

1 Cover Page

RF Exposure Report

Application No.: FYCR2301000008AT
Applicant: Chongqing Qiulong Technology Co., Ltd.
Address of Applicant: No.259, Shimian Village, Qiezixi Street, Dadukou District, Chongqing City, China
Manufacturer: Shenzhen Jimi IoT Co., Ltd.
Address of Manufacturer: 3-4/F, Block A, Building #7, Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China
Factory: Huizhou Newthinking Electronics Co., Ltd.
Address of Factory: The third & sixth floor, 1&2 Factory Buildings, Jimi Industrial Park, No.101 Jinfu Road, Xiaojinkou street, Huicheng District, Huizhou
Equipment Under Test (EUT):
EUT Name: TBOX
Model No.: QL-TBOX-JM
Trade Mark: Surron
FCC ID: 2A92B-QL-TBOX-JM
Standard(s) : 47 CFR Part 2.1091
 47 CFR Part 1.1310
 47 CFR Part 1.1307
Date of Receipt: 2023-01-09
Date of Test: 2023-01-12 to 2023-02-06
Date of Issue: 2023-02-08

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Winkay Wang

EMC Technical Manager



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Compliance Certification Services (Kunshan) Inc.
 Shenzhen Branch

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-02-08		Original

Authorized for issue by:				
				
		Tree Zhan/Project Engineer		
				
		Winkey Wang/Reviewer		



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3 General Information

3.1 Details of E.U.T.

Power supply:	DC 3.7V, 270mAh rechargeable battery which charged by External power, or DC 9V~90V
Test Voltage:	DC 12V
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Data rate:	1Mbps, 2Mbps
Antenna Type:	PIFA Antenna
Antenna Gain:	1.5dBi
LTE CatM1/Cat NB2 Band*	
Operation Frequency Band:	LTE CatM1 Band 2, 4, 5, 12, 13, 25, 26, 66, 85 NB-IoT Band 2, 4, 5, 12, 13, 25, 26, 66, 71, 85
Modulation Type:	QPSK, 16QAM
Antenna Type:	PIFA Antenna
Antenna Gain:	Please refer to section 4.1.3 of the report

*: The LTE CatM1/Cat NB2 module approval by TCB(FCC ID:XMR2020BG95M2), Grant at 05/21/2020.



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3.2 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc. Shenzhen branch.

Fuyong lab. Xinlong TechnoPark, Fengtang Road, Fuyong Subdistrict, Bao'an, Shenzhen, China

Tel: +86 755 8866 3988 Fax: +86 755 2671 0594

No tests were sub-contracted.

3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 6606.01)

Compliance Certification Services (Kunshan) Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6606.01.

• FCC –Designation Number: CN1322

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

• Innovation, Science and Economic Development Canada

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.

IC#: 28189.



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4 Radio Spectrum Technical Requirement

4.1 RF Exposure

4.1.1 Requirement

In accordance with 47 CFR FCC Part 2.1091, this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

According to 47 CFR FCC Part 1310, 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 Part1.1307(b).

TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density



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4.1.2 Method

According to IEEE C95.3:2002 section 5.5.1.1, the power density S at a point on the axis at a distance d from a transmitting antenna is given by the Friis free-space transmission formula:

$$S = \frac{PG}{4\pi d^2}$$

S = power density (mW/cm²)

P = the net power delivered to the antenna (mW)

G = gain of the antenna in linear scale

d = distance between observation point and center of the radiator (cm)

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit stated in above table, the minimum distance between the antenna and human body will be calculated.

4.1.3 Conclusion

Type	Test Freq. (MHz)	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
BLE	2440	1.5	1.41	6.38	4.35	0.0012	1.0000	0.0012	PASS
CatM1 Band2	1850.7	3.19	2.08	22	158.49	0.0657	1.0000	0.0657	PASS
CatM1 Band4	1710.7	1.63	1.46	22	158.49	0.0459	1.0000	0.0459	PASS
CatM1 Band5	824.7	-1.44	0.72	22	158.49	0.0226	0.5498	0.0412	PASS
CatM1 Band12	699.7	2.37	1.73	22	158.49	0.0544	0.4665	0.1167	PASS
CatM1 Band13	779.5	1.46	1.40	22	158.49	0.0441	0.5197	0.0849	PASS
CatM1 Band 25	1850.7	3.19	2.08	22	158.49	0.0657	1.0000	0.0657	PASS
CatM1 Band 26	824.7	-1.44	0.72	22	158.49	0.0226	0.5498	0.0412	PASS
CatM1 Band 66	1710.7	1.63	1.46	22	158.49	0.0459	1.0000	0.0459	PASS
CatM1 Band 85	700.5	2.44	1.75	22	158.49	0.0553	0.4670	0.1184	PASS
NB-IoT Band 2	1850.2	3.19	2.08	22	158.49	0.0657	1.0000	0.0657	PASS
NB-IoT	1710.2	1.63	1.46	22	158.49	0.0459	1.0000	0.0459	PASS



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Band 4									
NB-IoT Band 5	824.2	-1.44	0.72	22	158.49	0.0226	0.5495	0.0412	PASS
NB-IoT Band 12	699.2	2.37	1.73	22	158.49	0.0544	0.4661	0.1167	PASS
NB-IoT Band 13	777.2	1.46	1.40	22	158.49	0.0441	0.5181	0.0852	PASS
NB-IoT Band 25	1850.2	3.19	2.08	22	158.49	0.0657	1.0000	0.0657	PASS
NB-IoT Band 66	1710.2	1.63	1.46	22	158.49	0.0459	1.0000	0.0459	PASS
NB-IoT Band 71	663.2	2.74	1.88	22	158.49	0.0593	0.4421	0.1340	PASS
NB-IoT Band 85	698.2	2.37	1.73	22	158.49	0.0544	0.4655	0.1169	PASS

Note: Refer to report No. FYCR230100000802 and R1907A0448-R7V2 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

the MPE limit of 300MHz to 1500MHz is f/1500 mW/cm², the MPE limit of 1500MHz to 100000MHz is 1.0 mW/cm².

The simultaneous transmission result between of BLE and CatM1/NB-IoT Band:

The SAR Exclusion Threshold Level:

=CPD1 / LPD1 + CPD2 / LPD2

(CPD = Calculation power density, LPD = Limit of power density)

= (0.0012/1) +(0.0593/0.4421) = 0.1352 < 1

Since the SAR Exclusion Threshold Level is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

4.2 EUT Constructional Details

Refer to Appendix - external and internal photos for FYCR2301000008AT.

--End of the Report--



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