TEST REPORT

Applicant: Nebra LTD.

Address of Applicant: Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells TN3 9BJ United Kingdom

Equipment Under Test (EUT)

Product Name: Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner

Model No.: HNTOUT-868-G-LT+, HNTOUT-868-G-LT, HNTOUT-868-LT+, HNTOUT-868-G, HNTOUT-868-LT, HNTOUT-868

Trade mark: Nebra

Applicable standards: EN 55032:2015
EN 55035:2017
EN 61000-3-2:2014, EN 61000-3-3:2013

Date of sample receipt: 31 May, 2021

Date of Test: 31 May, to 08 Jul., 2021

Date of report issue: 09 Jul., 2021

Test Result: PASS*

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive2014/30/EU are considered.

CE

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

2 Version

Version No.	Date	Description
00	*09 Jul., 2021*	*Original*

Tested by: _____ ***Date:*** *09 Jul., 2021*

Test Engineer

Reviewed by: _____ ***Date:*** *09 Jul., 2021*

Project Engineer

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4 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission	EN 55032	EN 55032	Class B	PASS
Conducted Emission	EN 55032	EN 55032	Class B	PASS
Harmonic Emission	EN 61000-3-2	EN 61000-3-2	N/A	N/A
Flicker Emission	EN61000-3-3	EN61000-3-3	Clause 5 of EN 61000-3-3	N/A
ESD	EN 55035	EN61000-4-2:2009	Contact ±4 Kv Air ±8 kV	PASS
Continuous RF electromagnetic radiated field disturbances	EN 55035	EN61000-4-3: 2006+A1:2007+A2:2010	80MHz-1000MHz, 1800MHz,2600MHz, 3500MHz, 5000MHz: 3Vrms (emf), 80%, 1kHz Amp. Mod.	PASS
Electrical Fast Transients (EFT)	EN 55035	EN61000-4-4:2012	AC ±1.0kV	N/A
Surge	EN 55035	EN 61000-4-5: 2014+A1:2017	Line-line:±1kV Line-earth: ±2kV	N/A
Continuousinduced RF disturbances	EN 55035	EN61000-4-6: 2014+AC:2015	0.15-10MHz:3V 10-30MHz:3-1V 30-80MHz:1V 80%, 1kHz, AM	N/A
Power frequency magnetic field	EN 55035	EN 61000-4-8:2010	50/60 Hz 1A/m	N/A
Voltage Dips and Interruptions	EN 55035	EN61000-4-11: 2004+A1:2017	0 % U_T* for 0.5per 0 % U_T* for 250per 70 % U_T* for 25per	N/A

Remark:

1. *UT is the nominal supply voltage.*
2. *Pass: Meet the requirements.*
3. *N/A: not applicable.*

5 General Information

5.1 Client Information

Applicant:	Nebra LTD.
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells TN3 9BJ United Kingdom
Manufacturer:	Nebra LTD.
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells TN3 9BJ United Kingdom
Factory:	SUNSOAR TECH CO., LIMITED
Address:	4/F, Block E, Fengze Building, Huafeng No.2 Industrial Park, Hangkong Road, XiXiang Town, BaoAn District, Shenzhen, China

5.2 General Description of E.U.T.

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner
Model No.:	HNTOUT-868-G-LT+, HNTOUT-868-G-LT, HNTOUT-868-LT+, HNTOUT-868-G, HNTOUT-868-LT, HNTOUT-868
Hardware version:	V01-16-2021-1820
Software version:	4dc8745
Power supply:	AC: AC 230V / 50Hz POE: DC48V
Remark:	Model No.: HNTOUT-868-G-LT+, HNTOUT-868-G-LT, HNTOUT-868-LT+, HNTOUT-868-G, HNTOUT-868-LT, HNTOUT-868 The difference: we will offer the unit with or without a GPS module included. Models with the GPS Included are indicated with a -G on the end of the model number. For example a unit with model no HNTOUT-868 is 868 Mhz, no GPS. A unit with Model No HNTOUT-868-G, is 915Mhz with GPS. We offer the unit using the Raspberry Pi Compute Module 3+ 32GB by standard (no suffix) but have an -LT variant which uses the Raspberry Pi Compute Module 3 Lite with a 32 GB eMMC to SD adapter card and a -LT+ variant which uses the Raspberry Pi Compute Module 3+ Lite with a 32 GB eMMC to SD adapter card. These suffixes can be applied to the models both with and without GPS as described above. We also provide customers the ability to, optionally, add both cellular connectivity and an additional 8 channel LoRa gateway to any of these models by using an mPCIe module however these come as optional extras.

5.3 Test mode and voltage and test samples plans

ON-AC mode	Keep the EUT in ON link mode (AC power supply)
ON-POE mode	Keep the EUT in ON link mode
LAN mode	Keep the EUT in LAN link mode
Test voltage:	AC 230V/50Hz
Remark:	1. During the test, pre-scan 120Vac/60Hz and 230Vac/50Hz of the Power supply, found 230Vac/50Hz was worse case mode. 2. The report only reflects the worst mode.

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
NEBRA	Adapter	TM-K018VP-01201500PE-Z	PS1082	DoC
shenzhen gospell digital technology co.,ltd	POE	G0566-480-100	2053-000003	N/A
MERCURY	Router	MW305R	1192FPW000074	N/A
Lenovo	PC	ThinkPad E450	0B95180	DoC

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB
Radiated Emission (1GHz ~ 18GHz)	±5.16 dB
Radiated Emission (18GHz ~ 26.5GHz)	±3.20 dB

5.6 Description of Cable Used

N/A

5.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC- Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax:+86-755-23116366
Email: info-JYTee@lets.com, Website: http://www.ccis-cb.com

5.9 Monitoring of EUT for the Immunity Test

Visual:	Monitored the LED of EUT
Sound:	N/A
Other:	Monitored the data link of EUT

5.10 Test Instruments list

Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
3m SAC	ETS	9m*6m*6m	966	01-19-2021	01-18-2024
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-03-2021	03-02-2022
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-03-2021	03-02-2022
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-03-2021	03-02-2022
Pre-amplifier	CD	TRLA-010180G50B	20120401	03-03-2021	03-02-2022
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-03-2021	03-02-2022
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-03-2021	03-02-2022
Simulated Station	Anritsu	MT8820C	6201026545	03-03-2021	03-02-2022
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-03-2021	03-02-2022
Cable	MICRO-COAX	MFR64639	K10742-5	03-03-2021	03-02-2022
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-03-2021	03-02-2022
10m SAC	ETS	RFSD-100-F/A	Q2005	03-31-2021	04-01-2024
BiConiLog Antenna	SCHWARZBECK	VULB 9168	1249	03-31-2021	04-01-2022
BiConiLog Antenna	SCHWARZBECK	VULB 9168	1250	03-31-2021	04-01-2022
EMI Test Receiver	R&S	ESR 3	102800	04-06-2021	04-07-2022
EMI Test Receiver	R&S	ESR 3	102802	04-06-2021	04-07-2022
Pre-amplifier	Bost	LNA 0920N	2016	04-06-2021	04-07-2022
Pre-amplifier	Bost	LNA 0920N	2019	04-06-2021	04-07-2022
Test Software	R&S	EMC32	Version: 10.50.40		

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESCI 3	101189	03-03-2021	03-02-2022
RF Switch	TOP PRECISION	RSU0301	N/A	03-03-2021	03-02-2022
LISN	CHASE	MN2050D	1447	03-03-2021	03-02-2022
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	06-18-2020	06-17-2021
				06-18-2021	06-17-2022
ISN	Schwarzbeck	CAT3 8158	#96	03-03-2021	03-02-2022
ISN	Schwarzbeck	CAT5 8158	#166	03-03-2021	03-02-2022
ISN	Schwarzbeck	NTFM 8158	#126	03-03-2021	03-02-2022
Cable	HP	10503A	N/A	03-03-2021	03-02-2022
EMI Test Software	AUDIX	E3	Version: 6.110919b		

ESD:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
ESD Simulator	Haefely	ONYX30	183900	03-03-2021	03-02-2022

Radiated Immunity:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Signal Generator	Rohde & Schwarz	SMR20	1104.002.20	03-03-2021	03-02-2022
RF Amplifier 80M-1GHz	Amplifier Research	AR 150W1000	115243	03-03-2021	03-02-2022
RF Amplifier 1GHz-4.2GHz	Amplifier Research	AR 25S1G4AM1	145863	03-03-2021	03-02-2022
RF Amplifier 4GHz-6GHz	Amplifier Research	35S4G8A	247443	03-03-2021	03-02-2022
Power Meter	Rohde & Schwarz	NRVS	1020.1809.02	03-03-2021	03-02-2022
Software EMC32	Rohde & Schwarz	EMC32-S	N/A	N/A	N/A
Log-periodic Antenna	Amplifier Research	AT1080	3654	03-03-2021	03-02-2022
Antenna Tripod	Amplifier Research	TP1000A	7412	N/A	N/A
High Gain Horn Antenna	Amplifier Research	AT4002A	6987	03-03-2021	03-02-2022
Nexus Condutuining Amplifier	B&K	2690	3003552	N/A	N/A
MUTH Simulator	B&K	4227	N/A	N/A	N/A
Sound Level Calibrator	B&K	4231	N/A	N/A	N/A
Audio Analyzer	Rohde & Schwarz	UPL 16	100150	03-03-2021	03-02-2022

Harmonic Current/ Voltage Fluctuation and Flicker:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Three phase harmonic scintillation analyzer	AMETEK	PACS-3	2046A02916	02-03-2021	02-02-2022
Three phase harmonic power supply	AMETEK	MX45	2046A00586	02-03-2021	02-02-2022

6 Test Results

6.1 EMI (Emission)

6.1.1 Radiated Emission

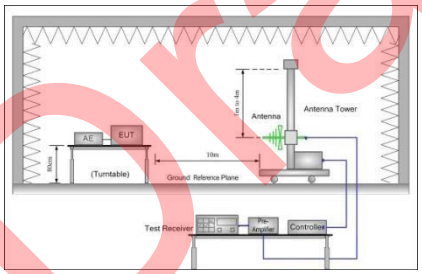
Test Requirement:	EN 55032				
Test Method:	EN 55032				
Test Frequency Range:	30MHz to 6GHz				
Test Distance:	3m or 10m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	QP Value
	Above 1GHz	Peak	1MHz	3MHz	PK Value
		Average	1MHz	3MHz	AV Value

ITE Limit:	Frequency	Limit (dBuV/m @10m)	Remark
	30MHz-230MHz	30.0	QP Value
	230MHz-1GHz	37.0	QP Value
	Frequency	Limit (dBuV/m @3m)	Remark
	1GHz-3GHz	50.0	AV Value
		70.0	PK Value
	3GHz-6GHz	54.0	AV Value
		74.0	PK Value

