

TEST REPORT

Applicant: Queclink Wireless Solutions Co., Ltd.
Address: No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, 201101
Equipment Type: LTE Cat 1 Compact GNSS Tracker
Model Name: GV50CNA
Brand Name: Queclink
FCC ID: YQD-GV50CNA
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: May 10, 2024
Test Date: Jan. 11, 2024 - May 23, 2024
Date of Issue: Jun. 07, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Xu Rui**Checked by:** Zong Liyao**Approved by:** Tolan Tu
(Testing Director)

Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Jun. 07, 2024</u>	<u>Initial Issue</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	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 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	Queclink Wireless Solutions Co., Ltd.
Address	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, 201101

2.2 Manufacturer Information

Manufacturer	Queclink Wireless Solutions Co., Ltd.
Address	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, 201101

2.3 General Description for Equipment under Test (EUT)

EUT Name	LTE Cat 1 Compact GNSS Tracker
Model Name Under Test	GV50CNA
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V1.02
Software Version	R00A01V14
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	4G Network FDD LTE Band2/4/5/12/66/71 Bluetooth, GPS, GLONASS
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	WWAN, Bluetooth		
Frequency Range	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 12	TX: 699 ~ 716 MHz	RX: 729 ~ 746 MHz
	LTE Band 13	TX: 777~ 787 MHz	RX: 746 ~ 756 MHz
	LTE B66	TX: 1710 ~ 1780 MHz	RX: 2110 ~ 2180 MHz
	LTE B71	TX: 663 ~ 698 MHz	RX: 617 ~ 652 MHz
	Bluetooth	2400 ~ 2483.5 MHz	
Antenna Type	WWAN: Ceramic Antenna Bluetooth: Ceramic 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 Devices:

CFR Title 47 §2.1091(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

LTE							
Mode	Band 2	Band 4	Band 5	Band 12	Band 13	Band 66	Band 71
Conducted Power (dBm)	22.87	22.63	22.92	23.10	22.62	22.67	23.20
Antenna Gain (dBi)	1.02	1.02	1.58	1.55	1.08	1.02	0.60
ERP/EIRP (dBm)	23.89	23.65	22.35	22.50	21.55	23.69	21.65

Note: This report listed the maximal case power value, please refer to FG3D2001 report for more details.

Bluetooth	
Mode	BLE
Conducted Power (dBm)	-0.52
Antenna Gain (dBi)	2.10
EIRP (dBm)	1.58

Note: This report listed the maximal case power value, please refer to BL-SH2440015-601 report for more details.

5.2 Tune-up power

Mode		Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
LTE	Band 2	[22.00,24.00]	[23.00,25.00]	[20.85,22.85]
	Band 4	[22.00,24.00]	[23.00,25.00]	[20.85,22.85]
	Band 5	[22.00,24.00]	/	[20.85,22.85]
	Band 12	[22.00,24.00]	/	[20.85,22.85]
	Band 13	[22.00,24.00]	/	[20.85,22.85]
	Band 66	[22.00,24.00]	[23.00,25.00]	[20.85,22.85]
	Band 71	[22.00,24.00]	/	[20.85,22.85]
Bluetooth		[-1.00,1.00]	[1.00,3.00]	[-1.15,0.85]

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)	Power / Limit	Verdict
LTE Band 2	22.85	192.75	200	3060.00	0.0630	Pass
LTE Band 4	22.85	192.75	200	3060.00	0.0630	Pass
LTE Band 5	22.85	192.75	200	1731.96	0.1113	Pass
LTE Band 12	22.85	192.75	200	1460.64	0.1320	Pass
LTE Band 13	22.85	192.75	200	1605.48	0.1201	Pass
LTE Band 66	22.85	192.75	200	3060.00	0.0630	Pass
LTE Band 71	22.85	192.75	200	1423.92	0.1354	Pass
Bluetooth	1.00	1.26	200	3060.00	0.0004	Pass

5.4 Collocated Power Calculation

Evolution mode	Frequency(MHz)	Power /Limit	$\Sigma(\text{Power / Limit})$ of WWAN + BT	Verdict
LTE Band 71	663 ~ 698 MHz	0.1350	0.1354	Pass
Bluetooth	2400 ~ 2483.5 MHz	0.0004		

Note:

1. $\Sigma(\text{Power / Limit})$: This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for BT+WWAN.
2. Both of the BT/WWAN can transmit simultaneously, the formula of calculated the Power is $CP1 / LP1 + CP2 / LP2 + \dots \text{etc.} < 1$
 CP = Calculation power
 LP = Limit of power
3. The worst-case situation is 0.1354, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
4. The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz, 663 MHz ~ 698 MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
5. More power list please refer to FG3D2001& BL-SH2440015-601 test report.

5.5 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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