

# FCC TEST REPORT



Issued to

TCT Mobile Limited

For

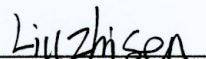
TERRACE

Model Name: F102G  
Trade Name: ALCATEL  
onetouch  
Brand Name: ALCATEL  
onetouch  
FCC ID : RAD508  
Standard: 47 CFR Part 22 Subpart H  
47 CFR Part 24 Subpart E  
Test date: 2014-4-10 to 2014-4-29  
Issue date: 2014-4-30

By

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Tested by

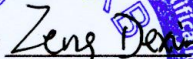


Liu Zhisen  
(Test Engineer)

Date

2014. 4. 30

Approved by

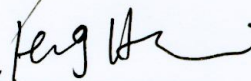


Zeng Dexin  
(Chief Engineer)

Date

2014. 4. 30

Reviewed by



Peng Huarui  
(Dept. Manager)

Date

2014. 4. 30



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| Change History |              |                   |
|----------------|--------------|-------------------|
| Issue          | Date         | Reason for change |
| 1.0            | Apr 30, 2014 | First edition     |
|                |              |                   |

## 1. GENERAL INFORMATION

### 1.1 EUT Description

EUT Type ..... : TERRACE  
Serial No. .... : (n.a, marked #1 by test site)  
Hardware Version ..... : V1.3  
Software Version..... : V1.3  
Applicant ..... : TCT Mobile Limited  
5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area Shanghai, P.R. China. 201203  
Manufacturer..... : TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED  
70 Huifeng 4rd,ZhongKai Hi-tech Development District ,Huizhou,  
Guangdong 516006 P.R.China  
(TCL Mobile Communication Co.,LTD.Huizhou)  
Frequency Range ..... : GSM 850MHz:  
Tx: 824.20 - 848.80MHz (at intervals of 200kHz);  
Rx: 869.20 - 893.80MHz (at intervals of 200kHz)  
GSM 1900MHz:  
Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz);  
Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)  
Modulation Type..... : GSM Mode with GMSK Modulation  
Antenna Type..... : PIFA Antenna  
Emission Designators ..... : GSM 850:243KGXW,GSM 1900:245KGXW

**Note 1:** The transmitter (Tx) frequency arrangement of the Cellular 850MHz band used by the EUT can be represented with the formula  $F(n)=824.2+0.2*(n-128)$ ,  $128 \leq n \leq 251$ ; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128 (824.2MHz), 190 (836.6MHz) and 251 (848.8MHz).

**Note 2:** The transmitter (Tx) frequency arrangement of the PCS 1900MHz band used by the EUT can be represented with the formula  $F(n)=1850.2+0.2*(n-512)$ ,  $512 \leq n \leq 810$ ; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661 (1880.0MHz) and 810 (1909.8MHz).

**Note 3:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and Part 24 for the EUT FCC ID Certification:

| No. | Identity                            | Document Title                                                                |
|-----|-------------------------------------|-------------------------------------------------------------------------------|
| 1   | 47 CFR Part 2<br>(10-1-13 Edition)  | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations |
| 2   | 47 CFR Part 22<br>(10-1-13 Edition) | Public Mobile Services                                                        |
| 3   | 47 CFR Part 24<br>(10-1-13 Edition) | Personal Communications Services                                              |

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

| No. | Section                         | Description                           | Result |
|-----|---------------------------------|---------------------------------------|--------|
| 1   | 2.1046                          | Conducted RF Output Power             | PASS   |
| 2.  | 24.232(d)                       | Peak to average radio                 | PASS   |
| 2   | 2.1049,22.917<br>24.238         | 99% Occupied Bandwidth                | PASS   |
| 3   | 2.1055,22.355<br>24.235         | Frequency Stability                   | PASS   |
| 4   | 2.1051,2.1057<br>22.917,24.238, | Conducted Out of Band Emissions       | PASS   |
| 5   | 2.1051,2.1057<br>22.917,24.238  | Band Edge                             | PASS   |
| 6   | 22.913,24.232                   | Transmitter Radiated Power (EIPR/ERP) | PASS   |
| 7   | 2.1053,2.1057<br>22.917,24.238  | Radiated Out of Band Emissions        | PASS   |

**NOTE:** Measurement method according to TIA/EIA 603.D-2010

## 1.3 Facilities and Accreditations

### 1.3.1 Facilities

All measurement facilities used to collect the measurement data are located at FL.1, Building A, FeiYang Science Park, No.8 LongChang Road,Block 67, BaoAn District, ShenZhen, GuangDong Province,P. R. China 518101. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 695796.

### 1.3.2 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): | 86-106  |

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

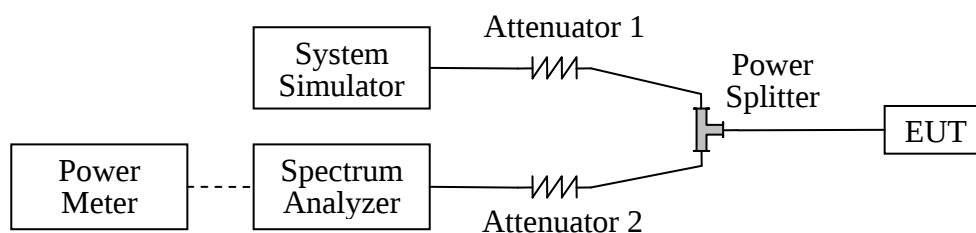
### 2.1 Conducted RF Output Power

#### 2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

#### 2.1.2 Test Description

##### 1. Test Setup:



The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.

The Power Meter was just used for the Conducted RF Output Power test of WCDMA Model.

##### 2. Equipments List:

| Description       | Manufacturer | Model  | Serial No. | Cal. Date  | Cal. Due   |
|-------------------|--------------|--------|------------|------------|------------|
| System Simulator  | Agilent      | E5515C | GB43130131 | 2014.02.26 | 2015.02.25 |
| Spectrum Analyzer | Agilent      | E7405A | US44210471 | 2014.02.26 | 2015.02.25 |
| Power Meter       | Agilent      | E4418B | GB43318055 | 2014.02.26 | 2015.02.25 |
| Power Sensor      | Agilent      | 8482A  | MY41091706 | 2014.02.26 | 2015.02.25 |
| Power Splitter    | Weinschel    | 1506A  | NW521      | 2014.02.26 | 2015.02.25 |
| Attenuator 1      | Resnet       | 20dB   | (n.a.)     | 2014.02.26 | 2015.02.25 |
| Attenuator 2      | Resnet       | 3dB    | (n.a.)     | 2014.02.26 | 2015.02.25 |

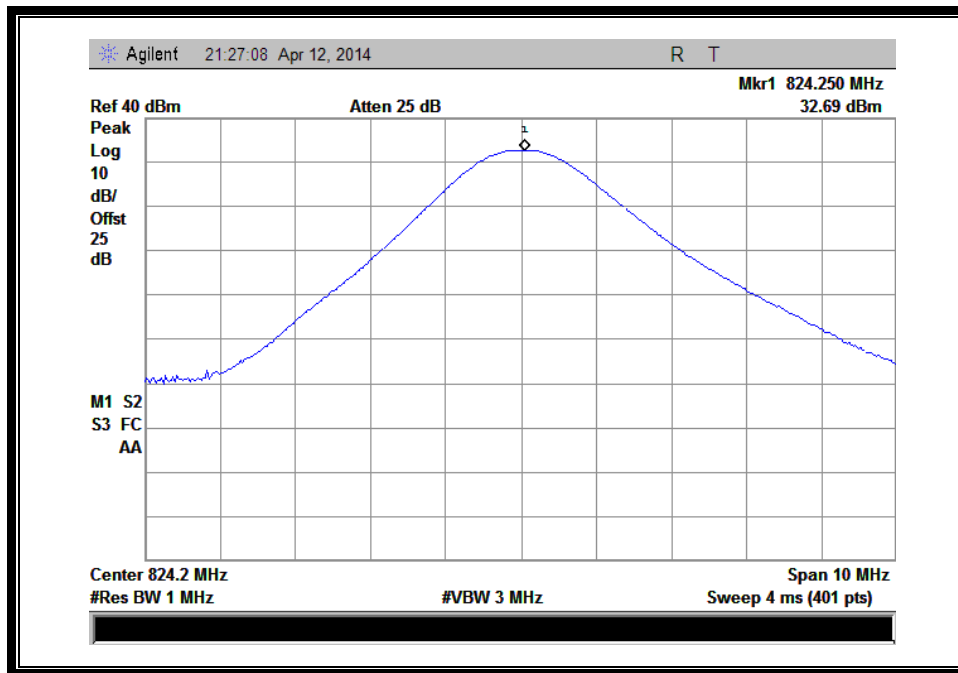
### 2.1.3 Test Results

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

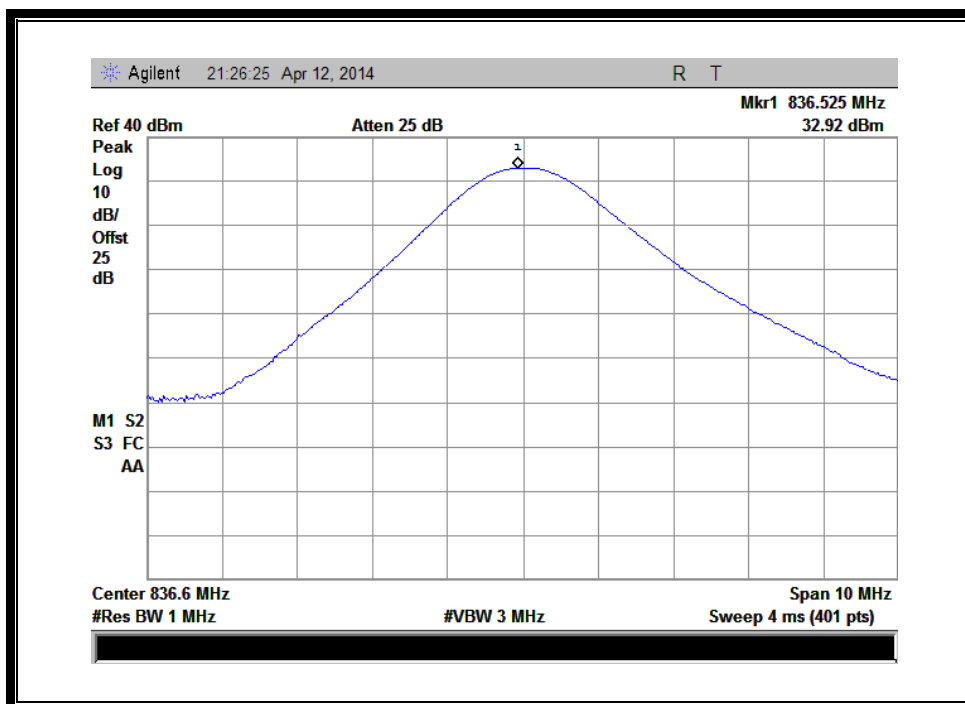
#### 1. GSM Model Test Verdict:

| Band           | Channel | Frequency (MHz) | Measured Output Power |                  | Limit | Verdict     |
|----------------|---------|-----------------|-----------------------|------------------|-------|-------------|
|                |         |                 | dBm                   | Refer to Plot    | dBm   |             |
| GSM<br>850MHz  | 128     | 824.2           | 32.69                 | Plot A1 to<br>A3 | 35    | <u>PASS</u> |
|                | 190     | 836.6           | 32.92                 |                  |       | <u>PASS</u> |
|                | 251     | 848.8           | 32.97                 |                  |       | <u>PASS</u> |
| GSM<br>1900MHz | 512     | 1850.2          | 29.31                 | Plot B1 to<br>B3 | 32    | <u>PASS</u> |
|                | 661     | 1880.0          | 29.24                 |                  |       | <u>PASS</u> |
|                | 810     | 1909.8          | 29.19                 |                  |       | <u>PASS</u> |

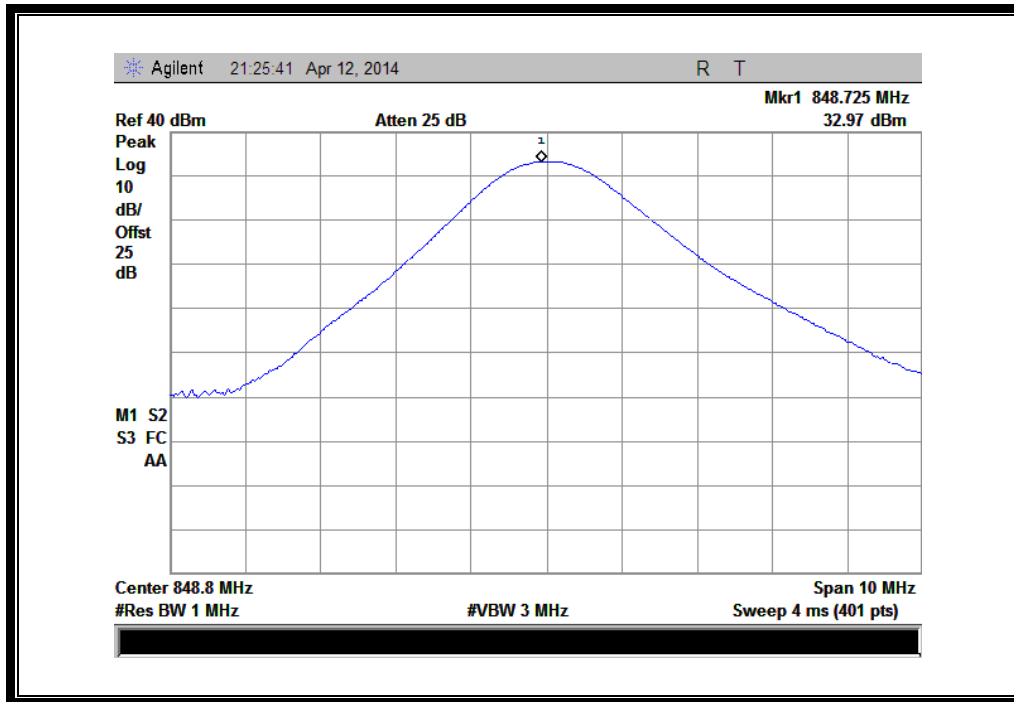
## GSM Model Test Plots:



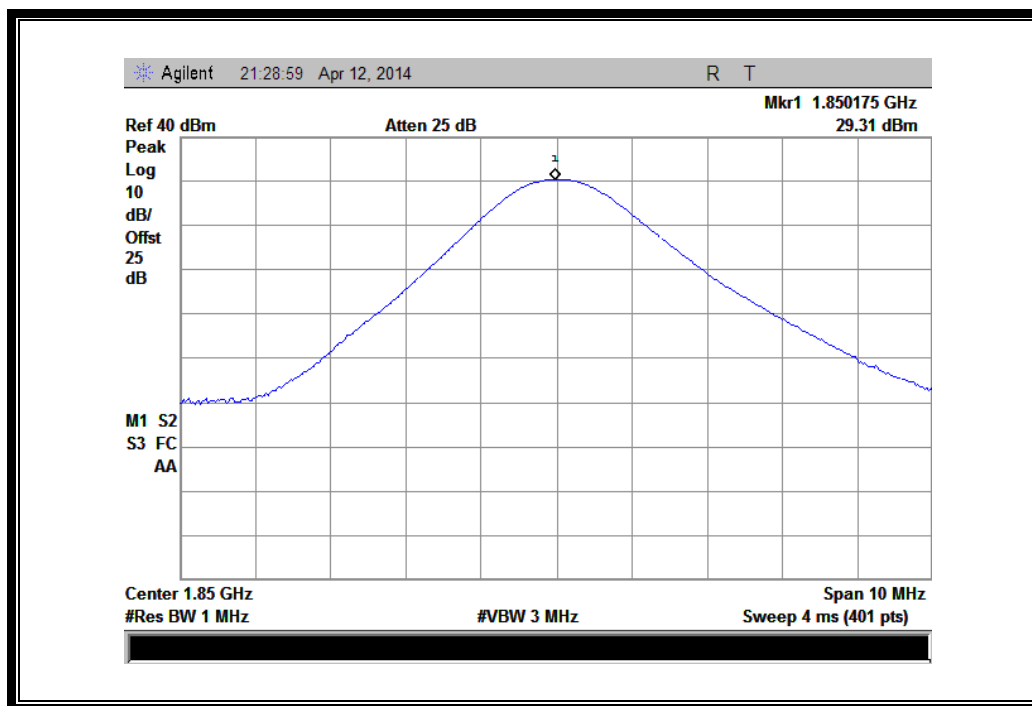
(Plot A1:GSM 850MHz Channel = 128)



