CE EMC Test Report

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

Equipment Under Test (EUT)

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version
Model No.:	NEBHNT-HHRK4-433, NEBHNT-HHRK4-470, NEBHNT-HHRK4-868, NEBHNT-HHRK4-915, NEBHNT-HHRK4-433-2, NEBHNT-HHRK4-470-2, NEBHNT-HHRK4-868-2, NEBHNT-HHRK4-915-2, NEBHNT-HHRK4-433-3, NEBHNT-HHRK4-470-3, NEBHNT-HHRK4-868-3, NEBHNT-HHRK4-915-3, NEBHNT-HHRK4-433-3, NEBHNT-HHRK4-470-3, NEBHNT-HHRK4-868-3, NEBHNT-HHRK4-915-3
Applicable standards:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.1.1 (2019-03) ETSI EN 301 489-17 V3.2.4 (2020-09)
Date of sample receipt:	05 Jan., 2022
Date of Test:	06 Jan., to 24 Jan., 2022
Date of report issue:	25 Jan., 2022
Test Result:	PASS

Tested by:	Mike.ou ***Test Engineer***	***Date:***	*25 Jan., 2022*
Reviewed by:	Vivier Zhang ***Project Engineer***	***Date:***	25 Jan., 2022
Approved by:	***Manager***	***Date:***	*25 Jan., 2022*

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

2 Version

Version No.	Date	Description
00	*25 Jan., 2022*	*Original*

3 Contents

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4 Test Summary

Test Item	Test requirement	Test method	Application	Result
EMI Test Items				
Radiated emission	ETSI EN301 489-1	EN 55032	Enclosure	PASS
Conducted emission	ETSI EN301 489-1	EN 55032	AC port	PASS
Harmonic current emissions	ETSI EN301 489-1	EN IEC 61000-3-2	AC port	Not Required
Voltage fluctuations and flicker	ETSI EN301 489-1	EN 61000-3-3	AC port	Not Required
EMS Test Items				
Electrostatic discharge (ESD)	ETSI EN301 489-1	EN 61000-4-2	Enclosure	PASS
RF electromagnetic field (80 MHz to 6 000 MHz)	ETSI EN301 489-1	EN 61000-4-3	Enclosure	PASS
Fast transients common mode (EFT)	ETSI EN301 489-1	EN 61000-4-4	AC & Lan port	PASS
Surges	ETSI EN301 489-1	EN 61000-4-5	AC & Lan port	PASS
RF common mode (0.15 MHz to 80 MHz)	ETSI EN301 489-1	EN 61000-4-6	AC & Lan port	PASS
Voltage dips and interruptions	ETSI EN301 489-1	EN 61000-4-11	AC port	PASS

Remark:
1. Pass: Meet the requirement.
2. 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, East Sussex, TN3 9BJ
Manufacturer/Factory:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells, East Sussex, TN3 9BJ

5.2 General Description of E.U.T.

Product name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version		
Model no.:	NEBHNT-HHRK4-433, NEBHNT-HHRK4-470, NEBHNT-HHRK4-868, NEBHNT-HHRK4-915, NEBHNT-HHRK4-433-2, NEBHNT-HHRK4-470-2, NEBHNT-HHRK4-868-2, NEBHNT-HHRK4-915-2, NEBHNT-HHRK4-433-3, NEBHNT-HHRK4-470-3, NEBHNT-HHRK4-868-3, NEBHNT-HHRK4-915-3, NEBHNT-HHRK4-433-3, NEBHNT-HHRK4-470-3, NEBHNT-HHRK4-868-3, NEBHNT-HHRK4-915-3		
Tx frequency:	Wi-Fi:	2412MHz~2472MHz 5180MHz~5240MHz	
	Bluetooth/BLE: 2402MHz~2480MHz		
	Lora:868.1MHz~868.5MHz		
Rx frequency	Wi-Fi:	2412MHz~2472MHz 5180MHz~5240MHz	
	Bluetooth/BLE: 2402MHz~2480MHz		
	Lora:868.1MHz~868.5MHz		
Hardware version:	v1		
Software version:	781099d		
Modulation technology:	Wi-Fi:	☒802.11b(DSSS) ☒802.11a/g/n/ac (OFDM)	
	Bluetooth:	☒BDR(GFSK) ☒EDR(π/4-DQPSK, 8DPSK) ☒LE(GFSK)	
	Lora:	OOK	
Antenna type:	External Antenna		
Antenna Gain:	Wi-Fi: 1dBi	Bluetooth/BLE: 1dBi	Lora: 3dBi
AC adapter:	Model No.:R241-1202500I Input: AC100-240V, 50/60Hz 1.5 A Output: DC 12.0V, 2.5A		
Remark:	Model no.: NEBHNT-HHRK4-433, NEBHNT-HHRK4-470, NEBHNT-HHRK4-868, NEBHNT-HHRK4-915, NEBHNT-HHRK4-433-2, NEBHNT-HHRK4-470-2, NEBHNT-HHRK4-868-2, NEBHNT-HHRK4-915-2, NEBHNT-HHRK4-433-3, NEBHNT-HHRK4-470-3, NEBHNT-HHRK4-868-3, NEBHNT-HHRK4-915-3, NEBHNT-HHRK4-433-3, NEBHNT-HHRK4-470-3, NEBHNT-HHRK4-868-3, NEBHNT-HHRK4-915-3, The difference between the models is that the LoRa Radio module used inside is different for each variant. Along with a respective antenna for each region / frequency. The -2 and -3 flags at the end of the model number relates to the specific chip part number for the main LoRa chip.		

5.3 Test mode and test environment

Test mode	Function and configuration
TM 1	Bluetooth link + Wi-Fi on + Lora on + Lan + Adapte
TM 2	Bluetooth on + Wi-Fi link + Lora on + Lan + Adapte
TM 3	Bluetooth on + Wi-Fi on + Lora Link + Lan + Adapte
TM 4	Lan + Adapter
Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: -20℃ ~ +40℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Test voltage:	AC 230V/50Hz

Remark:

1. Pre-scan the EUT stand-up position (H mode) and lie down position (E1, E2 mode) for three modes, and found the H mode worst case.

2. During the test, pre-scan 110Vac/60Hz and 230Vac/50Hz of the Power supply, found 230Vac/50Hz was worse case mode.

3. The report only reflects the test data of worst mode.

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
Lenovo	Laptop	ThinkPad T14 Gen 1	SL10Z47277	DoC

5.5 Description of Cable Used

CableType	Description	Length	From	To
N/A	N/A	N/A	N/A	N/A

5.6 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 150kHz)	±3.11 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.62 dB
Conducted Emission for ISN (150kHz ~ 30MHz)	±3.54 dB
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB
Radiated Emission (30MHz ~ 1GHz) (10m SAC)	±4.32 dB

Note: *All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.*

5.7 Additions to, deviations, or exclusions from the method

No

5.8 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 and 10m 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.

- **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

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

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General 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

5.9 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://jyt.lets.com

5.10 Monitoring of EUT for the Immunity Test

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

5.11 Test Instruments list

Radiated Emission(3m SAC):					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal.Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	ETS	9m*6m*6m	WXJ001-1	01-19-2021	01-18-2024
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-03-2021	03-02-2022
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	06-20-2021	06-19-2022
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-03-2021	03-02-2022
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	06-18-2021	06-17-2022
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	03-07-2021	03-06-2022
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXG001-7	03-07-2021	03-06-2022
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXG001-3	03-07-2021	03-06-2022
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXG001-9	03-07-2021	03-06-2022
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-03-2021	03-02-2022
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	03-07-2021	03-06-2022
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	03-07-2021	03-06-2022
Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYT3M-1G-BB-5M	WXG001-6	03-07-2021	03-06-2022
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	03-07-2021	03-06-2022
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal.Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESCI 3	WXJ003	03-03-2021	03-02-2022
RF Switch	TOP PRECISION	RSU0301	WXG003	03-03-2021	03-02-2022
LISN	Schwarzbeck	NSLK 8127	QCJ001-13	03-18-2021	03-17-2022
LISN	Rohde & Schwarz	ESH3-Z5	WXJ005-1	06-18-2021	06-17-2022
ISN	Schwarzbeck	CAT3 8158	WXJ018	03-03-2021	03-02-2022
ISN	Schwarzbeck	CAT5 8158	WXJ018-1	03-03-2021	03-02-2022
ISN	Schwarzbeck	NTFM 8158	WXJ018-2	03-03-2021	03-02-2022
LISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-NN-2M	WXG003-1	03-03-2021	03-02-2022
ISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-BN-3M	WXG003-2	03-03-2021	03-02-2022
Test Software	AUDIX	E3	Version: 6.110919b		

ESD:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
ESD Simulator	Haefely	ONYX30	WXJ016	03-05-2021	03-04-2022

Radiated Immunity:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Signal Generator	Rohde & Schwarz	SMB 100B-B106	QCJ005	04-06-2021	04-05-2022
Solid State Amplifiers	BONN	BLWA 0810-1000/500D	QCJ005-6	06-21-2021	06-20-2022
Broadband Amplifier	Rohde & Schwarz	BBA 150 D400/E100	QCJ005-6	06-21-2021	06-20-2022
Power Mete	Rohde & Schwarz	NRX	QCJ005-1	04-08-2021	04-07-2022
Power Sensor	Rohde & Schwarz	NRP6A	QCJ005-2	04-08-2021	04-07-2022
Power Sensor	Rohde & Schwarz	NRP6A	QCJ005-3	04-08-2021	04-07-2022
Stacked Log Periodic Antenna	Schwarzbeck	STLP 9128E	QCJ005-11	N/A	N/A
Stacked Microwave Log.-Per. Antenna	Schwarzbeck	STLP 9149	QCJ005-8	N/A	N/A

Surge \ EFT \ V-dips \ RW :					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
Four-in-one Immunity test system	EMC PARTNER	IMU-MGE	WXJ079	01-30-2021	01-29-2022
Lightning test system module	EMC PARTNER	EXT-IMU3000S6 (Surge1.2/50us)	WXJ079-4	01-30-2021	01-29-2022
Lightning surge high speed communication line coupling network 8 lines (Surge, RW)	EMC PARTNER	CDN-UTP8 ED3	WXJ079-3	01-30-2021	01-29-2022
Lightning test module of telecommunication terminal	EMC PARTNER	EXT-IMU3000 T6 (Surge 10/700μs)	WXJ079-5	01-30-2021	01-29-2022
Coupling decoupling network of power line (Surge, EFT, RW)	EMC PARTNER	CDN-A-6-32	WXJ079-2	01-30-2021	01-29-2022
EFT test system module	EMC PARTNER	EXT-IMU3000F5	WXJ079-6	01-30-2021	01-29-2022
Capacitive coupling clamp EFT	EMC PARTNER	CN-EFT1000/VERI-CP-EFT	WXJ079-7	01-30-2021	01-29-2022
Voltage dips and Interruption test module	EMC PARTNER	EXT-IMU D	WXJ079-1	01-30-2021	01-29-2022
Ring wave test module	EMC PARTNER	EXT-IMU3000 R6	WXJ079-8	01-30-2021	01-29-2022

Conducted Immunity:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Conducted Disturbance Test system	SCHLODER	CDG6000	WXJ017	03-03-2021	03-02-2022
Coupling/Decoupling Network	SCHLODER	CDN-M2+3	WXJ017-1	03-03-2021	03-02-2022
EM Clamp	SCHLODER	EMCL-20	WXJ017-2	03-03-2021	03-02-2022
Coupling/Decoupling Network	SCHLODER	CDN M5-32A	WXJ017-3	02-02-2021	02-01-2022

6 Technical requirements specifications

6.1 EMI (Emission)

6.1.1 Radiated emission

Test requirement:	ETSI EN301 489-1
Test method:	EN 55032
Test frequency Range:	30MHz to 6GHz
Test distance:	3m

Receiver setup:

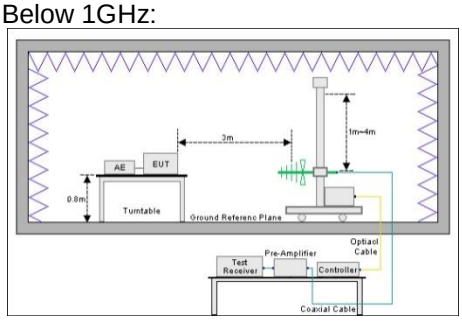
Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100kHz	300kHz	QP Value
Above 1GHz	Peak	1MHz	3MHz	PK Value
	Average	1MHz	3MHz	AV Value

Limit:

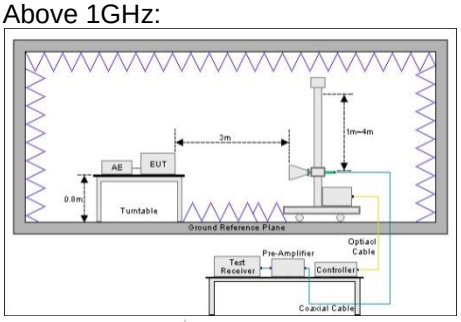
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-230MHz	40.0	QP Value
230MHz-1GHz	47.0	QP Value
1GHz-3GHz	50.0	AV Value
	70.0	PK Value
3GHz-6GHz	54.0	AV Value
	74.0	PK Value

Test setup:

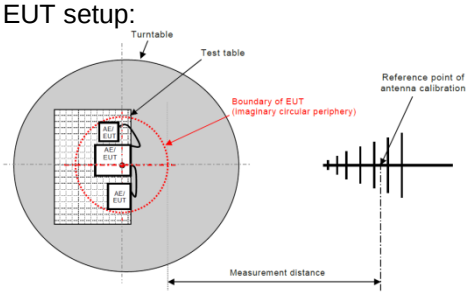
Below 1GHz:

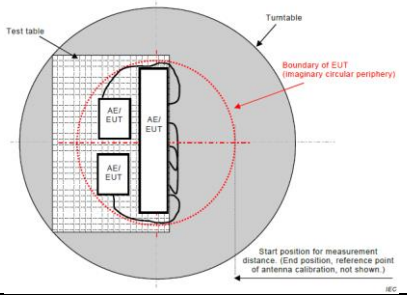


Above 1GHz:



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:

