

TEST REPORT

Applicant: Nebra Ltd

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

Equipment Under Test (EUT)

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

Model No.: HNTIN-470-G, HNTIN-868-G, HNTIN-915-G, HNTIN-433-G,
HNTIN-470, HNTIN-868, HNTIN-915, HNTIN-433

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

Date of sample receipt: 12 Mar., 2021

Date of Test: 13 Mar., to 19 Apr., 2021

Date of report issue: 23 Apr., 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 Directive 2014/30/EU are considered.

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.

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2 Version

Version No.	Date	Description
00	23 Apr., 2021	Original

Tested by: _____
Test Engineer

Date: _____ 23 Apr., 2021

Reviewed by: _____
Project Engineer

Date: _____ 23 Apr., 2021

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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. Audio output function: 80MHz-1000MHz: 0dB	PASS
Electrical Fast Transients (EFT)	EN 55035	EN61000-4-4:2012	AC ± 1.0 kV	PASS
Surge	EN 55035	EN 61000-4-5: 2014+A1:2017	Line-line: ± 1 kV Line-earth: ± 2 kV	PASS
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 Audio output function: 0.15MHz-30MHz: -20dB, 30MHz-80MHz: -10dB	PASS
Power frequency magnetic field	EN 55035	EN 61000-4-8:2010	50/60 Hz 1A/m	PASS
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	PASS
Remark: 1. U_T 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
Manufacturer:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells TN3 9BJ
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 Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner
Model No.:	HNTIN-470-G, HNTIN-868-G, HNTIN-915-G, HNTIN-433-G, HNTIN-470, HNTIN-868, HNTIN-915, HNTIN-433
Hardware version:	V12-15-2020-1614
Software version:	a98bfc8
Power supply:	DC 12V
AC adapter:	Model: TM-K018VP-01201500PE-Z Input: 100-240V~50/60Hz 0.45A Output: 12.0V , 1.5A
Remark:	Model No.: HNTIN-470-G, HNTIN-868-G, HNTIN-915-G, HNTIN-433-G, HNTIN-470, HNTIN-868, HNTIN-915, HNTIN-433 has the same internal circuit design, layout, components and internal wiring. The difference is that the ones with the -G suffix have GPS function, while those without the suffix do not. Each model has two appearances, except for the appearance, the interior is exactly the same. In addition, the corresponding frequency of each model of LoRa module is different, as follows: The Nebra HNT Indoor Hotspot is available in 4 variants to support multiple regions. It is available in the following frequency variants: <ul style="list-style-type: none"> • 433 Mhz (HNTIN-433) • 470 Mhz (HNTIN-470) • 868 Mhz (HNTIN-868) • 915 Mhz (HNTIN-915)

5.3 Test mode and voltage and test samples plans

Working :	Keep the EUT in Working 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
DELL	PC	OPTIPLEX7070	2J8XSZ2	DoC
DELL	MONITOR	SE2018HR	3M7QPY2	DoC
DELL	KEYBOARD	KB216d	N/A	DoC
DELL	MOUSE	MS116t1	N/A	DoC
HP	Printer	HP LaserJet P1007	VNFP409729	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

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> ● 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
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5.8 Laboratory Location

<p>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@ccis-cb.com, Website: http://www.ccis-cb.com</p>
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5.9 Monitoring of EUT for the Immunity Test

Visual:	Monitored the display of EUT
Sound:	Monitored the sound of EUT
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

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
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

Conducted Immunity:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Conducted Disturbance Test system	SCHLODER	CDG6000	126B1445/2016	03-03-2021	03-02-2022
Coupling/Decoupling Network	SCHLODER	CDN-M2+3	A2210417/2016	03-03-2021	03-02-2022
EM Clamp	SCHLODER	EMCL-20	132A1281/2016	03-03-2021	03-02-2022
Coupling/Decoupling Network	SCHLODER	CDN M5-32A	10204-1	02-02-2021	02-01-2022
Nexus Conduituining Amplifier	B&K	2690-0S2	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

Surge \ EFT \ V-dips \ RW :					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
Four-in-one Immunity test system	EMC PARTNER	IMU-MGE	109937-1520	01-30-2021	01-29-2022
Lightning test system module	EMC PARTNER	EXT-IMU3000S6 (Surge1.2/50us)	1652	01-30-2021	01-29-2022
Lightning surge high speed communication line coupling network 8 lines (Surge, RW)	EMC PARTNER	CDN-UTP8 ED3	1594	01-30-2021	01-29-2022
Lightning test module of telecommunication terminal	EMC PARTNER	EXT-IMU3000 T6 (Surge 10/700 μ s)	1568	01-30-2021	01-29-2022
Coupling decoupling network of power line (Surge, EFT, RW)	EMC PARTNER	CDN-A-6-32	109037-3063	01-30-2021	01-29-2022
EFT test system module	EMC PARTNER	EXT-IMU3000F5	1626	01-30-2021	01-29-2022
Capacitive coupling clamp EFT	EMC PARTNER	CN-EFT1000/VERI-CP-EFT	1863/1635	01-30-2021	01-29-2022
Voltage dips and Interruption test module	EMC PARTNER	EXT-IMU D	1723	01-30-2021	01-29-2022
Ring wave test module	EMC PARTNER	EXT-IMU3000 R6	1567	01-30-2021	01-29-2022

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 Conducting 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


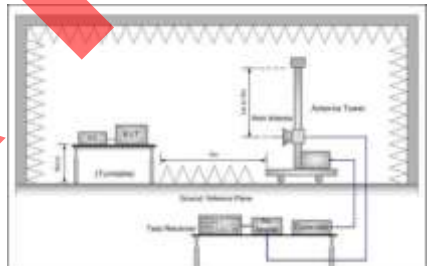
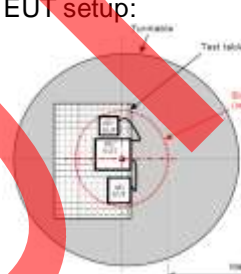
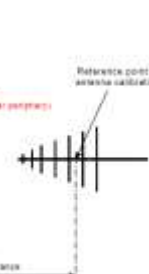
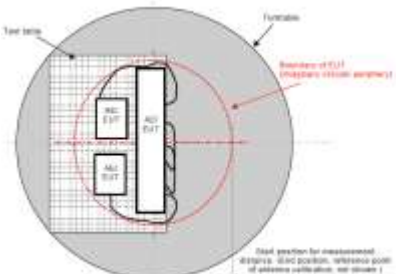
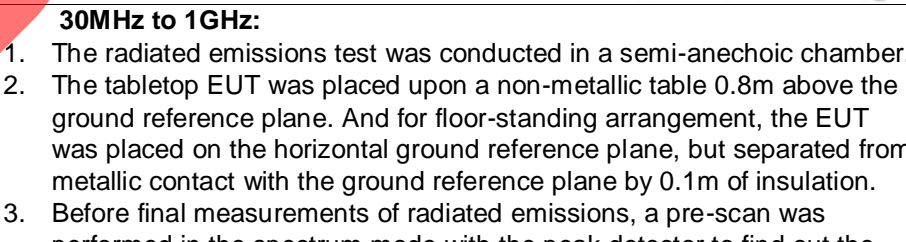
PFMF:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Power frequency magnetic field generator	Prima	PFM61008TG	PR16088206	11-16-2020	11-15-2021

