(2004)量认(国)字(H2402)号 No.L1659

# FCC Part 22H&24E TEST REPORT

*of*

## GSM 850/900/1800/1900 Mobile Terminal

| | |
|---|---|
| **FCC ID:** | T6LE2831 |
| **Model No.:** | E2831 |
| **Serial No.:** | N.A. |
| **Report No.:** | FCC07-8005 |
| **Date:** | January 11, 2007 |

*Prepared for*

**E28 Ltd.**

2nd Floor, Dong Yin Tower, No. 689 East Beijing Road,
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*Prepared by*

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# Table of Contents

# 1 Test Report Certification

| | |
|---|---|
| **Product:** | GSM 850/900/1800/1900 Mobile Terminal |
| **FCC ID:** | T6LE2831 |
| **Model No.:** | E2831 |
| **Applicant:** | E28 Ltd. |
| **Applicant Address:** | 2nd Floor, Dong Yin Tower, No. 689 East Beijing Road, Shanghai, 200001, P.R.China |
| **Manufacturer:** | E28 Ltd. |
| **Manufacturer Address:** | 2nd Floor, Dong Yin Tower, No. 689 East Beijing Road, Shanghai, 200001, P.R.China |
| **Test Standards:** | 47 CFR Part 2<br>47 CFR Part 22, Subpart H<br>47 CFR Part 24, Subpart E |
| **Test Result:** | **PASS** |

We, Shenzhen Electronic Product Quality Testing Center, hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Tested by: Lin Xingsun, Date: Jan. 11. 2007
Lin Xingsun

Checked by: Smart Li, Date: Jan. 11. 2007
Smart Li

Approved by: Wu Li An, Date: Jan. 15. 2007
Wu Li An

# 2 General Information

## 2.1 Description of EUT

| | |
|---|---|
| **Description:** | GSM 850/900/1800/1900 Mobile Terminal |
| **Model No.:** | E2831 |
| **Emission Designator:** | 300KGXW |
| **Modulation:** | GSM |
| **Frequency:** | GSM850, Tx: 824.20-848.80MHz;<br>Rx: 869.20-893.80MHz<br>GSM1900, Tx: 1850.20-1909.80MHz;<br>Rx: 1930.20MHz-1989.80MHz |
| **Power:** | 2W for GSM850; 1W for GSM1900 |
| **Serial No.:** | N.A. |
| **Hardware Version:** | P3.0 |
| **Software Version:** | V2.0 |
| **Battery Voltage:** | Normal, 3.7V; High, 4.2V; Low, 3.6V |

**NOTE:**

1. The EUT is Quad-band GSM mobile phone which supports GSM 850MHz, 900MHz, 1800MHz and 1900MHz bands. Only Cellular 850MHz and PCS 1900MHz bands were tested in this report.
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

## 2.2 Objective

Perform EMC test according to FCC rules Part 2, Part 22 and Part 24 for FCC ID Certification.

## 2.3 Test Standards and Results

The EUT has been tested according to 47 CFR

- Part 2 Frequency Allocations and Radio Treaty Matters: General Rules and Regulations (10-1-05 Edition)
- Part 22 Public Mobile Services (10-1-05 Edition)
- Part 24 Personal Communications Services (10-1-05 Edition)

Test items and the results are as bellow:

| ? | FCC Rules | Test Type | Result | Test Date |
|---|---|---|---|---|
| 1 | §2.106<br>§22.905<br>§24. 229 | Frequencies | PASS | 2007.1.5 |
| 2 | §2.1046 | Conducted RF Output Power at Antenna Terminal | PASS | 2007.1.5 |
| 3 | §2.1049 | Occupied Bandwidth | PASS | 2007.1.5 |
| 4 | §2.1051<br>§2.1057<br>§22.917<br>§24.238 | Conducted Spurious Emission at Antenna Terminal | PASS | 2007.1.5 |
| 5 | §22.913<br>§24.232 | Transmitter Radiated Power (EIRP/ERP) | PASS | 2007.1.7 |
| 6 | §2.1053<br>§2.1057<br>§22.917<br>§24.238 | Radiated Spurious Emission | PASS | 2007.1.7 |
| 7 | §2.1055<br>§22.355<br>§24.235 | Frequency Stability | PASS | 2007.1.8 |

## 2.4 List of Equipments Used

| Description | Manufacturer | Model No. | Cal. Due Date | Serial No. |
|---|---|---|---|---|
| Test Receiver | Rohde & Schwarz | ESIB26 | 2007.06.05 | A0304218 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 2007.06.05 | A0304220 |
| Ultra Broadband Ant. | Rohde & Schwarz | HL562 | 2007.06.05 | A0304224 |
| Horn Ant. | Rohde & Schwarz | HF906 | 2007.06.05 | 100150 |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU200 | 2007.06.05 | A0304212 |
| Mobile Phone Tester | Willtek | 4403 | 2007.02.10 | 0811211 |
| 3G Communication Antenna | European Antennas | PSA 75301R/170 | 2007.05.10 | A0304213 |
| Temperature Chamber | JAPAN TABAI | PSL-4G | 2007.02.05 | A8708056 |
| Regulated DC Power Supply | Jiangbo | JB-305 | -- | A0412374 |
| Shield Room | Nanbo Tech | Site 3 | 2008.01.04 | A9901141 |
| Shield Room | Nanbo Tech | Site 1 | 2008.01.04 | A0304188 |
| Anechoic Chamber | Albatross | EMC12.8× 6.8× 6.4$m^3$ | 2007.04.10 | A0304210 |

## 2.5 Test Facility

Shenzhen Electronic Product Quality Testing Center (SET) is a third party testing organization accredited by China National Accreditation Board for Laboratories (CNAL) according to ISO/IEC 17025. The accreditation certificate number is **L1659**.

The EMC chamber site No.1 (EMC12.8× 6.8× 6.4(m)), and the radiated and conducted Emission test equipments of SET are constructed and calibrated to meet the FCC requirements ANSI C63.4:2001 and CISPR 22/EN 55022. The FCC Registration Number is **261302**.

The EMC chamber site No.1 (EMC12.8× 6.8× 6.4(m)) also complies with Canada standard RSS 212, and acceptable to Industry Canada for the performance of radiated measurements. The Industry Canada Registration Number is **IC 5915**.

## 2.6 Environmental conditions

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

- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

# 3 Frequencies

## 3.1 Frequency Blocks Available for Cellular Service

According to FCC §22.905, the frequencies blocks assignment for the Cellular Radiotelephone Service are listed as bellow.

Block A: Mobile 824-835 MHz, Base 869-880 MHz;

Mobile 845-846.5 MHz, Base 891.5-894 MHz;

Block B: Mobile 835-845 MHz, Base 880-890 MHz;

Mobile 846.5-849 MHz, Base 891.5-894 MHz.

## 3.2 Frequency Blocks Available for Broadband PCS

According to FCC §24.229, the frequencies available in the Broadband PCS service are listed as bellow, in accordance with the frequency allocations table of FCC §2.106.

(a) The following frequency blocks are available for assignment on an MTA basis:

Block A: Mobile 1850–1865 MHz, Base 1930–1945 MHz;

Block B: Mobile 1870–1885 MHz, Base 1950–1965 MHz.

(b) The following frequency blocks are available for assignment on a BTA basis:

Block C: Mobile 1895–1910 MHz, Base 1975–1990 MHz;

Block D: Mobile 1865–1870 MHz, Base 1945–1950 MHz;

Block E: Mobile 1885–1890 MHz, Base 1965–1970 MHz;

Block F: Mobile 1890–1895 MHz, Base 1970–1975 MHz.

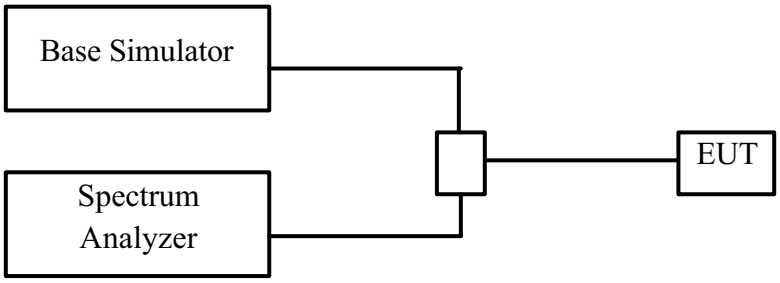
## 3.3 Test Procedure

a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. The resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter. For GSM signal, VBW=RBW=3 kHz; for CDMA signal, VBW=RBW=30 kHz.

## 3.4 Test Setup




For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

## 3.5 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The lowest channel and the highest channel were measured respectively: channel No.128 (low) and 251 (high) for GSM 850 MHz; channel No.512 (low) and 810 (high) for PCS 1900 MHz.

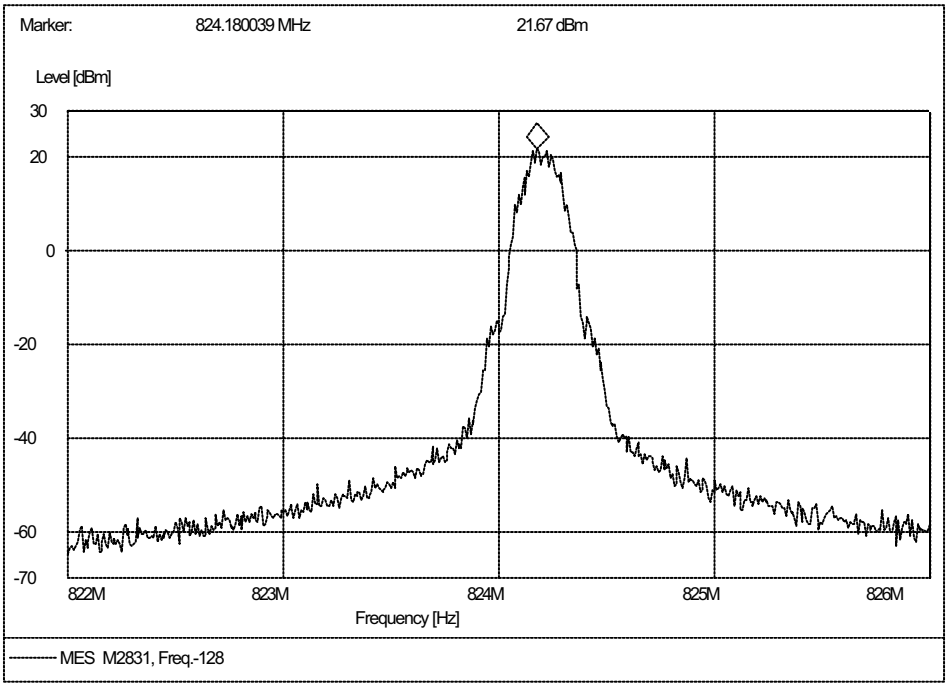
# 3.6 Test Results

The mobile transmitter frequency arrangement of the GSM 850 MHz band is

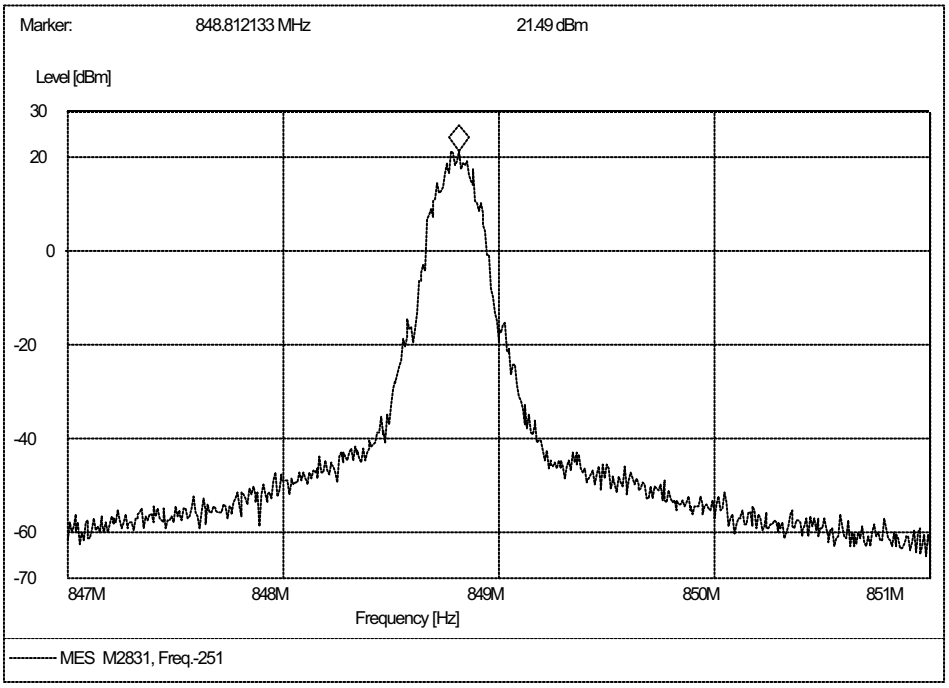
Fl(n) = 824.2 + 0.2*(n-128), 128≦n≦251

The frequencies of the lowest channel and the highest channel are as the following figures.

1. Lowest channel No.128




2. Highest channel No.251

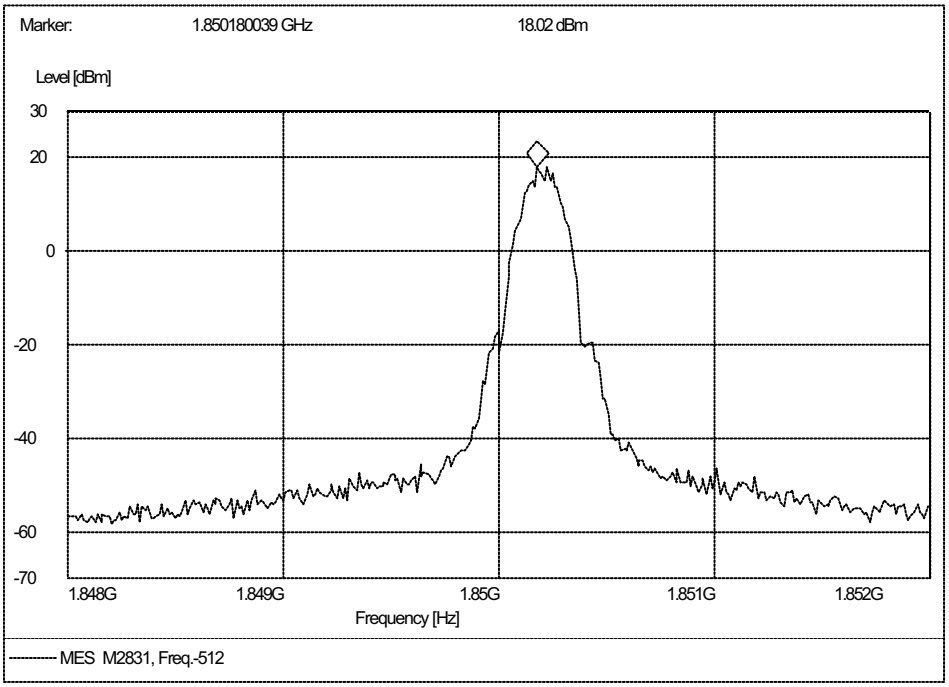


The mobile transmitter frequency arrangement of the PCS1900 band is

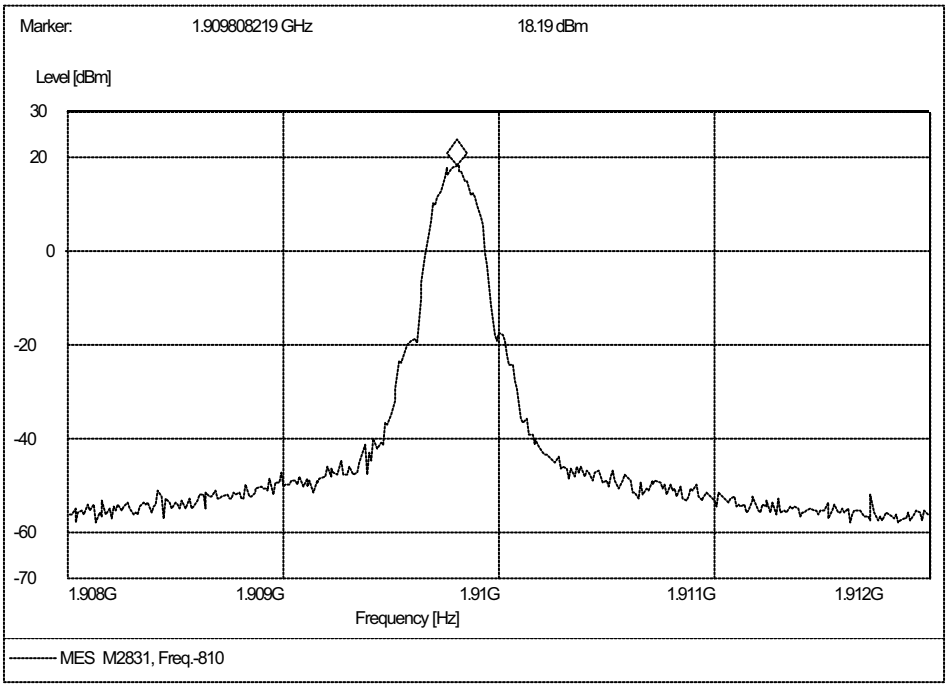
FI(n) = 1850.2 + 0.2*(n-512), 512≦n≦810

The frequencies of the lowest channel and the highest channel are as the following figures.

1. Lowest channel No.512




2. Highest channel No.810



# 4 Conducted RF Output Power Test

## 4.1 RF Power Output Test Requirement

According to FCC §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 § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

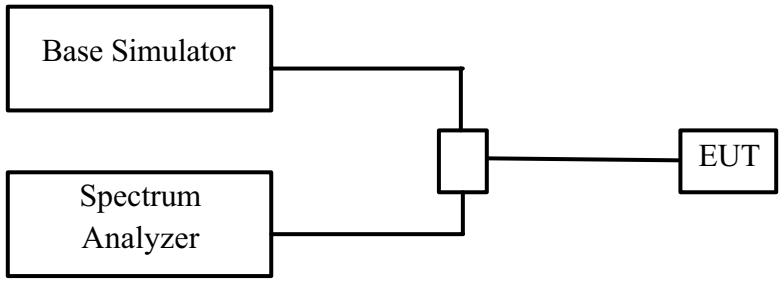
## 4.2 Test Procedure

a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. The resolution bandwidth of the spectrum analyzer was comparable to the emission bandwidth. For GSM signal, VBW=RBW=1 MHz; for CDMA signal, VBW=RBW=3 MHz.

## 4.3 Test Setup




For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

## 4.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low), 190 (middle) and 251 (high) for GSM 850 MHz; channel No.512 (low), 661 (middle) and 810 (high)

for PCS 1900.

