

FCC PART 22H, PART 24E  
MEASUREMENT AND TEST REPORT

For

**Queclink Wireless Solutions Co., Ltd**

Room 501, Building 9, No 99, TianZhou Road, Shanghai, China

**FCC ID: YQD-GV65**

|   |   |
|---|---|
| <b>Report Type:</b><br>Original Report  | <b>Product Type:</b><br>Compact Vehicle Tracking Device |
| <b>Test Engineer:</b> <u>Bernie Zhang</u> <i>Bernie Zhang</i>   |   |
| <b>Report Number:</b> <u>RKS170727001-00A</u>   |   |
| <b>Report Date:</b> <u>2017-08-02</u>   |   |
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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**GENERAL INFORMATION****Product Description for Equipment under Test (EUT)**

|              |                                      |
|--------------|--------------------------------------|
| Manufacturer | Queclink Wireless Solutions Co., Ltd |
| Model        | GV65                                 |
| Product      | Compact Vehicle Tracking Device      |
| Dimension    | 73mm(L)×54mm(W)×22.7mm(H)            |
| Power Supply | DC 8-32V supplied by DC source       |

*\*All measurement and test data in this report was gathered from production sample serial number: 20170727001. (Assigned by BACL, Kunshan). The EUT was received on 2017-07-27.*

**Objective**

This type approval report is prepared on behalf of Queclink Wireless Solutions Co., Ltd in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E of the Federal Communication Commission's rules.

The objective is to determine the compliance of EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, and band edge.

**Related Submittal(s)/Grant(s)**

N/A

## Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-Part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services  
Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-D.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Item                             |            | Uncertainty |
|----------------------------------|------------|-------------|
| RF conducted test with spectrum  |            | 0.9dB       |
| RF Output Power with Power meter |            | 0.5dB       |
| Radiated emission                | 30MHz~1GHz | 5.91dB      |
|                                  | Above 1GHz | 4.92dB      |
| Occupied Bandwidth               |            | 0.5kHz      |
| Temperature                      |            | 1.0°C       |
| Humidity                         |            | 6%          |

## Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Justification

The EUT was configured for testing according to TIA/EIA-603-D.

The final qualification test was performed with the EUT operating at normal mode.

### Equipment Modifications

No modifications were made to the EUT.

### Support Equipment List and Details

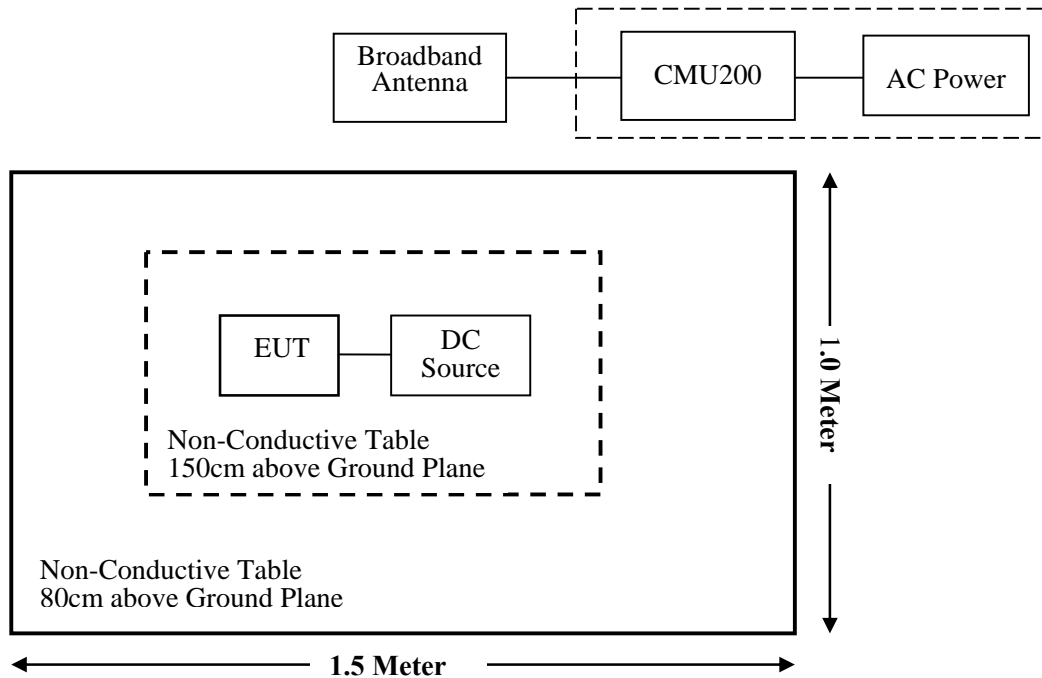
| Manufacturer | Description               | Model       | Serial Number |
|--------------|---------------------------|-------------|---------------|
| EAST         | Regulated DC Power Supply | MCH-303D-II | 14070562      |

