

# FCC RF Test Report

APPLICANT : HTC Corporation  
EQUIPMENT : Smartphone  
MODEL NAME : PH39130  
FCC ID : NM8PH39130  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)  
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)  
Tx/Rx FREQUENCY RANGE : GSM850 : 824.2 ~ 848.8 MHz /  
869.2 ~ 893.8 MHz  
GSM1900 : 1850.2 ~ 1909.8 MHz /  
1930.2 ~ 1989.8 MHz  
MAX. ERP/EIRP POWER : GSM850 (GSM) : 0.23 W  
GSM850 (EDGE 8) : 0.06 W  
GSM1900 (GPRS 8) : 0.36 W  
GSM1900 (EDGE 8) : 0.13 W

The product was received on Oct. 07, 2011 and completely tested on Oct. 27, 2011. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



## SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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## REVISION HISTORY

| REPORT NO.  | VERSION | DESCRIPTION             | ISSUED DATE   |
|-------------|---------|-------------------------|---------------|
| FG1O0640-01 | Rev. 01 | Initial issue of report | Nov. 29, 2011 |
|             |         |                         |               |
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## SUMMARY OF TEST RESULT

| Report Section | FCC Rule                            | IC Rule                            | Description                                   | Limit                               | Result | Remark                                 |
|----------------|-------------------------------------|------------------------------------|-----------------------------------------------|-------------------------------------|--------|----------------------------------------|
| 3.1            | §2.1046                             | N/A                                | Conducted Output Power                        | N/A                                 | PASS   | -                                      |
| 3.2            | §22.913(a)(2)                       | RSS-132(4.4)<br>SRSP-503(5.1.3)    | Effective Radiated Power                      | < 7 Watts                           | PASS   | -                                      |
| 3.2            | §24.232(c)                          | RSS-133 (6.4)<br>SRSP-510(5.1.2)   | Equivalent Isotropic Radiated Power           | < 2 Watts                           | PASS   | -                                      |
| 3.3            | §2.1049<br>§22.917(a)<br>§24.238(a) | N/A                                | Occupied Bandwidth                            | N/A                                 | PASS   | -                                      |
| 3.4            | §2.1051<br>§22.917(a)<br>§24.238(a) | RSS-132 (4.5.1)<br>RSS-133 (6.5.1) | Band Edge Measurement                         | < 43+10log <sub>10</sub> (P[Watts]) | PASS   | -                                      |
| 3.5            | §2.1051<br>§22.917(a)<br>§24.238(a) | RSS-132 (4.5.1)<br>RSS-133 (6.5.1) | Conducted Emission                            | < 43+10log <sub>10</sub> (P[Watts]) | PASS   | -                                      |
| 3.6            | §2.1053<br>§22.917(a)<br>§24.238(a) | RSS-132 (4.5.1)<br>RSS-133 (6.5.1) | Field Strength of Spurious Radiation          | < 43+10log <sub>10</sub> (P[Watts]) | PASS   | Under limit<br>18.70 dB at<br>2509 MHz |
| 3.7            | §2.1055<br>§22.355<br>§24.235       | RSS-132(4.3)<br>RSS-133(6.3)       | Frequency Stability for Temperature & Voltage | < 2.5 ppm                           | PASS   | -                                      |

# 1 General Description

## 1.1 Applicant

**HTC Corporation**

No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan

## 1.2 Manufacturer

**HTC Corporation**

No. 23, Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan

## 1.3 Feature of Equipment Under Test

| Product Feature & Specification |                                                             |
|---------------------------------|-------------------------------------------------------------|
| Equipment                       | Smartphone                                                  |
| Model Name                      | PH39130                                                     |
| FCC ID                          | NM8PH39130                                                  |
| Tx Frequency                    | GSM850 : 824 MHz ~ 849 MHz<br>GSM1900 : 1850 MHz ~ 1910 MHz |
| Rx Frequency                    | GSM850 : 869 MHz ~ 894 MHz<br>GSM1900 : 1930 MHz ~ 1990 MHz |
| Maximum Output Power to Antenna | GSM850 : 33.54 dBm<br>GSM1900 : 30.71 dBm                   |
| Antenna Type                    | Fixed Internal Antenna                                      |
| Type of Modulation              | GSM: GMSK<br>GPRS: GMSK<br>EDGE: GMSK / 8PSK                |
| EUT Stage                       | Identical Prototype                                         |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Emission Designator and Maximum ERP/EIRP Power