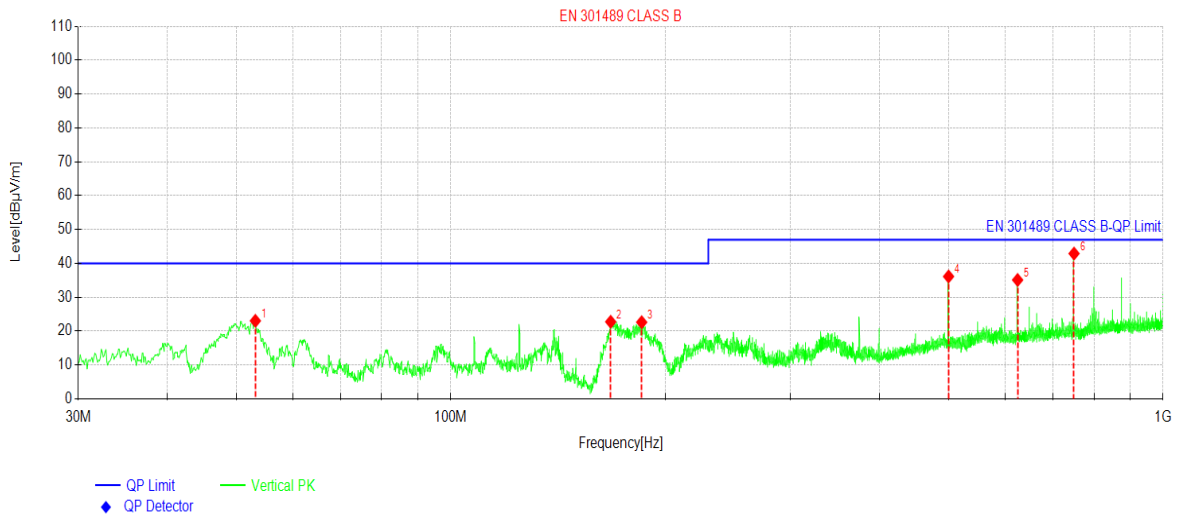
1. The radiated emissions test wasconducted in a fully-anechoic chamber.
2. The tabletop EUT was placed upon anon-metallic table0.8m above the

	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 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Below 1GHz:

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	**Product Model:**	NEBHNT-HHRK4-868
Test By:	Mike	**Test mode:**	TM 1
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Horizontal
Test Voltage:	AC 230/50Hz		



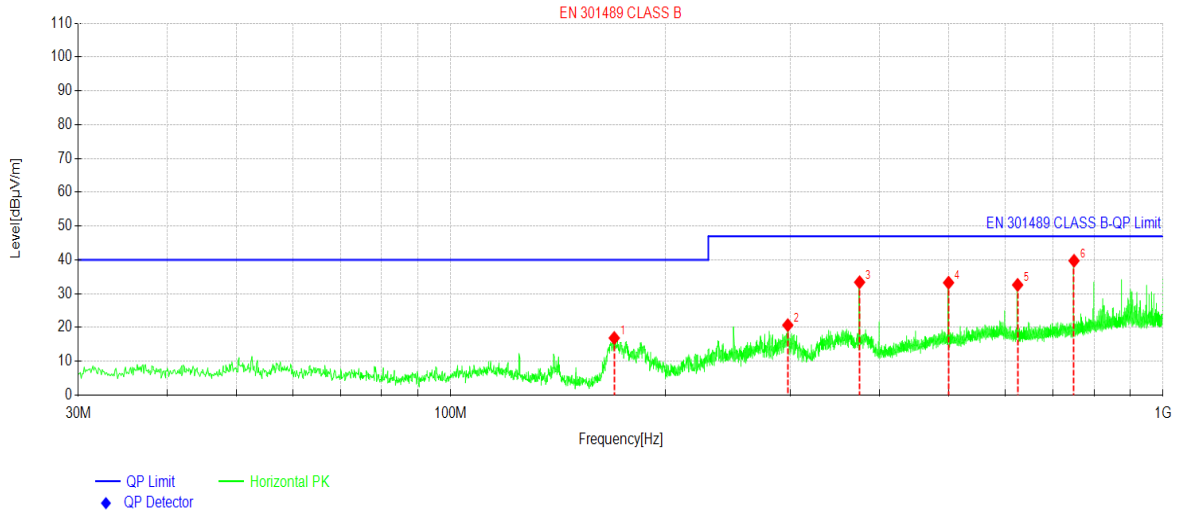
Suspected Data List

NO.	Freq. [MHz]	Reading[dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	53.1853	37.69	23.04	-14.65	40.00	16.96	PK	Vertical
2	167.753	39.84	22.75	-17.09	40.00	17.25	PK	Vertical
3	185.409	38.96	22.62	-16.34	40.00	17.38	PK	Vertical
4	500.012	43.09	36.13	-6.96	47.00	10.87	PK	Vertical
5	625.057	40.41	35.10	-5.31	47.00	11.90	PK	Vertical
6	750.103	46.64	42.90	-3.74	47.00	4.10	PK	Vertical

Remark:

1. *Final Level =Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	Product Model:	NEBHNT-HHRK4-868
Test By:	Mike	Test mode:	TM 1
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz		



Suspected Data List

NO.	Freq. [MHz]	Reading[dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	169.694	33.89	16.88	-17.01	40.00	23.12	PK	Horizontal
2	297.358	33.46	20.70	-12.76	47.00	26.30	PK	Horizontal
3	375.063	44.26	33.38	-10.88	47.00	13.62	PK	Horizontal
4	500.012	40.21	33.25	-6.96	47.00	13.75	PK	Horizontal
5	625.057	37.91	32.60	-5.31	47.00	14.40	PK	Horizontal
6	750.103	43.47	39.73	-3.74	47.00	7.27	PK	Horizontal

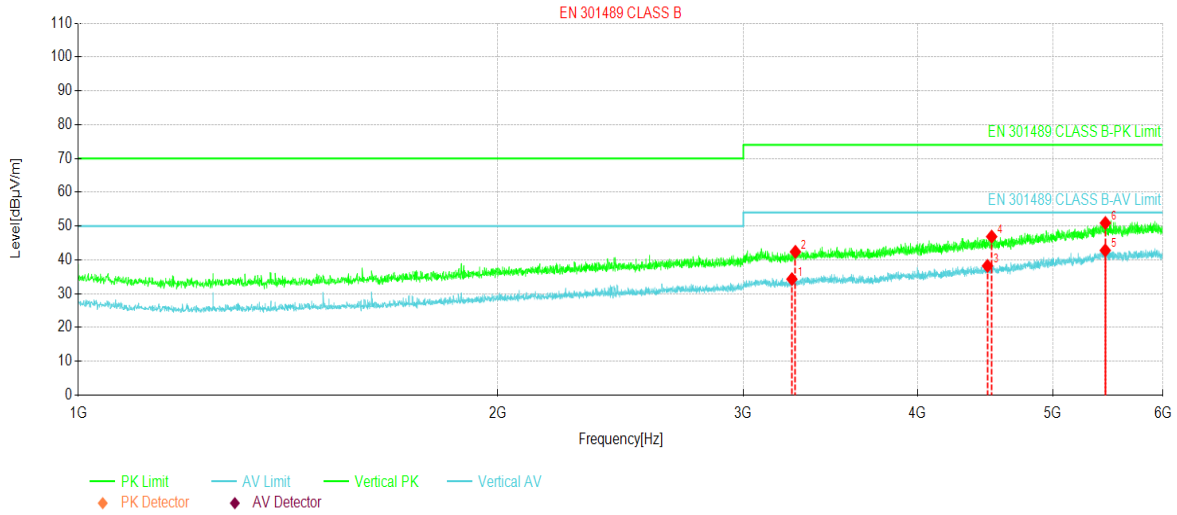
Remark:

3. Final Level =Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).

4. The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

Above 1GHz:

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	Product Model:	NEBHNT-HHRK4-868
Test By:	Mike	Test mode:	TM 1
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Vertical
Test Voltage:	AC 230/50Hz		

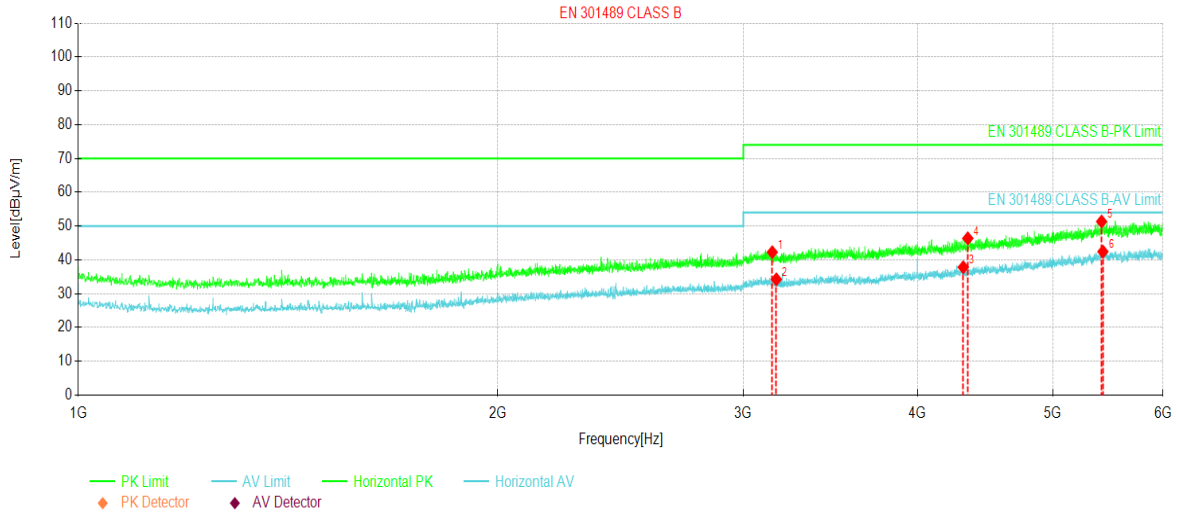


NO.	Freq. [MHz]	Reading[dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	3250.62	50.07	34.31	-15.76	54.00	19.69	AV	Vertical
2	3269.37	58.06	42.37	-15.69	74.00	31.63	PK	Vertical
3	4490.00	49.06	38.21	-10.85	54.00	15.79	AV	Vertical
4	4521.25	57.58	46.87	-10.71	74.00	27.13	PK	Vertical
5	5454.37	48.81	42.80	-6.01	54.00	11.20	AV	Vertical
6	5455.00	56.91	50.90	-6.01	74.00	23.10	PK	Vertical

Remark:

1. *Final Level =Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	Product Model:	
Test By:	Mike	Test mode:	TM 1
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 230/50Hz		

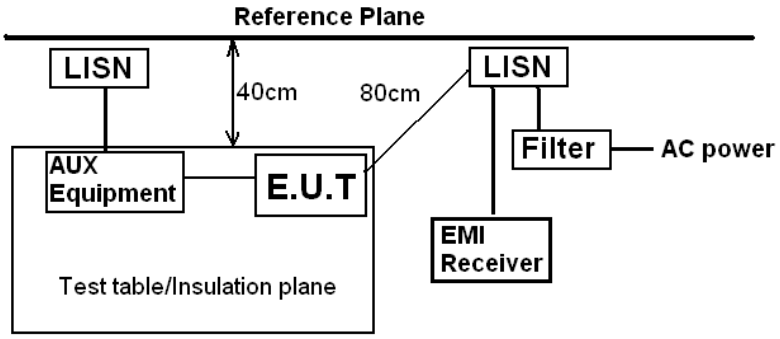


NO.	Freq. [MHz]	Reading[dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	3146.87	58.20	42.26	-15.94	74.00	31.74	PK	Horizontal
2	3168.12	50.17	34.23	-15.94	54.00	19.77	AV	Horizontal
3	4313.75	49.39	37.81	-11.58	54.00	16.19	AV	Horizontal
4	4346.25	57.79	46.36	-11.43	74.00	27.64	PK	Horizontal
5	5421.25	57.29	51.33	-5.96	74.00	22.67	PK	Horizontal
6	5433.12	48.42	42.44	-5.98	54.00	11.56	AV	Horizontal

Remark:

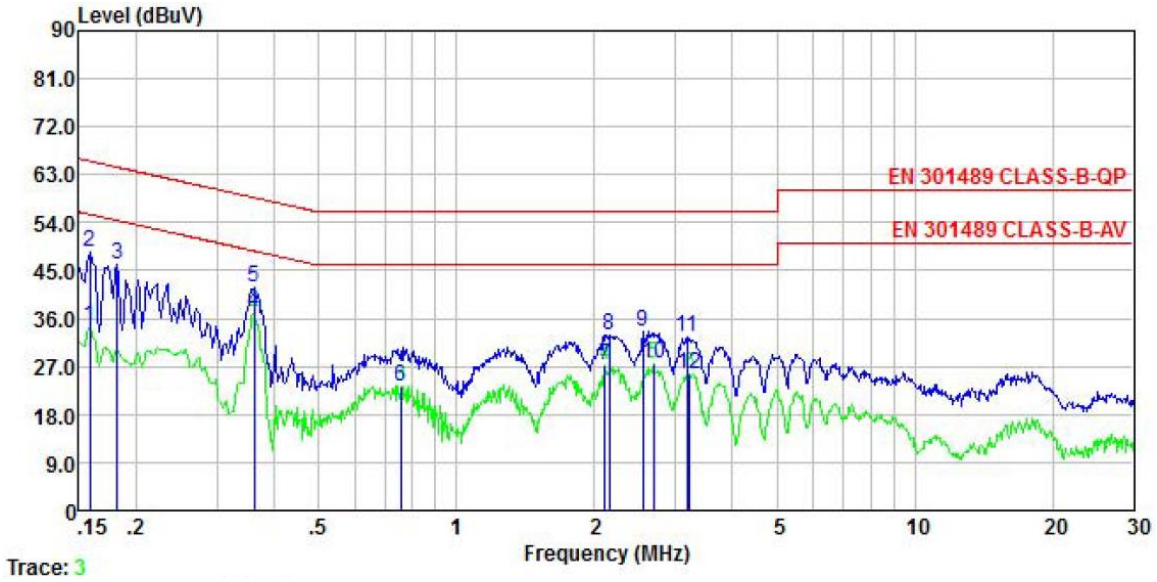
1. *Final Level =Receiver Read level + Factor (Antenna Factor + Cable Loss – Preamplifier Factor).*
2. *The emission levels of other frequencies are lower than the limit 20dB and not show in test report.*

6.1.2 Conducted emissions

Test requirement:	ETSI EN301 489-1		
Test method:	EN 55032		
Test frequency range:	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:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*		
Test procedure	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.		
Test instruments:	Refer to section 5.11 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

Measurement Data:

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	**Product Model:**	NEBHNT-HHRK4-868
Test by:	Mike	**Test mode:**	TM 1
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 230 V/50 Hz		

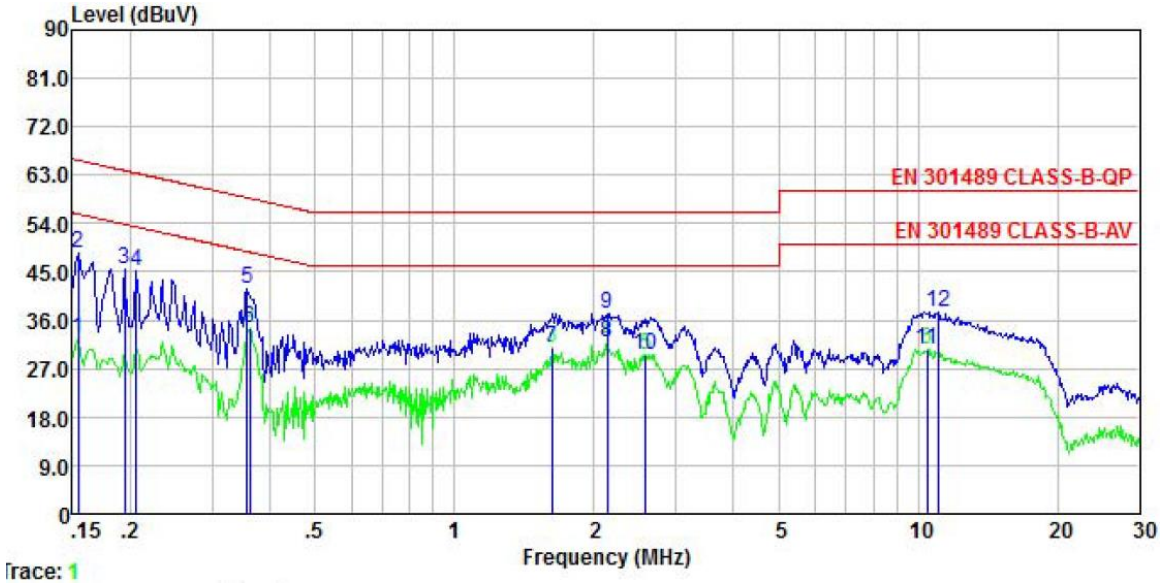


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.158	34.51	0.04	0.01	34.56	55.56	-21.00	Average
2	0.158	48.51	0.04	0.01	48.56	65.56	-17.00	QP
3	0.182	46.23	0.04	0.01	46.28	64.42	-18.14	QP
4	0.361	37.11	0.04	0.02	37.17	48.69	-11.52	Average
5	0.361	41.63	0.04	0.02	41.69	58.69	-17.00	QP
6	0.755	23.34	0.04	0.03	23.41	46.00	-22.59	Average
7	2.110	27.12	0.07	0.19	27.38	46.00	-18.62	Average
8	2.155	32.76	0.07	0.18	33.01	56.00	-22.99	QP
9	2.554	33.35	0.08	0.13	33.56	56.00	-22.44	QP
10	2.692	27.27	0.08	0.11	27.46	46.00	-18.54	Average
11	3.190	32.39	0.09	0.07	32.55	56.00	-23.45	QP
12	3.224	25.51	0.09	0.07	25.67	46.00	-20.33	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 Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	Product Model:	NEBHNT-HHRK4-868
Test by:	Mike	Test mode:	TM 1
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 230 V/50 Hz		

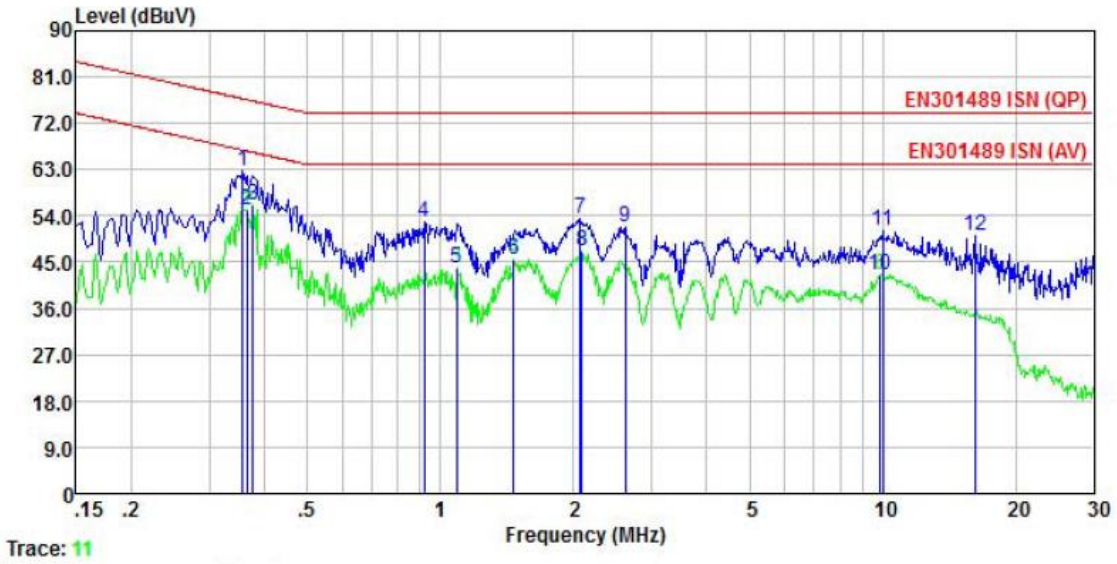


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	32.45	0.05	0.01	32.51	55.78	-23.27	Average
2	0.154	48.55	0.05	0.01	48.61	65.78	-17.17	QP
3	0.194	45.32	0.04	0.03	45.39	63.84	-18.45	QP
4	0.206	45.01	0.04	0.04	45.09	63.36	-18.27	QP
5	0.358	41.91	0.04	0.02	41.97	58.78	-16.81	QP
6	0.361	34.36	0.04	0.02	34.42	48.69	-14.27	Average
7	1.619	30.52	0.06	0.16	30.74	46.00	-15.26	Average
8	2.133	31.50	0.06	0.19	31.75	46.00	-14.25	Average
9	2.133	37.06	0.06	0.19	37.31	56.00	-18.69	QP
10	2.581	29.44	0.07	0.12	29.63	46.00	-16.37	Average
11	10.452	30.26	0.20	0.12	30.58	50.00	-19.42	Average
12	11.080	37.20	0.20	0.11	37.51	60.00	-22.49	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.*

Product Name:	Nebra Indoor LoRa Gateway ROCK Pi 4 Version / Nebra Indoor Helium Hotspot ROCK Pi 4 Version	Product Model:	NEBHNT-HHRK4-868
Test by:	Mike	Test mode:	TM 1
Test frequency:	150 kHz ~ 30 MHz	Port:	Lan (Cat 5)
Test voltage:	AC 230 V/50 Hz		



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.358	53.01	9.76	0.02	62.79	76.78	-13.99	QP
2	0.365	45.51	9.75	0.03	55.29	66.61	-11.32	Average
3	0.377	46.32	9.75	0.03	56.10	66.34	-10.24	Average
4	0.918	43.11	9.55	0.04	52.70	74.00	-21.30	QP
5	1.088	34.37	9.56	0.07	44.00	64.00	-20.00	Average
6	1.464	35.71	9.60	0.14	45.45	64.00	-18.55	Average
7	2.066	43.55	9.65	0.20	53.40	74.00	-20.60	QP
8	2.088	37.30	9.65	0.20	47.15	64.00	-16.85	Average
9	2.622	41.95	9.66	0.11	51.72	74.00	-22.28	QP
10	9.861	32.60	9.83	0.13	42.56	64.00	-21.44	Average
11	10.019	41.20	9.83	0.13	51.16	74.00	-22.84	QP
12	16.140	40.02	9.81	0.16	49.99	74.00	-24.01	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.*

6.1.3 Harmonic current emissions

Test requirement:	ETSI EN 301 489-1/3/17: EN IEC 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 IEC 61000-3-2. For further details, please refer to Clause 7, Note 1 of EN IEC 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 Voltage fluctuations and flicker

Test requirement:	ETSI EN 301 489-1/17: EN61000-3-3
Test method:	N/A: See Remark Below
Remark:	The appropriate requirements of EN 61000-3-3 [9] for voltage fluctuations and flicker apply for equipment covered bythe scope of the present document with an input current up to and including 16A per phase. For equipment with an inputcurrent of greater than 16A per phase EN 61000-3-11 [12] applies. As the section 6.1 of EN 61000-3-3, "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)

Performance Criteria of ETSI EN 301 489-1/3/17, sub clause 6

Criteria	Performance Criteria of EN 301 489-1 clause 6
CT/CR	During the test, the equipment shall: • continue to operate as intended; • not unintentionally transmit; • not unintentionally change its operating state; • not unintentionally change critical stored data.
TT/TR	For all ports and transient phenomena with the exception described below, the following applies: • The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data. • After application of the transient phenomena, the equipment shall operate as intended. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies: • For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost. • For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Performance Criteria of EN 301 489-3 clause 6

In the table below:
• performance criterion A applies for immunity tests with phenomena of a continuous nature;
• performance criterion B applies for immunity tests with phenomena of a transient nature.
NOTE: Whether a phenomenon is considered transient, continuous or otherwise is indicated in the test proceduresfor the phenomenon in ETSI EN 301 489-1 [1], clause 9.

Table 2: Performance Requirements

Criterion	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

Criteria	Performance Criteria of EN 301 489-17 clause 6
CT	The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
TT	The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 msduration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does notoccur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) ornot-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmissionresulting from the application of the test is correctly interpreted.
CR	The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. Insystems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and stepsshould be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
TR	The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms durationfor which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. Insystems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and stepsshould be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Table 1: Performance criteria

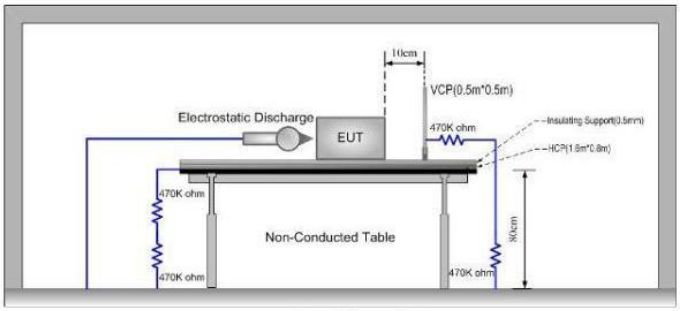
Criteria	During test	After test (i.e. as a result of the application of the test)
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

6.2.2 Minimum performance level

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

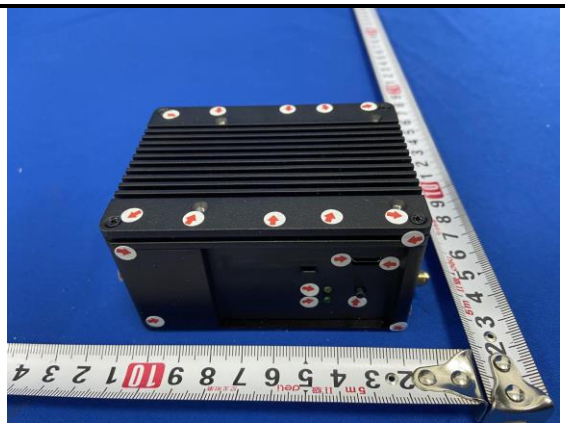
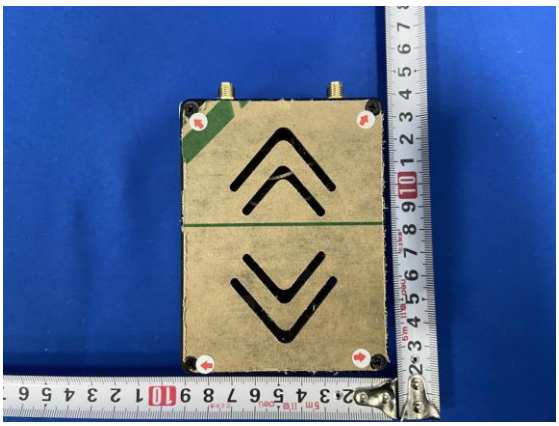
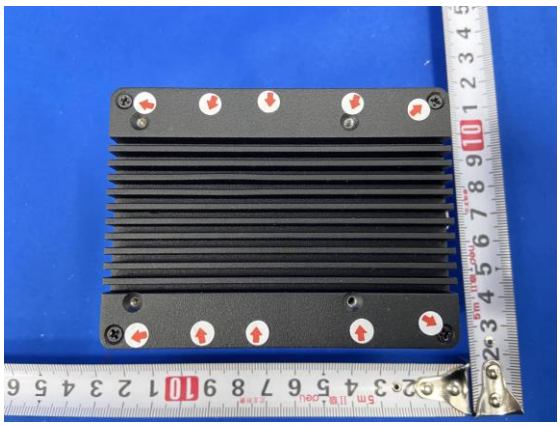
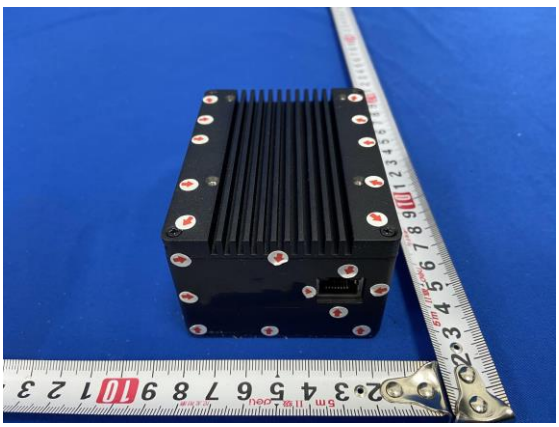
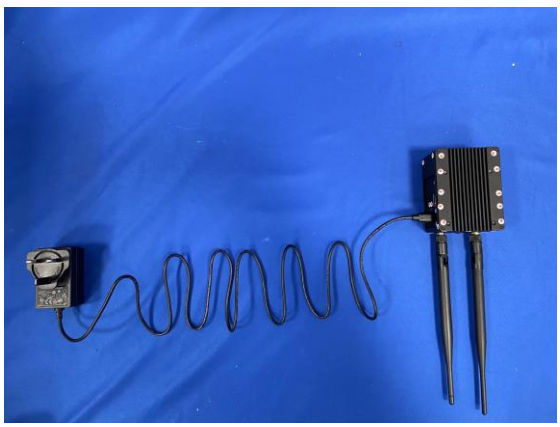
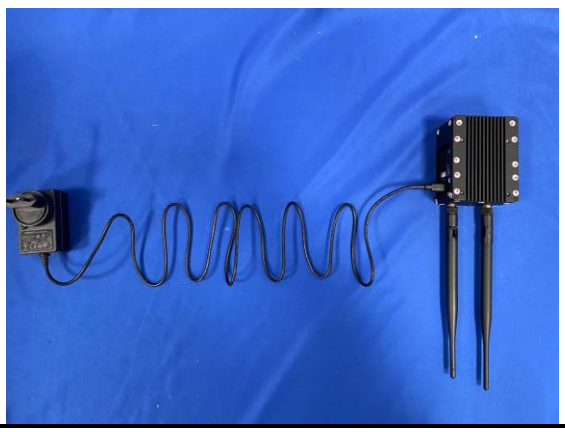
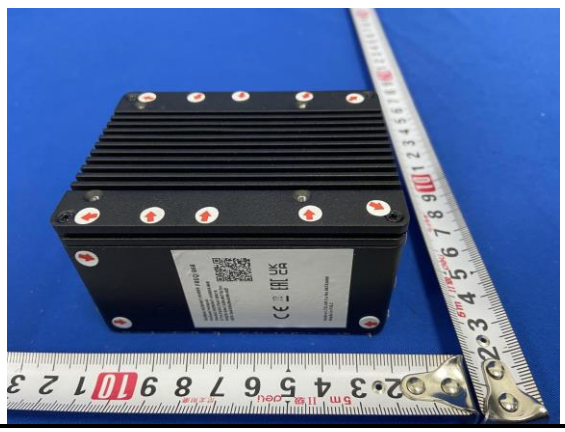
6.2.1 Electrostatic discharge (ESD)

