



47 CFR PART 15B, 22 H

# TEST REPORT

of

## HC-C200

Model Name: HC-C200  
Trade Name: Haier  
Report No.: SZ08030018E01  
FCC ID: SG70803HC-C200

*prepared for*

**Qingdao Haier Telecom Co., Ltd.**

No.1, Haier Road, Haier Park, 266101, P.R. China



**Shenzhen Morlab Communications Technology Co., Ltd.**

3/F, Electronic Testing Building, Shahe Road, Xili,  
Nanshan District, Shenzhen, 518055 P. R. China

Tel: +86 755 86130398

Fax: +86 755 86130218



**NOTE:** This test report can be duplicated completely for the legal use with the approval of the applicant, it shall not be reproduced except in full, without the written approval of Shenzhen Morlab Communications Technology Co., Ltd. Any objections should be raised to us within thirty workdays since the date of issue.

## TABLE OF CONTENTS

|            |   |          |
|------------|---|----------|
| <b>1.</b>  | <b>TEST RESULT CERTIFICATION .....</b>              | <b>4</b> |
| <b>2.</b>  | <b>GENERAL INFORMATION .....</b>                    | <b>5</b> |
| <b>2.1</b> | <b>Equipment under Test (EUT) Description .....</b> | <b>5</b> |
| <b>2.2</b> | <b>Test Standards and Results .....</b>             | <b>6</b> |
| <b>2.3</b> | <b>Facilities and Accreditations .....</b>          | <b>6</b> |
| 2.3.1      | Facilities .....                                    | 6        |
| 2.3.2      | Test Equipments .....                               | 6        |
| 2.3.3      | Test Environment Conditions .....                   | 6        |
| <b>3.</b>  | <b>47 CFR PART 15B REQUIREMENTS .....</b>           | <b>6</b> |
| <b>3.1</b> | <b>General Information .....</b>                    | <b>6</b> |
| 3.1.1      | Test Mode .....                                     | 6        |
| 3.1.2      | Test Setup .....                                    | 6        |
| <b>3.2</b> | <b>Conducted Emission .....</b>                     | <b>6</b> |
| 3.2.1      | Requirement .....                                   | 6        |
| 3.2.2      | Test Procedure .....                                | 6        |
| 3.2.3      | Test Result .....                                   | 6        |
| <b>3.3</b> | <b>Radiated Emission .....</b>                      | <b>6</b> |
| 3.3.1      | Requirement .....                                   | 6        |
| 3.3.2      | Test Procedure .....                                | 6        |
| 3.3.3      | Test Result .....                                   | 6        |
| <b>4.</b>  | <b>47 CFR PART 2, PART 22H REQUIREMENTS .....</b>   | <b>6</b> |
| <b>4.1</b> | <b>General Information .....</b>                    | <b>6</b> |
| 4.1.1      | Conducted Related Tests .....                       | 6        |
| 4.1.2      | Radiated Power and Spurious Emission Tests .....    | 6        |
| 4.1.3      | Frequency Stability Test .....                      | 6        |
| <b>4.2</b> | <b>Frequencies .....</b>                            | <b>6</b> |
| 4.2.1      | Requirement .....                                   | 6        |
| 4.2.2      | Test Procedure .....                                | 6        |
| 4.2.3      | Test Result .....                                   | 6        |
| <b>4.3</b> | <b>Conducted RF Output Power .....</b>              | <b>6</b> |

|            |  |          |
|------------|--|----------|
| 4.3.1      | Requirement .....                                  | 6        |
| 4.3.2      | Test Procedure .....                               | 6        |
| 4.3.3      | Test Result .....                                  | 6        |
| <b>4.4</b> | <b>Occupied Bandwidth .....</b>                    | <b>6</b> |
| 4.4.1      | Occupied Bandwidth Definition .....                | 6        |
| 4.4.2      | Test Procedure .....                               | 6        |
| 4.4.3      | Test Result .....                                  | 6        |
| <b>4.5</b> | <b>Conducted Spurious Emission .....</b>           | <b>6</b> |
| 4.5.1      | Requirement .....                                  | 6        |
| 4.5.2      | Test Procedure .....                               | 6        |
| 4.5.3      | Test Result .....                                  | 6        |
| <b>4.6</b> | <b>Transmitter Radiated Power (EIRP/ERP) .....</b> | <b>6</b> |
| 4.6.1      | Requirement .....                                  | 6        |
| 4.6.2      | Test Procedure .....                               | 6        |
| 4.6.3      | Test Result .....                                  | 6        |
| <b>4.7</b> | <b>Radiated Spurious Emission .....</b>            | <b>6</b> |
| 4.7.1      | Requirement .....                                  | 6        |
| 4.7.2      | Test Procedure .....                               | 6        |
| 4.7.3      | Test Result .....                                  | 6        |
| <b>4.8</b> | <b>Frequency Stability .....</b>                   | <b>6</b> |
| 4.8.1      | Frequency Stability Requirement .....              | 6        |
| 4.8.2      | Test Procedure .....                               | 6        |
| 4.8.3      | Test Result .....                                  | 6        |
| <b>I</b>   | <b>PHOTOGRAPH OF THE TEST SETUP .....</b>          | <b>6</b> |
| <b>II</b>  | <b>PHOTOGRAPH OF THE EUT .....</b>                 | <b>6</b> |



## 1. Test Result Certification

Equipment under Test: HC-C200

Trade Name: Haier  
Model Name: HC-C200  
FCC ID: SG70803HC-C200

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 15 Subpart B  
47 CFR Part 22 Subpart H

Test Result: PASS

### \* We Hereby Certify That:

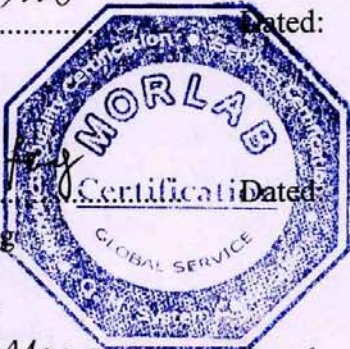
The equipment under test was tested by Shenzhen Morlab Communications Technology Co., Ltd. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

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: Luo Biao Dated: 2008.3.28  
Luo Biao

Reviewed by: Yao Xiaofeng Dated: 2008.3.28  
Yao Xiaofeng

Approved by: Shu Luan Dated: 2008.3.28  
Shu Luan





1. The EUT is a model of CDMA 1X mobile station operating in Cellular band.
2. The normal configuration for the EUT is the Mobile Phone (MS) associated with ancillary equipments e.g. the Battery and/or the AC Adapter (Charger).
3. For detailed features about the EUT, please see user manual supplied by the applicant.

## 2.2 Test Standards and Results

The objective of the report is to perform tests according to 47 CFR Part 2, Part 15 Part 22 for FCC ID Certification:

| No. | Identity                            | Document Title  |
|-----|-------------------------------------|---|
| 1   | 47 CFR Part 2<br>(10-1-05 Edition)  | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations |
| 2   | 47 CFR Part 15<br>(10-1-05 Edition) | Radio Frequency Devices   |
| 3   | 47 CFR Part 22<br>(10-1-05 Edition) | Public Mobile Services  |

Test detailed items and the results are as below:

| No.                     | Rules                         | Test Type                                       | Result | Date of Test |
|-------------------------|-------------------------------|---|--------|--------------|
| FCC Part 15 Requirement |                               |   |        |              |
| 1                       | §15.107                       | Conducted Emissions                             | PASS   | 2008-3-19    |
| 2                       | §15.109                       | Radiated Emissions                              | PASS   | 2008-3-19    |
| FCC Part 22 Requirement |                               |   |        |              |
| 1                       | §2.106<br>§22.905             | Frequencies                                     | PASS   | 2008-3-14    |
| 2                       | §2.1046                       | Conducted RF Output Power at Antenna Terminal   | PASS   | 2008-3-14    |
| 3                       | §2.1049                       | Occupied Bandwidth                              | PASS   | 2008-3-14    |
| 4                       | §2.1051<br>§2.1057<br>§22.917 | Conducted Spurious Emission at Antenna Terminal | PASS   | 2008-3-14    |
| 5                       | §22.913                       | Transmitter Radiated Power (EIPR/ERP)           | PASS   | 2008-3-14    |
| 6                       | §2.1053<br>§2.1057<br>§22.917 | Radiated Spurious Emission                      | PASS   | 2008-3-14    |
| 7                       | §2.1055<br>§22.355            | Frequency Stability                             | PASS   | 2008-3-14    |

## 2.3 Facilities and Accreditations

### 2.3.1 Facilities

Shenzhen Electronic Product Quality Testing Center 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 CNAS L1659.

All measurement facilities used to collect the measurement data are located at Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, P. R. China. The site was 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 Equipments

| No. | Description               | Specification  |
|-----|---------------------------|--|
| 1   | System Simulator          | Manufacturer: Rohde&Schwarz<br>Model No.: CMU200<br>Serial No.: 100448                 |
| 2   | System Simulator          | Manufacturer: Agilent<br>Model No.: E5515C<br>Serial No.: GB43130131                   |
| 3   | Spectrum Analyzer         | Manufacturer: Agilent<br>Model No.: E7405A<br>Serial No.: US44210471                   |
| 4   | Telecommunication Antenna | Manufacturer: European Antennas<br>Model No.: PSA-45010R/356<br>Serial No.: 403688-001 |
| 5   | Trilogy Antenna           | Manufacturer: Schwarzbeck<br>Model No.: VULB 9163<br>Serial No.: 9163-274              |
| 6   | Horn Antenna              | Manufacturer: Schwarzbeck<br>Model No.: BBHA 9120C<br>Serial No.: 9120C-384            |
| 7   | Power Splitter            | Manufacturer: WEINSCHEL<br>Model No.: 1506A<br>Serial No.: NW521                       |
| 8   | Anechoic Chamber          | Manufacturer: Albatross Projects GmbH  |
| 9   | DC Power Supply           | Manufacturer: Good Will Instrument Co., Ltd.   |
| 10  | Temperature Chamber       | Manufacturer: Chongqing YinHe Experimental Equip. Co., Ltd.                            |

**NOTE:**

1. Equipments listed above have been calibrated and are in the period of validation.

**2.3.3 Test Environment Conditions**

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

|                       |           |
|-----------------------|-----------|
| Temperature:          | 20 - 25°C |
| Relative Humidity:    | 40 - 60%  |
| Atmospheric Pressure: | 86-106kPa |



### **3. 47 CFR Part 15B Requirements**

#### **3.1 General Information**

##### **3.1.1 Test Mode**

The test modes of the EUT are showed as below:

(1) Call Mode:

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

Before the measurement, the lithium battery was completely discharge.

During the measurement, the lithium battery was installed into the MS, and the charger was connected to the MS. A communication link was established between the MS and a System Simulator (SS).

(2) Idle Mode:

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

Before the measurement, the lithium battery was completely discharge.

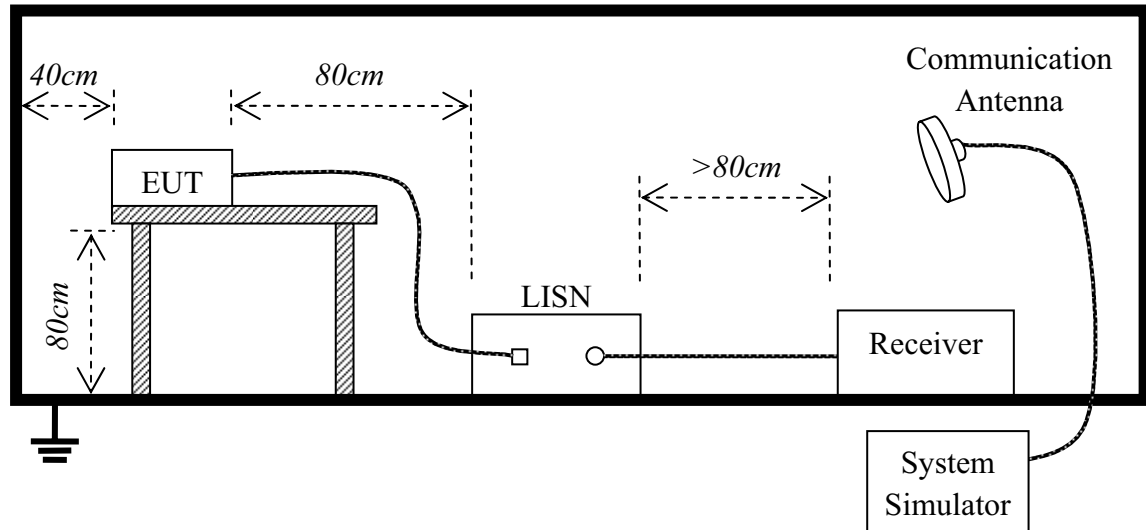
The MS was registered to the base station simulator but no call was set up.

