N21

Hardware Test Report

Issue 1.0

Date 2018-08-29

Neoway Product Document

Notice

This document provides guide for users to use N21.

This document is intended for system engineers (SEs), development engineers, and test engineers.

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Sales@neoway.com

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Contents

About This Document

Scope

This document is applicable to N21 series.

Audience

This document is intended for system engineers (SEs), development engineers, and test engineers.

Change History

Issue	Date	Change	Changed By
1.0	2018-08	Initial draft	Yong Chen

Conventions

Symbol	Indication
	This warning symbol means danger. You are in a situation that could cause fatal device damage or even bodily damage.
	Means reader be careful. In this situation, you might perform an action that could result in module or product damages.
	Means note or tips for readers to use the module

1 Purpose

This N21 Test Report is provided a summary of the results for hardware test performed as outlined within this document.

1.1 Contact Information

Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Shenzhen Neoway Technology Co., Ltd.

4th floor, building 2,Huarong Road Lianjian Science and Technology park, Longhua District,Shenzhen,Guangdong province,China.

Tel:86-0755-29672566

Email:support@neoway.com

Or our local office. For more information, please visit:

http://www.neoway.com

1.2 Product Information

Model name	N21
Hardware version	V1.1
Software version	N21_RDD0CM_BZ_V001
Sample quantity	15PCS
Support bands	Cat-NB1:B3,B5,B8

2 Test Equipment

Equipment Name	Model	Manufacturer
Wideband Radio Communication Tester	CMW500	R&S
Universal Radio Communication Tester	8960	AGILENT
Mobile Communications DC Sources	66319B	AGILENT
Temperature and Humidity Chamber	KM3166	KOMEG
Temperature and Humidity Chamber	PS1-150	HONGZHAN
Vibration Tester	MP-3000A	KHITACHI
Free Drop Tester	GP-2112	GOPOINT
Electrostatic Discharge Generator	ESD61002TC	Prima

3 Test Result

NO.	Test Item	Quantity	Test Result	Test Standards
1	RF Test at Normal Temperature	2	Pass	3GPP
2	Operation at High Temperature	3	Pass	IEC 60068-2-2
3	Operation at Low Temperature	3	Pass	IEC 60068-2-1
4	Operation at High Temperature&High Humidity	3	Pass	IEC 60068-2-3
5	Storage at High Temperature	2	Pass	IEC 60068-2-2
6	Storage at Low Temperature	2	Pass	IEC 60068-2-1
7	Thermal Shock	2	Pass	IEC 60068-2-14
8	Vibration Test	2	Pass	IEC 60068-2-6
9	Free Drop Test	2	Pass	IEC 60068-2-32
10	ESD	2	Pass	IEC 61000-4-2
11	Power Consumption	2	Pass	Internal standard
12	Repeated power off	2	Pass	Internal standard

4 Test Items

4.1 RF Test at Normal Temperature

4.1.1 Test Condition

Standard	Temperature(℃)	Humidity(%RH)	Monitoring
3GPP	18~25	30~60	YES

4.1.2 Test Results

Test Item	Criteria	Result
Register	Registered on test equipment successfully	Pass
RF Index	The RF index meets the 3GPP Standard	Pass

4.1.3 Test Data

Cat-NB1 Test Results

Band	BW	Channel	Transmit Performance					Sensitivity* (dBm)	Results
			Maximum Output Power (dBm)	Error Vector Magnitude (%)	Frequency Error (Hz)	Spectrum Emission Mask	Adjacent channel leakage ratio		
Band 3	200KHz	19201	23.61	0.74	-2.03	Pass	Pass	-107.5	Pass
		19575	23.89	0.39	-2.98	Pass	Pass	-107.5	
		19949	23.30	0.53	1.46	Pass	Pass	-107.5	
Band 5	200KHz	20401	23.27	1.16	5.19	Pass	Pass	-107.5	Pass
		20525	23.70	1.26	4.91	Pass	Pass	-107.5	

		20649	23.77	1.18	4.38	Pass	Pass	-107.5	
Band 8	200KHz	21451	23.20	0.44	-0.74	Pass	Pass	-107.5	Pass
		21625	22.68	0.61	-2.30	Pass	Pass	-107.5	
		21799	22.27	1.33	-5.05	Pass	Pass	-107.5	

Notes

All test under 3.75KHz sub-carrier spacing

Sensitivity*: Reference sensitivity level without repetitions

4.2 Operation at High Temperature

4.2.1 Test Condition

Standard	Temperature(℃)	Duration	Monitoring
IEC 60068-2-2	75	24 hours	YES

4.2.2 Test Procedures

1. Insert the SIM card into the module, power on it and put it into the testing chamber.
2. Serial Port Communication test: set up a TCP connection with the server through the serial port.
3. Perform the module in the work state at this environment for 24 hours.

