Photonic and Optical Test

CATALOG

KEYSIGHT

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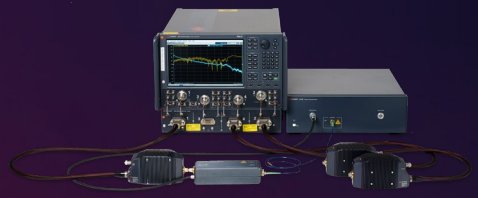
Keysight Photonic and Optical Test

One family. 7 classes.



PHOTONIC COMPONENT ANALYZERS

XP1, XP2, XP3, XP4, XP5, XP6-class

- Characterize long-range optical transmitters.
- Validate coherent transceivers for high-speed data-center networks.

COHERENT TRANSMISSION TESTS

XP7-class

- Characterize and validate diverse optical components.
- Provide precision and flexibility for critical performance insights.

PHOTONIC TEST PARTS

- Develop reliable, scalable optical test systems.
- Support next-generation component and network validation.

Introduction

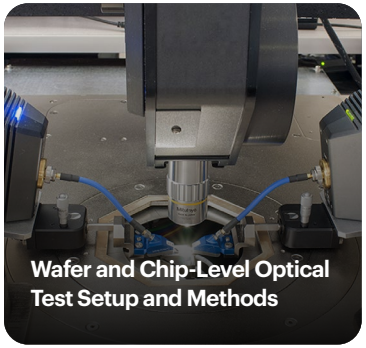
Keysight Optical Test Solutions — from photonic IC validation to coherent transmitter test

Keysight Optical test solutions are now offered in seven capability classes across optical component analyzers and coherent transmission test. Coherent transmission test includes the XP7-class, and the optical component analyzers includes the XP1-, XP2-, XP3-, XP4-, XP5-, and XP6-class. Explore our wide range of photonic and optical test products designed to meet your needs, whether you are developing, characterizing, or validating optical communications systems and devices. With a broad selection of photonic test components, ranging from optical switches, attenuators, and power meters to sophisticated tools for optoelectronic characterization and coherent transmission testing, our comprehensive library of photonic and optical resources will help you make informed decisions and choose the right products for your application.

Validate with precision and reliability

Optical and photonic test solutions are critical for ensuring the performance, reliability, and quality of high-speed communication and computing systems. Whether you are validating photonic ICs or tuning coherent transceivers, you need the right test tools and knowledge to get the most accurate and repeatable results. Keysight resources cover the basics and complex applications to help you develop a deeper understanding of photonics and optical test products.

Here are a few examples of the resources you will find to help you select the photonic and optical test products that are right for you:



Photonic Component Analyzers

Keysight photonic component analyzers support complex characterization and validation across a wide range of optical components and systems. Designed for precision, accuracy, and flexibility, these solutions help you uncover critical insights into optical performance, ensuring your designs meet today's demanding requirements. Explore our wide range of photonic component analyzers to find the one that is right for your application.

Lightwave component analyzers

Precision characterization of optical components

Explore

Wavelength meters

High-precision light measurements for optical calibration

Explore

Tunable lasers

High-performance narrow-band optical source

Explore

Reference transmitter

Standards-compliant signal generation for receiver testing

Explore

Optical return loss meter

Reflection measurement for optical fiber components

Explore

Optical polarization and dispersion

Precision polarization control, measurement, and analysis

Explore

Lightwave Component Analyzers

Precision characterization of optical components

Keysight XP1-class lightwave component analyzers (LCAs) include the N4300 Series. They make calibrated S-parameter measurements for characterizing optical and photonic components. These solutions pair high-bandwidth vector network analyzers with optical converters to measure frequency-dependent response in optical devices, enabling deeper insights during performance validation. LCAs eliminate the need for manual calibration and provide stable, repeatable results across temperature, wavelength, and polarization variations. Select the LCA you need based on the type, maximum frequency, and fiber mode you require to validate your modulators, photonic integrated circuits (PICs), and other next-generation optical components. Choose one of our popular configurations or configure one specific to your application.

Learn more about our lightwave component analyzers

Traceable calibration

Eliminate manual optical calibration with tools calibrated to industry standards for more confident S-parameter measurement accuracy.

