# SPECTRUM REPORT
## (Wi-Fi)

| | |
|---|---|
| **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:** | ETSI EN 300 328 V2.2.2 (2019-07) |
| **Date of sample receipt:** | 12 Mar., 2021 |
| **Date of Test:** | 13 Mar., to 19 Apr., 2021 |
| **Date of report issue:** | 11 May, 2021 |
| **Test Result:** | PASS* |

*In the configuration tested, the EUT detailed in this report complied with the standards specified above.

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* |
| *01* | *11 May, 2021* | *Updated model different on P.5* |
| | | |
| | | |
| | | |

***Tested by:***  ***Date:*** *11 May, 2021*

***Test Engineer***

***Reviewed by:***  ***Date:*** *11 May, 2021*

***Project Engineer***

# 3 Contents

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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 4.3.2.2 | Clause 5.4.2.2.1.2 | Clause 4.3.2.2.3 | PASS* |
| Power Spectral Density | Clause 4.3.2.3 | Clause 5.4.3 | Clause 4.3.2.3.3 | PASS* |
| Duty Cycle, Tx-sequence, Tx-gap | Clause 4.3.2.4 | Clause 5.4.2.2.1.3 | Clause 4.3.2.4.3 | N/A |
| Medium Utilisation (MU) factor | Clause 4.3.2.5 | Clause 5.4.2.2.1.4 | Clause 4.3.4.5.3 | N/A |
| Adaptivity (Adaptive Equipment using Modulations Other Than FHSS) | Clause 4.3.2.6 | Clause 5.4.6.2 | Clause 4.3.2.6 | PASS* |
| Occupied Channel Bandwidth | Clause 4.3.2.7 | Clause 5.4.7.2 | Clause 4.3.2.7.3 | PASS* |
| Transmitter unwanted emissions in the out-of-band domain | Clause 4.3.2.8 | Clause 5.4.8.2 | Clause 4.3.2.8.3 | PASS* |
| Transmitter unwanted emissions in the spurious domain | Clause 4.3.2.9 | Clause 5.4.9.2 | Clause 4.3.2.9.3 | PASS* |
| **Radio Spectrum Matter (RSM) Part of Rx** | | | | |
| Receiver spurious emissions | Clause 4.3.2.10 | Clause 5.4.10.2 | Clause 4.3.2.10.3 | PASS* |
| Receiver Blocking | Clause 4.3.2.11 | Clause 5.4.11.2 | Clause 4.3.2.11.4 | 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).*
6. *Pass*: Refer to the the Report No.: DL-2019092954R.*

# 5 General Information

## 5.1 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 |

## 5.2 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 |
| Operation Frequency: | 2412MHz~2472MHz (802.11b/802.11g/802.11n(HT20))<br>2422MHz~2462MHz (802.11n(HT40)) |
| Channel numbers: | 13 for 802.11b/802.11g/802.11n(HT20), 9 for 802.11n(HT40) |
| 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) |
| Data speed (IEEE 802.11b): | 1Mbps, 2Mbps, 5.5Mbps, 11Mbps |
| Data speed (IEEE 802.11g): | 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps |
| Data speed (IEEE 802.11n): | Up to 150Mbps |
| Max. E.I.R.P Power: | 802.11b: 15.17 dBm, 802.11g: 12.73 dBm, 802.11n(HT20): 12.42 dBm<br>802.11n(HT40): 11.51 dBm |
| Equipment Type: | Adaptive equipment |
| Antenna Type: | Internal Antenna |
| Antenna gain: | 2.0 dBi (declare by Applicant) |
| Power supply: | DC 5V |
| AC adapter: | Model: TM-K018VP-01201500PE-Z<br>Input: 100-240V~50/60Hz 0.45A<br>Output: 12.0V , 1.5A |
| Remark: | Model No.: HNTIN-470-G, HNTIN-868-G, HNTIN-915-G,HNTIN-433-G, HNTIN-470,HNTIN-868, HNTIN-915,HNTIN-433 were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name. |

