GW INSTEK

Simply Reliable

2025~2026 Good Will Instrument Co., Ltd. GENERAL CATALOG

www.gwinstek.com

World-Class Quality and Performance
Affordable Price
A Wide Range of Selections

Originally known and founded in 1975 as Good Will Instrument, GW Instek is the first professional manufacturer in Taiwan specializing in electrical test and measurement instruments. GW Instek began as a manufacturer of power supplies and quickly expanded into developing high precision electronic test and measurement instruments. After 50 years in the test and measurement industry, GW Instek has grown to become one of the most recognized manufacturers of instruments in the world. Today, GW Instek has more than 300 items ranging from oscilloscopes, spectrum analyzers, signal sources, DC power supplies, AC power sources, digital meters, LCR meters, other specific application meters to video surveillance systems.

Think of the word "innovation" and it's easy to think of R&D, new inventions, faster processing and groundbreaking technologies. At GW Instek, we focus on another type of innovation that is based on flexibility, manageability and efficient performance in real-world test applications. We call this "customer-focused" innovation and we strongly believe in it. By listening to our customers around the world, we are able to anticipate their needs and respond quickly to emerging trends. So when one of our customers introduces an exciting new technology, GW Instek is ready to test it.

Whether our customers are designing products with the ability to change people's lives, educating and training the engineers of tomorrow, or discovering new technologies that solve complex problems, GW Instek can be trusted to perform reliably and accurately in even the most demanding test environments. How can we be sure? We have the numbers to back it up. Actually, we have just one : 40. That's the number of in-house quality and performance verification tests each GW Instek product must pass before it leaves our facilities. This thorough process starts with environmental, safety and durability testing in the product design phase, through to burn-in and shipping tests ahead of final inspection and packing. Furthermore, our two manufacturing facilities in Taiwan and China all adhere to ISO quality and environmental management standards, as well as European CE safety regulations. That's why GW Instek products can be trusted to test.

At GW Instek, quality is reflected not in higher cost, but in greater value. We pride ourselves on the quality, reliability and affordability of our test and measurement instruments. With each of our products often in use for decades, it's not hard to understand the importance of measuring a product's value not by price, but by lifetime cost. This importance is deep-rooted to us; we have consistently produced products with some of the industry's lowest total cost per ownership. Reducing the total cost per ownership of our products allows us to provide exceptional value, reliability and performance with leading service and support over the lifetime of a product. That's why year after year, GW Instek can be trusted to perform reliably.

The industries we serve are as diverse as they are specialized. Our experience and expertise allow us to deliver high-performance test solutions that address the unique requirements of each client. GW Instek provides customized solutions that are backed by reliable products, comprehensive after-sales support, warranty, calibration services, and one of the industry's lowest Total Cost per Ownership.

GW INSTEK

SINCE 1975

50 Years of Reputation & Trust

We take prides in creating more than 50 years of satisfied customer experiences throughout the world. Today, GW Instek is considered the most Reliable Brand for professional measurement instruments with supreme quality and the **lowest TCO - Total Cost per Ownership**.
We invite you to be part of GW Instek success story and help perpetuate this value.

DURABLE

Uncompromised Durability

With an overriding commitment to provide highly durable products, GW Instek is your most **Reliable choice** when it comes to selecting the best measurement instruments with the **lowest TCO - Total Cost per Ownership.** Highly durable products mean long product lifetime capable of reducing operation & maintenance costs. This is definitely what you need to consider before investing.

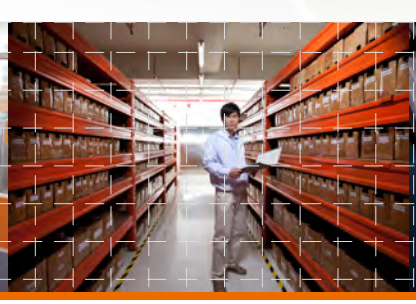
TRUST & PROMISE

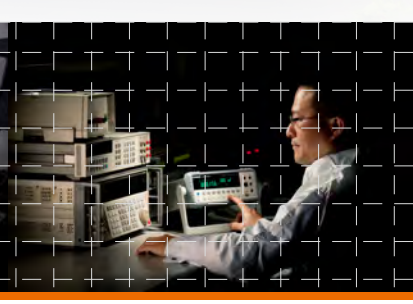
Your Most Trustworthy Partner

Being your most trustworthy and **Reliable Partner,** GW Instek promises to proactively provide insightful business solutions and products with the **lowest TCO – Total Cost per Ownership**, assisting your business to thrive in the highly competitive world. From feasibility evaluation, product selection, solution adaptation to timely after-sales service, we are dedicated to serving each individual customer and making your professional life easier than ever.

Milestones

1975	Good Will Instrument Co., Ltd was Established as a Power Supply Manufacturer.
1983	The Kaohsiung Branch was Established.
1985	The Taichung Branch was Established.
1989	Good Will Southeast Asia (Malaysia) was Established.
1991	Instek America Corp. was Established.
1993	Taiwan Headquarters was ISO-9002 Certified. Granted the National Small and Medium Enterprise Award. Granted the Industrial Technology Advancement Award of Distinction.
1996	Good Will Southeast Asia (Malaysia) was ISO-9002 Certified.
1998	Taiwan Headquarters was ISO-9001 Certified.
1999	Taiwan Headquarters was ISO-14001 Environmental Management Certified. Good Will Instrument Co., Ltd. Delivered Initial Public Offer on Taiwan's Over-The-Counter Security Exchange (OTC).
2000	The CNLA Electricity Calibration Laboratory Certification was Granted. Good Will Instrument was Went Public on the Taiwan Stock Exchange.
2001	Good Will Instrument Suzhou was Established.
2002	Taiwan Headquarters was ISO-9001 : 2000 Certified.
2003	Suzhou Subsidiary was ISO-9001 : 2000 Certified.
2004	Instek Electronics Shanghai was Established.
2005	Global Operational Headquarters was Established in Taiwan. The Brand new CIS (Corporate Identity System) was Introduced.
2006	Instek Japan Corporation was Established.
2007	Good Will Instrument Korea was Established.
2009	The Group Quality Award of Business Excellence Performance Model from the Chinese Society for Quality was Granted.
2010	Marketing office was set up in India.
2011	GW Instek won Taiwan Excellence Award for GDS-1000-U Series, AFG-3000 Series, PEL-2000 Series and GDM-8261.
2012	GW Instek won Technology Innovation Award for GDS-3000 Series and GSP-930. Acquired Japan TEXIO Technology Corporation.
2013	Instek Digital was Merged to Become a Member of GW Instek Business Group. GW Instek Cooperated with Hitachi and EMIC to Establish GW Alliance in Suzhou, China. GW Instek won Technology Innovation Award for PPH-1503 and AFG-2225.
2014	GW Instek won Technology Innovation Award (Gold) for GDS-300 full Touch Screen Oscilloscope. European Subsidiary was Established in the Netherlands.
2015	GW Instek won Taiwan Excellence Award for GDS-300/200 Series and PEL-3000 Series.
2016	GW Instek won Taiwan Excellence Award for GDS-2000E Series and GSP-9330.
2017	GW Instek won Taiwan Excellence Award for C-1100 and GPM-8213.
2018	GW Instek won Taiwan Excellence Award for C-1200 and GDM-906X Series.
2019	GW Instek INDIA LLP was Established.
2020	GW Instek won Taiwan Excellence Award for GPT-12000 Series and SKTS-5000.
2021	GW Instek won Taiwan Excellence Award for C-3200 and GPM-8310.
2022	GW Instek won Taiwan Excellence Award for GDS-3000A Series, PPX-Series, GPP-3060/6030 and GSM-20H10 and GPM-8310.
2024	GW Instek won Taiwan Excellence Award for MPO-2000 Series, GSG-2000 Series and ASR-6000 Series.

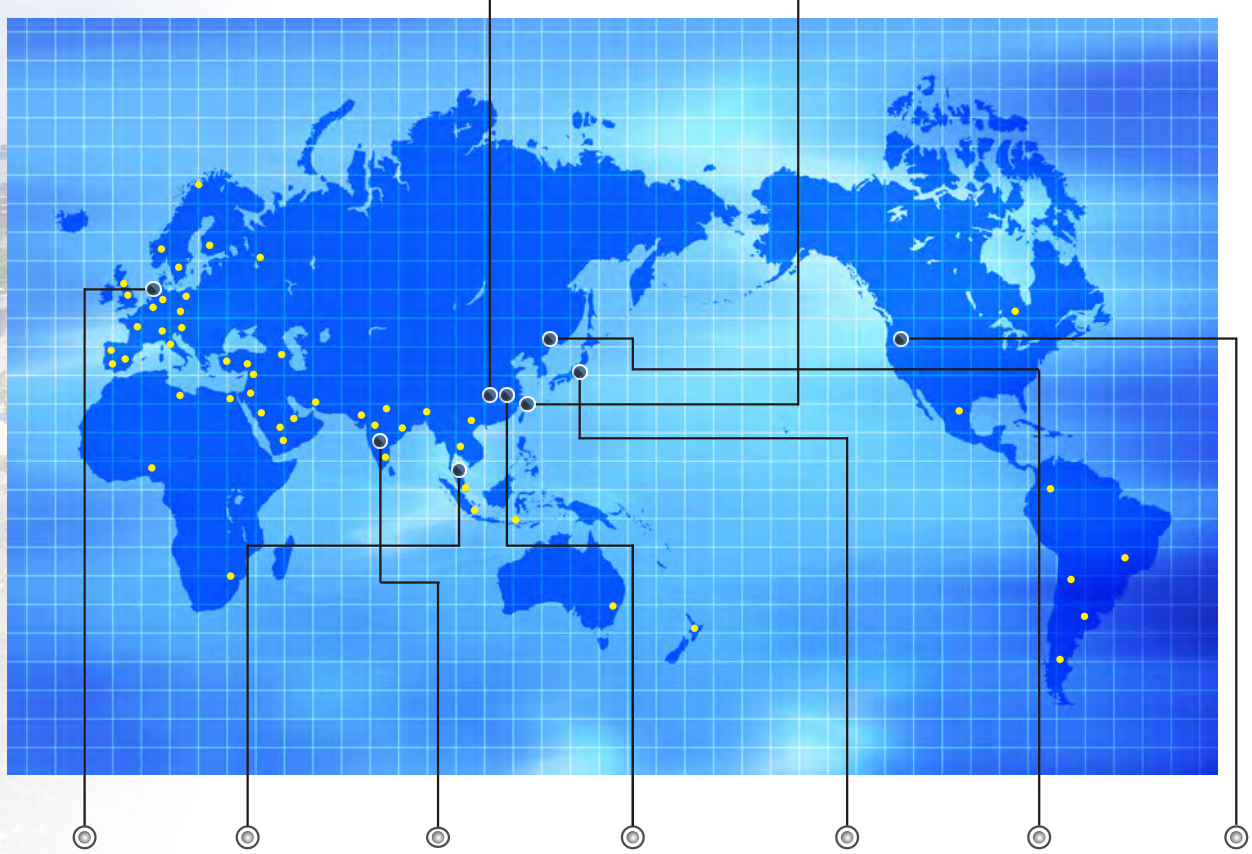




Global Network

Suzhou Plant

Headquarters & Plant



Europe Subsidiary | Malaysia Subsidiary | India Subsidiary | China Subsidiary | Japan Subsidiary | Korea Subsidiary | U.S.A. Subsidiary

Product Mix

OSCILLOSCOPES

- Digital Storage Oscilloscope
- Multi-function Programmable Oscilloscope
- Mixed-signal Oscilloscope
- Mixed-domain Oscilloscope
- Oscilloscope Education And Training Kit

SPECTRUM ANALYZERS & DEDICATED TESTER SERIES

- 8.0 GHz Spectrum Analyzer
- 3.8 GHz Spectrum Analyzer
- 3.25 GHz Spectrum Analyzer
- 3.0 GHz Spectrum Analyzer
- 1.8 GHz Spectrum Analyzer
- RF Training System

SIGNAL SOURCES

- 6GHz Vector Signal/Signal Generator
- Arbitrary Function Generator
- Multi-Channel Function Generator
- True Dual Channel Arbitrary Function Generator
- DDS Function Generator
- USB RF Signal Generator

DC POWER SUPPLIES

- Multi-Range High Power DC Source
- Programmable & Single Channel DC Power Supply
- Non-Programmable & Single Channel DC Power Supply
- Programmable & Multiple Channel DC Power Supply
- Non-Programmable & Multiple Channel DC Power Supply
- Source Measure Unit

AC/DC POWER SOURCES

- High-performance AC/DC Power Supply
- Programmable AC/DC Power Source
- Programmable AC Power Source
- AC Power Source

ELECTRONIC LOADS

- Multi-channel Electronic Loads
- High Power DC Electronic Load
- DC Electronic Load
- AC & DC Electronic Load

DIGITAL MULTIMETERS

- Data Acquisition System
- Digital Multimeter

SAFETY TESTERS

- AC/DC/IR/GB Electrical Safety Analyzer
- AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
- AC Ground Bond Tester
- Multiplex Scanner Box
- Leakage Current Tester

LCR METERS

- Benchtop LCR Meter
- Handheld LCR Meter

OTHER METERS

- DC Milli-Ohm Meter
- Battery Meter
- Digital Power Meter
- Automatic Distortion Meter
- AC Millvolt Meter
- Precision Current Shunt Meter

New Products

A 1 GHz/650 MHz/350 MHz Digital Storage Oscilloscope

CE | USB Full Speed | PC Software | Labview Driver | RS-232 | GPIB | Ethernet | VPO Visual Persistence Oscilloscope

GDS-3000A Series

* 1 GHz Bandwidth, 2 or 4 Input Channels
* 5 GSa/s Real-time Sampling Rate(half channels); 2.5 GSa/s Real-time Sampling Rate(all channels)
* Per Channel 200 Mpts Memory Depth
* 200,000 wfm/s of Waveform Update Rate
* 10.2 inch 800 x 480 TFT LCD Display
* 490,000 Segments of Segmented Memory and the Waveform Search Function to Optimize the Efficiency of Record Length
* Zoom Window and Play/Pause Rapidly Navigate the Waveforms
* 38 sets of Automatic Measurement Offer Various Measurement Selections
* High resolution acquisition mode
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
* Dual Channel Spectrum Analyzer (DC to 2.5 GHz) with spectrogram
* Dual Channel 25 MHz Arbitrary Waveform Generator
* Optional 13 Sets of Power Analysis Measurements
* Optional 16 Digital Channels with a Logic Analyzer(MSO)
* Flexible Remote Control Connectivity (Standard: USB/LAN/RS-232; Option: GPIB)

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A 100 MHz Digital Storage Oscilloscope

CE | USB | PC Software | Labview Driver

GDS-900 Series

* 100 MHz Bandwidth, 2 Input Channels
* 1 GS/s Real-time Sampling Rate Maximum
* Standard 25 MHz Arbitrary Function Generator for GDS-912G
* 20 Mpts Memory Depth per Channel
* Support 30 Automatic Waveform Measurements
* 6 digit High-precision Frequency Counter
* 2048 pts FFT Frequency Domain Signal Display
* 7" 800 x 480 TFT LCD Display

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B 8.0 GHz/3.8 GHz/1.8 GHz Spectrum Analyzer

CE | USB | LAN | PC Software

GSP-8000 Series

* Frequency Range
  GSP-8800 : 9 kHz to 8.0 Ghz ; GSP-8380 : 9 kHz to 3.8 GHz
  GSP-8180 : 9 kHz to 1.8 GHz
* RBW: 1 Hz to 1 MHz in 1-3-5-10 steps
* VBW: 10 Hz to 3 MHz in 1-3-5-10 steps
* Phase Noise: -104 dBc/Hz
* Sensitivity : -160 dBm/Hz Typical @PreAmp On
* Built-in AM/FM Demodulation
* Built-in Time Spec Function
* Measurement Function : ACPR/OCBW/CHPW, NdB BW, Pass-Fail, Freq. Counter, Noise Marker
* Built-in 20dB Preamplifier
* Communication Interface: LAN, USB Host/Device
* Display : 10.4" XGA Output (1024*768)
* Options : EMI Filter

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D Two-channel/Three-channel Programmable Switching DC Power Supply

CE | GPIB | USB | LabVIEW Driver | Analog Control | LAN

PSW-Multi Series

* Multi-channel: Maximum 720W for Dual-channel Module and Maximum 1080W for Triple-channel Models; The PSW-Multi Series Aslo Features a New Built-in Function That Allows Individualor Synchronizd Output Control of Eachvoltage Module Output Latency Between Channels with the Same Voltage Module is Less Than 0.1ms
* Multiple Voltage Combinations: Low Voltage Combinations Can be Selected From 30V/40V/80V/160V; High Voltage Combinations Can be Selected From 250V/800V
* Advanced Web Server: Executes SCPI Commands; Web Controls Through Server; Data Log; Edit Sequence
* CC/CV Priority Mode Selection is Ideal for Battery and LED Industries
* Adjustable Rising and Falling Slew Rate
* 720W/1080W Adopt 1/3, 1/2 Rack Mount Frame Designs (Standard EIA/JIS)
* Standard Communications Interfaces: LAN, USB, External Analog Remote Control Terminal
* Optional Communications Interfaces: GPIB-USB Adapter, RS232-USB Cable
* Support LabVIEW Driver

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New Products

C — 6 GHz Vector Signal / Signal Generator

CE | USB | GPIB | LAN | Mod In/Out | Trg In/Out

NEW

台灣精品 TAIWAN EXCELLENCE

GSG-2000 Series

* Frequency Range : 9 kHz to 6 GHz
* Frequency Resolution : 1 mHz
* Standard 10 ppm Frequency Stability, 2 ppm/year Aging Rate. (Optional: 10 ppb Frequency Stability with 0.1 ppm/year Aging Rate)
* Amplitude Range : -140 dBm to +20 dBm
* 0.01 dBm Amplitude Setting Resolution
* Amplitude Support dBm, dBμV, Vrms Unit
* Phase Noise : <-117 dBc/Hz (Typical) @1 GHz Output and 20 kHz Offset
* Frequency/Amplitude Switching Speed : < 5 ms
* Built-in LF Output, Pulse Output & Built-in in AM, FM, PM Analog Modulation
* Support IQ Modulation Output (Only for GSG-2160)
  - Maximum 60 MHz Baseband I or Q Modulation Output
  - Maximum 120 MHz RF I+Q Modulation Output
  - Built-in ASK,PSK,APSK,QAM,FSK,MSK,User-define IQ,User-define FSK Modulation Signal
* Provide USB, LAN and GPIB (Opt.), Commands Comply with SCPI Standards

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C — 25/35/60/80/100/250 MHz Arbitrary Function Generator

CE | USB Host | USB Device | LAN

NEW

AFG-4000 Series

* Provide Single-channel or Dual-channel Output Single Channel: AFG-4125E/4125AE(25 MHz) Dual Channel: AFG-4225E/4235/4260/4280/4210H/4225H(25/35/60/80/100/250 MHz)
* Built-in Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic Wave, Arbitrary Wave
* Min. Resolution : 1 μHz
* Sampling Rate : AFG-4225H : 1.25 GSa/s; AFG-4235/4260/4280/4210H : 500 MSa/s; AFG-4125E/4125AE/4225E : 125 MSa/s
* Amplitude Resolution : AFG-4125E/4125AE/4225E : 14 bits; AFG-4235/4260/4280/4210H/4225H : 16 bits
* Memory Length : AFG-4225E/4235/4260/4280/4210H/4225H : 10 M/per Channel; AFG-4125E/4125AE : 16 k/per Channel
* Modulation : AM,DSB-AM,FM,PM,PWM,ASK,PSK,BPSK,QPSK,FSK,FSK,4FSK,OSK,SUM
* Built-in Sweep, Burst, Counter Function
* AFG-4125AE Built-in Power Amplifier Function
* Communication Interface : AFG-4235/4260/4280/4210H/4225H Provide USB, LAN Interface AFG-4125E/4125AE/4225E Provide USB Interface
* 8" TFT LCD Display, 800 x 480 Resolution
* Multi-Touch Display : AFG-4235/4260/4280/4210H/4225H

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D — Multi-Range High Power DC Source

CE | USB | GPIB | Analog Control | LAN | Digital I/O | Devicenet | RS-232C | RS-485 | CAN | Ether CAT | Profinet | Modbus

NEW

PHU-Series

* Voltage Output : 80 V/200 V/500 V/750 V/1000 V/1500 V
* Power Output : 5 kW/10 kW/15 kW
* Maximum Current Output : 510 A
* C.V/C.C Priority Mode
* Adjustable Voltage/Current Rise and Fall Time
* AWS (Advanced Web Control)
* APC (Adaptive Parallel Connection)
* Parallel Connection (Maximum 10 Units)
* High Efficiency and High-power Density
* Bleeder Control Function & Internal Resistance Function
* Panel Lock Function & Three Sets of Preset Function
* Protection : OVP, OCP, OHP, UVL, AC Fail, FAN Fail
* Standard : USB, LAN, Isolated Analog Control
* Option: RS-232&485 or GPIB or CAN Bus or DeviceNet or Any Bus
* 3 U Height and 19" Rack Mount Size

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D — Programming Linear DC Power Supply

CE | USB Host | USB Device | GPIB | Contro I/O

NEW

GPP-1205/1323

* Voltage Resolution: 1 mV / 0.1 mV
* Current Resolution: Three levels: 0.1 mA/0.01 mA (H), 10 μA/1 μA (M), 1 μA/0.1 μA (L)
* Output Modes: Constant Voltage (CV) / Constant Current (CC)
* Switchable Power Supply & Electronic Load Function
* Output Control: On/Off with delay function
* Slew Rate Control for Voltage & Current
* Remote Sense for Voltage Compensation
* Sequence Programming for Power Output & Bleeder Circuit Control
* Voltage Averaging & Data Collection
* External Series & Parallel Connection Support
* Safety Protections: OVP, OCP, OTP, Reverse Polarity, Panel Lock
* Communication Interfaces: USB-TMC/CDC, LAN, Optional GPIB
* Display: 2.4-inch TFT-LCD with three modes
* Temperature-Controlled Fan
* Rack Compatibility: Supports GRA-441-J/E

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D Multiple Output LinearDC Power Supply

CE Remote I/O

NEW

GPE-X323A Series

* 1/2/3/4 Independent Isolated Output
* 4.3 Inch LCD Display
* Setting & Readback Resolution 10 mV/ 1 mA (GPE-1326A is 10 mV/2 mA)
* Output ON/OFF Switch
* Analog Control (Remote I/O) for Output ON/OFF
* Key Lock Function
* Tracking Series and Parallel Operation (Multi-channel Models)
* Optional European Jack Type Terminal
* Recovery Time：≤100 μs (50 % Load Change, Minimum Load 0.5 A)
* Remote Sense (GPE-1326A Only)

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D Single Channel Linear DC Power Supply

CE Remote I/O

NEW

GPE-1205/1323

* 2.4" TFT LCD
* Encoder Switch to Set up Voltage and Current
* Voltage Setting Resolution 1 mV
* Voltage Readback Resolution 100 μV
* Current Setting Resolution 0.1 mA
* Current Readback Resolution 10 μA
* Provided Hardware Protections: OVP, OCP, OTP, On/Off Switch, Key Lock
* Provided Remote Sense (Compensates Voltage up to 0.5 V)
* Can Perform Series/Parallel Connection of Two GPE-1000 Units of The Same Model Through The Rear Panel Control I/O Interface

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D 4.5/6/9/12/13.5/18/24/30/36 kVA High-Performance AC/DC Power Supply

CE RS-232 USB LAN CAN Device Net GPIB

NEW 台灣精品 TAIWAN EXCELLENCE

ASR-6000 Series

* Adopts Third-generation Semiconductor Silicon Carbide (SiC) Technology to Create a 4 U 6 kVA High-performance AC/DC Power Source with High Power Density
* AC Input Supports Single-phase and Three-phase, Phase Voltage 200 V to 240 V±10 %(Delta or Y Connection)*1
* 10 output Modes: Including External Input Signal Frequency and Mains Synchronization (SYNC), External Voltage Controlled Internal Amplifier Output (VCA)
* Multi-channel Output Function
* Supports AC 1P2W, 1P3W, 3P4W Output
* AC Maximum Output Phase Voltage: 350 Vrms Line Voltage: 700 Vrms
* AC Balanced and Unbalanced Three-phase, Phase Failure Output Functions
* Programmable Output Impedance Adjustment*1
* Dual-channel Voltage/Current Output Monitoring Function
* Voltage Output Rise Time Can be Adjusted in Three Ranges*1
* Supports Sequence Editing and Emulation Output Mode
* Powerful Arbitrary Waveform Editing and Output Function, Built-in Over 253 Types of Arbitrary Waveform Outputs
* Advanced Web Server Control to Support Data Acquisition and Data Logger Both Functions
* 100th Order Harmonic Measurement Function
* Support Parallel Connection Type Up to 36 kVA Maximum
* Interfaces: RS-232C, USB, LAN; Opt: CAN BUS, DeviceNet, GPIB

Note:*1 Stand-alone models only.

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D High Power DC Electronic Load

CE RS-232 GPIB USB LAN UK CA

NEW

PEL-5000G Series

* 4U/6 K High Power Density Design Also for Bench Testing
* Turbo Mode Function, Which Allows 1.5 Times the Rated Power or Current to be Used Within Two Seconds
* Turbo Mode can be Used with OCP/OPP/BMS/Short Mode/Surge Mode/ Hot Plug-In Testing
* High Tolerance to Environmental Temperature, with 4 k/5 kW Models not Affected by Environmental Temperature in Power Usage
* Can set the Power-on Status Value
* Short Circuit Duration Can be set Within Short Circuit Test Voltage Meter Display Can be Configured as Polarity Positive (”+”) or Negative("-")
* Optional Interface : GPIB, RS232, USB, LAN
* Protection function Testing for Battery BMS
* Protection Against V, I, W, and ℃

Page D163-169

New Products

E 6 ½ Digit 2 kV DC Voltmeter

CE | USB Host | USB Device | LAN | Digital IO | GPIB | RS-232 | LabVIEW Driver

NEW

GVM-9102

* 6 1/2 Digit Display : 2,399,999 Counts Max.
* 4.3 TFT Graphic LCD
* DC Voltage Measurement up to 2400 V
* DCV Basic Accuracy : 0.01 %
* The Fastest Sampling Rate : 10 k Readings/Sec
* USB Storage Function Available
* Graphic Display Capability, Providing Histogram, Bar Meter and Trend Chart
* Standard Interfaces : Digital I/O, RS-232C, USB Host/Device, LAN
* Option Interface : GPIB

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E 5 ½ Digit Dual Display Digital Multimeter

CE | RS-232 | USB Device | Digital I/O | PC Software | LabVIEW Driver

NEW

GDM-9052

* 5 ½ Digit Display: 239,999 Counts Max.
* 4.3 TFT Graphic LCD & DCV Basic Accuracy: 0.012 %
* A. I. Measurement Offers Automatic Identification and Measurement for Voltage, Resistance, Diode and Continuity Tests Without the Need for Manual Selection
* 12 Different Measurement Functions: AC/DC Voltage, AC/DC Current, 2-wire/4-wire Resistance, Frequency, Period, Diode, Continuity, Capacitance and Temperature
* True RMS (AC, AC+DC) Measurements
* Dual Measurement Function to Providing Two Selected Measurement Simultaneously
* Many Math Functions: Max./Min., REL/REL#, Compare, Hold, dB, dBm, MX+B, %, 1/X
* Digital I/O Provides Dual Mode (Standard Compare and User Definition Modes)
* Standard Interfaces: RS-232C and USB Device (Support USBCDC and USBTMC Modes)

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E 50000 Counts Dual Measurement Multimeter

CE | USB Host | USB Device | GPIB | LabVIEW Driver

NEW

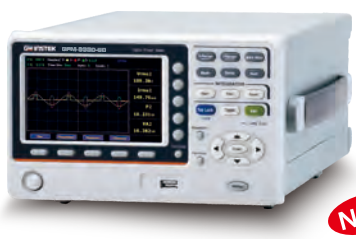
GDM-9041/9042

* 50,000 Counts
* 4.3 TFT Graphic LCD & DCV Basic Accuracy: 0.02%
* A. I. Measurement Offers Automatic Identification and Measurement for Voltage, Resistance, Diode and Continuity
* Tests Without the Need for Manual Selection 11 Measurement Functions: DCV, ACV, DCI, ACI, 2-wire Resistance, Frequency, Period, Diode, Continuity, Capacitance and Temperature
* True RMS (AC, AC+DC) Measurements
* Dual Measurement Function to Providing Two Selected Measurement Simultaneously
* Max./Min., REL, MX+B, 1/X, Ref %, Compare, Hold, dB, dBm
* Standard Interfaces: USB Device (support USBCDC & USBTMC)
* Temperature Measurement Function (GDM-9042 only)
* USB Storage for Data Collection (GDM-9042 only)
* Optional Interface: GPIB (factory install for GDM-9042 only)

Page E17-18

E Digital Power Meter

CE | USB Host | USB Device | LAN | RS-232 | GPIB | DA12



NEW

GPM-8320-60/8330-60

* 5" TFT LCD
* Voltage/Current Test Freq. Bandwidth: DC, 0.1 Hz to 100 kHz
* Direct Input Current up to 60 A
* Waveform Display : V (Voltage), I (Current), P (Wattage)
* Distorted Wave Current/Voltage Measurement: Full Range for CF=3, and Half Range for CF= 6 (or 6A)
* Meeting IEC 61000-4-7 Harmonic Measurement (50 Hz/60 Hz)
* Wiring Selecting Button (1P3W, 3P3W, 3P4W, 3V3A)
* Harmonic Measurement & Analysis up to 50 Orders
* Auto Ranging Function for Integration Mode
* Screen Capture Through USB Host
* Provide External Current Sensor Input (EXT1/EXT2)
* Standard Interface: RS-232C, USB Device/Host, LAN
* Optional Interface: GPM-DA12 - GPIB + Digital I/O (Factory Installed Only)

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Model Number Index

AD		
ADB-002	Accessory -- DC Block BNC 50 Ohm 10 MHz to 2.2 GHz	B25
ADB-006	Accessory -- DC Block N-TYPE 50 Ohm 10 MHz to 6 GHz	B25
ADB-008	Accessory -- DC Block SMA 50 Ohm 0.1 MHz to 8 GHz	B25
ADP-001	Accessory -- Adaptor, 50 Ω, BNC(J/F) - N(P/M)	B25
ADP-002	Accessory -- Adaptor, 50 Ω, SMA(J/F) - N(P/M)	B25
ADP-003	Accessory -- Adaptor, 50 Ω, N(J/F) - SMA(J/F)	C43
ADP-101	Accessory -- Adaptor, 75 Ω BNC(J/F) - 50 Ω BNC(P/M)	B25
AE		
AEL-5002-350-18.75	50 V/18.75 A/1875 W AC & DC Electronic Load	D153
AEL-5003-350-28	350 V/28 A/2800 W AC & DC Electronic Load	D153
AEL-5004-350-37.5	350 V/37.5 A/3750 W AC & DC Electronic Load	D153
AEL-5006-350-56	350 V/56 A/5600 W AC & DC Electronic Load	D153
AEL-5008-350-75	350 V/75 A/7500 W AC & DC Electronic Load	D153
AEL-5012-350-112.5	350 V/112.5 A/111250 W AC & DC Electronic Load	D153
AEL-5015-350-112.5	350 V/112.5 A/15000 W AC & DC Electronic Load	D153
AEL-5019-350-112.5	350 V/112.5 A/18750 W AC & DC Electronic Load	D153
AEL-5023-350-112.5	350 V/112.5 A/22500 W AC & DC Electronic Load	D153
AEL-5002-425-18.75	425 V/18.75 A/1875 W AC & DC Electronic Load	D153
AEL-5003-425-28	425 V/28 A/2800 W AC & DC Electronic Load	D153
AEL-5004-425-37.5	425 V/37.5 A/3750 W AC & DC Electronic Load	D153
AEL-5006-425-56	425 V/56 A/5600 W AC & DC Electronic Load	D153
AEL-5008-425-75	425 V/75 A/7500 W AC & DC Electronic Load	D153
AEL-5012-425-112.5	425 V/112.5 A/11250 W AC & DC Electronic Load	D153
AEL-5015-425-112.5	425 V/112.5 A/15000 W AC & DC Electronic Load	D153
AEL-5019-425-112.5	425 V/112.5 A/18750 W AC & DC Electronic Load	D153
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PSU 8-180	1440 W Programmable Switching DC Power Supply	D37
PSU 12.5-120	1500 W Programmable Switching DC Power Supply	D37
PSU 15-100	1500 W Programmable Switching DC Power Supply	D37
PSU 20-76	1520 W Programmable Switching DC Power Supply	D37
PSU 30-50	1500 W Programmable Switching DC Power Supply	D37
PSU 40-38	1520 W Programmable Switching DC Power Supply	D37
PSU 50-30	1500 W Programmable Switching DC Power Supply	D37
PSU 60-25	1500 W Programmable Switching DC Power Supply	D37
PSU 80-19	1520 W Programmable Switching DC Power Supply	D37
PSU 100-15	1500 W Programmable Switching DC Power Supply	D37
PSU 150-10	1500 W Programmable Switching DC Power Supply	D37
PSU 300-5	1500 W Programmable Switching DC Power Supply	D37
PSU 400-3.8	1520 W Programmable Switching DC Power Supply	D37
PSU 600-2.6	1560 W Programmable Switching DC Power Supply	D37
PSU-001	Accessory -- Front Panel Filter kit(factory Installed)	D170
PSU-01A	Accessory -- Joins a Vertical Stack of 2 PSU Units Together. 2U-Sized Handles x2, Joining Plates x2	D170
PSU-01B	Accessory -- Bus Bar for 2 units in Parallel Operation	D170
PSU-01C	Accessory -- Cable for 2 units in Parallel Operation	D170
PSU-02A	Accessory -- Joins a Vertical Stack of 3 PSU units Together. 3U-sized handles x2, Joining Plates x2	D170
PSU-02B	Accessory -- Bus Bar for 3 units in Parallel Operation	D170
PSU-02C	Accessory -- Cable for 3 units in Parallel Operation	D170

Model Number Index

PSU-03A	Accessory -- Joins a Vertical Stack of 4 PSU units Together. 4U-sized Handles x2, Joining Plates x2	D170
PSU-03B	Accessory -- Bus Bar for 4 units in Parallel Operation	D170
PSU-03C	Accessory -- Cable for 4 units in Parallel Operation	D170
PSU-232	Accessory -- RS232 Cable with DB9 Connector kit	D170
PSU-485	Accessory -- RS485 Cable with DB9 Connector kit	D170
PSU-GPIB	Accessory -- PSU GPIB Interface Card (Factory Installed)	D170
PSU-ISO-I	Accessory -- Isolated Current Remote Control Card (Factory Installed)	D170
PSU-ISO-V	Accessory -- Isolated Voltage Remote Control Card (Factory Installed)	D170
PSW160-14.4	720 W Multi-Range Programmable Switching DC Power Supply	D27
PSW160-21.6	1080 W Multi-Range Programmable Switching DC Power Supply	D27
PSW160-7.2	360 W Multi-Range Programmable Switching DC Power Supply	D27
PSW250-13.5	1080 W Multi-Range Programmable Switching DC Power Supply	D27
PSW250-4.5	360 W Multi-Range Programmable Switching DC Power Supply	D27
PSW250-9	720 W Multi-Range Programmable Switching DC Power Supply	D27
PSW30-108	1080 W Multi-Range Programmable Switching DC Power Supply	D27
PSW30-36	360 W Multi-Range Programmable Switching DC Power Supply	D27
PSW30-72	720 W Multi-Range Programmable Switching DC Power Supply	D27
PSW40-27	1080 W Multi-Range Programmable Switching DC Power Supply	D27
PSW40-54	360 W Multi-Range Programmable Switching DC Power Supply	D27
PSW40-81	720 W Multi-Range Programmable Switching DC Power Supply	D27
PSW-720L11	30 V/36 A*2 720 W Multi-Range DC Power Supply	D21
PSW-720L12	30 V/36 A*1 40 V/27 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720L14	30 V/36 A*1 80V/13.5 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720L15	30 V/36 A*1 160 V/7.2 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720L22	40 V/27 A*2 720 W Multi-Range DC Power Supply	D21
PSW-720L24	40 V/27 A*1 80 V/13.5 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720L25	40 V/27 A*1 160 V/7.2 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720L44	80 V/13.5 A*2 720 W Multi-Range DC Power Supply	D21
PSW-720L45	80 V/13.5 A*1 160 V/7.2 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720L55	160 V/7.2 A*2 720 W Multi-Range DC Power Supply	D21
PSW-720H66	250 V/4.5 A*2 720 W Multi-Range DC Power Supply	D21
PSW-720H68	250 V/4.5 A*1 800 V/1.44 A*1 720 W Multi-Range DC Power Supply	D21
PSW-720H88	800 V/1.44 A*2 720 W Multi-Range DC Power Supply	D21
PSW800-1.44	360 W Multi-Range Programmable Switching DC Power Supply	D27
PSW800-2.88	720 W Multi-Range Programmable Switching DC Power Supply	D27
PSW800-4.32	1080 W Multi-Range Programmable Switching DC Power Supply	D27
PSW80-13.5	360 W Multi-Range Programmable Switching DC Power Supply	D27
PSW80-27	720 W Multi-Range Programmable Switching DC Power Supply	D27
PSW80-40.5	1080 W Multi-Range Programmable Switching DC Power Supply	D27
PSW-1080L111	30 V/36 A*3 1080 W Multi-Range DC Power Supply	D21
PSW-1080L112	30 V/36 A*2 40 V/27 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L114	30 V/36 A*2 80 V/13.5 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L115	30 V/36 A*2 160 V/7.2 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L122	30 V/36 A*1 40 V/27 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080L124	30 V/36 A*1 40 V/27 A*1 80 V/13.5 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L125	30 V/36 A*1 40 V/27 A*1 160 V/7.2 A 1080 W Multi-Range DC Power Supply	D21
PSW-1080L144	30 V/36 A*1 80 V/13.5 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080L145	30 V/36 A*1 80 V/13.5 A*1 160 V/7.2 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L155	30 V/36 A*1 160 V/7.2 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080L222	40 V/27 A*3 1080 W Multi-Range DC Power Supply	D21
PSW-1080L224	40 V/27 A*2 80 V/13.5 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L225	40 V/27 A*2 160 V/7.2 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L244	40 V/27 A*1 80 V/13.5 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080L245	40 V/27 A*1 80 V/13.5 A*1 160 V/7.2 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L255	40 V/27 A*1 160 V/7.2 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080L444	80 V/13.5 A*3 1080 W Multi-Range DC Power Supply	D21
PSW-1080L445	80 V/13.5 A*2 160 V/7.2 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080L455	80 V/13.5 A*1 160 V/7.2 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080L555	160 V/7.2 A*3 1080 W Multi-Range DC Power Vupply	D21
PSW-1080H666	250 V/4.5 A*3 1080 W Multi-Range DC Power Supply	D21
PSW-1080H668	250 V/4.5 A*2 800 V/1.44 A*1 1080 W Multi-Range DC Power Supply	D21
PSW-1080H688	250 V/4.5 A*1 800 V/1.44 A*2 1080 W Multi-Range DC Power Supply	D21
PSW-1080H888	800 V/1.44 A*3 1080 W Multi-Range DC Power Supply	D21
PSW-001	Accessory -- Accessory Kits	D170
PSW-002	Accessory -- Simple IDC Tool	D170
PSW-003	Accessory -- Contact Removal Tool	D170
PSW-004	Accessory -- Basic Accessory Kit for 30 V/80 V/160 V Models	D170
PSW-005	Accessory -- Series Operation Cable for 2 units(for 30 V/8 0V/160 V)	D170
PSW-006	Accessory -- Parallel Operation Cable for 2 units	D170
PSW-007	Accessory -- Parallel Operation Cable for 3 units	D170
PSW-008	Accessory -- Basic Accessory Kit for 250 V/800 V Models	D170
PSW-009	Accessory -- Output Terminal Cover for 30 V/80 V/160 V Models	D170
PSW-010	Accessory -- Large Filter (Type II/III)	D170
PSW-011	Accessory -- Output Terminal Cover for 250 V/800 V Models	D170
PSW-012	Accessory -- High Voltage Output Terminal for 250 V/800 V Model	D170
PT		
PT-100	Accessory -- Temperature Probe, Approx. 1500 mm	E93
SF		
SFG-1003	3 MHz DDS Function Generator	C42
SFG-1013	3 MHz Dual Display DDS Function Generator	C42
SP		
SPD-3606	375 W, 3-Channel, Programmable Switching DC Power Supply	D47
SPS-1230	360 W Switching DC Power Supply	D46
SPS-1820	360 W Switching DC Power Supply	D46
SPS-2415	360 W Switching DC Power Supply	D46
SPS-3610	360 W Switching DC Power Supply	D46
SPS-606	360 W Switching DC Power Supply	D46
US		
USG-LF44	35 MHz to 4400 MHz, USB RF Signal Generator	C9

NOTE

OSCILLOSCOPES

The frequency bandwidth range from 100 MHz to the high-class 1 GHz. In addition, up to 5 GSa/s realtime sampling rate and 200 Mega points memory depth can pick up and hold the complete signal in order to preserve the accuracy. PC interfaces such as USB, LAN, GPIB, and RS-232 are integrated to the panel to satisfy data transmit/save needs. GDS-3000A digital storage oscilloscopes have 1 GHz models with two-channel, four-channel and 16-channel logic analyzer options. The series features the memory length of each channel up to 200 Mpts; the sampling rate of 5 GSa/s half channels and 2.5 GSa/s on all channels. GDS-3000A provides a rich measurement items for switch mode power supply testing. The provided power supply test items include AC input analysis items: Power Quality, Harmonics, Inrush Current and other; DC output analysis required test items: Ripple/Noise, Transient Response Analysis, Turn On/OFF, Efficiency; Control Loop response (Bode) and PSRR(Power Supply Rejection Ratio); Complete switching component analysis items: Modulation, Switching loss, SOA (Safe Operation Area) and Magnetics analysis: B-H curve.

The MD0-2000A series is multi-functional mixed domain oscilloscope. While entering the spectrum mode, MD0-2000A Series will display a full screen of frequency domain. Users can input Center frequency, Span, Start frequency, and Stop frequency based upon test requirements so as to rapidly and intuitively observe required frequency range that allows users to experience the user interface of a real spectrum analyzer.

MD0-2000AG and MDO-2000E also provide frequency response analysis function, it allows users to obtain DUT's FRA characteristic curve plot (Bode plot).

MP0-2000 is the only product that has a built-in Python GUI library. Users can build their own test systems at a lower cost. A variety of executable Python APPs are built-in. An all-in-one instrument with affordable pricing is ideal for test and measurement automation teaching courses; small-scale automated test of production lines, component tolerance testing for quality assurance, and diversified test applications. It is hoped that the launch of MP0-2000 can solve users' product test needs for repeatability and diversity, and can improve users' demand for simple and repetitive work efficiency and single-unit program control or the requirement of uploading test results to the cloud.

PRODUCTS

- **Digital Storage Oscilloscope**
- **Multi-function Programmable Oscilloscope**
- **Mixed-signal Oscilloscope**
- **Mixed-domain Oscilloscope**
- **Oscilloscope Education and Training Kit**

OSCILLOSCOPE OVERVIEW

Oscilloscopes are considered the most widely used instruments in the Electrical T&M field. With an Oscilloscope, it is possible to understand how an electrical signal changes over a time period graphically. In every electric application, from electronics laboratories, electronics R&D, product development, manufacturing QA, to After-Sales Service, there is a need for waveform representation by an Oscilloscope.

With the rapid advancement of technology, the oscilloscope market has also been shifting from conventional analog oscilloscopes, which displays the electronic waveforms through a CRT, towards Digital Storage Oscilloscopes (DSO). The major function of a DSO not only converts signals from analog to digital, but also stores testing data, allowing remote control and transmitting data through various interfaces. In spite of the strengths of DSOs, analog oscilloscopes still play an important role of providing real-time signal and waveform display.

There has been a growing need for detecting digital signals which are usually presented by 2 discrete voltage levels, a distinction from analog signals presented by continuous voltages. A logic analyzer is better suited for such digital signal measurements compared with an oscilloscope. A logic analyzer also has the benefit of multiple channel input measurements, which is usually limited to 2 or 4 channels in oscilloscopes.

To satisfy various needs of waveform observation in time domain, GW Instek provides an entire series of oscilloscope solutions, consisting of four groups: Digital Storage Oscilloscopes, Multi-function Programmable Oscilloscope, Mixed-signal Oscilloscope, Mixed-domain Oscilloscope.

MODEL	Type	1 GHz	650 MHz	500 MHz	350 MHz	300 MHz	200 MHz	100 MHz	Page
GDS-3000A Series	Digital	✓							A5-10
GDS-3000 Series	Digital			✓					A11-12
GDS-2000A Series	Digital					✓	✓	✓	A13-14
MPO-2000 Series	Digital						✓	✓	A15-20
MSO-2000EA Series	Digital						✓	✓	A21-22
MDO-2000A Series	Digital					✓	✓	✓	A23-24
MDO-2000E Series	Digital						✓	✓	A25-26
GDS-2000E Series	Digital						✓	✓	A27-28
GDS-1000B Series	Digital						✓	✓	A29-30
GDS-900 Series	Digital							✓	A31-32

MODEL	Collocation Instrument	Page
GDB-03	GDS-3000A/GDS-3000/GDS-2000A/GDS-2000E/MSO-2000E/GDS-1000B Series	A33

VPO TECHNOLOGY

When using a DSO to measure serial transmission signals, address/data/control buses on digital circuits, noise on signal components, composite video signals or modulated signals, the biggest challenge is that these signals have random, rapidly changing, incidental components or have components with non-periodic characteristics. Therefore it is necessary for a DSO to reduce the acquisition processing time (Dead time) to have the opportunity to capture these signal characteristics.

DSOs equipped with VPO (Visual Persistence Oscilloscope)technology use a high-density IC for hardware acceleration to transfer all the acquired data into the displayed waveform image. Figure A shows the compression and quantification of waveform data. GDS-3000 has a waveform display region of 750 frames in width, while the record length is 25k dots long. The hardware circuit cuts the waveform data into a number of data frames. The data in each data frame is passed through a count array and then written into a three-dimensional memory array. When all the frames have been quantized, a virtual 3D structure is created, shown in Figure B. The value in the memory array designates the appearance frequency of signal points constructing a waveform.

In Figure A, a count array consists of 256 computing units. Each unit is made of several comparators and counters. When 8-bit data passes through Acquire Memory, and then reaches counter array, comparators select corresponding counter that follows an increment in its value then. After some amount of data is processed, part of input waveform is statistically calculated by counter array.

This process holds only for hundreds of micro seconds even if the calculation implemented by hardware architecture repeats for 750 times. The GDS-3000 Series uses such parallel processing structures to shorten the dead time. Take 4-channel GDS-3000 as an example. It has 1024 counter arrays to simultaneously process input waveform data.

In general it takes approximately 16ms for the LCD panel to read data sequentially from the 3D memory array, display the data on the screen, and to update the counter array. Obviously, if the count array doesn't do any processing and only writes(overwrites) the existing information, the 3D memory array will have changed several times during an LCD update and results in users not seeing these changes. Therefore a mechanism called an Aging timer, as shown in the figure, has been added to the VPO circuit to simulate the persisting and aging property of traditional CRTs. The Aging timer will operate with value in 3D memory array when count array is writing and result in only partial value of the value in the 3D memory array been changed. For example, if the count array is not 0 in value, the 3D memory array will gradually increase in value. On the contrary, if the count array is 0 in value, the 3D memory array will gradually decrease in value until it reaches to 0. In this way the latest waveform data can be updated while the previous waveform can be retained for some time, from 100ms up to several seconds. As a result, we can say that the 3D structure of the memory array is dynamic. Users can change this feature by adjusting the Persist time. The time for the circuit to process this data is too short to be detected by the eyes and the overall effect is that the entire screen is aging all together at the same time.

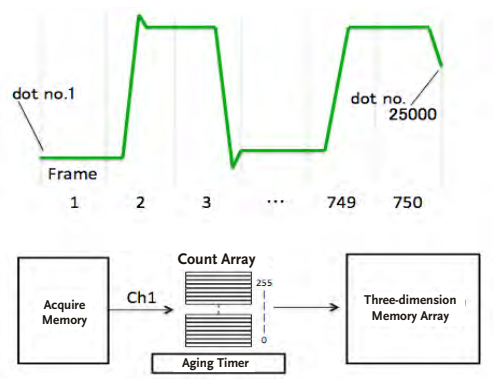


Figure A. The compression and quantization of waveform data

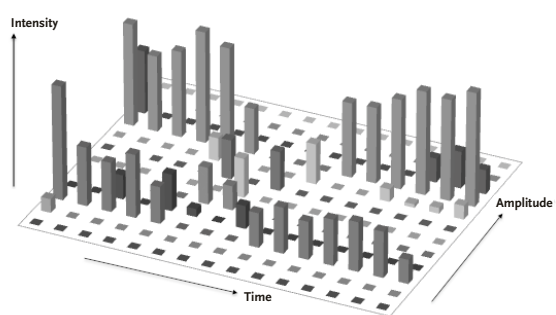


Figure B. Structure of 3D waveform data array

MEMORY DEPTH

Three major factors, including bandwidth, sample rate and memory depth, contribute the selection of a digital oscilloscope. The number of samples an oscilloscope can store is defined as memory depth. Memory depth can be calculated by Record duration divided by Sample period as shown in the formula below. As indicated, memory depth has a positive relationship with the sampling rate. In other words, waveforms can be recorded over a long period of time when stored in a larger memory depth.

Total Waveform Points Sampled = Record Duration /Sample Period=Record Duration X Sampling Rate
If Total Waveform Points Sampled > DSO Memory Depth, all excessive points sampled need to be abandoned and the effective sampling rate is forced to slow down
Memory Depth= Record Duration X Effective Sampling Rate
Effective Sampling Rate = Memory Depth/ Record Duration
When Record Duration is long, Longer DSO Memory Depth means Faster Effective Sampling Rate

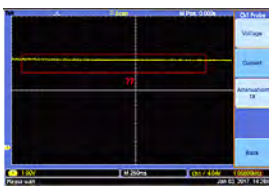
*Sample period is 1/sample rate **Record duration = Time Base X 10 div

DIGITAL STORAGE OSCILLOSCOPES

For relatively slow and repetitive signals, memory depth should be the primary consideration rather than sampling rate. The biggest shortcoming of short memory depth is Aliasing due to the lack of sample rate. Oscilloscope's sample rate should be 2x higher than DUT's frequency in order to restore the original waveforms. The following example is done by providing 1 KHz/1 V sine wave to TEK 1052B-EDU(2.5 k memory depth) and GDS-1102B (10 M/ch memory depth)via a GW Instek AFG-3021 function generator.

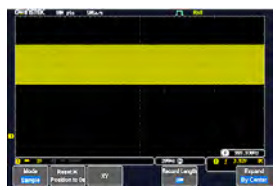
For TEK1052B-EDU under 250 ms/div, its 1 kSa/s sample rate cannot satisfy the Nyqeist theory: Sample rate should be at least 2x higher than input frequency. As a result, TEK1052B-EDU produced Aliasing.

For GDS-1102B under 200 ms/div, its 5 MSa/s can satisfy the requirement of sample rate which is 2x higher than input frequency. As a result, GDS-1102B revealed genuine waveforms without Aliasing.

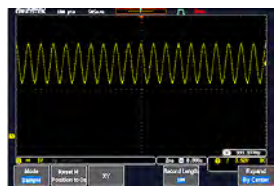


Aliasing due to the insufficient sample rate

After pressing pause and zooming in, signal is obviously distorted



Waveforms entered roll mode under 200 ms/div



After pressing pause and zooming in, signal is restore without distortion

DIGITAL STORAGE OSCILLOSCOPE SELECTION GUIDE

	GDS-3000A Series	GDS-3000 Series	GDS-2000A Series	MPO-2000 Series	MSO-2000E Series	MDO-2000A Series	MDO-2000EA Series	GDS-2000E Series	GDS-1000B Series	GDS-900 Series
Bandwidth	1GHz	500 MHz	300/200/ 100 MHz	P model : 200 MHz B model : 100 MHz	200/100 MHz	300/200/ 100 MHz	200/100 MHz	200/100 MHz	200/100 MHz	100 MHz
Display	10.2"TFT LCD WVGA	8"TFT LCD SVGA	8"TFT LCD SVGA	8"TFT LCD WVGA	8"TFT LCD WVGA	8"TFT LCD WVGA	8"TFT LCD WVGA	8"TFT LCD WVGA	7"TFT LCD WVGA	7"TFT LCD WVGA
VPO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory Depth	200 M/ch	25 k/ch	2 M	10 M/ch	10 M/ch	20 M/ch	10 M/ch	10 M/ch	10 M/ch	10 M/ch
Real Time Sampling Rate	5 GSa/s	4 GSa/s	2 GSa/s	1 GSa/s	1 GSa/s	2 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s	1 GSa/s
Channel	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4	2	2 or 4	2 or 4	2 or 4	2 or 4
Input Impedance	1 MΩ/50 Ω	1 MΩ/ 75/50 Ω	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)	1 MΩ (50 Ω adapter is option)
Vertical Resolution	8 bits 1 mV to 10 V/div (@1 MΩ); 1 mV to 1 V/div (@50 Ω)	8 bits 2 mV to 5 V/div (@1 MΩ) 2 mV to 1 V/div (@75/50 Ω)	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div	8 bits 1 mV to 10 V/div
Time Base Range	1 ns to 1000 s/div	1 ns to 100 s/div	1 ns to 100 s/div	1 ns to 100 s/div	1 ns to 100 s/div	1 ns to 100 s/div	1 ns to 100 s/div	1 ns to 100 s/div	5 ns to 100 s/div	5 ns to 100 s/div
Auto Measurement	38	28	36	38	38	38	38	38	36	36
Python Executable	-	-	-	Yes	-	-	-	-	-	-
1 M FFT	Yes	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Split Screen	-	Yes	-	-	-	-	-		-	-
Auto Range	-	Yes	-	-	-	-	-	-	-	-
Power Analysis	Yes(13 sets)	Yes(4 sets)	-	-	-	-	-	-	-	-
Serial Bus Decode	Yes (I^2C,SPI,UART ,CAN,LIN)	Optional (I^2C,SPI,UART)	Yes (I^2C,,SPI,UART ,CAN,LIN)	Yes (I^2C,SPI,UART ,CAN,LIN)	Yes (I^2C,SPI,UART ,CAN,LIN)	Yes (I^2C,UART, CAN, LIN)	Yes (I^2C,SPI,UART ,CAN,LIN)	Yes (I^2C,SPI,UART ,CAN,LIN)	-	-
Waveform Search	Yes	-	Yes	-	-	Yes	Yes	-	-	-
Segmented Memory	Yes	-	Yes	-	-	Yes	Yes	-	-	-
Logic Analyzer	Optional 16 CH	-	Optional 8 or 16 CH	-	Standard 16 CH	-	-	-	-	-
Arbitrary Waveform Generator	Standard provide dual channel 25 MHz	-	Optional 5 or 25 MHz	Standard provide dual channel 25 MHz	EA series provide dual channel 25 MHz	Standard provide dual channel 25 MHz	Standard provide dual channel 25 MHz	-	-	-
Interface	USB host/ device,LAN, RS232, Go/NoGo BNC,GPIB (optional)	USB host/ device,LAN, SVGA output, RS232, Go/NoGo BNC,GPIB (optional)	USB host/ device,LAN, SVGA output (optional), Go/NoGo BNC, GPIB(optional)	USB host/ device,LAN, Go/NoGo BNC	USB host/ device,LAN, Go/NoGo BNC	USB host/ device,LAN, Go/NoGo BNC	USB host/ device,LAN, Go/NoGo BNC	USB host/ device,LAN, Go/NoGo BNC	USB host/ device,LAN, Go/NoGo BNC *LAN only 4th ch model	USB host/ device,LAN, Go/NoGo BNC *LAN only 4th ch model
Page	**A5-10**	**A11-12**	**A13-14**	**A15-20**	**A21-22**	**A23-24**	**A25-26**	**A27-28**	**A29-30**	**A31-32**

1 GHz Digital Storage Oscilloscope

VPO
Visual Persistence Oscilloscope

GDS-3000A Series

NEW

CE | USB Full Speed | PC Software | Labview Driver | RS-232 | GPIB | Ethernet

台灣精品 TAIWAN EXCELLENCE

FEATURES

* 1 GHz Bandwidth, 2 or 4 Input Channels
* 5 GSa/s Real-time Sampling Rate(half channels); 2.5 GSa/s Real-time Sampling Rate(all channels)
* Per Channel 200 Mpts Memory Depth
* 200,000 wfm/s of Waveform Update Rate
* 10.2 inch 800 x 480 TFT LCD Display
* 490,000 Segments of Segmented Memory and the Waveform Search Function to Optimize the Efficiency of Record Length
* Zoom Window and Play/Pause Rapidly Navigate the Waveforms
* 38 sets of Automatic Measurement Offer Various Measurement Selections
* High resolution acquisition mode
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
* Dual Channel Spectrum Analyzer (DC to 2.5 GHz) with spectrogram
* Dual Channel 25MHz Arbitrary Waveform Generator
* Optional 13 Sets of Power Analysis Measurements
* Optional 16 Digital Channels with a Logic Analyzer(MSO)
* Flexible Remote Control Connectivity (Standard: USB/LAN/RS-232; Option: GPIB)

Rear Panel

GDS-3000A digital storage oscilloscopes have 1 GHz models with two-channel, four-channel and 16-channel logic analyzer options.The series features the memory length of each channel up to 200 Mpts; the sampling rate of 5 GSa/s half channels and 2.5 GSa/s on all channels. Its display is 10.2" TFT LCD and it provides the color display mode.

Accurate Signal Acquisition and Analysis

GDS-3000A strengthens many functions and specifications required for oscilloscope measurements including the memory depth of up to 200 Mpts per channel. The advantage of long memory is that it allows users to maintain high sampling rate even at low speed time settings; the waveform update rate is up to 200,000 wfm/s; and the segmented memory can capture and analyze up to 490,000 segments.For measurement, GDS-3000A incorporates the Fine scale function to allow users to fine-tune the vertical scale according to the requirements so as to achieve full scale measurement to improve its measurement accuracy. With a 10.2" large screen display and the acquisition method with the high resolution mode allow low-noise signals under high-bandwidth measurements.

In addition, the series is equipped with 1M ohm and 50 ohm input impedance selections, which can be set according to different DUT measurement requirements to achieve the effect of impedance matching. The search function can quickly find the signals that meet the conditions according to the needs of the test. The cursor mark function allows users to clearly observe the voltage (or current), time and delta data of each point measured by the cursor. Via the indicator function, the measured range is to be shown at the specific section of the waveform.

Dual Domain Measurement

For frequency domain measurement, it is equipped with a dual channel spectrum analyzer, which allows users to measure and analyze the frequency domain signals of two channels at the same time. It is also equipped with Spectrogram function, which allows users to easily observe complex frequency domain fluctuations that are proportionally decomposed into simple superimposed waves so as to understand the signal strength distribution. The soft keys allow users to have more intuitive settings for operation, which can improve the measurement efficiency.

13 Sets of Switching Mode Power Supply Measurements

GDS-3000A provides a rich measurement items for switch mode power supply testing. The provided power supply test items include AC input analysis items: Power Quality, Harmonics, Inrush Current; DC output analysis required test items: Ripple/Noise, Transient Response Analysis, Turn On/OFF, Efficiency; Control Loop response(Bode) and PSRR(Power Supply Rejection Ratio); Complete switching component analysis items: Modulation, Switching loss, SOA(Safe Operation Area) and Magnetics analysis: B-H curve. On one side of GDS-3000A, a power supply for 50 MHz (GCP-530) and 100 MHz(GCP-1030) current probes is provided. This feature can save users the cost of purchasing the power supply for current probes and relief the burden of carrying the power supply when going out.

GDS-3000A is standardly equipped with a dual-channel 25 MHz arbitrary waveform generator and the frequency response analysis function. The FRA has the load function, which can load multiple FRA measurement results for comparison. User define shortcut key provides user-definable shortcut keys. The use of the shortcut key can improve measurement efficiency. GDS-3000A provides a rich communication interfaces. In addition to the commonly used USB Host, USB Device port, and LAN port, it also includes a highly stable RS232 interface and an optional GPIB interface.

SELECTION GUIDE

Model	GDS-3102A	GDS-3104A
Bandwidth	1 GHz	1 GHz
Channels	2	4
Record Length	200 M / CH	200 M / CH
Real-time Sampling Rate	Max. 5 GSa/s	Max. 5 GSa/s
Built-in	Dual Channel Spectrum Analyzer(DC to 2.5 GHz) with Spectrogram	

ORDERING INFORMATION

GDS-3102A 1 GHz, 2-Channel, Digital Storage Oscilloscope
GDS-3104A 1 GHz, 4-Channel, Digital Storage Oscilloscope

ACCESSORIES
Power cord x 1
GTP-501R : 500 MHz 10:1 passive probe for GDS-3102A/3104A (one per channel)

OPTION

DS3A-PWR Power Analysis Software **DS3A-GPIB** GPIB Interface **DS3A-16LA** 16 Channel Logic Analyzer

OPTIONAL ACCESSORIES

GTP-033A	35 MHz 1:1 Passive probe	**GTL-248**	GPIB Cable, Double Shielded, 2000 mm
GTP-352R	350 MHz 20:1 Passive probe	**GTL-110**	Test lead, BNC to BNC connector
GDP-025	25 MHz High voltage differential probe	**GTL-232**	RS-232C cable, 9-pin female to 9-pin female
GDP-050	50 MHz High voltage differential probe	**GTL-246**	USB 2.0 cable, A-B type,1800 mm
GDP-100	100 MHz High voltage differential probe	**GRA-443**	Rack Adapter Panel
GCP-300	300 kHz/200 A Current probe	**GKT-100**	Deskew Fixture
GCP-500	500 kHz/150 A Current probe	**GTP-1501R**	1.5 GHz 10:1 Passive probe
GCP-530	50 MHz/30 A Current probe	**GCP-0275**	2 MHz/750 A Current probe
GCP-1000	1 MHz/70 A Current probe	**GCP-0550**	5 MHz/500 A Current probe
GCP-1030	100 MHz/30 A Current probe	**GCP-2525**	25 MHz/250 A Current probe

FREE DOWNLOAD

PC Software OpenWave software **Driver** LabView driver

SPECIFICATIONS

		GDS-3102A	GDS-3104A
VERTICAL	Channels	2Ch+EXT	4Ch+EXT
	Bandwidth	DC to 1 GHz (-3 dB)@50 Ω input impedance; DC to 500 MHz (-3dB)@1 MΩ input impedance	
	Calculated Rise Time	350 ps	
	Bandwidth Limit	20 MHz/100 MHz/200 MHz/350 MHz*1	
	Vertical Resolution	8 bits, (Max.12 bits with Hi Res)	
		For 1 MΩ input impedance : 1 mV*2 to 10 V/div	
		For 50 Ω input impedance:1 mV*2 to 1 V/div	
	Input Coupling	AC, DC, GND	
	Input Impedance	1 MΩ// 22 pF approx.	
	DC Gain Accuracy	1 mV : ±5 % full scale ; ≥2 mV : ±3 % full scale	
	Polarity	Normal , Invert	
	Maximum Input Voltage(1 MΩ)	300 Vrms, CAT I	
	Maximum Input Voltage(50 Ω)	5 Vrms CAT I	
	Offset Position Range	For 1 MΩ input impedance : 1 mV/div to 20 mV/div : ±1 V; 50 mV/div to 500 mV/div : ±10 V ; 1 V/div to 5 V/div: ±100 V ; 10 V/div: ±1000 V For 50 Ω input impedance : 1 mV/div to 50 mV/div : ±1 V ; 100 mV/div to 1 V/div: ±10 V	
	Waveform Signal Process	+, - x, ÷FFT, User Defined Expression FFT: Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning or Blackman	
TRIGGER	Source	2CH models: CH1, CH2, Line , EXT ; 4CH models: CH1 , CH2 , CH3 , CH4 , Line , EXT	
	Trigger Mode	Auto(Supports Roll Mode for 100 ms/div and slower), Normal, Single	
	Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope),Time out, Alternate, Event-Delay(1 to 65,535 events), Time-Delay (Duration, 4 ns to 10 s), Bus(I^2C,SPI,UART,CAN,LIN)	
	Trigger Holdoff Range	4 ns to 10 s	
	Coupling	AC, DC, LF rej. , Hf rej. , Noise rej.	
	Sensitivity	1 div	
EXT TRIGGER	Range	±20 V	
	Sensitivity	DC to 100 MHz Approx. 100 mV ; 100 MHz to 350 MHz Approx. 150 mV	
	Input Impedance	1 MΩ± 3 % // 22 pF	
HORIZONTAL	Range	1 ns/div to 1000 s/div (1-2-5 increments); ROLL : 100 ms/div to 1000 s/div	
	Pre-trigger	10 div maximum	
	Post-trigger	10,000,000 div max (depend on time base)	
	Accuracy	±5 ppm, about ±2 ppm increase in error per year	
X-Y MODE	X-Axis Input/Y-Axis Input Phase Shift	Channel 1, Channel 3 (for 4CH models); Channel 2, Channel 4 (for 4CH models) ±3° at 100 kHz	
SIGNAL ACQUISITION	Real Time Sample Rate	5 GSa/s half channels; 2.5 GSa/s all channels	
	Record Length	Max.200 Mpts/CH	
	Acquisition Mode	Normal, Average, Peak detect, High resolution, Single ; Average: Selectable from 2 to 256, Peak detect: 2 ns	
	Number of Segments	1 to 490,000 maximum	
CURSORS AND MEASUREMENT	Cursors	Amplitude, Time, Gating available; Unit:Seconds(s), Hz(1/s), Phase(degree), Ratio(%)	
	Automatic Measurement	38 sets with indicator: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx ,FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase	
	Cursors Measurement	Voltage difference between cursors (△ V) Time difference between cursors (△ T)	
	Auto Counter	6 digits, range from 2 Hz minimum to the rated bandwidth	
CONTROL PANEL FUNCTION	Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with “Undo Autoset”, “Fit Screen”/ “AC Priority” mode, and “Fine Scale” functions.	
	Save Setup	20 sets	
	Save Waveform	20 sets	
	Save Reference Waveform	4 sets	
POWER MEASUREMENTS (Option)		Power Quality, Harmonics, Ripple, In-rush current, Switching Loss, Modulation, SOA, Transient, Efficiency, B-H curve, Control Loop Response, PSRR, Turn On/Off	
AWG	Channels	2	
	Sample Rate	200 MSa/s	
	Vertical Resolution	14 bits	
	Max. Frequency	25 MHz	
	Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac	
	Output Range	20 mVpp to 5 Vpp, HighZ; 10 mVpp to 2.5 Vpp, 50 Ω	
	Output Resolution	1 mV	
	Output Accuracy	2 % (1 kHz)	
	Offset Range	±2.5 V, High Z; ±1.25 V, 50 Ω	
	Offset Resolution	1 mV	
	Sine	Frequency Range:100 mHz to 25 MHz; Flatness(relative to 1 kHz): ± 0.5 dB < 15 MHz, ±1 dB (15 MHz to 25 MHz); Harmonic Distortion:-40 dBc; Stray(Non-harmonic):-40 dBc; Total Harmonic Distortion: 1 % ; S/N Ratio:40 dB	
	Square/Pulse	Frequency Range:100 mHz to 15 MHz ; Rise/Fall time: <15 ns ; Overshoot: <3 % ; Duty cycle Square:50 % & Pulse:0.4 % to 99.6 % ; Min. Pulse Width:30 ns ; Jitter:500 ps	
	Ramp	Frequency Range:100 mHz to 1 MHz ; Linearity: 1 % ; Symmetry: 0 % to 100 %	
SPECTRUM ANALYZER	Frequency Range	DC to 2.5 GHz(Max.) dual channel with spectrogram (based on advanced FFT). Notice: Frequency which exceeds analog front end bandwidth is uncalibrated	
	Span	1 kHz to 2.5 GHz(Max.)	
	Resolution Bandwidth	1 Hz to 2.5 MHz(Max.)	
	Reference Level	-80 dBm to +40 dBm in steps of 5 dBm	
	Vertical Units	dBV RMS; Linear RMS; dBm	
	Vertical Position	-12 divs to +12 divs	
	Vertical Scale	1 dB/div to 20 dB/div in a 1-2-5 Sequence	
	Display Average Noise Level	1 V/div < -40 dBm, Avg : 16 ; 100 mV/div < -60 dBm, Avg : 16 ; 10 mV/div < -80 dBm, Avg : 16	
	Spurious Response	2nd harmonic distortion < 35 dBc ; 3rd harmonic distortion < 40 dBc	
	Frequency Domain Trace Types	Normal ; Max Hold ; Min Hold ; Average (2 to 256)	
	Detection Methods	Sample ; +Peak ; -Peak ; Average	
	FFT Windows	FFT Factor : Hanning 1.44 ; Rectangular 0.89 ; Hamming 1.30 ; Blackman 1.68	

*1. The tolerance of bandwidth limit is ± 10 %.
*2. The bandwidth is limited to 20 MHz at 2 mV/div or below; The bandwidth is limited to 900 MHz at 5 mV/div

1 GHz Digital Storage Oscilloscope

SPECIFICATIONS		
LOGIC ANALYZER (Option)	Sample Rate	Per Channel 1G Sa/s
	Bandwidth	200 MHz
	Record Length Input Channels	Per Channel 10 M pts (max) 16 Digital (D15 to D0)
	Trigger Type	Edge, Pattern, Pulse Width, Serial bus (I^2C, SPI, UART, CAN, LIN), Parallel Bus
	Thresholds Quad	Settable thresholds for: D0 to D3, D4 to D7,D8 to D11 ,D12 to D15
	Threshold Selections	TTL, CMOS(5 V,3.3 V,2.5 V), ECL, PECL,0 V ,User Defined
	User-defined Threshold Range	±5 V
	Maximum Input Voltage	±40 V
	Minimum Voltage Swing	±250 mV
	Vertical Resolution	1 bit
FREQUENCY RESPONSE ANALYSIS	Frequency Range	20 Hz to 25 MHz
	Input and Output Sources	Channel 1 to 2 for 2CH models ; Channel 1 to 4 for 4CH models
	Number of Test Points	10, 15, 30, 45, 90 points per decade selectable for logarithm scale; 2 to 1000 points selectable for linear scale
	Dynamic Range	> 80 dB (typical)
	Test Amplitude	10 mVpp to 2.5 Vpp into 50 Ω, 20 mVpp to 5 Vpp into High-Z, Fixed test amplitude or custom amplitude for each decade
	Test Results	Logarithmic or linear overlaid gain and phase plot, may also overlay with reference plots for cross comparison. Test results saved in csv format for offline analysis
	Manual Measurements	Tracking gain and phase markers
	Plot Scaling	Auto-scaled during test
DISPLAY SYSTEM	TFT LCD Type	10.2" TFT LCD WVGA color display
	Waveform Update Rate	200,000 wfms/sec max.
	Display Resolution	800 horizontal x 480 vertical pixels (WVGA)
	Interpolation	Sin (x)/x
	Waveform Display	Dots, Vectors, Variable persistence(16 ms to 4 s), Infinite persistence,gray and color
	Display Graticule	8 x 10 divisions
	Display Mode	YT,XY
INTERFACE	RS-232C	DB-9 male connector
	USB Port	USB 2.0 high-speed host port x 1 ; USB high-speed 2.0 device port x 1
	Ethernet Port	RJ-45 connector, 10/100 Mbps with HP Auto-MDIX
	VGA Video Port	DB-15 female connector, monitor output for display on VGA monitor
	Optional GPIB Module	Fully programmable with IEEE488.2 compliance
	Go/NoGo BNC	5 V Max/10 mA open collector output
	Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock
	Power Supply Receptacles	±12 V/500 mA for current probe usage. 2 sets for 2CH models; 4 sets for 4CH models
MISCELLANEOUS	Operating	0 °C to 50 °C, Relative Humidity ≤ 80 % at 40 °C or below ; ≤ 45 % at 41 °C to 50 °C
	Line Voltage Range	AC 100 V to 240 V, 50 Hz to 60 Hz, auto selection. power consumption:100 W
	Multi-Language Menu	Available
	On-Line Help	Available
	Time Clock	Time and date, provide the date/time for saved data
	Internal Flash Disk	800 Mega bytes Single-Level Cell flash memory
	Installed APP	Go/NoGo, DVM, DataLog, Digital Filter, Frequency Response Analyzer, Mask, Mount Remote Disk, Demo
	User Define Key	User can select one of the several different preset functions as shortcut key
DIMENSIONS &	420(W) mm X 253(H) mm X 113.8(D) mm, Approx. 4.6 kg	

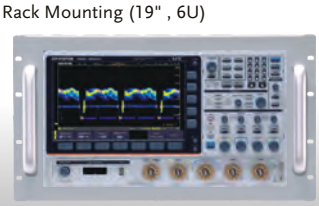
Note : Three-year warranty, excluding probes & LCD display panel.

GKT-100 Deskew Fixture

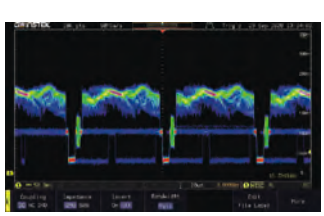
DS3A-16LA 16 Channel Logic Analyzer

GRA-443 Rack Adapter Panel

Rack Mounting (19" , 6U)



A. 10.2 INCH, 8 BITS RGB COLOR GRADIENT DISPLAY

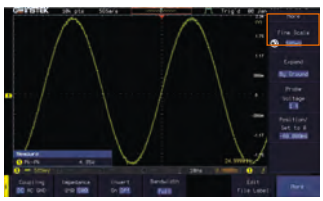


With respect to the waveform display technology, the GDS-3000A series oscilloscope is capable of displaying RGB color gradients with 8 bits each which can delineate the profound gradational fluctuations; as if it can recreate the analog oscilloscope display capability. When a composite signal is input, the GDS-3000A series, has the ability to precisely reveal the colored burst signal and to show details of layers with the brightness. Hence, the dull monochrome waveform is imbued with vitality, it allows users to easily determine and analyze waveforms.

B. 200 M MEMORY DEPTH PER CHANNEL INDEPENDENTLY

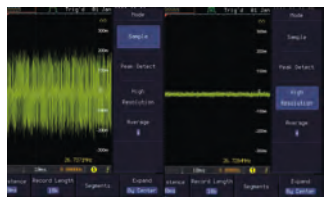
The GDS-3000A series oscilloscope has a powerful and incomparable memory depth for the data retrieving. 200 M memory depth per channel independently surpasses the specification of the industry's GDS-3000A series DSO boundary. 200 M memory depth allows users to easily seize the waveform detail while conducting fundamental measurement applications.

C. FINE SCALE



The Fine scale function is incorporated to allow users to fine-tune the vertical scale according to their needs to achieve full-scale measurement and improve the accuracy of the voltage or current measurements.

D. HIGH RESOLUTION ACQUISITION MODE



The acquisition method with high resolution mode is provided to effectively remove noise and improve the accuracy of automatic measurement.

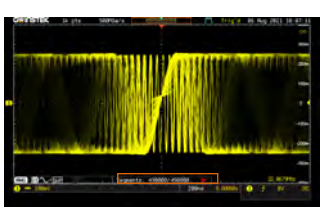
E. 38 ITEMS OF AUTO MEASUREMENT SELECTION AND THE STATISTICS FUNCTION

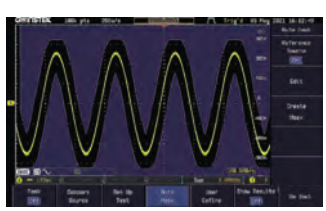
The GDS-3000A series soundly provides 38 measurement items. Based upon the parameters such as voltage, current, time, frequency, and delay measurement, users can decide which measurement items to choose. On the single display screen, the GDS-3000A series provides 8 measurement selections.

The statistics mode can also be selected for users to analyze the mean value, the maximum, the minimum, and standard deviation of the retrieved waveforms to ensure signal's integrity and identify abnormal waveforms.

Users can also use the Measure Shortcuts function to select the item to be measured, and then store the selected item in Shortcut 1 to 4, which can be selected to conduct measurements for the same product next time. Users just select the previously stored Shortcut 1 to 4 without making new selections from Add measurement, and all the measurement items will be displayed on the screen to improve the measurement efficiency.

F. 490,000 SEGMENTED MEMORY





In addition, GDS-3000A incorporates the Mask determination function under Segment, allowing users to quickly analyze abnormal waveforms that exceed the target range.

As the length of the sampling memory increases to 200 Mpts, the number of acquisitions that can be set in the GDS-3000A's segmented memory at one time has also increased significantly, and up to 490,000 waveforms can be stored continuously (under the condition of the memory length of 1,000 pts).

The segmented memory allows users to capture and observe interesting waveforms. Through the statistical function, it is especially helpful for finding sporadic problems in continuous events.

G. WAVEFORM SEARCH FUNCTION

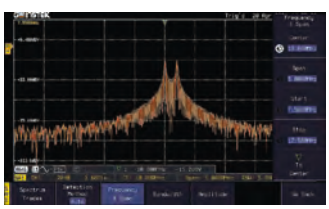
Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location met the trigger condition. The upper left hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus.
When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the GDS-3000A Series controls waveform zoom-out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

H. USER DEFINE KEY

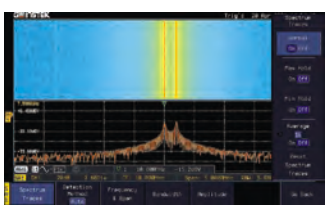
GDS-3000A incorporates a User Define key to allow users to set any one of the ten functions of User Define based upon the measurement requirement, including XY/YT; Reset all positons to 0; Measure all On/Off; Measure statistics On/Off; Segments On/Off; AWG output On/Off; Auto/Normal; Clear persistence; Freeze display and transparent readouts On/Off.

Users can quickly select the function setting by just pressing a key to quickly meet the measurement needs so as to improve the measurement efficiency.

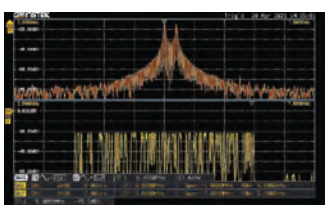
I. SPECTRUM ANALYZER FUNCTION



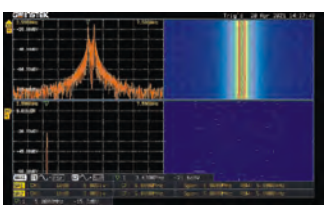
Spectrum Analyzer



Spectrum Analyzer + Spectrogram



Dual Spectrum Analyzer



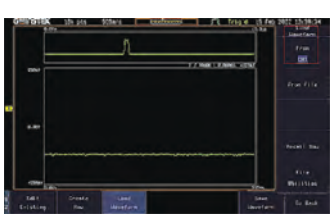
Dual Spectrum Analyzer + Spectrogram

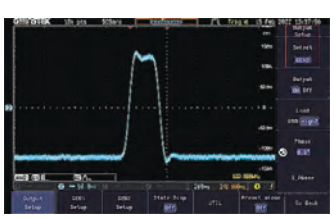
For frequency domain measurement, dual channel spectrum analyzer is equipped. Users can measure and analyze dual channel frequency domain signals at the same time. It also includes the Spectrogram function, which allows users to easily observe the signal's strength distribution and the relationship of the spectrum distribution over time. The independent numeric key input on the panel makes the operation more convenient for users, thereby improving the measurement efficiency. For promotion selling point, dual Spectrum Analyzer and Spectrogram can test the frequency response of the left and right channels of the Audio Amplifier at the same time.

The above displays are :

1. Spectrum Analyzer
2. Spectrum Analyzer + Spectrogram
3. Dual Spectrum Analyzer
   (Dual channels can set different conditions)
4. Dual Spectrum Analyzer + Spectrogram

J. 25 MHz DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR





*** The above two displays are load from CH1, and then it was generated by AWG to CH3**

GDS-3000A is standardly equipped with a 25 MHz dual channel arbitrary waveform generator, and provides built-in Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac and other waveforms. Users can be directly input the amplitude and frequency of the signal through the numeric keys. Compared with the previous model, the new function is that users can select the arbitrary waveform function of the AWG to store the signal measured by the analog channel of the oscilloscope to the arbitrary waveform of the signal source (UAW file), or it can directly output this signal from the signal generator, which is a new function that allows users to conveniently generate various measured signals to simulate diversified signal outputs.

K. PC REMOTE CONTROL (WEB SERVER FUNCTION)

GDS-3000A has a built-in Web Server function to allow users to connect GDS-3000A's Web Server by using a browser in the same network domain via Ethernet connection. System information can be obtained and the oscilloscope screen (. png file) can be observed and captured remotely.
GDS-3000A can be controlled remotely through GUI to download and upload configuration files and test SCPI commands. Users can use this function to obtain oscilloscope information and configuration files, and operate remote control even if they are not on-site.

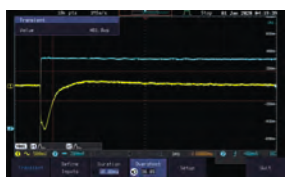
L. POWER ANALYSIS FUNCTIONS

13 Sets of Switching Mode Power Supply Measurements

In daily life, switching power supplies have become the mainstream of power supplies. Engineers often have to rack their brains in order to improve product performance and reduce switching loss, and Ripple/Noise.
GDS-3000A has an option of rich measurement items for switching mode power supply testing. To meet engineers' measurement needs for switching mode power supply, rich measurement function can help engineers save a lot of measurement computing time and improve product development efficiency.

Power Quality

For AC voltage and current measurement, its distortion and other abnormal phenomena will affect the power consumption, efficiency and reliability of the power supply.
Measurement items: current/voltage root mean square value, actual power, reactive power, frequency, power factor, phase angle, +/- V Peak, +/- I Peak, AC/DC voltage and current, voltage/current crest factor, impedance, resistance and reactance.



Transient Response Analysis

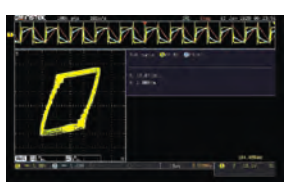
Output analysis required test items: Ripple/Noise, Transient response analysis, Turn On/OFF and Efficiency. It measures the time required for the output DC voltage to reach the stable level expected by users when the output load changes suddenly.
Measurement item: transient response value (s).

Switching Loss

Switching component analysis items: Switching loss, SOA (Safe Operation Area) and Modulation analysis.Analyze the integral of the product of the voltage and current of the switching device (MOSFET or IGBT) in the power supply, and then measure the switching loss of the device, including Turn-on switching loss, Turn-off switching loss and Conduction loss.
The higher the switching frequency, the higher the Turn-on and Turn-off switching loss.
Measurement items: power loss, energy loss & Rds(on)/Vce(sat).

Control Loop Response

Control Loop Response and PSRR (Power Supply Rejection Ratio)
PSRR: Power supply rejection ratio (PSRR) analysis, which is used to confirm that power equipment suppresses ripple noise in different frequency ranges.
Measurement items: frequency and PSRR (dB).



Magnetics Analysis

Magnetics Analysis(B-H Curve): The characteristics of magnetic materials are divided into magnetic flux density (B), magnetic field strength (H) and material magnetic permeability (μ). The B-H diagram is usually used to verify the saturation of the magnetic components in the switch power supply.
Measurement items: Measure the voltage and current flowing through the magnetic component and draw a B-H diagram.

M. OPTIONAL 16-CHANNEL LOGIC ANALYZER

GDS-3000A can be upgraded to a mixed-signal oscilloscope (MSO) by selecting an optional 16-channel logic analyzer, which is a plugin. When you have several GDS-3000As, you can plug in an optional logic analyzer to other unit at any time without installing any software. Users can analyze digital signals, I^2C, SPI, UART, CAN, LIN and parallel bus through a logic analyzer.

500 MHz Digital Storage Oscilloscope

VPO
Visual Persistence Oscilloscope

Patent No.ZL201220307783.4
ZL201210021617.9

GDS-3000 Series

CE | RS-232 | GPIB | Ethernet | USB High Speed | PC Software | Labview Driver | PictBridge Compatible | VGA Output

FEATURES

* 500 MHz Bandwidth, 2/4 Input Channels
* 4 GSa/s Real-time Sampling Rate and 100 GSa/s Equivalent Time Sampling Rate
* 25 k Points Memory for Each Input Channel
* VPO (Visual Persistence Oscilloscope) Technology to Display Less-Frequently-Occurred Signals
* 8"800 x 600 High Resolution TFT LCD Display
* Unique Split Screen System with Independent Setting and Display for Each Input Channel
* Three Built-in Input Impedance Selections : 50 Ω/75 Ω/1MΩ
* Optional Power Analysis Software for Power Source Measurement and Analysis
* Optional Serial bus Analysis Software for Trigger & Decode of I²C, SPI and UART Interfaces

SPECIFICATIONS

	GDS-3502	GDS-3504
VERTICAL		
Channels	2 Ch+EXT	4 Ch+EXT
Bandwidth	DC to 500 MHz(-3 dB)	DC to 500 MHz(-3 dB)
Calculated Rise Time	700 ps	700 ps
Bandwidth Limit	20M/100M/200/350 MHz	20M/100M/200/350 MHz
	The bandwidth of the 75Ω input impedance is limited to 150 MHz only.	
Vertical Resolution	8 bits	
Vertical Resolution(1M Ω)	2 mV to 5 V/div	
Vertical Resolution(50/75 Ω)	2 mV to 1V/div	
Input Coupling	AC, DC, GND	
Input Impedance	1 MΩ// 15 pF	
DC Gain Accuracy	±3 % full scale	
Polarity	Normal , Invert	
Maximum Input Voltage(1MΩ)	300Vrms, CAT I	
Maximum Input Voltage(50/75Ω)	5 Vrms	
Offset Position Range	2 mV/div to 100 mV/div : ±0.5 V ; 200 mV/div to 5 V/div : ±25 V	
Waveform Signal Process	Add, Subtract, Multiply, and Divide waveforms, Differentiation, Integration (App installation required)FFT ; FFT : Spectral magnitude. Set FFT vertical scale to Linear RMS or dBV RMS, and FFT window to Rectangular, Hamming, Hanning or Blackman	
TRIGGER		
Source	2 CH model: CH1, CH2, Line , EXT ; 4 CH model: CH1 , CH2 , CH3 , CH4 , Line , EXT	
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single	
Trigger Type	Edge, Pulse Width, Video, Runt, Rise & Fall, Alternate, Glitch Trigger, Duration Trigger, Slope Trigger Event-Delay(1 to 65,535 events),Time-Delay(10 ns to 10s),I²C,SPI,UART(optional)	
Trigger Holdoff Range	10 ns to 10 s	
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.	
Sensitivity	DC to 30 MHz Approx. 1 div or 10 mV; 50 MHz to 150 MHz Approx. 1.5 div or 15 mV; 150 MHz to 350 MHz Approx. 2 div or 20 mV; 350 MHz to 500 MHz Approx. 2.5 div or 25 mV	
EXT TRIGGER		
Range	±15V	
Sensitivity	DC to 150 MHz Approx. 100 mV; 150 MHz to 250 MHz Approx. 150 mV; 250MHz to 350 MHz Approx. 150 mV; 350 MHz to 500 MHz Approx. 200 mV	
Input Impedance	1 MΩ ± 3 %, ~16 pF	
HORIZONTAL		
Range	1-2.5-5 increments; ROLL: 100 ms/div to 100 s/div	
Pre-trigger	10 div maximum	
Post-trigger	1,000 div max (depend on time base)	
Accuracy	±20 ppm over any ≥ 1 ms time interval	
X-Y MODE		
X-Axis Input/Y-Axis Input	Channel 1; Channel 3/Channel 2; Channel 4	
Phase Shift	±3°at 100 kHz	
SIGNAL ACQUISITION		
Real Time Sample Rate	4 GSa/s	4 GSa/s
ET Sample Rate	100 GSa/s maximum for all models	
Memory Depth	25 k points	
Acquisition Mode	Normal, Average, Peak detect, High resolution, Single Average: 2 to 256 waveforms ; Peak detect: 2ns	
CURSORS AND MEASUREMENT		
Cursors	Amplitude, Time, Gating available	
Automatic	28 sets: Vpp, Vamp, Vavg, Vrms, Vhi, Vlo, Vmax, Vmin, Rise Preshoot/ Overshoot, Fall Preshoot/Overshoot	
Measurement	Freq, Period, Rise time, Fall time, Positive width, Negative width, Duty cycle,Phase, and eight different delay measurements (FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF)	
Cursors Measurement	Voltage difference between cursors (△V) Time difference between cursors (△T)	
Auto Counter	6 digits, range from 2 Hz minimum to the rated bandwidth	
POWER MEASUREMENTS(OPTION)		
Power Quality Measurements	V RMS, I RMS, True Power, Apparent Power, Reactive Power, Frequency, Power Factor, Phase Angle, V Crest Factor, I Crest Factor, (+)V Peak,(-)V Peak,(+)I Peak, (-)I Peak, DC Voltage, DC Current, Impedance, Resistance, Reactance	
Harmonics	Frequency(Hz), Magnitude(%), Mag. RMS(A), Phase(°), Limit(A), Limit(%), Pass / Fail, Max all, Windows(A),200 % Limit, POHC Limit, THD-F, THD-R,RMS, Overall, POHL, Input Power, Power Factor, Fundamental Current, Harmonic 3, Harmonic 5	
Ripple Measurements	Ripple, Nose	
In-rush Current	First peak, second peak	
CONTROL PANEL FUNCTION		
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo autoset	
Auto-range	Allow automatically adjusts the time base and/or the vertical scale of displayed waveform when the frequency and/or the amplitude of input signal changed.	
Save Setup	20 sets	
Save Waveform	24 sets	
DISPLAY SYSTEM		
TFT LCD Type	8" TFT LCD SVGA color display(LED Back-light)	
Waveform Update Rate	3500 wfms/sec	
Display Resolution	800 horizontal x 600 vertical pixels (SVGA)	
Interpolation	Sin(x)/x & Equivalent time sampling	
Waveform Display	Dots, Vectors, Variable persistence, Infinite persistence	
Display Graticule	8 x 10 divisions	
Display Brightness	Adjustable	

GDS-3000 Series

SPECIFICATIONS		
	GDS-3502	**GDS-3504**
INTERFACE		
RS-232C	DB-9 male connector	
USB Port	2 sets USB 2.0 high-speed host port ;1 set USB high-speed 2.0 device port	
Ethernet Port	RJ-45 connector, 10/100 Mbps	
SVGA Video Port	DB-15 female connector, monitor output for display on SVGA monitors	
GPIB	GPIB-to-USB Adapter (Optional)	
Go/NoGo BNC	5V Max/10mA open collector output	
Internal Flash Disk	64MB	
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock	
Line Output	3.5mm stereo jack for Go/NoGo audio alarm	
POWER SOURCE		
Line Voltage Range	AC 100 V to 240 V, 50 Hz to 60 Hz, auto selection; Power Consumption 96 VA	
OPERATING ENVIRONMENT		
Temperature	0°C to 50°C, Relative Humidity ≤80 % at 40°C or below ; ≤ 45 % at 41°C to 50°C	
MISCELLANEOUS		
Multi-Language Menu	Available	
On-Line Help	Available	
Time clock	Time and data, provide the date/time for saved date	
DIMENSIONS & WEIGHT		
400(W) X 200(H) X 130(D)mm, Approx. 4 kg		

The specifications apply when the oscilloscope is powered on for at least 30 minutes under +20°C~+30 C .

ORDERING INFORMATION

GDS-3502 500 MHz, 2-Channel, Digital Storage Oscilloscope
GDS-3504 500 MHz, 4-Channel, Digital Storage Oscilloscope

ACCESSORIES
Power cord x 1
GTP-501R : 500 MHz 10:1 passive probe for GDS-3502/3504 (one per channel)

OPTION

DS3-PWR Power analysis software: Power quality/Harmonic/Ripple/In-rush current measurements
DS3-SBD Serial Bus analysis software: I ₵/SPI/UART(only 4 channel models support SPI function)

OPTIONAL ACCESSORIES

GUG-001	GPIB to USB Adapter	**GTL-248**	GPIB Cable, Double Shielded, 2000 mm
GTP-033A	35 MHz 1:1 Passive probe	**GTL-110**	Test lead, BNC to BNC connector
GTP-352R	350 MHz 20:1 Passive probe	**GTL-232**	RS-232C cable, 9-pin female to 9-pin female
GDP-025	25 MHz High voltage differential probe	**GTL-246**	USB 2.0 cable, A-B type,1800 mm
GDP-050	50 MHz High voltage differential probe	**GRA-441**	Rack Adapter Panel
GDP-100	100 MHz High voltage differential probe	**GKT-100**	Deskew Fixture
GCP-300	300 kHz/200 A Current probe	**GTP-1501R**	1.5 GHz 10:1 Passive probe
GCP-500	500 kHz/150 A Current probe	**GCP-0275**	2 MHz/750 A Current probe
GCP-530	50 MHz/30 A Current probe	**GCP-0550**	5 MHz/500 A Current probe
GCP-1000	1 MHz/70 A Current probe	**GCP-2525**	25 MHz/250 A Current probe
GCP-1030	100 MHz/30 A Current probe	**GCP-425P**	Power supply for current probe (4 input channel)

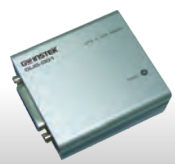
FREE DOWNLOAD

PC Software OpenWave software
Driver LabView driver

Rear Panel

GUG-001 GPIB to USB Adapter

For: GDS-3000 Series, PSW-Series



GRA-411 Rack Adapter Panel

Rack Mounting (19" , 6U)

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series/MDO-2000A/2000E Series

GSC-008 Soft Carrying Case

300 MHz/200 MHz/100 MHz Digital Storage Oscilloscope

VPO
Visual Persistence Oscilloscope

GDS-2000A Series

CE | USB Full Speed | PC Software | Labview Driver
RS-232 | GPIB | Ethernet | PictBridge Compatible

FEATURES

* 300/200/100 MHz Bandwidth, 4 Input Channels
* 2 GSa/s Maximum Real-Time Sampling Rate and 100 GSa/s Equivalent Time Sampling Rate
* 2 M points Maximum Record length
* VPO Technology to Display Less-Frequently-Occurred Signals
* Fast Update Rate of 80,000 Waveform Per Second
* Segmented Memory Acquisition and Waveform Search Function
* Standard Model Provides I^2C, UART, SPI CAN and LIN Serial Bus Trigger and Analysis Functionality
* Optional 8 or 16 Additional Digital Channels with Logic Analyzer(MSO)
* Upgradable DVM, H-Expansion, Data Log and Advanced Logic Functionality
* Optional 5 MHz Function Generator
* Flexible Remote Control Connectivity (Standard : USB ; Optional : LAN/GPIB)

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series/MDO-2000A/2000E Series

GSC-008 Soft Carrying Case

SPECIFICATIONS

VERTICAL

	GDS-2104A	GDS-2204A	GDS-2304A
Channels	4Ch+EXT	4Ch+EXT	4Ch+EXT
Bandwidth	DC~100MHz(-3dB)	DC~200MHz(-3dB)	DC~300MHz(-3dB)
Calculated Rise Time	3.5ns	1.75ns	1.17ns
Bandwidth Limit	20MHz	20M/100MHz	20M/100M/200MHz
Vertical Resolution	8 bits@1M : 1mV*~10V (* : When the vertical scale is set to 1mV/div, the bandwidth limit will be set to 20MHz automatically)		
Input Coupling	AC, DC, GND		
Input Impedance	1MΩ// 16pF approx.		
DC Gain Accuracy (**)	±(3% X |Readout| + 0.1div + 1mV) when 2mV/div or greater is selected ±(5% X |Readout| + 0.1div + 1mV) when 1mV/div is selected (** : The measurement type is average of≥16 waveforms with vertical position at zero)		
Polarity	Normal , Invert		
Maximum Input Voltage	300Vrms, CAT I		
Offset Position Range	1mV/div ~ 20mV/div : ±0.5V ; 50mV/div ~ 200mV/div : ±5V ; 500mV/div ~ 2V/div : ±25V ; 5V/div~10V/div : ±250V		
Waveform Signal Process	+, -, ×, ÷, FFT, d/dt, ∫dt, √‾ FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning , or Blackman		

TRIGGER

Source	CH1 ,CH2, CH3*, CH4*, Line, EXT, D0-D7 or D0-D15** ; *four channel models only **Logic analyzer option only
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single
Trigger Type	Edge, Pulse Width, Video, Pulse Runt, Rise & Fall, Alternate, Glitch Trigger, Duration Trigger, Slope Trigger, Time out, Event-Delay (1~65,535 events), Time-Delay(10ns~10s), Logic*, Bus, *with DS2-08LA or DS2-16LA option
Trigger Holdoff Range	10ns ~ 10s
Coupling	AC, DC, LF rej. , Hf rej. , Noise rej.
Sensitivity	DC ~ 100MHz Approx. 1div or 1.0mV ; 100MHz ~ 200MHz Approx. 1.5div or 15mV ; 200MHz ~ 300MHz Approx. 2div or 20mV

EXT TRIGGER

Range	±15V
Sensitivity	DC ~ 100MHz Approx. 100mV 100MHz ~ 200MHz Approx. 150mV ; 200MHz ~ 300MHz Approx. 150mV
Input Impedance	1MΩ±3%, ~16pF

HORIZONTAL

Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div
Pre-trigger	10 div maximum
Post-trigger	1,000 div max (depend on time base)
Accuracy	±20 ppm over any≥ 1 ms time interval
Real Time Sample Rate	Max. : 2GSa/s
ET Sample Rate	100GSa/s maximum for all models
Record Length	Max. : 2Mpts
Acquisition Mode	Normal, Average, Peak Detect, Single
Peak Detection	2ns (typical)
Average	Selectable from 2 to 256

X-Y MODE

X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)
Phase Shift	±3° at 100kHz

CURSORS AND MEASUREMENT

Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)
Automatic Measurement	36 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase
Control Panel Function	Cursors measurement
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset
Save Setup	20set
Save Waveform	24set

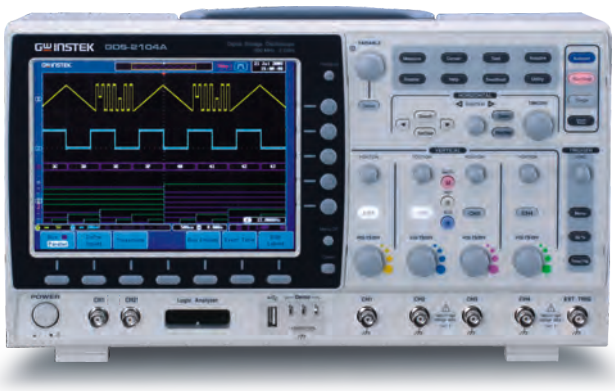
DISPLAY SYSTEM

TFT LCD Type	8" TFT LCD SVGA color display(LED Back-light)
Display Resolution	800 horizontal x 600 vertical pixels (SVGA)
Interpolation	Sin(x)/x & Equivalent time sampling
Waveform Display	Dots, Vectors, Variable persistence(16ms~10s), Infinite persistence
Waveform Update Rate	80,000 waveforms per second, maximum
Display Graticule	8 x 10 divisions

INTERFACE

RS-232C	DB-9 male connector
USB Port	USB 2.0 Full-speed host port, USB 2.0 Full-speed device port
Ethernet Port	RJ-45 connector, 10/100Mbps with HP Auto-MDIX (option)
SVGA Video Port	SVGA output (option)
GPIB	GPIB module (option)
Go/NoGo BNC	5V Max/10mA open collector output
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock

The specifications apply when the oscilloscope is powered on for at least 30 minutes under +20˚C~+30˚C .
Note : Three-year warranty, excluding probes & LCD display panel.



GDS-2000A Series

SPECIFICATIONS

LOGIC ANALYZER (OPTION)

Sample Rate	500MSa/s
Bandwidth	200MHz
Record Length	2M max
Input Channels	16 Digital (D15 - D0) or 8 Digital (D7~D0)
Trigger Type	Edge, Pattern, Pulse Width, Serial bus (I^2C, SPI, UART, CAN, LIN), Parallel
Thresholds	Quad-D0 ~ D3, D4 ~ D7..Thresholds D8~D11*, D12~D15* (*: DS2-16LA only)
Threshold Selections	TTL, CMOS, ECL, PECL, User Defined
Threshold Accuracy	±100mV
User-defined Threshold Range	±10V
Maximum Input Voltage	±40V
Minimum Voltage Swing	±500mV
Input Impedance	101K probe loading 8 pF
Vertical Resolution	1 bit

OPERATING ENVIRONMENT

Temperature	0°C ~ 50°C, Relative Humidity≤ 80% at 40°C or below; ≤45% at 41°C~50°C

POWER SOURCE MISCELLANEOUS

Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection
Multi-Language Menu	Available
On-Line Help	Available
Time clock	Time and date, provide the date/time for saved data

DIMENSIONS & WEIGHT

380(W) X 220(H) X 145(D)mm, Approx. 4.2 kg

ORDERING INFORMATION

GDS-2304A 300 MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2204A 200 MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2104A 100 MHz, 4-Channel, Digital Storage Oscilloscope

Accessories :
Power cord x 1
GTP-150A-2 : 150 MHz (10:1/1:1) Switchable passive probe for GDS-2104A (one per channel)
GTP-250A-2 : 250 MHz (10:1/1:1) Switchable passive probe for GDS-2204A (one per channel)
GTP-350A-2 : 350 MHz (10:1/1:1) Switchable passive probe for GDS-2304A (one per channel)

OPTION

DS2-16LA 16-Channel Logic Analyzer includes
16 Channel Logic Analyzer Card(GLA-16)
16-Channel Logic Analyzer Probe(GTL-16LA)

DS2-08LA 8-Channel Logic Analyzer : includes
8-Channel Logic Analyzer Card(GLA-08)
8-Channel Logic Analyzer Probe(GTL-08LA)

DS2-LAN Ethernet & SVGA output
DS2-GPIB GPIB Interface
DS2-FGN DDS Function Generator

OPTIONAL ACCESSORIES

GTL-08LA	8-Channel Logic Analyzer Probe	**GCP-300**	300 kHz/200 A Current probe
GTL-16LA	16-Channel Logic Analyzer Probe	**GCP-530**	50 MHz/30 A Current probe
GLA-08	8-Channel Logic Analyzer Card	**GCP-500**	500 kHz/150 A Current probe
GLA-16	16-Channel Logic Analyzer Card	**GCP-1030**	100 MHz/30 A Current probe
GRA-420	Rack Mount Kit	**GCP-1000**	1 MHz/70 A Current probe
GAK-003	50 Ω Impedance Adapter	**GCP-206P**	Power supply for current probe(2 input channel)
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000 mm	**GCP-425P**	Power supply for current probe(4 input channel)
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm	**GCP-0275**	2 MHz/750 A Current probe
GTL-248	GPIB Cable, Double Shielded, 2000 mm	**GCP-0550**	5 MHz/500 A Current probe
GTP-033A	Oscilloscope Probe, 35 MHz 1:1 Passive Probe, BNC(P/M)	**GCP-2525**	25 MHz/250 A Current probe
GDB-03	Oscilloscope Education & Training Kit	**GDP-025**	25 MHz High voltage differential probe
GSC-008	Soft Carrying Case	**GDP-050**	50 MHz High voltage differential probe
		GDP-100	100 MHz High voltage differential probe

FREE DOWNLOAD

PC Software FreeWave software
Driver USB driver, LabView Driver

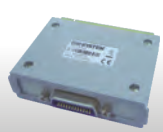
Rear Panel

DS2-16LA 16-Channel Logic Analyzer

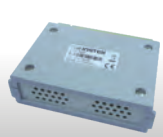
DS2-08LA 8-Channel Logic Analyzer

DS2-LAN Ethernet & SVGA Output

DS2-GPIB GPIB Interface



DS2-FGN DDS Function Generator



200 MHz/100 MHz Multi-function Programmable Oscilloscope

MPO-2000 Series

NEW

CE | USB high Speed | PC Software | Labview Driver | Ethernet

FEATURES

* MPO-2000P: 200MHz; 4CH/2CH
  MPO-2000B: 100MHz; 4CH/2CH
* Allow to Use Python Scripts to Control for Automation Purpose
* Dual Channel Spectrum Analyzer with Spectrogram
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Function
* MPO-2000P: CAN-FD, USB 2.0 (Full Speed), FlexRay, USB-PD, I^2S Digital Decoding
* MPO-2000B: CAN-FD, USB 2.0 (Full Speed) Digital Decoding
* MPO-2000P: Supports USB HID Protocol, Which Can be Used to Connect Keyboard, Mouse and Barcode Scanner Under Python Script Control
* MPO-2000P: Supports USB Host CDC-ACM Protocol, Which Controls Other GW Instek Instruments
* Equips with a Spectrum Analyzer; a Dual Channel 25MHz AWG; DMM and Power Supply
* Power Supply: Dual Channel Output, 1V to 20V Continuously Adjustable (0.1V step)

The MPO-2000 series is named after the abbreviation of Multi-function Programmable Oscilloscope. In addition to being an scilloscope, it also includes a spectrum analyzer, an arbitrary waveform generator, a digital multimeter and a DC power supply. In addition to the five-in-one multi-functional architecture, we innovatively introduced the Python script function into the MPO-2000, so that users can conduct program control of a small automated test system by setting up a single unit test or multi-unit test without a PC, hence, the name MPO.

The MPO-2000 series provides Basic and Professional versions (model suffixes are represented by B and P).In terms of bandwidth, the Basic version is 100MHz and the Professional version is 200MHz and the main difference is that the Professional version provides larger program memory and more system resources to achieve the ability to process longer waveform data. The series provides USB CDC device control to meet the needs of multi-unit collaborative tests, and a Python GUI library is provided to allow users to modify the original built-in Python APP or write their own programs that present curve drawing and GUI operation menus to be packaged into Python programs developed by users. The Basic version features the provided demo programs that can be executed (including programs with USB device control and GUI) and Python programs provided by users. In addition, the Professional version provides more diverse bus decoding functions, including FlexRay, USB-PD and I^2S. Many bus decoding functions are included in the standard configuration, and users do not have to pay to have the functions, making MPO-2000 more competitive.

MPO-2000P is the only product of its class that has a built-in Python GUI library. Users can build their own test systems at a lower cost. A variety of executable Python APPs are built-in. An all-in-one instrument with affordable pricing is ideal for test and measurement automation teaching courses; small-scale automated test of production lines, component tolerance testing for quality assurance, and diversified test applications. It is hoped that the launch of MPO-2000 can solve users' product test needs for repeatability and diversity, and can improve users' demand for simple and repetitive work efficiency and single-unit program control or the requirement of ploading test results to the cloud. It is also hoped that with the launch of MPO-2000, new markets can be explored in the fiercely competitive oscilloscope market and the overall competition of oscilloscopes can be improved.

Why do we choose to import Python into the oscilloscope? In the survey of top programming languages on GitHub in 2022, Python is second only to JavaScript in web-related applications, ranking second in the most popular programming language. The number of users of Python continues to grow, and the entry threshold is low. For beginners, its syntax is relatively simple and easy to learn. Python has become an increasingly common programming language, so we chose Python to be imported into the oscilloscopes to expand its program control applications.

The Python APP currently installed on MPO-2000 includes the following categories: BJT output characteristic curve; LC oscillator circuit frequency and temperature characteristic curve; fuse endurance test; LED forward bias characteristic curve and barcode scanner measurement application.

Python APP for MPO-2000

On the MPO-2000, if users want to modify or call the script of the drawing library, they must purchase the Pro version to modify the program by themselves to meet the testing of different DUTs. In addition, other manufacturers can use the built-in AWG function of the oscilloscope to achieve similar effects, but the voltage and power of this kind of AWG are too small, and their practicality is low. One single MPO-2000 unit can meet the IV test requirements of parts suitable for voltages below 20 V.

MPO-2000 is the only five-in-one instrument in the same class and provides seven innovative functions to extend diverse applications. The seven innovative functions include Python script execution, component tester I-V curve, MQTT protocol, serial bus decoding, spectrogram, Python GUI library* and USB CDC-ACM*; USB HID protocol*. (*: Professional version only).

SPECIFICATIONS

	MPO-2102B	MPO-2104B	MPO-2202P	MPO-2204P
Channels	2 ch+Ext	4 ch	2 ch+Ext	4 ch
Bandwidth	DC to 100 MHz	DC to 100 MHz	DC to 200 MHz	DC to 200 MHz
	(-3 dB)	(-3 dB)	(-3 dB)	(-3 dB)
Rise Time(calculated)	3.5 ns	3.5 ns	1.75 ns	1.75 ns
Bandwidth Limit	20 MHz	20 MHz	20M/100 MHz	20M/100 MHz
Python Script Execution (μPy)	Basic version	Basic version	Professional version	Professional version
VERTICAL SENSITIVITY				
Resolution	8 bit ; 1 mV to 10 V/div			
Input Coupling	AC, DC, GND			
Input Impedance	1 MΩ // 16 pF approx.			
DC Gain Accuracy	±(3 %)when 2 mV/div or greater is selected ; ±(5 %) when 1 mV/div is selected			
Polarity	Normal & Invert			
Maximum Input Voltage	300 Vrms, CAT I			
Offset Position Range	1 mV/div to 20 mV/div : ±0.5 V ; 50 mV/div to 200 mV/div : ±5 V ; 500 mV/div to 2 V/div : ±25 V ; 5V to 10 V/div : ±250 V			
Waveform Signal Process	+, -, ×, ÷, FFT, User Defined Expression. FFT: 1 Mpts ; FFT: Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning or Blackman			
TRIGGER				
Source	CH1 ,CH2, CH3**, CH4**, Line, EXT* ; *dual channel models only ; **four channel models only			
Trigger Mode	Auto (supports Roll Mode for 100 ms/div and slower), Normal, Single			
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Timeout, Alternate, Event-Delay(1 to 65535 events), Time-Delay (Duration, 4 ns to 10 s), Bus (UART, I^2C , SPI*, CAN, LIN) *This bus decoder is only available on 4 channel models			
Holdoff Range	4 ns to 10 s			
Coupling	AC, DC, LF rej. ,HF rej. ,Noise rej.			
Sensitivity	1 div			
EXTERNAL TRIGGER				
Range	±15 V			
Sensitivity	DC to 100 MHz Approx. 100 mV ; 100 MHz to 200 MHz Approx. 150 mV			
Input Impedance	1 MΩ±3 % to 16 pF			
HORIZONTAL				
Time Base Range	1 ns/div to 100 s/div (1-2-5 increments) ; ROLL: 100 ms/div to 100 s/div			
Pre-trigger	10 div maximum			
Post-trigger	2,000,000 div maximum			
Time Base Accuracy	±50 ppm over any ≥ 1 ms time interval			
Real Time Sample Rate	Max.:1 GSa/s (4 ch model); Per channel 1 GSa/s (2 ch model)			
Record Length	Per channel 10 M pts			
Acquisition Mode	Normal, Average, Peak Detect, Single			
Peak Detection	2 ns (typical)			
Average	selectable from 2 to 512			
X-Y MODE				
X-Axis Input	Channel 1; Channel 3 (four channel models only)			
Y-Axis Input	Channel 2; Channel 4 (four channel models only)			
Phase Shift	±3° at 100kHz			
CURSORS AND MEASUREMENT				
Cursors	Amplitude, Time, Gating available; Unit: Seconds(s), Hz(1/s) , Phase(degree) , Ration(%)			
Automatic Measurement	38 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx,FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase			
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth			
CONTROL PANEL FUNCTION				
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with “Undo Autoset”; “Fit Screen”/ “AC Priority” mode, and “Fine Scale” functions			
Save Setup	20 sets			
AWG SPECIFICATIONS				
Channels	2			
Sample Rate	200 Msa/s			
Vertical Resolution	14 bits			
Max. Frequency	25 MHz			
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac			
Output Range	20 mVpp to 5 Vpp, HighZ; 10 mVpp to 2.5 Vpp, 50 Ω			
Output Resolution	1 mV			
Output Accuracy	2 % (1 kHz)			
Offset Range	±2.5 V, HighZ; ±1.25 V, 50 Ω			
Offset Resolution	1 mV			
SINE				
Frequency Range	100 mHz to 25 MHz			
Flatness((relative to 1kHz)	±0.5 dB<15 MHz; ±1 dB 15 MHz to 25 MHz			
Harmonic Distortion	-40 dBc			
Stray (Non-harmonic)	-40 dBc			
Total Harmonic Distortion	1%			
S/N Ratio	40 dB			
SQUARE/PULSE				
Frequency Range	100 mHz to 15 MHz			
Rise/Fall Time	<15 ns			
Overshoot	<3 %			
Duty Cycle	Square: 50 %; Pulse: 0.4 % to 99.6 %			
Min. Pulse Width	30 ns			
Jitter	500 ps			
RAMP				
Frequency Range	100 mHz to 1 MHz			
Linearity	1%			
Symmetry	0 to 100 %			

200 MHz/100 MHz Multi-function Programmable Oscilloscope

SPECIFICATIONS

	MPO-2102B	MPO-2104B	MPO-2202P	MPO-2204P
SPECTRUM ANALYZER SPECIFICATIONS				
Frequency Range	DC to 500 MHz (Max. ,Max.bandwidth to 500 MHz uncalibrated)			
Span	1 kHz to 500 MHz (Max.)			
Resolution Bandwidth	1 Hz to 500 kHz (Max.)			
Reference Level	-50 dBm to +40 dBm in steps of 5 dBm			
Vertical Units	dBV RMS; Linear RMS; dBm			
Vertical Position	-12 divs to +12 divs			
Vertical Scale	1 dB/div to 20 dB/div in a 1-2-5 Sequence			
Display Average Noise Level	1 V/div < -50 dBm, Avg : 16100 mV/div < -70 dBm, Avg : 1610 mV/div < -90 dBm, Avg : 16			
Spurious Response	2 nd harmonic distortion < 40 dBc3rd harmonic distortion < 45 dBc			
Frequency Domain Trace Types	Normal ; Max Hold ; Min Hold ; Average (2 to 256)			
Detection Methods	Sample ; +Peak ; -Peak ; Average			
FFT Windows	FFT Factor : Hanning 1.44, Rectangular 0.89, Hamming 1.30, Blackman 1.68			
DMM SPECIFICATIONS				
Reading	5,000 counts			
Voltage Input	CAT II 600 Vrms, CAT III 300 Vrms			
	Below are the basic conditions required to operate the DMM within specifications: *Calibration: Yearly. *Operating Temperature Specification: 18°C to 28°C (64.4°F to 82.4°F). *Relative humidity: 80 %. (Non condensing) *AC measurement are based on a 50 % duty cycle.			
DC Voltage	50 mV, 500 mV, 5 V, 50 V, 500 V, 1000 V, 6 ranges			
Accuracy	50 mV, 500 mV, 5 V, 50 V, 500 V, 1000 V : ±(0.1 % reading + 5 digits)			
Input Impedance	10 MΩ			
DC Current	50 mA, 500 mA, 10 A, 3 ranges			
Accuracy	50 mA to 500 mA : ±(0.5 % reading + 0.05 mA) ; 10 A : ±(0.5 % reading + 50 mA)			
AC Voltage*	50 mV, 500 mV, 5 V, 50 V, 750 V, 5 range. * : AC voltage measurements above 700 V are not guaranteed to meet specifications.			
Accuracy	50 mV, 500 mV, 5 V, 50 V, 750 V : ±(1.5 % reading + 15 digits) at 50 Hz to 1 kHz			
AC Current	50 mA, 500 mA, 10 A, 3 ranges			
Accuracy*	50 mA, 500 mA: ±(1.5 % reading + 0.05 mA) at 50 Hz to 1 kHz 10 A: ±(3 % reading + 50 mA) at 50 Hz to 1 kHz ; * : Measure range: > 10 mA			
Resistance*	50 Ω, 500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ, 50 MΩ, 7 range. *: In resistance measurements, the 50 Ω and 50 MΩ ranges are not guaranteed to meet specifications.			
Accuracy	500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ: ±(0.3 % reading + 3 digits) 5 MΩ: ±(0.5 % reading + 3 digits)			
Diode Test	Maximum forward voltage 1.5 V, Open voltage 2.8 V			
Temperature (Thermocouple)*	Range: -50 °C to + 1000 °C; Resolution: 0.1 °C *: Specifications do not include probe accuracy.			
Continuity Beeper	15 Ω			
POWER SUPPLY SPECIFICATIONS				
Output Channel	CH1 & CH2			
Output Range	1 V to 5 V/1 A; 5 V to 10 V/0.5 A ; 10 V to 20 V/0.25 A ; Peak current: 1 A @250 ms			
Voltage Step	0.1V Continuously Adjustable			
Output Voltage Accuracy	±3 %			
Ripple and Noise	50 mVrms			
DISPLAY				
TFT LCD Type	8" TFT LCD WVGA color display			
Display Resolution	800 horizontal × 480 vertical pixels (WVGA)			
Interpolation	Sin(x)/x			
Waveform Display	Dots, vectors, variable persistence (16 ms to 4 s), infinite persistence			
Waveform Update Rate	120,000 waveforms per second, maximum			
Display Graticule	8 x 10 divisions			
Display Mode	YT ; XY			
INTERFACE				
USB 2.0 Hi-speed Host Port	One on the front panel. Supporting USB2.0 Mass Storage Class (FAT32 or NTFS formatted); Professional version (MPO-2000P series) also supports USB CDC ACM Class and USB HID Class			
USB 2.0 Hi-speed Device Port	One on the rear panel, USBTMC Class is supported			
Ethernet(LAN) Port	RJ-45 connector, 10/100 Mbps with HP Auto-MDIX which also supporting TCP sockets communication, the TCP socket communication is using the default 5025 port number			
Web Server	Supporting remote control and monitoring of the oscilloscope in web browser by using the LAN			
Go-NoGo BNC	5 V Max/10 mA TTL open collector output			
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock			
MISCELLANEOUS				
Multi-language Menu	Available			
Operation Environment	Temperature: 0 °C to 50 °C. Relative Humidity ≤ 80 % at 40 °C or below; ≤ 45 % at 41 °C to 50 °C			
Python Script Execution (µPy)	Maximum number of installable python apps: 100 sets (including the pre-installed Python apps); Note: There is no restriction on script files (*.py); APPs installation capacity limit: 20 M byte maximum; MQTT Protocol: "Message Queuing Telemetry Transport" is supported which including the "Publish" and "Subscribe" pattern. Basic version (MPO-2000B series): Supporting 1,000 points waveform data processing; Professional version (MPO-2000P series): Supporting USB CDC ACM Class, USB HID Class, Python GUI library, 100,000 points waveform data processing			
Component Tester	Providing I-V characteristic curve (tracer) with readout scale; Please refer to the application note for the details			
Time Clock	Time and Date , Provide the Date/Time for saved data			
Internal flash disk	100 M bytes Single-Level Cell flesh memory			
Installed APP	Go/NoGo, DVM, DataLog, Digital Filter, Frequency Response Analyzer, Mask, CAN-FD * , USB2.0 (full speed) * , FlexRay * + , I^2S * +, USB-PD * +, Mount Remote Disk, Demo. * : Available for bus decoder function ; + : For Professional version (MPO-2000P series) Note: The I^2S bus decoder is only available on 4 channel models.			
Dimensions & Weight	384(W) x 208(H) x 127.3(D) mm, Approx. 3 kg			

MPO-2000 Series

ORDERING INFORMATION

MPO-2204P	200 MHz, 4-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25 MHz AWG, 5000 counts DMM and Power Supply
MPO-2202P	200 MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25 MHz AWG, 5000 counts DMM and Power Supply
MPO-2104B	100 MHz, 4-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25 MHz AWG, 5000 counts DMM and Power Supply
MPO-2102B	100 MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25 MHz AWG, 5000 counts DMM and Power Supply

ACCESSORIES :

Power Cord, Certificate of Calibration, Passive probe (one probe per channel)
GTL-110 BNC-BNC cable x 2, GTL-105A Alligator Clip test lead, GTL-207 Banana plug test lead
GTP-100B-4 100 MHz(10:1/1:1)Switchable passive probe for MPO-2102B/2104B(one per channel)
GTP-200B-4 200 MHz(10:1/1:1)Switchable passive probe for MPO-2202P/2204P(one per channel)

OPTIONAL ACCESSORIES

GRA-426	Rack Adapter Panel
GAK-003	50 Ω Impedance Adapter
GSC-008	Soft Carrying Case
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm
GDP-025	Differential Probe, 25 M High Voltage Differntial Probe
GDP-050	Differential Probe, 50 M High Voltage Differntial Probe
GCP-300	300 kHz/200 A Current probe
GCP-530	50 MHz/30 A Current probe
GCP-500	500 kHz/150 A Current probe
GCP-1030	100 MHz/30 A Current probe
GCP-1000	1 MHz/70 A Current probe
GCP-206P	Power supply for current probe (2 input channel)
GCP-425P	Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030
GCP-0275	2 MHz/750 A Current probe
GCP-0550	5 MHz/500 A Current probe
GCP-2525	25 MHz/250 A Current probe

OPTIONAL

MP2-PRO	Basic version upgrade to professional version

FREE DOWNLOAD

PC Software	OpenWave software
Driver	LabView driver

Rear Panel

GRA-426 Rack Adapter Panel

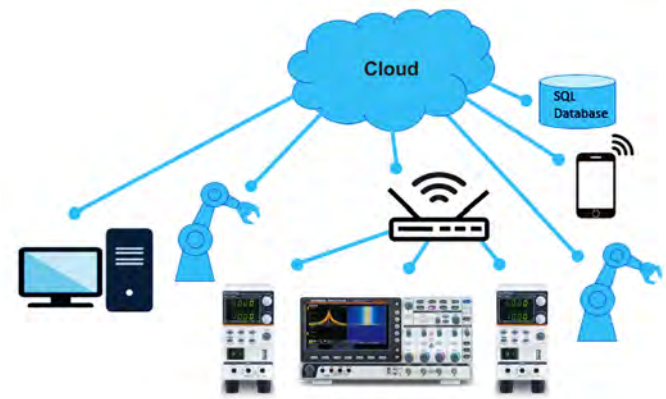
Rack Mounting (19" , 6 U)

GAK-003 50 Ω Impedance Adapter

GSC-008 Soft Carrying Case

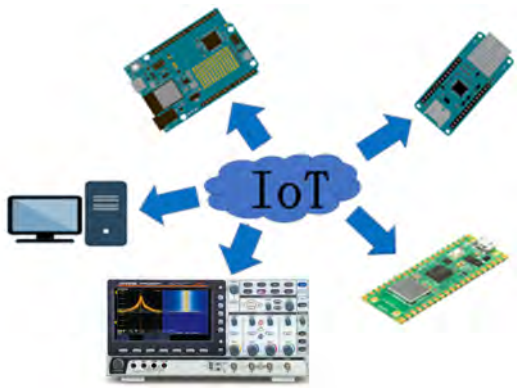
200 MHz/100 MHz Multi-function Programmable Oscilloscope

A. PYTHON SCRIPT EXECUTION



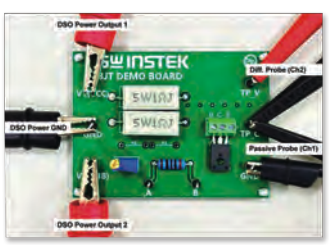
Maximum number of installable python APPs: 100 sets (including pre-installed Python APPs).Running Python source code (.py file) from internal disk or USB flash disk.

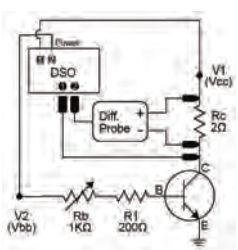
B. SUPPORT MQTT PROTOCOL

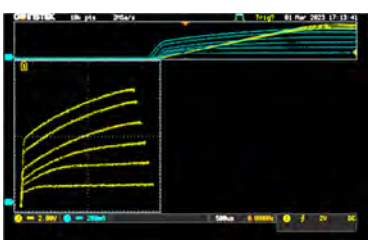


MPO-2000 also supports MQTT (Message Queuing Telemetry Transport) protocol. For publishers, measurement data can be transmitted to the cloud and for subscribers, remote control of an oscilloscope can be realized.

C. COMPONENT TESTER I-V CURVE

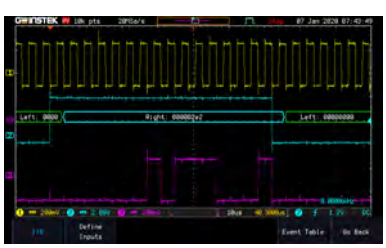






Providing I-V characteristic curve (Curve Tracer) with readout scale. The transistor characteristic curve is our first application after completing the Python software platform. We use MPO-2000 to implement the Curve Tracer function application. XY mode is used to have waveform accumulation (as shown in the figures below). Users can use the two built-in 20 V DC power outputs of MPO-2000. The Professional version can use an external DC power supply through USB CDC-ACM.

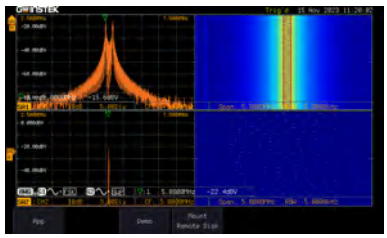
D. SERIAL BUS DECODING



Decoding Category	Application
CAN-FD	Automobile/electric vehicle control system signal transmission
USB 2.0 (Full Speed)	PC peripheral device/CPU embedded system development
FlexRay (Professional Version)	Automobile/electric vehicle control system signal transmission
I^2S (Professional Version)	Digital audio signal transmission
USB-PD (Professional Version)	USB Power Delivery for portable battery quick charging

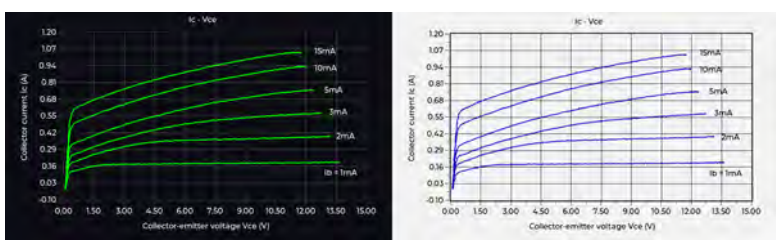
MPO-2000 provides CAN FD / USB 2.0 (FS) decoding in the Basic version and CAN FD / USB 2.0 (FS) / FlexRay / USB PD / I^2S decoding is provided in the Professional version. No additional options are required for decoding and analysis of new automotive, USB and audio protocols.

E. DUAL CHANNEL SPECTRUM ANALYZER WITH SPECTROGRAM



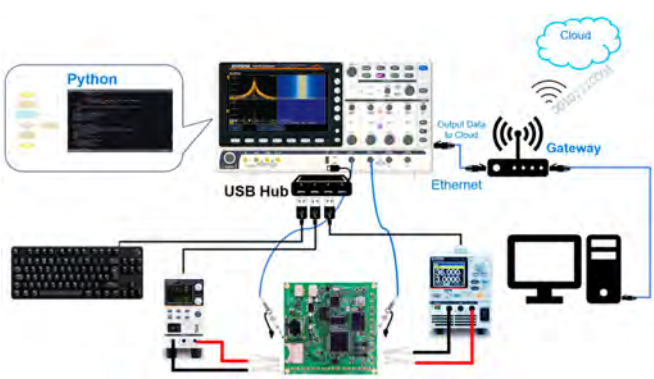
Other than signal measurement on time domain, MPO-2000 also provides the frequency domain measurement and operation, which are similar to a spectrum analyzer. The dual channel spectrum analyzer and spectrogram are equipped. Users can measure and analyze dual channel frequency domain signals at the same time. The spectrogram function, which allows users to easily observe the signal's strength distribution and the relationship of the spectrum distribution over time. For promotion selling point, dual Spectrum Analyzer and Spectrogram can test the frequency response of low frequency ~ VHF wireless communication; audio processing; vibration analysis (abnormal resonance of mechanical equipment), etc.

F. SUPPORT PYTHON GUI LIBRARY

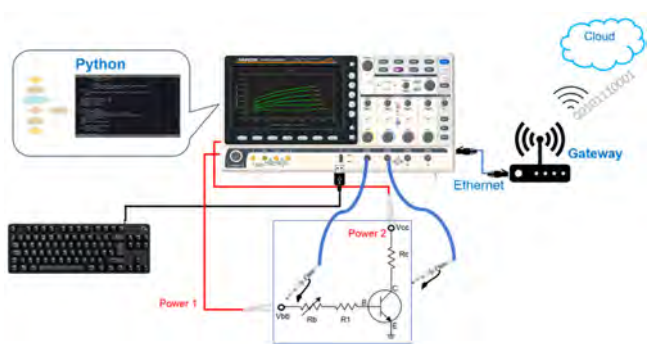


The Basic version can execute Python APP (with scale) with GUI drawing mode, and the parameters can be modified to accommodate the testing of different parts to be tested. If users wish to modify the script that is from the drawing library, users must purchase the Pro version to modify the program by themselves. The Python GUI library can be used to draw scaled charts. (As shown in the figures left, users can modify background color arbitrarily).

G. SUPPORT USB CDC-ACM TO ACHIEVE MULTI-UNIT COLLABORATIVE TEST



As Console: Control Other Instruments



Standalone Auto-measurement

The above two schematic diagrams are single-unit and multi-unit collaborative tests. No additional computer is required. Users only need to plug in a USB keyboard to program on a MPO-2000P model, and the measurement results can be presented in charts. It can also be saved as a CSV or image file, or uploaded to the cloud. It has the function of Python script execution to implement edge computing.

200 MHz/100 MHz Mixed-signal Oscilloscope

VPO
Visual Persistence Oscilloscope

MSO-2000EA Series

CE | USB high Speed | PC Software | Labview Driver | Ethernet | PictBridge Compatible

FEATURES

* 200/100 MHz Bandwidth Selections : 2 or 4 Channels
* Real Time Sample Rate Per Channel : 1 GSa/s (2 Channel Models); Maximum Real Time Sample Rate : 1 GSa/s (4 Channel Models)
* MSO-2000EA Equips with a 16 Channel Logic Analyzer and a Dual Channel 25 MHz Arbitrary Waveform Generator
* Free Frequency Response Analyzer Software
* Per Channel 10 M Memory Depth and VPO Waveform Display Technology
* Waveform Update Rate up to 120,000 wfm/s
* 8 ” WVGA TFT LCD
* Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
* High Pass, Low Pass and Band Pass Filter Functions
* 29,000 Segmented Memory Sections and Waveform Search Function
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
* Data Log Function is Able to Track Signal Changes up to 1000 Hours
* Mask Test Function
* Network Storage Function

SPECIFICATIONS

	MSO-2102EA	MSO-2104EA	MSO-2202EA	MSO-2204EA
VERTICAL SENSITIVITY				
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC~100MHz(-3dB)		DC~200MHz(-3dB)	
Calculated Rise Time	3.5ns		1.75ns	
Bandwidth Limit	20MHz		20M/100MHz	
Vertical Resolution	8 bits : 1mV ~ 10V/div			
Input Coupling	AC, DC, GND			
Input Impedance	1MΩ// 16pF approx.			
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected			
Polarity	Normal & Invert			
Maximum Input Voltage	300Vrms , CAT I (300Vrms CAT II with GTP-070B-4/100B-4/200B-4, 10 : 1 probe)			
Offset Position Range	1mV/div ~ 20mV/div : ±0.5V ; 50mV/div ~ 200mV/div : ±5V ; 500mV/div ~ 2V/div : ±25V ; 5V/div~10V/div : ±250V			
Waveform Signal Process	+ , - , × , ÷ , FFT, Uesr Defined Expression FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS ; FFT Window Displays : Rectangular, Hamming, Hanning, Blackman-Harris			
TRIGGER				
Source	CH1 ,CH2, CH3, CH4, Line, EXT* ; *dual channel models only			
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence			
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay (1~65,535 events), Time-Delay(Duration;4ns~10s), Bus			
Trigger Holdoff Range	4ns ~ 10s			
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.			
Sensitivity	1div			
EXT TRIGGER				
Range	±15V			
Sensitivity	DC ~ 100MHz Approx. 100mV; 100MHz ~ 200MHz Approx. 150mV			
Input Impedance	1MΩ±3%, ~16pF			
HORIZONTAL				
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div			
Pre-trigger	10 div maximum			
Post-trigger	2,000,000 div maximum			
Time Base Accuracy	±50 ppm over any ≥ 1 ms time interval			
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch model)			
Record Length	10Mpts/CH			
Acquisition Mode	Normal, Average, Peak Detect, Single			
Peak Detection	2ns (typical)			
Average	Selectable from 2 to 256			
X-Y MODE				
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)			
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)			
Phase Shift	±3° at 100kHz			
CURSORS AND MEASUREMENT				
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)			
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx., FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase Cursors measurement			
Control Panel Function	Cursors measurement			
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth			
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset			
Save Setup	20set			
Save Waveform	24set			
DISPLAY SYSTEM				
TFT LCD Type	8" TFT LCD WVGA color display			
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)			
Interpolation	Sin(x)/x			
Waveform Display	Dots, Vectors, Variable persistence(16ms~10s), Infinite persistence			
Waveform Update Rate	120,000 waveforms per second, maximum			
Display mode	YT ; XY			
Display Graticule	8 x 10 divisions			
INTERFACE				
USB Port	USB 2.0 Hish-speed host port x 1, USB 2.0 High-speed device port x 1			
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX			
Go/NoGo BNC	5V Max/10mA open collector output			
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock			
LOGIC ANALYSER SPECIFICATIONS				
Sample Rate	Per Channel 1GSa/s			
Bandwidth	200MHz			
Record Length	Per Channel 10M pts (max)			
Input Channels	16 Digital (D15 - D0)			
Trigger Type	Edge,Pattern,Pulse Width,Serial bus (I^2C,SPI,UART(RS232/422/485),CAN,LIN),Parallel Bus			
Thresholds Quad	D0~D3, D4~D7,D8~D11 ,D12~D15 Thresholds			
Threshold Selections	TTL, CMOS(5V,3.3V,2.5V), ECL, PECL,0V ,User Defined			
User-defined Threshold Range	±5V			
Maximum Input Voltage	±40 V			
Minimum Voltage Swing	±250 mV			
Input Impedance	101KΩ probe loading 8pF			
Vertical Resolution	1 bit			

MSO-2000EA Series

SPECIFICATIONS

	MSO-2102EA	MSO-2104EA	MSO-2202EA	MSO-2204EA
AWG SPECIFICATIONS (MSO-2000EA only)				
Channels	2			
Sample Rate	200 MSa/s			
Vertical Resolution	14 bits			
Max. Frequency	25 MHz			
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac			
Output Range	20 mVpp to 5 Vpp, High Z; 10 mVpp to 2.5 Vpp, 50 Ω			
Output Resolution	1mV			
Output Accuracy	2% (1 kHz)			
Offset Range	±2.5 V ac+dc, High Z; ±1.25 V ac+dc, 50 Ω			
Offset Resolution	1mV			
FREQUENCY RESPONSE ANALYSIS				
Dynamic Range	> 80 dB (typical)			
Input and Output Sources	Channel 1 or 2 (3 or 4 for four channel model)			
Frequency Range	20 Hz to 25 MHz			
Number of Test Points	10 to 90 points per decade			
Test Amplitude	20 mVpp to 5 Vpp into High-Z Fixed amplitude across entire sweep			
Test Results	Logarithmic overlaid gain and phase plot			
Manual Measurements	Two pairs of tracking gain and phase markers			
Plot Scaling	Auto-scaled during test			
POWER SOURCE MISCELLANEOUS				
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection			
Multi-Language Menu	Available			
On-Line Help	Available			
Time clock	Time and date, provide the date/time for saved data			
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: ≤80%, 40°C or below; ≤45%, 41°C ~ 50°C			
DIMENSIONS & WEIGHT				
	384(W) X 208(H) X 127.3(D)mm, Approx. 2.8 kg			

Note : Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

MSO-2204EA 200 MHz, 4 + 16 Channel, Mixed-signal Oscilloscope
MSO-2202EA 200 MHz, 2 + 16 Channel, Mixed-signal Oscilloscope
MSO-2104EA 100 MHz, 4 + 16 Channel, Mixed-signal Oscilloscope
MSO-2102EA 100 MHz, 2 + 16 Channel, Mixed-signal Oscilloscope
* Built-in a Dual Channel 25MHz Arbitrary Waveform Generator

ACCESSORIES :
Power cord x 1,
GCP-201 Probe Clip, 20 PCS **GTL-16E** 16-Channel Logic Analyzer Probe
GTP-100B-4 100 MHz(10:1/1:1)Switchable passive probe for MSO-2102EA/2104EA(one per channel)
GTP-200B-4 200 MHz(10:1/1:1)Switchable passive probe for MSO-2202EA/2204EA(one per channel)

OPTIONAL ACCESSORIES

GTL-16E 16-Channel Logic Analyzer Probe
GRA-426 Rack Mount Kit
GAK-003 50 Ω Impedance Adapter
GSC-008 Soft Carrying Case
GTL-246 USB Cable, USB 2.0, A-B Type, 1200 mm
GDB-03 Oscilloscope Education & Training Kit
GTP-033A Oscilloscope Probe, 35 MHz 1:1 Passive Probe, BNC(P/M)
GCP-300 300 kHz/200 A Current probe
GDP-025 25 MHz High voltage differential probe
GDP-050 50 MHz High voltage differential probe
GDP-100 100 MHz High voltage differential probe
GCP-530 50 MHz/30 A Current probe
GCP-500 500 kHz/150 A Current probe
GCP-1030 100 MHz/30 A Current probe
GCP-1000 1 MHz/70 A Current probe
GCP-206P Power supply for current probe (2 input channel)
GCP-425P Power supply for current probe (4 input channel)
GCP-201 Probe Clip, 20 PCS
GCP-0275 2 MHz/750 A Current probe
GCP-0550 5 MHZ/500 A Current probe
GCP-2525 25 MHZ/250 A Current probe

FREE DOWNLOAD

PC Software OpenWave software
Driver USB driver ; LabView driver

Rear Panel

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000EA Series/MDO-2000A/2000E Series

GTL-16E 16-Channel Logic Analyzer Probe

For : MSO-2000EA Series

GCP-201 Probe Clip , 20PCS

For : MSO-2000EA Series

300 MHz/200 MHz/100MHz Mixed-domain Oscilloscope

VPO
Visual Persistence Oscilloscope

MDO-2000A Series

CE | USB high Speed | PC Software | Labview Driver | Ethernet | PictBridge Compatible

FEATURES

* 300/200/100MHz Bandwidth Selections: 2 Channels
* Maximum Real Time Sampling Rate: 2 GSa/s
* MDO-2000A Equips with a Spectrum Analyzer MDO-2000AG Equips with a Spectrum Analyzer ; a Dual Channel 25MHz AWG
* Per Channel 20M Memory Depth and VPO Waveform Display Technology
* Waveform Update Rate up to 120,000 wfm/s
* 8 ” WVGA TFT LCD
* MDO-2000AG Provides Frequency Response Analysis Function
* Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
* High Pass, Low Pass and Band Pass Filter Functions
* 29,000 Segmented Memory Sections and Waveform Search Function
* I^2C/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
* Data Log Function is able to Track Signal Changes up to 1000 Hours
* Mask Test Function
* Network Storage Function

SPECIFICATIONS

	MDO-2102A/G	MDO-2202A/G	MDO-2302A/G
VERTICAL SENSITIVITY			
Channels	2Ch+EXT	2Ch+EXT	2Ch+EXT
Bandwidth	DC~100MHz(-3dB)	DC~200MHz(-3dB)	DC~300MHz(-3dB)
Calculated Rise Time	3.5ns	1.75ns	1.17ns
Bandwidth Limit	20MHz	20M/100MHz	20M/100M200MHz
Vertical Resolution	8 bits : 1mV ~ 10V/div		
Input Coupling	AC, DC, GND		
Input Impedance	1MΩ// 16pF approx.		
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected		
Polarity	Normal & Invert		
Maximum Input Voltage	300Vrms , CAT I		
Offset Position Range	1mV/div ~ 20mV/div : ±0.5V ; 50mV/div ~ 200mV/div : ±5V ; 500mV/div ~ 2V/div : ±25V ; 5V/div~10V/div : ±250V		
Waveform Signal Process	+ , - , × , ÷ , FFT , Uesr Defined Expression FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS and FFT Window to Rectangular, Hamming , Hanning, or Blackman		
TRIGGER			
Source	Ch1 ,CH2, Line, EXT		
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence		
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay (1~65,535 events),Time-Delay(Duration;4ns~10s), Bus		
Trigger Holdoff Range	4ns ~ 10s		
Coupling	AC, DC, LF rej. , Hf rej. , Noise rej.		
Sensitivity	1div		
EXT TRIGGER			
Range	±15V		
Sensitivity	DC ~ 100MHz Approx. 100mV; 100MHz ~ 200MHz Approx. 150mV; 200MHz ~ 300MHz Approx. 150mV		
Input Impedance	1MΩ±3%, ~16pF		
HORIZONTAL			
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div		
Pre-trigger	10 div maximum		
Post-trigger	2,000,000 div maximum		
Time Base Accuracy	±50 ppm over any≥ 1 ms time interval		
Real Time Sample Rate	Max. : 2GSa/s (shared)		
Record Length	Per Channel 20Mpts		
Acquisition Mode	Normal, Average, Peak Detect, Single		
Peak Detection	2ns (typical)		
Average	Selectable from 2 to 256		
X-Y MODE			
X-Axis Input	Channel 1		
Y-Axis Input	Channel 2		
Phase Shift	±3° at 100kHz		
CURSORS AND MEASUREMENT			
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)		
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx., FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase		
CONTROL PANEL FUNCTION			
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth		
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset		
Save Setup	20 sets		
Save Waveform	24 sets		
DISPLAY SYSTEM			
TFT LCD Type	8" TFT LCD WVGA color display		
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)		
Interpolation	Sin(x)/x		
Waveform Display	Dots, Vectors, Variable persistence(16ms~4s), Infinite persistence		
Waveform Update Rate	120,000 waveforms per second, maximum		
Display Mode	YT ; XY		
Display Graticule	8 x 10 divisions		
INTERFACE			
USB Port	USB 2.0 High-speed host port x 1, USB 2.0 High-speed device port x 1		
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX		
Go/NoGo BNC	5V Max/10mA open collector output		
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock		
SPECTRUM ANALYZER SPECIFICATIONS			
Frequency Range	DC~1GHz(Max.) (Max. bandwidth ~1GHz uncalibrated)		
Span	1kHz ~ 1GHz(Max.)		
Resolution Bandwidth	1Hz ~ 1MHz(Max.)		
Reference Level	-50 dBm to +40dBm in steps of 5dBm		
Vertical Units	dBV RMS; Linear RMS; dBm		
Vertical Position	-12divs to +12divs		
Vertical Scale	1dB/div to 20dB/div in a 1-2-5 Sequence		
Display Average Noise Level	1V/div < -50dBm, Avg : 16 ; 100mV/div < -70dBm, Avg : 16 ; 10mV/div < -90dBm, Avg : 16		
Spurious Response	2nd harmonic distortion< 40dBc ; 3rd harmonic distortion< 45dBc		
Frequency Domain Trace Types	Normal ; Max Hold ; Min Hold ; Average (2 ~ 256)		
Detection Methods	Sample ; +Peak ; -Peak ; Average		
FFT Windows	FFT Factor : Hanning 1.44 ; Rectangular 0.89 ; Hamming 1.30 ; Blackman 1.68		
AWG SPECIFICATIONS (MDO-2000AG only)			
Channels	2		
Sample Rate	200 MSa/s		
Vertical Resolution	14 bits		
Max. Frequency	25 MHz		
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac		
Output Range	20 mVpp to 5 Vpp, HighZ;10 mVpp to 2.5 Vpp, 50 Ω		
Output Resolution	1mV		
Output Accuracy	2% (1 kHz)		
Offset Range	±2.5 V ac+dc, High Z; ±1.25 V ac+dc, 50 Ω		
Offset Resolution	1mV		

MDO-2000A Series

SPECIFICATIONS

	MDO-2102A/G	MDO-2202A/G	MDO-2302A/G
Sine	Frequency Range: 100mHz~25MHz ; Flatness(relative to 1kHz): ±0.5dB<15MHz; ±1 dB 15MHz~25MHz; Harmonic Distortion:-40dBc;Stray(Non-harmonic):-40dBc;Total Harmonic Distortion:1%;S/N Ratio:40dB		
Square/Pulse	Frequency Range : 100mHz~15MHz ; Rise/Fall time : <15ns ; Overshoot : <3% ; Duty cycle Square : 50% & Pulse : 0.4%~99.6% ; Min. Pulse Width : 30 ns ; Jitter:500 ps		
Ramp	Frequency Range :100mHz~1MHz ; Linearity : 1% ; Symmetry : 0~100%		
FREQUENCY RESPONSE ANALYSIS (MDO-2000AG only)			
Dynamic Range	> 80 dB (typical)		
Input and Output Sources	Channel 1 or 2		
Frequency Range	20 Hz to 25 MHz		
Number of Test Points	10 to 90 points per decade		
Test Amplitude	20 mVpp to 5 Vpp into High-Z ; Fixed test amplitude or custom amplitude for each decade		
Test Results	Logarithmic overlaid gain and phase plot		
Manual Measurements	Two pairs of tracking gain and phase markers		
Plot Scaling	Auto-scaled during test		
MISCELLANEOUS			
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection		
Multi-Language Menu	Available		
On-Line Help	Available		
Time Clock	Time and date, provide the date/time for saved data		
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: ≤80% at 40°C or below; ≤45%, 41°C ~ 50°C		
Dimensions & Weight	384(W) X 208(H) x 127.3(D) mm, Approx. 3kg		

Note : Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

MDO-2302AG 300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2202AG 200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2102AG 100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2302A 300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2202A 200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2102A 100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer

Accessories :
Power cord x 1,
GTL-110 BNC-BNC cable x 2 (only on MDO-2000AG)
GTP-100B-4 : 100MHz(10:1/1:1)Switchable passive probe for MDO-2102A/2102AG(one per channel)
GTP-200B-4 : 200MHz(10:1/1:1)Switchable passive probe for MDO-2202A/2202AG(one per channel)
GTP-300B-4 : 300MHz(10:1/1:1)Switchable passive probe for MDO-2302A/2302AG(one per channel)

OPTIONAL ACCESSORIES

GRA-426 Rack Adapter Panel
GAK-003 50Ω Impedance Adapter
GSC-008 Soft Carrying Case
GTL-246 USB Cable, USB 2.0, A-B Type, 1200mm
GTP-033A Oscilloscope Probe, 35MHz 1:1 Passive Probe
GDP-025 Differential Probe, 25M High Voltage Differntial Probe
GDP-050 Differential Probe, 50M High Voltage Differntial Probe

GCP-300 300kHz/200A Current probe
GCP-530 50MHz/30A Current probe
GCP-500 500kHz/150A Current probe
GCP-1030 100MHz/30A Current probe
GCP-1000 1MHz/70A Current probe
GCP-206P Power supply for current probe (2 input channel)
GCP-425P Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030
GCP-0275 2 MHz/750 A Current probe
GCP-0550 5 MHz/500 A Current probe
GCP-2525 25 MHz/250 A Current probe

FREE DOWNLOAD

PC Software OpenWave software
Driver USB driver ; LabView driver

Rear Panel

GRA-426 Rack Adapter Panel

Rack Mounting (19" , 6U)

GAK-003 Impedance Adapter

GSC-008 Soft Carrying Case

200 MHz/100 MHz Mixed-domain Oscilloscope

VPO
Visual Persistence Oscilloscope

MDO-2000E Series

CE | USB high Speed | PC Software | Labview Driver | Ethernet | PictBridge Compatible

FEATURES

* 200/100 MHz Bandwidth Selections: 2 or 4 Channels
* Real Time Sample Rate Per Channel: 1 GSa/s (2 Channel Models); Maximum Real Time Sample Rate: 1 GSa/s (4 Channel Models)
* MDO-2000EG Equips with a Spectrum Analyzer and a Dual Channel 25 MHz AWG
* MDO-2000EX Equips with a Spectrum Analyzer ; a Dual Channel 25 MHz AWG; DMM and Power Supply
* Per Channel 10 M Memory Depth and VPO Waveform Display Technology
* Waveform Update Rate up to 120,000 wfm/s
* 8 ” WVGA TFT LCD
* Free Frequency Response Analyzer Software
* Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
* High Pass, Low Pass and Band Pass Filter Functions
* 29,000 Segmented Memory Sections and Waveform Search Functions
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
* Data Log Function is Able to Track Signal Changes up to 1000 Hours
* Mask Test Function
* Network Storage Function
* True RMS Measurement in DMM Function

SPECIFICATIONS

	MDO-2102E(G/X)	MDO-2104E(G/X)	MDO-2202E(G/X)	MDO-2204E(G/X)
VERTICAL SENSITIVITY				
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC~100MHz(-3dB)		DC~200MHz(-3dB)	
Calculated Rise Time	3.5ns		1.75ns	
Bandwidth Limit	20MHz		20M/100MHz	
Vertical Resolution	8 bits : 1mV ~ 10V/div			
Input Coupling	AC, DC, GND			
Input Impedance	1MΩ// 16pF approx.			
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected			
Polarity	Normal & Invert			
Maximum Input Voltage	300Vrms , CAT I			
Offset Position Range	1mV/div ~ 20mV/div: ±0.5V ; 50mV/div ~ 200mV/div: ±5V ; 500mV/div ~ 2V/div: ±25V; 5V/div~10V/div: ±250V			
Waveform Signal Process	+ , - , × , ÷ , FFT , Uesr Defined Expression FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS and FFT Window to Rectangular, Hamming, Hanning, or Blackman			
TRIGGER				
Source	CH1 ,CH2, CH3, CH4, Line, EXT* ; *dual channel models only			
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence			
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay (1~65,535 events),Time-Delay(Duration;4ns~10s), Bus			
Trigger Holdoff Range	4ns ~ 10s			
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.			
Sensitivity	1div			
EXT TRIGGER				
Range	±15V			
Sensitivity	DC ~ 100MHz Approx. 100mV; 100MHz ~ 200MHz Approx. 150mV			
Input Impedance	1MΩ±3%, ~16pF			
HORIZONTAL				
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div			
Pre-trigger	10 div maximum			
Post-trigger	2,000,000 div maximum			
Time Base Accuracy	±50 ppm over any ≥ 1 ms time interval			
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch model)			
Record Length	10Mpts/CH			
Acquisition Mode	Normal, Average, Peak Detect, Single			
Peak Detection	2ns (typical)			
Average	Selectable from 2 to 256			
X-Y MODE				
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)			
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)			
Phase Shift	±3° at 100kHz			
CURSORS AND MEASUREMENT				
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)			
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx., FRR,FRF,FFR,FFF,LRR,LRF,LFR,LFF,Phase			
CONTROL PANEL FUNCTION				
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth			
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset			
Save Setup	20 sets			
Save Waveform	24 sets			
DISPLAY SYSTEM				
TFT LCD Type	8" TFT LCD WVGA color display			
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)			
Interpolation	Sin(x)/x			
Waveform Display	Dots, Vectors, Variable persistence(16ms~4s), Infinite persistence			
Waveform Update Rate	120,000 waveforms per second, maximum			
Display mode	YT ; XY			
Display Graticule	8 x 10 divisions			
INTERFACE				
USB Port	USB 2.0 High-speed host port x 1, USB 2.0 High-speed device port x 1			
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX			
Go/NoGo BNC	5V Max/10mA open collector output			
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock			
SPECTRUM ANALYZER SPECIFICATIONS				
Frequency Range	DC~500MHz(Max.) (Max. bandwidth ~500MHz uncelebrated)			
Span	1kHz ~ 500MHz(Max.)			
Resolution Bandwidth	1Hz ~ 500kHz(Max.)			
Reference Level	-50 dBm to +40dBm in steps of 5dBm			
Vertical Units	dBV RMS; Linear RMS; dBm			
Vertical Position	-12divs to +12divs			
Vertical Scale	1dB/div to 20dB/div in a 1-2-5 Sequence			
Display Average Noise Level	1V/div < -50dBm, Avg : 16 ; 100mV/div < -70dBm, Avg : 16 ; 10mV/div < -90dBm, Avg : 16			
Spurious Response	2nd harmonic distortion< 40dBc ; 3rd harmonic distortion< 45dBc			
Frequency Domain Trace Types	Normal ; Max Hold ; Min Hold ; Average (2 ~ 256)			
Detection Methods	Sample ; +Peak ; -Peak ; Average			
FFT Windows	FFT Factor : Hanning 1.44 ; Rectangular 0.89 ; Hamming 1.30 ; Blackman 1.68			
AWG SPECIFICATIONS				
Channels	2			
Sample Rate	200 MSa/s			
Vertical Resolution	14 bits			
Max. Frequency	25 MHz			
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac			
Output Range	20 mVpp to 5 Vpp, High Z ; 10 mVpp to 2.5 Vpp, 50Ω			
Output Resolution	1mV			
Output Accuracy	2% (1 kHz)			
Offset Range	±2.5 V ac+dc, High Z; ±1.25 V ac+dc, 50Ω			
Offset Resolution	1mV			
Sine	Frequency Range: 100mHz~25MHz ; Flatness(relative to 1kHz): ±0.5dB<15MHz; ±1 dB 15MHz~25MHz; Harmonic Distortion: -40dBc; Stray(Non-harmonic): -40dBc; Total Harmonic Distortion:1%; S/N Ratio: 40dB			
Square/Pulse	Frequency Range:100mHz~15MHz ; Rise/Fall time:<15ns ; Overshoot: <3% ; Duty cycle Square:50% & Pulse: 0.4%~99.6% ; Min. Pulse Width: 30 ns ; Jitter: 500 ps			
Ramp	Frequency Range:100mHz~1MHz ; Linearity: 1% ; Symmetry: 0~100%			

Rear Panel

MDO-2000E Series

SPECIFICATIONS

	MDO-2102E(G/X)	MDO-2104E(G/X)	MDO-2202E(G/X)	MDO-2204E(G/X)
FREQUENCY RESPONSE ANALYSIS				
Dynamic Range	> 80 dB (typical)			
Input and Output Sources	Channel 1 or 2 (3 or 4 for four channel model)			
Frequency Range	20 Hz to 25 MHz			
Number of Test Points	10 to 90 points per decade			
Test Amplitude	20 mVpp to 5 Vpp into High-Z Fixed amplitude across entire sweep			
Test Results	Logarithmic overlaid gain and phase plot			
Manual Measurements	Two pairs of tracking gain and phase markers			
Plot Scaling	Auto-scaled during test			
DMM SPECIFICATIONS (MDO-2000EX only)				
Reading	5,000 counts			
Voltage Input	CAT II 600 Vrms, CAT III 300 Vrms ; Below are the basic conditions required to operate the DMM within specifications: *Calibration: Yearly. *Operating Temperature Specification: 18˚C to 28˚C (64.4˚F to 82.4˚F). *Relative humidity: 80 %. (Non condensing) *AC measurement are based on a 50 % duty cycle.			
DC Voltage	50 mV, 500 mV, 5 V, 50 V, 500 V, 1000 V, 6 ranges			
Accuracy	50 mV, 500 mV, 5 V, 50 V, 500 V, 1000 V : ±(0.1 % reading + 5 digits)			
Input Impedance	10 MΩ			
DC Current	50 mA, 500 mA, 10 A, 3 ranges			
Accuracy	50 mA to 500 mA : ±(0.5 % reading + 0.05 mA) ; 10 A : ±(0.5 % reading + 50 mA)			
AC Voltage*	50 mV, 500 mV, 5 V, 50 V, 750 V, 5 range. * : AC voltage measurements above 700 V are not guaranteed to meet specifications.			
Accuracy	50 mV, 500 mV, 5 V, 50 V, 750 V : ±(1.5 % reading + 15 digits) at 50 Hz to 1 kHz			
AC Current	50 mA, 500 mA, 10 A, 3 ranges			
Accuracy*	50 mA, 500 mA: ±(1.5 % reading + 0.05 mA) at 50 Hz to 1 kHz ; 10 A: ±(3 % reading + 50 mA) at 50 Hz to 1 kHz ; * : Measure range: > 10 mA			
Resistance*	50 Ω, 500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ, 50 MΩ, 7 range. *: In resistance measurements, the 50 Ω and 50 MΩ ranges are not guaranteed to meet specifications.			
Accuracy	500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ: ±(0.3 % reading + 3 digits) ; 5 MΩ: ±(0.5 % reading + 3 digits)			
Diode Test	Maximum forward voltage 1.5 V, Open voltage 2.8 V			
Temperature (Thermocouple)*	Range: -50 °C to + 1000 °C; Resolution: 0.1 °C *: Specifications do not include probe accuracy.			
Continuity Beeper	15 Ω			
POWER SUPPLY SOECIFICATIONS (MDO-2000EX only)				
Output Channel	CH1 & CH2			
Output Voltage Range	1.0V~5.0V			
Output Current (Max.)	1A			
Voltage Step	0.1V Continuously Adjustable			
Output Voltage Accuracy	±3%			
Ripple and Noise	50mVrms			
POWER SOURCE MISCELLANEOUS				
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection			
Multi-Language Menu	Available			
On-Line Help	Available			
Time Clock	Time and date, provide the date/time for saved data			
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: ≤80% at 40°C or below; ≤45%, 41°C ~ 50°C			
DIMENSIONS & WEIGHT				
	384(W) X 208(H) X 127.3(D)mm, Approx. 3 kg			

Note : Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

MDO-2204E(G/X) 200 MHz,4 Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25 MHz AWG
MDO-2202E(G/X) 200 MHz,2 Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25 MHz AWG
MDO-2104E(G/X) 100 MHz,4 Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25 MHz AWG
MDO-2102E(G/X) 100 MHz,2 Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25 MHz AWG

"(X)" built in 5000 counts DMM and power supply

Accessories :
Power cord x 1, **GTL-110** BNC-BNC cable x 2, **GTL-105A** Alligator Clip test lead (only on MDO-2000EX),**GTL-207A** Banana plug test lead (only on MDO-2000EX)
GTP-100B-4 100 MHz(10:1/1:1)Switchable passive probe for MDO-2102E(X)/2104E(X) (one per channel)
GTP-200B-4 200 MHz(10:1/1:1)Switchable passive probe for MDO-2202E(X)/2204E(X) (one per channel)

OPTIONAL ACCESSORIES

GRA-426 Rack Adapter Panel
GAK-003 50 Ω Impedance Adapter
GTL-246 USB Cable, USB 2.0, A-B Type, 1200 mm
GTL-205A Temperature probe adaptor with thermocouple (K type)
GDP-025 25 MHz High voltage differential probe
GDP-050 50 MHz High voltage differential probe
GDP-100 100 MHz High voltage differential probe
GSC-008 Soft Carrying Case
GTP-033A Oscilloscope Probe, 35 MHz 1:1 Passive Probe, BNC(P/M)
GCP-300 300 kHz/200 A Current probe
GCP-530 50 MHz/30 A Current probe
GCP-500 500 kHz/150 A Current probe
GCP-1030 100 MHz/30 A Current probe
GCP-1000 1 MHz/70 A Current probe
GCP-206P Power supply for current probe (2 input channel)
GCP-425P Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030
GCP-0275 2 MHz/750 A Current probe
GCP-0550 5 MHz/500 A Current probe
GCP-2525 25 MHz/250 A Current probe

FREE DOWNLOAD

PC Software OpenWave software
Driver USB driver ; LabView driver

200 MHz/100 MHz Digital Storage Oscilloscope

VPO Visual Persistence Oscilloscope

台灣精品 TAIWAN EXCELLENCE

GDS-2000E Series

CE | USB high Speed | PC Software | Labview Driver | Ethernet | PictBridge Compatible

FEATURES

* 200/100 MHz Bandwidth
* Sampling Rate : Max. 1 GSa/s (4 ch Model) ; Per Channel 1 GSa/s (2 ch Model)
* 10 M/CH Memory Depth and VPO Waveform Display Technology
* Waveform Update Rate of 120,000 wfm/s
* 8 ” 800 x 480 TFT LCD Display
* Max. 1M pts of FFT to Get Higher Resolution in Frequency Domain
* Digital Filter Function
* Segmented Memory and Waveform Search Functions
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Function
* Data Log Function for Waveform Observation in Long Periods of Time
* Network Storage Function

SPECIFICATIONS

	GDS-2102E	GDS-2104E	GDS-2202E	GDS-2204E
VERTICAL SENSITIVITY				
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC~100MHz(-3dB)		DC~200MHz(-3dB)	
Calculated Rise Time	3.5ns		1.75ns	
Bandwidth Limit	20MHz		20M/100MHz	
Vertical Resolution	8 bits : 1mV ~ 10V/div			
Input Coupling	AC, DC, GND			
Input Impedance	1MΩ// 16pF approx.			
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected			
Polarity	Normal & Invert			
Maximum Input Voltage	300Vrms , CAT I (300Vrms CAT II with GTP-070B-4/100B-4/200B-4, 10 : 1 probe)			
Offset Position Range	1mV/div ~ 20mV/div : ±0.5V ; 50mV/div ~ 200mV/div : ±5V ; 500mV/div ~ 2V/div : ±25V ; 5V/div~10V/div : ±250V			
Waveform Signal Process	+ , - , × , ÷ , FFT , FFTrms , Uesr defined expression. FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS ; FFT Window Displays : Rectangular, Hamming , Hanning, Blackman-Harris			
TRIGGER				
Source	CH1 ,CH2, CH3, CH4, Line, EXT* ; *dual channel models only.			
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence			
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay(1~65,535 events), Time-Delay(Duration;4ns~10s), Bus			
Trigger Holdoff Range	4ns ~ 10s			
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.			
Sensitivity	1div			
EXT TRIGGER				
Range	±15V			
Sensitivity	DC ~ 100MHz Approx. 100mV 100MHz ~ 200MHz Approx. 150mV			
Input Impedance	1MΩ±3%, ~16pF			
HORIZONTAL				
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div			
Pre-trigger	10 div maximum			
Post-trigger	2,000,000 div maximum			
Time Base Accuracy	±50 ppm over any≥ 1 ms time interval			
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch model)			
Record Length	Max. : 10Mpts			
Acquisition Mode	Normal, Average, Peak Detect, Single			
Peak Detection	2ns (typical)			
Average	Selectable from 2 to 256			
X-Y MODE				
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)			
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)			
Phase Shift	±3° at 100kHz			
CURSORS AND MEASUREMENT				
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)			
Automatic Measurement	36 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase			
Control Panel Function	Cursors measurement			
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth			
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset			
Save Setup	20set			
Save Waveform	24set			
DISPLAY SYSTEM				
TFT LCD Type	8" TFT LCD WVGA color display			
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)			
Interpolation	Sin(x)/x			
Waveform Display	Dots, Vectors, Variable persistence(16ms~10s), Infinite persistence			
Waveform Update Rate	120,000 waveforms per second, maximum			
Display mode	YT ; XY			
Display Graticule	8 x 10 divisions			
INTERFACE				
USB Port	USB 2.0 Full-speed host port x 1, USB High-speed 2.0 device port x 1			
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX			
Go/NoGo BNC	5V Max/10mA open collector output			
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock			
POWER SOURCE MISCELLANEOUS				
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection			
Multi-Language Menu	Available			
On-Line Help	Available			
Time clock	Time and date, provide the date/time for saved data			
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: ≤80%, 40°C or below; ≤45%, 41°C ~ 50°C			
DIMENSIONS & WEIGHT				
	384(W) X 208(H) X 127.3(D)mm, Approx. 2.8 kg			

GDS-2000E Series

Rear Panel

ORDERING INFORMATION

GDS-2204E	200 MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2202E	200 MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2104E	100 MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2102E	100 MHz, 2-Channel, Digital Storage Oscilloscope

Accessories :

Power cord x 1

GTP-100B-4	100 MHz(10:1/1:1) Switchable passive probe for GDS-2102E/2104E(one per channel)
GTP-200B-4	200 MHz(10:1/1:1) Switchable passive probe for GDS-2202E/2204E(one per channel)

OPTIONAL ACCESSORIES

GRA-426	Rack Adapter Panel
GAK-003	50 Ω Impedance Adapter
GSC-008	Soft Carrying Case
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm
GCP-300	300 kHz/200 A Current probe
GCP-530	50 MHz/30 A Current probe
GCP-500	500 kHz/150 A Current probe
GCP-1030	100 MHz/30 A Current probe
GCP-1000	1 MHz/70 A Current probe
GCP-206P	Power supply for current probe (2 input channel)
GCP-425P	Power supply for current probe (4 input channel)
GCP-0275	2 MHz/750 A Current probe
GCP-0550	5 MHz/500 A Current probe
GCP-2525	25 MHz/250 A Current probe
GTP-033A	Oscilloscope Probe, 35 MHz 1:1 Passive Probe, BNC(P/M)
GDP-025	25 MHz High voltage differential probe
GDP-050	50 MHz High voltage differential probe
GDP-100	100 MHz High voltage differential probe

FREE DOWNLOAD

PC Software	OpenWave software
Driver	USB driver ; LabView driver

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series/MDO-2000A/2000E Series

200 MHz/100 MHz Digital Storage Oscilloscope

GDS-1000B Series

CE | USB | PC Software | Labview Driver | Ethernet | PictBridge Compatible

The GDS-1000B Series features four bandwidth selections - 200 MHz, 100 MHz and equips with analog signal input terminals by four or two channels. The maximum sampling rate for each single channel is 1GSa/s, and the memory depth is 10Mpts per channel independently. The GDS-1000B Se.ries has a waveform update rate of 50,000 wfms/s, which helps users to precisely observe the detailed waveform variation. Additionally, 7" WVGA color LCD display and the 256 color gradient display function together allow waveforms to be observed with the senses of transparency and gradation. With respect to the horizontal time scale adjustment knob and trigger level adjustment knob, GW Instek provides a very thoughtful design -the zero key function, which allows engineers to work more effectively. For mathematical analysis mode, 1 Mpts FFT signal display makes the dull frequency domain signal analysis more delicate.

Moreover, the innovative exterior design and compact design also bring much convenience to users. Other diversified and charming multi-functional operation demonstrates the concept of complete technology integration

FEATURES

* 200/100 MHz Bandwidth Selections, 2 ch or 4 ch Input
* 1 GSa/s Maximum Sampling Rate
* 10 M Maximum Memory Depth For Each Channel
* 7" 800 x 480 WVGA LCD Display
* 256 Color Gradient Display Function to Strengthen Waveform Performance
* 1 Mpts FFT Frequency Domain Signal Display
* I^2C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
* Zero Key Function For Horizontal Time, Vertical Voltage and Triggering
* Compact And Innovative Exterior Design

SPECIFICATIONS

	GDS-1102B	GDS-1104B	GDS-1202B
VERTICAL			
Channels	2 + Ext	4	2 + Ext
Bandwidth	DC~100MHz (-3dB)	DC~100MHz (-3dB)	DC~200MHz (-3dB)
Calculated Rise Time	3.5ns	3.5ns	1.75ns
Bandwidth Limit	20MHz	20MHz	20MHz
Vertical Sensitivity	8 bit : 1mV~10V/div		
Resolution			
Input Coupling	AC, DC, GND		
Input Impedance	1MΩ// 16pF approx. ; GDS-1202B : 1MΩ// 14pF approx.		
DC Gain Accuracy*	±3%		
Polarity	Normal & Invert		
Maximum Input Voltage	300Vrms, CAT I (300Vrms CAT II with GTP-100B-4, 200B-4 10:1 probe)		
Offset Position Range	1mV/div : ±1.25V ; 2mV/div ~ 100mV/div : ±2.5V ; 200mV/div ~ 10V/div : ±125V		
Waveform Signal Process	+,-, ×, ÷, FFT, User Defined Expression ; FFT: 1Mpts; FFT: Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS ; FFT Window Display : Rectangular, Hamming, Hanning , or Blackman-Harris		
TRIGGER			
Source	CH1, CH2, CH3*, CH4*, Line, EXT** ; *four channel models only. ; **two channel models only		
Trigger Mode	Auto (supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence		
Trigger Type	Edge, Pulse Width, Video, Pulse Runt, Rise & Fall, Timeout, Alternate, Event-Delay (1~65535 events), Time-Delay (Duration, 4nS~10S)		
Holdoff range	4ns to 10s		
Coupling	AC, DC, LF rej., HF rej., Noise rej.		
Sensitivity	1div		
EXTERNAL TRIGGER			
Range	±2.5V		
Sensitivity	DC ~ 100MHz Approx. 100mV ; 100MHz ~ 200MHz Approx. 150mV		
Input Impedance	1MΩ±3% ~ 16pF ; GDS-1202B : 1MΩ±3% ~ 14pF		
HORIZONTAL			
Time base Range	5ns/div ~ 100s/div (1-2-5 increments)		
ROLL	100ms/div ~ 100s/div		
Pre-trigger	10 div maximum		
Post-trigger	2,000,000 div maximum		
Timebase Accuracy	±50 ppm over any ≥1 ms time interval		
Real Time Sample Rate	1GSa/s max.		
Record Length	Max. 10Mpts		
Acquisition Mode	Normal, Average, Peak Detect, Single		
Peak Detection	2ns (typical)		
Average	selectable from 2 to 256		
X-Y MODE			
X-Axis Input	Channel 1; Channel 3*(*four channel models only)		
Y-Axis Input	Channel 2; Channel 4*(*four channel models only)		
Phase Shift	±3° at 100kHz		
CURSORS AND MEASUREMENT			
Cursors	Amplitude, Time, Gating available; Unit : Seconds(s), Hz(1/s), Phase(degree), Ration(%)		
Automatic Measurement	36 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase		
Cursors Measurement	Voltage difference between cursors (ΔV) Time ; difference between cursors (ΔT)		
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth		
CONTROL PANEL FUNCTION			
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset		
Save Setup	20set		
Save Waveform	24set		

Rear Panel

GDS-1000B Series

SPECIFICATIONS			
	GDS-1102B	**GDS-1104B**	**GDS-1202B**
DISPLAY			
TFT LCD Type	7" TFT WVGA color display		
Display Resolution	800 horizontal × 480 vertical pixels (WVGA)		
Interpolation	Sin(x)/x		
Waveform Display	Dots, vectors, variable persistence (16ms~4s), infinite persistence		
Waveform Update Rate	50,000 waveforms per second, maximum		
Display Graticule	8 x 10 divisions		
Display Mode	YT, XY		
INTERFACE			
USB Port	USB 2.0 High-speed host port x1, USB High-speed 2.0 device port x1		
Ethernet Port(LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX (only for 4 channel models)		
Go-NoGo BNC	5V Max/10mA open collector output		
Kensington Style Lock	Rear-panel security slot connects to standard kensington-style lock		
POWER SOURCE			
	AC 100V ~ 240V , 50Hz ~ 60Hz , Auto selection , Power consumption: 30 Watts		
MISCELLANEOUS			
Multi-Language Menu	Available		
Operation Environment	Temperature : 0°C ~ 50°C. Relative Humidity ⩽80% at 40°C or below; ⩽ 45% at 41°C ~ 50°C		
Online Help	Available		
DIMENSIONS & WEIGHT			
380(W) x 208 (H) x 127.3(D)mm, Approx. 2.8kg			

Note : The specifications apply when the GDS-1000B is powered on for at least 30 minutes under +20°C~+30°C.

ORDERING INFORMATION

GDS-1202B	200 MHz, 2 channels, Digital Storage Oscilloscope
GDS-1104B	100 MHz, 4 channels, Digital Storage Oscilloscope
GDS-1102B	100 MHz, 2 channels, Digital Storage Oscilloscope

ACCESSORIES :

Power cord x 1

GTP-100B-4 100 MHz(10:1/1:1) Switchable passive probe for GDS-1104B, GDS-1102B(one per channel)

GTP-200B-4 200 MHz(10:1/1:1) Switchable passive probe for GDS-1202B(one per channel)

OPTIONAL ASSESSORIES

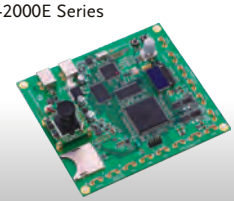
GRA-426	Rack Adapter Panel
GAK-003	50 Ω Impedance Adapter
GSC-008	Soft Carrying Case
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm
GCP-300	300 kHz/200 A Current probe
GCP-530	50 MHz/30 A Current probe
GCP-500	500 kHz/150 A Current probe
GCP-1030	100 MHz/30 A Current probe
GCP-1000	1 MHz/70 A Current probe
GCP-0275	2 MHz/750 A Current probe
GCP-0550	5 MHz/500 A Current probe
GCP-2525	25 MHz/250 A Current probe
GCP-206P	Power supply for current probe (2 input channel)
GCP-425P	Power supply for current probe (4 input channel)
GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, BNC(P/M)
GDP-025	25 MHz High voltage differential probe
GDP-050	50 MHz High voltage differential probe
GDP-100	100 MHz High voltage differential probe

FREE DOWNLOAD

Software	OpenWave Software
Driver	USB Driver ; LabView Driver

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series



100 MHz Digital Storage Oscilloscope

GDS-912

NEW

GDS-912G

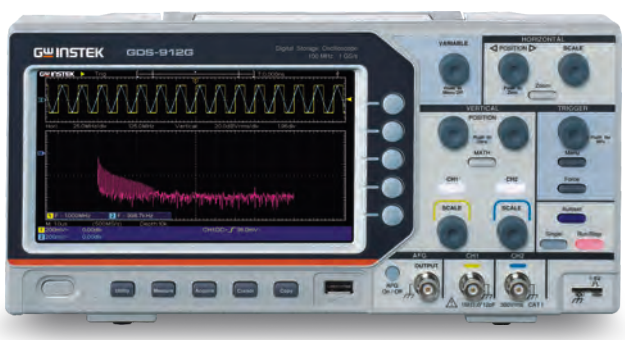
NEW

CE USB PC Software Labview Driver

Before 2000, digital storage oscilloscope technology was dominated by European, American, and Japanese manufacturers. In 2000, GW Instek took the lead by launching the GDS-830, the first 100 MHz digital storage oscilloscope (DSO) independently developed in the Chinese-speaking world. After 25 years of development, 100 MHz entry-level digital storage oscilloscopes have become a stronghold of Chinese brands. The newly released GDS-912/912G digital storage oscilloscopes by GW Instek feature a 7-inch widescreen display with 15 horizontal divisions, offering 50 % more signal display area. The series provides a maximum sampling rate of 1 GSa/s and a memory depth of 20 Mpts per channel, enabling the capture of long-duration transients and maintaining its sampling rate at middle and low speed time bases through long memory settings. With 30 automatic measurement parameters, the oscilloscope allows users to quickly and easily analyze various signal conditions. The Area parameter supports waveform integration - an example application being the integration calculation of energy (in joules) from a power waveform (watts * seconds). The +PulseCount feature enables fast data acquisition in applications such as stepper motor control (number of pulses per unit time) or industrial sewing machines (number of stitches per unit time). Other counting parameters include - PulseCount, RiseEdgeCnt, and FallEdgeCnt. The Cursor RMS function allows users to measure the RMS value within a specified interval using cursors - ideal for measuring the transient RMS of inrush currents. The built-in FFT function offers six window types: Hamming, Rectangular, Blackman, Hanning, Kaiser, and Bartlett. It supports simultaneous display of time and frequency domains, helping users understand the signal's frequency content. To prevent measurement errors, a passive probe compensation test is included. If the test result indicates under- or over-compensation, users can adjust the variable capacitor on the passive probe and re-test after proper compensation is achieved. The series also features automatic signal type detection and a second-level auto setup menu to speed up and improve measurement accuracy. The series' multi-language interface supports 10 languages - Traditional Chinese, Simplified Chinese, English, Russian, German, Spanish, French, Italian, Japanese, and Korean - helping reduce the learning curve for users worldwide. These specifications and features match or exceed those offered by others in the same category, all weighted in a lightweight of 1.1 kg, which reflects the product's design philosophy: “balanced pricing and specifications, lightweight form with advanced features – featherweight in size, heavyweight in performance.”

FEATURES

* 100 MHz Bandwidth, 2 Input Channels
* 1 GS/s Real-time Sampling Rate Maximum
* Standard 25 MHz Arbitrary Function Generator for GDS-912G
* 20 Mpts Memory Depth per Channel
* Support 30 Automatic Waveform Measurements
* 6 digit High-precision Frequency Counter
* 2048 pts FFT Frequency Domain Signal Display
* 7" 800 x 480 TFT LCD Display



GDS-912G

Rear Panel

ORDERING INFORMATION

GDS-912	100 MHz, 2 channels, Digital Storage Oscilloscope
GDS-912G	100 MHz, 2 channels, Digital Storage Oscilloscope, 25 MHz AFG

ACCESSORIES :
Power cord x 1, BNC Cable x 1 (only for GDS-912G), USB Cable x 1,
100 MHz(10:1/1:1)Switchable passive probe for GDS-900 Series x 2

OPTIONAL ASSESSORIES

GAK-003	50 Ω Impedance Adapter
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm
GCP-300	300 kHz/200 A Current probe
GCP-530	50 MHz/30 A Current probe
GCP-500	500 kHz/150 A Current probe
GCP-1030	100 MHz/30 A Current probe
GCP-1000	1 MHz/70 A Current probe
GTP-033A	Oscilloscope Probe, 35 MHz 1:1 Passive Probe, BNC(P/M)
GCP-206P	Power supply for current probe (2 input channel)
GCP-425P	Power supply for current probe (4 input channel)
GDP-025	25 MHz High voltage differential probe
GDP-050	50 MHz High voltage differential probe
GDP-100	100 MHz High voltage differential probe
GCP-0275	2 MHz/750 A Current probe
GCP-0550	5 MHz/500 A Current probe
GCP-2525	25 MHz/250 A Current probe
GTP-100B-4	100 MHz(10:1/1:1)Switchable passive probe

FREE DOWNLOAD

Software	OpenWave Software	**Driver**	USB Driver ; LabView Driver

SPECIFICATIONS

Model	GDS-912	GDS-912G
Bandwidth	100 MHz	100 MHz
Channel	2	2
Bandwidth Limit	20 MHz	20 MHz
Calculated Rise Time	3.5 ns (calculated)	3.5 ns (calculated)
Vertical Sensitivity		
Resolution	8 bits: 2 mV/div to 10 V/div	
Input Coupling	AC, DC, GND	
Input Impedance	1 MΩ±2 % , in parallel with 12 pF±5 pF	
DC Gain Accuracy	±3 %	
Polarity	Normal & Invert	
Maximum Input Voltage	300 Vrms	
Offset Position Range	±1 V (2 mV/div to 100 mV/div) ; ±60 V (200 mV/div to 10 V/div)	
Waveform Signal Process	+, −, ×, ÷, FFT	
Trigger		
Source	CH1 ,CH2	
Trigger Mode	Auto 、Normal 、Single	
Trigger Type	Edge, Video (NTSC 、PAL 、SECAM), ALT	
Holdoff Range	100 ns to 10 s	
Coupling	AC, DC	
Sensitivity	1 div	
Horizontal		
Time Base Range	2 ns/div to 1000 s/div (1-2-5 increments)	
Pre-trigger	Max. Record Length	
Post-trigger	Record Length / 2	
Time Base Accuracy	±100 ppm	
Real Time Sample Rate	1 GS/s(per-channel)*	
Record Length	20 Mpts / CH	
Acquisition Mode	Normal, Peak detect, Average, Single	
Peak Detection	2.5 ns (typical)	
Average	4, 16, 64, 128 selectable	
X-Y Mode		
X-Axis Input	CH1	
Y-Axis Input	CH2	
Phase Shift	±3 degrees	
Cursors and Measurement		
Cursors	△V and △T between cursors, auto cursor	
Automatic Measurement	Period, Frequency, Mean, PK-PK, RMS, Max, Min, Top, Base, Amplitude, Overshoot, Preshoot, Rise Time, Fall Time, +PulseWidth, -PulseWidth, +Duty Cycle, -Duty Cycle, Delay A→B (Rising), Delay A→B (Falling), Cycle RMS, Cursor RMS, Screen Duty, Phase, +PulseCount, -PulseCount, RiseEdgeCnt, FallEdgeCnt, Area, and Cycle Area.	
Control Panel Function		
Auto Counter	Available	
Autoset	Single button, automatic setup of all channels for vertical, horizontal and trigger systems. With "Cancel Autoset"	
Save Setup	8 set	
Save Waveform	16 waveforms	
Display		
TFT LCD Type	7 inch LCD	
Display Resolution	800 horizontal × 480 vertical pixels	
Interpolation	sin (x)/ x	
Waveform Display	Dots, vectors, variable persistence (1 s 、2 s 、5 s), infinite persistence	
Display Graticule	8 x 15 divisions	
Display Mode	Y-T and X-Y	
Interface		
USB	USB 2.0 Host/Device (Only one type is supported at a time can't use both at the same time.),Host mode: Supporting Mass Storage Class (FAT16 / 32) Device mode: Supporting USBTMC Class	
AFG Specifications (GDS-912G Only)		
Channel	–	1
Sample Rate		125 MSa/s
Vertical Resolution		14 bit
Max. Frequency		25 MHz
Standard Waveform		Sine wave, square wave, ramp wave, pulse wave, arbitrary wave
Built-in ARB Waveform		Sinc, exponential rise, exponential decline, Gaussian more than 16 kinds
Output Range		0.05 $V_{peak\ to\ peak}$ to 3 $V_{peak\ to\ peak}$ (50 Ω)
Output Resolution		1 mV
Output Accuracy		± (1 % of setting + 1 mVpp) typical value; 1 kHz sine 0 V offset
Offset Range		± (3 V – amplitude Vpp / 2)
Offset Resolution		± (1 % of |setting| + 1 mV + amplitude Vpp * 0.5 %)
Sine		
Frequency Range	–	0.1 Hz to 25 MHz
Flatness		Relative to 100 kHz Sine wave, 1 Vpp , 50 Ω
Harmonic Distortion		-35 dBc
Stray (Non-harmonic)		-40 dBc
Total Harmonic Distortion		0.8 %
S/N Ratio		50 dB
Square/Pulse		
Frequency Range	–	0.1 Hz to 5 MHz
Rise/Fall Time		Square <30 ns ; Pulse > 12 ns
Overshoot		<5 %
Duty Cycle		Square: 50 % ; Pulse: 0.4 % to 99.6 %
Min. Pulse Width		100 ns
Jitter		±100 ppm
Ramp		
Frequency Range	–	0.1 Hz to 1 MHz
Linearity		<2 % of peak output (typical 1 kHz,1 Vpp, symmetry 50 %)
Symmetry		0 % to 100 %
Miscellaneous		
Multi-language Menu	Available	
Operation Environment	Temperature: 0 °C to 40 °C ; Relative Humidity ≤ 90 %	
Power Consumption	16 Watts approx.	
Dimensions & Weight	301 (W) × 152 (H) × 70 (D) mm ; Approx. 1.1 kg	

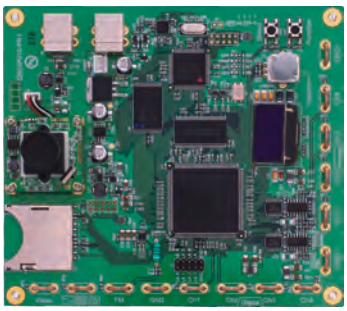
NOTE: 1. The specifications apply when the GDS-900 Series is powered on for at least 30 minutes under +20 °C to +30 °C .
2. (*) At 1000-point record length

Oscilloscope Education And Training Kit

The GDB-03 training kit allows you to learn both the basic and the advanced functions of the GDS-3000 Series, GDS-2000A Series/GDS-2000E Series/MSO-2000 Series and GDS-1000B Series Digital Storage Oscilloscope (DSO). Following the training procedures of this training kit, you will quickly understand the basic operations of a DSO, and the unique features, which represents a typical hi-tech DSO today.

The training kit is a signal generator board capable of producing waveforms, which contain various real-life scenarios you might encounter. With the GDB-03 training kit and the included curriculums, you are able to acquire adequate knowledge in using a DSO with advanced features.

GDB-03



SPECIFICATIONS

SIGNAL OUTPUT

The GDB-03 provides
9 basic and 19 advanced oscilloscope training signals

BASIC OSCILLOSCOPE TRAINING

Lab 1 Connect and view a waveform
Lab 2 Compensate the probe (1kHz square wave)
Lab 3 Adjust waveform scale and position (square wave)
Lab 4 Measure the waveform by manual (square wave ; frequency counter, cursor measure)
Lab 5 Automatic measurement (GDB-03 including noise function ; auto measure, cursor getting measure)
Lab 6 VPO (VPO signal, color, gray mode)
Lab 7 Autoset function (Fit screen, AC priority)
Lab 8 Automatic range
Lab 9 Save data using hardcopy function

ADVANCE OSCILLOSCOPE TRAINING

Lab 1 Automatic measurement (gating measurement)
Lab 2 Using peak detect mode
Lab 3 Low speed signal measurement
Lab 4 Noisy signal measurement
Lab 5 Using zoom timebase function
Lab 6 Transient signal measurement
Lab 7 Lissajous waveform & phase measurement
Lab 8 Runt trigger
Lab 9 Video trigger
Lab 10 Rise & Fall trigger
Lab 11 Pulse width trigger
Lab 12 Hold off function
Lab 13 Split window 1
Lab 14 Split window 2
Lab 15 UART signal
Lab 16 I^2C signal
Lab 17 SPI signal
Lab 18 CAN signal
Lab 19 LIN signal

POWER SUPPLY

5 V DC, USB or auxiliary power input

ORDERING INFORMATION

GDB-03 Oscilloscope Education And Training Kit

ACCESSORIES :
CD x 1
Singnal demo board with instructions
GTL-246 USB 2.0 A-B Type cable

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
DS2-08LA	8-Channel Logic Analyzer, Includes 8-channel Logic Analyzer Card(GLA-08) and 8 channel Logic Analyser Probe(GTL-08LA)	GDS-2000A Series
DS2-16LA	16-Channel Logic Analyzer, Includes 16-channel Logic Analyzer Card(GLA-16) and 16 channel Logic Analyser Probe(GTL-16LA)	GDS-2000A Series
DS2-FGN	DDS Function Generator, 5MHz, Sine/Square/Triangle/Pulse Function	GDS-2000A Series
DS2-GPIB	GPIB Interface	GDS-2000A Series
DS3A-GPIB	GPIB Interface	GDS-3000A Series
DS2-LAN	Ethernet & SVGA Output	GDS-2000A Series
DS3A-PWR	13 sets of Power Analysis Measurements	GDS-3000A Series
DS3A-GPIB	GPIB Interface	GDS-3000A Series
DS3A-16LA	16 Channel Logic Analyzer	GDS-3000A Series
DS3-PWR	Power Analysis Software: Power quality/Harmonic/Ripple/In-rush	GDS-3000 Series
DS3-SBD	Serial Bus Analysis Software I2C/SPI/UART (for 4 channel model only)	GDS-3000 Series
GAK-003	Adaptor, 50 Ω Termination, BNC(P/M)	GDS-2000A Series, MDO-2000A Series, MDO-2000E Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series,
GCP-0275	Current Probe, DC to 2 MHz, 500 Arms	GDS-3000A Series,GDS-3000 Series,GDS-2000A Series, MDO-2000A Series, MDO-2000E Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series, GDS-900 Series
GCP-0550	Current Probe, DC to 5 MHz, 350 Arms	GDS-3000A Series,GDS-3000 Series,GDS-2000A Series, MDO-2000A Series, MDO-2000E Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series, GDS-900 Series
GCP-2525	Current Probe, DC to 25 MHz, 170 Arms	GDS-3000A Series,GDS-3000 Series,GDS-2000A Series, MDO-2000A Series, MDO-2000E Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series, GDS-900 Series
GCP-1030	Current Probe, DC to 100 MHz, 30 Arms	GDS-3000A Series,GDS-3000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-206P	Current Probe - Power Supply, 2 Channel Power Supply for GCP-530/1030	GDS-3000 Series, MPO-2000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-300	300 kHz / 200 A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MPO-2000 Series, MDO-2000A Series, MDO-2000 Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series
GCP-425P	Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030	GDS-3000 Series, MPO-2000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-500	500 kHz / 150 A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MPO-2000 Series, MDO-2000A Series, MDO-2000 Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series
GCP-530	Current Probe, DC to 50 MHz, 30Arms	GDS-3000A Series, GDS-3000 Series, MPO-2000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-1000	1 MHz / 70 A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MPO-2000 Series, MDO-2000A Series, MDO-2000 Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series
GCP-1030	100 MHz / 30 A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MPO-2000 Series, MDO-2000A Series, MDO-2000 Series, MSO-2000EA Series, GDS-2000E Series
GDB-03	Digital Storage Oscilloscope Demo Kit	GDS-3000A Series,GDS-3000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GDP-025	25 MHz High Voltage Differntial Probe	GDS-3000A Series, GDS-3000 Series, MPO-2000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GDP-050	50 MHz High Voltage Differntial Probe	GDS-3000A Series, GDS-3000 Series, MPO-2000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GDP-100	100 MHz High Voltage Differntial Probe	GDS-3000A Series, GDS-3000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GKT-100	Deskew Fixture	GDS-3000A Series, GDS-3000 Series
GLA-08	Logic Analyzer Card, 8-Channel Logic Analyzer Card for DS2-8LA	GDS-2000A Series
GLA-16	Logic Analyzer Card, 16-Channel Logic Analyzer Card for DS2-16LA	GDS-2000A Series
GRA-411	Rack Mount Kit	GDS-3000 Series
GRA-420	Rack Mount Kit	GDS-2000A Series
GRA-426	Rack Mount Kit	MDO-2000A Series, MDO-2000E Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series
GRA-443-E	Rack Mount Kit	GDS-3000A Series
GSC-008	Soft Carrying Case	GDS-3000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series
GTL-08LA	Logic Analyzer Probe, 8-Channel Logic Analyzer Probe for DS2-8LA	GDS-2000A Series
GTL-16E	16-Channel Logic Analyzer Probe	MSO-2000EA Series
GTL-105A	Test Lead, Alligator to Banana Test Lead, Max. Current 3 A, 1000 mm	MDO-2000A Series, MDO-2000E Series
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series
GTL-16LA	Logic Analyzer Probe, 16-Channel Logic Analyzer Probe for DS2-16LA	GDS-2000A Series
GTL-205A	Temperature Probe Adaptor with Thermocouple (K type)	MDO-2000E Series
GTL-207A	Test Lead, Banana to Probe Test Lead, 800 mm	MDO-2000E Series.
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000 mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series,
GTL-246	USB 2.0 cable ,A-B type 4P ,1800 mm	All DSO Series, MPO-2000 Series
GTL-248	GPIB Cable, Double Shielded, 2000 mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series
GTP-033A	Oscilloscope Probe, 35 MHz 1:1 Passive Probe	GDS-3000A Series, GDS-3000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTP-070B-4	Oscilloscope Probe, 70 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTP-100B-4	Oscilloscope Probe, 100 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series, GDS-900 Series
GTP-150A-2	Oscilloscope Probe, 150 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series
GTP-151R	Oscilloscope Probe, 150 MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000 Series
GTP-200B-4	Oscilloscope Probe, 200 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-3000 Series, MSO-2000EA Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series
GTP-250A-2	Oscilloscope Probe, 250 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series, GDS-2000E Series
GTP-251R	Oscilloscope Probe, 250 MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000 Series
GTP-300B-4	Oscilloscope Probe, 300 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series, MDO-2000A Series
GTP-350A-2	Oscilloscope Probe, 350 MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series
GTP-351R	Oscilloscope Probe, 350 MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000 Series
GTP-352R	Oscilloscope Probe, 350 MHz 20:1 Passive Probe, BNC(P/M)	GDS-3000A Series, GDS-3000 Series
GTP-501R	Oscilloscope Probe, 500 MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000A Series, GDS-3000 Series
GUG-001	GPIB-USB Adaptor, GPIB to USB Adaptor	GDS-3000 Series
MP2-PRO	Basic Version Upgrade to Professional Version	MPO-2000 Series

GTP-100B-4

For: GDS-2102A/2104A, GDS-2102E/2104E

The GTP-100B-4 is a passive high impendence oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1 MΩ shunted by 20 pF. However, it may be compensated for use with instruments having an input capacitance of 5 to 30 pF(10:1).The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC to 100 MHz(±3dB)	DC to 10 MHz(±3dB)
Input R	~10 MΩ	1 MΩ (Oscilloscope)
Input C	14.5 to 17.5 pF	85 to 115 pF
Att. Ratio	1/10	1/1
Max. Input Voltage	≤600 Vpk	≤200 Vpk
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-200B-4

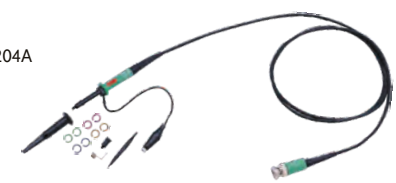
For: GDS-Series

The GTP-200B-4 is a passive high impendence oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1 MΩ shunted by 20 pF. However, it may be compensated for use with instruments having an input capacitance of 5 to 30 pF.The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC to 200 MHz(±3 dB)	DC to 10 MHz(±3 dB)
Input R	~10 MΩ	1 MΩ (Oscilloscope)
Input C	10.5 to 17.5 pF	65 to 105 pF
Att. Ratio	1/10	1/1
Max. Input Voltage	600 V peak	200 V peak
Accessories	1.Channel identifier clip 2.hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	
Compensation Range	5 to 30pF	—

GTP-250A-2

For: GDS-2202A/2204A



The GTP-250A-2 is a passive high impendence oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1 MW shunted by 20 pF. However, it may be compensated for use with instruments having an input capacitance of 10 to 35 pF. Connect this sentence to the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC to 250 MHz(±3dB)	DC to 6 MHz(±3 dB)
Input R	~10 MΩ	1 MΩ (Oscilloscope)
Input C	~17 pF	~47 pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500 V CAT Ⅰ, 300 CAT Ⅱ	300 V CATⅠ, 150 V CATⅢ
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-151R

For : GDS-3000 Series

The GTP-151R is compatible with readout function oscilloscopes that automatically detect and display the attenuation factor of the probe.

Item	10:1
Bandwidth	DC to 150 MHz(±3 dB)
Input R	~10 MΩ
Input C	~12 pF
Att. Ratio	1/10
Max. Input Voltage	< 500 Vpk
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip

GTP-251R

For: GDS-3000 Series

The GTP-251R is compatible with readout function oscilloscopes that automatically detect and display the attenuation factor of the probe.

Item	10:1
Bandwidth	DC to 250 MHz(±3 dB)
Input R	~10 MΩ
Input C	~12 pF
Att. Ratio	1/10
Max. Input Voltage	DC 500V CAT Ⅰ, 300 V CAT Ⅱ
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip

GTP-300B-4

For: MDO-2000A Series

The GTP-300B-4 is a passive high impendence oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1 MΩ shunted by 20 pF. However, it may be compensated for use with instruments having an input capacitance of 10 to 35pF. The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC to 300 MHz(±3 dB)	DC to 10 MHz(±3 dB)
Input R	~10 MΩ	1 MΩ (Oscilloscope)
Input C	10.5 to 17.5 pF	65 to 105 pF
Att. Ratio	1/10	1/1
Max. Input Voltage	600 V DC+AC pk	200 V DC+AC pk
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

Ordering Guide

If an accessory is ordered separately from the main product, please indicate the nomenclature of the accessory when placing order.

Example : GSC-008 Soft Carrying Case for GDS-2000E Series

If an accessory is ordered along with the main product, please indicate the option number of the accessory when placing order.

Example : GDS-3502 500 MHz, 2-Channel, Visual Persistence DSO , GSC-008 Soft Carrying Case

ACCESSORIES

GTP-351R/352R

For: GDS-3000A Series

Both GTP-351R and GTP-352R are passive high impendence oscilloscope probes designed and calibrated for use on instrument. GTP-351R has an input impendence of 1 MΩ shunted by 20pF while GTP-352R has an input impendence of 1 MΩ shunted by 15pF. However, GTP-351R may be compensated for use with instruments having an input capacitance of 10~35pF while GPT-352R has an input impendence of 10~30pF.

	GTP-351R	GTP-352R
Item	10:1	20:1
Bandwidth	DC to 350 MHz	DC to 350 MHz
Input R	~10 MΩ	~10 MΩ
Input C	~12 pF	~7 pF
Att. Ratio	1/10	1/20
Max. Input Voltage	500 V CAT Ⅰ, 300 V CAT Ⅱ	1 kV CAT Ⅱ
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip	

GTP-350A-2

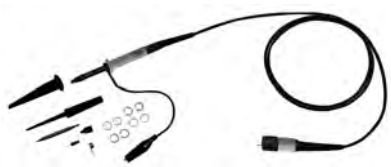
For: GDS-2302A/2304A

The GTP-350A-2 is a passive high impendence oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1 MΩ shunted by 15 pF. However, it may be compensated for use with instruments having an input capacitance of 10 to 30 pF. Connect this sentence to the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC to 350 MHz	DC to 6 MHz
Input R	~10 MΩ	~1 MΩ
Input C	~13 pF	~46 pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500 V CAT Ⅰ, 300 V CAT Ⅱ	300 V CAT Ⅰ, 150 V CAT Ⅱ
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip	

GTP-501R

For: GDS-3000A Series
GDS-3000 Series



The GTP-501R is a passive high impendence oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1 MΩ shunted by 13pF. However, it may be compensated for use with instruments having an input capacitance of 8 to 20pF. Connect this sentence to the end of the previous sentence.

Item	10:1
Bandwidth	DC to 500 MHz
Input R	~10 MΩ
Input C	~11.5 pF
Att. Ratio	1/10
Max. Input Voltage	500 V CAT Ⅰ, 300 V CAT Ⅱ
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip

GTP-033A

For: GDS-3000 Series

GTP-033A is a x 1, attenuator modular probe. Designed for use with DC to 35 MHz oscilloscope with input impedance of 1 MΩ The probe consists of following separate units;
1. BNC male connector and compensation box.
2. Approx. 1.2 M cable

Item	1:1
Bandwidth	DC to 35 MHz(±3 dB)
Input R	1 MΩ (Oscilloscope)
Input C	~83 pF
Att. Ratio	1/1
Max. Input Voltage	<300 V CAT Ⅰ
Accessories	1.Channel Identifier Clip 2.Sprung Hook 3.Ground Lead 4.Insulating Tip 5. IC Tip

GKT-100 Deskew Fixture

The GKT-100 deskew fixture is used to compensate for the propagation delay between a passive voltage probe and current probe. It is used with the GDS-3000 Series, Required tools.

1.GDS-3000 x 1 or GDS-3000A x 1
2.GKT-100 x 1
3.USB type A-B cable x1 -used for deskew fixture
4.Standard passive probe x 1
5.Current probe x 1 (GCP-530 or GCP-1030)

ACCESSORIES

GTL-101

GTL-110

GTL-207A

GTL-232

GTL-246

GTL-248

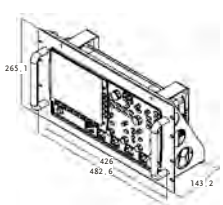
GTL-250

GTL-253

GTL-205A

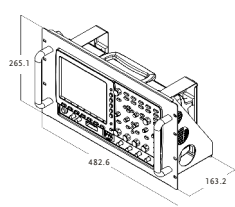
GRA-411 Rack Mount Kit

For : GDS-3000 Series



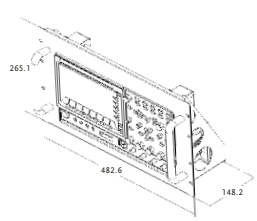
GRA-420 Rack Mount Kit

For : GDS-2000A Series



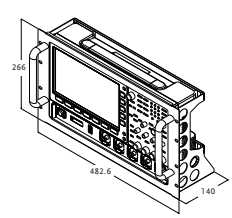
GRA-426 Rack Mount Kit

For : MDO-2000A Series, MDO-2000E Series,
MSO-2000E Series, GDS-2000E Series, GDS-1000B Series



GRA-443 Rack Mount Kit

For : GDS-3000A Series



GCP-0275/0550/2525 Current Probe

For: GDS-3000A, GDS-3000 Series, GDS-2000A Series, MDO-2000A Series, MDO-2000E Series, MSO-2000EA Series, GDS-2000E Series, GDS-1000B Series, MPO-2000 Series, GDS-900 Series

Model	GCP-0275	GCP-0550	GCP-2525
Bandwidth (-3 dB)	DC to 2 MHz	DC to 5 MHz	DC to 25 MHz
DC + Peak AC MAX. (non-continuous)	750 A (*1)	500 A (*2)	250 A (*3)
Continuous Maximum Current (RMS)	500 Arms	350 Arms	170 Arms
Minimum Current	50 mA	20 mA	20 mA
Rise Time	175 ns or less	70 ns or less	14 ns or less
Conversion Ratio	2 mV/A (500 X) 20 mV/A (50 X)	5 mV/A (200 X) 50 mV/A (20 X)	10 mV/A (100 X) 100 mV/A (10 X)
Accuracy	2 mV/A : 1 % ± 1 mV 20 mV/A : 1 % ± 1 mV	5 mV/A : 1 % ± 1 mV 50 mV/A : 1 % ± 2 mV	10 mV/A : 1 % ± 1 mV 100 mV/A : 1 % ± 5 mV
Measuring Range (peak)	2 mV/A : 50 mA to 125 A 20 mV/A : 125 A to 750 A	5 mV/A : 20 mA to 50 A 50 mV/A : 50 A to 500 A	10 mV/A : 20 mA to 25 A 100 mV/A : 25 A to 250 A
Noise (RMS)	50 mA	20 mA	20 mA
Weight (Probe)	390 g	380 g	370 g
Size (Probe)	151.85 mm * 26.4 mm * 62.28 mm		
Intended Output Load	1 MΩ		
Clamp Dia.	20 mm		
Power Supply	DC 12 V / 2 A		
Coupling Mode	AC / DC		
Operating Temperature And Humidity	0 ℃ to 50 ℃ / 20 %RH to 75 %RH		
Insulated line Voltage	600V CAT II / 300V CAT III		

*1 750 A peak at pulse width of ≤ 30 µs *2 500 A peak at pulse width of ≤ 30 µs *3 250 A peak at pulse width of ≤ 30 µs

ACCESSORIES

Current Probe and Differential Probe Selections

GCP-300/500/1000

GCP-530/1030,GCP-206P/425P

GDP-025

GDP-050/100

In addition to the standard passive probes, the optional current or differential probes can be used to perform additional tests or power analysis.
The differential probes come in three bandwidths: 25 MHZ, 50 MHz and 100 MHz. The current probes come in a broad variety of bandwidth and current ranges (ranging from 50 MHz/30 A, 100 MHz/30 A, 300 kHz/200 A, 500 kHz/150 A, 1 MHz/70 A), to cover any number of power supply testing applications.

**** The GCP-530/1030 must be used in conjunction with the GCP-206P/425P current probe power supply.***
**** The GCP-206P is capable of powering 2 units of GCP-530 or GCP-1030 and the GCP-425P is capable of powering 4 units.***

CURRENT PROBE

	GCP-300	GCP-500	GCP-530	GCP-1000	GCP-1030
Probe Bandwidth	DC~300kHz	DC~500kHz	DC~50MHz	DC~1MHz	DC~100MHz
Rise Time	1.17μs(Typ.)	0.7μs(Typ.)	7ns or less	0.35μs (Typ.)	3.5ns or less
Maximum Continuous Input Range	200A(10mV/A) 20A(100mV/A)	150A(20mV/A) 15A(200mV/A)	30Apeak	70A(50mV/A) 7A(500mV/A)	30Apeak
Maximum Peak Current Value	DC : 200A AC : 140Arms	DC : 150A AC : 100Arms	50A	DC : 70A AC : 50Arms	50A
Output Voltage Rate	100mV/A ;10mV/A	200mV/A;20mV/A	0.1V/A	500mV/A;50mV/A	0.1V/A
DC Amplitude Accuracy	±3% ±50 mA at 100 mV/A (50 mA ~ 20A peak range) ±4% ±50 mA at 10 mV/A (500 mA ~ 70A peak range) ±15% max at 10 mV/A (70A peak ~ 150A peak range) ±25% max at 10mV/A (150A peak ~ 200A peak range)	±3% ±30 mA at 200 mV/A (30 mA ~ 15 A peak range) ±4% ±300 mA at 20 mV/A (300 mA ~ 80 A peak range) ±15% max at 20 mV/A (80A peak ~ 150A peak range)	±1.0%rdg±1mV (0~30Arms/DC, 45~66Hz);±2.0%rdg (30Arms~50A peak /DC, 45~66Hz)	±3% ±20 mA at 500 mV/A (20 mA ~ 7A peak range) ±4% ±200 mA at 50 mV/A (200 mA ~ 50 A peak range) ±15% max at 50 mV/A (50A peak ~ 70A peak range)	±1.0%rdg±1mV (0~30Arms/DC, 45~66Hz);±2.0%rdg (30Arms~50A peak /DC, 45~66Hz)
Noise	–	–	2.5mArms or less	–	2.5mArms or less
Rate Supply Voltage	–	–	±12V± 0.5V	–	±12V± 0.5V
Maximum Rated Power	–	–	5.6VA	–	5.3VA
Maximum Rated Voltage	CAT Ⅲ 300V/CAT Ⅱ 600V	CAT Ⅲ 600V	300V, CAT I	CAT Ⅲ 600V	300V, CAT I

CURRENT PROBE POWER SUPPLY

	GCP-206P	GCP-425P
Compatible Current Probe	GCP-530/GCP-1030	GCP-530/GCP-1030
Number of Power Supply Connectors	2	4
Output Voltage	±12V± 0.5V	±12V± 0.5V
Rated Output Current	±600mA	±2.5A
Rated Supply Voltage(50/60Hz)	110V/120V, 220V/240V AC±10%	100V~240V AC±10%
Maximum Rated Power	20VA	170VA
Dimensions & Weight	73(W)x110(H)x186(D)mm ; Approx.1.1kg	80(W)x119(H)x200(D) mm ; Approx.1.1kg
Accessories	Power cord, fuse	Power cord, fuse

HIGH-VOLTAGE DIFFERENTIAL PROBE

	GDP-025	GDP-050	GDP-100
Probe Bandwidth	DC ~ 25MHz (attenuation x50, x200) ; DC ~ 15MHz(attenuation x20)	DC ~ 50MHz(attenuation x200, x500, x1000) ; DC ~ 25MHz(attenuation x100)	DC ~ 100MHz(attenuation x200, x500 , x1000); DC ~ 50MHz(attenuation x100)
Attenuation	x20 , x50 , x200	x100 , x200 , x500 , x1000	x100 , x200 , x500 , x1000
Accuracy	±2%	±2%	±2%
Voltage Input Range (DC+AC peak to peak)	≤140Vp-p for x 20 , ≤350Vp-p for x 50 , ≤1400Vp-p for x 200	≤ 700Vp-p for x 100 ≤ 1400Vp-p for x 200 ≤ 3500Vp-p for x 500 ≤ 7000Vp-p for x 1000	≤ 700Vp-p for x 100 ≤ 1400Vp-p for x 200 ≤ 3500Vp-p for x 500 ≤ 7000Vp-p for x 1000
Permitted Max Input Voltage	Maximum differential voltage: Max voltage between input terminal and ground: 600Vrms	Maximum differential voltage: Max voltage between input terminal and ground: 6500Vrms	Maximum differential voltage: Max voltage between input terminal and ground: 6500Vrms
Input Impedance	Differential:4MΩ/1.2pF ; Between terminals and ground: 2MΩ/2.3pF	Differential:54MΩ/1.2pF ; Between terminals and ground:27MΩ/2.3pF	Differential: 54MΩ/1.2pF ; Between terminals and ground: 27MΩ/2.3pF
Output	≤7.0V	≤7.0V	≤7.0V
Output Impedance	50Ω	50Ω	50Ω
Rise Time	14ns (x50, x200 attenuation) ; 23.4ns (x20 attenuation)	7ns (x200, x500, x1000 attenuation) ; 14ns (x100 attenuation)	3.5ns (x200, x500, x1000 attenuation) ; 7ns (x100 attenuation)
Rejection Rate on Common Mode(CMRR)	60Hz>80dB , 100Hz>60dB, 1MHz>50dB	60Hz>80dB , 100Hz>60dB, 1MHz>50dB	60Hz>80dB , 100Hz>60dB, 1MHz>50dB
Power Supply	External DC adapter	External DC adapter	External DC adapter
Consumption	Maximum 35mA (0.4Watt)	Maximum 35mA (0.4Watt)	Maximum 35mA (0.4Watt)

SPECTRUM ANALYZERS

GW Instek's spectrum analyzer product line has three categories: application, basic and educational spectrum analyzers. These three categories are suitable for a wide range of test applications, ranging from R&D, service, maintenance, manufacturing, education and other RF-related fields.