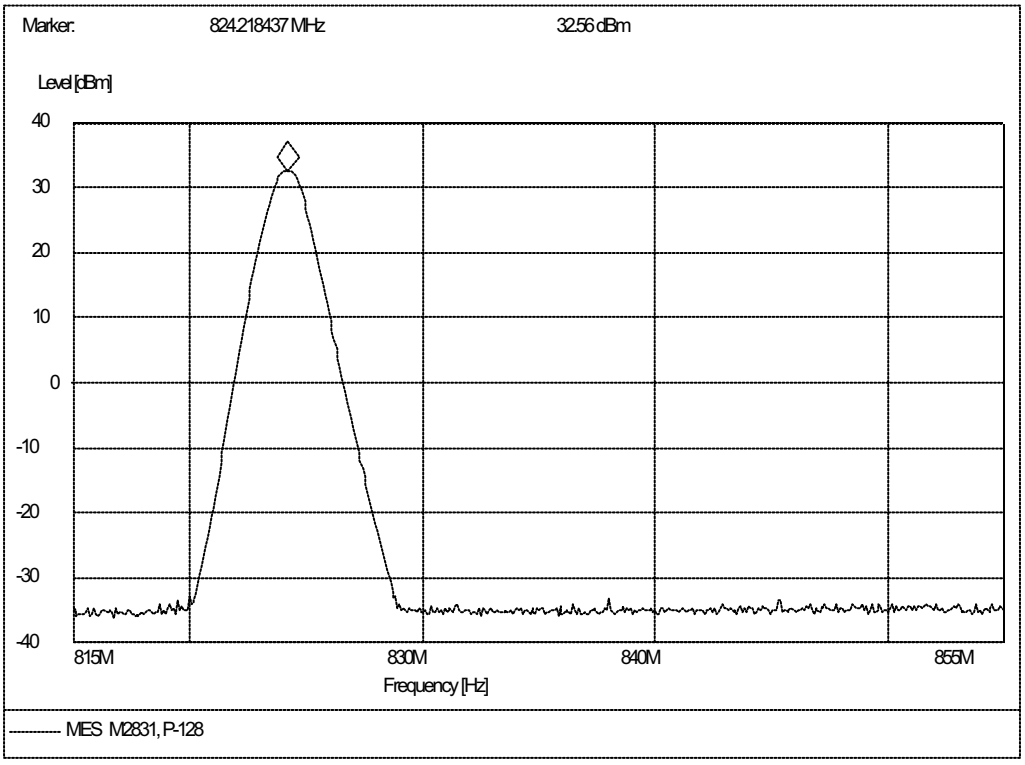
# 4.5 Test Results

### I. GSM 850MHz Band

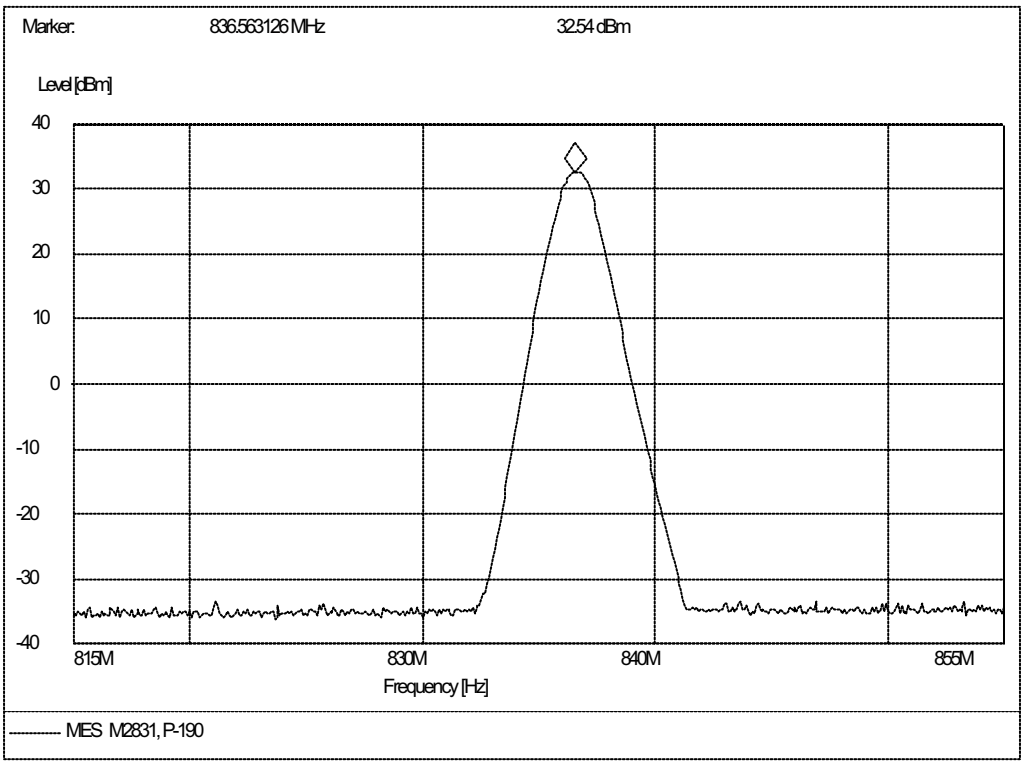
| No. | GSM 850 Channel No. | Frequency (MHz) | Measured Power | | Rated Power (dBm) |
|---|---|---|---|---|---|
| | | | (dBm) | (W) | |
| 1 | 128 | 824.20 | 32.56 | 1.803 | 33 |
| 2 | 190 | 836.60 | 32.54 | 1.795 | 33 |
| 3 | 251 | 848.80 | 32.60 | 1.820 | 33 |

**Test Plots**

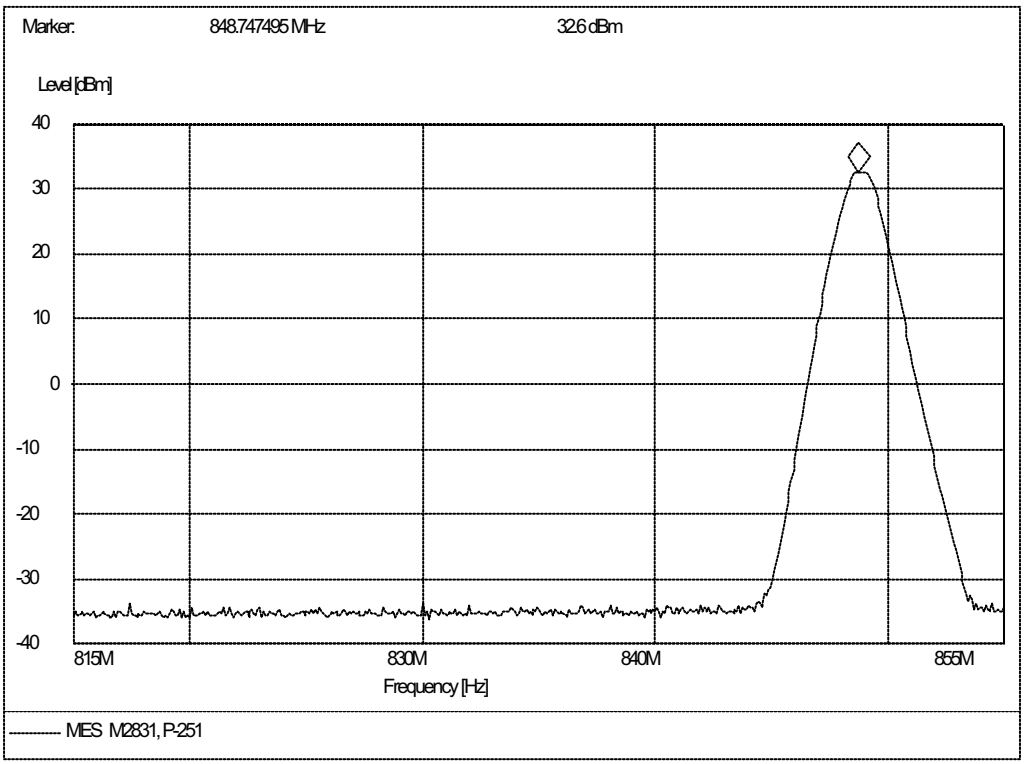
1. Lowest channel No.128



2. Middle channel No.190




3. Highest channel No.251

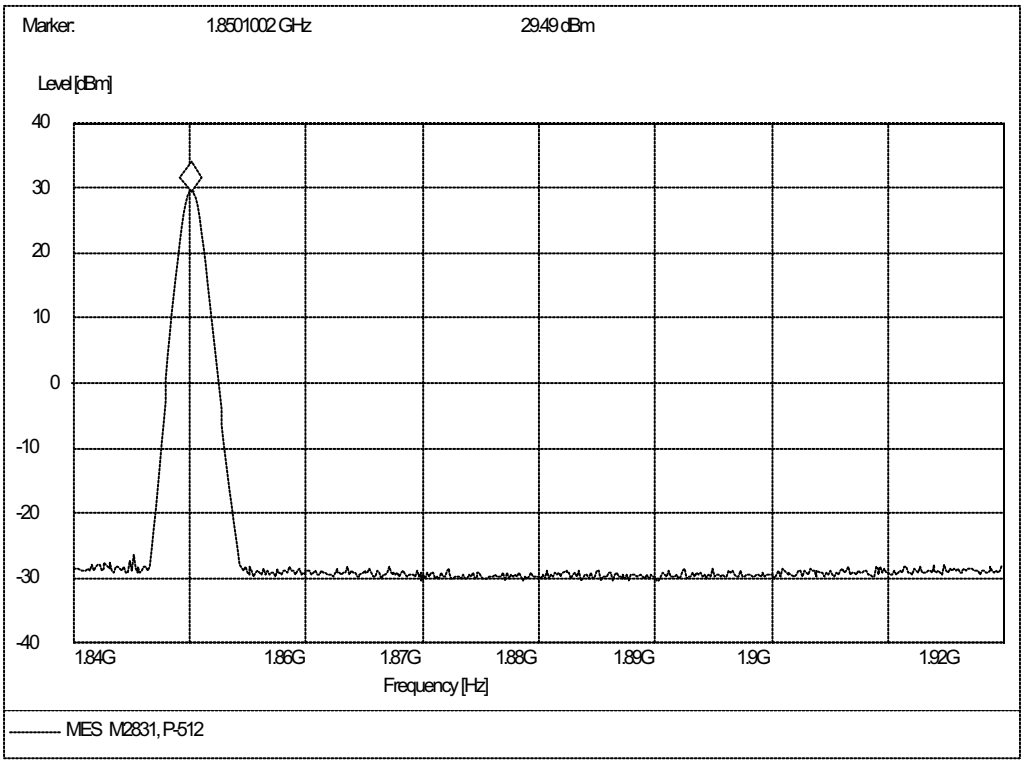


## II. PCS 1900MHz Band

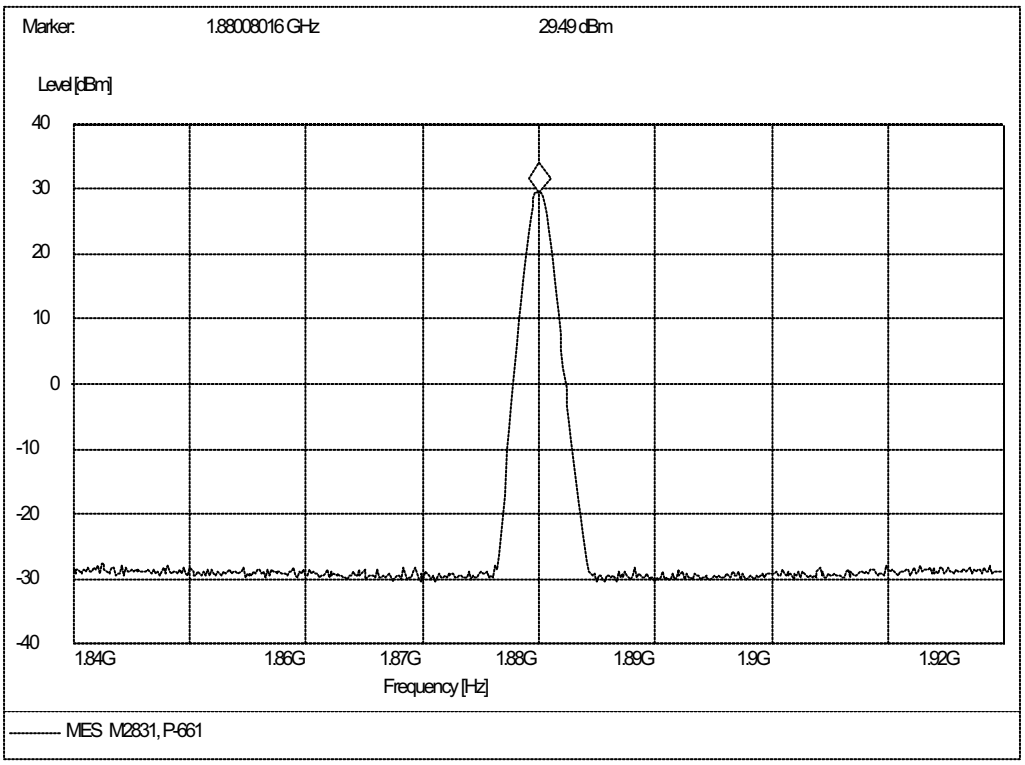
| No. | PCS 1900 Channel No. | Frequency (MHz) | Measured Power | | Rated Power (dBm) |
|---|---|---|---|---|---|
| | | | (dBm) | (W) | |
| 1 | 512 | 1850.20 | 29.49 | 0.889 | 30 |
| 2 | 661 | 1880.00 | 29.49 | 0.889 | 30 |
| 3 | 810 | 1909.80 | 29.70 | 0.933 | 30 |

**Test Plots**

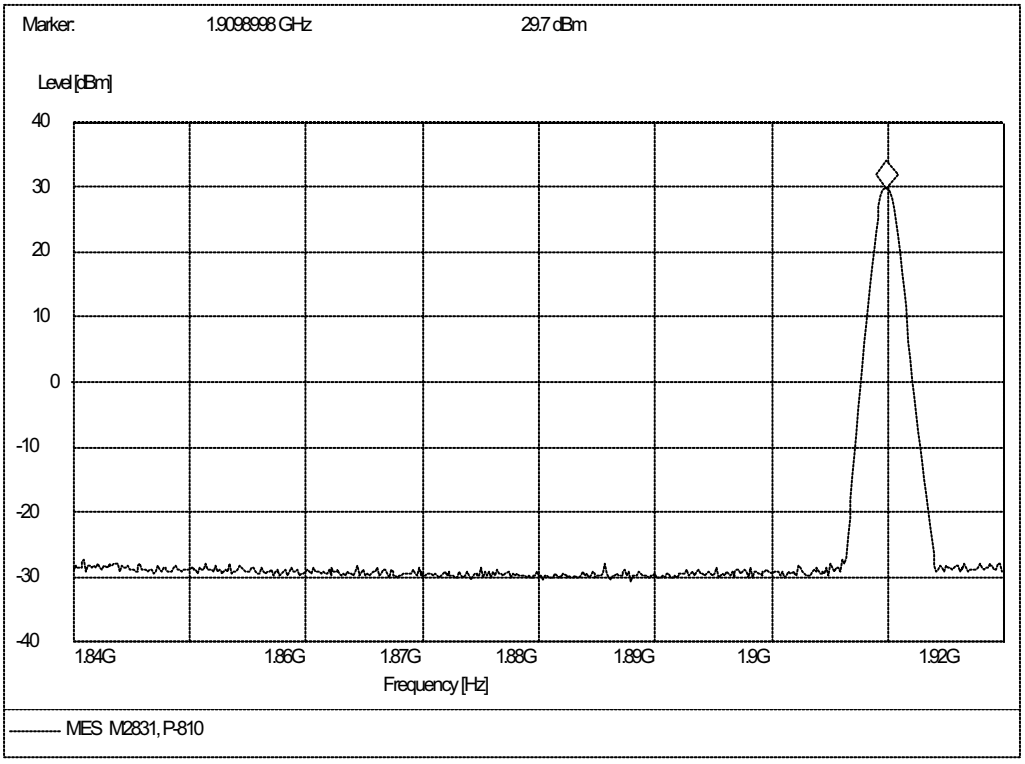
1. Lowest channel No.512



2. Middle channel No.661




3. Highest channel No.810



# 5 Occupied Bandwidth Test

## 5.1 Definition

According to FCC §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, or 20dB bandwidth (10log 1%=20dB) taking the total RF output power as reference.

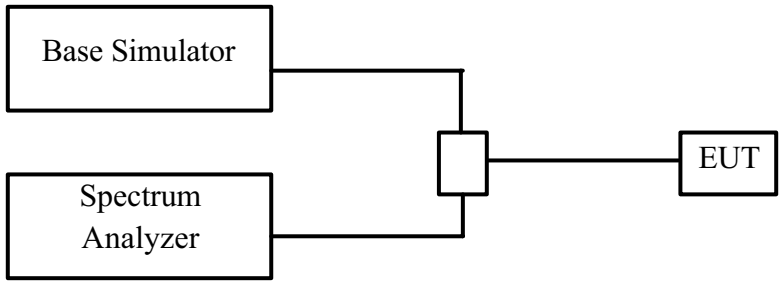
## 5.2 Test Procedure

a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.

c. The resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth. For GSM signal, VBW=RBW=3 kHz; for CDMA signal, VBW=RBW=30 kHz.

## 5.3 Test Setup




For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

## 5.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

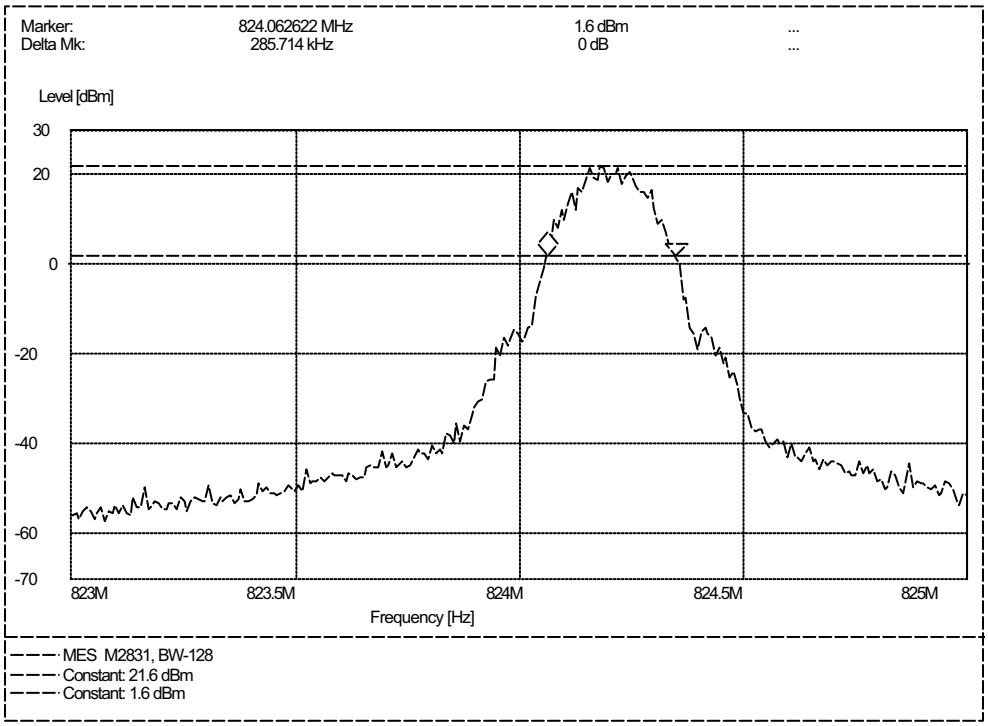
The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low), 190 (middle) and 251 (high) for GSM 850 MHz; channel No.512 (low), 661 (middle) and 810 (high) for PCS 1900.

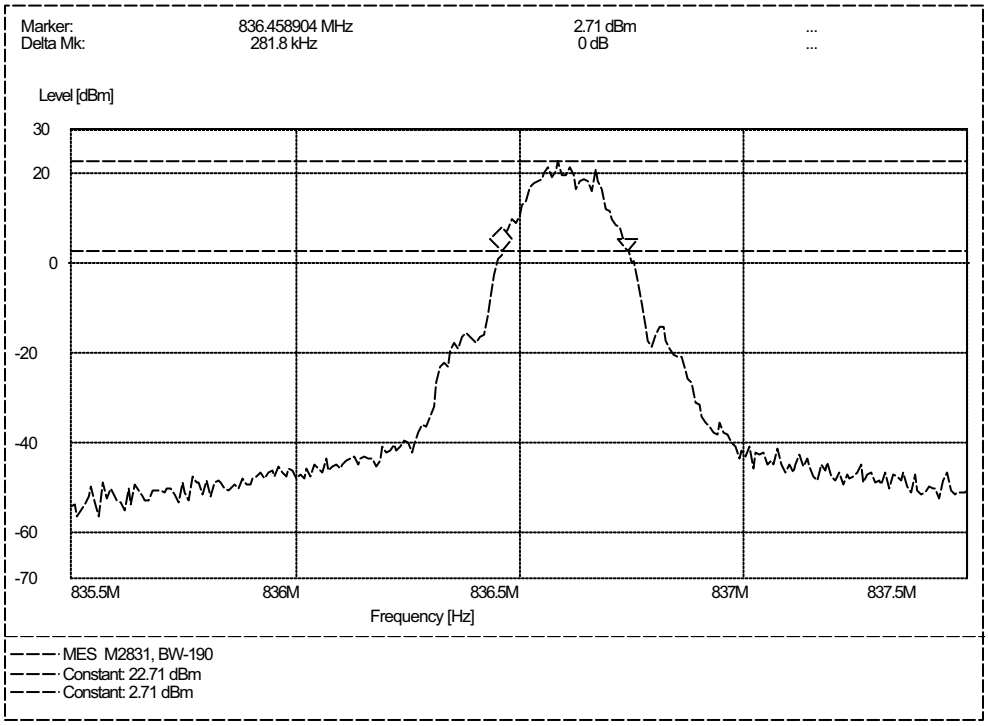
# 5.5 Test Results

The occupied bandwidth was measured to be about 300 kHz. Refer to the following plots.