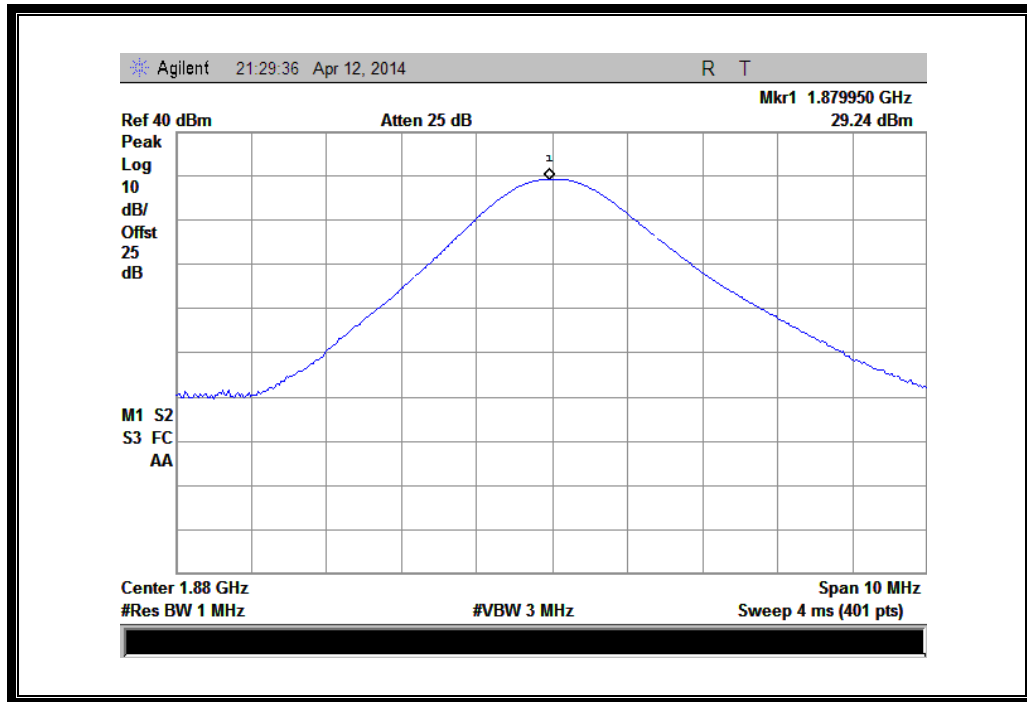
(Plot A2:GSM 850MHz Channel = 190)



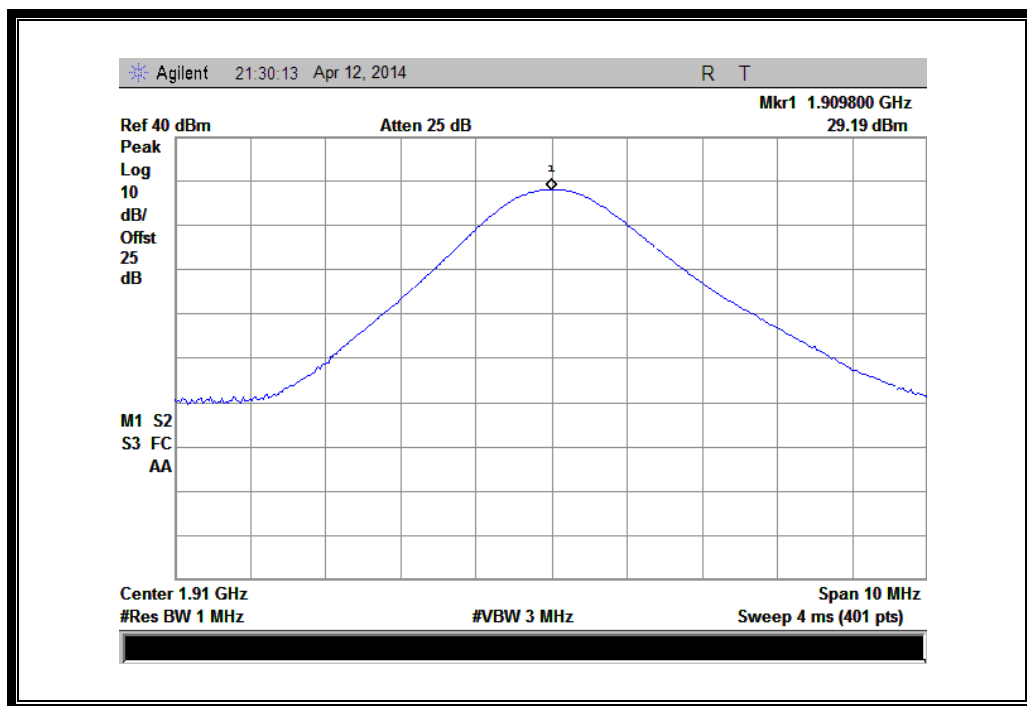
(Plot A3:GSM 850MHz Channel = 251)



(Plot B1: GSM 1900MHz Channel = 512)



(Plot B2: GSM 1900MHz Channel = 661)



(Plot B3: GSM 1900Hz Channel = 810)

## 2.2 Peak to Average Ratio

### 2.2.1 Definition

According to FCC section 2.1049 and FCC 24.232(d) the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 2.2.2 Test Description

See section 2.1.2 of this report.

### 2.2.3 Test Verdict

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

Test procedures:

A .For GSM/EGPRS operating mode:

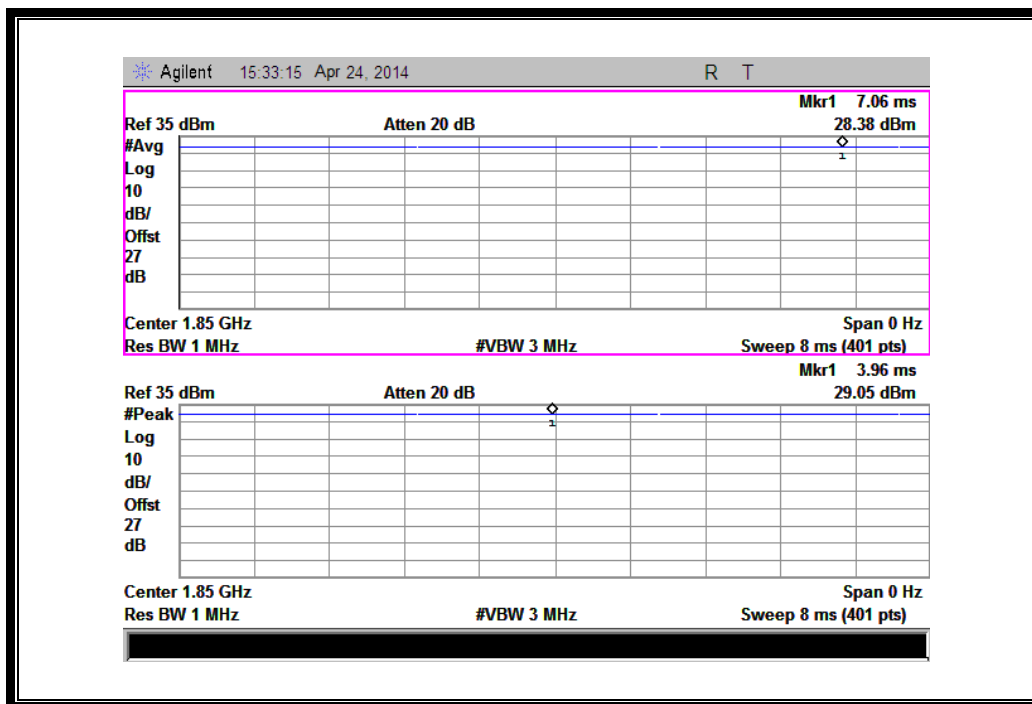
- a. Set RBW=1MHz, VBW=1MHz, peak detector in spectrum analyzer.
- b. Set EUT in maximum output power, and triggered the bust signal.
- c. Measured respectively the peak level and mean level, and the deviation was recorded as Peak to Average radio.

B. For UMTS operating mode:

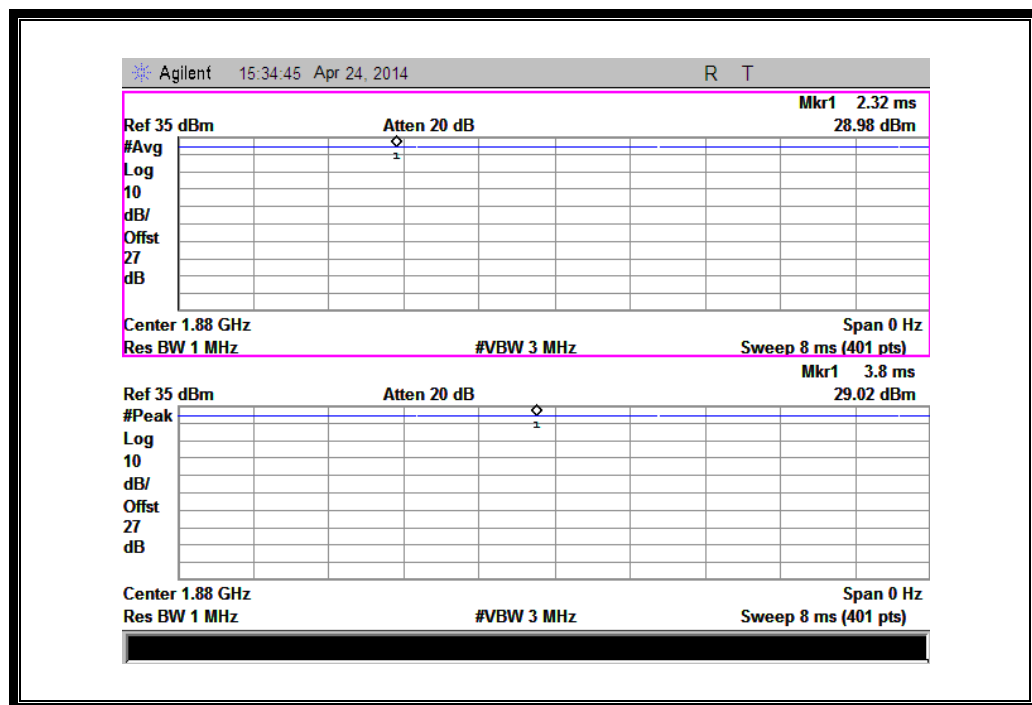
- a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.

1. Test Verdict:

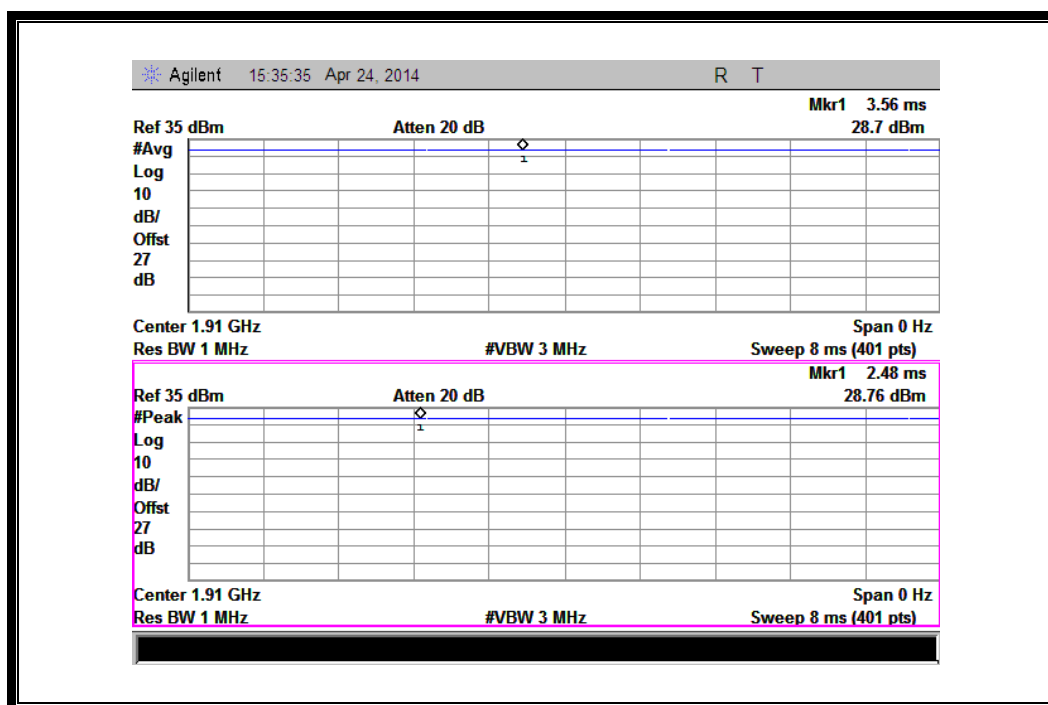
| Band           | Channel | Frequency<br>(MHz) | Peak to Average radio |               | Limit<br>dBm | Verdict |
|----------------|---------|--------------------|-----------------------|---------------|--------------|---------|
|                |         |                    | dBm                   | Refer to Plot |              |         |
| GSM<br>1900MHz | 512     | 1850.2             | 0.27                  | Plot A1 to A3 | 13           | PASS    |
|                | 661     | 1880.0             | 0.04                  |               |              | PASS    |
|                | 810     | 1909.8             | 0.06                  |               |              | PASS    |



(Plot A1:GSM 1900 MHz Channel = 512)



(Plot A2:GSM 1900 MHz Channel = 661)



(Plot A3:GSM 1900MHz Channel = 810)

## 2.3 99% Occupied Bandwidth

### 2.3.1 Definition

According to FCC section 2.1049 and FCC § 22.917 & 24.238 the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth,

### 2.3.2 Test Description

See section 2.1.2 of this report.

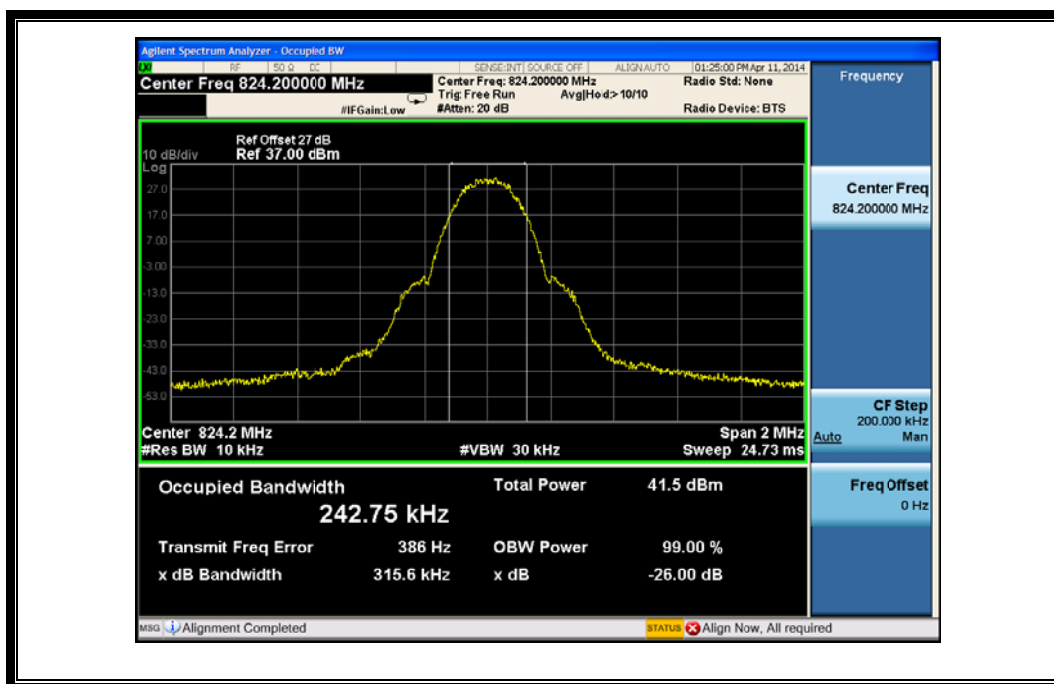
### 2.3.3 Test Verdict

Here the lowest, middle and highest channels are selected to perform testing to verify the 99% occupied bandwidth.

