# FCC REPORT

| | |
|---|---|
| **Report Reference No. ..... :** | TRE 1706027102 R/C…….: 80738 |
| **FCC ID ..... :** | SRQ-ZTE-R341 |
| **Applicant's name ..... :** | ZTE Corporation |
| Address ..... : | ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,Nanshan District,Shenzhen,Guangdong,P.R.China |
| Manufacturer.....: | ZTE Corporation |
| Address.....: | ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park,Nanshan District,Shenzhen,Guangdong,P.R.China |
| **Test item description ..... :** | FEATURE PHONE |
| Trade Mark ..... : | ZTE |
| Model/Type reference ..... : | ZTE R341, R341 |
| **Standard ..... :** | 47 CFR FCC Part 22(H): Cellular Radiotelephone Service<br>47 CFR FCC Part 24(E): Personal Communications Services |
| Date of receipt of test sample……..: | June 14, 2017 |
| Date of testing……..: | June. 15, 2017 - July. 05, 2017 |
| Date of issue……..: | July. 05, 2017 |
| **Result .....……..:** | **Pass** |

| | | |
|---|---|---|
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| Change History | | |
|---|---|---|
| Issue | Date | Reason for change |
| 1.0 | 2017.07.05 | First edition |
| | | |
| | | |

# 1. GENERAL INFORMATION

## 1.1 EUT Description

| | |
|---|---|
| EUT Type | FEATURE PHONE |
| Hardware Version | V1.2 |
| Software Version | CLA_CL_ZTE-R341V1.0.0 |
| EUT supports Radios application | GSM/GPRS<br>Bluetooth V3.0+EDR |
| Multi Slot Class | GPRS: Multi slot Class12 |
| Frequency Range | GSM 850MHz:<br>Tx: 824.2 - 848.8MHz (at intervals of 200kHz);<br>Rx: 869.2 - 893.8MHz (at intervals of 200kHz)<br>GSM 1900MHz:<br>Tx: 1850.2 - 1909.8MHz (at intervals of 200kHz);<br>Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz) |
| Maximum Output Power to Antenna | GSM 850: 32.98dBm<br>GSM 1900: 29.49dBm<br>GPRS 850: 32.94dBm<br>GPRS 1900: 29.47dBm |
| Type of Modulation | GSM/GPRS:GMSK |
| Antenna Type | PIFA Antenna |
| Antenna Gain | GSM 850/1900: -3.2dBi |

## 1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

| System | Type of Modulation | Emission Designator | Frequency Tolerance (ppm) | Maximum ERP/EIRP(W) |
|---|---|---|---|---|
| GSM 850 | GMSK | 247KGXW | 0.03 | 0.743 |
| GSM 1900 | GMSK | 249KGXW | 0.03 | 0.324 |
| GPRS 850 | GMSK | 245KGXW | 0.03 | 0.724 |
| GPRS 1900 | GMSK | 246KGXW | 0.03 | 0.318 |

## 1.3 Test Standards and Results

1. 47 CFR Part 2, 22(H), 24(E)

2. ANSI / TIA / EIA-603-D-2010

3. FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

Remark：

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

Test detailed items/section required by FCC rules and results are as below:

| No. | Section<br>FCC | Description | Limit | Result |
|---|---|---|---|---|
| 1 | 2.1046 | Conducted Output Power | Reporting Only | PASS |
| 2 | 24.232(d) | Peak to Average Radio | ＜13dBm | PASS |
| 3 | 2.1049<br>22.917(b)<br>24.238(b) | Occupied Bandwidth | Reporting Only | PASS |
| 4 | 2.1055<br>22.355<br>24.235 | Frequency Stability | ≤±2.5ppm | PASS |
| 5 | 2.1051<br>22.917<br>24.238 | Conducted Out of Band Emissions | < 43+10log10 (P[Watts]) | PASS |
| 6 | 2.1051<br>22.917<br>24.238 | Band GPRS | < 43+10log10 (P[Watts]) | PASS |
| 7 | 22.913 | Effective Radiated Power | ＜7Watts | PASS |
| | 24.232 | Equivalent Isotropic Radiated Power | ＜2Watts | PASS |
| 8 | 2.1053<br>22.917<br>24.238 | Radiated Spurious Emissions | < 43+10log10 (P[Watts]) | PASS |

## 1.4 Test Configuration of Equipment under Test

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for GSM850.
2. 30 MHz to 20000 MHz for GSM1900.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

| Test Modes | | |
|---|---|---|
| Band | Radiated TCs | Conducted TCs |
| GSM 850 | GSM Link | GSM Link |
| | GPRS Class 8 Link | GPRS Class 8 Link |
| GSM 1900 | GSM Link | GSM Link |
| | GPRS Class 8 Link | GPRS Class 8 Link |

## 1.5 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 7dB and 10dB attenuator.

Example:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).
= 7 + 10 = 17 (dB)

## 1.6 Facilities and Accreditations

### 1.6.1 Test Facilities

**CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories

(identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

**FCC-Registration No.: 317478**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017

### 1.6.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15℃- 35℃ |
| Relative Humidity (%): | 30% -60% |
| Atmospheric Pressure (kPa): | 86KPa-106KPa |

# 2. 47 CFR PART 2, PART 22H & 24E REQUIREMENTS

## 2.1 Conducted RF Output Power

### 2.1.1 Definition

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

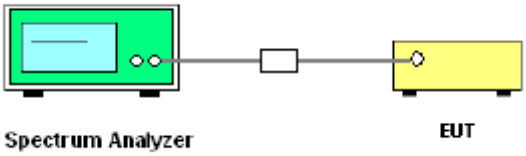
### 2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

### 2.1.4 Test Setup



### 2.1.5 Test Results of Conducted Output Power

1. Test Verdict:

| Band | Channel | Frequency (MHz) | Measured Output Power dBm | Verdict |
|---|---|---|---|---|
| GSM 850MHz | 128 | 824.2 | 32.95 | PASS |
| | 190 | 836.6 | **32.98** | PASS |
| | 251 | 848.8 | 32.87 | PASS |
| GSM 1900MHz | 512 | 1850.2 | **29.49** | PASS |
| | 661 | 1880.0 | 29.38 | PASS |
| | 810 | 1909.8 | 29.20 | PASS |
| GPRS 850MHz | 128 | 824.2 | 32.92 | PASS |
| | 190 | 836.6 | **32.94** | PASS |
| | 251 | 848.8 | 32.84 | PASS |
| GPRS 1900MHz | 512 | 1850.2 | **29.47** | PASS |
| | 661 | 1880.0 | 29.30 | PASS |
| | 810 | 1909.8 | 29.18 | PASS |

Note 1: For the GPRS model, all the slots were tested and just the worst data was record in this report.

## 2.2 Peak to Average Radio

### 2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. 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.

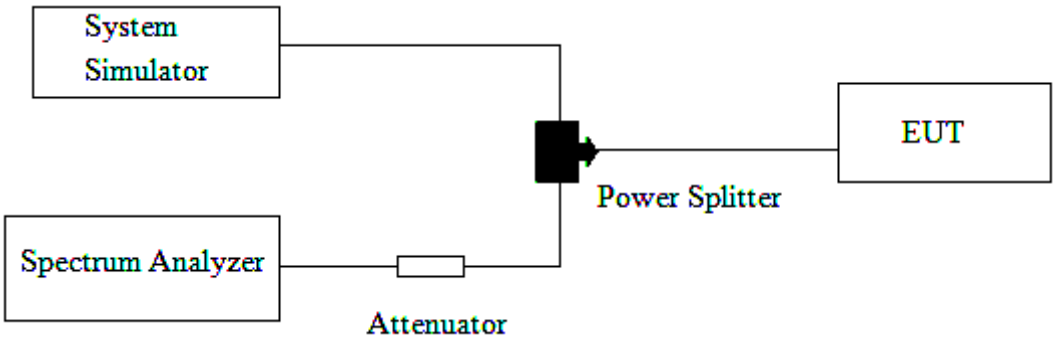
### 2.2.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.2.3 Test Procedures

1. The testing follows FCC KDB 971168 D01v02r02 Section 5.1.2&5.2.3.
2. Calculate Peak to Average Ratio follow FCC KDB 971168 D01v02r02 Section 5.7.2.
3. Record the deviation as Peak to Average Ratio.

### 2.2.4 Test Setup



### 2.2.5 Test Results of Peak-to-Average Ratio

| Band | Channel | Frequency (MHz) | PK Power (dBm) | AV Power (dBm) | Peak to Average radio | Limit dB | Verdict |
|---|---|---|---|---|---|---|---|
| GSM 1900MHz | 512 | 1850.2 | 29.60 | 29.49 | 0.11 | 13 | PASS |
| | 661 | 1880.0 | 29.55 | 29.38 | 0.17 | | PASS |
| | 810 | 1909.8 | 29.41 | 29.20 | 0.21 | | PASS |
| GPRS 1900MHz | 512 | 1850.2 | 29.57 | 29.47 | 0.10 | | PASS |
| | 661 | 1880.0 | 29.50 | 29.30 | 0.20 | | PASS |
| | 810 | 1909.8 | 29.39 | 29.18 | 0.21 | | PASS |

## 2.3 99% Occupied Bandwidth and 26dB Bandwidth Measurement

### 2.3.1 Definition

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

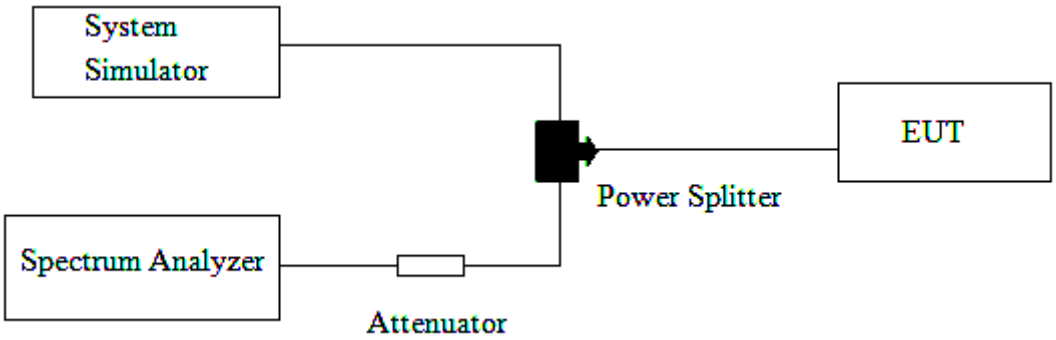
### 2.3.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.3.3 Test Procedures

1. The testing follows FCC KDB 971168 D01v02r02 Section 4.2.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.
5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

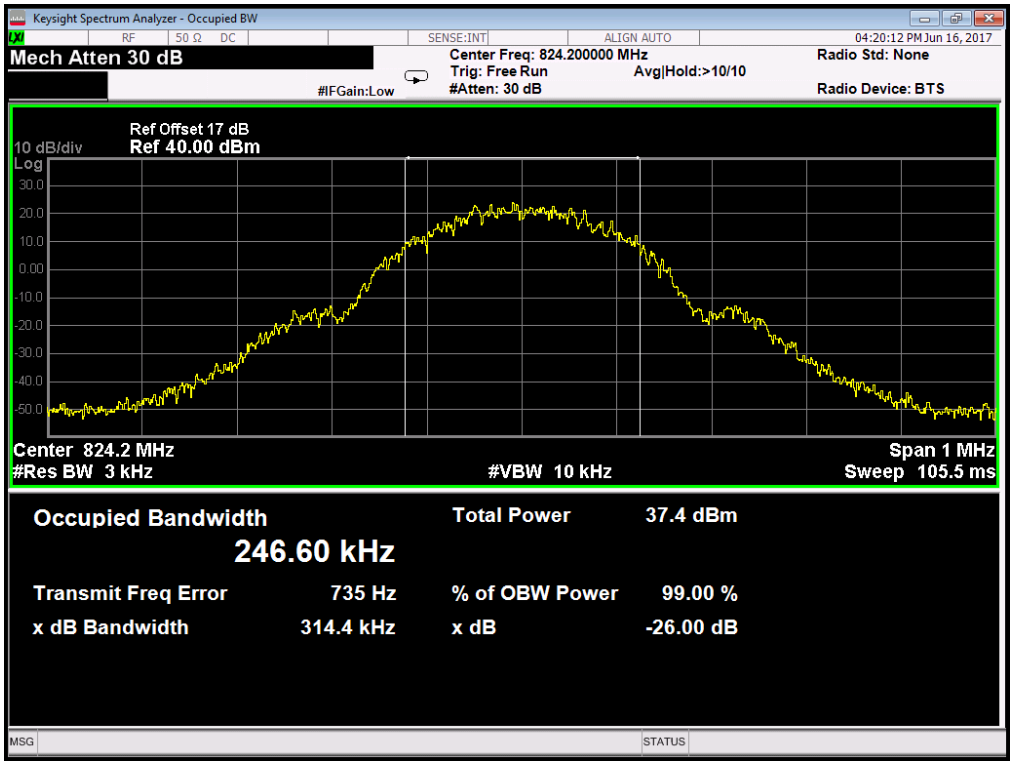
### 2.3.4 Test Setup



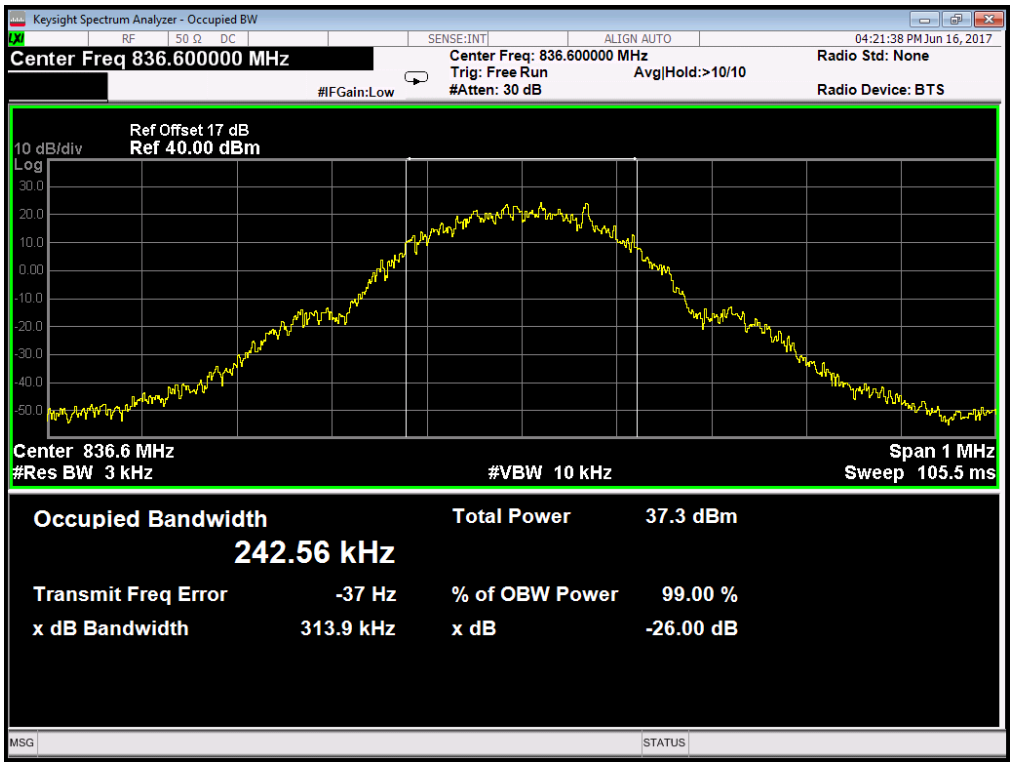
### 2.3.5 Test Results of 99% Occupied Bandwidth and 26dB Bandwidth

| Band | Channel | Frequency (MHz) | 26dB bandwidth | 99% Occupied Bandwidth | Refer to Plot |
|---|---|---|---|---|---|
| GSM 850MHz | 128 | 824.2 | 314.4 KHz | 246.60 KHz | Plot A1 |
| | 190 | 836.6 | 313.9 KHz | 242.56 KHz | Plot A2 |
| | 251 | 848.8 | 314.5 KHz | 244.49 KHz | Plot A3 |
| GSM 1900MHz | 512 | 1850.2 | 306.0 KHz | 245.55 KHz | Plot B1 |
| | 661 | 1880.0 | 314.1 KHz | 243.93 KHz | Plot B2 |
| | 810 | 1909.8 | 315.9 KHz | 249.03 KHz | Plot B3 |
| GPRS 850MHz | 128 | 824.2 | 312.3 KHz | 243.60 KHz | Plot C1 |
| | 190 | 836.6 | 317.4 KHz | 245.04 KHz | Plot C2 |
| | 251 | 848.8 | 307.5 KHz | 242.95 KHz | Plot C3 |
| GPRS 1900MHz | 512 | 1850.2 | 315.6 KHz | 243.05 KHz | Plot D1 |
| | 661 | 1880.0 | 322.4 KHz | 245.77 KHz | Plot D2 |
| | 810 | 1909.8 | 321.4 KHz | 240.80 KHz | Plot D3 |

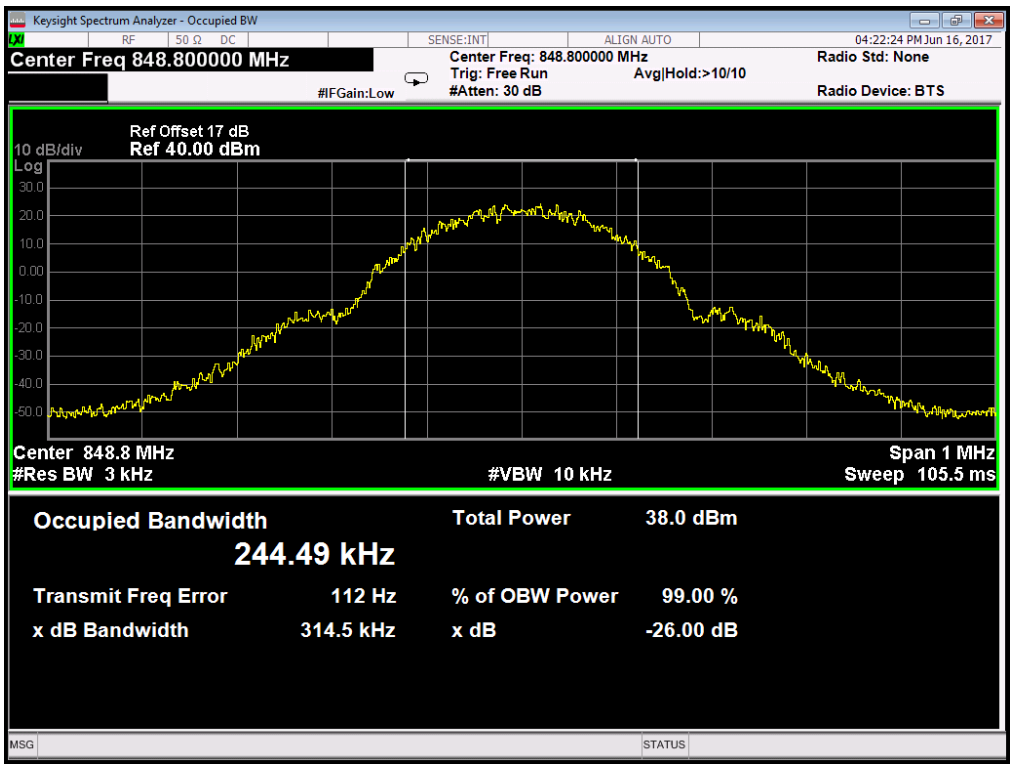
## 2.3.6 Test Results (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth



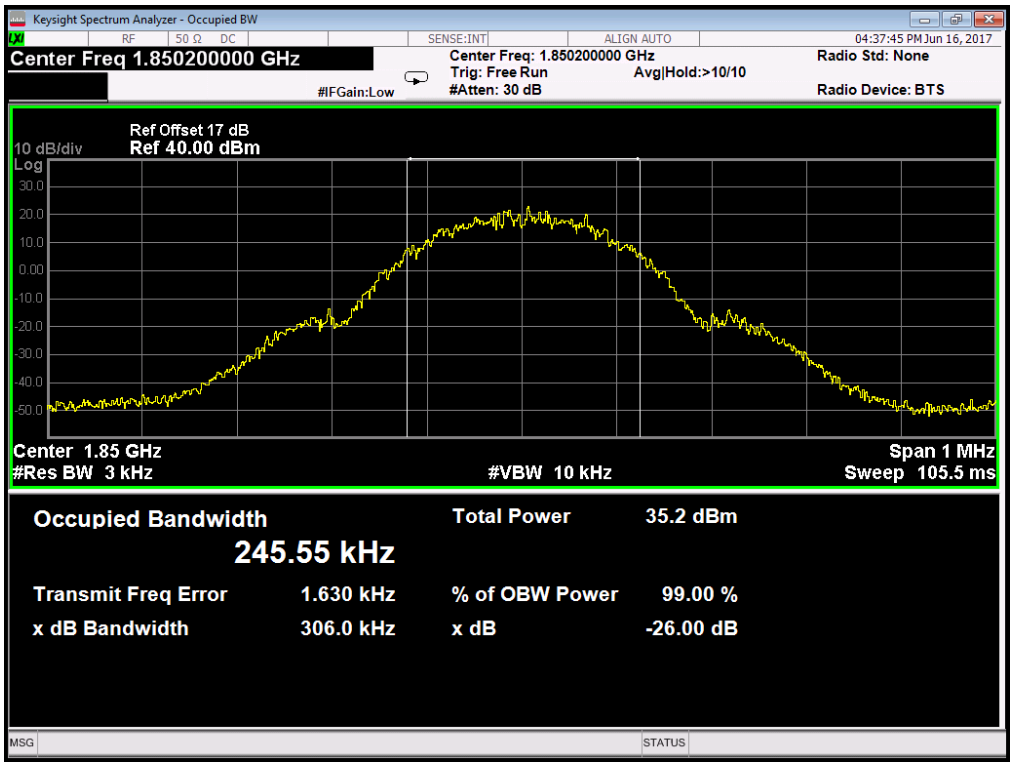

(Plot A1: GSM 850MHz Channel = 128 Occupied bandwidth)



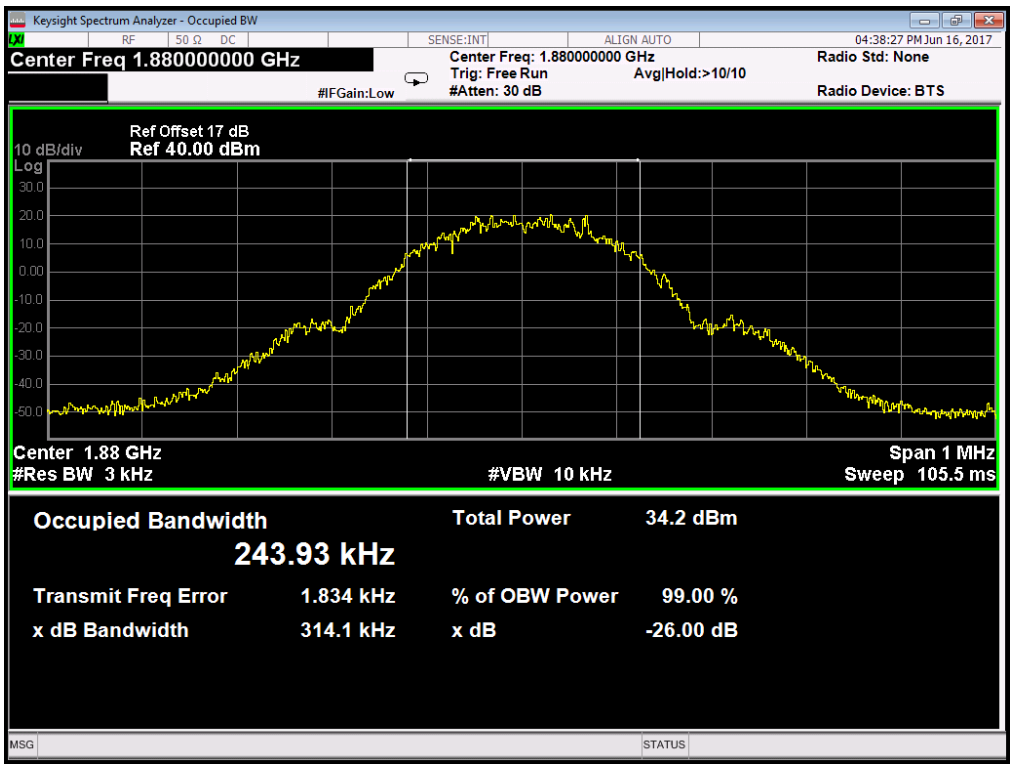

(Plot A2: GSM 850MHz Channel = 190 Occupied bandwidth)



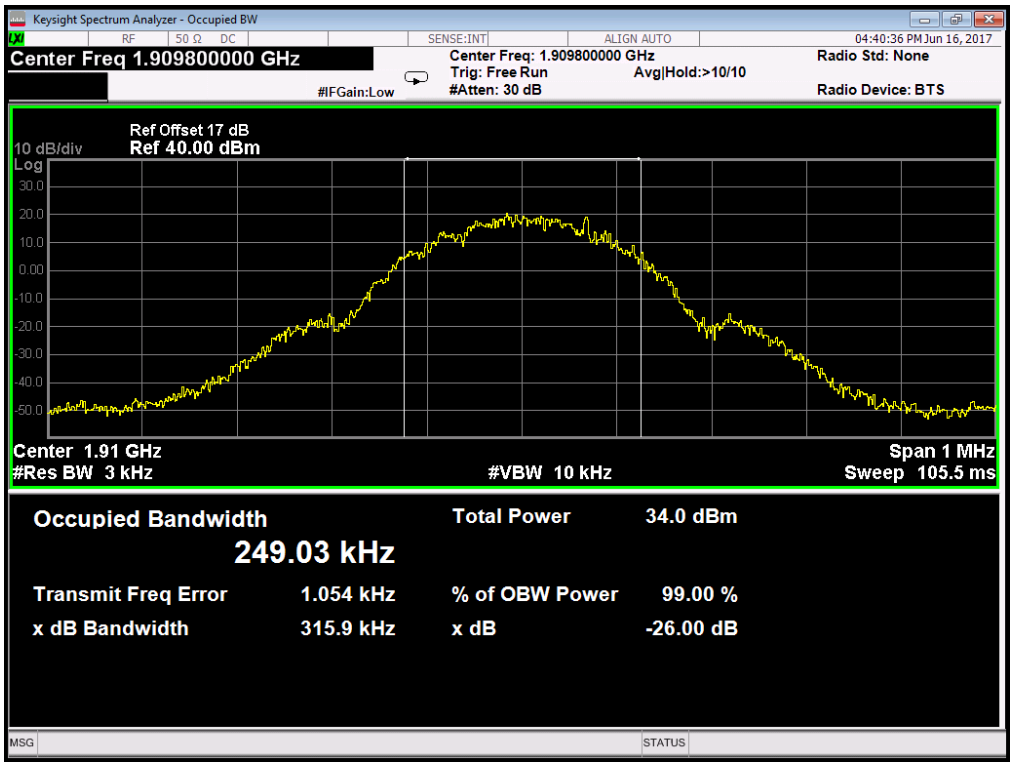

(Plot A3: GSM 850MHz Channel = 251 Occupied bandwidth)



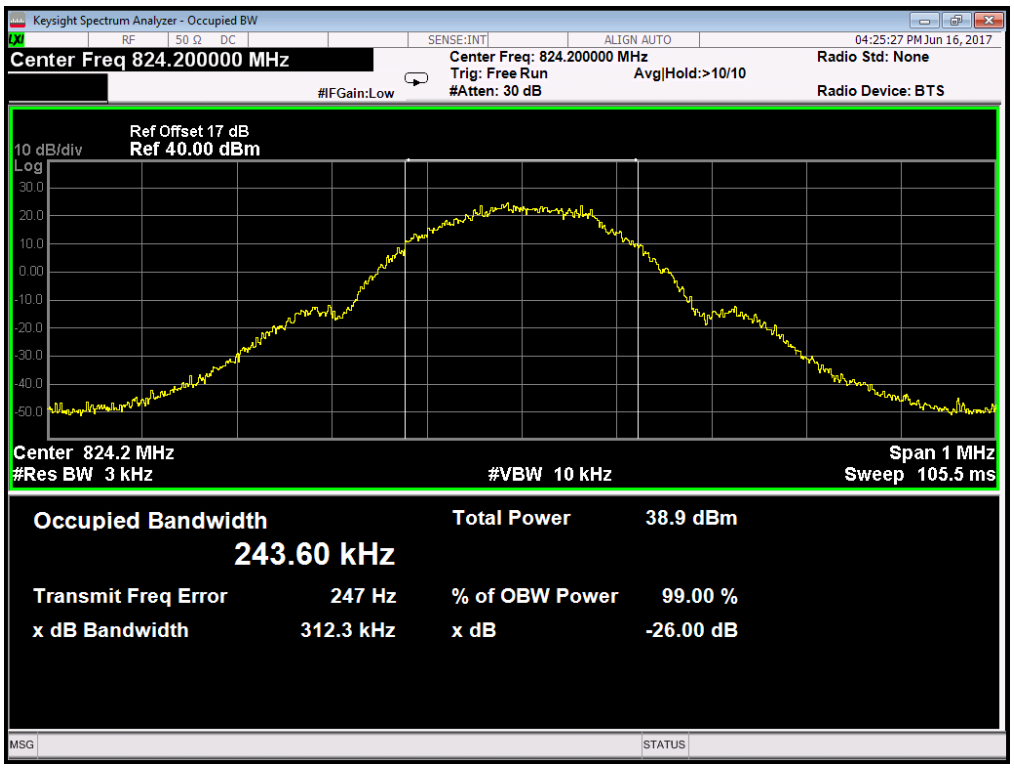

(Plot B1: GSM 1900MHz Channel = 512 Occupied bandwidth)



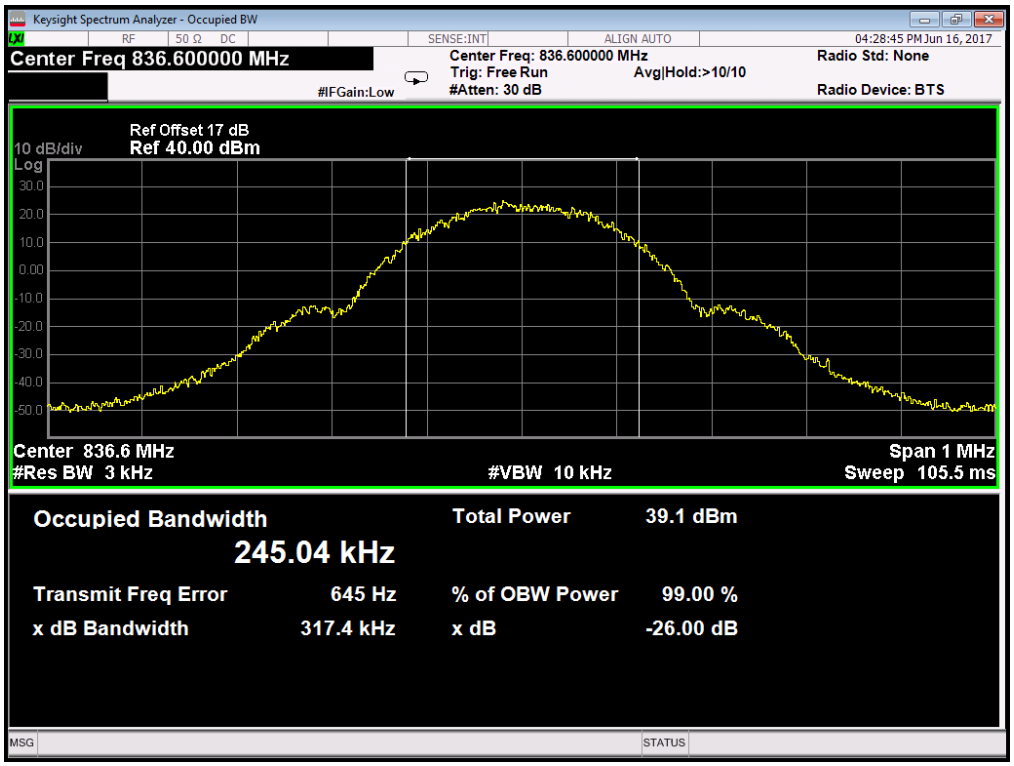

(Plot B2: GSM 1900MHz Channel = 661 Occupied bandwidth)



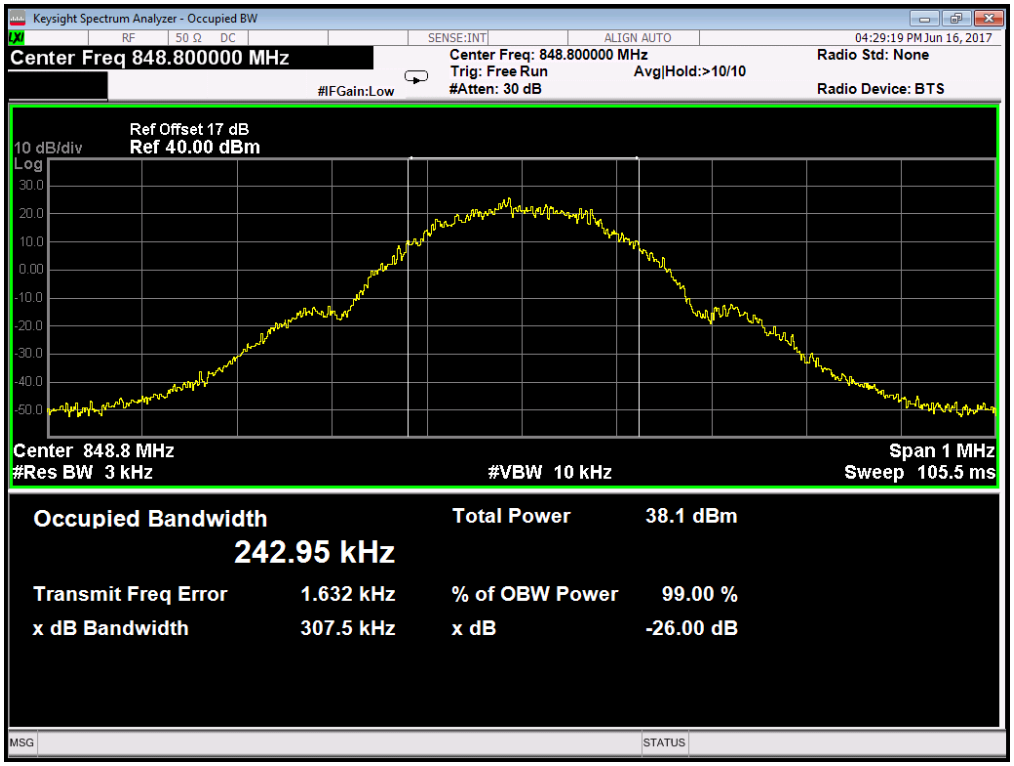

(Plot B3: GSM 1900MHz Channel = 810 Occupied bandwidth)



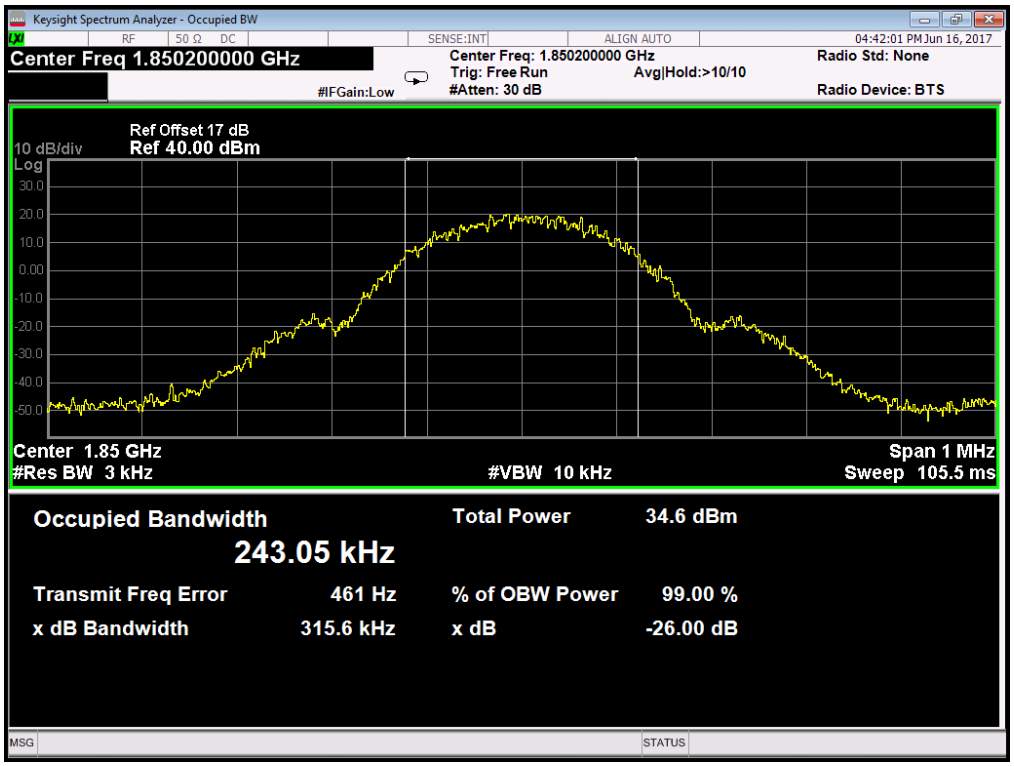

(Plot C1: GPRS 850MHz Channel = 128 Occupied bandwidth)