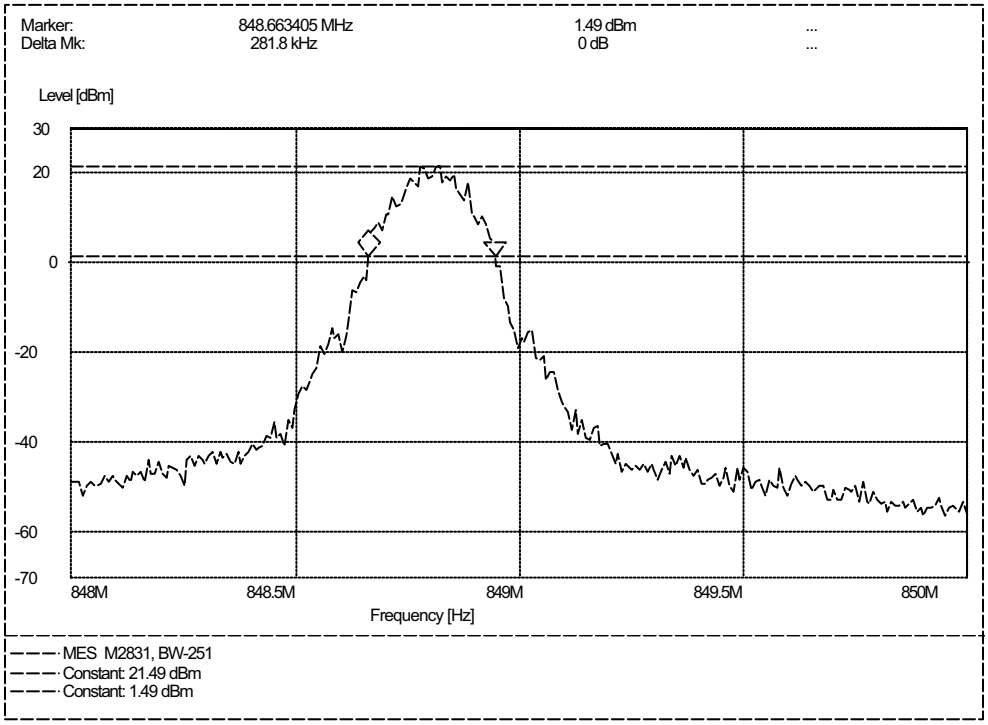
1. GSM 850MHz band, lowest channel No.128



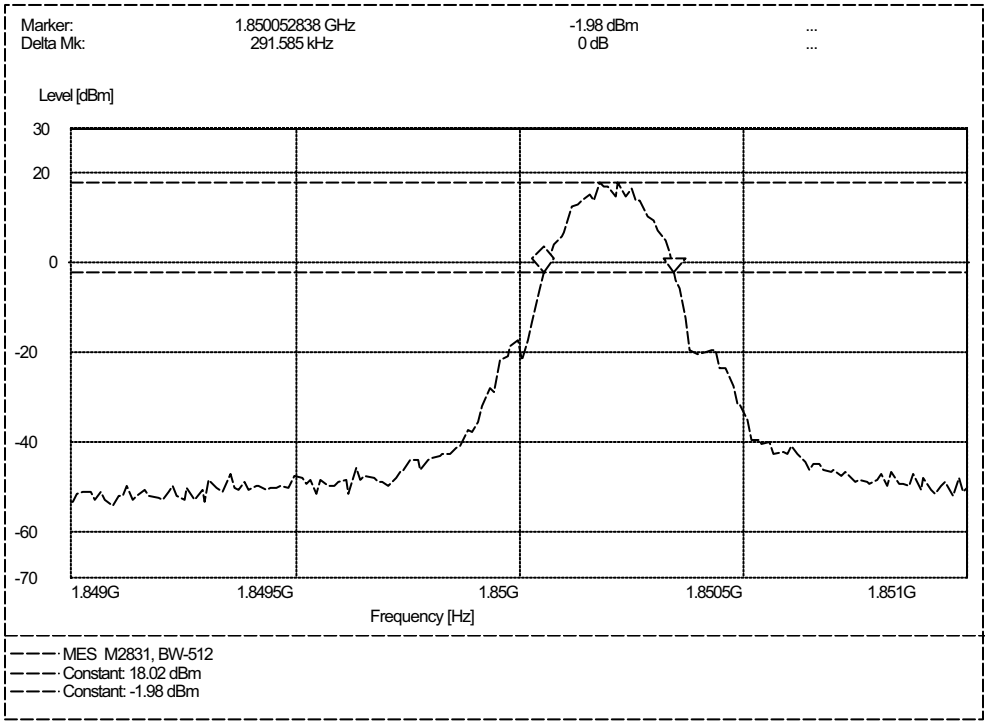

2. GSM 850MHz band, middle channel No.190



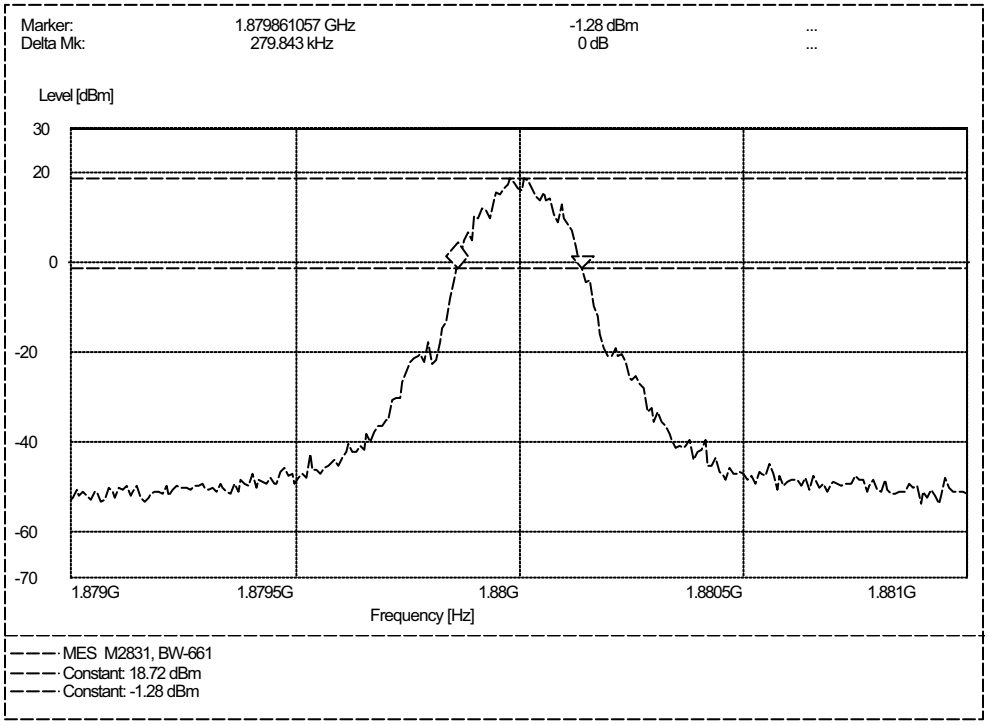
3. GSM 850MHz band, highest channel No.251



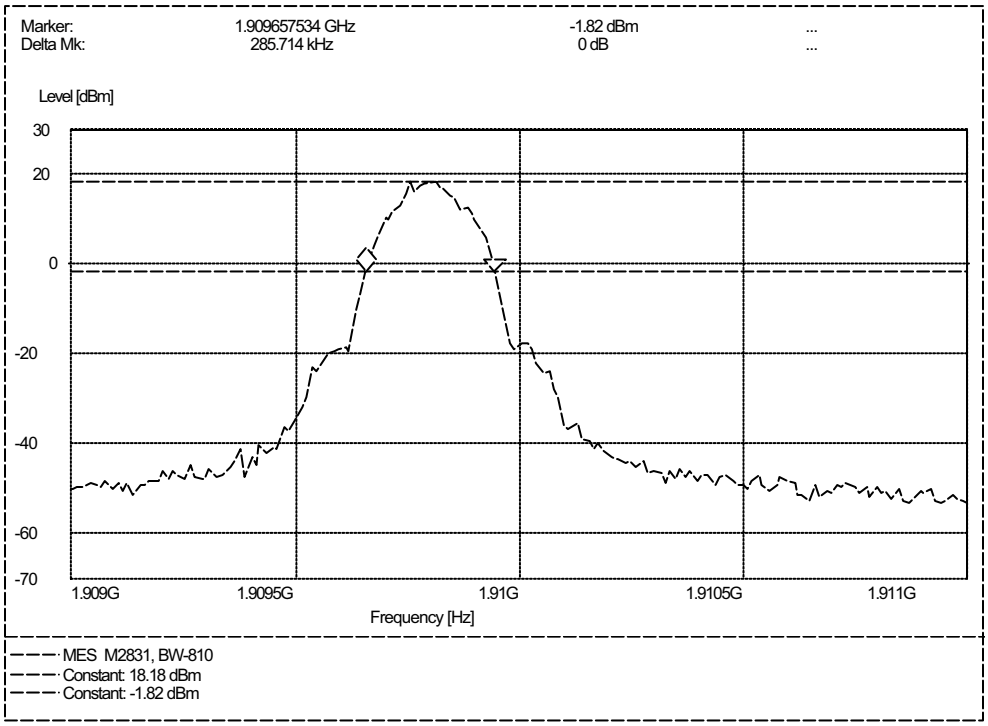

4. PCS 1900MHz band, lowest channel No.512



5. PCS 1900MHz band, middle channel No.661




6. PCS 1900MHz band, highest channel No.810



# 6 Conducted Spurious Emission Test

## 6.1 Limits of Conducted Spurious Emission

According to FCC §22.917 (a) and §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.

According to FCC §22.917 (b) and §24.238 (b), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Thus the 26dB emission bandwidth is measurement for showing compliance at the band-edges

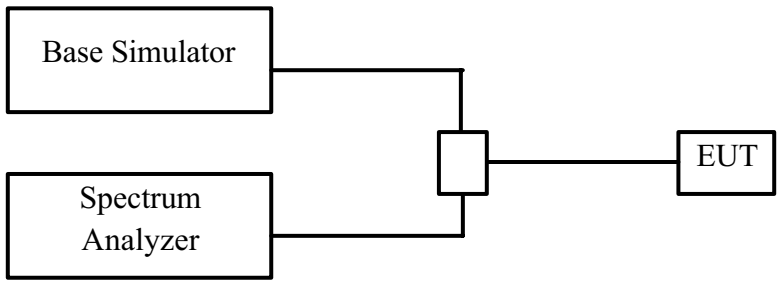
## 6.2 Test Procedure

a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.

b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 9 kHz to 10th harmonic of the fundamental frequency.

c. In the 1 MHz bands immediately outside and adjacent to the frequency block, the resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter. For GSM signal, the resolution bandwidth was 3 kHz; for CDMA signal, the resolution bandwidth was 30 kHz.

## 6.3 Test Setup




## 6.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900. The lowest channel and the highest channel were measured respectively: channel No.128 (low) and 251 (high) for GSM 850 MHz; channel No.512 (low) and 810 (high) for PCS 1900 MHz.

# 6.5 Test Results

**I. GSM 850MHz Band**

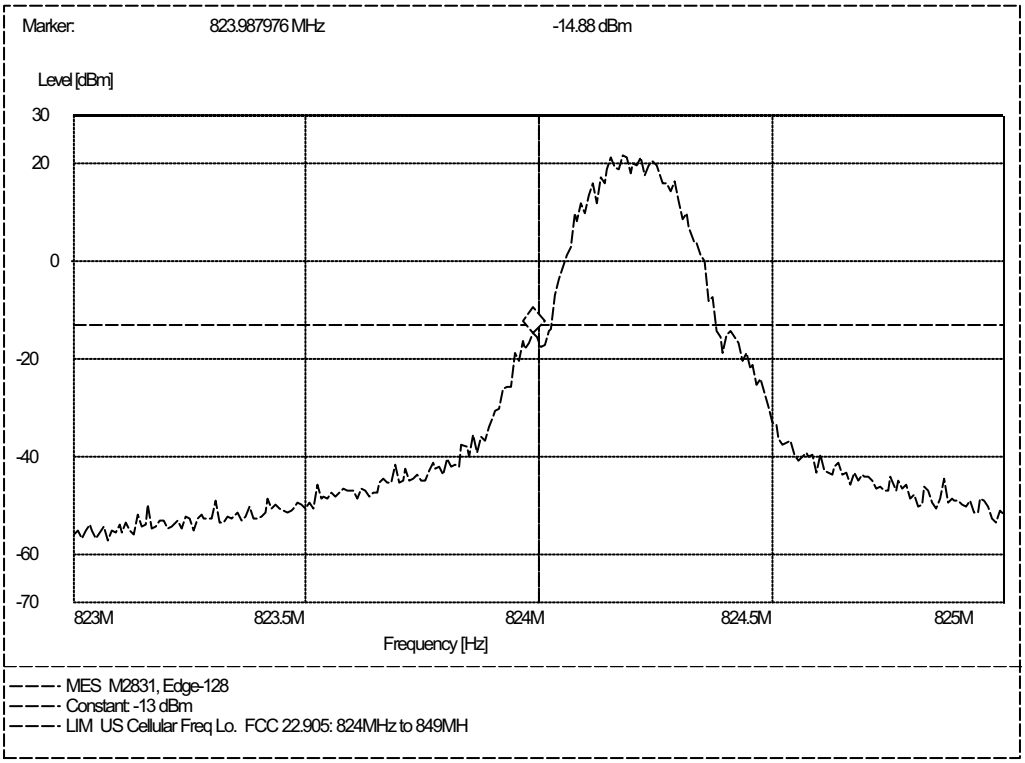
| No. | Frequency (MHz) | Emission Power (dBm) | Limit (dBm) |
|---|---|---|---|
| **GSM 850 MHz: Channel No. 128 (824.20 MHz)** | | | |
| 1 | 1648.40 | -51.04 | -13 |
| 2 | 2472.60 | -53.54 | -13 |
| 3 | 3296.80 | -- | -13 |
| 4 | 4121.00 | -- | -13 |
| 5 | 4945.20 | -- | -13 |
| 6 | 5769.40 | -- | -13 |
| 7 | 6593.60 | -- | -13 |
| 8 | 7417.80 | -- | -13 |
| 9 | 8242.00 | -- | -13 |
| **GSM 850 MHz: Channel No. 190 (836.60 MHz)** | | | |
| 10 | 1673.20 | -55.97 | -13 |
| 11 | 2509.80 | -57.84 | -13 |
| 12 | 3346.40 | | -13 |
| 13 | 4183.00 | -- | -13 |
| 14 | 5019.60 | -- | -13 |
| 15 | 5856.20 | -- | -13 |
| 16 | 6692.80 | -- | -13 |
| 17 | 7529.40 | -- | -13 |
| 18 | 8366.00 | -- | -13 |
| **GSM 850 MHz: Channel No. 251 (848.80 MHz)** | | | |
| 19 | 1697.60 | -55.47 | -13 |
| 20 | 2546.40 | -56.15 | -13 |
| 21 | 3395.20 | -- | -13 |
| 22 | 4244.00 | -- | -13 |
| 23 | 5092.80 | -- | -13 |
| 24 | 5941.60 | -- | -13 |
| 25 | 6790.40 | -- | -13 |
| 26 | 7639.20 | -- | -13 |
| 27 | 8488.00 | -- | -13 |

**NOTE:**

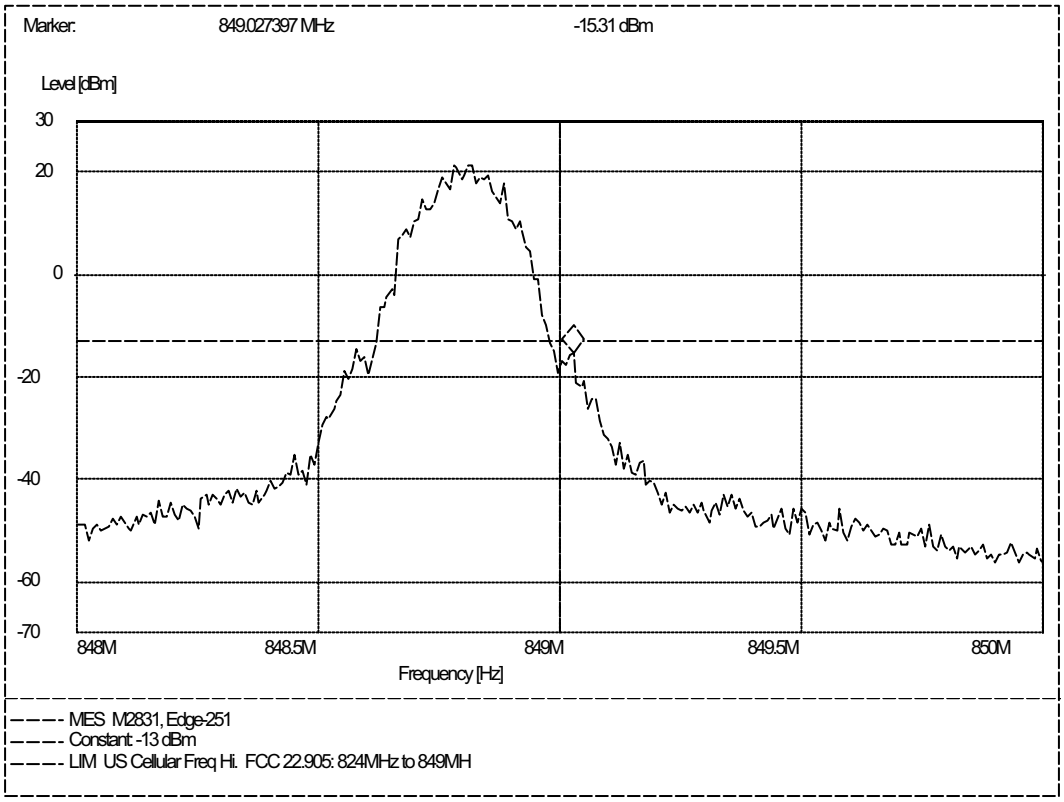
1. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
2. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

**Plot of Band Edge**

1. Lowest channel No.128



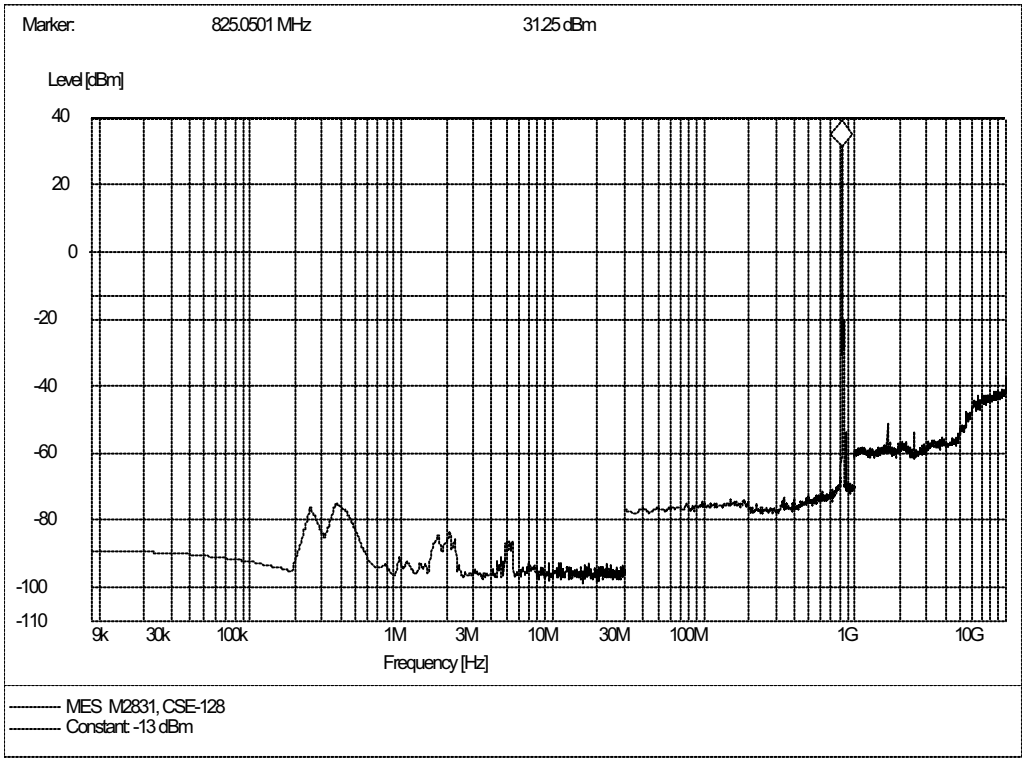

2. Highest channel No.251



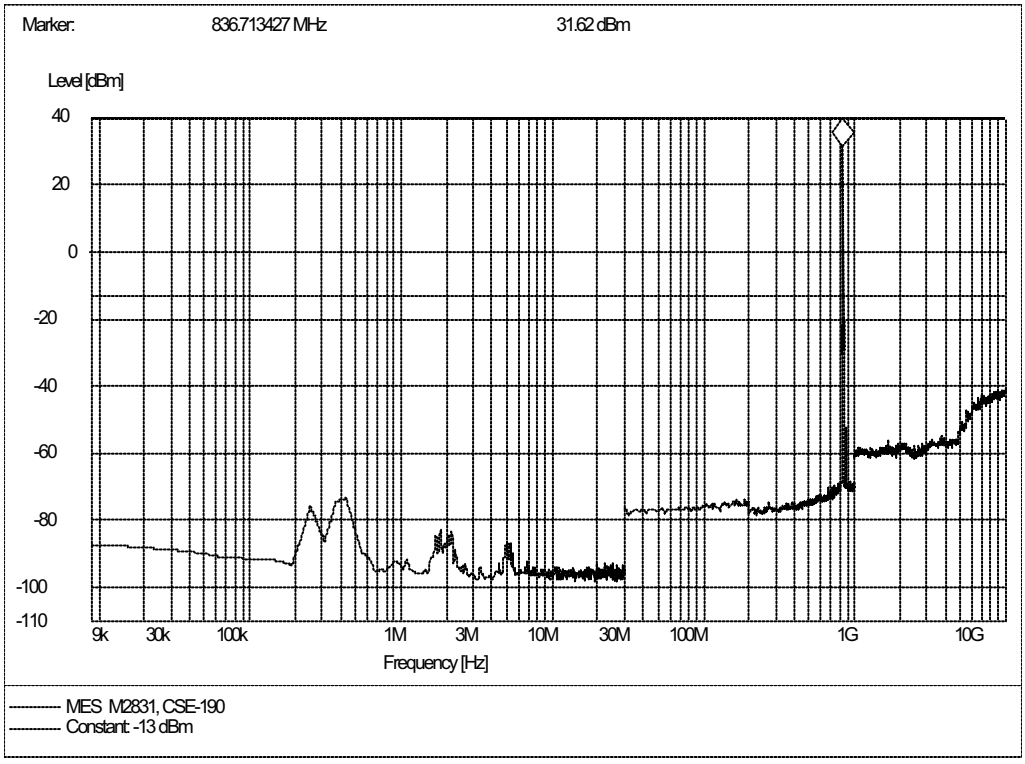
**Plot of Spurious Emission**

(Note: The marker point is the MS transmitting frequency which should be ignored.)