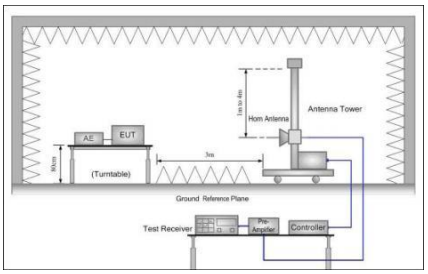
FM Receiver limit:	Frequency	Limit (dBuV/m @10m)		Remark
		Fundamental	Harmonics	
	30MHz-230MHz	50	42	QP Value
	230MHz-300MHz		42	QP Value
	300MHz-1000MHz		46	QP Value

Test setup:

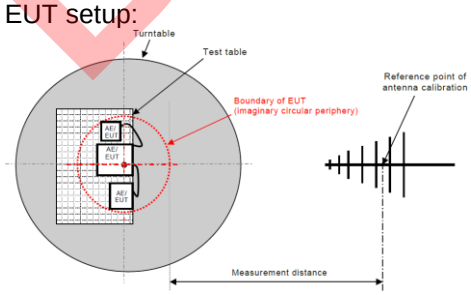
Below 1GHz:

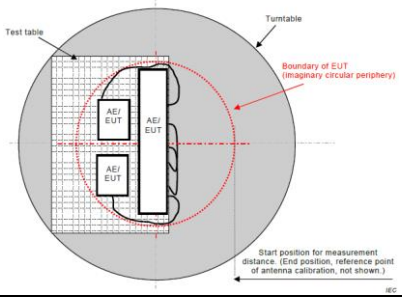


Above 1GHz:



EUT setup:





Test Procedure:

30MHz to 1GHz:

1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.
4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters

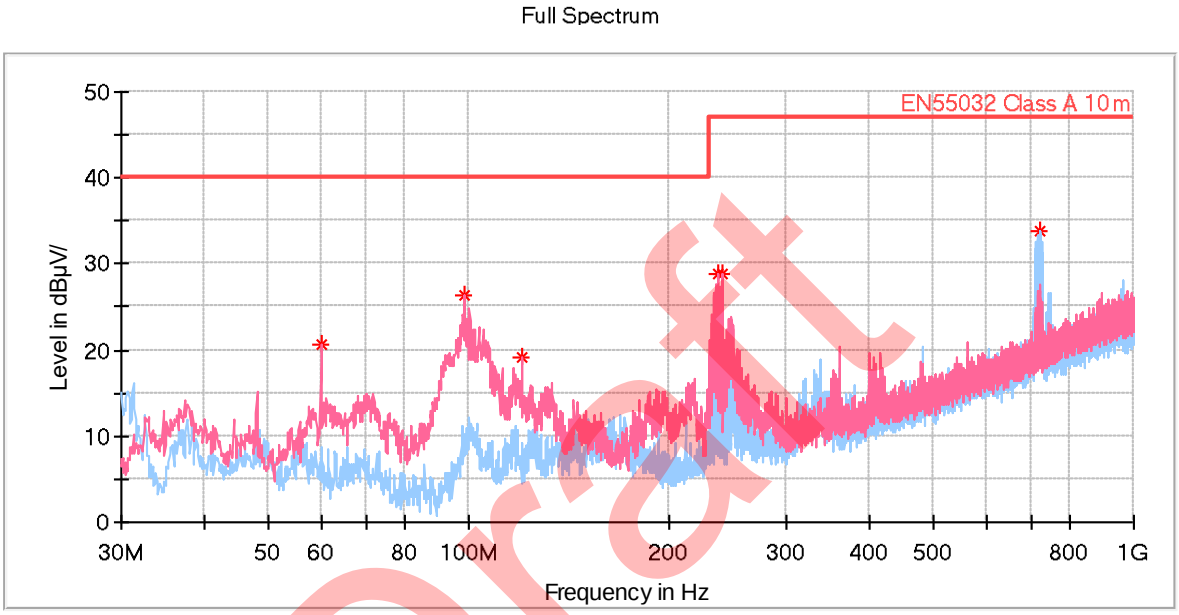
	in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization. **Above 1GHz:** 1. The radiated emissions test wasconducted in a fully-anechoic chamber. 2. The tabletop EUT was placed upon anon-metallic table0.8m above the ground reference plane.And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.
Test Instruments:	Refer to section 5.10 for details
Test Mode:	Refer to section 5.3 for details
Test Results:	Passed

Measurement Data:

AC Power supply

Below 1GHz:

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	**Product Model:**	HNTOUT-433-G
Test By:	Carey	**Test mode:**	ON-AC mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical & Horizontal
Test Voltage:	AC 230/50Hz	**Environment:**	Temp: 24℃ Huni: 57%



Critical_Freqs

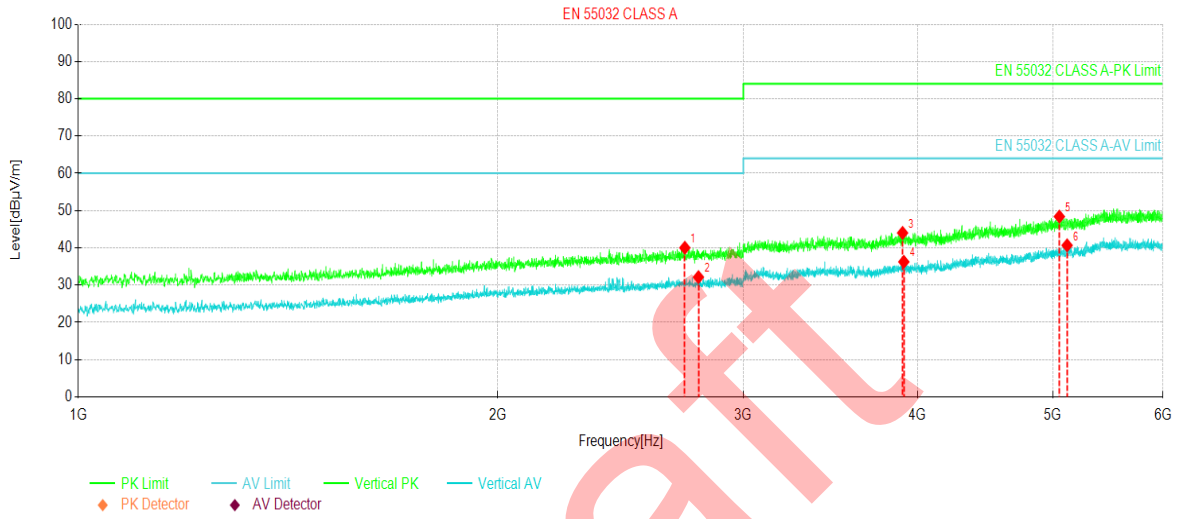
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
59.973000	20.54	40.00	19.46	100.0	V	126.0	-16.3
98.676000	26.39	40.00	13.61	100.0	V	95.0	-19.0
120.016000	19.05	40.00	20.95	100.0	V	308.0	-17.1
236.804000	28.95	47.00	18.05	100.0	V	84.0	-15.9
240.005000	28.95	47.00	18.05	100.0	V	84.0	-15.7
723.259000	33.82	47.00	13.18	100.0	H	107.0	-4.7

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *The Aux Factor is a notch filter switch box loss, this item is not used.*

Above 1GHz:

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	**Product Model:**	HNTOUT-433-G
Test By:	Carey	**Test mode:**	ON-AC mode
Test Frequency:	1 GHz ~ 6 GHz	**Polarization:**	Vertical
Test Voltage:	AC 230/50Hz	**Environment:**	Temp: 24℃ Huni: 57%



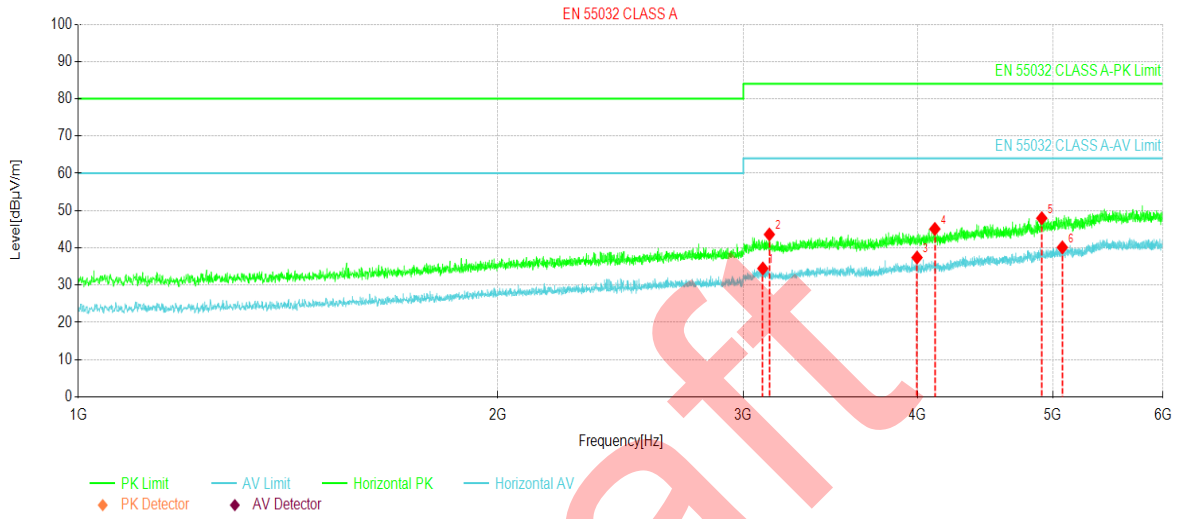
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	2723.75	58.31	40.01	-18.30	80.00	39.99	PK	Vertical
2	2785.62	50.30	32.13	-18.17	60.00	27.87	AV	Vertical
3	3902.50	58.02	44.00	-14.02	84.00	40.00	PK	Vertical
4	3910.62	50.23	36.24	-13.99	64.00	27.76	AV	Vertical
5	5056.25	57.08	48.39	-8.69	84.00	35.61	PK	Vertical
6	5121.25	49.19	40.67	-8.52	64.00	23.33	AV	Vertical

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss + Aux Factor – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	Product Model:	HNTOUT-433-G
Test By:	Carey	Test mode:	ON-AC mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Huni: 57%



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	3098.12	50.93	34.46	-16.47	64.00	29.54	AV	Horizontal
2	3131.87	60.02	43.59	-16.43	84.00	40.41	PK	Horizontal
3	3996.87	51.09	37.39	-13.70	64.00	26.61	AV	Horizontal
4	4116.25	58.27	45.06	-13.21	84.00	38.94	PK	Horizontal
5	4911.25	57.33	47.95	-9.38	84.00	36.05	PK	Horizontal
6	5081.25	48.75	40.11	-8.64	64.00	23.89	AV	Horizontal

Remark:

