

TEST REPORT

Applicant: Queclink Wireless Solutions Co., Ltd.
Address: No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China 201101
Equipment Type: GNSS tracker
Model Name: GV350CEU (refer section 2.4)
Brand Name: Queclink
FCC ID: YQD-GV350CEU
Test Standard: 47 CFR Part 2.1091
KDB 447498 D01 v06
Test Date: May 23, 2022 - Jun. 06, 2022
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ISSUED BY:

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Revision History		
Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jun. 17, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

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	GNSS tracker
Model Name Under Test	GV350CEU
Series Model Name	DT435C
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name.
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

N/A

2.6 Technical Information

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

Operating Mode	Bluetooth BLE, 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
	Bluetooth BLE	2400 ~ 2483.5 MHz	
Antenna Type	Bluetooth BLE	Ceramic Antenna	
	WWAN	PIFA	
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 D01 v06	447498 D01 General RF Exposure Guidance D01 v06

Note: Compared with the EUT of test report BL-EC2250407-501, the EUT of this report contain the RF module (Mode: QLC200 FCC ID: YQD-QLC200), So the EIRP/ERP of GSM and LTE please refer to report BL-EC2250407-501 issued by Shenzhen BALUN Technology Co., Ltd. on Jun. 15, 2022, and the RF Exposure was Evaluated Collocated Power Density simultaneously.

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Derives:

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 D01 General RF Exposure Guidance v06 Limit

Devices operating in standalone mobile exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When the categorical exclusion provision of § 2.1091(c) applies, the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to FCC Part 1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the commission's guidelines.

Limits for General Population/ Uncontrolled Exposure			
Frequency Range (MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength (H)(A/m)	Power Density (S)(mW/cm ²)
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f ²)*
30-300	27.5	0.073	0.2
300-1500			f/1500
1500-100,000			1.0

MPE calculation formula

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density

P = output power (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Separation distance between radiator and human body (cm)

5 ASSESSMENT RESULT

5.1 Output Power

GSM		
Mode	GSM 850	GSM 1900
ERP/EIRP (dBm)	30.24	31.64

Note: This report listed the worst case ERP/EIRP value, please refer to RF test report BL-EC2250407-501 issued by Shenzhen BALUN Technology Co., Ltd. On Jun. 15, 2022 for more details.

LTE				
Mode	Band 2	Band 4	Band 5	Band 7
ERP/EIRP (dBm)	25.63	24.69	19.65	25.92

Note: This report listed the worst case ERP/EIRP value, please refer to RF test report BL-EC2250407-501 issued by Shenzhen BALUN Technology Co., Ltd. On Jun. 15, 2022 for more details.

Bluetooth	
Mode	BLE
	GFSK
Measured Output Peak Power (dBm)	5.04

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

5.2 Tune-up power

Mode		Range
GSM	GSM 850	29.00-31.00
	GSM 1900	30.00-32.00
LTE	Band 2	24.00-26.00
	Band 4	23.00-25.00
	Band 5	18.00-20.00
	Band 7	24.00-26.00
Bluetooth		4.50-5.50

5.3 RF Exposure Evaluation Result

Evolution mode	Maximum ERP/EIRP (dBm)	Antenna Gain (typical) (dBi):	Total Power (W)	Distance (cm)	Limit of Power Density (mW/cm ²)	Power Density (mW/cm ²)	Power Density / Limit	Verdict
Bluetooth	8.14	2.64	0.007	20	1	0.001	0.001	Pass
GSM	GSM 850	31.00	1.259	20	0.549	0.251	0.457	Pass
	GSM 1900	32.00	1.584	20	1	0.315	0.315	Pass
LTE	Band 2	26.00	0.398	20	1	0.079	0.079	Pass
	Band 4	25.00	0.398	20	1	0.063	0.063	Pass
	Band 5	20.00	0.100	20	0.549	0.020	0.036	Pass
	Band 7	26.00	0.398	20	1	0.079	0.079	Pass

5.4 Collocated Power Density Calculation

Evolution mode	Frequency (MHz)	Power Density/Limit	Σ (Power Density / Limit) of WWAN + Bluetooth	Verdict
GSM 850	824MHz ~ 849MHz	0.457	0.458	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.001		
Evolution mode	Frequency (MHz)	Power Density/Limit	Σ (Power Density / Limit) of WWAN + Bluetooth	Verdict
LTE Band 2	1850MHz ~ 1910MHz	0.079	0.080	Pass
Bluetooth	2400MHz ~ 2483.5MHz	0.001		

Note:

- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for Bluetooth 2.4GHz+WWAN.
- The 2.4GHz/850MHz/1900MHz can transmit simultaneously, the formula of calculated the MPE is $CPD1 / LPD1 + CPD2 / LPD2 + \dots$ etc. < 1
 CPD = Calculation power density
 LPD = Limit of power density
- The worst-case situation is 0.458, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.
- The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz, 824MHz ~ 849MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
- More power list please refer to RF 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

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--