



47 CFR PART 22H & 24E

TEST REPORT

of

GSM Mobile Phone

Trade Name: Haier
Model Name: HG-M180
Report No.: SZ10070101E01
FCC ID.: SG71005HG-M180

prepared for

Qingdao Haier Telecom Co.Ltd

No.1, Haier Road, Hi-tech Zone, Qingdao, 266101, P.R.China

prepared by

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LAB CODE 20081223-00

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| Change History | | |
|----------------|-----------------|--------------------------------------|
| Issue | Date | Reason for change |
| 1.0 | August 3, 2010 | First edition |
| 1.0 | August 18, 2010 | second edition: corrected some place |

1. TEST CERTIFICATION

Equipment under Test: GSM Mobile Phone

Trade Name: Haier
Model Name: HG-M180
FCC ID: SG71005HG-M180
Applicant: Qingdao Haier Telecom Co.Ltd
No.1, Haier Road, Hi-tech Zone, Qingdao, 266101, P.R.China
Manufacturer: Qingdao Haier Telecom Co.Ltd
No.1, Haier Road, Hi-tech Zone, Qingdao, 266101, P.R.China

Test Standards: 47 CFR Part 2
47 CFR Part 22 Subpart H
47 CFR Part 24 Subpart E

Test Date(s): August 1, 2010 - August 2, 2010
Test Result: PASS

* We Hereby Certify That:

The equipment under test was tested by Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by:  Dated: 2010.8.19

Reviewed by:  Dated: 2010.08.19

Approved by:  Dated: 201008.19



2. GENERAL INFORMATION

2.1 EUT Description

EUT Type: GSM Mobile Phone
Model Name: HG-M180
Serial No.....: (n.a, marked #1 by test site)
Hardware Version: V5
Software Version: HG-M180-H03-S001-PANAMA-(SP-EN-5802E-ZNC065A-4038-SST-TORCH-US-TMOVIL)-20100427181558
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.....: GMSK
Emission Designators: 300KGXW
Power Supply.....: Battery
 Model Name: H11170
 Brand name: Haier
 Capacitance: 650mAh
 Rated voltage: 3.7V
 Manufacturer: SHENZHEN BAK BATTERY Co.,Ltd
Ancillary Equipments.....: AC Adapter (Charger for Battery)
 Model Name: LSA-80A5
 Brand Name: Haier
 Serial No.: (n.a. marked #1 by test site)
 Rated Input: ~ 100-240V, 50/60Hz, 150mA
 Rated Output: = 5.0V, 550mA
 Manufacturer: NINGBO LISHUNDA ELECTRONICS CO LTD
 Manufacturer Address: 13 GUANG MING RD LI SHAN, DI
 TANG TOWN YUYAO, ZHEJIANG 315491 CHINA

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.

2.2 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 (10-1-05 Edition) | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations |
| 2 | 47 CFR Part 22 (10-1-05 Edition) | Public Mobile Services |
| 3 | 47 CFR Part 24 (10-1-05 Edition) | Personal Communications Services |

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

| No. | Section | Description | Result |
|-----|--------------------------------------|---------------------------------------|--------|
| 1 | 2.106 22.905 24.229 | Frequencies | PASS |
| 2 | 2.1046 | Conducted RF Output Power | PASS |
| 3 | 2.1049 | 20dB Occupied Bandwidth | PASS |
| 4 | 2.1055 22.355 24.235 | Frequency Stability | PASS |
| 5 | 2.1051 2.1057 22.917 24.238 | Conducted Out of Band Emissions | PASS |
| 6 | 2.1051 2.1057 22.917 24.238 | Band Edge | PASS |
| 7 | 22.913 24.232 | Transmitter Radiated Power (EIPR/ERP) | PASS |
| 8 | 2.1053 2.1057 22.917 24.238 | Radiated Out of Band Emissions | PASS |

2.3 Facilities and Accreditations

2.3.1 Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. 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 741109.

2.3.2 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 |

3. 47 CFR PART 2, PART 22H & 24E REQUIREMENTS

3.1 Frequencies

3.1.1 Requirement

According to FCC section 22.905, the frequency blocks assignment for the cellular radiotelephone service is listed as below:

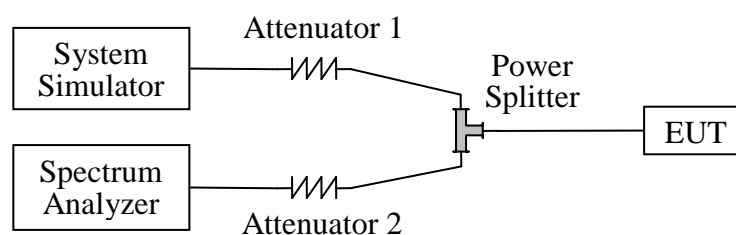
- (a) Channel Block A:
 Mobile 824 - 835MHz, Base 869 - 880MHz;
 Mobile 845 - 846.5MHz, Base 890 - 891.5MHz
- (b) Channel Block B:
 Mobile 835 - 845 MHz, Base 880 - 890MHz;
 Mobile 846.5 - 849 MHz, Base 891.5 - 894MHz

According to FCC section 24.229, the frequencies available in the Broadband PCS services are listed as below, in accordance with the frequency allocations table of FCC section 2.106.

- (a) The following frequency blocks are available for assignment on an MTA basis:
 Block A: 1850 - 1865MHz paired with 1930 - 1945MHz;
 Block B: 1870 - 1885MHz paired with 1950 - 1965MHz.
- (b) The following frequency blocks are available for assignment on a BTA basis:
 Block C: 1895 - 1910 MHz paired with 1975 - 1990MHz;
 Block D: 1865 - 1870 MHz paired with 1945 - 1950MHz;
 Block E: 1885 - 1890 MHz paired with 1965 - 1970MHz;
 Block F: 1890 - 1895 MHz paired with 1970 - 1975MHz.

3.1.2 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.

2. Equipments List:

| Description | Manufacturer | Model | Serial No. | Cal. Date | Cal. Due |
|-------------------|--------------|--------|------------|-----------|----------|
| System Simulator | Agilent | E5515C | GB43130131 | 2009.08 | 1year |
| Spectrum Analyzer | Agilent | E7405A | US44210471 | 2009.08 | 1year |
| Power Splitter | Weinschel | 1506A | NW521 | (n.a.) | (n.a.) |
| Attenuator 1 | Resnet | 20dB | (n.a.) | (n.a.) | (n.a.) |
| Attenuator 2 | Resnet | 3dB | (n.a.) | (n.a.) | (n.a.) |

3.1.3 Test Result

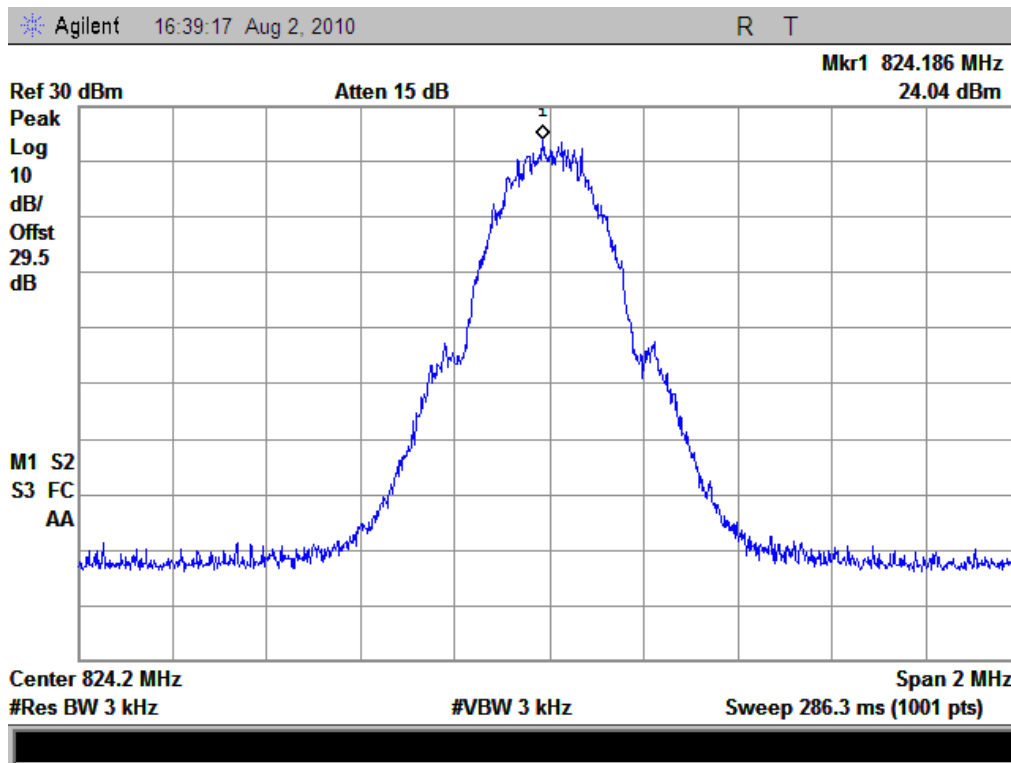
The Tx frequency arrangement of the Cellular 850MHz band employed by the EUT should be from 824.2MHz to 848.8MHz (the corresponding frequency block is from 824MHz to 849MHz), and Tx frequency arrangement of the PCS 1900MHz band employed by the EUT should be from 1850.2MHz to 1909.8MHz (the corresponding frequency block is from 1850MHz to 1910MHz). Here the lowest and highest channels are tested to verify the EUT's using the frequency block required.

1. Test Verdict:

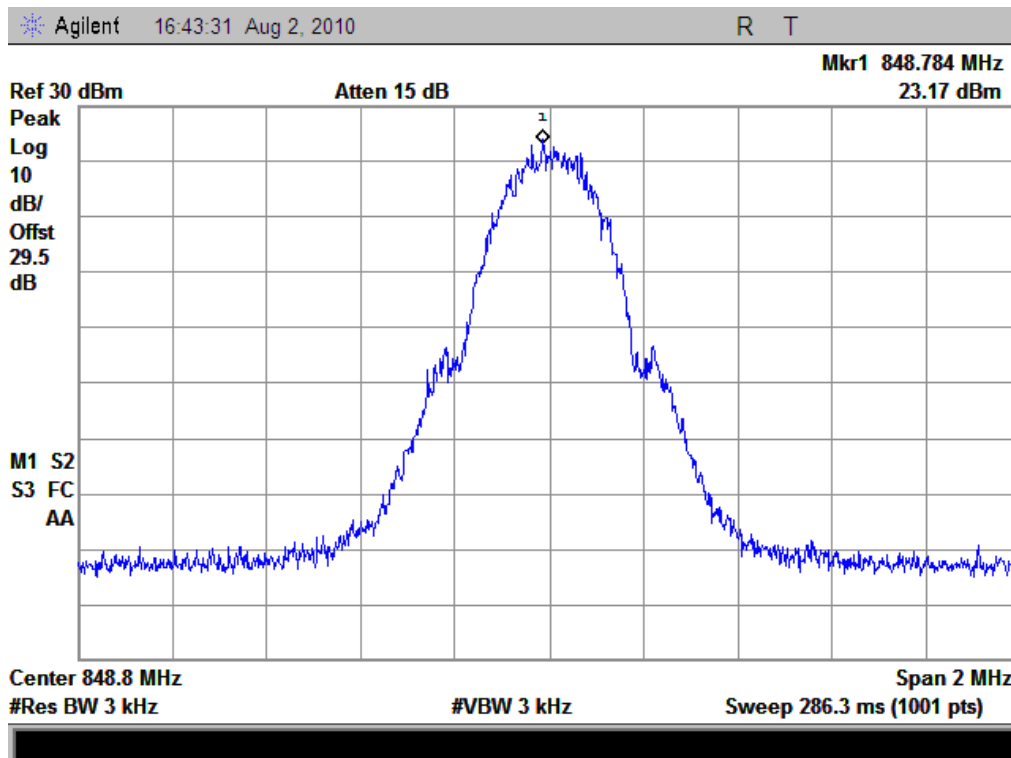
The required frequency block is employed legally, the verdict is PASS.

| Band | Channel | Frequency (MHz) | Measured Carrier (dBm) | Refer to Plot |
|----------------|---------|-----------------|------------------------|---------------|
| GSM 850MHz | 128 | 824.2 | 24.04 | Plot A |
| | 251 | 848.8 | 23.17 | Plot B |
| GSM 1900MHz | 512 | 1850.2 | 20.33 | Plot C |
| | 810 | 1909.8 | 21.1 | Plot D |

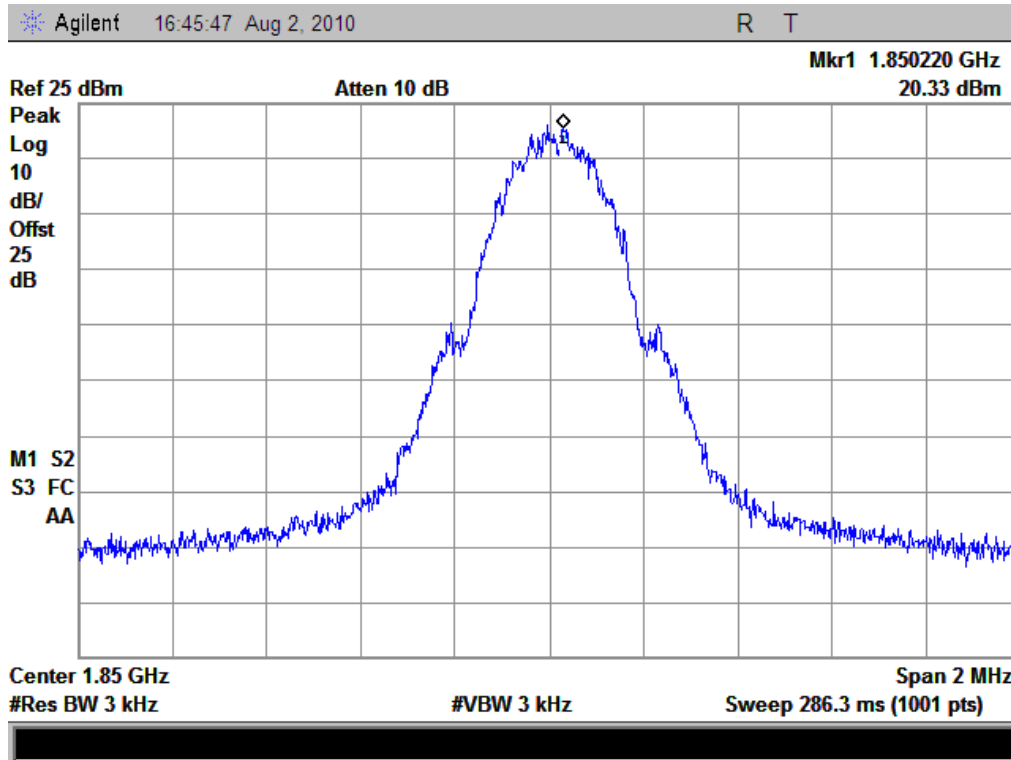
2. Test Plot:



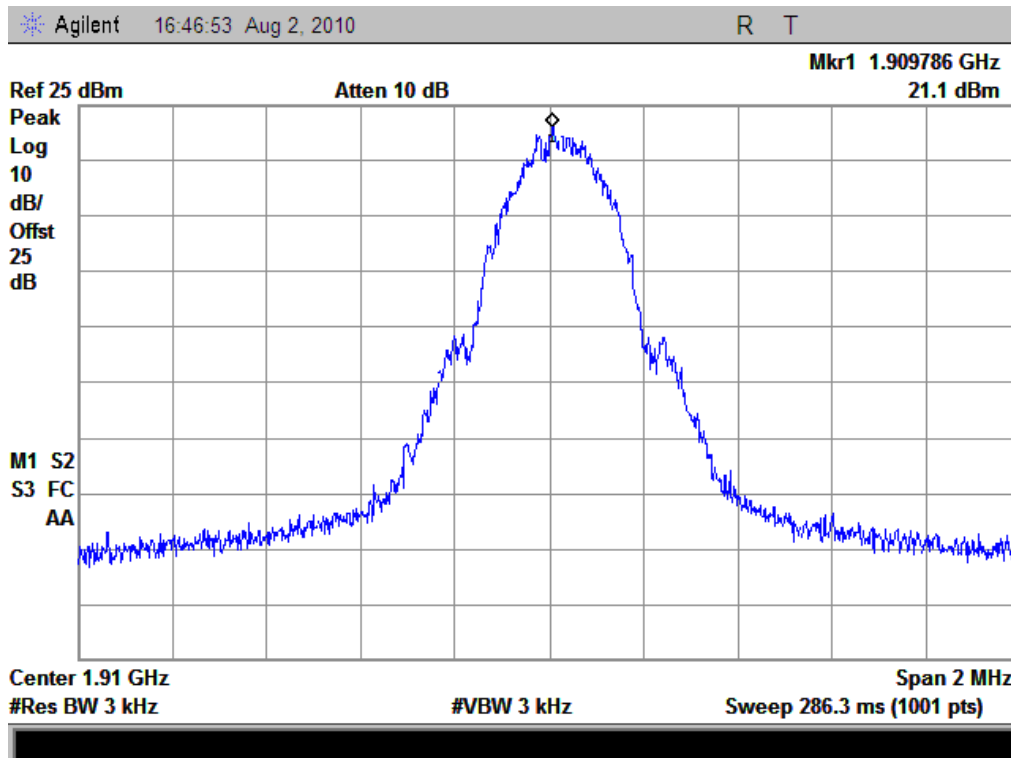
(Plot A: GSM 850MHz Channel = 128)



(Plot B: GSM 850MHz Channel = 251)



(Plot C: GSM 1900MHz Channel = 512)



(Plot D: GSM 1900MHz Channel = 810)

3.2 Conducted RF Output Power

3.2.1 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).

