

1 Version

Version No.	Date	Description
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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
Factory:	Zhejiang dusun electron co., ltd
Address:	No.640 Feng Qing St, DeQing Zhejiang China

3.2 General Description of E.U.T.

Product Name:	Smart Gateway L-Serial
Model No.:	DSGW-041, DSGW-041-X(X:1~25)
Operation Frequency:	2.4G Wi-Fi: 2412MHz~2462MHz ZigBEE: 2405MHz~2480MHz 908.4 MHz GSM850: 824.2 MHz - 848.8 MHz PCS1900: 1850.2 MHz - 1909.8 MHz BLE: 2402MHz~2480MHz 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 25: 1850 MHz - 1915 MHz
Modulation technology:	802.11b: DSSS, 802.11g/n: OFDM BLE: GFSK, ZigBEE : OQPSK, 908.4MHz: GFSK, GSM: GPRS, EGPRS LTE: QPSK, 16QAM
Antenna Type:	Internal Antenna & PCB Antenna
Antenna gain:	Wi-Fi: ANT1: 3.88dBi (declare by Applicant); ANT2: 4.47dBi (declare by applicant) BLE: 0.2 dBi (declare by Applicant), ZigBee: 0.7 dBi (declare by Applicant) 908.4MHz: 0.39 dBi (declare by Applicant) GSM 850: 1.53 dBi (declare by Applicant) PCS1900: 1.57 dBi (declare by Applicant) LTE band 2: 1.57 dBi (declare by Applicant) LTE band 4: 4.60 dBi (declare by Applicant) LTE band 5: 1.53 dBi (declare by Applicant) LTE band 12: 4.41 dBi (declare by Applicant) LTE band 13: 3.96 dBi (declare by Applicant) LTE band 25: 1.57dBi (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
ZigBee mode	Keep the EUT in continuously transmitting in ZigBee mode
Transmitting mode	Keep the EUT in continuously transmitting in transmitting e mode
2.4G WIFI mode	Keep the EUT in continuously transmitting in 2.4G WIFI mode
GSM mode	Keep the EUT in continuously transmitting in GSM 850/ PCS1900 mode
LTE mode	Keep the EUT in continuously transmitting in LTE band 2/4/5/12/13/25mode

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)	Verdict
2.4G Wi-Fi								
2452	17.468	55.821	4.47	2.80	20.00	0.031	1.0	Pass
BLE								
2402	5.298	3.387	0.2	1.05	20.00	0.001	1.0	Pass
ZigBee								
2405	7.77	5.984	0.7	1.17	20.00	0.001	1.0	Pass
Z-WAVE								
908.4	-29.40	0.001	0.39	1.09	20.00	0.000	0.61	Pass
GSM								
GSM850	23.97	249.459	1.53	1.42	20.00	0.071	0.55	Pass
PCS1900	20.97	125.026	1.57	1.44	20.00	0.036	1.0	Pass
EMTC: LTE								
LTE Band2	24.00	251.189	1.57	1.44	20.00	0.072	1.0	Pass
LTE Band4	23.00	199.526	4.60	2.88	20.00	0.114	1.0	Pass
LTE Band5	24.00	251.189	1.53	1.42	20.00	0.071	0.55	Pass
LTE Band12	24.00	251.189	4.41	2.76	20.00	0.138	0.47	Pass
LTE Band13	24.00	251.189	3.96	2.49	20.00	0.124	0.52	Pass
LTE Band25	25.00	316.228	1.57	1.44	20.00	0.090	1.0	Pass
NB-IOT: LTE								
LTE Band2	25.00	316.228	1.57	1.44	20.00	0.090	1.0	Pass
LTE Band4	25.00	316.228	4.60	2.88	20.00	0.181	1.0	Pass
LTE Band5	25.00	316.228	1.53	1.42	20.00	0.089	0.55	Pass
LTE Band12	25.00	316.228	4.41	2.76	20.00	0.174	0.47	Pass
LTE Band13	25.00	316.228	3.96	2.49	20.00	0.157	0.52	Pass
LTE Band25	25.00	316.228	1.57	1.44	20.00	0.090	1.0	Pass

Note:

1. Just the worst case mode was shown in report.
2. The GSM and LTE maximum output power reference report: R2007A0435-R1 & R2007A0435-R2 & R2007A0435-R3 & R2007A0435-R4 & R2007A0435-R5 & R2007A0435-R6, FCC ID: XMR201707BG96, which is issued by TA Technology(Shanghai) Co., Ltd.

Simultaneous transmission(Worse mode):

Mode	Ratio	Total Ratio	Limit	Verdict
NB-IOT LTE Band 12	0.370	0.403	1.00	Pass
2.4G Wi-Fi	0.031			
Z-WAVE	0.000			
BLE	0.001			
Zigbee	0.001			

4.4 Conclusion

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

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