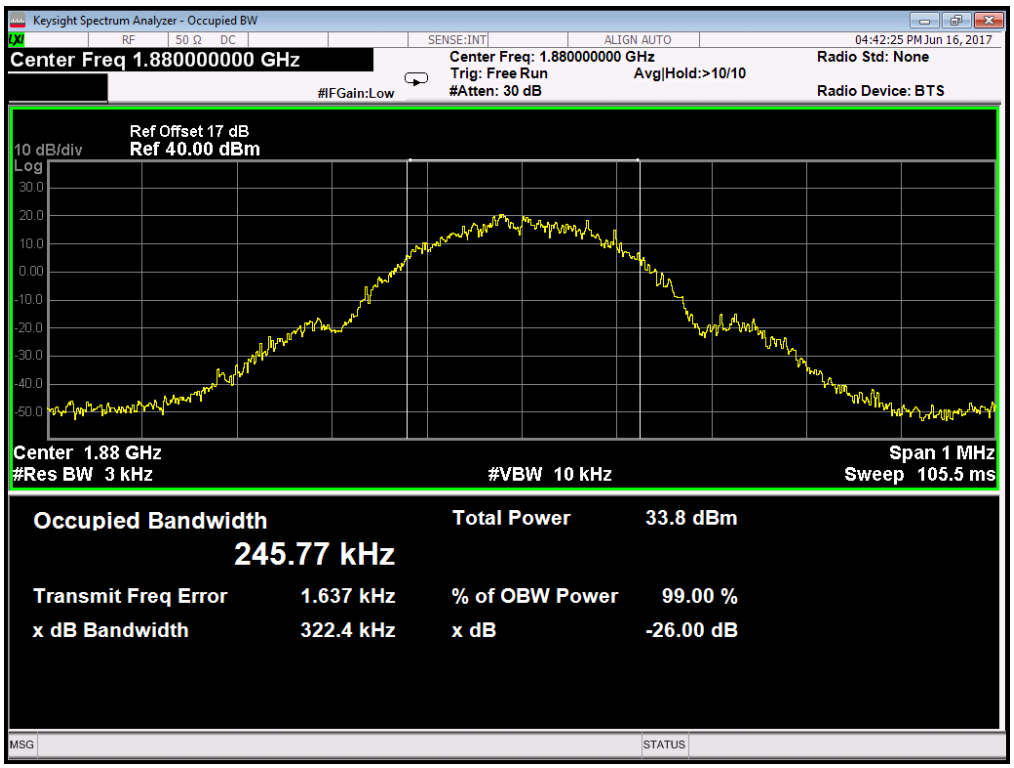

(Plot C2: GPRS 850MHz Channel = 190 Occupied bandwidth)



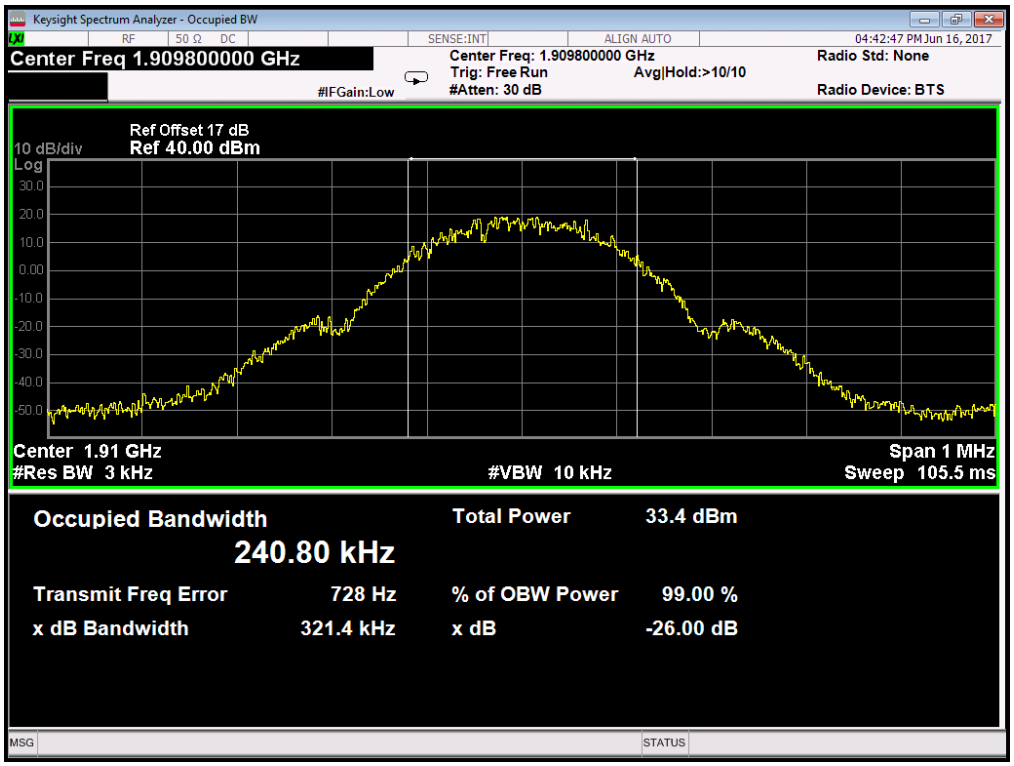

(Plot C3: GPRS 850MHz Channel = 251 Occupied bandwidth)




(Plot D1: GPRS 1900MHz Channel = 512 Occupied bandwidth)




(Plot D2: GPRS 1900MHz Channel = 661 Occupied bandwidth)




(Plot D3: GPRS 1900MHz Channel = 810 Occupied bandwidth)

## 2.4 Frequency Stability

### 2.4.1 Requirement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

### 2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

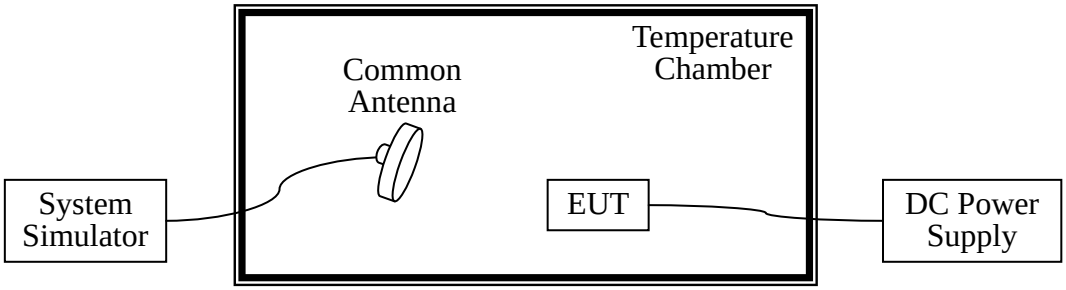
### 2.4.3 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 D01v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

### 2.4.4 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 D01v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

### 2.4.5 Test Setup




### 2.4.6 Test Results of Frequency Stability

1. GSM 850MHz Band

| Band: | GSM 850 | Channel: | 190 |
|---|---|---|---|
| Limit(ppm): | 2.5 | Frequency: | 836.6MHz |

| Power (VDC) | Temperature (℃) | GSM | | GPRS | | Result |
|---|---|---|---|---|---|---|
| | | Freq. Dev. (Hz) | Deviation (ppm) | Freq. Dev. (Hz) | Deviation (ppm) | |
| 3.7 | -30 | 20 | 0.02 | 10 | 0.01 | PASS |
| | -20 | 11 | 0.01 | 20 | 0.02 | |
| | -10 | 9 | 0.01 | 12 | 0.01 | |
| | 0 | 28 | 0.03 | 22 | 0.03 | |
| | +10 | 12 | 0.01 | 14 | 0.02 | |
| | +20 | 30 | 0.03 | 8 | 0.01 | |
| | +30 | 18 | 0.02 | 18 | 0.02 | |
| | +40 | 15 | 0.02 | 25 | 0.03 | |
| | +50 | 22 | 0.03 | 11 | 0.01 | |
| 4.2 | +25 | 10 | 0.01 | 24 | 0.03 | |
| 3.5 | +25 | 35 | 0.03 | 20 | 0.02 | |

2. GSM 1900MHz Band

| Band: | GSM 1900 | Channel: | 661 |
|---|---|---|---|
| Limit(ppm): | 2.5 | Frequency: | 1880.0MHz |

| Power (VDC) | Temperature (℃) | GSM | | GPRS | | Result |
|---|---|---|---|---|---|---|
| | | Freq. Dev. (Hz) | Deviation (ppm) | Freq. Dev. (Hz) | Deviation (ppm) | |
| 3.7 | -30 | 41 | 0.02 | 22 | 0.01 | PASS |
| | -20 | 25 | 0.01 | 53 | 0.03 | |
| | -10 | 50 | 0.03 | 42 | 0.02 | |
| | 0 | 36 | 0.02 | 61 | 0.03 | |
| | +10 | 27 | 0.01 | 27 | 0.01 | |
| | +20 | 31 | 0.02 | 41 | 0.02 | |
| | +30 | 55 | 0.03 | 28 | 0.01 | |
| | +40 | 37 | 0.02 | 61 | 0.03 | |
| | +50 | 44 | 0.02 | 37 | 0.02 | |
| 4.2 | +25 | 62 | 0.03 | 32 | 0.02 | |
| 3.5 | +25 | 33 | 0.02 | 62 | 0.03 | |

## 2.5 Conducted Out of Band Emissions

### 2.5.1 Requirement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

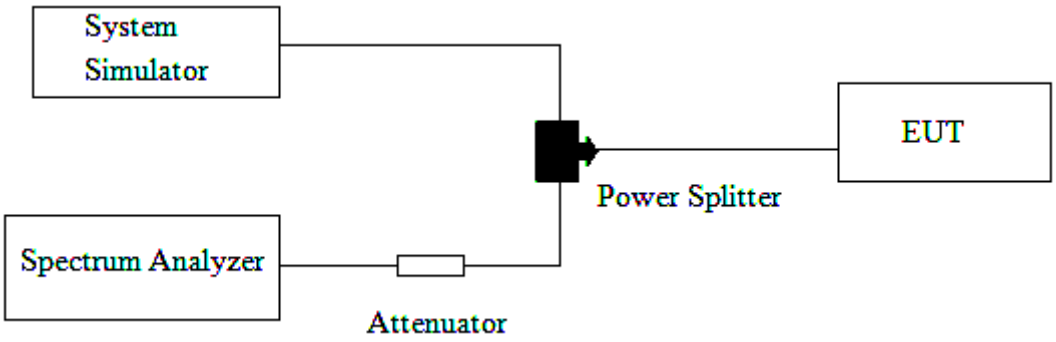
### 2.5.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.5.3 Test Procedures

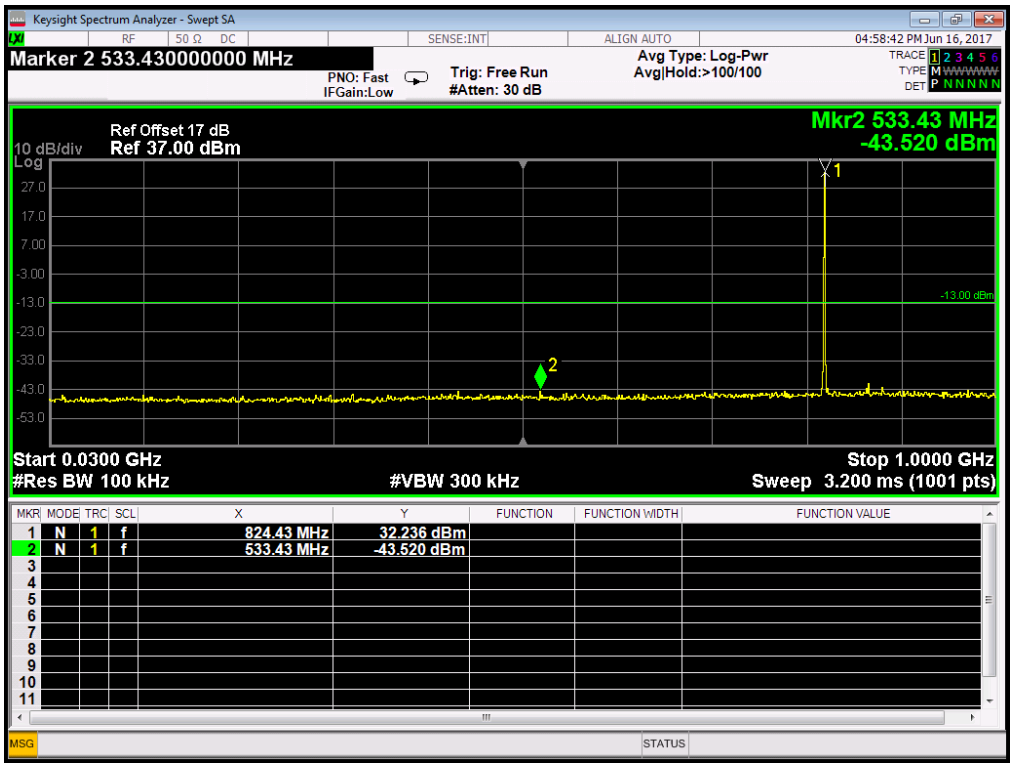
1. The testing follows FCC KDB 971168 D01v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
   = P(W) - [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.
8. For 9KHz to 30MHz: the amplitude of spurious emissions are attenuated by more than 20dB below the permissible value has no need to be reported.

### 2.5.4 Test Setup

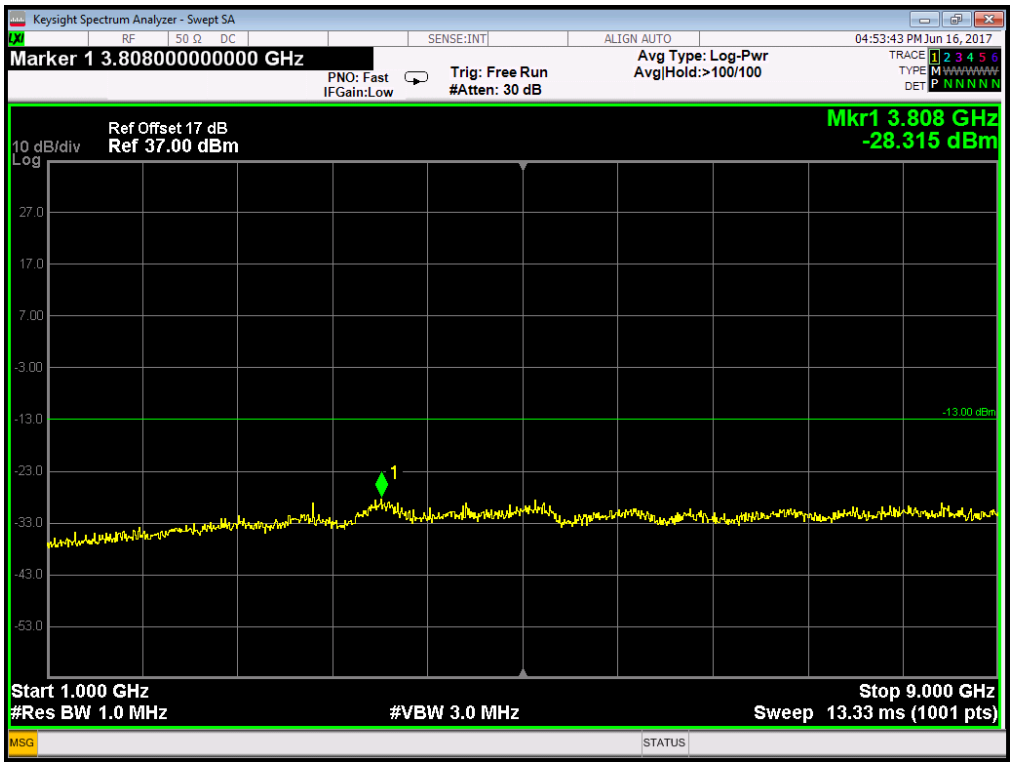


### 2.5.5 Test Result (Plots) of Conducted Spurious Emission

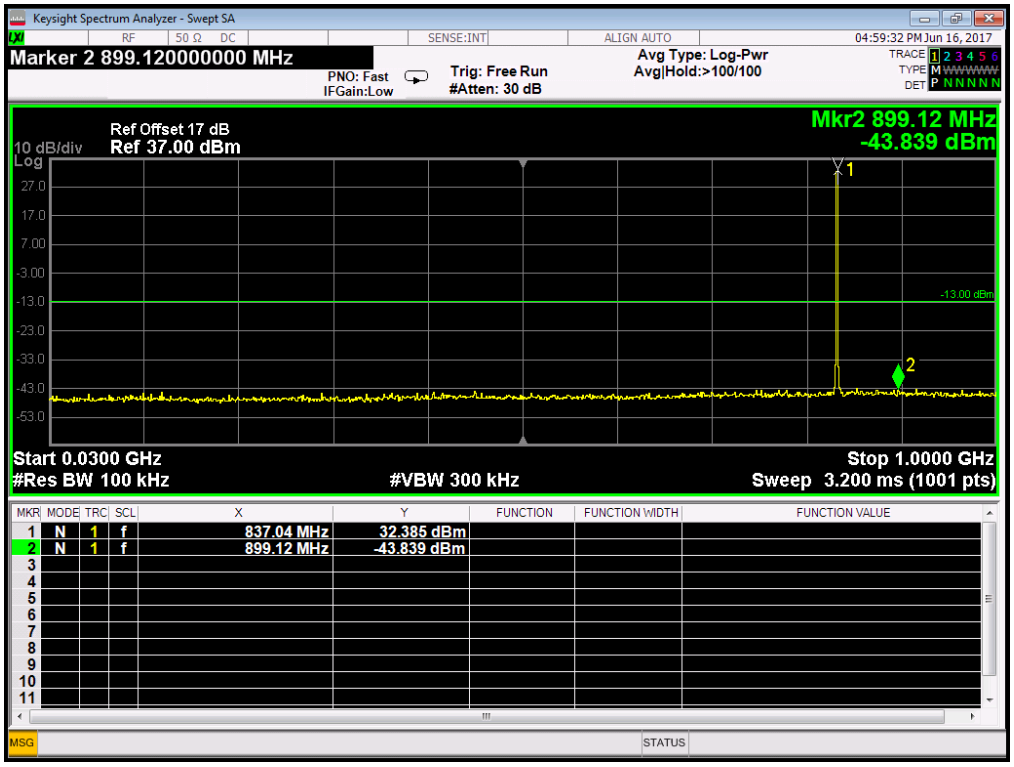
Note: For 9 KHz to 30MHz: the amplitude of spurious emissions is attenuated by more than 20dB below the permissible value, so we not provide the test result here.