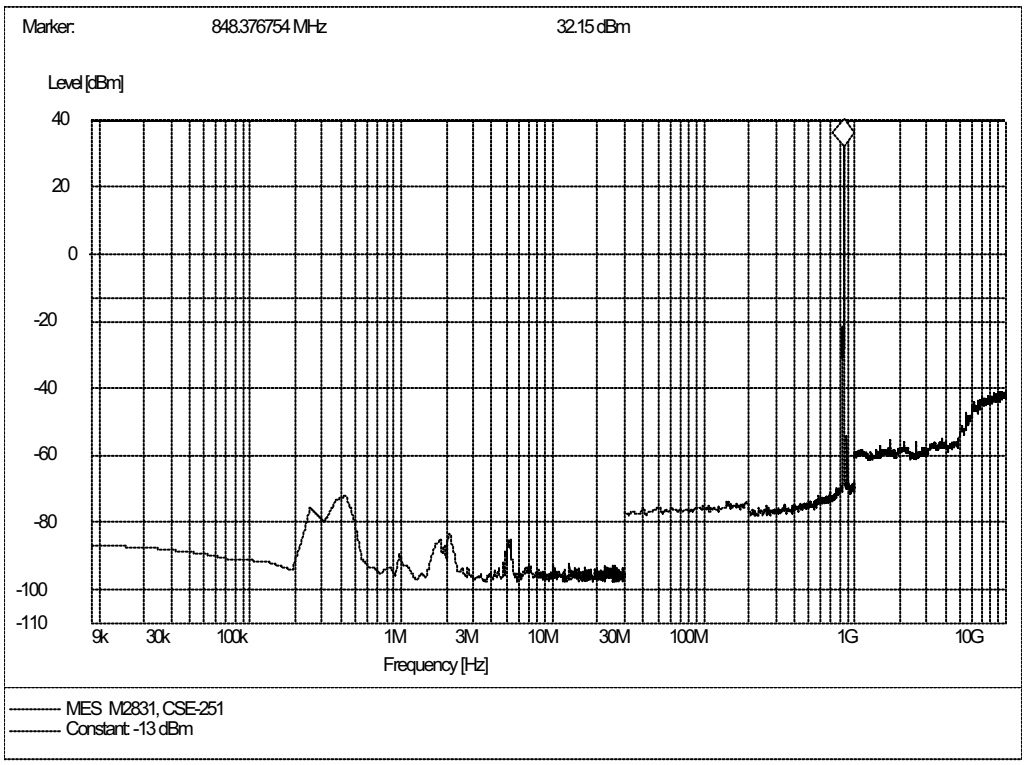
1. Lowest channel No.128




2. Middle channel No.190



3. Highest channel No.251



**II. PCS 1900MHz Band**

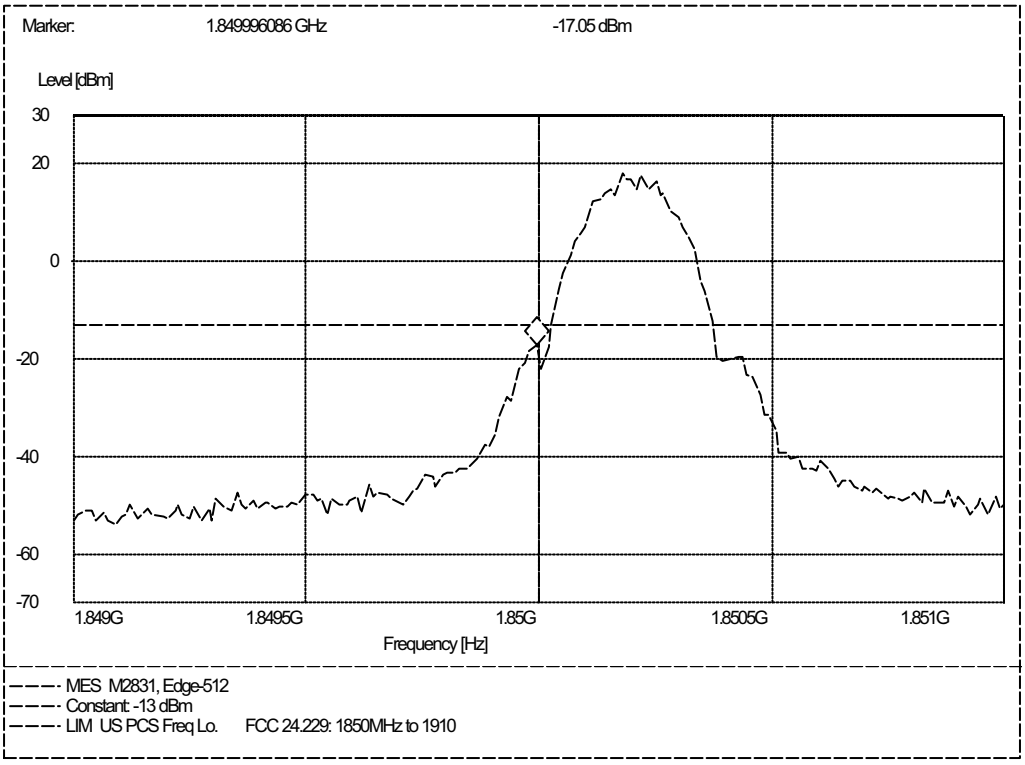
| No. | Frequency (MHz) | Emission Power (dBm) | Limit (dBm) |
|---|---|---|---|
| **PCS 1900 MHz: Channel No. 512 (1850.20 MHz)** | | | |
| 1 | 3700.40 | -49.63 | -13 |
| 2 | 5550.60 | -- | -13 |
| 3 | 7400.80 | -- | -13 |
| 4 | 9251.00 | -- | -13 |
| 5 | 11101.20 | -- | -13 |
| 6 | 12951.40 | -- | -13 |
| 7 | 14801.60 | -- | -13 |
| 8 | 16651.80 | -- | -13 |
| 9 | 18502.00 | -- | -13 |
| **PCS 1900 MHz: Channel No. 661 (1880.00 MHz)** | | | |
| 10 | 3760.00 | -48.24 | -13 |
| 11 | 5640.00 | -- | -13 |
| 12 | 7520.00 | -- | -13 |
| 13 | 9400.00 | -- | -13 |
| 14 | 11280.00 | -- | -13 |
| 15 | 13160.00 | -- | -13 |
| 16 | 15040.00 | -- | -13 |
| 17 | 16920.00 | -- | -13 |
| 18 | 18800.00 | -- | -13 |
| **PCS 1900 MHz: Channel No. 810 (1909.80 MHz)** | | | |
| 19 | 3819.60 | -45.18 | -13 |
| 20 | 5729.40 | -- | -13 |
| 21 | 7639.20 | -- | -13 |
| 22 | 9549.00 | -- | -13 |
| 23 | 11458.80 | -- | -13 |
| 24 | 13368.60 | -- | -13 |
| 25 | 15278.40 | -- | -13 |
| 26 | 17188.20 | -- | -13 |
| 27 | 19098.00 | -- | -13 |

**NOTE:**

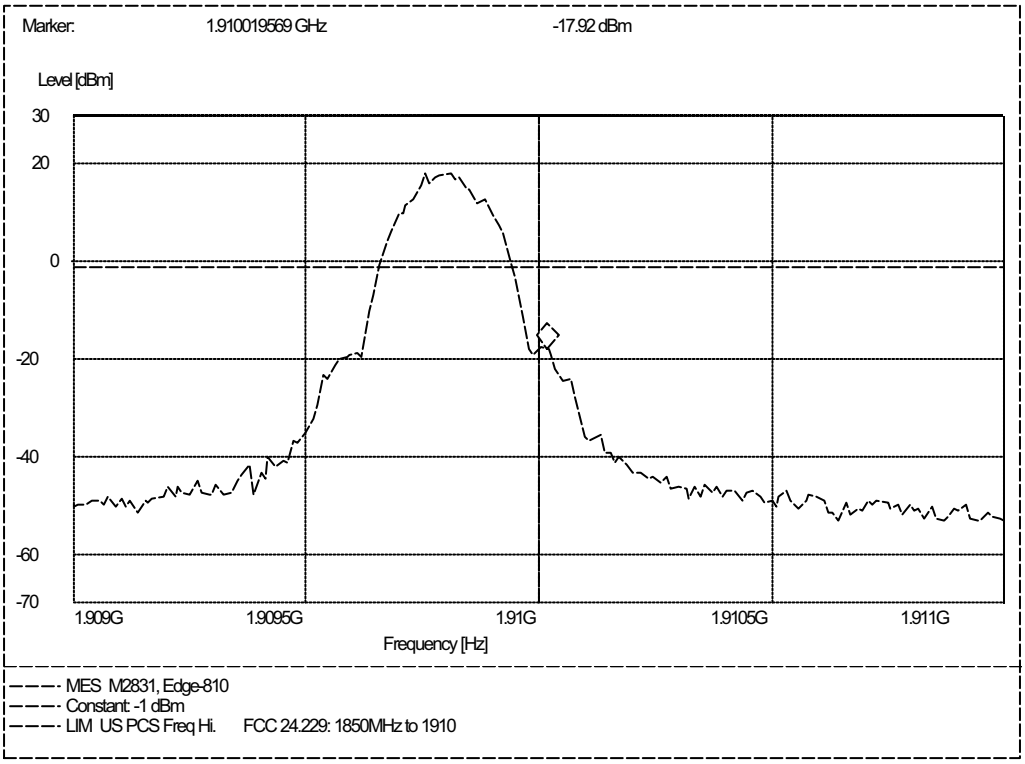
1. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
2. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

## Plot of Out-of-Band Emission

1. Lowest channel No.512



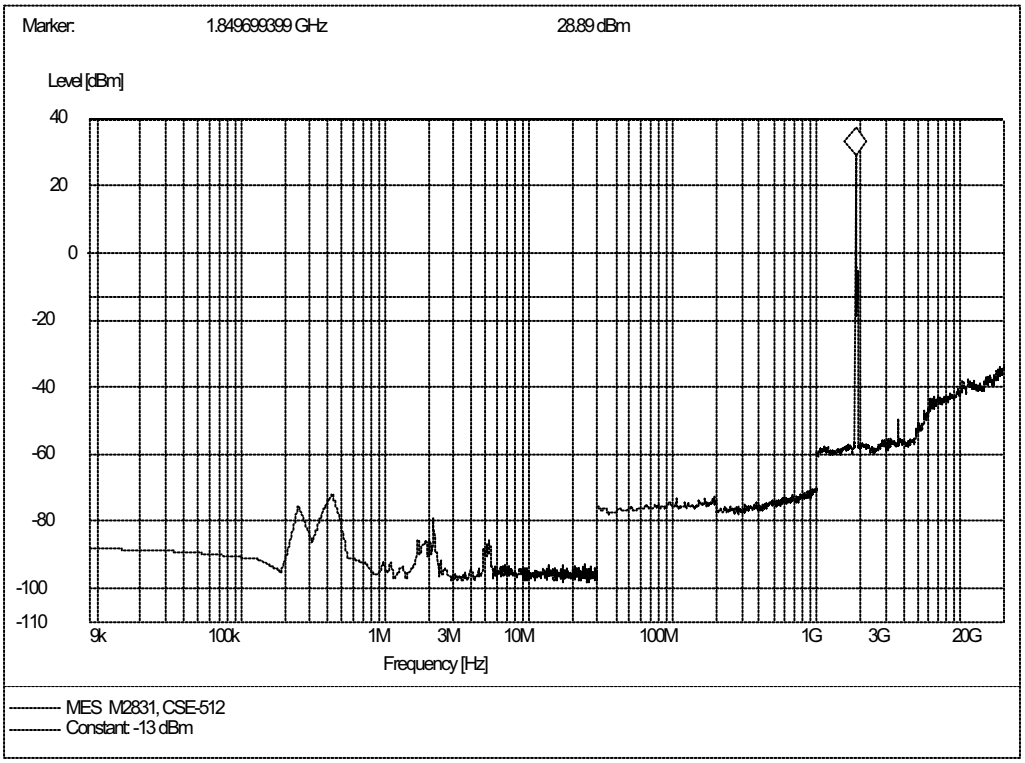

2. Highest channel No.810



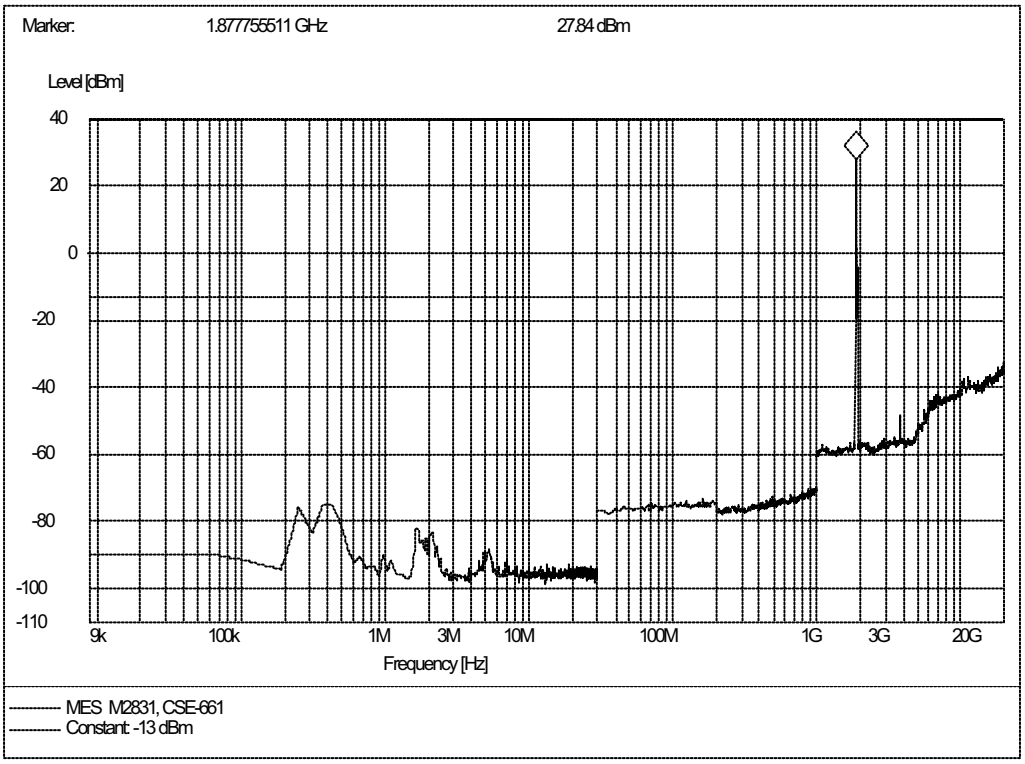
**Plot of Spurious Emission**

(Note: The marker point is the MS transmitting frequency which should be ignored.)

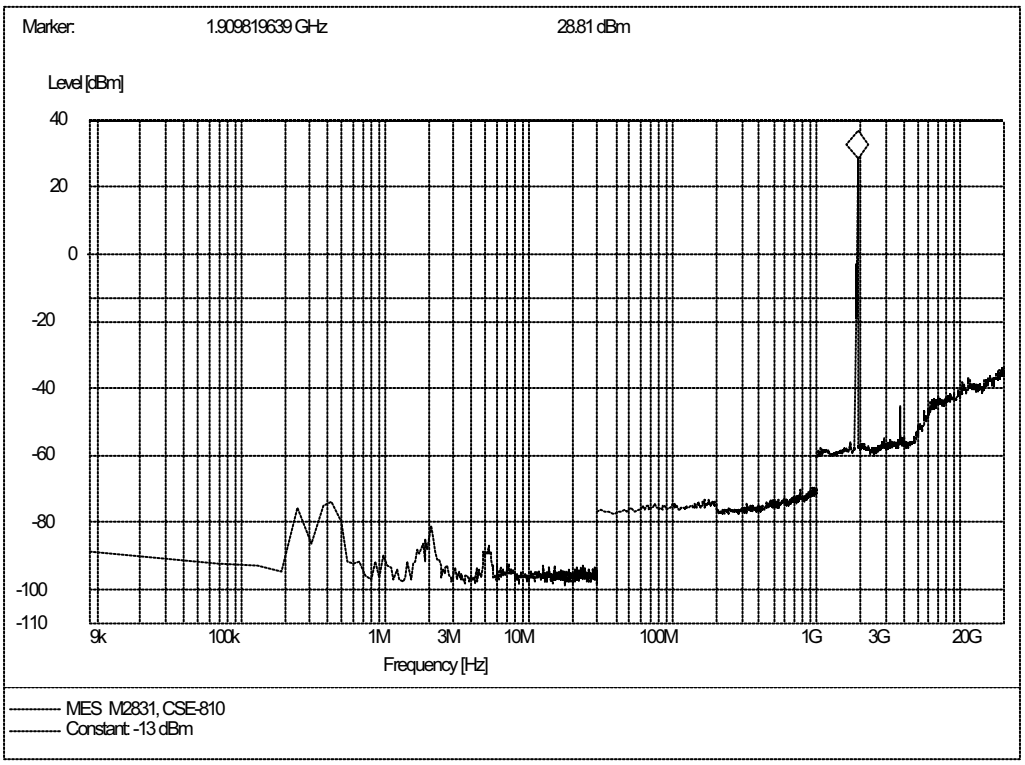
1. Lowest channel No.512




2. Middle channel No.661



3. Highest channel No.810



# 7 Transmitter Radiated Power (EIRP/ERP) Test

## 7.1 Limits of EIRP/ERP

According to FCC §22.913, the **ERP** of Cellular mobile transmitters must not exceed 7 Watts (38.5dBm).

According to FCC §24.232, the broadband PCS mobile stations are limited to 2 watts (33dBm) **EIRP** peak power.

## 7.2 Test Procedure

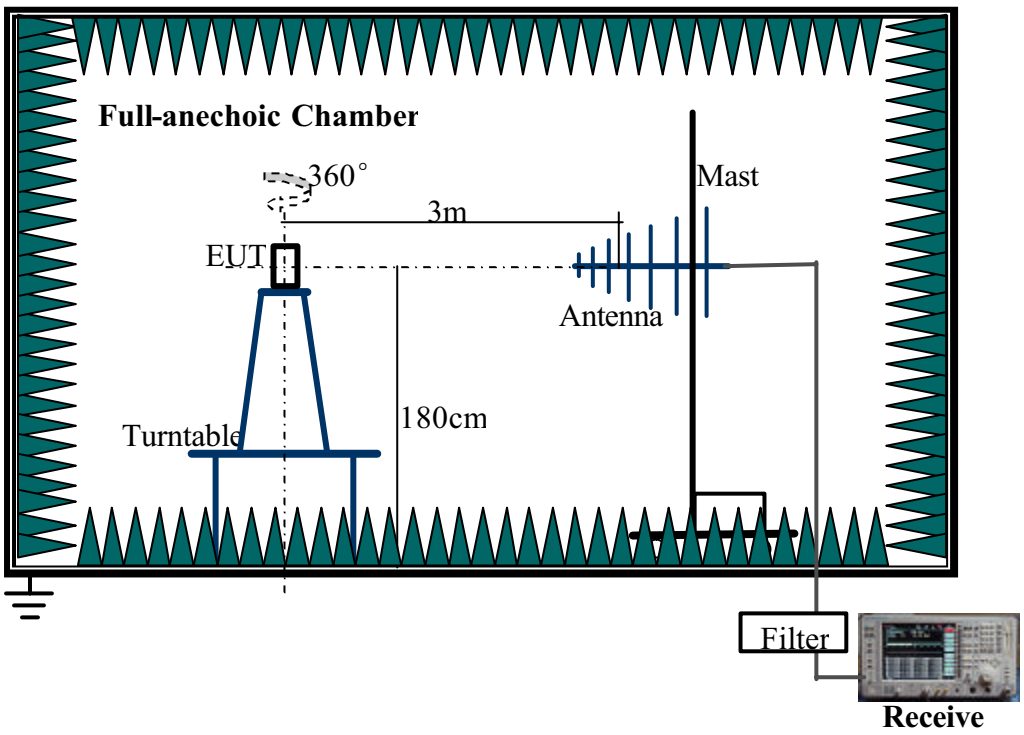
a. The radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.

b. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.

d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The polarization of the receiving antenna was the same as that of the EUT transmitting antenna.

c. The spectrum analyzer was set to Maxpeak Detector and Maximum Hold mode. The resolution bandwidth was comparable to the emission bandwidth. For GSM signal, VBW=RBW=1MHz; for CDMA signal, VBW=RBW=3MHz.

## 7.3 Test Setup




For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

## 7.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low), 190 (middle) and 251 (high) for GSM 850 MHz; channel No.512 (low), 661 (middle) and 810 (high) for PCS 1900.