High-frequency characterization

Supports electro-optical measurements up to 110 GHz, critical for capturing high-speed device behaviors in 1.6T designs.

VNA integration

Built on a Keysight vector network analyzer (VNA) platform for simple configuration and a shared user interface for both electrical and optical use cases.

Passive and active support

Engineered to characterize both passive and active components, like optical modulators and photonic ICs, supporting diverse testing needs.

Class	Included Brands	Range of Performance Specifications		
		Type	Maximum Frequency	Fiber Mode
XP1	N4300 Series	Lightwave Component Analyzer, Lightwave Detector, Lightwave Transmitter Analyzer Bundle	26.5 GHz to 110 GHz	Multimode, Single-mode, Single-mode and multimode

View popular configurations

Wavelength Meters

High-precision light measurements for optical calibration

Keysight XP2-class wavelength meters include the 86120 Series which provides fast, accurate, and traceable wavelength measurements of dense wavelength division multiplexing (DWDM) signals for calibrating tunable transmitter lasers. Featuring high resolution and repetition rate, our wavelength meters are designed to meet the stringent demands of R&D labs, manufacturing lines, and calibration environments where absolute wavelength accuracy is critical. With wide wavelength coverage and sub-picometer resolution, Keysight wavelength meters ensure compliance with International Telecommunication Union (ITU) grids, minimize drift-related errors, and accelerate tuning and validation tasks. Select the wavelength meter you need based on the wavelength range and absolute wavelength accuracy level you require. Choose one of our popular configurations or configure one specific to your application.

Learn more about our wavelength meters

Sub-picometer accuracy

Achieve ultra-fine wavelength resolution with absolute accuracy down to ±0.3 pm, ideal for tightly spaced ITU channel validation and fine spectral tuning.

Fast update rates

Real-time wavelength display and fast measurement speeds enable closed-loop laser tuning and high-throughput manufacturing workflows.

Broad wavelength coverage

Covers multiple optical wavelength ranges across C, L, and O bands to support diverse applications from optical communications to photonics.

Traceable calibration

Factory-calibrated to international standards with long-term stability and low drift to provide you confidence in every wavelength measurement.

Class	Included Brands	Range of Performance Specifications				
		Wavelength Range	Absolute Wavelength Accuracy	Measurement Cycle Time	Minimum Resolvable Line Separation	Best Power Accuracy
XP2	86120 Series	700 nm to 1650 nm 1270 nm to 1650 nm	±0.2 ppm to ±1 ppm	0.3 s to 0.6 s	5 GHz to 15 GHz	± 0.5 dB to ± 0.6 dB

View popular configurations

Tunable Lasers

High-performance narrow-band optical source

Keysight XP4-class tunable laser sources include the N7770 Series and deliver high-resolution, narrow-linewidth optical signals, enabling precise characterization of wavelength-dependent performance in photonic components and systems. Designed for use in swept or stepped wavelength testing, our tunable lasers feature exceptional stability, low noise, and fine-tuning control — making them ideal for testing filters, modulators, and photonic integrated circuits. With wide tuning ranges and programmable sweep capability, you can easily integrate them into automated optical test systems. Select the tunable laser source you need based on the absolute wavelength accuracy and tunability you require. Choose one of our popular configurations or configure one specific to your application.

Learn more about our tunable lasers

Narrow linewidth stability

Delivers ultra-clean optical output with low phase noise and high coherence, enabling precise testing of narrowband optical components.

Wide tuning range

Covers up to 200 nm within the 1260 – 1650 nm range, ideal for testing across and beyond telecom bands.

Fast, linear sweeps

Programmable, high-speed wavelength sweeps reduce test time and improve wavelength-dependent loss and reflection measurements.

System integration

Designed for system-level use with SCPI command support and modular compatibility to streamline automated optical testing.