1234567890

6 Test Results

6.1 EMI (Emission)

6.1.1 Radiated Emission

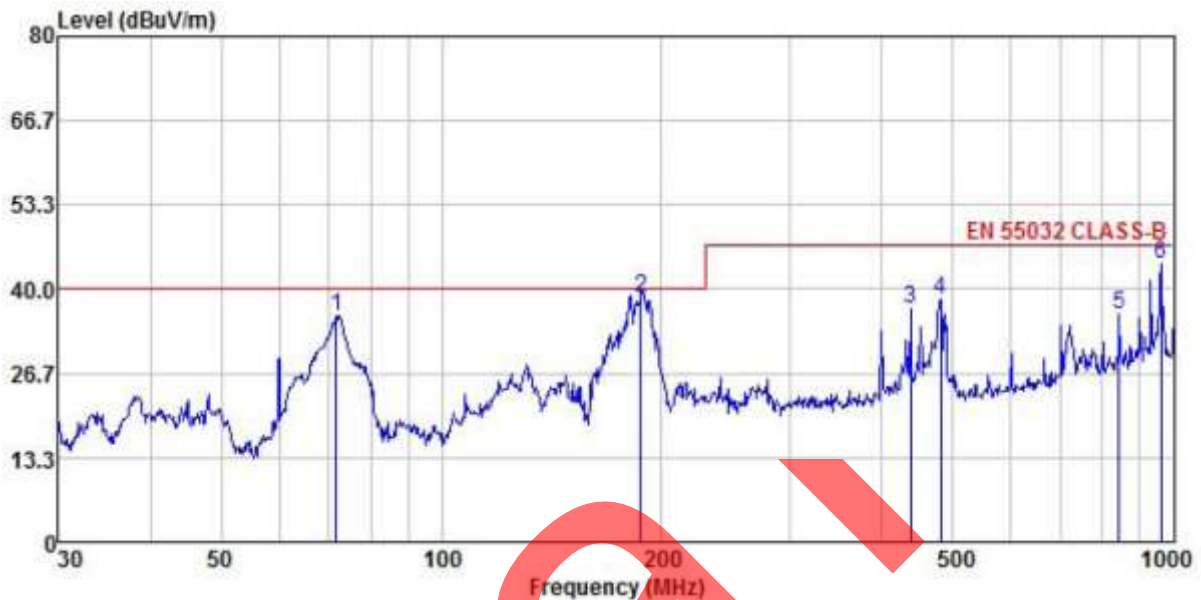
Test Requirement:	EN55032				
Test Method:	EN55032				
Test Frequency Range:	30MHz to 6GHz				
TestDistance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	QP Value
	Above 1GHz	Peak	1MHz	3MHz	PK Value
		Average	1MHz	3MHz	AV Value
ITE Limit:	Frequency	Limit (dBuV/m @3m)			Remark
	30MHz-230MHz	40.0			QP Value
	230MHz-1GHz	47.0			QP Value
	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 @3m)		Remark	
		Fundamental	Harmonics		
	30MHz-230MHz	60	52	QP Value	
	230MHz-300MHz		52	QP Value	
	300MHz-1000MHz		56	QP Value	
Test setup:	Below 1GHz:				
					
	Above 1GHz:				
					
EUT setup:					
					
					
					
Test Procedure:	30MHz to 1GHz:				
	<div>1. The radiated emissions test was conducted in a semi-anechoic chamber.</div> <div>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.</div> <div>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.</div> <div>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</div>				

	<p>performed for both horizontal and vertical antenna polarization.</p> <p>Above 1GHz:</p> <ol style="list-style-type: none"> 1. The radiated emissions test was conducted in a fully-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 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

Sample

Measurement Data:
Below 1GHz:

Product Name:	Nebra Smart Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner	Product Model:	HNTIN-868-G
Test By:	Yaro	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Humi: 57%



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Line	Limit	
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	71.832	54.27	10.62	0.66	29.71	35.84	40.00	-4.16 QP
2	187.096	48.85	17.29	1.34	28.92	38.56	40.00	-1.44 QP
3	437.120	44.44	19.18	2.14	28.85	36.91	47.00	-10.09 QP
4	480.528	45.53	19.33	2.31	28.92	38.25	47.00	-8.75 QP
5	842.130	39.50	21.32	3.20	28.03	35.99	47.00	-11.01 QP
6	962.162	45.34	22.88	3.53	27.65	44.10	47.00	-2.90 QP

Remark:

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

Product Name:	Nebra Smart Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner	Product Model:	HNTIN-868-G
Test By:	Yaro	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Humi: 57%



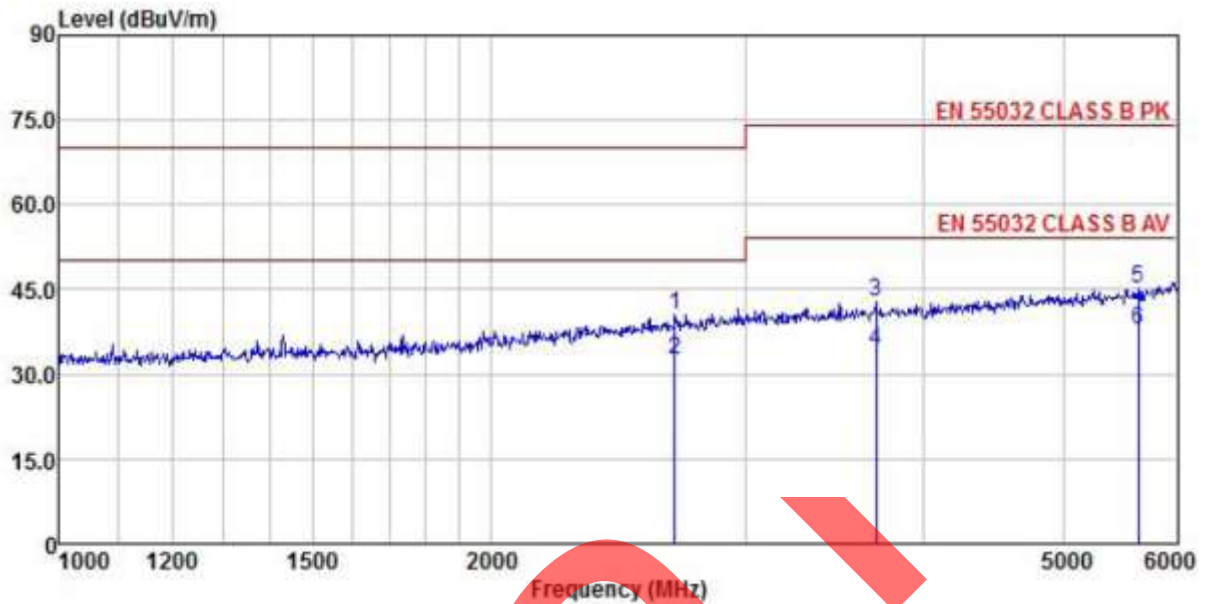
	Freq	ReadAntenna	Cable	Preamp	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1	73.359	43.10	11.06	0.66	29.69	25.13	40.00
2	147.921	40.47	14.14	1.02	29.23	26.40	40.00
3	187.096	48.27	17.29	1.34	28.92	37.98	40.00
4	437.120	37.28	19.18	2.14	28.85	29.75	47.00
5	721.726	40.04	20.55	2.90	28.58	34.91	47.00
6	962.162	43.93	22.88	3.53	27.65	42.69	47.00