## 5.3 Test environment and mode, and test samples plans

| Operating Environment: | |
|---|---|
| Temperature: | Normal: 15℃ ~ 35℃, Extreme: -20℃ ~ +55℃ |
| Humidity: | 20 % ~ 75 % RH |
| Atmospheric Pressure: | 1008 mbar |
| Voltage: | Nominal: 5.0 Vdc, Extreme: Low 4.5 Vdc, High 5.5 Vdc |
| **Test mode:** | |
| Transmitting mode: | Keep the EUT in continuously transmitting mode with modulation. |
| Receiving mode: | Keep the EUT in receiving mode. |
| We have verified the construction and function in typical operation. All the test items were carried out with the EUT in above test modes. | |
| According to EN 300 328 standards, the test results are both the “worst case” and “worst setup” 1 Mbps for 802.11b, 6 Mbps for 802.11g, 6.5 Mbps for 802.11n(HT20), 13.5 Mbps for 802.11n(HT40). | |

## 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%) |
|---|---|
| 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) | ±4.32 dB |
| Radiated Emission (1GHz ~ 18GHz) | ±5.16 dB |

## 5.6 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

## 5.7 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

## 5.8 Test Instruments list

| Radiated Emission: | | | | | |
|---|---|---|---|---|---|
| **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Date (mm-dd-yy)** | **Cal. Due date (mm-dd-yy)** |
| 3m SAC | ETS | 9m*6m*6m | 966 | 01-19-2021 | 01-18-2024 |
| BiConiLog Antenna | SCHWARZBECK | VULB9163 | 497 | 03-03-2021 | 03-02-2022 |
| Biconical Antenna | SCHWARZBECK | VUBA9117 | 359 | 06-18-2020 | 06-17-2021 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 916 | 03-03-2021 | 03-02-2022 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 1805 | 06-18-2020 | 06-17-2021 |
| EMI Test Software | AUDIX | E3 | Version: 6.110919b | | |
| Pre-amplifier | HP | 8447D | 2944A09358 | 03-03-2021 | 03-02-2022 |
| Pre-amplifier | CD | PAP-1G18 | 11804 | 03-03-2021 | 03-02-2022 |
| Spectrum analyzer | Rohde & Schwarz | FSP30 | 101454 | 03-03-2021 | 03-02-2022 |
| EMI Test Receiver | Rohde & Schwarz | ESRP7 | 101070 | 03-03-2021 | 03-02-2022 |
| Signal Generator | Rohde & Schwarz | SMX | 835454/016 | 03-03-2021 | 03-02-2022 |
| Signal Generator | Rohde & Schwarz | SMR20 | 1008100050 | 03-03-2021 | 03-02-2022 |
| Cable | ZDECL | Z108-NJ-NJ-81 | 1608458 | 03-03-2021 | 03-02-2022 |
| Cable | MICRO-COAX | MFR64639 | K10742-5 | 03-03-2021 | 03-02-2022 |
| Cable | SUHNER | SUCOFLEX100 | 58193/4PE | 03-03-2021 | 03-02-2022 |
| RF Switch Unit | MWRFTEST | MW200 | N/A | N/A | N/A |
| Test Software | MWRFTEST | MTS8200 | Version: 2.0.0.0 | | |

| Conducted method: | | | | | |
|---|---|---|---|---|---|
| **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal. Date (mm-dd-yy)** | **Cal. Due date (mm-dd-yy)** |
| Spectrum Analyzer | Keysight | N9010B | MY60240202 | 11-27-2020 | 11-26-2021 |
| Vector Signal Generator | Keysight | N5182B | MY59101009 | 11-27-2020 | 11-26-2021 |
| Analog Signal Generator | Keysight | N5173B | MY59100765 | 11-27-2020 | 11-26-2021 |
| Power Detector Box | MWRF-test | MW100-PSB | MW201020JYT | 11-27-2020 | 11-26-2021 |
| Simulated Station | Rohde & Schwarz | CMW270 | 102335 | 11-27-2020 | 11-26-2021 |
| RF Control Box | MWRF-test | MW100-RFCB | MW200927JYT | N/A | N/A |
| PDU | MWRF-test | XY-G10 | N/A | N/A | N/A |
| Test Software | MWRF-tes | MTS 8310 | Version: 2.0.0.0 | | |
| DC Power Supply | Keysight | E3642A | MY60296194 | 11-27-2020 | 11-26-2021 |
| Temperature Humidity Chamber | ZhongZhi | CZ—C—150D | ZH16491 | 09-23-2020 | 09-22-2021 |