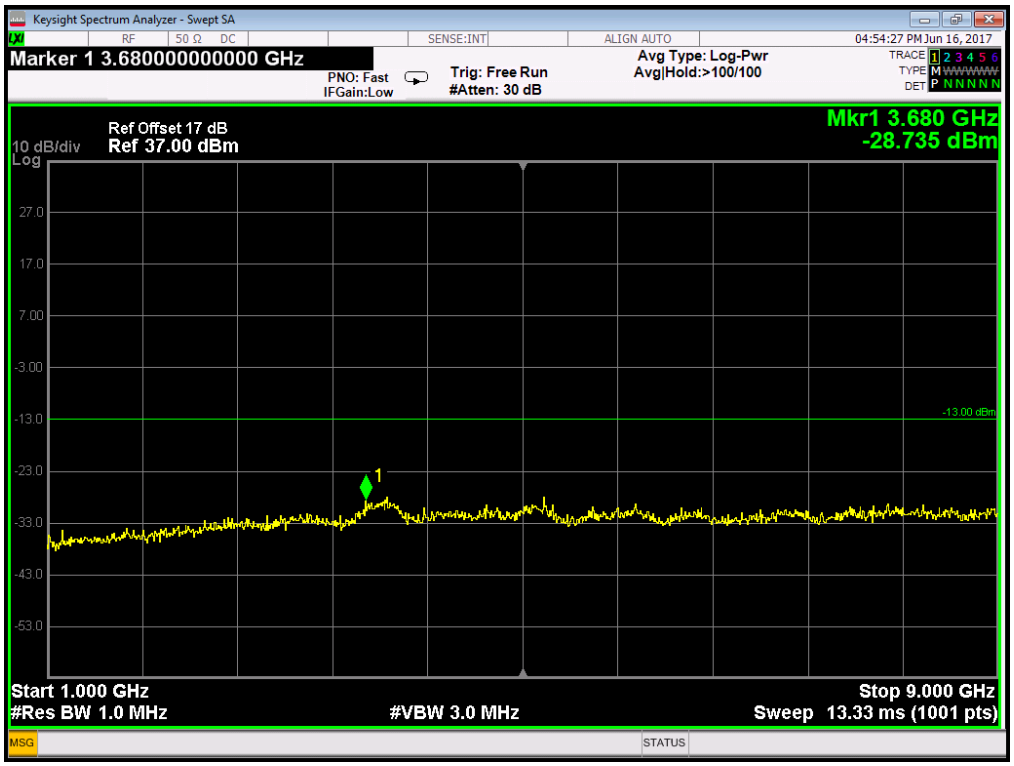

GSM 850MHz Channel = 128, 30MHz to 1GHz



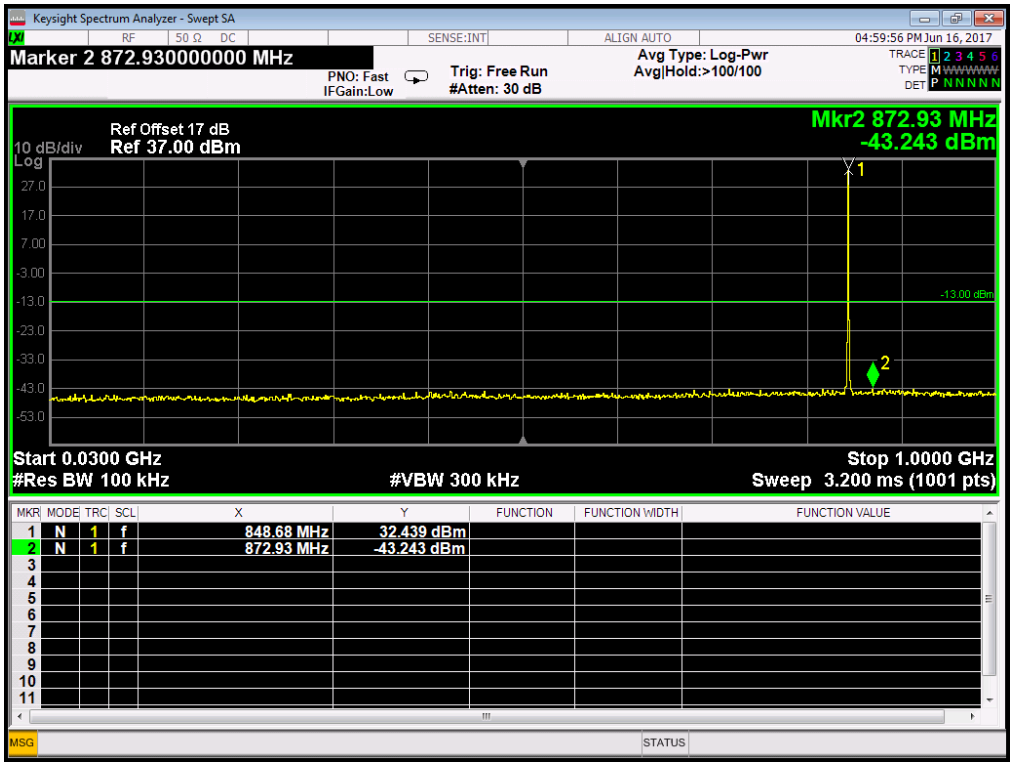

GSM 850MHz Channel = 128, 1GHz to 9GHz



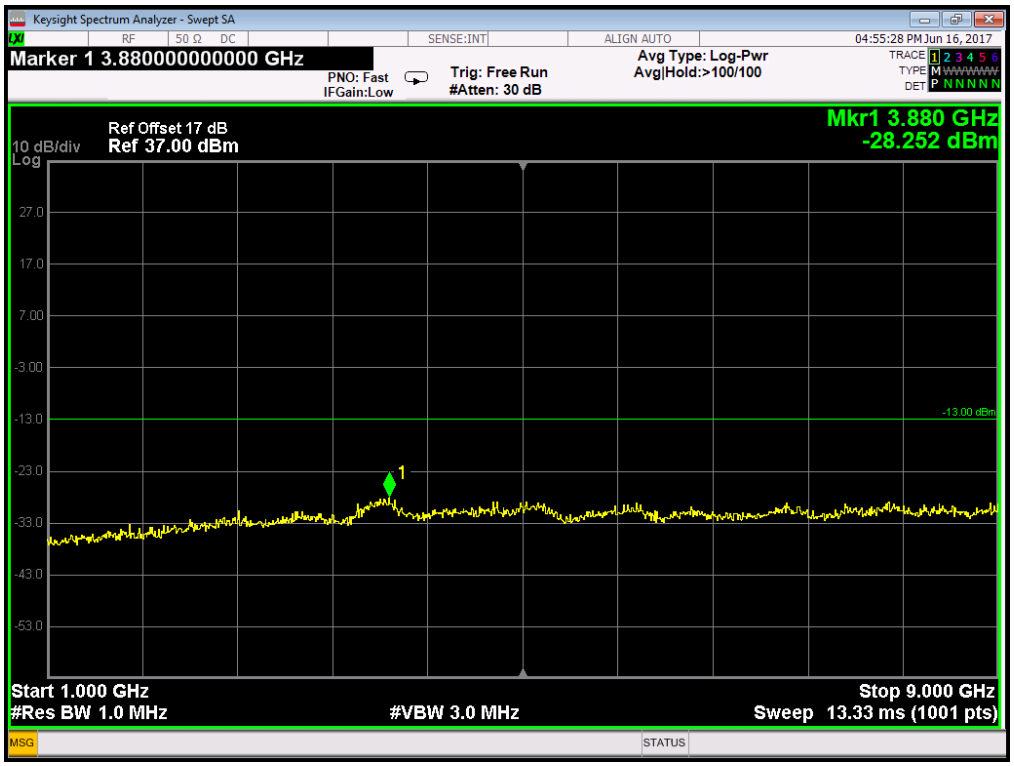

GSM 850MHz Channel = 190, 30MHz to 1GHz



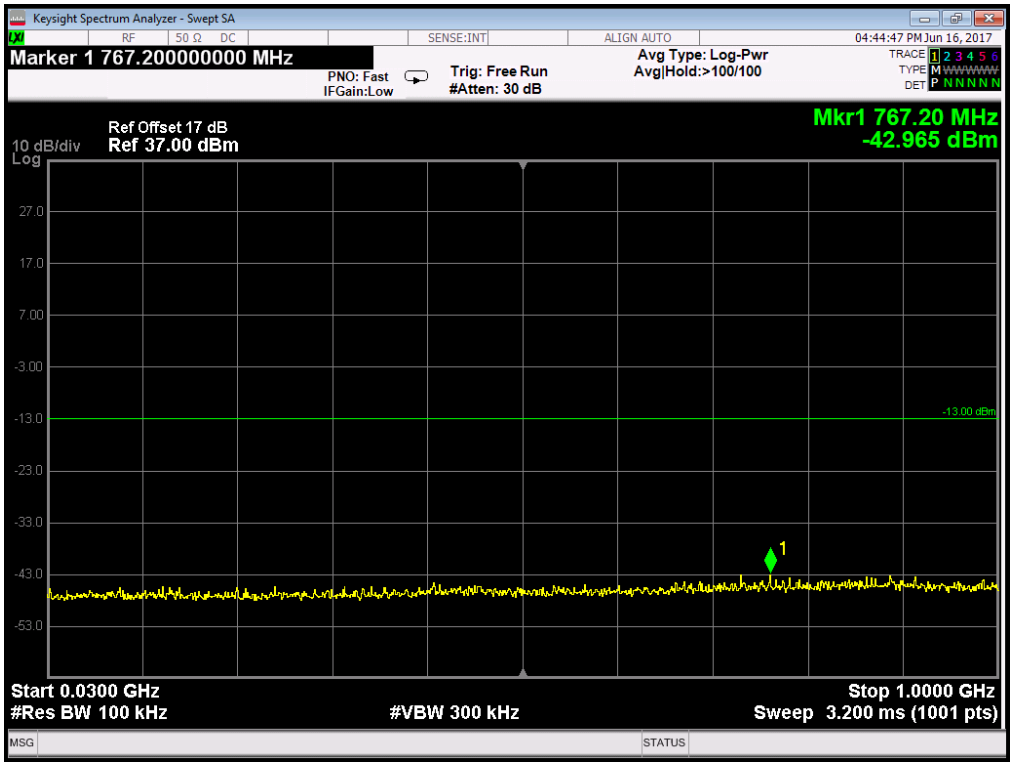

GSM 850MHz Channel = 190, 1GHz to 9GHz



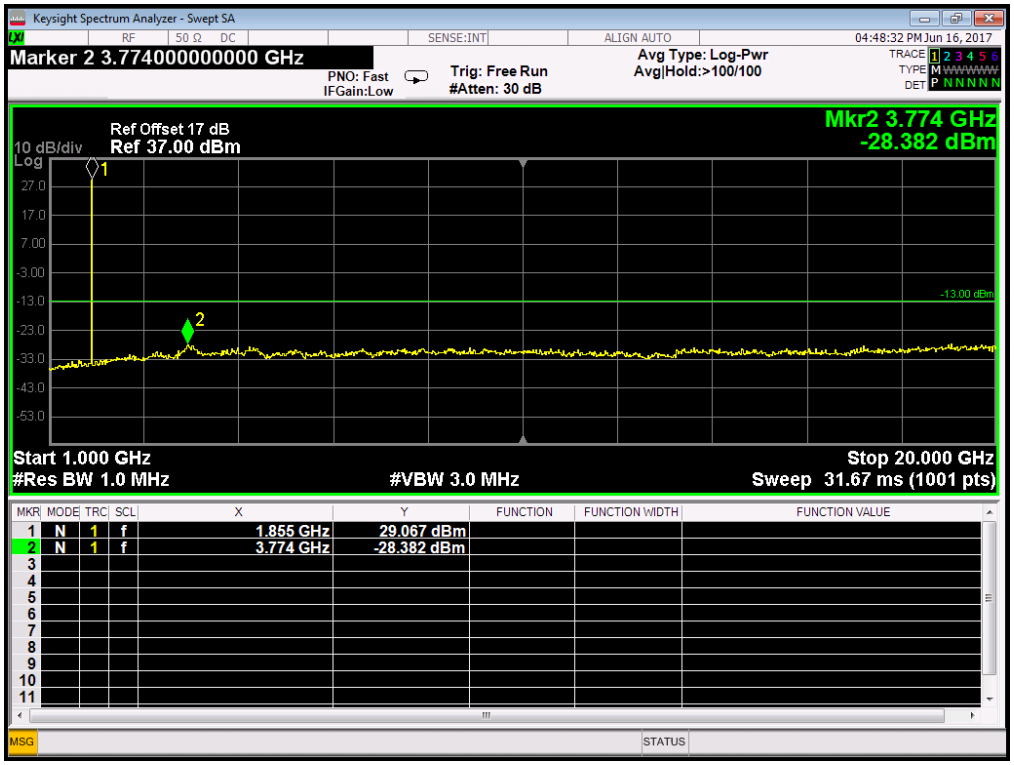

GSM 850MHz Channel = 251, 30MHz to 1GHz



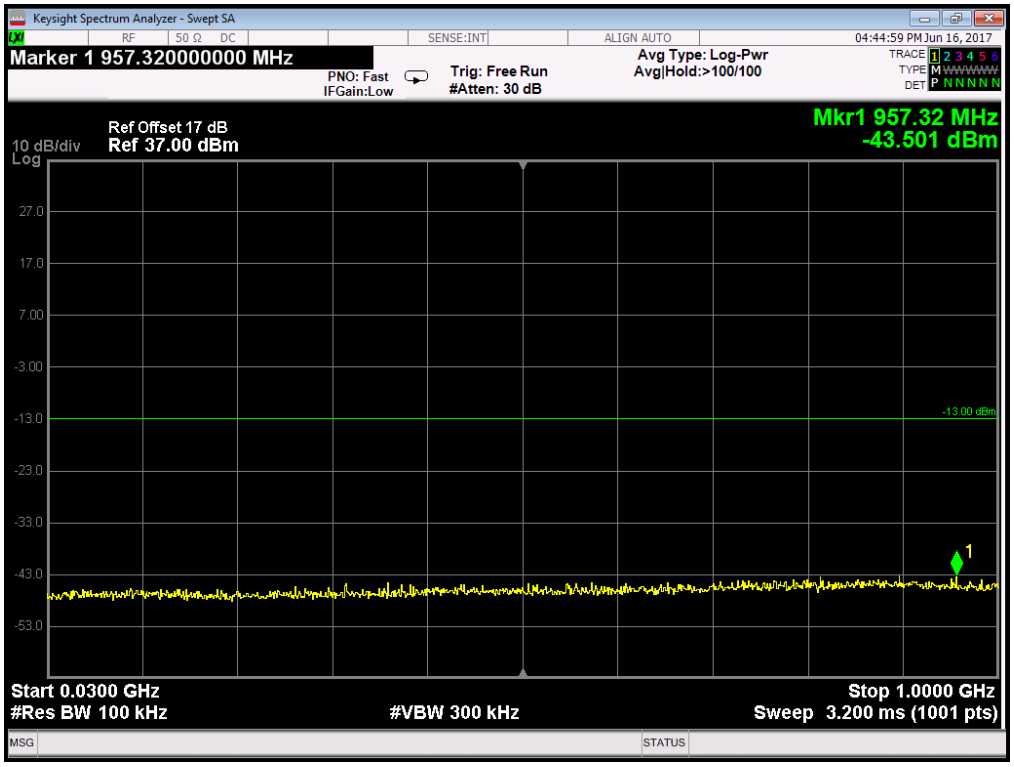

GSM 850MHz Channel = 251, 1GHz to 9GHz



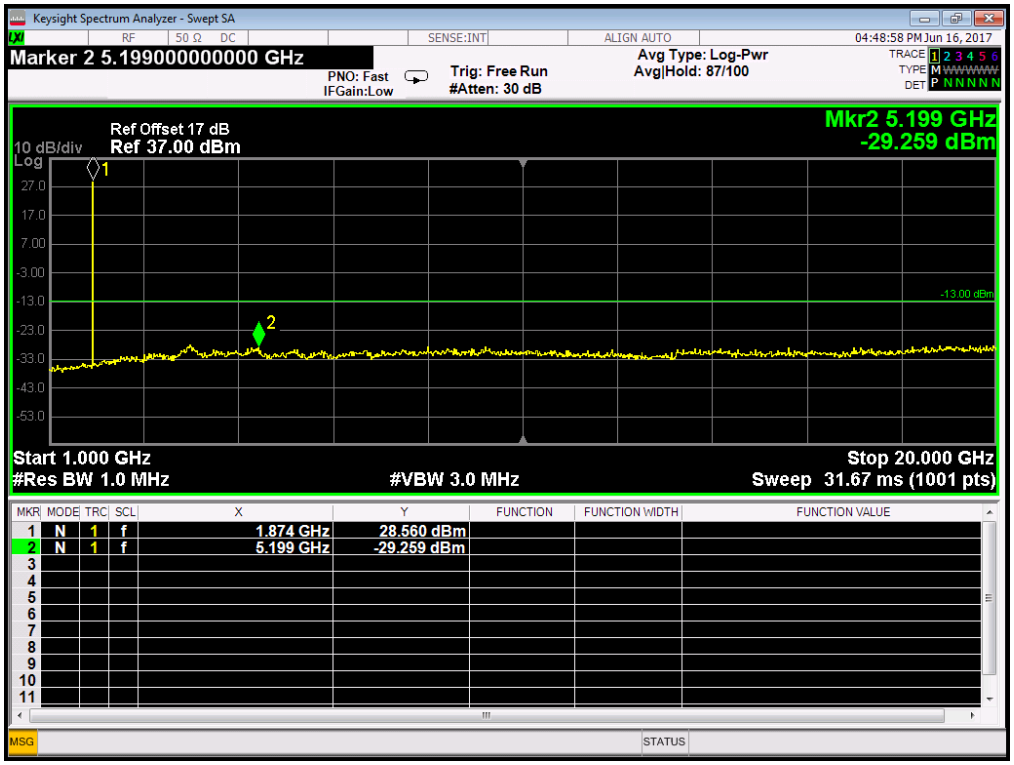

GSM 1900MHz Channel = 512, 30MHz to 1GHz



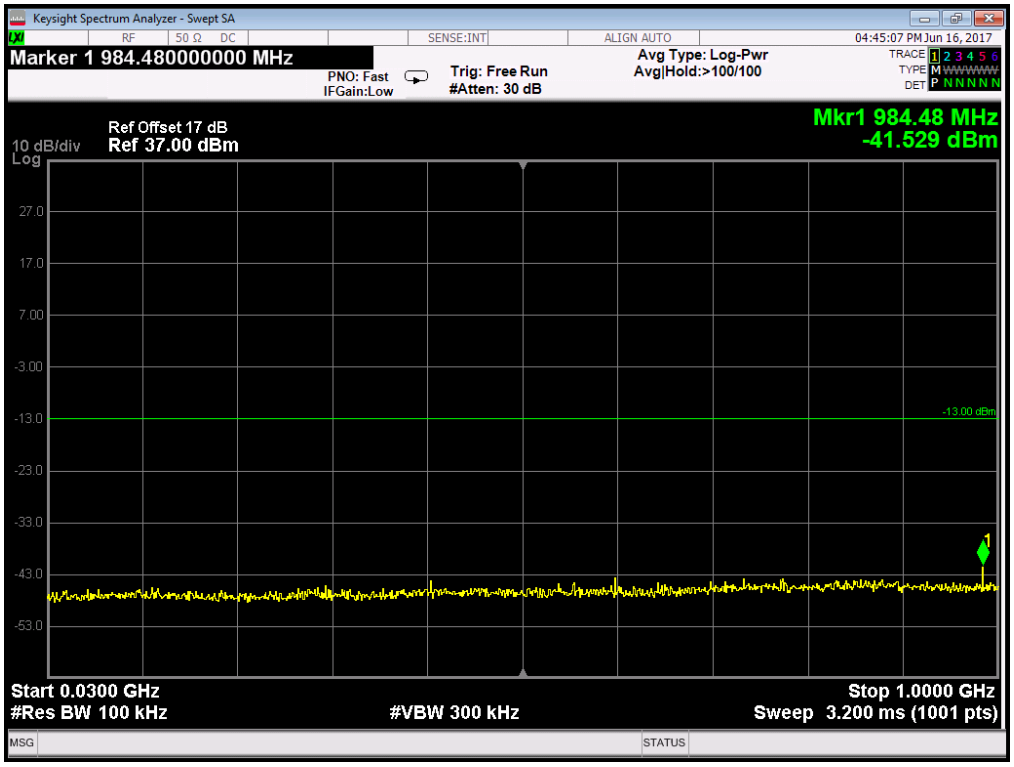

GSM 1900MHz Channel = 512, 1GHz to 20GHz



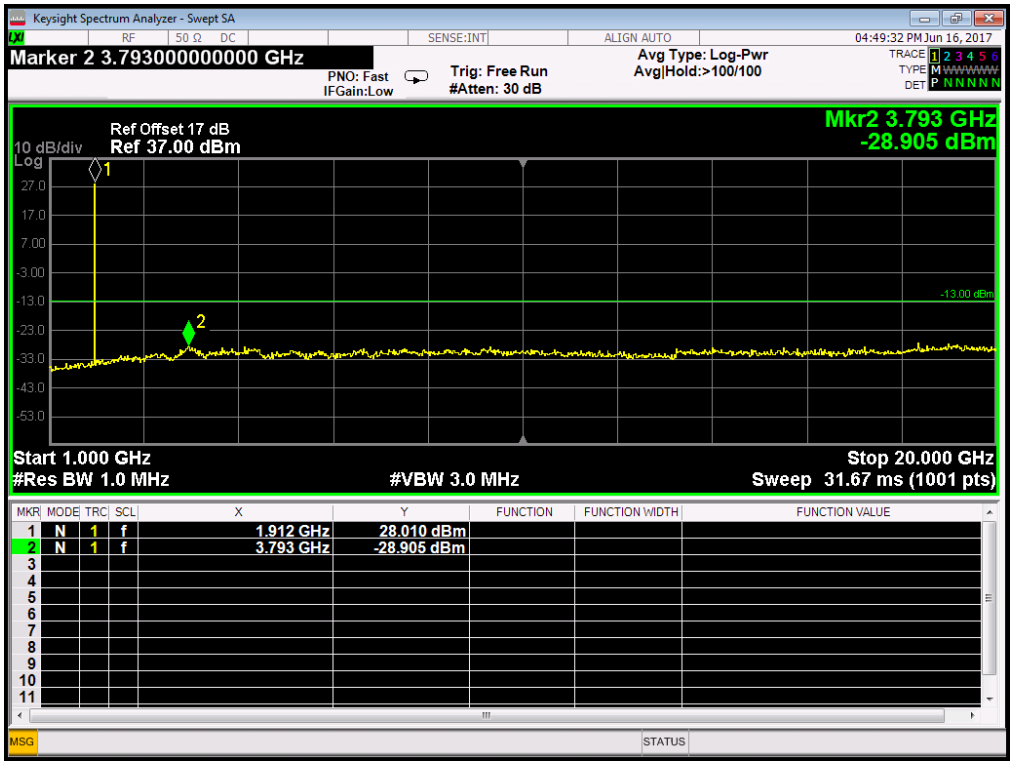

GSM 1900MHz Channel = 661, 30MHz to 1GHz



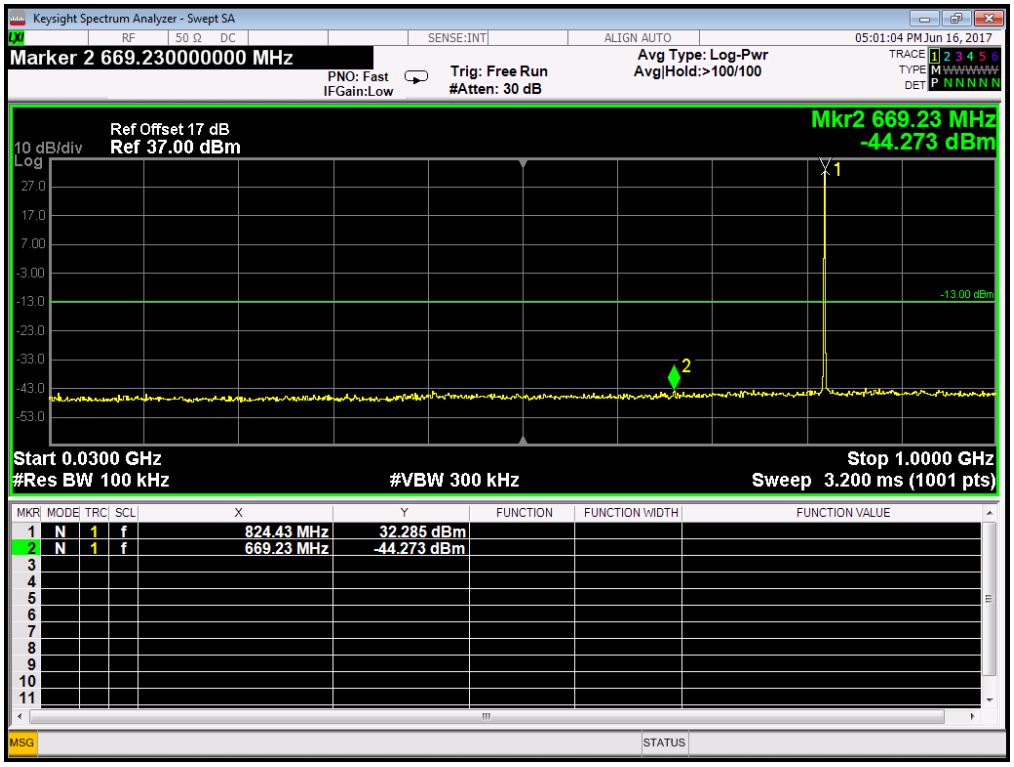