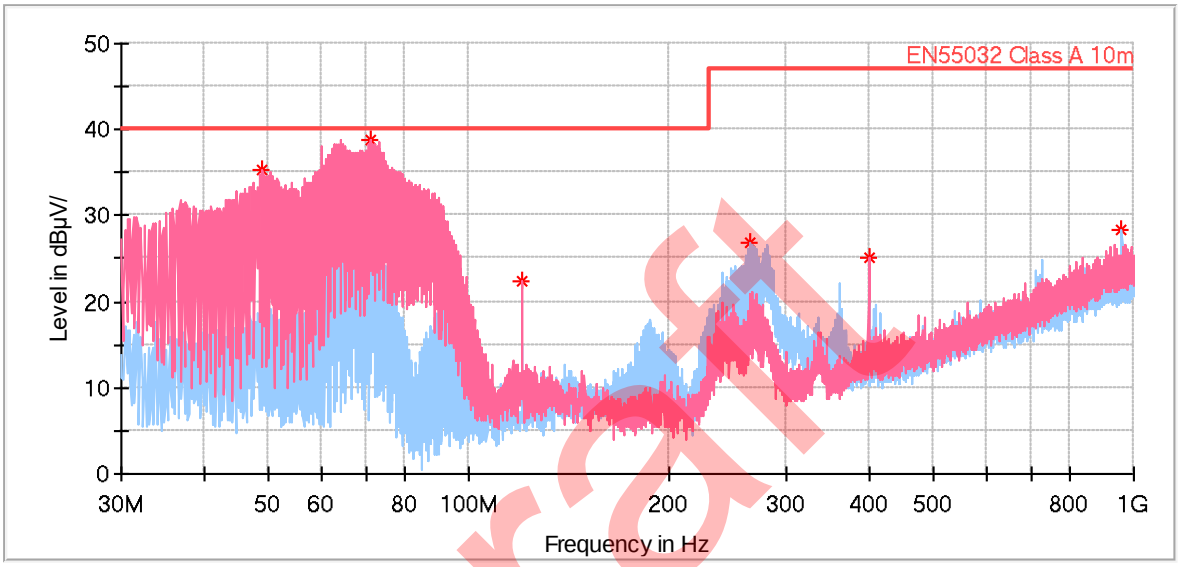
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss + Aux Factor – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

POE Power supply

Below 1GHz:

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	**Product Model:**	HNTOUT-433-G
Test By:	Carey	**Test mode:**	ON-POE mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical & Horizontal
Test Voltage:	AC 230/50Hz	**Environment:**	Temp: 24℃ Huni: 57%

Full Spectrum



Critical_Freqs

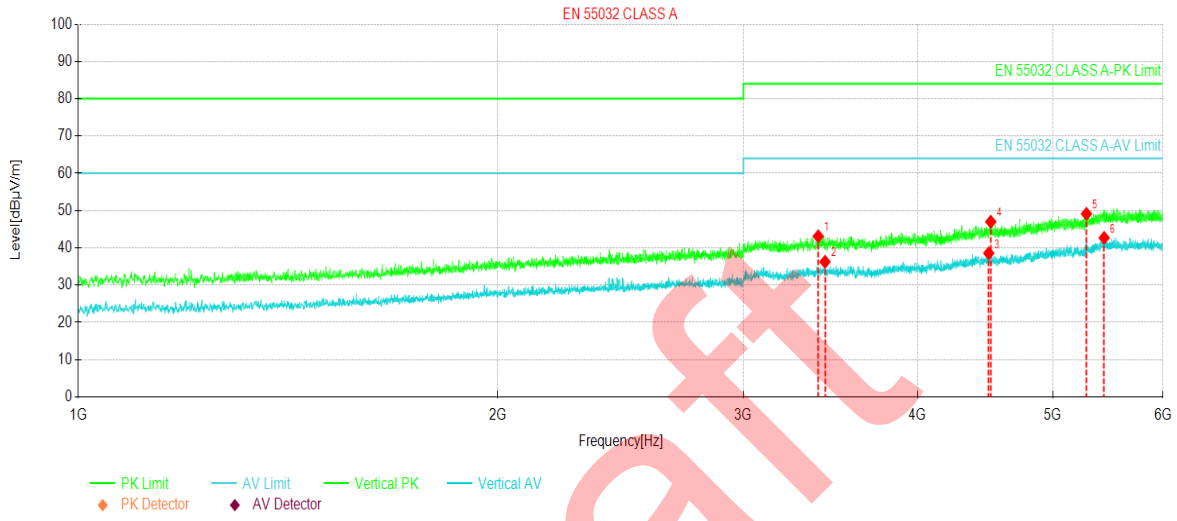
Frequency (MHz)	MaxPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.012000	35.21	40.00	4.79	100.0	V	224.0	-15.8
71.031000	38.93	40.00	1.07	100.0	V	307.0	-18.5
120.016000	22.38	40.00	17.62	100.0	V	73.0	-17.1
265.710000	26.97	47.00	20.03	100.0	H	104.0	-15.4
398.988000	25.08	47.00	21.92	100.0	V	269.0	-11.0
960.133000	28.45	47.00	18.55	100.0	H	215.0	-0.6

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *The Aux Factor is a notch filter switch box loss, this item is not used.*

Above 1GHz:

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	**Product Model:**	HNTOUT-433-G
Test By:	Carey	**Test mode:**	ON-POE mode
Test Frequency:	1 GHz ~ 6 GHz	**Polarization:**	Vertical
Test Voltage:	AC 230/50Hz	**Environment:**	Temp: 24℃ Huni: 57%



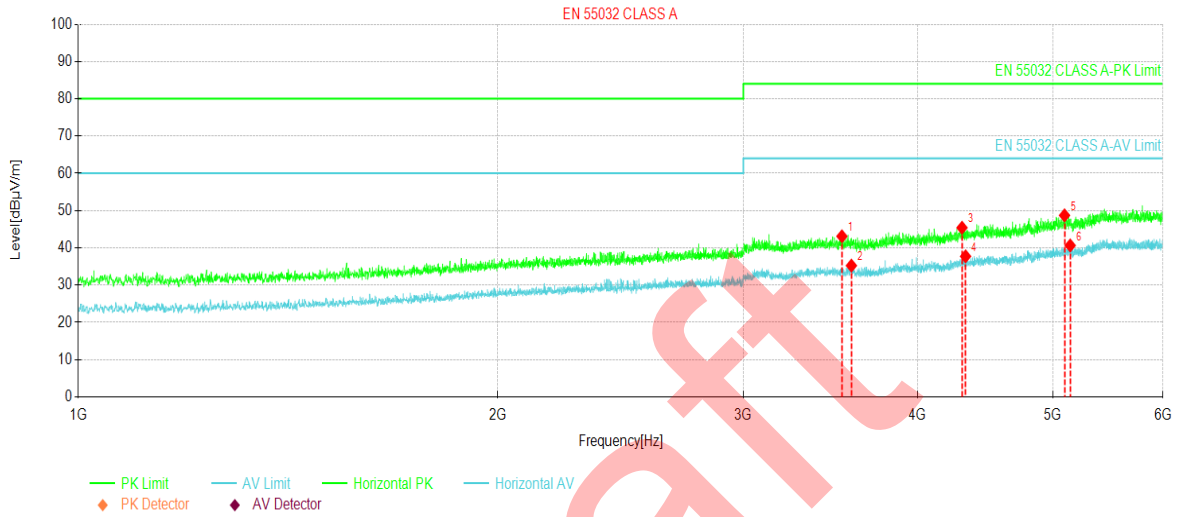
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	3395.00	58.89	43.09	-15.80	84.00	40.91	PK	Vertical
2	3433.12	51.90	36.25	-15.65	64.00	27.75	AV	Vertical
3	4499.37	49.77	38.56	-11.21	64.00	25.44	AV	Vertical
4	4514.37	58.17	46.99	-11.18	84.00	37.01	PK	Vertical
5	5287.50	56.67	49.12	-7.55	84.00	34.88	PK	Vertical
6	5444.37	49.29	42.69	-6.60	64.00	21.31	AV	Vertical

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss + Aux Factor – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	Product Model:	HNTOUT-433-G
Test By:	Carey	Test mode:	ON-POE mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Huni: 57%



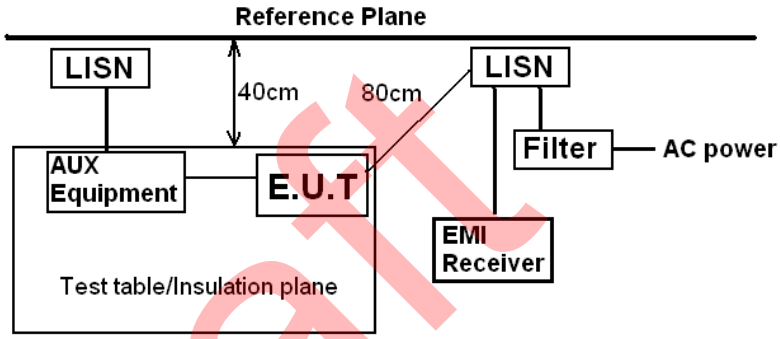
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	3530.62	58.48	43.09	-15.39	84.00	40.91	PK	Horizontal
2	3586.25	50.61	35.23	-15.38	64.00	28.77	AV	Horizontal
3	4305.00	57.67	45.40	-12.27	84.00	38.60	PK	Horizontal
4	4330.62	49.82	37.72	-12.10	64.00	26.28	AV	Horizontal
5	5099.37	57.31	48.71	-8.60	84.00	35.29	PK	Horizontal
6	5147.50	49.06	40.63	-8.43	64.00	23.37	AV	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss + Aux Factor – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