The entire product line has five frequency ranges. The bandwidth ranges are 1.8GHz / 3GHz / 3.25GHz / 3.8GHz / 8.0GHz respectively to meet the measurement functions of various applications, including ASK/FSK/AM/FM demodulation analysis, ACPR/OCBW/CHPW, SEM measurement, TOI, Harmonic, CNR/CTB/CSO, frequency counter and USB, RS-232, Lan, MicroSD, GPIB are also provided for the communication interface.

There are two application spectrum analyzers, GSP-9330 and GSP-9300B. GSP-9330 has built-in unique EMI-specific functions and is equipped with special test accessories, allowing engineers to quickly and accurately identify EMI problems. In order to provide more stable measurement and further signal analysis, it has built-in Spectrogram and Topographic display modes. Through time accumulation and image stacking, the energy changes of the signal can be easily displayed. The built-in sequence function allows customers to create and execute the required test steps directly on the instrument without the need of a PC connection.

The GSP-8000 series is a basic spectrum analyzer, providing three bandwidth measurement ranges including 1.8GHz / 3.8GHz / 8.0GHz, and built-in basic measurement functions, such as AM/FM demodulation, channel power measurement, Time Spec display functions, etc., collocating with a 10.4-inch large display and easy-to-upgrade TG and EMI optional functions, which are suitable for general RF measurement applications.

GSP-730 is a spectrum analyzer developed for the education market and is equipped with a dedicated GRF-1300A communications module for teaching communications courses.

PRODUCTS

- **8.0 GHz Spectrum Analyzer**
- **3.8 GHz Spectrum Analyzer**
- **3.25 GHz Spectrum Analyzer**
- **3.0 GHz Spectrum Analyzer**
- **1.8 GHz Spectrum Analyzer**
- **RF Training System**

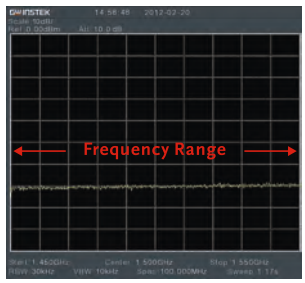
SPECTRUM ANALYZER OVERVIEW

Spectrum analyzer is the most widely applied measuring instrument for wireless communications devices, components or systems. It measures and displays the frequency spectrum distribution of an RF signal. Spectrum analyzer can measure and read both frequency and amplitude information. Nowadays, digital communications dominate wireless communications systems. Despite the dominance of digital communications, measuring a frequency spectrum by a spectrum analyzer is still considered an important process.

To choose the right spectrum analyzer, several key specifications should be considered, which are explained below.

FREQUENCY RANGE

Selecting a spectrum analyzer for a measurement requires selecting its frequency range, like 1 GHz, 2.4 GHz, and so on. Therefore the frequency range is the first consideration for most applications.



Frequency Range

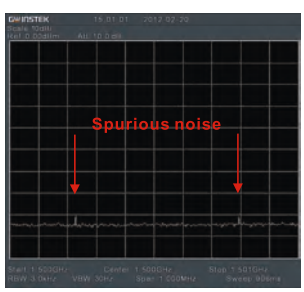
NOISE FLOOR

Noise floor is the bottom noise level when no signal is fed into spectrum analyzer. It represents the lowest signal level that spectrum analyzer can measure. The noise floor usually depends on Resolution Bandwidth (RBW).

Noise Floor

SPURIOUS NOISE

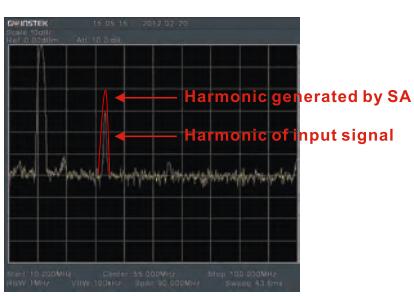
Circuit noise or interference that looks like a signal occurs even without an input signal due to spurious noise of spectrum analyzer. Unlike noise floor, spurious noise presents itself like a signal with a specific frequency.



Spurious Noise

HARMONICS

Spectrum analyzer itself also generates harmonics from an input signal. Therefore if the harmonics generated by a spectrum analyzer are greater than the harmonics from an input signal, the harmonic measurement will result in an error as Figure 4 presents.

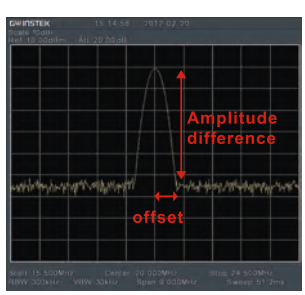


Harmonics

PHASE NOISE

Phase noise shows the purity of a signal. there are two signals with different levels of phase noise. The lower one is purer than the upper one, and therefore it has better phase noise performance.

Signals With Different Phase Noises



Definition Of Phase Noise

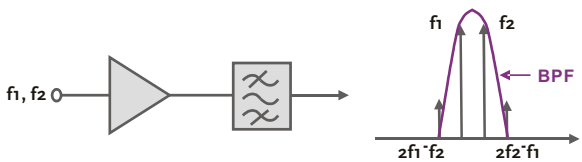
shows the definition of phase noise. It is usually defined as dBc with a frequency offset. For example,"-50 dBc at 200 kHz offset with 30 kHz RBW".

THIRD ORDER INTER-MODULATION

Third order inter-modulation occurs with a two-tone input signal, a signal with two frequencies or two signals with different frequencies that are fed into a spectrum analyzer at the same time. When the input signal frequencies are f1 and f2, the harmonics are as follows.

Input	output	
f1, f2	fundamentals	f1,f2
	2nd order harmonics	2f1, 2f2, f1±f2,
	3rd order harmonics	3f1, 3f2, 2f1±f2, 2f2±f1
	----	----

The third order harmonics are the primary concerns in a system. If the frequencies of f1 and f2 are very close, then 2f1-f2 and f1-2f2 will also be very close to the original signal. It will be difficult for the subsequent filters to filter out the harmonics accordingly. The concepts are illustrated.



Third Order Harmonics of 2f1-f2 and 2f2-f1

An example is expressed in Table 1.

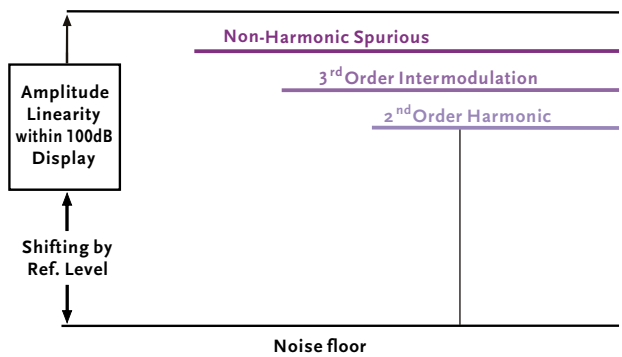
	Harmonics	1	2	3
Input Frequency	100, 110	**100, 110**	···	300, 330, 310, 320, 90, 120
	100, 101	**100, 101**	···	300, 303, 301, 302, 99, 102
	100, 100.1	100, 100.1	···	300, 300.3, 300.1, 300.2, 99.9, 100.2

Two-Tone Signal Harmonics

In case the input signal frequencies are 100 and 100.1, their 3rd order harmonics will be 99.9 (2f1-f2) and 100.2 (2f2-f1). Using that example it is easy to see that the third order harmonics are close to the original signals, which will pose challenges for designing the subsequent filters. Therefore the inter-modulation distortion of spectrum analyzer itself might limit the ability of two-toned signal measurements.

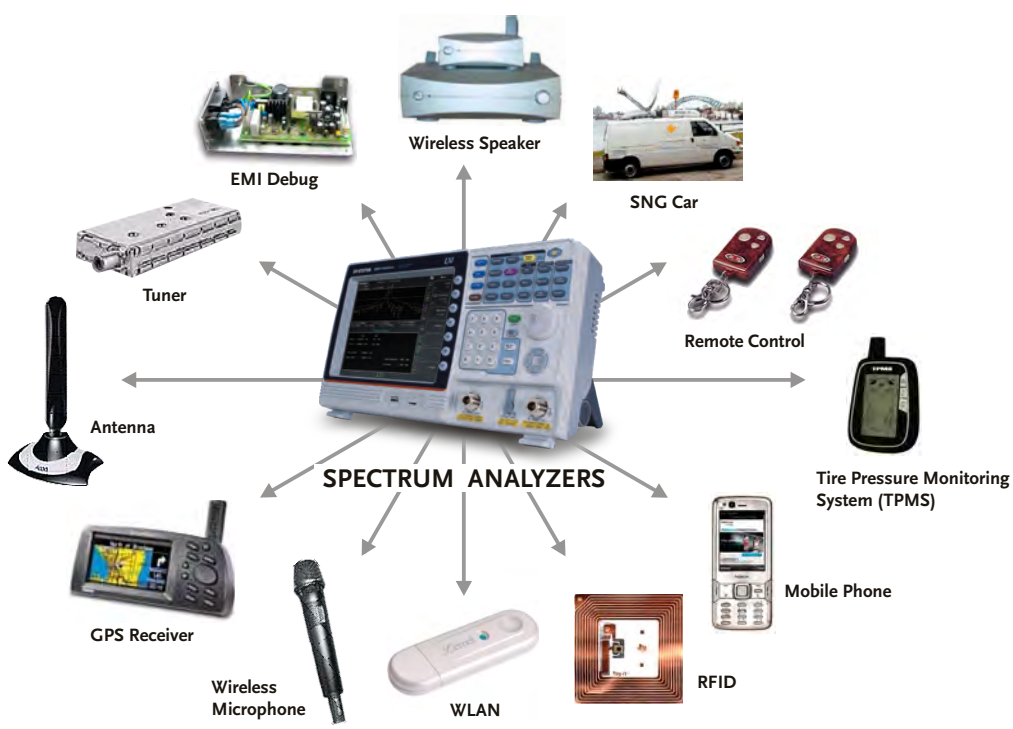
DYNAMIC RANGE

Different companies use different definitions for dynamic range, but actually they all point to the same thing; the ability to accurately measure amplitude. Considering the specifications introduced above, the dynamic range might actually include more than one term. For example, if a two-tone signal is under measurement, the inter-modulation distortion needs to be considered. If the input signal frequency falls onto the spurious noise, it will limit the dynamic range. But generally speaking, dynamic range is defined as the level between noise floor and the maximum measurable level. Alternatively, sometimes the display range (80 or 100 dB) is called dynamic range. It describes the range within the display without shifting the reference level. The entire concept is illustrated.



Dynamic Range

APPLICATION



SPECTRUM ANALYZERS

	GSP-9330	GSP-9300B	GSP-8800 / 8380 / 8180	GSP-730
Frequency Range	9 kHz to 3.25 GHz	9 kHz to 3 GHz	9 kHz to 8 GHz / 3.8 GHz / 1.8 GHz	150 kHz to 3 GHz
Frequency Stability	± 1 ppm max. (per year)	± 1 ppm max. (per year)	± 1 ppm max. (per year)	-
Over Temperature Frequency Stability	± 0.025 ppm (0 °C to 50 °C)	± 0.025 ppm (0 °C to 50 °C)	< 1 ppm (15 °C to 35 °C)	-
RBW Range	1 Hz to 1 MHz in 1-3-10 sequence 200 Hz, 9 kHz, 120 kHz, 1 MHz for EMI Filter	1 Hz to 1 MHz in 1-3-10 sequence 200 Hz, 9 kHz, 120 kHz, 1 MHz for EMI Filter	1 Hz to 1 MHz 1-3-5-10 steps EMI Filter(Opt): 200 Hz, 9 kHz, 120 kHz, 1 MHz	30 kHz, 100 kHz, 300 kHz, 1 MHz (30 kHz Range is not adjustable)
VBW Range	1 Hz to 1 MHz in 1-3-10 sequence	1 Hz to 1 MHz in 1-3-10 sequence	10 Hz to 3 MHz in 1-3-10 sequence	-
Phase Noise	-88 dBc/Hz @1 GHz, 10 kHz offset	-88 dBc/Hz @1 GHz, 10 kHz offset	-104 dBc/Hz @1 GHz, 10 kHz offset	-85 dBc/Hz @1 GHz, 500 kHz offset
Noise Floor	-139 dBm @1 GHz, 10 Hz RBW, per-amp on	-139 dBm @1 GHz, 10 Hz RBW, per-amp on	-150 dBm @1 GHz, 1 Hz RBW, per-amp on	-100 dBm @1 GHz, 30 kHz RBW
Overload Protection	+30 dBm, ± 50 VDC	+30 dBm, ± 50 VDC	+30 dBm, ± 50 VDC	+30 dBm, ± 25 VDC
Reference Level Range	-110 dBm to +30 dBm	-110 dBm to +30 dBm	-80 dBm to +30 dBm	-40 dBm to +20 dBm
Input Attenuator	0 dB to 50 dB, in 1 dB steps	0 dB to 50 dB, in 1 dB steps	0 dB to 40 dB, in 1 dB steps	-
Pre-amplifier	Built-in 18 dB internal	Built-in 18 dB internal	Built-in 20 dB internal	-
Measurement Function	SEM, ACPR, OCBW, CHPW, N-dB BW, Phase Jitter, Demod. Analyzer, Harmonic, TOI, CNR, CSO, CTB, P1dB, TDP	SEM, ACPR, OCBW, CHPW, N-dB BW, Phase Jitter, Demod. Analyzer, Harmonic, TOI, CNR, CSO, CTB, P1dB, TDP	ACPR, OCBW, CHPW, N-dB BW, Demod. Analyzer	ACPR, OCBW, CHPW
Advantage Feature	Gated Sweep, Sequence, Correction Table, Split-Window, IF (886 MHz) Output, Limit Line, RF Counter	Gated Sweep, Sequence, Correction Table, Split-Window, IF (886 MHz) Output, Limit Line, RF Counter	Limit Line, RF Counter	Split-Window, Limit Line
Demodulator	AM, FM, ASK, FSK	AM, FM, ASK, FSK	AM, FM	-
Trace Number	4 Traces	4 Traces	5 Traces	3 Traces
Trace Detect Mode	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quesi-Peak, Average	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quesi-Peak, Average	Positive-peak, negative-peak, sample, normal, Volt Average, (Optional) Quesi-Peak, RMS Average	-
Marker Number	6	6	8	5
Internal Memory	16 MB nominal	16 MB nominal	256 MB nominal	5 memories
Sweep Points	601	601	801	601
Display Modes	Spectrogram,Topographic, Spectrum	Spectrogram,Topographic, Spectrum	Time Spec, Demod Analyzer, Spectrum	Spectrum mode
Tracking Generator	100 kHz to 3.25 GHz (Optional)	100 kHz to 3 GHz (Optional)	100 kHz to 8 GHz / 3.8 GHz / 1.8 GHz	-
Interface	USB Host/Device, RS-232, LAN(LXI), MicroSD, GPIB(Optional)	USB Host/Device, RS-232, LAN(LXI), MicroSD, GPIB(Optional)	USB Host/Device, LAN	USB Host/Device, RS-232
Screen Size	8.4-inch Color TFT LCD with SVGA (800 x 600)	8.4-inch Color TFT LCD with SVGA (800 x 600)	10.4-inch Color TFT LCD with XVGA (1024 x 768)	5.6-inch Color TFT LCD with VGA (640 x 480)
Rack Adapter Panel	V, GRA-415	V, GRA-415	-	-
Power Operation	AC	AC	AC	AC
Power Source	AC 100 V to 240 V, 50 Hz or 60Hz	AC 100 V to 240 V, 50 Hz or 60Hz	AC 100 V to 240 V, 50 Hz or 60Hz	AC 100 V to 240 V, 50 Hz or 60Hz
Page	**B5-12**	**B13-16**	**B17-20**	**B21-24**

RF & SPECTRUM ANALYZER TRAINING SYSTEM

Model	GRF-1300A
Collocation Instrument	GSP-730
Necessary Option	USG-LF44
RF Cable	SMA Cable
RF Connector	SMA Female
Interface	USB Device
Power Source	AC 100 V to 240 V, 50 Hz or 60 Hz
Page	**B23-24**

3.25 GHz Spectrum Analyzer

GSP-9330

台灣精品 TAIWAN EXCELLENCE

CE | USB | LXI | RS-232 | GPIB | PC Software

GSP-9330, a high test speed spectrum analyzer with 3.25 GHz, provides the fastest 204 µs sweep speed. Users, via high speed sweep time, can easily handle and analyze modulation signals. The keys to handling modulated signals are fast sweep time and signal demodulation

functions. In addition to the analog AM/FM demodulation and analysis function, GSP-9330 also provides digital signal ASK/FSK, and 2FSK demodulation and analysis capabilities.

Nowadays, EMC issues are very crucial to product's design processes. Therefore, GSP-9330 has incorporated the EMC pretest solution to facilitate EMC tests. The simple and easy EMC pretest procedures from GSP-9330 can tremendously shorten users' product launch timeline.

GSP-9330

FEATURES

* Frequency Range : 9 kHz to 3.25 GHz
* 0.025 ppm Frequency Stability and 1 ppm Aging Rate
* RBW : 1 Hz to 1 MHz (3dB), 6 dB EMI Filter : 200 Hz, 9 kHz, 120 kHz, 1 MHz
* Fastest Sweep Time : 204 µs
* Sensitivity : -149 dBm/Hz (@PreAmp on)
* Built-in Preamplifier, 50 dB Attenuator, and Sequence Function
* Built-in EMC Pretest Function
* Built-in 2FSK Analysis, AM/FM/ASK/FSK Demodulation & Analysis
* Built-in P1dB Point, Harmonic, Channel Power, N-dB Bandwidth, OCBW, ACPR, SEM, TOI, CNR, CTB, CSO, Noise Marker, Frequency Counter, Time Domain Power, Gated Sweep
* Built-in Spectrogram, Topographic and Split-window Display Modes
* Remote Control EMI Measurement Software : SpectrumShot
* Remote Control Interface : LAN, USB, RS-232
* Options : Tracking Generator, GPIB Interface

Rear Panel

GRA-415 Rack Adapter Panel

For : GSP-9330/9300B, Rack Mounting (19", 6U)

ORDERING INFORMATION

GSP-9330	3.25 GHz Spectrum Aalyzer	
EMC Pretest Solution	**GKT-008**	EMI Near Field Probe Set
	GLN-5040A	Line Impedance Stabilization Network
	APS-7100E	1 kVA AC Power Source
	GPL-5010	Transient Limiter

GLN-5040A

APS-7100E

GPL-5010

ACCESSORIES :
Power Cord

OPTION	
GSP-93T1	Tracking Generator (Factory installed option)
GSP-93G1	GPIB Interface (Factory installed option)
OPTIONAL ACCESSORIES	
GSC-009	Soft Carrying Case
GSP-93G1	Rack Adapter Panel
FREE DOWNLOAD	

SpectrumShot PC Software for Windows System (available on GW Instek website); IVI Driver Supports LabVIEW/LabWindows/CVI Programming (available on NI website)

SPECIFICATIONS

FREQUENCY		
FREQUENCY		
Range	9 kHz to 3.25 GHz	
Resolution	1 Hz	
FREQUENCY REFERENCE		
Accuracy	±(period since last adjustment x aging rate) + stability over temperature + supply voltage stability	
Aging Rate	± 1 ppm max.	1 year after last adjustment
Frequency Stability Over Temperature	± 0.025 ppm	0 °C to 50 °C
Supply Voltage Stability	± 0.02 ppm	
FREQUENCY READOUT ACCURACY		
Start, Stop, Center, Marker	±(marker frequency indication x frequency reference accuracy + 10% x RBW + frequency resolution)	
Trace Points	601 points	
MARKER FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Accuracy	±(marker frequency indication X frequency reference accuracy + counter resolution)	RBW/Span >= 0.02 ; Mkr level to DNL > 30 dB
FREQUENCY SPAN		
Range	0 Hz (zero span), 100 Hz to 3.25 GHz	
Resolution	1 Hz	
Accuracy	± frequency resolution *1	RBW : Auto
PHASE NOISE		
Offset From Carrier	Fc = 1 GHz; RBW = 1 kHz, VBW = 10 Hz; Average ≥ 40	
10 kHz	< -88 dBc/Hz	Typical *2
100 kHz	< -95 dBc/Hz	Typical
1 MHz	< -113 dBc/Hz	Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth	1 Hz to 1 MHz in 1-3-10 sequence 200 Hz, 9 kHz, 120 kHz, 1MHz	-3 dB bandwidth -6 dB bandwidth
Accuracy	± 8 %, RBW = 1 MHz; ± 5 %, RBW < 1 MHz	Nominal *3
Shape Factor	< 4.5 : 1	Normal Bandwidth ratio: -60 dB : -3 dB
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz to 1 MHz in 1-3-10 sequence	-3 dB bandwidth

[1] Frequency Resolution = Span/(Trace points - 1)

[2] Typical specifications in this datasheet mean that the performance can be exhibited in 80% of the units with a 95% confidence level over the temperature range 20 to 30 °C. They are not covered by the product warranty.

[3] Nominal values indicate expected performance. They are not covered by the product warranty.

AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 3.25 GHz	DANL to 18 dBm DANL to 21 dBm DANL to 30 dBm
ATTENUATOR		
Input Attenuator Range	0 dB to 50 dB, in 1 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVEL		
Average Total Power	≤ +33 dBm	Input attenuator ≥ 10 dB
DC Voltage	± 50 V	
1 dB GAIN COMPRESSION		
Total Power at 1st Mixer	> 0 dBm	Typical ; Fc ≥ 50 MHz; preamp. off
Total Power at the Preamp	> -22 dBm	Typical ; Fc ≥ 50 MHz; preamp. On
	Mixer power level (dBm) = input power (dBm) - attenuation (dB)	
DISPLAYED AVERAGE NOISE LEVEL (DANL) *4		
Preamp off	0 dB attenuation; RF Input is terminated with a 50 Ω load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60 dBm; trace average ≥ 40	
9 kHz to 100 kHz	< -93 dBm	Nominal
100 kHz to 1 MHz	< -90 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz to 2.7 GHz	< -122 dBm	Nominal
2.7 GHz to 3.25 GHz	< -116 dBm	Nominal
Preamp on	0 dB attenuation; RF Input is terminated with a 50 Ω load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60 dBm; trace average ≥ 40	
100 kHz to 1 MHz	< -108 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz to 10 MHz	< -142 dBm	Nominal
10 MHz to 3.25 GHz	< -142 dBm + 3 x (f/1 GHz) dB	Nominal

[4] DANL spec excludes spurious response.

LEVEL DISPLAY RANGE		
Scales	Log, Linear	
Units	dBm, dBmV, dBuV, V, W	
Marker Level Readout	0.01 dB 0.01 % of reference level	Log scale Linear scale
Level Display Modes	Trace, Topographic, Spectrogram	Single/Split Windows
Number of Traces	4	
Detector	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quasi-Peak(EMI), Average(EMI)	Can be setup for each trace separately
Trace Functions	Clear & Write, Max/Min Hold, View, Blank, Average	
ABSOLUTE AMPLITUDE ACCURACY		
Absolute Point	Center = 160 MHz ; RBW 10 kHz; VBW 1 kHz; span 100 kHz; log scale; 1 dB/div; peak detector; 23 °C ± 5 °C; Signal at Reference Level	
Preamp Off	± 0.5 dB	Ref level 0 dBm; 10 dB RF attenuation
Preamp On	± 0.6 dB	Ref level 0 dBm; -30 dB RF attenuation
FREQUENCY RESPONSE		
Preamp Off	Attenuation : 10 dB; Reference: 160 MHz; 20 °C to 30 °C	
100 kHz to 2.0 GHz	± 0.5 dB	
2 GHz to 3.25 GHz	± 0.7 dB	
Preamp On	Attenuation: 0 dB; Reference: 160 MHz; 20 °C to 30 °C	
1 MHz to 2 GHz	± 0.6 dB	
2 GHz to 3.25 GHz	± 0.8 dB	

SPECIFICATIONS		
ATTENUATION SWITCHING UNCERTAINTY		
Attenuator Setting Uncertainty	0 dB to 50 dB in 1 dB step	
	± 0.25 dB	Reference : 160 MHz, 10 dB attenuation
RBW FILTER SWITCHING UNCERTAINTY		
1 Hz to 1 MHz	± 0.25 dB	Reference : 10 kHz RBW
LEVEL MEASUREMENT UNCERTAINTY		
Overall Amplitude Accuracy	± 1.5 dB	20 °C to 30°C; frequency > 1 MHz; Signal input 0 dBm to -50 dBm; Reference level 0 dBm to -50 dBm; Input attenuation 10 dB; RBW 1 kHz; VBW 1 kHz; after cal; Preamp Off
	± 0.5 dB	Typical
SPURIOUS RESPONSE		
Second Harmonic Intercept	Preamp off; signal input -30dBm; 0 dB attenuation	
	+35 dBm +60 dBm	Typical; 10 MHz < fc < 775 MHz Typical; 775 MHz ≤ fc < 1.625 GHz
Third-order Intercept	Preamp off; signal input -30dBm; 0 dB attenuation	
	> 1 dBm	300 MHz to 3.25 GHz
Input Related Spurious	< -60 dBc	Input signal level -30 dBm, Att. Mode, Att = 0 dB; 20 °C to 30 °C
Residual Response (Inherent)	< -90 dBm	Input terminated; 0 dB attenuation; Preamp off
SWEEP		
SWEEP TIME		
Range	204 µs to 1000 s 50 µs to 1000 s	Span > 0 Hz Span = 0 Hz; Min resolution=10 µs
Sweep Mode	Continuous; Single	
Trigger Source	Free run; Video; External	
Trigger Slope	Positive or negative edge	
RF PREAMPLIFIER		
Frequency Range	1 MHz to 3.25 GHz	
Gain	18 dB	Nominal (installed as standard)
FRONT PANEL INPUT/OUTPUT		
RF INPUT		
Connector Type	N-type female	
Impedance	50 Ω	Nominal
VSWR	< 1.6 :1	300 kHz to 3.25 GHz ; Input attenuator 10 dB
POWER FOR OPTION		
Connector Type	SMB male	
Voltage/Current	DC + 7 V/ 500 mA max	With short-circuit protection
USB HOST		
Connector Type	A plug	
Protocol	Version 2.0	Support Full/High/Low speed
MICROSD SOCKET		
Protocol	SD 1.1	
Support Cards	MicroSD, MicroSDHC	Up to 32 GB capacity
REAR PANEL INPUT/OUTPUT		
REFERENCE OUTPUT		
Connector Type	BNC female	
Output Frequency	10 MHz	Nominal
Output Amplitude	3.3 V CMOS	
Output Impedance	50 Ω	
REFERENCE INPUT		
Connector Type	BNC female	
Input Reference Frequency	10 MHz	
Input Amplitude	-5 dBm to +10 dBm	
Frequency Lock Range	Within ± 5 ppm of the input reference frequency	
ALARM OUTPUT		
Connector Type	BNC female	Open-collector
TRIGGER INPUT/GATED SWEEP INPUT		
Connector Type	BNC female	
Input Amplitude	3.3 V CMOS	
Switch	Auto selection by function	
LAN TCP/IP INTERFACE		
Connector Type	RJ-45	
Base	10 Base-T; 100 Base-Tx; Auto-MDIX	
USB DEVICE		
Connector Type	B plug	For remote control only; supports USB TMC
Protocol	Version 2.0	Supports Full/High/Low speed
IF OUTPUT		
Connector Type	SMA female	
Impedance	50 Ω	Nominal
IF Frequency	886 MHz	Nominal
Output Level	-25 dBm	10 dB attenuation; RF input : 0 dBm @ 1 GHz
EARPHONE OUTPUT		
Connector Type	3.5mm stereo jack, wired for mono operation	
RS-232C INTERFACE		
Connector Type	D-sub 9-pin female	Tx , Rx , RTS , CTS
GPIB INTERFACE (OPTIONAL)		
Connector Type	IEEE-488 bus connector	
AC POWER INPUT		
Power Source	AC 100 V to 240 V, 50 Hz or 60 Hz	Auto range selection

SPECIFICATIONS

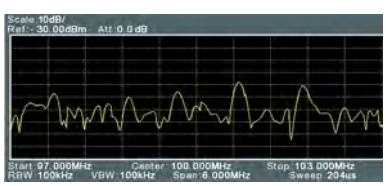
GENERAL		
Internal Data Storage	16 MB nominal	
Power Consumption	< 65 W	
Warm-up Time	< 30 minutes	
Temperature Range	+5 °C to + 45 °C	Operating
	-20 °C to + 70 °C	Storage
Dimensions & Weight	350(W) x 210(H) x 100(D) mm, Approx. 4.5kg	Inc. all options (Basic + TG + GPIB + Battery)
	13.8(W) x 8.3(H) x 3.9(D) inch, Approx. 9.9lb	
Calibration Cycle	The recommended calibration cycle is one year; calibration services are available through GW Instek's authorized calibration services.	
TRACKING GENERATOR (OPTIONAL) *5		
Frequency Range	100 kHz to 3.25 GHz	
Output Power	-50 dBm to 0 dBm in 0.5 dB steps	
Absolute Accuracy	± 0.5 dB	@160 MHz, -10 dBm, Source attenuation 10 dB, 20 °C to 30 °C
Output Flatness	Referenced to 160 MHz, -10 dBm	
	100 kHz to 2 GHz	± 1.5 dB
	2 GHz to 3.25 GHz	± 2 dB
Output Level Switching Uncertainty	± 0.8 dB	Referenced to -10 dBm
Harmonics	< -30 dBc	Typical, output level = -10 dBm
Reverse Power	+30 dBm max.	
ConnectorType	N-type female	
Impedance	50 Ω	Nominal
Output VSWR	< 1.6 : 1	300 kHz to 3.25 GHz, source attenuation ≥ 12 dB

[5] The minimum RBW filter is 10kHz when the TG output is ON.

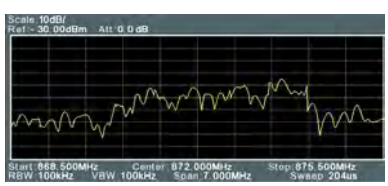
Note : The specifications apply when the GSP-9330 is powered on for at least 60 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

A. FAST SIGNAL SWEEP

FM Signal Monitoring



Taiwan Telecom Signals



For spectrum analyzer, speed is the most important specification. GSP-9330 provides sweep speed up to 204 µs. Users, via high speed sweep time, can identify and analyze various fast or transient signals such as frequency/amplitude modulation signals, Blue tooth frequency hopping signals, tuned oscillator or other interfering signals under ISM Band.

B. MODULATED SIGNAL ANALYSIS

2FSK Signal Analysis **ASK/FSK Signal Demodulation & Analysis** **AM/FM Signal Demodulation & Analysis**

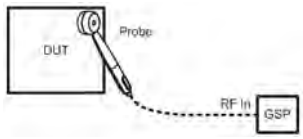
2FSK **FSK** **ASK** **FM** **AM**

2FSK modulation, for its features of low design cost and low electricity consumption, is widely used by RF communications applications with low power and low data transmission speed characteristics. Nowadays, 2FSK modulation technology has been applied in various products and systems such as consumer electronics, automotive electronics, RFID, auto reading electricity meter, and industrial control devices, etc. 2FSK signal analysis measures parameters including carrier power, FSK frequency deviation, carrier frequency, and carrier frequency offset. Users can set the criterion in frequency deviation and carrier offset for fast test result determination.

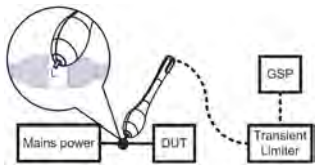
RFID and optical communications systems often use Amplitude Shift Keying (ASK). Applications such as wireless telephone, paging systems, and RFID, etc. utilize Frequency Shift Keying (FSK). ASK/FSK demodulation and analysis measures parameters including ASK depth, frequency deviation, carrier power, carrier frequency offset, symbol, and waveform. Users can set ASK depth, frequency deviation, carrier power and carrier offset for Pass/Fail testing result. Data message is provided to determined preamble & sync function.

AM/FM Signal Analysis measures parameters including AM depth, frequency deviation, modulation rate, carrier power, carrier frequency offset and SINAD. Users can set the criterion in AM depth, frequency deviation, carrier power and carrier offset for fast test result determination. The GSP-9330 has a convenient AM/FM demodulation function to tune into AM or FM broadcast signals and listen to the demodulated signals.

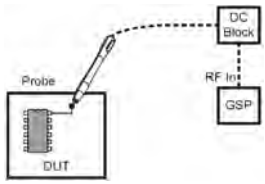
C. EMC PRETEST SOLUTION



ANT-04/ANT-05



PR-01



PR-02

GSP-9330 has the built-in EMI dedicated 200/9 k/120 k/1 MHz filter, 20 dB low noise amplifier and Quasi-Peak/Average detection mode to conduct radiation and conduction tests after collocating with the probe set.

GKT-008, the radiation test probe set, provides a complete near field test probe set to simplify the complex measurement procedures and to simulate 3 m/10 m far field tests from the labs. Using GKT-008 can greatly save engineers' debugging time and the money for going back and forth to the labs.

GKT-008 can collocate with the Tracking Generator function of GSP-9330 to conduct EMS tests.

For conduction tests, GSP-9330 can collocate with LISN and AC Power Source to conduct electromagnetic conduction tests. If users concern EUT's large voltage variation or complexity, applying a Transient Limiter will make test equipment safer.

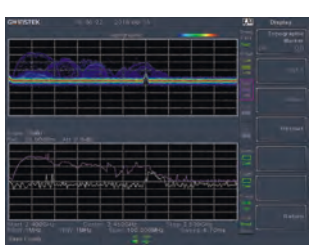
EMC Pretest Instruments Provided by GW Instek Are as Follows :		
GSP-9330	**Spectrum Analyzer**	Built-in complete EMC pretest solution
GKT-008	**EMI Near Field Probe Set**	Provide probe set for near field signals, including, ANT-04/ANT-05 field sensor PR-01 AC high voltage probe PR-02 Source contact probe
GLN-5040A	**LISN**	LISN required by EMI conduction tests and it meets CISPR 16-1-2 regulations.
APS-7100E	**AC Power Source**	Different mains have different current leakages that will cause systems to have short circuit, AC Power Source Isolation transformer prevents short circuit by isolating current loop.
GPL-5010	**Transient Limiter**	Transient Limiter will make test equipment safer, if EUT has large voltage variation or complexity.

For more detailed information about EMC Pretest Solution, please visit "DETAILED EMC PRETEST SOULTION" documents.

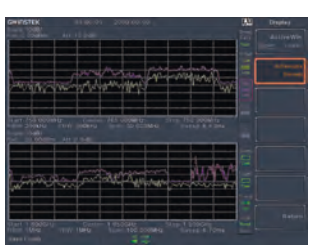
D. GRAPHIC PROCESSING OF SIGNAL MONITORING

Observe FM Signals by Spectrogram

Observe WiFi Signals by Topographic



Observe 4G LTE Signals by Split-Window Display



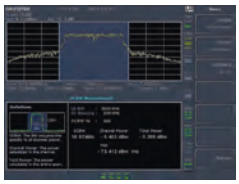
Spectrogram can simultaneously display power, frequency, and time. Frequency and power variation according to time changes can also be tracked. Especially, the intermittently appeared signals can be identified. Users, by using Spectrogram, can analyze the stability of signal versus time or identify the intermittently appeared interference signals in the communications system. Users can use two markers to find out the relation of power to frequency and time.

Topographic uses color shade to show the probability distribution of signal appearance. This function allows users to directly understand the process of signal variation according to time changes that is beneficial to observe intermittent feeble signals or electromagnetic interference signals. Users can use two makers to find out the relation of power to frequency and percentage.

Split-Window allows two independent observations that are very convenient for monitoring two different frequency bandwidths.

E. SIGNAL VERIFICATION, TEST AND ANALYSIS

Channel Power Measurement



ACPR **OCBW**

Telecommunications and broadcasting service carriers will encounter distorted signals caused by adjacent channels' inter-modulation while transmitting modulated signals using communications channels. If the distorted signals are too large the communications quality of adjacent channels will be affected. The ACPR measurement can examine the leakage status that is conducive to identifying interference source.

The OCBW measurement can simultaneously display OCBW, channel power and PSD. OCBW's unit is shown by percentage. A measurement area containing bandwidth will be shown when OCBW is in use.

Spectrum Emission Mask

SEM

SEM measures out-of-channel emission which is defined by corresponding in-channel power. Users can set main channel's parameters, out-of-channel range, and limit line, etc.

GSP-9330 has the built-in SEM settings of 3 GPP, WLAN 802.11b/g/n, Wimax 802.16 and self-defined communications system. SEM supports the Pass/Fail test function and lists frequency range for surpassing each out-of-channel limit. An alarm signal will be triggered if any measurement results that are not matched with SEM.

CATV System Parameter Tests

CNR/CSO/CTB

The built-in CNR/CSO/CTB functions of GSP-9330 are ideal for measuring performance of CATV amplifier and system.

Note: General CATV is 75 Ω. For GSP-9330, a 50 to 75 Ω adapter is needed.

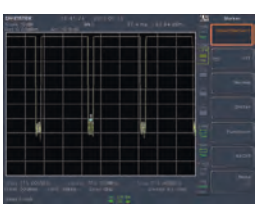
TOI (Third Order Intercept)

Users can measure the linearity of non-linear systems and components such as receiver, low-noise amplifier and mixer by TOI which automatically tests effective carrier and measures inter-modulation sidebands.

Harmonic

Harmonic can easily measure the amplitude of fundamental frequency and as high as ten orders of harmonic frequency. This function can also measure amplitude(dBc) which is the ratio of harmonic and corresponding fundamental carrier. Total harmonic distortion (THD)can also be calculated by this function. The best harmonic information can be obtained by adjusting RBW.

Time Domain Power



Users can go to zero span setting and open marker to observe burst signals when measuring burst signal in time domain is required.

Phase Jitter

The Phase Jitter function can rapidly measure phase noise produced by RF signal source's and oscillator's carrier deviation. This function can directly convert signal jitter to phase (rad) and time (ns).

Marker Noise

The marker noise function calculates the average noise level over a bandwidth of 1 Hz, referenced from the marker position.

Gated Sweep

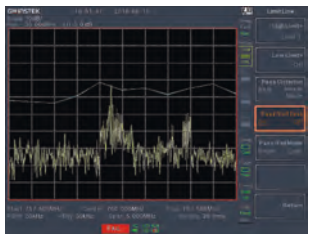
Radar or TDMA communications systems, via intermittently turning On/Off output power, control transmission signals. In order to monitor the power spectrum during the transmission process, the Gated Sweep function can initiate measurement only when signals appear. This function is ideal for measuring burst signals such as GSM or WLAN.

F. PRODUCTION LINE APPLICATIONS

Sequence Function

The sequence function allows users to edit a sequence formulated by a series of steps directly from the instrument. Pause and delay can be inserted in the sequence to observe the test results. There are five sets of sequence for selection. Each sequence allows editing of 20 steps. Different sequence can be interactive and support each other. This function provides automatic editing without using the PC that is very convenient for assembly lines in which execute routine test procedures.

Limit Line Function



The limit line function, based upon the preset criteria of passing the test, can be used to directly determine whether the DUT passes the test. Test result not only can be shown on the LCD screen, but also an alarm signal output indication from the rear panel which is done by connecting a speaker or light device to show the test result.

Shorten Warm-Up Time

GSP-9330 utilizes the patented design of high efficient heat dissipation and feedback temperature control. After the instrument is turned on, the internal instrument can rapidly maintain a stable temperature so as to provide accurate amplitude measurement and deliver the frequency measurement with 0.025 ppm frequency stability.

Wake-Up Clock

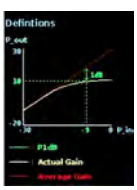
Users can set up automatic wake-up time for each day of the week. By so doing, the purpose of GSP-9330 pre wake-up can be achieved. Pre wake-up is ideal for the lower temperature environment to conduct tests in the preset time.

G. USER FRIENDLY DESIGN

Status Icons

Status Icons show the interface status, power status, alarm status and etc of GSP-9330. Users can easily understand the setting status and test results of the instrument.

Definition Help



The built-in Definition Help function allows users to immediately understand the parameters of Channel Power, OCBW, ACPR, SEM, Phase Jitter, N-dB Bandwidth & P1dB items so as to save time on reading user manual.

H. COMMUNICATIONS INTERFACE

Various Interface

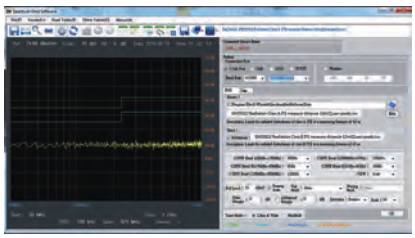
Provide USB Host, RS-232, LXI C(LAN), and GPIB(option) instrument control interface. Supported programs comply with IEEE488.2.

USB Device/MicroSD

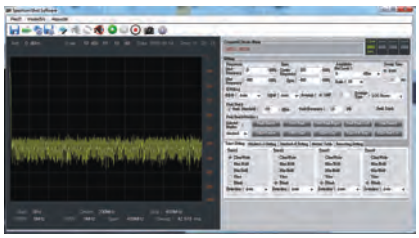
Provide USB Device, MicroSD interface for file storage. Quick Save function is also available for users to quickly retrieve display.

I. SOFTWARE SUPPORT

PC Software - SpectrumShot



EMI Pretest Mode



Get Trace Mode

Remote Control Mode

Users can use the external software Spectrum Shot for EMI pretest report management and assessment, remote control and waveform data recording for long periods of time.

Under the EMI Pre-test Mode, users can select the required CISPR EMI regulation for conduction and radiation measurement.

Under Get Trace mode, users can record the waveform data for long periods of time. It can be applied to spectrum monitoring for detecting any abnormal radio signals. The software will send out e-mail to inform users if any abnormal situation occurs.

Under the Remote Control mode, users can monitor wireless interference signals or observe signals for long periods of time.

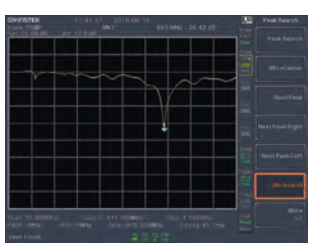
IVI Driver & LabVIEW Support

IVI Driver Supports LabView & LabWindows/CVI Programming.
It is available on NI website.

J. VARIOUS AUGMENTING OPTIONS

Tracking Generator

Scalar Network Analysis



3dB Frequency Bandwidth

Reflection Loss

P1dB Point Measurement

TG option provides 0 to -50 dBm synchronized sweep output, conducts scalar network analysis (S11. S21) function as well as P1 dB.

The built-in tracking generator can swiftly and easily measure frequency response of cable loss, filter bandwidth, amplifier gain, mixer conversion loss, etc. The N-dB Bandwidth function measures 3 dB bandwidth of Bandpass filter. SWR bridge should be connected with tracking generator to measure the return loss of antenna or filter.

All active components have linear dynamic range for power output. Once output power reaches the maximum level, active component will enter the non-linear saturated area of P1dB point and cease amplifying signal intensity as well as produce harmonic distortion. It is very useful for P1dB point measurement in active components such as low noise amplifier, mixer and active filter.

Soft Carrying Case

Optional soft carrying case(GSC-009) provides convenience and protection to the instrument. GSP-9330 is equipped with 8.4 inches 800 x 600 pixels LCD display which yields clearer display results for outdoor operations.

3 GHz Spectrum Analyzer

Patent No. ZL201220347963.5

GSP-9300B

CE | USB | LXI | RS-232 | GPIB | PC Software

FEATURES

* Frequency Range : 9 kHz to 3 GHz
* 0.025 ppm Frequency Stability and 1ppm Aging Rate
* Built-in Preamplifier, 50 dB Attenuator, and Sequence Function
* RBW : 1 Hz to 1 MHz
* Sensitivity : -149 dBm/Hz (@PreAmp on)
* Built-in AM/FM Demodulation & Analysis
* Built-in P1dB point, Harmonic, Channel Power, N-dB Bandwidth, OCBW, ACPR, SEM, TOI, CNR, CTB, CSO, Noise Marker, Frequency Counter, Time Domain Power, Gated Sweep
* Built-in Spectrogram, Topographic and Dual-View Display Modes
* Remote Control Software : SpectrumShot
* Remote Control Interface : LAN, USB, RS-232
* Options : Tracking Generator, GPIB Interface

GSP-9300B is a 3 GHz spectrum analyzer, which meets general RF measurement requirements. It provides a frequency stability of 0.025 ppm and collocates with a built-in preamplifier, which has a minimum noise floor of -149 dBm / Hz. More than 20 measurement applications are also available, including AM/FM modulation analysis, ACPR/OCBW/CHPW, CATV parameters etc.

For signal monitoring and processing, GSP-9300B provides Topographic and Spectrogram display modes to analyze the signal through the change of color temperature. The split-window display mode can set parameters for both displays and measure two different frequency bands at the same time. Friendly user interface provides functions such as status icon display, online help, multi-language support, and sequence setting. The patented heat-conducting design can greatly shorten the time for the machine to power up. The preset power-on function can improve the efficiency when it is used in the production line. Communications interfaces include USB, RS-232, LXI, MicroSD, GPIB interface output.

In summary, GSP-9300B is a stable, lightweight and suitable test equipment for various applications. It is very ideal for the education market, production line, general signal monitoring, and more importantly, its price is beyond your imagination. It is the preferred product for limited budgets.

GSP-9300B

Rear Panel

GRA-415 Rack Adapter Panel

For : GSP-9330/9300B, Rack Mounting (19", 6U)

ORDERING INFORMATION

GSP-9300B	3 GHz Spectrum Aalyzer	
EMC Pretest Solution	**GKT-008**	EMI Near Field Probe Set
	GLN-5040A	Line Impedance Stabilization Network
	APS-7100E	1 kVA AC Power Source
	GPL-5010	Transient Limiter
ACCESSORIES :		
Power Cord		
OPTION		
GSP-93T1	Tracking Generator (Factory installed option)	
GSP-93G1	GPIB Interface (Factory installed option)	
OPTIONAL ACCESSORIES		
GSC-009	Soft Carrying Case	
GSP-93G1	Rack Adapter Panel	
FREE DOWNLOAD		
SpectrumShot PC Software for Windows System (available on GW Instek website); IVI Driver Supports LabVIEW/LabWindows/CVI Programming (available on NI website)		

SPECIFICATIONS

FREQUENCY		
FREQUENCY		
Range	9 kHz to 3 GHz	
Resolution	1 Hz	
FREQUENCY REFERENCE		
Accuracy	±(period since last adjustment x aging rate) + stability over temperature + supply voltage stability	
Aging Rate	± 1 ppm max.	1 year after last adjustment
Frequency Stability Over Temperature	± 0.025 ppm	0 °C to 50 °C
Supply Voltage Stability	± 0.02 ppm	
FREQUENCY READOUT ACCURACY		
Start, Stop, Center, Marker	±(marker frequency indication x frequency reference accuracy + 10% x RBW + frequency resolution)	
Trace Points	601 points	
MARKER FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	
Accuracy	±(marker frequency indication X frequency reference accuracy + counter resolution)	RBW/Span >= 0.02 ; Mkr level to DNL > 30 dB
FREQUENCY SPAN		
Range	0 Hz (zero span), 100 Hz to 3 GHz	
Resolution	1 Hz	
Accuracy	± frequency resolution *1	RBW : Auto
PHASE NOISE		
Offset From Carrier	Fc = 1 GHz; RBW = 1 kHz, VBW = 10 Hz; Average ≥ 40	
10 kHz	< -88 dBc/Hz	Typical *2
100 kHz	< -95 dBc/Hz	Typical
1 MHz	< -113 dBc/Hz	Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth	1 Hz to 1 MHz in 1-3-10 sequence	-3 dB bandwidth
	200 Hz, 9 kHz, 120 kHz, 1MHz	-6 dB bandwidth
Accuracy	± 8 %, RBW = 1 MHz; ± 5 %, RBW < 1 MHz	Nominal *3
Shape Factor	< 4.5 : 1	Normal Bandwidth ratio: -60 dB : -3 dB
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz to 1 MHz in 1-3-10 sequence	-3 dB bandwidth

[1] Frequency Resolution = Span/(Trace points - 1)

[2] Typical specifications in this datasheet mean that the performance can be exhibited in 80% of the units with a 95% confidence level over the temperature range 20 to 30 °C. They are not covered by the product warranty.

[3] Nominal values indicate expected performance. They are not covered by the product warranty.

AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 kHz to 1 MHz	DANL to 18 dBm
	1 MHz to 10 MHz	DANL to 21 dBm
	10 MHz to 3 GHz	DANL to 30 dBm
ATTENUATOR		
Input Attenuator Range	0 dB to 50 dB, in 1 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVEL		
Average Total Power	≤ +33 dBm	Input attenuator ≥ 10 dB
DC Voltage	± 50 V	
1 dB GAIN COMPRESSION		
Total Power at 1st Mixer	> 0 dBm	Typical ; Fc ≥ 50 MHz; preamp. off
Total Power at the Preamp	> -22 dBm	Typical ; Fc ≥ 50 MHz; preamp. On
	Mixer power level (dBm) = input power (dBm) - attenuation (dB)	
DISPLAYED AVERAGE NOISE LEVEL (DANL) *4		
Preamp Off	0 dB attenuation; RF Input is terminated with a 50 Ω load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60 dBm; trace average ≥ 40	
9 kHz to 100 kHz	< -93 dBm	Nominal
100 kHz to 1 MHz	< -90 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz to 2.7 GHz	< -122 dBm	Nominal
2.7 GHz to 3 GHz	< -116 dBm	Nominal
Preamp on	0 dB attenuation; RF Input is terminated with a 50 Ω load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60 dBm; trace average ≥ 40	
100 kHz to 1 MHz	< -108 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz to 10 MHz	< -142 dBm	Nominal
10 MHz to 3 GHz	< -142 dBm + 3 x (f/1 GHz) dB	Nominal

[4] DANL spec excludes spurious response.

LEVEL DISPLAY RANGE		
Scales	Log, Linear	
Units	dBm, dBmV, dBuV, V, W	
Marker Level Readout	0.01 dB	Log scale
	0.01 % of reference level	Linear scale
Level Display Modes	Trace, Topographic, Spectrogram	Single/Split Windows
Number of Traces	4	
Detector	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quasi-Peak(EMI), Average(EMI)	Can be setup for each trace separately
Trace Functions	Clear & Write, Max/Min Hold, View, Blank, Average	
Absolute Point	Center = 160 MHz ; RBW 10 kHz; VBW 1 kHz; span 100 kHz; log scale; 1 dB/div; peak detector; 23 °C ± 5 °C; Signal at Reference Level	
Preamp Off	± 0.5 dB	Ref level 0 dBm; 10 dB RF attenuation
Preamp On	± 0.6 dB	Ref level 0 dBm; -30 dB RF attenuation

SPECIFICATIONS		
FREQUENCY RESPONSE		
Preamp Off	Attenuation : 10 dB; Reference: 160 MHz; 20 °C to 30 °C	
100 kHz to 2.0 GHz	± 0.5 dB	
2 GHz to 3 GHz	± 0.7 dB	
Preamp On	Attenuation: 0 dB; Reference: 160 MHz; 20 °C to 30 °C	
1 MHz to 2 GHz	± 0.6 dB	
2 GHz to 3 GHz	± 0.8 dB	
ATTENUATION SWITCHING UNCERTAINTY		
Attenuator Setting Uncertainty	0 dB to 50 dB in 1 dB step	
	± 0.25 dB	Reference : 160 MHz, 10 dB attenuation
RBW FILTER SWITCHING UNCERTAINTY		
1 Hz to 1 MHz	± 0.25 dB	Reference : 10 kHz RBW
LEVEL MEASUREMENT UNCERTAINTY		
Overall Amplitude Accuracy	± 1.5 dB	20 °C to 30°C; frequency > 1 MHz; Signal input 0 dBm to -50 dBm; Reference level 0 dBm to -50 dBm; Input attenuation 10 dB; RBW 1 kHz; VBW 1 kHz; after cal; Preamp Off
	± 0.5 dB	Typical
SPURIOUS RESPONSE		
Second Harmonic Intercept	Preamp off; signal input -30dBm; 0 dB attenuation	
	+35 dBm	Typical; 10 MHz < fc < 775 MHz
	+60 dBm	Typical; 775 MHz ≤ fc < 1.625 GHz
Third-order Intercept	Preamp off; signal input -30dBm; 0 dB attenuation	
	> 1 dBm	300 MHz to 3 GHz
Input Related Spurious	< -60 dBc	Input signal level -30 dBm, Att. Mode, Att = 0 dB; 20 °C to 30 °C
Residual Response (Inherent)	< -90 dBm	Input terminated; 0 dB attenuation; Preamp off
SWEEP		
SWEEP TIME		
Range	204 µs to 1000 s	Span > 0 Hz
	50 µs to 1000 s	Span = 0 Hz; Min resolution=10 µs
Sweep Mode	Continuous; Single	
Trigger Source	Free run; Video; External	
Trigger Slope	Positive or negative edge	
RF PREAMPLIFIER		
Frequency Range	1 MHz to 3 GHz	
Gain	18 dB	Nominal (installed as standard)
FRONT PANEL INPUT/OUTPUT		
RF INPUT		
Connector Type	N-type female	
Impedance	50 Ω	Nominal
VSWR	< 1.6 :1	300 kHz to 3 GHz ; Input attenuator 10 dB
POWER FOR OPTION		
Connector Type	SMB male	
Voltage/Current	DC + 7 V/ 500 mA max	With short-circuit protection
USB HOST		
Connector Type	A plug	
Protocol	Version 2.0	Support Full/High/Low speed
MICROSD SOCKET		
Protocol	SD 1.1	
Support Cards	MicroSD, MicroSDHC	Up to 32 GB capacity
REAR PANEL INPUT/OUTPUT		
REFERENCE OUTPUT		
Connector Type	BNC female	
Output Frequency	10 MHz	Nominal
Output Amplitude	3.3 V CMOS	
Output Impedance	50 Ω	
REFERENCE INPUT		
Connector Type	BNC female	
Input Reference Frequency	10 MHz	
Input Amplitude	-5 dBm to +10 dBm	
Frequency Lock Range	Within ± 5 ppm of the input reference frequency	
ALARM OUTPUT		
Connector Type	BNC female	Open-collector
TRIGGER INPUT/GATED SWEEP INPUT		
Connector Type	BNC female	
Input Amplitude	3.3 V CMOS	
Switch	Auto selection by function	
LAN TCP/IP INTERFACE		
Connector Type	RJ-45	
Base	10 Base-T; 100 Base-Tx; Auto-MDIX	
USB DEVICE		
Connector Type	B plug	For remote control only; supports USB TMC
Protocol	Version 2.0	Supports Full/High/Low speed
IF OUTPUT		
Connector Type	SMA female	
Impedance	50 Ω	Nominal
IF Frequency	886 MHz	Nominal
Output Level	-25 dBm	10 dB attenuation; RF input : 0 dBm @ 1 GHz

SPECIFICATIONS		
EARPHONE OUTPUT		
Connector Type	3.5mm stereo jack, wired for mono operation	
RS-232C INTERFACE		
Connector Type	D-sub 9-pin female	Tx , Rx , RTS , CTS
GPIB INTERFACE (OPTIONAL)		
Connector Type	IEEE-488 bus connector	
AC POWER INPUT		
Power Source	AC 100 V to 240 V, 50 Hz or 60 Hz	Auto range selection
GENERAL		
Internal Data Storage	16 MB nominal	
Power Consumption	< 65 W	
Warm-up Time	< 30 minutes	
Temperature Range	+5 °C to + 45 °C	Operating
	-20 °C to + 70 °C	Storage
Dimensions & Weight	350(W) x 210(H) x 100(D) mm, Approx. 4.5kg	Inc. all options (Basic + TG + GPIB + Battery)
	13.8(W) x 8.3(H) x 3.9(D) inch, Approx. 9.9lb	
Calibration Cycle	The recommended calibration cycle is one year; calibration services are available through GW Instek's authorized calibration services.	
TRACKING GENERATOR (OPTIONAL) *5		
Frequency Range	100 kHz to 3 GHz	
Output Power	-50 dBm to 0 dBm in 0.5 dB steps	
Absolute Accuracy	± 0.5 dB	@160 MHz, -10 dBm, Source attenuation 10 dB, 20 °C to 30 °C
Output Flatness	Referenced to 160 MHz, -10 dBm	
	100 kHz to 2 GHz	± 1.5 dB
	2 GHz to 3 GHz	± 2 dB
Output Level Switching Uncertainty	± 0.8 dB	Referenced to -10 dBm
Harmonics	< -30 dBc	Typical, output level = -10 dBm
Reverse Power	+30 dBm max.	
ConnectorType	N-type female	
Impedance	50 Ω	Nominal
Output VSWR	< 1.6 : 1	300 kHz to 3 GHz, source attenuation ≥ 12 dB
[5] The minimum RBW filter is 10kHz when the TG output is ON.		

Note : The specifications apply when the GSP-9300B is powered on for at least 60 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

GKT-001 General Kit Set

Include :
ADP-002
ATN-100
GTL-303
GSC-002
For: GSP-Series

GKT-002 CATV Kit Set

Include :
ADP-001
ADP-101
GTL-304
GSC-003
For: GSP-Series

GKT-003 RLB Kit Set

Include :
GAK-001
GAK-002
GTL-302
GSC-004
For: GSP-Series

GSC-009 Soft Carrying Case

For: GSP-9330/9300B

GKT-008 EMI Probe Kit Set

Include :
ADP-002
GTL-303
PR-01
PR-02
ANT-04
ANT-05
For: GSP-Series

8.0 GHz/3.8 GHz/1.8 GHz Spectrum Analyzer

NEW

GSP-8000 Series

CE USB LAN PC Software

FEATURES

* Frequency Range
  - GSP-8800 : 9 kHz to 8.0 GHz
  - GSP-8380 : 9 kHz to 3.8 GHz
  - GSP-8180 : 9 kHz to 1.8 GHz
* RBW: 1 Hz to 1 MHz in 1-3-5-10 steps
* VBW: 10 Hz to 3 MHz in 1-3-5-10 steps
* Phase Noise: -104 dBc/Hz
* Sensitivity : -160 dBm/Hz Typical @PreAmp On
* Built-in AM/FM Demodulation
* Built-in Time Spec Function
* Measurement Function : ACPR/OCBW/ CHPW, NdB BW, Pass-Fail, Freq. Counter, Noise Marker
* Built-in 20dB Preamplifier
* Communication Interface: LAN, USB Host/ Device
* Display : 10.4" XGA Output (1024*768)
* Options : EMI Filter

The GSP-8000 series, brand new general spectrum analyzers from GW Instek, features three frequency ranges, namely 8.0 GHz, 3.8 GHz and 1.8 GHz. The series is suitable for teaching research, R&D verification, and the test requirements of radio frequency products during production and development stages. The series provides 1 Hz to 1 MHz resolution bandwidth (RBW), 10 Hz to 3 MHz video bandwidth (VBW), -104 dBc/Hz phase noise, a 20 dB preamplifier, and the lowest noise floor of -160 dBm/Hz (typical).

With respect to measurement applications, GSP-8000 has built-in Time Spec function, AM/FM signal demodulation function, channel test (Channel Power Measurement) function, Pass-Mail function, etc. The Time Spec function can simultaneously observe and display the correlation between power, frequency and time. ACPR/OCBW/CHPW tests can be used to test adjacent channels, power occupation bandwidth ratio, and channel power. The Pass-Fail function can be used to determine whether the signal is within the set range. Users can use these functions to conduct a wide range of measurement applications.

GSP-8000 utilizes a 10.4-inch TFT LCD large-size screen with XGA (1024*768) resolution to allow an easy observation of test signals. For communication interface, GSP-8000 provides two interfaces: USB and LAN. Through the USB Host, users can quickly retrieve the files stored after measurements, while USB Device and LAN interface allow users to control the instrument through dedicated PC software, or use the corresponding command set to design the required program.

GSP-8000 provides EMI filter option. Customers can be activated through the corresponding software authorization (Soft-Key), which greatly improves usage efficiency.

GSP-8800

Rear Panel

ORDERING INFORMATION

GSP-8800	8.0 GHz Spectrum Analyzer
GSP-8800(TG)	8.0 GHz Spectrum Analyzer with TG
GSP-8380(TG)	3.8 GHz Spectrum Analyzer with TG
GSP-8180(TG)	1.8 GHz Spectrum Analyzer with TG

ACCESSORIES :
Power Cord, USB Cable

OPTIONAL ACCESSORIES

GSP-8800E1	EMI Activation Option for GSP-8800
GSP-8380E1	EMI Activation Option for GSP-8380
GSP-8180E1	EMI Activation Option for GSP-8180
ADP-001	N(M)-BNC(F) Adapter
ADP-002	N(M)-SMA(F) Adapter
GTL-301	N(M)-N(M) RF Cable
GTL-303	SMA(M)-SMA(M) RF Cable

FREE DOWNLOAD

Spectrum PC Software for Windows System (available on GW Instek website)

SPECIFICATIONS

Model	GSP-8180	GSP-8380	GSP-8800
FREQUENCY			
FREQUENCY			
Range	9 kHz to 1.8 GHz	9 kHz to 3.8 GHz	9 kHz to 8.0 GHz
Resolution	1 Hz		
FREQUENCY SPAN			
Span Range	0 Hz, 100 Hz to max. frequency of instrument		
Span Uncertainty	± span / (sweep points-1)		
INTERNAL FREQUENCY REFERENCE			
Span Range	10.000000 MHz		
Reference Frequency Accuracy	± [(days from last calibrate × freq aging rate) + temperature stability + initial accuracy]		
Temperature stability	< 1 ppm, 15°C to 35°C		
Aging rate	< 1 ppm/year		
Initial Accuracy	< 1 ppm		
SSB PHASE NOISE			
Offset from Carrier	fc = 1 GHz, RBW = 1 kHz, VBW = 1 kHz, 20 °C to 30°C, average ≥ 40		
10 kHz	< -104 dBc/Hz		
100 kHz	< -106 dBc/Hz, Typical		
1 MHz	< -115 dBc/Hz, Typical		
BANDWIDTH			
Resolution Bandwidth	1 Hz to 1 MHz (1-3-5-10 steps by sequence) EMI Filter (6 dB): 200 Hz, 9 kHz, 120 kHz, 1 MHz (Optional)		
RBW Uncertainty	< 5 %, Typical, RBW ≤ 1 MHz		
Resolution Filter Shape Factor (60	< 5: 1, Typical, digital and close to Gaussian shape		
Video Bandwidth (VBW)	10 Hz to 3 MHz		
AMPLITUDE			
AMPLITUDE AND LEVEL			
Amplitude Measurement Range	DANL to +10 dBm	100 kHz to 1 MHz, Preamp Off	DANL to +10 dBm	100 kHz to 1 MHz, Preamp Off	DANL to +10 dBm	100 kHz to 10 MHz, Preamp Off
	DANL to +20 dBm	1 MHz to 1.8 GHz, Preamp Off	DANL to +20 dBm	1 MHz to 3.8 GHz, Preamp Off	DANL to +20 dBm	10 MHz to 8 GHz, Preamp Off
Reference Level	-80 dBm to +30 dBm, 0.01 dB by step					
Preamp	20 dB, 100 kHz to Max. Frequency Range					
Input Attenuation	0 to 40 dB, in 1 dB step					
Max Input DC Voltage	50 VDC					
Max Continuous Power	+30 dBm, Average continuous power					
Displayed Average Noise Level (DANL)						
Preamp Off	Input Attenuation = 0 dB, ref. level ≥ -60 dBm, trace average ≥ 40, RBW normalizes to 1 Hz, DETECTOR = SAMPLE, RBW = 100 Hz, VBW = 100 Hz					
	9 kHz to 1 MHz	< -95 dBm (typical), < -88 dBm	9 kHz to 1 MHz	< -95 dBm (typical), < -88 dBm	9 kHz to 1 MHz	-95 dBm (typical), < -88 dBm
	1 MHz to 1 GHz	< -140 dBm (typical), < -130 dBm	1 MHz to 1 GHz	< -140 dBm (typical), < -130 dBm	1 MHz to 500 MHz	-140 dBm (typical), < -130 dBm
	1 GHz to 1.8 GHz	< -138 dBm (typical), < -128 dBm	1 GHz to 3.8 GHz	< -138 dBm (typical), < -128 dBm	500 MHz to 3 GHz	-138 dBm (typical), < -128 dBm
					3 GHz to 6 GHz	-134 dBm (typical), < -124 dBm
					6 GHz to 8 GHz	-129 dBm (typical), < -119 dBm
Preamp On	Input Attenuation = 0 dB, ref. level ≥ -60 dBm, trace average ≥ 40, RBW normalizes to 1 Hz, DETECTOR = SAMPLE, RBW = 100 Hz, VBW = 100 Hz					
	9 kHz to 1 MHz	< -135 dBm (typical), < -128 dBm	9 kHz to 1 MHz	< -135 dBm (typical), < -128 dBm	9 kHz to 1 MHz	-135 dBm (typical), < -128 dBm
	1 MHz to 1 GHz	< -160 dBm (typical), < -150 dBm	1 MHz to 1 GHz	< -160 dBm (typical), < -150 dBm	1 MHz to 500 MHz	-160 dBm (typical), < -150 dBm
	1 GHz to 1.8 GHz	< -160 dBm (typical), < -150 dBm	1 GHz to 3.8 GHz	< -160 dBm (typical), < -150 dBm	500 MHz to 3 GHz	-160 dBm (typical), < -150 dBm
					3 GHz to 6 GHz	-154 dBm (typical), < -144 dBm
					6 GHz to 8 GHz	-149 dBm (typical), < -139 dBm
FREQUENCY RESPONSE						
Filter Bandwidth	20°C to 30°C, 30% to 70% relative humidity, input attenuation = 10 dB, reference frequency = 50 MHz, SPAN = 200 kHz, RBW = 10 kHz, VBW = 10					
Preamp Off, fc ≥100 kHz	± 0.8 dB, 100 kHz to Max. Frequency Range					
Preamp On, fc ≥1 MHz	± 0.9 dB, 100 kHz to Max. Frequency Range					
UNCERTAINTY AND ACCURACY						
RBW Switch Uncertainty	Reference: 10 kHz RBW at Frequency Center is 50 MHz ± 0.2 dB, Log resolution					
Input Attenuation Uncertainty	20 °C to 30 °C, fc = 50 MHz, Preamplifier Off, 10 dB RF attenuation, RBW = 10 kHz 1 dB to 40 dB ± 0.5 dB					
Absolute Amplitude Uncertainty	20 °C to 30 °C, fc = 50 MHz, Span = 200 kHz, RBW = 10 kHz, VBW = 10 kHz, peak detector, 10 dB RF attenuation, average ≥ 20, 2 dB/div, 95%					
Preamp Off	± 0.4 dB, input signal level -20 dBm					
Preamp On	± 0.5 dB, input signal level -40 dBm					
Uncertainty	20 °C to 30 °C, fc ≥ 1 MHz, signal input range 0 dBm to -50 dBm, Ref Level range 0 dBm to -50 dBm, 10 dB RF attenuation, RBW = 1 kHz, VBW = 1 ± 1.5 dB (typical)					
VSWR	< 1.5, Nominal, Input 10 dB RF attenuation, 1 MHz to 1.8 GHz / 3.8 GHz				< 1.8, Nominal, Input 20 dB RF attenuation, 1 MHz to 8 GHz	
DISTORTION AND SPURIOUS RESPONSE						
Second Harmonic Distortion	fc ≥ 50 MHz, Preamp off, signal input -20 dBm, 0 dB RF attenuation, 20 °C to 30 °C -65 dBc					
Third-order Intermodulation	fc ≥ 50 MHz, Input double tone level -20 dBm, frequency interval 100 kHz, input attenuation 0 dB, preamplifier off, 20 °C to 30 °C +10 dBm					
1 dB Gain Compression	Nominal, fc ≥ 50 MHz, 0 dB RF attenuation, Preamp off, 20 °C to 30 °C > -2 dBm					

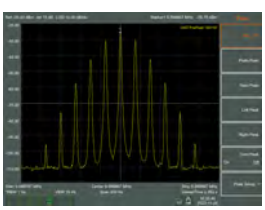
8.0 GHz/3.8 GHz/1.8 GHz Spectrum Analyzer

SPECIFICATIONS

Model	GSP-8180	GSP-8380	GSP-8800
Residual Response	Connect 50 Ω load at input port, 0 dB input attenuation, 20 °C to 30 °C, average ≥ 40, RBW = 300 Hz, VBW = 3 kHz, SPAN = 2 MHz		
	< -85 dBm, from 1 MHz to Max. Frequency Range		
Input Related Spurious	< -60 dBc, -30 dBm signal at input mixer, 20 °C to 30 °C		
SWEEP			
SWEEP TIME			
Range	10 ms to 3000 s, None-zero Span		
	1 ms to 3000 s, Zero Span		
Sweep Mode	Continuous; Single		
TRACKING GENERATOR (ONLY APPLICABLE TO MODELS WITH TG)			
TRACKING GENERATOR OUTPUT			
Frequency Range	100 kHz to Max. Frequency Range		
Output Power Level Range	-40 dBm to 0 dBm		
Output Power Level Rresolution	1 dB		
Output Flatness	± 3 dB		
Maximum Safe Reverse Level	Average total power: +30 dBm, DC : ± 50 VDC		
Impedance	50 Ω, Nominal		
Connector	N Type Female		
FREQUENCY COUNTER			
FREQUENCY COUNTER			
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz		
Accuracy	± (frequency indication × frequency reference accuracy) + counter resolution		
INPUTS AND OUTPUTS			
RF INPUT			
Impedance	50 Ω, Nominal		
Connector	N Type Female		
REFERENCE INPUT			
Connector	BNC Female		
10MHz Reference Amplitude	0 dBm to +10 dBm		
Trigger Input			
Impedance	1 kΩ		
10MHz Reference Amplitude	BNC Female		
USB			
USB Host	Connector: A Plug, Protocol: USB 2.0 (Host End)		
USB Device	Connector: B Plug, Protocol: 2.0 Version		
GENERAL			
Display	10.4" TFT LCD, Resolution: 1024*768, Color: 65,536 colors		
Remote Control	USB Device: B Plug, supports USB TMC		
	LAN TCP/IP Interface : RJ-45, supports 10Base-T/100Base-Tx,		
Mass Memory	Internal Memory: 256M Bytes		
Temperature	Operating Temperature: 0 °C to 40 °C ; Storage Temperature: -20 °C to 70 °C		
Relative Humidity	0 °C to 30 °C: ≤ 95 % ; 30 °C to 40 °C: ≤ 75 %		
Power Consumption	28 W		
Dimensions & Weight	421(W) × 221(H) × 115(D) mm; Approx. 5.0 kg (without package)		
AC Power Socket	AC 100 V to 240 V, 50 Hz or 60 Hz		

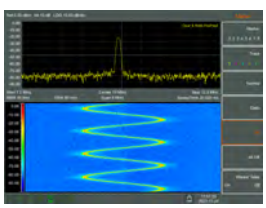
Note : The specifications apply when the GSP-8000 is powered on for at least 60 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

A. RICH ANALYTICAL BANDWIDTH



GSP-8000 provides RBW from 1 Hz to 1 MHz, and provides 1-3-5-10 Sequence stages, allowing users to observe the signal in more detail.

B. TIME SPEC



This function can simultaneously view and display the relationship between power, frequency and time, and can track changes in frequency and power over time.

C TRACE & DETECTOR

GSP-8000 provides five traces of different colors, among which Trace1 is displayed in yellow, Trace 2 is fuchsia, Trace 3 is azure, Trace 4 is orange, and Trace 5 is green. Users can collocate the required Detector for test and measurement.The Detector function provides Pos Peak, Neg Peak, Sample, Normal, Voltage Avg, RMS Avg and Quasi-Peak functions. The Quasi-Peak function can only be used after the EMI option is turned on.

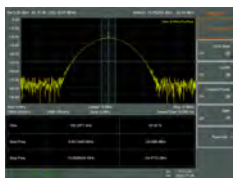
D. PEAK SEARCH & MARKER FUNCTION

In addition to the functions related to Max Peak, the Peak Search function provides a new settable search for Min Peak. Users can set whether to search for Max Peak or Min Peak.
GSP-8000 provides up to 8 Markers for simultaneous display, and Markers can be assigned to different Traces. It also provides three application functions: N-dB, Marker Noise and Frequency Counter.1 kHz, 100 Hz, 10 Hz and the most accurate resolution of 1 Hz.

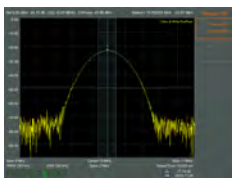
* N-dB: N-dB: It can measure the bandwidth when the left and right sides of the Marker value decrease by N-dB respectively.
* Marker Noise: Marker Noise: The current Marker frequency reading can be converted into the dBm/Hz absolute power reading at 1 Hz RBW.
* Frequency Counter: Frequency Counter: Users can set the counter to 1 kHz, 100 Hz, 10 Hz and the most accurate resolution of 1 Hz.

F. ACPR, OCBW, CHPW

ACPR



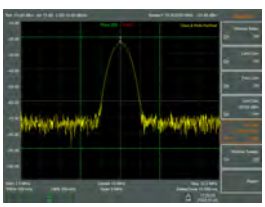
OCBW



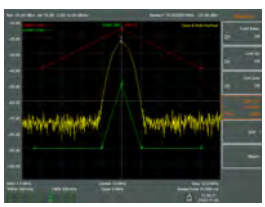
CHPW

Adjacent Channel Power Ratio (ACPR) measurement can check the power of the signal and adjacent channels, which helps to understand the power value between channels. The ACPR function can set up to three groups of adjacent channel tests.
Occupied Bandwidth (OCBW) measurement can simultaneously display the occupied bandwidth, channel power and power spectrum density.
Channel Power (OCBW) is used to measure the power strength of a signal in a user-defined channel.

E. LIMIT LINE



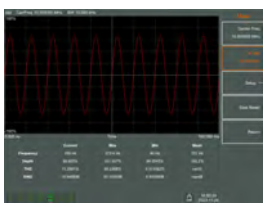
Windows Measure



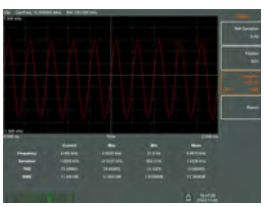
Limit Measure

Provides two Limit Line measurement functions, namely Windows Measure and Limit Measure. Determine whether the measured signal is qualified through the set conditions.

F. AM AND FM SIGNAL DEMODULATION



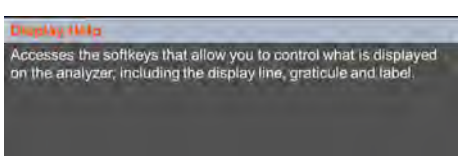
AM Analysis



FM Analysis

AM/FM signal analysis measurement parameters, such as amplitude modulation depth (Depth) or frequency deviation (Deviation), distortion (THD) and signal-to-noise and distortion ratio (SINAD), and supports demodulated audio source output.

I. HELP FUNCTION



When the Help function is turned on, users can learn about the introduction or usage of each key or function, speeding up the user's understanding and familiarity with the functions.

J. LARGE SCREEN

Provides a large 10.4" TFT LCD with a resolution of 1024*768 (XGA), making it easier for users to observe the details of waveforms.

K. ICON STATUS

There are two areas in the icon status. The area in the lower left corner is mainly for the function settings of the instrument, while the area at the lower right corner is the usage of the communication interface, allowing users to easily understand the status and results of the instrument.

L. COMMUNICATION INTERFACE

Provides USB Host and LAN interfaces, and supports the command set that complies with the IEEE488.2 commands to facilitate users in the control of the instrument.

M. DEDICATED PC SOFTWARE

GSP-8000 has dedicated PC software that can be controlled directly through the computer's USB or LAN interface.
In addition to basic Span, Amplitude, BW settings, the PC software also provides more commonly used functions such as Max/Min Trace, Detector and Peak On/Off.

3 GHz Spectrum Analyzer

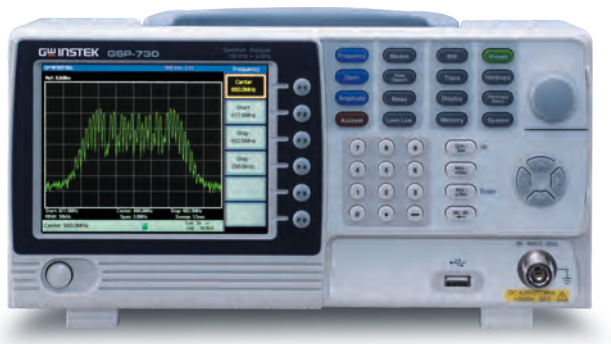
GSP-730

GW Instek GSP-730 is a 3 GHz Spectrum Analyzer developed mainly to fulfill the demands of RF Communication educations. Budget constraint and insufficient teaching tools are normally the two hurdles for schools to provide high-quality courses for RF communication experiments. GSP-730, featuring full functions, a moderate spectrum analyzer should provide, along with GRF-1300A RF communication trainer possesses a unique position in the field as an economical turn-key solution for 3 GHz RF Communication Experiment courses.

CE | USB | RS-232 | VGA Output | PC Software

GSP-730 FEATURES

* Frequency Range : 150 kHz to 3 GHz
* Autoset Function
* Noise level : ≤-100 dBm
* RBW Range : 30 kHz, 100 kHz, 300 kHz, 1 MHz
* ACPR/CHPW/OCBW Measurement
* 3 Traces in Different Colors
* Split Window Function
* Limit Line Function
* Remote Control Software
* Presentation Material for Training Courses
* Support Interface : USB Device/Host, RS-232C
* 5.6" TFT LCD with VGA Output



GSP-730

Rear Panel

ORDERING INFORMATION

GSP-730	3 GHz Spectrum Analyzer
GRF-1300A	RF and Communication System Trainer
ACCESSORIES :	
GSP-730	Power cord x 1
GRF-1300A	RF cable x 6, Antenna x 2, N to SMA adapter connector x 1, Power cord x 1
OPTION	
GBK-002	GRF-1300A Experiment test book of teacher version
OPTIONAL ACCESSORIES	
ADP-001	BNC to N-Type Adapter
ADP-002	SMA to N-Type Adapter
ATA-001	Antenna, General FM Antenna, BNC(M)
GTL-303	RF Cable, RG316 Assembly, 600 mm, SMA(P/M)
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm
FREE DOWNLOAD	
PC Software, Training system remote control software	

SPECIFICATIONS (GSP-730)		
FREQUENCY		
FREQUENCY		
Range	150 kHz to 3 GHz	
CENTER FREQUENCY		
Setting Resolution	0.1 MHz	
Accuracy	± 50 kHz	Frequency span: 0.3 GHz to 2.6 GHz, 20 ± 5 °C)
FREQUENCY SPAN		
Start, Stop, Center, Marker	1 MHz to 3 GHz	
Accuracy	± 3 %	Frequency span: 0.3 GHz to 2.6 GHz, 20 ± 5 °C)
RESOLUTION BANDWIDTH (RBW)		
Setting Range	30 kHz, 100 kHz, 300 kHz,1 MHz	Nominal, -3 dB bandwidth
SSB PHASE NOISE		
Offset from Carrier	< -85 dBc/Hz @500 kHz offset	Typical, RBW: 30 kHz, Span: 1 MHz@1 GHz
INHERENT SPURIOUS RESPONSE		
	less than -45 dBc	Reference at -40 dBm input, typical less than -50 dBc
AMPLITUDE		
REFERENCE LEVEL		
Input Range	+20 dBm to -40 dBm	
Unit	dBm, dBV, dBμV	
AVERAGE NOISE LEVEL		
Frequency Range	≤ -100dBm	Typical, center frequency: 1 GHz, RBW: 30 kHz
FREQUENCY CHARACTERISTIC		
@300 MHz to 2.6 GHz	± 3.0 dB	
@80 MHz to 300 MHz and 2.6 GHz to 3.0 GHz	± 6.0 dB	
Accuracy	Within ± 2 dB	input -10 dBm
INPUT		
Input Impedance	50 Ω	
Input VSWR	less than 2.0 @input att ≧ 10 dB	
Input Damage Level	+30 dBm (CW average power), 25 VDC	
Input Connector	N connector	
SWEEP		
SWEEP TIME		
Range	300 ms to 8.4 s, auto	Not adjustable
INTERFACE		
RS-232C	Sub-D female-D 9 pins	
USB Connector	USB Host/Device full speed supported	USB Format: Supports FAT/FAT32 only
Display	640 x 480 RGB color LCD	
VGA Output	Sub-D female 15 pins	
GENERAL		
Temperature Range	Operating: 5 °C to 45 °C Storage: -20 °C to 60 °C	Guaranteed at 25 °C ± 5 °C, without soft carrying case less than 60 °C / 70 % RH
Operating Humidity	Less than 45 °C / 90 % RH	
Dimensions	296 (L) × 153 (W) × 105 (H) mm	
Weight	Approx. 2.2 kg	
Power Source	AC 100 V to 240 V, 50 Hz or 60 Hz	

Note : The specifications apply when the GSP-730 is powered on for at least 60 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

RF and Communication Trainer

GRF-1300A

CE USB PC Software

GRF-1300A

GRF-1300A FEATURES

* Waveform Support :
  Sine Wave : 0.1 to 3 MHz
  Square Wave : 0.1 to 3 MHz
  Triangle Wave : 0.1 to 3 MHz
* RF Frequency : 870 to 920 MHz
* AM Modulation & FM Modulation
* 5 On/Off Switches and 5 Test Points to Simulate 8 Failure Conditions for Learning Outcome Test
* USB Interface to Provide Remote Control
* Mixer & 2.4 GHz Bandpass Filter

SPECIFICATIONS (GRF-1300A)	
BASE BAND	
Waveform	Sine, Square, Triangle
Frequency Range	0.1 MHz to 3 MHz, Step: 10 kHz
Amplitude	≥ 1.5 Vpp
	≥ 0.75 Vpp into 50 Ω
Harmonic Distortion	≤ -30 dBc
RF/FM ANALYSIS	
Frequency Accuracy	± 0.15 MHz
Adjustable Range	≥ 45 MHz (870MHz to 920 MHz)
	Step: 1 MHz
Power Range	≥ -15 dBm
FM	
Max. Frequency Deviation	> 3 MHz
AM	
Peak Difference	≥ -18 dBm
MIXER	
LO + LF	≥ -35 dBm
LO - LF	≥ -35 dBm
MIXER + MODULATION	
	≥ -60 dBm
BANDPASS FILTER	
Frequency Centre: 2.4 GHz	Bandwidth: ± 20 MHz
INTERFACE	
USB Device	USB Type B
DIMENSIONS & WEIGHT	
165(W) x 155(H) x 90(D) mm / 6.5(W) x 6.1(H) x 3.3(D) inch, Approx. 1.2 kg / 2.6 lb	

Note : The specifications apply when the GSF-1300A is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

A TURN-KEY SOLUTION TO CLEAR AWAY TWO OBSTACLES

GSP-730, carrying 3 GHz bandwidth and measurement functions including Autoset, Split Window, Limit Line, ACPR and OCBW etc., is regarded as the advanced educations of Mobile Communications (GSM, 3 G, 4 G/LTE...), Wi-Fi, Zigbee and RFID in the Electronic or the communications classes. The USB ports, the RS-232 interface and the VGA video output facilitate the teaching efficiency. The combination of GSP-730 and GRF-1300A RF communications training is a turn-key system for both lecture and hands-on training purposes.

GRF-1300A RF communications trainer, as the counterpart of GSP-730 for the basic RF communications experiment system, is capable of generating a baseband signal and a RF carrier signal for the built-in AM and FM communications operations. The baseband signal output contains the selections of Sine, Triangle, and Square waveforms in the frequency range of 100 kHz to 3 MHz, whereas the RF signal output is a frequency-variable Sine wave in the range of 870 to 920 MHz. Connecting the baseband signal output with AM or FM inputs on the panel, GRF-1300A produces AM or FM signal output respectively by using the internal RF signal as the modulation carrier according to users' selected frequency.

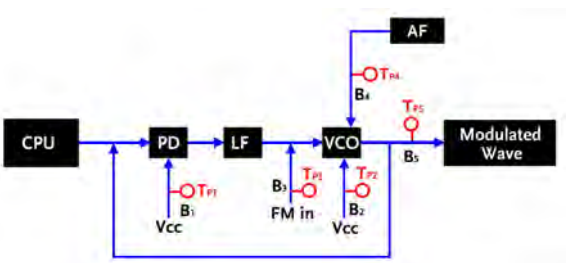
The GRF-1300A RF training kit features not only all functions of GRF-1300A RF training kit but also augments itself with Mixer and Bandpass Filter. Users can better understand the characteristics of Mixer and Bandpass Filter by operating scalar network analyzer measurement which is produced by combining GSP-730 spectrum analyzer, GRF-1300A RF Communications Trainer, and USG signal generator. The combination of USG signal generator and GRF-1300A Mixer function can produce 2.4 GHz AM and FM modulation signals. GRF-1300A Bandpass Filter can purify the output signals by filtering out harmonic and spurious produced by Mixer output signals.

An Experiment Textbook (student's book) is available as the standard accessory of GRF-1300A to provide experiment courses. The curriculum of the textbook includes the introduction of the frequency domain and the time domain concepts, the operation theories of a spectrum analyzer, and nine experiments to perform hands-on training for the learning of basic RF communications theories and the RF measurement techniques using a spectrum analyzer. A CD, containing power-point slides for course presentation and the remote-control software for experiment, is attainable with GRF-1300A, allowing teachers to give lecture of experiment theories and perform experiment simultaneously.

Another Experiment Textbook (teacher's book) is accessible as an optional accessory of 1300A. In addition to the same contents in the student's book, this book provides the experiment results to the questions and as well as some advanced experiment theories. Thus, a section of test-for-learning outcomes can also be seen in the lecturers' material in order to guide the students from the faulty diagnosis to the correct one in a RF communication circuitry. On the GRF-1300A panel, there are five test points set at different joints of circuit blocks. Through turning on or off the corresponding relays of the five test points enables the teachers to simulate the faults and teach students diagnosis technique.

The economical solution of GSP-730 and GRF-1300A greatly lowers the budget barriers for providing fundamental RF Communications Educations and facilitates the establishment of RF communication experiment labs with more training stations in schools.

TEST POINTS ON GRF-1300A FOR FAULT DIAGNOSIS



GSP-730+GRF-1300A+USG-Series Solution

CURRICULUM CONTENTS

- **Introductions of Frequency Domain , Time Domain, and Spectrum Analyzer Basics.**
- **9 Experiments Include**

  Operations of Spectrum Analyzer
  Base band and RF signal measurements
  AM and FM signal measurements
  Communication system and product measurements
- **Learning Outcome Tests**
- **Auxiliary Tools**

  PPT files including all experiments contents
  Remote control software to control GRF-1300A, GSP-730 simultaneously Experiment text books including the student version and the teacher(optional)

* USB hub is excluded from the product standard accessories.

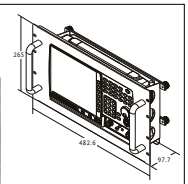
ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
ADB-002	Adapter, DC Block, BNC(P/M)-BNC(J/K), 50 W, 10 MHz to 2.2 GHz	GSP-Series
ADB-006	Adapter, DC Block, N(P/M)-N(J/K), 50 W, 10 MHz to 6 GHz	GSP-Series
ADB-008	Adapter, DC Block SMA(P/M)-SMA(J/K), 50 W, 0.1 MHz to 8 GHz	GSP-Series
ADP-001	Adaptor, 50 Ω, BNC(J/F) - N(P/M)	GSP-Series
ADP-002	Adaptor, 50 Ω, SMA(J/F) - N(P/M)	GSP-Series
ADP-101	Adaptor, 75 Ω BNC(J/F) - 50 Ω BNC(P/M)	GSP-Series
APS-7000E	1 KVA AC Power Source	GSP-Series
ATA-001	Antenna, General FM Antenna, BNC(P/M)	GSP-Series
ATN-100	Adaptor, 10 dB Attenuator, 50 Ω, N(J/F)-N(P/M)	GSP-Series
GAK-001	Adaptor, 50 Ω Termination, N(P/M)	GSP-Series
GAK-002	Adaptor, Cap with Chain, N(P/M)	GSP-Series
GBK-002	GRF-1300A Experiment Text Book of Teacher Version	GRF-1300A
GSC-009	Soft Carrying Case	GSP-9330, GSP-9300B
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm	GSP-Series
GTL-248	GPIB Cable, Double Shielded, 2000 mm	GSP-9330, GSP-9300B
GTL-250	GPIB Cable, Double Shielded, 600 mm	GSP-9330, GSP-9300B
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm	GSP-Series
GTL-301	RF Cable, RG223 Assembly, 1000 mm, N(P/M)	GSP-Series
GTL-302	RF Cable, RG223 Assembly, 300 mm, N(P/M)	GSP-Series
GTL-303	RF Cable, RG316 Assembly, 600 mm, SMA(P/M)	GSP-Series, GRF-1300A
GTL-304	RF Cable, RG223 Assembly, 280 mm, N(P/M) - N(J/F)	GSP-Series
GRA-415	Rack Mount Kit, 19", 6U Size	GSP-9330, GSP-9300B
GLN-5040A	Line Impedance Stabilization Network (LISN), AC Single Phase, 9 kHz to 30 MHz	GSP-Series
GPL-5010	Transient Limiter, Input: BNC(J/F), Output: M(P/M), 9 kHz to 200 MHz	GSP-Series
GKT-001	General Kit Set, Including ADP-002, ATN-100, GTL-303, GSC-002	GSP-Series
GKT-002	CATV Kit Set, Including ADP-001, ADP-101, GTL-304, GSC-003	GSP-Series
GKT-003	RLB Kit Set, Including GAK-001, GAK-002, GTL-302, GSC-004	GSP-Series
GKT-008	EMI Probe Kit Set, Including ANT-04, ANT-05, PR-01, PR-02, ADP-002, GTL-303	GSP-Series
USG-LF44	35 MHz to 4400 MHz RF Signal Generator	GSP-Series

GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm

GTL-246 USB Cable, USB 2.0, A-B Type, 1200 mm

GRA-415 Rack Adapter Kit



GTL-248 GPIB Cable, Double Shielded, 2000 mm

GTL-250 GPIB Cable, Double Shielded, 600 mm

GPL-5010 Transient Limiter, Input: BNC(J/F), Output: M(P/M), 9 kHz to 200 MHz

GLN-5040A Line Impedance Stabilization Network (LISN),AC Single Phase, 9 kHz to 30 MHz

APS-7100E AC Power Source

ACCESSORIES

ADB-002
DC Block BNC 50 Ω 10 MHz to 2.2 GHz

ADB-006
DC Block N-TYPE 50 Ω 10 Mhz to 6 GHz

ADB-008
DC Block SMA 50 Ω 0.1 MHz to 8 GHz

GAK-003
50 Ω Impedance Adaptor

ADP-101
BNC(J/F) 75 Ω to
BNC(P/M) 50 Ω

(An additional ADP-001 is needed for fitting GSP spectrum analyzers)

ATN-100
10 dB Attenuator
N(J/F) to N(P/M)

GKT-008 EMI Probe Kit Set
ADP-002 : Adaptor SMA(J/F) to N (P/M) x 1
GTL-303 : RF Cable SMA(P/M) to SMA(P/M) x 1
PR-01 : AC Voltage Probe x 1
PR-02 : Touch Passive RF Probe x 1
ANT-04 : H-field Probe x 1
ANT-05 : H-field Probe x 1

GKT-001 General Kit Set
ADP-002
ATN-100
GTL-303
GSC-002

GKT-002 CATV Kit Set
ADP-001
ADP-101
GTL-304
GSC-003

GKT-003 RLB Kit Set
GAK-001
GAK-002
GTL-302
GSC-004

ADP-001
Adaptor
BNC(J/F) to N(P/M)

ADP-002
Adaptor
SMA(J/F) to N(P/M)

GAK-001
Termination 50 Ω
N (P/M)

GAK-002
Cap with Chain
N (P/M)

GTL-301
RF Cable (RG 223
N(P/M) ,
1000 mm)

GTL-302
RF Cable Assembly
(RG223, N(P/M),
300 mm)

GTL-303
RF Cable Assembly
(SMA(P/M),RG316,
600 mm)

(An additional ADP-002 is needed for fitting GSP spectrum analyzers)

GTL-304
RF Cable Assembly
(Rg223, N(P/M) to
N(J/F),280 mm)

ATA-001
BNC Antenna
For: GSP-Series
(An additional ADP-001 is needed for fitting GSP spectrum analyzers)

SIGNAL SOURCES

GW Instek has been one of the major signal source suppliers for worldwide users by providing the advanced-featured products for decades. The wide product lines including GSG-2000 series, MFG (Multi-Channel Function Generator), AFG (Arbitrary Function Generator), RF Signal Generator and DDS (Direct Digital Synthesized) Function Generators are well provided. The GSG-2000 series provides 6 GHz frequency bandwidth. The minimum frequency resolution and amplitude resolution are 1mHz and 0.01 dB respectively. With respect to signal modulation, the series has built-in AM, FM and PM. GSG-2160 is vector signal generator which feature the digital signal modulation function, and output up to 60 MHz of digital signals, supporting ASK, PSK, APSK, QAM, FSK, MSK, user-defined IQ, user defined FSK modulation signals. The AFG-4000 series is GW Instek's first arbitrary function generator series to be equipped with an 8" large touch screen. The frequency bandwidth of the single-channel models is 25 MHz, and dual- channel models feature 250 MHz/100 MHz/80 MHz/60 MHz/35 MHz/25 MHz frequency bandwidth selections. The MFG-2000 series is a mainstay function generator and its special feature is that you can output maximum five channels simultaneously. One of the five channels is RF Generator and its frequency is from 1 µHz to 160 MHz/320 MHz. The isolated channel design is an important feature of GW Instek function generators. Output Channels, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The MFG-2000 series is designed for scientific research and educational applications by the RF Generator and the isolated design. The AFG-3000 series is designed for industrial, scientific research and educational applications by the high sample rate and the long waveform length. The AFG-2000 is designed to accommodate the educational and basic industrial requirements. The USG series is a pocket-sized, and USB interface compatible RF signal generator. The SFG series is a DDS based design for entry level engineering and educational applications. To fit versatile applications, each product line features different frequency ranges and/or specifications to meet the demands. Last but not least, Audio Generators are also provided for the specific fields.

PRODUCTS

- **6 GHz Vector Signal/Signal Generator**
- **Arbitrary Function Generator**
- **Multi-Channel Function Generator**
- **True Dual Channel Arbitrary Function Generator**
- **DDS Function Generator**
- **USB RF Signal Generator**

RF SIGNAL GENERATOR

RF SIGNAL GENERATOR OVERVIEW

RF signal generators are high-precision electronic test instruments designed to produce stable RF signals, widely used in wireless communications, radar systems, aerospace defense, and electronic testing. Their core function is to generate high-frequency sine waves, typically spanning kHz to GHz, with adjustable frequency and amplitude to simulate various RF environments and ensure RF circuit and system performance meets design specifications.

According to the technical architecture and application requirements, RF signal generators can be divided into many types.

Analog Signal Generator

- Generates continuous wave (CW) signals.
- Provides analog modulation signal output, such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM).
- Used for basic RF tests, such as radio equipment calibration and receiver sensitivity analysis.

Vector Signal Generator (VSG)

- Provides analog modulation signal and digital modulation signal output.
- Produces digitally modulated signals, including quadrature amplitude modulation (QAM), phase shift modulation (PSK), amplitude shift keying (ASK) and frequency shift modulation (FSK)...etc.
- Widely applied in 5G, Wi-Fi, LTE, and IoT technology testing.

Pulse Signal Generator

- Generates high-power pulse signals in short durations.
- Essential for radar systems and high-speed electronic equipment testing.

Pattern Generator

- Used for communications protocol testing and environments involving graphics and image processing.

In terms of technical characteristics, RF signal generators usually have:

- Wide frequency range: Hundreds of kHz to tens of GHz.
- Analog modulation and/or digital modulation output.
- Low phase noise: Critical for signal quality and test accuracy.
- Adjustable output power: Adaptable to different test requirements.

RF signal generators are integral to numerous industries, playing a crucial role in the following diverse applications:

- Wireless communications: Verification and testing of 5 G, Wi-Fi, and satellite communications technologies.
- Radar and aerospace systems: Used in military radar development and navigation systems.
- Electronic testing: Calibration and RF component performance analysis.

VECTOR SIGNAL/SIGNAL GENERATOR & USB RF SIGNAL GENERATOR

	MODEL	GSG-2160	GSG-2060	USG-LF44
TECHNOLOGY	Type	Vector Signal Generator	RF Signal Generator	USB RF Signal Generator
FREQUENCY CHARACTERISTIC	Frequency Range	9 kHz to 6 GHz	9 kHz to 6 GHz	34.5 MHz to 4400 MHz
	Frequency Resolution	1 mHz	1 mHz	10 kHz
	Phase Noise (@1 GHz, 20 kHz offset)	-117 dBc/Hz	-117 dBc/Hz	< -97 dBc/Hz
	Frequency Switching Speed	≤ 5 ms	≤ 5 ms	100 ms
	Non-Harmonic Distortion (@1 GHz)	-70 dBc	-70 dBc	-65 dBc @Resolution ≥ 1 MHz
	Harmonic Distortion (@1 GHz)	-35 dBc	-35 dBc	-20 dBc typical @2 GHz
	Temperature Stability	10 ppb	10 ppb	-
	Aging Rate	0.1 ppm/year	0.1 ppm/year	-
	Frequency Stability	10 ppm	10 ppm	1 ppm @first year
	Optional OCXO Stability	10 ppb	10 ppb	-
AMPLITUDE CHARACTERISTIC	Output Power (@1 GHz)	-140 dBm to +20 dBm	-140 dBm to +20 dBm	-30 dBm to 0 dBm
	Amplitude Resolution	0.01 dB	0.01 dB	1 dB
	Amplitude Units	dBm, dBμV, Vrms	dBm, dBμV, Vrms	dBm
	Amplitude Switching Speed	≤ 5 ms	≤ 5 ms	100 ms
ADVANCED FUNCTION	Sweep Mode	Step Sweep	Step Sweep	Continuous, single, hopping
	LF Signal Output	V	V	-
	Pulse Generator	V	V	-
	Pulse Modulation	V	V	
	Analog Modulation	V	V	-
	Digital Modulation	V	-	-
ANALOG MODULATION	Amplitude Modulation (AM)	V	V	-
	Frequency Modulation (FM)	V	V	-
	Phase Modulation (PM)	V	V	-
DIGITAL MODULATION	Baseband I/Q Bandwidth	Up to 60 MHz	-	-
	RF I/Q Bandwidth	Up to 120 MHz	-	-
	ASK	ASK, 2ASK, 4ASK, 8ASK, 16ASK, 32ASK	-	-
	PSK	BPSK, QPSK, DQPSK, OQPSK, π/4 DQPSK, 8PSK, D8PSK, 16PSK	-	-
	APSK	16APSK, 32APSK	-	-
	QAM	16QAM, 32QAM, 64QAM, 128QAM, 256QAM, user define I/Q	-	-
	FSK	2FSK, 4FSK, 8FSK, 16FSK, user define FSK	-	-
IQ GENERATOR	Resolution	16 bit	-	-
	Sampling Rate	Max. 180 MHz	-	-
	Bandwidth	60 MB	-	-
	ARB Memory Length	16 Msa	-	-
	ARB Memory Storage *1	16 GB	-	-
FUNCTION INPUT / OUTPUT	I/Q Input	V	-	-
	I/Q Output	V	-	-
	Trigger Input	V	V	-
	PULSE Output	V	V	-
	PULSE Input	V	V	-
	Trigger Output	V	V	-
	Reference Input	V	V	-
	Reference Output	V	V	-
COMMUNICATION INTERFACE	USB	V	V	V
	LAN	V	V	-
	GPIB	V, Option	V, Option	-
DISPLAY	Display	7" TFT LCD	7" TFT LCD	-
STORAGE	Internal memory *1	16 GB	16 GB	-
POWER	Power Source	AC 100 V to AC 240 V	AC 100 V to AC 240 V	5 Vdc nominal
	Power Consumption	90 VA	90 VA	1 W
Page		C4-8	C4-8	C9-10

*1. The GSG-2000 is equipped with 16GB of storage, primarily used for storing system files, pulse train data, sweep lists, and arbitrary waveforms (ARB).

6 GHz Vector Signal / Signal Generator

NEW

台灣精品
TAIWAN EXCELLENCE

GSG-2000 Series

CE | USB | GPIB | LAN | Mod In/Out | Trg In/Out

FEATURES

* Frequency Range : 9 kHz to 6 GHz
* Frequency Resolution : 1 mHz
* Standard 10 ppm Frequency Stability, 2 ppm/year Aging Rate. (Optional: 10 ppb Frequency Stability with 0.1 ppm/year Aging Rate)
* Amplitude Range : -140 dBm to +20 dBm
* 0.01 dBm Amplitude Setting Resolution
* Amplitude Support dBm, dBμV, Vrms Unit
* Phase Noise : <-117 dBc/Hz (Typical) @1 GHz Output and 20 kHz Offset
* Frequency/Amplitude Switching Speed : < 5 ms
* Built-in LF Output, Pulse Output
* Built-in in AM, FM, PM Analog Modulation
* Support IQ Modulation Output (Only for GSG-2160)
  - Maximum 60 MHz Baseband I or Q Modulation Output
  - Maximum 120 MHz RF I+Q Modulation Output
  - Built-in ASK,PSK,APSK,QAM,FSK,MSK,User-define IQ, User-define FSK Modulation Signal
* Provide USB, LAN and GPIB (Opt.), Commands Comply with SCPI Standards

The GSG-2000 series is a basic RF vector signal/signal generator that covers a frequency range from 9 kHz to 6 GHz. It is suitable for applications in communications education, RF component testing (such as amplifiers, antennas, and filters), automotive electronic signal testing, and IoT applications. It meets the testing requirements of RF products during production and development stages. Compared to its main competitors, the GSG-2000 series offers superior specifications including a wide amplitude output range of +20 dBm to -140 dBm, lower phase noise of -117 dBc/Hz, and high frequency accuracy with 10ppm frequency stability and 2ppm aging rate. Users have the option to enhance frequency stability and aging rate by selecting the OCXO (Oven Controlled Crystal Oscillator) option, which provides 10ppb stability and 0.1ppm aging rate.

For the signal modulation, the entire series has built-in AM, FM, and PM analog modulation, and GSG-2160 features a digital signal modulation function with a maximum bandwidth of 60 MHz digital signal output, supporting ASK, PSK, APSK, QAM, FSK, MSK, User-defined IQ, User-defined FSK modulation signals.

Furthermore, the GSG-2000 series also provides LF signal and Pulse signal output. The LF signal allows users to output Sine, Square, Triangle/Ramp, Gaussian Noise signals, and the Pulse signal output can simulate pulse wave applications of various widths. In addition to the above signal outputs, GSG-2000 also provides AM/FM/digital IQ signal input, as well as independent output ports for digital I or Q signals.

GSG-2000 series adopts a seven-inch TFT LCD display that can fully display the parameters and status set by the user, and the series also provides USB, LAN, GPIB (option) communications interfaces, and provides standard SCPI-compatible commands to support remote control. GSG-2000 series is designed for 3 U high standard rack size.

SELECTION GUIDE

Model	GSG-2160	GSG-2060
Frequency Range	9 kHz to 6 GHz	9 kHz to 6 GHz
Analog Modulation	AM, FM, PM	AM, FM, PM
Digital Modulation	ASK, PSK, APSK, QAM, FSK, MSK, user define IQ, user define FSK	—
LF Output	V	V
Pulse Output	V	V

GSG-2000 Series

Rear Panel

GRA-447 Rack Mount Kit. 19", 3U Size

ORDERING INFORMATION

GSG-2160 (GPIB)	6 GHz Vector Signal Generator
GSG-2060 (GPIB)	6 GHz Signal Generator
GSG-2160 (GPIB + OCXO)	6 GHz Vector Signal Generator with OCXO
GSG-2060 (GPIB + OCXO)	6 GHz Signal Generator with OCXO
ACCESSORIES :	
Power Cord x 1	
OPTIONAL ACCESSORIES	
ADP-001	N(M)-BNC(F) Adapter
ADP-002	N(M)-SAM(F) Adapter
GTL-301	N(M)-N(M) RF Cable
GTL-303	SMA(M)-SMA(M) RF Cable
GRA-447	Rack Mount Kit 19", 3U Size
FREE DOWNLOAD	
LabVIEW Driver	

6 GHz Vector Signal / Signal Generator

SPECIFICATIONS

FREQUENCY SPECIFICATIONS

FREQUENCY RANGE

Frequency Range		9 kHz to 6 GHz	
Frequency Resolution		1 mHz	
Frequency Bands	Band	Frequency Range	N
	1	9 kHz to 5 MHz	digital synthesis
	1	< 5 MHz to 187.5 MHz	1
	2	< 187.5 MHz to 375 MHz	0.25
	3	< 375 MHz to 750 MHz	0.5
	4	< 750 MHz to 1500 MHz	1
	5	< 1500 MHz to 3000 MHz	2
	6	< 3000 MHz to 6000 MHz	4
Frequency Switching		< 5 ms	

PHASE NOISE @ 20 KHZ OFFSET

Frequency (MHz)	**Range**	ALC on	ALC off
	5	-	-122
	100	-112	-115
	250	-112	-117
	1000	-112	-117
	2000	-108	-112
	3000	-107	-110
	6000	-102	-105
Residual FM (0.3 kHz to 3 kHz)(1 GHz CW)		< 2 Hz	

NON HARMONICS

Non Harmonics	< -65 dBc	1 MHz ≤ freq < 5 MHz
(Level > -10 dBm, offset > 10 kHz)	< -72 dBc	5 MHz ≤ freq < 187.5 MHz
	< -75 dBc	187.5 MHz ≤ freq < 750 MHz
	< -72 dBc	750 MHz ≤ freq < 1500 MHz
	< -66 dBc	1500 MHz ≤ freq < 3000 MHz
	< -58 dBc	3000 MHz ≤ freq < 6000 MHz

HARMONICS

Range	Level < 4 dBm
9 kHz ≤ Freq < 6000 MHz	< -35 dBc

RMS JITTER

Frequency		Bandwidth	Seconds (meas.)
	1 GHz	1 Hz to 10 MHz	0.23 ps
	155 MHz	100 Hz to 1 MHz	1.38 ps
	622 MHz	1 kHz to 3 MHz	0.17 ps
	2.488 GHz	5 kHz to 10 MHz	0.12 ps

*Calculated from phase noise performance in CW mode at 0 dBm, ALC off (sample) mode.

FREQUENCY REFERENCE

Frequency Reference	10 MHz	
Temperature Stability	< 10 ppm, Standard	< 10 ppb, OCXO Option
Aging	2 ppm/year, Standard	0.1 ppm/year, OCXO Option
Output	1 Vpp, 50 Ohm Load	
Input	-3 dBm to 20 dBm, 50 Ohm Load	
Input Deviation	3 ppm, for GSG-2160	
	0.5 ppm, for GSG-2060	

AMPLITUDE SPECIFICATIONS

AMPLITUDE

Setting Range	20 dBm to -140 dBm
Resolution	0.01 dB
Amplitude Unit	dBm, dBuV, Vrms

AMPLITUDE ACCURACY

Absolute level accuracy in CW mode (ALC On)		14 dBm to -60 dBm	-60 dBm to -90 dBm	-90 dBm to -110 dBm
	9 kHz < freq < 3 GHz	± 0.6 dB	± 0.8 dB (0.6 dB typical)	± 1 dB (0.7 dB typical)
	3 GHz < freq < 6 GHz	± 0.8 dB	± 1 dB (0.6 dB typical)	± 1.2 dB (0.7 dB typical)
Addition level error		< 0.15 dB, at ALC Off, Power search run		
VSWR (5 MHz to 3 GHz)		< 1.8 (output ≤ -40 dBm)		
Amplitude Switching (ALC on, CW)		< 5 ms		

SWEEP SPECIFICATIONS

SWEEP

Mode	frequency, amplitude, list
Dwell time	100 µs to 100 s
Number of points(step)	2 to 65535
Number of points(list)	1 to 4096
Triggering	free, trigger key, external, timer

ANALOG MODULATION SPECIFICATIONS

FM

Source		internal, external
Max. Deviation		N x 1 MHz
Rate	**freq > 10 MHz**	0.1 Hz to 1 MHz
	freq < 10 MHz	0.1 Hz to 100 kHz
Resolution		1 mHz
Accuracy (1 kHz rate)		2 % setting + 20 Hz
Distortion (1 kHz rate, N x 50 kHz deviation)		0.4 %

PM

Source		internal, external
Max. Deviation		N x 1 MHz/rate or 5N rad
Rate	**freq > 10 MHz**	0.1 Hz to 1 MHz
	freq < 10 MHz	0.1 Hz to 100 kHz
Resolution		0.001 rad
Accuracy (1 kHz rate)		1 % of setting + 0.1 rad
Distortion (1 kHz rate, max deviation)		0.2 %
Response		0.1 Hz to 1 MHz

SPECIFICATIONS

AM		
Source		internal, external
Resolution		0.01 %
Depth		0 % to 100 %
Accuracy (1 kHz, 0 dBm)	< 5 MHz	1.5 % setting + 1 %
	5 MHz to 4 GHz	3 % of setting + 1 %
	4 GHz to 6 GHz	5 % of setting + 1 %
Distortion (1 kHz, 80 %, < 8 dBm)	< 5 MHz	1.5 %
	5 MHz to 4 GHz	2 %
	4 GHz to 6 GHz	3 %
Response		0.1 Hz to 20 kHz
PULSE SPECIFICATIONS		
PULSE		
Mode		Free-run, square, triggered, adjustable doublet, trigger doublet, gated, pulse train, and external pulse
Source		internal, external
Pulse Input		-0.5 V to 5 V, $V_{IL} = V_{IH} = 1.5$ V (typ.)
Edge Time		< 20 ns
On/Off Ratio		70 dB, 5 MHz to 3 GHz, 45 dB, 3 GHz to 6 GHz
Repetition Rate		0.1 Hz to 10 MHz
Pulse Period		100 ns to 42 s
Resolution		10 ns
Width		50 ns to period - 10 ns
Pulse Train Number of Patterns		2047
LF PECIFICATIONS		
LF		
Waveform		sine, square, triangle, ramp, gaussian noise
Frequency Range	Sine	0.1 Hz to 10 MHz
	Square, Triangle, Ramp	0.1 Hz to 1 MHz
	Gaussian Noise	10 MHz BW
Resolution		1 mHz
Output		2 mVpp to 6 Vpp
Impedance		50 Ohm
VECTOR MODULATION SPECIFICATIONS (GSG-2160 ONLY)		
VECTOR MODULATION		
Source		internal, external
Bandwidth (baseband)		60 MHz
Bandwidth (RF)		120 MHz
Carrier Frequency		< 5 MHz to 6000 MHz
Carrier Suppression @25 ± 5 °C		> 50 dBc
Sideband Suppression @25 ± 5 °C		> 50 dBc
Modulation Mode		ASK, PSK, APSK, QAM, FSK, MSK, user define IQ, user define FSK
ASK		2ASK(0 % to 100 %), 4ASK, 8ASK, 16ASK, 32ASK
PSK		BPSK, QPSK, DQPSK, OQPSK, π /4 DQPSK, 8PSK, D8PSK, 16PSK
APSK		16APSK, 32APSK
QAM		16QAM, 32QAM, 64QAM, 128QAM, 256QAM
FSK		2FSK, 4FSK, 8FSK, 16FSK
Internal Modulation EVM		0.8 %, 10 MHz < freq < 3 GHz
(16QAM, RRC filter, α = 0.25, 4 Msps, level ≦ 4 dBm, ALC off)		1.2 %, 3 GHz ≤ freq < 5 GHz
IQ GENERATOR		
Resolution		16 bit
Sample Rate		10 kHz to 180 MHz
Baseband Bandwidth		60 MHz
ARB Memory	Waveform Length	16 Msa
	Storage Capacity	16 GB
Trigger Type		free, gated, trigger and run
Trigger Source		external, trigger key
INTERNAL IQ ADJUSTMENT		
IQ Offset		± 10 %
IQ Gain		± 6 dB
IQ Skew		max 30 ps to 100 ps
EXTERNAL IQ OUTPUT		
Impedance		50 Ohm per output
Maximum per Output		0.5 Vpk
Bandwidth		60 MHz
Common Mode Offset		± 1.25 V
Differential Mode Offset		± 50 mV
EXTERNAL IQ INPUT		
Bandwidth		60 MHz
Full Scale		± 1 V into 50 Ohm
IQ Offset		± 10 % full scale
IQ Gain		± 6 dB
SIMULTANEOUS MODULATION		
All modulation types (I/Q, FM, AM, ΦM, and pulse modulation) may be simultaneously enabled except: FM and phase modulation.		
GENERAL SPECIFICATIONS		
GENERAL SPECIFICATIONS		
Display		7-inch TFT LCD, 1024(RGB) x 600
Operating Temperature		0 ℃ to 50 ℃
Storage Temperature		-10 °C to 70 °C
Humidity		85 % at 40 ℃
Altitude		Up to 2000 m
Power Source		AC 100 V to 240 V, 50 Hz to 60 Hz
Power Consumption		90 VA Maximum
Dimensions (W x H x D)		430 mm x 140 mm x 540 mm
Weight		Approx. 13 kg

The specifications apply when the GSG-2000 is powered on for at least 60 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

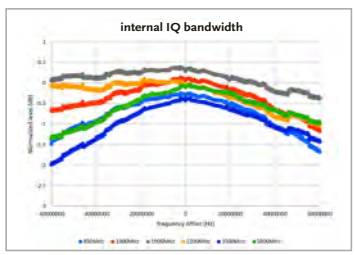
6 GHz Vector Signal / Signal Generator

A. PROVIDES MULTIFUNCTIONAL OUTPUT SIGNALS

RF and LF Signal Output Ports

Pulse Signal Output Port

Digital Signal Output (GSC-2160 only)



Frequency Response Plot Generated by Internal Input IQ Signal.

Both GSC-2160 and GSC-2060 provide RF signal output from 9 kHz to 6 GHz. GSC-2060 supports analog RF signal output (such as AM, FM, PM), and GSC-2160 supports analog and digital RF signal output.

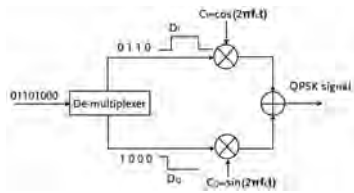
LF Output with Built-in Function Signal - Equipped with an LF function signal (Low Frequency function generator) that can be output independently, and the series provides waveforms such as Sine, Square, Triangle, Ramp, Gaussian noise, etc. Users can use it in conjunction with other input and output functions, or it can be used alone in applications such as circuit design and electronic component testing and other related applications.

Pulse Signal Output - GSC-2000 Series has a built-in Pulse signal output. Users can adjust the Pulse duty cycle, which is often used to test digital circuits such as TTL, CMOS, ECL, etc., or to simulate changes in switching signals.

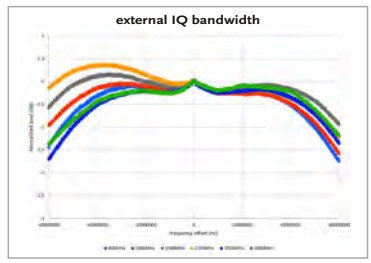
Vector signal output (GSC-2160 only) - Frequency response plot generated by internal input IQ signal.

B. SUPPORTS VARIOUS SIGNAL INPUTS

External IQ Signal & AM/FM Signal Input



I and Q input for QPSK Signal



Frequency Response Diagram Generated by External Input IQ Signal

Provides Input for External IQ Signal - Users can input I and Q data respectively, and then synthesize the required IQ vector signal through the internal RF signal output.

External AM/FM Signal Input - Users can input AM or FM signals externally for analog modulation related applications.

For example, in the QPSK signal in the diagram, after inputting the corresponding data from I and Q respectively, and selecting the QPSK function, QPSK output can be edited.

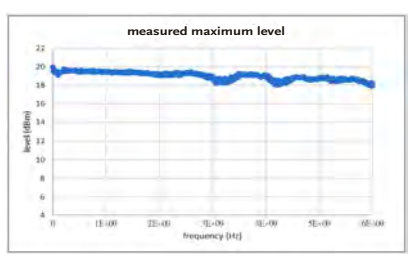
Frequency response diagram generated by external input IQ signal. (GSC-2160 only)

C. ACCURATELY SET RESOLUTION

0.01 dBm Setting Resolution

GSC-2000 provides a setting resolution as low as 1 mHz in frequency and a setting resolution in amplitude of 0.01 dBm, allowing users to process more complex signals.

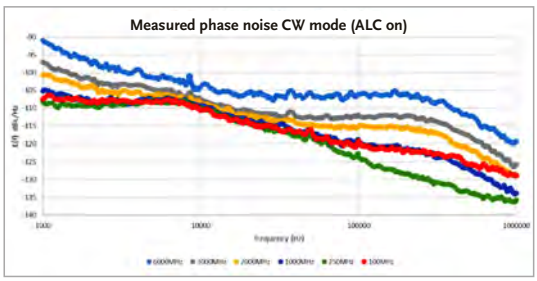
D. WIDE AMPLITUDE OUTPUT RANGE



Guaranteed Specification Range

GSC-2000 provides a setting range from +20 dBm to -140 dBm, and a guaranteed specification range from +14 dBm to -110 dBm.

E. PURER SIGNAL OUTPUT

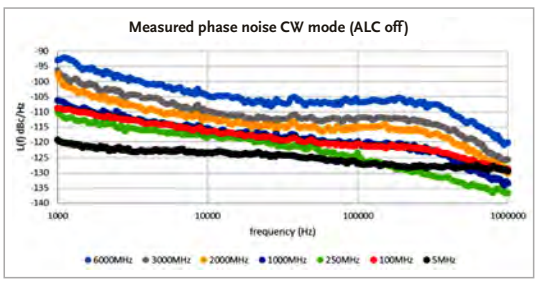


Measured Phase Noise CW mode (ALC on)

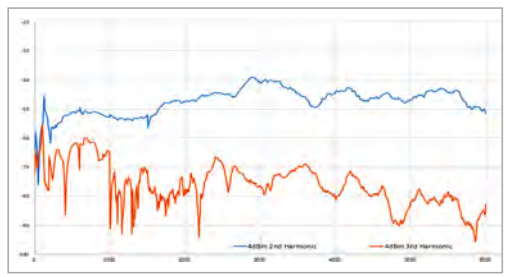
-117 dBc/Hz phase noise the output signal provided by GSG-2000 has an optimal phase noise of -117 dBc/Hz, which can be applied to a wider variety of applications, such as automotive digital signals, IoT industrial applications and other fields that require pure signals.

The phase noise at each frequency under ALC On and ALC Off.

The signal purity of its Harmonic and Spur is also close to the entry-level indicators of major European and American manufacturers.



Measured Phase Noise CW mode (ALC off)



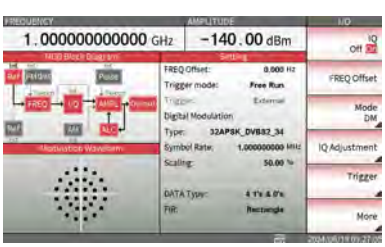
Harmonics <-35 dBc

Phase Noise @ 20kHz offset (dBc/Hz)			
	MHz	ALC On	ALC Off
Frequency Range	5	-	-122
	100	-112	-115
	250	-112	-117
	1000	-112	-117
	2000	-108	-112
	3000	-107	-110
	6000	-102	-105

Harmonics	
Range	Level ≤ 4 dBm
9 k ≤ Freq. < 6000 M	<-35 dBc

Non-Harmonics		
Level > -10 dBm, Offset > 10 kHz	<-35 dBc	1 M ≤ Freq. < 5 M
	<-70 dBc	5 M ≤ Freq. < 187.5 M
	<-75 dBc	187.5 M ≤ Freq. < 750 M
	<-72 dBc	750 M ≤ Freq. < 1500 M
	<-64 dBc	1500 M ≤ Freq. < 3000 M
	<-58 dBc	3000 M ≤ Freq. < 6000 M

F. GRAPHIC DISPLAY DESIGN



GSG-2000 utilizes a 7-inch large-size LCD display. All setting parameters, measurement results and current function information can be directly displayed, allowing users to quickly understand the current setting information.

For the first innovation, icons and arrow connections are displayed directly on the screen, allowing users to understand the path of signal generation at a glance. For example, the PSK and QAM signal output in the picture above directly displays the block diagram, modulation signal pattern and corresponding parameters on the screen, allowing the user to set related parameters.

G. RICH COMMUNICATIONS INTERFACES

GSG-2000 series provides standard interface LAN and USBTMC output, and optional GPIB interface to meet the user's connection needs under various interfaces. The command supports the standard SCPI IEEE488.2 standard command set.

USB RF Signal Generator

USG-LF44

CE USB PC Software

The USG-LF44 RF signal generator is a pocket-sized and USB interface compatible RF signal generator. It covers the frequency range from 35 MHz to 4400 MHz. The USG-LF44 provides continuous wave (CW) signal outputs without any signal modulation function.

The built-in electronic attenuator of the USG-LF44 allows an adjustable power range between -30 dBm to 0 dBm. The USG-LF44 has several operational modes including fixed frequency, frequency sweep, frequency hopping, and power sweep.

A USG CD-ROM provides dedicated PC application programs, which were developed under JAVA software structure. This USG PC application program supports operating systems such as Windows 2000/XP/Vista/7/8, Linux & Mac OS X through the USB interface.

Users can download USG APP to smart phone or tablet with Android 4.0 or above. To operate USG, use USB-OTG connecting cable to connect tablet (or smart phone) and USG. The Android APP application software for the USG signal generator is available on Google Play Store.

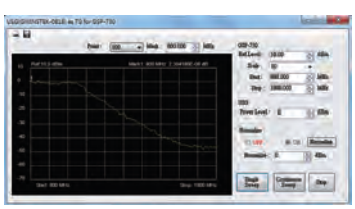
The USG signal generator can be designated as the tracking generator for GSP-730 spectrum analyzer to conduct measurement functions of scalar network analyzer. A USG CD-ROM provides PC application programs for the GSP-730 Primary RF software. Users can, using a Windows OS computer, control USG and GSP-730 via the Primary RF software.

FEATURES

* **Frequency Range : 34.5 MHz to 4400 MHz**
* **Output Power Range : -30 dBm to 0 dBm**
* **Continuous Wave Signal Without any Modulation**
* **Support Fixed Frequency, Frequency Sweep, Frequency Hopping & Power Sweep Mode**
* **-107 dBc/Hz Phase Noise@100 kHz Offset**
* **Frequency Resolution : 10 kHz**
* **PC USB Interface Powered and Controlled**
* **External PC Software Support Different Operating System**

Test Result of Simultaneous Power Sweep and Frequency Sweep

Easy to Use Graphical Interface with Numeric Setting



Test Result of Low Pass Filter with PrimaryRF Software

ORDERING INFORMATION	
USG-LF44	35 MHz to 4400 MHz, USB RF Signal Generator
ACCESSORIES	
GTL-253	USB Cable, USB 2.0, A-mini B Type, 1400 mm
OPTIONAL ACCESSORIES	
ADP-003	50 Ω N type (female) to SMA (female) Adapter
GTL-303	50 Ω SMA RF cable (600 mm)
FREE DOWNLOAD	
PC Software	

SPECIFICATIONS

MAIN		
Frequency Range		34.5 MHz to 4.4 GHz
Output Power		-30 dBm to 0 dBm, in 1 dB steps
Internal Reference Frequency		25 MHz , aging ± 1 ppm at first year
Frequency Accuracy (0 dBm Output Level)		± 100 Hz at 100 MHz
Frequency Resolution		10 kHz
Output Isolation		≦ -75 dBc , Output Control On/Off
Mode Control		Fixed Frequency / Single Sweep / CW Sweep / Hopping / Power sweep
Step Dwell		≦1000 ms in 1 ms steps
Frequency Offset		-50 kHz to 50 kHz in 10 kHz steps
Output Flatness (0 dBm Output Level)		-1 dBm to 3.5 dBm, typical
PHASE NOISE		
Carrier frequency		fc = 1.0 GHz
At 10 kHz offset frequency		< -97 dBc/Hz typical -100 dBc/Hz
At 100kHz offset frequency		< -107 dBc/Hz typical -110dBc/Hz
HARMONICS (0 dB ATTENUATION)		
2nd Harmonics		≦ -15 dBc typical, 34.5 MHz to 2.0 GHz; ≦ -10 dBc typical, 2.0 GHz to 3.0 GHz; ≦ -25 dBc typical, 3.0 GHz to 4.4 GHz
3rd Harmonics		≦ -5 dBc typical, 34.5 MHz to 2.0 GHz; ≦ -20 dBc typical, 2.0 GHz to 3.0 GHz; ≦ -40 dBc, typical 3.0 GHz to 4.4 GHz
SPURIOUS		
Related to Resolution Settings		≦ -30 dBc, typical , Resolution < 1MHz; ≦ -65 dBc, typical , Resolution ≧ 1MHz
Related to the Fundamental Output		≦ -60 dBc, typical
INTERFACE		
USB	**Support Protocal**	Version 2.0
	Connector Type	Mini-B Type
SUPPORTED OS		
		Windows, Linux, Mac
RF OUTPUT		
RF Connector Type		N-type male
Impedance		50 Ohm nominal
Output VSWR		< 1.5 : 1, Output Level @ -30 dBm
Maximum Permissible DC Voltage		±25V
Maximum Reverse Power		+30 dBm (1 W)
GENERAL		
Power Source		5 V nominal (via USB port)
Current Consumption		200 mA
Electromagnetic compatibility		EN 55011 class A, EN 61326-1 (industrial environment), EN 61326-2-1, EN 61000-4-2, EN 61000-4-3, EN 61000-4-11
Dimensions & Weight		30mm(W) x 103mm(H) x 30mm(D), Approx. 100g

The specifications apply when the USG-Series is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

ADP-003

50Ω N type (female) to SMA (female) Adapter
For: USG-Series

GTL-303

50Ω SMA RF cable (600 mm)
For: USG-Series

ARBITRARY FUNCTION GENERATOR OVERVIEW

Arbitrary function generator (ARB) is a digital-synthesized-technique based signal generator which generates both arbitrary and function waveforms. For the arbitrary waveform, the demanded waveform data can be edited by different means, saved into the memory, and sent out thru a digital to analog converter as a stimulus source. For the function waveform generation part in arbitrary function generator, the commonly used function waveforms like sine, square, triangle, ramp, pulse ..... etc. are built into the memory for selection, which is referred to DDS (Direct Digital Synthesized) type function generator. The AM, FM, FSK, PWM and Sweep function, etc are usually optional features.

One major difference of the circuit structure between ARB and DDS function generator is that a low pass filter is used at the digital-to-analog converter (DAC) output to smooth out the quantization steps in DDS function generator. Therefore when a function waveform is demanded, in order to obtain low-distortion waveform, the signal generated from function section is suggested instead of ARB section.

The major specifications for arbitrary waveform generation are described as follows.

Sample Rate, Repetition Rate and True-Point-by-Point Arbitrary Waveform

The profile of arbitrary waveform is composed of a series of data. The frequency of arbitrary waveform is derived from sampling rate divided by the number of points constructing a complete waveform, i.e. frequency = sampling rate/number of points in waveform. Based on the equation, the higher the sampling rate, the higher the arbitrary waveform frequency can be available.

The ultimate case of composing an arbitrary waveform is the waveform made of two points. The frequency of the two-points-waveform is supposed to be half of the sample rate according to the above equation. But many ARB waveform generators do not follow this rule. The Repetition Rate is used to describe the limitation of highest frequency can be composed for the arbitrary waveform. It could be one third, one forth... etc of the sample rate. In case of the repetition is half of sample rate, it is true-point-by-point arbitrary waveform generator.

Vertical Resolution

The vertical resolution in arbitrary waveform represents the quantization distortion level, which the bit number of DAC plays the main role to decide it.
The higher bit DAC generates the output levels in finer steps, the output signal is less distorted and with less noise.

Memory Length

The waveform data is stored in the memory for sending out. More memory allows more waveform data to be stored, which is convenient for users to create a complex or lasting long waveform.

SELECTION GUIDE OF AFG-4000 Series

	MODEL	AFG-4125E	AFG-4125AE	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	1	1	2	2	2	2	2	2
ISOLATED CHANNEL	Isolated	-	-	-	-	-	-	-	-
FREQUENCY	Frequency Range	1 µHz to 25 MHz	1 µHz to 25 MHz	1 µHz to 25 MHz	1 µHz to 35 MHz	1 µHz to 60 MHz	1 µHz to 80 MHz	1 µHz to 100 MHz	1 µHz to 250 MHz
	Frequency Resolution	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz
ARB	Sample Rate	125 MSa/s	125 MSa/s	125 MSa/s	500 MSa/s	500 MSa/s	500 MSa/s	500 MSa/s	1.25 GSa/s
	Repetition Rate	15 MHz	15 MHz	15 MHz	30 MHz	30 MHz	30 MHz	30 MHz	30 MHz
	Memory Length	16k Points	16k Points	10M Points	10M Points	10M Points	10M Points	10M Points	10M Points
	Vertical Resolution	14-bit	14-bit	14-bit	16-bit	16-bit	16-bit	16-bit	16-bit
OUTPUT	Amplitude Range (@ 50 Ω) *1	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp
	DC Offset (@ 50 Ω)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)	± (10 Vpk to Vpp / 2)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	V	V	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	< 10 ns	< 10 ns	< 10 ns	< 8 ns	< 8 ns	< 8 ns	< 8 ns	< 5 ns
	Square Duty Cycle *2	50 % Fixed	50 % Fixed	50 % Fixed	50 % Fixed	50 % Fixed	50 % Fixed	50 % Fixed	50 % Fixed
PULSE CHARACTERISTIC	Pulse Width	200 ns to 1000 ks	200 ns to 1000 ks	200 ns to 1000 ks	66.667 ns to 1000 ks	40 ns to 1000 ks	40 ns to 1000 ks	40 ns to 1000 ks	20 ns to 1000 ks
	Duty Cycle *2 *3	0.1 % to 99.9 %	0.1 % to 99.9 %	0.1 % to 99.9 %	0.1 % to 99.9 %	0.1 % to 99.9 %	0.1 % to 99.9 %	0.1 % to 99.9 %	0.1 % to 99.9 %
	Leading and Trailing Edge Time	≥ 32 ns	≥ 32 ns	≥ 32 ns	≥ 8 ns	≥ 8 ns	≥ 8 ns	≥ 8 ns	≥ 5 ns
BASIC WAVEFORM	Sine	V	V	V	V	V	V	V	V
	Square	V	V	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V	V	V
	Noise	V	V	V	V	V	V	V	V
	Harmonic	V	V	V	V	V	V	V	V
	Burst	V	V	V	V	V	V	V	V
	DC	-	-	-	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	V	V	V	V	V
MODULATION	AM	V	V	V	V	V	V	V	V
	DSB-AM	V	V	V	V	V	V	V	V
	FM	V	V	V	V	V	V	V	V
	PM	V	V	V	V	-	-	-	-
	FSK	V	V	V	V	V	V	V	V
	3FSK	V	V	V	V	V	V	V	V
	4FSK	V	V	V	V	V	V	V	V
	ASK	V	V	V	V	V	V	V	V
	PSK	V	V	V	V	V	V	V	V
	BPSK	V	V	V	V	V	V	V	V
	QPSK	V	V	V	V	V	V	V	V
	OSK	V	V	V	V	V	V	V	V
	PWM	V	V	V	V	V	V	V	V
	SUM	V	V	V	V	V	V	V	V
COUNTER FUNCTION	Counter	V	V	V	V	V	V	V	V
OTHERS	Reference Input	V	V	V	V	V	V	V	V
	Reference Output	V	V	V	V	V	V	V	V
	Modulation Input	V	V	V	V	V	V	V	V
	Trigger Input	V	V	V	V	V	V	V	V
POWER AMPLIFIER	Power Amplifier, Input, Output	-	V	-	-	-	-	-	-
INTERFACE	GPIB	-	-	-	-	-	-	-	-
	USB Host	V	V	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V	V	V
	LAN	-	-	-	V	V	V	V	V
	RS-232C	-	-	-	-	-	-	-	-
DISPLAY	Display	8" TFT LCD	8" TFT LCD	8" TFT LCD	8" TFT LCD	8" TFT LCD	8" TFT LCD	8" TFT LCD	8" TFT LCD
	Touch Screen Capacitive	-	-	-	V	V	V	V	V
DSO LINK	DSO Link	-	-	-	-	-	-	-	-
STORAGE MEMORY	Internal Storage Memory *4	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB	32 MB
LABVIEW	LabView Driver	-	-	-	-	-	-	-	-
POWER	Power Source	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V
	Power Consumption	50 VA	50 VA	50 VA	50 VA	50 VA	50 VA	50 VA	50 VA
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*1. AFG-4125E/4125AE/4225E/4235/4360/4280/4210H: 1 mVpp to 10 Vpp, for ≤ 25 MHz; 1 mVpp to 5 Vpp, for ≤ 60 MHz; 1 mVpp to 2.5 Vpp, for ≤ 100 MHz;
AFG-4225H: 1 mVpp to 10 Vpp, for ≤ 40 MHz; 1 mVpp to 5 Vpp, for ≤ 80 MHz ; 1 mVpp to 2.5 Vpp, for ≤ 120 MHz; 1 mVpp to 1 Vpp, for ≤ 250 MHz
*2. The square wave only supports a fixed 50 % duty cycle. To change the width, the Pulse function must be used.
*3. The range of duty cycle is limited by the frequency setting, refer to the user manual for details.
*4. The range of duty cycle is limited by the frequency setting, refer to the user manual for details.

AFG-3000 Series SELECTION GUIDE

	MODEL	AFG-3032	AFG-3031	AFG-3022	AFG-3021	AFG-3081	AFG-3051
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	1	2	1	1	1
ISOLATED DESIGN	Isolated	V	V	V	V	-	-
FREQUENCY	Frequency Range	1 µHz to 30 MHz	1 µHz to 30 MHz	1 µHz to 20 MHz	1 µHz to 20 MHz	1 µHz to 80 MHz	1 µHz to 50 MHz
	Frequency Resolution	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz
ARB	Sample Rate	250 MSa/s	250 MSa/s	250 MSa/s	250 MSa/s	200 MSa/s	200 MSa/s
	Repetition Rate	125 MHz	125 MHz	125 MHz	125 MHz	100 MHz	100 MHz
	Memory Length	8M Points	8M Points	8M Points	8M Points	1M Points	1M Points
	Vertical Resolution	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit
OUTPUT	Amplitude Range (@ 50 Ω)	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp
	DC Offset (@ 50 Ω)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	< 8ns	< 8ns	< 8ns	< 8ns	< 8ns	< 8ns
	Square Duty Cycle	20 % to 80 %	20 % to 80 %	20 % to 80 %	20 % to 80 %	20 % to 80 %	20 % to 80 %
PULSE CHARACTERISTIC	Pulse Width	20 ns to 999830 s	20 ns to 999830 s	20 ns to 999830 s	20 ns to 999830 s	8 ns to 1999.9 s	8 ns to 1999.9 s
	Duty Cycle	0.017 % to 99.983 %	0.017 % to 99.983 %	0.017 % to 99.983 %	0.017 % to 99.983 %	-	-
	Leading and Trailing Edge Time	9.32 ns to 799900 s	9.32 ns to 799900 s	9.32 ns to 799900 s	9.32 ns to 799900 s	< 8 ns	< 8 ns
BASIC WAVEFORM	Sine	V	V	V	V	V	V
	Square	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V
	Noise	V	V	V	V	V	V
	Harmonic	V	V	V	V	-	-
	Burst	V	V	V	V	V	V
	DC	V	V	V	V	V	V
SWEEP FUNCTION	Sweep	V	V	V	V	V	V
MODULATION	AM	V	V	V	V	V	V
	FM	V	V	V	V	V	V
	PM	V	V	V	V	-	-
	FSK	V	V	V	V	V	V
	ASK	-	-	-	-	-	-
	PSK	V	V	V	V	-	-
	PWM	V	V	V	V	V	V
	SUM	V	V	V	V	-	-
COUNTER FUNCTION	Counter	-	-	-	-	-	-
OTHERS	Ext. Trigger Input	V	V	V	V	V	V
	Ext. Modulation Input	V	V	V	V	V	V
	Trigger Output	-	-	-	-	V	V
	Modulation Output	-	-	-	-	V	V
POWER AMPLIFIER	Power Amplifier, Input, Output	-	-	-	-	-	-
INTERFACE	GPIB (Including Option)	V	V	V	V	V	V
	USB Host	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V
	LAN	V	V	V	V	-	-
	RS-232C	-	-	-	-	V	V
DISPLAY	Display	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD
	Voltage Display	V	V	V	V	V	V
DSO LINK	DSO Link	V	V	V	V	V	V
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V	V
POWER	Power Source	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V
	Power Consumption	85 VA	50 VA	85 VA	50 VA	65 VA	65 VA
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AFG-2000 Series SELECTION GUIDE

	MODEL	AFG-2225	AFG-2125	AFG-2112	AFG-2105	AFG-2025	AFG-2012	AFG-2005
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	1	1	1	1	1	1
RF	RF Generatror Frequency	-	-	-	-	-	-	-
FREQUENCY	Frequency Range	1 μHz to 25 MHz	0.1 Hz to 25 MHz	0.1 Hz to 12 MHz	0.1 Hz to 5 MHz	0.1 Hz to 25 MHz	0.1 Hz to 12 MHz	0.1 Hz to 5 MHz
	Frequency Resolution	1 μHz	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz	0.1 Hz
ARB	Sample Rate	120 MSa/s	20 MSa/s	20 MSa/s	20 MSa/s	20 MSa/s	20 MSa/s	20 MSa/s
	Repetition Rate	60 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz
	Memory Length	4k Points	4k Points	4k Points	4k Points	4k Points	4k Points	4k Points
	Vertical Resolution	10-bit	10-bit	10-bit	10-bit	10-bit	10-bit	10-bit
OUTPUT	Amplitude Range (@ 50 Ω)	1 mVpp to 10 Vpp (≦ 20 MHz) 1 mVpp to 5 Vpp (> 20 MHz)	1 mVpp to 10 Vpp (≦ 20 MHz) 1 mVpp to 5 Vpp (> 20 MHz)	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp (≦ 20 MHz) 1 mVpp to 5 Vpp (> 20 MHz)	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp
	DC Offset (@ 50 Ω)	± 5 Vpk (AC+DC) (≦ 20 MHz) ± 2.5 Vpk (AC+DC) (> 20 MHz)	± 5 Vpk (AC+DC) (≦ 20 MHz) ± 2.5 Vpk (AC+DC) (> 20 MHz)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC) (≦ 20 MHz) ± 2.5 Vpk (AC+DC) (> 20 MHz)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	-	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	≦ 25 ns	≦ 25 ns	≦ 25 ns	≦ 25 ns	≦ 25 ns	≦ 25 ns	≦ 25 ns
	Square Duty Cycle	1 % to 99 %	1 % to 99 %	1 % to 99 %	1 % to 99 %	1 % to 99 %	1 % to 99 %	1 % to 99 %
PULSE CHARACTERISTIC	Pulse Width	20 ns to 1999.9 s	-	-	-	-	-	-
	Duty Cycle	-	-	-	-	-	-	-
	Leading and Trailing Edge Time	-	-	-	-	-	-	-
BASIC WAVEFORM	Sine	V	V	V	V	V	V	V
	Square	V	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V	V
	Noise	V	V	V	V	V	V	V
	Burst	V	-	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	V	-	-	-
MODULATION	AM / Modulation	V	V	V	V	-	-	-
	FM	V	V	V	V	-	-	-
	PM	V	-	-	-	-	-	-
	FSK	V	V	V	V	-	-	-
	ASK	-	-	-	-	-	-	-
	PSK	-	-	-	-	-	-	-
	PWM	-	-	-	-	-	-	-
	SUM	V	-	-	-	-	-	-
COUNTER FUNCTION	Counter	V	V	V	V	-	-	-
OTHERS	Ext. Trigger Input	V	V	V	V	-	-	-
	Ext. Modulation Input	V	V	V	V	-	-	-
	Trigger Output	V	-	-	-	-	-	-
	Modulation Output	-	V	V	V	-	-	-
	Marker Output	-	-	-	-	-	-	-
INTERFACE	GPIB(Including option)	-	-	-	-	-	-	-
	USB Host	V	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V	V
	LAN	-	-	-	-	-	-	-
	RS232C	-	-	-	-	-	-	-
DISPLAY	Display	3.5" TFT LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD
	Voltage Display	V	V	V	V	V	V	V
DSO LINK	DSO Link	V	X	X	X	X	X	X
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V	V	V
POWER	Power Source	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V
	Power Consumption	25W	25VA	25VA	25VA	25VA	25VA	25VA
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MFG-2000 Series SELECTION GUIDE

	MODEL	MFG-2220HM	MFG-2260MRA	MFG-2260MFA	MFG-2260M	MFG-2230M	MFG-2160MR
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	2	2	2	2	1
ISOLATED DESIGN	Isolated	-	V	V	V	V	V
RF	RF Generatror Frequency	-	320 MHz	160 MHz	-	-	320 MHz
FREQUENCY	Frequency Range	200 MHz	60 MHz	60 MHz	60 MHz	30 MHz	60 MHz
	Frequency Resolution	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz
ARB	Sample Rate	250 MSa/s	200 MSa/s	200 MSa/s	200 MSa/s	200 MSa/s	200 MSa/s
	Repetition Rate	125 MHz	100 MHz	100 MHz	100 MHz	100 MHz	100 MHz
	Memory Length	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points
	Vertical Resolution	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit
OUTPUT	Amplitude Range (@ 50 Ω)	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp
	DC Offset (@ 50 Ω)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	< 15 ns	< 15 ns	< 15 ns	< 15 ns	< 15 ns	< 15 ns
	Square Duty Cycle	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %
PULSE CHARACTERISTIC	Pulse Width	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks
	Duty Cycle	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %
	Leading and Trailing Edge Time	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s
BASIC WAVEFORM	Sine	V	V	V	V	V	V
	Square	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V
	Noise	V	V	V	V	V	V
	Harmonic	-	-	-	-	-	-
	Burst	V	V	V	V	V	V
	DC	-	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	V	V	V
MODULATION	AM	V	V	V	V	V	V
	FM	V	V	V	V	V	V
	PM	V	V	V	V	V	V
	FSK	V	V	V	V	V	V
	ASK (RF Channel)	V	V	V	-	-	V
	PSK (RF Channel)	V	V	V	-	-	V
	PWM	V	V	V	V	V	V
	SUM	V	V	V	V	V	V
COUNTER FUNCTION	Counter	V	V	V	V	V	V
OTHERS	Ext. Trigger Input	V	V	V	V	V	V
	Ext. Modulation Input	V	V	V	V	V	V
	Trigger Output	V	V	V	V	V	V
	Modulation Output	-	-	-	-	-	-
	Marker Output	V	V	V	V	V	V
COUNTER FUNCTION	Power Amplifier, Input, Output	V	V	V	-	-	-
INTERFACE	GPIB (Including option)	-	-	-	-	-	-
	USB Host	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V
	LAN	V	V	V	V	V	-
	RS232C	-	-	-	-	-	-
DISPLAY	Display	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD
	Voltage Display	V	V	V	V	V	V
DSO LINK	DSO Link	V	V	V	V	V	-
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V	V
POWER	Power Source	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V
	Power Consumption	30 W to 80 W	30 W to 80 W	30 W to 80 W	30 W to 80 W	30 W to 80 W	30 W to 80 W
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MFG-2000 Series SELECTION GUIDE

	MODEL	MFG-2160MF	MFG-2130M	MFG-2120MA	MFG-2120	MFG-2110
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	1	1	1	1	1
ISOLATED DESIGN	Isolated	V	V	V	V	V
RF	RF Generatror Frequency	160 MHz	-	-	-	-
FREQUENCY	Frequency Range	60 MHz	30 MHz	20 MHz	20 MHz	10 MHz
	Frequency Resolution	1 µHz	1 µHz	1 µHz	1 µHz	1 µHz
ARB	Sample Rate	200 MSa/s	200 MSa/s	200 MSa/s	200 MSa/s	200 MSa/s
	Repetition Rate	100 MHz	100 MHz	100 MHz	100 MHz	100 MHz
	Memory Length	16k Points	16k Points	16k Points	16k Points	16k Points
	Vertical Resolution	14-bit	14-bit	14-bit	14-bit	14-bit
OUTPUT	Amplitude Range (@ 50 Ω)	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp	1 mVpp to 10 Vpp
	DC Offset (@ 50 Ω)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	< 15 ns	< 15 ns	< 15 ns	< 15 ns	< 15 ns
	Square Duty Cycle	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %
PULSE CHARACTERISTIC	Pulse Width	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks	20 ns to 999.9 ks
	Duty Cycle	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %	0.01 % to 99.99 %
	Leading and Trailing Edge Time	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s	10 ns to 20 s
BASIC WAVEFORM	Sine	V	V	V	V	V
	Square	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V
	Pulse	V	V	V	V	V
	Noise	V	V	V	V	V
	Harmonic	-	-	-	-	-
	Burst	V	V	V	-	-
	DC	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	-	-
MODULATION	AM	V	V	V	-	-
	FM	V	V	V	-	-
	PM	V	V	V	-	-
	FSK	V	V	V	-	-
	ASK (RF Channel)	V	-	-	-	-
	PSK (RF Channel)	V	-	-	-	-
	PWM	V	V	V	-	-
	SUM	V	V	V	-	-
COUNTER FUNCTION	Counter	V	V	V	-	-
OTHERS	Ext. Trigger Input	V	V	V	-	-
	Ext. Modulation Input	V	V	V	-	-
	Trigger Output	V	V	V	-	-
	Modulation Output	-	-	-	-	-
	Marker Output	V	V	V	-	-
COUNTER FUNCTION	Power Amplifier, Input, Output	-	-	V	-	-
INTERFACE	GPIB (Including option)	-	-	-	-	-
	USB Host	V	V	V	V	V
	USB Device	V	V	V	V	V
	LAN	-	-	-	-	-
	RS232C	-	-	-	-	-
DISPLAY	Display	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD
	Voltage Display	V	V	V	V	V
DSO LINK	DSO Link	-	-	-	-	-
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V
POWER	Power Source	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V	AC 100 V to AC 240 V
	Power Consumption	30 W to 80 W	30 W to 80 W	30 W to 80 W	30 W to 80 W	30 W to 80 W
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25/35/60/80/100/250 MHz Arbitrary Function Generator

NEW

AFG-4000 Series

CE | USB Host | USB Device | LAN

FEATURES

* Provide Single-channel or Dual-channel Output
  Single Channel : AFG-4125E/4125AE (25 MHz)
  Dual Channel : AFG-4225E/4235/4260/4280/4210H/4225H(25/35/60/80/100/250 MHz)
* Built-in Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic Wave, Arbitrary Wave
* Min. Resolution : 1 μHz
* Sampling Rate : AFG-4225H : 1.25 GSa/s; AFG-4235/4260/4280/4210H : 500 MSa/s; AFG-4125E/4125AE/4225E : 125 MSa/s
* Amplitude Resolution : AFG-4125E/4125AE/4225E : 14 bits; AFG-4235/4260/4280/4210H/4225H : 16 bits
* Memory Length : AFG-4225E/4235/4260/4280/4210H/4225H : 10 M/per Channel; AFG-4125E/4125AE : 16 k/per Channel
* Modulation : AM,DSB-AM,FM,PM,PWM,ASK,PSK,BPSK,QPSK,FSK,FSK,4FSK,OSK,SUM
* Built-in Sweep, Burst, Counter Function
* AFG-4125AE Built-in Power Amplifier Function
* Communication Interface : AFG-4235/4260/4280/4210H/4225H Provide USB, LAN Interface
  AFG-4125E/4125AE/4225E Provide USB Interface
* 8" TFT LCD Display, 800 x 480 Resolution
* Multi-Touch Display : AFG-4235/4260/4280/4210H/4225H

AFG-4000 series arbitrary function generator series is GW Instek's first arbitrary function generator series to be equipped with an 8" large touch screen. The frequency bandwidth of the single-channel models is 25 MHz, and dual- channel models feature 250/100/80/60/35/25 MHz frequency bandwidth selections. The entire series provides high resolution of 1 μHz and has built-in standard waveforms such as sine wave, square wave, triangle wave, pulse wave, noise wave, harmonic wave, etc. The highest bandwidth 250 MHz model provides 1.25 GSa/s sample rate; the mid-range models ranging from 35 MHz to 100 MHz provide 500 MSa/s sample rate; and the 25 MHz entry-level models have a sampling rate of 125 MSa/s. For vertical resolution, the 35 MHz to 250 MHz models feature 16-bit resolution, and 25 MHz entry-level models provide 14-bit resolution. In addition, in terms of memory depth, dual channel 25 MHz to 250 MHz models provide 10 M memory depth, and entry-level single channel 25 MHz models provide arbitrary waveform editing function with 16k memory depth. The entire series has built-in 146 arbitrary waveforms for editing and output.

The dual-channel models provide dual-channel related settings such as frequency coupling, amplitude coupling and tracking, allowing users to quickly set the output related to the two channels. In terms of modulation function, the AFG-4000 series provides AM, DSB-AM, FM, PM, PWM, ASK, PSK, BPSK, QPSK, FSK, 3FSK, 4FSK, OSK, SUM and other modulation signal outputs. Standard functions include Sweep and Burst outputs and the Counter function. AFG-4125AE has a built-in power amplifier. The power output of the amplifier reaches 10 W, and the amplification factor reaches 10 times to produce a maximum output of 22 V. The independent input/output power amplifier provides a bandwidth range from 5 Hz to 100 kHz, which can be used for audio signal and other application requirements.

The AFG-4000 series is equipped with an 8-inch high-resolution TFT LCD, and models above 35 MHz are equipped with the touch screen function. The configuration of touch screen makes inputting parameters more convenient. Users only need to touch parameters such as Frequency, Amplitude or DC offset, and a numeric input window will appear on the screen. Users can intuitively input parameters through this window or the numeric keys on the AFG-4000 panel. Through the 8" large screen, touch screen and diverse built-in waveforms, users can control it at will to meet their signal generation needs.

As for the interfaces, the 25 MHz models: AFG-4125E/4125AE/4225E have a built-in USB Host/Device interfaces, and the models with higher bandwidths ranging from 35 MHz to 250 MHz come standard with USB Host/Device and LAN interfaces.

SELECTION GUIDE

Model	AFG-4125E	AFG-4125AE*	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
No. of Channel	Single		Dual					
Frequency Range (Sine)	25 MHz		25 MHz	35 MHz	60 MHz	80 MHz	100 MHz	250 MHz
Sample Rate (Sa/s)	125 M		500 M					1.25 G
Amplitude Resolution	14 bits		16 bits					
Memory Length	16 k/CH		10 M/CH					
Touch Panel	N/A		Yes					
Communication Interface	USB(Host, Device)		USB(Host, Device), LAN					

*AFG-4125AE built-in power amplifier function

AFG-4000 Series

Rear Panel

ORDERING INFORMATION

AFG-4125E	25 MHz, 1-Channel Arbitrary Function Generator
AFG-4125AE	25 MHz, 1-Channel Arbitrary Function Generator, Plus Power Amplifier
AFG-4225E	25 MHz, 2-Channel Arbitrary Function Generator
AFG-4235	35 MHz, 2-Channel Arbitrary Function Generator
AFG-4260	60 MHz, 2-Channel Arbitrary Function Generator
AFG-4280	80 MHz, 2-Channel Arbitrary Function Generator
AFG-4210H	100 MHz, 2-Channel Arbitrary Function Generator
AFG-4225H	250 MHz, 2-Channel Arbitrary Function Generator

ACCESSORIES :
USB Cable x 1, Power Cord x 1
AFG-4125E/4125AE: Test Lead, BNC to Alligator Clips Cable x 1
AFG-4225E/4235: Test Lead, BNC to Alligator Clips Cable x 2
AFG-4260/4280/4210H/4225H: Test Lead, BNC Cable x 2

OPTIONAL ASSESSORIES

GTL-101	Test Lead, BNC (P/M) to Alligator, approx. 1100 mm
GTL-110	BNC Cable, BNC (P/M) to BNC (P/M), approx. 1000 mm

SPECIFICATIONS

Models	AFG-4125E	AFG-4125AE	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
CHANNELS								
	1		2					
WAVEFORMS								
	Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic wave, Arbitrary wave							
ARBITRARY FUNCTIONS								
ARB Function	Built-in							
Sample Rate(*1)	125 MSa/s			500 MSa/s				1.25 GSa/s
Repetition Rate (Arbitrary Wave)	15 MHz			30 MHz				
Waveform Length	2 to 16 k points		2 to 10 M points					
Amplitude Resolution	14 bits			16 bits				
Minimum Rise and Fall Time	< 10 ns			< 8 ns				< 5 ns
Jitter	8 ns							
Non-Volatile Memory	32 MB							
User-defined Output Section	From point 2 to 16,384		From point 2 to 10,240,000					
User-defined Output Marker Section	From point 2 to 16,384		From point 2 to 10,240,000					
Output Mode	1 to 1,000,000 cycles or infinite mode							
FREQUENCY CHARACTERISTICS								
Sine	25 MHz			35 MHz	60 MHz	80 MHz	100 MHz	250 MHz
Square	5 MHz			15 MHz	30 MHz			50 MHz
Pulse	5 MHz			15 MHz	25 MHz			
Triangle, Ramp	1 MHz			3 MHz				5 MHz
Noise (-3dB)	25 MHz BW			35 MHz BW	60 MHz BW	80 MHz BW	100 MHz BW	120 MHz BW
Harmonic Wave	12.5 MHz			17.5 MHz	30 MHz	40 MHz	50 MHz	125 MHz
Resolution	1 µHz or 10 significant figures							
Accuracy Stability	± 2 ppm at 25 °C ± 5 °C							± 1 ppm at 0 °C to 40 °C
Aging	± 1 ppm, per 1 year							
Tolerance	± 1 ppm							
OUTPUT CHARACTERISTICS (*2)								
Output Amplitude — Into 50 Ω	1 mVpp to 10 Vpp, for ≤ 25 MHz ; 1 mVpp to 5 Vpp, for ≤ 60 MHz ; 1 mVpp to 2.5 Vpp, for ≤ 100 MHz							1 mVpp to 10 Vpp, for ≤ 40 MHz; 1 mVpp to 10 Vpp, for ≤ 40 MHz; 1 mVpp to 2.5 Vpp, for ≤ 120 MHz; 1 mVpp to 1 Vpp, for ≤ 250 MHz
Output Amplitude — Open-circuit	2 mVpp to 20 Vpp, for ≤ 25 MHz ; 2 mVpp to 10 Vpp, for ≤ 60 MHz ; 2 mVpp to 5 Vpp, for ≤ 100 MHz							2 mVpp to 20 Vpp, for ≤ 40MHz 2 mVpp to 10 Vpp, for ≤ 80 MHz 2 mVpp to 5 Vpp, for ≤ 120 MHz; 2 mVpp to 2 Vpp, for ≤ 250MHz
Bandwidth Fatness	≤ 10 MHz: ± 0.2 dB ; ≤ 60 MHz: ± 0.3 dB ; ≤ 100 MHz: ± 0.5 dB ; (relative to 100 kHz Sine wave, 1 Vpp, 50 Ω)							≤ 10 MHz: ± 0.2 dB; ≤ 60 MHz: ± 0.3 dB; ≤ 100 MHz: ± 0.5 dB; ≤ 160 MHz: ± 1 dB; ≤ 250 MHz: ± 1.5 dB; (relative to 1 kHz Sine wave, 1 Vpp, 50 Ω)
Accuracy	± (2 % of setting + 1 mVpp) (1 kHz sine, 0 V offset, > 10 mVpp)							
Resolution	0.1 mVpp or 4 digits (The amplitude ≥ 1 Vpp is 1 mVpp)							
Output Impedance	50Ω (Typical)							
Output protection	Short circuit protection, the output will be automatically turned off when overloaded							
DC Offset — Range	± (10 Vpk – Amplitude Vpp / 2), (High resistance)							
DC Offset — Accuracy	± (3 % of |setting| + 5 mV + amplitude Vpp * 0.5 %)			± (1 % of |setting| + 5 mV + amplitude Vpp * 0.5%)				
DC Offset — Resolution	0.1 mVpp or 4 digits (The amplitude > 1 Vpp is 1 mVpp)							
SINE WAVE CHARACTERISTICS								
Harmonic Distortion(*3)	DC to 1 MHz: < -65 dBc; 1 MHz to 10 MHz: < -60 dBc; 10 MHz to 60 MHz: < -55 dBc; 60 MHz to 100 MHz: < -50 dBc Typical (0 dBm)							DC to 1 MHz: < -65 dBc; 1 MHz to 10 MHz: < -60 dBc; 10 MHz to 120 MHz: < -50 dBc; 120 MHz to 250 MHz: < -45 dBc; Typical (0 dBm)
Total Harmonic Distortion	< 0.05 %, 10 Hz to 20 kHz, 1 Vpp							
Non-harmonic Distortion	≤ 10 MHz: < -70 dBc; > 10 MHz: < -70 dBc + 6 dB/sound interval; Typical (0 dBm)							
Phase Noise	10 MHz: ≤ -110 dBc/Hz Typical (0 dBm, 10 kHz offset)							
SQUARE WAVE CHARACTERISTICS								
Rise/Fall Time	< 30 ns			< 8 ns				< 5 ns
Overshoot	Typical (100 kHz, 1 Vpp) < 5%, (1 Vpp, 50 Ω)			Typical (100 kHz, 1 Vpp) < 3%, (1 Vpp, 50 Ω)				
Duty Cycle	50.00 % (fixed)							
RAMP WAVE CHARACTERISTICS								
Linearity	< 0.1 % of peak output (typical 1 kHz, 1 Vpp, symmetry 50 %)							
Symmetry	0.0 % to 100.0 %							
PULSE WAVE CHARACTERISTICS								
Period	200 ns to 1000 ks			66.667 ns to 1000 ks	40 ns to 1000 ks			20 ns to 1000 ks
Pulse Width	≥ 48 ns			≥ 18 ns	≥ 12 ns			≥ 7 ns
Duty cycle	0.1 % to 99.9 % (limited by the frequency setting)							
Rise and fall time				≥ 8 ns (limited by the pulse width setting)				≥ 7 ns (limited by the pulse width setting)
Overshoot	Typical (100 kHz, 1 Vpp) < 5%			Typical (100 kHz, 1 Vpp) < 3%				
NOISE WAVE CHARACTERISTICS								
Types	Gaussian white noise							
Bandwidth (-3 dB)	25 MHz BW			35 MHz BW	60 MHz BW	80 MHz BW	100 MHz BW	120 MHz BW

SPECIFICATIONS

Models		AFG-4125E	AFG-4125AE	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
HARMONIC WAVE CHARACTERISTICS									
Harmonic number		≤ 16							
Frequency Range		1 μHz to 12.5 MHz			1 μHz to 17.5 MHz	1 μHz to 30 MHz	1 μHz to 40 MHz	1 μHz to 50 MHz	1 μHz to 125 MHz
Harmonic type		Odd, even, sequential, custom							
Harmonic amplitude		Each harmonic amplitude can be set							
Harmonic phase		Each harmonic phase can be set							
MODULATION CHARACTERISTICS									
AM	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	Sin, Square, Ramp, Noise, ARB							
	Modulating Frequency	2 mHz to 1 MHz							
	Depth	0 % to 120 %							
	Source	Internal or External							
DSBAM	Carrier Waveforms	Sine, Square, Ramp							
	Modulating Waveforms	Sine, Square, Ramp							
	Modulating Frequency	2 mHz to 1 MHz							
	Depth	0% to 100%							
	Source	Internal or External							
FM	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	Sine, square, ramp, noise, ARB							
	Modulating Frequency	2 mHz to 1 MHz							
	Frequency Offset	2 mHz ≤ offset ≤ min (carrier frequency, carrier maximum frequency carrier frequency) by default, the smaller of the two.							
	Source	Internal or External							
PM	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	Sine, square, ramp, noise, ARB							
	Modulating Frequency	2 mHz to 1 MHz							
	Phase Deviation Range	0° to 180°							
	Source	Internal or External							
PWM	Carrier Waveforms	Pulse							
	Modulating Waveforms	Sine, square, ramp, noise, ARB							
	Modulating Frequency	2 mHz to 1 MHz							
	Offset	Offset 0 to min (min is the smaller value of pulse wave duty cycle and 100 %-pulse wave duty cycle)							
	Source	Internal or External							
ASK	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	50% duty cycle Square wave							
	Modulating Frequency	2 mHz to 1 MHz							
	Source	Internal or External							
PSK	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	50% duty cycle Square							
	Modulating Frequency	2 mHz to 1 MHz							
	Source	Internal or External							
BPSK / QPSK	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	50% duty cycle Square							
	Modulating Frequency	2 mHz to 1 MHz							
	Source	Internal							
FSK	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	50% duty cycle Square							
	Modulating Frequency	2 mHz to 1 MHz							
	Source	Internal or External							
3FSK / 4FSK	Carrier Waveforms	Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
	Modulating Waveforms	50% duty cycle Square							
	Modulating Frequency	2 mHz to 1 MHz							
	Source	Internal							
OSK	Carrier Waveforms	Sine wave							
	Modulating Waveforms	50% duty cycle Square							
	Modulating Frequency	8ns to 249.75s							
	Carrier Waveforms	2 mHz to 1 MHz							
	Source	Internal							
SUM	Carrier Waveforms	Sine, square, ramp							
	Modulating Waveforms	Sine, square, ramp, noise, ARB							
	Modulating Frequency	2 mHz to 1 MHz							
	Depth	0 % to 100 %							
	Source	Internal or External							
SWEEP									
Carrier Waveforms		Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
Minimum Starting Frequency		1 μHz							
Maximum Stop Frequency	Sine	25 MHz			35 MHz	60 MHz	80 MHz	100 MHz	250 MHz
	Square	5 MHz			15 MHz	30 MHz			50 MHz
	Triangle, Ramp	1 MHz			3 MHz				5 MHz
	Arbitrary	15 MHz			15 MHz (built-in waveform) or 25 MHz (user-defined waveform)				
Types		Linear, logarithmic, Step							
Sweep Direction		Up / Down							
Sweep Time		1 ms to 500 s ± 0.1%							
Trigger Source		Internal, external, manual							

SPECIFICATIONS

Models		AFG-4125E	AFG-4125AE	AFG-4225E	AFG-4235	AFG-4260	AFG-4280	AFG-4210H	AFG-4225H
BURST									
Waveform		Sine, Square, Ramp, ARB(except DC) (ARB length is 8192)							
Types		Count (1 to 1000,000 cycles), Infinite, gated							
Trigger Source		Internal, External, Manual							
Carrier Frequency		2 mHz to BW/ 2							
Trigger Cycle		20 ns to 500 s (Min = Cycles x Period)							
Gated Source		External trigger							
COUNTER									
Measurement Function		Frequency, period, positive pulse width, negative pulse width, duty cycle							
Frequency Range		100 mHz to 200 MHz							
Frequency Resolution		7 digits							
Coupling Method		AC, DC Voltage range and sensitivity (non-modulated signal)							
DC Offset Range		± 1.5 V							
DC Coupling		100 mHz to 100 MHz: 250 mVpp to 5 Vpp (AC + DC); 100 Hz to 200 MHz: 400 mVpp to 5 Vpp (AC + DC)							
AC Coupling		1 Hz to 100 MHz: 250 mVpp to 5 Vpp; 100 Hz to 200 MHz: 400 mVpp to 5 Vpp							
Pulse Width and Duty Cycle Measurement		1 Hz to 10 MHz (250 mVpp to 5 Vpp)							
Input Resistance		1 MΩ							
Sensitivity		Can be set high, medium and low							
Trigger Level Range		± 2.5 V							
POWER AMPLIFIER (AFG-4125AE ONLY)									
Max Output Power		10 W							
Gain		X 10							
Bandwidth (at full power)		5 Hz to 100 kHz							
Offset		< 7 %							
Input Impedance		10 kΩ							
Output Impedance		< 2 Ω							
Max Input Voltage		2 Vpp							
Max Output Voltage		20 Vpp							
Max Output Power		5 V/us							
INPUT/OUTPUT CHARACTERISTICS									
Channel Coupling		Channel copy, amplitude syn, frequency syn, align phase							
External Modulation Input	Input Frequency Range	DC to 100 kHz (Due to hardware limitations, it is best to set the external modulation frequency to be less than 20 kHz)							
	Input Level Range	± 1 V full scale							
	Input Impedance	10 kΩ (typical)							
External Trigger Input	Level	TTL-compatible							
	Slope	Rising or falling (selectable)							
	Pulse Width	> 100 ns							
External Clock Input (Counter Input)	Impedance	1 MΩ, AC coupling							
	Input Level Range	1 Vpp to 3.3 Vpp							
	Lock Time	< 1 s							
	Lock Range	10 MHz ± 50 Hz							
Internal Clock Output	Frequency	10 MHz ± 50 Hz							
	Impedance	50 Ω, DC coupling							
	Amplitude	1.2 Vpp (50 Ω)							
Sync Output	Level	3.3 V (LVTTL)							
	Impedance	50 Ω, DC coupling							
	Maximum Frequency	1 MHz							
GENERAL SPECIFICATIONS									
Display	Type	8-inch color LCD display; Resolution: 800 Horizontal × 480 Vertical pixels; Color: 65,536 colors, 16 bits, TFT							
	Touch Screen Capacitive	-				Multi-touch			
Communication Interface		USB Host, USB Device				USB Host, USB Device, LAN			
Power	Source	100 V to 240 V (± 10 %), 50 Hz or 60 Hz							
	Power Consumption	Less than 50 VA							
	Fuse	250 V, F2AL							
Operating Environment	Temperature to Satisfy	18 °C to 28 °C							
	Operating Temperature	0 °C to 40 °C							
	Relative Humidity	Less than 35 °C: ≤ 90 % relative humidity; 35 °C to 40 °C: ≤ 60 % relative humidity							
	Installation Category	CAT II							
	Operating Altitude	Operating 3,000 meters ; Non-operation 12,000 meters							
Storage Temperature		-20 °C to 60 °C, Humidity: ≤ 70%							
Pollution Degree		IEC 61010 degree 2, Indoor use							
Safety Designed		EN61010-1							
Cooling Method		Smart fan cooling							
Dimensions & Weight		340 (W) × 177 (H) × 90 (D) mm ; Approx. 2.5 kg							

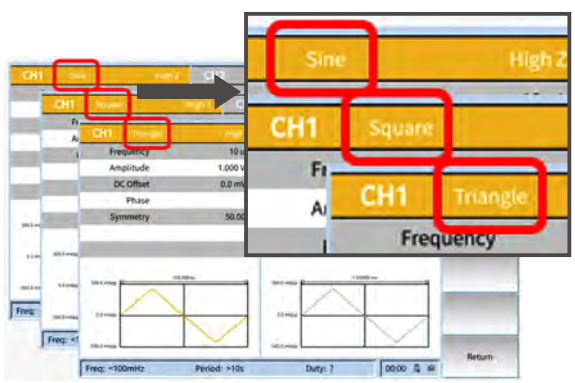
Note : *1. The User's available range of the sample rate is from 1 μSa/s to 75 MSa/s. (AFG-4125E / 4125AE / 4225E is from 1 μSa/s to 30 MSa/s) *2. Not specifically labeled, the load defaults to 50 Ω. *3. DC offset set to zero.
The specifications apply when the AFG-4000 is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

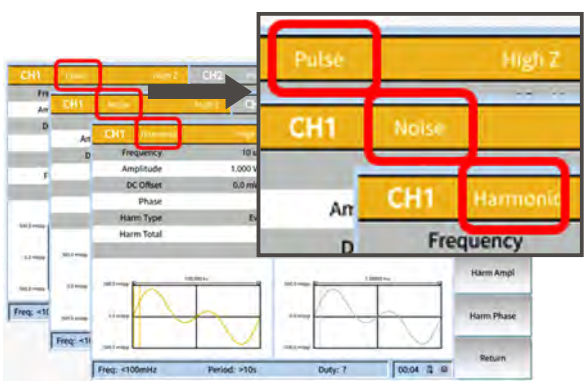
A. 8" TOUCH SCREEN DISPLAY

The AFG-4000 series is equipped with an 8-inch high-resolution TFT LCD, and models above 35 MHz are equipped with the touch screen function.

The configuration of touch screen makes inputting parameters more convenient. Users only need to touch parameters such as Frequency, Amplitude or DC offset, and a numeric input window will appear on the screen. They can intuitively enter setting parameters through this window or the numeric keys on the AFG-4000 series.

B. BUILT-IN VARIOUS STANDARD WAVEFORMS





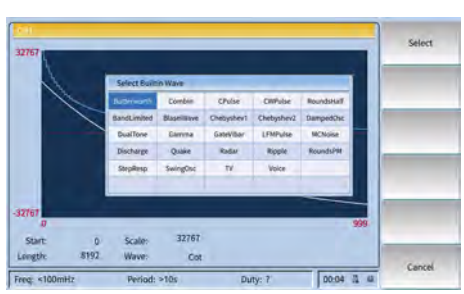
Various standard waveforms are built-in, such as sine wave, square wave, triangle wave, pulse wave, noise wave, harmonics, etc., allowing users to easily select and set to generate the waveforms required for their applications.

C. HARMONIC SIGNAL GENERATOR

The harmonic signal generator can simulate the harmonic signal of the switching power supply and test the characteristics of the EMI power filter.

Users can set the amplitude and phase of each order signal to achieve the desired signal. AFG-4000 can set and generate up to 16 th order harmonics.

D. RICH BUILT-IN ARBITRARY WAVEFORM SELECTIONS

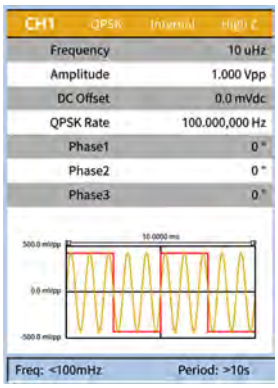


Users can use the built-in 146 application arbitrary waveforms for signal editing and output.

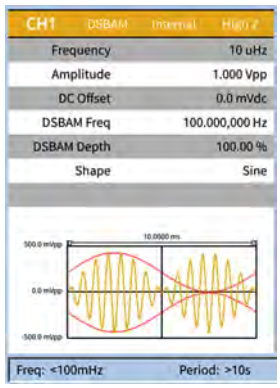
ARB's built-in waveforms include Common, Medical, Standard, or Math and Trigonometric, Window, Engineer, and Segmented Modulation related waveforms.

From the panel, users can select built-in waveforms and edit, save, recall and output arbitrary waveforms..

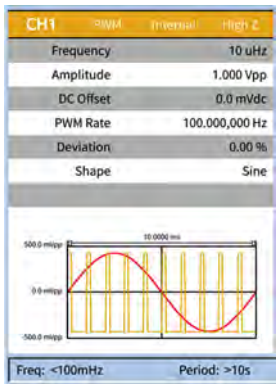
E. BUILT-IN RICH MODULATION WAVEFORMS



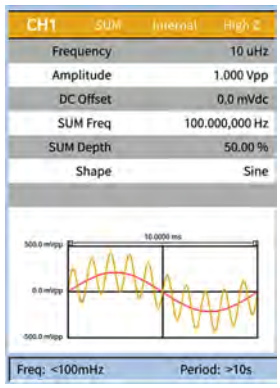
QPSK



DSBAM



PWM

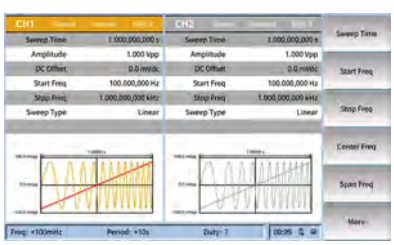


SUM

Provides a wide range of modulation signals, including analog and digital modulation, such as AM, DSB-AM, FM, PM, PWM, ASK, PSK, BPSK, QPSK, FSK, 3FSK, 4FSK, OSK, SUM and other modulation signals.

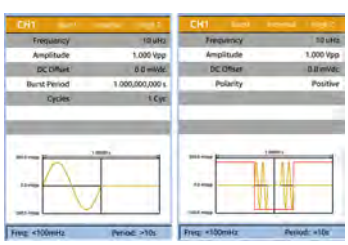
Suitable for various tests such as fundamental frequency function of communications system, motor control and lighting adjuster, etc.

F. PROVIDES SWEEP, BURST, COUNTER FUNCTIONS



Sweep

Frequency sweeping function can be set to sine wave, square wave, triangle wave and arbitrary wave mode. Linear/logarithmic output can be set to meet various application requirements with different sweeping methods. Frequency sweep can test the frequency response of electronic components such as filters and low-frequency amplifiers, etc.



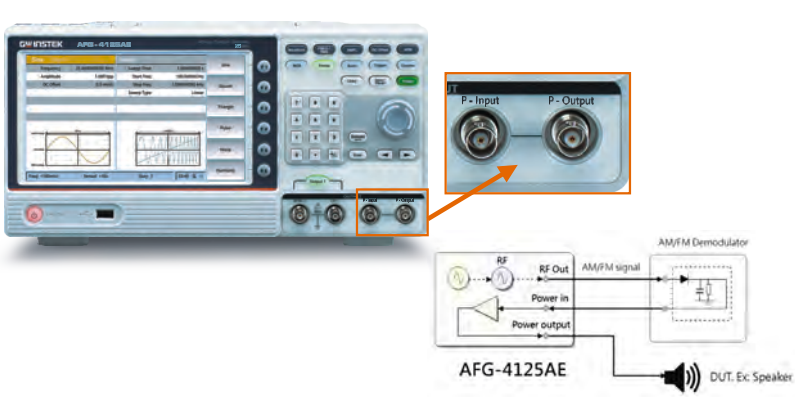
Burst

Supports N-cycle or Gate mode triggering, and can adjust its duration, operating frequency, waveform polarity and internal or external triggering to achieve discontinuous output related applications.

Counter

Provides 100 mHz to 200 MHz frequency counter function

G. POWER AMPLIFIER



AFG-4125AE features a power amplifier with a built-in amplifier that can independently input/output 10 W power and has a gain of 10 times.

This power amplifier has a bandwidth of 5 Hz to 100 kHz and can be used as an audio amplifier; or for a power component characteristic test; for a drive amplifier for piezoelectric components (collocate with an impedance transformer, 10 W output).

Users can connect the AFG-4125AE's low-frequency amplifier to a speaker and use it as the driver source for the speaker, which is a common educational application.

30/20 MHz Arbitrary Function Generator

AFG-3000 Series arbitrary function generators include 20/30 MHz single isolated channel and 20/30 MHz dual isolated channel models, designed to meet industry, scientific research, and education applications. Not only output channel is earth ground isolation, dual channel models are also independently earth ground isolation, which is suitable for floating circuits (up to ±42 V). Without taking grounding reference into consideration, each channel of dual channel models can be operated independently and multi ARB units can output simultaneously. Applications are, for instance, the ignition control or transmission device of automotive electronics. The series features sample rate of 250 MSa/s, 16-bit resolution, and 8 M point memory depth arbitrary waveform characteristics. Users can rebuild maximum 8 M memory depth waveforms through using a GW Instek digital storage oscilloscope with the built-in DSOLink function of the AFG-3000 Series.

AFG-3000 Series

CE | LAN | GPIB | USB | PC Software

The series supports synchronized phase for multi channel operation and the maximum phase synchronization operation is up to 6 units and 12 channels. 10 MHz atomic clock frequency standard can be input via external signal source to elevate precision for frequency output. The series supports frequency sweep and amplitude sweep that can also integrate functions, including linear/logarithm, one-way (saw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by applying different sweep methods. Frequency sweep tests the frequency response of electronic components such as filter and low frequency amplifier. Amplitude sweep simulates vibration tests (requires a vibration tester), and it also conducts aging tests of various materials and linearity tests of low frequency amplifier.

FEATURES

* 1 μHz to 20 or 30 MHz, 20 Vpp. 1 or 2 Channel(s)
* Arbitrary Waveform 250 MSa/s, 16-bit Resolution, 8 M Memory Depth
* Isolation Channel Circuit Design
* Synchronized Phase Operates up to 6 Units and 12 Channels
* Harmonic Signal Generator
* Dual Channel Models Support SUM Modulation, Coupling, Tracking, and Phase Functions
* Pulse Waveform Parameters Can be Set Independently
* Built-in AM/FM/PM/FSK/PWM/SUM Modulation, Sweep and Burst Functions
* Built-in Medical and Automotive Electronic Waveforms
* Built-in I/Q baseband Waveform on AFG-3032/AFG-3022
* Provide USB/LAN/GPIB (Optional) Instrument Control Interface

The main features of the AFG-3000 Series include output amplitude from 1mVpp to 10 Vpp (connected with a 50 ohm load); frequency range from 1 μHz to 20 MHz or 30 MHz; 1 μHz frequency resolution; and built-in sine, square, pulse, triangle, ramp, DC voltage, harmonic and noise. The waveform width, rise edge time and fall edge time of pulse waveform can be adjusted flexibly. Pulse waveform, with duty cycle from 0.017 % to 99.983 %, can be applied as trigger signals. Users can conduct arbitrary editing via 65 built-in function waveforms. The series supports AM/FM/PM/FSK/PWM modulation, frequency sweep, amplitude sweep and burst to satisfy industrial application requirements. Dual channel models provide SUM modulation, coupling, tracking, and phase to meet the test requirements of differential signal, phase control and amplifier distortion. Built-in 8th harmonic signal generator simulates harmonic signal of switching power supplies and it also tests EMI power filter characteristics. The AFG-3000 Series provides free arbitrary waveform editing software (AWES) for users to quickly edit waveforms from the built-in diagrams so as to execute measurements.

AFG-3032/3022

AFG-3032/3022 Rear Panel

AFG-3031/3021 Rear Panel

ORDERING INFORMATION

AFG-3031	30 MHz Single channel Arbitrary Function Generator
AFG-3032	30 MHz Dual channel Arbitrary Function Generator
AFG-3021	20 MHz Single channel Arbitrary Function Generator
AFG-3022	20 MHz Dual channel Arbitrary Function Generator

ACCESSORIES :

GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm x 1 (only AFG-3031/3021)
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm x 2 (only AFG-3032/3022)

OPTIONAL

AFG-3G1	GPIB Interface	**GRA-432**	Rack Adapter Kit

OPTIONAL ASSESSORIES

GTL-246	USB Type A to Type B cable

FREE DOWNLOAD

Arbitrary Waveform Editing Software

SPECIFICATIONS

		AFG-3031	AFG-3032	AFG-3021	AFG-3022
FEATURES					
CHANNELS		1	2	1	2
I/O Signal Ground for the Instrument Chassis		Connector shells for channel output(s), Sync output, 10MHz REF Input, Modulation Input and Modulation output are isolated from the instrument's chassis. Maximum allowable voltage on isolated connector shells is ± 42 Vpk. (DC + AC Peak)			
Each of the Signal Ground of CH1 & CH2		-	Isolated	-	Isolated
Standard Waveforms		Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic			
ARBITRARY WAVEFORM					
Sample Rate		250 MSa/s			
Repetition Rate		125 MHz			
Waveform Length		8M points			
Amplitude Resolution		16 bits			
Non-Volatile Memory		Ten 8M waveforms (1)			
User-define Output Section		Any section from 2 to 8M points			
Trigger		External			
Built-in Arbitrary Waveforms		Sine, Square, Ramp, Sinc, Exp Rise, Exp Fall, DC, Pulse, Abstan, Havercosine, Sinever, Abssin, Haversine, Stair_down, Abssinehalf, N_pulse, Stair_UD, Ampalt, Negramp, Stair_up, Attalt, Rectpuls1, Stepresp, Diric_even, Roundhalf, Trapezia, Diric_odd, Sawtoot, Tripuls1, Gauspuls1, Sinetra, Dlorentz, Ln, Sqrt, Since, Lorentz, Xsquare, Gauss, Arccos, Arctan, Sech, Arccot, Arctanh, Sinh, Arccsc, Cosh, Tan, Arcsec, Cot, Tanh, Arcsin, Csc, Arcsinh, Sec, Barthannwin, Chebwin, Kaiser, Bartlett, Flattopwin, Triang, Blackman, Hamming, Tukeywin, Bohmanwin, Hann, Cardiac, EOG, EEG, EMG, PLETH, RESP, ECG1, ECG2, ECG3, ECG4, ECG5, ECG6, ECG7, ECG8, ECG9, ECG10, ECG11, ECG12, ECG13, ECG14, ECG15, LFPULSE, TENS1, TENS2, TENS3, IGNITION, SP, VR, TP1, TP2A, TP2B, TP3A, TP3B, TP4, TP5A, TP5B Note: It is required to update the ARB data first prior to enabling both Medical (Cardiac, EOG, EEG, EMG, PLETH, RESP, ECG1, ECG2, ECG3, ECG4, ECG5, ECG6, ECG7, ECG8, ECG9, ECG10, ECG11, ECG12, ECG13, ECG14, ECG15, LFPULSE, TENS1, TENS2, TENS3) and AutoElec (IGNITION, SP, VR, TP1, TP2A, TP2B, TP3A, TP3B, TP4, TP5A, TP5B) waveforms.			
IQ WAVEFORMS					
Source		Random, Fixed Pattern			
Type		ASK, MSK, FSK, 2FSK, 4FSK, 8FSK, BPSK, QPSK, DQPSK, OQPSK, pi/4 – QPSK, pi/4 – DQPSK, 8PSK, 16APSK, 32APSK, 16QAM, 32QAM, 64QAM			
FREQUENCY CHARACTERISTICS					
Sine / Square		1 µHz to 30 MHz	1 µHz to 30 MHz	1 µHz to 20 MHz	1 µHz to 20 MHz
Pulse		1 µHz to 25 MHz	1 µHz to 25 MHz	1 µHz to 20 MHz	1 µHz to 20 MHz
Triangle / Ramp		1 µHz to 1 MHz			
Resolution		1 µHz			
Accuracy	Stability	± 1 ppm at 0 °C to 50 °C; ± 0.3 ppm at 18 °C to 28 °C			
	Aging	± 1 ppm, per 1 year			
	Tolerance	≦ 1 µHz			
OUTPUT CHARACTERISTICS (2)					
Amplitude	Range	1 mVpp to 10 Vpp (into 50 Ω); 2 mVpp to 20 Vpp (into open-circuit)			
	Accuracy	± 1 % of setting ± 1 mVpp (at 1 kHz / into 50 Ω without DC offset)			
	Resolution	0.1 mV or 4 digits			
	Flatness	0.1 dB, < 10 MHz; 0.2 dB, 10 MHz to 30 MHz (sinewave relative to 1 kHz/into 50 Ω)			
	Units	Vpp, Vrms, dBm			
Offset	Range	± 5 Vpk ac +dc (into 50 Ω); ± 10Vpk ac +dc (into open circuit)			
	Accuracy	1 % of setting + 2 mV+ 0.5 % of amplitude			
Waveform Output	Impedance	50 Ω typical (fixed); > 10 MΩ (output disabled)			
	Protection	Short-circuit protected; Overload relay automatically disables main output			
SYNC Output	Level	TTL-compatible into > 1 kΩ			
	Impedance	50 Ω nominal			
SINE WAVE CHARACTERISTICS					
Harmonic Distortion(5)		-60 dBc, DC to 1 MHz, Ampl < 3 Vpp; -55 dBc, DC to 1 MHz, Ampl > 3 Vpp; -45 dBc, 1 MHz to 5 MHz, Ampl >3 Vpp; -30 dBc, 5 MHz to 30 MHz, Ampl > 3 Vpp			
Total Harmonic Distortion		< 0.2 % + 0.1 mVrms (DC to 20 kHz)			
Spurious (non-harmonic)(5)		-60 dBc , DC to 1 MHz; -50 dBc, 1 MHz to 20 MHz; -50 dBc + 6 dBc/octave, 1 MHz to 30 MHz (AFG-3031/3032 only)			
Phase Noise		< -110 dBc/Hz typical, 15 kHz offset, fc = 10 MHz			
SQUARE WAVE CHARACTERISTICS					
Rise/Fall Time		< 8 ns (3)			
Overshoot		< 5%			
Asymmetry		1 % of period+1 ns			
Variable Duty Cycle		20.0 % to 80.0 %, ≦ 25 MHz; 40.0 % to 60.0 %, 25 MHz to 30MHz		20.0 % to 80.0 % , ≦ 20 MHz	
Jitter		0.01 % + 525ps, < 2 MHz; 0.1 % + 75 ps, > 2 MHz			
RAMP CHARACTERISTICS					
Linearity		< 0.1 % of peak output			
Variable Symmetry		0 % to 100 % (0.1 % resolution)			
PALSE CHARACTERISTICS					
Pulse Width		20 ns to 999,83 ks (Extended mode 0.00 ns to 1,000 ks (6)) Width - 0.625 x [(Rise Time - 0.6 ns) + (Fall Time - 0.6 ns)] ≧ 0; Period ≧ Width + 0.625 x [(Rise Time - 0.6 ns)+(Fall Time - 0.6 ns)]			
Duty setting range		0.017 % to 99.983 % (Extended mode 0.0000 % to 100.0000 %(6))			
Period		40 ns to 1,000,000 s			
Rise Time and Fall Time		9.32 ns to 799.89 ks			
Resolution		0.0001 %			
Overshoot		< 5 %			
Jitter		100 ppm + 50 ps			
NOISE					
Noise Type		Gaussian			
Noise Bandwidth		100 MHz equivalent bandwidth			
HARMONIC					
Harmonic order		≦8			
Harmonic Type		Even, Odd, All, User; Amplitude and Phase can be set for all harmonics			

30/20 MHz Arbitrary Function Generator

SPECIFICATIONS

		AFG-3031	AFG-3032	AFG-3021	AFG-3022
MODULATION					
AM and AM (DSB-SC)	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse, Arb			
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
	Modulating Frequency	2 mHz to 20 kHz			
	Depth	0 % to 120.0%			
	Source	Internal / External			
FM	Carrier Waveforms	Sine, Square, Triangle, Ramp			
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
	Modulating Frequency	2 mHz to 20 kHz			
	Peak Deviation	DC to 30 MHz (1 µHz resolution)		DC to 20 MHz (1 µHz resolution)	
	Source	Internal / External			
PM	Carrier Waveforms	Sine, Triangle, Ramp			
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
	Phase Deviation	0° to 360°, 0.1° resolution			
	Modulating Frequency	2 mHz to 20 kHz			
	Source	Internal			
PWM	Carrier Waveforms	Square			
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
	Modulating Frequency	2 mHz to 20 kHz			
	Deviation	0 % to 100.0% of pulse width, 0.1 % resolution			
	Source	Internal / External			
PSK	Carrier Waveforms	Sine, Square, Triangle, Ramp			
	Modulating Waveforms	50 % duty cycle square			
	Internal Rate	2 mHz to 1 MHz			
	Frequency Range	DC to 30 MHz		DC to 20 MHz	
	Source	Internal / External			
FSK	Carrier Waveforms	Sine, Square, Triangle, Ramp			
	Modulating Waveforms	50 % duty cycle square			
	Internal Rate	2 mHz to 1 MHz			
	Frequency Range	DC to 30 MHz		DC to 20 MHz	
	Source	Internal / External			
ADDITIVE MODULATION (SUM)	Carrier Waveforms	Sine, Triangle, Ramp, Pulse, Noise			
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
	Ratio	0 % to 100 % of carrier amplitude, 0.01 % resolution			
	Modulating Frequency	2 mHz to 20 kHz			
	Source	Internal / External			
SWEEP					
Waveforms		Frequency Sweep: Sine, Square, Triangle, Ramp ; Amplitude Sweep: Sine, Square, Triangle, Ramp, Pulse, Noise, ARB			
Type		Frequency, Amplitude			
Functions		Linear or Logarithmic			
Direction		Up or Down			
Start / Stop FREQ		Any frequency within the waveform's range			
Sweep Time		1 ms to 500 s (1 ms resolution)			
Trigger Mode		Single, External, Internal			
Trigger Source		Internal / External			
BURST					
Waveforms		Sine, Square, Triangle, Ramp, Pulse, Noise			
Frequency		1 µHz to 30 MHz (4)		1 µHz to 20MHz (4)	
Burst Count		1 to 1,000,000 cycles or Infinite			
Start / Stop Phase		-360.0° to +360.0° (0.1° resolution)			
Internal Period		1 µs to 500 s			
Gate Source		External Trigger (pulse waveforms can only be used in gate mode)			
Trigger Source		Single, External or Internal Rate			
Trigger Delay		N-Cycle, Infinite: 0 µs to 100s (1 µs resolution)			
EXTERNAL MODULATION INPUT					
Type		AM, AM (DSB-SC), FM, PWM, SUM			
Voltage Range		± 5V full scale			
Input Impedance		10 kΩ			
Frequency		DC to 20 kHz			
Modulation Output		AFG-3031/3021 only			
Type		AM, FM, PM, PWM, SUM, Sweep			
Amplitude Range		≧ 1 Vpp			
Impedance		> 10 kΩ typical			
EXTERNAL TRIGGER INPUT					
Type		For FSK, Burst, Sweep, N Cycle ARB			
Input Level		TTL Compatibility			
Slope		Rising or Falling (Selectable)			
Pulse Width		> 100 ns			
Input rate		DC to 1 MHz			
Input Impedance		10 kΩ, DC coupled			
Latency	Sweep	< 1 µs (typical)			
	Burst	< 0.55 µs (typical)			
	ARB	< (27.5/sample rate) + 274ns			
Jitter	Sweep	2.5 µs			
	Burst	1 ns; except pulse, 300 ps			

SPECIFICATIONS

	AFG-3031	AFG-3032	AFG-3021	AFG-3022
REFERENCE OUTPUT				
Output voltage	1 Vp-p / 50 Ω square wave			
Output Impedance	50 Ω, AC coupled			
Output Frequency	10 MHz			
REFERENCE INPUT				
Input Voltage	0.5 Vpp to 5 Vpp			
Input Impedance	1 kΩ, unbalanced, AC coupled			
Input Frequency	10 MHz ± 10 Hz			
Waveform	Sine or Square (50 % ± 5 % duty)			
Ground Isolation	42Vpk max.			
EXTERNAL-SYNC				
Phase Delay (max.)	Series Connection: 39 + (N-2) x39 ± 25ns; Parallel connection: (N-1) x 6 ± 25ns; (where N = number of connected units)			
Maximum Number of Connected Units	Series Connection: 4; Parallel Connection: 6			
Applicable Functions	Sine, Square, Triangle, Pulse, Ramp, Harmonic, MOD, Sweep, Burst			
GENERAL SPECIFICATIONS				
Store/Recall	10 Groups of Setting Memories			
Interface	GPIB(Optional), LAN, USB			
Display	4.3-inch TFT LCD, 480 × 3 (RGB) × 272			
Power Source	AC 100 V to AC 240 V, 50 Hz or 60 Hz			
Power Consumption	50 VA	85 VA	50 VA	85 VA
Operating Environment	Temperature to satisfy the specification : 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C Relative Humidity: ≤ 80 %, 0 °C to 40 °C; ≤ 70%, 35 °C to 40 °C Installation category: CAT II; Operating Altitude: 2000 meters			
Pollution Degree	IEC 61010 Degree 2, Indoor Use			
Storage Temperature	-10 °C to 70 °C, Humidity: ≤ 70 %			
Dimensions & Weight	265 (W) x 107 (H) x 374 (D) mm, Approx. 4 kg			

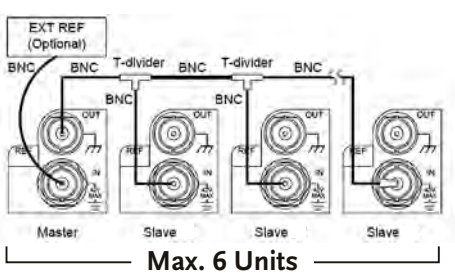
Note: (1). A total of ten waveforms can be stored. (Every waveform can composed of 8 M points maximum.)
(2). Add 1/10th of output amplitude and offset specification per °C for operation outside of 0 °C to 28 °C range (1-year specification).
(3). Edge time decreased at higher frequency.
(4). Sine and square waveforms above 25 MHz are allowed only with an "Infinite" count.
(5). Harmonic distortion and Spurious noise at low amplitudes is limited by a -70 dBm floor.
(6). Loss may occur if the pulse width is beyond the setting range of the normal mode. The pulse may vanish at times.
(7). Rise time and Fall time should be ≥ 0.01% of period.

The specifications apply when the AFG-3000 is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

A. CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINAL, INSTRUMENT CHASSIS, AND DUAL CHANNELS

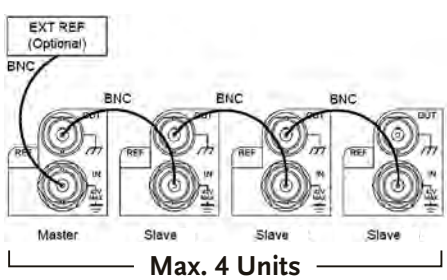
Channel 1, channel 2, reference 10 MHz input, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The output channels of dual channel models are independently isolated. These connectors can sustain maximum isolation voltage up to ±42 Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi units output can be achieved without factoring in grounding reference issue. Applications include ignition controller or transmission devices of automotive electronics. The built-in DC bias voltage of the AFG-3000 Series can be applied on various waveforms. The DC bias voltage is ±5 V under 50 Ω load. For automotive electronic applications require higher DC bias voltage such as ignition controller or transmission devices, the external power supplies can be used to bring up the DC bias voltage to ±42 Vpk (DC+ AC peak value).

B. MULTI CHANNEL SYNCHRONIZED PHASE OPERATION



Method one uses reference frequency output (REF OUT) and reference frequency input (REF IN), 50 ohm BNC cable (RG-58A/U) and T type BNC connector to connect up to 6 units to conduct synchronized phase operation.

Users can implement multi channel synchronized phase operation up to 6 units and 12 channels (AFG-3032/3022). There are two methods to execute synchronized phase applications. Under different frequency, master unit can synchronize each channel and modulate individual phase.



Method two uses reference frequency output (REF OUT) and reference frequency input (REF IN)), 50 ohm BNC cable (RG-58A/U) to connect up to 4 units to conduct synchronized phase operation.

At 10 MHz reference frequency input (REF IN) connector, users can input 10 MHz atomic clock frequency standard via external signal source to enhance precision for frequency output.

80/50 MHz Arbitrary Function Generator

AFG-3081/3051

台灣精品 TAIWAN EXCELLENCE 2012

CE | RS-232 | GPIB | USB | PC Software | LabVIEW Driver

FEATURES

* Wide Frequency Range From 1 μHz to 80/50 MHz
* 1 μHz Frequency Resolution Throughout Full Range
* Standard Waveform : Sine, Square, Triangle, Ramp, Pulse, Noise
* Built-In AM, FM, PWM, FSK, Sweep, Burst Functions
* 16 bit, 200 MSa/s, 1 M-Point Deep Arbitrary Waveform
* DWR (Direct Waveform Reconstruction) Capability
* Arbitrary Waveform Editing PC Software
* 4.3" High Resolution LCD Display
* GPIB, RS-232C, USB Host/Device Standard Interfaces

The AFG-3081/3051 is an Arbitrary Waveform and Digital-Synthesized Function Generator designed for industrial, scientific research and educational applications. The series comes with bandwidth of 80 MHz for AFG-3081 and 50 MHz for AFG-3051. The AFG-3081/3051, featuring 200 MSa/s sample rate, 100 MHz repetition rate by true point-by-point edit, 16-bit vertical resolution and 1 M points waveform length, is a very useful and flexible signal source to meet diversified application needs in the market today.

The user-friendly operation, the On-Screen Help, and the multiple ways of arbitrary waveform editing make AFG-3081/3051 just a plug-and-play equipment. The point by point waveform data entry or standard waveform clip piling through front panel operation, the CSV file waveform data download, the direct waveform reconstruction through DSO waveform data import, and the PC software edited waveform download are the 4 methods available for arbitrary waveform editing.

A 4.3-inch high resolution TFT LCD in the AFG-3081/3051 front panel is used to display waveform and set parameters.

The large and high-resolution screen is especially useful when the arbitrary waveform construction is done through front panel operation. The impedance of AFG-3081/3051 can be selected between 50 Ohm and Hi-Z to ensure right impedance compatibility between AFG and DUT.

AFG-3081/3051

Rear Panel

ORDERING INFORMATION

AFG-3081 80 MHz Arbitrary Function Generator
AFG-3051 50 MHz Arbitrary Function Generator

ACCESSORIES :
Power Cord x 1 , GTL-110 Test Lead x 1

OPTIONAL ASSESSORIES

GTL-232 RS-232C Cable
GTL-246 USB Type A to Type B Cable
GTL-248 GPIB Cable (2.0 m)
GTL-250 GPIB Cable, Double Shielded, 600 mm
GRA-432 Rack Adapter Kit

FREE DOWNLOAD

Arbitrary Waveform Editing Software, LabVIEW Driver

Note:
1. A total of ten waveforms can be stored (Every waveform can composed of 1 M points maximum).
2. Add 1/10th of output amplitude and offset specification per °C for operation outside of 0 °C to 28 °C range (1 year specification).
3. Edge time decreased at higher frequency.
4. Sine and square waveforms above 25 MHz are allowed only with an "Infinite" count.
5. Harmonic distortion and Spurious noise at low amplitudes is limited by a -70 dBm floor.
6. Arb Download Times :

	Binary Code		ASCII Code
Typical	GPIB/RS-232C (115 Kbps)	USB (Device)	USB (Host)
1 M points	189 Sec	34 Sec	70 Sec
512 K points	95 Sec	18Sec	35 Sec
256 K points	49 Sec	9 Sec	18 Sec
64 K points	16 Sec	3 Sec	6 Sec
16 K points	7 Sec	830 mS	1340 mS
8 K points	6 Sec	490 mS	780 mS
4 K points	6 Sec	365 mS	520 mS
2 K points	5 Sec	300 mS	390 mS

SPECIFICATIONS

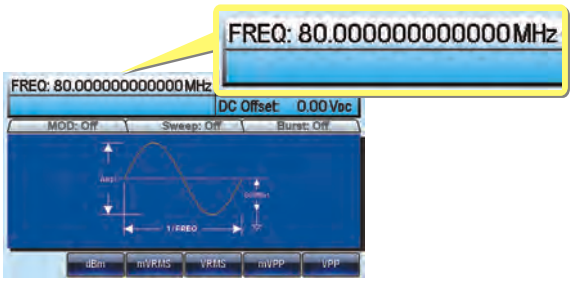
		AFG-3081	AFG-3051
WAVEFORMS			
Standard Waveform		Sine, Square, Ramp, Pulse, Noise, DC, Sin(x)/x, Exponential Rise, Exponential Fall, Negative Ramp	
ARBITRARY WAVEFORMS			
ARB Function		Built in	
Sample Rate		200 MSa/s	
Repetition Rate		100 MHz	
Waveform Length		1M points	
Amplitude Resolution		16 bits	
Non-Volatile Memory		Ten 1M waveforms (1)	
User define Output Section		Any section from 2 to 1M points	
User define Mark Output		Any section from 2 to 1M points	
FREQUENCY CHARACTERISTICS			
Range	Sine, Square	80 MHz	50 MHz
	Triangle, Ramp	1 MHz	
Resolution		1 μHz	
Accuracy	Stability	± 1 ppm 0 to 50 °C	
	Aging	± 1 ppm, per 1 year	
	Tolerance	≦ 1 μHz	
OUTPUT CHARACTERISTICS (2)			
Amplitude	Range	10 mVpp to 10 Vpp (into 50 Ω); 20 mVpp to 20 Vpp (open-circuit)	
	Accuracy	± 1 % of setting ±1 mVpp (at 1 kHz, > 10 mVpp) (into 50 Ω)	
	Resolution	0.1 mV or 4 digits	
	Flatness	± 1 % (0.1 dB), <10 MHz; ± 2 % (0.2 dB), 10 MHz to 50 MHz, ± 10 % (0.9 dB), 50 MHz to 70 MHz, ± 20 % (1.9 dB) 70 MHz to 80 MHz (sinewave relative to 1 kHz)	
	Units	Vpp, Vrms, dBm	
Offset	Range	± 5 Vpk ac +dc (into 50 Ω); ± 10 Vpk ac +dc (Open circuit)	
	Accuracy	1 % of setting + 2 mV + 0.5 % of amplitude	
Waveform Output	Impedance	50 Ω typical (fixed); > 10 MΩ (output disabled)	
	Protection	Short-circuit protected; Overload relay auto-matically disables main output	
SYNC Output	Level	TTL-compatible into > 1 kΩ	
	Impedance	50 Ω nominal	
SINEWAVE CHARACTERISTICS			
Harmonic Distortion (5)		-60 dBc, DC to 1 MHz, Ampl < 3 Vpp; -55 dBc, DC to 1 MHz, Ampl > 3 Vpp; -45 dBc, 1 MHz to 5 MHz, Ampl > 3 Vpp; -30 dBc, 5 MHz to 80 MHz, Ampl > 3 Vpp	
Total Harmonic Distortion		< 0.2 % + 0.1 mVrms, DC to 20 kHz	
Spurious (non-harmonic) (5)		-60 dBc, DC to 1 MHz; -50 dBc, 1 MHz to 20 MHz; -50 dBc + 6 dBc/octave, 1 MHz to 80 MHz	
Phase Noise		< -65 dBc typical @10MHz, 30 kHz band; < -47 dBc typical @80 MHz, 30 kHz band	
SQUARE WAVE CHARACTERISTICS			
Rise/Fall Time		< 8 ns (3)	
Overshoot		< 5%	
Asymmetry		1 % of period + 1 ns	
Variable Duty Cycle		20.0 % to 80.0 %, ≦ 25 MHz; 40.0 % to 60.0 %, 25 MHz to 50 MHz, 50.0%(Fixed), 50 MHz to 80 MHz	
Jitter		0.01 % + 525 ps, < 2 MHz; 0.1 % + 75 ps, > 2 MHz	
RAMP CHARACTERISTICS			
Linearity		< 0.1 % of peak output	
Variable Symmetry		0 % to 100 %	
PULSE CHARACTERISTICS			
Period		20 ns to 2000 s	
Pulse Width		8 ns to 1999.9 s Minimum Pulse Width: 8ns when FREQ ≦ 50 MHz; 5 % of setting period when FREQ ≦ 6.5MHz Resolution: 1ns when FREQ ≦ 50 MHz; 1 % of setting period when FREQ ≦ 6.5 MHz	
Overshoot		< 5 %	
Jitter		100 ppm + 50 ps	
MODULATION			
AM	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse, Arb	
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
	Modulating Frequency	2 mHz to 20 kHz	
	Depth	0 % to 120.0 %	
	Source	Internal / External	
FM	Carrier Waveforms	Sine, Square, Triangle, Ramp	
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
	Modulating Frequency	2 mHz to 20 kHz	
	Peak Deviation	DC to 80 MHz	DC to 50 MHz
	Source	Internal / External	
PWM	Carrier Waveforms	Square	
	Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp	
	Modulating Frequency	2 mHz to 20 kHz	
	Deviation	0 % to 100.0 % of pulse width	
	Source	Internal / External	
FSK	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse	
	Modulating Waveforms	50 % duty cycle square	
	Internal Rate	2 mHz to 100 kHz	
	Frequency Range	DC to 80 MHz	DC to 50 MHz
	Source	Internal / External	

80/50 MHz Arbitrary Function Generator

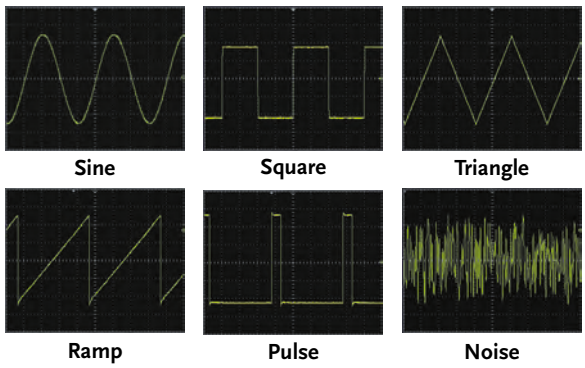
SPECIFICATIONS		
	AFG-3081	**AFG-3051**
SWEEP		
Waveforms	Sine, Square, Triangle, Arb	
Type	Linear or Logarithmic	
Direction	Up or Down	
Start F / Stop FREQ	100 µHz to 80 MHz	100 µHz to 50 MHz
Sweep Time	1 ms to 500 s	
Trigger	Single, External, Internal	
Marker	Falling edge of Mark signal (Programmable frequency)	
Source	Internal / External	
BURST		
Waveforms	Sine, Square, Triangle, Ramp	
Frequency	1 µHz to 80 MHz (4)	1 µHz to 50 MHz (4)
Burst Count	1 to 1000000 cycles or Infinite	
Start / Stop Phase	-360.0° to +360.0°	
Internal Period	1 ms to 500 s	
Gate Source	External Trigger	
Trigger Source	Single, External or Internal Rate	
Trigger Delay	N-Cycle, Infinite: 0 s to 85 s	
EXTERNAL MODULATION INPUT		
Type	for AM, FM, Sweep, PWM	
Voltage Range	± 5V full scale	
Input Impedance	10 kΩ	
Frequency	DC to 20 kHz	
EXTERNAL TRIGGER INPUT		
Type	for FSK, Burst, Sweep	
Input Level	TTL Compatible	
Slope	Rising or falling(selectable)	
Pulse Width	> 100 ns	
Input Impedance	10kΩ, DC coupled	
Latency	Sweep: < 10 µs (typical); Burst: < 100 ns (typical)	
Jitter	Sweep: 2.5 µs; Burst: 1 ns; except pulse, 300 ps	
MODULATION OUTPUT		
Type	for AM, FM, Sweep, PWM	
Amplitude	Range: ≧1 Vpp; Impedance: > 10 kΩ typical (fixed)	
TRIGGER OUTPUT		
Type	for Burst, Sweep	
Level	TTL Compatible into 50 Ω	
Pulse Width	> 450 ns	
Maximum Rate	1 MHz	
Fan-out	≧ 4 TTL load	
Impedance	50 Ω typical	
MARKER OUTPUT		
Type	for ARB, Sweep	
Level	TTL Compatible into 50 Ω	
Fan-out	≧ 4 TTL load	
Impedance	50 Ω typical	
SYSTEM CHARACTERISTICS		
Configuration Times (typical)	Function Change: Standard -> 102 ms, Pulse -> 660 ms, Built-in Arb -> 240 ms	
	Frequency Change: 24 ms; Amplitude Change: 50 ms; Offset Change: 50 ms	
	Select User Arb: < 2s for 1M points; Modulation Change: < 200 ms	
Arb Download Times (typical)	Binary Code: GPIB / RS-232 (115 Kbps), USB (Device)	
	ASCII Code: USB(Host) (6)	
GENERAL CHARACTERISTICS		
Store/Recall	10 Groups of Setting Memories	
Interface	GPIB, RS232, USB	
Display	4.3-inch TFT LCD, 480 × 3 (RGB) × 272	
Power Source	AC 100 V to AC 240 V, 50 Hz or 60 Hz	
Power Consumption	65 VA	
Operating Environment	Temperature to satisfy the specification : 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C	
	Relative Humidity: ≤ 80 %, 0 °C to 40 °C; ≤ 70%, 35 °C to 40 °C	
	Installation category: CAT II; Operating Altitude: 2000 meters	
Pollution Degree	IEC 61010 Degree 2, Indoor Use	
Storage Temperature	-10 °C to 70 °C, Humidity: ≤ 70 %	
Dimensions & Weight	265 (W) x 107 (H) x 374 (D) mm, Approx. 4 kg	

The specifications apply when the AFG-3051/3081 is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

A. WIDE FREQUENCY RANGE FROM 1 μHz to 80/50 MHz



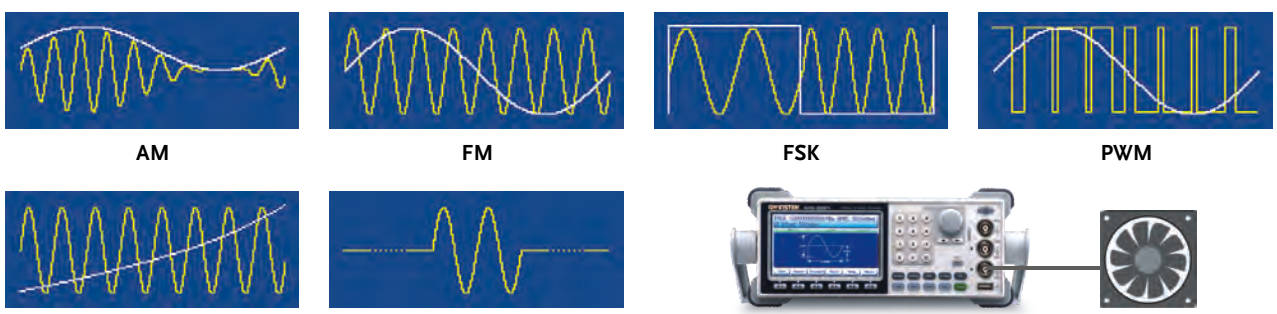
The Minimum 1 μHz Resolution



The AFG-3000 Series arbitrary waveform/ function generator employs direct digital synthesis (DDS) technology to generate and output a variety of stable and precise waveforms. The frequency operates at up to 80 MHz (AFG-3081) or 50 MHz (AFG-3051), with a minimum resolution of 1 μHz for the entire frequency range.