NOTE:

1. All test modes are performed, only the worst cases are recorded in this report.

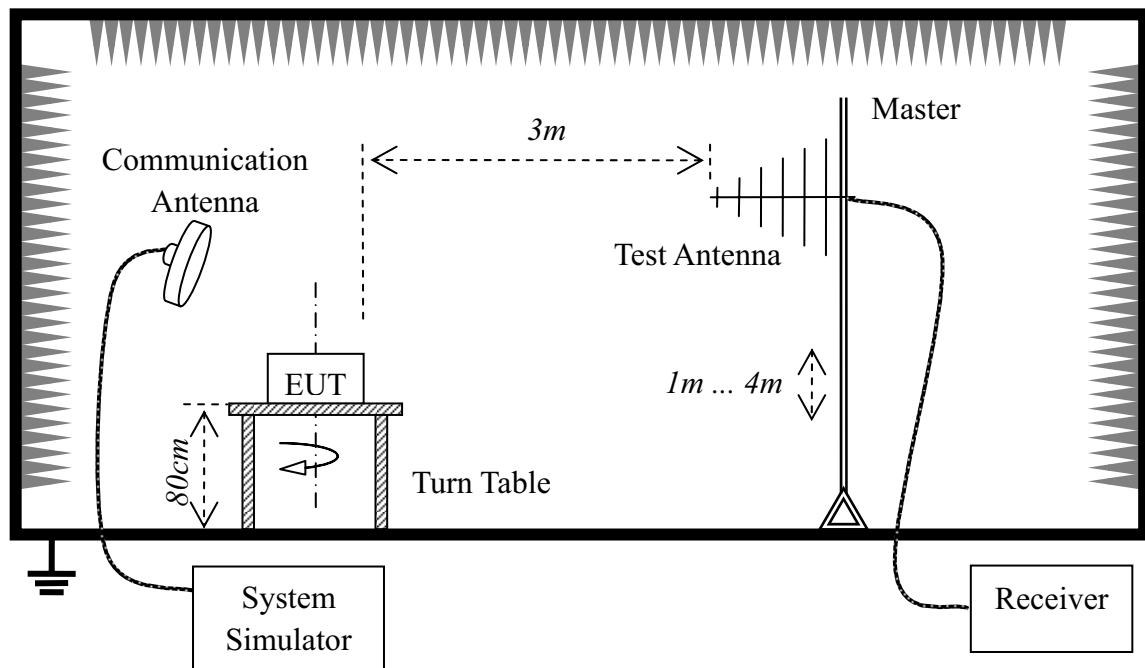
### 3.1.2 Test Setup

#### 3.1.2.1 Conducted Emission Test



1. The test is performed in a Shield Room; the factors of the test system are calibrated to correct the reading.
2. The EUT is placed on a 0.8 meters high insulating table and keeps 0.4 meters away from the conducting wall of the Shield Room.
3. The EUT is connected to the power mains through a Line Impedance Stabilization Network (LISN). The LISN provides  $50\Omega/50\mu\text{H}$  of coupling impedance for the measuring instrument.

### 3.1.2.2 Radiated Emission Test



1. The test is performed in a Semi-anechoic Chamber; the factors of the test system are calibrated to correct the reading.
2. The EUT is placed on a 0.8 meters high insulating table and keeps 3 meters away from the Test Antenna, which is mounted on the top of a variable-height antenna Master tower.

#### NOTE:

1. The test method is the substitution method according to TIA-603-C.

## 3.2 Conducted Emission

### 3.2.1 Requirement

According to FCC §15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

| Frequency range (MHz) | Conducted Limit (dB $\mu$ V) |          |
|-----------------------|------------------------------|----------|
|                       | Quasi-peak                   | Average  |
| 0.15 - 0.50           | 66 to 56                     | 56 to 46 |
| 0.50 - 5              | 56                           | 46       |
| 5 - 30                | 60                           | 50       |

NOTE:

1. The limit subjects to the Class B digital device.
2. The lower limit shall apply at the band edges.
3. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

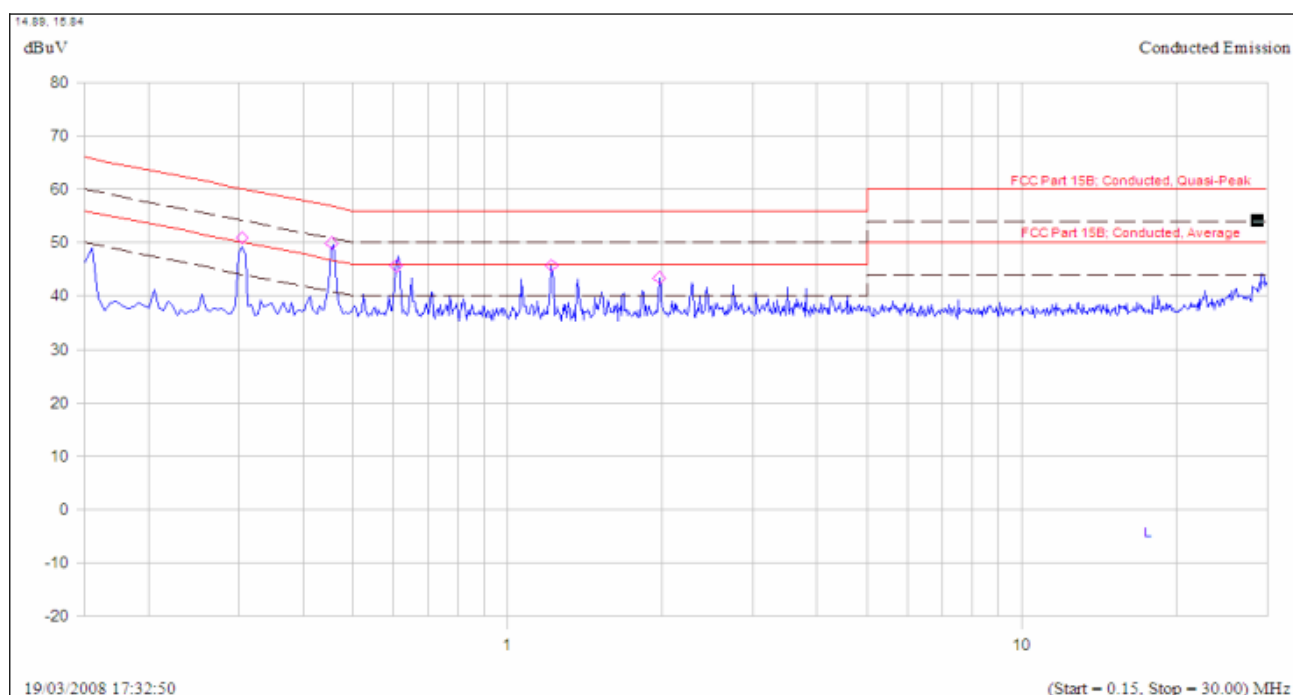
### 3.2.2 Test Procedure

1. Perform test setup as described in section 3.1.2.1.
2. Each test mode in section 3.1.1 should be applied. At each test mode, the frequency range from 150 kHz to 30MHz is searched using the CISPR Quasi-Peak and/or the Average detector of the Receiver. If the emission levels measured with Quasi-Peak detector are lower than the Average Limit, it's not necessary to measure with Average detector.
3. The emission levels at both L phase and N phase should be tested.
4. Record the test result plot and distinct points.
5. In the test report show the worst test data.

### 3.2.3 Test Result

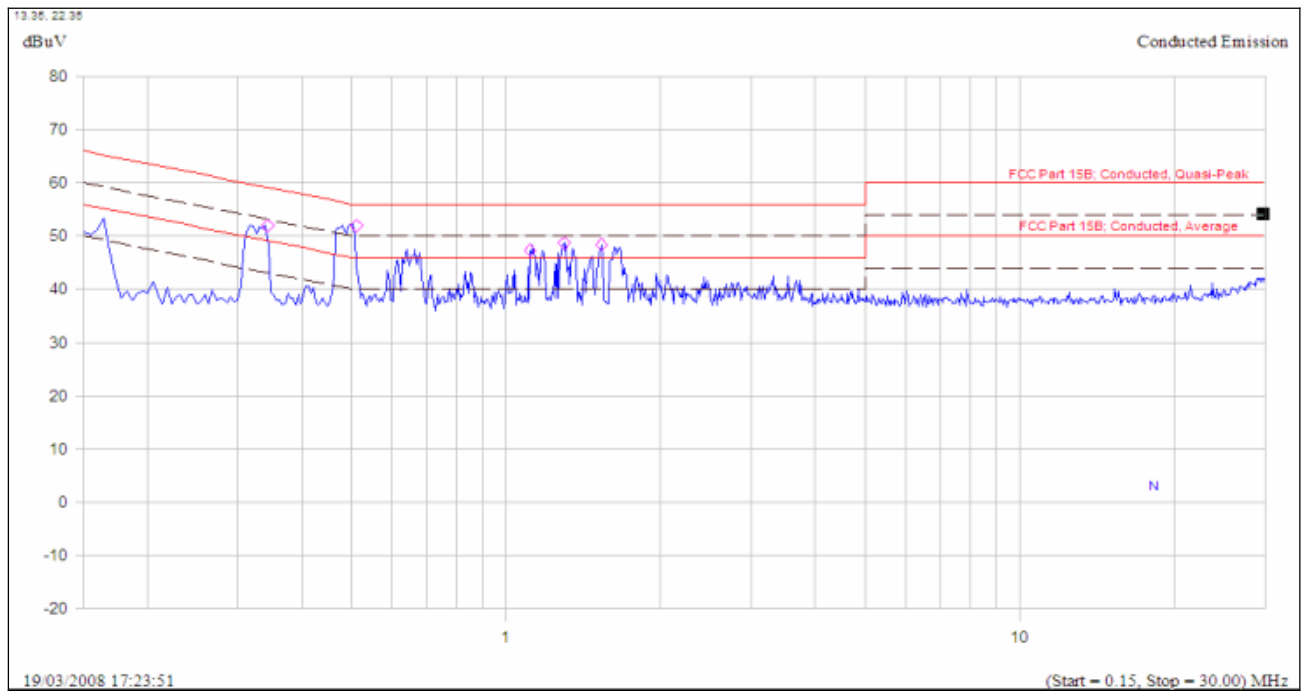
| No. | @Frequency (MHz) | Measured Emission Level (dB $\mu$ V) |        |        |       | Limit (dB $\mu$ V) |        | Verdict |
|-----|------------------|--------------------------------------|--------|--------|-------|--------------------|--------|---------|
|     |                  | PK                                   | QP     | AV     | Phase | QP                 | AV     |         |
| 1   | 0.304            | 50.9                                 | 49.7   | 38.7   | L     | 60.2               | 50.2   | PASS    |
| 2   | 0.455            | 49.9                                 | 48.4   | 38.6   | L     | 56.8               | 46.8   | PASS    |
| 3   | 0.608            | 45.6                                 | 42.9   | 33.5   | L     | 56.0               | 46.0   | PASS    |
| 4   | 1.216            | 45.7                                 | 42.7   | 31.3   | L     | 56.0               | 46.0   | PASS    |
| 5   | (n.a.)           | (n.a.)                               | (n.a.) | (n.a.) | L     | (n.a.)             | (n.a.) | (n.a.)  |
| 6   | 0.343            | 51.9                                 | 48.6   | 35.5   | N     | 59.2               | 49.2   | PASS    |
| 7   | 0.511            | 51.9                                 | 46.1   | 31.5   | N     | 56.0               | 46.0   | PASS    |
| 8   | 1.298            | 48.7                                 | 45.2   | 32.5   | N     | 56.0               | 46.0   | PASS    |
| 9   | 1.532            | 58.4                                 | 44.3   | 31.0   | N     | 56.0               | 46.0   | PASS    |

#### 1. Plot for L Phase:





## 2. Plot for N Phase:



### 3.3 Radiated Emission

#### 3.3.1 Requirement

According to FCC §15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

| Frequency range (MHz) | Field Strength  |                          |
|-----------------------|-----------------|--------------------------|
|                       | $\mu\text{V/m}$ | $\text{dB}\mu\text{V/m}$ |
| 30 - 88               | 100             | 40                       |
| 88 - 216              | 150             | 43.5                     |
| 216 - 960             | 200             | 46                       |
| Above 960             | 500             | 54                       |

NOTE:

1. Field Strength ( $\text{dB}\mu\text{V/m}$ ) =  $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$ .
2. In the emission tables above, the tighter limit applies at the band edges.

#### 3.3.2 Test Procedure

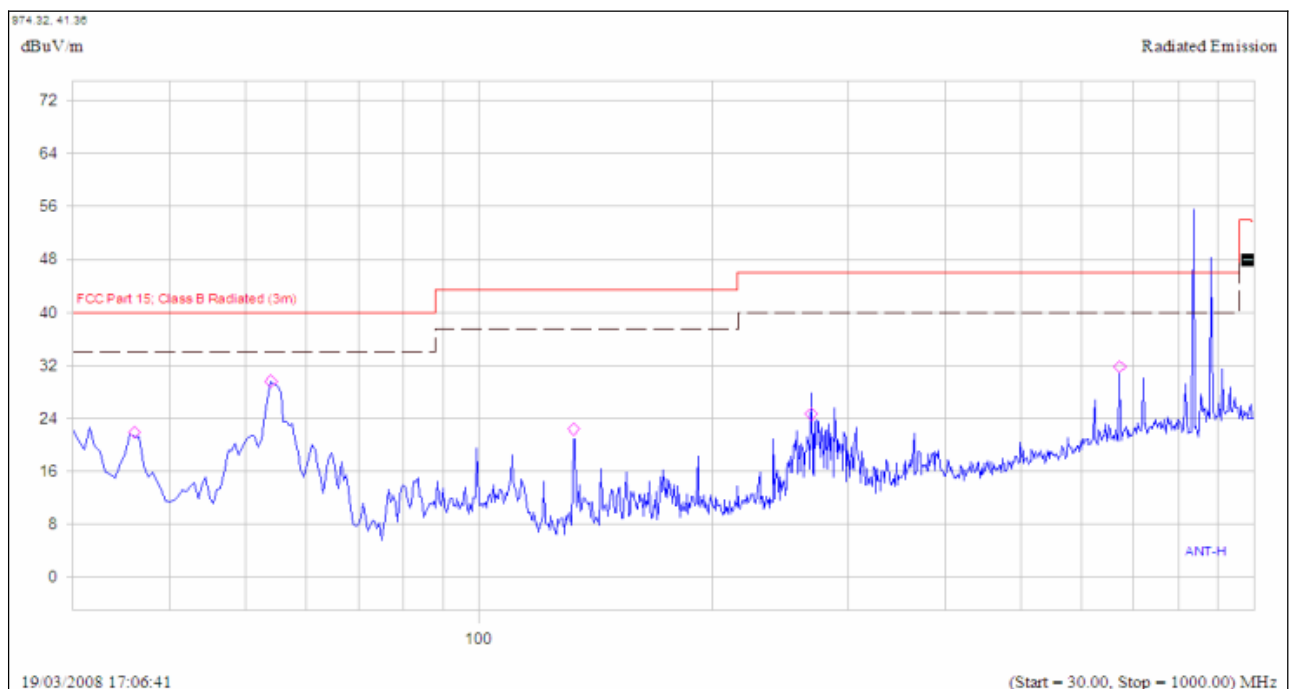
1. Perform test setup as described in section 3.1.2.2.
2. Each test mode in section 3.1.1 should be applied. At each test mode, the Turn Table turns from 0 degrees to 360 degrees to find the maximum reading; for the suspected points, the Test Antenna varies from 1 meter to 4 meters to determine the maximum value of the field strength.
3. The Receiver is set to Peak Detector function and specified bandwidth with maximum hold mode. If the emission level of the EUT in peak mode is 6dB lower than the limit specified, then testing could be stopped and the peak values would be reported; otherwise the emission less than 6dB margins would be retested one by one using the quasi-peak method.
4. The emission levels at both horizontal and vertical polarizations should be tested.
5. Record the test result plot and distinct points.
6. In the test report show the worst test data.