6.1.2 Conducted Emission

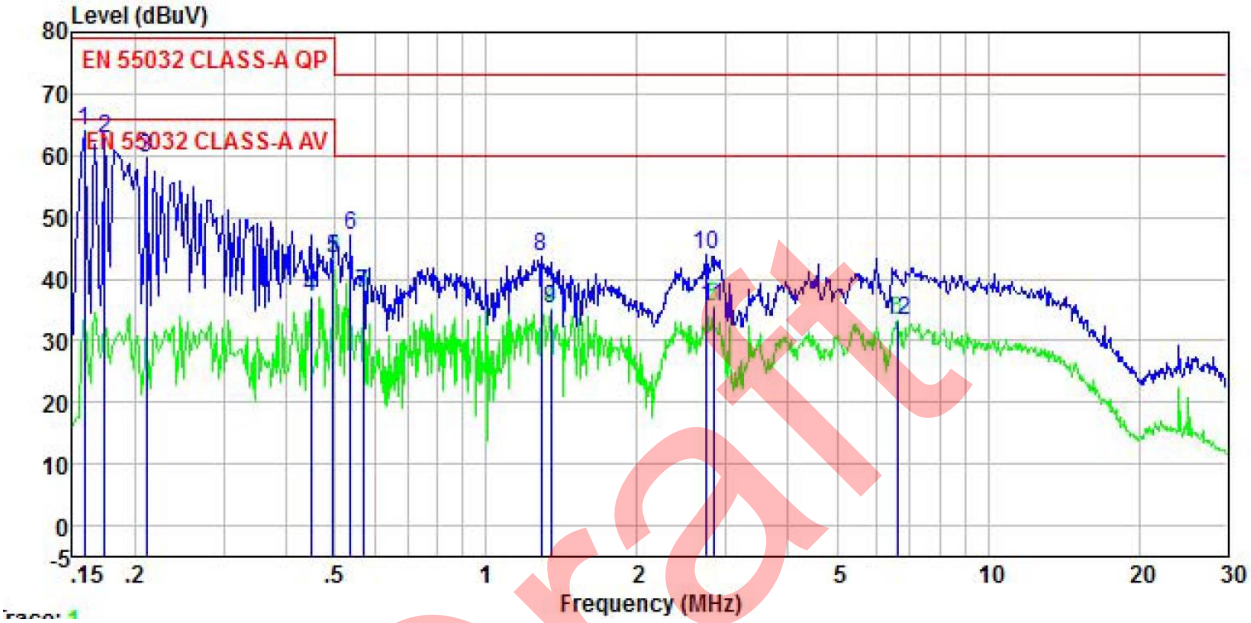
<table>
<tr><td>Test Requirement:</td><td colspan="3">EN 55032</td></tr>
<tr><td>Test Method:</td><td colspan="3">EN 55032</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="3">150kHz to 30MHz</td></tr>
<tr><td>Class / Severity: Class B</td><td colspan="3">Class B</td></tr>
<tr><td>Receiver setup:</td><td colspan="3">RBW=9kHz, VBW=30kHz</td></tr>
<tr><td>Limit:</td><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td></td><td>Quasi-peak</td><td>Average</td></tr>
<tr><td></td><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td></td><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td></td><td>5-30</td><td>60</td><td>50</td></tr>
<tr><td></td><td colspan="3">* Decreases with the logarithm of the frequency.</td></tr>
<tr><td>Test setup:</td><td colspan="3"> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test procedure</td><td colspan="3">The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). Which provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to EN55032 Class B on conducted measurement.</td></tr>
<tr><td>Test Instruments:</td><td colspan="3">Refer to section 5.10 for details</td></tr>
<tr><td>Test Instruments:</td><td colspan="3">Refer to section 5.3 for details</td></tr>
<tr><td>Test Mode:</td><td colspan="3">Passed</td></tr>
</table>

Measurement Data:

AC Power supply

Product name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	Product model:	HNTOUT-433-G
Test by:	Carey	Test mode:	ON-AC mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5℃ Huni: 55%

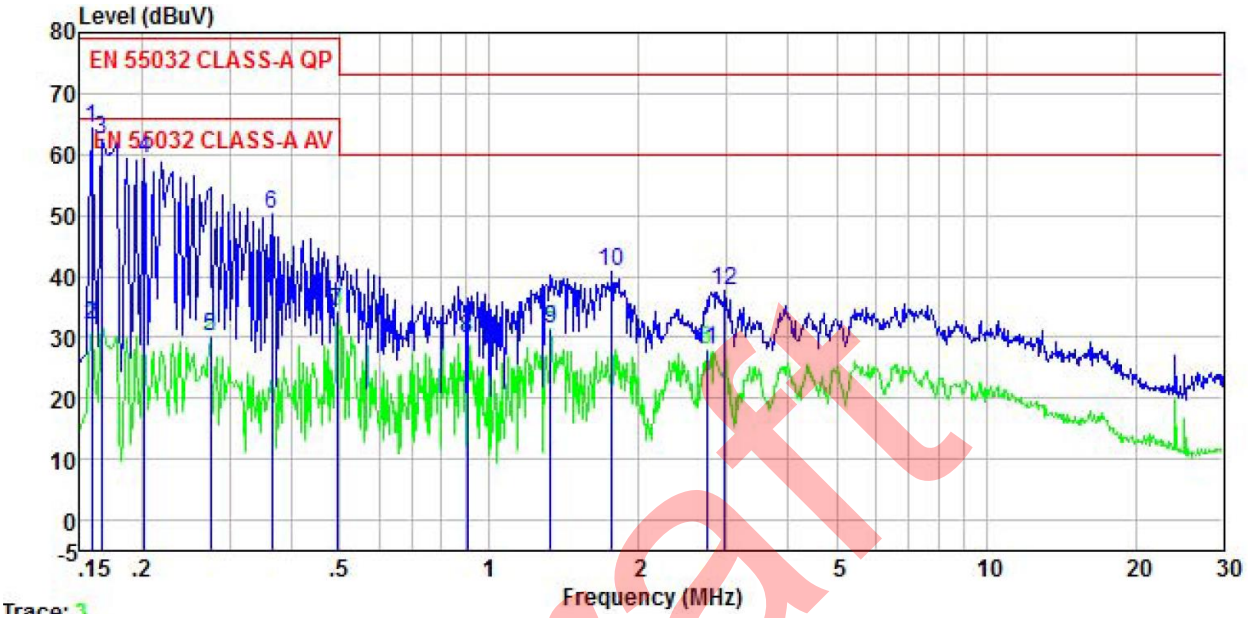


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.158	53.93	10.12	-0.07	0.01	63.99	79.00	-15.01	QP
2	0.174	52.70	10.13	-0.11	0.01	62.73	79.00	-16.27	QP
3	0.211	49.58	10.15	-0.17	0.03	59.59	79.00	-19.41	QP
4	0.447	26.49	10.31	0.05	0.03	36.88	66.00	-29.12	Average
5	0.497	33.18	10.34	-0.32	0.03	43.23	66.00	-22.77	Average
6	0.538	37.03	10.36	-0.36	0.03	47.06	73.00	-25.94	QP
7	0.570	27.62	10.37	-0.37	0.02	37.64	60.00	-22.36	Average
8	1.289	32.85	10.50	0.18	0.11	43.64	73.00	-29.36	QP
9	1.345	24.44	10.51	0.13	0.12	35.20	60.00	-24.80	Average
10	2.736	33.60	10.57	-0.23	0.10	44.04	73.00	-28.96	QP
11	2.839	24.89	10.57	-0.23	0.09	35.32	60.00	-24.68	Average
12	6.592	21.49	10.72	1.09	0.10	33.40	60.00	-26.60	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss + Aux Factor.*

Product name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	Product model:	HNTOUT-433-G
Test by:	Carey	Test mode:	ON-AC mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5℃ Huni: 55%



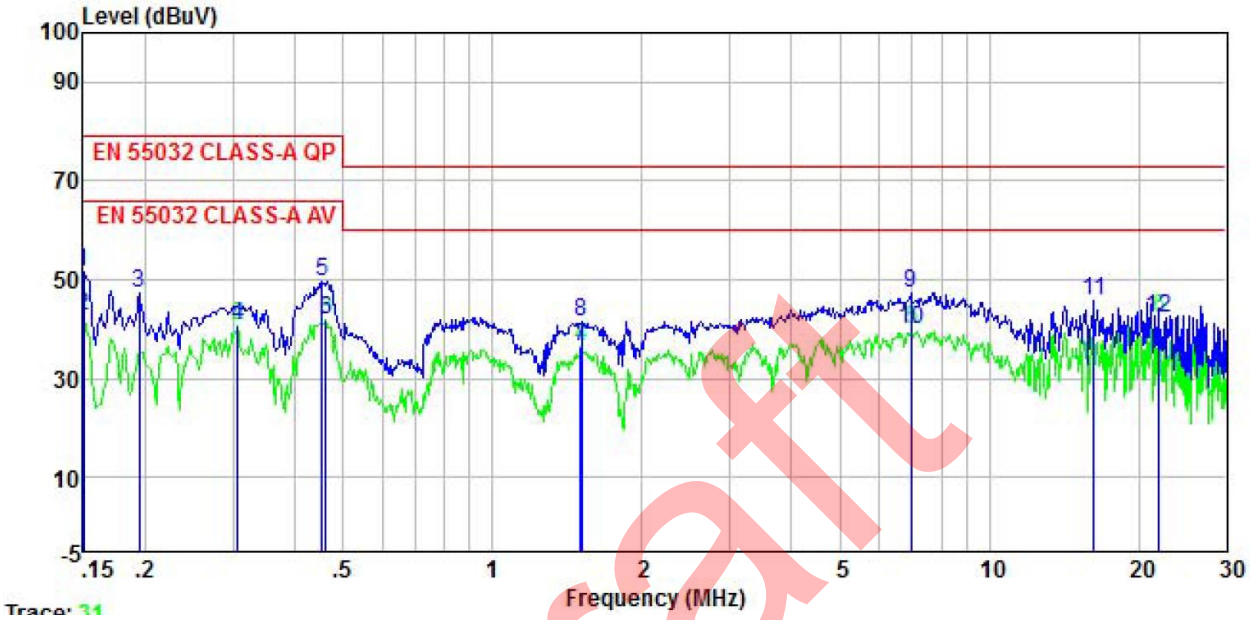
	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.158	54.45	9.90	0.01	0.01	64.37	79.00	-14.63	QP
2	0.158	22.23	9.90	0.01	0.01	32.15	66.00	-33.85	Average
3	0.166	52.53	9.90	0.01	0.01	62.45	79.00	-16.55	QP
4	0.202	49.34	9.92	0.00	0.04	59.30	79.00	-19.70	QP
5	0.274	20.14	9.99	0.01	0.02	30.16	66.00	-35.84	Average
6	0.365	40.11	10.09	-0.04	0.03	50.19	79.00	-28.81	QP
7	0.494	23.80	10.20	0.03	0.03	34.06	66.00	-31.94	Average
8	0.904	19.20	10.50	0.07	0.04	29.81	60.00	-30.19	Average
9	1.331	20.37	10.66	0.12	0.12	31.27	60.00	-28.73	Average
10	1.762	29.84	10.76	0.15	0.18	40.93	73.00	-32.07	QP
11	2.736	16.72	10.88	0.28	0.10	27.98	60.00	-32.02	Average
12	2.978	26.34	10.90	0.31	0.07	37.62	73.00	-35.38	QP

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss + Aux Factor.*

POE Power supply

Product name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	**Product model:**	HNTOUT-433-G
Test by:	Carey	**Test mode:**	ON-POE mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 230 V/50 Hz	**Environment:**	Temp: 22.5℃ Huni: 55%