3.2.2 Test Description

See section 3.1.2 of this report.

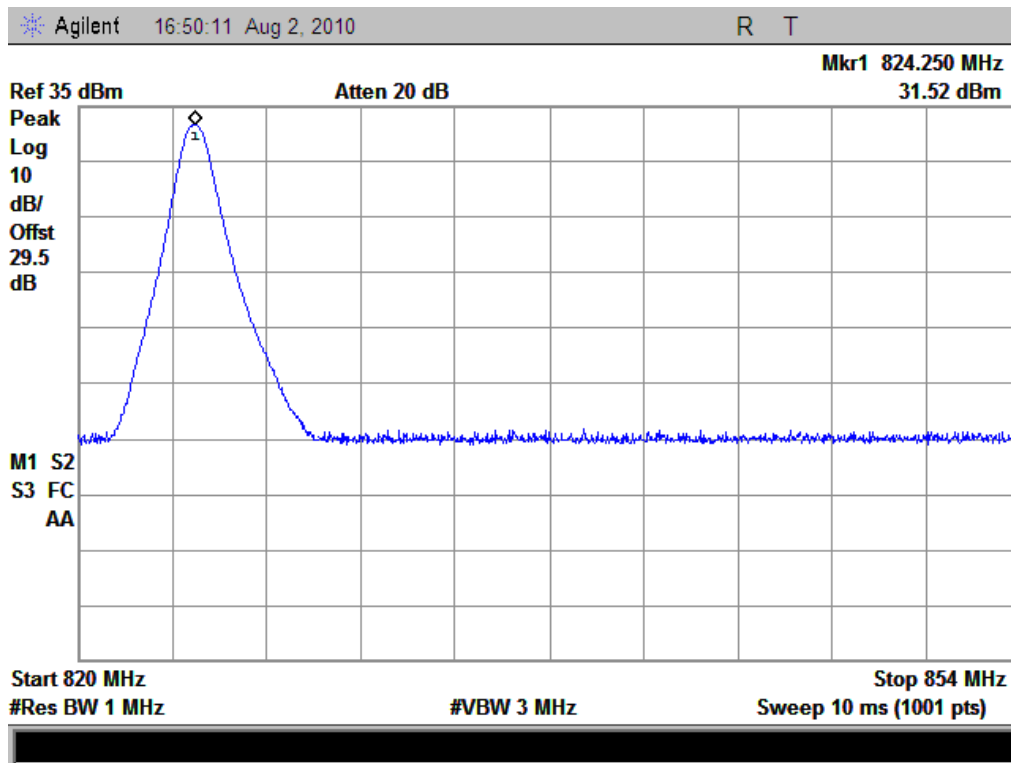
3.2.3 Test Result

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT. For the GSM 850MHz operates at PCL=5 (where Power Class is 4), the rated conducted RF output power is 33dBm within the tolerance of ± 3 dB, and For the GSM 1900MHz operates at PCL=0 (where Power Class is 1), the rated conducted RF output power is 30dBm within the tolerance of ± 3 dB.

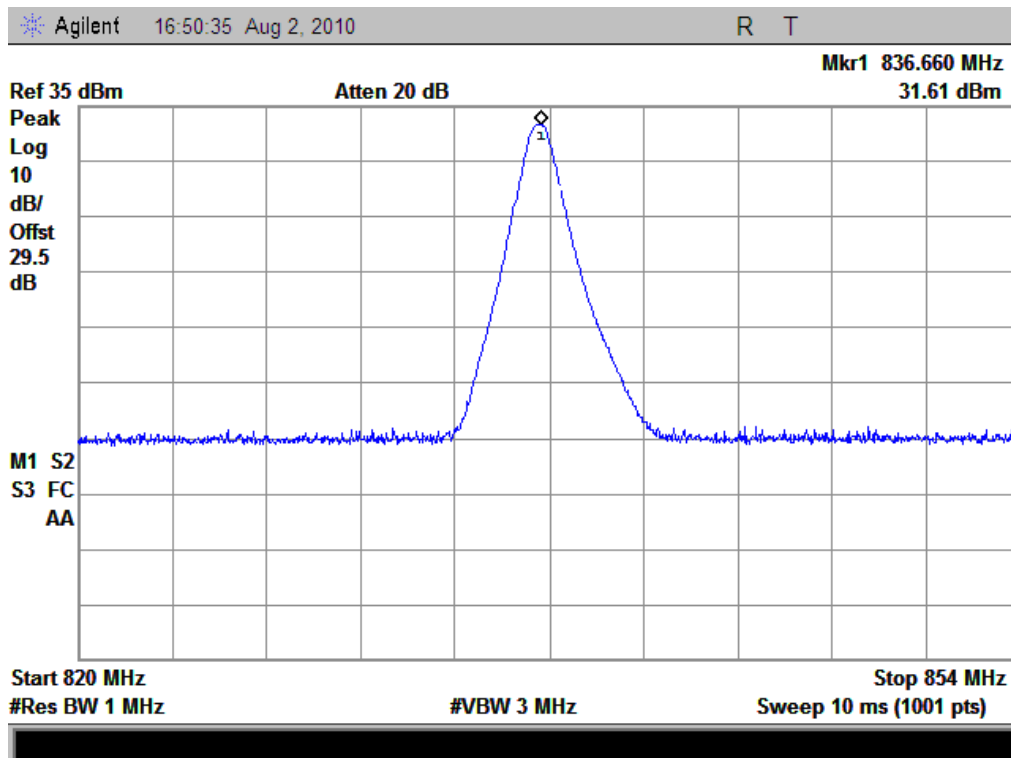
1. Test Verdict:

| Band | Channel | Frequency (MHz) | Measured Output Power | | Rated Output Power | | Verdict |
|----------------|---------|-----------------|-----------------------|---------------|--------------------|----------------|---------|
| | | | dBm | Refer to Plot | dBm | Tolerance (dB) | |
| GSM 850MHz | 128 | 824.2 | 31.52 | Plot A | 33 | ± 3 | PASS |
| | 190 | 836.6 | 31.61 | Plot B | | | PASS |
| | 251 | 848.8 | 32.06 | Plot C | | | PASS |
| GSM 1900MHz | 512 | 1850.2 | 29.07 | Plot D | 30 | ± 3 | PASS |
| | 661 | 1880.0 | 29.36 | Plot E | | | PASS |
| | 810 | 1909.8 | 29.17 | Plot F | | | PASS |

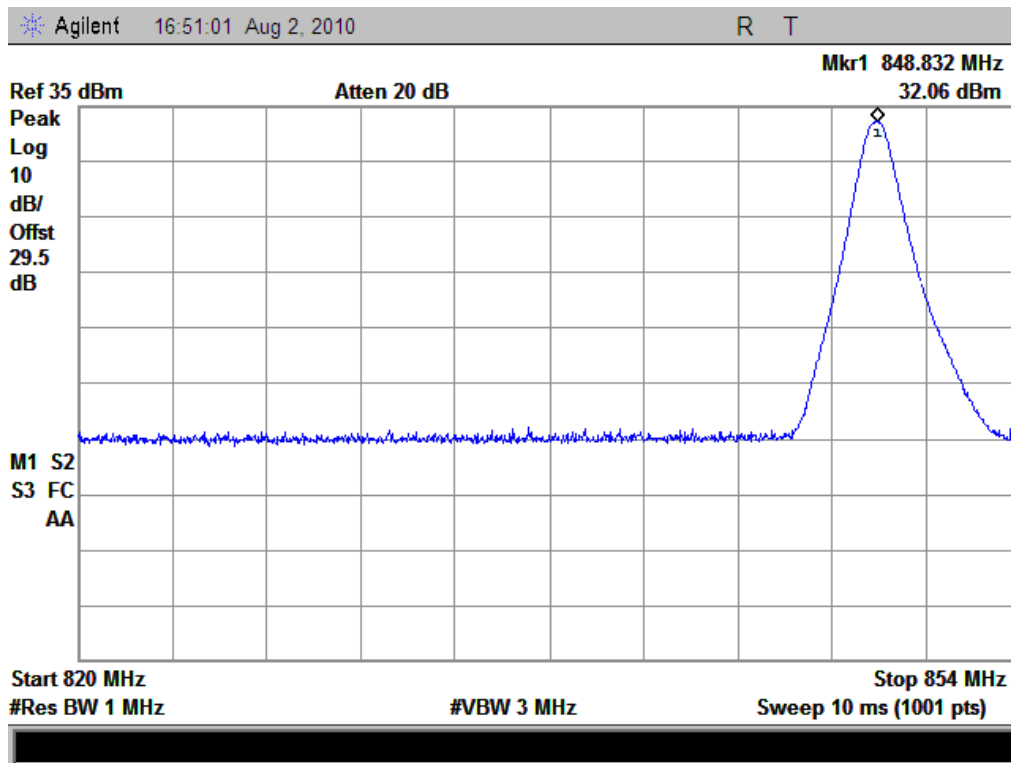
2. Test Plot:



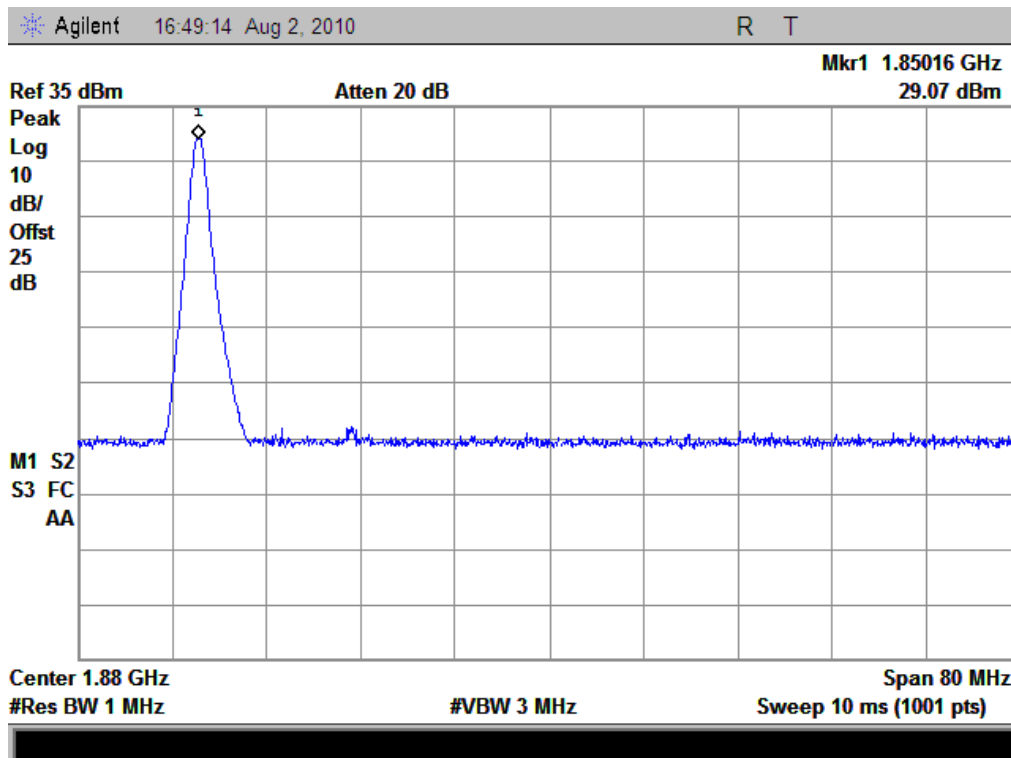
(Plot A: GSM 850MHz Channel = 128)



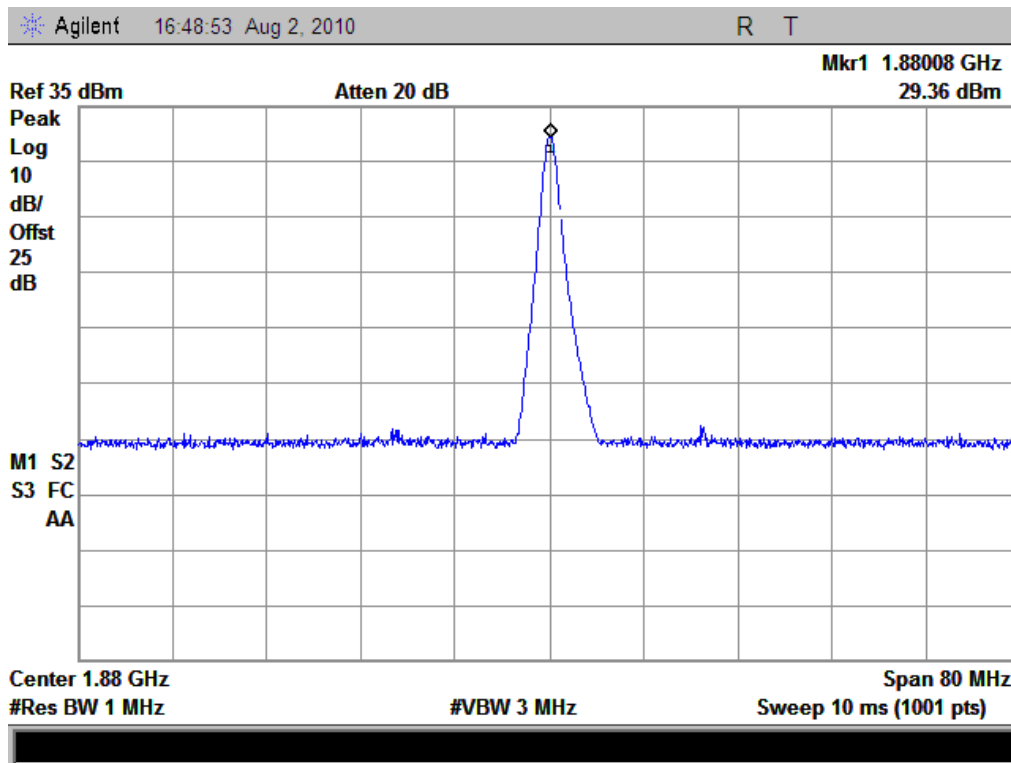
(Plot B: GSM 850MHz Channel = 190)



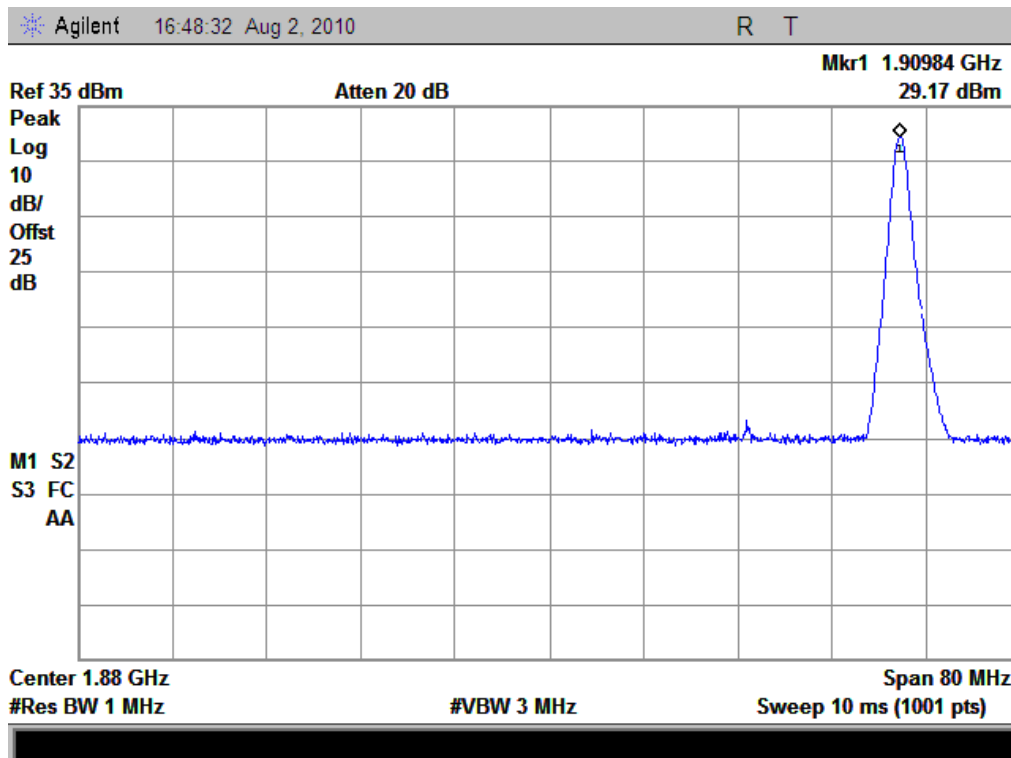
(Plot C: GSM 850MHz Channel = 251)



(Plot D: GSM 1900MHz Channel = 512)



(Plot E: GSM 1900MHz Channel = 661)



(Plot F: GSM 1900MHz Channel = 810)

3.3 99% Occupied Bandwidth

3.3.1 Definition

According to FCC section 2.1049, 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,.