| FCC Rule | System         | Type of Modulation | Emission Designator | Maximum ERP/EIRP |
|----------|----------------|--------------------|---------------------|------------------|
| Part 22  | GSM850 GSM     | GMSK               | 246KGXW             | 0.23 W           |
| Part 22  | GSM850 EDGE 8  | GMSK / 8PSK        | 242KG7W             | 0.06 W           |
| Part 24  | GSM1900 GPRS 8 | GMSK               | 250KGXW             | 0.36 W           |
| Part 24  | GSM1900 EDGE 8 | GMSK / 8PSK        | 246KG7W             | 0.13 W           |

## 1.5 Testing Site

|                           |                                                                                                                                                                 |           |                                |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------------------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.                                                                                                                                      |           |                                |
| <b>Test Site Location</b> | No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |           |                                |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                         |           | <b>FCC/IC Registration No.</b> |
|                           | TH02-HY                                                                                                                                                         | 03CH07-HY | 722060/4086B-1                 |

## 1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ Preliminary Guidance for Receiving Applications for Certification of 3G Device. May 9, 2006.
- ♦ FCC 47 CFR Part 2, 22(H), 24(E)
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ IC RSS-132 Issue 2
- ♦ IC RSS-133 Issue 5

### Remark:

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

## 1.7 Ancillary Equipment List

| Item | Equipment        | Trade Name | Model No. | FCC ID | Data Cable | Power Cord        |
|------|------------------|------------|-----------|--------|------------|-------------------|
| 1.   | System Simulator | R&S        | CMU200    | N/A    | N/A        | Unshielded, 1.8 m |

## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for GSM850.
2. 30 MHz to 19000 MHz for GSM1900.

| Test Modes |                                                                                        |                                                                                        |
|------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Band       | Radiated TCs                                                                           | Conducted TCs                                                                          |
| GSM 850    | <ul style="list-style-type: none"> <li>■ GSM Link</li> <li>■ EDGE 8 Link</li> </ul>    | <ul style="list-style-type: none"> <li>■ GSM Link</li> <li>■ EDGE 8 Link</li> </ul>    |
| GSM 1900   | <ul style="list-style-type: none"> <li>■ GPRS 8 Link</li> <li>■ EDGE 8 Link</li> </ul> | <ul style="list-style-type: none"> <li>■ GPRS 8 Link</li> <li>■ EDGE 8 Link</li> </ul> |

**Note:**

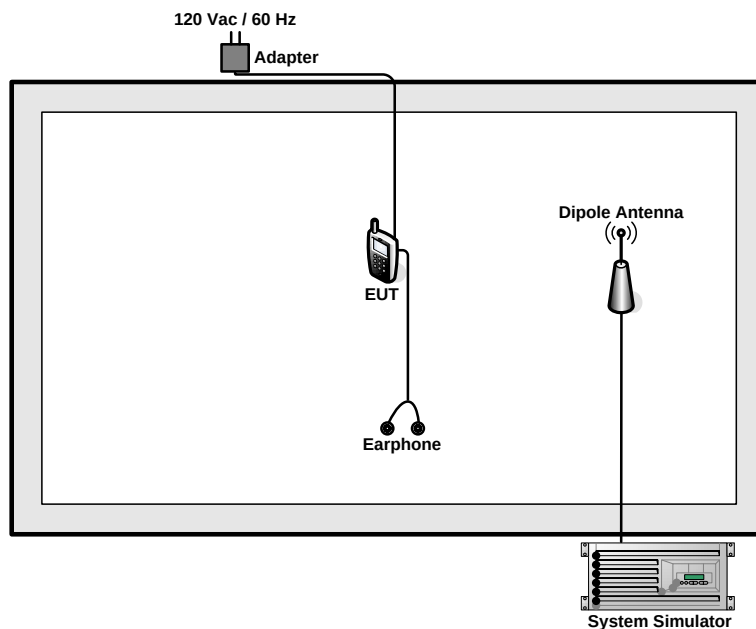
1. The maximum power levels are GSM mode for GMSK link, EDGE multi-slot class 8 mode for 8PSK link, only these modes were used for all tests.
2. Because there are individual antennas for each WWAN, WLAN, and Bluetooth, the co-location test modes are not required.