Class	Included Brands	Range of Performance Specifications			
		Absolute Wavelength Accuracy	Tunability	Signal to SSE ratio	Maximum Power
XP4	N7770 Series	±1.5 pm to ±10 pm	Stepped, Continuous sweep	75 dB/nm, 80 dB/nm	+13 dBm to +19.4 dBm

View popular configurations

Reference Transmitter

Standards-compliant signal generation for receiver testing

Keysight XP5-class optical reference transmitters include the N7718C and 81491A optical reference transmitters. They deliver stable, high-quality optical signals for accurate characterization of optical receivers and systems. Our reference transmitter converts high-frequency electrical signals from arbitrary waveform generators (AWGs) or pattern generators into ideal optical signals in a variety of modulation formats, useful for communications research and receiver conformance testing to optical standards. Choose a Keysight optical reference transmitter when you need a golden optical signal source for validating receiver performance. Request a quote for the Keysight reference transmitter today.

Learn more about our optical reference transmitter

Optical receiver test

Simulate ideal and stressed optical transmitter behavior when paired with a high-symbol rate BERT as a key part of an optical receiver test solution.

High-bandwidth research

Generate optical signals at various modulation levels (up to PAM8) at 448 Gb/s for 3.2T pathfinding when paired with a high-bandwidth AWG.

Signal format variety

Suitable for any intensity-modulated signal format at rates above 120 Gbaud with built-in 1310 nm laser. Also compatible with tunable lasers for additional coverage.

Golden optical source

Used by standards bodies and test labs as the ideal signal source reference for receiver compliance testing.

Bandwidth	**> 60 GHz**
Wavelength range	**1260 nm to 1360 nm**
Input power range	**+8 dBm to +20 dBm**
Output power	**≥ +5.5 dBm**
Fiber mode	**Single-mode**

Get quote

Optical Return Loss Meter

Reflection measurement for optical fiber components

Keysight XP3-class optical return loss meters include the N7753C which measures the optical power into and reflected from fiber optic links and components for calculating return loss. With integrated power sensors and internal couplers, our optical return loss meter enables fast, accurate return loss measurements without the need for external hardware — ideal for characterizing connectors, isolators, and passive components. Its compact, USB-controlled design streamlines integration into automated test setups for both R&D and production. Choose the Keysight optical return loss meter when you need dependable, high-accuracy reflection measurements built directly into your optical test workflow. Request a quote for the Keysight optical return loss meter today.

Learn more about our optical return loss meter

Wide dynamic range

Measures return loss up to 70 dB, ensuring precise characterization of high-performance optical components and systems.

Integrated dual sensors

Utilizes two built-in power sensors and fiber couplers for direct, calibrated return loss measurements without external equipment.

Fast wavelength sweeps

Synchronizes with tunable laser sources, enabling rapid, wavelength-dependent return loss measurements across 1250 – 1640 nm.

User-friendly interface

Features an on-board graphical interface with step-by-step guidance, simplifying calibration and eliminating measurement uncertainties.

Wavelength range	**1250 nm to 1640 nm**
Number of channels	**1**
Sensor type	**InGaAs**
Dynamic range	**70 dB**
Relative uncertainty (typical)	**±0.5 dB**

Get quote

Optical Polarization and Dispersion

Precise polarization control, measurement, and analysis

Keysight XP6-class optical polarization and dispersion instruments include the N7780C Series. They provide comprehensive control and analysis capabilities. They offer high-speed real-time polarization synthesis, analysis, scrambling, and measurement of polarization-dependent loss and dispersion, key metrics for high performance characterization and verification of optical components and sub-systems. These instruments specialize in interferometry, polarization alignment, component characterization, and transmission system testing. Select the optical polarization and dispersion instrument you need based on the functionality and input power range you require. Choose one of our popular configurations or configure one specific to your application.

Learn more about our optical polarization and dispersion products

Polarization control

Achieve complete polarization state control for precise testing of fibers, modulators, and photonic components.

Fast switching

Capture fast-changing polarization effects with sampling up to 1 MSa/s and state of polarization (SOP) switching speeds up to 100 krad/s for dynamic analysis.

Synchronous scrambling

Electrically synchronized SOP changes for loop-based network stress-testing with timing precision and behavior replication.

Compact and integrated

Each instrument combines multiple functions (scrambler / stabilizer, polarimeter / controller) to provide more features in fewer instruments.

