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-023
FCC ID:	2AUXBDSGW-023
Applicable standards:	FCC CFR Title 47 Part 2 (§2.1091)
Date of sample receipt:	25 Nov., 2022
Date of Test:	26 Nov., to 28 Dec., 2022
Date of report issue:	29 Dec., 2022
Test Result:	PASS

Tested by:	Mike ou ***Test Engineer***	***Date:***	*29 Dec., 2022*
Reviewed by:	Winner Zhang ***Project Engineer***	***Date:***	*29 Dec., 2022*
Approved by:	Manager	***Date:***	*29 Dec., 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.

1 Version

Version No.	Date	Description
00	*29 Dec., 2022*	*Original*

2 Contents

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-023		
Operation Frequency:	2.4G Wi-Fi: 2412MHz~2462MHz Zigbee: 2405MHz~2480MHz BLE: 2402MHz~2480MHz Z-Wave: 908.4 MHz 5G Wi-Fi Band 1: 5150 MHz - 5250 MHz 5G Wi-Fi 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 12: 699 MHz - 716 MHz LTE band 13: 777 MHz - 787 MHz LTE band 14: 788MHz - 798MHz LTE band 66: 1710 MHz - 1780 MHz LTE band 71: 663 MHz - 698 MHz		
Modulation technology:	2.4G Wi-Fi: 802.11b: DSSS, 802.11g/n: OFDM BLE: GFSK Z-Wave: GFSK Zigbee: OQPSK 5G Wi-Fi : 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:	Internal Antenna		
Antenna gain:	2.4G Wi-Fi: ANT1/2: 6 dBi; BLE: 3.24dBi; ZigBee: 0.5 dBi; Z-Wave: 0.39 dBi		
	5.8G Wi-Fi : ANT1/2: 6 dBi; 5.2G Wi-Fi :ANT1/2: 6 dBi		
	WCDMA	WCDMA band II:	2.13 dBi (declare by Applicant)
		WCDMA band IV:	0.86 dBi (declare by Applicant)
		WCDMA band V:	3.39 dBi (declare by Applicant)
	LTE	LTE band 2:	2.13 dBi (declare by Applicant)
		LTE band 4:	0.86 dBi (declare by Applicant)
		LTE band 5:	3.39 dBi (declare by Applicant)
		LTE band 12:	1.61 dBi (declare by Applicant)
		LTE band 13:	2.90 dBi (declare by Applicant)
		LTE band 14:	3.28 dBi (declare by Applicant)

		LTE band 66:	0.86 dBi (declare by Applicant)
		LTE band 71:	0.45 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
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 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 14 mode	Keep the EUT in continuously transmitting in LTE band 14 mode
LTE band 66 mode	Keep the EUT in continuously transmitting in LTE band 66 mode
LTE band 71 mode	Keep the EUT in continuously transmitting in LTE band 71 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^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)
2.4G Wi-Fi							
2437	16.72	46.989	6	3.98	20.00	0.037	1.0
BLE							
2442	7.39	5.483	3.24	2.11	20.00	0.002	1.0
ZigBee							
2405	10.062	10.144	0.5	1.12	20.00	0.002	1.0
5G Wi-Fi							
5200	15.332	34.135	6	3.98	20.00	0.027	1.0
5825	15.14	32.659	6	3.98	20.00	0.026	1.0
WCDMA							
Band II	25.79	379.315	2.13	1.63	20.00	0.123	1.0
Band IV	24.43	277.332	0.86	1.22	20.00	0.067	1.0
Band V	25.24	334.195	3.39	2.18	20.00	0.145	0.55
LTE							
Band 2	25.7	371.535	2.13	1.63	20.00	0.121	1.0
Band 4	24.46	279.254	0.86	1.22	20.00	0.068	1.0
Band 5	25.71	372.392	3.39	2.18	20.00	0.162	0.55
Band 12	23.96	248.886	1.61	1.45	20.00	0.072	0.47
Band 13	25.69	370.681	2.90	1.95	20.00	0.144	0.52
Band 14	25.66	368.129	3.28	2.13	20.00	0.156	0.53
Band 66	25.24	334.195	0.86	1.22	20.00	0.081	1.0
Band 71	22.31	170.216	0.45	1.11	20.00	0.038	0.44

Simultaneous transmission(Worse mode):

Mode	Ratio	Total Ratio	Limit
2.4G Wi-Fi	0.020	0.143	1.00
WCDMA Band II	0.123		

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------