### External Cable List and Details

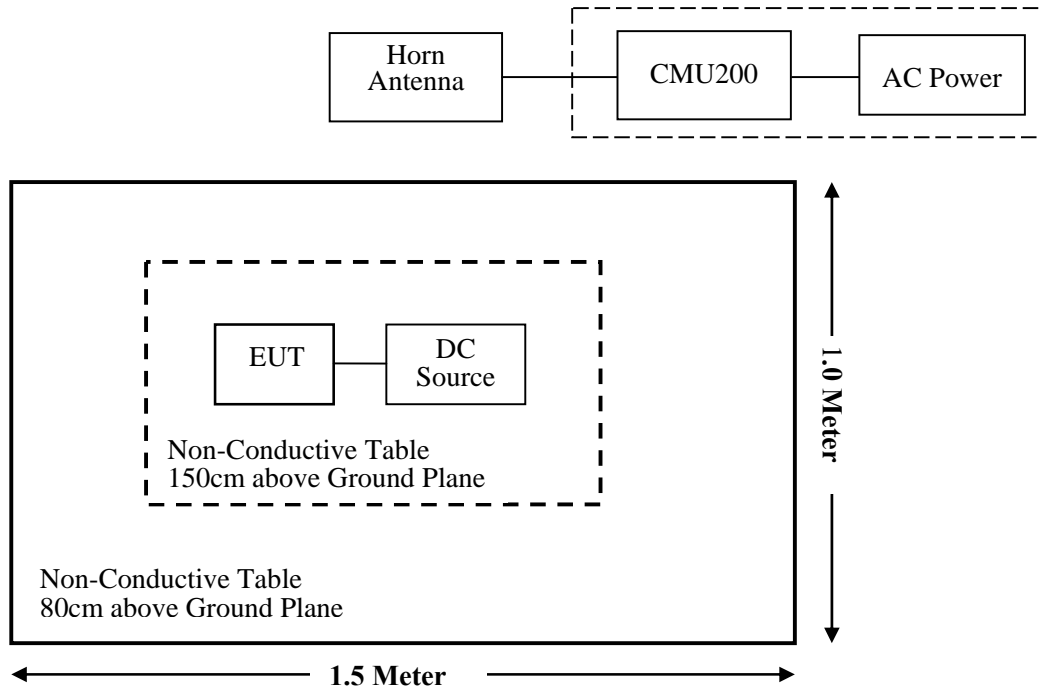
| Cable Description | Length (m) | From Port | To |
|-------------------|------------|-----------|----|
| /                 | /          | /         | /  |

## Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz)



For Radiated Emissions(Above 1GHz):



**SUMMARY OF TEST RESULTS**

| FCC Rules                                 | Description of Test                    | Result         |
|---|--|----------------|
| §1.1307 & §2.1091                         | MAXIMUM PERMISSIBLE EXPOSURE (MPE)     | Compliance     |
| §2.1046; § 22.913 (a);<br>§ 24.232 (c)    | RF Output Power                        | Compliance     |
| § 2.1047                                  | Modulation Characteristics             | Not Applicable |
| § 2.1049; § 22.905;<br>§ 22.917; § 24.238 | Occupied Bandwidth                     | Compliance     |
| § 2.1051; § 22.917 (a);<br>§ 24.238 (a)   | Spurious Emissions at Antenna Terminal | Compliance     |
| § 2.1053; § 22.917 (a);<br>§ 24.238 (a)   | Spurious Radiated Emissions            | Compliance     |
| § 22.917 (a);<br>§ 24.238 (a)             | Band Edge                              | Compliance     |
| § 2.1055; § 22.355;<br>§ 24.235           | Frequency stability                    | Compliance     |

**TEST EQUIPMENT LIST**

| Manufacturer                  | Description                    | Model           | Serial Number | Calibration Date | Calibration Due Date |
|-------------------------------|--------------------------------|-----------------|---------------|------------------|----------------------|
| <b>Radiated Emission Test</b> |                                |                 |               |                  |                      |
| Rohde & Schwarz               | EMI Test Receiver              | ESCI            | 100195        | 2016-11-25       | 2017-11-24           |
| HP                            | Signal Generator               | 8341B           | DE23437       | 2016-08-29       | 2017-08-28           |
| Rohde & Schwarz               | Signal Analyzer                | FSIQ26          | 100048        | 2016-11-25       | 2017-11-24           |
| Sunol Sciences                | Broadband Antenna              | JB3             | A040914-2     | 2016-01-09       | 2019-01-08           |
| Sunol Sciences                | Broadband Antenna              | JB3             | A090314-2     | 2016-01-09       | 2019-01-08           |
| ETS-LINDGREN                  | Horn Antenna                   | 3115            | 9311-4159     | 2016-01-11       | 2019-01-10           |
| ETS-LINDGREN                  | Horn Antenna                   | 3115            | 6229          | 2016-01-11       | 2019-01-10           |
| ETS-LINDGREN                  | Horn Antenna                   | 3116            | 00084159      | 2016-10-18       | 2019-10-17           |
| Sonoma Instrument             | Pre-amplifier                  | 330             | 171377        | 2016-12-12       | 2017-12-11           |
| Narda                         | Pre-amplifier                  | AFS42-00101800  | 2001270       | 2016-12-12       | 2017-12-11           |
| Heatsink Required             | Amplifier                      | QLW-18405536-J0 | 15964001009   | 2016-12-12       | 2017-12-11           |
| Rohde & Schwarz               | Auto test Software             | EMC32           | 100361        | /                | /                    |
| Haojintech                    | Coaxial Cable                  | Cable-1         | 001           | 2016-12-12       | 2017-12-11           |
| Haojintech                    | Coaxial Cable                  | Cable-2         | 002           | 2016-12-12       | 2017-12-11           |
| Haojintech                    | Coaxial Cable                  | Cable-3         | 003           | 2016-12-12       | 2017-12-11           |
| MICRO-COAX                    | Coaxial Cable                  | Cable-4         | 004           | 2016-12-12       | 2017-12-11           |
| MICRO-COAX                    | Coaxial Cable                  | Cable-5         | 005           | 2016-12-12       | 2017-12-11           |
| MICRO-COAX                    | Coaxial Cable                  | Cable-7         | 007           | 2016-12-12       | 2017-12-11           |
| EAST                          | Regulated DC Power Supply      | MCH-303D-II     | 14070562      | /                | /                    |
| <b>RF Conducted Test</b>      |                                |                 |               |                  |                      |
| Rohde & Schwarz               | Signal Analyzer                | FSIQ26          | 836131/009    | 2016-09-21       | 2017-09-20           |
| Rohde & Schwarz               | UNIVERSAL RADIO COMMUNICATIO   | CMU200          | 110605        | 2016-11-25       | 2017-11-24           |
| BACL                          | Temperature & Humidity Chamber | BTH-150         | 30023         | 2016-10-10       | 2017-10-09           |
| EAST                          | Regulated DC Power Supply      | MCH-303D-II     | 14070562      | /                | /                    |
| Queclink                      | RF Cable                       | N/A             | N/A           | 2017-07-31       | 2018-07-30           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).