Test requirement:	ETSI EN301489-1
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
Test setup:	
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.
Test instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

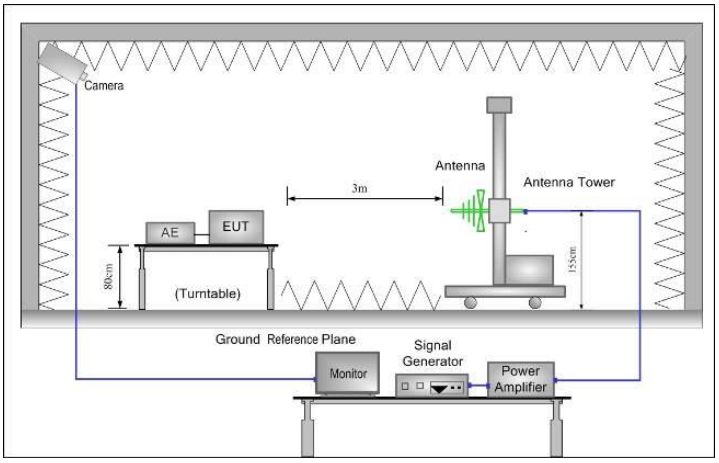
Measurement Record:

Test mode:	TM 1			
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	I	TT/TR	Pass
± 2,± 4,± 8	Air	II	N/A	N/A
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	TT/TR	Pass
± 2,± 4	VCP-Front/Back /Left/Right	Center of the VCP	TT/TR	Pass
Remark: *Red arrow: contact discharge test points.*				

ESD Test points as below:

6.2.2 RF electromagnetic field (80 MHz to 6 000 MHz)

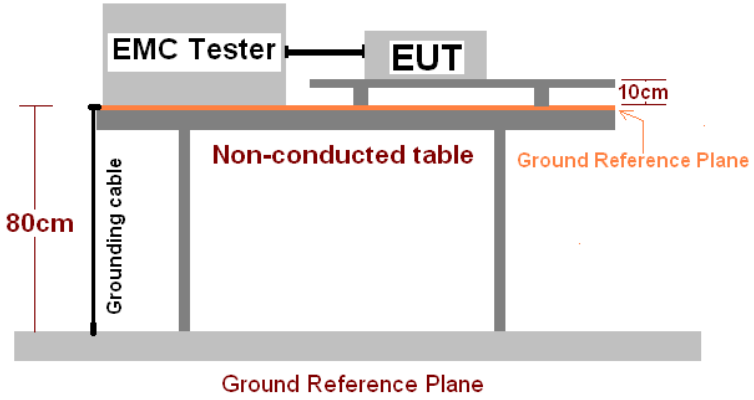
Test requirement:	ETSI EN 301 489-1
Test method:	EN61000-4-3
Frequency range:	80MHz to 6GHz
Test level:	3V/m
Modulation:	80%, 1kHz Amplitude Modulation
Test setup:	
Test procedure:	1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing 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 astable 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 inthe 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 facebeing 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 thepreceding frequency value. 5. The dwell time of the amplitude modulated carrier at each frequency was not be less than thetime necessary for the EUT to be exercised and to respond, and was not less than0,5 s. 6. The test normally was performed with the generating antenna facing each side of theEUT. 7. The polarizationof the field generated by each antenna necessitates testing each selectedside twice, once with the antenna positioned vertically and again with the antenna positionedhorizontally. 8. The EUT was performed in a configuration to actual installation conditions, a video camera and/ora audio monitor were used to monitor the performance of the EUT.
Test instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode: TM 1

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80MHz-6GHz	3V/m	1kHz, 80% Amp. Mod, 1% increment, dwell time=3seconds	V	Front	CT/CR	Pass
			H			
			V	Rear		
			H			
			V	Left		
			H			
			V	Right		
			H			
			V	Top		
			H			
			V	Bottom		
			H			

6.2.3 Fast transients common mode (EFT)

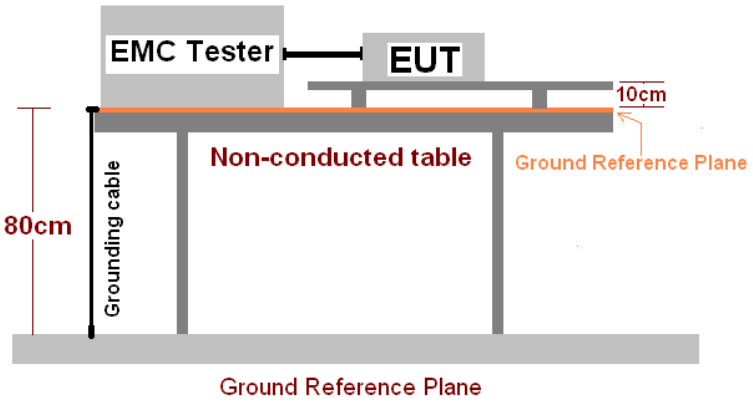
Test requirement:	ETSI EN 301 489-1
Test method:	EN 61000-4-4
Test level:	±1.0kV on AC port ±0.5kV on Lan port
Polarity:	Positive & Negative
Repetition frequency:	5kHz
Burst duration:	15ms
Burst period:	300ms
Test duration:	2 minute per level & polarity
Test setup:	
Test procedure:	The EUT and its simulators were placed on the ground reference plane and wereinsulated from it by a wood support 0.1m + 0.01m thick. The ground reference planewas 1m*1m metallic sheet with 0.65mm minimum thickness. This reference groundplane was project beyond the EUT by at least 0.1m on all sides and the minimumdistance between EUT and all other conductive structure, except the ground plane wasmore than 0.5m. All cables to the EUT was placed on the wood support, cables notsubject to EFT/B was routed as far as possible from the cable under test to minimizethe coupling between the cables. Test on SignalPorts, TelecommunicationPorts and ControlPorts: 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. 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
Test instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode: TM 1

Lead under Test	Level(kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	±1.0	Direct	TT/TR	Pass
N	± 1.0	Direct	TT/TR	Pass
L-N	± 1.0	Direct	TT/TR	Pass
LAN	± 0.5	Clamp	TT/TR	Pass

6.2.4 Surges

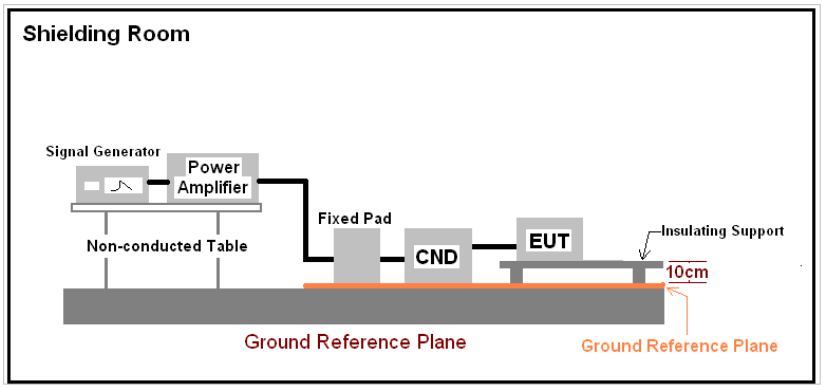
Test requirement:	ETSI EN 301 489-1
Test method:	EN61000-4-5
Test level:	±1kV Live to Neutral: Differential mode ±2kV Live to Earth or Neutral to Earth: Common mode ±0.5kV For Lan Port
Polarity:	Positive & Negative
Test interval:	60s between each surge
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.
Performance criterion:	B
Test setup:	
Test procedure:	1. For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (atopen-circuit condition) and 8/20us current surge to EUT selected points, and foractive 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 EUTimmunity criterion for above each test.
Test instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode: TM 1

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)	Result
L-N	± 1	5	60s	0°	TT/TR	Pass
				90°		
				180°		
				270°		
Lan	± 0.5	5	60s	/	TT/TR	Pass

6.2.5 RF common mode (0.15 MHz to 80 MHz)

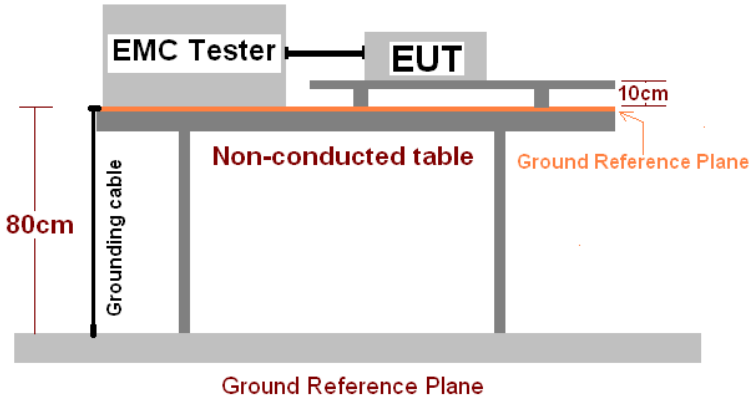
Test requirement:	ETSI EN301489-1
Test method:	EN61000-4-6
Frequency range:	0.15MHz to 80MHz
Test level:	3V rms
Modulation:	80%, 1kHz Amplitude Modulation
Test setup:	
Test procedure:	1. Let the EUT work in test mode and test it. 2. The EUT are placed on an insulating support 0.1m high above a groundreference 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). 3. The disturbance signal described below is injected to EUT through CDN. 4. The EUT operates within its operational mode(s) under intended climaticconditions after power on. 5. The frequency range is swept from 0.150MHz to 80MHz using 3V signal level,and with the disturbance signal 80% amplitude modulated with a 1kHz sinewave. 6. The rate of sweep shall not exceed 1.5*10-3decades/s. Where the frequency isswept incrementally; the step size shall not exceed 1% of the start andthereafter 1% of the preceding frequency value. 7. Recording the EUT operating situation during compliance testing and decidethe EUT immunity criterion.
Test instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Record:

Test mode: TM 1

Frequency	Injected Position	Test Level	Modulation	Step Size	Dwell Time	Observations (Performance Criterion)	Result
150kHz to 80MHz	AC Mains	3Vrms	80%, 1kHz Amp. Mod.	1%	2s	CT/CR	Pass
150kHz to 80MHz	Lan	3Vrms	80%, 1kHz Amp. Mod.	1%	2s	CT/CR	Pass

6.2.6 Voltage dips and interruptions

Test requirement:	ETSI EN301489-1
Test method:	EN61000-4-11
Test level:	0% of VT(Supply Voltage) for 0.5 period 0% of VT(Supply Voltage) for 1.0 period 70% of VT(Supply Voltage) for 25 period 0% of VT(Supply Voltage) for 250 period
No. of Dips / Interruptions:	3 per Level
Test setup:	
Test procedure:	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 instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

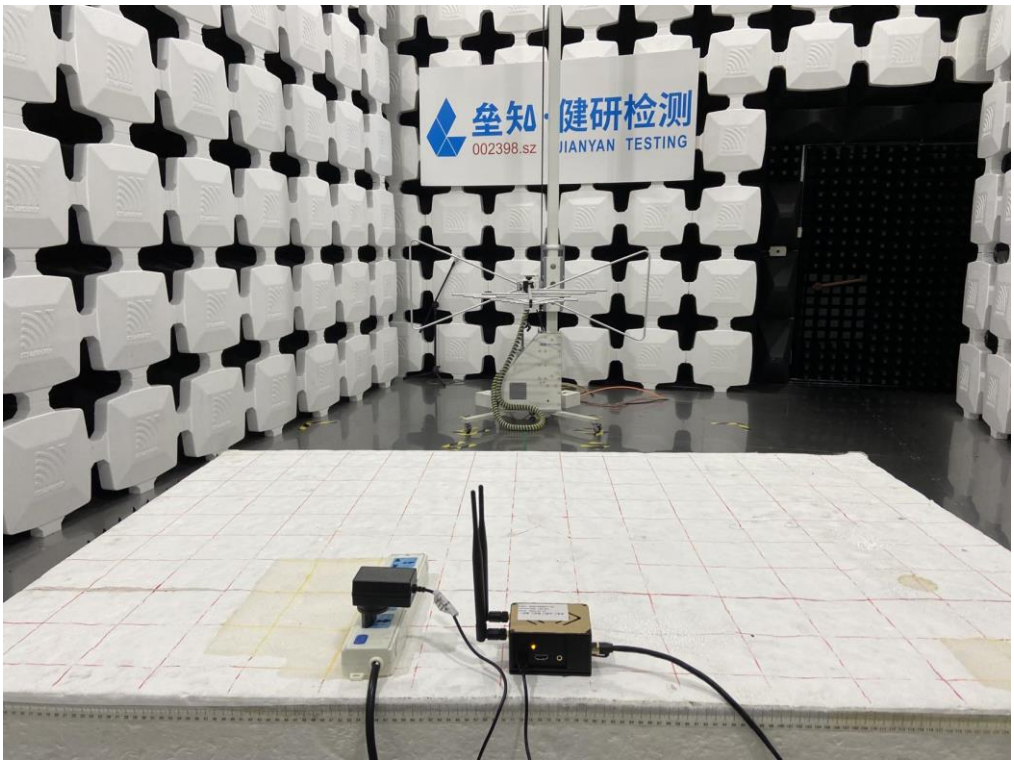
Measurement Record:

Test mode: TM 1

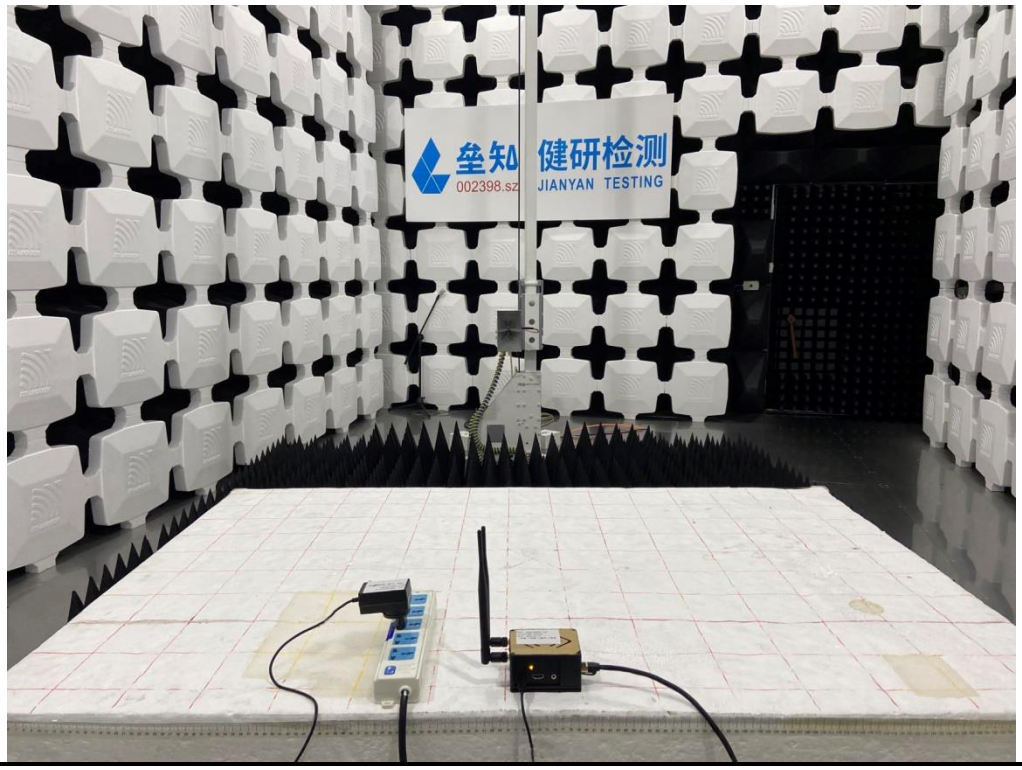
Test Level % U_T	Duration (Periods)	Phase angle	No of dropout	Time between dropout	Observations (Performance Criterion)	Result
0	0.5	0°, 90°, 180°, 270°	3	10s	TT/TR	Pass
0	1	0°, 90°, 180°, 270°	3	10s		
70	25	0°, 90°, 180°, 270°	3	10s		
0	250	0°, 90°, 180°, 270°	3	10s		

7 Test Setup Photo

Radiated Emission Below1GHz

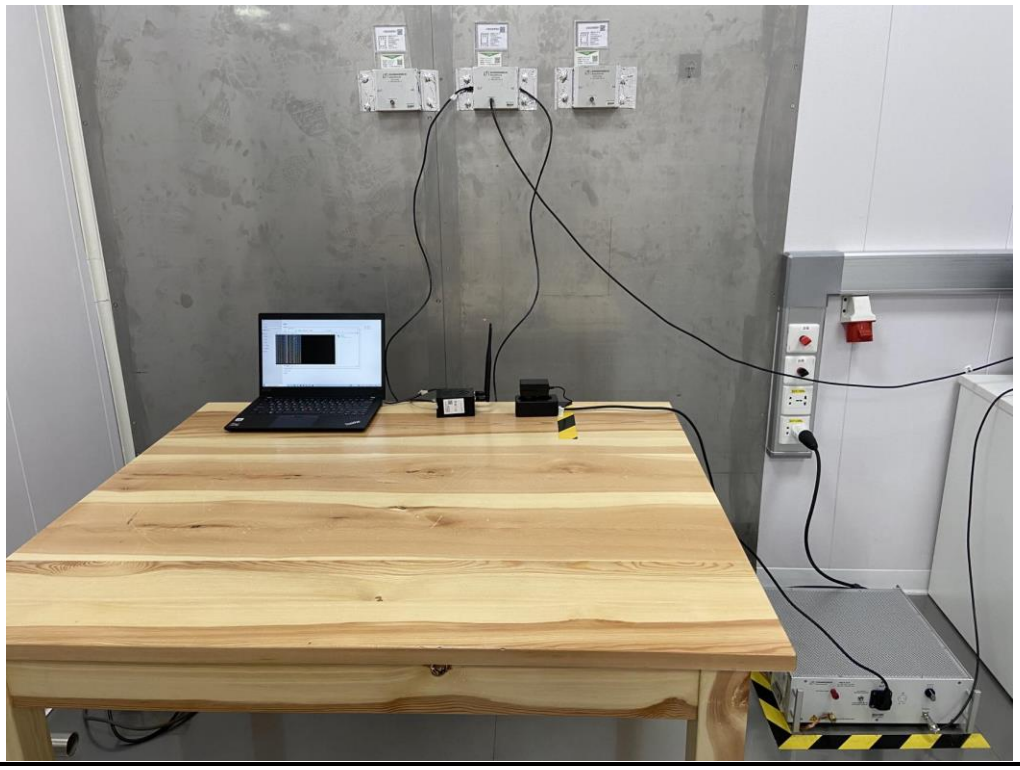


Radiated Emission Above1GHz

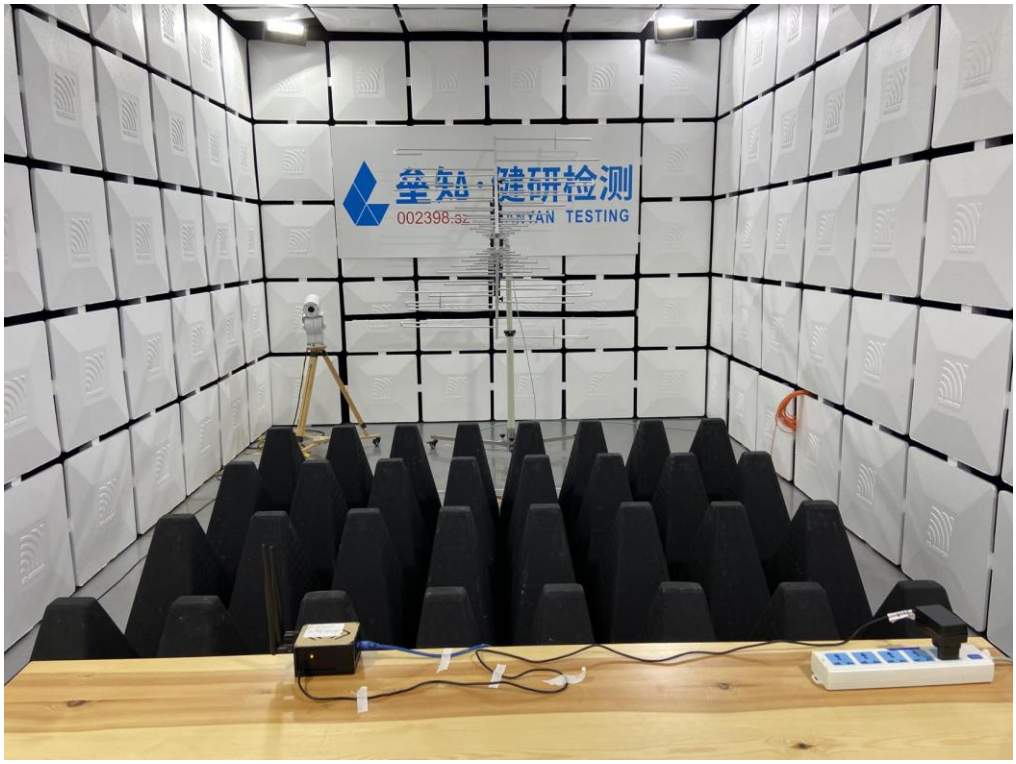


Conducted Emission (AC Main Port)

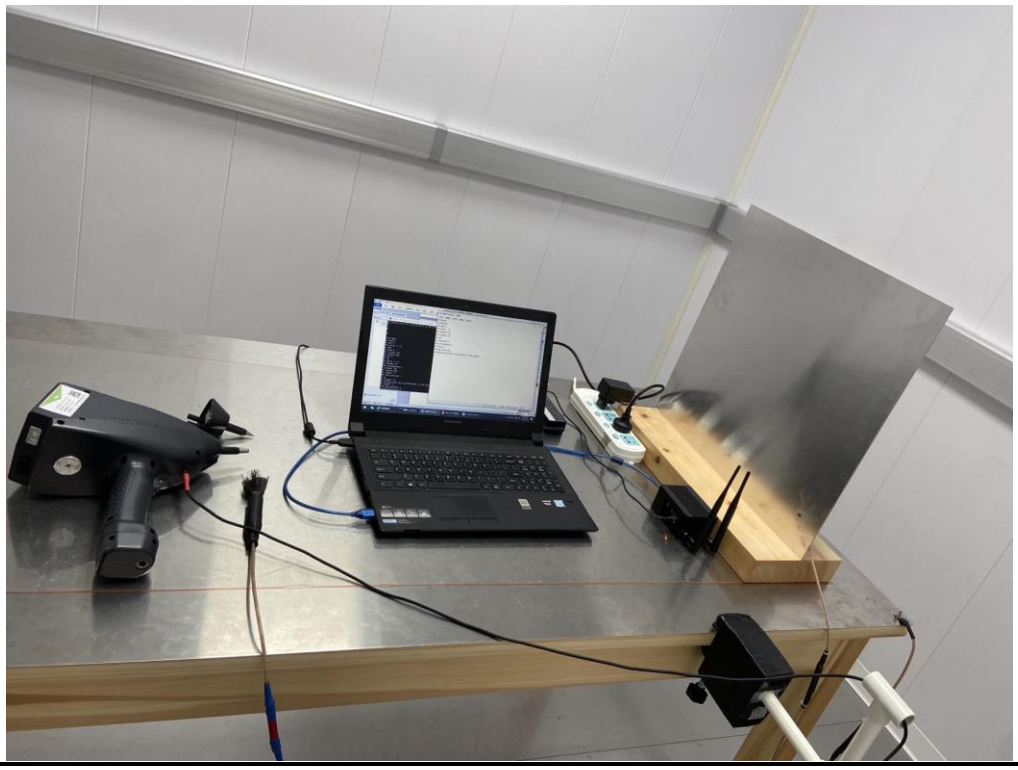
Conducted Emission (LAN Port)



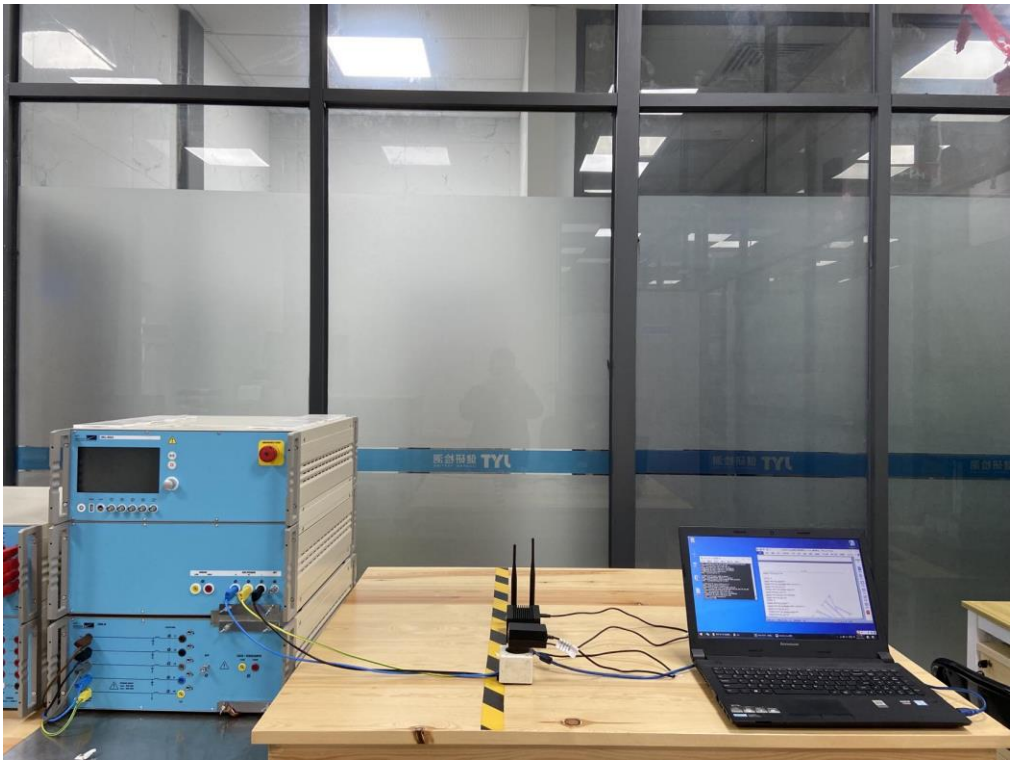
R/S



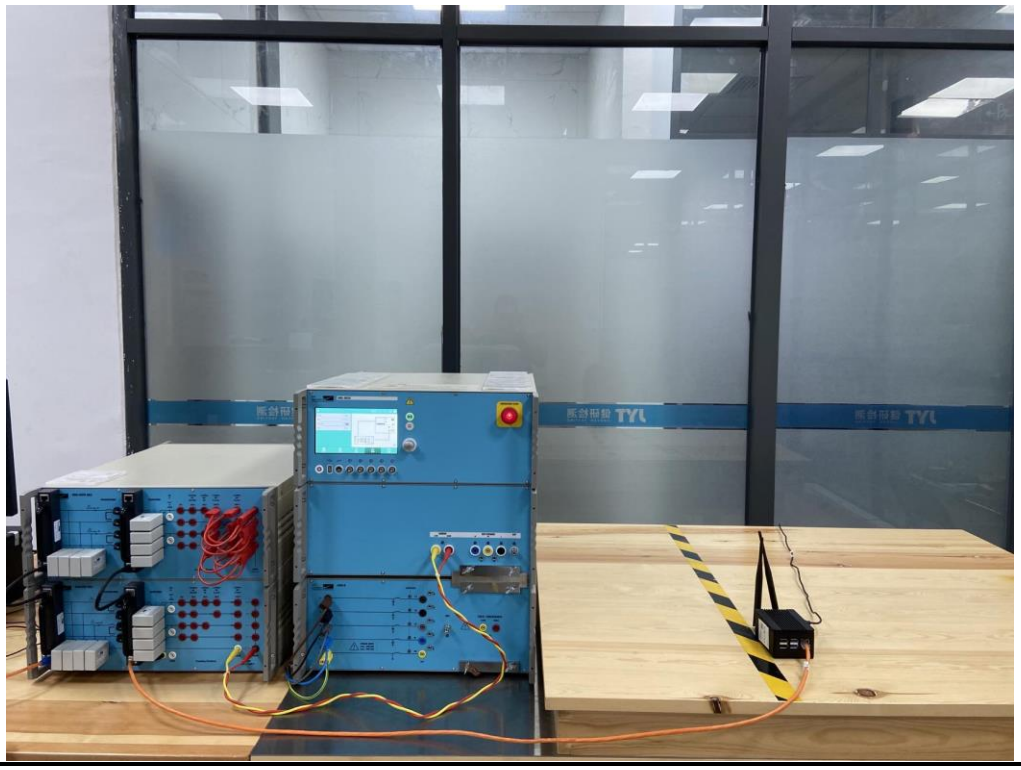
ESD



EFT/B & Surge & V-dips (AC Main Port)