4.2.3 Test Results

Test Item	Criteria	Result
Register	Registered on CAT-NB1 successfully.	Pass
Connect	No interruption of serial port communication. No crash. No restart. No offline.	Pass

4.3 Operation at Low Temperature

4.3.1 Test Condition

Standard	Temperature(℃)	Duration	Monitoring
IEC 60068-2-1	-30	24 hours	YES

4.3.2 Test Procedures

1. Insert the SIM card into the module, power on it and put it into the testing chamber.
2. Serial Port Communication test: set up a TCP connection with the server through the serial port.
3. Perform the module in the work state at this environment for 24 hours.

4.3.3 Test Results

Test Item	Criteria	Result
Register	Registered on CAT-NB1 successfully.	Pass
Connect	No interruption of serial port communication. No crash. No restart. No offline.	Pass

4.4 Operation at High Temperature&High Humidity

4.4.1 Test Condition

Standard	Temperature(℃)	Humidity(%RH)	Duration	Monitoring
IEC 60068-2-3	55	95	24 hours	YES

4.4.2 Test Procedures

1. Insert the SIM card into the module, power on it and put it into the testing chamber.
2. Serial Port Communication test: set up a TCP connection with the server through the serial port.
3. Perform the module in the work state at this environment for 24 hours.

4.4.3 Test Results

Test Item	Criteria	Result
Register	Registered on CAT-NB1 successfully.	Pass
Connect	No interruption of serial port communication. No crash. No restart. No offline.	Pass

4.5 Storage at High Temperature

4.5.1 Test Condition

Standard	Temperature(℃)	Duration	Monitoring
IEC 60068-2-2	90	48 hours	NO

4.5.2 Test Procedures

1. Before the test, check the appearance, function, RF index.
2. Power off the module and put it into the testing chamber.
3. Storage the module at this environment for 48 hours.
4. After the test, check the appearance, function, RF index.

4.5.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	Register and connect to the CAT-NB1 network successfully after the whole test.	Pass
RF Index	The RF indexes meet the 3GPP Standard after the whole test.	Pass

4.6 Storage at Low Temperature

4.6.1 Test Condition

Standard	Temperature(℃)	Duration	Monitoring
IEC 60068-2-1	-45	48 hours	NO

4.6.2 Test Procedures

1. Before the test, check the appearance, function, RF index.
2. Power off the module and put it into the testing chamber.
3. Storage the module at this environment for 48 hours.
4. After the test, check the appearance, function, RF index.

4.6.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	Register and connect to the CAT-NB1 network successfully after the whole test.	Pass
RF Index	The RF indexes meet the 3GPP Standard after the whole test.	Pass

4.7 Thermal Shock

4.7.1 Test Condition

Standard	Temperature(℃)	Change Over Speed	Duration	Monitoring
IEC 60068-2-14	-45/90	5±1℃/min	20Cycles	NO

4.7.2 Test Procedures

1. Before the test, check the appearance, function, RF index.
2. Put N21 into the testing chamber. Test the module in the above conditions.

3. Take the module out from the chamber and check its basic functions after two hours at room temperature.
4. After the test, check the appearance, function, RF index.

4.7.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	Register and connect to the CAT-NB1 network successfully after the whole test.	Pass
RF Index	The RF indexes meet the 3GPP Standard after the whole test.	Pass

4.8 Vibration Test

4.8.1 Test Condition

Standard	Temperature(℃)	Duration	Frequency	Monitoring
IEC 60068-2-6	25	24 hours	100 Hz	NO

4.8.2 Test Procedures

1. Before the test, check the appearance, function, RF index.
2. Fix the module to the vibration tester.
3. Start the equipment and test the module in the above conditions.
4. After the test, check the appearance, function, RF index.

4.8.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	Register and connect to the CAT-NB1 network successfully after the whole test.	Pass
RF Index	The RF indexes meet the 3GPP Standard after the whole test.	Pass

4.9 Free Drop Test

4.9.1 Test Condition

Standard	Temperature(℃)	Height	Number of Drops	Monitoring
IEC 60068-2-32	25	1 m	12(6 faces, 2 times per face)	NO

4.9.2 Test Procedures

1. Before the test, check the appearance, function, RF index.
2. Fix the module to the test board.
3. Test the modules in the above conditions.
4. After the test, check the appearance, function, RF index.