## **FCC§1.1307& §2.1091 – MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

### **Applicable Standard**

According to subpart §2.1091 and subpart §1.1310, 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 Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                                      |                                      |  |                                 |
|--|--------------------------------------|--------------------------------------|--|---------------------------------|
| <b>Frequency Range (MHz)</b>                                   | <b>Electric Field Strength (V/m)</b> | <b>Magnetic Field Strength (A/m)</b> | <b>Power Density (mW/cm<sup>2</sup>)</b> | <b>Averaging Time (minutes)</b> |
| 0.3-1.34   | 614                                  | 1.63                                 | *(100)                                   | 30                              |
| 1.34-30  | 824/f                                | 2.19/f                               | *(180/f <sup>2</sup> )                   | 30                              |
| 30-300   | 27.5                                 | 0.073                                | 0.2                                      | 30                              |
| 300-1500   | /                                    | /                                    | f/1500                                   | 30                              |
| 1500-100,000   | /                                    | /                                    | 1.0                                      | 30                              |

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

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

**Calculated Data:**

| Mode     | Frequency Range | Antenna Gain |           | Output Power |        | Evaluation Distance | Power Density         | MPE Limit             |
|----------|-----------------|--------------|-----------|--------------|--------|---------------------|-----------------------|-----------------------|
|          | (MHz)           | (dBi)        | (numeric) | (dBm)        | (mW)   | (cm)                | (mW/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) |
| GPRS 850 | 824.2-848.8     | 1.54         | 1.43      | 25.5         | 354.81 | 20                  | 0.1006                | 0.55                  |
| GPRS1900 | 1850.2-1909.8   | 2.91         | 1.95      | 22.0         | 158.49 | 20                  | 0.0616                | 1.0                   |

| Number of Time slot                                  | 1     | 2     |
|--|-------|-------|
| Duty Cycle   | 1:8   | 1:4   |
| Time based Ave. power compared to slotted Ave. power | -9 dB | -6 dB |

**Note:** The target output power:

GPRS 850: 1 slot  $31.5 \pm 0.5$ dBm, 2slot  $31 \pm 0.5$ dBm max average power 25.5dBm

GPRS 1900: 1 slot  $29 \pm 0.5$ dBm, 2slot  $27 \pm 1$ dBm max average power 22.0dBm  
which declared by the manufacturer.

**Result:** The device meet FCC MPE at 20 cm distance.

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## **FCC §2.1047 – MODULATION CHARACTERISTIC**

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According to FCC § 2.1047(d) , Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

**§2.1046; § 22.913 (a);§ 24.232 (c) – RF OUTPUT POWER****Applicable Standards**

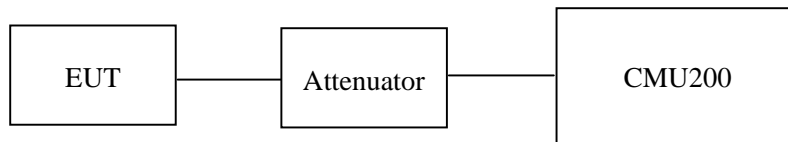
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

**Test Procedure**

*Conducted method:*

The RF output of the transmitter was connected to the CMU200 through sufficient attenuation.

**Test Data****Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 23.1 °C  |
| Relative Humidity: | 50 %     |
| ATM Pressure:      | 101.0kPa |

*The testing was performed by Bernie Zhang on 2017-08-01.*

**Conducted Power****Cellular Band (Part 22H)**

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) |         | Limit (dBm) |
|------|---------|-----------------|----------------------------|---------|-------------|
|      |         |                 | 1 slot                     | 2 slots |             |
| GPRS | 128     | 824.2           | 31.85                      | 31.16   | 38.45       |
|      | 190     | 836.6           | 31.78                      | 31.07   | 38.45       |
|      | 251     | 848.8           | 31.72                      | 30.95   | 38.45       |

**PCS Band (Part 24E)**

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) |         | Limit (dBm) |
|------|---------|-----------------|----------------------------|---------|-------------|
|      |         |                 | 1 slot                     | 2 slots |             |
| GPRS | 512     | 1850.2          | 29.44                      | 27.75   | 33.01       |
|      | 661     | 1880.0          | 29.26                      | 27.60   | 33.01       |
|      | 810     | 1909.8          | 28.62                      | 26.47   | 33.01       |

**Peak-to-average ratio (PAR)****Cellular Band**

| Mode | Channel | PAR (dB) | Limit (dB) |
|------|---------|----------|------------|
| GPRS | Low     | 2.16     | 13         |
|      | Middle  | 2.22     | 13         |
|      | High    | 2.29     | 13         |

**PCS Band**

| Mode | Channel | PAR (dB) | Limit (dB) |
|------|---------|----------|------------|
| GPRS | Low     | 2.18     | 13         |
|      | Middle  | 2.30     | 13         |
|      | High    | 2.26     | 13         |

**Radiated Power****GPRS Mode:**

| Frequency<br>(MHz)                       | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|  |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| Cellular Band (Part 22H), Middle Channel |                               |                              |                |                |                             |                       |                         |                            |                |                |
| 836.60                                   | 81.21                         | 337                          | 169            | H              | 26.46                       | 0.30                  | 4.86                    | 31.02                      | 38.45          | 7.43           |
| 836.60                                   | 84.62                         | 6                            | 170            | V              | 26.00                       | 0.30                  | 4.86                    | 30.56                      | 38.45          | 7.89           |
| PCS Band (Part 24E), Middle Channel      |                               |                              |                |                |                             |                       |                         |                            |                |                |
| 1880.00                                  | 87.25                         | 111                          | 190            | H              | 18.80                       | 0.44                  | 8.81                    | 27.17                      | 33.01          | 5.84           |
| 1880.00                                  | 88.56                         | 73                           | 169            | V              | 17.90                       | 0.44                  | 8.81                    | 26.27                      | 33.01          | 6.74           |

**Note:**

All above data were tested with no amplifier.

