



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

For

## SWAGTEK

10205 NW 19th Street STE101, Miami, Florida, United States

**FCC ID: O55181917**

|  |   |
|--|---|
| <b>Report Type:</b><br>Original Report       | <b>Product Name:</b><br>LOGIC   |
| <b>Test Engineer:</b> Tom Tang               | <i>Tom Tang</i>   |
| <b>Report Number:</b> RDG170601011C          |   |
| <b>Report Date:</b> 2017-06-20               |   |
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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The **SWAGTEK**'s product, model number: **LOGIC F2 (FCC ID: O55181917)** (the "EUT") in this report was a **LOGIC**, which was measured approximately: 13.5 cm (L) × 6.4 cm (W) × 1.3 cm (H), rated input voltage: DC3.7V battery or DC5.0V charging from adapter.

Adapter information:

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC5.0V 300mA

*Note: The series product, model LOGIC F2, iSWAG Flip and UNONU U8 are electrically identical, the difference them is the model name, we selected LOGIC F2 for fully testing, the details was explained in the attached declaration letter.*

*\*All measurement and test data in this report was gathered from final production sample, serial number: 170601011 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-06-01, and EUT conformed to test requirement.*

### Objective

This report is prepared on behalf of **SWAGTEK** in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules.

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

### Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: O55181917.

FCC Part 15C DSS submissions with FCC ID: O55181917.

## **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, Part 22 Subpart H, Part 24 Subpart E.

Applicable Standards: TIA/EIA 603-D-2010.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu).

## **Test Facility**

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. 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.: 560332. 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

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### Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode.

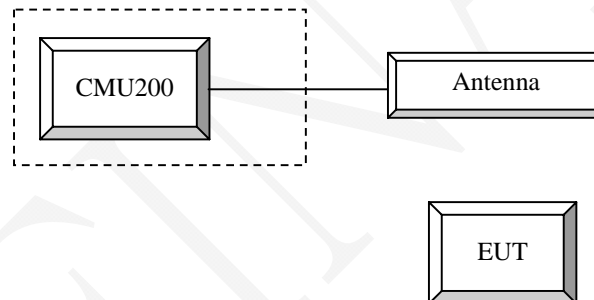
### Equipment Modifications

No modification was made to the EUT.

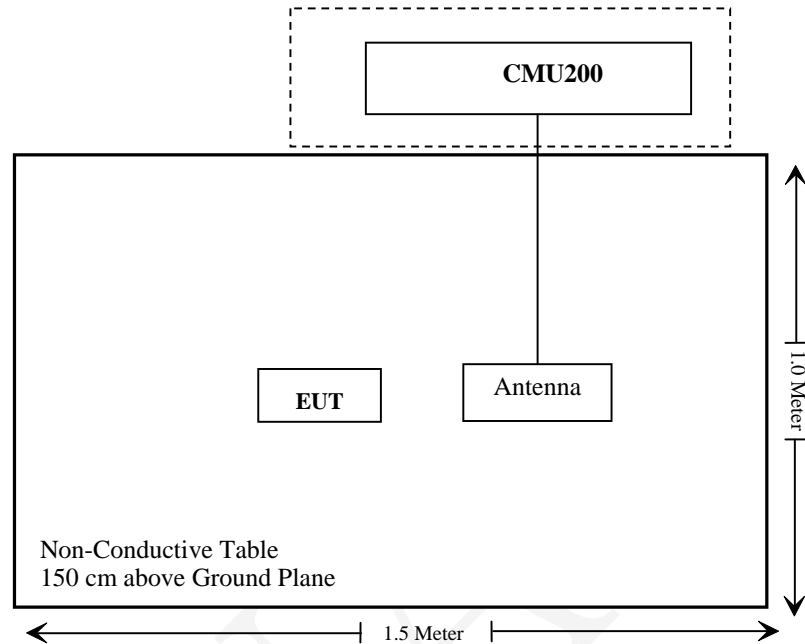
### Support Equipment List and Details

| Manufacturer | Description                          | Model  | Serial Number  |
|--------------|--------------------------------------|--------|----------------|
| R&S          | Universal Radio Communication Tester | CMU200 | 11-9435686-111 |

### Configuration of Test Setup



## Block Diagram of Test Setup



## **SUMMARY OF TEST RESULTS**

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| <b>FCC Rules</b>                           | <b>Description of Test</b>   | <b>Result</b>  |
|--|--|----------------|
| §1.1310, §2.1093                           | RF Exposure  | Compliance     |
| §2.1046;<br>§ 22.913 (a); § 24.232<br>(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,<br>§ 22.917 (a); § 24.238<br>(a) | Spurious Emissions at Antenna Terminal                                 | Compliance     |
| § 2.1053<br>§ 22.917 (a); § 24.238<br>(a)  | Field Strength of Spurious Radiation                                   | Compliance     |
| § 22.917 (a); § 24.238<br>(a)              | Out of band emission, Band Edge  | Compliance     |
| § 2.1055<br>§ 22.355; § 24.235             | Frequency stability vs. temperature<br>Frequency stability vs. voltage | Compliance     |



## **FCC §1.1310 & §2.1093- RF EXPOSURE**

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### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliant, please refer to the SAR report: RDG170601011-20.

FINAL

## **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.

FINAL

## **FCC § 2.1046, § 22.913 (a) & § 24.232 (c) - RF OUTPUT POWER**

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### **Applicable Standard**

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..