The built-in standard waveforms include sine, square, triangle, ramp, pulse, noise and other types of waveforms.

B. MODULATION, SWEEP and BURST FUNCTIONS



PWM to Control & Test the Motor Speed

The Modulation functions, including AM, FM, FSK and PWM, are provided to cover a broad range of market requirements. A dedicated terminal for the modulating signal output is available in the front panel for modulation onitoring or other control purposes. Either an internal signal or an external signal can be selected to perform the modulation.

FSK is a frequency modulation scheme in which digital information is transmitted through signal frequency variation. The BFSK (binary FSK) modulation, using two frequencies to represent data 1 and 0 respectively, is commonly applied for Call ID and Remote Metering applications.

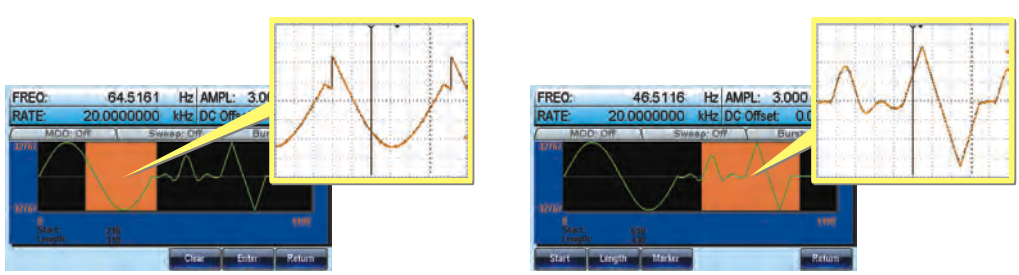
PWM is a digital modulation scheme that can be used to adjust the output power level by controlling the pulse width of the driving signal. The examples include the speed control of motor rotation and the luminance control of LED lighting instrument. With the pulse width

The built-in standard waveforms include sine, square, triangle, ramp, pulse, noise and other types of waveforms.

The Sweep function supports three trigger modes of INT, EXT and manual, and two sweep modes of LOG and LIN. Each time a sweep signal is perceived, the function generator will start to sweep through the user-defined frequency range by the frequency variation of either Log curve or Linear curve.

The Burst function supports two modes of Gate and N Cycle. To run burst function, the burst repetitive rate has to be set first, then the time duration of each burst has to be defined under Gate mode, or the number of the waveform cycles in each burst has to be set under N Cycle mode. Under both Gate mode and N Cycle mode, the burst waveform polarity and phase can be controlled.

C. OUTPUT FROM ANY SECTION OF 1M-POINT-LONG WAVEFORMS



Arbitrary Editing / Output

The AFG-3081/3051 provides 10 sets of memory for user save and recall applications. Each set of memory is able to store a set of front panel setting and a set of 1M-point arbitrary waveform data. With 1M long memory, AFG-3081/3051 can store more complex waveforms consisted of more data.

Furthermore, any section of waveform within this 1 M memory can be edited or output independently. This is a unique feature allowing more flexibility for user to do waveform storage and extraction.

MFG-2000 Series

CE LAN USB PC Software

FEATURES

* **Maximum Five Output Channels**
  - **2 Equivalent Performance Arbitrary Channels Frequency : 1 μHz to 10/20/30/60/200 MHz**
  - **RF Channel Frequency (FG/ARB/MOD) : 160/320 MHz**
  - **Pulse Generator Frequency : 25 MHz**
  - **Power Amplifier : Low Frequency, 5 Hz to 100 kHz, 20 dB/20 W(limited by current setting)**
* **True Point by Point Output Arbitrary Waveform Function: MFG-2220HM Sample Rate: 250 MSa/s, Repetition Rate: 125 MHz; Other models Sample Rate: 200 MSa/s, Repetition Rate: 100 MHz, 14-bit Resolution, 16 k Points Memory Depth**
* **Earth Ground Isolation Design Among I/O Terminals and Instrument Chassis (MFG-2220HM Excluded)**
* **Frequency Counter : 150 MHz, 8-bit Frequency Resolution**
* **AM/FM/PM/ASK/FSK/PSK/SUM/PWM Modulation**
* **Built-in Medical and Automotive Electronic Waveforms**
* **USB Host/USB Device/LAN(MFG-22XX only)**
* **4.3 Inch TFT Color Display**

MFG-2220HM Rear Panel

MFG-2260MRA Rear Panel

The MFG-2000 series is a multi-channel function generator, which has up to 5 simultaneous output channels, including CH1 and CH2 equivalent performance dual channel arbitrary function generator with the maximum 200 MHz for both channels; RF signal generator, a standard AFG, which produces the maximum 320 MHz sine wave and various modulation RF signals; pulse generator, whose frequency reaches 25 MHz; power amplifier, which is ideal for audio range. The above-mentioned five different functionality channels are separately or totally allocated on 11 models, which extend from the basic single-channel AFG with pulse generator models to five-channel models so as to satisfy various educational and industrial applications.

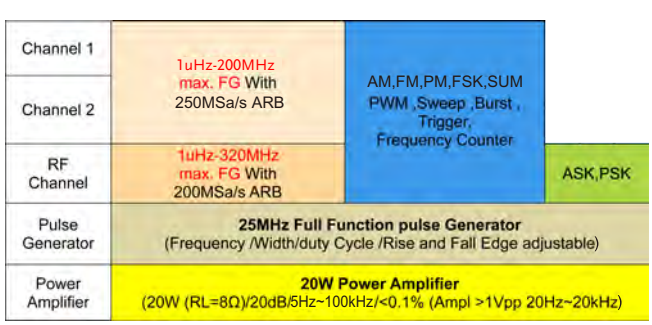
The AFG channel of the MFG-2000 series outputs sine, square, and triangle, etc. The series features true point by point output arbitrary aveform characteristics of 200 MSa/s sample rate, 100 MHz waveform repetition rate, 14-bit resolution, and 16 k points memory depth. The MFG-2220HM offers up to 250 MSa/s sample rate and 125 MHz repetition rate. Some models provide various modulation methods such as AM/FM/PM/FSK/PWM. Sweep, Burst, Trigger, 150 MHz Frequency Counter and 25 MHz pulse generator are also available for some models. Synchronized dual channel models provide correlated functions, including synchronization, delay, sum, and coupling. RF signal generator, a complete AFG signal source (including ARB), features various modulations, Sweep, and digital modulations such as ASK and PSK and its sine wave frequency is up to 320 MHz. A full-function pulse generator with 25 MHz is equipped to all models and its pulse width, rise edge time, fall edge time are adjustable that can be applied as trigger signals. Independent input/output power amplifier with 20 W, 20 dB, 5 Hz to 100 kHz bandwidth, and distortion less than 0.1 % can be applied to the audio application.

The overall design of the MFG-2000 series (MFG-2220HM excluded) is earth ground isolation among output/input terminals and instrument chassis that can only be found in high-level signal sources. The output channels can sustain maximum isolation voltage up to ±42 Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without factoring in grounding reference issue. There is no additional isolation requirement for experiments such as “full-wave rectification” and “voltage doubler” which are easy and safe. An external power supply can bring up the DC bias voltage to ±42 Vpk to meet the requirements of higher DC bias voltage such as automotive and educational applications.

The AFG of the MFG-2000 series collocating with AWES (Arbitrary Waveform Editing Software) allows users to easily and quickly edit arbitrary waveforms. DWR (Direct Waveform Reconstruction) allows users to collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction. 102 built-in waveforms allow users to edit arbitrary waveforms and to output the whole segment or divided segments.

With the multi-functionality channels, the MFG-2000 series provides different industrial sectors with special dual channel waveforms, IQ modulation signals, low-frequency vibration simulation, automotive sensors, medical applications (MFG-2220HM exduled), AM/FM broadcast signals, PWM motor or fan control signals, pulse synchronized signals, pulse noise, audio circuit or devices such as speaker tests. The series is ideal for various fields, including scientific research, education, research and development, production and quality control.

The MFG-2000 series can maximally and simultaneously output five functional channels. The functionalities of each channel are as follows:



* ASK, PSK are standard equipped in MFG-2220HM

SPECIFICATIONS

	CH1 (Function With ARB)	CH2 (Function With ARB)	25MHz Palse Generator	RF Generator (Function With ARB)	Power Amplifier	Modulation/ Sweep / Burst / Frequency Counter
MFG-2110	● 10 MHz		●			
MFG-2120	● 20 MHz		●			
MFG-2120MA	● 20 MHz		●		●	●
MFG-2130M	● 30 MHz		●			●
MFG-2160MF	● 60 MHz		●	● 160 MHz		●
MFG-2160MR	● 60 MHz		●	● 320 MHz		●
MFG-2230M	● 30 MHz	● 30 MHz	●			●
MFG-2260M	● 60 MHz	● 60 MHz	●			●
MFG-2260MFA	● 60 MHz	● 60 MHz	●	● 160 MHz	●	●
MFG-2260MRA	● 60 MHz	● 60 MHz	●	● 320 MHz	●	●
MFG-2220HM	● 200 MHz	● 200 MHz	●			●

CH1/ CH2

Waveform	Standard		Sine, Square, Ramp, Pulse, Noise
Arbitrary Functions	ARB function		Built-in
	Sample Rate		200 MSa/s; MFG-2220HM: 250 MSa/s
	Repetition Rate		100 MHz; MFG-2220HM: 125M Hz
	Waveform Length		16k points
	Amplitude Resolution		14 bits
	Non-Volatile Memory		10 sets 16k points (1)
	User-defined Output Section		From point 2 to 16384
	User-defined Output Marker Section		From point 2 to 16384
Frequency Characteristics	Range	Sine	MFG-2220HM: 200MHz; MFG-2260MRA/2260MFA/2260M/2160MR/2160MF: 60MHz (Max); MFG-2230M/2130M: 30MHz; MFG-2120MA/2120: 20MHz; MFG-2110: 10MHz
		Square	MFG-2220HM: 60MHz; MFG-2260MRA/2260MFA/2260M/2230M/2160MR/2160MF/2130M: 25MHz MFG-2120MA/2120: 20MHz; MFG-2110: 10MHz
		Triangle, Ramp	MFG-2220HM: 5MHz; Other models: 1 MHz
	Resolution		1 μHz
	Accuracy Stability		± 20 ppm
	Aging		± 1 ppm, per 1 year
	Tolerance		≤1 μ Hz
Output Characteristics (2)	Amplitude Range	MFG-2220HM	1mVpp to 10Vpp ≦20MHz; 1mVpp to 5Vpp ≦70MHz; 1mVpp to 2Vpp ≦120MHz; 1mVpp to 1Vpp ≦ 1mVpp to 10 Vpp (into 50 Ω); 2mVpp to 20 Vpp (open-circuit)
		Others Model	
	Accuracy		± 2 % of setting ±1 mVpp (at 1 kHz/into 50 Ω without DC offset)
	Resolution		0.1 mV or 4 digits
	Flatness (sinewave relative to 1 kHz/into 50 Ω)	MFG-2220HM	± 1 % (0.1 dB) ≦ 10 MHz; ± 8 % (0.8 dB) ≦ 160 MHz; ± 2 % (0.2 dB) ≦ 60 MHz; ± 4 % (0.4 dB) ≦100 MHz; ± 10 % (1 dB) ≦ 200 MHz
		Others Model	± 1 % (0.1 dB) ≦ 1 MHz; ± 3 % (0.3 dB) ≦ 50 MHz; ± 16 % (1.5 dB) ≦ 60 MHz
	Units		Vpp, Vrms, dBm
Offset	Range		± 5 Vpk AC + DC (into 50 Ω); ± 10 Vpk AC + DC (Open-circuit)
	Accuracy		± (1 % of setting + 5 mV + 0.5 % of amplitude)
Waveform Output	Impedance		50 Ω typical (fixed); > 10 MΩ (output disabled)
	Protection		Short-circuit protected; Overload relay automatically disables main output
	Ground Isolation		42 Vpk max (MFG-2220HM excluded)
Sync Output	Range		TTL-compatible into > 1 kΩ
	Impedance		50 Ω standard
	Ground Isolation		42 Vpk max (MFG-2220HM excluded)
Sine wave Characteristics (3)	Harmonic Distortion	MFG-2220HM	-60 dBc, < 200 kHz; -55 dBc, 200 kHz to 1 MHz; -45 dBc, 1 MHz to 10 MHz; -35 dBc, 10 MHz to 30 MHz, -30 dBc, 30 MHz to 200 MHz (at 1 Vpp/into 50 Ω without DC offset)
		Others Model	-60 dBc, DC to 200 kHz, Ampl > 0.1 Vpp; -55 dBc, 200 kHz to 1 MHz, Ampl > 0.1 Vpp -45 dBc, 1 MHz to 10 MHz, Ampl ＞ 0.1 Vpp; -30 dBc, 10 MHz to 30 MHz, Ampl > 0.1Vpp -27 dBc, 10 MHz to 30 MHz, Ampl > 0.1Vpp (without DC offset)
	Total harmonic distortion		< 0.1 % (Ampl > 1 Vpp) DC to 100 kHz
Square wave Characteristics	Rise/Fall Time		< 15 ns; MFG-2220HM: < 6 ns
	Overshoot		< 5 %
	Asymmetry		1 % of period + 5 ns
	Variable duty Cycle		0.01 % to 99.99 % (limited by the current frequency setting)
	Jitter		20 ppm + 500 ps (4)
Ramp Characteristics	Linearity		< 0.1 % of peak output
	Variable Symmetry		0 % to 100 %
Pulse Characteristics	Frequency		1 μHz to 25 MHz
	Pulse Width		≧ 20ns; MFG-2220HM ≧ 10 ns (limited by the current frequency setting)
	Variable duty Cycle		0.01 % to 99.99 % (limited by the current frequency setting)
	Overshoot		< 5 %
	Jitter		20 ppm + 500 ps (4)

PULSE GENERATOR

Pulse Generator	Amplitude	1 mVpp to 2.5 Vpp (into 50 Ω); 2 mVpp to 5 Vpp (open-circuit)
	Offset	± 1 Vpk ac + dc (into 50 Ω); ± 2 Vpk ac + dc (Open circuit)
	Frequency	1 μHz to 25 MHz
	Pulse Width	20 ns to 999.9 ks (limited by the current frequency setting)
	Variable duty Cycle	0.01 % to 99.99 % (limited by the current frequency setting)

SPECIFICATIONS			
	Leading and Trailing Edge Time (5)		10 ns to 20 s (1 ns resolution) (limited by the current frequency and pulse width settings)
	Overshoot		< 5 %
	Jitter		100 ppm + 500 ps (4)
RF GENERATOR			
Arbitrary Functions	ARB function		Built-in
	Sample Rate		200 MSa/s
	Repetition Rate		100 MHz
	Waveform Length		16k points
	Amplitude Resolution		14 bits
	User-defined output section		From point 2 to 16384
	Jitter		20 ppm + 5 ns
Frequency Characteristics	Range		Sine: 1 µHz to 160 MHz (DDS) / 1 µHz to 60 MHz (ARB) for MFG-2xxxMF Sine: 1 µHz to 320 MHz (DDS) / 1 µHz to 60 MHz (ARB) for MFG-2xxxMR Square: 25 MHz (Max.); Triangle, Ramp: 1 MHz
	Resolution		1 µHz
	Accuracy Stability		± 20 ppm
	Aging		± 1 ppm, per 1 year
	Tolerance		≤ 1 µHz
Output Characteristics (2)	Amplitude (into 50 Ω)		1 mVpp to 2 Vpp (MFG-2XXXMF); 1 mVpp to 1 Vpp (MFG-2XXXMR)
	Accuracy		± 2 % of setting ± 1 mVpp (at 1 kHz/into 50 Ω without DC offset)
	Resolution		1 mV or 3 digits
	Flatness		± 1 % (0.1 dB) ≦ 1 MHz; ± 3 % (0.3 dB) ≦ 50 MHz; ± 10 % (0.9 dB) ≦ 160 MHz; ± 30 % (3 dB) ≦ 320 MHz
Offset			± 1 Vpk AC + DC (into 50 Ω); ± 2 Vpk AC + DC (Open-circuit)
Waveform Output	Impedance		50 Ω typical (fixed); > 10 MΩ (output disabled)
Sine Wave Characteristics (3)	Harmonic Distortion		-60 dBc, DC to 200 kHz, Ampl > 0.1 Vpp; -55 dBc, 200 kHz to 1 MHz, Ampl > 0.1 Vpp -45 dBc, 1 MHz to 10 MHz, Ampl > 0.1Vpp; -30 dBc, 10 MHz to 320 MHz, Ampl > 0.1 Vpp
	Total Harmonic Distortion		< 0.1 % (Ampl > 1Vpp), DC to 100 kHz
Square Wave Characteristics	Rise/Fall Time		< 15 ns
	Overshoot		< 5 %
	Asymmetry		1 % of period +5 ns
	Variable Duty Cycle		0.01 % to 99.99 % (limited by the current frequency setting)
	Jitter		20 ppm + 500 ps (4)
Ramp Characteristics	Linearity		< 0.1 % of peak output
	Variable Symmetry		0 % to 100 %
Modulation/Sweep	Modulation Type		AM, FM, PM, FSK, PWM (The detail same as CH1 modulation specification)
	Sweep Type		Frequency
	Source		INT/EXT (INT only for AM, FM, PM, PWM)
PSK (MFG-2220HM also provided)	Carrier Waveforms		Sine, Square, Triangle, Ramp, Pulse
	Modulating Waveforms		50 % duty cycle square
	Internal Frequency		2 mHz to 1 MHz
	Phase Range		0° to +360.0°
	Source		Internal / External
ASK (MFG-2220HM also provided)	Carrier Waveforms		Sine, Square, Triangle, Ramp, Pulse
	Modulating Waveforms		50 % duty cycle square
	Internal Frequency		2 mHz to 1 MHz
	Amplitude Range		1 mVpp to 10 Vpp
	Source		Internal / External
POWER AMPLIFIER			
Power Amplifier	Input Impedance		10 kΩ
	Input Voltage		1.25 Vpmax
	Working Mode		Constant Voltage
	Gain		20 dB
	Output Power (RL = 8 Ω)		20 W (Square)
	Output Voltage		12.5 Vpmax
	Output Current		1.6 Amax
	Rise/Fall Time		< 2.5 µs
	Full Power Bandwidth		5 Hz to 100 kHz
	Overshoot		5%
	Total Harmonic Distortion		< 0.1 % (Ampl > 1 Vpp); 20 Hz to 20 kHz
	Ground Isolation		42 Vpk max
ADVANCED FUNCTIONS			
Modulation	AM	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse, Arb
		Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
		Modulating Frequency	2 mHz to 20 kHz; MFG-2220HM: 2 mHz to 50 kHz(Int); DC to 20 kHz; MFG-2220HM: DC to 50 kHz (Ext)
		Depth	0 % to 120.0 %
		Source	Internal / External

SPECIFICATIONS

	FM	Carrier Waveforms	Sine, Square, Triangle, Ramp
		Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
		Modulating Frequency	2 mHz to 20 kHz; MFG-2220HM: 2 mHz to 50 kHz (Int) DC to 20 kHz; MFG-2220HM: DC to 50 kHz (Ext)
		Peak Deviation	DC to max frequency; MFG-2220HM: DC to 0.5 x max frequency
		Source	Internal / External
	PM	Carrier Waveforms	Sine, Square, Triangle, Ramp
		Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
		Modulating Frequency	2 mHz to 20 kHz; MFG-2220HM: 2 mHz to 50 kHz (Int) DC to 20 kHz; MFG-2220HM: DC to 50 kHz (Ext)
		Phase deviation	0° to 360.0°
		Source	Internal / External
	SUM	Carrier Waveforms	Sine, Square, Triangle, Ramp; MFG-2220HM: Sine, Square, Triangle, Pulse ,Ramp ,Noise
		Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
		Modulation Frequency	2 mHz to 20 kHz ;MFG-2220HM: 2 mHz to 50 kHz (Int) DC to 20 kHz; MFG-2220HM: DC to 50 kHz (Ext)
		SUM depth	0 % to 100.0 %
		Source	Internal / External
	PWM	Carrier Waveforms	Square
		Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
		Modulation Frequency	2 mHz to 20 kHz; MFG-2220HM: 2 mHz to 50 kHz (Int) DC to 20 kHz; MFG-2220HM: DC to 50 kHz (Ext)
		Phase deviation	0 % to 100.0 % pulse width
		Source	Internal / External
	FSK	Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse
		Modulating Waveforms	50 % duty cycle square
		Internal Frequency	2 mHz to 1 MHz
		Frequency Range	1 µHz to max frequency
		Source	Internal / External
Sweep	Waveforms		Sine, Square, Triangle, Ramp
	Type		Linear or Logarithmic
	Sweep Direction		Sweep up or sweep down
	Start/Stop Freq.		1 µHz to max frequency
	Sweep Time		1 ms to 500 s
	Source		Internal / External
	Trigger		Single, External, Internal.
	Marker		Marker signal on falling edge (programmable)
	Source		Internal / External
Burst	Waveforms		Sine, Square, Triangle, Ramp
	Frequency		1 µHz to Max Frequency
	Pulse Count		1 to 1000000 Cycles or infinite
	Start/ Stop Phase		-360.0° to +360.0°
	Internal Frequency		1 µs to 500 s
	Gate Source		External Trigger
	Trigger Source		Single, External, Internal.
Trigger Delay	NCycle, Infinite		0 s to 100 s
External Trigger Input	Type		For FSK, Burst, Sweep
	Input Level		TTL Compatibility
	Slope		Rising or Falling(Selectable)
	Pulse Width		> 100 ns
	Input Impedance		10 kΩ, DC coupled
External Modulation Input	Type		For AM, FM, PM, SUM, PWM
	Voltage Range		± 5 V full scale
	Input Impedance		10 kΩ
	Frequency		DC to 20 kHz (MFG-2220HM:DC to 50 kHz)
	Ground Isolation		42 Vpk max (MFG-2220HM excluded)
Trigger Output	Type		For FSK, Burst, Sweep
	Level		TTL Compatible into 50 Ω
	Pulse Width		> 450 ns; MFG-2220HM: > 100 ns
	Maximum Rate		1 MHz
	Fan-out		≥ 4 TTL Load
	Impedance		50 Ω Typical
Reference Input (MFG-2220HM only)	Input Voltage		0.5 Vpp to 5 Vpp
	Output Impedance		1 kΩ, unbalanced, AC coupled
	Input Frequency		26.8436 MHz ± 500 Hz
	Waveform		Since or Square (50 ± 5 % duty)
Reference Output (MFG-2220HM only)	Output Voltage		3.3 Vpp square wave
	Output Impedance		50 Ω, AC coupled
	Output Frequency		26.8436 MHz

Multi-Channel Function Generator

SPECIFICATIONS

Frequency Counter	**Range**	5 Hz to 150 MHz
	Accuracy	Time Base accuracy ± 1 count
	Time Base	± 20 ppm (23 ˚C ± 5 ˚C)
	Resolution	The maximum resolution is: 100 nHz for 1 Hz, 0.1 Hz for 100 MHz.
	Input Impedance	1 kΩ/1 pf
	Sensitivity	35 mVrms to 30 Vms (5 Hz to 150 MHz)
	Ground Isolation	42 Vpk max (MFG-2220HM excluded)
Dual Channel Function (CH1/CH2)	**Phase**	-180° to +180°, Synchronize phase
	Track	CH2 = CH1
	Coupling	Frequency(Ratio or Difference); Amplitude & DC Offset
	Dsolink	V

GENERAL CHARACTERISTICS

Save/Recall	10 Groups of Setting Memories
Interface	LAN (MFG-22XX only), USB
Display	4.3-inch TFT LCD, 480 × 3 (RGB) × 272
Power Source	AC 100 V to AC 240 V, 50 Hz or 60 Hz
	AC 100 V to AC 120 V, AC 220 V to AC 240 V, 50 Hz or 60 Hz; (MFG-2120MA/2260MFA/2260MRA only)
Power Consumption	30 W or 80 W (with power amplifier); MFG-2220HM: 35 W
Operating Environment	Temperature to satisfy the specification: 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C
	Relative Humidity: ≤ 80 %, 0 °C to 40 °C; ≤ 70 %, 35 °C to 40 °C
	Installation category: CAT II; Operating Altitude: 2000 meters
Pollution Degree	IEC 61010 degree 2, Indoor use
Storage Temperature	-10 ˚C to 70 ˚C, Humidity: ≤ 70 %
Dimensions & Weight	266 (W) x 107 (H) x 293 (D) mm & Approx. 2.5 kg (MFG-2220HM 2.8 kg)

Note:
(1). A total of ten waveforms can be stored. (Every waveform can be composed of a maximum of 16k points.)
(2). Add 1/10th of output amplitude and offset specification per °C for operation outside of 0°C to 28 °C range (1-year specification).
(3). DC offset set to zero.
(4). Jitter specification for RF Generator: 20 ppm +5 ns.
(5). Only Pulse channel support.

The specifications apply when the MFG-2000 is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

ORDERING INFORMATION

MFG-2110	10 MHz Single Channel Arbitrary Function Generator with Pulse Generator
MFG-2120	20 MHz Single Channel Arbitrary Function Generator with Pulse Generator
MFG-2120MA	20 MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, Power Amplifier
MFG-2130M	30 MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFG-2160MF	60 MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160 MHz RF Signal Generator
MFG-2160MR	60 MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320 MHz RF Signal Generator
MFG-2230M	30 MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFG-2260M	60 MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFG-2260MFA	60 MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160 MHz RF Signal Generator, Power Amplifier
MFG-2260MRA	60 MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320 MHz RF Signal Generator, Power Amplifier
MFG-2220HM	200 MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation

ACCESSORIES :

GTL-101	BNC-Alligator test lead x 1 (MFG-2110/2120/2120MA/2130M/2160MF/2160MR)
GTL-101	BNC-Alligator test lead x 2 (MFG-2230M/2260M/2260MFA/2260MRA)
GTL-110	BNC cable x 2 (MFG-2220HM)

OPTIONAL ACCESSORIES

GTL-246	USB Type A to Type B cable

FREE DOWNLOAD

Arbitrary Waveform Editing Software, LabVIEW Driver

25 MHz True Dual Channel Arbitrary Function Generator

AFG-2225

CE | USB Host | USB Device | PC Software | LabVIEW Driver

FEATURES

* Wide Frequency Ranges From 1 μHz to 25 MHz (sine wave)
* 1μHz Resolution in Full Range
* Built-in Standard 120 MSa/s, 10 bit, 4 k Points Arbitrary Function for Both Channels
* True Dual-Channel Output, CH2 Provides the Same Characteristics as CH1
* Dual-Channel Supports Couple, Tracking, Phase Operations
* 1 % to 99 % Adjustable Duty Cycle for Square Waveform
* User Friendly for Easy Parameter Setting and Parameters Display
* Multiple Editing Methods to Edit Arbitrary Waveform Easily
* Built-in Standard AM/FM/PM/FSK/SUM/ Sweep/Burst and Frequency Counter
* USB Host/Device Interface for Remote Control and Waveform Editing

AFG-2225 is the first basic level dual-channel arbitrary function generator, which provides superior features in its class. Both channels are equipped with same characteristics to adapt dual-signal applications such as differential signaling or IQ modulation. The outstanding cost-performance value makes the AFG-2225 a practical instrument to accelerate the development process.

The major features for both channels include 10 Vpp output amplitude; 25 MHz frequency bandwidth with 1 μHz resolution; built-in waveforms of Sine, Square, Ramp (Triangle) and Noise. As to the 1 % to 99 % adjustable duty cycle of Square waveform can be used as pulse signal sources. For the arbitrary waveform, user can edit the 66 built-in waveforms or create a whole new one. Moreover, AFG-2225 carries features of AM/FM/PM/FSK/SUM Modulation, Sweep, Burst and Frequency Counter, which can be applied to various communication fields.

In addition to the intuitive and user friendly, the 3.5-inch color LCD displays the comprehensive operation information including the true waveform presented at the output. USB Host and Device interfaces are equipped to link the AFG-2225 with other devices, which provide the flexibility of waveform generation for more practical usages. With link to GW Instek GDS-series Digital Storage Oscilloscopes (DSOs), the waveforms of interest can be captured and reconstructed. User can also use the arbitrary waveform PC software to edit the waveform and then send to AFG-2225 directly, or save the waveform into flash drive and then transfer to AFG-2225.

AFG-2225

Rear Panel

ORDERING INFORMATION

AFG-2225	25 MHz True Dual Channel Arbitrary Function Generator
ACCESSORIES :	
Power Cord x 1, GTL-101 Test Lead x 2	
OPTIONAL ASSESSORIES	
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm
GTL-246	USB Cable, USB 2.0 Type A to Type B, 4 P
FREE DOWNLOAD	
Arbitrary Waveform Editing Software, LabVIEW Driver	

25 MHz True Dual Channel Arbitrary Function Generator

SPECIFICATIONS		
Waveforms		Sine, Square, Ramp, Pulse, Noise, ARB
ARBITRARY FUNCTION (1)		
Sample Rate		120 MSa/s
Repetition Rate		60 MHz
Waveform Length		4k points
Amplitude Resolution		10 bits
Non-Volatile Memory		4k points
FREQUENCY CHARACTERISTICS		
Range	**Sine, Square**	1 μHz to 25 MHz
	Ramp	1 MHz
Resolution		1 μHz
Accuracy	**Stability**	± 20 ppm
	Aging	± 1 ppm, per 1 year
	Tolerance	≤ 1 mHz
OUTPUT CHARACTERISTICS		
Amplitude	**Range**	1 mVpp to 10 Vpp (into 50 Ω); 2mVpp to 20 Vpp (open-circuit) 1 mVpp to 5 Vpp (into 50 Ω) for 20 MHz to 25 MHz; 2mVpp to 10 Vpp (open-circuit) for 20 MHz to 25 MHz
	Accuracy	± 2 % of setting ±1 mVpp (at 1 kHz)
	Resolution	1 mV or 3 digits
	Flatness	± 1 % (0.1 dB) ≤ 100 kHz; ± 3 % (0.3 dB) ≤ 5 MHz; ± 5 % (0.4 dB) ≤ 12 MHz; ± 10 %(0.9 dB) ≤ 25 MHz (sine wave relative to 1 kHz)
	Units	Vpp, Vrms, dBm
Offset	**Range**	± 5 Vpk ac + dc (into 50 Ω); ± 10 Vpk ac + dc (open-circuit) ± 2.5 Vpk ac + dc (into 50 Ω) for 20 MHz to 25 MHz; ± 5 Vpk ac + dc (Open circuit) for 20 MHz to 25 MHz
	Accuracy	2 % of setting + 10 mV+ 0.5 % of amplitude
Waveform Output	**Impedance**	50 Ω typical (fixed); > 10 MΩ (output disabled)
	Protection	Short-circuit protected; Overload relay automatically disables main output
SINE WAVE CHARACTERISTICS		
Harmonic distortion		≤ -55 dBc, DC to 200 kHz, Ampl > 0.1 Vpp; ≤ -50 dBc, 200 kHz to 1 MHz, Ampl > 0.1 Vpp ≤ -35 dBc, 1 MHz to 5 MHz, Ampl > 0.1 Vpp; ≤ -30 dBc, 5 MHz to 25 MHz, Ampl > 0.1 Vpp
SQUARE WAVE CHARACTERISTICS		
Rise/Fall Time		≤ 25 ns at maximum output. (into 50 Ω load)
Overshoot		5 %
Asymmetry		1 % of period +5 ns
Variable Duty Cycle		1.0 % to 99.0 % ≤ 100 kHz; 10 % to 90 % ≤ 1 MHz; 50 % ≤ 25 MHz
RAMP CHARACTERISTICS		
Linearity		< 0.1 % of peak output
Variable Symmetry		0 % to 100 % (0.1 % Resolution)
PULSE CHARACTERISTICS		
Period		40 ns to 2000 s
Pulse Width (2)		20 ns to 1999.9 s
Overshoot		< 5 %
Jitter		20 ppm + 10 ns
MODULATION		
AM	**Carrier Waveforms**	Sine, Square, Ramp, Pulse, Arb
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)
	Depth	0 % to 120.0 %
	Source	Internal / External
FM	**Carrier Waveforms**	Sine, Square, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulating Frequency	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)
	Peak Deviation	DC to Max Frequency
	Source	Internal / External
PM	**Carrier Waveforms**	Sine, Square, Ramp
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)
	Phase deviation	0° to 360°
	Source	Internal / External
FSK	**Carrier Waveforms**	Sine, Square, Ramp, Pulse
	Modulating Waveforms	50 % duty cycle square
	Modulation Rate	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)
	Frequency Range	1 μHz to Max Frequency
	Source	Internal / External
SUM	**Carrier Waveforms**	Sine, Square, Ramp, Pulse, Noise
	Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp
	Modulation Frequency	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)
	SUM Depth	0 % to 100.0 %
	Source	Internal / External
SWEEP		
Waveforms		Sine, Square, Ramp
Type		Linear or Logarithmic
Start/Stop Freq		1 μHz to Max Frequency
Sweep Time		1 ms to 500 s
Source		Internal / External / Manual

SPECIFICATIONS

BURST		
Waveforms		Sine, Square, Ramp
Frequency (4)		1 µHz to 15 MHz
Burst Count		1 to 65535 cycles or Infinite
Start/Stop Phase		-360° to +360°
Internal Period		1 ms to 500 s
Gate Source		External Trigger
Trigger Source		Single, External or Internal Rate
Trigger Delay	**N-Cycle, Infinite**	0 s to 655350 ns
FREQUENCY COUNTER		
Range		5 Hz to 150 MHz
Accuracy		Time Base accuracy±1count
Time Base		± 20 ppm (23 ˚C ± 5 ˚C) after 30 minutes warm up
Resolution		The maximum resolution is: 100 nHz for 1 Hz, 0.1 Hz for 100 MHz.
Input Impedance		1 kΩ / 1 pf
Sensitivity		35 mVrms to 30 Vrms (5 Hz to 150 MHz)
DUAL CHANNEL FUNCTION		
Phase (3)		-180° to 180°, Synchronize phase
Track		CH2 = CH1 (CH2 follows), CH1 = CH2 (CH1 follows)
Coupling		Frequency (Ratio or Difference), Amplitude & DC Offset
DSOlink		√
EXTERNAL TRIGGER INPUT		
Type		For FSK, Burst, Sweep
Input Level		TTL Compatibility
Slope		Rising or Falling (Selectable)
Pulse Width		> 100 ns
Input Impedance		10 kΩ, DC coupled
EXTERNAL MODULATION INPUT		
Type		For AM, FM, PM, SUM
Voltage Range		± 5 V full scale
Input Impedance		10 kΩ
Frequency		DC to 20 kHz
TRIGGER OUTPUT		
Type		For Burst, Sweep, Arb
Level		TTL Compatible into 50 Ω
Pulse Width		> 450 ns
Maximum Rate		1 MHz
Fan-out		≥ 4 TTL Load
Impedance		50 Ω Typical
GENERAL SPECIFICATIONS		
Save/Recall		10 Groups of Setting Memories
Interface		USB (Host & Device)
Display		3.5" TFT LCD
Power Source		AC 100 V to AC 240 V, 50 Hz or 60 Hz
Power Consumption		25 W (Max)
Operating Environment		Temperature to satisfy the specification: 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C Relative Humidity: ≤ 80 %, 0 °C to 40 °C; ≤ 70 %, 35 °C to 40 °C Installation category: CAT II; Operating Altitude: 2000 meters
Storage Temperature		-10 ˚C to 70 ˚C, Humidity: ≤ 70 %
Dimensions & Weight		266(W) x 107(H) x 293(D) mm, Approx. 2.5 kg

Note: (1). Filter bandwidth 20 MHz -3dB.
(2). Pulse amplitude will decrease when pulse width is < 50 ns
(3). Square and Pulse can not be change, Phase is 0°
(4). 1 µHz to 15 MHz (Sine, Square), 1 µHz to 1 MHz (Ramp)

The specifications apply when the AFG-2225 is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

25/12/5 MHz Arbitrary Function Generator

AFG-2105/2112/2125

AFG-2005/2012/2025

CE | USB | PC Software | LabVIEW Driver

FEATURES

* 0.1 Hz to 5/12/25 MHz with in 0.1 Hz Resolution
* Sine, Square, Ramp, Noise and Arbitrary Waveform
* 20 MSa/s Sampling Rate, 10 bit Vertical Resolution and 4 k point Memory for Arbitrary Waveform
* 1 % to 99 % Adjustable Duty Cycle for Square Waveform
* Waveform Parameter Setting Through Numeric Keypad Entry & Knob Selection
* Amplitude, DC Offset and Other Key Setting Information Shown on the 3.5" LCD Screen Simultaneously
* AM/FM/FSK Modulation, Sweep, and Frequency Counter Functions (AFG-2100 only)
* USB Device Interface for Remote Control and Waveform Editing
* PC Arbitrary Waveform Editing Software

The AFG-2100/2000 Series Arbitrary Function Generator is a DDS (Direct Digital Synthesized) based signal generator designed to accommodate the educational and basic industrial requirements for an accurate and affordable signal source covering the output of Sine, Square (Pulse), Ramp (Triangle), Noise and Arbitrary waveforms. The 20 MSa/s sampling rate, 10 bit vertical resolution and 4 k point memory of the AFG-2100/2000 Series provide users with a flexible environment for creating the specific waveform output as needed. The 0.1 Hz resolution of Sine, Square and Triangle waveforms and the 1 % to 99 % adjustable duty cycle of Square (Pulse) waveform are the remarkable features to greatly extend its application range in various fields. The AFG-2100/2000 Series includes 6 models in three frequency bands of 5 MHz, 12 MHz and 25 MHz. Besides the basic features of the whole AFG-2100/2000 Series, AFG-2100 carries additional features of AM/FM/FSK Modulation, Sweep, and Frequency Counter. The friendly human interface of AFG-2100/2000 Series allows users to set waveform parameters, including waveform type, frequency, amplitude, DC offset, modulation type, and duty cycle, through keypad entry and/or the knob selection, and display the set parameters on the 3.5" LCD screen. The AFG-2100/2000 Series is equipped with a USB Device interface for remote control and waveform editing through a PC. A waveform editing software is provided to facilitate the waveform creation on the PC. After the waveform editing is done, the user is able to download the waveform data from PC to the AFG-2100/2000 Series for signal output.

AFG-2125

Rear Panel

SELECTION GUIDE

MODEL	AFG-2005	AFG-2105	AFG-2012	AFG-2112	AFG-2025	AFG-2125
FREQUENCY RANGE	5MHz	5MHz	12MHz	12MHz	25MHz	25MHz
ARBITRARY WAVEFORM	✓	✓	✓	✓	✓	✓
DUTY	✓	✓	✓	✓	✓	✓
TTL	✓	✓	✓	✓	✓	✓
DC OFFSET	✓	✓	✓	✓	✓	✓
USB INTERFACE	✓	✓	✓	✓	✓	✓
LIN/LOG SWEEP		✓		✓		✓
AM/FM/FSK MODULATION		✓		✓		✓
EXT COUNTER		✓		✓		✓

ORDERING INFORMATION

AFG-2005 5MHz Arbitrary Waveform Function Generator
AFG-2105 5MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/FSK Modulation & Ext. Counter
AFG-2012 12MHz Arbitrary Waveform Function Generator
AFG-2112 12MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/FSK Modulation & Ext. Counter
AFG-2025 25MHz Arbitrary Waveform Function Generator
AFG-2125 25MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/FSK Modulation & Ext. Counter

ACCESSORIES:

AFG-2100 Series Power Cord x 1, GTL-101 Test Lead x 2
AFG-2000 Series Power Cord x 1, GTL-101 Test Lead x 1

OPTIONAL ACCESSORIES

GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm
GTL-246 USB Cable, USB 2.0 Type A to Type B, 4P

FREE DOWNLOAD

Arbitrary Waveform Editing Software, LabVIEW Driver

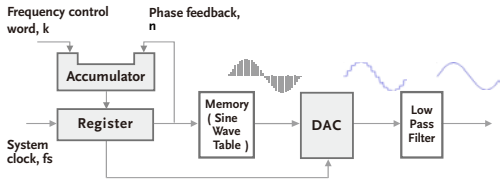
SPECIFICATIONS

		AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025
WAVEFORMS							
Standard Waveform		Sine, Square, Ramp, Noise, Arbitrary Waveform					
ARBITRARY WAVEFORM							
Sample Rate		20 MSa/s					
Repetition Rate		10 MHz					
Waveform Length		4k points					
Amplitude Resolution		10 bit					
Non-Volatile Memory		4k points					
FREQUENCY CHARACTERISTICS							
Range	**Sine, Square**	0.1 Hz to 5 MHz	0.1 Hz to 12 MHz	0.1 Hz to 25 MHz	0.1 Hz to 5 MHz	0.1 Hz to 12 MHz	0.1 Hz to 25 MHz
	Ramp	0.1 Hz to 1 MHz					
Resolution	**Sine, Square, Ramp**	0.1 Hz					
Accuracy	**Stability**	± 20 ppm					
	Aging	± 1 ppm, per 1 year					
	Tolerance	≦ 1 mHz					
OUTPUT CHARACTERISTICS							
Amplitude	**Range**	1 mVpp to 10 Vpp(into 50 Ω), 0.1 Hz to 20 MHz; 2 mVpp to 20 Vpp (open-circuit), 0.1 Hz to 20 MHz 1 mVpp to 5 Vpp(into 50 Ω), 20 MHz to 25 MHz; 2 mVpp to 10 Vpp (open-circuit), 20 MHz to 25 MHz					
	Accuracy	± 2 % of setting ± 1 mVpp (at 1 kHz/into 50 Ω without DC offset)					
	Resolution	1 mV or 3 digits					
	Flatness	± 1 % (0.1 dB), ≦ 100 kHz; ± 3 % (0.3 dB), ≦ 5 MHz; ± 4 % (0.4 dB), ≦ 12 MHz; ± 20 % (2 dB), ≦ 20 MHz; ± 5% (0.4 dB), ≦ 25 MHz (sine wave relative to 1 kHz)					
	Units	Vpp, Vrms, dBm					
Offset	**Range**	± 5 Vpk ac + dc (into 50 Ω); ± 10 Vpk ac + dc (Open circuit) ± 2.5 Vpk ac + dc (into 50 Ω) for 20 MHz to 25 MHz; ± 5 Vpk ac + dc (Open circuit) for 20 MHz to 25 MHz					
	Accuracy	2 % of setting + 5 mV+ 0.5 % of amplitude					
Output	**Impedance**	50 Ω typical (fixed); > 300 kΩ (output disabled)					
	Protection (main output)	Short-circuit protected by overload relay automatically disables output					
SYNC Output	**Level**	TTL-compatible into > 1 kΩ					
	Impedance	50 Ω nominal					
	Rise or Fall Time	≦ 25 ns					
SINE WAVE CHARACTERISTICS							
Harmonic Distortion		-55 dBc, DC to 200 kHz, Ampl > 0.1 Vpp; -50 dBc, 200 kHz to 1 MHz, Ampl > 0.1 Vpp -35 dBc, 1 MHz to 5 MHz, Ampl > 0.1 Vpp; -30 dBc, 5 MHz to 25 MHz, Ampl > 0.1 Vpp					
SQUARE WAVE CHARACTERISTICS							
Rise/Fall Time		≦ 25 ns at maximum output (into 50 Ω load)					
Overshoot		< 5 %					
Asymmetry		1 % of period + 1 ns					
Variable Duty Cycle		1.0 % to 99.0 %, ≦ 100 kHz; 20.0 % to 80.0 %, ≦ 5 MHz; 40.0 % to 60.0 %, ≦ 10 MHz; 50%, ≦ 25 MHz (1% Resolution for full Frequency Range)					
RAMP WAVE CHARACTERISTICS							
Linearity		< 0.1 % of peak output					
Variable Symmetry		0 % to 100 % (0.1 % Resolution)					
MODULATION							
AM	**Carrier Waveforms**	Sine, Square, Triangle			–		
	Modulating Waveforms	Sine, Square, Triangle					
	Modulating Frequency	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)					
	Depth	0 % to 120.0 %					
	Source	Internal / External					
FM	**Carrier Waveforms**	Sine, Square, Triangle					
	Modulating Waveforms	Sine, Square, Triangle					
	Modulating Frequency	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)					
	Deviation	DC to Max Frequency					
	Source	Internal / External					
FSK	**Carrier Waveforms**	Sine, Square, Triangle					
	Modulating Waveforms	50% duty cycle square					
	Modulation Rate	2 mHz to 20 kHz (Int); DC to 20 kHz (Ext)					
	Frequency Range	0.1 Hz to Max Frequency					
	Source	Internal / External					
SWEEP							
Waveforms		Sine, Square, Triangle			–		
Type		Linear or Logarithmic					
Start / Stop Frequency		0.1 Hz to Max Frequency					
Sweep Time		1 ms to 500 s					
Source		Internal / External					
FREQUENCY COUNTER							
Range		5 Hz to 150 MHz			–		
Accuracy		Time Base accuracy ± 1 count					
Time base		± 20 ppm (23 °C ± 5 °C) after 30 minutes warm up					
Resolution		100 nHz for 1 Hz; 0.1 Hz for 100 MHz					
Input Impedance		1 kΩ / 1 pf					
Sensitivity		35 mVrms to 30 Vms (5 Hz to 150 MHz)					
GENERAL SPECIFICATIONS							
Store/Recall		10 Groups of Setting Memories					
Interface		USB(Device)					
Display		LCD					
Power Source		AC 100 V to AC 240 V, 50 Hz or 60 Hz					
Power Consumption		25 VA					
Operating Environment		Temperature to satisfy the specification: 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C Relative Humidity: ≤ 80 %, 0 °C to 40 °C; ≤ 70 %, 35 °C to 40 °C Installation category: CAT II; Operating Altitude: 2000 meters					
Storage Temperature		-10 °C to 70 °C, Humidity: ≤ 70 %					
Dimensions & Weight		266(W) x 107(H) x 293(D) mm, Approx. 2.5 kg					

The specifications apply when the AFG-2000 Series is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

DIRECT DIGITAL SYNTHESIZED (DDS) FUNCTION GENERATOR OVERVIEW

DDS type Function Generator has become the main stream in signal generation. This technique brings the advantages of simplicity, stable frequency and low distortion. The basic principle of how DDS works is as follows.



Block Diagram of DDS

The block diagram of DDS is illustrated in above. A digitized sine wave data is stored in a memory. The data is picked and sent out to a DAC, where step-shape sine wave is formed. A pure sine wave is then generated by a low pass filter.

The sine wave data is picked by accumulating the frequency control word, K. The whole sequence is as follows. At the very beginning, K is loaded into the accumulator. In a resister, an address n in the memory selects the K_{Th} data. Meanwhile the address n is fed back as part of the phase feedback to be added with K. Repeat the above steps, the $2K_{Th}$, $3K_{Th}$, and eventually a wave data is sent to construct a complete sine wave. The time base is the system clock fs. Compared with the conventional function generator (introduced in the later section), there is no toggle between positive and negative current sources, therefore no spike noise occurs on the peak of the generated sine wave.

Besides, the frequency stability follows the time base fs. As a result, the frequency stability is much better than that of a conventional function generator.

The extended product of DDS function generators is the arbitrary waveform generator. In the DDS unit, a sine wave data is stored in the memory. If the waveform data is loaded into the memory as demanded, an arbitrary waveform generator is constructed accordingly.

SFG-1000 SERIES SELECTION GUIDE

MODEL	SFG-1003	SFG-1013
Technology	DDS	DDS
Analog Channel	1	1
Frequency Range	0.1 Hz to 3 MHz	0.1 Hz to 3 MHz
Frequency Resolution	0.1 Hz	0.1 Hz
Sample Rate	-	-
Repetition Rate	-	-
Vertical Resolution	-	-
Memory Length	-	-
Amplitude Range (@50Ω)	10 Vpp	10 Vpp
DC Offset (@50Ω)	± 5 Vpk (AC+DC)	± 5 Vpk (AC+DC)
Attenuator	-40 dB x 1	-40 dB x 1
Amplitude Unit	-	Vpp
Impedance Switch	50 Ω	50 Ω
Square Rise/Fall Time	25 ns	25 ns
Square Duty Cycle	25 % to 75 %	25 % to 75 %
Sine	V	V
Square	V	V
Triangle/Ramp	V	V
Pulse	-	-
Noise	-	-
Burst	-	-
CMOS Output	-	-
TTL Output/Sync Output	-	-
Sweep	-	-
AM/Modulation	-	-
FM	-	-
PM	-	-
FSK	-	-
PWM	-	-
SUM	-	-
GCV Function	-	-
VCF Function	-	-
Counter Function	-	-
Ext. Trigger Input	-	-
Ext. Modulation Input	-	-
Trigger Output	-	-
Modulation Output	-	-
Marker Output	-	-
GPIB	-	-
USB Host	-	-
USB Device	-	-
RS-232C	-	-
Display	6 digits LED	6 digits LED
Voltage Display	-	V
DSO Link	-	-
Internal Storage Memory	-	-
LabView Driver	-	-
Power Source	AC 110 V/120 V/220 V/240 V ± 10 %	AC 110 V/120 V/220 V/240 V ± 10 %
Power Consumption	-	-
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3 MHz DDS Function Generator

SFG-1003/1013 (3 MHz)

CE

For educational institutions, the SFG-1003/1013 series direct digital synthesis (DDS) signal generator is the most affordable option for accurate waveform generation. It supports outputs of up to 3 MHz and includes a voltage display. Using DDS technology embedded in an FPGA chip, the SFG-1003/1013 series generates waveforms with high precision and high stability for customers who need accurate signals.

SFG-1013

FEATURES

* DDS Technology and FPGA Design
* Frequency Range : 0. 1 Hz to 3 MHz
* High Frequency Accuracy : 20 ppm
* High Frequency Stability : 20 ppm
* Max. Frequency Resolution : 100 mHz
* Low Distortion Sine Wave : -55 dBc, 0. 1 Hz to 200 kHz
* Voltage Display (Only SFG-1013)

SELECTION GUIDE

MAIN FUNCTION \ MODEL	SFG-1003	SFG-1013
Frequency	3 MHz	3 MHz
Offset	✓	✓
TTL Output	✓	✓
-40dB Attenuation	✓	✓
Voltage display	—	✓

SPECIFICATIONS

MAIN	
Output Function	Sine, Square, Triangle, TTL
Frequency Range(For Sine, Square)	0.1Hz ~ 3MHz
Frequency Range(For Triangle)	0.1Hz ~ 1MHz
Frequency Resolution	0.1Hz maximum
Frequency Stability	±20ppm
Frequency Accuracy	±20ppm
Aging	±5ppm/year
Amplitude Range	2mVp-p to 10Vp-p (into 50Ω load)
Amplitude Accuracy	±20% at maximum position (only SFG-1013)
Impedance	50Ω±10%
Attenuator	-40dB±1dB×1
DC Offset	< -5V ~ > 5V (into 50Ω load)
Duty Control Range	25% ~ 75% below 1MHz (for square wave only)
Output Control	ON/OFF selector
SINE WAVE	
Harmonics Distortion	Maximum Amplitude attenuation to 1/10 of any panel settings, TTL OFF ≧ -55 dBc, 0.1 Hz to 200 kHz; ≧ -40 dBc, 0.2 MHz to 2 MHz; ≧ -35 dBc, 2 MHz to 3 MHz
Flatness	< ± 0.3 dB, 0.1 Hz to 1 MHz; < ± 0.5 dB, 1 MHz to 2 MHz; < ± 1 dB, 2 MHz to 3 MHz (at maximum amplitude relative to 1 kHz)
SQUARE WAVE	
Symmetry	5 % of period + 4 ns, 0.1 Hz to 100 kHz
Rise or Fall Time	≦ 100 ns at maximum output (into 50 Ω load)
TRIANGLE WAVE	
Linear	≧ 98 %, 0.1 Hz to 100 kHz ; ≧ 95 %, 100 kHz to 1 MHz
TTL OUTPUT	
Level	≧ 3 Vp-p
Fan Out	20 TTL load
Rise or Fall Time	≦ 25 ns
GENERAL	
Display	6-digit LED display
Power Source	AC 100 V to AC 240 V, 50 Hz or 60 Hz
Operating Environment	Temperature to satisfy the specification: 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C Relative Humidity: ≦ 80 %, 0 °C to 40 °C; ≦ 70 %, 35 °C to 40 °C Installation category: CAT II; Operating Altitude: 2000 meters
Storage Temperature	-10 °C to 70 °C, Humidity: ≦ 70 %
Dimensions & Weight	251(W) x 91(H) x 291(D) mm, Approx. 2.1 kg

The specifications apply when the AFG-2000 Series is powered on for at least 30 minutes to warm-up to a temperature of 20 ℃ to 30 ℃, unless specified otherwise.

ORDERING INFORMATION

SFG-1003 3 MHz DDS Function Generator
SFG-1013 3 MHz Dual Display DDS Function Generator

ACCESSORIES :
Power cord x 1, Test lead GTL-101 x 1

OPTIONAL ACCESSORIES

GTL-110 BNC Cable, BNC(P/M) to BNC(P/M), 1000 mm

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
ADP-001	Adaptor, N(M)-BNC(F)	GSG-2000 Series
ADP-002	Adaptor, N(M)-SMA(F)	GSG-2000 Series
ADP-003	Adaptor, 50 Ω, N(J/F) - SMA(J/F)	USG-Series
GRA-432	Rack Mount Kit	AFG-3000 Series
GRA-447	Rack Mount Kit 19", 3U Size	GSG-2000 Series
GTL-101	Test Lead, BNC(P/M) to Alligator Test Lead, 1100 mm	AFG-Series, MFG-2000 Series, SFG-Series
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000 mm	GSG-2000 Series, AFG-Series, MFG-2000 Series, SFG-Series
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000 mm	AFG-3081/3051
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm	GSG-2000 Series, MFG-2000 Series, AFG-Series
GTL-248	GPIB Cable, Double Shielded, 2000 mm	GSG-2000 Series, AFG-3000 Series
GTL-250	GPIB Cable, Double Shielded, 600 mm	GSG-2000 Series, AFG-3000 Series
GTL-253	USB Cable, USB 2.0, A-mini B Type, 1400 mm	USG-Series
GTL-301	RF Cable, N(M)-N(M), 1000 mm	USG-Series, GSG-2000 Series
GTL-303	RF Cable, SMA(M)-SMA(M), 600 mm	USG-Series, GSG-2000 Series

ADP-001

ADP-002

ADP-003

GTL-301

GTL-303

GTL-232

GTL-101

GTL-110

GTL-246

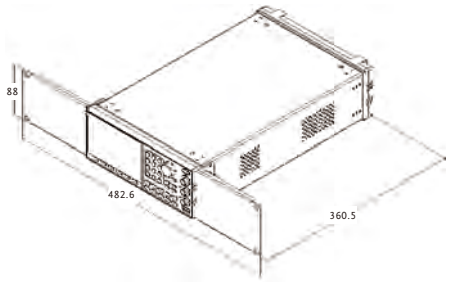
GTL-248

GTL-250

GTL-253

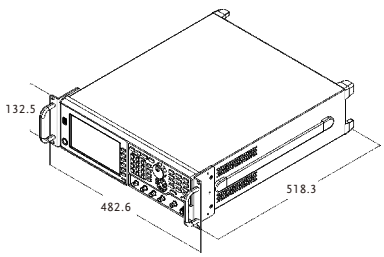
GRA-432 Rack Mount Kit

For : AFG-3000 Series



GRA-447 Rack Mount Kit

For : GSG-2000 Series



DC POWER SUPPLIES

Stemming from the design and manufacture demands of electronic industries, GW Instek offers diverse power supply product lines to meet user's demand for a variety of applications. Based on different needs, the product lines can be divided into several categories including DC Power Supply, AC Power Source, DC Electronic Load and Source Measure Unit.

For DC Power Supply, the products can be briefly categorized by the following types, Technic, Programmable or Non-programmable, Single or Multiple Outputs, High Precision or Affordable Price, Dual Range and Wide Combinations of Voltage and Current, which can be selected to meet the application requirements.

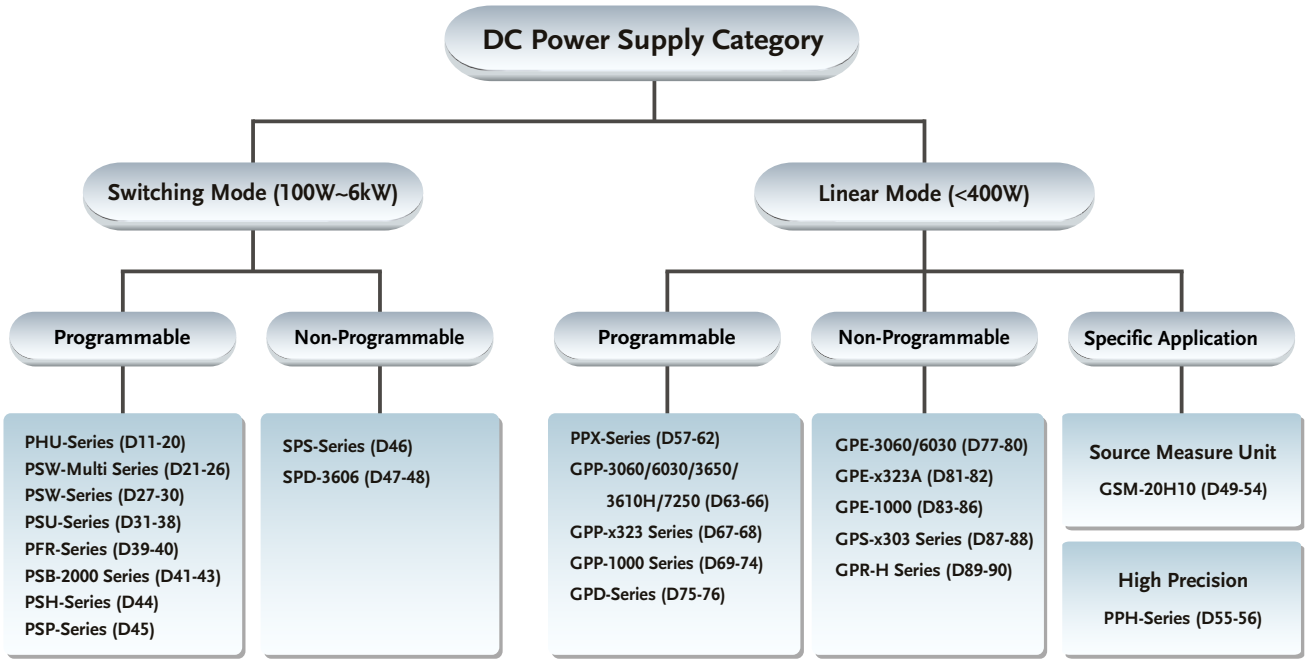
Precision source meter is the latest product offering a four-quadrant power supply, which can accurately utilize voltage or current and measure voltage and/or current at the same time.

GW Instek offers more than 100 power supply products, Which are suitable for the requirements of Electronic Assembly Testing, Education, Component Testing, Wireless Product Testing, Burn-in, Battery-Power Product Testing Automotive, Aerospace industries and so on.

PRODUCTS

- **Multi-Range High Power DC Source**
- **Programmable & Single Channel DC Power Supply**
- **Non-Programmable & Single Channel DC Power Supply**
- **Programmable & Multiple Channel DC Power Supply**
- **Non-Programmable & Multiple Channel DC Power Supply**
- **Source Measure Unit**

GENERAL SELECTION GUIDE OF POWER SUPPLY BY APPLICATION



	Education	R&D/Research Lab	Production Testing	ATE for Production	Burn-In	Page
PHU-Series		V	V	V	V	D11-20
PSW-Multi Series		V	V	V	V	D21-26
PSW-Series		V	V	V	V	D27-30
PSU-Series		V	V	V	V	D31-38
PFR-Series		V		V		D39-40
PSB-2000 Series		V	V	V	V	D41-43
PSH-Series		V	V	V	V	D44
PSP-Series	V	V		V		D45
SPS-Series			V	V	V	D46
SPD-3606	V	V	V		V	D47-48
GSM-20H10	V	V	V	V		D49-54
PPH-Series		V	V		V	D55-56
PPX-Series		V	V		V	D57-62
GPP-3610H/7250/6030/ 3060/3650	V	V	V	V	V	D63-66
GPP-x323 Series	V	V	V	V	V	D67-68
GPP-1000 Series	V	V	V	V	V	D69-74
GPD-Series	V	V	V			D75-76
GPE-3060/6030	V	V	V		V	D77-80
GPE-x323A	V	V	V		V	D81-82
GPE-1000 Series	V	V	V			D83-86
GPS-x303 Series	V	V	V			D87-88
GPR-H Series		V	V		V	D89-90

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY TECHNIC

Technic	Channel	Programmability	Display	Model Series	Page
Switching	1	Programable	TFT-LCD	PHU-Series	D11-20
	1		LED	PSW-Series	D21-26
	1		LED	PSU-Series	D31-38
	1		LED	PFR-Series	D39-40
	1		LED	PSB-2400L/2800L/2400H/2800H/2800LS	D41-43
	1		LCD	PSH-Series	D44
	1		LCD	PSP-Series	D45
	1	Non-Programable	LED	SPS-Series	D46
	2	Programable	LED	PSW-Multi Series	D21-26
	2		LED	PSB-2400L2	D41-43
	3	Non-Programable	LED	SPD-3606	D47-48
Linear	1	Programable	LCD	GSM-20H10	D49-54
	1		LCD	PPH-1503	D55-56
	1		LCD	PPX-Series	D57-62
	1		LCD	GPP-3610H/7250	D63-66
	1		LCD	GPP-1326	D67-68
	1		LCD	GPP-1000 Series	D69-74
	1	Non-Programable	LED	GPE-1326A	D81-82
	1		LCD	GPE-1000 Series	D77-80
	1		LED	GPR-H Series	D89-90
	2	Programable	LCD	PPH-1503D/1506D/1510D	D55-56
	2		LCD	GPP-2323	D67-68
	2		LED	GPD-2303S	D75-76
	2	Non-Programable	LED	GPE-2323A	D81-82
	2		LED	GPS-2303	D87-88
	3	Programable	LCD	GPP-3060/6030/3650	D63-66
	3		LCD	GPP-3323	D67-68
	3		LED	GPD-3303S/3303D	D75-76
	3	Non-Programable	LCD	GPE-3060/6030	D77-80
	3		LED	GPE-3323A	D81-82
	3		LED	GPS-3303	D87-88
	4	Programable	LCD	GPP-4323	D67-68
	4		LED	GPD-4303S	D75-76
	4	Non-Programable	LED	GPE-4323A	D81-82
	4		LED	GPS-4303	D87-88

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY CHANNEL

Channel	Programmability	Technic	Display	Model Series	Page
Single Channel	Programable	Switching	TFT-LCD	PHU-Series	D11-20
			LED	PSW-Series	D27-30
			LED	PSU-Series	D37-38
			LED	PFR-Series	D39-40
			LED	PSB-2400L/2800L/2400H/PSB-2800LS	D41-43
			LCD	PSH-Series	D44
			LCD	PSP-Series	D45
	Non-Programable		LED	SPS-Series	D46
	Programable	Linear	LCD	GSM-20H10	D49-54
			LCD	PPH-1503	D55-56
			LCD	PPX-Series	D57-62
			LCD	GPP-7250/3610H	D63-66
			LCD	GPP-1326	D67-68
			LCD	GPP-1000 Series	D69-74
	Non-Programable		LED	GPE-1326A	D81-82
			LCD	GPE-1000 Series	D83-86
			LED	GPR-H Series	D89-90
Multiple Channel	Programable	Switching	LED	PSW-Multi Series	D21-26
	Programable		LED	PSB-2400L2	D41-43
	Programable	Linear	LCD	PPH-1503D/1506D/1510D	D53-56
	Programable		LCD	GPP-3060/6030/3650	D63-66
	Programable		LCD	GPP-2323/3323/4323	D67-68
	Programable		LED	GPD-Series	D75-76
	Non-Programable	Switching	LED	SPD-3606	D47-48
	Non-Programable	Linear	LCD	GPE-3060/6030	D77-80
	Non-Programable		LED	GPE-2323A/3323A/4323A	D81-82
	Non-Programable		LED	GPS-x303 Series	D87-88

PROGRAMMABLE & SINGLE CHANNEL DC POWER SUPPLY

Voltage (V)	Current (A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
6	200	1200	PSU 6-200	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
8	180	1440	PSU 8-180	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	
9	5	45	PPH-1503	LCD	Linear	USBCDC, LAN, GPIB, External Control	D55-56
10	5	50	PPX-1005	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB, External I/O	D57-62
12.5	120	1500	PSU 12.5-120	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
15	100	1500	PSU 15-100	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	
15	3	45	PPH-1503	LCD	Linear	USBCDC, LAN, GPIB, External Control	D55-56
20	76	1520	PSU 20-76	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
20	18	360	PSH-2018A	LCD	Switching	RS-232, (Opt)GPIB	D44
20	10	200	PSP-2010	LCD	Switching	RS-232	D45
20	1	20	GSM-20H10	LCD	Linear	RS-232, USBTMC, LAN, (Opt)GPIB, Digital I/O	D49-54
20	2	40	PPX-2002	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB, External I/O	D57-62
20	5	100	PPX-2005	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB, External I/O	
20	5	100	GPP-1205	LCD	Linear	USB-TMC/CDC, LAN, (Opt)GPIB, Control I/O	D69-74
30	36	360	PSW 30-36	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D27-30
30	72	720	PSW 30-72	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
30	108	1080	PSW 30-108	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
30	50	1500	PSU 30-50	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
32	6	192	GPP-1326	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	D69-74
32	3	96	GPP-1323	LCD	Linear	USB-TMC/CDC, LAN, (Opt)GPIB, Control I/O	D67-68
36	10	360	PSH-3610A	LCD	Switching	RS-232, (Opt)GPIB	D44
36	20	720	PSH-3620A	LCD	Switching	RS-232, (Opt)GPIB	
36	30	1080	PSH-3630A	LCD	Switching	RS-232, (Opt)GPIB	
36	1	36	PPX-3601	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB, External I/O	D57-62
36	3	108	PPX-3603	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB, External I/O	
36	10	360	GPP-3610H	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	D63-66
40	27	360	PSW 40-27	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D27-30
40	54	720	PSW 40-54	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
40	81	1080	PSW 40-81	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
40	38	1520	PSU 40-38	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt) ISO Analog(Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
40	5	200	PSP-405	LCD	Switching	RS-232	D45
50	30	1500	PSU 50-30	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt) ISO Analog(Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
50	10	100	PFR-100L	LED	Switching	RS-232, RS-485, USBCDC, LAN, (Opt)GPIB	D39-40
60	25	1500	PSU 60-25	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt) ISO Analog(Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
60	3.5	200	PSP-603	LCD	Switching	RS-232	D45
72	5	360	GPP-7250	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	D63-66
80	170	5000	PHU 80-170	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&485, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	D11-20
80	340	10000	PHU 80-340	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&486, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
80	510	15000	PHU 80-510	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&487, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
80	13.5	360	PSW 80-13.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D27-30
80	27	720	PSW 80-27	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
80	40.5	1080	PSW 80-40.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
80	19	1520	PSU 80-19	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt), GPIB, (Opt) ISO Analog(Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
80	40	400	PSB-2400L	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D41-43
80	80	800	PSB-2800L	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	
80	80	800	PSB-2800LS	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	
100	15	1500	PSU 100-15	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt) ISO Analog(Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
100	1	100	PPX-10H01	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB, External I/O	D57-62
150	10	1500	PSU 150-10	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt) ISO Analog(Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
160	7.2	360	PSW 160-7.2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D27-30
160	14.4	720	PSW 160-14.4	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
160	21.6	1080	PSW 160-21.6	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	

DC POWER SUPPLIES

Voltage (V)	Current (A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
200	70	5000	PHU 200-70	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&488, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	D11-20
200	140	10000	PHU 200-140	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&489, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
200	210	15000	PHU 200-210	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&490, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
200	0.1	20	GSM-20H10	LCD	Linear	RS-232, USBTMC, LAN, (Opt)GPIB, Digital I/O	D49-54
250	4.5	360	PSW 250-4.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D27-30
250	9	720	PSW 250-9	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
250	13.5	1080	PSW 250-13.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
250	2	100	PFR-100M	LED	Switching	RS-232, RS-485, USBCDC, LAN, (Opt)GPIB	D39-40
300	5	1500	PSU 300-5	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
400	3.8	1520	PSU 400-3.8	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	
500	30	5000	PHU 500-30	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&491, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	D11-20
500	60	10000	PHU 500-60	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&492, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
500	90	15000	PHU 500-90	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&493, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
600	2.6	1560	PSU 600-2.6	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB, (Opt)ISO Analog (Voltage Control), (Opt)ISO Analog(Current Control)	D31-38
750	20	5000	PHU 750-20	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&494, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	D11-20
750	40	10000	PHU 750-40	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&495, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
750	60	15000	PHU 750-60	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&496, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
800	1.44	360	PSW 800-1.44	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D27-30
800	2.88	720	PSW 800-2.88	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
800	4.32	1080	PSW 800-4.32	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
800	3	400	PSB-2400H	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D41-43
800	6	800	PSB-2800H	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	
1000	15	5000	PHU 1000-15	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&497, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	D11-20
1000	30	10000	PHU 1000-30	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&498, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
1000	45	15000	PHU 1000-45	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&499, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
1500	10	5000	PHU 1500-10	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&500, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
1500	20	10000	PHU 1500-20	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&501, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	
1500	30	15000	PHU 1500-30	LCD	Switching	USB, LAN, Analog Control, Digital I/O, (Opt.)GPIB, (Opt.)RS-232&502, (Opt.)CAN Bus, (Opt.)Device Net, Any Bus, Modbus	

NON-PROGRAMMABLE & SINGLE CHANNEL DC POWER SUPPLY

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Remark	Page
8	30	240	GPR-0830HD	LED	Linear	Rear-Panel Output	D89
12	30	360	SPS-1230	LED	Switching	Rear-Panel Output	D46
18	20	360	SPS-1820	LED	Switching	Rear-Panel Output	D46
18	20	360	GPR-1820HD	LED	Linear	Rear-Panel Output	D89-90
20	5	100	GPE-1205	LCD	Linear		D83-86
24	15	360	SPS-2415	LED	Switching	Rear-Panel Output	D46
32	6	192	GPE-1326A	LED	Linear		D83-86
32	3	96	GPE-1323	LCD	Linear		D87-88
35	10	350	GPR-3510HD	LED	Linear	Rear-Panel Output	D89-90
36	10	360	SPS-3610	LED	Switching	Rear-Panel Output	D46
60	6	360	SPS-606	LED	Switching	Rear-Panel Output	D46
60	6	360	GPR-6060D	LED	Linear	Rear-Panel Output	D89-90
75	5	375	GPR-7550D	LED	Linear	Rear-Panel Output	D89-90
110	3	330	GPR-11H30D	LED	Linear	Rear-Panel Output	D89-90
300	1	300	GPR-30H10D	LED	Linear	Rear-Panel Output	D89-90

PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Voltage (V)		Current (A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Interface	Page
CH1	30	36	360	720	PSW-720L11	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	D21-26
CH2	30	36	360							
CH1	30	36	360	720	PSW-720L12	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	40	27	360							
CH1	30	36	360	720	PSW-720L14	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	80	13.5	360							
CH1	30	36	360	720	PSW-720L15	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	160	7.2	360							
CH1	30	36	360	1080	PSW-1080L111	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	30	36	360							
CH3	30	36	360							
CH1	30	36	360	1080	PSW-1080L112	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	30	36	360							
CH3	40	27	360							
CH1	30	36	360	1080	PSW-1080L114	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	30	36	360							
CH3	80	13.5	360							
CH1	30	36	360	1080	PSW-1080L115	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	30	36	360							
CH3	160	7.2	360							
CH1	30	36	360	1080	PSW-1080L122	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	40	27	360							
CH3	40	27	360							
CH1	30	36	360	1080	PSW-1080L124	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	40	27	360							
CH3	80	13.5	360							
CH1	30	36	360	1080	PSW-1080L125	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	40	27	360							
CH3	160	7.2	360							
CH1	30	36	360	1080	PSW-1080L144	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	80	13.5	360							
CH3	80	13.5	360							
CH1	30	36	360	1080	PSW-1080L145	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	80	13.5	360							
CH3	160	7.2	360							
CH1	30	36	360	1080	PSW-1080L155	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	160	7.2	360							
CH3	160	7.2	360							
CH1	40	27	360	720	PSW-720L22	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	40	27	360							
CH1	40	27	360	720	PSW-720L24	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	80	13.5	360							
CH1	40	27	360	720	PSW-720L25	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	160	7.2	360							
CH1	40	27	360	1080	PSW-1080L222	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	40	27	360							
CH3	40	27	360							
CH1	40	27	360	1080	PSW-1080L224	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	40	27	360							
CH3	80	13.5	360							

PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Voltage (V)		Current (A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Interface	Page
CH1	40	27	360	1080	PSW-1080L225	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	D21-26
CH2	40	27	360							
CH3	160	7.2	360							
CH1	40	27	360	1080	PSW-1080L244	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	80	13.5	360							
CH3	80	13.5	360							
CH1	40	27	360	1080	PSW-1080L245	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	80	13.5	360							
CH3	160	7.2	360							
CH1	40	27	360	1080	PSW-1080L255	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	160	7.2	360							
CH3	160	7.2	360							
CH1	80	40	400	800	PSB-2400L2	2	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D41-43
CH2	80	40	400							
CH1	80	13.5	360	720	PSW-720L44	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	D21-26
CH2	80	13.5	360							
CH1	80	13.5	360	720	PSW-720L45	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	160	7.2	360							
CH1	80	13.5	360	1080	PSW-1080L444	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	80	13.5	360							
CH3	80	13.5	360							
CH1	80	13.5	360	1080	PSW-1080L445	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	80	13.5	360							
CH3	160	7.2	360							
CH1	80	13.5	360	1080	PSW-1080L455	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	160	7.2	360							
CH3	160	7.2	360							
CH1	160	7.2	360	720	PSW-720L55	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	160	7.2	360							
CH1	160	7.2	360	1080	PSW-1080L555	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	160	7.2	360							
CH3	160	7.2	360							
CH1	250	4.5	360	720	PSW-720H66	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	250	4.5	360							
CH1	250	4.5	360	720	PSW-720H68	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	800	1.44	360							
CH1	250	4.5	360	1080	PSW-1080H666	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	250	4.5	360							
CH3	250	4.5	360							
CH1	250	4.5	360	1080	PSW-1080H668	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	250	4.5	360							
CH3	800	1.44	360							
CH1	250	4.5	360	1080	PSW-1080H688	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	800	1.44	360							
CH3	800	1.44	360							
CH1	800	1.44	360	720	PSW-720H88	2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB , (Opt)RS232	
CH2	800	1.44	360							
CH1	800	1.44	360	1080	PSW-1080H888	3	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, (Opt)RS232	
CH2	800	1.44	360							
CH3	800	1.44	360							

PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Voltage (V)		Current (A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Interface	Page
CH1	9	5	45	63	PPH-1503D	2	LCD	Linear	USBTMC, LAN, GPIB, External Control	D55-56
CH1	15	3	45							
CH2	12	1.5	18							
CH1	9	5	45	81	PPH-1506D	2	LCD	Linear	USBTMC, LAN, GPIB, External Control	
CH1	15	3	45							
CH2	12	3	36							
CH1	4.5	10	45	81	PPH-1510D	2	LCD	Linear	USBTMC, LAN, GPIB, External Control	
CH1	9	5	45							
CH1	15	3	45							
CH2	12	3	36							
CH1	30	3	90	180	GPD-2303S	2	LED	Linear	USBCDC	D75-76
CH2	30	3	90							
CH1	30	3	90	195	GPD-3303S	3	LED	Linear	USBCDC	
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15							
CH1	30	3	90	195	GPD-3303D	3	LED	Linear	USBCDC	
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15							
CH1	30	3	90	195	GPD-4303S	4	LED	Linear	USBCDC	
CH2	30	3	90							
CH3	5	3	15							
CH4	5	1	5							
CH1	30	6	180	385	GPP-3060	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	D63-66
CH2	30	6	180							
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	32	3	96	192	GPP-2323	2	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	D67-68
CH2	32	3	96							
CH1	32	3	96	217	GPP-3323	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	
CH2	32	3	96							
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	32	3	96	212	GPP-4323	4	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	
CH2	32	3	96							
CH3	5	1	5							
CH4	15	1	15							
CH1	36	5	180	385	GPP-3650	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	D63-66
CH2	36	5	180							
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	60	3	180	385	GPP-6030	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, (Opt)GPIB, Control I/O	
CH2	60	3	180							
CH3	1.8/2.5/3.3/5.0	5	25							

NON-PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

Voltage(V)		Current(A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Page
CH1	30	6	180	375	SPD-3606	3	LED	Switching	D47-48
	60	3	180						
CH2	30	6	180						
	60	3	180						
CH3	5	3	15						
CH1	30	6	180	385	GPE-3060	3	LCD	Linear	D77-80
CH2	30	6	180						
CH3	5	5	25						
CH1	60	3	180	385	GPE-6030	3	LCD	Linear	
CH2	60	3	180						
CH3	5	5	25						
CH1	32	3	96	192	GPE-2323A	2	LED	Linear	D81-83
CH2	32	3	96						
CH1	32	3	96	217	GPE-3323A	3	LED	Linear	
CH2	32	3	96						
CH3	5	5	25						
CH1	32	3	96	212	GPE-4323A	4	LED	Linear	
CH2	32	3	96						
CH3	5	1	5						
CH4	15	1	15						
CH1	30	3	90	180	GPS-2303	2	LED	Linear	D87-88
CH2	30	3	90						
CH1	30	3	90	195	GPS-3303	3	LED	Linear	
CH2	30	3	90						
CH3	5	3	15						
CH1	30	3	90	200	GPS-4303	4	LED	Linear	
CH2	30	3	90						
CH3	2.2 ~ 5.2	1	5.2						
CH4	8 ~ 15	1	15						

Multi-Range High Power DC Source

PHU-Series

NEW

CE | USB | GPIB | Analog Control | LAN | Digital I/O | RS-232C | RS-485 | CAN | Ether CAT | Profinet | Modbus | Devicenet

The PHU Series is a single channel programmable DC power supply with multi-range output feature which offers a wide range of voltage and current combinations for greater flexibility. The circuit design adopts SiC (silicon carbide) components to achieve high power density characteristics which can generate 15 kW high output and keep the compact size at just 3 U height.

PHU's wide voltage and current range, along with its high-power characteristics, can cover a broader range of testing applications such as photovoltaic systems, electric vehicles (EVs), and automotive electronics, etc. The launch of PHU high-power DC power supplies enhances the completeness of the DC power supply product line of GW Instek, and to provide customers with more comprehensive and integrated solutions.

The AWS (Advanced Web Server) function allows the user to operate devices directly through a web browser, without needing to install any complicated software or drivers. This functionality allows users to complete tasks more efficiently, saving time and increasing productivity.

The unique APC (Adaptive Parallel Connection) feature offers adaptability in parallel connection, allowing users to make the best choice according to their needs. For instance, users can opt for a 15 kW model and a 10 kW model, to combine both to reach a 25 kW capacity within their budget constraints. Up to 10 PHU units can be connected to reach 150 kW without the need for additional power distribution for control.

For industry interface, PHU provides a variety of embedded industrial interface options to meet user needs, eliminating the need for users to prepare additional interfaces. The available ports including EtherCAT, CANopen, Modbus, Profinet and DeviceNet, etc. Except the standard built-in programmable sequence function, PHU also offers a variety optional functions including Datalogger, MPPT (Maximum Power Point Tracking), Solar Array Simulator, AH/WH Meter and Battery Simulation to meet customer's requirements.

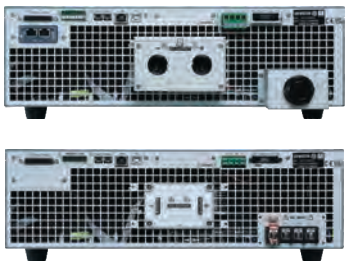
There are a total of 18 models, consisting of 3 power capacities (5 kW/10 kW/15 kW) and 6 voltages (80 V/200 V/500 V/750 V/
1000 V/1500 V) to meet all customer needs.

FEATURES

* Voltage Output : 80 V/200 V/500 V/750 V/ 1000 V/1500 V
* Power Output : 5 kW/10 kW/15 kW
* Maximum Current Output : 510 A
* C.V/C.C Priority Mode
* Adjustable Voltage/Current Rise and Fall Time
* AWS (Advanced Web Control)
* APC (Adaptive Parallel Connection)
* Parallel Connection (Maximum 10 Units)
* High Efficiency and High-power Density
* Bleeder Control Function
* Internal Resistance Function
* Panel Lock Function
* Three Sets of Preset Function
* Protection : OVP, OCP, OHP, UVL, AC Fail, FAN Fail
* Standard : USB, LAN, Isolated Analog Control
* Option: RS-232&485 or GPIB or CAN Bus or DeviceNet or Any Bus
* 3 U Height and 19" Rack Mount Size

Medium Voltage				High Voltage				High Current			
Model	V	A	W	Model	V	A	W	Model	V	A	W
PHU 500-30	500	30	5 kW	PHU 1000-15	1000	15	5 kW	PHU 80-170	80	170	5 kW
PHU 500-60	500	60	10 kW	PHU 1000-30	1000	30	10 kW	PHU 80-340	80	340	10 kW
PHU 500-90	500	90	15 kW	PHU 1000-45	1000	45	15 kW	PHU 80-510	80	510	15 kW
PHU 750-20	750	20	5 kW	PHU 1500-10	1500	10	5 kW	PHU 200-70	200	70	5 kW
PHU 750-40	750	40	10 kW	PHU 1500-20	1500	20	10 kW	PHU 200-140	200	140	10 kW
PHU 750-60	750	60	15 kW	PHU 1500-30	1500	30	15 kW	PHU 200-210	200	210	15 kW

Rear Panel



GRA-4XX Rack Mount Kit

For : PHU-Series

PHU-Series

ORDERING INFORMATION

5 kW	
PHU 80-170	80 V, 170 A, 5000 W Programmable DC Power Supply PHU 80-170-C (Input Voltage 3P3W 200 V) PHU 80-170-D (Input Voltage 3P4W 380 V)
PHU 200-70	200 V, 70 A, 5000 W Programmable DC Power Supply PHU 200-70-C (Input Voltage 3P3W 200 V) PHU 200-70-D (Input Voltage 3P4W 380 V)
PHU 500-30	500 V, 30 A, 5000 W Programmable DC Power Supply PHU 500-30-C (Input Voltage 3P3W 200 V) PHU 500-30-D (Input Voltage 3P4W 380 V)
PHU 750-20	750 V, 20 A, 5000 W Programmable DC Power Supply PHU 750-20-C (Input Voltage 3P3W 200 V) PHU 750-20-D (Input Voltage 3P4W 380 V)
PHU 1000-15	1000 V, 15 A, 5000 W Programmable DC Power Supply PHU 1000-15-C (Input Voltage 3P3W 200 V) PHU 1000-15-D (Input Voltage 3P4W 380 V)
PHU 1500-10	1500 V, 10 A, 5000 W Programmable DC Power Supply PHU 1500-10-C (Input Voltage 3P3W 200 V) PHU 1500-10-D (Input Voltage 3P4W 380 V)

10 kW	
PHU 80-340	80 V, 340 A, 10,000 W Programmable DC Power Supply PHU 80-340-C (Input Voltage 3P3W 200 V) PHU 80-340-D (Input Voltage 3P4W 380 V)
PHU 200-140	200 V, 140 A, 10,000 W Programmable DC Power Supply PHU 200-140-C (Input Voltage 3P3W 200 V) PHU 200-140-D (Input Voltage 3P4W 380 V)
PHU 500-60	500 V, 60 A, 10,000 W Programmable DC Power Supply PHU 500-60-C (Input Voltage 3P3W 200 V) PHU 500-60-D (Input Voltage 3P4W 380 V)
PHU 750-40	750 V, 40 A, 10,000 W Programmable DC Power Supply PHU 750-40-C (Input Voltage 3P3W 200 V) PHU 750-40-D (Input Voltage 3P4W 380 V)
PHU 1000-30	1000 V, 30 A, 10,000 W Programmable DC Power Supply PHU 1000-30-C (Input Voltage 3P3W 200 V) PHU 1000-30-D (Input Voltage 3P4W 380 V)
PHU 1500-20	1500 V, 20 A, 10,000 W Programmable DC Power Supply PHU 1500-20-C (Input Voltage 3P3W 200 V) PHU 1500-20-D (Input Voltage 3P4W 380 V)

15 kW	
PHU 80-510	80 V, 510 A, 15,000 W Programmable DC Power Supply PHU 80-510-C (Input Voltage 3P3W 200 V) PHU 80-510-D (Input Voltage 3P4W 380 V)
PHU 200-210	200 V, 210 A, 15,000 W Programmable DC Power Supply PHU 200-210-C (Input Voltage 3P3W 200 V) PHU 200-210-D (Input Voltage 3P4W 380 V)
PHU 500-90	500 V, 90 A, 15,000 W Programmable DC Power Supply PHU 500-90-C (Input Voltage 3P3W 200 V) PHU 500-90-D (Input Voltage 3P4W 380 V)
PHU 750-60	750 V, 60 A, 15,000 W Programmable DC Power Supply PHU 750-60-C (Input Voltage 3P3W 200 V) PHU 750-60-D (Input Voltage 3P4W 380 V)
PHU 1000-45	1000 V, 45 A, 15,000 W Programmable DC Power Supply PHU 1000-45-C (Input Voltage 3P3W 200 V) PHU 1000-45-D (Input Voltage 3P4W 380 V)
PHU 1500-30	1500 V, 30 A, 15,000 W Programmable DC Power Supply PHU 1500-30-C (Input Voltage 3P3W 200 V) PHU 1500-30-D (Input Voltage 3P4W 380 V)

ACCESSORIES

AC Input terminal cover x 1, DC Output terminal cover x 1, Handle x 2, Sensing connector x 1, sensing connector cover x 1, Digital I/O control connector x 1, Parallel control dummy connector x 1, DC Output terminal screws x 2, Safety Guide

OPTIONAL

PHU-IF01 GPIB interface
PHU-IF02 RS-232&RS-485 interface card (RJ45)
PHU-IF03 Isolated Digital interface card
PHU-IF04 CANbus interface card
PHU-IF05 DeviceNet interface card
PHU-IF06 Anybus Riser card

OPTIONAL ACCESSORIES

PHU-PC01 Parallel operation cable kit for 2 units x 1
PHU-PC02 Parallel operation cable kit for 3 units x 1
PHU-PC03 Parallel operation cable kit for 4 units x 1
PHU-PC04 Parallel operation cable kit for 5 units x 1
PHU-PC05 Parallel operation cable kit for 6 units x 1
PHU-PC06 Parallel operation cable kit for 7 units x 1
PHU-PC07 Parallel operation cable kit for 8 units x 1
PHU-PC08 Parallel operation cable kit for 9 units x 1
PHU-PC09 Parallel operation cable kit for 10 units x 1
GPW-021 Input power cord, 10 AWG/4C, 3 m, UL/CSA (PHU-C-5kW, PHU-D-5kW, PHU-D-10kW, PHU-D-15kW)
GPW-022 Input power cord, 6 AWG/4C, 3 m, UL/CSA (PHU-C-10kW, PHU-C-15kW)

GTL-133 Load cable, 1.5 m, 100 A
GTL-218 Load cable, 1.5 m, 200 A
GTL-219 Load cable, 3 m, 200 A
GTL-220 Load cable, 1.5 m, 300 A
GTL-221 Load cable, 3 m, 300 A
GTL-222 Load cable, 1.5 m, 400 A
GTL-223 Load cable, 3 m, 400 A

PHU-PC01

PHU-PC02

PHU-PC03

PHU-PC04

PHU-PC05

PHU-PC06

PHU-PC07

PHU-PC08

PHU-PC09

Multi-Range High Power DC Source

SPECIFICATIONS(PHU-5 kW Series)								
Model		PHU	80-170	200-70	500-30	750-20	1000-15	1500-10
Rated output voltage (*1)		V	80	200	500	750	1000	1500
Rated output current (*2)		A	170	70	30	20	15	10
Rated output power		W	5000	5000	5000	5000	5000	5000
Output power ratio		—	2.72	2.8	3	3	3	3
Constant Voltage Mode								
Line regulation (*3) [0.01 % of Vo_rated]		mV	8	20	50	75	100	150
Load regulation (*4) [0.02 % of Vo_rated]		mV	16	40	100	150	200	300
Ripple and noise (*5)	p-p (*6)	mV	200	300	350	800	1600	2400
	r.m.s. (*7)	mV	16	40	70	200	350	400
Temperature coefficient		ppm/℃	100 ppm/℃ from rated output voltage, following 30 minutes warm-up					
Remote snese compensation voltage	5 % of Vo_rated	V	4	10	25	37.5	50	75
Rise time (*8)	Rated load	ms	30	30	30	30	30	30
	No load	ms	30	30	30	30	30	30
Fall time (*9)	Rated load	ms	80	80	80	80	80	80
	No load	ms	1000	1000	1000	1200	1000	1200
Transient response time (*10)		ms	1.5	1.5	1.5	1.5	1.5	1.5
Constant Current Mode								
Line regulation (*3) [0.05 % of Io_rated]		mA	85	35	15	10	7.5	5
Load regulation (*11) [0.1 % of Io_rated]		mA	170	70	30	20	15	10
Ripple and noise (*12)	r.m.s.(*7)	mA	170	50	16	16	8	8
Temperature coefficient		ppm/℃	100 ppm/℃ from rated output current, following 30 minutes warm-up					
Protection Function								
Over voltage protection (OVP)	Setting range	V	5.00 V to 88.00 V	5.00 V to 220.00 V	5.00 V to 550.00 V	5.0 V to 825.0 V	5.0 V to 1100.0 V	5.0 V to 1650.0 V
	Setting accuracy	mV	80	200	500	750	1000	1500
Over current protection (OCP)	Setting range	A	5.00 A to 187.00 A	5.00 A to 77.00 A	3.000 A to 33.000 A	2.000 A to 22.000 A	1.500 A to 16.500 A	1.000 A to 11.000 A
	Setting accuracy	mA	340	140	60	40	30	20
Over power protection (OPP)	Setting range	W	100 W to 5500 W	100 W to 5500 W	100 W to 5500 W	100 W to 5500 W	100 W to 5500 W	100 W to 5500 W
	Setting accuracy	W	50	50	50	50	50	50
Over voltage limit (OVL)	Setting range	V	0.00 V to 84.00 V	0.00 V to 210.00 V	0.00 V to 525.00 V	0.0 V to 787.5 V	0.0 V to 1050.0 V	0.0 V to 1575.0 V
Under voltage limit (UVL)	Setting range	V	0.00 V to 84.00 V	0.00 V to 210.00 V	0.00 V to 525.00 V	0.0 V to 787.5 V	0.0 V to 1050.0 V	0.0 V to 1575.0 V
Over current limit (OCL)	Setting range	A	0.00 A to 178.50 A	0.00 A to 73.50 A	0.000 A to 31.500 A	0.000 A to 21.000 A	0.000 A to 15.750 A	0.000 A to 10.500 A
Under cuttent limit (UCL)	Setting range	A	0.00 A to 178.50 A	0.00 A to 73.50 A	0.000 A to 31.500 A	0.000 A to 21.000 A	0.000 A to 15.750 A	0.000 A to 10.500 A
Power unit fail (PUF)	Operation		Turn the output off					
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off					
Low AC input protection (AC-FAIL)	Operation		Turn the output off					
Shutdown (SD)	Operation		Turn the output off					
Power limit (POWER LIMIT)	Operation		Over power limit					
	Value (fixed)		Approx. 102 % of rated output power					
Other Functions								
Voltage Slew Rate	Setting range	V/s	0.01 to 160.00	0.01 to 400.00	0.1 to 1000.0	0.1 to 1500.0	0.1 to 2000.0	0.1 to 3000.0
	Resolution	mV	10	10	100	100	100	100
Current slew rate	Setting range	A/s	0.01 to 340.00	0.01 to 140.00	0.001 to 60.000	0.001 to 40.000	0.001 to 30.000	0.001 to 20.000
	Resolution	mA	10	10	1	1	1	1
Internal resistance	Setting range	Ω	0.000 to 0.471	0.000 to 2.857	0.00 to 16.67	0.00 to 37.50	0.0 to 66.7	0.0 to 150.0
	Resolution	mΩ	1	1	10	10	100	100
Front Panel								
Display			TFT-LCD, 5", 800 pt x 480 pt					
Voltage accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Current accuracy [0.2 % of Io_rated]		mA	340	140	60	40	30	20
Power accuracy [1 % of Po_rated]		W	50	50	50	50	50	50
Voltage resolution		V	0.01	0.01	0.01	0.1	0.1	0.1
Current resolution		A	0.01	0.01	0.001	0.001	0.001	0.001
Power resolution		W	0.1	0.1	0.1	0.1	0.1	0.1
Buttons			Menu, Local, Exit, Clear, Enter, Lock, Current, Shift Output, Numeric Keypad					
Rotary knob			Turn the knob to increase or decrease the value					
USB port			Type A USB connector					
Programming and Measurement (Digital Interface)								
Output voltage programming range	0 % to 105 %	V	0 to 84	0 to 210	0 to 525	0 to 787.5	0 to 1050	0 to 1575
Output current programming range	0 % to 105 %	A	0 to 178.5	0 to 73.5	0 to 31.5	0 to 21	0 to 15.75	0 to 10.5
Output power programming range	0 % to 102 %	W	0 to 5100	0 to 5100	0 to 5100	0 to 5100	0 to 5100	0 to 5100
Output voltage programming accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Output current programming accuracy [0.2 % of Io_rated]		mA	340	140	60	40	30	20
Output power programming accuracy [1 % of Po_rated]		W	50	50	50	50	50	50
Output voltage programming resolution		mV	10	10	10	100	100	100
Output current programming resolution		mA	10	10	1	1	1	1
Output power programming resolution		W	0.1	0.1	0.1	0.1	0.1	0.1
Output voltage measurement accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Output current measurement accuracy [0.2 % of Io_rated]		mA	340	140	60	40	30	20
Output power measurement accuracy [1 % of Po_rated]		W	50	50	50	50	50	50
Output voltage measurement resolution		mV	10	10	10	100	100	100
Output current measurement resolution		mA	10	10	1	1	1	1
Output power measurement resolution		W	0.1	0.1	0.1	0.1	0.1	0.1

SPECIFICATIONS(PHU-5 kW Series)			
Input Characteristics for PHU-C Series			
Norminal input rating			Single Phase, 3-Phase, 200 V models: 180 Vac to 265 Vac (Covers 200 Vac / 230 Vac)
Input frequency range			47 Hz to 63 Hz
Maximum input current	200 Vac	A	32 A (L1, L2)
Inrush current	200 Vac	A	Less than 50 A
Maximum input power		VA	6000
Power factor	Rated Power		> 0.95
Efficiency (*14)	200 Vac	%	86 to 94
Hold-up time			10 ms or greater
Input Characteristics for PHU-D Series			
Norminal input rating			3-Phase, 400 V models: 342 Vac to 528 Vac (Covers 380/400/415/440/460/480 Vac)
Input frequency range			47 Hz to 63 Hz
Maximum input current	400 Vac	A	16 A (L1, L2)
Inrush current	400 Vac	A	Less than 25 A
Maximum input power		VA	6000
Power factor	Rated Power		> 0.95
Efficiency (*14)	400 Vac	%	87 to 94
Hold-up time			10 ms or greater
Interface Capabilities			
USB			Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
Isolated Analog Control Interface			V_{set} / I_{set} = 0 V to 5 V or 0 V to 10 V | V_{mon} / I_{mon} = 0 V to 5 V or 0 V to 10 V
Factory Option			RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O
Isolated Analog Control Interface			
Vout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated V_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated V_{out}
Iout voltage programming			0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of rated I_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated I_{out}
Pout voltage programming			0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of rated P_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated P_{out}
Internal resistance voltage programming			0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of maximum R_{int}, or 0 V to 10 V Accuracy: ± 1 % of maximum R_{int}
Output voltage monitor			0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 %
Output current monitor			0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 %
Reference voltage			Voltage reference for 0 V to 5V or 0 V to 10V
Alarm Input			Turn off the PHU output with a High (4.5 V to 5 V)
Output on/off control			Possible logic selections: Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0 V to 0.5 V) or short-circuit
Alarm clear control			Clear alarms with a High (4.5 V to 5 V)
CV/CC/CP/ALM/PWR ON/OUT ON indicator			Photocoupler open collector output; Maximum voltage 30 V, maximum sink current 8 mA
Environmental Conditions			
Operaing temperature			0 °C to 50 °C
Storage temperature			-25 °C to 70 °C
Operating humidity			20 % to 85 % RH; No condensation
Storage humidity			90 % RH or less; No condensation
Altitude			Maximum 2000 m
General Specifications			
Weight	Main unit only	kg	Less than 21 kg
Dimensions (W×H×D)		mm	442 mm × 130 mm × 675 mm
Cooling			Forced air cooling by internal fan
EMC			Complies with the European EMC directive 89/336/EEC for Class A test and measurement products
Safety			Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking
Withstand voltage			Chassis and output terminal; chassis and AC input; AC input and output terminal: AC 1500 V or DC 2130 V 1 minute
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100 MΩ or more (DC 500 V)

Notes:

***1.Minimum voltage is guaranteed to maximum 0.2 % of the rated output voltage.**
***2.Minimum current is guaranteed to maximum 0.4 % of the rated output current.**
***3.At 180 Vac to 265 Vac or 342 Vac to 528 Vac, constant load.**
***4.From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.**
***5.For 80 V, 200 V models: Measure with JEITA RC-9131B (1:1) probe. For 500 V, 750 V, 1000 V and 1500 V models: Measured with (100:1) probe.**
***6.Measurement frequency bandwidth is 10 Hz to 20 MHz.**
***7.Measurement frequency bandwidth is 5 Hz to 1 MHz.**
***8.From 10 % to 90 % of rated output voltage, with rated resistive load.**
***9.From 90 % to 10 % of rated output voltage, with rated resistive load.**
***10.Time for output voltage to recover within 1 % of its rated output for a load change from 10 % to 90 % of its rated output current. Voltage set point from 10 % to 100 % of rated output.**
***11.For load voltage change, equal to the unit voltage rating, constant input voltage.**
***12.The ripple is measured at 20 % to 100 % output voltage and full output current.**
***13.For output power change from 10 % to 90 %, constant input voltage.**
***14.At rated output power.**

Multi-Range High Power DC Source

SPECIFICATIONS(PHU-10 kW Series)								
Model		PHU	80-340	200-140	500-60	750-40	1000-30	1500-20
Rated output voltage (*1)		V	80	200	500	750	1000	1500
Rated output current (*2)		A	340	140	60	40	30	20
Rated output power		W	10000	10000	10000	10000	10000	10000
Output power ratio		—	2.72	2.8	3	3	3	3
Constant Voltage Mode								
Line regulation (*3) [0.01 % of Vo_rated]		mV	8	20	50	75	100	150
Load regulation (*4) [0.02 % of Vo_rated]		mV	16	40	100	150	200	300
Ripple and noise (*5)	p-p (*6)	mV	200	300	350	800	1600	2400
	r.m.s. (*7)	mV	16	40	70	200	350	400
Temperature coefficient		ppm/℃	100 ppm/℃ from rated output voltage, following 30 minutes warm-up.					
Remote snese compensation voltage	5 % of Vo_rated	V	4	10	25	37.5	50	75
Rise time (*8)	Rated load	ms	30	30	30	30	30	30
	No load	ms	30	30	30	30	30	30
Fall time (*9)	Rated load	ms	80	80	80	80	80	80
	No load	ms	1000	1000	1000	1200	1000	1200
Transient response time (*10)		ms	1.5	1.5	1.5	1.5	1.5	1.5
Constant Current Mode								
Line regulation (*3) [0.05 % of Io_rated]		mA	170	70	30	20	15	10
Load regulation (*11) [0.1 % of Io_rated]		mA	340	140	60	40	30	20
Ripple and noise (*12)	r.m.s. (*7)	mA	340	100	32	32	22	22
Temperature coefficient		ppm/℃	100 ppm/℃ from rated output current, following 30 minutes warm-up.					
Protection Function								
Over voltage protection (OVP)	Setting range	V	5.00 V to 88.00 V	5.00 V to 220.00 V	5.00 V to 550.00 V	5.0 V to 825.0 V	5.0 V to 1100.0 V	5.0 V to 1650.0 V
	Setting accuracy	mV	80	200	500	750	1000	1500
Over current protection (OCP)	Setting range	A	5.00 A to 374.00 A	5.00 A to 154.00 A	5.00 A to 66.00 A	4.000 A to 44.000 A	3.000 A to 33.000 A	2.000 A to 22.000 A
	Setting accuracy	mA	680	280	120	80	60	40
Over power protection (OPP)	Setting range	W	200 W to 11000 W	200 W to 11000 W	200 W to 11000 W	200 W to 11000 W	200 W to 11000 W	200 W to 11000 W
	Setting accuracy	W	100	100	100	100	100	100
Over voltage limit (OVL)	Setting range	V	0.00 V to 84.00 V	0.00 V to 210.00 V	0.00 V to 525.00 V	0.0 V to 787.5 V	0.0 V to 1050.0 V	0.0 V to 1575.0 V
Under voltage limit (UVL)	Setting range	V	0.00 V to 84.00 V	0.00 V to 210.00 V	0.00 V to 525.00 V	0.0 V to 787.5 V	0.0 V to 1050.0 V	0.0 V to 1575.0 V
Over current limit (OCL)	Setting range	A	0.00 A to 357.00 A	0.00 A to 147.00 A	0.00 A to 63.00 A	0.000 A to 42.000 A	0.000 A to 31.500 A	0.000 A to 21.000 A
Under cuttent limit (UCL)	Setting range	A	0.00 A to 357.00 A	0.00 A to 147.00 A	0.00 A to 63.00 A	0.000 A to 42.000 A	0.000 A to 31.500 A	0.000 A to 21.000 A
Power unit fail (PUF)	Operation		Turn the output off.					
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.					
Low AC input protection (AC-FAIL)	Operation		Turn the output off.					
Shutdown (SD)	Operation		Turn the output off.					
Power limit (POWER LIMIT)	Operation		Over power limit.					
	Value (fixed)		Approx. 102 % of rated output power					
Other Functions								
Voltage Slew Rate	Setting range	V/s	0.01 to 160.00	0.01 to 400.00	0.1 to 1000.0	0.1 to 1500.0	0.1 to 2000.0	0.1 to 3000.0
	Resolution	mV	10	10	100	100	100	100
Current slew rate	Setting range	A/s	0.1 to 680.0	0.01 to 280.00	0.01 to 120.00	0.01 to 80.00	0.001 to 60.000	0.001 to 40.000
	Resolution	mA	100	10	10	10	1	1
Internal resistance	Setting range	Ω	0.000 to 0.235	0.000 to 1.428	0.00 to 8.33	0.00 to 18.75	0.00 to 33.33	0.0 to 75.0
	Resolution	mΩ	1	1	10	10	10	100
Front Panel								
Display			TFT-LCD, 5", 800 pt x 480 pt					
Voltage accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Current accuracy [0.2 % of Io_rated]		mA	680	280	120	80	60	40
Power accuracy [1 % of Po_rated]		W	100	100	100	100	100	100
Voltage resolution		V	0.01	0.01	0.01	0.1	0.1	0.1
Current resolution		A	0.01	0.01	0.001	0.001	0.001	0.001
Power resolution		W	1	1	1	1	1	1
Buttons			Menu, Local, Exit, Clear, Enter, Lock, Current, Shift Output, Numeric Keypad					
Rotary knob			Turn the knob to increase or decrease the value					
USB port			Type A USB connector					
Programming and Measurement (Digital Interface)								
Output voltage programming range	0 % to 105 %	V	0 to 84	0 to 210	0 to 525	0 to 787.5	0 to 1050	0 to 1575
Output current programming range	0 % to 105 %	A	0 to 357	0 to 147	0 to 63	0 to 42	0 to 31.5	0 to 21
Output power programming range	0 % to 102 %	W	0 to 10200	0 to 10200	0 to 10200	0 to 10200	0 to 10200	0 to 10200
Output voltage programming accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Output current programming accuracy [0.2 % of Io_rated]		mA	680	280	120	80	60	40
Output power programming accuracy [1 % of Po_rated]		W	100	100	100	100	100	100
Output voltage programming resolution		mV	10	10	10	100	100	100
Output current programming resolution		mA	10	10	1	1	1	1
Output power programming resolution		W	1	1	1	1	1	1
Output voltage measurement accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Output current measurement accuracy [0.2 % of Io_rated]		mA	680	280	120	80	60	40
Output power measurement accuracy [1 % of Po_rated]		W	100	100	100	100	100	100
Output voltage measurement resolution		mV	10	10	10	100	100	100
Output current measurement resolution		mA	10	10	1	1	1	1
Output power measurement resolution		W	1	1	1	1	1	1

SPECIFICATIONS(PHU-10 kW Series)			
Input Characteristics for PHU-C Series			
Norminal input rating			3-Phase, 200 V models: 180 Vac to 265 Vac (Covers 200 Vac / 230 Vac)
Input frequency range			47 Hz to 63 Hz
Maximum input current	200 Vac	A	56 A (L1), 32 A (L2, L3)
Inrush current	200 Vac	A	Less than 100 A
Maximum input power		VA	12000
Power factor	Rated Power		> 0.95
Efficiency (*14)	200 Vac	%	86 to 94
Hold-up time			10 ms or greater
Input Characteristics for PHU-D Series			
Norminal input rating			3-Phase, 400 V models: 342 Vac to 528 Vac (Covers 380/400/415/440/460/480 Vac)
Input frequency range			47 Hz to 63 Hz
Maximum input current	400 Vac	A	28 A (L1), 16 A (L2, L3)
Inrush current	400 Vac	A	Less than 50 A
Maximum input power		VA	12000
Power factor	Rated Power		> 0.95
Efficiency (*14)	400 Vac	%	87 to 94
Hold-up time			10 ms or greater
Interface Capabilities			
USB			Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
Isolated Analog Control Interface			V_{set} / I_{set} = 0 V to 5 V or 0 V to 10 V | V_{mon} / I_{mon} = 0 V to 5 V or 0 V to 10 V
Factory Option			RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O
Isolated Analog Control Interface			
Vout voltage programming			0 % to 100 %, 0V to 5 V Accuracy: ± 1 % of rated V_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated V_{out}
Iout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated I_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated I_{out}
Pout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated P_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated P_{out}
Internal resistance voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of maximum R_{int}, or 0 V to 10 V Accuracy: ± 1 % of maximum R_{int}
Output voltage monitor			0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 %
Output current monitor			0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 %
Reference voltage			Voltage reference for 0 V to 5V or 0 V to 10V
Alarm Input			Turn off the PHU output with a High (4.5 V to 5 V)
Output on/off control			Possible logic selections: Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0V to 0.5 V) or short-circuit
Alarm clear control			Clear alarms with a High (4.5 V to 5 V)
CV/CC/CP/ALM/PWR ON/OUT ON indicator			Photocoupler open collector output; Maximum voltage 30 V, maximum sink current 8 mA
Environmental Conditions			
Operaing temperature			0 °C to 50 °C
Storage temperature			-25 °C to 70 °C
Operating humidity			20 % to 85 % RH; No condensation
Storage humidity			90 % RH or less; No condensation
Altitude			Maximum 2000 m
General Specifications			
Weight	Main unit only	kg	Less than 30.5 kg
Dimensions (W×H×D)		mm	442 mm × 130 mm × 675 mm
Cooling			Forced air cooling by internal fan
EMC			Complies with the European EMC directive 89/336/EEC for Class A test and measurement products
Safety			Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking
Withstand voltage			Chassis and output terminal; chassis and AC input; AC input and output terminal: AC 1500 V or DC 2130 V 1 minute
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100 MΩ or more (DC 500 V)

Notes:
***1.Minimum voltage is guaranteed to maximum 0.2 % of the rated output voltage.**
***2.Minimum current is guaranteed to maximum 0.4 % of the rated output current.**
***3.At 180 Vac to 265 Vac or 342 Vac to 528 Vac, constant load.**
***4.From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.**
***5.For 80 V, 200 V models: Measure with JEITA RC-9131B (1:1) probe. For 500 V, 750 V, 1000 V and 1500 V models: Measured with (100:1) probe.**
***6.Measurement frequency bandwidth is 10 Hz to 20 MHz.**
***7.Measurement frequency bandwidth is 5 Hz to 1 MHz.**
***8.From 10 % to 90 % of rated output voltage, with rated resistive load.**
***9.From 90 % to 10 % of rated output voltage, with rated resistive load.**
***10.Time for output voltage to recover within 1 % of its rated output for a load change from 10 % to 90 % of its rated output current. Voltage set point from 10 % to 100 % of rated output.**
***11.For load voltage change, equal to the unit voltage rating, constant input voltage.**
***12.The ripple is measured at 20 % to 100 % output voltage and full output current.**
***13.For output power change from 10 % to 90 %, constant input voltage.**
***14.At rated output power.**

Multi-Range High Power DC Source

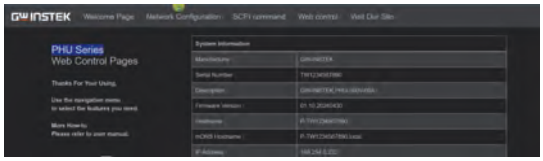
SPECIFICATIONS(PHU-15 kW Series)								
Model		PHU	80-510	200-210	500-90	750-60	1000-45	1500-30
Rated output voltage (*1)		V	80	200	500	750	1000	1500
Rated output current (*2)		A	510	210	90	60	45	30
Rated output power		W	15000	15000	15000	15000	15000	15000
Output power ratio		—	2.72	2.8	3	3	3	3
Constant Voltage Mode								
Line regulation (*3) [0.01 % of Vo_rated]		mV	8	20	50	75	100	150
Load regulation (*4) [0.02 % of Vo_rated]		mV	16	40	100	150	200	300
Ripple and noise (*5)	p-p (*6)	mV	200	300	350	800	1600	2400
	r.m.s. (*7)	mV	16	40	70	200	350	400
Temperature coefficient		ppm/℃	100 ppm/℃ from rated output voltage, following 30 minutes warm-up.					
Remote snese compensation voltage	5 % of Vo_rated	V	4	10	25	37.5	50	75
Rise time (*8)	Rated load	ms	30	30	30	30	30	30
	No load	ms	30	30	30	30	30	30
Fall time (*9)	Rated load	ms	80	80	80	80	80	80
	No load	ms	1000	1000	1000	1200	1000	1200
Transient response time (*10)		ms	1.5	1.5	1.5	1.5	1.5	1.5
Constant Current Mode								
Line regulation (*3) [0.05 % of Io_rated]		mA	255	105	45	30	22.5	15
Load regulation (*11) [0.1 % of Io_rated]		mA	510	210	90	60	45	30
Ripple and noise (*12)	r.m.s.	mA	510	150	48	48	26	26
Temperature coefficient		ppm/℃	100 ppm/℃ from rated output current, following 30 minutes warm-up.					
Protection Function								
Over voltage protection (OVP)	Setting range	V	5.00 V to 88.00 V	5.00 V to 220.00 V	5.00 V to 550.00 V	5.0 V to 825.0 V	5.0 V to 1100.0 V	5.0 V to 1650.0 V
	Setting accuracy	mV	80	200	500	750	1000	1500
Over current protection (OCP)	Setting range	A	5.00 A to 561.00 A	5.00 A to 231.00 A	5.00 A to 99.00 A	5.00 A to 66.00 A	4.5 A to 49.500 A	3 A to 33.000 A
	Setting accuracy	mA	1020	420	180	120	90	60
Over power protection (OPP)	Setting range	W	300 W to 16500 W	300 W to 16500 W	300 W to 16500 W	300 W to 16500 W	300 W to 16500 W	300 W to 16500 W
	Setting accuracy	W	150	150	150	150	150	150
Over voltage limit (OVL)	Setting range	V	0.00 V to 84.00 V	0.00 V to 210.00 V	0.00 V to 525.00 V	0.0 V to 787.5 V	0.0 V to 1050.0 V	0.0 V to 1575.0 V
Under voltage limit (UVL)	Setting range	V	0.00 V to 84.00 V	0.00 V to 210.00 V	0.00 V to 525.00 V	0.0 V to 787.5 V	0.0 V to 1050.0 V	0.0 V to 1575.0 V
Over current limit (OCL)	Setting range	A	0.00 A to 535.50 A	0.00 A to 220.50 A	0.00 A to 94.50 A	0.00 A to 63.00 A	0.000 A to 47.250 A	0.000 A to 31.500 A
Under cuttent limit (UCL)	Setting range	A	0.00 A to 535.50 A	0.00 A to 220.50 A	0.00 A to 94.50 A	0.00 A to 63.00 A	0.000 A to 47.250 A	0.000 A to 31.500 A
Power unit fail (PUF)	Operation		Turn the output off.					
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.					
Low AC input protection (AC-FAIL)	Operation		Turn the output off.					
Shutdown (SD)	Operation		Turn the output off.					
Power limit (POWER LIMIT)	Operation		Over power limit.					
	Value (fixed)		Approx. 102 % of rated output power					
Other Functions								
Voltage Slew Rate	Setting range	V/s	0.01 to 160.00	0.01 to 400.00	0.1 to 1000.0	0.1 to 1500.0	0.1 to 2000.0	0.1 to 3000.0
	Resolution	mV	10	10	100	100	100	100
Current slew rate	Setting range	A/s	0.1 to 1020.0	0.01 to 420.00	0.01 to 180.00	0.01 to 120.00	0.01 to 90.00	0.001 to 60.000
	Resolution	mA	100	10	10	10	10	1
Internal resistance	Setting range	Ω	0.000 to 0.157	0.00 to 0.95	0.00 to 5.56	0.00 to 12.50	0.00 to 22.22	0.0 to 50.0
	Resolution	mΩ	1	10	10	10	10	100
Front Panel								
Display			TFT-LCD, 5", 800 pt x 480 pt					
Voltage accuracy [0.1% of Vo_rated]		mV	80	200	500	750	1000	1500
Current accuracy [0.2% of Io_rated]		mA	1020	420	180	120	90	60
Power accuracy [1% of Po_rated]		W	150	150	150	150	150	150
Voltage resolution		V	0.01	0.01	0.01	0.1	0.1	0.1
Current resolution		A	0.01	0.01	0.01	0.001	0.001	0.001
Power resolution		W	1	1	1	1	1	1
Buttons			Menu, Local, Exit, Clear, Enter, Lock, Current, Shift Output, Numeric Keypad					
Rotary knob			Turn the knob to increase or decrease the value.					
USB port			Type A USB connector					
Programming and Measurement (Digital Interface)								
Output voltage programming range	0 % to 105 %	V	0 to 84	0 to 210	0 to 525	0 to 787.5	0 to 1050	0 to 1575
Output current programming range	0 % to 105 %	A	0 to 535.5	0 to 220.5	0 to 94.5	0 to 63	0 to 47.25	0 to 31.5
Output power programming range	0 % to 102 %	W	0 to 15300	0 to 15300	0 to 15300	0 to 15300	0 to 15300	0 to 15300
Output voltage programming accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Output current programming accuracy [0.2 % of Io_rated]		mA	1020	420	180	120	90	60
Output power programming accuracy [1 % of Po_rated]		W	150	150	150	150	150	150
Output voltage programming resolution		mV	10	10	10	100	100	100
Output current programming resolution		mA	10	10	10	1	1	1
Output power programming resolution		W	1	1	1	1	1	1
Output voltage measurement accuracy [0.1 % of Vo_rated]		mV	80	200	500	750	1000	1500
Output current measurement accuracy [0.2 % of Io_rated]		mA	1020	420	180	120	90	60
Output power measurement accuracy [1 % of Po_rated]		W	150	150	150	150	150	150
Output voltage measurement resolution		mV	10	10	10	100	100	100
Output current measurement resolution		mA	10	10	10	1	1	1
Output power measurement resolution		W	1	1	1	1	1	1

SPECIFICATIONS(PHU-15 kW Series)			
Input Characteristics for PHU-C Series			
Norminal input rating			3-Phase, 200 V models: 180 Vac to 265 Vac (Covers 200 Vac / 230 Vac)
Input frequency range			47 Hz to 63 Hz
Maximum input current	200 Vac	A	56 A (L1, L2, L3)
Inrush current	200 Vac	A	Less than 100 A
Maximum input power		VA	18000
Power factor	Rated Power		> 0.95
Efficiency (*14)	200 Vac	%	86 to 94
Hold-up time			10 ms or greater
Input Characteristics for PHU-D Series			
Norminal input rating			3-Phase, 400 V models: 342 Vac to 528 Vac (Covers 380/400/415/440/460/480 Vac)
Input frequency range			47 Hz to 63 Hz
Maximum input current	400 Vac	A	28 A (L1, L2, L3)
Inrush current	400 Vac	A	Less than 50 A
Maximum input power		VA	18000
Power factor	Rated Power		> 0.95
Efficiency (*14)	400 Vac	%	87 to 94
Hold-up time			10 ms or greater
Interface Capabilities			
USB			Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
Isolated Analog Control Interface			V_{set} / I_{set} = 0 V to 5 V or 0 V to 10 V | V_{mon} / I_{mon} = 0 V to 5 V or 0 V to 10 V
Factory Option			RS-232&485 or GPIB or CAN Bus or DeviceNet or Isolated Digital I/O
Isolated Analog Control Interface			
Vout voltage programming			0 % to 100%, 0 V to 5 V Accuracy: ± 1 % of rated V_{out}, or 0~10 V Accuracy: ± 1 % of rated V_{out}
Iout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated I_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated I_{out}
Pout voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of rated P_{out}, or 0 V to 10 V Accuracy: ± 1 % of rated P_{out}
Internal resistance voltage programming			0 % to 100 %, 0 V to 5 V Accuracy: ± 1 % of maximum R_{int}, or 0 V to 10 V Accuracy: ± 1 % of maximum R_{int}
Output voltage monitor			0 V to 5 V or 0 V to 10 V, Accuracy: ± 1 %
Output current monitor			0 V to 5 V or 0 to 10 V, Accuracy: ± 1 %
Reference voltage			Voltage reference for 0 V to 5 V or 0 V to 10 V
Alarm Input			Turn off the PHU output with a High (4.5 V to 5 V)
Output on/off control			Possible logic selections: Turn the output on using a LOW (0 V to 0.5 V) or short-circuit, turn the output off using a HIGH (4.5 V to 5 V) or open-circuit Turn the output on using a HIGH (4.5 V to 5 V) or open-circuit, turn the output off using a LOW (0 V to 0.5 V) or short-circuit
Alarm clear control			Clear alarms with a High (4.5V to 5V)
CV/CC/CP/ALM/PWR ON/OUT ON indicator			Photocoupler open collector output; Maximum voltage 30 V, maximum sink current 8 mA.
Environmental Conditions			
Operaing temperature			0 °C to 50 °C
Storage temperature			-25 °C to 70 °C
Operating humidity			20 % to 85 % RH; No condensation
Storage humidity			90 % RH or less; No condensation
Altitude			Maximum 2000 m
General Specifications			
Weight	Main unit only	kg	Less than 40 kg
Dimensions (W×H×D)		mm	442 mm × 130 mm × 675 mm
Cooling			Forced air cooling by internal fan
EMC			Complies with the European EMC directive 89/336/EEC for Class A test and measurement products
Safety			Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking
Withstand voltage			Chassis and output terminal; chassis and AC input; AC input and output terminal: AC 1500 V or DC 2130 V 1 minute
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100 MΩ or more (DC 500 V)

Notes:
***1.Minimum voltage is guaranteed to maximum 0.2 % of the rated output voltage.**
***2.Minimum current is guaranteed to maximum 0.4 % of the rated output current.**
***3.At 180 Vac to 265 Vac or 342 Vac to 528 Vac, constant load.**
***4.From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.**
***5.For 80 V, 200 V models: Measure with JEITA RC-9131B (1:1) probe. For 500 V, 750 V, 1000 V and 1500 V models: Measured with (100:1) probe.**
***6.Measurement frequency bandwidth is 10 Hz to 20 MHz.**
***7.Measurement frequency bandwidth is 5 Hz to 1 MHz.**
***8.From 10 % to 90 % of rated output voltage, with rated resistive load.**
***9.From 90 % to 10 % of rated output voltage, with rated resistive load.**
***10.Time for output voltage to recover within 1 % of its rated output for a load change from 10 % to 90 % of its rated output current. Voltage set point from 10 % to 100 % of rated output.**
***11.For load voltage change, equal to the unit voltage rating, constant input voltage.**
***12.The ripple is measured at 20 % to 100 % output voltage and full output current.**
***13.For output power change from 10 % to 90 %, constant input voltage.**
***14.At rated output power.**

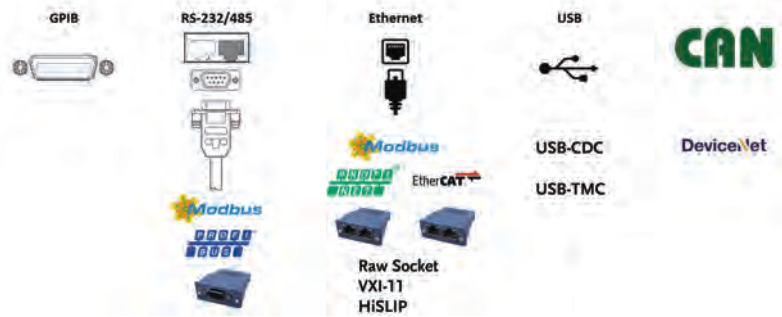
Multi-Range High Power DC Source

A. AWS (ADVANCED WEB SERVER)



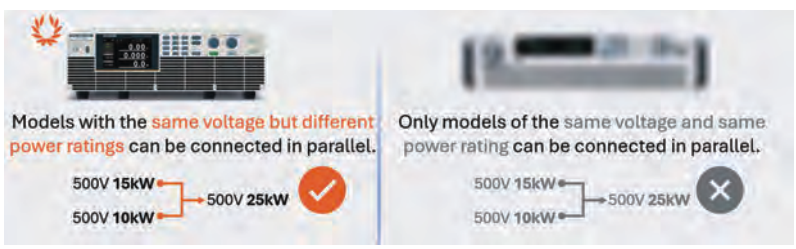
AWS is a powerful function that simplifies operations. With AWS, users can operate devices directly through a web browser,without needing to install any complicated software or drivers. This functionality allows users to complete tasks more efficiently, saving time and increasing productivity. Simply connect to the LAN port, enter the IP address through any web browser, and you can perform tasks such as device control, parameter settings, and function toggling without needing to install or learn any additional software.

B. INDUSTRY INTERFACE



PHU provides a variety of embedded industrial interface options to meet user needs, eliminating the need for users to prepare additional interfaces.

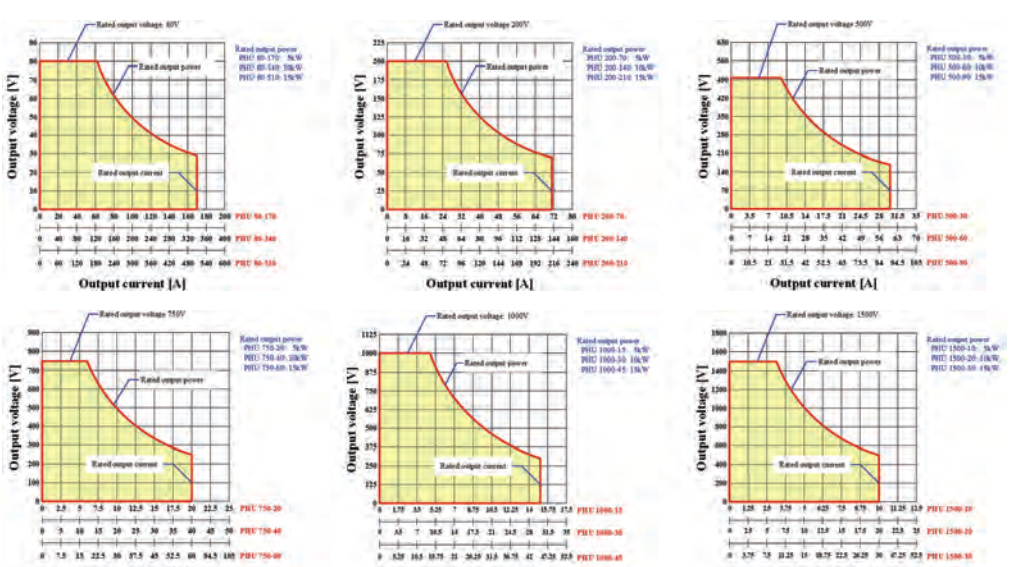
C. APC (ADAPTIVE PARALLEL CONNECTION)



It is easy to set up the master-slave in the parallel connection function.

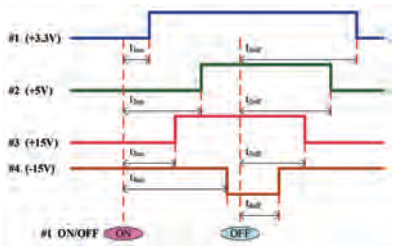
The unique APC (Adaptive Parallel Connection) feature offers adaptability in parallel connection, allowing users to make the best choice according to their needs. For instance, users can opt for a 15 kW model and a 10 kW model, to combine both to reach a 25 kW capacity within their budget constraints. Up to 10 PHU units can be connected to reach 150 kW without the need for additional power distribution for control.

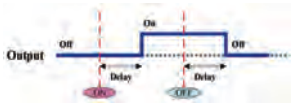
D. MULTI-RANGE OUTPUT



This feature enables the power supply to automatically adapt to higher output voltages when there is a smaller current or handle higher currents when there is a lower voltage. It allows the use of a single source to address multiple voltage and current combinations.

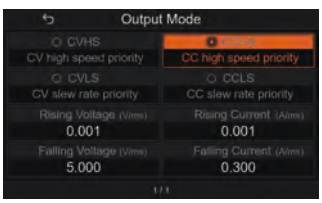
E. OUTPUT ON/OFF DELAY



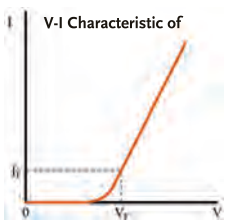


The output ON/OFF delay feature enables the setting of a specific time delay for output on after the power supply output is turned on, and a specific time delay for output off after the power supply output is turned off.

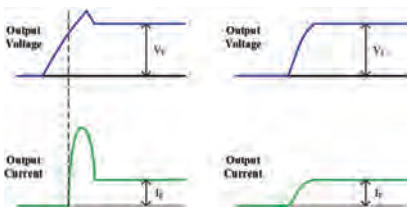
F. CC/CV PRIORITY



CV Priority

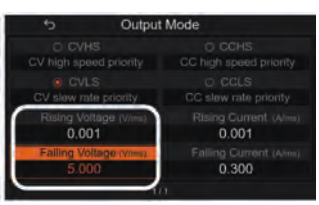


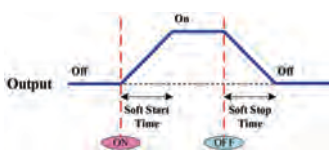
CC Priority



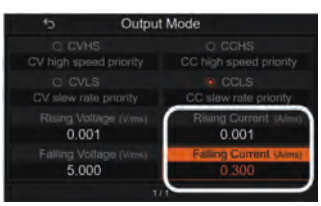
The PHU-Series has CV and CC priority modes. The CC priority mode can prevent inrush current and surge voltage from occurring at turn-on to protect DUT.

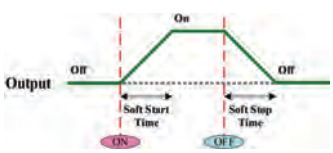
G. SLEW RATE CONTROL (SOFT START/STOP)





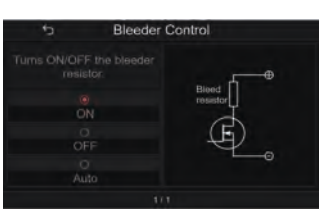
The default voltage (or current) rising speed when starting/stopping the output is set as the highest speed. PHU provides the function for the user to set the speed per their request for applications.
In CVLS (Constant Voltage Low Speed) mode, the user can set the parameter to control the voltage rising when starting the output and the voltage falling when stopping the output.

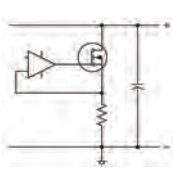




In CCLS (Constant Current Low Speed) mode, the user can set the parameter to control the current rising when starting the output and the current falling when stopping the output.

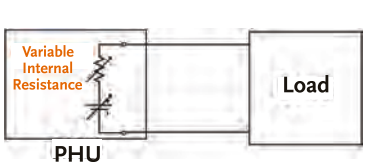
H. BLEED CIRCUIT ON/OFF CONTROL

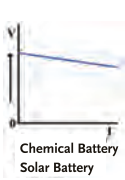




The bleeder circuit is a power supply circuit designed to discharge the electric charge stored in the power supply filter capacitors when the equipment is turned OFF, primarily for safety reasons to protect the DUT. The bleed function can be disabled for specific purposes, such as battery applications.

I. VARIABLE INTERNAL RESISTANCE





The internal resistance of the power supply can be user-defined in software. When the internal resistance is set it can be seen as a resistance in series with the positive output terminal.
This allows the power supply to simulate power sources that have internal remittances such as lead acid batteries.

J FUNCTION

Except the standard built-in programmable sequence function, PHU also offers a variety of optional functions including data logger, Capacity/Energy, Solar Array Simulator, and Battery Simulation to meet customer's requirements.

Dual-channel/Triple-channel Programmable Switching DC Power Supply

PSW-Multi Series

NEW

CE | GPIB | USB | LabVIEW Driver | Analog Control | LAN

PSW-Multi Series is a dual-channel or triple-channel wide range output programmable switching DC power supply. The maximum output power can reach 1080W. There are 13 dual-channel models with a rated power of 720W, and 24 triple-channel models with a rated power of 1080W. The rated voltages of low voltage modules are 30V, 40V, 80V, 160V. The rated voltages of high voltage modules are 250V and 800V.

The CV/CC priority selection of the PSW-Multi Series is a very useful feature for DUT protection. The conventional power supply normally operates under CV mode when the power output is turned on. This could bring a high inrush current to the capacitive load or current-intensive load at the power output-on stage. Taking the I-V curve verification of LED as an example, it becomes a very challenging task to perform this measurement using a conventional power supply.
With LED connected to a power supply under CV mode as the initial setting, when the power output is turned on and the voltage rises to the LED forward voltage, the current will suddenly peak up and exceed the preset value of current limit. Upon detecting this high current, the power supply starts the transition from CV mode to CC mode. Though the current becomes stable after the CC mode being activated, the current spike occurred at the CV and CC crossover point may possibly damage the DUT. At the power output-on stage, the PSW-Multi Series is able to operate under CC priority to limit the current spike occurred at the threshold voltage and therefore protects DUT from the inrush current damage.

The adjustable slew rate of the PSW-Multi Series allows users to set for either output voltage or output current, a specific rise time from low to high level transition, and a specific fall time from high to low level transition. This facilitates the characteristic verification of a DUT during voltage or current level changes with controllable slew rates. Most manufacturing tests of lighting device or large capacitor during power output-on are associated with the occurrence of high surge current, which can greatly reduce the life time of the DUT. To prevent inrush current from damaging current-intensive devices, a smooth and slow voltage transition during power On-Off can significantly reduce the pike current and protect the device from high current damage.

The OVP and OCP are provided with the PSW-Multi Series. Both OVP and OCP levels can be selected, with default level set at 110%, of the rated voltage/current of the power supply. When any of the protection levels is tripped, the power output will be switched off to protect the DUT. The PSW-Multi Series provides USB Host/Device and LAN interfaces as standard, GPIB-USB adapter and RS232-USB cable as optional. The LabVIEW driver and the Data Logging PC software are supported on all the available interfaces. An analog control/monitoring connector is also available on the rear panel for external control of power On/Off and external monitoring of power output Voltage and Current.

FEATURES

* **Multi-channel: Maximum 720W for Dual-channel Module and Maximum 1080W for Triple-channel Models; The PSW-Multi Series Aslo Features a New Built-in Function That Allows Individualor Synchronizd Output Control of Eachvoltage Module Output Latency Between Channels with the Same Voltage Module is Less Than 0.1ms**
* **Multiple Voltage Combinations: Low Voltage Combinations Can be Selected From 30V/40V/80V/160V; High Voltage Combinations Can be Selected From 250V/800V**
* **Advanced Web Server: Executes SCPI Commands; Web Controls Through Server; Data Log; Edit Sequence**
* **CC/CV Priority Mode Selection is Ideal for Battery and LED Industries**
* **Adjustable Rising and Falling Slew Rate**
* **720W/1080W Adopt 1/3, 1/2 Rack Mount Frame Designs (Standard EIA/JIS)**
* **Standard Communications Interfaces: LAN, USB, External Analog Remote Control Terminal**
* **Optional Communications Interfaces: GPIB-USB Adapter, RS232-USB Cable**
* **Support LabVIEW Driver**

DUAL-CHANNEL MODELS ARE AS FOLLOWS

MODEL	CH1	CH2	SIZE
PSW-720L11	30.00V	30.00V	1/3 Rack 3U
PSW-720L12	30.00V	40.00V	1/3 Rack 3U
PSW-720L14	30.00V	80.00V	1/3 Rack 3U
PSW-720L15	30.00V	160.0V	1/3 Rack 3U
PSW-720L22	40.00V	40.00V	1/3 Rack 3U
PSW-720L24	40.00V	80.00V	1/3 Rack 3U
PSW-720L25	40.00V	160.0V	1/3 Rack 3U
PSW-720L44	80.00V	80.00V	1/3 Rack 3U
PSW-720L45	80.00V	160.0V	1/3 Rack 3U
PSW-720L55	160.0V	160.0V	1/3 Rack 3U
PSW-720H66	250.0V	250.0V	1/3 Rack 3U
PSW-720H68	250.0V	800.0V	1/3 Rack 3U
PSW-720H88	800.0V	800.0V	1/3 Rack 3U

TRIPLE-CHANNEL MODELS ARE AS FOLLOWS

MODEL	CH1	CH2	CH3	SIZE
PSW-1080L111	30.00V	30.00V	30.00V	1/2 Rack 3U
PSW-1080L112	30.00V	30.00V	40.00V	1/2 Rack 3U
PSW-1080L114	30.00V	30.00V	80.00V	1/2 Rack 3U
PSW-1080L115	30.00V	30.00V	160.0V	1/2 Rack 3U
PSW-1080L122	30.00V	40.00V	40.00V	1/2 Rack 3U
PSW-1080L124	30.00V	40.00V	80.00V	1/2 Rack 3U
PSW-1080L125	30.00V	40.00V	160.0V	1/2 Rack 3U
PSW-1080L144	30.00V	80.00V	80.00V	1/2 Rack 3U
PSW-1080L145	30.00V	80.00V	160.0V	1/2 Rack 3U
PSW-1080L155	30.00V	160.0V	160.0V	1/2 Rack 3U
PSW-1080L222	40.00V	40.00V	40.00V	1/2 Rack 3U
PSW-1080L224	40.00V	40.00V	80.00V	1/2 Rack 3U
PSW-1080L225	40.00V	40.00V	160.0V	1/2 Rack 3U
PSW-1080L244	40.00V	80.00V	80.00V	1/2 Rack 3U
PSW-1080L245	40.00V	80.00V	160.0V	1/2 Rack 3U
PSW-1080L255	40.00V	160.0V	160.0V	1/2 Rack 3U
PSW-1080L444	80.00V	80.00V	80.0V	1/2 Rack 3U
PSW-1080L445	80.00V	80.00V	160.0V	1/2 Rack 3U
PSW-1080L455	80.00V	160.0V	160.0V	1/2 Rack 3U
PSW-1080L555	160.0V	160.0V	160.0V	1/2 Rack 3U
PSW-1080H666	250.0V	250.0V	250.0V	1/2 Rack 3U
PSW-1080H668	250.0V	250.0V	800.0V	1/2 Rack 3U
PSW-1080H688	250.0V	800.0V	800.0V	1/2 Rack 3U
PSW-1080H888	800.0V	800.0V	800.0V	1/2 Rack 3U

GRA-410-J/E Rack Mount Kit (JIS/EIA)

For : PSW-Series

Notes :

*1: At 85 ~ 132Vac or 170 ~ 265Vac, constant load.
*2: From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
*3: Measure with JEITA RC-9131B (1:1) probe
*4: Measurement frequency bandwidth is 10Hz to 20MHz.
*5: Measurement frequency bandwidth is 5Hz to 1MHz.
*6: From 10% to 90% of rated output voltage, with rated resistive load.
*7: From 90% to 10% of rated output voltage, with rated resistive load.
*8: Time for output voltage to recover within 0.1% + 10mV of its rated output for a load change from 50 to 100% of its rated output current.
*9: For load voltage change, equal to the unit voltage rating, constant input voltage.

SPECIFICATIONS

Module Type			1	2	4	5	6	8
H/L Voltage Classicfication		—	L	L	L	L	H	H
Rated output voltage		V	30	40	80	160	250	800
Rated output current		A	36	27	13.5	7.2	4.5	1.44
Rated output power		W	360	360	360	360	360	360
Power ratio		—	3	3	3	3.2	3.125	3.2
Constant Voltage Mode			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
Line regulation (*1)		mV	18	23	43	83	128	403
Load regulation (*2)		mV	20	25	45	85	130	405
Ripple and noise (*3)	p-p (*4)	mV	60	60	60	60	80	150
	r.m.s. (*5)	mV	7	7	7	12	15	30
Temperature coefficient		ppm/℃	100ppm/°C of rated output voltage, after a 30 minute warm-up					
Remote snese compensation voltage (single wire)		V	0.6	0.6	0.6	0.6	1	1
Rise time (*6)	Rated load	ms	50	50	50	100	100	150
	No load	ms	50	50	50	100	100	150
Fall time (*7)	Rated load	ms	50	50	50	100	150	300
	No load	ms	500	500	500	1000	1200	2000
Transient response time (*8)		ms	1	1	1	2	2	2
Constant Current Mode			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
Line regulation (*1)		mA	41	32	18.5	12.2	9.5	6.44
Load regulation (*9)		mA	41	32	18.5	12.2	9.5	6.44
Ripple and noise	r.m.s.	mA	72	54	27	15	10	5
Temperature coefficient		ppm/℃	200ppm/°C of rated output current, after a 30 minute warm-up					
Protection Function			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
Over voltage protection (OVP)	Setting range	V	3-33	4-44	8-88	16-176	20-275	20-880
	Setting accuracy		± (2% of rated output voltage)					
Over current protection (OCP)	Setting range	A	3.6-39.6	2.7-29.7	1.35-14.85	0.72-7.92	0.45-4.95	0.144-1.584
	Setting accuracy		± (2% of rated output current)					
Over temperature protection (OTP)	Operation		Turn the output off					
Low AC input protection (AC-FAIL)	Operation		Turn the output off					
Power limit (POWER LIMIT)	Operation		Over power limit.					
	Value (fixed)		Approx. 105% of rated output power					
Analog Programming and Monitoring			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
External voltage control output voltage	at 23 °C ± 5 °C		Accuracy and linearity: ±0.5% of rated output voltage.					
External voltage control output current	at 23 °C ± 5 °C		Accuracy and linearity: ±1% of rated output current.					
External resistor control output voltage	at 23 °C ± 5 °C		Accuracy and linearity: ±1.5% of rated output voltage.					
External resistor control output current	at 23 °C ± 5 °C		Accuracy and linearity: ±1.5% of rated output current.					
Output voltage monitor	at 23 °C ± 5 °C		Accuracy: ±1%				Accuracy: ±2%	
Output current monitor	at 23 °C ± 5 °C		Accuracy: ±1%				Accuracy: ±2%	
Shutdown control			Turns the output off with a LOW (0V to 0.5V) or short-circuit					
Output on/off control			Possible logic selections: Turn the output on using a LOW (0V to 0.5V) or short-circuit, turn the output off using a HIGH (4.5V to 5V) or open-circuit. Turn the output on using a HIGH (4.5V to 5V) or open-circuit, turn the output off using a LOW (0V to 0.5V) or short-circuit.					
CV/CC/ALM/PWR ON/OUT ON indicator			Photocoupler open collector output; Maximum voltage 30V, maximum sink current 8mA.					
Front Panel			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
Display, 4 digits Voltage accuracy	at 23 °C ± 5 °C; ± (0.1% +	mV	20	20	20	100	200	400
Current accuracy	at 23 °C ± 5 °C; ± (0.1% +	mA	40	30	20	5	5	2
Indications			GREEN LED's: CV, CC, VSR, ISR, DLY, RMT, 20, 40, 60, 80, 100, %W, W, V, A					
			RED LED's: ALM					
Buttons			Function, OVP/OCP, Set, Test, Lock/Local, PWR DSPL, Output					
Knobs			Voltage, Current					
USB port			Type A USB connector					
Programming and Measurement (USB, LAN, GPIB)			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
Output voltage programming accuracy	at 23 °C ± 5 °C; ± (0.1% +	mV	10	10	10	100	200	400
Output current programming accuracy	at 23 °C ± 5 °C; ± (0.1% +	mA	30	20	10	5	5	2
Output voltage programming resolution		mV	1	1	2	3	5	14
Output current programming resolution		mA	1	1	1	1	1	1
Output voltage measurement accuracy	at 23 °C ± 5 °C; ± (0.1% +	mV	10	10	10	100	200	400
Output current measurement accuracy	at 23 °C ± 5 °C; ± (0.1% +	mA	30	20	10	5	5	2
Output voltage measurement resolution		mV	1	1	2	3	5	14
Output current measurement resolution		mA	1	1	1	1	1	1
Input Characteristics			**30-36**	**40-27**	**80-13.5**	**160-7.2**	**250-4.5**	**800-1.44**
Efficiency	100Vac	%	77	78	78	79	79	80
	200Vac	%	79	80	80	81	81	82
Input Characteristics			**Dual Channel**			**Triple Channel**		
Norminal input rating			100Vac to 240Vac, 50Hz to 60Hz, single phase					
Input voltage range			85Vac ~ 265Vac					
Input frequency range			47Hz ~ 63Hz					
Maximum input current	100Vac	A	10			15		
	200Vac	A	5			7.5		
Inrush current			Less than 50A			Less than 75A		
Maximum input power		VA	1000			1500		
Power factor	100Vac		0.99					
	200Vac		0.97					
Hold-up time			20ms or greater					
Interface Capabilities			**Dual Channel**			**Triple Channel**		
USB			TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)					
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask					
GPIB			Optional: GUG-001 (GPIB to USB Adapter)					
Environmental Conditions			**Dual Channel**			**Triple Channel**		
Operaing temperature			0 ~ 50 °C					
Storage temperature			-25 ~ 70 °C					
Operating humidity			20% to 85% RH; No condensation					
Storage humidity			90% RH or less; No condensation					
Altitude			Maximum 2000m					
General Specifications			**Dual Channel**			**Triple Channel**		
Weight	main unit only	kg	Approx. 5.4kg			Approx. 7.7kg		
Dimensions	(W×H×D)	mm	142 x 124 x 350			214 x 124 x 350		
Cooling			Forced air cooling by internal fan					
EMC			Complies with the European EMC directive for Class A test and measurement products					
Safety			Complies with the European Low Voltage Directive and carries the CE-marking					
Withstand voltage	Between input and chassis		No abnormalities at 1500 Vac for 1 minute					
	Between input and output		No abnormalities at 3000 Vac for 1 minute					
	Between output and chassis		No abnormalities at 500 Vdc for 1 minute for 30V, 40V, 80V, 160V models No abnormalities at 1500 Vdc for 1 minute for 250V, 800V models					
Insulation resistance	Between input and chassis		500 Vdc, 100 MΩ or more					
	Between input and output		500 Vdc, 100 MΩ or more					
	Between output and chassis		500 Vdc, 100 MΩ or more for 30V, 40V, 80V, 160V and 250V models 1000 Vdc, 100 MΩ or more for 800V models					

Dual-channel/Triple-channel Programmable Switching DC Power Supply

PSW-Multi Series(Three-channel)

PSW-Multi Series(Two-channel)

PSW-Multi Series (LV)
Three-channel Models Rear Panel

PSW-Multi Series (HV)
Three-channel Models Rear Panel

PSW-Multi Series (LV)
Two-channel Models Rear Panel

PSW-Multi Series (HV)
Two-channel Models Rear Panel

ORDERING INFORMATION

Dual Channel Model

PSW-720L11	30V/36A*2 720W Multi-Range DC Power Supply
PSW-720L12	30V/36A*1 40V/27A*1 720W Multi-Range DC Power Supply
PSW-720L14	30V/36A*1 80V/13.5A*1 720W Multi-Range DC Power Supply
PSW-720L15	30V/36A*1 160V/7.2A*1 720W Multi-Range DC Power Supply
PSW-720L22	40V/27A*2 720W Multi-Range DC Power Supply
PSW-720L24	40V/27A*1 80V/13.5A*1 720W Multi-Range DC Power Supply
PSW-720L25	40V/27A*1 160V/7.2A*1 720W Multi-Range DC Power Supply
PSW-720L44	80V/13.5A*2 720W Multi-Range DC Power Supply
PSW-720L45	80V/13.5A*1 160V/7.2A*1 720W Multi-Range DC Power Supply
PSW-720L55	160V/7.2A*2 720W Multi-Range DC Power Supply
PSW-720H66	250V/4.5A*2 720W Multi-Range DC Power Supply
PSW-720H68	250V/4.5A*1 800V/1.44A*1 720W Multi-Range DC Power Supply
PSW-720H88	800V/1.44A*2 720W Multi-Range DC Power Supply

Triple Channel Model

PSW-1080L111	30V/36A*3 1080W Multi-Range DC Power Supply
PSW-1080L112	30V/36A*2 40V/27A*1 1080W Multi-Range DC Power Supply
PSW-1080L114	30V/36A*2 80V/13.5A*1 1080W Multi-Range DC Power Supply
PSW-1080L115	30V/36A*2 160V/7.2A*1 1080W Multi-Range DC Power Supply
PSW-1080L122	30V/36A*1 40V/27A*2 1080W Multi-Range DC Power Supply
PSW-1080L124	30V/36A*1 40V/27A*1 80V/13.5A*1 1080W Multi-Range DC Power Supply
PSW-1080L125	30V/36A*1 40V/27A*1 160V/7.2A 1080W Multi-Range DC Power Supply
PSW-1080L144	30V/36A*1 80V/13.5A*2 1080W Multi-Range DC Power Supply
PSW-1080L145	30V/36A*1 80V/13.5A*1 160V/7.2A*1 1080W Multi-Range DC Power Supply
PSW-1080L155	30V/36A*1 160V/7.2A*2 1080W Multi-Range DC Power Supply
PSW-1080L222	40V/27A*3 1080W Multi-Range DC Power Supply
PSW-1080L224	40V/27A*2 80V/13.5A*1 1080W Multi-Range DC Power Supply
PSW-1080L225	40V/27A*2 160V/7.2A*1 1080W Multi-Range DC Power Supply
PSW-1080L244	40V/27A*1 80V/13.5A*2 1080W Multi-Range DC Power Supply
PSW-1080L245	40V/27A*1 80V/13.5A*1 160V/7.2A*1 1080W Multi-Range DC Power Supply
PSW-1080L255	40V/27A*1 160V/7.2A*2 1080W Multi-Range DC Power Supply
PSW-1080L444	80V/13.5A*3 1080W Multi-Range DC Power Supply
PSW-1080L445	80V/13.5A*2 160V/7.2A*1 1080W Multi-Range DC Power Supply
PSW-1080L455	80V/13.5A*1 160V/7.2A*2 1080W Multi-Range DC Power Supply
PSW-1080L555	160V/7.2A*3 1080W Multi-Range DC Power Supply
PSW-1080H666	250V/4.5A*3 1080W Multi-Range DC Power Supply
PSW-1080H668	250V/4.5A*2 800V/1.44A*1 1080W Multi-Range DC Power Supply
PSW-1080H688	250V/4.5A*1 800V/1.44A*2 1080W Multi-Range DC Power Supply
PSW-1080H888	800V/1.44A*3 1080W Multi-Range DC Power Supply

Apart from the differences in output type, each unit differs at output channels and voltage.
The PSW-720 is dual channel output and PSW-1080 is triple channel output.

ACCESSORIES :

Power Cord x1 (Region dependent)

GTL-123	Test Lead x 1 (30V/40V/80V/160VOne low voltage module for each channel)
GTL-240	USB Cable"L" Type x1
PSW-004	Basic Accessories Kit x1 (30V/40V/80V/160V low voltage module)
PSW-008	Basic Accessories Kit x1 (250V/800V high voltage module)
PSW-009	Output terminal cover (30V/40V/80V/160V low voltage module)
PSW-011	Output terminal cover (250V/800V high voltage module)
PSW-012	High voltage output terminal(250V/800V high voltage module)

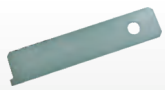
OPTIONAL ACCESSORIES

PSW-001	Accessory Kit
PSW-002	Simple IDC Tool
PSW-003	Contact Removal Tool
GUG-001	GPIB to USB Adaptor
GRA-410-J	Rack Mount Kit(JIS)
GRA-410-E	Rack Mount Kit(KIA)
GET-001	Extended Terminal with max. 30A (30V/40V/80V/160V low voltage module)
GET-002	Extended Terminal with max. 10A (250V/800V high voltage module)
GET-005	Extended European Terminal with max. 20A (30V/40V/80V/160V low voltage module)
GTL-130	Test Lead: 2x red, 2x black (250V/800V high voltage module)
GTL-248	GPIB Cable, 2000mm
GTL-250	GPIB Cable, 600mm
GUR-001A	USB to RS-232 Cable (M3), 3000mm
GUR-001B	USB to RS-232 Cable (#4-40 UNC), 3000mm

PSW-001

PSW-002

PSW-003



PSW-004

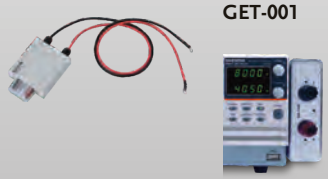
GUG-001

GTL-130

GUR-001A

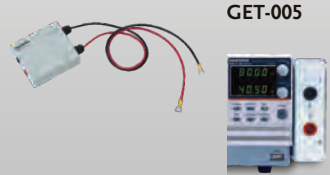
GUR-001B

GET-001

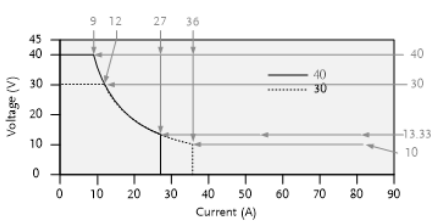


GET-002

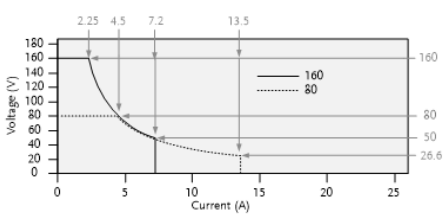
GET-005



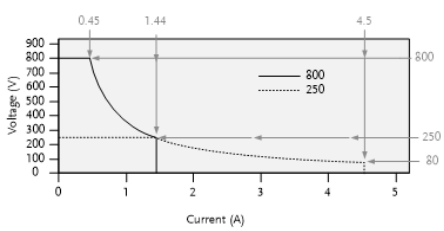
A. MULTI-RANGE OPERATION



PSW 30V/40V Series Operating Area



PSW 80V/160V Series Operating Area



PSW 250V/800V Series Operating Area

When the power supply is configured that the total output (Current x Voltage output) is less than the rated power output, it functions as a typical Constant Current (CC) and Constant Voltage (CV) power supply.

However, when the power supply is configured such that the total output power (Current x Voltage Output) exceeds the rated power output, the effective output is actually limited to the operation area of the unit.

B. MULTI-CHANNEL

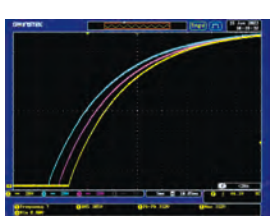


Figure 1

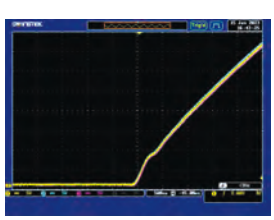


Figure 2

Multi-Channel, Dual-channel or triple-channel; the output latency between channels for same voltage module is less than 0.1ms.

When using a single-channel power supply for parallel multiple voltage output testing, there are different delays and slew rate settings, resulting in longer voltage output delay times and lack of control. The PSW-Multi Series features a built-in synchronous output control function (F130) that allow Dual-channel or triple-channel; the output latency between channels for same voltage module is less than 0.1ms.

It can fulfill diverse testing applications, for example: multi-channel digital device testing, electronic circuit verification, battery charging and discharging testing, and more.

When using a single-channel power supply with three units connected in parallel through the backplane for synchronized output, each unit will experience a voltage output latency of approximately 5 to 10 ms. (Figure 1)

The waveform of PSW-Multi Series in triple-channel synchronized output mode exhibits voltage output latency times less than 0.1 ms for each channel (with the same voltage model) (Figure 2)

C. ADVANCED WEB SERVER

Figure 1

Figure 2

Figure 3

Figure 4

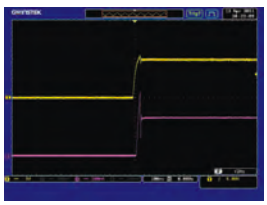
SCPI commands can be issued directly on the browser, examples are as follows: Direct control of PSW-Multi series power supplies on the browser. (Figure 1)

Data Log can be performed on the browser. For standard web server, the fastest data log time interval is 1 second. PSW-Multi series also provide paid version (active by option license key), the fastest data log time interval is 0.1 seconds and the data save to USB drive directly. (Figure 2)

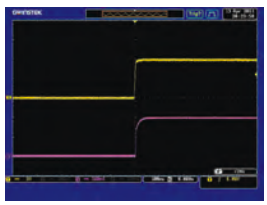
Sequences can be edited on the browser. (Figure 3)

The above advanced web server functions are new functions of PSW-Multi. Currently, there is no plan to update the advanced web server in the existing PSW-Series (Single Channel). (Figure 4)

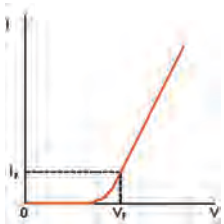
D. CV / CC PRIORITY SELECTION



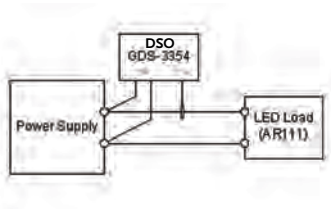
The Inrush Current and Surge Voltage occur at LED Forward Voltage(Vf)Under C.V Priority



The CC Priority Feature Effectively Limits the Occurrence of Inrush Current and Surge Voltage when the Supplied Voltage Rises to the LED Forward Voltage



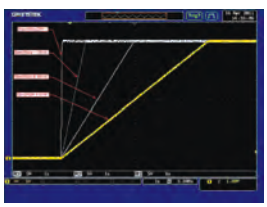
V-I Characteristic of Diode



Using GDS-3354 DSO to Test LED Operation Under CV Priority and CC Priority Respectively

The PSW-Multi Series provides CC Mode and CV Mode to fit various applications in the general purpose market. To get into critical application niches, however, the power supply needs to provide advanced features to meet the specific requirements. The CC and CV Priority Selection enable the power supply to run under CC priority, rather than normal CV priority, at the output-on stage.

E. ADJUSTABLE SLEW RATE

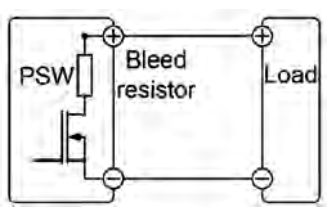


The Adjustable Rise Time of the PSW 30V Module

The Adjustable Rise Time of the PSW 800V Module

The PSW-Multi Series has adjustable slew rates for the level transition of both Current and Voltage. This gives the PSW-Multi Series power supply the ability to set specific rise time and fall time of the Voltage and Current drawn from the power supply to verify DUT performance during the Voltage/Current level transition. The feature also provides the benefit to slow down the voltage transition at the power output-on to protect DUT from inrush current damage. This is especially useful for the test of heavy-current-drawn devices like capacitors.

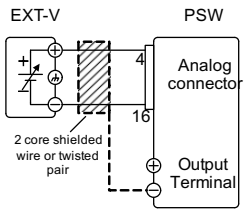
F. BLEEDER CONTROL



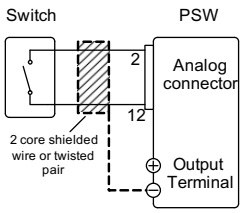
PSW-Multi Series Built-in Bleed Resistor

The PSW-Multi Series employs a bleed resistor in parallel with the output terminal. Bleed resistor is designed to dissipatch the power from the power supply filter capacitors when power is turned off and the load is disconnected. Without a bleed resistor, power terminal may remain charged on the filter capacitors for some time and be potentially hazardous. In addition, bleed resistor also allows for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load. The bleed resistance can be turned on or off using the configuration setting.

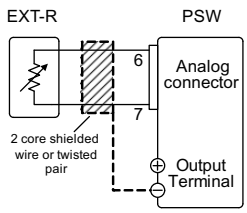
G. EXTERNAL ANALOG REMOTE CONTROL



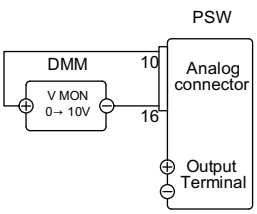
External Voltage Control of the Voltage Output



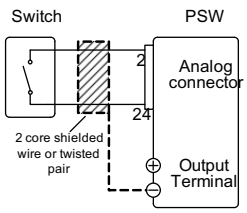
External Switch Control of the Main Power Shut-down



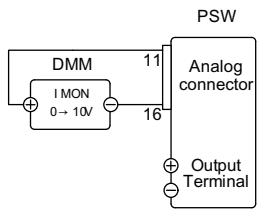
External Resistance control of the Voltage Output



External DMM Monitoring of the Output Voltage



External Switch Control of the Output On/Off



External DMM Monitoring of the Output Current

On the rear panel of the PSW-Multi Series power supply, a 26-pin Analog Control connector is available to perform lots of remote control and monitoring functions. The output voltage and current can be set using external voltage or resistance.

The power supply output on/off and main power shut-down can also be controlled using external switches. This Analog Control Connector is complied with the Mil 26 pin connector(OMRON XG4 IDC plug) standard.

H. VARIOUS INTERFACES SUPPORT & EXTENDED TERMINAL BOX

Rear Panel for PSW-Multi Series

GUG-001
GPIB to USB Adapter

GET-001
Extended Terminal (for PSW 30V/40V/80V/160V)

GET-002
Extended Terminal (for PSW 250V/800V)

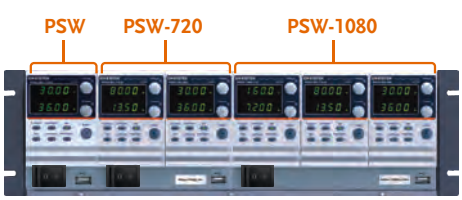
GET-005
Extended European Terminal (for PSW 30V/40V/80V/160V)

The PSW-Multi Series provides USB Host port in the front panel for easy access of stored data, such as test script program. In the rear panel, a USB Device port is available for remote control or I & V data logging of power output through a PC controller. The LAN interface, which meets DHCP standard, is provided as a standard feature of the PSW-Multi Series for system communications and ATE applications.

An Extender Terminal box (P/N: GET-001/GET-002/GET-005) is provided as optional accessory to extend the power output form the rear panel to the front side. This extender terminal gives R&D or QC engineers convenience to do the jobs without frequently reaching the output terminal at the rear side of the PSW-Multi Series.

I. USING THE RACK MOUNT KIT

Rack Mount Kit GRA-410-J (JIS)



Rack Mount Kit GRA-410-E (EIA)

The PSW-Multi Series has an optional Rack Mount Kit (GW Instek part number: [JIS] GRA-410-J, [EIA] GRA-410-E[EIA]) that can be used to hold 6x PSW models, 3x PSW-720 models, 2x PSW-1080 models or a combination of all models (1x PSW, 1x PSW-720 and 1x PSW-1080).

Programmable Switching DC Power Supply (Multi-Range DC Power Supply)

PSW-Series

CE | GPIB | USB | LabVIEW Driver | Analog Control | LAN

FEATURES

* Voltage Rating : 30V/40V/80V/160V/250V/800V, Output Power Rating : 360W–1080W
* Multi-range Voltage & Current Combinations in One Power Supply
* C.V/C.C Priority ; Particularly Suitable for the Battery and LED Industry
* Adjustable Slew Rate
* Series Operation(2 units in Series)for(30V/40V /80V/160V), Parallel Operation(3 units in Parallel) for (30V/40V/80V/160V/250V/800V)
* High Efficiency and High Power Density
* 1/2, 1/3, 1/6 Rack Mount Size Design (EIA/JIS Standard) for 360W, 720W, 1080W
* Standard Interface : LAN, USB, Analog Control Interface
* Optional Interface : GPIB-USB Adaptor, RS232-USB Cable
* LabVIEW Driver

PSW 80-40.5 (0 to 80V, 0 to 40.5 A, 1080 W)

PSW 80-27 (0 to 80 V, 0 to 27 A, 720 W)

PSW 80-13.5 (0 to 80 V, 0 to 13.5 A, 360 W)

The PSW-Series is a single-output multi-range programmable switching DC Power Supply covering a power range up to 1080W. This series of products include eighteen models with the combination of 30V, 40V, 80V, 160V, 250V and 800V rated voltages and 360W, 720W and 1080W maximum output powers. The multi-range feature allows the flexible and efficient configuration of voltage and current within the rated power range. As the PSW-Series can be connected in series for maximum 2 units or in parallel for maximum 3 units, the capability of connecting multiple PSW-Series units for higher voltage or higher current output provides a broad coverage of applications. With the flexibility of multi-range power utilization and series/parallel connection, the PSW-Series significantly reduces the users' cost for various power supply products to accommodate the projects with different power requirements.

The C.V/C.C priority selection of the PSW-Series is a very useful feature for DUT protection. The conventional power supply normally operates under C.V mode when the power output is turned on. This could bring a high inrush current to the capacitive load or current-intensive load at the power output-on stage. Taking the I-V curve verification of LED as an example, it becomes a very challenging task to perform this measurement using a conventional power supply. With LED connected to a power supply under C.V mode as the initial setting, when the power output is turned on and the voltage rises to the LED forward voltage, the current will suddenly peak up and exceed the preset value of current limit. Upon detecting this high current, the power supply starts the transition from C.V mode to C.C mode. Though the current becomes stable after the C.C mode being activated, the current spike occurred at the C.V and C.C crossover point may possibly damage the DUT. At the power output-on stage, the PSW-Series is able to operate under C.C priority to limit the current spike occurred at the threshold voltage and therefore protects DUT from the inrush current damage.

The adjustable slew rate of the PSW-Series allows users to set for either output voltage or output current, a specific rise time from low to high level transition, and a specific fall time from high to low level transition. This facilitates the characteristic verification of a DUT during voltage or current level changes with controllable slew rates. Most manufacturing tests of lighting device or large capacitor during power output-on are associated with the occurrence of high surge current, which can greatly reduce the life time of the DUT. To prevent inrush current from damaging current-intensive devices, a smooth and slow voltage transition during power On-Off can significantly reduce the spike current and protect the device from high current damage.

The OVP and OCP are provided with the PSW-Series. Both OVP and OCP levels can be selected, with default level set at 110%, of the rated voltage/current of the power supply. When any of the protection levels is tripped, the power output will be switched off to protect the DUT. The PSW-Series provides USB Host/Device and LAN interfaces as standard, GPIB-USB adapter and RS232-USB cable as optional. The LabView driver and the Data Logging PC software are supported on all the available interfaces. An analog control/monitoring connector is also available on the rear panel for external control of power On/Off and external monitoring of power output Voltage and Current.

PARALLEL OPERATION (3 UNITS)

MODEL	SINGLE UNIT	2 UNITS	3 UNITS
PSW 30-36	30V/36A	30V/72A	30V/108A
PSW 30-72	30V/72A	30V/144A	30V/216A
PSW 30-108	30V/108A	30V/216A	30V/324A
PSW 40-27	40V/27A	40V/54A	40V/81A
PSW 40-54	40V/54A	40V/108A	40V/162A
PSW 40-81	40V/81A	40V/162A	40V/243A
PSW 80-13.5	80V/13.5A	80V/27A	80V/40.5A
PSW 80-27	80V/27A	80V/54A	80V/81A
PSW 80-40.5	80V/40.5A	80V/81A	80V/121.5A
PSW 160-7.2	160V/7.2A	160V/14.4A	160V/21.6A
PSW 160-14.4	160V/14.4A	160V/28.8A	160V/43.2A
PSW 160-21.6	160V/21.6A	160V/43.2A	160V/64.8A
PSW 250-4.5	250V/4.5A	250V/9A	250V/13.5A
PSW 250-9	250V/9A	250V/18A	250V/27A
PSW 250-13.5	250V/13.5A	250V/27A	250V/40.5A
PSW 800-1.44	800V/1.44A	800V/2.88A	800V/4.32A
PSW 800-2.88	800V/2.88A	800V/5.76A	800V/8.64A
PSW 800-4.32	800V/4.32A	800V/8.64A	800V/12.96A

SERIES OPERATION (2 UNITS)

MODEL	SINGLE UNIT	2 UNITS
PSW 30-36	30V/36A	60V/36A
PSW 30-72	30V/72A	60V/72A
PSW 30-108	30V/108A	60V/108A
PSW 40-27	40V/27A	80V/27A
PSW 40-54	40V/54A	80V/54A
PSW 40-81	40V/81A	80V/81A
PSW 80-13.5	80V/13.5A	160V/13.5A
PSW 80-27	80V/27A	160V/27A
PSW 80-40.5	80V/40.5A	160V/40.5A
PSW 160-7.2	160V/7.2A	320V/7.2A
PSW 160-14.4	160V/14.4A	320V/14.4A
PSW 160-21.6	160V/21.6A	320V/21.6A
PSW 250-4.5	N/A	N/A
PSW 250-9	N/A	N/A
PSW 250-13.5	N/A	N/A
PSW 800-1.44	N/A	N/A
PSW 800-2.88	N/A	N/A
PSW 800-4.32	N/A	N/A

SPECIFICATIONS

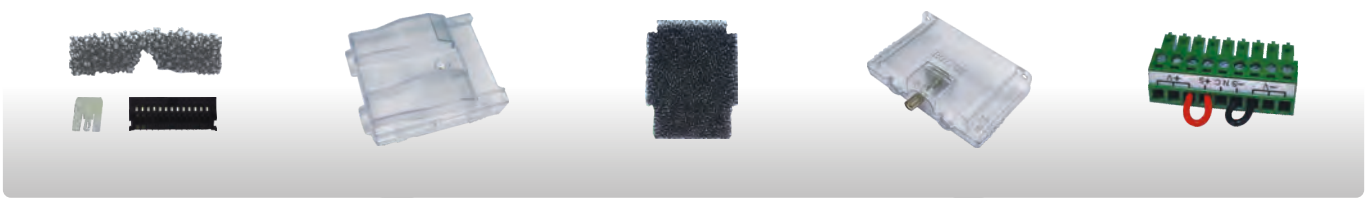
	PSW 30-36	PSW 30-72	PSW 30-108	PSW 40-27	PSW 40-54	PSW 40-81	PSW 80-13.5	PSW 80-27	PSW 80-40.5
OUTPUT RATING									
Voltage	0 ~ 30V	0 ~ 30V	0 ~ 30V	0 ~ 40V	0 ~ 40V	0 ~ 40V	0 ~ 80V	0 ~ 80V	0 ~ 80V
Current	0 ~ 36A	0 ~ 72A	0 ~ 108A	0 ~ 27A	0 ~ 54A	0~ 81A	0 ~ 13.5A	0 ~ 27A	0 ~ 40.5A
Power	360W	720W	1080W	360W	720W	1080W	360W	720W	1080W
REGULATION(CV)									
Load	20mV	20mV	20mV	25mV	25mV	25mV	45mV	45mV	45mV
Line	18mV	18mV	18mV	23mV	23mV	23mV	43mV	43mV	43mV
REGULATION(CC)									
Load	41mA	77mA	113mA	32mA	59mA	86mA	18.5mA	32mA	45.5mA
Line	41mA	77mA	113mA	32mA	59mA	86mA	18.5mA	32mA	45.5mA
RIPPLE & NOISE (Noise Bandwidth 20MHz; Ripple Bandwidth=1MHz)									
CV p-p	60mV	80mV	100mV	60mV	80mV	100mV	60mV	80mV	100mV
CV rms	7mV	11mV	14mV	7mV	11mV	14mV	7mV	11mV	14mV
CC rms	72mA	144mA	216mA	54mA	108mA	162mA	27mA	54mA	81mA
PROGRAMMING ACCURACY									
Voltage	0.1% +10mV	0.1% +10mV	0.1% +10mV	0.1%+10mV	0.1%+10mV	0.1%+10mV	0.1% +10mV	0.1% +10mV	0.1% +10mV
Current	0.1% + 30mA	0.1% + 60mA	0.1% + 100mA	0.1%+20mA	0.1%+50mA	0.1%+80mA	0.1% + 10mA	0.1% + 30mA	0.1% + 40mA
MEASUREMENT ACCURACY									
Voltage	0.1% +10mV	0.1% +10mV	0.1% +10mV	0.1%+10mV	0.1%+10mV	0.1%+10mV	0.1% +10mV	0.1% +10mV	0.1% +10mV
Current	0.1% +30mA	0.1% +60mA	0.1% +100mA	0.1%+20mA	0.1%+50mA	0.1%+80mA	0.1% +10mA	0.1% +30mA	0.1% +40mA
RESPONSE TIME									
Raise Time	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms
Fall Time(Full Load)	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms
Fall Time(No Load)	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms
Load Transient Recover Time (Load change from 50~100%)	1ms	1ms	1ms	1ms	1ms	1ms	1ms	1ms	1ms
PROGRAMMING RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV
Current	1mA	2mA	3mA	1mA	2mA	3mA	1mA	2mA	3mA
MEASUREMENT RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV
Current	1mA	2mA	3mA	1mA	2mA	3mA	1mA	2mA	3mA
SERIES AND PARALLEL CAPABILITY									
Parallel Operation	Up to 3 units including the master unit								
Series Operation	Up to 2 units including the master unit								
PROTECTION FUNCTION									
OVP	3~33V	3~33V	3~33V	4 ~ 44V	4 ~ 44V	4 ~ 44V	8~88V	8~88V	8~88V
OCP	3.6 ~39.6A	5~79.2A	5~118.8A	2.7 ~ 29.7A	5 ~ 59.4A	5 ~ 89.1A	1.35~14.85A	2.7~29.7A	4.05~44.55A
OHP	Activated by elecated internal temperatures								
FRONT PANEL DISPLAY ACCURACY, 4 digits									
Voltage	0.1%±20mV	0.1%±20mV	0.1%±20mV	0.1%+20mV	0.1%+20mV	0.1%+20mV	0.1%±20mV	0.1%±20mV	0.1%±20mV
Current	0.1%±40mA	0.1%±70mA	0.1%±100mA	0.1%+30mA	0.1%+60mA	0.1%+80mA	0.1%±20mA	0.1%±40mA	0.1%±50mA
ENVIRONMENT CONDITION									
Operation Temp	0℃ ~ 50℃								
Storage Temp	-25℃ ~ 70℃								
Operating Humidity	20% ~ 85% RH; No condensation								
Storage Humidity	90% RH or Less; No condensation								
READ BACK TEMP COEFFICIENT									
Voltage	100ppm/℃ of rated output voltage : after a 30 minute warm-up								
Current	200ppm/℃ of rated output current : after a 30 minute warm-up								
OTHER									
Analog Control	Yes								
Interface	USB/LAN/GPIB-USB(Option)/RS232-USB(Option)								
Fan	With thermal sensing control								
POWER SOURCE	85VAC~265VAC, 47~63Hz, single phase								
DIMENSIONS & WEIGHT	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D)mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg

PSW-001 **PSW-002** **PSW-003** **PSW-004** **PSW-005** **PSW-006** **PSW-007**

Programmable Switching DC Power Supply (Multi-Range DC Power Supply)

SPECIFICATIONS	PSW 160-7.2	PSW 160-14.4	PSW 160-21.6	PSW 250-4.5	PSW 250-9	PSW 250-13.5	PSW 800-1.44	PSW 800-2.88	PSW 800-4.32
OUTPUT RATING									
Voltage	0 ~ 160V	0 ~ 160V	0 ~ 160V	0 ~ 250V	0 ~ 250V	0 ~ 250V	0 ~ 800V	0 ~ 800V	0 ~ 800V
Current	0 ~ 7.2A	0 ~ 14.4A	0 ~ 21.6A	0 ~ 4.5A	0 ~ 9A	0 ~ 13.5A	0 ~ 1.44A	0 ~ 2.88A	0 ~ 4.32A
Power	360W	720W	1080W	360W	720W	1080W	360W	720W	1080W
REGULATION(CV)									
Load	85mV	85mV	85mV	130mV	130mV	130mV	405mV	405mV	405mV
Line	83mV	83mV	83mV	128mV	128mV	128mV	403mV	403mV	403mV
REGULATION(CC)									
Load	12.2mA	19.4mA	26.6mA	9.5mA	14mA	18.5mA	6.44mA	7.88mA	9.32mA
Line	12.2mA	19.4mA	26.6mA	9.5mA	14mA	18.5mA	6.44mA	7.88mA	9.32mA
RIPPLE & NOISE (Noise Bandwidth 20MHz; Ripple Bandwidth=1MHz)									
CV p-p	60mV	80mV	100mV	80mV	100mV	120mV	150mV	200mV	200mV
CV rms	12mV	15mV	20mV	15mV	15mV	15mV	30mV	30mV	30mV
CC rms	15mA	30mA	45mA	10mA	20mA	30mA	5mA	10mA	15mA
PROGRAMMING ACCURACY									
Voltage	0.1% +100mV	0.1% +100mV	0.1% +100mV	0.1%+200mV	0.1%+200mV	0.1%+200mV	0.1%+400mV	0.1%+400mV	0.1%+400mV
Current	0.1% + 5mA	0.1% +15mA	0.1% +20mA	0.1%+5mA	0.1%+10mA	0.1%+15mA	0.1%+2mA	0.1%+4mA	0.1%+6mA
MEASUREMENT ACCURACY									
Voltage	0.1% +100mV	0.1% +100mV	0.1% +100mV	0.1%+200mV	0.1%+200mV	0.1%+200mV	0.1%+400mV	0.1%+400mV	0.1%+400mV
Current	0.1% +5mA	0.1% +15mA	0.1% +20mA	0.1%+5mA	0.1%+10mA	0.1%+15mA	0.1%+2mA	0.1%+4mA	0.1%+6mA
RESPONSE TIME									
Raise Time	100ms	100ms	100ms	100ms	100ms	100ms	150ms	150ms	150ms
Fall Time(Full Load)	100ms	100ms	100ms	150ms	150ms	150ms	300ms	300ms	300ms
Fall Time(No Load)	1000ms	1000ms	1000ms	1200ms	1200ms	1200ms	2000ms	2000ms	2000ms
Load Transient Recover Time (Load change from 50~100%)	2ms	2ms	2ms	2ms	2ms	2ms	2ms	2ms	2ms
PROGRAMMING RESOLUTION (By PC Remote Control Mode)									
Voltage	3mV	3mV	3mV	5mV	5mV	5mV	14mV	14mV	14mV
Current	1mA	2mA	3mA	1mA	1mA	1mA	1mA	1mA	1mA
MEASUREMENT RESOLUTION (By PC Remote Control Mode)									
Voltage	3mV	3mV	3mV	5mV	5mV	5mV	14mV	14mV	14mV
Current	1mA	2mA	3mA	1mA	1mA	1mA	1mA	1mA	1mA
SERIES AND PARALLEL CAPABILITY									
Parallel Operation	Up to 3 units including the master unit			3	3	3	3	3	3
Series Operation	Up to 2 units including the master unit			N/A	N/A	N/A	N/A	N/A	N/A
PROTECTION FUNCTION									
OVP	16~176V	16~176V	16~176V	20~275V	20~275V	20~275V	20~880V	20~880V	20~880V
OCP	0.72~7.92A	1.44~15.84A	2.16~23.76A	0.45~4.95A	0.9~9.9A	1.35~14.85A	0.144~1.584A	0.288~3.168A	0.432~4.752
OHP	Activated by elecated internal temperatures								
FRONT PANEL DISPLAY ACCURACY, 4 digits									
Voltage	0.1%±100mV	0.1%±100mV	0.1%±100mV	0.1%±200mV	0.1%±200mV	0.1%±200mV	0.1%±400mV	0.1%±400mV	0.1%±400mV
Current	0.1%±5mA	0.1%±30mA	0.1%±30mA	0.1%±5mA	0.1%±10mA	0.1%±20mA	0.1%±2mA	0.1%±4mA	0.1%±6mA
ENVIRONMENT CONDITION									
Operation Temp	0℃ ~ 50℃								
Storage Temp	-25℃ ~ 70℃								
Operating Humidity	20% ~ 85% RH; No condensation								
Storage Humidity	90% RH or Less; No condensation								
READ BACK TEMP COEFFICIENT									
Voltage	100ppm/℃ of rated output voltage : after a 30 minute warm-up								
Current	200ppm/℃ of rated output current : after a 30 minute warm-up								
OTHER									
Analog Control	Yes								
Interface	USB/LAN/GPIB-USB(Option)/RS232-USB(Option)								
Fan	With thermal sensing control								
POWER SOURCE	85VAC~265VAC, 47~63Hz, single phase								
DIMENSIONS & WEIGHT	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D)mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg

PSW-008 **PSW-009** **PSW-010** **PSW-011** **PSW-012**



PSW-Series

ORDERING INFORMATION

PSW 30-36	(0~30V/0~36A/360W) Multi-Range DC Power Supply
PSW 30-72	(0~30V/0~72A/720W) Multi-Range DC Power Supply
PSW 30-108	(0~30V/0~108A/1080W) Multi-Range DC Power Supply
PSW 40-27	(0~40V/0~27A/360W) Multi-Range DC Power Supply
PSW 40-54	(0~40V/0~54A/720W) Multi-Range DC Power Supply
PSW 40-81	(0~40V/0~81A/1080W) Multi-Range DC Power Supply
PSW 80-13.5	(0~80V/0~13.5A/360W) Multi-Range DC Power Supply
PSW 80-27	(0~80V/0~27A/720W) Multi-Range DC Power Supply
PSW 80-40.5	(0~80V/0~40.5A/1080W) Multi-Range DC Power Supply
PSW 160-7.2	(0~160V/0~7.2A/360W) Multi-Range DC Power Supply
PSW 160-14.4	(0~160V/0~14.4A/720W) Multi-Range DC Power Supply
PSW 160-21.6	(0~160V/0~21.6A/1080W) Multi-Range DC Power Supply
PSW 250-4.5	(0~250V/0~4.5A/360W) Multi-Range DC Power Supply
PSW 250-9	(0~250V/0~9A/720W) Multi-Range DC Power Supply
PSW 250-13.5	(0~250V/0~13.5A/1080W) Multi-Range DC Power Supply
PSW 800-1.44	(0~800V/0~1.44A/360W) Multi-Range DC Power Supply
PSW 800-2.88	(0~800V/0~2.88A/720W) Multi-Range DC Power Supply
PSW 800-4.32	(0~800V/0~4.32A/1080W) Multi-Range DC Power Supply

ACCESSORIES :

GTL-123 Test Lead x 1(for PSW 30V/40V/80V/160V), Power Cord x 1 (Region dependent),
GTL-240 USB Cable " L " Type x 1, PSW-004 Basic Accessories Kit x 1 (for PSW 30V/40V/80V/160V),
Includes : M4 Terminal screws and washers x 2, Air Filter x 1, Analog control protection dummy x 1,
Analog control lock lever x 1, M8 terminal bolts, nuts and washers x 2

PSW-004	Basic Accessories Kit x1 (30V/40V/80V/160V low voltage module)
PSW-008	Basic Accessories Kit for PSW 250V/800V models
PSW-009	Output Terminal Cover for 30V/40V/80V/160V models
PSW-011	Output Terminal Cover for 250V/800V models
PSW-012	High Voltage Output Terminal for 250V/800V model

OPTIONAL ACCESSORIES

PSW-001	Accessory Kit
PSW-002	Simple IDC Tool
PSW-003	Contact Removal Tool
PSW-005	Cable for 2 Units of PSW-Series in Series Mode Connection (for PSW 30V/40V/80V/160V)
PSW-006	Cable for 2 Units of PSW-Series in Parallel Mode Connection
PSW-007	Cable for 3 Units of PSW-Series in Parallel Mode Connection
PSW-010	Large filter (Type II/III)
GTL-248	GPIB Cable, Double Shielded, 2000mm
GTL-250	GPIB Cable, Double Shielded, 600mm
GUR-001A	USB to RS-232 Cable, 300mm(H3)
GUR-001B	RS-232 to USB Adapter with #4-40 UNC Rivet Nut
GUG-001	GPIB to USB Adaptor
GRA-410-J	Rack Mount Kit (JIS)
GRA-410-E	Rack Mount Kit (EIA)
GET-001	Extended Terminal with max. 30A(for PSW 30V/40V/80V/160V)
GET-002	Extended Terminal with max. 10A(for PSW 250V/800V)
GET-005	Extended European Terminal with max. 20A (for PSW 30V/40V/80V/160V)
GTL-130	Test lead : 2 x red, 2 x black(for PSW 250V/800V)

PSW-Series (LV) Rear Panel

PSW-Series (HV) Rear Panel

GRA-410-J/E Rack Mount Kit (JIS/EIA)

For : PSW-Series

GTL-130 Test lead, 1200mm, 18AWG, UL 3239

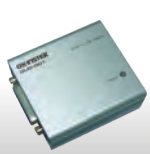
(for PSW 250V/800V)

GUR-001A USB to RS-232 Cable

(for PSW-Series, 300mm)

GUG-001 GPIB to USB Adapter

(for GDS-3000Series, PSW-Series)

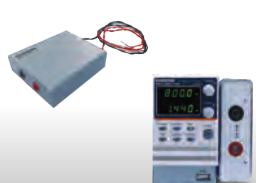


GET-001 Extended Terminal

(for PSW 30V/40V/80V/160V)

GET-002 Extended Terminal

(for PSW 250V/800V)



GET-005 Extended European Terminal

(for PSW 30V/40V/80V/160V)

Programmable Switching DC Power Supply

PSU-Series

CE | USB | GPIB | Analog Control | LAN | LabVIEW Driver | RS-232 | RS-485

FEATURES

* **Voltage Output : 6V/8V/12.5V/15V/20V/30V/40V/ 50V/60V/80V/100V/150V/300V/400V/600V**
* **Power Output : 1200W ~ 1560W**
* **C.V/C.C Priority Mode**
* **Adjustable Voltage/Current Rise and Fall Time**
* **Series/Parallel Connection : Max. 2 units (Models Under 300V)/4 units of The Same Model**
* **High Efficiency and High Power Density**
* **1U Height and 19"Rack Mount Size**
* **Three sets of Preset Function**
* **Bleeder Control Function**
* **Internal Resistance Function**
* **Panel Lock Function**
* **Protection : OVP, OCP, OHP, UVL, AC Fail, FAN Fail**
* **Standard : USB, LAN, RS-232, RS-485, Analog Control**
* **Option : GPIB, Isolated Analog Interface (Voltage Control/Current Control)**

GW Instek PSU-Series, a DC power supply with high power density design, is 1U in height and compatible with 19" Rack Mount Size. The series is suitable for test system installation or system integration by flexibly selecting models for the integration into the existing test system. The PSU-Series, featuring superior voltage and current control functions, comprises fifteen models with output voltage/current ranging from 6V/200A to 600V/2.6A. The Series is suitable for different test conditions and DUTs, including electronic components testing, micro resistors, relays, shunt resistors, 12V/24V/48V battery simulation, and automotive electronic device testing.

The PSU-HV series is ideal for the primary input of DC/DC converter and servomotor production application. PSU is often integrated into component test systems such as aging test equipment for capacitors; 600V DC bias applications; aging test equipment for diode; semiconductor production equipment; automotive electronics; and ECU for V8 engine or V12 engine, etc.

Utilizing same model units of the PSU-Series to conduct series and parallel connections can increase total output power, total current or total voltage. The wide voltage and current output ranges of the PSU-Series can fully satisfy various voltage and current measurement requirements. The PSU-Series is a single power output DC programmable power supply, which outputs 1200W to 1560W. The PSU-Series provides maximum 2 units in series connection (models under 300V) to achieve maximum 600V or 4 units in parallel connection to obtain maximum 800A and the maximum output power of 6.24 kilowatts.

The PSU-Series allows settings for CC priority or CV priority. Under CC or CV mode, users can adjust slew rate for output voltage or current based upon test requirements. There are two kinds of slew rate settings: high speed priority and slew rate priority. High speed priority sets slew rate at the maximum speed to reach CC or CV mode. Slew rate priority allows users to set slew rate for CC or CV mode in order to control rise or fall slew rate. Slew rate priority mode is ideal for motor tests by adjusting the rise time of output voltage to protect DUT from being damaged by inrush current occurred at turn-on.

Comparing with other 1U power supplies available in the market, PSU supports a most complete array of interfaces, including USB, LAN, RS-232, RS-485, analog control interface, GPIB (option), isolated analog interface (voltage control), and isolated analog interface (current control). Via the multi-drop mode, PSU will not need any switch/hub and GPIB cable for remote control and slave unit augmentation when using LAN, USB or GPIB. This feature can help users save costs on augmentation equipment for connecting slave while using LAN or USB.

The PSU-Series provides users with flexible settings of High/Low Level or Trigger input/Trigger output signals with pulse width of 1 ~ 60ms. Trigger input controls PSU to output or upload preset voltage, current and memory parameters. While outputting or uploading preset voltage, current and memory parameters PSU can produce corresponding Trigger output signals.

PSU-Series Model Selection Table

1.5kW 1U High	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Voltage	6.000 V	8.000 V	12.50 V	15.00 V	20.00 V	30.00 V	40.00 V	50.00 V	60.00 V	80.00 V	100.0 V	150.0 V	300.0 V	400.0 V	600.0 V
Current	200.0 A	180.0 A	120.0 A	100.0 A	76.00 A	50.00 A	38.00 A	30.0 A	25.00 A	19.00 A	15.00 A	10.00 A	5.000 A	3.800 A	2.600 A
Power	1200 W	1440 W	1500 W	1500 W	1520 W	1500 W	1520 W	1500 W	1500 W	1520 W	1500 W	1500 W	1500 W	1520 W	1560 W
3kW 2U High	6-400(B)	8-360(B)	12.5-240(B)	15-200(B)	20-152(B)	30-100(B)	40-76(B)	50-60(B)	60-50(B)	80-38(B)	100-30(B)	150-20(B)	300-10(B)	400-7.6(B)	600-5.2(B)
Voltage	6.000 V	8.000 V	12.50 V	15.00 V	20.00 V	30.00 V	40.00 V	50.00 V	60.00 V	80.00 V	100.0 V	150.0 V	300.0 V	400.0 V	600.0 V
Current	400.0 A	360.0 A	240.0 A	200.0 A	152.0 A	100.0 A	76.00 A	60.00 A	50.00 A	38.00 A	30.00 A	20.00 A	10.00 A	7.600 A	5.200 A
Power	2400 W	2880 W	3000 W	3000 W	3040 W	3000 W	3040 W	3000 W	3000 W	3040 W	3000 W	3000 W	3000 W	3040 W	3120 W
4.5kW 3U High	6-600(B)	8-540(B)	12.5-360(B)	15-300(B)	20-228(B)	30-150(B)	40-114(B)	50-90(B)	60-75(B)	80-57(B)	100-45(B)	150-30(B)	300-15(B)	400-11.4(B)	600-7.8(B)
	6-600(C)	8-540(C)	12.5-360(C)	15-300(C)	20-228(C)	30-150(C)	40-114(C)	50-90(C)	60-75(C)	80-57(C)	100-45(C)	150-30(C)	300-15(C)	400-11.4(C)	600-7.8(C)
	6-600(D)	8-540(D)	12.5-360(D)	15-300(D)	20-228(D)	30-150(D)	40-114(D)	50-90(D)	60-75(D)	80-57(D)	100-45(D)	150-30(D)	300-15(D)	400-11.4(D)	600-7.8(D)
Voltage	6.000 V	8.000 V	12.50 V	15.00 V	20.00 V	30.00 V	40.00 V	50.00 V	60.00 V	80.00 V	100.0 V	150.0 V	300.0 V	400.0 V	600.0 V
Current	600.0 A	540.0 A	360.0 A	300.0 A	228.0 A	150.0 A	114.0 A	90.0 A	75.00 A	57.00 A	45.00 A	30.00 A	15.00 A	11.40 A	7.800 A
Power	3600 W	4320 W	4500 W	4500 W	4560 W	4500 W	4560 W	4500 W	4500 W	4560 W	4500 W	4500 W	4500 W	4560 W	4680 W
6kW 4U High	6-800(B)	8-720(B)	12.5-480(B)	15-400(B)	20-304(B)	30-200(B)	40-152(B)	50-120(B)	60-100(B)	80-76(B)	100-60(B)	150-40(B)	300-20(B)	400-15.2(B)	600-10.4(B)
	6-800(C)	8-720(C)	12.5-480(C)	15-400(C)	20-304(C)	30-200(C)	40-152(C)	50-120(C)	60-100(C)	80-76(C)	100-60(C)	150-40(C)	300-20(C)	400-15.2(C)	600-10.4(C)
	6-800(D)	8-720(D)	12.5-480(D)	15-400(D)	20-304(D)	30-200(D)	40-152(D)	50-120(D)	60-100(D)	80-76(D)	100-60(D)	150-40(D)	300-20(D)	400-15.2(D)	600-10.4(D)
Voltage	6.000 V	8.000 V	12.50 V	15.00 V	20.00 V	30.00 V	40.00 V	50.00 V	60.00 V	80.00 V	100.0 V	150.0 V	300.0 V	400.0 V	600.0 V
Current	800.0 A	720.0 A	480.0 A	400.0 A	304.0 A	200.0 A	152.0 A	120.0 A	100.0 A	76.0 A	60.00 A	40.00 A	20.00 A	15.20 A	10.40 A
Power	4800 W	5760 W	6000 W	6000 W	6080 W	6000 W	6080 W	6000 W	6000 W	6080 W	6000 W	6000 W	6000 W	6080 W	6240 W

Note: B: Input voltage 170~265VAC, single phase; C: Input voltage 180~253VAC, three-phase three-wire; D: Input voltage 360~440VAC, three-phase four-wire; No CE certificate.