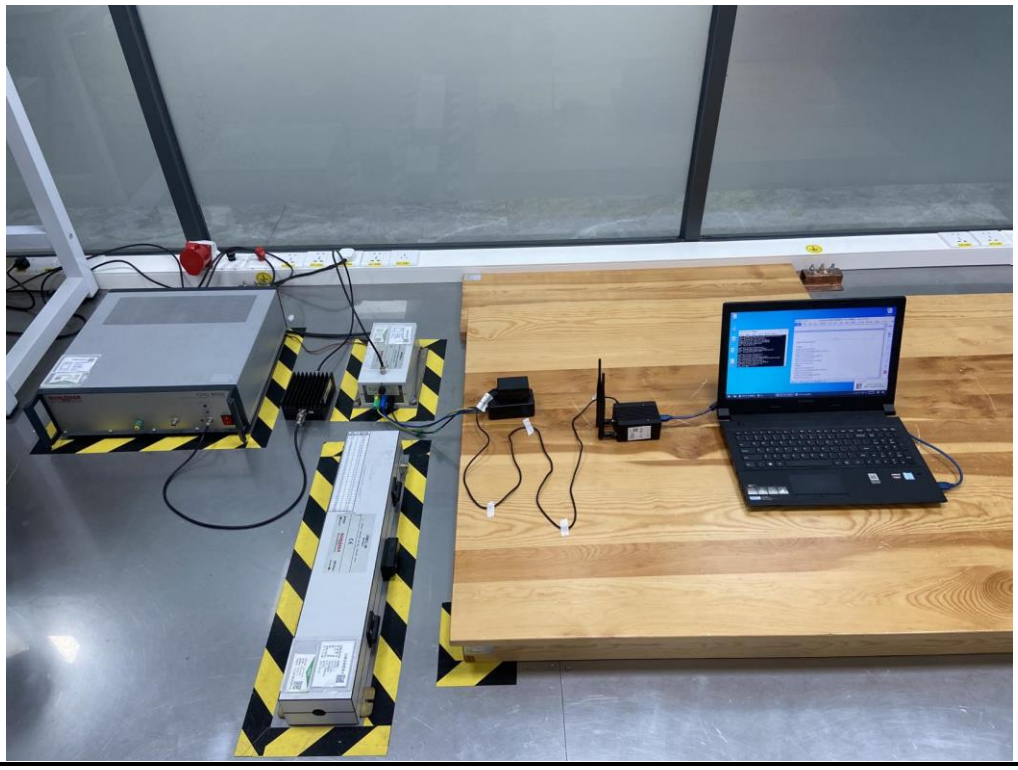


Surge (LAN Port)

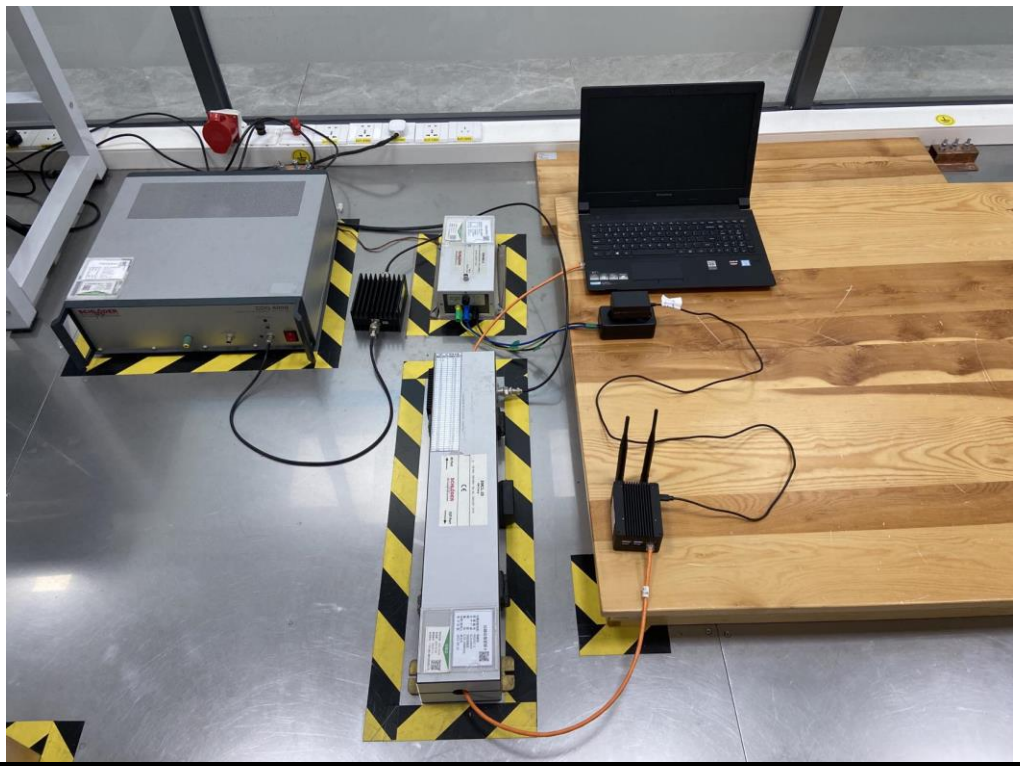


EFT/B (LAN Port)

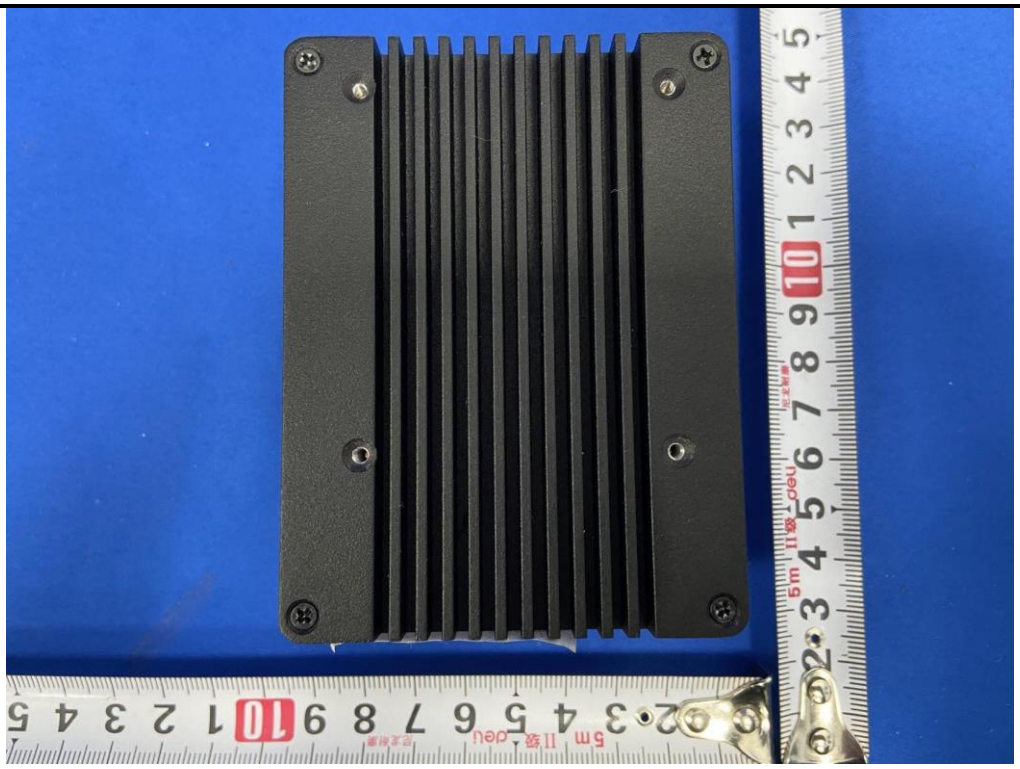
C/S (AC Main Port)

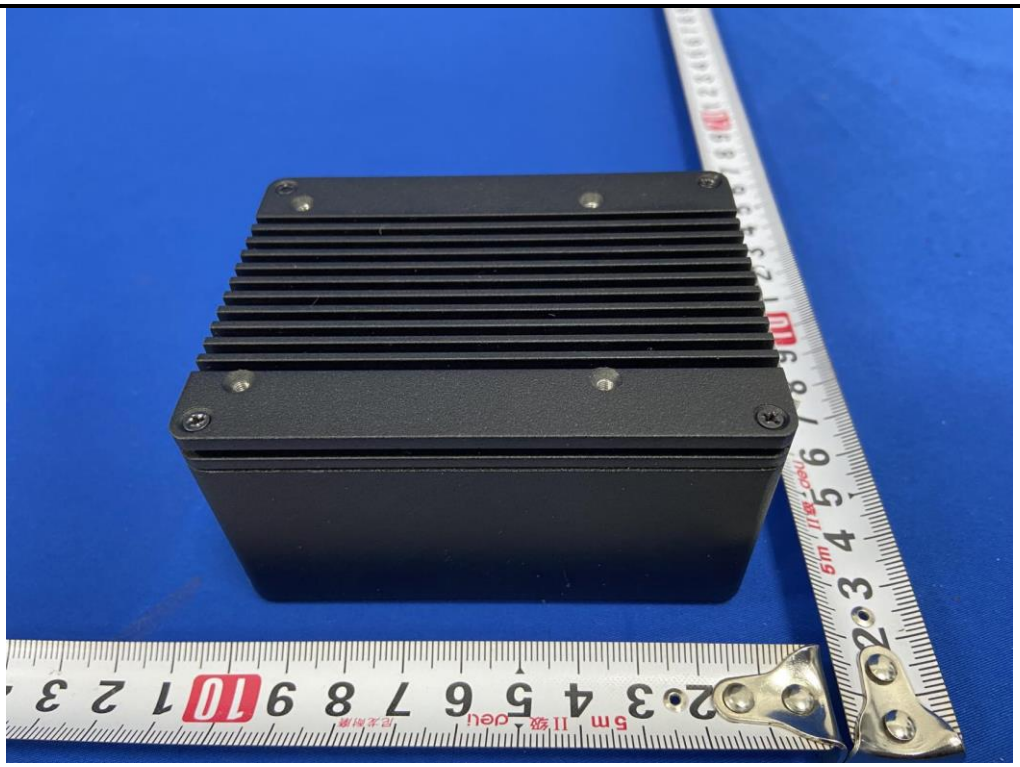


C/S (LAN Port)