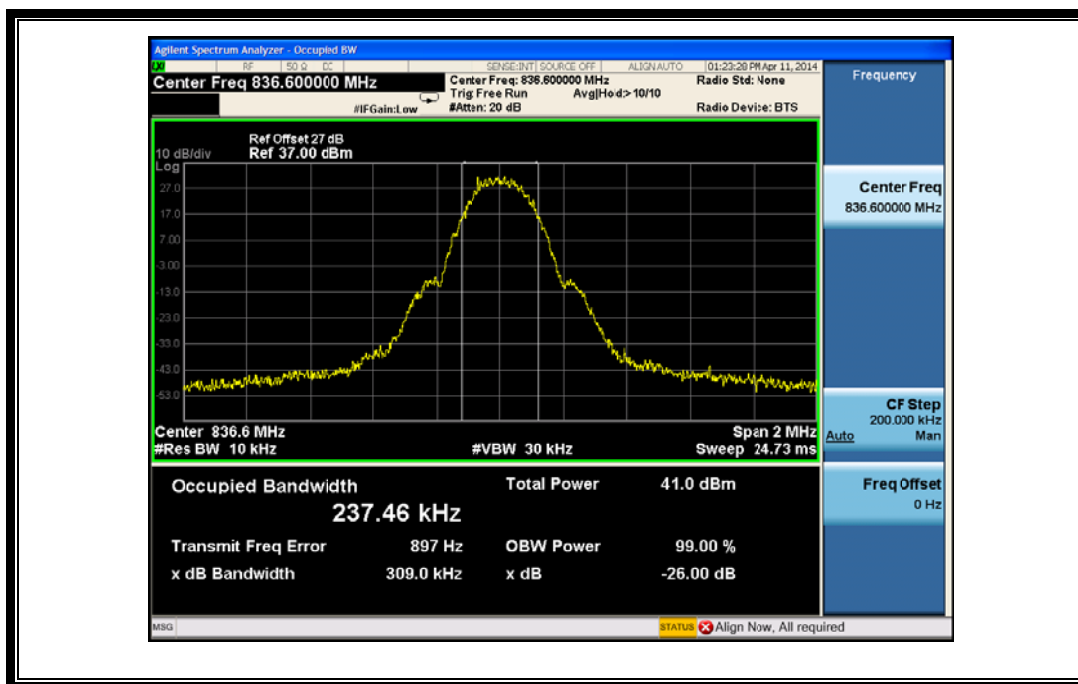
#### 2. Test Verdict:

| Band        | Channel | Frequency (MHz) | 26dB bandwidth | 99% Occupied Bandwidth | Refer to Plot |
|-------------|---------|-----------------|----------------|------------------------|---------------|
| GSM 850MHz  | 128     | 824.2           | 315.6 KHz      | 242.75 KHz             | Plot A        |
|             | 190     | 836.6           | 309.0 KHz      | 237.46 KHz             | Plot B        |
|             | 251     | 848.8           | 313.5 KHz      | 241.48 KHz             | Plot C        |
| GSM 1900MHz | 512     | 1850.2          | 317.8 KHz      | 242.41 KHz             | Plot D        |
|             | 661     | 1880.0          | 310.5 KHz      | 244.23 KHz             | Plot E        |
|             | 810     | 1909.8          | 308.1 KHz      | 244.89 KHz             | Plot F        |

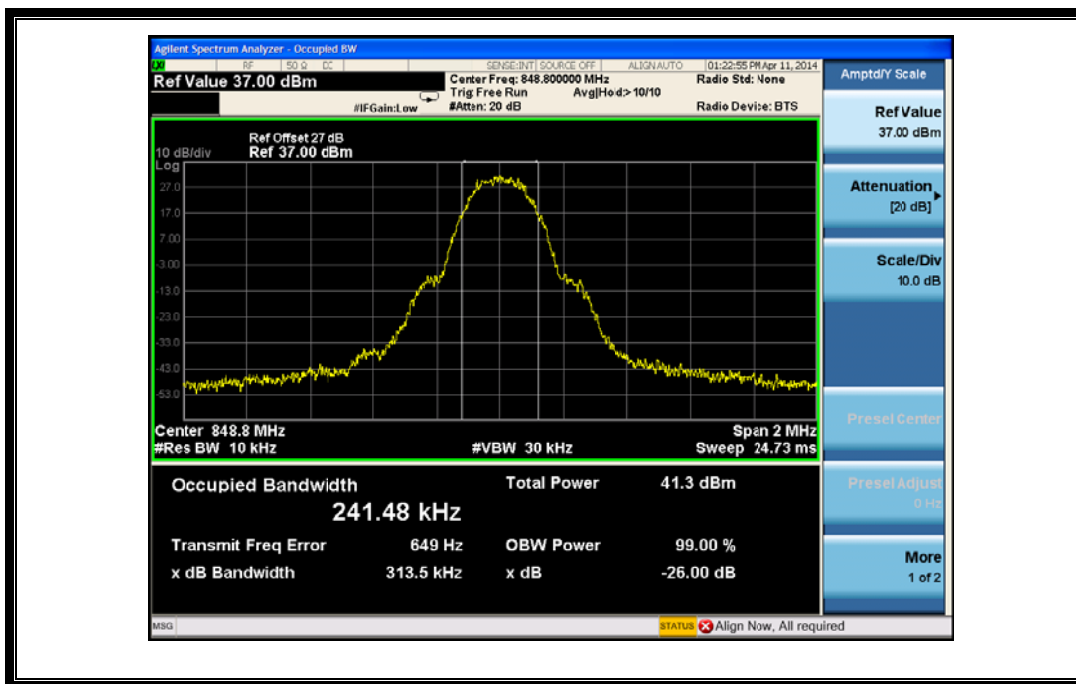
### 3. Test Plots:



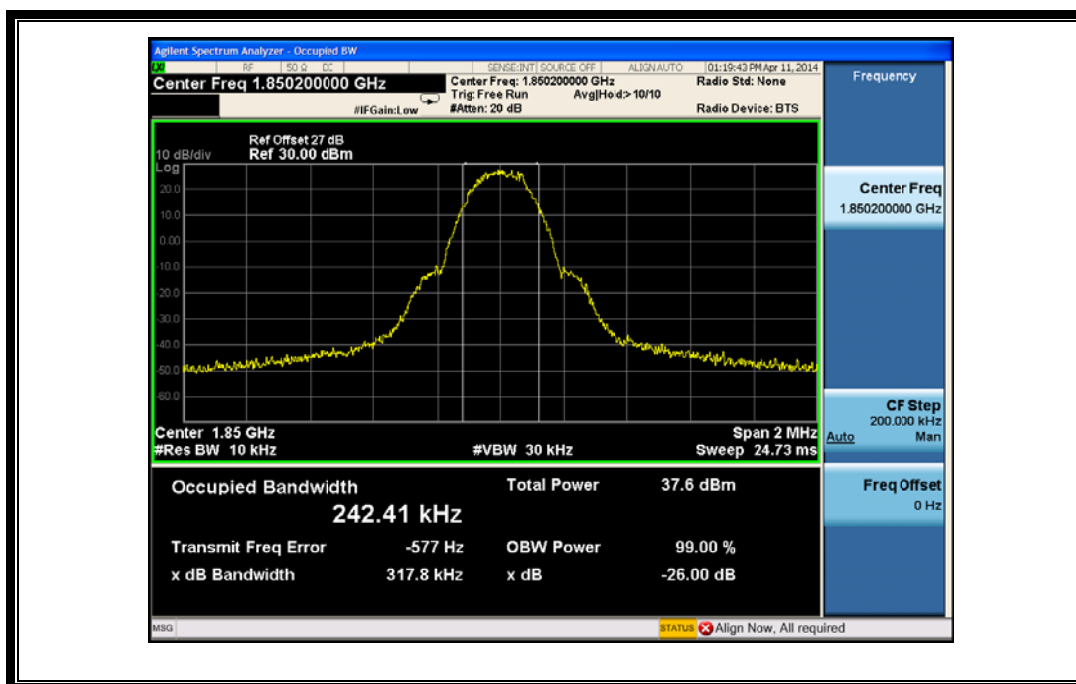
(Plot A1: GSM 850MHz Channel = 128)



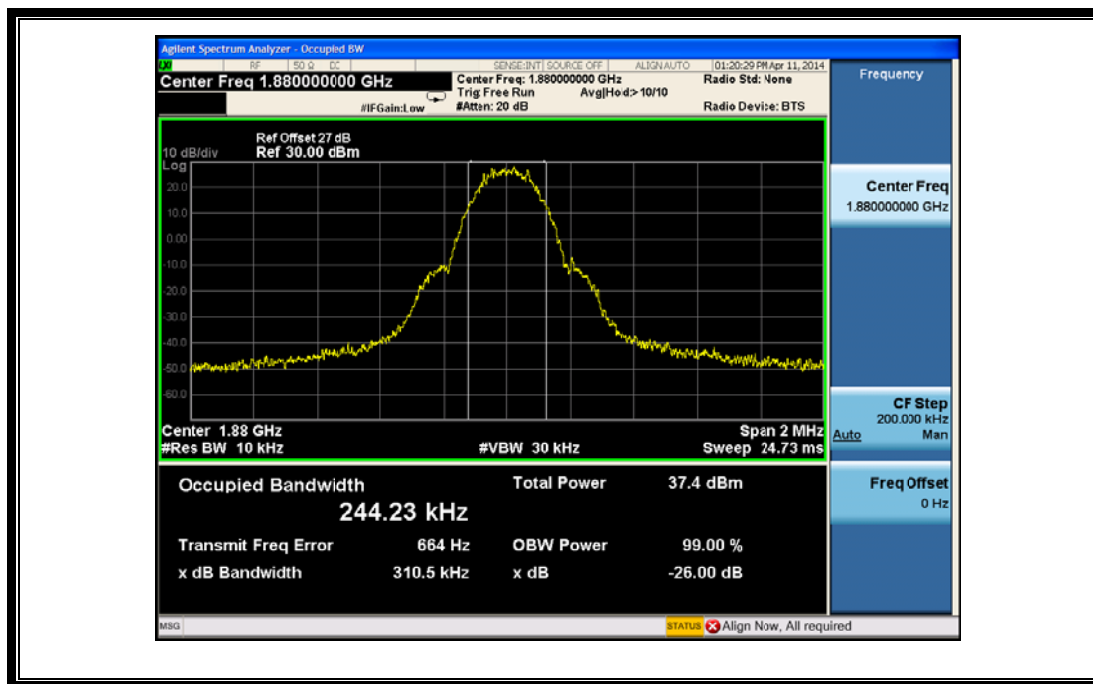
(Plot B1: GSM 850MHz Channel = 190)



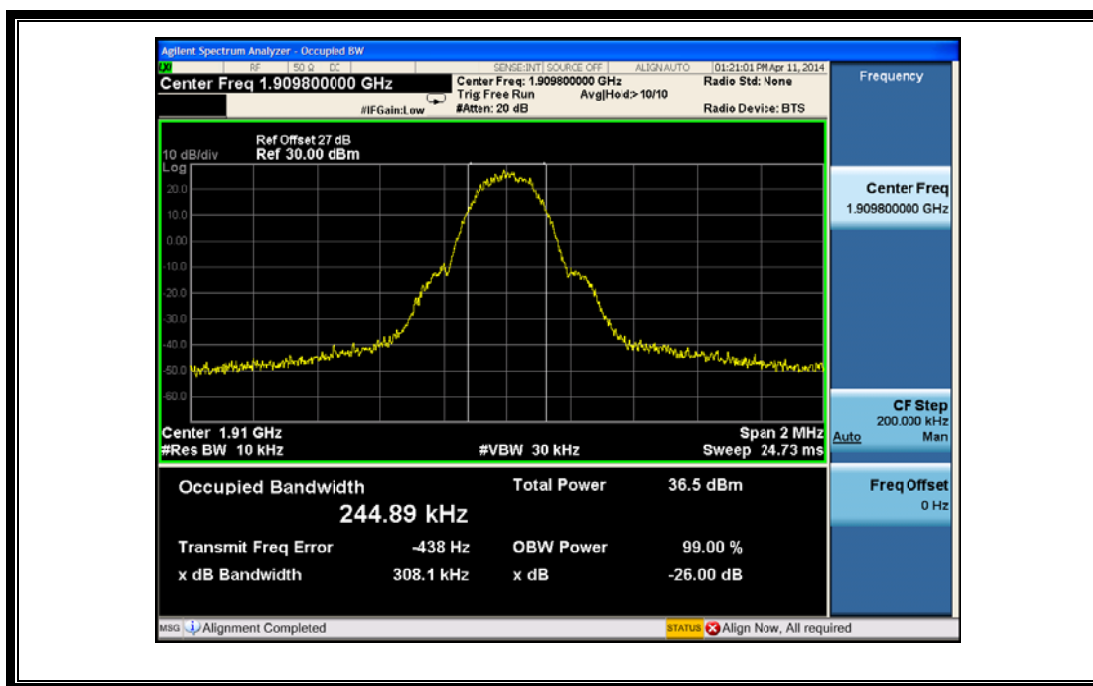
(Plot C1: GSM 850MHz Channel = 251)



(Plot D1: GSM 1900MHz Channel = 512)



(Plot E1: GSM 1900MHz Channel = 661)



(Plot F1:GSM 1900MHz Channel = 810)

## 2.4 Frequency Stability

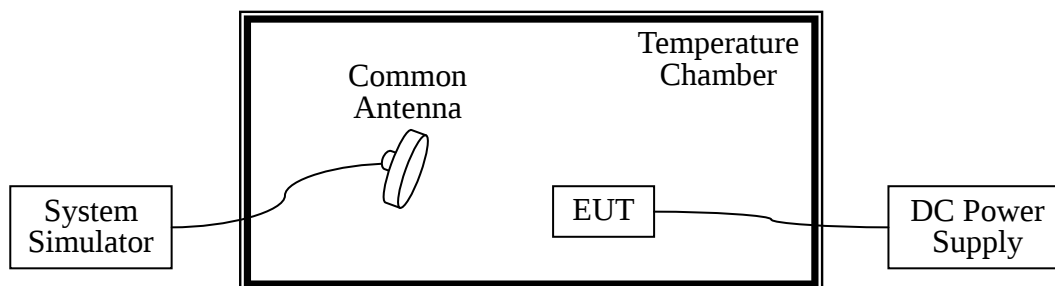
### 2.4.1 Requirement

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of not more than  $10^{\circ}\text{C}$ .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

### 2.4.2 Test Description

#### 1. Test Setup:



The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.

#### 2. Equipments List:

| Description         | Manufacturer              | Model      | Serial No. | Cal. Date  | Cal. Due   |
|---------------------|---------------------------|------------|------------|------------|------------|
| System Simulator    | Agilent                   | E5515C     | GB43130131 | 2014.02.26 | 2015.02.25 |
| DC Power Supply     | Good Will                 | GPS-3030DD | EF920938   | 2014.02.26 | 2015.02.25 |
| Temperature Chamber | YinHe Experimental Equip. | HL4003T    | (n.a.)     | 2014.02.26 | 2015.02.25 |

### 2.4.3 Test Verdict

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.2VDC and 3.4VDC, which are specified by the applicant; the normal temperature here used is  $25^{\circ}\text{C}$ . The frequency deviation limit of

850MHz band is  $\pm 2.5\text{ppm}$ , and 1900MHz is  $\pm 1\text{ppm}$ .

## 1. GSM 850MHz Band

| Test Conditions |                  | Frequency Deviation      |         |                          |         |                          |        | Verdict     |
|-----------------|------------------|--------------------------|---------|--------------------------|---------|--------------------------|--------|-------------|
| Power (VDC)     | Temperature (°C) | Channel = 128 (824.2MHz) |         | Channel = 190 (836.6MHz) |         | Channel = 251 (848.8MHz) |        |             |
|                 |                  | Hz                       | Limits  | Hz                       | Limits  | Hz                       | Limits |             |
| 3.7             | -30              | -22.41                   | ±2060.5 | 22.55                    | ±2091.5 | 13.07                    | ±2122  | <u>PASS</u> |
|                 | -20              | -17.46                   |         | 12.43                    |         | -11.01                   |        |             |
|                 | -10              | 32.14                    |         | -17.46                   |         | 15.16                    |        |             |
|                 | 0                | -24.93                   |         | 32.14                    |         | 5.05                     |        |             |
|                 | +10              | -17.19                   |         | -24.93                   |         | 3.02                     |        |             |
|                 | +20              | 19.36                    |         | -17.19                   |         | 10.76                    |        |             |
|                 | +30              | 19.64                    |         | 19.36                    |         | -16.53                   |        |             |
|                 | +40              | 23.27                    |         | 19.64                    |         | -2.13                    |        |             |
|                 | +55              | -17.46                   |         | 23.27                    |         | -12.89                   |        |             |
| 4.2             | +25              | -15.73                   |         | 28.05                    |         | -7.55                    |        |             |
| 3.4             | +25              | -19.75                   |         | 31.71                    |         | 7.78                     |        |             |

## 2. GSM 1900MHz Band

| Test Conditions |                  | Frequency Deviation       |         |                           |         |                           |         | Verdict     |
|-----------------|------------------|---------------------------|---------|---------------------------|---------|---------------------------|---------|-------------|
| Power (VDC)     | Temperature (°C) | Channel = 512 (1850.2MHz) |         | Channel = 661 (1880.0MHz) |         | Channel = 810 (1909.8MHz) |         |             |
|                 |                  | Hz                        | Limits  | Hz                        | Limits  | Hz                        | Limits  |             |
| 3.7             | -30              | 5.05                      | ±1850.2 | 36.08                     | ±1880.0 | 35.17                     | ±1909.8 | <u>PASS</u> |
|                 | -20              | 3.02                      |         | -2.05                     |         | -16.08                    |         |             |
|                 | -10              | 10.76                     |         | 40.06                     |         | -12.81                    |         |             |
|                 | 0                | -16.53                    |         | 1.98                      |         | 19.32                     |         |             |
|                 | +10              | -2.13                     |         | -19.76                    |         | 21.34                     |         |             |
|                 | +20              | -12.89                    |         | 39.76                     |         | 30.26                     |         |             |
|                 | +30              | 35.02                     |         | 46.66                     |         | -29.21                    |         |             |
|                 | +40              | 43.02                     |         | 36.08                     |         | 19.33                     |         |             |
|                 | +55              | 19.76                     |         | 24.02                     |         | -19.37                    |         |             |
| 4.2             | +25              | 37.88                     |         | 23.72                     |         | 27.09                     |         |             |
| 3.4             | +25              | -3.85                     |         | 15.98                     |         | 15.92                     |         |             |

## 2.5 Conducted Out of Band Emissions

### 2.5.1 Requirement

According to FCC section 22.917(a) and FCC section 24.238(a) the power of any emission 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. This calculated to be -13dBm.

### 2.5.2 Test Description

See section 2.1.2 of this report.