Absolute Level = Submitted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

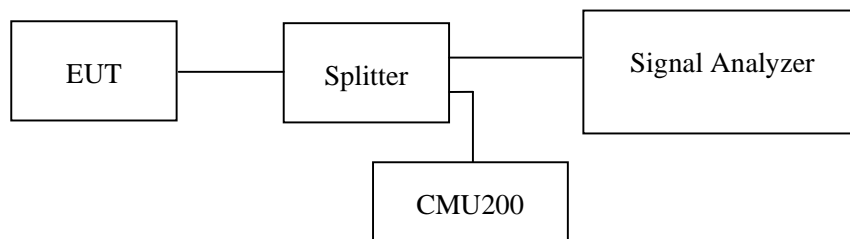
**FCC §2.1049, §22.917, §22.905 & §24.238 – OCCUPIED BANDWIDTH****Applicable Standards**

FCC 47 §2.1049, §22.917, §22.905, §24.238.

**Test Procedure**

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 5 kHz (Cellular /PCS) & 100 kHz (WCDMA) and the 26 dB & 99% bandwidth was recorded.

**Test Data****Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 23.2 °C  |
| Relative Humidity: | 50 %     |
| ATM Pressure:      | 101.0kPa |

The testing was performed by Bernie Zhang on 2017-08-02.

EUT operation mode: Transmitting

**Test Result:** Compliant.

**Cellular Band (Part 22H)**

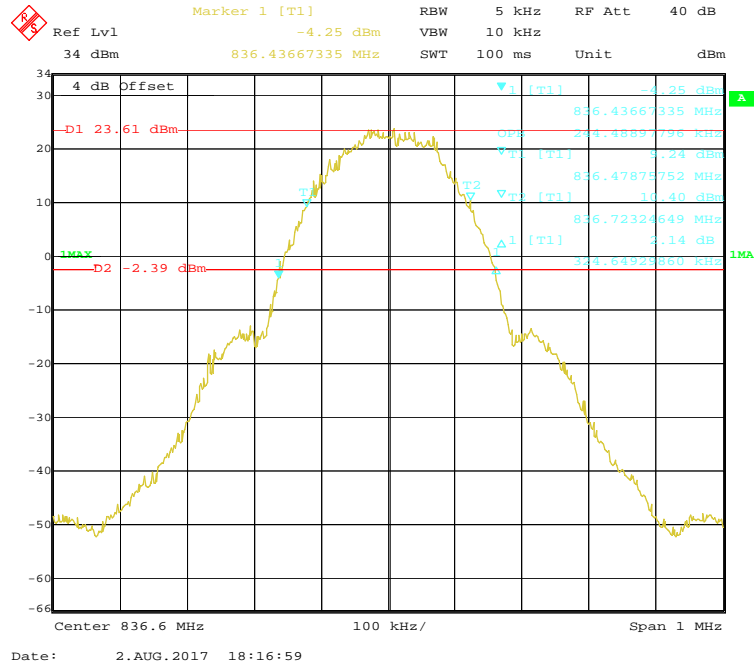
| Mode       | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|------------|-----------------|------------------------------|--------------------------------|
| GPRS(GMSK) | 836.6           | 0.244                        | 0.325                          |

**PCS Band (Part 24E)**

| Mode       | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|------------|-----------------|------------------------------|--------------------------------|
| GPRS(GMSK) | 1880.0          | 0.242                        | 0.315                          |

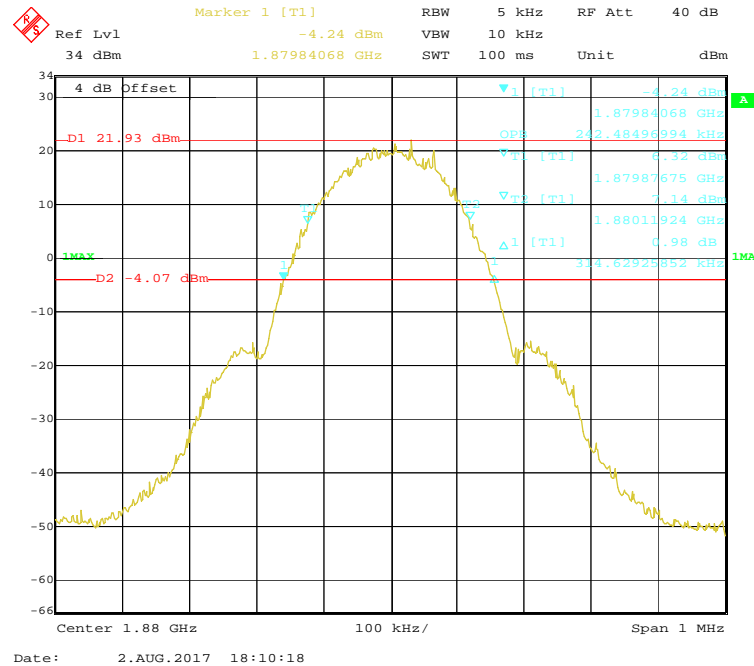
## Cellular Band (Part 22H)