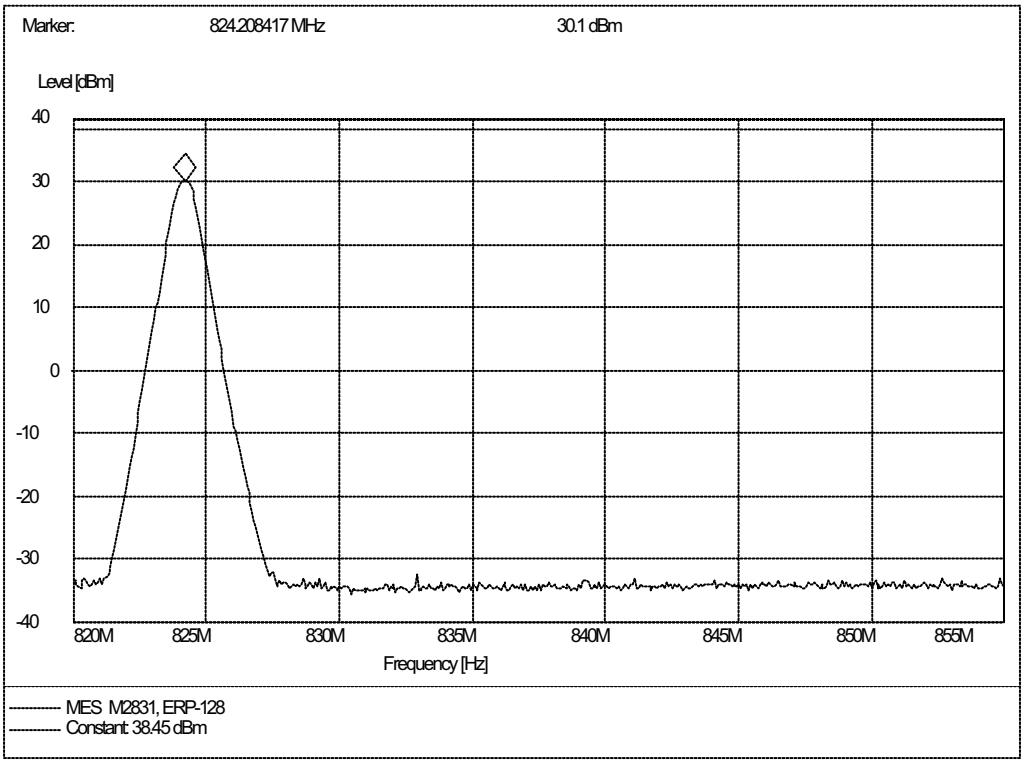
# 7.5 Test Results

### I. GSM 850MHz Band

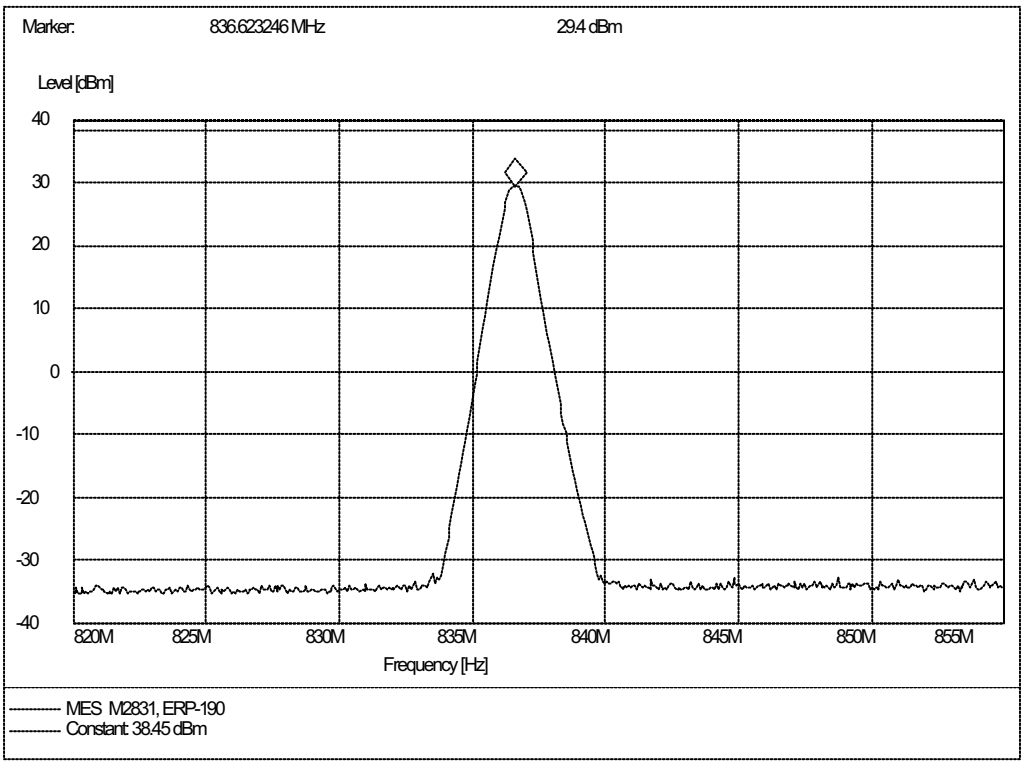
| No. | GSM 850 Channel No. | Frequency (MHz) | ERP (dBm) | ERP (W) | Limit ERP (W) |
|---|---|---|---|---|---|
| 1 | 128 | 824.20 | 30.10 | 1.023 | 7 |
| 2 | 190 | 836.60 | 29.40 | 0.871 | 7 |
| 3 | 251 | 848.80 | 30.01 | 1.002 | 7 |

**Test Plots**

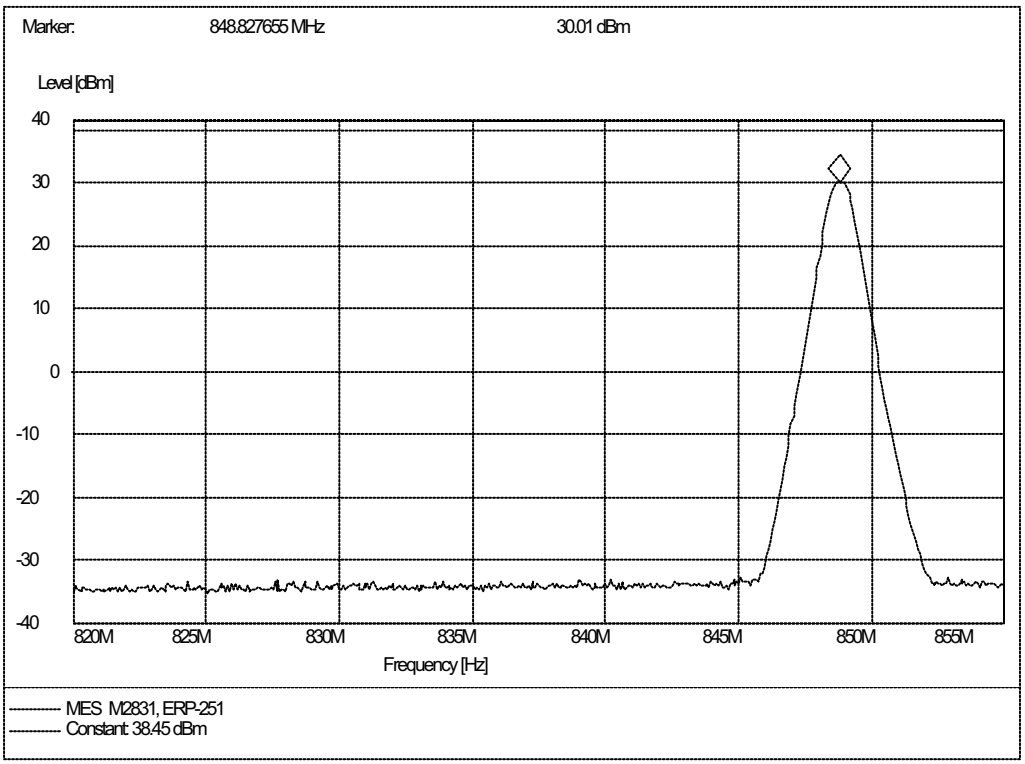
1. Lowest channel No.128



2. Middle channel No.190




3. Highest channel No.251

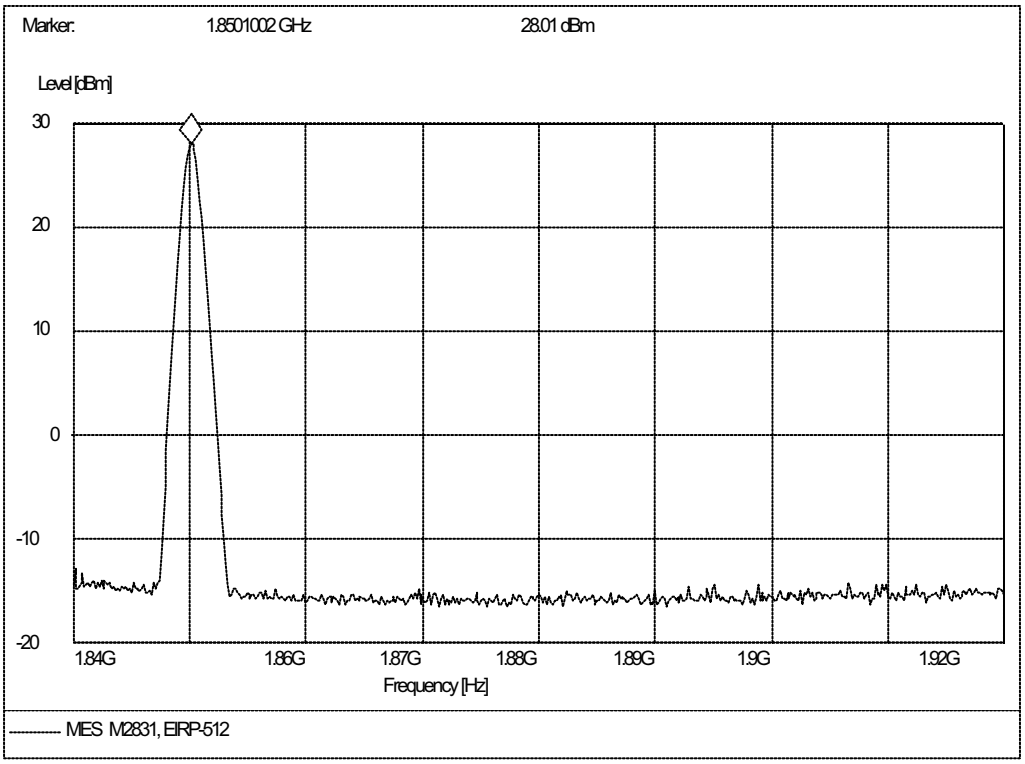


## II. PCS 1900MHz Band

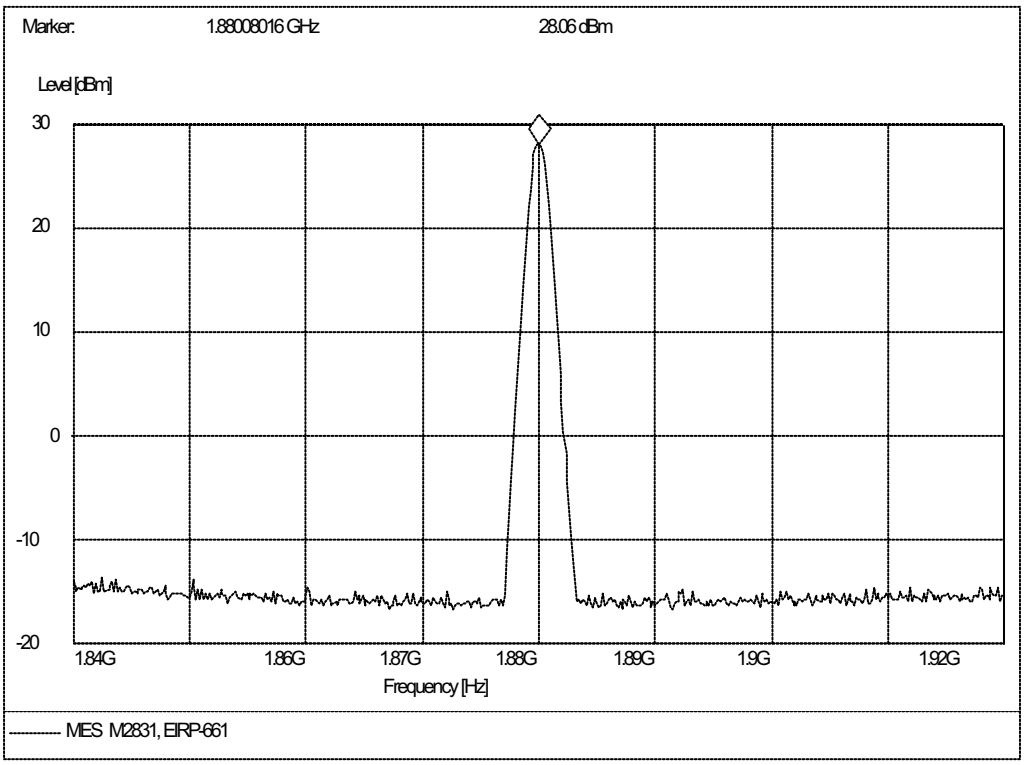
| No. | PCS 1900 Channel No. | Frequency (MHz) | EIRP (dBm) | EIRP (W) | Limit EIRP (W) |
|---|---|---|---|---|---|
| 1 | 512 | 1850.20 | 28.01 | 0.632 | 2 |
| 2 | 661 | 1880.00 | 28.06 | 0.640 | 2 |
| 3 | 810 | 1909.80 | 29.39 | 0.869 | 2 |

**Test Plots**

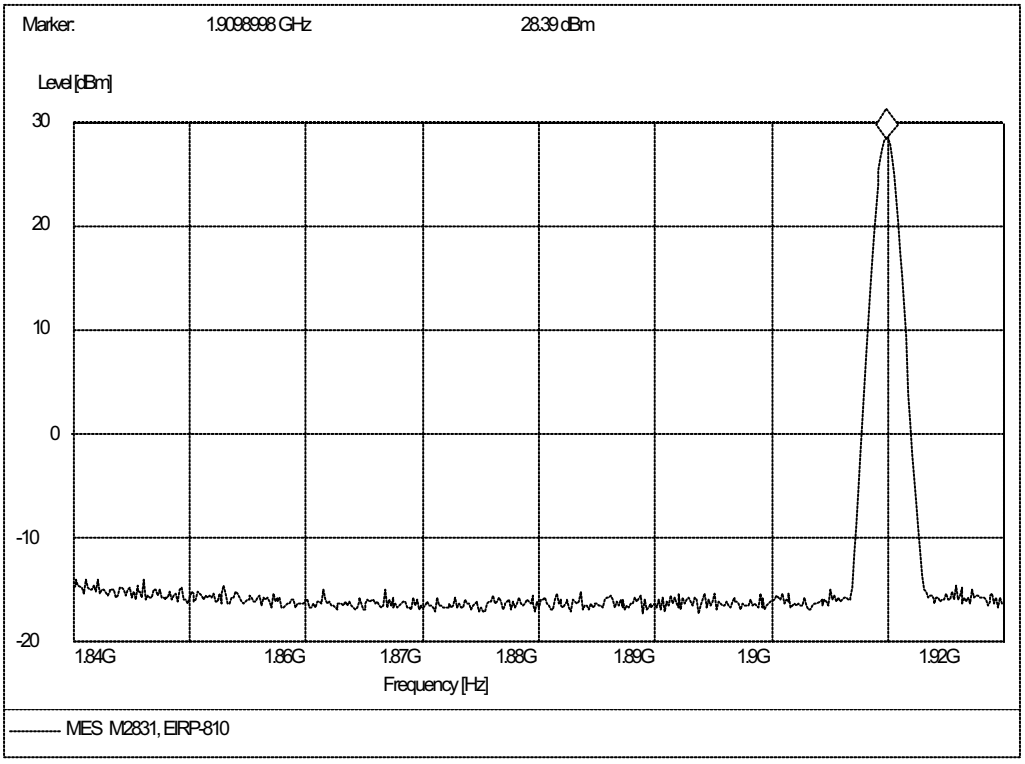
1. Lowest channel No.512



2. Middle channel No.661




3. Highest channel No.810



# 8 Radiated Spurious Emission Test

## 8.1 Limits of Radiated Spurious Emission

According to FCC §22.917 (a) and §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.

## 8.2 Test Procedure

a. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.

b. In the frequency range above 30MHz, the radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.

c. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.

d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The measurement was performed with the antenna at horizontal and vertical polarization respectively.

e. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 30 MHz to 10th harmonic of the fundamental frequency.

## 8.3 Test Setup

Same as 7.3

## 8.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS). The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low) and 251 (high) for GSM 850 MHz; channel No.512 (low) and 810 (high) for PCS 1900.

# 8.5 Test Results

**I. GSM 850MHz Band**

| No. | Frequency (MHz) | ERP (dBm) Antenna: Vertical | ERP (dBm) Antenna: Horizontal | Limit (dBm) |
|---|---|---|---|---|
| **GSM 850 MHz: Channel No. 128 (824.20 MHz)** | | | | |
| 1 | 1648.40 | -28.80 | -26.37 | -13 |
| 2 | 2472.60 | -38.61 | -35.03 | -13 |
| 3 | 3296.80 | -52.64 | -47.36 | -13 |
| 4 | 4121.00 | -- | -57.32 | -13 |
| 5 | 4945.20 | -- | -- | -13 |
| 6 | 5769.40 | -- | -- | -13 |
| 7 | 6593.60 | -- | -- | -13 |
| 8 | 7417.80 | -- | -- | -13 |
| 9 | 8242.00 | -- | -- | -13 |
| **GSM 850 MHz: Channel No. 190 (836.60 MHz)** | | | | |
| 10 | 1673.20 | -27.35 | -24.81 | -13 |
| 11 | 2509.80 | -36.12 | -37.47 | -13 |
| 12 | 3346.40 | -53.90 | -54.34 | -13 |
| 13 | 4183.00 | -49.70 | -47.80 | -13 |
| 14 | 5019.60 | -- | -- | -13 |
| 15 | 5856.20 | -- | -- | -13 |
| 16 | 6692.80 | -- | -- | -13 |
| 17 | 7529.40 | -- | -- | -13 |
| 18 | 8366.00 | -- | -- | -13 |
| **GSM 850 MHz: Channel No. 251 (848.80 MHz)** | | | | |
| 19 | 1697.60 | -28.97 | -28.12 | -13 |
| 20 | 2546.40 | -35.46 | -34.42 | -13 |
| 21 | 3395.20 | -56.55 | -57.87 | -13 |
| 22 | 4244.00 | -51.88 | -52.40 | -13 |
| 23 | 5092.80 | -- | -- | -13 |
| 24 | 5941.60 | -- | -- | -13 |
| 25 | 6790.40 | -- | -- | -13 |
| 26 | 7639.20 | -- | -- | -13 |
| 27 | 8488.00 | -- | -- | -13 |

**NOTE:**

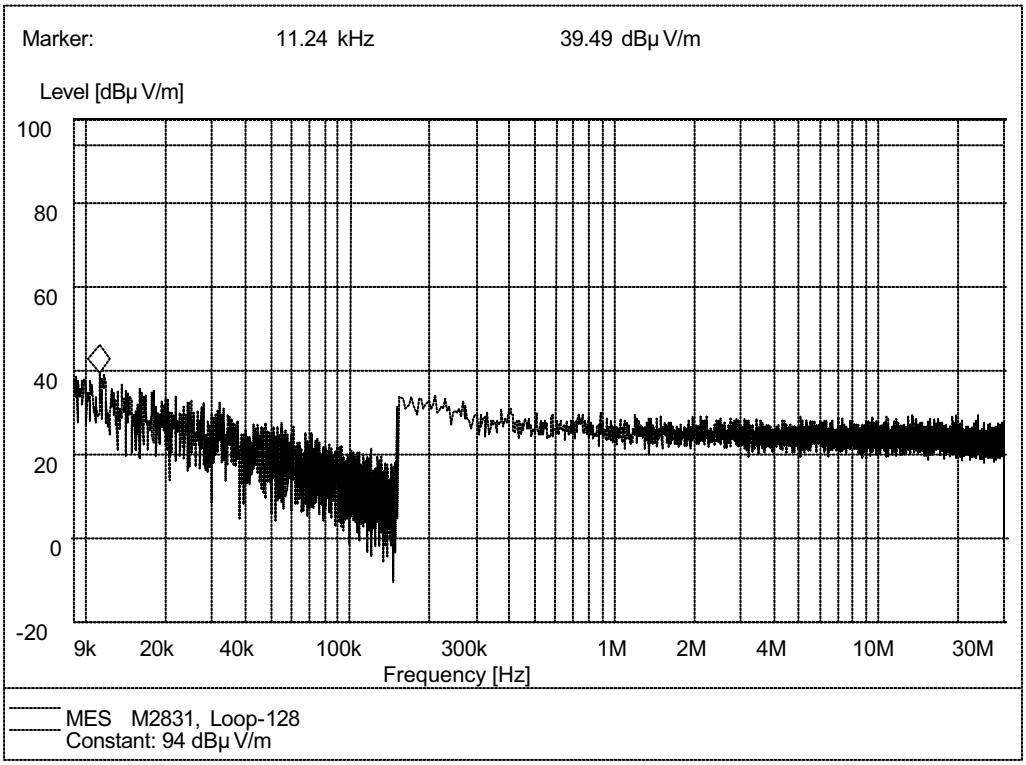
1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

**Plot of Spurious Emission**

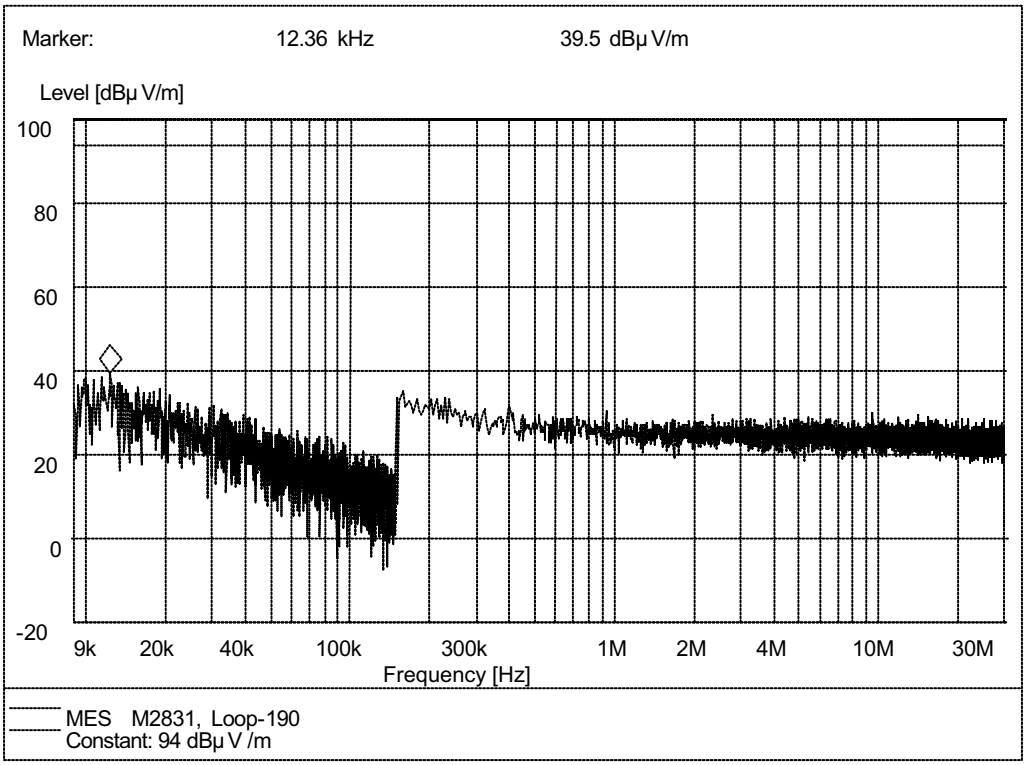
(Note: The marker point is the MS transmitting frequency which should be ignored.)