3.3.2 Test Description

See section 3.1.2 of this report.

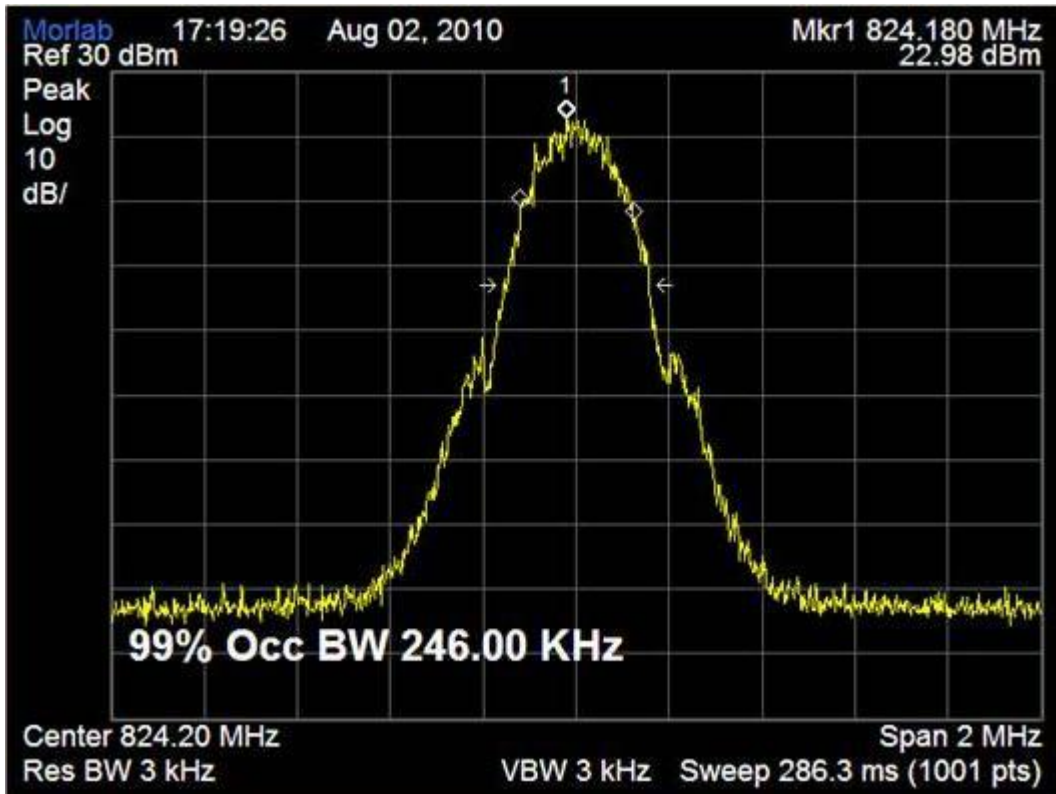
3.3.3 Test Verdict

Here the lowest, middle and highest channels are tested to record the 99% occupied bandwidth, it's about 300kHz.

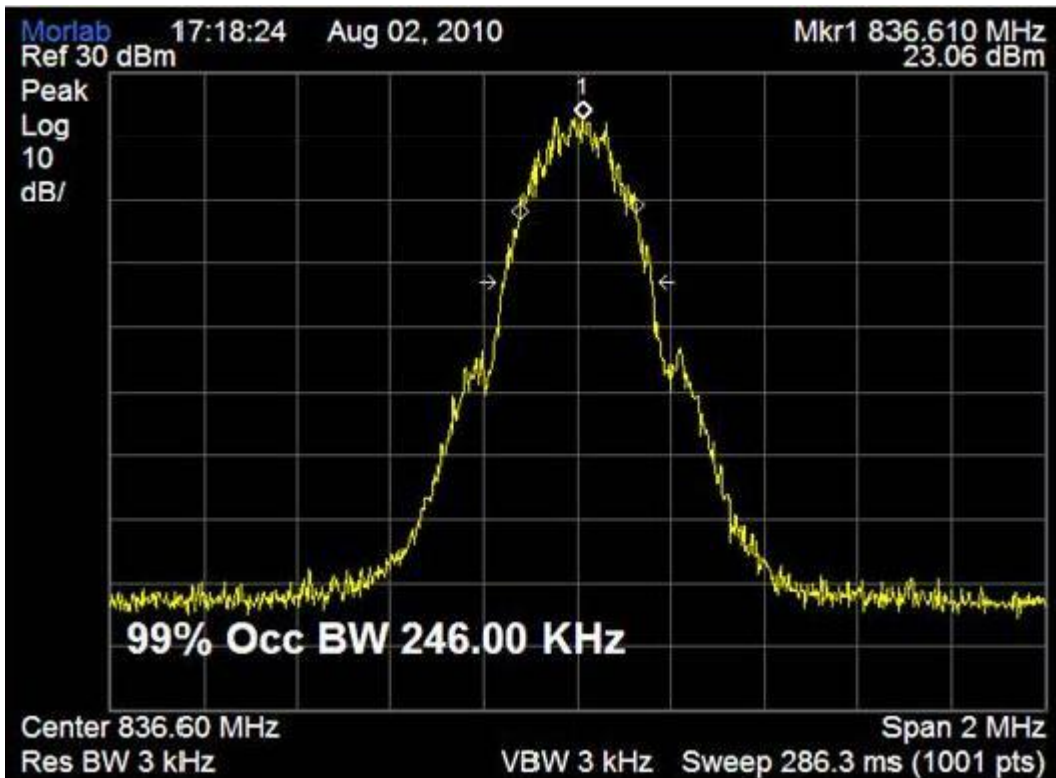
1. Test Verdict:

| Band | Channel | Frequency (MHz) | Measured 99% Occupied Bandwidth (kHz) | Refer to Plot |
|----------------|---------|-----------------|---------------------------------------|---------------|
| GSM 850MHz | 128 | 824.2 | 246.0 | Plot A |
| | 190 | 836.6 | 246.0 | Plot B |
| | 251 | 848.8 | 246.0 | Plot C |
| GSM 1900MHz | 512 | 1850.2 | 246.0 | Plot D |
| | 661 | 1880.0 | 248.0 | Plot E |
| | 810 | 1909.8 | 246.0 | Plot F |

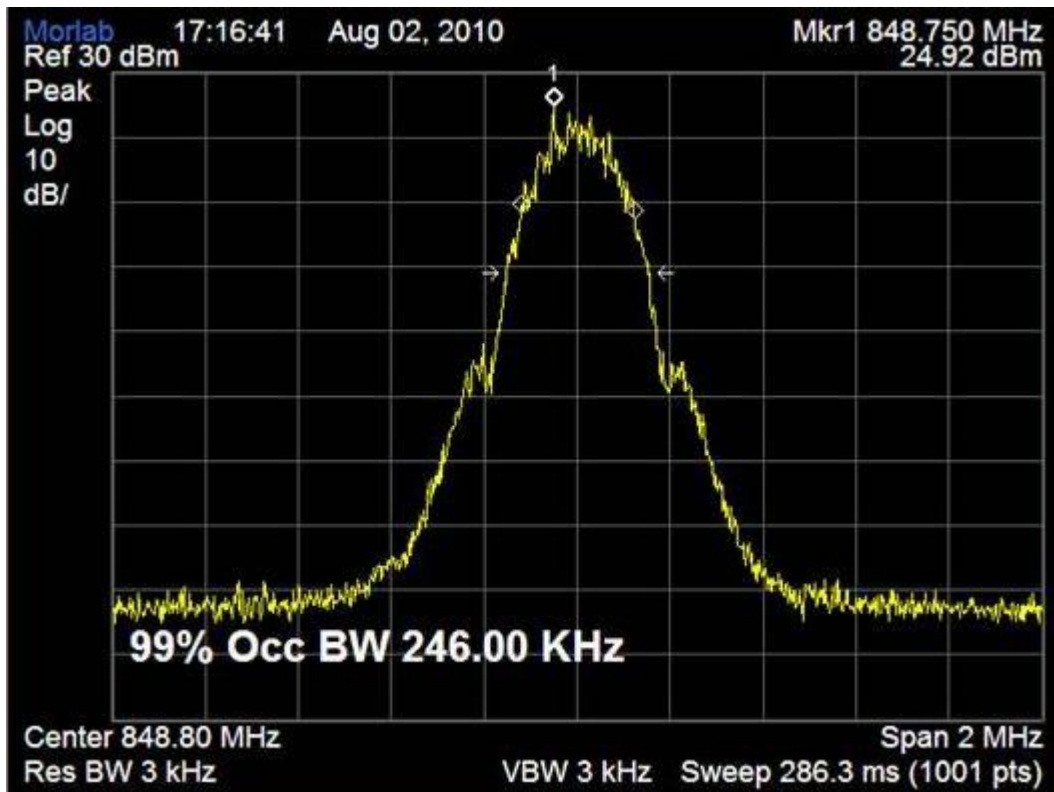
2. Test Plot:



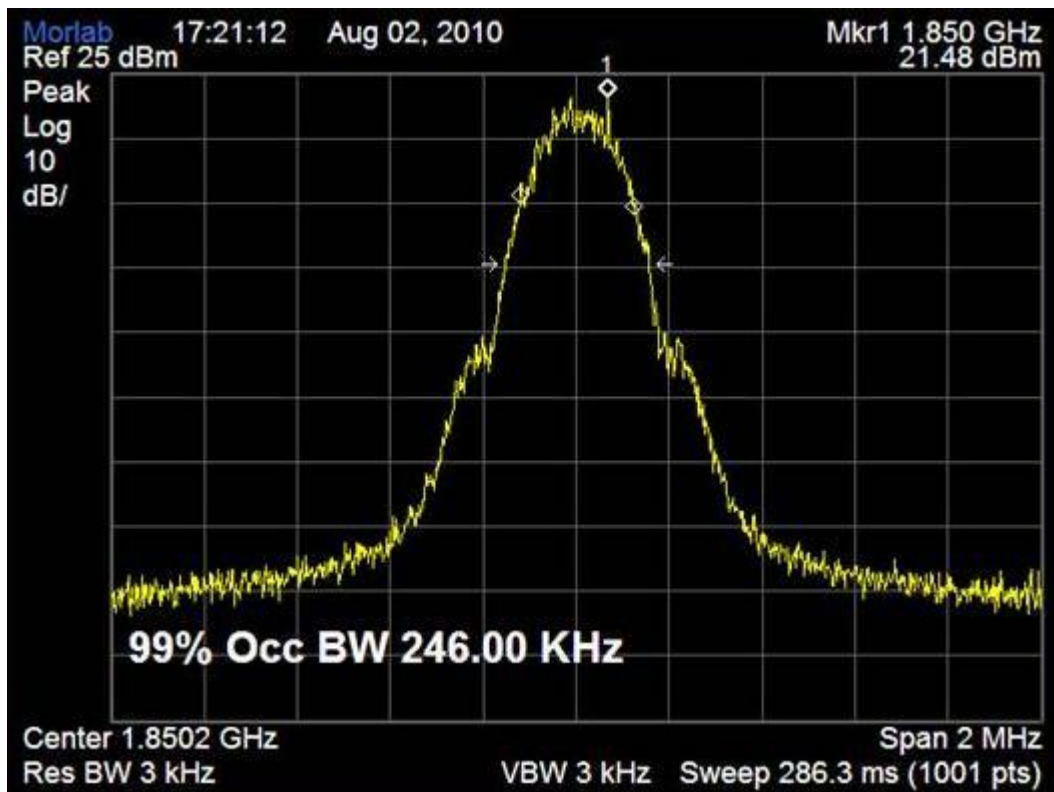
(Plot A: GSM 850MHz Channel = 128)



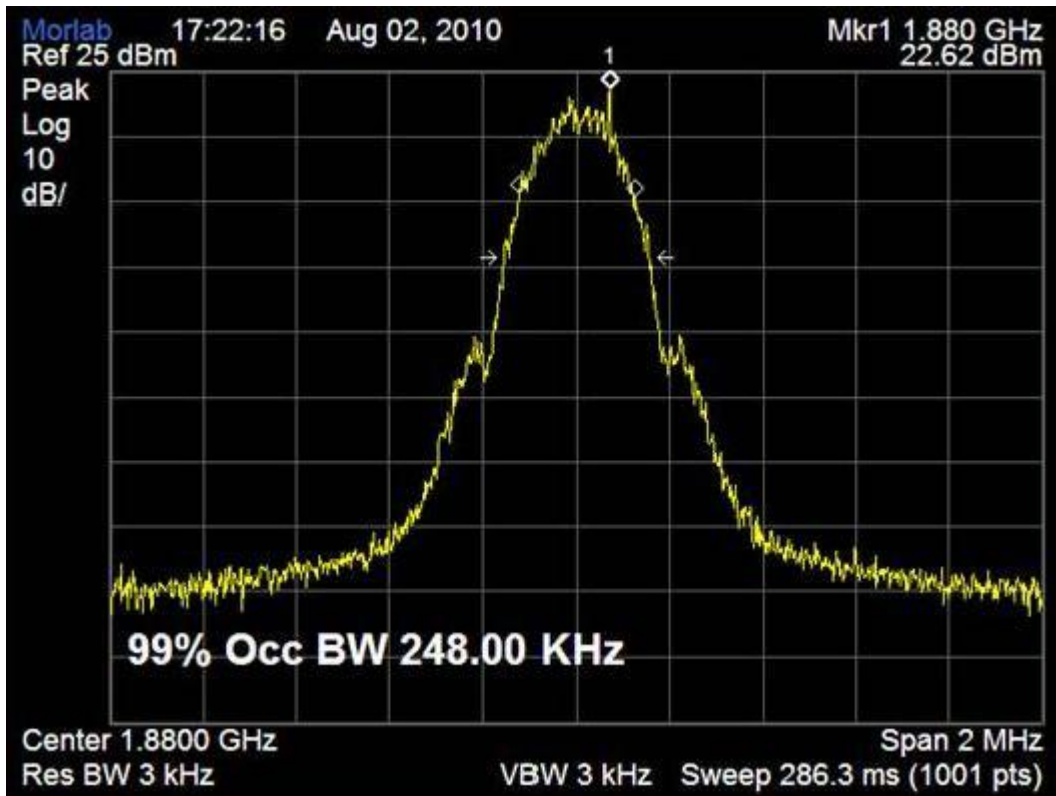
(Plot B: GSM 850MHz Channel = 190)



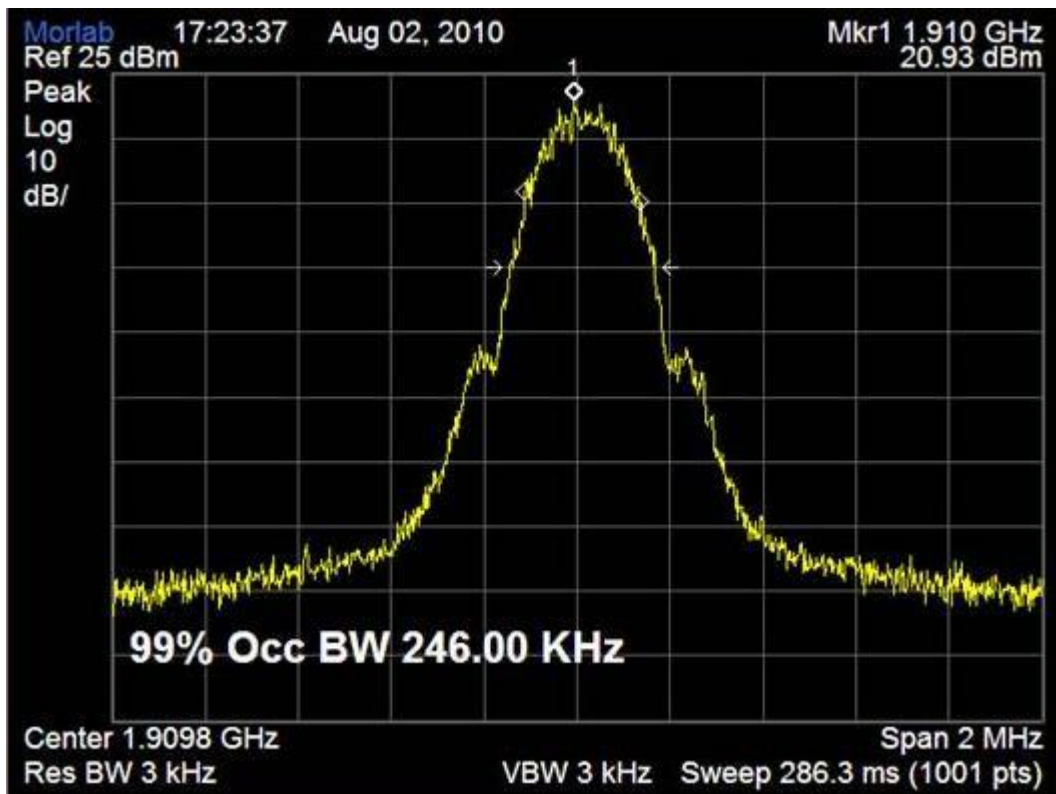
(Plot C: GSM 850MHz Channel = 251)