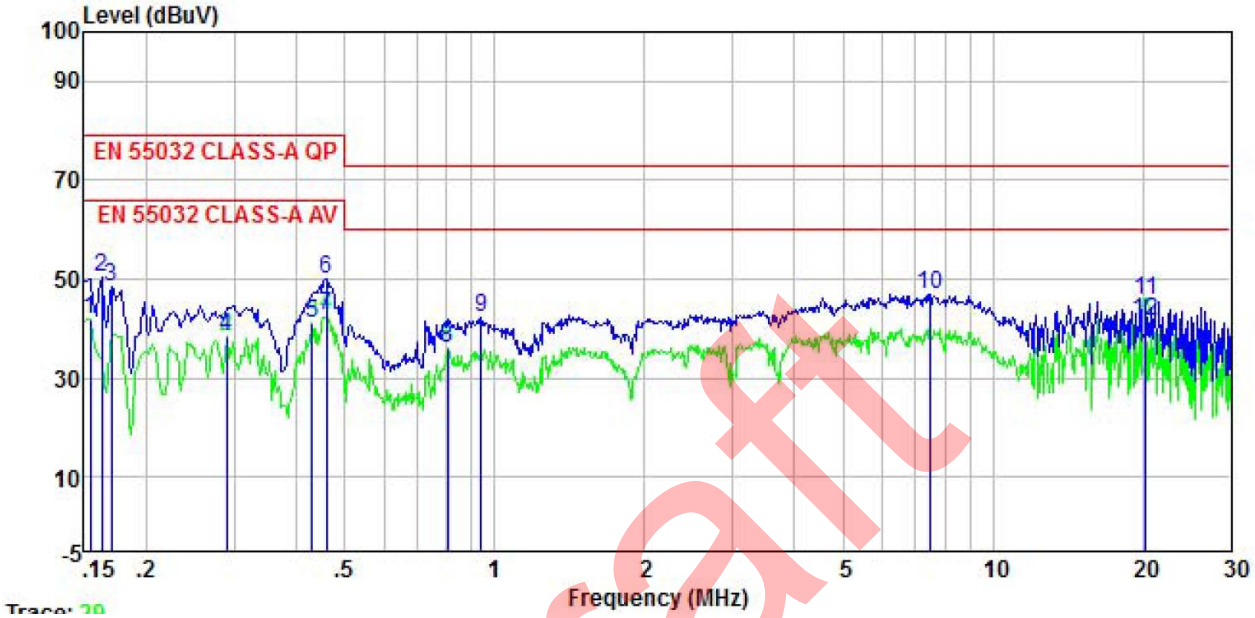


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.150	41.52	10.12	-0.05	0.01	51.60	79.00	-27.40	QP
2	0.150	32.70	10.12	-0.05	0.01	42.78	66.00	-23.22	Average
3	0.194	37.28	10.14	-0.15	0.03	47.30	79.00	-31.70	QP
4	0.307	30.79	10.22	-0.20	0.03	40.84	66.00	-25.16	Average
5	0.454	39.40	10.32	-0.01	0.03	49.74	79.00	-29.26	QP
6	0.461	31.49	10.32	-0.06	0.03	41.78	66.00	-24.22	Average
7	1.503	25.91	10.52	0.00	0.14	36.57	60.00	-23.43	Average
8	1.511	30.79	10.52	-0.01	0.15	41.45	73.00	-31.55	QP
9	6.951	35.33	10.73	1.30	0.10	47.46	73.00	-25.54	QP
10	6.988	27.72	10.73	1.30	0.10	39.85	60.00	-20.15	Average
11	16.226	31.60	11.08	2.91	0.16	45.75	73.00	-27.25	QP
12	21.946	29.91	11.22	0.93	0.16	42.22	60.00	-17.78	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss + Aux Factor.*

Product name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	Product model:	HNTOUT-433-G
Test by:	Carey	Test mode:	ON-POE mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5℃ Huni: 55%

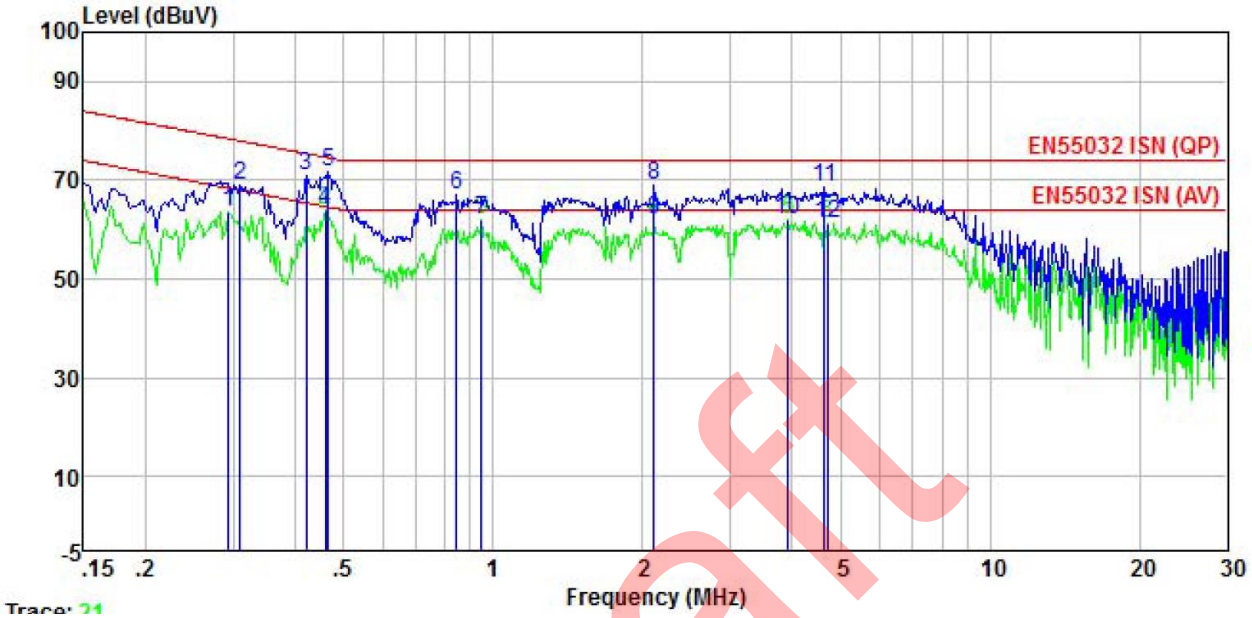


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	32.10	9.89	0.01	0.01	42.01	66.00	-23.99	Average
2	0.162	40.65	9.90	0.01	0.01	50.57	79.00	-28.43	QP
3	0.170	38.71	9.90	0.01	0.01	48.63	79.00	-30.37	QP
4	0.289	28.54	10.00	0.01	0.03	38.58	66.00	-27.42	Average
5	0.431	30.78	10.15	-0.03	0.03	40.93	66.00	-25.07	Average
6	0.459	39.68	10.17	0.00	0.03	49.88	79.00	-29.12	QP
7	0.459	32.54	10.17	0.00	0.03	42.74	66.00	-23.26	Average
8	0.804	25.72	10.44	0.06	0.03	36.25	60.00	-23.75	Average
9	0.938	31.45	10.53	0.07	0.04	42.09	73.00	-30.91	QP
10	7.486	34.95	11.12	0.94	0.10	47.11	73.00	-25.89	QP
11	20.270	33.71	11.64	0.27	0.19	45.81	73.00	-27.19	QP
12	20.270	29.47	11.64	0.27	0.19	41.57	60.00	-18.43	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss + Aux Factor.*

Product name:	Nebra Smart Outdoor LoRa Gateway / Nebra HNT Outdoor Hotspot Miner	Product model:	HNTOUT-433-G
Test by:	Carey	Test mode:	LAN mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	/
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5℃ Huni: 55%



	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.294	53.66	10.05	0.00	0.03	63.74	68.41	-4.67	Average
2	0.310	59.12	10.03	0.00	0.03	69.18	77.97	-8.79	QP
3	0.421	60.88	9.91	0.00	0.04	70.83	75.42	-4.59	QP
4	0.459	53.96	9.88	0.00	0.03	63.87	64.71	-0.84	Average
5	0.466	61.96	9.88	0.00	0.03	71.87	74.58	-2.71	QP
6	0.844	57.08	9.75	0.00	0.04	66.87	74.00	-7.13	QP
7	0.948	52.02	9.77	0.00	0.05	61.84	64.00	-2.16	Average
8	2.110	59.76	9.12	0.00	0.19	69.07	74.00	-4.93	QP
9	2.110	52.82	9.12	0.00	0.19	62.13	64.00	-1.87	Average
10	3.922	52.19	9.65	0.00	0.08	61.92	64.00	-2.08	Average
11	4.647	59.01	9.68	0.00	0.09	68.78	74.00	-5.22	QP
12	4.696	51.53	9.69	0.00	0.09	61.31	64.00	-2.69	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss + Aux Factor.*

6.1.3 Harmonics Test Result

Test Requirement:	EN 61000-3-2
Test Method:	N/A: See Remark Below
Remark	There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN 61000-3-2. For further details, please refer to Clause 7, Note 1 of EN 61000-3-2 which states: “For the following categories of equipment limits are not specified in this edition of the standard. Note 1: Equipment with a rated power of 75W or less, other than lighting equipment.”

6.1.4 Flicker Test Result

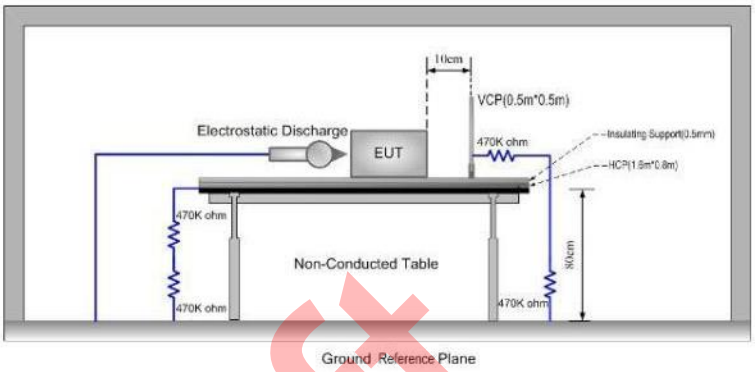
Test Requirement:	EN 61000-3-3
Test Method:	EN 61000-3-3
Remark:	As the section 6.1 of EN 6100-3-3, “Devices and Equipment that do(with the utmost probability) not generate relevant voltage fluctuations or flicker need not to be tested”.