### 3.3.3 Test Result

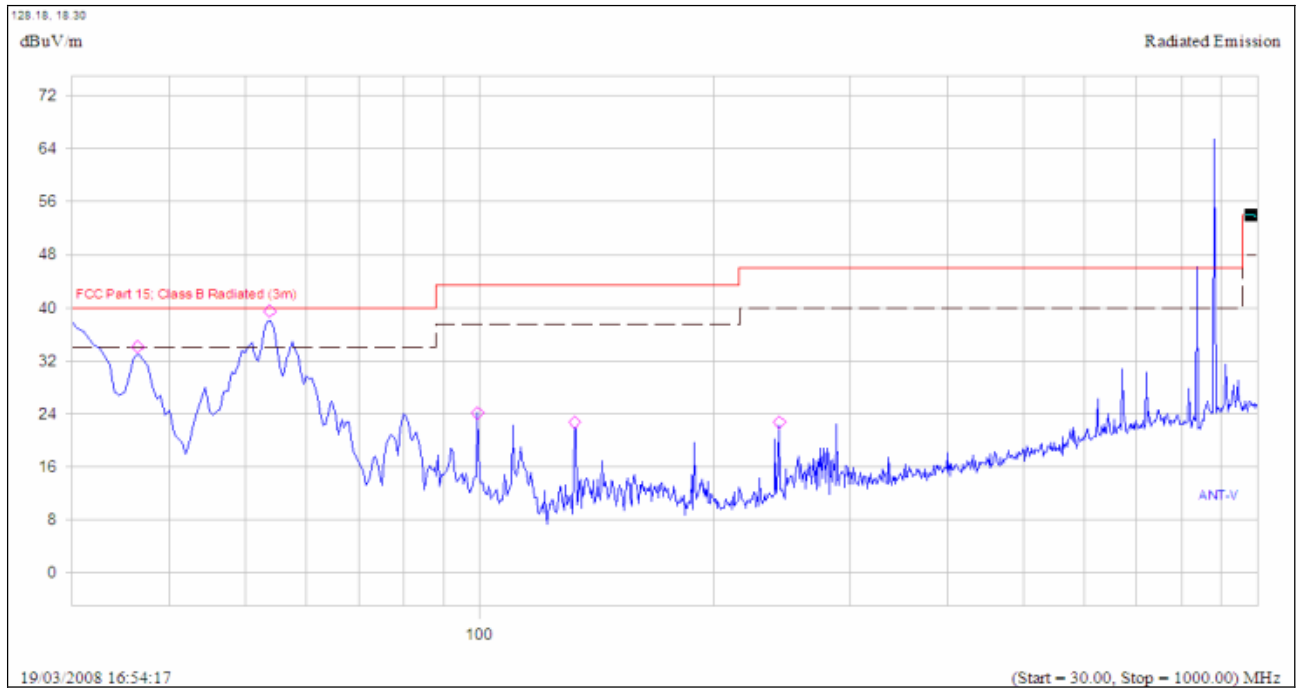
| No. | Frequency (MHz) | Emission Level (dB $\mu$ V/m) |            |                      | Quasi-Peak Limit (dB $\mu$ V/m) | Result |
|-----|-----------------|-------------------------------|------------|----------------------|---------------------------------|--------|
|     |                 | Peak                          | Quasi-Peak | Antenna Polarization |                                 |        |
| 1   | 36.003          | 21.9                          | 17.0       | Vertical             | 40.0                            | PASS   |
| 2   | 132.738.        | 22.4                          | 20.6       | Vertical             | 43.5                            | PASS   |
| 3   | 268.802         | 24.6                          | 22.4       | Vertical             | 46.0                            | PASS   |
| 4   | 672.098         | 31.8                          | 29.6       | Vertical             | 46.0                            | PASS   |
| 5   | 36.427          | 34.1                          | 31.2       | Horizontal           | 40.0                            | PASS   |
| 6   | 53.810          | 39.5                          | 37.4       | Horizontal           | 40.0                            | PASS   |
| 7   | 99.567          | 24.1                          | 21.6       | Horizontal           | 43.5                            | PASS   |
| 8   | 132.737         | 22.7                          | 21.2       | Horizontal           | 43.5                            | PASS   |
| 9   | 243.003         | 22.7                          | 20.3       | Horizontal           | 46.0                            | PASS   |

Following is the plots for emission measurement; please note that marked spikes with circle should be ignored because they are MS and SS carrier frequency.

1. Plot when Test Antenna at Horizontal Polarization:



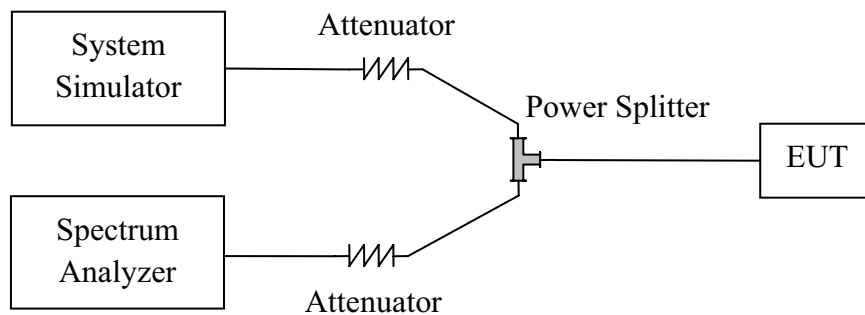
## 2. Plot when Test Antenna at Vertical Polarization:



## 4. 47 CFR Part 2, Part 22H Requirements

### 4.1 General Information

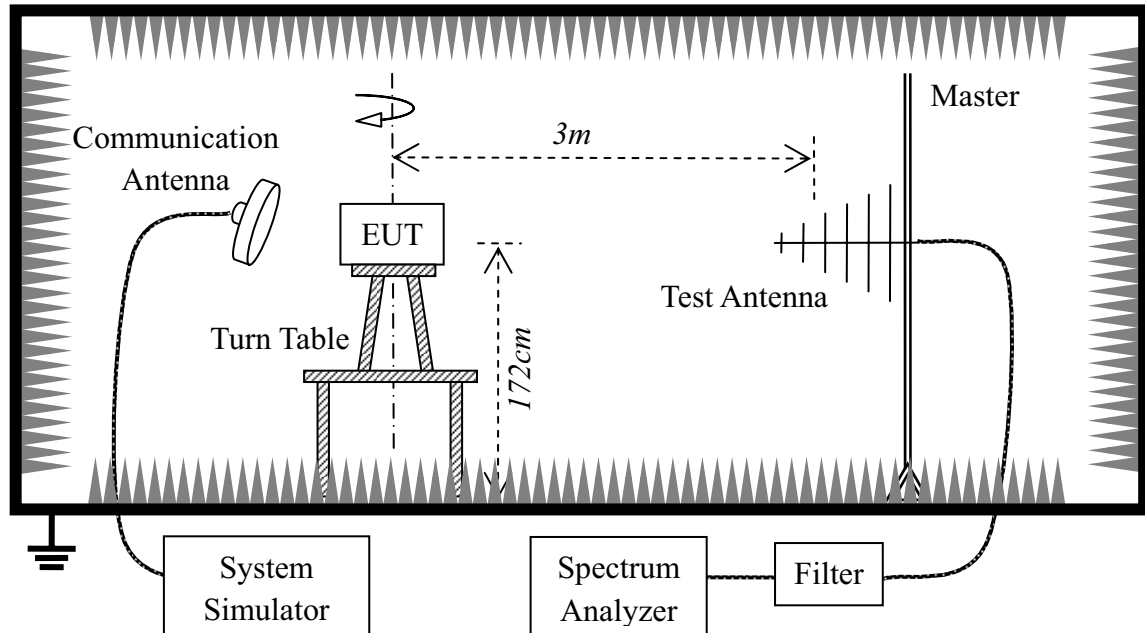
#### 4.1.1 Conducted Related Tests



1. The EUT is coupled to the Spectrum Analyzer and the System Simulator with the suitable Attenuators through the Power Splitter; the path loss is calibrated to correct the reading.
2. The EUT is configured here as MS + Battery.
3. The EUT is commanded via the System Simulator (SS) to operate at the maximum output power .A communication link is established between the EUT and the SS.
4. The Spectrum Analyzer is set to max-peak detector function and maximum hold mode.

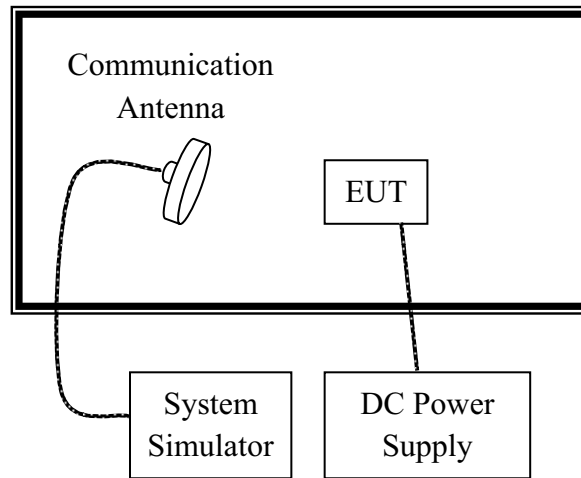


#### 4.1.2 Radiated Power and Spurious Emission Tests



1. The test is performed in a full-Anechoic Chamber; the air loss of the site and the factors of the test system are pre-calibrated using the substitution method.
2. The EUT is configured as MS + Battery.
3. The EUT is placed on the vertical axis of a Turn Table 1.72 meters above the ground.
4. The Test Antenna is a bi-log one or a horn one, and the Test Antenna is at the same height as the EUT.
5. The EUT is commanded via the System Simulator (SS) to operate at the maximum output power. A communication link is established between the EUT and the SS.
6. The Spectrum Analyzer is set to max-peak detector function and maximum hold mode.

#### 4.1.3 Frequency Stability Test



1. The test is performed in a Temperature Chamber.
2. The EUT is configured as MS + DC Power Supply.

## **4.2 Frequencies**

### **4.2.1 Requirement**

According to FCC §22.905, the frequencies blocks assignment for the Cellular Radiotelephone Service are 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

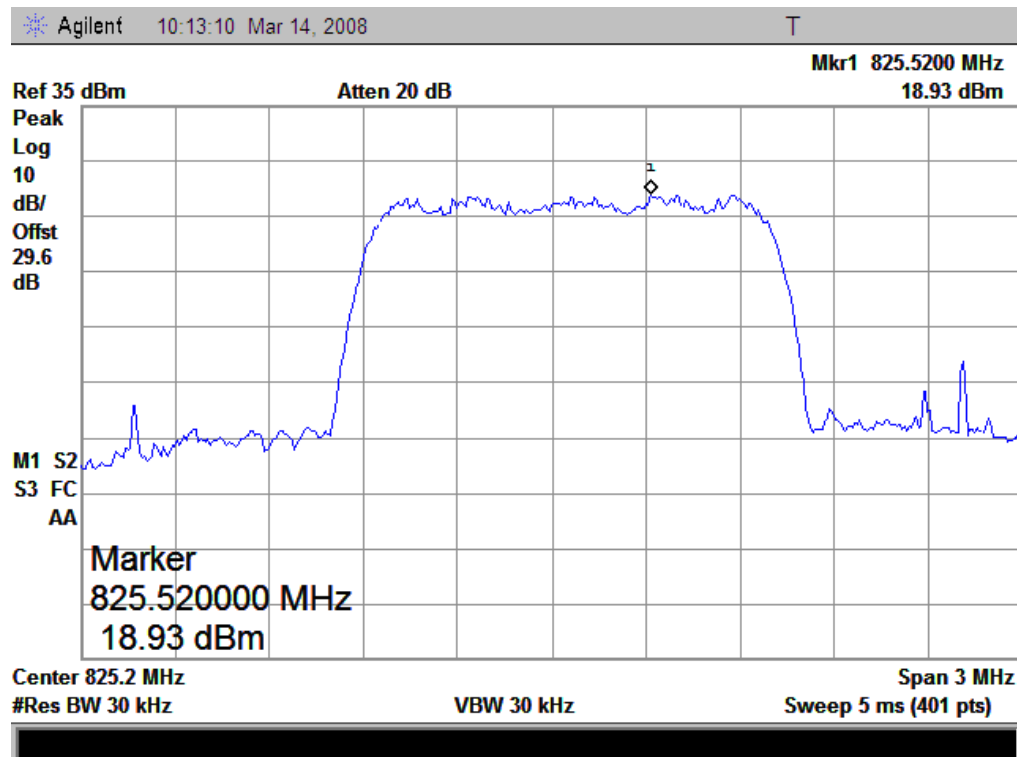
### **4.2.2 Test Procedure**

1. Perform test system setup as section 4.1.1.
2. The resolution bandwidth (RBW) of the Spectrum Analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter, e.g. for GSM modulated signal (here used):  $RBW=VBW=3kHz$ , for CDMA modulated signal:  $RBW=VBW=30kHz$ .
3. The transmitter frequency arrangement of the Cellular 850MHz band employed by the EUT should be from 825.27MHz to 847.74MHz. The lowest and the highest channel were selected to perform tests respectively. Set the TCH number to 9.
4. Set the Spectrum Analyzer suitably to capture the waveform, search peak and mark, and then record the plot.
5. Set the TCH number to 758, then repeat step 5.

