

TEST REPORT

Applicant: Shenzhen Jimi IoT Co., Ltd.
Address: 3-4/F, Block A, Building #7, Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China
Equipment Type: LTE CAT1 ASSET GNSS TRACKER
Model Name: LL302
Brand Name: JIMI
FCC ID: 2AMLF-LL302
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Test Date: Aug. 05, 2022 – Aug. 18, 2022
Date of Issue: Sep. 07, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Zhong Weiqiang **Checked by:** Xiong Lining **Approved by:** Wei Yanquan
(Chief Engineer)

Zhong Weiqiang

Xiong Li Ning

Wei Yanquan

Revision History		
Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Sep. 01, 2022</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Sep. 07, 2022</u>	<u>Updated test data in section 5.3</u>

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	<input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	<input type="checkbox"/> 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Shenzhen Jimi IoT Co., Ltd.
Address	3-4/F, Block A, Building #7, Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China

2.2 Manufacturer Information

Manufacturer	Shenzhen Jimi IoT Co., Ltd.
Address	3-4/F, Block A, Building #7, Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	LTE CAT1 ASSET GNSS TRACKER
Model Name Under Test	LL302
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	TT72_MB_V1.4
Software Version	TT72_LL302E_WAAP_YY_V4.28_cta_test_220527.1836
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Li-Polymer Battery 1	
	Brand Name	N/A
	Model No.	M145174
	Serial No.	N/A
	Capacity	6000mAh
	Rated Voltage	3.70 V
	Limit Charge Voltage	N/A

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS 850/1900 MHz 4G Network FDD LTE Band 2/4/5/7 2.4G WIFI, GPS
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	GSM, LTE		
Frequency Range	GSM 850	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	GSM 1900	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE Band 7	TX: 2500 ~ 2570 MHz	RX: 2620 ~ 2690 MHz
Antenna Type	PIFA Antenna		
Exposure Category	General Population/Uncontrolled Exposure		
EUT Stage	Mobile Device		

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices
2	KDB 447498 D04	447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Device:

CFR Title 47 §2.1091(b)

(b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter’s radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

Frequencies above 300 kHz but at distances $R > \lambda / 2 \pi$, R is the antenna-person separation distance

- Primarily MPE-based exemptions
- As this exemption requires $R > \lambda / 2 \pi$

the lowest frequency versus distance at which they can be used are:

- 20cm @ > 239 MHz;
- 50cm @ > 96 MHz; 1m @ > 48 MHz
- The rules do allow you to use the maximum conducted power and not the ERP when antenna is shorter than $\lambda / 4$
- $\lambda / 2 \pi$
- λ = wavelength of transmitted signal
- Can calculate from the frequency of operation using $v = f \lambda$
- v = speed of light = 3×10^8 m/s
- f = frequency (Hz)
- Primarily an MPE-based exclusion but also SAR-based where $\lambda / 2 \pi$ is < 20cm

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	$1,920 R^2$
1.34	–	30	35.6 m	–	1.6 m	$3,450 R^2/f^2$
30	–	300	1.6 m	–	159 mm	$3.83 R^2$
300	–	1,500	159 mm	–	31.8 mm	$0.0128 R^2f$
1,500	–	100,000	31.8 mm	–	0.5 mm	$19.2R^2$

Subscripts L and H are low and high; λ is wavelength.
 From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

5 ASSESSMENT RESULT

5.1 Output Power

GSM/GPRS 850						
Mode	GSM850			GPRS850 2TX		
	Low Channel	Middle Channel	High Channel	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	23.18	23.25	23.32	24.33	24.27	24.36
Antenna Gain (dBi)	-5.15					
ERP (dBm)	18.03	18.10	18.17	19.18	19.12	19.21

Note: This table listed the worst case power value, please refer to BL-SZ2280124-501 report for more details.