4.9.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	Register and connect to the CAT-NB1 network successfully after the whole test.	Pass
RF Index	The RF indexes meet the 3GPP Standard after the whole test.	Pass

4.10 ESD

4.10.1 Test Condition

Standard	Temperature (℃)	Humidity (%RH)	Duration	Monitoring	Contact Discharge	Air Discharge
IEC 61000-4-2	25	30~60	/	YES	8kV	15kV

4.10.2 Test Procedures

1. Before the test, check the appearance, function, RF index.
2. Power on the module.

3. Keep the head of the Electrostatic Discharge Generator perpendicular to the test point.
4. Discharge electricity at the test point and then ground the test point to remove the ESD.
5. Test each point for 30 times at a 1 second interval.
6. Contact discharge test points: RF connector, power supply ground, cover.
7. Air discharge test points: antenna.
8. Perform the above tests when the module registers networks, transmits data, and is in a call.
9. After the test, check the appearance, function, RF index.

4.10.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	Connect to the Internet and word for a long time without disconnection during the whole test.	Pass
RF Index	The RF indexes meet the 3GPP Standard after the whole test.	Pass

4.11 Power Consumption under LTE Cat-NB1

	Description	Conditions	Typ.	Unit
VBAT=3.6v @Band 5	Power Saving Mode	PSM@Instrument	4.5	uA
	IDLE	e-DRX@Instrument (edrx value：20.48 sec PTW：2.56 sec)	1.2	mA
		DRX@Instrument	1.7	mA
	Active State	23dBm@Instrument(1@0 MCS=0 3.75KHZ)	107	mA
		23dBm@Instrument(1@0 MCS=0 15KHZ)	61	mA
		0dBm@Instrument(1@0 MCS=0 3.75KHZ)	50	mA
		0dBm@Instrument(1@0 MCS=0 15KHZ)	36	mA
		-10dBm@Instrument(1@0 MCS=0 3.75KHZ)	30	mA
		-10dBm@Instrument(1@0 MCS=0 15KHZ)	27	mA
		Receive@Instrument	TBD	mA

4.12 Repeated power off test

4.12.1 Test Condition

Standard	High Temperature (75℃)	Low Temperature (-30℃)	High temperature and high humidity (55℃95%RH)	Monitoring
Internal standard	10000times	10000times	5000times	YES

4.12.2 Test Procedures

1. Before the test, check the appearance, function.
2. Set test tools: power up 15s, power off 5s.
3. The temperature of the box is adjusted to 75 degrees, and the test is 10000 times.
4. The temperature of the box is adjusted to -30 degree, and the test is 10000 times.
5. The temperature of the box is adjusted to 55 degrees, the humidity is 95, and the test is 5000 times.
6. After the test, check the appearance, function.

4.12.3 Test Results

Test Item	Criteria	Result
Appearance	NO deformation or unconsolidated component.	Pass
Function	1. Serial port communication function is normal. 2. USB port communication function is normal. 3. The sample can be registered to the real network and can make calls with SIM card. 4. The success rate of the startup 100%.	Pass