## 99% Occupied &amp; 26 dB Emissions Bandwidth for GPRS (GMSK) Mode



## PCS Band (Part 24E)

## 99% Occupied &amp; 26 dB Emissions Bandwidth for GPRS (GMSK) Mode



## § 2.1051; § 22.917 (a);§ 24.238 (a) – SPURIOUS EMISSIONS AT ANTENNA TERMINALS

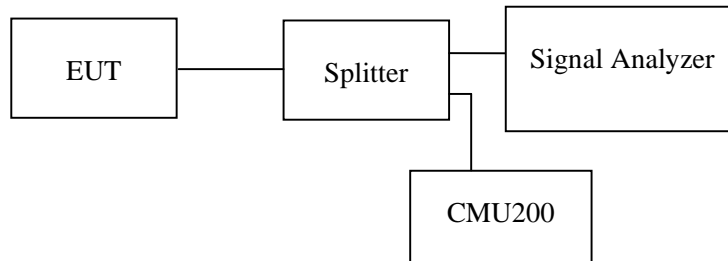
### Applicable Standards

FCC §2.1051, §22.917(a) and §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

### Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



### Test Data

#### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 23.2 °C  |
| Relative Humidity: | 50 %     |
| ATM Pressure:      | 101.0kPa |

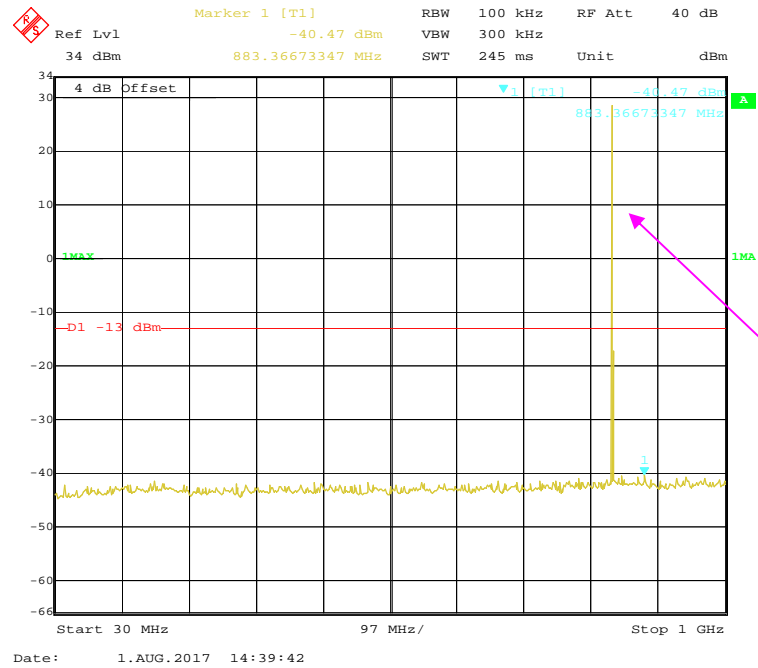
*The testing was performed by Bernie Zhang on 2017-08-01.*

