

TEST REPORT

Applicant: Queclink Wireless Solutions Co., Ltd.
Address: No.30, Lane 500, Xinlong Road, Minhang District,
Shanghai, China 201101
Equipment Type: GPS Tracker
Model Name: GV58LAU
Brand Name: Queclink
FCC ID: YQD-GV58LAU
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Test Date: Sep. 16, 2021 - Oct. 28, 2022
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ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Nov. 08, 2022</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Nov. 10, 2022</u>	<u>Updated Section 5.2 and 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	☒ 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, China 201101

2.2 Manufacturer Information

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

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	GPS Tracker
Model Name Under Test	GV58LAU
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	R101V1.02
Software Version	R01A01V22
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment	Battery	
	Brand Name	BPI
	Model No.	PL402030H
	Serial No.	N/A
	Capacitance	190mAh
	Rated Voltage	3.70 V
	Limit Charge Voltage	4.25 V

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/900/1800/1900 MHz 3G Network WCDMA/HSDPA/HSUPA Band 1/2/5/8 4G Network FDD LTE Band 1/2/3/4/5/7/8/28 Bluetooth (BLE), GPS, GLONASS, BDS, Galileo
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth, GSM, WCDMA , LTE		
Frequency Range	Bluetooth BLE	2400 ~ 2483.5 MHz	
	GSM 850	TX: 824~849 MHz	RX: 869~894 MHz
	GSM 1900	TX: 1850~1910 MHz	RX: 1930~1990 MHz
	WCDMA Band 2	TX: 1850~1910 MHz	RX: 1930~1990 MHz
	WCDMA Band 5	TX: 824~849 MHz	RX: 869~894 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	Bluetooth	Ceramic antenna	
	WWAN	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 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).

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

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

Bluetooth			
Mode	GFSK (BLE)		
	Low Channel	Middle Channel	High Channel
Conducted Power (dBm)	4.82	4.83	4.64
Antenna Gain (dBi)	3.00		
EIRP(dBm)	7.82	7.83	7.64
Note: This report listed the worst case power value, please refer to BL-EC22A0710-601 report for more details.			

GSM		
Mode	GSM 850	GSM 1900
Conducted Power (dBm)	30.19	29.49
Antenna Gain (dBi)	1.14	1.29
ERP/EIRP (dBm)	31.33	30.78
Note: This report listed the worst case power value, please refer to BL-EC2180704-501 report for more details.		

WCDMA		
Mode	Band 2	Band 5
Conducted Power (dBm)	23.03	21.89
Antenna Gain (dBi)	1.29	1.14
ERP/EIRP (dBm)	24.32	23.03
Note: This report listed the worst case power value, please refer to BL-EC2180704-501 report for more details.		

LTE				
Mode	Band 2	Band 4	Band 5	Band 7
Conducted Power (dBm)	25.20	23.57	21.47	23.07
Antenna Gain (dBi)	1.29	2.04	1.14	1.58
ERP/EIRP (dBm)	26.49	25.61	22.61	24.65
Note: This report listed the worst case power value, please refer to BL-EC2180704-501 report for more details.				

5.2 Tune-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
GSM 850	[29.00, 31.00]	/	[30.14, 32.14]
GSM 1900	[28.00, 30.00]	[29.29, 21.29]	[27.14, 29.14]
WCDMA Band 2	[22.00, 24.00]	[23.29, 25.29]	[21.14, 23.14]
WCDMA Band 5	[20.00, 22.00]	/	[21.14, 23.14]
LTE Band 2	[24.00, 26.00]	[25.29, 27.29]	[23.14, 25.14]
LTE Band 4	[22.00, 24.00]	[24.04, 26.04]	[21.89, 23.89]
LTE Band 5	[20.00, 22.00]	/	[21.14, 23.14]
LTE Band 7	[22.00, 24.00]	[23.58, 25.58]	[21.43, 23.43]
Bluetooth	[3.00, 5.00]	[6.00, 8.00]	[3.85, 5.85]

Note 1: ERP= EIRP -2.15dB

Note 2: 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
GSM 850	32.14	1636.82	200	1731.96	0.945	Pass
GSM 1900	30.00	1000.00	200	3060.00	0.327	Pass
WCDMA Band 2	24.00	251.19	200	3060.00	0.082	Pass
WCDMA Band 5	23.14	206.06	200	1731.96	0.119	Pass
LTE Band 2	26.00	398.11	200	3060.00	0.130	Pass
LTE Band 4	24.00	251.19	200	3060.00	0.082	Pass
LTE Band 5	23.14	206.06	200	1731.96	0.119	Pass
LTE Band 7	24.00	251.19	200	3060.00	0.082	Pass
Bluetooth	5.85	3.85	200	3060.00	0.001	Pass

5.4 Collocated Power Calculation

Evolution mode	Frequency(MHz)	Power Density/Limit	Σ (Power Density / Limit) of GPRS 850 + Bluetooth	Verdict
Max WWAN	824MHz ~ 849MHz	0.945	0.946	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.001		

Note:

1. Σ (Power / Limit): This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for Bluetooth + WWAN.
2. Both of the Bluetooth/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 0.946, 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 and 824 MHz~ 849 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 RF (BL-EC2180740-501 and BL-EC22A0710-601) 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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--END OF REPORT--