Remark:

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

Above 1GHz:

Product Name:	Nebra Smart Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner	Product Model:	HNTIN-868-G
Test By:	Yaro	Test mode:	Working mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Vertical
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Humi: 57%

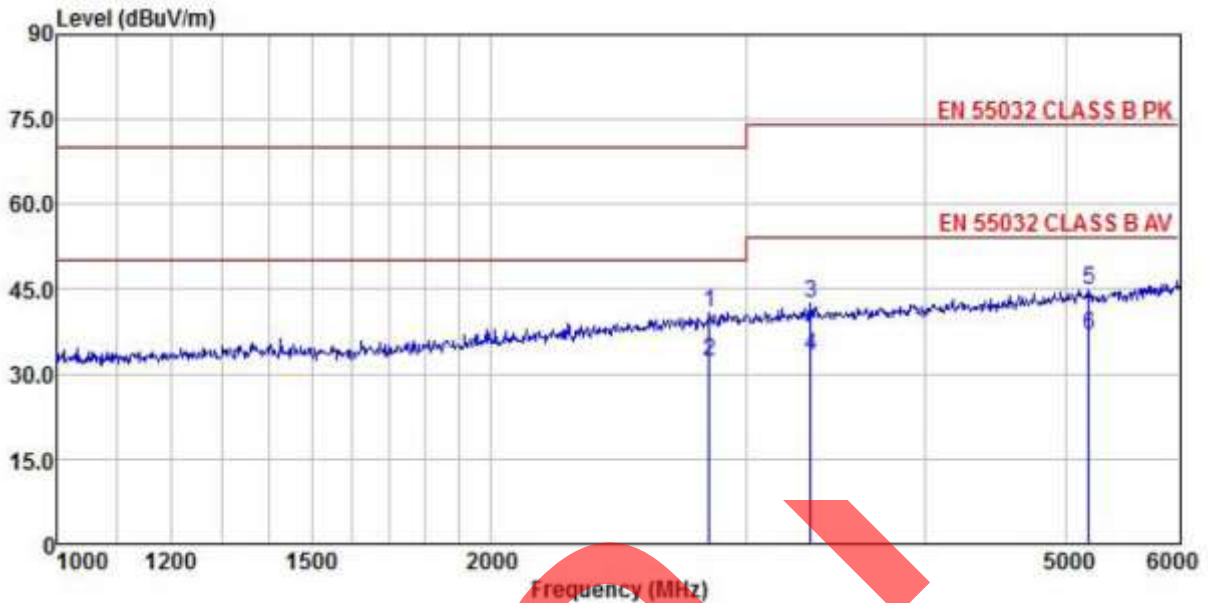


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2683.869	59.32	27.74	8.15	54.60	40.61	70.00	-29.39	Peak
2	2683.869	51.36	27.74	8.15	54.60	32.65	50.00	-17.35	Average
3	3705.344	58.81	28.96	9.45	54.46	42.76	74.00	-31.24	Peak
4	3705.344	50.27	28.96	9.45	54.46	34.22	54.00	-19.78	Average
5	5635.286	56.06	32.35	11.03	54.35	45.09	74.00	-28.91	Peak
6	5635.286	48.71	32.35	11.03	54.35	37.74	54.00	-16.26	Average

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 Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner	Product Model:	HNTIN-868-G
Test By:	Yaro	Test mode:	Working mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz	Environment:	Temp: 24℃ Humi: 57%



	Freq	ReadAntenna	Cable Preamp	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level
		dBuV	dB/m	dB	dB	dBuV/m
						dBuV/m
1	2832.082	59.05	28.05	8.35	54.58	40.87
2	2832.082	50.34	28.05	8.35	54.58	32.16
3	3327.664	59.30	28.60	9.00	54.51	42.39
4	3327.664	50.22	28.60	9.00	54.51	33.31
5	5189.446	56.63	31.63	10.83	54.30	44.79
6	5189.446	48.71	31.63	10.83	54.30	36.87

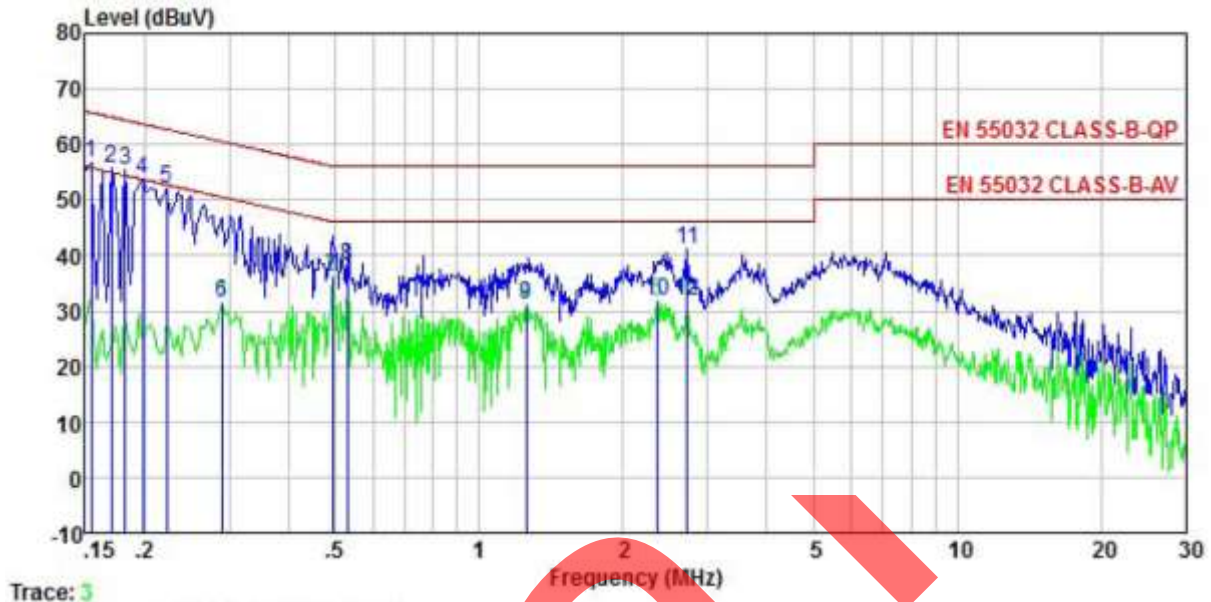
Remark:

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

Test Requirement:	EN 55032		
Test Method:	EN 55032		
TestFrequencyRange:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test setup:	<p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test procedure	<p>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.</p>		
Test Instruments:	Refer to section 5.10 for details		
Test Instruments:	Refer to section 5.3 for details		
Test Mode:	Passed		

Measurement Data:

Product name:	Nebra Smart Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner	Product model:	HNTIN-868-G
Test by:	Yaro	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5℃ Humi: 55%

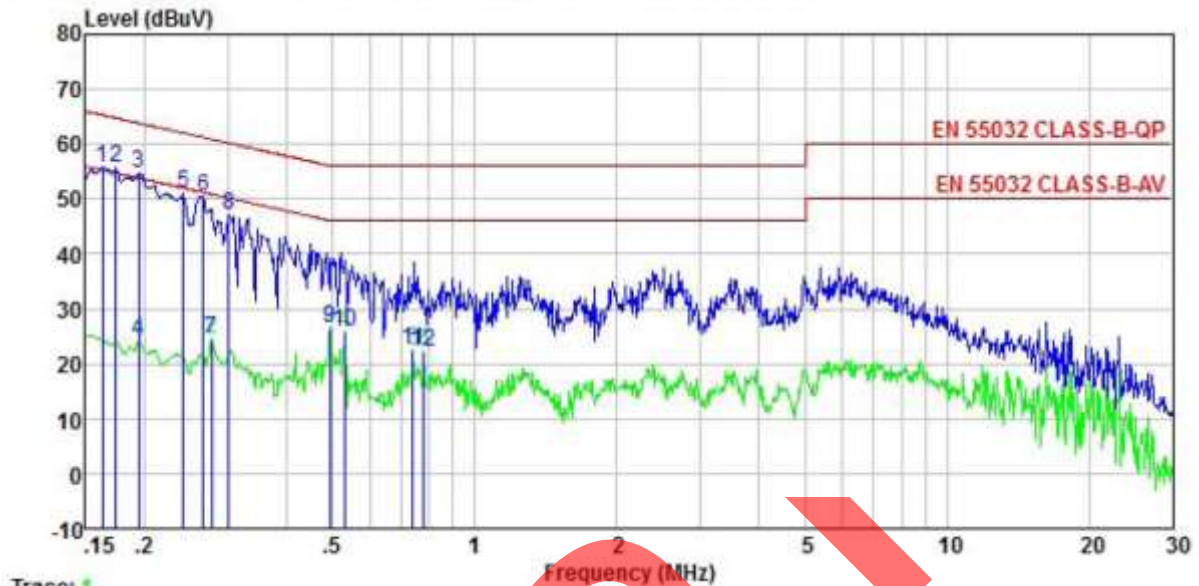


	Freq	Read Level	LISN Factor	Aux Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	46.58	10.20	0.01	0.01	56.80	65.78	-8.98	QP
2	0.170	45.39	10.20	0.01	0.01	55.61	64.94	-9.33	QP
3	0.182	45.32	10.20	0.00	0.01	55.53	64.42	-8.89	QP
4	0.198	43.63	10.20	0.00	0.04	53.87	63.71	-9.84	QP
5	0.222	41.75	10.20	0.00	0.03	51.98	62.74	-10.76	QP
6	0.289	21.22	10.20	0.01	0.03	31.46	50.54	-19.08	Average
7	0.494	25.98	10.20	0.03	0.03	36.24	46.10	-9.86	Average
8	0.529	27.92	10.20	0.03	0.03	38.18	46.00	-7.82	Average
9	1.255	20.79	10.22	0.11	0.10	31.22	46.00	-14.78	Average
10	2.358	21.13	10.27	0.23	0.15	31.78	46.00	-14.22	Average
11	2.721	30.60	10.30	0.28	0.10	41.28	56.00	-14.72	QP
12	2.721	21.03	10.30	0.28	0.10	31.71	46.00	-14.29	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 Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner	Product model:	HNTIN-868-G
Test by:	Yaro	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 230 V/50 Hz	Environment:	Temp: 22.5℃ Humi: 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	0.162	55.86	0.00	0.01	0.01	55.88	65.34	-9.46	QP
2	0.174	55.59	0.00	0.00	0.01	55.60	64.77	-9.17	QP
3	0.194	54.70	0.00	0.00	0.03	54.73	63.84	-9.11	QP
4	0.194	24.30	0.00	0.00	0.03	24.33	53.84	-29.51	Average
5	0.242	51.05	0.00	0.00	0.01	51.06	62.04	-10.98	QP
6	0.266	50.56	0.00	0.01	0.02	50.59	61.25	-10.66	QP
7	0.277	24.66	0.00	0.01	0.02	24.69	50.90	-26.21	Average
8	0.302	47.10	0.00	0.01	0.03	47.14	60.19	-13.05	QP
9	0.494	26.63	0.00	0.03	0.03	26.69	46.10	-19.41	Average
10	0.529	25.89	0.00	0.03	0.03	25.95	46.00	-20.05	Average
11	0.739	22.60	0.00	0.05	0.03	22.68	46.00	-23.32	Average
12	0.779	22.00	0.00	0.05	0.03	22.08	46.00	-23.92	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".

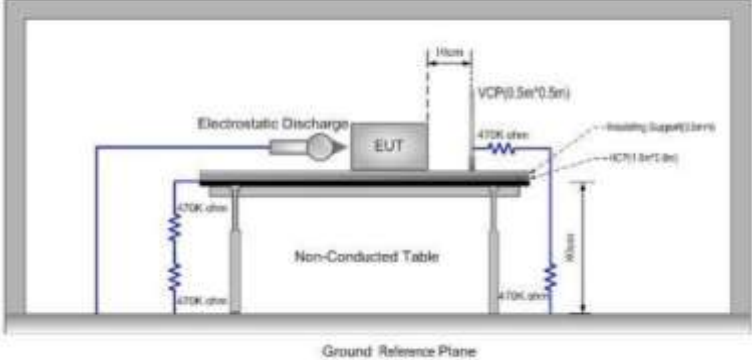
Sample

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:	<p>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.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.</p> <p>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.</p>
Criterion C:	<p>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.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