# 6 Radio Technical Specification in ETSI EN 300 328

## 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

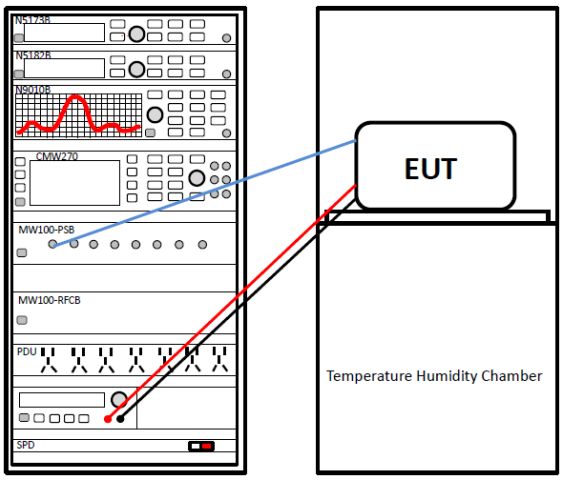
| Operation Frequency each of channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2412MHz | 5 | 2432MHz | 9 | 2452MHz | 13 | 2472MHz |
| 2 | 2417MHz | 6 | 2437MHz | 10 | 2457MHz | | |
| 3 | 2422MHz | 7 | 2442MHz | 11 | 2462MHz | | |
| 4 | 2427MHz | 8 | 2447MHz | 12 | 2467MHz | | |

*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 1, 7 and 13 of 802.11B/G/N20 chosen for testing. Channel 3, 7 and 11 of 802.11 N40 chosen for testing.*

| Clause No. | Test Conditions | | | Test Channel | | | Mode | | | | Test mode | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NVNT | NVLT | NVHT | Low | Middle | High | 802.11b | 802.11g | 802.11n (HT20) | 802.11n (HT40) | Tx | Rx | Normal |
| 4.3.2.2 | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | |
| 4.3.2.3 | √ | | | √ | √ | √ | √ | √ | √ | √ | √ | | |
| 4.3.2.4 | | | | | | | | | | | | | |
| 4.3.2.5 | | | | | | | | | | | | | |
| 4.3.2.6 | √ | | | √ | | √ | √ | √ | √ | √ | | | √ |
| 4.3.2.7 | √ | | | √ | | √ | √ | √ | √ | √ | √ | | |
| 4.3.2.8 | √ | | | √ | | √ | √ | √ | √ | √ | √ | | |
| 4.3.2.9 | √ | | | √ | | √ | √ | √ | √ | √ | √ | | |
| 4.3.2.10 | √ | | | √ | | √ | √ | √ | √ | √ | | √ | |
| 4.3.2.11 | √ | | | √ | | √ | √ | √ | √ | √ | | √ | |

*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. | Mode | Test Condition | Test Data | Verdict |
|---|---|---|---|---|
| 4.3.2.2 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | Appendix A – 2.4G Wi-Fi | Pass |
| | | NVLT | | |
| | | NVHT | | |
| 4.3.2.3 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | Appendix A – 2.4G Wi-Fi | Pass |
| 4.3.2.4 | N/A | N/A | N/A | N/A |
| 4.3.2.5 | N/A | N/A | N/A | N/A |
| 4.3.2.6 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | Appendix A – 2.4G Wi-Fi | Pass |
| 4.3.2.7 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | Appendix A – 2.4G Wi-Fi | Pass |
| 4.3.2.8 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | Appendix A – 2.4G Wi-Fi | Pass |
| 4.3.2.9 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | See Section 6.4.2 | Pass |
| 4.3.2.10 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | See Section 6.4.3 | Pass |
| 4.3.2.11 | 802.11 b & g & n(HT20) & n(HT40) | NVNT | See Section 6.4.4 | Pass |

***Note:*** *"NVNT" means Normal Voltage Normal Temperature, "NVLT" means Normal Voltage Low Temperature, "NVHT" means Normal Voltage High Temperature.*

### 6.4.2 Transmitter unwanted emissions in the spurious domain

Refer to the Report No.: DL-2019092954R.