GSM 1900MHz Channel = 661, 1GHz to 20GHz



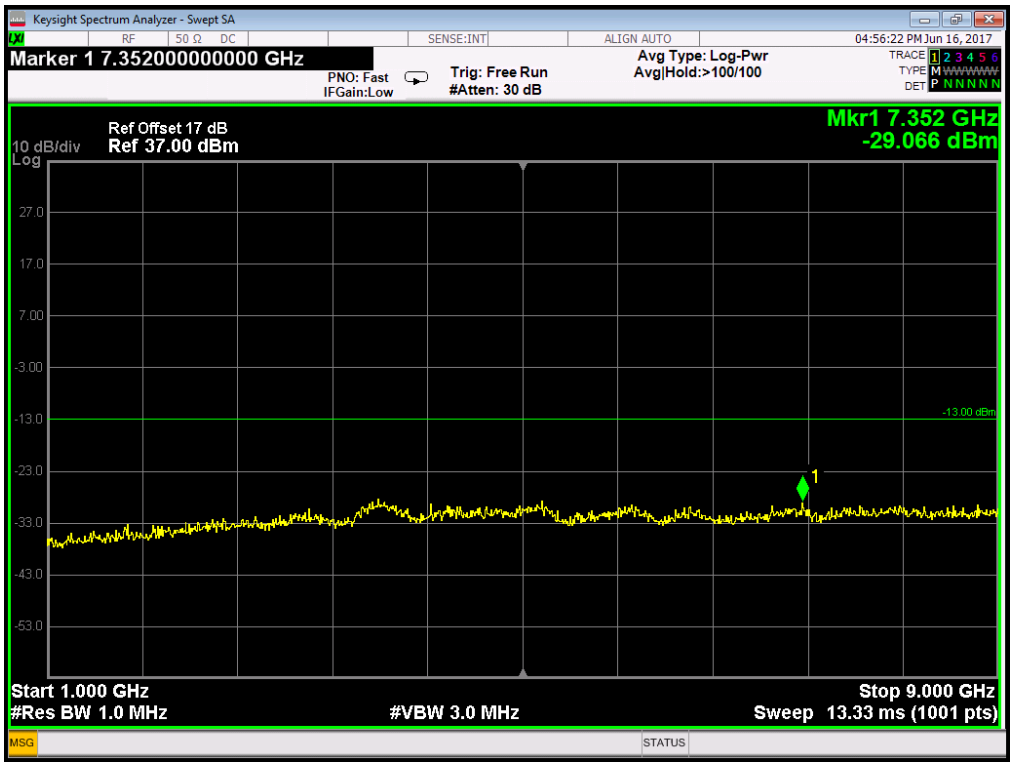

GSM 1900MHz Channel = 810, 30MHz to 1GHz



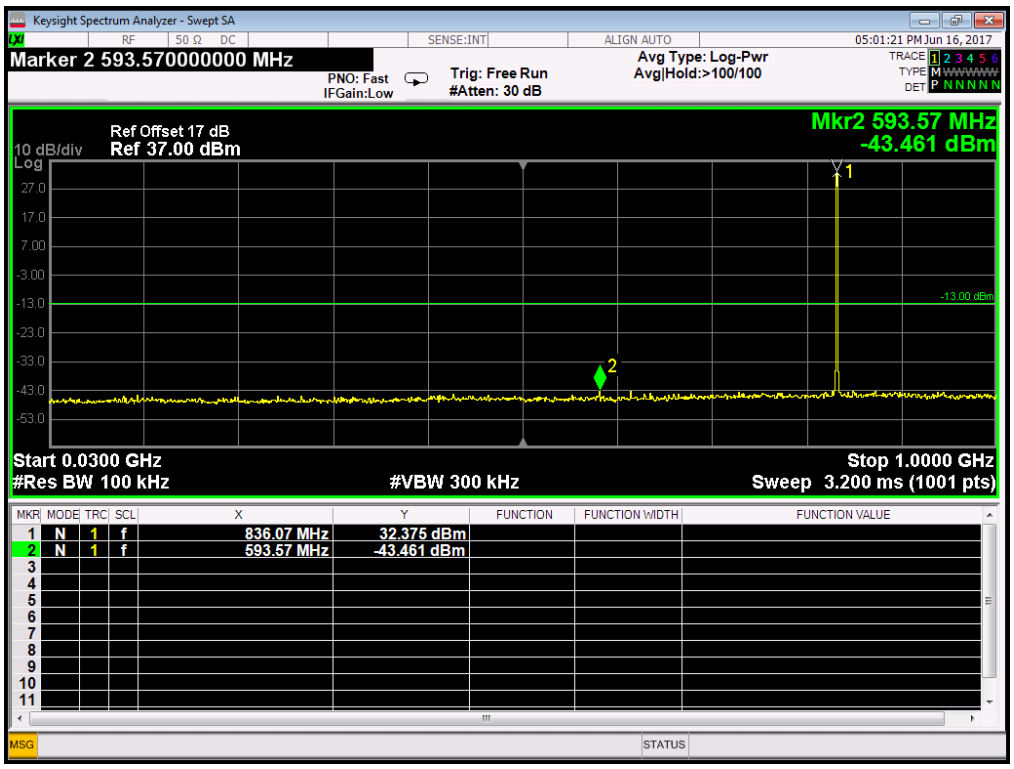

GSM 1900MHz Channel = 810, 1GHz to 20GHz



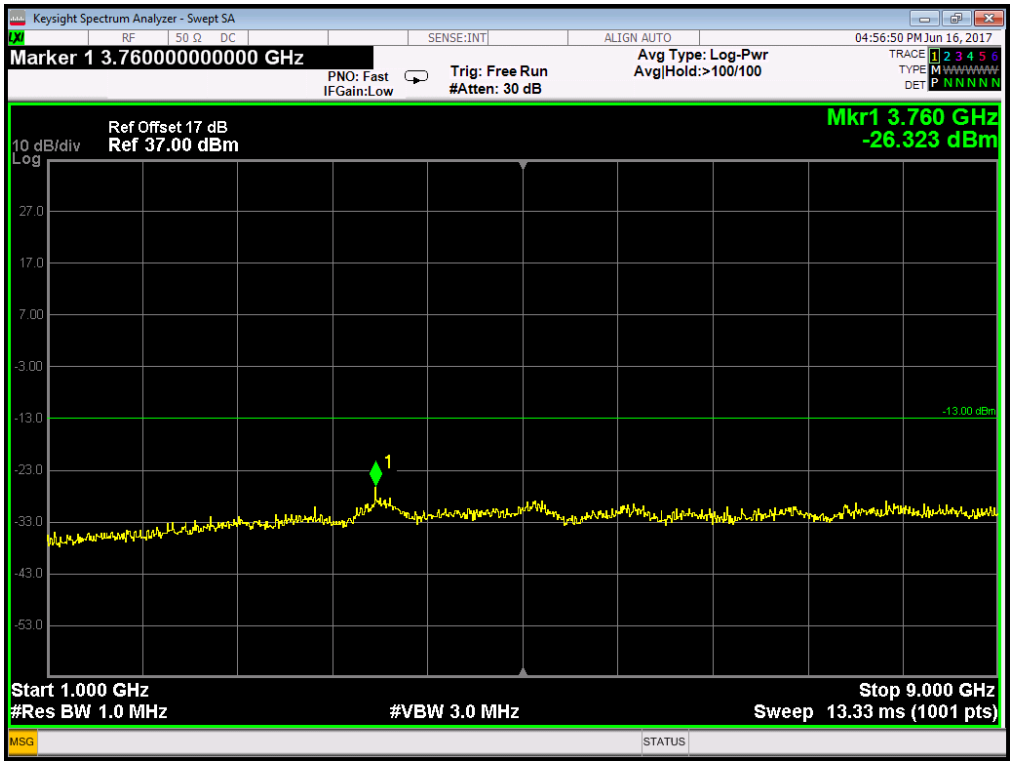

GPRS 850MHz Channel = 128, 30MHz to 1GHz



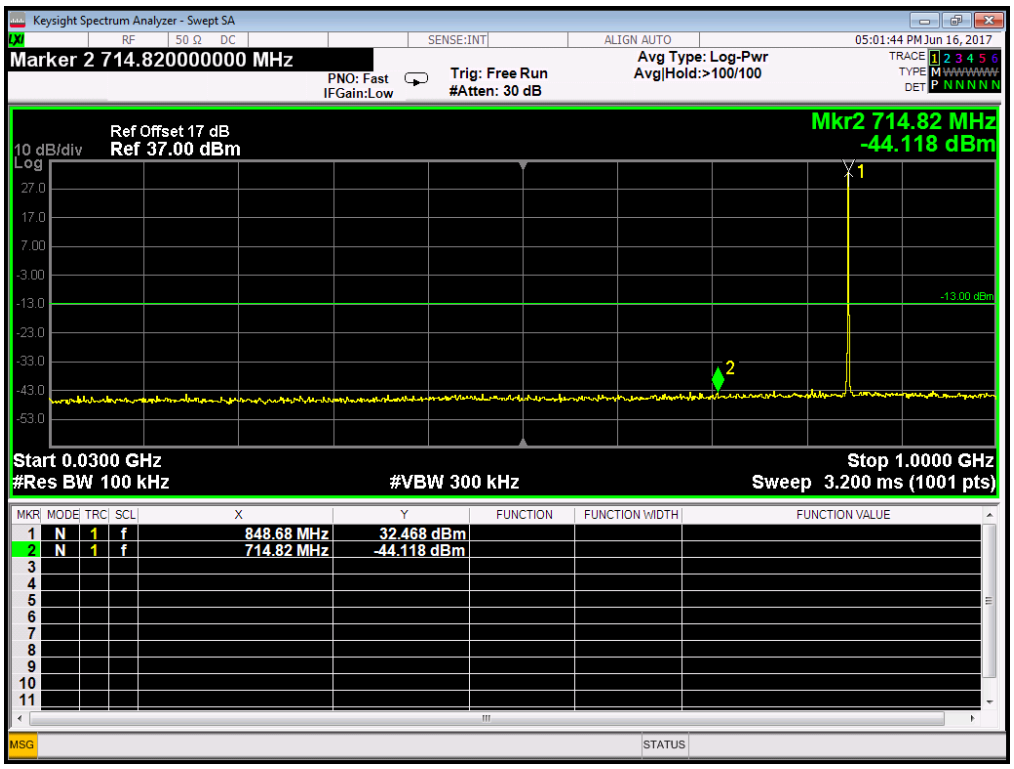

GPRS 850MHz Channel = 128, 1GHz to 9GHz



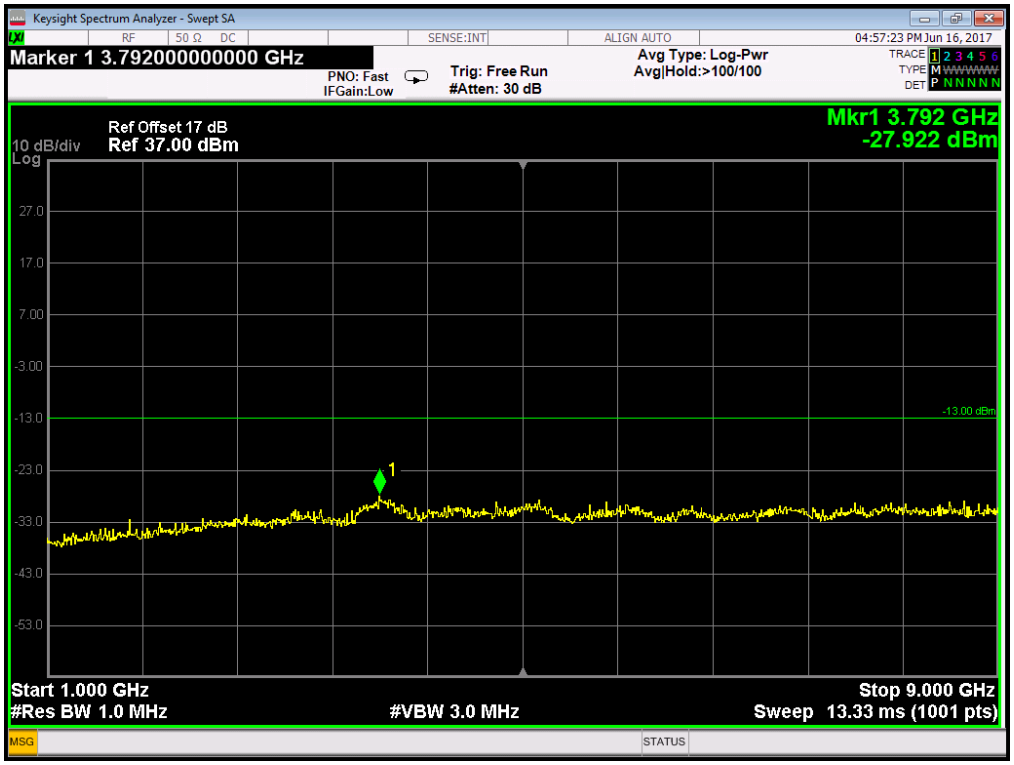

GPRS 850MHz Channel = 190, 30MHz to 1GHz



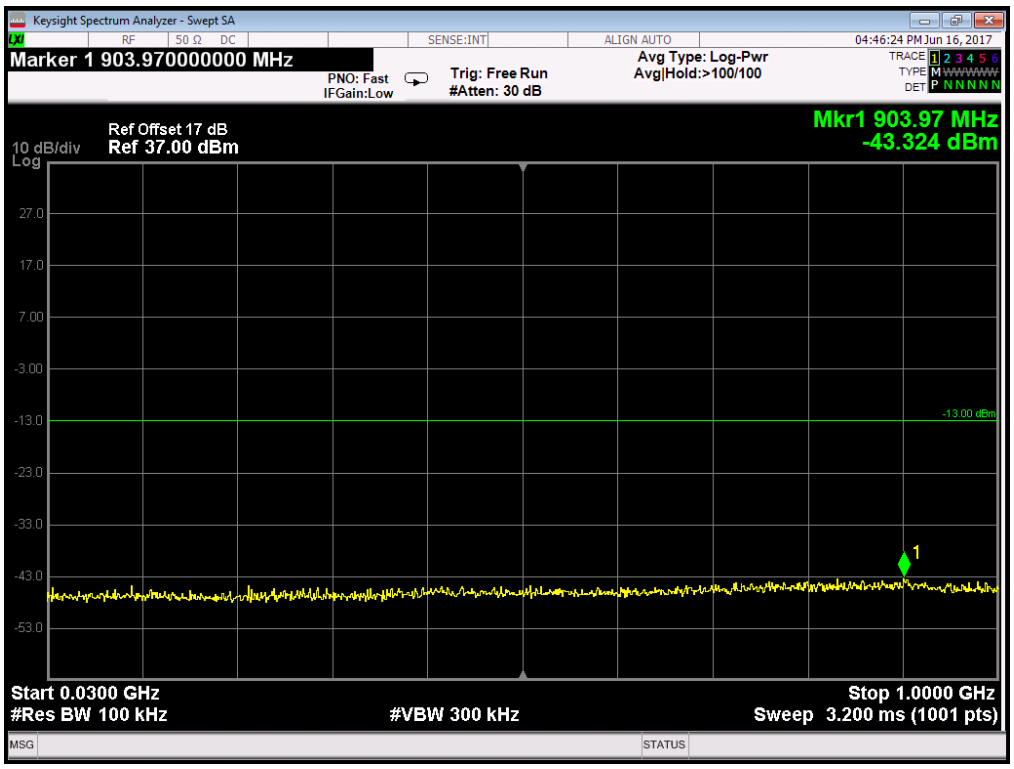

GPRS 850MHz Channel = 190, 1GHz to 9GHz



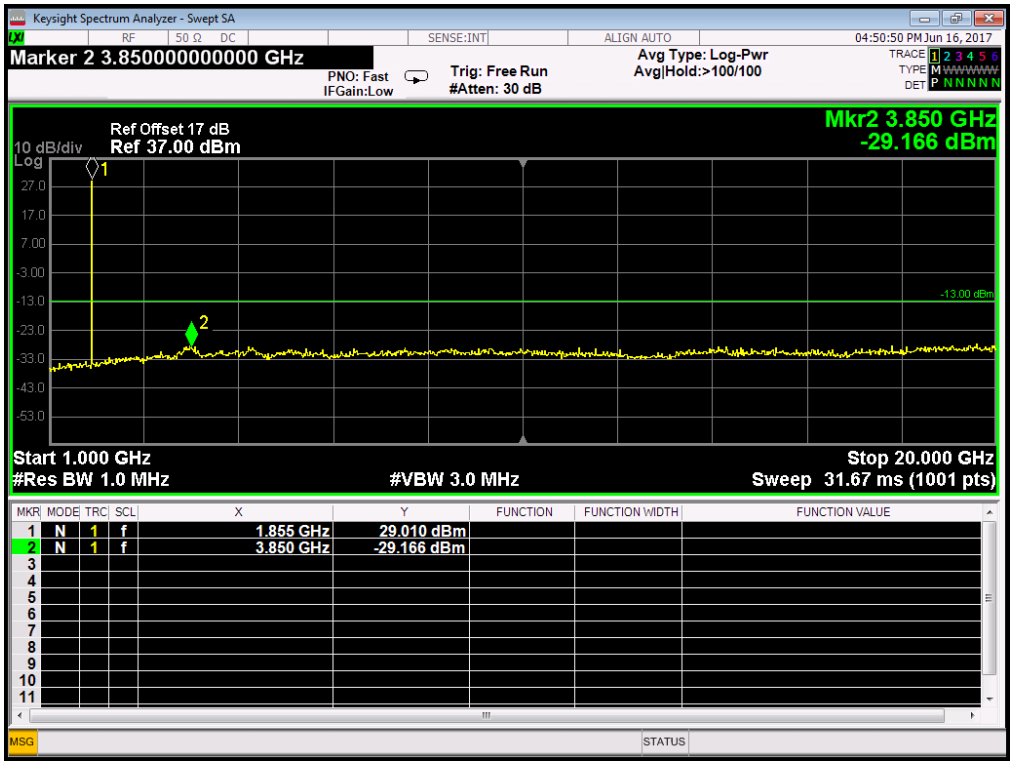

GPRS 850MHz Channel = 251, 30MHz to 1GHz



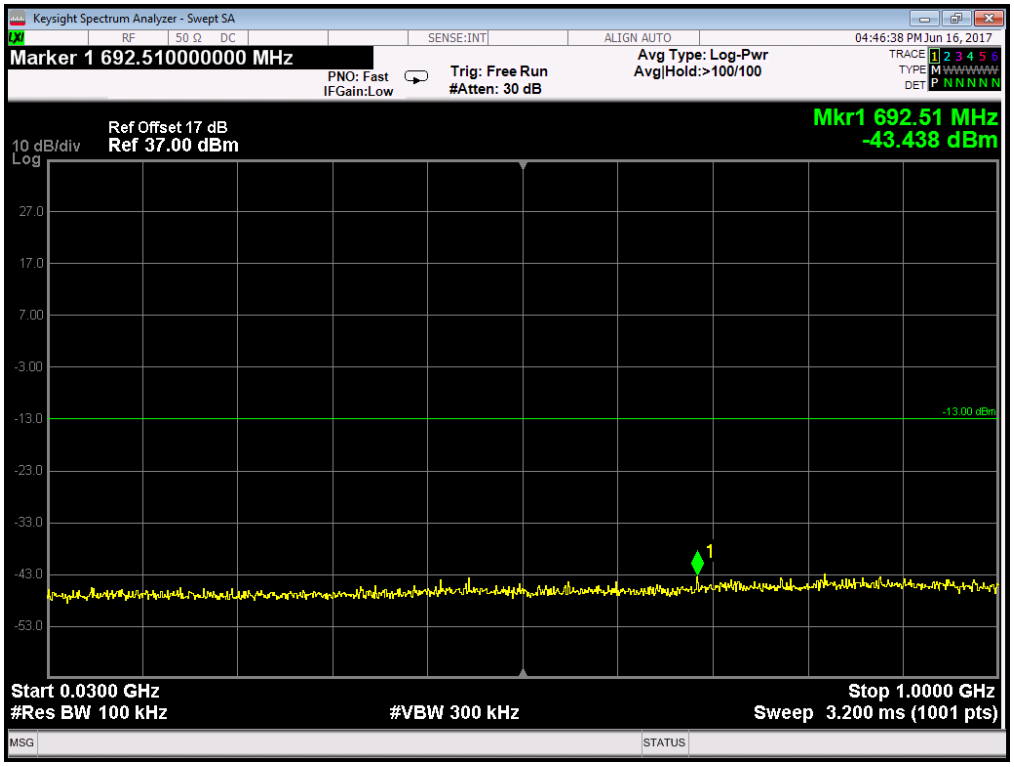

GPRS 850MHz Channel = 251, 1GHz to 9GHz



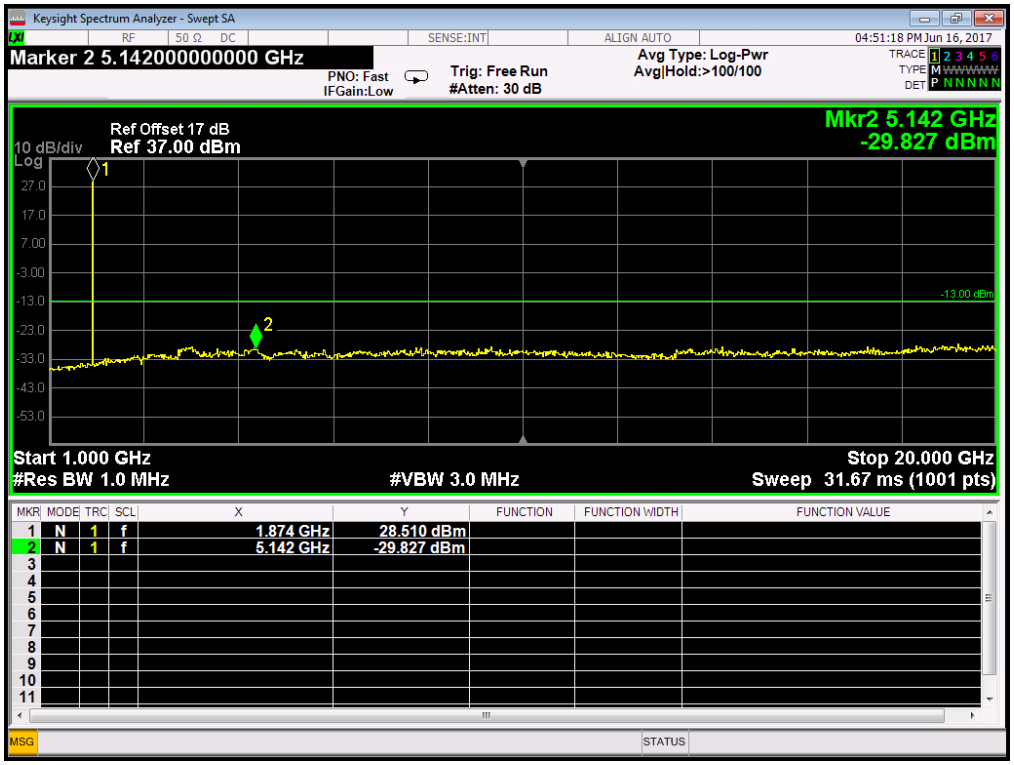

GPRS 1900MHz Channel = 512, 30MHz to 1GHz



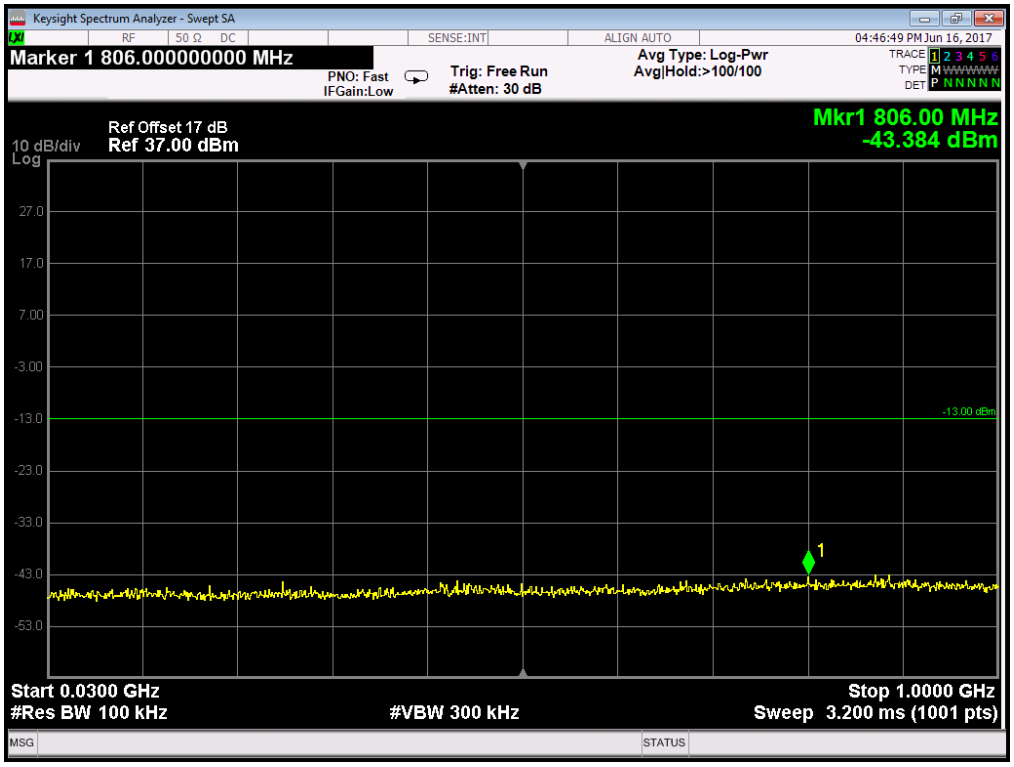