SPECIFICATIONS

Model		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Rated output voltage (*1)		V	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Rated output current (*2)		A	200	180	120	100	76	50	38	30	25	19	15	10	5	3.8	2.6
Rated output power		W	1200	1440	1500	1500	1520	1500	1520	1500	1500	1520	1500	1500	1500	1520	1560
Constant Voltage Mode		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Line regulation (*3)		mV	2.6	2.8	3.25	3.5	4	5	6	7	8	10	12	17	32	42	62
Load regulation (*4)		mV	2.6	2.8	3.25	3.5	4	5	6	7	8	10	12	17	32	42	62
Ripple and noise (*5)	p-p (*6)	mV	60	60	60	60	60	60	60	60	60	80	80	100	150	200	300
	r.m.s. (*7)	mV	8	8	8	8	8	8	8	8	8	8	8	10	25	40	60
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Remote snese compensation voltage (single wire)		V	1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5
Rise time (*8)	Rated load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250
	No load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250
Fall time (*9)	Rated load	ms	10	50	50	50	50	80	80	80	80	150	150	150	150	200	250
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000
Transient response time (*10)		ms	1.5	1.5	1	1	1	1	1	1	1	1	1	2	2	2	2
Constant Current Mode		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Line regulation (*3)		mA	22	20	14	12	9.6	7	5.8	5	4.5	3.9	3.5	3	2.5	2.38	2.26
Load regulation (*11)		mA	45	41	29	25	20.2	15	12.6	11	10	8.8	8	7	6	5.76	5.52
Ripple and noise (*12)	r.m.s.	mA	400	360	240	200	152	125	95	85	75	57	45	35	25	17	12
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Protection Function		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 220	5-198	5 - 132	5 - 110	5 - 83.6	5 - 55	3.8 - 41.8	3 - 33	2.5 - 27.5	1.9 - 20.9	1.5 - 16.5	1 - 11	0.5 - 5.5	0.38 - 4.18	0.26 - 2.86
	Setting accuracy	mA	4000	3600	2400	2000	1520	1000	760	600	500	380	300	200	100	76	52
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.														
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.														
Low AC input protection (AC-FAIL)	Operation		Turn the output off.														
Shutdown (SD)	Operation		Turn the output off.														
Power limit (POWER LIMIT)	Operation		Over power limit.														
Analog Programming and Monitoring		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
External voltage control output voltage			Accuracy and linearity: ±0.5% of rated output voltage.														
External voltage control output current			Accuracy and linearity: ±1% of rated output current.														
External resistor control output voltage			Accuracy and linearity: ±1% of rated output voltage.														
External resistor control output current			Accuracy and linearity: ±1.5% of rated output current.														
Output voltage monitor			Accuracy: ±1%														
Output current monitor			Accuracy: ±1%														
Shutdown control			Turns the output off with a LOW (0V to 0.5V) or short-circuit.														
Output on/off control			Possible logic selections: Turn the output on using a LOW (0V to 0.5V) or short-circuit, turn the output off using a HIGH (4.5V to 5V) or open-circuit. Turn the output on using a HIGH (4.5V to 5V) or open-circuit, turn the output off using a LOW (0V to 0.5V) or short-circuit.														
Alarm clear control			Clear alarms with a LOW (0V to 0.5V) or short-circuit.														
CV/CC/ALM/PWR ON/OUT ON indicator			Photocoupler open collector output; Maximum voltage 30V, maximum sink current 8mA.														
Trigger out			Maximum low level output = 0.8V; minimum high level output = 2V; Maximum source current = 8mA.														
Trigger in			Maximum low level input voltage = 0.8V; minimum high level input votage = 2V, Maximum sink current = 8mA.														
Front Panel		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Display, 4 digits Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	800	1200
Current accuracy	0.2% +	mA	600	540	360	300	228	150	114	90	75	57	45	30	15	11.4	7.8
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR														
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output														
Knobs			Voltage, Current														
USB port			Type A USB connector														
Programming and Measurement (RS-232/485, USB, LAN, GPIB)		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	200	180	120	100	76	50	38	30	25	19	15	10	5	3.8	2.6
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	6	6	4	3.3	2.5	1.7	1.2	1	0.8	0.65	0.5	0.34	0.19	0.13	0.09
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	400	360	240	200	152	100	76	60	50	38	30	20	10	7.6	5.2
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	6	6	4	3.3	2.5	1.7	1.2	1	0.8	0.65	0.5	0.34	0.19	0.13	0.09
Input Characteristics		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Norminal input rating			100Vac ~ 240Vac, 50Hz ~ 60Hz, single phase														
Input voltage range			85Vac ~ 265Vac														
Input frequency range			47Hz ~ 63Hz														
Maximum input current	100Vac / 200Vac	A	21 / 11														
Inrush current			Less than 50A														
Maximum input power		VA	2000														
Power factor	100Vac / 200Vac		0.99 / 0.98														
Efficiency (*13)	100Vac / 200Vac	%	76.5 / 79	78/81	82 / 85	82 / 85	83 / 86	83 / 86	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87
Hold-up time			20ms or greater														
Interface Capabilities		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
USB			TypeA : Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)														
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask														
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications														
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface														
Isolated Analog Control Interface (Factory Option)		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Voltage Control			Using 0-5V or 0 ~ 10V signals for programming and measurement														
Current Control			Using 4 ~ 20mA current signals for programming and measurement														
Environmental Conditions		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Operaing temperature			0˚C ~ 50˚C (*14)														
Storage temperature			-25˚C ~ 70˚C														
Operating humidity			20% ~ 85% RH; No condensation														
Storage humidity			90% RH or less; No condensation														
Altitude			Maximum 2000m														
General Specifications		PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Weight	main unit only	kg	Less than 8.7kg														
Dimensions	(W×H×D)	mm	423 × 43.6 × 447.2														
Cooling			Forced air cooling by internal fan.														
EMC			Complies with the European EMC directive 89/336/EEC for Class A test and measurement products.														
Safety			Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking.														
Withstand voltage			AC to Chassis : 1500Vac/1min; AC to Output terminal : 3000Vac/1min;Vout≦150V; Output terminal to Chassis : 1000Vdc/1min; 150<Vout≦600; Output terminal to Chassis : 1500Vdc/1min														
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)														

Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) At 85 ~ 132Vac or 170 ~ 265Vac, constant load.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measure with JEITA RC-9131B (1:1) probe
(*6) Measurement frequency bandwidth is 10Hz ~ 20MHz.
(*7) Measurement frequency bandwidth is 5Hz ~ 1MHz.
(*8) From 10% ~ 90% of rated output voltage, with rated resistive load.
(*9) From 90% ~ 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 0.5% of its rated output for a load change from 10 ~ 90% of its rated output current. Voltage set point from 10% ~ 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
(*12) For 6V ~ 20V model the ripple is measured at 2V ~ rated output voltage and full output current.
For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

Programmable Switching DC Power Supply

SPECIFICATIONS

Model		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Rated output voltage (*1)		V	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Rated output current (*2)		A	400	360	240	200	152	100	76	60	50	38	30	20	10	7.6	5.2
Rated output power		W	2400	2880	3000	3000	3040	3000	3040	3000	3000	3040	3000	3000	3000	3040	3120
Constant Voltage Mode		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Line regulation (*3)		mV	0.01% of rated output voltage +2mV														
Load regulation (*4)		mV	0.01% of rated output voltage +5mV														
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	75	75	75	75	75	100	100	120	300	300	500
	r.m.s. (*7)	mV	10	10	10	10	10	10	10	10	10	15	15	25	35	35	120
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.														
Remote snese compensation voltage (single wire)		V	1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5
Rise time (*8)	No load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250
Fall time (*9)	Rated load	ms	10	50	50	50	50	80	80	80	80	150	150	150	150	200	250
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000
Transient response time (*10)		ms	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Constant Current Mode		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Line regulation (*3)		mA	0.05% of rated output current														
Load regulation (*11)		mA	0.5% of rated output current									1% of rated output current					
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.														
Ripple and noise (*12)	r.m.s.	mA	850	800	650	590	520	290	185	137	107	85	69	58	30	20	15
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			6~15V model : Less than 0.5% rated output current over 30 minutes following power on ; 20~600V model : Less than 0.25% rated output current over 30 minutes following power on.														
Protection Function		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 440	5-396	5 - 262	5 - 220	5 - 167.2	5 - 110	5 - 83.6	5 - 66	5 - 55	3.8 - 41.8	3 - 33	2 - 22	1 - 11	0.76 - 8.36	0.52 - 5.72
	Setting accuracy	A	8	7.2	4.8	4	3.04	2	1.52	1.2	1	0.76	0.6	0.4	0.2	0.152	0.104
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.														
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.														
Low AC input protection (AC-FAIL)	Operation		Turn the output off.														
Shutdown (SD)	Operation		Turn the output off.														
Power limit (POWER LIMIT)	Operation		Over power limit.														
	Value (fixed)		Approx. 105% of rated output power														
Front Panel		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Display, 4 digits Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	800	1200
Current accuracy	0.2% +	mA	1200	1080	720	600	456	300	228	180	150	114	90	60	30	22.8	15.6
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR														
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output														
Knobs			Voltage, Current														
USB port			Type A USB connector														
Programming and Measurement (RS-232/485, USB, LAN, GPIB)		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	400	360	240	200	152	100	76	60	50	38	30	20	10	7.6	5.2
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	12	12	8	6.6	5	3.4	2.4	2	1.6	1.3	1	0.68	0.38	0.26	0.18
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	800	720	480	400	304	200	152	120	100	76	60	40	20	15.2	10.4
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	12	12	8	6.6	5	3.4	2.4	2	1.6	1.3	1	0.68	0.38	0.26	0.18
Input Characteristics		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Norminal input rating			B type : 1P2W 200V models														
Input voltage range			B type : 1P2W 170 ~ 265Vac														
Input frequency range			47Hz ~ 63Hz														
Maximum input current	200Vac	A	B type : 22A														
Inrush current			B type : 1P2W 200V models Less than 100A.														
Power factor	200Vac		0.98 @1 Phase 200Vac														
Efficiency (*13)		%	78.5	81	85	85	86	86	87	87	87	87	87	87	87	87	87
Hold-up time			20ms or greater														
Interface Capabilities		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
USB			TypeA : Host, TypeB : Slave, Speed: 1.1/2.0, USB Class : CDC(Communications Device Class)														
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask														
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications														
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface														
Environmental Conditions		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Operaing temperature			0˚C ~ 50˚C (*14)														
Storage temperature			-25˚C ~ 70˚C														
Operating humidity			20% ~ 85% RH; No condensation														
Storage humidity			90% RH or less; No condensation														
Altitude			Maximum 2000m														
General Specifications		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2
Weight	main unit only	kg	Less than 20kg														
Dimensions	(W×H×D)	mm	423 × 87.2 × 447.2														
Cooling			Forced air cooling by internal fan.														
Withstand voltage			AC to Chassis:500Vac/1min; AC to Output terminal:3000Vac/1min; Vout≦150V; Output terminal to Chassis:1000Vdc/1min; 150<Vout≦600; Output terminal to Chassis: 1500Vdc/1min														
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)														

Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) Single phase 200V models : 170 ~ 265Vac.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measured at rated output voltage and current with JEITA RC-9131B probe.
(*6) Measurement frequency bandwidth is 10Hz ~ 20MHz.
(*7) Measurement frequency bandwidth is 5Hz ~ 1MHz.
(*8) From 10% ~ 90% of rated output voltage, with rated resistive load.
(*9) From 90% ~ 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 2% of its rated output for a load change from 50 to 100% of its rated output current. Voltage set point from 10% ~ 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
(*12) For 6V ~ 20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

Model		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Rated output voltage (*1)		V	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Rated output current (*2)		A	600	540	360	300	228	150	114	90	75	57	45	30	15	11.4	7.8
Rated output power		W	3600	4320	4500	4500	4560	4500	4560	4500	4500	4560	4500	4500	4500	4560	4680
Constant Voltage Mode		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Line regulation (*3)		mV	0.01% of rated output voltage +2mV														
Load regulation (*4)		mV	0.01% of rated output voltage +5mV														
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	75	75	75	75	75	100	100	120	300	300	500
	r.m.s. (*7)	mV	10	10	10	10	10	10	10	10	10	15	15	25	35	35	120
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.														
Remote snese compensation voltage (single wire)		V	1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5
Rise time (*8)	No load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250
Fall time (*9)	Rated load	ms	10	50	50	50	50	80	80	80	80	150	150	150	150	200	250
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000
Transient response time (*10)		ms	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Constant Current Mode		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Line regulation (*3)		mA	0.1% of rated output cur	0.05% of rated output current													
Load regulation (*11)		mA	0.5% of rated output current									1% of rated output current					
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.														
Ripple and noise (*12)	r.m.s.	mA	1400	1315	1060	987	900	472	275	191	138	110	92	81	30	20	15
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			6~15V model : Less than 0.5% rated output current over 30 minutes following power on. 20~600V model : Less than 0.25% rated output current over 30 minutes following power on.														
Protection Function		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 660	5-594	5 - 396	5 - 330	5 - 250.8	5 - 165	5 - 125.4	5 - 99	5 - 82.5	5 - 62.7	4.5 - 49.5	3 - 33	1.5 - 16.5	1.14 - 12.54	0.78 - 8.58
	Setting accuracy	A	12	10.8	7.2	6	4.56	3	2.28	1.8	1.5	1.04	0.9	0.6	0.3	0.228	0.156
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.														
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.														
Low AC input protection (AC-FAIL)	Operation		Turn the output off.														
Shutdown (SD)	Operation		Turn the output off.														
Power limit (POWER LIMIT)	Operation		Over power limit.														
	Value (fixed)		Approx. 105% of rated output power														
Front Panel		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Display, 4 digits Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	800	1200
Current accuracy	0.2% +	mA	1800	1620	1080	900	684	450	342	270	225	171	135	90	45	34.2	23.4
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR														
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output														
Knobs			Voltage, Current														
USB port			Type A USB connector														
Programming and Measurement (RS-232/485, USB, LAN, GPIB)		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	600	540	360	300	228	150	114	90	75	57	45	30	15	11.4	7.8
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	18	18	12	9.9	7.5	5.1	3.6	3	2.4	1.95	1.5	1.02	0.57	0.39	0.27
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	1200	1080	720	600	456	300	228	180	150	114	90	60	30	22.8	15.6
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	18	18	12	9.9	7.5	5.1	3.6	3	2.4	1.95	1.5	1.02	0.57	0.39	0.27
Input Characteristics		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Norminal input rating			B type : 1P2W 200V models, C type : 3P3W 200V models, D type : 3P4W 400V models														
Input voltage range			B type : 1P2W 170 ~ 265Vac, C type : 3P3W 180 ~ 253Vac, D type : 3P4W 360 ~ 440Vac														
Input frequency range			47Hz ~ 63Hz														
Maximum input current	200Vac / 400Vac	A	B type : 33A、C type : 19A、D type 11A														
Inrush current			B type : 1P2W 200V models Less than 150A; C type：3P3W 200V model Less than 100A; D type：3P4W 400V model Less than 50A.														
Power factor	200Vac / 400Vac		0.98 @1 Phase 200Vac / 0.95 @ 3 Phase 200/400Vac														
Efficiency (*13)		%	78.5	81	85	85	86	86	87	87	87	87	87	87	87	87	87
Hold-up time			20ms or greater														
Interface Capabilities		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
USB			TypeA: Host, TypeB : Slave, Speed: 1.1/2.0, USB Class : CDC(Communications Device Class)														
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask														
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications														
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface														
Environmental Conditions		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Operaing temperature			0˚C ~ 50˚C (*14)														
Storage temperature			-25˚C ~ 70˚C														
Operating humidity			20% ~ 85% RH; No condensation														
Storage humidity			90% RH or less; No condensation														
Altitude			Maximum 2000m														
General Specifications		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Weight	main unit only	kg	Less than 28.7kg														
Dimensions	(W×H×D)	mm	423 × 130.8 × 447.2														
Cooling			Forced air cooling by internal fan.														
Withstand voltage			AC to Chassis : 1500Vac/1min; AC to Output terminal : 3000Vac/1min; Vout≦150V;Output terminal to Chassis:1000Vdc/1min; 150<Vout≦600; Output terminal to Chassis:1500Vdc/1min														
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)														

Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) Single phase 200V models: 170-265Vac. Three phase 200V models : 180-253Vac. Three phase 400V models : 360-440Vac.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measured at rated output voltage and current with JEITA RC-9131B probe
(*6) Measurement frequency bandwidth is 10Hz ~ 20MHz.
(*7) Measurement frequency bandwidth is 5Hz ~ 1MHz.
(*8) From 10% ~ 90% of rated output voltage, with rated resistive load.
(*9) From 90% ~ 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 2% of its rated output for a load change from 50 ~ 100% of its rated output current. Voltage set point from 10% ~ 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
(*12) For 6V ~ 20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) Single phase and three phase 200V models : at 200Vac input voltage. Three phase 400V models : at 400Vac input voltage. At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

Programmable Switching DC Power Supply

SPECIFICATIONS

Model		PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4
Rated output voltage (*1)		V	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Rated output current (*2)		A	800	720	480	400	304	200	152	120	100	76	60	40	20	15.2	10.4
Rated output power		W	4800	5760	6000	6000	6080	6000	6080	6000	6000	6080	6000	6000	6000	6080	6240
Constant Voltage Mode		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Line regulation (*3)		mV	0.01% of rated output voltage +2mV														
Load regulation (*4)		mV	0.01% of rated output voltage +5mV														
Ripple and noise (*5)	p-p (*6)	mV	75	75	75	75	75	75	75	75	75	100	100	120	300	300	500
	r.m.s. (*7)	mV	10	10	10	10	10	10	10	10	10	15	15	25	35	35	120
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.														
Remote snese compensation voltage (single wire)		V	1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5
Rise time (*8)	No load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250
Fall time (*9)	Rated load	ms	10	50	50	50	50	80	80	80	80	150	150	150	150	200	250
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000
Transient response time (*10)		ms	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Constant Current Mode		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Line regulation (*3)		mA	0.1% of rated output current				0.05% of rated output current										
Load regulation (*11)		mA	0.5% of rated output current									1% of rated output current					
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.														
Ripple and noise (*12)	r.m.s.	mA	2000	1900	1500	1390	1250	650	365	245	170	140	116	104	30	20	15
Temperature coefficient		ppm/℃	100ppm/℃ after a 30 minute warm-up														
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			6–15V model : Less than 0.5% rated output current over 30 minutes following power on. 20–600V model : Less than 0.25% rated output current over 30 minutes following power on.														
Protection Function		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8 -8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 880	5 -792	5 - 528	5 - 440	5 - 334.4	5 - 220	5 - 167.2	5 - 132	5 - 110	5 - 83.6	5 - 66	4 - 44	2 - 22	1.52 - 16.72	1.04 - 11.44
	Setting accuracy	A	16	14.4	9.6	8	6.08	4	3.04	2.4	2	1.52	1.2	0.8	0.4	0.304	0.208
Under voltage limit (UVL)	Setting range		0 - 6.3	0 -8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.														
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.														
Low AC input protection (AC-FAIL)	Operation		Turn the output off.														
Shutdown (SD)	Operation		Turn the output off.														
Power limit (POWER LIMIT)	Operation		Over power limit.														
	Value (fixed)		Approx. 105% of rated output power														
Front Panel		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Display, 4 digits Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	800	1200
Current accuracy	0.2% +	mA	2400	2160	1440	1200	912	600	456	360	300	228	180	120	60	45.6	31.2
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR														
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output														
Knobs			Voltage, Current														
USB port			Type A USB connector														
Programming and Measurement (RS-232/485, USB, LAN, GPIB)		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	800	720	480	400	304	200	152	120	100	76	60	40	20	15.2	10.4
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	24	24	16	13.2	10	6.8	4.8	4	3.2	2.6	2	1.36	0.76	0.52	0.36
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	1600	1440	960	800	608	400	304	240	200	152	120	80	40	30.4	20.8
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	24	24	16	13.2	10	6.8	4.8	4	3.2	2.6	2	1.36	0.76	0.52	0.36
Input Characteristics		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Norminal input rating			B type : 1P2W 200V models, C type : 3P3W 200V models, D type : 3P4W 400V models														
Input voltage range			B type : 1P2W 170 ~ 265Vac, C type : 3P3W 180 ~ 253Vac, D type : 3P4W 360 ~ 440Vac														
Input frequency range			47Hz ~ 63Hz														
Maximum input current	200Vac / 400Vac	A	B type : 44A, C type : 29A, D type 22A														
Inrush current			B type : 1P2W 200V models Less than 200A; C type：3P3W 200V model Less than 100A; D type：3P4W 400V model Less than 100A.														
Power factor	200Vac / 400Vac		0.98 @1 Phase 200Vac / 0.95 @ 3 Phase 200/400Vac														
Efficiency (*13)		%	78.5	81	85	85	86	86	87	87	87	87	87	87	87	87	87
Hold-up time			20ms or greater														
Interface Capabilities		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
USB			TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)														
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask														
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications														
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface														
Environmental Conditions		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Operating temperature			0˚C ~ 50˚C (*14)														
Storage temperature			-25˚C ~ 70˚C														
Operating humidity			20% ~ 85% RH; No condensation														
Storage humidity			90% RH or less; No condensation														
Altitude			Maximum 2000m														
General Specifications		**PSU**	**6-800**	**8-720**	**12.5-480**	**15-400**	**20-304**	**30-200**	**40-152**	**50-120**	**60-100**	**80-76**	**100-60**	**150-40**	**300-20**	**400-15.2**	**600-10.4**
Weight	main unit only	kg	Less than 37.4kg														
Dimensions	(W×H×D)	mm	423 × 174.4 × 447.2														
Cooling			Forced air cooling by internal fan.														
Withstand voltage			AC to Chassis : 1500Vac/1min; AC to Output terminal : 3000Vac/1min; Vout≦150V; Output terminal to Chassis:1000Vdc/1min; 150<Vout≦600; Output terminal to Chassis:1500Vdc/1min														
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)														

Notes:
(*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
(*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
(*3) Single phase 200V models: 170 ~ 265Vac. Three phase 200V models : 180 ~ 253Vac. Three phase 400V models : 360 ~ 440Vac.
(*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
(*5) Measured at rated output voltage and current with JEITA RC-9131B probe
(*6) Measurement frequency bandwidth is 10Hz ~ 20MHz.
(*7) Measurement frequency bandwidth is 5Hz ~ 1MHz.
(*8) From 10% ~ 90% of rated output voltage, with rated resistive load.
(*9) From 90% ~ 10% of rated output voltage, with rated resistive load.
(*10) Time for output voltage to recover within 2% of its rated output for a load change from 50 ~ 100% of its rated output current. Voltage set point from 10% ~ 100% of rated output.
(*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
(*12) For 6V ~ 20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
(*13) Single phase and three phase 200V models : at 200Vac input voltage. Three phase 400V models : at 400Vac input voltage. At rated output power.
(*14) If install the front panel filter kit, the temperature is guaranteed to 40˚C.

1U Handle & Bracket

PSU-3kW

PSU-4.5kW

PSU-6kW

ORDERING INFORMATION

PSU 6-200	1200W	Programmable Switching DC Power Supply
PSU 8-180	1440W	Programmable Switching DC Power Supply
PSU 12.5-120	1500W	Programmable Switching DC Power Supply
PSU 15-100	1500W	Programmable Switching DC Power Supply
PSU 20-76	1520W	Programmable Switching DC Power Supply
PSU 30-50	1500W	Programmable Switching DC Power Supply
PSU 40-38	1520W	Programmable Switching DC Power Supply
PSU 50-30	1500W	Programmable Switching DC Power Supply
PSU 60-25	1500W	Programmable Switching DC Power Supply
PSU 80-19	1520W	Programmable Switching DC Power Supply
PSU 100-15	1500W	Programmable Switching DC Power Supply
PSU 150-10	1500W	Programmable Switching DC Power Supply
PSU 300-5	1500W	Programmable Switching DC Power Supply
PSU 400-3.8	1520W	Programmable Switching DC Power Supply
PSU 600-2.6	1560W	Programmable Switching DC Power Supply

ACCESSORIES :

Output terminal cover x 1, Analog connector plug kit x 1, Output terminal M8 bolt set(6V~60V model), Input terminal cover x 1, 1U Handle(RoHS), 1U Bracket(LEFT, RoHS), 1U Bracket (RIGHT,RoHS), Power Cord(10A) provided for certain regions only

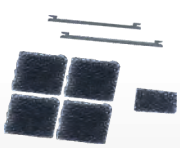
OPTIONAL ACCESSORIES

PSU-01B	Bus Bar for 2 units in parallel operation (Applies to models ≤60 volts)
PSU-01C	Cable for 2 units in parallel connection
PSU-02B	Bus Bar for 3 units in parallel operation (Applies to models ≤60 volts)
PSU-02C	Cable for 3 units in parallel connection
PSU-03B	Bus Bar for 4 units in parallel operation (Applies to models ≤60 volts)
PSU-03C	Cable for 4 units in parallel connection
PSU-232	RS232 Cable with DB9 connector kit
PSU-485	RS485 Cable with DB9 connector kit
PSU-001	Front panel filter kit(factory Installed)
PSU-01A	Joins a vertical stack of 2 PSU units together. 2U-sized handles x2, joining plates x2
PSU-02A	Joins a vertical stack of 3 PSU units together. 3U-sized handles x2, joining plates x2
PSU-03A	Joins a vertical stack of 4 PSU units together. 4U-sized handles x2, joining plates x2
PSU-ISO-I	Isolate current remote control card(factory option)
PSU-ISO-V	Isolate voltage remote control card(factory option)
GTL-246	USB Cable, USB 2.0A-B Type Cable, 4P
GTL-258	GPIB Cable, 2000mm
GTL-259	RS-232 Cable with DB9 connector to RJ45
GTL-260	RS-485 Cable with Db9 connector to RJ45
GTL-261	Serial Master Cable+Terminator, 0.5M
GTL-262	RS-485 Slave cable
GRM-001	Slide bracket 2pcs/set ,PSU option
PSU-GPIB	GPIB Interface card (factory option)
GPW-001	UL/CSA power cord 3m ,PSU option
GPW-002	VDE power cord 3m ,PSU option
GPW-003	PSE power cord 3m ,PSU option

FREE DOWNLOAD

Driver LabView Driver

PSU-001



PSU-01C

PSU-02C

GPW-001

PSU-01A

PSU-01B

PSU-232

PSU-03B

GPW-002

PSU-02A

PSU-02B

PSU-485

PSU-03C

GPW-003

PSU-03A

GRM-001

GTL-259

GTL-260

GTL-261

GTL-262

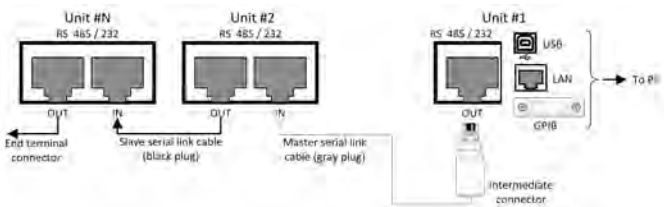
A. SERIES/PARALLEL OPERATION AND HIGH POWER DENSITY

Series Connection	1 unit	2 units
Height of sets	1U	2U
PSU 6-200	6V	12V
	200A	200A
PSU 8-180	8V	16V
	180A	180A
PSU 12.5-120	12.5V	25V
	120A	120A
PSU 15-100	15V	30V
	100A	100A
PSU 20-76	20V	40V
	76A	76A
PSU 30-50	30V	60V
	50A	50A
PSU 40-38	40V	80V
	38A	38A
PSU 50-30	50V	100V
	30A	30A
PSU 60-25	60V	120V
	25A	25A
PSU 80-19	80V	160V
	19A	19A
PSU 100-15	100V	200V
	15A	15A
PSU 150-10	150V	300V
	10A	10A
PSU 300-5	300V	600V
	5A	5A
PSU 400-3.8	400V	NA
	3.8A	NA
PSU 600-2.6	600V	NA
	2.6A	NA

Series Parallel	1 unit	2 units	3 units	4 units
Height of sets	1U	2U	3U	4U
PSU 6-200	6V	6V	6V	6V
	200A	400A	600A	800A
PSU 8-180	8V	8V	8V	8V
	180A	360A	540A	720A
PSU 12.5-120	12.5V	12.5V	12.5V	12.5V
	120A	240A	360A	480A
PSU 15-100	15V	15V	15V	15V
	100A	200A	300A	400A
PSU 20-76	20V	20V	20V	20V
	76A	152A	228A	304A
PSU 30-50	30V	30V	30V	30V
	50A	100A	150A	200A
PSU 40-38	40V	40V	40V	40V
	38A	76A	114A	152A
PSU 50-30	50V	50V	50V	50V
	30A	60A	90A	120A
PSU 60-25	60V	60V	60V	60V
	25A	50A	75A	100A
PSU 80-19	80V	80V	80V	80V
	19A	38A	57A	76A
PSU 100-15	100V	100V	100V	100V
	15A	30A	45A	60A
PSU 150-10	150V	150V	150V	150V
	10A	20A	30A	40A
PSU 300-5	300V	300V	300V	300V
	5A	10A	15A	20A
PSU 400-3.8	400V	400V	400V	400V
	3.8A	7.6A	11.4A	15.2A
PSU 600-2.6	600V	600V	600V	600V
	2.6A	5.2A	7.8A	10.4A

To augment output power, the PSU-series can realize two-fold rated power(models under 300V)via 2 same model units in series connection; and four-fold rated power via 4 same model units in parallel connection so as to satisfy customers with large voltage and large current requirements. 2U height units in series connection can achieve maximum 600V output. 4U height units in parallel connection can output maximum 800A and 6240W.

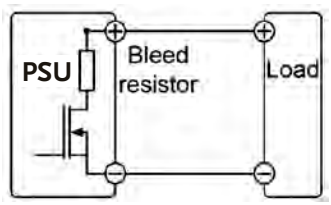
B. REMOTE PROGRAM CONTROL (UP TO 31 UNITS CONNECTION)



Provide RS-232, RS-485, USB, GPIB and LAN for PC to remote control Master PSU-Series. RJ-45 connector on the rear panel can connect up to 31 units.
LAN or USB remote control and augmenting slave units by using PSU-Series multi-drop mode will no longer need any switch/hub that can help customers save equipment costs.

* For the detailed information please refer to User Manual

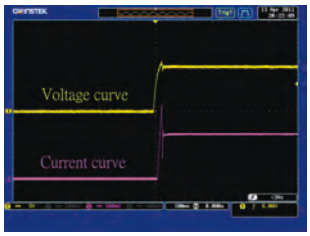
C. BLEEDER CONTROL



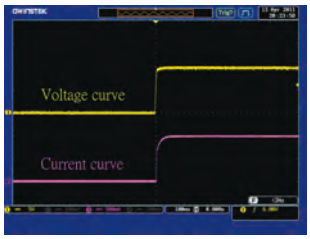
PSU-Series Built-in Bleed Resistor

The PSU-Series employs a bleed resistor in parallel with the output terminal. Bleed resistor is designed to dispatch the power from the power supply filter capacitors when power is turned off or the load is disconnected. Without a bleed resistor, power terminal may remain charged on the filter capacitors for some time and be potentially hazardous. In addition, bleed resistor also allows for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load. The bleed resistance can be turned on or off using the configuration setting.

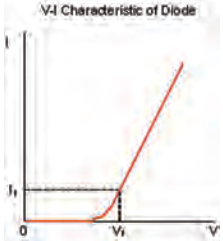
D. C.V/C.C PRIORITY MODE



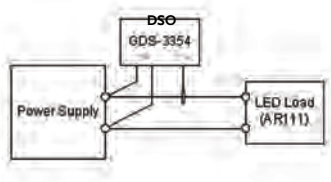
Under the conventional C.V mode, inrush current and surge voltage appeared at forward voltage(Vf) of LED.



Under C.C priority mode, inrush and surge voltage are effectively restrained.



V-I Characteristic of Diode



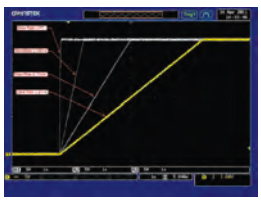
Using GDS-3354 DSO to Test LED Operation Under C.V Priority and C.C Priority Respectively

Conventional power supplies under the CV priority mode will produce inrush current and surge voltage at turn-on. The PSU-series has CV and CC priority modes.

The CC priority mode can prevent inrush current and surge voltage from occurring at turn-on to protect DUT.

E. ADJUSTABLE SLEW RATE

VOLTAGE SLEW RATE	CURRENT SLEW RATE
0.001V~0.060V/msec (PSU 6-200)	0.001A~2.000A / msec (PSU 6-200)
0.001V~0.080V/msec(PSU 8-180)	0.001A~1.800A / msec (PSU 8-180)
0.001V~0.125V/msec (PSU 12.5-120)	0.001A~1.200A / msec (PSU 12.5-120)
0.001V~0.150V/msec(PSU 15-100)	0.001A~1.000A / msec(PSU 15-100)
0.001V~0.200V/msec (PSU 20-76)	0.001A~0.760A / msec (PSU 20-76)
0.001V~0.300V/msec(PSU 30-50)	0.001A~0.500A / msec(PSU 30-50)
0.001V~0.400V/msec (PSU 40-38)	0.001A~0.380A / msec (PSU 40-38)
0.001V~0.500V/msec(PSU 50-30)	0.001A~0.300A / msec(PSU 50-30)
0.001V~0.600V/msec (PSU 60-25)	0.001A~0.250A / msec (PSU 60-25)
0.001V~0.800V/msec(PSU 80-19)	0.001A~0.190A / msec(PSU 80-19)
0.001V~1.000V/msec (PSU 100-15)	0.001A~0.150A / msec (PSU 100-15)
0.001V~1.500V/msec (PSU 150-10)	0.001A~0.100A / msec (PSU 150-10)
0.001V~1.500V/msec (PSU 300-5)	0.001A~0.025A / msec (PSU 300-5)
0.001V~2.000V/msec (PSU 400-3.8)	0.001A~0.008A / msec (PSU 400-3.8)
0.001V~2.400V/msec (PSU 600-2.6)	0.001A~0.006A / msec (PSU 600-2.6)



Adjustable Voltage Slew Rate

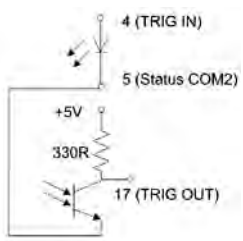
The PSU series can adjust slew rate for current and voltage. Via setting the rise and fall time of voltage and current, users can verify DUT's characteristics during voltage and current variation. Additionally, slew rate adjustment can mitigate voltage shift to effectively prevent DUT from being damaged by inrush current. This function is ideal for tests such as capacitive load and motor.

F. OVP,OCP AND UVL

MODEL	OCP	OVP	UVL
PSU 6-200	5 ~ 220A	0.6 ~ 6.6V	0 ~ 6.3V
PSU 8-180	5 ~ 198A	0.8 ~ 8.8V	0 ~ 8.4V
PSU 12.5-120	5 ~ 132A	1.25 ~ 13.75V	0 ~ 13.12V
PSU 15-100	5 ~ 110A	1.5 ~ 16.5V	0 ~ 15.75V
PSU 20-76	5 ~ 83.6A	2 ~ 22V	0 ~ 21V
PSU 30-50	5 ~ 55A	3 ~ 33V	0 ~ 31.5V
PSU 40-38	3.8 ~ 41.8A	4 ~ 44V	0 ~ 42V
PSU 50-30	3 ~ 33A	5 ~ 55V	0 ~ 52.5V
PSU 60-25	2.5 ~ 27.5A	5 ~ 66V	0 ~ 63V
PSU 80-19	1.9 ~ 20.9A	5 ~ 88V	0 ~ 84V
PSU 100-15	1.5 ~ 16.5A	5 ~ 110V	0 ~ 105V
PSU 150-10	1 ~ 11A	5 ~ 165V	0 ~ 157.5V
PSU 300-5	0.5 ~ 5.5A	5 ~ 330V	0 ~ 315V
PSU 400-3.8	0.38 ~ 4.18A	5 ~ 440V	0 ~ 420V
PSU 600-2.6	0.26 ~ 2.86A	5 ~ 660V	0 ~ 630V

Once the voltage or current output exceeds the preset level of OVP or OCP, PSU will shut down output to protect DUT.UVL is for users to set the minimum output voltage from the output terminal.

G. TRIGGER CONTROL (TRIGGER INPUT/TRIGGER OUTPUT)



PSU-series provides users with complete trigger input and trigger output functions so as to flexibly control PSU-series. Each function is elaborated as follows.

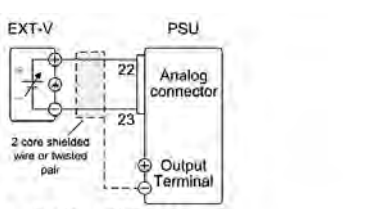
Trigger Input function :

1. Allow users to set the effective pulse width from 0~60ms for trigger input (0: the LOW or HIGH signal of DC level for trigger input)
2. Receive trigger input to control PSU-series output or to output preset voltage and current.
3. Receive trigger input to upload preset memory parameters.

Trigger Output function :

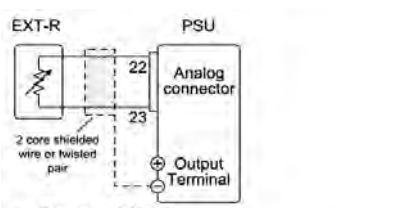
1. Allow users to set the effective pulse width from 0~60ms for trigger output (0: the LOW or HIGH signal of DC level for trigger output)
2. Set LOW or HIGH for output DC level
3. PSU produces trigger output signal when setting output or changing preset value or uploading preset memory parameters.

H. EXTERNAL ANALOG CONTROL FUNCTION



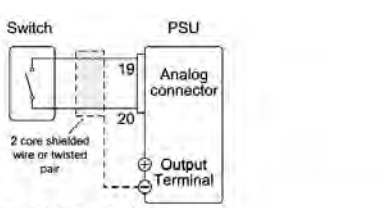
- Pin23 → EXT-V (-)
- Pin22 → EXT-V (+)
- Wire shield → negative (-) output terminal

External Voltage Controls Voltage Range



- Pin22 → EXT-R
- Pin23 → EXT-R
- Wire shield → negative (-) output terminal

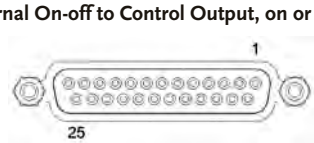
External Resistance Controls Voltage Range



- Pin19 → Switch
- Pin20 → Switch
- Wire shield → negative (-) output terminal

External On-off to Control Output, on or off

The rear panel of the PSU-series has an analog control terminal. The external analog control interface allows external voltage or resistance to control voltage and current output; and allows power supply to output or to be turned on and off. The diagram on the upper shows typical connection methods for external control applications. For more detailed connection information please refers to user manual.



Fanless Multi-Range DC Power Supply

PFR-100L

PFR-100M

CE | GPIB | USB | RS-232 | Analog Control | LAN | RS-485 | Front/Rear Output

The PFR-100 series, a small and high-performance programmable D.C. power supply, adopts natural convection design to dissipate heat. The fanless structure allows users to focus on their experiments and tests in a quiet environment. Fanless power supply will not suck in dust and foreign objects, therefore, PFR-100 series has a longer life cycle compared with that of power supplies with fan.

The PFR-100 series is a power supply with a five-fold rated power that allows users to self-define voltage and current under rated power conditions so as to satisfy them with wider voltage and current operational ranges. PFR-100 series, with rated 100W, provides two models: PFR-100L- maximum output voltage of 50 V (at 2 A) or maximum output current of 10 A (at 10 V); PFR-100M- maximum output voltage of 250 V (at 0.4 A) or maximum output current of 2 A (at 50 V).

The PFR-100 series provides front and rear panel output terminals. The front panel output terminal helps users shorten test lead replacement time while conducting adjustment on front panel's function keys. The rear panel output terminal facilitates an easy wiring operation for rackmount assembly. 3U height, 70mm width and 2.5 KG in weight have greatly elevated PFR-100 series portability. Furthermore, the multi-drop mode allows users to control up to 31 PFR-100 series without using switch/Hub that help users save the equipment cost.

The LAN interface for PFR-100 is Ethernet port. PFR-100 also has a built-in web server and intuitive user interface. Users, via general browsers including Internet Explorer, Mozilla Firefox or Android cellular phones, can monitor PFR-100's test and measurement anywhere. Users not only can remotely monitor PFR-100 via internet, but also remotely observe and adjust their operating PFR-100 in the lab from your home. The outputs of PFR-100 series can be monitored including OVP, OCP, UVL; and the system information can be checked such as unit's serial number, firmware edition and internet setting. Users can remotely adjust PFR-100 settings, including output voltage/current, the slew rate for voltage/current, Bleeder circuit control, OCP, delayed time for output voltage and Buzzer settings.

The PFR-100 series provides special functionalities to meet test requirements for different load's characteristics. The CC priority mode can be applied for DUTs with diode characteristics to prevent DUT from being damaged by inrush current. A slow rise time for voltage can also protect DUT from inrush current, especially for tests on capacitive load. When power is off or load is disconnected, the activation of Bleeder circuit control will allow the bleeder resistor to consume filter capacitor's electricity. Without the bleed resistor, power supply's filter capacitor may still have electricity that is a potential hazard. For automatic testing equipment systems, the bleeder resistor allows PFR-100 series to rapidly discharge to prepare itself for the next operation.

FEATURES

* Constant Power Output for Fivefold Multi-Range(V&I) Operation
* Natural Convection Cooling Design (Fanless Structure)
* Preset Memory Function
* Output ON/OFF Delay Function
* CV, CC Priority Mode
* Adjustable Slew Rate For Voltage and Current
* Bleeder Circuit Control
* Protection : OVP, OCP, AC FAIL and OTP
* Support Front Panel and Rear Panel Output
* Interface: USB,LAN,RS-232/485(std.); GPIB(opt.)
* Web Server Monitoring and Control
* External Analog Control and Monitor Function
* Remote Sensing Function

Model	PFR-100L	PFR-100M
Output Channel	1	1
Output Voltage	0 to 50 V	0 to 250 V
Output Current	0 to 10 A	0 to 2 A
Rated Power	100 W	100 W

SPECIFICATIONS

Model		PFR-100L	PFR-100M
OUTPUT RATING			
Rated Output Voltage		50 V	250 V
Rated Output Current		10 A	2 A
Rated Output Power		100 W	100 W
REGULATION(CV)			
Load Regulation (*2)		10 mV	33 mV
Line Regulation (*1)		3 mV	5 mV
REGULATION(CC)			
Load Regulation (*9)		10 mA	3.2 mA
Line Regulation (*1)		8 mA	1.2 mA
RIPPLE & NOISE (*3)			
Vp-p (*4)		50 mV	150 mV
Vr.m.s.(*5)		4 mV	15 mV
A r.m.s.		10 mA	2 mA
PROGRAMMING ACCURACY			
Voltage	0.1 % of setting +	40 mV	200 mV
Current	0.2 % of setting +	20 mA	2 mA
MEASUREMENT ACCURACY			
Voltage	0.1 % of reading +	40 mV	200 mV
Current	0.2 % of reading +	20 mA	2 mA
RESPONSE TIME			
Rise Time (*6)	Rated load	50 ms	100 ms
Fall Time (*7)	Rated load	100 ms	200 ms
	No load	500 ms	1000 ms
Transient Response Time (*8)		1.5 ms	2 ms
PROGRAMMING RESOLUTION			
Voltage		2 mV	10 mV
Current		1 mA	0.1 mA
MEASUREMENT RESOLUTION			
Voltage		2 mV	10 mV
Current		1 mA	0.1 mA
PROTECTION FUNCTION			
Over Voltage Protection (OVP)	Setting range	5 to 55 V	5 to 275 V
Over Current Protection (OCP)	Setting range	1 to 11 A	0.2 to 2.2 A
Under Voltage Limit (UVL)	Setting range	0 to 52.5 V	0 to 262.5 V
Over Temperature Protection (OTP)	Operation	Turn the output off.	Turn the output off.
Low AC Input Protection (AC-Fail)	Operation	Turn the output off.	Turn the output off.
Power Limit (Power Limit)	Operation	Turn the output off.	Turn the output off.

PFR-Series

Rear Panel

SPECIFICATIONS			
Model		**PFR-100L**	**PFR-100M**
FRONT PANEL DISPLAY ACCURACY, 4 DIGITS			
Voltage	**0.1 % of reading +**	40 mV	200 mV
Current	**0.2 % of reading +**	20 mA	2 mA
ENVIRONMENT CONDITION			
Operating Temperature		0 ℃ to 40 ℃	
Storage Temperature		-20 ℃ to 70 ℃	
Operating Humidity		20 % to 80 % RH; No condensation	
Storage Humidity		20 % to 85 % RH; No condensation	
READBACK TEMP. COEFFICIENT(After A 30 Minute Warm-up)			
Voltage		100 ppm/℃	
Current		200 ppm/℃	
OTHER			
Analog Control		Yes	
Interface		USB, LAN, RS-232/485(std.); GPIB(opt.)	
AC Input		85 to 265 VAC, 47 to 63 Hz, single phase	
DIMENSIONS & WEIGHT			
		70(W)x124(H)x300(D)mm; Approx. 2.5 kg	

Note: *1: At 85 to 132 Vac or l 70 to 265 Vac, constant load.
*2: From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
*3: Measure with JEITA RC-9131B (1:1) probe
*4: Measurement frequency bandwidth is 10 Hz to 20 MHz.
*5: Measurement frequency bandwidth is 5 Hz to 1 MHz.
*6: From 10 % to 90 % of rated output voltage, with rated resistive load.
*7: From 90 % to 100 % of rated output voltage, with rated resistive load.
*8: Time for output voltage to recover within 0.1 % + 10 mV of its rated output for a load change from 50 % to 100 % of its rated output current.
*9: For load voltage change, equal to the unit voltage rating, constant input voltage.

ORDERING INFORMATION

PFR-100L Fanless Multi-Range DC Power Supply
PFR-100M Fanless Multi-Range DC Power Supply (European terminals provided only)

ACCESSORIES :
Power cord , GTL-134 test lead , Accessory Packages
GTL-104A test lead (for PFR-100L only) , GTL-105A test lead (for PFR-100M only) ,
GTL-204A test lead (for PFR-100L European Type Jack Terminal)

OPTIONAL ACCESSORIES

GTL-258	GPIB Cable, 2000mm	**GTL-259**	RS-232 Cable with DB9 connector to RJ45
PSU-232	RS-232 Cable with DB9 Connector Kit	**GTL-260**	RS-485 Cable with DB9 connector to RJ45
PSU-485	RS-485 Cable with DB9 Connector Kit	**GTL-261**	Serial Master Cable+Terminator, 0.5 M
GTL-246	USB Cable (USB 2.0 Type A-TypeB Cable)	**GTL-262**	RS-485 Slave cable
GRA-431-J-100/200	Rack Mount Kit(JIS)with AC 100 V/200 V		
GRA-431-E-100/200	Rack Mount Kit(EIA)with AC 100 V/200 V		
PFR-GPIB	Optional GPIB Interface for PFR (Factory Installed)		

GTL-259 **GTL-260** **GTL-261** **GTL-262**

GRA-431-J/E Rack Mount Kit(JIS/EIA)

PSU-232 RS-232 Cable with DB9 Connector Kit

PSU-485 RS-485 Cable with DB9 Connector Kit

GTL-258 GPIB Cable, 2000mm

GTL-134 Test Lead

Programmable Switching DC Power Supply (Multi-range DC Power Supply)

PSB-2400L2

PSB-2400L/PSB-2400H/ PSB-2800L/PSB-2800H

PSB-2800LS

USB | RS-232 | GPIB | Analog Control | Local Bus | Front/Rear Output | LabVIEW Driver

The PSB-2000 Series is a high power density, programmable and multi-range output DC power supply. There are six models in the series including one power booster unit. The PSB-2000 Series has the output voltage of 0~80V and 0~800V, and the output power ranges of 0~400W and 0~800W. The multi-range output functionality facilitates flexible collocations of higher voltage and larger current under the rated power range. Both series and parallel connections can be applied to the PSB-2000 Series to fulfill the requirements of higher

The PSB-2000 Series provides three sets of preset function keys to memorize regularly used settings of voltage, current and power that users can recall rapidly. The sequence function, via RS232C, USB interface or optional GPIB interface, can connect with the computer to produce output power defined by sequence of a series of set voltage and current steps that are defined by the computer. This function is often used to establish a standard test procedure for the verification of the influence on DUTs done by the swiftly changing operating

The PSB-2000 Series protects over voltage and over current. The power supply output function will be shut down to protect DUTs while the protection mechanism is triggered to function. When conducting battery charging operation, the Hi-Ω mode of the PSB-2000 Series will prevent reverse current from damaging power supply.

The PSB-2000 Series provides analog control interfaces on the rear panel to control PSB-2000 Series output via the external voltage or to externally monitor voltage and current output status of power supply. The PSB-2000 Series panel can be rotated 90 degree angle suitable for vertical or horizontal position to accommodate the ideal space utilization.

FEATURES

* Output Voltage Rating : 80V/800V, Output Power Rating : 400W ~ 800W
* Constant Power Output for Multi-Range (V & I) Operation
* Series and Parallel Operation (2 Units in Series or 4 Units in Parallel Maximum)
* 90 Degree Angle Rotatable Control Panel
* Sequence Function Edited by PC will be Controlled Through Power Supply Optional Interfaces
* Standard Interface : RS-232C/USB/Analog Control Interface
* Optional Interface : GPIB
* Preset Function (3 Points)
* LabVIEW Driver

SERIES OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS
PSB-2400L	80V/40A	160V/40A
PSB-2800L	80V/80A	160V/80A
PSB-2800LS (Booster Unit for PSB-2800L Only)	N/A	N/A
PSB-2400L2	N/A	N/A
PSB-2400H	N/A	N/A
PSB-2800H	N/A	N/A

PARALLEL OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS	THREE UNITS	FOUR UNITS
PSB-2400L	80V/40A	80V/80A	80V/120A	80V/160A
PSB-2800L	80V/80A	80V/160A	80V/240A	80V/320A
PSB-2800LS	N/A	80V/160A (PSB-2800L x 1+ PSB-2800LS x 1)	80V/240A (PSB-2800L x 1+ PSB-2800LS x 2)	N/A
PSB-2400L2	N/A	N/A	N/A	N/A
PSB-2400H	800V/3A	800V/6A	N/A	N/A
PSB-2800H	800V/6A	800V/12A	N/A	N/A

SPECIFICATIONS

	PSB-2400L	PSB-2800L	PSB-2400L2	PSB-2400H	PSB-2800H	PSB-2800LS
OUTPUT RATING						
Voltage **Current** **Power**	0 ~ 80V 0 ~ 40A 400W	0 ~ 80V 0 ~ 80A 800W	0 ~ 80V x 2CH 0 ~ 40A x 2CH 800W	0 ~ 800V 0 ~ 3A 400W	0 ~ 800V 0 ~ 6A 800W	80V 80A 800W
REGULATION (CV)						
Load **Line**	0.01% ± 3mV of rated voltage 0.01% ± 2mV of rated voltage			0.01% ± 30mV of rated voltage 0.01% ± 20mV of rated voltage		N/A
REGULATION (CC)						
Load **Line**	0.02% ± 3mA of rated current 0.01% ± 2mA of rated current			0.05% ± 15mA of rated current 0.05% ± 10mA of rated current		N/A
RIPPLE & NOISE (Noise Bandwidth 20MHz ; Ripple Bandwidth=1MHz)						
CV p-p	90mV	150mV	90mV	250mV(only output voltage measures more than 1% of the rated voltage)	300mV(only output voltage measures more than 1% of the rated voltage)	N/A
CV rms	4mV	6mV	4mV	20mV(when current measures<2A) 35mV(when current measures>2A)	25mV(when current measures<2A) 40mV(when current measures>2A)	
CC rms	30mA	60mA	30mA	15mA	20mA	
PROGRAMMING ACCURACY						
Voltage **Current** **Power**	0.1% setting±2digits 0.2%setting±2digits ± 10W			0.1% setting±2digits 0.2% setting±2digits ±10W (only output voltage measures more than 1% of rated voltage)		N/A
READ BACK ACCURACY						
Voltage **Current** **Power**	0.2% reading±2digits 0.3% reading±2digits 0.5% reading±5digits			0.2% reading±2digits 0.3% reading±2digits 0.5% reading±Vout x 40mA		N/A
RESPONSE TIME						
Raise Time(Full load/No load) **Fall Time(Full load)** **Fall Time(No load)** **Load Transient Recover Time (Load change from 50~100%)**	50ms 100ms 500ms 1ms			200ms 500ms 1000ms 7ms		N/A
PROGRAMMING RESOLUTION						
Voltage **Current** **Power**	10mV 10mA 10W			100mV 10mA 10W		N/A
MEASUREMENT RESOLUTION						
Voltage **Current** **Power**	10mV 10mA 10W			100mV 10mA 10W		N/A
SERIES AND PARALLEL CAPABILITY						
Channel Number **Series Operation** **Parallel Operation** **Parallel with booster PSB-2800LS**	1 Up to 2 Units Up to 4 Units N/A	1 Up to 2 Units Up to 4 Units Up to 3 Units	2 N/A N/A N/A	1 N/A Up to 2 Units N/A	1 N/A Up to 2 Units N/A	For PSB-2800L Only
PPROTECTION FUNCTION						
OVP (Fixed) **OVP (Variable)** **OCP (Fixed)** **OCP (Variable)** **OHP**	Output off when 110% of rated voltage Output off when operating; Setting range:1V~84V with front panel Output off when 110% of rated current Output off when operating;Setting range:1A~42A(84A for model number) Output off above heat sink setting temperature			Output off when output voltage exceeds 110% of rated voltage Presettable in range from 10V ~ 840V om front panel Output off when output voltage exceed 110% of rated current Presettable in range from 0.1A ~ 6.30A om front panel Output off at the intemal heat sink temperature over setting value		N/A
ENVIRONMENT CONDITION						
Operation Temp **Storage Temp** **Operating Humidity** **Storage Humidity**	0℃ ~ 40℃ -20℃ ~ 70℃ 30% ~ 80% RH (no dew condensation) 30% ~ 80% RH (no dew condensation)					N/A
OTHER						
Inrush Current **Power Consumption/Factor**	35A Max 560VA/0.99	70A Max 1120VA/0.99	70A Mmax 1120VA/0.99	35A Max 560VA/0.99	70A Max 1120VA/0.99	70A Max 1120VA/0.99
Cooling Method **Power Source** **Interface (Standard)** **Interface (Optional)** **Analog Control**	Forced air-cooling with fan motor 100VAC ~ 240VAC, 50/60Hz, Single phase RS-232C/USB GPIB Yes					
DIMENSIONS & WEIGHT						
	210(W) x 124(H) x 290(D)mm					
	Approx.5kg	Approx.7kg	Approx.7kg	Approx. 5kg	Approx. 6kg	Approx. 7kg

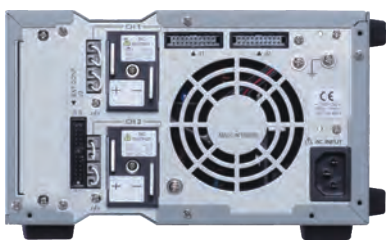
Programmable Switching DC Power Supply (Multi-range DC Power Supply)

PSB-2400L2

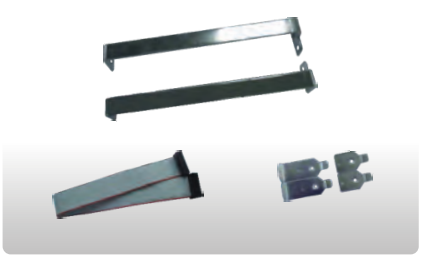
PSB-2400L/PSB-2400H/ PSB-2800L/PSB-2800H

PSB-2800LS

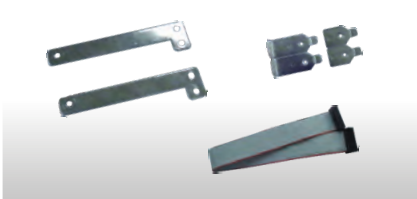
Rear Panel



PSB-003 Parallel Connection Kit for Horizontal Installation



PSB-004 Parallel Connection Kit for Vertical Installation



ORDERING INFORMATION

PSB-2400L	0~80V/0~40A/400W Multi-Range DC Power Supply
PSB-2800L	0~80V/0~80A/800W Multi-Range DC Power Supply
PSB-2400L2	0~80V x 2/0~40A x 2/800W Multi-Range DC Power Supply
PSB-2400H	0~800V/0~3A/400W Multi-Range DC Power Supply
PSB-2800H	0~800V/0~6A/800W Multi-Range DC Power Supply
PSB-2800LS	800W Slave (Booster) Unit For Current Extension Only

ACCESSORIES :

AC Power Cord x 1, External Control Connector (26pin), Screws for output terminals on rear panel, Protection covers for output terminals on rear panel, Protection caps for output terminals on the front panel, GND Cable, USB Cable (For Model Number : PSB-2400L; PSB-2800L; PSB-2400L2; PSB-2400H; PSB-2800H) Local Bus (For Model Number : PSB-2400L; PSB-2800L; PSB-2400L2; PSB-2400H; PSB-2800H)

OPTIONAL ACCESSORIES

PSB-001	GPIB Card
PSB-003	Parallel Connection Kit for Horizontal Installation. Kit Includes : (PSB-007 Joint Kit, Horizontal bus bar x 2 , PSB-005 x1)
PSB-004	Parallel Connection Kit for Vertical Installation. Kit Includes : (PSB-007 Joint Kit, Verical bus bar x 2, PSB-005 x 1)
PSB-005	Parallel Connection Signal Cable
PSB-006	Series Connection Signal Cable
PSB-007	Joint Kit : Includes 4 Joining Plates, (M3x6)screws x 4 ; (M3x8)screw x 2
PSB-008	RS232C Cable (PSB-2000 Only)
GTL-246	USB Cable
GTL-248	GPIB Cable
GRJ-1101	Modular Cable
GRA-424	Rack Mount Kit

FREE DOWNLOAD

Driver	Labview Driver

PSB-001 GPIB Control Board

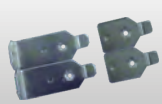
GRJ-1101 Modular Cable

PSB-008 RS-232C Cable (PSB-2000 Only)

PSB-005 Parallel Connection Signal Cable

PSB-006 Series Connection Signal Cable

PSB-007 Joint Kit



Programmable Switching DC Power Supply

PSH-Series

RS-232 | GPIB | Rear-Panel Output | PC Software | LabVIEW Driver

FEATURES

* Wide Input Voltage Range and High Power Factor (P.F)
* High Efficiency and High Power Density
* Constant Voltage and Constant Current Operation
* Over Voltage , Over Current and Over Temperature Protection
* Self-Test and Software Calibration
* Output ON/OFF Control
* Low Ripple and Noise
* LCD Display
* Built-in Buzzer Alarm
* Standard Interface : RS-232C
* Optional Interface : GPIB (IEEE-488.2)
* LabVIEW Driver

The PSH-Series is a single output from 360W to 1080W, programmable switching DC power supply. OVP, OCP and OTP protect the power supply and loads from unexpected conditions. Remote sensing adds an extra level of precision by compensating cable losses between loads. The bright LCD with simultaneous parameter outputs allows effortless operation. Self-test and software calibration features also reduce maintenance overhead. SCPI commands and LabVIEW driver access through the RS-232C or the optional GPIB interface allow remote control and ATE software development capability. Modular architecture, dedicated rear-panel output, and the 19 inch 4U rack mounting option ensure that the PSH-Series is optimized for large systems.

SPECIFICATIONS

	PSH-2018A	PSH-3610A	PSH-3620A	PSH-3630A
OUTPUT				
Voltage Current	20V 18A	36V 10A	36V 20A	36V 30A
REGULATION (C.V.)				
Load Line	≦ 0.1%+5mV ≦ 0.05%+5mV	≦ 0.1%+5mV ≦ 0.05%+5mV	≦0.1%+5mV ≦0.05%+5mV	≦ 0.1%+5mV ≦ 0.05%+5mV
REGULATION (C.C.)				
Load Line	≦ 0.2%+5mA ≦ 0.2%+5mA	≦ 0.2%+5mA ≦ 0.2%+5mA	≦0.2%+10mA ≦0.2%+10mA	≦ 0.2%+15mA ≦ 0.2%+15mA
RIPPLE & NOISE				
Voltage (mVrms) Voltage (mVp-p) Current (mArms)	≦ 10mVrms ≦ 100mVp-p 20Hz~20MHz ≦ 0.2%	≦ 10mVrms ≦ 100mVp-p 20Hz~20MHz ≦ 0.2%	≦ 10mVrms ≦ 100mVp-p 20Hz~20MHz ≦0.2%+20mA	≦ 10mVrms ≦ 100mVp-p 20Hz~20MHz ≦ 0.2%+40mA
RESOLUTION				
Voltage Current	10mV 10mA	10mV 10mA	10mV 10mA	10mV 10mA
PROGRAM ACCURACY				
Voltage Current	≦ 0.05%+25mV ≦ 0.2%+30mA	≦ 0.05%+25mV ≦ 0.2%+30mA	≦ 0.05%+25mV ≦ 0.2%+30mA	≦ 0.05%+25mV ≦ 0.2%+30mA
READBACK RESOLUTION (Meter)				
Voltage Current	Same as Resolution Same as Resolution	Same as Resolution Same as Resolution	Same as Resolution Same as Resolution	As Resolution As Resolution
READBACK ACCURACY (Meter)				
Voltage Current	Same as Program Accuracy Same as Program Accuracy	Same as Program Accuracy Same as Program Accuracy	Same as Program Accuracy Same as Program Accuracy	As Program Accuracy As Program Accuracy
READBACK TEMP. COEFFICIENT				
Voltage (25 ±5℃)	≦ 100ppm/°C	≦ 100ppm/°C	≦100ppm/°C	≦100ppm/°C
RESPONSE (Rise/Fall) TIME				
Voltage Up (10%~90%) Voltage Down (90%~10%)	≦150mS (≦95% rating load) ≦150mS (≧10% rating load)	≦150mS (≦95% rating load) ≦150mS (≧10% rating load)	≦150mS (≦95% rating load) ≦150mS (≧ 10% rating load)	≦150mS (≦95% rating load) ≦150mS (≧10% rating load)
RECOVERY TIME (50% Step Load Change From 25%~75%)				
CV Mode	≦ 2mS	≦ 2mS	≦2mS	≦2mS
PROTECTION				
OVP/OCP/OTP	V	V	V	V
Rush Current	V	V	V	V
OUTPUT ON/OFF CONTROL				
	V	V	V	V
INTERFACE				
Standard : RS-232C; Optional : GPIB				
POWER SOURCE				
AC90V~250V, 50/60Hz				
DIMENSIONS & WEIGHT				
	108(W)x142(H)x393(D) mm; Approx. 3.3kg	108(W)x142(H)x393(D) mm; Approx. 3.3kg	188(W)x142(H)x393(D) mm; Approx. 6.2kg	268(W)x142(H)x393(D) mm; Approx. 9.3kg

Rear Panel

ORDERING INFORMATION

PSH-2018A	360W Programmable Switching DC Power Supply
PSH-3610A	360W Programmable Switching DC Power Supply
PSH-3620A	720W Programmable Switching DC Power Supply
PSH-3630A	1080W Programmable Switching DC Power Supply

ACCESSORIES :
Power cord x 1

OPTION

Opt. 01: GPIB Interface (Factory Installed)

OPTIONAL ACCESSORIES

GRA-403	Rack Mount Kit
GTL-232	RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer
GTL-122	Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm
GTL-248	GPIB Cable, Double Shielded, 2000mm

FREE DOWNLOAD

PC Software	PC Software including Data Log ; Remote Control Software
Driver	Labview Driver

Note : When Opt.01 GPIB interface is ordered, the standard interface RS-232C will be deleted.

Programmable Switching DC Power Supply

The PSP-Series is a single output, 200W, programmable switching DC power supply. OVL, OCL, OTP, and OPL protect the PSP-Series and its loads from unexpected conditions. The PSP-Series has a large LCD panel with output and parameter views and a key lock feature to prevent changing the settings. The PSP-Series is suitable for generic bench-top applications in laboratories and educational institutions.

PSP-603/405/2010

CE RS-232 PC Software

FEATURES

* LCD Display
* Output ON/OFF Control
* 3 Step Fan Speed Control
* Voltage/Current/Power Setting
* Key Lock to Avoid Error Operation
* Normal , +% & -% Output Operation Key
* Standard Interface : RS-232C
* Optional European Type Jack Terminal

European Type Jack Terminal

Rear Panel

SPECIFICATIONS

OUTPUT

Model	PSP-603	PSP-405	PSP-2010
Voltage Current	0 ~ 60V 0 ~ 3.5A	0 ~ 40V 0 ~5A	0 ~ 20V 0 ~ 10A
VOLTAGE REGULATION			
Load Line	≤ 10mV ≤ 0.05%	≤ 10mV ≤ 0.05%	≤ 10mV ≤ 0.05%
CURRENT REGULATION			
Load Line	≤ 5mA ≤ 0.05%	≤ 5mA ≤ 0.05%	≤ 5mA ≤ 0.05%
RIPPLE			
Voltage (mVrms) Current (mArms)	≤ 20mV ≤ 10mA	≤ 20mV ≤ 10mA	≤ 20mV ≤ 10mA
RESOLUTION			
Voltage Current	20mV 10mA	10mV 10mA	10mV 10mA
PROGRAM ACCURACY			
Voltage Current	± 0.05%rdg ± 4digits ± 0.1%rdg + 5digits	± 0.05%rdg ± 3digits ± 0.1%rdg + 5digits	± 0.05%rdg ± 3digits ± 0.3%rdg + 10digits
READBACK (METER) RESOLUTION			
Voltage Current	Same as Resolution Same as Resolution	Same as Resolution Same as Resolution	Same as Resolution Same as Resolution
READBACK (METER) ACCURACY			
Voltage Current	Same as Program Accuracy Same as Program Accuracy	Same as Program Accuracy Same as Program Accuracy	Same as Program Accuracy Same as Program Accuracy
PROTECTION			
OVL/OCL/OPL/OTP	V	V	V
OUTPUT ON/OFF CONTROL			
	V	V	V
DISPLAY			
LCD			
INTERFACE (STANDARD)			
RS-232C			
POWER SOURCE			
AC 115V/230V±15% , 50/60Hz			
DIMENSIONS & WEIGHT			
225(W) x 100(H) x 305(D) mm ; Approx. 4kg			

ORDERING INFORMATION

PSP-603 200W Programmable Switching DC Power Supply
PSP-405 200W Programmable Switching DC Power Supply
PSP-2010 200W Programmable Switching DC Power Supply

ACCESSORIES :
Power cord x 1, Test lead GTL-104A x 1 , European test lead GTL-204A x 1

OPTIONAL ACCESSORIES

GTL-232A RS-232C Cable
GRA-428 Rack Mount Kit, 19", 3U Size

FREE DOWNLOAD

PC Software RS-232C Remote Control Software

Switching DC Power Supply

The SPS-Series is a single output, 360W, switching DC power supply. OVP protects the SPS-Series and their loads from unexpected conditions. High regulation is maintained at 0.01%. Remote sensing adds an extra level of precision by compensating cable losses between loads. Turning the output On/Off from external device is available through Remote control terminals. The GPS-Series is an ideal solution for power-efficient bench-top or portable applications requiring high regulation.

SPS-1230/1820/2415/3610/606

CE Rear-Panel Output

FEATURES

* Dual Measurement Display
* 0.01 % High Regulation
* Constant Voltage and Constant Current Operation
* High Efficiency
* High Power Density
* Over Voltage Protection
* Remote Output ON/OFF Control

Rear Panel

SPECIFICATIONS

OUTPUT

	SPS-1230	SPS-1820	SPS-2415	SPS-3610	SPS-606
Voltage	0 ~ 12V	0 ~ 18V	0 ~ 24V	0 ~ 36V	0 ~ 60V
Current	0 ~ 30A	0 ~ 20A	0 ~ 15A	0 ~ 10A	0 ~ 6A

CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation ≤5mV Load regulation ≤5mV
Ripple & Noise	≤5mVrms, 100mVp-p 20Hz ~ 20MHz
Recovery Time	≤500μS (50% Load change, Minimum load 0.5A)
Temp. Coefficient	≤ 100ppm /°C
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation ≤3mA Load regulation ≤3mA
Ripple Current	≤3mArms (SPS-606) ≤5mArms (SPS-3610) ≤10mArms (SPS-2415) ≤10mArms (SPS-1820) ≤30mArms (SPS-1230)
Output Range	0 to rating current continuously adjustable (HI/LO range switchable)
METER	
Type	3 1/2 digit, 0.39" LED display
Accuracy	± (0.5% of rdg + 2digits)
INSULATION	
Chassis and Terminal	20MΩ or above (DC 500V)
Chassis and AC Cord	30MΩ or above (DC 500V)
POWER SOURCE	
AC 115V/ 230V± 15 %, 50/60Hz	
DIMENSIONS & WEIGHT	
128(W) x 151(H) x 295(D) mm, Approx. 3.2kg	

ORDERING INFORMATION

SPS-1230	360W Switching DC Power Supply
SPS-1820	360W Switching DC Power Supply
SPS-2415	360W Switching DC Power Supply
SPS-3610	360W Switching DC Power Supply
SPS-606	360W Switching DC Power Supply

ACCESSORIES :
Power cord x 1 , Test lead GTL-203A x 1

Multiple Output Dual Range DC Power Supply

SPD-3606

Remote I/O

The SPD-3606 DC power supply provides 375W output capacity, three isolated outputs with dual-range for CH1 & CH2, highly efficient power conversion, low noise, high reliability, thorough protection, excellent value and a compact size. SPD-3606 creates a new bench mark for satisfying mainstream power supply demands. CH1 & CH2 offer dual-range output either at 30V/6A or 60V/3A per channel to accommodate a wide range of applications. SPD-3606 supports series and parallel tracking, allowing the CH1 and CH2 to be internally connected in series or parallel providing flexible output (30 V/12 A, 60 V/6 A, or 120 V/3 A). High power density and high power conversion efficiency lets SPD-3606 consume less energy making for a greener power supply. In addition, the high power density makes SPD-3606 weigh less than half and occupy much less space compared to linear power supplies. To avoid damage caused by improper operation, it also has OVP and OTP. The dual range AC input accepts both 115 V and 230 V inputs. When the instrument is on, devices can be connected and voltage/current levels can be adjusted safely from the front panel by turning off the output using the Output on/off key. The optional voltage/current protection knobs can be used to prevent accidentally changing the output levels. These knobs are useful for automated testing at fixed output levels, such as in assembly lines or product inspections.

FEATURES

* Three Independent, Isolated Output
* CH1/CH2 : Dual Output Range of 30V/6A or 60V/3A
* CH3 Adjustable Output : 0.1~5V/3A
* High Efficiency Power Conversion (Up to 25% Than Traditional Power Supply)
* Remote Output On/Off Control
* OVP to Protect the DUT
* OTP to Protect SPD-3606 for Reducing the Repair Rate
* Automatically Switches AC 115V/230V Source
* Full Safety Design: Reverse Polarity, CH3 Overload Protection, Safe Output Setting , C.C./C.V. Mode
* Compact Size, Light Weight
* Low Fan Acoustic Noise with Fan Speed Control Circuit
* Voltage/Current Protection Knob(Option)
* Optional European Jack Type Terminal

SPECIFICATIONS	
OUTPUT RATINGS	
CH1/CH2 Independent	0 ~ 30V / 0 ~ 6A ; 0 ~ 60V / 0 ~ 3A
CH1/CH2 Series	0 ~ 60V / 0 ~ 6A ; 0 ~ 120V / 0 ~ 3A
CH1/CH2 Parallel	0 ~ 30V / 0 ~ 12A ; 0 ~ 60V / 0 ~ 6A
CH3	0.1 ~ 5V / 3A
VOLTAGE REGULATION	
Line	≤ 0.01% + 3mV
Load	≤ 0.01% + 5mV (rating current ≤ 6A)
	≤ 0.01% + 8mV (rating current ≤ 12A)
Ripple & Noise	≤ 5mVrms (5Hz ~ 1MHz); ≤ 50mVpp (20Hz ~ 20MHz)
Recovery Time	≤ 100 μs(50% load change, minimum load 0.5A)
CURRENT REGULATION	
Line	≤ 0.2% + 3mA
Load	≤ 0.2% + 3mA
Ripple & Noise	≤ 3mArms
TRACKING OPERATION	
Tracking Error	≤ 0.5% + 10mV of master
Series Regulation	≤ 300mV
Ripple & Noise	≤ 10mVrms (5Hz ~ 1MHz) ;≤ 100mVpp (20Hz ~ 20MHz)
OUTPUT ON/OFF RESPONSE TIME	
Voltage Up (10% ~ 90%)	≤ 100ms (≤ 95% rating load)
Voltage Down (90% ~ 10%)	≤ 100ms (≥ 10% rating load)
OVP	
Accuracy	± (0.5% of reading + 0.5V)
METER	
Type	3 1/2digit 0.5" LED display
Accuracy	± (0.5% of reading + 2 digits)
Resolution	100mV/10mA
INSULATION	
Chassis & Terminal	100MΩor above (DC 1000V)
Chassis & AC code	100MΩor above (DC 1000V)
TEMPERATURE COEFFICIENT	
Voltage	≤ 100ppm/°C + 3mV
Current	≤ 150ppm/°C + 3mA
REMOTE CONTROL	
Output On/Off	
FAN NOISE	
≤ 50dB	
OPERATION ENVIRONMENT	
Ambient temperature 0 ~ 40°C ; Relative humidity ≤ 80%	
STORAGE ENVIRONMENT	
Ambient temperature -10 ~ 70°C ; Relative humidity ≤ 70%	
POWER SOURCE	
AC 115V/230V±15%, 50/60Hz	
DIMENSIONS & WEIGHT	
255 (W) x 145 (H) x 265 (D) mm ; Approx. 6kg	

SPD-3606

ORDERING INFORMATION

SPD-3606 Multiple Output Dual Range DC Power Supply

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead GTL-104A x 2, GTL-105A x 1
European Test Lead GTL-201A x 1, GTL-203A x 1, GTL-204A x 2

OPTIONAL ACCESSORIES

GPS-001 Voltage/Current protection Knob

Rear Panel

European Type Jack Terminal

GPS-001
Voltage/Current protection Knob

GSM-20H10

台灣精品 TAIWAN EXCELLENCE

NEW

CE | RS-232 | USB Host | USB Device | LAN | Digit I/O | GPIB

FEATURES

* Maximum Output ±210V/±1.05A/22W
* Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
* OVP /OTP Protection Function
* 0.012% Basic Measure Accuracy with 6½-digit Resolution
* Variable Sampling Speed
* SDM (Source Delay Measure) Cycle
* 2-, 4-, and 6-wire Remote V-source and Measure Sensing
* Variable Display Digits
* Built-in Limit Function
* Built-in 5 Calculation Functions
* 4.3" TFT LCD, Digital Number Keyboard
* Built-in RTC Clock
* Interface: RS-232, USBTMC, LAN, GPIB (Opt.)

GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade 6½-digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics and the test applications of production, including nanomaterials and components, semiconductor architecture, organic materials, high-efficiency illumination, passive components and material characteristics analysis, etc.

GSM-20H10 provides four-quadrant operation of ±210V/±1.05A/22W. The first and third quadrants operate as power supplies to supply power to the load. The second and fourth quadrants function as loads to consume power internally. Voltage value, current value and resistance value can be measured while operating the power supply or load function with an accuracy of 0.012% and a resolution of 1μV/10pA/10μΩ.

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50k points/second, which can accurately analyze the characteristics of the DUT. With the large 4.3-inch screen, all measurement settings, parameters and results can be completely displayed on the screen. The SDM (Source Delay Measure) function is provided to delay sampling when the signal changes so as to prevent the unstable signal from being captured and cause misjudgment. There are four built-in sequence output modes (Stair, Log, SRC-MEM, Custom), which can support up to 2500 points of sequence variation output.

Pertaining to protection, GSM-20H10 provides OVP/OTP modes. The design of OVP allows users to self-define the range of OVP. OTP can effectively prevent errors caused by temperature drift during the test process. For interfaces, this product supports standard SCPI commands and provides RS-232, USBTMC, LAN, GPIB (optional) interfaces to meet users' different interface needs.

GSM-20H10

Rear Panel

SM-01/SM-02 Digital I/O Adapter

ORDERING INFORMATION

GSM-20H10 with GPIB	Source Measure Unit with GPIB
GSM-20H10	Source Measure Unit

ACCESSORIES :
Test Lead GTL-207A x 1, Alligator Clip x 2

OPTIONAL ACCESSORIES

SM-01	Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN	**GRA-450-J**	Rack Mount kit
SM-02	Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN	**GRA-450-E**	Rack Mount kit
GTL-246	USB Cable (USB 2.0 A-B Type, approx. 1200 mm)		
GTL-248	GPIB Cable, 2000 mm		

NOTE :
1. Required to reach 0.1 % of final value after Command is processed. Resistive load. 10 μA to 100 mA range.
2. Overshoot into a fully resistive 100 kΩ load, 10 Hz to 1 MHz BW, adjacent ranges: 100 mV typical, except 20 V/200 V.
3. Maximum time required for the output to begin to change following the receipt of : SOURce : VOLTage | CURRent <nrf> Command
4. Speed = Normal (1 PLC). For 0.1 PLC, add 0.005 % of range to offset specifications, except 200 mV, 1 A ranges, add 0.05 %. For 0.01 PLC, add 0.05 % of range to offset specifications, except 200 mV, 1 A ranges, add 0.5 %.
5. Enhanced mode is Source readback ON, offset compensation ON, add system noise but don't include offsets.
6. Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forma.
7. Purely resistive lead. 1 μA and 10 μA ranges < 65 ms.
8. 1000 point sweep was characterized with the source on a fixed rang.
9. Pass/Fail test performed using one high limit and one low math limit.
10. Includes time to re-program source to a new level before making measurement.
11. Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
12. Command processing time of : SOURce : VOLTage | CURRent : TRIGgered <nrf> Command not included.

SPECIFICATIONS

MAXIMUM RANGE

Voltage	± 210 V
Current	± 1.05 A
Power	22 W
Voltage Resolution	1 µV
Current Resolution	10 pA

SOURCE

DC Voltage

Output Voltage	± 21 V / ± 1.05 A, ± 210 V / ± 105 mA
Current Limit	Min. 0.1 % of range

Programming Resolution & Accuracy *1

Range	Resolution	Accuracy
± 200.000 mV	1 µV	± (0.02 % + 600 µV)
± 2.00000 V	10 µV	± (0.02 % + 600 µV)
± 20.0000 V	100 µV	± (0.02 % + 2.4 mV)
± 200.000 V	1 mV	± (0.02 % + 24 mV)

Load Regulation	0.01 % of range + 100 µV
Line Regulation	0.01 % of range
Overshoot	< 0.1 % typical (full scale step, resistive load, 10 mA range)
Recovery Time (1000% Load Change)	< 250 µs (within 0.1 % plus load regulation errors, 1 A and 100 mA compliance.)
Ripple and Noise	4 mVrms (20 Hz to 1 MHz) / 10 mVpp (20 Hz to 1 MHz)
Temperature Coefficient	± (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)

DC Current

Output Current	± 1.05 A / ± 21 V, ± 105 mA / ± 210 V
Voltage Limit	Min. 0.1 % of range

Programmed Source Resolution & Accuracy *1

Range	Resolution	Accuracy
± 1.00000 µA	10 pA	± (0.035 % + 600 pA)
± 10.0000 µA	100 pA	± (0.033 % + 2 nA)
± 100.000 µA	1 nA	± (0.031 % + 20 nA)
± 1.00000 mA	10 nA	± (0.034 % + 200 nA)
± 10.00000 mA	100 nA	± (0.045 % + 2 µA)
± 100.000 mA	1 µA	± (0.066 % + 20 µA)
± 1.00000 A	10 µA	± (0.27 % + 900 µA)

Load Regulation	0.01 % of range + 100 pA
Line Regulation	0.01 % of range
Overshoot	< 0.1 % typical (1 mA step, RL = 10 kΩ, 20 V range).
Temperature Coefficient	± (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)

General

Output Settling Time *1	100 µs typical time
Output Rise Time (± 30 %)	300 µs, 200 V range, 100 mA compliance ; 150 V/µs, 20 V range, 100 mA compliance.
DC Floating Voltage	Output can be floated up to ± 250 VDC
Remote Sense	Up to 1 V drop per load lead.
Compliance Accuracy	Add 0.3 % of range and ± 0.02 % of reading to base specification.
Range Change Overshoot *2	Adjacent range changes between 200 mV, 2 V and 20 V ranges, 100 mV typical.
Minimum Compliance Value	0.1 % of range
Command Processing Time *3	Autorange On:10 ms. Autorange Off: 7 ms.

MEASUREMENT

Voltage

Input Resistance	>10 GΩ

Measurement Resolution & Accuracy

Range	Resolution	Accuracy
± 200.000 mV	1 µV	± (0.012 % + 300 µV)
± 2.00000 V	10 µV	± (0.012 % + 300 µV)
± 20.0000 V	100 µV	± (0.015 % + 1.5 mV)
± 200.000 V	1 mV	± (0.015 % + 10 mV)

Temperature Coefficient	± (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)

Current

Voltage Burden (4-wire mode)	< 1 mV

Programmed Source Resolution & Accuracy *4

Range	Resolution	Accuracy
± 1.00000 µA	10 pA	± (0.029 % + 300 pA)
± 10.0000 µA	100 pA	± (0.027 % + 700 pA)
± 100.000 µA	1 nA	± (0.025 % + 6 nA)
± 1.00000 mA	10 nA	± (0.027 % + 60 nA)
± 10.00000 mA	100 nA	± (0.035 % + 600 nA)
± 100.000 mA	1 µA	± (0.055 % + 6 µA)
± 1.00000 A	10 µA	± (0.22 % + 570 µA)

Temperature Coefficient	± (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)

Resistance

Range

Range	Resolution	Test current	Accuracy	
<2.00000 Ω	---	---	Source IACC+Meas.VACC	
2.00000 Ω	10 µΩ	---	Source IACC+Meas.VACC	
20.0000 Ω	100 µΩ	100 mA	± (0.1 % + 0.003 Ω), Normal	± (0.07 % + 0.001 Ω), Enhanced
200.000 Ω	1 mΩ	10 mA	± (0.08 % + 0.03 Ω), Normal	± (0.05 % + 0.01 Ω), Enhanced
2.00000 kΩ	10 mΩ	1 mA	± (0.07 % + 0.3 Ω), Normal	± (0.05 % + 0.1 Ω), Enhanced
20.0000 kΩ	100 mΩ	100 µA	± (0.06 % + 3 Ω), Normal	± (0.04 % + 1 Ω), Enhanced
200.000 kΩ	1 Ω	10 µA	± (0.07 % + 30 Ω), Normal	± (0.05 % + 10 Ω), Enhanced
2.00000 MΩ	10 Ω	5 µA	± (0.11 % + 300 Ω), Normal	± (0.05 % + 100 Ω), Enhanced
20.0000 MΩ	100 Ω	0.5 µA	± (0.11 % + 1 kΩ), Normal	± (0.05 % + 500 Ω), Enhanced
200.000 MΩ	1 kΩ	100 nA	± (0.66 % + 10 kΩ), Normal	± (0.35 % + 5 kΩ), Enhanced
>200.000 MΩ	---	---	Source IACC+Meas.VACC	

Temperature Coefficient	± (0.15 × accuracy specification)/ °C (0 °C to 18 °C & 28 °C to 50 °C)
Source I mode, Manual OHMS	Total uncertainty = I source accuracy + V measure accuracy (4-wire remote sense).
Source V mode, Manual OHMS	Total uncertainty = V source accuracy + I measure accuracy (4-wire remote sense).
6-wire OHMS mode	Available using active ohms guard and guard sense. Max. Guard Output Current: 50 mA (except 1 A range). Accuracy is load dependent.
Guard Output Impedance	< 0.1 Ω in ohms mode

SPECIFICATIONS

SYSTEM SPEED *6

Maximum Range Change Rate		75 / second					
Maximum Measure Auto Range Time		40 ms (fixed source) *7					
Sequence reading rates *8 (rdg./second) for 60 Hz (50 Hz)	Speed	Fast	488.2	Medium	488.2	Normal	488.2
	NPLC/ Trig Origin	0.01 / internal	0.01 / external	0.1 / internal	0.1 / external	1 / internal	1 / external
Measure	TO MEMORY	2081 (2030)	1239 (1200)	510 (433)	438 (380)	59 (49)	57 (48)
	TO GPIB	1198 (1210)	1079 (1050)	509 (433)	438 (380)	59 (49)	57 (48)
Source-Measure *10	TO MEMORY	1551 (1515)	1018 (990)	470 (405)	409 (360)	58 (48)	57 (48)
	TO GPIB	1000 (900)	916 (835)	470 (410)	409 (365)	58 (48)	57 (47)
Source-Measure Pass/Fail test *9, *10	TO MEMORY	902 (900)	830 (830)	389 (343)	374 (333)	56 (47)	56 (47)
	TO GPIB	809 (840)	756 (780)	388 (343)	374 (333)	56 (47)	56 (47)
Measure Memory *9, *10	TO MEMORY	165 (162)	163 (160)	133 (126)	131 (125)	44 (38)	44 (38)
	TO GPIB	164 (162)	162 (160)	132 (126)	131 (125)	44 (38)	44 (38)

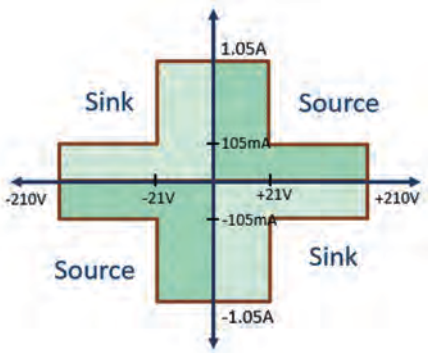
Single Reading Operation Rates (rdg./second) for 60 Hz (50 Hz)	Speed	488.2	488.2	488.2
	NPLC/ Trig Origin	0.01 / external	0.1 / external	1 / external
Measure	TO GPIB	256 (256)	167 (166)	49 (42)
Source-Measure	TO GPIB *10	79 (83)	72 (70)	34 (31)
Source-Measure Pass/Fail test *9, *10	TO GPIB	79 (83)	69 (70)	35 (30)

Component Interface Handler Time for 60 Hz (50 Hz): *9, *11	Speed	Fast	Medium	Normal
	NPLC/ Trig Origin	0.01 / internal	0.1 / internal	1 / internal
Measure	TO GPIB	1.04 ms (1.08 ms)	2.55 ms (2.9 ms)	17.53 ms (20.9 ms)
Source Pass/Fail test	TO GPIB	0.5 ms (0.5 ms)	0.5 ms (0.5 ms)	0.5 ms (0.5 ms)
Source-Measure Pass/Fail test *10, *12	TO GPIB	4.82 ms (5.3 ms)	6.27 ms (7.1 ms)	21.31 ms (25.0 ms)

GENERAL SPECIFICATIONS

Load Impedance	Stable into 20,000 pF typical
Differential mode Voltage	250 VPk
Common mode Voltage	250 VDC
Common mode Isolation	> 10 GΩ, < 1000 pF
Over Range	105 % of range, source and measure.
Max. Voltage drop	5 V
Max. Sense lead Resistance	1 MΩ
Sense input Impedance	> 100 GΩ
Guard offset Voltage	< 150 µV, typical
Source output modes	Fixed DC level, Memory List (mixed function), Stair (linear and log)
Source memory list	100 points max.
Memory buffer	5,000 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp. Lithium battery backup(3 yr+ battery life).
Programmability	IEEE-488.2 (SCPI), RS-232; 5 user-definable power-up states plus factory default and *RST.
Digital I/O Connector	Active low input. Start of test, end of test, 3 category bits. ; +5V@ 300 mA supply. ; 1 trigger input, 4 TTL/Relay Drive outputs (33V @ 500 mA, diode)
Remote Interface	USB, GPIB, LAN, RS-232
Insulation	Chassis and terminal: 20 MΩ or above (DC 500V); Chassis and AC cord: 30 MΩ or above (DC 500V)
Operation Environment	Indoor use, Altitude: ≤ 2000 m Ambient temperature: 0 °C to 40 °C Relative humidity: ≤ 80 %; Installation category: II, Pollution degree: 2
Storage Environment	Temperature: -20 °C to 70 °C; Humidity: < 80 %
Input Power	AC 100 V to AC 240 V, 50 Hz or 60 Hz
Power Consumption	80 W
Accessories	CD User manual x1, Quick Start manual x1, Test lead GTL-207A x 1, ALLIGATOR CLIP x 2
Dimensions & Weight	214 (W) x 86 (H) x 356.5 (D) mm, Approx. 4.8 kg

A. MAXIMUM OUTPUT: ±210V/±1.05A/22W

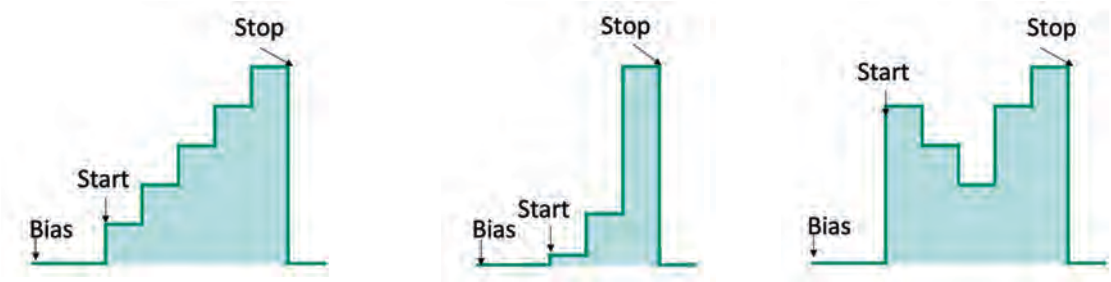


The power source output of the GSM-20H10 has two ranges.

The voltage range is ±21 volts, and the current is ±1.05A.
The voltage range is ±210 volts, and the current range is ±105mA.
The power capacity is 22W.

Provide a full range of four-quadrant measurement without duty cycle limit.

B. BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



LINEAR STAIRCASE SWEEP **LOG STAIRCASE SWEEP** **CUSTOM MODE**

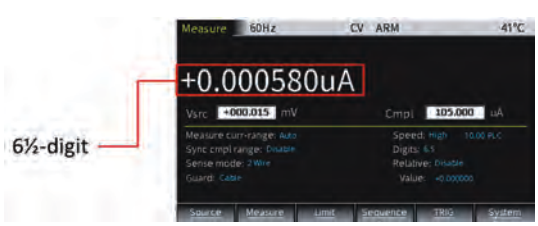
GSM-20H10 Source Measure Unit provides four sequence output modes: linear staircase, log staircase, SRC-MEM (source memory) and Custom (self-defined).

With these output modes, users can quickly generate output as needed. The total number of sequence points is 2,500.

C. OVP/OTP PROTECTION FUNCTION

In terms of protection, GSM-20H10 provides OVP/OTP protection modes; in the design of OVP, users can define the range of OVP, and the protection of OTP can effectively prevent errors caused by temperature drift during the test process.

D. 0.012% BASIC MEASURE ACCURACY WITH 6½DIGIT RESOLUTION



GSM-20H10 provides a measurement accuracy of up to 0.012%, and provides a meter display function of up to 6½ digits, allowing users to have more accurate results when measuring small signals...

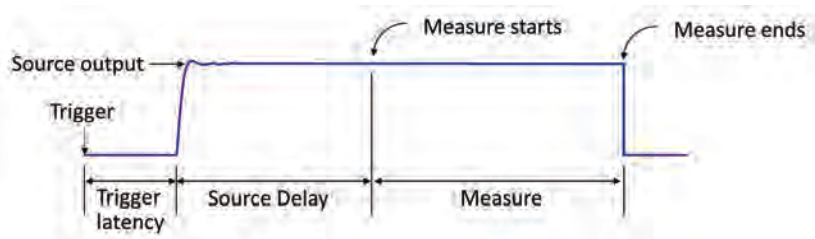
E. VARIABLE SAMPLING SPEED

SAMPLING MODE	FAST	MEDIUM	NORMAL	HIGH	OTHER
Speed, NPLC	0.01	0.1	1	10	User defined
Digit	3½	4½	5½	6½	Selectable

The sampling rate of GSM-20H10 is variable. Therefore, users can choose the sampling rate from 0.01 PLC to 10 PLC according to their needs.

Where NPLC represents the number of power line cycles, for example, AC power frequency is 50Hz, 1 PLC means 20ms, 2 PLC means 40ms, and so on.

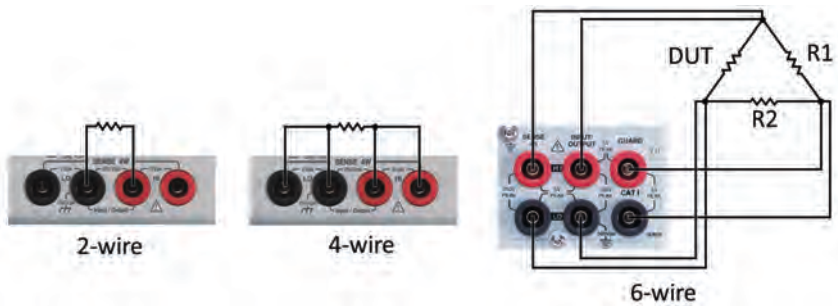
F. SDM (SOURCE DELAY MEASURE) CYCLE



The initial state of the source output may be unstable. If the meter starts measuring after the source is output, users can set the source delay to start the meter measurement after passing the unstable period so as to obtain stable measurement results.

GSM-20H10 Source Measure Unit delay range is 0 to 9999.999 seconds.

G. 2-, 4-, AND 6-WIRE REMOTE V-SOURCE AND MEASURE SENSING



Other than 2-wire, GSM-20H10 also provides 4-wire and 6-wire resistance measurements.

4-wire measurement eliminates the effect of lead resistance, realizing accurate measurement of small resistances below 100ohm at high currents.

6-wire combining 4-wire connection and the protection of ohm characteristics eliminate the effects of internal parallel resistance, realizing the resistance measurement of a tiny wire.

H. VARIABLE DISPLAY DIGITS

The display bits of GSM-20H10 are variable. Therefore, users can choose the number of display bits among 3.5, 4.5, 5.5, and 6.5 bits according to their needs.

I. BUILT-IN LIMIT FUNCTION

GSM-20H10 has three built-in Pass/Fail limit line tests with a total of 11 sets.

J. BUILT-IN 5 CALCULATION FUNCTIONS

- $\text{Power} = V \cdot I$
- $\text{CompOhms} = \frac{(V2-V1)}{(I2-I1)}$
- $\text{Vceoff}(\%) = \left[\frac{\Delta R}{(R2+\Delta V)}\right] * 100\%$
- $\text{VarAlpha}\ , \alpha = \frac{log(I2 \div I1)}{log(v2 \div V1)}$
- $\text{Dev} = \left[\frac{(X-Y)}{Y}\right] * 100\%$

GSM-20H10 provides five built-in calculation functions: Power, Offset Compensation Ohms, Voltage Coefficient, Varistor Alpha, and Percent Deviation.

Programmable High Precision DC Power Supply

PPH-1503

CE | USB Device | PC Software | Front Output | LAN | GPIB | LabVIEW Driver | Rear Output

PPH-1503D/1506D/1510D

CE | USB Host | USB Device | Front Output | PC Software | LAN | GPIB | LabVIEW Driver | Rear Output

FEATURES

* 3.5"TFT LCD Display
* High Measurement Resolution: 1mV/0.1μA for 5mA range.
* Transient Recovery Time: ≦40μS within 100mV; <80μs within 20mV
* Current Sink Function
* Pulse Current Measurement (Pulse width min.: 33μs)
* Long Integration Current Measurement
* Built-in DVM Measurement Function
* Sequence Function (Sequence power output)
* Built-in Battery Simulation Function (CH1 of PPH-15xxD)
* OVP, OCP, OTP & Temperature Display for Heat Sink
* Support USB (Device & Host)/GPIB/LAN
* Five Groups of Save/Recall Setting
* External Relay Control

PPH-1503 Rear Panel

PPH-1503D/1506D/1510D Rear Panel

PPH-Series high precision measurement capability achieves the maximum resolution of 1mV/0.1μA and the smallest pulse current width of 33μs that satisfy customers' measurement application requirements of high resolution and pulse current. Fast load current variation will result in voltage sag for general power supplies that will have an impact on DUT's internal circuit operation. PPH-Series is equipped with the excellent transient recovery time, which can, in less than 40μs, recover the output voltage to within 100mV of the previous voltage output when the current level changes from 10% to 100% of the full scale. Furthermore, conventional power supplies do not have sufficient response speed to promptly respond to set voltage value once the set voltage is changed. PPH-15xxD has a rise time of 0.2ms and a fall time of 0.3ms, which are 100 times faster than that of conventional power supplies. Therefore, PPH-15xxD can provide DUT with a stable output voltage even when DUT is operating under large transient current output. The internal high-speed sampling circuit design of PPH-15xxD, with the sample rate of 64K, can conduct pulse current measurement without using a current probe and oscilloscope. The current read back accuracy is 0.2%+1μA (equals to 11μA) at 5mA range, and the read back resolution is 0.1μA that allow DUT to be measured with a high accuracy level. Unlike battery, general power supplies, which do not have the characteristics of fast transient recovery time, can not maintain a stable power supply for cellular phone, wireless device, and wearable device which produce large transient pulse current load for hundreds of μs to dozens of ms when in use. PPH-15xxD, different from general power supplies, has the characteristics of fast transient recovery time. While simulating battery to output pulse current, PPH-15xxD can quickly compensate the voltage drop caused by pulse current. PPH-15xxD's CH1 has the built-in battery simulation function, which can define output impedance settings so as to accurately simulate battery's impedance characteristics during battery discharge. Fast transient recovery time and built-in battery simulation function together facilitate PPH-15xxD to accurately simulate battery's real behavior pattern so as to conduct product tests.

PPH-15xxD is not only suitable for simulating battery, charger and supplying power to DUT, but also ideal for simulating an electronic load to conduct discharge tests with its sink current capability. The sink current function allows PPH-15xxD to simulate a voltage source with the sink current capability. The maximum sink current of PPH-15xxD's CH1 is 3.5A and for CH2 is 3A. Long integration current measurement can be utilized to conduct average current measurement for periodical pulse current in a long period of time that is applied to analyze power consumption for a period of time. One of the applications is to measure the average power consumption of a cellular phone in use so as to conduct the internal RF module parameter analysis. The maximum pulse current measurement range of CH1 is 5A and for CH2 is 3A. The built-in sequence function of CH1 provides users with 1000 steps to edit sequential outputs, including voltage, current and execution time. The built-in DVM function of CH2 has a voltage range from 0 to +20VDC that saves users the cost of purchasing an additional voltage meter.

PPH-15xxD provides OTP function and shows heat sink temperature on the upper right corner of the display screen. Other than that, features such as five sets of system setting values for the SAVE/RECALL function, 10 sets of Power On Setup Settings, Key-Lock function to prevent unauthorized inputs, temperature-controlled fan to reduce noise, hardcopy to save screen information, and external relay control device together augment PPH-15xxD's usability. PPH-Series supports test requirements of Profile1, Profile2 and Profile3 from USB Power Delivery(PD) constructed by USB-IF association.

SELECTION GUIDE

Model		PPH-1503	PPH-1503D	PPH-1506D	PPH-1510D
Channel		1	2	2	2
Dual Range Output	Channel 1	0 V to 15 V / 0 A to 3 A or 0 V to 9 V / 0 A to 3 A	0 V to 15 V / 0 A to 3 A or 0 V to 9 V / 0 A to 3 A	0 V to 15 V / 0 A to 3 A or 0 V to 9 V / 0 A to 3 A	0 V to 15 V / 0 A to 3 A or 0 V to 9 V / 0 A to 3 A Rear Terminal: 0 A to 10 A (0 V to 4.5 V)
	Channel 2	NA	0 V to 12 V / 0 A to 1.5 A	0 V to 12 V / 0 A to 3.0 A	0 V to 12 V / 0 A to 3.0 A
Dsiplay		3.5-inch TFT LCD	3.5-inch TFT LCD	3.5-inch TFT LCD	3.5-inch TFT LCD
Current Measurement Range		5 A / 5 mA	5 A / 500 mA / 5 mA (CH1)	5 A / 500 mA / 5 mA (CH1)	5 A / 500 mA / 5 mA (CH1)
CV & CC		V	V	V	V
DVM Measurement Function		V	V (CH2)	V (CH2)	V (CH2)
Pulse Current Measurement		V	V	V	V
Long Integration Current Measurement		V	V	V	V
Battery Simulation		NA	V (CH1)	V (CH1)	V (CH1)
Automated Sequential Output		V	V (CH1)	V (CH1)	V (CH1)
High Measurement Resolution		V (1 mV / 0.1 μA)	V (1 mV / 0.1 μA)	V (1 mV / 0.1 μA)	V (1 mV / 0.1 μA)
Sink Current Capability		V (Max: 2 A)	V (Max: 3.5 A)	V (Max: 3.5 A)	V (Max: 3.5 A)
Selectable Output From Front or Rear Panel		V	V	V	V
Relay Output Control		V	V	V	V
Memory		5 sets	5 sets	5 sets	5 sets
Sample Rate		60 k	64 k	64 k	64 k
Lock Function		V	V	V	V
Protection Function		OVP, OCP, OTP	OVP, OCP, OTP	OVP, OCP, OTP	OVP, OCP, OTP
Four Wire Output Open Circuit Protection		NA	V	V	V
Temperature Display for Heat Sink		NA	V	V	V
Standard Interface	GPIB	V	V	V	V
	USB	V (CDC)	V (TMC)	V (TMC)	V (TMC)
	LAN	V	V	V	V

ORDERING INFORMATION

PPH-1503 45 W High Precision Single Channel Output DC Power Supply (15 V/3 A or 9 V/5 A)
PPH-1503D 63 W High Precision Dual Channel Output DC Power Supply (CH1: 15 V/3 A or 9 V/5 A, CH2: 12 V/1.5 A)
PPH-1506D 81 W High Precision Dual Channel Output DC Power Supply (CH1: 15 V/3 A or 9 V/5 A, CH2: 12 V/3.0 A)
PPH-1510D 81 W High Precision Dual Channel Output DC Power Supply (CH1: 15 V/3 A or 9 V/5 A or 4.5 V/10 A (Rear Terminal); CH2: 12 V/3 A)

ACCESSORIES :
Power cord (Region dependent), Test lead GTL-207A x 1, GTL-203A x 1, GTL-204A x 1

OPTIONAL ACCESSORIES

GTL-246 USB Cable (USB 2.0, A-B Type) **GRA-450-J** Rack Mount kit **GRA-450-E** Rack Mount kit

FREE DOWNLOAD

LabVIEW Driver

(*1) PLC=Powerlinecycle, 1PLC = 16.7ms For 60Hz Operation, 20ms For 50Hz Operation
(*2) Display OFF, Speed Includes Measurement And Binary Data Transfer Out Of GPIB
(*3) PLC = 1
(*4) STABILITY: Following 15 Minute Warm-Up, The Change In Output Over 8 Hours Under Ambient Temperature, Constant Load, And Line Operating Conditions
(*5) The Ground Ring Of The Probe Is Pressed Directly Against The Output Ground Of The Power Supply And The Tip Is In Contact With The Output Voltage Pin
(*6) Auto Detected At Power-Up

SPECIFICATIONS

	PPH-1503	PPH-1503D / 1506D / 1510D	
OUTPUT RATING			
Number of Output Channel	1	2	
Channel No.	CH1	CH1	CH2
Max. Power	45 W	45 W	1503D: 18 W 1506D: 36 W 1510D: 36 W
Typical Reading Time (*2)(*3)	31 ms	31 ms	
DC GENERAL			
Measurement Time Choices (*1)	0.01 to 10 PLC, 0.01 PLC/step	0.01 to 10 PLC, 0.01 PLC/step	
Average Readings	1 to 10	1 to 10	
Typical Reading Time (*2)(*3)	31 ms	31 ms	
DC VOLTAGE OUTPUT (23 °C ± 5 °C)			
Output Voltage	0 V to 15 V	0 V to 15 V	0 V to 12 V
Output Accuracy	± (0.05 % + 10 mV)	± (0.05 % + 10 mV)	
Programming Resolution	2.5 mV	2.5 mV	
Readback Accuracy (*3)	± (0.05 % + 3 mV)	± (0.05 % + 3 mV)	
Readback Resolution	1 mV	1 mV	
Output Voltage Rising Time	0.15 ms (10 % to 90 %)	0.20 ms (10 % to 90 %)	
Output Voltage Falling Time	0.65 ms (90 % to 10 %)	0.30 ms (90 % to 10 %)	
Load Regulation	0.01 % + 2 mV	0.01 % + 2 mV	
Line Regulation	0.5 mV	0.5 mV	
Stability (*4)	0.01 % + 0.5 mV	0.01 % + 0.5 mV	
Recovery Time (1000 % Load Change)	< 40 µs (< 100 mV); < 80 µs (< 20 mV)	< 40 µs (< 100 mV, Rear); < 50 µs (< 100 mV, Front); < 80 µs (< 20 mV)	
Ripple & Noise (*5)	1 mVrms (0 to 1 MHz); 8 mVpp (20 Hz to 20 MHz)	3 mVrms (0 to 1 MHz); 8 mVpp (20 Hz to 20 MHz) (≤ 5 A); 12 mVpp (20 Hz to 20 MHz) (> 5 A)	
DC CURRENT OUTPUT (23°C±5°C)			
Output Current	0 A to 5 A (0 V to 9 V) or 0 A to 3 A (9 V to 15 V)	0 A to 5 A (0 V to 9 V) or 0 A to 3 A (9 V to 15 V) 0 A to 10 A (Rear 0 V to 4.5 V) (1510D at Rear Output)	0 A to 1.5 A (PPH-1503D) 0 A to 3.0 A (PPH-1506D/1510D)
Source Compliance Accuracy	(0.16 % + 5 mA)	1.5 A / 3.0 A & 5 A range: ± (0.16 % + 5 mA) 500 mA range: ± (0.16 % + 0.5 mA) ; 5 mA range: ±(0.16 % + 5 µA)	
Programmed Source Resolution	1.25 mA	5 A range: 1.25 mA 500 mA range: 0.125 mA ; 5 mA range: 1.25 uA	1.5 A / 3.0 A range: 1.25mA
Readback Accuracy (*3)	5 A range: ± (0.2 % + 400 µA) 5 mA range: ± (0.2 % + 1 µA)	5 A range: ± (0.2 % + 400 µA) 500 mA range: ± (0.2 % + 100 µA) 5 mA range: ± (0.2 % + 1 µA)	1.5 A /3.0 A range: ± (0.2 % + 400 µA) 5 mA range: ± (0.2 % + 1 uA)
Readback Resolution	5 A range: 100 µA 5 mA range: 0.1 µA	1.5 A / 3.0 A & 5 A range: 100 µA 500 mA range: 10 µA ; 5 mA range: 0.1 µA	
Current Sink Capacity	0 V to 5 V: 2 A 5 V to 15 V: (2 A derate 0.1 A)/V	0 V to 4 V: 3.5 A 4 V to 15 V: 3.5 A - (0.25 A/V) x (Vset - 4 V)	0 V to 5 V: 2 A (PPH-1503D); 3 A (PPH-1506D/1510D) 5 V to 12 V: 2.0 A - (0.1 A/V) x (Vset - 5 V) (PPH-1503D) 3.0 A - (0.25 A/V) x (Vset - 5 V) (PPH-1506D/1510D)
Load Regulation	0.01 % + 1 mA	0.01 % + 1 mA	
Line Regulation	0.5 mA	0.5 mA	
Stability	0.01 % + 50 µA	--	
DVM			
Input Voltage Range	0 VDC to 20 VDC	0 to 20 VDC	
Input Impedance	10^{11} Ω	20 MΩ	
Maximum Input Voltage	-3 V, + 22 V	-3 V, + 22 V	
Reading Accuracy (*3)	± (0.05 % + 3 mV)	± (0.05 % + 3 mV)	
Reading Resolution	1 mV	1 mV	
PULSE CURRENT MEASUREMENT			
Trigger Level	5 mA to 5 A,5 mA/step	5 mA to 5 A,5 mA/step	5 mA to 1.5 A/ 3.0 A, 5 mA/step
High Time/Low Time/Average Time	33.3 µs to 833 ms, 33.3 µs/step	33.3 µs to 833 ms, 33.3 µs/step	
Trigger Delay	0 s to 100 ms, 10 µs/steps	0 s to 100 ms, 10 µs/steps	
Average Readings	1 to 100	1 to 100	
Long Integration Pulse Timeout	1 s to 63 s	1 s to 63 s	
Long Integration Measurement Time	850 ms (60 Hz) / 840 ms (50 Hz) to 60 s, or AUTO time 16.7 ms/steps (60 Hz), 20 ms/steps (50 Hz)	850 ms (60 Hz) / 840 ms (50 Hz) to 60 s, or AUTO time 16.7 ms/steps (60 Hz), 20 ms/steps (50 Hz)	
Long Integration Trigger Mode	Rising, Falling, Neither	Rising, Falling, Neither	
RESISTANCE			
Range	--	0.001 Ω to 1.000 Ω	
Programmed Resolution		0.001 Ω	
Programmed Accuracy		± (0.5 % + 0.01 Ω)	
OVP			
OVP Range	OFF, ON (1.00 V to 15.2 V)	Auto, OFF, ON (1.00 V to 15.2 V)	Auto, OFF, ON (1.00 V to 12.2 V)
Resolution	10 mV	10 mV	
Accuracy	50 mV	0.8 V	50 mV
OTHERS			
Output Terminal	Front/Rear Panel	Front/Rear Panel	Rear Panel
DVM Input	Front/Rear Panel	--	Front Panel
User_Definable Power_Up States	5 sets	5 sets	
Rear Panel Connector	8-Pin: Output x 4, Sense x 2, DVM x 2	5 Pin x 2: Output x 2, Sense x 2, Ground x 1	
Temperature Coefficient	0.1 x specification/ °C	0.1 x specification/ °C	
Relay Control Connector	150 mA / 15 V, 5 V output, 100 mA	150 mA / 15 V, 5 V output, 100 mA	
Insulation Chassis And Terminal	20 MΩ or above (DC 500V)	20 MΩ or above (DC 500V)	
Insulation Chassis And AC Cord	30 MΩ or above (DC 500V)	30 MΩ or above (DC 500V)	
GENERAL SPECIFICATIONS			
Display	3.5" TFT LCD		
Interface	USB (CDC), LAN, GPIB(option)	USB (TMC), LAN, GPIB	
Programming	IEEE-488.2 (SCPI)		
Operation Environment	Temperature to satisfy the specification: 18 °C to 28 °C; Operating temperature: 0 °C to 40 °C ; Relative Humidity: ≤ 80 %, 0 °C to 40 °C Installation category: CAT II; Operating Altitude: 2000 meters		
Storage Environment	Temperature: -20°C to 70°C; Humidity: < 80 %		
Input Power	AC 100 V to AC 240 V, 50 Hz or 60 Hz (*6)		
Power Consumption	150 VA	160W (PPH-1503D), 180W (PPH-1506D), 210W (PPH-1510D)	
Dimensions	222 (W) X 86 (H) X 363 (D) mm, Approx. 4.2 kg (PPH-1503), 4.5 kg (PPH-1503D/1506D/1510D)		

Programmable High-precision DC Power Supply

PPX-Series

CE RS-232 RS-485 USB LAN Ext I/O GPIB

FEATURES

* CV, CC Priority Start Function
* Four Levels of Current Measurement Resolution (min. 0.1μA)/Two Levels of Voltage Measurement Resolution (min. 0.1mV)
* Power Output ON/OFF Delay Function
* Adjustable Voltage and Current Slew Rate
* Bleeder Circuit Control
* Delayed Over-current Protection(OCP Delay)
* Sequential Power Output Function
* Remote Sensing Function & Data Logger
* 10 Sets of Memory Function
* Over Voltage Protection, Under Voltage Limit, Over Current Protection, Over Temperature Protection, AC Alarm Function
* Supports K-Type Thermocouple Temperature Measurement
* Interfaces: USB, LAN, RS-232, RS-485, Analog Control; Opt: GPIB

The PPX-Series programmable high-precision DC power supplies include six models; PPX-1005(10V/5A/50W), PPX-2002(20V/2A/40W), PPX-2005(20V/5A/100W)), PPX-3601(36V/1A/36W), PPX-3603(36V/3A/108W), and PPX-10H01(100V/1A/100W). This series has the output low noise (0.35mVrms) and fast transient response characteristics (<50μs) of conventional linear power supplies. It also provides constant voltage and constant current priority output modes, and the series can also set the voltage and current rising/falling slew rates separately, and the delay time for the output to be turned on and off.

The PPX-Series has four current levels and two voltage levels to provide users with high-precision measurements, and via the Data Logger function, the measurement records can be stored in the USB for long-term measurement and recording of IoT devices, portable devices, wearable devices, and sensor components.

In order to extend the use time of portable devices and wearable devices, manufacturers are not only committed to improving the operating efficiency of the circuit, but also reducing standby power consumption as much as possible. In order to satisfy users' low-power measurement applications, GW Instek has launched the PPX-Series with current measurement resolutions (0.1μA, 1μA, 10μA, 0.1mA) and voltage measurement resolutions (0.1mV, 1mV) to provide power for portable devices and wearable devices. When the device enters the sleep mode or the standby mode, the PPX series can still measure the subtle current changes of the DUT.

The PPX-Sseries provides the Test Sequence function, which allows users to arbitrarily define output waveforms. The voltage rising or falling time and the voltage maintenance time of each step can be set. For the operation, users can directly edit parameters on the front panel of the PPX-Series, or the CSV file can be edited via computer and imported into the PPX-Series, and the PPX-Series can be remotely edited. In addition, the OCP Delay function of the PPX-Series allows users to flexibly adjust the time to enable the over-current protection according to the characteristics of the DUT to protect the DUT and at the same time to test the current change of the DUT within a certain period of time.

Other than voltage, current, and power measurement, the PPX-Series also supports temperature measurement. While collocating with a K Type Thermocouple, the temperature range can be measured from -200°C ~ +1372°C. Supported standard communication interfaces include USB, LAN, RS-232, RS-485 and optional GPIB interface.

PPX-Series

GTL-205A

GTL-259

GTL-260

GTL-261

GTL-262

SPECIFICATIONS

Model		PPX-1005	PPX-2002	PPX-2005	PPX-3601	PPX-3603	PPX-10H01
OUTPUT RATING							
Output Voltage Output Current Output Power		10.000 V 5.0000 A 50 W	20.000 V 2.0000 A 40 W	20.000 V 5.0000 A 100 W	36.000 V 1.0000 A 36 W	36.000 V 3.0000 A 108 W	100.00 V 1.0000 A 100 W
CONSTANT VOLTAGE OPERATION							
Line Regulation		± (0.01 % of setting + 1 mV)	± (0.01 % of setting + 1 mV)	± (0.01 % of setting + 1 mV)	± (0.01 % of setting + 3 mV)	± (0.01 % of setting + 3 mV)	± (0.01 % of setting + 7 mV)
Load Regulation		± (0.01 % of setting + 2 mV)	± (0.01 % of setting + 2 mV)	± (0.01 % of setting + 3 mV)	± (0.01 % of setting + 3 mV)	± (0.0 1% of setting + 4 mV)	± (0.01 % of setting + 7 mV)
Transient Response (*1)		< 50 µs					< 100 µs
Ripple & noise	Vrms (*2)/ Vpp (*3)	0.35 mVrms / < 6 mVpp	0.5 mVrms / < 8 mVpp	0.5 mVrms / < 8 mVpp	0.8 mVrms / < 10 mVpp	0.8 mVrms / < 10 mVpp	1.2 mVrms / < 15 mVpp
Rise time (*4)	Rated Load / No Load	20 ms / 20 ms	50 ms / 50 ms	50 ms / 50 ms	50 ms / 50 ms	50 ms / 50 ms	100 ms / 100 ms
Fall time (*5)	Rated Load / No Load	10 ms / 100 ms	20 ms / 150 ms	20 ms / 150 ms	20 ms / 150 ms	20 ms / 150 ms	50 ms / 250 ms
Setting Range (105 %)		0 V to 10.5 V	0 V to 21.0 V	0 V to 21.0 V	0 V to 37.8 V	0 V to 37.8 V	0 V to 105.0 V
Setting Resolution		0.2 mV	0.5 mV	0.5 mV	1 mV	1 mV	2 mV
Setting Accuracy (23 °C ± 5 °C)		± (0.03 % of setting + 3 mV)	± (0.03 % of setting + 5 mV)	± (0.03 % of setting + 5 mV)	± (0.03 % of setting + 8 mV)	± (0.03 % of setting + 8 mV)	± (0.03 % of setting + 20 mV)
Maximum Remote Sensing Compensation Voltage (Single Line)		1 V					3 V
Temperature Coefficient (TYP.) (*6)		100 ppm/°C					
CONSTANT CURRENT OPERATION							
Line regulation		± (0.02 % of setting + 250 µA)	± (0.02 % of setting + 100 µA)	± (0.02 % of setting + 250 µA)	± (0.02 % of setting + 50 µA)	± (0.02 % of setting + 150 µA)	± (0.02 % of setting + 50 µA)
Load regulation		± (0.02 % of setting + 250 µA)	± (0.02 % of setting + 100 µA)	± (0.02 % of setting + 250 µA)	± (0.02 % of setting + 50 µA)	± (0.02 % of setting + 150 µA)	± (0.02 % of setting + 50 µA)
Ripple &noise (Arms) (*2)		2 mA	1 mA	2 mA	400 µA	1 mA	1 mA
Setting range (105%)		0 A to 5.25 A	0 A to 2.1 A	0 A to 5.25 A	0 A to 1.05 A	0 A to 3.15 A	0 A to 1.05 A
Setting resolution		0.1 mA	0.05 mA	0.1 mA	0.02 mA	0.1 mA	0.02 mA
Setting accuracy (23℃±5℃)		± (0.05 % of setting + 3.0 mA)	± (0.05 % of setting + 1.0 mA)	± (0.05 % of setting + 3.0 mA)	± (0.05 % of setting + 0.5 mA)	± (0.05 % of setting + 1.5 mA)	± (0.05 % of setting + 1.0 mA)
Temperature Coefficient (TYP.) (*6)		200 ppm/°C					
MEASUREMENT AND DISPLAY							
Voltage Range	H	10.000 V	20.000 V	20.000 V	36.000 V	36.000 V	100.00 V
	L	1.0000 V	2.0000 V	2.0000 V	3.6000 V	3.6000 V	10.000 V
Current Range	H	5.0000 A	2.0000 A	5.0000 A	1.0000 A	3.0000 A	1.0000 A
	M	500.00 mA	200.00 mA	500.00 mA	100.00 mA	300.00 mA	100.00 mA
	L	50.000 mA	20.000 mA	50.000 mA	10.000 mA	30.000 mA	10.000 mA
	LL	5.0000 mA	2.0000 mA	5.0000 mA	1.0000 mA	3.0000 mA	1.0000 mA
Measurement Resolution	Voltage (H)	1 mV					10 mV
	Voltage (L)	0.1 mV					1 mV
	Current (H)	0.1 mA					0.1 mA
	Current (M)	0.01 mA					0.01 mA
	Current (L)	0.001 mA					0.001 mA
	Current (LL)	0.0001 mA					0.0001 mA
Measurement Accuracy	Voltage (H/L)	± (0.03 % of rdg + 2 mV)	± (0.03 % of rdg + 4 mV)	± (0.03% of rdg + 5 mV)	± (0.03 % of rdg + 6 mV)	± (0.03 % of rdg + 8 mV)	± (0.03 % of rdg + 15 mV)
	Temperature Coefficient (*6)(TYP.)	100 ppm/°C					
	Current (H/M)	± (0.05 % of rdg + 2.5 mA)	± (0.05 % of rdg + 1.0 mA)	± (0.05 % of rdg + 2.5 mA)	± (0.05 % of rdg + 0.4 mA)	± (0.05 % of rdg + 1.2 mA)	± (0.05 % of rdg + 1.0 mA)
	Current (L/LL)	± (0.1 % of rdg + 40 µA)	± (0.1 % of rdg + 24 µA)	± (0.1 % of rdg + 40 µA)	± (0.1 % of rdg + 16 µA)	± (0.1 % of rdg + 28 µA)	± (0.1 % of rdg + 24 µA)
	Temperature Coefficient (*6) (TYP.)	200 ppm/°C					
TEMPERATURE MEASUREMENT							
Temperature (K-Type Thermocouple)	Range	-200 °C to +1372 °C					
	Resolution	0.25 °C					
	Accuracy	± (0.5 % + 2 °C)					
PROTECTION							
Over Voltage Protection (OVP)	Operation	Turns the output off, displays OVP and lights ALARM					
	Setting Range	0.5 V to 11.0 V	1.0 V to 22.0 V	1.0 V to 22.0 V	1.8 V to 39.6 V	1.8 V to 39.6 V	5.0 V to 110.0 V
		(5 % to 110 % of the rated output voltage)					
	Setting Accuracy	± (1 % of rating)					
Over Current Protection (OCP)	Operation	Turns the output off, displays OCP and lights ALARM					
	Setting Range	0.25 A to 5.5 A	0.1 A to 2.2 A	0.25 A to 5.5 A	0.05 A to 1.1 A	0.15 A to 3.3 A	0.05 A to 1.1 A
		(5 % to 110 % of the rated output current)					
	Setting Accuracy	± (1 % of rating)					
Over Temperature Protection (OTP)	Operation	Turns the output off, displays OTP and lights ALARM					
GENERAL SPECIFICATIONS							
Interface	LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask					
	USB	Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB-CDC					
	RS-232/RS-485	Complies with the EIA-RS-232/RS-485 specifications (excluding the connector)					
Nominal Input Voltage (*7)		100 Vac / 120 Vac / 220 Vac / 240 Vac (± 10 %), 50 Hz or 60 Hz, single phase					
Input Frequency Range		47 Hz to 63 Hz					
Max. Inrush Current		25 Amax	20 Amax	30 Amax	35 Amax	40 Amax	30 Amax
Max. Power Consumption		200 VA	150 VA	300 VA	150 VA	300 VA	300 VA
Operating Environment		0 °C to 40 °C; 20 % to 80 % RH; No condensation					
Storage Environment		-20 °C to 70 °C; 20 % to 85 % RH; No condensation					
Dimensions (mm) & Weight		107(W)×124(H)×313(D) mm(not including protrusions), Approx. 5.5 kg					

Note: *1. Time for output voltage to recover within ±(0.1 % + 10 mV) of its rated output for a load change from 50 % to 100 % of its rated output current
*2. Measurement frequency bandwidth is 5 Hz to 1 MHz
*3. Measurement frequency bandwidth is 10 Hz to 20 MHz
*4. From 10 % to 90 % of rated output voltage, with rated resistive load
*5. From 90 %t o 10 % of rated output voltage, with rated resistive load
*6. Temperature coefficient: after a 30 minute warm-up
*7. Before connecting the power plug to an AC line outlet, make sure the voltage selector switches of the bottom panel in the correct position.
It might be damaged the instrument by connecting to the wrong AC line voltage

Programmable High-precision DC Power Supply

Rear Panel

GRA-441-J/E Rack Mount Kit(JIS/EIA)

ORDERING INFORMATION

PPX-1005	50 W Single Programmable High Precision DC Power Supply (10 V/ 5 A)
PPX-2002	40 W Single Programmable High Precision DC Power Supply (20 V/ 2 A)
PPX-2005	100 W Single Programmable High Precision DC Power Supply (20 V/ 5 A)
PPX-3601	36 W Single Programmable High Precision DC Power Supply (36 V/ 1 A)
PPX-3603	108 W Single Programmable High Precision DC Power Supply (36 V/ 3 A)
PPX-10H01	100 W Single Programmable High Precision DC Power Supply (100 V/ 1 A)

ACCESSORIES :

Power Cord, Test Lead :

GTL-104	Test Lead, PPX-1005/PPX-2005/PPX-3603
GTL-105A	Test Lead, PPX-2002/PPX-3601

European Test Leads :

GTL-204A	Test Lead, PPX-1005/PPX-2005/PPX-3603
GTL-203A	Test Lead, PPX-2002/PPX-3601/PPX-10H01
GTL-201A	Ground lead

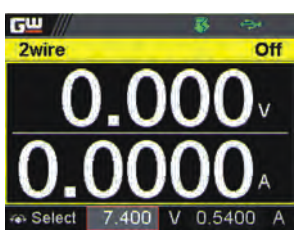
OPTIONAL ACCESSORIES

GTL-246	USB Cable(USB 2.0 Type A-Type B Cable,4P)
GTL-205A	Temperature probe adapter(thermal coupling, K-Type), about 1000 mm
GTL-258	GPIB Cable, 2000 mm
GTL-259	RS-232 Cable with DB9 connector to RJ45
GTL-260	RS-485 Cable with DB9 connector to RJ45
GTL-261	Serial Master Cable+Terminator, 0.5 M
GTL-262	RS-485 Slave cable
GRA-441-J	Rack for PPX-Series(JIS)
GRA-441-E	Rack for PPX-Series(EIA)
PPX-G	GPIB Interface(factory installed)

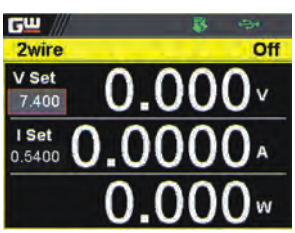
FREE DOWNLOAD

LabVIEW Driver

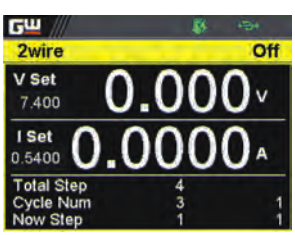
A. DISPLAY MODE



Voltage and Current



Voltage, Current and Wattage

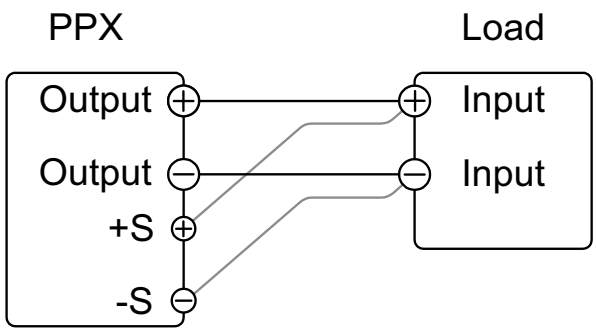


Voltage, Current and Sequence Test

Voltage, Current and Temperature Measurement

The PPX-Series has four display modes, namely 1) voltage and current 2) voltage, current and wattage 3) voltage, current and Sequence Test 4)voltage, current and temperature measurement, which are convenient for users to switch to different display modes according to test requirements.

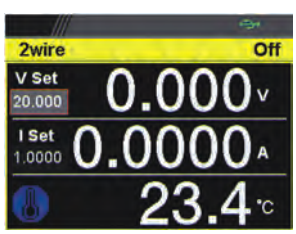
B. REMOTE SENSING



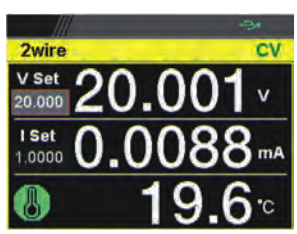
REMOTE SENSING CONNECTION DIAGRAM

The Remote Sensing function can be used to compensate for the voltage drop caused by the resistance on the test connection lead from the power output to the load. PPX-1005/2002/2005/3601/3603 compensates for voltages up to 1 volt, and PPX-10H01 compensates for voltages up to 3 volts. When testing, choose a test connection lead with a voltage drop less than the compensation voltage of the PPX series as much as possible.

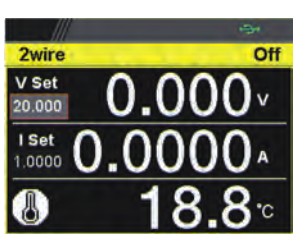
C. TEMPERATURE MEASUREMENT



Blue: Temperature Control on with no GTL-205A Connected



Green: Output Safe is Activated and Output is on with GTL-205A Connected

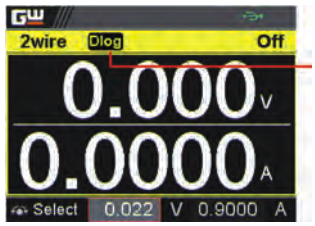


White: Temperature Control on with GTL-205A Connected

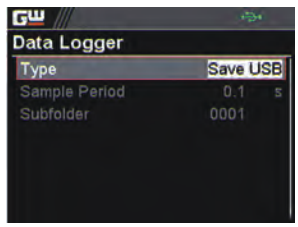
Red: The Alarm of Short Circuit Occurs From Temperature Measurement

The PPX-Series can measure DUT temperature while outputting power. Before measuring the temperature, please use the optional accessory GTL-205A (temperature probe adapter with K-type thermocouple) to connect the DUT and TC input terminals on the front panel of the PPX-Series respectively. During the measurement process, users can set the monitoring temperature for the DUT. Once the measurement temperature reaches the monitoring temperature value, the PPX-Series will stop the output. The PPX-Series can measure the temperature range of -200.0℃~1372.0℃ (-328.0℉~2501.6 ℉). Users can choose the display unit as ℃ or ℉ according to the requirement.

D. DATA LOGGER



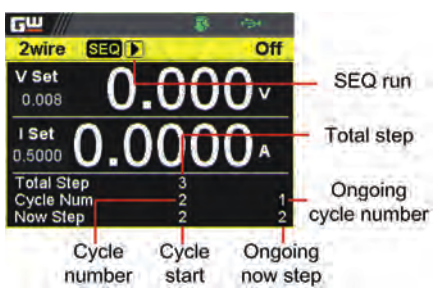
Data Logger Function



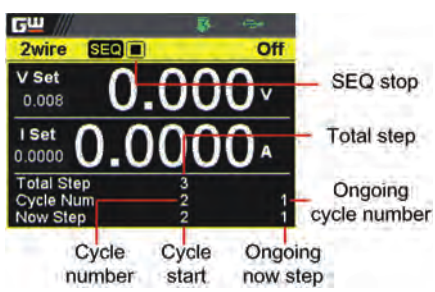
Save Data Log Into USB Disk

The PPX-Series can record the measured voltage, current and temperature data to a USB flash drive or can be remotely controlled to read the data. Data sampling interval is 0.1~999.9 seconds.

E. SEQUENCE TEST



SEQ Run in Cycle Mode



SEQ Stop in Cycle Mode

The Sequence Test function allows users to plan the PPX-Series to execute a sequential power output. The PPX-Series will automatically execute the planned power output to the DUT to realize automated measurement. The PPX-Series can store

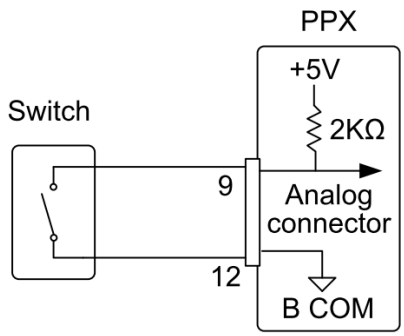
F. V/ I SLEW RATE

Model	R_V Slew Rate/ F_V Slew Rate Setting Range
PPX-1005	0.0001V/ms ~ 0.1V/ms
PPX-2002	0.0001V/ms ~ 0.2V/ms
PPX-2005	0.0001V/ms ~ 0.2V/ms
PPX-3601	0.0001V/ms ~ 0.36V/ms
PPX-3603	0.0001V/ms ~ 0.36V/ms
PPX-10H01	0.001V/ms ~ 0.5V/ms

Voltage Rising/Falling Slew Rate

The PPX-Series can adjust the slew rate of current and voltage. Via setting the rising and falling time of voltage and current, users can verify the performance of the DUT during the voltage/current changes. In addition, the adjustment of the slew rate slows down the voltage transfer, which can effectively avoid the damage of the inrush current to the DUT, therefore, the series is especially suitable for the testing of capacitive loads and motors.

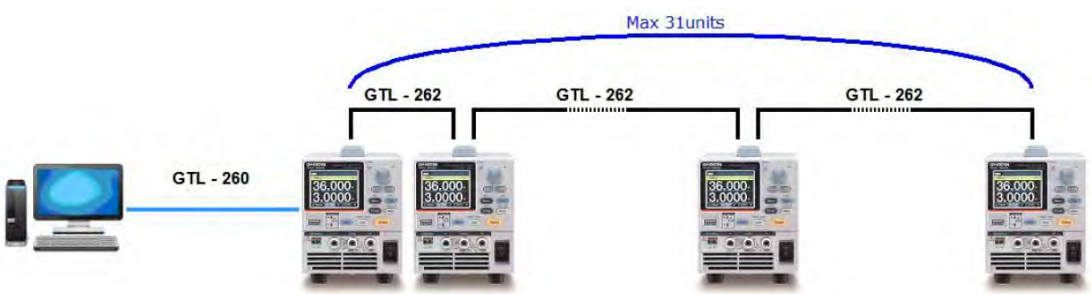
G. ANALOG REMOTE CONTROL



External Control of Output

The PPX-Series supports the analog control function, including external voltage to control voltage output/current output, external resistance to control voltage output/current output, external control of power output, trigger input/trigger output, and voltage/current monitoring.

H. MULTIPLE UNIT CONNECTION



Multiple Unit Connection

The PPX series can connect up to 31 units. The PC is connected to the first unit of PPX through GTL-260, and the remaining PPX units are connected in a daisy-chained method via GTL-262. When using PPX-Series Multiple Unit Connection for remote program control and slave expansion, there is no need to use other remote control equipment (E.g. switch/Hub), which can help users save equipment purchase costs.

Triple & Single Channel Programmable DC Power Supply

GPP-3610H/7250

NEW

GPP-3060/6030/3650

NEW

台灣精品
TAIWAN EXCELLENCE

CE | RS-232 | GPIB | USB | LAN | Ext I/O

The GPP-400W series includes five programmable DC power supply models: the single-channel GPP-3610H (36 V/10 A) and GPP-7250 (72 V/5 A), along with the triple-channel GPP-3060 (30 V/6 A), GPP-6030 (60 V/3 A), and GPP-3650 (36 V/5 A). These models feature high resolution, low ripple noise (≤1 mVrms/≤2 mArms), and fast transient recovery (≤100 µs), making them ideal for precision testing environments.

The triple-channel models provide a maximum output power of 385 W, with CH1 and CH2 supporting different voltage and current ranges, while CH3 uniformly supports 1.8 V, 2.5 V, 3.3 V, and 5.0 V/5 A. The single-channel models offer 36 V/10 A and 72 V/5 A outputs, both equipped with independent output switches.

All models support multiple display modes, allowing users to view settings, measurements, and waveforms. The built-in monitoring function enables users to set conditions for alarms or automatic output shutdown to protect the DUT. Additionally, the output recorder function logs voltage and current data, which can be stored internally or transferred via USB.

For protection, all models include OVP (overvoltage protection), OCP (overcurrent protection), OPP (overpower protection), and OTP (overtemperature protection), implemented via hardware circuits for faster response compared to software-based protection. The rear panel features terminal outputs and remote sensing terminals, allowing users to choose front or rear panel output for standalone or rack-mounted operation.

Each model is equipped with Trigger In/Trigger Out functionality for external device synchronization and an intelligent temperature-controlled fan that adjusts speed based on power component temperature to minimize noise. Additionally, the sequence, delay, and recorder functions provide 10 internal memory slots, accessible via USB. Standard interfaces include RS-232 and USB, with optional LAN or LAN+GPIB interfaces available to meet diverse user requirements.

FEATURES

* 1-CH Models: GPP-3610H, 7250; 3-CH Models: GPP-3060, 6030, 3650
* Programming Resolution: 1 mV / 0.2 mA or 2 mV / 0.1 mA (Model Dependent)
* Readback Resolution: 0.1 mV / 0.1 mA or 0.1 mV / 0.2 mA (Model Dependent)
* Ripple Noise: ≤ 1 mVrms / ≤ 2 mArms or ≤ 2 mVrms / ≤ 2 mArms (Model Dependent)
* Tracking Series / Parallel: Available on 3-CH Models, No Wiring Needed
* Transient Response: ≤ 100 µs
* Load Modes: CV, CC, CR
* Protections: OVP, OCP, OTP
* Built-in Delay, Monitoring, Recorder, and Sequencing (8 waveforms)
* 10 Memory Sets for User-defined Settings
* Intelligent Fan Reduces Noise
* USB Type-A Front Panel (3060 / 6030 / 3650)
* 4.3" TFT LCD Display
* Interfaces: RS-232, USB, Ext I/O (Standard); LAN, GPIB+LAN (Optional)

GPP-7250

GPP-6030

Rear Panel

European Type Jack Terminal

SPECIFICATIONS

		GPP-3610H	GPP-7250	GPP-6030	GPP-3060	GPP-3650
OUTPUT RATING						
Total Channel		1	1	3	3	3
Voltage / Current Range	CH1	0 V to 36.000 V / 0 A to 10.000 A	0 V to 72.000 V / 0 A to 5.0000 A	0 V to 60.000 V / 0 A to 3.0000 A	0 V to 30.000 V / 0 A to 6.0000 A	0 V to 36.000 V / 0 A to 5.0000 A
	CH2	-	-	0 V to 60.000 V / 0 A to 3.0000 A	0 V to 30.000 V / 0 A to 6.0000 A	0 V to 36.000 V / 0 A to 5.0000 A
	CH3 (*1)	-	-	1.8 V/2.5 V/3.3 V/5.0 V, ± 5 % (USB Port Volt ± 0.35 V); 5 A (USB Port 3 A)		
Total Power		360 W	360 W	385 W	385 W	385 W
CONSTANT VOLTAGE OPERATION						
Line Regulation		≤ 0.01 % + 3 mV				
Load Regulation		≤ 0.01 % + 5 mV				
Ripple & Noise (5 Hz to 1 MHz)		≤ 2 mVrms		≤ 1 mVrms		
Transient Recovery Time		≤ 100 μs (50 % load change, minimum load 0.5 A)				
Maximum Remote Sensing Compensation Voltage (Single Line)		1 V (only for rear terminal output)				
Temperature Coefficient		≤ 300 ppm/°C				
CONSTANT CURRENT OPERATION						
Line Regulation		≤ 0.01 % + 3 mA				
Load Regulation		≤ 0.01 % + 3 mA				
Ripple & Noise		≤ 2 mArms				
RESOLUTION						
Voltage	Programming/Readba	1 mV / 0.1 mV	2 mV / 0.1 mV	2 mV / 0.1 mV	1 mV / 0.1 mV	1 mV / 0.1 mV
Current	Programming/Readba	0.2 mA / 0.2 mA	0.1 mA / 0.1 mA	0.1 mA / 0.1 mA	0.2 mA / 0.1 mA	0.2 mA / 0.1 mA
TRACKING OPERATION (CH1/CH2) (*2)						
Tracking Series Voltage/Current (*3)		-		0 V to 120.000 V / 0 A to 3.0000 A	0 V to 60.0000 V / 0 A to 6.0000 A	0 V to 72.0000 V / 0 A to 5.0000 A
Tracking Parallel Voltage/Current (*3)				0 V to 60.0000 V / 0 A to 6.0000 A	0 V to 30.0000 V / 0 A to 12.000 A	0 V to 36.0000 V / 0 A to 10.000 A
Tracking Error				≤ 0.2 % + 20 mV of Master	≤ 0.1 % + 10 mV of Master	≤ 0.1 % + 10 mV of Master
Parallel Regulation	Line			(No Load, with load add load regulation ≤ 200 mV) ≤ 0.01 % + 3 mV		
	Load			≤ 0.01 % + 5 mV (rating current ≤ 10 A) ; ≤ 0.02 % + 5 mV (rating current > 10 A)		
Series Regulation	Line			≤ 0.01 % + 5 mV		
	Load			≤ 200 mV		
Ripple & Noise				≤ 2 mVrms (5 Hz to 1 MHz)		
METER						
Full Scale	Voltage/Current	36.5000 V / 10.200 A	72.5000 V / 5.2000 A	62.0000 V / 3.2000 A	32.0000 V / 6.2000 A	36.5000 V / 5.2000 A
Programming	Voltage/Current	5 digits / 6 digits		5 digits / 5 digits		
Readback Resolution	Voltage/Current	6 digits / 6 digits		6 digits / 5 digits		
Setting Accuracy	Voltage	± (0.03 % of reading + 10 mV)				
	Current	± (0.3 % of reading + 10 mA)				
Readback Accuracy	Voltage	± (0.03 % of reading + 10 mV)				
	Current	± (0.3 % of reading + 10 mA)				
DC LOAD MODE						
Display	Voltage	1 V to 36.50 V	1 V to 72.50 V	1 V to 62.00 V	1 V to 32.00 V	1 V to 36.50 V
	Current	0 A to 10.200 A	0 A to 5.200 A	0 A to 3.200 A	0 A to 6.200 A	0 A to 5.200 A
	Power	0 W to 100.00 W	0 W to 100.00 W	0 W to 50.00 W	0 W to 50.00 W	0 W to 50.00 W
CV Mode	Setting Range	1.500 V to 36.50 V	1.500 V to 72.50 V	1.500 V to 62.00 V	1.500 V to 32.00 V	1.500 V to 36.50 V
	Setting/Readback	≤ ± (0.1 % + 30 mV)	≤ ± (0.1 % + 30 mV)	≤ ± (0.1 % + 30 mV)	≤ ± (0.1 % + 30 mV)	≤ ± (0.1 % + 30 mV)
	Resolution	10 mV	10 mV	10 mV	10 mV	10 mV
CC Mode	Setting Range	0 A to 10.200 A	0 A to 5.200 A	0 A to 3.200 A	0 A to 6.200 A	0 A to 5.200 A
	Setting/Readback	≤ ± (0.3 % + 10 mA)	≤ ± (0.3 % + 10 mA)	≤ ± (0.3 % + 10 mA)	≤ ± (0.3 % + 10 mA)	≤ ± (0.3 % + 10 mA)
	Resolution	1 mA	1 mA	1 mA	1 mA	1 mA
CR Mode (*4)	Setting Range	1 Ω to 1 kΩ	1 Ω to 1 kΩ	1 Ω to 1 kΩ	1 Ω to 1 kΩ	1 Ω to 1 kΩ
	Setting/Readback	≤ ± (3 % + 1 Ω)	≤ ± (3 % + 1 Ω)	≤ ± (3 % + 1 Ω)	≤ ± (3 % + 1 Ω)	≤ ± (3 % + 1 Ω)
	Resolution	1 Ω	1 Ω	1 Ω	1 Ω	1 Ω
CH3 SPECIFICATION (*5)						
Output Voltage		-		1.8 V/2.5 V/3.3 V/5.0 V, ± 5 %		
Output Current				5 A		
Meter				1.8 V/2.5 V/3.3 V/5.0 V		
Line Regulation				≤ 3 mV		
Load Regulation				≤ 5 mV		
Ripple & Noise				≤ 2 mVrms		
Transient Recovery Time				≤ 100 μs (50 % load change, minimum load 0.5 A)		
USB Port	Output			1.8 V/2.5 V/3.3 V/5.0 V, ± 0.35 V, 3 A		
	OCP			3.1 A (USB port)		
PROTECTION						
OVP	Power Mode	OFF,ON (0.5 V to 38.0 V)	OFF,ON (0.5 V to 75.0 V)	OFF,ON (0.5 V to 65.0 V)	OFF,ON (0.5V to 35.0 V)	OFF,ON (0.5 V to 38.0 V)
	Load Mode	OFF,ON (1.5 V to 38.0 V)	OFF,ON (1.5 V to 75.0 V)	OFF,ON (1.5 V to 65.0 V)	OFF,ON (1.5V to 35.0 V)	OFF,ON (1.5 V to 38.0 V)
	Setting Accuracy	± 100 mV				
	Resolution	100 mV				
OCP	Power Mode	OFF,ON (0.05 A to 10.5 A)	OFF,ON (0.05 A to 5.50 A)	OFF,ON (0.05 A to 3.50 A)	OFF,ON (0.05 A to 6.50 A)	OFF,ON (0.05 A to 5.50 A)
	Load Mode	OFF,ON (0.05 A to 10.5 A)	OFF,ON (0.05 A to 5.50 A)	OFF,ON (0.05 A to 3.50 A)	OFF,ON (0.05 A to 6.50 A)	OFF,ON (0.05 A to 5.50 A)
	Setting Accuracy	± 20 mA				
	Resolution	10 mA				
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500 V) ; Between chassis and DC power cord : 30 MΩ or above (DC 500 V)				
ADVANCED FUNCTION						
Status Signal Out	OUT ON/OFF Status	Turns on when the output is on				
	CV Status	Turns on during CV operation				
	CC Status	Turns on during CC operation				
	ALM Status	Turns on when an alarm has been activated				
	PWR ON Status	Turns on when the power is turned on				
GENERAL SPECIFICATIONS						
Display		4.3-inch TFT LCD				
Interface		Standard RS-232, USB (CDC), Ext. I/O, Optional (manufacturer installed only): LAN, GPIB+LAN				
Operation Environment		Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %; Installation category: II / Pollution degree: 2				
Storage Environment		Temperature: -10 °C to 70 °C, Humidity: ≤ 70 %				
Power Input		AC 100 V/120 V/220 V/230 V ± 10 %, 50 Hz or 60 Hz				
Power Consumption		900 VA, 680 W				
Dimensions & Weight		213 (W) x 145 (H) x 362 (D) mm; Approx. 10 kg				

Note: (*1) Warning : The CH3 output current from the 2 terminals should Not exceed 5A.
(*2) Tracking is not supported in LOAD mode, and not supported in 1 channel model.
(*3) Only Channel 1 and Channel 2 can perform series and parallel functions.
(*4) Setting/feedback accuracy requirements: voltage ≥ 0.1V, current ≥ 0.1A.
(*5) The CH3 specification is only suitable for GPP-3060/6030/3650.

GRA-449-J Rack Mount Kit (JIS)

GRA-449-E Rack Mount Kit (EIA)

ORDERING INFORMATION

GPP-3610H	360 W Single-Channel Programmable DC Power Supply (36 V / 10 A)
GPP-7250	360 W Single-Channel Programmable DC Power Supply (72 V / 5 A)
GPP-6030	385 W Triple-Channel Programmable DC Power Supply (60 V / 3 A x 2; 5 V / 5 A x1)
GPP-3060	385 W Triple-Channel Programmable DC Power Supply (30 V / 6 A x 2; 5 V / 5 A x1)
GPP-3650	385 W Triple-Channel Programmable DC Power Supply (36 V / 5 A x 2; 5 V / 5 A x1)

ACCESSORIES :

GPP-3610H/7250 : Power Cord x 1, Test Lead GTL-104A x 1, GTL-105A x 1

GPP-6030/3060/3650 : Power Cord x 1, Test Lead GTL-104A x 3,
European test lead: GTL-204A x 3, GTL-201A x 1

OPTION (Manufacturer Installed Only)

LAN Interface, GPIB+LAN Interface

OPTIONAL ACCESSORIES

GTL-246	USB Cable(USB 2.0 Type A-Type B Cable, 4P
GRA-449-E	Rack Mount Kit (EIA)
GRA-449-J	Rack Mount Kit (JIS)

FREE DOWNLOAD

PC Software, LabVIEW Driver

A. OUTPUT MONITORING FUNCTION

Output Monitoring

Monitoring Function Setting

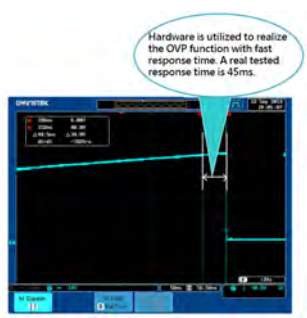
The output monitoring function allows users to set the monitoring conditions according to the requirements, including voltage, current, and power greater than or less than the setting and the logical relationship of AND, OR. It also allows users to sound alarms or stop the output during the measurement process, stop the measurement, and protect the customer's DUT.

B. SEQUENCE OUTPUT FUNCTION

Output Waveform of the GPP-Series

GPP-3610H and GPP-7250 provide the sequence output function, which not only allows users to edit the power output waveform, but also allows users to set a sequence of constant voltage (CV) or constant current (CC) load waveform for instance, a serial power output or a simulation test of a dynamic load. The sequence editing point can set up to 2048 steps, and the interval time of each step can be set from 1 to 300 seconds. In order to simplify the settings of waveform editing, the GPP series has 8 built-in waveforms in the templet waveform in the sequence output function, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, Exp Fall waveforms for users to apply output directly. The edited data output by sequence can be stored in the instrument's internal 10 sets of memory, or can be accessed using a USB flash drive (Save/Recall) and saved as *.SEQ or *.CSV file. The saved *.CSV can be exported to Excel for editing and analysis. The edited files can be uploaded (Save/Recall) into the instrument using a USB flash drive.

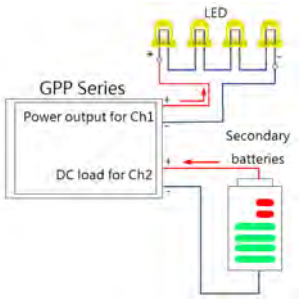
HARDWARE PROTECTION FUNCTION (OVP/OCP/OTP)



OVP Trigger

The protection mechanism of OVP/OCP/OTP is implemented by hardware circuit, which has the advantage of faster response time than competitors who use software to achieve protection. When it is detected that the voltage of the DUT exceeds the setting value of the OVP, the output of the power supply can be stopped in a short time to achieve the purpose of protecting the DUT.

D. LOAD FUNCTION

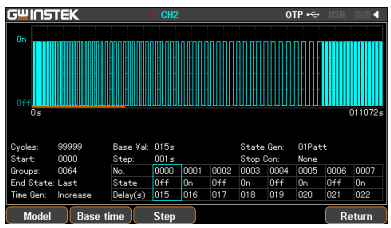


GPP-Series Application

The CH1/CH2 of the GPP series is designed with the load function. A single power supply can meet the basic battery charging and discharging test requirements. It can provide power output in channel 1 and channel 2. The rated constant voltage load (CV), rated constant current load (CC) and maximum 1 k constant resistance load (CR) function are built-in to allow users to conduct discharging test without using an electronic load.
In application, users can also set either that one channel of the single GPP series as the power output, one channel as the load function to consume the power of the DUT, or that both channels as load functions to consume the power of different loads simultaneously.

Ω

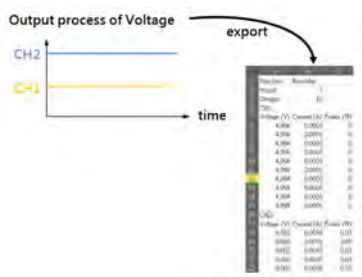
E. OUTPUT DELAY FUNCTION



GPP-Series Delayed Waveform

Output delay function allows users to edit the timing waveform of the power output on/off when the front panel voltage and current settings are unchanged. In order to simplify the setting of waveform editing, the GPP-Series has three built-in timing modes in the delay output function, including Fixtime, Increase, Decline for users to apply directly. The editing data of the output delay can be stored in he internal 10 sets of memory, or to be saved by USB flash drive (Save/Recall) and saved as *.DLY or *.CSV file. The stored *.CSV can be exported into Excel for editing and analysis. The final edited file can be exported to (Save/Recall) of the power supply using a USB flash drive.

F. OUTPUT RECORDER FUNCTION



Schematic Diagram for Recorder Function

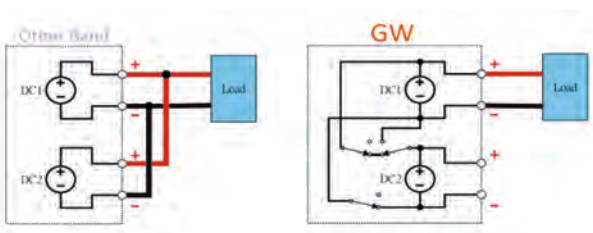
Recorder Function Setting

Save as*.REC

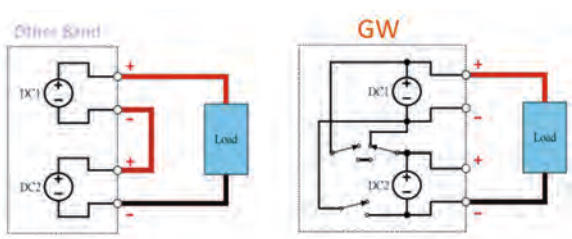
The output recorder function records the voltage & current parameters of the output process. The recording interval of each point can be set according to user's requirements, and the shortest interval is 1 second and the longest is 300 seconds. The results can be stored in *.REC or *.CSV format to the power supply or directly saved in the USB flash drive. The stored *.CSV can be exported into Excel to conduct the future analysis. (*.REC can be saved to 2048 records, *.CSV can be saved to 614400 records)

* Channel 3 does not support the output recorder function

G. TRACKING SERIES AND PARALLEL FUNCTION



Output in Parallel Connections



Output in Series Connections

For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output.

The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

Multi-output Programmable DC Power Supply

GPP-1326/2323/3323/4323

CE | RS-232 | GPIB | USB | LAN | Ext I/O

FEATURES

* 4.3" TFT LCD Display
* Supports Setting Value, Measurement Value and Output Waveform Display
* Load Function (CC, CV, CR Mode)
* Setting Resolution: 1 mV/0.1 mA ; Read Back Resolution: 0.1 mV/0.1 mA
* Low Ripple Noise: ≦ 350 μVrms/≦ 2 mArms
* Transient Response Time: ≦ 50 μs
* Tracking Series and Parallel Function without Additional External Wiring
* Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
* Delay Function/Output Monitoring Function/ Output Recorder Function
* Intelligent Temperature Control Fan Effectively Reduces Noise
* Sequential Output Function and Built-in 8 Template Waveforms
* The Output Recorder Function Records The Output Voltage & Current Parameters with A Minimum Recording Interval of 1 Second
* Provides 10 Sets of Memory for Each Sequence /Delay/Recorder/Panel Setting Condition
* GPP-3323 Supports A USB(Type A) Output Terminal
* Standard: RS-232, USB, Ext I/O; Optional (Manufacturer Installed Only) : LAN, GPIB+LAN
* Compatible with Commands of GPD-X303S Series

With the maximum output power of 217W, the GPP-Series, the multi-channel programmable DC power supply, includes four models: GPP-1326 (0 to 32 V/0 to 6 A) for single-channel output and GPP-2323 for dual-channel output (CH1: 0 to 32 V/0 to 3 A, CH2: 0 to 32 V/0 to 3 A), GPP-3323 for three-channel output (CH1: 0 to 32 V/0 to 3 A, CH2: 0 to 32 V/0 to 3 A, CH3: 1.8 V, 2.5 V, 3.3 V, 5.0 V/5 A) and GPP-4323 for four-channel output (CH1: 0 to 32V/0 to 3A, CH2: 0 to 32 V/0 to 3 A, CH3: 0 to 5 V/0 to 1 A, CH4: 0 to 15 V/0 to 1 A). This series not only provides high program resolution (1 mV/0.1 mA) and read back resolution (0.1 mV/0.1 mA), but also features optimal low-ripple noise characteristics ≦350 μVrms/≦ 2 mArms and output transient recovery capability≦50 μs. Independent output on-off switch is provided for each channel.

For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output. The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

The GPP-Series offers a variety of display modes, including single or multi-channel setting values, measurement values, and waveform displays. The Monitor function of the GPP-Series allows users to set monitoring conditions according to requirements, sound alarms or stop output during the measurement process, and stop measurement and protect the customer's DUT. The GPP-Series provides output recorder function, which records the voltage/current of the output process to the internal memory, and the result can be stored as a (*.REC) or (*.CSV) file, which can then be transferred to the USB flash drive. The stored *.CSV can be exported to the Excel to conduct the future analysis.

The CH1/CH2 of the GPP-Series are designed with the load function. A single power supply can set one channel as the power output, and one channel for the load function to consume the power of the DUT so as to meet the basic charging and discharging test requirements for battery. Channel 1 and channel 2 not only provide 32 V/3 A power output, but also feature built-in maximum 32 V constant voltage load (CV), maximum 3.2 A constant current load (CC) and maximum 1 kΩ constant resistance load (CR) function.

The GPP-Series provides the sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. In order to simplify the setting of waveform editing, the GPP-Series has 8 built-in Templet waveforms in the sequence output function for users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, Exp Fall waveforms.

The sound protection functions include OVP/OCP/OPP/OTP, in which the protection mechanism for OVP/OCP/OTP is implemented by hardware circuit that has the advantage of faster response time compared with competitors who adopt software to achieve protections. The OVP/OCP functions allow users to set the protection action point (except CH3 of GPP-3323) according to the conditions of the DUT. The OPP is only activated during the operation of the load function. The Delay Function sets the length of time during channel 1 or channel 2 power output on or during power output off.

In addition, the Trigger In/Trigger Out functions synchronize external devices. The GPP-3323 channel 3 adds a 3 A USB (Type A) output terminal for USB charging test. The intelligent temperature-controlled fan can adjust the speed according to the temperature of the power transistor so as to reduce unnecessary noise. The output value setting and the Sequence/Delay/Recorder functions provide 10 sets of internal memory for use, and can be loaded/stored using a USB flash drive. In addition to the standard RS-232 and USB remote interfaces, the GPP-Series also has an optional LAN or LAN+GPIB interface to facilitate different requirements. The commands of the GPP-Series conform to SCPI requirements and are compatible with the commands of the GPD-X303S Series.

OUTPUT FUNCTION LIST

Model Number	GPP-4323 / GPP-3323 / GPP-2323 / GPP-1326			
Number of Outputs	CH1	CH2	CH3	CH4
Sequence Output Function	✓	✓		
Load Functions (CC, CV, CR mode)	✓	✓		
Output Delay Function	✓	✓		
Output Monitoring Monitor(10 sets)	✓	✓	✓ (GPP-3323 not supported)	✓
Output Recorder Function	✓	✓	✓ (GPP-3323 not supported)	✓
Panel Save/Recall	✓	✓	✓	✓

ORDERING INFORMATION

GPP-4323 212 W Quad-Channel Programmable DC Power Supply (32 V/3 A x 2; 5 V /1 A; 15 V / 1 A)
GPP-3323 217 W Triple-Channel Programmable DC Power Supply (32 V/3 A x 2; 1.8 V/2.5 V/3.3 V / 5.0 V, 5 A)
GPP-2323 192 W Dual-Channel Programmable DC Power Supply (32 V/3 A *2)
GPP-1326 192 W Single-Channel Programmable DC Power Supply (32 V/6 A)

ACCESSORIES:

Power Cord x 1, Test Lead:
GPP-4323 Test Lead GTL-104A x 2, GTL-105A x 2
GPP-3323 Test Lead GTL-104A x 3
GPP-2323 Test Lead GTL-104A x 2
GPP-1326 Test Lead GTL-104A x 1, GTL-105A x 1

European Test Leads:
GPP-4323 GTL-203A x 2, GTL-204A x 2, GTL-201A x 1
GPP-3323 GTL-204A x 3, GTL-201A x 1
GPP-2323 GTL-204A x 2, GTL-201A x 1
GPP-1326 GTL-203A x 1, GTL-204A x 1, GTL-201A x 1

OPTION (Manufacturer Installed Only)

LAN Interface, GPIB+LAN Interface

OPTIONAL ACCESSORIES

GTL-246 USB Cable(USB 2.0 Type A-Type B Cable, 4P
GRA-449-E Rack Mount Kit (EIA)
GRA-449-J Rack Mount Kit (JIS)

FREE DOWNLOAD

PC Software, LabVIEW Driver

SPECIFICATIONS

Model		GPP-4323				GPP-3323			GPP-2323		GPP-1326
OUTPUT RATING											
Number of Channel		CH1	CH2	CH3	CH4	CH1	CH2	CH3 (*1)	CH1	CH2	CH1
Voltage		0 V to 32.000 V		0 to 5.000 V	0 to 15.000 V	0 V to 32.000 V		1.8 V/2.5 V/3.3 V/5.0 V, ± 5 % (USB Port Volt ± 0.35 V)	0 V to 32.000 V		0 V to 32.000 V
Current		0 A to 3.0000 A		0 A to 1.0000 A	0 A to 1.0000 A	0 A to 3.0000 A		5A (USB Port 3 A)	0 A to 3.0000 A		0 A to 6.0000 A
Total Power		212 W				217 W			192 W		192 W
CONSTANT VOLTAGE OPERATION											
Line Regulation		≦ 0.01 % + 3 mV				≦ 0.01 % + 3 mV		≦ 3 mV	≦ 0.01 % + 3 mV		≦ 0.01 % + 3 mV
Load Regulation	(rating current ≦ 3 A)	≦ 0.01 % + 3 mV				≦ 0.01 % + 3 mV		≦ 5 mV	≦ 0.01 % + 3 mV		≦ 0.01 % + 3 mV
	(rating current > 3 A)	≦ 0.02 % + 5 mV				≦ 0.02 % + 5 mV			≦ 0.02 % + 5 mV		≦ 0.02 % + 5 mV
Ripple & Noise (5 Hz to 1 MHz)		≦ 350 μVrms		≦ 1 mVrms		≦ 350 μVrms		≦ 2 mVrms	≦ 350 μVrms		≦ 500 μVrms
Recovery Time		≦ 50 μs				≦ 50 μs		≦ 100 μs	≦ 50 μs		≦ 100 μs
		(50 % load change, minimum load 0.5 A)									
Maximum Remote Sensing Compensation Voltage (Single Line)		-									1 V
Temperature Coefficient		≦ 300 ppm/°C									
CONSTANT CURRENT OPERATION											
Line Regulation		≦ 0.2 % + 3 mA									
Load Regulation		≦ 0.2 % + 3 mA									
Ripple & Noise		≦ 2 mArms				≦ 2 mArms			≦ 2 mArms		≦ 4 mArms
RESOLUTION											
Voltage	Programming/Readback	1 mV / 1 mV				1 mV / 0.1 mV		-	1 mV / 0.1 mV		1 mV / 0.1 mV
Current	Programming/Readback	0.2 mA / 0.2 mA				0.1 mA / 0.1 mA			0.1 mA / 0.1 mA		0.1 mA / 0.1 mA
TRACKING OPERATION (CH1/CH2) (*2)											
Tracking Series Voltage/Current (*3)		0 V to 64.000 V / 0 A to 3.0000 A									
Tracking Parallel Voltage/Current (*3)		0 to 32.0000 V / 0 A to 6.0000 A									
Tracking Error		≦ 0.1 % + 10 mV of Master (0 V to 32 V, No Load , with Load add load regulation ≦ 100 mV)									
Parallel Regulation		Line: ≦ 0.01 % + 3 mV									
		Load: ≦ 0.01 % + 3 mV(rating current ≦ 3 A); ≦ 0.02 % + 5 mV(rating current > 3 A)									
Series Regulation		Line: ≦ 0.01 % + 5 mV									
		Load: ≦ 100 mV									
Ripple & Noise (5 Hz to 1 MHz)		≦ 1 mVrms									
METER											
Full Scale		33.0000 V / 3.2000 A				33.0000 V / 3.2000 A		1.8 V/2.5 V/3.3 V/5.0 V	33.0000 V / 3.2000 A		33.0000 V / 6.2000 A
Programming Resolution	Voltage/Current	5 digits / 5 digits				5 digits / 5 digits		-	5 digits / 5 digits		5 digits / 5 digits
Readback Resolution	Voltage/Current	5 digits / 6 digits				6 digits / 5 digits		-	6 digits / 5 digits		6 digits / 5 digits
Setting Accuracy		≦ ± (0.03 % + 10 mV)				≦ ± (0.03 % + 10 mV)		-	≦ ± (0.03 % + 10 mV)		≦ ± (0.03 % + 10 mV)
		≦ ± (0.30 % + 10 mA)				≦ ± (0.30 % + 10 mA)		-	≦ ± (0.30 % + 10 mA)		≦ ± (0.30 % + 10 mA)
Readback Accuracy		≦ ± (0.03 % + 10 mV)				≦ ± (0.03 % + 10 mV)		-	≦ ± (0.03 % + 10 mV)		≦ ± (0.03 % + 10 mV)
		≦ ± (0.30 % + 10 mA)				≦ ± (0.30 % + 10 mA)		-	≦ ± (0.30 % + 10 mA)		≦ ± (0.30 % + 10 mA)
DC LOAD MODE											
Display	Voltage	1 V to 33.00 V				1 V to 33.00 V			1 V to 33.00 V		1 V to 33.00 V
	Current	0 A to 3.200 A				0 A to 3.200 A			0 A to 3.200 A		0 A to 3.200 A
	Power	0 W to 50.00 W				0 W to 50.00 W			0 W to 50.00 W		0 W to 50.00 W
CV Mode	Setting Range	1.500 V to 33.00 V				1.500 V to 33.00 V			1.500 V to 33.00 V		1.500 V to 33.00 V
	Setting/Readback	10 mV				10 mV			10 mV		10 mV
	Resolution	≦ ± (0.1 % + 30 mV)				≦ ± (0.1 % + 30 mV)			≦ ± (0.1 % + 30 mV)		≦ ± (0.1 % + 30 mV)
CC Mode	Setting Range	0 A to 3.200 A				0 A to 3.200 A			0 A to 3.200 A		0 A to 3.200 A
	Setting/Readback	1 mA				1 mA			1 mA		1 mA
	Resolution	≦ 0.3 % + 10 mA				≦ 0.3 % + 10 mA			≦ 0.3 % + 10 mA		≦ 0.3 % + 10 mA
CR Mode (*4)	Setting Range	1 Ω to 1 kΩ				1 Ω to 1 kΩ			1 Ω to 1 kΩ		1 Ω to 1 kΩ
	Setting/Readback	≦ ± (3 % + 1 Ω)				≦ ± (3 % + 1 Ω)			≦ ± (3 % + 1 Ω)		≦ ± (3 % + 1 Ω)
	Resolution	1 Ω				1 Ω			1 Ω		1 Ω
PROTECTION											
OVP	Power Mode	OFF,ON (0.5 V to 35.0 V)		OFF,ON (0.5 V to 6.0 V)	OFF,ON (0.5V to 16.5	OFF,ON (0.5 V to 35.0 V)		Fixed 5.5 V	OFF,ON (0.5 V to 35.0 V)		OFF,ON (0.5 V to 35.0 V)
	Load Mode	OFF,ON (1.5 V to 35.0 V)		-		OFF,ON (1.5 V to 35.0 V)		-	OFF,ON (1.5 V to 35.0 V)		OFF,ON (1.5 V to 35.0 V)
	Setting Accuracy	± 100 mV									
	Resolution	100 mV									
OCP	Power Mode	OFF,ON (0.05 A to 3.5 A)		OFF,ON (0.05 A to 1.20 A)		OFF,ON (0.05 A to 3.5 A)		3.1 A (USB port)	OFF,ON (0.05 A to 3.5 A)		OFF,ON (0.05 A to 7.00 A)
	Load Mode	OFF,ON (0.05 A to 3.5 A)		-		OFF,ON (0.05 A to 3.5 A)			OFF,ON (0.05 A to 3.5 A)		OFF,ON (0.05 A to 7.00 A)
	Setting Accuracy	± 20 mA									
	Resolution	10 mA									
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500V)									
		Between chassis and DC power cord : 30 MΩ or above (DC 500V)									
ADVANCED FUNCTION											
Status Signal Out	OUT ON/OFF Status	Turns on when the output is on									
	CV Status	Turns on during CV operation									
	CC Status	Turns on during CC operation									
	ALM Status	Turns on when an alarm has been activated									
	PWR ON Status	Turns on when the power is turned on									
GENERAL SPECIFICATIONS											
Display		4.3-inch TFT LCD									
Interface		Standard RS-232, USB (CDC), Ext. I/O, Optional (manufacturer installed only): LAN, GPIB+LAN									
Operation Environment		Indoor use, Altitude: ≦ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≦ 80 %; Installation category: II / Pollution degree: 2									
Storage Environment		Temperature: -10 °C to 70 °C, Humidity: ≦ 70 %									
Power Input		AC 100 V/120 V/220 V/230 V ± 10 %, 50 Hz or 60 Hz									
Power Consumption		900 VA, 680 W									
Dimensions & Weight		213 (W) x 145 (H) x 312 (D) mm; Approx. 7.5 kg									

Note: (*1) Warning : The CH3 output current from the 2 terminals should Not exceed 5A.
(*2) Tracking is not supported in LOAD mode, and not supported in 1 channel model.
(*3) Only Channel 1 and Channel 2 can perform series and parallel functions.
(*4) Setting/feedback accuracy requirements: voltage ≥ 0.1V, current ≥ 0.1A.

Rear Panel

LAN

LAN+GPIB

European Type Jack Terminal

GRA-449-J Rack Mount Kit (JIS)

GRA-449-E Rack Mount Kit (EIA)

Programming Linear DC Power Supply

NEW

GPP-1323

NEW

GPP-1205

CE | USB Host | USB Device | GPIB | Contro I/O

FEATURES

* Voltage Resolution: 1 mV / 0.1 mV
* Current Resolution: Three levels: 0.1 mA/ 0.01 mA (H), 10 μA/1 μA (M), 1 μA/0.1 μA (L)
* Output Modes: Constant Voltage (CV) / Constant Current (CC)
* Switchable Power Supply & Electronic Load Function
* Output Control: On/Off with delay function
* Slew Rate Control for Voltage & Current
* Remote Sense for Voltage Compensation
* Sequence Programming for Power Output
* Bleeder Circuit Control
* Voltage Averaging & Data Collection
* External Series & Parallel Connection Support
* Safety Protections: OVP, OCP, OTP, Reverse Polarity, Panel Lock
* Communication Interfaces: USB-TMC/CDC, LAN, Optional GPIB
* Display: 2.4-inch TFT-LCD with three modes
* Temperature-Controlled Fan
* Rack Compatibility: Supports GRA-441-J/E

The GPP-1000 series is a high-precision programmable DC power supply designed for accuracy in precision testing. It features voltage resolution up to 1 μmV / 0.1 μmV and three levels of current resolution, with a maximum of 1 μA / 0.1 μA. Supporting both Constant Voltage (CV) and Constant Current (CC) modes, it also includes a switchable power supply and electronic load function. The series consists of two models: GPP-1205 (20 V / 5 A / 100 W) and GPP-1323 (32 V / 3 A / 96 W), offering flexible output options.

Equipped with Remote Sense functionality, the GPP-1000 series compensates for voltage drops due to lead resistance, ensuring accurate output. It supports data logging and external series/parallel connections of up to four units for higher power applications. Safety features include OVP, OCP, OTP, and reverse polarity protection, along with a front panel lock to prevent accidental operation. Communication interfaces include USB-TMC/CDC and LAN, with optional GPIB for remote control. A 2.4-inch TFT-LCD provides clear data visualization, while an intelligent temperature-controlled fan enhances cooling efficiency.

With its high resolution, versatile communication options, robust safety protections, and flexible application modes, the GPP-1000 series is a powerful solution for R&D, testing, and production environments. It exemplifies modern test equipment trends, making testing more accurate, convenient, and efficient.

GPP-1323

GPP-1205

Rear Panel

Note: *1. EXT I/O connector on the rear panel.
*2. Open collector output: Maximum voltage of 30 V and maximum current of 8 mA. The common line for the status pins is floating (isolated voltage of 60 V or less), it is isolated from the output and control circuits.
*3. When the protection function is activated, it turns the output off, displays OVP, OCP, or OTP.

The specifications apply when the GPP-1205/1323 are powered on for at least 30 minutes under +20 °C to +30 °C.

SPECIFICATIONS

		GPP-1323	GPP-1205
OUTPUT RATING			
Output Voltage		0.000 V to 32.000 V	0.000 V to 20.000 V
Output Current		0.0000 A to 3.0000 A	0.0000 A to 5.0000 A
Output Power		96 W	100 W
CONSTANT VOLTAGE OPERATION			
Line Regulation		± (0.01 % of setting + 3 mV)	
Load Regulation		≤ 0.01 % + 3 mV (rating current ≤ 3 A) ≤ 0.02 % + 5 mV (rating current > 3 A)	
Transient Response		< 100 µs	
Ripple Noise		0.8 mVrms	
Setting Range		0 V to 33.600 V	0 V to 21.000 V
Rise Time		≤ 100 ms	
Fall Time		≤ 100 ms	
Maximum Remote Sensing Compensation Voltage (Single Line)		0.5 V	
Temperature Coefficient (TYP.)		300 ppm/°C	
CONSTANT CURRENT OPERATION			
Line Regulation		≤ 0.1 % + 3 mA	
Load Regulation		≤ 0.1 % + 3 mA	
Setting Range		0 A to 3.1500 A	0 A to 5.2500 A
Ripple Noise (Arms)		≤ 2 mArms	
Temperature Coefficient (TYP.)		300 ppm/°C	
RESOLUTION			
Voltage	Programming/Readback	1 mV / 0.1 mV	
Current	Programming/Readback	(High) 0.1 mA / 0.01 mA; (Middle) 10 µA / 1 µA; (Low) 1 µA/ 0.1 µA	
METER			
Full Scale	Voltage/Current	33.6000 V / 3.1500 A	21.0000 V / 5.2500 A
Programming	Voltage/Current	5 digits / 5 digits	
Readback Resolution	Voltage/Current	6 digits / 6 digits	
Setting Accuracy		Voltage: ± (0.03 % of reading + 10 mV); Current: ± (0.3 % of reading + 10 mA) (H) Current: ± (0.3 % of reading + 1 mA) (M); Current: ± (0.3 % of reading + 0.1 mA) (L)	
Readback Accuracy		Voltage: ± (0.03 % of reading + 10 mV); Current: ± (0.3 % of reading + 10 mA) (H) Current: ± (0.3 % of reading + 1 mA) (M); Current: ± (0.3 % of reading + 0.1 mA) (L)	
DC LOAD MODE			
Display	Voltage	3.000 V to 32.000 V	3.000 V to 20.000 V
	Current	0 A to 3.0000 A	0 A to 5.0000 A
	Power	96 W	100 W
CV Mode	Setting Range	3.000 V to 32.000 V	3.000 V to 20.000 V
	Setting/Readback	≤ 0.1 % + 30 mV	
	Resolution	1 mV	
CC Mode	Setting Range	0 A to 3.0000 A	0 A to 5.0000 A
	Setting/Readback	≤ ± 0.3 % + 10 mA	
	Resolution	0.1 mA	
PROTECTION *3			
OVP	Setting Range	1.8 V to 35.2 V	1.0 V to 22.0 V
	Setting Accuracy	± 100 mV	
	Operation	Turns the output off, displays OVP	
OCP	Setting Range	0.15 A to 3.3 A	0.25 A to 5.5 A
	Setting Accuracy	± 20 mA	
	Operation	Turns the output off, displays OCP	
OTP	Operation	Turns the output off, displays OTP	
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500V) Between chassis and DC power cord : 30 MΩ or above (DC 500V)	
SERIES AND PARALLEL CAPABILITY			
Parallel Number		4 units	
Series Number		4 units	
ADVANCED FUNCTION			
Trigger Signal *1	Trigger Input	A high- or low-level CMOS signal is applied for 100 µs or longer. It receives a pulse to perform actions like power output, V/I set operation or memory recall.	
	Trigger Output	Trigger output: approx. 3.3 V Pulse width: approx. 1ms, Output impedance: approx. 50 Ω It outputs a pulse when power output, V/I set operation or memory recall is executed.	
Status Signal Out *1 *2	OUT ON/OFF Status	Turns on when the output is on	
	CV Status	Turns on during CV operation	
	CC Status	Turns on during CC operation	
	ALM Status	Turns on when an alarm has been activated	
	PWR ON Status	Turns on when the power is turned on	
GENERAL SPECIFICATIONS			
Display		2.4-inch TFT LCD	
Interface	LAN	MAC Address, Gateway IP Address, Instrument IP Address, Subnet Mask	
	USB	Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB-CDC/TMC	
	GPIB (Factory Optional)	SCPI-1993, IEEE 488.2 compliant interface	
Operating Environment		Indoor use, Overvoltage Category II, Altitude: ≤ 2000 m, Ambient temperature: 0 °C to 40 °C, Relative humidity: 20 % to 80 % RH; No condensation	
Storage Environment		Ambient temperature: -20 °C to 70 °C, Relative humidity: 20 % to 85 % RH; No condensation	
Power Source		AC (100 V, 120 V, 220 V, 240 V) ± 10 %, 50 or 60 Hz	
Power Consumption		300 VA	
Max. Inrush Current		30 A max or less	
Dimensions & Weight		107 mm x 124 mm x 313 mm (W x H x D) (not including protrusions), Approx. 5.5 kg	

Programming Linear DC Power Supply

European Type Jack Terminal

ORDERING INFORMATION

GPP-1205	100 W Single Channel Programming Linear DC Power Supply (USB, LAN) (20 V /5 A)
GPP-1323	96 W Single Channel Programming Linear DC Power Supply (USB, LAN) (32 V/3 A)

ACCESSORIES:
Power Cord x 1, Packing List x 1, Test lead: Non-European: GTL-104A x 1 Test lead: European: GTL-204A x 1

OPTION (Manufacturer Installed Only)
GPIB interface

OPTIONAL ACCESSORIES

GTL-303	RF Cable, for Trigger In/Out use	**GRA-441-J**	Rack Mount Kit for JIS type
GTL-246	USB Cable (USB 2.0 A-B Type, approx. 1200mm)	**GRA-441-E**	Rack Mount Kit for EIA type

FREE DOWNLOAD
PC Software, LabVIEW Driver

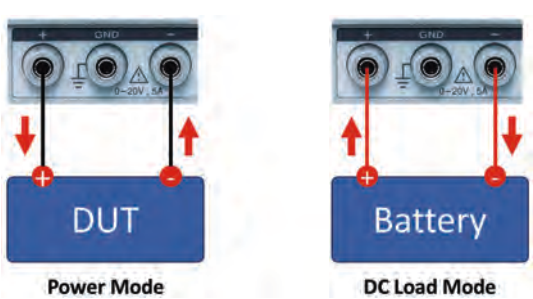
A. HIGH MEASUREMENT RESOLUTION

The GPP-1000 series features a synchronous display function, showing both set and actual readback values for precise testing.

Voltage Resolution: Up to 1 mV / 0.1 mV for fine control.

Current Resolution: Three levels for set/readback:
* High (H): 0.1 mA / 0.01 mA
* Middle (M): 10 µA / 1 µA
* Low (L): 1 µA / 0.1 µA

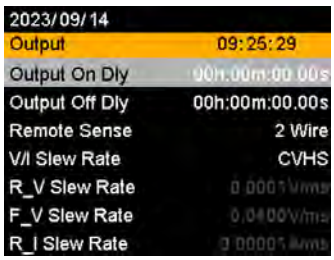
B. ELECTRONIC LOAD FUNCTION



The GPP-1000 series can switch between Power Mode and DC Load Mode. In Power Mode, it can provide the stable power required by the DUT, while Electronic Load Mode is suitable for applications such as battery discharge testing.

The electronic load function supports two setting modes: CV (constant voltage) and CC (constant current), allowing users to flexibly adjust load conditions according to test requirements to ensure accurate test results.

C. POWER ON/OFF DELAY FUNCTION

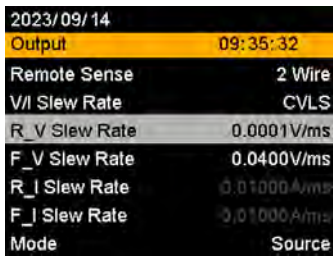


The output on/off delay time can be set to improve test flexibility.

Support 2-Wire / 4-Wire output, suitable for different test environments.

Can be set from 00h:00m:00.00 s to 99h:59m:59.99 s, providing precise time control.

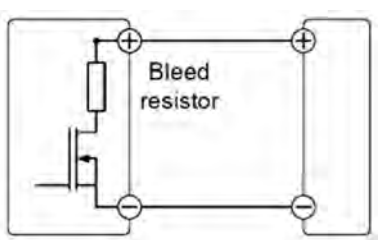
D. POWER OUTPUT SLEW RATE SETTING FUNCTION



The GPP-1000 series offers slew rate control for voltage and current to ensure stability and accuracy in testing.

High-Speed Mode (CVHS, CCHS): Uses the fastest slew rate for rapid response; User-Defined Mode (CVLS, CCLS): Allows customized slew rate settings for precise control.

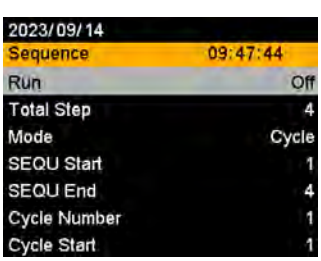
E. BLEEDER RESISTOR DESIGN



This series adopts the parallel bleeder resistor design for the first time, which can quickly release the stored energy of the power filter capacitor to avoid the impact of surges.

This design can also serve as a minimum voltage load to ensure stable voltage regulation and improve system reliability.

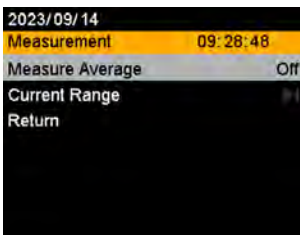
F. SEQUENCE POWER OUTPUT



The GPP-1000 series supports waveform editing and sequence output, allowing CV/CC loading for various tests.

- Stores up to 5 test scripts in internal memory or USB.
- Supports CSV files, editable in Excel and importable via USB(Save/Recall).
- Enhances test efficiency with flexible data management.

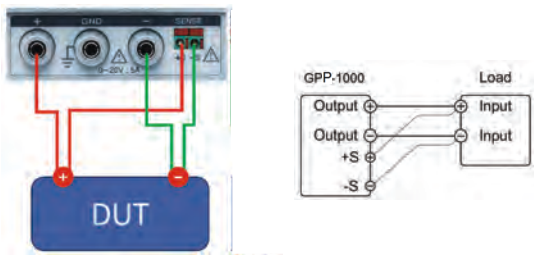
G. VOLTAGE AVERAGE OUTPUT FUNCTION



The adjustable sampling speed function ensures stable test results by controlling voltage averaging.

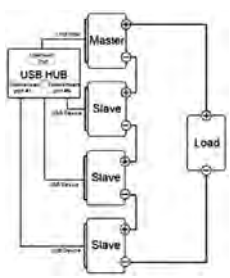
- Low: Slowest speed, ideal for steady measurements.
- Middle: Balanced accuracy and responsiveness.
- High: Fastest speed, suited for dynamic testing.

H. REMOTE SENSING FUNCTION



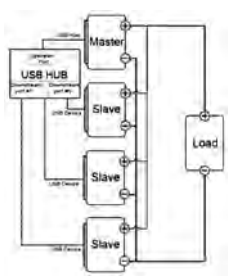
Remote Sensing compensates for voltage drops between the power supply output and the load, preventing the resistance of the test leads from affecting accuracy. When testing, users should choose a connection line with a voltage drop less than the power supply compensation range to ensure stable output.

I. EXTERNAL SERIES-PARALLEL CONNECTION CONTROL



Number of Series Unit (Max V / I)		
Model	GPP-1205	GPP-1323
1 unit	20V / 5A	32V / 3A
2 units	40V / 5A	64V / 3A
3 units	60V / 5A	96V / 3A
4 units	80V / 5A	128V / 3A

Provides external series-parallel connection application to flexibly expand output capacity. A maximum of 4 units can be connected in series or in parallel, which is suitable for high-power testing needs.



Number of Parallel Unit (Max V / I)		
Model	GPP-1205	GPP-1323
1 unit	20V / 5A	32V / 3A
2 units	20V / 10A	32V / 6A
3 units	20V / 15A	32V / 9A
4 units	20V / 20A	32V / 12A

- External series connection: 1 to 4 units, can increase the output voltage, up to 128 V (GPP-1323).
- External parallel connection: 1 to 4 units, can increase output current, up to 20 A (GPP-1205).

J. RECORDING FUNCTION

Mode	Contents
None	The Recording function will not be executed
Save to Udisk	To store data in USB, users need to insert
Remote (LAN)	Stores data to a remote location via LAN
Remote (USB)	Stores data on a remote PC via USB

The data logging and remote transmission function records voltage, current, and time data to a USB flash drive or transmits it remotely for analysis.

- Record function accessible via the RECO button.
- Recording time adjustable from 1 to 999 seconds for long-term testing.
- Three data collection modes enhance flexibility and accuracy.

K. OUTPUT ON/OFF FUNCTION

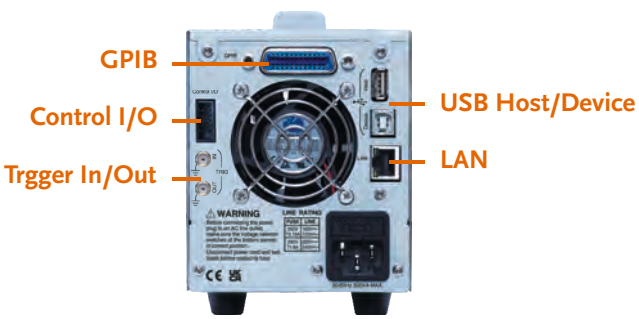
With output On/Off control function, it can effectively avoid unnecessary damage caused by pre-output when the DUT is connected to the power supply. Users can first set voltage and current parameters and confirm that all wiring is complete, and then manually execute output through the front panel to ensure the safety and accuracy of the test process.

L. MULTIPLE PROTECTION FUNCTIONS

The protection mechanisms ensure reliability and safety.

- Hardware-based OVP, OCP, OTP: Faster response than software protections, immediately stopping output when limits are exceeded.
- Panel Lock Function: Prevents unauthorized parameter changes, safeguarding the DUT and test environment.

M. PROVIDES MULTIPLE COMMUNICATION INTERFACES



This series offers versatile communication interfaces, including USB Host/Device, LAN, and optional GPIB, with USB Device supporting both USB-TMC and USB-CDC for flexible remote control. Additionally, Control I/O and Trigger In/Out enable seamless integration with external devices, enhancing automation capabilities in testing.

N. TEMPERATURE CONTROLLED FAN FUNCTION

The GPP-1000 series uses a 2.4-inch TFT LCD to provide clear data display and supports three display modes: V/I, V/I/W and V/I + Sequence. Users can flexibly choose the appropriate display mode according to test requirements, improving operational convenience and data visualization.

O. THREE SCREEN DISPLAY MODES

Voltage / Current

Voltage / Current / Watt

Voltage / Current / Sequence

The GPP-1000 series uses a temperature-controlled fan design that adjusts the speed according to the internal temperature of the machine to ensure stable operation and maintain specification consistency.

This design not only effectively controls the temperature inside the machine, but also reduces the noise generated by the fan speed, providing a quieter operating environment.

Multiple Output Programmable Linear DC Power Supply

GPD-2303S/3303S/ 4303S/3303D

CE USB PC Software LabVIEW Driver

The GPD-Series is a cutting edge, economical, high resolution programmable power supply, Which is equipped with 2, 3 and 4 independent output channels and support a maximum output from 180Watt to 195Watt. The power supplies include four sets of memory for voltage and current setting, a USB remote interface, high resolution (GPD-2303S / GPD-3303S / GPD-4303S) and intelligent fan control to reduce noise. The durable features along with the free output monitoring software make the GPD-Series suitable for any lab as well as the LED industry.

FEATURES

* 2, 3 and 4 Independent Isolated Output
* 4 LED Display Sets : 3 Digits After Decimal Point (GPD-2303S/3303S/4303S)
* Minimum Resolution :
  GPD-2303S/3303S/4303S (1mV/1mA)
  GPD-3303D (100mV/10mA)
* Digital Panel Control (Rotary Encoder Switch, Rubber Key With Indicator)
* User-Friendly Operation, Coarse / Fine Volume Control
* 4 Sets Save / Recall
* Key-Lock
* Output ON/OFF
* Tracking Series and Parallel Mode
* Smart Cooling Fan Achieving Low Noise
* Compact Design
* PC Software & USB Driver
* USB Standard Interface
* Optional European Jack Type Terminal

GPD-2303S

GPD-3303S

GPD-3303D

GPD-4303S

Rear Panel

ORDERING INFORMATION

GPD-2303S	2 Channels, 180W Programmable Linear DC Power Supply
GPD-3303S	3 Channels, 195W Programmable Linear DC Power Supply
GPD-4303S	4 Channels, 195W Programmable Linear DC Power Supply
GPD-3303D	3 Channels, 195W Programmable Linear DC Power Supply

ACCESSORIES :

Power Cord x 1, Test Lead :

GPD-4303S	Test Lead GTL-104A x 2, GTL-105A x 2
GPD-3303S	Test Lead GTL-104A x 2, GTL-105A x 1
GPD-2303S	Test Lead GTL-104A x 2
GPD-3303D	Test Lead GTL-104A x 2, GTL-105A x 1

European Test Leads:

GPD-4303S	GTL-203A x 2, GTL-204A x 2, GTL-201A x 1
GPD-3303S	GTL-203A x 1, GTL-204A x 2, GTL-201A x 1
GPD-2303S	GTL-204A x 2, GTL-201A x 1
GPD-3303D	GTL-203A x 1, GTL-204A x 2, GTL-201A x 1

OPTIONAL ACCESSORIES

GTL-246 USB Cable

FREE DOWNLOAD

PC Software including Data Log

SPECIFICATIONS

		GPD-4303S				GPD-3303S			GPD-2303S		GPD-3303D		
OUTPUT RATING													
Number of Channel		CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2	CH1	CH2	CH3
Voltage		0 V to 30.000 V		0 V to 5.000 V / or 5.001 V to 10.000 V	0 V to 5.000 V	0 V to 30.000 V		(2.5V/3.3V/5.0 V) ± 8 % (Fixed)	0 V to 30.000 V		0 V to 30.000 V		(2.5V/3.3V/5.0 V) ± 8 % (Fixed)
Current		0 A to 3.000 A		0 A to 3.000 A or 0 A to 1.000 A	0 A to 1.000 A	0 A to 3.000 A		3 A Max.	0 A to 3.000 A		0 A to 3.000 A		3 A Max.
Total Power		200 W				195 W			180 W		195 W		
CONSTANT VOLTAGE OPERATION													
Line Regulation		≦ 0.01 % + 3 mV											
Load Regulation		≦ 0.01 % + 3 mV (rating current ≦ 3 A) ≦ 0.02 % + 5 mV(rating current > 3 A)											
Ripple & Noise (5 Hz to 1 MHz)		≦ 1 mVrms		≦ 2 mVrms	≦ 1 mVrms	≦ 1 mVrms			≦ 1 mVrms		≦ 1 mVrms		
Recovery Time		≦ 100 μs (50 % Load Change, Minimum Load 0.5 A)											
Temperature Coefficient		≦ 300 ppm / ℃											
CONSTANT CURRENT OPERATION													
Line Regulation		≦ 0.2 % + 3 mA											
Load Regulation		≦ 0.2 % + 3 mA											
Ripple & Noise		≦ 3 mArms											
RESOLUTION													
Voltage	**Programming/Readback**	1 mV / 1 mV				1 mV / 1 mV		-	1 mV / 1 mV		100 mV / 100 mV		-
Current	**Programming/Readback**	1 mA / 1 mA				1 mV / 1 mV		-	1 mV / 1 mV		10 mA / 10 mA		-
TRACKING OPERATION (CH1/CH2) (*1)													
Tracking Series Voltage		0 V to 60.000 V		-		0 V to 60.000 V		-	0 V to 60.000 V		0 V to 60.0 V		-
Tracking Parallel Current		0 A to 6.0000 A		-		0 A to 6.0000 A		-	0 A to 6.0000 A		0 A to 6.00 A		-
Tracking Error		≦0.5 % ± 10 mV (10 V to 30 V no load) with load added ≦ 300 mV; ≦ 0.5 % ± 30 mV (0 V to 9.99 V no load) with load added ≦ 300 mV											
Parallel Regulation		Line: ≦ 0.01 % + 3 mV Load: ≦ 0.01 % + 3 mV (rating current ≦ 3 A); ≦ 0.02 % + 5 mV (rating current > 3 A)											
Series Regulation		Line: ≦ 0.01 % + 5 mV Load: ≦ 300 mV											
METER													
Full Scale		32.000 V / 3.000 A		10.000 V / 1.000 A	5.000 V / 1.000 A	32.000 V / 3.000 A		-	32.000 V / 3.000 A		32.000 V / 3.000 A		-
Programming & Readback Resolution	**Voltage/Current**	Voltage: 5 digits 0.4" LED display (full scale: 32 V) Current: 4 digits 0.4" LED Display (full scale: 3.2 A)									Voltage: 3 digits 0.4" LED Display Current: 3 digits 0.4" LED Display		
Setting Accuracy		Voltage: ± (0.03 % of RDG + 10 digits) Current: ± (0.3 % of RDG + 10 digits)									Voltage: ± (0.5 % of RDG + 2 digits) Current: ± (0.5 % of RDG + 2 digits)		
Readback Accuracy		Voltage: ± (0.03 % of RDG + 10 digits) Current: ± (0.3 % of RDG + 10 digits)									Voltage: ± (0.5 % of RDG + 2 digits) Current: ± (0.5 % of RDG + 2 digits)		
PROTECTION													
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500V) Between chassis and DC power cord : 30 MΩ or above (DC 500V)											
ADVANCED FUNCTION													
Status Signal Out	**OUT ON/OFF Status**	Turns on when the output is on											
	CV Status	Turns on during CV operation											
	CC Status	Turns on during CC operation											
	PWR ON Status	Turns on when the power is turned on											
GENERAL SPECIFICATIONS													
Display		4 LED Display											
Interface		USB Device (CDC)											
Operation Environment		Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %; Installation category: II / Pollution degree: 2											
Storage Environment		Temperature: -10 ˚C to 70 ˚C, Humidity: ≤ 70 %											
Power Input		AC 100 V/120 V/220 V/230 V ± 10 %, 50 Hz or 60 Hz											
Dimensions & Weight		210 (W) x 130 (H) x 265 (D) mm; Approx. 7 kg											

Note: (*1) Only Channel 1 and Channel 2 can perform series and parallel functions.

European Type Jack Terminal

Triple-Channel DC Power Supply

GPE-3060/6030

NEW

CE Remote I/O

The GPE-3060/6030 are high-resolution linear DC power supplies. Their primary aim is to replace the existing GPC-3060D/6030D models. The GPE-3060/6030 deliver 385 watts of output power and feature three independent isolated output channels. The GPE-3060 offers CH1/CH2 outputs of 0 to 30 V and 0 to 6 A, while the GPE-6030 supports CH1/CH2 outputs of 0 to 60 V and 0 to 3 A. Both models feature CH3 outputs 5.0 V at 5 A.

Series/Parallel Operation Function - In addition to the independent output between each channel, GPE-3060/6030 can perform series/parallel automatic connection tracking function. Through the parallel or series function, the output of the power supply can be controlled at 30 V/12 A (parallel) (GPE-3060) or 120 V/3 A (series) (GPE-6030) and this function can be used on CH1/CH2.

With respect to high resolution, GPE-3060 provides 10 mV/2 mA and GPE-6030 offers 20 mV/1 mA. GPE-3060/6030 adopts a new hybrid power supply design, which can save 13 % of power consumption compared with the wattage of the conventional linear power supplies, and the volume and weight are significantly reduced.

FEATURES

* 1/2/3 Independent Isolated Output Channels
* GPE-3060 Provides CH1/CH2 : 0 to 30 V/0 to 6 A Output; CH3 Supports 5.0 V at 5 A
* GPE-6030 Supports CH1/CH2 : 0 to 60 V/0 to 3 A Output; CH3 Supports 5.0 V at 5 A
* Series/Parallel Tracking Function
* Setting/Read back Resolution :
  Voltage (4digits) : 10 mV (GPE-3060) / 20 mV (GPE-6030)
  Current (4digits) : 2 mA (GPE-3060) / 1 mA (GPE-6030)
* Output On/Off Function
* Simple Analog Control Interface
* Multiple Protection Apparatuses Such as Over Voltage and Overload Protection Functions

GPE-3060

GPE-6030

European Type Jack Terminal

GPE-3060

GPE-6030

Rear Panel

ORDERING INFORMATION

GPE-3060	385 W Triple-Channel DC Power Supply
GPE-6030	385 W Triple-Channel DC Power Supply

ACCESSORIES :

Power Cord, Test Lead GTL-104A x 3;
European Test Leads: GTL-204A x 3, GTL-201A x 1

SPECIFICATIONS

		GPE-6030			GPE-3060		
OUTPUT RATING							
Number of Channel		CH1	CH2	CH3	CH1	CH2	CH3
Output Voltage		0 V to 60.00 V		5.0 V, ± 5 %	0 V to 30.00 V		5.0 V, ± 5 %
Output Current		0 A to 3.000 A		5 A	0 A to 6.000 A		5 A
Total Power		385 W			385 W		
CONSTANT VOLTAGE OPERATION							
Line Regulation		≤ 0.01 % + 3 mV		≤ 3 mV	≤ 0.01 % + 3 mV		≤ 3 mV
Load Regulation		≤ 0.01 % + 5 mV; ≤ 0.02 % + 5mV (≥ 10 A)		≤ 5 mV	≤ 0.01 % + 5 mV; ≤ 0.02 % + 5mV (≥ 10 A)		≤ 5 mV
Ripple & Noise (5 Hz to 1 MHz)		≤ 1 mVrms					
Transient Recovery Time		≤ 100 μs (50 % load change, minimum load 0.5 A)					
Setting Range		0 V to 60.00 V		5 V Fixed	0 V to 30.00 V		5 V Fixed
Temperature Coefficient		≤ 300 ppm/°C					
CONSTANT CURRENT OPERATION							
Line Regulation		≤ 0.01 % + 3 mA					
Load Regulation		≤ 0.01 % + 3 mA					
Ripple & Noise		≤ 2 mArms					
Setting Range		0 A to 3.000 A		-	0 A to 6.000 A		-
RESOLUTION							
Voltage	Programming/Readback	20 mV / 20 mV		-	10 mV / 10 mV		-
Current	Programming/Readback	1 mA / 1 mA		-	2 mA / 2 mA		-
TRACKING OPERATION (CH1/CH2)							
Tracking Series Voltage/Current		0 V to 120.000 V / 0 A to 3.0000 A		-	0 V to 60.0000 V / 0 A to 6.0000 A		-
Tracking Parallel Voltage/Current		0 V to 60.0000 V / 0 A to 6.0000 A		-	0 V to 30.0000 V / 0 A to 12.000 A		-
		≤ 0.2 % + 20 mV of Master		-	≤ 0.1 % + 10 mV of Master		-
Tracking Error		(No Load, with load add load regulation ≤ 200 mV)		-	(No Load, with load add load regulation ≤ 200 mV)		-
Parallel Regulation	Line	≤ 0.01 % + 3 mV					
	Load	≤ 0.01 % + 5 mV; ≤ 0.02 % + 5mV (≥ 10 A)					
Series Regulation	Line	≤ 0.01 % + 5 mV					
	Load	≤ 200 mV					
Ripple & Noise		≤ 2 mVrms (5 Hz to 1 MHz)					
METER							
Full Scale	Voltage/Current	60.00 V / 3.000 A		5 V Fixed	30.00 V / 6.000 A		5 V Fixed
Programming Resolution	Voltage/Current	4 digits / 4 digits		-	4 digits / 4 digits		-
Readback Resolution	Voltage/Current	4 digits / 4 digits		-	4 digits / 4 digits		-
Setting Accuracy	Voltage	± (0.1 % of reading + 30 mV) (4 digits) / ± (0.1 % of reading + 200 mV) (3 digits)					
	Current	± (0.3 % of reading + 10 mA) (4 digits) / ±(0.3 % of reading + 20 mA) (3 digits)					
Readback Accuracy	Voltage	± (0.1 % of reading + 30 mV) (4 digits) / ± (0.1 % of reading + 200 mV) (3 digits)					
	Current	± (0.3 % of reading + 10 mA) (4 digits) / ±(0.3 % of reading + 20 mA) (3 digits)					
PROTECTION							
OVP	Power Mode	OFF,ON (1 V to 65.0 V)		5.5 V	OFF,ON (1 V to 35.0 V)		5.5 V
	Setting Accuracy	± 1 V		-	± 1 V		-
	Resolution	1 V		-	1 V		-
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500V) Between chassis and DC power cord : 30 MΩ or above (DC 500V)					
GENERAL SPECIFICATIONS							
Display		4.3" monochrome LCD					
Interface		Remote I/O, 10-pin terminal					
Operation Environment		Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %; Installation category: II / Pollution degree: 2					
Storage Environment		Temperature: -10 °C to 70 °C, Humidity: ≤ 70 %					
Power Input		AC 100 V/120 V/220 V/230 V ± 10 %, 50 Hz or 60 Hz					
Power Consumption		900 VA, 680 W					
Dimensions & Weight		210 (W) x 155 (H) x 360 (D) mm; Approx. 10 kg					

The specifications apply when the GPE-Series are powered on for at least 30 minutes under +20 °C to +30 °C.

Programming Linear DC Power Supply

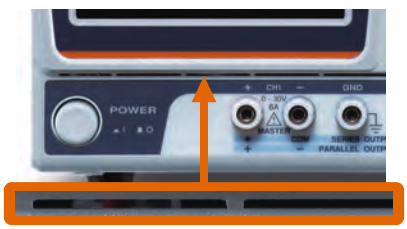
A. DIGITAL PANEL CONTROL

The GPE-3060/6030 linear DC power supplies have a built-in digital panel control design. By long pressing and short pressing a single button, they provide efficient and user-friendly OVP (overvoltage protection) function. The OVP function provides overvoltage protection, and the panel lock function prevents voltage/current parameters from being tampered with by a third party to improve the protection of the DUT. The voltage and current setting knobs are changed to Encoder Switches to make the setting more accurate. In addition, the On/Off output button has a backlight display, which makes it easier for users to identify the current operating status of the power supply.

B. SERIES/PARALLEL OPERATION FUNCTION

In addition to the independent output between each channel, GPE-3060/6030 can perform series/parallel automatic connection tracking function. Through the parallel or series function, the output of the power supply can be controlled at 30 V/12 A (parallel) (GPE-3060) or 120 V/3 A (series) (GPE-6030) and this function can be used on CH1/CH2.

C. OPTIMIZATION OF HEAT DISSIPATION



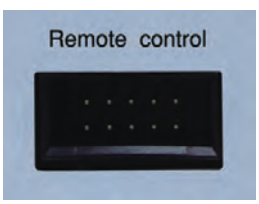
There are air inlet ducks in front of the panel to efficiently dissipate heat.
Temperature controlled fan can effectively reduce fan noise.

D. HIGH MEASUREMENT RESOLUTION (SETTING AND READBACK FUNCTIONS)

With respect to high measurement resolution, GPE-3060 provides 10 mV/2 mA and GPE-6030 offers 20mV/1mA with a readback accuracy of 30mV/10mA. GPE-3060/6030 ensure that the power output is pure and stable.

Users can easily apply the series to simulate the DUT with very small voltages or currents. Conventional low-resolution linear DC power supplies cannot achieve this function.

E. PANEL OUTPUT ON/OFF OR REAR PANEL REMOTE CONTROL OUTPUT ON/OFF FUNCTION



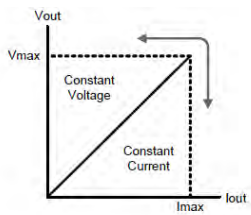
GPE-3060/6030 provide the output On/Off function. This function can avoid unnecessary damage caused by pre-output when the DUT is connected to the power supply. Users can set the voltage and current parameters in advance and confirm all connections have been completed, and manually execute output On/Off function through the front panel.

Furthermore, the series provides a simple analog control function to control external output On/Off through the Remote Control terminal on the rear panel.

F. OPERATING MODE

C.V. and C.C Operation Mode

In constant voltage (CV) mode, the current limit must be set to determine its crossover point, and in constant current (CC) mode, the voltage limit must be set to determine its crossover point. When the current exceeds the crossover point, the power supply mode will switch to constant current (CC) mode.

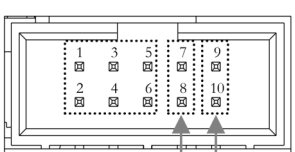


Series and Parallel Mode

When the CH1/CH2 of GPE-3060/6030 linear DC power supply are in parallel connection, the total output current will increase. While in series conditions, the total output voltage will increase to twice the original single channel rated output (maximum value). Users only need to press the required series or parallel button on the front panel to perform series or parallel operation.

Remote Control Settings

GPE-3060/6030 provide a simple Remote Control function. Remote Output On/Off control can be performed through this connector. The pin definitions are as follows:



7 & 8 Short circuit is the setting of remote control.
At this time, the On/Off on the front panel will keep flashing.
9 & 10 Open circuit is the status of remote control Output On.
9 & 10 Short circuit is the status of remote control Output Off.

Key Lock Function

When users output voltage and current under fixed conditions to the power supply for a long time, users can start the panel lock function to protect the safety of the DUT in order to prevent a third party other than the user from arbitrarily changing the setting parameters and causing damage to the DUT.

Multiple Output Linear DC Power Supply

GPE-X323A Series

NEW

CE Remote I/O

FEATURES

* 1/2/3/4 Independent Isolated Output
* 4.3 Inch LCD Display
* Setting & Readback Resolution 10 mV/ 1 mA (GPE-1326A is 10 mV/2 mA)
* Output ON/OFF Switch
* Analog Control (Remote I/O) for Output ON/OFF
* Key Lock Function
* Tracking Series and Parallel Operation (Multi-channel Models)
* Recovery Time : ≤100 μs (50 % Load Change, Minimum Load 0.5 A)
* Remote Sense (GPE-1326A Only)
* Optional European Jack Type Terminal

Rear Panel

The GPE-X323A series is a cutting edge, economical linear DC Power supply. The GPE-X323A series features output power from 192 watts to 217 watts, independent isolated output channels, high resolution, low noise, high reliability, and compact size. The GPE-X323A series has a built-in digital panel control design to replace conventional control method. This unique design allows the GPE-X323A series linear DC power supply to provide users with more efficient functionalities, including set view and key lock so as to expedite the operation process. The key lock function protects DUTs by preventing others from changing voltage and current parameters. Additionally, output key light facilitates users in clearly reading the operational status of power supply.

GPE-X323A Series

European Jack Type Terminal

GPE-1326A

GPE-2323A

GPE-3323A

GPE-4323A

ORDERING INFORMATION

GPE-4323A	212 W Quad-Channel DC Power Supply
GPE-3323A	217 W Triple-Channel DC Power Supply
GPE-2323A	192 W Dual-Channel DC Power Supply
GPE-1326A	192 W Single-Channel DC Power Supply

ACCESSORIES :

Power Cord,

Test Lead :

GPE-4323A	Etest Lead GTL-104A x 2, GTL-105A x 2
GPE-3323A	Test Lead GTL-104A x 3
GPE-2323A	Test Lead GTL-104A x 2
GPE-1326A	Test Lead GTL-104A x 1, GTL-105A x 1

European Test Leads :

GPE-4323A	GTL-203A x 2, GTL-204A x 2
GPE-3323A	GTL-204A x 3
GPE-2323A	GTL-204A x 2
GPE-1326A	GTL-203A x 1, GTL-204A x 1

SPECIFICATIONS

			GPE-4323A				GPE-3323A			GPE-2323A		GPE-1326A
OUTPUT RATING												
Total Channel			CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2	CH1
Output Voltage			0 V to 32.00 V		0 to 5.00 V	0 to 15.00 V	0 V to 32.00 V		5.0 V, ± 5 %	0 V to 32.00 V		0 V to 32.00 V
Output Current			0 A to 3.000 A		0 A to 1.000 A	0 A to 1.000 A	0 A to 3.000 A		5 A	0 A to 3.000 A		0 A to 6.000 A
Total Power			212 W				217 W			192 W		192 W
CONSTANT VOLTAGE OPERATION												
Line Regulation			≤ 0.01 % + 3 mV				≤ 0.01 % + 3 mV		≤ 3 mV	≤ 0.01 % + 3 mV		≤ 0.01 % + 3 mV
Load Regulation	**(rating current ≤ 3 A)**		≦ 0.01 % + 3 mV				≦ 0.01 % + 3 mV		≤ 5 mV	≦ 0.01 % + 3 mV		≦ 0.01 % + 3 mV
	(rating current > 3 A)		≦ 0.02 % + 5 mV				≦ 0.02 % + 5 mV			≦ 0.02 % + 5 mV		≦ 0.02 % + 5 mV
Ripple & Noise (5 Hz to 1 MHz)			≤ 1 mVrms									
Transient Recovery Time			≤ 100 μs (50 % load change, minimum load 0.5 A)									
Setting Range			0 V to 32.00 V		0 to 5.00 V	0 to 15.00 V	0 V to 32.00 V		5.0 V Fixed	0 V to 32.00 V		
Temperature Coefficient			≤ 300 ppm/°C									
CONSTANT CURRENT OPERATION												
Line Regulation			≤ 0.2 % + 3 mA									
Load Regulation			≤ 0.2 % + 3 mA									
Ripple & Noise			≤ 3 mArms									
Setting Range			0 A to 3.000 A		0 A to 1.000 A	0 A to 1.000 A	0 A to 3.000 A		-	0 A to 3.000 A		
RESOLUTION *1												
Voltage	**Programming & Readback**		10 mV or 100 mV				10 mV or 100 mV		-	10 mV or 100 mV		10 mV or 100 mV
Current	**Programming & Readback**		1 mA / 10 mA				1 mA / 10 mA		-	1 mA / 10 mA		2 mA / 10 mA
TRACKING OPERATION (CH1/CH2) *2												
Tracking Series Voltage/Current			0 V to 64.00 V / 0 A to 3.000 A									
Tracking Parallel Voltage/Current			0 V to 32.00 V / 0 A to 6.000 A									
Tracking Error			≤ 0.1 % + 10 mV of Master (No Load, with load add load regulation ≤ 100 mV)									
Parallel Regulation	**Line**		Line: ≦ 0.01 % + 3 mV									
	Load		Load: ≦ 0.01 % + 3 mV(rating current ≦ 3 A); ≦ 0.02 % + 5 mV(rating current > 3 A)									
Series Regulation	**Line**		Line: ≦ 0.01 % + 5 mV									
	Load		Load: ≦ 100 mV									
Ripple & Noise (5 Hz to 1 MHz)			(Parallel) ≤ 1 mVrms, (Series) ≤ 2 mVrms									
METER												
Full Scale	**Voltage/Current**		33.00 V / 3.200 A				33.00 V / 3.200 A		5.0 V Fixed	33.00 V / 3.200 A		33.00 V / 6.200 A
Programming	**Voltage & Current**		4 digits or 3 digits				4 digits or 3 digits		-	4 digits or 3 digits		4 digits or 3 digits
Readback Resolution	**Voltage & Current**		4 digits or 3 digits				4 digits or 3 digits		-	4 digits or 3 digits		4 digits or 3 digits
Setting Accuracy	**Voltage**	**4 digits**	± (0.1 % + 30 mV)				± (0.1 % + 30 mV)		-	± (0.1 % + 30 mV)		± (0.1 % + 30 mV)
		3 digits	± (0.1 % + 200 mV)				± (0.1 % + 200 mV)		-	± (0.1 % + 200 mV)		± (0.1 % + 200 mV)
	Current	**4 digits**	± (0.3 % + 6 mA)				± (0.3 % + 6 mA)		-	± (0.3 % + 6 mA)		± (0.3 % + 10 mA)
		3 digits	± (0.3 % + 20 mA)				± (0.3 % + 20 mA)		-	± (0.3 % + 20 mA)		± (0.3 % + 20 mA)
Readback Accuracy	**Voltage**	**4 digits**	± (0.1 % + 30 mV)				± (0.1 % + 30 mV)		-	± (0.1 % + 30 mV)		± (0.1 % + 30 mV)
		3 digits	± (0.1 % + 200 mV)				± (0.1 % + 200 mV)		-	± (0.1 % + 200 mV)		± (0.1 % + 200 mV)
	Current	**4 digits**	± (0.3 % + 6 mA)				± (0.3 % + 6 mA)		-	± (0.3 % + 6 mA)		± (0.3 % + 10 mA)
		3 digits	± (0.3 % + 20 mA)				± (0.3 % + 20 mA)		-	± (0.3 % + 20 mA)		± (0.3 % + 20 mA)
PROTECTION												
OVP	**Power Mode**		OFF, ON		OFF, ON	OFF, ON	OFF, ON		5.5 V	OFF, ON		OFF, ON
	Setting Accuracy		± 1 V						-	± 1 V		
	Resolution		1 V						-	1 V		
Insulation Resistance			Between chassis and terminal : 20 MΩ or above (DC 500V) Between chassis and DC power cord : 30 MΩ or above (DC 500V)									
GENERAL SPECIFICATIONS												
Display			4.3" monochrome LCD									
Interface			Remote I/O, 10-pin terminal									
Operation Environment			Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %; Installation category: II / Pollution degree: 2									
Storage Environment			Temperature: -10 °C to 70 °C, Humidity: ≤ 70 %									
Power Input			AC 100 V / 120 V / 220 V ± 10 %, 230 V + 10 %/-6 %, 50 Hz or 60 Hz									
Power Consumption			550 VA / 420 W, MAX									
Dimensions & Weight			210 mm x 155 mm x 306 mm, (W x H x D), Approx. 7 kg									

Note:
(*1) Voltage ≥ 10.00 V, resolution is 100 mV, Voltage < 10.00 V, resolution is 10 mV.
(*2) Only channel 1 and channel 2 can perform series and parallel functions, expect GPE-1326A.

The specifications apply when the GPE-Series are powered on for at least 30 minutes under +20 °C to +30 °C.

Single Channel Linear DC Power Supply

NEW

GPE-1205

NEW

GPE-1323

CE Remote I/O

FEATURES

* 2.4" TFT LCD
* Encoder Switch to Set up Voltage and Current
* Voltage Setting Resolution 1 mV
* Voltage Readback Resolution 100 μV
* Current Setting Resolution 0.1 mA
* Current Readback Resolution 10 μA
* Provided Hardware Protections: OVP, OCP, OTP, On/Off Switch, Key Lock
* Provided Remote Sense (Compensates Voltage up to 0.5 V)
* Can Perform Series/Parallel Connection of Two GPE-1000 Units of The Same Model Through The Rear Panel Control I/O Interface

Rear Panel

The GPS-S series - comprising models such as the GPS-1850D, 3030D, and 3030DD - has long been a mainstay among DC power supplies offered by GW Instek. Renowned for its exceptional stability, durability, and dependable performance, this series has earned the trust of users and maintained a steadfast presence in the market for over three decades. Employing linear regulation technology, it delivers low-noise, high-precision output, rendering it well-suited to applications in research and development, education, and electronics manufacturing. Yet, as testing technologies have advanced, certain aspects of the series - namely its resolution, protective features, and user convenience - now present opportunities for refinement. Moreover, the cost of maintenance has steadily risen over time.
To meet the demands of modern testing applications, GW Instek has introduced the GPE-1000 series of DC power supplies as the ideal successor to the esteemed GPS-S series. This new line offers enhanced precision, steadfast stability, and intelligent functionality in its design. The series comprises two models - GPE-1205 (20 V / 5 A / 100 W) and GPE-1323 (32 V / 3 A / 96 W) - providing users with versatile options for output power to suit a range of requirements.

