CE RF Test Report

(FHSS)

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-HHRK4-868
Applicable standards:	ETSI EN 300 328 V2.2.2 (2019-07)
Date of sample receipt:	11 May, 2022
Date of Test:	12 May, to 27 May, 2022
Date of report issue:	27 May, 2022
Test Result:	PASS

Tested by:	***Test Engineer***	***Date:***	*27 May, 2022*
Reviewed by:	***Project Engineer***	***Date:***	*27 May, 2022*
Approved by:	***Manager***	***Date:***	*27 May, 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	*27 May, 2022*	*Original*

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4 Test Summary

Test Items	Test Requirement	Test method	Limit/Severity	Result
Radio Spectrum Matter (RSM) Part of Tx				
RF Output Power	Clause 4.3.1.2	Clause 5.4.2.2.1.2	Clause 4.3.1.2.3	PASS
Duty Cycle, Tx-sequence, Tx-gap	Clause 4.3.1.3	Clause 5.4.2.2.1.3	Clause 4.3.1.3.3	N/A
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	Clause 4.3.1.4	Clause 5.4.4.2	Clause 4.3.1.4.3	PASS
Hopping Frequency Separation	Clause 4.3.1.5	Clause 5.4.5.2	Clause 4.3.1.5.3	PASS
Medium Utilisation (MU) factor	Clause 4.3.1.6	Clause 5.4.2.2.1.4	Clause 4.3.1.6.3	N/A
Adaptivity (Adaptive Frequency Hopping)	Clause 4.3.1.7	Clause 5.4.6.2	Clause 4.3.1.7	N/A
Occupied Channel Bandwidth	Clause 4.3.1.8	Clause 5.4.7.2	Clause 4.3.1.8.3	PASS
Transmitter unwanted emissions in the out-of-band domain	Clause 4.3.1.9	Clause 5.4.8.2	Clause 4.3.1.9.3	PASS
Transmitter unwanted emissions in the spurious domain	Clause 4.3.1.10	Clause 5.4.9.2	Clause 4.3.1.10.3	PASS
Radio Spectrum Matter (RSM) Part of Rx				
Receiver spurious emissions	Clause 4.3.1.11	Clause 5.4.10.2	Clause 4.3.1.11.3	PASS
Receiver Blocking	Clause 4.3.1.12	Clause 5.4.11.2	Clause 4.3.1.12.4	PASS
Geo-location capability	Clause 4.3.1.13	Clause 4.3.1.13.2	Clause 4.3.1.13.3	PASS

Remark:

1. *Tx: In this whole report Tx (or tx) means Transmitter.*
2. *Rx: In this whole report Rx (or rx) means Receiver.*
3. *Pass: Meet the requirement.*
4. *N/A: Not Applicable.*
5. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).*

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-HHRK4-868
Hardware version:	v1
Software version:	781099d
Operation Frequency:	2402MHz ~ 2480MHz
Channel number:	79
Channel separation:	1MHz
Modulation type:	Frequency Hopping Spread Spectrum (FHSS)
Equipment Type:	Adaptive equipment
Modulation Technology:	GFSK, π/4 DQPSK, 8DPSK
Max. E.I.R.P Power:	6.56 dBm (GFSK)
Antenna Type:	External antenna
Antenna gain:	1.0 dBi (declare by Applicant)
Antenna transmit mode:	SISO (1TX, 1RX)
AC adapter:	Model No.: R241-1202500I Input: AC100-240V, 50/60Hz 1.5 A Output: DC 12.0V, 2.5A

5.3 Test environment and test mode

Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: -20℃ ~ +55℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: 12.0Vdc, Extreme: Low 10.2Vdc, High 13.8Vdc
Test mode:	
Transmitting mode:	Keep the EUT in continuously transmitting mode with modulation.
Hopping mode:	Keep the EUT in normal hopping mode.
Receiving mode:	Keep the EUT in receiving mode.
We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation.	

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %
Radiated Emission (30MHz ~ 1000MHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 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.*

5.6 Additions to, deviations, or exclusions from the method

No

5.7 Laboratory Facility

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

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

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

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber 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

5.8 Laboratory Location

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

5.9 Test Instruments list

Radiated Emission:

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
				02-17-2022	02-16-2023
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	06-20-2021	06-19-2022
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-03-2021	03-02-2022
				02-17-2022	02-16-2023
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
				02-17-2022	02-16-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXG001-7	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXG001-3	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXG001-9	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-03-2021	03-02-2022
				02-17-2022	02-16-2023
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	11-27-2021	11-26-2022
Signal Generator	Agilent	N5173B	WXJ006-7	03-25-2021	03-24-2022
				03-30-2022	03-29-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Coaxial Cable (30MHz ~ 1GHz)	JYT	JYT3M-1G-NN-8M	WXG001-4	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
Coaxial Cable (1GHz ~ 18GHz)	JYT	JYT3M-18G-NN-8M	WXG001-5	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
Coaxial Cable (9kHz ~ 30MHz)	JYT	JYT3M-1G-BB-5M	WXG001-6	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
Coaxial Cable (18GHz ~ 40GHz)	JYT	JYT3M-40G-SS-8M	WXG001-7	03-07-2021	03-06-2022
				02-17-2022	02-16-2023
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Conducted Method:

Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-27-2021	10-26-2022
Vector Signal Generator	Keysight	N5182B	WXJ006-6	10-27-2021	10-26-2022
Signal Generator	Keysight	N5173B	WXJ006-4	10-27-2021	10-26-2022
Wireless Connectivity Tester	Rohde & Schwarz	CMW270	WXJ008-7	10-27-2021	10-26-2022
DC Power Supply	Keysight	E3642A	WXJ025-2	11-27-2020	11-26-2023
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	03-19-2021	03-18-2023
Power Detector Box	MWRFTEST	MW100-PSB	WXJ007-4	11-19-2021	11-18-2022
RF Control Unit	MWRFTEST	MW100-RFCB	WXG006	N/A	

Test Software	MWRFTEST	MTS 8310	Version: 2.0.0.0

6 Technical requirements specification

6.1 Justification

The EUT and test equipment were configured for testing according to ETSI EN 300 328 V2.2.2 (2019-07).

The EUT was tested in the normal operating mode to represent worst-case results during the final qualification test.

6.2 Test Configuration of EUT

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
…	…	…	…	…	…	…	…
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		

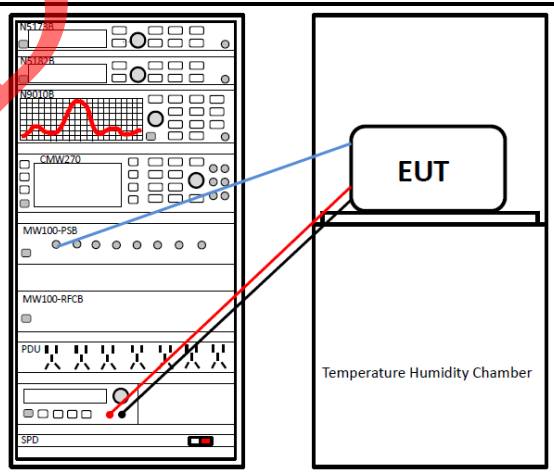
Remark: The EUT operation in above frequency list, and used test software to control the EUT for staying in continuous transmitting and receiving mode. Channel 0, 39 and 78 of Bluetooth were chosen for testing.