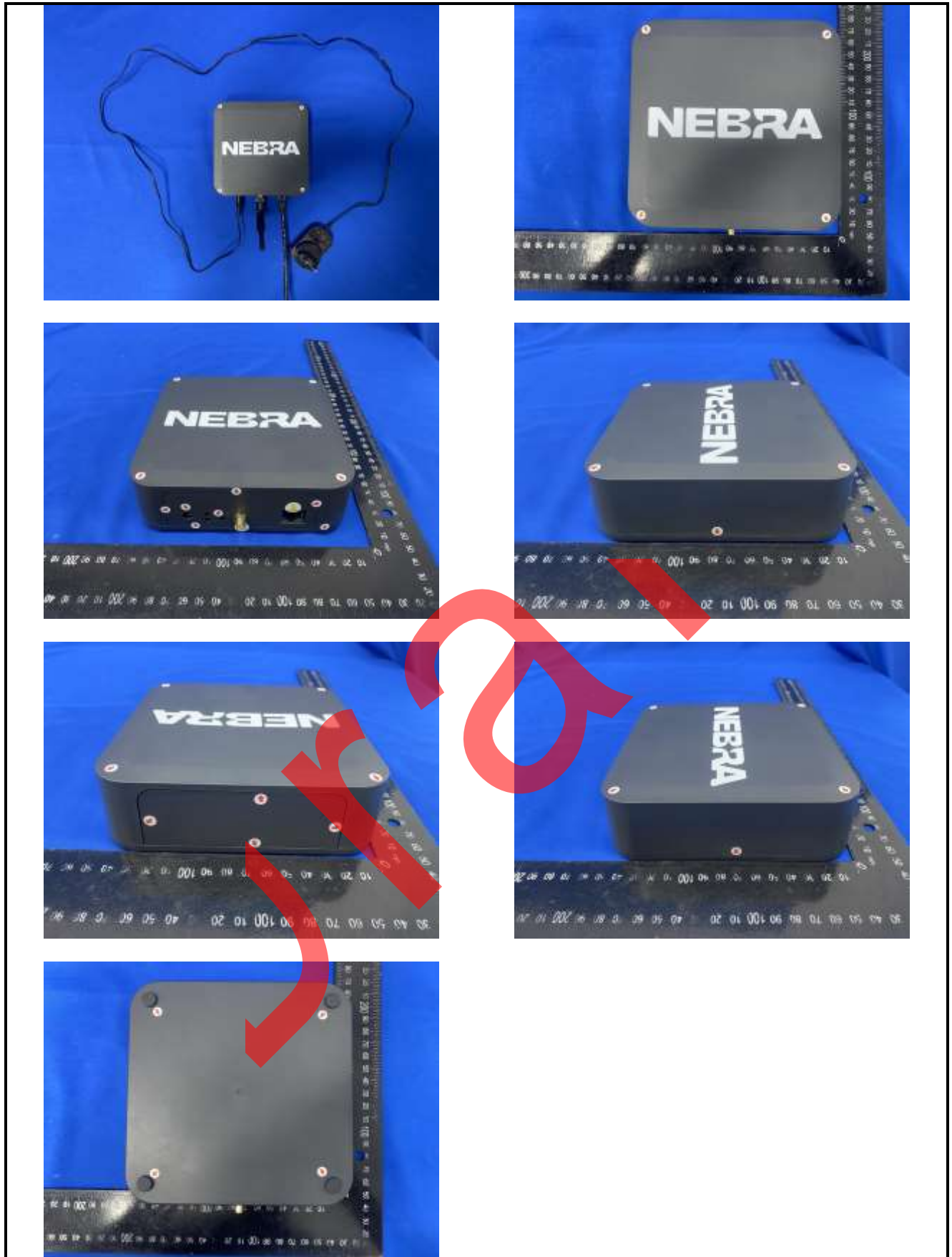
6.2.2 Electrostatic Discharge

Test Requirement:	EN 55035
Test Method:	EN61000-4-2
Discharge Voltage:	Contact Discharge, HCP and VCP: $\pm 2\text{kV}$, $\pm 4\text{kV}$, Air Discharge: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$
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:	<p>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</p> <p>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.</p> <p>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.</p> <p>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.</p>
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:

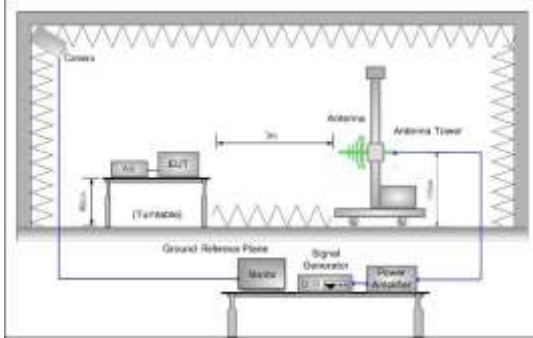
Test mode:	Charging & Recording mode			
Test points:	I: Please refer to red arrows as below plots			
	II:Please refer to yellow arrows as below plots			
Direct discharge				
Discharge Voltage (KV)	Type of discharge	Test points	Observations (Performance Criterion)	Result
± 2, ± 4	Contact	II	A	Pass
± 2, ± 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:	<ol style="list-style-type: none"> 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. 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. 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). 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. 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. The test normally was performed with the generating antenna facing each side of the EUT. 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. 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: Charging & Recording mode

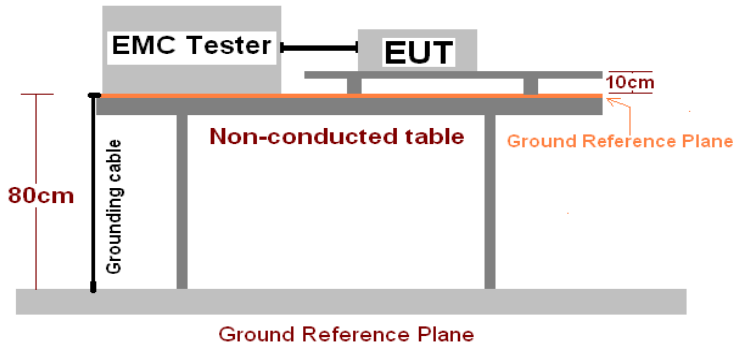
Continuous RF electromagnetic radiated field disturbances swept test

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.						