**i. 9kHz to 30MHz**

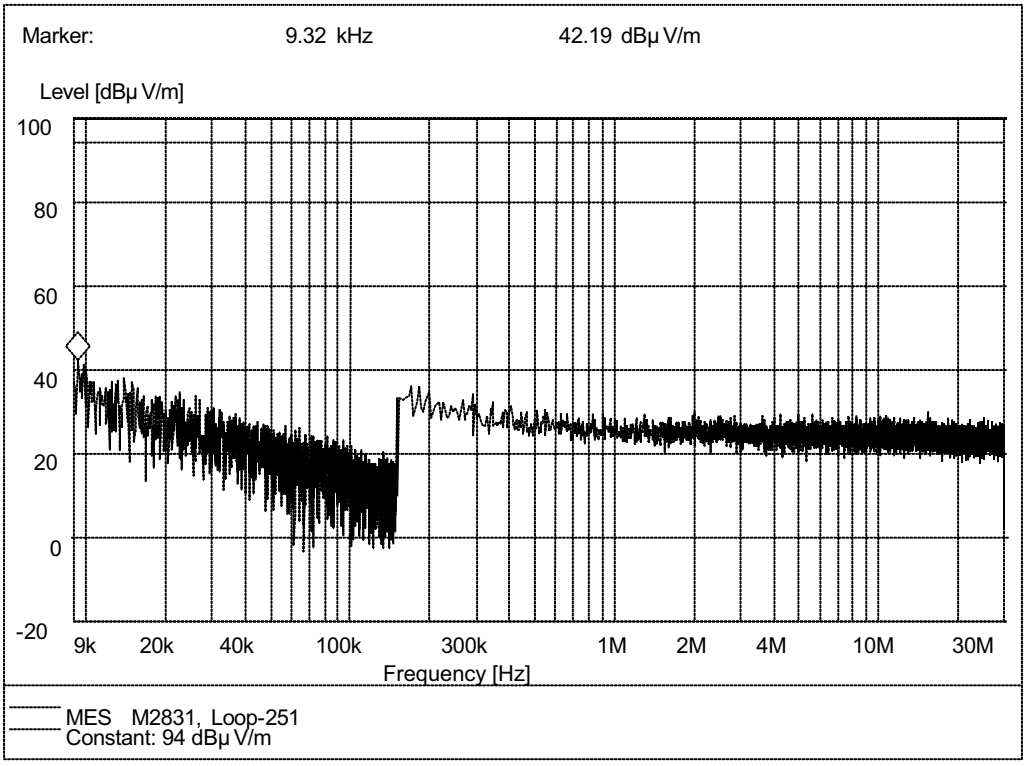
1. Lowest channel No.128




2. Middle channel No.190

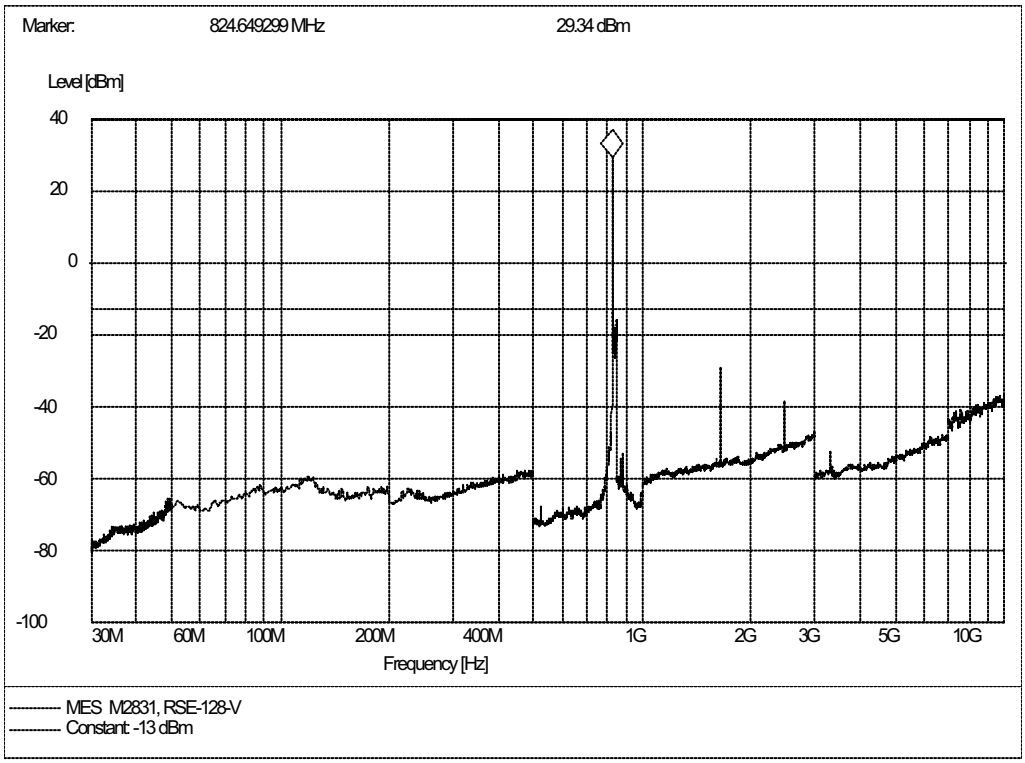


3. Highest channel No.251

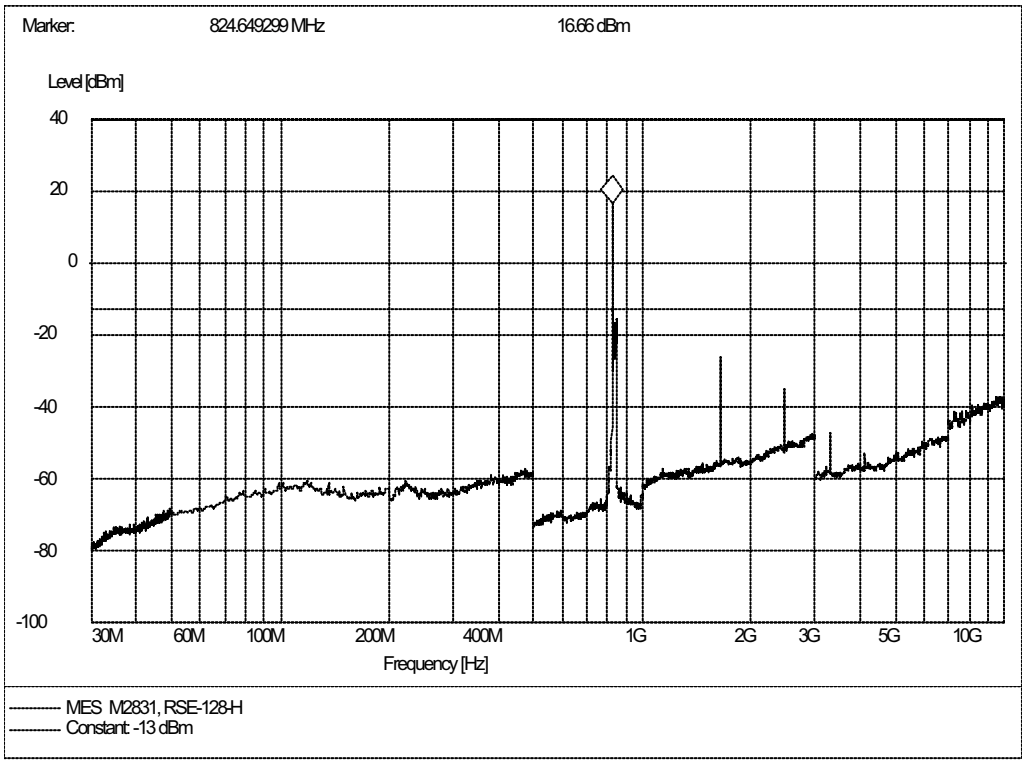


**ii. Above 30MHz**

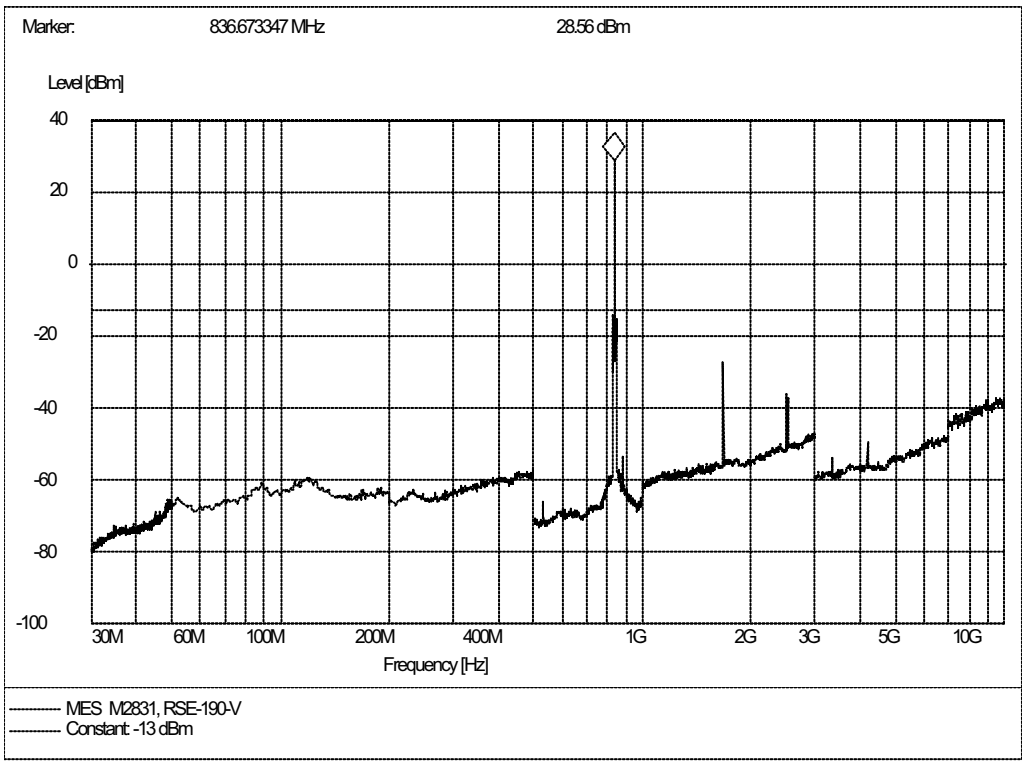
1. Lowest channel No.128, antenna vertical



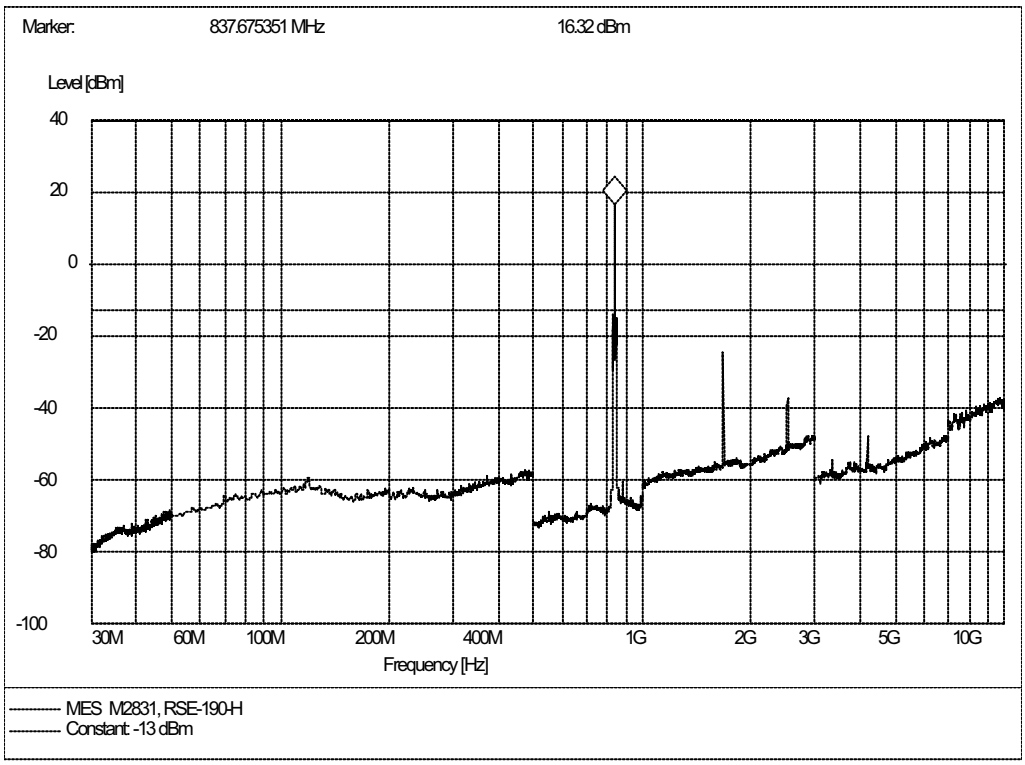

2. Lowest channel No.128, antenna horizontal



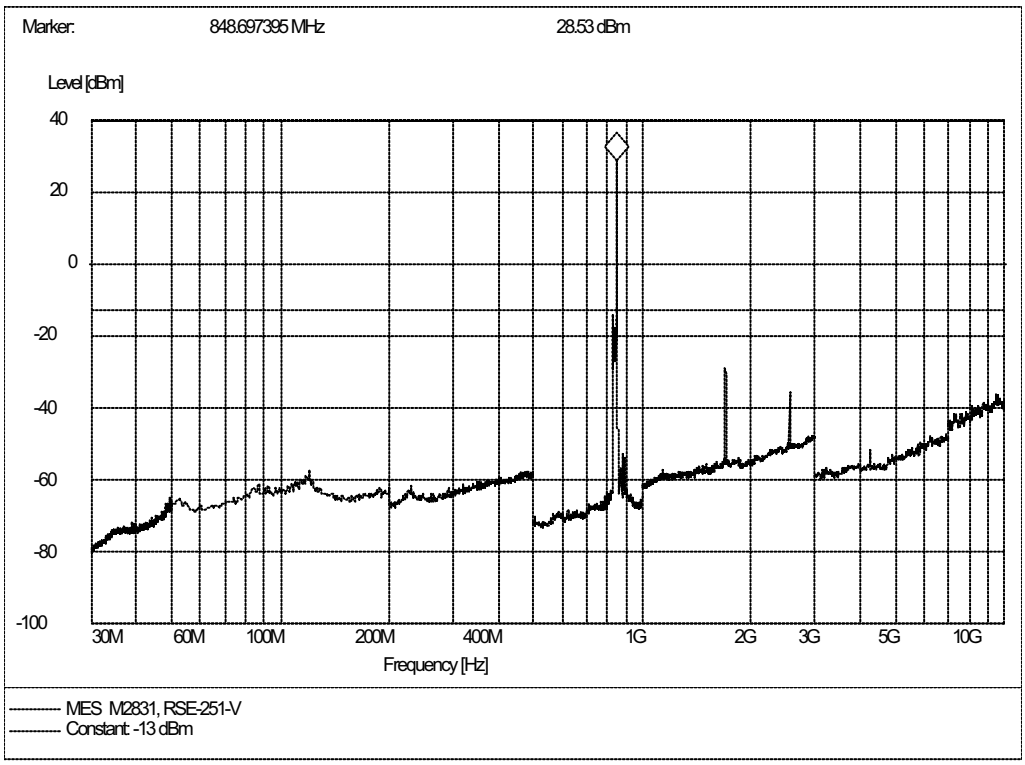
3. Middle channel No.190, antenna vertical



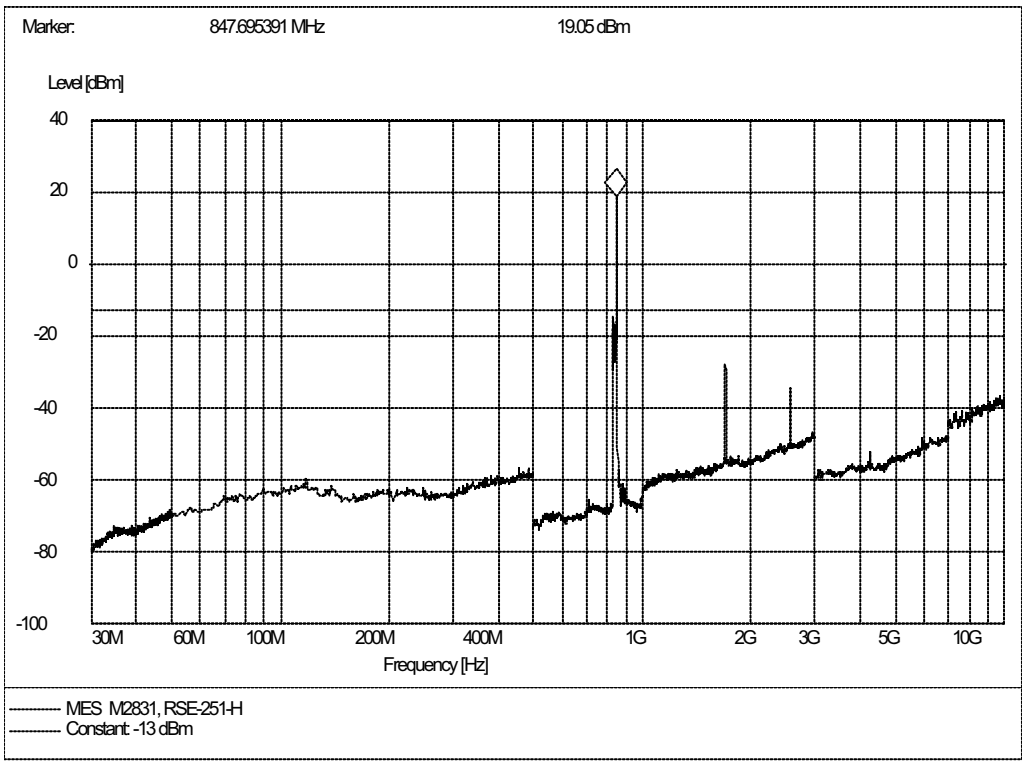

4. Middle channel No.190, antenna horizontal



5. Highest channel No.251, antenna vertical




6. Highest channel No.251, antenna horizontal



**II. PCS 1900MHz Band**

| No. | Frequency (MHz) | ERP (dBm) Antenna: Vertical | ERP (dBm) Antenna: Horizontal | Limit (dBm) |
|---|---|---|---|---|
| **PCS 1900 MHz: Channel No. 512 (1850.20 MHz)** | | | | |
| 1 | 3700.40 | -46.79 | -48.43 | -13 |
| 2 | 5550.60 | -- | -- | -13 |
| 3 | 7400.80 | -- | -- | -13 |
| 4 | 9251.00 | -- | -- | -13 |
| 5 | 11101.20 | -- | -- | -13 |
| 6 | 12951.40 | -- | -- | -13 |
| 7 | 14801.60 | -- | -- | -13 |
| 8 | 16651.80 | -- | -- | -13 |
| 9 | 18502.00 | -- | -- | -13 |
| **PCS 1900 MHz: Channel No. 661 (1880.00 MHz)** | | | | |
| 10 | 3760.00 | -46.12 | -48.40 | -13 |
| 11 | 5640.00 | -- | -- | -13 |
| 12 | 7520.00 | -- | -- | -13 |
| 13 | 9400.00 | -- | -- | -13 |
| 14 | 11280.00 | -- | -- | -13 |
| 15 | 13160.00 | -- | -- | -13 |
| 16 | 15040.00 | -- | -- | -13 |
| 17 | 16920.00 | -- | -- | -13 |
| 18 | 18800.00 | -- | -- | -13 |
| **PCS 1900 MHz: Channel No. 810 (1909.80 MHz)** | | | | |
| 19 | 3819.60 | -45.70 | -45.95 | -13 |
| 20 | 5729.40 | -- | -- | -13 |
| 21 | 7639.20 | -- | -- | -13 |
| 22 | 9549.00 | -- | -- | -13 |
| 23 | 11458.80 | -- | -- | -13 |
| 24 | 13368.60 | -- | -- | -13 |
| 25 | 15278.40 | -- | -- | -13 |
| 26 | 17188.20 | -- | -- | -13 |
| 27 | 19098.00 | -- | -- | -13 |