The conducted power tables are as follows:

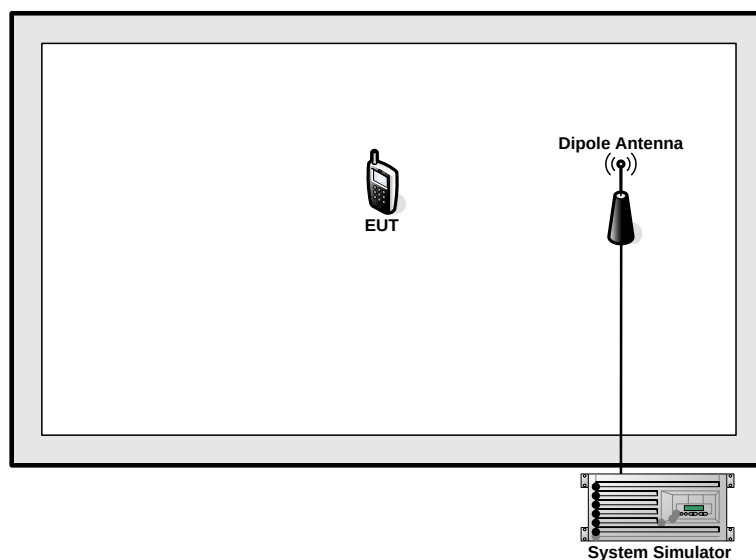
| Conducted Power (*Unit: dBm) |        |       |       |         |        |        |
|------------------------------|--------|-------|-------|---------|--------|--------|
| Band                         | GSM850 |       |       | GSM1900 |        |        |
| Channel                      | 128    | 189   | 251   | 512     | 661    | 810    |
| Frequency                    | 824.2  | 836.4 | 848.8 | 1850.2  | 1880.0 | 1909.8 |
| GSM                          | 33.43  | 33.52 | 33.54 | 30.70   | 30.66  | 30.47  |
| GPRS 8                       | 32.52  | 32.59 | 32.63 | 30.71   | 30.67  | 30.48  |
| GPRS 10                      | 32.32  | 32.40 | 32.53 | 29.70   | 29.58  | 29.42  |
| GPRS 11                      | 32.78  | 32.90 | 32.94 | 28.02   | 27.98  | 27.97  |
| GPRS 12                      | 30.72  | 30.53 | 31.04 | 26.40   | 26.36  | 26.23  |
| EGPRS 8                      | 26.00  | 25.98 | 24.65 | 25.25   | 25.16  | 25.11  |
| EGPRS 10                     | 25.37  | 25.38 | 25.41 | 24.52   | 24.48  | 24.33  |
| EGPRS 11                     | 25.19  | 25.24 | 25.30 | 24.10   | 24.03  | 23.90  |
| EGPRS 12                     | 25.02  | 25.03 | 25.10 | 23.73   | 23.71  | 23.63  |

## 2.2 Connection Diagram of Test System

### <Radiation Mode>



### <EIRP/ERP Mode>





### 3 Test Result

#### 3.1 Conducted Output Power Measurement

##### 3.1.1 Description of the Conducted Output Power Measurement

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

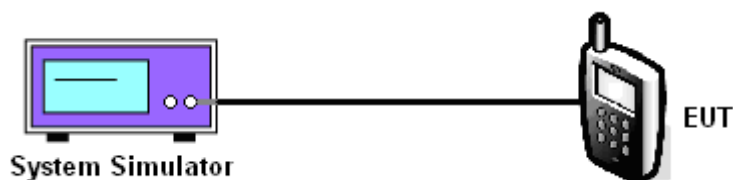
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