Compared to the old models, the GPE-1000 series has been significantly improved in many aspects. The old model's GPS-S design uses a VR knob, which is not only difficult to adjust the value accurately, but also has a low resolution, usually only up to 100 mV/10 mA. The new model utilizes an Encoder Switch digital knob design, which allows users to set the required value more accurately, and its voltage/current setting resolution is 1 mV/0.1 mA, and the readback resolution is increased to 0.1 mV/10 μA, greatly improving operational convenience and test accuracy. In addition, Remote Sense technology can perform voltage compensation to ensure accurate voltage output. The master-slave series/parallel connection function can provide higher voltage or current, suitable for higher power testing.

In terms of safety, the GPE-1000 series is equipped with multiple protective mechanisms, including Over Voltage Protection (OVP), Over Current Protection (OCP), Over Temperature Protection (OTP), and reverse polarity protection, thereby ensuring the safety of test equipment. Its 2.4-inch TFT-LCD display presents voltage and current readings with clarity, while the front panel lock function prevents accidental operation. Additionally, the temperature-controlled fan design effectively reduces noise, enhancing the comfort of the testing environment.

The GPE-1000 series supports the GRA-441-J/E rack mount kit, facilitating seamless integration into test systems and enhancing both spatial and management efficiency. With its high precision and intelligent design, the GPE-1000 series stands as an ideal choice for research and development, education, and electronics manufacturing. It empowers users to obtain accurate test data, thereby improving the efficiency of product development and testing processes.

GPE-1205

GPE-1323

SPECIFICATIONS

		GPE-1205	GPE-1323
OUTPUT RATING			
Output Voltage		0.000 V to 20.000 V	0.000 V to 32.000 V
Output Current		0.0000 A to 5.0000 A	0.0000 A to 3.0000 A
Output Power		100 W	96 W
CONSTANT VOLTAGE OPERATION			
Line Regulation		≤ 0.01 % + 3 mV	
Load Regulation		≤ 0.01 % + 5 mV; ≤ 0.01 % + 5mV (≥ 10 A)	
Ripple & Noise (5 Hz to 1 MHz)		≤ 0.5 mVrms	
Maximum Remote Sensing Compensation Voltage (Single Line)		0.5 V	
Transient Recovery Time		≤ 100 μs (50 % load change, minimum load 0.5 A)	
Setting Range		0 V to 21.000 V	0 V to 33.600 V
Temperature Coefficient		≤ 300 ppm/°C	
CONSTANT CURRENT OPERATION			
Line Regulation		≤ 0.2 % + 3 mA	
Load Regulation		≤ 0.2 % + 3 mA	
Ripple & Noise		≤ 2 mArms	
Setting Range		0 A to 5.2500 A	0 A to 3.1500 A
RESOLUTION			
Voltage	Programming/Readback	1 mV / 0.1 mV	1 mV / 0.1 mV
Current	Programming/Readback	0.1 mA / 0.01 mA	0.1 mA / 0.01 mA
2 UNITS WITH SERIES/PARALLEL FUNCTION *1			
Tracking Series Voltage/Current		0 V to 40.000 V, 0 A to 5.0000 A	0 V to 64.000 V, 0 A to 3.0000 A
Tracking Parallel Voltage/Current		0 A to 20.000 A, 0 A to 10.0000 A	0 V to 32.000 V, 0 A to 6.0000 A
METER			
Full Scale	Voltage/Current	32.000 V / 3.0000 A	20.000 V / 5.0000 A
Programming	Voltage/Current	5 digits / 6 digits	
Readback Resolution	Voltage/Current	5 digits / 6 digits	
Setting Accuracy	Voltage	± (0.03 % of reading + 10 mV)	
	Current	± (0.3 % of reading + 10 mA)	
Readback Accuracy	Voltage	± (0.03 % of reading + 10 mV)	
	Current	± (0.3 % of reading + 10 mA)	
PROTECTION			
OVP	Power Mode	OFF, ON (1.0 V to 22.0 V)	OFF, ON (1.8 V to 35.2 V)
	Setting Accuracy	≤ ± 100 mV	
	Resolution	100 mV	
OCP	Power Mode	OFF, ON (0.25 A to 5.5 A)	OFF, ON (0.15 A to 3.3 A)
	Setting Accuracy	≤ ± 20 mA	
	Resolution	10 mA	
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500V) Between chassis and DC power cord : 30 MΩ or above (DC 500V)	
GENERAL SPECIFICATIONS			
Display		2.4" monochrome LCD	
Interface		Remote I/O, 9-pin terminal	
Operation Environment		Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %; Installation	
Storage Environment		Temperature: -10 °C to 70 °C, Humidity: ≤ 70 %	
Power Input		AC 100 V/120 V/220 V/240 V ± 10 %, 50 Hz or 60 Hz	
Power Consumption		300 VA	
Dimensions & Weight		107 mm x 124 mm x 313 mm, (W x H x D), Approx. 5.2 kg	

The specifications apply when the GPE-Series are powered on for at least 30 minutes under +20 °C to +30 °C.

ORDERING INFORMATION

GPE-1205 100 W Single Channel Linear DC Power Supply (20 V /5 A)
GPE-1323 96 W Single Channel Linear DC Power Supply (32 V/3 A)

ACCESSORIES:
Power Cord x 1, Packing List x 1,
Test lead : Non-European: GTL-104A x 1
Test lead : European: GTL-204A x 1

OPTIONAL ACCESSORIES

GTL-234 RS-232C cable, 9 pin
GRA-441-J Rack Mount Kit for JIS type
GRA-441-E Rack Mount Kit for EIA type

European Type Jack Terminal

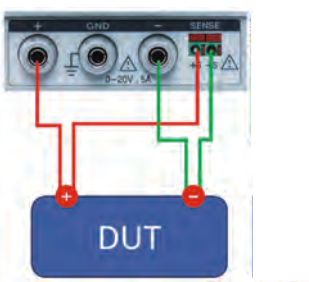
Single Channel Linear DC Power Supply

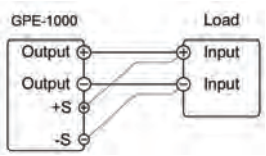
A. HIGH MEASUREMENT RESOLUTION

The set value and the actual readback value after the output is turned on can be displayed directly on the screen at the same time.

The setting resolution can reach: 1 mV / 0.1 mA, and the readback resolution can reach: 0.1 mV / 10 μA.

B. REMOTE SENSING FUNCTION

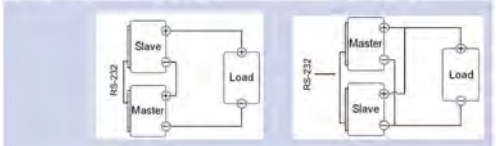




Remote Sensing can be used for compensation. Due to the voltage drop caused by the resistance on the test connection cable from the power supply output to the load, a test connection cable with a voltage drop less than the power supply compensation voltage should be selected during testing.

C. EXTERNAL SERIES / PARALLEL CONTROL

Model	Series Range	Parallel Range
GPE-1323	64V / 3A	32V / 6A
GPE-1205	40V / 5A	20V / 10A



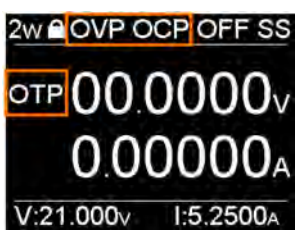
Use two GPEs of the same model and select the Series / Parallel function on the front of the machine, and connect them with the IO on the rear panel for series or parallel applications.

D. OUTPUT ON/OFF FUNCTION

This function can avoid unnecessary damage when the DUT is connected to the power supply and output is performed in advance.

Users can set the voltage and current parameters in advance, confirm that all wiring has been completed, and then manually execute the output of the machine through the front panel.

E. MULTIPLE PROTECTION FUNCTIONS



The protection mechanism of OVP/OCP/OTP is implemented by hardware circuit, which has the advantage of faster response time compared with competitors that use software to implement protection.

When it is detected that the voltage or current of the DUT exceeds the protection setting value, the output of the power supply can be stopped in a very short time to achieve the purpose of protecting the DUT.

F. PANEL LOCK FUNCTION

In order to prevent the DUT from being damaged by any person other than the user changing the setting parameters at will, the user can activate the panel lock function to protect the safety of the DUT.

G. TEMPERATURE CONTROLLED FAN FUNCTION

The product uses a temperature-controlled fan, whose speed will change with the temperature inside the machine, so that the temperature inside the machine remains stable and the specifications will also be stable.
In addition to reducing the noise caused by the fan speed, the temperature-controlled fan is also less likely to generate noise due to rotation.

Multiple Output Linear DC Power Supply

GPS-2303/3303/4303

The GPS-Series linear power supplies have 2-4 independent output channels, 180 W to 200 W output, overload and reverse polarity protection as well as an output ON/OFF switch for safety. The tracking mode switches allow voltage/current to be output in parallel or series and the intelligent fan reduces noise. The GPS-Series is an entry level general purpose power supply recognized for their affordability in education, laboratories and industry.

FEATURES

* 2, 3 and 4 Independent Isolated Output
* Four "3 Digits" LED Displays
* 0.01% Load and Line Regulation
* Low Ripple and Noise
* Tracking Operation and Auto Series/Parallel Operation
* Output ON/OFF Switch
* Output Voltage and Current Setting When Output Disable (Except for GPS-2303)
* Fan Speed Control Circuit to Minimize Fan Noise
* Over Load and Reverse Polarity Protection
* Optional European Jack Type Terminal

European Type Jack Terminal

GPS-001
Voltage/Current protection Knob

Rear Panel

GPS-3303

GPS-4303

GPS-3303

GPS-2303

ORDERING INFORMATION

GPS-4303 200 W Quad-Channel DC Power Supply (30 V/3 A *2; 2.2 V to 5.2 V/1 A; 8.0 V to 15.0 V/1 A)
GPS-3303 195 W Triple-Channel DC Power Supply (30 V/3 A *2; 5 V/3 A)
GPS-2303 180 W Dual-Channel DC Power Supply (30 V/3 A *2)

ACCESSORIES :
Power Cord x 1,
Test Lead :

GPS-4303 Test Lead GTL-104A x 2, GTL-105A x 2
GPS-3303 Test Lead GTL-104A x 2, GTL-105A x 1
GPS-2303 Test Lead GTL-104A x 2

European Test Leads :

GPS-4303 Test Lead GTL-203A x 2, GTL-204A x 2, GTL-201 x 1
GPS-3303 Test Lead GTL-204A x 1, GTL-204A x 2, GTL-201 x 1
GPS-2303 Test Lead GTL-204A x 2, GTL-201 x 1

OPTIONAL ACCESSORIES

GPS-001 Voltage/Current Protection Knob

SPECIFICATIONS

		GPS-4303				GPS-3303			GPS-2303	
OUTPUT RATING										
Total Channel		CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2
Output Voltage		0 V to 30.0 V		2.2 V to 5.2 V	8.0 V to 15.0 V	0 V to 30.0 V		5.0 V Fixed	0 V to 30.0 V	
Output Current		0 A to 3.00 A		1 A Max.	1 A Max.	0 A to 3.00 A		3 A Max.	0 A to 3.00 A	
Total Power		200 W				195 W			180 W	
CONSTANT VOLTAGE OPERATION (CH1, CH2)										
Line Regulation		≤ 0.01 % + 3 mV		≦ 5 mV	≦ 5 mV	≤ 0.01 % + 3 mV		≦ 5 mV	≤ 0.01 % + 3 mV	
Load Regulation	**(rating current ≤ 3 A)**	≦ 0.01 % + 3 mV		≦ 15 mV	≦ 10 mV	≦ 0.01 % + 3 mV		≦ 15 mV	≦ 0.01 % + 3 mV	
	(rating current > 3 A)	≦ 0.02 % + 5 mV				≦ 0.02 % + 5 mV			≦ 0.02 % + 5 mV	
Ripple & Noise (5 Hz to 1 MHz)		≤ 1 mVrms		≤ 2 mVrms		≤ 1 mVrms		≤ 2 mVrms	≤ 1 mVrms	
Transient Recovery Time		≤ 100 μs (50 % load change, minimum load 0.5 A)								
Setting Range		0 V to 30.0 V		2.2 V to 5.2 V	8.0 V to 15.0 V	0 V to 30.0 V		5.0 V Fixed	0 V to 30.0 V	
Temperature Coefficient		≤ 300 ppm/°C								
CONSTANT CURRENT OPERATION (CH1, CH2)										
Line Regulation		≤ 0.2 % + 3 mA								
Load Regulation		≤ 0.2 % + 3 mA								
Ripple & Noise		≤ 3 mArms								
Setting Range		0 A to 3.000 A		0 A to 1.000 A	0 A to 1.000 A	0 A to 3.000 A		-	0 A to 3.000 A	
RESOLUTION *1										
Voltage	**Programming/Readback**	100 mV / 100 mV				100 mV / 100 mV		-	100 mV / 100 mV	
Current	**Programming/Readback**	10 mA / 10 mA				10 mA / 10 mA		-	10 mA / 10 mA	
TRACKING OPERATION (CH1/CH2) *2										
Tracking Series Voltage/Current		0 V to 60.00 V / 0 A to 3.000 A								
Tracking Parallel Voltage/Current		0 V to 30.00 V / 0 A to 6.000 A								
Tracking Error		≤ 0.5 % + 10 mV of CH1								
Tracking Error		(No load, with load add load regulation ≦ 300 mV)								
Parallel Regulation	**Line**	Line: ≦ 0.01 % + 3 mV								
	Load	Load: ≦ 0.01 % + 3 mV(rating current ≦ 3 A); ≦ 0.02 % + 5 mV(rating current > 3 A)								
Series Regulation	**Line**	Line: ≦ 0.01 % + 5 mV								
	Load	Load: ≦ 300 mV								
Ripple & Noise (5 Hz to 1 MHz)		≤ 1 mVrms								
METER										
Full Scale	**Voltage/Current**	33.0 V / 3.20 A				33.0 V / 3.20 A		5.0 V Fixed	33.0 V / 3.20 A	
Programming Resolution	**Voltage/Current**	3 digits / 3 digits				3 digits / 3 digits		-	3 digits / 3 digits	
Readback Resolution	**Voltage/Current**	3 digits / 3 digits				3 digits / 3 digits		-	3 digits / 3 digits	
Setting Accuracy	**Voltage**	Out ON, ± (0.5 % of rdg + 2 digits); Out OFF, ± (0.5 % of rdg + 8 digits)						-	± (0.5 % of rdg + 2 digits)	
	Current							-		
Readback Accuracy	**Voltage**	Out ON, ± (0.5 % of rdg + 2 digits); Out OFF, ± (0.5 % of rdg + 8 digits)						-	± (0.5 % of rdg + 2 digits)	
	Current							-		
PROTECTION										
Insulation Resistance		Between chassis and terminal : 20 MΩ or above (DC 500V)								
		Between chassis and DC power cord : 30 MΩ or above (DC 500V)								
GENERAL SPECIFICATIONS										
Display		3 Digits 0.5" LED Display								
Operation Environment		Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %;								
		Installation category: II / Pollution degree: 2								
Storage Environment		Temperature: -10 °C to 70 °C, Humidity: ≤ 70 %								
Power Input		AC 100 V/120 V/220 V ± 10 %, 230 V(+ 10 % to - 6 %), 50 Hz or 60 Hz								
Power Consumption		550 VA / 420 W, MAX								
Dimensions & Weight		255(W) x 145(H) x 265(D) mm, Approx. 7 kg								

Note:
(*1) The specification refers to the highest resolution.
(*2) Only channel 1 and channel 2 can perform series and parallel functions

The specifications apply when the GPE-Series are powered on for at least 30 minutes under +20 °C to +30 °C.

Linear DC Power Supply

The GPR-H Series consists of single output linear DC power supplies with voltage outputs rating from 8 V to 300 V. The series includes overload and reversed polarity protection to protect devices under test from being damaged due to impropriety operation. The internal select for dynamic loads is often used for amplifier testing. It can support high pulse current derived from dynamic processes as well as support low noise and noise, which make it suitable for high-end bench-top applications requiring precision. Its rear panel supports output wiring. These features combined into one assembly allow the GPR-H Series to predominate in applications requiring high voltage or high current.

GPR-H Series

CE Rear-Panel Output

Note: CE Approved Only for GPR-1820HD, GPR-3510HD, GPR-7550D, GPR-11H30D
Rear-Panel Output Only for GPR-0830HD, GPR-1820HD

FEATURES

* 0.01 % High Regulation
* Constant Voltage and Constant Current Operation
* Internal Select for Continuous or Dynamic Load
* Low Ripple and Noise
* Overload and Reverse Polarity Protection
* 3 1/2 Digit 0.5" LED Display
* Internal Select for Continuous or Dynamic Load (for GPR-3510HD/GPR-6060D/ GPR-7550D)

Rear Panel

ORDERING INFORMATION

GPR-0830HD	240 W Single Channel DC Power Supply (8 V/30 A)
GPR-1820HD	360 W Single Channel DC Power Supply (18 V/20 A)
GPR-3510HD	350 W Single Channel DC Power Supply (35 V/10 A)
GPR-6060D	360 W Single Channel DC Power Supply (60 V/6 A)
GPR-7550D	375 W Single Channel DC Power Supply (75.5 V/5 A)
GPR-11H30D	330 W Single Channel DC Power Supply (110 V/3 A)
GPR-30H10D	300 W Single Channel DC Power Supply (300 V/1 A)

ACCESSORIES :
Power cord x 1
Test lead GTL-105A x 1 (≤ 3A) or GTL-104A x 1 (≤10A) or Not Available (>10A)

OPTIONAL ACCESSORIES

GTL-122	Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm

SPECIFICATIONS

		GPR-0830HD	GPR-1820HD	GPR-3510HD	GPR-6060D	GPR-7550D	GPR-11H30D	GPR-30H10D
OUTPUT RATING								
Output Voltage		0 V to 8.00 V	0 V to 18.00 V	0 V to 35.0 V	0 V to 60.0 V	0 V to 75.5V	0 V to 110.0 V	0 V to 300.0 V
Output Current		0 A to 30.0 A	0 A to 20.0 A	0 A to 10.00 A	0 A to 6.00 A	0 A to 5.00 A	0 A to 3.00 A	0 A to 1.000 A
Total Power		240 W	360 W	350 W	360 W	375 W	330 W	300 W
CONSTANT VOLTAGE OPERATION								
Line Regulation		≤ 0.01 % + 3 mV						
Load Regulation	(rating current < 10 A)	≦ 0.01 % + 3 mV						
	(rating current ≥ 10 A)	≦ 0.02 % + 5 mV						
Ripple & Noise (5 Hz to 1 MHz)		≤ 1 mVrms						
Transient Recovery Time		≤ 100 µs (50 % load change, minimum load 0.5 A)						
Setting Range		0 V to 8.00 V	0 V to 18.00 V	0 V to 35.0 V	0 V to 60.0 V	0 V to 75.5V	0 V to 110.0 V	0 V to 300.0 V
Temperature Coefficient		≤ 300 ppm/°C						
CONSTANT CURRENT OPERATION								
Line Regulation		≤ 0.2 % + 3 mA						
Load Regulation		≤ 0.2 % + 5 mA						
Ripple & Noise		< 5 mArms (< 20 A); < 10 mArms (< 30 A); < 20 mArms (< 50 A)						
Setting Range		0 A to 30.0 A	0 A to 20.0 A	0 A to 10.00 A	0 A to 6.00 A	0 A to 5.00 A	0 A to 3.00 A	0 A to 1.000 A
RESOLUTION *1								
Voltage	Programming/Readback	10 mV / 10 mV	10 mV / 10 mV	100 mV / 100 mV	100 mV / 100 mV	100 mV / 100 mV	100 mV / 100 mV	100 mV / 100 mV
Current	Programming/Readback	100 mA / 100 mA	100 mA / 100 mA	10 mA / 10 mA	10 mA / 10 mA	10 mA / 10 mA	10 mA / 10 mA	1 mA / 1 mA
METER								
Full Scale	Voltage/Current	8.00 V / 30.0 A	18.00 V / 20.0 A	35.0 V / 10.00 A	60.0 V / 6.00 A	75.5 V / 5.00 A	110.0 V / 3.00 A	300.0 V / 1.000 A
Programming	Voltage/Current	4 digits / 4 digits						
Readback Resolution	Voltage/Current	4 digits / 4 digits						
Setting Accuracy	Voltage/Current	±(0.5% of rdg + 2 digits)						
Readback Accuracy	Voltage/Current	±(0.5% of rdg + 2 digits)						
PROTECTION								
Insulation Resistance		Between chassis and terminal: 100 MΩ or above (DC 1000 V) Between chassis and DC power cord: 100 MΩ or above (DC 1000 V)						
GENERAL SPECIFICATIONS								
Display		3 1/2 Digit 0.5" LED Display						
Operation Environment		Indoor use, Altitude: ≤ 2000 m; Ambient temperature: 0 °C to 40 °C / Relative humidity: ≤ 80 %; Installation category: II / Pollution degree: 2						
Storage Environment		Temperature: -10 °C to 70 °C, Humidity: ≤ 70 %						
Power Input		AC 100 V/120 V/220 V/240 V ± 10 %, 50 Hz or 60 Hz						
Dimensions		254(W) x 152(H) x 456(D) mm, Approx. 18.5 kg						
Weight		18.5 kg	18.5 kg	18.5 kg	18.5 kg	18.5 kg	13.5 kg	13.5 kg

Note: (*1) The specification refers to the highest resolution.
(*2) Only channel 1 and channel 2 can perform series and parallel functions

The specifications apply when the GPE-Series are powered on for at least 30 minutes under +20 °C to +30 °C.

AC/DC POWER SOURCES

GW Instek offers three types of AC Power Sources: Programmable AC/DC Power Source, Programmable Linear AC Power Source, and Linear AC Power Source.

The ASR-3000/ASR-2000 Series serves as both a precision AC/DC power source and a powerful analyzer. It supports AC, DC, and AC+DC outputs, and measures Vrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF, and harmonics up to the 40th order. It provides four signal sources (INT, EXT, ADD, SYNC) and features a sequence function for arbitrary waveform generation. The series also includes 16 waveform storage slots and 10 panel setting memory slots.

The ASR-6000 Series is GW Instek's first unit supporting AC Single/Three-phase Input/Output and rated DC power output. It uses silicon carbide (SiC) technology to offer a high power density of 6 kVA in a 4U form factor.

The APS-7000 Series is a programmable linear AC power source with a 2U height and a frequency range of 45 to 500 Hz. Output capacities are 500 VA (APS-7050), 1000 VA (APS-7100), 2000 VA (APS-7200), and 3000 VA (APS-7300). It offers nine measurement functions, a user interface similar to an AC power meter, and is ideal for applications requiring high accuracy and low ripple/noise. The APS-7000E Series is a non-programmable option with high precision and THD below 0.5 %.

PRODUCTS

- **High-performance AC/DC Power Supply**
- **Programmable AC/DC Power Source**
- **Programmable AC Power Source**
- **AC Power Source**

AC POWER SOURCES

4.5 kVA to 36 kVA HIGH-PERFORMANCE AC/DC POWER SUPPLY

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-6450	AC 4.5 kVA DC 4.5 kW	1 to 2000 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01V/0.1V DC Voltage Range -250 V to +250 V/-500 V to +500 V	45 A/22.5 A	LCD	40	D95-107
ASR-6450-09	AC 9 kVA DC 9 kW	1 to 1000 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01 V/0.1 V DC Voltage Range -250 V to +250 V/-500 V to +500 V	90 A/45 A	LCD	155	
ASR-6450-13.5	AC 13.5 kVA DC 13.5 kW	1 to 1000 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01 V/0.1 V DC Voltage Range -250 V to +250 V/-500 V to +500 V	135 A/67.5 A	LCD	200	
ASR-6600	AC 6 kVA DC 6 kW	1 to 2000 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01 V/0.1 V DC Voltage Range -250 V to +250 V/-500 V to +500 V	60 A/30 A	LCD	40	
ASR-6600-12	AC 12 kVA DC 12 kW	1 to 1000 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01 V/0.1 V DC Voltage Range -250 V to +250 V/-500 V to +500 V	120 A/60 A	LCD	155	
ASR-6600-18	AC 18 kVA DC 18 kW	1 to 1000 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01 V/0.1 V DC Voltage Range -250 V to +250 V/-500 V to +500 V	180 A/90 A	LCD	200	
ASR-6600-24	AC 24 kVA DC 24 kW	1 to 550 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01V/0.1V DC Voltage Range -250V~+250V/-500V~+500V	240 A/120 A	LCD	250	
ASR-6600-30	AC 30 kVA DC 30 kW	1 to 550 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01V/0.1V DC Voltage Range -250V~+250V/-500V~+500V	300 A/150 A	LCD	305	
ASR-6600-36	AC 36 kVA DC 36 kW	1 to 550 Hz	Phase Voltage Range 0.0 V to 175.0 V/0.0 V to 350.0 V Line Voltage Range 1P3W: 0.00 V to 350.0 V/0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V/0.00 V to 606.2 V Setting Resolution 0.01V/0.1V DC Voltage Range -250V~+250V/-500V~+500V	360 A/180 A	LCD	370	

2 kVA to 5 kVA PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-3200	2 kVA	1 to 999.9 Hz	AC 100 V Range 0.0 V to 200.0 V DC 100V Range -285 V to +285 V AC 200 V Range 0.0 V to 400.0 V DC 200V Range -570 V to +570 V	AC 100 V Range 20 A DC 100V Range 20 A AC 200 V Range 10 A DC 200V Range 10 A	LCD	25	D108-112
ASR-3300	3 kVA	1 to 999.9 Hz	AC 100 V Range 0.0 V to 200.0 V DC 100V Range -285 V to +285 V AC 200 V Range 0.0 V to 400.0 V DC 200V Range -570 V to +570 V	AC 100 V Range 30 A DC 100V Range 30 A AC 200 V Range 15 A DC 200V Range 15 A	LCD	25	
ASR-3400	4 kVA	1 to 999.9 Hz	AC 100 V Range 0.0 V to 200.0 V DC 100V Range -285 V to +285 V AC 200 V Range 0.0 V to 400.0 V DC 200V Range -570 V to +570 V	AC 100 V Range 40 A DC 100V Range 40 A AC 200 V Range 20 A DC 200V Range 20 A	LCD	25	
ASR-3400HF	4 kVA	1 to 5000 Hz	AC 100 V Range 0.0 V to 200.0 V DC 100V Range -285 V to +285 V AC 200 V Range 0.0 V to 400.0 V DC 200V Range -570 V to +570 V	AC 100 V Range 40 A DC 100V Range 40 A AC 200 V Range 20 A DC 200V Range 20 A	LCD	25	
ASR-3500	5 kVA	1 to 999.9 Hz	AC 100 V Range 0.0 V to 200.0 V DC 100V Range -285 V to +285 V AC 200 V Range 0.0 V to 400.0 V DC 200V Range -570 V to +570 V	AC 100 V Range 50 A DC 100V Range 50 A AC 200 V Range 25 A DC 200V Range 25 A	LCD	25	

PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-2050/ ASR-2050R	500 VA	1 to 999.9 Hz	AC 100 V Range 0.0 V to 175.0 V AC 200 V Range 0.0V to 350.0 V DC 100 V Range -250.0V to +250.0 V DC 200 V Range -500.0V to +500.0 V	AC 100 V Range 5 A AC 200 V Range 2.5 A DC 100 V Range 5 A DC 200 V Range 2.5 A	LCD	11.5 (ASR-2000 Series) 10.5 (ASR-2000R Series)	D113-114
ASR-2100/ ASR-2100R	1000 VA	1 to 999.9 Hz	AC 100 V Range 0.0 V to 175.0 V AC 200 V Range 0.0 V to 350.0 V DC 100 V Range -250.0 V to +250.0 V DC 200 V Range -500.0 V to +500.0 V	AC 100 V Range 10 A AC 200 V Range 5 A DC 100 V Range 10 A DC 200 V Range 5 A	LCD	11.5 (ASR-2000 Series) 10.5 (ASR-2000R Series)	

AC POWER SOURCES

PROGRAMMABLE LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
APS-7050	500 VA	45 to 500 Hz Option: 45 to 999.9 Hz	0 to 310 V, 0 to 155 V Option: 0 to 600 V	2.1 A, 4.2 A	LCD	24	D115-118
APS-7100	1000 VA	45 to 500 Hz Option: 45 to 999.9 Hz	0 to 310 V, 0 to 155 V Option: 0 to 600 V	4.2 A, 8.4 A	LCD	38	
APS-7200	2000 VA	45 to 500 Hz Option: 45 to 999.9 Hz	0 to 310 V, 0 to 155 V Option: 0 to 600 V	8.4 A, 16.8 A	LCD	90	
APS-7300	3000 VA	45 to 500 Hz Option: 45 to 999.9 Hz	0 to 310 V, 0 to 155 V Option: 0 to 600 V	12.6 A, 25.2 A	LCD	128	

LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
APS-7050E	500 VA	45 to 500 Hz	0 to 310 V, 0 to 155 V	2.1 A, 4.2 A	LCD	24	D119-120
APS-7100E	1 kVA	45 to 500 Hz	0 to 310 V, 0 to 55 V	4.2 A, 8.4 A	LCD	38	

4.5/6/9/12/13.5/18/24/30/36 kVA High-Performance AC/DC Power Supply

ASR-6000 Series

NEW 台灣精品 TAIWAN EXCELLENCE

CE | RS-232 | USB | LAN | CAN | Device Net | GPIB

FEATURES

* Adopts Third-generation Semiconductor Silicon Carbide (SiC) Technology to Create a 4 U 6 kVA High-performance AC/DC Power Source with High Power Density
* AC Input Supports Single-phase and Three-phase, Phase Voltage 200 V to 240 V±10% (Delta or Y Connection)•1
* 10 output Modes: Including External Input Signal Frequency and Mains Synchronization (SYNC), External Voltage Controlled Internal Amplifier Output (VCA)
* Multi-channel Output Function
* Supports AC 1P2W, 1P3W, 3P4W Output
* AC Maximum Output Phase Voltage: 350 Vrms Line Voltage: 700 Vrms
* AC Balanced and Unbalanced Three-phase, Phase Failure Output Functions
* Programmable Output Impedance Adjustment•1
* Dual-channel Voltage/Current Output Monitoring Function
* Voltage Output Rise Time Can be Adjusted in Three Ranges•1
* Supports Sequence Editing and Emulation Output Mode
* Powerful Arbitrary Waveform Editing and Output Function, Built-in Over 253 Types of Arbitrary Waveform Outputs
* Advanced Web Server Control to Support Data Acquisition and Data Logger Both Functions
* 100th Order Harmonic Measurement Function
* Support Parallel Connection Type Up to 36 kVA Maximum
* Interfaces: RS-232C, USB, LAN; Opt: CAN BUS, DeviceNet, GPIB

Note:•1 Stand-alone models only.

GRA-451-J Rack Mount Adapter(JIS)

GRA-451-E Rack Mount Adapter(EIA)

From the very moment Alpha Go defeated the human chess champion with its ultra-high-speed computing capability, artificial intelligence technology (AI) has developed rapidly around the world. Today, servers with advanced AI functions process tremendous amounts of data under the high-speed computing architecture of 2 CPUs + 8 GPUs. servers require a huge amount of power to maintain high-speed computing! In order to meet this demand, the power, density and efficiency of server power supplies have been greatly improved. High-power server power modules require high-efficiency conversion and saving of power consumption. AC single-phase input, HVDC 400 V input or increased DC voltage output designs can be utilized to achieve this purpose. In order to ensure power stability when high-power servers are operating, power modules with hot-swappable redundant power supply specifications (such as CRPS) have been widely applied in server racks. Power modules with redundant functions require testing of multiple power modules at a time to ensure that all modules can maintain normal operation during high power output. Due to the rapid changes in the development of server power supplies GW Instek developed the brand new flagship model ASR-6000 series to meet customer needs. ASR-6000 series series has two models - ASR-6450 AC/DC 4.5 kVA and ASR-6600 series AC/DC 6 kVA.

ASR-6000 series is the first stand-alone unit from GW Instek that supports AC single/three-phase input and output, and has rated DC power output. The series employs third-generation semiconductor silicon carbide (SiC) technology to create a 4U 6 kVA high power density and high-performance AC/DC power source ASR-6000 series has the ability to emulate more diverse power environment changes, such as balanced three-phase and unbalanced three-phase, phase failure, and features multi-channel output function in three-phase output mode, programmable output impedance adjustment, and up to tens of thousands of arbitrary waveform outputs. The invincible launch of GW Instek flagship model ASR-6000 series demonstrates that GW Instek can provide a complete test solution for high-power AC sources. ASR-6000 series is the MVP of GW Instek power sources.

ORDERING INFORMATION

ASR-6450	4.5 kVA High-Performance AC/DC Power Supply
ASR-6450-09	9 kVA AC/DC Rack Type Power Source
ASR-6450-13.5	13.5 kVA AC/DC Rack Type Power Source
ASR-6600	6 kVA High-Performance AC/DC Power Supply
ASR-6600-12	12 kVA AC/DC Rack Type Power Source
ASR-6600-18	18 kVA AC/DC Rack Type Power Source
ASR-6600-24	24 kVA AC/DC Rack Type Power Source
ASR-6600-30	30 kVA AC/DC Rack Power Source
ASR-6600-36	36 kVA AC/DC Rack Power Source

ACCESSORIES :

Input terminal cover, Output terminal cover, Copper plate for delta connection input(Mark 1), Copper plate for single phase and Y connection input(Mark 2), Copper plate for delta connection input(Mark 3), Copper plate for 1P output(Mark 4)

GRA-451-E Rack mount adapter(EIA)(Stand-alone models only)

GTL-246 USB cable (USB 2.0 Type A - Type B cable, approx. 1.2 M)

OPTIONAL ACCESSORIES

ASR-003	GPIB Interface Card
ASR-004	DeviceNet Interface Card
ASR-005	CAN BUS Interface Card
ASR-C003	Modbus TCP feature
GTL-232	RS-232C Cable, approx. 2 M
GTL-248	GPIB Cable, approx. 2 M

For ASR-6450/ASR-6600 use only :

ASR-006	External Parallel Cable
GRA-451-J	Rack mount adapter(JIS)
GPW-008	6RV3 Power Cord; 10 AWG/3 C, 3 m Max Length, , RV5-5*3P, RV5-5*3P UL Type
GPW-012	6RVV5 VDE Power Cord; 2.5 mm 2/5 C, 3 m Max Length, RVS3-5*5P, RVS3-5*5P VDE Type
GPW-013	6RVT5 PSE Power Cord; 2.0 mm 2/5 C, 3 m Max Length, RVS2-5*5P, RVS2-5*5P PSE Type
GPW-014	6RV4 UL Power Cord; 10 AWG/4 C, 3 m, RV5-5*4P,RV5-5*4P UL TYPE
GPW-015	6RVV4 VDE Power Cord; 2.5 mm 2/4 C, 3 m Max Length, RVS3-5*4P, RVS3-5*4P VDE Type

Model	ASR-6450	ASR-6600	ASR-6450-09	ASR-6450-13.5	ASR-6600-12	ASR-6600-18	ASR-6600-24	ASR-6600-30	ASR-6600-36
AC Input Voltage	Single/Three Phase 200 Vac to 240 Vac ±10 %		200 Vac to 240 Vac ±10 % (Phase Voltage) / 380 to 415 Vac ± 10 % (Line Voltage)						
AC Output Voltage	Phase Voltage 0 V to 350.0 V/Line Voltage 0 V to 700 V								
AC Output Current	1P2W 45 A/22.5 A 1P3W, 3P4W 15 A/7.5 A	1P2W 60 A/30 A 1P3W, 3P4W 20 A/10 A	1P2W 90 A/45 A 1P3W, 3P4W 30 A/15 A	1P2W 135 A/67.5 A 1P3W, 3P4W 45 A/22.5 A	1P2W 120 A/60 A 1P3W, 3P4W 40 A/20 A	1P2W 180 A/90 A 1P3W, 3P4W 60 A/30 A	1P2W 240 A/120 A 1P3W, 3P4W 80 A/40 A	1P2W, 300 A/150 A 1P3W, 3P4W 100 A/50 A	1P2W, 360 A/180 A 1P3W, 3P4W 120 A/60 A
Output Frequency	2000 Hz	2000 Hz	1000 Hz	1000 Hz	1000 Hz	1000 Hz	550 Hz	550 Hz	550 Hz
AC Output Capacity	4.5 kVA	6 kVA	9 kVA	13.5 kVA	12 kVA	18 kVA	24 kVA	30 kVA	36 kVA
DC Output Voltage	-250.0 V to +250.0 V/-500.0 V to +500.0 V								
DC Output Capacity	4.5 kW	6 kW	9 kW	13.5 kW	12 kW	18 kW	24 kW	30 kW	36 kW

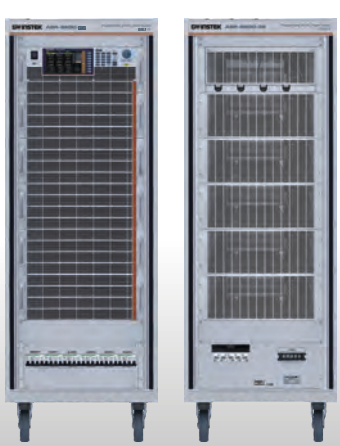
ASR-6450-09/6600-12 (Two units)

ASR-6450-13.5/6600-18 (Three units)

ASR-6600-24 (Four units)

ASR-6600-30 (Five units)

ASR-6600-36 (Six units)



SPECIFICATIONS

		ASR-6450		ASR-6600	
Input Ratings					
Power type		Single-phase ; Three-phase, Delta or Y connection selectable			
Voltage range*1		200 Vac to 240 Vac ±10 % phase voltage (Delta: L-L, Y: L-N)			
Frequency range		47 Hz to 63 Hz			
Power factor*2		0.95 or higher (typ.)			
Efficiency*2		80 % or higher			
Maximum power consumption		6 kVA or lower		8 kVA or lower	
AC Output					
Multi-phase output		Single-phase output	Polyphase output	Single-phase output	Polyphase output
Output capacity		4.5 kVA	1P3W: 3 kVA ; 3P4W: 4.5 kVA	6 kVA	1P3W: 4 kVA ; 3P4W: 6 kVA
Mode		1P2W	1P3W ; 3P4W (Y-connection)	1P2W	1P3W ; 3P4W (Y-connection)
Setting mode*3		---	Independ, Balanced	---	Independ, Balanced
Phase voltage	Setting Range*4	0.00 V to 175.0 V / 0.0 V to 350.0 V (sine and square wave), Setting Resolution: 0.01 V / 0.1 V			
		0.00 Vpp to 500.0 Vpp / 0.00 Vpp to 1000 Vpp (triangle and arbitrary wave), Setting Resolution: 0.01 Vpp / 0.1 Vpp / 1 Vpp			
	Accuracy*5	±(0.3 % of set + 0.5 V / 1 V)			
Line voltage setting range*6		---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V	---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V
Maximum current*7		45 A / 22.5 A	15 A / 7.5 A	60 A / 30 A	20 A / 10 A
Maximum peak current*8		Four times of the maximum RMS current			
Load power factor*9		0 to 1 (leading phase or lagging phase, 45 Hz to 65Hz)			
Frequency	Setting range	AC Mode: 15.00 Hz to 2000.0 Hz, AC+DC Mode: 1.00 Hz to 2000.0 Hz, Setting resolution: 0.01 Hz / 0.1 Hz			
	Accuracy	± 0.01% of set			
	Stability*10	± 0.005%			
Output on phase setting range*11		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 2000 Hz)			
Output off phase setting range*11		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 2000 Hz)			
Setting range of the phase angle*12		---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°	---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°
Phase angle accuracy*13		---	45 Hz to 65 Hz: ±1.0° 15 Hz to 2000 Hz: ±2.0°	---	45 Hz to 65 Hz: ±1.0° 15 Hz to 2000 Hz: ±2.0°
DC offset*14		± 20 mV (typ.)			
DC Output (Only Single Phase Output)					
Output capacity		4.5 kW		6 kW	
Mode		Floating output, the N terminal can be grounded			
Voltage	Setting Range	-250.0 V to +250.0 V / -500.0 V to +500.0 V, Setting Resolution: 0.01 V / 0.1 V			
	Accuracy*15	±(|0.3 % of set| + 0.3 V / 0.6 V)			
Maximum current*16		45 A / 22.5 A		60 A / 30 A	
Maximum peak current*17		Four times of the maximum current			
Output Stability, Total Harmonic Distortion, Output Voltage Rising Time and Ripple Noise					
Line regulation		±0.1% or less (Phase voltage)			
Load regulation*18		±0.1 V / ±0.2 V, @DC (only single-phase output) ±0.1 V / ±0.2 V, @45 Hz to 65 Hz (phase voltage, 0 to 100%, via output terminal) ±0.5 V / ±1.0 V, @all other frequencies (phase voltage, 0 to 100%, via output terminal)			
Distortion of Output*19		<0.3 % @1Hz to 100Hz, <0.5 % @100.1 Hz to 500 Hz, <1 % @500.1 Hz to 2000 Hz			
Output voltage response time*20		Fast: 50 µs (typ.) ; Middle: 100 µs (typ.) ; Slow: 300 µs (typ.)			
Ripple noise*21		0.5 Vrms / 1 Vrms (TYP)			

*1 Y connection is three-phase, five-wire, Delta connection is three-phase, four-wire. (Accessories will be provided)
*2. In the case of AC-INT mode, the rate output voltage, resistance load at maximum output current, 45 Hz to 65 Hz and sine wave output only.
*3. Can be only set in polyphase mode.
*4. For phase voltage setting in polyphase output. In balance mode all phase are collectively set and in unbalance mode each phases are individually set.
"*5. For an output voltage of 10 V to 175 V / 20 V to 350 V, sine wave, an output frequency of 45 Hz to 65 Hz, no load, DC voltage setting 0V (AC+DC mode) and 23°C ± 5°C.
For phase voltage etting in the polyphase output."
*6. Line voltage only can be set in balance mode.
"*7. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the DC superimmposition, the active current of AC+DC satisfies the maximum current.
In the case of 40 Hz or lower or 400 Hz or higher, and that the ambient temperature is 40 degree or higher, the maximum current may decrease."
*8. With respect to the capacitor-input rectifying load. Limited by the maximum current.
*9. External power injection or regeneration which is over short reverse power flow capacity is not available.
*10. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature range.
*11. L1, L2 and L3 phase can be set independ at independ mode in the polyphase output.
*12. Can be set only with independ mode in polyphase output.
*13. For an output voltage of 50V or higher, sine wave, same load and voltage condition for all phase.
*14. In the case of the AC mode and output voltage setting to 0 V, 23°C ± 5°C
*15. For an output voltage of -250 V to -10 V, +10 V to +250 V / -500 V to -20 V, +20 V to +500 V, no load, AC voltage set to 0V (AC+DC mode) and 23°C ± 5°C
"*16. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the AC superimmposition, the active current of AC+DC satisfies the maximum current.
And the ambient temperature is 40 degree or higher, the maximum current may decrease."
*17. Instantaneous eithin 3 ms, limited by the maximum current at rated output voltage.
*18. For an output voltage of 75 V to 175 V / 150 V to 350 V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel.
*19. 50 % or higher of the rated output voltage, the maximum current or lower, AC and AC+DC modes, THD+N. For the polyphase output, it is a specification for phase voltage setting.
*20. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse).
10% to 90% of output voltage.
*21. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.

Measured Value Display (All accuracy of the measurement function is indicated for 23 °C±5 °C.)

		Single-phase output	Polyphase output*6
Voltage*1*2	Resolution	0.01 V / 0.1 V	
	RMS value accuracy	45 Hz to 65 Hz and DC: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 2000 Hz: ± (0.7 % of rdg + 1 V / 2 V)	45 Hz to 65 Hz: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 2000 Hz: ± (0.7 % of rdg + 1 V / 2 V)
	AVG value accuracy	DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)	DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)
	PEAK value accuracy*3	45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 1 V / 2 V)	45 Hz to 65 Hz: ±(|2 % of rdg| + 1 V / 2 V)

SPECIFICATIONS

			ASR-6450	ASR-6600
Current*4	Resolution		0.01 A / 0.1 A	
	RMS value accuracy		45 Hz to 65 Hz and DC: ±(0.5 % of rdg + 0.1 A / 0.05 A) 15 Hz to 2000 Hz: ±(0.7 % of rdg + 0.2 A / 0.1 A)	45 Hz to 65 Hz: ±(0.5 % of rdg + 0.05 A / 0.03 A) 15 Hz to 2000 Hz: ±(0.7 % of rdg + 0.1 A / 0.05 A)
	AVG value accuracy		DC: ± (|0.5 % of rdg| + 0.2 A / 0.1 A)	DC: ± (|0.5 % of rdg| + 0.1 A / 0.05 A)
	PEAK value accuracy*5		45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 1 A / 0.5 A)	45 Hz to 65 Hz: ±(|2 % of rdg| + 0.5 A / 0.25 A)
Power*7*8	Active (W)	Resolution	0.1 W /1 W	
		Accuracy*9	±(1 % of rdg + 3 W)	±(1 % of rdg + 1 W)
	Apparent (VA)	Resolution	0.1 VA / 1 VA	
		Accuracy	±(2 % of rdg + 6 VA)	±(2 % of rdg + 2 VA)
	Reactive (VAR)	Resolution	0.1 VAR / 1 VAR	
		Accuracy*10	±(2 % of rdg + 6 VAR)	±(2 % of rdg + 2 VAR)
Power factor		Range	0.000 to 1.000	
		Resolution	0.001	
Harmonic voltage Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)*11		Range	Up to 100th order of the fundamental wave	
		Full Scale	200 V / 400 V, 100%	
		Resolution	0.01 V /0.1 V, 0.1%	
		Accuracy*12	Up to 20th: ±(0.2 % of rdg + 0.5 V / 1 V) ; 20th to 100th: ±(0.3 % of rdg + 0.5 V / 1 V)	
Harmonic current Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)*11		Range	Up to 100th order of the fundamental wave	
		Full Scale	63 A / 31.5 A, 100%	21 A / 10.5 A, 100%
		Resolution	0.01 A / 0.1 A, 0.1%	
		Accuracy*13	Up to 20th: ±(1 % of rdg + 1.5 A / 0.75 A) 20th to 100th: ±(1.5 % of rdg + 1.5 A / 0.75 A)	Up to 20th: ±(1 % of rdg + 0.5 A / 0.25 A) 20th to 100th: ±(1.5 % of rdg + 0.5 A / 0.25 A)

*1. In the polyphase output, the specification is for phase voltage, and the DC average value display cannot be selected.
*2. Accuracy values are in the case that the output voltage is within voltage setting range.
*3. The accuracy is for output waveform DC or sine wave only.
*4. Accuracy values are in the case that the output current is 5% to 100% of the maximum current.
*5. The accuracy is for output waveform DC or sine wave only.
*6. In the polyphase output, these are the specifications for each phase.
*7. For an output voltage of 50 V or greater, an output current in the range of 10 % to 100 % of the maximum current, DC or an output frequency of 45 Hz to 65 Hz.
*8. The apparent and reactive powers are not displayed in the DC mode.
*9. For the load with the power factor 0.5 or higher.
*10. For the load with the power factor 0.5 or lower.
*11. The measurement does not conform to the IEC or other standard. Phase Voltage and Phase Current.
*12. For an output voltage of 10 V to 175 V / 20 V to 350 V.
*13. An output current in the range of 5 % to 100 % of the maximum current.

Others			
Protections			UVP, OVP, OCP, OTP, OPP, Fan Fail, Peak and RMS Current Limit
Parallel function			Up to 4 units
Display			TFT-LCD, 7 inch
Memory function			Store and recall settings, Basic settings: 10
Arbitrary Wave	Number of memories		253 (nonvolatile)
	Waveform length		4096 words
	Amplitude resolution		16 bits
General Specifications			
Interface	Standard	USB	Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB-CDC / USB-TMC
		LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
		External	External Signal Input ; External Control I/O ; V/I Monitor Output
		RS-232C	Complies with the EIA-RS-232 specifications
	Optional 1	GPIB	SCPI-1993, IEEE 488.2 compliant interface
	Optional 2	CAN Bus	Complies with CAN 2.0A or 2.0B based protocol
	Optional 3	DeviceNet	Complies with CAN 2.0A or 2.0B based protocol
Insulation resistance	Between input and chassis, output and chassis, input and output		DC 500 V, 30 MΩ or more
Withstand voltage	Between input and chassis, output and chassis, input and output		AC 1500 V or DC 2130 V , 1 minute
EMC			EN 61326-1 (Class A) ; EN 61326-2-1/-2-2 (Class A) ; EN 61000-3-2/-3-12 (Class A, Group 1) ; EN 61000-3-3/-3-11 (Class A, Group 1) ; EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11/-4-34 ; (Class A, Group 1) ; EN 55011 (Class A, Group1)
Safety			EN 61010-1
Vibration, Shock and Transportation Integrity			ISTA 2A Test Procedure
Environment	Operating environment		Indoor use, Overvoltage Category II
	Operating temperature range		0 °C to 40 °C
	Storage temperature range		-10 °C to 70 °C
	Operating humidity range		20 %rh to 80 % RH (no condensation)
	Storage humidity range		90 % RH or less (no condensation)
	Altitude		Up to 2000 m
Dimensions (mm)			430(W)×176(H)×590(D) (not including protrusions)
Weight			Approx. 40 kg

A value with the accuracy is the guaranteed value of the specification. However, an accuracy noted as reference value shows the supplemental data for reference when the product is used, and is not under the guarantee. A value without the accuracy is the nominal value or representative value (shown as typ.).
Product specifications are subject to change without notice.

SPECIFICATIONS

		ASR-6450-09		ASR-6600-12	
Input Ratings					
Power type		Three-phase Three-wire Delta connection, Three-phase Four-wire Y connection			
Voltage range[*1]		200 Vac to 240 Vac (Phase Voltage), 380 Vac to 460 Vac (Line Voltage)			
Frequency range		47 Hz to 63 Hz			
Power factor[*2]		0.95 or higher (typ.)			
Efficiency[*2]		80 % or higher			
Maximum power consumption		12 kVA or lower		16 kVA or lower	
AC output					
Multi-phase output		Single-phase output	Polyphase output	Single-phase output	Polyphase output
Output capacity		9 kVA	1P3W: 6 kVA ; 3P4W: 9 kVA	12 kVA	1P3W: 8 kVA ; 3P4W: 12 kVA
Mode		1P2W	1P3W ; 3P4W (Y-connection)	1P2W	1P3W ; 3P4W (Y-connection)
Setting mode[*3]		---	Unbalance, Balanced	---	Unbalance, Balanced
Phase voltage	**Setting Range**[*4]	0.00 V to 175.0 V / 0.0 V to 350.0 V (sine and square wave), Setting Resolution: 0.01 V / 0.1 V			
		0.00 Vpp to 500.0 Vpp / 0.00 Vpp to 1000 Vpp (triangle and arbitrary wave), Setting Resolution: 0.01 Vpp / 0.1 Vpp / 1 Vpp			
	Accuracy[*5]	±(0.3 % of set + 0.5 V / 1 V)			
Line voltage setting range[*6]		---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V	---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V
Maximum current[*7]		90 A / 45 A	30 A / 15 A	120 A / 60 A	40 A / 20 A
Maximum peak current[*8]		Four times of the maximum RMS current			
Load power factor[*9]		0 to 1 (leading phase or lagging phase, 45 Hz to 65Hz)			
Frequency	**Setting range**	AC Mode: 15.00 Hz to 1000.0 Hz, AC+DC Mode: 1.00 Hz to 1000.0 Hz, Setting resolution: 0.01 Hz / 0.1 Hz			
	Accuracy	± 0.01% of set			
	Stability[*10]	± 0.005%			
Output on phase setting range[*11]		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 1000 Hz)			
Output off phase setting range[*11]		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 1000 Hz)			
Setting range of the phase angle[*12]		---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°	---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°
Phase angle accuracy[*13]			45 Hz to 65 Hz: ±1.0° 15 Hz to 1000 Hz: ±2.0°		45 Hz to 65 Hz: ±1.0° 15 Hz to 1000 Hz: ±2.0°
DC offset[*14]		± 20 mV (typ.)			
DC output (only single phase output)					
Output capacity		**9 kW**		**12 kW**	
Mode		Floating output, the N terminal can be grounded			
Voltage	**Setting Range**	-250.0 V to +250.0 V / -500.0 V to +500.0 V, Setting Resolution: 0.01 V / 0.1 V			
	Accuracy[*15]	±(|0.3 % of set| + 0.3 V / 0.6 V)			
Maximum current[*16]		90 A / 45 A		120 A / 60 A	
Maximum peak current[*17]		Four times of the maximum current			
Output Stability, Total Harmonic Distortion, Output voltage rising time and Ripple noise					
Line regulation		±0.1% or less (Phase voltage)			
Load regulation[*18]		±0.5 V / ±1.0 V (phase voltage, 0 to 100%, via output terminal)			
Distortion of Output[*19]		<0.3 % @1Hz to 100Hz, <0.5 % @100.1 Hz to 500 Hz, <1 % @500.1 Hz to 1000 Hz			
Output voltage response time[*20]		Middle: 100 µs (typ.); Slow: 300 µs (typ.)			
Ripple noise[*21]		0.5 Vrms / 1 Vrms (TYP)			

*1 Y connection is three-phase, five-wire, Delta connection is three-phase, four-wire.
*2. In the case of AC-INT mode, the rate output voltage, resistance load at maximum output current, 45 Hz to 65 Hz and sine wave output only.
*3. Can be only set in polyphase mode.
*4. For phase voltage setting in polyphase output. In balance mode all phase are collectively set and in unbalance mode each phases are individually set.
*5. For an output voltage of 10 V to 175 V / 20 V to 350 V, sine wave, an output frequency of 45 Hz to 65 Hz, no load, DC voltage setting 0V (AC+DC mode) and 23°C ± 5°C. For phase voltage setting in the polyphase output.
*6. Line voltage only can be set in balance mode.
*7. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the DC superimmposition, the active current of AC+DC satisfies the maximum current. In the case of 40 Hz or lower or 400 Hz or higher, and that the ambient temperature is 40 degree or higher, the maximum current may decrease.
*8. With respect to the capacitor-input rectifying load. Limited by the maximum current.
*9. External power injection or regeneration which is over short reverse power flow capacity is not available.
*10. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature range.
*11. L1, L2 and L3 phase can be set independ at independ mode in the polyphase output.
*12. Can be set only with independ mode in polyphase output.
*13. For an output voltage of 50V or higher, sine wave, same load and voltage condition for all phase.
*14. In the case of the AC mode and output voltage setting to 0 V, 23°C ± 5°C
*15. For an output voltage of -250 V to -10 V, +10 V to +250 V / -500 V to -20 V, +20 V to +500 V, no load, AC voltage set to 0V (AC+DC mode) and 23°C ± 5°C
*16. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the AC superimmposition, the active current of AC+DC satisfies the maximum current. And the ambient temperature is 40 degree or higher, the maximum current may decrease.
*17. Instantaneous eithin 3 ms, limited by the maximum current at rated output voltage.
*18. For an output voltage of 75 V to 175 V / 150 V to 350 V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel.
*19. 50 % or higher of the rated output voltage, the maximum current or lower, AC and AC+DC modes, THD+N. For the polyphase output, it is a specification for phase voltage setting.
*20. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse). 10% ~ 90% of output voltage.
*21. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.

Measured Value Display (All accuracy of the measurement function is indicated for 23 °C±5 °C.)				
			Single-phase output	**Polyphase output**[*6]
Voltage[*1*2]	**Resolution**		0.01 V / 0.1 V	
	RMS value accuracy		45 Hz to 65 Hz and DC: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 1000 Hz: ± (0.7 % of rdg + 1 V / 2 V)	45 Hz to 65 Hz: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 1000 Hz: ± (0.7 % of rdg + 1 V / 2 V)
	AVG value accuracy		DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)	DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)
	PEAK value accuracy[*3]		45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 1 V / 2 V)	45 Hz to 65 Hz: ±(|2 % of rdg| + 1 V / 2 V)

SPECIFICATIONS

			ASR-6450-09	ASR-6600-12
Current*4	Resolution		0.01 A / 0.1 A	
	RMS value accuracy		45 Hz to 65 Hz and DC: ±(0.5 % of rdg + 0.2 A / 0.1 A) 15 Hz to 1000 Hz: ±(0.7 % of rdg + 0.4 A / 0.2 A)	45 Hz to 65 Hz: ±(0.5 % of rdg + 0.1 A / 0.05 A) 15 Hz to 1000 Hz: ±(0.7 % of rdg + 0.2 A / 0.1 A)
	AVG value accuracy		DC: ± (|0.5 % of rdg| + 0.4 A / 0.2 A)	DC: ± (|0.5 % of rdg| + 0.2 A / 0.1 A)
	PEAK value accuracy*5		45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 2 A / 1 A)	45 Hz to 65 Hz: ±(|2 % of rdg| + 1 A / 0.5 A)
Power*7*8	Active (W)	Resolution	0.1 W / 1 W / 10 W	
		Accuracy*9	±(2 % of rdg + 6 W)	±(2 % of rdg + 2 W)
	Apparent (VA)	Resolution	0.1 VA / 1 VA / 10VA	
		Accuracy	±(2 % of rdg + 9 VA)	±(2 % of rdg + 3 VA)
	Reactive (VAR)	Resolution	0.1 VAR / 1 VAR / 10VAR	
		Accuracy*10	±(2 % of rdg + 9 VAR)	±(2 % of rdg + 3 VAR)
Power factor		Range	0.000 to 1.000	
		Resolution	0.001	
Harmonic voltage Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)*11		Range	Up to 100th order of the fundamental wave	
		Full Scale	200 V / 400 V, 100%	
		Resolution	0.01 V /0.1 V, 0.1%	
		Accuracy*12	Up to 20th: ±(0.2 % of rdg + 0.5 V / 1 V) 21th to 100th: ±(0.3 % of rdg + 0.5 V / 1 V)	
Harmonic current Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)*11		Range	Up to 100th order of the fundamental wave	
		Full Scale	126 A / 63 A, 100%	42 A / 21 A, 100%
		Resolution	0.01 A / 0.1 A, 0.1%	
		Accuracy*13	Up to 20th: ±(1 % of rdg + 3 A / 1.5 A) 21th to 100th: ±(1.5 % of rdg + 3 A / 1.5 A)	Up to 20th: ±(1 % of rdg + 1 A / 0.5 A) 21th to 100th: ±(1.5 % of rdg + 1 A / 0.5 A)

*1. In the polyphase output, the specification is for phase voltage, and the DC average value display cannot be selected.
*2. Accuracy values are in the case that the output voltage is within voltage setting range.
*3. The accuracy is for output waveform DC or sine wave only.
*4. Accuracy values are in the case that the output current is 5% to 100% of the maximum current.
*5. The accuracy is for output waveform DC or sine wave only.
*6. In the polyphase output, these are the specifications for each phase.
*7. For an output voltage of 50 V or greater, an output current in the range of 10 % to 100 % of the maximum current, DC or an output frequency of 45 Hz to 65 Hz.
*8. The apparent and reactive powers are not displayed in the DC mode.
*9. For the load with the power factor 0.5 or higher.
*10. For the load with the power factor 0.5 or lower.
*11. The measurement does not conform to the IEC or other standard. Phase Voltage and Phase Current.
*12. For an output voltage of 10 V to 175 V / 20 V to 350 V.
*13. An output current in the range of 5 % to 100 % of the maximum current.

Others			
Protections			UVP, OVP, OCP, OTP, OPP, Fan Fail, Peak and RMS Current Limit
Display			TFT-LCD, 7 inch
Memory function			Store and recall settings, Basic settings: 10
Arbitrary wave	Number of memories		253 (nonvolatile)
	Waveform length		4096 words
	Amplitude resolution		16 bits
General Specifications			
Interface	Standard	USB	Type A: Host, Type B: Slave, Speed: 2.0, USB-CDC / USB-TMC
		LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
		External	External Signal Input; External Control I/O; V/I Monitor Output
		RS-232C	Complies with the EIA-RS-232 specifications
	Optional 1	GPIB	SCPI-1993, IEEE 488.2 compliant interface
	Optional 2	CAN Bus	Complies with CAN 2.0A or 2.0B based protocol
	Optional 3	Device Net	Complies with CAN 2.0A or 2.0B based protocol
Insulation resistance	Between input and chassis, output and chassis, input and output		DC 500 V, 30 MΩ or more
Withstand voltage	Between input and chassis, output and chassis, input and output		AC 1500 V or DC 2130 V , 1 minute
EMC			EN 61326-1 (Class A) ; EN 61326-2-1/-2-2 (Class A) ; EN 61000-3-2 (Class A, Group 1) ; EN 61000-3-3 (Class A, Group 1) ; EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11 (Class A, Group 1) ; EN 55011 (Class A, Group1)
Safety			EN 61010-1
Environment	Operating environment		Indoor use, Overvoltage Category II
	Operating temperature range		0 °C to 40 °C
	Storage temperature range		-10 °C to 70 °C
	Operating humidity range		20 %rh to 80 % RH (no condensation)
	Storage humidity range		90 % RH or less (no condensation)
	Altitude		Up to 2000 m
Dimensions (mm)			598(W)×937(H)×906(D) (not including protrusions)
Weight			Approx. 155 kg

A value with the accuracy is the guaranteed value of the specification. However, an accuracy noted as reference value shows the supplemental data for reference when the product is used, and is not under the guarantee. A value without the accuracy is the nominal value or representative value (shown as typ.).
Product specifications are subject to change without notice.

SPECIFICATIONS

		ASR-6450-13.5		ASR-6600-18	
Input Ratings					
Power type		Three-phase Three-wire Delta connection, Three-phase Four-wire Y connection			
Voltage range*1		200 Vac to 240 Vac (Phase Voltage), 380 Vac to 460 Vac (Line Voltage)			
Frequency range		47 Hz to 63 Hz			
Power factor*2		0.95 or higher (typ.)			
Efficiency*2		80 % or higher			
Maximum power consumption		18 kVA or lower		24 kVA or lower	
AC Output					
Multi-phase output		Single-phase output	Polyphase output	Single-phase output	Polyphase output
Output capacity		13.5 kVA	1P3W: 9 kVA ; 3P4W: 13.5 kVA	18 kVA	1P3W: 12 kVA ; 3P4W: 18 kVA
Mode		1P2W	1P3W ; 3P4W (Y-connection)	1P2W	1P3W ; 3P4W (Y-connection)
Setting mode*3		---	Unbalance, Balanced	---	Unbalance, Balanced
Phase voltage	Setting Range*4	0.00 V to 175.0 V / 0.0 V to 350.0 V (sine and square wave), Setting Resolution: 0.01 V / 0.1 V			
		0.00 Vpp to 500.0 Vpp / 0.00 Vpp to 1000 Vpp (triangle and arbitrary wave), Setting Resolution: 0.01 Vpp / 0.1 Vpp / 1 Vpp			
	Accuracy*5	±(0.3 % of set + 0.5 V / 1 V)			
Line voltage setting range*6		---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V	---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V
Maximum current*7		135 A / 67.5 A	45 A / 22.5 A	180 A / 90 A	60 A / 30 A
Maximum peak current*8		Four times of the maximum RMS current			
Load power factor*9		0 to 1 (leading phase or lagging phase, 45 Hz to 65Hz)			
Frequency	Setting range	AC Mode: 15.00 Hz to 1000.0 Hz, AC+DC Mode: 1.00 Hz to 1000.0 Hz, Setting resolution: 0.01 Hz / 0.1 Hz			
	Accuracy	± 0.01% of set			
	Stability*10	± 0.005%			
Output on phase setting range*11		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 1000 Hz)			
Output off phase setting range*11		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 1000 Hz)			
Setting range of the phase angle*12		---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°	---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°
Phase angle accuracy*13			45 Hz to 65 Hz: ±1.0° 15 Hz to 1000 Hz: ±2.0°		45 Hz to 65 Hz: ±1.0° 15 Hz to 1000 Hz: ±2.0°
DC Offset*14		± 20 mV (typ.)			
DC output (only single phase output)					
Output Capacity		**13.5 kW**		**18 kW**	
Mode		Floating output, the N terminal can be grounded			
Voltage	Setting Range	-250.0 V to +250.0 V / -500.0 V to +500.0 V, Setting Resolution: 0.01 V / 0.1 V			
	Accuracy*15	±(|0.3 % of set| + 0.3 V / 0.6 V)			
Maximum current*16		135 A / 67.5 A		180 A / 90 A	
Maximum peak current*17		Four times of the maximum current			
Output Stability, Total Harmonic Distortion, Output voltage rising time and Ripple noise					
Line regulation		±0.1% or less (Phase voltage)			
Load regulation*18		±0.5 V / ±1.0 V (phase voltage, 0 to 100%, via output terminal)			
Distortion of Output*19		<0.3 % @1Hz to 100Hz, <0.5 % @100.1 Hz to 500 Hz, <1 % @500.1 Hz to 1000 Hz			
Output voltage response time*20		Middle: 100 µs (typ.); Slow: 300 µs (typ.)			
Ripple noise*21		0.5 Vrms / 1 Vrms (TYP)			

*1 Y connection is three-phase, five-wire, Delta connection is three-phase, four-wire. (Accessories will be provided)
*2. In the case of AC-INT mode, the rate output voltage, resistance load at maximum output current, 45 Hz to 65 Hz and sine wave output only.
*3. Can be only set in polyphase mode.
*4. For phase voltage setting in polyphase output. In balance mode all phase are collectively set and in unbalance mode each phases are individually set.
*5. For an output voltage of 10 V to 175 V / 20 V to 350 V, sine wave, an output frequency of 45 Hz to 65 Hz, no load, DC voltage setting 0V (AC+DC mode) and 23°C ± 5°C.
For phase voltage setting in the polyphase output.
*6. Line voltage only can be set in balance mode.
*7. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the DC superimmposition, the active current of AC+DC satisfies the maximum current. In the case of 40 Hz or lower or 400 Hz or higher, and that the ambient temperature is 40 degree or higher, the maximum current may decrease.
*8. With respect to the capacitor-input rectifying load. Limited by the maximum current.
*9. External power injection or regeneration which is over short reverse power flow capacity is not available.
*10. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature range.
*11. L1, L2 and L3 phase can be set independ at independ mode in the polyphase output.
*12. Can be set only with independ mode in polyphase output.
*13. For an output voltage of 50V or higher, sine wave, same load and voltage condition for all phase.
*14. In the case of the AC mode and output voltage setting to 0 V, 23°C ± 5°C
*15. For an output voltage of -250 V to -10 V, +10 V to +250 V / -500 V to -20 V, +20 V to +500 V, no load, AC voltage set to 0V (AC+DC mode) and 23°C ± 5°C
*16. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the AC superimmposition, the active current of AC+DC satisfies the maximum current. And the ambient temperature is 40 degree or higher, the maximum current may decrease.
*17. Instantaneous eithin 3 ms, limited by the maximum current at rated output voltage.
*18. For an output voltage of 75 V to 175 V / 150 V to 350 V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel.
*19. 50 % or higher of the rated output voltage, the maximum current or lower, AC and AC+DC modes, THD+N. For the polyphase output, it is a specification for phase voltage setting.
*20. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse). 10% ~ 90% of output voltage.
*21. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.

Measured Value Display (All accuracy of the measurement function is indicated for 23 °C±5 °C.)

		Single-phase output	Polyphase output*6
Voltage*1*2	Resolution	0.01 V / 0.1 V	
	RMS value accuracy	45 Hz to 65 Hz and DC: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 1000 Hz: ± (0.7 % of rdg + 1 V / 2 V)	45 Hz to 65 Hz: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 1000 Hz: ± (0.7 % of rdg + 1 V / 2 V)
	AVG value accuracy	DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)	DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)
	PEAK value accuracy*3	45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 1 V / 2 V)	45 Hz to 65 Hz: ±(|2 % of rdg| + 1 V / 2 V)

SPECIFICATIONS

			ASR-6450-13.5	ASR-6600-18
Current*4	Resolution		0.01 A / 0.1 A	
	RMS value accuracy		45 Hz to 65 Hz and DC: ±(0.5 % of rdg + 0.3 A / 0.15 A) 15 Hz to 1000 Hz: ±(0.7 % of rdg + 0.6 A / 0.4 A)	45 Hz to 65 Hz: ±(0.5 % of rdg + 0.15 A / 0.08 A) 15 Hz to 1000 Hz: ±(0.7 % of rdg + 0.3 A / 0.15 A)
	AVG value accuracy		DC: ± (|0.5 % of rdg| + 0.6 A / 0.4 A)	DC: ± (|0.5 % of rdg| + 0.3 A / 0.15 A)
	PEAK value accuracy*5		45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 3 A / 1.5 A)	45 Hz to 65 Hz: ±(|2 % of rdg| + 1.5 A / 0.75 A)
Power*7*8	Active (W)	Resolution	0.1 W / 1 W / 10 W	
		Accuracy*9	±(2 % of rdg + 6 W)	±(2 % of rdg + 2 W)
	Apparent (VA)	Resolution	0.1 VA / 1 VA / 10VA	
		Accuracy	±(2 % of rdg + 9 VA)	±(2 % of rdg + 3 VA)
	Reactive (VAR)	Resolution	0.1 VAR / 1 VAR / 10VAR	
		Accuracy*10	±(2 % of rdg + 9 VAR)	±(2 % of rdg + 3 VAR)
Power factor		Range	0.000 to 1.000	
		Resolution	0.001	
Harmonic voltage Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)*11		Range	Up to 100th order of the fundamental wave	
		Full Scale	200 V / 400 V, 100%	
		Resolution	0.01 V /0.1 V, 0.1%	
		Accuracy*12	Up to 20th: ±(0.2 % of rdg + 0.5 V / 1 V) 21th to 100th: ±(0.3 % of rdg + 0.5 V / 1 V)	
Harmonic current Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)*11		Range	Up to 100th order of the fundamental wave	
		Full Scale	189 A / 94.5 A, 100%	63 A / 31.5 A, 100%
		Resolution	0.01 A / 0.1 A, 0.1%	
		Accuracy*13	Up to 20th: ±(1 % of rdg + 3 A / 1.5 A) 21th to 100th: ±(1.5 % of rdg + 3 A / 1.5 A)	Up to 20th: ±(1 % of rdg + 1 A / 0.5 A) 21th to 100th: ±(1.5 % of rdg + 1 A / 0.5 A)

*1. In the polyphase output, the specification is for phase voltage, and the DC average value display cannot be selected.
*2. Accuracy values are in the case that the output voltage is within voltage setting range.
*3. The accuracy is for output waveform DC or sine wave only.
*4. Accuracy values are in the case that the output current is 5% to 100% of the maximum current.
*5. The accuracy is for output waveform DC or sine wave only.
*6. In the polyphase output, these are the specifications for each phase.
*7. For an output voltage of 50 V or greater, an output current in the range of 10 % to 100 % of the maximum current, DC or an output frequency of 45 Hz to 65 Hz.
*8. The apparent and reactive powers are not displayed in the DC mode.
*9. For the load with the power factor 0.5 or higher.
*10. For the load with the power factor 0.5 or lower.
*11. The measurement does not conform to the IEC or other standard. Phase Voltage and Phase Current.
*12. For an output voltage of 10 V to 175 V / 20 V to 350 V.
*13. An output current in the range of 5 % to 100 % of the maximum current.

Others			
Protections			UVP, OVP, OCP, OTP, OPP, Fan Fail, Peak and RMS Current Limit
Display			TFT-LCD, 7 inch
Memory function			Store and recall settings, Basic settings: 10
Arbitrary wave	Number of memories		253 (nonvolatile)
	Waveform length		4096 words
	Amplitude resolution		16 bits
General Specifications			
Interface	Standard	USB	Type A: Host, Type B: Slave, Speed: 2.0, USB-CDC / USB-TMC
		LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
		External	External Signal Input; External Control I/O; V/I Monitor Output
		RS-232C	Complies with the EIA-RS-232 specifications
	Optional 1	GPIB	SCPI-1993, IEEE 488.2 compliant interface
	Optional 2	CAN Bus	Complies with CAN 2.0A or 2.0B based protocol
	Optional 3	Device Net	Complies with CAN 2.0A or 2.0B based protocol
Insulation resistance	Between input and chassis, output and chassis, input and output		DC 500 V, 30 MΩ or more
Withstand voltage	Between input and chassis, output and chassis, input and output		AC 1500 V or DC 2130 V , 1 minute
EMC			EN 61326-1 (Class A) ; EN 61326-2-1/-2-2 (Class A) ; EN 61000-3-2 (Class A, Group 1) ; EN 61000-3-3 (Class A, Group 1); EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11 (Class A, Group 1); EN 55011 (Class A, Group1)
Safety			EN 61010-1
Environment	Operating environment		Indoor use, Overvoltage Category II
	Operating temperature range		0 °C to 40 °C
	Storage temperature range		-10 °C to 70 °C
	Operating humidity range		20 %rh to 80 % RH (no condensation)
	Storage humidity range		90 % RH or less (no condensation)
	Altitude		Up to 2000 m
Dimensions (mm)			598(W)×1116(H)×906(D) (not including protrusions)
Weight			Approx. 200 kg

A value with the accuracy is the guaranteed value of the specification. However, an accuracy noted as reference value shows the supplemental data for reference when the product is used, and is not under the guarantee. A value without the accuracy is the nominal value or representative value (shown as typ.).
Product specifications are subject to change without notice.

4.5/6/9/12/13.5/18/24/30/36 kVA High-Performance AC/DC Power Supply

SPECIFICATIONS

		ASR-6600-24		ASR-6600-30		ASR-6600-36	
Input Ratings							
Power type		Three phase Three wire Delta connection, Three phase Four wire Y connection					
Voltage range *1		200 to 240 Vac ± 10 % (Phase Voltage), 380 to 415 Vac ± 10 % (Line Voltage)					
Frequency range		47 Hz to 63 Hz					
Power factor *2		0.95 or higher (typ.)					
Efficiency *2		80 % or higher					
Maximum power consumption		32 kVA or lower		40 kVA or lower		48 kVA or lower	
AC Output							
Multi-phase output		Single-phase output	Polyphase output	Single-phase output	Polyphase output	Single-phase output	Polyphase output
Output capacity		24 kVA	1P3W: 16 kVA ; 3P4W: 24 kVA	30 kVA	1P3W: 20 kVA ; 3P4W: 30 kVA	36 kVA	1P3W: 24 kVA ;3P4W: 36 kVA
Mode		1P2W	1P3W ; 3P4W (Y-connection)	1P2W	1P3W ; 3P4W (Y-connection)	1P2W	1P3W ; 3P4W (Y-connection)
Setting mode *3		---	Unbalance, Balanced	---	Unbalance, Balanced	---	Unbalance, Balanced
Phase voltage	**Setting Range** *4	0.00 V to 175.0 V / 0.0 V to 350.0 V (sine and square wave), Setting Resolution: 0.01 V / 0.1 V					
		0.00 Vpp to 500.0 Vpp / 0.00 Vpp to 1000 Vpp (triangle and arbitrary wave), Setting Resolution: 0.01 Vpp / 0.1 Vpp / 1 Vpp					
	Accuracy *5	±(0.3 % of set + 0.5 V / 1 V)					
Line voltage setting range *6		---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V	---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine wave only) Setting Resolution: 0.01 V / 0.1 V	---	1P3W: 0.00 V to 350.0 V / 0.00 V to 700.0 V 3P4W: 0.00 V to 303.1 V / 0.00 V to 606.2 V (sine and square wave) Setting Resolution: 0.01 V / 0.1 V
Maximum current *7		240 A / 120 A	80 A / 40 A	300 A / 150 A	100 A / 50 A	360 A / 180 A	120 A / 60 A
Maximum peak current *8		Four times of the maximum RMS current					
Load power factor *9		0 to 1 (leading phase or lagging phase, 45 Hz to 65Hz)					
Frequency	**Setting range**	AC Mode: 15.00 Hz to 550.0 Hz, AC+DC Mode: 1.00 Hz to 550.0 Hz, Setting resolution: 0.01 Hz / 0.1 Hz					
	Accuracy	± 0.01 % of set					
	Stability *10	± 0.005 %					
Output on phase setting range *11		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 550 Hz)					
Output off phase setting range *11		0.0° to 359.9° variable (Free / Fix selectable), 0.1° (1 Hz to 500 Hz), 1° (500 Hz to 550 Hz)					
Setting range of the phase angle *12		---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°	---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°	---	3P4W: L2 phase: 0° to 359.9° L3 phase: 0° to 359.9° Setting Resolution: 0.1°
Phase angle accuracy *13		---	45 Hz to 65 Hz: ±1.0° 15 Hz to 550 Hz: ±2.0°	---	45 Hz to 65 Hz: ±1.0° 15 Hz to 550 Hz: ±2.0°	---	45 Hz to 65 Hz: ±1.0° 15 Hz to 550 Hz: ±2.0°
DC offset *14		± 20 mV (typ.)					
DC Output (only single phase output)							
Output capacity		24 kW		30 kW		36 kW	
Mode		Floating output, the N terminal can be grounded					
Voltage	**Setting Range**	-250.0 V to +250.0 V / -500.0 V to +500.0 V, Setting Resolution: 0.01 V / 0.1 V					
	Accuracy *15	±(|0.3 % of set| + 0.3 V / 0.6 V)					
Maximum current *16		240 A / 120 A		300 A / 150 A		360 A / 180 A	
Maximum peak current *17		Four times of the maximum current					
Output Stability, Total Harmonic Distortion, Output Voltage Rising Time and Ripple Noise							
Line regulation		±0.1 % or less (Phase voltage)					
Load regulation *18		±1 V (phase voltage, 0 % to 100 %, via output terminal)					
Distortion of Output *19		<0.3 % @1 Hz to 100 Hz, <0.5 % @100.1 Hz to 550 Hz					
Output voltage response time *20		Slow: 300 μs (typ.)					
Ripple noise *21		0.5 Vrms / 1 Vrms (TYP)					

*1 Y connection is three-phase, five-wire, Delta connection is three-phase, four-wire. (Accessories will be provided)
*2. In the case of AC-INT mode, the rate output voltage, resistance load at maximum output current, 45 Hz to 65 Hz and sine wave output only.
*3. Can be only set in 3P4W mode.
*4. For phase voltage setting in polyphase output. In balance mode all phase are collectively set and in unbalance mode each phases are individually set.
*5. For an output voltage of 10 V to 175 V / 20 V to 350 V, sine wave, an output frequency of 45 Hz to 65 Hz, no load, DC voltage setting 0V (AC+DC mode) and 23 °C ± 5 °C. For phase voltage setting in the polyphase output.
*6. Line voltage only can be set in balance mode.
*7. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the DC superimmposition, the active current of AC+DC satisfies the maximum current. In the case of 40 Hz or lower or 400 Hz or higher, and that the ambient temperature is 40 degree or higher, the maximum current may decrease.
*8. With respect to the capacitor-input rectifying load. Limited by the maximum current.
*9. External power injection or regeneration which is over short reverse power flow capacity is not available.
*10. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature range.
*11. L1, L2 and L3 phase can be set independ at independ mode in the polyphase output.
*12. Can be set only with independ mode in polyphase output.
*13. For an output voltage of 50 V or higher, sine wave, same load and voltage condition for all phase.
*14. In the case of the AC mode and output voltage setting to 0 V, 23 °C ± 5 °C
*15. For an output voltage of -250 V to -10 V, +10 V to +250 V / -500 V to -20 V, +20 V to +500 V, no load, AC voltage set to 0 V (AC+DC mode) and 23 °C ± 5 °C
*16. If the output voltage is higher than rated value, this is limited to satisfy the power capacity. If there is the AC superimmposition, the active current of AC+DC satisfies the maximum current. And the ambient temperature is 40 degree or higher, the maximum current may decrease.
*17. Instantaneous eithin 3 ms, limited by the maximum current at rated output voltage.
*18. For an output voltage of 75 V to 175 V / 150 V to 350 V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel.
*19. 50 % or higher of the rated output voltage, the maximum current or lower, AC and AC+DC modes, THD+N. For the polyphase output, it is a specification for phase voltage setting.
*20. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse). 10 % to 90 % of output voltage.
*21. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.

Measured Value Display (All accuracy of the measurement function is indicated for 23 °C±5 °C.)

		Single-phase output	Polyphase output *6
Voltage *1*2	**Resolution**	0.01 V / 0.1 V	
	RMS value accuracy	45 Hz to 65 Hz and DC: ± (0.5 % of rdg + 0.5 V / 1 V) 15 Hz to 550 Hz: ± (0.7 % of rdg + 1 V / 2 V)	
	AVG value accuracy	DC: ± (|0.5 % of rdg| + 0.5 V / 1 V)	
	PEAK value accuracy *3	45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 1 V / 2 V)	
Current *4	**Resolution**	0.01 A / 0.1 A	
	RMS value accuracy	45 Hz to 65 Hz: ±(0.5 % of rdg + 0.3 A / 0.15 A) 15 Hz to 550 Hz: ±(0.7 % of rdg + 0.6 A / 0.4 A)	45 Hz to 65 Hz: ±(0.5 % of rdg + 0.15 A / 0.08 A) 15 Hz to 550 Hz: ±(0.7 % of rdg + 0.3 A / 0.15 A)
	AVG value accuracy	DC: ± (|0.5 % of rdg| + 0.6 A / 0.4 A)	DC: ± (|0.5 % of rdg| + 0.3 A / 0.15 A)
	PEAK value accuracy *5	45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 3 A / 1.5 A)	45 Hz to 65 Hz and DC: ±(|2 % of rdg| + 1.5 A / 0.75 A)

SPECIFICATIONS

			ASR-6600-24	ASR-6600-30	ASR-6600-36
Power[*7*8]	Active (W)	Resolution	0.1 W / 1 W / 10 W		
		Accuracy[*9]	45 Hz to 65 Hz and DC: ±(2 % of rdg + 9 W)	45 Hz to 65 Hz and DC: ±(2 % of rdg + 3 W)	
	Apparent (VA)	Resolution	0.1 VA / 1 VA / 10VA		
		Accuracy	45 Hz to 65 Hz: ±(2 % of rdg + 18 VA)	45 Hz to 65 Hz: ±(2 % of rdg + 6 VA)	
	Reactive (VAR	Resolution	0.1 VAR / 1 VAR / 10VAR		
		Accuracy[*10]	45 Hz to 65 Hz: ±(2 % of rdg + 18 VAR)	45 Hz to 65 Hz: ±(2 % of rdg + 6 VAR)	
Power factor		Range	0.000 to 1.000		
		Resolution	0.001		
Harmonic voltage Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)[*11]		Range	Up to 100th order of the fundamental wave		
		Full Scale	200 V / 400 V, 100 %		
		Resolution	0.01 V /0.1 V, 0.1%		
		Accuracy[*12]	Up to 20th: ±(0.2 % of rdg + 0.5 V / 1 V) 21th to 100th: ±(0.3 % of rdg + 0.5 V / 1 V)		
Harmonic current Effective value (rms) Percent (%) (AC-INT and 50/60 Hz only)[*11]		Range	Up to 100th order of the fundamental wave		
		Full Scale	252 A / 126 A, 100 % (ASR-6600-24), 315 A / 157.5 A, 100 % (ASR-6600-30), 378 A / 189 A, 100 % (ASR-6600-36)	84 A / 42 A, 100 % (ASR-6600-24), 105A / 52.5 A, 100 % (ASR-6600-30), 126 A / 63 A, 100 % (ASR-6600-36)	
		Resolution	0.01 A / 0.1 A / 1 A, 0.1%		
		Accuracy[*13]	Up to 20th: ±(1 % of rdg + 3 A / 1.5 A) 21th to 100th: ±(1.5 % of rdg + 3 A / 1.5 A)	Up to 20th: ±(1 % of rdg + 1 A / 0.5 A) 21th to 100th: ±(1.5 % of rdg + 1 A / 0.5 A)	

*1. In the polyphase output, the specification is for phase voltage, and the DC average value display cannot be selected.
*2. Accuracy values are in the case that the output voltage is within voltage setting range.
*3. The accuracy is for output waveform DC or sine wave only.
*4. Accuracy values are in the case that the output current is 5 % to 100 % of the maximum current.
*5. The accuracy is for output waveform DC or sine wave only.
*6. In the polyphase output, these are the specifications for each phase.
*7. For an output voltage of 50 V or greater, an output current in the range of 10 % to 100 % of the maximum current.
*8. The apparent and reactive powers are not displayed in the DC mode.
*9. For the load with the power factor 0.5 or higher.
*10. For the load with the power factor 0.5 or lower.
*11. The measurement does not conform to the IEC or other standard. Phase Voltage and Phase Current.
*12. For an output voltage of 10 V to 175 V / 20 V to 350 V.
*13. An output current in the range of 5 % to 100 % of the maximum current.

Others					
Protections			UVP, OVP, OCP, OTP, OPP, Fan Fail, Peak and RMS Current Limit		
Display			TFT-LCD, 7 inch		
Memory function			Store and recall settings, Basic settings: 10		
Arbitrary wave	Number of memories		253 (nonvolatile)		
	Waveform length		4096 words		
	Amplitude resolution		16 bits		
General Specifications					
Interface	Standard	USB	Type A: Host, Type B: Slave, Speed: 2.0, USB-CDC / USB-TMC		
		LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask		
		External	External Signal Input External Control I/O V/I Monitor Output		
		RS-232C	Complies with the EIA-RS-232 specifications		
	Optional 1	GPIB	SCPI-1993, IEEE 488.2 compliant interface		
	Optional 2	CAN Bus	Complies with CAN 2.0A or 2.0B based protocol		
	Optional 3	Device Net	Complies with CAN 2.0A or 2.0B based protocol		
Insulation resistance	Between input and chassis, output and chassis, input and output		DC 500 V, 30 MΩ or more		
Withstand voltage	Between input and chassis, output and chassis, input and output		AC 1500 V or DC 2130 V, 1 minute		
EMC			EN 61326-1 (Class A) ; EN 61326-2-1/-2-2 (Class A) ; EN 61000-3-2 (Class A, Group 1) ; EN 61000-3-3 (Class A, Group 1) ; EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11		
Safety			EN 61010-1		
Environment	Operating environment		Indoor use, Overvoltage Category II		
	Operating temperature range		0 °C to 40 °C		
	Storage temperature range		-10 °C to 70 °C		
	Operating humidity range		20 %rh to 80 % RH (no condensation)		
	Storage humidity range		90 % RH or less (no condensation)		
	Altitude		Up to 2000 m		
Dimensions (mm) (not including protrusions)			598(W)×1294(H)×906(D)	598(W)×1472(H)×906(D)	598(W)×1650(H)×906(D)
Weight			Approx. 250 kg	Approx. 305 kg	Approx. 370 kg

A value with the accuracy is the guaranteed value of the specification. However, an accuracy noted as reference value shows the supplemental data for reference when the product is used, and is not under the guarantee. A value without the accuracy is the nominal value or representative value (shown as typ.).
Product specifications are subject to change without notice.

4.5/6/9/12/13.5/18/24/30/36 kVA High-Performance AC/DC Power Supply

Rear Panel

ASR-003

ASR-004

ASR-005

ASR-006

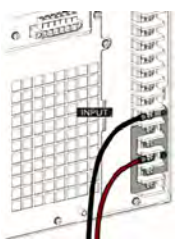
GET-006

GPW-008

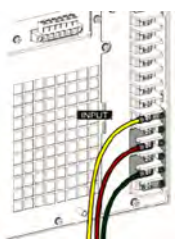
GPW-012/013

GPW-014/015

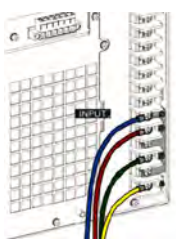
A. SINGLE UNIT PROVIDES AC SINGLE/THREE-PHASE INPUT FUNCTION



ASR-6000 AC One-phase Input



ASR-6000 AC Three-phase Input (Delta Connection)



ASR-6000 AC Three-phase Input (Y Connection)

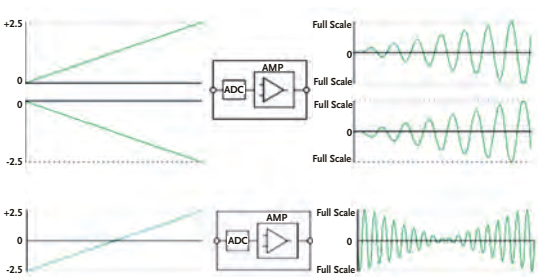
The ASR-6000 series is GW Instek's first programmable AC/DC power source that supports AC single/three-phase input.
AC three-phase input supports delta (Delta) and star (Y) wiring methods
Advantages:
a. ASR-6000 can use mains in most countries around the world (ex. Mainland China, Southeast. Asia, India, Europe...)AC single-phase 220 V input can help test software development engineers work with the ASR-6000 on mains in the office. No additional three-phase power source is required.

b. ASR-6000 can be used immediately in various regions around the world and is not affected by differences in power grids in different countries.

Note: 1. The AC input three-phase Y connection method must be connected to the N wire, otherwise the ASR-6000 cannot be turned on.
2. ASR-6000 AC voltage input range AC 200 V to AC 240 V.

B. 10 OUTPUT MODES

ASR-6000 Has 10 Output Modes



AC-VCA Output Mode

Output Phase	Output Mode	Signal Source				
		INT	EXT	ADD	Sync.	VCA
1P	AC+DC	AC+DC-INT	AC+DC-EXT	AC+DC-ADD	AC+DC-Sync.	N/A
	AC	AC-INT	AC-EXT	AC-ADD	AC-Sync.	AC-VCA
	DC	DC-INT	N/A	N/A	N/A	N/A
1P3W	AC+DC	AC+DC-INT	AC+DC-EXT	AC+DC-ADD	AC+DC-Sync.	N/A
	AC	AC-INT	AC-EXT	AC-ADD	AC-Sync.	AC-VCA
	DC	DC-INT	N/A	N/A	N/A	N/A
3P	AC+DC	AC+DC-INT	AC+DC-EXT	AC+DC-ADD	AC+DC-Sync.	N/A
	AC	AC-INT	AC-EXT	AC-ADD	AC-Sync.	AC-VCA
	DC	DC-INT	N/A	N/A	N/A	N/A

- AC+DC-INT AC & DC Internal output
- AC-INT AC Internal output
- DC-INT DC Internal output
- AC+DC-EXT AC & DC External output
- AC-EXT AC External output
- AC+DC-ADD AC & DC Additional output
- AC-ADD AC Additional output
- AC+DC-Sync AC & DC Synchronal output
- AC-Sync AC Synchronal output
- AC-VCA AC Voltage Control Amplifier output

A high-performance AC power source = amplifier + signal source
It has: internal output + external input signal to control internal output + amplify external input signal. and output, and other diversified output functions.
ASR-6000 has up to 10 output modes, including :
1.Internal output (INT)
2.External input controls internal output (EXT)
3.Sum output of external and internal signal sources (ADD)
4.Mains frequency synchronous output (SYNC)
5.External DC signal controls internal AC amplitude (VCA)

C. AC SINGLE/THREE-PHASE OUTPUT + MULTI-CHANNEL OUTPUT FUNCTION

The ASR-6000 series has diverse output functions, including three modes: 1P2W, 1P3W and 3P4W. The maximum output for phase voltage is 350 Vrms and the maximum output for line voltage is 700 Vrms.

In AC three-phase output (3P4W) mode, each phase supports independent output settings. Taking ASR-6600 as an example, The maximum output of each phase reaches 2 kVA, supporting power supply testing of up to three DUTs to meet the needs of server power modules, Testing requirements for high-power AC power products such as electric vehicle chargers and uninterruptible power supply systems. independent output settings. Taking ASR-6600 as an example, The maximum output of each phase reaches 2kVA, supporting power supply testing of up to three DUTs to meet the needs of server power modules, Testing requirements for high-power AC power products such as electric vehicle chargers and uninterruptible power supply systems.

D. AC BALANCED/UNBALANCED THREE-PHASE OUTPUT MODES

AC Balanced Three-phase

AC Unbalanced Three-phase

The ASR-6000 series has unbalanced and balanced three-phase output modes. In the AC three-phase output mode, users can set the phase angles of L1, L2 and L3 for control.

Main applications: Three-phase input power supply products, when emulating unbalanced three-phase input and phase loss, the ability of three-phase power input products to restore balanced three-phase.

E. OUTPUT IMPEDANCE ADJUSTMENT FUNCTION

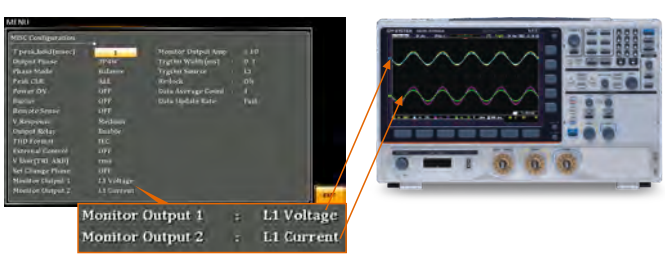
ASR-6000 has an output impedance adjustment function, which is mainly used to change the output inductance value and output impedance value of each phase to emulate the output voltage drop of each phase due to line loss.

The adjustable range of the output impedance of ASR-6000 is as follows:

L1, L2, L3 Output Inductance	**0.0 to 2000 μH**
L1, L2, L3 Output Resistance	**0.0 to 1 Ω**

Note: This function only supports stand-alone applications.
This function is automatically turned off in external parallel connection.

F. VOLTAGE AND CURRENT OUTPUT MONITORING FUNCTIONS



ASR-6000 provides dual-channel voltage and current monitoring, allowing instant output of voltage and current signals of each phase to an oscilloscope for measurement.

G. OUTPUT VOLTAGE RISE TIME IS ADJUSTABLE

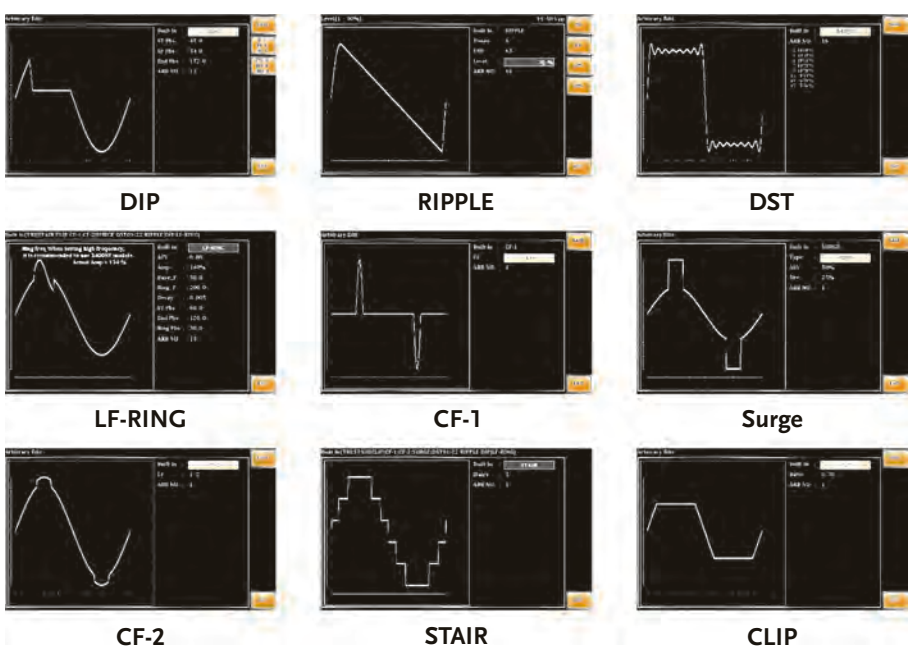
In order to meet the test requirements of different DUT output voltages, it is necessary to adjust the rise time of different output voltages. The ASR-6000 offers users up to three adjustable settings: typical values are fast (50 microseconds), medium (100 microseconds) and slow (300 microseconds). ASR-6000 is initially set to medium speed.

Note: When using 1P2W output, impedance adjustment or external parallel connection, the fast range setting will be automatically turned off.
Application: It can output high-speed arbitrary waveforms to emulate various changes in the power system caused by transient high-speed rising voltage, etc.

H. ADVANCED WEB SERVER CONTROL FEATURES

ASR-6000 provides a full range of web control functions, including:
* View system and information, and network configuration
* Monitor measurements
* Set/Operate ASR-6000
* Sequence Function/Simulate Function/Edit Waveform
* Data logger function

I. DIVERSE WAVEFORM OUTPUT FUNCTION



ASR-6000 provides more than 40 built-in waveforms, including: TRI, STAIR, CLIP, CF-1, CF-2, SURGE, DST01-22, RIPPLE, DIP, LF-RING. Each waveform also provides a change setting function, which can modulate thousands of combined waveforms and quickly emulate different AC output environments.

Users can adjust the required waveform type through the panel (the screen is displayed simultaneously), then load it into the ARB 1 to 16 waveform register through the access step, and return to the main menu output mode to perform ARB Waveform output. Users can also edit waveform through ASR-6000 software and then import it into ASR-6000 for execution.

Programmable AC/DC Power Source

ASR-3000 Series

CE | RS-232 | GPIB | USB | LAN | Ext I/O

FEATURES

* Output Rating: AC 0 Vrms to 400 Vrms, DC 0 V to ± 570 V
* Output Frequency up to 999.9 Hz (5 kHz for ASR-3400HF only)
* DC Output (100 % of Rated Power)
* Measurement Items: Vrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF
* Voltage and Current Harmonic Analysis (THDv, THDi)
* Remote Sensing Capability
* OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
* Support Arbitrary Waveform Function
* Output Capacity: 2 kVA/3 kVA/4 kVA/5 kVA
* Customized Phase Angle for Output On/Off
* Sequence and Simulation Function (up to 10 sets)
* Interface(std): USB, LAN, RS-232, GPIB
* Built-in External Control I/O and External Signal Input
* Built-in Output Relay Control
* Memory Function (up to 10 sets)
* Built-in Web Server

The ASR-3000 Series is an AC+DC power source, featuring high-speed DC voltage rising and falling time (≦100 μs). five models of the series : ASR-3200(2 kVA), ASR-3300(3 kVA), ASR-3400/3400HF(4 kVA) and ASR-3500(5 kVA). The series can provide rated power output during AC output and DC output. Ten ASR-3000 Series output modes are available, including 1) AC power output mode (AC-INT Mode), 2) DC power output mode (DC-INT Mode), 3) AC/DC power output mode (AC+DC-INT Mode), 4) External AC signal source mode (AC-EXT Mode), 5) External AC/DC signal source mode (AC+DC-EXT Mode), 6) External AC signal superimposition mode (AC-ADD Mode), 7) External AC/DC signal superimposition mode (AC+DC-ADD Mode), 8) External AC signal synchronization mode (AC-SYNC Mode), 9) External AC/DC signal synchronization mode (AC+DC-SYNC Mode)10) External DC voltage control of AC output mode(AC-VCA).

ASR-3000 Series is ideal for the development of On-board Chargers, Server Powers, LED modules, AC Motors, AC Fans, UPS and various electronic components, as well as for testing applications of automotive electrical equipment and home appliances.

The ASR-3000 Series provides users with waveform output capabilities including 1) Sequence mode generates waveform fallings, surges, sags, changes and other abnormal power line conditions; 2) Arbitrary waveform function allows users to store/upload user-defined waveforms; and 3) Simulate mode simulates power outage, voltage rise, voltage fall, and frequency variations. When the ASR-3000 Series power source outputs, it can also measure Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, IpkH, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. In addition, the remote sensing function ensures accurate voltage output, and the Customized Phase Angle for Output On/Off function can set the start and end angles of the voltage output according to the test requirements. The protection limits of V-Limit, Ipeak-Limit and F-Limit can be set according to user requirements. Over voltage limit, OCP, OPP will protect the DUT during the output process. The Fan Fail Alarm function and the AC fail alarm function are also designed in the ASR-3000 Series.

The front panel of the ASR-3000 Series provides a universal socket or a European socket, which allows users to plug and use so as to save wiring time. Since the power socket specification has a maximum current of 15 A, the rear panel of ASR-3000 Series is designed with a current circuit breaker. When the socket current is greater than 15 A, it will automatically open the circuit to protect users. The ASR-3000 Series supports I/O interface and is standardly equipped with USB, LAN, External I/O, RS-232C and GPIB.

ASR-3000 Series

Rear Panel

GRA-442-J Rack Mount Adapter(JIS)

GRA-442-E Rack Mount Adapter(EIA)

ASR-002 External three phase control unit

* Basis Requirement of ASR-002 to ASR-Series
1. Must be the three same models of ASR-Series

* Functions of ASR-Series are limited when conducts to ASR-002
1. No DC Output
2. Measurement Items: only current(A), power(W)and PF for each phase
3. No Voltage and Current Harmonic Analysis
4. No Remote Sensing Capability
5. No Arbitrary Waveform Function
6. No Sequence and Simulation Function
7 Not supported External Control I/O
8. No memory Function
9. Only support USB, no LAN port for communication

GTL-137

APS-008

GET-006
(AC signel phase 250V/13Amps)

GPW-005

GPW-006
(ASR-3200, ASR-3300 Ues Only)

GPW-007

GPW-017

SPECIFICATIONS

		ASR-3200	ASR-3300	ASR-3400	ASR-3500	ASR-3400HF
INPUT RATING (AC rms)						
NOMINAL INPUT VOLTAGE		200 Vac to 240 Vac				
INPUT VOLTAGE RANGE		180 Vac to 264 Vac				
PHASE		Single phase, Two-wire				
NOMINAL INPUT FREQUENCY		50 Hz to 60 Hz				
INPUT FREQUENCY RANGE		47 Hz to 63 Hz				
MAX. POWER CONSUMPTION		2500 VA or less	3750 VA or less	5000 VA or less	6000 VA or less	5000 VA or less
POWER FACTOR*1	200 Vac	0.95 (TYP)				
*1. For an output voltage of 100 V / 200 V (100 V / 200 V range), maximum current, and a load power factor of 1.						
AC MODE OUTPUT RATINGS (AC rms)						
VOLTAGE	Setting Range*1	0.0 V to 200.0 V / 0.0 V to 400.0 V				
	Setting Resolution	0.1 V				
	Accuracy*2	±(1 % of set + 1 V / 2 V)				
OUTPUT PHASE		Single phase, Two-wire				
MAXIMUM CURRENT*3	100 V	20 A	30 A	40 A	50 A	40 A
	200 V	10 A	15 A	20 A	25 A	20 A
MAXIMUM PEAK CURRENT*4	100 V	120 A	180 A	240 A	300 A	160 A
	200 V	60 A	90 A	120 A	150 A	80 A
LOAD POWER FACTOR		0 to 1(leading phase or lagging phase)				
POWER CAPACITY		2000 VA	3000 VA	4000 VA	5000 VA	4000 VA
FREQUENCY	Setting Range	AC Mode: 40.00 Hz to 999.9 Hz, AC+DC Mode: 1.00 Hz to 999.9 Hz				AC Mode: 40.0 Hz to 5000 Hz, AC+DC Mode: 1 Hz to 5000 Hz
	Setting Resolution	0.01 Hz (1.00 Hz to 99.99 Hz), 0.1 Hz (100.0 Hz to 999.9 Hz)				0.01 Hz (1.00 Hz to 99.99 Hz), 0.1 Hz (100.0 Hz to 999.9 Hz), 1 Hz (1000 Hz to 5000 Hz)
	Accuracy	0.02 % of set (23 °C ± 5 °C)				
	Stability*5	± 0.005 %				
OUTPUT ON PHASE		0° to 359° variable (setting resolution 1°)				
DC OFFSET*6		Within ± 20 mV (TYP)				

*1. 100 V / 200 V range
*2. For an output voltage of 20 V to 200 V / 40 V to 400 V, an output frequency of 45 Hz to 65 Hz, no load, and 23 °C ± 5 °C.
*3. For an output voltage of 1 V to 100 V / 2 V to 200 V. Limited by the power capacity when the output voltage is 100 V to 200 V / 200 V to 400 V.
If there is the DC superimposition, the current of AC+DC mode satisfies the maximum current. In the case of lower than 40 Hz, and the power rating temperature, the maximum current will be decrease.
*4. With respect to the capacitor-input rectifying load. Limited by the maximum current.
*5. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature.
*6. In the case of the AC mode and 23 °C ± 5 °C.

OUTPUT RATING FOR DC MODE						
VOLTAGE	Setting Range*1	-285 V to +285 V / -570 V to +570 V				
	Setting Resolution	0.1 V				
	Accuracy*2	±(1 % of set + 1 V / 2 V)				
MAXIMUM CURRENT*3	100 V	20 A	30 A	40 A	50 A	40 A
	200 V	10 A	15 A	20 A	25 A	20 A
MAXIMUM PEAK CURRENT*4	100 V	120 A	180 A	240 A	300 A	160 A
	200 V	60 A	90 A	120 A	150 A	80 A
POWER CAPACITY		2000 W	3000 W	4000 W	5000 W	4000 W

*1. 100 V / 200 V range
*2. For an output voltage of -285 V to -28.5 V, +28.5 V to +285 V / -570 V to -57 V, +57 V to +570 V, no load, and 23 °C ± 5 °C
*3. For an output voltage of 1.4 V to 100 V / 2.8 V to 200 V. Limited by the power capacity when the output voltage is 100 V to 250 V / 200 V to 500 V.
*4. Limited by the maximum current.

OUTPUT VOLTAGE STABILITY						
LINE REGULATION*1		0.2 % or less				
LOAD REGULATION*2		0.5 % or less (0 % to 100 %, via output terminal)				
RIPPLE NOISE*3		1 Vrms / 2 Vrms (TYP)				

*1. Power source input voltage is 200 V, 220 V, or 240 V, no load, rated output.
*2. For an output voltage of 100 V to 200 V / 200 V to 400 V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel.
*3. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.

OUTPUT VOLTAGE WAVEFORM DISTORTION RATIO, OUTPUT VOLTAGE RESPONSE TIME, EFFICIENCY						
TOTAL HARMONIC DISTORTION(THD)*1		< 0.2 % @50/60 Hz			< 0.2 % @50/60 Hz	<0.2 % @50/60 Hz
		< 0.3 % @<500 Hz			< 0.6 % @<500 Hz	<0.5 % @<500 Hz
		< 0.5 % @500.1 Hz to 999.9 Hz			< 0.8 % @500.1 Hz to 999.9	<1 % @500.1 Hz to 2000 Hz
						< 2 % @2001 Hz to 5000 Hz
OUTPUT VOLTAGE RESPONSE TIME*2		100 µs (TYP)				
EFFICIENCY*3		80 % or more				

*1. At an output voltage of 50 V to 200 V / 100 V to 400 V, a load power factor of 1, and in AC mode.
*2. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse).
*3. For AC mode, at an output voltage of 100 V / 200 V, maximum current, and load power factor of 1.

MEASURED VALUE DISPLAY							
VOLTAGE	RMS, AVG Value*1	Resolution	0.1 V				
		Accuracy*2	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading + 0.5 V / 1 V)				
			For all other frequencies: ±(0.7 % of reading + 1 V / 2 V)				
	PEAK Value	Resolution	0.1 V				
		Accuracy	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 1 V / 2 V)				
CURRENT	RMS, AVG Value	Resolution	0.01 A				
		Accuracy*3	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+ 0.1 A/0.05 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+ 0.15 A/0.08 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+ 0.2 A/0.1 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+ 0.25 A/0.13 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+ 0.2 A/0.1 A)
			For all other frequencies: ±(0.7 % of reading+ 0.2 A/0.1 A)	For all other frequencies: ±(0.7 % of reading+ 0.3 A/0.15 A)	For all other frequencies: ±(0.7 % of reading+ 0.4 A/0.2 A)	For all other frequencies: ±(0.7 % of reading+ 0.5 A/0.25 A)	For all other frequencies: ±(0.7 % of reading+ 0.4 A/0.2 A)
	PEAK Value	Resolution	0.1 A				
		Accuracy*4	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 0.5 A/0.25 A)	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 0.8 A/0.4 A)	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 1 A/0.5 A)	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 1.3 A/0.65 A)	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 1 A/0.5 A)

SPECIFICATIONS

			ASR-3200	ASR-3300	ASR-3400	ASR-3500	ASR-3400HF
POWER	Active (W)	Resolution	1 W				
		Accuracy*5	±(2 % of reading +2 W)	±(2 % of reading +3 W)	±(2 % of reading +4 W)	±(2 % of reading +5 W)	±(2 % of reading +4 W)
	Apparent (VA)	Resolution	1 VA				
		Accuracy*5*6	±(2 % of reading +2 VA)	±(2 % of reading +3 VA)	±(2 % of reading +4 VA)	±(2 % of reading +5 VA)	±(2 % of reading +4 VA)
	Reactive (VAR)	Resolution	1 VAR				
		Accuracy*5*7	±(2 % of reading +2 VAR)	±(2 % of reading +3 VAR)	±(2 % of reading +4 VAR)	±(2 % of reading +5 VAR)	±(2 % of reading +4 VAR)
LOAD POWER FACTOR		Range	0.000 to 1.000				
		Resolution	0.001				
LOAD CREST FACTOR		Range	0.00 to 50.00				
		Resolution	0.01				
HARMONIC VOLTAGE EFFECTIVE VALUE (RMS) PERCENT (%) (AC-INT and 50/60 Hz only)		Range	Up to 100th order of the fundamental wave				
		Full Scale	200 V / 400 V, 100%				
		Resolution	0.1 V, 0.1%				
		Accuracy*8	Up to 20th : ±(0.2 % of reading + 0.5 V / 1 V) ; 20th to 100th : ±(0.3 % of reading + 0.5 V / 1 V)				
HARMONIC CURRENT EFFECTIVE VALUE (RMS) PERCENT (%)		Range	Up to 100th order of the fundamental wave				
		Full Scale	20 A / 10 A, 100 %	30 A / 15 A, 100 %	40 A / 20 A, 100 %	50 A / 25 A, 100 %	40 A / 20 A, 100 %
		Resolution	0.01 A/0.1 A, 0.1%				
		Accuracy*3	Up to 20th ±(1 % of reading+0.4 A/0.2 A)	Up to 20th ±(1 % of reading+0.6 A/0.3 A)	Up to 20th ±(1 % of reading+0.8 A/0.4 A)	Up to 20th ±(1 % of reading+1 A/0.5 A)	Up to 20th ±(1 % of reading+0.8 A/0.4 A)
			20th to 100th ±(1.5 % of reading+ 0.4 A/0.2 A)	20th to 100th ±(1.5 % of reading+ 0.6 A/0.3 A)	20th to 100th ±(1.5 % of reading+ 0.8 A/0.4 A)	20th to 100th ±(1.5 % of reading+ 1 A/0.5 A)	20th to 100th ±(1.5 % of reading+ 0.8 A/0.4 A)

*1. The voltage display is set to RMS in AC/AC+DC mode and AVG in DC mode.
*2. AC mode: For an output voltage of 20 V to 200 V / 40 V to 400 V and 23 °C ± 5 °C. DC mode: For an output voltage of 28.5 V to 285 V / 57 V to 570 V and 23 °C ± 5 °C.
*3. An output current in the range of 5 % to 100 % of the maximum current, and 23 °C ± 5 °C.
*4. An output current in the range of 5 % to 100 % of the maximum peak current in AC mode, an output current in the range of 5 % to 100 % of the maximum instantaneous current in DC mode, and 23 °C ± 5 °C. The accuracy of the peak value is for a waveform of DC or sine wave.
*5. For an output voltage of 50 V or greater, an output current in the range of 10 % to 100 % of the maximum current, DC or an output frequency of 45 Hz to 65 Hz, and 23 °C ± 5 °C.
*6. The apparent and reactive powers are not displayed in the DC mode.
*7. The reactive power is for the load with the power factor 0.5 or lower.
*8. An output voltage in the range of 20 V to 200 V / 40 V to 400 V and 23 °C ± 5 °C.

OTHERS			
PROTECTIONS			UVP, OCP, OTP, OPP, Fan Fail
DISPLAY			TFT-LCD, 4.3 inch
MEMORY FUNCTIC			Store and recall settings, Basic settings: 10 (0 to 9 numeric keys)
ARBITRARY WAVE	Number of Memories		253 (nonvolatile)
	Waveform Length		4096 words
INTERFACE	Standard	USB	Type A: Host, Type B: Slave, Speed: 2.0, USB-CDC
		LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
		RS-232C	Complies with the EIA-RS-232 specifications
		EXT Control	External Signal Input; External Control I/O
		GPIB	SCPI-1993, IEEE 488.2 compliant interface
INSULATION RESISTANCE Between input and chassis, output and chassis, input and output			1000 Vdc, 30 MΩ or more
WITHSTAND VOLTAGE Between input and chassis, output and chassis, input and output			1500 Vac, 1 minute
EMC			EN 61326-1, EN 61326-2-1, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12
			EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11/-4-34, EN 55011 (Class A), EN 55032
SAFETY			EN 61010-1
ENVIRONMENT	Operating Environment		Indoor use, Overvoltage Category II
	Operating Temperature Range		0 °C to 40 °C
	Storage Temperature Range		-10 °C to 70 °C
	Operating Humidity Range		20 % to 80 % RH (no condensation)
	Storage Humidity Range		90 % RH or less (no condensation)
	Altitude		Up to 2000 m
TRANSPORTATION INTEGRITY			ISTA 2A Test Procedure
DIMENSIONS & WEIGHT			430 mm(W) × 176 mm(H) × 530 mm(D) (not including protrusions); Approx. 25 kg

* Note: A value with the accuracy is the guaranteed value of the specification. However, an accuracy noted as reference value shows the supplemental data for reference when the product is used, and is not under the guarantee. A value without the accuracy is the nominal value or representative value (shown as typ.).

ORDERING INFORMATION

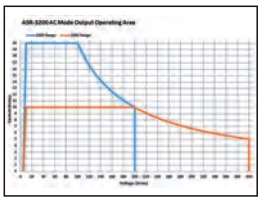
ASR-3200 2 kVA Programmable AC/DC Power Source
ASR-3300 3 kVA Programmable AC/DC Power Source
ASR-3400 4 kVA Programmable AC/DC Power Source
ASR-3400HF 4 kVA Programmable AC/DC Power Source
ASR-3500 5 kVA Programmable AC/DC Power Source

ACCESSORIES :
Safety guide, Input Terminal Cover, Output terminal cover include remote sensing,
GRA-442-E Rack mount adapter(EIA), GTL-246 USB Cable

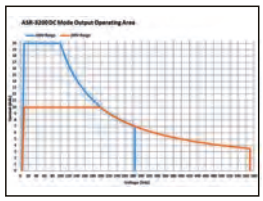
OPTIONAL ACCESSORIES

GPW-005 Power Cord, 3 m, 105 ℃, UL/CSA Type
GPW-006 Power Cord, H05VV-F 1.5 mm²/3 C, 3 m, 105 ℃, VDE Type (ASR-3200, ASR-3300 Ues Only)
GPW-007 Power Cord, 3 m, 105 ℃, PSE Type
GPW-017 Power Cord H05VV-F 4.0 mm²/3 C 3 m, 105 °C, VDE Type
GRA-442-J Rack mount adapter(JIS)
GTL-137 Output power wire (Load wire_10AWG: 50 A, 600 V/Sense wire_16 AWG: 20 A, 600 V)
ASR-C003 Modbus TCP feature
GTL-232 RS232C Cable, approx. 2 m
GTL-248 GPIB Cable, approx. 2 m
ASR-002 External three phase control unit for IP2W, IP3W, 3P4W output
APS-008 Air inlet filter
GET-006 Universal Extension
* European Output Outlet(factory installed)

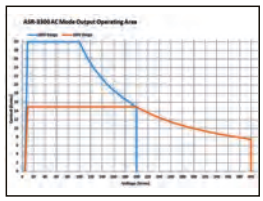
A. OPERATING AREA FOR ASR-3000 SERIES



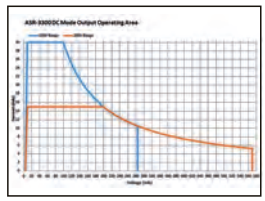
AC Output for ASR-3200



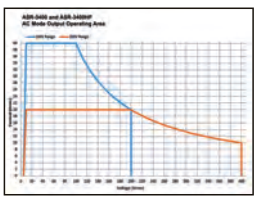
DC Output for ASR-3200



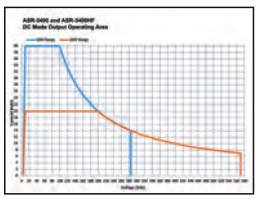
AC Output for ASR-3300



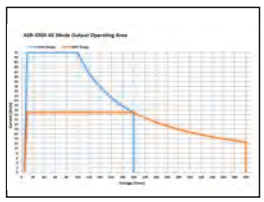
DC Output for ASR-3300



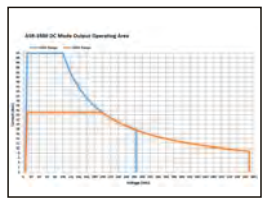
AC Output for ASR-3400/3400HF



DC Output for ASR-3400/3400HF



AC Output for ASR-3500



DC Output for ASR-3500

Model Name	Power Rating	Max. Output Current	Max. Output Voltage
ASR-3200	2 kVA	20 / 10 A	400 Vrms / ±570 Vdc
ASR-3300	3 kVA	30 / 15 A	400 Vrms / ±570 Vdc
ASR-3400	4 kVA	40 / 20 A	400 Vrms / ±570 Vdc
ASR-3400HF	4 kVA	40 / 20 A	400 Vrms / ±570 Vdc
ASR-3500	5 kVA	50 / 25 A	400 Vrms / ±570 Vdc

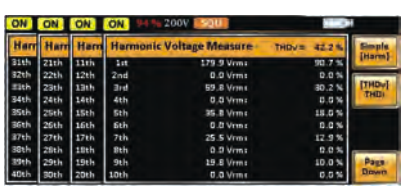
The ASR-3000 series is an AC + DC power source that provides not only rated power output for AC output, but also rated power output for DC output.

B. MEASUREMENT ITEMS FOR ASR-3000 SERIES

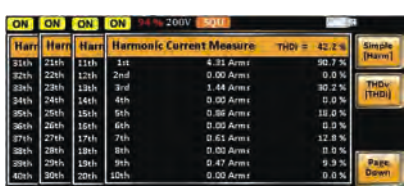
RMS Meas Display

AVG Meas Display

Peak Meas Display



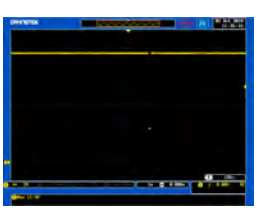
Voltage Harmonic



Current Harmonic

The ASR-3000 Series provides users with measurement capabilities including Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, IpkH, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. During the power output, the measurement parameters including Vrms/Irms, Vavg/Iavg and Vmax/Vmin/Imax/Imin can be switched by users at any time to display the instantaneous calculation reading.

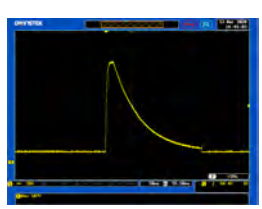
C. SEQUENCE MODE AND BUILT-IN ISO-16750-2 WAVEFORMS



SEQ6: Momentary Drop in Supply Voltage

SEQ7: Reset Behavior at Voltage Drop with 12 V System

SEQ8: Starting Profile Waveform

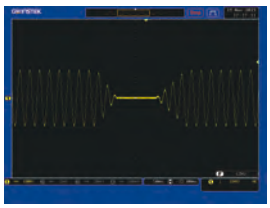


SEQ9: Load Dump with Tr_10 ms, Td_40 ms

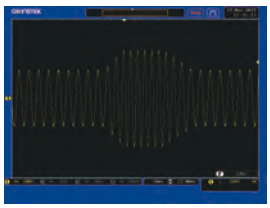
The sequence mode provides editable 10 sets of SEQ0~SEQ9, each set has 0 to 999 steps, each step time setting range is 0.0001 to 999.9999 seconds. Users can combine multiple sets of steps to generate the required waveforms, including waveform falling, surges, sags and other abnormal power line conditions to meet the needs of the test applications.

In addition, ASR-3000 Series also built in common ISO-16750-2 test waveforms in the Sequence Mode preset waveforms, including Momentary Drop in Supply Voltage built in at SEQ6, Reset Behavior at Voltage Drop with 12 V system built in at SEQ7, Starting Profile Waveform built in at SEQ8 and Load Dump with Tr_10 ms, and Td_40 ms built in at SEQ9.

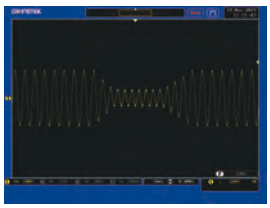
D. SIMULATE MODE



Power Outage



Voltage Rise



Voltage Fall

Simulate Mode can quickly simulate different transient waveforms, such as power outage, voltage rise, voltage fall, etc., for engineers to evaluate the impact of transient phenomena on the DUT. Ex: Capacitance durability test.

E. FUNCTION WAVEFORM (ARBITRARY EDIT) MODE

TRI Waveform

STAIR Waveform

CLIP Waveform

SURGE Waveform

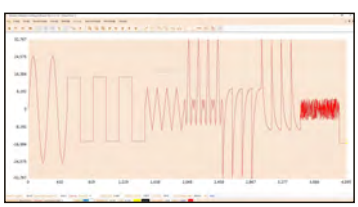
Fourier Series Synthesized Waveform

ASR-3000 Series provides more than 20,000 waveform combinations in seven categories, allowing users to quickly simulate different AC voltage waveforms. Adjust the desired waveform type directly through the panel (displayed synchronously on the screen), then the waveform is loaded into the ARB 1 to 16 waveform register through the access procedures, and return to the main menu output mode to perform ARB Waveform output.

F. PC SOFTWARE

Basic Controller

Sequence Mode



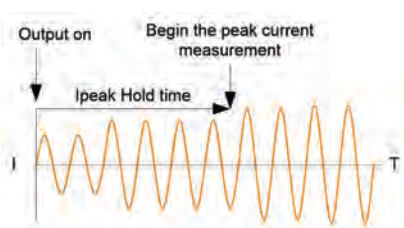
ARB Waveform Edit

The Waveform is Observed with DSO

The ASR-3000 Series software includes basic settings, the Simulate Mode, the Sequence Mode, Data Log and the arbitrary waveform editing function. Users can directly set output voltage, frequency, start/stop phase on ASR-3000 Series through the software.
The Simulate Mode can quickly simulate different transient waveforms such as power outage, voltage rise, voltage fall... etc.

The Sequence Mode can edit the editing parameters read back from ASR-3000 Series, or directly edit the parameters and control ASR-3000 Series to output waveforms according to the set sequence. The arbitrary waveform editing function not only combines various waveforms, including sine waves, square waves, triangle waves, and noise waveforms, but also allows uses to draw arbitrary waveforms and output them.

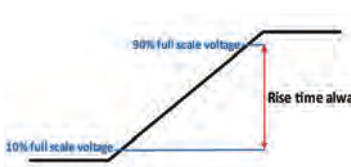
G. T, IPK HOLD & IPK, HOLD FUNCTIONS



T, Ipk Measurement

T, Ipk Hold is used to set the delay time after the output (1 ms to 60,000 ms) to capture the Ipeak value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T, Ipk Hold delay time setting can be used to measure surge current at the power on process of the DUT.
Ipk Hold can be used to measure the transient surge current of the DUT at power on without using an oscilloscope and a current probe.

H. SLEW RATE MODE



Time Mode

Slope Mode

The ASR-3000 Series can set the Slew Rate Mode to determine the rise time of the voltage according to the test requirements of the DUT. Slew Rate Mode provides "Time" and "Slope" modes. When setting "Time" mode, ASR-3000 Series can increase output to 10 to 90 % of the set voltage within 100 µs; and when selecting "Slope" mode, ASR-3000 Series increases output voltage by a fixed rising slope of 1.5 V/µs until reaching the set voltage value.
In addition, if users decide to self-define the rise time of the output voltage, users can flexibly set the rise time of the ASR-3000 Series voltage by editing the Sequence mode.

Compact Programmable AC/DC Power Source

ASR-2050/2100 Series

ASR-2050R/2100R Series

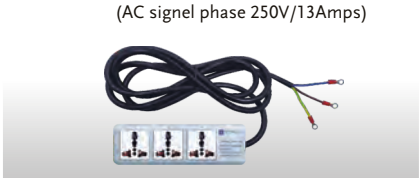
CE | RS-232 | GPIB | USB | LAN | Ext I/O

FEATURES

* Output Rating: AC 0 to 350 Vrms, DC 0 to ± 500 V
* Output Frequency up to 999.9 Hz
* DC Output (100 % of Rated Power)
* Output Capacity: 500 VA/1000 VA
* Measurement Items: Vrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF
* Voltage and Current Harmonic Analysis (THDv, THDi)
* Customized Phase Angle for Output On/Off
* Remote Sensing Capability
* OVP, OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
* Interface: USB,LAN,RS-232(std.); GPIB(opt.)
* Built-in External Control I/O and External Signal Input
* Built-in Output Relay Control
* Memory Function (up to 10 sets)
* Sequence and Simulation Function (up to 10 sets)
* Support Arbitrary Waveform Function
* Built-in Web Server

GET-003 Universal Extended Terminal Box
GET-004 Euro Extended Terminal Box
(ASR-2000R only)

GET-006 Universal extension
(AC signel phase 250V/13Amps)



The ASR-2000 series, an AC+DC power source aiming for system integration or desktop applications, provides both rated power output for AC output and rated power output for DC output. Ten ASR-2000 output modes are available, including 1) AC power output mode (AC-INT Mode), 2) DC power output mode (DC-INT Mode), 3) AC/DC power output mode (AC+DC-INT Mode), 4) External AC signal source mode (AC-EXT Mode), 5) External AC/DC signal source mode (AC+DC-EXT Mode), 6) External AC signal superimposition mode (AC-ADD Mode), 7) External AC/DC signal superimposition mode (AC+DC-ADD Mode), 8) External AC signal synchronization mode (AC-SYNC Mode), 9) External AC/DC signal synchronization mode (AC+DC-SYNC Mode), 10) External DC voltage control of AC output mode(AC-VCA).

The ASR-2000 series provides users with waveform output capabilities to meet the test requirements of different electronic component development, automotive electrical devices and home appliance, including 1) Sequence mode generates waveform fallings, surges, sags, changes and other abnormal power line conditions; 2) Arbitrary waveform function allows users to store/upload user-defined waveforms; and 3) Simulate mode simulates power outage, voltage rise, voltage fall, and frequency variations. When the ASR-2000 series power source outputs, it can also measure Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, IpkH, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. In addition, the Remote sense function ensures accurate voltage output. The Customized Phase Angle for Output On/Off function can set the starting angle and ending angle of the voltage output according to the test requirements. V-Limit, Ipeak-Limit, F-Limit, OVP, OCP, OPP function settings can protect the DUT during the measurement process. In addition to OTP, OCP, and OPP protection, the ASR-2000 series also incorporates the Fan fail alarm function and AC fail alarm function.

The front panel of the ASR-2050/2100 provides a universal socket or a European socket, which allows users to plug and use so as to save wiring time. The ASR-2050R/2100R is 3U height and 1/2 Rack width design, which is compatible with ATS assembly. The ASR-2000 series supports I/O interface and is equipped with USB, LAN, PS-232C External I/O and optional GPIB.

SPECIFICATIONS

		ASR-2050/ASR-2050R	ASR-2100/ASR-2100R
INPUT RATING (AC)			
NOMINAL INPUT VOLTAGE		100 Vac to 240 Vac	100 Vac to 240 Vac
INPUT VOLTAGE RANGE		90 Vac to 264 Vac	90 Vac to 264 Vac
PHASE		Single phase, Two-wire	Single phase, Two-wire
INPUT FREQUENCY RANGE		47 Hz to 63 Hz	47 Hz to 63 Hz
MAX. POWER CONSUMPTION		800 VA or less	1500 VA or less
POWER FACTOR*1	100Vac	0.95 (typ.)	0.95 (typ.)
	200Vac	0.90 (typ.)	0.90 (typ.)
MAX. INPUT CURRENT	100Vac	8 A	15 A
	200Vac	4 A	7.5 A
*1. For an output voltage of 100 V/200 V (100V/200V range), maximum current, and a load power factor of 1.			
AC MODE OUTPUT RATINGS (AC rms)			
VOLTAGE	Setting Range*1	0.0 V to 175.0 V / 0.0 V to 350.0 V	
	Setting Resolution	0.1 V	
	Accuracy*2	±(0.5 % of set + 0.6 V / 1.2 V)	
OUTPUT PHASE		Single phase, Two-wire	
MAXIMUM CURRENT*3	100 V	5 A	10 A
	200 V	2.5 A	5 A
MAXIMUM PEAK CURRENT*4	100 V	20 A	40 A
	200 V	10 A	20 A
POWER CAPACITY		500 VA	1000 VA
FREQUENCY	Setting Range	AC Mode: 40.00 Hz to 999.9 Hz, AC+DC Mode: 1.00 Hz to 999.9 Hz	
	Setting Resolution	0.01 Hz (1.00 to 99.99 Hz), 0.1 Hz (100.0 to 999.9 Hz)	
	Accuracy	For 45 Hz to 65 Hz: 0.01% of set, For 40 Hz to 999.9 Hz: 0.02% of set	
	Stability*5	± 0.005%	
OUTPUT ON PHASE		0.0° to 359.9° variable (setting resolution 0.1°)	
DC OFFSET*6		Within ± 20 mV (TYP)	
*1. 100 V / 200 V range *2. For an output voltage of 17.5 V to 175 V / 35 V to 350 V, sine wave, an output frequency of 45 Hz to 65 Hz, no load, DC voltage setting 0V (AC+DC mode) and 23°C ± 5°C *3. For an output voltage of 1 V to 100 V / 2 V to 200 V, Limited by the power capacity when the output voltage is 100 V to 175 V / 200 V to 350 V. *4. With respect to the capacitor-input rectifying load. Limited by the maximum current. *5. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature. *6. In the case of the AC mode and output voltage setting to 0 V.			
OUTPUT RATING FOR DC MODE			
VOLTAGE	Setting Range*1	-250 V to +250 V / -500 V to +500 V	
	Setting Resolution	0.1 V	
	Accuracy*2	±(|0.5 % of set| + 0.6 V / 1.2 V)	
MAXIMUM CURRENT*3	100 V	5 A	10 A
	200 V	2.5 A	5 A
MAXIMUM PEAK CURRENT*4	100 V	20 A	40 A
	200 V	10 A	20 A
POWER CAPACITY		500 W	1000 W
*1. 100 V / 200 V range *2. For an output voltage of -250 V to -25 V, +25 V to +250 V / -500 V to -50 V, +50 V to +500 V, no load, AC volatge setting 0V (AC+DC mode) and 23°C ± 5°C *3. For an output voltage of 1.4 V to 100 V / 2.8 V to 200 V, Limited by the power capacity when the output voltage is 100 V to 250 V / 200 V to 500 V. *4. Within 5 ms, Limited by the maximum current.			
OUTPUT VOLTAGE STABILITY			
LINE REGULATION*1		±0.2% or less	
LOAD REGULATION*2		±0.15%@45-65Hz;±0.5%@DC,all other frequencies(0~100%, via output terminal)	
RIPPLE NOISE*3		0.7 Vrms / 1.4 Vrms (TYP)	
*1. Power source input voltage is 100 V, 120 V, or 230 V, no load, rated output. *2. For an output voltage of 75 V to 175V/150V to 350V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel. *3. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.			
OUTPUT VOLTAGE WAVEFORM DISTORTION RATIO, OUTPUT VOLTAGE RESPONSE TIME, EFFICIENCY			
TOTAL HARMONIC DISTORTION(THD)*1		≦ 0.2% @50/60Hz, ≦ 0.3% @<500Hz, ≦ 0.5% @500.1Hz~999.9Hz	
OUTPUT VOLTAGE RESPONSE TIME*2		100 μs (TYP)	
EFFICIENCY*3		70 % or more	
*1. At an output voltage of 50 V to 175 V / 100 V to 350 V, a load power factor of 1, and in AC and AC+DC mode. *2. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse); 10% ~ 90% of output voltage *3. For AC mode, at an output voltage of 100 V / 200 V, maximum current, and load power factor of 1 and sine wave only.			
MEASURED VALUE DISPLAY			
VOLTAGE RMS, AVG Value*1	Resolution	0.1 V	
	Accuracy*2	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading + 0.3 V/0.6 V)For 40 Hz to 999.9 Hz: ±(0.7 % of reading + 0.9 V/1.8 V)	
PEAK Value	Resolution	0.1 V	
	Accuracy	For 45 Hz to 65 Hz and DC: ±(|2 % of reading| + 1 V / 2 V)	
CURRENT RMS, AVG Value	Resolution	0.01 A	0.01 A
	Accuracy*3	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+0.02 A/0.02 A); For 40 Hz to 999.9 Hz: ±(0.7 % of reading + 0.04 A / 0.04 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+0.04 A/0.02 A); For 40 Hz to 999.9 Hz: ±(0.7 % of reading + 0.08 A / 0.04 A)

ASR-2000 Series

SPECIFICATIONS

			ASR-2050/ASR-2050R	ASR-2100/ASR-2100R
	PEAK Value	Resolution	0.01 A	0.01 A
		Accuracy*4	For 45 Hz to 65 Hz and DC: ±(|2 % of reading|+0.2 A/0.1 A)	For 45 Hz to 65 Hz and DC: ±(|2 % of reading|+0.2 A/0.1 A)
POWER	Active (W)	Resolution	0.1 / 1 W	0.1 / 1 W
		Accuracy*5	±(2 % of reading + 0.5 W)	±(2 % of reading + 1 W)
	Apparent (VA)	Resolution	0.1 / 1 VA	0.1 / 1 VA
		Accuracy*5*6	±(2 % of reading + 0.5 VA)	±(2 % of reading + 1 VA)
	Reactive (VAR)	Resolution	0.1 / 1 VAR	0.1 / 1 VAR
		Accuracy*5*7	±(2 % of reading + 0.5 VAR)	±(2 % of reading + 1 VAR)
LOAD POWER FACTOR		Range	0.000 to 1.000	0.000 to 1.000
		Resolution	0.001	0.001
LOAD CREST FACTOR		Range	0.00 to 50.00	0.00 to 50.00
		Resolution	0.01	0.01
HARMONIC VOLTAGE		Range	Up to 100th order of the fundamental wave	Up to 100th order of the fundamental wave
EFFECTIVE VALUE (RMS)		Full Scale	175 V / 350 V, 100%	175 V / 350 V, 100%
PERCENT (%)		Resolution	0.1 V, 0.1%	0.1 V, 0.1%
(AC-INT and 50/60 Hz only)		Accuracy*8	Up to 20th±(0.2% of reading + 0.5V/1V); 20th to 100th±(0.3% of reading + 0.5V/1V)	Up to 20th±(0.2% of reading + 0.5V/1V); 20th to 100th±(0.3% of reading + 0.5V/1V)
HARMONIC CURRENT		Range	Up to 100th order of the fundamental wave	Up to 100th order of the fundamental wave
EFFECTIVE VALUE (RMS)		Full Scale	5 A / 2.5 A, 100%	10 A / 5 A, 100%
PERCENT (%)		Resolution	0.01 A, 0.1%	0.01 A, 0.1%
(AC-INT and 50/60 Hz only)		Accuracy*3	Up to 20th±(1% of reading + 0.1A/0.05 A); 20th to 100th±(1.5% of reading + 0.1A/0.05A)	Up to 20th±(1% of reading + 0.2A/0.1A); 20th to 100th±(1.5% of reading + 0.2A/0.1A)

*1. The voltage display is set to RMS in AC/AC+DC mode and AVG in DC mode.
*2. AC mode: For an output voltage of 17.5V to 175V/35V to 350V and 23 °C±5 °C. DC mode:For an output voltage of 25V to 250V/50V to 500V and 23 °C±5 °C.
*3. An output current in the range of 5 % to 100 % of the maximum current, and 23 °C ± 5 °C.
*4. An output current in the range of 5 % to 100 % of the maximum peak current in AC mode, an output current in the range of 5 % to 100 % of the maximum instantaneous current in DC mode, and 23 °C ± 5 °C. The accuracy of the peak value is for a waveform of DC or sine wave.
*5. For an output voltage of 50V or greater, an output current in the range of 10 % to 100 % of the maximum current,DC or an output frequency of 45Hz to 65Hz, and 23 °C±5 °C.
*6. The apparent and reactive powers are not displayed in the DC mode. *7. The reactive power is for the load with the power factor 0.5 or lower.
*8. An output voltage in the range of 17.5 V to 175 V/35 V to 350 V and 23 °C ± 5 °C.

OTHERS

PROTECTIONS			OCP, OTP, OPP, FAN Fail
DISPLAY			TFT-LCD, 4.3 inch
MEMORY FUNCTION			10 sets for Store and Recall settings
ARBITRARY WAVE	Number of Memories		16 (nonvolatile)
	Waveform Length		4096 words
INTERFACE	Standard	USB	Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB-CDC
		LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
		RS-232C	Complies with the EIA-RS-232 specifications
		EXT Control	External Signal Input; External Control I/O
	Optional	GPIB	SCPI-1993, IEEE 488.2 compliant interface
INSULATION RESISTANCE	Between input and chassis, output and chassis, input and output		500 Vdc, 30 MΩ or more
WITHSTAND VOLTAGE	Between input and chassis, output and chassis, input and output		1500 Vac, 1 minute
EMC			EN 61326-1 (Class A);EN 61326-2-1/-2-2 (Class A);EN 61000-3-2 (Class A, Group 1);EN 61000-3-3 (Class A, Group 1);EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11 (Class A, Group 1);EN 55011 (Class A, Group1);EN 61010-1
Safety Environment	Operating Environment		Indoor use, Overvoltage Category II
	Operating Temperature Range		0 °C to 40 °C
	Storage Temperature Range		-10 °C to 70 °C
	Operating Humidity Range		20 % RH to 80 % RH (no condensation)
	Storage Humidity Range		90 % RH or less (no condensation)
	Altitude		Up to 2000 m
DIMENSIONS & WEIGHT			ASR-2000 : 285(W)×124(H)×480(D) (not including protrusions); Approx. 11.5 kg ASR-2000R : 213(W)×124(H)×480(D) (not including protrusions); Approx. 10.5 kg

ORDERING INFORMATION

ASR-2050 500 VA Programmable AC/DC Power Source
ASR-2100 1000 VA Programmable AC/DC Power Source
ASR-2050R 500 VA Programmable AC/DC Power Source for 3U 1/2 Rack Mount
ASR-2100R 1000 VA Programmable AC/DC Power Source for 3U 1/2 Rack Mount

ACCESSORIES :
Safety Guide, Power Cord, Mains Terminal Cover Set, Remote Sense Terminal Cover Set, GTL-123 Test Lead, GTL-246 USB Cable

OPTIONAL ACCESSORIES

ASR-GPIB-2K Optional GPIB Interface for ASR-2000 (Factory installed)
ASR-UR-2K European Output Outlet only for ASR-2000 (Factory installed)
GET-003 Extended Universal Power Socket(ASR-2000R only)
GET-004 Extended European Power Socket(ASR-2000R only)
ASR-001 Air inlet filter
ASR-002 External three phase control unit for IP2W, IP3W, 3P4W output
ASR-C003 Modbus TCP feature
GRA-439-E Rack Mount Kit (EIA)
GRA-439-J Rack Mount Kit (JIS)
GTL-232 RS-232C Cable, approx. 2 M
GTL-258 GPIB Cable, approx. 2 M, including 25 pins Micro-D connector
GET-006 Universal Extension

FREE DOWNLOAD

USB Driver

Note : GET-003/GET-004 are not CE approved.

ASR-2050/2100 Rear Panel

ASR-2050R/2100R Rear Panel

GRA-439-J/E Rack Mount Kit(JIS/EIA)

For : ASR-2000 Series

GTL-258 GPIB Cable, 2000mm

ASR-001 Air Inlet Filter

ASR-002 External three phase control unit

* Basis Requirement of ASR-002 to ASR-Series

1. Must be the three same models of ASR-Series
2. To ASR-2000 Series, the ASR-GPIB-2K: GPIB interface is required

* Functions of ASR-Series are limited when conducts to ASR-002

1. No DC Output
2. Measurement Items: only current(A), power(W)and PF for each phase
3. No Voltage and Current Harmonic Analysis
4. No Remote Sensing Capability
5. No Arbitrary Waveform Function
6. No Sequence and Simulation Function
7 Not supported External Control I/O
8. No memory Function
9. Only support USB, no LAN port for communication

500/1000/2000/3000 VA Programmable Linear AC Power Source

APS-7050

APS-7100

CE | USB HOST | USB Device | GPIB | LAN | RS-232

FEATURES

* 4.3-inch TFT-LCD
* Output Capacity:APS-7050(500 VA,310 Vrms,4.2 Arms); APS-7100(1000 VA,310 Vrms,8.4 Arms);APS-7200(2000 VA, 310 Vrms,16.8 Arms);APS-7300(3000 VA,310 Vrms,25.2 Arms) Output Augmentation by Options(0 to 600 Vrms/45 to 999.9 Hz)
* Low Ripple & Noise
* Measurement and Test Functions Include VOLT, CURR, PWR, SVA, IPK, IPKH, FREQ, PF, CF
* Support a Small AC Current Measurement 2 mA to 35 A, Min. Revolution 0.01 mA(APS- 7050&APS-7100)
* Reverse Current Alarm Function
* 10 sets of Sequence Function to Edit Output Waveforms/10 sets of Simulate Mode to Rapidly Simulate Transient Power Supply/10 sets of Program Mode to Define Measurement Sequence/10 sets of Panel Memory Function
* Automatic Execution of Sequence, Simulate, Program mode and Output Function when the Power is on
* Standard Interfaces:USB Host, LAN, USB Device(APS-7200 & APS-7300 only)
* Optional Interfaces:GPIB(APS-001),RS-232/USB CDC(APS-002 for APS-7050 & APS-7100 only), RS-232 (APS-007 for APS-7200 & APS-7300 only)

APS-001/APS-002 Interface Card

GPIB RS-232/USB

APS-003
Output Voltage Capacity

APS-004
Output Frequency Capacity

APS-007 RS-232 Interface Card

For: APS-7200 Series, APS-7300 Series

GWInstek introduces APS-7000 series programmable AC power sources, which consists of 500VA of APS-7050, 1000 VA of APS-7100, 2000 VA of APS-7200 and 3000 VA of APS-7300. APS-7000 series features power characteristics from its linear structure design including low noise, low THD, and highly stabilized power output that are ideal for the product development and verification of input power with low noise requirement or stereo, video and audio device applications, etc. The maximum rated voltage is 0 to 310 Vrms, 25.2 Arms, 100.8 A peak current and the output frequency range is 45 to 500.0 Hz. Users can conveniently augment the output voltage from 0 Vrms to 600 Vrms and output frequency from 45 Hz to 999.9 Hz by purchasing options without sending equipment back to GW Instek.

One of the popular alternative energy solutions in the market is to utilize inverter to convert DC to AC and the converted AC is then sent to power grid or products require electricity. For instance, AC produced by PV inverter is sent to power grid or equipment requires electricity. While simulating power grid to verify inverter connecting with power grid, general AC power sources cannot withstand DUT's feedback energy, hence, additional power consumption resistors are needed to prevent AC power source from being damaged. On the contrary, APS-7000 series has the characteristic of absorbing reverse current so that additional power consumption resistors are not required. The input terminal of APS-7000 series is designed to isolate from the simulated AC power grid output terminal, therefore, users do not need an additional isolation device to protect DUT. APS-7000 series is suitable for simulating power grid and conducting inverter output characteristic tests, including synchronized phase and frequency. Reverse current and power detected by APS-7000 series will be displayed in red readings to facilitate user's test observation. APS-7000 series utilizes Simulate mode and Sequence mode to provide a single step or consecutive power changes; and to simulate power grid's Voltage Abnormality Test and Frequency Abnormality Test.

APS-7000 series comprises nine measurement and test functions (Vrms, Irms, F, Ipk, W, VA, PF, Ipk hold, CF), and provides user interface similar to that of AC Power Meter. APS-7000 series is ideal for the LED industry and standby mode power consumption test. Under the ARB mode, APS-7000 series provides waveforms in seven categories including Sine waveform, Triangle waveform, Staircase waveform(Square wave), Clipped Sinewave, Crest factor waveform, Surge waveform, and Fourier series and 20,000 waveform combinations so as to meet the requirements of simulating abnormal input power waveform test of various industries. Ten Preset settings allow users to store ten sets of data; Power ON Output setting allows Sequence, Simulate, and Program to automatically execute output after the equipment power is on.

To meet the test criteria of line voltage fluctuation often seen in consumer electronics, APS-7000 series features five methods to cope with special purpose or abnormal voltage, frequency, and phase; ten sets of the Simulate mode simulate power outage, voltage rise, and voltage fall; ten sets of the Sequence mode allow users to define parameters and produce sine wave by editing steps; ten sets of the Program mode can edit AC waveform output and define the ceiling and floor level of measurement items for different DUTs; Ramp Control allows users to set the variation speed for output voltage rise and fall; Surge/Dip Control simulates DUT's input power producing a Surge or Dip voltage overlapping with output voltage waveform at a specific time. For larger current output applications, voltage drop across the output cables should be avoided. APS-7200/7300 also provide the remote sense function, which senses DUT's voltage and sends the information back to APS-7200/7300 for program controlled voltage compensation. Therefore, APS-7200/7300 can avoid the voltage drop of the cable to affect output voltage.

Ethernet Port, on the rear panel, can be used for remote program control; Sync Output Socket provides external 10 V sync output; Signal Output Connector provides monitor of Program execution results. APS-7000 series also provides users with Trigger In/Out and Output on/off remote control functions from J1 connector on the rear panel.

SPECIFICATIONS

Model		APS-7050	APS-7100	APS-7200	APS-7300
AC OUTPUT					
Power Rating		500VA	1000VA	2000VA	3000VA
Output Voltage		0 ~ 155Vrms, 0 ~ 310Vrms	0 ~ 155Vrms, 0 ~ 310Vrms	0 ~ 155Vrms, 0 ~ 310Vrms	0 ~ 155Vrms, 0 ~ 310Vrms
Output Frequency		45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz
Maximum Current(r.m.s) *1	0~155Vrms	4.2A	8.4A	16.8A	25.2A
	0~310Vrms	2.1A	4.2A	8.4A	12.6A
Maximum Current(peak)	0~155Vrms	16.8A	33.6A	67.2A	100.8A
	0~310Vrms	8.4A	16.8A	33.6A	50.4A
OPT. APS-003(rms)	0~600Vrms	1.05A	2.1A	4.2A	6.3A
OPT. APS-003(peak)	0~600Vrms	4.2A	8.4A	16.8A	25.2A
Total Harmonic Distortion (THD)*2		≦0.5% at 45 ~ 500Hz (Resistive Load)			
Crest Factor		≦4			
Line Regulation		0.1% (% of full scale)			
Load Regulation		0.3% (% of full scale)			
Response Time		<100μs			
Reverse Current		30% of Maximum Output RMS Current (Continue); 100% of Maximum Output RMS Current (Within 3 minutes)			
SETTING					
Voltage	Range	0~155Vrms, 0~310Vrms, Auto			
	Resolution	0.01V at 0.00 ~ 99.99Vrms; 0.1V at 100.0 ~ 310.0Vrms			
	Accuracy	±(0.5% of setting+2 counts)			
Frequency	Range	45 ~ 500Hz			
	Resolution	0.01Hz at 45.00 ~ 99.99Hz; 0.1Hz at 100.0 ~ 500.0Hz			
	Accuracy	±0.02% of setting			
OPT. APS-004	Range	45~999.9Hz			
	Resolution	0.01Hz at 45.00 ~ 99.99Hz; 0.1Hz at 100.0 ~ 999.9Hz			
Power On/Off Phase Angle	Range	0 ~ 359°			
	Resolution	1°			
	Accuracy	±1°(45 ~ 65Hz)			
MEASUREMENT*3					
Voltage(RMS)	Range	0.20~38.75Vrms;38.76~77.50Vrms; 77.51~155.0Vrms;155.1~310.0Vrms		0.20~38.75Vrms;38.76~77.50Vrms; 77.51~155.0Vrms;155.1~310.0Vrms	
	Resolution	0.01V at 0.00 ~ 99.99Vrms; 0.1V at 100.0 ~ 310.0Vrms		0.01V at 0.00 ~ 99.99Vrms; 0.1V at 100.0 ~ 310.0Vrms	
	Accuracy*4	±(0.5% of reading + 2 counts)		±(0.5% of reading + 2 counts)	
Frequency	Range	45 ~ 500Hz		45 ~ 500Hz	
	Resolution	0.01Hz at 45Hz~99.99Hz; 0.1Hz at 100Hz~500.0Hz		0.01Hz at 45Hz~99.99Hz; 0.1Hz at 100Hz~500.0Hz	
	Accuracy	±0.1Hz		±0.1Hz	
Current(RMS)	Range	2.00 ~ 70.00mA;60.0 ~ 350.0mA; 0.300 ~ 3.500A;3.00 ~ 17.5A		0.200 ~ 3.500A;3.00~35.00A	
	Resolution	0.01mA, 0.1mA, 0.001A, 0.01A		0.001A;0.01A	
	Accuracy	±(0.6% of reading+5 counts),2.00~350.0mA; ±(0.5% of reading+5 counts),0.300~3.500A; ±(0.5% of reading+3 counts),3.000~17.50A		±(0.5% of reading+5 counts),0.200~3.500A ±(0.5% of reading+3 counts),3.00~35.00A	

APS-7200

APS-7300

SPECIFICATIONS

Model		APS-7050	APS-7100	APS-7200	APS-7300
Current(Peak)	Range	0.0 ~ 70.0A		0.0 ~ 140.0A	
	Resolution	0.1A		0.1A	
	Accuracy	±(1% of reading+1 count)		± 1% of reading+1 count)	
Power(W)	Resolution	0.01W, 0.1W, 1W		0.1W, 1W	
	Accuracy	±(0.6% of reading+5 counts),0.20~99.99W; ±(0.6% of reading+5 counts),100.0~999.9W; ±(0.6% of reading+2 counts),1000~9999W		±(0.6% of reading+5counts),0.2~999.9W; ±(0.6% of reading+2counts),1000~9999W	
Apparent(VA)	Resolution	0.01VA, 0.1VA, 1VA		0.1VA, 1VA	
	Accuracy	±(1% of reading+7 counts),0.20~99.99VA; ±(1% of reading+7 counts),100.0~999.9VA; ±(1% of reading+5 counts),1000~9999VA		±(1% of reading+7 counts),0.2~999.9VA; ±(1% of reading+5 counts),1000~9999VA	
Power Factor	Resolution	0.001		0.001	
	Accuracy	±(2% of reading + 2 counts)		±(2% of reading+2 counts)	
GENERAL					
Remote output signal		Pass, Fail, Test-in Process, Trigger in, Trigger out, OUT ON/OFF			
Sync output signal		Output Signal 10 V, BNC Type			
Number of Preset		10 (0~9 numeric keys)			
Protection		OCP, OPP, OTP and Alarm			
Trigger Out		Maximum low level output = 0.8V ; Minimum high level output = 2V ; Maximum source current = 8mA			
Trigger In		Maximum low level input voltage = 0.8V ; Minimum high level input voltage = 2.0V; Maximum sink current = 8mA			
SEQUENCE/SIMULATION FUNCTION					
Number of Memories		10 (0 ~ 9 Numeric keys)			
Number of Steps		255 max. (For 1 sequence)			
Step Time Setting Range		0.01 ~ 999.99s			
Operation Within Step Parameters		Constant, Keep, Linear Sweep Output Range, Frequency, Waveform (sine wave only); On Phase, Off Phase, Term Jump Count (0 ~ 255) jump-to, Branch 1, Branch 2, Trigger Output			
Sequence Control		Start, Stop, Hold, Continue, Branch 1, Branch 2			
AC INPUT					
Phase		Single Phase	Single Phase	Single Phase	Single Phase
Input Voltage		115/230Vac±15%	115/230Vac±15%	230Vac±15%	230Vac±15%
Input Frequency		50/60Hz	50/60Hz	50/60Hz	50/60Hz
Max. Current		16A/8A	32A/16A	32A	50A
Power Factor		0.7Typ.	0.7Typ.	0.7Typ.	0.7Typ.
Power Consumption		1.8kVA or less	3.6kVA or less	7.2kVA or less	10.8kVA or less
ENVIRONMENT CONDITIONS					
Operating Temperature Range		0 ~ +40℃			
Storage Temperature Range		-10 ~ +70℃			
Operating Humidity Range		20 ~ 80% RH (No Condensation)			
Storage Humidity Range		80% RH or less(No Condensation)			
INTERFACE					
Standard		USB Host, LAN		USB Host, USB CDC, LAN	
Optional		GPIB (APS-001) RS232 / USB CDC (APS-002)		GPIB (APS-001) RS232 (APS-007)	
DIMENSIONS & WEICHT					
		430(W) x 88(H) x 400(D) mm; Approx. 24 kg	430(W) x 88(H) x 560(D) mm; Approx. 38 kg	430(W) x 312(H) x 650(D) mm; Approx. 90 kg	430(W) x 400(H) x 650(D) mm; Approx. 128 kg

ORDERING INFORMATION

APS-7050 500 VA Programmable AC Power Source
APS-7100 1000 VA Programmable AC Power Source
APS-7200 2000 VA Programmable AC Power Source
APS-7300 3000 VA Programmable AC Power Source

ACCESSORIES :
Safety Guide, Power Cord(Region Dependent), GTL-123 Test Lead, Mans terminal cover set (APS-7050, APS-7100)

OPTIONAL ASSESSORIES

APS-001 GPIB interface card
APS-002 RS-232/USB interface card(APS-7050, APS-7100)
APS-007 RS-232 interface card(APS-7200, APS-7300)
APS-003 Output Voltage Capacity(0 to 600 Vrms)
APS-008 Air Inlet Filter(APS-7200/7300 only)
APS-004 Output Frequency Capacity(45 to 999.9 Hz)
GRA-423 APS-7050, APS-7100 rack mount kit
GRA-429 Rack mount kit (APS-7200)
GRA-430 Rack mount kit (APS-7300)
GPW-004 Power Cord, 8 mm / 3C 3 m, 105 ℃

Note : 1. APS-7200/APS-7300 are not CE approved.
2. The minimum time settings of sequence mode or simulate mode must be greater than 1 cycle of the waveform itself.

APS-7300 Rear Panel

APS-7200 Rear Panel

APS-7100 Rear Panel

APS-7050 Rear Panel

Note:
The Specifications are not suit for ARB mode.
*1. Maximum output current at working voltage 120 Vrms, 240 Vrms
*2. 45 to 500 Hz, 10 % or higher of the rated output voltage, the maximum current or lower
*3. All of measurement accuracy is at 23±5 ℃
*4. In the case of 15 to 155 V, 30 to 310 V, sine wave, no load

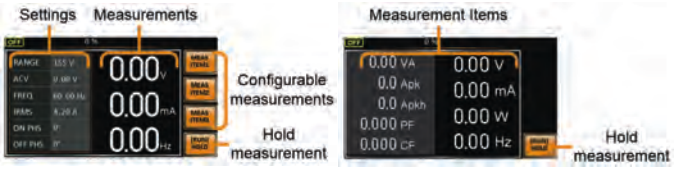
APS-7000 Series
Europe Type Output Outlet

GPW-004 Power Cord, 8 mm / 3C 3 m, 105 ℃

Mains Terminal Cover Set

For: APS-7100/7100E Series For: APS-7050/7050E Series

A. CONTROL PANEL CHARACTERISTICS



Standard Mode **Simple Mode**

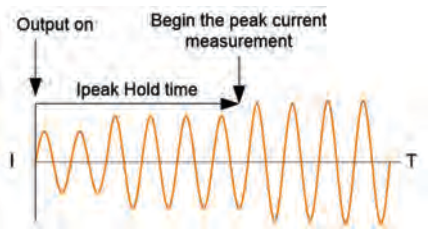
There are two control panel modes: Standard mode and Simple mode. Both modes are shown on the above. Standard mode combines settings and AC Power Meter measurement window display. Users apply Function key (F1~F3) to select required measurement items. There are nine items for selection. Simple mode shows all measurement items on the display.

B REVERSE CURRENT DISPLAY

Standard Mode **Simple Mode**

When output terminal detects 180 degree phase difference between voltage and current (reverse current), the front panel of APS-7000 Series will remind users the power and power factor measurement results in red numerical display. This feature can be applied to show the power and power factor measurement while testing inverter for feedback power grid. As shown on the above :
APS-7000 Series can withstand reverse current: 30% of the maximum effective current or maximum current output within three minutes.

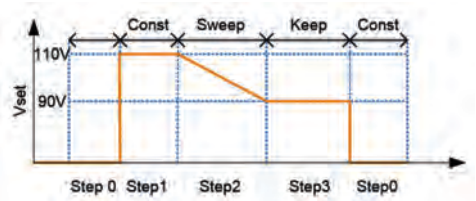
C T IPEAK, HOLD FUNCTION



Ipeak Measurement

T, Ipk Hold sets delay time (1ms~60 seconds) for measurement after the output of Ipeak value and the maximum value will be retrieved. Update will be proceeded only if measured value is greater than the original value. Ipk Hold is for measuring transient inrush current as soon as the equipment power is on that is usually done by oscilloscope and current probe. T, Ipk Hold delay time setting can be applied to measure inrush current of sequentially activated DUT.

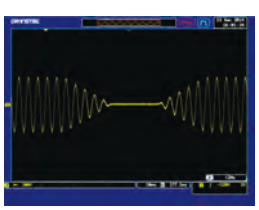
D SEQUENCE MODE



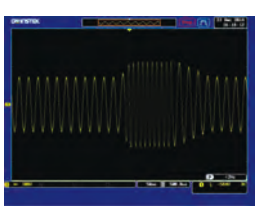
Sequence Mode

There are ten sets of Sequence mode and each set has 0~255 steps. The time setting range for each step is 0.01 ~ 999.99 seconds. Combining many sets of steps to edit required waveforms can satisfy users' requirement of highly complicated waveforms.

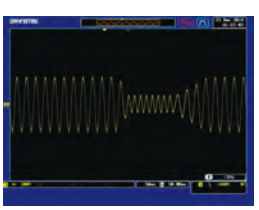
E SIMULATE MODE



Power Outage



Voltage Rise

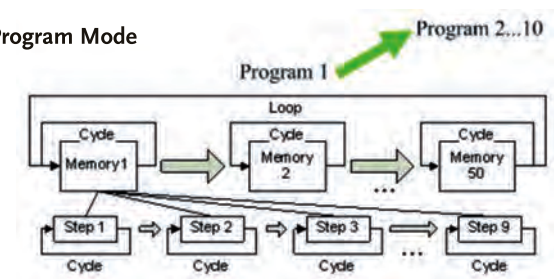


Voltage Fall

This mode can rapidly produce different simulated input transient waveforms such as power outage; voltage rise and voltage fall etc. for engineers to evaluate the impact on DUT posed by the transient phenomena. For instance, capacitor endurance test.

F PROGRAM MODE

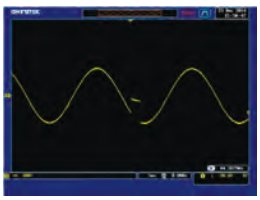
Program Mode



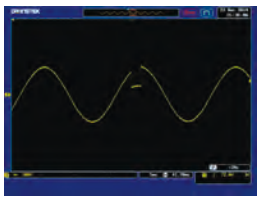
This mode allows users to set ceiling and floor specifications to produce PASS/FAIL result after the measurement is done. It can also show test results for each test procedure or only show the last result.

There are ten sets of Program mode and each set has 50 sets of memory. Each memory comprises 9 steps. Each Program will operate according to memory sequence, self-defined loops or designated steps to stop.

G SURGE/DIP CONTROL



Surge

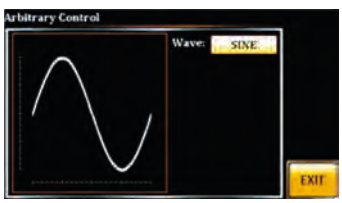


Dip

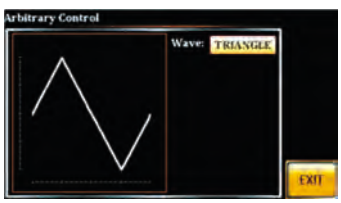
Overlapping a Surge/Dip voltage on a normal voltage as the input power for DUT allows users to simulate Surge/Dip situation and evaluate DUT characteristics.

H. FUNCTION WAVEFORM (ARB) MODE

Provide waveforms in seven categories and 20,000 waveform combinations so as to rapidly simulate distorted AC voltage waveforms.

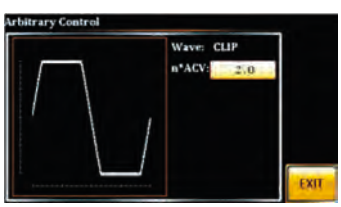


Sine Waveform
Standard AC Waveform

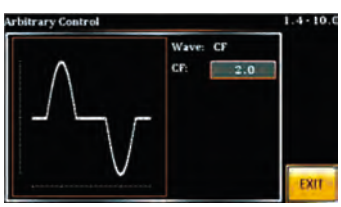


Triangle Waveform
Power Harmonic Output Simulation
Is Triangle Waveform

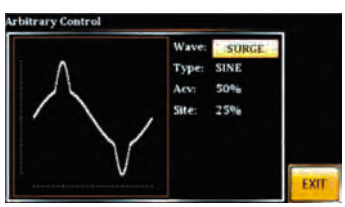
Staircase Waveform
Simulate Square Waveform And Staircase
Waveform For Commercial Ups



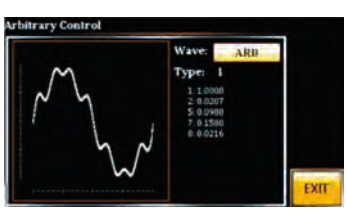
Clipped Sinewave
Simulate Grid Power Supply Heavy
Load Waveform



Crest Factor Waveform
Simulate Rectified Filter Current
Waveform By Capacitor Input



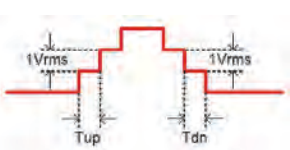
Surge Waveform
Simulate Grid Power Supply's
Peak Over-voltage



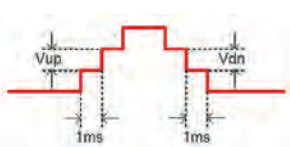
Fourier Series Synthesized Waveform

Simulate real output power waveform. Distorted power waveform is produced due to output impedance and non-linear effect such as inductance, capacitance, and parasitic capacitance effect. For example: motors.

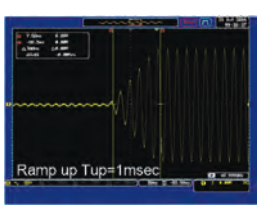
I. RAMP CONTROL



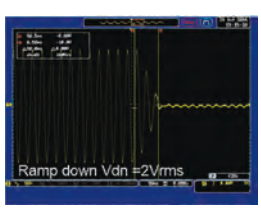
Tup → 0.1 ~ 999.9ms
Tdn → 0.1 ~ 999.9ms



Vup → 0.01 ~ 99.99 Vrms
Vdn → 0.01 ~ 99.99 Vrms



Mode=Time, Tup=1msec,
VAC=100V, Freq=50Hz,
Ramp output=on.



Mode=Voltage, Vdn=2Vrms,
VAC=100V, Freq=50Hz,
Ramp output=off.

Ramp control allows users to set output voltage rise or fall speed which is based on time (1ms) or voltage (1Vrms) unit.

500/1000 VA AC Power Source

APS-7050E

APS-7100E

CE USB HOST

GW Instek launches the APS-7000E series the economy version of the APS-7000 programmable AC power source. With the height of 2U, the maximum rated output for APS-7050E is 500 VA, 310 Vrms, 4.2 Arms and APS-7100E is 1000 VA, 310 Vrms, 8.4 Arms. The output frequency range of the series is 45 to 500 Hz. The series is ideal for the test and development of DC power supply devices, consumer electronics, automotive electronics and electronic components.

The APS-7000E series comprises six measurement and test functions (Vrms, Irms, F, Ipk, W, PF), and provides user interface similar to that of AC Power Meter. The APS-7000E series, via switching many sets of current levels to increase small current measurement resolution, is ideal for the LED industry and standby mode power consumption test. Ten sets of Preset allow users to store ten settings.

To meet the test criteria of line voltage fluctuation often seen in consumer electronics, the APS-7000E series not only provides a stable AC power source but also features the Test mode to satisfy special or abnormal voltage and frequency variation demands. Ten sets of the Test mode simulate power outage, voltage rise, and voltage fall. The APS-7000E series that simulates waveforms of city power grid's transient changes is suitable for verifying electronics products operated under abnormal power source.

The APS-7000E series is the economy version of the APS-7000 series. If communications interface and larger voltage/frequency are required, please refer to the APS-7000 series.

FEATURES

* 4.3" large LCD Display
* Output Capacity:
  APS-7050E (500VA, 310Vrms, 4.2/2.1Arms)
  APS-7100E (1000VA, 310Vrms, 8.4/4.2Arms)
* Measurement Function :
  Voltage, Current, Power, Frequency, Power Factor, Ipeak
* Reverse Current Alarm Function
* 10 Sets of The Test Mode Simulate Power Transient Output
* 10 Sets of Preset Allow Users to Store Ten Settings
* OCP/OPP/OTP Protection
* Variable Voltage, Frequency and Current Limiter
* Universal Power Inlet

SPECIFICATIONS

Model		APS-7050E	APS-7100E
Power Rating		500VA	1000VA
Output Voltage		0 ~ 155Vrms/0 ~ 310.0 Vrms	0 ~ 155Vrms/0 ~ 310.0 Vrms
Output Frequency		45.00 ~ 500.0 Hz	45.00 ~ 500.0 Hz
Maximum Current (r.m.s)	0~155Vrms	4.2A	8.4A
	0~310Vrms	2.1A	4.2A
Maximum Current (peak)	0~155Vrms	16.8A	33.6A
	0~310Vrms	8.4A	16.8A
Total Harmonic Distoration (THD)		≦0.5% at 45 ~ 500Hz (Resistive Load)	
Crest Factor		≦4	
Line Regulation		0.1% (% of full scale)	
Load Regulation		0.3% (% of full scale)	
Response Time		<100μs	
Reverse Current		30% of Maximum Output RMS Current (Continue); 100% of Maximum Output RMS Current (Within 3 minutes)	
SETTING			
Voltage	Range	0 ~ 155Vrms/0 ~ 310Vrms/Auto	
	Resolution	0.01V at 0.00 ~ 99.99Vrms; 0.1V at 100.0 ~ 310.0Vrms	
	Accuracy	±(0.5% of setting+2 counts)	
Frequency	Range	45 ~ 500Hz	
	Resolution	0.01Hz at 45.00 ~ 99.99Hz/0.1Hz at 100.0 ~ 500.0Hz	
	Accuracy	±0.02% of setting	
MEASUREMENT			
Voltage(RMS)	Range	0.20~38.75Vrms/38.76~77.50 Vrms/77.51~155.0Vrms/155.1~310.0Vrms	
	Resolution	0.01V at 0.00 ~ 99.99Vrms; 0.1V at 100.0 ~ 310.0Vrms	
	Accuracy	±(0.5% of reading + 2 counts)	
Frequency	Range	45 ~ 500Hz	
	Resolution	0.01Hz (at 45Hz~99.99Hz)/0.1Hz (at 100Hz~500.0Hz)	
	Accuracy	±0.1Hz	
Current(RMS)	Range	2.00 ~ 70.00mA/60.0 ~ 350.0mA/0.300 ~ 3.500A/3.00 ~ 17.5A	
	Resolution	0.01mA, 0.1mA, 0.001A, 0.01A	
	Accuracy	±(0.6% of reading+5 counts); 2.00~350.0mA/±(0.5% of reading+5 counts); 0.350~3.500A/±(0.5% of reading+3 counts);3.500~17.50A	
Current(Peak)	Range	0.0 ~ 70.0A	
	Resolution	0.1A	
	Accuracy	±(1% of reading+1 count)	
Power(W)	Resolution	0.01W, 0.1W, 1W	
	Accuracy	±(0.6% of reading+5 counts); 0.20~99.99W; ±(0.6% of reading+5 counts); 100.0~999.9W ±(0.6% of reading+2 counts); 1000~9999W	
Power Factor	Resolution	0.001	
	Accuracy	±(2% of reading + 2 counts)	
GENERAL			
Number of Preset		10(0~9 Numeric keys)	
Protection		OCP, OPP, OTP and Alarm	

APS-7050E

APS-7050E Rear Panel

APS-7100E

APS-7100E Rear Panel

SPECIFICATIONS		
Model	**APS-7050E**	**APS-7100E**
ENVIRONMENT CONDITIONS		
Operation Temperature	0 ~ +40℃	
Storage Temperature	-10 ~ +70℃	
Operating Temperature	20 ~ 80% RH (No Condensation)	
Storage Humidity	80% RH or less(No Condensation)	
AC INPUT		
Input Power Source	1φ AC 115/230Vac ±15%	
DIMENSIONS & WEICHT		
	430(W) x 88(H) x 400(D) mm; Approx. 24kg	430(W) x 88(H) x 560(D) mm; Approx. 38kg

ORDERING INFORMATION

APS-7050E 500 VA AC Power Source
APS-7100E 1000 VA AC Power Source

ACCESSORIES :
Power Cord (Region Dependent), Mains Terminal Cover Set, GTL-123 Test Lead

OPTIONAL ASSESSORIES

GRA-423 Rack Mount Kit (APS-7000E Series)

Mains Terminal Cover Set

For: APS-7100/7100E Series

For: APS-7050/7050E Series

APS-7000E Series Europe Type Output Outlet

ELECTRONIC LOADS

GW Instek provides DC electronic loads, AC/DC electronic loads, which allow users to flexibly test various batteries, energy storage systems, and power supply devices. DC electronic load can simulate load characteristics, including static, dynamic, constant current, constant resistance, constant voltage, constant power and short circuit. AC/DC electronic load can simulate sine wave current load in the CC mode, non-sine wave current load in the linear CC mode, and AC rectified load in the rectifier mode.

Electronic loads can be simply divided into multi-channel electronic loads and single-channel electronic loads according to application requirements. The multi-channel electronic load can test and measure multiple sets of low-power and different specifications of power output devices at the same time; and the single-channel electronic load can, based on the characteristics of a single load, choose high power, high voltage, high precision, high resolution or fast dynamic response to conduct test and measurement.

Electric vehicles, solar energy, energy storage systems, server power supplies, and power electronics, etc., can use the built-in dedicated test modes of GW Instek electronic loads to simplify user's operating procedures and shorten the test time. For example: using the CC+CV, CP+CV, CC+UVP, CP+UVP battery discharge modes to discharge electric vehicle battery can avoid over-discharge and protect the battery at the same time. The MPPT mode can quickly obtain the maximum power point of the solar panel.

PRODUCTS

- **Multi-channel Electronic Loads**
- **High Power DC Electronic Load**
- **DC Electronic Load**
- **AC & DC Electronic Load**

MULTI-CHANNEL DC ELECTRONIC LOAD MODULES

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-2020A(B)	0 to 80 V	20 A	100/100 W	2	3.8	D139-142
PEL-2030A(B)	0 to 80 V	5/40 A	30/250 W	2	3.8	
PEL-2040A(B)	0 to 80 V	70 A	350 W	1	3.8	
PEL-2041A(B)	0 to 500 V	10A	350 W	1	3.8	

DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-503-80-50	0 to 80 V	50 A	250 W	1	5.3	D151-152
PEL-504-80-70	0 to 80 V	70 A	350 W	1	5.3	
PEL-507-80-140	0 to 80 V	140 A	700 W	1	10.3	
PEL-3021A	0 to 150 V	35 A	175 W	1	6	D125-132
PEL-3031AE	0 to 150 V	60 A	300 W	1	7.5	D133-138
PEL-3041A	0 to 150 V	70 A	350 W	1	7	D123-130
PEL-3111A	0 to 150 V	210 A	1050 W	1	17	
PEL-3211A	0 to 150 V	420 A	2100 W	1	23	
PEL-3032AE	0 to 500 V	15 A	300 W	1	7.5	D133-138
PEL-504-500-15	0 to 500 V	15 A	350 W	1	5.3	D151-152
PEL-507-500-30	0 to 500 V	30 A	700 W	1	10.3	
PEL-3021AH	0 to 800 V	8.75 A	175 W	1	9	D125-132
PEL-3041AH	0 to 800 V	17.5 A	350 W	1	10	
PEL-3111AH	0 to 800 V	52.5 A	1050 W	1	20	
PEL-3211AH	0 to 800 V	105 A	2100 W	1	28	

HIGH POWER DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-5008C-150-800	150 V	800 A	8 kW	1	77.5	D143-150
PEL-5010C-150-1000	150 V	1000 A	10 kW	1	84.8	
PEL-5012C-150-1200	150 V	1200 A	12 kW	1	92	
PEL-5015C-150-1500	150 V	1500 A	15 kW	1	116.5	
PEL-5018C-150-1800	150 V	1800 A	18 kW	1	124	
PEL-5020C-150-2000	150 V	2000 A	20 kW	1	140.5	
PEL-5024C-150-2000	150 V	2000 A	24 kW	1	155	
PEL-5008C-600-560	600 V	560 A	8 kW	1	77.5	
PEL-5010C-600-700	600 V	700 A	10 kW	1	84.8	
PEL-5012C-600-840	600 V	840 A	12 kW	1	92	
PEL-5015C-600-1050	600 V	1050 A	15 kW	1	116.5	
PEL-5018C-600-1260	600 V	1260 A	18 kW	1	124	
PEL-5020C-600-1400	600 V	1400 A	20 kW	1	140.5	
PEL-5024C-600-1680	600 V	1680 A	24 kW	1	155	
PEL-5006C-1200-240	1200 V	240 A	6 kW	1	62	
PEL-5008C-1200-320	1200 V	320 A	8 kW	1	77.5	
PEL-5010C-1200-400	1200 V	400 A	10 kW	1	84.8	
PEL-5012C-1200-480	1200 V	480 A	12 kW	1	92	
PEL-5015C-1200-600	1200 V	600 A	15 kW	1	116.5	
PEL-5018C-1200-720	1200 V	720 A	18 kW	1	124	
PEL-5020C-1200-800	1200 V	800 A	20 kW	1	140.5	
PEL-5024C-1200-960	1200 V	960 A	24 kW	1	155	
PEL-5004G-150-400	150 V	400 A	4 kW	1	32	D163-169
PEL-5005G-150-500	150 V	500 A	5 kW	1	32.5	
PEL-5006G-150-500	150 V	600 A	6 kW	1	32.5	
PEL-5004G-600-280	600 V	280 A	4 kW	1	32.5	
PEL-5005G-600-350	600 V	350 A	5 kW	1	33	
PEL-5006G-600-420	600 V	420 A	6 kW	1	33	
PEL-5004G-1200-160	1200 V	160 A	4 kW	1	31	
PEL-5005G-1200-200	1200 V	200 A	5 kW	1	32	
PEL-5006G-1200-240	1200 V	240 A	6 kW	1	32	

AC/DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
AEL-5002-350-18.75	350 V	18.75 A	1875 W	1	21.5	D153-162
AEL-5003-350-28	350 V	28 A	2800 W	1	27.5	
AEL-5004-350-37.5	350 V	37.5 A	3750 W	1	33.5	
AEL-5006-350-56	350 V	56 A	5600 W	1	58	
AEL-5008-350-75	350 V	75 A	7500 W	1	70	
AEL-5012-350-112.5	350 V	112.5 A	11250 W	1	105	
AEL-5015-350-112.5	350 V	112.5 A	15000 W	1	140	
AEL-5019-350-112.5	350 V	112.5 A	18750 W	1	260	
AEL-5023-350-112.5	350 V	112.5 A	22500 W	1	295	
AEL-5002-425-18.75	425 V	18.75 A	1875 W	1	21.5	
AEL-5003-425-28	425 V	28 A	2800 W	1	27.5	
AEL-5004-425-37.5	425 V	37.5 A	3750 W	1	33.5	
AEL-5006-425-56	425 V	56 A	5600 W	1	58	
AEL-5008-425-75	425 V	75 A	7500 W	1	70	
AEL-5012-425-112.5	425 V	112.5 A	11250 W	1	105	
AEL-5015-425-112.5	425 V	112.5 A	15000 W	1	140	
AEL-5019-425-112.5	425 V	112.5 A	18750 W	1	260	
AEL-5023-425-112.5	425 V	112.5 A	22500 W	1	295	
AEL-5003-480-18.75	480 V	18.75 A	2800 W	1	27.5	
AEL-5004-480-28	480 V	28 A	3750 W	1	33.5	

Programmable DC Electronic Load

PEL-3111A/3111AH

PEL-3041A/3041AH/3021A/ 3021AH

CE | USB | GPIB | Analog Control | RS-232 | LAN

FEATURES

* Operating Voltage (DC) : 0 V to 150 V (PEL-3000A)/0 to 800 V(PEL-3000AH)
* Operating Mode : CC/CV/CR/CP/CC+CV/ CR+CV/CP+CV
* Parallel Connection of Inputs for Higher Capacity (Max : 9,450 W)
* Support of High Slew Rate : Max 16 A/μs (PEL-3000A)/0.84 A/μs(PEL-3000AH)
* Run Program Function (Go/NoGo Test)
* Sequence Function for High Efficient Load Simulations
* Dynamic (Switching) Function : 0.0166 Hz to 20 kHz
* Soft Start Function : Off/On (1 ms to 200 ms, Res. 1 ms)
* Adjustable OCP/OVP/OPP/UVP Setting
* Short Circuit Function
* Timer Function : Elapsed Time of Load on
* Cut Off Time (Auto Load Off Timer) : 1 s to 999 h 59 min 59 s or Off
* External Channel Control/Monitoring Via Analog Control Connector
* Setup Memories : 100 sets
* 3.5 Inch TFT LCD Display
* Multi Interface : USB, RS-232/RS-485/LAN, GPIB(Optional)

The PEL-3000A Series, a single-channel, programmable DC electronic load with 0.01 mA current resolution and 16 A/ μ s current Slew Rate, is very ideal for testing SPS (Switching Power Supply) for commercial and industrial computers. The flexible power combination of PEL-3000A Series meets the test requirements of present high-power power supply. The PEL-3000AH Series programmable DC Electronic load, which not only inherited functions and features from the PEL-3000A Series but providing three current ranges for all PEL-3000AH Series and adding voltage monitor BNC terminals on the front panel. The PEL-3000AH Series, a single-channel, programmable DC electronic load with 800 V and 0.84 A/ μ s current Slew Rate, is ideal for the test of the high voltage devices such as DC/DC converters or high-voltage batteries. With respect to battery testing applications such as rechargeable battery for electrical tools, battery module and automobile battery, PEL-3000A(AH) Series has three stand-alone models to offer including 175 W, 350 W, 1050 W and Booster. By connecting Booster 2100 W units with master units, the maximum load capacity of the whole system can reach 9,450 W. Hence, the PEL-3000A(AH) Series fulfills various power testing requirements including medium to low power or high-power power supply.

The PEL-3000A(AH) Series has seven operating modes and three operating functions. Among the seven operating modes, four of them are basic operating modes, including constant current, constant voltage, constant resistance, and constant power, and the other three are advanced operating modes including constant current + constant voltage, constant resistance + constant voltage, and constant power + constant voltage. Users must first select operating mode and then operating function based upon the test requirements. Static, Dynamic and Sequence operating functions can be applied to different testing conditions including a fixed load level, switching between two levels or switching among more than two levels. Sequence function is divided into Fast Sequence and Normal Sequence according to the test time of each step. Both Dynamic and Sequence are to assist users to simulate the genuine load change. For instance, PEL-3000A(AH) Series can simulate HEV current consumption to make sure that automobile battery can supply HEV with sufficient power need on the road. By so doing, manufacturers can elevate product quality and reliability.

The Soft Start function of the PEL-3000A(AH) Series can set current rise time for the moment PEL-3000A(AH) Series is turned on to reduce the abnormal situation of the voltage drop of power supply under test. The adjustable Under Voltage Protection (UVP), GO/NO GO voltage input monitoring function, current monitoring function and Timer Function to control load activation time can be jointly applied to the characteristic tests of battery bleeding to avoid battery damage during bleeding operation. Based upon the functionalities described above, the PEL-3000A(AH) Series can test a vast variety of power supply ranging from the fundamental static sink current to complex dynamic load simulations so as to enhance product quality and reliability.

The single unit D.C Electronic Load of PEL-3000A(AH) Series

The PEL-3000A(AH) Series is a high speed, single channel and programmable D.C. electronic load and its power, functionality, parallel combination and size are listed on the following chart :

MODEL	PEL-3021A(AH)	PEL-3041A(AH)	PEL-3111A(AH)	PEL-3211A(AH)
Power	175W	350W	1,050W	2,100W Booster
Function	Full-function Single Unit	Full-function Single Unit	Full-function Single Unit	No control panel, can not be operated alone
Parallel Combination	Parallel with same model, 5 units the maximum	Parallel with same model, 5 units the maximum	Parallel with same model, 5 units the maximum Parallel with the maximum of four PEL-3211A(AH)s	Parallel with PEL-3111A(AH)
Size	Half Rack	Half Rack	Full Rack	Full Rack

GTL-259 GTL-260 GTL-261 GTL-262

SPECIFICATIONS

Model			PEL-3021A			PEL-3041A			PEL-3111A			PEL-3211A		
Voltage			0 V to 150 V			0 V to 150 V			0 V to 150 V			0 V to 150 V		
Current			35 A			70 A			210 A			420 A		
Power			175 W			350 W			1050 W			2100 W		
Input Resistance			500 kΩ			500 kΩ			500 kΩ			500 kΩ		
Min. Operating			0.75 V at 17.5 A			0.75 V at 35 A			0.75 V at 105 A			0.75 V at 210 A		
			1.5 V at 35 A			1.5 V at 70 A			1.5 V at 210 A			1.5 V at 420 A		
CONSTANT CURRENT MODE (CC)														
Operating Range	H, M, L		0 A to 35 A	0 A to 3.5 A	0 A to 0.35 A	0 A to 70 A	0 A to 7 A	0 A to 0.7 A	0 A to 210 A	0 A to 21 A	0 A to 2.1 A	0 A to 420 A	0 A to 42 A	N/A
Accuracy of Setting	H, M		±(0.2 % of set + 0.1 % of F.S.[*1]) + Vin[*2]/500 kΩ									±(1.2% of set+1.1% of F.S.[*1])		
Accuracy of Setting	L		±(0.2 % of set + 0.1 % of F.S.) + Vin[*2]/500 kΩ									N/A		
Accuracy of Setting(Parallel)			±(1.2% of set + 1.1% of F.S.[*3])									±(1.2% of set+1.1% of F.S.[*1])		
Resolution	H, M, L		1 mA	0.1 mA	0.01 mA	2 mA	0.2 mA	0.02 mA	10 mA	1 mA	0.1 mA	N/A		
CONSTANT RESISTANCE MODE (CR)														
Operating Range[*4]	Range	H	23.3336 S to 400 µS			46.6672 S to 800 µS			140.0016 S to 2.4 mS			280.0032 S to 4.8 mS		
			(42.857 mΩ to 2.5 kΩ)			(21.428 mΩ to 1.25 kΩ)			(7.1427 mΩ to 416.6667 Ω)			(3.5714 mΩ to 208.3334 Ω)		
		M	2.33336 S to 40 µS			4.6667 S to 80 µS			14.0001 S to 242.4 µS			28.00032 S to 484.8 µS		
			(428.566 mΩ to 25 kΩ)			(214.28 mΩ to 12.5 kΩ)			(71.427 mΩ to 4.16667 kΩ)			(35.7135 mΩ to 2.083334 kΩ)		
		L	0.233336 S to 4 µS			0.46667 S to 8 µS			1.40001 S to 24.24 µS			N/A		
			(4.28566 Ω to 250 kΩ)			(2.1428 Ω to 125 kΩ)			(714.27 mΩ to 41.6667 kΩ)					
Accuracy of Setting[*5]	H, M		±(0.5 % of set[*6] + 0.5 % of F.S.[*1]) + Vin[*2]/500 kΩ									±(1.2% of set +1.1% of F.S.[*1])		
Accuracy of Setting[*5]	L		±(0.5 % of set[*6] + 0.5 % of F.S.) + Vin[*2]/500 kΩ									N/A		
Parallel			±(1.2 % of set + 1.1 % of F.S.[*3])									N/A		
Resolution	H, M, L		400 µs	40 µs	4 µs	800 µs	80 µs	8 µs	2.4 ms	240 µs	24 µs	N/A		
CONSTANT VOLTAGE MODE (CV)														
Operating Range	Range	H	1.5 V to 150 V									1.5 V to 150 V		
		L	1.5 V to 15 V									1.5 V to 15 V		
Accuracy of Setting[*7]	H, L		±(0.1 % of set + 0.1 % of F.S.)									N/A		
	H, L		10 mV/1 mV											
CONSTANT POWER MODE (CP)														
Operating Range		H	17.5 W to 175 W			35 W to 350 W			105 W to 1050 W			210 W to 2100 W		
	Range	M	1.75 W to 17.5 W			3.5 W to 35 W			10.5 W to 105 W			21 W to 210 W		
		L	0.175 W to 1.75 W			0.35 W to 3.5 W			1.05 W to 10.5 W			N/A		
Accuracy of Setting[*8]	H, M, L		±(0.6 % of set + 1.4 % of F.S.[*3]) + (Vin[*2])²/ 500 kΩ									N/A		
Resolution	H, M, L		10 mW	1 mW	0.1 mW	10 mW	1 mW	0.1 mW	100 mW	10 mW	1 mW			
PARALLEL Mode														
Capacity			875 W			1750 W			5250 W			PEL-3111A with 4 booster units : Max. 9.45 kW		
SLEW RATE														
Operation Mode			CC, CR			CC, CR			CC, CR			N/A		
Setting Range (CC mode)[*10]		H	2.5 mA/µs to 2.5 A/µs			5 mA/µs to 5 A/µs			16.02 mA/µs to 16.002 A/µs			N/A		
	Range	M	250 µA/µs to 250 mA/µs			500 µA/µs to 500 mA/µs			1.602 mA/µs to 1.6002 A/µs					
		L	25 µA/µs to 25 mA/µs			50 µA/µs to 50 mA/µs			160.2 µA/µs to 160.02 mA/µs					
Setting Range (CR Mode)[*10]		H	250 µA/µs to 250 mA/µs			500 µA/µs to 500 mA/µs			1.602 mA/µs to 1.6002 A/µs			N/A		
	Range	M	25 µA/µs to 25 mA/µs			50 µA/µs to 50 mA/µs			160.2 µA/µs to 160.02 mA/µs					
		L	2.5 µA/µs to 2.5 mA/µs			5 µA/µs to 5 mA/µs			16.02 µA/µs to 16.002 mA/µs					
Accuracy of Setting[*9]	H, M, L		±(10 % of set + 5 µs)									N/A		
Resolution (Setting Range)[*10]			1 mA(250 mA/µs to 2.5 A/µs)			2 mA(500 mA/µs to 5 A/µs)			6 mA(1.6 A/µs to 16 A/µs)			N/A		
			100 µA(25 mA/µs to 250 mA/µs)			200 µA(50 mA/µs to 500 mA/µs)			600 µA(160 mA/µs to 1.6 A/µs)					
			10 µA(2.5 mA/µs to 25 mA/µs)			20 µA(5 mA/µs to 50 mA/µs)			60 µA(16 mA/µs to 160 mA/µs)					
			1 µA(250 µA/µs to 2.5 mA/µs)			2 µA(500 µA/µs to 5 mA/µs)			6 µA(1.6 mA/µs to 16 mA/µs)					
			100 nA(25 µA/µs to 250 µA/µs)			200 nA(50 µA/µs to 500 µA/µs)			600 nA(160 µA/µs to 1.6 mA/µs)					
			10 nA(2.5 µA/µs to 25 µA/µs)			20 nA(5 µA/µs to 50 µA/µs)			60 nA(16 µA/µs to 160 µA/µs)					
METER														
Voltmeter	Accuracy		±(0.1 % of rdg + 0.1 % of F.S.)									N/A		
Ammeter			±(0.2 % of rdg + 0.3 % of F.S.[*3])											
Ammeter(Parallel Operation)			±(1.2% of rdg +1.1% of F.S.)											
DYNAMIC MODE														
Operation Mode			CC , CR and CP											
T1 & T2			0.025 ms to 10 ms/Resolution : 1 µs 10 ms to 60 s/Resolution : 1 ms											
Accuracy			±100 ppm of setting											
Slew Rate (CC Mode)		H	2.5 mA/µs to 2.5 A/µs			5 mA/µs to 5 A/µs			16 mA/µs to 16 A/µs			N/A		
	Range	M	250 µA/µs to 250 mA/µs			500 µA/µs to 500 mA/µs			1.6 mA/µs to 1.6 A/µs					
		L	25 µA/µs to 25 mA/µs			50 µA/µs to 50 mA/µs			160 µA/µs to 160 mA/µs					
Slew Rate (CR Mode)		H	250 µA/µs to 250 mA/µs			500 µA/µs to 500 mA/µs			1.6 mA/µs to 1.6 A/µs			N/A		
	Range	M	25 µA/µs to 25 mA/µs			50 µA/µs to 50 mA/µs			160 µA/µs to 160 mA/µs					
		L	2.5 µA/µs to 2.5 mA/µs			5 µA/µs to 5 mA/µs			16 µA/µs to 16 mA/µs					
Current Accuracy			±0.4% F.S.			±0.4% F.S.			±0.4% F.S.			±(1.2% of set+1.1% of F.S.)		
PROTECTION FUNCTION														
Functions			Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OTP), Undervoltage protection(UVP), Reverse voltage protection(RVP)											
GENERAL														
Input Range			90 Vac to 132 Vac/180 Vac to 250 Vac Single-phase; 47 Hz to 63 Hz											
Power(Max.)			90 VA			110 VA			190 VA			230 VA		
Interface			Standard : USB, RS-232/RS-485, LAN. Optional : GPIB									N/A		
Dimensions (W x H x D)			213.8 mm x 124 mm x 400.5 mm			213.8 mm x 124 mm x 400.5 mm			427.8 mm x 124 mm x 400.5 mm			427.7 mm x 127.8 mm x 553.5 mm		
Weight			Approximate 6 kg			Approximate 7 kg			Approximate 17 kg			Approximate 23 kg		

Note : *1 Full scale of H range.
*2 Vin: input terminal voltage of electronic load.
*3 M range applies to the full scale of H range.
*4 Siemens[S] = Input current[A] / Input voltage[V] = 1/resistance[Ω]
*5 Converted value at the input current. At the sensing point during remote sensing under the operating range of the input voltage. operation.
*6 set = Vin/Rset.
*7 At the sensing point during remote sensing under the operating range of the input voltage. It is also applied for the condition of the parallel operation.
*8 It is not applied for the condition of the parallel operation.
*9 Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in M range) of the rated current.
*10. Minimum setting range and resolution will change in parallel (Detail please reference user manual)

Programmable DC Electronic Load

SPECIFICATIONS

Model			PEL-3021AH			PEL-3041AH			PEL-3111AH			PEL-3211AH		
Voltage			0 V to 800 V			0 V to 800 V			0 V to 800 V			0 V to 800 V		
Current			8.75 A			17.5 A			52.5 A			105 A		
Power			175 W			350 W			1050 W			2100 W		
Input Resistance			3.24 MΩ			3.24 MΩ			3.24 MΩ			3.24 MΩ		
Min. Operating			5 V at 8.75 A			5 V at 17.5 A			5 V at 52.5 A			5 V at 105 A		
			2.5 V at 4.375 A			2.5 V at 8.75 A			2.5 V at 26.25 A			2.5 V at 52.5 A		
CONSTANT CURRENT MODE (CC)														
Operating Range		H, M, L	0 A to 8.75 A	0 A to 875 mA	0 A to 87.5 mA	0 A to 17.5 A	0 A to 1.75 A	0 A to 175 mA	0 A to 52.5 A	0 A to 5.25 A	0 A to 525 mA	0 A to 105 A	0 A to 10.5 A	0 A to 1.05 A
Accuracy of Setting		H, M	±(0.2 % of set + 0.1 % of F.S.[*1]) + Vin[*2]/3.24 MΩ									±(1.2% of set+1.1% of F.S.[*3])		
Accuracy of Setting		L	±(0.2 % of set + 0.1 % of F.S.) + Vin[*2]/3.24 MΩ											
Accuracy of Setting(Parallel)			±(1.2% of set + 1.1% of F.S.[*3])											
Resolution		H, M, L	300 µA	30 µA	3 µA	0.6 mA	60 µA	6 µA	2 mA	200 µA	20 µA	N/A		
CONSTANT RESISTANCE MODE (CR)														
Operating Range[*4]	Range	H	1.75 S to 30 µS			3.5 S to 60 µS			10.5 S to 180 µS			21 S to 360 µS		
			(571 mΩ to 33.3 kΩ)			(285 mΩ to 16.6 kΩ)			(95.2 mΩ to 5.55 kΩ)			(47.6 mΩ to 2.777 kΩ)		
		M	175 mS to 3 µS			350 mS to 6 µS			1.05 S to 18 µS			2.1 S to 36 µS		
			(5.71 Ω to 333 kΩ)			(2.85 Ω to 166 kΩ)			(952 mΩ to 55.5 kΩ)			(476 mΩ to 27.77 kΩ)		
		L	17.5 mS to 0.3 µS			35 mS to 0.6 µS			105 mS to 1.8 µS			210 mS to 3.6 µS		
			(57.1 Ω to 3.33 MΩ)			(28.5 Ω to 1.66 MΩ)			(9.52 Ω to 555 kΩ)			(4.762 Ω to 277.7 kΩ)		
Accuracy of Setting[*5]		H, M	±(0.5 % of set[*6] + 0.5 % of F.S.[*1]) + Vin[*2]/3.24 MΩ									±(1.2% of set +1.1% of F.S.[*3])		
Accuracy of Setting[*5]		L	±(0.5 % of set[*6] + 0.5 % of F.S.) + Vin[*2]/3.24 MΩ											
Parallel			±(1.2 % of set + 1.1 % of F.S.[*3])											
Resolution		H, M, L	30 µs	3 µs	0.3 µs	60 µs	6 µs	0.6 µs	180 µs	18 µs	1.8 µs	N/A		
CONSTANT VOLTAGE MODE (CV)														
Operating Range	Range	H	5 V to 800 V									5 V to 800 V		
		L	5 V to 80 V									5 V to 80 V		
Accuracy of Setting[*7]		H, L	±(0.2 % of set + 0.2 % of F.S.)									N/A		
		H, L	20 mV/2 mV											
CONSTANT POWER MODE (CP)														
Operating Range		H	17.5 W to 175 W			35 W to 350 W			105 W to 1050 W			210 W to 2100 W		
	Range	M	1.75 W to 17.5 W			3.5 W to 35 W			10.5 W to 105 W			21 W to 210 W		
		L	0.175 W to 1.75 W			0.35 W to 3.5 W			1.05 W to 10.5 W			N/A		
Accuracy of Setting[*8]		H, M, L	±(0.6 % of set + 1.4 % of F.S.[*3]) + (Vin[*2])²/ 3.24 MΩ									N/A		
Resolution		H, M, L	10 mW	1 mW	0.1 mW	10 mW	1 mW	0.1 mW	100 mW	10 mW	1 mW			
PARALLEL Mode														
Capacity			875 W			1750 W			5250 W			PEL-3111AH with 4 booster units : Max. 9.45 kW		
SLEW RATE														
Operation Mode			CC, CR			CC, CR			CC, CR			N/A		
Setting Range (CC mode)[*10]		H	0.14 mA/µs to 140 mA/µs			0.28 mA/µs to 280 mA/µs			0.84 mA/µs to 840 mA/µs			N/A		
	Range	M	14 µA/µs to 14 mA/µs			28 µA/µs to 28 mA/µs			84 µA/µs to 84 mA/µs					
		L	1.4 µA/µs to 1.4 mA/µs			2.8 µA/µs to 2.8 mA/µs			8.4 µA/µs to 8.4 mA/µs					
Setting Range (CR Mode)[*10]		H	14 µA/µs to 14 mA/µs			28 µA/µs to 28 mA/µs			84 µA/µs to 84 mA/µs			N/A		
	Range	M	1.4 µA/µs to 1.4 mA/µs			2.8 µA/µs to 2.8 mA/µs			8.4 µA/µs to 8.4 mA/µs					
		L	0.14 µA/µs to 140 µA/µs			0.28 µA/µs to 280 µA/µs			0.84 µA/µs to 840 µA/µs					
Accuracy of Setting[*9]		H, M, L	±(10 % of set + 25 µs)									N/A		
Resolution (Setting Range)[*10]			50 µA(14 mA/µs to 140 mA/µs)			100 µA(28 mA/µs to 280 mA/µs)			300 µA(84 mA/µs to 0.84 A/µs)			N/A		
			5 µA(1.4 mA/µs to 14 mA/µs)			10 µA(2.8 mA/µs to 28 mA/µs)			30 µA(8.4 mA/µs to 84 mA/µs)					
			0.5 µA(140 µA/µs to 1.4 mA/µs)			1 µA(280 µA/µs to 2.8 mA/µs)			3 µA(840 µA/µs to 8.4 mA/µs)					
			50 nA(14 µA/µs to 140 µA/µs)			0.1 µA(28 µA/µs to 280 µA/µs)			0.3 µA(84 µA/µs to 840 µA/µs)					
			5 nA(1.4 µA/µs to 14 µA/µs)			10 nA(2.8 µA/µs to 28 µA/µs)			30 nA(8.4 µA/µs to 84 µA/µs)					
			0.5 nA(0.14 µA/µs to 1.4 µA/µs)			1 nA(0.28 µA/µs to 2.8 µA/µs)			3 nA(0.84 µA/µs to 8.4 µA/µs)					
METER														
Voltmeter	Accuracy		±(0.1 % of rdg + 0.1 % of F.S.)									N/A		
Ammeter			±(0.2 % of rdg + 0.3 % of F.S.[*3])											
Ammeter(Parallel Operation)			±(1.2% of rdg +1.1% of F.S.)											
DYNAMIC MODE														
Operation Mode			CC , CR and CP											
T1 & T2			0.025 ms to 10 ms/Resolution : 1 µs 10 ms to 60 s/Resolution : 1 ms											
Accuracy			±100 ppm of setting											
Slew Rate (CC Mode)		H	0.14 mA/µs to 140 mA/µs			0.28 mA/µs to 280 mA/µs			0.84 mA/µs to 840 mA/µs			N/A		
	Range	M	14 µA/µs to 14 mA/µs			28 µA/µs to 28 mA/µs			84 µA/µs to 84 mA/µs					
		L	1.4 µA/µs to 1.4 mA/µs			2.8 µA/µs to 2.8 mA/µs			8.4 µA/µs to 8.4 mA/µs					
Slew Rate (CR Mode)		H	14 µA/µs to 14 mA/µs			28 µA/µs to 28 mA/µs			84 µA/µs to 84 mA/µs			N/A		
	Range	M	1.4 µA/µs to 1.4 mA/µs			2.8 µA/µs to 2.8 mA/µs			8.4 µA/µs to 8.4 mA/µs					
		L	0.14 µA/µs to 140 µA/µs			0.28 µA/µs to 280 µA/µs			0.84 µA/µs to 840 µA/µs					
Current Accuracy			±0.4% F.S.			±0.4% F.S.			±0.4% F.S.			±(1.2% of set+1.1% of F.S.)		
PROTECTION FUNCTION														
Functions			Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OTP), Undervoltage protection(UVP), Reverse voltage protection(RVP)											
GENERAL														
Input Range			90 Vac to 132 Vac/180 Vac to 250 Vac Single-phase; 47 Hz to 63 Hz											
Power(Max.)			90 VA			110 VA			190 VA			230 VA		
Interface			Standard：USB, RS-232/RS-485, LAN. Optional：GPIB											
Dimensions (W x H x D)			213.8 mm x 124 mm x 400.5 mm			213.8 mm x 124 mm x 400.5 mm			427.8 mm x 124 mm x 400.5 mm			427.7 mm x 127.8 mm x 553.5 mm		
Weight			Approximate 9 kg			Approximate 10 kg			Approximate 20 kg			Approximate 28 kg		

Note : *1 Full scale of H range.
*2 Vin: input terminal voltage of electronic load.
*3 M range applies to the full scale of H range.
*4 Siemens[S] = Input current[A] / Input voltage[V] = 1/resistance[Ω]
*5 Converted value at the input current. At the sensing point during remote sensing under the operating range of the input voltage. operation.
*6 set = Vin/Rset.
*7 At the sensing point during remote sensing under the operating range of the input voltage. It is also applied for the condition of the parallel operation.
*8 It is not applied for the condition of the parallel operation.
*9 Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in M range) of the rated current.
*10. Minimum setting range and resolution will change in parallel (Detail please reference user manual)

PEL-3111AH/3211AH

PEL-3041AH

ORDERING INFORMATION

PEL-3021A	(150 V/35 A/175 W) Single-Channel Programmable DC Electronic Load
PEL-3041A	(150 V/70 A/350 W) Single-Channel Programmable DC Electronic Load
PEL-3111A	(150 V/210 A/1050 W) Single-Channel Programmable DC Electronic Load
PEL-3211A	(150 V/420 A/2100 W) 2100 W Booster for PEL-3111 only
PEL-3021AH	(800 V/8.75 A/175 W) Single-Channel Programmable DC Electronic Load
PEL-3041AH	(800 V/17.5 A/350 W) Single-Channel Programmable DC Electronic Load
PEL-3111AH	(800 V/52.5 A/1050 W) Single-Channel Programmable DC Electronic Load
PEL-3211AH	(800 V/105 A/2100 W) 2100 W Booster for PEL-3111H only

ACCESSORIES :

Quick Start Guide, Power Cord

PEL-011 Load Input Terminal Cover
PEL-012 Terminal Fittings Kits
PEL-013 Flexible Terminal Cover
PEL-014 J1/J2 Protection Plug
Front Terminal Washers

GTL-255 Frame Link Cable 300 mm
(for linking units that are stacked).
Note that this accessories is optional for the PEL-3021A(AH) or PEL-3041A(AH).

OPTIONAL ACCESSORIES

CR123A	3 V Lithium Battery for Clock.
GRA-413-E	Rack mount bracket for booster PEL-3211A/AH (EIA)
GRA-413-J	Rack mount bracket for booster PEL-3211A/AH (JIS)
GRA-414-E	Rack Mount Kit (EIA), 19", 3U Size for PEL-3021A(AH)/3041A(AH)/3111A(AH)
GRA-414-J	Rack Mount Kit (JIS), 19", 3U Size for PEL-3021A(AH)/3041A(AH)/3111A(AH)
GTL-246	USB Cable Type A- Type B
GTL-248	GPIB Cable, 2.0 m
GTL-259	RS-232 Cable with DB9 connector to RJ45
GTL-260	RS-485 Cable with DB9 connector to RJ45
GTL-261	Serial Master Cable+Terminator, 0.5 m
GTL-262	RS-485 Slave cable
PEL-010	Dust Filter
PEL-004	GPIB Option
PEL-005	Connect Cu Plate
PEL-006	Connect Cu Plate
PEL-007	Connect Cu Plate
PEL-008	Connect Cu Plate
PEL-009	Connect Cu Plate

FREE DOWNLOAD

Driver LabView Driver

Rear Panel

PEL-3111A/3111AH

PEL-3211A/3211AH

PEL-3041A

PEL-3041AH

GRA-413 Rack Mount Kit (JIS)

For:PEL-3211A(AH)

GRA-413 Rack Mount Kit (EIA)

For:PEL-3211A(AH)

GRA-414-J Rack Mount Kit (JIS)

For:PEL-3021A/3021AH/3041A/3041AH/3111A/3111AH

GRA-414-E Rack Mount Kit (EIA)

For:PEL-3021A/3021AH/3041A/3041AH/3111A/3111AH

PEL-004

PEL-005

PEL-006

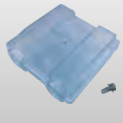
PEL-007

PEL-008

PEL-009

PEL-010

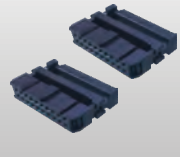
PEL-011



PEL-012

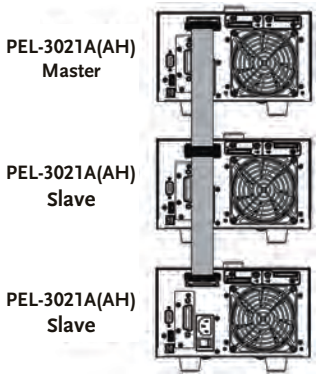
PEL-013

PEL-014



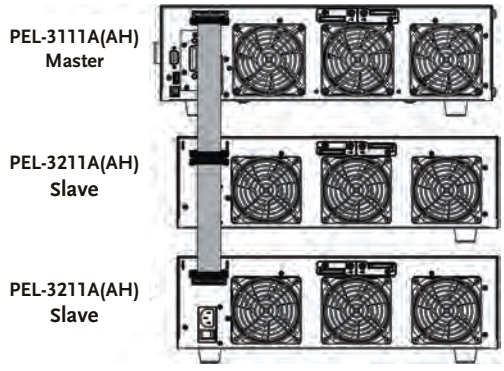
GTL-255

A. OPERATING FUNCTION FOR MASTER AND SLAVE IN PARALLEL



Three PEL-3021A(AH) in Parallel

PEL-3000A(AH) Series connects with loads via MIL 20-pin interface and connecting cables to designate a master to control other slave units in parallel. One PEL-3111A(AH) and four PEL-3211A(AH) in parallel provide the maximum power of 9,450 W.