**NOTE:**

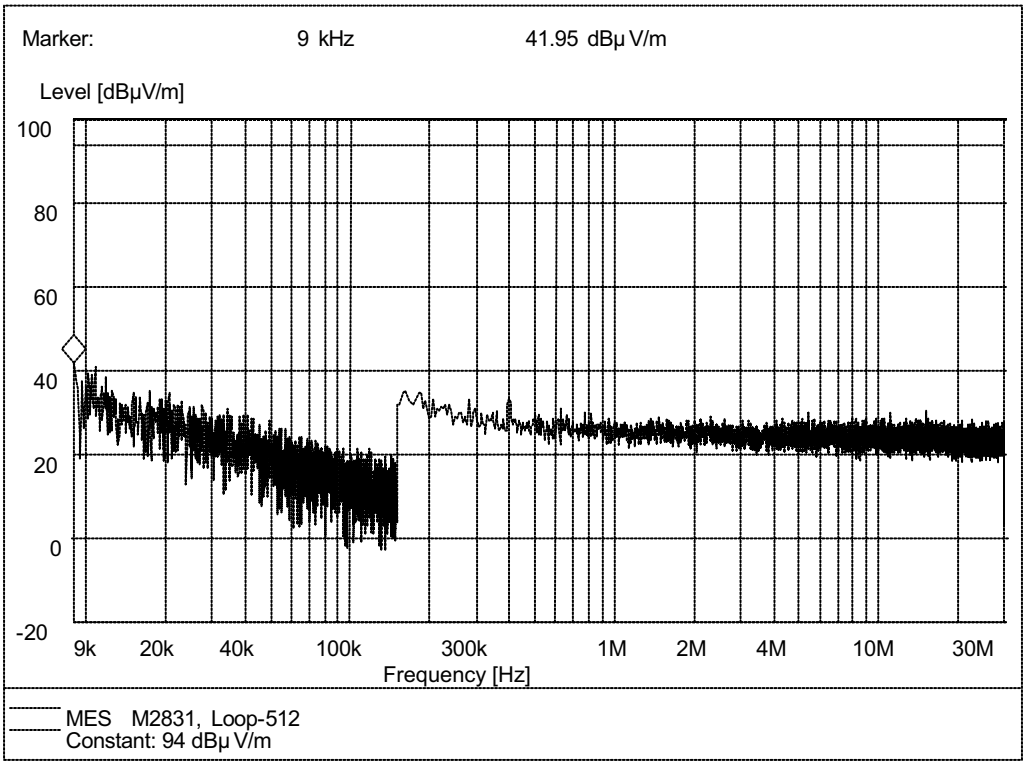
1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

**Plot of Spurious Emission**

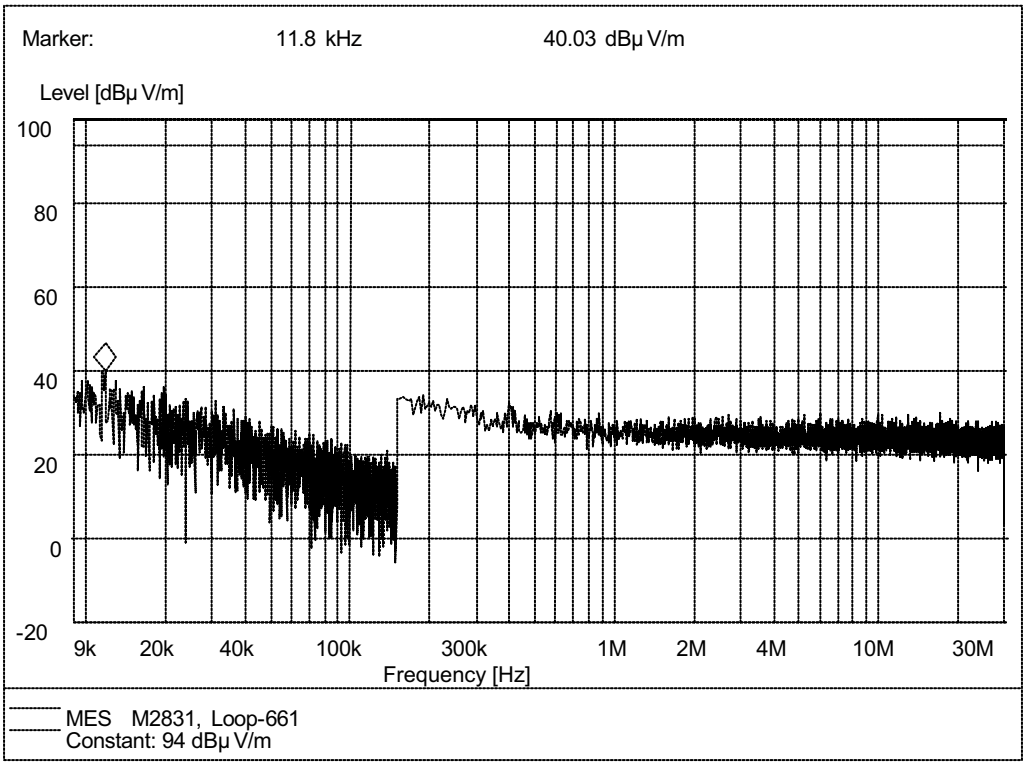
(Note: The marker point is the MS transmitting frequency which should be ignored.)

**i. 9kHz to 30MHz**

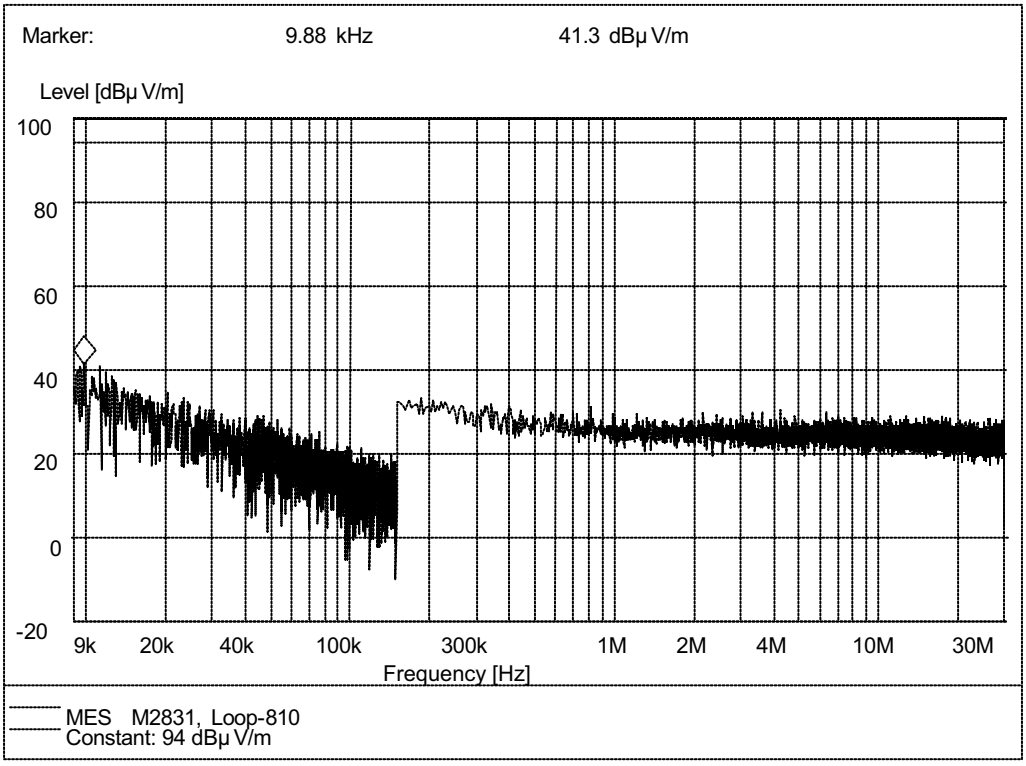
1. Lowest channel No.512




2. Middle channel No.661

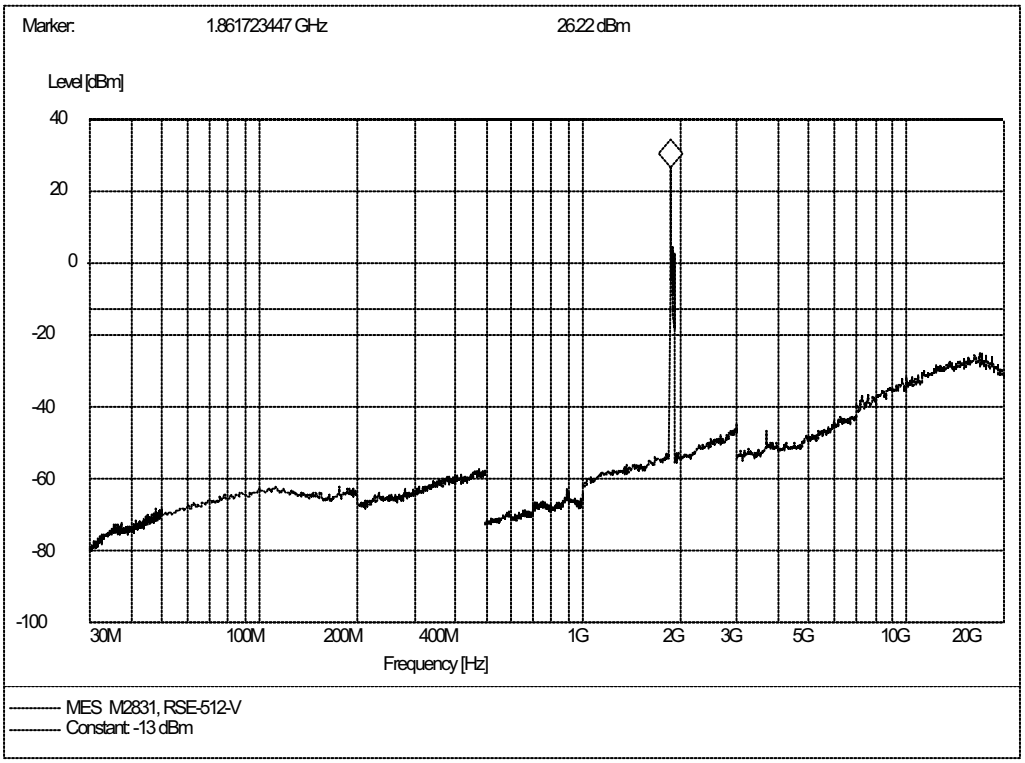


3. Highest channel No.810

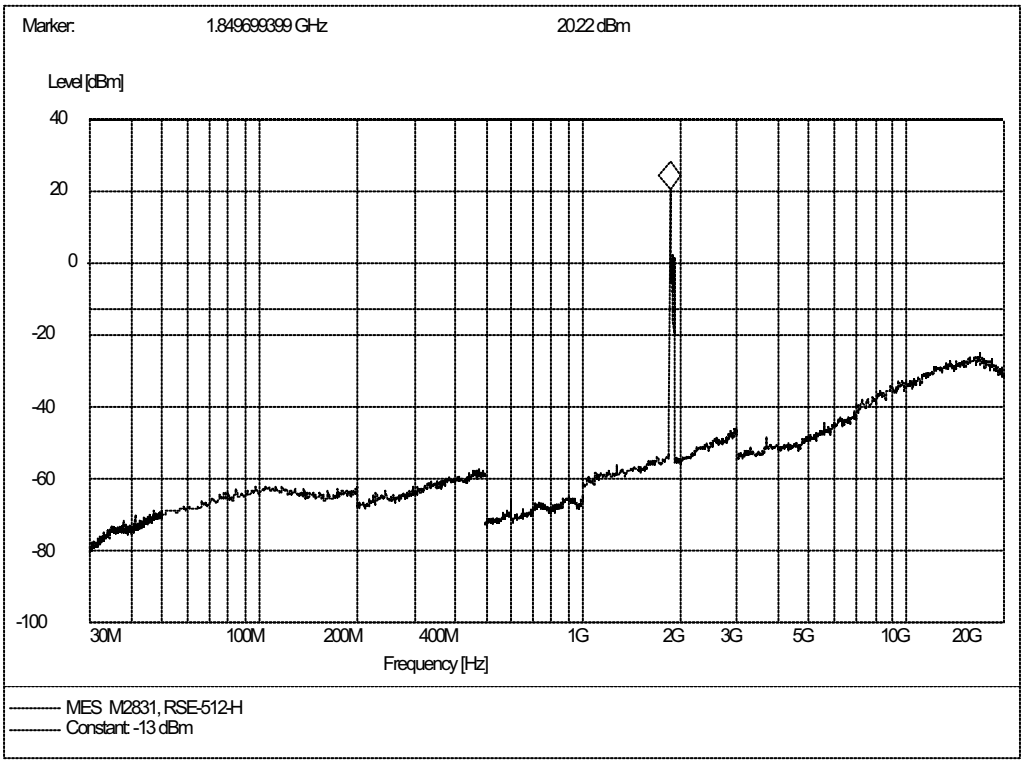


**ii. Above 30MHz**

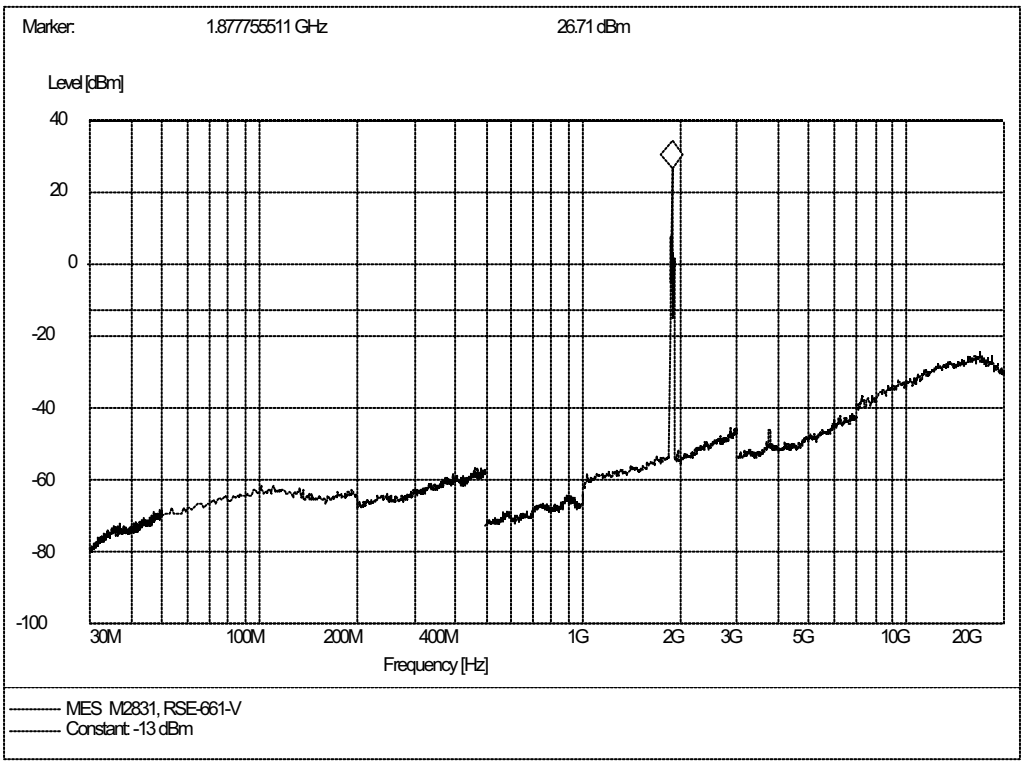
1. Lowest channel No.512, antenna vertical



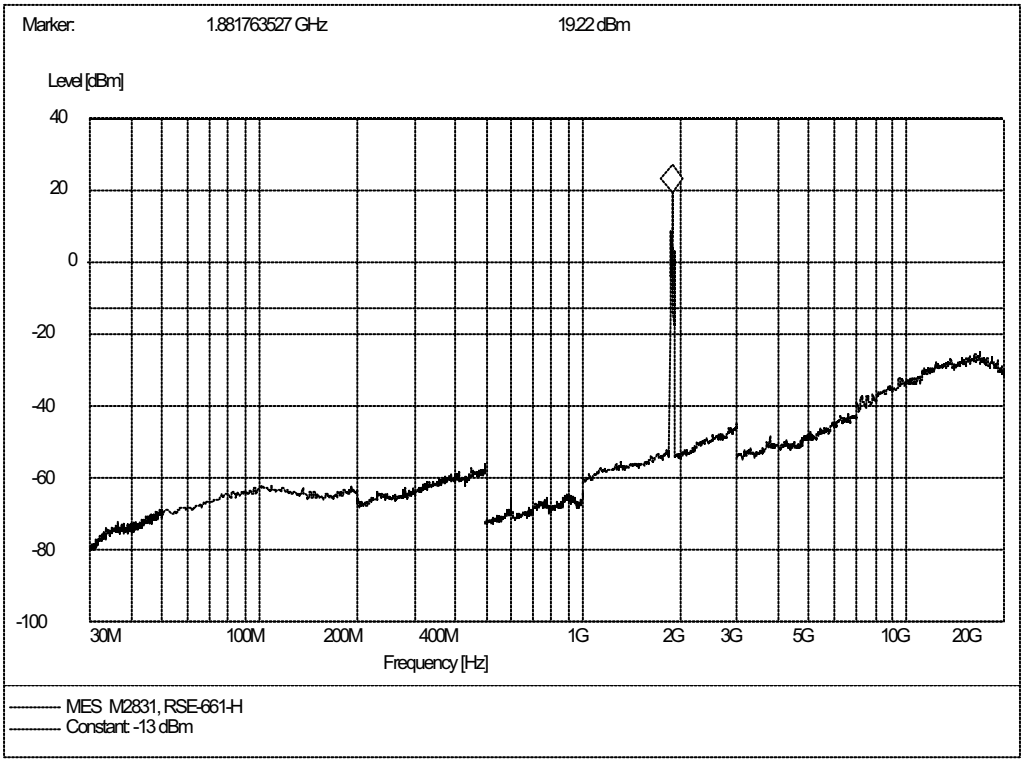

2. Lowest channel No.512, antenna horizontal



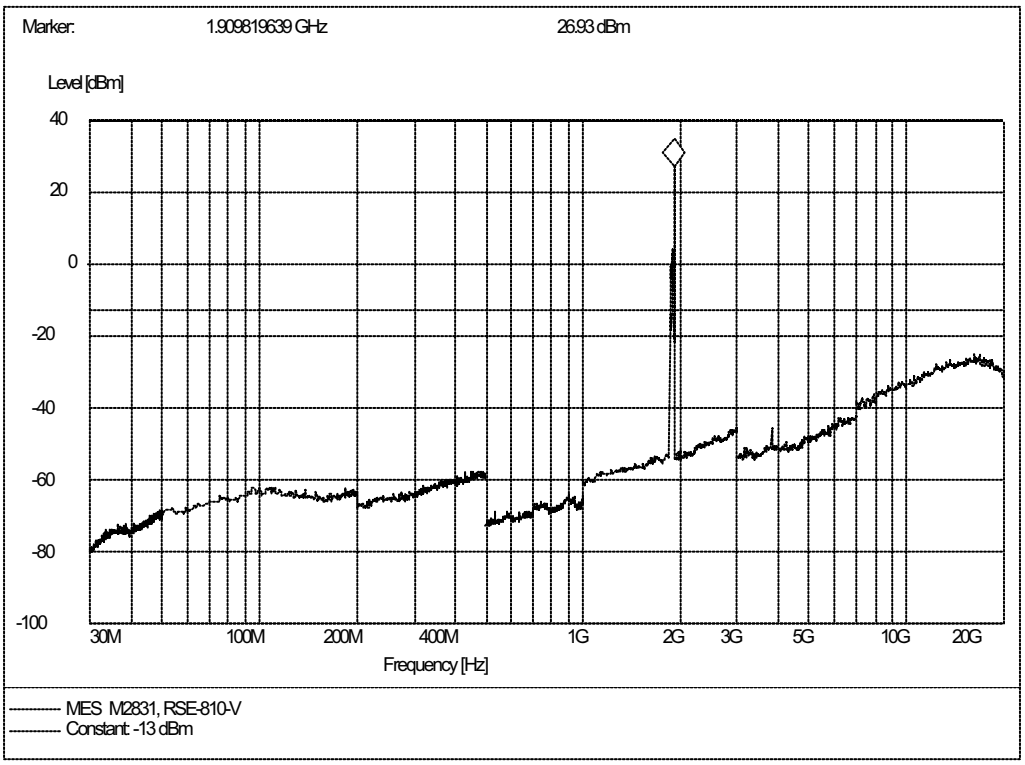
3. Middle channel No.661, antenna vertical



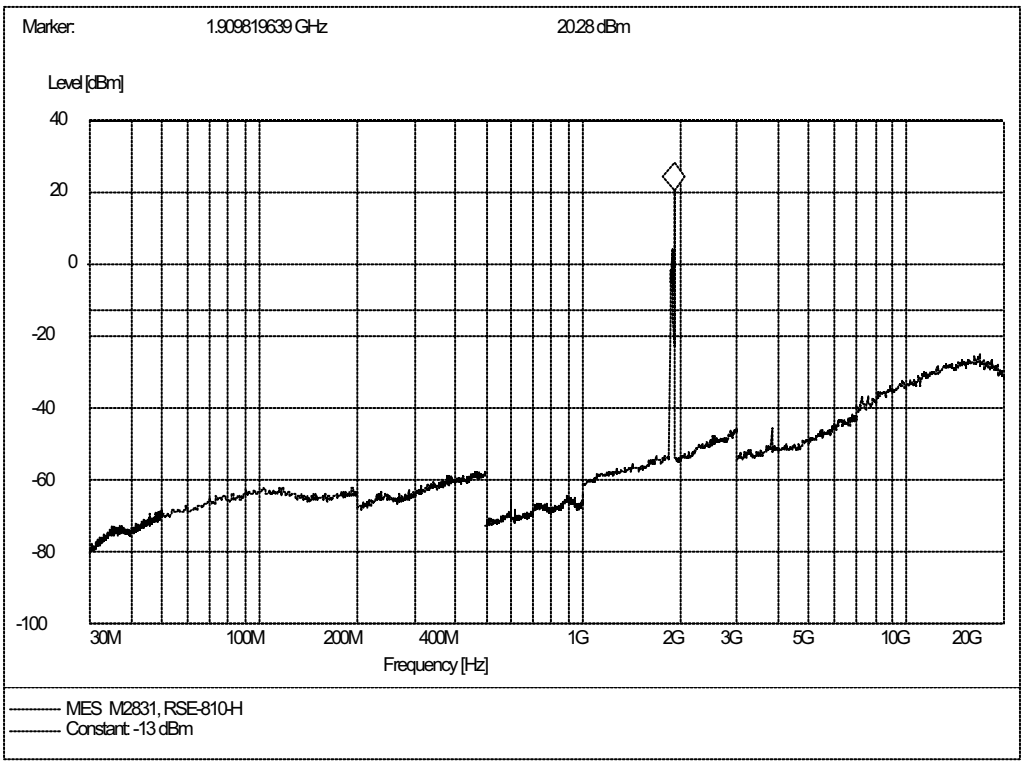

4. Middle channel No.661, antenna horizontal



5. Highest channel No.810, antenna vertical




6. Highest channel No.810, antenna horizontal



# 9 Frequency Stability Test

## 9.1 Requirement of Frequency Stability

According to FCC §22.355, the carrier frequency of each transmitter (821-896MHz, =3W) must be maintained within ±2.5ppm.