Clause No.	Test Conditions			Test Channel			Modulation			Test mode		
	NVNT	NVLT	NVHT	Low	Middle	High	GFSK	π/4 DQPSK	8DPSK	Tx	Hopping	Rx
4.3.1.2	√	√	√				√	√	√		√	
4.3.1.3												
4.3.1.4	√						√	√	√		√	
4.3.1.5	√						√	√	√		√	
4.3.1.6												
4.3.1.7												
4.3.1.8	√			√		√	√	√	√	√		
4.3.1.9	√						√	√	√		√	
4.3.1.10	√			√		√	√	√	√	√		
4.3.1.11	√			√		√	√	√	√			√
4.3.1.12	√										√	

Note:

1. *"√" means that this configuration is chosen for test.*
2. *"NVNT" means Normal Voltage Normal Temperature, "NVLT" means Normal Voltage Low Temperature, "NVHT" means Normal Voltage High Temperature.*

6.3 Test Setup Block



6.4 Test Results

6.4.1 Test Result Summary

Clause No.	Modulation	Test Condition	Test Data	Verdict
4.3.1.2	GFSK & π/4 DQPSK & 8DPSK	NVNT	Appendix A - BT	Pass
		NVLT		
		NVHT		
4.3.1.3	N/A	N/A	N/A	N/A
4.3.1.4	GFSK & π/4 DQPSK & 8DPSK	NVNT	Appendix A - BT	Pass
4.3.1.5	GFSK & π/4 DQPSK & 8DPSK	NVNT	Appendix A - BT	Pass
4.3.1.6	N/A	N/A	N/A	N/A
4.3.1.7	N/A	N/A	N/A	N/A
4.3.1.8	GFSK & π/4 DQPSK & 8DPSK	NVNT	Appendix A - BT	Pass
4.3.1.9	GFSK & π/4 DQPSK & 8DPSK	NVNT	Appendix A - BT	Pass
4.3.1.10	GFSK & π/4 DQPSK & 8DPSK	NVNT	See Section 6.4.2	Pass
4.3.1.11	GFSK & π/4 DQPSK & 8DPSK	NVNT	See Section 6.4.3	Pass
4.3.1.12	Normal hopping mode	NVNT	Appendix A - BT	Pass
4.3.1.13	/	/	See Section 6.4.4	Pass

Note:

1. *During the test, pre-scan all modulation mode, found DH5, 2-DH5 and 3-DH5 modulation mode were worse case mode. so only reflects test data of worst modulation mode.*
2. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).*

6.4.2 Transmitter unwanted emissions in the spurious domain

GFSK: The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
105.42	Vertical	-85.45	-54.00	Pass
201.81	V	-81.47		
381.38	V	-80.93	-36.00	
944.71	V	-72.62		
4804.00	V	-49.23	-30.00	
50.13	Horizontal	-81.48	-54.00	
221.21	H	-82.85		
345.74	H	-82.66	-36.00	
807.46	H	-72.47		
4804.00	H	-53.65	-30.00	
GFSK: The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
105.42	Vertical	-85.07	-54.00	Pass
201.81	V	-81.73		
381.38	V	-80.50	-36.00	
944.71	V	-72.85		
4960.00	V	-49.53	-30.00	
50.13	Horizontal	-81.03	-54.00	
221.21	H	-83.19		
345.74	H	-82.83	-36.00	
807.46	H	-72.53		
4960.00	H	-53.78	-30.00	

π/4 DQPSK: The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
105.42	Vertical	-84.69	-54.00	Pass
201.81	V	-81.60		
381.38	V	-80.17	-36.00	
944.71	V	-72.99		
4804.00	V	-49.24	-30.00	
50.13	Horizontal	-80.79	-54.00	
221.21	H	-83.31		
345.74	H	-82.44	-36.00	
807.46	H	-72.81		
4804.00	H	-53.79	-30.00	
π/4 DQPSK: The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
105.42	Vertical	-85.08	-54.00	Pass
201.81	V	-82.03		
381.38	V	-80.54	-36.00	
944.71	V	-72.52		
4960.00	V	-49.50	-30.00	
50.13	Horizontal	-80.88	-54.00	
221.21	H	-83.04		
345.74	H	-82.79	-36.00	
807.46	H	-72.58		
4960.00	H	-54.26	-30.00	

8DPSK: The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
105.42	Vertical	-85.24	-54.00	Pass
201.81	V	-81.60		
381.38	V	-80.21	-36.00	
944.71	V	-72.87		
4804.00	V	-49.10	-30.00	
50.13	Horizontal	-80.67	-54.00	
221.21	H	-83.39		
345.74	H	-82.74	-36.00	
807.46	H	-72.25		
4804.00	H	-54.51	-30.00	
8DPSK: The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
105.42	Vertical	-85.33	-54.00	Pass
201.81	V	-81.11		
381.38	V	-79.75	-36.00	
944.71	V	-72.90		
4960.00	V	-48.63	-30.00	
50.13	Horizontal	-80.19	-54.00	
221.21	H	-83.42		
345.74	H	-82.65	-36.00	
807.46	H	-72.53		
4960.00	H	-54.69	-30.00	

6.4.3 Receiver spurious emissions

GFSK: The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
344.64	Vertical	-80.77	-57.00	Pass
675.29	V	-75.66		
4804.00	V	-82.04	-47.00	
310.57	Horizontal	-84.04	-57.00	
656.14	H	-77.01		
4804.00	H	-83.56	-47.00	
GFSK: The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
344.64	Vertical	-80.89	-57.00	Pass
675.29	V	-75.69		
4960.00	V	-82.14	-47.00	
310.57	Horizontal	-84.28	-57.00	
656.14	H	-77.00		
4960.00	H	-83.59	-47.00	

π/4 DQPSK: The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
344.64	Vertical	-80.89	-57.00	Pass
675.29	V	-76.03		
4804.00	V	-82.17	-47.00	
310.57	Horizontal	-84.39	-57.00	
656.14	H	-76.90		
4804.00	H	-83.31	-47.00	
π/4 DQPSK: The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
344.64	Vertical	-80.67	-57.00	Pass
675.29	V	-76.44		
4960.00	V	-82.66	-47.00	
310.57	Horizontal	-84.31	-57.00	
656.14	H	-77.30		
4960.00	H	-83.70	-47.00	