*EUT operation mode: Transmitting*

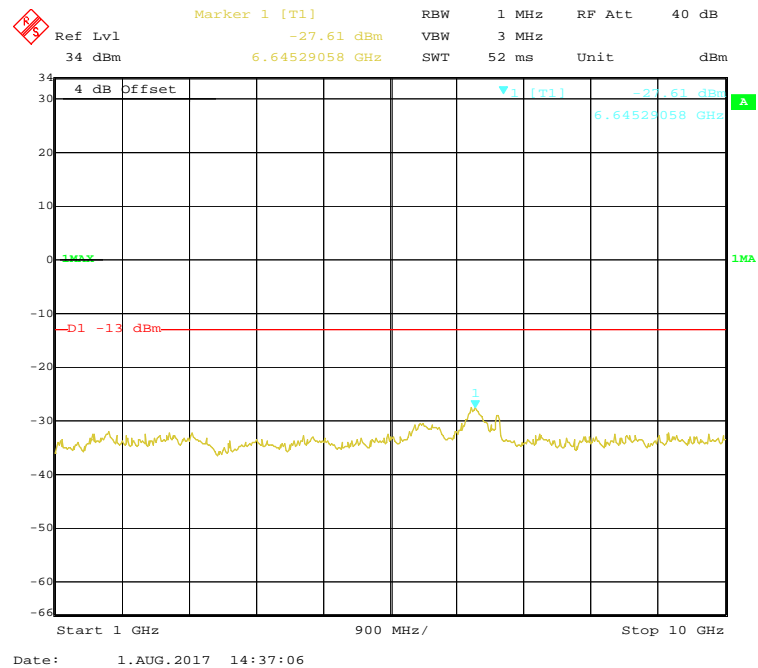


## Cellular Band (Part 22H)

## 30 MHz – 1 GHz (GPRS Mode)

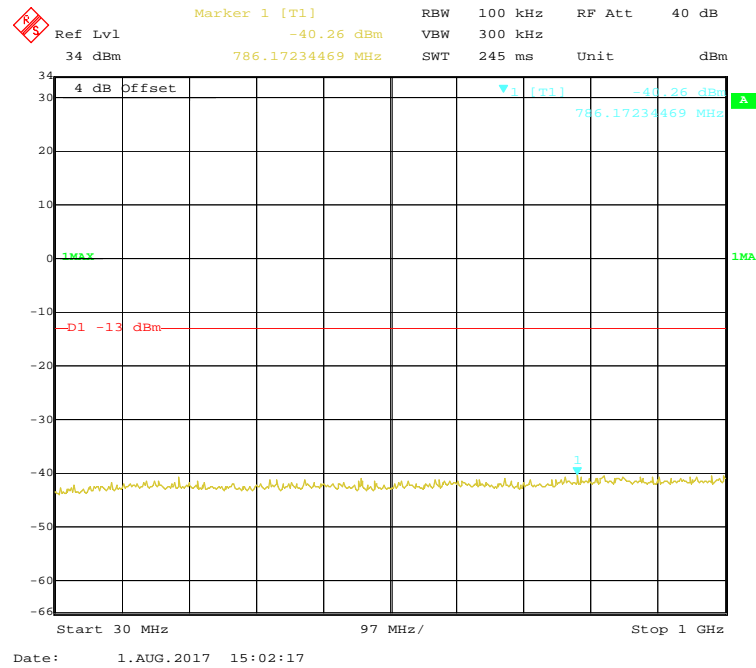


## 1 GHz – 10 GHz (GPRS Mode)

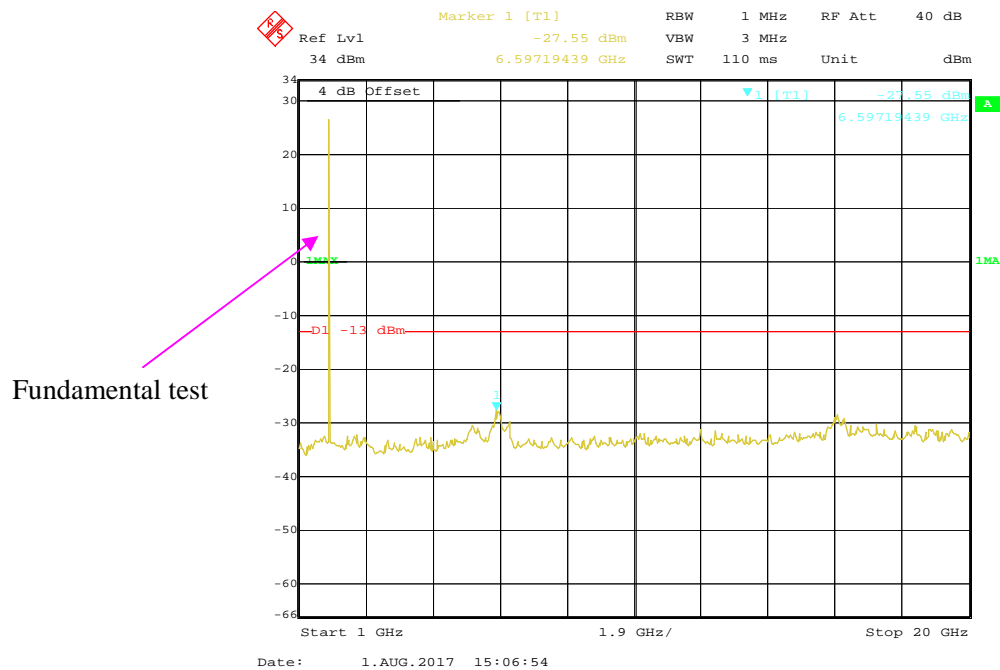


# PCS Band (Part 24E)

## 30 MHz – 1 GHz (GPRS Mode)



## 1 GHz – 20 GHz (GPRS Mode)



**FCC § 2.1053; § 22.917 (a);§ 24.238 (a) – SPURIOUS RADIATED EMISSIONS**

---

**Applicable Standards**

FCC § 2.1053, §22.917(a) and § 24.238(a)

**Test Procedure**

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg (\text{TX pwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 23.2 °C  |
| <b>Relative Humidity:</b> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

The testing was performed by Bernie Zhang on 2017-08-01.

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data as below)

**30 MHz ~ 10 GHz:****Cellular Band (Part 22H)**

| Frequency<br>(MHz)        | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                           |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| GPRS Mode, Middle channel |                               |                              |                |                |                             |                       |                         |                            |                |                |
| 342.63                    | 31.62                         | 298                          | 221            | H              | -71.26                      | 0.30                  | 4.19                    | -67.37                     | -13            | 54.37          |
| 342.63                    | 29.83                         | 262                          | 108            | V              | -71.35                      | 0.30                  | 4.19                    | -67.46                     | -13            | 54.46          |
| 1673.20                   | 67.55                         | 316                          | 200            | H              | -42.61                      | 0.39                  | 8.48                    | -34.52                     | -13            | 21.52          |
| 1673.20                   | 64.32                         | 177                          | 232            | V              | -47.78                      | 0.39                  | 8.48                    | -39.69                     | -13            | 26.69          |
| 2509.80                   | 58.31                         | 189                          | 217            | H              | -52.60                      | 0.49                  | 10.09                   | -43.00                     | -13            | 30.00          |
| 2509.80                   | 54.56                         | 207                          | 248            | V              | -57.06                      | 0.49                  | 10.09                   | -47.46                     | -13            | 34.46          |

**30 MHz ~ 20 GHz:****PCS Band (Part 24E)**

| Frequency<br>(MHz)        | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna     |                | Substituted                 |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------------------------|-------------------------------|------------------------------|----------------|----------------|-----------------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                           |                               |                              | Height<br>(cm) | Polar<br>(H/V) | Submitted<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| GPRS Mode, Middle channel |                               |                              |                |                |                             |                       |                         |                            |                |                |
| 541.63                    | 32.62                         | 62                           | 1              | H              | -66.29                      | 0.30                  | 4.59                    | -62.00                     | -13            | 49.00          |
| 541.63                    | 30.98                         | 177                          | 2              | V              | -66.11                      | 0.30                  | 4.59                    | -61.82                     | -13            | 48.82          |
| 3760.00                   | 55.32                         | 212                          | 2              | H              | -50.01                      | 0.59                  | 9.74                    | -40.86                     | -13            | 27.86          |
| 3760.00                   | 52.64                         | 77                           | 2              | V              | -53.81                      | 0.59                  | 9.74                    | -44.66                     | -13            | 31.66          |
| 5640.00                   | 47.62                         | 194                          | 2              | H              | -54.03                      | 0.67                  | 10.47                   | -44.23                     | -13            | 31.23          |
| 5640.00                   | 45.36                         | 204                          | 2              | V              | -58.16                      | 0.67                  | 10.47                   | -48.36                     | -13            | 35.36          |