### 6.4.3 Receiver spurious emissions

Refer to the Report No.: DL-2019092954R.

### 6.4.4 Receiver Blocking

| 802.11b Lowest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 2 | 10 | Pass |
| | 2504 | | 2 | | |
| -74 | 2300 | | 3 | 10 | Pass |
| | 2330 | | 6 | | |
| | 2360 | | 5 | | |
| | 2524 | | 4 | 10 | Pass |
| | 2584 | | 2 | | |
| | 2674 | | 3 | | |
| *NOTE:*<br>*(1) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>*(2) The EUT belongs to receiver category 1 equipment.*<br>*(3) Conducted measurements.* | | | | | |

| 802.11b Highest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 3 | 10 | Pass |
| | 2504 | | 3 | | |
| -74 | 2300 | | 3 | 10 | Pass |
| | 2330 | | 5 | | |
| | 2360 | | 4 | | |
| | 2524 | | 6 | 10 | Pass |
| | 2584 | | 6 | | |
| | 2674 | | 5 | | |
| *NOTE:*<br>*(1) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>*(2) The EUT belongs to receiver category 1 equipment.*<br>*(3) Conducted measurements.* | | | | | |

| 802.11g Lowest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 3 | 10 | Pass |
| | 2504 | | 4 | | |
| -74 | 2300 | | 5 | 10 | Pass |
| | 2330 | | 5 | | |
| | 2360 | | 6 | | |
| | 2524 | | 3 | 10 | Pass |
| | 2584 | | 4 | | |
| | 2674 | | 2 | | |
| *NOTE:*<br>*(1) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>(2) *The EUT belongs to receiver category 1 equipment.*<br>(3) *Conducted measurements.* | | | | | |

| 802.11g Highest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 3 | 10 | Pass |
| | 2504 | | 6 | | |
| -74 | 2300 | | 5 | 10 | Pass |
| | 2330 | | 4 | | |
| | 2360 | | 5 | | |
| | 2524 | | 6 | 10 | Pass |
| | 2584 | | 4 | | |
| | 2674 | | 2 | | |
| *NOTE:*<br>*(1) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>(2) *The EUT belongs to receiver category 1 equipment.*<br>(3) *Conducted measurements.* | | | | | |

| 802.11n-HT20 Lowest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 3 | 10 | Pass |
| | 2504 | | 3 | | |
| -74 | 2300 | | 3 | 10 | Pass |
| | 2330 | | 6 | | |
| | 2360 | | 5 | | |
| | 2524 | | 4 | 10 | Pass |
| | 2584 | | 5 | | |
| | 2674 | | 3 | | |
| *NOTE:*<br>*(1) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>(2) *The EUT belongs to receiver category 1 equipment.*<br>(3) *Conducted measurements.* | | | | | |