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

According to FCC §2.1055, the test conditions are:

- **Temperature**: The temperature is varied from -30ºC to +50ºC at intervals of not more than 10ºC.
- **Primary Supply Voltage**: 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.

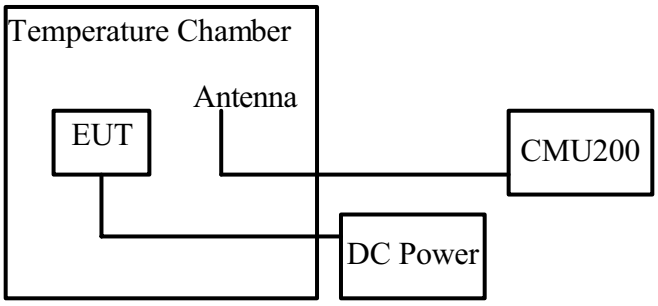
## 9.2 Test Procedure

a. The temperature was varied from -30ºC to +50ºC at intervals of 10ºC. At each temperature level, the EUT was powered off and put in the temperature chamber for 2 hour.

b. After sufficient stabilization, the EUT was turned on and a communication link was established. The frequency was measured within three minutes.

c. For extreme supply voltage measurement, the EUT was tested at room temperature.

## 9.3 Test Setup



# 9.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + DC power supply.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low), 190 (middle) and 251 (high) for GSM 850 MHz; channel No.512 (low), 661 (middle) and 810 (high) for PCS 1900.

# 9.5 Test Results

**I. GSM 850 MHz Band**

| No. | Test Conditions | | Frequency Deviation (Hz) | | | |
|---|---|---|---|---|---|---|
| | Voltage | Temperature (°C) | 128CH | 190CH | 251CH | Limit (±2.5ppm) |
| 1 | 3.7V ($V_{nom}$) | -30 | +10 | -4 | +16 | 128CH, ±2060Hz<br>190CH, ±2096Hz<br>251CH, ±3055Hz |
| 2 | | -20 | -8 | +3 | +6 | |
| 3 | | -10 | +21 | -12 | +3 | |
| 4 | | 0 | +13 | +19 | -5 | |
| 5 | | +10 | +15 | +24 | -2 | |
| 6 | | +20 | +17 | +15 | +8 | |
| 7 | | +30 | +1 | -15 | +10 | |
| 8 | | +40 | -1 | -10 | +4 | |
| 9 | | +50 | +21 | -7 | -14 | |
| 10 | 4.2V ($V_{max}$) | +22 | +4 | -7 | +18 | |
| 11 | 3.6V ($V_{min}$) | +22 | +13 | +13 | +5 | |

**II. PCS 1900 MHz Band**

| No. | Test Conditions | | Frequency Deviation (Hz) | | | |
|---|---|---|---|---|---|---|
| | Voltage | Temperature (ºC) | 512CH | 661CH | 810CH | Limit （±1ppm） |
| 1 | 3.7V ($V_{nom}$) | -30 | -19 | +29 | -1 | 512CH, ±1850Hz<br>661CH, ±1880Hz<br>810CH, ±1910Hz |
| 2 | | -20 | +19 | +22 | -19 | |
| 3 | | -10 | +20 | 0 | +21 | |
| 4 | | 0 | +12 | -23 | +9 | |
| 5 | | +10 | -8 | -19 | -12 | |
| 6 | | +20 | +29 | -7 | +9 | |
| 7 | | +30 | +4 | +14 | +29 | |
| 8 | | +40 | -22 | -9 | -17 | |
| 9 | | +50 | -21 | +20 | -10 | |
| 10 | 4.2V ($V_{max}$) | +22 | -2 | +12 | -4 | |
| 11 | 3.6V ($V_{min}$) | +22 | -17 | +22 | -15 | |

# 10 Simultaneous Transmission of Co-located Transmitters

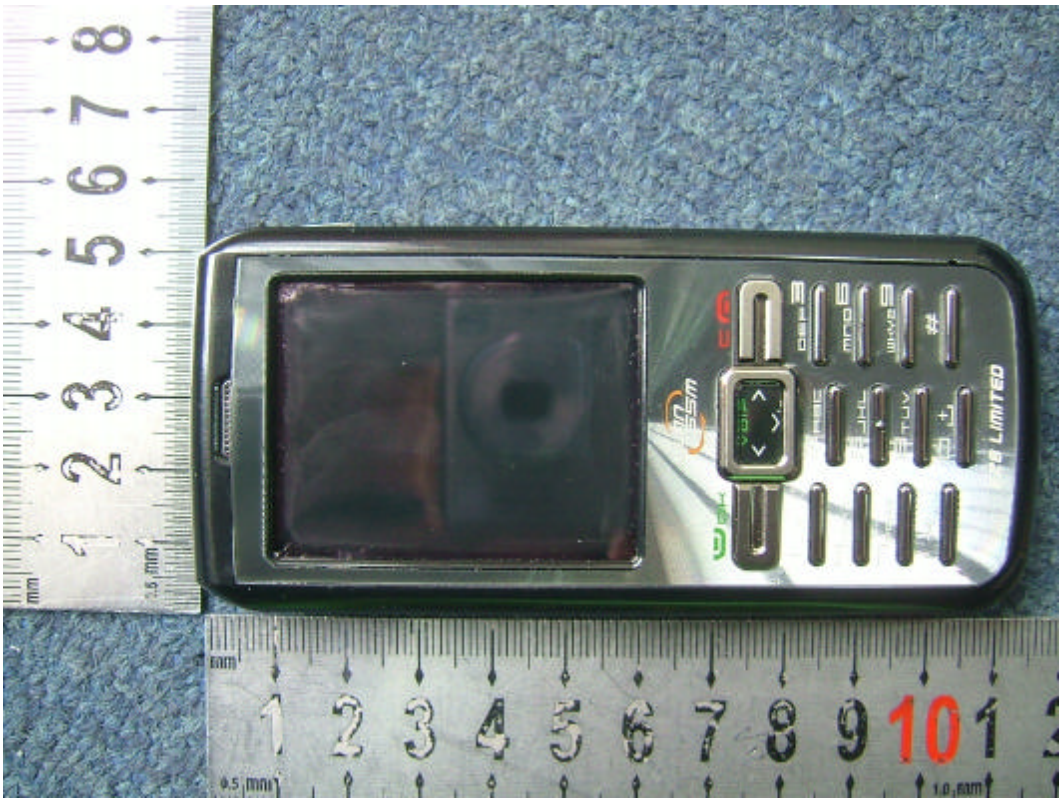
The EUT is a GSM mobile station also supporting Bluetooth and Wi-Fi functions. It has 3 transmitters located < 20cm apart from each other. Each transmitter uses individual antenna.

Refer to test reports FCC07-8005 (this report, GSM), FCC07-8006 (Bluetooth), and FCC07-8007 (Wi-Fi) for individual transmitter test results.

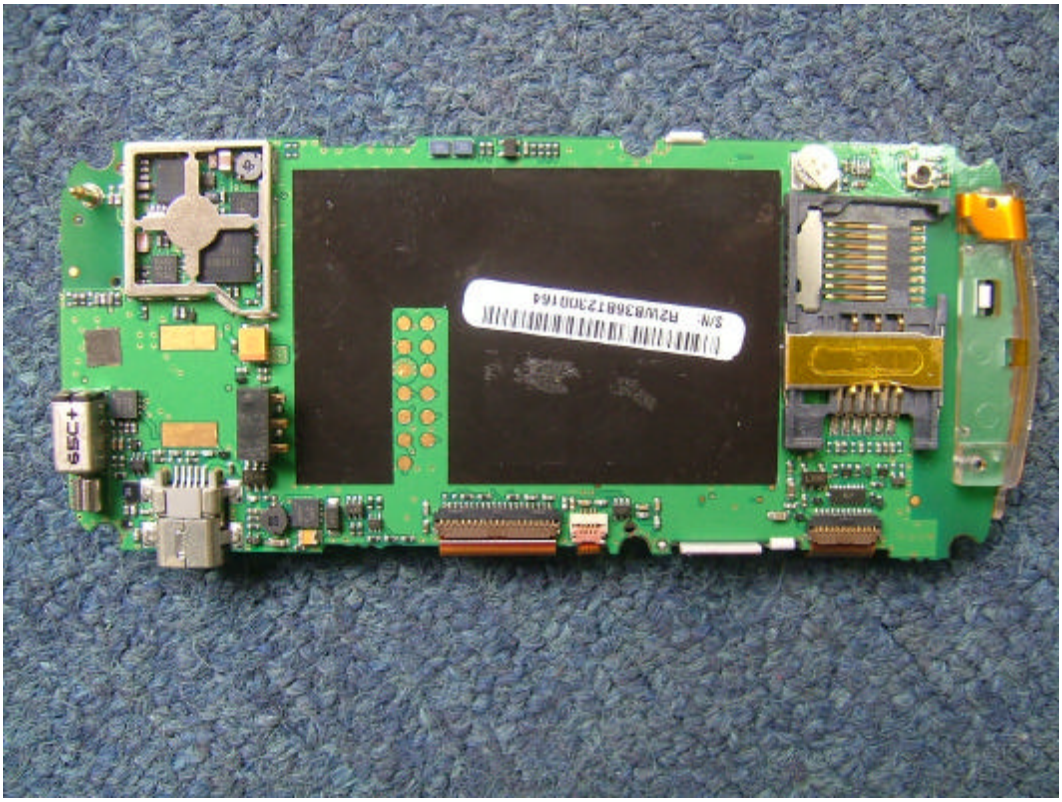
Simultaneous transmissions were also investigated, with transmitters active at the same time. The transmitter output levels and spurious emissions were no worse than individual tests. No new intermodulation patterns were found.

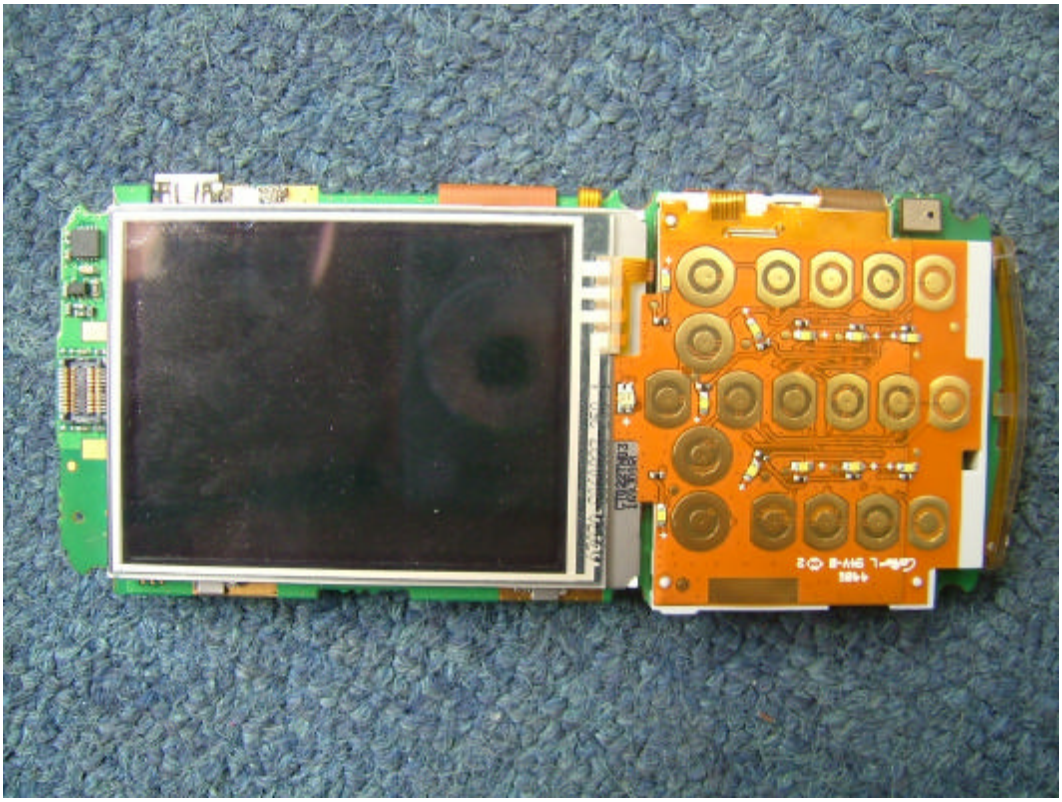
# Appendix I: Photographs of the EUT

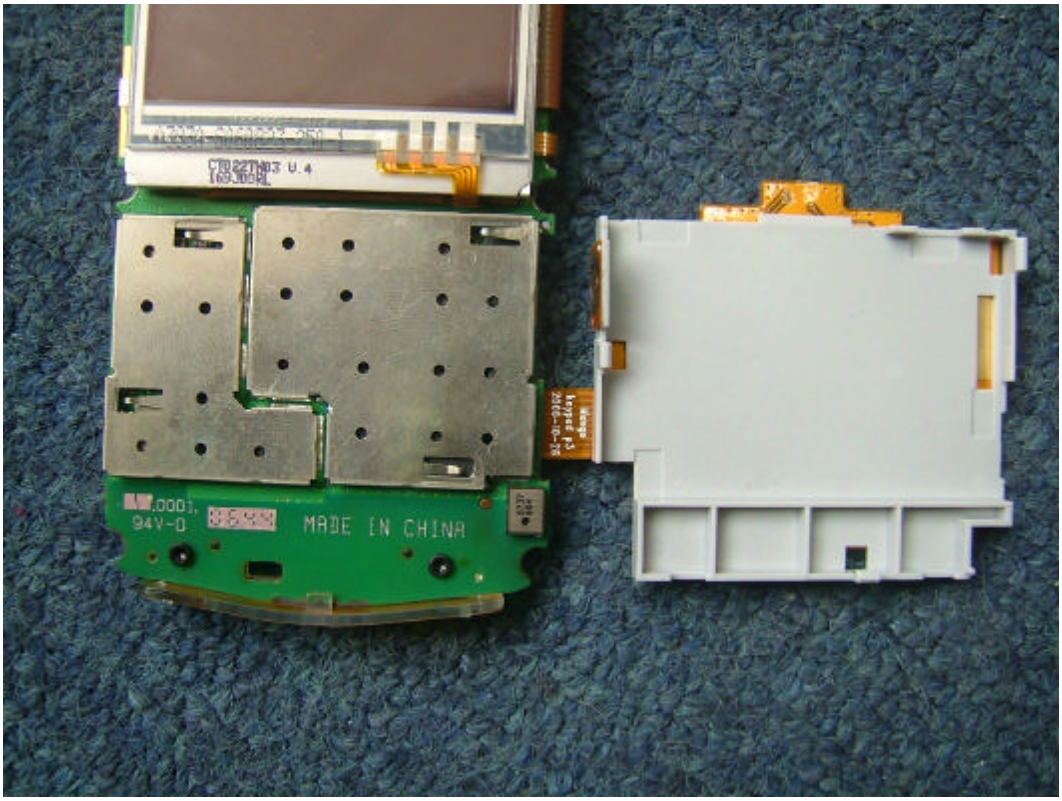
## 1. Appearance of the MS

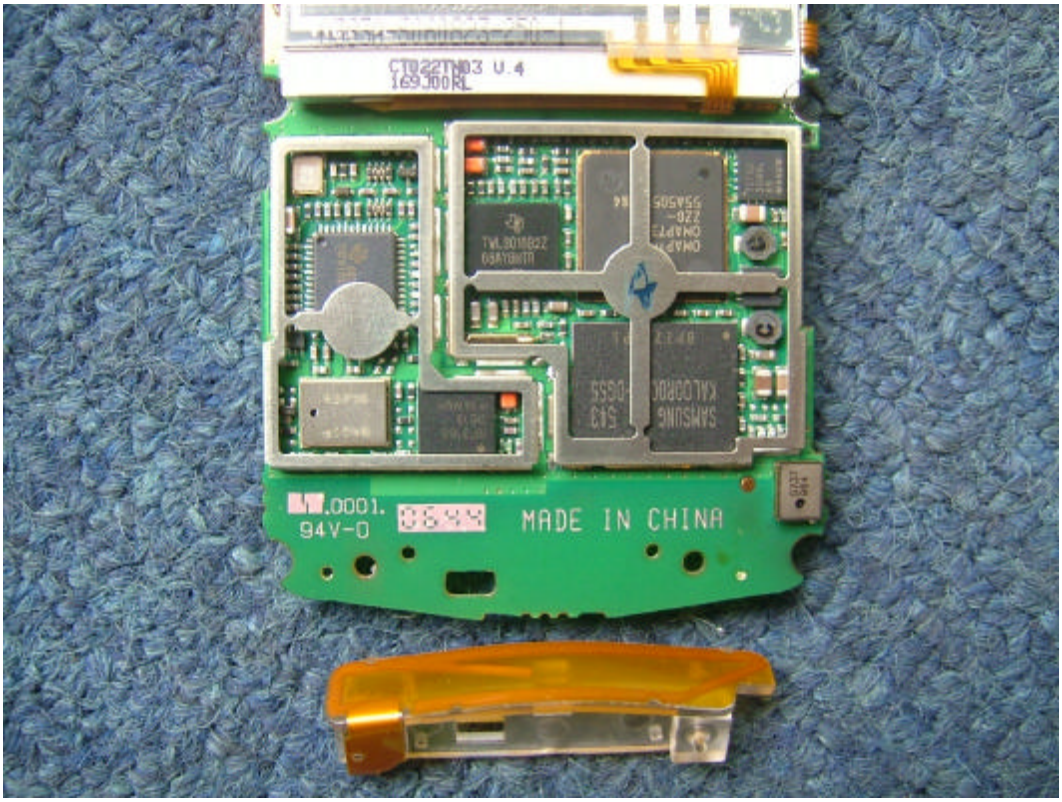


**2. Inside of the MS**





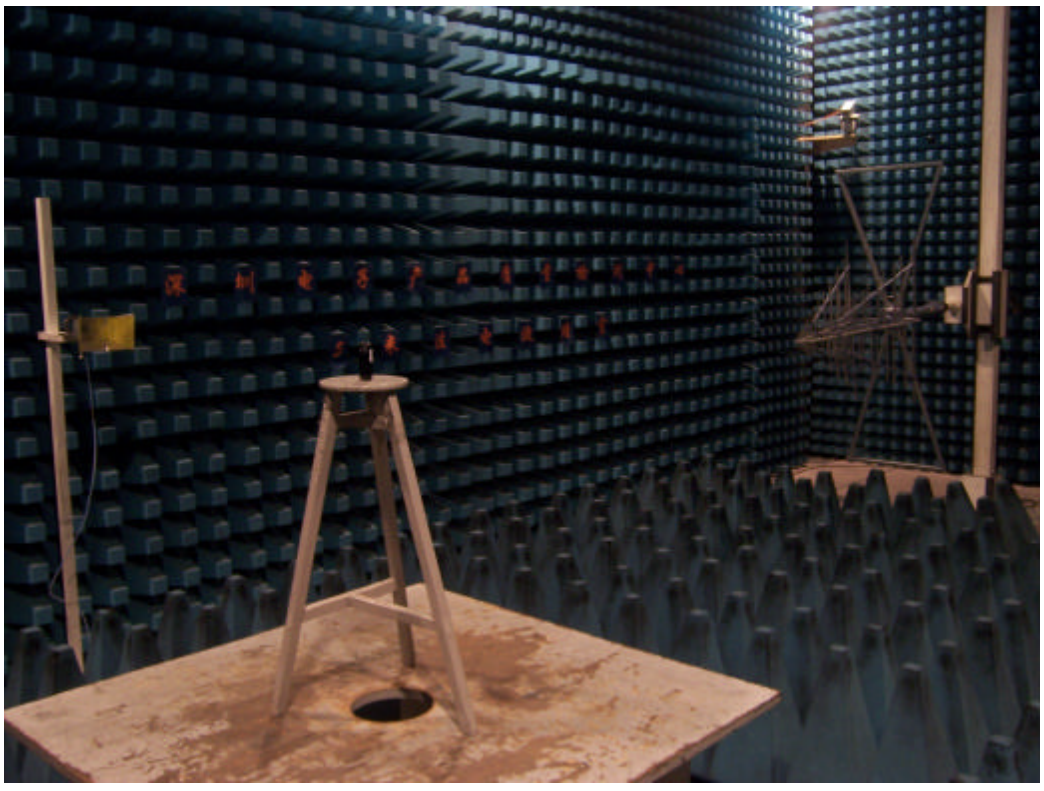

MADE IN CHINA


MADE IN CHINA

# Appendix II: Photographs of the Test Configuration

**1. Conducted RF Test**

**2. Radiated RF Test**



**3. Radiated RF Test (9kHz~30MHz)**