### 2.5.3 Test Result

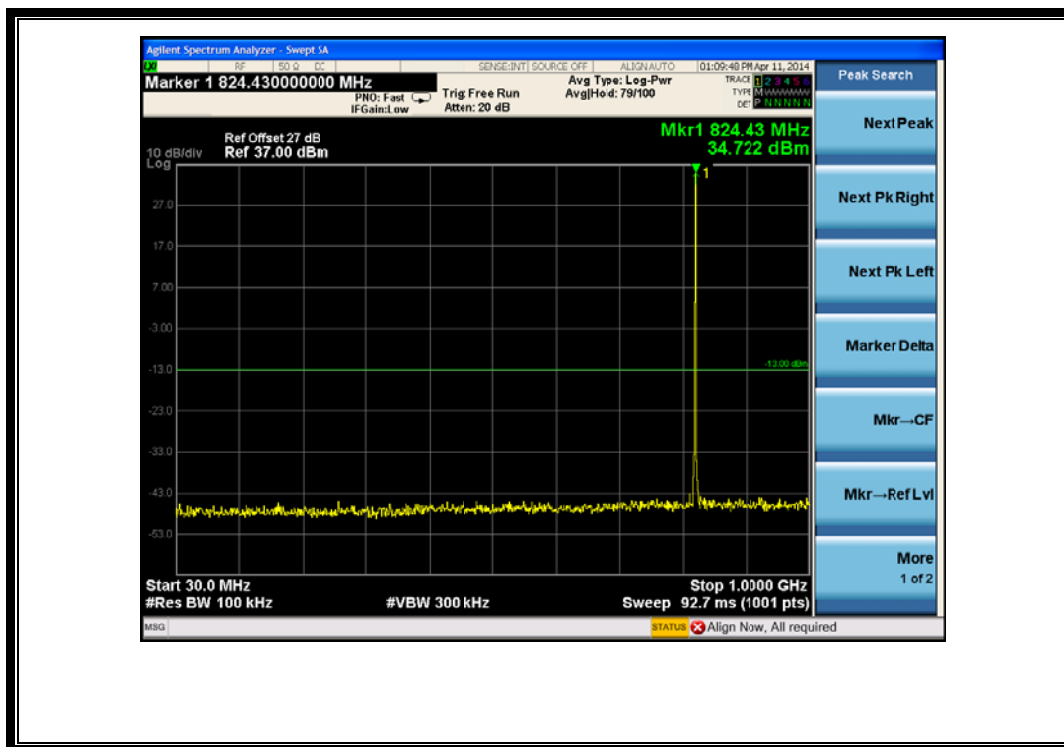
The measurement frequency range is from 30MHz to the 10<sup>th</sup> harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

#### 1. Test Verdict:

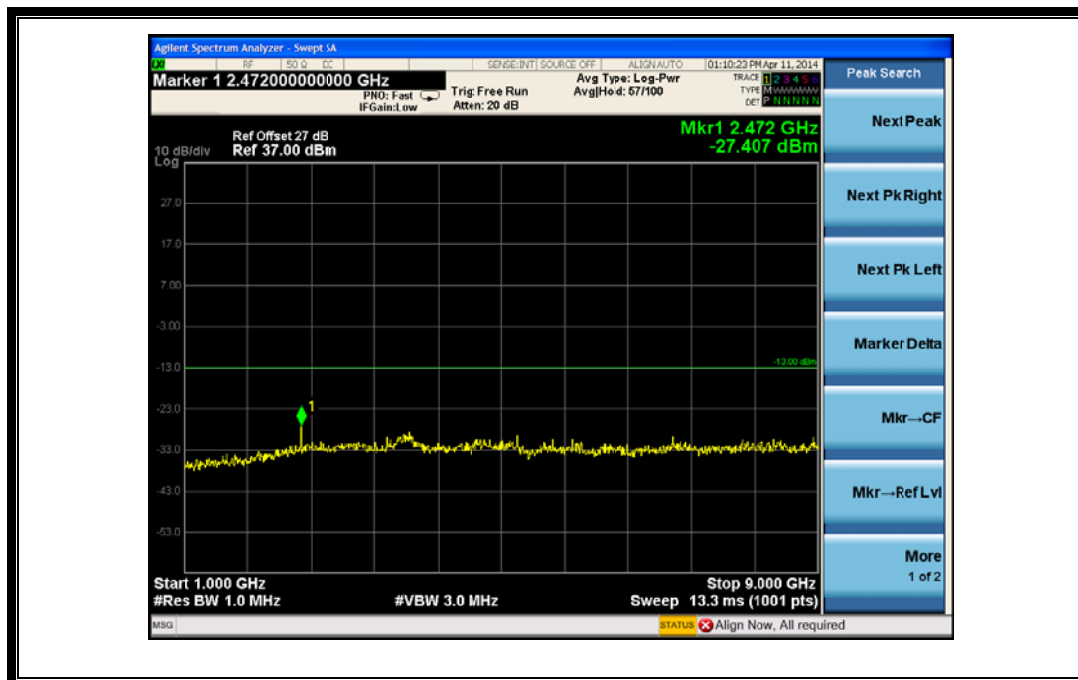
| Band        | Channel | Frequency (MHz) | Measured Max. Spurious Emission (dBm) | Refer to Plot | Limit (dBm) | Verdict     |
|-------------|---------|-----------------|---------------------------------------|---------------|-------------|-------------|
| GSM 850MHz  | 128     | 824.2           | <-25                                  | Plot A1toA1.1 | -13         | <u>PASS</u> |
|             | 190     | 836.6           | <-25                                  | Plot A2toA2.1 |             | <u>PASS</u> |
|             | 251     | 848.8           | <-25                                  | Plot A3toA3.1 |             | <u>PASS</u> |
| GSM 1900MHz | 512     | 1850.2          | <-25                                  | Plot B1toB1.1 | -13         | <u>PASS</u> |
|             | 661     | 1880.0          | <-25                                  | Plot B2toB2.1 |             | <u>PASS</u> |
|             | 810     | 1909.8          | <-25                                  | Plot B3toB3.1 |             | <u>PASS</u> |

## 2. Test Plots for the Whole Measurement Frequency Range:

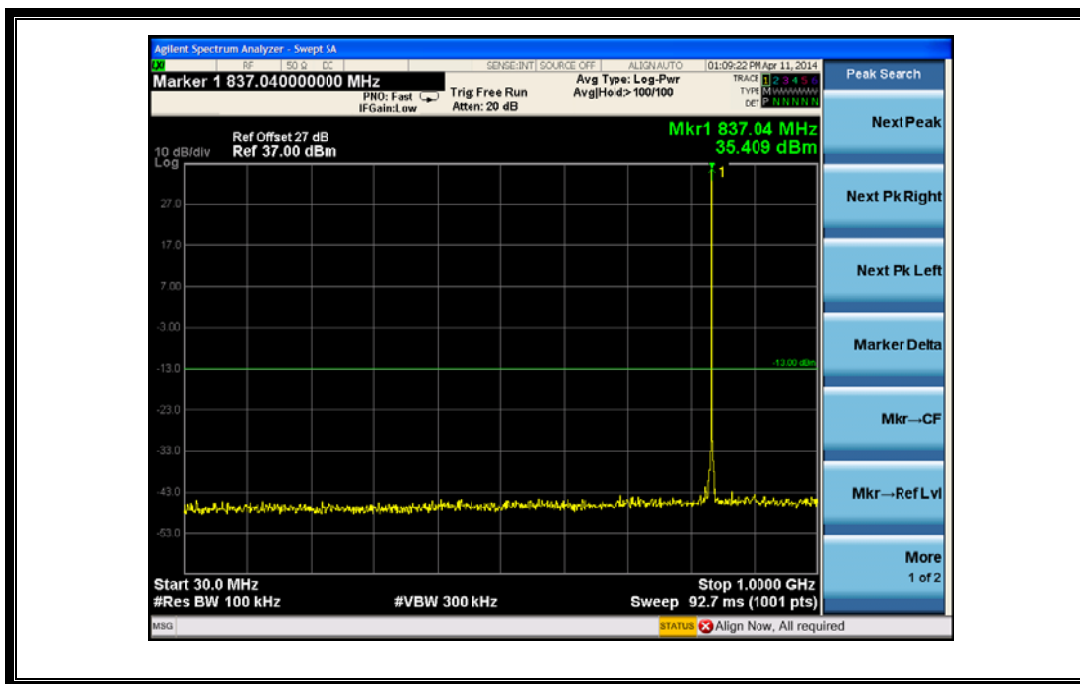
**Note:** the power of the EUT transmitting frequency should be ignored.



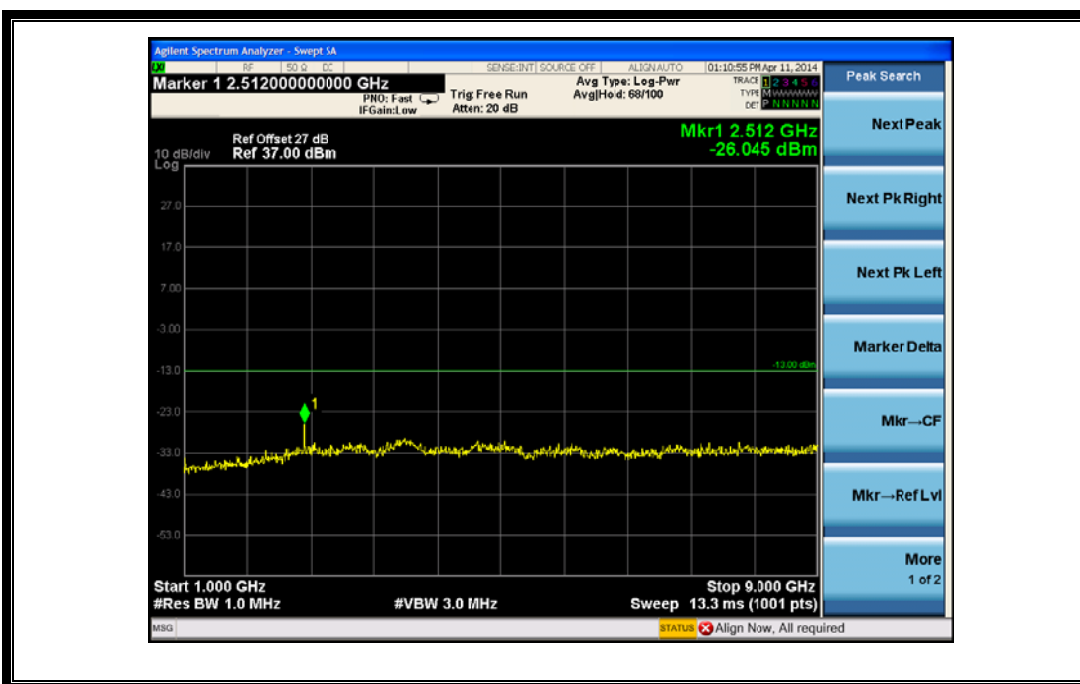
(Plot A1: GSM 850MHz Channel = 128, 30MHz to 1GHz)



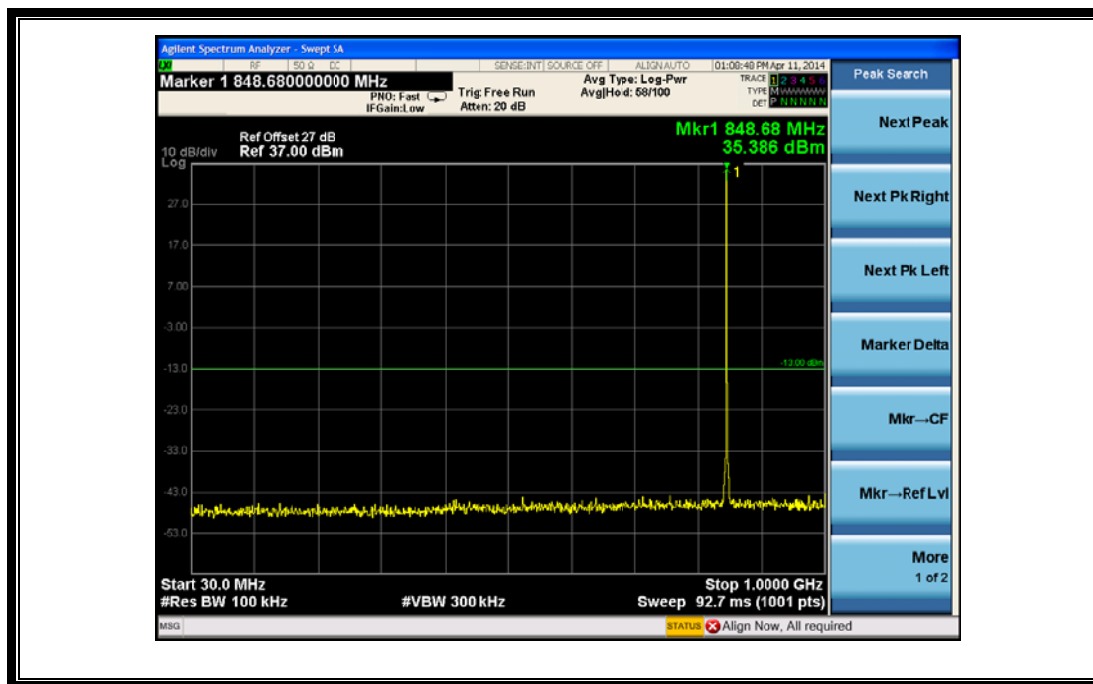
(Plot A1.1: GSM 850MHz Channel = 128, 1GHz to 9GHz)



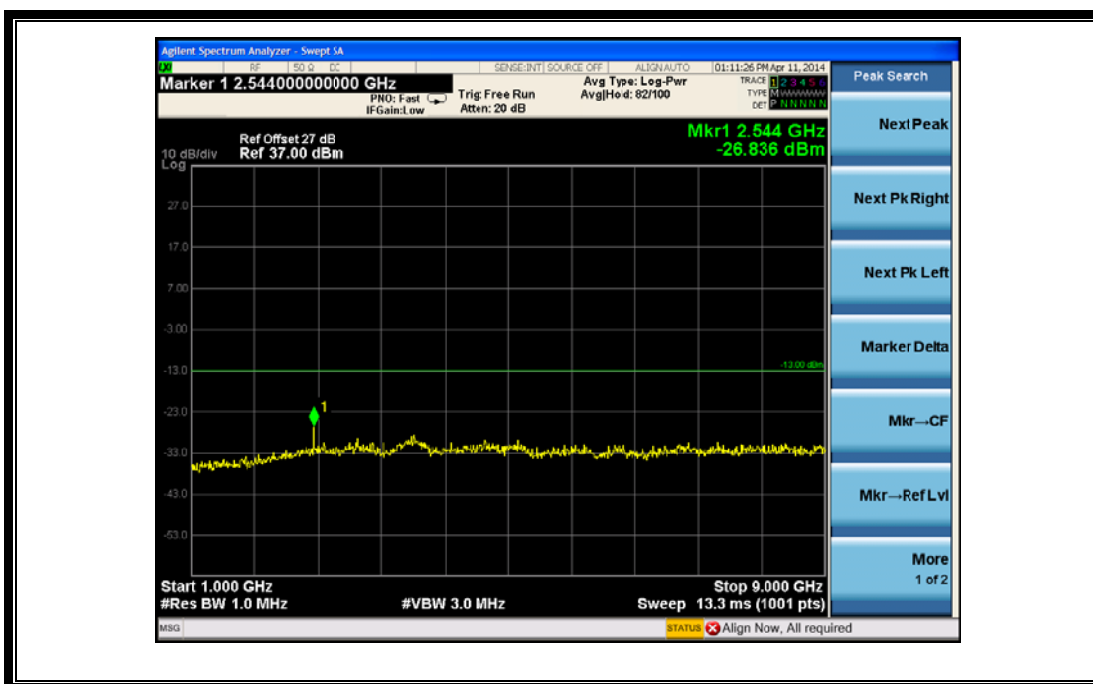
(Plot A2: GSM 850MHz Channel = 190, 30MHz to 1GHz)