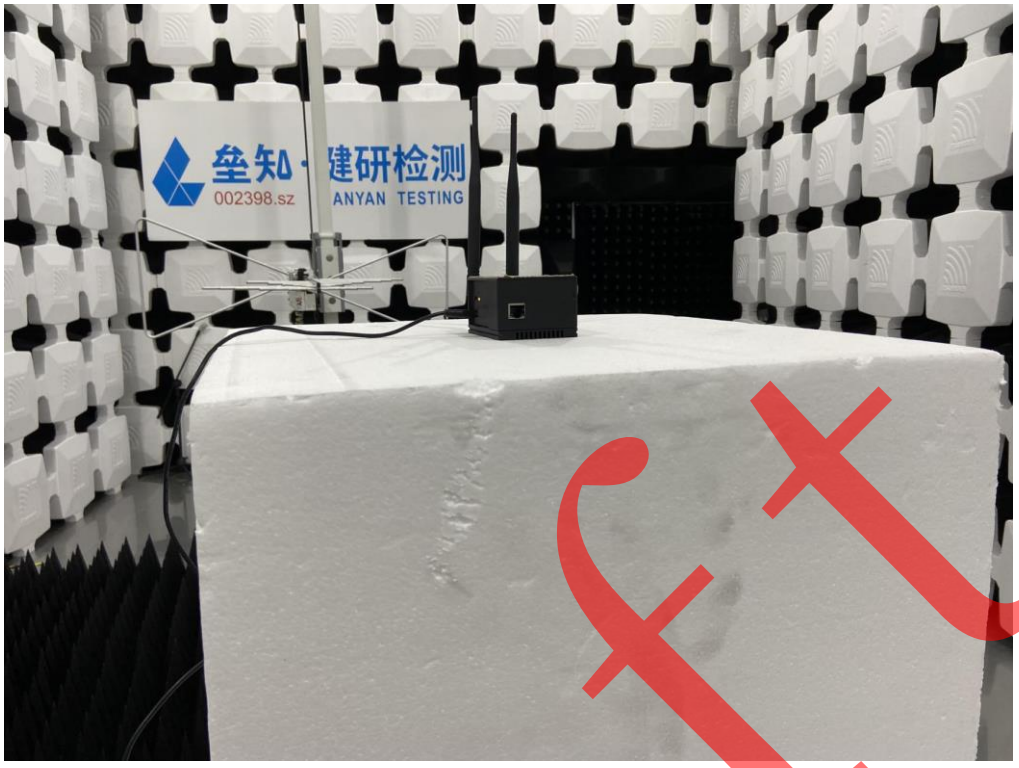
8DPSK: The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
344.64	Vertical	-80.18	-57.00	Pass
675.29	V	-76.05		
4804.00	V	-82.41	-47.00	
310.57	Horizontal	-83.91	-57.00	
656.14	H	-77.70		
4804.00	H	-83.92	-47.00	
8DPSK: The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	Polarization	Level(dBm)		
344.64	Vertical	-79.96	-57.00	Pass
675.29	V	-76.27		
4960.00	V	-82.65	-47.00	
310.57	Horizontal	-83.82	-57.00	
656.14	H	-77.60		
4960.00	H	-84.31	-47.00	

6.4.4 Geo-location capability

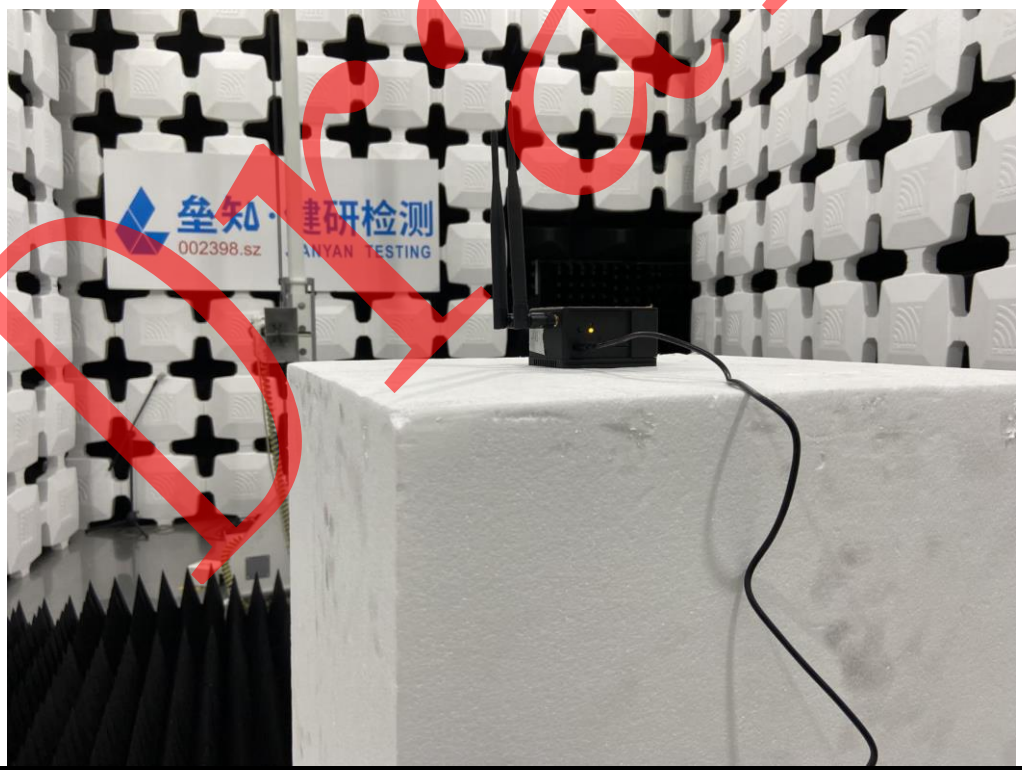
The equipment configure of according to the regulatory requirements applicable at the geographical location where operates, and shall not be accessible to the user in a way that would allow the user to alter it.