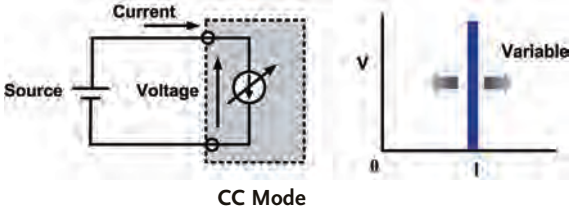
One PEL-3111A(AH) connects with two PEL-3211A(AH) in Parallel

Parallel arrangement allows users to flexibly select and apply different power arrangement which enhances equipment utilization efficiency to save R&D cost.

B. OPERATING MODE

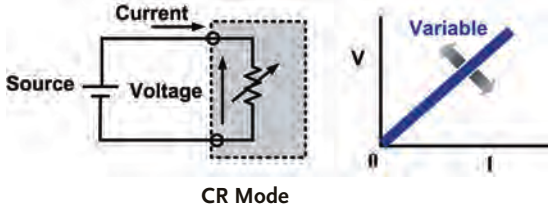
The PEL-3000A(AH) series provides four fundamental operating modes and three add-on modes of CC, CR and CP separately combining with CV. Users can set different load condition under different operating modes such as setting operating range for load level, Current Slew Rate, input voltage and load current.

The input voltage range has two levels - high and low. The load current operating range has three levels - high, medium and low current levels which possess different resolution to meet test requirements of different power product specifications.



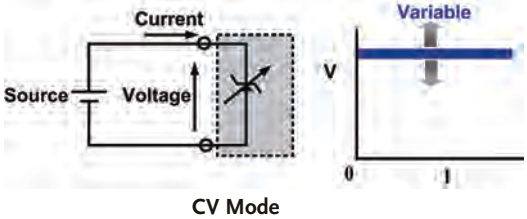
CC Mode

Under constant current mode, electronic load will sink the amount of current users has set. Different current settings via CC mode allow users to test the voltage changes of DC power supply which is called load regulation test.



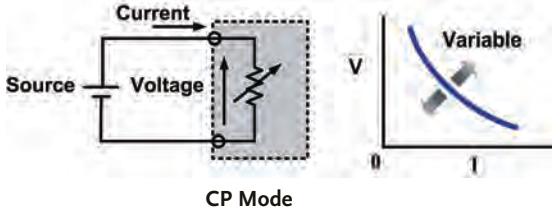
CR Mode

Under constant resistance mode, electronic load will sink load current, which is linearly direct proportion to input voltage. This mode can be utilized in testing voltage or the activation and current limit of power supply.



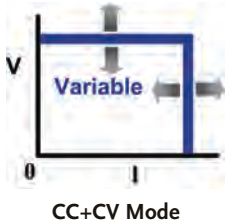
CV Mode

Under constant voltage mode, electronic load will sink sufficient current to regulate the voltage source to the set value. This mode allows users not only to test current limit function of power supply, but also to simulate battery operation in testing battery chargers.

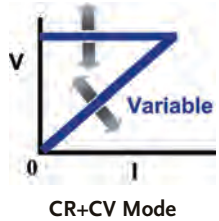


CP Mode

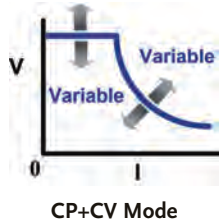
Under constant power mode, electronic load will sink load current, which is indirect proportion to input voltage to reach preset constant power requirement. Hence, the changes of input voltage will have indirect proportion effect on current sinking so as to reach constant power control.



CC+CV Mode



CR+CV Mode



CP+CV Mode

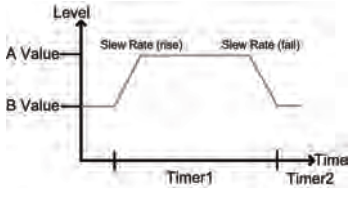
+CV mode can be selected under CC, CR or CP mode. When + CV mode function is turned on and electronic load sinks more current than the maximum current of power supply under test, electronic load will automatically switch to CV mode. It is because that the current sunk is the maximum current of power device. Therefore, power supply will switch to CC mode and PEL-3000A(AH) will switch to CV mode to limit electronic load from sinking the total current of power supply so as to prevent power supply under test from damaging. Electronic load will cease operation once the voltage of DUT is lower than the set voltage under + CV mode.

C. THREE OPERATING FUNCTIONS

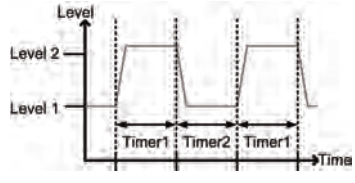
The PEL-3000A(AH) series, according to different test conditions, step or continuous changes, test speeds, and selectable modes, has three operating functions: Static, Dynamic and Sequence, which can be separately applied on a fixed load test; between two loads; or among more than two loads. Detailed descriptions of these functions are as follows:

Static function provides a fixed load to test output stability of power supply. Switching load value A to B will be manually operated. Under Dynamic function, two test conditions can be switched automatically and every set of parameter includes Level, Timer and Slew Rate. Timer can be set to the fastest of 25 μs to accommodate response time of different power supply and assist testing power supply output status when load is unstable in order to enhance products' reliability and quality.

Function \ Operation	Static	Dynamic	Sequence	
			Fast	Normal
Operating Condition Selection	Single fixed condition	Selection between two conditions	Selection among more than two conditions	Selection from more than two conditions
Operating Modes	All modes	• Two conditions using same mode • CR, CC,CP modes	• Each condition must use same mode • Support CC or CR mode	• Each condition using different mode • All modes
Adjustable Condition Setting	• A/B Value • Slew Rate	• Level 1/Level 2 • Timer 1/Timer 2 (25 μs) • Slew Rate 1/Slew Rate 2	• Level • Timer • Slew Rate • Others...	• Level • Timer • Slew Rate • Others...
Sequence Step Combination	N/A	N/A	• 1 Sequence • 2560 steps • 25 μs/step • Res. 1 μs	• 10 Sequence • 2560 steps • 10 μs/step • Res. 10 μs
Other Functions	N/A	N/A	• Trigger Out function	• Trigger Out function • Ramp function

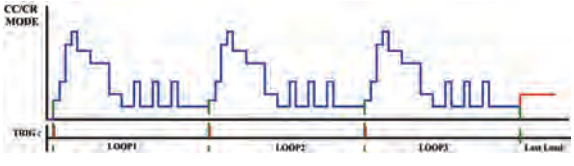


Static Mode

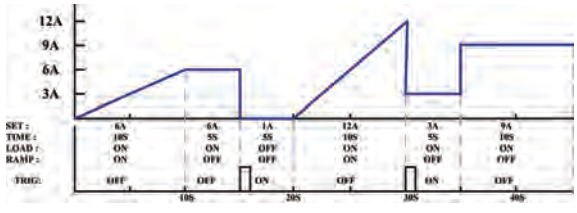


Dynamic Mode

In Sequence function, waveforms of load current edited by Fast Sequence are steps and every step can reach the fastest of 25 μs to provide the high slew rate for electronic loads.



Fast Sequence Diagram



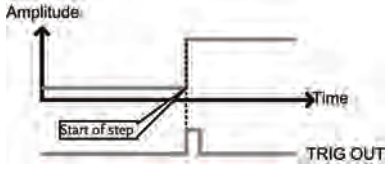
Normal Sequence Diagram

Normal Sequence provides RAMP function to users, according to their requirements, to select between slope and step method under set time to sink current.

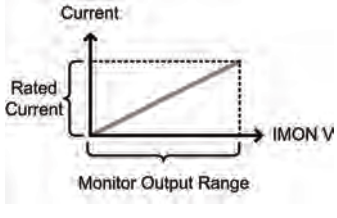
By applying a complete sequence editing function, users can control electronic load without using a computer or writing a program so as to save cost and time of R&D.

D. TRIGGER SIGNAL AND CURRENT MONITORING (IMON)

BNC connectors on the front panel



TRIG OUT = ON

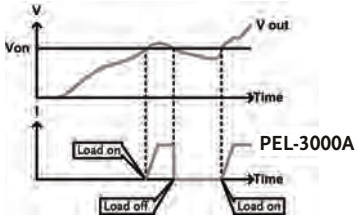


IMON OUTPUT

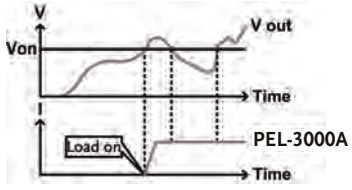
The front panel of PEL-3000A(AH), via BNC connectors provides two output signals, which are Trigger Signal and IMON. Under Dynamic or Sequence function, the moment the load current setting is changed BNC on the front panel will output a 4.5 V and 2 μs pulse voltage. This trigger signal can be set to open or close for every step. Users can use trigger signal to synchronize other devices inside the system.

Current monitoring signals, using a BNC connector to compare with the full scale of real load current, output 0 V to 1 V(0 V to 10 V for PEL-3000AH) at high and low current levels and 0 V to 0.1 V (0 V to 1 V for PEL-3000AH) at medium current level. Therefore, users can monitor load current change without using current probe to save cost.

E. VON VOLTAGE AND VON LATCH FUNCTION



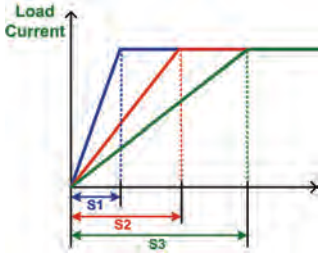
Von Latch = OFF



Von Latch = ON

Von Voltage is the threshold voltage for electronic load to activate or terminate sinking current. When Von Latch is set to off, electronic load operation will be activated if input voltage is higher than Von Voltage and electronic load operation will be terminated if input voltage is lower than Von Voltage. When Von Latch is set to on, electronic load operation will be activated if input voltage is higher than Von Voltage and will continue operation even input voltage is lower than Von Voltage. Von Voltage function can test the transient maximum current capability provided by power supply.

F. SOFT START



Three different load waveforms of Soft Start Time

Soft Start regulates the time of current rising from 0 to preset value during the moment load is activated. This function is to prevent voltage from dropping due to the fast transient rising speed of load current. Sudden voltage drop will result in an unsuccessful activation of electronic load or DUT and a damaged DUT.

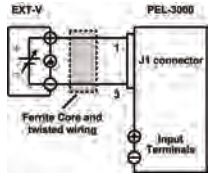
G. PROTECTION MODES

Functions \ Protection	OCP	OVP	OPP	OTP	UVP	RVP
Adjustable Thresholds	✓	✓	✓	Fixed	✓	N/A
Load Off	✓	✓	✓	N/A	✓	Fixed
Limit Function	✓	N/A	✓	N/A	N/A	N/A

The PEL-3000A(AH) Series provides many protective functions including over current protection(OCP), over voltage protection (OVP), over power protection(OPP), over temperature protection (OTP) and under voltage protection(UVP). Except for OTP, all thresholds of protective functions are adjustable. When protective function is activated, electronic load will send out warning signal and terminate operation. Other than protective functions, Limit function can also be utilized to maintain electronic load in operation at a preset value. The related settings and selections are as above: Take UVP as an example. In battery bleeding tests, electronic load will cease operation if battery voltage is lower than the set protective threshold value in order to prevent battery from over bleeding.

H. ANALOG CHANNEL CONTROL

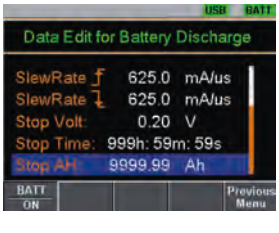
Rear Panel



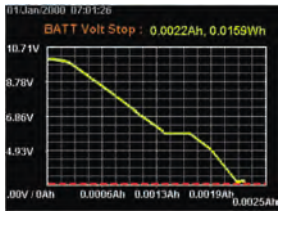
External Voltage Connection

The PEL-3000A(AH) Series provides the external analog channel control function, which allows users to connect J1 and J2 MIL 20 pin standard connectors on the rear panel to input voltage or to connect resistance to control electronic load operation. Input voltage is limited to the range of 0 V to 10 V; connecting resistance is limited to the range of 0 to 10 kΩ; and related to load level are 0 to 100%. For instance, when operating PEL-3021under CC mode and 35 A, external input voltage is 1 V and sink current is 3.5 A. Users can integrate this function into test system and utilize signals generated from the test system to control PEL-3000A(AH) Series.

I. BATT TEST AUTOMATION



BATT Test Automation Editing

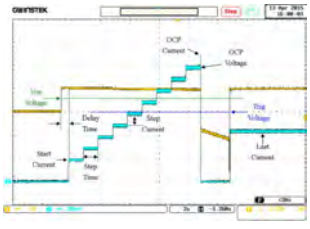


Waveform of TEST Result

Sample of Data Log

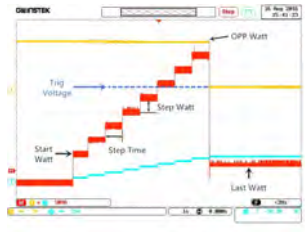
The built-in BATT Test Automation of PEL-3000A(AH) provides battery discharge applications with more flexible discharge stop time setting as well as rise and fall Slew Rate for discharge current settings. Under CP, CC or CR mode, the conditions for stop discharge can be set respectively. For instance, set the input voltage for stop discharge current, the execution time for discharge current or total discharge current*time (AH) to satisfy the verification of battery capability.

J. OCP TEST AUTOMATION



OCP test Automation for DUT(Power Supply), provide users with high resolution OCP measurement values to verify DUT's OCP activation point. It also provides users with measurement results so as to help them determine whether DUT's actual OCP activation point meets the regulations. It can test the value of OCP by setting load current increment from start current to stop current. OCP's activation point can be accurately measured.

K. OPP TEST AUTOMATION

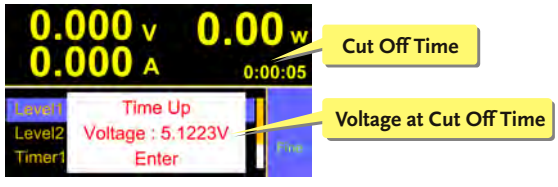


OPP test Automation for DUT(Power Supply), provide users with high resolution OPP measurement values to verify DUT's OPP activation point. It also provides users with measurement results so as to help them determine whether DUT's actual OPP activation point meets the regulations. It can test the value of OPP by setting power increment from start power to stop power. OPP's activation point can be accurately measured.

L. TIMER FUNCTIONS

Elapsed Time

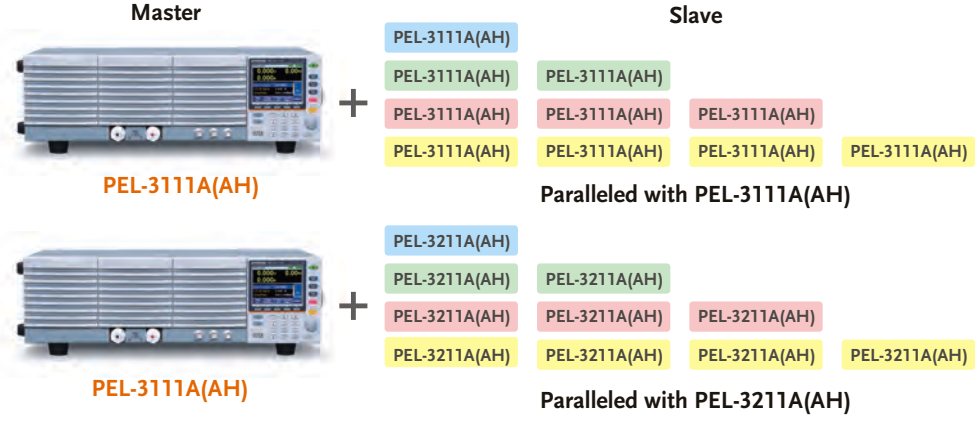
The PEL-3000A(AH) Series provides count time and cut off time functions. The display screen will show present activation time when electronic load is activated. When electronic load operation is terminated count time will stop and the total operation time will be shown on the display screen. ;The activation time of cut off time can be set to the maximum length of 999 h 59 min 59 s. When electronic load



Voltage at Cut Off Time

is activated this function will start counting time. Electronic load will cease operation (load off) and show the final input voltage on the screen when preset time is reached. Timer function can provides information and application related to time. Users can obtain the total time of limiting electronic load operation to increase the agility of electronic load tests.

M. MATER/SLAVE PARALLEL CONTROL



PEL-3111A(AH) can be used as either master or Slave. PEL-3111A(AH) can also be connected in parallel with PEL-3211A(AH) (Booster unit). Customers, based upon their DUT requirements, can collocate different models to meet their power requirements. The system collocation connection and terminals are all copper bar structure.

When the Master/Slave control mode is selected, Master will automatically calculate current sunk as soon as load has been activated. The system will automatically distribute current to each Master/Slave unit. For Master/Slave parallel collocation, users only enter settings and edit programs on Master. Logically speaking, Master/Slave parallel collocation can be regarded as one single load unit. Therefore, this collocation can safely provide load capacity with actual current and power in the respective level. Parallel collocation can also meet different current and power requirements.

Programmable DC Electronic Load

PEL-3031AE

PEL-3032AE

CE | USB | GPIB | Analog Control | LAN | RS-232

FEATURES

* 0 to 150 V(PEL-3031AE)Min. Operating Voltage(dc) : 1 V at 60 A, 0.5 V at 30 A 0 to 500 V(PEL-3032AE)Min. Operating Voltage(dc) : 2.5 V at 15 A, 1.25 V at 7.5 A
* 7 Operating Modes : CC, CV, CR, CP, CC+CV, CR+CV, CP+CV
* Normal Sequence Function: Max Steps: 1000 steps/Step Time:1 ms to 999 h 59 min 59 s(3599940 sec)Fast Sequence Function: Max Steps:1000 steps/Step Time:25 us to 600 ms
* Soft Start
* BATT Test Automation:Max Test Time:999 h: 59 min 59 s(3599940 sec):Max Test AH:9999.99 Ah
* OCP, OPP Test Automation
* Max. Slew Rate : 2.5 A/μs
* Dynamic Mode
* Protection : OVP, OCP, OPP, OTP, RVP, UVP
* Remote Sense
* Integrate Voltage, Current and Power Measurement Functions
* External Voltage or Resistance Control
* Rear Panel BNC, Trigger IN/OUT
* Analog External Control
* Interfaces : LAN/USB/RS-232 & RS-485(Std.), GPIB(Opt.)

GW Instek launches new PEL-3000AE Series programmable single-channel electronic load. In the series, PEL-3031AE provides 300 W (1 V to 150 V/60 A) and PEL-3032AE provides 300 W(2.5 V to 500 V/15 A) current sink capability. Inherited from the PEL-3000A Series, PEL-3000AE has an easy-to-read LCD panel and user-friendly interface. This model features high speed and accurate measurement capability for electronic component, battery, portable charger and power products that require low to medium power consumption.

The PEL-3000AE Series is designed for current sink operation starting from 60 mA and aims at measurement applications, including charger, adapter, various power supply equipment, and portable charger.

The PEL-3000AE Series has seven operating modes. Among them, four basic operating modes are constant current, constant voltage, constant resistance, and constant power. Three other combined operating modes are constant current + constant voltage, constant resistance + constant voltage, constant power + constant voltage. Users can select operating modes based upon products' test requirements. For C.C. mode, electronic load will sink a constant current according to the set current value; for C.V. mode, electronic load will attempt to sink sufficient current to control the source voltage to the programmed value; for C.R. mode, electronic load will sink a current linearly proportional to input voltage according to the set resistance value; for C.P. mode, electronic load will initiate load power sinking operation (load voltage x load current) in accordance with the programmed power setting.

To meet the requirements of different test conditions, the Static function is to sink a constant current; the Dynamic function is to periodically switch between two sink conditions, and the Sequence function is to provide tests for more than two sink conditions. The sequence function can be divided into Normal Sequence and Fast Sequence. Normal Sequence is the most flexible mean of generating complex sequences that can facilitate users to establish a set of changing current sink conditions based upon different sinking conditions (CC, CR, CV or CP mode) and time(adjustable range: 1ms to 999 h 59 min 59 s). Fast sequence allows time resolution of 25us to be set for the smallest step. Setting parameters for multiple steps can simulate consecutive current changes of various real load conditions. For instance, while using an electronic load to test a power-driven tool's power supply, we can first obtain waveforms by an oscilloscope and a current probe from the tool, and subsequently, use the obtained waveforms to edit simulated current waveforms, via electronic load's sequence function, to test the power-driven tool and to analyze its operational status. The Soft Start function allows users to determine the rise time of current sink that is to decide the required time to reach electronic load's set current, resistance or power value. Setting a proper rise time for Soft Start is effective to counter output voltage fluctuation caused by DUT's (power supply) transient output current. It is worth noting, General DC loads do not have the soft start function. When conducting high speed current sink operation, the inductance effect on the cable connecting electronic load and DUT will lead to transient voltage drop on electronic load's input terminal, therefore, that will result in Voltage Non-monotonic increase. PEL-3000AE's soft start function not only allows output voltage to be Monotonic increase, but also prevents inrush current and surge voltage from happening on DUT. For instance, tests using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

The built-in BATT Test Automation of PEL-3000AE Series provides battery discharge applications with more flexible discharge stop setting as well as rise and fall Slew Rate for discharge current settings. OCP, OPP test Automation for DUT (ex. Power Supply), provide users with high resolution measurement values to verify DUT's activation point. Provide users with measurement results so as to help them determine whether DUT's actual over protection activation point meets the regulations. Other than that, PEL-3000AE provides users with analog control terminal to control PEL-3000AE Series from external voltage, external resistance and switch. Analog control terminal can also monitor electronic load's status and display protective alarms.

SPECIFICATIONS

Model	PEL-3031AE		PEL-3032AE	
Power	300W	300W	300W	300W
Range	Low	High	Low	High
Voltage	0 ~ 150V	0 ~ 150V	0 ~ 500V	0 ~ 500V
Current	0 ~ 6A	0 ~ 60A	0 ~ 1.5A	0 ~ 15A
Min. Operating Voltage(dc)	1V ~ 6A	1V ~ 60A	2.5V ~ 1.5A	2.5V ~ 15A
STATIC MODE				
Constant Current Mode				
Range	0 ~ 6A	0 ~ 60A	0 ~ 1.5A	0 ~ 15A
Setting Range	0 ~ 6.12A	0 ~ 61.2A	0 ~ 1.53A	0 ~ 15.3A
Resolution	0.2mA	2mA	0.05mA	0.5mA
Accuracy	(T*1)±(0.1% of set +0.1% of FS)+ Vin/500kΩ (Full scale of High range)	(T*1)±(0.1% of set +0.2% of FS)+ Vin/500kΩ (Full scale of High range)	(T*1)±(0.1% of set +0.1% of FS)+ Vin/500kΩ (Full scale of High range)	(T*1)±(0.1% of set +0.2% of FS)+ Vin/500kΩ (Full scale of High range)
Constant Resistance Mode				
Range	60S~0.002S(0.01666Ω~500Ω)(300W/15V) 6S~0.0002S(0.1666Ω~5kΩ)(300W/150V)		6S~0.0002S(0.16666Ω~5kΩ)(300W/50V) 0.6S~0.00002S(1.6666Ω~0kΩ)(300W/500V)	
Setting Range	60S~0.002S(0.01666Ω~500Ω)(300W/15V) 6S~0.0002S(0.1666Ω~5kΩ)(300W/150V)		6S~0.0002S(0.16666Ω~5kΩ)(300W/50V) 0.6S~0.00002S(1.6666Ω~50kΩ)(300W/500V)	
Resolution(30000 Steps)	0.002S(15V) ; 0.0002S(150V)		0.0002S(50V) ; 0.00002S(500V)	
Accuracy	(T*1)±(0.3% of set + 0.6S) + 0.002mS		(T*1)±(0.3% of set + 0.06S) + 0.002mS	
Constant Voltage Mode				
Range	1 ~ 15V	1 ~ 150V	2.5 ~ 50V	2.5 ~ 500V
Setting Range	0 ~ 15.3V	0 ~ 153V	0 ~ 51V	0 ~ 510V
Resolution	0.5mV	5mV	1mV	10mV
Accuracy	(T*1)±(0.1% of set+ 0.1% of FS) (Full scale of High range)	(T*1)±(0.1% of set+ 0.1% of FS) (Full scale of High range)	(T*1)±(0.1% of set+ 0.1% of FS) (Full scale of High range)	(T*1)±(0.1% of set+ 0.1% of FS) (Full scale of High range)
Constant Power Mode				
Range	0W ~ 30W(6A)	0W ~ 300W(60A)	0W ~ 30W(1.5A)	0W ~ 300W(15A)
Setting Range	0W ~ 30.6W	0W ~ 306W	0W ~ 30.6W	0W ~ 306W
Resolution	1mW	10mW	1mW	10mW
Accuracy	(T*1)±(0.6 % of set + 1.4 % of FS (Full scale of H range) + Vin∧2/500 kΩ			

PEL-3032AE

SPECIFICATIONS

Model	PEL-3031AE		PEL-3032AE	
DYNAMIC MODE				
General T1& T2	0.05ms~30ms/Res:1μs;30ms~30s/Res:1ms		0.05ms~30ms/Res:1μs;30ms~30s/Res:1ms	
Accuracy	1μs/1ms±200ppm	1μs/1ms±200ppm	1μs/1ms±200ppm	1μs/1ms±200ppm
Slew Rate(Accuracy 10%)	0.001 ~ 0.25A/μs	0.01 ~ 2.5A/μs	0.25 ~ 62.5mA/μs	2.5 ~ 625mA/μs
Slew Rate Resolution	0.001A/μs	0.01A/μs	0.25mA/μs	2.5mA/μs
Slew Rate Accuracy of Setting	±(10% + 15μs) *1 Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in L range) of the rated current.			
Constant Current Mode Current Setting Range	0 ~ 6A	0 ~ 60A	0 ~ 1.5A	0 ~ 15A
Current Resolution	0 ~ 6.12A	0 ~ 61.2A	0 ~ 1.53A	0 ~ 15.3A
Current Accuracy	0.2mA	2mA	0.05mA	0.5mA
	±0.8% FS	±0.8% FS	±0.8% FS	±0.8% FS
Constant Resistance Mode Range	60S~0.002S(0.01666Ω~500Ω)(300W/15V) 6S~0.0002S(0.1666Ω~5kΩ)(300W/150V)		6S~0.0002S(0.16666Ω~5kΩ)(300W/50V) 0.6S~0.00002S(1.6666Ω~50kΩ)(300W/500V)	
Setting Range	60S~0.002S(0.01666Ω~500Ω)(300W/15V) 6S~0.0002S(0.1666Ω~5kΩ)(300W/150V)		6S~0.0002S(0.16666Ω~5kΩ)(300W/50V) 0.6S~0.00002S(1.6666Ω~50kΩ)(300W/500V)	
Resistance Resolution	30000 steps		30000 steps	
Resistance Accuracy	(T*1)±(1%set + 0.6S) + 0.002mS		(T*1)±(1%set + 0.06S) + 0.002mS	
MEASUREMENT				
Voltage Readback Range	0 ~ 15V	0 ~ 150V	0 ~ 50V	0 ~ 500V
Resolution	0.5mV	5mV	2mV	20mV
Accuracy	(T*1)±(0.1% of rdg +0.1% of FS) (Full scale of Low range)	(T*1)±(0.1% of rdg +0.1% of FS) (Full scale of High range)	(T*1)±(0.1% of rdg +0.1% of FS) (Full scale of Low range)	(T*1)±(0.1% of rdg +0.1% of FS) (Full scale of High range)
Current Readback Range	0 ~ 6A	0 ~ 60A	0 ~ 1.5A	0 ~ 15A
Resolution	0.2mA	2mA	0.05mA	0.5mA
Accuracy	(T*1)±(0.1% of rdg+ 0.1% of FS) (Full scale of High range)	(T*1)±(0.1% of rdg+ 0.2% of FS) (Full scale of High range)	(T*1)±(0.1% of rdg+ 0.1% of FS) (Full scale of High range)	(T*1)±(0.1% of rdg+ 0.2% of FS) (Full scale of High range)
Power Read back H&L Range	0 ~ 300W	0 ~ 300W	0 ~ 300W	0 ~ 300W
CP Mode L Range	0 ~ 30W	0 ~ 30W	0 ~ 30W	0 ~ 30W
FUNCTION				
Sequence(Normal/Fast)	Normal sequence function: Max steps: 1000 steps/Step time: 1ms ~ 999h 59min 59s(3599940 sec) Fast sequence function: Max steps: 1000 steps/Step time: 25us ~ 600ms			
BATT Test Automation	Max test time: 999h: 59m: 59s(3599940sec) ; Max test AH: 9999.99Ah			
Test Function	OCP Autotest function, OPP Autotest Function			
Soft Start	Yes			
In/Out Terminal	Analog External Control, Current Monitor Output, Trigger In/Out Terminal(BNC)			
Preset Data	10 Sets			
Protection	OCP, OPP, UVP, OVP, OTP, RVP			
OTHER				
Power Source	100 ~ 120VAC/200 ~ 240VAC, 47 ~ 63Hz			
Interface	LAN/USB/RS-232 & RS-485(Std.), GPIB(Opt.)			
Dimensions & Weight	213.8(W) x 124.0(H) x 400.5(D)mm, Approx. 7.5Kg			

Note : *1 - If the ambient temperature is over 30 ℃ or below 20 ℃, then T = ± | t - 25 ℃ | x 100 ppm/℃ x Set
If the ambient temperature is in the range of 20 ℃ to 30 ℃, then T = 0 (t is the ambient temperature)

ORDERING INFORMATION

PEL-3031AE 150 V/60 A/300 W Programmable Single-channel DC Electronic Load
PEL-3032AE 500 V/15 A/300 W Programmable Single-channel DC Electronic Load

ACCESSORIES :
Power Cord (Region dependent), Front Terminal Washers-spring Washer(M6) x 2,
GTL-105A Remote Sense Cables(Red x 1, Black x 1)

OPTIONAL ACCESSORIES

GTL-246 USB cable, Type A – Type B
GTL-248 GPIB cable, 2.0 m
GTL-259 RS-232 Cable with Db9 connector to RJ45
GTL-260 RS-485 Cable with DB9 connector to RJ45
GTL-261 Serial Master Cable+Terminator, 0.5M
GTL-262 RS-485 Slave cable
GRA-414-J Rack Mount Kit(JIS)
GRA-414-E Rack Mount Kit(EIA)
PEL-010 Dust Filter
PEL-004 GPIB option

Rear Panel

PEL-010 Dust Filter

PEL-004 GPIB Option

GRA-414-J Rack Mount Kit (JIS)

GRA-414-E Rack Mount Kit (EIA)

GTL-259

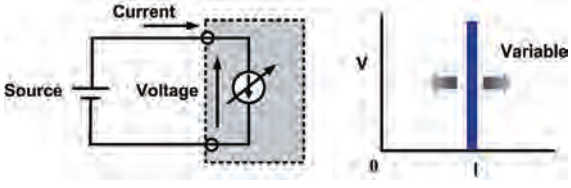
GTL-260

GTL-261

GTL-262

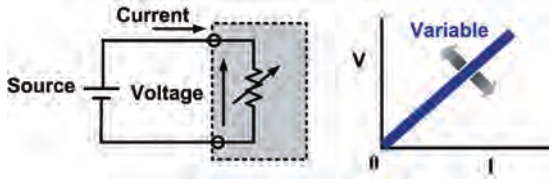
A. OPERATING MODE

The PEL-3000AE series provides four fundamental operating modes and three add-on modes of CC, CR and CP separately combining with CV. Users can set different load condition under different operating modes such as setting operating range for load level, Current Slew Rate, input voltage and load current. The input voltage range has two levels - high and low. The load current operating range has two levels - high and low current levels which possess different resolution to meet test requirements of different power product specifications.



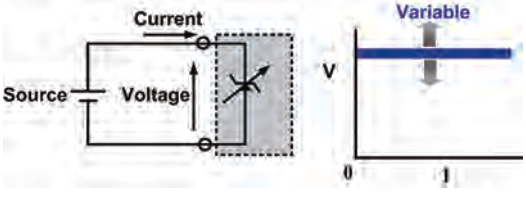
CC Mode

Under constant current mode, electronic load will sink the amount of current users has set. Different current settings via CC mode allow users to test the voltage changes of DC power supply which is called load regulation rate test.



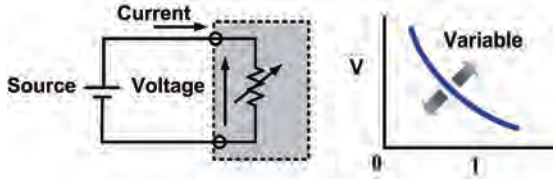
C.R Mode

Under constant resistance mode, electronic load will sink load current, which is linearly direct proportion to input voltage. This mode can be utilized in testing voltage or the activation and current limit of power supply.



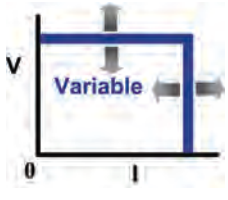
C.V Mode

Under constant voltage mode, electronic load will sink sufficient current to regulate the voltage source to the set value. This mode allows users not only to test current limit function of power supply, but also to simulate battery operation in testing battery chargers.

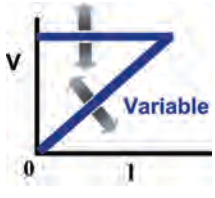


C.P Mode

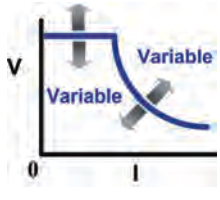
Under constant power mode, electronic load will sink load current, which is indirect proportion to input voltage to reach preset constant power requirement. Hence, the changes of input voltage will have indirect proportion effect on current sinking so as to reach constant power control.



CC+CV Mode



CR+CV Mode



CP+CV Mode

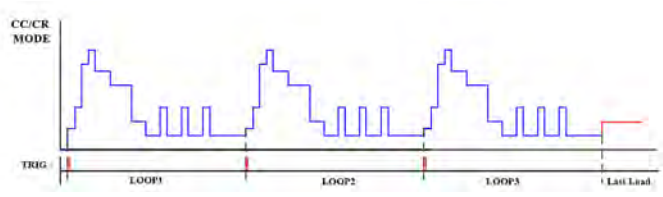
+CV mode can be selected under CC, CR or CP mode. When +CV mode function is turned on and electronic load sinks more current than the maximum current of power supply under test, electronic load will automatically switch to CV mode. It is because that the current sunk is the maximum current of power device. Therefore, power supply will switch to CC mode and PEL-3000AE will switch to CV mode to limit electronic load from sinking the total current of power supply so as to prevent power supply under test from damaging. Electronic load will cease operation once the voltage of DUT is lower than the set voltage under + CV mode.

B. STATIC/DYNAMIC/SEQUENCE MODE

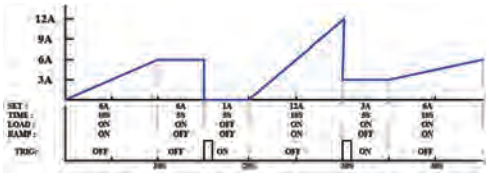
Function \ Operation	Static	Dynamic	Sequence	
			Fast	Normal
Operating Condition Selection	Single fixed condition	Selection between two conditions	Selection from more than two conditions	Selection from more than two conditions
Operating Modes	All modes	• Two conditions using same mode • Support CC or CR mode	• Each condition must use same mode • Support CC or CR mode	• Each condition is able to be used in different mode • All modes
Adjustable Condition Setting	• Value A/ Value B • Slew Rate	• Level 1/Level 2 • Timer 1/Timer 2 • Slew Rate 1/Slew Rate 2	• Level • Others... • Timer • Slew Rate	• Level • Others... • Timer • Slew Rate
Sequence Step Combination	N/A	N/A	• 1 Sequence • 25μs/step • 1,000 steps	• 10 Sequence • 1ms/step • 1,000 steps
Other Functions	N/A	Trigger Out function	Trigger Out function	• Trigger Out function • Ramp function

The PEL-3000AE Series, according to different test conditions, step or continuous changes, test speeds, and selectable modes, has three operating functions: Static, Dynamic and Sequence.

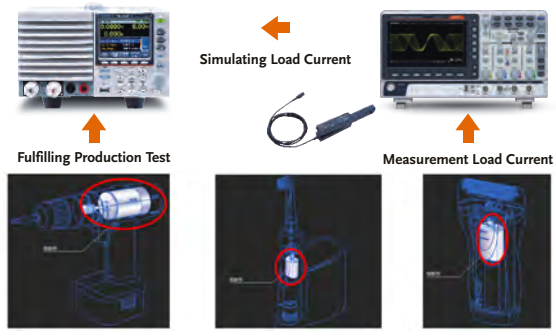
C. FAST SEQUENCE & NORMAL SEQUENCE



Fast Sequence Diagram

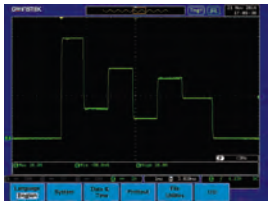


Normal Sequence Diagram

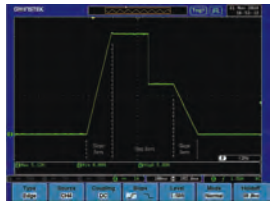


Power-driven Tools Simulation Test

Set a complete sequence editing function to obtain following waveforms. Users can save development cost and time without using a PC to control electronic load and writing programs.

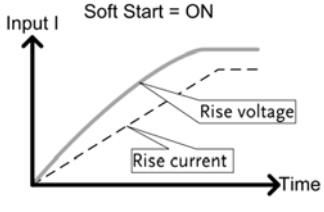


When operating the Sequence Function, PEL-3000AE Series follows the time and load settings of step1, step2, step3, etc. so as to realize different load current variation.

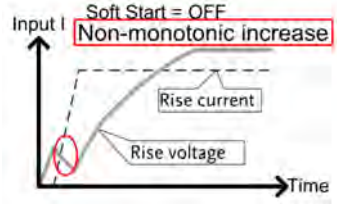


Ramp function of PEL-3000AE Series is able to set the current transition. When turned on, the current takes on a slope form; when turned off, the current takes on a step form.

D. SOFT START

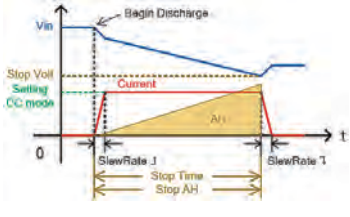


The Soft Start function of PEL-3000AE Series allows users to determine the rise time of current sink that is to decide how much time is required to reach electronic load's set current, resistance or power value. PEL-3000AE's soft start function prevents inrush current and surge voltage from happening on DUT.

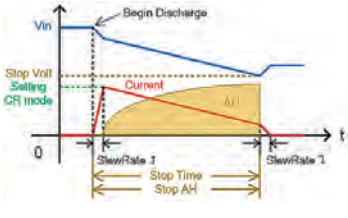


For instance, test applications using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

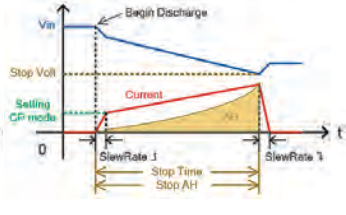
E. BATT TEST AUTOMATION



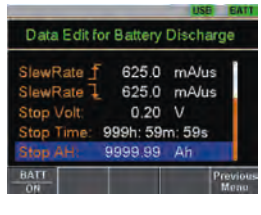
CC Mode



CR Mode



CP Mode

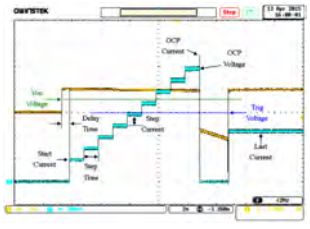


BATT Test Automation Editing

The built-in BATT Test Automation of PEL-3000AE provides battery discharge applications with more flexible discharge stop time setting as well as rise and fall Slew Rate for discharge current settings. Under CP, CC or CR mode, the conditions for stop discharge can be set respectively.

For instance, set the input voltage for stop discharge current, the execution time for discharge current or total discharge current*time (AH) to satisfy the verification of battery capability.

F. OCP TEST AUTOMATION

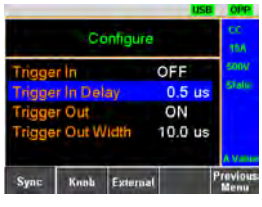


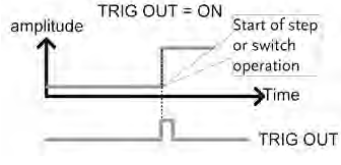
OCP test Automation for DUT(Power Supply), Provide users with high resolution OCP measurement values to verify DUT's OCP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OCP activation point meets the regulations. Test the value of OCP by setting load current increment from start current to stop current. OCP's activation point can be accurately measured.

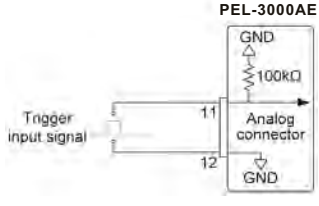
G. OPP TEST AUTOMATION

OPP test Automation for DUT(Power Supply), Provide users with high resolution OPP measurement values to verify DUT's OPP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OPP activation point meets the regulations. Test the value of OPP by setting power increment from start power to stop power. OPP's activation point can be accurately measured.

H. TRIGGER IN/OUT BNC







Trigger In/Out function could be turned on or off by CONFIGURE setting of PEL-3000AE Series. The Trigger Input can be set the delay time while the Trigger Out Pulse Width can be set as well.

The trigger output signal is generated every time a switching operation is performed such as Dynamic mode or Fast/Normal sequence is executed when the trig out parameter is enabled.

The trigger output signal from TRIG OUT BNC is a 4.5V pulse of at least 2us with an impedance of 500ohm. The common potential is connected to the chassis potential. The signal threshold level is TTL.

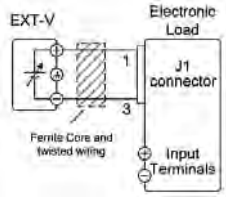
The TRIG IN BNC on the rear panel is used to resume a sequence after a pause. This action is useful to synchronize the execution of a sequence with another device. To resume a pause sequence, apply a high signal for 10us or more. The TRIG IN BNC is pulled down to earth internally using a 100Kohm resistor.

I. PROTECTION MODES

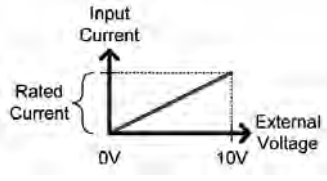
Function \ Protection	OCP	OVP	OPP	OTP	UVP
Adjustable Thresholds	✓	✓	✓	N/A	✓
Load Off	✓	✓	✓	Fixed	✓
Limit Function	✓	N/A	✓	N/A	N/A

The PEL-3000AE Series provides many protective functions including over current protection (OCP), over voltage protection (OVP), over power protection (OPP), over temperature protection (OTP) and under voltage protection (UVP). Except for OTP, all thresholds of protective functions are adjustable. When protective function is activated, electronic load will send out warning signal and terminate operation. Other than protective functions, Limit function can also

J. ANALOG EXTERNAL CONTROL

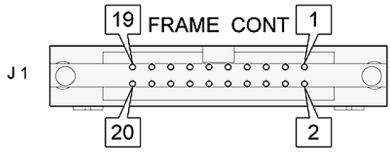


External Voltage Control

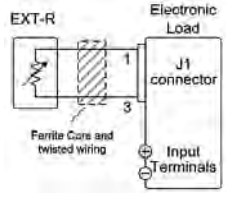


CC Mode

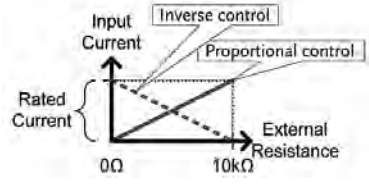
Input current = rated current x (external voltage/10)



J1 Connector



External Resistance Control



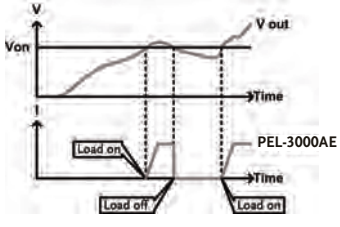
CC Mode

Proportional Control:Input current = rated current x (external resistance/10K ohm)

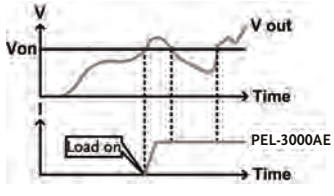
Inverse Control:Input current = rated current x (1- external resistance/10k ohm)

The PEL-3000AE Series provides the external analog channel control function, which allows users to connect J1 connectors on the rear panel to input voltage or to connect resistance to control electronic load operation. Users can integrate this function into test system and utilize signals generated from the test system to control PEL-3000AE Series.

K. VonN VOLTAGE AND Von LATCH FUNCTION



Von Latch = OFF

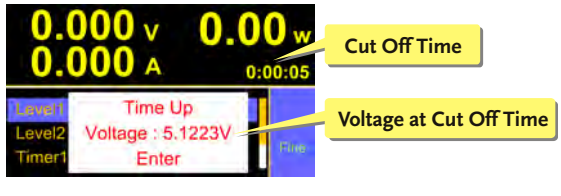


Von Latch = ON

Von Voltage is the threshold voltage for electronic load to activate or terminate sinking current. When Von Latch is set to off, electronic load operation will be activated if input voltage is higher than Von Voltage and electronic load operation will be terminated if input voltage is lower than Von Voltage. When Von Latch is set to on, electronic load operation will be activated if input voltage is higher than Von Voltage and will continue operation even input voltage is lower than Von Voltage. Von Voltage function can test the transient maximum current capability provided by power supply.

L. TIMER FUNCTIONS

Elapsed Time



Voltage at Cut Off Time

The PEL-3000AE series provides count time and cut off time functions. The display screen will show present activation time when electronic load is activated. When electronic load operation is terminated count time will stop and the total operation time will be shown on the display screen. The activation time of cut off time can be set to the maximum length of 999h 59min 59s. When electronic load is activated this function will start counting time. Electronic load will cease operation (load off) and show the final input voltage on the screen when preset time is reached. Timer function can provides information and application related to time. Users can obtain the total time of limiting electronic load operation to increase the agility of electronic load tests.

Programmable DC Electronic Load

PEL-2004A

PEL-2002A

CE | RS-232 | GPIB | USB | LabVIEW Driver | LAN

FEATURES

* Sequence Function to do High Speed Load Simulations
* Flexible Configuration with Mainframes and Plug-in Modules
* Multiple Independent Load Inputs up to 8 Channels in a Mainframe
* Parallel Connection of Inputs for Higher Load Capacity
* Program Mode to Create Work Routines for Repetitive Tests
* OPP/OCP/OVP/OTP/RVP/UVP Protections
* External Channel Control/Monitoring via Analog Control Connector
* Multiple-Interface USB Device/Host, RS-232C, and GPIB/LAN (Optional)

The PEL-2004A and PEL-2002A are multiple channel, programmable DC electronic loads with a modularized structure. The PEL-2000A Series is designed to meet the continuing shift toward high speed operation in today's semiconductor market. As the power supply units, DC-DC converters, and batteries that drive semiconductor circuits need to follow this shift, power supply design, quality inspection and characteristic certification using high-speed performance loads have become necessary. The PEL-2000A Series includes two types of mainframes and 4 types of load modules to accommodate users' requirements in a flexible manner. Any load module combination can be used with a mainframe to tailor a test system based on the number of channels, and the maximum load power, voltage and current of each channel. Multiple loads can be connected in parallel to provide a higher-power load to test higher power supply outputs. This flexibility significantly reduces the investment needed for future projects that have differed power requirements.

PEL-2004A is a 4-slot mainframe with a master control unit to hold 4 load modules, while PEL-2002A is a 2-slot mainframe with master control unit to hold 2 load modules. When PEL-2004A is configured with 4 load modules rated at 350 W each, the PEL-2000A Series is able to sink up to 1.4 kVA of power.

For higher load capacities, mainframes can be linked together in parallel with standard MIL 20-pin connectors. A maximum of 5 mainframes, including one master and 4 slaves can be chained together to create a total load capacity of 7 kW for high current and high power applications. Using 4 dual channel load modules, PEL-2004A is able to test 8 power supply outputs simultaneously.

The Sequence function allows each channel to change its load sink according to a predefined sequence at a rate of up to 100 µs per step. Each sequence is able to run concurrently, under the control of one clock. This is one of the most powerful features of the PEL-2000A Series as it is able to realistically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a pre-defined speed up to 25 µs per step. This is often used as the standard test procedure to verify the response of a power supply to quick load changes. Most remarkably, multiple load channels can be connected in parallel to run Dynamic tests synchronously under a single clock. This Parallel Dynamic functionality gives the flexibility to perform dynamic tests for a high-power power supply without the need of another high-power load.

The PEL-2000A Series includes a number of protection modes: Over Current Protection (OCP), Over Voltage Protection (OVP), Over Power Protection (OPP), Reverse Voltage Protection (RVP), and Under Voltage Protection(UVP). The protection modes are useful to protect both the load modules and the DUT(s).

A buzzer can be set for when a protection setting has been tripped. When a protection mode has been tripped, the load unit will display an alarm and stop sinking current/voltage. When a load unit is operating in CR or CV mode, the unit may need Over Current Protection to prevent excessive current being sunk. Over Current Protection stops the load from sinking more current than its recommended limit and prevents the load from burn-out damage. Over Voltage Protection is used to limit the amount of voltage sunk. If the OVP trips, the PEL-Series load will stop sinking voltage. Over Power Protection is used when the input power exceeds the specifications of the load. When OPP is tripped, the power will cease to be sunk. Reverse Voltage Protection prevents reverse voltage damage to the PEL-2000 A Series up to the specified rating. When Reverse Voltage Protection has been tripped, an alarm tone will sound until the reverse voltage is removed. Under Voltage Protection will turn off the load when the voltage drops below a set limit.

The Go/NoGo function is available to monitor test results all the time. When a test result goes beyond a preset limit range, a "No Go" indication will be shown on the display and a "No Go" signal can be sent out through the D-SUB interface for external device control. This Go/NoGo function is available for CC mode, CV mode and CR mode. Under "Program" mode, 12 programs each containing 10 panel-setup memories, can be edited to create work routines for repetitive tests. After a program has been executed, the results of all test steps, along with the Go/NoGo judgments, will be shown on the screen. For external control and system configuration, the PEL-Series has USB and RS-232 interfaces as standard and LAN as well as GPIB as an option. The LabView driver and Data Logging PC software are both supported for all the available interfaces. Each channel has an analog control/monitoring connector on the rear panel to externally turn a load on/off and to externally monitor load input current and voltage.

PEL-001 GPIB Card

PEL-002 Rack Mount Kit

PEL-003 Panel Cover

PEL-016 LAN Card
(for PEL-2000A Main Frame)

GTL-249 Frame Link Cable

GTL-120 Test Lead

GTL-121 Sense Lead

SPECIFICATIONS

	PEL-2020A/ PEL-2020B		PEL-2030A/ PEL-2030B			PEL-2040A/ PEL-2040B		PEL-2041A/ PEL-2041B	
CHANNEL	L/R	L/R	Left	Right	Right	One channel	One channel	One channel	One channel
RANGE	Low	High	N/A	Low	High	Low	High	Low	High
POWER	100W	100W	30W	250W	250W	350W	350W	350W	350W
CURRENT	0~2A	0~20A	0~5A	0~4A	0~40A	0~7A	0~70A	0~1A	0~10A
VOLTAGE	0~80V	0~80V	0~80V	0~80V	0~80V	0~80V	0~80V	0~500V	0~500V
MIN.OPERATING VOLTAGE (DC)(Typ.)	0.4V at 2A 0.2V at 1A	0.8V at 20A 0.4V at 10A	0.8V at 5A 0.4V at 2.5A	0.4V at 4A 0.2V at 2A	0.8V at 40A 0.4V at 20A	0.4V at 7A 0.2V at 3.5A	0.8V at 70A 0.4V at 35A	1V at 1A 0.5V at 0.5A	2V at 10A 1V at 5A
STATIC MODE									
CONSTANT CURRENT MODE									
Operating Range	0~2A	0~20A	0~5A	0~4A	0~40A	0~7A	0~70A	0~1A	0~10A
Setting Range	0~2.04A	0~20.4A	0~5.1A	0~4.08A	0~40.8A	0~7.14A	0~71.4A	0~1.02A	0~10.2A
Resolution	0.1mA	1mA	0.125mA	0.1mA	1mA	0.2mA	2mA	0.05mA	0.5mA
Accuracy	±(0.1%set + 0.1%F.S.)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S.)	±(0.1%set + 0.1%F.S.)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S.)	±(0.1%set+ 0.2%F.S.)	±(0.1%set+ 0.1%F.S.)	±(0.1%set+ 0.2%F.S.)
CONSTANT RESISTANCE MODE									
Operating Range	0.075Ω~300Ω(100W/16V) 3.75Ω~15K(100W/80V)		0.3Ω~1.2KΩ(30W/16V) 15Ω~60K(30W/80V)	0.0375Ω~150Ω(250W/16V) 1.875Ω~7.5K(250W/80V)		0.025Ω~100Ω(350W/16V) 1.25Ω~5K(350W/80V)		1.25Ω~5KΩ(350W/125V) 50Ω~200K(350W/500V)	
Setting Range	0.075Ω~300Ω(100W/16V) 3.75Ω~15K(100W/80V)		0.3Ω~1.2KΩ(30W/16V) 15Ω~60K(30W/80V)	0.0375Ω~150Ω(250W/16V) 1.875Ω~7.5K(250W/80V)		0.025Ω~100Ω(350W/16V) 1.25Ω~5K(350W/80V)		1.25Ω~5Ω(350W/125V) 50Ω~200K(350W/500V)	
Resolution	0.333mS(100W/16V) 6.667μS(100W/80V)		83.333μS(30W/16V) 1.666μS(30W/80V)	0.666mS(250W/16V) 13.333μS(250W/80V)		1mS(350W/16V) 20μS(350W/80V)		20μS(350W/125V) 0.5μS(350W/500V)	
Accuracy (with≥2.5V at input)	300Ω: ±(0.2%set+0.1S) 15KΩ: ±(0.1%set+0.01S)		1.2KΩ:±(0.2%set+0.1S) 60KΩ:±(0.1%set+0.01S)	150Ω:±(0.2%set+0.1S) 7.5KΩ:±(0.1%set+0.01S)		100Ω: ±(0.2%set+0.1S) 5KΩ: ±(0.1%set+0.01S)		5KΩ:±(0.2%set+0.02S) 200KΩ:±(0.1%set+0.005S)	
CONSTANT VOLTAGE+ CONSTANT CURRENT MODE									
Operating Range	1~80V					1~80V		2.5~500V	
Setting Range	0~81.6V					0~81.6V		0~510V	
Resolution	2mV					2mV		10mV	
Accuracy	±(0.05%set + 0.1%F.S.)					±(0.05%set + 0.1%F.S.)		±(0.05%set + 0.1%F.S.)	
Current Setting Range	0~20A		0~5A	0~40A		0~70A		0~10A	
Resolution	1mA		0.125mA	1mA		2mA		0.5mA	
Accuracy	±(0.1%set + 0.2%F.S)								
CONSTANT POWER MODE									
Operating Range*	1~10W	1~100W	1~30W	1~25W	1~250W	1~35W	1~350W	1~35W	1~350W
Setting Range	0~10.2W	0~102W	0~30.6W	0~25.5W	0~255W	0~35.7W	0~357W	0~35.7W	0~357W
Resolution	1mW	10mW	1mW	1mW	10mW	1mW	10mW	1mW	10mW
Accuracy	±(0.5%set + 0.5%F.S)	±(0.5%set + 0.5%F.S)	±(0.5%set + 0.5%F.S)	±(0.5%set + 0.5%F.S)	±(0.5%set + 0.5%F.S)	±(0.5%set+ 0.5%F.S)	±(0.5%set+ 0.5%F.S)	±(0.5%set+ 0.2%F.S)	±(0.5%set+ 0.5%F.S)
DYNAMIC MODE									
T1&T2	0.025mS~10mS/Res:1μS 10mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 10mS~30S/Res:1mS			0.025mS~10mS/Res:1μS 10mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 10mS~30S/Res:1mS	
Accuracy	1μS/1mS ± 100ppm		1μS/1mS ± 100ppm			1μS/1mS±100ppm		1μS/1mS±100ppm	
CONSTANT CURRENT MODE									
Slew Rate (±10%set+15μS)	0.32~80mA/μS	3.2~800mA/μS	0.8~200mA/μS	0.64~160mA/μS	6.4~1600mA/μS	0.001~0.28A/μS	0.01~2.8A/μS	0.16~40mA/μS	1.6~400mA/μS
Slew Rate Resolution	0.32mA/μS	3.2mA/μS	0.8mA/μS	0.64mA/μS	6.4mA/μS	0.001A/μS	0.01A/μS	0.16mA/μS	1.6mA/μS
Slew Rate Accuracy of Setting	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)
Current Settong Range	0~2A	0~20A	0~5A	0~4A	0~40A	0~7A	0~70A	0~1A	0~10A
Current Resolution	0.1mA	1mA	0.125mA	0.1mA	1mA	0.2mA	2mA	0.05mA	0.5mA
Current Accuracy	±0.4% F.S.	±0.4% F.S.	±0.4%F.S.	±0.4%F.S.	±0.4%F.S.	±0.4% F.S.	±0.4% F.S.	±0.4%F.S.	±0.4%F.S.
CONSTANT RESISTANCE MODE									
Slew Rate	0.32~80mA/μS	3.2~800mA/μS	0.8~200mA/μS	0.64~160mA/μS	6.4~1600mA/μS	0.001~0.28A/μS	0.01~2.8A/μS	0.16~40mA/μS	1.6~400mA/μS
Slew Rate Resolution	0.32mA/μS	3.2mA/μS	0.8mA/μS	0.64mA/μS	6.4mA/μS	0.001A/μS	0.01A/μS	0.16mA/μS	1.6mA/μS
Slew Rate Accuracy of setting	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)	±(10%+15μs)
Resistance Setting Range	0.075Ω~300KΩ(100W/16V) 3.75Ω~15K(100W/80V)		0.3Ω~1.2KΩ(30W/16V) 15Ω~60K(30W/80V)	0.0375Ω~150KΩ(250W/16V) 1.875Ω~7.5K(250W/80V)		0.025Ω~100Ω(350W/16V) 1.25Ω~5K(350W/80V)		1.25Ω~5KΩ(350W/125V) 50Ω~200K(350W/500V)	
Resistance Resolution	0.333mS(100W/16V) 6.667μS(100W/80V)		83.333μS(30W/16V) 1.666μS(30W/80V)	0.666mS(250W/16V) 13.333μS(250W/80V)		1mS(350W/16V) 20μS(350W/80V)		20μS(350W/125V) 0.5μS(350W/500V)	
Resistance Resolution	300Ω:±(0.5%set+0.1S)		1.2KΩ:±(0.5%set+0.1S)	150Ω:±(0.5%set+0.1S)		100Ω:±(0.5%set + 0.1S)		5KΩ:±(0.5%set + 0.02S)	
Resistance Accuracy	15KΩ:±(0.5%set+0.01S)		60KΩ:±(0.5%set+0.01S)	7.5KΩ:±(0.5%set+0.01S)		5KΩ:±(0.5%set + 0.01S)		200KΩ:±(0.5%set + 0.005S)	
MEASUREMENT									
VOLTAGE READBACK									
Range	0~16V	0~80V	0~16V,0~80V	0~16V	0~80V	0~16V	0~80V	0~125V	0~500V
Resolution	0.32mV	1.6mV	0.32mV,1.6mV	0.32mV	1.6mV	0.32mV	1.6mV	2.5mV	10mV
Accuracy	±(0.025%set + 0.025%F.S.)								
CURRENT READBACK									
Range	0~2A	0~20A	0~5A	0~4A	0~40A	0~7A	0~70A	0~1A	0~10A
Resolution	0.04mA	0.4mA	0.1mA	0.08mA	0.8mA	0.14mA	1.4mA	0.02mA	0.2mA
Accuracy	±(0.05%set + 0.05%F.S.)								
POWER READBACK									
Range	0~10W	0~100W	0~30W	0~25W	0~250W	0~35W	0~350W	0~35W	0~350W
Accuracy	±(0.1%set + 0.1%F.S.*1)								

*1 : Power F.S.=Vrange F.S. x Irange F.S.

Programmable DC Electronic Load

PEL-2004A Rear Panel

PEL-2020A Rear Panel

PEL-2000A(B) Series

SPECIFICATIONS

	PEL-2020A/ PEL-2020B		PEL-2030A/ PEL-2030B			PEL-2040A/ PEL-2040B		PEL-2041A/ PEL-2041B	
PROTECTION									
OVER POWER PROTECTION									
Range	1~102W		1~30.6W	1~255W		1~357W		1~357W	
Resolution	0.5W		0.15W	1.25W		1.75W		1.75W	
Accuracy	±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)	±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)	
OVER CURRENT PROTECTION									
Range	0~20.4A		0~5.1A	0~40.8A		0~71.4A		0~10.2A	
Resolution	0.05A		0.0125A	0.1A		0.175A		0.025A	
Accuracy	±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)	±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)	
OVER VOLTAGE PROTECTION									
Range	1~81.6V		1~81.6V	1~81.6V		1~81.6V		1~510V	
Resolution	0.2V		0.2V	0.2V		0.2V		1.25V	
Accuracy	±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)	±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)		±(2%set+0.25%F.S.)	
Over Temperature Protection	≒85℃		≒85℃	≒85℃		≒85℃		≒85℃	
RATED POWER PROTECTION									
Value	110W		33W	275W		385W		385W	
Accuracy	±(2%set)		±(2%set)	±(2%set)		±(2%set)		±(2%set)	
GENERAL									
SHORT CIRCUIT									
Current(CC)	≒2.2/2A	≒22/20A	≒5.5/5A	≒4.4/4A	≒44/40A	≒7.7/7A	≒77/70A	≒1.1/1A	≒11/10A
Voltage(CV)	0V	0V	0V	0V	0V	0V	0V	0V	0V
Resistance(CR)	≒3.75Ω	≒0.075Ω	≒15Ω , ≒0.3Ω	≒1.875Ω	≒0.0375Ω	≒1.25Ω	≒0.025Ω	≒15Ω , ≒50Ω	≒1.25Ω
INPUT RESISTANCE(LOAD OFF)									
	500KΩ(Typical)								
POWER SOURCE	AC100V ~ 230V ± 10% ; 50Hz / 60Hz ± 2Hz								
WEIGHT	Approx. 3.8 kg								
DIMENSIONS & WEIGHT (PEL-2002A)	272(W) x 200(H) x 581(D) mm ; Approx. 17.1kg(full modules)								
DIMENSIONS & WEIGHT (PEL-2004A)	435(W) x 200(H) x 581(D) mm ; Approx. 28.4kg(full modules)								

ORDERING INFORMATION

PEL-2020A/2020B	Dual Channel Module, (0 to 80 V, 0 to 20 A, 100 W) x 2
PEL-2030A/2030B	Dual Channel Module, (1 to 80 V, 0 to 5 A, 30 W)+(1 to 80 V, 0 to 40 A, 250 W)
PEL-2040A/2040B	Single Channel Module, (0 to 80 V, 0 to 70 A, 350 W)
PEL-2041A/2041B	Single Channel Module, (0 to 500 V, 0 to 10 A, 350 W)
PEL-2004A	4-Slot Programmable DC Electronic Load Mainframe
PEL-2002A	2-Slot Programmable DC Electronic Load Mainframe

Note : Load module cannot be used without a mainframe

ACCESSORIES :

PEL-2002A/2004A Power Cord x1

PEL-2020A/2020B/2030A/2030B/2040A/2040B/2041A/2041B GTL-120 Test Lead x 1, GTL-121 Sense Lead x 1

* PEL-003 x 3 (PEL-2004A); PEL-003 x 1 (PEL-2002A)

OPTIONAL ACCESSORIES

PEL-001	GPIB Card
PEL-016	LAN Card (for PEL-2000A(B) Main Frame)
GTL-248	GPIB Cable (2 m)
GTL-249	Frame Link Cable
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000 mm

A. MODULARIZED STRUCTURE/PROGRAM & INTERFACE

Modularized Structure

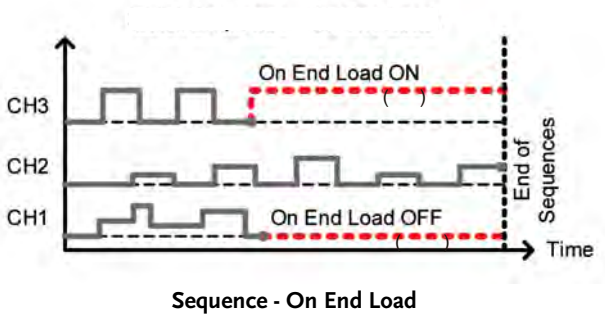
PEL-2004A is a 4-slot mainframe with a master control unit made to hold 4 load modules, and PEL-2002A is a 2-slot mainframe with a master control unit made to hold 2 load modules. The modularized structure of the PEL-2000A Series allows any combination of mainframe and load module (PEL-2020A, PEL-2030A, PEL-2040A, PEL-2041A) to be integrated into a custom-tailored system.

Multiple loads within the same mainframe can be connected in parallel to perform both static and dynamic tests. This flexibility makes the PEL-2000A Series a very cost-effective instrument for testing a broad range of power supply outputs.

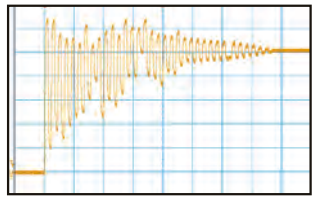
Program & Interface

The PEL-2000A Series supports a total of 12 different programs and 10 sequences to each program. With a total of up to 120 different configurations. For external control and system configuration, the PEL-Series has USB and RS-232 interfaces as standard and GPIB as an option. The LabView driver and Data Logging PC software are supported for all the interfaces available. Each channel has an analog control/monitoring connector to externally turn a load on/off and to externally monitor load input current and voltage.

B. AUTOMATICALLY SEQUENCE FUNCTION



Sequence - On End Load

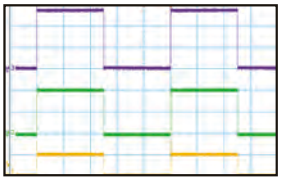


The figure above shows the current waveform of a simulation using the sequence function.

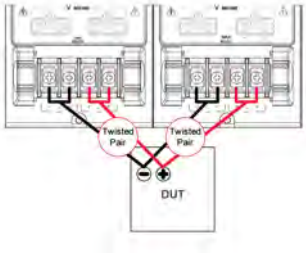
The Sequence function allows each channel to change its load sink according to a predefined sequence at a rate of up to 100μs per step. Each sequence is able to run concurrently, under the control of one clock. This is one of the most powerful features of the PEL-2000A Series as it is able to realistically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a pre-defined speed up to 25μs per step. This is often used as the standard test procedure to verify the response of a power supply to quick load changes.

The picture above is an example of a sequence used as a load profile for a single output switching power supply. A load profile is programmed to simulate the current drawn of a power supply load.
By using a current probe to acquire a current waveform, PEL-2000A Series is able to evaluate the performance of a power supply based on the load sequence that is programmed. An oscilloscope is then used to display the result.

C. PARALLEL DYNAMIC LOADING



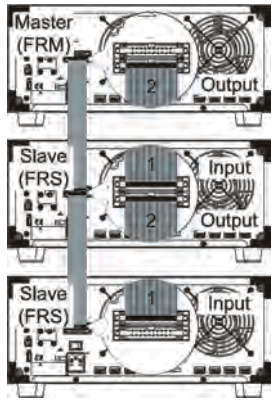
Dynamic Test



Wire Connection

All the load channels in a PEL-2000A Series mainframe can be connected in parallel to perform any combination of static or dynamic loading. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a predefined speed of up to 25μs per step. When the channels are connected in parallel, dynamic tests are synchronously clocked. The ability to perform parallel dynamic loading gives you the flexibility to perform dynamic tests to high-power power supplies without the need for a dedicated high power electronic load.

D. FRAME LINK



The PEL-2000A Series allows multiple mainframes to be linked together with standard MIL 20-pin connectors to provide higher power load capacity. A maximum of 5 mainframes, including one master and 4 slaves, can be chained together to give a 7kW load capacity for high current and high power applications.

High Power DC Electronic Load

PEL-5000C Series

CE RS-232 GPIB USB LAN

FEATURES

* Maximum Power up to 192 kW
* Up to 8 units of Master/Slave Parallel Control
* 5-digit Digital Voltage, Current and Power Meter
* Large LCD Display
* Display Voltage Value, Current Value, Watt Value at the Same Time
* Suitable for Power Factor Regulator (PFC) Testing (600 V, 1200 V Models)
* Automatically Perform OCP, OPP Test
* The Power-on State Value Can be Set
* Constant Current, Constant Resistance, Constant Voltage, Constant Power, Constant Current + Constant Voltage, Constant Power + Constant Voltage, Dynamic and Short Circuit Modes
* Short Circuit Time Can be Set During Short Circuit Test
* Over Current, Over Power, Over Temperature Protection and Over Voltage Warning
* Voltage Polarity Display Can be Set to Positive Value ("+") or Negative Value ("-")
* Support Solar Panel MPPT Test
* Optional Interface: GPIB, RS232, USB, LAN

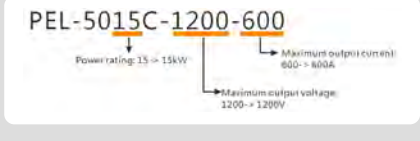
PEL-5000C series single-channel electronic load provides 150 V/600 V/1200 V models with a power range of 8 kW to 24 kW. PEL-5000C has a total of 24 models featuring different combinations of power, voltage, and current. It can test and verify the specifications of batteries, electric vehicle chargers/charging stations, electric vehicle batteries and solar panels. PEL-5000C supports parallel connection for same voltage specification and different power models. PEL-5000C can support up to 8 units connected in parallel to provide a maximum power of 192 kW.

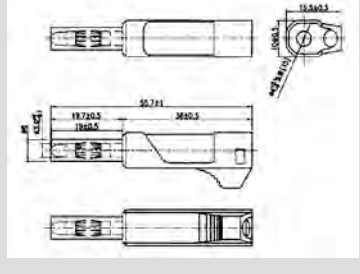
For the scenario of battery testing, PEL-5000C specifically provides four battery discharge modes, namely CC+CV battery discharge test mode, CP+CV battery discharge test mode, CC+UVP battery discharge test mode, and CP+UVP battery discharge test mode. Users can choose a suitable test mode according to the test requirements. In addition to the four battery discharge modes, PEL-5000C also provides Time period discharge, Pulse discharge, and RAMP discharge modes. Users can set the discharge time, or discharge in the pulse current mode, or even set the rising/falling slew rate of the discharge current. These functions can be very flexible in the simulation of the battery discharge current waveform when an electric vehicle is running.

In order to meet the verification requirements of different DUTs, PEL-5000C provides a variety of test functions, including inrush current test mode, solar panel MPPT test mode, automated OCP, OPP test functions and 150 sets of parameter storage function. The 1200 V model of PEL-5000C not only provides full power output at 1000 V, but also provides 60 % power output at 1200 V output, which is higher than the 50 % power output of other manufacturers of similar electronic loads. High-voltage batteries or chargers directly connected to the electronic load may cause damage to the electronic load. PEL-5000C has a built-in slow starter, which not only protects the DC load, but also saves the user's installation cost and setting time for measurement.

ORDERING INFORMATION

PEL-5008C-150-800	150 V/800 A/8 kW High Power DC Electronic Load
PEL-5010C-150-1000	150 V/1000 A/10 kW High Power DC Electronic Load
PEL-5012C-150-1200	150 V/1200 A/12 kW High Power DC Electronic Load
PEL-5015C-150-1500	150 V/1500 A/15 kW High Power DC Electronic Load
PEL-5018C-150-1800	150 V/1800 A/18 kW High Power DC Electronic Load
PEL-5020C-150-2000	150 V/2000 A/20 kW High Power DC Electronic Load
PEL-5024C-150-2000	150 V/2000 A/24 kW High Power DC Electronic Load
PEL-5008C-600-560	600 V/560 A/8 kW High Power DC Electronic Load
PEL-5010C-600-700	600 V/700 A/10 kW High Power DC Electronic Load
PEL-5012C-600-840	600 V/840 A/12 kW High Power DC Electronic Load
PEL-5015C-600-1050	600 V/1050 A/15 kW High Power DC Electronic Load
PEL-5018C-600-1260	600 V/1260 A/18 kW High Power DC Electronic Load
PEL-5020C-600-1400	600 V/1400 A/20 kW High Power DC Electronic Load
PEL-5024C-600-1680	600 V/1680 A/24 kW High Power DC Electronic Load
PEL-5008C-1200-320	1200 V/320 A/8 kW High Power DC Electronic Load
PEL-5010C-1200-400	1200 V/400 A/10 kW High Power DC Electronic Load
PEL-5012C-1200-480	1200 V/480 A/12 kW High Power DC Electronic Load
PEL-5015C-1200-600	1200 V/600 A/15 kW High Power DC Electronic Load
PEL-5018C-1200-720	1200 V/720 A/18 kW High Power DC Electronic Load
PEL-5020C-1200-800	1200 V/800 A/20 kW High Power DC Electronic Load
PEL-5024C-1200-960	1200 V/960 A/24 kW High Power DC Electronic Load





STANDARD ACCESSORIES

PEL-5000C Series operation manual
BANANA PLUGS : Please refer to Fig.1 x 1
BNC – BNC CABLE : BNC to BNC CABLE, 1m x 1
HD-DSUB : 15PIN Parallel wire Parallel Wire x 1

OPTIONAL ACCESSORIES

PEL-022	GPIB Card	PEL-030	GPIB+RS-232 Card
PEL-023	RS-232 Card	GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm
PEL-024	LAN Card	GTL-248	GPIB Cable, Double Shielded, 2000 mm
PEL-025	USB Card		
PEL-026	Hook Ring x 4		
PEL-027-1	Rack Mount Kit For PEL-5006C		
PEL-027-2	Rack Mount Kit For PEL-5008C, PEL-5010C, PEL-5012C		
PEL-027-3	Rack Mount Kit For PEL-5015C, PEL-5018C		
PEL-027-4	Rack Mount Kit For PEL-5020C, PEL-5024C		
PEL-028	HANDLES, U-shaped Handle(fixed to the bracket)		

Note: * Regarding the product delivery date, please contact your regional sales representative.

Rear Panel

PEL-5008C-150-800
PEL-5008C-600-560
PEL-5008C-1200-320

PEL-5010C-150-1000
PEL-5010C-600-700
PEL-5010C-1200-400

PEL-5012C-150-1200
PEL-5012C-600-840
PEL-5012C-1200-480

PEL-5015C-150-1500
PEL-5015C-600-1050
PEL-5015C-1200-600

PEL-5018C-150-1800
PEL-5018C-600-1260
PEL-5018C-1200-720

PEL-5020C-150-2000
PEL-5020C-600-1400
PEL-5020C-1200-800

PEL-5024C-150-2000
PEL-5024C-600-1680
PEL-5024C-1200-960

Power / Voltage	150 V		600 V		1200 V	
8 kW	PEL-5008C-150-800	(800 A)	PEL-5008C-600-560	(560 A)	PEL-5008C-1200-320	(320 A)
10 kW	PEL-5010C-150-1000	(1000 A)	PEL-5010C-600-700	(700 A)	PEL-5010C-1200-400	(400 A)
12 kW	PEL-5012C-150-1200	(1200 A)	PEL-5012C-600-840	(840 A)	PEL-5012C-1200-480	(480 A)
15 kW	PEL-5015C-150-1500	(1500 A)	PEL-5015C-600-1050	(1050 A)	PEL-5015C-1200-600	(600 A)
18 kW	PEL-5018C-150-1800	(1800 A)	PEL-5018C-600-1260	(1260 A)	PEL-5018C-1200-720	(720 A)
20 kW	PEL-5020C-150-2000	(2000 A)	PEL-5020C-600-1400	(1400 A)	PEL-5020C-1200-800	(800 A)
24 kW	PEL-5024C-150-2000	(2000 A)	PEL-5024C-600-1680	(1680 A)	PEL-5024C-1200-960	(960 A)

PEL-022 GPIB Card

PEL-023 RS-232 Card

PEL-024 LAN Card

PEL-025 USB Card

PEL-026 Hook Ring

PEL-027-1~4 Rack Mount Kit

PEL-028 Handles

High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL-5008C-150-800		PEL-5010C-150-1000		PEL-5012C-150-1200	
Power*1	8kW		10kW		12kW	
Current	0 ~ 80A	0 ~ 800A	0 ~ 100A	0 ~ 1000A	0 ~ 120A	0 ~ 1200A
Voltage	0 ~ 150V					
Min. Operating Voltage	0.7V @ 800A		0.7V @ 1000A		0.7V @ 1200A	
Protections						
Over Power Protection (OPP)	105%					
Over Current Protection (OCP)	104%					
Over Voltage Protection (OVP)	105%					
Over Temp Protection (OTP)	90℃±5℃					
Constant Current Mode						
Range*2	80A	800A	100A	1000A	120A	1200A
Resolution	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Accuracy*3	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	11250Ω~0.1875Ω	0.1875Ω~0.0009Ω	9000Ω~0.15Ω	0.15Ω~0.0007Ω	7500Ω~0.125Ω	0.125Ω~0.0006Ω
Resolution	88.888μS	3.125μΩ	111.111μS	2.5μΩ	133.333μS	2.084μΩ
Accuracy	±0.2% of (Setting + Range)					
Constant Voltage Mode						
Range	150V					
Resolution	2.5mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	800W	8000W	1000W	10000W	1200W	12000W
Resolution	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode						
Range	150V	800A	150V	1000A	150V	1200A
Resolution	2.5mV	12.8mA	2.5mV	3.2mA	2.5mV	19.2mA
Accuracy	± 1.0% of (Setting + Range)					
Constant Voltage Mode + Constant Power Mode						
Range	150V	8000W	150V	10000W	150V	12000W
Resolution	2.5mV	128mW	2.5mV	160mW	2.5mV	192mW
Accuracy	± 1.0% of (Setting + Range)					
Surge Test						
Surge & Normal current	0~800A		0~1000A		0~1200A	
Surge time	10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5					
MPPT Mode						
Algorithm	P&O					
Load mode	CV					
P&O interval	1000ms~60000ms ; resolution 1000ms					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms					
Resolution	0.001 / 0.01 / 0.1 / 1ms					
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm					
Slew Rate	0.0192A~1.2A/μs	0.192A~12A/μs	0.024A~1.5A/μs	0.24A~15A/μs	0.0288A~1.8A/μs	0.288A~18A/μs
Resolution	0.0048A/μs	0.048A/μs	0.006A/μs	0.06A/μs	0.0072A/μs	0.072A/μs
Min. Rise Time	66.7μs(typical)					
Current						
Range	0~80A	80~800A	0~100A	100~1000A	0~120A	120~1200A
Resolution	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Measurement						
Voltage Read Back						
Range (5 Digital)	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	±0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0~80A	80~800A	0~100A	100~1000A	0~120A	120~1200A
Resolution	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Accuracy	±0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	8000W		10000W		12000W	
Accuracy	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	0.0009Ω		0.0007Ω		0.0006Ω	
Maximum Short Current	800A		1000A		1200A	
Load ON Voltage	0.25 ~ 62.5V					
Load OFF Voltage	0 ~ 62.5V					
Power Consumption	920VA		920VA		920VA	
Dimension (HxWxD)	571.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm	
HxWxD (Not included Rack Mount Kit,wheels)	467.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm	
Weight	77.5 kg		84.8 kg		92 kg	
Temperature*4	0~40℃					
Safety & EMC	CE					

Cooling : Advanced Fan Cooled

Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25 °C
Note *2 : The range is automatically or forcing to range II only in CC Mode
Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.
Note *4 : Operating temperature range is 0~40℃ , all specifications apply for 25℃±5℃

SPECIFICATIONS

MODEL	PEL-5015C-150-1500		PEL-5018C-150-1800		PEL-5020C-150-2000		PEL-5024C-150-2000	
Power*1	15kW		18kW		20kW		24kW	
Current	0 ~ 150A	0 ~ 1500A	0 ~ 180A	0 ~ 1800A	0 ~ 200A	0 ~ 2000A	0 ~ 200A	0 ~ 2000A
Voltage	0 ~ 150V							
Min. Operating Voltage	0.7V @ 1500A		0.7V @ 1800A		0.7V @ 2000A		0.7V @ 2000A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90℃±5℃							
Constant Current Mode								
Range*2	150A	1500A	180A	1800A	200A	2000A	200A	2000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	3.2mA	32mA	3.2mA	32mA
Accuracy*3	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	6000Ω~0.1Ω	0.1Ω~0.0005Ω	5000Ω~0.0833Ω	0.0833Ω~0.0004Ω	4500Ω~0.075Ω	0.075Ω~0.0004Ω	4500Ω~0.075Ω	0.075Ω~0.0004Ω
Resolution	166.666μS	1.667μΩ	200μS	1.389μΩ	222.22μS	1.25μΩ	222.22μS	1.25μΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	150V							
Resolution	2.5mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1500W	15000W	1800W	18000W	2000W	20000W	2400W	24000W
Resolution	24mW	240mW	28.8mW	288mW	32mW	320mW	38.4mW	384mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	150V	1500A	150V	1800A	150V	2000A	150V	2000A
Resolution	2.5mV	24mA	2.5mV	28.8mA	2.5mV	32mA	2.5mV	32mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	150V	15000W	150V	18000W	150V	20000W	150V	24000W
Resolution	2.5mV	240mW	2.5mV	288mW	2.5mV	320mW	2.5mV	384mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~1500A		0~1800A		0~2000A		0~2000A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.036A~2.25A/μs	0.360A~22.5A/μs	0.0432A~2.7A/μs	0.432A~27A/μs	0.048A~3A/μs	0.48A~30A/μs	0.048A~3A/μs	0.48A~30A/μs
Resolution	0.009A/μs	0.09A/μs	0.0108A/μs	0.108A/μs	0.012A/μs	0.12A/μs	0.012A/μs	0.12A/μs
Min. Rise Time	66.7μs(typical)							
Current								
Range	0~150A	150~1500A	0~180A	180~1800A	0~200A	200~2000A	0~200A	200~2000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	3.2mA	32mA	3.2mA	32mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~150A	15~1500A	0~180A	180~1800A	0~200A	200~2000A	0~200A	200~2000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	3.2mA	32mA	3.2mA	32mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	15000W		18000W		20000W		24000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0005Ω		0.0004Ω		0.0004Ω		0.0004Ω	
Maximum Short Current	1500A		1800A		2000A		2000A	
Load ON Voltage	0.25 ~ 62.5V							
Load OFF Voltage	0 ~ 62.5V							
Power Consumption	1320VA		1320VA		1700VA		1700VA	
Dimension (HxWxD)	760.6x481x757.3mm		760.6x481x757.3mm		886.6x481x757.3mm		886.6x481x757.3mm	
HxWxD (Not included Rack Mount Kit,wheels)	656.6x445.2x757.3mm		656.6x445.2x757.3mm		782.6x445.2x757.3mm		782.6x445.2x757.3mm	
Weight	116.5 kg		124 kg		140.5 kg		155 kg	
Temperature*4	0~40℃							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25°C

Note *2 : The range is automatically or forcing to range **II** only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Operating temperature range is 0~40°C , all specifications apply for 25°C±5℃

SPECIFICATIONS

MODEL	PEL-5008C-600-560		PEL-5010C-600-700		PEL-5012C-600-840	
Power*1	8kW		10kW		12kW	
Current	0 ~ 56A	0 ~ 560A	0 ~ 70A	0 ~ 700A	0 ~ 84A	0 ~ 840A
Voltage	0 ~ 600V					
Min. Operating Voltage	10V @ 560A		10V @ 700A		10V @ 840A	
Protections						
Over Power Protection (OPP)	105%					
Over Current Protection (OCP)	104%					
Over Voltage Protection (OVP)	105%					
Over Temp Protection (OTP)	90℃±5℃					
Constant Current Mode						
Range*2	56A	560A	70A	700A	84A	840A
Resolution	0.896mA	8.96mA	1.12mA	11.2mA	1.334mA	13.44mA
Accuracy*3	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	64284Ω~1.0714Ω	1.0714Ω~0.01788Ω	51427.2Ω~0.85712Ω	0.85712Ω~0.014304Ω	42856Ω~0.714267Ω	0.714267Ω~0.01192Ω
Resolution	15.5559μS	17.88μΩ	19.4449μS	14.304μΩ	23.3339μS	11.92μΩ
Accuracy	±0.2% of (Setting + Range)					
Constant Voltage Mode						
Range	600V					
Resolution	10mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	800W	8000W	1000W	10000W	1200W	12000W
Resolution	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode						
Range	600V	560A	600V	700A	600V	840A
Resolution	10mV	8.96mA	10mV	11.2mA	10mV	13.44mA
Accuracy	± 1.0% of (Setting + Range)					
Constant Voltage Mode + Constant Power Mode						
Range	600V	8000W	600V	10000W	600V	12000W
Resolution	10mV	128mW	10mV	160mW	10mV	192mW
Accuracy	± 1.0% of (Setting + Range)					
Surge Test						
Surge & Normal current	0~560A		0~700A		0~840A	
Surge time	10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5					
MPPT Mode						
Algorithm	P&O					
Load mode	CV					
P&O interval	1000ms~60000ms ; resolution 1000ms					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms					
Resolution	0.001 / 0.01 / 0.1 / 1ms					
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm					
Slew Rate	0.0288A~1.8A/μs	0.288A~18A/μs	0.0336A~2.1A/μs	0.336A~21A/μs	0.0384A~2.4/μs	0.384A~24A/μs
Resolution	0.0072A/μs	0.072A/μs	0.0084A/μs	0.084A/μs	0.0096A/μs	0.096A/μs
Current						
Range	0~56A	56~560A	0~70A	70~700A	0~84A	84~840A
Resolution	0.896mA	8.96mA	1.12mA	11.2mA	1.334mA	13.34mA
Measurement						
Voltage Read Back						
Range (5 Digital)	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V
Resolution	1mV	10mV	1mV	10mV	1mV	10mV
Accuracy	±0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0~56A	56~560A	0~70A	70~700A	0~84A	84~840A
Resolution	0.896mA	8.96mA	1.12mA	11.2mA	1.334mA	13.34mA
Accuracy	±0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	8000W		10000W		12000W	
Accuracy	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	0.0179Ω		0.0143Ω		0.00120Ω	
Maximum Short Current	560A		700A		840A	
Load ON Voltage	0.4 ~ 100V					
Load OFF Voltage	0 ~ 100V					
Power Consumption	920VA		920VA		920VA	
Dimension (HxWxD)	571.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm	
HxWxD(Not included Rack Mount Kit,wheels)	467.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm	
Weight	77.5 kg		84.8 kg		92 kg	
Temperature*4	0~40℃					
Safety & EMC	CE					

Cooling：Advanced Fan Cooled

Input AC Power：100~240 Vac ±10%，50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25˚C

Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Operating temperature range is 0~40˚C，all specifications apply for 25˚C±5˚C

SPECIFICATIONS

MODEL	PEL-5015C-600-1050		PEL-5018C-600-1260		PEL-5020C-600-1400		PEL-5024C-600-1680	
Power*1	15kW		18kW		20kW		24kW	
Current	0 ~ 105A	0 ~ 1050A	0 ~ 126A	0 ~ 1260A	0 ~ 140A	0 ~ 1400A	0 ~ 168A	0 ~ 1680A
Voltage	0 ~ 600V							
Min. Operating Voltage	10V @ 1050A		10V @ 1260A		10V @ 1400A		10V @ 1680A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90℃±5℃							
Constant Current Mode								
Range*2	105A	1050A	126A	1260A	140A	1400A	168A	1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Accuracy*3	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	34284.8~0.571413Ω	0.571413~0.009536Ω	28570.67~0.476178Ω	0.476178~0.007947Ω	25713.6~0.42856Ω	0.42856~0.007152Ω	21428~0.357133Ω	0.357133~0.00596Ω
Resolution	29.1674μS	9.536μΩ	35.0009μS	7.947μΩ	38.8899μS	7.152μΩ	46.6679μS	5.96μΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	600V							
Resolution	10mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1500W	15000W	1800W	18000W	2000W	20000W	2400W	24000W
Resolution	24mW	240mW	28.8mW	288mW	32mW	320mW	38.4mW	384mW
Accuracy	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	600V	1050A	600V	1260A	600V	1400A	600V	1680A
Resolution	10mV	16.8mA	10mV	20.16mA	10mV	22.4mA	10mV	26.88mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	600V	15000W	600V	18000W	600V	20000W	600V	24000W
Resolution	10mV	240mW	10mV	288mW	10mV	320mW	10mV	384mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~1050A		0~1260A		0~1400A		0~1680A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.0432A~2.7A/μs	0.432A~27A/μs	0.048A~3A/μs	0.48A~30A/μs	0.0528A~3.3A/μs	0.528A~33A/μs	0.0576A~3.6A/μs	0.576A~36A/μs
Resolution	0.0108A/μs	0.108A/μs	0.012A/μs	0.12A/μs	0.0132A/μs	0.132A/μs	0.0144A/μs	0.144A/μs
Current								
Range	0~105A	105~1050A	0~126A	126~1260A	0~140A	140~1400A	0~168A	168~1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V
Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~105A	105~1050A	0~126A	126~1260A	0~140A	140~1400A	0~168A	168~1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	15000W		18000W		20000W		24000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0096Ω		0.0080Ω		0.0072Ω		0.0060Ω	
Maximum Short Current	1050A		1260A		1400A		1680A	
Load ON Voltage	0.4 ~ 100V							
Load OFF Voltage	0 ~ 100V							
Power Consumption	1320VA		1320VA		1700VA		1700VA	
Dimension (HxWxD)	760.6x481x757.3mm		760.6x481x757.3mm		886.6x481x757.3mm		886.6x481x757.3mm	
HxWxD(Not included Rack Mount Kit,wheels)	656.6x445.2x757.3mm		656.6x445.2x757.3mm		782.6x445.2x757.3mm		782.6x445.2x757.3mm	
Weight	116.5 kg		124 kg		140.5 kg		155 kg	
Temperature*4	0~40℃							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25°C
Note *2 : The range is automatically or forcing to range II only in CC Mode
Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.
Note *4 : Operating temperature range is 0~40°C , all specifications apply for 25°C±5℃

SPECIFICATIONS

MODEL	PEL-5008C-1200-320		PEL-5010C-1200-400		PEL-5012C-1200-480	
Power*1	8kW		10kW		12kW	
Current	0 ~ 32A	0 ~ 320A	0 ~ 40A	0 ~ 400A	0 ~ 48A	0 ~ 480A
Voltage	0 ~ 1200V					
Min. Operating Voltage	15V @ 320A		15V @ 400A		15V @ 480A	
Protections						
Over Power Protection (OPP)	105%					
Over Current Protection (OCP)	104%					
Over Voltage Protection (OVP)	104%					
Over Temp Protection (OTP)	90℃±5℃					
Constant Current Mode						
Range*2	32A	320A	40A	400A	48A	480A
Resolution	0.512mA	5.12mA	0.64mA	6.4mA	0.768mA	7.68mA
Accuracy*3	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	22.5KΩ~3.75Ω	3.75Ω~0.0468Ω	18KΩ~3Ω	3Ω~0.0375Ω	15KΩ~2.5Ω	2.5Ω~0.0312Ω
Resolution	4.444μS	62.5μΩ	5.5555μS	50μΩ	6.6666μS	41.667μΩ
Accuracy	±0.2% of (Setting + Range)					
Constant Voltage Mode						
Range	1200V					
Resolution	20mV					
Accuracy	± 0.05% of (Setting + Range)					
Constant Power Mode						
Range	800W	8000W	1000W	10000W	1200W	12000W
Resolution	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode						
Range	1200V	320A	1200V	400A	1200V	480A
Resolution	20mV	5.12mA	20mV	6.4mA	20mV	7.68mA
Accuracy	± 1.0% of (Setting + Range)					
Constant Voltage Mode + Constant Power Mode						
Range	1200V	8000W	1200V	10000W	1200V	12000W
Resolution	20mV	128mW	20mV	160mW	20mV	192mW
Accuracy	± 1.0% of (Setting + Range)					
Surge Test						
Surge & Normal current	0~320A		0~400A		0~480A	
Surge time	10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5					
MPPT Mode						
Algorithm	P&O					
Load mode	CV					
P&O interval	1000ms~60000ms ; resolution 1000ms					
Dynamic Mode						
Timing						
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms					
Resolution	0.001 / 0.01 / 0.1 / 1ms					
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm					
Slew Rate	0.0192A~1.2A/μs	0.192A~12A/μs	0.0224A~1.4A/μs	0.224A~14A/μs	0.0256A~1.6A/μs	0.256A~16A/μs
Resolution	0.0048A/μs	0.048A/μs	0.0056A/μs	0.056A/μs	0.0064A/μs	0.064A/μs
Current						
Range	0~32A	32~320A	0~40A	40~400A	0~48A	48~480A
Resolution	0.512mA	5.12mA	0.64mA	6.4mA	0.768mA	7.68mA
Measurement						
Voltage Read Back						
Range (5 Digital)	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V
Resolution	2mV	20mV	2mV	20mV	2mV	20mV
Accuracy	±0.025% of (Reading + Range)					
Current Read Back						
Range (5 Digital)	0~32A	32~320A	0~40A	40~400A	0~48A	48~480A
Resolution	0.512mA	5.12mA	0.64mA	6.4mA	0.768mA	7.68mA
Accuracy	±0.05% of (Reading + Range)					
Power Read Back						
Range (5 Digital)	8000W		10000W		12000W	
Accuracy	± 0.06% of (Reading + Range)					
General						
Typical Short Resistance	0.0469Ω		0.0375Ω		0.0313Ω	
Maximum Short Current	320A		400A		480A	
Load ON Voltage	0.96 ~ 240V					
Load OFF Voltage	0 ~ 240V					
Power Consumption	920VA		920VA		920VA	
Dimension (HxWxD)	571.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm	
HxWxD(Not included Rack Mount Kit,wheels)	467.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm	
Weight	77.5 kg		84.8 kg		92 kg	
Temperature*4	0~40℃					
Safety & EMC	CE					

Cooling : Advanced Fan Cooled

Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25˚C
Note *2 : The range is automatically or forcing to range II only in CC Mode
Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.
Note *4 : Operating temperature range is 0~40˚C , all specifications apply for 25˚C±5˚C

SPECIFICATIONS

MODEL	PEL-5015C-1200-600		PEL-5018C-1200-720		PEL-5020C-1200-800		PEL-5024C-1200-960	
Power*1	15kW		18kW		20kW		24kW	
Current	0 ~ 60A	0 ~ 600A	0 ~ 72A	0 ~ 720A	0 ~ 80A	0 ~ 800A	0 ~ 96A	0 ~ 960A
Voltage	0 ~ 1200V							
Min. Operating Voltage	15V @ 600A		15V @ 720A		15V @ 800A		15V @ 960A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	104%							
Over Temp Protection (OTP)	90℃±5℃							
Constant Current Mode								
Range*2	60A	600A	72A	720A	80A	800A	96A	960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	12.8mA	1.536mA	15.36mA
Accuracy*3	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	12Ω~2Ω	2Ω~ 0.0250Ω	10KΩ~1.666Ω	1.666Ω~0.0208Ω	9KΩ~1.5Ω	1.5Ω~0.0187Ω	7.5KΩ~1.25Ω	1.25Ω~0.0156Ω
Resolution	8.3333μS	33.334μΩ	10μS	27.778μΩ	11.111μS	25μΩ	13.333μS	20.834μΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	1200V							
Resolution	20mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1500W	15000W	1800W	18000W	2000W	20000W	2400W	24000W
Resolution	24mW	240mW	28.8mW	288mW	32mW	320mW	38.4mW	384mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	1200V	600A	1200V	720A	1200V	800A	1200V	960A
Resolution	20mV	9.6mA	20mV	3.2mA	20mV	3.84mA	20mV	15.36mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	1200V	15000W	1200V	18000W	1200V	20000W	1200V	24000W
Resolution	20mV	240mW	20mV	288mW	20mV	320mW	20mV	384mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~600A		0~720A		0~800A		0~960A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.0288A~1.8A/μs	0.288A~18A/μs	0.032A~2A/μs	0.32A~20A/μs	0.0352A~2.2A/μs	0.352A~22A/μs	0.0384A~2.4A/μs	0.384A~24A/μs
Resolution	0.0072A/μs	0.072A/μs	0.008A/μs	0.08A/μs	0.0088A/μs	0.088A/μs	0.0096A/μs	0.096A/μs
Current								
Range	0~60A	60~600A	0~72A	72~720A	0~80A	80~800A	0~96A	96~960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	12.8mA	1.536mA	15.36mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V
Resolution	2mV	20mV	2mV	20mV	2mV	20mV	2mV	20mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~60A	60~600A	0~72A	72~720A	0~80A	80~800A	0~96A	96~960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	12.8mA	1.536mA	15.36mA
Accuracy	±0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	15000W		18000W		20000W		24000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0250Ω		0.0209Ω		0.0188Ω		0.0157Ω	
Maximum Short Current	600A		720A		800A		960A	
Load ON Voltage	0.96 ~ 240V							
Load OFF Voltage	0 ~ 240V							
Power Consumption	1320VA		1320VA		1700VA		1700VA	
Dimension (HxWxD)	760.6x481x757.3mm		760.6x481x757.3mm		886.6x481x757.3mm		886.6x481x757.3mm	
HxWxD (Not included Rack Mount Kit,wheels)	656.6x445.2x757.3mm		656.6x445.2x757.3mm		782.6x445.2x757.3mm		782.6x445.2x757.3mm	
Weight	116.5 kg		124 kg		140.5 kg		155 kg	
Temperature*4	0~40℃							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25°C

Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Operating temperature range is 0~40℃ , all specifications apply for 25℃±5℃

PEL-503-80-50

PEL-507-80-140

CE RS-232 USB

FEATURES

* 5-digit Digital Voltage, Current and Power Meter
* Simultaneous Display of Voltage, Current, and Watts
* Short-circuit Time Can be Set During Short-circuit Test
* Automatic Test Function of Overcurrent Protection/Overpower Protection
* The Battery Discharge Test Function Can Set the Discharge Stop Voltage(Vbatt), Discharge Capacity(AH, WH) and Stop Discharge Time
* Surge Test Can Simulate Boot Overshoot Current and Transient Current From Hot Plugging
* Constant Current, Constant Resistance, Constant Voltage, Constant Power and Dynamic Mode
* Overvoltage, Overcurrent, Overpower, Over Temperature Protection and Reverse Polarity Detection
* Voltage Polarity Display Can be set to Positive Value"+" or Negative Value"-"
* Communications Interface: RS232, USB

The PEL-500 series single-channel electronic load has a total of 5 models and provides 0 V to 80 V/0 V to 500 V voltage operating ranges and 250 W to 700 W power operating range. The series can be applied to R&D, quality control, ATE system and production test, including voltage source/current source test; switching power supply transient response; constant voltage mode for current limiting test; battery simulation; and battery discharge test.

The PEL-500 series provides a 5-digit digital display of voltage, current and power. Users can monitor the measurement data of the DUT at the same time. In order to facilitate users to evaluate whether the DUT can withstand the overshoot current, the PEL-500 series provides Surge test, which can simulate the boot overshoot current and the transient current from hot plugging. The built-in battery discharge test function can determine the conditions for stopping the discharge according to the test requirements of the DUT, including setting the discharge stop voltage (Vbatt), discharge capacity (AH, WH) and stop discharge time.

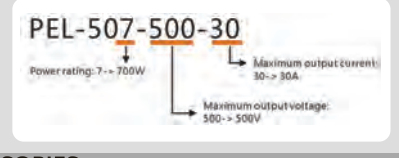
Users can set the loading voltage/unloading voltage of the PEL-500 series for testing according to the characteristics of the DUT. When the output voltage of the DUT rises to the loading voltage value, the loading starts. When the output voltage drops to the unloading voltage, the loading ends. Users can use the GO/NG function to pre-set the judgment conditions according to the function and specifications of the DUT. The PEL-500 series will automatically generate the judgment results according to the set judgment conditions during the test.

Under the safety test requirements of the power supply, the PEL-500 series not only provides the Short test function, but also provides the automatic test function of overcurrent protection/overpower protection to simplify users' complicated manual operation and verify the OCP/OPP of the DUT's action points. The generated measurement results help users confirm whether the actual operating action points of the DUT for OCP/OPP are within the measurement regulations.

In addition to the function of providing load current waveforms to the oscilloscope via the BNC output terminal of monitor, the PEL-500 series also provides overvoltage, overcurrent, overpower and over temperature protection, and reverse polarity detection. When any one of them generates a trigger action, The PEL-500 series will have protective or reminding measures to protect the PEL-500 from damage due to abnormal operating ranges.

ORDERING INFORMATION

PEL-503-80-50	80 V/50 A/250 W DC Electronic Load
PEL-504-80-70	80 V/70 A/350 W DC Electronic Load
PEL-504-500-15	500 V/15 A/350 W DC Electronic Load
PEL-507-80-140	80 V/140 A/700 W DC Electronic Load
PEL-507-500-30	500 V/30 A/700 W DC Electronic Load



OPTIONAL ACCESSORIES

GTL-238	RS-232 Cable, 9-pin, M-F Type, 1000 mm
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm

Note: * Regarding the product delivery date, please contact your regional sales representative.

GTL-238 RS-232 Cable, 9-pin, M-F Type, 1000mm

Rear Panel

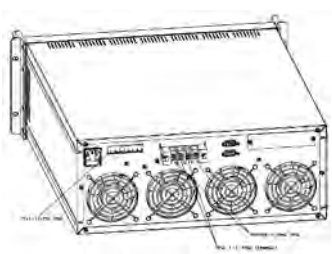
Model		PEL-503-80-50	PEL-504-80-70	PEL-504-500-15	PEL-507-80-140	PEL-507-500-30
INPUT RATINGS						
Power(Watt)		250 W	350 W	350 W	700 W	700 W
Current(Ampere)		50 A	70 A	15 A	140 A	30 A
Voltage(Volt)		80 V	80 V	500 V	80 V	500 V
Min. Operating Voltage		1.0V @ 50A	1.2V @ 70A	6V @ 15A	0.9V @ 140A	3V @ 30A
PROTECTIONS						
Over Power Protection(OPP)		≒262.5W	≒367.5W	≒367.5W	≒735W	≒735W
Over Current Protection(OCP)		≒52.5A	≒73.5A	≒15.75A	≒147A	≒31.5A
Over Voltage Protection(OVP)		≒84V	≒84V	≒525V	≒84V	≒525V
Over Temp. Protection(OTP)		YES	YES	YES	YES	YES
CC Mode						
Range		0~5.04~50.4A	0~7.02~70.2A	0~1.5~15A	0~14.04~140.4A	0~3~30A
Resolution		0.084mA/0.84mA	0.117mA/1.17mA	0.025mA/0.25mA	0.234mA/2.34mA	0.05mA/ 0.5mA
Accuracy		±0.1% of (SETTING + RANGE)				
CR Mode						
Range		0.016~1.6~96000Ω	0.0114~1.14~68400Ω	0.4~40~2400000Ω	0.0057~0.57~34200Ω	0.2~20~1200000Ω
Resolution		26.666μΩ/0.010416mSiemens	19μΩ/0.014619mSiemens	666.667μΩ/0.416μSiemens	9.5μΩ/29.239μSiemens	333.334μΩ/0.833μSiemens
Accuracy		±0.2% of (SETTING + RANGE)				
CV Mode						
Range		0~8.1~81V	0~8.1~81V	0~60~500V	0~8.1~81V	0~60~500V
Resolution		0.135mV/1.35mV	0.135mV/1.35mV	1mV/10mV	0.135mV/1.35mV	1mV/10mV
Accuracy		±0.05% of (SETTING + RANGE)				
CP Mode						
Range		0~25.02~250.2W (Imax=r1:5A, r2:50A)	0~35.04~350.4W (Imax=r1:7A, r2:70A)	0~35.04~350.4W (Imax=r1:1.5A, r2:15A)	0~70.02~700.2W (Imax=r1:14A, r2:140A)	0~70.02~700.2W (Imax=r1:3A, r2:30A)
Resolution		0.417mW/4.17mW	0.584mW/5.84mW	0.584mW/5.84mW	1.167mW/11.67mW	1.17mW/117mW
Accuracy		±0.5% of (SETTING + RANGE)				
Dynamic Mode						
THIGH/TLOW		10μS to 9.999 Sec				
Resolution		0.001/0.01/0.1/1mS				
Slew rate	L	0.032~2A/μs	0.0464~2.90A/μs	1~62.5mA/μs	0.0096~0.6A/μs	2~125mA/μs
	H	3.2~200mA/μs	4.64~290mA/μs	10~625mA/μs	0.096~6A/μs	20~1250mA/μs
Accuracy		±5%±10μs				
Measurement						
Voltage Read Back	Range (5 Digital)	0~8.1~81V	0~8.1~81V	0~60~500V	0~8.1~81V	0~60~500V
	Resolution	0.135mV/1.35mV	0.135mV/1.35mV	1mV/10mV	0.135mV/1.35mV	1mV/10mV
	Accuracy	±0.025% of (READING+ RANGE)				
Current Read Back	Range (5 Digital)	0~5.04~50.4A	0~7.02~70.2A	0~1.5~15A	0~14.04~140.4A	0~3~30A
	Resolution	0.084mA/0.84mA	0.117mA/1.17mA	0.025mA/0.25mA	0.234mA/2.34mA	0.05mA/ 0.5mA
	Accuracy	±0.1% of (READING+ RANGE)				
Power Read Back	Range (5 Digital)	25W / 250W	35W / 350W	35W / 350W	70W / 700W	70W / 700W
	Resolution	0.001W / 0.01W	0.001W / 0.01W	0.001W / 0.01W	0.001W / 0.01W	0.001W / 0.01W
	Accuracy	±0.1% of (READING+ RANGE)				
Surge Test						
Surge & Normal current		0~50A	0~70A	0~15A	0~140A	0~30A
Surge time		10~1000ms	10~1000ms	10~1000ms	10~1000ms	10~1000ms
Surge step		1~5	1~5	1~5	1~5	1~5
Battery Discharge Test						
UVP		0~81V	0~81V	0~500V	0~81V	0~500V
Time		1~99999 Sec	1~99999 Sec	1~99999 Sec	1~99999 Sec	1~99999 Sec
Capacity		0.1~19999.9AH/0.1~19999.9WH				
Others						
Load ON Voltage		0.1~25V		0.4~100V	0.1~25V	0.4~100V
Accuracy		1% of (SETTING + RANGE)				
Load OFF Voltage		0~25V		0~100V	0~25V	0~100V
Accuracy		0.05% of (SETTING + RANGE)				
Imonitor (Non-isolated)		5.04 A/V	7.02 A/V	1.5 A/V	14.04 A/V	3 A/V
Current Monitor		Full scale: 10V				
Accuracy		0.5% of (SETTING + RANGE)				
Typical Short Resistance		0.018Ω	0.0169Ω	0.367Ω	0.0053Ω	0.087Ω
Max. short Current		50A	70A	15A	140A	30A
Power input		115/230 Vac±10%, 50/60Hz				
Interface (Standard)		USB/RS232				
Power Consumption		40 VA			60 VA	
Dimension (HxWxD)		205 x 123 x 477mm	205 x 123 x 477mm	205 x 123 x 477mm	205 x 231 x 480mm	205 x 231 x 480mm
Weight		5.3kg	5.3kg	5.3kg	10.3kg	10.3kg

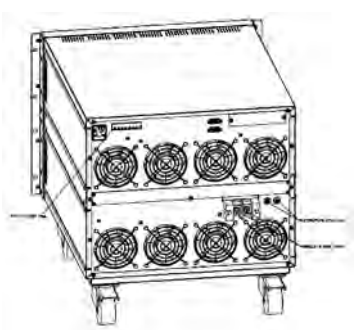
AEL-5000 Series

CE | RS-232 | GPIB | USB | LAN

FEATURES

* Turbo Mode (Multiplier Mode) Can Withstand up to 2 Times the Rating Current and Power of the Electronic Load in a Short Period of Time
* Operating Mode: CC, linear CC, CR, CV, CP and AC Rectifier Loads
* Measurement Items: Voltage Value(Vrms, Vpeak, Vmax., Vmin), Current Value(Irms, Ipeak, Imax., Imin.), Watt Value, Volt-ampere Value(VA), Frequency Value, Crest Factor, Power Factor, Voltage Total Distortion(V THD, VH), Current Total Distortion (I THD, IH), Etc
* Eight Units Connected in Parallel up to 180 kW for Single-phase and 540 kW for Three-phase
* Support Loading and Unloading Angle Control, Loading and Unloading Angle Control Can be set at the Full Range of 0 to 359 Degrees
* Support Positive Half Cycle or Negative Half Cycle Load
* Support SCR/TRIAC Current Phase Modulation Waveform, 90 Degree Trailing Edge and Leading Edge
* Support the Capacitive Load (Inrush Current) when the Power Supply is Turned on and the Transient Current (Surge Current) Test when the Load is Suddenly Connected (Hot Plug-in) During Operation
* Crest Factor Range: 1.414 to 5.0
* Power Factor Range: 0.1 to 1.0 Leading or Trailing
* Frequency Range: DC, 40 Hz to 440 Hz (AEL-5003-480-18.75/AEL-5004-480-28: DC, 40 Hz to 70 Hz), and 800 Hz and 1 kHz Need to be Customized
* Optional Control Interfaces: GPIB, RS-232, USB, LAN





GW Instek launches 20 models of the AEL-5000 series AC/DC electronic loads depending on the power range. The power range of a single unit is from 1875 W to 22500 W, and up to 8 units can be connected in parallel. The maximum power of single-phase parallel connection can reach 180 kW, and the total power of 3-phase can reach 540 kW, which are suitable for UPS, Inverter/Breaker, AC Power Source, Battery, Fuse/Breaker, DC Power Source and other applications.

The AEL-5000 series has built-in precision measurement circuits such as 16-bit A/D and DSP to provide accurate measurement items, which include voltage root mean square value (Vrms), current root mean square value (Arms), and watt value (Watt), volt-ampere (VA), crest factor (CF), power factor (PF), total harmonic distortion (THD), voltage total harmonic distortion (VTHD), current total harmonic distortion (ITHD) , peak current (Ipeak), maximum current (Amax), minimum current (Amin), maximum voltage (Vmax), minimum voltage (Vmin), time measurement. In addition, built-in test modes include UPS Efficiency, PV Inverter Efficiency, UPS Back-up time, Battery Discharge time, UPS transfer time, Fuse/Breaker Trip/Non-Trip, short circuit simulation, OCP, OPP and other test modes.

The AEL-5000 series has the Turbo mode (ON or OFF can be selected) design, which can increase the current and power of the electronic load by 2 times in one second. For test applications that require transient high power and large current such as transient overload test of protective components or short circuit of Fuse/Breaker and AC power supply, OCP and OPP tests etc.. The Turbo mode provides the most economical solution.

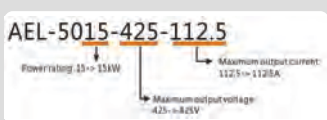
The AEL-5000 series also supports the Load On startup function (pre-set Load On). When the inverter or uninterruptible power supply is turned on, the series directly loads the set load current to verify that whether startup of the inverter or uninterrupted power supply connecting to the electrical appliance is stable. At the same time, the Load On start function can also set positive half cycle or negative half load to verify whether the output voltage of the inverter or uninterruptible power supply remains stable when the actual electrical appliance only has a positive half cycle or negative half cycle load current. Control load angle and unload angle can also be set (range 0 to 359 degrees) to verify the stability of the transient response of the inverter or uninterruptible power supply when the appliance is plugged in and unplugged. In addition, the series also supports SCR/TRIAC current phase modulation waveform, 90 degree Trailing Edge and Leading Edge settings.

For the application of the adjustable bandwidth (BW) function, when the bandwidth of the DUT does not match the bandwidth of the AEL-5000 series, there will be oscillations. Users can reduce the BW setting value accordingly to meet the response speed of the DUT. Inrush Current verifies whether the transient response of the inverter output voltage is stable when the electrical appliance is turned on (Inrush Current) and when the electrical appliance is suddenly connected (Surge Current).

The entire series of AEL-5000 provides over-voltage warning, over-current, over-power, and over-temperature protection. Analog Input terminal can control constant current, constant power and other working modes through external voltage. Vmonitor/Imonitor terminal is used to connect external voltage/current monitoring device. In addition, a variety of optional control interfaces are provided such as GPIB, RS-232, USB, and LAN to meet the needs of system integration.

ORDERING INFORMATION

AEL-5002-350-18.75	350 V/18.75 A/1875 W	AC & DC Electronic Load
AEL-5003-350-28	350 V/28 A/2800 W	AC & DC Electronic Load
AEL-5004-350-37.5	350 V/3 7.5 A/3750 W	AC & DC Electronic Load
AEL-5006-350-56	350 V/56 A/5600 W	AC & DC Electronic Load
AEL-5008-350-75	350 V/75 A/7500 W	AC & DC Electronic Load
AEL-5012-350-112.5	350 V/112.5 A/11250 W	AC & DC Electronic Load
AEL-5015-350-112.5	350 V/112.5 A/15000 W	AC & DC Electronic Load
AEL-5019-350-112.5	350 V/112.5 A/18750 W	AC & DC Electronic Load
AEL-5023-350-112.5	350V/112.5 A/22500 W	AC & DC Electronic Load
AEL-5002-425-18.75	425 V/18.75 A/l 875 W	AC & DC Electronic Load
AEL-5003-425-28	425 V/28 A/2800 W	AC & DC Electronic Load
AEL-5004-425-37.5	425 V/3 7.5 A/3750 W	AC & DC Electronic Load
AEL-5006-425-56	425 V/56 A/5600 W	AC & DC Electronic Load
AEL-5008-425-75	425 V/75 A/7500 W	AC & DC Electronic Load
AEL-5012-425-112.5	425 V/112.5 A/11250 W	AC & DC Electronic Load
AEL-5015-425-112.5	425 V/112.5 A/15000 W	AC & DC Electronic Load
AEL-5019-425-112.5	425 V/112.5 A/18750 W	AC & DC Electronic Load
AEL-5023-425-112.5	425 V/112.5 A/22500 W	AC & DC Electronic Load
AEL-5003-480-18.75	480 V/18.75 A/2800 W	AC & DC Electronic Load
AEL-5004-480-28	480 V/28 A/3750 W	AC & DC Electronic Load



STANDARD ACCESSORIES

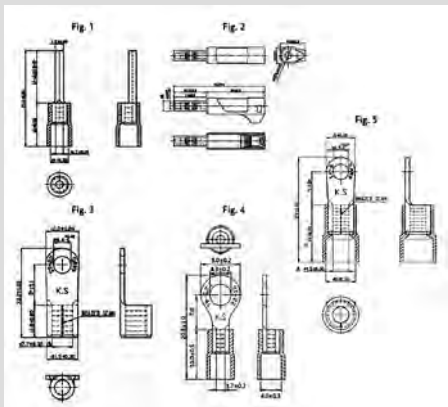
HD-DSUB : 15pin MALE to MALE 150cm x 1
PTV1-12 PIN TRML : Please refer to Fig.1 x 6

AEL-5002-xxx-18.75/AEL-5003-xxx-28/AEL-5004-xxx-37.5

PVL 1-4 RING TERMINALS : Please refer to Fig.4 x 2
RNYBS8-4 RING TRML : Please refer to Fig.5 x 2

AEL-5006-xxx-56/AEL-5008-xxx-78/AEL-5012-xxx-112.5/ AEL-5015-xxx-112.5/AEL-5019-xxx-112.5/AEL-5023-xxx/112.5

SLS10B RED PLUG CONN 20A RED : Please refer to Fig.2; The terminal is used for Vsense x 1
SLS10B BLK PLUG CONN 20A BLK : Please refer to Fig.2; The terminal is used for Vsense x 1
RNB S22-6 RING TRML, #4 : Please refer to Fig.3 x 2



OPTIONAL ACCESSORIES

PEL-022	GPIB Card	**PEL-030**	GPIB+RS-232 Card
PEL-023	RS-232 Card	**GTL-246**	USB Cable, USB 2.0, A-B Type, 1200mm
PEL-024	LAN Card	**GTL-248**	GPIB Cable, Double Shielded, 2000mm
PEL-025	USB Card	**GTL-250**	GPIB Cable, Double Shielded, 600mm
PEL-028	HANDLES, U-shaped handle(fixed to the bracket) (for AEL-5006/5008/5012/5015)		
PEL-029	HANDLES Rack Accessories(for AEL-5002/5003/5004)		

Note: * Regarding the product delivery date, please contact your regional sales representative.

AEL-5002-350-18.75
AEL-5003-350-28
AEL-5004-350-37.5
AEL-5002-425-18.75
AEL-5003-425-28
AEL-5004-425-37.5
AEL-5003-480-18.75
AEL-5004-480-28

AEL-5006-350-56
AEL-5008-350-75
AEL-5006-425-56
AEL-5008-425-75

AEL-5012-350-112.5
AEL-5012-425-112.5

AEL-5015-350-112.5
AEL-5015-425-112.5

AEL-5019-350-112.5
AEL-5019-425-112.5

AEL-5023-350-112.5
AEL-5023-425-112.5

MODEL	Power (W)		Current (Ampere)		Voltage (Volt)
	Turbo OFF	Turbo ON	Turbo OFF	Turbo ON	
AEL-5002-350-18.75	1875 W	3750 W (x2)*	18.75 Arms / 56.25 Apeak	37.5 Arms / 56.25 Apeak (x2)*	50 Vrms to 350 Vrms / 500 Vdc
AEL-5003-350-28	2800 W	5600 W (x2)*	28 Arms / 84 Apeak	56 Arms / 84 Apeak (x2)*	
AEL-5004-350-37.5	3750 W	7500 W (x2)*	37.5 Arms / 112.5 Apeak	75.0 Arms / 112.5 Apeak (x2)*	
AEL-5002-425-18.75	1875 W	3750 W (x2)*	1875 Arms / 56.25 Apeak	37.5 Arms / 56.25 Apeak (x2)*	50 Vrms to 425 Vrms / 600 Vdc
AEL-5003-425-28	2800 W	5600 W (x2)*	28 Arms / 84 Apeak	56 Arms / 84 Apeak (x2)*	
AEL-5004-425-37.5	3750 W	7500 W (x2)*	37.5 Arms / 112.5 Apeak	75.0 Arms / 112.5 Apeak (x2)*	
AEL-5006-350-56	5600 W	11200 W (x2)*	56.0 Arms / 168 Apeak	112.0 Arms / 168 Apeak (x2)*	50 Vrms to 350 Vrms / 500 Vdc
AEL-5008-350-75	7500 W	15000 W (x2)*	75.0 Arms / 225 Apeak	150.0 Arms / 225 Apeak (x2)*	
AEL-5012-350-112.5	11250 W	22500 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5015-350-112.5	15000 W	30000 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5019-350-112.5	18750 W	37500 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5023-350-112.5	22500 W	45000 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5006-425-56	5600 W	11200 W (x2)*	56.0 Arms / 168 Apeak	112.0 Arms / 168 Apeak (x2)*	50 Vrms to 425 Vrms / 600 Vdc
AEL-5008-425-75	7500 W	15000 W (x2)*	75.0 Arms / 225 Apeak	150.0 Arms / 225 Apeak (x2)*	
AEL-5012-425-112.5	11250 W	22500 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5015-425-112.5	15000 W	30000 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5019-425-112.5	18750 W	37500 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5023-425-112.5	22500 W	45000 W (x2)*	112.5 Arms / 337.5 Apeak	225 Arms / 337.5 Apeak (x2)*	
AEL-5003-480-18.75	2800 W	5600 W (x2)*	18.75 Arms / 56.25 Apeak	37.5 Arms / 56.25 Apeak (x2)*	50 Vrms to 480 Vrms / 700 Vdc
AEL- 5004-480-28	3750 W	7500 W (x2)*	28 Arms / 84 Apeak	56 Arms / 84 Apeak (x2)*	

* Power and current boost rate of Turbo ON

AC & DC Electronic Load

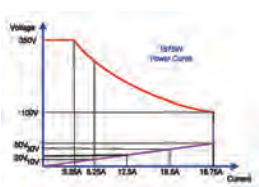
SPECIFICATIONS

		AEL-5002-350-18.75	AEL-5003-350-28	AEL-5004-350-37.5	AEL-5002-425-18.75	AEL-5003-425-28	AEL-5004-425-3 7.5
Power (W)		1875 W	2800 W	3750 W	1875 W	2800 W	3750 W
Current (Ampere)		18.75 Arms/56.25 Apeak	28 Arms / 84 Apeak	37.5 Arms / 112.5 Apeak	18.75 Arms/ 56.25 Apeak	28 Arms/ 84 Apeak	37.5 Arms / 112.5 Apeak
Voltage (Volt)		50 Vrms to 350 Vrms / 500 Vdc			50 Vrms to 425 Vrms / 600 Vdc		
FREQUENCY Range		DC,40 Hz to 440 Hz(CC,CP Mode), DC to 440 Hz(LIN,CR,CV Mode)			DC,40 Hz to 440 Hz(CC,CP Mode), DC to 440 Hz(LIN,CR,CV Mode)		
PROTECTIONS							
Over Power Protection		1968.75 Wrms or Programmable	2940 Wrms or Programmable	3937.5 Wrms or Programmable	1968.75 Wrms or Programmable	2940 Wrms or Programmable	3937.5 Wrms or Programmable
Over Current Protection		19.687 Arms or Programmable	29.40 Arms or Programmable	39.375 Arms or Programmable	19.687 Arms or Programmable	29.40 Arms or Programmable	39.375 Arms or Programmable
Over Vlotage Protection		367.5 Vrms / 525 Vdc			446.25 Vrms/630 Vdc		
Over Temp. Protection		Yes			Yes		
OPERATION MODE							
Constant Current Mode for Sine-Wave							
Range		0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
Resolution		0.3125 mA / 16 bits	0.5 mA / 16 bits	0.625 mA / 16 bits	0.3125 mA / 16 bits	0.5 mA / 16 bits	0.625 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz			±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz		
Linear ConstantCurrent Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave							
Range		0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
Resolution		0.3125 mA/ 16 bits	0.5 mA / 16 bits	0.625 mA/ 16 bits	0.3125 mA / 16 bits	0.5 mA / 16 bits	0.625 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz			±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz		
Constant Resistance Mode							
Range		3.2 ohm to 64 kohm	2.0 ohm to 40 kohm	1.6 ohm to 32 kohm	3.2 ohm to 64 kohm	2.0 ohm to 40 kohm	1.6 ohm to 32 kohm
Resolution *1		0.0052083 mS / 16 bits	0.0083333 mS / 16 bits	0.010416 mS / 16 bits	0.0052083 mS / 16 bits	0.0083333 mS / 16 bits	0.010416 mS / 16 bits
Accuracy		±0.2 % of (setting+ range) @ 50/60 Hz, ±(0.5 % of setting + 2 % of range) @ DC and 400 Hz			±0.2 % of (setting + range) @ 50/60 Hz, ±(0.5 % of setting + 2 % of range) @ DC and 400 Hz		
Constant Voltage Mode							
Range		50 Vrms to 350 Vrms / 500 Vdc			50 Vrms to 425 Vrms / 600 Vdc		
Resolution		0.01 V			0.1 V		
Accuracy		±(0.1 % of setting + 0.1 % of range)			±(0.1 % of setting + 0.1 % of range)		
Constant Power Mode							
Range		1875 W	2800 W	3750 W	1875 W	2800 W	3750 W
Resolution		0.1 W	0.1 W	0.1 W	0.1 W	0.1 W	0.1 W
Accuracy*4		±0.5 % of (setting+ range) @ 50/60 Hz, ±2 % of (setting+ range)			±0.5 % of (setting+ range) @ 50/60 Hz, ±2 % of (setting+ range)		
CREST FACTOR (CC & CP MODE ONLY)							
Range		√2 to 5			√2 to 5		
Resolution		0.1			0.1		
Accuracy		(0.5 % / Irms) + 1 % FS			(0.5 % / Irms) + 1 % FS		
POWER FACTOR (CC&CP MODE ONLY)							
Range		0 to 1 Lag or Lead			0 to 1 Lag or Lead		
Resolution		0.01			0.01		
Accuracy		1 % FS			1 % FS		
TEST MODE							
UPS Efficient Measurement		Non-Linear Mode			Non-Linear Mode		
Operating Frequency		Auto, 40 Hz to 440 Hz			Auto, 40 Hz to 440 Hz		
Current Range		0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
PF Range		0 to 1			0 to 1		
Measuring Efficiency for PV Systems, Power Conditioners for THD 80 %		Resistive + Non-Linear Mode			Resistive + Non-Linear Mode		
Operating Frequency		Auto, 40 Hz to 440 Hz			Auto, 40 Hz to 440 Hz		
Current Range		0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
Resistive Range		3.2 ohm to 64 kohm	2.0 ohm to 40 kohm	1.6 ohm to 32 kohm	3.2 ohm to 64 kohm	2.0 ohm to 40 kohm	1.6 ohm to 32 kohm
UPS Back-Up Function (CC,LIN,CR,CP)							
UVP (VTH)		0 V to 500 V			0 V to 600 V		
UPS Back-Up Time		1 Sec to 99999 Sec (>27 H)			1 Sec to 99999 Sec (>27 H)		
Battery Discharge Function (CC,LIN,CR,CP)							
UVP (VTH)		50 Vrms to 350 Vrms / 500 Vdc			50 V rms to 425 Vrms / 600 Vdc		
Battery Discharge Time		1 Sec to 99999 Sec (>27 H)			1 Sec to 99999 Sec (>27 H)		
UPS Transfer Time							
Current Range		0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
UVP (VTH)		2.5 V			2.5 V		
Time Range		0.15 mS to 999.99 mS			0.15 mS to 999.99 mS		
Fuse Test Mode							
Max. Current	Turbo OFF (CC1 to 3)	18.75 Arms	28.0 Arms	37.5 Arms	18.75 Arms	28.0 Arms	37.5 Arms
	Turbo ON (CC3)						
	Turbo OFF (CC1 to 2)	37.5 Arms (x2) *3	56.0 Arms (x2) *3	75.0 Arms (x2) *3	37.5 Arms (x2) *3	56.0 Arms (x2) *3	75.0 Arms (x2) *3
Trip & Non-Trip Time	Turbo OFF (Time1 to 3)	0.01 Sec to 333.33 Sec			0.01 Sec to 333.33 Sec		
	Turbo ON (Time1 to 2)	0.01 Sec to 0.50 Sec			0.01 Sec to 0.50 Sec		
	Turbo ON (Time3)	0.01 Sec to 600.00 Sec			0.01 Sec to 600.00 Sec		
OFF Time		0.1 Sec to 999.9 Sec			0.1 Sec to 999.9 Sec		
Meas. Accuracy		±0.003 Sec			±0.003 Sec		
Repeat Cycle		0 to 99999			0 to 99999		
Short/OPP/OCP Test Function							
ShortTime	Turbo OFF	0.1 Sec to 10 Sec or Cont.			0.1 Sec to 10 Sec or Cont.		
	Turbo ON	0.1 Sec to 1 Sec			0.1 Sec to 1 Sec		
OPP/OCP Step Time	Turbo OFF	100 ms			100 ms		
	Turbo ON	100 ms, up to 10 Steps			100 ms, up to 10 Steps		
OCP Istop	Turbo OFF	18.75 Arms	28.0 Arms	37.5 Arms	18.75 Arms	28.0 Arms	37.5 Arms
	Turbo ON	37.5 Arms	56.0 Arms	75.0 Arms	37.5 Arms	56.0 Arms	75.0 Arms
OPP Pstop	Turbo OFF	1875 W	2800 W	3750 W	1875 W	2800 W	3750 W
	Turbo ON	3750 W	5600 W	7500 W	3750 W	5600 W	7500 W

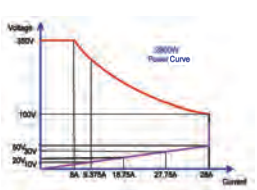
SPECIFICATIONS

	AEL-5002-350-18.75	AEL-5003-350-28	AEL-5004-350-37.5	AEL-5002-425-18.75	AEL-5003-425-28	AEL-5004-425-3 7.5
Programmable Inrush Current Simulation: Istart- Istop/ Tsep						
Istart, Inrush Start Current	0 A to 37.5 A	0 A to 56 A	0 A to 75 A	0 A to 37.5 A	0 A to 56 A	0 A to 75A
Inrush Step Time	0.1 ms to 100 ms			0.1 ms to 100 ms		
Istop, Inrush Stop Current	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
Programmable Surge current simulation: S1/T1 - S2/T2 - S3/T3						
S1 and S2 Current	0 A to 37.5 A	0 A to 56 A	0 A to 75 A	0 A to 37.5 A	0 A to 56 A	0 A to 75 A
T1 and T2 Time	0.01 Sec to 0.5 Sec			0.01 Sec to 0.5 Sec		
S3 Current	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A	0 A to 18.75 A	0 A to 28 A	0 A to 37.5 A
T3 Time	0.01 Sec to 9.99 Sec or Cont.			0.01 Sec to 9.99 Sec or Cont.		
MEASUREMENTS						
VOLTAGE READBACK V METER						
Range	500 V			600 V		
Resolution	0.01 V			0.01 V		
Accuracy	±0.05 % of (reading + range)			±0.05 % of(reading + range)		
Parameter	Vrms,V Max/Min,± Vpk			Vrms,V Max/Min,± Vpk		
CURRENT READBACK A METER						
Range	9.375 Arms/18.75 Arms	14 Arms/28 Arms	18.75 Arms/37.5 Arms	9.375 Arms/ 18.75 Arms	14 Arms/28 Arms	18.75 Arms/37.5 Arms
Resolution	0.2 mA/0.4 mA	0.3 mA/0.6 mA	0.4 mA/0.8 mA	0.2 mA/0.4 mA	0.3 mA/0.6 mA	0.4 mA/0.8 mA
Accuracy	±0.05 % of (reading + range) @ 50/60 Hz			±0.05 % of (reading + range) @ 50/60 Hz		
Parameter	Irms, I Max/Min, ± Ipk			Irms, I Max/Min, ± Ipk		
WATT READBACK W METER						
Range	1875 W	2800 W	3750 W	1875 W	2800 W	3750 W
Resolution	0.03125 W	0.05 W	0.0625 W	0.03125 W	0.05 W	0.0625 W
Accuracy *4	±0.5 % of (reading+ range) @ 50/60 Hz, ±2 % of (reading+ range)			±5 % of (reading+ range) @ 50/60 Hz, ±2 % of (reading+ range)		
VA METER	VrmsxArms Correspond To Vrms and Arms			VrmsxArms Correspond To Vrms and Arms		
POWER FACTOR METER						
Range	± 0.000 to 1.000			± 0. 000 to 1.000		
Accuracy	±(0.002±(0.001/PF) x F)			±(0.002±(0.001/PF) x F)		
Frequency M ETER (Hz)						
Range	DC,40 Hz to 440 Hz			DC,40 Hz to 440 Hz		
Accuracy	0.1 %			0.1 %		
Other Parameter METER						
VA, VAR, CF_I,Ipeak, Imax, Imin Vmax, Vmin, IHD, VHD, ITHD, VTHD						
OTHERS						
Startup Loading	Yes, Power on loading during Inverter / UPS startup			Yes, Power on loading during Inverter/ UPS start up		
Load ON / OFF Angle	0 to 359 degree can be programmed for the angle of load ON and load OFF loading			0 to 359 degree can be programmed for the angle of load ON and load OFF loading		
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed			Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed		
Master/Slave (3 Phase or Parallel Application)	Yes, 1 master and upto 7 slave units			Yes, 1 master and upto 7 slave units		
External Programming Input (Option)	FS /10 Vdc, Resulotion 0.1 V			FS / 10 Vdc, Resulotion 0.1 V		
External SYNC Input	TTL			TTL		
Vmonitor (Isolated)	±500 V / ± 10V			±600 V /± 10 V		
Imonitor (Isolated)	±56.25 Apk / ±10 Vpk	±84 Apk / ±10 Vpk	±112.5 Apk / ±10 Vpk	±56.25 Apk / ±10 Vpk	±84 Apk / ±10 Vpk	±112.5 Apk /± 10 Vpk
Interface (Option)	GPIB, RS-232, LAN, USB			GPIB, RS-232, LAN, USB		
MAX. Power Consumption	150 VA			150 VA		
Operation Temperature *2	0 °C to 40 °C			0 °C to 40 °C		
Current of Input Impedance (mA) @ 50/60 Hz, @ 400 Hz	~V x 0.3, ~V x 2.2	~V x 0.45, ~V x 3.3	~V x 0.6, ~V x 4.4	~V x 0.3, ~V x 2.2	~V x 0.45,~V x 3.3	~V x 0.6,~V x 4.4
Dimension (H x W x D)	177 mm x 440 mm x 558 mm			177 mm x 440 mm x 558 mm		
Weight	21.5 kg	27.5 kg	33.5 kg	21.5 kg	27.5 kg	33.5 kg

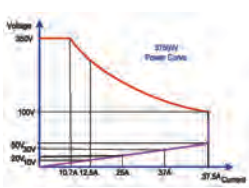
*1 ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω
*2 Operating temperature range is 0 °C to 40 °C, all specification apply for 25 °C±5 °C, Except as noted
*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function
*4 The specification apply for current less than 20 Arms
* All specifications apply for 50/60 Hz.
* All specifications subject to change
Input AC Power : 100 Vac to 230 Vac ± 10 %, 50/60 Hz
Cooling : Advanced Fan Cooled



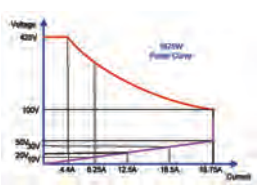
AEL-5002-350-18.75



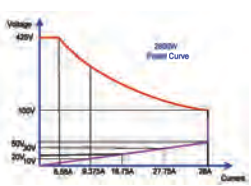
AEL-5003-350-28



AEL-5004-350-37.5



AEL-5002-425-18.75



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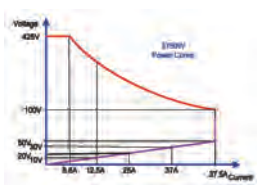


AEL-5004-425-37.5

AC & DC Electronic Load

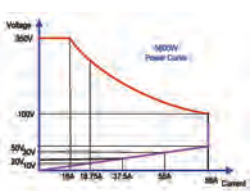
SPECIFICATIONS

		AEL-5006-350-56	AEL-5008-350-75	AEL-5012-350-112.5	AEL-5015-350-112.5	AEL-5019-350-112.5	AEL-5023-350-112.5
Power (W)		5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
Current (Ampere)		56 Arms/ 168 Apeak	75 Arms / 225 Apeak	112.5 Arms/ 337.5 Apeak	112.5 Arms/ 337.5 Apeak	112.5 Arms/ 337.5 Apeak	112.5 Arms/ 337.5 Apeak
Voltage (Volt)		50 Vrms to 350 Vrms / 500 Vdc					
FREQUENCY Range		DC,40 Hz to 440 Hz(CC,CP Mode), DC to 440 Hz(LIN,CR,CV Mode)					
PROTECTIONS							
Over Power Protection		5880 Wrms or Programmable	7875 Wrms or Programmable	11812.5 Wrms or Programmable	15750 Wrms or Programmable	19687.5 Wrms or Programmable	23625 Wrms or Programmable
Over CurrentProtection		58.8 Arms, or Programmable	78.75 Arms, or Programmable	118.125 Arms or Programmable	118.125 Arms or Programmable	118.125 Arms or Programmable	118.125 Arms or Programmable
Over Vlotage Protection		367.5 Vrms/525 Vdc					
Over Temp. Protection		Yes					
OPERATION MODE							
Constant Current Mode for Sine-Wave							
Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Resolution		1 mA / 16 bits	1.25 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz					
Linear ConstantCurrent Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave							
Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Resolution		1 mA / 16 bits	1.25 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz ±0.5 % of (setting + range) @ DC and 400 Hz					
Constant Resistance Mode							
Range		1 ohm to 20 kohm	0.8 ohm to 16 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm
Resolution *1		0.016666 mS / 16 bits	0.020832 mS / 16 bits	0.031248 mS / 16 bits	0.031248 mS / 16 bits	0.031248 mS / 16 bits	0.031248 mS / 16 bits
Accuracy		±0.2 % of (setting+ range) @ 50/60 Hz, ±(0.5 % of setting + 2 % of range) @ DC and 400 Hz					
Constant Voltage Mode							
Range		50 Vrms to 350 Vrms / 500 Vdc					
Resolution		0.1 V					
Accuracy		±0.2 % of (setting + range) @ 50/60 Hz					
Constant Power Mode							
Range		5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
Resolution		0.1 W	0.1 W	1 W	1 W	1 W	1 W
Accuracy *4		±0.5 % of (setting+ range) @ 50/60 Hz, ±2 % of (setting+ range)					
CREST FACTOR (CC & CP MODE ONLY)							
Range		√2 to 5					
Resolution		0.1					
Accuracy		(0.5 % / Irms)+ 1 % FS					
POWER FACTOR (CC&CP MODE ONLY)							
Range		0 to 1 Lag or Lead					
Resolution		0.01					
Accuracy		1 % F S					
TEST MODE							
UPS Efficient Measurement		Non-Linear Mode					
Operating Frequency		Auto, 40 Hz to 440 Hz					
CurrentRange		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
PF Range		0 to 1					
Measuring Efficiency for PV Systems, Power Conditioners for THD 80 %		Resistive + Non-Linear Mode					
Operating Frequency		Auto, 40 Hz to 440 Hz					
Current Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Resistive Range		1 ohm to 20 kohm	0.8 ohm to 16 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm
UPS Back-Up Function (CC,LIN,CR,CP)							
UVP (VTH)		50 Vrms to 350 Vrms / 500 Vdc					
UPS Back-Up Time		1 Sec to 99999 Sec (>27 H)					
Battery Discharge Function (CC,LIN,CR,CP)							
UVP (VTH)		50 Vrms to 350 Vrms / 500 Vdc					
Battery Discharge Time		1 Sec to 99999 Sec (>27 H)					
UPS Transfer Time							
Current Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
UVP (VTH)		2.5 V					
Time Range		0.15 ms to 999.99 ms					
Fuse Test Mode							
Max. Current	Turbo OFF (CC1 to 3)	56 Arms	75 Arms	112.5 Arms	112.5 Arms	112.5 Arms	112.5 Arms
	Turbo ON (CC3)						
	Turbo ON (CC1 to 2)	112 Arms (x2) *3	150 Arms (x2) *3	225 Arms (x2) *3	225 Arms (x2) *3	225 Arms (x2) *3	225 Arms (x2) *3
Trip & Non-Trip Time	Turbo OFF (Time1 to 3)	0.01 Sec to 333.33 Sec					
	Turbo ON (Time1 to 2)	0.01 Sec to 0.50 Sec					
	Turbo ON (Time3)	0.01 Sec to 600.00 Sec					
OFF Time		0.1 Sec to 999.9 Sec					
Meas. Accuracy		±0.003 Sec					
RepeatCycle		0 to 99999					
Short/OPP/OCP Test Function							
ShortTime	Turbo OFF	0.1 Sec to 10 Sec or Cont.					
	Turbo ON	0.1 Sec to 1 Sec					
OPP/OCP Step	Turbo OFF	100 ms					
	Turbo ON	100 ms, up to 10 Steps					
OCP Istop	Turbo OFF	56 Arms	75 Arms	112.5 Arms	112.5 Arms	112.5 Arms	112.5 Arms
	Turbo ON	112 Arms	150 Arms	225 Arms	225 Arms	225 Arms	225 Arms
OPP Pstop	Turbo OFF	5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
	Turbo ON	11200 W	15000 W	22500 W	30000 W	37500 W	45000 W

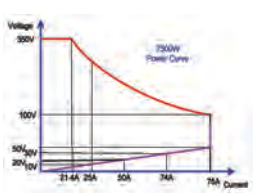
SPECIFICATIONS

	AEL-5006-350-56	AEL-5008-350-75	AEL-5012-350-112.5	AEL-5015-350-112.5	AEL-5019-350-112.5	AEL-5023-350-112.5
Programmable Inrush Current Simulation: Istart- Istop/ Tsep						
Istart,Inrush Start Current	0 A to 112 A	0 A to 150 A	0 A to 225 A	0 A to 225 A	0 A to 225 A	0 A to 225 A
Inrush Step Time	0.1 ms to 100 ms					
Istop,Inrush Stop Current	0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Programmable Surge Current Simulation S1/T1 - S2/T2 - S3/T3						
S1 and S2 Current	0 A to 112 A	0 A to 150 A	0 A to 225 A	0 A to 225 A	0 A to 225 A	0 A to 225 A
T1 and T2 Time	0.01 Sec to 0.5 Sec					
S3 Current	0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
T3 Time	0.01 Sec to 9.99 Sec or Cont.					
MEASUREMENTS						
VOLTAGE READBACK V METER						
Range	500 V					
Resolution	0.01 V					
Accuracy	±0.05 % of (reading + range)					
Parameter	Vrms,V Max/Min, ±Vpk					
CURRENT READBACK A METER						
Range	28 Arms/56 Arms	37.5 Arms/75 Arms	56.25 Arms/112.5 Arms	56.25 Arms/112.5 Arms	56.25 Arms/112.5 Arms	56.25 Arms/112.5 Arms
Resolution	0.6 mA/1.2 mA	0.8 mA/1.6 mA	1.2 mA/2.4 mA	1.2 mA/2.4 mA	1.2 mA/2.4 mA	1.2 mA/2.4 mA
Accuracy	±0.1 % of (reading + range) @ 50/60 Hz					
Parameter	Irms,I Max/Min,± Ipk					
WATT READBACK W METER						
Range	5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
Resolution	0.1 W	0.125 W	0.1875 W	0.25 W	0.3125 W	0.375 W
Accuracy *4	± 0.5 % of (reading+ range) @ 50/60 Hz ± 2 % of (reading+ range)					
VA METER	VrmsxArms Correspond To Vrms and Arms					
POWER FACTOR METER						
Range	± 0.000 to 1.000					
Accuracy	±(0.002±(0.001/PF) x F)					
Frequency M ETER (Hz)						
Range	DC, 40 Hz to 440 Hz					
Accuracy	0.1 %					
Other Parameter METER						
VA, VAR, CF I, Ipeak, Imax, Imin Vmax, Vmin, IHD, VHD, ITHD, VTHD						
OTHERS						
Startup Loading	Yes, Power on loading during Inverter/ UPS startup					
Load ON / OFF Angle	0 to 359 degree can be programmed for the angle of load ON and load OFF loading					
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed					
Master/Slave (3 Phase or Parallel	Yes,1 master and upto 7 slave unit					
External Programming Input (Option)	FS / 10 Vdc, Resulotion 0.1 V					
External SYNC Input	TTL					
Vmonitor (Isolated)	± 500 V /± 10 V					
Imonitor (Isolated)	± 168 Apk / ± 10 Vpk	± 225 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk
Interface (Option)	GPIB, RS-232, LAN, USB					
MAX. Power Consumption	270 VA	270 VA	390 VA	510 VA	630 VA	750 VA
Operation Temperature *2	0 °C to 40 °C					
Current of Input Impedance (mA) @ 50/60 Hz, @ 400 Hz	~V x 0.9, ~V x 6.6	~V x 1.2, ~V x 8.8	~V x 1.8, ~V x 13.2	~V x 2.4, ~V x 17.6	~V x 3.0, ~V x 22	~V x 3.6, ~V x 26.4
Dimension (H x W x D)	458 mm x 480 mm x 590 mm	458 mm x 480 mm x 590 mm	636 mm x 480 mm x 590 mm	814 mm x 480 mm x 590 mm	1283 mm x 600 mm x 600 mm	1283 mm x 600 mm x 600 mm
Weight	58 kg	70 kg	105 kg	740 kg	260 kg	295 kg

*1 ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω
*2 Operating temperature range is 0 °C to 40 °C, all specification apply for 25 °C±5 °C, Except as noted
*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function
*4 The specification apply for current less than 20 Arms
* All specifications apply for 50/60 Hz.
* All specifications subject to change
Input AC Power : 100 Vac to 230 Vac ± 10 %, 50/60 Hz
Cooling : Advanced Fan Cooled



AEL-5006-350-56



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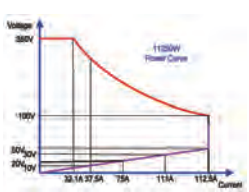
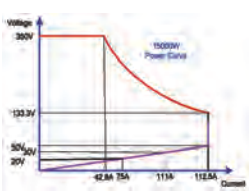
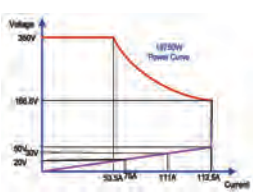


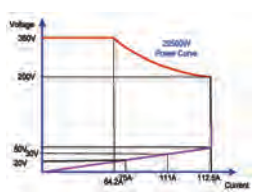
AEL-5012-350-112.5



AEL-5015-350-112.5



AEL-5019-350-112.5



AEL-5023-350-112.5

AC & DC Electronic Load

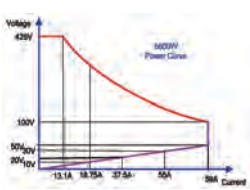
SPECIFICATIONS

		AEL-5006-425-56	AEL-5008-42.5-7.5	AEL-5012-425-112.5	AEL-5015-425-112.5	AEL-5019-425-112.5	AEL-5023-425-112.5
Power (W)		5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
Current (Ampere)		56 Arms/ 168 Apeak	75 Arms / 225 Apeak	112.5 Arms/ 337.5 Apeak	112.5 Arms/ 337.5 Apeak	112.5 Arms/ 337.5 Apeak	112.5 Arms/ 337.5 Apeak
Voltage (Volt)		50 Vrms to 425 Vrms / 600 Vdc					
FREQUENCY Range		DC,40 Hz to 440 Hz(CC,CP Mode), DC to 440 Hz(LIN,CR,CV Mode)					
PROTECTIONS							
Over Power Protection		5880 Wrms or Programmable	7875 Wrms or Programmable	11812.5 Wrms or Programmable	15750 Wrms or Programmable	19687.5 Wrms or Programmable	23625 Wrms or Programmable
Over Current Protection		58.8 Arms, or Programmable	78.75 Arms, or Programmable	118.125 Arms or Programmable	118.125 Arms or Programmable	118.125 Arms or Programmable	118.125 Arms or Programmable
Over Vlotage Protection		446.25 Vrms/630 Vdc					
Over Temp.Protection		Yes					
OPERATION MODE							
Constant Current Mode for Sine-Wave							
Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Resolution		1 mA/ 16 bits	1.25 mA/ 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz,±0.5 % of (setting + range) @ DC and 400 Hz					
Linear ConstantCurrent Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave							
Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Resolution		1 mA/ 16 bits	1.25 mA/ 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits	1.875 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz ±0.5 % of (setting + range) @ DC and 400 Hz					
Constant Resistance Mode							
Range		1 ohm to 20 kohm	0.8 ohm to 16 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm
Resolution*1		0.016666 mS / 16 bits	0.020832 mS / 16 bits	0.031248 mS / 16 bits	0.031248 mS / 16 bits	0.031248 mS / 16 bits	0.031248 mS / 16 bits
Accuracy		±0.2 % of (setting+ range) @ 50/60 Hz,±(0.5 % of setting + 2 % of range) @ DC and 400 Hz					
Constant Voltage Mode							
Range		50 Vrms to 425 Vrms / 600 Vdc					
Resolution		0.1 V					
Accuracy		±0.2 % of (setting + range) @ 50/60 Hz					
Constant Power Mode							
Range		5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
Resolution		0.1 W	0.1 W	1 W	1 W	1 W	1 W
Accuracy *4		±0.5 % of (setting+ range) @ 50/60 Hz,±2 % of (setting+ range)					
CREST FACTOR (CC & CP MODE ONLY)							
Range		√2 to 5					
Resolution		0.1					
Accuracy		(0.5 % / Irms)+ 1 % FS					
POWER FACTOR (CC&CP MODE ONLY)							
Range		0 to 1 Lag or Lead					
Resolution		0.01					
Accuracy		1 % FS					
TEST MODE							
UPS Efficient Measurement		Non-Linear Mode					
Operating Frequency		Auto, 40 Hz to 440 Hz					
Current Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
PF Range		0 to 1					
Measuring Efficiency for PV Systems, Power Conditionersfor THD 80 %		Resistive+ Non-Linear Mode					
Operating Frequency		Auto, 40 Hz to 440 Hz					
Current Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Resistive Range		1 ohm to 20 kohm	0.8 ohm to 16 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm	0.533 ohm to 10.666 kohm
UPS Back-Up Function (CC,LIN,CR,CP)							
UVP (VTH)		50 Vrms to 425 Vrms / 600 Vdc					
UPS Back-Up Time		1 Sec to 99999 Sec (>27 H)					
Battery Discharge Function (CC,LIN,CR,CP)							
UVP (VTH)		50 Vrms to 425 Vrms / 600 Vdc					
Battery Discharge Time		1 Sec to 99999 Sec (>27 H)					
UPS Transfer Time							
Current Range		0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
UVP (VTH)		2.5 V					
Time Range		0.15 ms to 999.99 ms					
Fuse Test Mode							
Max. Current	Turbo OFF (CC1 to 3)	56 Arms	75 Arms	112.5 Arms	112.5 Arms	112.5 Arms	112.5 Arms
	Turbo ON (CC3)						
	Turbo ON (CC1 to 2)	112 Arms (x2) *3	150 Arms (x2) *3	225 Arms (x2) *3	225 Arms (x2) *3	225 Arms (x2) *3	225 Arms (x2) *3
Trip & Non-Trip Time	Turbo OFF (Time1)	0.01 Sec to 333.33 Sec					
	Turbo ON (Time1 to 2)	0.01 Sec to 0.50 Sec					
	Turbo ON (Time3)	0.01 Sec to 600.00 Sec					
OFF Time		0.1 Sec to 999.9 Sec					
Meas. Accuracy		± 0.003 Sec					
RepeatCycle		0 to 99999					
Short/OPP/OCP Test Function							
ShortTime	Turbo OFF	0.1 Sec to 10 Sec or Cont.					
	Turbo ON	0.1 Sec to 1 Sec					
OPP/OCP Step Time	Turbo OFF	100 ms					
	Turbo ON	100 ms, up to 10 Steps					
OCP Istop	Turbo OFF	56 Arms	75 Arms	112.5 Arms	112 5Arms	112 5Arms	112 5Arms
	Turbo ON	112 Arms	150 Arms	225 Arms	225 Arms	225 Arms	225 Arms
OPP Pstop	Turbo OFF	5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
	Turbo ON	11200 W	15000 W	22500 W	30000 W	37500 W	45000 W

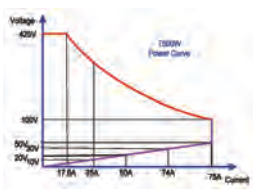
SPECIFICATIONS

	AEL-5006-425-56	AEL-5008-42.5-7.5	AEL-5012-425-112.5	AEL-5015-425-112.5	AEL-5019-425-112.5	AEL-5023-425-112.5
Programmable Inrush Current Simulation: Istart- Istop/ Tsep						
Istart,Inrush	0 A to 112 A	0 A to 150 A	0 A to 225 A	0 A to 225 A	0 A to 225 A	0 A to 225 A
Inrush Step Time	0.1 ms to 100 ms					
Istop,Inrush Stop Current	0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
Programmable Surge Current Simulation S1/T1 - S2/T2 - S3/T3						
S1 and S2 Current	0 A to 112 A	0 A to 150 A	0 A to 225 A	0 A to 225 A	0 A to 225 A	0 A to 225 A
T1 and T2 Time	0.01 Sec to 0.5 Sec					
S3 Current	0 A to 56 A	0 A to 75 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A	0 A to 112.5 A
T3 Time	0.01 Sec to 9.99 Sec or Cont.					
MEASUREMENTS						
VOLTAGE READBACK V METER						
Range	600 V					
Resolution	0.01 V					
Accuracy	±0.05 % of (reading + range)					
Parameter	Vrms,V Max/Min, ±Vpk					
CURRENT READBACK A METER						
Range	28 Arms/56 Arms	37.5 Arms/75 Arms	56.25 Arms/112.5 Arms	56.25 Arms/112.5 Arms	56.25 Arms/112.5 Arms	56.25 Arms/112.5 Arms
Resolution	0.6 mA/1.2 mA	0.8 mA/1.6 mA	1.2 mA/2.4 mA	1.2 mA/2.4 mA	1.2 mA/2.4 mA	1.2 mA/2.4 mA
Accuracy	± 0.1 % of (reading + range)@ 50/60 Hz					
Parameter	Irms,I Max/Min, ±Ipk					
WATT READBACK W METER						
Range	5600 W	7500 W	11250 W	15000 W	18750 W	22500 W
Resolution	0.1 W	0.125 W	0.1875 W	0.25 W	0.3125 W	0.375 W
Accuracy *4	± 0.5 % of (reading+ range) @ 50/60 Hz ± 2 % of (reading+ range)					
VA METER						
POWER FACTOR METER						
Range	± 0.000 to 1.000					
Accuracy	±(0.002±(0.001/PF) x F)					
Frequency M ETER (Hz)						
Range	DC,40 Hz to 440 Hz					
Accuracy	0.1 %					
Other Parameter METER						
VA, VAR, CF_I, Ipeak, Imax, Imin Vmax, Vmin, IHD, VHD, ITHD, VTHD						
OTHERS						
Startup Loading	Yes, Power on loading during Inverter / UPS startup					
Load ON / OFF Angle	0 to 359 degree can be programmed for the angle o fload ON and load OFF loading					
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed					
Master/Slave (3 Phase or Parallel	Yes, 1 master and upto 7 slave unit					
External Programming Input (Option)	FS / 10 Vdc, Resulotion 0.1 V					
External SYNC Input	TTL					
Vmonitor (Isolated)	±600 V | ± 10 V					
Imonitor (Isolated)	± 168 Apk / ± 10 Vpk	± 225 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk	± 337.5 Apk / ± 10 Vpk
Interface (Option)	GPIB, RS-232, LAN, USB					
MAX. Power Consumption	270 VA	270 VA	390 VA	510 VA	630 VA	750 VA
Operation Temperature *2	0 °C to 40 °C					
Current of Input Impedance (mA) @ 50/60 Hz, @ 400 Hz	~V x 0.9,~V x 6.6	~V x 1.2, ~V x 8.8	~V x 1.8, ~V x 13.2	~V x 2.4, ~V x 17.6	~V x 3.0, ~V x 22	~V x 3.6, ~V x 26.4
Dimension (H x W x D)	458 mm x 480 mm x 590 mm	458 mm x 480 mm x 590 mm	636 mm x 480 mm x 590 mm	814 mm x 480 mm x 590 mm	1283 mm x 600 mm x 600 mm	1283 mm x 600 mm x 600 mm
Weight	58 kg	70 kg	105 kg	140 kg	260 kg	295 kg

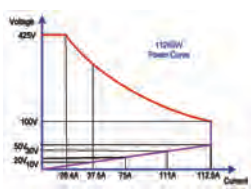
*1 ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω
*2 Operating temperature range is 0 °C to 40 °C, all specification apply for 25 °C±5 °C, Except as noted
*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function
*4 The specification apply for current less than 20 Arms
* All specifications apply for 50/60 Hz.
* All specifications subject to change
Input AC Power : 100 Vac to 230 Vac ± 10 %, 50/60 Hz
Cooling : Advanced Fan Cooled



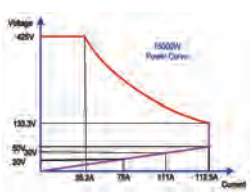
AEL-5006-425-56



AEL-5008-425-75



AEL-5012-425-112.5



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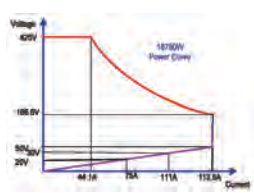
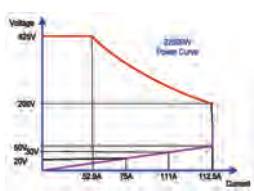


AEL-5019-425-112.5



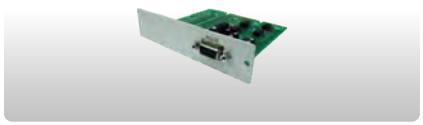
AEL-5023-425-112.5

AC & DC Electronic Load

SPECIFICATIONS			
		AEL-5003-480-18.75	AEL-5004-480-28
Power (W)		2800 W	3750 W
Current (Ampere)		18.75 Arms / 56.25 Apeak	28 Arms / 84 Apeak
Voltage (Volt)		50 Vrms to 480 Vrms / 700 Vdc	
FREQUENCY Range		DC,40 Hz to 70 Hz(CC,CP Mode), DC to 70 Hz(LIN,CR,CV Mode)	
PROTECTIONS			
Over Power Protection		2940 Wrms or Programmable	3937.5 Wrms or Programmable
Over Current Protection		19.687 Arms or Programmable	29.4 Arms or Programmable
Over Vlotage Protection		504 Vrms / 735 Vdc	
Over Temp.Protection		Yes	
OPERATION MODE			
Constant Current Mode for Sine-Wave			
Range		0 A to 18.75 A	0 A to 28 A
Resolution		0.3725 mA / 16 bits	0.5 mA / 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz	
Linear Constant Current Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave			
Range		0 A to 18.75 A	0 A to 28 A
Resolution		0.3125 mA/ 16 bits	0.5 mA/ 16 bits
Accuracy		±(0.1 % of setting + 0.2 % of range) @ 50/60 Hz, ±0.5 % of (setting + range) @ DC and 400 Hz	
Constant Resistance Mode			
Range		4 ohm to 80 Kohm	2.5 ohm to 50 Kohm
Resolution *1		0.004166 mS / 16 bits	0.006666 mS / 16 bits
Accuracy		±2 % of (setting + range) @ 50/60 Hz, ±(0.5 % of setting + 2 % of range) @ DC and 400 Hz	
Constant Voltage Mode			
Range		50 Vrms to 480 Vrms / 700 Vdc	
Resolution		0.0125 V	
Accuracy		±(0.1 % of setting + 0.1 % of range)	
Constant Power Mode			
Range		2800 W	3750 W
Resolution		0.1 W	0.1 W
Accuracy *4		±0.5% of (setting+ range) @ 50/60 Hz,±2 % of (setting+ range)	
CREST FACTOR (CC & CP MODE ONLY)			
Range		√2 to 5	
Resolution		0.1	
Accuracy		(0.5 % /Irms) +1 % FS	
POWER FACTOR (CC&CP MODE ONLY)			
Range		0 to 1 Lag or Lead	
Resolution		0.01	
Accuracy		1 % FS	
TEST MODE			
UPS Efficient Measurement		Non-Linear Mode	
Operating Frequency		Auto, 40 Hz to 70 Hz	
CurrentRange		0 A to 18.75 A	0 A to 28 A
PF Range		0 to 1	
Measuring Efficiency For PV Systems, Power Conditionersfor THD 80 %		Resistive+ Non-Linear Mode	
Operating Frequency		Auto, 40 Hz to 70 Hz	
CurrentRange		0 A to 18.75 A	0 A to 28 A
Resistive Range		4 ohm to 80 Kohm	2.5 ohm to 50 Kohm
UPS Back-Up Function (CC,LIN,CR,CP)			
UVP (VTH)		50 Vrms to 480 Vrms / 700 Vdc	
UPS Back-Up Time		1 Sec to 99999 Sec (>27 H)	
Battery Discharge Function (CC,LIN,CR,CP)			
UVP (VTH)		50 Vrms to 480 Vrms / 700 Vdc	
BatteryDischarge Time		1 Sec to 99999 Sec (>27 H)	
UPS Transfer Time			
CurrentRange		0 A to 18.75 A	0 A to 28 A
UVP (VTH)		2.5 V	
Time Range		0.15 ms to 999.99 ms	
Fuse Test Mode			
Max. Current	Turbo OFF (CC1 to 3)	18 75Arms	28 Arms
	Turbo ON (CC3)		
	Turbo ON (CC1 to 2)	37.5 Arms (x2) *3	56.0 Arms (x2) *3
Trip & Non-Trip Time	Turbo OFF (Time1 to 3)	0.01 Sec to 333.33 Sec	
	Turbo ON (Time1 to 2)	0.01 Sec to 0.50 Sec	
	Turbo ON (Time3)	0.01 Sec to 600.00 Sec	
OFF Time		0.1 Sec to 999.9 Sec	
Meas. Accuracy		± 0.003 Sec	
RepeatCycle		0 to 99999	
Short/OPP/OCP Test Function			
ShortTime	Turbo OFF	0.1 Sec to 10 Sec or Cont.	
	Turbo ON	0.1 Sec to 1 Sec	
OPP/OCP Step Time	Turbo OFF	100 ms	
	Turbo ON	100 ms, upto 10 Steps	
OCP Istop	Turbo OFF	18.75 Arms	28.0 Arms
	Turbo ON	37.5 Arms	56.0 Arms
OPP Pstop	Turbo OFF	2800 W	3750 W
	Turbo ON	5600 W	7500 W

PEL-022 GPIB Card

PEL-023 RS-232 Card



PEL-024 LAN Card

PEL-025 USB Card

PEL-028 HANDLES, U-shaped handle
(for AEL-5006/5008/5012/5015)

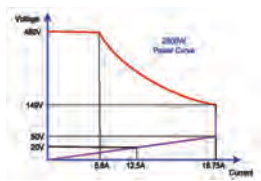
PEL-029 HANDLES Rack Accessories
(for AEL-5002/5003/5004)

SPECIFICATIONS

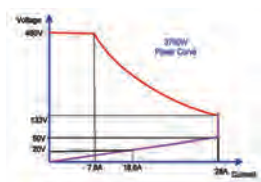
	AEL-5003-480-18.75	AEL-5004-480-28
Programmable Inrush Current Simulation: Istart-Istop/ Tsep		
Istart, Inrush StartCurrent	0 A to 37.5 A	0 A to 56 A
Inrush Step Time	0.1 ms to 100 ms	
Istop, Inrush Stop Current	0 A to 18.75 A	0 A to 28 A
Programmable Surge Current Simulation S1/T1 - S2/T2 - S3/T3		
SI and S2 Current	0 A to 37.5 A	0 A to 56 A
TI and T2 Time	0.01 Sec to 0.5 Sec	
S3 Current	0 A to 18.75 A	0 A to 28 A
T3 Time	0.01 Sec to 9.99 Sec or Cont.	
MEASUREMENTS		
VOLTAGE READBACK V METER		
Range	700 V	
Resolution	0.0125 V	
Accuracy	± 0.05 % of (reading + range)	
Parameter	Vrms,V Max/Min, ±Vpk	
CURRENT READBACK A METER		
Range	9.375 Arms/18.75 Arms	14 Arms/28 Arms
Resolution	0.2 mA/0.4 mA	0.3 mA/0.6 mA
Accuracy	± 0.05 % of (reading + range) @ 50/60 Hz	
Parameter	Irms, I Max/Min, ±Ipk	
WATT READBACK W METER		
Range	2800 W	3750 W
Resolution	0.05 W	0.0625 W
Accuracy *4	±0.5 % of (reading+ range) @ 50/60 Hz, ±2 % of (reading+ range)	
VA METER	Vrmsx Arms Correspond To Vrms and Arms	
POWER FACTOR METER		
Range	± 0.000 to 1.000	
Accuracy	±(0.002±(0.001/PF) x F)	
Frequency M ETER (Hz)		
Range	DC,40 Hz to 70 Hz	
Accuracy	0.1 %	
Other Parameter METER		
VA, VAR, CF_I, Ipeak, Imax, Imin Vmax, Vmin, IHD, VHD, ITHD, VTHD		
OTHERS		
Startup Loading	Yes, Power on loading during Inverter / UPS startup	
Load ON / OFF Angle	0 to 359 degree can be programmed for the angle of load ON and load OFF loading	
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed	
Master/Slave (3 Phase or Parallel	Yes, 1 master and upto 7 slave units	
External Programming Input (Option)	FS / 10 Vdc, Resulotion 0.1 V	
External SYNC Input	TTL	
Vmonitor (Isolated)	± 700 V /± 10 V	
Imonitor (Isolated)	± 56.25 Apk / ± 10 Vpk	± 84 Apk / ± 10 Vpk
Interface (Option)	GPIB, RS-232, LAN, USB	
MAX. Power Consumption	150 VA	
Operation Temperature *2	0 °C to 40 °C	
Current of Input Impedance (mA) @ 50/60 Hz, @ 400 Hz	~V x 0.3, ~V x 2.2	~V x 0.4, ~V x 2.95
Dimension (H x W x D)	177 mm x 440 mm x 558 mm	177 mm x 440 mm x 558 mm
Weight	27.5 kg	33.5 kg

*1 ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω
*2 Operating temperature range is 0 ℃ to 40 ℃, all specification apply for 25 ℃±5 ℃, Except as noted
*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function
*4 The specification apply for current less than 20 Arms
* All specifications apply for 50/60 Hz.
* All specifications subject to change without notice.

Input AC Power : 100 Vac to 230 Vac ± 10 %, 50/60 Hz
Cooling : Advanced Fan Cooled



AEL-5003-480-18.75



AEL-5004-480-28

Rear Panel

AEL-5002-350-18.75
AEL-5003-350-28
AEL-5004-350-37.5
AEL-5002-425-18.75
AEL-5003-425-28
AEL-5004-425-37.5
AEL-5003-480-18.75
AEL-5004-480-28

AEL-5006-350-56
AEL-5008-350-75
AEL-5006-425-56
AEL-5008-425-75

AEL-5012-350-112.5
AEL-5012-425-112.5

AEL-5015-350-112.5
AEL-5015-425-112.5

AEL-5019-350-112.5
AEL-5019-425-112.5

AEL-5023-350-112.5
AEL-5023-425-112.5

High Power DC Electronic Load

PEL-5000G Series

NEW

CE RS-232 GPIB USB LAN UKCA

FEATURES

* 4U/6 kW High Power Density Design Also for Bench Testing
* Turbo Mode Function, Which Allows 1.5 Times the Rated Power or Current to be Used Within Two Seconds
* Turbo Mode can be Used with OCP/OPP/ BMS/Short Mode/Surge Mode/Hot Plug-In Testing
* High Tolerance to Environmental Temperature, with 4 kW/5 kW Models not Affected by Environmental Temperature in Power Usage
* Can set the Power-on Status Value
* Short Circuit Duration Can be set Within Short Circuit Test Voltage Meter Display Can be Configured as Polarity Positive ("+") or Negative("-")
* Optional Interface : GPIB, RS232, USB, LAN
* Protection Function Testing for Battery BMS
* Protection Against V, I, W, and ℃

GW Instek PEL-5000G series single-channel electronic load provides 150 V/ 600 V/ 1200 V models with a power range of 4,5,6 kW. PEL-5000G can test and verify the specifications of batteries, electric vehicle chargers/charging stations, electric vehicle batteries and solar panels. PEL-5000G supports parallel connection for same voltage specification and different power models. PEL-5000G can support up to 8 units connected in parallel.

PEL-5000G Series has its own control and display panel, CC / CR / CV / CP / Dynamic modes. The new Turbo mode is designed for overload or protection testing, which includes OCP, OPP, Short for AC/DC or DC/DC power source; Over Charge/Discharge and Short for Battery BMS protection; and Blow/Not Blow testing for Fuse, Breaker or PTC Current Protection Components.

Support Short, OCCP and OCDP protection tests for battery BMS protection testing, the peak current before protection and protection response time are measured. The BMS, Fuse, OCP and OPP single-key test functions on the module make test more efficient. The SHORT duration setting and SHORT_VH, SHORT_VL setting function, also can measure Short Voltage and Current. PEL-5000G also provides Programmable LOAD ON/OFF voltage, GO/NG meter check, Voltage meter display" + "or"–" is selectable

Dynamic can be simulated under CC, CP mode. The current Rise / Fall slew rate can be adjusted individually and there is an external signal input so that load can have a simulated Specific Load Current Waveform. PEL-5000G also provides 150 sets Store / Recall larger memory is much advance feature for each different application. The 150 sets test parameter and status storage function can call the storage memory real time in accordance with the auto sequence requirement, at any time to tune out the stored memory for use.

PEL-022 GPIB Card

PEL-023 RS-232 Card

PEL-024 LAN Card

PEL-025 USB Card

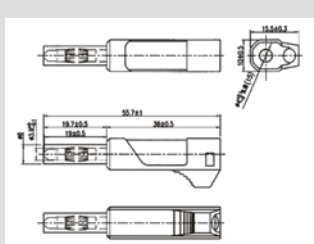
PEL-028 Handles

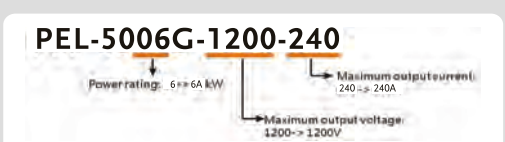
PEL-031 Rack Mount Kit

PEL-032 9923 Current Waveform Generator + RS232 Interface

ORDERING INFORMATION

PEL-5004G-150-400	150 V/400 A/4000 W High Power DC Electronic Load
PEL-5005G-150-500	150 V/500 A/5000 W High Power DC Electronic Load
PEL-5006G-150-600	150 V/600 A/6000 W High Power DC Electronic Load
PEL-5004G-600-280	600 V/280 A/ 4000 W High Power DC Electronic Load
PEL-5005G-600-350	600 V/350 A/5000 W High Power DC Electronic Load
PEL-5006G-600-420	600 V/420 A/6000 W High Power DC Electronic Load
PEL-5004G-1200-160	1200 V/l 60 A/4000 W High Power DC Electronic Load
PEL-5005G-1200-200	1200 V/200 A/5000 W High Power DC Electronic Load
PEL-5006G-1200-240	1200 V/240 A/6000 W High Power DC Electronic Load





STANDARD ACCESSORIES

BANANA PLUGS x 2
HD-DSUB : 15PIN Parallel wire Parallel Wire x 1
PEL-028 HANDLES, U-shaped handle(fixed to the bracket)
PEL-031 Rack Mount Kit For PEL-5000G

OPTIONAL ACCESSORIES

PEL-022	GPIB Card	**GTL-246**	USB Cable, USB 2.0, A-B Type, 1200mm
PEL-023	RS-232 Card	**GTL-248**	GPIB Cable, Double Shielded, 2000mm
PEL-024	LAN Card	**PEL-032**	9923 Current Waveform Generator + RS232 Interface
PEL-025	USB Card		
PEL-030	GPIB+RS-232 Card		

Note: * Regarding the product delivery date, please contact your regional sales representative.

Rear Panel

SPECIFICATIONS

	PEL-5004G-150-400		PEL-5005G-150-500		PEL-5006G-150-600	
Power *1	0 W to 4 kW	0 W to 6 kW max. *1	0 W to 5 kW	0 W to 7.5 kW max. *1	0 W to 6 kW	0 W to 9 kW max. *1
Current	0 A to 400 A	0 A to 600 A max. *1	0 A to 500 A	0 A to 750 A max. *1	0 A to 600 A	0 A to 900 A max. *1
Voltage	0 V to 150 V		0 V to 150 V		0 V to 150 V	
Min. Operating Voltage	0.7 V@400 A		0.7 V@500 A		0.7 V@600 A	
Protections						
Over Power	105%					
Over Current	104%					
Over Voltage	105%					
Over Temp Protection(OTP)	90 °C ± 5 °C					
Constant Current Mode						
Range *2	0 A to 40 A	0 A to 400 A	0 A to 50 A	0 A to 500 A	0 A to 60 A	0 A to 600 A
Resolution	0.64 mA	6.4 mA	0.80 mA	8.0 mA	0.96 mA	9.6 mA
Accuracy *3	± 0.05% of (Setting + Range)					
Constant Resistance Mode						
Range	22.5 kΩ to 0.375 Ω	0.375 Ω to 0.0018 Ω	18 kΩ to 0.3 Ω	0.3 Ω to 0.0015 Ω	15 kΩ to 0.25 Ω	0.25 Ω to 0.0012 Ω
Resolution	44 µS	6.25 µΩ	56 µS	5 µΩ	67 µS	4.167 µΩ
Accuracy	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.) *9	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.) *9	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.) *9
Constant Voltage Mode						
Range	0 to 150 V					
Resolution	2.5 mV					
Accuracy	± 0.05 % of (Setting + Range)					
Constant Power Mode						
Range	0 W to 400 W	400 to 4 kW	0 W to 500 W	500 W to 5 kW	0 W to 600 W	600 W to 6 kW
Resolution	6.4 mW	64 mW	8 mW	80 mW	9.6 mW	96 mW
Accuracy *4	± 0.2 % of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	150 V	400 A	150 V	500 A	150 V	600 A
Resolution	2.5 mV	6.4 mA	2.5 mV	8 mA	2.5 mV	9.6 mA
Accuracy *4	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	150 V	4 kW	150 V	5 kW	150 V	6 kW
Resolution	2.5 mV	64 mW	2.5 mV	80 mW	2.5 mV	96 mW
Accuracy *4	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)
Turbo Mode *5	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP Test Function						
Max. Current	400 A	600 A	500 A	750 A	600 A	900 A
Max. Power	4000 W	6000 W	5000 W	7500 W	6000 W	9000 W
Test Accuracy *6	± 1.0 % of (Reading + Range)					
Short Time	100 ms to 10000 ms Continuous	100 ms to 2000 ms	100 ms to 10000 ms Continuous	100 ms to 2000 ms	100 ms to 10000 ms Continuous	100 ms to 2000 ms
Setting. Accuracy	±5 ms					
Short V Hi	Setting range : 0.00 V to 150.00 V / Resolution : 0.0025 V					
Short V Lo	Setting range : 0.00 V to 150.00 V / Resolution : 0.0025 V					
OCP Time(Tstep)	100 ms	20 ms	100 ms	20 ms	100 ms	20 ms
Setting. Accuracy	±5 ms					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00 A to 400.00 A / Resolution : 6.4 mA	Setting range : 0.00 A to 600.00 A / Resolution : 9.6 mA	Setting range : 0.00 A to 500.00 A / Resolution : 8.0 mA	Setting range : 0.00 A to 750.00 A / Resolution : 12 mA	Setting range : 0.00 A to 600.00 A / Resolution : 9.60 mA	Setting range : 0.00 A to 900.00 A / Resolution : 14.4 mA
OCP VTH	Setting range : 0.00 V to 150.00 V / Resolution : 0.0025 V					
OPP Time(Tstep)	100 ms	20 ms	100 ms	20 ms	100 ms	20 ms
Setting. Accuracy	±5 ms					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00 W to 4000.0 W / Resolution : 64.0 mW	Setting range : 0.00 W to 6000.0 W / Resolution : 96.0 mW	Setting range : 0.00 W to 5000.0 W / Resolution : 80.0 mW	Setting range : 0.00 W to 7500.0 W / Resolution : 120 mW	Setting range : 0.00 W to 6000.0 W / Resolution : 96 mW	Setting range : 0.00 W to 9000.0 W / Resolution : 144 mW
OPP VTH	Setting range : 0.00 V to 150.00 V / Resolution : 0.0025 V					
BMS Test Mode *7						
Max. Current	400 A	600 A	500 A	750 A	600 A	900 A
Meas. Accuracy *6	±3.0 % of (Reading + Range)					
Short test Time	0.05 ms to 10 ms / Resolution : 0.01 ms					
Meas. Accuracy	±0.02 ms					
Setting Accuracy	±0.05 ms					
Short ITH	Setting range : 0.19 A to 200.00 A / Resolution : 6.4 mA	Setting range : 0.28 A to 300.00 A / Resolution : 9.6 mA	Setting range : 0.24 A to 250.00 A / Resolution : 8.0 mA	Setting range : 0.36 A to 375.00 A / Resolution : 12 mA	Setting range : 0.28 A to 300.00 A / Resolution : 9.6 mA	Setting range : 0.43 A to 450.00 A / Resolution : 14.4 mA
OCP ISTAR	Setting range : 0.64 A to 400.00 A / Resolution : 6.4 mA	Setting range : 0.96 A to 600.00 A / Resolution : 9.6 mA	Setting range : 0.80 A to 500.00 A / Resolution : 8.0 mA	Setting range : 1.20 A to 750.00 A / Resolution : 12 mA	Setting range : 0.96 A to 600.00 A / Resolution : 9.6 mA	Setting range : 1.44 A to 900.00 A / Resolution : 14.4 mA

SPECIFICATIONS

	PEL-5004G-150-400		PEL-5005G-150-500		PEL-5006G-150-600	
OCP TSTEP	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms
Meas. Accuracy	± 0.1 ms / ± 0.5 ms	± 0.5 ms	± 0.1 ms / ± 0.5 ms	± 0.5 ms	± 0.1 ms / ± 0.5 ms	± 0.5 ms
OCP ISTEP	Setting range : 0.00 A to 400.00 A / Resolution : 6.4 mA	Setting range : 6.00 A to 600.00 A / Resolution : 9.6 mA	Setting range : 0.00 A to 500.00 A / Resolution : 8.0 mA	Setting range : 7.50 A to 750.00 A / Resolution : 12 mA	Setting range : 0.00 A to 600.00 A / Resolution : 9.6 mA	Setting range : 9.00 A to 900.00 A / Resolution : 14.4 mA
OCP ISTOP	Setting range : 0.64 A to 400.00 A / Resolution : 6.4 mA	Setting range : 0.96 A to 600.00 A / Resolution : 9.6 mA	Setting range : 0.80 A to 500.00 A / Resolution : 8.0 mA	Setting range : 1.20 A to 750.00 A / Resolution : 12 mA	Setting range : 0.96 A to 600.00 A / Resolution : 9.6 mA	Setting range : 1.44 A to 900.00 A / Resolution : 14.4 mA
OCP ITH	Setting range : 0.19 A to 200.00 A / Resolution : 6.4 mA	Setting range : 0.29 A to 300.00 A / Resolution : 9.6 mA	Setting range : 0.24 A to 250.00 A / Resolution : 8.0 mA	Setting range : 0.37 A to 375.00 A / Resolution : 12 mA	Setting range : 0.29 A to 300.00 A / Resolution : 9.6 mA	Setting range : 0.44 A to 450.00 A / Resolution : 14.4 mA
Surge Test Mode						
Surge Current	0 A to 600 A		0 A to 750 A		0 A to 900 A	
Normal Current	0 A to 300 A		0 A to 375 A		0 A to 450 A	
Surge Time	10 ms to 2000 ms		10 ms to 2000 ms		10 ms to 2000 ms	
Surge Step	1 to 5		1 to 5		1 to 5	
Batt test Mode						
Mode CC	Setting range : 0.00 A to 400.00 A / Resolution : 6.4 mA		Setting range : 0.00 A to 500.00 A / Resolution : 8.0 mA		Setting range : 0.00 A to 600.00 A / Resolution : 9.6 mA	
Mode CP	Setting range : 0.00 W to 4000.0 W / Resolution : 64.0 mW		Setting range : 0.00 W to 5000.0 W / Resolution : 80.0 mW		Setting range : 0.00 W to 6000.0 W / Resolution : 96 mW	
STOP Voltage (UVP)	Setting range : 0.00 V to 150.00 V / Resolution : 0.0025 V					
STOP TIME	Setting range : OFF , 1 sec. to 99999 sec. / Resolution : 1 sec.					
STOP CAP. AH	Setting range : OFF, 0.1 AH to 19999 AH / Resolution : 0.1 AH					
STOP CAP. WH	Setting range : OFF, 0.1 WH to 19999 WH / Resolution : 0.1 WH					
SEQ Load Mode (remote only)						
Load Mode	CC / CP					
Setting STEP	2 to 16					
Timing	20 µs to 1000 µs / 2 ms to 65535 ms / 66 sec to 999 sec.					
Resolution	10 µs / 1 ms / 1 sec.					
Dynamic Mode						
Timing Thigh & Tlow	0.010 ms to 9.999 ms/ 99.99 ms / 999.9 ms/ 9999 ms					
Resolution	0.001 ms / 0.01 ms/ 0.1 ms/ 1 ms					
Accuracy	1 µs / 10 µs / 100 µs / 1 ms + 50 ppm					
Slew Rate	0.0256 A/µs to 1.600 A/µs	0.2560 A/µs to 16.000 A/µs	0.0320 A/µs to 2.000 A/µs	0.3200 A/µs to 20.000 A/µs	0.0384 A/µs to 2.400 A/µs	0.3840 A/µs to 24.000 A/µs
Resolution	0.0064 A/µs	0.064 A/µs	0.008 A/µs	0.08 A/µs	0.0096 A/µs	0.096 A/µs
Min. Rise Time	25 µs(typical)					
Accuracy	±(5 % of Setting)±10 µs					
Current Range	0 A to 40 A	40 A to 400 A	0 A to 50 A	50 A to 500 A	0 A to 60 A	60 A to 600 A
Resolution	0.64 mA	6.4 mA	0.8 mA	8 mA	0.96 mA	9.6 mA
Conf Key Parameter						
LDon Voltage	Setting range : 0.25 V to 62.50 V / Resolution : 0.25 V					
LDoFF Voltage	Setting range : 0.000 V to 62.250 V / Resolution : 0.0025 V					
Average Times	0 to 64					
CV Res. Speed	1 to 4 (Fastest)					
Measurement						
Voltage Read Back	0 V to 15 V	15 V to 150 V	0 V to 15 V	15 V to 150 V	0 V to 15 V	15 V to 150 V
Resolution	0.25 mV	2.5 mV	0.25 mV	2.5 mV	0.25 mV	2.5 mV
Accuracy	± 0.025 % of (Reading + Range)					
Current Read Back	0 A to 40 A	40 A to 400 A	0 A to 50 A	50 A to 500 A	0 A to 60 A	60 A to 600 A
Resolution	0.64 mA	6.4 mA	0.8 mA	8 mA	0.96 mA	9.6 mA
Accuracy	± 0.05 % of (Reading + Range)					
Power Read Back	4 kW		5 kW		6 kW	
Resolution	0.01 W					
Accuracy *4	± 0.06 % of (Reading + Range)					
General						
Typical Short Resistance	1.8 mΩ		1.5 mΩ		1.2 mΩ	
Maximum Short Current	400 A		500 A		600 A	
Load ON Voltage	0.25 V to 62.5 V					
Load OFF Voltage	0 V to 62.25 V					
Input Range & Power Onsumption	100 Vac to 240 Vac,47 Hz to 63 Hz ; 550 VA(max.)					
Dimension(H x W x D)	177 mm x 440 mm x 745 mm					
Weight	32 kg ±0.5 kg		32.5 kg ± 0.5 kg		32.5 kg ± 0.5 kg	
Temperature *8	0 °C to 40 °C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25 °C
Note *2 : The range is automatically or forcing to range II only in CC mode
Note *3 : If the operating current is below range 0.1 %, the accuracy specification is 0.1 % F.S.
Note *4 : Power range = Vrange x Irange
Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, Bms, Short/OCP/OPP test function
Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep = 1 % FS
Note *7 : Bms Test function for Battery Management System Board SHORT, OCCP and OCDP Test
Note *8 : Operating temperature range is 0 °C to 40 °C, All specifications apply for 25 °C ± 5 °C, Except as noted
Note *9 : The specification is valid only for input voltage >1.5 V and resistance setting > 0.0037 Ω(PEL-5004G-150-400), 0.003 Ω(PEL-5005G-150-500), 0.0025 Ω(PEL-5006G-150-600)

SPECIFICATIONS

	PEL-5004G-600-280		PEL-5006G-600-350		PEL-5004G-600-420	
Power[*1]	0 W to 4 kW	0 W to 6 kW max.[*1]	0 W to 5 kW	0 W to 7.5 kW max.[*1]	0 W to 6 kW	0 W to 9 kW max.[*1]
Current	0 A to 280 A	0 A to 420 A max.[*1]	0 A to 350 A	0 A to 525 A max.[*1]	0 A to 420 A	0 A to 630 A max.[*1]
Voltage	0 V to 600 V		0 V to 600 V		0 V to 600 V	
Min. Operating Voltage	10 V@280 A		10 V@350 A		10 V@420 A	
Protections						
Over Power	105%					
Over Current	104%					
Over Voltage	105%					
Over Temp Protection(OTP)	90 °C ± 5 °C					
Constant Current Mode						
Range[*2]	0 A to 28 A	0 A to 280 A	0 A to 35 A	0 A to 350 A	0 A to 42 A	0 A to 420 A
Resolution	0.448 mA	4.48mA	0.56 mA	5.6 mA	0.672 mA	6.72 mA
Accuracy[*3]	± 0.05 % of (Setting + Range)					
Constant Resistance Mode						
Range	128610 Ω to 2.1435 Ω	2.1435 Ω to 0.0357 Ω	102888 Ω to 1.7148 Ω	1.7148 Ω to 0.0285 Ω	85740 Ω to 1.4290 Ω	1.4290 Ω to 0.0238 Ω
Resolution	8 µS	35.73 µΩ	10 µS	28.584 µΩ	12 µS	23.82 µΩ
Accuracy	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.)	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.)	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.)
Constant Voltage Mode						
Range	0 V to 600 V					
Resolution	10 mV					
Accuracy	± 0.05 % of (Setting + Range)					
Constant Power Mode						
Range	0 W to 400 W	400 W to 4 kW	0 W to 500 W	500 W to 5 kW	0 W to 600 W	600 W to 6 kW
Resolution	6.4 mW	64 mW	8 mW	80 mW	9.6 mW	96 mW
Accuracy[*4]	± 0.1 % of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	600 V	280 A	600 V	350 A	600 V	420 A
Resolution	10 mV	4.48 mA	10 mV	5.6 mA	10 mV	6.72 mA
Accuracy[*4]	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	600 V	4 kW	600 V	5 kW	600 V	6 kW
Resolution	10 mV	64 mW	10 mV	80 mW	10 mV	96 mW
Accuracy[*4]	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)
Turbo Mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP Test Function						
Max. Current	280 A	420 A	350 A	525 A	420 A	630 A
Max. Power	4000 W	6000 W	5000 W	7500 W	6000 W	9000 W
Test Accuracy[*6]	± 1.0 % of (Reading + Range)					
Short Time	100 ms to 10000 ms Continuous	100 ms to 2000 ms	100 ms to 10000 ms Continuous	100 ms to 2000 ms	100 ms to 10000 ms Continuous	100 ms to 2000 ms
Setting. Accuracy	± 5 ms					
Short V Hi	Setting range : 0.00 V to 600.00 V / Resolution : 0.01 V					
Short V Lo	Setting range : 0.00 V to 600.00 V / Resolution : 0.01 V					
OCP Time(Tstep)	100 ms	20 ms	100 ms	20 ms	100 ms	20 ms
Setting. Accuracy	± 5 ms					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00 A to 280.00 A / Resolution : 4.48 mA	Setting range : 0.00 A to 420.00 A / Resolution : 6.72 mA	Setting range : 0.00 A to 350.00 A / Resolution : 5.6 mA	Setting range : 0.00 A to 525.00 A / Resolution : 8.4 mA	Setting range : 0.00 A to 420.00 A / Resolution : 6.72 mA	Setting range : 0.00 A to 630.00 A / Resolution : 10.08 mA
OCP VTH	Setting range : 0.00 V to 600.00 V / Resolution : 0.01 V					
OPP Time(Tstep)	100 ms	20 ms	100 ms	20 ms	100 ms	20 ms
Setting. Accuracy	±5 ms					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00 W to 4000.0 W / Resolution : 64.0 mW	Setting range : 0.00 W to 6000.0 W / Resolution : 96.0 mW	Setting range : 0.00 W to 5000.0 W / Resolution : 80.0 mW	Setting range : 0.00 W to 7500.0 W / Resolution : 120 mW	Setting range : 0.00 W to 6000.0 W / Resolution : 96 mW	Setting range : 0.00 W to 9000.0 W / Resolution : 144 mW
OPP VTH	Setting range : 0.00 V to 600.00 V / Resolution : 0.01 V					
BMS Test Mode *7						
Max. Current	280 A	420 A	350 A	525 A	420 A	630 A
Meas. Accuracy[*6]	± 3.0 % of (Reading + Range)					
Short test Time	0.05 ms to 10 ms / Resolution : 0.01 ms					
Meas. Accuracy	± 0.02 ms					
Setting Accuracy	± 0.05 ms					
Short ITH	Setting range : 0.13 A to 140.00 A / Resolution : 4.48 mA	Setting range : 0.20 A to 210.00 A / Resolution : 6.72 mA	Setting range : 0.16 A to 175.00 A / Resolution : 5.6 mA	Setting range : 0.25 A to 262.50 A / Resolution : 8.4 mA	Setting range : 0.20 A to 210.00 A / Resolution : 6.72 mA	Setting range : 0.30 A to 315.0 A / Resolution : 10.08 mA
OCP ISTAR	Setting range : 0.44 A to 280.00 A / Resolution : 4.48 mA	Setting range : 0.67 A to 420.00 A / Resolution : 6.72 mA	Setting range : 0.56 A to 350.00 A / Resolution : 5.6 mA	Setting range : 0.84 A to 525.00 A / Resolution : 8.4 mA	Setting range : 0.67 A to 420.00 A / Resolution : 6.72 mA	Setting range : 1.00 A to 630.00 A / Resolution : 10.08 mA
OCP TSTEP	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms	0.05 ms to 10 ms 11 ms to 1000 ms	0.05ms to 10 ms

SPECIFICATIONS

	PEL-5004G-600-280		PEL-5006G-600-350		PEL-5004G-600-420	
Meas. Accuracy	±0.1 ms / ± 0.5 ms	± 0.5 ms	±0.1 ms / ± 0.5 ms	± 0.5 ms	±0.1 ms / ± 0.5 ms	± 0.5 ms
OCP ISTEP	Setting range : 0.00 A to 280.00 A / Resolution : 4.48 mA	Setting range : 4.20 A to 420.00 A / Resolution : 6.72 mA	Setting range : 0.00 A to 350.00 A / Resolution : 5.6 mA	Setting range : 5.25 A to 525.00 A / Resolution : 8.4 mA	Setting range : 0.00 A to 420.00 A / Resolution : 6.72 mA	Setting range : 6.30 A to 630.00 A / Resolution : 10.08 mA
OCP ISTOP	Setting range : 0.44 A to 280.00 A / Resolution : 4.48 mA	Setting range : 0.67 A to 420.00 A / Resolution : 6.72 mA	Setting range : 0.56 A to 350.00 A / Resolution : 5.6 mA	Setting range : 0.84 A to 525.00 A / Resolution : 8.4 mA	Setting range : 0.67 A to 420.00 A / Resolution : 6.72 mA	Setting range : 1.00 A to 630.00 A / Resolution : 10.08 mA
OCP ITH	Setting range : 0.13 A to 140.00 A / Resolution : 4.48 mA	Setting range : 0.20 A to 210.00 A / Resolution : 6.72 mA	Setting range : 0.17 A to 175.00 A / Resolution : 5.6 mA	Setting range : 0.26 A to 262.50 A / Resolution : 8.4 mA	Setting range : 0.20 A to 210.00 A / Resolution : 6.72 mA	Setting range : 0.30 A to 315.00 A / Resolution : 10.08 mA
Surge Test Mode						
Surge Current	0 A to 420 A		0 A to 525 A		0 A to 630 A	
Normal Current	0 A to 210 A		0 A to 262.5 A		0 A to 315 A	
Surge Time	10 ms to 2000 ms		10 ms to 2000 ms		10 ms to 2000 ms	
Surge Step	1 to 5		1 to 5		1 to 5	
Batt test Mode						
Mode CC	Setting range : 0.00 A to 280.00 A / Resolution : 4.48 mA		Setting range : 0.00 A to 350.00 A / Resolution : 5.6 mA		Setting range : 0.00 A to 420.00 A / Resolution : 6.72 mA	
Mode CP	Setting range : 0.00 W to 4000.0 W / Resolution : 64.0 mW		Setting range : 0.00 W to 5000.0 W / Resolution : 80.0 mW		Setting range : 0.00 W to 6000.0 W / Resolution : 96 mW	
STOP Voltage (UVP)	Setting range : 0.00 V to 600.00 V / Resolution : 0.01 V					
STOP TIME	Setting range : OFF, 1 sec. to 99999 sec. / Resolution : 1 sec.					
STOP CAP. AH	Setting range : OFF, 0.1 AH to 19999 AH / Resolution : 0.1 AH					
STOP CAP. WH	Setting range : OFF, 0.1 WH to 19999 WH / Resolution : 0.1 WH					
SEQ Load Mode (remote only)						
Load Mode	CC / CP					
Setting STEP	2 to 16					
Timing	20 µs to 1000 µs / 2 ms to 65535 ms / 66 sec. to 999 sec.					
Resolution	10 µs / 1 ms / 1 sec.					
Dynamic Mode						
Timing Thigh & Tlow	0.010 ms to 9.999 ms / 99.99 ms / 999.9 ms / 9999 ms					
Resolution	0.001 ms / 0.01 ms / 0.1 ms / 1 ms					
Accuracy	1 µs / 10 µs / 100 µs / 1 ms + 50 ppm					
Slew Rate	0.01792 A/µs to 1.120 A/µs	0.1792 A/µs to 11.200 A/µs	0.0224 A/µs to 1.400 A/µs	0.2240 A/µs to 14.00 A/µs	0.02688 A/µs to 1.680 A/µs	0.2688 A/µs to 16.800 A/µs
Resolution	0.00448 A/µs	0.0448 A/µs	0.0056 A/µs	0.056 A/µs	0.00672 A/µs	0.0672 A/µs
Min. Rise Time	25 µs(typical)					
Accuracy	±(5 % of Setting)±10 µs					
Current Range	0 A to 28 A	28 A to 280 A	0 A to 35 A	35 A to 350 A	0 A to 42 A	42 A to 420 A
Resolution	0.45 mA	4.48 mA	0.56 mA	5.6 mA	0.67 mA	6.72 mA
Conf Key Parameter						
LDon Voltage	Setting range : 0.4 V to 100.0 V / Resolution : 0.4 V					
LDoFF Voltage	Setting range : 0.000 V to 99.60 V / Resolution : 0. 01 V					
Average Times	0 to 64					
CV Res. Speed	1 to 4 (Fastest)					
Measurement						
Voltage Read Back Range (5 Digital)	0 V to 60 V	60 V to 600 V	0 V to 60 V	60 V to 600 V	0 V to 60 V	60 V to 600 V
Resolution	1.00 mV	10.0 mV	1.00 mV	10.0 mV	1.00 mV	10.0 mV
Accuracy	± 0.025 % of (Reading + Range)					
Current Read Back Range (5 Digital)	0 A to 28 A	28 A to 280 A	0 A to 35 A	35 A to 350 A	0 A to 42 A	42 A to 420 A
Resolution	0.448 mA	4.48 mA	0.56 mA	5.6 mA	0.672 mA	6.72 mA
Accuracy	± 0.05 % of (Reading + Range)					
Power Read Back Range (5 Digital)	4 kW		5 kW		6 kW	
Resolution	0.01 W					
Accuracy *4	± 0.06 % of (Reading + Range)					
General						
Typical Short Resistance	35.73 mΩ		28.584 mΩ		23.82 mΩ	
Maximum Short Current	280 A		350 A		420 A	
Load ON Voltage	0.4 V to 100 V					
Load OFF Voltage	0 V to 99.6 V					
Input Range & Power Onsumption	100 Vac to 240 Vac, 47 Hz to 63 Hz ; 550 VA (max.)					
Dimension(H x W x D)	177 mm x 440 mm x 745 mm					
Weight	32.5 kg ±0.5 kg		33 kg ± 0.5 kg		33 kg ± 0.5 kg	
Temperature *8	0 °C to 40 °C					
Safety & EMC	C E					

Note *1 : The power rating specifications at ambient temperature = 25 °C
Note *2 : The range is automatically or forcing to range II only in CC mode
Note *3 : If the operating current is below range 0.3 %, the accuracy specification is 0.1 % F.S.
Note *4 : Power range = Vrange x Irange (the specification is valid only for the model PEL-600-XXX with loading current > 0.03 % F.S.)
Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, Bms, Short/OCP/OPP test function
Note *6 : The best accuracy of OCP/OPP test is Istep/Pstep = 1 % FS
Note *7 : Bms Test function for Battery Management System Board SHORT, OCCP and OCDP Test
Note *8 : Operating temperature range is 0 °C to 40 °C, All specifications apply for 25 °C ± 5 °C, Except as noted

SPECIFICATIONS

	PEL-5004G-1200-160		PEL-5005G-1200-200		PEL-5006G-1200-240	
Power[*1]	0 W to 4 kW	0 W to 6 kW max.[*1]	0 W to 5 kW	0 W to 7.5 kW max.[*1]	0 W to 6 kW	0 W to 9 kW max.[*1]
Current	0 A to 160 A	0 A to 240 A max.[*1]	0 A to 200 A	0 A to 300 A max.[*1]	0 A to 240 A	0 A to 360 A max.[*1]
Voltage	0 V to 1200 V		0 V to 1200 V		0 V to 1200 V	
Min. Operating Voltage	15 V@160 A		15 V@200 A		15 V@240 A	
Protections						
Over Power	105%					
Over Current	104%					
Over Voltage	105%					
Over Temp Protection(OTP)	90 °C ± 5 °C					
Constant Current Mode						
Range[*2]	0 A to 16 A	0 A to 160 A	0 A to 20 A	0 A to 200 A	0 A to 24 A	0 A to 240 A
Resolution	0.256 mA	2.56 mA	0.32 mA	3.2 mA	0.384 mA	3.84 mA
Accuracy[*3]	± 0.05 % of (Setting + Range)					
Constant Resistance Mode						
Range	450 kΩ to 7.5 Ω	7.5 Ω to 0.0937 Ω	360 kΩ to 6 Ω	6 Ω to 0.075 Ω	300 kΩ to 5 Ω	5 Ω to 0.0625 Ω
Resolution	2.2 µS	125 µΩ	2.8 µS	100 µΩ	3.3 µS	83.34 µΩ
Accuracy	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.)	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.)	± (0.1 %(Vin / Setting) + 0.1 % IF.S.)	± (0.2 %(Vin / Setting) + 0.5 % IF.S.)
Constant Voltage Mode						
Range	0 V to 1200 V					
Resolution	20 mV					
Accuracy	± 0.05 % of (Setting + Range)					
Constant Power Mode						
Range	0 W to 400 W	400 W to 4 kW	0 W to 500 W	500 W to 5 kW	0 W to 600 W	600 W to 6 kW
Resolution	6.4 mW	64 mW	8 mW	80 mW	9.6 mW	96 mW
Accuracy[*4]	± 0.2 % of (Setting + Range)					
Constant Voltage Mode + Current Limit Mode						
Range	1200 V	160 A	1200 V	200 A	1200 V	240 A
Resolution	20 mV	2.56 mA	20 mV	3.2 mA	20 mV	3.84 mA
Accuracy[*4]	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)
Constant Voltage Mode + Power Limit Mode						
Range	1200 V	4 kW	1200 V	5 kW	1200 V	6 kW
Resolution	20 mV	64 mW	20 mV	80 mW	20 mV	96 mW
Accuracy[*4]	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)	± 0.05 % of (Setting + Range)	± 1.0 % of (Setting + Range)
Turbo Mode[*5]	OFF	ON	OFF	ON	OFF	ON
Short / OCP / OPP Test Function						
Max. Current	160 A	240 A	200 A	300 A	240 A	360 A
Max. Power	4000 W	6000 W	5000 W	7500 W	6000 W	9000 W
Test Accuracy[*6]	± 1.0 % of (Reading + Range)					
Short Time	100 ms to 10000 ms Continuous	100 ms to 2000 ms	100 ms to 10000 ms Continuous	100 ms to 2000 ms	100 ms to 10000 ms Continuous	100 ms to 2000 ms
Setting. Accuracy	±5 ms					
Short V Hi	Setting range : 0.25 V to 1200.0 V / Resolution : 0.02 V					
Short V Lo	Setting range : 0.000 V to 1200.0 V / Resolution : 0.02 V					
OCP Time(Tstep)	100 ms	20 ms	100 ms	20 ms	100 ms	20 ms
Setting. Accuracy	±5 ms					
OCP ISTAR / ISTEP / ISTOP	Setting range : 0.00 A to 160.00 A / Resolution : 2.56 mA	Setting range : 0.00 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.00 A to 200.00 A / Resolution : 3.2 mA	Setting range : 0.00 A to 300.00 A / Resolution : 4.8 mA	Setting range : 0.00 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.00 A to 360.00 A / Resolution : 5.76 mA
OCP VTH	Setting range : 0.00 V to 1200.00 V / Resolution : 0.02 V					
OPP Time(Tstep)	100 ms	20 ms	100 ms	20 ms	100 ms	20 ms
Setting. Accuracy	±5 ms					
OPP PSTAR / PSTEP / PSTOP	Setting range : 0.00 W to 4000.0 W / Resolution : 64.0 mW	Setting range : 0.00 W to 6000.0 W / Resolution : 96.0 mW	Setting range : 0.00 W to 5000.0 W / Resolution : 80.0 mW	Setting range : 0.00 W to 7500.0 W / Resolution : 120 mW	Setting range : 0.00 W to 6000.0 W / Resolution : 96 mW	Setting range : 0.00 W to 9000.0 W / Resolution : 144 mW
OPP VTH	Setting range : 0.00 V to 1200.00 V / Resolution : 0.02 V					
BMS Test Mode *7						
Max. Current	160 A	240 A	200 A	300 A	240 A	360 A
Meas. Accuracy[*6]	± 3.0 % of (Reading + Range)					
Short test Time	0.05 ms to 10 ms / Resolution : 0.01 ms					
Meas. Accuracy	± 0.02 ms					
Setting Accuracy	± 0.05 ms					
Short ITH	Setting range : 0.07 A to 80.00 A / Resolution : 2.56 mA	Setting range : 0.11 A to 120.00 A / Resolution : 3.84 mA	Setting range : 0.09 A to 100.00 A / Resolution : 3.2 mA	Setting range : 0.14 A to 150.00 A / Resolution : 4.8 mA	Setting range : 0.11 A to 120.00 A / Resolution : 3.84 mA	Setting range : 0.17 A to 180.00 A / Resolution : 5.76 mA
OCP ISTAR	Setting range : 0.25 A to 160.00 A / Resolution : 2.56 mA	Setting range : 0.38 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.32 A to 200.00 A / Resolution : 3.2 mA	Setting range : 0.48 A to 300.00 A / Resolution : 4.8 mA	Setting range : 0.38 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.57 A to 360.00 A / Resolution : 5.76 mA
OCP TSTEP	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms	0.05 ms to 10 ms 11 ms to 1000 ms	0.05 ms to 10 ms

SPECIFICATIONS

	PEL-5004G-1200-160		PEL-5005G-1200-200		PEL-5006G-1200-240	
Meas. Accuracy	± 0.1 ms / ± 0.5 ms	± 0.5 ms	± 0.1 ms / ± 0.5 ms	± 0.5 ms	±0.1 ms / ±0.5 ms	± 0.5 ms
OCP ISTEP	Setting range : 0.00 A to 160.00 A / Resolution : 2.56 mA	Setting range : 2.40 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.00 A to 200.00 A / Resolution : 3.2 mA	Setting range : 3.00 A to 300.00 A / Resolution : 4.8 mA	Setting range : 0.00 A to 240.00 A / Resolution : 3.84 mA	Setting range : 3.60 A to 360.00 A / Resolution : 5.76 mA
OCP ISTOP	Setting range : 0.25 A to 160.00 A / Resolution : 2.56 mA	Setting range : 0.38 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.32 A to 200.00 A / Resolution : 3.2 mA	Setting range : 0.48 A to 300.00 A / Resolution : 4.8 mA	Setting range : 0.38 A to 240.00 A / Resolution : 3.84 mA	Setting range : 0.57 A to 360.00 A / Resolution : 5.76 mA
OCP ITH	Setting range : 0.10 A to 80.00 A / Resolution : 2.56 mA	Setting range : 0.15 A to 120.00 A / Resolution : 3.84 mA	Setting range : 0.10 A to 100.00 A / Resolution : 3.2 mA	Setting range : 0.15 A to 150.00 A / Resolution : 4.8 mA	Setting range : 0.10 A to 120.00 A / Resolution : 3.84 mA	Setting range : 0.15 A to 180.00 A / Resolution : 5.76 mA
Surge Test Mode						
Surge Current	0 A to 240 A		0 A to 300 A		0 A to 360 A	
Normal Current	0 A to 120 A		0 A to 150 A		0 A to 180 A	
Surge Time	10 ms to 2000 ms		10 ms to 2000 ms		10 ms to 2000 ms	
Surge Step	1 to 5		1 to 5		1 to 5	
Batt test Mode						
Mode CC	Setting range : 0.00 A to 160.00 A / Resolution : 2.56 mA		Setting range : 0.00 A to 200.00 A / Resolution : 3.2 mA		Setting range : 0.00 A to 240.00 A / Resolution : 3.84 mA	
Mode CP	Setting range : 0.00 W to 4000.0 W / Resolution : 64.0 mW		Setting range : 0.00 W to 5000.0 W / Resolution : 80.0 mW		Setting range : 0.00 W to 6000.0 W / Resolution : 96 mW	
STOP Voltage (UVP)	Setting range : 0.00 V to 1200.00 V / Resolution : 0.02 V					
STOP TIME	Setting range : OFF, 1 sec. - 99999 sec. / Resolution : 1 sec.					
STOP CAP. AH	Setting range : OFF, 0.1 AH to 19999 AH / Resolution : 0.1 AH					
STOP CAP. WH	Setting range : OFF, 0.1 WH to 19999 WH / Resolution : 0.1 WH					
SEQ Load Mode (Remote Only)						
Load Mode	CC / CP					
Setting STEP	2 to 16					
Timing	20 µs to 1000 µs / 2 ms to 65535 ms / 66 sec. to 999 sec.					
Resolution	10 µs / 1 ms / 1 sec.					
Dynamic Mode						
Timing Thigh & Tlow	0.010 ms to 9.999 ms / 99.99 ms / 999.9 ms / 9999 ms					
Resolution	0.001 ms / 0.01 ms / 0.1 ms / 1 ms					
Accuracy	1 µs / 10 µs / 100 µs / 1 ms + 50 ppm					
Slew Rate	0.01024 A/µs to 0.640 A/µs	0.1024 A/µs to 6.400 A/µs	0.0128 A/µs to 0.800 A/µs	0.1280 A/µs to 8.000 A/µs	0.01536 A/µs to 0.960 A/µs	0.1536 A/µs to 9.600 A/µs
Resolution	0.00256 A/µs	0.0256 A/µs	0.0032 A/µs	0.032 A/µs	0.00384 A/µs	0.0384 A/µs
Min. Rise Time	25 µs(typical)					
Accuracy	± (5 % of Setting) ± 10 µs					
Current Range	0 A to 16 A	16 A to 160 A	0 A to 20 A	20 A to 200 A	0 A to 24 A	42 A to 240 A
Resolution	0.26 mA	2.56 mA	0.32 mA	3.2 mA	0.38 mA	3.84 mA
Conf Key Parameter						
LDon Voltage	Setting range : 1 V to 250.0 V / Resolution : 1 V					
LDoFF Voltage	Setting range : 0.000 V to 249.0 V / Resolution : 0.02 V					
Average Times	0 to 64					
CV Res. Speed	1 to 4 (Fastest)					
Measurement						
Voltage Read Back Range (5 Digital)	0 V to 120 V	120 V to 1200 V	0 V to 120 V	120 V to 1200 V	0 V to 120 V	120 V to 1200 V
Resolution	2.00 mV	20.0 mV	2.00 mV	20.0 mV	2.00 mV	20.0 mV
Accuracy	± 0.025 % of (Reading + Range)					
Current Read Back Range (5 Digital)	0 A to 16 A	16 A to 160 A	0 A to 20 A	20 A to 200 A	0 A to 24 A	24 A to 240 A
Resolution	0.256 mA	2.56 mA	0.32 mA	3.2 mA	0.384 mA	3.84 mA
Accuracy	± 0.05 % of (Reading + Range)					
Power Read Back Range (5 Digital)	4 kW		5 kW		6 kW	
Resolution	0.01 W					
Accuracy *4	± 0.06 % of (Reading + Range)					
General						
Typical Short Resistance	93.75 mΩ		75 mΩ		62.505 mΩ	
Maximum Short Current	160 A		200 A		240 A	
Load ON Voltage	1 V to 250 V					
Load OFF Voltage	0 V to 249 V					
Input Range & Power	100 Vac to 240 Vac,47 Hz to 63 Hz ; 550 VA (max.)					
Dimension(H x W x D)	177 mm x 440 mm x 745 mm					
Weight	32 kg ± 0.5 kg		32.5 kg ± 0.5 kg		32.5 kg ± 0.5 kg	
Temperature *8	0 °C to 40 °C					
Safety & EMC	CE					