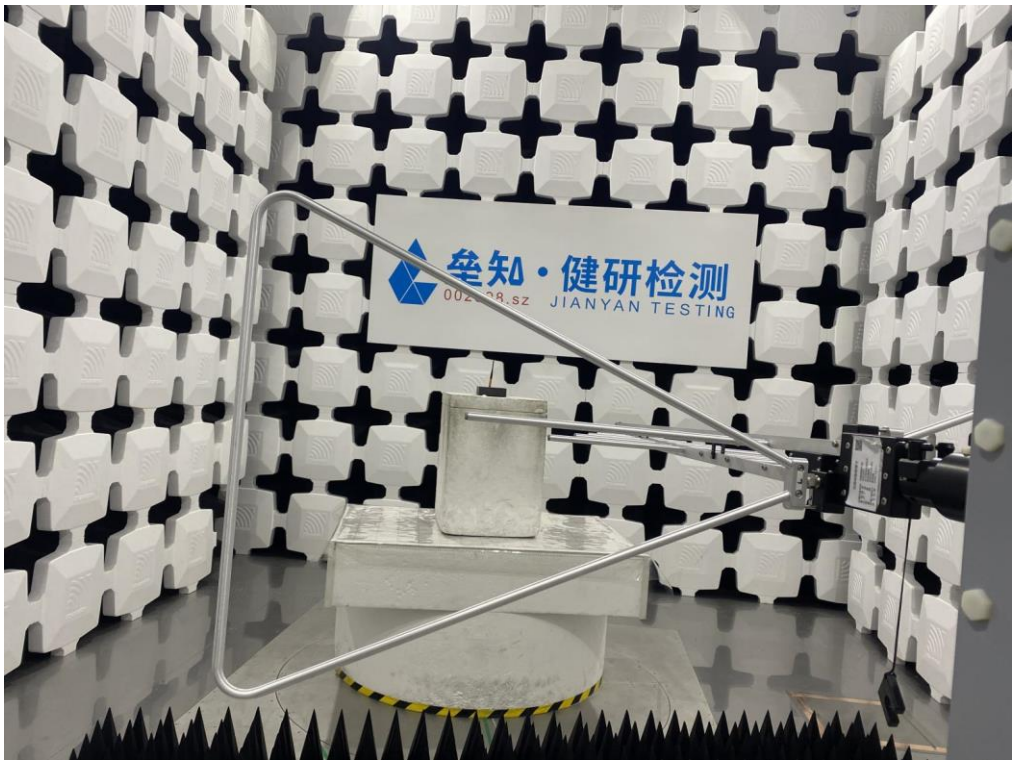
| 802.11n-HT20 Highest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 1 | 10 | Pass |
| | 2504 | | 3 | | |
| -74 | 2300 | | 3 | 10 | Pass |
| | 2330 | | 4 | | |
| | 2360 | | 5 | | |
| | 2524 | | 5 | 10 | Pass |
| | 2584 | | 4 | | |
| | 2674 | | 3 | | |
| *NOTE:*<br>*(1) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>(2) *The EUT belongs to receiver category 1 equipment.*<br>(3) *Conducted measurements.* | | | | | |

| 802.11n-HT40 Lowest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 2 | 10 | Pass |
| | 2504 | | 2 | | |
| -74 | 2300 | | 3 | 10 | Pass |
| | 2330 | | 5 | | |
| | 2360 | | 4 | | |
| | 2524 | | 2 | 10 | Pass |
| | 2584 | | 2 | | |
| | 2674 | | 4 | | |
| *NOTE:*<br>*(4) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>(5) *The EUT belongs to receiver category 1 equipment.*<br>(6) *Conducted measurements.* | | | | | |