7 Test setup photo

Radiated Emission Below 1GHz

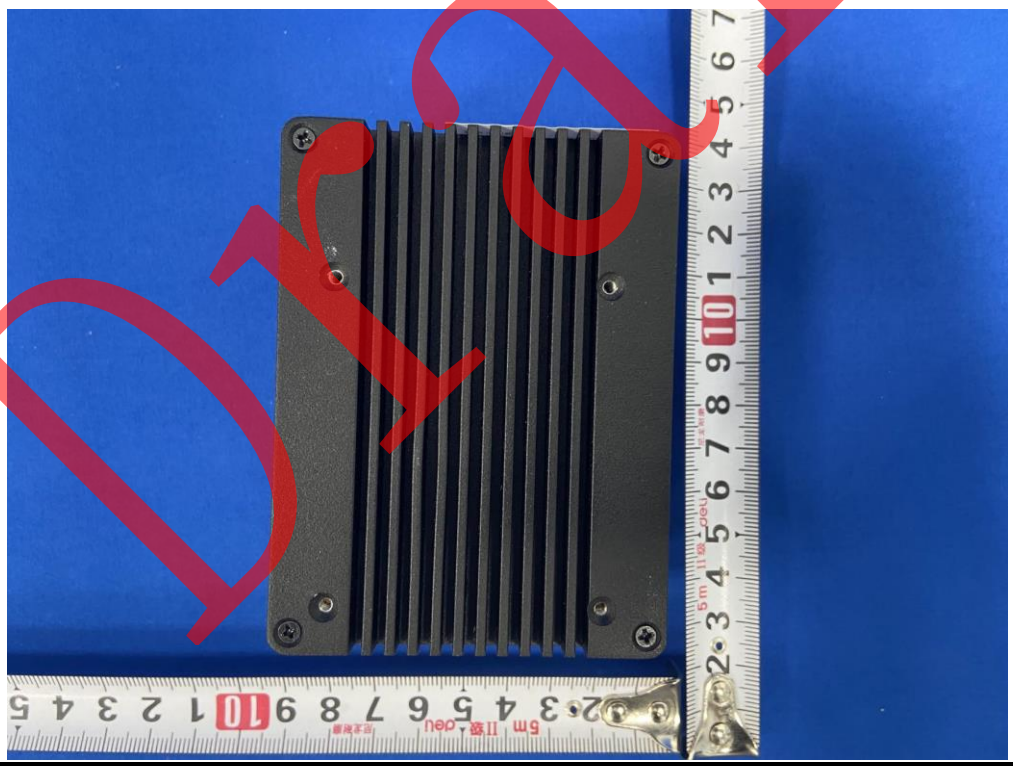


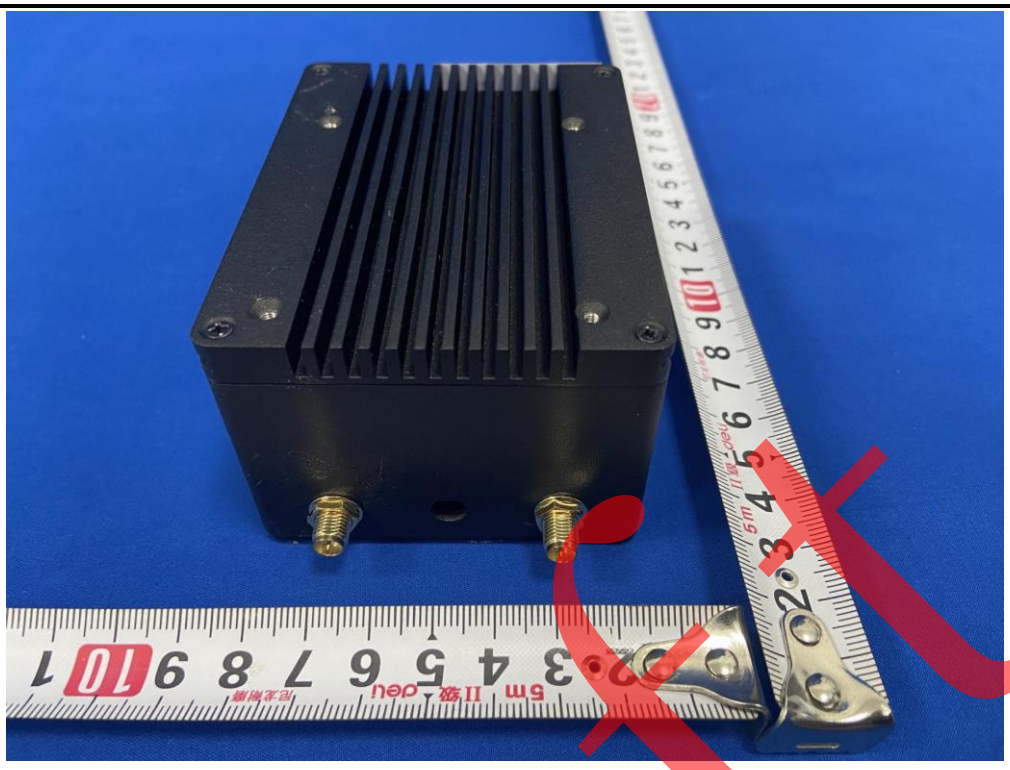
Radiated Emission Above 1GHz

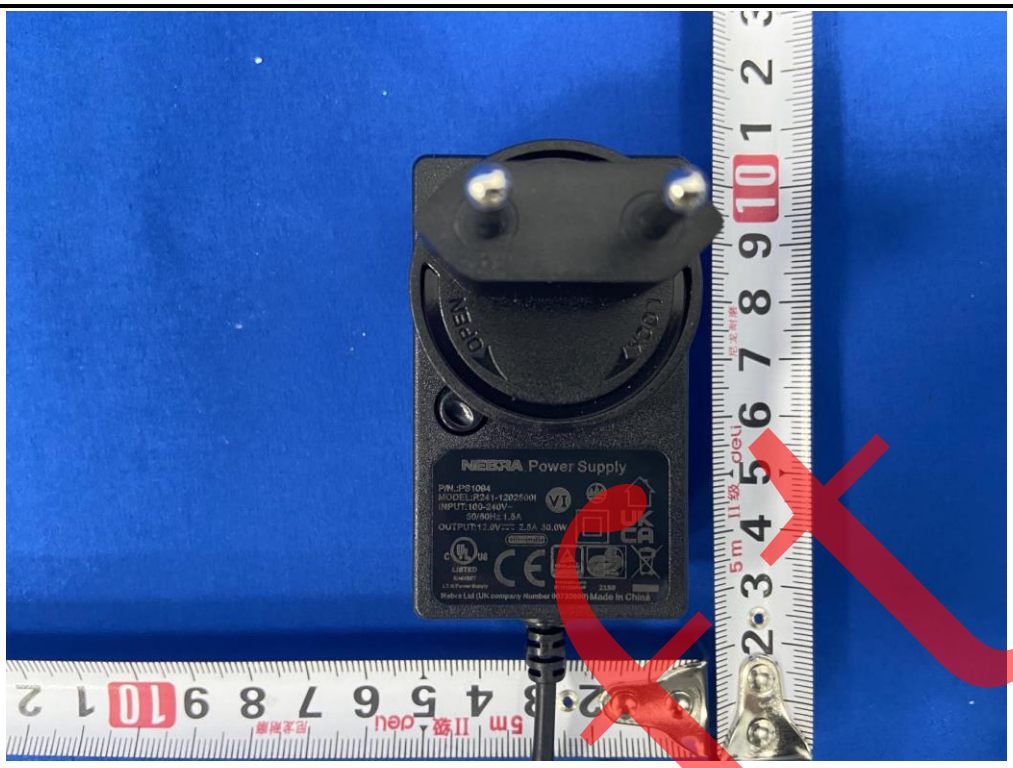


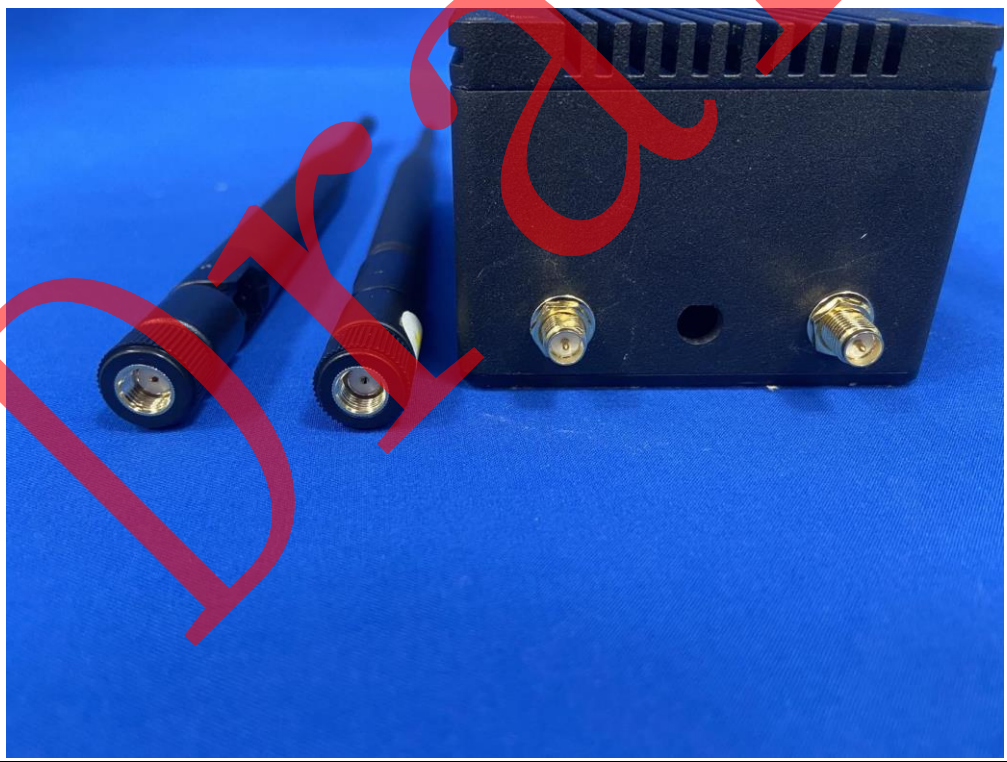
Conducted Test Methods

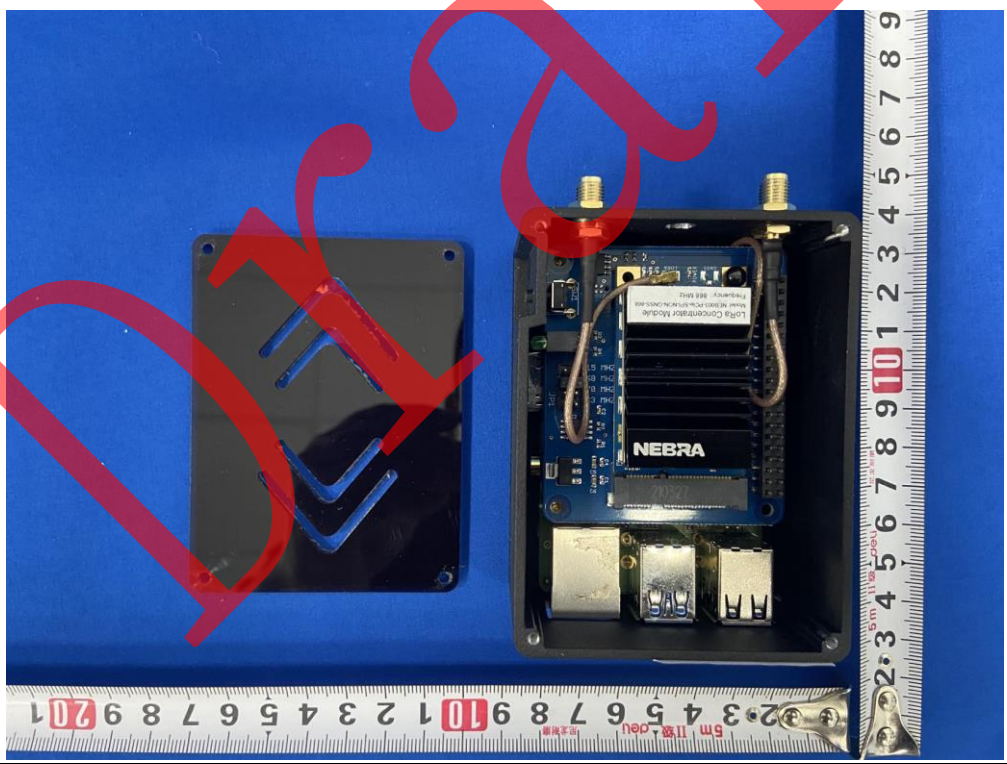
8 EUT Constructional Details

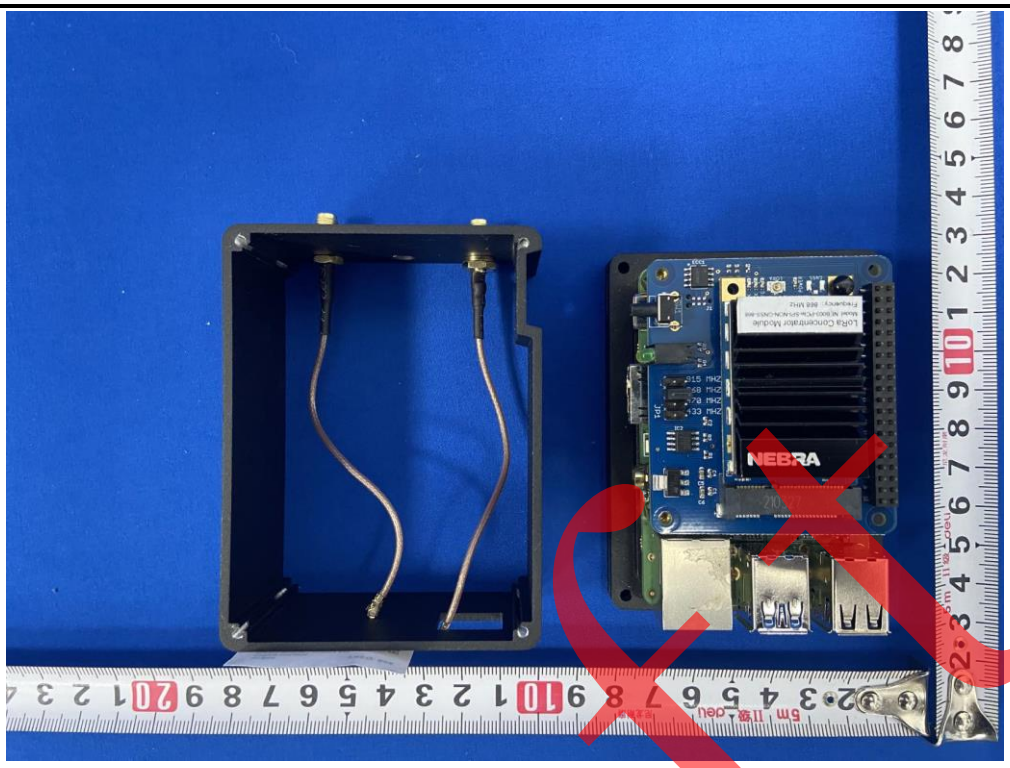


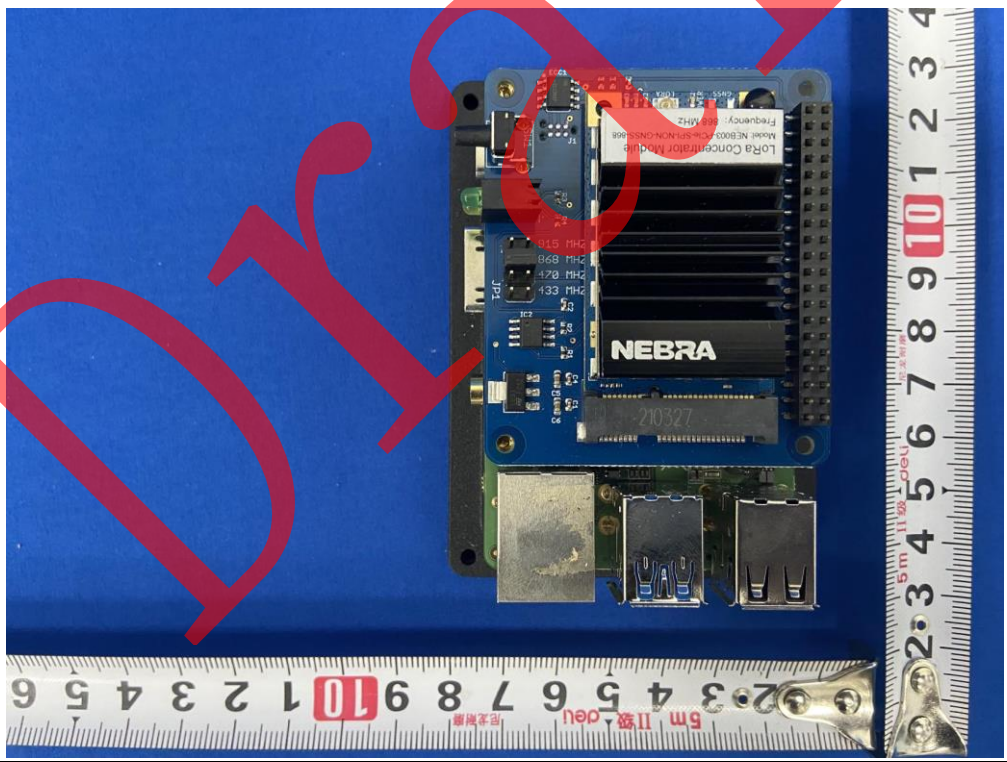


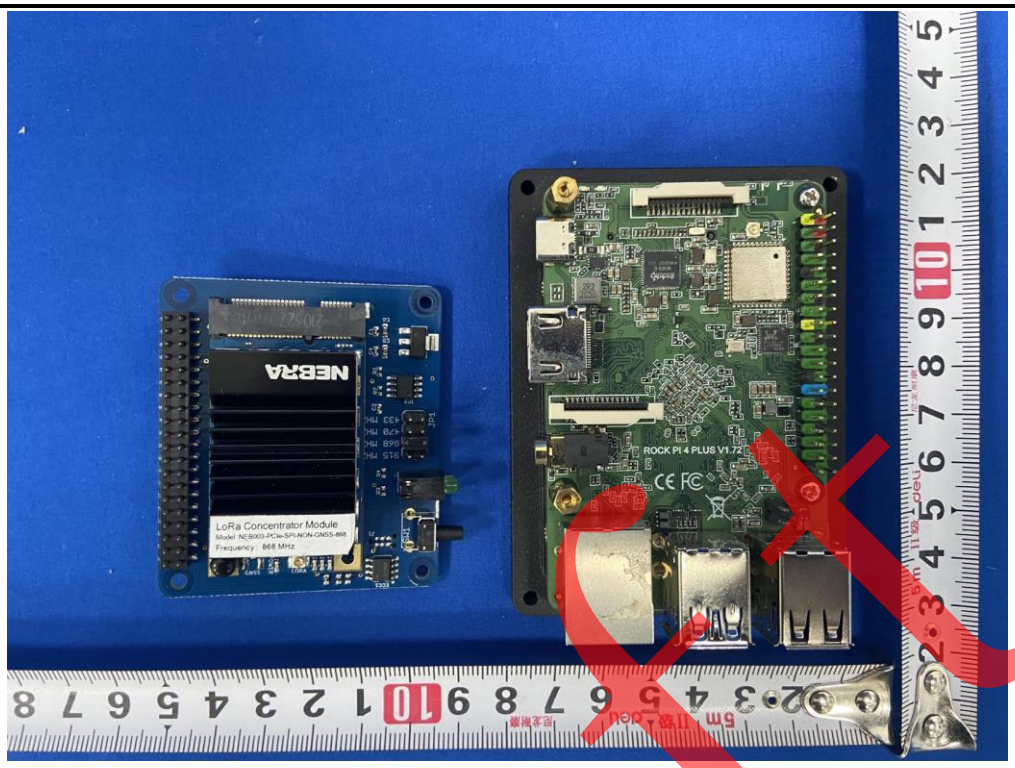




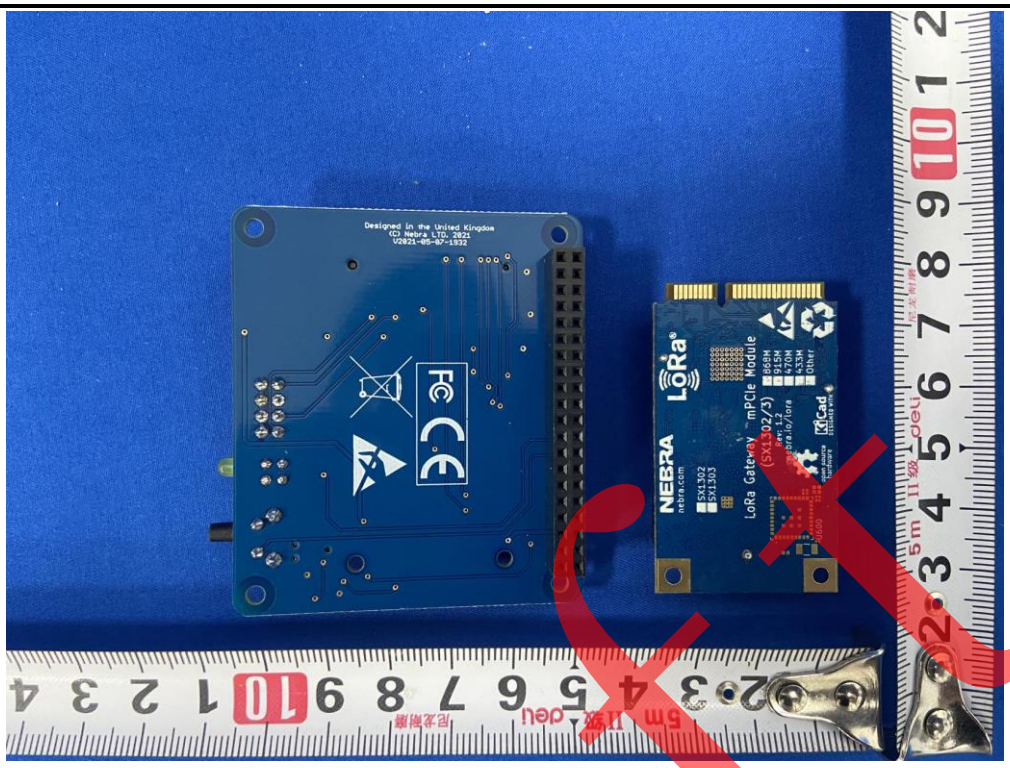


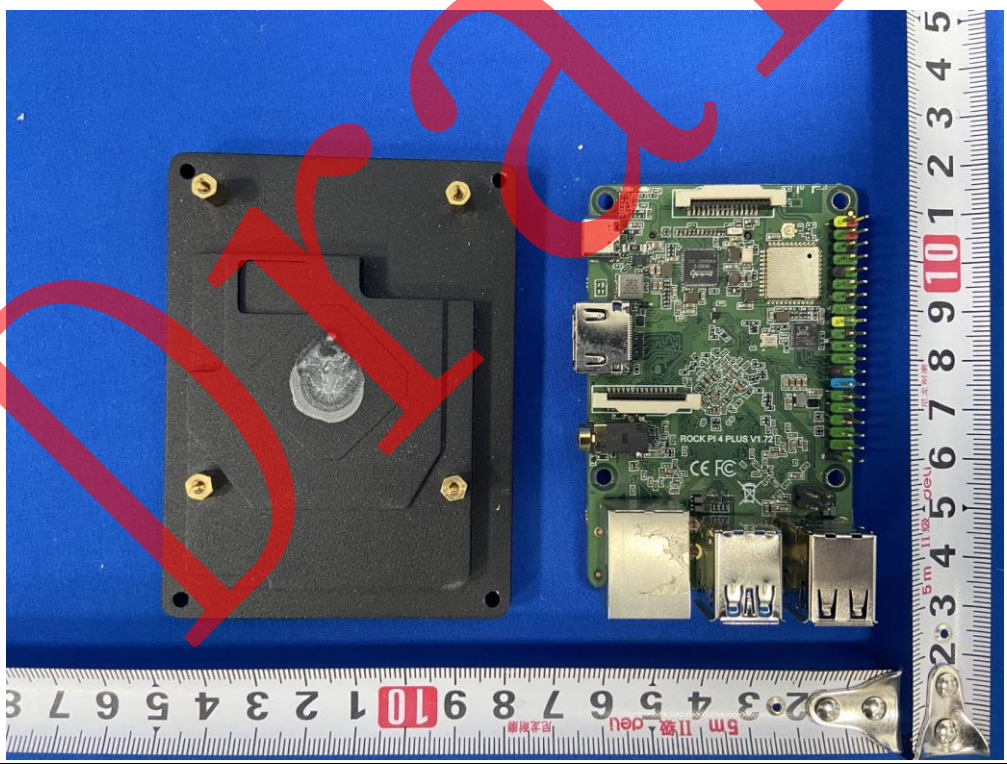

NEBRA

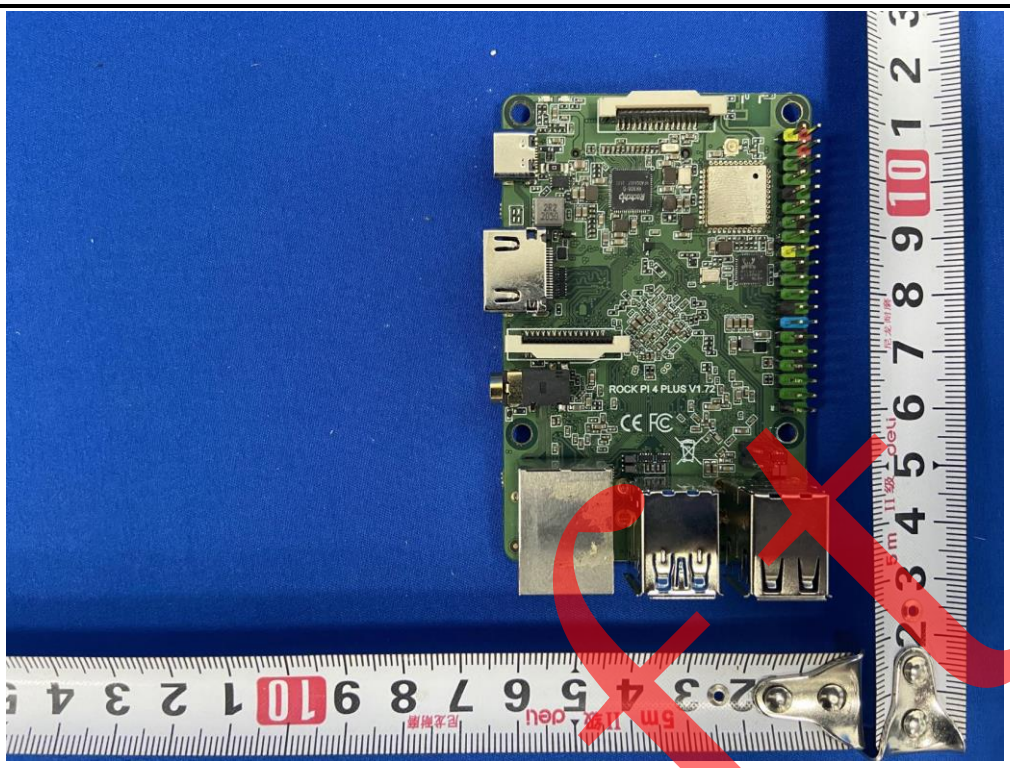

NEBRA
LoRa Concentrator Module
915 MHz
868 MHz
470 MHz
433 MHz
JP1

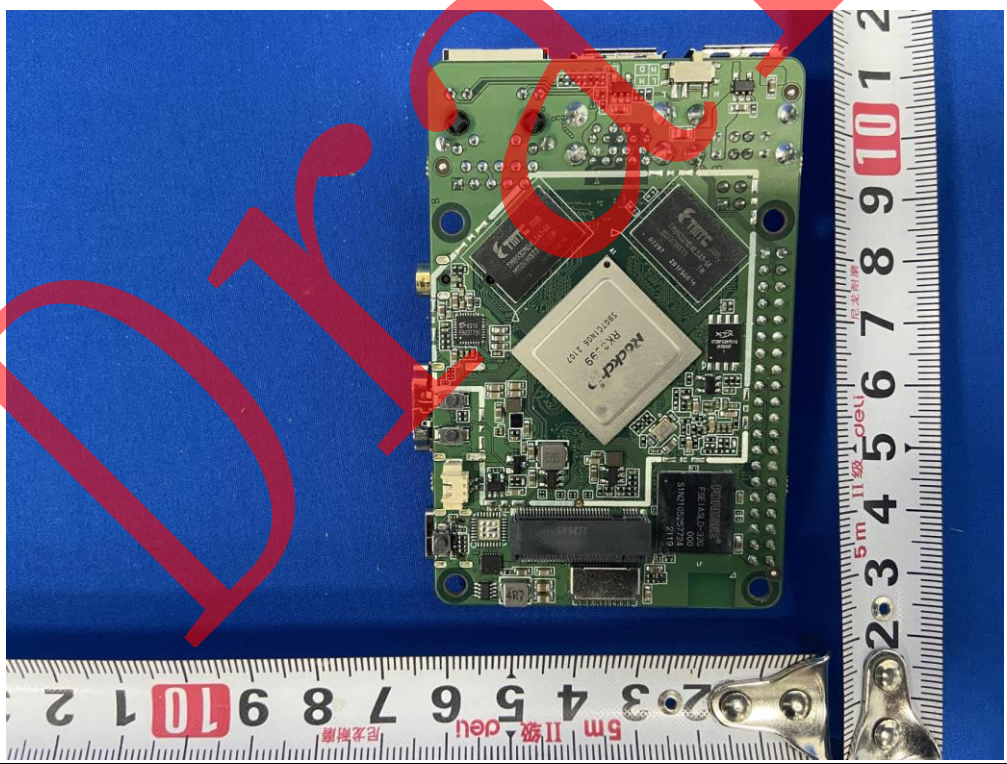

NEBRA
LoRa Concentrator Module
ROCK PI 4 PLUS V1.72


NEBRA
Helium Hotspot HNT
https://nebra.io
LoRa Concentrator Module
NEBRA


Designed in the United Kingdom
(C) Nebra LTD. 2021
V2021-05-07-1932
LoRa Gateway mPCie Module
(SX1302/3)
NEBRA
nebra.com
SX1302
SX1303


ROCK Pi 4 PLUS V1.7





ANNEX Application form for testing

In accordance with EN 300 328 V2.2.2, clause 5.4.1, the following information is provided by the supplier.

a) The type of modulation used by the equipment:

☒ FHSS

☐ Other forms of modulation

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:
  The number of Hopping Frequencies: .....
- In case of Adaptive Frequency Hopping Equipment:
  The maximum number of Hopping Frequencies: 79
  The minimum number of Hopping Frequencies: 79