(Plot D: GSM 1900MHz Channel = 512)



(Plot E: GSM 1900MHz Channel = 661)



(Plot F: GSM 1900MHz Channel = 810)

3.4 Frequency Stability

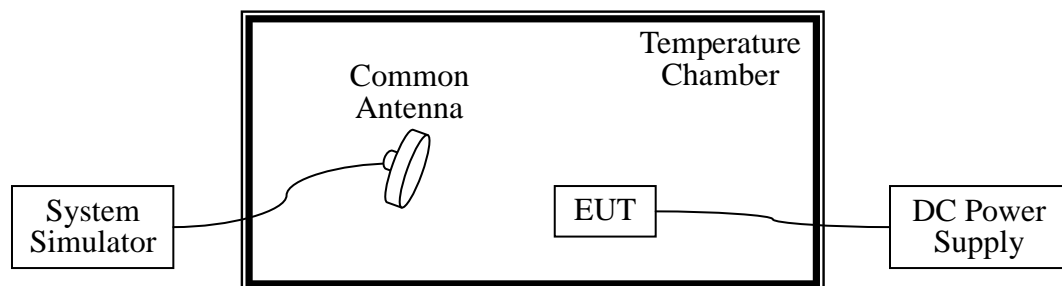
3.4.1 Requirement

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 $-30\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ at intervals of not more than $10\text{ }^{\circ}\text{C}$.
- (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.

3.4.2 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 | 2009.08 | 1year |
| DC Power Supply | Good Will | GPS-3030DD | EF920938 | 2009.08 | 2year |
| Temperature Chamber | YinHe Experimental Equip. | HL4003T | (n.a.) | 2009.08 | 1year |

3.4.3 Test Verdict

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 4.2VDC and 3.6VDC, which are specified by the applicant; the normal temperature here used is $25\text{ }^{\circ}\text{C}$. The frequency

deviation limit of GSM 850MHz band is ± 2.5 ppm, and GSM 1900MHz is ± 1 ppm

| 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 | |
| GSM 850MHz | 3.7 | -30 | -4.94 | ± 2060.5 | 27.78 | ± 2091.5 | 44.02 | ± 2122 | PASS |
| | | -20 | 22.12 | | -0.07 | | -5.83 | | |
| | | -10 | -7.29 | | 21.18 | | 18.04 | | |
| | | 0 | -0.39 | | -15.26 | | -0.57 | | |
| | | +10 | 37.93 | | -2.18 | | -23.69 | | |
| | | +20 | 51.30 | | 55.88 | | 50.05 | | |
| | | +30 | -13.52 | | -21.86 | | -22.61 | | |
| | | +40 | 7.29 | | -2.13 | | 0.77 | | |
| | | +50 | -9.31 | | 34.04 | | 47.01 | | |
| | 4.2 | +25 | 28.13 | 23.26 | -10.57 | | | | |
| 3.6 | +25 | 9.43 | 39.72 | 31.53 | | | | | |
| 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 | |
| GSM 1900MHz | 3.7 | -30 | -0.47 | ± 1850.2 | -32.02 | ± 1880.0 | -24.98 | ± 1909.8 | PASS |
| | | -20 | -32.04 | | 26.33 | | -1.99 | | |
| | | -10 | 27.03 | | -7.73 | | 38.43 | | |
| | | 0 | -23.37 | | 43.45 | | -16.75 | | |
| | | +10 | -24.91 | | -1.64 | | -0.25 | | |
| | | +20 | 46.55 | | 41.31 | | 42.30 | | |
| | | +30 | -8.72 | | -6.04 | | 37.43 | | |
| | | +40 | -32.59 | | -15.24 | | 40.21 | | |
| | | +50 | 50.56 | | 34.52 | | -23.04 | | |
| | 4.2 | +25 | -2.03 | 31.84 | 12.02 | | | | |
| 3.6 | +25 | -23.71 | -0.01 | -8.65 | | | | | |

3.5 Conducted Out of Band Emissions

3.5.1 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.

3.5.2 Test Description

See section 3.1.2 of this report.

3.5.3 Test Setup

RBW = 1MHz, VBW = 3MHz, Attenuation = 10dB, detector = Peak max hold

3.5.4 Test Result

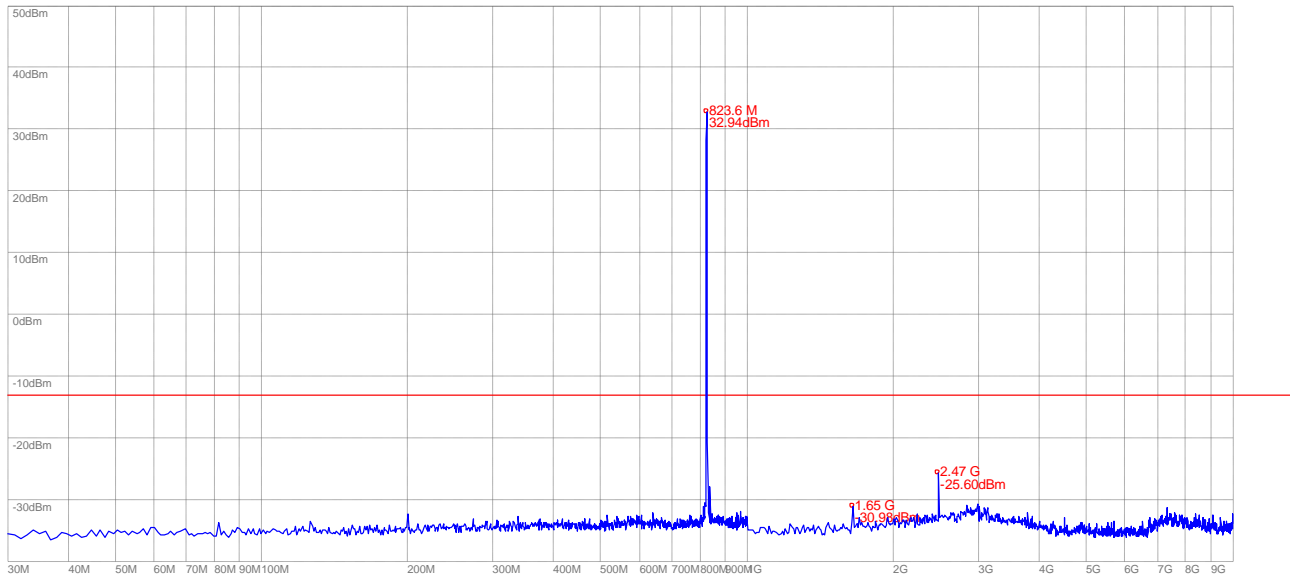
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

1. Test Verdict:

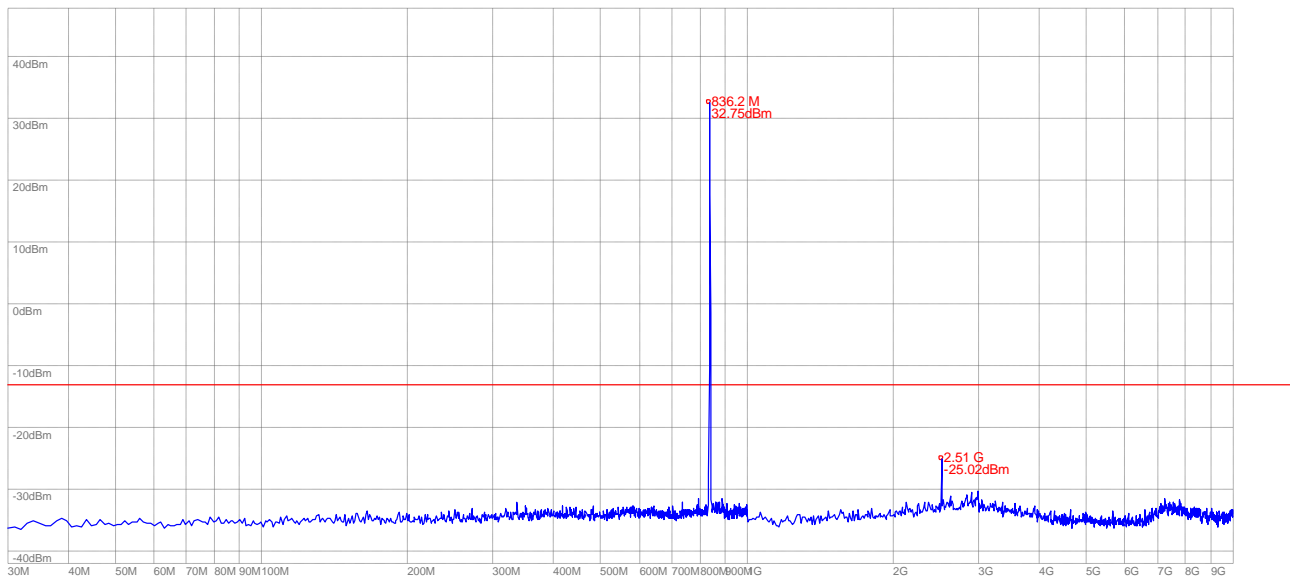
| Band | Channel | Frequency (MHz) | Measured Max. Spurious Emission (dBm) | Refer to Plot | Limit (dBm) | Verdict |
|-------------|---------|-----------------|---------------------------------------|---------------|-------------|---------|
| GSM 850MHz | 128 | 824.2 | -25.60 | Plot A | -13 | PASS |
| | 190 | 836.6 | -25.02 | Plot B | | PASS |
| | 251 | 848.8 | -24.64 | Plot C | | PASS |
| GSM 1900MHz | 512 | 1850.2 | -31.70 | Plot D | -13 | PASS |
| | 661 | 1880.0 | -28.64 | Plot E | | PASS |
| | 810 | 1909.8 | -31.89 | Plot F | | PASS |

2. Test Plot for the Whole Measurement Frequency Range:

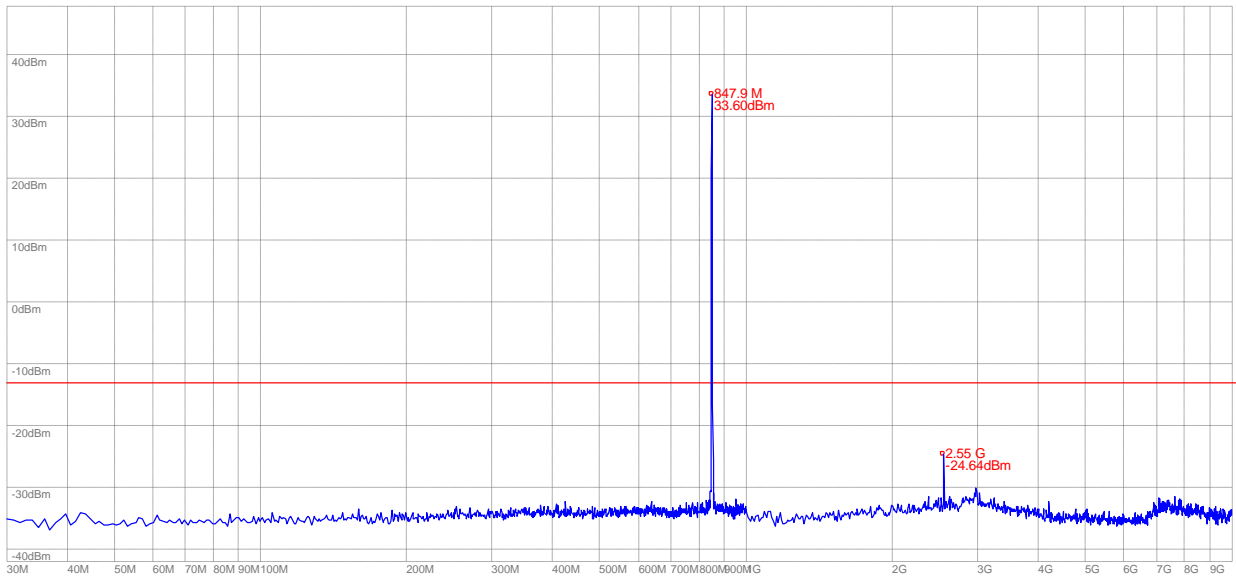
Note: the power of the EUT transmitting frequency should be ignored.



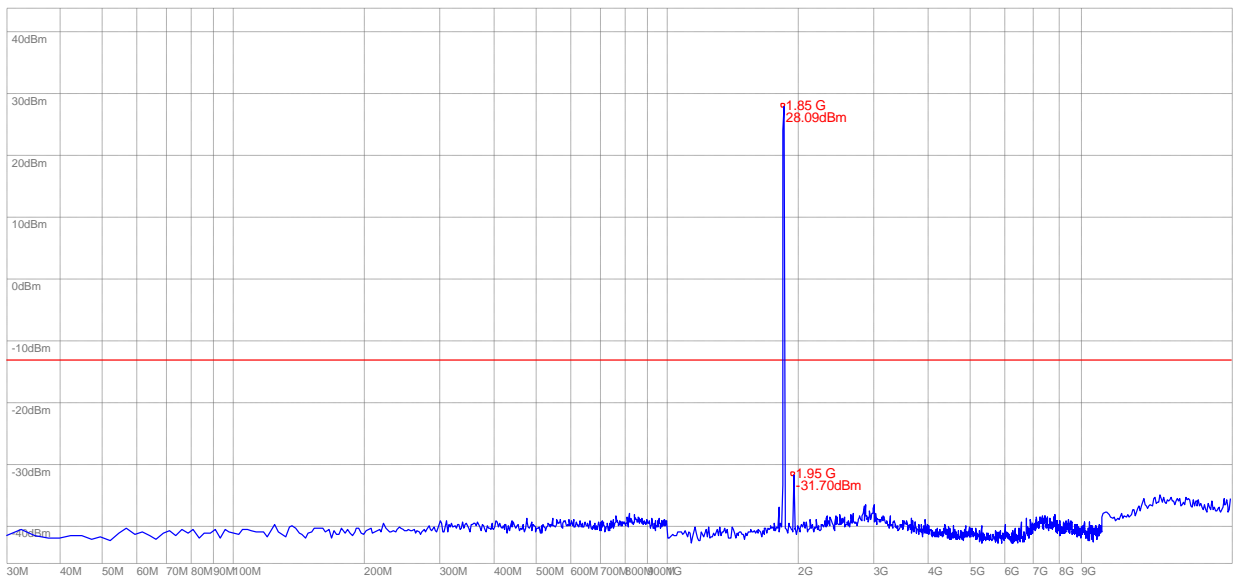
(Plot A: GSM 850MHz Channel = 128, 30MHz to 10GHz)