6.2.4 Electrical Fast Transients

Test Requirement:	EN 55035					
Test Method:	EN61000-4-4					
Test Level:	1.0kV on AC port					
Polarity:	Positive & Negative					
Repetition Frequency:	5kHz					
Burst Duration:	15ms					
Burst Period:	300ms					
Test Duration:	2 minute per level & polarity					
Performance Criterion:	B					
Test setup:						
Test Procedure:	<p>The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.</p> <p>Test on Signal Ports, Telecommunication Ports and Control Ports: The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT with burst noise for 2 minutes.</p> <p>Test on power supply ports: The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal. Each of the Line and Neutral conductors is impressed with burst noise for 2 minutes. The length of the signal and power lines between the coupling device and the EUT is 0.5m</p>					
Test environment:	Temp.:	25°C	Humid.:	63%	Press.:	1050mbar
Test Instruments:	Refer to section 5.10 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					

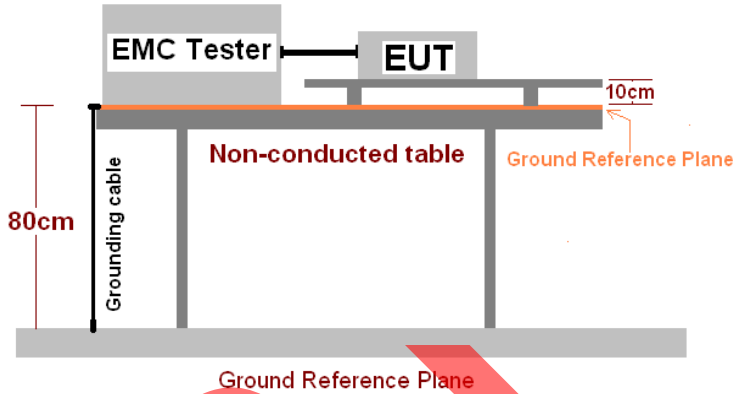
Measurement Record:

Test mode: Charging & Recording mode

Lead under Test	Level (\pm kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	± 1.0	Direct	A	Pass
N	± 1.0	Direct	A	Pass
L-N	± 1.0	Direct	A	Pass
LAN	± 0.5	Direct	A	Pass
<i>Remark:</i> A: No degradation in the performance of the E.U.T. was observed.				

100%

6.2.5 Surge

Test Requirement:	EN 55035					
Test Method:	EN61000-4-5					
Test Level:	± 1 kV Live to Neutral: Differential mode ± 2 kV Live to Earth or Neutral to Earth: Common mode					
Polarity:	Positive & Negative					
Generator source impedance:	2 Ω (line-line coupling)					
Test Interval:	60s between each surge					
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.					
Performance Criterion:	B					
Test setup:						
Test Procedure:	<ol style="list-style-type: none"> 1) For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV. 2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/minrepetition rate are applied during test. 3) Different phase angles are done individually. 4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test. 					
Test environment:	Temp.:	26°C	Humid.:	53%	Press.:	1012mbar
Test Instruments:	Refer to section 5.10 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					

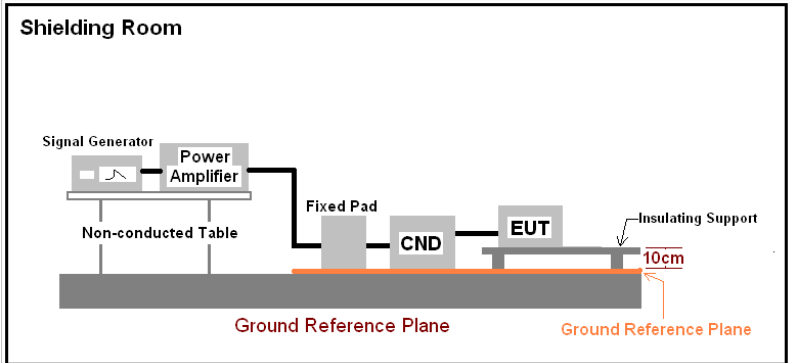
Measurement Record:

Test mode: Charging & Recording mode

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)	Result
L-N	± 1	5	60s	0°	A	Pass
				90°	A	Pass
				180°	A	Pass
				270°	A	Pass
LAN	± 0.5	5	60S	/	A	Pass
Remark: A: During the test, The EUT works normal, and after the test, the function of the EUT is normal.						

100%

6.2.6 Continuous induced RF disturbances

Test Requirement:	EN 55035					
Test Method:	EN61000-4-6					
Frequency range:	0.15MHz to 80MHz					
Test Level:	0.15-10MHz:3V 10-30MHz:3-1V 30-80MHz:1V Audio output function: 0.15MHz-30MHz: -20dB, 30MHz-80MHz: -10dB					
Modulation:	80%, 1kHz Amplitude Modulation					
Performance Criterion:	Criteria A					
Test setup:						
Test Procedure:	<ol style="list-style-type: none"> Let the EUT work in test mode and test it. The EUT are placed on an insulating support 0.1m high above a groundreference plane. CDN (coupling and decoupling device) is placed on theground plane about 0.3m from EUT. Cables between CDN and EUT are asshort as possible, and their height above the ground reference plane shall bebetween 30 and 50 mm (where possible). The disturbance signal described below is injected to EUT through CDN. The EUT operates within its operational mode(s) under intended climaticconditions after power on. The frequency range is swept from 0.150MHz to 80MHz using 3V signal level,and with the disturbance signal 80% amplitude modulated with a 1 kHz sinewave. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency isswept incrementally; the step size shall not exceed 1% of the start andthereafter 1% of the preceding frequency value. Recording the EUT operating situation during compliance testing and decidethe EUT immunity criterion. 					
Test environment:	Temp.:	24°C	Humid.:	51%	Press.:	1012mbar
Test Instruments:	Refer to section 5.10 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					

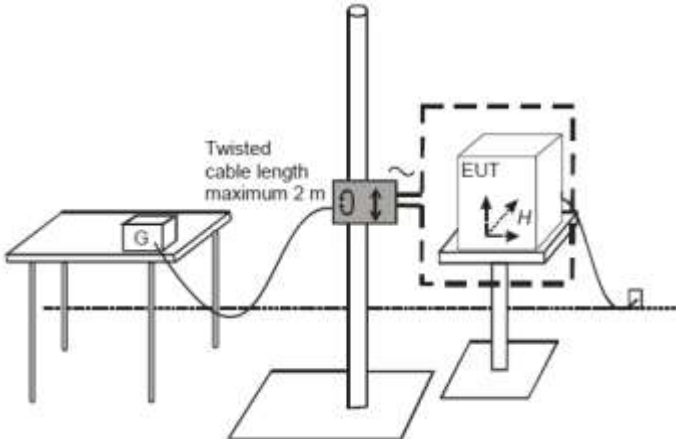
Measurement Record:

Test mode: Charging & Recording mode

Frequency	Injected Position	Test Level	Modulation	Step Size	Dwell Time	Observations (Performance Criterion)	Result
150kHz to 10MHz	AC Main	3V	80%, 1kHz Amp. Mod.	1%	2s	A	Pass
10MHz to 30MHz		3V to1V				A	Pass
30MHz to 80MHz		1V				A	Pass
150kHz to 10MHz	LAN	3V	80%, 1kHz Amp. Mod.	1%	2s	A	Pass
10MHz to 30MHz		3V to1V				A	Pass
30MHz to 80MHz		1V				A	Pass
Remark: A: No loss of function was observed.							