##### 3.1.4 Test Setup



**3.1.5 Test Result of Conducted Output Power**

| Cellular Band   |            |                 |                       |                         |
|-----------------|------------|-----------------|-----------------------|-------------------------|
| Modes           | Channel    | Frequency (MHz) | Conducted Power (dBm) | Conducted Power (Watts) |
| GSM850 (GSM)    | 128 (Low)  | 824.2           | 33.43                 | 2.20                    |
|                 | 189 (Mid)  | 836.4           | 33.52                 | 2.25                    |
|                 | 251 (High) | 848.8           | 33.54                 | 2.26                    |
| GSM850 (EDGE 8) | 128 (Low)  | 824.2           | 26.00                 | 0.40                    |
|                 | 189 (Mid)  | 836.4           | 25.98                 | 0.40                    |
|                 | 251 (High) | 848.8           | 24.65                 | 0.29                    |

| PCS Band         |            |                 |                       |                         |
|------------------|------------|-----------------|-----------------------|-------------------------|
| Modes            | Channel    | Frequency (MHz) | Conducted Power (dBm) | Conducted Power (Watts) |
| GSM1900 (GPRS 8) | 512 (Low)  | 1850.2          | 30.71                 | 1.18                    |
|                  | 661 (Mid)  | 1880.0          | 30.67                 | 1.17                    |
|                  | 810 (High) | 1909.8          | 30.48                 | 1.12                    |
| GSM1900 (EDGE 8) | 512 (Low)  | 1850.2          | 25.25                 | 0.33                    |
|                  | 661 (Mid)  | 1880.0          | 25.16                 | 0.33                    |
|                  | 810 (High) | 1909.8          | 25.11                 | 0.32                    |

## 3.2 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

### 3.2.1 Description of the ERP/EIRP Measurement

ERP/EIRP is measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

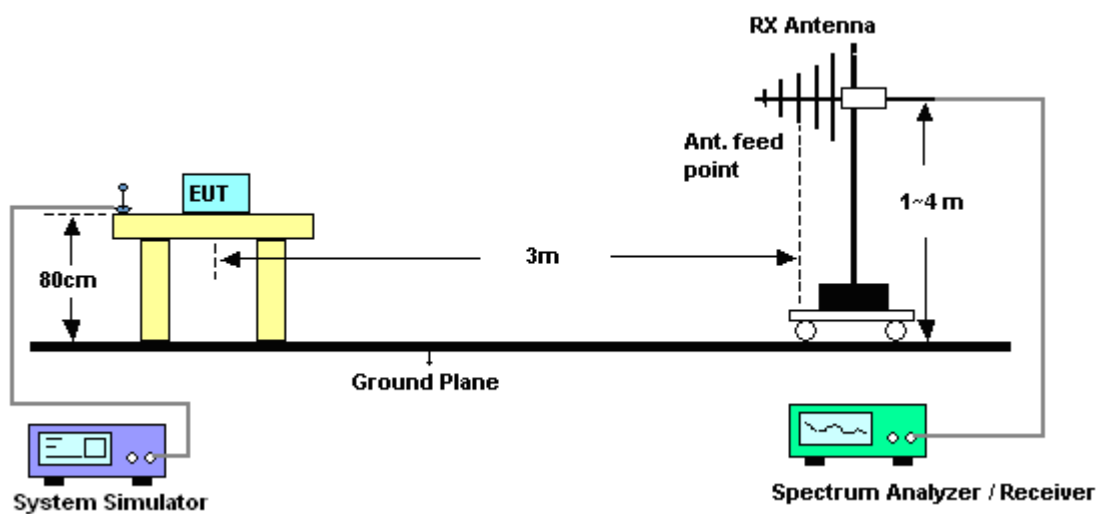
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW= 3MHz,VBW= 3MHz, and peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor,  $EIRP = LVL + \text{Correction factor}$  and  $ERP = EIRP - 2.15$ .

### 3.2.4 Test Setup



### 3.2.5 Test Result of ERP

| GSM850 (GSM) Radiated Power ERP |              |                           |              |            |
|---------------------------------|--------------|---------------------------|--------------|------------|
| Horizontal Polarization         |              |                           |              |            |
| Frequency<br>(MHz)              | LVL<br>(dBm) | Correction Factor<br>(dB) | ERP<br>(dBm) | ERP<br>(W) |
| 824.2                           | -5.03        | 30.89                     | 23.71        | 0.23       |
| 836.4                           | -6.52        | 31.13                     | 22.46        | 0.18       |
| 848.8                           | -5.91        | 31.62                     | 23.56        | 0.23       |
| Vertical Polarization           |              |                           |              |            |
| Frequency<br>(MHz)              | LVL<br>(dBm) | Correction Factor<br>(dB) | ERP<br>(dBm) | ERP<br>(W) |
| 824.2                           | -15.53       | 35.93                     | 18.25        | 0.07       |
| 836.4                           | -14.49       | 34.95                     | 18.31        | 0.07       |
| 848.8                           | -14.73       | 34.71                     | 17.83        | 0.06       |