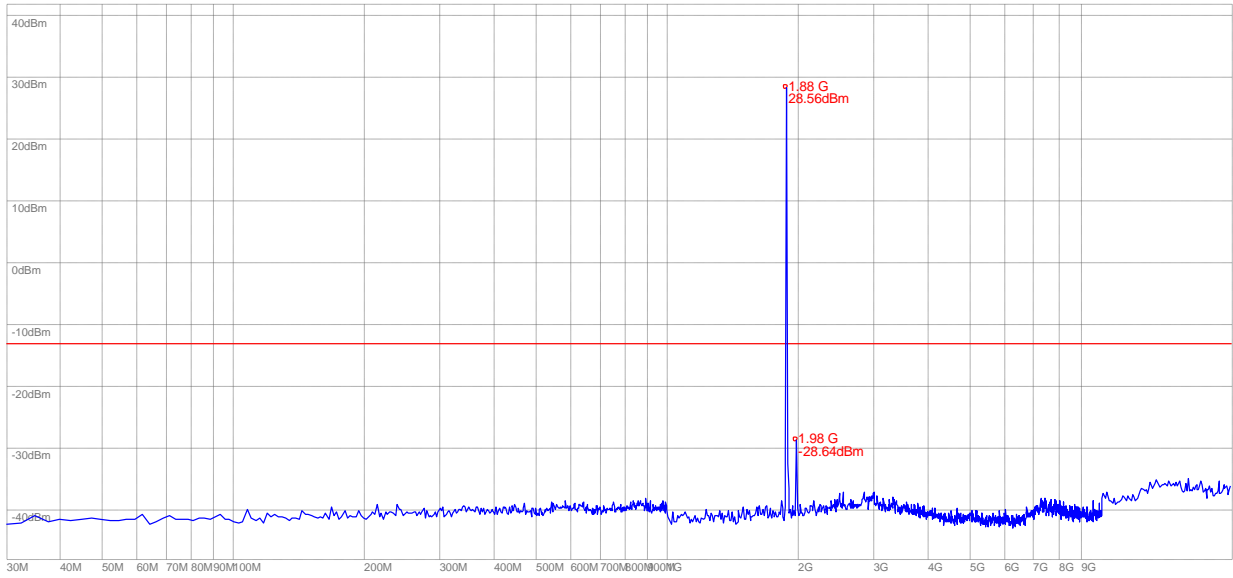
(Plot B: GSM 850MHz Channel = 190, 30MHz to 10GHz)



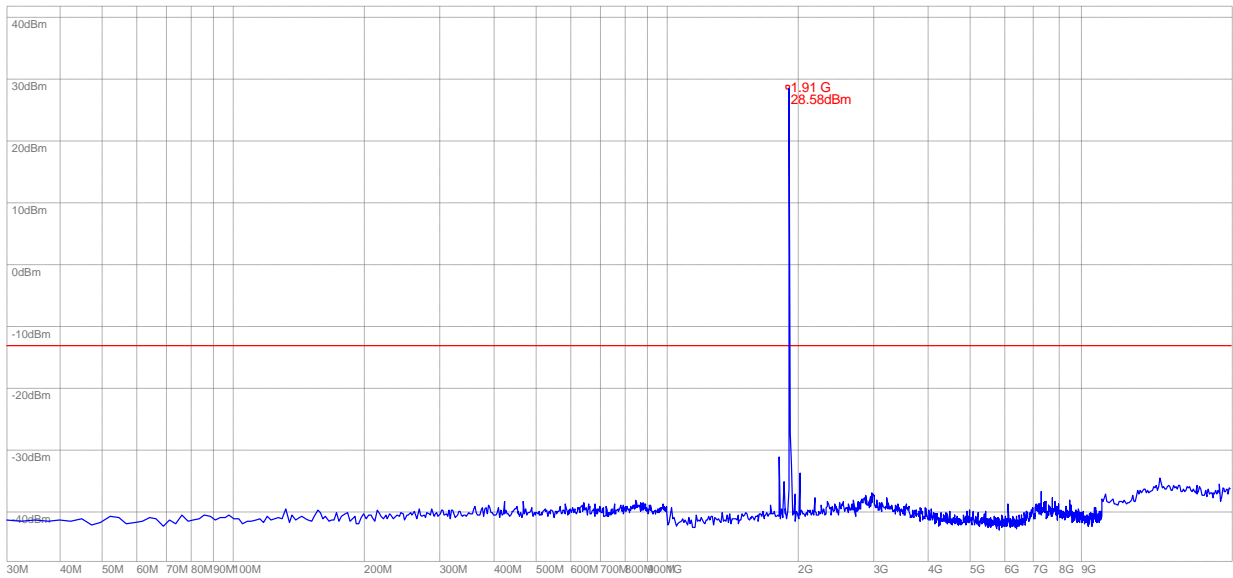
(Plot C: GSM 850MHz Channel = 251, 30MHz to 10GHz)



(Plot D: GSM 1900MHz Channel = 512, 30MHz to 20GHz)



(Plot E: GSM 1900MHz Channel = 661, 30MHz to 20GHz)



(Plot F: GSM 1900MHz Channel = 810, 30MHz to 20GHz)

3.6 Band Edge

3.6.1 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.

3.6.2 Test Description

See section 3.1.2 of this report.

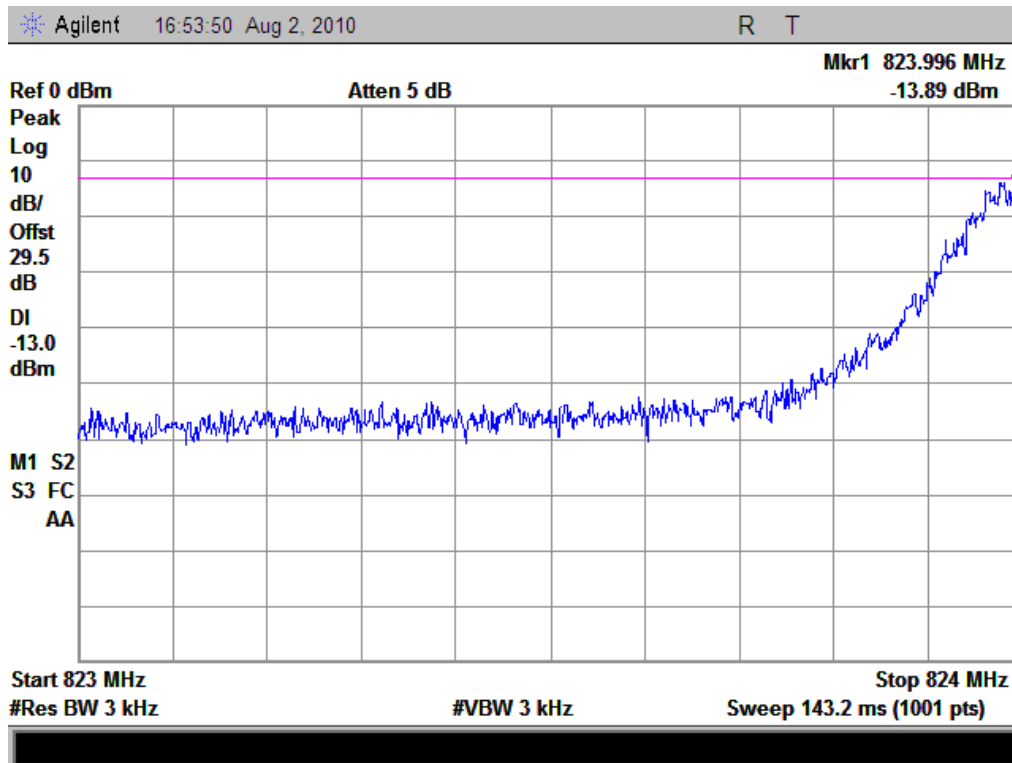
3.6.3 Test Result

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

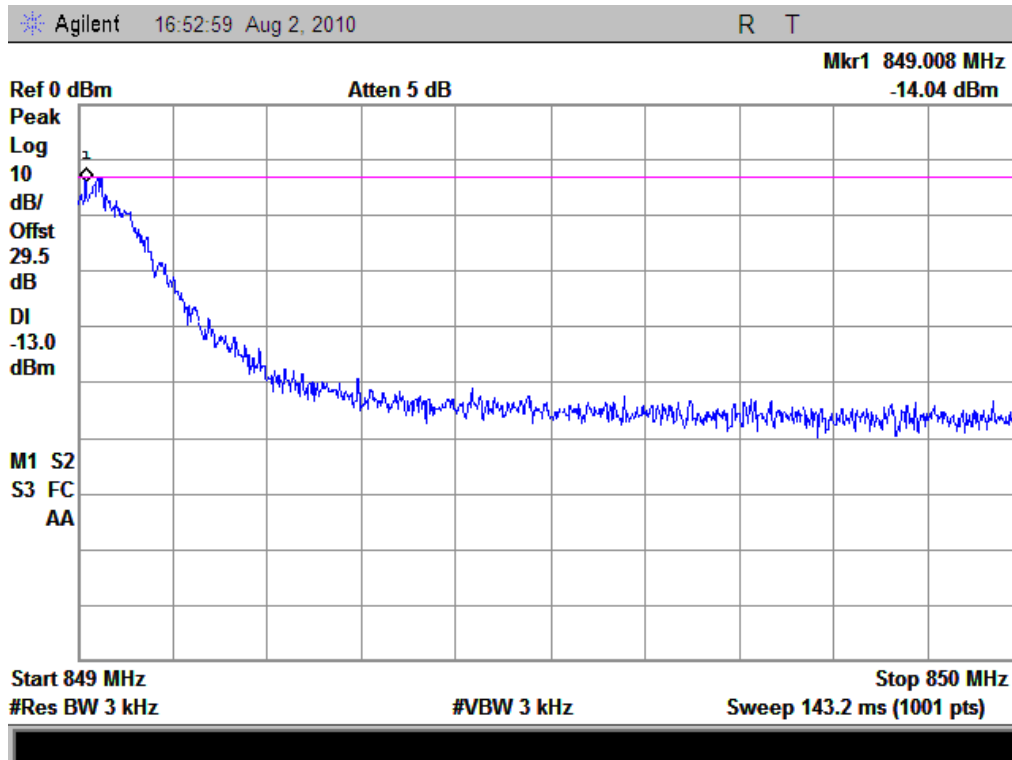
1. Test Verdict:

| Band | Channel | Frequency (MHz) | Measured Max. Band Edge Emission (dBm) | Refer to Plot | Limit (dBm) | Verdict |
|----------------|---------|-----------------|--|---------------|-------------|---------|
| GSM 850MHz | 128 | 824.2 | -13.89 | Plat A | -13 | PASS |
| | 251 | 848.8 | -14.04 | Plot B | | PASS |
| GSM 1900MHz | 512 | 1850.2 | -14.32 | Plat C | -13 | PASS |
| | 810 | 1909.8 | -16.4 | Plot D | | PASS |

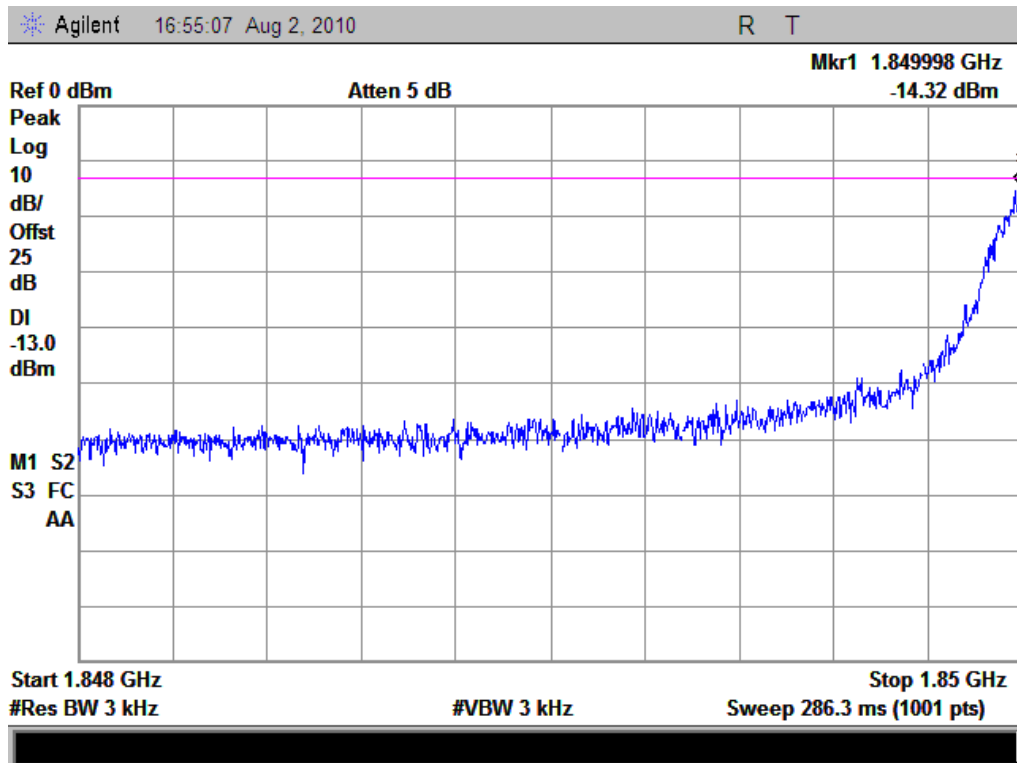
2. Test Plot:



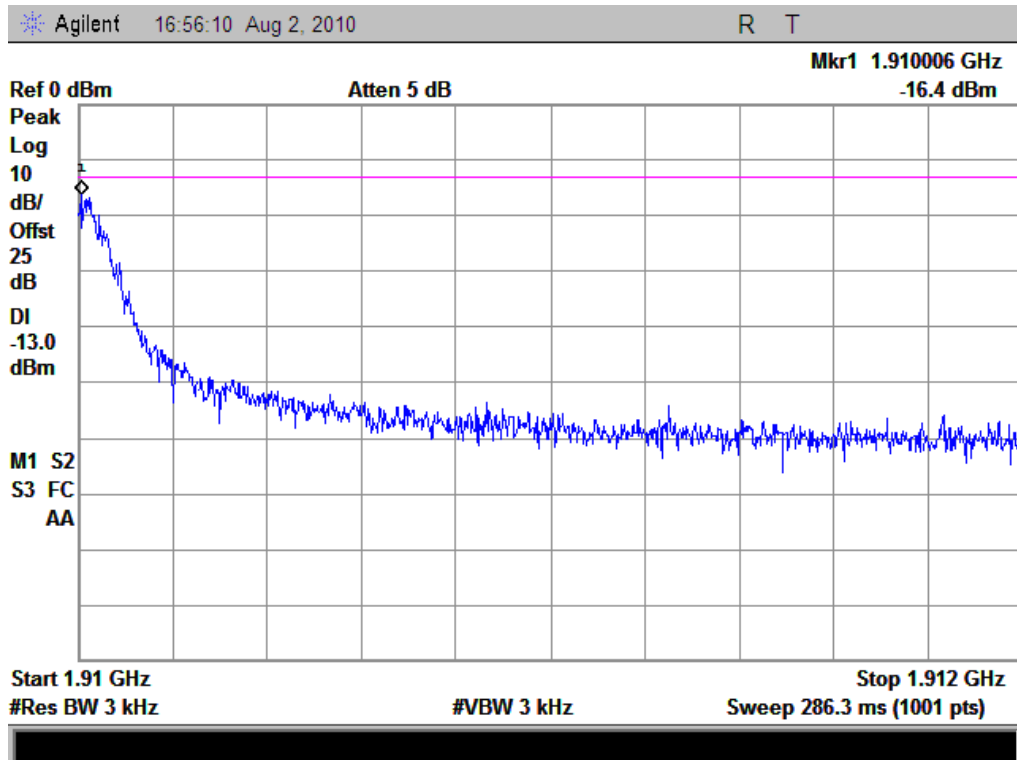
(Plot A: Channel = 128)



(Plot B: Channel = 251)



(Plot C: Channel = 512)



(Plot D: Channel = 810)

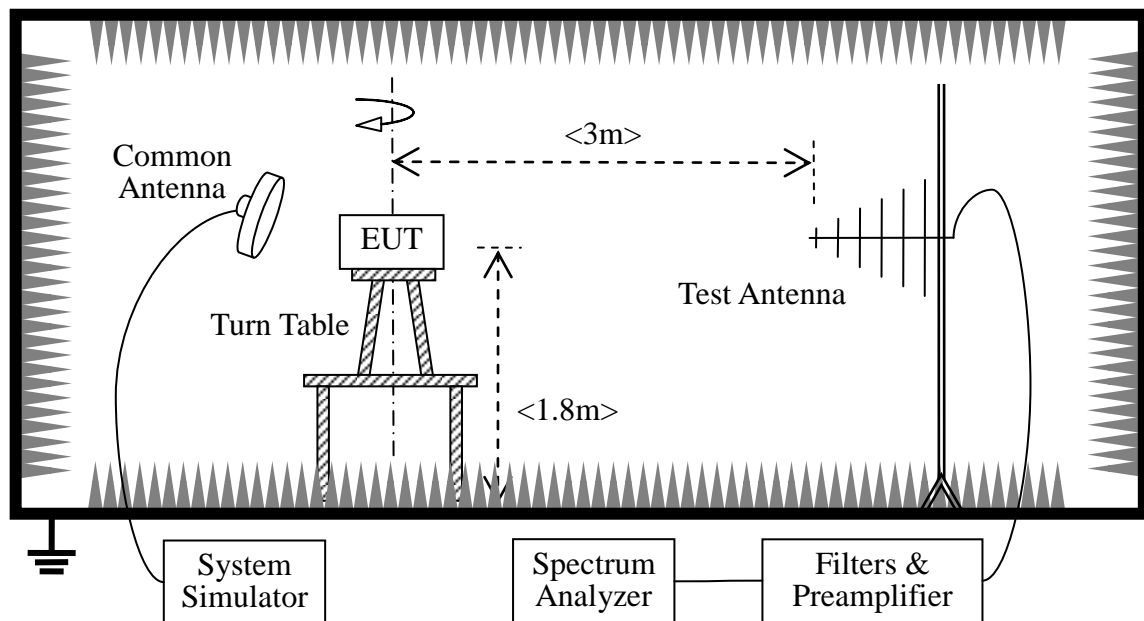
3.7 Transmitter Radiated Power (EIRP/ERP)

3.7.1 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 2Watts e.i.r.p. peak power.