**Note:**

Absolute Level = Submitted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

**FCC § 22.917 (a);§ 24.238 (a) – BAND EDGES****Applicable Standards**

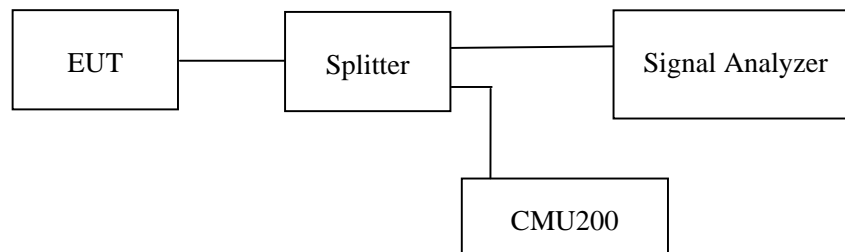
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency

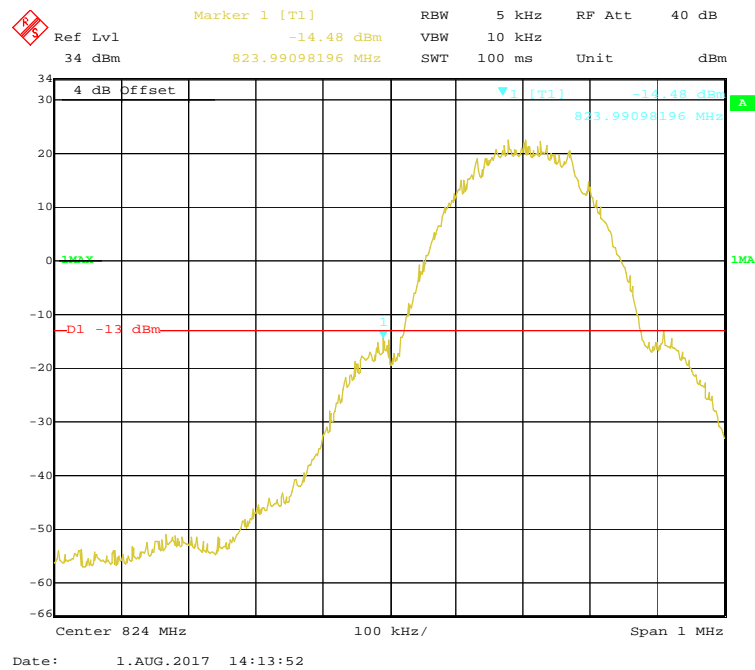
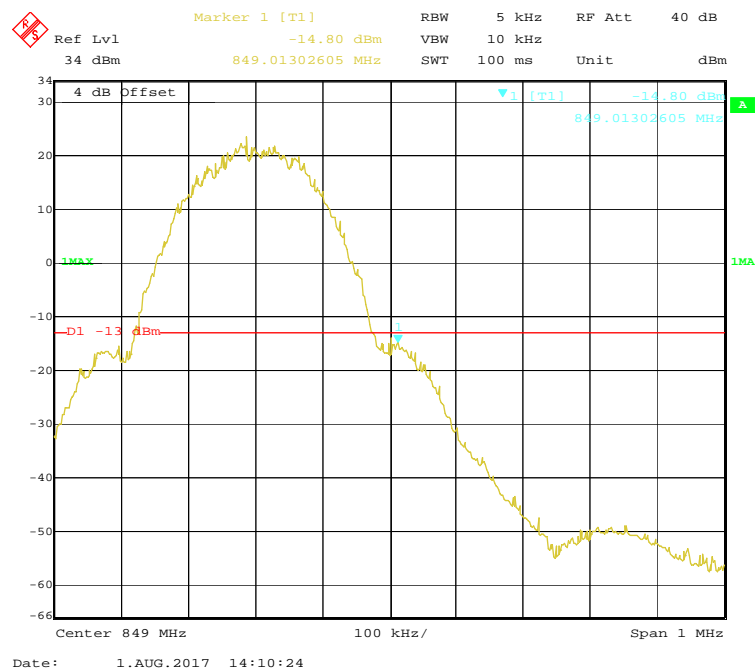
**Test Data****Environmental Conditions**

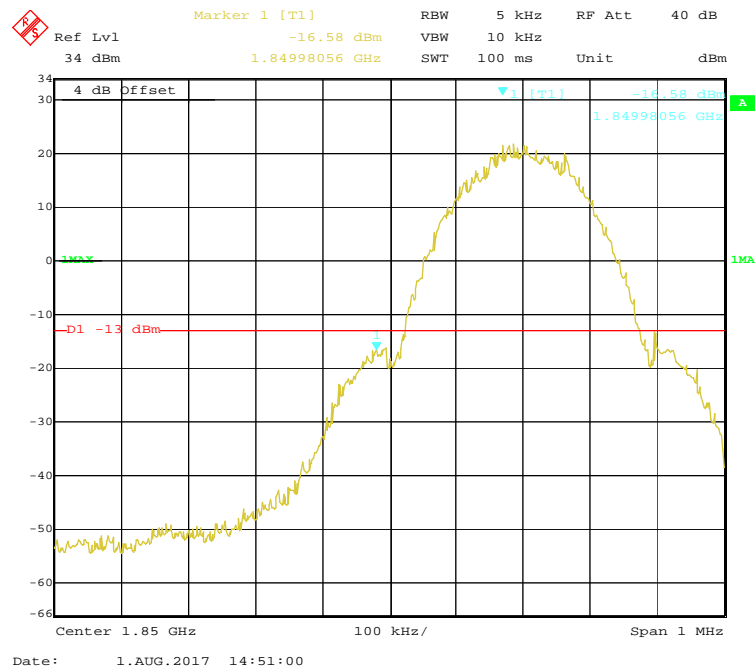
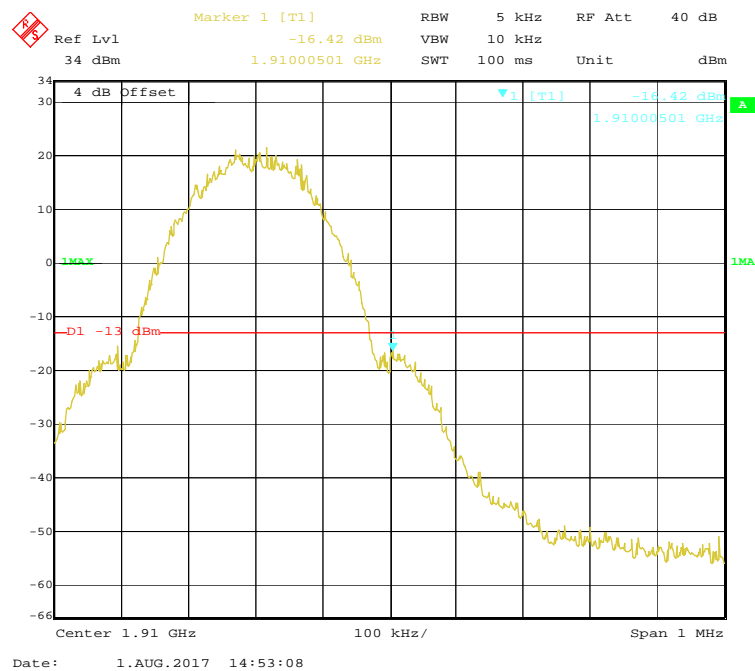
|                    |          |
|--------------------|----------|
| Temperature:       | 23.1 °C  |
| Relative Humidity: | 50 %     |
| ATM Pressure:      | 101.0kPa |