Note *1 : The power rating specifications at ambient temperature = 25 °C
Note *2 : The range is automatically or forcing to range II only in CC mode
Note *3 : If the operating current is below range 0.1 %, the accuracy specification is 0.1 % F.S.
Note *4 : Power range = Vrange x Irange
Note *5 : Turbo mode for up to 1.5X Current rating & Power rating support Surge, Bms, Short /OCP/OPP test function
Note *6 : The best accuracy of OCP /OPP test is Istep/Pstep = 1 % FS
Note *7 : Bms Test function for Battery Management System Board SHORT, OCCP and OCDP Test
Note *8 : Operating temperature range is 0 °C to 40 °C, All specifications apply for 25 °C±5 °C, Except as noted

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
APS-001	GPIB Interface Card	APS-7000 Series
APS-002	RS-232/USB Interface Card	APS-7050, APS-7100
APS-003	Output Voltage Capacity (0 to 600 Vrms)	APS-7000 Series
APS-004	Output Frequency Capacity (45 to 999.9 Hz)	APS-7000 Series
APS-007	RS-232 Interface Card	APS-7200, APS-7300
APS-008	Air Inlet Filter	ASR-3000 Series, APS-7200, APS-7300
ASR-001	Air Inlet Filter	ASR-2000 Series
ASR-002	External Three Phase Control Unit	ASR-2000 Series, ASR-3000 Series
ASR-003	GPIB Interface Card	ASR-6000 Series
ASR-C003	Modbus TCP Feature	ASR-2000 Series, ASR-3000 Series, ASR-6000 Series
ASR-004	DeviceNet Interface Card	ASR-6000 Series
ASR-005	CAN BUS Interface Card	ASR-6000 Series
ASR-006	External Parallel Cable	ASR-6000 Series
GET-001	Extended Terminal with max.30 A for 30 V/80 V/160 V models	PSW-Series, PSW-Multi Series
GET-002	Extended Terminal with max.10 A for 250 V/800 V models	PSW-Series, PSW-Multi Series
GET-003	Extended Universal Power Socket	ASR-2000 Series
GET-004	Extended European Power Socket	ASR-2000 Series
GET-005	Extended European Terminal with max.20A for 30 V/80 V/160 V models	PSW-Series, PSW-Multi Series
GET-006	Universal Extension, AC signel phase 250 V/13 Amps	ASR-3000/2000 Series
GPS-001	Knob, Voltage/Current Protection Knob	GPS-x303 Series, SPD-3606
GPW-001	UL/CSA Power Cord, 3000 mm	PSU-Series
GPW-002	VDE Power Cord, 3000 mm	PSU-Series
GPW-003	PSE Power Cord, 3000 mm	PSU-Series
GPW-004	Power Cord, 8 mm / 3C 3 m, 105 ℃	APS-7000 Series
GPW-005	Power Cord, 3 m, 105 ℃, UL/CSA type	ASR-3000 Series
GPW-006	Power Cord, H05VV-F 1.5 mm 2/3 C, 3 m, 105 ℃, VDE type (ASR-3200, ASR-3300 Ues Only)	ASR-3000 Series
GPW-007	Power Cord, 3 m, 105 ℃, PSE type	ASR-3000 Series
GPW-017	Power Cord, H05VV-F 4.0 mm 2/3 C 3 m, 105 °C, VDE Type	ASR-3000 Series
GPW-008	6RV3 Power Cord; 10 AWG/3 C, 3 m Max Length, , RV5-5*3P, RV5-5*3P UL Type	ASR-6000 Series
GPW-012	6RVV5 VDE Power Cord; 2.5 mm 2/5 C, 3 m Max Length, RVS3-5*5P, RVS3-5*5P VDE Type	ASR-6000 Series
GPW-013	6RVT5 PSE Power Cord; 2.0 mm 2/5 C, 3 m Max Length, RVS2-5*5P, RVS2-5*5P PSE Type	ASR-6000 Series
GPW-014	6RV4 UL Power Cord; 10 AWG/4 C, 3 m, RV5-5*4P,RV5-5*4P UL TYPE	ASR-6000 Series
GPW-015	6RVV4 VDE Power Cord; 2.5 mm 2/4C, 3 m Max Length, RVS3-5*4P, RVS3-5*4P VDE Type	ASR-6000 Series
GPW-021	Input power cord, 10 AWG/4C, 3 m, UL/CSA (PHU-C-5kW, PHU-D-5kW, PHU-D-10kW, PHU-D-15kW)	PHU-Series
GPW-022	Input power cord, 6 AWG/4C, 3 m, UL/CSA (PHU-C-10kW, PHU-C-15kW)	PHU-Series
GRA-401	Rack Mount Kit, 19", 4U Size	GPC-Series, GPR-M Series, PPE-3323, PPS-3635, PPT-Series, PEL-300
GRA-403	Rack Mount Kit, 19", 4U Size	PSH-Series
GRA-407	Rack Mount Kit, 19", 4U Size	PST-Series
GRA-408	Rack Mount Kit, 19", 4U Size	PSS-Series
GRA-409	Rack Mount Kit, 19", 5U Size	APS-1102A
GRA-410-E	Rack Mount Kit (EIA), 19", 3U Size	PSW-Series, PSW-Multi Series
GRA-410-J	Rack Mount Kitt (JIS), 19", 3U Size	PSW-Series, PSW-Multi Series
GRA-413-E	Rack mount bracket for booster PEL-3211A/AH (EIA)	PEL-3211A/3211AH
GRA-413-J	Rack mount bracket for booster PEL-3211A/AH (JIS)	PEL-3211A/3211AH
GRA-414-E	Rack Mount Kit (EIA), 19", 3U Size	PEL-3021A(H)/3041A(H)/3111A(H), PEL-3000AE Series
GRA-414-J	Rack Mount Kit (JIS), 19", 3U Size	PEL-3021A(H)/3041A(H)/3111A(H), PEL-3000AE Series
GRA-419-E	Rack Mount Kit (EIA), 19", 2U Size	PCS-1000I
GRA-419-J	Rack Mount Kit (JIS), 19", 2U Size	PCS-1000I
GRA-423	Rack Mount Kit, 19", 2U Size	APS-7000/7000E Series
GRA-424	Rack Mount Kit, 19", 3U Size	PSB-2000 Series
GRA-428	Rack Mount Kit (EIA), 19", 3U Size	PSP-Series
GRA-429	Rack Mount Kit, 7U Size	APS-7200 Series
GRA-430	Rack Mount Kit, 9U Size	APS-7300 Series
GRA-431-J	Rack Mount Kit (JIS)	PFR-Series
GRA-431-E	Rack Mount Kit (EIA)	PFR-Series
GRA-439-J	Rack Mount Kit (JIS), 19", 3U Size	ASR-2000 Series
GRA-439-E	Rack Mount Kit(EIA)), 19", 3U Size	ASR-2000 Series
GRA-441-J	Rack Mount Kit (JIS), 19", 3U Size	PPX-Series, GPE-1000 Series
GRA-441-E	Rack Mount Kit(EIA)), 19", 3U Size	PPX-Series, GPE-1000 Series
GRA-442-J	Rack Mount Kit (JIS), 19", 3U Size	ASR-3000 Series
GRA-442-E	Rack Mount Kit(EIA)), 19", 3U Size	ASR-3000 Series
GRA-449-J	Rack Mount Kit (JIS), 19", 3U Size	GPP-Series, GPP-3060/6030/3650, GPP-3610H/7250
GRA-449-E	Rack Mount Kit (EIA), 19", 3U Size	GPP-Series, GPP-3060/6030/3650, GPP-3610H/7250
GRA-450-J	Rack Mount Kit (JIS), 19", 3U Size	GSM-20H10, PPH-Series
GRA-450-E	Rack Mount Kit (EIA), 19", 3U Size	GSM-20H10, PPH-Series

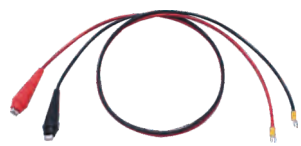
ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
GRA-451-J	Rack Mount Kit (JIS), 19", 3U Size	ASR-6000 Series
GRA-451-E	Rack Mount Kit (EIA), 19", 3U Size	ASR-6000 Series
GRA-454	Rack Mount Kit (19" 2U)	GDM-904X Series
GRJ-1101	Module Cable (0.5 m)	PSB-2000 Series
GRM-001	Slide Bracket 2 pcs/set	PSU-Series
GTL-104A	Test Lead, U-type to Alligator Test Lead, Max. Current 10 A, 1000 mm	PFR/PSP/PST/GPC/GPD/GPP/GPR/GPS/GPE/PPT-Series, PPS-3635, SPD-3606, PPX-Series, GPP-3060/6030/3650
GTL-105A	Test Lead, Alligator to Banana Test Lead, Max. Current 3 A, 1000 mm	PFR/PSS/PST/GPC/GPD/GPP/GPR/GPS/PPT-Series, PEL-2000B, PPE-3323, SPD-3606, PCS-1000I, PPX-Series, GPE-1000 Series
GTL-117	Test Lead, Banana to Probe Test Lead, 1200 mm	PPH-1503/1503D/1506D
GTL-120	Test Lead, O-type to O-type Test Lead, Max. 40 A, 1200 mm	PEL-2000A(B) Series
GTL-121	Sense Lead, O-type to free Lead, 1200 mm	PEL-2000A(B) Series
GTL-122	Test Lead, U-type to Alligator Test Lead, Max. Current 40 A, 1200 mm	PSH-Series, GPR-U Series, GPR-H Series
GTL-123	Test Lead, O-type to O-type Test Lead, 1200 mm	PSW-Series, APS-7000 Series
GTL-130	Test Leads: 2 x red, 2 x black, for 250 V/800 V models, 1200 mm	PSW-Series, PSW-Multi Series
GTL-133	Load cable, 1.5 m, 100 A	PHU-Series
GTL-134	Test Leads for Rear Panel, 1200 mm, 10 A, 16 AWG	PFR-Series
GTL-137	Output Power wire(load wire_10AWG:50 A, 600 V/sense wire_16 AWG:20 A, 600 V)	ASR-3000 Series
GTL-201A	Ground Lead, Banana to Banana, European Terminal, 200 mm	AFG-200/100 Series, GPD-Series, GPP-Series, GPS-X303 Series, SPD-3606, PPX-Series, GPP-3060/6030/3650
GTL-203A	Test Lead, Banana to Alligator, European Terminal, Max. Current 3 A, 1000 mm	PSS/PST/GPD/GPP/GPS/SPS-Series, SPD-3606, PPH-1503/1503D/1506D, PPX-Series, GPE-1000 Series
GTL-204A	Test Lead, Banana to Alligator, European Terminal, Max. Current 10 A, 1000 mm	PFR/PSP/PSS/GPS/GPE/PPT/PST/GPD/GPP-Series, SPD-3606, PPH-1503/1503D/1506D, PPX-Series, GPP-3060/6030/3650
GTL-205A	Temperature Probe Adapter(Thermal Coupling, K-Type), about 1000 mm	PPX-Series
GTL-207A	Test Lead, Banana to Probe Test Lead, 800 mm	PCS-1000I, GSM-20H10
GTL-218	Test Lead, O-type to O-type Test Lead, Max. 200 A, 1500 mm	PSU-Series, PSW-Series, PHU-Series
GTL-219	Test Lead, O-type to O-type Test Lead, Max. 200 A, 3000 mm	PSU-Series, PSW-Series, PHU-Series
GTL-220	Test Lead, O-type to O-type Test Lead, Max. 300 A, 1500 mm	PSU-Series, PSW-Series, PHU-Series
GTL-221	Test Lead, O-type to O-type Test Lead, Max. 300 A, 3000 mm	PSU-Series, PSW-Series, PHU-Series
GTL-222	Test Lead, O-type to O-type Test Lead, Max. 400 A, 1500 mm	PSU-Series, PSW-Series, PHU-Series
GTL-223	Test Lead, O-type to O-type Test Lead, Max. 400 A, 3000 mm	PSU-Series, PSW-Series, PHU-Series
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000 mm	PSH-Series, PSS-Series, APS-7000 Series, PEL-2000A(B) Series, ASR-6000/3000/2000 Series
GTL-232A	RS-232C Cable, 9-pin, F-F Type, null modem, 2000 mm	PSP-Series
GTL-234	RS-232C Cable, 9-pin, F-F Type, 2000 mm	APS-1102A, GPE-1000 Series
GTL-238	RS-232 Cable, 9-pin, M-F Type, 1000 mm	PEL-500 Series
GTL-240	USB Cable, USB 2.0, A-B Type (L Type), 1200 mm	PSW-Series, PSU-Series, APS-1102A, APS-7000 Series, PCS-1000I
GTL-246	USB Cable, USB 2.0, A-B Type, 1200 mm	PFR-Series, PSU-Series, PSB-2000 Series, PPH-1503/1503D, GPD-Series, GPP-Series, APS-1102A, APS-7000 Series, PEL-3000A/3000AH Series, PEL-3000AE Series, PEL-2000A(B) Series, PPX-Series, ASR-3000, Series, PEL-5000C Series, AEL-5000 Series, GPP-3060/6030/3650, GPP-3610H/7250, GSM-20H10, PEL-5000G
GTL-248	GPIB Cable, Double Shielded, 2000 mm	PSB-2000 Series, PPH-1503, PSW/PSW-Multi/PSU/PSH/PSS/PPT-Series, APS-7000 Series, PEL-3000A/3000AH Series, PEL-3000AE Series, PEL-2000A(B) Series, ASR-6000/3000 Series, PEL-5000C Series, AEL-5000 Series, PEL-5000G Series, GSM-20H10
GTL-249	Frame Link Cable, 300 mm	PEL-2000A(B) Series
GTL-250	GPIB Cable, Double Shielded, 600 mm	PSW/PSW-Multi/PSU/PSH-Series, PSB-2000 Series, APS-7000 Series, AEL-5000 Series
GTL-258	GPIB Cable, 25 pins Micro-D Connector	PFR-Series, PPX-Series, ASR-2000 Series, PSU-Series
GTL-259	RS-232 Cable with DB9 Connector to RJ45	PPX-Series, PFR-Series, PSU-Series
GTL-260	RS-485 Cable with DB9 Connector to RJ45	PPX-Series, PFR-Series, PSU-Series
GTL-261	Serial Master Cable + Terminator, 0.5M	PSU-Series, PFR-Series, PSU-Series, PPX-Series
GTL-262	RS-485 Slave Cable	PPX-Series, PFR-Series, PSU-Series
GUG-001	GPIB-USB Adaptor, GPIB to USB Adaptor	GDS-3000 Series, PSW-Series, PSW-Multi Series
GUR-001A	RS232-USB Cable, 300 mm	PSW-Series, PSW-Multi Series
GUR-001B	RS-232 to USB Adapter with #4-40 UNC Rivet Nut	PSW-Multi Series
PCS-001	Basic Accessory Kit	PCS-1000I
PEL-001	GPIB Card	PEL-2000A(B) Series
PEL-002	Rack Mount Kit, PEL-2000 Series Rack Mount Kit	PEL-2000A(B) Series
PEL-003	Panel Cover	PEL-2000A(B) Series
PEL-004	GPIB Card	PEL-3000A/3000AH Series, PEL-3000AE Series
PEL-005	Connect Cu Plate	PEL-3000A/3000AH Series
PEL-006	Connect Cu Plate	PEL-3000A/3000AH Series
PEL-007	Connect Cu Plate	PEL-3000A/3000AH Series
PEL-008	Connect Cu Plate	PEL-3000A/3000AH Series
PEL-009	Connect Cu Plate	PEL-3000A/3000AH Series
PEL-010	Dust Filter	PEL-3000A/3000AH Series, PEL-3000AE Series
PEL-011	Load Input Terminal Cover	PEL-3000A/3000AH Series
PEL-012	Terminal Fittings Kits	PEL-3000A/3000AH Series
PEL-013	Flexible Terminal Cover	PEL-3000A/3000AH Series

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
PEL-014	J1/J2 Protection Plug	PEL-3000A/3000AH Series
PEL-016	LAN Card	PEL-2000A(B) Series
PEL-022	GPIB Card	PEL-5000C Series, AEL-5000 Series, PEL-5000G Series
PEL-023	RS-232 Card	PEL-5000C Series, AEL-5000 Series, PEL-5000G Series
PEL-024	LAN Card	PEL-5000C Series, AEL-5000 Series, PEL-5000G Series
PEL-025	USB Card	PEL-5000C Series, AEL-5000 Series, PEL-5000G Series
PEL-026	Hook Ring	PEL-5000C Series
PEL-027-1~4	Rack Mount Kit	PEL-5000C Series
PEL-028	HANDLES, U-shaped Handle(Fixed to the Bracket)	PEL-5000C Series, AEL-5000 Series
PEL-029	HANDLES Rack Accessories(for AEL-5002/5003/5004)	AEL-5000 Series
PEL-030	GPIB+RS-232 Card	PEL-5000C Series, AEL-5000 Series, PEL-5000G Series
PEL-031	Rack Mount Kit	PEL-5000G
PEL-032	9923 Current Waveform Generator + RS232 Interface	PEL-5000G
PHU-IF01	GPIB interface	PHU-Series
PHU-IF02	RS-232&RS-485 interface card (RJ45)	PHU-Series
PHU-IF03	Isolated digital interface card	PHU-Series
PHU-IF04	CANbus interface card	PHU-Series
PHU-IF05	DeviceNet interface card	PHU-Series
PHU-IF06	Anybus riser card	PHU-Series
PHU-PC01	Parallel operation cable kit for 2 units x 1	PHU-Series
PHU-PC02	Parallel operation cable kit for 3 units x 1	PHU-Series
PHU-PC03	Parallel operation cable kit for 4 units x 1	PHU-Series
PHU-PC04	Parallel operation cable kit for 5 units x 1	PHU-Series
PHU-PC05	Parallel operation cable kit for 6 units x 1	PHU-Series
PHU-PC06	Parallel operation cable kit for 7 units x 1	PHU-Series
PHU-PC07	Parallel operation cable kit for 8 units x 1	PHU-Series
PHU-PC08	Parallel operation cable kit for 9 units x 1	PHU-Series
PHU-PC09	Parallel operation cable kit for 10 units x 1	PHU-Series
PPX-G	GPIB Interface(Factory Installed)	PPX-Series
PSB-001	GPIB Card	PSB-2000 Series
PSB-003	Parallel Connection Kit (for Horizontal Installation), Kit Includes: (PSB-007 Joint Kit, Horizontal bus bar x 2 , PSB-005 x1)	PSB-2000 Series
PSB-004	Parallel Connection Kit (for Vertical Installation) Kit Includes: (PSB-007 Joint Kit, Verical bus bar x 2, PSB-005 x 1)	PSB-2000 Series
PSB-005	Parallel Connection Signal Cable	PSB-2000 Series
PSB-006	Serial Connection Signal Cable	PSB-2000 Series
PSB-007	Joint Kit: Includes 4 Joining Plates, [M3x6]screws x 4 ; [M3x8]screw x 2	PSB-2000 Series
PSB-008	RS232C Cable (PSB-2000 Only)	PSB-2000 Series
PSU-001	Front Panel Filter kit(Factory Installed)	PSU-Series
PSU-01A	Joins a vertical stack of 2 PSU units together. 2U-sized handles x 2, joining plates x 2	PSU-Series
PSU-01B	Bus Bar for 2 units in parallel operation	PSU-Series
PSU-01C	Cable for 2 units in parallel operation	PSU-Series
PSU-02A	Joins a vertical stack of 3 PSU units Together. 3U-sized Handles x 2, joining plates x 2	PSU-Series
PSU-02B	Bus Bar for 3 units in Parallel Operation	PSU-Series
PSU-02C	Cable for 3 units in Parallel Operation	PSU-Series
PSU-03A	Joins a Vertical Stack of 4 PSU units Together. 4U-sized Handles x 2, joining plates x 2	PSU-Series
PSU-03B	Bus Bar for 4 units in Parallel Operation	PSU-Series
PSU-03C	Cable for 4 units in Parallel Operation	PSU-Series
PSU-232	RS232 Cable with DB9 Connector Kit	PSU-Series, PFR-Series
PSU-485	RS485 Cable with DB9 Connector Kit	PSU-Series, PFR-Series
PSU-GPIB	PSU GPIB Interface Card (Factory Installed)	PSU-Series
PSU-ISO-I	Isolated Current Remote Control Card (Factory Installed)	PSU-Series
PSU-ISO-V	Isolated Voltage Remote Control Card (Factory Installed)	PSU-Series
PSW-001	Accessory Kits	PSW-Series, PSW-Multi Series
PSW-002	Simple IDC Tool	PSW-Series, PSW-Multi Series
PSW-003	Contact Removal Tool	PSW-Series, PSW-Multi Series
PSW-004	Basic Accessory Kit for 30 V/80 V/160 V models	PSW-Series, PSW-Multi Series
PSW-005	Series Operation Cable for 2 units(30 V/80 V/160 V models moly)	PSW-Series
PSW-006	Parallel Operation Cable for 2 units	PSW-Series
PSW-007	Parallel Operation Cable for 3 units	PSW-Series
PSW-008	Basic Accessory Kit for 250 V/800 V models	PSW-Series
PSW-009	Output Terminal Cover for 30 V/80 V/160 V models	PSW-Series
PSW-010	Large Filter (Type II/III)	PSW-Series
PSW-011	Output Terminal Cover for 250 V/800 V models	PSW-Series
PSW-012	High Voltage Output Terminal for 250 V/800 V model	PSW-Series

ACCESSORIES

GTL-101	GTL-105A	GTL-104A
GTL-120	GTL-121	GTL-122 
GTL-123	GTL-201A	GTL-203A
GTL-204A	GTL-218	GTL-219
GTL-220/GTL-222	GTL-221/GTL-223	GTL-232
GTL-232A	GTL-240	GTL-246
GTL-248	GTL-249	GTL-250

ACCESSORIES

GTL-253

GTL-258

GTL-259

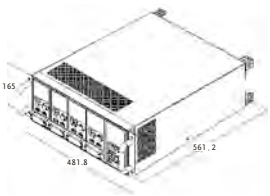
GTL-260

GTL-261

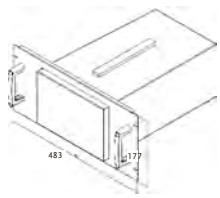
GTL-262

PEL-002 Rack Mount Kit

For : PEL-2000A Series

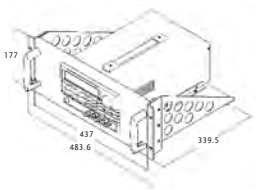


GRA-401 Rack Mount Kit

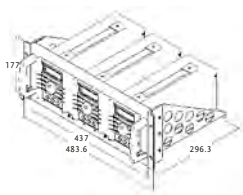


GRA-407 Rack Mount Kit

For : PST-Series

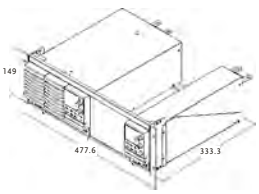


GRA-408 Rack Mount Kit



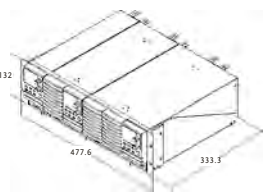
GRA-410-J Rack Mount Kit (JIS)

For : PSW-Series



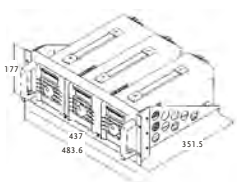
GRA-410-E Rack Mount Kit (EIA)

For : PSW-Series



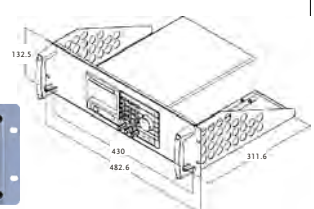
GRA-403 Rack Mount Kit

For : PSH-Series



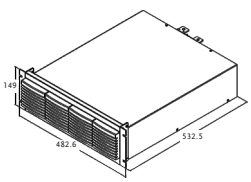
GRA-428 Rack Mount Kit (EIA)

For : PSP-Series



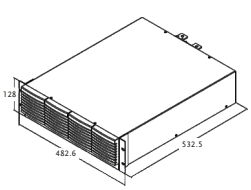
GRA-413-J Rack Mount Kit (JIS)

For : PEL-3211/3211H



GRA-413-E Rack Mount Kit (EIA)

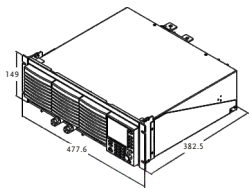
For : PEL-3211/3211H



ACCESSORIES

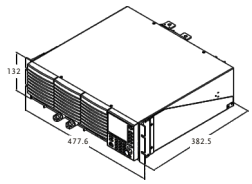
GRA-414-J Rack Mount Kit (JIS)

For : PEL-3021/3021H/3041/3041H/3111/3111H
PEL-3031AE/3032AE



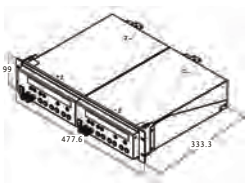
GRA-414-E Rack Mount Kit (EIA)

For : PEL-3021/3021H/3041/3041H/3111/3111H
PEL-3031AE/3032AE



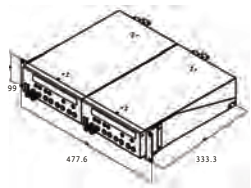
GRA-419 Rack Mount Kit (JIS)

For : PCS-1000I



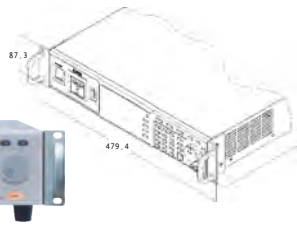
GRA-419 EIA Rack Mount Kit

For : PCS-1000



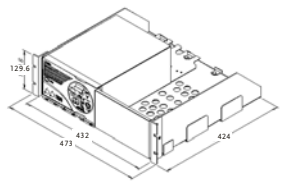
GRA-423 Rack Mount Kit

For : APS-7050/7100/7050E/7100E Series



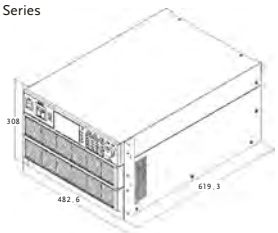
GRA-424 Rack Mount Kit

For : PSB-2000 Series



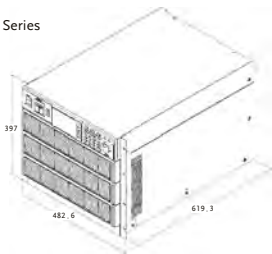
GRA-429 Rack Mount Kit

For : APS-7200 Series



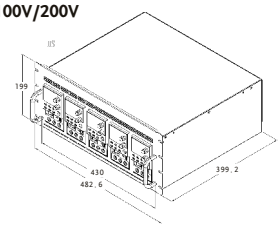
GRA-430 Rack Mount Kit

For : APS-7300 Series



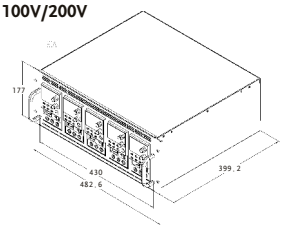
GRA-431-J Rack Mount Kit (JIS) with AC 100V/200V

For : PFR-Series



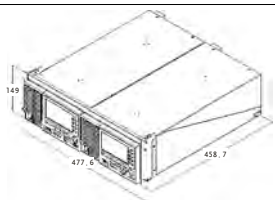
GRA-431-E Rack Mount Kit (EIA) with AC 100V/200V

For : PFR-Series



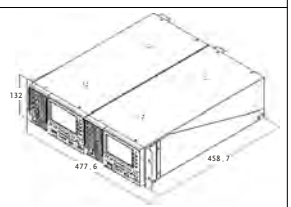
GRA-439-J Rack Mount Kit (JIS)

For : ASR-2000 Series



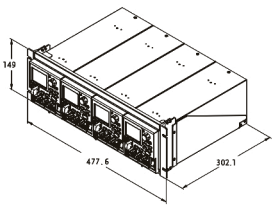
GRA-439-E Rack Mount Kit (EIA)

For : ASR-2000 Series



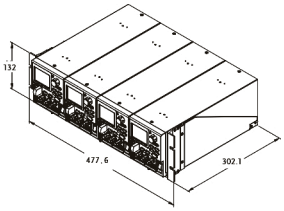
GRA-441-J Rack Mount Kit (JIS)

For : PPX-Series



GRA-441-E Rack Mount Kit (EIA)

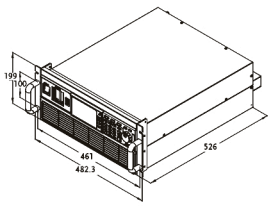
For : PPX-Series



ACCESSORIES

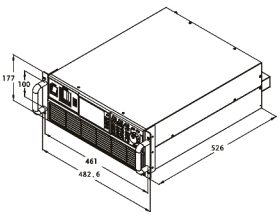
GRA-442-J Rack Mount Kit (JIS)

For : ASR-3000 Seriea



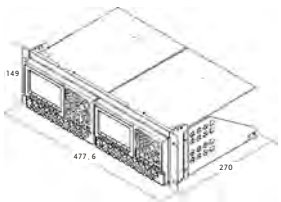
GRA-442-E Rack Mount Kit (EIA)

For : ASR-3000 Series



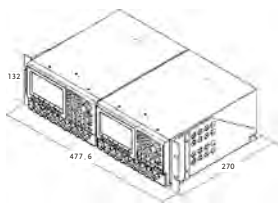
GRA-449-J Rack Mount Kit (JIS)

For : GPP-Series



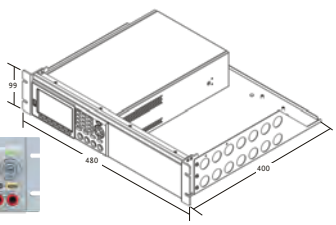
GRA-449-E Rack Mount Kit (EIA)

For : GPP-Series



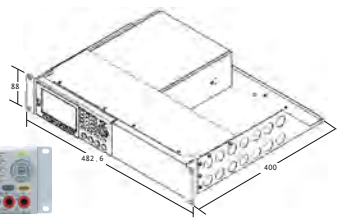
GRA-450-J Rack Mount Kit (JIS)

For : GSM-20H10, PPH-Series



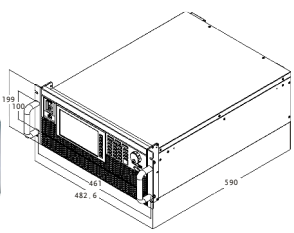
GRA-450-E Rack Mount Kit (EIA)

For : GSM-20H10, PPH-Series



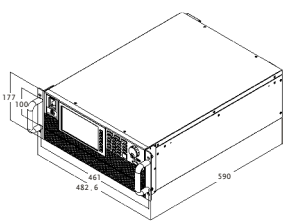
GRA-451-J Rack Mount Kit (JIS)

For : ASR-6000 Series



GRA-451-E Rack Mount Kit (EIA)

For : ASR-6000 Series



DATA ACQUISITION SYSTEM & DIGITAL MULTIMETER

Data acquisition is the process of sampling signals that measure physical conditions and converting the resulting samples into digital values that computers can manipulate. Data acquisition systems (abbreviated as DAQ) typically convert analog waveforms into digital values for processing.

The DAQ-9600 data acquisition system has seven high-quality modules and built-in 6 1/2 digits multimeter to provide you with measuring and converting 14 different input signals: Temperature with thermocouples, RTDs and thermistors; DC/AC voltage; 2-wire and 4-wire resistance; frequency and period; DC/AC current and capacitance; direct strain and bridge strain achieving an efficient and accurate data acquisition.

Digital Multimeters are the most commonly utilized instruments on many engineering workbenches. GW Instek provides a variety of digital multimeters ideal for you to satisfy the requirements of your customers in different situations.

The GDM-906X series, 6 1/2 DMM, has become the best asset for users in R&D verification, production testing and high-end educational institutions by its excellent performance and high-precision design.

The GVM-9102, 6 1/2 2 kV Voltmeter, has DC voltage measurement up to 2400 V without the need for attenuators, effectively reducing measurement losses and errors. This makes it particularly suitable for measuring the output of energy storage devices, photovoltaic devices, or DC power supply devices.

The GDM-9052, 5 1/2 digits (239,999 full scale), has 0.012 % basic DC voltage accuracy, A.I. measurement and USB/RS232C connectors to provide users with measurement precision, lucid data observation, and the convenient connection with the personal computer.

The GDM-904X series and GDM-8245 feature 4 3/4 digits (50,000 counts). The GDM-904X series and GDM-8245 have become the best tools for technicians in service and maintenance.

PRODUCTS

- **Data Acquisition System**
- **Digital Multimeters**

DATA ACQUISITION SYSTEM & DIGITAL MULTIMETER

The DAQ-9600 is a precision data acquisition system that uses built-in 6 1/2-digit multimeter technology, you will find even greater accuracy, functionality, and speed. a large 4.3-inch TFT LCD will guide users through set-up, data visualization, and analysis.

Available 7 plug-in modules, you can build a test system that can measure or control up to 60 two-wire channels or 120 single-ended channels or 96 matrix crosspoints.

The DAQ-9600 supports measurement data storage, and the acquired data can be stored in the internal memory or directly recorded to a USB flash drive without connecting to a PC. For remote setting and control of data logging applications, the DAQ-9600 is equipped with LAN, USB and GPIB (optional), and provides free DAQ-Data Logger software to simplify data collection and analysis, allowing users to easily collect data.

MAIN / MODEL	DAQ-9600	DAQ-9600 with GPIB
Slots	3	3
Built-in DMM	6 1/2 digits	6 1/2 digits
Display	4.3' TFT LCD	4.3' TFT LCD
Measurement Characteristics	Measures and Converters 14 different Input Signals AC & DC Voltage AC & DC Current 2- & 4-wires Resistance Frequency & Period Temperature (Thermocouple/RTD/Thermistor) Capacitance & Diode Direct Strain and Bridge Strain	Measures and Converters 14 different Input Signals AC & DC Voltage AC & DC Current 2- & 4-wires Resistance Frequency & Period Temperature (Thermocouple/RTD/Thermistor) Capacitance & Diode Direct Strain and Bridge Strain
Modules	20-Channel Universal Multiplexer (Solid State Relay) 20+2 Channels Universal Multiplexer (Armature Relay) 40-Channel Single-Ended Multiplexer 4 x 8 2-Wire Matrix Multifunction Module 20-Channel Actuator/General Purpose Switch 8+2 Channels High Voltage High Current Multiplexer	20-Channel Universal Multiplexer (Solid State Relay) 20+2 Channels Universal Multiplexer (Armature Relay) 40-Channel Single-Ended Multiplexer 4 x 8 2-Wire Matrix Multifunction Module 20-Channel Actuator/General Purpose Switch 8+2 Channels High Voltage High Current Multiplexer
Computed Channel	20 channels Capable of Performing Math Operations (channels 401 through 420)	20 channels Capable of Performing Math Operations (channels 401 through 420)
Interface (Std.)	USB host / device LAN, Digital I/O	USB host / device LAN, Digital I/O Mini GPIB
Page	E3-7	E3-7

Data Acquisition System

DAQ-9600

CE | USB Host | USB Device | LAN | Digital IO | GPIB

FEATURES

* Large 4.3" TFT Color Display
* 3-slot Mainframe with Built-in 6 ½ Digit DMM
* Basic 0.0035% DCV Accuracy
* 6 Seletable Switch Modules
* Up to DC 600 V/AC 400 V Voltage Measurement (DAQ-909 Module)
* Up to 450 Channel/s Scan Rate
* Up to 100 kilo Points Internal Memory
* Measures and Converts 14 Different Input Signals: Temperature with Thermocouple, RTDs and Thermistor; DC/AC Volts; 2- and 4-wire Resistance; Frequency and Period; DC/AC Current and Capacitance; Direct Strain and Bridge Strain
* Command Compatible with the DAQ970A
* USB Storage Supports to Copy/Log Data in Standalone Operation
* Interface: Digit I/O, LAN, USB Host/Device and Mini GPIB (Optional)
* Free PC Software DAQ-Data Logger, Allows Easy Configuration and Control of Tests

The DAQ-9600 data acquisition system is a modularized data acquisition system with high flexibility and higher performance. The mainframe is equipped with 3 module slots and a built-in precision 6 1/2 digital DMM is the core of its test and measurement. 7 modules are available to meet different measurement needs. For the research and development of analyzing product characteristics or the production and manufacturing of system testing or fault diagnosis, a data acquisition system with flexibility and high performance can effectively fulfill different measurement requirements by expansion and change that make the overall test simpler, faster and more reliable.

The modular structure of the DAQ-9600 provides 3 module slots and 6 optional modules, including general-purpose modules (DAQ-900/DAQ-901), multi-function module (DAQ-903), matrix module (DAQ-904), switch module (DAQ-908) and high-voltage and high-current module (DAQ-909). Users can combine and match arbitrarily according to the measurement needs. Since the DMM is built-in, it will not take up the slot space for maximum flexibility to expand channels to 60 two-wire channels or 120 single-ended channels or 96 matrix crosspoints.

The DAQ-9600 features a 4.3-inch graphic color display and concise function key design, allowing users to quickly and easily configure module channels in an intuitive way. Measurement data is presented in different formats, such as numerical values, bar graphs, trend graph and histogram to quickly check the measurement results. At the same time, the DAQ-9600 can convert 14 input signals, including temperature (RTD/thermocouple/thermistor), voltage (AC/DC), current (AC/DC), resistance (two-wire/four-wire), Strain (direct/bridge), frequency/period, and capacitance. The built-in 6 1/2 digital DMM provides basic accuracy of 0.0035% DC voltage, 0.05% AC voltage, and 0.01% resistance within a one-year calibration cycle.

The DAQ-9600 supports measurement data storage, and the acquired data can be stored in the internal memory or directly recorded to a USB flash drive without connecting to a PC. For remote setting and control of data logging applications, the DAQ-9600 is equipped with LAN, USB and GPIB (optional), and provides free DAQ-Data Logger software to simplify data collection and analysis, allowing users to easily collect data. In addition, the LAN interface can be used to configure measurements, define and execute scan lists through common web browsers (such as Chrome, IE). Users can monitor the measurement results no matter where they are as long as they are connected to the Internet.

The DAQ-9600 can meet the demand for data acquisition. Users can construct flexible signal routing and control functions through a variety of optional modules. With the built-in excellent measurement functions, including resolution, accuracy and speed, 14 different input signals can be easily measured to meet different application requirements. The DAQ-9600 is definitely a perfect combination of price and the test and measurement performance.

DAQ MODULES SPECIFICATIONS

Module Description	Type	Speed (CH/sec)	Max (Volts)	Max (Amps)	Bandwidth	Thermal (Offset)	Comments
DAQ-900 20 ch Multiplexer	2-wire solid-state (4-wire selectable)	450	120 V		10 MHz	< 4 μV	Built-in cold junction reference
DAQ-901 20 ch Multiplexer + 2 ch current	2-wire armature (4-wire selectable)	80	300 V	1 A	10 MHz	< 4 μV	Built-in cold junction reference 2 additional current channels (22 total)
DAQ-903 40 ch Single-Ended Mux	1-wire armature (common low)	80	300 V		10 MHz	< 1 μV	No four-wire measurements
DAQ-904 4 x 8 Matirx	2-wire armature		300 V		10 MHz	< 1 μV	
DAQ-907 Multifunction Module	16 bits of digital input and output		42 V				Open drain
	100 kHz totalizer		42 V		100 kHz		Input threshold selectable
	Two 18-bit analog outputs		±12 V	±24 mA			Max 40 mA total output per frame
DAQ-908 20 ch Actuator/General Purpose Switch	SPDT / form C		300 V		10 MHz	< 4 μV	
DAQ-909 8 ch HV Multiplexer + 2 ch current	2-wire armature (4-wire selectable)	60	DC 600 V AC 400 V	2 A	10 MHz	< 4 μV	High voltage / high current channels 2 additional current channels (22 total)

INTERNAL DMM MEASUREMENT FUNCTIONS SUPPORTED

	DAQ-900	DAQ-901	DAQ-903	DAQ-904	DAQ-907	DAQ-908	DAQ-909
AC/DC Voltage	✓ 2,3	✓	✓				✓
AC/DC Current		✓					✓
Frequency/Period	✓	✓	✓				✓
2Wire Resistance	✓ 1	✓	✓				✓
4Wire Resistance	✓ 1	✓					✓
Thermocouple	✓	✓					✓ 4
2Wire RTD		✓	✓				✓
4Wire RTD		✓					✓
Thermistor		✓	✓				✓
Capacitance		✓	✓				✓

NOTE:

1. For the measurement of 100 Ω and 1 kΩ resistance ranges, it is recommended to use 4-wire resistance. The maximum resistance range of DAQ-900 is 1 MΩ.
2. When measuring AC voltage, the input impedance will decrease with frequency.
   A source impedance of 5 Ω or less will maintain specification over frequency.
   A source impedance of 50 Ω or less will maintain specification in the 5 kHz range.
3. For DC voltage measurement, if the integration time is short and the source impedance is high, more stabilization time may be required.
4. Need to use an extension cable moving the cold junction outside the chassis and manually set the reference temperature value

Function	Range (2)	Resolution	Input Resistance etc.	24 Hour TCAL ± 1 °C	90 Day TCAL ± 5 °C	1 Year TCAL ± 5 °C	Temperature Coefficient 0 °C to 18 °C/ 28 °C to 55 °C
DC Characteristics							
DC Voltage *1	100.0000 mV	0.1 µV	10 MΩ or > 10 GΩ	0.0030 + 0.0050	0.0040 + 0.0060	0.0050 + 0.0060	0.0005 + 0.0005
	1.000000 V	1 µV	10 MΩ or > 10 GΩ	0.0020 + 0.0006	0.0035 + 0.0007	0.0048 + 0.0007	0.0005 + 0.0001
	10.00000 V	10 µV	10 MΩ or > 10 GΩ	0.0015 + 0.0004	0.0020 + 0.0005	0.0035 + 0.0005	0.0005 + 0.0001
	100.0000 V	0.1 mV	10 MΩ ± 1%	0.0020 + 0.0006	0.0035 + 0.0006	0.0050 + 0.0006	0.0005 + 0.0001
	600.000 V	1 mV	10 MΩ ± 1%	0.0025 + 0.0020	0.0040 + 0.0020	0.0050 + 0.0020	0.0005 + 0.0001
Resistance *1 *3	100.0000 Ω	100 µΩ	1 mA	0.003 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.0008 + 0.0005
	1.000000 kΩ	1 mΩ	1 mA	0.002 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
	10.00000 kΩ	10 mΩ	100 µA	0.002 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
	100.0000 kΩ	100 mΩ	10 µA	0.002 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
	1.000000 MΩ	1 Ω	5 µA	0.002 + 0.0010	0.008 + 0.001	0.010 + 0.001	0.0010 + 0.0002
	10.00000 MΩ	10 Ω	500 nA	0.015 + 0.0010	0.020 + 0.001	0.040 + 0.001	0.0030 + 0.0004
	100.0000 MΩ	100 Ω	500 nA // 10 MΩ	0.300 + 0.0100	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0004
	1.000000 GΩ	1 kΩ	500 nA // 10 MΩ	2.500 + 0.0500	3.500 + 0.050	3.500 + 0.050	1.0000 + 0.0040
DC Current *1	1.000000 µA	1 pA	< 0.015 V	0.025 + 0.050	0.050 + 0.050	0.050 + 0.050	0.002 + 0.003
	10.00000 µA	10 pA	< 0.15 V	0.020 + 0.010	0.040 + 0.025	0.050 + 0.025	0.002 + 0.003
	100.0000 µA	100 pA	< 0.020 V	0.010 + 0.020	0.040 + 0.025	0.050 + 0.025	0.002 + 0.003
	1.000000 mA	1 nA	< 0.20 V	0.007 + 0.006	0.030 + 0.006	0.050 + 0.006	0.002 + 0.001
	10.00000 mA	10 nA	< 0.15 V	0.007 + 0.020	0.030 + 0.020	0.050 + 0.020	0.002 + 0.002
	100.0000 mA	100 nA	< 0.7 V	0.010 + 0.004	0.030 + 0.005	0.050 + 0.005	0.002 + 0.001
	2.000000 A	1 µA	< 0.8 V	0.180 + 0.020	0.200 + 0.020	0.200 + 0.020	0.005 + 0.001
Diode Test *1 *4	5.00000 V	10 µV	1 mA	0.002 + 0.030	0.008 + 0.030	0.01 + 0.030	0.001 + 0.002
AC Characteristics							Accuracy : ± (% of reading + % of range)
True RMS AC Voltage *5 *6 *7 *8	100.0000 mV	0.1 µV	3 Hz to 5 Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
			5 Hz to 10 Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
			10 Hz to 20 kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.003
			20 kHz to 50 kHz	0.10 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
			50 kHz to 100 kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
			100 kHz to 300 kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.200 + 0.020
	1.000000 V to 400.000 V	1 µV to 1 mV	3 Hz to 5 Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.004
			5 Hz to 10 Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.004
			10 Hz to 20 kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
			20 kHz to 50 kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
			50 kHz to 100 kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
			100 kHz to 300 kHz	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.200 + 0.020
True RMS AC Current *5 *7 *9	100.0000 µA (Burden Voltage < 0.020 V)	100 pA	3 Hz to 5 Hz	1.00 + 0.04	1.00 + 0.06	1.00 + 0.06	0.100 + 0.006
			5 Hz to 10 Hz	0.35 + 0.04	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
			10 Hz to 5 kHz	0.10 + 0.04	0.10 + 0.06	0.10 + 0.06	0.015 + 0.006
			5 kHz to 10 kHz	0.18 + 0.04	0.18 + 0.10	0.18 + 0.10	0.035 + 0.006
	1.000000 mA (Burden Voltage < 0.020 V)	1 nA	3 Hz to 5 Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
			5 Hz to 10 Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
			10 Hz to 5 kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
			5 kHz to 10 kHz	0.15 + 0.04	0.15 + 0.04	0.15 + 0.04	0.030 + 0.006
	10.00000 mA (Burden Voltage < 0.15 V)	10 nA	3 Hz to 5 Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
			5 Hz to 10 Hz	0.35 + 0.04	0.35 + 0.04	0.35 + 0.04	0.035 + 0.006
			10 Hz to 5 kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
			5 kHz to 10 kHz	0.18 + 0.04	0.18 + 0.04	0.18 + 0.04	0.030 + 0.006
	100.0000 mA (Burden Voltage < 0.7 V)	100 nA	3 Hz to 5 Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
			5 Hz to 10 Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
			10 Hz to 5 kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
			5 kHz to 10 kHz	0.15 + 0.04	0.15 + 0.04	0.15 + 0.04	0.030 + 0.006
	2.000000 A (Burden Voltage < 0.80 V)	1 µA	3 Hz to 5 Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
			5 Hz to 10 Hz	0.35 + 0.04	0.35 + 0.04	0.35 + 0.04	0.035 + 0.006
			10 Hz to 5 kHz	0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.015 + 0.006
			5 kHz to 10 kHz	0.23 + 0.04	0.23 + 0.04	0.23 + 0.04	0.030 + 0.006
Frequency and Period Characteristics							Accuracy : ± (% of reading)
Frequency/Period *9 *10 *11 *12	100.0000 mV to 400.000 V	—	3 Hz to 5 Hz	0.1	0.1	0.1	0.1
			5 Hz to 10 Hz	0.05	0.05	0.05	0.035
			10 Hz to 40 Hz	0.03	0.03	0.03	0.015
			40 Hz to 1 MHz	0.006	0.006	0.006	0.015
Temperature Characteristics							
Temperature (RTD) *13	-200 °C to -100 °C	0.001 °C	—	—	—	0.09 °C	0.004 °C / °C
	-100 °C to -20 °C	0.001 °C	—	—	—	0.08 °C	0.005 °C / °C
	-20 °C to 20 °C	0.001 °C	—	—	—	0.06 °C	0.005 °C / °C
	20 °C to 100 °C	0.001 °C	—	—	—	0.08 °C	0.005 °C / °C
	100 °C to 300 °C	0.001 °C	—	—	—	0.12 °C	0.007 °C / °C
	300 °C to 600 °C	0.001 °C	—	—	—	0.22 °C	0.009 °C / °C
Temperature (Thermocouples)*13	-200 °C to +1000 °C	0.002 °C	E	—	—	0.2 °C	0.03 °C / °C
	-210 °C to +1200 °C	0.002 °C	J	—	—	0.2 °C	0.03 °C / °C
	-200 °C to +400 °C	0.002 °C	T	—	—	0.3 °C	0.04 °C / °C
	-200 °C to +1372 °C	0.002 °C	K	—	—	0.3 °C	0.04 °C / °C
	-200 °C to +1300 °C	0.003 °C	N	—	—	0.4 °C	0.05 °C / °C
	-50 °C to +1768 °C	0.01 °C	R	—	—	1 °C	0.14 °C / °C
	-50 °C to +1768 °C	0.01 °C	S	—	—	1 °C	0.14 °C / °C
	+350 °C to +1820 °C	0.01 °C	B	—	—	1 °C	0.14 °C / °C
Temperature (Thermistor) *13	–80 °C to 150 °C	0.01 °C	—	—	—	0.01 °C	0.003 °C / °C
Capacitance Characteristics							Accuracy : ± (% of reading + % of range)
Capacitance *14	1.000 nF	—	—	2.00 + 2.00	2.00 + 2.00	2.00 + 2.00	0.05 + 0.01
	10.00 nF	—	—	2.00 + 1.00	2.00 + 1.00	2.00 + 1.00	0.05 + 0.01
	100.0 nF	—	—	2.00 + 0.40	2.00 + 0.40	2.00 + 0.40	0.05 + 0.01
	1.000 µF	—	—	2.00 + 0.40	2.00 + 0.40	2.00 + 0.40	0.05 + 0.01
	10.00 µF	—	—	2.00 + 0.40	2.00 + 0.40	2.00 + 0.40	0.05 + 0.01
	100.0 µF	—	—	2.00 + 0.40	2.00 + 0.40	2.00 + 0.40	0.05 + 0.01

Data Acquisition System

SPECIFICATIONS

GENERAL	⚠ **Note**	All specifications are ensured only under a single display At least 1 hour of warm-up time is required before applying these specifications MAX DC 600 V, AC 400 V
	Environment	Operating Environment: Full accuracy for 0 °C to 55 °C Full accuracy to 80% R.H. at 40 °C Non–condensing Operating Altitude Up to 2,000 m Storage Temperature -40 °C to 70 °C
	Line Power	Power Supply: 100 / 120 / 220 / 240 VAC ±10% Power Line Frequency: 50 Hz / 60 Hz ±10% Power Consumption: Max. 50 VA
	Mechanical	Rack Dimensions : 88 mm(H) x 220 mm(W) x 348.6 mm(D) (without bumpers) Bench Dimensions : 107 mm(H) x 266.9 mm(W) x 357.8 mm(D) (without bumpers) Weight : 4.5 kg (9.92 lbs)

NOTE :
1. DC Specifications: In addition to the availability that requires warm-up of 60 minutes, it must be set in 5/s speed rate, A-Zero on.
2. The entire range of measurement will pass the set range by 20% except the tests of 600 V DC, 400 V AC, 2 A DC, 2 A AC and diode.
3. These specifications apply to 4-wire ohms function or 2-wire ohms using math null for offset. Without math null, add 2 Ω additional error in 2-wire ohms function. The 100 Mohm and 1 Gohm ranges are for 2-wire only.
4. These specification apply to the voltage measured from input terminal. 1 mA test current is the typical value. The change of current source leads to the variation in buck of diode junction.
5. AC Specifications: It will be available after 60 minutes of warm-up, sine wave as well as 1/s speed rate.
6. Specifications are for sinewave input >5% of range. For inputs from 1% to 5% of range and <50 kHz, add 0.1% of range additional error. For 50 kHz to 100 kHz, add 0.13% of range. The measurement range of 400 VAC is limited within the range of 7.5 x 10^7 Volt–Hz.
7. Three speed settings provided for low-frequency performance: 1/s (3 Hz), 5/s (20 Hz), 20/s (200 Hz). Additional errors will Not occur for the frequency greater than the filter settings.
8. Specifications are for sinewave input >5% of range, and is beyond 10 μA AC. For inputs from 1% to 5% of range, add 0.1% of range additional error.
9. These specifications will be available after 60 minutes of warm-up and sine wave input, unless stated otherwise. These specifications apply to 1s gate time.
10. These specifications are available when both sine wave and square wave input ≥ 100 mV. For the input of 10 mV to 100 mV, the % of reading error needs to be multiplied by 10 times.
11. The amplitude range is from 10% to 120% and is lower than 400 VAC.
12. The input ≥ 60 mV, for 300 kHz to 1 MHz, within 100 mV range.
13. The actual measurement range and test lead error will be constrained by the adopted test lead. The test lead accuracy adder covers all errors of measurements and ITS-90 temperature change.
14. Specifications are for film Capacitance inputs that are greater than 10% range.

ORDERING INFORMATION

DAQ-9600	Data Acquisition System (USB/LAN/Digital IO)
DAQ-9600 with GPIB	Data Acquisition System (USB/LAN/Digital IO and opt. GPIB)
DAQ-900	20-Channel Universal Multiplexer
DAQ-901	20+2 Channels Universal Multiplexer
DAQ-903	40-Channel Single-Ended Multiplexer
DAQ-904	4 x 8 Matrix
DAQ-907	Multifunction Module
DAQ-908	20-Channel Actuator/General-Purpose Switch
DAQ-909	8+2 Channels High Voltage High Current Multiplexer

ACCESSORIES :
Power Cord x 1, Screw Driver x 1, GTL-246 USB Cable x 1

OPTIONAL ACCESSORIES

GTL-258	GPIB Cable, 25-pin Micro-D Connector, Approx. 1900 mm
GRA-455	Rack Mount Kit, 19" 2U size for one or two sets

Rear Panel

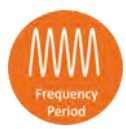
A. CUSTOMIZED CONFIGURATION FOR CHANGING NEEDS

Data Acquisition | **Multiplexer** | **Mainframe**

The DAQ-9600 provides 3 module slots, and all of which can be used to install and control selected modules. 7 different modules are available to meet different measurement needs. These modules include general-purpose modules, multi-function modules, matrix module and high-voltage and high-current module. Users can choose, mix and match these modules to obtain the functions as required. The measurement channels of each module can be configured independently, including measurement function, range, speed and the advanced measurement functions such as offset compensation. The DAQ-9600 can provide up to 60 two-wire measurements, 120 single-ended measurements, or 96 matrix crosspoints in a half-rack, which saves work space and cost when completing complex and diverse measurement tasks.

B. PRECISE TEST AND MEASUREMENT

RANGE	-200 °C to 1820 °C	-200 °C to 600 °C	-80 °C to 150 °C	100 mV to 400 V	100 mV to 600 V	100 µA to 2 A
RESOLUTION	0.002 °C to 0.01 °C	0.002 °C	0.01 °C	0.1 µV to 1 mV	0.1 µV to 1 mV	100 pA to 1 µA
ACCURACY	0.2 °C	0.06 °C	0.1 °C	0.05%	0.0035%	0.10%



RANGE	1 µA to 2 A	100 Ω to 1000 MΩ	100 Ω to 1000 MΩ	1 nF to 100 µF	3 Hz to 300 kHz
RESOLUTION	1 pA to 1 µA	0.1 mΩ to 1000 Ω	0.1 mΩ to 1000 Ω	0.0001 nF to 0.01 µF	
ACCURACY	0.05%	0.01%	0.01%	2%	

The test and measurement core of the DAQ-9600 is a 6 1/2-digit DMM, which has the functions and performance of an industrial-grade DMM. It can measure and convert 14 different input signals. In addition to high resolution, it also provides basic accuracy of 0.0035% DC voltage, 0.05% basic accuracy of AC voltage and 0.01% basic accuracy of resistance (within one-year calibration period). The functions of this DMM can be used with general-purpose modules (DAQ-900/ DAQ-901), multi-function module (DAQ-903) and high-voltage and high-current module (DAQ-909). All multiplexer modules use "disconnect before connect" scanning to ensure that only one channel (or a pair of channels) is closed at a time.

C. BUILT-IN SIGNAL CONDITIONING

Transducer plays an important role in the application of data acquisition system, converting physical quantities into electronic signals, such as temperature measurement (temperature to voltage), and pressure and strain measurement (resistance to voltage). The DAQ -9600 does not rely on external or plug-in signal conditioning modules to handle functions other than DC voltage, which not only greatly reduces noise and errors generated by external wiring from entering the system, and improves reliability. At the same time, it does not have unnecessary cables, wire distribution boxes and signal conditioning components that makes configuration quicker and easier. Taking temperature measurement as an example, the measurement of thermocouples is often accompanied by the Seebeck effect (the thermoelectric phenomenon in which the temperature difference between two different electrical conductors or semiconductors causes a voltage difference between two substances). Two DAQ-9600 modules,DAQ-900 and DAQ-901, provide cold junction compensation to ensure maximum accuracy for all channels measuring thermocouples, avoiding the use of temperature extension wires with external cold junctions, which will increase noise and errors generated by external wiring into the system.

D. INTERNAL MEMORY AND USB STORAGE

Varity Interfaces

The DAQ-9600 can store the measurement results without connecting to a PC with the non-volatile memory capacity of 100k readings. Users can store the measurement results inside the system first, and then connect to a PC to collect data. In addition, for larger memory capacity, the DAQ-

USB Storage

9600 also supports the USB storage function, which can directly record data to an external USB flash drive, or copy the data of the internal non-volatile memory to the flash drive for follow-up analysis.

Data Acquisition System

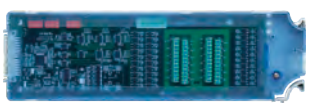
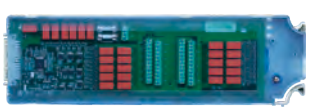
E. SIMPLIFY DATA COLLECTION AND ANALYSIS

DAQ-Data Logger

Web Control

The DAQ-9600 provides LAN, USB and GPIB (optional) to meet the most suitable and customary remote control interface requirements. Users can be benefitted from the free data collection software (DAQ-Data Logger) to easily and quickly set up tests, acquire and store measurement data, and perform real-time observation and analysis during the measurement process. If LAN is used as the interface, it can be easily connected to the company network to collect measurement data and store it in the central database. It can also use a common web browser (such as Chrome, IE) through the built-in graphical web interface to configure test and measurements, define and execute scan lists to reduce the time spent on programming.

F. THE INTRODUCTION OF MODULES

DAQ-900 	**20-Channel Universal Multiplexer (Solid State Relay)** * Scanning speed up to 450 channels per second * 2-wire and 4-wire scanning * Built-in temperature cold junction reference * 120 V switching	DAQ-900 is a solid state relay module that provides two groups (A/B) of 10 2-wire channels each. All 20 channels are switchable to high (HI) and low (LO) inputs, providing fully isolated inputs for the built-in digital meter or external instruments. During 4-wire resistance measurements, the channels of group A are automatically paired with the channels of group B to provide power and sense connections. The module has a built-in cold junction reference, which can greatly reduce errors caused by thermal gradients when measuring thermocouples.
DAQ-901 	**20+2 Channels Universal Multiplexer (Armature Relay)** * The scanning speed can reach 80 channels per second * 2-wire and 4-wire scanning * Built-in temperature cold junction reference * 300 V switching * The extra 2 channels can directly measure the current (1 A/per CH)	DAQ-901 is a comprehensive multiplexer for general scanning. The same module can mix 2-wire and 4-wire channels; at the same time, the additional 2 current input channels can be used for AC and DC current measurement without external shunt resistors (maximum 1 A per channel). DAQ-901, a total of 22 channels, intensive multi-function switching and a scan rate of up to 80 channels per second, is suitable for various data acquisition applications.
DAQ-903 	**40-Channel Single-Ended Multiplexer** * The scanning speed can reach 80 channels per second * Single-wire switching is suitable for common-low applications	DAQ-903 can switch 40 single-wire inputs per module. It can be used for common-low applications such as battery testing, component characterization and desktop testing. The low-voltage connection is isolated from ground and can be floated up to 300 V. DAQ-903 also supports all 2-wire internal measurements except current.
DAQ-904 	**4 x 8 2-Wire Matrix** * The switching speed 3 ms * 32 2-wire intersections * 300 V, 1 A switching * Up to 96 crosspoints (3 slots)	DAQ-904 module can provide the most flexible connection path between your DUT and the test system, allowing different test instruments to be connected to multiple points on the DUT at the same time. DAQ-904 can connect the rows and columns of multiple modules to build larger matrices, such as 8 x 8, 4 x 16...etc. Up to 96 crosspoints can be built in a single instrument.
DAQ-907 	**Multifunction Module** * 16 bits of digital input and output * 100 kHz totalizer input * Two analog modes: ±12 V outputs or ±24 mA outputs	DAQ-907 provides great flexibility for various sense and control applications. It engages two 8-bit digital input and output ports, a 100 kHz gated totalizer, and two ± 12 V or ± 24 mA analog outputs— all on a single earth-referenced module. The digital inputs and totalizer input may be included in a scan. Alarm limits for the digital and totalizer inputs are evaluated continuously, capturing and logging alarm conditions even between scans. In addition, it has two additional channels (DMM INPUT and DMM CURRENT) that can sense output current when sourcing voltage or output voltage when sourcing current.
DAQ-908 	**20-Channel Actuator/General-Purpose Switch** * SPDT (Form C) latching relays * 300 V, current 1 A actuation and control	DAQ-908, a general purpose switch module with 20 independent single pole double throw (SPDT) relays, can be used for power cycling in DUTs, control indicator lights and status lights. DAQ-908 can also activate external power relays and solenoid valves. While combining DAQ-908 with matrix and multiplexer modules, switching systems can be customized. 300 V and 1 A contact can handle up to 50 W, which is sufficient for multiple powerline switching applications.
DAQ-909 	**8+2 Channels High Voltage High Current Multiplexer** * The switching speed 3ms * DC 600 V / AC 400 Vrms voltage , current 2 A * 2-wire and 4-wire scanning * Additional 2 channels can directly measure current (2 A/per channel)	DAQ-909 is a multiplexer specially designed for high voltage, providing 8 channels for DC 600 V / AC 400 Vrms voltage measurement. The additional 2 current input channels can be used for AC and DC current measurement, external shunt resistors are not required (maximum 2 A / per channel).

DIGITAL MULTIMETER OVERVIEW

From 6 1/2 to 4 3/4 digits, the GDM-9000 Series can deliver a measurement accuracy of up to 0.0035 % and with high current fuse protection can withstand up to 12 A. With the design focused on superior performance and ease of use, the GDM-9000 Series has become some of the best assets for engineers and technicians in service & repair, production testing and educational institutions. USB, RS-232C, GPIB and LAN interfaces all make the series ideal for PC controlled applications.

BENCH-TOP DIGITAL MULTIMETER

MODEL / MAIN FUNCTION	GDM-9061	GDM-9060	GVM-9102
Display	6 1/2 (1200000 Counts) TFT LCD Dual Measurement	6 1/2 (1200000 Counts) TFT LCD Dual Measurement	6 1/2 (2399999 Counts) TFT LCD
Autoranging	√	√	√
DCV Basic Accuracy	0.0035 %	0.0075 %	0.01 %
Major Measurement Functions	AC & DC Voltage AC & DC Current (3 A / 10 A) 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/Thermocouple/Thermistor) Capacitance	AC & DC Voltage AC & DC Current (3A) 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/Thermocouple/Thermistor) Capacitance	DC Voltage
Advanced Functions	Math. (REL, dB, dBm, Compare, MA+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram); Rear Input	Math. (REL, dB, dBm, Compare, MA+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram)	Math. (REL, dB, dBm, Compare, MX+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram); Rear Input only
Interface (Std.)	USB device (USBTMC/USBCDC) RS-232C, LAN, Digital I/O USB host	USB device (USBTMC/USBCDC) RS-232C, LAN, Digital I/O USB host	USB device (USBTMC/USBCDC) RS-232C, Digital I/O USB host
Optional	GPIB	GPIB	GPIB
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BENCH-TOP DIGITAL MULTIMETER

MODEL / MAIN FUNCTION	GDM-9052	GDM-9042	GDM-9041	GDM-8245
Display	5 1/2 (239999 Counts) TFT LCD Dual Measurement	50000 Counts TFT LCD Dual Measurement	50000 Counts TFT LCD Dual Measurement	50000 Counts LED Dual Display
Autoranging	√	√	√	√
DCV Basic Accuracy	0.012%	0.02%	0.02%	0.03%
Major Measurement Functions	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 2- wires resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency & Period Capacitance	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency Capacitance
Advanced Measurement Functions	REL, dB, dBm, Hold, Math, Max./Min., Compare	REL, dB, dBm, Hold, Math, Max./Min., Compare	REL, dB, dBm, Hold, Math, Max./Min., Compare	REL, dBm, Hold, Max./Min., AC+Hz, AC+DC True RMS
Interface (Std.)	USB device (USBTMC/USBCDC) RS-232C, Digital I/O	USB device (USBTMC/USBCDC) USB host	USB device (USBTMC/USBCDC)	–
Optional	–	GPIB	–	–
Page	E15-16	E17-18	E17-18	E19

6 ½ Digit Dual Measurement Multimeter

GDM-906X Series

台灣精品
TAIWAN EXCELLENCE

CE | USB Device | USB Host | LAN | RS-232 | GPIB | Digital I/O | PC Software | LabVIEW Driver

GW Instek launches GDM-906X series 6 ½ digit dual measurement multimeter (2 models: GDM-9061 and GDM-9060), featuring high precision DC voltage accuracy, fast sampling rate, 12 measurement functions (DC voltage/current, AC voltage/current, 2-wire/4-wire resistance, frequency, period, diode, continuity beeper, temperature, capacitance), 6 mathematical functions (dB/dBm/Compare/ MX+B/Percent and 1/X) as well as a variety of communications interfaces (USB device/host, RS-232C, LAN, digital I/O and optional GPIB) to provide comprehensive measurement capabilities, higher speed and accuracy.

The series adopts a 4.3-inch TFT graphical display and a fast sampling rate (GDM-9061: 10 k/s, GDM-9060: 1k/s max.). In addition to the conventional digital display, displays can be collocated with bar meter, trend chart or histogram to make the panoramic view of the entire measurement process more completely and quickly presented. At the same time, the internal memory capacity (GDM-9061: 100 k, GDM-9060: 10 k) can simultaneously facilitate the trend plot or histogram measurement process and perform statistical calculations to simplify the complex trend analysis.

For user-friendly, the GDM-906X series incorporates some ingenious operational ideas, such as numeric soft keys for settings that require numerical input, upper/lower limits, LAN IP operational interfaces or messages, and multiple languages (English / Traditional Chinese/ Simplified Chinese/ Japanese / Korean) to shorten the operational and learning time of the meter.

For ATS measurement or remote control applications, the GDM-906X series provides GPIB (option can be installed at customer site) other than standard communications interfaces: USB, RS-232 and LAN. With respect to software supports, the GDM-906X series provides DMM-Viewer2 to assist users in observing or recording the data from the measurement process. In addition, LabVIEW driver is also provided to facilitate the program requirements of different system integrations.

FEATURES

* 6 ½ Digit Display: 1,200,000 Counts
* 4.3" TFT Graphic LCD
* DCV Basic Accuracy: 0.0035 %(GDM-9061)/ 0.0075 %(GDM-9060)
* 12 Measurement Functions: DCV, ACV, DCI, ACI, 2-wire and 4-wire Resistance, Frequency, Period, Diode, Continuity, Temperature and Capacitance
* Sampling Rate up to 10 k SPS (GDM-9061)
* Dual Measurements to Perform Two Selected Measurement Simultaneously
* Offer Graphical Capabilities Including Histogram, Bar Meter and Trend
* Temperature Measurement Support RTD, Thermistor as well as Thermocouple
* Standard Interface: USB Host/Device, RS-232C,LAN,Digital I/O
* Optional Interface: GPIB

SPECIFICATIONS

DC CHARACTERISTICS

Accuracy : ± (% of reading + % of range)

DC Voltage

Range	Resolution	Input Resistance	Accuracy(1Year)(TCAL±5°C)	
			GDM-9061	GDM-9060
100.0000 mV	0.1µV	10MΩ or >10GΩ	0.0050 + 0.0035	0.0090 + 0.0065
1.000000 V	1µV	10MΩ or >10GΩ	0.0048 + 0.0007	0.0080 + 0.0010
10.00000 V	10µV	10MΩ or >10GΩ	0.0035 + 0.0005	0.0075 + 0.0005
100.0000 V	0.1mV	10MΩ ±1%	0.0050 + 0.0006	0.0085 + 0.0006
1000.000 V	1mV	10MΩ ±1%	0.0050 + 0.0010	0.0085 + 0.0010

Resistance

Range	Resolution	Test Current	Accuracy(1Year)(TCAL±5°C)	
			GDM-9061	GDM-9060
100.0000 Ω	100µΩ	1mA	0.010 + 0.004	0.014 + 0.007
1.000000 kΩ	1mΩ	1mA	0.010 + 0.001	0.014 + 0.001
10.00000 kΩ	10mΩ	100µA	0.010 + 0.001	0.014 + 0.001
100.0000 kΩ	100mΩ	10µA	0.010 + 0.001	0.014 + 0.001
1.000000 MΩ	1Ω	5µA	0.010 + 0.001	0.014 + 0.001
10.00000 MΩ	10Ω	500nA	0.040 + 0.001	0.040 + 0.001
100.0000 MΩ	100Ω	500nA//10 MΩ	0.800 + 0.010	0.800 + 0.010

DC Current

Range	Resolution	Burden Volt.	Accuracy(1Year)(TCAL±5°C)	
			GDM-9061	GDM-9060
100.0000 µA	100pA	< 0.011 V	0.05 + 0.025	0.05 + 0.025
1.000000 mA	1nA	< 0.11 V	0.05 + 0.006	0.05 + 0.006
10.00000 mA	10nA	< 0.04 V	0.05 + 0.020	0.05 + 0.020
100.0000 mA	100nA	< 0.4 V	0.05 + 0.005	0.05 + 0.005
1.000000 A	1µA	< 0.7 V	0.10 + 0.010	0.10 + 0.010
3.000000 A	1µA	< 2.0 V	0.20 + 0.020	0.20 + 0.020
10.00000 A	10µA	< 0.5 V	0.15 + 0.010	----------

Continuity

Range	Resolution	Test Current	Accuracy(1Year)(TCAL±5°C)	
			GDM-9061	GDM-9060
1000.000 Ω	0.001 Ω	1 mA	0.010 + 0.030	0.014 + 0.030

Diode Test

Range	Resolution	Test Current	Accuracy(1Year)(TCAL±5°C)	
			GDM-9061	GDM-9060
5.000000 V	1µV	1 mA	0.010 + 0.030	0.014 + 0.030

DC Ratio

Accuracy Specification: ± (DC Input accuracy + DC Reference accuracy)

TEMPERATURE CHARACTERISTICS

RTD (Accuracy based on PT100)

Range	Resolution	Accuracy(1Year)(TCAL±5°C)
-200 °C ~ -100 °C	0.001 °C	0.09 °C
-100 °C ~ -20 °C	0.001 °C	0.08 °C
-20 °C ~ 20 °C	0.001 °C	0.06 °C
20 °C ~ 100 °C	0.001 °C	0.08 °C
100 °C ~ 300 °C	0.001 °C	0.12 °C
300 °C ~ 600 °C	0.001 °C	0.22 °C

Thermocouples (Accuracy based on ITS-90)

Type	Range	Resolution	Accuracy(1Year)(TCAL±5°C)
E	-200 °C ~ +1000 °C	0.002 °C	0.2 °C
J	-210 °C ~ +1200 °C	0.002 °C	0.2 °C
T	-200 °C ~ +400 °C	0.002 °C	0.3 °C
K	-200 °C ~ +1372 °C	0.002 °C	0.3 °C
N	-200 °C ~ +1300 °C	0.003 °C	0.4 °C
R	-50 °C ~ +1768 °C	0.01 °C	1 °C
S	-50 °C ~ +1768 °C	0.01 °C	1 °C
B	+350 °C ~ +1820 °C	0.01 °C	1 °C

Thermistor (2.2kΩ,5kΩ,10kΩ or User Type)

Range	Resolution	Accuracy(1Year)(TCAL±5°C)	
		GDM-9061	GDM-9060
-80 °C ~ 150 °C	0.001 °C	0.1 °C	0.15 °C

AC CHARACTERISTICS

Accuracy : ± (% of reading + % of range)

AC Voltage (True RMS)

Range	Resolution	Frequency	Accuracy(1Year)(TCAL±5°C)	
			GDM-9061	GDM-9060
100.0000 mV	0.1µV	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04
		5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04
		10Hz ~ 20kHz	0.06 + 0.04	0.09 + 0.04
		20kHz ~ 50kHz	0.12 + 0.05	0.15 + 0.05
		50kHz ~ 100kHz	0.60 + 0.08	0.63 + 0.08
		100kHz ~ 300kHz	4.00 + 0.50	4.00 + 0.50

GDM-906X Series

SPECIFICATIONS

	1.000000 V ~ 750.000 V	1μV ~ 1mV	3Hz ~ 5Hz	1.00 + 0.03	1.00 + 0.03
			5Hz ~ 10Hz	0.35 + 0.03	0.38 + 0.03
			10Hz ~ 20kHz	0.06 + 0.03	0.09 + 0.03
			20kHz ~ 50kHz	0.12 + 0.05	0.15 + 0.05
			50kHz ~ 100kHz	0.60 + 0.08	0.63 + 0.08
			100kHz ~ 300kHz	4.00 + 0.50	4.00 + 0.50
AC Current (True RMS)	**Range**	**Resolution**	**Frequency**	**Accuracy(1Year)(TCAL±5°C)**	
				GDM-9061	**GDM-9060**
	100.0000 μA 10.00000 mA	100pA 10nA	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04
			5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04
			10Hz ~ 5kHz	0.10 + 0.04	0.13 + 0.04
			5kHz ~ 10kHz	0.18 + 0.04	0.20 + 0.04
	1.000000 mA 100.0000 mA	1nA 100nA	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04
			5Hz ~ 10Hz	0.30 + 0.04	0.33 + 0.04
			10Hz ~ 5kHz	0.10 + 0.04	0.13 + 0.04
			5kHz ~ 10kHz	0.15 + 0.04	0.18 + 0.04
	1.000000 A	1μA	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04
			5Hz ~ 10Hz	0.30 + 0.04	0.33 + 0.04
			10Hz ~ 5kHz	0.10 + 0.04	0.13 + 0.04
			5kHz ~ 10kHz	0.15 + 0.04	0.18 + 0.04
	3.000000 A	1μA	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04
			5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04
			10Hz ~ 5kHz	0.23 + 0.04	0.23 + 0.04
			5kHz ~ 10kHz	0.23 + 0.04	0.23 + 0.04
	10.00000 A	10μA	3Hz ~ 5Hz	1.10 + 0.04	----------
			5Hz ~ 10Hz	0.35 + 0.04	----------
			10Hz ~ 5kHz	0.15 + 0.04	----------
			5kHz ~ 10kHz	0.35 + 0.04	----------

CAPACITANCE CHARACTERISTICS			Accuracy : ± (% of reading + % of range)
Capacitance	**Range**	**Resolution**	**Accuracy(1Year)(TCAL±5°C)**
	1.000 nF	0.001nF	2.00 + 2.00
	10.00 nF	0.01nF	2.00 + 1.00
	100.0 nF	0.1nF	2.00 + 0.40
	1.000 μF	0.001μF	2.00 + 0.40
	10.00 μF	0.01μF	2.00 + 0.40
	100.0 μF	0.1μF	2.00 + 0.40

FREQUENCY AND PERIOD CHARACTERISTICS			Accuracy : ± (% of reading)
Frequency/Period	**Range**	**Frequency**	**Accuracy(1Year)(TCAL±5°C)**
	100.0000mV ~ 750.000V	3Hz ~ 5Hz	0.1
		5Hz ~ 10Hz	0.05
		10Hz ~ 40Hz	0.03
		40Hz ~ 1MHz	0.006

GENERAL INFORMATION	
Display	4.3" Color TFT WQVGA (480 x 272)
Standard Interface	RS-232C, USB Host/Device, LAN, Digital I/O
Power Source	AC 100 V/120 V/220 V/240 V±10%
Power Line Frequency	50 Hz/60 Hz/400 Hz±10%
Power Consumption	Max. 25VA
Dimensions & Weight	267(W) x 107(H) x 302(D) mm, Approx. 3.5kg

ORDERING INFORMATION

GDM-9061 6 ½ (1200000 counts) Digit Dual Measurement Multimeter
GDM-9060 6 ½ (1200000 counts) Digit Dual Measurement Multimeter

ACCESSORIES :
Power cord x 1, USB cable GTL-246 x 1, Test lead GTL-217 x 1,

OPTION

GDM-90G1 GPIB card (*) GPIB can be installed at customer site

OPTIONAL ACCESSORIES

GTL-205A Temperature Probe Adapter with Thermal Coupling (K-type), approx. 1000 mm
GTL-234 RS-232C Cable, 9-pin female-female cable, approx. 2000 mm
GTL-248 GPIB Cable, approx. 2000 mm
GBM-01 4 Wire(kelvin clip) test lead, 90 V(max.), approx..1100 mm
GRA-422 Rack Mount Kit, 19" 2U size
GRA-454 Rack Mount Kit, 19" 2U size for one or two sets
GDM-TL1 Test Lead Set
GSC-014 Soft Carrying Case for DMM Accessory

GDM-9061 Rear Panel

GDM-9060 Rear Panel

GTL-217 Test Lead

GSC-014 Soft Carrying Case for DMM Accessory

GDM-TL1 Test Lead Set

GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m

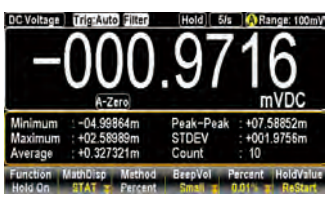
6 ½ Digit Dual Measurement Multimeter

A. IDEAL BENCHTOP PARTNER

	GDM-9061	GDM-9060
DCV Accuracy	0.0035%	0.0075%
Sampling Rate	10k/sec	1k/sec
Memory	100k	10k
Rear Input	Yes	No
Current Terminal (Front)	3A, 10A	3A
Current Terminal (Rear)	3A	–
Display	Number, Trend Chart, Bar Meter, Histogram	
Function	Voltage/Current : AC, DC Resistance : 2-Wire, 4-Wire Diode, Continuity, Temperature Frequency, Period, Capacitance	
Math.	REL, dB, dBm, Compare, MX+B, Percent, 1/X	
STAT.	Min/Max/Average/ P-P, STDEV	
Interface	RS-232C, USB Host/Device, LAN	

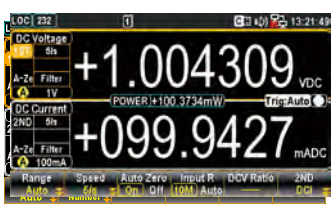
The GDM-906X series provides all fundamental measurement functions engineers require to design, develop, and test electronic circuits or products, including voltage, current, resistance, diode, and continuity beeper, frequency, temperature and capacitance. In addition, the series also features mathematical functions (dB, dBm, Compare, MX+B, 1/X and Percent), statistical functions (Min/Max/Average/P-P/STDEV), and a variety of standard communications interfaces. The series can meet specific measurement requirements and complex measurement applications whether for the benchtop operation or to be installed in the system.

B. DIVERSE DISPLAY MODE



In addition to the standard numeric display mode, it also provides a variety of graphical functions such as bar meter, trend chart and histogram, so that the measurement results are no longer just a series of numbers, but a swift insight into the panoramic measurement.

C. DUAL MEASUREMENT AND DUAL TREND LINE



The dual measurement function has always been a unique feature of GW Instek digital multimeters, allowing two measurement functions to be performed simultaneously and displaying the test results separately so as to greatly improve the test speed of the multi-functional measurement tasks.

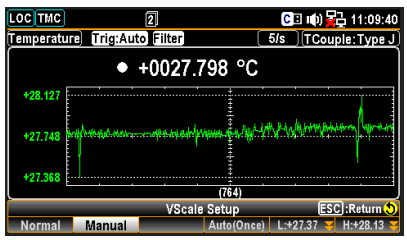
D. HIGH MEASUREMENT RESOLUTION AND HIGH SAMPLING RATE

GDM-9061 MEASUREMENT TYPE ~ DCV/DCI/2W/4W									
Refresh Rate Available									
6½ Resolution				5½ Resolution			4½ Resolution		
5/s	20/s	60/s	100/s	400/s	1.2k/s	2.4k/s	4.8k/s	7.2k/s	10k/s

GDM-9060 MEASUREMENT TYPE ~ DCV/DCI/2W/4W									
Refresh Rate Available									
6½ Resolution				5½ Resolution			4½ Resolution		
5/s	20/s	60/s	100/s	400/s	1k/s	–	–	–	–

The GDM-906X series provides high resolution of 0.1μV for voltage measurement, 100pA for current measurement, and 100μΩ for resistance measurement to meet the necessary requirements for precision measurement in specific applications. In addition, GDM-9061 is capable of achieving 10k readings per second with a display resolution of 4½ digits, while GDM-9060 achieves 1k measurement readings per second with a display resolution of 5½ digits; such a fast sampling rate is sufficient for current measurement needs.

E. TEMPERATURE MEASUREMENT

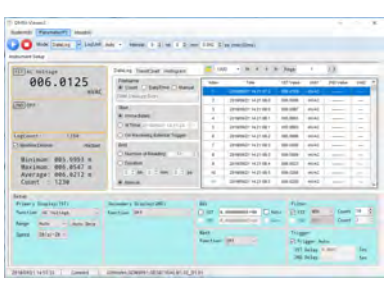


The GDM-906X series conducts temperature measurement and is ideal for a variety of temperature sensors, such as thermistors, RTDs, and thermocouples. The GDM-906X's temperature measurement supports commonly used thermocouple types (e.g. J / T / K..., etc.), using voltage measurement terminals as thermocouple inputs, and calculating temperature based on voltage fluctuations; the function can be used as a temperature recorder if collocated with internal memory capacity and the trend chart function.

F. DIVERSE COMMUNICATIONS INTERFACE AND FAST TRANSFER RATE

For system integration applications, the GDM-906X series is equipped with RS232, USB and LAN as standard communications interfaces, and GPIB is an option (can be installed by customer) to meet the requirements of different system integrations. Data transfer rate is up to 10k readings per second (GDM-9061) or 1k readings per second (GDM-9060) via USB/LAN/GPIB interfaces.

G. CONVENIENT PC SOFTWARE



The PC software DMM-Viewer2 is suitable for any computer communications interfaces (RS232C/LAN/USB/ GPIB) provided by the GDM-906X series for long-term data acquisition. The software not only allows users to control the settings of the GDM-906X series but also provides the observation mode or the recording mode for the captured data. For the observation mode, the measurement result is directly presented as the result of the trend plot or the histogram and the result is not saved. For the recording mode, the measurement result is directly saved into the log file, but only the current display is shown in the process. The measured data and trend plot can be viewed after the recording mode is stopped. In addition, the GDM-906X series also provides LabVIEW driver to meet the software application requirements of system integration.

6 ½ Digit 2 kV DC Voltmeter

GVM-9102

NEW

CE | USB Host | USB Device | LAN | Digital IO | GPIB | RS-232 | LabVIEW Driver | PC Software

FEATURES

* 6 1/2 Digit Display : 2,399,999 Counts Max.
* 4.3 TFT Graphic LCD
* DC Voltage Measurement up to 2400 V
* DCV Basic Accuracy : 0.01 %
* The Fastest Sampling Rate : 10 k Readings/Sec
* USB Storage Function Available
* Graphic Display Capability, Providing Histogram, Bar Meter and Trend Chart
* Standard Interfaces : Digital I/O, RS-232C, USB Host/Device, LAN
* Option Interface : GPIB

GW Instek launches GVM-9102 6 ½ digit 2 kV Voltmeter, featuring high precision DC voltage accuracy, fast sampling rate, 6 mathematical functions (dB/dBm/Compare/ MX+B/Percent and 1/X) as well as a variety of communications interfaces (USB device/host, RS-232C, LAN, digital I/O and optional GPIB) to provide comprehensive measurement capabilities, higher speed and accuracy , making it particularly suitable for output measurement of energy storage devices, photovoltaic devices or DC power supply devices.

The GVM-9102 adopts a 4.3-inch TFT graphical display and a fast sampling rate 10 k /s. In addition to the conventional digital display, displays can be collocated with bar meter, trend chart or histogram to make the panoramic view of the entire measurement process more completely and quickly presented. At the same time, the internal memory capacity 100 k can simultaneously facilitate the trend chart or histogram measurement process and perform statistical calculations to simplify the complex trend analysis.

For user-friendly, the GVM-9102 incorporates some ingenious operational ideas, such as numeric soft keys for settings that require numerical input, upper/lower limits, LAN IP operational interfaces or messages, and multiple languages (English / Traditional Chinese/ Simplified Chinese/ Japanese / Korean) to shorten the operational and learning time of the meter.

For ATS measurement or remote control applications, the GVM-9102 provides GPIB (option can be installed at customer site) other than standard communications interfaces: USB, RS-232 and LAN. With respect to software supports, the GVM-9102 provides LabVIEW driver to facilitate the program requirements of different system integrations.

Model	GVM-9102
DCV Accuracy	0.01%
Sampling Rate	10 k/sec
Memory	100 k
Display	Number, Trend Chart, Bar Meter, Histogram
Math.	REL, dB, dBm, Compare, MX+B, Percent, 1/X
STAT.	Min/Max/Average/ P-P, STDEV
Interface	RS-232C, USB Host/Device, LAN, Digital I/O and GPIB option

ORDERING INFORMATION

GVM-9102 6 ½ Digit 2 kV DC Voltmeter

ACCESSORIES :
Safety Instructions x 1, Power cord x 1, USB cable GTL-246 x 1,
Test lead GHT-116R x 1, GHT-116B x 1

OPTION *

GDM-90G1 GPIB card (*) GPIB can be installed at customer site

OPTIONAL ACCESSORIES

GTL-234 RS-232C Cable, 9-pin female-female cable, approx. 2000 mm
GTL-248 GPIB Cable, approx. 2000 mm
GRA-422 Rack Mount Kit (19", 2U)
GRA-454 Rack Mount kit (19", 2U) for one or two sets

GRA-422 Rack Mount Kit

GRA-454 Rack Mount Kit

Rear Panel

GVM-9102

SPECIFICATION

DC CHARACTERISTICS *1

DC Voltage

Range *2	1 Year TCAL ± 5 °C	Temperature Coefficient / °C
20.00000 V	0.0100 + 0.0030	0.0010 + 0.0005
200.0000 V	0.0100 + 0.0010	0.0010 + 0.0005
2000.000 V *3	0.0100 + 0.0010	0.0010 + 0.0005

Accuracy Specifications: ± (% of reading + % of range)

MEASURING CHARACTERISTICS

DC Voltage		Range	Input Resistance
		20 V	30 MΩ ± 1 %
		200 V	
		2000 V	
	Input Bias	30 pA (Typ, 25 °C)	
	Input Protection	2400 V on all ranges	

Measurement Method: Sigma-delta A/D Converter

		Speed	Digits
Reading Rate (Readings/sec)	**DCV**	5 /s, 20 /s, 60 /s, 100 /s	6 ½
		400 /s, 1.2 k /s, 2.4 k /s	5 ½
		4.8 k /s, 7.5 k /s, 10 k /s	4 ¼

GENERAL

Display	4.3" color TFT WQVGA (480 x 272) with LED backlight Supports basic number, bar meter, trend chart and histogram views
Interface	USB Host/Device, RS-232C, LAN, Digital I/O and GPIB (optional)
Power Source	Power Supply : AC 100 V / 120 V / 220 V / 240 V ± 10 % Power Line Frequency : 50 Hz / 60 Hz / 400 Hz ± 10 % Power Consumption : Max. 25 VA
Dimensions & Weight	Rack Dimensions : 220 mm (W) x 88 mm (H) x 276.6 mm (D) (without bumpers) Bench Dimensions : 266.9 mm (W) x 107 mm (H) x 301.8 mm (D) (with bumpers) Weight : 3.30 kg (7.3 lbs)

Note : *1. DC Specification: In addition to the availability that requires warm-up of 60 minutes, it must be set in 5/s speed rate, A-Zero on.
*2. The entire range of measurement will pass the set range by 20 %.
*3. Specifications exceeding 1,000 V are linearly scaled based on 0 V to 1,000 V.
For the 2,000 V range, an additional coefficient of 0.02 ppm/V is required.

5 ½ Digit Dual Display Digital Multimeter

GDM-9052

NEW

CE | RS-232 | USB Device | Digital I/O | PC Software | LabVIEW Driver

GW Instek presents the new style 5 1/2 Digit Dual Measurement Multimeter— GDM-9052 to replace GDM-8351 and GDM-8352 (China only) of the same category. GDM-9052 features LCD display, maximum 239,999 counts, 0.012 % basic DC voltage accuracy, A.I. measurement and USB/RS232C connectors to provide users with measurement precision, lucid data observation, and the convenient connection with the personal computer.

In addition to the fundamental measurement items such as AC/DC voltage, AC/DC current, AC+DC voltage/current, 2Wire/4Wire resistance, frequency, temperature measurement, continuity beeper and diode test, GDM-9052 is equipped with the capacitance measurement function. Furthermore, the GDM-9052 also provides many math functions, including maximum/minimum values, dB, dBm, compare, reading hold, algorithms (MX+B, 1/X, %) etc. to meet the measurement requirements for manufacturing process tests, educational experiments and testing facilities.

For the external control, the pin of digital I/O interface not only provides the signal output frequently used by the compare function, but also allows users to define signal output for each pin. Under the self-definition mode, users can apply the I/O as a simple digital hardware. The external control requirement can be achieved by signals from each pin so as to help users reduce trouble of making hardware.

With respect to remote control and retrieving data, GDM-9052, taking consideration of users' habitual practice and universal system interface, provides standard RS-232C and USB interface to edit control programs and read measurement results. It is worth noting that for utilizing the USB interface, users have options of selecting either USBCDC or USBTMC mode. While USBTMC is selected, users are able to control instrument with the USB interface exactly the same as controlling instrument with the GPIB interface; therefore, the relatively expensive GPIB connection cable is no longer required.

FEATURES

* 5 ½ Digit Display: 239,999 Counts Max.
* 4.3 TFT Graphic LCD & DCV Basic Accuracy: 0.012 %
* A. I. Measurement Offers Automatic Identification and Measurement for Voltage, Resistance, Diode and Continuity Tests Without the Need for Manual Selection
* 12 Different Measurement Functions: AC/DC Voltage, AC/DC Current, 2-wire/4-wire Resistance, Frequency, Period, Diode, Continuity, Capacitance and Temperature
* True RMS (AC, AC+DC) Measurements
* Dual Measurement Function to Providing Two Selected Measurement Simultaneously
* Many Math Functions: Max./Min., REL/REL#, Compare, Hold, dB, dBm, MX+B, %, 1/X
* Digital I/O Provides Dual Mode (Standard Compare and User Definition Modes)
* Standard Interfaces: RS-232C and USB Device (Support USBCDC and USBTMC Modes)

GTL-205A Temperature probe adaptor with thermocouple (K type)

GTL-246 USB Cable

GTL-207A Test Lead

SPECIFICATIONS (*1)

Range (*2)	Resolution	Input Resistance etc.	Accuracy (*3) 1 Year (23 °C ± 5 °C)
DC Voltage			
200.000 mV	1 µV	10 MΩ or > 10 GΩ	0.012 + 8
2.00000 V	10 µV	10 MΩ or > 10 GΩ	0.012 + 5
20.0000 V	100 µV	11.1 MΩ	0.012 + 5
200.000 V	1 mV	10.1 MΩ	0.012 + 5
1000.00 V	10 mV	10 MΩ	0.012 + 5
Resistance			
200.000 Ω	1 mΩ	1 mA	0.05 + 8
2.00000 kΩ	10 mΩ	1 mA	0.05 + 5
20.0000 kΩ	100 mΩ	100 µA	0.05 + 5
200.000 kΩ	1 Ω	10 µA	0.05 + 5
2.00000 MΩ	10 Ω	1 µA	0.05 + 5
10.0000 MΩ	100 Ω	0.5 µA	0.30 + 5
100.000 MΩ	1 kΩ	0.5 µA // 10 MΩ	3.00 + 8
DC Current			
20.0000 mA	100 nA	1 Ω	0.05 + 15
200.000 mA	1 µA	1 Ω	0.05 + 5
2.00000 A	10 µA	0.1 Ω	0.20 + 5
10.0000 A	100 µA	0.01 Ω	0.20 + 5
Continuity			
2000.00 Ω	10 mΩ	1 mA	0.05 + 5
Diode Test			
6.0000 V	100 µV	1 mA@ 6 V	0.05 + 15
Capacitance			
10.00 nF	0.01 nF	10 µA	2.0 + 10
100.0 nF	0.1 nF	10 µA	2.0 + 4
1.000 µF	0.001 µF	100 µA	2.0 + 4
10.00 µF	0.01 µF	1 mA	2.0 + 4
100.0 µF	0.1 µF	1 mA	2.0 + 4
True RMS AC (or AC+DC – AC Coupled) Voltage			
200.000 mV	1 µV	20 Hz to 45 Hz	1.0 + 100
		45 Hz to 10 kHz	0.3 + 100
		10 kHz to 30 kHz	1.5 + 300
		30 kHz to 100 kHz	5.0 + 300
2.00000 V	10 µV	20 Hz to 45 Hz	1.0 + 100
		45 Hz to 10 kHz	0.2 + 100
		10 kHz to 30 kHz	1.0 + 100
		30 kHz to 100 kHz	3.0 + 200
20.0000 V	100 µV	20 Hz to 45 Hz	1.0 + 100
		45 Hz to 10 kHz	0.2 + 100
		10 kHz to 30 kHz	1.0 + 100
		30 kHz to 100 kHz	3.0 + 200
200.000 V	1 mV	20 Hz to 45 Hz	1.0 + 100
		45 Hz to 10 kHz	0.2 + 100
		10 kHz to 30 kHz	1.0 + 100
		30 kHz to 100 kHz	3.0 + 200
750.00 V	10 mV	20 Hz to 45 Hz	1.0 + 100
		45 Hz to 10 kHz	0.2 + 100
		10 kHz to 30 kHz	1.0 + 100
		30 kHz to 100 kHz	3.0 + 200

GDM-9052

SPECIFICATIONS (*1)

Range (*2)	Resolution	Input Resistance etc.	Accuracy (*3) 1 Year (23 °C ± 5 °C)
True RMS AC (or AC+DC – AC Coupled) Current			
20.0000 mA	100 nA	20 Hz to 45 Hz	1.5 + 100
		45 Hz to 2 kHz	0.5 + 100
		2 kHz to 10 kHz	2.0 + 200
200.000 mA	1 µA	20 Hz to 45 Hz	1.5 + 100
		45 Hz to 2 kHz	0.5 + 100
		2 kHz to 10 kHz	2.0 + 200
2.00000 A	10 µA	20 Hz to 45 Hz	1.5 + 100
		45 Hz to 2 kHz	0.5 + 100
		2 kHz to 10 kHz	2.0 + 200
10.0000 A	100 µA	20 Hz to 45 Hz	1.5 + 100
		45 Hz to 2 kHz	1.0 + 100
		2 kHz to 10 kHz	-----
Frequency			
(Voltage) 10 Hz to 1 MHz	------	------	0.01 + 3
(Current) 20 Hz to 10 kHz			
Temperature (Thermocouple)			
-200 °C to 0 °C	0.01 °C	J / T / K	0.6 °C (typical)
0 °C to +300 °C			0.3 °C (typical)
Display			
4.3" TFT Graphic LCD			
Interface			
RS-232C, USB device (USBCDC & USBTMC), Digital I/O			
Power Source			
AC 100 V / 120 V / 220 V / 240 V ± 10 %, 50 Hz to 60 Hz ; Power Consumption Max. 30 VA			
Dimensions & Weight			
268 (W) mm x 107 (H) mm x 302 (D) mm ; Approx. 3.2 kg			

Note: *1. All specifications are applicable to the single (1st) display only and warmed up for at least 30 minutes and operated in the slow rate.
*2. 20 % overrange on all ranges, except 750 V / 10 A range
*3. Accuracy: ± (% of Reading + Digits)

ORDERING INFORMATION

GDM-9052 5 ½ Digit Dual Measurement Multimeter

ACCESSORIES :
Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-207A x 1

OPTIONAL ACCESSORIES

GTL-108A	4Wire Test Lead (Kelvin Clip), Approx. 1100 mm
GTL-205A	Temperature probe adaptor with thermocouple (K-type), Approx. 1000 mm
GTL-232	RS-232 Cable, 9 pin F-F type, null modem for computer, Approx. 2000 mm
GTL-246	USB Cable, A-B type, Approx. 1200 mm
GDM-TL1	Test Lead Set for All DMM
GSC-014	Soft Carrying Case for DMM Accessory
GRA-422	Rack Mount Kit (19" 2U)
GRA-454	Rack Mount Kit (19" 2U) for one set or two sets

Rear Panel

GRA-422 Rack Mount Kit

GRA-454 Rack Mount Kit

GDM-TL1 Test Lead Set

GTL-108A 4W Type Test Lead

GTL-232 RS-232C Cable

GSC-014 Soft Carrying Case for DMM Accessory

50000 Counts Dual Measurement Multimeter

GDM-9041/9042

NEW

CE | USB Host | USB Device | GPIB | LabVIEW Driver | PC Software

FEATURES

* 50,000 Counts
* 4.3 TFT Graphic LCD
* DCV Basic Accuracy: 0.02%
* A. I. Measurement Offers Automatic Identification and Measurement for Voltage, Resistance, Diode and Continuity
* Tests Without the Need for Manual Selection 11 Measurement Functions: DCV, ACV, DCI, ACI, 2-wire Resistance, Frequency, Period, Diode, Continuity, Capacitance and Temperature
* True RMS (AC, AC+DC) Measurements
* Dual Measurement Function to Providing Two Selected Measurement Simultaneously
* Max./Min., REL, MX+B, 1/X, Ref %, Compare, Hold, dB, dBm
* Standard Interfaces: USB Device (support USBCDC & USBTMC)
* Temperature Measurement Function (GDM-9042 only)
* USB Storage for Data Collection (GDM-9042 only)
* Optional Interface: GPIB (factory install for GDM-9042 only)

GW INSTEK rolls out the new Dual Measurement Multimeter -- the GDM-904x series, which has two models -GDM-9041 and GDM-9042, to replace the existing GDM-834x series. Its exceptional features include 50,000 counts, LCD display, 0.02 % basic DC voltage accuracy, Automatic Identification (A.I.) measurement and a USB protocol connector to provide users with measurement precision, lucid data observation, smooth measurement experience and the convenience to connect with the personal computer.

The GDM-904x series not only supports the fundamental measurement items provided by general multimeters, but also equips with capacitance and temperature measurement functions. At the same time, the GDM-904x series' Automatic Identification (A.I.) measurement can automatically identify measurement signals and switch measurement items before performing measurements, without the need for users to switch manually. Furthermore, the GDM-904x series also provides many math functions to meet the measurement requirements for manufacturing process tests, educational experiments and testing facilities.

With respect to storing and retrieving data, the GDM-904x series has two methods to offer: first, the USB flash drive storage function --- operating alone without connecting with a computer; second, USB interface (support USBCDC and USBTMC) and optional GPIB interface (must be installed in factory) for automatic measurement system users to conveniently save and retrieve data.

GDM-904X Series

ORDERING INFORMATION

GDM-9042 with GPIB	50000 counts Dual Measurement Multimeter with USB Host/Device and opt. GPIB
GDM-9042	50000 counts Dual Measurement Multimeter with USB Host/Device
GDM-9041	50000 counts Dual Measurement Multimeter with USB Device

ACCESSORIES :
Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-207A x 1

OPTION *

GDM-90G2	GPIB card

Note: Optional GPIB interface is only for GDM-9042 and it must be installed in factory.

OPTIONAL ACCESSORIES

GTL-205A	Temperature probe adaptor with thermocouple (K-type), Approx. 1000 mm
GTL-246	USB Cable, A-B type, Approx. 1200 mm
GTL-248	GPIB Cable, Approx. 2000 mm
GDM-TL1	Test Lead Set for All DMM
GSC-014	Soft Carrying Case for DMM Accessory
GRA-422	Rack Mount Kit (19" 2U)
GRA-454	Rack Mount Kit (19" 2U) for one set or two sets

Rear Panel

GRA-422 Rack Mount Kit

GRA-454 Rack Mount Kit

GTL-205A

GDM-TL1

GSC-014

SPECIFICATIONS

Function	Range (*2)	Resolution	Input Resistance or etc.	Accuracy(*1) 1 Year 23 °C ± 5 °C
DC Voltage	500.00 mV	10 µV	10 MΩ or > 10 GΩ	0.02 + 4
	5.0000 V	100 µV	10 MΩ or > 10 GΩ	0.02 + 4
	50.000 V	1 mV	11.1 MΩ	0.02 + 4
	500.00 V	10 mV	10.1 MΩ	0.02 + 4
	1000.0 V	100 mV	10 MΩ	0.02 + 4
Resistance	500.00 Ω	10 mΩ	1 mA	0.10 + 5 (*3)
	5.0000 kΩ	100 mΩ	1 mA	0.10 + 3 (*3)
	50.000 kΩ	1 Ω	100 µA	0.10 + 3
	500.00 kΩ	10 Ω	10 µA	0.10 + 3
	5.0000 MΩ	100 Ω	1 µA	0.10 + 3
	100.00 MΩ	10 kΩ	500 nA // 10 MΩ	≤ 50 MΩ: 0.30 + 3 > 50 MΩ: 1.75 + 3
DC Current	500.00 µA	10 nA	0.06 V max.	0.05 + 5
	5.0000 mA	100 nA	0.6 V max.	0.05 + 4
	50.000 mA	1 µA	0.14 V max.	0.05 + 4
	500.00 m A	10 µA	1.4 V max.	0.10 + 4
	5.0000 A	100 µA	0.5 V max.	0.25 + 5
	10.000 A	1 mA	0.8 V max.	0.25 + 5
Continuity	5000.0 Ω	100 mΩ	1 mA	0.10 + 5
Diode Test	5.0000 V	100 µV	1 mA	0.05 + 5
Capacitance	5.000 nF: 0.5 nF to 1 nF	0.001 nF	10 µA	2.00 + 20
	5.000 nF: 1 nF to 5 nF	0.001 nF	10 µA	2.00 + 10
	50.00 nF: 5 nF to 10 nF	0.01 nF	10 µA	2.00 + 30
	50.00 nF: 10 nF to 50 nF	0.01 nF	10 µA	2.00 + 10
	500.0 nF	0.1 nF	100 µA	2.00 + 4
	5.000 µF	1 nF	0.5 mA	2.00 + 4
	50.00 µF	10 nF	1 mA	2.00 + 4
True RMS Volatge AC (or AC+DC) (*4/*5/*6)	500.00 mV	10 µV	30 Hz to 50 Hz	1.00 + 40
			50 Hz to 10 kHz	0.50 + 40
			10 kHz to 30 kHz	2.00 + 60
			30 kHz to 100 kHz	3.00 + 120
	5.0000 V	100 µV	30 Hz to 50 Hz	1.00 + 20
			50 Hz to 10 kHz	0.35 + 15
			10 kHz to 30 kHz	1.00 + 20
			30 kHz to 100 kHz	3.00 + 50
	50.000 V	1 mV	30 Hz to 50 Hz	1.00 + 20
			50 Hz to 10 kHz	0.35 + 15
			10 kHz to 30 kHz	1.00 + 20
			30 kHz to 100 kHz	3.00 + 50
	500.00 V	10 mV	30 Hz to 50 Hz	------
			50 Hz to 10 kHz	0.50 + 15
			10 kHz to 30 kHz	1.00 + 20
			30 kHz to 100 kHz	3.00 + 50
	750.0 V	100 mV	30 Hz to 50 Hz	------
			50 Hz to 10 kHz	0.50 + 15
			10 kHz to 30 kHz	------
			30 kHz to 100 kHz	------
True RMS Current AC (or AC+DC) (*4/*5/*6)	500.00 µA	10 nA	30 Hz to 50 Hz	1.50 + 50
			50 Hz to 2 kHz	0.50 + 40
			2 kHz to 5 kHz	1.50 + 50
			5 kHz to 20 kHz	3.00 + 75
	5.0000 mA	100 nA	30 Hz to 50 Hz	1.50 + 40
			50 Hz to 2 kHz	0.50 + 20
			2 kHz to 5 kHz	1.50 + 40
			5 kHz to 20 kHz	3.00 + 60
	50.000 mA	1 µA	30 Hz to 50 Hz	1.50 + 40
			50 Hz to 2 kHz	0.50 + 20
			2 kHz to 5 kHz	1.50 + 40
			5 kHz to 20 kHz	3.00 + 60
	500.00 mA	10 µA	30 Hz to 50 Hz	1.50 + 40
			50 Hz to 2 kHz	0.50 + 20
			2 kHz to 5 kHz	1.50 + 40
			5 kHz to 20 kHz	3.00 + 60
	5.0000 A	100 µA	30 Hz to 50 Hz	2.00 + 40
			50 Hz to 2 kHz	0.50 + 30
	10.000 A	1 mA	30Hz to 50 Hz	2.00 + 40
			50 Hz to 2 kHz	0.50 + 30
Frequency	10 Hz to 500 Hz	------	------	0.01 + 5
	500 Hz to 500 kHz			0.01 + 3
	500 kHz to 1 MHz			0.01 + 5
Temperature (*7)(Thermocouple)	-200 °C to +300 °C	0.1 °C	J / T / K	2 °C (typical)
Display	4.3" TFT Graphic LCD			
Interface	USB Device, USB Host (for GDM-9042 only), GPIB (optional for GDM-9042 only)			
Power Source	AC 100 V / 120 V / 220 V / 240 V ± 10%, 50 Hz / 60 Hz; Power consumption: 30 VA max.			
Dimensions & Weight	268(W) mm x 107(H) mm x 302(D) mm ; Approx. 3.2 kg without option			

Note: 1. Accuracy = +/- (% of reading + digits)
2. 2% overrange on all ranges, except 10 A is 20% overrange
3. REL function is on
4. The AC+DC is in AC coupled
5. The accuracy of AC+DC is equal to AC with 10 more digits added
6. AC characteristics are for sinewave input > 5% of range
7. Function is available for GDM-9042 only, and specifications do not include probe accuracy

50000 Counts Dual Display Digital Multimeter

GDM-8245 is an economical bench-top DMM equipped with a rich set of features. GDM-8245 has large 7 segment LED dual display features up to 50,000 counts and the ability to show two measurements at extensive list of measurement items - DC Voltage/ Current, AC Voltage/Current with true RMS, Resistance, Capacitance, Frequency, Continuity (with beeper), Diode Test, and dBm. Additional measurement functions, such as Max/Min, Hold and Relative value. With great range, good accuracy and ability to accept up to 20 A of current, GDM-8245 is the perfect general purpose DMM.

GDM-8245 (50000 Counts)

CE

FEATURES

* 50000 Counts Display
* Multi-Function ACV, DCV, ACA, DCA, R, C, Hz, Continuity Beeper, Diode Test, Max/Min, REL, Hold, dBm
* Dual Display Indicate ACV and Hz, DCV(ACV) and dBm
* Manual or Auto Ranging
* 0.03 % DCV Accuracy
* ACV Measuring Frequency Up to 50 kHz
* AC True RMS or AC + DC True RMS

Rear Panel

GTL-117 Test Lead

Approx. 1.1 m

SPECIFICATIONS	
DC VOLTAGE	
Range	500mV, 5V, 50V, 500V, 1000V 5 ranges
Accuracy	± (0.03% rdg + 4 digits)
Input Impedance	10MΩ
AC VOLTAGE TRUE RMS (AC OR AC + DC TRUE RMS)	
Range	500mV, 5V, 50V, 500V, 1000V 5 ranges
Accuracy	500mV ~ 50V 3 ranges : 20Hz ~ 45Hz : ±(1% rdg + 15 digits) 45Hz ~ 2kHz ±(0.5% rdg + 15 digits) 2kH~10kHz ±(1% rdg + 15 digits) 10kHz ~ 20kHz ±(2% rdg + 30 digits) 20kHz ~ 50kHz ±(5% rdg + 30digits) 500V,1000V range : 45Hz ~ 1kHz ±(0.5% rdg + 15 digits)
Input Impedance	10MΩ
DC CURRENT	
Range	500µA, 5mA, 50mA, 500mA, 2A, 20A 6 ranges
Accuracy	500µA~500mA 4ranges:±(0.2% rdg+2 digits);2A~20A 2ranges:±(0.3% rdg+2digits)
AC CURRENT TRUE RMS (AC OR AC + DC TRUE RMS)	
Range	500µA, 5mA, 50mA, 500mA, 2A, 20A 6 ranges
Accuracy	500µA ~ 20A 6 ranges 20Hz ~ 45Hz : ±(1% rdg + 15 digits) ; 45Hz ~ 2kHz : ±(0.5%rdg + 15 digits) 500µA ~ 50mA 3 ranges 2kHz ~ 10kHz : ±(1% rdg + 15 digits) ; 10kHz ~ 20kHz : ±(2% rdg + 15 digits)
RESISTANCE	
Range	500Ω,5kΩ,50kΩ,500kΩ,5MΩ,20MΩ 6 ranges
Accuracy	500Ω : ±(0.1% rdg + 4 digits); 5kΩ ~ 500kΩ 3 ranges : ±(0.1% rdg + 2 digits) 5MΩ : ±(0.2% rdg + 2 digits); 20MΩ : ±(0.3% rdg + 2 digits)
DIODE TEST	
	The one range can check the forward voltage of diode. Maximum forward voltage 1.5V open voltage 2.8V
CAPACITANCE	
Range	5nF, 50nF, 500nF, 5µF, 50µF 5 ranges
Accuracy	± (2% rdg + 4 digits)
FREQUENCY	
Input Level (Sine Wave)	mV range : 10Hz ~ 50kHz : >120mV ; 50k ~ 150kHz : >200mV 5V ~ 50V range : 10Hz ~ 200kHz >1.2V ; 500V range : 20Hz ~ 1kHz >12V
FUNCTIONS	
	Auto Manual/Range, Max, Min, dBm, REL, Hold
CONTINUITY BEEPER	
	Built in buzzer sounds when conductance is less than 5Ω
DISPLAY	
Dual Display 0.4" and 0.5", 7 segment LED display	
POWER SOURCE	
AC 100V/120V/230V±10%, 50/60Hz ; Power Consumption : Max. 8VA	
DIMENSIONS & WEIGHT	
251(W) x 91(H) x 291(D) mm, Approx. 2.6kg	

ORDERING INFORMATION

GDM-8245 50,000 Counts Dual Display Digital Multimeter

ACCESSORIES :
Power cord x 1, Test lead GTL-117 x 1

OPTIONAL ACCESSORIES

GDM-TL1 Test Lead Set
GSC-014 Soft Carrying Case for DMM Accessory

HAND-HELD DIGITAL MULTIMETER

MODEL	GDM-541	GDM-533	GDM-532	GDM-531
Max. Display	22000	6000	9999	6000
Auto Ranging	✓	✓	✓	
Analog Bar	✓	✓		
True RMS	✓	✓	✓	
Display Backlight	✓	✓	✓	✓
Auto Power off	✓	✓	✓	✓
Curr. Range Protection	PTS & Fuse	PTS & Fuse	Fuse	Fuse
DC Voltage	1000 V	1000 V	999.9 V	600 V
AC Voltage	1000 V	1000 V	999.9 V	600 V
DC Current	20 A	20 A	9.99 A	10 A
AC Current	20 A	20 A	9.99 A	
Resistance	220 MΩ	60 MΩ	99.99 MΩ	60 MΩ
Capacitance	220 mF	60 mF	9.999 mF	9.999 mF
Frequency	220 MHz	10 MHz	9.9 MHz	
Diode	✓	✓	✓	✓
Continuity	✓	✓	✓	✓
Temperature		✓	✓	
Duty Cycle (%)	✓	✓	✓	
Transistor (hFE)	✓			
NCV Function	✓	✓	✓	✓
REL	✓	✓	✓	
Data Hold	✓	✓	✓	✓
Peak Hold	✓	✓		
MAX MIN	✓	✓		
LoZ ACV		✓		
LPF ACV	✓			
Audible / Visual Alarm	✓	✓	✓	✓
AC+DC Measurement	✓			
Interface	USB	USB		
Safety Rating	CAT III 1000 V CAT IV 600 V	CAT III 1000 V CAT IV 600 V	CAT II 1000 V CAT III 600 V	CAT III 600 V
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Hand-Held Digital Multimeter

GDM-541

CE USB PC Software

GDM-533

CE USB PC Software

GDM-532

CE

The GDM-500 Series Hand Held DMM are a compact, high precision, battery operated multimeter series designed to meet of service engineers. The GDM-500 Series design is driven by mobile-oriented features: automatic power off to preserve battery life, a large backlight display for crisp viewing, a rotary selector and push buttons to ease operation, and then NCV (Non-Contact Voltage) function for outdoor use.

The basic functions match the depth of bench-top multimeters: fuse-protected current input, true RMS for accurate AC measurements, Audible/Visual Alarm when Overload, Auto ranging, Duty cycle and Relative mode. The compact, reliable and economical devices are ideal for any engineer.

GDM-541 FEATURES

* 22000 Counts Auto/Manual Ranging
* 46 Segments Analogue Bar
* ACV Measurement up to 1000 V
* AC+DC Voltage Measurement
* Current Measurement up to 20 A
* Transistor (hFE) Measurement
* Audible/Visual Alarm when Overload
* True RMS/USB Interface

GDM-533 FEATURES

* 6000 Counts Auto/Manual Ranging
* 31 Segments Analogue Bar
* LoZ ACV Measurement
* ACV Measurement up to 1000 V
* Current Measurement up to 20 A
* Temperature Measurement
* Audible/Visual Alarm when Overload
* True RMS/USB Interface

GDM-532 FEATURES

* 9999 Counts Auto/Manual Ranging
* Display Backlight/Auto Power Off
* Continuity Beeper/Diode Test
* Temperature Measurement
* Non-Contact Voltage (NCV) Detection
* Data Hold and Relative Mode

SPECIFICATIONS

DC VOLTAGE	
Range	220.00mV, 2.2000V, 22.000V, 220.00V, 1000V(GDM-541) 60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V(GDM-533) 9.999mV, 99.99mV, 999.9mV, 9.999V, 99.99V, 999.9V(GDM-532) 600.0mV, 6000mV, 60.00V, 600.0V(GDM-531)
Best Accuracy	±(0.05%rdg + 5 digits) for GDM-541; ±(0.5%rdg + 3 digits) for GDM-533 ±(0.5%rdg + 3 digits) for GDM-532; ±(0.7%rdg + 3 digit) for GDM-531
Input Impedance	10 MΩ (At mV range : 1GΩ for GDM-541/533; 3GΩ for GDM-532)
AC VOLTAGE	
Range	220.00mV, 2.2000V, 22.000V, 220.00V, 1000.0V(GDM-541) 60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V(GDM-533) 9.999mV, 99.99mV, 999.9mV, 9.999V, 99.99V, 999.9V(GDM-532) 600.0V(GDM-531)
Best Accuracy	±(0.8%rdg + 10 digits) for GDM-541; ±(1.0%rdg + 3 digits) for GDM-533 ±(0.8%rdg + 3 digits) for GDM-532; ±(1.2%rdg + 3 digits) for GDM-531
Frequency Response	40Hz-10kHz for GDM-541; 40Hz-1kHz for GDM-533 45Hz-400Hz for GDM-532; 40Hz-400Hz for GDM-531
Input Impedance	10 MΩ
DC CURRENT	
Range	220.00μA, 2200.0μA, 22.000mA, 220.00mA, 20.000A(GDM-541) 600.0μA, 6000μA, 60.00mA, 600.0mA, 6.000A, 20.00A(GDM-533) 999.9μA, 999.9mA, 9.999A(GDM-532) 600.0μA, 60.00mA, 600.0mA, 10.00A(GDM-531)
Best Accuracy	±(0.5%rdg + 10 digits) for GDM-541; ±(1.0%rdg + 2 digits) for GDM-533 ±(0.8%rdg + 3 digits) for GDM-532; ±(1.0%rdg + 3 digits) for GDM-531
AC CURRENT	
Range	220.00μA, 2200.0μA, 22.000mA, 220.00mA, 20.000A(GDM-541) 600.0μA, 6000μA, 60.00mA, 600.0mA, 6.000A, 20.00A(GDM-533) 999.9μA, 999.9mA, 9.999A(GDM-532)
Best Accuracy	±(0.8%rdg + 10 digits) for GDM-541; ±(1.2%rdg + 5 digits) for GDM-533 ±(1.0%rdg + 3 digits) for GDM-532
RESISTANCE	
Range	220.00Ω, 2.2000kΩ, 22.000kΩ, 220.00kΩ, 2.2000MΩ, 22.000MΩ, 220.00MΩ(GDM-541) 600.0Ω, 6.000kΩ, 60.00kΩ, 600.0kΩ, 6.000MΩ, 60.00MΩ(GDM-533) 999.9Ω, 9.999kΩ, 99.99kΩ, 999.9kΩ, 9.999MΩ, 99.99MΩ(GDM-532) 600.0Ω, 6000Ω, 60.00kΩ, 600.0kΩ, 60.00MΩ(GDM-531)
Best Accuracy	±(0.5%rdg + 10 digits) for GDM-541; ±(1.0%rdg + 2 digit) for GDM-533 ±(0.8%rdg + 2 digits) for GDM-532; ±(0.8%rdg + 2 digits) for GDM-531
CONTINUITY BEEPER	
	Buzzer sounds if conductance less than 50Ω for GDM-541/533 Buzzer sounds if conductance less than 30Ω for GDM-532 Buzzer sounds if conductance less than 10Ω for GDM-531
DIODE TEST	
Open Circuit Voltage	GDM-541/533 : 3V (Approx.); GDM-532 : 3.3V (Approx.); GDM-531 : 2.1V (Approx.)
CAPACITANCE	
Range	22.000nF,220.00nF,2.2000μF,22.000μF,220.00μF,2.2000mF,22.000mF,220.00mF(GDM-541) 60.00nF, 600.0nF, 6.000μF, 60.00μF, 600.0μF, 6.000mF, 60.00mF(GDM-533) 9.999nF, 99.99nF, 999.9nF, 9.999μF, 99.99μF, 999.9μF, 9.999mF(GDM-532/531)
Best Accuracy	±(3.0%rdg + 5 digits) for GDM-541/533; ±(4.0%rdg + 5 digits) for GDM-532/531
FREQUENCY	
Range	10Hz ~ 220MHz(GDM-541); 10Hz ~ 10MHz(GDM-533); 99.99Hz ~ 9.999MHz(GDM-532)
Best Accuracy	±(0.01%rdg + 5 digits) for GDM-541; ±(0.1%rdg + 4 digits) for GDM-533 ±(0.1%rdg + 5 digits) for GDM-532
Input Amplitude	≤20Vrms
TEMPERATURE	
Range	-40°C ~ 1000°C / -40°F ~ 1832°F
Best Accuracy	±(1.0%rdg + 3 °C) for GDM-533; ±(1.0%rdg + 5 °C) for GDM-532 ±(1.0%rdg + 4 °F) for GDM-533; ±(1.5%rdg + 5 °F) for GDM-532

SPECIFICATIONS

SPECIAL FUNCTION
Auto Ranging(GDM-541/533/532); True RMS(GDM-541/533/532); Analog Bar(GDM-541/533); USB(GDM-541/533/532/531); Display Backlight(GDM-541/533/532/531); NCV Function(GDM-541/533/532/531); Audible/Visual Alarm(GDM-541/533/531); AC+DC Voltage(GDM-541); LPF ACV(GDM-541); hFE Test(GDM-541); LoZ ACV(GDM-533)
LCD DISPLAY
22000 counts (GDM-541), 6000 counts (GDM-533/531), 9999 counts (GDM-532)
POWER SOURCE
1.5V AAA x 4 (GDM-541/533); 1.5V AAA x 3 (GDM-532); 1.5V AAA x 2 (GDM-531)
DIMENSIONS & WEIGHT
89(W) x 186(H) x 49(D) mm, Approx. 400g (GDM-541/533) 81(W) x 169(H) x 46(D) mm, Approx. 400g (GDM-532) 76.5(W) x 155(H) x 49(D) mm, Approx. 255g (GDM-531)

ORDERING INFORMATION

GDM-541 22000 Counts Hand-Held DMM with True RMS Measurement and USB Interface
GDM-533 6000 Counts Hand-Held DMM with True RMS Measurement and USB Interface
GDM-532 9999 Counts Hand-Held DMM with True RMS Measurement
GDM-531 6000 Counts Hand-Held DMM

ACCESSORIES :
Test leads, Battery, USB cable & Adapter socket (GDM-541/533 only),
K-type thermocouple (GDM-533/532 only)

FREE DOWNLOAD

GDM-541 PC Software Remote Software
GDM-533 PC Software Remote Software

GDM-531

GDM-531 FEATURES

* **6000 Counts Manual Ranging**
* **Display Backlight/Auto Power Off**
* **Capacitance Measurement**
* **Non-Contact Voltage (NCV) Detection**
* **Data Hold**
* **Audible/Visual Alarm when Overload**

LCR METERS

GW Instek offers high-precision bench-top LCR meters: the LCR-8200A/LCR-8200/LCR-6000 series which are designed for a variety of applications such as production testing, QC inspection, and design verification, etc. Reliable operability, accurate results, user-friendly interfaces, and automatic testing functions make the LCR-8200A/LCR-8200/LCR-6000 series one of the best choices for passive component tests.

Other than the bench-top LCR meters, GW instek also provides the LCR-1000 series hand-held LCR meters to make quick and basic LCR measurements at an affordable price.

PRODUCTS

- **Benchtop LCR Meter**
- **Handheld LCR Meter**

LCR METERS OVERVIEW

Test Frequency
Based on testing requirement, a test frequency can be set either as specificity frequency like component's datasheet specification or as the working frequency like component's real condition in circuit. Electrical components need to be tested at the frequency in which the final product/application is used.

Test Voltage
Most LCR meters can select the signal level applied to DUTs. Generally, the signal level is measured under an open circuit condition.

Accuracy and Speed
The testing speed of a LCR meter is actually a trade-off between testing accuracy. The more time it takes, the more accurate the measurement becomes. Conversely, the faster the measurement speed, the less accurate it becomes.

Measurement Parameters
Primary parameters L, C, R as well as Z, Y and DCR; Secondary parameters Q, D, θ (θr or θd) as well as X and G.

Range
In order to measure a wide range of impedance value, a measurement instrument must have several ranges. Selecting a range is usually done automatically according to the impedance of DUTs.

Averaging
Averaging is related to a LCR meter integration time. If the integration time is longer than cycles of the test signal, the measurement time will become longer, but the accuracy will be enhanced.

Bias Voltage and Bias Current
A LCR meter might include bias voltage or bias current function applicable to DUT which providing an extra source level to DUT when a LCR meter is taking measurement. Bias voltage uses with capacitance measurement commonly and bias current uses with inductance measurement.

BENCHTOP LCR METER

MODEL	Description (Main Function)	Page
LCR-8250A	50 MHz High Frequency LCR Meter	E25-28
LCR-8230A	30 MHz High Frequency LCR Meter	
LCR-8220A	20 MHz High Frequency LCR Meter	
LCR-8210A	10 MHz High Frequency LCR Meter	
LCR-8205A	5 MHz High Frequency LCR Meter	
LCR-8230	30 MHz High Frequency LCR Meter	
LCR-8220	20 MHz High Frequency LCR Meter	
LCR-8210	10 MHz High Frequency LCR Meter	
LCR-8205	5 MHz High Frequency LCR Meter	
LCR-8201	1 MHz High Frequency LCR Meter	
LCR-6300	10 Hz to 300 kHz Precision LCR Meter	E29-30
LCR-6200	10 Hz to 200 kHz Precision LCR Meter	
LCR-6100	10 Hz to 100 kHz Precision LCR Meter	
LCR-6020	10 Hz to 20 kHz Precision LCR Meter	
LCR-6002	10 Hz to 2 kHz Precision LCR Meter	

HANDHELD LCR METER

MODEL	Description (Main Function)	Page
LCR-1100	100 kHz Hand-held LCR Meter	E31-32
LCR-1010	10 kHz Hand-held LCR Meter	
LCR-916	100 Hz/120 Hz/1 k/10 k/100 kHz Hand Held LCR Meter	E33-34
LCR-915	100 Hz/120 Hz/1 k/10 kHz Hand Held LCR Meter	
LCR-914	100 Hz/120 Hz/1 kHz Hand Held LCR Meter	

High Frequency LCR Meter

LCR-8200(A) Series

CE | USB Device | USB Host | LAN | RS-232 | Handler | Trigger | GPIB | PC Software

FEATURES

* **Wide Test Frequency :**
  LCR-8200A : DC, 10 Hz ~ 50/30/20/10/5 MHz
  LCR-8200 : DC, 10 Hz ~ 30/20/10/5/1 MHz
* **7" LCD color Display**
* **0.08 % Basic Accuracy**
* **Displaying Four Measurement Results Simultaneously From 17 Selectable Measurement Parameters Freely**
* **15 Steps List Measurement**
* **Two Curves Sweep Mode**
* **Equivalent Circuit Model Analysis** (LCR-8200A only)
* **Internal DC Bias Voltage ±12 V**
* **USB Storage Available**
* **ALC Function Available**
* **Standard Interfaces : RS-232C, USB Host/ Device, LAN, GPIB and Handler**
* **Universal Power Input**

GW Instek's high-frequency LCR tester to LCR-8200 (A), which includes two series, LCR-8200A and LCR-8200, has ten models and the maximum test frequency is up to 50 MHz. The entire series adopts 7-inch color display and features a high measurement accuracy (0.08 %). The measurement results can be presented numerically or graphically according to the selected measurement mode, allowing users to optimally interpret the characteristics of the DUT. At the same time, a full range of standard interfaces such as USB device / RS-232C / Handler and GPIB allow users to control the instrument by the most familiar interface without worrying about additional hardware investment costs. Furthermore, the series also provides USB storage function when operating in the graphics mode. The measured characteristic curves and values of the DUT are saved for subsequent analysis. The wide variety of features of the LCR-8200 (A) can help users easily respond to the test requirements of passive components in R&D, engineering, and production.

Under the numerical measurement mode, it is divided into MEAS measurement and LIST measurement. Under the MEAS measurement mode, users can select up to 4 (at least 1) desired measurement items from the 17 measurement parameters. Each selected measurement item can be set to compare (PASS/FAIL judgement) or to the BIN function to conduct judgement and sorting, so that users can easily learn the results of the measurement by color and sound. Under the LIST mode, users is allowed to set 15 test points and each test point can set parameters independently, including frequency/voltage/bias, and it even can set independent comparison function and numerical display mode (value, difference value, difference percentage). On top of that, under the LIST mode, the automatic trigger mode is also provided. After each LIST measurement is completed, the instrument will be in the mechanism of standby trigger. Users only need to place the next DUT, and the LIST test can be automatically performed that saves time of repeatedly pressing the trigger button.
Under the graphical measurement mode, the SWEEP measurement provides the ability to sweep two parameters simultaneously (TRACE A / TRACE B). The relative parameters of the sweep, including the sweep source (frequency, voltage, current or bias voltage), horizontal / vertical axis scale (LINEAR / LOG), speed...etc., even adding a bias, can be set and tested according to the actual needs of users. Besides, the LCR-8200A series provides 7 different equivalent circuit models which allows user analysis by 3-components or 4-components combination to characterize the operational characteristics of the circuit. After the sweep is completed, the scale can be automatically adjusted according to the selected TRACE, so that the whole observation is clearer and easier to read. Other than that, the swept graphics (bmp) and values (csv) can be saved to the flash drive for subsequent analysis and applications.
Whether it is for measurement data collection during the test process or the collocation for the system integration, the LCR-8200 (A) series offers the most comprehensive communications interfaces, including USB device, RS-232C, LAN for PC connection and even GPIB, which are all standard communications interfaces. Users can choose according to the habits of use and the convenience of the system architecture without any additional cost. In addition, the LCR-8200 (A) series also provides a Handler interface for system integration of PLCs or sorters.

OPTIONAL ACCESSORIES SELECTION GUIDE

ACCESSORY MODEL	BRIEF DESCRIPTION	LCR-8250A	LCR-8230A	LCR-8220A	LCR-8210A	LCR-8205A	–
		–	LCR-8230	LCR-8220	LCR-8210	LCR-8205	LCR-8201
LCR-05A	Test Fixture for axial & radial lead components (up to 50 MHz)	✓	✓	✓	✓	✓	✓
LCR-06B	Test Lead with Kelvin clip (4 wire type)	△	△	△	△	△	✓
LCR-07	Test Lead with Alligator clip (2 wire type)	△	△	△	△	△	✓
LCR-08	Test Fixture (Tweezers) for SMD / Chip components	△	△	△	△	△	✓
LCR-10A	Test Fixture for bottom electrode components (up to 50 MHz)	✓	✓	✓	✓	✓	✓
LCR-12	Test Lead with Kelvin clip (4 wire type)	△	△	△	✓	✓	✓
LCR-15A	Test Fixture for SMD / Chip components (up to 50 MHz)	✓	✓	✓	✓	✓	✓
GTL-234	RS-232C cable	✓	✓	✓	✓	✓	✓
GTL-248	GPIB Cable	✓	✓	✓	✓	✓	✓
GTL-246	USB Cable	✓	✓	✓	✓	✓	✓
GRA-445	Rack Mount Kit, 19" 4U size	✓	✓	✓	✓	✓	✓

Note : "△" means the accessories work with a frequency limitation (under 1 MHz)

LCR-05A

LCR-06B

LCR-07

LCR-08

LCR-10A

LCR-12

LCR-15A

LCR-DB1

LCR-8200(A) Series

Rear Panel

SPECIFICATIONS

	LCR-8250A	LCR-8230A	LCR-8220A	LCR-8210A	LCR-8205A	–
	–	LCR-8230	LCR-8220	LCR-8210	LCR-8205	LCR-8201
TEST FREQUENCY						
	DC, 10Hz~50MHz; 6 Digits, ±0.0007%	DC, 10Hz~30MHz; 6 Digits, ±0.0007%	DC, 10Hz~20MHz; 6 Digits, ±0.0007%	DC, 10Hz~10MHz; 6 Digits, ±0.0007%	DC, 10Hz~5MHz; 6 Digits, ±0.0007%	DC, 10Hz~1MHz; 6 Digits, ±0.0007%
OUTPUT IMPEDANCE						
	25Ω / 100Ω SELECTABLE					
BASIC ACCURACY						
	±0.08%					
TEST SPEED						
	MAX: 2.5ms(>10kHz), FAST: 50ms(>20Hz), MEDIUM: 100ms, SLOW: 300ms, SLOW2: 600ms					
TEST SIGNAL LEVEL						
AC Voltage **AC Current** **DCR Voltage**	10mV ~ 2Vrms (FREQ. ≦1MHz), 10mV ~ 1Vrms (FREQ. > 1MHz or FREQ. ≦1MHz and RO=25Ω) 100μA ~ 20mArms (RO=100Ω), 200μA ~ 40mArms (RO=25Ω) 1Vdc (40mA max.)					
MEASUREMENT PARAMETERS						
	Maximum four parameters can be measured and displayed at the same time Impedance (Z), Inductance (Ls / Lp), Capacitance (Cs / Cp), AC Resistance (Rs / Rp), Quality Factor (Q), Dissipation Factor (D), Admittance (Y), Conductance (G), Reactance (X), Phase Angle (θd / θr), Susceptance (B), DC Resistance (Rdc)					
LIST MEASUREMENT						
Listed Steps **Listed Parameters** **Trigger**	15 Freq/Vac/Iac/DC Bias/Comp/BIN AUTO, REPEAT, SINGLE					
SWEEP MEASUREMENT						
Swept Graphical **Swept Parameters**	Two of measurement parameters Freq/Vac/Iac/BIAS V, Keep Trace					
EQUIVALENT CIRCUIT MODEL ANALYSIS ("A" series only)						
	7 different equivalent circuit models, 3-components, 4 types, 4-components, 3 types					
OTHER FUNCTIONS						
Auto Level Control (ALC) **DC Bias** **Handler**	Standard 0 ~ ±12V PASS, FAIL and OK, NG or BIN 1-9					
OTHER FEATURES						
Correction **V/I Monitor** **Comparator** **Buzzer** **Average**	Open/Short/HF Load/Load Vac, Iac, Vdc, Idc Value, Δ, Δ% OFF, Pass, Fail 1 to 64					
DISPLAY						
	7" LCD color display (800 x 480)					
INTERFACE						
	USB/GPIB/LAN/RS-232/Handler/USB Host/TRIGGER Input					
POWER SOURCE						
	AC 100 V to 240 V, 50/60 Hz; Consumption: 65 VA (max.)					
DIMENSIONS & WEIGHT						
	346 (W) x 145 (H) x 335 (D) mm; Approx. 3.3 kg					

* Difference between "A" series and "Non-A" series is only the "A" series provides the equivalent circuit model analysis.

ORDERING INFORMATION

LCR-8250A DC, 10 Hz to 50 MHz High Frequency LCR Meter
LCR-8230A DC, 10 Hz to 30 MHz High Frequency LCR Meter
LCR-8220A DC, 10 Hz to 20 MHz High Frequency LCR Meter
LCR-8210A DC, 10 Hz to 10 MHz High Frequency LCR Meter
LCR-8205A DC, 10 Hz to 5 MHz High Frequency LCR Meter
LCR-8230 DC, 10 Hz to 30 MHz High Frequency LCR Meter
LCR-8220 DC, 10 Hz to 20 MHz High Frequency LCR Meter
LCR-8210 DC, 10 Hz to 10 MHz High Frequency LCR Meter
LCR-8205 DC, 10 Hz to 5 MHz High Frequency LCR Meter
LCR-8201 DC, 10 Hz to 1 MHz High Frequency LCR Meter

ACCESSORIES :
AC Power Cord x 1, Test Fixture LCR-06B x 1, Safety Sheet x 1

OPTION

LCR-05A Test Fixture for Axial & Radial Lead Components(up to 50 MHz)
LCR-06B Test Lead with Kelvin clip(4 wire type)
LCR-07 Test Lead with Alligator clip(2 wire type)
LCR-08 Test Fixture(Tweezers) for SMD/Chip Components
LCR-10A Test Fixture for Bottom Electrode Components(up to 50 MHz)
LCR-12 Test Lead with Kelvin clip(4 wire type)
LCR-15A Test Fixture for SMD/Chip components (up to 50 MHz)
LCR-DB1 External DC Bias Voltage Box
GRA-445 Rack Mount Kit, 19" 4U size
GTL-234 RS-232C cable
GTL-248 GPIB Cable
GTL-246 USB Cable

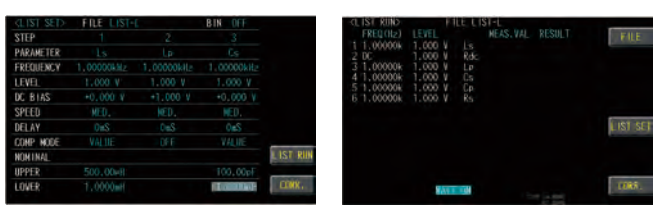
A. THE PRESENTATION OF FLEXIBLE MEASUREMENT COMBINATIONS

LCR-8200(A) Series allows users to select and arrange measurement parameters. Users can select at least one parameter to maximum four parameters from the 17 measurement parameters according to the measurement requirements and the presentation order can also be arranged in a desired manner. The set parameters can be stored in internal/external memory groups for subsequent recalls.

B. INDEPENDENT SETTING JUDGMENT

Each selected test parameter can independently set judgement and comparison such as value, difference value or difference percentage. Additionally, the display method can also be based on value, difference value or difference percentage to self-define the presentation of test results, and the observation is more in line with the actual needs. In addition to using the warning sound, all the parameters set for comparison judgment will be displayed in different colors. "Red" means that the limit value is exceeded, and "Green" means that it is within the limit value, so that the judgment can be conducted smoothly under noisy environment.

C. LIST MEASUREMENT

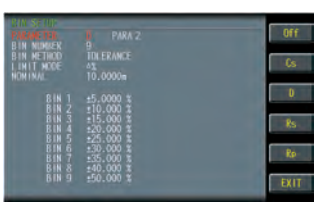


The 15-point LIST measurement mode provides measurement values at a specific frequency or voltage of the DUT, and each set point can set independent comparison and judgement. When the trigger mode is set to “AUTO”, the display “WAIT ON” will appear on the measurement screen and LCR-8200(A) Series will detect the contact status of the fixture. When the DUT is connected, the test will start automatically.

D. TWO-CURVE SWEEP

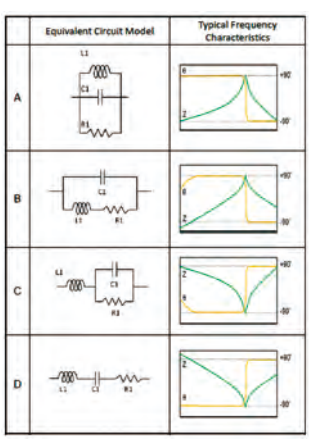
Up to 2 characteristic parameters of the DUT can be swept at the same time. Sweep type (frequency/Vac/Iac), axis form (LOG/LINEAR), sweep speed, even adding bias (internal), etc can be set according to the actual demands. After the sweep is completed, automatic adjustment can be used to obtain the best observation display. The movable cursor can be used to obtain the measurement result of the specific position. Swept displays and point values can be saved to the flash drive via the USB host on the panel for subsequent analysis.

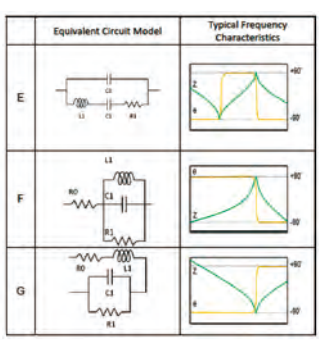
E. BIN FUNCTION



BIN settings for one specific parameter of the selected measurement parameters provide up to 9 BIN positions. Set the judgment basis for individual classifications according to the desired BIN methods (EQUAL/SEQUENTIAL/TOLERANCE/RANDOM) and limit value mode (VALUE/delta/delta%). The result of this sorting can be obtained through the Handler interface. If directly connected to an external device such as a sorter, an immediate sorting can be performed.

F. EQUIVALENT CIRCUIT MODEL ANALYSIS





This function, which adopts the algorithm based on resonance theory, consists of 7 different equivalent circuit models. The 3-components analysis model is composed of 4 types, A, B, C and D, whereas the 4-components analysis model covers 3 types, E, F and G. By selecting suitable equivalent circuit model, the instrument will automatically calculate approximate value of each component parameter after measurement, and generate simulated curve (TRACE A/B SIMULATION) to compare with the measured curve (TRACE A/B).

Also, it's available to choose equivalent circuit model followed by directly input value of each component parameter to generate a simulated curve (TRACE A/B SIMULATION) to further compare with the measured curve (TRACE A/B). The parameters of both resonance frequency (SRF) and quality factor (Qm) can be displayed simultaneously.

Precision LCR Meter

LCR-6000 Series

CE | PC Software | RS-232 | Handler | LabVIEW Driver | USB Device | USB Host

FEATURES

* 3.5" Color LCD
* 5 Models (10 Hz to 2 kHz/20 kHz/100 kHz/ 200 kHz/300 kHz)
* Consecutive Test Frequency
* Basic Accuracy : 0.05 %
* Measuring Speed up to 25 ms (Max.)
* Full Frequency Range or Spot OPEN/SHORT
* 16 Major/Secondary Parameter Measurement Combinations and Two Additional Monitoring Parameters (Maximum Four Different Parameters Can be Show Simultaneously)
* DCR Measurement and Internal D.C. Bias Voltage (±2.5 V)
* PASS/FAIL Judgment
* Auto Level Control (ALC) Function
* BIN Function Provides 9 BIN and 1 AUX, Totally 10 BIN
* 10 Steps Listed Tests to Select Different Frequency, Voltage and Current Criteria
* Standard Interface : RS-232C, Handler and USB Host/Device
* Compact Size, Ideal for Automatic Integration (2 U, 1/2 Rack)

GW Instek introduces the brand new high precision LCR meter - LCR-6000 series, which, with five models, has a test frequency range xtending from 2 kHz/20 kHz/100 kHz/200 kHz/300 kHz (maximum) and with 0.05 % basic accuracy. The compact size design, 2 U height and 1/2 rack, is one of the practical features of the series which is the optimum space saver suitable for either bench top or system rack. The compacted LCR-6000 series with abundant features is absolutely the excellent tool for R&D, production test, IQC, etc. on implementing each test stages for passive components.

The LCR-6000 series provides rich functionalities with the compact size. First of all, the entire series adopts 3.5-inch color LCD and features opulent display parameters. In addition to simultaneously displaying setting criteria and measurement results, the series increases two additional monitoring parameters. In other words, there are four parameters, primary/secondary and two monitoring, simultaneously shown on the screen that tremendously enhances the measurement efficiency. The enlarge display mode not only emphasizes the measurement results, but also provides PASS/FAIL judgment to facilitate a rapid and convenient test result.

Convenience is one of the unique features. The LCR-6000 series comes equipped with two zero methods, which are full frequency range and spot. Users, without turning off the power and changing test fixture, can freely change frequency within the provided frequency range to conduct measurements. By so doing, tremendous time can be saved from repeatedly executing zero operation. Additionally, frequency range of the series is consecutive that allows users to input precise frequency value to conduct the most genuine test on components.

The LCR-6000 series also features diverse ancillary measurements to meet the measurement requirements of different materials. For instance, the series provides the automatic level control (ALC) function to satisfy the test voltage requirement of MLCC. For inductive component measurements, the series provides the adjustable test current function and the D.C. resistance measurement function. The optional external bias current adapter (±2.5 A) is to satisfy the measurement requirements. With respect to the D.C. bias voltage test for capacitive omponents
requirements, the series allows users to conduct verification measurement on materials by its internal ±2.5 V adjustable voltage or via an optional external bias voltage adapter (±45 V). Furthermore, 10 steps of listed test functionalities allow users to set testing parameters (either by frequency, or voltage, or current) for each step based on users' requirements in order to observe the trend of DUT characteristics.

The LCR-6000 series has 10 memory sets defined by panel setting criteria to facilitate users in selecting test criteria and saving time in repeated settings. 10,000 measurement result storage capability can easily record measurement results instantaneously. The USB host allows easy access to recorded results without connecting the series to the PC. The USB host also allows USB to retrieve and save screen so as to assist users in compiling setting guidelines.

For the external control, the LCR-6000 series provides handler interface and collocates with its measurement sorting function (9BIN, AUX: 1BIN) to facilitate the connection with sorting machine so as to sort out the materials. For remote control and measurement result retrieval requirements, the LCR-6000 series provides RS-232C to assist setting control or measurement result retrieval via the PC commands. Additionally, the free PC software gives users an instant tool to store measurement results that saves time in developing programs.

The brand new compacted LCR-6000 series can effectively improve the limitation of space. Diverse measurement functionalities and display methods are making the series the high CP ratio choice in meeting the requirements of R&D, component assessment for engineering departments, category sorting requirements for component production, and IQC for verification on component specifications.

ORDERING INFORMATION

LCR-6300	10 Hz to 300 kHz Precision LCR Meter
LCR-6200	10 Hz to 200 kHz Precision LCR Meter
LCR-6100	10 Hz to 100 kHz Precision LCR Meter
LCR-6020	10 Hz to 20 kHz Precision LCR Meter
LCR-6002	10 Hz to 2 kHz Precision LCR Meter

ACCESSORIES :
Safety Sheet x 1, Power Cord x 1, Test Fixture LCR-06B x 1

OPTION

LCR-16	±45 V DC Bias Voltage Box
LCR-17	±2.5 A DC Bias Current Box
LCR-DB1	±200 V DC Bias Voltage Box (Freq. up to 2 MHz)

OPTIONAL ASSESSORIES

LCR-05	Test Fixture for Axial & Radial Lead Components
LCR-06B	Kelvin Clip Test Lead
LCR-07	Test Fixture, Two-Wire with Alligator Clips
LCR-08	Test Fixture (Tweezers) for SMD/Chip Components
LCR-15	Test Fixture for SMD/Chip Components (0201 to 1812)
GTL-232	RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer, Approx. 2 m
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4 P
GRA-422	Rack Mount Kit, 19" 2 U size
GRA-454	Rack Mount Kit, 19" 2 U size for one or two sets

FREE DOWNLOAD

PC Software	LCR-6000 Series
Driver	LabVIEW Driver

Rear Panel

LCR-6000 Series

SPECIFICATIONS		
TEST FREQUENCY		LCR-6300 : 10 Hz to 300 kHz (±0.01 %) (4 digits resolution) LCR-6200 : 10 Hz to 200 kHz (±0.01 %) (4 digits resolution) LCR-6100 : 10 Hz to 100 kHz (±0.01 %) (4 digits resolution) LCR-6020 : 10 Hz to 20 kHz (±0.01 %) (4 digits resolution) LCR-6002 : 10 Hz to 2 kHz (±0.01 %) (4 digits resolution)
OUTPUT IMPEDANCE		30 Ω / 50 Ω / 100 Ω selectable
BASIC ACCURACY	Slow / Med Fast	0.05 % 0.1 %
TEST SPEED		FAST : 25 ms / MED : 100 ms / SLOW : 333 ms
TEST SIGNAL LEVELS	AC Voltage Current DCR	10.00 mV to 2.00 V (±10 %) CV : 10.00 mV to 2.00 V (±6 %) 100.0 µA to 20.00 mA (±10%) CC : 100.0 µA to 20.00 mA (±6 %) (@2 VMax) +2V, 0.066 A(Max.), Output impedance fixed 30 Ω
DC BIAS	Internal	±2.5 V (0.5% + 0.005 V)
DISPLAY RANGE	R, X, |Z| G, B, |Y| L C D Q θ d θ r DCR △%	0.00001 Ω to 99.9999 MΩ 0.01 nS to 999.999 S 0.00001 µH to 9999.99 H 0.00001 pF to 9999.99 mF 0.00001 to 9.99999 0.00001 to 99999.9 -179.999° to 179.999° -3.14159 to 3.14159 0.00001 Ω to 99.9999 MΩ -99999 % to 99999 %
TEST MODE	Combinations Monitor Parameter (2 Selectable)	Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q, Rs-Q, Rp-Q, R-X, DCR, Z-θr, Z-θd, Z-D, Z-Q, Auto LCZ Z, D, Q, Vac, Iac, △, △%, θr, θd, R, X, G, B, Y
LISTED MODE		10 steps
BIN FUNCTION		Comparator (9 BIN, AUX: 1 BIN)
MEMORY	INT – Panel Setting INT – Measured Data USB Storage	10 file name 10000 Data(.csv) 10 file name for setting, 9999 file name for data, 999 Log file for LCD screen
OTHER FUNCTION	Auto Level Control (ALC) Average Trigger Delay Judgment Screen Capture	ON/OFF 1 to 256 times INT / MAN / EXT / BUS 0 ms to 60 s PASS / FAIL Saving in to USB (Bmp form)
DISPLAY		3.5" LCD, RGB color (320 x 240)
INTERFACE		RS-232(SCPI), Handler, USB Host/Device
POWER SOURCE		AC 100 V to 240 V, 50 to 60 Hz, Max. 15 W
DIMENSIONS & WEIGHT		265(W) mm x 107(H) mm x 312(D) mm ; Approx. 3 kg

LCR-05 LCR-06B LCR-07 LCR-08 LCR-15 LCR-16 LCR-17

Handheld LCR Meter

LCR-1100

LCR-1010

CE USB PC Software

FEATURES

* 2.8" TFT Touch LCD
* 50,000 Counts Resolution on Primary and Secondary Display
* 0.2 % Basic Accuracy
* Six or Eight Selectable Test Frequencies Depends on Model
* 15 Kinds Measurement Combinations Available
* Test Level Selectable : AC 0.3 V/0.7 V/1 Vrms and DC +/- 1 V
* Selectable Measurement Speed : Fast 10 Times/s, Slow 2.5 Times/s
* Auto LCZ Mode for Automatic Component Type Identification and Measurement
* Data Hold
* USB-HID/USB-VCOM Interfaces for Remote Communication
* Software for Data logging is Available

GW Instek launches the new LCR-1000 Series, which is a handheld LCR meter with the automatic real-time test function. The series adopts TFT-LCD and provides a basic accuracy of 0.2 %. Users can choose to use buttons or touch screen operations. The series, with high measurement accuracy and usability, is suitable for precision tests, including maintenance test, component production, schools/research institutes, and even quality test.

The LCR-1000 Series comprises 2 models. The LCR-1100 provides a test frequency up to 100 kHz, and the LCR-1010 provides a test frequency up to 10 kHz. The series provides selectable test voltages (0.3/0.7/1.0 Vrms) and equivalent circuits (series/parallel) to automatically measure capacitance, inductance, resistance, reactance, impedance, quality factor, loss factor, phase and DC resistance.

The LCR-1000 Series, with 50,000 display counts for both main and auxiliary parameters and a basic accuracy of 0.2 %, supports 2-wire or 5-wire measurement. Furthermore, the series also provides the comparison function and data retention function to meet various test and measurement requirements for different types of components.

The entire series is equipped with USB-HID and USB-VCOM interfaces. A simple and practical free PC software is provided and remote control commands (compatible with SCPI) are available for users to write their own personal software to meet the needs of data acquisition.

ACCESSORIES GUIDE

MODEL	LCR-1100	LCR-1010
Test Frequency	50 Hz/100 Hz/120 Hz/1 k/2 k/10 k/50 k/100 kHz	50 Hz/100 Hz/120 Hz/1 k/2 k/10 kHz
Display	Primary/Secondary : 50,000 counts	Primary/Secondary : 50,000 counts
Output Impedance	100 Ω	100 Ω
Basic Accuracy	0.2%	0.2%
Test Speed	Slow: 2.5 times/s, Fast: 10 times/s	Slow: 2.5 times/s, Fast: 10 times/s
Test Signal Level	0.3 V/0.7 V/1.0 Vrms selectable	0.3 V/0.7 V/1.0 Vrms selectable
Test Parameters	C-D, C-Q, C-R, L-D, L-Q, L-R, L-Rdc,	C-D, C-Q, C-R, L-D, L-Q, L-R, L-Rdc,
	R-Q, R-X, R-Rdc, Rdc, Z-D, Z-Q, Z-θr, Z-θd	R-Q, R-X, R-Rdc, Rdc, Z-D, Z-Q, Z-θr, Z-θd
Equivalent Circuit	Series / Parallel selectable	Series / Parallel selectable

ORDERING INFORMATION

LCR-1100 100 kHz Hand-held LCR Meter
LCR-1010 10 kHz Hand-held LCR Meter

ACCESSORIES :
LCR-305 Rechargeable Lithium battery, **LCR-101** Kelvin Clip, **LCR-100** Short circuit bar,
LCR-205 USB Cable Type A-C, **LCR-503** Carry bag, **LCR-108** Tweezers Test fixture (only LCR-1100)

OPTIONAL ACCESSORIES

LCR-108 Test fixture (Tweezers) for SMD/Chip Components (only LCR-1010)

Full Accessories

LCR-100

LCR-101

LCR-108 (Option LCR-1010)

LCR-205

LCR-305

LCR-503

LCR-1100

LCR-1010

Rear Panel

SPECIFICATIONS

	LCR-1100	LCR-1010
TEST FREQUENCY		
	50 Hz/100 Hz/120 Hz/1 k/2 k/10 k/50 k/100 kHz selectable	50 Hz/100 Hz/120 Hz/1 k/2 k/10 kHz Selectable
FULL SCALE		
Main Display	50,000 counts	
Sub Display	50,000 counts	
CAPACITANCE (C) and DISSIPATION (D)		
C Display Range	1 pF to 50 mF depends on the selected test frequency	
C Best Accuracy	±(0.2% rdg + 2 counts) to ±(3.0% rdg + 10 counts)	
C Resolution	0.001 pF to 0.001 mF depends on selected range	
D Accuracy (De)	0.002 to 0.03 depends on the selected test frequency & range	
INDUCTANCE (L) and QUALITY FACTOR (Q)		
L Display Range	0.5 µH to 1000 H depends on the selected test frequency	
L Best Accuracy	±(0.2% rdg + 2 counts) to ±(2.5% rdg + 10 counts)	
L Resolution	0.001 µH to 0.1 H depends on selected range	
Q Accuracy (Qe)	0.002 to 0.08 depends on the selected test frequency & range	
IMPEDANCE (Z) and PHASE ANGLE (θ)		
Z Display Range	0.05 Ω to 10 MΩ depends on the selected test frequency	
Z Best Accuracy	±(0.2% rdg+ 2 counts) to ±(3.0% rdg + 20 counts)	
Z Resolution	0.0001 Ω to 0.001 MΩ depends on selected range	
θ Accuracy (θe)	0.2° to 2° depends on the selected test frequency & range	
ESR and ø		
	ESR is equal to the series equivalent resistance (Rs)	
Accuracy Formula	$Rs_e = \pm X_x * ø_e$; $X_X = 2\pi fL_x$ or $1/2\pi fC_x$; $ø_e = \theta e * \pi/180$	
	Parallel equivalent resistance	
Accuracy Formula	$Rpe = \pm R_p * ø_e / D_e \mp_{ze}$	
DC RESISTANCE		
Display Range	0.05 Ω to 10 MΩ	
Best Accuracy	±(0.2% rdg+ 2 counts) to ±(3.0% rdg + 5 counts)	
Resolution	0.0001 Ω to 0.001 MΩ depends on selected range	
MEASUREMENT CIRCUIT		
	Parallel or Series selectable	
AUTO LCZ MODE		
	Automatically identifies and measures the DUT when the meter is switch on	
SORTING MODE		
	±1 %, ±5 %, ±10 %, ±20 %, Input %	
OTHER FUNCTIONS		
	Auto range, Backlight, Data hold, Zero, Auto power off	
DISPLAY		
	2.8 Color LCD display (touch operation available)	
INTERFACE		
	USB (type C)	
POWER SOURCE		
	Rechargeable lithium battery(8.4 V)	
DIMENSIONS & WEIGHT		
	90(W) × 195(H) × 41(D) mm, Approx. 380 g	

Hand Held LCR Meter

LCR-916/915/914 (100 kHz/10 kHz/1 kHz)

CE USB

FEATURES

* 20,000/2,000 Counts Dual Display
* Test Frequency : 100 Hz/120 Hz/1 kHz/10 kHz/ 100 kHz Depend on Model
* Auto LCR Mode for DUT Measuring
* 0.2% Basic Accuracy
* Measurement Parameters : L, C, R (AC/DC), D, Q, ESR, θ
* Parallel/Series Testing Mode
* Sorting Mode for Quality Control
* 2Wire or 5Wire Measurement Available
* Data Hold and Zero Mode Supported
* Max and Min (LCR-916 Only)
* Auto Range, Auto Backlit
* Low Battery Indication
* Auto Power Off
* Data Collection or DC Power Operation (Optional for LCR-915)

The LCR-916/915/914 is a smart, convenient and fully-functional dual display handheld LCR meter. The test frequency extends as high as 100 kHz/10/1 kHz, providing greater flexibility to test a wider range of components. The LCR-916/915/914 uses a dual 20,000/2000 count display. The 20000 count display is used for displaying primary parameters such as capacitance, inductance, reactance and resistance and a 2000 count display is for secondary parameters such as Q, D, ESR and RP measurements. Secondary measurements can also be combined with the primary measurement while the primary measurement is still being taken. The LCR-916/915/914 provides two measurement methods, 2 wire and 5 wire measurement, The LCR-916/915/914 also comes with a host of various standard or optional accessories to assist in testing a number of different component types. The meters also include handy functions such as data hold, tolerance sorting, zero mode and Min/Max (LCR-916 only).

The meters' USB interface can be used to log data to a PC using the LCR-900 software and provide the DC 5V needed to power the meter.

With the LCR-916/915/914, you can perform quick and basic LCR measurements with precision at an affordable price.

SPECIFICATIONS

	LCR-916	LCR-915	LCR-914
TEST FREQUENCY			
	100 Hz/120 Hz/1 kHz/10 kHz/ 100 kHz Selectable	100 Hz/120 Hz/1k Hz/10 kHz Selectable	100 Hz/120 Hz/1 kHz Selectable
FULL SCALE			
	Main Display : 20,000/2,000 count Selectable; Sub Display : 2,000 count		
INDUCTANCE			
Range	20 µH to 20 kH depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 digits)		
Resolution	0.001 µH to 0.001 kH depends on the selected range		
CAPACITANCE			
Range	20 pF to 20 mF depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 digits)		
Resolution	0.001 pF to 0.001 mF depends on the selected range		
RESISTANCE			
Range	20 Ω to 200 MΩ depends on the selected test frequency		
Best Accuracy	± (0.2 % rdg + 2 digits)		
Resolution	0.001 Ω to 0.01 MΩ depends on the selected range		
DC RESISTANCE			
Range	200 Ω to 200 MΩ		
Best Accuracy	± (0.2 % rdg + 2 digits)		
Resolution	0.01 Ω to 0.01 MΩ depends on the selected range		
QUALITY FACTOR (Q)			
Range	0.000 to 999		
Accuracy	2 x (main parameter accuracy)		
Best Resolution	0.001		
DISSIPATION FACTOR (D)			
Range	0.000 to 999		
Accuracy	2 x (main parameter accuracy)		
Best Resolution	0.001		
PHASE ANGLE (θ)			
Range	-90.0° to 90.0°		
Accuracy	± (0.2 % rdg + 5 digits)		
Resolution	0.1°		
MEASUREMENT CIRCUIT			
Parallel or Series Selectable			
AUTO LCR MODE			
Automatically identifies and measures the DUT when the meter is switched on			
SORTING MODE			
±0.1 %, ±0.2 %, ±0.25 %, ±0.5 %, ±1.0 %, ±2.0 %, ±5.0 %, ±10.0 %, ±20.0 % and +80 %/-20 % Selectable			
OTHER FUNCTIONS			
Auto range, Auto back-light, Max, Min, Data Hold, Zero, 46 segments Analogue bar, Auto power off			
DISPLAY			
LCD mono display			
INTERFACE			
USB			
POWER SOURCE			
AA Battery 1.5 V x 4, DC 5 V (through AC adapter or USB cable - optional for LCR-915/914)			
DIMENSIONS & WEIGHT			
95(W) x 207(H) x 52(D) mm, Approx. 630 g			

Note : Specifications are performed by test cable length = 0m

AUTO LCR MODE

5 Wire & 2 Wire Measurement Terminal

Full Accessories

ORDERING INFORMATION

LCR-916	100 kHz Hand-held LCR Meter
LCR-915	10 kHz Hand-held LCR Meter
LCR-914	1 kHz Hand-held LCR Meter

ACCESSORIES :
Battery

OPTIONAL ACCESSORIES

Opt.01	4Wire DIP test lead
Opt.02	Accessory Pack for LCR-915
Opt.03	Accessory Pack for LCR-914
Opt.04	Magnetic Hang kit for LCR-914
GTL-253	USB Cable, USB 2.0 A-mini B type, Approx. 1400mm

Note : 1. The accessory pack for LCR-915 includes SMD test probe, AC adapter, USB cable and CD.

ACCESSORIES GUIDE

	MODEL	LCR-916	LCR-915	LCR-914
1	**Shorting Cube**	Standard	Standard	Standard
2	**Alligator Clip**	Standard	Standard	Standard
3	**Magnetic Hang Kit**	Standard	Standard	Opt. 04
4	**4 Wire SMD Probe**	Standard	Opt. 02	Opt. 03
5	**AC Power Adapter**	Standard	Opt. 02	Opt. 03
6	**USB Cable**	Standard	Opt. 02	Opt. 03
7	**PC Software (CD)**	Standard	Opt. 02	N/A
8	**4 Wire DIP Clip**	Opt. 01	Opt. 01	Opt. 01

SAFETY TESTERS

Safety testers are designed to ensure safe operation of DUTs under various operating conditions and environment. GW Instek's, GPT-Series provides safe and quick measurement tools for AC/DC withstanding voltage tests, insulation resistance tests, and AC ground bond tests as well as ground continuity tests. Those tests are required by many international safety regulations such as CE, UL, VDE, and etc.

A dedicated option, multiplex scanner box, for specific safety tester series. This multiplex scanner box, GSB-01/02, has a function that distributes the test voltage or current provided by the GPT-9900A/9900/9800 Series to multiple test points.

We also have leakage current tester, GLC-9000, which supports all the major leakage current test standards for general electronic equipment.

PRODUCTS

- **AC/DC/IR/GB Electrical Safety Analyzer**
- **AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester**
- **AC Ground Bond Tester**
- **Multiplex Scanner Box**
- **Leakage Current Tester**

SAFETY TESTERS

SAFETY TESTERS OVERVIEW

A safety tester is designed to ensure safe operation of DUT's under a number of operating conditions and environments. Thus, many of the international safety regulation, such as UL in USA, VDE in Germany, CE in EU, BS in the Great Britain and CSA in Canada, are constituted to standardize safety testing. GW Instek offers a series of Safety Testers for manufacturers to meet the mentioned regulations. The Safety Testers offed by GW Instek, GPT-15012/15000/12000/9900/9800/9600/9500 Series are general multifunction safety testers and cover a variety of different usages based models: AC Hi-Pot, DC Hi-Pot, Insulation Resistance and Ground Bond as well as Continuity tests.

TEST ITEMS EXPLANATION

HI-Pot (Withstanding)	**Purpose:** Make sure users do not receive electrical shocks that might be caused by a breakdown of the electrical insulation when using product. **Method:** While operating the product under high voltage mode, measure the current leakage between AC primary circuits and low voltage secondary circuits, or between AC primary circuits and its ground, or between low voltage secondary circuits and its ground.
ARC Detection	**Purpose:** Check potential problems such as loose screws, bad material insulation, etc. **Method:** Measure the duration of a current spike caused by a dramatic change in voltage. Normally, an ARC Detection is performed during a Hi-Pot test.
Insulation Resistance	**Purpose:** Check the quality of insulation. **Method:** Measure the resistance between AC primary circuits and low voltage secondary circuits, or between AC primary circuits and its ground, or between low voltage secondary circuits and its ground.
Ground Bond	**Purpose:** Verify if exposed conductive parts of product and its power system ground are well connected and be able to sustain high current, until the fuse or circuit breaker shuts off the power. **Method:** Measure the resistance of a ground circuit and verify the adequacy of the connection. A Ground Bond test is for measuring the ground path with low voltage and high current.
Continuity	**Purpose:** Verifies that an electrical connection exists between the mains power ground and any conductive surface of the product. **Method:** A ground bond test is for measuring the ground path with low voltage and low current.

GPT-9000 FAMILY (GPT-9900 Series, GPT-9800 Series and GPT-9600 Series)

The GPT-9000 family is a fully automatic electrical tester with 500 VA, 200 VA and 100VA test capacity which combines AC/DC Hi-pot, Insulation Resistance and high current ground bond (up to 32 Aac) tests. The GPT-9000 family complies with electrical equipment and appliance testing standards such as UL, CSA and. The safety compliance, reliable test results, user-friendly and fully automatic interface make the GPT-9000 Series family an advanced safety tester series that can perform up to four essential electrical safety tests and deliver fast and reliable test results from a single test connection.

No Load Set Up of Trip Current and Output Voltage

With the GPT-9900/9800 Series, the trip current and output voltage can be set without high voltage, or using a load resistor.

Safety Fault Interrupt

With the built-in Safety Fault Intercept technology, the GPT-9900/9800/9600 Series are able to set the high limit current as a watchdog to detect whether the current is abnormal to shut-off the output power when tripped.

Flashing High voltage indicator

A flashing red LED indicator outputs a warning when a high voltage is present at the output.

Highly Efficiency Voltage Output

The high-efficiency PWM power amplifier of the GPT-9900/9800/9600 Series provides a very stable HV output and avoids load affecting the DUT.

Zero Crossing Turn-On

The Zero Crossing Turn-On feature ensures that the output voltage will start from the zero crossing point of a sine wave. This function prevents unexpected occurrences of spikes or arcs, and ensures accurate cut-off current.

Selectable Arc Detection

An Arc is a short duration (>10 uS) current spike occurring due to a dramatic change in voltage or current. The GPT-9900/9800/9600Series offer selectable Arc detection setting value depending on the cutoff range to identify the potential problems in product quality such as loose screws, bad insulation material etc.

Controllable Ramp Up Time

During a AC/DC Hi-pot and IR test, an unfavorable condition such as spike in current might occur. The GPT-9900/9800 Series can control the ramp up time to prevent spikes, which might cause erroneous measurement results.

Memories of 100 AUTO, Each AUTO 16 Manu Steps of Test Set-Up

The GPT-9900/9800 Series provide 16 steps for test set-ups, each Manu step containing one electrical safety test. All 16 steps can be executed just by pressing a button. The GPT-9900/9800 Series offer 100 AUTO of memories to facilitate testing of up to 100 different products in a production line.

SAFETY TESTING INSTRUMENTS

MODEL	Description (Main Function)	Page
GPT-15012	DC 12kV DC/IR Electrical Safety Analyzer	**E39-44**
GPT-15004	AC 500VA AC/DC/IR/GB Electrical Safety Analyzer	
GPT-15003	AC 500VA AC/DC/IR Electrical Safety Analyzer	
GPT-15002	AC 500VA AC/DC Electrical Safety Analyzer	
GPT-15001	AC 500VA AC Electrical Safety Analyzer	
GPT-12004	AC 200VA AC/DC/IR/GB Electrical Safety Analyzer	
GPT-12003	AC 200VA AC/DC/IR Electrical Safety Analyzer	
GPT-12002	AC 200VA AC/DC Electrical Safety Analyzer	
GPT-12001	AC 200VA AC Electrical Safety Analyzer	
GPT-9904	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	**E45-46**
GPT-9903A	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester	
GPT-9902A	AC 500VA AC/DC Withstanding Voltage Tester	
GPT-9901A	AC 500VA AC Withstanding Voltage Tester	
GPT-9804	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	
GPT-9803	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester	
GPT-9802	AC 200VA AC/DC Withstanding Voltage Tester	
GPT-9801	AC 200VA AC Withstanding Voltage Tester	
GSB-01	Multiplex Scanner Box – 8CH H.V.	**E47-48**
GSB-02	Multiplex Scanner Box – 6CH H.V./2CH G.B.	
GCT-9040	AC Ground Bond Tester	**E49-50**
GPT-9603	AC 100VA AC/DC Withstanding Voltage/Insulation Resistance Tester	**E51-52**
GPT-9612	AC 100VA AC Withstanding Voltage/Insulation Resistance Tester	
GPT-9602	AC 100VA AC/DC Withstanding Voltage Tester	
GPT-9601	AC 100VA AC Withstanding Voltage Tester	
GPT-9513	Multi-Channel Hipot Tester	**E53-56**
GPT-9503	Multi-Channel Hipot Tester	
GLC-10000	Leakage Current Tester	**E57-58**
GLC-9000	Leakage Current Tester	**E59-60**

GPT-SERIES QUICK SELECTION GUIDE

		Functions					Features					
MODEL	Output Capacity	ACW	DCW	IR	GB	GC	SWEEP	ARC Detect	RAMP Up	RAMP Down	Rear Output	Barcode
GPT-15012	DC 12kV		✓	✓			✓	✓	✓	✓	✓	✓
GPT-15004	500VA	✓*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-15003	500VA	✓*	✓	✓		✓	✓	✓	✓	✓	✓	✓
GPT-15002	500VA	✓*	✓			✓	✓	✓	✓	✓	✓	✓
GPT-15001	500VA	✓*				✓	✓	✓	✓	✓	✓	✓
GPT-12004	200VA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-12003	200VA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
GPT-12002	200VA	✓	✓			✓	✓	✓	✓	✓	✓	✓
GPT-12001	200VA	✓				✓	✓	✓	✓	✓	✓	✓
GPT-9904	500VA	✓*	✓	✓	✓		✓	✓	✓		✓	
GPT-9903A	500VA	✓*	✓	✓			✓	✓	✓		✓	
GPT-9902A	500VA	✓*	✓				✓	✓	✓		✓	
GPT-9901A	500VA	✓*					✓	✓	✓		✓	
GPT-9804	200VA	✓	✓	✓	✓			✓	✓			
GPT-9803	200VA	✓	✓	✓				✓	✓			
GPT-9802	200VA	✓	✓					✓	✓			
GPT-9801	200VA	✓						✓	✓			
GPT-9603	100VA	✓	✓	✓				✓				
GPT-9612	100VA	✓		✓				✓				
GPT-9602	100VA	✓	✓					✓				
GPT-9601	100VA	✓						✓				
GPT-9513	150VA	✓	✓	✓		✓		✓	✓	✓	8CH Scanner	
GPT-9503	150VA	✓	✓	✓		✓		✓	✓	✓	8CH Scanner	

* Short Current > 200 mA

AC/DC/IR/GB Electrical Safety Analyzer

GPT-15012

GPT-15004/12004

GPT-15003/15002/15001
GPT-12003/12002/12001

CE | USB Host | RS-232 | GPIB | USB | Signal I/O | Rear Output | LAN

台灣精品 TAIWAN EXCELLENCE

FEATURES

* Dc12 kV Output and 200 VA/500 VA AC Test Capacity (500 VA short circuit current>200 mA)
* 7" TFT LCD
* Comply with IEC 61010-2-034 Design Requirement
* Manual Test Mode/Auto Test Mode
* RMS Current Measurement
* Zero Crossing Turn-on Operation
* Controllable Ramp-up & Ramp-down Time
* Statistics & Analysis Function
* Capacitive Load Testing Capability up to 47 μF
* Sweep Function for DUT Characteristic Analysis
* Convenience Listed AUTO Mode Easy to Read Result and Judge
* Internal Storage and USB Storage Available
* Barcode Function Available
* Setting Data Export/Import
* Rear Panel Output Available
* Standard Interface : RS-232C, USB Host/Device and Signal I/O
* Optional Interface : GPIB or LAN
* Universal Power Input

GPT-15012 Rear Panel

GPT-15004/12004 Rear Panel

GPT-15001/15002/15003/12001/12002/12003

GW Instek introduces the flagship model (high voltage DC 12 kV output and 500 VA/200 VA output capacity) safety analyzer-the GPT-10000 series, which is the first safety analyzer in the world to comply with IEC 61010-2-034 (Safety requirement for electrical requirement for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength), which stipulates that the requirements of the software and hardware interfaces must be followed while designing high voltage and insulation resistance test and measurement instruments so as to ensure that users are provided with necessary protection and warning while using the instruments.

The GPT-10000 series safety analyzer has nine models: GPT-15012 supports DC withstanding test and insulation resistance test; GPT-15004 and GPT-12004 features AC/DC withstanding voltage test, insulation resistance test, AC ground bond test and continuity test; GPT-15003 and GPT-12003 conducts AC/DC withstanding voltage test, insulation resistance test, and continuity test; GPT-15002 and GPT-12002 carry out AC/DC withstanding voltage test and continuity test; GPT-15001 and GPT-12001 executes AC withstanding voltage test and continuity test. The entire series utilizes a high-efficient PWM amplifier to effectively exclude the influence from the fluctuating input voltage or distorted waveforms so as to guarantee a stable high-voltage output while conducting AC withstanding voltage test on the DUT to meet the safety regulations such as IEC, EN, UL, CSA, GB, JIS that demand the test requirements for various electronic/electrical products or parts.

To comply with IEC 61010-2-034 requirements, the series takes into account of safety by adopting the double insulation design for input power supply and output voltage to enhance user safety. Additionally, the retracted on-off switch design (START key) and various (optional) mechanisms for test activation (for instance, press and hold for 1 second to activate, activation by pressing double keys, etc.) are incorporated into the series to avoid accidentally touching that results in high voltage/large current output causing damage and danger to products or users. High illumination LED lights (flashing or permanently lit) and a high volume audial indicator are included in designing the series to provide warnings of the status of the on-going tests or judgement results from the safety analyzer. On top of that, the DUT will be automatically discharged to the safe voltage (approximately 30 V) after each test to prevent large residual test voltage from causing harm to users.

The series utilizes 7-inch color TFT LCD and inherits the consistent simplicity key design style of the product family to allow users to experience easy operations and a clear observation of the test results. Among the series, GPT-15012 supports high DC withstanding voltage test up to DC 12 kV, and the major test functions of other models include AC withstanding voltage test (AC 5 kV), DC withstanding voltage test (DC 6 kV), insulation resistance test (DC 50 V to 5000 V), ground bond test (AC 32 A), and grounding continuity test (DC 100 mA fixed). The series also collocates with superb output adjustment resolution, measurement resolution (AC withstanding voltage: 1 μA; DC withstanding voltage: 0.1 μA; insulation resistance: 0.1 MΩ; ground bond: 0.1 MΩ; continuity test: 0.01 Ω), controllable voltage ramp up and ramp down time settings, and upper/lower limit judgement settings, and large capacitance test capability (up to 47 μF) for DUT with large capacitance such as surge absorber and large capacitance on the input terminal of EMC/EMI prevention. For Insulation resistance, provides 10 mA pre-charged current (fixed) to first rapidly fully charge the DUT's capacitive load and then to conduct test and measurement so as to avoid misjudgment from fluctuating inrush current. All the above features of the series facilitate a more flexible execution of the required tests so that users can obtain accurate test and measurement results.

The statistic function is the highlight of the series. Test items, number of tests, judgement results are recoded after testing and the test results can be shown by bar graph on the display. Users can immediately learn the status of product tests and judgement distribution during the manufacturing process without using a PC. The other strong feature is the sweep function, which can be used for the analysis on product's crash point. Users can use the sweep mode to see the curve diagram of the test results after finishing the functional tests. Users can also select any time point during the process to analyze the relation between voltage and current (when ACW or DCW is selected). The test result of the certain period of time can be swept by setting start and stop time points to analyze the relation between voltage and current under that time frame. Furthermore, the tabular continuity test function can combine 10 manual memory sets to carry out automatic tests or 9 manual memory sets with one connection device to connect next automatic test so as to increase the test items of the continuity test. Users can obtain various test values and judgement results without switching to a different display screen.

Other functions and features of the GPT-10000 series include 100 sets of manual test as well as 100 sets of auto test memory for the storage of different test conditions and the saved test conditions can be exported to another GPT-10000 through USB flash drive to quick replication and expansion of production line equipment; barcode scanner can be conducted to the front panel USB host of GPT-10000 for managing test condition of DUT and then be able to quick and correctly recall required test condition; rear output terminal for system integration; front panel remote control terminal mount/rear panel Signal I/O for users to conveniently control the analyzer's output/stop based upon the requirements. The USB storage function allows test results to be stored in the USB flash drive or internal memory to save the trouble of using a PC, and the function is conducive to the follow-up data analysis. For users with the requirements of PC control and test results recording, the series also provides RS-232C, USB and option GPIB or LAN.ts of PC control and test results recording, the series also provides RS-232C, USB and option GPIB or LAN.

SELECTION GUIDE

Model \ Function	Output Capacity	AC	DC	IR	GB	Continuity	Rear Output
GPT-15012	12 kVdc		✓	✓			✓
GPT-15001	500 VA	✓				✓	✓
GPT-15002	500 VA	✓	✓			✓	✓
GPT-15003	500 VA	✓	✓	✓		✓	✓
GPT-15004	500 VA	✓	✓	✓	✓	✓	✓
GPT-12001	200 VA	✓				✓	✓
GPT-12002	200 VA	✓	✓			✓	✓
GPT-12003	200 VA	✓	✓	✓		✓	✓
GPT-12004	200 VA	✓	✓	✓	✓	✓	✓

Note : GPT-15000 Series ACW short current > 200 mA

SPECIFICATIONS

MODEL	GPT-15012	GPT-15000 Series	GPT-12000 Series
AC WITHSTANDING			
Output-Voltage Range	—	0.050 kV to 5.000 kV	0.050 kV~5.000 kV
Output-Voltage Resolution		1 V	1 V
Output-Voltage Accuracy		±(1% of setting + 5 V) [no load]	±(1% of setting + 5 V) [no load]
Maximum Rated Load		500 VA (5 kV / 100 mA)	200 VA (5 kV / 40 mA)
Maximum Rated Current		100 mA (0.5 kV<V≦5 kV); 10 mA (0.05 kV≦V≦0.5 kV)	40 mA (0.5 kV<V≦5 kV); 10 mA (0.05 kV≦V≦0.5 kV)
Output-Voltage Waveform		Sine wave	Sine wave
Output-Voltage Frequency		50 Hz / 60 Hz selectable	50 Hz / 60 Hz selectable
Voltage Regulation		±(1% + 5 V) [maximum rated load -- no load]	±(1% + 5 V) [maximum rated load -- no load]
Voltmeter Accuracy		±(1% of reading + 5 V)	±(1% of reading + 5 V)
Current Measurement Range		1 μA to 100.0 mA	1 μA to 40.00 mA
Current Best Resolution		1 μA / 10 μA / 100 μA	1 μA / 10 μA
Current Measurement Accuracy		±(1.5% of reading + 30 μA)	±(1.5% of reading + 30 μA)
Current Offset		60 μA Maximum	60 μA Maximum
Window Comparator Method		Yes	Yes
ARC Detect		Yes	Yes
RAMP UP (Rise Time)		0.1 s to 999.9 s	0.1 s to 999.9 s
RAMP DOWN (Fall Time)		0.0 s to 999.9 s	0.0 s to 999.9 s
TIMER (Test Time)*		OFF, 0.3 s to 999.9 s	OFF, 0.3 s to 999.9 s
WAIT TIME		0.0 s to 999.9 s	0.0 s to 999.9 s
GND		ON/OFF	ON/OFF
DC WITHSTANDING			
Output-Voltage Range	0.050 kV to 12.00 kV	0.050 kV to 6.000 kV	0.050 kV to 6.000 kV
Output-Voltage Resolution	1 V	1 V	1 V
Output-Voltage Accuracy	±(1% of setting + 5 V) [no load]	±(1% of setting + 5 V) [no load]	±(1% of setting + 5 V) [no load]
Maximum Rated Load	120 W (12 kV / 10 mA)	100 W (5 kV / 20 mA)	50W (5 kV / 10 mA)
Maximum Rated Current	10 mA (0.5 kV<V≦12 kV); 2mA (0.05 kV≦V≦0.5 kV)	20 mA (0.5 kV<V≦6 kV); 2 mA (0.05 kV≦V≦0.5 kV)	10mA (0.5 kV<V≦5 kV); 2mA (0.05 kV≦V≦ 0.5kV)
Voltage Regulation	±(1% + 5 V) [maximum rated load -- no load]	±(1% + 5 V) [maximum rated load -- no load]	±(1% + 5 V) [maximum rated load -- no load]
Voltmeter Accuracy	±(1% of reading + 5 V)	±(1% of reading + 5 V)	±(1% of reading + 5 V)
Current Measurement Range	1 μA to 10.00 mA	1 μA to 20.00 mA	1 μA to 10.00 mA
Current Best Resolution	0.1 μA / 1 μA / 10 μA	0.1 μA / 1 μA / 10 μA	0.1 μA / 1 μA / 10 μA
Current Measurement Accuracy	±(1.5% of reading + 3 μA) when I Reading <1 mA ; ±(1.5% of reading + 30 μA) when I Reading ≧1 mA	±(1.5% of reading + 3 μA) when I Reading <1 mA ; ±(1.5% of reading + 30 μA) when I Reading ≧1 mA	±(1.5% of reading + 3 μA) when I Reading < 1 mA; ±(1.5% of reading + 30 μA) when I Reading ≧1 mA
Current Offset	5 μA Maximum	5 μA Maximum	5 μA Maximum
Window Comparator Method	Yes	Yes	Yes
ARC Detect	Yes	Yes	Yes
RAMP UP (Rise Time)	0.1 s to 999.9 s	0.1 s to 999.9 s	0.1 s to 999.9 s
RAMP DOWN (Fall Time)	0.0 s to 999.9 s	0.0 s to 999.9 s	0.0 s to 999.9 s
TIMER (Test Time)*	OFF, 0.3 s to 999.9 s	OFF, 0.3 s to 999.9 s	OFF, 0.3 s to 999.9 s
WAIT TIME	0.0 s to 999.9 s	0.0 s to 999.9 s	0.0 s to 999.9 s
GND	ON/OFF	ON/OFF	ON/OFF
INSULATION RESISTANCE		(Firmware version: V.1.06 or later)	(Firmware version: V.1.12 or later)
Output Voltage	50 V to 5000 V dc	50 V to 5000 V dc	50 V to 5000 V dc
Output-Voltage Resolution	50 V	50 V	50 V
Output-Voltage Accuracy	±(1% of setting + 5 V) [no load]	±(1% of setting + 5V) [no load]	±(1% of setting + 5 V) [no load]
Resistance Measurement Test Voltage Display Range	Measurement Range / Accuracy	Measurement Range / Accuracy	Measurement Range / Accuracy
50 V≦V≦100 V 0.001 MΩ to 10.00 GΩ	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 50 MΩ:±(5% of reading + 1 count);	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 50 MΩ:±(5% of reading + 1 count);	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 50 MΩ:±(5% of reading + 1 count);
150 V≦V≦450 V 0.001 MΩ to 20.00 GΩ	50.1 MΩ to 2 GΩ:±(10% of reading + 1 count)	50.1 MΩ to 2 GΩ:±(10% of reading + 1 count)	50.1 MΩ to 2 GΩ:±(10% of reading + 1 count)
500 V≦V≦1200 V 0.001 MΩ to 50.00 GΩ	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 500 MΩ:±(5% of reading + 1 count); 500.1 MΩ to 9.999 GΩ:±(10% of reading + 1 count); 10 GΩ to 50 GΩ:±(20% of reading + 1 count)	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 500 MΩ:±(5% of reading + 1 count); 500.1 MΩ to 9.999 GΩ:±(10% of reading + 1 count); 10 GΩ to 50 GΩ:±(20% of reading + 1 count)	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 500 MΩ:±(5% of reading + 1 count); 500.1 MΩ to 9.999 GΩ:±(10% of reading + 1 count); 10 GΩ to 50 GΩ:±(20% of reading + 1 count)
1250 V≦V≦5000 V 0.001 MΩ to 50.00 GΩ	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 500 MΩ:±(5% of reading + 1 count); 500.1 MΩ to 9.999 GΩ:±(10% of reading + 1 count); 10 GΩ to 50 GΩ:±(15% of reading + 1 count)	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 500 MΩ:±(5% of reading + 1 count); 500.1 MΩ to 9.999 GΩ:±(10% of reading + 1 count); 10 GΩ to 50 GΩ:±(15% of reading + 1 count)	0.1 MΩ to 1 MΩ:±(5% of reading + 3 count); 1.1 MΩ to 500 MΩ:±(5% of reading + 1 count); 500.1 MΩ to 9.999 GΩ:±(10% of reading + 1 count); 10 GΩ to 50 GΩ:±(15% of reading + 1 count)
Voltage Regulation	±(1% + 5 V) [maximum rated load -- no load]	±(1% + 5 V) [maximum rated load -- no load]	±(1% + 5 V) [maximum rated load -- no load]
Voltmeter Accuracy	±(1% of reading + 5 V)	±(1% of reading + 5 V)	±(1% of reading + 5 V)
Short-Circuit Current	10 mA max.	10 mA max.	10 mA max.
Output Impedance	2 kΩ	2 kΩ	2 kΩ
Window Comparator Method	Yes	Yes	Yes
RAMP UP (Rise Time)	0.1 s to 999.9 s	0.1 s to 999.9 s	0.1 s to 999.9 s
RAMP DOWN (Fall Time)	0.0 s to 999.9 s	0.0 s to 999.9 s	0.0 s to 999.9 s
TIMER (Test Time)*	0.3 s to 999.9 s	0.3 s to 999.9 s	0.3 s to 999.9 s
WAIT TIME	0.0 s to 999.9 s	0.0 s to 999.9 s	0.0 s to 999.9 s
GND	ON/OFF	ON/OFF	ON/OFF
GROUND BOND			
Output-Current	—	03.00 A to 32.00 A ac	03.00 A to 32.00 A ac
Output-Current Resolution		0.01 A	0.01 A
Output-Current Accuracy		3 A≦I≦8 A:±(1% of reading + 0.2 A); 8 A<I≦32 A:±(1% of reading + 0.05 A)	3 A≦I≦8 A:±(1% of reading + 0.2 A); 8 A<I≦32 A:±(1% of reading + 0.05 A)
Test-Voltage		8 Vac max (open circuit)	8 Vac max (open circuit)
Test-Voltage Frequency		50 Hz/60 Hz selectable	50 Hz/60 Hz selectable
Ohmmeter Measurement Range		1 mΩ to 650 mΩ	1 mΩ to 650 mΩ
Ohmmeter Measurement Resolution		0.1 mΩ	0.1 mΩ
Ohmmeter Measurement Accuracy		±(1% of reading + 2 mΩ)	±(1% of reading + 2 mΩ)
Window Comparator Method		Yes	Yes
TIMER (Test Time)*		0.3 s to 999.9 s	0.3 s to 999.9 s
Test Method		Four Terminal	Four Terminal
GND		ON/OFF	ON/OFF
CONTINUITY TEST			
Output-Current	—	100 mA dc (fixed)	100 mA dc (fixed)
Ohmmeter Measurement Range		0.10 Ω to 70.00 Ω	0.10 Ω to 70.00 Ω
Ohmmeter Measurement Resolution		0.01 Ω	0.01 Ω
Ohmmeter Measurement Accuracy		±(10% of reading + 2 Ω)	±(10% of reading + 2 Ω)
Window Comparator Method		Yes	Yes
TIMER (Test Time)*		0.3 s to 999.9 s	0.3 s to 999.9 s

AC/DC/IR/GB Electrical Safety Analyzer

SPECIFICATIONS			
MODEL	GPT-15012	GPT-15000 Series	GPT-12000 Series
MEMORY			
Single Step Memory Automatic Testing Memory	MANU : 100 blocks AUTO : 100 blocks, Manu per auto : 10	MANU : 100 blocks AUTO : 100 blocks, Manu per auto : 10	MANU : 100 blocks AUTO : 100 blocks, Manu per auto : 10
INTERFACE			
Standard (Front) Standard (Rear) Option	REMOTE, USB host Rear Output, RS-232C, USB device, Signal I/O, GPIB, LAN	REMOTE, USB host Rear Output, RS-232C, USB device, Signal I/O, GPIB, LAN	REMOTE, USB host Rear Output, RS-232C, USB device, Signal I/O, GPIB, LAN
DISPLAY			
	7" color LCD	7" color LCD	7" color LCD
POWER SOURCE			
	AC 100 V to 240 V ± 10%, 50 Hz / 60 Hz; Power consumption : Max. 400 VA	AC 100 V to 240 V ± 10%, 50 Hz / 60 Hz; Power consumption : Max. 1000 VA	AC 100 V to 240 V ± 10%, 50 Hz / 60 Hz; Power consumption : Max. 400 VA
DIMENSIONS & WEIGHT**			
	GPT-15012 : 380 mm x 148 mm x 492 mm; Approx. 9.8 kg	GPT-15001/15002/15003 : 380 mm x 148 mm x 492 mm; Approx. 17 kg(max.) GPT-15004 : 380 mm x 148 mm x 546 mm; Approx. 21 kg	GPT-12001/12002/12003 : 380 mm x 148 mm x 436 mm; Approx. 11 kg(max.) GPT-12004 : 380 mm x 148 mm x 454 mm; Approx. 15 kg

Note : * TIMER Accuracy: +/-(100ppm+20ms) ** Dimensions: W x H x D

ORDERING INFORMATION

GPT-15012 DC 12 kV DC/IR Electrical Safety Analyzer
GPT-15004 AC 500 VA AC/DC/IR/GB Electrical Safety Analyzer
GPT-15003 AC 500 VA AC/DC/IR Electrical Safety Analyzer
GPT-15002 AC 500 VA AC/DC Electrical Safety Analyzer
GPT-15001 AC 500 VA AC Electrical Safety Analyzer
GPT-12004 AC 200 VA AC/DC/IR/GB Electrical Safety Analyzer
GPT-12003 AC 200 VA AC/DC/IR Electrical Safety Analyzer
GPT-12002 AC 200 VA AC/DC Electrical Safety Analyzer
GPT-12001 AC 200 VA AC Electrical Safety Analyzer

ACCESSORIES :
Power cord x 1, Interlock Key x 1, Remote Terminal, Cable GHT-119 x 1,
Test lead GHT-115 x 1 for GPT-15001/15002/15003/12001/12002/12003,
Test lead GHT-115 x 1, GTL-215 x 1 for GPT-15004/12004,
Test lead GHT-120 x 1 for GPT-15012

OPTION

GPT-10KG1 GPIB card **GPT-10KL1** LAN card

OPTIONAL ASSESSORIES

GHT-117/GHT-117(EU) High Voltage Adapter Box
GHT-118/GHT-118(EU) High Voltage/Ground Bond Adapter Box
GHT-113 High Voltage Test Pistol
GHT-205 High Voltage Test Probe
GTL-232 RS232C Cable, 9-pin Female to 9-pin, null Modem for Computer
GTL-246 USB Cable, A-B type, approx. 1.2 m
GTL-248 GPIB Cable, approx. 2 m
GTL-264 Signal I/O Converted Cable, 15-pin Male to 9-pin Female. Approx. 200 mm
GRA-440 Rack Adapter Panel (19', 4U)
GHT-122 High Voltage / Continuity Test Lead, Approx. 3000 mm

ASSESSORIES GUIDE

Model / Assessories	GPT-15012	GPT-15000 Series	GPT-12000 Series
GHT-117/ GHT-117(EU)	–	✓	✓
GHT-118/ GHT-118(EU)	–	✓	✓
GHT-113	–	✓	✓
GHT-205	–	✓	✓
GTL-232	✓	✓	✓
GTL-246	✓	✓	✓
GTL-248	✓	✓	✓
GTL-264	✓	✓	✓
GRA-440	✓	✓	✓
GPT-10KG1	✓	✓	✓
GPT-10KL1	✓	✓	✓
GHT-122	–	✓	✓

GHT-121

Interlock Key

GPT-10KG1/10KL1

GHT-205

GHT-117/GHT-117(EU)

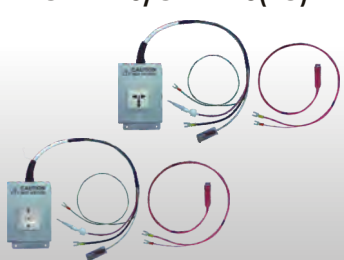
GHT-115

GHT-120

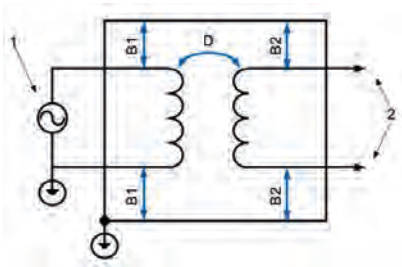
GTL-215

GHT-119

GHT-118/GHT-118(EU)



A. MEETS IEC 61010-2-034 DESIGN REQUIREMENTS



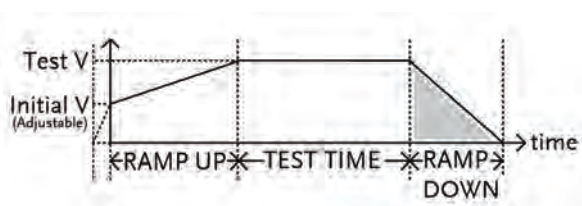
Providing the markets with safe electronic products is the responsibility of every manufacturer! Similarly, safety analyzer that tests whether electronic products meet safety regulations must attach the importance to the safety it provides! GPT-10000 Series is the world's first safety analyzer to comply with IEC 61010-2-034 (Safety requirement for electrical requirement for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength). Apart from this, the safety considerations also include double insulation for input and output voltages, safe output/warning mechanism, post-test discharge mechanism, etc. to ensure user safety during the operation.

B. HIGH ACCURACY AND HIGH RESOLUTION TESTING PERFORMANCE

High Adjustment & Measurement Resolution

For production tests and characteristic verification, the GPT-10000 Series provides a withstand voltage test voltage (AC 5 kV/DC 6 kV) that can be adjusted in 1 V steps with current measurement resolutions up to 1μA (ACW) or 0.1 μA (DCW) to realize the small leakage current measurement for products or components. In addition, the insulation resistance test voltage can be adjusted in 50 V steps from a DC output range of 50 V to 5000V, and the resistance measurement resolution can reach 0.1 MΩ. Since most safety regulations require AC power supply for ground bond test, the GPT-10000 Series provides 8 Vac (open) and 3 A to 32 Aac current for ground bond test with a resistance measurement resolution of 0.1 mΩ. The entire series provides the continuity grounding test function with a 100 mAdc (fixed) test source and a measurement resolution of 0.01 Ω to detect if the tested equipment is correctly grounded. With these functions, users can perform various safety tests and verifications with high accuracy and reliability.

C. FLEXIBLE SUPPLEMENTARY TESTING MECHANISM

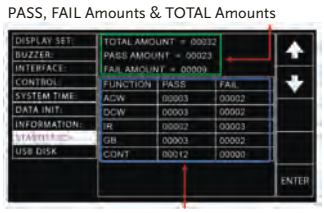


Testing Period Timing

To make tests compliant with the test requirements of relevant safety regulations, the GPT-10000 Series provides a more flexible output sequence setting starting from the start point of the test. Taking the AC/DC withstand voltage test as an example, the initial voltage can be set. Users determine the initial voltage ratio (i.e., the ratio of the rated test voltage), and then the voltage ramp up can also be set to reduce the risk of insulation breakdown or damage to the DUT caused by transient high voltages. After the rated test voltage is reached, the upper/lower limit judgement window, delay judgment and test timer mechanism can be set to assist users to conduct tests smoothly and correctly. The new voltage ramp down time setting allows users to test with a ramp down voltage to avoid the impact of excessively high rated test voltage to instantaneous discharge on the DUT.

With respect to the insulation resistance test, other than the newly added grounding mode to perform test in accordance with the actual grounding state of the DUT, the setting mechanism of the supplementary upper/lower limit judgement is also added to shorten the test time. The user-definable mode mechanisms include: STOP ON FAIL: The test is terminated as soon as the FAIL setting is met; STOP ON PASS: The test is terminated as long as the PASS setting is met, or TIMER: judgement is conducted when the timer time is reached.

D. STATISTIC AND ANALYSIS

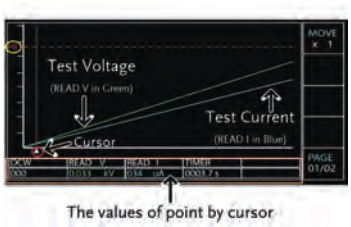


Statistic

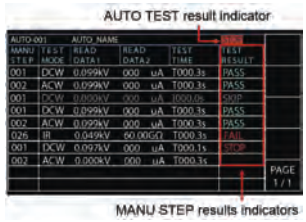
Analysis

The GPT-10000 Series provides the statistic function, which can record the test functions and judgment results in the temporary storage area (60,000 lots max.). Users can immediately learn the test of each function during the test without using a PC. The distribution of the good products can be analyzed to understand the quality of the batch based on the data. If most of them fall at the critical point that is close to be categorized as defect product, the results can be found in the test process in time so as to improve the manufacturing process and stop the defect products from entering the markets to ensure the reliability of products after leaving the factory.

E. SWEEP AND TABULAR AUTOMATIC TEST



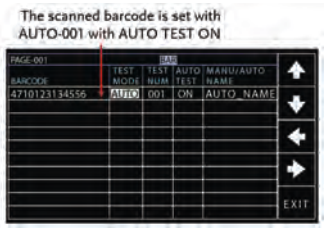
Sweep Function



Tabular Automatic Test

The GPT-10000 Series features a unique sweep function, which displays a curve diagram of the test results of the DUT. Test readings are recorded point by point based on the applied test voltage or current and relevant settings (such as initial voltage, ramp up time, test time, or ramp down time). After the test is completed, users can learn the amount of applied energy (voltage or current) at a specific time point and the results of measurement parameters by moving the cursor position so as to help users understand the changes of the measurement parameters (current or resistance) during the test. The function can also be used to determine the critical break down of the DUT. With respect to the automatic test function, each automatic test has up to 10 manual test items and all related settings and result judgement are presented in a table, so that users can easily obtain the results of all test items at a time. Other than that, if there are multiple automatic test connection requirements, uses only need to select CON in the last item of the table to automatically connect the automatic measurement of the next position (such as AUTO-012 to AUTO-013)

F. BARCODE FUNCTION

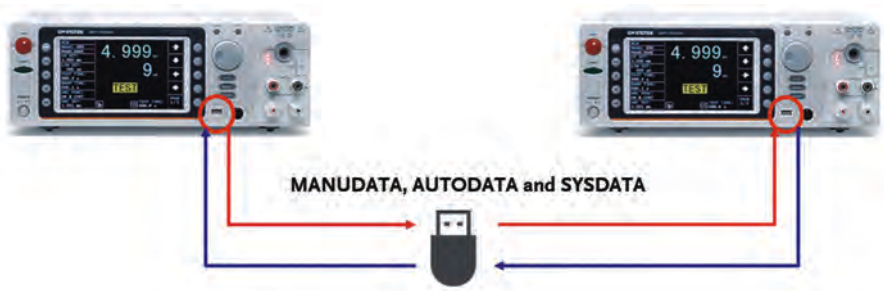


Barcode Setting

Barcode Execute

GPT-10000 Series supports the connection mechanism of the barcode machine. Users can manage the test conditions of each DUT through the use and setting of the barcode machine, which is especially suitable for mixed-type production lines. By scanning the barcode of the DUT, GPT-10000 Series can automatically reveal the corresponding test conditions, which can avoid using wrong conditions and causing damage to the DUT.

G. SETTING DATA EXPORT / IMPORT MECHANISM



Setting Data Export / Import

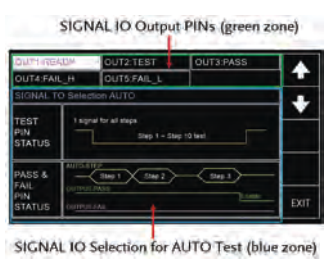
In order to expedite the deployment of the production line and achieve the consistency of test conditions, GPT-10000 Series provides a mechanism that can replicate test conditions. Users only need to set test conditions for one unit, and all settings can be copied via a USB flash drive. Other than the rapid setting of consistent test conditions, it can also avoid the difference while conducting settings.

H. COMPLETE TEST DATA RETRIEVAL INTERFACE

Storage Function

In order to facilitate users to analyze the results of the safety test, GPT-10000 Series provides the USB storage function in addition to its own statistic and analysis functions. When a USB is inserted and the storage function is activated, each time the test button (START) is pressed, the test results of all tests (every manual or automatic test item) are automatically saved to the USB in the form of a text file (txt) for follow-up analysis. When there is no USB flash drive available, users can turn on the internal memory storage function (up to 30,000 lots) to store the results of each test in theinternal memory first, and then transfer them to an external device via a USB flash drive when available. Besides, the entire series is equipped with RS-232C and USB device (GPIB or LAN is optional) for easy retrieval of test data and results by connecting a PC.

I. USER DEFINED SIGNAL I/O

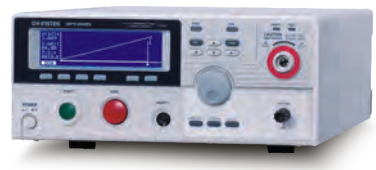


Self-defined Signal I/O

For interface connections, the GPT-10000 Series offers external control or a variety of remotely connected ports such as a signal I/O port that can be used to connect an external controller or PLC. The signal I/O's output signal pins can be self-defined so as to collocate with various PLC control requirements.

AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester

GPT-9904



GPT-9903A/9902A/9901A

GPT-9804

GPT-9803/9802/9801

CE | USB Device | RS-232 | GPIB | PC Software | Remote Terminal | Signal I/O | Rear-Panel Output | LabVIEW Driver

FEATURES

* 500 VA and 200 VA AC Test Capacity
* 240 x 64 Ice Blue Dot Matrix LCD
* Manual/Auto Mode
* Function Key for Quick Selecting
* High Intensity Flash for Caution & Status Indication
* Safety Interlock Function
* Zero Crossing Turn-on Operation
* Controllable Ramp-up Time
* RMS Current Measurement
* High Resolution : 1 μA for Measuring Current, 2 V for Setting Voltage
* PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
* Max. 100 Memory Block for Test Condition (Step) Setting. And Each Step can be Named Individually
* Remote Terminal on the Front Panel for "Start"and"Stop" Control by External
* Interface : RS-232C, USB Device, Signal I/O and GPIB (Optional)

The GPT-9900 series is built upon a platform of AC 500VA, and the GPT-9800 series is built upon a platform of AC 200 VA maximum power output. Each series with 4 models, The GPT-9904 and GPT-9804 are a 4-in-1 model capable of performing AC withstanding, DC withstanding, insulation resistance and ground bond tests. The GPT-9903A and GPT-9803 are a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9902A and GPT-9802 are capable of performing both AC and DC withstanding tests, whereas the GPT-9901A and GPT-9801 are able to perform AC withstanding test. The high-efficiency PWM amplifier is the core of both series platform design to impede the influence from the voltage fluctuation of input AC source. Each series supports the major test items among all the needed for the compliance of the safety standards such as IEC, EN, UL, CSA, GB, JIS and other safety regulations.

Following a tidy and easy-to-use design concept, the both series are equipped with a simple & clear panel layout, a high resolution dot matrix LCD display, and color LED indicators, allowing operators to interpret measurement results easily and quickly. All major test functions, including AC withstanding (AC 5 kV), DC withstanding (DC 6 kV), insulation resistance (DC 50 V to 1000 V) and ground bond (AC 32 A max.) tests, are performed under a high-stability voltage or current output with high-resolution measurement results. Further more, the test duration, ramp up time and upper/lower limits of the tripping current/resistance are fully-adjustable to accommodate a wide variety of safety tests with accurate measurement results.

The "Sweep" function of the GPT-9900 series is able to display the test results point by point all through the testing period to form a trace graph. This graphic display performs the characteristic verification of a DUT through observing the parameter response to the changes of the applied voltage or current or testing time.

Other significant functions and features are also incorporated with both series such as the output voltage is automatically cut off (within 150 μs) upon the detection of an abnormal output voltage or a trip of current limits during test to protect the operator from hazardous injury and automatically discharges a DUT after test to eliminate excessive voltage on a DUT, the open-circuit detection to ensure proper connections of apparatus for ground bond test, 100 sets of memory to save and recall the panel settings for individual or sequential tests, a remote output on-off terminal on the front panel and a signal I/O port in the rear panel provided as the means for remote start/stop control of the safety tester, and RS-232C, USB and GPIB (optional) interfaces available for PC remote control and test result logging.