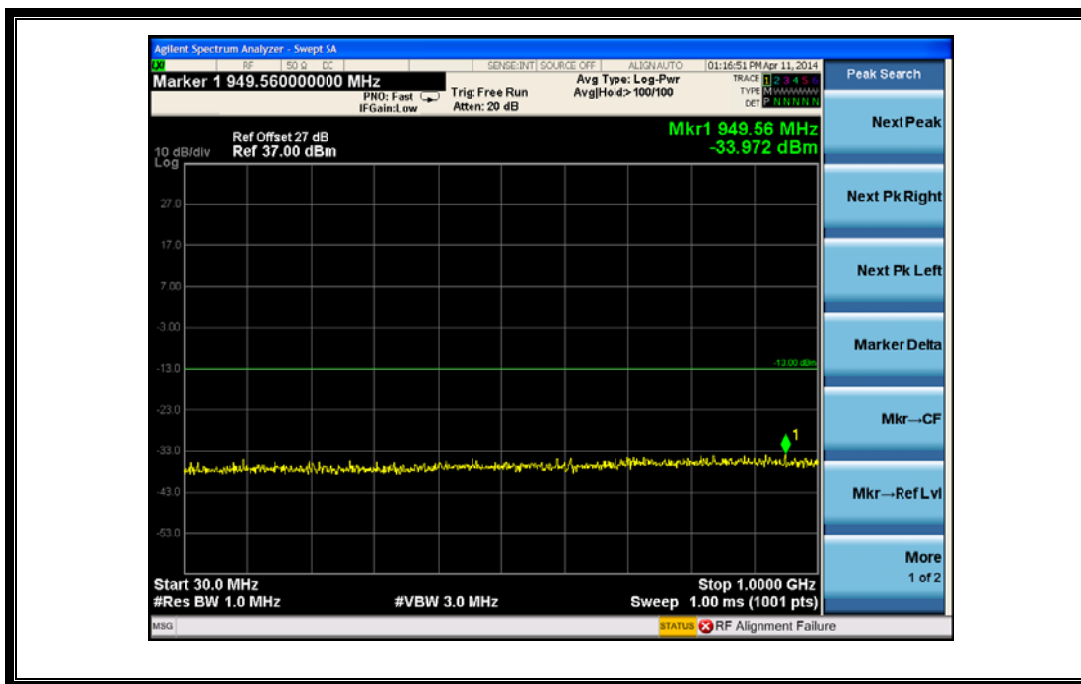
(Plot A2.1: GSM 850MHz Channel = 190, 1GHz to 9GHz)



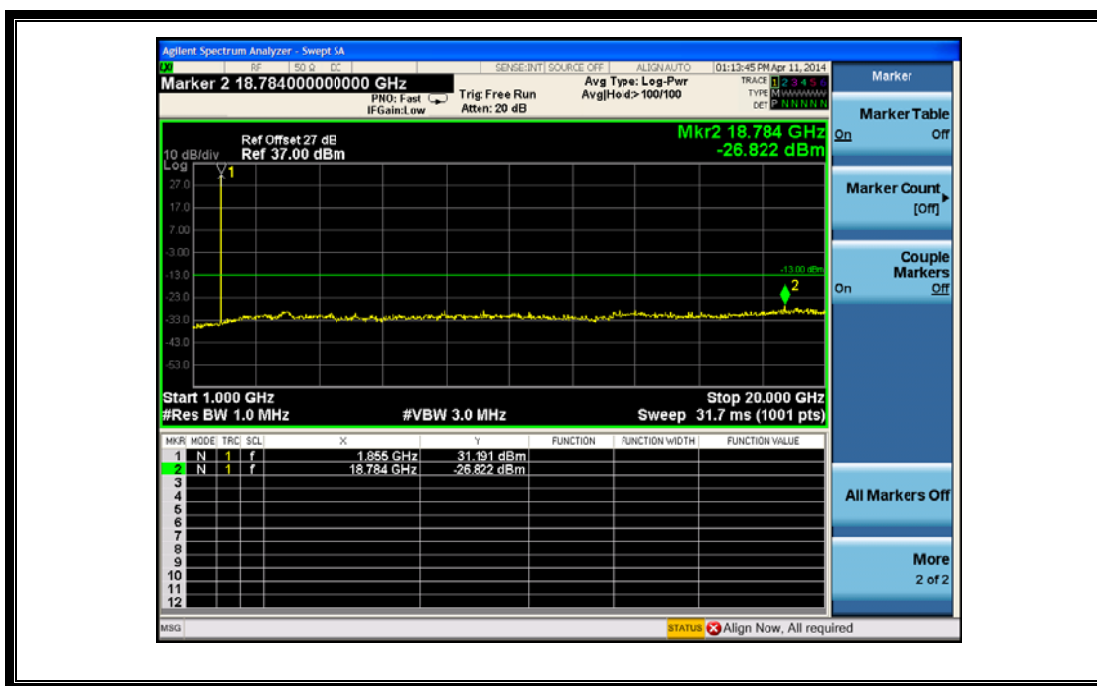
(Plot A3: GSM 850MHz Channel = 251, 30MHz to 1GHz)



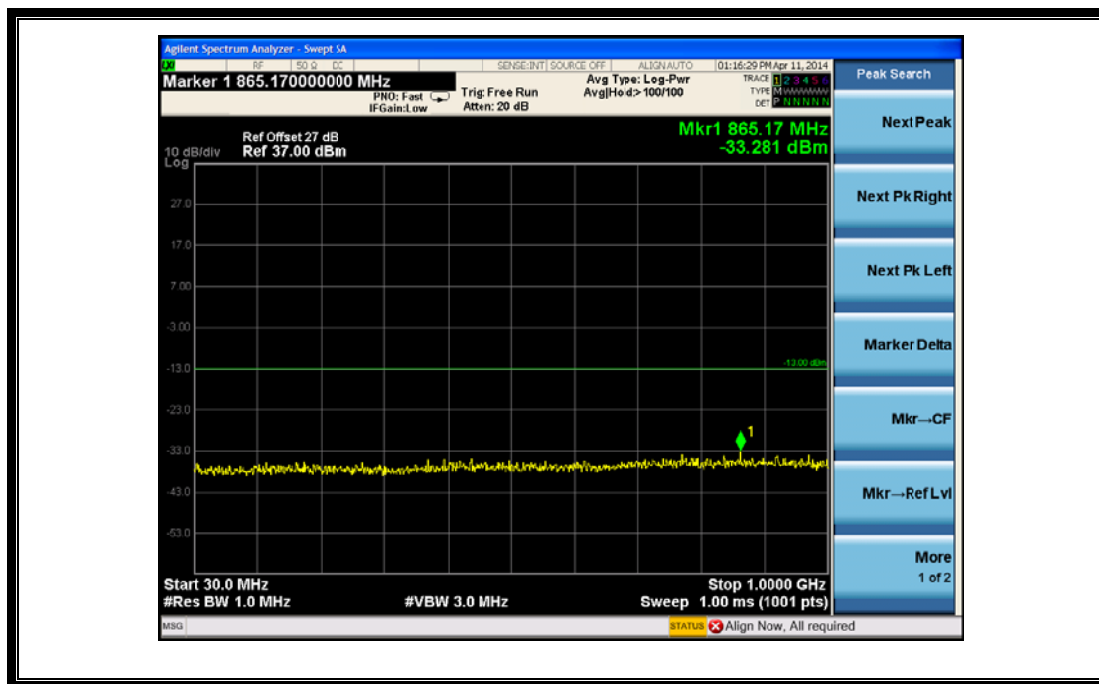
(Plot A3.1: GSM 850MHz Channel = 251, 1GHz to 9GHz)



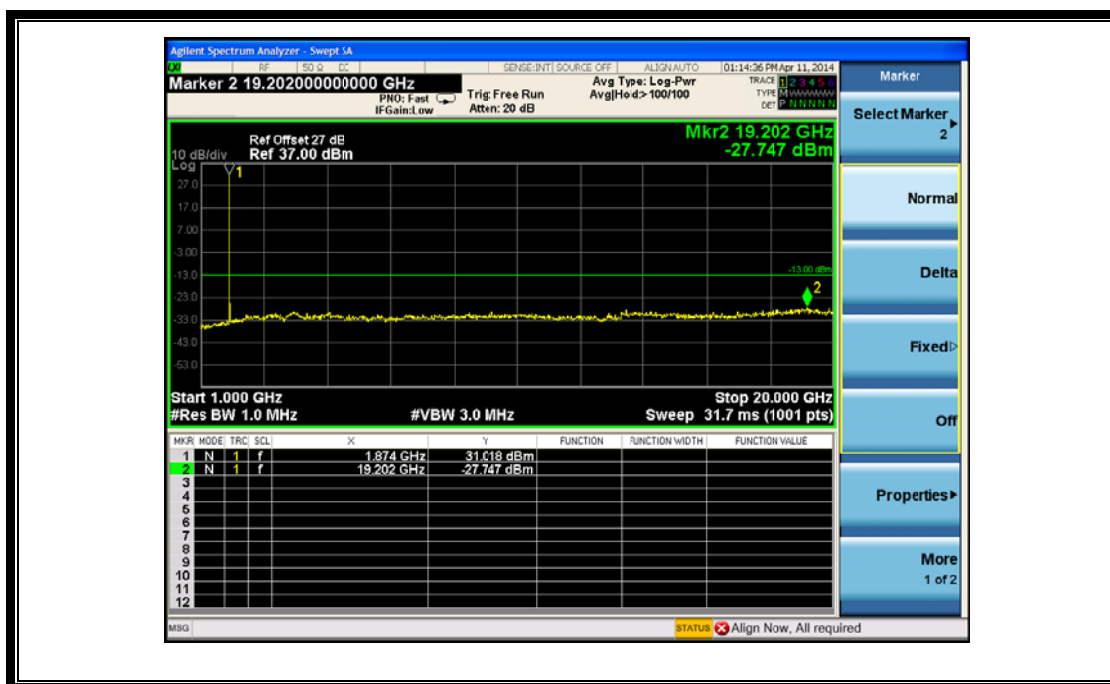
(Plot B1: GSM 1900MHz Channel = 512, 30MHz to 1GHz)



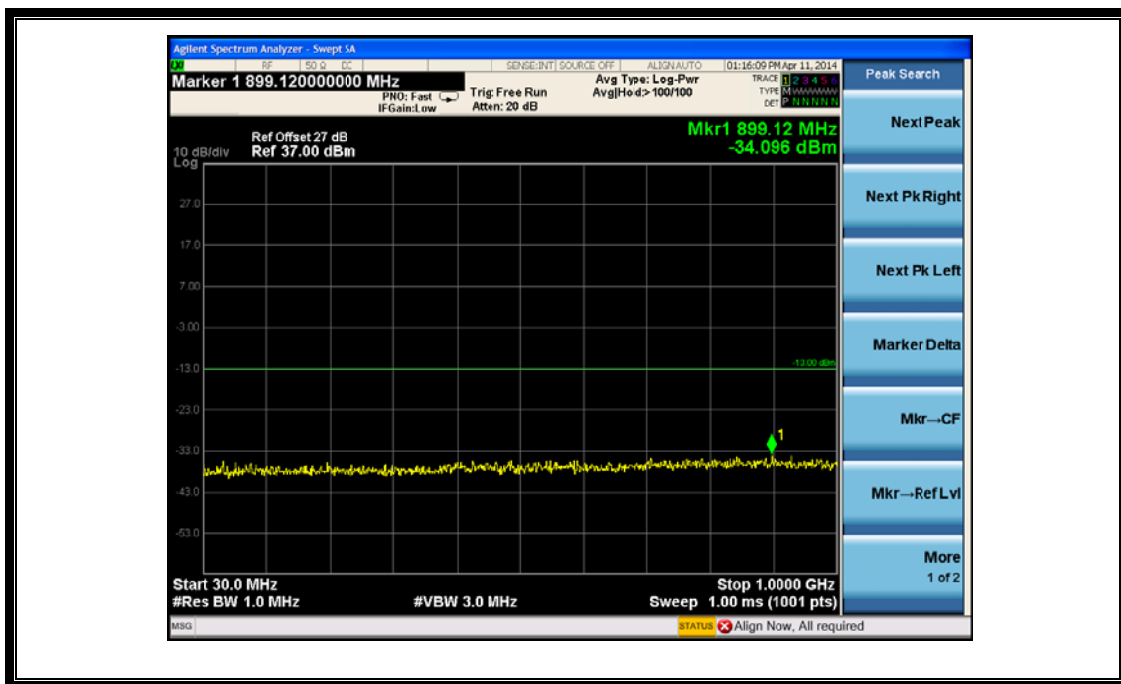
(Plot B1.1: GSM 1900MHz Channel = 512, 1GHz to 20GHz)



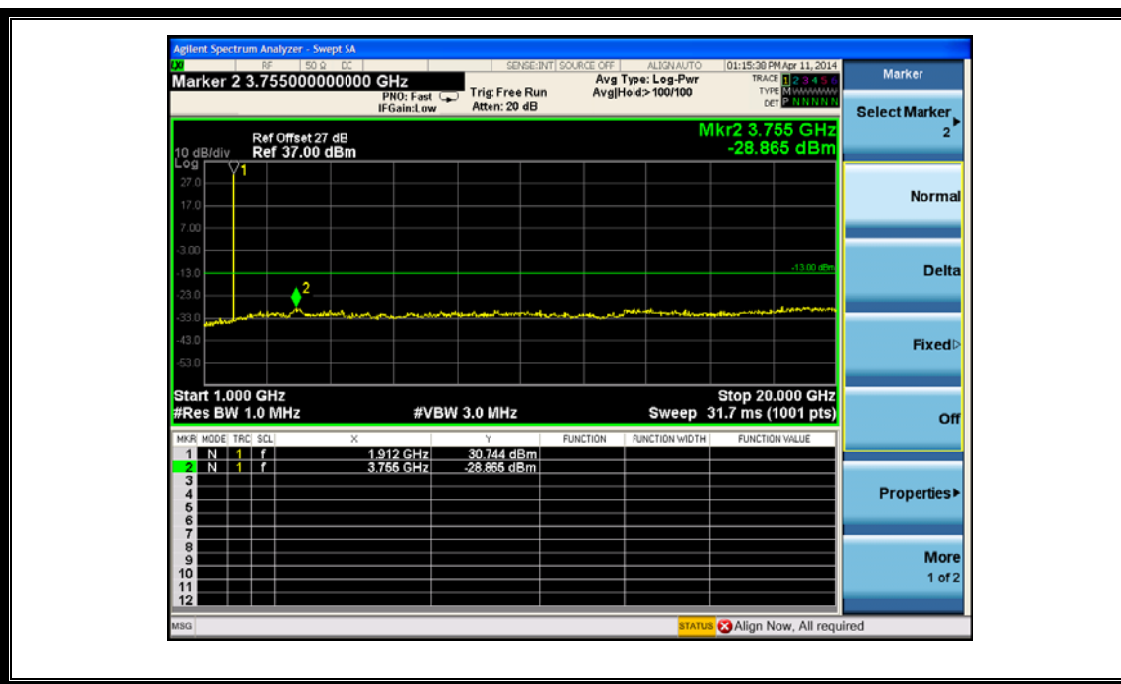
(Plot B2: GSM 1900MHz Channel = 661, 30MHz to 1GHz)



(Plot B2.1: GSM 1900MHz Channel = 661, 1GHz to 20GHz)



(Plot B3: GSM 1900MHz Channel = 810, 30MHz to 1GHz)



(Plot B3.1: GSM 1900MHz Channel = 810, 1GHz to 20GHz)

## 2.6 Band Edge

### 2.6.1 Requirement

According to FCC section 22.917(b) and FCC section 24.238(b) in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

### 2.6.2 Test Description

See section 2.1.2 of this report.

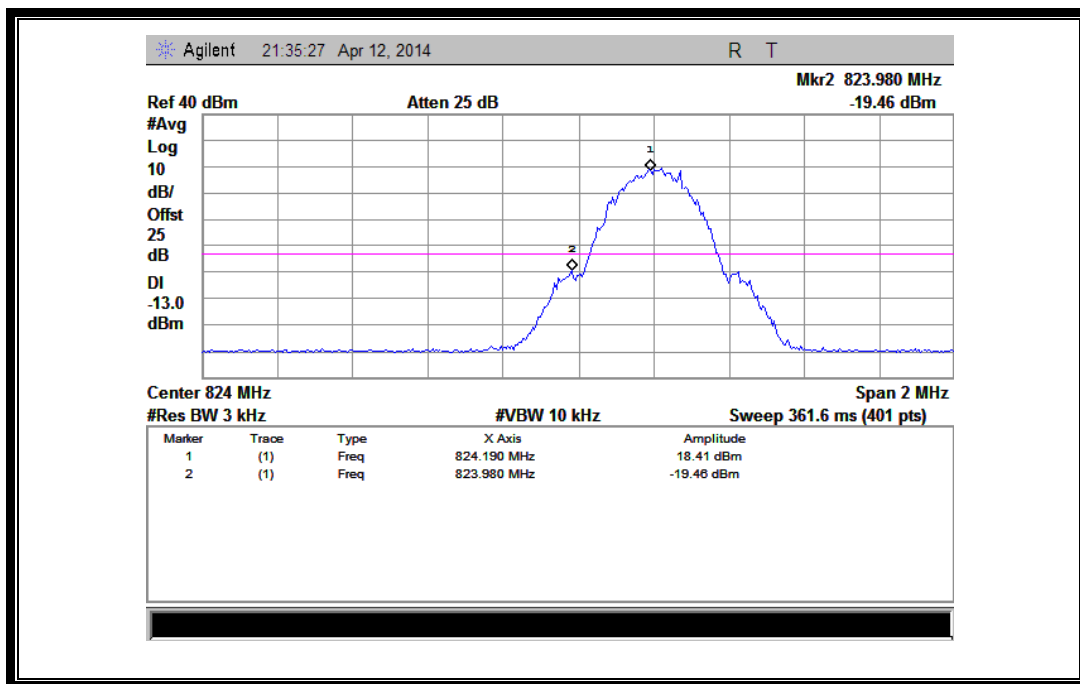
### 2.6.3 Test Result

The lowest and highest channels are tested to verify the band edge emissions.

