RF Exposure Evaluation Report

Applicant:	Nebra Ltd
Address of Applicant:	Unit 4 Bells Yew Green Business Court Bells Yew Green

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-HHRK4-915, NEBHNT-HHRK4-915-2, NEBHNT-HHRK4-915-3
Canada IC:	27187-HHRK4
Applicable standards:	RSS-102 Issue 5 March 2015
Date of sample receipt:	05 Jan., 2022
Date of Test:	06 Jan., to 08 May, 2022
Date of report issue:	18 May, 2022
Test Result:	PASS*

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*09 May, 2022*	*Original*
01	*18 May, 2022*	*Updated page 1, 4, 6*

Tested by: Mike.ou ***Date:*** *18 May, 2022*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *18 May, 2022*

Project Engineer

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4 General Information

4.1 Client Information

Applicant:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court Bells Yew Green
Manufacturer/Factory:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court Bells Yew Green

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-HHRK4-915, NEBHNT-HHRK4-915-2, NEBHNT-HHRK4-915-3
Operation Frequency:	2.4G Wi-Fi: 2412MHz~2472MHz Bluetooth: 2402MHz~2480MHz Lora: 903.9 MHz – 905.3 MHz, 923.3 MHz – 927.5 MHz
Modulation technology:	802.11b: DSSS, 802.11g/n: OFDM Bluetooth BDR /BLE: GFSK, Bluetooth EDR: π/4-DQPSK, 8DPSK Lora
Antenna Type:	External Antenna
Antenna gain:	BT: 1 dBi; 2.4GWi-Fi: 1 dBi; Lora: 3 dBi
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

4.3 Operating Modes

Operating mode	Detail description
BT mode	Keep the EUT in continuously transmitting in BT mode
2.4G WIFI mode	Keep the EUT in continuously transmitting in 2.4G WIFI mode
Lora mode	Keep the EUT in continuously transmitting in Lora mode

4.4 Additions to, deviations, or exclusions from the method

No

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

5 Technical Requirements Specification in RSS-102

5.1 Limits

According to RSS-102 Issue 5 March 2015, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $22.48/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Frequency Range (MHz)	Exemption Limits (W)
< 20	1
20 ~ 48	$22.48/f^{0.5}$
48 ~ 300	0.6
300 ~ 6000	$1.31*10^{-2}f^{0.6834}$
> 6000	5

5.2 Result

Frequency (MHz)	Output power (dBm)	Gain (dBi)	E.I.R.P (dBm)	Distance (cm)	Max. tune-up Power (dBm)	Max. Power (mW)	Output power level (mW)
2.4G Wi-Fi mode							
2437.00	15.750	1	16.750	20.00	17	50.12	2703.01
BT mode							
2402.00	7.991	1	8.991	20.00	9	7.94	2676.42
LORA							
905.3	20.39	3	23.39	20.00	23.5	223.87	1373.86
923.3	27.12	3	30.12	20.00	30.5	1122.02	1392.47

Simultaneous transmission:

ANT No.	Mode	Ratio	Max Ratio	Total Ratio	Limit
Main ANT	Wifi 802.11b	0.0185	0.0215	0.9902	1.0
	BT	0.0030			
Secondary ANT	LoRa 905.3	0.1828	0.9687		
	LoRa 923.3	0.9041			

Note: Just the worst case mode was shown in report.

5.3 Conclusion

The device is exempt from the SAR test and satisfies RF exposure evaluation.

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