Functionality	**polarization analyzer, polarization synthesizer, synchronous scrambler, polarimeter**
Input power range	**-50 dBm to +7 dBm -38 dBm to +19 dBm <+20 dBm**
Wavelength range	**1240 nm to 1650 nm**
Insertion loss	**4.0 dB to 5.0 dB**
State of polarization uncertainty	**1.5°**

View popular configurations

Coherent Transmission Tests

Keysight coherent transmission test products enable you to characterize long-range optical transmitters and validate coherent transceivers and systems used in high-speed data center networks. Measure modulated optical signals with high fidelity to analyze performance metrics such as error vector magnitude (EVM), Q-factor, and phase error for compliance with industry standards. Choose from a wide range of solutions including high-frequency analyzers based on our Pro benchtop oscilloscopes, or modular coherent transmission test solutions, available in various bandwidths and channel configurations to match your application requirements. Explore our broad portfolio to find the right configuration for your development, validation, or manufacturing testing needs.

Optical Modulation Analyzers

Modular Coherent Transmission Tests

	XP7-class	
Maximum sample rate	**256 GSa/s**	**20 GSa/s to 640 GSa/s**
Frequency rate	**DC to 110 GHz**	**1 MHz to 40 GHz**
ADC resolution	**10 bits**	**8 bits**
Maximum detectable symbol rate	**220 Gbaud**	**74 Gbaud**
Brands included	**N4391C**	**M8290A Series** **M8132A**
	Explore	Explore

Optical Modulation Analyzers

In-depth analysis of complex coherent optical signals

Keysight XP7-class optical modulation analyzers (OMAs) include the N4391C OMA, which combines a high-bandwidth real-time oscilloscope and coherent optical receiver to enable detailed insights into complex, high-speed modulation formats increasingly used in next-generation data communication systems. These products support modulation analysis up to 160 GBd with upgrade paths to meet your future testing needs. Whether you are developing 800ZR coherent transceivers or evaluating system-level performance, Keysight OMAs provide the accuracy and repeatability you need for compliance validation. Choose one of our popular configurations or configure one specific to your application.

Learn more about our optical modulation analyzers

High symbol rate support

Measure baud rates up to 220 GBd, ideal for analyzing ultra-high-speed signals in next-gen 800ZR networks.

Upgradeable hardware

Scale as standards advance and test needs evolve with upgradable bandwidth, channel count, and analysis features.

Vector signal analysis

Analyze complex modulation formats with constellation diagrams, error vector magnitude (EVM), and polarization analysis.

Multiband options

Choose calibrated receivers for C/L/O-band operations, enabling analysis across wavelength ranges and applications.

Maximum sample rate	**256 GSa/s**
Frequency range	**DC to 110 GHz**
ADC resolution	**10 bits**
Maximum detectable symbol rate	**220 Gbaud**
Maximum record length	**2 GSa**
Wavelength range options	**1527.60 nm to 1620 nm, 1270 nm to 1340 nm**

View popular configurations

Modular Coherent Transmission Tests

In-depth analysis of complex coherent optical signals

Keysight optical modulation analyzers (OMAs) combine a high-bandwidth real-time oscilloscope and coherent optical receiver to enable detailed insights into complex, high-speed modulation formats increasingly used in next-generation data communication systems. These products support modulation analysis up to 160 GBd with upgrade paths to meet your future testing needs. Whether you are developing 800ZR coherent transceivers or evaluating system-level performance, Keysight OMAs provide the accuracy and repeatability you need for compliance validation. Choose one of our popular configurations or configure one specific to your application.

See catalog

Maximum sample rate	**20 GSa/s to 640 GSa/s**
Frequency range	**1 MHz to 40 GHz**
ADC resolution	**8 bits**
Maximum detectable symbol rate	**74 Gbaud**
Maximum memory depth	**4 Mpts**

Photonic Test Parts

Keysight photonic test parts are designed to help you develop reliable, efficient, and scalable test systems for a wide range of optical applications. Whether you're developing next-generation components or validating complex networks, our comprehensive portfolio supports precise, high-performance testing at every stage. Explore our wide range of photonic test parts you need to build the optical test environment that meets your requirements today and into the future.