6.2 EMS (Immunity)

6.2.1 Performance Criteria Description in EN 55035

Criterion A:	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
Criterion B:	After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
Criterion C:	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

6.2.2 Electrostatic Discharge

Test Requirement:	EN 55035
Test Method:	EN61000-4-2
Discharge Voltage:	Contact Discharge, HCP and VCP: ±2kV, ±4kV, Air Discharge: ±2kV, ±4kV, ±8kV
Polarity:	Positive & Negative
Number of Discharge:	Contact Discharge: Minimum 25 times at each test point, Air Discharge: Minimum 10 times at each test point.
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Testsetup:	
Test Procedure:	**1) Air discharge:** The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure was repeated until all the air discharge completed **2) Contact discharge:** The test was applied on conductive surfaces of EUT. the generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. the tip of the discharge electrode was touch the EUT before the discharge switch was operated. **3) Indirect discharge for horizontal coupling plane** At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.Consideration should be given to exposing all sides of the EUT. **4) Indirect discharge for vertical coupling plane** At least 10 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.
Testenvironment:	Temp.: 26°C | Humid.: 54% | Press.: 101kPa
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

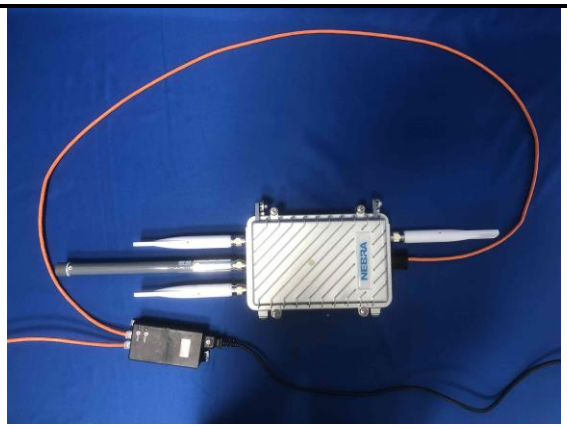
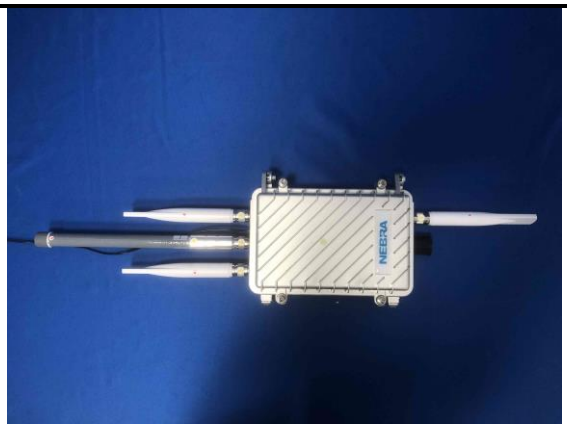
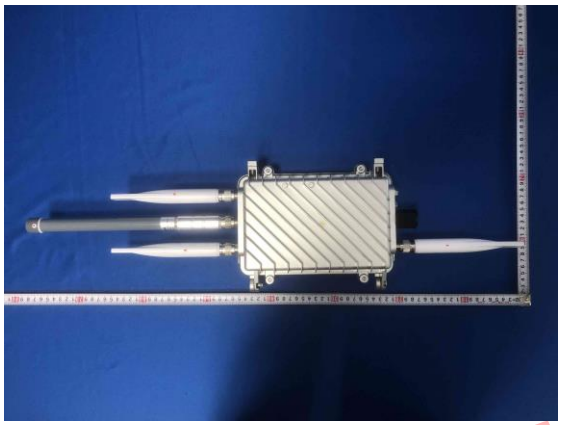
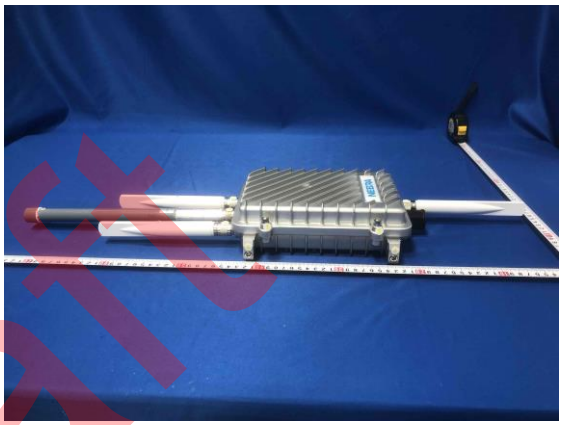
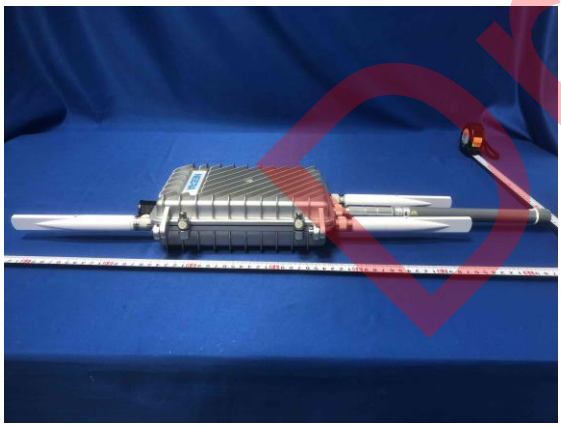
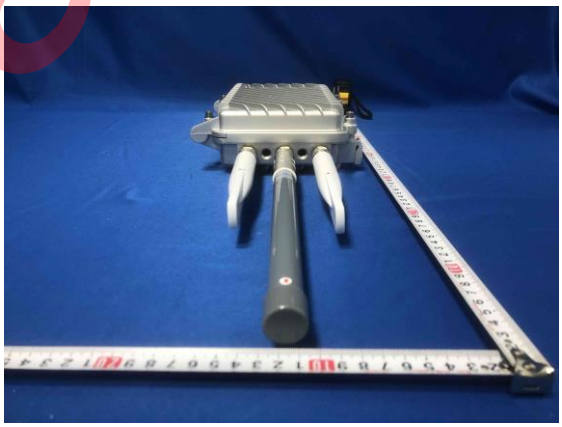
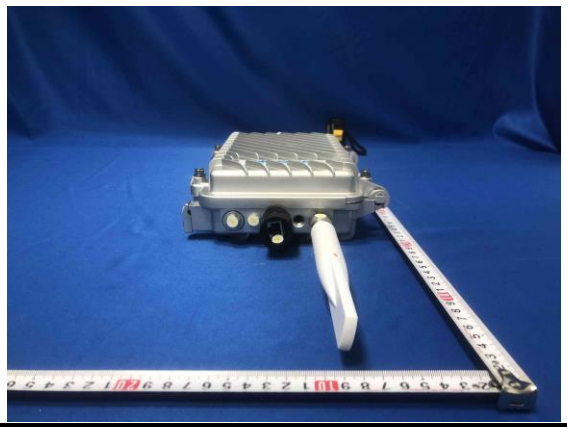
Measurement Record:

Test mode:	ON-AC mode			
Test points:	**I:** Please refer to red arrows as below plots			
	II: Please refer to yellow arrows as below plots			
Direct discharge				
Discharge Voltage (KV)	**Type of discharge**	**Test points**	**Observations (Performance Criterion)**	**Result**
± 2, ± 4	Contact	II	A	Pass
± 2, ± 4,± 8	Air	I	A	Pass
Indirect discharge				
Discharge Voltage (KV)	**Type of discharge**	**Test points**	**Observation Performance**	**Result**
± 2, ± 4	HCP-Bottom/Top/ Front/Back/Left/Right	Edge of the HCP	A	Pass
± 2, ± 4	VCP-Front/Back /Left/Right	Center of the VCP	A	Pass

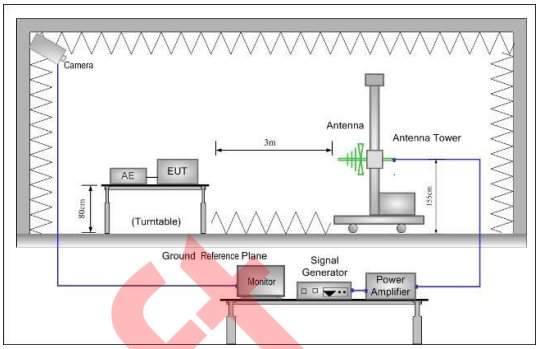
Remark:

1. *A: No degradation in performance of the EUT was observed.*
2. *Red arrow: Air discharge test points.*
3. *Yellow arrow: Contact discharge test points.*

ESD Test points as below:

6.2.3 Continuous RF electromagnetic radiated field disturbances

Test Requirement:	EN 55035					
Test Method:	EN61000-4-3					
Frequency range:	Swept test:80MHz to 1GHz Spot test: 1800MHz,2600MHz,3500MHz,5000MHz					
Test Level:	3V/m Audio output function: 80MHz-1000MHz: 0dB					
Modulation:	80%, 1kHz Amplitude Modulation					
Performance Criterion:	Criteria A					
Test setup:						
Test Procedure:	1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items. 2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length. 3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area). 4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary.Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value. 5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 5 s. 6. The test normally was performed with the generating antenna facing each side of the EUT. 7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. 8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT.					
Test environment:	Temp.:	25°C	Humid.:	52%	Press.:	1012mbar
Test Instruments:	Refer to section 5.10 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					

Measurement Record:

Test mode: ON-AC mode

Continuous RF electromagnetic radiated field disturbances swept test

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80 MHz-1 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=5seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass
Remarks: *A: No degradation in the performance of the E.U.T. was observed.*						

Continuous RF electromagnetic radiated field disturbances spot test

Frequency (+/-1%)	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
1800MHz, 2600MHz, 3500MHz, 5000MHz	3V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=5seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass
Remarks: *A: No degradation in the performance of the E.U.T. was observed.*						

Test mode: ON-POE mode

Continuous RF electromagnetic radiated field disturbances swept test

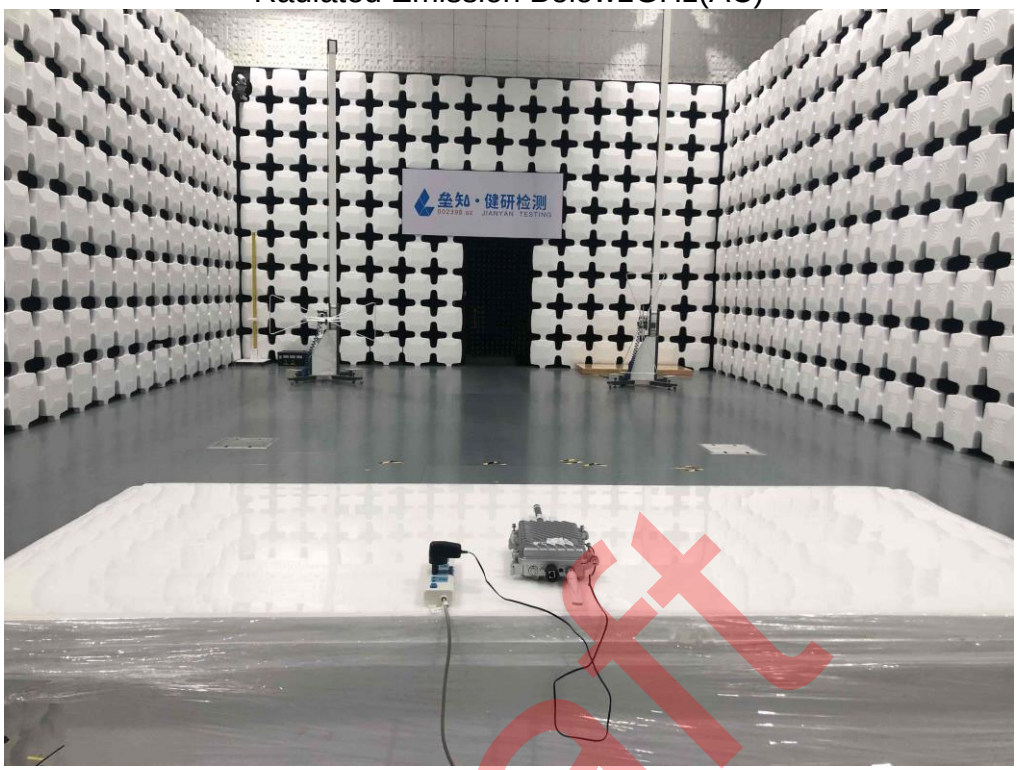
Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80 MHz-1 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=5seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass
Remarks: *A: No degradation in the performance of the E.U.T. was observed.*						

