

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: Solar Powered Asset Tracker
Model Name: LL303
Brand Name: JIMI
FCC ID: 2AMLF-LL303
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Test Date: Aug. 17, 2022 – Aug. 31, 2022
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ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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(Chief Engineer)

Zhong Weiqiang

Xu Rui

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Revision History		
Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Oct. 28, 2022</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Nov. 07, 2022</u>	<u>Added the WIFI only receiver in section 2.6</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION.....	3
1.1	Test Laboratory	3
1.2	Test Location	3
2	PRODUCT INFORMATION	4
2.1	Applicant Information	4
2.2	Manufacturer Information.....	4
2.3	Factory Information.....	4
2.4	General Description for Equipment under Test (EUT).....	4
2.5	Ancillary Equipment.....	4
2.6	Technical Information	5
3	SUMMARY OF TEST RESULT	6
3.1	Test Standards	6
4	DEVICE CATEGORY AND LEVELS LIMITS	7
5	ASSESSMENT RESULT	9
5.1	Output Power	9
5.2	Tune-up power	10
5.3	RF Exposure Evaluation Result	10
5.4	Conclusion.....	10

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	Solar Powered Asset Tracker
Model Name Under Test	LL303
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	L343 PCB V1.3
Software Version	L343_LL303L_WABG_LA_V2.0_220627.1805
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	PL165182S
	Serial No.	N/A
	Capacity	10000 mAh
	Rated Voltage	3.7 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 Bluetooth, WIFI receiver, GPS
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	GSM, LTE, Bluetooth		
Frequency Range	GSM 850	TX: 824 MHz ~ 849 MHz	RX: 869 MHz ~ 894 MHz
	GSM 1900	TX: 1850 MHz ~ 1910 MHz	RX: 1930 MHz ~ 1990 MHz
	LTE Band 2	TX: 1850 MHz ~ 1910 MHz	RX: 1930 MHz ~ 1990 MHz
	LTE Band 4	TX: 1710 MHz ~ 1755 MHz	RX: 2110 MHz ~ 2155 MHz
	LTE Band 5	TX: 824 MHz ~ 849 MHz	RX: 869 MHz ~ 894 MHz
	LTE Band 7	TX: 2500 MHz ~ 2570 MHz	RX: 2620 MHz ~ 2690 MHz
	Bluetooth	2400 ~ 2483.5 MHz	
Antenna Type	FPC 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 v01	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

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad \text{(B.2)}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

5 ASSESSMENT RESULT

5.1 Output Power

GSM							
GSM850 Band	Burst Average Power(dBm)			Division Factors	Frame-Averaged power (dBm)		
Channel	128	190	251		128	190	251
GSM (GMSK, 1-Slot)	31.52	31.87	31.97	9.19	22.33	22.68	22.78
GPRS (GMSK, 1-Slot)	31.47	31.81	31.91	9.19	22.28	22.62	22.72
GPRS (GMSK, 2-Slots)	29.28	29.58	29.76	6.13	23.15	23.45	23.63
GPRS (GMSK, 3-Slots)	26.98	27.25	27.54	4.42	22.56	22.83	23.12
GPRS (GMSK, 4-Slots)	25.01	25.22	25.34	3.18	21.83	22.04	22.16
GSM1900 Band	Burst Average Power(dBm)			Division Factors	Frame-Averaged power(dBm)		
Channel	512	661	810		512	661	810
GSM (GMSK, 1-Slot)	29.13	29.17	29.00	9.19	19.94	19.98	19.81
GPRS (GMSK, 1-Slot)	29.14	29.12	28.95	9.19	19.95	19.93	19.76
GPRS (GMSK, 2-Slots)	26.96	27.12	27.03	6.13	20.83	20.99	20.90
GPRS (GMSK, 3-Slots)	24.99	25.04	24.98	4.42	20.57	20.62	20.56
GPRS (GMSK, 4-Slots)	22.92	23.02	22.90	3.18	19.74	19.84	19.72

Note: This table listed the worst case power value, please refer to BL-SZ2280597-501 report for more details.

GSM		
Mode	GSM850	GSM1900
Conducted Power (dBm)	23.63	20.99
Antenna Gain (dBi)	-4.26	-5.19
ERP/EIRP (dBm)	17.22	15.80

Note: This table listed the worst case power value, please refer to BL-SZ2280597-501 report for more details.

LTE				
Mode	Band 2	Band 4	Band 5	Band 7
Conducted Power (dBm)	22.33	22.52	22.45	22.34
Antenna Gain (dBi)	-4.29	-3.52	-5.19	-4.15
ERP/EIRP (dBm)	18.04	19.00	15.11	18.19

Note: This table listed the worst case power value, please refer to BL-SZ2280597-501 report for more details.

Bluetooth	
Conducted Power (dBm)	-3.28
Antenna Gain (dBi)	4.58
EIRP (dBm)	1.30

Note: This table listed the worst case power value, please refer to BL-SZ2280597-601 report for more details.

5.2 Tune-up power

Mode		Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
GSM	GSM850	[20.00, 24.00]	/	[15.74, 17.74]
	GSM1900	[20.00, 22.00]	[14.81, 16.81]	[12.66, 14.66]
LTE	Band 2	[21.00, 23.00]	[16.71, 18.71]	[14.56, 16.56]
	Band 4	[21.00, 23.00]	[17.48, 19.48]	[15.33, 17.33]
	Band 5	[21.00, 23.00]	/	[13.66, 15.66]
	Band 7	[21.00, 23.00]	[16.85, 18.85]	[14.70, 16.70]
Bluetooth		[-5.00, -3.00]	[-0.42, 1.58]	[-2.57, -0.57]

Note1: ERP= EIRP -2.15dB.
Note2: According KDB 447498 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		Maximum power (dBm)	Maximum power (mw)	Distance (mm)	Threshold Power (mW)	Verdict
GSM	GSM850	24.00	251.19	200	1680.96	Pass
	GSM1900	22.00	158.49	200	3060.00	Pass
LTE	Band 2	23.00	199.53	200	3060.00	Pass
	Band 4	23.00	199.53	200	3060.00	Pass
	Band 5	23.00	199.53	200	1680.96	Pass
	Band 7	23.00	199.53	200	3060.00	Pass
Bluetooth		-0.57	0.88	200	3060.00	Pass

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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