

UKCA RF 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: BS EN IEC 62311: 2020

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

Date:

25 Jan., 2022

Reviewed by:

Wenwen Zhang

Date:

25 Jan., 2022

Approved by:

Wenwen Zhang

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.

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2 Version

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

3 Contents

Page

1	COVER PAGE.....	1
2	VERSION	2
3	CONTENTS	3
4	GENERAL INFORMATION.....	4
4.1	CLIENT INFORMATION	4
4.2	GENERAL DESCRIPTION OF E.U.T.	4
4.3	TEST MODE	5
4.4	DESCRIPTION OF SUPPORT UNITS.....	5
4.5	LABORATORY FACILITY	5
4.6	LABORATORY LOCATION	5
4.7	TEST INSTRUMENTS LIST.....	5
5	TECHNICAL REQUIREMENTS SPECIFICATION	6

4 General Information

4.1 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

4.2 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
Hardware version:	v1
Software version:	781099d
BLE Specification	
Operation Frequency:	2402MHz-2480MHz
Channel number:	40
Channel separation:	2MHz
Modulation	GFSK
Antenna Type:	External Antenna
Antenna gain:	1 dBi (declare by Applicant)
2.4G WiFi Specification	
Operation Frequency:	2412MHz-2472MHz
Channel number:	13 for 802.11b/802.11g/802.11n-HT20
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Antenna Type:	External Antenna
Antenna gain:	1 dBi (declare by Applicant)
Lora Specification	
Operation Frequency:	868.1MHz~868.5MHz
Channel number:	5
Modulation :	OOK
Antenna Type :	External Antenna
Antenna gain :	3 dBi (declare by Applicant)

4.3 Test Mode

Operating mode	Detail description
BLE mode	Keep the EUT in continuously transmitting in BLE mode
2.4GWIFI mode	Keep the EUT in continuously transmitting in 2.4GWIFI mode
Lora	Keep the EUT in continuously transmitting in Lora mode

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 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>

4.6 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>

4.7 Test Instruments list

Please refer to the report No.: BCTC2202398390-3E & BCTC2202398390-4E issue by Shenzhen BCTC Testing Co., Ltd. SZAWW180830005-04W issue by Shenzhen Anbotek Compliance Laboratory Limited.

5 Technical Requirements Specification

General Description of Applied Standards

BS EN IEC 62311 Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz–300 GHz) is to demonstrate the compliance of apparatus with the basic restrictions or reference levels on exposure of the general public related to electric, magnetic, electromagnetic fields as well as induced and contact current.

RF Exposure Evaluation Limit

Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	$0,73/f$	$0,92/f$	—
1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

Notes:

1. f as indicated in the frequency range column.

Test method

The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement of the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.

Far Field Calculation Formula

$$E = \frac{\sqrt{30PG(\theta, \phi)}}{r}$$

G = antenna gain relative to an isotropic antenna
 θ, ϕ = elevation and azimuth angles to point of investigation
 r = distance from observation point to the antenna

Measurement Data(Worst case)

Modulation	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Antenna Gain (numeric)	E Field Strength (V/m)	E Field Strength Limit (V/m)	Result
Maximum Emissions Level of BLE							
GFSK Mode	2.79	1.90	1	1.26	0.0005	61	Pass
Maximum Emissions Level of 2.4G WIFI							
802.11b mode	14.42	27.67	1	1.26	0.0069	61	Pass
Maximum Emissions Level of Lora							
OOK	12.836	19.21	3	2.00	5.36	40.51	Pass
<i>Note: Output Power refer to the report No.: BCTC2202398390-3E & BCTC2202398390-4E & SZAWW180830005-04W</i>							

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