Continuous RF electromagnetic radiated field disturbances spot test

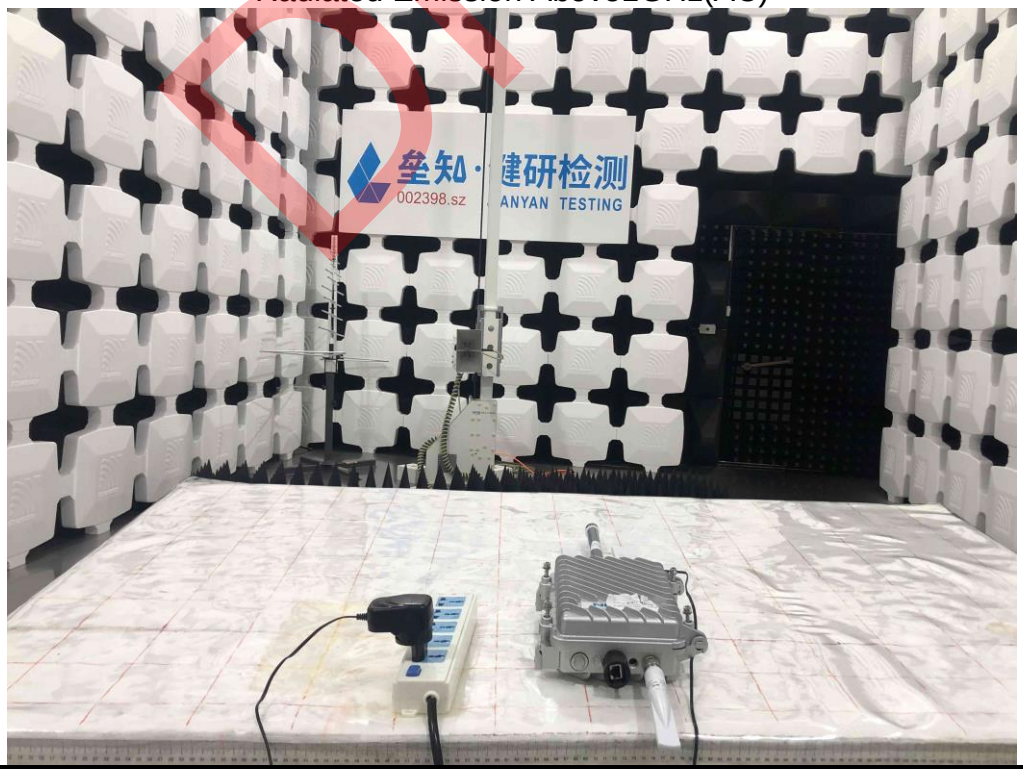
Frequency (+/-1%)	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
1800MHz, 2600MHz, 3500MHz, 5000MHz	3V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=5seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass
Remarks: *A: No degradation in the performance of the E.U.T. was observed.*						

7 Test Setup Photo

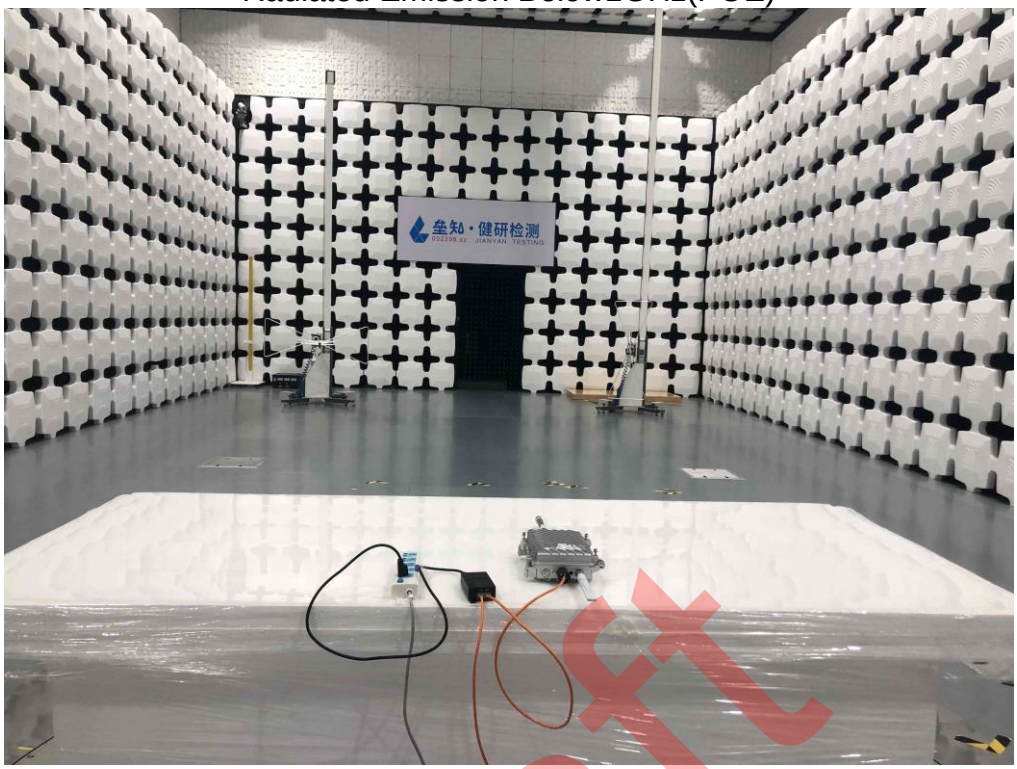
Radiated Emission Below1GHz(AC)



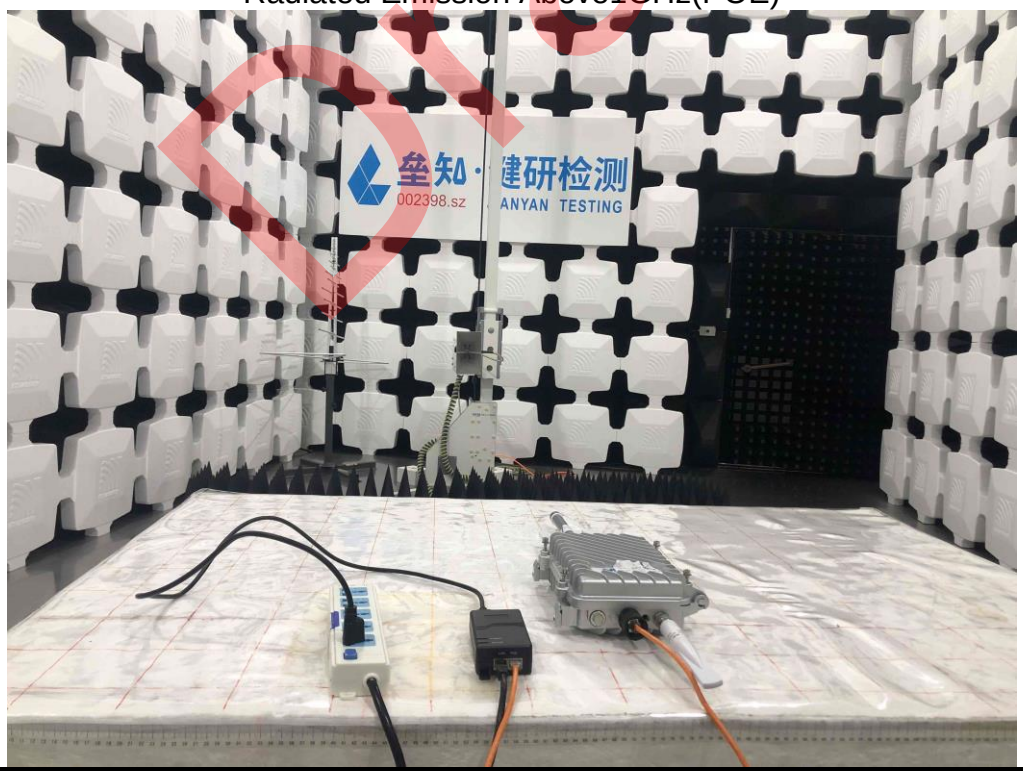
Radiated Emission Above1GHz(AC)



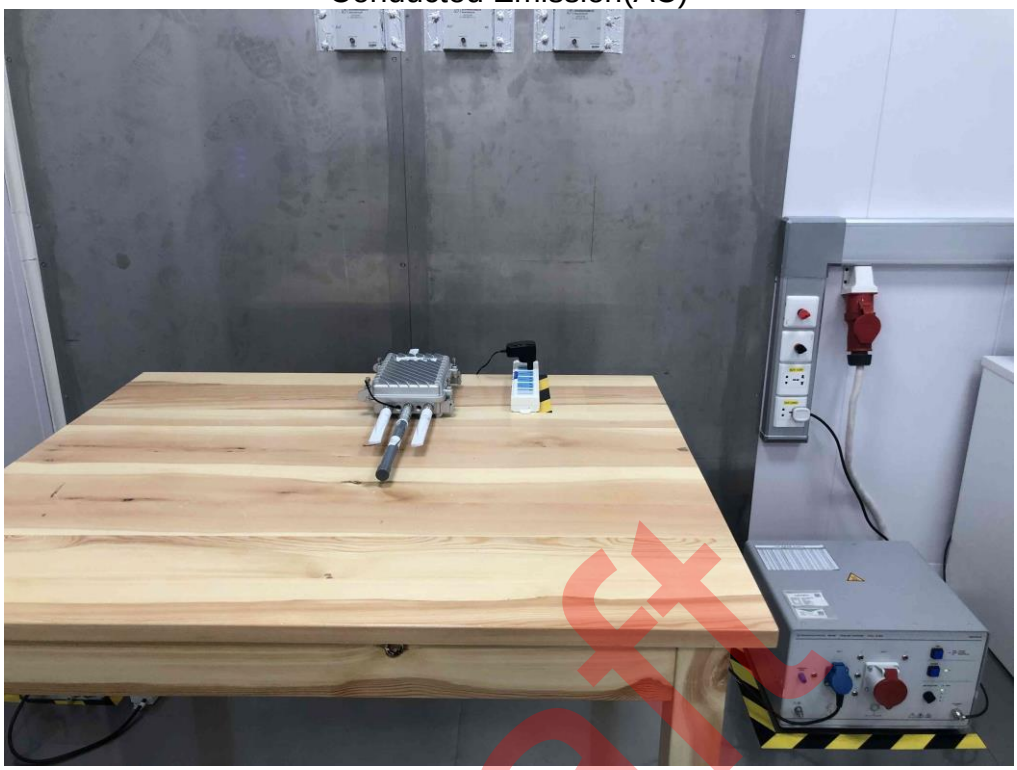
Radiated Emission Below1GHz(POE)