GPRS 1900MHz Channel = 512, 1GHz to 20GHz



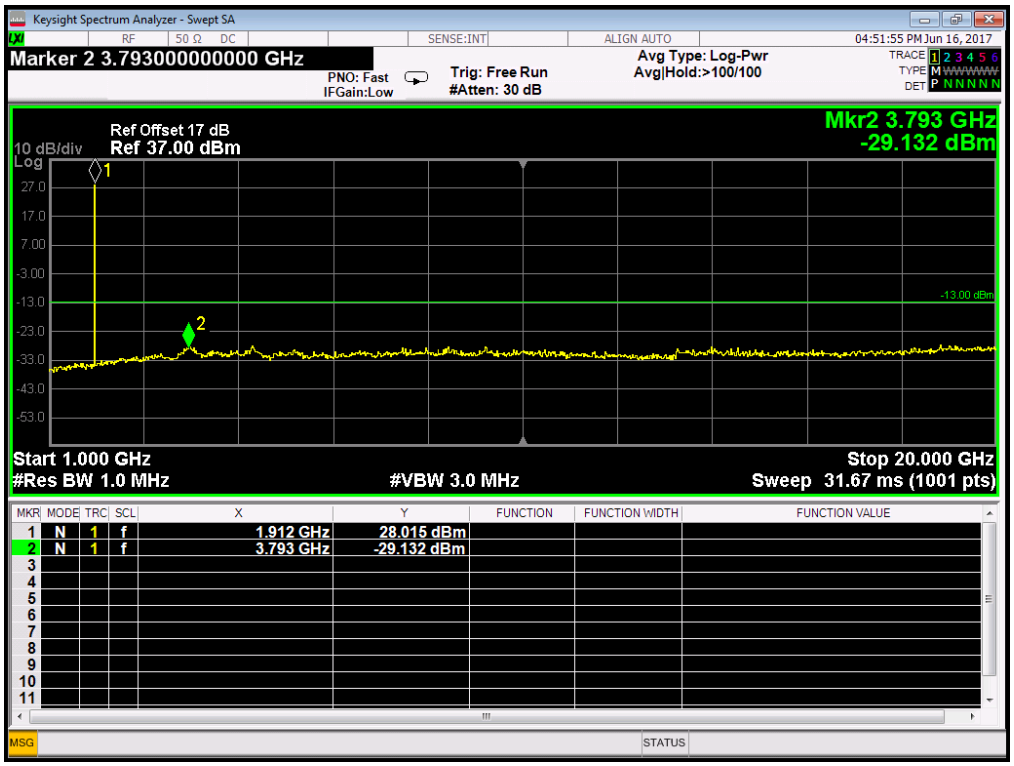

GPRS 1900MHz Channel = 661, 30MHz to 1GHz




GPRS 1900MHz Channel = 661, 1GHz to 20GHz




GPRS 1900MHz Channel = 810, 30MHz to 1GHz




GPRS 1900MHz Channel = 810, 1GHz to 20GHz

## 2.6 Band edge

### 2.6.1 Requirement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

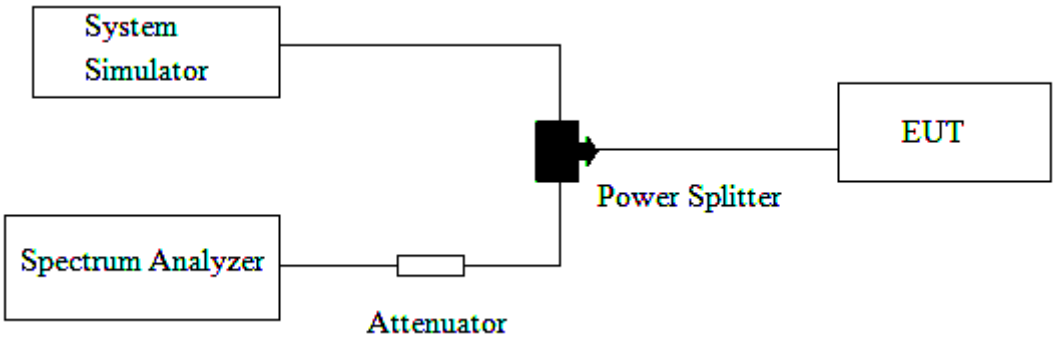
### 2.6.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.6.3 Test Procedures

1. The testing follows FCC KDB 971168 D01v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band GPRSs of low and high channels for the highest RF powers were measured.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
   = P(W) - [43 + 10log(P) ] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P) ] (dB)
   = -13dBm.