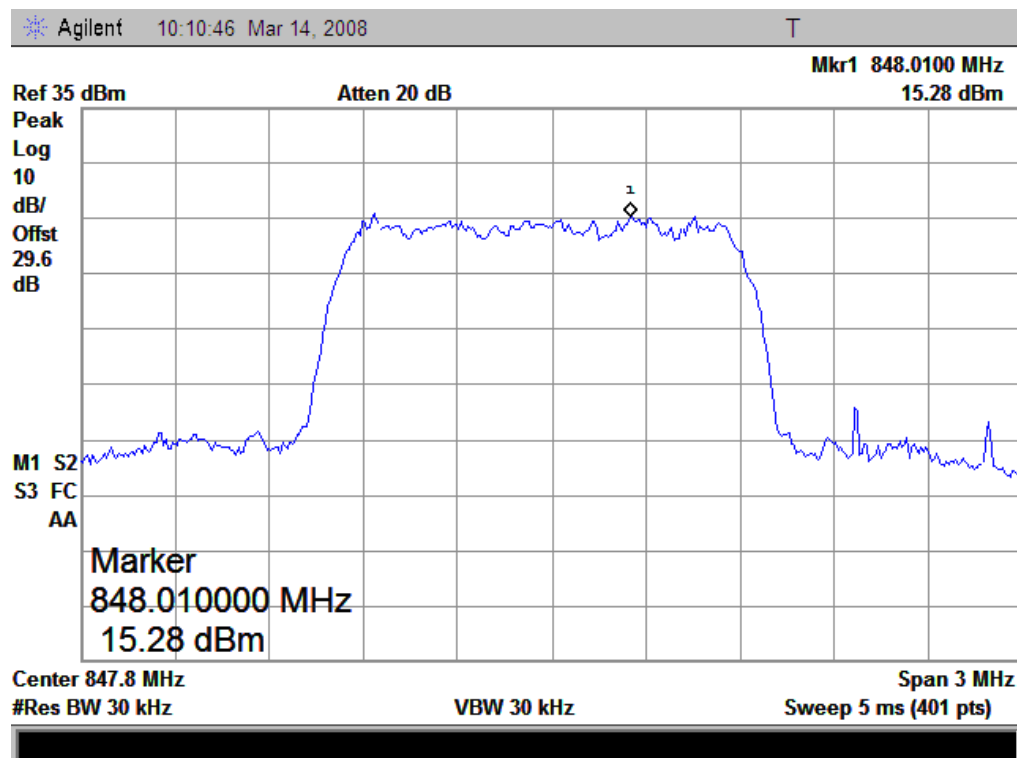
### **4.2.3 Test Result**

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

1. Plot when the TCH number set to 9:



2. Plot when the TCH number set to 758:



### 4.3 Conducted RF Output Power

#### 4.3.1 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.

#### 4.3.2 Test Procedure

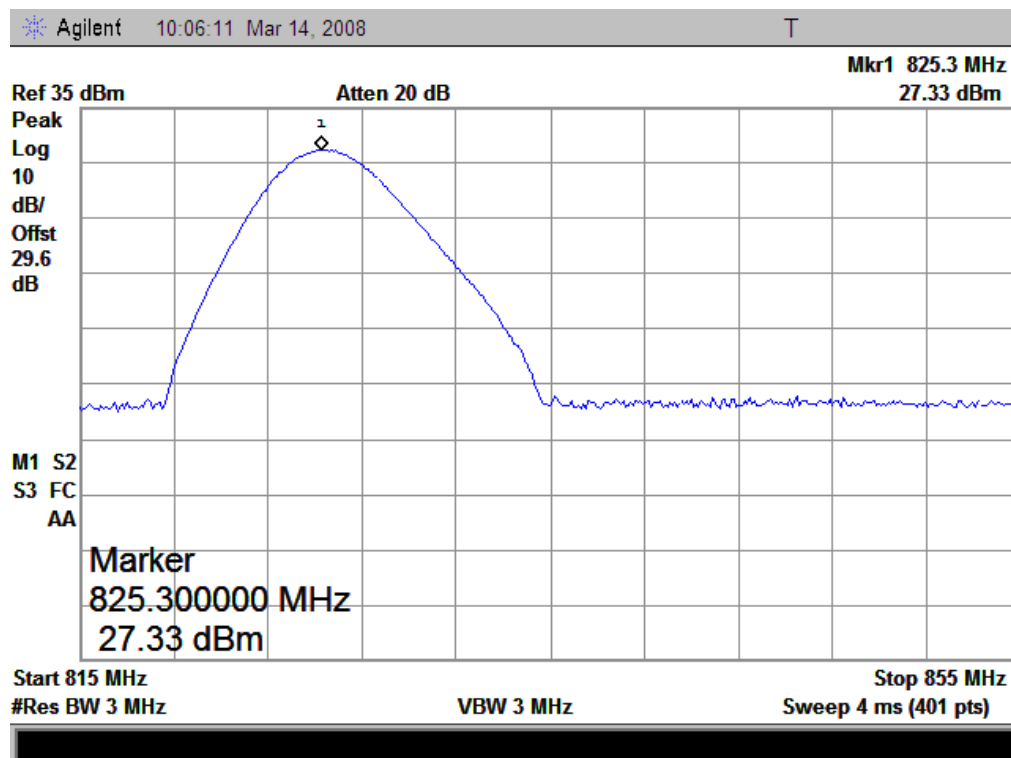
1. Perform test system setup as section 4.1.1 (the radio frequency load attached to the EUT antenna terminal is  $50\Omega$ ).
2. The resolution bandwidth of the Spectrum Analyzer is set to be comparable to the emission bandwidth of the transmitter, e.g. for GSM modulated signal (here used):  $RBW=VBW=1\text{MHz}$ , for CDMA modulated signal:  $RBW=VBW=3\text{MHz}$ .
3. The low, middle and the high channels are selected to perform tests respectively. Set the TCH number to 9 as the low channel.
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak and mark it; finally record the peak and the plot.
5. Set the TCH number to 384 as the middle channel, then repeat step 4.
6. Set the TCH number to 758 as the high channel, then repeat step 4.

#### 4.3.3 Test Result

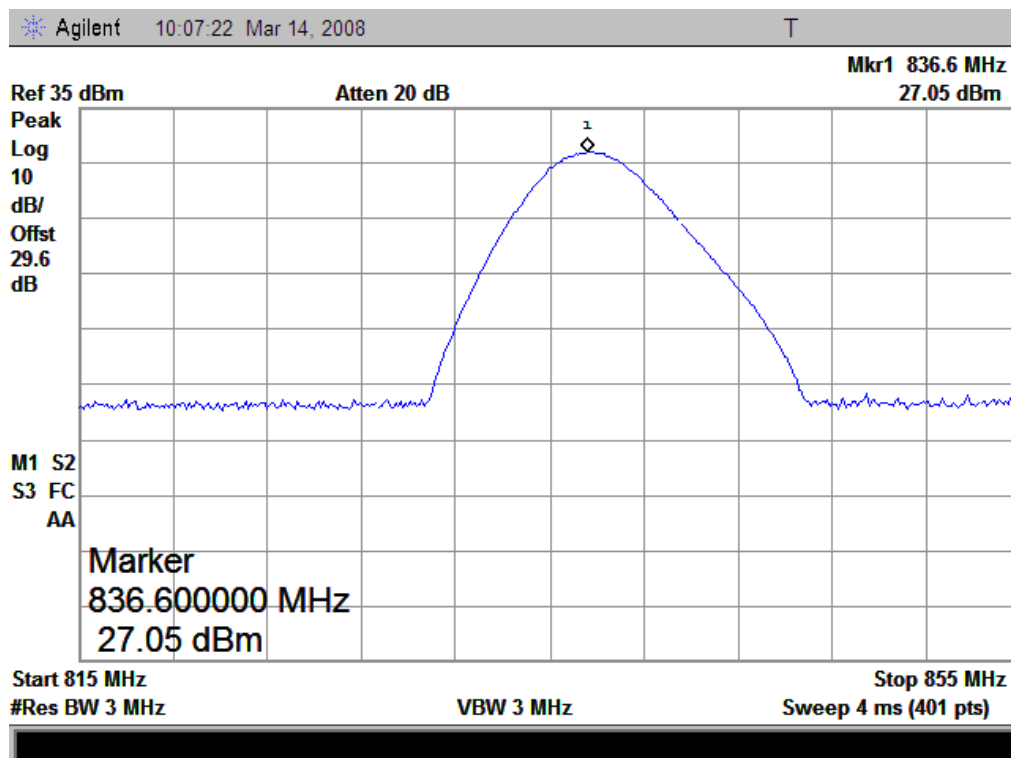
| No. | Channel Number | Frequency (MHz) | Measured Power |      | Rated Power |   |
|-----|----------------|-----------------|----------------|------|-------------|---|
|     |                |                 | dBm            | W    | dBm         | W |
| 1   | 9              | 825.27          | 27.33          | 0.54 | 33          | 2 |
| 2   | 384            | 836.52          | 27.05          | 0.51 | 33          | 2 |
| 3   | 758            | 847.74          | 24.91          | 0.31 | 33          | 2 |



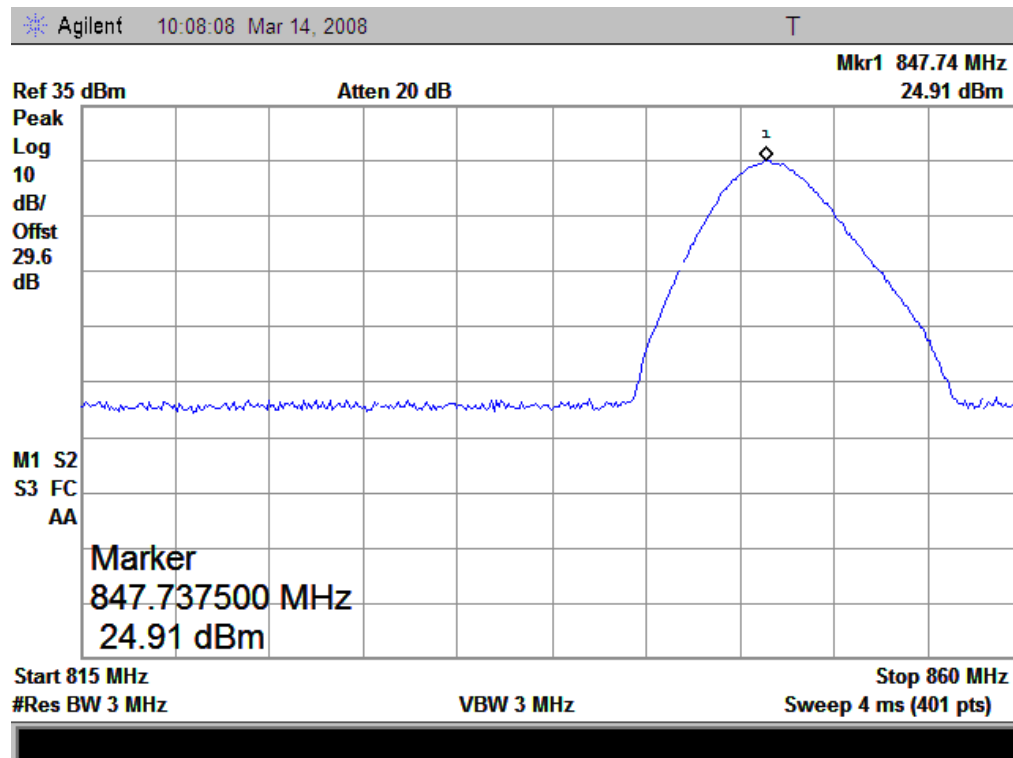
- Plot when the TCH number set to 9:



- Plot when the TCH number set to 384:



3. Plot when the TCH number set to 758:



## 4.4 Occupied Bandwidth

### 4.4.1 Occupied Bandwidth 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

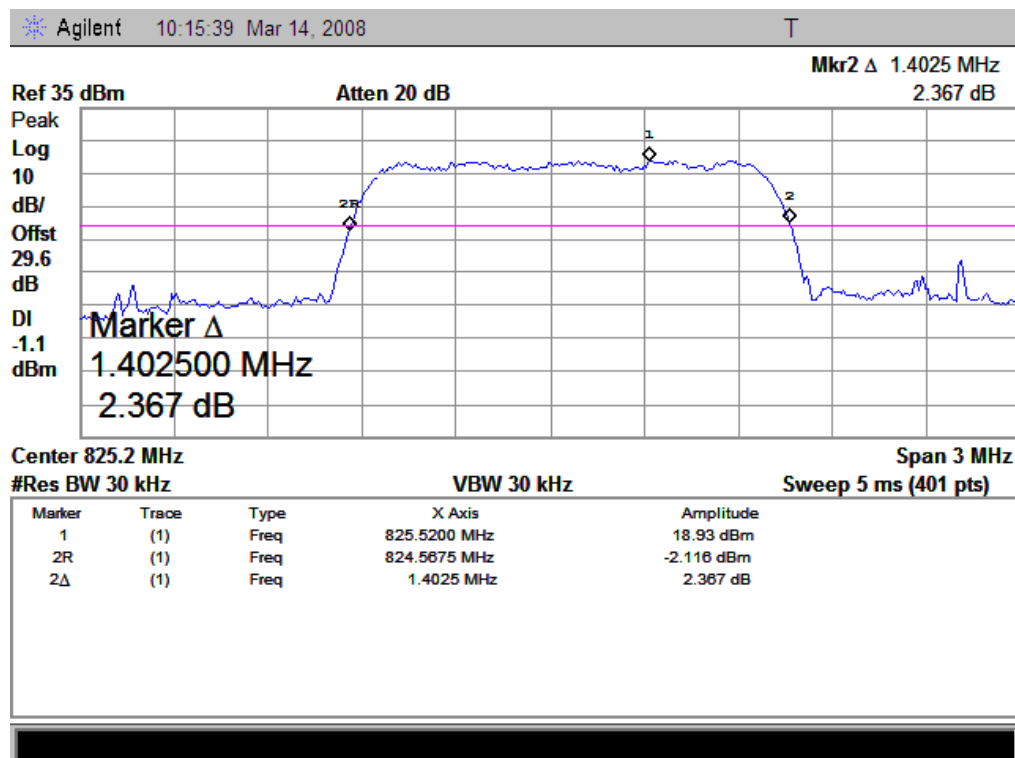
### 4.4.2 Test Procedure

1. Perform test system setup as section 4.1.1.
2. The resolution bandwidth of the Spectrum Analyzer is set to at least one percent of the emission bandwidth, e.g. for GSM modulated signal (here used):  $RBW=VBW=3kHz$ , for CDMA modulated signal:  $RBW=VBW=30kHz$ .
3. The low, middle and the high channels are selected to perform tests respectively. Set the TCH number to 9 as the low channel.
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.
5. Set the TCH number to 384 as middle channel, then repeat step 4.
6. Set the TCH number to 758 as high channel, then repeat step 4.

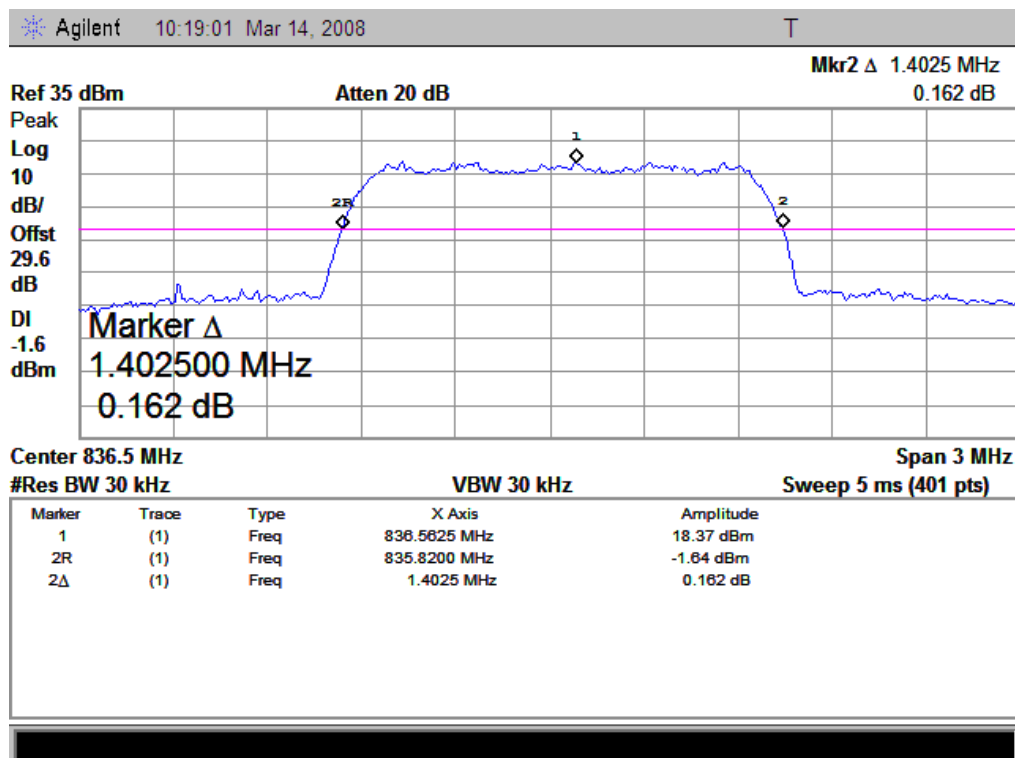
### 4.4.3 Test Result

| No. | Channel Number | Frequency (MHz) | Measured Occupied Bandwidth (MHz) |
|-----|----------------|-----------------|-----------------------------------|
| 1   | 9              | 825.27          | 1.40                              |
| 2   | 384            | 836.52          | 1.40                              |
| 3   | 758            | 847.74          | 1.40                              |

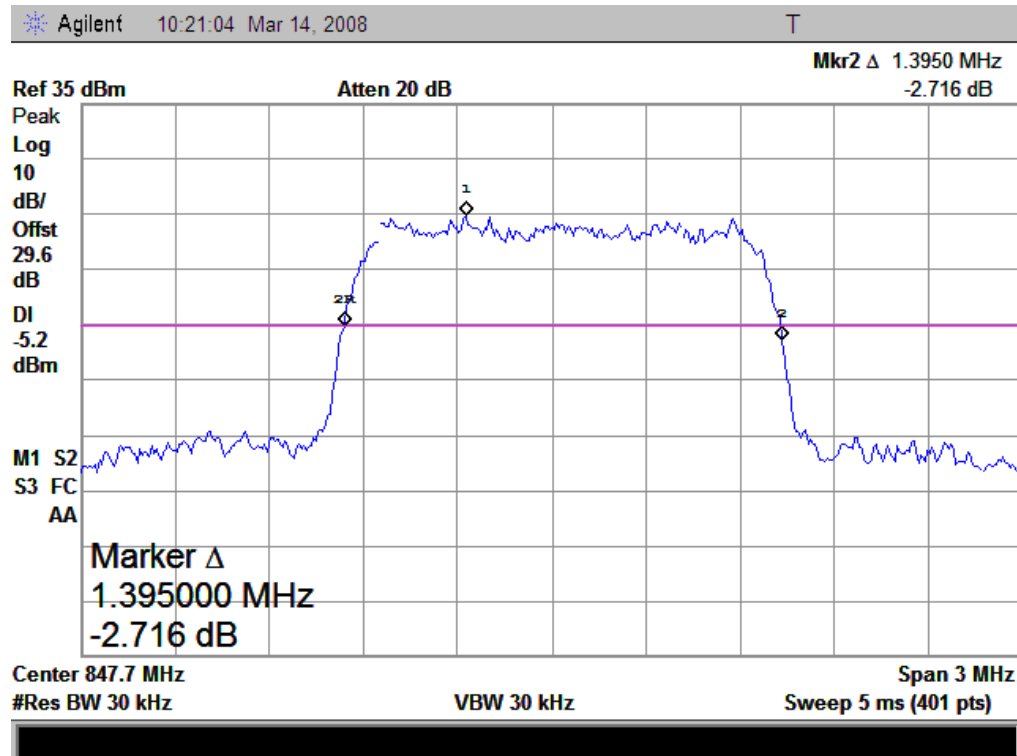
- Plot when the TCH number set to 9:



- Plot when the TCH number set to 384:



3. Plot when the TCH number set to 758:





## **4.5 Conducted Spurious Emission**

### **4.5.1 Requirement**

According to FCC §22.917(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 (a), in the 1MHz 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-edge.

### **4.5.2 Test Procedure**

1. Perform test system setup as section 4.1.1.
2. Make a limit line whose value is -13dBm on the Spectrum Analyzer.
3. The lowest, middle and the highest channels are selected to perform tests respectively. Set the TCH number to 9 as the lowest channel.
4. Set the RBW of the Spectrum Analyzer to 1MHz, and the measuring frequency range from 9kHz to 10<sup>th</sup> harmonic of the fundamental frequency (here used 10GHz); mark the fundamental frequency and the harmonics thereof; finally record the harmonics and the plot. Note: the measuring frequency range can be divided into several parts to perform tests.
5. In the 1MHz bands immediately outside and adjacent to the frequency black, the RBW of the Spectrum Analyzer was set to at least one percent of the emission bandwidth of the fundamental emission of the transmitter, e.g. for GSM modulated signal (here used): RBW=3kHz, for CDMA modulated signal: RBW=30kHz.
6. Set the TCH number to 384 as the middle channel, then repeat step 4.
7. Set the TCH number to 758 as the highest channel, then repeat step 4 and 5.

### 4.5.3 Test Result

#### 4.5.3.1 Table for the Harmonics and Plots for the Spurious Emission

1. Table for the Harmonics:

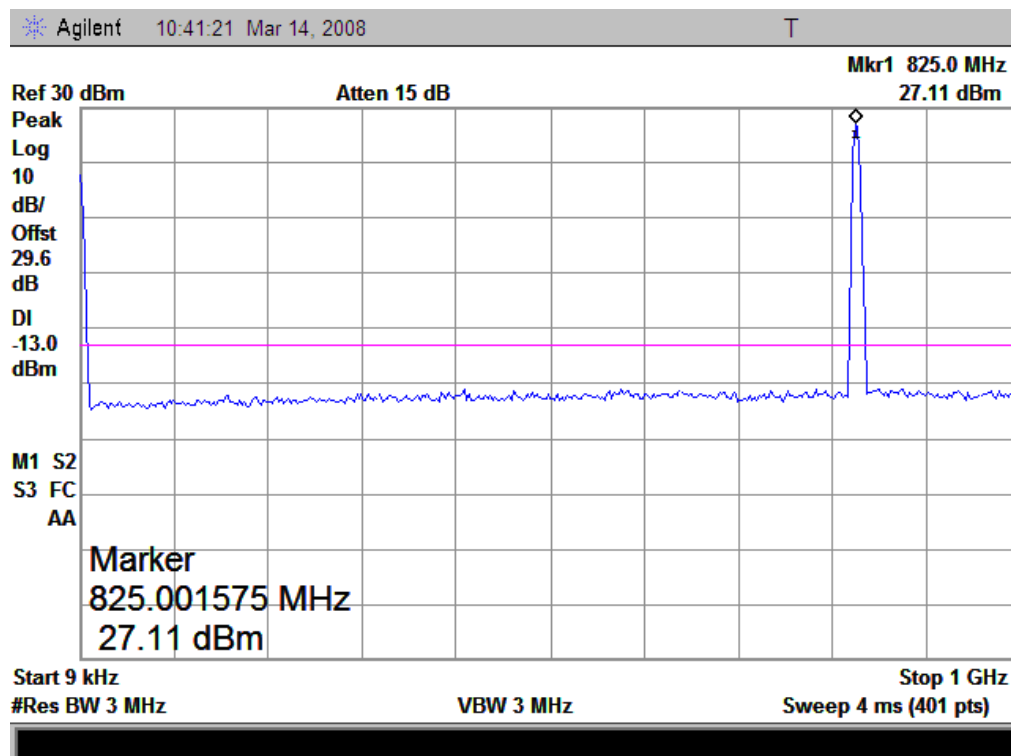
| No. | Channel | Frequency(MHz ) | Measured Max Spurious Emission(dBm) | Limit(dBm) |
|-----|---------|-----------------|-------------------------------------|------------|
| 1.  | 9       | 825.27          | -20                                 | -13        |
| 2.  | 384     | 836.52          | -20                                 | -13        |
| 3.  | 758     | 847.74          | -20                                 | -13        |

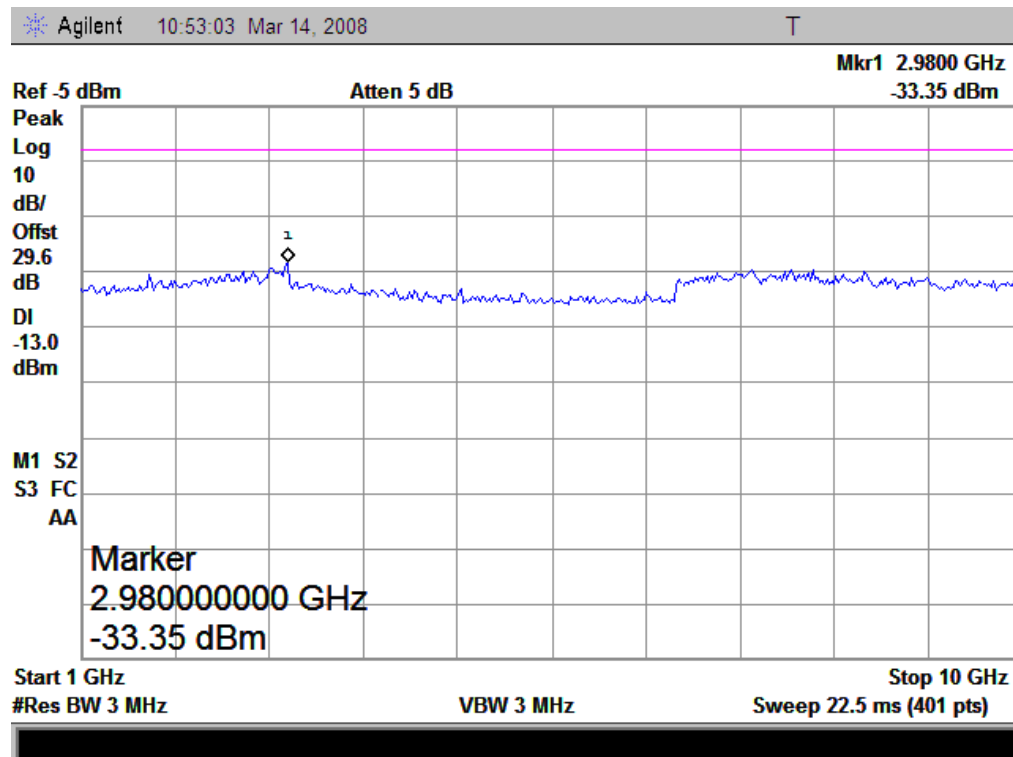
2. Plot for Spurious Emission:

The measuring frequency range was from 9kHz to 10GHz.

