

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 OBDII GNSS Tracker
Model Name: VL502 (refer to section 2.4)
Brand Name: Jimi
FCC ID: 2AMLF-VL502
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: May 18, 2023
Test Date: Jun. 16, 2023 – Jul. 12, 2023
Date of Issue: Aug. 04, 2023

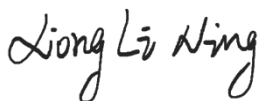
ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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(Testing Director)



Revision History		
Version	Issue Date	Revisions Content
Rev. 01	Jul. 24, 2023	Initial Issue
Rev. 02	Aug. 04, 2023	Updated output power and evaluation result in section 5

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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	Huizhou Newthinking Electronics Co., Ltd.
Address	The third&sixth floor, 1&2 Factory Buildings, Jimi Industrial Park, No.101 Jinfu Road, Xiaojinkou street, Huicheng District, Huizhou

2.4 General Description for Equipment under Test (EUT)

EUT Name	LTE OBDII GNSS Tracker
Model Name Under Test	VL502
Series Model Name	VL502(A), VL502_A, VL04NA, VL04(NA), VL502A
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name. (this information provided by the customer)
Hardware Version	VL04NA_MB_V1.0 VL04NA_SUB_V1.0
Software Version	VL04NA_VL04NA_WAAH_V1.0_230223.1012
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Note: Not applicable.

2.6 Technical Information

Network and Wireless connectivity	4G Network FDD LTE Band 2/4/5/12/13 Bluetooth (BLE), GPS
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	LTE, Bluetooth		
Frequency Range	LTE CAT.M Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE CAT.M Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE CAT.M Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE CAT.M Band 12	TX: 699 ~ 716 MHz	RX: 729 ~ 746 MHz
	LTE CAT.M Band 13	TX: 777 ~ 787 MHz	RX: 746 ~ 756 MHz
	LTE NB-IOT Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE NB-IOT Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE NB-IOT Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE NB-IOT Band 12	TX: 699 ~ 716 MHz	RX: 729 ~ 746 MHz
	LTE NB-IOT Band 13	TX: 777 ~ 787 MHz	RX: 746 ~ 756 MHz
	Bluetooth	2400 ~ 2483.5 MHz	
Antenna Type	Bluetooth	PIFA Antenna	
	LTE	PIFA Antenna	
Exposure Category	General Population/Uncontrolled Exposure		
Product Type	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

Mode	CAT.M				
Band	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 12	LTE Band 13
Conducted Power (dBm)	22.00	22.00	22.00	22.00	22.00
Antenna Gain (dBi)	0.40	0.50	-0.30	-1.20	-1.20
EIRP (dBm)	22.40	22.50	19.55	18.65	18.65
Note: This report listed the worst case conducted power value, please refer to R1907A0448-M1V1 test report for more details.					

Mode	NB-IOT				
Band	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 12	LTE Band 13
Conducted Power (dBm)	22.00	22.00	22.00	22.00	22.00
Antenna Gain (dBi)	0.40	0.50	-0.30	-1.20	-1.20
EIRP (dBm)	22.40	22.50	19.55	18.65	18.65
Note: This report listed the worst case conducted power value, please refer to R1907A0448-M1V1 test report for more details.					

Mode	Bluetooth
Conducted Power (dBm)	-3.69
Antenna Gain (dBi)	2.40
EIRP (dBm)	-1.29
Note: This report listed the worst case conducted power value, please refer to BL-SZ2360686-601 test report for more details.	

5.2 Tune-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
LTE CAT.M Band 2	[20.00, 22.00]	[20.40, 22.40]	[18.25, 20.25]
LTE CAT.M Band 4	[20.00, 22.00]	[20.50, 22.50]	[18.35, 20.35]
LTE CAT.M Band 5	[20.00, 22.00]	/	[17.55, 19.55]
LTE CAT.M Band 12	[20.00, 22.00]	/	[16.65, 18.65]
LTE CAT.M Band 13	[20.00, 22.00]	/	[16.65, 18.65]
LTE NB-IOT Band 2	[20.00, 22.00]	[20.40, 22.40]	[18.25, 20.25]
LTE NB-IOT Band 4	[20.00, 22.00]	[20.50, 22.50]	[18.35, 20.35]
LTE NB-IOT Band 5	[20.00, 22.00]	/	[17.55, 19.55]
LTE NB-IOT Band 12	[20.00, 22.00]	/	[16.65, 18.65]
LTE NB-IOT Band 13	[20.00, 22.00]	/	[16.65, 18.65]
Bluetooth	[-5.00, -3.00]	[-2.60, -0.60]	[-4.75, -2.75]

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
LTE CAT.M Band 2	22.00	158.49	200	3060.00	Pass
LTE CAT.M Band 4	22.00	158.49	200	3060.00	Pass
LTE CAT.M Band 5	22.00	158.49	200	1731.96	Pass
LTE CAT.M Band 12	22.00	158.49	200	1460.64	Pass
LTE CAT.M Band 13	22.00	158.49	200	1605.48	Pass
LTE NB-IOT Band 2	22.00	158.49	200	3060.00	Pass
LTE NB-IOT Band 4	22.00	158.49	200	3060.00	Pass
LTE NB-IOT Band 5	22.00	158.49	200	1731.96	Pass
LTE NB-IOT Band 12	22.00	158.49	200	1460.64	Pass
LTE NB-IOT Band 13	22.00	158.49	200	1605.48	Pass
Bluetooth	-2.75	0.53	200	3060.00	Pass

Note: The product does not support simultaneous transmission.

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--