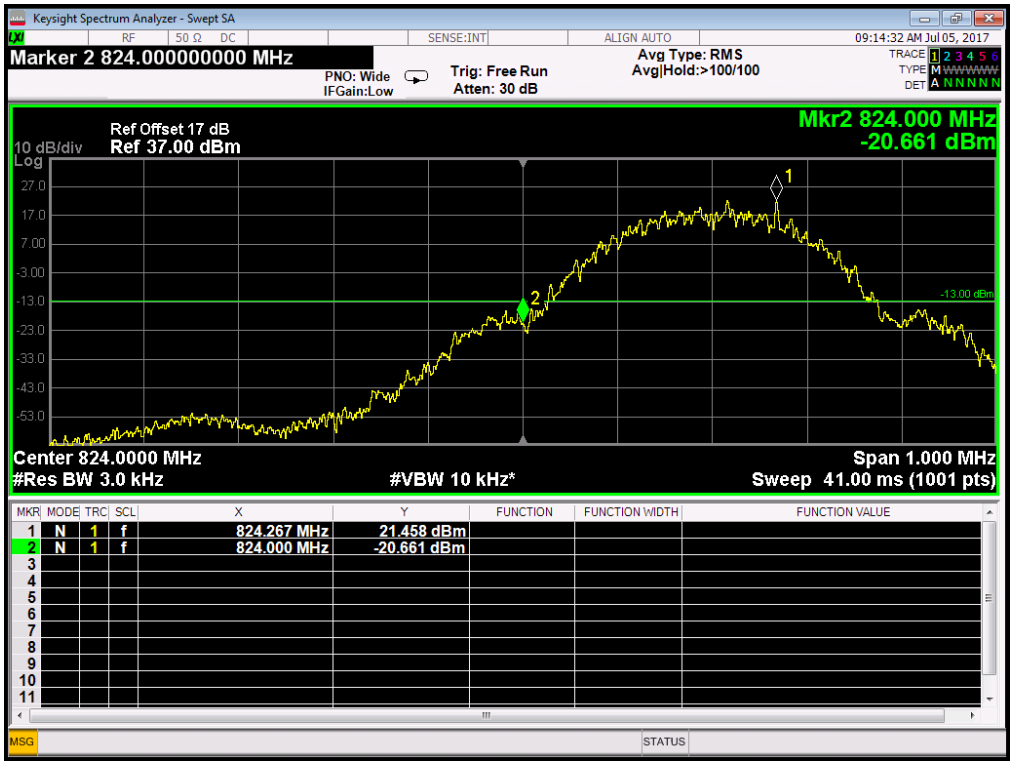
### 2.6.4 Test Setup



### 2.6.5 Test Result of Conducted Bandedge

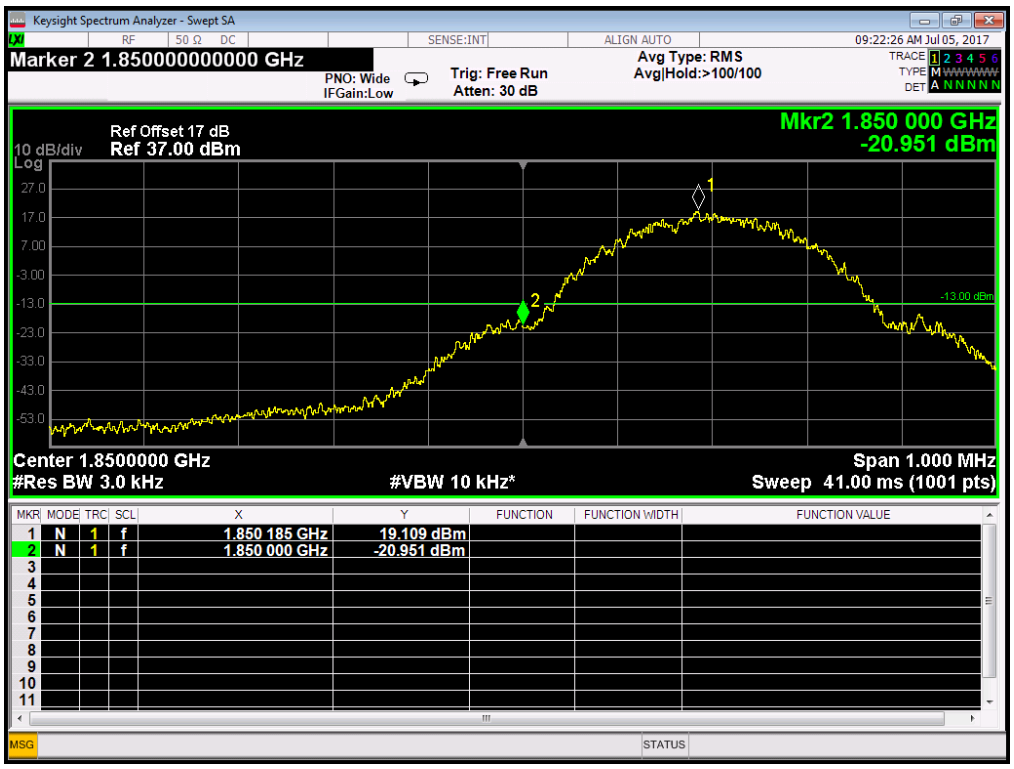
| Band | Channel | Frequency (MHz) | Measured Max. Bandedge Emission (dBm) | Refer to Plot | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| GSM 850MHz | 128 | 824.2 | -20.661 | Plat A | -13 | PASS |
| | 251 | 848.8 | -18.427 | Plot B | | PASS |
| GSM 1900MHz | 512 | 1850.2 | -20.951 | Plat C | -13 | PASS |
| | 810 | 1909.8 | -20.128 | Plot D | | PASS |
| GPRS 850MHz | 128 | 824.2 | -19.299 | Plat E | -13 | PASS |
| | 251 | 848.8 | -20.328 | Plot F | | PASS |
| GPRS 1900MHz | 512 | 1850.2 | -19.195 | Plat G | -13 | PASS |
| | 810 | 1909.8 | -22.982 | Plot H | | PASS |

## 2.6.6 Test Result (Plots) of Conducted Bandedge



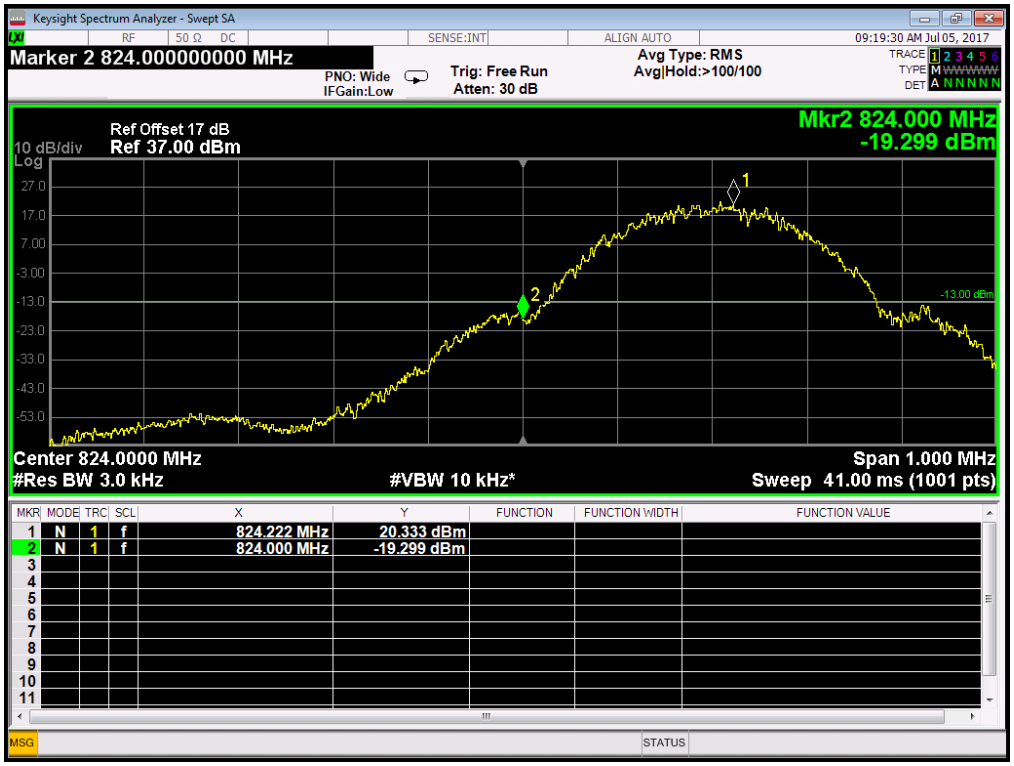

(Plot A: GSM 850 Channel = 128)

(Plot B: GSM 850 Channel = 251)



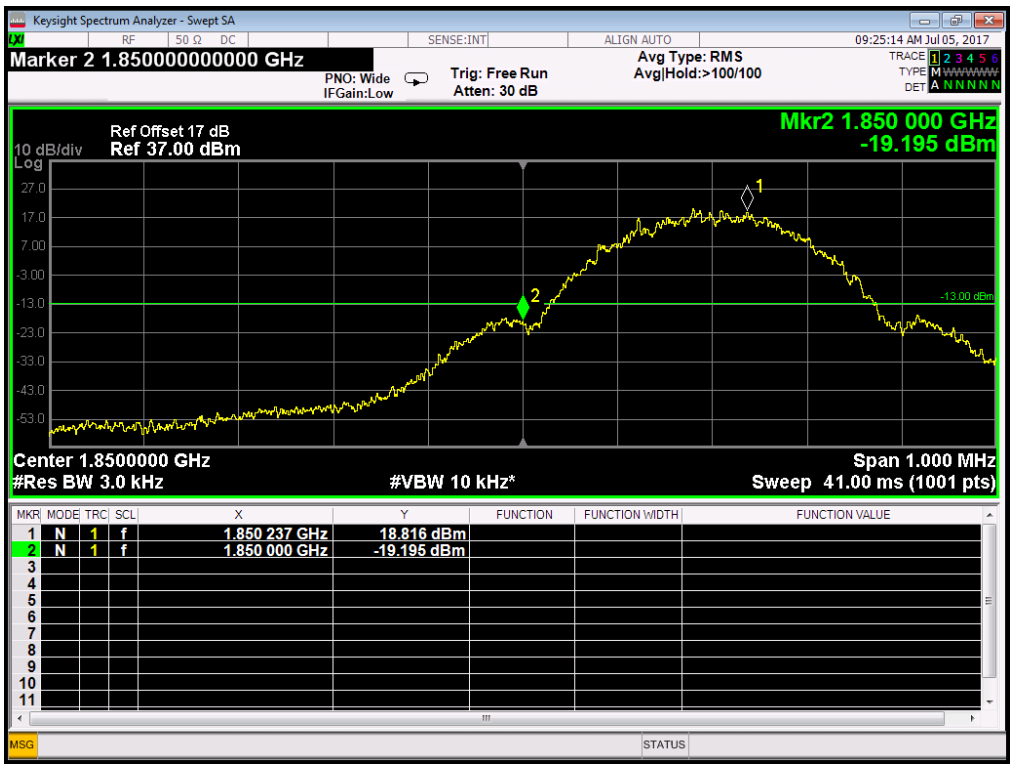

(Plot C: GSM 1900 Channel = 512)

(Plot D: GSM 1900 Channel = 810)




(Plot E: GPRS 850 Channel = 128)

(Plot F: GPRS 850 Channel = 251)




(Plot G: GPRS 1900 Channel = 512)

(Plot H: GPRS 1900 Channel = 810)

## 2.7 Transmitter Radiated Power (EIRP/ERP)

### 2.7.1 Requirement

The substitution method, in ANSI / TIA / EIA-603-D-2010, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band) and 1 Watts (AWS Band).

### 2.7.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.7.3 Test Procedures

1. The testing follows FCC KDB 971168 D01v02r02 Section 5.2.2.2 (for GSM/GSM/GPRS) and ANSI / TIA-603-D-2010 Section 2.2.17.
2. The EUT was placed on a turntable 0.8 meters high in a fully anechoic chamber.
3. The EUT was placed 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;
5. The table was rotated 360 degrees to determine the position of the highest radiated power.
6. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
7. Taking the record of maximum ERP/EIRP.
8. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
9. The conducted power at the terminal of the dipole antenna is measured.
10. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
11. ERP/EIRP = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs

Ps (dBm)：Input power to substitution antenna.

Gs (dBi or dBd)：Substitution antenna Gain.

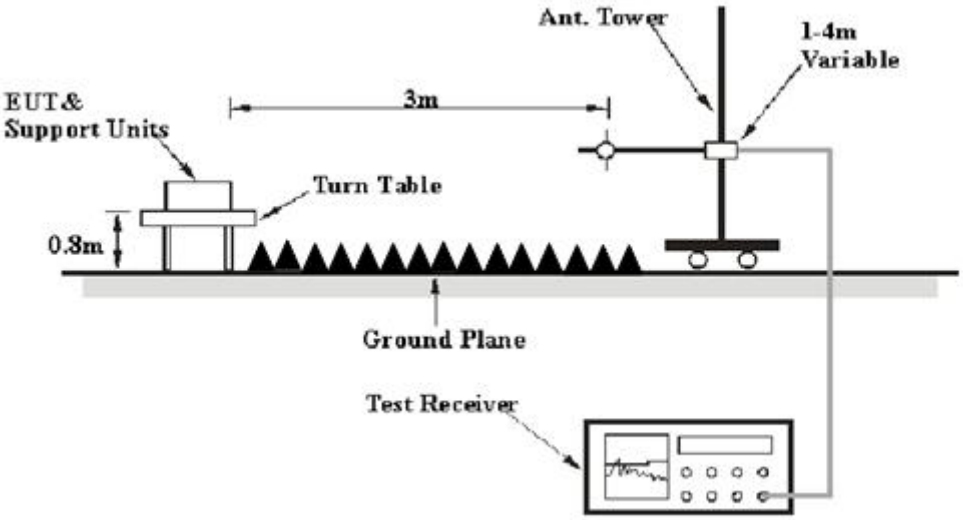
Et = Rt + AF  Es = Rs + AF

AF (dB/m)：Receive antenna factor

Rt：The highest received signal in spectrum analyzer for EUT.

Rs：The highest received signal in spectrum analyzer for substitution antenna.

### 2.7.4 Test Setup



### 2.7.5 Test Result of Transmitter Radiated Power

Test Notes:

1. This device employs GMSK technology with GSM capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the vertical positioning where the EUT is laying on its side. The data reported in the tables below were measured in this test setup.

| Band | Channel | Frequency (MHz) | PCL | Antenna Pol (H/V) | Measured ERP dBm | Limit dBm | Verdict |
|---|---|---|---|---|---|---|---|
| GSM 850MHz | 128 | 824.20 | 5 | V | 28.63 | 38.5 | PASS |
| | | | | H | 27.09 | | |
| | 190 | 836.60 | 5 | V | 28.55 | | PASS |
| | | | | H | 27.02 | | |
| | 251 | 848.80 | 5 | V | **28.71** | | PASS |
| | | | | H | 27.18 | | |

| Band | Channel | Frequency (MHz) | PCL | Antenna Pol (H/V) | Measured EIRP dBm | Limit dBm | Verdict |
|---|---|---|---|---|---|---|---|
| GSM 1900MHz | 512 | 1850.2 | 0 | V | **25.11** | 33 | PASS |
| | | | | H | 23.75 | | |
| | 661 | 1880.0 | 0 | V | 25.06 | | PASS |
| | | | | H | 23.67 | | |
| | 810 | 1909.8 | 0 | V | 24.98 | | PASS |
| | | | | H | 23.62 | | |

| Band | Channel | Frequency (MHz) | PCL | Antenna Pol (H/V) | Measured ERP dBm | Limit dBm | Verdict |
|---|---|---|---|---|---|---|---|
| GPRS 850MHz | 128 | 824.20 | 5 | V | 28.52 | 38.5 | PASS |
| | | | | H | 27.02 | | |
| | 190 | 836.60 | 5 | V | **28.60** | | PASS |
| | | | | H | 27.09 | | |
| | 251 | 848.80 | 5 | V | 28.55 | | PASS |
| | | | | H | 27.05 | | |

| Band | Channel | Frequency (MHz) | PCL | Antenna Pol (H/V) | Measured EIRP dBm | Limit dBm | Verdict |
|---|---|---|---|---|---|---|---|
| GPRS 1900MHz | 512 | 1850.2 | 0 | V | **25.03** | 33 | PASS |
| | | | | H | 23.45 | | |
| | 661 | 1880.0 | 0 | V | 24.96 | | PASS |
| | | | | H | 23.52 | | |
| | 810 | 1909.8 | 0 | V | 24.99 | | PASS |
| | | | | H | 23.47 | | |

## 2.8 Radiated Spurious Emissions

### 2.8.1 Requirement

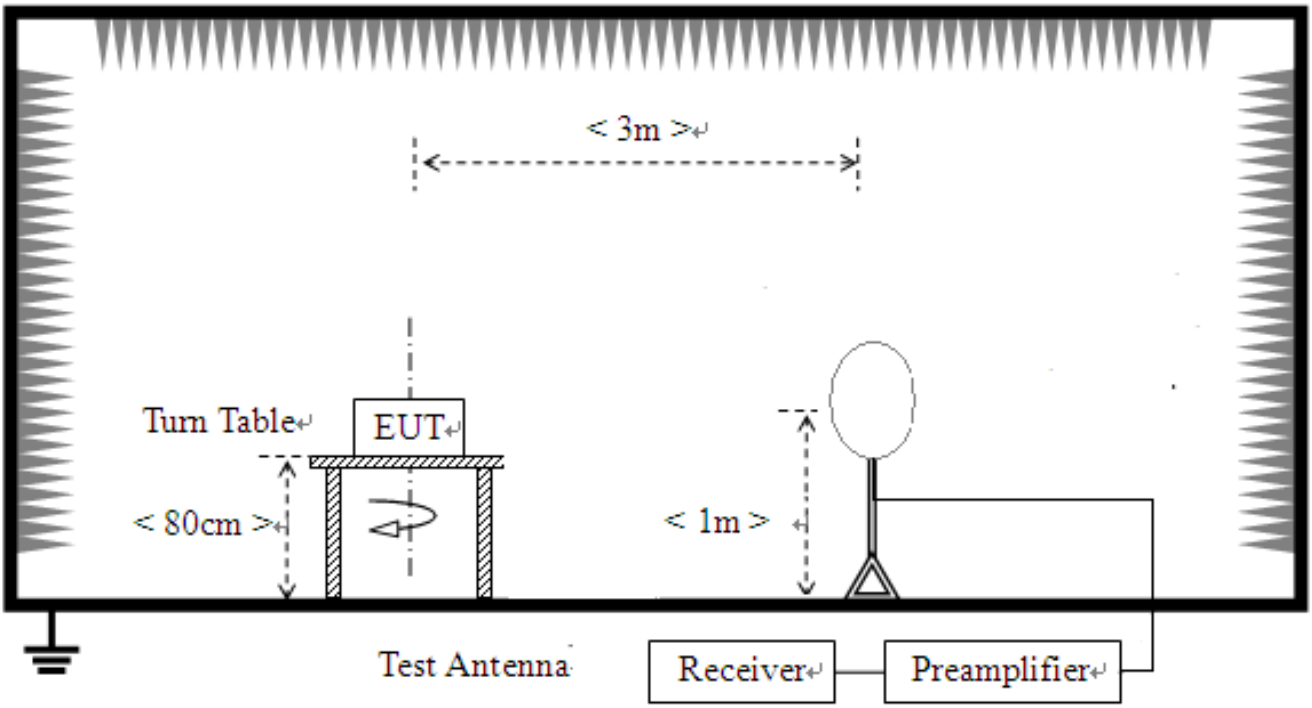
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 2.8.2 Measuring Instruments

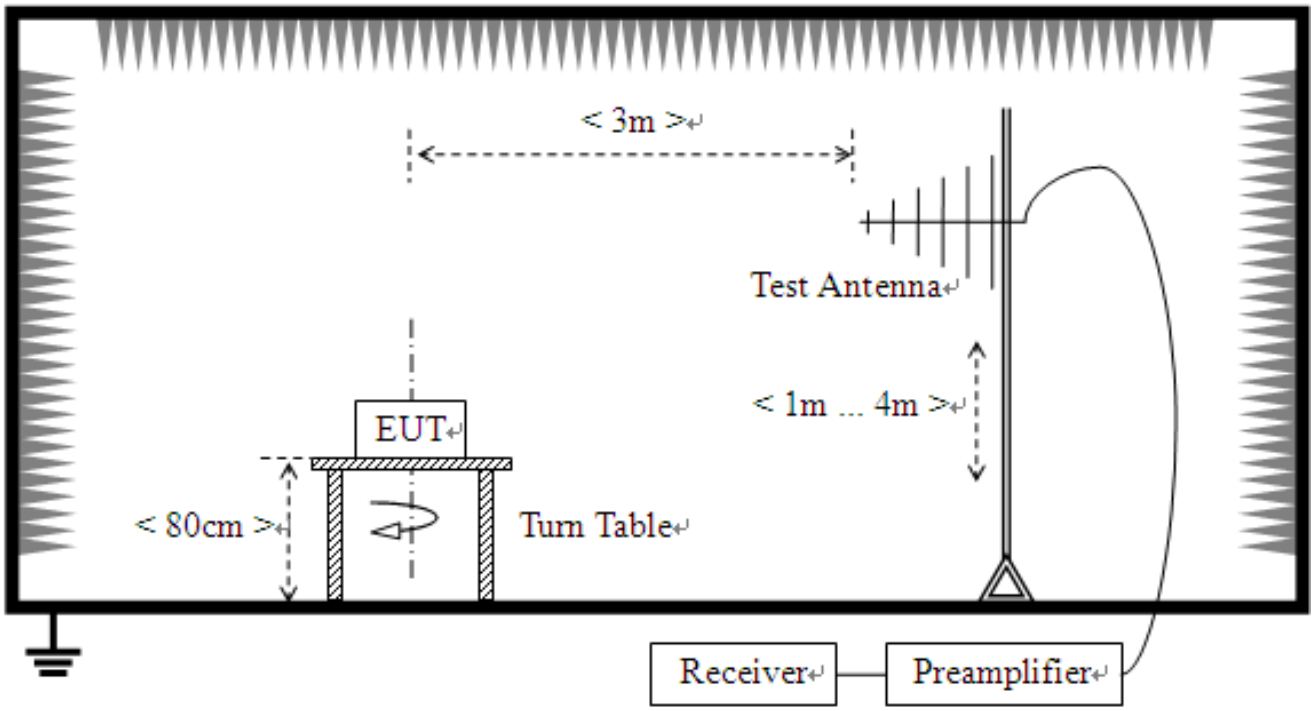
The measuring equipment is listed in the section 3 of this test report.