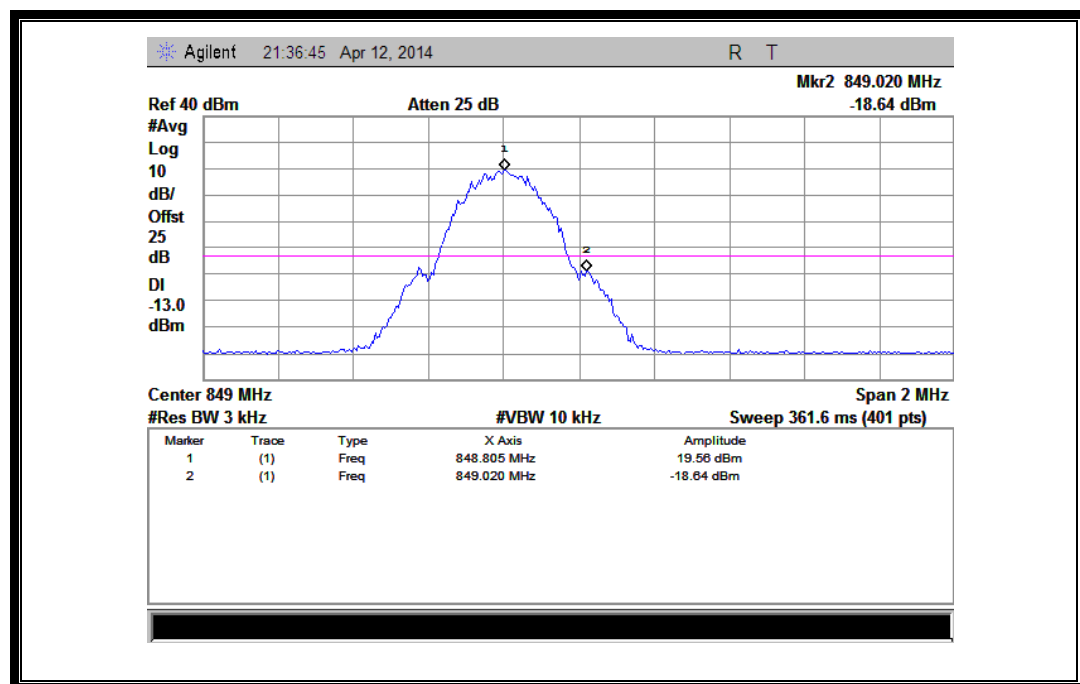
#### 1. Test Verdict:

| Band        | Channel | Frequency (MHz) | Measured Max. Band Edge Emission (dBm) | Refer to Plot | Limit (dBm) | Verdict     |
|-------------|---------|-----------------|----------------------------------------|---------------|-------------|-------------|
| GSM 850MHz  | 128     | 824.2           | -19.46                                 | Plat A        | -13         | <u>PASS</u> |
|             | 251     | 848.8           | -18.64                                 | Plot B        |             | <u>PASS</u> |
| GSM 1900MHz | 512     | 1850.2          | -20.20                                 | Plat C        | -13         | <u>PASS</u> |
|             | 810     | 1909.8          | -23.87                                 | Plot D        |             | <u>PASS</u> |

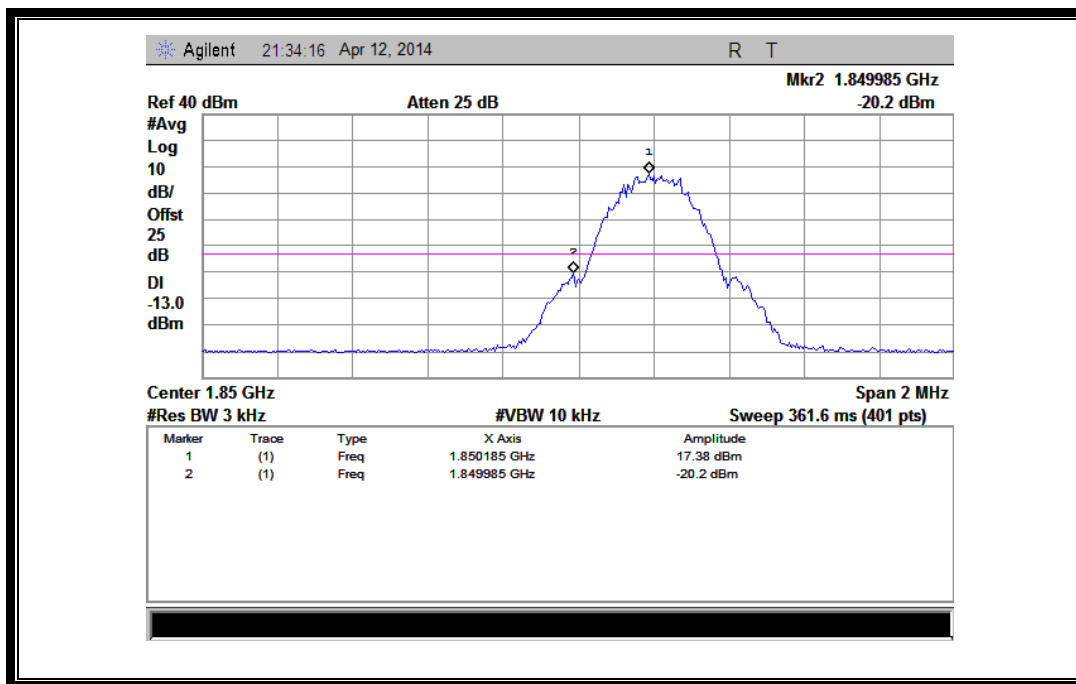
#### 2. Test Plots:



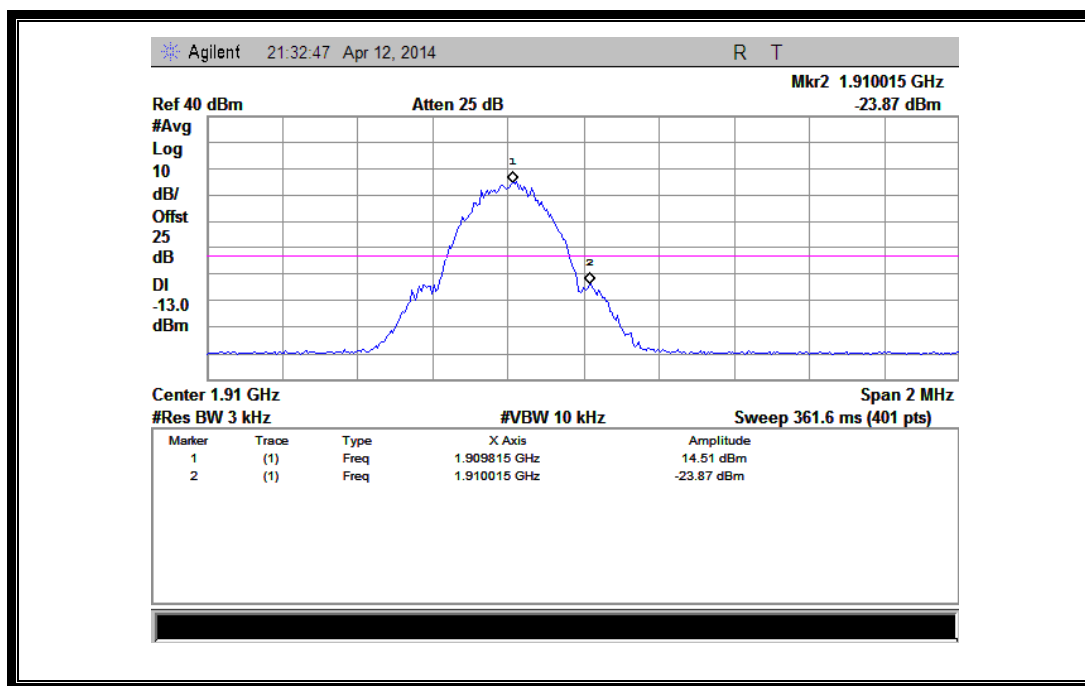
(Plot A: GSM 850 Channel = 128)



(Plot B: GSM 850 Channel = 251)



(Plot C: GSM 1900 Channel = 512)



(Plot D: GSM 1900 Channel = 810)

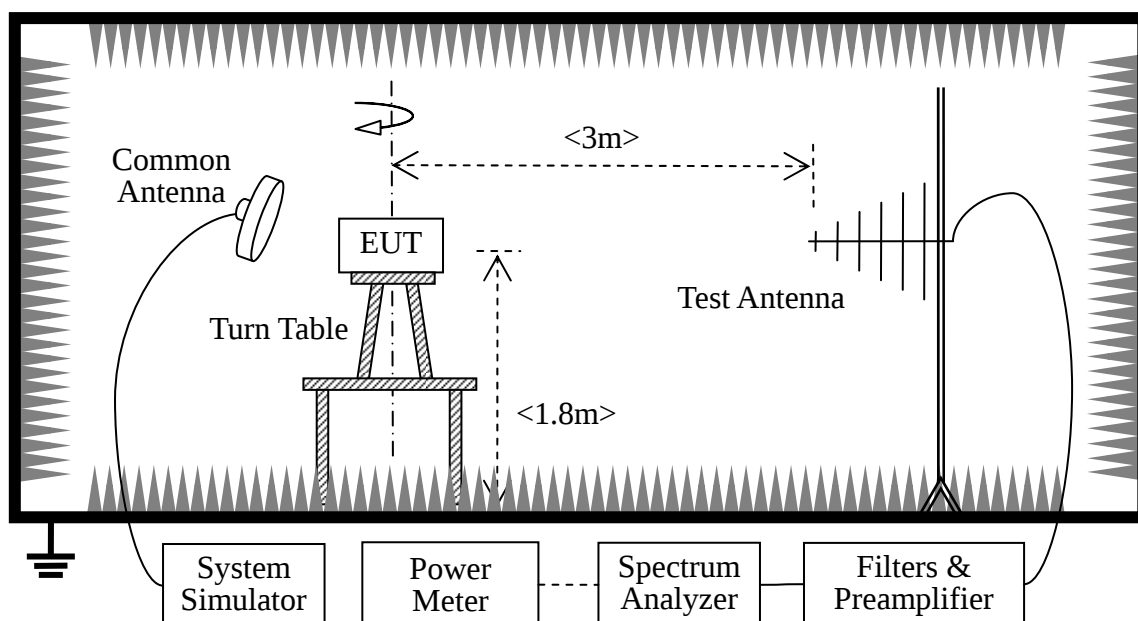
## 2.7 Transmitter Radiated Power (EIRP/ERP)

### 2.7.1 Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power

### 2.7.2 Test Description

#### 1. Test Setup:



The EUT, which is powered by the Battery charged with the AC Adapter, is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power (i.e. GSM850MHz band Power Control Level (PCL) = 5/19 and Power Class = 4, GSM1900MHz band Power Control Level (PCL) = 0/15 and Power Class = 1), and only the test result of the maximum output power was recorded.

- GSM Maximum RF output power: GSM 850 32.97dBm, GSM 1900 29.31dBm, Please refer to section 2.1.3 of this report.

- Step size (dB): 3dB

- Minimum RF power: GSM 850 3.1dBm, GSM 1900 0.35dBm, WCDMA 850 0.31dBm, WCDMA 1900 0.5dBm.

The Test Antenna is a Bi-Log one (used for 30MHz to 1GHz) or a Horn one (used for above 3GHz), and it's located at the same height as the EUT. The Filters consists of Notch Filters and High Pass Filter.

## 2. Equipments List:

| Description           | Manufacturer | Model              | Serial No.   | Cal. Date  | Cal. Due   |
|-----------------------|--------------|--------------------|--------------|------------|------------|
| System Simulator      | Agilent      | E5515C             | GB43130131   | 2014.02.26 | 2015.02.25 |
| Spectrum Analyzer     | Agilent      | E7405A             | US44210471   | 2014.02.26 | 2015.02.25 |
| Full-Anechoic Chamber | Albatross    | 9m*6m*6m           | (n.a.)       | 2014.02.26 | 2015.02.25 |
| Test Antenna - Bi-Log | Schwarzbeck  | VULB 9163          | 9163-274     | 2014.02.26 | 2015.02.25 |
| Test Antenna - Horn   | Schwarzbeck  | BBHA 9120C         | 9120C-384    | 2014.02.26 | 2015.02.25 |
| Substitution Antenna  | Schwarzbeck  | BBHA 9120C         | 9120C-384    | 2014.02.26 | 2015.02.25 |
| Pre-AMPs              | lucix        | S10M100L3802       | S020180L3203 | 2014.02.26 | 2015.02.25 |
| Notch Filter          | COM-MW       | ZBSF-C836.5-25-X   | NA           | 2014.02.26 | 2015.02.25 |
| Notch Filter          | COM-MW       | ZBSF-C1747.5-75-X2 | NA           | 2014.02.26 | 2015.02.25 |
| Notch Filter          | COM-MW       | ZBSF-C1880-60-X2   | NA           | 2014.02.26 | 2015.02.25 |

### 2.7.3 Test Result

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested.

The substitution corrections are obtained as described below:

$$A_{\text{SUBST}} = P_{\text{SUBST\_TX}} - P_{\text{SUBST\_RX}} - L_{\text{SUBST\_CABLES}} + G_{\text{SUBST\_TX\_ANT}}$$

$$A_{\text{TOT}} = L_{\text{CABLES}} + A_{\text{SUBST}}$$

Where  $A_{\text{SUBST}}$  is the final substitution correction including receive antenna gain.

$P_{\text{SUBST\_TX}}$  is signal generator level,

$P_{\text{SUBST\_RX}}$  is receiver level,

$L_{\text{SUBST\_CABLES}}$  is cable losses including TX cable,

$G_{\text{SUBST\_TX\_ANT}}$  is substitution antenna gain.

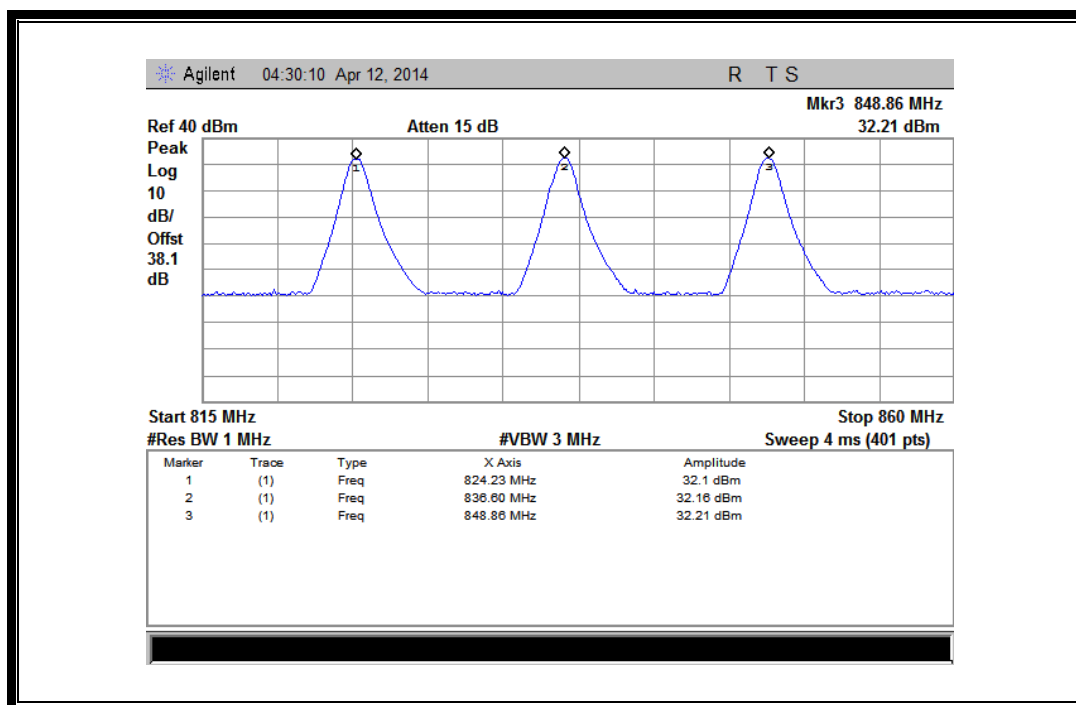
$A_{\text{TOT}}$  is total correction factor including cable loss and substitution correction

During the test, the data of  $A_{\text{TOT}}$  was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of  $A_{\text{TOT}}$ .

