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:	IoT Ceiling Edge Computer Gateway
Model No.:	DSGW-230
FCC ID:	2AUXBDSGW-230
Applicable standards:	FCC CFR Title 47 Part 2 Subpart J Section 2.1091
Date of sample receipt:	10 May, 2022
Date of Test:	11 May, to 25 May, 2022
Date of report issue:	25 May, 2022
Test Result:	PASS*

Authorized Signature:

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	*25 May, 2022*	*Original*

Tested by: Janet Wei ***Date:*** *25 May, 2022*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *25 May, 2022*

Project Engineer

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4 General Information

4.1 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

4.2 General Description of E.U.T.

Product Name:	IoT Ceiling Edge Computer Gateway
Model No.:	DSGW-230
Operation Frequency:	LTE (Tx): Band2: 1850 MHz~1910 MHz Band4: 11710 MHz~1755 MHz Band5: 824 MHz~849 MHz Band12: 699 MHz~716 MHz Band13: 777 MHz~787 MHz Band25: 1850 MHz~915 MHz Band26: 814MHz~849MHz 2.4G Wi-Fi: 2412MHz~2462MHz 5.2G Wi-Fi Band 1: 5180MHz~5240MHz 5.8G Wi-Fi Band 4: 5725MHz~5875MHz BLE: 2402MHz~2480MHz Zigbee: 2405MHz~2480MHz LoRa(FHSS): 902.3MHz~914.9MHz LoRa(DTS): 923.3MHz~927.5MHz Z-wave:908.4MHz
Modulation technology:	LTE: QPSK, 16QAM 802.11b: DSSS, 802.11a/g/n/ac: OFDM BLE: GFSK, Zigbee:OQPSK LoRa: FSK, Z-wave: GFSK
Antenna Type:	Internal Antenna
Antenna gain:	LTE Band2 :3.84 dBi, Band4 :3.69 dBi, Band5 :-1.76 dBi, Band12 :-0.94 dBi, Band13 :-2.59 dBi, Band25 :3.84 dBi, Band26 :-1.76 dBi, 2.4G WiF-i: 4.56 dBi; 5.2G Wi-Fi: 4.27 dBi, 5.8G Wi-Fi: 4.41 dBi, BLE: 1.94 dBi, Zigbee: 2.0 dBi , LoRa(FHSS): 0.42 dBi, LoRa(DTS): -1.29 dBi Z-wave:2.63 dBi
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

4.3 Operating Modes

Operating mode	Detail description
LTE Band 2 mode	Keep the EUT in continuously transmitting in Band 2 mode
LTE Band 4 mode	Keep the EUT in continuously transmitting in Band 4 mode
LTE Band 5 mode	Keep the EUT in continuously transmitting in Band 5 mode
LTE Band 12 mode	Keep the EUT in continuously transmitting in Band 12 mode
LTE Band 13 mode	Keep the EUT in continuously transmitting in Band 13 mode
LTE Band 25 mode	Keep the EUT in continuously transmitting in Band 25 mode
LTE Band 26 mode	Keep the EUT in continuously transmitting in Band 26 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 mode
BLE mode	Keep the EUT in continuously transmitting in BLE mode
LoRa(HFSS) mode	Keep the EUT in continuously transmitting in LoRa(HFSS) mode
LoRa(DTS) mode	Keep the EUT in continuously transmitting in LoRa(DTS) mode
Zigbee mode	Keep the EUT in continuously transmitting in Zigbee mode
Z-wave mode	Keep the EUT in continuously transmitting in Z-wave mode

4.4 Additions to, deviations, or exclusions from the method

No

4.5 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

4.6 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

5 Technical Requirements Specification in FCC CFR Title 47 Part 2.1091

5.1 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

5.2 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

5.3 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)
LTE Band 2							
1905	24.50	281.84	3.84	2.42	20	0.136	1.0
LTE Band 4							
1732.5	24.50	281.84	3.69	2.34	20	0.131	1.0
LTE Band 5							
848.3	24.50	281.84	-1.76	0.67	20	0.037	0.566
LTE Band 12							
700.5	24.50	281.84	-0.94	0.81	20	0.045	0.467
LTE Band 13							
784.5	24.50	281.84	-2.59	0.55	20	0.031	0.523
LTE Band 25							
1882.5	25.00	316.23	3.84	2.42	20	0.152	1.0
LTE Band 26							
815.5	25.00	316.23	-1.76	0.67	20	0.420	0.544
2.4G WIFI							
2462	17.66	58.34	4.56	2.86	20	0.033	1.0
5.2G WIFI							
5230	12.83	19.19	4.27	2.67	20	0.010	1.0
5.8G WIFI							
5755	13.64	23.12	4.41	2.76	20	0.013	1.0
BLE							
2480	8.22	6.64	1.94	1.56	20	0.002	1.0
Zigbee							
2405	9.51	9.66	2.00	1.58	20	0.003	1.0
Lora(HFSS)							
902.3	20.73	118.30	0.42	1.10	20	0.026	0.602
DTS(HFSS)							
925.7	26.90	489.78	-1.29	0.74	20	0.072	0.617
Z-wave							
908.4	-12.33	0.06	2.63	1.83	20	0.001	0.606

Simultaneous Transmission Evaluation:

ANT No.	Mode	Ratio	Total Ratio	Limit
Main ANT	LTE Band 26	0.77	0.95	1.0
Secondary ANT	2.4G Wi-FI	0.03		
	LoRa	0.12		
	BLE	0.01		
	Zigbee	0.01		
	Z-Wave	0.01		

5.4 Conclusion

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

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