

# RF Exposure Evaluation Report

**Applicant:** Hangzhou Roombanker Technology Co., Ltd.

**Address of Applicant:** A#801 Wantong center, Hangzhou, China

## Equipment Under Test (EUT)

**Product Name:** Smart Gateway

**Model No.:** DSGW-201

**FCC ID:** 2AUXBDSGW-201

**Applicable standards:** FCC CFR Title 47 Part 2 (§2.1091)

**Date of sample receipt:** 13 Oct., 2022

**Date of Test:** 14 Oct., to 10 Nov., 2022

**Date of report issue:** 24 Nov., 2022

**Test Result:** PASS

**Tested by:**

Mike DU

Test Engineer

**Date:**

24 Nov., 2022

**Reviewed by:**

Wenwen Zhang

Project Engineer

**Date:**

24 Nov., 2022

**Approved by:**

Wenwen Zhang

Manager

**Date:**

24 Nov., 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.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

## 1 Version

| Version No. | Date          | Description      |
|-------------|---------------|------------------|
| 00          | 11 Nov., 2022 | Original         |
| 01          | 24 Nov., 2022 | Updated page 4/8 |
|             |               |                  |
|             |               |                  |
|             |               |                  |

## 2 Contents

|  | Page |
|--|------|
| Cover Page .....   | 1    |
| 1 Version .....  | 2    |
| 2 Contents.....  | 3    |
| 3 General Information .....                                      | 4    |
| 3.1 Client Information .....                                     | 4    |
| 3.2 General Description of E.U.T. ....                           | 4    |
| 3.3 Operating Modes.....   | 5    |
| 3.4 Additions to, deviations, or exclusions from the method..... | 5    |
| 3.5 Laboratory Facility .....                                    | 6    |
| 3.6 Laboratory Location.....                                     | 6    |
| 4 Technical Requirements Specification .....                     | 7    |
| 4.1 Limits .....   | 7    |
| 4.2 Test Procedure .....   | 7    |
| 4.3 Result .....   | 8    |
| 4.4 Conclusion.....  | 8    |

### 3 General Information

#### 3.1 Client Information

|               |  |
|---------------|--|
| Applicant:    | Hangzhou Roombanker Technology Co., Ltd. |
| Address:      | A#801 Wantong center, Hangzhou, China    |
| Manufacturer: | Hangzhou Roombanker Technology Co., Ltd. |
| Address:      | A#801 Wantong center, Hangzhou, China    |

#### 3.2 General Description of E.U.T.

|                        |  |                |                                  |
|------------------------|--|----------------|----------------------------------|
| Product Name:          | Smart Gateway  |                |                                  |
| Model No.:             | DSGW-201   |                |                                  |
| Operation Frequency:   | 2.4G Wi-Fi: 2412MHz~2462MHz<br>Zigbee: 2405MHz~2480MHz<br>BLE: 2402MHz~2480MHz<br>Z-Wave: 908.4 MHz<br>5G Wi-Fi Band 1: 5150 MHz - 5250 MHz<br>5G Wi-Fi Band 4: 5725 MHz - 5850 MHz<br>WCDMA band II: 1852.4 MHz - 1907.6 MHz<br>WCDMA band IV: 1712.4 MHz - 1752.6 MHz<br>WCDMA band V: 826.4 MHz - 846.6 MHz<br>LTE band 2: 1850 MHz - 1910 MHz<br>LTE band 4: 1710 MHz - 1755 MHz<br>LTE band 5: 824 MHz - 849 MHz<br>LTE band 7: Tx: 2500 MHz - 2570 MHz<br>LTE band 12: 699 MHz - 716 MHz<br>LTE band 13: 777 MHz - 787 MHz<br>LTE band 25: 1850 MHz - 1915 MHz<br>LTE band 26: 814 MHz - 849 MHz<br>LTE band 38: Tx: 2570 MHz - 2620 MHz<br>LTE band 41: Tx: 2496 MHz - 2690 MHz |                |                                  |
| Modulation technology: | 2.4G Wi-Fi: 802.11b: DSSS, 802.11g/n: OFDM<br>BLE: GFSK<br>Z-Wave: GFSK<br>Zigbee: OQPSK<br>5G Wi-Fi : IEEE 802.11a/802.11n: OFDM-BPSK, QPSK, 16QAM, 64QAM<br>IEEE 802.11ac: OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM   |                |                                  |
| Antenna Type:          | Internal Antenna   |                |                                  |
| Antenna gain:          | 2.4G Wi-Fi: ANT1/2: 2.63 dBi; BLE: 2 dBi; ZigBee: 0.5 dBi; Z-Wave: 3.15 dBi<br>5.8G Wi-Fi : ANT1/2: 4.86 dBi; 5.2G Wi-Fi :ANT1/2: 2.96 dBi   |                |                                  |
|                        | WCDMA  | WCDMA band II: | 4.30 dBi (declare by Applicant)  |
|                        |  | WCDMA band IV: | 2.90 dBi (declare by Applicant)  |
|                        |  | WCDMA band V:  | 2.47 dBi (declare by Applicant)  |
|                        | LTE  | LTE band 2:    | 4.30 dBi (declare by Applicant)  |
|                        |  | LTE band 4:    | 2.90 dBi (declare by Applicant)  |
|                        |  | LTE band 5:    | 2.47 dBi (declare by Applicant)  |
|                        |  | LTE band 7:    | 2.50 dBi (declare by Applicant)  |
|                        |  | LTE band 12:   | -0.47 dBi (declare by Applicant) |
|                        |  | LTE band 13:   | 0.48 dBi (declare by Applicant)  |