SPECIFICATIONS

	GPT-9800 Series	GPT-9900 Series
AC WITHSTANDING		
Output-Voltage Range	0.050kV~ 5.000kV ac	0.050kV~ 5.000kV ac
Output-Voltage Resolution	2V/step	2V/step
Output-Voltage Accuracy	±(1% of setting + 5V) [no load]	±(1% of setting + 5V) [no load]
Maximum Rated Load	200 VA (5kV/40mA)	500 VA (5kV/100mA)
Maximum Rated Current	40mA (0.5kV<V≦5kV) 10mA (0.05kV≦V≦0.5kV)	100mA (0.5kV< V≦5kV) 10mA (0.05kV≦V≦0.5kV)
Output-Voltage Waveform	Sine wave	Sine wave
Output-Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
Voltage Regulation	±(1% of rdg + 5V) [full load → no load]	±(1% of rdg + 5V) [full load → no load]
Voltmeter Accuracy	±(1% of rdg + 5V)	±(1% of rdg + 5V)
Current Measurement Range	0.001mA~40.0mA	0.001mA~100.0mA
Current Best Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
AC Current Measurement Accuracy	±(1.5% of rdg+30counts)when HI SET <1.11mA ±(1.5% of rdg+3counts)when HI SET ≧1.11mA	±(1.5% of rdg+30counts)when HI SET <1.11mA ±(1.5% of rdg+3counts)when HI SET ≧1.11mA
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up Time)	0.1s~999.9s	0.1s~999.9s
TIMER (Test Time)*	OFF, 0.5s~999.9s	OFF, 0.5s~999.9s
Sweep Function*	NOT Support	Yes
GND	ON/OFF	ON/OFF
DC WITHSTANDING		
Output-Voltage Range	0.050kV~6.000kV dc	0.050kV~6.000kV dc
Output-Voltage Resolution	2V/step	2V/step
Output-Voltage Accuracy	±(1% of setting + 5V) [no load]	±(1% of setting + 5V) [no load]
Maximum Rated Load	50W(5kV/10mA)	100W (5kV/20mA)
Maximum Rated Current	10mA(0.5kV< V≦6kV) 2mA (0.05kV≦V≦0.5kV)	20mA (0.5kV< V≦6kV) 2mA (0.05kV≦V≦0.5kV)
Voltage Regulation	±(1% of rdg + 5V)[full load→no load]	±(1% of rdg + 5V)[full load→no load]
Voltmeter Accuracy	±(1% of rdg + 5V)	±(1% of rdg + 5V)
Current Measurement Range	0.001mA~10.0mA	0.001mA~20.0mA
Current Best Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
DC Current Measurement Accuracy	±(1.5% of rdg+30counts)when HI SET <1.11mA ±(1.5% of rdg+3counts)when HI SET ≧1.11mA	±(1.5% of rdg+30counts)when HI SET<1.11mA ±(1.5% of rdg+3counts)when HI SET≧1.11mA
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up Time)	0.1s~999.9s	0.1s~999.9s
TIMER (Test Time)*	OFF, 0.5s~999.9s	OFF, 0.5s~999.9s
Sweep Function*	NOT Support	Yes
GND	ON/OFF	ON/OFF

SPECIFICATIONS

	GPT-9800 Series		GPT-9900 Series	
INSULATION RESISTANCE				
Output Voltage	50V~1000V dc		50V~1000V dc	
Output-Voltage Resolution	50V/step		50V/step	
Output-Voltage Accuracy	±(1% of setting +5V)[no load]		±(1% of setting +5V)[no load]	
Resistance Measurement Range	1MΩ~ 9500MΩ		0.001GΩ~ 50.00GΩ	
Test Voltage	**Measurable Range**	**Accuracy**	**Measurable Range**	**Accuracy**
50V≤V≤450V	1 ~ 50MΩ 51 ~ 2000MΩ	±(5% of rdg+1count) ±(10% of rdg+1count)	0.001~0.050GΩ 0.051~2.000GΩ	±(5% of rdg+1count) ±(10% of rdg+1count)
500V≤V≤1000V	1 ~ 500MΩ 501 ~ 9500MΩ	±(5% of rdg+1count) ±(10% of rdg+1count)	0.001~0.500GΩ 0.501~9.999GΩ 10.00~50.00GΩ	±(5% of rdg+1count) ±(10% of rdg+1count) ±(20% of rdg+1count)
Window Comparator Method	Yes		Yes	
Output Impedance	600kΩ		600kΩ	
RAMP (Ramp-Up Time)	0.1s~999.9s		0.1s~999.9s	
TIMER (Test Time)	0.5s~999.9s		0.5s~999.9s	
GND	OFF (fix)		OFF (fix)	
Sweep Function*	NOT Support		Yes	
GROUND BOND				
Output-Current	03.00A~30.00A ac		03.00A~32.00A ac	
Output-Current Resolution	0.01A		0.01A	
Output-Current Accuracy	3A≤I≤8A : ±(1% of setting+0.2A), 8A< I≤30A : ±(1% of setting+0.05A)		3A≤I≤8A : ±(1% of setting+0.2A), 8A< I≤32A : ±(1% of setting+0.05A)	
Test-Voltage	6Vac max (open circuit)		6Vac max (open circuit)	
Test-Voltage Frequency	50Hz/60Hz selectable		50Hz/60Hz selectable	
Resistance Measurement Range	10mΩ~ 650.0mΩ		10mΩ~650.0mΩ	
Resistance Measurement Resolution	0.1mΩ		0.1mΩ	
Resistance Measurement Accuracy	±(1% of rdg + 2mΩ)		±(1% of rdg + 2mΩ)	
Window Comparator Method	Yes		Yes	
TIMER (Test Time)	0.5s~999.9s		0.5s~999.9s	
Sweep Function*	NOT Support		Yes	
Test Method	Four Terminal		Four Terminal	
MEMORY				
Single Step Memory	MANU : 100 blocks		MANU : 100 blocks	
Automatic Testing Memory	AUTO : 100 blocks, menu per auto:16		AUTO : 100 blocks, menu per auto:16	
INTERFACE				
Rear Output	NOT Support		Standard	
RS-232C	Standard		Standard	
USB	Standard		Standard	
GPIB	Option		Option	
Remote Terminal (Front)	Standard		Standard	
Signal I/O	Standard		Standard	
DISPLAY	240 x 64 Ice Blue Dot matrix LCD		240 x 64 Ice Blue Dot matrix LCD	
POWER SOURCE				
	Ac100 V/120 V/220 V/230 V±10 %, 50/60 Hz; Power Consumption : Max. 500 VA		Ac100 V/120 V/220 V/230 V±10 %, 50/60 Hz; Power Consumption : Max. 1000 VA	
DIMENSIONS & WEIGHT				
	330(W) x 148(H) x 452(D) mm Approx. 19 kg max.		330(W)x148(H)x482(D)mm (GPT-9902A/9901A/9903A); 330(W)x148(H)x587(D)mm(GPT-9904); Approx. 27 kg max.	

* The sweep function and timer off can only be performed when the tester is in the special MANU mode.

ORDERING INFORMATION

GPT-9904	AC 500 VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9903A	AC 500 VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9902A	AC 500 VA AC/DC Withstanding Voltage Tester
GPT-9901A	AC 500 VA AC Withstanding Voltage Tester
GPT-9804	AC 200 VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9803	AC 200 VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9802	AC 200 VA AC/DC Withstanding Voltage Tester
GPT-9801	AC 200 VA AC Withstanding Voltage Tester

ACCESSORIES :
Power cord x 1, Interlock Key x 1, Remote Cable, GHT-119 x 1, Test lead GHT-114 x 1 for GPT-9903A/9902A/9901A/9803/9802/9801, Test lead GHT-114 x 1, GTL-215 x 1 for GPT-9904/9804

OPTION

GPT-9KG1	GPIB card	**GSB-02**	Multiplex Scanner Box(6 CH H.V./2 CH G.B.)
GSB-01	Multiplex Scanner Box(8 CH H.V.)		

OPTIONAL ASSESSORIES

GHT-113	High Voltage Test Pistol	**GTL-247**	USB Cable, A-A type, approx. 1.8 m
GHT-117/GHT-117(EU)	High Voltage Adapter Box	**GTL-232**	RS-232C Cable, 9-pin Female to 9-pin null Modem for Computer
GHT-118/GHT-118(EU)	High Voltage/Ground Bond Adapter Box	**GRA-417**	Rack Mount Kit
GHT-205	High Voltage Test Probe	**GRA-433**	Rack Mount Kit for GPT-9904 only
GTL-248	GPIB Cable, approx. 2 m		
GHT-122	High Voltage / Continuity Test Lead, Approx. 3000 mm		

FREE DOWNLOAD

PC Software GPT-9000

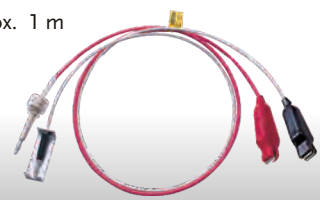
Interlock Key

GHT-119 Remote Cable

Approx. 500 mm

GHT-114 Clip High Voltage Probe

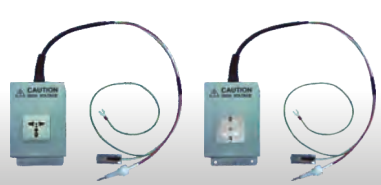
Approx. 1 m



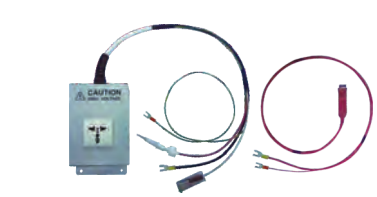
GTL-215 Test Lead

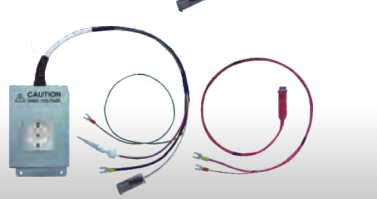
Approx. 1 m

GHT-117/GHT-117(EU)
High Voltage Adapter Box



GHT-118/GHT-118(EU)
High Voltage/Ground Bond Adapter Box





Multiplex Scanner Box

ZL201420282101.8

GSB-01/02

CE RS-232

FEATURES

* Model : GSB-01 (8 CH High Voltage Scanner Box), GSB-02 (6 CH High Voltage and 2 CH Ground Bond Scanner Box)
* Multi-channel Outputs for Withstanding Voltage, Insulation Resistance, Ground Bond Tests
* High-intensity LED for Channel, Status & Judgment Indications
* Front & Rear Input Connector Design is Suitable for the GPT-9800/9900/9900A Series
* A Maximum of 4 Scanner Boxes (32 CH) can be Connected to One GPT-9800/9900/9900A Series

The GSB-01/GSB-02, multiplex scanner box, is a dedicated option for GPT-9800/9900/9900A Series. The GSB-01 has connections for ACW, DCW and IR testing, while the GSB-02 also includes support for GB testing. It will provide reliable withstanding voltage, insulation resistance and ground bond testing for the electronic products and components.

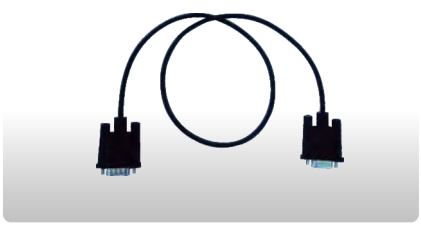
This scanner box handles withstanding voltage 5 kVac / 6 kVdc and insulation resistance voltage 1 kVdc as well as the ground bond current 40 Aac supplied from safety tester proper. Each scanner box extends the output to 8 channels, a potential HI, LO or X can be set for each channel and AC / DC withstanding voltage, insulation resistance or ground bond test can be conducted depending on the model of scanner box.

A maximum 4 scanner boxes can be connected to one GPT-9800/9900/9900A series, it allows the output channel can be extended up to 32 channels. It is particularly well suited for multi-point safety testing as well for volume testing on factory floors.

SPECIFICATIONS		
	GSB-01	GSB-02
HIGH VOLTAGE RATING		
	5 kVac / 6 kVdc	5 kVac / 6kVdc
HIGH CURRENT RATING		
	----	40 Aac
NUMBER OF H.V. CHANNELS		
	8 CH	6 CH
NUMBER OF G.B CHANNELS		
	----	2 CH
MAXIMUM NUMBER OF SCANNERS		
	4 Scanners (up to 32 channels)	
INTERFACE		
	RS-232C for connection between tester or scanner box	
POWER SOURCE		
	AC 100 to 240 V ±10 %, 50/60 Hz; Power Consumption : Max. 50 VA	
DIMENSIONS & WEIGHT		
	GSB-01 : 330(W) x 101(H) x 399(D) mm GSB-02 : 330(W) x 101(H) x 413(D) mm Approx. 5.5kg	

GTL-235 Communication Cable

Approx. 700 mm



ORDERING INFORMATION

GSB-01 Multiplex Scanner Box – 8CH H.V.
GSB-02 Multiplex Scanner Box – 6CH H.V./ 2CH G.B

ACCESSORIES:
Power Cord x 1, H.V. Wiring Lead GHT-108 x 1, G.B Wiring Lead GHT-109 x 1 (GSB-02 only), Communication Cable GTL-235 x 1
Test Lead for GSB-01 : GHT-116R x 8, GHT-116B x 1
Test Lead for GSB-02 : GHT-116R x 6, GHT-116B x 1, GTL-116R x 2, GTL-116B x 1

OPTIONAL ASSESSORIES

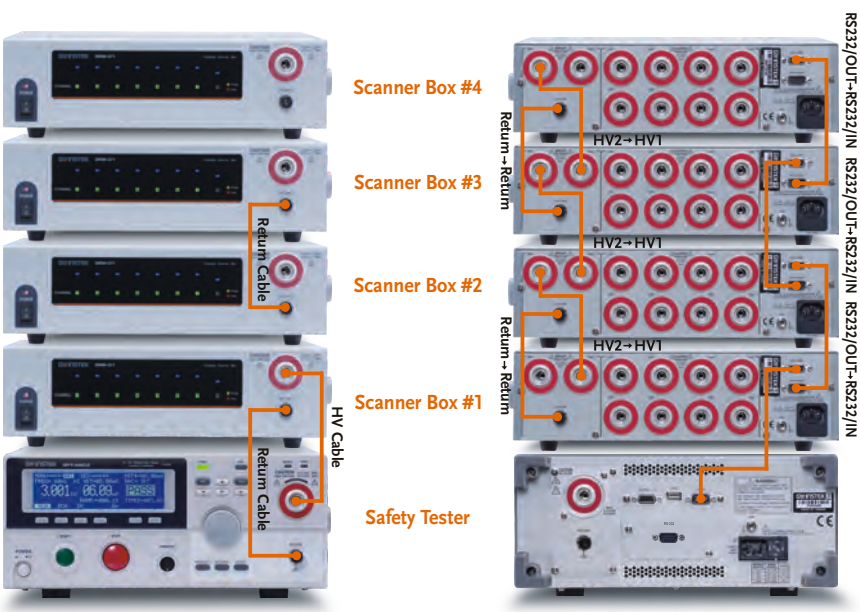
GRA-438 Rack Mount Kit
GHT-123R High Voltage Test Lead(RED), Approx. 3 m
GHT-123B High Voltage Test Lead(Black), Approx. 3 m

GSB-01

GSB-01 Rear Panel

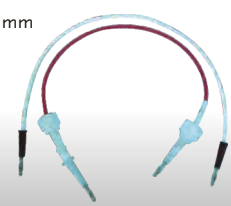
GSB-02

GSB-02 Rear Panel



GHT-108 H.V. Wiring Lead

Approx. 500 mm

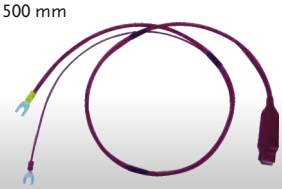


GHT-109 G.B Wiring Lead

Approx. 450 mm

GTL-116R Test Lead

Approx. 1500 mm



GHT-123B

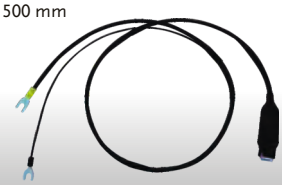
Approx. 3 m

GHT-123R

Approx. 3 m

GTL-116B Test Lead

Approx. 1500 mm



AC Ground Bond Tester

GCT-9040

CE | USB Device | LINK | GPIB | Remote Terminal | Signal I/O

FEATURES

* AC 40 A Ground Bond Tester
* Measuring Resistance from 1 mΩ to 650 mΩ
* Connect with the GPT-9800/9900 Series to Become a Sequential Test or Simultaneous Test System
* 240x64 Ice Blue Dot Matrix LCD
* Function Key for Quick Selecting
* High Intensity Flash for Caution & Status Indication
* PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
* Max. 100 Memory Block for Test Condition Setting
* Remote Terminal on the Front Panel for "Start" and "Stop" Remote Active
* Interface : USB Device, Signal I/O and GPIB (optional)

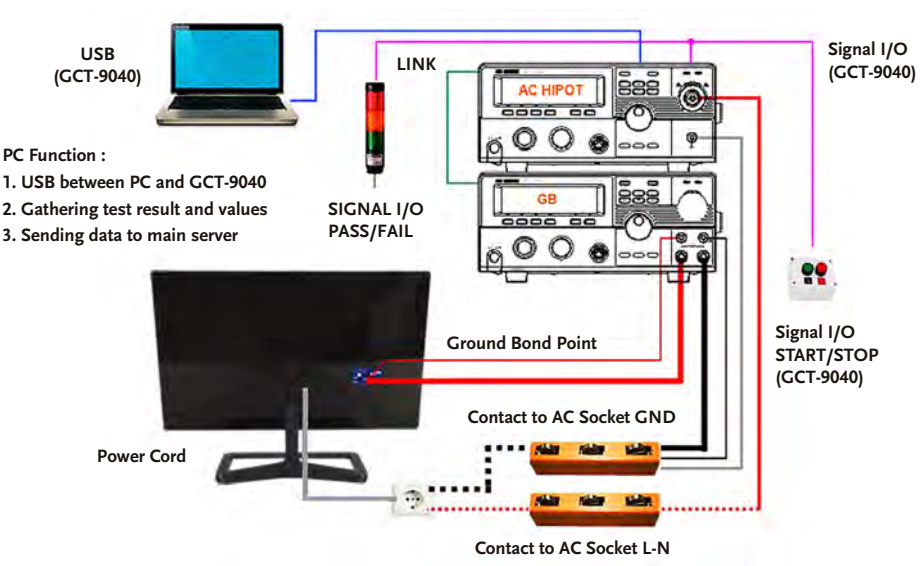
GW Instek rolls out 40 A AC ground bond tester - GCT-9040 to augment the existing safety tester product line and to replace the legacy model GCT-630. GCT-9040 provides the maximum AC test current of 40A and adopts the PWM design the same as other models to ensure test efficiency and reliability. Furthermore, large LCD display, 100 memory blocks from setting criteria, and programmable communications interface together deliver users with higher readability and convenience.

In addition to the standalone ground bond test operation, GCT-9040, with 40A AC ground bond test capability, can also externally connect with GW Instek safety testers such as GPT-9800/9900/9900A series to augment users' product test requirements by the all-in-one test platform. For instance, GPT-9802 (AC/DC withstanding tester), via external connection, can be expanded to a safety tester system with three testing functionalities.

Additionally, after the safety tester system has been assembled, not only the sequential test function for the original all-in-one models can be executed, but also the simultaneous output testcan be conducted. The simultaneous output test allows two testers to simultaneously test DUTso as to shorten the overall test time. Whether the safety tester system executes sequential test or simultaneous output test, GCT-9040 will automatically obtain control over two testers, including activation control, final status indication light, and pin signal output from Digital I/O etc. to avoid confusion caused by each tester's indication light.

Last but not least, GCT-9040, with respect to remote control and data retrieval, not only provides standard USB (optional GPIB) interface to control all functionalities but also controls connected safety testers (GPT-9800/9900/9900A series) via commands to read measurement results.

SIMULTANEOUS TEST (SCHEMATIC DIAGRAM FOR CONNECTION)



GCT-9040

Rear Panel

SPECIFICATIONS	
GROUND BOND	
Output-Current	03.00A to 40.00 A ac
Output-Current Resolution	0.01 A
Output-Current Accuracy	3 A ≦ I ≦ 8 A:±(1 % of setting + 0.2 A) 8 A < I ≦ 40 A:±1 % of setting + 0.05 A)
Test-Voltage	8 Vac max (open circuit)
Test-Voltage Frequency	50 Hz/60 Hz selectable
Resistance Measurement Range	1.0 mΩ to 650.0 mΩ
Resistance Measurement Resolution	0.1 mΩ
Resistance Measurement Accuracy	±(1 % of reading + 2 mΩ)
Window Comparator Method	Yes
TIMER (Test Time)	0.5 s to 999.9 s
GND	OFF (fix)
Test Method	Four Terminal
MEMORY	
Single Step Memory	MANU : 100 blocks
INTERFACE	
LINK	For system connection
USB	Standard
GPIB	Option
Remote Terminal (Front)	Standard
Signal I/O	Standard
Display	240 x 64 Ice Blue Dot matrix LCD
POWER SOURCE & CONSUMPTION	
Source	AC 100 V / 120 V / 220 V / 230 V ±10 %, 50/60 Hz
Consumption	Max. 700 VA
DIMENSIONS & WEIGHT	
330(W) x 148(H) x 460(D) mm; Approx. 17 kg max.	

ORDERING INFORMATION

GCT-9040 40 A AC Ground Bond Tester

ACCESSORIES:

Power cord x 1, Test lead GTL-215 x 1, LINK cable GTL-132 x 1,
USB cable GTL-247 x 1, Remote Cable GHT-119 x 1, Interlock key x 1

OPTION

GPT-9KG1 GPIB card

OPTIONAL ASSESSORIES

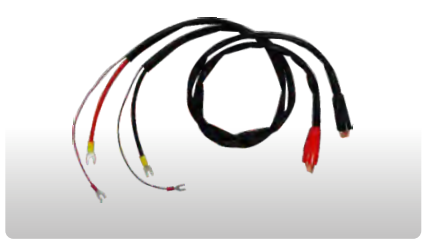
GTL-248 GPIB Cable, approx. 2m

GRA-417 Rack Mount Kit

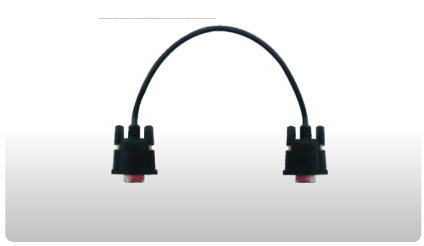
GHT-119 Remote Cable

Approx. 500mm

GTL-215 Test Lead



GTL-132 LINK Cable



AC/DC Withstanding Voltage/Insulation Resistance Tester

GPT-9600 Series

CE | Remote Terminal | Signal I/O

FEATURES

* 100 VA AC Test Capacity
* 240 x 48 Ice Blue Dot Matrix LCD
* RMS Current Measurement
* ARC Detection
* Zero Crossing Turn-on Operation
* PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
* Automatically Switching Input Source for World-wide Input Voltage
* Light Design and Easy to Operation

GW Instek launches new economical safety testers, the GPT-9600 Series, which offers an affordable solution for supporting routine tests of major items of the safety standards such as IEC, EN, UL, CSA, GB, JIS and other safety regulations.

The GPT-9600 Series is built upon a platform of 100VA AC maximum power output. The GPT-9603 is a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9612 is capable of performing AC withstanding and insulation resistance tests. The GPT-9602 is capable of performing AC and DC withstanding tests, and GPT-9601 is able to perform AC withstanding test. The GPT-9600 Series is equipped with the high-efficiency PWM amplifier, which is the core of the platform design to impede the influence from the input AC voltage fluctuation and ensure a stable voltage output.

Following a tidy and easy-to-use design concept, the GPT-9600 Series renders users an intuitive operation environment by a simple and clear panel layout, a large LCD display and color LED indicators.

The switching power supply, used as a universal input source, accommodates the power systems in most countries in the world. The GPT-9600 series, equipped with the same output voltage function as that of all GW Instek Safety Testers, indicates the expected output voltage before high voltage tests are applied. Furthermore, an AUTO mode, including test sequence selections of withstanding-then-insulation or insulation-then-withstanding, is designed for models carrying insulation Resistance test function to reduce the testing time of dual test items.

Other functions and features of GPT-9600 include: the zero crossing turn-on operation protects DUT from the impact of surge voltage output, the interlock function safeguards users from the hazardous shock of unintentional touch of the voltage output, a remote output on-off terminal in the front panel and a signal I/O port in the rear panel are provided as the means for remote start/stop control of the safety tester.

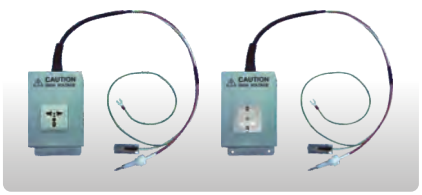
SPECIFICATIONS

AC WITHSTANDING	
Output-Voltage Range	0.10 kV to 5.00 kV ac
Output-Voltage Resolution	10V
Output-Voltage Accuracy	± (1.5 % of setting + 2 counts) with no load
Maximum Rated Load	100VA(5kV/20mA)
Maximum Rated Current	20mA (0.5kV<V≤5kV); 5mA (0.1kV≤V≤0.5kV)
Output-Voltage Waveform	Sine wave
Output-Voltage Frequency	50Hz/60Hz selectable
Voltage Regulation	±(1.5% + 2 counts) [full load → no load]
Voltmeter Accuracy	±(1.5% of rdg + 2 counts)
Current Measurement Range	0.01mA~20.0mA
Current Best Resolution	0.01mA/0.1mA
Current Measurement Accuracy	±(2.0% of rdg+10 counts)when HI SET<1.00mA ; ±(2.0% of rdg+3counts)when HI SET ≥1.00mA
Current Judgment Accuracy	±(3.0% of setting+10 counts)when HI SET<1.00mA ; ±(3.0% of setting+3counts)when HI SET ≥1.00mA
Window Comparator Method	Yes
ARC Detect	Yes
RAMP (Ramp-Up Time)	0.1s fixed
TIMER (Test Time)	OFF, 1s~180s
GND	ON

DC WITHSTANDING	
Output-Voltage Range	0.10kV~6.00kV dc
Output-Voltage Resolution	10V
Output-Voltage Accuracy	± (1.5% of setting + 2 counts) with no load
Maximum Rated Load	25W(5kV/5mA)
Maximum Rated Current	6mA(0.5kV< V≤ 6kV); 2mA (0.1kV≤V≤ 0.5kV)
Voltage Regulation	±(1.5% + 2 counts)[full load → no load]
Voltmeter Accuracy	±(1.5% of rdg + 2 counts)
Current Measurement Range	0.01mA~6.00mA
Current Best Resolution	0.01mA
Current Measurement Accuracy	±(2.0% of rdg+10 counts)when HI SET<1.00mA ±(2.0% of rdg+3counts)when HI SET ≥1.00mA
Current Judgment Accuracy	±(3.0% of setting+10 counts)when HI SET<1.00mA ±(3.0% of setting+3counts)when HI SET≥ 1.00mA
Window Comparator Method	Yes
ARC Detect	Yes
RAMP (Ramp-Up Time)	0.1s fixed
TIMER (Test Time)	OFF, 1s~180s
GND	ON

GHT-117/GHT-117(EU)

High Voltage Adapter Box



GPT-9600 Series

SPECIFICATIONS		
INSULATION RESISTANCE		
Output Voltage	50 V, 100 V, 250 V, 500 V, 1000 V dc	
Output-Voltage Accuracy	±(3.0 % of setting + 1 count)[no load]	
Resistance Measurement Range	1 MΩ to 2000 MΩ	
Test Voltage	**Measurable Range**	**Accuracy**
50V/100V/250V	1 to 50 MΩ 51 to 2000 MΩ	±(5% of rdg + 2 MΩ) ±(10% of rdg + 2 MΩ)
500V/1000V	1 to 500 MΩ 501 to 2000 MΩ	±(5% of rdg + 2 MΩ) ±(10% of rdg + 2 MΩ)
Window Comparator Method	Yes	
Output Impedance	600 kΩ	
RAMP (Ramp-Up Time)	0.1s fixed	
TIMER (Test Time)	OFF, 1 s to 180 s	
GND	OFF (fix)	
TEST MODE *		
Single **Auto**	ACW, DCW, IR AC-IR, IR-AC, DC-IR, IR-DC	
INTERFACE		
Remote Terminal (Front) **Signal I/O**	Standard Standard	
DISPLAY		
	240 x 48 Ice Blue Dot matrix LCD	
POWER SOURCE		
	AC 100 V to 120 V/220 V to 240 V±10 % , 50/60 Hz	
POWER CONSUMPTION		
	400 VA Max.	
DIMENSIONS & WEIGHT		
	330(W)x148(H)x385(D) mm; Approx. 9 kg max.	

* The available "Test Mode" depends on selected model

ORDERING INFORMATION

GPT-9603 AC 100 VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9612 AC 100 VA AC Withstanding Voltage/Insulation Resistance Tester
GPT-9602 AC 100 VA AC/DC Withstanding Voltage Tester
GPT-9601 AC 100 VA AC Withstanding Voltage Tester

ACCESSORIES :
Power cord x 1, Interlock Key x 1, Remote Cable GHT-119 x 1, Test lead GHT-114 x 1

OPTIONAL ASSESSORIES

GHT-113	High Voltage Test Pistol
GHT-117/GHT-117(EU)	High Voltage Adapter Box
GHT-205	High Voltage Test Probe
GRA-417	Rack Mount Kit
GHT-121	High Voltage Test Lead, Approx. 3 m

Rear Panel

Interlock Key

GHT-119 Remote Cable

Approx. 500mm

GHT-114 Clip High Voltage Probe

Approx. 1m

GHT-122 High Voltage Test Lead

Approx. 3 m

Multi-Channel Hipot Tester

GPT-9500 Series

CE | USB Host | USB Device | RS-232 | Signal I/O

FEATURES

* 150 VA AC Test Capacity
* 3 in 1 Tester : AC, DC, IR
* Built-in 8 Channel Scanner
* 480 x 272 Color TFT LCD
* Test Parameter Export/Import Through USB Host
* Statistics (Counter) Function
* Insulation Resistance Measurement up to 10 GΩ
* Open/Short Check (OSC)
* ARC Detection
* Multi-language : Traditional/Simplified Chinese, English
* Interface : RS-232C, USB Host/Device and Signal I/O

GW Instek introduces a new multi-channel withstanding voltage tester-the GPT-9500 series. This series has 2 models and each model has a built-in 8-channel scanner. The series meets safety regulations: IEC, EN, UL, CSA, GB, JIS and other safety regulations. The series aims at the needs of the main test items of general electronic components or winding components during routine tests.

The GPT-9500 series is a three-in-one multi-channel tester, providing AC withstanding voltage (5kV max.), DC withstanding voltage (6 kV max.), and insulation resistance (1000 V max.). The design of the series conforms to the latest IEC-61010-2-034 standard requirements and it is built on the output platform of AC 150VA. The status of the 8 channels of GPT-9513 can be set to H, L or X according to the test requirements, especially suitable for winding components such as transformers to perform mutual testing of multiple points of single components. The status of the 8 channels of GPT-9503 only provides the setting of H or X, which is more suitable for general components such as passive components for high-voltage testing between two points.

The GPT-9500 series adopts 4.3' color LCD (480 x 272 resolution), which provides users with complete measurement information and a user-friendly operation interface, making operation and setting parameters easier and more convenient. AUTO test supports tabular display, therefore, there is unnecessary to switch the screen to see all the test results. At the same time, the series provides the statistical counting function. Users can quickly obtain the total number of tests and the number of NO-GOs without connecting an external counter. All scanning channels are all configured on the rear panel of the tester. Other than being relatively esthetic when the tester is mounted on the rack, the design can also avoid personal injury by preventing accidental contact during the output process. The disconnection detection function is provided for the series to avoid the misjudgment of the test caused by the disconnection of the wire.

Other functions and features of the GPT-9500 series include the export/import function of setting parameters, which can copy the settings of one tester to the same model testers on the production line through a USB flash drive. By so doing, the test stations of the production lines can be quickly expanded and the risk of errors caused by repeated inputs can also be avoided; the zero start function, which avoids the impact of instantaneous voltage on the DUT; the interlock function, which is a safety protection hardware structure to allow users to connect external protection devices; display in 3 languages, which include English, Traditional Chinese and Simplified Chinese; and the Signal I/O terminal and RS-232C/USB device on the rear panel, which can be used for external control and monitoring or measurement data acquisition.

Model	GPT-9513	GPT-9503
Channel	8 CH	8 CH
Channel Status	H, L or X	H or X

GHT-123B

Approx. 3 m

GHT-123R

Approx. 3 m

SPECIFICATIONS

AC WITHSTANDING	
Output-Voltage Range	0.050kV ~ 5.000kV
Output-Voltage Resolution	1V
Output-Voltage Accuracy	±(1% of setting + 5V) [no load]
Maximum Rated Load	150 VA (5kV/30mA)
Maximum Rated Current	30mA; 0.001mA ~ 10mA (0.05kV≦V≦0.5kV) ; 0.001mA ~ 30mA (0.5kV< V≦5kV)
Output-Voltage Waveform	Sine wave
Voltage Regulation	±(1% + 5V) [maximum rated load → no load]
Output-Voltage Frequency	50 Hz / 60 Hz selectable
Voltmeter Accuracy	±(1% of reading + 5V)
Current Measurement Range	0.001mA ~ 30.00mA
Current Best Resolution	1 μA (0.001mA ~ 9.999mA) ; 10 μA (10.00mA ~ 30.00mA)
Current Measurement Accuracy	±(1.5% of reading + 50 μA)
Current Offset	80 μA maximum
ARC Detect	Yes
RAMP TIME (Rise Time)	0.1s~999.9s
FALL Time	OFF~999.9s
WAIT Time	OFF~999.9s
TIMER (Test Time)	CONT[2], 0.3s~999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF
DC WITHSTANDING	
Output-Voltage Range	0.050kV~6.000kV
Output-Voltage Resolution	1V
Output-Voltage Accuracy	±(1% of setting + 5V) [no load]
Maximum Rated Load	50W (5kV/10mA)
Maximum Rated Current	10mA ; 0.001mA ~ 2mA (0.05kV≦ V ≦0.5kV); 0.001mA ~ 10mA (0.5kV< V ≦6kV)
Voltmeter Accuracy	±(1% of reading + 5V)
Voltage Regulation	±(1% + 5V) [maximum rated load → no load]
Current Measurement Range	0.001mA ~ 10.00mA
Current Best Resolution	0.1 μA (0.1 μA ~ 999.9 μA) ; 1 μA (1 μA ~ 9.999mA) ; 10 μA (10.00mA)
Current Measurement Accuracy	±(1% of reading + 3 μA) when I Reading < 1mA ; ±(1% of reading + 10 μA) when I Reading ≧1mA
Current Offset	5 μA maximum
ARC Detect	Yes
RAMP TIME (Rise Time)	0.1s~999.9s
FALL Time	OFF~999.9s
WAIT Time	OFF~999.9s
TIMER (Test Time)	CONT[2], 0.3s~999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF

Rear Panel

GPT-9500 Series

SPECIFICATIONS

INSULATION RESISTANCE	
Output Voltage	0.050kV~1.000kV dc
Output-Voltage Resolution	1V
Output-Voltage Accuracy	± (1% of setting + 5V) [no load]
Resistance Measurement	0.1MΩ~10GΩ
Test Voltage	Measurement Range / Accuracy
50V≦V<500V	0.1MΩ~10MΩ : ±(5% of reading + 3% fs) 10.1MΩ~50MΩ : ±(5% of reading + 1% fs) 50.1MΩ~2GΩ : ±(10% of reading + 1% fs)
500V≦V≦1000V	0.1MΩ~10MΩ : ±(5% of reading + 3% fs) 10.1MΩ~500MΩ : ±(5% of reading + 1% fs) 500.1MΩ~10GΩ : ±(10% of reading + 1% fs)
Voltage Regulation	± (1% + 5V) [maximum rated load → no load]
Voltmeter Accuracy	± (1% of reading + 5V)
Short-Circuit Current	10mA max.
Output Impedance	2kΩ
RAMP TIME (Rise Time)	0.1s~999.9s
FALL Time	OFF~999.9s
WAIT TIME	OFF~999.9s
TIMER (Test Time)	0.3s~999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF
CONTINUITY TEST	
Output-Current	100mA dc
Ohmmeter Measurement Accuracy	±(10% of reading+2Ω), ON/OFF
INTERFACE	
Signal I/O	Standard
RS-232C	Standard
USB (Device)	Standard
USB (Host)	Standard (for Parameter/LCD Hardcopy)
Rear Output	Scanner
DISPLAY	
	4.3" Color LCD
POWER SOURCE	
	AC 100 V to 240 V ±10 %, 50 Hz/60 Hz
POWER CONSOMPTION	
	400 VA Max.
DIMENSIONS & WEIGHT	
	320(W) x 120(H) x 435(D) mm; Approx. 11 kg

* The specifications apply when the GPT-9500 is powered on for at least 30 minutes under +15 °C to +35 °C.

ORDERING INFORMATION

GPT-9513 AC 150 VA Multi-Channel Hipot Tester
GPT-9503 AC 150 VA Multi-Channel Hipot Tester

ACCESSORIES :
Power Cord x 1, Test Leads GHT-115 x 1, GHT-116B x 1, GHT-116R x 8

OPTIONAL ASSESSORIES

GTL-236	RS-232C Cable, 9-pin F-M type, approx. 2 m
GTL-246	USB Cable, A-B type, approx. 1.2m
GRA-446	Rack Mount Kit, 19" 4U
GHT-122	High Voltage Test Lead, Approx. 3 m
GHT-123R	High Voltage Test Lead(RED), Approx. 3 m
GHT-123B	High Voltage Test Lead(Black), Approx. 3 m

GTL-236 RS-232C Cable

GHT-115 High Voltage/Contiunity Test Lead

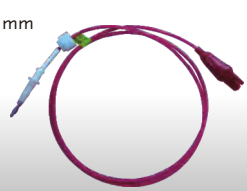
Approx. 1500 mm

GHT-122 High Voltag Test Lead

Approx.3 m

GHT-116R Test Lead

Approx. 1500 mm

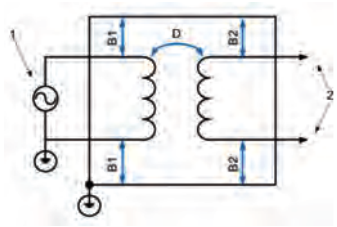


GHT-116B Test Lead

Approx. 1500 mm

Multi-Channel Hipot Tester

A. MEETS IEC 61010-2-034 DESIGN REQUIREMENTS



Meets IEC 61010-2-034 Design Requirements

GPT-9500 is the world's first multi-channel hipot tester to comply with IEC 61010-2-034 (Safety requirement for electrical requirement for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength).

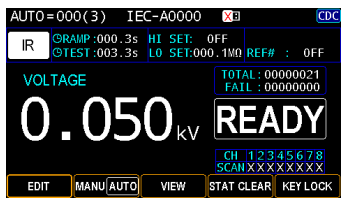
Apart from this, the safety considerations also include double insulation for input and output voltages, safe output/warning mechanism, post-test discharge mechanism, etc. to ensure user safety during the operation.

B. FRIENDLY USER INTERFACE

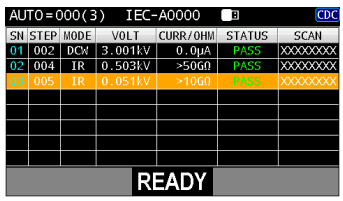
4.3' Color LCD, High-brightness Indicator and Function Keys

Operation design in simplicity is incorporated into the tester through configuring the function keys at the bottom of the LCD screen to easily change the test function by just pressing the function keys, or by rotating the knob to change the measurement value, which greatly improves the convenience of operation; updating various status indicators on the front panel immediately according to the status on the display, which not only provides users with a more comprehensive control of the test status, but also avoids unnecessary operation risks. For example, when the output is executed, the high-voltage output indicator will keep flashing.

C. COMPLETE INFORMATION PRESENTATION



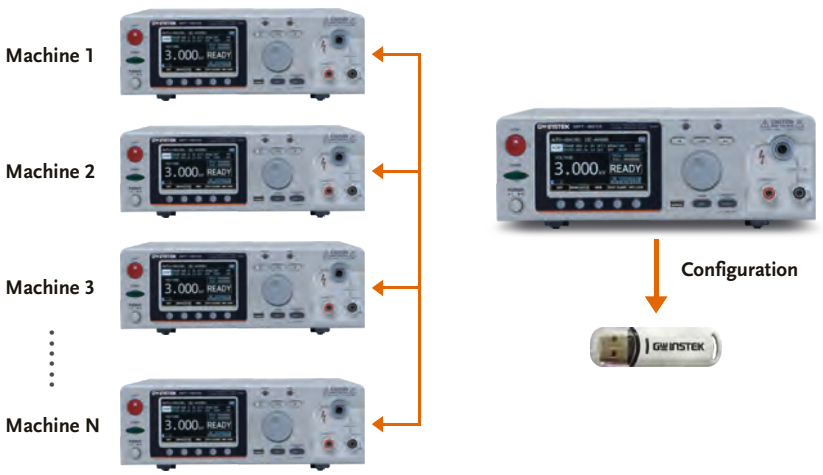
Rich Information



AUTO Mode Listed Result

The large-sized LCD clearly and simultaneously displays the test voltage, test parameters, test status, measurement value and judgment result. The channel usage status and statistical counting results (the total number of tests and the number of FAILs) can be displayed simultaneously, hence, users can easily obtain complete information without switching the screen or connecting an external counter. In addition, AUTO mode also supports tabular testing, which greatly improves the convenience of observation.

D. CONVENIENT PARAMETER DUPLICATION



Export/Import of Setting Parameters

The GPT-9500 series supports the export/import of setting parameters via a USB flash drive. Users only need to set one tester, and the settings can be quickly and massively copied to all testers on production lines that not only improves the efficiency of production testing, but also avoids errors caused by repeated inputs.

E. SETTING DATA EXPORT / IMPORT MECHANISM

Channels Configured on the Rear Panel

The channel outputs of the GPT-9500 series are all configured on the rear panel. Other than the aesthetics of the system configuration, it is more important to effectively reduce the possibility of accidental contact by personnel. Each channel provides disconnection detection to avoid performing an invalid test.

Leakage Current Tester

GLC-10000

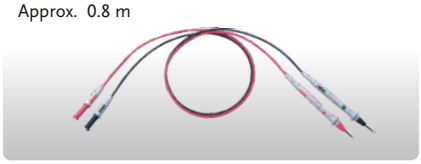
CE | RS-232 | GPIB | USB Device | USB Host | LAN | Signal I/O

FEATURES

* Suitable for Medical Electrical & General Electrical of Leakage Current Measurement
* 7" Touch Pane with Color LCD
* 11 Different Measurement Network to Simulate the Resistance of Human Body (Including IEC 60601-1:2020 3.2rd)
* The Measurement of Maximum Allowable Leakage Current is Up to 50 mA
* External Terminal for Extension MD Connection
* MD OUT Terminal can be Connected to an Oscilloscope for Convenient Comparison of Measured Waveforms
* 30 Sets Memories for Test Parameter; 1000 Sets Memories for Measured Data.
* Test Parameter Export/Import Function Through USB Host
* USB Storage for Measurement Data/ Screen Capture
* Various Standard Interfaces: RS-232C, USB Host & Device, LAN, Signal I/O and GPIB (Optional)

GTL-207A Test Lead

Approx. 0.8 m



GLC-01 Alligator Clips

GLC-02 Foil Probe

GW Instek launches a new leakage current tester – GLC-10000, which features 11 simulated human impedance networks that comply with related safety regulations so as to conduct leakage current test for electric equipment under normal condition or single fault condition. These 11 simulated human impedance networks are comprised of networks for medical electric equipment and general electric and electronic equipment to ensure that the product design and manufacture are in compliance with requirements of safety regulations including IEC, EN, UL, etc.

GLC-10000 provides test requirements for most IT products, household appliances and other electronic and electric equipment, and even medical electronics in the measurement of leakage current (or touch current), including the required measurement network, measurement bandwidth of various current forms are all in compliance with the requirements of the latest version of the applicable regulations. Furthermore, in order to comply with the leakage current flow paths under different regulations, GLC-10000 provides 20 measurement options to meet the requirements of the old and latest versions of the standards.

GLC-10000 is equipped with a 7-inch TFT LCD touch screen, which makes the operation more convenient and fast, and the large screen allows setting information and test results to be displayed on the LCD at the same time, improving the readability of information observation. In addition, users can select the front socket output (10A max.) or the rear terminal block output (up to 20A) to measure the leakage current according to the current consumption of the DUT. 30 sets of internal memory can be used to store the measurement settings of users' products. In addition, 1000 sets of measurement results can be stored to conduct subsequent analysis.

For the rear panel configuration, GLC-10000 also provides a reserved MD external terminal block (EXT+/EXT-), and users can self-define the required simulated impedance networks (only applicable to parallel RC combination) to measure the leakage current to meet the requirements of new MD in future regulations. In addition, GLC-10000 provides a variety of standard interfaces, such as RS-232C, USB device, LAN and Remote I/O, and even GPIB (optional) to meet the needs of system control and data acquisition.

SPECIFICATIONS

Ranges	Range	Resolution	Accuracy		
DC					
50.00 mA	4.00 mA to 50.00 mA	10 µA	±(2 %rdg+6 dgt)		
5.000 mA	0.400 mA to 5.000 mA	1 µA	±(2 %rdg+6 dgt)		
500.0 µA	40.0 µA to 500.0 µA	0.1 µA	±(2 %rdg+6 dgt)		
50.00 µA	4.00 µA to 50.00 µA	0.01 µA	±2.0 %fs		
AC / AC+DC					
			0.1 Hz≤f≤15 Hz	15 Hz< f≤100 kHz	100 kHz< f≤1 MHz
50.00 mA	4.00 mA to 50.00 mA	10 µA	±(4.0 %rdg+10 dgt)	±(2.0 %rdg+6 dgt)	±(2.0 %rdg+10 dgt)
5.000 mA	0.400 mA to 5.000 mA	1 µA	±(4.0 %rdg+10 dgt)	±(2.0 %rdg+6 dgt)	±(2.0 %rdg+10 dgt)
500.0 µA	40.0 µA to 500.0 µA	0.1 µA	±(4.0 %rdg+10 dgt)	±(2.0 %rdg+6 dgt)	±(2.0 %rdg+10 dgt)
50.00 µA	4.00 µA to 50.00 µA	0.01 µA	±4.0 %fs	±2.0 %fs	±2.0 %fs
AC PEAK					
			15 Hz≤f≤10 kHz	10 kHz<f≤100 kHz	100 kHz<f≤1 MHz
75.0 mA	5.0 mA to 75.0 mA	100 µA	±(2.0 %rdg+6dgt)	±5.0 %fs	±15 %fs
7.500 mA	0.500 mA to 7.500 mA	1 µA	±2.5 %fs	±5.0 %fs	±15 %fs
750.0 µA	40.0 µA to 750.0 µA	0.1 µA	±4 %fs	±5.0 %fs	±20 %fs
EUT Voltage/Current Monitor					
300 V	85 V to 300 V	0.1 V	±(5 % rdg + 10 dgt)		
20 A	0.5 A to 20 A	0.1 A	±(2 % rdg + 5 dgt)		

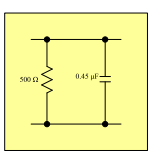
POWER SUPPLY	
For GLC-10000	AC 100 V to 240 V ±10 %, 50/60 Hz; Power consumption: Max. 50 VA
For EUT IN	AC 100 V to 240 V±10 %, 50/60 Hz, 20 A
EUT OUT (Front)	AC 100 V to 240 V, 50/60 Hz, 10 A
EUT OUT (Rear)	AC 100 V to 240 V, 50/60 Hz, 20 A
INTERFACE	
RS-232C, USB host & device, LAN, Signal I/O and GPIB (Optional)	
DIMENSIONS & WEIGHT	
342 (W) x 133.87 (H) x 348.51 (D) mm; Approx. 7.5 kg	

GLC-10000

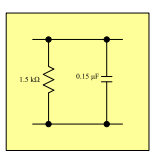
Rear Panel

MEASUREMENT NETWORK (MD)

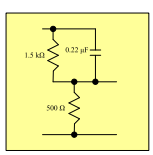
MD-A *UL1563*



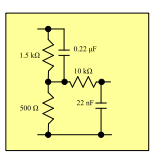
MD-B *UL1492/1310*



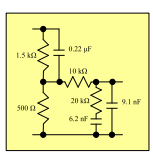
MD-C1 *IEC60990/61010-1*



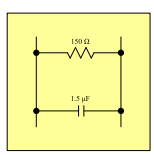
MD-C2 *IEC60990/60598-1*



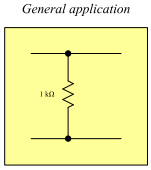
MD-C3 *IEC60990/62368-1*



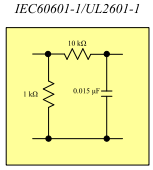
MD-D *IEC60598-1/GB7000.1*



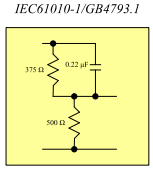
MD-E *General application*



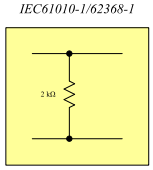
MD-F *IEC60601-1/UL2601-1*



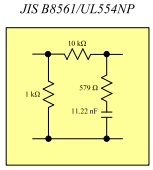
MD-G *IEC61010-1/GB4793.1*



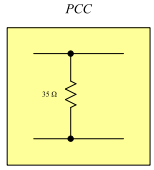
MD-H *IEC61010-1/62368-1*



MD-I *JIS B8561/UL554NP*

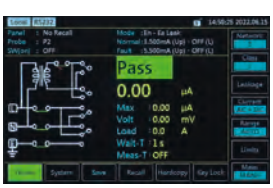


PCC



Note : 1. The standard numbers that are listed are only example; the MD can be used with all applicable standards.
2. PCC is for Meter mode only.

A. SIMPLE AND INTUITIVE SYSTEM



The color TFT touch screen makes operation intuitive and simple, whilst making it easier to observe test result.

B. VARIOUS MEASUREMENT NETWORK

Nine Measurement Network are available for measuring the leakage current of electrical and medical equipment.

C. VARIOUS STANDARD INTERFACES

The various practical interfaces are equipped as standard making control convenient and flexible.

ORDERING INFORMATION

GLC-10000 Leakage Current Tester

ACCESSORIES :
Power cord x 1, Test lead(GTL-207A) x 2, Alligator clips(GLC-01) x 1(Red x 2/Black x 2), Foil probe(GLC-02) x 1, Power Cord for EUT (GLC-03) x 1, Input & output terminal cover (GLC-04) x 1

OPTIONAL

GLC-10KG1 GPIB Card

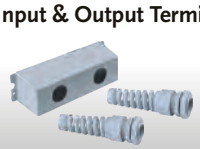
OPTIONAL ACCESSORIES

GTL-232	RS-232C Cable
GTL-240	USB Cable, USB 2.0, A-B Type (L Type), 1200 mm
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GTL-248	GPIB Cable (2.0m)

GLC-03 Power Cord for EUT

Approx. 1.8 m

GLC-04 Input & Output Terminal Cover



Leakage Current Tester

GLC-9000

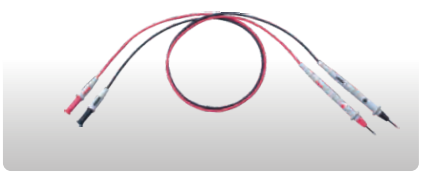
CE | RS-232 | GPIB | USB Device | USB Host | EXT I/O

FEATURES

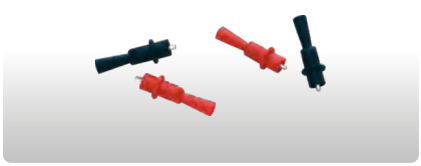
* Suitable for General Electrical of Leakage Current Measurement
* Touch Panel with Color LCD Display
* 9 Different Measurement Network to Simulate the Resistance of Human Body
* 50 Sets Preset Test Conditions Conform to the IEC 60990 ; 30 Sets Memories for Customer Defined
* 8 Different Types of Leakage Current
* Meter Function with SELV/CONV Function
* Upper & Lower Limitation for PASS/FAIL Judgment
* Various Leakage Current Measuring Mode : DC/AC/AC+DC/AC Peak
* Various Standard Interfaces : RS-232/ GPIB/USB Host & Device/EXT I/O

GTL-207A Test Lead

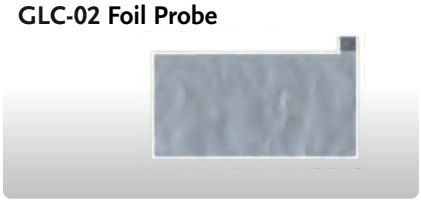
Approx. 0.8 m



GLC-01 Alligator Clips



GLC-02 Foil Probe



The GLC-9000, leakage current tester, is used to perform leakage current (or called touch current) tests on general purpose electric (IEC 60990) equipment. This tester engages with nine measurement networks (or called Measuring Device) to provide the simulation of human body whilst the EUT (equipment under test) is taking a leakage current testing, in compliance with the specific standards or regulations such as IEC, UL, JIS...etc..

In order to provide a simple operation environment, the GLC-9000 equips a large TFT LCD touch panel to configure system as well as to present the measurement settings information and result simultaneously. Besides, there are 50 preset testing conditions, which conform to IEC60990 and other standards, for general electric equipment can be recalled to reduce the setting time. In addition, 30 sets of empty memory are available for user defined.

A Meter mode is also available for the GLC-9000. It uses the measurement terminal (T1/T2) to measure voltage as the same way of ordinary voltmeter. During the voltage measurement, the SELV function (safety extra low voltage) is applicable to detect the voltage value between measuring points whether exceeding the SELV setting.

SPECIFICATIONS

	Ranges	Range	Resolution	Accuracy	
DC					
	25.00 mA	5.00 mA to 25.00 mA	10 µA	±(0.2 %rdg+3 dgt)	
	5.000 mA	0.500 mA to 5.000 mA	1 µA	±(0.2 %rdg+3 dgt)	
	500.0 µA	50.0 µA to 500.0 µA	0.1 µA	±1.0 %fs	
	50.00 µA	4.00 µA to 50.00 µA	0.01 µA	±1.0 %fs	
AC or AC+DC					
				10 Hz<f ≤100 kHz	100 kHz<f ≤1 MHz
	25.00 mA	5.00 mA to 25.00 mA	10 µA	±(2.0 %rdg+6 dgt)	±(2.0 % rdg+10 dgt)
	5.000 mA	0.500 mA to 5.000 mA	1 µA	±(2.0 %rdg+6 dgt)	±(2.0 % rdg+10 dgt)
	500.0 µA	50.0 µA to 500.0 µA	0.1 µA	±(2.0 %rdg+6 dgt)	±(2.0 % rdg+10 dgt)
	50.00 µA	4.00 µA to 50.00 µA	0.01 µA	±2.0 %fs	±2.0 %fs
AC PEAK					
				20 Hz<f ≤1 kHz	1 kHz<f ≤10 kHz
	75.0 mA	10.0 mA to 25.0 mA	100 µA	±(2.0 %rdg+2 dgt)	±(5.0 %rdg+10 dgt)
	10.00 mA	1.00 mA to 10.00 mA	10 µA	±(2.0 %rdg+2 dgt)	±(5.0 %rdg+10 dgt)
	1.000 mA	500 µA to 1.000 mA	1 µA	±2.5 %fs	±5.0 %fs
	500.0 µA	40.0 µA to 500.0 µA	0.1 µA	±4.0 %fs	±5.0 %fs
EUT (V/I CHECK)					
Voltage	300 V	85 V to 300 V	0.1 V	±(2 %rdg+10 dgt)	
Current	10 A	0.5 A to 10 A	0.1 A	±(2 %rdg+5 dgt)	
METER MODE					
	AC/DC	10.0 to 300.0 V	0.1 V	±(3 %rdg+2 V)	
	AC+DC	10.0 to 300.0 V	0.1 V	±(3 %rdg+2 V)	
	AC Peak	15.0 to 430.0 V	0.1 V	±(3 %rdg+2 V)	
INTERFACE					
RS-232C, GPIB, USB Host & Device, EXT I/O					
POWER SOURCE					
For GLC-9000: AC 100 V/120 V/220 V/230 V±10 %, 50/60 Hz; Power Consumption: Max. 30 VA For EUT: AC 85 V to 250 V, 50/60 Hz (264 V Max.)					
DIMENSIONS & WEIGHT					
330 (W) x 150 (H) x 350 (D) mm; Approx. 5 kg					

ORDERING INFORMATION

GLC-9000 Leakage Current Tester

ACCESSORIES :
Power cord x 2, Test lead(GTL-207A) x 2, Alligator clips(GLC-01) x 4(Red x 2/Black x 2), Foil probe(GLC-02) x 1,

OPTIONAL ACCESSORIES

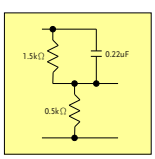
GTL-232	RS-232C Cable
GTL-240	USB Cable, USB 2.0, A-B Type (L Type), 1200 mm
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GTL-248	GPIB Cable (2.0 m)

GLC-9000

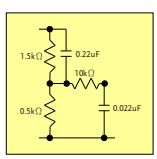
Rear Panel

MEASUREMENT NETWORK (MD)

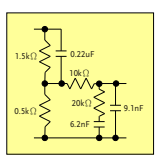
MD-A



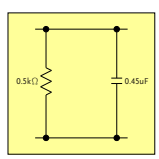
MD-B



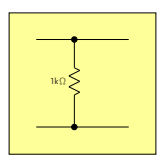
MD-C



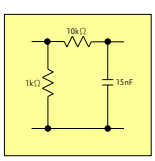
MD-D



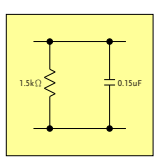
MD-E



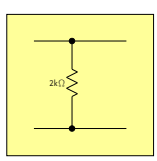
MD-F



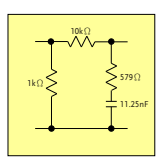
MD-G



MD-H



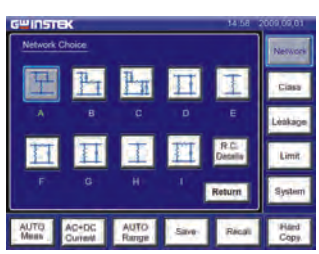
MD-I



A. SIMPLE AND INTUITIVE SYSTEM

The color TFT touch screen makes operation intuitive and simple, whilst making it easier to observe test result.

B. VARIOUS MEASUREMENT NETWORK



Nine Measurement Network are available for measuring the leakage current of electrical and medical equipment.

C. VARIOUS STANDARD INTERFACES

The various practical interfaces are equipped as standard making control convenient and flexible.

OTHER METERS

GW Instek offers a comprehensive "one-stop shopping" solution for all your test and measurement needs, with specialized instruments designed for a wide range of applications.

For power-related measurements, our GPM-8320/8320-60/8330/8330-60 digital power meters are engineered for precise three-phase AC power measurements, making them ideal for testing most electrical and electronic products; the "-60" models support direct input currents of up to 60 A. Meanwhile, the GPM-8310/8213 (AC/DC) digital power meters are perfect for mid-to-high-end applications, including standby power measurements, SPEC Power®, and other low-level power analysis.

If you need to measure D.C. resistance in material components, the GOM-800 Series D.C. milli-ohm meter delivers accuracy and reliability. For audio signal measurements, GW Instek provides the GAD-201G automatic distortion meter and the GVT-427B/417B A.C. millivolt meters.

We also offer three models in the GBM-3000 Series battery meters, with voltage ranges of 1000 V, 300 V, and 80 V. And for high-precision current measurement, the PCS-1000I combines built-in current shunts with advanced measurement circuitry to deliver accurate D.C. and A.C. current readings.

PRODUCTS

- **DC Milli-Ohm Meter**
- **Battery Meter**
- **Digital Power Meter**
- **Automatic Distortion Meter**
- **AC Millvolt Meter**
- **Precision Current Shunt Meter**

OTHER APPLICATION METERS

COMPONENTS TESTING INSTRUMENT

MODEL	Description (Main Function)	Page
GOM-805	DC Milli-Ohm Meter 5 mΩ to 5 MΩ	E63-65
GOM-804	DC Milli-Ohm Meter 5 mΩ to 5 MΩ	

BATTERY METER

MODEL	Description (Main Function)	Page
GBM-3100H	1000 V Battery Meter (including RS-232C/USB device/host and HANDLER interface)	E66-68
GBM-3300	300 V Battery Meter (including RS-232C/USB device/host and HANDLER interface)	
GBM-3080	80 V Battery Meter (including RS-232C/USB device/host and HANDLER interface)	

POWER RELATED INSTRUMENT

MODEL	Description (Main Function)	Page
GPM-8330-60	DC and 0.1 Hz to 100 kHz, Max. direct input of up to 1000 V and 60 A, 5" TFT LCD 3 input element model, Total 10 parameters display, waveform display for V / I / P, Harmonic measurement & analysis	E69-74
GPM-8320-60	DC and 0.1 Hz to 100 kHz, Max. direct input of up to 1000 V and 60 A, 5" TFT LCD 2 input element model, Total 10 parameters display, waveform display for V / I / P, Harmonic measurement & analysis	
GPM-8330	DC and 0.1 Hz to 100 kHz, Max. direct input of up to 1000 V and 20 A, 5" TFT LCD 3 input element model, Total 10 parameters display, waveform display for V / I / P, Harmonic measurement & analysis	E75-78
GPM-8320	DC and 0.1 Hz to 100 kHz, Max. direct input of up to 1000 V and 20 A, 5" TFT LCD 2 input element model, Total 10 parameters display, waveform display for V / I / P, Harmonic measurement & analysis	
GPM-8310	DC and 0.1 Hz to 100 kHz, Max. Direct Input of up to 600 V and 20 A, 5" TFT LCD Total 10 Parameters Display, Waveform Display for V / I / P, Harmonic Measurement & Analysis	E79-84
GPM-8213	DC and 45 Hz to 6 kHz, Max. Direct Input of up to 600 V and 20 A, 4" TFT LCD Total 8 Parameters Display	E85-86

AUDIO RELATED INSTRUMENT

MODEL	Description (Main Function)	Page
GAD-201G	20 Hz to 20 kHz Automatic Distortion Meter	E87
GVT-427B/417B	AC Millivolt Meter (2 CH/1 CH)	E98

PRECISION CURRENT SHUNT METER

MODEL	Description (Main Function)	Page
PCS-1000I	Max. Voltage, AC 600 V/DC 1000 V, Max. Current, AC 300 A/DC 300 A	E89-92

DC Milli-Ohm Meter

GOM-804/805

CE | RS-232 | USB Device | GPIB | Handler | SCAN | EXT I/O | LabVIEW Driver

FEATURES

* 50,000 Counts Display
* 3.5" (320 x 240) TFT LCD Display
* High Accuracy of 0.05 % Precision
* 1Amp Test Current, 0.1 μΩ Resolution
* Fast Measurement of 60 Readings Per Second
* Four wire Resistance Measurement
* Temperature Compensation Measurement Function
* Delayed Measurement
* 20 sets of Panel Setting Memory
* Dry Circuit (GOM-805 Only)
* Drive Modes :
  GOM-805 : DC+/DC-, Pulsed, PWM, Zero, Standby
  GOM-804 : DC+, Standby
* Interface : USB Device, RS-232C, Handler/Scan/EXT I/O, and GPIB(Option)

GOM-804/805 feature 3.5-inch TFT display, maximum 50,000 counts measurement display, the rapid sampling rate of 60 readings per second, optimum 0.05 % measurement precision, four wire measurement method as well as the temperature measurement and temperature compensation measurement function to meet the requirement of low resistance measurement application. The GOM-805 also includes various drive modes and Dry circuit for contact resistance measurement applications. More features, including 20 sets of panel setting memory and many external control interface such as RS-232C, USB, Handler/Scan/EXT IO or GPIB (option), greatly elevate GOM-804/805 milliohm meter's convenience on practical applications.

GOM-804/805 adopt 3.5-inch color LCD to enhance the clarity of measurement results and to provide display for related setting criteria that tremendously brings up the completeness of test information. Additionally, GOM-804/805, with the optimum 0.05 % precision, augment the measurement speed to 60 sampling rate per second and maintain the display digits of five instead of four despite of different speed selections. Furthermore, the independent functionality keys and direction keys together increase the operational convenience which allows users to complete their measurement tasks with intuitive convenience and speed.

GOM-805 provides Dry circuit and various drive modes (DC+, DC-, Pulsed, PWM) for measurement applications on different materials. The pulsed current output mode is suitable for interacting conductors of different materials and this output mode is to reduce the thermal EMF influence, which is caused by electric potential difference generated from different conductors acting on different temperatures while conducting low resistance measurements. The DC+ and DC- output modes are best for the measurement requirements of inductive components. The PWM output mode, ideal for changing temperature sensitive materials, can avoid resistance value variation which is due to over load happened on current measurement for a long period of time. During the DC+, DC- and Pulsed drive is supplied; the Dry circuit can work with them also. Dry circuit can limit the applied voltage under the open circuit voltage of 20mV to avoid over voltage occurred on the both ends of components. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the validity of measurement will then be ruined. For instance, contact resistance of connector measurement is one of the applications.

With respect to connecting the external control, GOM-804/805 provide a D-sub 25-pin combined interface to execute, according to the functionalities, Handler, Scan or EXT IO for respectively connecting to a sorting machine; connecting to an external on-off switch, and directly conducting external trigger control. For remote control and measurement result retrieval requirements, GOM-804/805 also provide various interface selections such as RS-232C, USB, and GPIB (GOM-804(option)/GOM-805(standard) interface. Furthermore, the control commands are compatible to that of GOM-802 that saves time in adjusting programs while switching from the old model to the new model.

To sum up, GOM-804 evolves from GOM-802 platform with more advanced functionalities and specifications, including display digits, measurement speed and standard interface (RS-232C/USB). With all the capabilities of GOM-804, GOM-805 augments itself with new measurement abilities (Dry circuit and various drive modes) to meet the requirements of broader low resistance measurement applications.

SPECIFICATIONS

	GOM-804	GOM-805
DISPLAY		
	50,000 counts	
SAMPLING RATE		
Slow	10 readings / s	
Fast	60 readings / s	

RESISTANCE MEASUREMENT

Range	Resolution	Test Current	Accuracy
5mΩ	0.1μΩ	1A	±(0.1% reading + 0.2% of range)
50mΩ	1μΩ	1A	±(0.1% reading + 0.02% of range)
500mΩ	10μΩ	100mA	±(0.05% reading + 0.02% of range)
5Ω	100μΩ	100mA	±(0.05% reading + 0.02% of range)
50Ω	1mΩ	10mA	±(0.05% reading + 0.02% of range)
500Ω	10mΩ	1mA	±(0.05% reading + 0.008% of range)
5kΩ	100mΩ	100μA	±(0.05% reading + 0.008% of range)
50kΩ	1Ω	100μA	±(0.05% reading + 0.008% of range)
500kΩ	10Ω	10μA	±(0.05% reading + 0.008% of range)
5MΩ (GOM-804)	100Ω	1μA	±(0.2% reading + 0.008% of range)
5MΩ (GOM-805)	100Ω	1μA	±(0.5% reading + 0.008% of range)

TEMPERATURE		
Range	-50°C ~ 399.9°C	
Accuracy	-10°C ~ 40°C : 0.3%±0.5°C ; Other : 0.3%±1.0°C	
Resolution	0.1°C	
DRY CIRCUIT		
	–	Open circuit less than 20mV; For 500mΩ, 5Ω, 50Ω range only

GOM-804/805

SPECIFICATIONS		
	GOM-804	**GOM-805**
DRIVE MODE		
DC+ / DC-	DC + Only	Yes
Pulsed	–	Yes
PWM	–	Yes
Zero	–	Yes
Standby(*)	Yes	Yes
OTHER FUNCTIONS		
	Trigger - Internal, Manual, External; Math - ABS, REL, %, TC; Average : 2 ~10 times; Measurement Delay; TC for Transformer; Compare; Diode; Continuity beeper; Binning (GOM-805 only)	
INTERFACE		
USB	Standard	Standard
RS-232C	Standard	Standard
HANDLER/SCAN/EXT I/O	Standard	Standard
GPIB	Option (factory installed)	Standard
DISPLAY		
	3.5" (320 x 240) TFT LCD	
MEMORY		
	20 sets for panel setting	
POWER SOURCE		
	AC 100 to 240 V, 50/60 Hz	
CONSUMPTION		
	25 VA (max.)	
DIMENSIONS & WEIGHT		
	223 (W) x 102 (H) x 283 (D) mm ; Approx. 3 kg	

Note:(*)The Standby function must be collocated with the new PCB hardware; it is not applicable to sold instruments.

ORDERING INFORMATION

GOM-805	DC Milliohm Meter(Handler/RS-232C/USB Device/GPIB)
GOM-804 with GPIB	DC Milliohm Meter(Handler/RS-232C/USB Device/Opt.01 GPIB)
GOM-804	DC Milliohm Meter(Handler/RS-232C/USB Device)

ACCESSORIES :
Power cord x 1, Test lead GTL-308 x 1

OPTION

GOM-801G1	GPIB Card (only for GOM-804 and must be installed at factory before shipment)

OPTIONAL ACCESSORIES

PT-100	Platinum Temperature Probe
GTL-232	RS-232C cable 9-pin, F-F type, approx. 2000 m
GTL-246	USB cable, A-B type, approx. 1200 m
GTL-248	GPIB cable approx. 2000 m
GTL-309	Test lead, approx. 3000 m

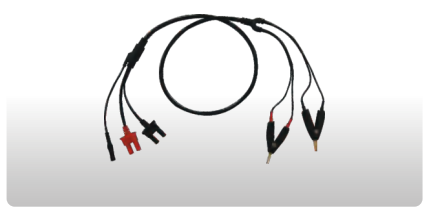
FREE DOWNLOAD

Driver	LabView Driver

Rear Panel

GTL-308 Test lead

Approx. 1.5 m



GTL-309 Test lead

Approx. 3 m

PT-100 Temperature Probe

Approx. 1.5 m

D.C. Milli-Ohm Meter

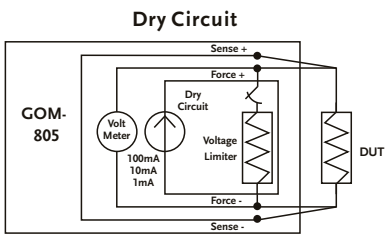
A. TOTALLY REPLACING THE EXISTING MODELS

In terms of the basic functionalities and specifications, GOM-804/805 can absolutely replace the existing model_GOM-802. All GOM-802 functionalities can be found from GOM-804/805, including resistance measurement range, 1A test current (maximum), four wire measurement method, temperature probe (option, accessory model : PT-100) for temperature measurement and temperature compensation measurement, etc.The programming commands are also compatible to that of GOM-802. To simply put it, the brand new GOM-804/805 not only provide better display interface, fast measurement (60 readings per second), but also collocate with standard communications interface (RS-232C/USB device) to facilitate users in accomplishing measurement tasks rapidly. On top of that, model switching will not be a problem.

B. FASTER MEASUREMENT WITHOUT SACRIFICING RESOLUTION

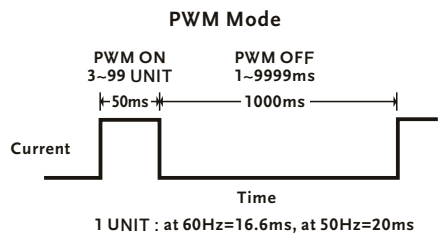
GOM-804/805 has two measurement speed selections, which are Fast reaching 60 readings per second, and Slow 10 readings per second. A major departure from the past, users, in the past, had to juggle between speed and display resolution. GOM-804/805 will not affect resolution despite of any speed selections and will maintain the highest display digits. In other words, reading resolution will not be changed by changing speed and the display digits remain the same.

C. DRY CIRCUIT TEST FOR GOM-805 ONLY



Dry circuit is to limit test voltage and current to certain levels which will not cause contact points to produce physically or electrically changed circuit and its most frequently used application is contact resistance of connector measurement. Based upon MIL-STD-1344 method 3002-1 low signal level contact resistance, tests must be applied under the maximum open circuit voltage of 20 mV (or lower), and short circuit current of 100 mA (or lower) to avoid over voltage for the both ends of components. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the validity of measurement will then be ruined. GOM-805 provides three levels (500 mΩ:100 mA/5 Ω:10 mA/50 Ω:1 mA) to limit open circuit voltage at 20 mV to execute Dry circuit tests.

D. VARIOUS DRIVE MODES FOR GOM-805 ONLY



GOM-805 provides various current output drive modes to satisfy diversified and accurate low resistance measurement applications. For instance, for interacting conductors of different materials, the pulsed current output mode can be applied to reduce the thermal EMF influence, which is caused by different conductors acting on different temperatures. The PWM output mode, ideal for changing temperature sensitive materials, can avoid resistance value variation which is due to over load on large current measurement in a long period of time. The DC+ and DC- output modes are best for the measurement requirements of inductive components.

E. STANDARD INTERFACE FOR CONTROL AND COMMUNICATIONS

With respect to connecting the external control, GOM-804/805 provide a D-sub 25-pin composite interface to execute, according to the functionalities, Handler, Scan or EXT IO for connecting to a sorting machine; connecting to an external on-off switch, and directly conducting external trigger control respectively. For remote control and measurement result retrieval requirements, GOM-804/805 also provide various interface selections such as RS-232C, USB, and GPIB GOM-804(option)/GOM-805 (standard) interface. The commands of GOM-804/805 are compatible to that of GOM-802 that allows users to switch equipment with simple settings. There is no cost in adjusting existing programs and production delay will not be happening while switching from the old model to the new model.

Battery Meter

GBM-3000 Series

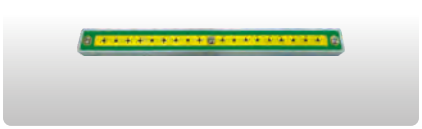
CE | USB Host | USB Device | RS-232 | Handler

FEATURES

* 3.5' TFT LCD (320x240)
* Measurement Items: DC Voltage and AC Resistance
  - Voltage Measurement: 1000 V(GBM-3100H)/ 300 V(GBM-3300)/80 V(GBM-3080)
  - Resistance Measurement: 0 mΩ to 3.2 kΩ(max.)
* Basic Accuracy For Voltage Measurement: 0.01%
* Basic Accuracy For Resistance Measurement: 0.5%
* Measurement Resolution up to 0.1 μΩ and 10 μV, Suitable For Single-cell Measurement
* Independent Go/NoGo Determination Function For Voltage and Resistance Respectively
* The Judgment Mechanism of Test Lead(Probe) Disconnect/Contact Failure is to Ensure The Measurement Reliability
* Standard Interfaces: USB Host/Device, RS-232C and Handler

Rear Panel

GBM-S1 Short Bar



GW Instek desktop battery tester, the GBM-3000 series, which uses AC 1 kHz as the test signal and measures battery's voltage and internal resistance to 1000 V (GBM-3100H) or 300 V (GBM-3300) and 80V (GBM-3080). The series features 3.5" TFT LCD, 4-wire measurement method, high-resolution (6-digit voltage / 5-digit resistance) measurement display capability, and independent GO/NOGO determination of voltage and resistance, various communications interfaces, etc. to meet various types of battery measurements, ranging from single cell, battery cell, to the end product (battery), etc. so as to facilitate users in achieving accurate measurements at all stages of production.

The GBM-3000 series provides excellent features for various types of batteries in measuring open circuit voltage and resistance. For voltage measurement, the accuracy is as high as ± (0.01 % reading + 5 digits), and measurement resolution is up to 10 μV (at 8 V). For resistance measurement, the accuracy reaches ± (0.5 % reading + 5 digits) and the resolution achieves 0.1 μΩ (at 3 mΩ) that is especially suitable for the sorting of single cell measurements, which is to achieve a better output balance for the follow-up series and parallel connections. In the meantime, in order to facilitate users to quickly and clearly interpret the measurement results, the GBM-3000 series features HI/LO determination respectively based on voltage and resistance, and can be switched to the simple (big numerical display) mode to meet the requirements of test accuracy, clear and easy-to-read, and elevated inspection efficiency and capabilities.

Other than the excellent measurement capabilities, the GBM-3000 series also provides a number of functions to ensure effectiveness and convenience. For the effectiveness, the test lead (probe) contact status detection function is to effectively prompt users whether test lead (probe) and DUT are in good contact to ensure the validity of the measured value. In terms of convenience, the GBM-3000 series provides two data storage methods (up to 10,000 lots of measurement values). "General storage" only stores the measured voltage and resistance values; "statistical storage" has the related parameters (Cp/Ckp/Mean/MAX/MIN...) for the statistical analysis. Users can store the data from the measurement process in the internal memory first and then transfer the data to the computer via flash drive for subsequent analysis without being limited to the connection with the computer.

In addition, for retrieving and storing measurement results via the transmission method, the GBM-3000 series provides RS-232C/USB device (virtual COM) for writing programs and retrievals. The handler interface is provided for external trigger control via PLC. All interfaces are standard-equipped that not only save the cost of instruments, but also meet the requirement of using different automated measurement systems.

GBM-3000 Series

ORDERING INFORMATION

GBM-3100H	1000 V Battery Meter (including RS-232C/USB device/host and HANDLER interface)
GBM-3300	300 V Battery Meter (including RS-232C/USB device/host and HANDLER interface)
GBM-3080	80 V Battery Meter (including RS-232C/USB device/host and HANDLER interface)

ACCESSORIES :
Power cord x 1
GBM-01 x 1 : 4 Wire(kelvin clip) test lead, 90 V(max.), approx..1100 mm

FREE DOWNLOAD

PC Software : Battery Meter

OPTIONAL ACCESSORIES

GBM-02	4 Wire (single pin) test probe, 80 V (max.), approx. 1100 mm
GBM-03	4 Wire (twin pin) test probe, 300 V (max.), approx. 1400 mm
GBM-03A	4 Wire (twin pin) test probe, 1000 V (max.), approx. 1400 mm
GBM-S1	Short Bar (for GBM-02/GBM-03/GBM-03A)
GTL-232	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000 mm
GTL-246	USB cable, A-B type, approx.1200 mm
GRA-422	Rack Mount kit
GRA-454	Rack Mount Kit (19",2U) for one set or two sets

Battery Meter

SPECIFICATIONS

DISPLAY	**Screen**	3.5"(320 x240) TFT LCD
	Resistance	5 digits
	Voltage	6 digits
TEST SPEED	**Slow**	4 time/second
	Medium	11 time/second
	Fast	25 time/second
	Ex. Fast	60 time/second
RESISTANCE MEASUREMENT	**Test Frequency**	1kHz (±0.5Hz) Fixed
	Input Impedance	3mΩ~ 300mΩ: 99kΩ, 3Ω ~ 3kΩ: 2MΩ

Range

Range No.	Range	Max. scale	Resolution	Test Current	Open-circuit Voltage (Vpp,Max)
0	3mΩ	3.1000mΩ	0.1μΩ	100mA	8V
1	30mΩ	31.000mΩ	1μΩ	100mA	8V
2	300mΩ	310.00mΩ	10μΩ	10mA	7V
3	3Ω	3.1000Ω	100μΩ	1mA	3V
4	30Ω	31.000Ω	1mΩ	100μA	2V
5	300Ω	310.00Ω	10mΩ	10μA	1.5V
6	3kΩ	3200.0Ω	100mΩ	10μA	1.5V

Accuracy

Range No.	Speed	Accuracy	Temperature Coefficient
0	Slow	±0.5%rdg ± 10dgt	(±0.05%rdg ±1dgt)/°C
	Medium	±0.5%rdg ± 15dgt	
	Fast	±0.5%rdg ± 20dgt	
	EX. Fast	±0.5%rdg ± 40dgt	
1~6	Slow	±0.5%rdg ± 5dgt	(±0.05%rdg ± 0.5dgt)/°C
	Medium	±0.5%rdg ± 7dgt	
	Fast	±0.5%rdg ± 7dgt	
	EX. Fast	±1.0%rdg ± 8dgt	

VOLTAGE MEASUREMENT	**Range (GBM-3100H)**	

Range No.	Range	Max. scale	Resolution
0	10V	±9.99999	10 μV
1	100V	±99.9999	100 μV
2	1000V	±1009.99	1mV/10mV

Range (GBM-3300/3080)

Range No.	Range	Max. scale	Resolution
0	8V	±8.08000	10 μV
1	80V	±80.8000	100 μV
2	300V (For GBM-3300 only)	±303.000	1mV

Accuracy

Range No.	Speed	Accuracy	Temperature Coefficient
0~2	Slow	±0.01%rdg ±5dgt	(±0.001%rdg ± 0.5dgt)/°C
	Medium	±0.01%rdg ±7dgt	
	Fast	±0.05%rdg ±7dgt	
	EX. Fast	±0.10%rdg ±10dgt	

OTHER FUNCTIONS	**Range Selection**	Auto range, Hold range, Nom range
	Comparator	ABS, PER or SEQ
	Contact Detection	OPEN & WIRE
	Buzzer	OFF, Pass, Fail
	Trigger	INT, EXT
INTERFACE		USB Host/USB Device/RS-232C/Handler
POWER SOURCE		AC 100 to 240, 50 to 60 Hz; Consumption: 10 W
DIMENSIONS & WEIGHT		264(W) x 107(H) x 309(D) mm, Approx. 2.8 kg

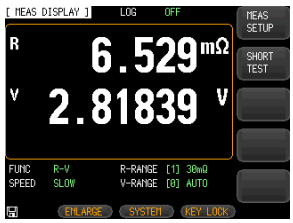
GBM-01
4 Wire(kelvin clip) test lead, 90 V(max.)

GBM-02
4 Wire(single pin) test probe, 80 V(max.)

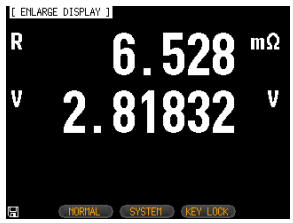
GBM-03
4 Wire(twin pin) test probe, 300 V(max.)

GBM-03A
4 Wire(twin pin) test probe, 1000 V(max.)

A. TWO DISPLAY MODES



Standard Mode
(Setting conditions and R+V measurement parameters)

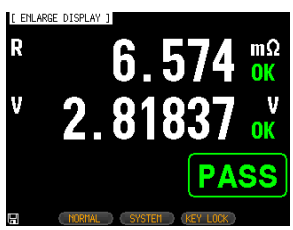


Simple Mode
(R+V measurement parameters)

The GBM-3000 series offers two display modes to facilitate users in maximizing the benefits of their measurements – Standard mode: The main measurement parameters (three combinations: R+V/R/V) and parameter settings for the related measurements can be displayed simultaneously. This mode is applicable to R&D design and engineering certification. Simple mode: Big numerical display only shows the results of main measurement parameters to increase the visibility of observations. This mode is suitable for production measurements.

B. INDEPENDENT GO/NOGO DETERMINATION

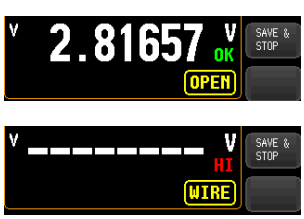
Independent HI/LO Setting



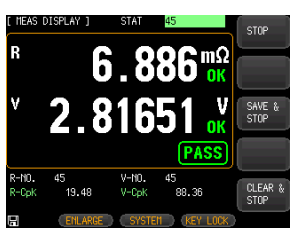
Separate & Totally Judgement

The GBM-3000 series provides independent HI/LO determination settings for both voltage and resistance and can be set according to the required mode, such as SEQ, PER or ABS. In addition to displaying the results of the final determination, the results of individual measurement parameters are also provided for subsequent actions.

C. EXCELLENT SUPPLEMENTARY MEASUREMENT CAPABILITY



Disconnect/Contact Display



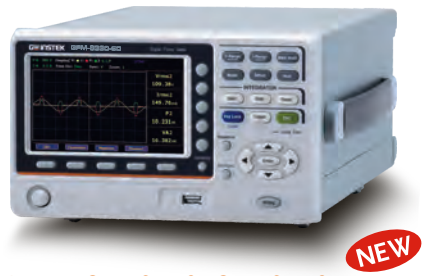
Statistical Function

In addition to providing accurate measurements, the ability of the GBM-3000 Series to supplement the measurement of production lines is also a major feature of the series. For example, the ability to detect disconnect/contact. The display screen can clearly show bad contact of the test lead (probe).The series can store up to 10,000 lots of measurement data and has the statistical calculation function to allow the status of the production process to be clearly observed and retained in real time without any manual calculation or connection to the computer. After the measurement is completed, the result can be transferred to the computer through flash drive for long-term storage and subsequent analysis.

D. COMPREHENSIVE STANDARD INTERFACES

Finally, the GBM-3000 series provides a variety of practical and standard-equipped interfaces including RS-232C/USB device/ Handler, which are for measurement result collection in the remote program control or collocating with system integration for external trigger measurement through PLC.

Digital Power Meter



NEW

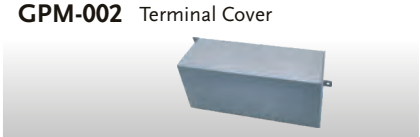
GPM-8320-60/8330-60

CE | USB Host | USB Device | LAN | RS-232 | GPIB | DA12

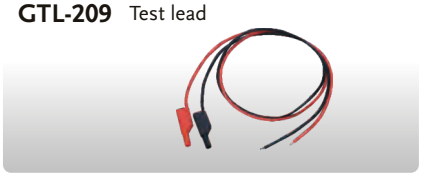
FEATURES

* 5" TFT LCD
* Voltage/Current Test Freq. Bandwidth: DC, 0.1 Hz to 100 kHz
* Direct Input Current up to 60 A
* Waveform Display : V (Voltage), I (Current), P (Wattage)
* Distorted Wave Current/Voltage Measurement: Full Range for CF=3, and Half Range for CF= 6 (or 6A)
* Meeting IEC 61000-4-7 Harmonic Measurement (50 Hz/60 Hz)
* Wiring Selecting Button (1P3W, 3P3W, 3P4W, 3V3A)
* Harmonic Measurement & Analysis up to 50 Orders
* Auto Ranging Function for Integration Mode
* Screen Capture Through USB Host
* Provide External Current Sensor Input (EXT1/EXT2)
* Standard Interface: RS-232C, USB Device/Host, LAN
* Optional Interface: GPM-DA12 - GPIB + Digital I/O (Factory Installed Only)

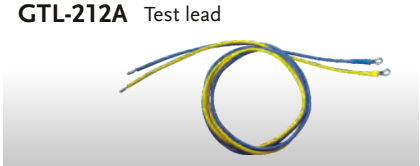
GPM-002 Terminal Cover



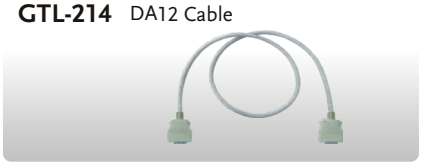
GTL-209 Test lead



GTL-212A Test lead



GTL-214 DA12 Cable



GW Instek GPM-8320-60/GPM-8330-60 are extension models of the existing three-phase power meter GPM-8320/GPM-8330. The GPM-8320-60 provides 2 input elements, and the GPM-8330-60 provides 3 input elements and the added ""-60"" symbol means the maximum current of the direct input can reach 70 A (60 A is guaranteed specification) , which not only enhance the high-current power measurement applications, but also save the cost of current transformer compared to the existing models. These models have a testing bandwidth of DC, 0.1 Hz to 100 kHz and feature 16-bit A/D converters and a sampling rate of 300 kHz. A 5-inch TFT LCD display, 5 digits of measurement readings, 25 different power measurement parameters, and high precision measurement capabilities are also provided. GPM-8320-60/GPM-8330-60 also feature waveform display capabilities (voltage/current/power), the integration measurement function, harmonics measurement and analysis of multiple orders (50 Hz / 60 Hz measurement complies with IEC61000-4-7 requirements), external sensor input terminals, and a variety of communications interfaces. These features help users achieve clear, convenient, and accurate power measurements, making them the most fully-featured and cost-effective power meters in the same category.

GPM-8320-60/GPM-8330-60 provide multiple input voltage configuration wiring modes (1P3W/3P3W/3P4W/3V3A). Users can choose the wiring mode according to their specific requirements to measure parameters for specific wiring methods, and even calculate efficiency. In addition, for a rated input voltage of 1000 V and an input current of 60 A, they support a minimum current range of 1 A (resolution of 0.1 mA), power measurement resolution of 0.1 mW, crest factor of 3 (for half range, the CF can reach up to 6 or 6A), and voltage/current/power measurement accuracy of ± 0.1 % reading ± 0.05 % range. Users can select different measurement modes (AC+DC/AC/DC/V-MEAN) to provide up to 25 related parameters for power measurement. These parameters include voltage (Vrms/Vac/Vdc/Vmn/V+pk/V-pk), current (Irms/Iac/Idc/I+pk/I-pk), frequency (VHz/IHz), power (P/ P+pk/ P-pk), crest factor (CFV/CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion (THDV/THDI), maximum current ratio (MCR), and MATH calculation function. Therefore, they provide the best range and accuracy support for measuring the power consumption of electrical and electronic products.

GPM-8320-60/GPM-8330-60 also effectively utilize the advantages of TFT LCD display, providing results of parameter measurements in both numerical and graphical formats. In terms of numerical display, it offers a general mode and a multiple mode. The general mode includes 4 tabs (page1~page4), and each tab can display 10 measurement parameters (2 main measurements + 8 monitoring measurements). Users can freely combine these parameters to display the results of measurements from various modules. The multiple mode can simultaneously display the measurement results of three modules, which is particularly suitable for comparing differences in measurements between modules, such as unbalanced three-phase. This mode also offers 4 tabs, and each tab can display 8 measurement parameters. In terms of graphical display, they offer a simple oscilloscope mode to display voltage, current, and power parameters in waveform format. Additionally, the display provides numerical or bar chart display for the measurement and analysis of harmonics signals at various orders that not only satisfies the need for accuracy and clear readability in process testing, but also meets the diverse measurement application requirements for research and development, design and quality verification.

GPM-8320-60/GPM-8330-60 have comprehensive mechanisms and functions for auxiliary measurements. For applications that require measuring high voltage, they provide VT rate settings that can be used with external potential transformers. For measuring large current, it depends on the type of current transformer, whether it is a voltage output type or a current output type. If it is a current output type, it can be directly locked onto the meter's rear panel and used with CT rate settings for measurement. If it is a voltage output type, it can be measured through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8320-60/GPM-8330-60. Automatic range switching can be customized to the required range to save unnecessary time spent on range switching. The internal memory of 10,000 data logs can store measurement data at the update rate set by GPM-8320-60/GPM-8330-60 or at a user-defined time interval for future analysis.

In terms of data acquisition and storage, GPM-8320-60/GPM-8330-60 offer a variety of communications interfaces, including RS-232C/USB device (virtual COM)/LAN, or optional GPIB. Users can choose to write programs to read measurement results according to their habits or in collocation with existing system interfaces. The USB host can support screen capture, internal data logging, and firmware updates for GPM-8320-60/GPM-8330-60. For those with the needs of using external signal control or data recorder for data recording, GPM-8320-60/GPM-8330-60 also offer an optional Digital I/O (DA12) interface (must be installed at the factory), which can be connected to external controllers such as PLC or data recorders to meet the needs of automated measurements or long recording applications.

ORDERING INFORMATION

GPM-8320-60 Digital Power Meter (RS-232C/USB/USB device & host/LAN)
GPM-8320-60 (with GPM-DA12) Digital Power Meter (RS-232C/USB/USB device & host/LAN and opt. GPM-DA12)
GPM-8330-60 Digital Power Meter (RS-232C/USB/USB device & host/LAN)
GPM-8330-60 (with GPM-DA12) Digital Power Meter (RS-232C/USB/USB device & host/LAN and opt. GPM-DA12)

ACCESSORIES :
Power cord x 1, Terminal Cover GPM-002 x 1
GPM-8320-60: Test LEAD GTL-209 x 2, Test Lead GTL-212A x 2
GPM-8330-60: Test LEAD GTL-209 x 3, Test Lead GTL-212A x 3
DA12 cable GTL-214 (available for GPM-8320-60/8330-60 with GPM-DA12)

OPTIONAL

GPM-DA12 GPIB+DA12 Interface (including cable, GTL-214)
Note : The option is 2-in-1 interface and must be installed in factory.

OPTIONAL ACCESSORIES

GCP-300 Current Probe (suitable for the external input, EXT2, connection)
GTL-209 Test Lead, Banana to Bare-wire, Approx. 1000 mm
GTL-212A Test Lead, O-Type to Bare-wire, Approx. 1000 mm
GTL-214 DA12 Cable, Approx. 1000 mm
GTL-232 RS-232 Cable, 9 pin F-F type, null modem for computer, Approx. 2000 mm
GTL-246 USB Cable, A-B type, Approx. 1200 mm
GTL-258 GPIB Cable, 25-pin Micro-D connection, Approx. 1900 mm
GRA-452 Rack Mount Kit (19" 3U)

SPECIFICATIONS

INPUT		
Item	Specifications	
Input type	Voltage	Floating input through resistive voltage divider
	Current	Floating input through shunt
Measure range	Voltage	15 V, 30 V, 60 V, 150 V, 300 V, 600 V and 1000 V
	Current	
	Direct input	1 A, 2 A, 5 A, 10 A, 20 A and 60 A
	Sensor input	EX1: 2.5 V, 5 V and 10 V EX2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V and 2 V
Input impedance	Voltage	Input resistance: approach 2 MΩ
	Current	
	Direct input range 1 A to 60 A	Input resistance: approach 1.65 mΩ
	Sensor input	
	Input range 2.5 V to 10 V (EX1)	Input resistance: approach 100 kΩ
	Input range 50 mV to 2 V (EX2)	Input resistance: approach 20 kΩ
Continuous maximum allowable input	Voltage	Peak value of 1.5 kV or RMS value of 1 kV, whichever is less. When range 1000 V CF=1.5
	Current	
	Direct input range 1 A to 60 A	Peak value of 150 A or RMS value of 70 A, whichever is less. Guaranteed specifications 65 A
	Sensor input	Peak value less than or equal to 5 times of the rated range
Input bandwidth	DC, 0.1 Hz to 100 kHz	
Continuous maximum Common-mode voltage	600 Vrms, CAT Ⅱ	
Line filter	select OFF or ON (cut off frequency of 500 Hz)	
Frequency filter	select OFF or ON (cut off frequency of 500 Hz)	
A/D converter	Simultaneous conversion voltage and current inputs	
	Resolution 16 bits	
	Maximum conversion rate Approx. 300 kHz	
Display update interval	When the data update interval is 100 ms the numeric display 10 items display update interval is 200 ms	
	When the data update interval is 100 ms or 250 ms and the numeric value display is set to Matrix or ALL Items display update interval is 500 ms	
	The waveform display update intervals are approximately 1 s	

VOLTAGE AND CURRENT ACCURACY		
Item	Specifications	
Requirements	Temperature	23 °C ± 5 °C
	Humidity	30 % to 75 %RH
	Input waveform	Sine wave crest factor = 3
	common-mode voltage	0 V
	Number of displayed digits	5 digits
	Frequency filter	Turn on to measure voltage or current of 200 Hz or less
	After 30 minutes after warm-up time has passed	
	After measurement range is changed (zero-level compensation)	
	Update interval is 250 ms	
Accuracy	Effective range	1 % to 105 % of range
	DC	± (0.2 % of reading + 0.2 % of range)
	0.1 Hz ≤ f < 45 Hz	± (0.1 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1 kHz	± (0.1 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± ((0.07 x f) % of reading + 0.3% of range) to Voltage ± ((0.13 x f) % of reading + 0.4% of range) to Current ± ((0.07 x f) % of reading + 0.3% of range) to EXT 1/2
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 0.5 % of range) ± [{0.04 x (f-10)} % of reading] to Voltage ± ((0.13 x f) % of reading + 0.5% of range)) to Current ± (0.5 % of reading + 0.5 % of range) ± [{0.04 x (f-10)} % of reading] to EXT 1/2
	Values for voltage in excess of 750 V for which 30 kHz < f ≤ 100 kHz are reference only Values for current in excess of 20 A for which 30 kHz < f ≤ 100 kHz are reference only	
Temperature coefficient	Add	± 0.03 % of reading/°C within the range 5 °C to 18 °C or 28 °C to 40 °C
When the line filter is turned ON	45 Hz to 66 Hz	Add 0.3 % of reading
	< 45 Hz	Add 1 % of reading
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy changes caused by data update interval	When the data update interval is 100 ms, and Auto, add 0.05 % of reading to the 0.1 Hz to 1 kHz accuracy	
Influence of temperature changes after zero-level compensation or range change	Add 0.02 % of range/°C to the DC voltage accuracy.	
	Add the following value to the DC current accuracies.	
	1 A / 2 A / 5 A / 10 A / 20 A / 60 A ranges	500 µA/°C
	External current sensor input (/EX1)	1 mV/°C
	External current sensor input (/EX2)	50 µV/°C
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy changes caused by data update interval	When the data update interval is 100 ms, and Auto, add 0.05 % of reading to the 0.1 Hz to 1 kHz accuracy	

SPECIFICATIONS

ACTIVE POWER ACCURACY		
Item	Specifications	
Requirements	same as the conditions for voltage and current.	
	Power factor	1
Accuracy	Effective range	1 % to 110 % of range
	DC	± (0.3 % of reading + 0.2 % of range)
	0.1 Hz ≤ f < 45 Hz	± (0.3 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1 kHz	± (0.2 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± (0.3 % of reading + 0.5 % of range) ± [{0.13 x f} % of reading]
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 1 % of range) ± [{0.13 x f} % of reading]
Influence of power factor	when power factor (λ) = 0 (S: apparent power)	
	± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz	
	± {(0.1 + 0.15 × f) % of S } for up to 100 kHz as reference data	
	•f is frequency of input signal in kHz	
	when 0 < λ < 1 (Φ: phase angle of the Voltage and current)	
	(power reading) × [(power reading error%) + (power range %) × (power range / indicated apparent power value) + {tanΦ × (influence when λ=o)%}]	
When the line filter is turned ON	45 Hz to 66 Hz	Add 0.3 % of reading
	< 45 Hz	Add 1 % of reading
Temperature coefficient	same as the temperature coefficient for voltage and current	
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy of apparent power S	voltage accuracy + current accuracy	
Accuracy of reactive power Q	accuracy of apparent power + (√1.0004 - λ2) - (√1 - λ2) × 100 %	
Accuracy of power factor λ	± [(λ-λ/1.0002)+ | cosø-cos{ø+sin-1 (influence from the power factor when λ = 0 %/100)} |] ± 1 digit when voltage and current are at the measurement range rated input	
Accuracy of phase difference Φ	± [| ø-cos-1(λ/1.0002) | + sin-1 (influence from the power factor when λ = 0 % / 100)] ± 1 digit when voltage and current are at the measurement range rated input	
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy changes caused by data update interval	When the data update interval is 100 ms, and Auto, add 0.05 % of reading to the 0.1 Hz to 1 kHz accuracy	
VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENT		
Item	Specifications	
Measurement method	Digital sampling method	
Crest factor	3 or 6 (6A)	
Wiring system	1P3W, 3P3W, 3P4W, 3V3A	
Range select	Select manual or auto ranging	
Auto range	Auto-range increase	
	The range is upped when any of the following conditions is met.	
	Crest factor 3	Vrms or Irms exceeds 130 % of the currently set measurement range Vpk, Ipk value of the input signal exceeds 300 % of the currently set measurement range
	Crest factor 6	Vrms or Irms exceeds 130 % of the currently set measurement range Vpk, Ipk value of the input signal exceeds 600 % of the currently set measurement range
	Crest factor 6A	Vrms or Irms exceeds 260 % of the currently set measurement range Vpk, Ipk value of the input signal exceeds 600 % of the currently set measurement range
	Auto-range decline	
	The range is downed when all of the following conditions are met	
	Crest factor 3	Vrms or Irms is less than or equal to 30 % of the measurement range Vrms or Irms is less than or equal to 125 % of the next lower measurement range Vpk, Ipk value of the input signal exceeds 300 % of the currently set measurement range
	Crest factor 6 or 6A	Vrms or Irms is less than or equal to 30 % of the measurement range Vrms or Irms is less than or equal to 125 % of the next lower measurement range Vpk, Ipk value of the input signal exceeds 600 % of the currently set measurement range
Display mode Switching	AC+DC (the true RMS value of voltage and current)	
	V-MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current)	
	AC	
	DC	
Measurement synchronization source	Select voltage, current, or off	
	In the case of Auto Update Rate, select the voltage or current from the equipped element	
Line filter	Select OFF or ON (cutoff frequency at 500 Hz)	
Peak measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled	
Zero-level compensation	Removes the internal offset of the measure unit (After measurement range is changed)	
Measurement parameters	Voltage	Vrms, Vmn, Vdc, Vac
	Current	Irms, Idc, Iac
	Active Power	P
	Apparent Power	VA

SPECIFICATIONS

	Reactive power	VAR		
	Power Factor	PF		
	Crest Factor	CFI, CFV		
	Phase Angle	DEG		
	Frequency	IHz and VHz		
	Voltage Peak	V+pk and V-pk		
	Current Peak	I+pk and I-pk		
	Active Power Peak	P+pk and P-pk		
	Total Harmonic Distortion	THDI and THDV		
	Mathematical Computation	MATH, EFFi		
	Maximum Current Ratio	MCR		
FREQUENCY MEASUREMENT				
Item	Specifications			
Measurement item	Voltage and current			
Measurement frequency range	Data update interval	Measurement Frequency Range		
	0.1 s	20 Hz ≤ f ≤ 100 kHz		
	0.25 s	10 Hz ≤ f ≤ 100 kHz		
	0.5 s	5.0 Hz ≤ f ≤ 100 kHz		
	1 s	2.0 Hz ≤ f ≤ 100 kHz		
	2 s	1.0 Hz ≤ f ≤ 100 kHz		
	5 s	0.5 Hz ≤ f ≤ 100 kHz		
	10 s	0.2 Hz ≤ f ≤ 100 kHz		
	20 s	0.1 Hz ≤ f ≤ 100 kHz		
	Auto (*)	0.1 Hz ≤ f ≤ 100 kHz		
	(*) Limit of the measurement lower limit frequency by the Timeout setting			
	Timeout	lower limit frequency		
	1 s	2.0 Hz		
	5 s	0.5 Hz		
	10 s	0.2 Hz		
	20 s	0.1 Hz		
Measurement range	Auto switching among six types: 100 mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.			
Frequency filter	Select OFF or ON (cut off frequency of 500 Hz)			
Accuracy	Requirements	When the input signal level is 30 % or more of the measurement range If the crest factor is set to 3		
		(60 % or more if the crest factor is set to 6 or 6A)		
		• Frequency filter is ON when measuring voltage or current of 200 Hz or less		
	± (0.06 % of reading)			
INTEGRATION				
Item	Specifications			
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode			
Timer	Automatically stop integration by setting a timer.			
	Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds			
Count overflow	WP: 999999 MWh / -99999 MWh q: 999999 MAh / -99999 MAh			
Accuracy	± (Power accuracy (or current accuracy) + 0.1 % of reading) (fixed range)			
Range setting	Auto range or fixed range is available for Integration			
Timer accuracy	± 0.02 %			
Remote control	Start, stop and reset operations are available using an external remote signal (option)			
HARMONIC MEASUREMENT				
Item	Specifications			
Measured item	Voltage, Current, Power			
Measured method	Zero-cross simultaneous calculation method			
Frequency range	10 Hz to 1.2 kHz			
FFT data length	4096			
	(Auto switch when both 50 Hz / 60 Hz and update rate must be greater than or equal to 0.5 s)			
Sample rate, window width, and upper limit of Analysis orders*		Sample rate	Window Width	upper limit of Analysis orders
	45 Hz to 55 Hz	f × 512	10	50
	54 Hz to 66 Hz	f x 512	12	50
FFT data length	1024			
Sample rate, window width, and upper limit of Analysis orders*	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders
	10 Hz to 67 Hz	f × 1024	1	50
	67 Hz to 150 Hz	f × 512	2	32
	150 Hz to 300 Hz	f × 256	4	16
	300 Hz to 600 Hz	f × 128	8	8
	600 Hz to 1200 Hz	f × 64	16	4
Accuracy	Frequency	Voltage	Current	Power
	10 Hz ≤ f < 45 Hz	0.15 % of reading	0.15 % of reading	0.35 % of reading
		+ 0.35 % of range	+ 0.35 % of range	+ 0.50 % of range
	45 Hz ≤ f < 440 Hz	0.15 % of reading	0.15 % of reading	0.25 % of reading
		+ 0.35 % of range	+ 0.35 % of range	+ 0.50 % of range

SPECIFICATIONS				
	440 Hz ≤ f < 1.2 kHz	0.20 % of reading	0.20 % of reading	0.40 % of reading
		+ 0.35 % of range	+ 0.35 % of range	+ 0.50 % of range

* 50 Hz / 60 Hz Compliant IEC61000-4-7 (update rate must be > 0.5 s)
* Harmonic calculation: FFT method in which FFT data length is divided into 2 types: 1024 and 4096.
* FFT data length automatically switches in accord with the Frequency and Update Rate of measured signal.

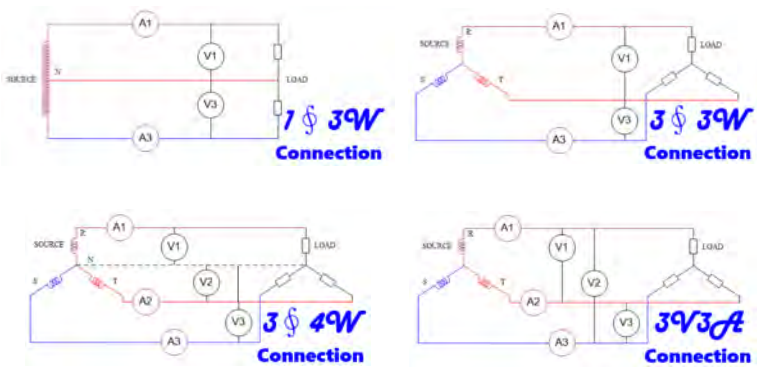
D/A OUTPUT (OPTIONS)	
Item	Specifications
Output voltage	± 5 V FS (approach ± 7.5 V maximum) against each rated value
Number of output channels	12
Output items	Set for each channel : V, I, P, VA, VAR, PF, DEG, VHZ, IHZ, Vpk, Ipk, WP, WP±, q, q±, Off
Accuracy	± (accuracy of each measurement item + 0.2 % of FS) (FS = 5 V)
D/A conversion resolution	16 bits
Minimum load	100 kΩ
Update Interval	Same as the data update interval.
	In the case of Auto Update Rate, update interval is equal to signal interval. More than 100 ms
Temperature coefficient	± 0.05 %/°C of FS

REMOTE CONTROL INPUT/OUTPUT SIGNAL (OPTIONS)	
Item	Specifications
Remote control input signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET
Remote control output signal	INTEG BUSY
I/O level	TTL
I/O logic format	Negative logic, Falling edge

* Q (VAR), S (VA), λ (PF) and Φ (DEG) are originated from the measured values including voltage, current and active power which go through computation process.
In respect to distorted signal input, accordingly, the value acquired from other instruments, which employ different methods, may differ from that acquired from GPM-8320-60/8330-60 unit.
* "Zero" will be shown for S or Q and "--" will be displayed for λ and Φ when either current or voltage is less than 0.5 % of the rated range (less than or equivalent to 1 % when crest factor is set 6).

A. WIRING SELECTION KEY

GPM-8320-60/GPM-8330-60 provide multiple input voltage configuration wiring modes (1P3W/3P3W/3P4W/3V3A). Users can choose the wiring mode according to their specific requirements to measure parameters for specific wiring methods, and even calculate efficiency.



B. VARIOUS DISPLAY MODES

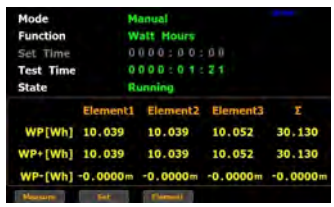
Numerical (Single) Mode | **Numerical (Multiple) Mode** | **Numerical (Simple) ModeMode** | **Waveform Mode** | **Harmonics (Bar Graph) Measurement** | **Harmonics (List) Measurement**

GPM-8320-60/GPM-8330-60 provide two display modes, numerical and graph, which help users maximize the benefits of their measurements. In numerical mode, there are two options: single and multiple. In single mode, there are four tabs that can be customized with the module's measurement settings, and each tab can display up to 10 measurement parameters (2 main and 8 secondary measurements). In multiple mode, there are also four tabs, and users can simultaneously observe the same 8 measurement parameters from three different modules. Parameters in both modes can be arranged and customized as needed, and a simple mode that displays only the first four parameters is also available regardless of which tab is selected. In graph mode, there is a simple oscilloscope function that displays the waveforms of three parameters: voltage, current, and power. The horizontal scale can be adjusted (from 50 µs/div to 10 ms/div depending on the set data update rate), and three waveform observation magnification ratios are available. When measuring harmonics, the harmonics measurement results of each order can be displayed in a bar chart, and a specific observation order can be specified. Additionally, all relevant values for harmonics of each order (voltage/current/power voltage distortion percentage/current distortion percentage/power distortion percentage/voltage phase angle/current phase angle) can be fully recorded and presented.

C. RICH MEASUREMENT PARAMETERS

Measurement Items	Symbols
Voltage	Vrms, V+pk, V-pk, Vac*, Vdc*, Vmn*
Current	Irms, I+pk, I-pk, Iac*, Idc*
Power	P, P+pk, P-pk, VA, VAR
Power Factor	PF
Crest Factor	CFV, CFI
Phase Angle	DEG
Frequency	VHz, IHz
Total Harmonic Distortion	THDV, THDI
Mathematical Computation	MATH
Maximum Current Ratio	MCR, EFFi
Integration	WP, WP+, WP-, q, q+, q-, Vac, Iac

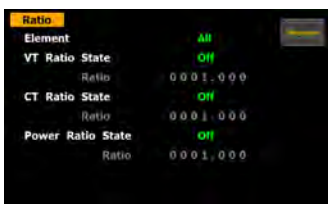
*: Only applicable to specific measurement modes and available for selection



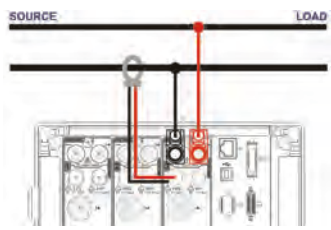
GPM-8320-60/GPM-8330-60 provide a variety of measurement items, including voltage, current, frequency, active power, apparent power, reactive power, power factor, crest factor, total harmonic distortion, and even the ability to measure maximum current ratio. Additionally, GPM-8320-60/GPM-8330-60 are equipped with measurement functions for power or current time integration specific to the DUT. Users set a period of time to perform instantaneous power integration during this time, and then divide by the time to obtain the average power of the DUT. Moreover, during integration measurements, GPM-8320-60/GPM-8330-60 support automatic range switching function to obtain the most complete integration results in response to the power changes of the DUT in different time periods.

D. SUPERB MEASUREMENT ASSISTANCE

Direct Input



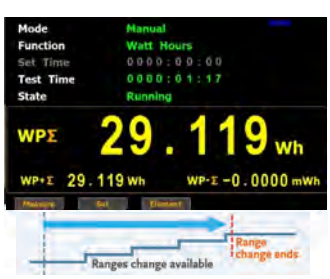
Ratio Configuration



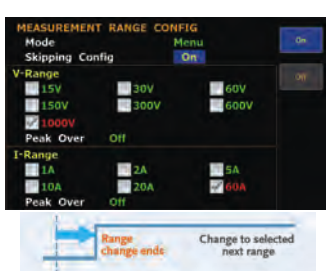
External Current Sensor Input

In terms of measurement support, the GPM-8320-60/GPM-8330-60 perform very well. First, in high voltage/power measurements, a voltage/power ratio setting is provided to restore the decay rate to its true value. For high current measurement, in addition to the direct input of up to 60 A current measurement, they also provide current ratio setting and external current sensor terminals (EXT1/EXT2) to connect current sensors or voltage output type current transformers, making high current measurement above 60 A more convenient. In addition, the GPM-8320-60/GPM-8330-60 provides 4 sets of panel settings for storage/recall, and a memory that can store up to 10,000 measurements. Measurement storage can record measurement results at an update rate or user-defined time intervals for later analysis. The USB host on the front panel supports screen capture, measurement value storage and firmware updates.

E. FLEXIBLE LEVEL-CHANGING MECHANISM



Automatic level-changing under the integration function

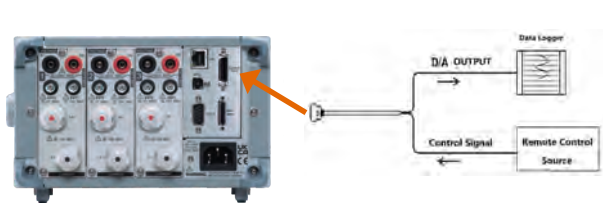


Self-defined automatic level-changing mechanism

GPM-8320-60/GPM-8330-60 offer automatic range switching mode for integral measurement, allowing users to calculate the total value of the DUT's power variation from the start to the end of the integration period. In addition, GPM-8320-60/GPM-8330-60 also support a customizable range switching mechanism. Users can select the desired range, which not only saves time wasted during range switching but also speeds up the testing process.

F. CONVENIENT AND PRACTICAL INTERFACE

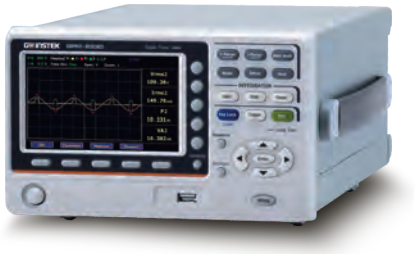
Practical Interface



DA12 Interface Mechanism

GPM-8320-60/GPM-8330-60 offer a comprehensive and diverse set of communications interfaces, including RS-232/USB/LAN/GPIB (optional), suitable for users to remotely control and collect measurement results through command sets to program computer software. The optional Digital I/O (DA12) interface provides three different modes according to users' settings: including external control, DA12 output, and self-defined output. When the setting is external control mode, users can activate, stop, trigger, or reset the integration measurement function through external signals. When it is set to DA12 output mode, users can define 12 measurement parameter values from the provided 17 measurement parameters (even the result of integration measurement) to output in a fixed range (full scale + 5 V) or manual range (full scale ± 5 V) and receive the results in collocation with a data recorder. When it is set to custom output mode, it needs to be used with a communications interface, and the action of each defined pin is controlled through commands.

Digital Power Meter



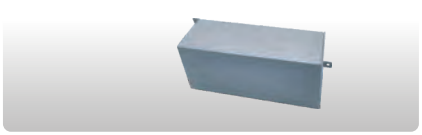
GPM-8320/8330

CE | USB Host | USB Device | LAN | RS-232 | GPIB | DA12

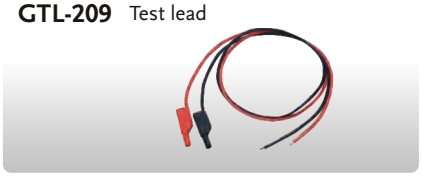
FEATURES

* 5" TFT LCD
* Voltage/Current Meter Test Freq. Bandwidth: DC, 0.1Hz ~ 100kHz
* Waveform Display : V (Voltage), I (Current), P (Wattage)
* Distorted wave Current/Voltage Measurement: Full Range for CF=3, and Half Range for CF=6 (or 6A)
* Meeting IEC 61000-4-7 Harmonic Measurement (50/60Hz)
* Wiring Selecting Button (1P3W, 3P3W, 3P4W, 3V3A)
* Harmonic Measurement & Analysis up to 50 Orders
* Auto Ranging Function for Integration Mode
* Screen Capture Through USB Host
* Provide External Current Sensor Input (EXT1/ EXT2)
* Standard Interface: RS-232C, USB Device/ Host, LAN
* Optional Interface: GPM-DA12 - GPIB + Digital I/O (Factory Installed Only)

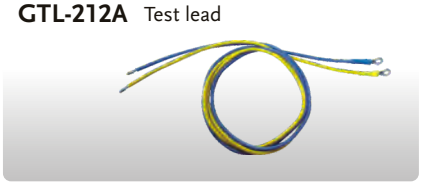
GPM-002 Terminal Cover



GTL-209 Test lead



GTL-212A Test lead



GTL-214 DA12 Cable

GW Instek GPM-8320/8330 are digital power meters designed specifically for measuring power in three-phase AC power sources, making it suitable for most electrical and electronic product testing applications (GPM-8320 provides 2 modules, and GPM-8330 provides 3 modules). These models have a testing bandwidth of DC, 0.1Hz~100 kHz and feature 16-bit A/D converters and a sampling rate of 300 kHz. A 5-inch TFT LCD display, 5 digits of measurement readings, 25 different power measurement parameters, and high precision measurement capabilities are also provided. GPM-8320/8330 also feature waveform display capabilities (voltage/current/power), the integration measurement function, harmonics measurement and analysis of multiple orders (50/60Hz measurement complies with IEC61000-4-7 requirements), external sensor input terminals, and a variety of communications interfaces. These features help users achieve clear, convenient, and accurate power measurements, making them the most fully-featured and cost-effective power meters in the same category.

GPM-8320/8330 provide multiple input voltage configuration wiring modes (1P3W/3P3W/3P4W/3V3A). Users can choose the wiring mode according to their specific requirements to measure parameters for specific wiring methods, and even calculate efficiency. In addition, for a rated input voltage of 1000V and an input current of 20A, they support a minimum current range of 0.5A (resolution of 0.1mA), power measurement resolution of 0.1mW, crest factor of 3 (for half range, the CF can reach up to 6 or 6A), and voltage/current/power measurement accuracy of ±0.1% reading ±0.05% range. Users can select different measurement modes (AC+DC/ AC/ DC/ V-MEAN) to provide up to 25 related parameters for power measurement. These parameters include voltage (Vrms/ Vac/ Vdc/ Vmn/ V+pk / V-pk), current (Irms/ Iac/ Idc/ I+pk/ I-pk), frequency (VHz/ IHz), power (P/ P+pk/ P-pk), crest factor (CFV/ CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion (THDV/ THDI), maximum current ratio (MCR), and MATH calculation function. Therefore, they provide the best range and accuracy support for measuring the power consumption of electrical and electronic products.

GPM-8320/8330 also effectively utilize the advantages of TFT LCD display, providing results of parameter measurements in both numerical and graphical formats. In terms of numerical display, it offers a general mode and a multiple mode. The general mode includes 4 tabs (page1~page4), and each tab can display 10 measurement parameters (2 main measurements + 8 monitoring measurements). Users can freely combine these parameters to display the results of measurements from various modules. The multiple mode can simultaneously display the measurement results of three modules, which is particularly suitable for comparing differences in measurements between modules, such as unbalanced three-phase. This mode also offers 4 tabs, and each tab can display 8 measurement parameters. In terms of graphical display, they offer a simple oscilloscope mode to display voltage, current, and power parameters in waveform format. Additionally, the display provides numerical or bar chart display for the measurement and analysis of harmonics signals at various orders that not only satisfies the need for accuracy and clear readability in process testing, but also meets the diverse measurement application requirements for research and development, design and quality verification.

GPM-8320/8330 have comprehensive mechanisms and functions for auxiliary measurements. For applications that require measuring high voltage, they provide VT rate settings that can be used with external potential transformers. For measuring large current, it depends on the type of current transformer, whether it is a voltage output type or a current output type. If it is a current output type, it can be directly locked onto the meter's rear panel and used with CT rate settings for measurement. If it is a voltage output type, it can be measured through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8320/8330. Automatic range switching can be customized to the required range to save unnecessary time spent on range switching. The internal memory of 10,000 data logs can store measurement data at the update rate set by GPM-8320/8330 or at a user-defined time interval for future analysis.

In terms of data acquisition and storage, GPM-8320/8330 offer a variety of communications interfaces, including RS-232C/USB device (virtual COM)/LAN, or optional GPIB. Users can choose to write programs to read measurement results according to their habits or in collocation with existing system interfaces. The USB host can support screen capture, internal data logging, and firmware updates for GPM-8320/8330. For those with the needs of using external signal control or data recorder for data recording, GPM-8320/8330 also offer an optional Digital I/O (DA12) interface (must be installed at the factory), which can be connected to external controllers such as PLC or data recorders to meet the needs of automated measurements or long recording applications.

ORDERING INFORMATION

GPM-8330	Digital Power Meter (RS-232C/USB device & Host/LAN)
GPM-8330 (with GPM-DA12)	Digital Power Meter (RS-232C/USB device & Host/LAN and opt. GPIB+DA12)
GPM-8320	Digital Power Meter (RS-232C/USB device & Host/LAN)
GPM-8320 (with GPM-DA12)	Digital Power Meter (RS-232C/USB device & Host/LAN and opt. GPIB+DA12)

ACCESSORIES :

Power cord x 1, Test lead GTL-209 x 2, Test lead GTL-212A x 2 (for GPM-8320), Test lead GTL-209 x 3, Test lead GTL-212A x 3 (for GPM-8330), DA12 cable GTL-214 (available for GPM-8320/8330 with GPM-DA12 only), GPM-002 Terminal Cover

OPTIONAL

GPM-DA12 GPIB+DA12 Interface (including cable, GTL-214)

Note : The option is 2-in-1 interface and must be installed in factory.

OPTIONAL ACCESSORIES

GTL-209	Test Lead, Banana to Bare-wire, Approx. 1000mm
GTL-212A	Test Lead, O-Type to Bare-wire, Approx. 1000mm
GTL-214	DA4 Cable, Approx. 1000mm
GTL-232	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm
GTL-246	USB Cable, A-B type, Approx. 1200mm
GTL-258	GPIB Cable, 25-pin Micro-D Connector, Approx. 1900mm
GRA-452	Rack Mount Kit, 19" 3U size
GCP-300	Current Probe (for external input, EXT2, connection)

SPECIFICATIONS

INPUT

Item	Specifications		
Input Type	Voltage / Current		Floating input through resistive voltage divider; Floating input through shunt
Measure Range	Voltage		15V, 30V, 60V, 150V, 300V, 600V, 1000V
	Current	Direct input	0.5A, 1A, 2A, 5A, 10A, 20A
		Sensor input	EXT 1: 2.5 V, 5 V, 10 V; EXT 2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V
Input Impedance	Voltage		Input resistance: approach 2 MΩ
	Current	Direct input range 0.5A ~ 20A	Input resistance: approach 5 mΩ
	Sensor	Input range 2.5V ~ 10V (EXT1)	Input resistance: approach 100 kΩ
		Input range 50mV ~ 2V (EXT2)	Input resistance: approach 20 kΩ
Continuous Maximum Allowable Input	Voltage		peak value of 1.5kV or RMS value of 1kV, whichever is less
	Current	Direct input range 0.5A ~ 20A	peak value of 100A or RMS value of 30A, whichever is less
		Sensor input	peak value less than or equal to 5 times of the rated range
Input Bandwidth	DC, 0.1 Hz ~ 100kHz		
Continuous Maximum Common-mode Voltage	600 Vrms, CAT Ⅱ		
Line Filter	select OFF or ON (cut off frequency of 500 Hz)		
Frequency Filter	select OFF or ON (cut off frequency of 500 Hz)		
A/D Converter	Simultaneous conversion voltage and current inputs; Resolution 16bits; Maximum conversion rate Approx. 300kHz		
Display Update Interval	When the data update interval is 100 ms the numeric display 10 items display update interval is 200 ms. When the data update interval is 100 ms or 250ms and the numeric value display is set to Matrix or ALL Items display update interval is 500 ms. The waveform display update intervals are approximately 1s.		

VOLTAGE AND CURRENT ACCURACY

Item	Specifications	
Requirements	Temperature	23 ± 5℃
	Humidity	30~75% RH
	Input waveform	Sine wave crest factor = 3
	common-mode voltage	0 V
	Number of displayed digits	5 digits
	Frequency filter	Turn on to measure voltage or current of 200 Hz or less
	After 30 minutes after warm-up time has passed; After measurement range is changed (zero-level compensation); Update interval is 250 ms	
Accuracy	DC	± (0.1% of reading + 0.2% of range)
	0.1 Hz ≤ f < 45 Hz	± (0.1 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1 kHz	± (0.1 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± (0.07 *f) % of reading + 0.3% of range)
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 0.5 % of range) ± [{0.04x(f-10)}% of reading]
	Values for voltage in excess of 750V for which 30kHz < f < 100kHz are reference only.	
Temperature Coefficient	Add	±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.
When the Line Flter is Turned ON	45 ~ 66 Hz	Add 0.3 % of reading
	< 45 Hz	Add 0.1 % of reading
Accuracy When the Crest Factor is Sset to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	
Influence of Temperature Changes After Zero-level Compensation or Range Change	Add 0.02% of range/°C to the DC voltage accuracy.	
	Add the following value to the DC current accuracies.	
	5 mA/10 mA/20 mA/50 mA/100 mA/200 mA ranges	5 μA/°C
	0.5 A/1 A/2 A/5 A/10 A/20 A ranges	500 μA/°C
	External current sensor input (/EXT1)	1 mV/°C
	External current sensor input (/EXT2)	50 μV/°C
Accuracy When the Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	

ACTIVE POWER ACCURACY

Item	Specifications	
Requirements	same as the conditions for voltage and current.	
	Power factor	1
Accuracy	DC	(0.1 % of reading + 0.2 % of range)
	0.1Hz ≤ f < 45 Hz	± (0.3 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1kHz	± (0.2 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± (0.1 % of reading + 0.3 % of range) ± [{0.067x(f-1)}% of reading]
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 0.5 % of range) ± [{0.09x(f-10)}% of reading]
Influence of Power Factor	when power factor (λ) = 0 (S: apparent power)	
	± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz	
	± {(0.1 + 0.15 × f) % of S } for up to 100 kHz as reference data	
	•f is frequency of input signal in kHz	
	when 0 < λ < 1 (Φ: phase angle of the Voltage and current)	
	(power reading) × [(power reading error%) + (power range %) × (power range / indicated apparent power value) + {tanΦ × (influence when λ=o)%}]	
When The Line Filter is Turned ON	45 ~ 66 Hz	Add 0.3 % of reading
	< 45 Hz	Add 1 % of reading
Temperature Coefficient	same as the temperature coefficient for voltage and current	

SPECIFICATIONS

Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy of Apparent Power S	voltage accuracy + current accuracy
Accuracy of Reactive Power Q	accuracy of apparent power + ($\sqrt{}$1.0004 - λ2) - ($\sqrt{}$1 - λ2) ×100 %
Accuracy of Power Factor Λ	± [(λ-λ/1.0002)+ |λcosø-cos{ø+sin-1 (influence from the power factor when λ = 0%/100)} |] ±1 digit when voltage and current are at the measurement range rated input
Accuracy of Phase Difference Φ	± [| ø-cos-1 (λ/1.0002) | + sin-1 (influence from the power factor when λ = 0 % / 100)] ± 1 digit when voltage and current are at the measurement range rated input
Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.

VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENTS

Item	Specifications
Measurement Method	Digital sampling method
Crest Factor	3 or 6 (6A)
Wiring System	Single-phase, two-wire (1 P2 W)
Range Select	Select manual or auto ranging
Auto Range	Auto-range increase: The range is upped when any of the following conditions is met. Crest factor 3 — Vrms or Irms exceeds 130% of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 — Vrms or Irms exceeds 130% of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Crest factor 6A — Vrms or Irms exceeds 260% of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Auto-range decline: The range is downed when all of the following conditions are met. Crest factor 3 — Vrms or Irms is less than or equal to 30% of the measurement range. Vrms or Irms is less than or equal to 125% of the next lower measurement range. Vpk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 or 6A — Vrms or Irms is less than or equal to 30% of the measurement range. Vrms or Irms is less than or equal to 125% of the next lower measurement range. Vpk, Ipk value of the input signal exceeds 600% of the currently set measurement range.
Display Mode Switching	Vrms (the true RMS value of voltage and current) VOLTAGE MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current) AC DC
Measurement Synchronization Source	Select voltage, current, or off In the case of Auto Update Rate, select the voltage or current from the equipped element.
Line Filter	Select OFF or ON (cutoff frequency at 500 Hz).
Peak Measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.
Zero-level Compensation	Removes the internal offset of the measure unit (After measurement range is changed)
Measurement Parametersl	Voltage — Vrms , Vmn, Vdc , Vac Current — Irms , Idc , Iac Active Power — P Apparent Power — VA Reactive power — VAR Power Factor — PF Crest Factor — CFI, CFV Phase Angle — DEG Frequency — IHz and VHz Voltage Peak — V+pk and V-pk Current Peak — I+pk and I-pk Active Power Peak — P+pk and P-pk Total Harmonic Distortion — THDI and THDV Mathematical Computation — MATH Maximum Current Ratio — MCR

FREQUENCY MEASUREMENT

Item	Specifications
Measurement Item	Voltage and current
Measurement Frequency Range	Data update interval — Measurement Frequency Range 0.1 s — 20 Hz ≤ f ≤ 100 kHz 0.25 s — 10 Hz ≤ f ≤ 100 kHz 0.5 s — 5 Hz ≤ f ≤ 100 kHz 1 s — 2.0 Hz ≤ f ≤ 100 kHz 2 s — 1.0 Hz ≤ f ≤ 100 kHz 5 s — 0.5 Hz ≤ f ≤ 100 kHz 10 s — 0.2 Hz ≤ f ≤ 100 kHz 20 s — 0.1 Hz ≤ f ≤ 100 kHz Auto (*) — 0.1 Hz ≤ f ≤ 100 kHz (*) Limit of the measurement lower limit frequency by the Timeout setting Timeout — lower limit frequency 1 s — 2.0 Hz 5 s — 0.5 Hz 10 s — 0.2 Hz 20 s — 0.1 Hz
Measurement Range	Auto switching among six types: 100mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.
Frequency Filter	Select OFF or ON (cut off frequency of 500 Hz)
Accuracy	Requirements — When the input signal level is 30% or more of the measurement range If the crest factor is set to 3. (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 200 Hz or less. ± (0.06% of reading)

SPECIFICATIONS

INTEGRATION

Item	Specifications
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode.
Timer	Automatically stop integration by setting a timer. Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds
Accuracy	±(Power accuracy (or current accuracy) + 0.1% of reading) (fixed range)
Range Setting	Auto range or fixed range is available for Integration
Timer Accuracy	±0.02%
Remote Control	Start, stop and reset operations are available using an external remote signal. (option)

HARMONIC MEASUREMENT

Item	Specifications
Measured Item	Voltage, Current, Power
Measured Method	Zero-cross simultaneous calculation method
Frequency Range	10 Hz to 1.2 kHz.
FFT Data Length Sample rate, window width, and upper limit of Analysis orders*	4096 (Auto switch when both 50Hz/60Hz and update rate must be greater than or equal to 0.5s) Fundamental Frequency / Sample rate / Window Width / upper limit of Analysis orders 45 Hz to 55 Hz / f×512 / 10 / 50 54 Hz to 66 Hz / f×512 / 12 / 50
FFT Data Length Sample rate, window width, and upper limit of Analysis orders*	1024 Fundamental Frequency / Sample rate / Window Width / upper limit of Analysis orders 10 Hz to 67 Hz / f × 1024 / 1 / 50 67 Hz to 150 Hz / f×512 / 2 / 32 150 Hz to 300 Hz / f × 256 / 4 / 16 300 Hz to 600 Hz / f × 128 / 8 / 8 600 Hz to 1200 Hz / f × 64 / 16 / 4

Accuracy	Frequency	Voltage	Current	Power
	10 Hz ≤ f < 45 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range
	45 Hz ≤ f < 440 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range
	440 Hz ≤ f < 1.2kHz	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range

* 50Hz/60Hz Compliant IEC61000-4-7 (update rate must be > 0.5s)
* Harmonic calculation: FFT method in which FFT data length is divided into 2 types: 1024 and 4096.
* FFT data length automatically switches in accord with the Frequency and Update Rate of measured signal.

D/A OUTPUT (OPTIONS)

Item	Specifications
Output Voltage	±5 V FS (approach ±7.5 V maximum) against each rated value.
Number Of Output Channels	12
Output Items	Set for each channel: V, I, P, VA, VAR, PF, DEG, VHZ, IHZ, Vpk, Ipk, WP, WP±, q, q±, Off
Accuracy	±(accuracy of each measurement item + 0.2% of FS) (FS = 5 V)
D/A Conversion Resolution	16 bits
Minimum Load	100 kΩ
Update Interval	Same as the data update interval. In the case of Auto Update Rate, update interval is equal to signal interval. More than 100ms.
Temperature Coefficient	±0.05%/°C of FS

REMOTE CONTROL INPUT/OUTPUT SIGNAL (OPTIONS)

Item	Specifications
Remote Control Input Signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET
Remote Control Output Signal	INTEG BUSY
I/O Level	TTL
I/O Logic Format	Negative logic, Falling edge

* Q (VAR), S (VA), λ (PF) and Φ (DEG) are originated from the measured values including voltage, current and active power which go through computation process. In respect to distorted signal input, accordingly, the value acquired from other instruments, which employ different methods, may differ from that acquired from GPM-8320/8330 unit.
* "Zero" will be shown for S or Q and "--" will be displayed for λ and Φ when either current or voltage is less than 0.5% of the rated range (less than or equivalent to 1% when crest factor is set 6)

GENERAL

Note	The below are the basic conditions required to operate the GPM-8320/8330 within specifications: • 1-year Calibration: Yearly • Operating Environment: 18~28 °C (64.4~82.4 °F) • Humidity: <80%RH, • Accuracy: ± (% of reading + % of range) • The specifications apply when it warmed up for at least 30 minutes and operates in the slow rate. • The power supply cable must be grounded to ensure accuracy. • Input voltage and current must be standard sine wave. • The power factor must be 1. • The crest factor must be 3. • The common-mode voltage must be zero.
Specification Condition	Temperature: 23°C±5°C ; Humidity: <80%RH (non-condensing)
Operation Condition	Temperature 0°C ~ 40°C, • 30 ~ 40°C, Relative Humidity < 70%RH (non-condensing) • >40°C, Relative Humidity < 50%RH (non-condensing) Indoor use only Altitude: < 2000 meters Pollution degree 2
Storage Condition	Temperature −40°C ~ 70°C ; Humidity: < 90%RH (non-condensing)
Power Source	AC 100-240V, 50–60Hz ; Consumption Max. 35VA
Dimensions	220(W) x 132(H) x 402.5(D)mm(w/t bumpers)
Weight	Approx. 3.85kg

Digital Power Meter

GPM-8310

CE | USB Host | USB Device | LAN | RS-232 | GPIB | DA4

台灣精品 TAIWAN EXCELLENCE

FEATURES

- 5" TFT LCD
- DC, 0.1 Hz to 100 kHz Voltage/Current Test Bandwidth
- Two Numerical Display Modes
  - General Mode: Displays 2 Main Test Items + 8 Secondary Test Items
  - Simple Mode: Displays the Test Values of 4 Main Test Items
- Waveform Display: V (voltage), I (current), P (power)
- The Current/Voltage can be Measured to a Deformed Wave with CF of 3, and the Half-range CF can Reach 6 or 6 A
- Meeting the IEC 61000-4-7 Harmonics Measurement Requirements (50/60 Hz)
- 50 th Order of Harmonic Measurement and Analysis (value and bar graph)
- Integration Function Supports Automatic Level-changing
- External Current Sensor Input Terminals (EXT1/EXT2)
- Standard Interfaces: RS-232C, USB Device/ Host, LAN, GPIB
- Optional Interface: Digital I/O (DA4) (must be installed before leaving the factory)
- Optional Accessory: GPM-001

GW Instek GPM-8310 is a digital power meter for single-phase (1 P/2 W) AC power measurement. Features include DC, 0.1 Hz to 100 kHz test bandwidth, 16 bits A/D, and 300 kHz sampling rate. It adopts 5" TFT LCD screen with a five-digit measurement display and provides 25 power measurement related parameters, and has a high-precision measurement capability. It also features the ability to display waveform (voltage/current/ power), the integration measurement function, harmonic measurement and analysis of each order (meeting the IEC 61000-4-7 harmonics measurement requirements at 50/60 Hz), external sensor input terminals, and various communication interfaces, etc., to help users achieve clear, convenient and accurate power measurements. This power meter is a most cost-effective power meter with most complete functionalities among the products of the same category.

The rated direct input voltage of GPM-8310 is 600 V and the input current is 20 A. The minimum current level is 5 mA (resolution up to 0.1 μA) and the power measurement resolution is 1 μW. The crest factor can reach 3 (half measurement range can reach 6 or 6 A), and the voltage/current/power measurement capability can reach (±0.05 % reading ±0.1 % level). Different measurement modes can be selected according to (AC+DC/ AC/DC/V-MEAN), providing up to 25 relevant parameters for power measurement, including voltage (Vrms/Vac/Vdc/Vmn/V+pk/V-pk), current (Irms/Iac/Idc/I+pk/I-pk), frequency (VHz/IHz), power (P/P+pk/P-pk), crest factor (CFV/CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion rate (THDV/THDI), maximum current ratio (MCR), and the MATH calculation function. Hence, for the measurement of low current/low power such as standby power consumption, or the measurement of power consumption of general products, this power meter provides the best range and accuracy support.

GPM-8310 also makes good use of the advantages of the TFT LCD to display the results of parameter measurement by using numerical and graphical methods. In terms of numerical values, the general mode and the simple mode are provided. The general mode can display 10 measurement parameters (2 main measurements + 8 monitoring measurements), and the simple mode can display four measurement parameters. These displayed parameters can be arbitrarily selected from 25 power parameters according to the needs of users. In terms of graphic display, a simple oscilloscope mode is provided to display waveforms for three parameters including voltage, current and power. In addition, the measurement and analysis of each harmonic order of the measurement signal can be completely displayed by numerical values or bar graphs. This power meter not only meets the needs of accuracy and legibility in process testing, but also meets the needs of diverse measurement applications in R&D design and quality verification.

In addition, the performance of GPM-8310 in auxiliary measurement mechanism/function is also comprehensive. For the application of measuring large voltage, the VT rate setting can be used with an external voltage Potential Transformer. For the measurement of large current, the type of current transformer ~ voltage output type or current output type will determine the applied method. If it is a current output type, it can be directly locked to the rear panel of the instrument and collocated with the CT rate setting to conduct measurement. If it is a voltage output type, measurement can be conducted through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8310. Automatic level-changing can self-define the required level to save level-changing time. 10,000 lots of internal memories can be used to store measurement data according to the update rate set by GPM-8310 or a user-defined time interval for subsequent analysis.

In terms of data retrieval and storage, GPM-8310 provides a variety of communication interfaces including RS-232C/ USB device (virtual COM)/LAN/GPIB. Users can write programs to read the measurement results according to their habits or with existing system interfaces and there is no need to procure interfaces. USB host supports GPM-8310 screen capture, internal record data access, and firmware update. For the needs of external signal control or the use of data recorder to record data, GPM-8310 also provides an optional Digital I/O (DA4) interface (must be installed before leaving the factory), which can be connected to an external controller such as PLC or a data recorder to meet the application of automatic measurement or long recording.

SPECIFICATIONS

INPUT

Item	Specifications	
Input Type	Voltage	Floating input through resistive voltage divider
	Current	Floating input through shunt
Measure Range	Voltage	15V, 30V, 60V, 150V, 300V, 600V
	Current	
	Direct input	5mA, 10mA, 20mA, 50mA, 100mA, 200mA, 0.5A, 1A, 2A, 5A, 10A, 20A
	Sensor input	EXT 1: 2.5 V, 5 V, 10 V
		EXT 2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V
Input Impedance	Voltage	Input resistance: approach 2 MΩ
	Current	
	Direct input range 5mA ~ 200mA	Input resistance: approach 505 mΩ
	Direct input range 0.5A ~ 20A	Input resistance: approach 5 mΩ
	Sensor input	
	Input range 2.5V ~ 10V (EXT1)	Input resistance: approach 100 kΩ
	Input range 50mV ~ 2V (EXT2)	Input resistance: approach 20 kΩ
Continuous Maximum Allowable Input	Voltage	peak value of 1.5kV or RMS value of 1kV, whichever is less
	Current	
	Direct input range 5mA ~ 200mA	peak value of 30 A or RMS value of 20A, whichever is less
	Direct input range 0.5A ~ 20A	peak value of 100A or RMS value of 30A, whichever is less
	Sensor input	peak value less than or equal to 5 times of the rated range
Input Bandwidth	DC, 0.1 Hz ~ 100kHz	
Continuous Maximum Common-mode Voltage	600 Vrms, CAT Ⅱ	
Line Filter	select OFF or ON (cut off frequency of 500 Hz)	
Frequency Filter	select OFF or ON (cut off frequency of 500 Hz)	
A/D Converter	Simultaneous conversion voltage and current inputs Resolution 16bits Maximum conversion rate Approx. 300kHz	

GPM-8310

SPECIFICATIONS

VOLTAGE AND CURRENT ACCURACY

Item	Specifications	
Requirements	Temperature	23 ± 5℃
	Humidity	30~75% RH
	Input waveform	Sine wave crest factor = 3
	common-mode voltage	0 V
	Number of displayed digits	5 digits
	Frequency filter	Turn on to measure voltage or current of 200 Hz or less
	After 30 minutes after warm-up time has passed	
	After measurement range is changed (zero-level compensation)	
	Update interval is 250 ms	
Accuracy	DC	± (0.1% of reading + 0.2% of range)
	0.1 Hz ≤ f < 45 Hz	± (0.1 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1 kHz	± (0.1 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± (0.07 *f) % of reading + 0.3% of range)
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 0.5 % of range) ± [{0.04x(f-10)}% of reading]
Temperature Coefficient	Add	±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.
When the Line Flter is Turned ON	45 ~ 66 Hz	Add 0.2 % of reading
	< 45 Hz	Add 0.5 % of reading
Accuracy When the Crest Factor is Sset to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	
Influence of Temperature Changes After Zero-level Compensation or Range Change	Add 0.02% of range/°C to the DC voltage accuracy.	
	Add the following value to the DC current accuracies.	
	5 mA/10 mA/20 mA/50 mA/100 mA/200 mA ranges	5 µA/°C
	0.5 A/1 A/2 A/5 A/10 A/20 A ranges	500 µA/°C
	External current sensor input (/EXT1)	1 mV/°C
	External current sensor input (/EXT2)	50 µV/°C
Accuracy When the Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	

ACTIVE POWER ACCURACY

Item	Specifications	
Requirements	same as the conditions for voltage and current.	
	Power factor	1
Accuracy	DC	(0.1 % of reading + 0.2 % of range)
	0.1Hz ≤ f < 45 Hz	± (0.3 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1kHz	± (0.2 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± (0.1 % of reading + 0.3 % of range) ± [{0.067x(f-1)}% of reading]
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 0.5 % of range) ± [{0.09x(f-10)}% of reading]
Influence of Power Factor	when power factor (λ) = 0 (S: apparent power) ± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz ± {(0.1 + 0.15 × f) % of S } for up to 100 kHz as reference data •f is frequency of input signal in kHz when 0 < λ < 1 (Φ: phase angle of the Voltage and current) (power reading) × [(power reading error%) + (power range %) × (power range / indicated apparent power value) + {tanΦ × (influence when λ=o)%}]	
When The Line Filter is Turned ON	45 ~ 66 Hz	Add 0.3 % of reading
	< 45 Hz	Add 1 % of reading
Temperature Coefficient	same as the temperature coefficient for voltage and current	
Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy of Apparent Power S	voltage accuracy + current accuracy	
Accuracy of Reactive Power Q	accuracy of apparent power + ($\sqrt{}$1.0004 - λ2) - ($\sqrt{}$1 - λ2) ×100 %	
Accuracy of Power Factor Λ	± [(λ-λ/1.0002)+ |λcosø-cos{ø+sin-1 (influence from the power factor when λ = 0%/100)} |] ±1 digit when voltage and current are at the measurement range rated input	
Accuracy of Phase Difference Φ	± [| ø-cos-1(λ/1.0002) | + sin-1 (influence from the power factor when λ = 0 % / 100)] ± 1 digit when voltage and current are at the measurement range rated input	
Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	

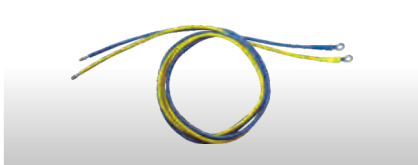
Rear Panel

GPM-001 Test Fixture/Test Fixture(EU)

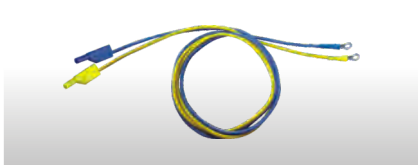
GTL-209 Test Lead

GTL-210 Test Lead

GTL-212A Test Lead



GTL-213 Test Lead



SPECIFICATIONS

VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENTS

Item	Specifications
Measurement Method	Digital sampling method
Crest Factor	3 or 6 (6A)
Wiring System	Single-phase, two-wire (1 P2 W)
Range Select	Select manual or auto ranging
Auto Range	Auto-range increase The range is upped when any of the following conditions is met. Crest factor 3 Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Crest factor 6A Urms or Irms exceeds 260% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Auto-range decline The range is downed when all of the following conditions are met. Crest factor 3 Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 or 6A Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range.
Display Mode Switching	Vrms (the true RMS value of voltage and current) VOLTAGE MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current) AC DC
Measurement Synchronization Source	Select voltage, current, or off In the case of Auto Update Rate, select the voltage or current from the equipped element.
Line Filter	Select OFF or ON (cutoff frequency at 500 Hz).
Peak Measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.
Zero-level Compensation	Removes the internal offset of the measure unit (After measurement range is changed)
Measurement Parametersl	Voltage Vrms , Vmn, Vdc , Vac Current Irms , Idc , Iac Active Power P Apparent Power VA Reactive power VAR Power Factor PF Crest Factor CFI, CFV Phase Angle DEG Frequency IHz and VHz Voltage Peak V+pk and V-pk Current Peak I+pk and I-pk Active Power Peak P+pk and P-pk Total Harmonic Distortion THDI and THDV Maximum Current Ratio MCR

FREQUENCY MEASUREMENT

Item	Specifications
Measurement Item	Voltage and current
Measurement Frequency Range	Data update interval — Measurement Frequency Range 0.1 s — 20 Hz ≤ f ≤ 100 kHz 0.25 s — 10 Hz ≤ f ≤ 100 kHz 0.5 s — 5 Hz ≤ f ≤ 100 kHz 1 s — 2.0 Hz ≤ f ≤ 100 kHz 2 s — 1.0 Hz ≤ f ≤ 100 kHz 5 s — 0.5 Hz ≤ f ≤ 100 kHz 10 s — 0.2 Hz ≤ f ≤ 100 kHz 20 s — 0.1 Hz ≤ f ≤ 100 kHz Auto (*) — 0.1 Hz ≤ f ≤ 100 kHz (*) Limit of the measurement lower limit frequency by the Timeout setting Timeout — lower limit frequency 1 s — 2.0 Hz 5 s — 0.5 Hz 10 s — 0.2 Hz 20 s — 0.1 Hz
Measurement Range	Auto switching among six types: 100mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.
Frequency Filter	Select OFF or ON (cut off frequency of 500 Hz)
Accuracy	Requirements — When the input signal level is 30% or more of the measurement range If the crest factor is set to 3. (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 200 Hz or less. ± (0.06% of reading)

SPECIFICATIONS

INTEGRATION

Item	Specifications
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode.
Timer	Automatically stop integration by setting a timer. Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds
Accuracy	±(Power accuracy (or current accuracy) + 0.1% of reading) (fixed range)
Range Setting	Auto range or fixed range is available for Integration
Timer Accuracy	±0.02%
Remote Control	Start, stop and reset operations are available using an external remote signal. (option)

HARMONIC MEASUREMENT

Item	Specifications			
Measured Item	Voltage, Current, Power			
Measured Method	Zero-cross simultaneous calculation method			
Frequency Range	10 Hz to 1.2 kHz.			
FFT Data Length	1024 4096 (Auto switch when both 50Hz/60Hz and update rate > 0.1s conditions are met)			
Sample Rate, Window Width, and Upper Limit of Analysis Orders*	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders
	10 Hz to 44 Hz	f × 1024	1	50
	45 Hz to 55 Hz	f x 512	10	50
	54 Hz to 66Hz	f x 512	12	50
	67 Hz to 150 Hz	f × 512	2	32
	150 Hz to 300 Hz	f × 256	4	16
	300 Hz to 600 Hz	f × 128	8	8
	600 Hz to 1200 Hz	f × 64	16	4
Accuracy	Frequency	Voltage	Current	Power
	10 Hz ≤ f < 45 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range
	45 Hz ≤ f < 440 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range
	440 Hz ≤ f < 1.2kHz	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range

* 50Hz/60Hz Compliant IEC61000-4-7

D/A OUTPUT (OPTIONS)

Item	Specifications
Output Voltage	±5 V FS (approach ±7.5 V maximum) against each rated value.
Number Of Output Channels	4
Output Items	Set for each channel: V, I, P, VA, VAR, PF, DEG, VHZ, IHZ, Vpk, Ipk, WP, WP±, q, q±, Off
Accuracy	±(accuracy of each measurement item + 0.2% of FS) (FS = 5 V)
D/A Conversion Resolution	16 bits
Minimum Load	100 kΩ
Update Interval	Same as the data update interval. In the case of Auto Update Rate, update interval is equal to signal interval. More than 100ms.
Temperature Coefficient	±0.05%/°C of FS

REMOTE CONTROL INPUT/OUTPUT SIGNAL (OPTIONS)

Item	Specifications
Remote Control Input Signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET
Remote Control Output Signal	INTEG BUSY
I/O Level	TTL
I/O Logic Format	Negative logic, Falling edge

DIGITAL IO SIGNAL (OPTIONS)

Item	Specifications
I/O Control Output Signal	OUT1, OUT2, OUT3, OUT4
I/O Level	TTL
I/O Sink Current	Max 100mA (per/ch)

* Q (VAR), S (VA), λ (PF) and Φ (DEG) are originated from the measured values including voltage, current and active power which go through computation process. In respect to distorted signal input, accordingly, the value acquired from other instruments, which employ different methods, may differ from that acquired from GPM-8310 unit.
* "Zero" will be shown for S or Q and "--" will be displayed for λ and Φ when either current or voltage is less than 0.5% of the rated range (less than or equivalent to 1% when crest factor is set 6).

GENERAL

Note	The below are the basic conditions required to operate the GPM-8310 within specifications: • 1-year Calibration: Yearly • Operating Environment: 18~28 °C (64.4~82.4 °F) • Humidity: <80%RH, • Accuracy: ± (% of reading + % of range) • The specifications apply when it warmed up for at least 30 minutes and operates in the slow rate. • The power supply cable must be grounded to ensure accuracy. • Input voltage and current must be standard sine wave. • The power factor must be 1. • The crest factor must be 3. • The common-mode voltage must be zero.
Specification Condition	Temperature: 23°C±5°C Humidity: <80%RH (non-condensing)
Operation Condition	Temperature 0°C ~ 40°C, • 30 ~ 40°C, Relative Humidity < 70%RH (non-condensing) • >40°C, Relative Humidity < 50%RH (non-condensing) Indoor use only Altitude: < 2000 meters Pollution degree 2
Storage Condition	Temperature −40°C ~ 70°C Humidity: < 90%RH (non-condensing)
Power Source	AC 100-240V, 50–60Hz ; Consumption Max. 30VA
Dimensions	268(W) x 107(H) x 379(D) mm (w/t bumpers)
Weight	Approx. 2.9kg

ORDERING INFORMATION

GPM-8310	Digital Power Meter with RS-232C/USB device & host/LAN/GPIB
GPM-8310 with DA4	Digital Power Meter with RS-232C/USB device & host/LAN/GPIB and opt. DA4

ACCESSORIES :
Power cord x 1, Test lead GTL-209 x 1, Test lead GTL-212A x 1, DA4 cable GTL-214 (available for GPM-8310 with DA4 only)

OPTIONAL

GPM-DA4	DA4 Interface (including cable, GTL-214) Note : Optional DA4 interface must be installed in factory.

OPTIONAL ACCESSORIES

GPM-001	Test Fixture (including GTL-210 x 2, GTL-213 x 1)	**GTL-232**	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000 mm
GPM-001(EU)	Test Fixture (including GTL-210 x 2, GTL-213 x 1)	**GTL-246**	USB Cable, A-B type, Approx. 1200 mm
GTL-209	Test Lead, Banana to Bare-wire, Approx. 1000 mm	**GTL-248**	GPIB Cable, Approx. 2000 mm
GTL-210	Test Lead, Banana to Banana, Approx. 1000 mm	**GRA-422**	Rack Mount Kit, 19" 2U size
GTL-212A	Test Lead, O-Type to Bare-wire, Approx. 1000 mm	**GRA-454**	Rack Mount Kit, 19" 2U size for one or two sets
GTL-213	Test Lead, O-Type to Banana, Approx. 1000 mm	**GCP-300**	Current Probe (for external input, EXT2, connection)
GTL-214	Da4 Cable, Approx. 1000 mm		

A. VARIOUS DISPLAY MODES

Numerical (General) Mode

Numerical (Simple) Mode

Waveform Mode

Harmonic (Bar Graph) Measurement

Harmonic (Table Column) Measurement

GPM-8310 provides the numerical value display mode and the waveform display mode, which help users to maximize the benefit of their measurement. Under the numerical mode, there are the general mode and the simple mode. The general mode has related measurement settings and can simultaneously display 10 measurement parameters (2 main measurements and 8 secondary measurements). The simple mode displays only 4 measurement parameter results. The parameters in each mode can be arranged and combined as required. Under the graphic mode, a simple oscilloscope function is provided to display the waveforms of three parameters including voltage, current and power. The horizontal scale can be adjusted (from 25 us/div to 1 s/div according to the set data update rate), and 3 magnification rates for waveform observation are also provided for users to select. In the harmonic measurement, the measurement results of each order of harmonics can be displayed by bar graphs, and a specific observation order can be specified. The relevant values of each order of harmonics (voltage/current/power/voltage distortion ratio/current distortion ratio/power distortion ratio/voltage phase angle/current phase angle) can be completely recorded and displayed.

B. RICH MEASUREMENT PARAMETERS

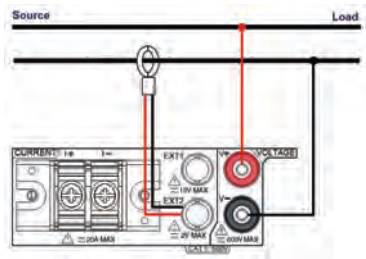
Measurement Items	Symbols
Voltage	Vrms, V+pk, V-pk, Vac*, Vdc*, Vmn*
Current	Irms, I+pk, I-pk, Iac*, Idc*
Power	P, P+pk, P-pk, VA, VAR
Power Factor	PF
Crest Factor	CFV, CFI
Phase Angle	DEG
Frequency	VHz, IHz
Total Harmonic Distortion	THDV, THDI
Maximum Current Ratio	MCR
Integration	WP, WP+, WP-, q, q+, q-, Vac, Iac

Note : "*" Only applicable to specific measurement modes for selection

GPM-8310 provides a variety of measurement items and functions, including voltage, current, frequency, effective power, apparent power, reactive power, power factor, crest factor, total harmonic distortion, and can also measure the maximum current ratio. GPM-8310 is also equipped with the measurement function of power or current time integration for the DUT. Users set a period of time to perform instantaneous power integration at the set time period, and then divide by the time to obtain the average power of the DUT. In addition, when performing integration measurement, GPM-8310 supports automatic level-changing function for the power change of the DUT at different times in order to obtain the most complete integration result within the set time.

C. SUPERB MEASUREMENT ASSISTANCE

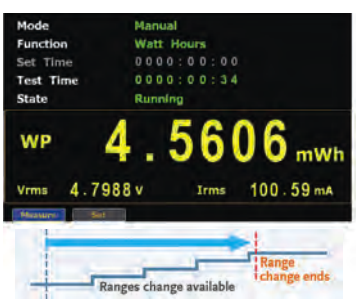
Ratio Configuration



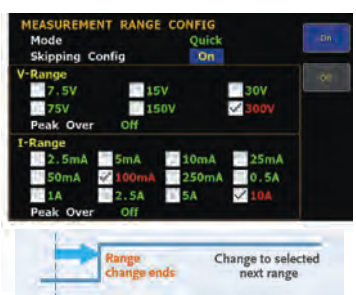
External Current Sensor Input

With respect to the support of measurement assistance, the performance of GPM-8310 is outstanding. First of all, for the measurement of high voltage/high power, the setting of voltage ratio/power ratio is provided to restore the attenuated ratio to a true value. For the measurement of large current, other than the setting of current ratio, external current sensor terminals (EXT1/EXT2) can be utilized to connect with a voltage output type current transformer, making large current measurement more convenient. In addition, GPM-8310 provides 4 sets of panel settings for storage/recall and memory for storing 10,000 lots of measurement values. The measurement storage can log the measurement results based upon the update rate or a self-defined time interval to facilitate the subsequent analysis. The USB host on the front panel supports screen capture, measurement value storage, and GPM-8310 firmware update.

D. FLEXIBLE LEVEL-CHANGING MECHANISM



Automatic level-changing under the integration function

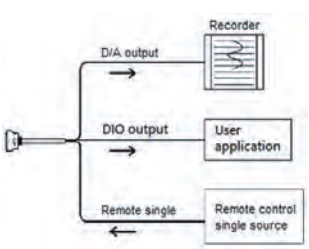


Self-defined automatic level-changing mechanism

GPM-8310 provides the measurement of the integration function under the automatic level-changing mode to allow users to fully calculate the total value of the power consumption of the DUT from the beginning to the end of the integration function. In addition, GPM-8310 also supports self-defined setting mechanism for level-changing. Users can select the required level to be changed to save time on level-changing and expedite the test.

E. CONVENIENT AND PRACTICAL INTERFACE

Practical Interface



DA4 Interface Mechanism

GPM-8310 provides comprehensive and diverse communications interfaces including RS-232 / USB / LAN / GPIB, which are suitable for customers to write computer software for remote control and the collection of measurement results through commands. The optional Digital I/O (DA4) interface provides 3 different modes: the external control mode, the DA4 output mode and the self-defined output mode based on user settings. When the setting is in the external control mode, it allows users to activate, stop, trigger or reset the integration measurement function through external signals. When the setting is in the DA4 output mode, users can define 4 measurement parameter values from the 25 measurement parameters provided (even with the result of integration measurement) to produce outputs by a fixed level (full scale +5 V) or a manual level (full scale ±5 V) and receive results by collocating with a data recorder. When the setting is in the self-defined output mode, a communications interface is required to control the action of each defined pin through commands.

Digital Power Meter

GPM-8213

台灣精品
TAIWAN EXCELLENCE

CE | USB Device | LAN | RS-232 | GPIB

FEATURES

* 4" TFT LCD
* Basic Accuracy : ±(0.1% of reading + 0.1% of range)
* Two Data Display Modes
  - Standard Display : Displaying Two Major Measurement Items + Six Minor Measurement Items
  - Simple Display : Displaying Test Data of Four Different Measurement Items
* Met the Requirement of IEC 62301 Power Measurement
  - Voltage/Current Test Frequency Bandwidth : DC to 6 kHz
  - Watt Resolution : 1 mW
  - Current Resolution : 0.1 mA
  - Current/Voltage Measurements Reach CF=3 for Distorted Wave and CF=6 for Half Range
  - W-h Power vs Time/A-h Current vs Time Integration Function
  - Total Harmonic Distortion Measurement
* Front Panel Test Terminal
* Standard Interfaces : RS-232C, USB Device, LAN
* Optional Test Fixture : GPM-001

GPM-8213 power meter is designed specifically for single-phase (1P/2W) AC power supply's power measurements. Powerful features, including 4" TFT LCD, five-digit measurement display, 19 power measurement parameters, integral measurement function, high-accuracy voltage/current/power measurement capabilities, front/rear panel input terminals, and various communications ports, are to facilitate users with clear, convenient, and accurate power measurements.

GPM-8213 provides as many as 19 power measurement parameters, including voltage(Vrms/V+pk/V-pk), current (Irms/I+pk/I-pk), frequency (VHz/IHz), power (P/P+pk/P-pk), crest factor (CFV/CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion (THDV/THDI), high-accuracy voltage/current/power measurement capabilities (reading: ±0.1%; level: ±0.1%). The advantages of TFT LCD have been efficiently deployed to simple mode and standard mode. Simple mode displays conventional power meter's four measurement parameters to meet the requirement of accuracy and clarity for the test on manufacturing process. Standard mode extends the display to the maximum of 8 measurement parameters (2 major measurements + 6 monitor measurements) to satisfy the various measurement application requirements of R&D, design, and quality verification.

For DUT requiring IEC 62301/EN 50564 standby power consumption test, GPM-8213 provides the optimal measurement supports, including test frequency bandwidth of DC to 6 kHz, the minimum current level of 5mA (resolution: 0.1uA), power measurement resolutions (1uW for minimum current and voltage levels; 1mW for maximum current and voltage levels), crest factor reaching 3 (half range reaching 6), and measurement of total harmonic distortion (at least 13th order power harmonic).

For large voltage/large current measurement applications of general power measurement, GPM-8213 provides PT/CT rate function to collocate with external potential transformer or current transformer to meet the measurement requirements.

With respect to data retrieval and storage, the standard RS-232C/USB interfaces (virtual COM)/ LAN can be utilized to edit and retrieve programs or the optional GPIB interface (installed by manufacturer) can be selected to meet users' automatic test system requirements.

SPECIFICATIONS

INPUT		
ITEM		Range
RATING VOLTAGE		600 Vrms
RATING CURRENT		20 Arms
IMPEDANCE(50/60Hz)	Voltage	2.4 MΩ
	Current	5mA~200mA : 500 mΩ
	Current	0.5A~20A : 5 mΩ
MAXIMUM VOLTAGE		700 Vrms
MAXIMUM CURRENT		25 Arms
MAXIMUM COMMON MODE VOLTAGE		300 V
LOW PASS FILTER	Cutoff frequency	500 Hz
PARAMETERS		
ITEM		Symbol
MEASUREMENT	Voltage	Vdc, Vrms, V+pk, V-pk
	Current	Idc, Irms, I+pk, I-pk
	Power	P, P+pk, P-pk, VA, Var
	Crest Factor	CFV, CFI
	Power Factor	PF
	Frequency	VHz, IHz
	Angle	Deg
	Total Harmonic Distortion	THDV, THDI
	Integration	Time, WP, WP+, WP-, q, q+, q-
DISPLAY DIGITS		5 digits
FREQUENCY BANDWIDTH		DC, 45Hz~6kHz
AVERAGE		1, 2, 4, 8, 16, 32, 64
PT RATE		1 ~ 9999.999
CT RATE		1 ~ 9999.999
DISPLAY MODE	Standard	8 measurement Item
	Simple	4 measurement Item
VOLTAGE		
ITEM		Range
RANGE	CF=3	15V, 30V, 60V, 150V, 300V, 600V
	CF=6	7.5V, 15V, 30V, 75V, 150V, 300V
CREST FACTOR		3 or 6 (selectable)
ACCURACY	Effective Range	1% ~ 105% of range
	DC	±(0.2% of reading+0.2% of range)
	45Hz ≦ f ≦ 66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≦ 1kHz	±(0.1% of reading+0.2% of range)
	1kHz < f ≦ 6kHz	±3% of reading
	Filter(ON)	Add 0.3% of reading@45Hz ~ 66Hz
TEMPERATURE EFFECT	5-18° C / 28-40° C	Add ±0.03% of reading/° C
RESIDUAL NOISE		0.5% of range
CURRENT		
ITEM		Range
MEASUREMENT	CF=3	5mA,10mA,20mA,50mA,100mA,200mA,0.5A,1A, 2A,5A,10A,20A
	CF=6	2.5mA,5mA,10mA,25mA,50mA,100mA,250mA, 0.5A,1A,2.5A,5A,10A

GPM-8213

Rear Panel

SPECIFICATIONS

CREST FACTOR		3 or 6 (selectable)
ACCURACY	**Effective Range**	1% ~ 105% of range
	DC	±(0.2% of reading+0.2% of range)
	45Hz≦f ≦66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≦1kHz	±(0.1% of reading+0.2% of range)
	1kHz < f ≦6kHz	±3% of reading
	Filter(ON)	Add 0.3% of reading@45Hz ~ 66Hz
TEMPERATURE EFFECT	**5-18° C/28-40° C**	Add ±0.03% of reading/° C
RESIDUAL NOISE		0.5% of range
POWER		
ITEM		Range
ACCURACY	**Effective Range**	1% ~ 110% of range
	DC	±(0.2% of reading+0.2% of range)
	45Hz≦f ≦66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≦1kHz	±(0.1% of reading+0.3% of range)
	1kHz < f ≦6kHz	±3% of reading
	Filter(ON)	Add 3% of reading@45Hz~66Hz
TEMPERATURE EFFECT	**5-18° C/28-40° C**	Add ±0.03% of reading/° C
FREQUENCY		
ITEM		Range
MEASUREMENT	**Filter(ON)**	30.000 Hz~499.99 Hz
	Filter(OFF)	30.000 Hz~9.9999 kHz
PARAMETER		Voltage, Current
EFFECTIVE RANGE		10%~105% of voltage input
ACCURACY		±0.06% of reading
INTEGRATION		
ITEM		Range
INTERGRATION	**Accuracy**	±(voltage or current accuracy+0.1% of reading)
TIME	**Range**	0 hour 00 min ~ 9999 hour 59 min
	Accuracy	±0.01%±1second
DISPLAY		
4" TFT LCD		
POWER CONSUMPTION		
Max. 25 VA		
INTERFACE		
RS-232C, USB device, LAN		
POWER SOURCE		
AC 100 to 240 V, 50 to 60Hz		
DIMENSIONS & WEIGHT		
270(W) x 110(H) x 350(D) mm, Approx. 2.9 kg		

ORDERING INFORMATION

GPM-8213 with GPIB Digital Power Meter (RS-232C/USB device/LAN/Opt.01 GPIB)
GPM-8213 Digital Power Meter (RS-232C/USB device/LAN)

ACCESSORIES :
Power Cord x 1, Test Lead GTL-209 x 2

OPTIONAL

GPM-82G1 GPIB card (factory installed)

OPTIONAL ACCESSORIES

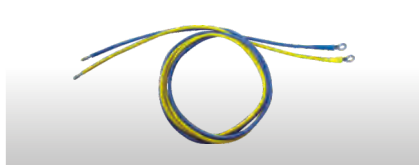
GPM-001 Test Fixture (including GTL-210 x 2, GTL-213 x 1)
GPM-001(EU) Test Fixture (including GTL-210 x 2, GTL-213 x 1)
GTL-209 Test Lead, Banana to Bare-wire, Approx. 1000mm
GTL-210 Test Lead, Banana to Banana, Approx. 1000mm
GTL-212A Test Lead, O-Type to Bare-wire, Approx. 1000mm
GTL-213 Test Lead, O-Type to Banana, Approx. 1000mm
GTL-232 RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000 mm
GTL-246 USB Cable, A-B type, Approx. 1200 mm
GTL-248 GPIB Cable, Approx. 2000mm
GRA-422 Rack Mount Kit, 19" 2U size
GRA-454 Rack Mount Kit, 19" 2U size for one or two sets

GPM-001 Test Fixture/Test Fixture(EU)

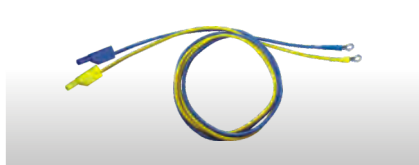
GTL-209 Test Lead

GTL-210 Test Lead

GTL-212A Test Lead



GTL-213 Test Lead



Automatic Distortion Meter

The GAD-201G distortion meter is aimed at total harmonic distortion (THD) and AC voltage measurement at audio frequency range, from 20 kHz to 20 kHz. Frequency and voltage are displayed simultaneously on dual meters, with measurement range automatically switching over full scale. The frequency keys cover 400 Hz, 1 kHz, and 10 kHz for commonly used measurement frequencies. The output terminals can feed basic waveforms (X) and harmonic distortion (Y) to an external monitoring device. Residual distortion, including hum and noise, is kept to a minimum level of 0.03%, making GAD-201G ideal for high-end audio applications.

GAD-201G

FEATURES

* Automatic Level & Distortion Measurements
* Auto or Hold Function Can be Selectable
* 0.1% ~ 100% in 7 Distortion Measuring Ranges
* 20Hz ~ 20kHz in 3 Continuous Ranges
* 400Hz, 1kHz, 10kHz 3 Spot Frequency
* 1mVrms ~ 300Vrms in 12 ACV Measuring Ranges

GTL-103 Test Lead

Banana-Alligator Heads
Approx. 1.2m

SPECIFICATIONS

DISTORTION MEASUREMENT	
Range	0.1% ~ 100% full scale in 7 ranges by auto ranging
Fundamental Frequency Range	20Hz ~ 20kHz in 3 continuous ranges with fine adjustment tuning and 3 spots for 400Hz, 1kHz and 10kHz only
Input Level	100mVrms ~ 300Vrms
Automatic Level Control Range	±10dB
Fundamental Rejection	80dB or above
Second Harmonic Accuracy	Within±1dB at a basic frequency of 20Hz ~ 20kHz
Residual Distortion	(Including hum and noise) Less than 0.03%
AC VOLTAGE MEASUREMENT	
Range	1mVrms to 300Vrms full scale in 12 ranges by auto ranging
Frequency Response	20Hz ~ 200kHz±1dB
Input Impedance	100kΩ±10%, 70pF or less(Unbalanced)
Accuracy	Within±3% of full scale (at 1kHz)
Residual Noise	Less than 10μV (input short circuited)
Output Level	X : 1Vrms, Y : 500mVrms at meter full scale
Output Impedance	Approx. 600Ω
POWER SOURCE	
AC 100V/120V/220V/240V±10%, 50/60Hz; Power Consumption : Max. 25VA	
DIMENSIONS & WEIGHT	
310(W) x 165(H) x 300(D)mm, Approx. 4.6 kg	

ORDERING INFORMATION

GAD-201G Automatic Distortion Meter

ACCESSORIES :
Power cord x 1
Test lead GTL-103 x 1

A.C. Millivolt Meter

The GVT-427B/417B Series is a compact analog AC millivoltmeter ideal for low level voltage measurements with a remarkable 300 V full scale sensitivity. GVT-427B has dual independent channels that can be used simultaneously or separately for measurement. Voltage scale is separated into 12 ranges, easily accessible by the large rotary selector. The wide measurement range, frequency (10 Hz to 1 MHz) and voltage (-70 dB to +40 dB), provides ample headroom for most applications.

GVT-427B (2 CH)
GVT-417B (1 CH)

CE

FEATURES

* 300 μV Full Scale Sensitivity
* Measures Frequency From 10Hz ~ 1MHz
* Measures From -70dB ~ +40dB in 12 Ranges
* Dual Channel (GVT-427B)

GTL-101 Test Lead

BNC-Alligator Heads
Approx. 1.2m

SPECIFICATIONS	
INPUT	
Voltage Range	300 μV ~ 100V of Full Scale in 12 ranges
Decibel Range	-70dB ~ +40dB in 12 ranges
Accuracy	±3% of full scale
Operating Mode	GVT-427B : Ch1 and Ch2 separately or simultaneously at Ch1 GVT-417B : one Ch1 only
Frequency Response	20Hz ~ 200kHz±3%,10Hz ~ 1MHz±10% (reference 1 kHz)
Impedance	1MΩ, approx, 40pF
OUTPUT	
Level	Approx. 0.1Vrms at full scale
Distortion	Less than 2%
POWER SOURCE	
AC 115V/230V ±10% , 50/60Hz; Power Consumption : Max. 10VA	
DIMENSIONS & WEIGHT	
130(W) x 210(H) x 295(D)mm; Approx. 2.8 kg	

ORDERING INFORMATION

GVT-427B	2 Channels AC Millivolt Meter
GVT-417B	1 Channel AC Millivolt Meter

ACCESSORIES :
Power cord x 1
Test Lead GTL-101 x 2 for GVT-427B
Test Lead GTL-101 x 1 for GVT-417B

Note : GVT-427B Without CE Approved

Isolated Output High Precision Current Shunt Meter

PCS-1000I

CE USB Device GPIB

FEATURES

* 6 1/2 Digit Voltage and Current Measurement Resolution
* Simultaneous Current and Voltage Measurement
* Five Current Measurement Levels(AC & DC) : 30 mA/300 mA/3 A/30 A/300 A
* AC Voltage Measurement Levels : 200 mV/2 V/20 V/200 V/600 V
* DC Voltage Measurement Levels : 200 mV/2 V/20 V/200 V/1000 V
* Standard : USB Device & GPIB
* CE Verification

GW Instek rolls out the new PCS-1000I isolated output high precision current shunt meter, which inherits the simultaneous voltage and current measurement function of PCS-1000. PCS-1000I adopts five sets of independent shunt resistors to provide five current measurement levels, including 300 A, 30 A, 3 A, 300 mA, and 30 mA to meet the requirements of different current level measurements. Internally, PCS-1000I utilizes two sets of 24 bits ADCs and low temperature coefficient electronic components to mainly focus on the current measurement of power supply devices. High precision PCS-1000I can be used in adjusting and calibrating instruments. Additionally, temperature variation will not cause PCS-1000I to yield any measurement errors. PCS-1000I can automatically select optimal measurement level with the maximum resolution so as to replace manual selection to save operational time.

PCS-1000I provides a BNC output, which can connect with an oscilloscope to directly observe current waveform variation without using a current probe. General oscilloscopes do not have isolated channels and their input and output are structured at a common point, therefore, the output load will likely result in measurement errors. PCS-1000I's isolated current output design can prevent measurement errors from an oscilloscope with non-isolated outputs. PCS-1000I, a high precision AC/DC current shunt meter, not only provides USB and GPIB communications interfaces for users to remotely control the instrument but also conducts simultaneous voltage and current measurements. The SCPI communications commands of PCS-1000I allow users to remotely control PCS-1000I via a PC to operate measurement data read backs.

SPECIFICATIONS

DC CHARACTERISTICS

DC Voltage

Range	Half Year 23 ℃ ± 5 ℃	Temperature Coefficient/℃
200.0000 mV	0.0050 + 0.0035	0.0005 + 0.0005
2.000000 V	0.0050 + 0.0010	0.0005 + 0.0001
20.00000 V	0.0050 + 0.0010	0.0005 + 0.0001
200.0000 V	0.0050 + 0.0010	0.0005 + 0.0001
1000.000 V	0.0050 + 0.0020	0.0005 + 0.0001

Accuracy specification : ±(% of reading + % of range);voltage input resistance: 10MΩ for all DC voltage ranges

DC Current

Range	Burden Voltage	Half Year 23 ℃ ± 5 ℃	Temperature Coefficient/℃
30.00000 mA	< 0.4 V	0.01 + 0.005	0.001 + 0.002
300.0000 mA	< 0.5 V	0.01 + 0.005	0.001 + 0.002
3.000000 A	< 0.8 V	0.01 + 0.005	0.001 + 0.002
30.00000 A*1	< 0.8 V	0.01 + 0.005	0.001 + 0.002
300.0000 A*1	< 0.8 V	0.02 + 0.005	0.001 + 0.002

Accuracy specification : ± (% of reading + % of range)

Isolated DC Current Monitor Accuracy

Range	Half Year 23 ℃ ± 5 ℃ DC Accuracy	Temperature Coefficient/℃
30.00000 mA	0.1 + 0.05	0.001
300.0000 mA	0.1 + 0.05	0.001
3.000000 A	0.1 + 0.05	0.001
30.00000 A*1	0.1 + 0.05	0.001
300.0000 A*1	0.2 + 0.05	0.001

Accuracy specification : ±(% of output + % of full scale);monitor output voltage for the full scale current = 3V

AC CHARACTERISTICS

True RMS AC Voltage

Range	Frequency	Half Year 23 ℃ ± 5 ℃	Temperature Coefficient/℃
200.0000 mV	45Hz~2kHz 2kHz~10kHz 10kHz~20kHz	0.5 + 0.05 1.0 + 0.05 2.0 + 0.10	0.005 + 0.005
2.000000 V			0.005 + 0.005
20.00000 V			0.005 + 0.005
200.0000 V			0.005 + 0.005
600.000 V			0.005 + 0.005

Accuracy specification : ±(% of reading + % of range)

True RMS AC Current

Range	Frequency	Half Year 23 ℃ ± 5 ℃	Temperature Coefficient/℃
30.00000 mA	45Hz~2kHz 2kHz~10kHz	0.5 + 0.05 1.0 + 0.05	0.03 + 0.006
300.0000 mA			0.03 + 0.006
3.000000 A			0.03 + 0.006
30.00000 A*1	45Hz~400Hz	0.5 + 0.05	0.03 + 0.006
300.0000 A*1			0.03 + 0.006

Accuracy specification : ±(% of reading + % of range)

PCS-1000I

Rear Panel

SPECIFICATIONS

Isolated AC Current Monitor Accuracy

Range	Frequency	Half Year 23℃±5℃ AC Accuracy	Temperature Coefficient/℃
30.00000 mA	45Hz~2kHz 2kHz~10kHz	0.2 + 0.05 0.5 + 0.05	0.001
300.0000 mA			0.001
3.000000 A			0.001
30.00000 A*1	45Hz~400Hz	0.5 + 0.05	0.001
300.0000 A*1			0.001

Accuracy specification : ±(% of output + % of full scale); monitor output voltage for the full scale current = 3V; The specifications are only applicable when the input is 10% or greater of the full scale range

GENERAL

Power Supply	100 V/120 V/220 V/240 V ±10%
Power Line Frequency	50/60 Hz
Operating Environment	Full accuracy for 0 ℃ to 55 ℃, Full accuracy to 80% R.H. at 40 ℃
Storage Environment	-40 ℃ to 70 ℃
Power Consumption	Max 35 VA
Dimensions Weight	210(W) x 80(H) x 390(D) mm ; Approx. 5 kg

(The specifications apply when the PCS-1000I is powered on for at least 30 minutes to warm-up to a temperature of 18 ℃~ 28 ℃, unless specified otherwise.)
Note: *1 The accuracy for 30 A/300 A levels must be increased by a power factor of 8 ppm/watt.

PCS-001 Basic Accessory Kit

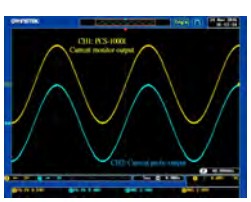
ORDERING INFORMATION

PCS-1000I Isolated Output High Precision Current Shunt Meter

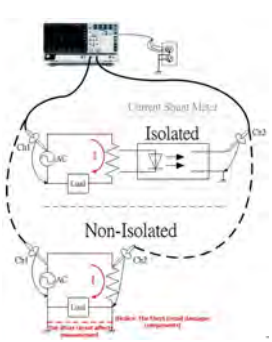
ACCESSORIES :
AC Power Cord x 1 (Region Dependant)
GTL-105A Alligator Clip Test Lead (3 A Max)
GTL-207A Banana Plug Test Lead
GTL-240 USB Cable
PCS-001 Basic Accessory Kit

OPTIONAL ACCESSORIES

GRA-419-J Rack Mount Kit (JIS)
GRA-419-E Rack Mount Kit (EIA)



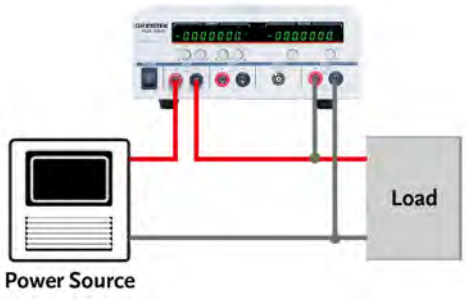
PCS-1000I
VS. Current Probe for
Measurement



The Measurement Issue
for Non-Isolated Shunt Meter

Isolated Output High Precision Current Shunt Meter

A. SIMULTANEOUS VOLTAGE AND CURRENT MEASUREMENT



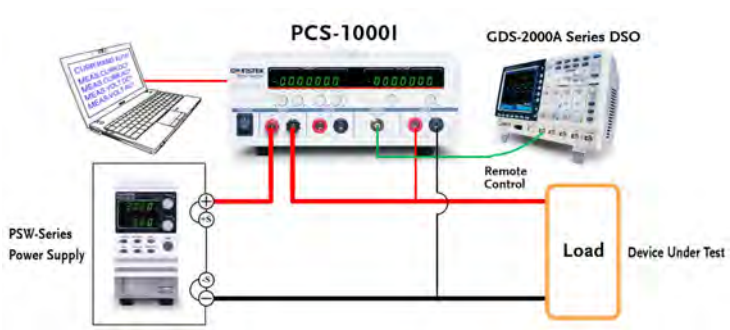
PCS-1000I high precision AC and DC shunt meter can simultaneously measure current and voltage with the maximum 6 1/2 measurement resolution. The above diagram shows the connection method of simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000I is simple in connection and there is no requirement of any additional instrument.

B. FIVE SETS OF SHUNT RESISTORS TO SWITCH MEASUREMENT

The switching measurement of five independent shunt resistors provides excellent resolution than that of a single shunt resistor.

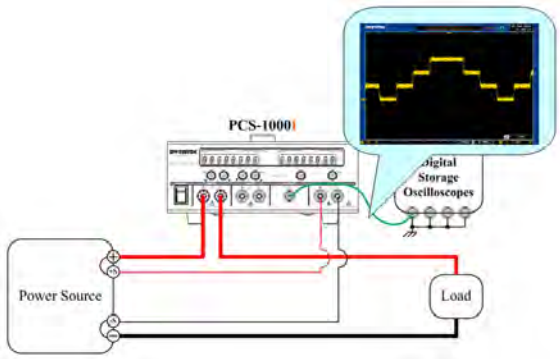
Under 30 mA range, the resolution is 0.01 uA, which is ideal for very small current measurement.

C. REMOTE CONTROL APPLICATION



PCS-1000I is not only a high precision AC/DC shunt meter but also provides users with USB and GPIB communications interface so as to remotely control operational sequence. The SCPI commands of PCS-1000I allow users to read back measurement value via a computer remotely controlling PCS-1000I. As shown on the above diagram, the series connection between PCS-1000I and DUT and the parallel connection between voltage input and DUT are arranged to conduct simultaneous voltage and current measurement on DUT. Via the connection between communications and a notebook computer, PCS-1000I can be remotely controlled by operating the notebook computer and edited sequence.

D. ISOLATED OUTPUT CURRENT OUTPUT DESIGN



PCS-1000I adopts isolated current output design. Its BNC output can directly connect with an oscilloscope to avoid measurement errors resulted from the common ground of oscilloscope's analog input measurement.

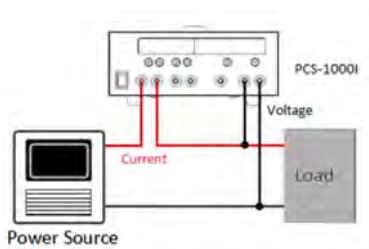
E. AUTOMATIC RANGE-SWITCHING MEASUREMENT FUNCTION

Press and hold Auto key, PCS-1000I will automatically select the maximum measurement resolution for users to save time in manual selection.

F. CONNECTION COMPARISON

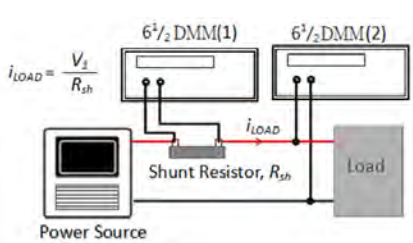
PCS-1000I can simultaneously measure current and voltage with 6 1/2 measurement resolution. The left diagram shows the connection method of simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000I is simple in connection and there is no requirement of any additional instrument.

PCS-1000i Conducts Simultaneous Voltage and Current Measurement



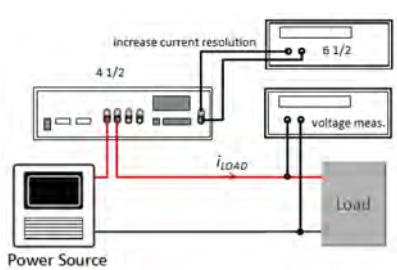
1. Only one PCS-1000I is needed to measure voltage and current
2. Easy connection
3. USB and GPIB communications on the rear panel can be used for data communication while connecting with a PC

Shunt Resistor Conducts Current and Voltage Measurement



1. One voltage meter is needed to measure voltage on shunt and the voltage will be converted to current. For simultaneous voltage and current measurement, one extra voltage meter is required
2. Complex connection
3. For data communication with a PC, the PC must be connected to two voltage meters

Conventional Shunt Meter Conducts Current and Voltage Measurement



1. This method requires one shunt meter, one current meter to increase current measurement resolution, and one voltage meter to measure voltage
2. Complex connection
3. For data communication with a PC, the PC must be connected to two meters

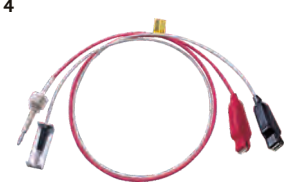
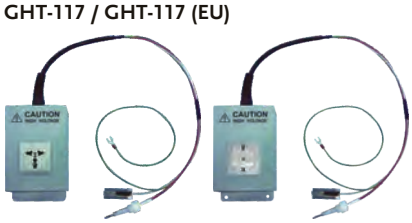
ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
GBM-01	4 Wire (kelvin clip) Test Lead, 90 V (max.), Approx. 1100 mm	GBM-3100H/3300/3080
GBM-02	4 Wire (single pin) Test Probe, 80 V (max.), Approx. 1100 mm	GBM-3100H/3300/3080
GBM-03	4 Wire (twin pin) Test Probe, 300 V (max.), Approx. 1400 mm	GBM-3100H/3300/3080
GBM-03A	4 Wire (twin pin) Test Probe, 1000 V (max.), Approx. 1400 mm	GBM-3100H/3300/3080
GBM-S1	Short Bar (for GBM-02/GBM-03/GBM-03A)	GBM-02/03/03A
GCP-300	Current Probe (for external input, EXT2, connection)	GPM-8330-60/8330/8320-60/8320/8310
GDM-90G1	GPIB card for GVM-9102 and GDM-906X series	GDM-906X Series, GVM-9102
GDM-90G2	GPIB card for GDM-9042 (factory install)	GDM-9042
GDM-TL1	Test Lead Set	All GDM-Series
GHT-108	H.V. Wiring Lead, Approx. 500mm	GSB-01/02
GHT-109	G.B Wiring Lead, Approx. 450mm	GSB-02
GHT-113	High Voltage Test Pistol, Approx. 1000 mm	GPT-15000/12000/9900A/9900/9800/9600 Series
GHT-114	High Voltage Test Lead, Approx. 1000 mm	GPT-9900A/9900/9800/9600 Series
GHT-115	High Voltage / Continuity Test Lead, Approx. 1000 mm	GPT-10000 Series, GPT-9500 Series
GHT-116B	High Voltage Test Lead (Black only), Approx. 1500 mm	GSB-01/02, All GPT-Series, GPT-9500 Series
GHT-116R	High Voltage Test Lead (Red only), Approx. 1500 mm	GSB-01/02, All GPT-Series, GPT-9500 Series
GHT-117	H.V Adaptor (Universal or Europe type socket)	GPT-15003/15002/15001/12003/12002/12001, GPT-9903A/9902A/9901A, GPT-9803/9802/9801, GPT-9600
GHT-118	H.V / G.B. Adaptor (Universal or Europe type socket)	GPT-15004/12004/9904/9804
GHT-119	Remote Terminal Cable, Approx. 500 mm	All GPT-Series, GCT-9040
GHT-120	High Voltage Test Lead, Approx. 1000 mm	GPT-15012
GHT-121	High Voltage Test Lead, Approx. 3000 mm	GPT-9900A/9900/9800/9600 Series
GHT-122	High Voltage / Continuity Test Lead, Approx. 3000 mm	GPT-10000 Series, GPT-9500 Series
GHT-123B	High Voltage Test Lead (Black only), Approx. 3000 mm	GSB-01/02, All GPT-Series, GPT-9500 Series
GHT-123R	High Voltage Test Lead (Red only), Approx. 3000 mm	GSB-01/02, All GPT-Series, GPT-9500 Series
GHT-205	High Voltage Test Probe, Approx. 1100 mm	GPT-15000/12000/9900A/9900/9800/9600 Series
GLC-01	Alligator Clips	GLC-10000/9000
GLC-02	Foil Probe	GLC-10000/9000
GLC-03	Power Cord for EUT	GLC-10000
GLC-04	Input & Output Terminal Cover	GLC-10000
GOM-80G1	GPIB card for GOM-804 (factory install)	GOM-804
GPM-001	Test Fixture (Universal or Europe type socket)	GPM-8310/8213
GPM-002	Terminal Cover	GPM-8330-60/8330/8320-60/8320
GPM-82G1	GPIB card for GPM-8213 (factory install)	GPM-8213
GPM-DA4	DA4 Interface (factory install)	GPM-8310
GPM-DA12	GPIB+DA12 Interface (factory install), including cable, GTL-214	GPM-8330-60/8330/8320-60/8320
GPT-10KG1	GPIB card for GPT-10000 series	GPT-10000 Series
GPT-10KL1	LAN card for GPT-10000 series	GPT-10000 Series
GPT-9KG1	GPIB card for GPT-9900/9800 series and GCT-9040	GPT-9900A/9900/9800, GCT-9040
GPT-9KR1	RS-232 card for GPT-9900/9800 series when GSB is connected	GPT-9900A/9900/9800
GRA-417	Rack Mount Kit, 19", 4U Size	GPT-9900A/9800/9600, GCT-9040
GRA-419-E	Rack Mount Kit (EIA), 19", 2U Size	PCS-1000I
GRA-419-J	Rack Mount Kit (JIS), 19", 2U Size	PCS-1000I
GRA-422	Rack Mount Kit, 19", 2U Size	DAQ-9600, GDM-906X Series, GDM-9052/904X Series, LCR-6000 Series, GBM-Series, GPM-8310/8213
GRA-433	Rack Mount Kit, 19", 4U Size	GPT-9904
GRA-438	Rack Mount Kit 19", 2U Size	GSB-01/02
GRA-440	Rack Mount Kit 19", 4U Size	GPT-10000 Series
GRA-445	Rack Mount Kit 19", 4U Size	LCR-8200/8200A Series
GRA-446	Rack Mount Kit 19", 4U Size	GPT-9500 Series
GRA-452	Rack Mount Kit 19", 3U Size	GPM-8330-60/8330/8320-60/8320
GRA-454	Rack Mount Kit 19", 2U Size for One or Two Sets	GDM-906X Series, GDM-9052/904X Series, LCR-6000 Series, GBM-Series, GPM-8213/8310
GRA-455	Rack Mount Kit 19", 2U Size for One or Two Sets	DAQ-9600
GSC-014	Soft Carrying Case for DMM Accessory	All GDM-Series
GTL-101	Test Lead, BNC (P/M) to Alligator, Approx. 1100 mm	GVT-Series
GTL-103	Test Lead, Banana to Alligator, Approx. 1200 mm	GAD-201G
GTL-105A	Test Lead, Banana to Alligator, Current 3A max. Approx. 1000 mm	PCS-1000I
GTL-108A	4 Wire (kelvin clip) Test Lead, Approx. 1100 mm	GDM-9052
GTL-115	G.B. Test Lead, U type to Alligator, Approx. 1000 mm	GPT-9904/9804
GTL-116B	G.B. Test Lead (Black only), U type to Alligator, Approx. 1500 mm	GSB-02, GPT-9904/9804
GTL-116R	G.B. Test Lead (Red only), U type to Alligator, Approx. 1500 mm	GSB-02, GPT-9904/9804
GTL-117	Test Lead, Banana to Probe, Approx. 1200mm	GDM-8245
GTL-132	LINK Cable, Approx. 250mm	GCT-9040
GTL-205A	Temperature Probe Adaptor with Thermocouple (K-type), Approx. 1000 mm	GDM-906X Series, GDM-9052/904X Series
GTL-207A	Test Lead, Banana to Probe, Approx. 1000 mm	GDM-9052/904X Series, GLC-10000/9000, PCS-1000I

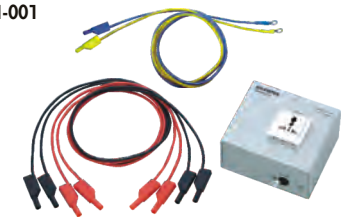
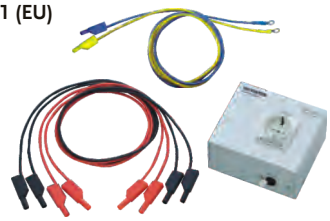
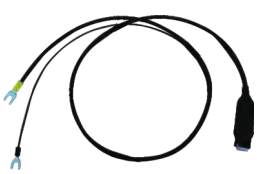
ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
GTL-209	Test Lead, Banana to Bare-wire, Approx. 1000 mm	GPM-8330-60/8330/8320-60/8320/8310/8213
GTL-210	Test Lead, Banana to Banana, Approx. 1000 mm	GPM-001
GTL-212A	Test Lead, O-Type to Bare-wire, Approx. 1000 mm	GPM-8330-60/8330/8320-60/8320/8310/8213
GTL-213	Test Lead, O-Type to Banana, Approx. 1000 mm	GPM-001
GTL-214	DA4 Cable, Approx. 1000 mm	GPM-8330-60/8330/8320-60/8320/8310/8213
GTL-215	G.B. Test Lead, U type to Alligator, Approx. 1000 mm	GPT-15004/12004, GCT-9040
GTL-217	Test Lead, Banana to Probe, Approx. 1400 mm	GDM-906X Series
GTL-232	RS-232C Cable, 9-pin F-F type, null modem for computer, Approx. 2000 mm	GDM-9052, GPT-10000/9900A/9900/9800 Series, GLC-10000/9000, GOM-805/804, GBM-Series, GPM-8310/8213
GTL-234	RS-232C Cable, 9-pin F-F type, null modem for computer, Approx. 2000 mm	GDM-906X Series, LCR-8200
GTL-235	Communication Cable, F-M type, Approx. 700 mm	GSB-01/02
GTL-236	RS-232C Cable, 9-pin F-M type, Approx. 2000 mm	GPT-9500 Series
GTL-240	USB Cable, USB 2.0 A-B type (L shape), Approx. 1200 mm	GLC-10000/9000, PCS-1000I
GTL-246	USB Cable, USB 2.0 A-B type, Approx. 1200 mm	GDM-906X Series, GDM-9052/904X Series, LCR-8200A/8200//6000 Series, GPT-10000/9500 Series, GLC-10000/9000, GOM-805/804, GBM-Series, GPM-8310/8213
GTL-247	USB Cable, USB 1.1 A-A type, Approx. 1800 mm	GPT-9900A/9900/9800, GCT-9040
GTL-248	GPIB Cable, Approx. 2000 mm	GDM-906X Series, GDM-9042, LCR-8200A/8200 Series, GPT-10000/9900A/9900/9800 Series, GLC-10000/9000, GOM-805/804, GPM-8310/8213
GTL-258	GPIB Cable, 25-pin Micro-D Connector, Approx. 1900mm	DAQ-9600, GPM-8330-60/8330/8320-60/8320
GTL-308	4 Wire (kelvin clip) + Shield Test Lead, Approx. 1500mm	GDM-906X Series, GDM-9052, GOM-805/804
GTL-309	4 Wire (kelvin clip) + Shield Test Lead, Approx. 3000mm	GDM-906X Series, GDM-9052, GOM-805/804
LCR-05	Test Fixture for Axial & Radial Leaded Components	LCR-8200A/8200/6000 Series
LCR-05A	50 MHz Test Fixture for Axial & Radial Leaded Components (including STD-LOAD kit)	LCR-8200A/8200 Series
LCR-06B	Test Lead with Kelvin clip (4 wire type), Approx. 750 mm	LCR-8200A/8200/6000 Series
LCR-07	Test Lead with Alligator clip (2 wire type), Approx. 750 mm	LCR-8200A/8200/6000 Series
LCR-08	Test Fixture (Tweezers) for SMD/Chip Components, Approx. 750 mm	LCR-8200A/8200/6000 Series
LCR-10A	50 MHz Test Fixture for Bottom Electrode Components (including STD-LOAD kit)	LCR-8200A/8200 Series
LCR-12	Test Lead with Kelvin clip (4 wire type), Approx. 600mm	LCR-8200A/8200 Series
LCR-15	Test Fixture for SMD/Chip components	LCR-8200A/8200/6000 Series
LCR-15A	50 MHz Test Fixture for SMD/Chip components (including STD-LOAD kit)	LCR-8200A/8200 Series
LCR-16	DC Bias Voltage Box (+/- 45 V)	LCR-6000 Series
LCR-17	DC Bias Current Box (+/- 2.5 A)	LCR-6000 Series
LCR-DB1	External DC Bias Voltage Box (+/- 200 V)	LCR-8200A/8200 Series, LCR-6000 Series
PCS-001	Basic Accessory Kit	PCS-1000I
PT-100	Temperature Probe, Approx. 1500 mm	GOM-805/804

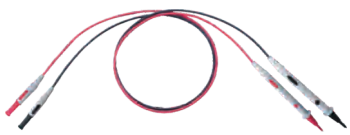
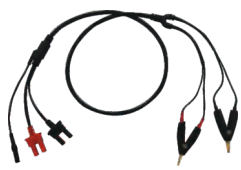
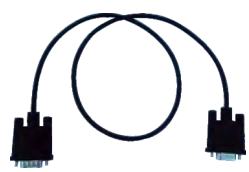
ACCESSORIES

GBM-01	GBM-02	GBM-03/03A
GBM-S1	GDM-TL01	GHT-113
GHT-108	GHT-109	GHT-119
GHT-114 	GHT-120	GHT-121
GHT-115	GHT-122	GHT-116B
GHT-123B	GHT-116R	GHT-123R
GHT-117 / GHT-117 (EU) 	GHT-118	GHT-118 (EU)

ACCESSORIES

GHT-205	PT-100	GLC-01
GLC-02	GPM-001 	GPM-001 (EU) 
GSC-014	GTL-101	GTL-103
GTL-105A	GTL-108A	GTL-115
GTL-116B 	GTL-116R	GTL-117
GTL-132	GTL-205A	GTL-207A
GTL-209	GTL-210	GTL-212A

ACCESSORIES

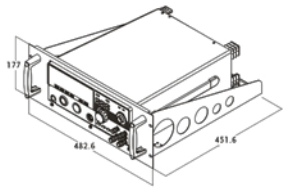
GTL-213	GTL-214	GTL-215
GTL-217 	GTL-308 	GTL-309
GTL-232	GTL-234	GTL-235 
GTL-236	GTL-240	GTL-246
GTL-247	GTL-248	GTL-250
GTL-253	LCR-DB1	GPT-9KR1
GDM-82G1	GDM-82L1	GDM-90G1

ACCESSORIES

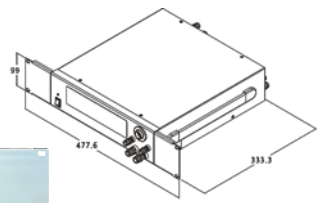
GPT-9KG1 	GPT-10KG1 	GPT-10KL1
GTL-264 	GTL-258 	GLC-03
GLC-04 		

ACCESSORIES

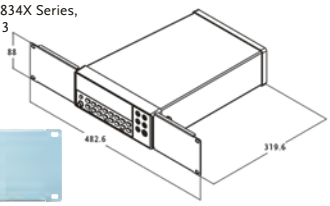
GRA-417 Rack Mount Kit
For : GPT-9900A/9800/9600 Series, GCT-9040



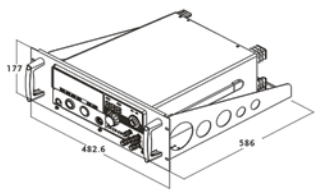
GRA-438 Rack Mount Kit
For : GSB-01/02



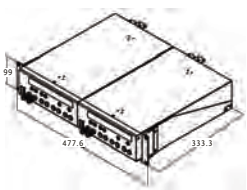
GRA-422 Rack Mount Kit
For : GDM-906X Series, GDM-8261A/8255A/8351/834X Series,
LCR-6000 Series, GBM-Series, GPM-8310/8213



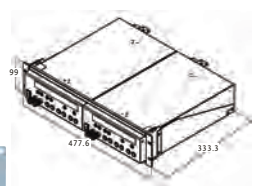
GRA-433 Rack Mount Kit
For : GPT-9904



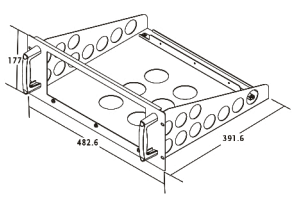
GRA-419 EIA Rack Mount Kit
For : PCS-1000I



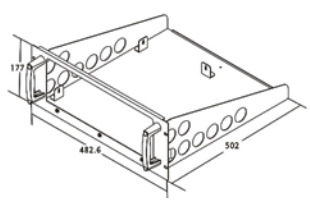
GRA-419 JIS Rack Mount Kit
For : PCS-1000I



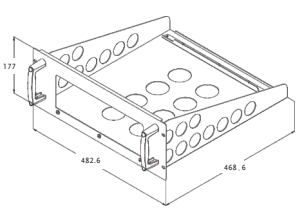
GRA-445 Rack Mount Kit
For : LCR-8200(A) Series



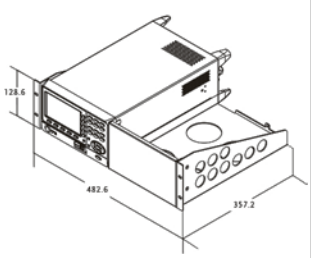
GRA-440 Rack Mount Kit
For : GPT-10000 Series



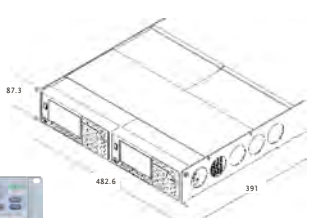
GRA-446 Rack Mount Kit
For : GPT-9500



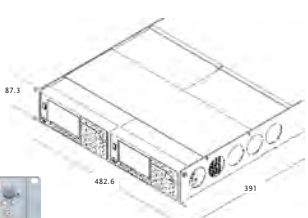
GRA-452 Rack Mount Kit
For : GPM-8320/8330



GRA-454 Rack Mount Kit
For : GDM-906X Series, GDM-904X Series,
GDM-9052, LCR-6000 Series,
GBM-3000 Series, GPM-8310,
GPM-8213



GRA-455 Rack Mount Kit
For : DAQ-9600



ACCESSORIES

FIXTURE MODEL	DESCRIPTION	CONNECTION	DUT PACKAGE	APPLICATION
LCR-05	Test fixture for measuring axial and radial lead components Frequency: DC to 1 MHz Max. Voltage: +/- 35 V	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-05A	Test Fixture for axial & radial leaded components Frequency: DC to 50 MHz Max. Voltage: +/- 45 V (Including SHORT Bar and STD LOAD)	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-06B	Kelvin clip test lead Frequency: DC to 1 MHz Max. Voltage: +/- 45 V	4 Wire (Kelvin clip)	Odd-shaped components	Suitable for low R or high C
LCR-07	Test leads for conventional component measurement. Frequency: DC to 1 MHz Max. Voltage: +/- 35 V	2 Wire (Alligator clip)	Conventional component for in-circuit, board-mounted components	Suitable for low C or high R
LCR-08	SMD/chip tweezers Frequency: DC to 1 MHz Max. Voltage: +/- 35 V	4 Wire (SMD/chip tweezers)	SMD components	Suitable for SMD type L, C, R
LCR-10A	Test Fixture for bottom electrode components Frequency: DC to 50 MHz Max. Voltage: +/- 45 V	4 Wire (SMD/chip tweezers)	SMD/chip components	Range:0402 to 2512 (Including SHORT Bar and STD LOAD)
LCR-12	Kelvin clip test lead Frequency : DC to 10 MHz Max. Voltage : +/- 35 V Approx. 0.6 m	Kelvin clip test lead		
LCR-15	SMD/chip test fixture Frequency: DC to 10 MHz Max. Voltage: +/- 45 V	4 Wire (SMD/chip test fixture)	SMD/chip components	Suitable for SMD Range: 0201 to 1812
LCR-15A	Test Fixture for SMD/Chip components Frequency: DC to 50 MHz Max. Voltage: +/- 45 V	4 Wire (SMD/chip test fixture)	SMD/chip components	Range: 0201 to 1812 (Including STD LOAD)
LCR-16	External DC Bias voltage box Frequency: 40 Hz to 1 MHz Max. Voltage: +/- 45 V			
LCR-17	External DC Bias Current Box Frequency: 40 Hz to 1 MHz Max. Current: +/- 2.5 A			

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GDS-1000-U Series 2012
Digital Storage Oscilloscope

AFG-3000 Series 2012
Arbitrary Function Generator

PEL-2000 Series 2012
Programmable D.C. Electronic Load

GDS-300/200 Series 2015
Digital Storage Oscilloscope

PEL-3000 Series 2015
Programmable D.C. Electronic Load

GDS-2000E Series 2016
Digital Storage Oscilloscope

GSP-9330 2017
3.25GHz Spectrum Analyzer

C 1100 2018
ASK/FSK Tester

C-1200 2019
LoRa Tester

GPM-8213 2018
Digital Power Meter

GDM-906X Series 2019
6 1/2 Digit Dual Measurement Multimeter

GPT-12000 Series 2020
AC/DC/IR/GB Electrical Safety Analyzer

C-3200 2021
LoRaWAN Tester

2020
SKTS-5000
Smart Keys Test Solution

GPM-8310 2021
Digital Power Meter

GDS-3000A Series 2022
650/350 MHz Digital Storage Oscilloscope

PPX-Series 2022
Programmable High-precision D.C. Power Supply

GSM-20H10 2022
Precision Source Meter

GPP-3060/6030 2022
Triple-channel Programmable DC Power Supply

MPO-2000 Series 2024
Multi-function Programmable Oscilloscope

GSG-2000 Series 2024
RF Signal Generator

ASR-6000 Series 2024
High-Performance AC/DC Power Supply

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