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### **Test Procedure**

#### **GSM/GPRS/EGPRS**

Function: Menu select > GSM Mobile Station > GSM 850/1900  
Press Connection control to choose the different menus  
Press RESET > choose all the reset all settings  
Connection Press Signal Off to turn off the signal and change settings  
Network Support > GSM + GPRS or GSM + EGSM  
Main Service > Packet Data  
Service selection > Test Mode A – Auto Slot Config. off  
MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting  
    > Slot configuration > Uplink/Gamma  
    > 33 dBm for GPRS 850  
    > 30 dBm for GPRS 1900  
    > 27 dBm for EGPRS 850  
    > 26 dBm for EGPRS 1900  
BS Signal channel Enter the same channel number for TCH channel (test channel) and BCCH  
Frequency Offset > + 0 Hz  
Mode > BCCH and TCH  
BCCH Level > -85 dBm (May need to adjust if link is not stable)  
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]  
Channel Type > Off

P0 > 4 dB  
 Slot Config > Unchanged (if already set under MS signal)  
 TCH > choose desired test channel  
 Hopping > Off  
 Main Timeslot > 3  
 Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)  
 Bit Stream > 2E9-1 PSR Bit Stream  
 AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input  
 Connection Press Signal on to turn on the signal and change settings

*Radiated method:*

ANSI/TIA-603-D section 2.2.17

## Test Equipment List and Details

| Manufacturer    | Description                          | Model   | Serial Number  | Calibration Date | Calibration Due Date |
|-----------------|--------------------------------------|---------|----------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver                    | ESCI    | 100028         | 2016-12-02       | 2017-12-01           |
| Sunol Sciences  | Broadband Antenna                    | JB3     | A121808        | 2016-04-10       | 2019-04-09           |
| Rohde & Schwarz | Spectrum Analyzer                    | FSEM30  | 100018         | 2016-12-02       | 2017-12-01           |
| ETS             | Horn Antenna                         | 3115    | 003-6076       | 2016-12-02       | 2017-12-01           |
| ETS             | Horn Antenna                         | 3115    | 6751           | 2017-06-16       | 2020-06-15           |
| EMCO            | Adjustable Dipole Antenna            | 3121C   | 9109-258       | N/A              | N/A                  |
| HP              | Signal Generator                     | 8648C   | 3623A04150     | 2017-05-23       | 2018-05-22           |
| WILTRON         | SWEPT FREQUENCY SYNTHESIZER          | 6737    | 213001         | 2016-05-23       | 2017-05-22           |
| EMCT            | Semi-Anechoic Chamber                | 966     | 966-1          | 2015-04-24       | 2018-04-23           |
| Unknown         | RF Cable (below 1GHz)                | Unknown | NO.1           | 2016-11-10       | 2017-11-09           |
| Unknown         | RF Cable (below 1GHz)                | Unknown | NO.4           | 2016-11-10       | 2017-11-09           |
| Unknown         | RF Cable (above 1GHz)                | Unknown | NO.2           | 2016-11-10       | 2017-11-09           |
| R&S             | Universal Radio Communication Tester | CMU200  | 11-9435686-111 | 2016-07-28       | 2017-07-27           |

**\* Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

## Test Data

### Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 27.1 °C   |
| <b>Relative Humidity:</b> | 61.2 %    |
| <b>ATM Pressure:</b>      | 100.1 kPa |

The testing was performed by Tom Tang on 2017-06-17.

### Conducted Output Power

#### Cellular Band (Part 22H) & PCS Band (Part 24E)

| Band     | Channel No. | Peak Output Power (dBm) |                |                |                |                |
|----------|-------------|-------------------------|----------------|----------------|----------------|----------------|
|          |             | GSM                     | GPRS 1 TX Slot | GPRS 2 TX Slot | GPRS 3 TX Slot | GPRS 4 TX Slot |
| Cellular | 128         | 32.40                   | 32.54          | 31.36          | 29.78          | 28.31          |
|          | 190         | 32.37                   | 32.41          | 31.57          | 29.81          | 28.22          |
|          | 251         | 32.46                   | 32.37          | 31.49          | 29.44          | 28.24          |
| PCS      | 512         | 29.56                   | 29.61          | 28.35          | 26.82          | 25.35          |
|          | 661         | 29.33                   | 29.45          | 28.17          | 26.91          | 25.41          |
|          | 810         | 29.49                   | 29.52          | 28.26          | 26.76          | 25.28          |

### EIRP/ERP:

| Frequency<br>(MHz)      | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                    | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-------------------------|----------------|-------------------------------|-------------------------------|------------------------------|--------------------|----------------------------|----------------|----------------|
|                         |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable Loss<br>(dB) |                            |                |                |
| GSM 850 Middle Channel  |                |                               |                               |                              |                    |                            |                |                |
| 836.600                 | H              | 101.66                        | 24.6                          | 0.0                          | 0.6                | 24.0                       | 38.5           | 14.5           |
| 836.600                 | V              | 103.87                        | 28.9                          | 0.0                          | 0.6                | 28.3                       | 38.5           | 10.2           |
| PCS 1900 Middle Channel |                |                               |                               |                              |                    |                            |                |                |
| 1880.000                | H              | 95.47                         | 21.9                          | 8.0                          | 0.9                | 29.0                       | 33.0           | 4.0            |
| 1880.000                | V              | 91.49                         | 19.1                          | 8.0                          | 0.9                | 26.2                       | 33.0           | 6.8            |

### Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

## **FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH**

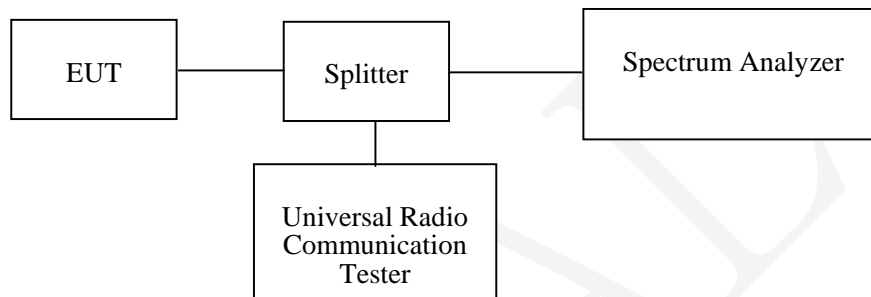
### **Applicable Standard**

FCC §2.1049, §22.917 and §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 26 dB & 99% bandwidth was recorded.