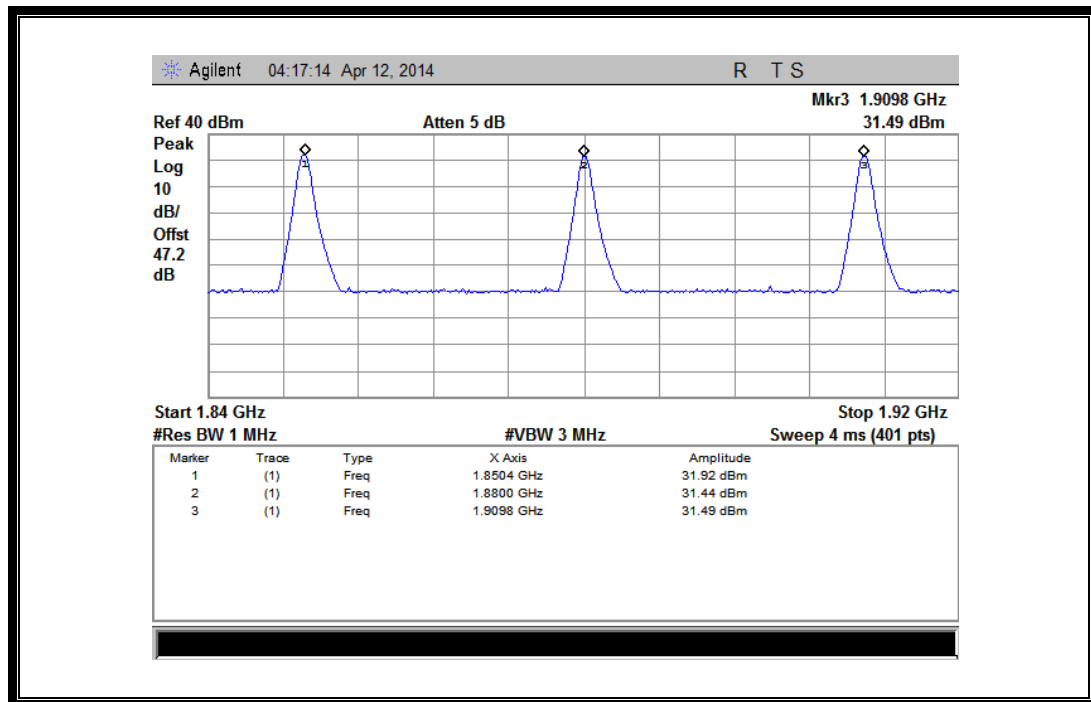
## 1. GSM Model Test Verdict:

| Band        | Channel | Frequency (MHz) | PCL | Measured ERP  |       |               | Limit |   | Verdict |
|-------------|---------|-----------------|-----|---------------|-------|---------------|-------|---|---------|
|             |         |                 |     | dBm           | W     | Refer to Plot | dBm   | W |         |
| GSM 850MHz  | 128     | 824.20          | 5   | 32.10         | 1.622 | Plot A        | 38.5  | 7 | PASS    |
|             | 190     | 836.60          | 5   | 32.16         | 1.644 |               |       |   | PASS    |
|             | 251     | 848.80          | 5   | 32.21         | 1.663 |               |       |   | PASS    |
|             |         |                 |     |               |       |               |       |   |         |
| Band        | Channel | Frequency (MHz) | PCL | Measured EIRP |       |               | Limit |   | Verdict |
|             |         |                 |     | dBm           | W     | Refer to Plot | dBm   | W |         |
| GSM 1900MHz | 512     | 1850.2          | 0   | 31.92         | 1.556 | Plot B        | 33    | 2 | PASS    |
|             | 661     | 1880.0          | 0   | 31.44         | 1.393 |               |       |   | PASS    |
|             | 810     | 1909.8          | 0   | 31.49         | 1.409 |               |       |   | PASS    |

## 2. Test Plots:



(Plot A: GSM 850MHz Channel = 128, 190, 251)



(Plot B: GSM 1900MHz Channel = 512, 661, 810)

## 2.8 Radiated Out of Band Emissions

### 2.8.1 Requirement

According to FCC section 22.917(a) and section 24.238(a) the power of any emission 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. This calculated to be -13dBm.

The spurious emission with frequency band 1900 according to FCC section 2.1057.

### 2.8.2 Test Description

See section 2.7.2 of this report.

Equipment List:

| Description           | Manufacturer | Model              | Serial No.   | Cal. Date  | Cal. Due   |
|-----------------------|--------------|--------------------|--------------|------------|------------|
| System Simulator      | Agilent      | E5515C             | GB43130131   | 2014.02.26 | 2015.02.25 |
| Spectrum Analyzer     | Agilent      | E7405A             | US44210471   | 2014.02.26 | 2015.02.25 |
| Full-Anechoic Chamber | Albatross    | 9m*6m*6m           | (n.a.)       | 2014.02.26 | 2015.02.25 |
| Test Antenna - Bi-Log | Schwarzbeck  | VULB 9163          | 9163-274     | 2014.02.26 | 2015.02.25 |
| Test Antenna - Horn   | Schwarzbeck  | BBHA 9120C         | 9120C-384    | 2014.02.26 | 2015.02.25 |
| Substitution Antenna  | Schwarzbeck  | BBHA 9120C         | 9120C-384    | 2014.02.26 | 2015.02.25 |
| Pre-AMPs              | lucix        | S10M100L3802       | S020180L3203 | 2014.02.26 | 2015.02.25 |
| Notch Filter          | COM-MW       | ZBSF-C836.5-25-X   | NA           | 2014.02.26 | 2015.02.25 |
| Notch Filter          | COM-MW       | ZBSF-C1747.5-75-X2 | NA           | 2014.02.26 | 2015.02.25 |
| Notch Filter          | COM-MW       | ZBSF-C1880-60-X2   | NA           | 2014.02.26 | 2015.02.25 |

**Note:** when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

### 2.8.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions.

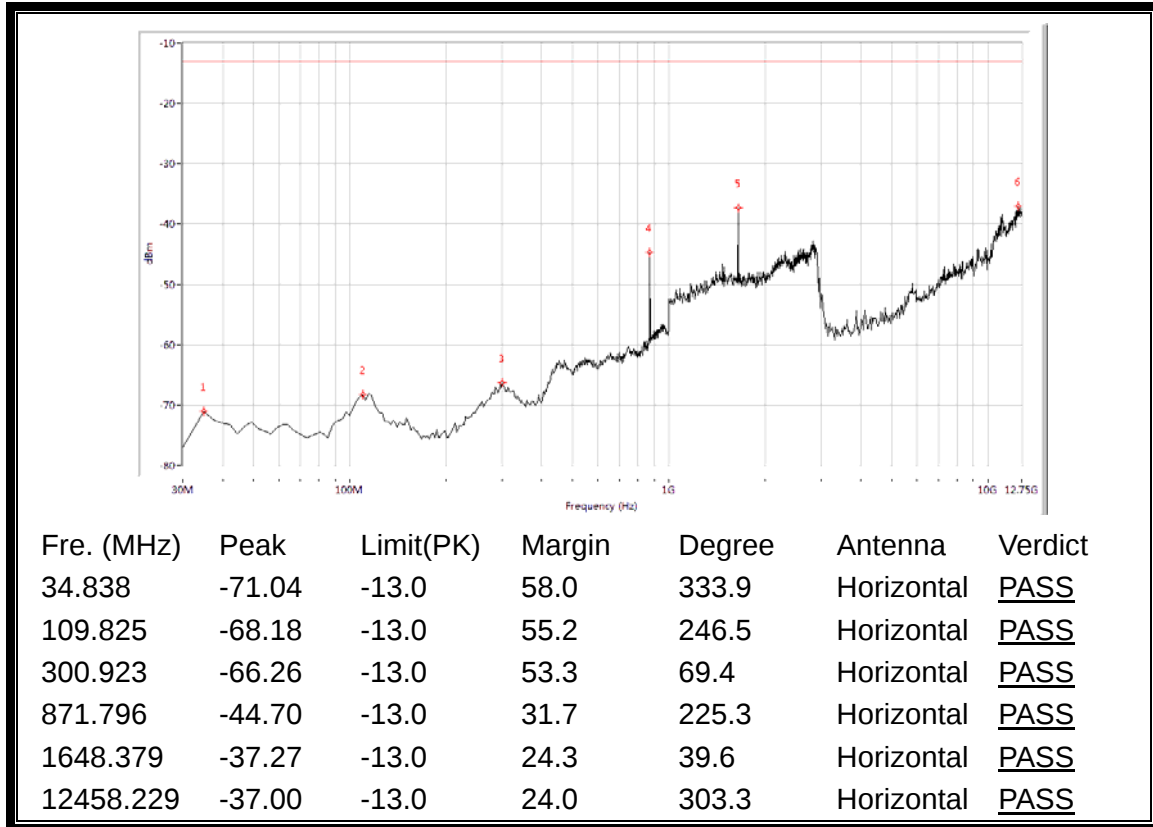
## 1. Test Verdict:

| Band        | Channel | Frequency (MHz) | Measured Max. Spurious Emission (dBm) |                       | Refer to Plot | Limit (dBm) | Verdict     |
|-------------|---------|-----------------|---------------------------------------|-----------------------|---------------|-------------|-------------|
|             |         |                 | Test Antenna Horizontal               | Test Antenna Vertical |               |             |             |
| GSM 850MHz  | 128     | 824.2           | < -25                                 | < -25                 | Plot A.1/A.2  | -13         | <u>PASS</u> |
|             | 190     | 836.6           | < -25                                 | < -25                 | Plot A.3/A.4  |             | <u>PASS</u> |
|             | 251     | 848.8           | < -25                                 | < -25                 | Plot A.5/A.6  |             | <u>PASS</u> |
| GSM 1900MHz | 512     | 1850.2          | < -25                                 | < -25                 | Plot B.1/B.2  | -13         | <u>PASS</u> |
|             | 661     | 1880.0          | < -25                                 | < -25                 | Plot B.3/B.4  |             | <u>PASS</u> |
|             | 810     | 1909.8          | < -25                                 | < -25                 | Plot B.5/B.6  |             | <u>PASS</u> |

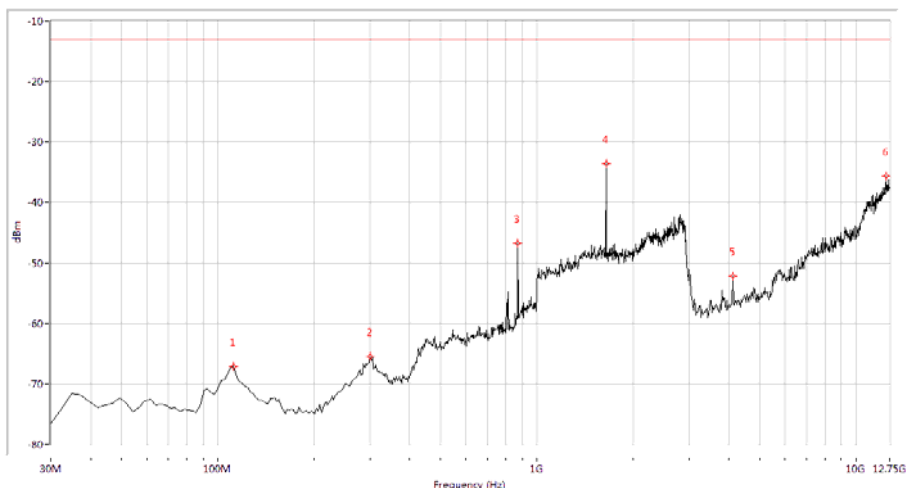
## 2. Test Plots for the Whole Measurement Frequency Range:

Note1: the power of the EUT transmitting frequency should be ignored.

Note2: All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

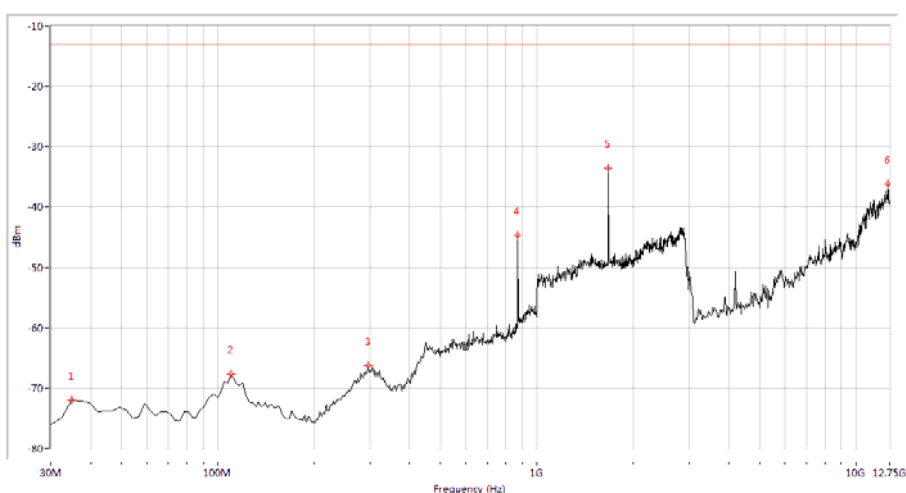


(Plot A.1: GSM 850MHz Channel = 128, Test Antenna Horizontal)



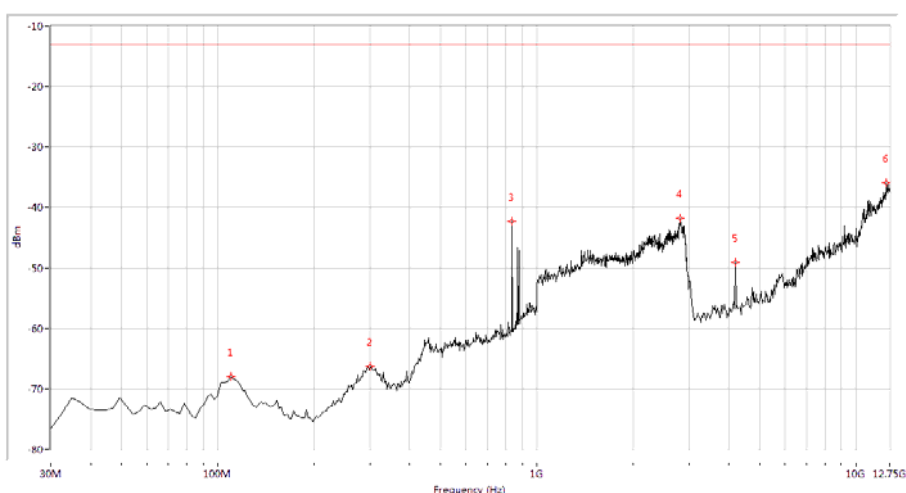
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 112.244    | -67.14 | -13.0     | 54.1   | 216.5  | Vertical | <u>PASS</u> |
| 300.923    | -65.41 | -13.0     | 52.4   | 172.0  | Vertical | <u>PASS</u> |
| 871.796    | -46.69 | -13.0     | 33.7   | 239.3  | Vertical | <u>PASS</u> |
| 1648.379   | -33.62 | -13.0     | 20.6   | 272.7  | Vertical | <u>PASS</u> |
| 4118.454   | -52.16 | -13.0     | 39.2   | 68.1   | Vertical | <u>PASS</u> |
| 12409.601  | -35.60 | -13.0     | 22.6   | 285.3  | Vertical | <u>PASS</u> |

(Plot A.2: GSM 850MHz Channel = 128, Test Antenna Vertical)



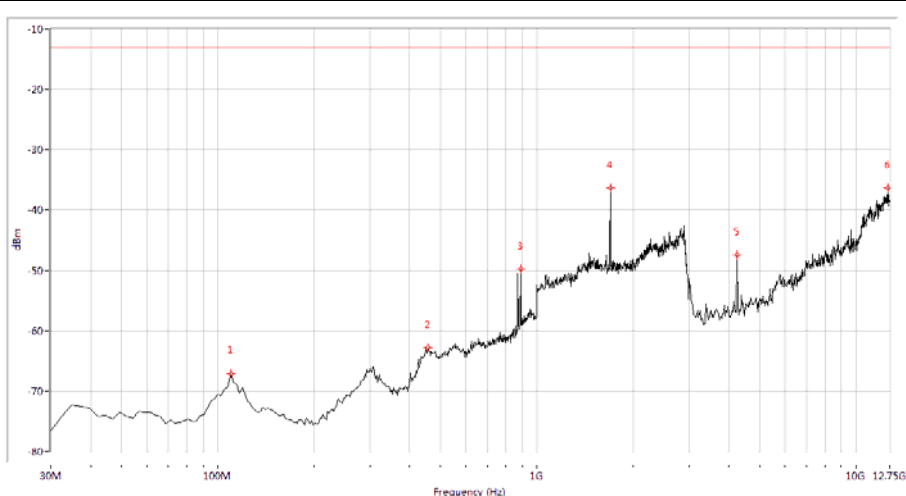
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna    | Verdict     |
|------------|--------|-----------|--------|--------|------------|-------------|
| 34.838     | -71.95 | -13.0     | 59.0   | 1.2    | Horizontal | <u>PASS</u> |
| 109.825    | -67.70 | -13.0     | 54.7   | 36.6   | Horizontal | <u>PASS</u> |
| 296.085    | -66.32 | -13.0     | 53.3   | 23.9   | Horizontal | <u>PASS</u> |
| 871.796    | -44.59 | -13.0     | 31.6   | 265.9  | Horizontal | <u>PASS</u> |
| 1673.317   | -33.58 | -13.0     | 20.6   | 263.1  | Horizontal | <u>PASS</u> |
| 12628.429  | -36.24 | -13.0     | 23.2   | 133.2  | Horizontal | <u>PASS</u> |

(Plot A.3: GSM 850MHz Channel = 190, Test Antenna Horizontal)