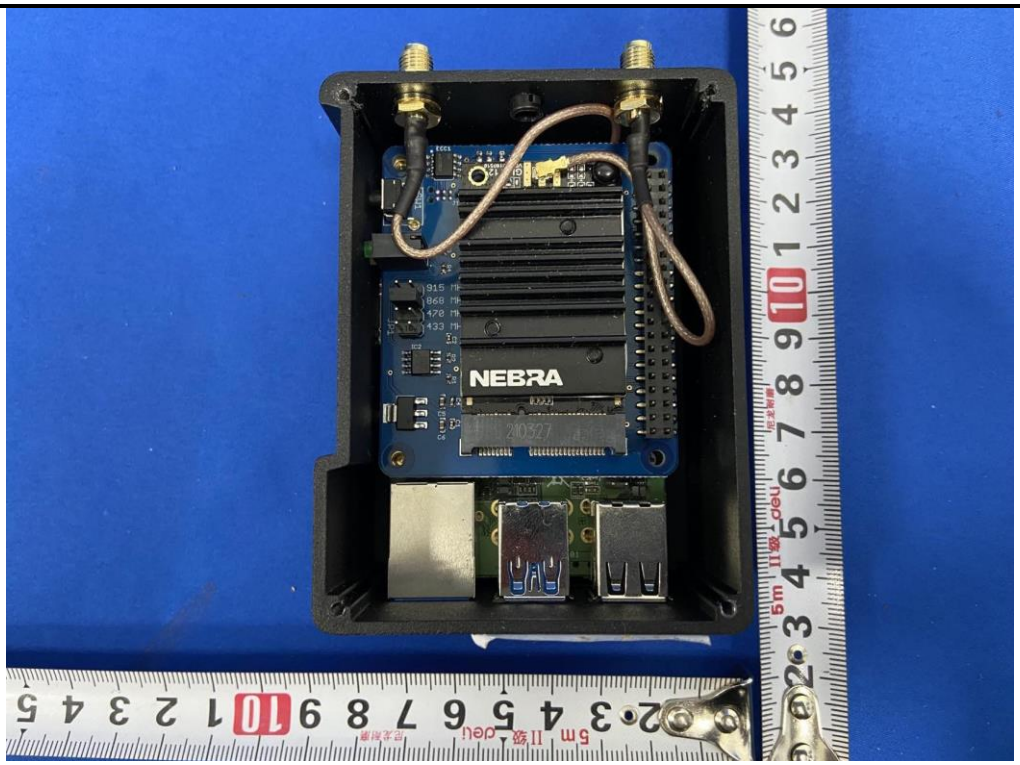
8 EUT Constructional Details

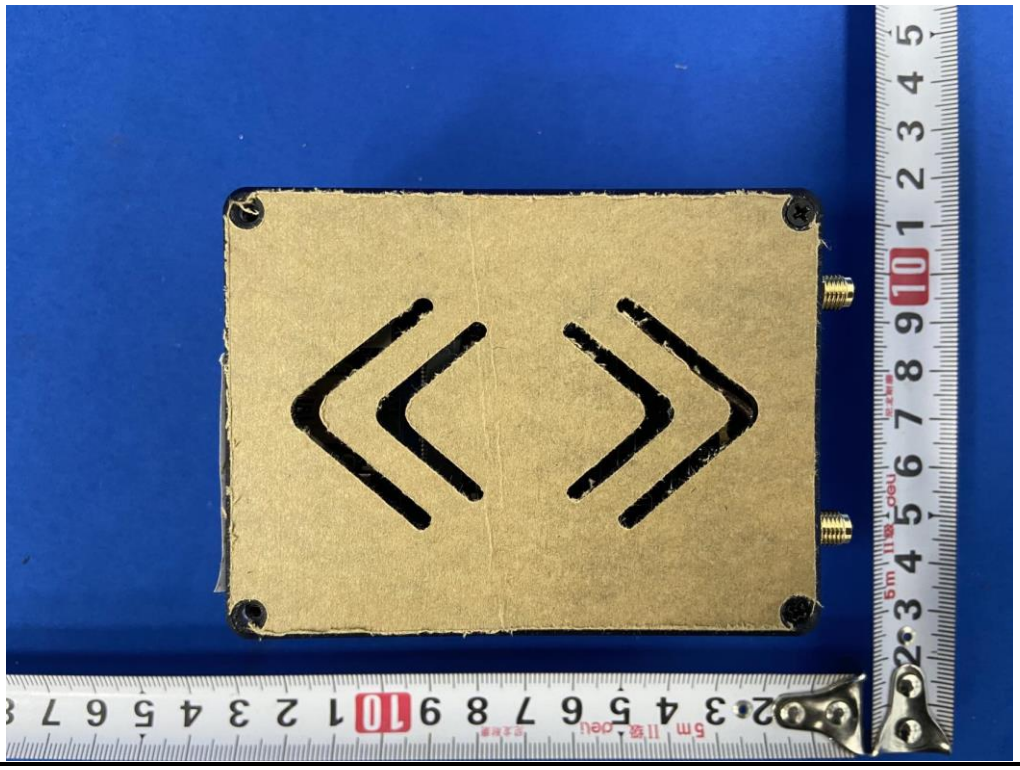


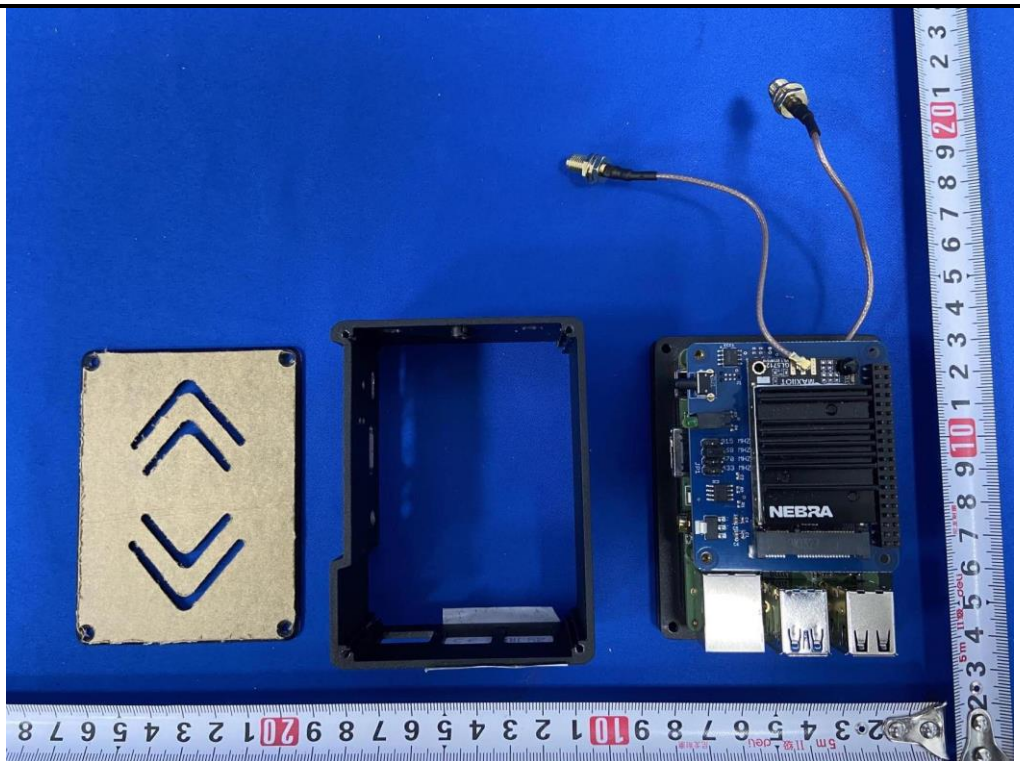



NEBRA Power Supply
P/N.:PB1094
MODEL:R241-12025001
INPUT:100-240V~
50/60Hz 1.0A
OUTPUT:12.0V⎓ 2.5A 30.0W
Made in China


OPEN
LOCK
NEBRA Power Supply
P/N:PS1094
MODEL:R241-1202500I
INPUT:100-240V~
50/60Hz 1.5A
OUTPUT:12.0V⎓ 2.5A 30.0W
Made in China


NEBRA

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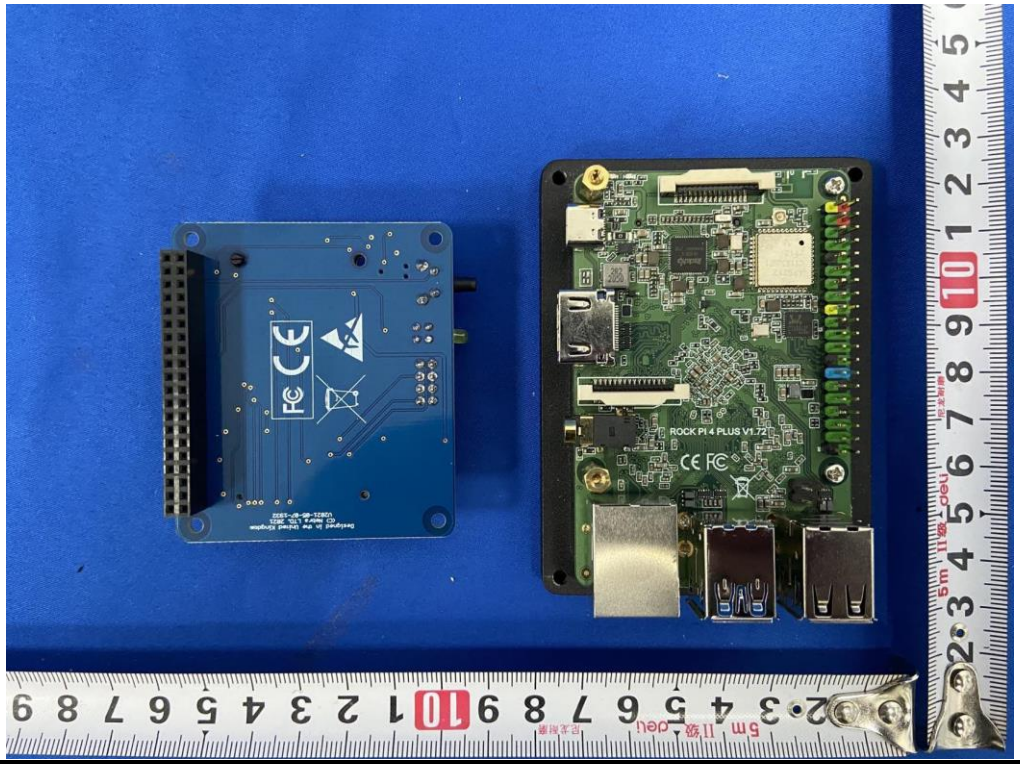
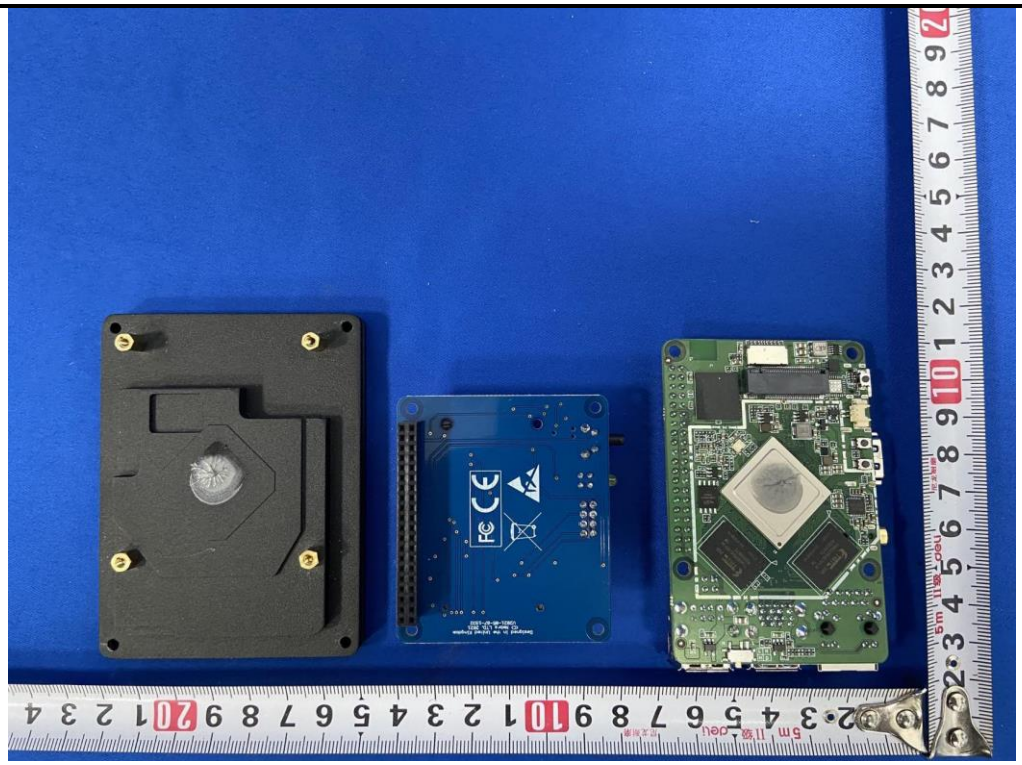
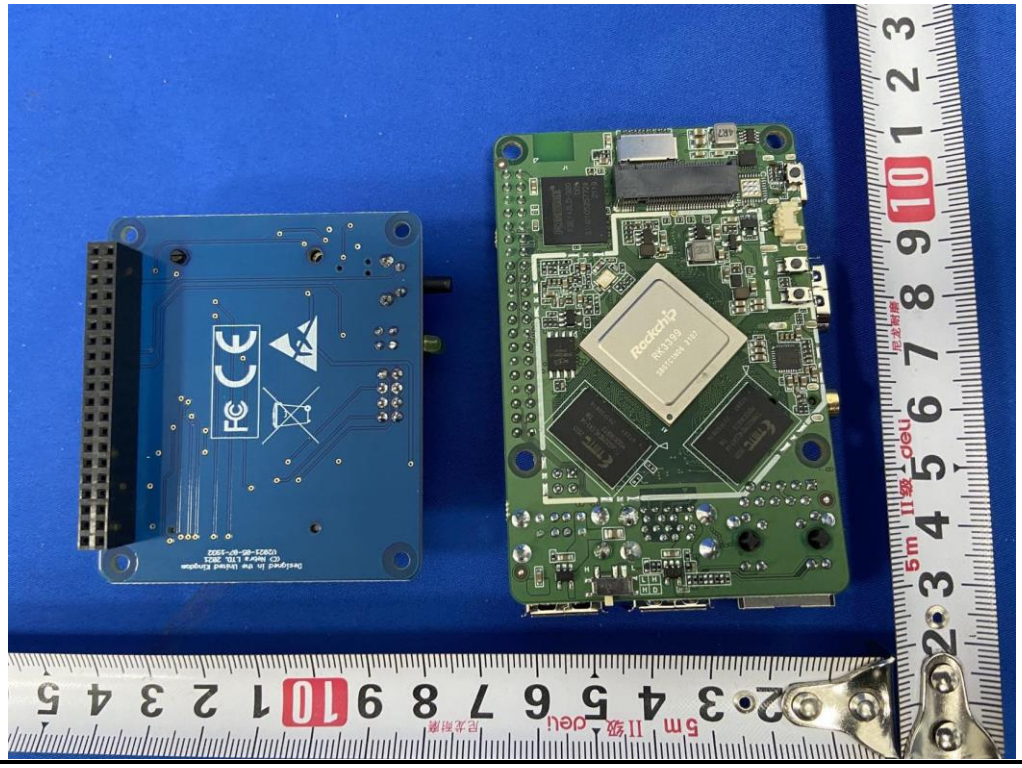
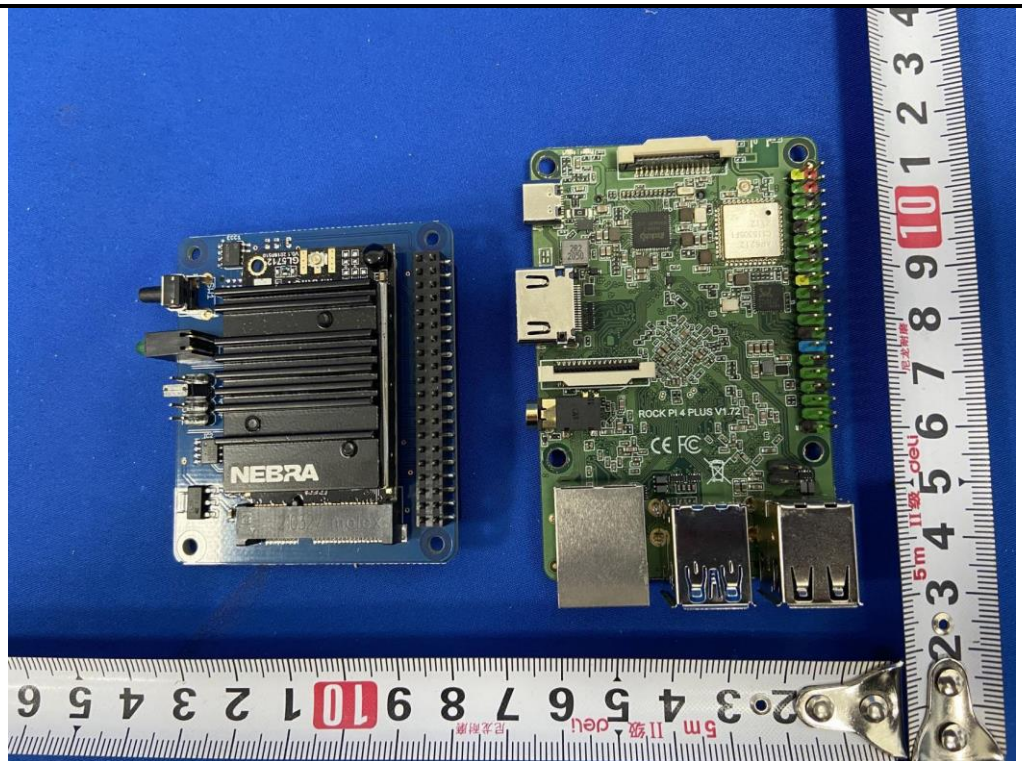
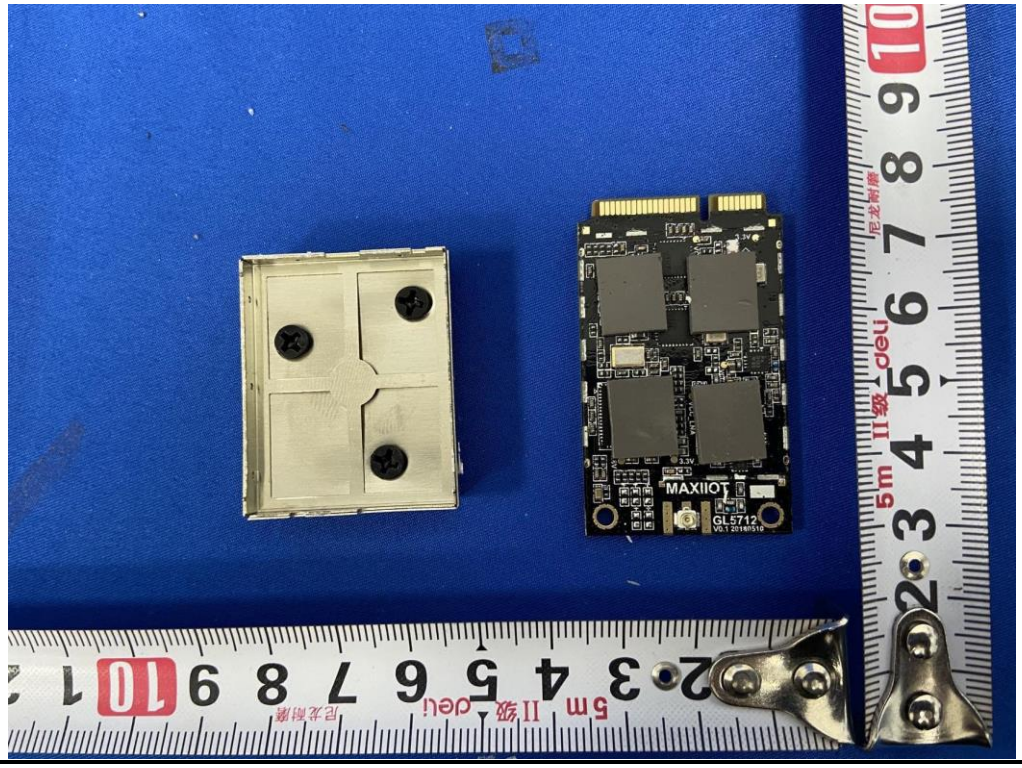
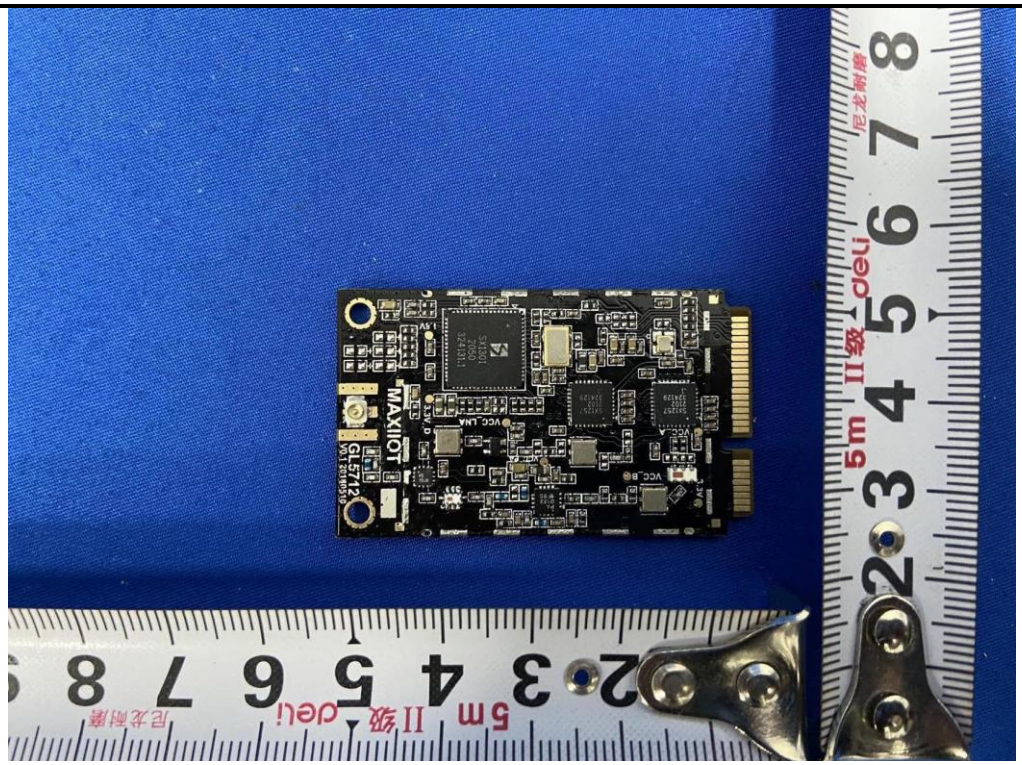