### **Test Equipment List and Details**

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30  | 100018        | 2016-12-02       | 2017-12-01           |
| Unknown         | RF Attenuator     | 10dB    | 10dB-2        | Each Time        | /                    |
| Unknown         | RF Cable          | Unknown | C-2           | Each Time        | /                    |
| Unknown         | Two-way Splitter  | Unknown | OE0120121     | Each Time        | /                    |

**\* Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

## Test Data

### Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 28.2 °C   |
| <b>Relative Humidity:</b> | 43.9 %    |
| <b>ATM Pressure:</b>      | 100.1 kPa |

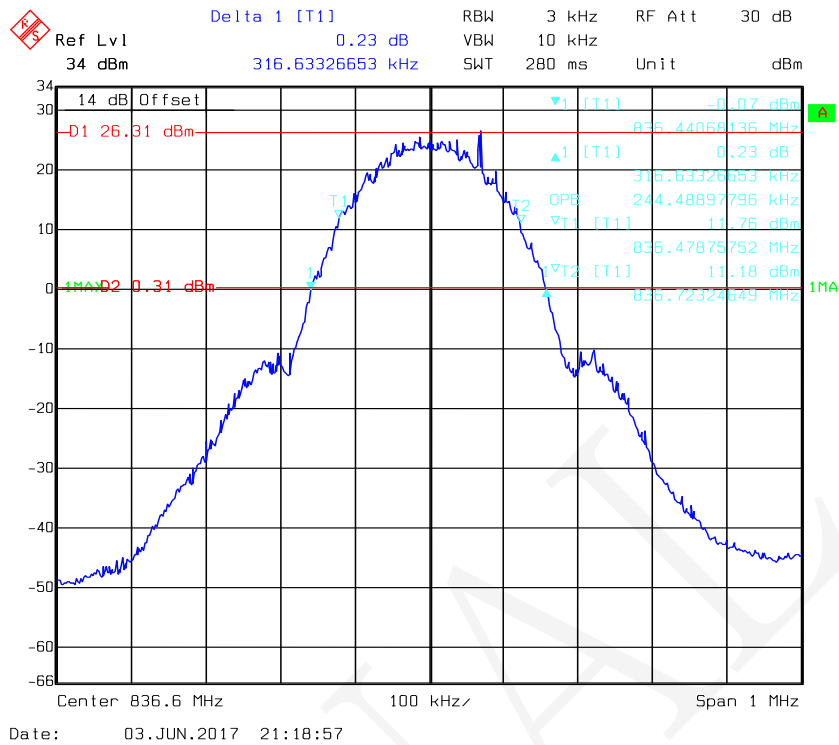
*The testing was performed by Tom Tang on 2017-06-03.*

*Test Mode: Transmitting*

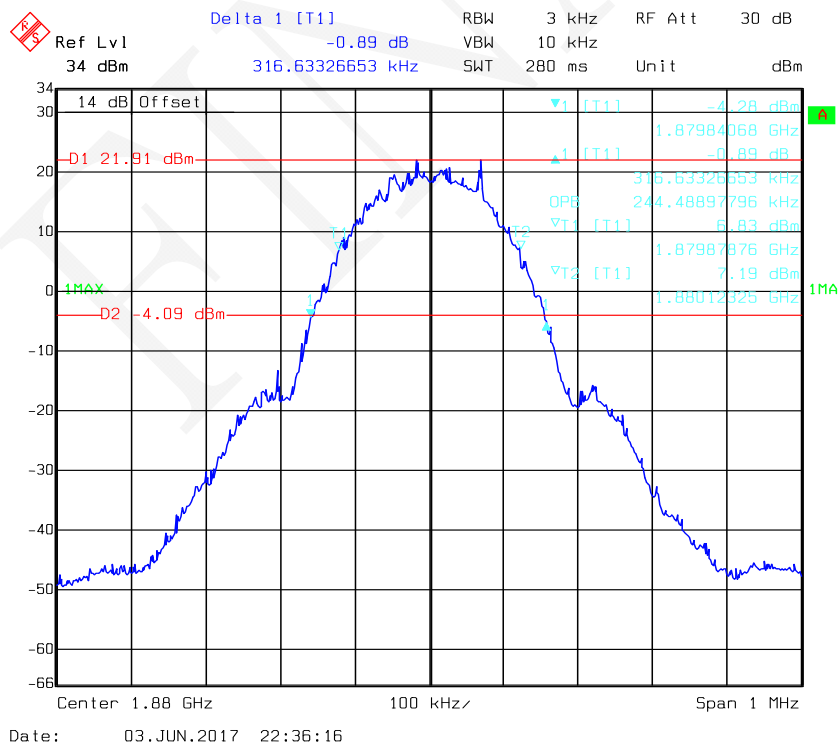
*Test Result: Compliant. Please refer to the following table and plots.*

| <b>Band</b> | <b>Test Channel</b> | <b>Mode</b> | <b>99% Occupied Bandwidth (kHz)</b> | <b>26 dB Occupied Bandwidth (kHz)</b> |
|-------------|---------------------|-------------|-------------------------------------|---------------------------------------|
| Cellular    | M                   | GSM         | 244.489                             | 316.633                               |
| PCS         |                     | PCS         | 244.489                             | 316.633                               |