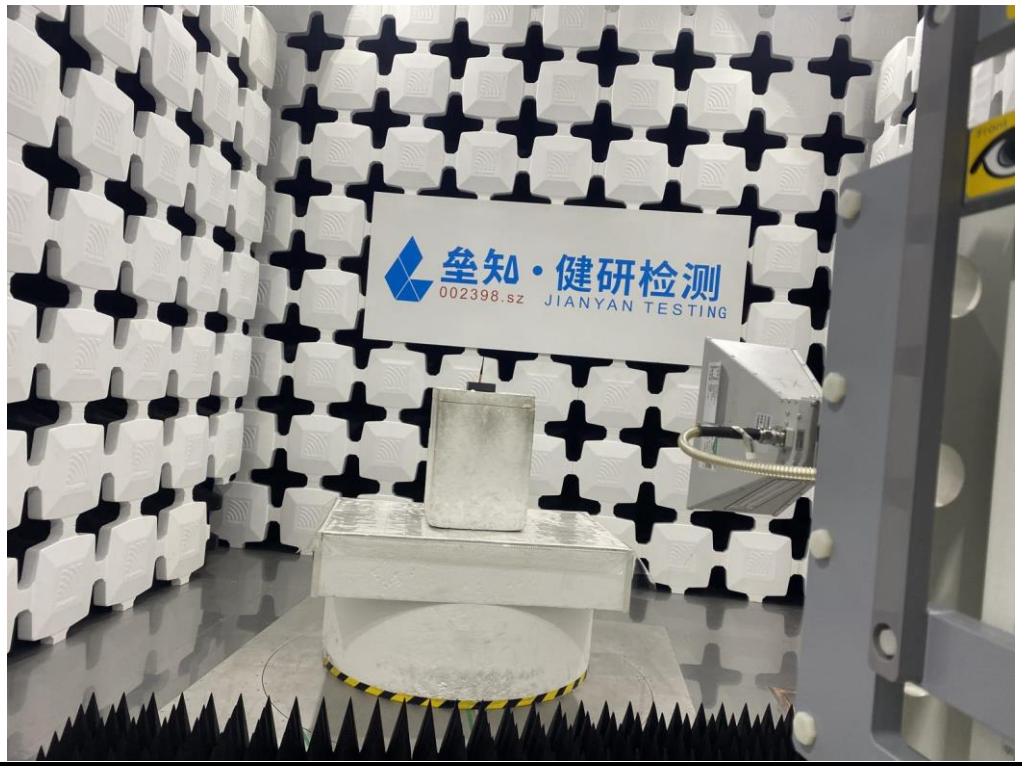
| 802.11n-HT40 Highest Channel: | | | | | |
|---|---|---|---|---|---|
| Wanted signal mean power from companion device (dBm) | Blocking signal frequency (MHz) | Blocking signal power(dBm) | PER measurement level (%) | PER Limit (%) | Results |
| -68 | 2380 | -34 | 3 | 10 | Pass |
| | 2504 | | 3 | | |
| -74 | 2300 | | 4 | 10 | Pass |
| | 2330 | | 2 | | |
| | 2360 | | 5 | | |
| | 2524 | | 1 | 10 | Pass |
| | 2584 | | 5 | | |
| | 2674 | | 4 | | |
| *NOTE:*<br>*(4) The minimum performance criterion shall be PER less than or equal to 10 %.*<br>(5) *The EUT belongs to receiver category 1 equipment.*<br>(6) *Conducted measurements.* | | | | | |

# 7 Test setup photo

Radiated Emission Below 1GHz




Radiated Emission Above 1GHz



# 8 EUT Constructional Details

Reference to the test report No. JYTSZB-R01-2100195

# 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: …
  The minimum number of Hopping Frequencies: …
- The Dwell Time: …
- The Minimum Channel Occupation Time: …

**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: 1.743 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 802.11b
- Power Spectral Density 802.11b
- Duty cycle, Tx-Sequence, Tx-gap …
- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment) …
- Hopping Frequency Separation (only for FHSS equipment) …
- Medium Utilisation …
- Adaptivity & Receiver Blocking 802.11b
- Occupied Channel Bandwidth 802.11n(HT40)
- Transmitter unwanted emissions in the OOB domain 802.11b
- Transmitter unwanted emissions in the spurious domain 802.11b
- Receiver spurious emissions 802.11b

**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: 2412 MHz to 2472 MHz
- Operating Frequency Range 2: 2422 MHz to 2462 MHz

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

**j) Occupied Channel Bandwidth(s):**

- Occupied Channel Bandwidth 1: 36.65 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: 4.5 V to 5.5 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: 2.0 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 5.0 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:**

Continuous transmitting mode control in engineer mode.

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

# 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: 15.17 dBm

Corresponding Antenna assembly gain: 2.0 dBi  Antenna Assembly #: 1

Corresponding conducted power setting: 13.17 dBm  Listed as Power Setting #: 19

(also the power level to be used for testing)

# Additional information provided by the applicant

## Modulation:

ITU Class(es) of emission: DSSS

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------