3.7.2 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.

-Maximum RF output power: GSM850 32.06dBm, GSM 1900 29.36dBm, please refer to 3.2.3.

- Step size (dB): 3dB

- Minimum RF power: GSM850 3.5dBm, GSM 1900 -0.2dBm

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 | 2009.08 | 1year |
| Spectrum Analyzer | Agilent | E7405A | US44210471 | 2009.08 | 1year |
| Full-Anechoic Chamber | Albatross | 9m*6m*6m | (n.a.) | 2009.08 | 2year |
| Test Antenna - Bi-Log | Schwarzbeck | VULB 9163 | 9163-274 | 2009.08 | 1year |
| Test Antenna - Horn | Schwarzbeck | BBHA 9120C | 9120C-384 | 2009.08 | 1year |

3.7.3 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:

$$SCF_{\text{Offset}} = P_g(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)} - P_r(\text{dBm})$$

Where P_g is the generator output power into the substitution antenna

Cable loss is the reduction in power between the generator and the substitution antenna

Antenna gain is the gain of the substitution antenna relative to an ideal half wave dipole antenna (for ERP) or isotropic radiator (for EIRP)

P_r is the spectrum analyzer reading

SCF_{Offset} is substitution correction factor.

Calculation example:

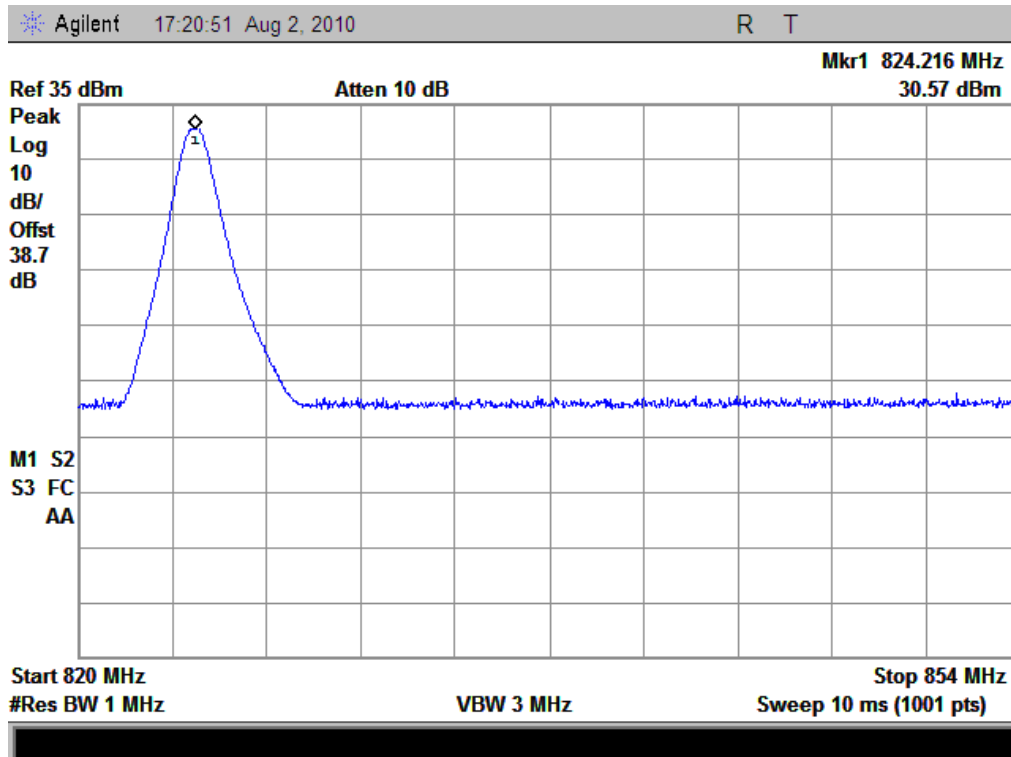
| Band | SCF_{Offset} | $P_g(\text{dBm})$ | cable loss (dB) | antenna gain | $P_r(\text{dBm})$ |
|---------|-----------------------|-------------------|-----------------|--------------|-------------------|
| GSM850 | 38.7 dB | 0 dBm | 0.3 dB | 7.94 dBd | -31.06 dBm |
| GSM1900 | 47 dB | 0 dBm | 1.3 dB | 12.57 dBi | -35.73 dBm |

During the test, the data of SCF_{Offset} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of SCF_{Offset} .

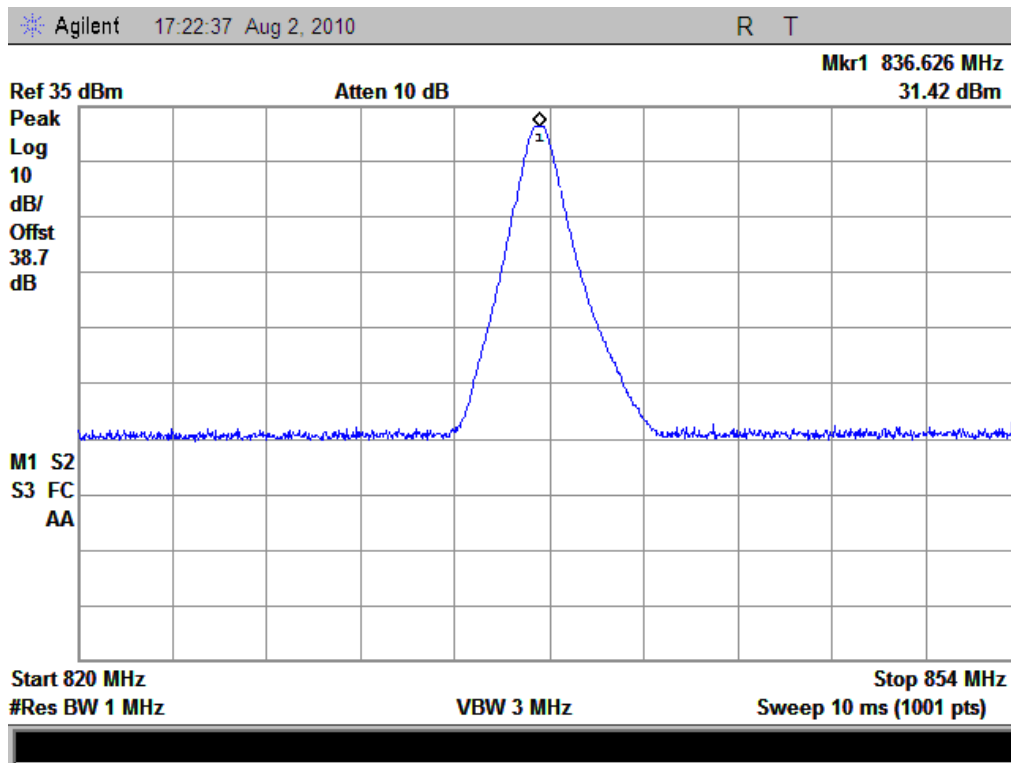
1. Test Verdict:

| Band | Channel | Frequency (MHz) | PCL | Measured ERP | | | Limit | | Verdict |
|-------------|---------|-----------------|-----|---------------|------|---------------|-------|---|---------|
| | | | | dBm | W | Refer to Plot | dBm | W | |
| GSM 850MHz | 128 | 824.20 | 5 | 30.57 | 1.14 | Plot A | 38.45 | 7 | PASS |
| | 190 | 836.60 | 5 | 31.42 | 1.39 | Plot B | | | PASS |
| | 251 | 848.80 | 5 | 31.68 | 1.47 | Plot C | | | PASS |
| Band | Channel | Frequency (MHz) | PCL | Measured EIRP | | | Limit | | Verdict |
| | | | | dBm | W | Refer to Plot | dBm | W | |
| GSM 1900MHz | 512 | 1850.2 | 0 | 25.48 | 0.35 | Plot D | 33 | 2 | PASS |
| | 661 | 1880.0 | 0 | 27.47 | 0.56 | Plot E | | | PASS |
| | 810 | 1909.8 | 0 | 26.84 | 0.48 | Plot F | | | PASS |

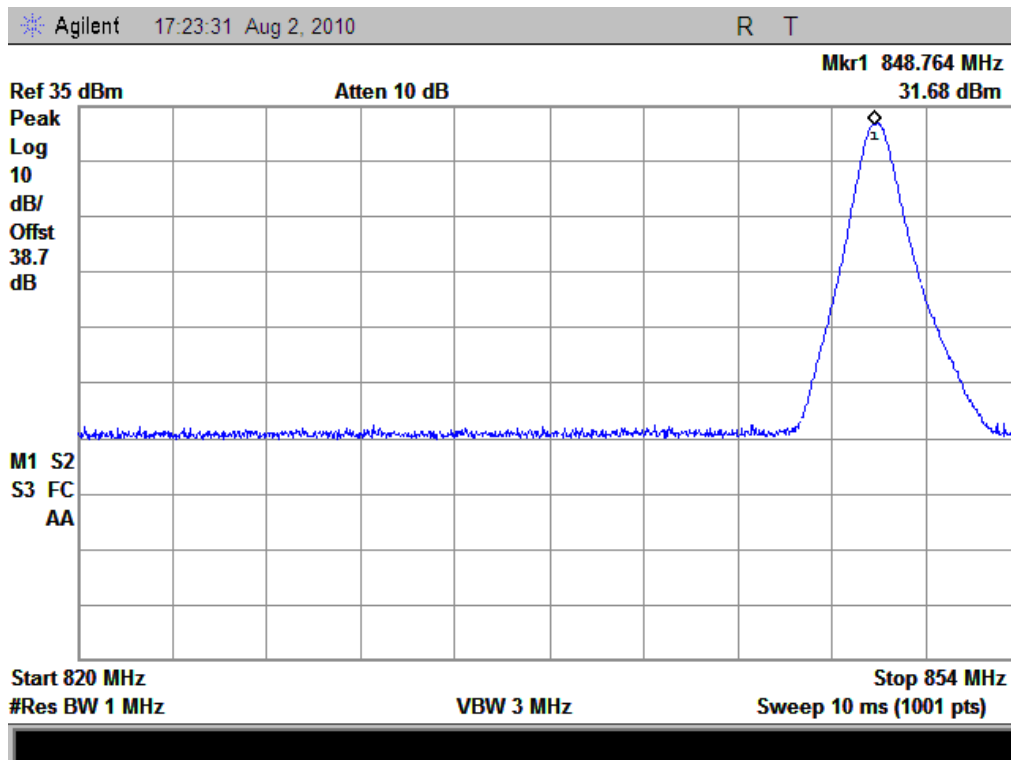
2. Test Plot:



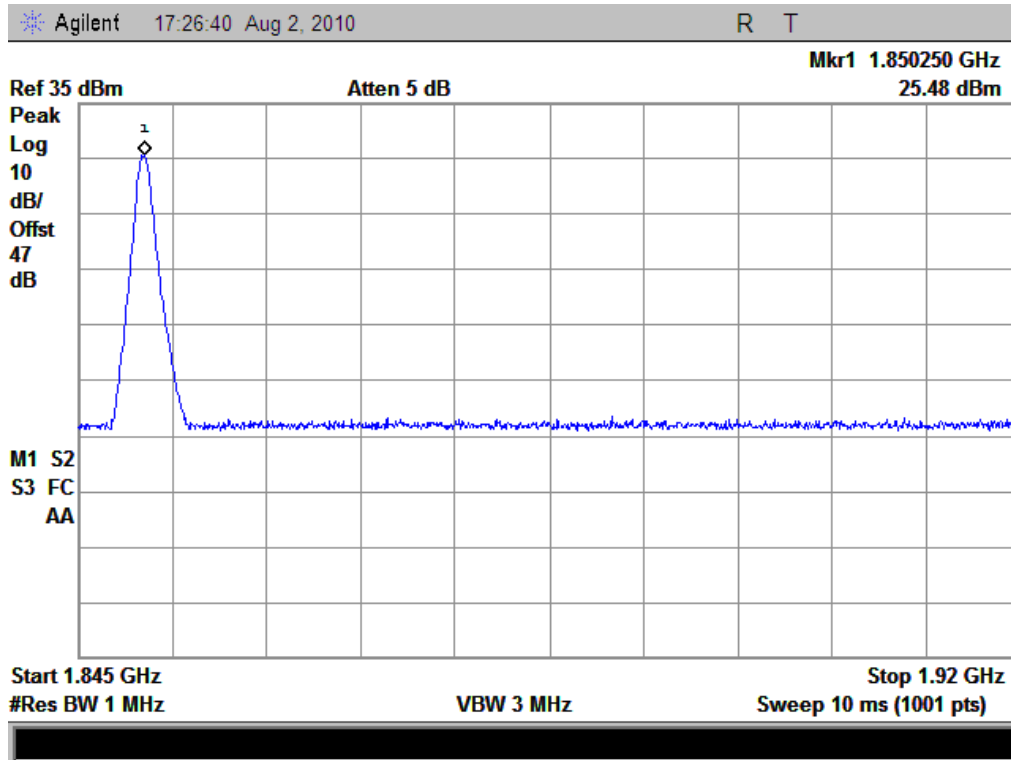
(Plot A: GSM 850MHz Channel = 128)



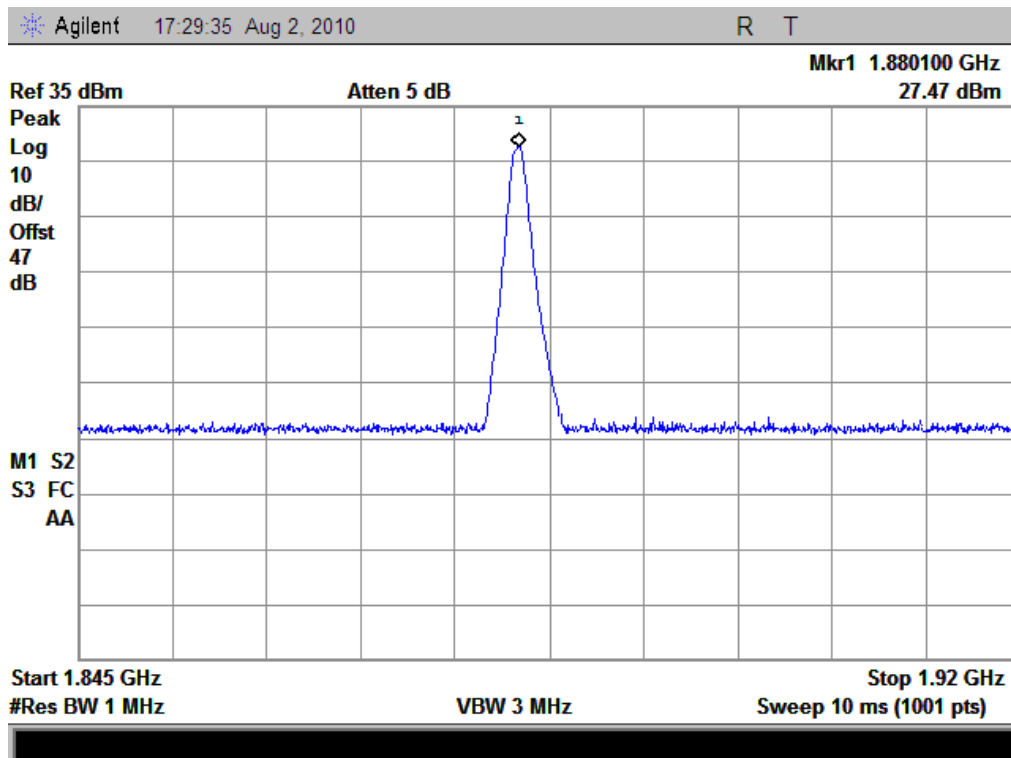
(Plot B: GSM 850MHz Channel = 190)



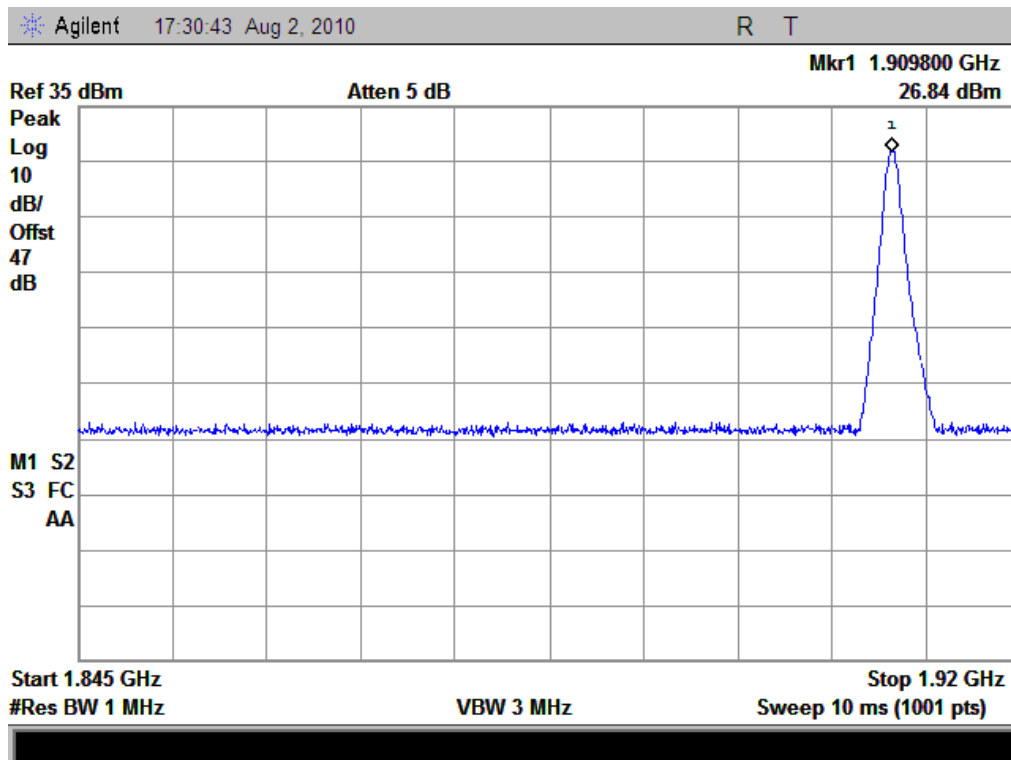
(Plot C: GSM 850MHz Channel = 251)



(Plot D: GSM 1900MHz Channel = 512)



(Plot E: GSM 1900MHz Channel = 661)



(Plot F: GSM 1900MHz Channel = 810)

3.8 Radiated Out of Band Emissions

3.8.1 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.