### GMSK 850 Cellular Band



### GMSK PCS Band





## FCC §2.1051, §22.917(a) & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

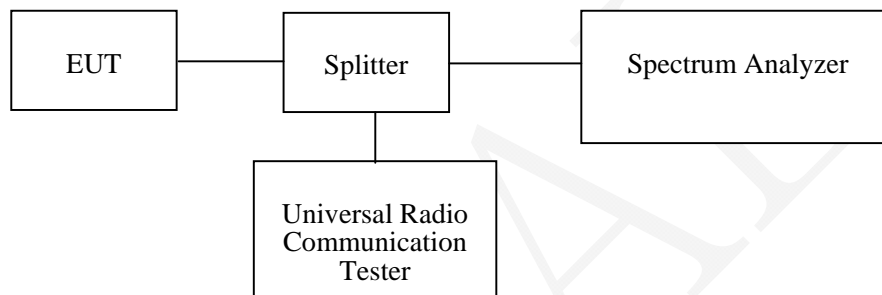
### Applicable Standard

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. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



### Test Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30  | 100018        | 2016-12-02       | 2017-12-01           |
| Unknown         | RF Attenuator     | 10dB    | 10dB-2        | Each Time        | /                    |
| Unknown         | RF Cable          | Unknown | C-2           | Each Time        | /                    |
| Unknown         | Two-way Splitter  | Unknown | OE0120121     | Each Time        | /                    |

\* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

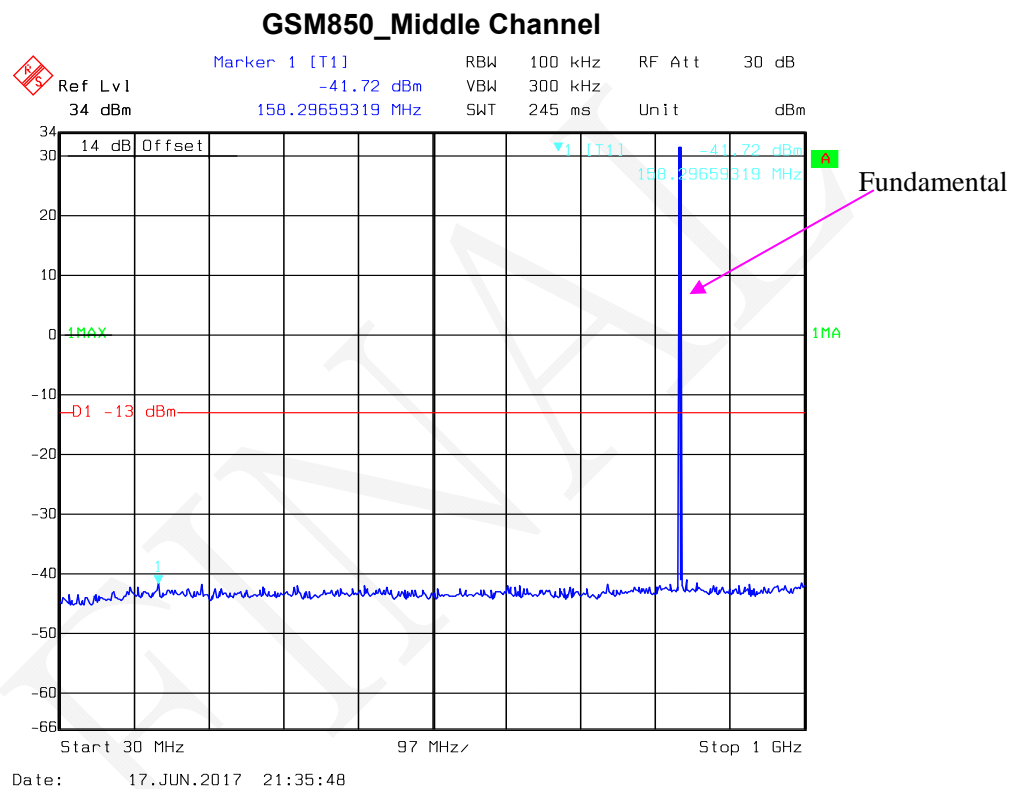
## Test Data

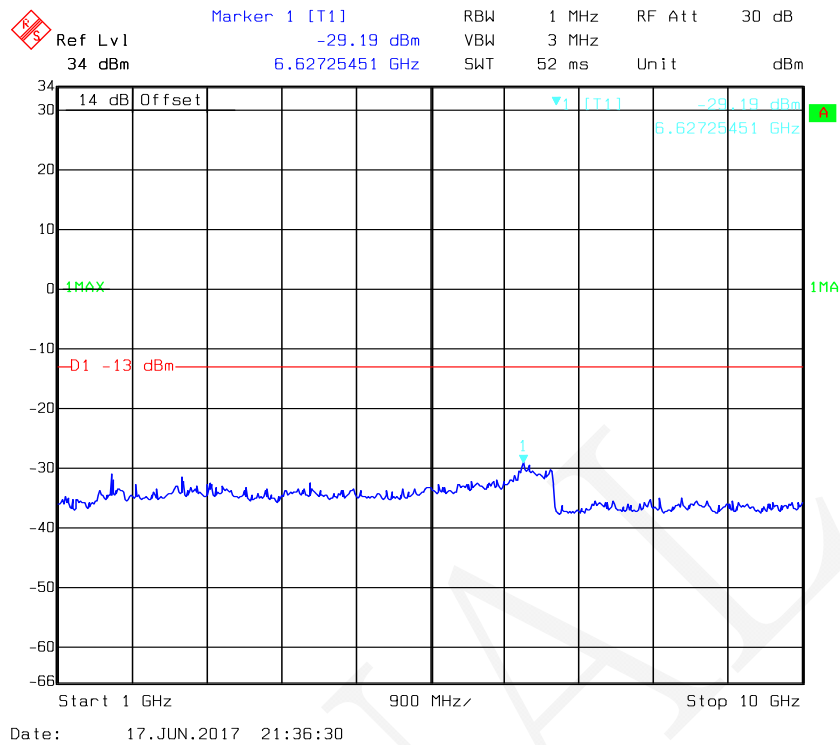
### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 27.1 °C   |
| Relative Humidity: | 61.2 %    |
| ATM Pressure:      | 100.1 kPa |