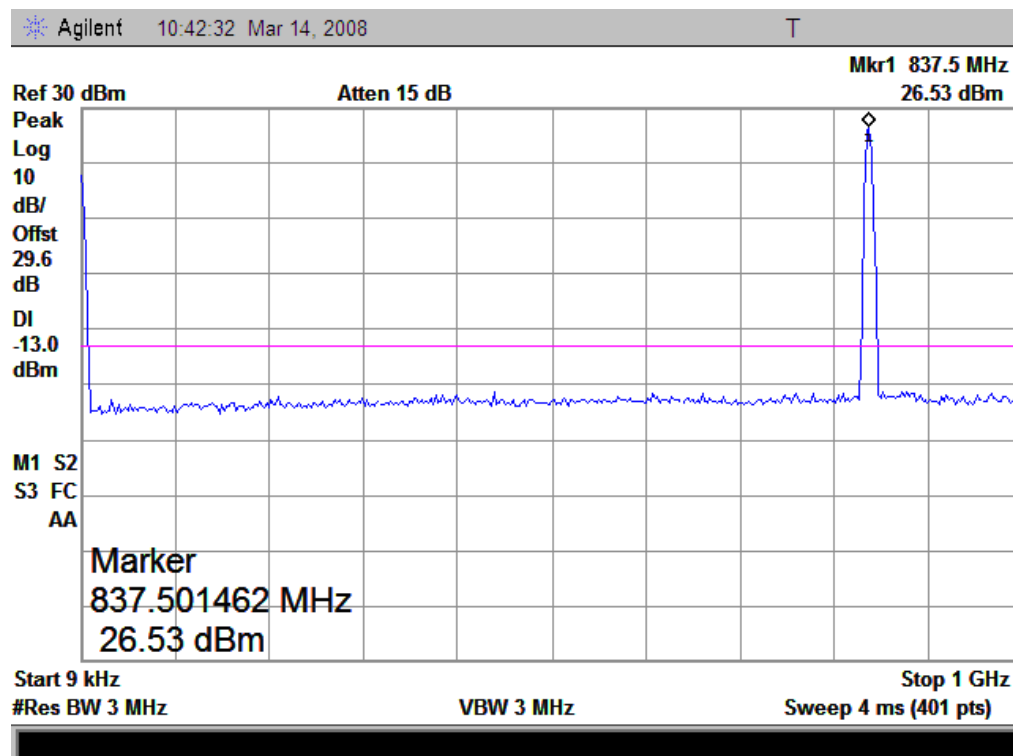
NOTE: The marker points are the Mobile Phone and/or System Simulator transmitting frequencies which should be ignored.

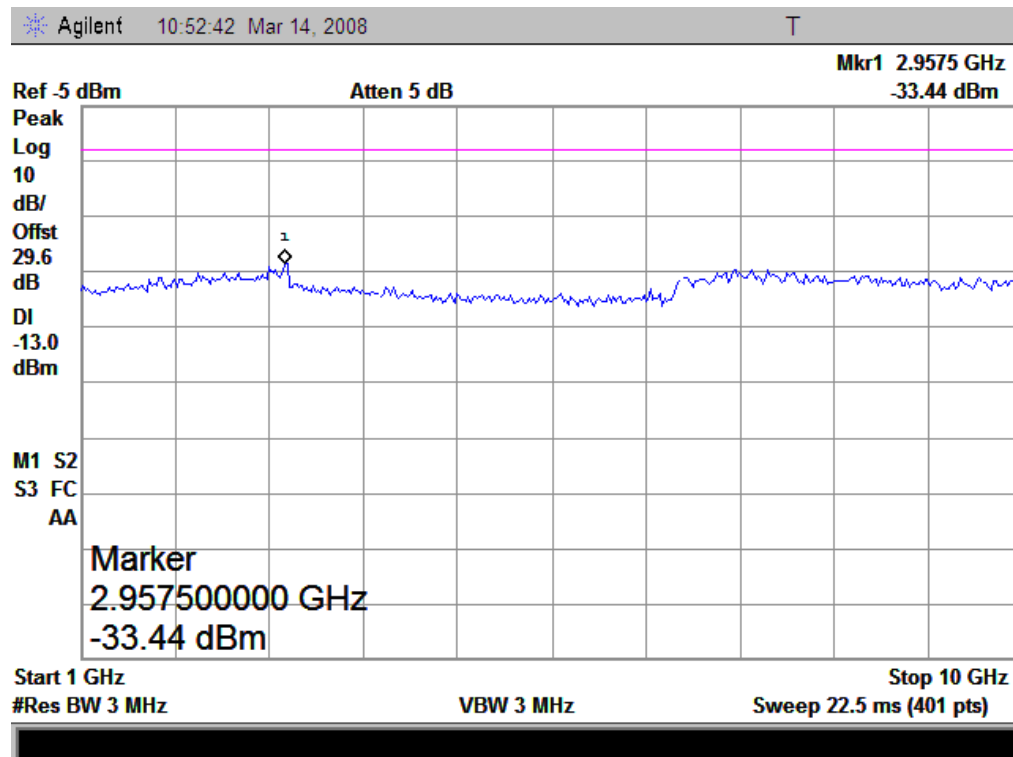
2.1 Plot when the TCH number set to 9:



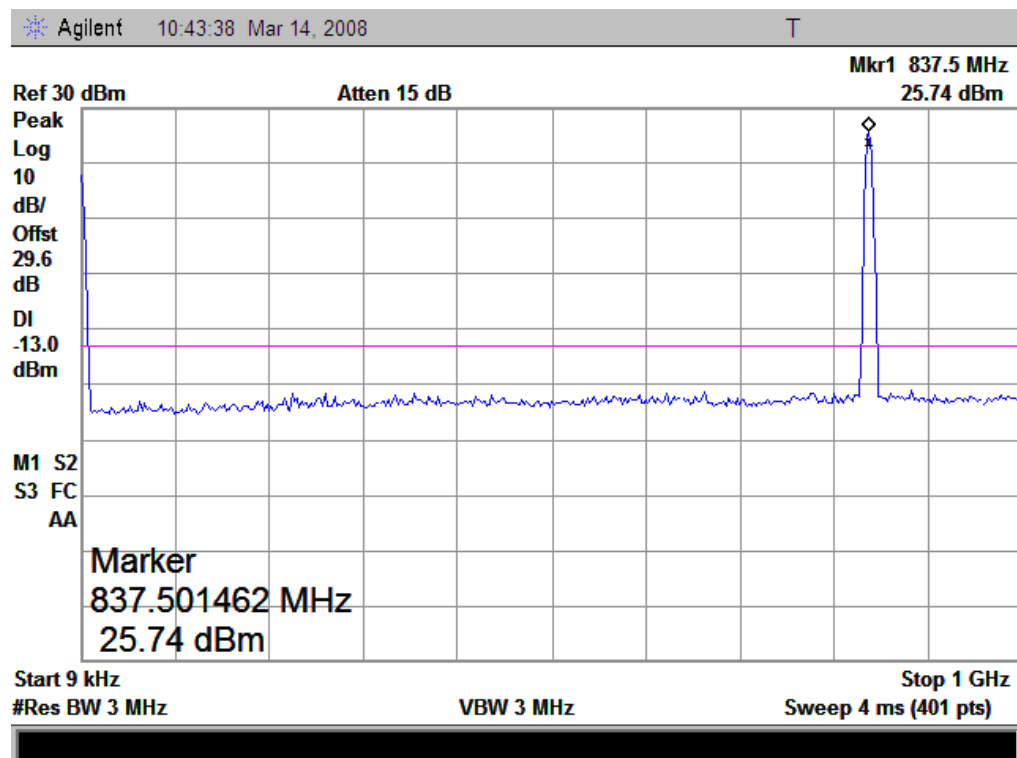


2.2 Plot when the TCH number set to 384:



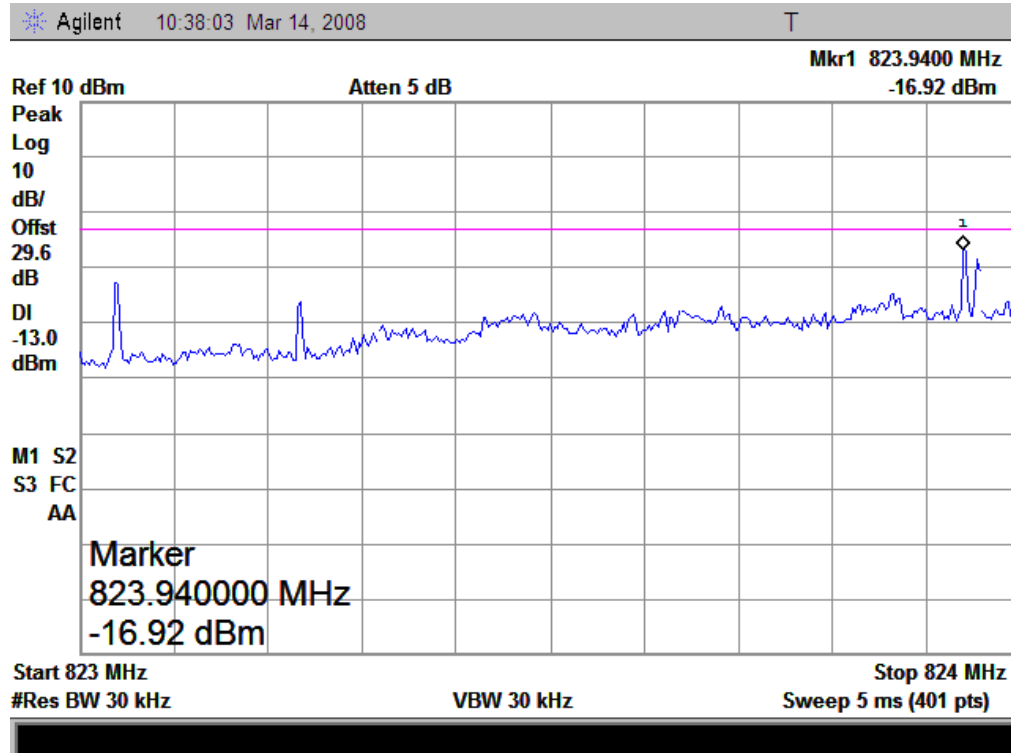


2.3 Plot when the TCH number set to 758:

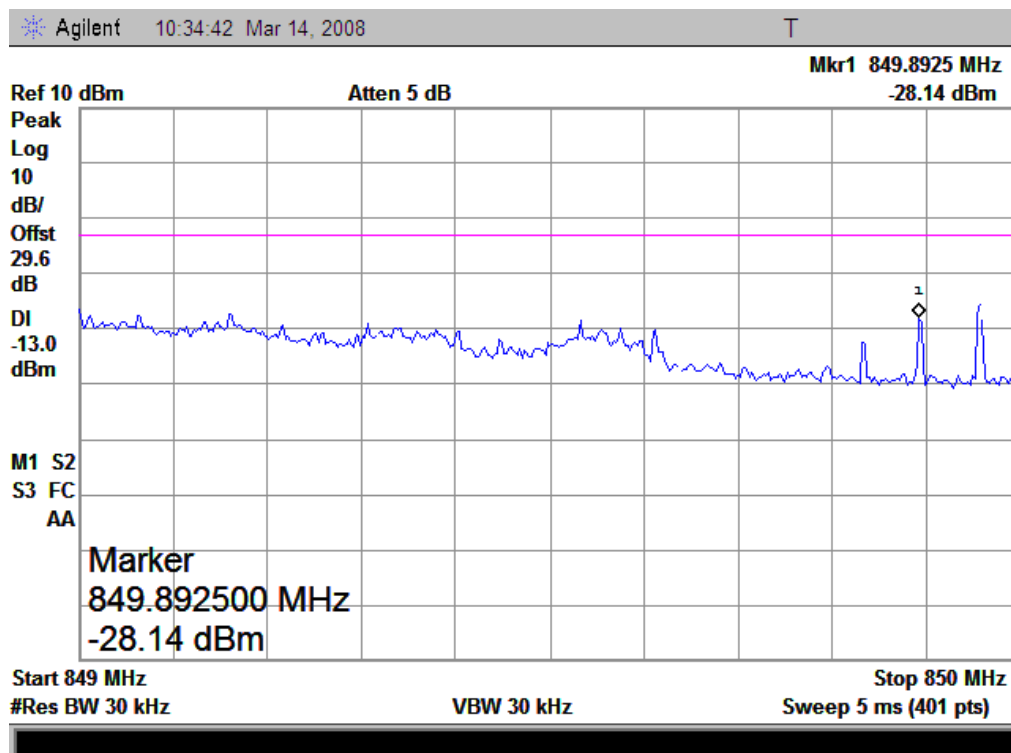


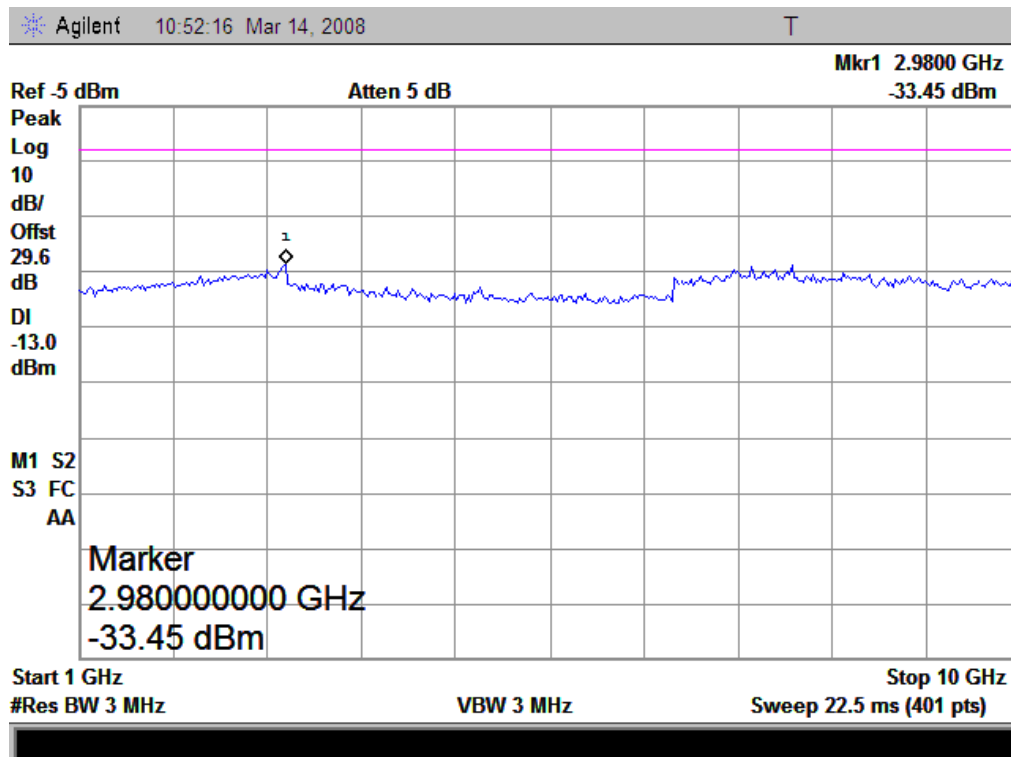
### 4.5.3.2 Plot for Band-edge

- Plot when the TCH number set to 9:



- Plot when the TCH number set to 758:





## 4.6 Transmitter Radiated Power (EIRP/ERP)

### 4.6.1 Requirement

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

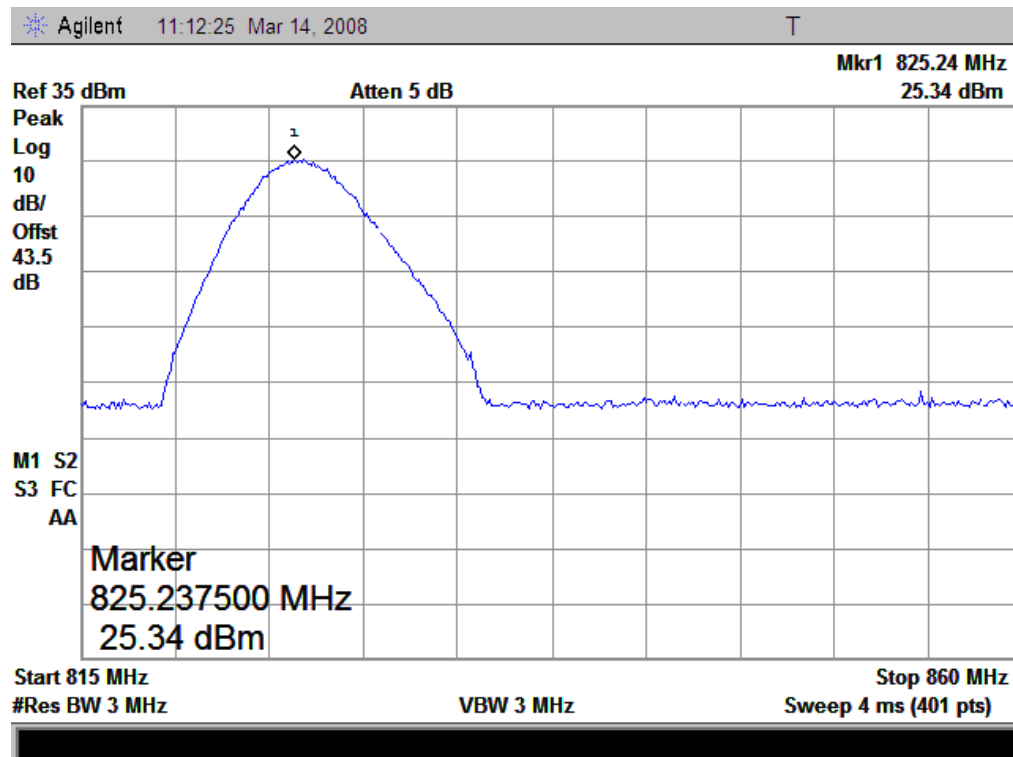
### 4.6.2 Test Procedure

1. Perform test system setup as section 4.1.2.
2. The resolution bandwidth of the Spectrum Analyzer is set to be comparable to the emission bandwidth of the transmitter, e.g. for GSM modulated signal (here used): RBW=VBW=1MHz, for CDMA modulated signal: RBW=VBW=3MHz.
3. The low, middle and the high channels are selected to perform tests respectively. Set the TCH number to 9 as the low channel.
4. Employ the bi-log Test Antenna as the test system receiving antenna; set the polarization of the Test Antenna to be the same as that of the EUT transmitting antenna.
5. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; actuate the Turn Table to turn from 0 degrees to 360 degrees to find the maximum reading via the Spectrum Analyzer, mark the peak; finally record the peak and the plot.
6. Set the TCH number to 384 as the middle channel, then repeat step 5.
7. Set the TCH number to 758 as the high channel, then repeat step 5.

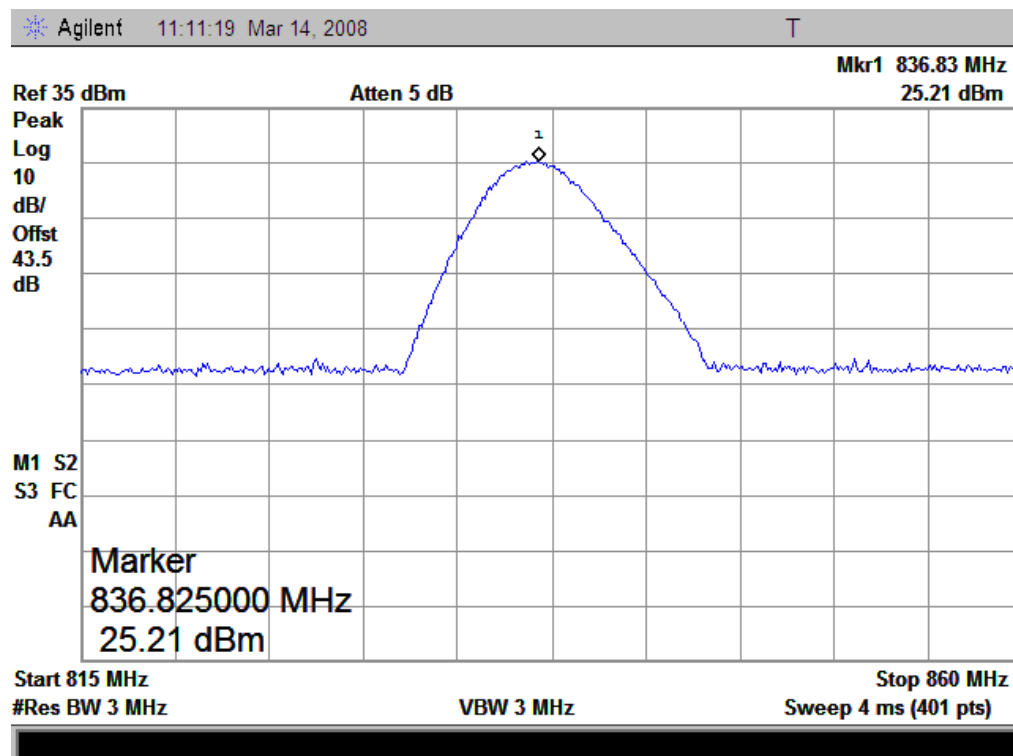
### 4.6.3 Test Result

| No. | Channel | Frequency (MHz) | Measured ERP |      | Limit ERP |   |
|-----|---------|-----------------|--------------|------|-----------|---|
|     |         |                 | dBm          | W    | dBm       | W |
| 1   | 9       | 825.27          | 25.34        | 0.34 | 38.5      | 7 |
| 2   | 384     | 836.52          | 25.21        | 0.33 | 38.5      | 7 |
| 3   | 758     | 847.74          | 24.98        | 0.31 | 38.5      | 7 |

1. Plot when the TCH number set to 9:

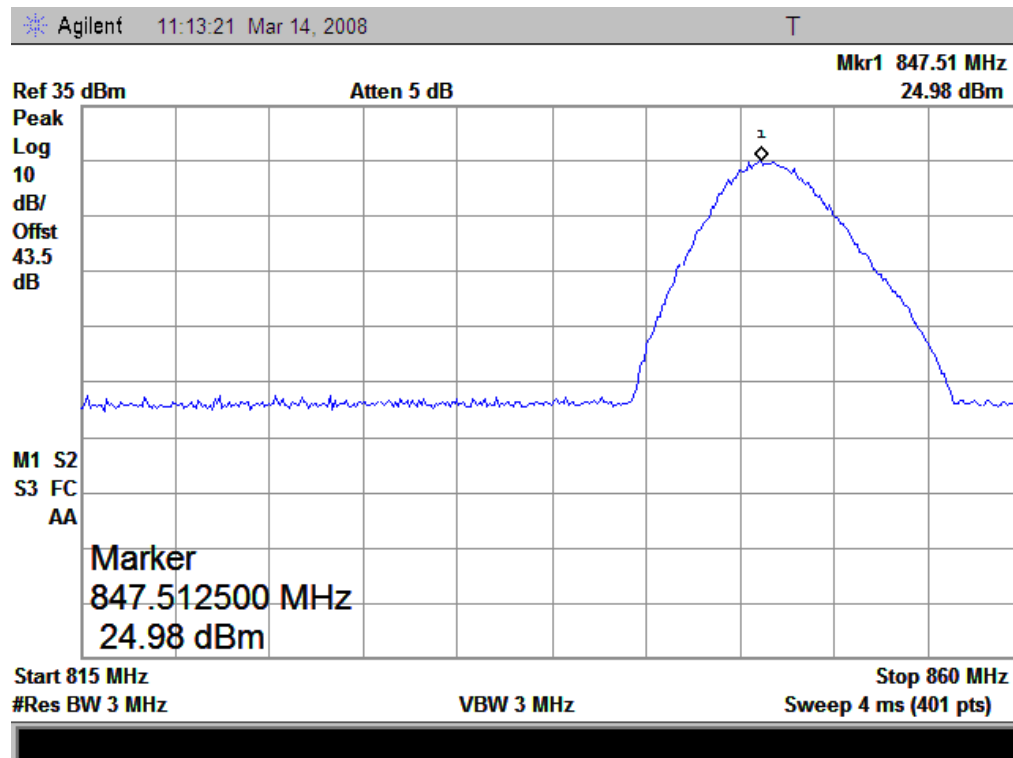


2. Plot when the TCH number set to 384:





3. Plot when the TCH number set to 758:



## **4.7 Radiated Spurious Emission**

### **4.7.1 Requirement**

According to FCC §22.917(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.

### **4.7.2 Test Procedure**

1. Perform test system setup as section 4.1.2.
2. Make a limit line whose value is -13dBm on the Spectrum Analyzer, and set the RBW of the Spectrum Analyzer to 1MHz.
3. The low, middle and the high channels are selected to perform tests respectively. Set the TCH number to 9 as the low channel.
4. Employ the bi-log Test Antenna as the test system receiving antenna and set the frequency range of the Spectrum Analyzer from 30MHz to 3GHz.
5. The measurement is performed with the Test Antenna at both horizontal and vertical polarization respectively. Set the polarization of the Test Antenna to be horizontal.
6. Actuate the Turn Table to turn from 0 degrees to 360 degrees to find the maximum reading via the Spectrum Analyzer, mark the fundamental frequency and the harmonics thereof, after then record the harmonics and the plot.
7. Set the polarization of the Test Antenna to be vertical, then repeat step 6.
8. Employ the horn Test Antenna as the test system receiving antenna and set the frequency range of the Spectrum Analyzer from 3GHz to 10<sup>th</sup> harmonic of the fundamental frequency (here used 10GHz), then repeat step 5 to 7.
9. Set the TCH number to 384 as the middle channel, then repeat step 4 to 8.
10. Set the TCH number to 758 as the high channel, then repeat step 4 to 8.