ROCK PI 4 PLUS V1.72






NEBRA
ROCK PI 4 PLUS V1.7Z


MAXIIOT
GL5712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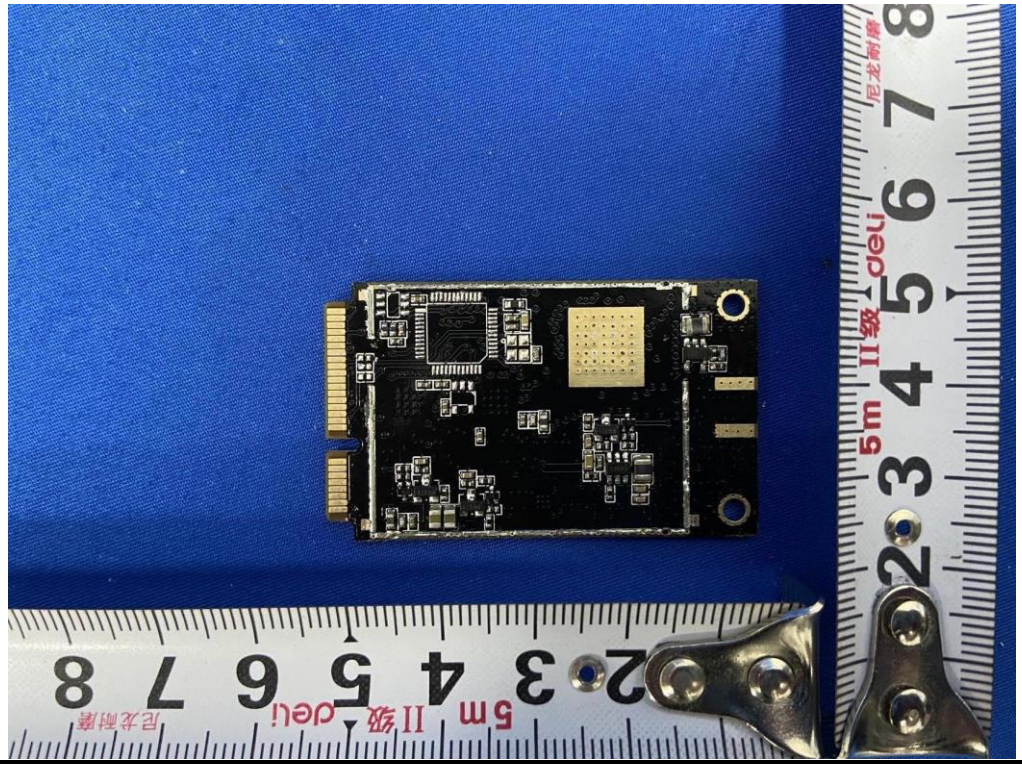

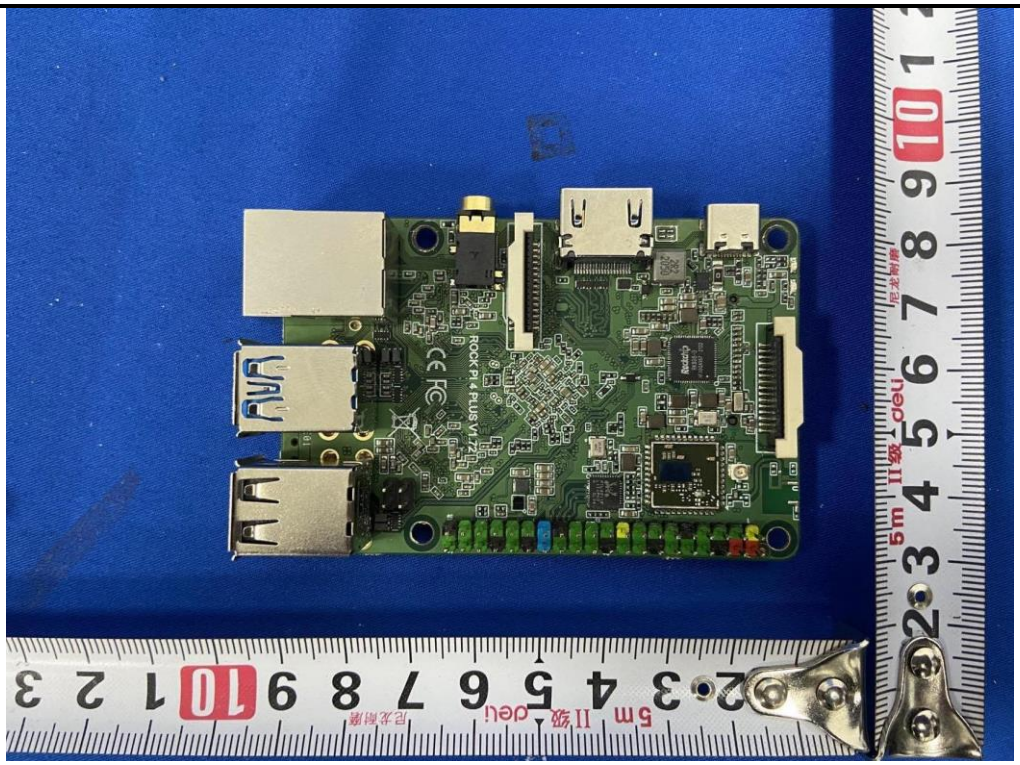

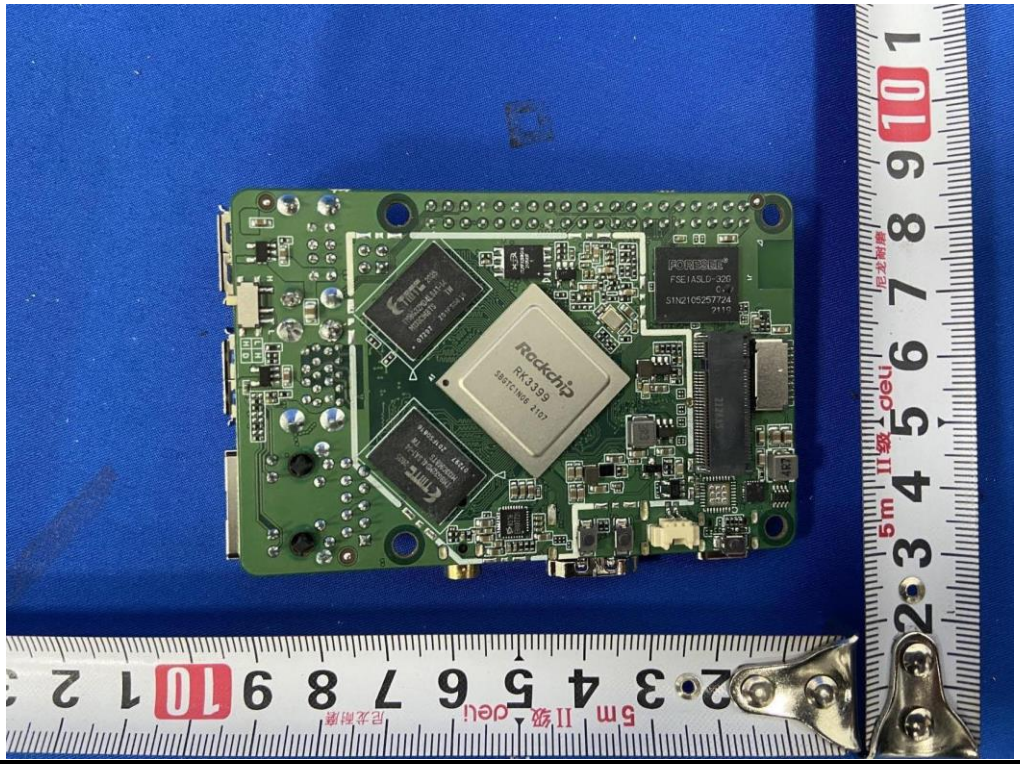

------End of report------