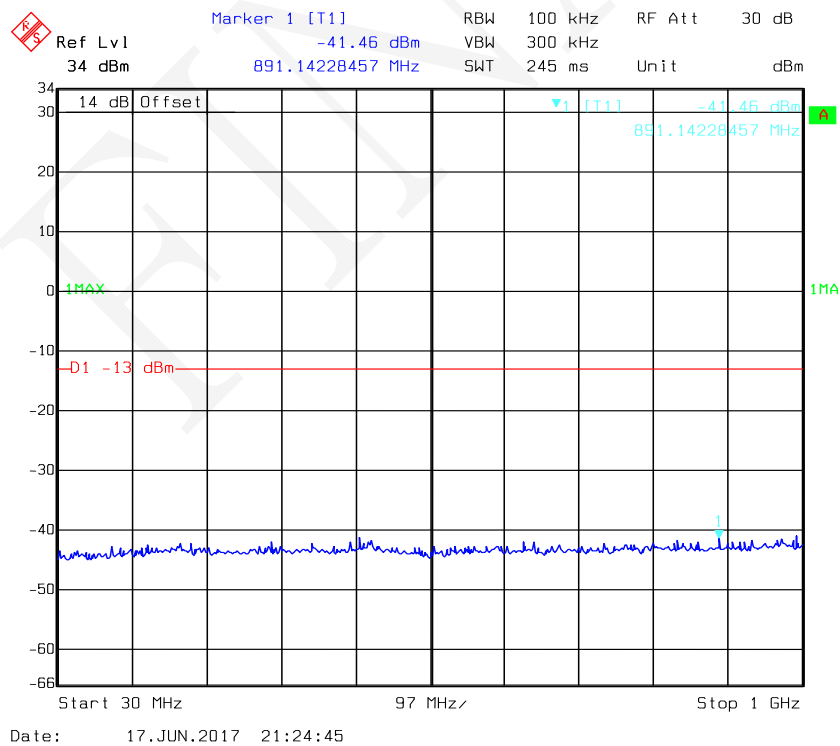
The testing was performed by Tom Tang on 2017-06-17.

Please refer to the following plots.

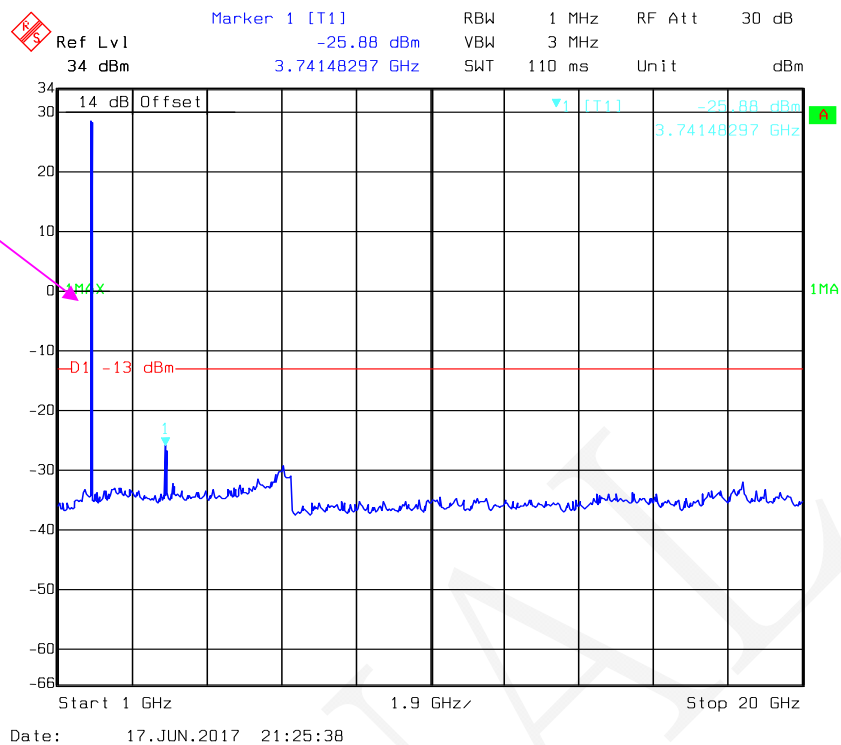




### PCS 1900\_Middle Channel



Fundamental  
test with band  
rejection filter



## **FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS**

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### **Applicable Standard**

FCC § 2.1053, §22.917 and § 24.238.

### **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 =  $10 \lg (\text{TXpwr in Watts}/0.001)$  – the absolute level

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

## Test Equipment List and Details

| Manufacturer          | Description                 | Model       | Serial Number      | Calibration Date | Calibration Due Date |
|-----------------------|-----------------------------|-------------|--------------------|------------------|----------------------|
| Agilent               | Amplifier                   | 8447D       | 2944A10442         | 2016-12-02       | 2017-12-01           |
| Rohde & Schwarz       | EMI Test Receiver           | ESCI        | 100028             | 2016-12-02       | 2017-12-01           |
| Sunol Sciences        | Broadband Antenna           | JB3         | A121808            | 2016-04-10       | 2019-04-09           |
| Rohde & Schwarz       | Spectrum Analyzer           | FSEM30      | 100018             | 2016-12-02       | 2017-12-01           |
| ETS                   | Horn Antenna                | 3115        | 003-6076           | 2016-12-02       | 2017-12-01           |
| ETS                   | Horn Antenna                | 3115        | 6751               | 2017-06-16       | 2020-06-15           |
| EMCO                  | Adjustable Dipole Antenna   | 3121C       | 9109-258           | N/A              | N/A                  |
| HP                    | Signal Generator            | 8648C       | 3623A04150         | 2017-05-23       | 2018-05-22           |
| WILTRON               | SWEPT FREQUENCY SYNTHESIZER | 6737        | 213001             | 2017-05-23       | 2018-05-22           |
| Mini-circuits         | Amplifier                   | ZVA-183-S+  | 771001215          | 2017-05-20       | 2018-05-19           |
| HP                    | Amplifier                   | 8449B       | 3008A00277         | 2016-12-02       | 2017-12-01           |
| EMCT                  | Semi-Anechoic Chamber       | 966         | 966-1              | 2015-04-24       | 2018-04-23           |
| Unknown               | RF Cable (below 1GHz)       | Unknown     | NO.1               | 2016-11-10       | 2017-11-09           |
| Unknown               | RF Cable (below 1GHz)       | Unknown     | NO.4               | 2016-11-10       | 2017-11-09           |
| Unknown               | RF Cable (above 1GHz)       | Unknown     | NO.2               | 2016-11-10       | 2017-11-09           |
| Ducommun Technologies | Horn Antenna                | ARH-4223-02 | 1007726-01<br>1315 | 2016-08-18       | 2017-08-18           |
| Ducommun Technologies | Horn Antenna                | ARH-2823-02 | 1007726-01<br>1312 | 2016-08-18       | 2017-08-18           |

