

TEST REPORT

Applicant: Queclink Wireless Solutions Co., Ltd.
Address: No.30, Lane 500, Xinlong Road, Minhang District,
Shanghai, 201101
Equipment Type: GNSS Tracker
Model Name: GL533CG
Brand Name: Queclink
FCC ID: YQD-GL533CG
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: N/A
Test Date: N/A
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ISSUED BY:

Shanghai Tejet Communications Technology Co., Ltd. Testing Center



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Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shanghai Tejet Communications Technology Co., Ltd. Testing Center
Address	1-2/F., Building 1, No. 222 Xuanlan Road, Xuanqiao Town, Pudong New District, Shanghai, China

1.2 Test Location

Name	Shanghai Tejet Communications Technology Co., Ltd. Testing Center
Location	1st to 2nd floors, Building 1, No. 222 Xuanlan Road, Xuanqiao Town, Pudong New District, Shanghai, China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1352. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 29671.

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	GNSS Tracker
Model Name Under Test	GL533CG
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	R101V1.01
Software Version	R11A03V10
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	2G Network GPRS/EGPRS 850/1900 4G Network LTE FDD Band 1/2/3/4/5/7/8/20/28 GNSS(GPS/GLONASS/BDS/Galileo), Bluetooth,433MHz SRD
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	GSM, LTE, Bluetooth,433MHz SRD		
Frequency Range	GSM 850	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	GSM 1900	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE B2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	LTE B4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	LTE B5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	LTE B7	TX: 2500 ~ 2570 MHz	RX: 2620 ~ 2690 MHz
	Bluetooth	2402 ~ 2480 MHz	
	433MHz SRD	433MHz	
Antenna Type	WWAN	PIFA	
	Bluetooth	Chip	
	GNSS	Patch	
	433MHz	monopole	
Exposure Category	General Population/Uncontrolled Exposure		
Product Type	Mobile Device		

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	KDB 447498 D04 v01	447498 D04 Interim General RF Exposure Guidance v01

3.2 Limit Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices

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

GSM					
Mode	Burst Average Power(dBm)		Division	Frame-Averaged power (dBm)	
	GSM 850	GSM 1900	Factors	GSM 850	GSM 1900
GPRS (GMSK, 1-Slot)	33.46	30.61	9.19	24.27	21.42
GPRS (GMSK, 2-Slots)	33.44	30.59	6.13	27.31	24.46
GPRS (GMSK, 3-Slots)	32.35	29.33	4.42	27.93	24.91
GPRS (GMSK, 4-Slots)	30.29	27.35	3.18	27.11	24.17
EGPRS (8PSK, 1-Slot)	28.38	28.21	9.19	19.19	19.02
EGPRS (8PSK, 2-Slots)	26.70	25.71	6.13	20.57	19.58
EGPRS (8PSK, 3-Slots)	25.25	23.94	4.42	20.83	19.52
EGPRS (8PSK, 4-Slots)	23.49	21.42	3.18	20.31	18.24
Antenna Gain (dBi)	1.03	1.00	N/A	1.03	1.00
MAX ERP/EIRP (dBm)	32.34	31.61	N/A	26.81	25.91
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SZ2590850-501 for more details.					

LTE				
Mode	Band 2	Band 4	Band 5	Band 7
Conducted Power (dBm)	24.16	23.17	23.82	20.97
Antenna Gain (dBi)	1.00	4.08	1.03	1.96
EIRP (dBm)	25.16	27.25	22.70	22.93
Note: This report listed the worst case conducted power value, please refer to RF test report No.BL-SZ2590850-501 for more details.				

Bluetooth	
Mode	BLE 1M
Conducted Power (dBm)	4.78
Antenna Gain (dBi)	2.10
EIRP (dBm)	6.88
Note: This report listed the worst case conducted power value, please refer to RF test report No. BL-SZ2590850-601 for more details.	

Mode	433MHz
Field Strength (dBuV/m)	42.80
Conducted Power (dBm)	-28.54
Antenna Gain (dBi)	-5.31
ERP(dBm)	-36.00

Note 1: This table listed the worst case power value, please refer to BL-SZ259850-602 report for more details.

Note 2: Add the appropriate maximum ground reflection factor to the EIRP level (6dB for frequencies ≤ 30 MHz, 4.7dB for frequencies between 30MHz and 1000MHz, inclusive and 0dB for frequencies > 1000 MHz).

Note 3: Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log D + 104.8 + \text{maximum ground reflection factor}$$

where:

E=electric field strength in dBuV/m

EIRP =equivalent isotropic radiated power dBm

D=specified measurement distance in meters

Note 4: When frequencies ≤ 1000 MHz, radiated power is ERP.

5.2 Tune-up power

Mode		Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
GSM	GSM 850	【27.00,29.00】	/	【25.88,27.88】
	GSM 1900	【24.00,26.00】	【21.00,23.00】	【22.85,24.85】
LTE	Band 2	【23.00,25.00】	【24.00,26.00】	【21.85,23.85】
	Band 4	【22.00,24.00】	【26.08,28.08】	【23.93,25.93】
	Band 5	【23.00,25.00】	/	【21.88,23.88】
	Band 7	【20.00,22.00】	【21.96,23.96】	【19.81,21.81】
Bluetooth		【4.00,6.00】	【6.10,8.10】	【3.95,5.95】
433MHz		【-30.00,-28.00】	/	【-37.46,-35.46】

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		Frequency (MHz)	Distance (mm)	Maximum power Tune up(dBm)	Maximum power (mW)	Threshold Power (mW)	P/P _{limit}	Verdict
GSM	GSM850	824	20	29.00	794.33	1680.96	0.4725	Pass
	GSM1900	1850	20	26.00	398.11	3060.00	0.1301	Pass
LTE	Band 2	1850	20	25.00	316.23	3060.00	0.1033	Pass
	Band 4	1710	20	25.93	391.74	3060.00	0.1280	Pass
	Band 5	824	20	25.00	316.23	1680.96	0.1881	Pass
	Band 7	2500	20	22.00	158.49	3060.00	0.0518	Pass
Bluetooth		2402	20	6.00	3.98	3060.00	0.0013	Pass
433MHz		433	20	-28.00	0.00	883.32	0.0000	Pass

5.4 Collocated Power Calculation

Evolution mode	Frequency(MHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$	Verdict
GSM850	824MHz ~ 849 MHz	0.4725	0.4738	Pass
Bluetooth	2402MHz ~ 2480MHz	0.0013		

Note:

1. $\Sigma(\text{Power} / \text{Limit})$: This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for WWAN+ Bluetooth.
2. Both of the WWAN+ Bluetooth 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 0.4738, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
4. 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 Testing Center 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.
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--END OF REPORT--