- The Dwell Time: 2.891ms

c) Adaptive / non-adaptive equipment:

☐ Non-adaptive Equipment

☒ Adaptive Equipment without the possibility to switch to a non-adaptive mode

☐ Adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment: ____ ms

☐ The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐ The equipment is Frame Based equipment

☒ The equipment is Load Based equipment

☐ The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: ____µs

The value q as referred to in clause 4.3.2.5.2.2.2: .....

☐ The equipment has implemented an non-LBT based DAA mechanism

☐ The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): ___dBm

The maximum (corresponding) Duty Cycle: ____ %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power GFSK
- Power Spectral Density N/A
- Duty cycle, Tx-Sequence, Tx-gap .....
- Dwell time, Hopping Sequence (only for FHSS equipment)
  2.891ms, 79 channels
- Hopping Frequency Separation (only for FHSS equipment) GFSK
- Medium Utilisation N/A
- Adaptivity & Receiver Blocking GFSK
- Occupied Channel Bandwidth 8DPSK
- Transmitter unwanted emissions in the OOB domain 8DPSK
- Transmitter unwanted emissions in the spurious domain 8DPSK
- Receiver spurious emissions GFSK

g) The different transmit operating modes (tick all that apply):

☒ Operating mode 1: Single Antenna Equipment

☒ Equipment with only 1 antenna

☐ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time

☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)
☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
NOTE: Add more lines if more channel bandwidths are supported.
☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)
☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐ Symmetrical power distribution
☐ asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....
NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2402 MHz to 2480 MHz
- Operating Frequency Range 2: ..... MHz to..... MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

- Occupied Channel Bandwidth 1: 1.222 MHz
- Occupied Channel Bandwidth 2: ..... MHz

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒ Stand-alone
☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
☐ Plug-in radio device (Equipment intended for a variety of host systems)
☐ Other.....

l) The extreme operating conditions that apply to the equipment:

Operating temperature range: -20 ° C to +55° C
Operating voltage range: 10.2 V to 13.8 V ☐ AC ☒ DC
Details provided are for the: ☒ stand-alone equipment
☐ combined (or host) equipment
☐ test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type:

☒ Integral Antenna
☒ Antenna Gain: 1.0 dBi
If applicable, additional beamforming gain (excluding basic antenna gain): ____dB
☐ Temporary RF connector provided
☐ No temporary RF connector provided
☐ Dedicated Antennas (equipment with antenna connector)
☐ Single power level with corresponding antenna(s)
☐ Multiple power settings and corresponding antenna(s) Number of different Power Levels: …
Power Level 1: ____dBm
Power Level 2: ____dBm
Power Level 3: ____dBm
NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

- For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable

Power Level 1: ____dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

Power Level 2: ____dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

Power Level 3: ____dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☒ stand-alone equipment
☐ combined (or host) equipment
☐ test jig

Supply Voltage ☐ AC mains State AC voltage ____V
☒ DC State DC voltage 12.0 V

In case of DC, indicate the type of power source
☐ Internal Power Supply
☒ External Power Supply or AC/DC adapter
☐ Battery
☐ Other: .....

o) Describe the test modes available which can facilitate testing:

Hopping mode and continuous transmitting mode control in engineer mode.

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):

Bluetooth

Configuration for testing

From all combinations of conducted power settings and intended antenna assembly(ies) specified in clause 5.4.1 m), specify the combination resulting in the highest e.i.r.p. for the radio equipment.

Unless otherwise specified in EN 300 328, this power setting is to be used for testing against the requirements of EN 300 328. In case there is more than one such conducted power setting resulting in the same (highest) e.i.r.p. level, the highest power setting is to be used for testing. See also EN 300 328, clause 5.3.2.3.