3.8.2 Test Description

See section 3.7.2 of this report.

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

3.8.3 Test Setup

| | | |
|---------|---|--|
| GSM850 | 30MHz-1GHz 1GHz-2.5GHz Above 2.5GHz | RBW = 1MHz, VBW = 3MHz, Attenuation = 10dB, detector = Peak max hold |
| GSM1900 | 30MHz-1GHz 1GHz-2.5GHz Above 2.5GHz | RBW = 1MHz, VBW = 3MHz, Attenuation = 10dB, detector = Peak max hold |

3.8.4 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.

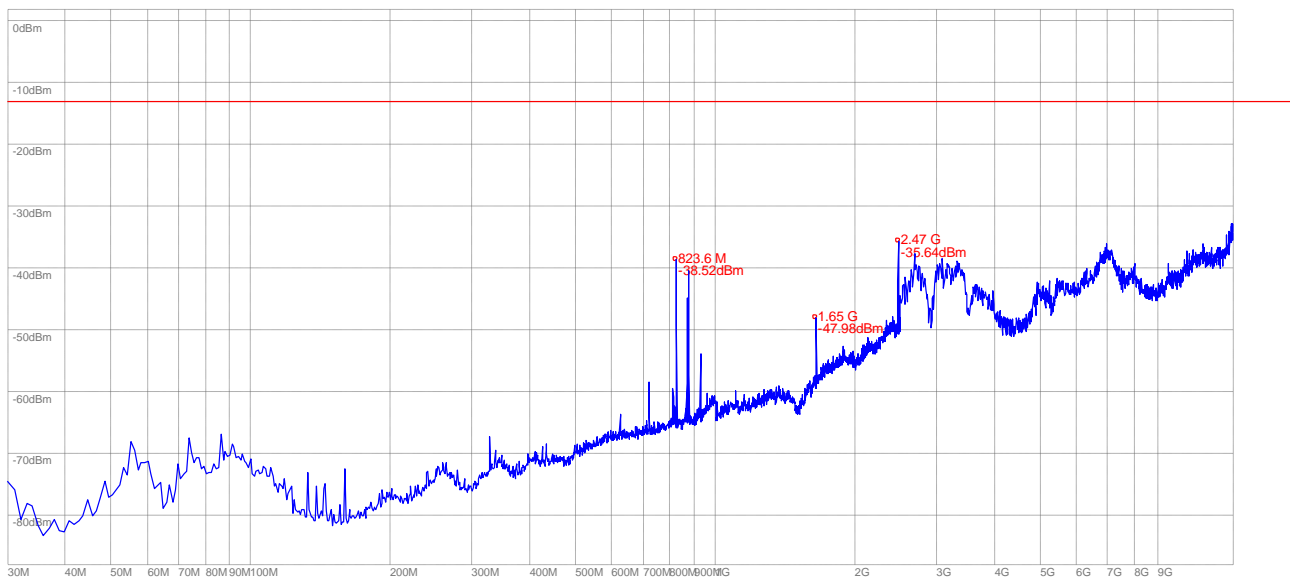
1. Test Verdict:

| Band | Channel | ERP | Measured Max. Spurious Emission (dBm) | | | | Refer to Plot | Limit (dBm) | Verdict |
|------|---------|-------|---------------------------------------|--------|-----------------------|--------|---------------|-------------|---------|
| | | | Ant Horizo (Hz dBm) | | Ant Vertical (Hz dBm) | | | | |
| GSM | 128 | 30.57 | 2.47G | -35.64 | 2.47G | -36.94 | Plot A | -13 | PASS |

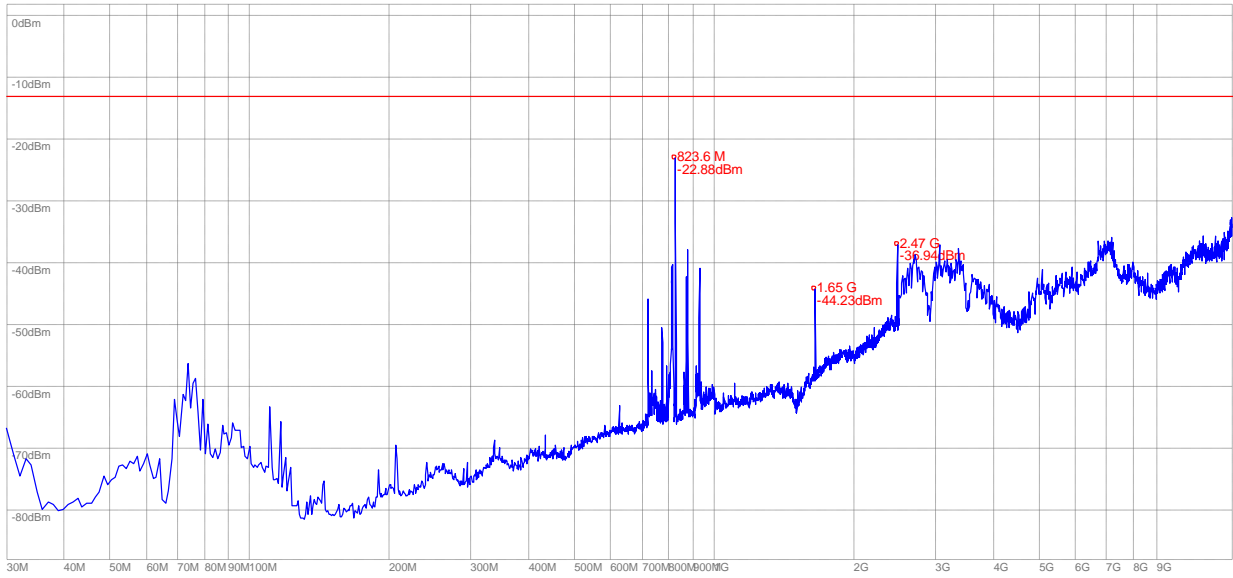
| Band | Channel | ERP | Measured Max. Spurious Emission (dBm) | | | | Refer to Plot | Limit (dBm) | Verdict |
|-------------|---------|-------|---------------------------------------|--------|-----------------------|--------|---------------|-------------|---------|
| | | | Ant Horizo (Hz dBm) | | Ant Vertical (Hz dBm) | | | | |
| 850MHz | 190 | 31.42 | 875M | -40.79 | 939.9M | -40.52 | Plot B | | PASS |
| | 251 | 31.68 | 875M | -40.77 | 875M | -37.98 | Plot C | | PASS |
| Band | Channel | EIRP | Measured Max. Spurious Emission (dBm) | | | | Refer to Plot | Limit (dBm) | Verdict |
| | | | Ant Horizo (Hz dBm) | | Ant Vertical (Hz dBm) | | | | |
| GSM 1900MHz | 512 | 25.48 | 1.95G | -38.56 | 1.8G | -35.06 | Plot D | -13 | PASS |
| | 661 | 27.47 | 1.95G | -37.98 | 1.8G | -33.78 | Plot E | | PASS |
| | 810 | 26.84 | 1.76G | -37.02 | 1.76G | -36.29 | Plot F | | PASS |

2. Test Plot for the Whole Measurement Frequency Range:

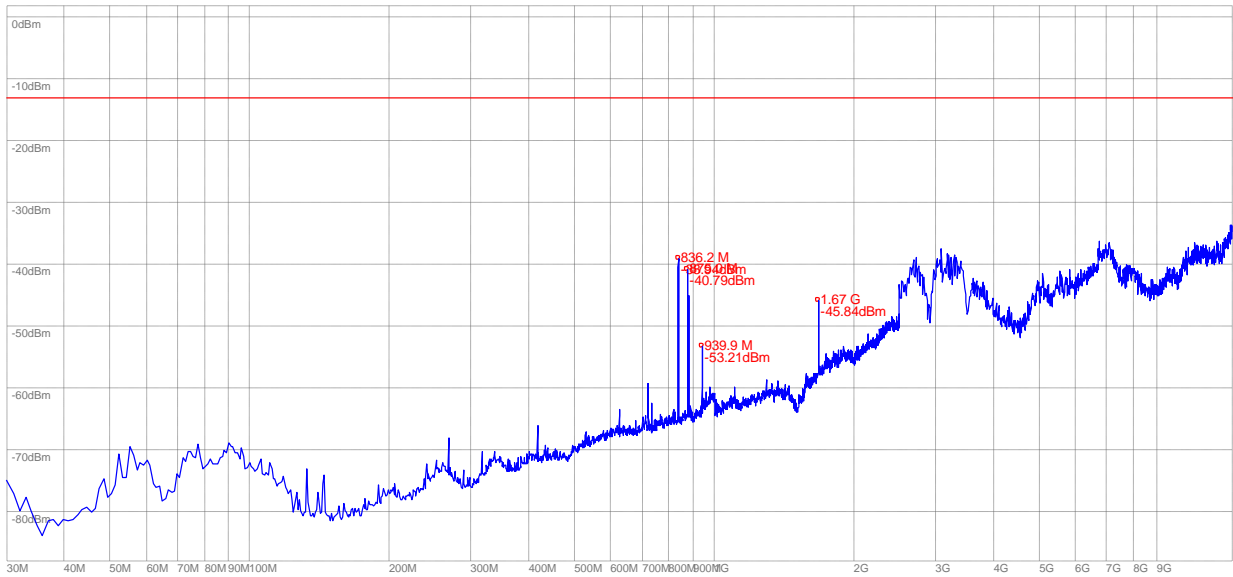
Note: the power of the EUT transmitting frequency should be ignored.



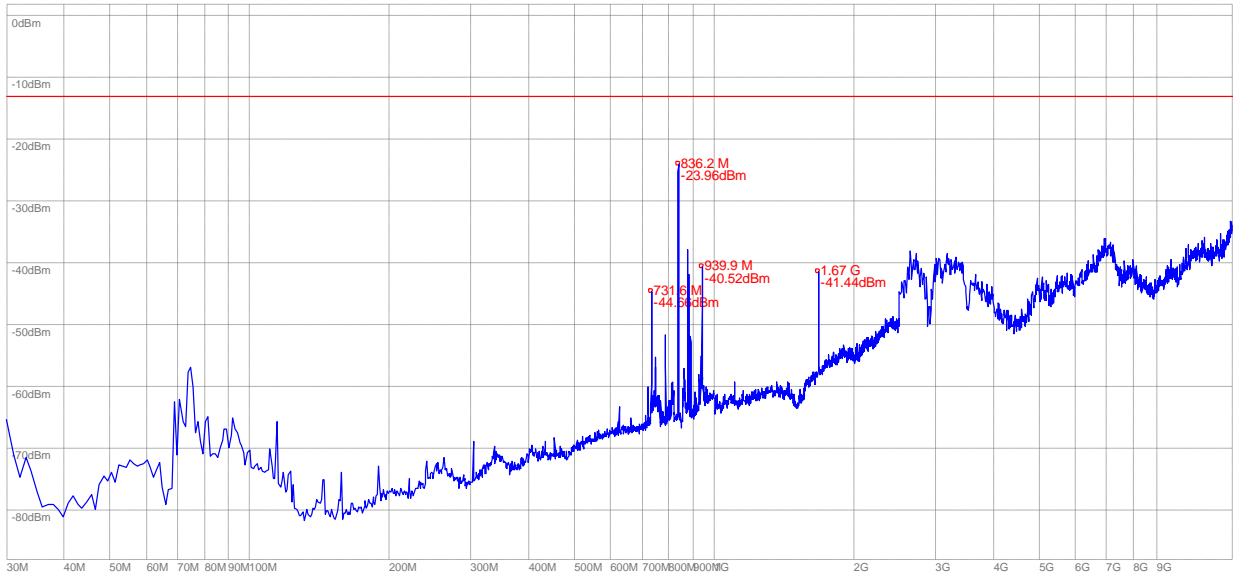
(Plot A.1: GSM 850MHz Channel = 128, Test Antenna Horizontal)



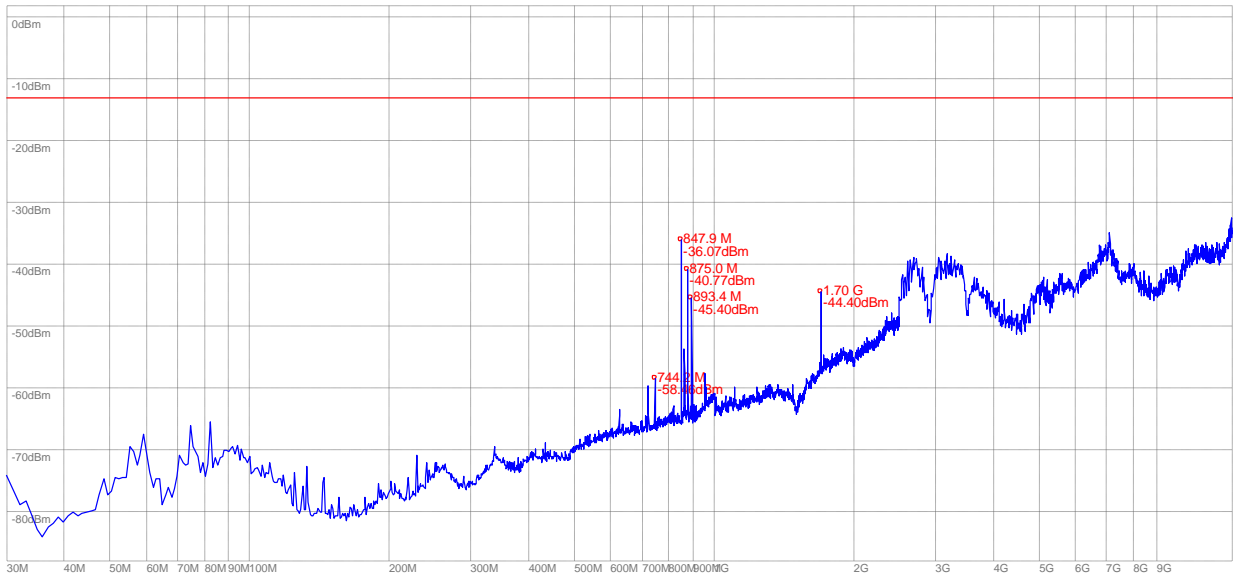
(Plot A.2: GSM 850MHz Channel = 128, Test Antenna Vertical)