GSM/GPRS 1900						
Mode	GSM1900			GPRS1900 2TX		
	Low Channel	Middle Channel	High Channel	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	20.54	20.42	20.23	21.72	21.50	21.39
Antenna Gain (dBi)	-5.36					
EIRP (dBm)	15.18	15.06	14.87	16.36	16.14	16.03

Note: This table listed the worst case power value, please refer to BL-SZ2280124-501 report for more details.

LTE Band2						
Mode	QPSK			16-QAM		
	Low Channel	Middle Channel	High Channel	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	23.5	23.85	23.35	22.94	23.09	22.73
Antenna Gain (dBi)	-4.96					
EIRP (dBm)	18.54	18.89	18.39	17.98	18.13	17.77

Note: This table listed the worst case power value, please refer to BL-SZ2280124-501 report for more details.

LTE Band4						
Mode	QPSK			16-QAM		
	Low Channel	Middle Channel	High Channel	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	23.74	23.72	24.11	23.31	22.96	23.5
Antenna Gain (dBi)	-3.67					
EIRP (dBm)	20.07	20.05	20.44	19.64	19.29	19.83
Note: This table listed the worst case power value, please refer to BL-SZ2280124-501 report for more details.						

LTE Band5						
Mode	QPSK			16-QAM		
	Low Channel	Middle Channel	High Channel	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	23.37	23.28	23.06	22.34	22.58	22.3
Antenna Gain (dBi)	-5.25					
EIRP (dBm)	18.12	18.03	17.81	17.09	17.33	17.05
Note: This table listed the worst case power value, please refer to BL-SZ2280124-501 report for more details.						

LTE Band7						
Mode	QPSK			16-QAM		
	Low Channel	Middle Channel	High Channel	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	24	24.12	24.17	23.54	23.51	23.64
Antenna Gain (dBi)	-4.25					
EIRP (dBm)	19.75	19.87	19.92	19.29	19.26	19.39
Note: This table listed the worst case power value, please refer to BL-SZ2280124-501 report for more details.						

5.2 Turn-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
GPRS 850	23.00-25.00	/	18.00-20.00
GPRS 1900	20.00-22.00	14.00-17.00	11.85-13.85
FDD LTE Band 2	22.00-24.00	17.00-19.00	14.85-16.85
FDD LTE Band 4	22.00-25.00	19.00-21.00	16.85-18.85
FDD LTE Band 5	22.00-24.00	/	17.00-19.00
FDD LTE Band 7	23.00-25.00	19.00-20.00	16.85-17.85
Note1: ERP= EIRP -2.15dB.			
Note2: According KDB 447497 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.			

5.3 RF Exposure Evaluation Result

Evolution mode	Frequency Range (MHz)	Distance (cm)	$\lambda / 2 \pi$ (m)	$\lambda / 2 \pi$ (mm)	Distance Greater Than $\lambda / 2 \pi$	Threshold Power ERP(W)	Conducted Power (dBm)	Conducted Power (mW)	ERP Range (dBm)	ERP Range (W)	Verdict	$\lambda / 4$ (mm)	Antenna length
GPRS 850	848.800	20	0.056	56.000	Yes	0.435	25.00	0.316	20.00	0.100	Pass	88.360	61.000
GPRS 1900	1909.800	20	0.025	25.000	Yes	0.768	22.00	0.158	13.85	0.024	Pass	39.271	61.000
FDD LTE Band 2	1900.000	20	0.025	25.000	Yes	0.768	24.00	0.251	16.85	0.048	Pass	39.474	61.000
FDD LTE Band 4	1745.000	20	0.027	27.000	Yes	0.768	25.00	0.316	18.85	0.077	Pass	42.980	61.000
FDD LTE Band 5	844.000	20	0.057	57.000	Yes	0.432	24.00	0.251	19.00	0.079	Pass	88.863	61.000
FDD LTE Band 7	2560.000	20	0.019	19.000	Yes	0.768	25.00	0.316	17.85	0.061	Pass	29.297	61.000

5.4 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

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--END OF REPORT--