Radiated Emission Above1GHz(POE)

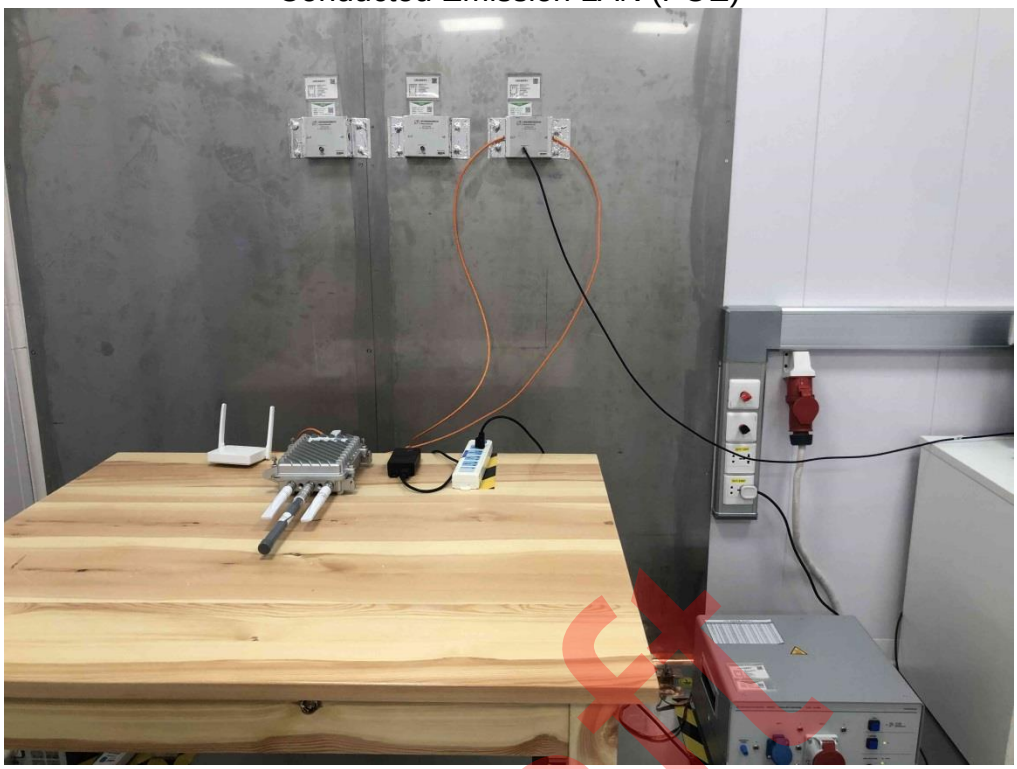


Conducted Emission(AC)

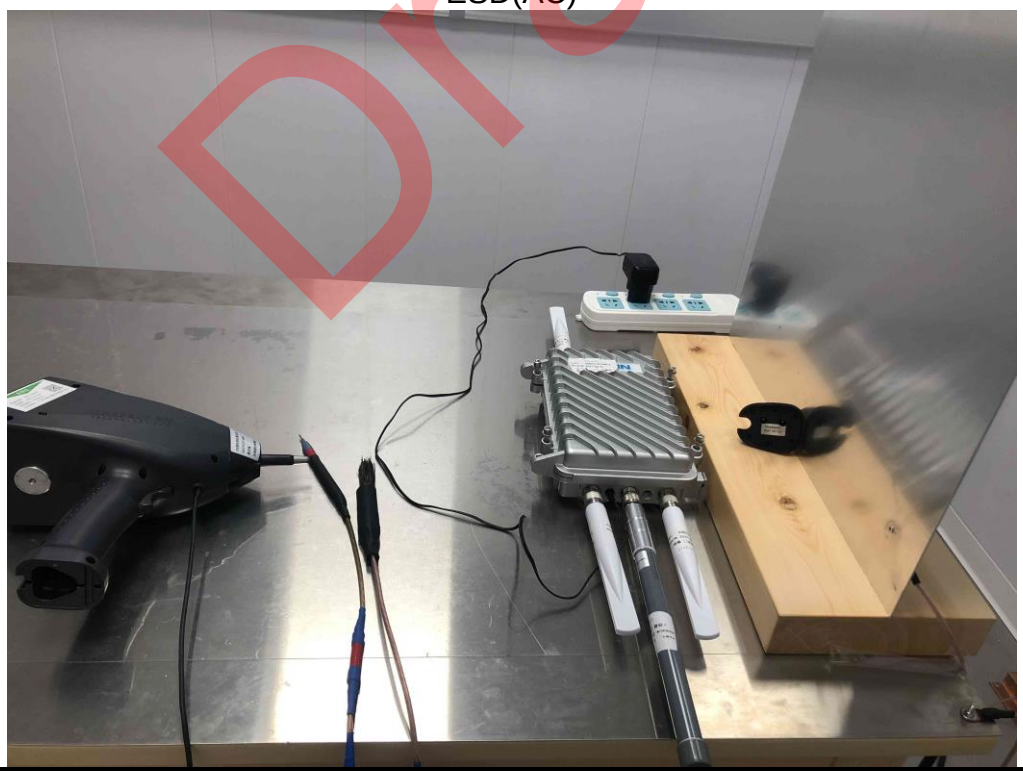


Conducted Emission(POE)

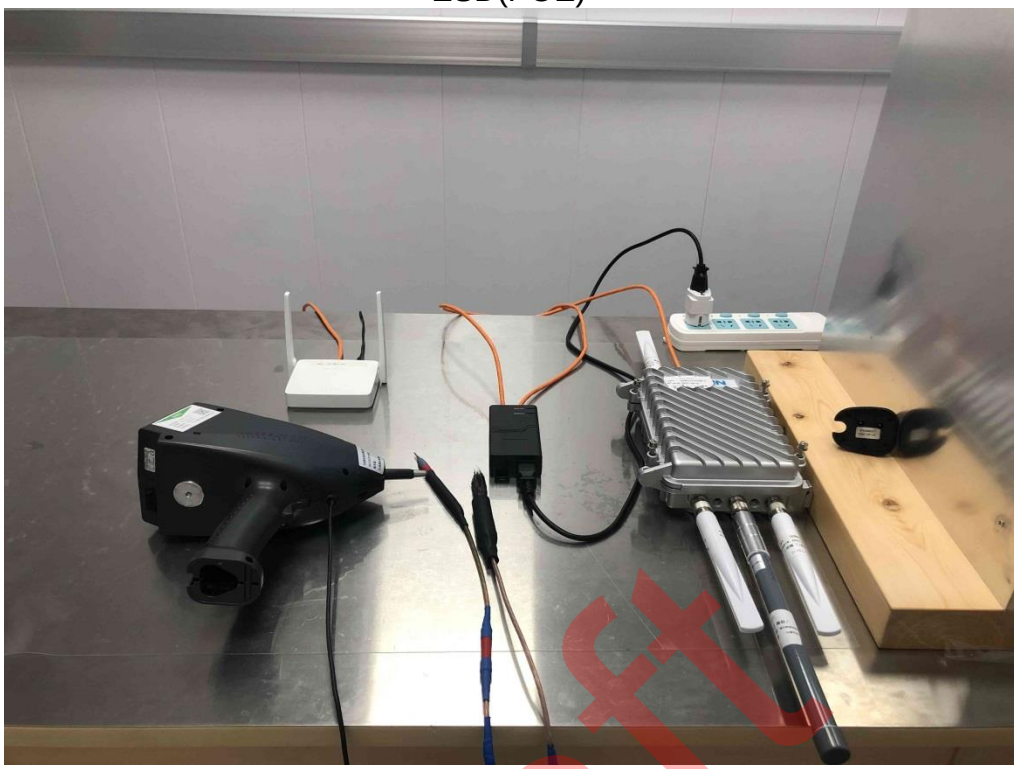
Conducted Emission LAN (POE)



ESD(AC)

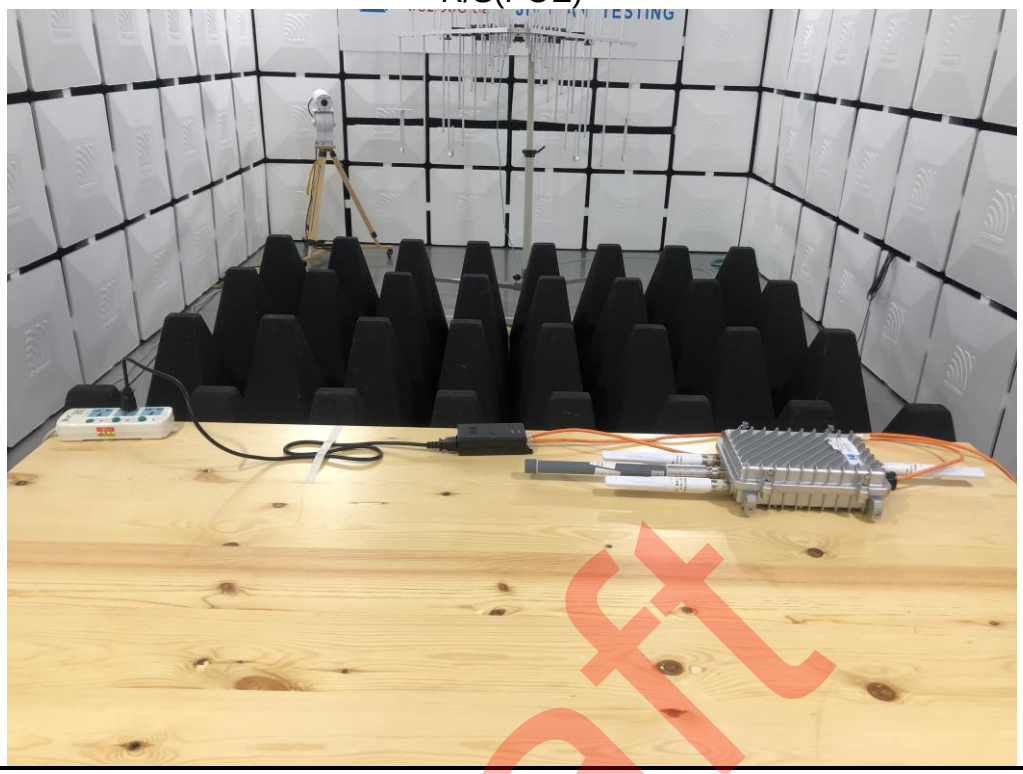


ESD(POE)



R/S(AC)

R/S(POE)



8 EUT Constructional Details

Reference to the test report No. JYTSZB-R01-2100336

------End of report------