*The testing was performed by Bernie Zhang on 2017-08-01.*

*EUT operation mode: Transmitting*

**Test Result:** Compliant

**Cellular Band, Left Band Edge for GPRS (GMSK) Mode****Cellular Band, Right Band Edge for GPRS (GMSK) Mode**

**PCS Band, Left Band Edge for GPRS (GMSK) Mode****PCS Band, Right Band Edge for GPRS (GMSK) Mode**

**FCC § 2.1055; § 22.355;§ 24.235 – FREQUENCY STABILITY****Applicable Standards**

FCC § 2.1055, §22.355, §24.235.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

**Frequency Tolerance for Transmitters in the Public Mobile Services**

| Frequency Range (MHz) | Base, fixed (ppm) | Mobile > 3 watts (ppm) | Mobile ≤ 3 watts (ppm) |
|-----------------------|-------------------|------------------------|------------------------|
| 25 to 50              | 20.0              | 20.0                   | 50.0                   |
| 50 to 450             | 5.0               | 5.0                    | 50.0                   |
| 450 to 512            | 2.5               | 5.0                    | 5.0                    |
| 821 to 896            | 1.5               | 2.5                    | 2.5                    |
| 928 to 929.           | 5.0               | N/A                    | N/A                    |
| 929 to 960.           | 1.5               | N/A                    | N/A                    |
| 2110 to 2220          | 10.0              | N/A                    | N/A                    |

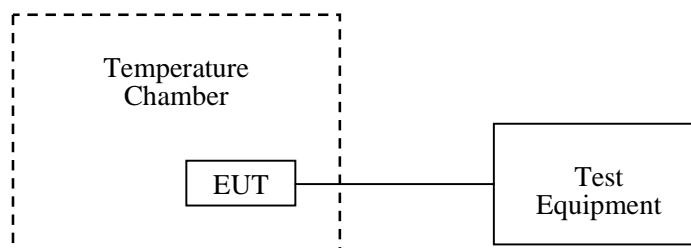
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

**Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.





**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 23.2 °C  |
| <b>Relative Humidity:</b> | 50 %     |
| <b>ATM Pressure:</b>      | 101.0kPa |

*The testing was performed by Bernie Zhang on 2017-07-31.*

*EUT operation mode: Transmitting*

**Test Result:** Compliance.

**Cellular Band (Part 22H)****GPRS Mode**

| Middle Channel, $f_0 = 836.6$ MHz |                             |                      |                       |             |
|-----------------------------------|-----------------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                  | Power Supplied ( $V_{DC}$ ) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                               | 12                          | 12                   | 0.014                 | 2.5         |
| -20                               |                             | 12                   | 0.014                 | 2.5         |
| -10                               |                             | 11                   | 0.013                 | 2.5         |
| 0                                 |                             | 11                   | 0.013                 | 2.5         |
| 10                                |                             | 11                   | 0.013                 | 2.5         |
| 20                                |                             | -1                   | -0.001                | 2.5         |
| 30                                |                             | 8                    | 0.010                 | 2.5         |
| 40                                |                             | 2                    | 0.002                 | 2.5         |
| 50                                |                             | 11                   | 0.013                 | 2.5         |
| 25                                | V min.= 8                   | 8                    | 0.010                 | 2.5         |
| 25                                | V max.= 32                  | 11                   | 0.013                 | 2.5         |

**PCS Band (Part 24E)****GPRS Mode**

| Middle Channel, $f_0 = 1880.0$ MHz |                                   |                      |                       |        |
|------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                   | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                | 12                                | 17                   | 0.009                 | Pass   |
| -20                                |                                   | 18                   | 0.010                 | Pass   |
| -10                                |                                   | 17                   | 0.009                 | Pass   |
| 0                                  |                                   | 18                   | 0.010                 | Pass   |
| 10                                 |                                   | 17                   | 0.009                 | Pass   |
| 20                                 |                                   | 5                    | 0.003                 | Pass   |
| 30                                 |                                   | 11                   | 0.006                 | Pass   |
| 40                                 |                                   | 16                   | 0.009                 | Pass   |
| 50                                 |                                   | 8                    | 0.004                 | Pass   |
| 25                                 | V min.= 8                         | 11                   | 0.006                 | Pass   |
| 25                                 | V max.= 32                        | 8                    | 0.004                 | Pass   |

\*\*\*\*\* END OF REPORT \*\*\*\*\*