### 4.7.3 Test Result

#### 4.7.3.1 Table for the Harmonics

NOTE: “---” in the table following means that the emission power was too small to be measured and was at least 12dB below the limit.

| No.                               | Frequency (MHz) | Emission Power (dBm)  |                         | Limit (dBm) |
|-----------------------------------|-----------------|-----------------------|-------------------------|-------------|
|                                   |                 | Test Antenna Vertical | Test Antenna Horizontal |             |
| TCH number set to 9 (825.27MHz)   |                 |                       |                         |             |
| 1                                 | 1650.54         | -40.48                | -43.55                  | -13         |
| 2                                 | 2475.81         | ---                   | ---                     | -13         |
| 3                                 | 3301.08         | ---                   | ---                     | -13         |
| 4                                 | 4126.35         | ---                   | ---                     | -13         |
| 5                                 | 4951.62         | ---                   | ---                     | -13         |
| 6                                 | 5776.89         | ---                   | ---                     | -13         |
| 7                                 | 6602.16         | ---                   | ---                     | -13         |
| 8                                 | 7427.43         | ---                   | ---                     | -13         |
| 9                                 | 8252.70         | ---                   | ---                     | -13         |
| TCH number set to 384 (836.52MHz) |                 |                       |                         |             |
| 10                                | 1673.04         | -40.39                | -43.75                  | -13         |
| 11                                | 2509.56         | ---                   | ---                     | -13         |
| 12                                | 2509.56         | ---                   | ---                     | -13         |
| 13                                | 3346.08         | ---                   | ---                     | -13         |
| 14                                | 4182.6          | ---                   | ---                     | -13         |
| 15                                | 5855.64         | ---                   | ---                     | -13         |
| 16                                | 6692.16         | ---                   | ---                     | -13         |
| 17                                | 7528.68         | ---                   | ---                     | -13         |
| 18                                | 8365.20         | ---                   | ---                     | -13         |
| TCH number set to 758 (847.74MHz) |                 |                       |                         |             |
| 19                                | 1695.48         | -41.44                | -43.07                  | -13         |
| 20                                | 2543.22         | ---                   | ---                     | -13         |
| 21                                | 3390.96         | ---                   | ---                     | -13         |
| 22                                | 4238.70         | ---                   | ---                     | -13         |
| 23                                | 5086.44         | ---                   | ---                     | -13         |
| 24                                | 5934.18         | ---                   | ---                     | -13         |
| 25                                | 6781.92         | ---                   | ---                     | -13         |
| 26                                | 7629.66         | ---                   | ---                     | -13         |
| 27                                | 8477.40         | ---                   | ---                     | -13         |

## **4.8 Frequency Stability**

### **4.8.1 Frequency Stability Requirement**

According to FCC §22.355, 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:

- (a) Temperature:  
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) 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.

### **4.8.2 Test Procedure**

1. Perform test system setup as section 4.1.3.
2. Set the voltage of the DC Power Supply to normal supply voltage (here used 3.7V) and the temperature of the Temperature Chamber to vary from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of  $10^{\circ}\text{C}$ .
3. At each temperature level, the EUT is powered off and kept in the Temperature Chamber for two hours. After sufficient stabilization, turn on the EUT, command it via the System Simulator (SS) to operate at the maximum output power i.e. A communication link is established between the EUT and the SS.
4. The low, middle and the high channels are selected to perform tests respectively. Set the TCH number to 9 as the low channel.
5. The frequency deviation is measured (directly read from the SS, which can report the parameter) within three minutes.
6. Set the TCH number to 384 as the middle channel, then repeat step 5.
7. Set the TCH number to 758 as the high channel, then repeat step 5.
8. Adjust the temperature of the Temperature Chamber as specified in step 2, then repeat step 3 to 7.
9. Set the voltage of the DC Power Supply to high extreme supply voltage (here used 4.2V) and the temperature of the Temperature Chamber to normal (here used  $+22^{\circ}\text{C}$ ), then repeat step 3 to 8.
10. Set the voltage of the DC Power Supply to low extreme supply voltage (here used 3.6V) and the temperature of the Temperature Chamber to normal (here used  $+22^{\circ}\text{C}$ ), then repeat step 3 to 8.

### 4.8.3 Test Result

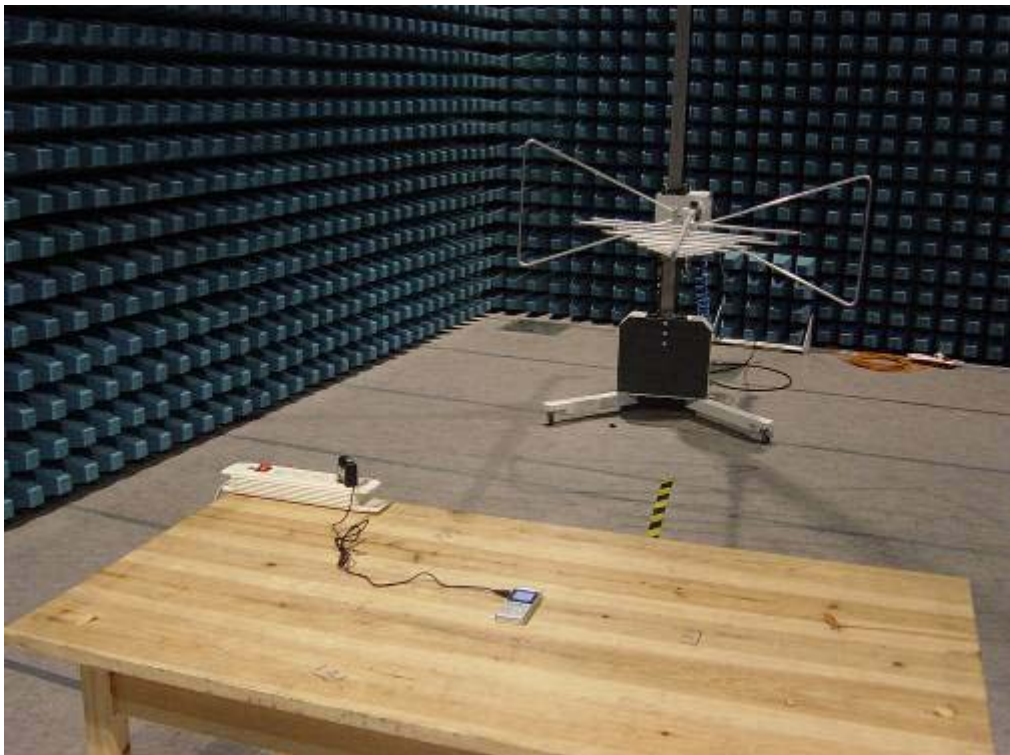
| No.          | Test Conditions |             | Frequency Deviation (Hz) at Channels Used |       |      |        |
|--------------|-----------------|-------------|---|-------|------|--------|
|              | Voltage         | Temperature | 128                                       | 190   | 251  | Limit  |
| 1            | 3.7V            | -30°C       | -11.45                                    | 9.9   | 7.97 | ±300Hz |
| 2            |                 | -20°C       | -9.53                                     | -8.29 | 6.34 |        |
| 3            |                 | -10°C       | -9.63                                     | 5.17  | 6.01 |        |
| 4            |                 | 0°C         | 5.59                                      | 8.36  | 6.39 |        |
| 5            |                 | +10°C       | 7.26                                      | 5.29  | 3.07 |        |
| 6            |                 | +20°C       | 7.78                                      | 5.5   | 2.55 |        |
| 7            |                 | +30°C       | 9.69                                      | 6.66  | 3.46 |        |
| 8            |                 | +40°C       | 8.89                                      | -3.94 | 2.68 |        |
| 9            |                 | +50°C       | 9.40                                      | 5.45  | 2.95 |        |
| 10           | 4.2V            | +22°C       | 8.92                                      | 6.56  | 1.75 |        |
| 11           | 3.6V            | +22°C       | 7.25                                      | 5.23  | 2.56 |        |
| Result: PASS |                 |             |   |       |      |        |

## I Photograph of the test setup

### 1. Conducted Emission Measurement



### 2. Radiated Emission Measurement

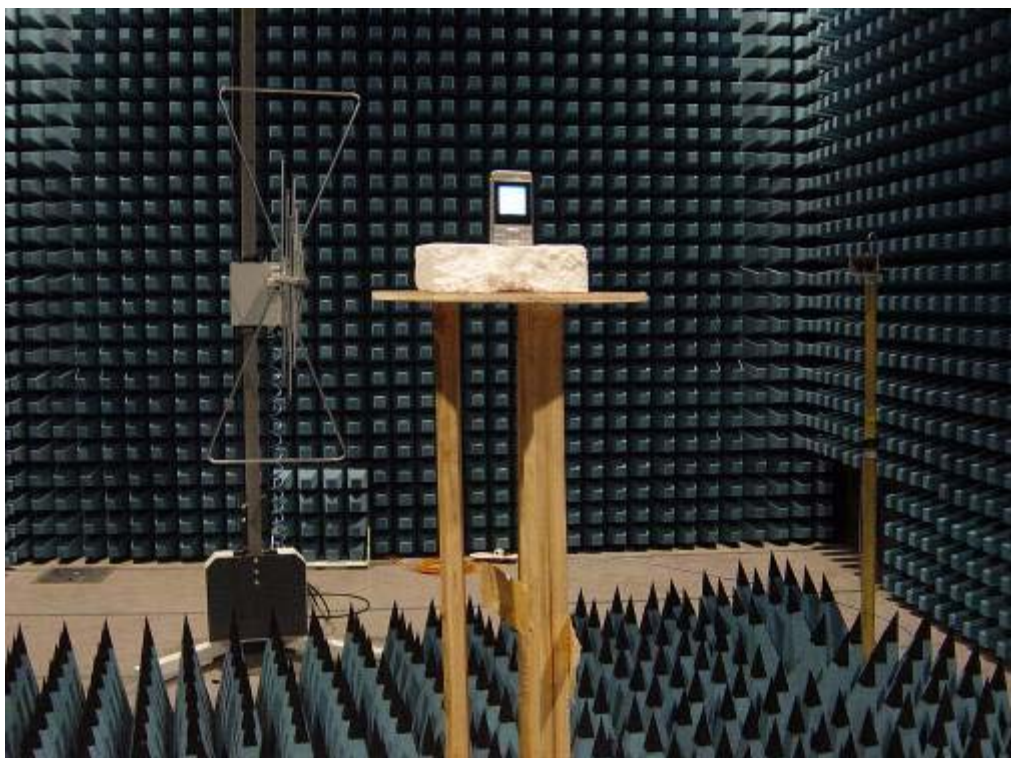




### 3. Conducted Emission at Antenna Port

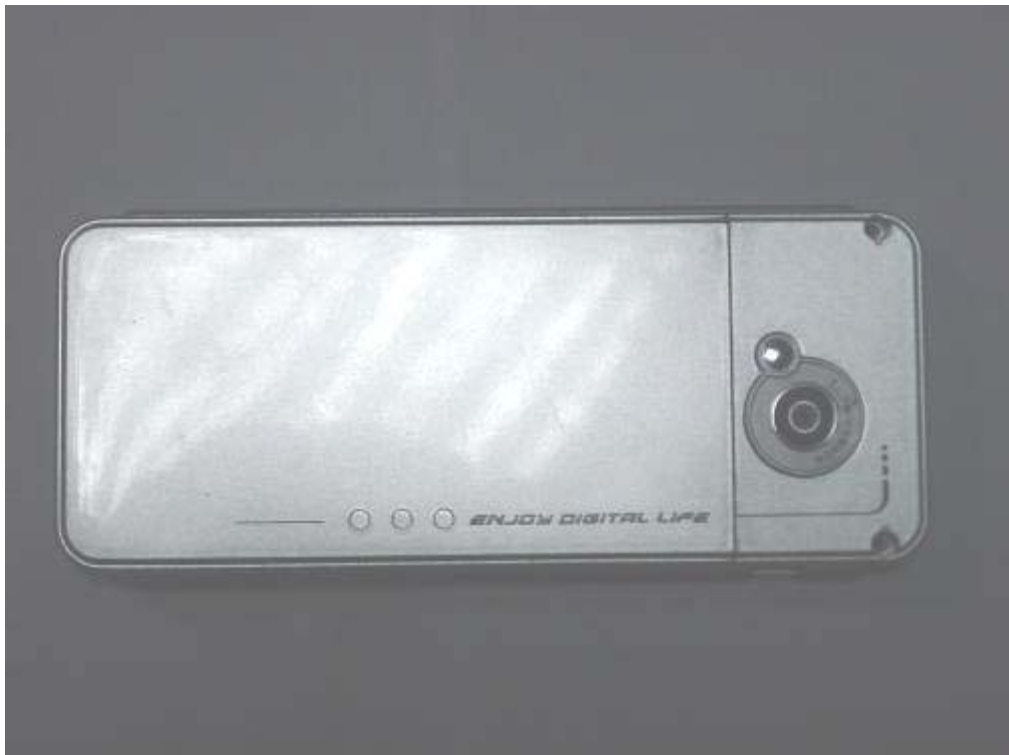


### 4. EIRP/ERP and Spurious Radiation Measurement



## II Photograph of the EUT

### 1. Appearance of the EUT









## 2. Inside of the EUT