Optical power meters

Accurate and reliable multichannel optical power measurements

Explore

Optical power meter heads

Sensor heads for flexible optical power detection

Explore

Optical attenuators

Precise power control for optical signal testing

Explore

Optical switches

Signal routing for automated multichannel optical testing

Explore

Optical Power Meters

Accurate and reliable multichannel optical power measurements

Keysight optical power meters measure optical signal strength, providing multi-channel measurement processing and system control while offering rapid response times, wide dynamic range, and simple integration into automated test setups. Our optical power meters feature built-in calibration factors for different sensor types and enable you to perform high-speed logging, relative power measurements, and absolute power validation with SCPI control and optical test automation software. Choose the optical power meter you need to enable centralized control, flexible connectivity, and scalable measurement capability for optical component development or production test. Choose one of our popular configurations or configure one specific to your application.

Learn more about our optical power meters

High-speed acquisition

Capture fast changes with rapid sampling rates and low latency, ideal for dynamic environments and time-sensitive manufacturing testing.

Multi-channel scalability

Provides up to eight channels in a compact, half-rack form factor for high-throughput environments when rack space is scarce.

Automation ready

Enables synchronization of multiple instruments for time-aligned measurements, programmable via SCPI commands and automation software.

High optical sensitivity

Make precise, linear, and repeatable optical measurements over a wide wavelength and power range with indium gallium arsenide (InGaAs) sensors.

Range of Performance Specifications				
Power Range	**Number of Channels**	**Analog Output**	**Uncertainty at Reference Conditions**	**Wavelength Range**
+10 dBm to -80 dBm +20 dBm to -70 dBm +10 dBm to -110 dBm	2 to 8	Varies	± 2.5%	1250 nm to 1650 nm 800 nm to 1650 nm 800 nm to 1700 nm

View popular configurations

Optical Power Meter Heads

Sensor heads for flexible optical power detection

Keysight optical power meter heads serve as the sensing front-end that converts optical signals into electrical output for measurement. Designed for accuracy and durability, each head is calibrated for specific wavelength ranges and power levels. Sensor types include InGaAs, germanium, and silicon detectors with optional integrating spheres and filters for optimized performance. With support for a wide range of fiber connectors and configurations, our optical power meter heads enable you to tailor your measurement setup to your application. Pair the right sensor head with the interface you need to maximize accuracy, protect against overload, and match your specific device under test. Choose one of our popular configurations or configure one specific to your application.

Learn more about our optical power meter heads

Wavelength-optimized sensors

Available with InGaAs, silicon, or germanium sensors optimized for specific spectral ranges to deliver high accuracy and sensitivity in optical measurements.

Wide power range

Measure from picowatts to high-power levels with specialized heads, allowing precise characterization of low-level signals and protection against high-power overloads.

Swappable connectors

Support for a wide variety of optical connector types enables easy adaptation to different devices under test (DUTs) and testing scenarios without extensive reconfiguration.

Polarization-sensitive

Low polarization-dependent loss (PDL) heads for polarization-sensitive applications, enabling more accurate and reliable measurements.

Range of Performance Specifications				
Type	**Power Range**	**Wavelength Range**	**Sensor Type**	**Uncertainty at Reference Conditions**
Head, Interface	+10 dBm to -90 dBm +10 dBm to -80 dBm +27 dBm to -70 dBm +40 dBm to -60 dBm	800 nm to 1700 nm 450 nm to 1020 nm 750 nm to 1800 nm 850 nm to 1650 nm	InGaAs, Si, Ge	± 2.2% to ± 3.0%

View popular configurations

Optical Attenuators

Precise power control for optical signal testing

Keysight optical attenuators provide precise control of optical signal power for accurate and repeatable optical component testing. Attenuators emulate signal loss, balance power levels, and protect sensitive devices during testing. Keysight attenuators offer low insertion loss, low polarization-dependent loss (PDL), and high resolution across a wide attenuation range. These features ensure accurate and stable signal control in both single-mode and multimode applications. Select the optical attenuator you need to simulate real-world optical link conditions, calibrate power levels, or automate signal conditioning in your optical test setup based on maximum attenuation and number of channels. Choose one of our popular configurations or configure one specific to your application.

Learn more about our optical attenuators

Wide attenuation range

Offers fine control across a broad range up to 60 dB, enabling accurate signal loss emulation for diverse optical power levels and test scenarios.

