TEST REPORT

Applicant:	Nebra Ltd
Address of Applicant:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells TN3 9BJ
Equipment Under Test (EUT)	
Product Name:	Nebra Smart Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner
Model No.:	HNTIN-470-G, HNTIN-868-G, HNTIN-915-G,HNTIN-433-G, HNTIN-470,HNTIN-868, HNTIN-915,HNTIN-433
Applicable standards:	EN 62311: 2020
Date of sample receipt:	12 Mar., 2021
Date of Test:	13 Mar., to 19 Apr., 2021
Date of report issue:	23 Apr., 2021
Test Result:	PASS*

The UKCA mark as shown below can be used, under the responsibility of the manufacturer, after completion of an UKCA Declaration of Conformity and compliance with all relevant UK Radio Equipment Regulations (SI 2017/1206) Directives. The protection requirements with respect to electromagnetic compatibility contained in UK Radio Equipment Regulations (SI 2017/1206) are considered.

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

2 Version

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

Tested by: Yaro Wu ***Date:*** *23 Apr., 2021*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *23 Apr., 2021*

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, Tunbridge Wells TN3 9BJ
Manufacturer:	Nebra Ltd
Address:	Unit 4 Bells Yew Green Business Court, Bells Yew Green, Tunbridge Wells TN3 9BJ
Factory:	SUNSOAR TECH CO., LIMITED
Address:	4/F, Block E, Fengze Building, Huafeng No.2 Industrial Park, Hangkong Road, XiXiang Town, BaoAn District, Shenzhen, China

4.2 General Description of E.U.T.

Product Name:	Nebra Smart Indoor LoRa Gateway / Nebra HNT Indoor Hotspot Miner
Model No.:	HNTIN-470-G, HNTIN-868-G, HNTIN-915-G,HNTIN-433-G, HNTIN-470,HNTIN-868, HNTIN-915,HNTIN-433
Hardware version:	V12-15-2020-1614
Software version:	a98bfc8
BLE Specification	
Operation Frequency:	2402MHz-2480MHz
Channel number:	40
Channel separation:	2MHz
Modulation	GFSK
Antenna Type:	Internal Antenna
Antenna gain:	2.0 dBi (declare by Applicant)
Bluetooth Specification	
Operation Frequency:	2402MHz-2480MHz
Channel number:	79
Channel separation:	1MHz
Modulation	GFSK, Pi/4DQPSK, 8DPSK
Antenna Type:	Internal Antenna
Antenna gain:	2.0 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:	Internal Antenna
Antenna gain:	2.0 dBi (declare by Applicant)

LoRa Specification	
Operation Frequency:	868.1MHz~868.5MHz
Channel number:	5
Modulation technology:	OOK
Antenna Type:	Cylindrical Antenna
Antenna gain:	3.0 dBi (declare by Applicant)

4.3 Operating Modes

Operating mode	Detail description
BLE mode	Keep the EUT in continuously transmitting in BLE mode
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 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
Skyworth	Color LCD TV	24E12HR	K026709	N/A
Flypower	Switching Adapter	PS30D120K 1500UD	N/A	N/A

4.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
RF output power, conducted	±1.5 dB

4.6 Additions to, deviations, or exclusions from the method

No

4.7 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 of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

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

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 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

4.8 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@ccis-cb.com, Website: http://www.ccis-cb.com

4.9 Test Instruments list

Conducted method:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Spectrum Analyzer	Agilent	N9020A	MY50510123	11-18-2020	11-17-2021
Vector Signal Generator	Agilent	N5182A	MY49060014	11-18-2020	11-17-2021
Signal Generator	R&S	SMR20	1008100050	03-05-2021	03-04-2022
Power Sensor	D.A.R.E	RPR3006W	15I00041SNO12	11-25-2020	11-24-2021
Power Sensor	D.A.R.E	RPR3006W	15I00041SNO54	11-25-2020	11-24-2021
Power Sensor	D.A.R.E	RPR3006W	17I00015SNO27	11-25-2020	11-24-2021
Power Sensor	D.A.R.E	RPR3006W	17I00015SNO28	11-25-2020	11-24-2021
RF Switch Unit	Ascentest	AT890-RFB	N/A	N/A	N/A
Test Software	MWRFTEST	MTS 8310	Version: 2.0.0.0		
DC Power Supply	XinNuoEr	WYK-10020K	1409050110020	09-25-2020	09-24- 2021
Temperature Humidity Chamber	HengPu	HPGDS-500	20140828008	11-01-2020	10-31- 2021

5 Technical Requirements Specification in EN 62311

5.1 General Description of Applied Standards

EN 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.

5.2 RF Exposure Evaluation

5.2.1 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/m²)
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.

5.2.2 Test method

The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement ot the user for keeing 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

5.2.3 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 Bluetooth							
GFSK Mode	-1.65	0.68	2	1.58	0.90	61	Pass
Pi/4DQPSK Mode	-2.95	0.51	2	1.58	0.78	61	Pass
8DPSK Mode	-2.16	0.61	2	1.58	0.85	61	Pass
Maximum Emissions Level of BLE							
GFSK Mode	0.42	1.10	2	1.58	1.14	61	Pass
Maximum Emissions Level of 2.4G WIFI							
802.11b mode	13.17	20.75	2	1.58	4.97	61	Pass
802.11g mode	10.73	11.83	2	1.58	3.75	61	Pass
802.11n-HT20	10.38	10.91	2	1.58	3.60	61	Pass
802.11n-HT40	9.51	8.93	2	1.58	3.26	61	Pass
Maximum Emissions Level of LoRa							
Low	9.99	9.98	3	2.00	3.86	40.51	Pass
Middle	9.90	9.77	3	2.00	3.82	40.52	Pass
High	8.82	7.62	3	2.00	3.38	40.52	Pass

5.2.4 Conclusion

Meet the requirements of EN 62311:2020

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