5 Appendix

Figure 5-1 N21 module

Figure 5-2 N21 on the EVB board

Figure 5-3 N21 under the RF test

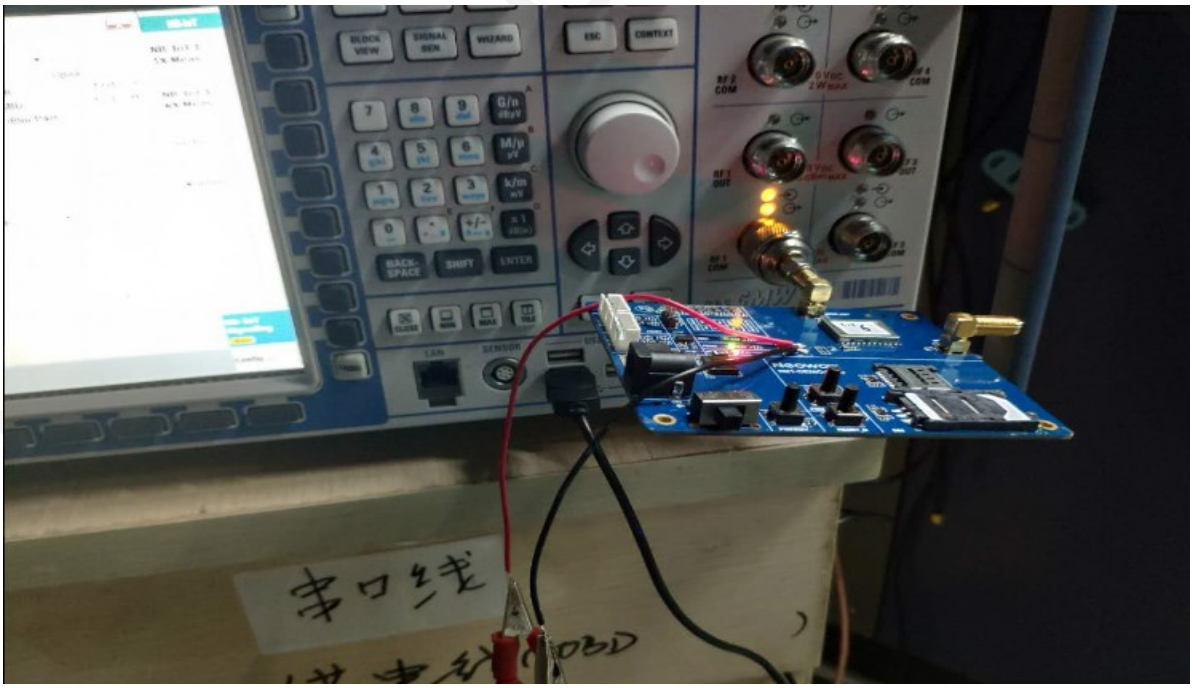


Figure 5-4 N21 under the ESD test

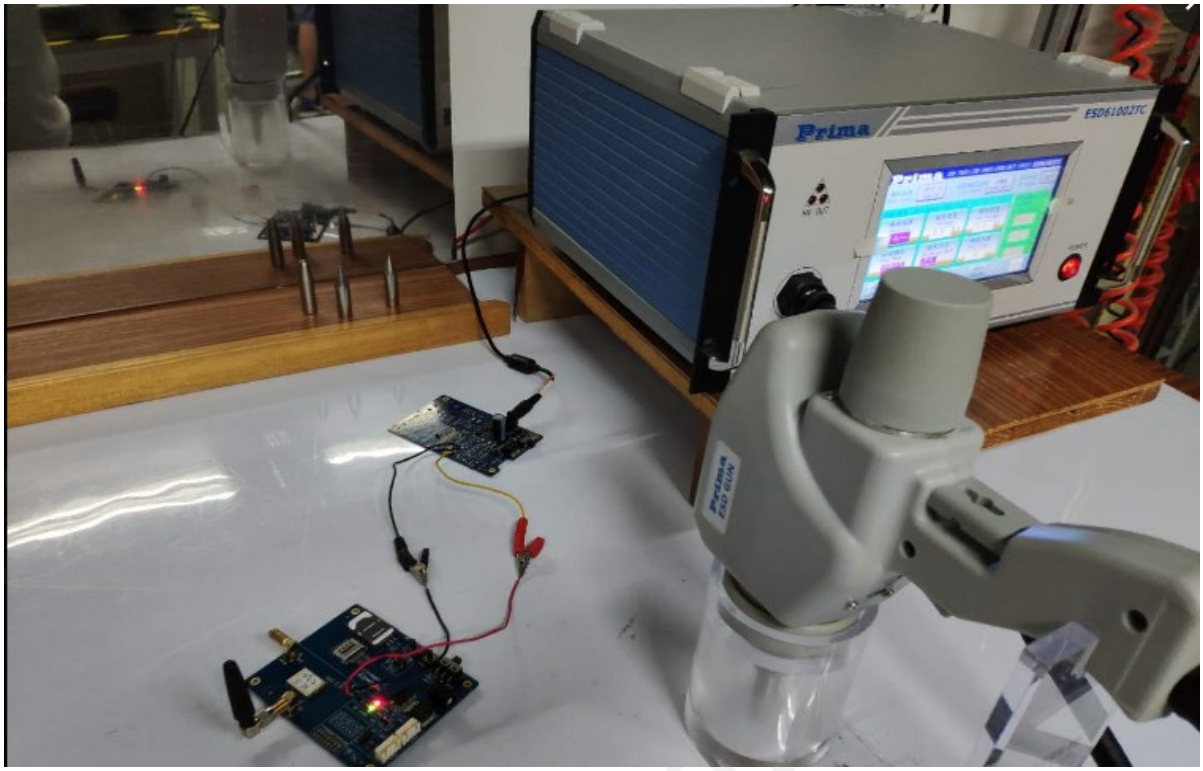
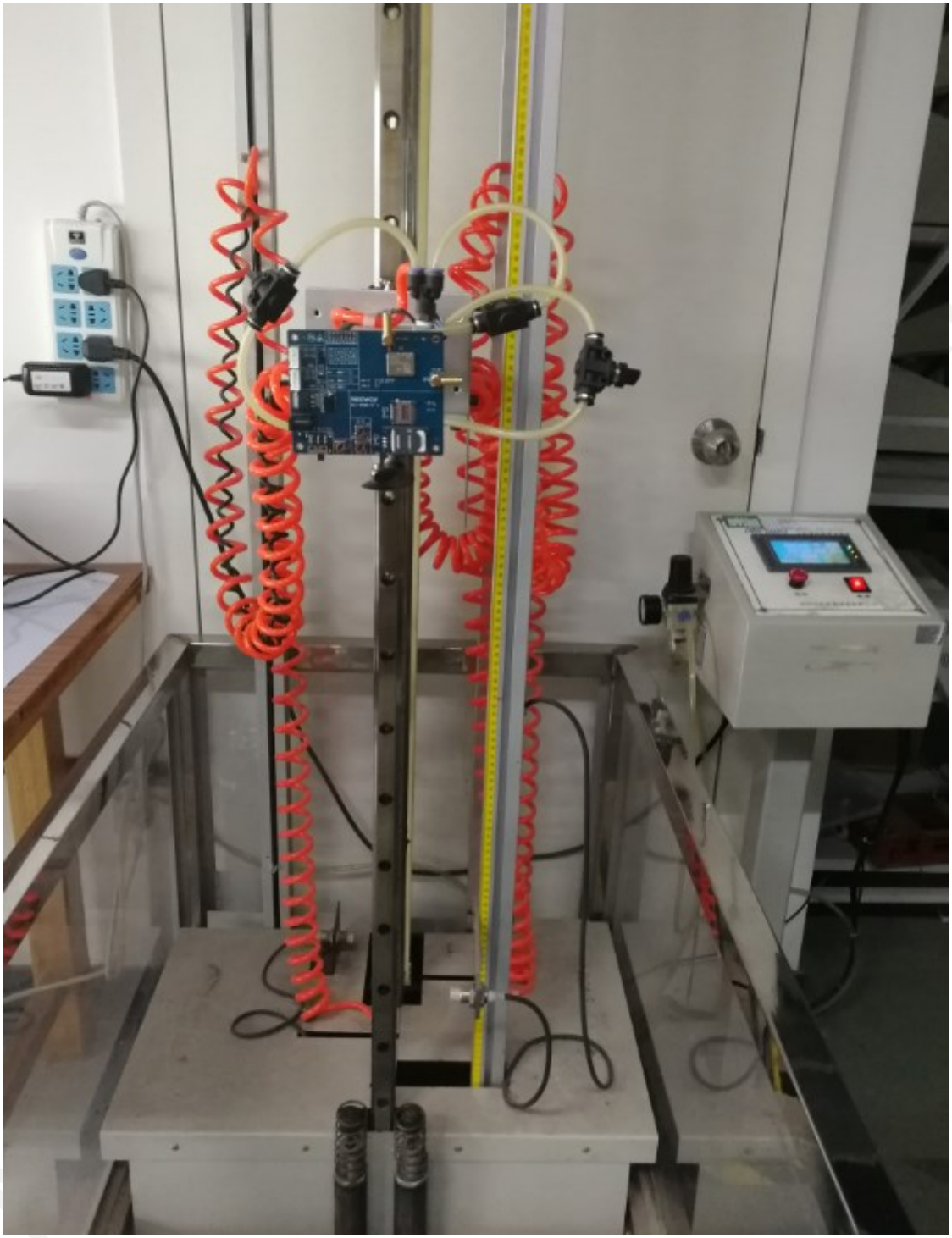


Figure 5-5 N21 under the high temperature test

Figure 5-6 N21 under the low temperature test

Figure 5-7 N21 under the high temperature and high humidity test

Figure 5-8 N21 under the free drop test



****End The Report***

