

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-021

Trade Mark: N/A

FCC ID: 2AUXBDSGW-021




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


Date of sample receipt: 23 Dec., 2022

Date of Test: 24 Dec., 2022 to 16 Jan., 2023

Date of report issue: 17 Jan., 2023

Test Result: PASS

Tested by:	 Test Engineer	Date:	17 Jan., 2023
Reviewed by:	 Project Engineer	Date:	17 Jan., 2023
Approved by:	 Manager	Date:	17 Jan., 2023



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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1 Version

Version No.	Date	Description
00	17 Jan., 2023	Original

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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-021	
Operation Frequency:	BLE: 2402MHz~2480MHz 2.4G WiFi : 2412 MHz - 2462 MHz 5G WiFi: Band 1: 5150 MHz - 5250 MHz Band 4: 5725 MHz - 5850 MHz WCDMA band II: 1852.4 MHz - 1907.6 MHz WCDMA band IV: 1712.4 MHz - 1752.6 MHz WCDMA band V: 826.4 MHz - 846.6 MHz LTE band 2: 1850 MHz - 1910 MHz LTE band 4: 1710 MHz - 1755 MHz LTE band 5: 824 MHz - 849 MHz LTE band 7: 2500 MHz - 2570 MHz LTE band 12: 699 MHz - 716 MHz LTE band 13: 777 MHz - 787 MHz LTE band 25: 1850 MHz - 1915 MHz LTE band 26: 814 MHz - 849 MHz LTE band 38: 2570 MHz - 2620 MHz LTE band 41: 2496 MHz - 2690 MHz	
Modulation technology:	BLE:	GFSK
	2.4G WiFi	(IEEE 802.11b):DSSS-DBPSK, DQPSK, CCK
		(IEEE 802.11g/802.11n): OFDM-BPSK, QPSK, 16QAM, 64QAM
	5G WiFi	(IEEE 802.11a/802.11n): OFDM-BPSK, QPSK, 16QAM, 64QAM
		(IEEE 802.11ac): OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
	WCDMA:	QPSK,16QAM
LTE:	QPSK,16QAM	
Antenna Type:	2.4G WiFi & 5G WiFi: Integral antenna, BLE & WCDMA & LTE: Internal Antenna	
Antenna gain:	BLE: 3.24dBi; 2.4G WiFi: 3.82 dBi; 5G WiFi band 1: 4.23 dBi, band 4: 4.80dBi	
	WCDMA	WCDMA band II: 6.57 dBi (declare by Applicant)
		WCDMA band IV: 4.60 dBi (declare by Applicant)
		WCDMA band V: 1.53 dBi (declare by Applicant)
	LTE	LTE band 2: 6.57 dBi (declare by Applicant)
		LTE band 4: 4.60 dBi (declare by Applicant)
		LTE band 5: 1.53 dBi (declare by Applicant)
		LTE band 7: 4.80 dBi (declare by Applicant)
		LTE band 12: 4.41 dBi (declare by Applicant)
		LTE band 13: 3.96 dBi (declare by Applicant)
LTE band 25: 6.57 dBi (declare by Applicant)		

	LTE band 26:	1.53 dBi (declare by Applicant)
	LTE band 38:	4.48 dBi (declare by Applicant)
	LTE band 41:	4.80 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
BLEmode	Keep the EUT in continuously transmitting in BLE mode
2.4G WiFi mode	Keep the EUT in continuously transmitting in 2.4G WiFi mode
5G WiFi mode	Keep the EUT in continuously transmitting in 5G WiFi Band 1/4 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.

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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 ²)	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 ²)	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 ²)	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 ²)	Limits for General Population/ Uncontrolled Exposure (mW/cm ²)
BLE							
2480	8.598	7.241	3.24	2.11	20.00	0.0030	1.0
2.4G WiFi							
2462	18.19	65.917	3.82	2.41	20.00	0.0316	1.0
5G WiFi							
Band 1	15.448	35.059	4.23	2.65	20.00	0.0185	1.0
Band 4	15.448	35.059	4.80	3.02	20.00	0.0211	1.0
WCDMA							
Band II	25.47	352.371	6.57	4.54	20.00	0.3182	1.0
Band IV	25.82	381.944	4.60	2.88	20.00	0.2191	1.0
Band V	24.00	251.189	1.53	1.42	20.00	0.0711	0.55
LTE							
Band 2	26.23	419.759	6.57	4.54	20.00	0.3791	1.0
Band 4	26.89	488.652	4.60	2.88	20.00	0.2804	1.0
Band 5	23.71	234.963	1.53	1.42	20.00	0.0665	0.55
Band 7	26.87	486.407	4.80	3.02	20.00	0.2922	1.0
Band 12	25.41	347.536	4.41	2.76	20.00	0.1909	0.47
Band 13	26.43	439.542	3.96	2.49	20.00	0.2176	0.52
Band 25	26.14	411.150	6.57	4.54	20.00	0.3713	1.0
Band 26 (Part 90S)	24.07	255.270	1.53	1.42	20.00	0.0722	0.54
Band 26 (Part 22)	24.32	270.396	1.53	1.42	20.00	0.0765	0.54
Band 38	25.94	392.645	4.48	2.81	20.00	0.2191	1.0
Band 41	26.91	490.908	4.80	3.02	20.00	0.2949	1.0

Simultaneous transmission(Worse mode):

Mode	Ratio	Total Ratio	Limit
2.4G WiFi	0.0316	0.4501	1.00
LTE Band 13	0.4185		

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-----