|                        |   |                                 |
|------------------------|---|---------------------------------|
|                        | LTE band 25:  | 4.30 dBi (declare by Applicant) |
|                        | LTE band 26:  | 2.47 dBi (declare by Applicant) |
|                        | LTE band 38:  | 0.96 dBi (declare by Applicant) |
|                        | LTE band 41:  | 2.50 dBi (declare by Applicant) |
| Test Sample Condition: | The test samples were provided in good working order with no visible defects. |                                 |

### 3.3 Operating Modes

| Operating mode     | Detail description  |
|--------------------|---|
| BLE mode           | Keep the EUT in continuously transmitting in BLE mode           |
| Z-Wave mode        | Keep the EUT in continuously transmitting in Z-Wave mode        |
| Zigbee mode        | Keep the EUT in continuously transmitting in Zigbee mode        |
| 2.4G WIFI mode     | Keep the EUT in continuously transmitting in 2.4G WIFI mode     |
| 5.2G WIFI mode     | Keep the EUT in continuously transmitting in 5.2G WIFI mode     |
| 5.8G WIFI mode     | Keep the EUT in continuously transmitting in 5.8G WIFI mode     |
| WCDMA band II mode | Keep the EUT in continuously transmitting in WCDMA band II mode |
| WCDMA band IV mode | Keep the EUT in continuously transmitting in WCDMA band IV mode |
| WCDMA band V mode  | Keep the EUT in continuously transmitting in WCDMA band V mode  |
| LTE band 2 mode    | Keep the EUT in continuously transmitting in LTE band 2 mode    |
| LTE band 4 mode    | Keep the EUT in continuously transmitting in LTE band 4 mode    |
| LTE band 5 mode    | Keep the EUT in continuously transmitting in LTE band 5 mode    |
| LTE band 7 mode    | Keep the EUT in continuously transmitting in LTE band 7 mode    |
| LTE band 12 mode   | Keep the EUT in continuously transmitting in LTE band 12 mode   |
| LTE band 13 mode   | Keep the EUT in continuously transmitting in LTE band 13 mode   |
| LTE band 25 mode   | Keep the EUT in continuously transmitting in LTE band 25 mode   |
| LTE band 26 mode   | Keep the EUT in continuously transmitting in LTE band 26 mode   |
| LTE band 38 mode   | Keep the EUT in continuously transmitting in LTE band 38 mode   |
| LTE band 41 mode   | Keep the EUT in continuously transmitting in LTE band 41 mode   |

### 3.4 Additions to, deviations, or exclusions from the method

|    |
|----|
| No |
|----|

### 3.5 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>

### 3.6 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 Technical Requirements Specification

### 4.1 Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

| Frequency range (MHz)                                   | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposures        |                               |                               |                                     |                          |
| 0.3–3.0   | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0–30  | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30–300  | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300–1500  |                               |                               | f/300                               | 6                        |
| 1500–100,000  |                               |                               | 5                                   | 6                        |
| (B) Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
| 0.3–1.34  | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30   | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30–300  | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300–1500  |                               |                               | f/1500                              | 30                       |
| 1500–100,000  |                               |                               | 1.0                                 | 30                       |