**\* Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

## Test Data

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 27.1 °C   |
| Relative Humidity: | 61.2 %    |
| ATM Pressure:      | 100.1 kPa |

The testing was performed by Tom Tang on 2017-06-16.

EUT Operation Mode: Transmitting

**Cellular Band (PART 22H)**

**30 MHz-10 GHz:**

| Frequency<br>(MHz)                 | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                    |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| GSM850 GMSK, Frequency:836.600 MHz |                |                               |                               |                              |                       |                            |                |                |
| 1673.200                           | H              | 69.25                         | -33.9                         | 7.9                          | 0.8                   | -26.8                      | -13.0          | 13.8           |
| 1673.200                           | V              | 67.90                         | -33.5                         | 7.9                          | 0.8                   | -26.4                      | -13.0          | 13.4           |
| 2509.800                           | H              | 62.04                         | -37.7                         | 8.9                          | 1.3                   | -30.1                      | -13.0          | 17.1           |
| 2509.800                           | V              | 59.30                         | -38.2                         | 8.9                          | 1.3                   | -30.6                      | -13.0          | 17.6           |
| 702.500                            | H              | 45.20                         | -59.9                         | 0.0                          | 0.6                   | -60.5                      | -13.0          | 47.5           |
| 780.340                            | V              | 40.63                         | -64.2                         | 0.0                          | 0.6                   | -64.8                      | -13.0          | 51.8           |

**PCS Band (PART 24E)**

**30 MHz-20 GHz:**

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                      |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| GSM1900 GMSK, Frequency:1880.000 MHz |                |                               |                               |                              |                       |                            |                |                |
| 3760.000                             | H              | 61.82                         | -33.1                         | 8.8                          | 1.4                   | -25.7                      | -13.0          | 12.7           |
| 3760.000                             | V              | 59.67                         | -35.2                         | 8.8                          | 1.4                   | -27.8                      | -13.0          | 14.8           |
| 5640.000                             | H              | 52.96                         | -40.1                         | 10.3                         | 1.8                   | -31.6                      | -13.0          | 18.6           |
| 5640.000                             | V              | 50.43                         | -42.7                         | 10.3                         | 1.8                   | -34.2                      | -13.0          | 21.2           |
| 702.500                              | H              | 46.00                         | -59.1                         | 0.0                          | 0.6                   | -59.7                      | -13.0          | 46.7           |
| 780.340                              | V              | 39.00                         | -65.9                         | 0.0                          | 0.6                   | -66.5                      | -13.0          | 53.5           |

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

## FCC §22.917(a) & §24.238(a) - BAND EDGES

### Applicable Standard

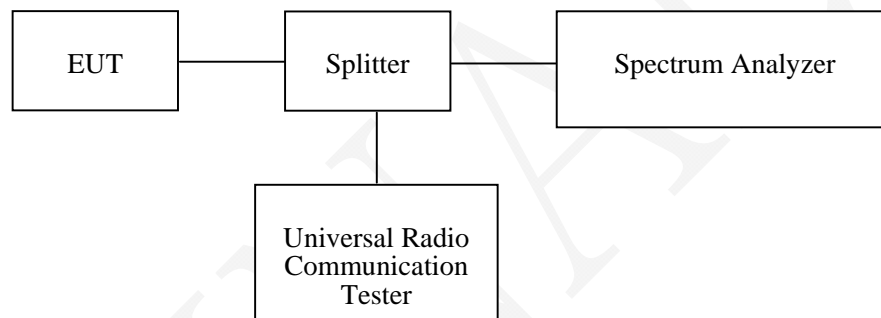
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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 Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30  | 100018        | 2016-12-02       | 2017-12-01           |
| Unknown         | RF Attenuator     | 10dB    | 10dB-2        | Each Time        | /                    |
| Unknown         | RF Cable          | Unknown | C-2           | Each Time        | /                    |
| Unknown         | Two-way Splitter  | Unknown | OE0120121     | Each Time        | /                    |