\* ERP = LVL (dBm) + Correction Factor (dB) – 2.15

| GSM850 (EDGE 8) Radiated Power ERP |              |                           |              |            |
|------------------------------------|--------------|---------------------------|--------------|------------|
| Horizontal Polarization            |              |                           |              |            |
| Frequency<br>(MHz)                 | LVL<br>(dBm) | Correction Factor<br>(dB) | ERP<br>(dBm) | ERP<br>(W) |
| 824.2                              | -12.25       | 30.89                     | 16.49        | 0.04       |
| 836.4                              | -13.41       | 31.13                     | 15.57        | 0.04       |
| 848.8                              | -11.91       | 31.62                     | 17.56        | 0.06       |
| Vertical Polarization              |              |                           |              |            |
| Frequency<br>(MHz)                 | LVL<br>(dBm) | Correction Factor<br>(dB) | ERP<br>(dBm) | ERP<br>(W) |
| 824.2                              | -22.55       | 35.93                     | 11.23        | 0.01       |
| 836.4                              | -20.95       | 34.95                     | 11.85        | 0.02       |
| 848.8                              | -20.55       | 34.71                     | 12.01        | 0.02       |

\* ERP = LVL (dBm) + Correction Factor (dB) – 2.15

**3.2.6 Test Result of EIRP**

| <b>GSM1900 (GPRS 8) Radiated Power EIRP</b> |                      |                                   |                       |                     |
|---------------------------------------------|----------------------|-----------------------------------|-----------------------|---------------------|
| Horizontal Polarization                     |                      |                                   |                       |                     |
| <b>Frequency<br/>(MHz)</b>                  | <b>LVL<br/>(dBm)</b> | <b>Correction Factor<br/>(dB)</b> | <b>EIRP<br/>(dBm)</b> | <b>EIRP<br/>(W)</b> |
| 1850.2                                      | -15.70               | 41.24                             | 25.54                 | 0.36                |
| 1880.0                                      | -16.30               | 41.46                             | 25.16                 | 0.33                |
| 1909.8                                      | -17.09               | 41.21                             | 24.12                 | 0.26                |
| Vertical Polarization                       |                      |                                   |                       |                     |
| <b>Frequency<br/>(MHz)</b>                  | <b>LVL<br/>(dBm)</b> | <b>Correction Factor<br/>(dB)</b> | <b>EIRP<br/>(dBm)</b> | <b>EIRP<br/>(W)</b> |
| 1850.2                                      | -22.75               | 41.52                             | 18.77                 | 0.08                |
| 1880.0                                      | -22.13               | 43.10                             | 20.97                 | 0.13                |
| 1909.8                                      | -22.06               | 42.73                             | 20.67                 | 0.12                |

\* EIRP = LVL (dBm) + Correction Factor (dB)

| <b>GSM1900 (EDGE 8) Radiated Power EIRP</b> |                      |                                   |                       |                     |
|---------------------------------------------|----------------------|-----------------------------------|-----------------------|---------------------|
| Horizontal Polarization                     |                      |                                   |                       |                     |
| <b>Frequency<br/>(MHz)</b>                  | <b>LVL<br/>(dBm)</b> | <b>Correction Factor<br/>(dB)</b> | <b>EIRP<br/>(dBm)</b> | <b>EIRP<br/>(W)</b> |
| 1850.2                                      | -20.04               | 41.24                             | 21.20                 | 0.13                |
| 1880.0                                      | -20.82               | 41.46                             | 20.64                 | 0.12                |
| 1909.8                                      | -21.35               | 41.21                             | 19.86                 | 0.10                |
| Vertical Polarization                       |                      |                                   |                       |                     |
| <b>Frequency<br/>(MHz)</b>                  | <b>LVL<br/>(dBm)</b> | <b>Correction Factor<br/>(dB)</b> | <b>EIRP<br/>(dBm)</b> | <b>EIRP<br/>(W)</b> |
| 1850.2                                      | -27.06               | 41.52                             | 14.46                 | 0.03                |
| 1880.0                                      | -26.45               | 43.10                             | 16.65                 | 0.05                |
| 1909.8                                      | -26.23               | 42.73                             | 16.50                 | 0.04                |