### 4.2 Test Procedure

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

### 4.3 Result

| Frequency (MHz)  | Maximum Output power (dBm) | Maximum Output power (mW) | Antenna Gain (dBi) | Antenna Gain (numeric) | Distance (cm) | Result (mW/cm <sup>2</sup> ) | Limits for General Population/ Uncontrolled Exposure (mW/cm <sup>2</sup> ) |
|------------------|----------------------------|---------------------------|--------------------|------------------------|---------------|------------------------------|--|
| 2.4G Wi-Fi       |                            |                           |                    |                        |               |                              |  |
| 2412             | 16.75                      | 47.315                    | 2.63               | 1.83                   | 20.00         | 0.0172                       | 1.0  |
| BLE              |                            |                           |                    |                        |               |                              |  |
| 2402             | 9.389                      | 8.688                     | 2                  | 1.58                   | 20.00         | 0.0027                       | 1.0  |
| Zigbee           |                            |                           |                    |                        |               |                              |  |
| 2405             | 10.062                     | 10.144                    | 0.5                | 1.12                   | 20.00         | 0.0023                       | 1.0  |
| 5G Wi-Fi         |                            |                           |                    |                        |               |                              |  |
| 5190             | 13.891                     | 24.496                    | 2.96               | 1.98                   | 20.00         | 0.0096                       | 1.0  |
| 5825             | 13.94                      | 24.774                    | 4.86               | 3.06                   | 20.00         | 0.0151                       | 1.0  |
| WCDMA            |                            |                           |                    |                        |               |                              |  |
| Band II          | 23.88                      | 244.343                   | 4.30               | 2.39                   | 20.00         | 0.1308                       | 1.0  |
| Band IV          | 23.82                      | 240.991                   | 2.90               | 1.95                   | 20.00         | 0.0935                       | 1.0  |
| Band V           | 23.86                      | 243.220                   | 2.47               | 1.77                   | 20.00         | 0.0855                       | 0.55   |
| LTE              |                            |                           |                    |                        |               |                              |  |
| Band 2           | 24.64                      | 291.072                   | 4.30               | 2.69                   | 20.00         | 0.1559                       | 1.0  |
| Band 4           | 24.91                      | 309.742                   | 2.90               | 1.95                   | 20.00         | 0.1202                       | 1.0  |
| Band 5           | 24.00                      | 251.189                   | 2.47               | 2.10                   | 20.00         | 0.0883                       | 0.55   |
| Band 7           | 23.87                      | 243.781                   | 2.50               | 1.78                   | 20.00         | 0.0862                       | 1.0  |
| Band 12          | 24.30                      | 269.153                   | -0.47              | 0.90                   | 20.00         | 0.0481                       | 0.47   |
| Band 13          | 24.13                      | 258.821                   | 0.48               | 1.12                   | 20.00         | 0.0575                       | 0.52   |
| Band 25          | 24.55                      | 285.102                   | 4.30               | 2.69                   | 20.00         | 0.1527                       | 1.0  |
| Band 26(Part22)  | 24.07                      | 255.270                   | 2.47               | 1.77                   | 20.00         | 0.0897                       | 0.54   |
| Band 26(Part90S) | 24.94                      | 311.889                   | 2.47               | 1.77                   | 20.00         | 0.1096                       | 0.54   |
| Band 38          | 23.89                      | 244.906                   | 0.96               | 1.25                   | 20.00         | 0.0608                       | 1.0  |
| Band 41          | 23.91                      | 246.037                   | 2.50               | 1.78                   | 20.00         | 0.0870                       | 1.0  |

**Simultaneous transmission(Worse mode):**

| Mode             | Ratio  | Total Ratio | Limit |
|------------------|--------|-------------|-------|
| 2.4G Wi-Fi       | 0.0172 | 0.2202      | 1.00  |
| Band 26(Part90S) | 0.2030 |             |       |

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

### 4.4 Conclusion

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

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