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6.2.7 Power frequency magnetic field

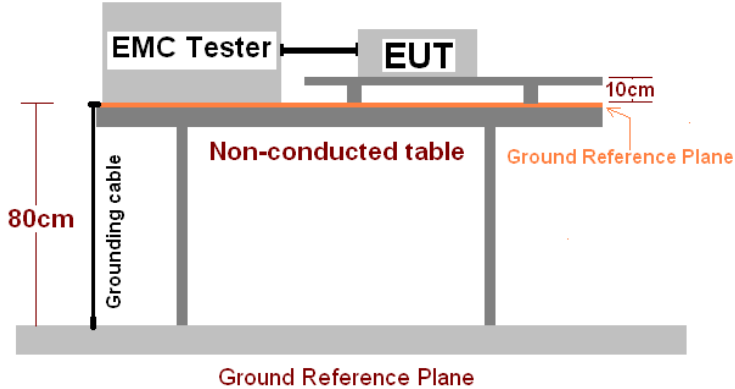
Test Requirement:	EN 55035
Test Method:	EN61000-4-8
Test Frequency:	50/60 Hz
Test Level:	1 A/m
Performance Criterion:	Criteria A
Test setup:	
Test Procedure:	<p>The EUT place center of the test magnetic field coils.</p> <p>The plane of the inductive coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.</p> <p>The signal generator generates a magnetic field of 1A/m for testing.</p>
Test environment:	Temp.: 24°C Humid.: 51% 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: Charging & Recording mode

Test Frequency (Hz)	Test Level (A/m)	Observations (Performance Criterion)	Result
50	1	A	Pass
60	1	A	Pass
Remark: A: No loss of function was observed.			

6.2.8 Voltage Dips and Voltage Interruptions

Test Requirement:	EN 55035
Test Method:	EN61000-4-11
Test Level:	0% of VT(Supply Voltage) for 0.5 period 70% of VT(Supply Voltage) for 25 period 0% of VT(Supply Voltage) for 250 period
No. of Dips / Interruptions:	3 per Level
Performance Criterion:	>95% VD, 0.5 period----Performance criterion: B 30% VD, 25 period----Performance criterion: C >95% VI, 250 period----Performance criterion: C
Test setup:	 <p>The diagram illustrates the test setup. An EMC Tester and an EUT (Equipment Under Test) are placed on a non-conducted table. The table is 80cm high and has a 10cm clearance from the ground reference plane. A grounding cable is connected to the table. The ground reference plane is indicated by a red line at the bottom of the table.</p>
Test Procedure:	<ol style="list-style-type: none"> 1) The EUT and test generator were setup as shown on above setup photo. 2) The interruptions are introduced at selected phase angles with specified duration. 3) Record any degradation of performance.
Test environment:	Temp.: 25°C Humid.: 63% Press.: 1050mbar
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: Charging & Recording mode

Test Level % U _T	Duration (Periods)	Phase angle	No of dropout	Time between dropout	Observations (Performance Criterion)	Result
0	0.5	0°, 90°, 180°, 270°	3	10ms	A	Pass
70	25	0°, 90°, 180°, 270°	3	500ms	A	Pass
0	250	0°, 90°, 180°, 270°	3	5000ms	B	Pass
<p>Remark:</p> <p>A: No loss of function was observed.</p> <p>B: After the test, the equipment can operate as intended without operator intervention. No loss of function was observed.</p>						

7 Test Setup Photo

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



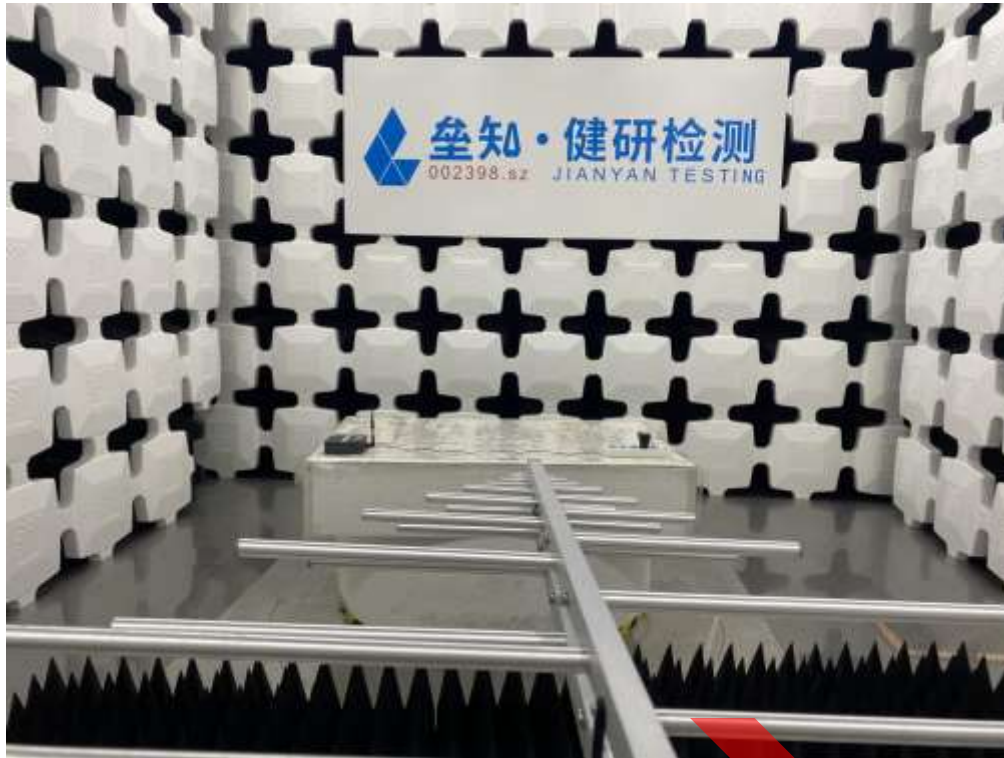
Conducted Emission (for AC)



Conducted Emission (for LAN)