Fast switching speed

Rapid attenuation adjustment improves test throughput and responsiveness for automated applications with quick signal level changes.

High repeatability

Delivers highly repeatable attenuation settings over thousands of cycles, supporting stable, automated test setups and long-term use in manufacturing environments.

Ultra-low PDL

Minimizes polarization-dependent loss to ensure consistent and accurate attenuation across varying signal polarizations, ideal for precision testing of sensitive optical components.

Range of Performance Specifications				
Maximum Attenuation	**Number of Channels**	**Insertion Loss**	**Power Range**	**Fiber Mode**
35 dB to 60 dB	1 to 4	< 1.7 dB to < 2.2 dB	+20 dB to -35 dB, +20 dB to -50 dB	Multimode, Single-mode

View popular configurations

Optical Switches

Precise signal routing for automated optical testing

Keysight optical switches enable high-performance, multichannel optical signal routing for automated and manual test applications. Designed for durability and precision, our optical switches support single-mode and multimode fiber types with low insertion loss, high return loss, and reliable repeatability. With support for various switch configurations, they offer flexible routing options for test setups of any complexity. Fast switching speeds, remote control capabilities, and integration with other Keysight photonic test instruments make them ideal for scalable optical test systems in R&D, validation, and manufacturing environments. Choose one of our popular configurations or configure one specific to your application.

Learn more about our optical switches

Low insertion loss

Minimizes signal degradation across switching paths, preserving signal quality and measurement accuracy throughout complex optical setups.

Programmable switching

Enables rapid, programmable signal routing via software or SCPI commands, streamlining test automation and increasing hardware efficiency.

Flexible configurations

Supports a variety of switch configurations including multichannel and matrix topologies to match your specific test needs.

Connection certainty

Reduces variability from repeated manual reconnections with automated optical switching for more reliable, repeatable optical measurements.

Range of Performance Specifications				
Number of Channels	**Switch Configuration**	**Fiber Mode**	**Insertion Loss**	**Wavelength Range**
1 to 4	2x2, 1x4, 1x16	Single-mode	<2.4 dB	1250 nm to 1650 nm

View popular configurations

Software and Accessories

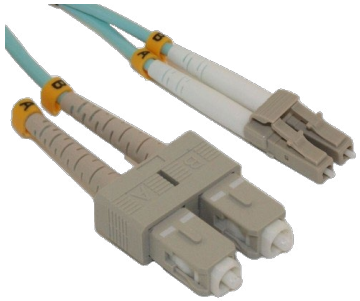
Find compatible software and accessories for your photonic test solutions

Explore the wide range of analysis and automation software for our photonics and optical products. Streamline waveform analysis and device characterization with powerful tools designed for optical test and photonic component analyzers, or automate testing for repeatable, reliable manufacturing test applications. Complete your setup with optical heads, polarization controllers, probes, and calibration accessories to make the right measurements for your application.

Gain deeper insight into optical performance with software enabling:

- optical modulation analysis
- vector signal analysis
- component analysis automation
- polarization Lambda scan automation
- time-domain analysis

Explore software



Get more functionality from your photonic and optical products with the right accessories, including:

- optical head adapters
- fiber adapters and interfaces
- multiport power meter adapters
- snap-on connectors

Explore accessories

Keysight Support Services

Explore the services that are right for you

Keysight Support Services can reduce your learning curve, enhance your uptime, guarantee the accuracy of your testing equipment, and provide the expertise you require, precisely when and where you need it.

Maximize your instrument uptime, quickly optimize your test measurements, and get the answers you need at our fastest available times. KeysightCare curated support plans bundle critical services with prioritized response and turnaround times. **High-performance instruments include one year of KeysightCare Assured.**

Explore support services

Calibration

Ensure your test system performs to specification and meets local and global standards.

Repair

Restore equipment to original functionality and specifications with trained technicians.

KeysightCare

Innovate at speed with curated support plans and prioritized response and turnaround times.

Education

Make measurements quickly with eLearning and in-house, instructor-led training.

Keysight Support

Get 24x7 access to service requests, case management help, and technical articles.

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.