Highest overall e.i.r.p. value: 6.56 dBm	
Corresponding Antenna assembly gain: 1.0 dBi	Antenna Assembly #: 1
Corresponding conducted power setting: 5.56 dBm (also the power level to be used for testing)	Listed as Power Setting #: 7

Additional information provided by the applicant

Modulation:

ITU Class(es) of emission: FHSS

Can the transmitter operate unmodulated? ☐ yes ☒ no

Duty Cycle

The transmitter is intended for:

☐ Continuous duty

☐ Intermittent duty

☒ Continuous operation possible for testing purposes

About the UUT

☒ The equipment submitted are representative production models

☐ If not, the equipment submitted are pre-production models?

☐ If pre-production equipment are submitted, the final production equipment will be identical in all respects with the equipment tested

☐ If not, supply full details

.....

☐ The equipment submitted is CE marked

☐ In addition to the CE mark, the Class-II identifier (Alert Sign) is affixed.

Additional items and/or supporting equipment provided

☐ Spare batteries (e.g. for portable equipment)

☐ Battery charging device

☒ External Power Supply or AC/DC adapter

☐ Test Jig or interface box

☐ RF test fixture (for equipment with integrated antennas)

☐ Host System Manufacturer: .....
Model #: .....
Model name: .....

☐ Combined equipment Manufacturer: .....
Model #: .....
Model name: .....

☒ User Manual

☒ Technical documentation (Handbook and circuit diagrams)

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