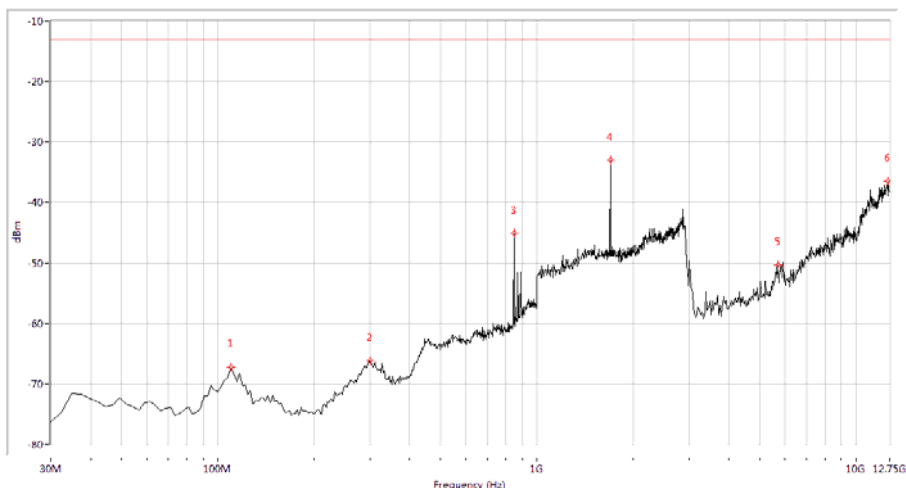
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 109.825    | -67.99 | -13.0     | 55.0   | 235.3  | Vertical | <u>PASS</u> |
| 300.923    | -66.27 | -13.0     | 53.3   | 235.3  | Vertical | <u>PASS</u> |
| 835.511    | -42.25 | -13.0     | 29.2   | 359.2  | Vertical | <u>PASS</u> |
| 2820.449   | -41.80 | -13.0     | 28.8   | 21.2   | Vertical | <u>PASS</u> |
| 4191.397   | -49.05 | -13.0     | 36.1   | 201.4  | Vertical | <u>PASS</u> |
| 12482.544  | -35.99 | -13.0     | 23.0   | 139.9  | Vertical | <u>PASS</u> |

(Plot A.4: GSM 850MHz Channel = 190, Test Antenna Vertical)



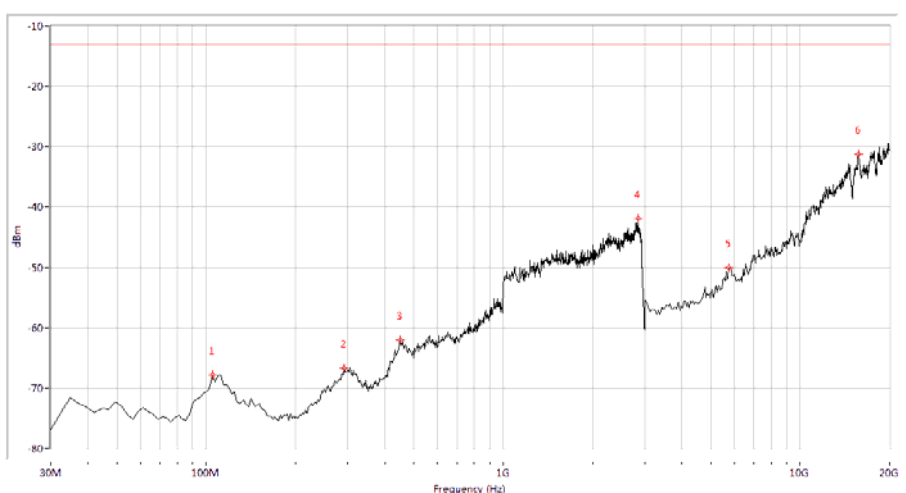
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna    | Verdict     |
|------------|--------|-----------|--------|--------|------------|-------------|
| 109.825    | -67.08 | -13.0     | 54.1   | 360.0  | Horizontal | <u>PASS</u> |
| 455.736    | -62.86 | -13.0     | 49.9   | 305.7  | Horizontal | <u>PASS</u> |
| 891.147    | -49.82 | -13.0     | 36.8   | 294.9  | Horizontal | <u>PASS</u> |
| 1698.254   | -36.29 | -13.0     | 23.3   | 54.5   | Horizontal | <u>PASS</u> |
| 4240.025   | -47.46 | -13.0     | 34.5   | 7.9    | Horizontal | <u>PASS</u> |
| 12579.800  | -36.37 | -13.0     | 23.4   | 358.3  | Horizontal | <u>PASS</u> |

(Plot A.5: GSM 850MHz Channel = 251, Test Antenna Horizontal)



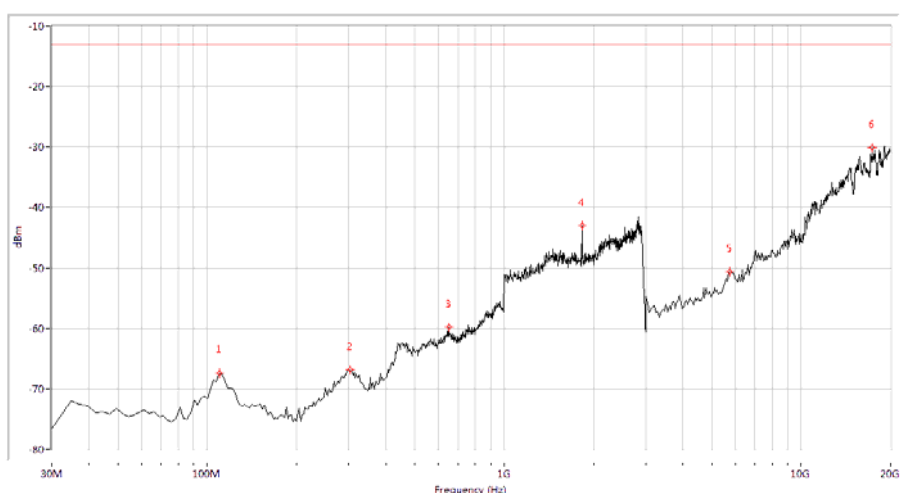
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 109.825    | -67.27 | -13.0     | 54.3   | 156.3  | Vertical | <u>PASS</u> |
| 300.923    | -66.10 | -13.0     | 53.1   | 27.0   | Vertical | <u>PASS</u> |
| 847.606    | -45.07 | -13.0     | 32.1   | 81.2   | Vertical | <u>PASS</u> |
| 1698.254   | -33.02 | -13.0     | 20.0   | 234.9  | Vertical | <u>PASS</u> |
| 5698.878   | -50.34 | -13.0     | 37.3   | 339.5  | Vertical | <u>PASS</u> |
| 12579.800  | -36.52 | -13.0     | 23.5   | 8.8    | Vertical | <u>PASS</u> |

(Plot A.6: GSM 850MHz Channel = 251, Test Antenna Vertical)



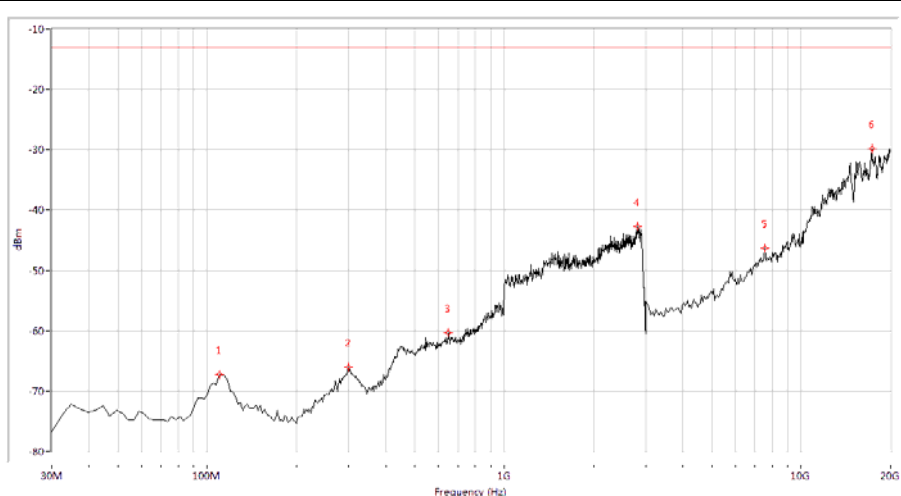
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 104.988    | -67.86 | -13.0     | 54.9   | 136.5  | Vertical | <u>PASS</u> |
| 291.247    | -66.72 | -13.0     | 53.7   | 24.7   | Vertical | <u>PASS</u> |
| 450.898    | -61.94 | -13.0     | 48.9   | 32.9   | Vertical | <u>PASS</u> |
| 2840.399   | -41.86 | -13.0     | 28.9   | 8.0    | Vertical | <u>PASS</u> |
| 5755.611   | -50.05 | -13.0     | 37.0   | 206.1  | Vertical | <u>PASS</u> |
| 15718.204  | -31.25 | -13.0     | 18.2   | 189.2  | Vertical | <u>PASS</u> |

(Plot B.1: GSM 1900MHz Channel = 512, Test Antenna Horizontal)



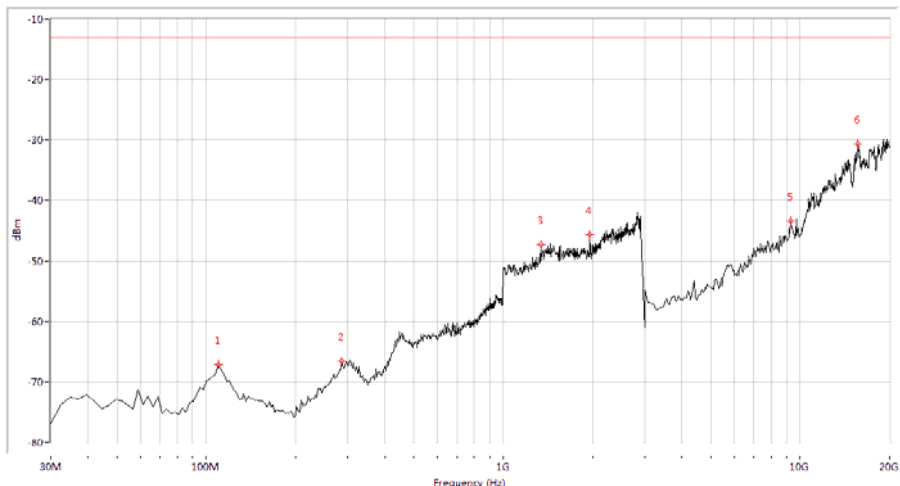
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 109.825    | -67.41 | -13.0     | 54.4   | 0.1    | Vertical | <u>PASS</u> |
| 303.342    | -66.85 | -13.0     | 53.8   | 133.8  | Vertical | <u>PASS</u> |
| 651.671    | -59.76 | -13.0     | 46.8   | 1.2    | Vertical | <u>PASS</u> |
| 1827.930   | -42.96 | -13.0     | 30.0   | 261.0  | Vertical | <u>PASS</u> |
| 5755.611   | -50.58 | -13.0     | 37.6   | 106.9  | Vertical | <u>PASS</u> |
| 17329.177  | -30.16 | -13.0     | 17.2   | 171.7  | Vertical | <u>PASS</u> |

(Plot B.2: GSM 1900MHz Channel = 512, Test Antenna Vertical)



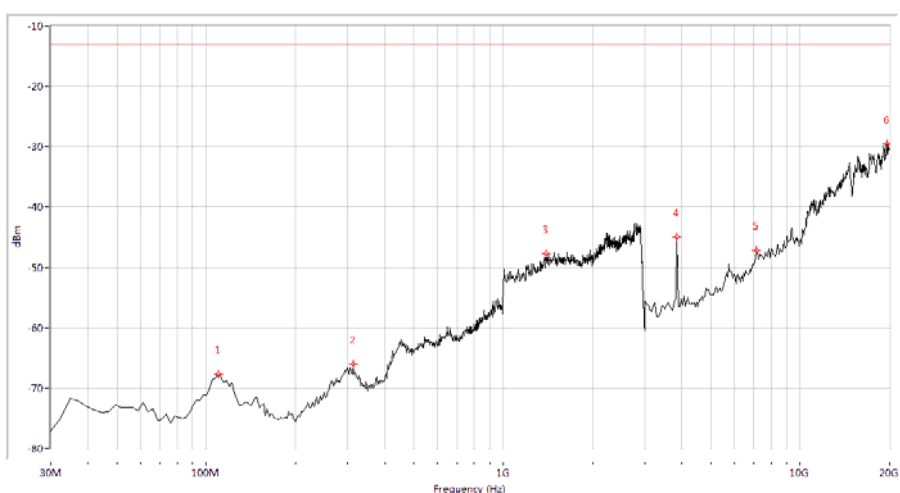
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 109.825    | -67.24 | -13.0     | 54.2   | 144.8  | Vertical | <u>PASS</u> |
| 298.504    | -66.01 | -13.0     | 53.0   | 310.5  | Vertical | <u>PASS</u> |
| 649.252    | -60.32 | -13.0     | 47.3   | 160.8  | Vertical | <u>PASS</u> |
| 2815.461   | -42.67 | -13.0     | 29.7   | -0.0   | Vertical | <u>PASS</u> |
| 7536.160   | -46.28 | -13.0     | 33.3   | 80.8   | Vertical | <u>PASS</u> |
| 17286.783  | -29.89 | -13.0     | 16.9   | 251.1  | Vertical | <u>PASS</u> |

(Plot B.3: GSM 1900MHz Channel = 661, Test Antenna Horizontal)



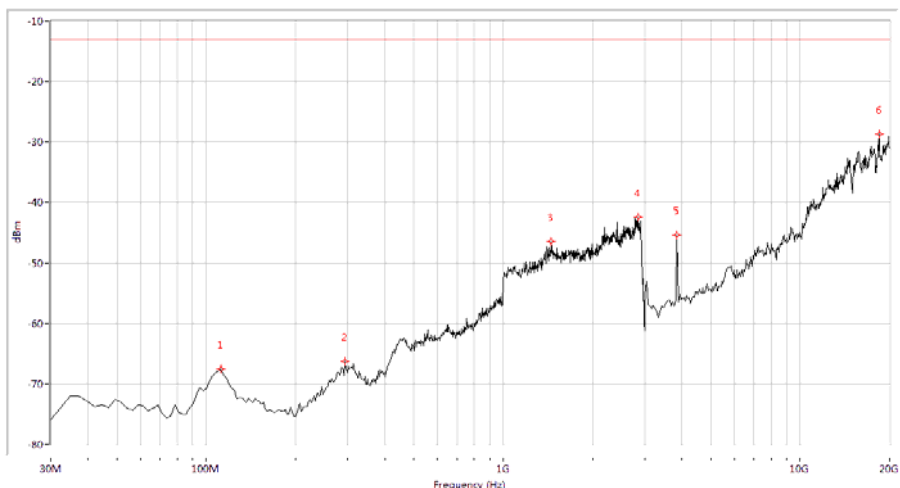
| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 109.825    | -67.13 | -13.0     | 54.1   | 78.3   | Vertical | <u>PASS</u> |
| 286.409    | -66.58 | -13.0     | 53.6   | 43.1   | Vertical | <u>PASS</u> |
| 1339.152   | -47.26 | -13.0     | 34.3   | 315.6  | Vertical | <u>PASS</u> |
| 1957.606   | -45.67 | -13.0     | 32.7   | 19.6   | Vertical | <u>PASS</u> |
| 9274.314   | -43.38 | -13.0     | 30.4   | 69.1   | Vertical | <u>PASS</u> |
| 15675.810  | -30.64 | -13.0     | 17.6   | 54.2   | Vertical | <u>PASS</u> |

(Plot B.4: GSM 1900MHz Channel = 661, Test Antenna Vertical)



| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna    | Verdict     |
|------------|--------|-----------|--------|--------|------------|-------------|
| 109.825    | -67.66 | -13.0     | 54.7   | 50.5   | Horizontal | <u>PASS</u> |
| 313.017    | -66.00 | -13.0     | 53.0   | 359.4  | Horizontal | <u>PASS</u> |
| 1394.015   | -47.69 | -13.0     | 34.7   | 114.1  | Horizontal | <u>PASS</u> |
| 3847.880   | -44.94 | -13.0     | 31.9   | 22.1   | Horizontal | <u>PASS</u> |
| 7112.219   | -47.17 | -13.0     | 34.2   | 63.1   | Horizontal | <u>PASS</u> |
| 19618.454  | -29.57 | -13.0     | 16.6   | 111.5  | Horizontal | <u>PASS</u> |

(Plot B.5: GSM 1900MHz Channel = 810, Test Antenna Horizontal)



| Fre. (MHz) | Peak   | Limit(PK) | Margin | Degree | Antenna  | Verdict     |
|------------|--------|-----------|--------|--------|----------|-------------|
| 112.244    | -67.58 | -13.0     | 54.6   | 122.0  | Vertical | <u>PASS</u> |
| 293.666    | -66.30 | -13.0     | 53.3   | 101.2  | Vertical | <u>PASS</u> |
| 1453.865   | -46.49 | -13.0     | 33.5   | 360.0  | Vertical | <u>PASS</u> |
| 2855.362   | -42.44 | -13.0     | 29.4   | 195.1  | Vertical | <u>PASS</u> |
| 3847.880   | -45.34 | -13.0     | 32.3   | 286.3  | Vertical | <u>PASS</u> |
| 18473.815  | -28.66 | -13.0     | 15.7   | -0.0   | Vertical | <u>PASS</u> |

(PlotB.6: GSM 1900MHz Channel = 810, Test Antenna Vertical)

\*\* END OF REPORT \*\*