# TEST REPORT

| | |
|---|---|
| **Applicant:** | Queclink Wireless Solutions Co., Ltd. |
| **Address:** | No.30, Lane 500, Xinlong Road, Minhang District, Shanghai, China |
| **Equipment Type:** | Telematics dual-lens LTE Dash Cam |
| **Model Name:** | CV100LG |
| **Brand Name:** | QUECLINK |
| **FCC ID:** | YQD-CV100LG |
| **Test Standard:** | 47 CFR Part 2.1091<br>KDB 447498 D01 v06 |
| **Test Date:** | Jun. 21, 2022 - Jun. 28, 2022 |
| **Date of Issue:** | Jul. 07, 2022 |

**ISSUED BY:**

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Julie Zhu **Checked by:** Zong Liyao **Approved by:** Wei Yanquan (Chief Engineer)

**Revision History**

| Version | Issue Date | Revisions Content |
|---|---|---|
| Rev. 01 | Jul. 07, 2022 | Initial Issue |

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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 |

## 2.2 Manufacturer Information

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

## 2.3 Factory Information

| | |
|---|---|
| Factory | N/A |
| Address | N/A |

## 2.4 General Description for Equipment under Test (EUT)

| | |
|---|---|
| EUT Name | Telematics dual-lens LTE Dash Cam |
| Model Name Under Test | CV100LG |
| Series Model Name | N/A |
| Description of Model name differentiation | N/A |
| Hardware Version | N/A |
| Software Version | N/A |
| Dimensions (Approx.) | N/A |
| Weight (Approx.) | N/A |

## 2.5 Ancillary Equipment

Note: Not applicable.

## 2.6 Technical Information

| | |
|---|---|
| Network and Wireless connectivity | 2G Network GSM/GPRS/EGPRS 1900 MHz;<br>3G Network WCDMA/HSDPA/HSUPA Band 2<br>4G Network FDD LTE Band 2/4/12/13<br>Bluetooth BLE<br>2.4G WIFI 802.11b, 802.11g, 802.11n(HT20)<br>GPS, GLONASS |

The requirement for the following technical information of the EUT was tested in this report:

| | | | |
|---|---|---|---|
| Operating Mode | Bluetooth, GSM, WCDMA, LTE, WLAN | | |
| Frequency Range | Bluetooth | 2400 ~ 2483.5 MHz | |
| | WIFI | 2412MHz ~ 2462MHz | |
| | GSM 1900 | TX: 1850 ~ 1910 MHz | RX: 1930 ~ 1990 MHz |
| | WCDMA 2 | 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 12 | TX: 699 ~ 716 MHz | RX: 729 ~ 746 MHz |
| | LTE Band 13 | TX: 777 ~ 787 MHz | RX: 746 ~ 756 MHz |
| Antenna Type | Bluetooth | PIFA Antenna | |
| | WIFI | PIFA 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 D01 v06 | 447498 D01 General RF Exposure Guidance D01 v06 |

# 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 the 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/f2)* |
| 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 1900 |
| ERP/EIRP (dBm) | 32.96 |
| Note: This report listed the worst case ERP/EIRP value, please refer to RF test report for more details. | |

| WCDMA | |
|---|---|
| Mode | Band 2 |
| ERP/EIRP (dBm) | 25.07 |
| Note: This report listed the worst case ERP/EIRP value, please refer to RF test report for more details. | |

| LTE | | | | |
|---|---|---|---|---|
| Mode | Band 2 | Band 4 | Band 12 | Band 13 |
| ERP/EIRP (dBm) | 25.83 | 25.53 | 20.35 | 23.10 |
| Note: This report listed the worst case ERP/EIRP value, please refer to RF test report for more details. | | | | |

| Bluetooth | | | |
|---|---|---|---|
| Mode | GFSK (BLE 1Mbps) | | |
| | Low Channel | Middle Channel | High Channel |
| Peak Power (dBm) | 0.08 | 0.10 | -0.24 |
| Antenna Gain（dBi） | 1.91 | | |
| EIRP/ERP | 1.99 | **2.01** | 1.67 |
| Note: This report listed the maximal case power value, please refer to RF test report for more details. | | | |

| 2.4G WIFI | | | |
|---|---|---|---|
| Mode | 802.11b | 802.11g | 802.11n20 |
| Peak Power (dBm) | 18.07 | 20.47 | 20.69 |
| Antenna Gain（dBi） | 1.91 | | |
| EIRP/ERP | 19.98 | 22.38 | **22.60** |
| 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 1900 | | 30.00-33.00 |
| WCDMA | Band 2 | 23.00-27.00 |
| LTE | Band 2 | 23.00-26.50 |
| | Band 4 | 23.00-26.00 |
| | Band 12 | 18.00-21.00 |
| | Band 13 | 21.00-24.00 |
| Bluetooth | | 1.00-2.50 |
| 2.4G WIFI | | 17.00-23.00 |

## 5.3 RF Exposure Evaluation Result

| Evolution mode | | Maximum ERP/EIRP (dBm) | Antenna Gain (typical) (dBi): | Total Power (mw) | Distance (cm) | Power Density (mW/cm²) | Limit of Power Density (mW/cm²) | Power Density / Limit | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| Bluetooth | | 2.50 | 1.91 | 1.778 | 20 | 0.0004 | 1 | 0.0004 | Pass |
| 2.4G WIFI | | 23.00 | 1.91 | 199.526 | 20 | 0.0397 | 1 | 0.0397 | Pass |
| GSM 1900 | | 33.00 | 2.63 | 1995.262 | 20 | 0.3969 | 1 | 0.3969 | Pass |
| WCDMA | Band 2 | 27.00 | 2.63 | 501.1872 | 20 | 0.0997 | 1 | 0.0997 | Pass |
| LTE | Band 2 | 26.50 | 2.63 | 446.6836 | 20 | 0.0889 | 1 | 0.0889 | Pass |
| | Band 4 | 26.00 | 2.28 | 398.1072 | 20 | 0.0792 | 1 | 0.0792 | Pass |
| | Band 12 | 21.00 | -0.82 | 125.8925 | 20 | 0.0250 | 0.466 | 0.0536 | Pass |
| | Band 13 | 24.00 | 1.36 | 251.1886 | 20 | 0.0500 | 0.518 | 0.0965 | Pass |

## 5.4 Collocated Power Density Calculation

| Evolution mode | Frequency(MHz) | Power Density/Limit | Σ(Power Density / Limit) of WWAN + WLAN | Verdict |
|---|---|---|---|---|
| GSM 1900 | 1850MHz ~ 1910 MHz | 0.3969 | **0.4366** | Pass |
| 2.4G WIFI | 2412MHz ~ 2462MHz | 0.0397 | | |

| Evolution mode | Frequency(MHz) | Power Density/Limit | Σ(Power Density / Limit) of WWAN + Bluetooth | Verdict |
|---|---|---|---|---|
| GSM 1900 | 1850MHz ~ 1910 MHz | 0.3969 | **0.3973** | Pass |
| Bluetooth | 2400MHz ~ 2483.5MHz | 0.0004 | | |

Note:

1. ∑(Power Density / Limit): This is a summation of [(power density for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz+WWAN+ Bluetooth.
2. Both of the 2.4GHz/1900MHz can transmit simultaneously, the formula of calculated the MPE is CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
   CPD = Calculation power density
   LPD = Limit of power density
3. The worst-case situation is 0.4366, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.
4. The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz and 1850MHz ~ 1910 MHz or 22412MHz ~ 2462MHz and 1850MHz ~ 1910 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 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--