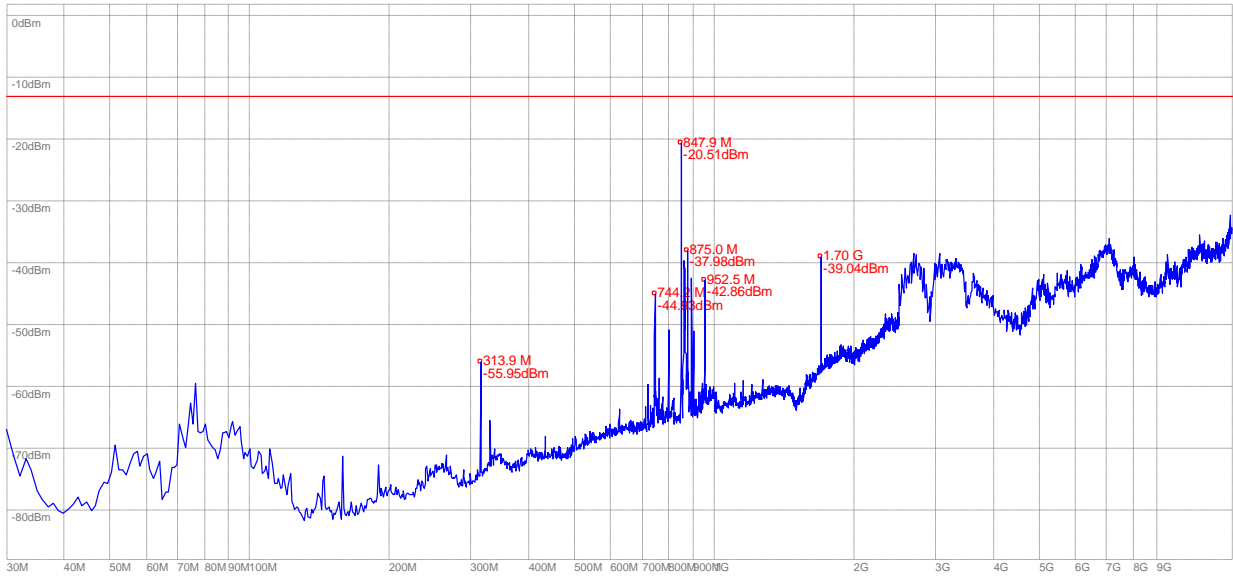
(Plot B.1: GSM 850MHz Channel = 190, Test Antenna Horizontal)



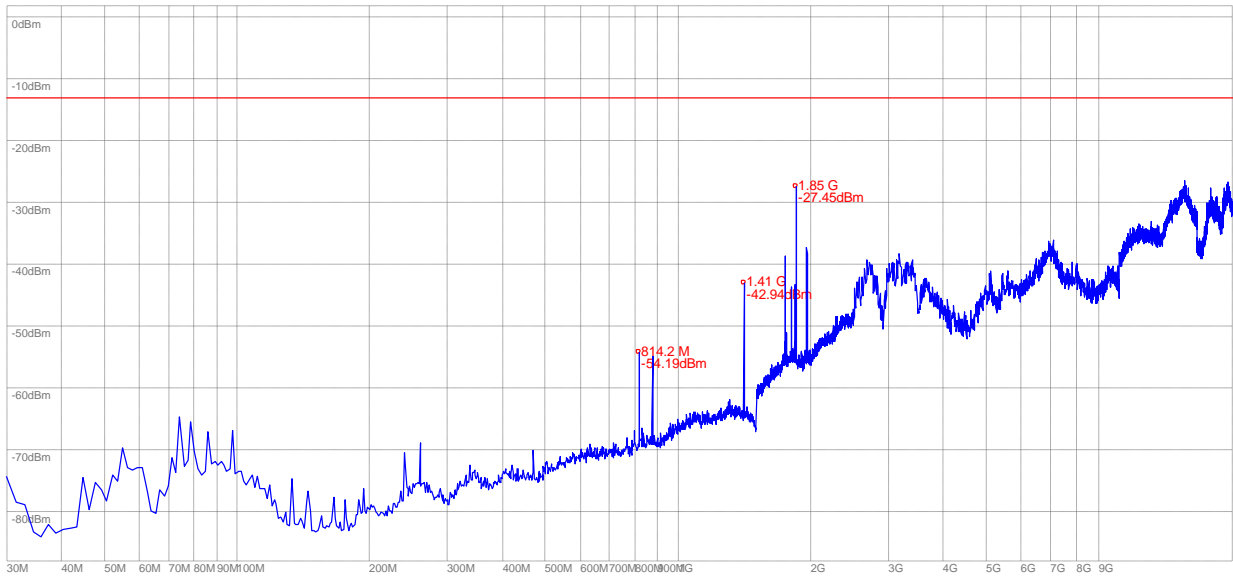
(Plot B.2: GSM 850MHz Channel = 190, Test Antenna Vertical)



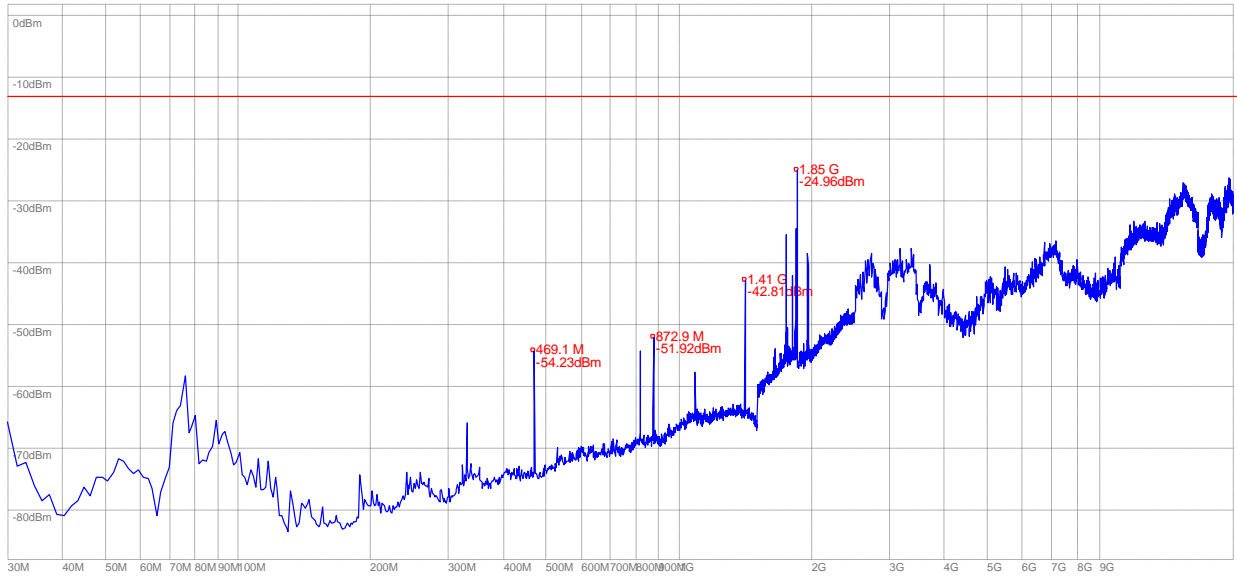
(Plot C.1: GSM 850MHz Channel = 251, Test Antenna Horizontal)



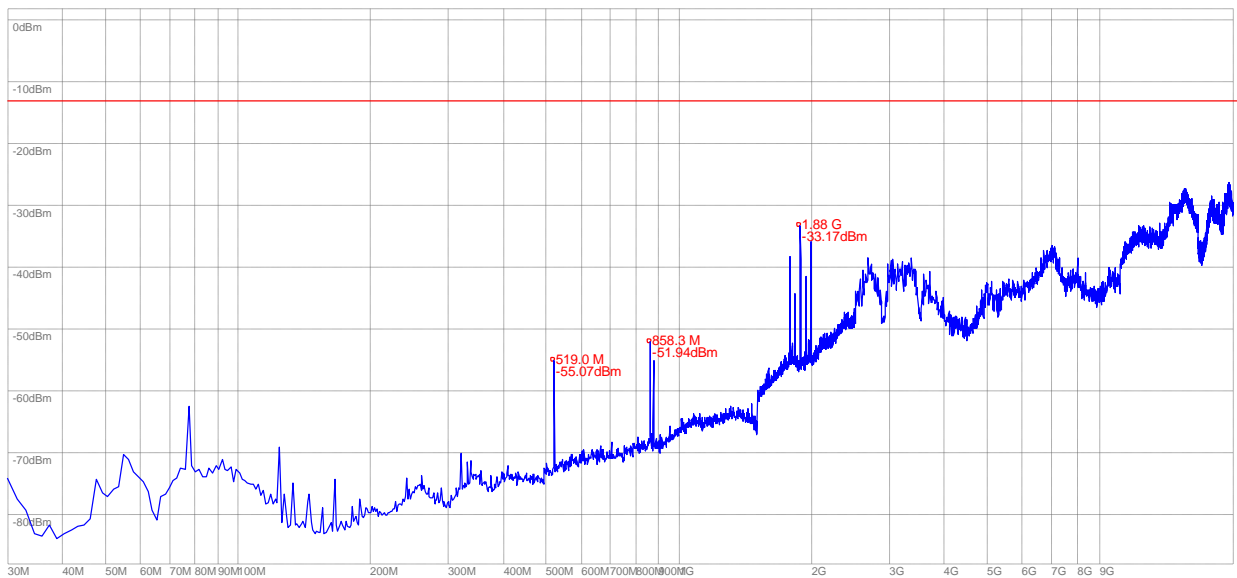
(Plot C.2: GSM 850MHz Channel = 251, Test Antenna Vertical)



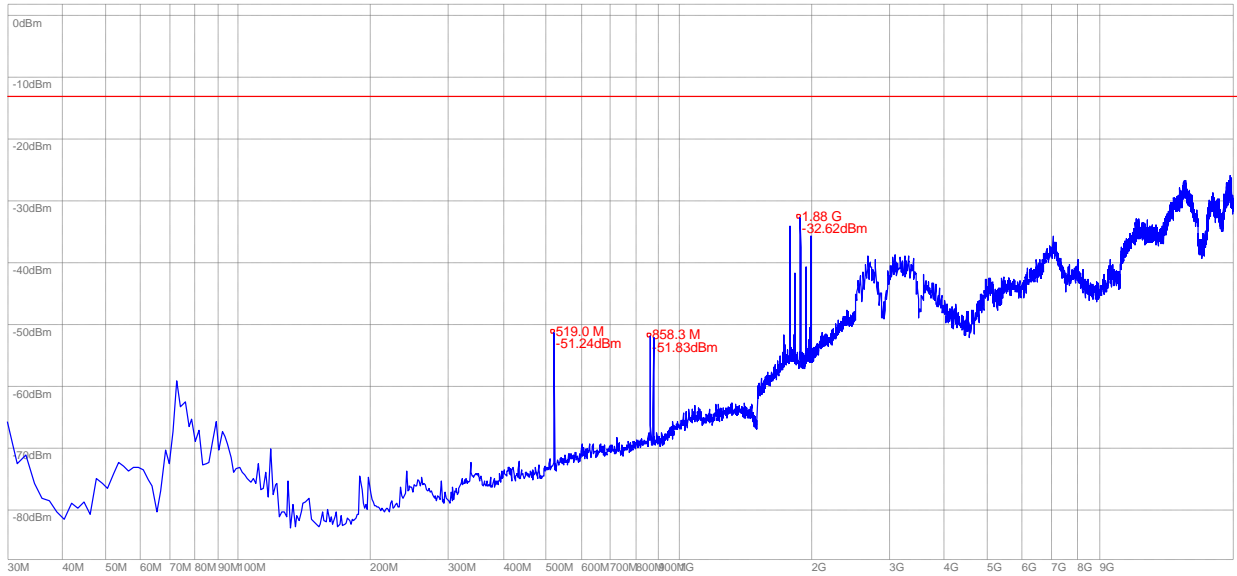
(Plot D.1: GSM 1900MHz Channel = 512, Test Antenna Horizontal)



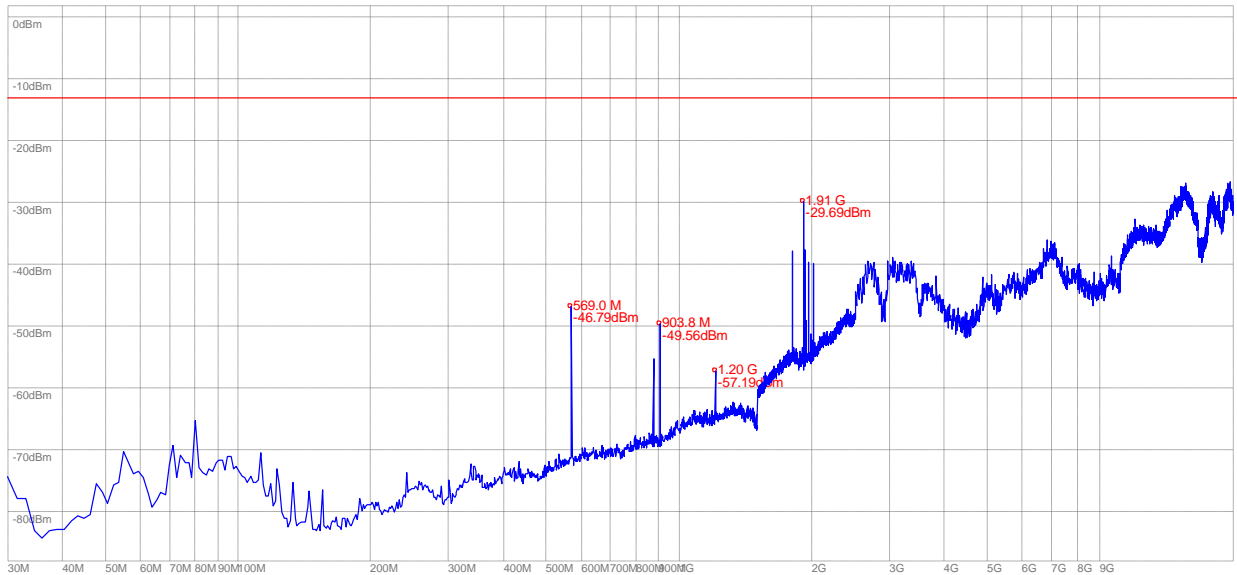
(Plot D.2: GSM 1900MHz Channel = 512, Test Antenna Vertical)



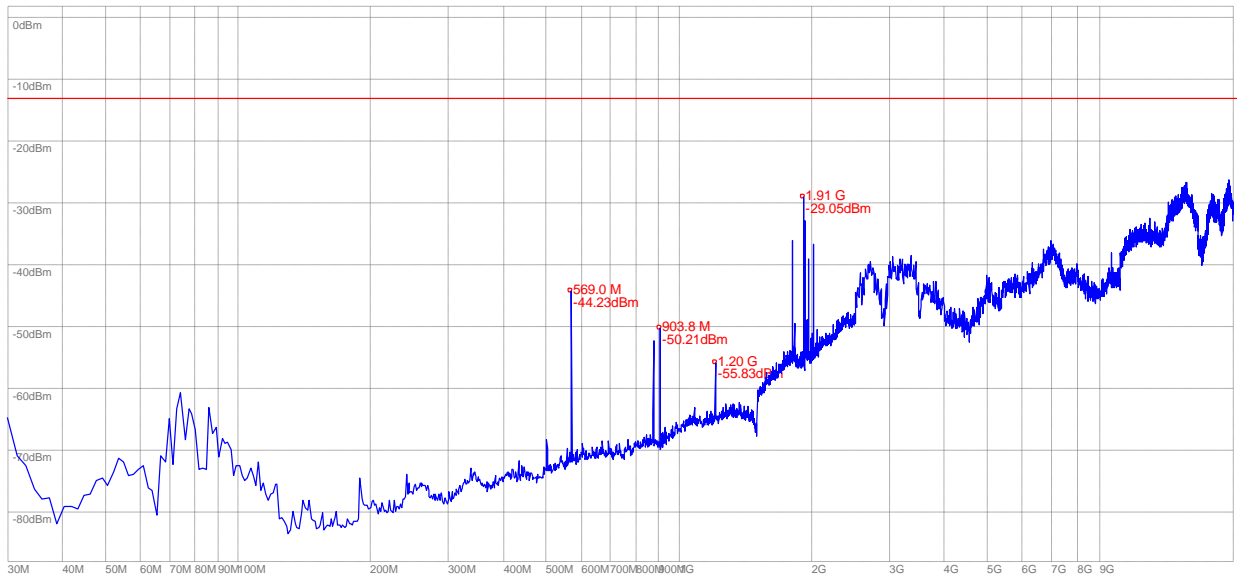
(Plot E.1: GSM 1900MHz Channel = 661, Test Antenna Horizontal)



(Plot E.2: GSM 1900MHz Channel = 661, Test Antenna Vertical)



(Plot F.1: GSM 1900MHz Channel = 810, Test Antenna Horizontal)



(Plot F.2: GSM 1900MHz Channel = 810, Test Antenna Vertical)

** END OF REPORT **