**\* Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".



## Test Data

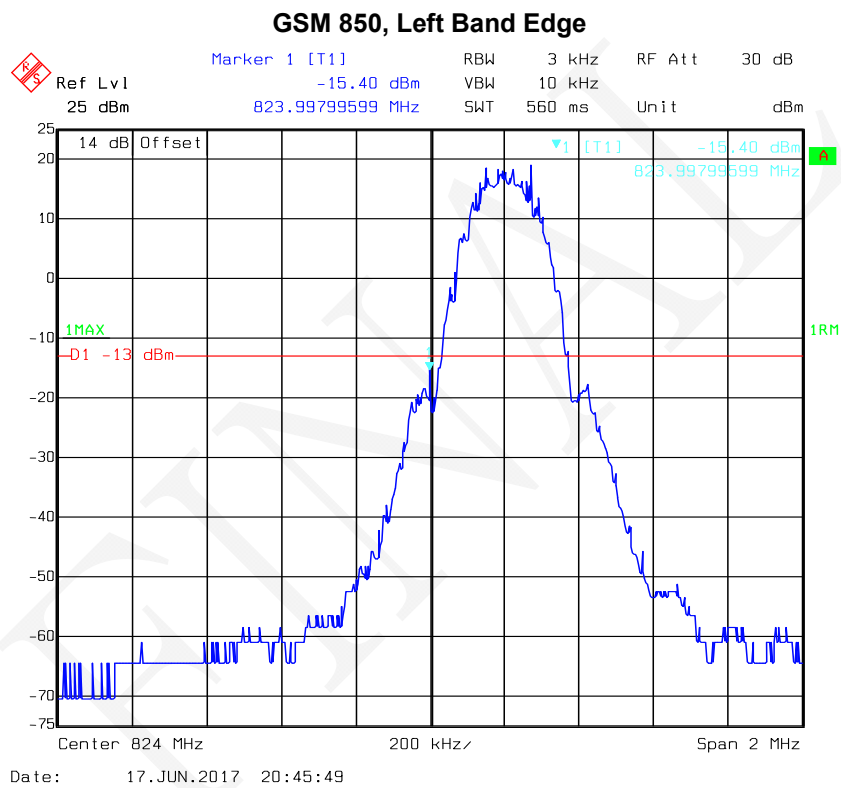
### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 27.1 °C   |
| Relative Humidity: | 61.2 %    |
| ATM Pressure:      | 100.1 kPa |

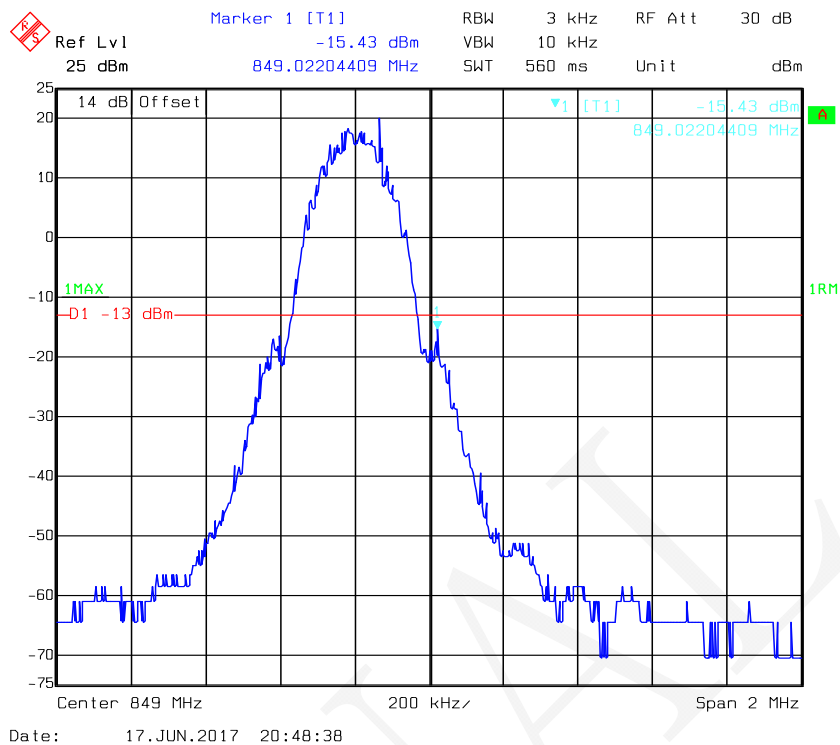
The testing was performed by Tom Tang on 2017-06-17.

Test Mode: Transmitting

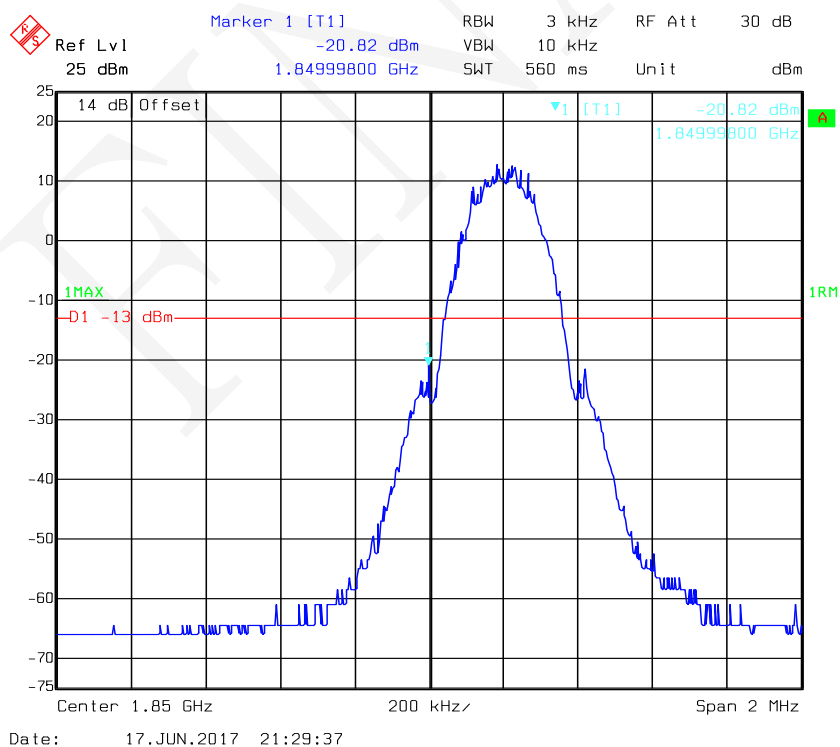
Test Result: Compliant. Please refer to the following plots.



