Test Report

Verified code: 781257

Report No.: E202211175126-3

Customer:	Queclink Wireless Solutions Co., Ltd.
Address:	No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China 201101
Sample Name:	GNSS Tracker
Sample Model:	GV58CEU
Receive Sample Date:	Nov.18,2022
Test Date:	Nov.21,2022 ~ Nov.28,2022
Reference Document:	CFR 47, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices.
Test Result:	Pass

Prepared by: Chen XiaoCong Reviewed by: Jiang Tao Approved by: Liao Liang

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-12-14

GUANGZHOU GRG METROLOGY & TEST CO., LTD.
Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel：（+86）400-602-0999 FAX：（+86）020-38698685 Web：http://www.grgtest.com

Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.

2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.

3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.

4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.

5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

---------- **The following blanks** ----------

TABLE OF CONTENTS

---------- The following blanks ----------

REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202211175126-3	Original Issue	2022-12-02

Note:

1. The maximum output Power of GSM & LTE were refer to the module report. (Report No.: BL-EC2250407-501) which issued on 06-15-2022 by Shenzhen BALUN Technology Co., Ltd.
2. The maximum output Power of BLE were refer to the module report. (Report No.: E202211175126-2)

---------- **The following blanks** ----------

1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

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

1.2 MANUFACTURER

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

1.3 FACTORY

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

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment:	GNSS Tracker
Model No.:	GV58CEU
Adding Model:	/
Trade Name:	Queclink
FCC ID:	YQD-GV58CEU
Power Supply:	Input power: DC 8-32V DC 3.7V power supplied by battery
Battery Specification:	Model: PL402030 Nominal Voltage:3.7Vdc Rated Capacity: 190mAh 0.703Wh
Frequency Range:	GSM 850 TX: 824 MHz ~ 849 MHz GSM 1900 TX: 1850 MHz ~ 1910 MHz FDD LTE Band 2 TX: 1850 MHz ~ 1910 MHz FDD LTE Band 4 TX: 1710 MHz ~ 1755 MHz FDD LTE Band 5 TX: 824 MHz ~ 849 MHz FDD LTE Band 7 TX: 2500 MHz ~ 2570 MHz BLE TX: 2402 MHz ~ 2480 MHz
Transmit Power:	Reference Section 5 Table 2
Modulation type:	GSM/GPRS/EGPRS: GMSK,8PSK LTE: QPSK, 16QAM BLE: GFSK
Antenna Specification:	Reference Section 5 Table 1
Temperature Range:	-30℃~70℃
Hardware Version:	R101V1.02
Software Version:	A01V23
Sample No:	/
Note:	/

2. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add.:	No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China.
P.C.:	518110
Tel :	0755-61180008
Fax:	0755-61180008

---------- **The following blanks** ----------

3. EVALUATION METHOD

Exposure category: General population/uncontrolled environment
EUT Type: Production Unit
Device Type: Mobile Device

Systems operating under the provisions of FCC 47 CFR 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.
In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.
In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

LIMITS FOR GENERAL POPULATION/UNCONTROLLEDEXPOSURE
(B)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)	Averaging Time$[E]^2$, $[H]^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

For multiple RF sources: Multiple RF sources are exempt if:
in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation

$$\sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

$Evaluated_k$: the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.
$Exposure\ Limit_k$: either the general population/uncontrolled maximum permissible exposure (MPE) or specific Absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k*

4. CALCULATION METHOD

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01
$S=PG/4\pi R^2$
Where: S=power density
P=power input to antenna
G=power gain of the antenna in the direction of interest relative to anisotropic radiator
R=distance to the center of radiation of the antenna
From the EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the maximum gain of the used as following information, the RF power density can be obtained.

Table 1 Antenna Specification

Frequency Band	Antenna type	Internal Identification	Maximum antenna gain
GSM 850	PIFA antenna	Antenna 1	-0.65 dBi
GSM 1900			1.00 dBi
FDD LTE Band 2			3.03 dBi
FDD LTE Band 4			1.47 dBi
FDD LTE Band 5			-0.65 dBi
FDD LTE Band 7			3.86 dBi
BLE	Ceramic antenna	Antenna 2	3.40 dBi

Table 2 Transmit Power

Frequency Band	Maximum Output Power (dBm)	Tune-up Output Power Range (dBm)
GSM 850	30.89	30.00±1.00
GSM 1900	30.64	30.00±1.00
FDD LTE Band 2	22.60	22.00±1.00
FDD LTE Band 4	23.22	23.00±1.00
FDD LTE Band 5	20.30	20.00±1.00
FDD LTE Band 7	22.06	22.00±1.00
BLE	4.33	4.00±1.00

Note:

3. The maximum output Power of GSM & LTE were refer to the module report. (Report No.: BL-EC2250407-501) which issued on 06-15-2022 by Shenzhen BALUN Technology Co., Ltd.
4. The maximum output Power of BLE were refer to the module report. (Report No.: E202211175126-2)

5. ESTIMATION RESULT

5.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Tune-up Output power (EIRP/ERP)		Antenna Gain (dBi)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
		(dBm)	(mW)			
GSM 850	824 - 849	31.00	1258.93	-0.65	0.25	0.55
GSM 1900	1850 - 1910	31.00	1258.93	1.00	0.25	1.00
FDD LTE Band 2	1850 - 1910	23.00	199.53	3.03	0.04	1.00
FDD LTE Band 4	1710 -1755	24.00	251.19	1.47	0.05	1.00
FDD LTE Band 5	824 - 849	21.00	125.89	-0.65	0.03	0.55
FDD LTE Band 7	2500 - 2570	23.00	199.53	3.86	0.04	1.00
BLE	2402 - 2480	5.00	3.16	3.40	0.00	1.00

Remark: 1. MPE use distance is 20cm from manufacturer declaration of user manual.

Maximum Simultaneous transmission MPE Ratio for WWLAN & BT (BLE)

Maximum MPE ratio (GSM 850)	Maximum MPE ratio (BLE)	∑ MPE ratios	Limit	Results
0.45	0.00	0.45	1.000	Pass

Note:

1. $Evaluated_k$: the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation.
2. Exposure $Limit_k$: either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable sources.

$$\text{MPE Ratio} = \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

6. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

---------- End of Report ----------