### 2.8.3 Test Setup

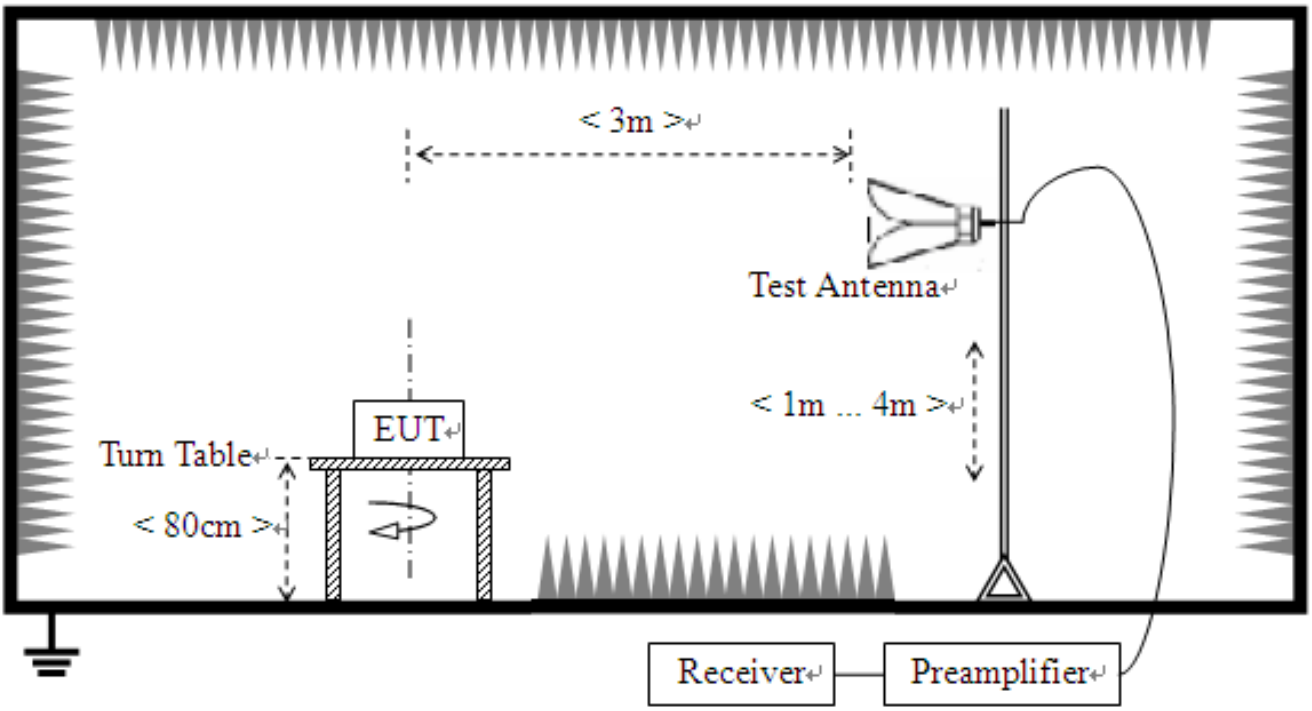
For radiated emissions from 9 kHz to 30MHz



For radiated emissions from 30MHz to 1GHz




For radiated emissions above 1GHz

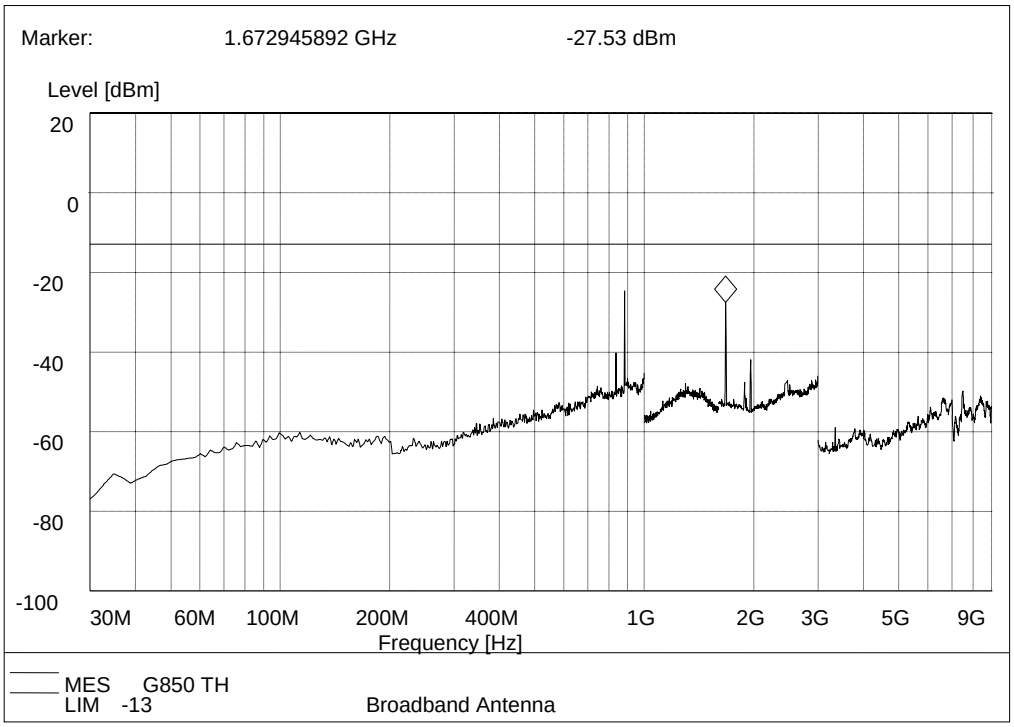


### 2.8.4 Test Procedures

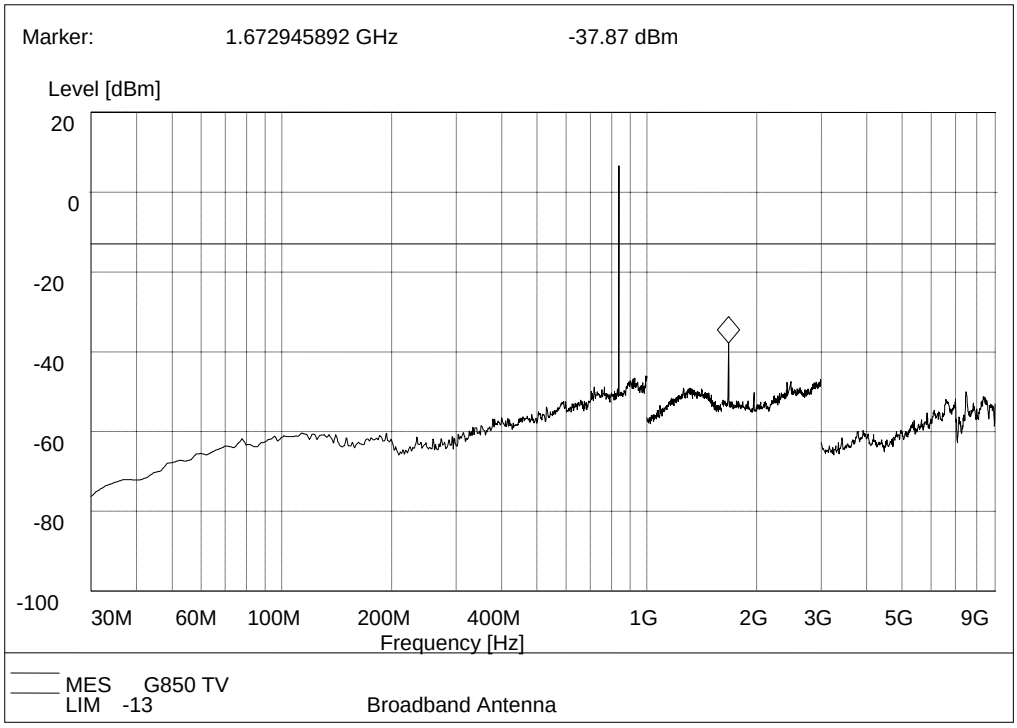
1. The testing follows FCC KDB 971168 D01v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
12. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
    = P(W) - [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
13. This device employs GMSK technology with GSM and GSM capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.
14. This unit was tested with its standard battery.
15. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
16. The spectrum is measured from 9 KHz to the $10^{th}$ harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
17. For 9KHz to 30MHz: the amplitude of spurious emissions are attenuated by more than 20dB below the permissible value has no need to be reported.

### 2.8.5 Test Results of Radiated Spurious Emissions

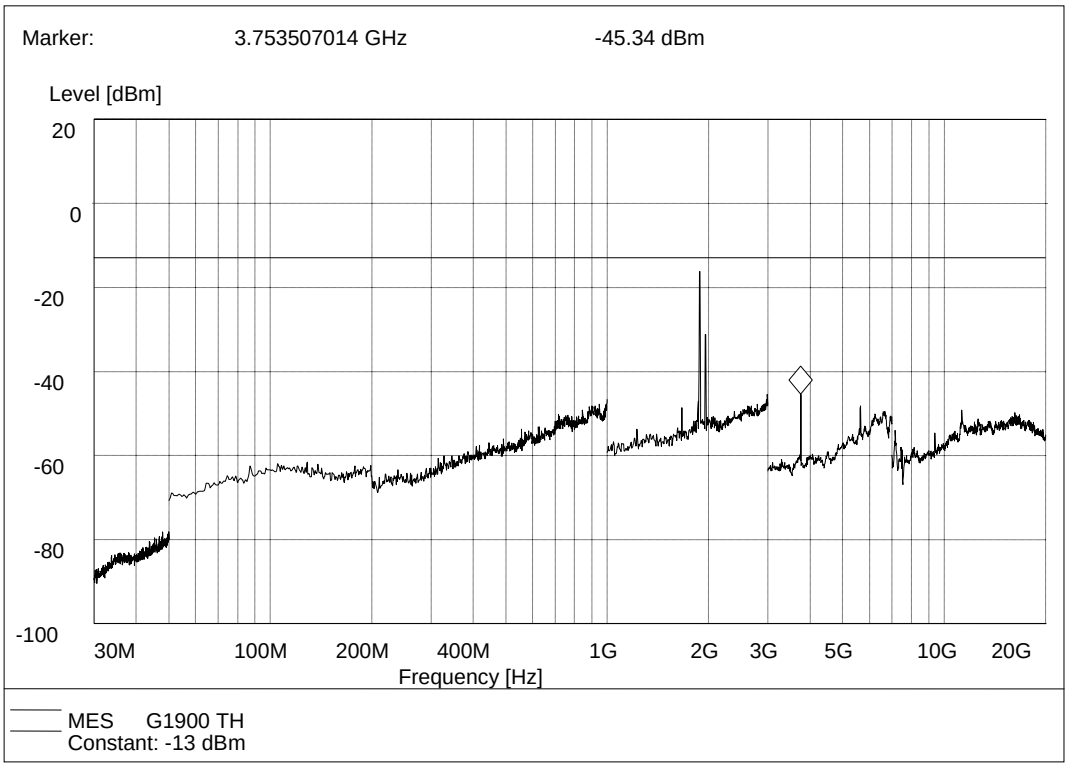
Note: For 9 KHz to 30MHz: the amplitude of spurious emissions is attenuated by more than 20dB below the permissible value, so we not provide the test result here.



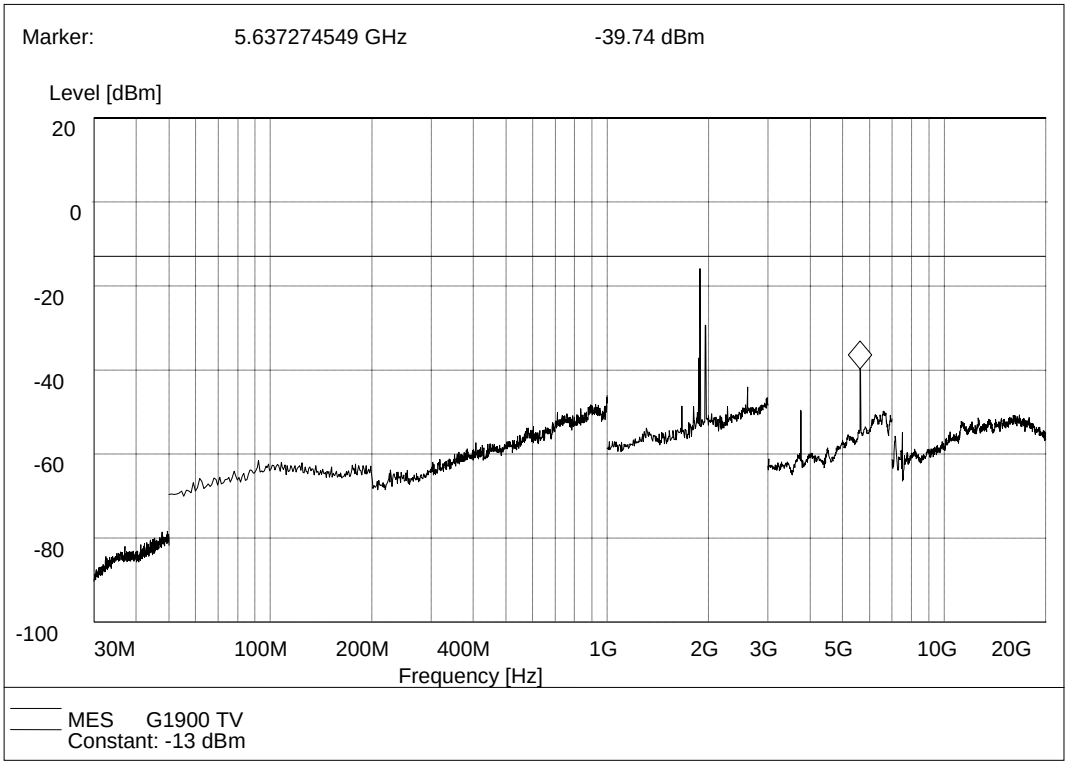

GSM 850MHz, Test Antenna Horizontal




GSM 850MHz, Test Antenna Vertical




GSM 1900MHz, Test Antenna Horizontal




GSM 1900MHz, Test Antenna Vertical

# 3. LIST OF MEASURING EQUIPMENT

| Radiated Emission | | | | | |
|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal |
| 1 | Ultra-Broadband Antenna | ShwarzBeck | VULB9163 | 538 | 11/13/2016 |
| 2 | EMI TEST RECEIVER | Rohde&Schwarz | ESI 26 | 100009 | 11/13/2016 |
| 3 | EMI TEST Software | Audix | E3 | N/A | N/A |
| 4 | TURNTABLE | ETS | 2088 | 2149 | N/A |
| 5 | ANTENNA MAST | ETS | 2075 | 2346 | N/A |
| 6 | EMI TEST Software | Rohde&Schwarz | ESK1 | N/A | N/A |
| 7 | HORNANTENNA | ShwarzBeck | 9120D | 1011 | 11/13/2016 |
| 8 | Amplifer | Sonoma | 310N | E009-13 | 11/13/2016 |
| 9 | JS amplifer | Rohde&Schwarz | JS4-00101800-28-5A | F201504 | 11/13/2016 |
| 10 | High pass filter | Compliance Direction systems | BSU-6 | 34202 | 11/13/2016 |
| 11 | HORNANTENNA | ShwarzBeck | 9120D | 1012 | 11/13/2016 |
| 12 | Amplifer | Compliance Direction systems | PAP1-4060 | 120 | 11/13/2016 |
| 13 | Loop Antenna | Rohde&Schwarz | HFH2-Z2 | 100020 | 11/13/2016 |
| 14 | TURNTABLE | MATURO | TT2.0 | ---- | N/A |
| 15 | ANTENNA MAST | MATURO | TAM-4.0-P | ---- | N/A |
| 16 | Horn Antenna | SCHWARZBECK | BBHA9170 | 25841 | 11/13/2016 |
| 17 | ULTRA-BROADBAND ANTENNA | Rohde&Schwarz | HL562 | 100015 | 11/13/2016 |
| 18 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 11/13/2016 |

| Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission | | | | | |
|---|---|---|---|---|---|
| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Last Cal |
| 1 | Spectrum Analyzer | Rohde&Schwarz | FSP | 1164.4391.40 | 11/13/2016 |
| 3 | Spectrum Analyzer | Keysight | N9030A | ATO-67098 | 07/19/2016 |
| 4 | Power Meter | Anritsu | ML2480B | 100798 | 11/13/2016 |
| 5 | Power Sensor | Anritsu | MA2411B | 100258 | 11/13/2016 |
| 6 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 11/13/2016 |

** END OF REPORT **