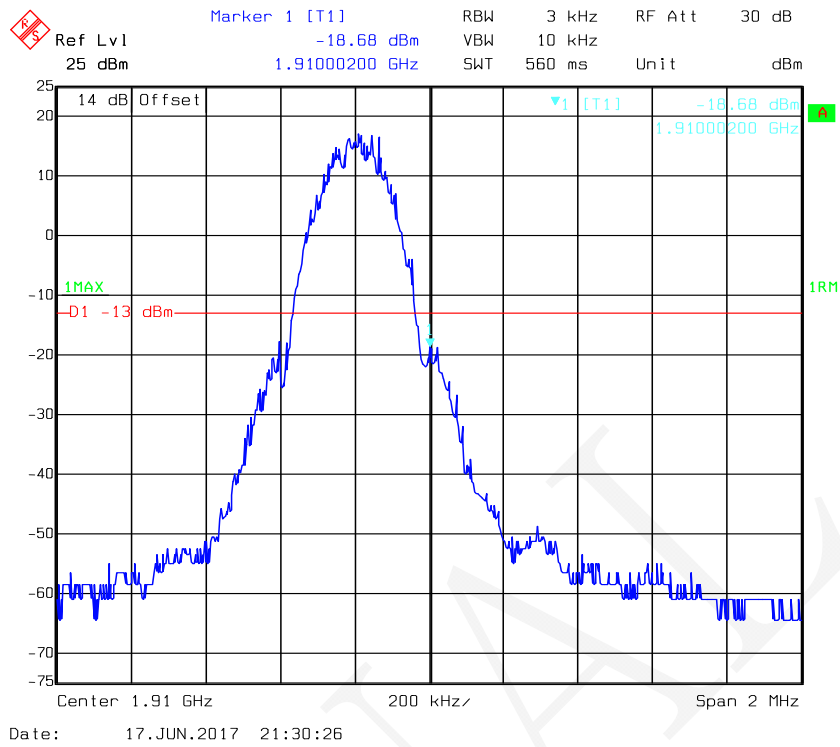
### GSM 850, Right Band Edge



### GSM 1900, Left Band Edge



### GSM 1900, Right Band Edge



## FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY

### Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235

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                    |

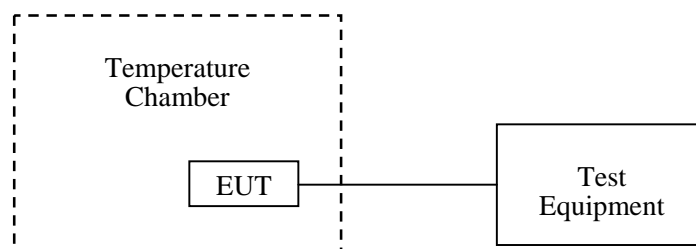
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### 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: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to the battery end point. The output frequency was recorded for each battery voltage.



## Test Equipment List and Details

| Manufacturer | Description                          | Model   | Serial Number  | Calibration Date | Calibration Due Date |
|--------------|--------------------------------------|---------|----------------|------------------|----------------------|
| FLUKE        | Multimeter                           | 1587    | 27870099       | 2016-12-30       | 2017-12-29           |
| BACL         | High Temperature Test Chamber        | BTH-150 | 30024          | 2016-12-02       | 2017-12-01           |
| R&S          | Universal Radio Communication Tester | CMU200  | 11-9435686-111 | 2016-07-28       | 2017-07-27           |
| Unknown      | RF Attenuator                        | 10dB    | 10dB-2         | Each Time        | /                    |
| Unknown      | RF Cable                             | Unknown | C-2            | Each Time        | /                    |

\* **Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

## Test Data

### Environmental Conditions

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 27.1 °C   |
| <b>Relative Humidity:</b> | 61.2 %    |
| <b>ATM Pressure:</b>      | 100.1 kPa |

*The testing was performed by Tom Tang on 2017-06-17.*

### Cellular Band (Part 22H)

| GMSK, Middle Channel, $f_c = 836.6$ MHz |                 |                 |                 |       |
|---|-----------------|-----------------|-----------------|-------|
| Temperature                             | Voltage         | Frequency Error | Frequency Error | Limit |
| °C                                      | V <sub>DC</sub> | Hz              | ppm             | ppm   |
| -30                                     | 3.7             | -7              | -0.008          | 2.5   |
| -20                                     |                 | -10             | -0.012          |       |
| -10                                     |                 | -8              | -0.010          |       |
| 0                                       |                 | -11             | -0.013          |       |
| 10                                      |                 | -6              | -0.007          |       |
| 20                                      |                 | -13             | -0.016          |       |
| 30                                      |                 | -8              | -0.010          |       |
| 40                                      |                 | -3              | -0.004          |       |
| 50                                      |                 | -10             | -0.012          |       |
| 25                                      | 3.5             | -9              | -0.011          | 2.5   |
| 25                                      | 4.2             | -6              | -0.007          |       |

### PCS Band (Part 24E)

| GMSK, Middle Channel, $f_c = 1880.0$ MHz |                 |                 |                 |            |
|--|-----------------|-----------------|-----------------|------------|
| Temperature                              | Voltage         | Frequency Error | Frequency Error | Result     |
| °C                                       | V <sub>DC</sub> | Hz              | ppm             |            |
| -30                                      | 3.7             | -5              | -0.003          | Compliance |
| -20                                      |                 | -8              | -0.004          |            |
| -10                                      |                 | -3              | -0.002          |            |
| 0  |                 | -4              | -0.002          |            |
| 10                                       |                 | -6              | -0.003          |            |
| 20                                       |                 | -5              | -0.003          |            |
| 30                                       |                 | -7              | -0.004          |            |
| 40                                       |                 | -4              | -0.002          |            |
| 50                                       |                 | -8              | -0.004          |            |
| 25                                       | 3.5             | -4              | -0.002          | Compliance |
| 25                                       | 4.2             | -1              | -0.001          |            |

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