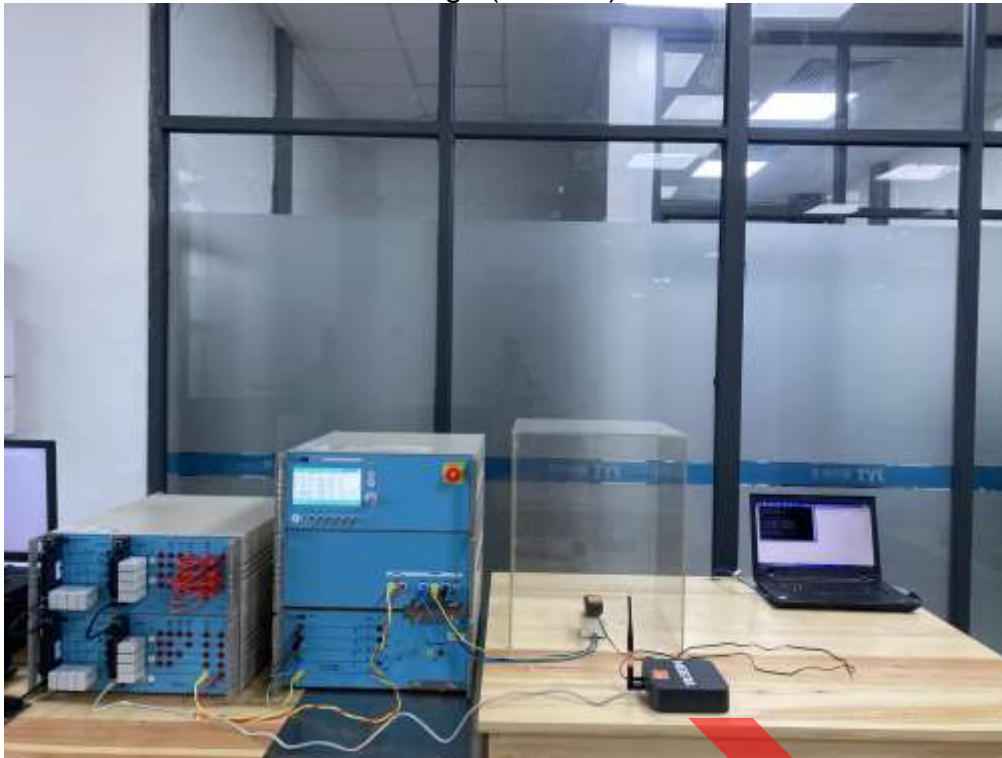
R/S



EFT/B / Surge / V-dips (fo AC)



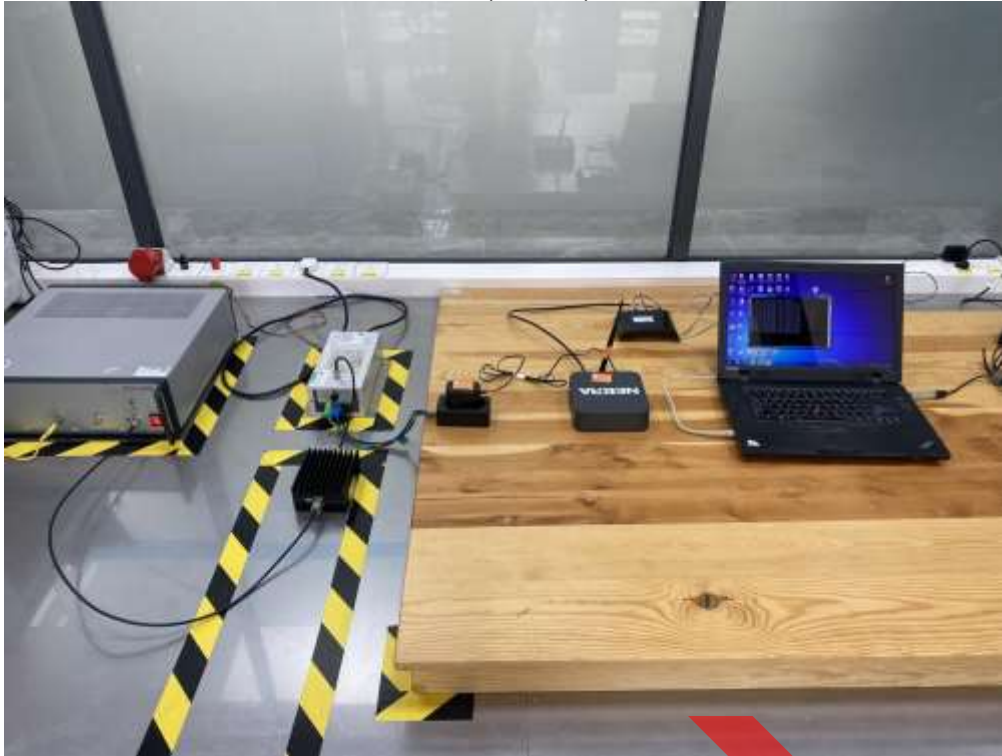
Surge (for LAN)



EFT/B (for LAN)



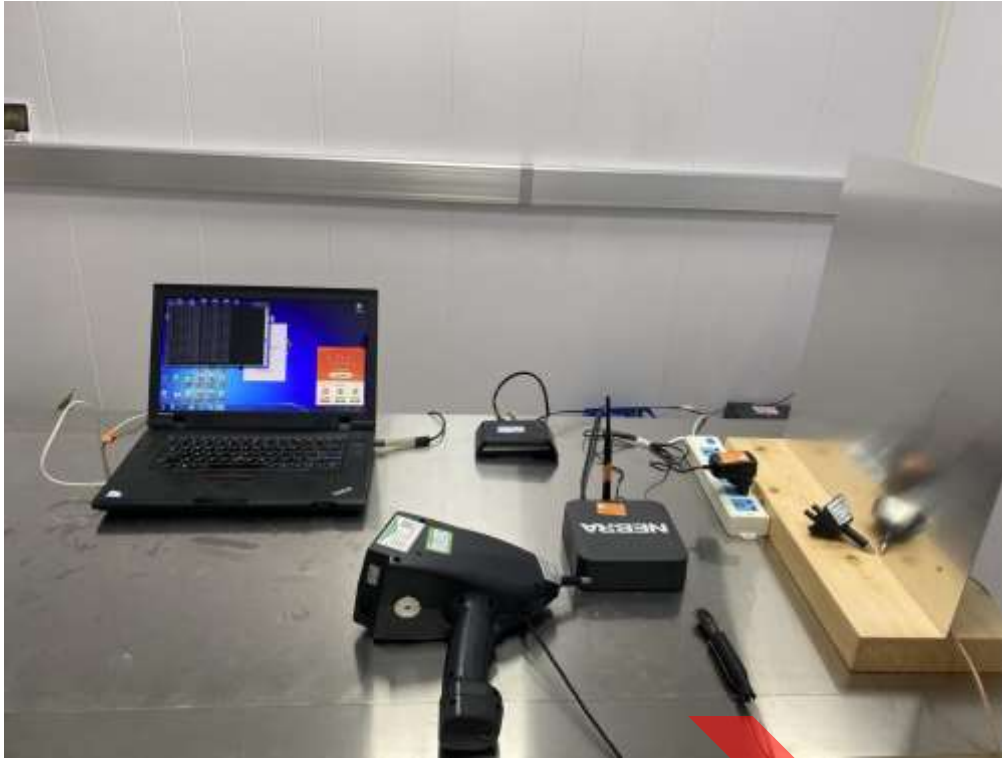
C/S (for AC)



C/S (for LAN)



ESD



PFMF



8 EUT Constructional Details

Reference to the test report No..

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

Sample