\* EIRP = LVL (dBm) + Correction Factor (dB)

### 3.3 Occupied Bandwidth Measurement

#### 3.3.1 Description of Occupied Bandwidth Measurement

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

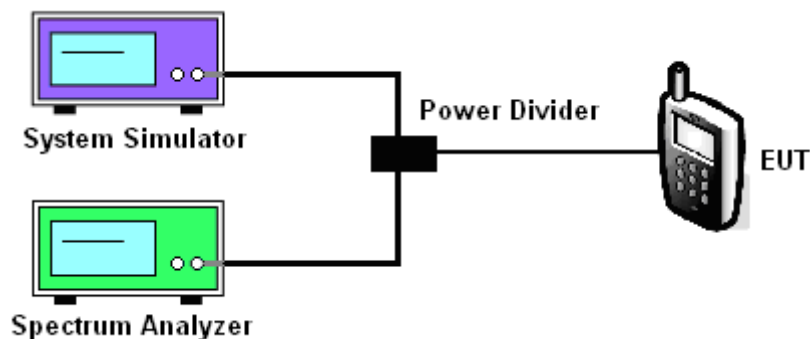
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

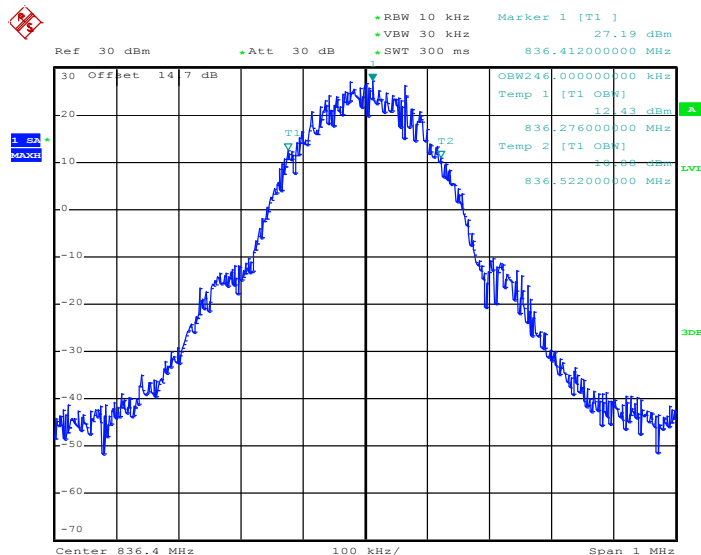
1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers were measured.

#### 3.3.4 Test Setup

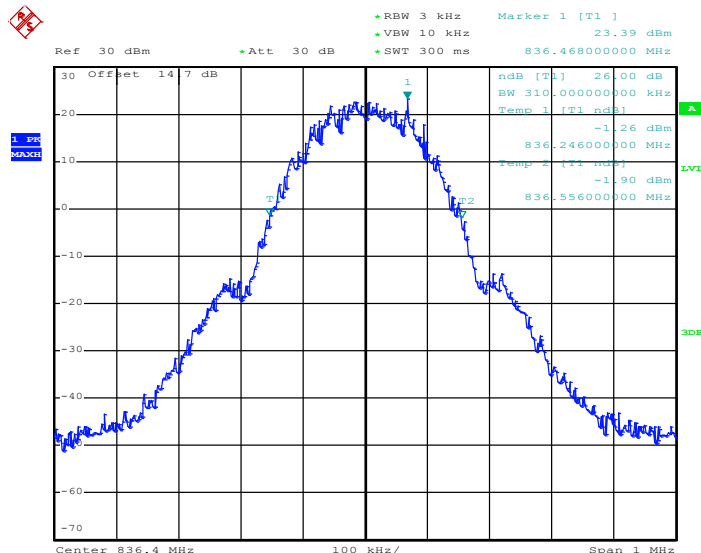


### 3.3.5 Test Result (Plots) of Occupied Bandwidth

|                    |          |                      |      |
|--------------------|----------|----------------------|------|
| <b>Band :</b>      | GSM 850  | <b>Power Stage :</b> | High |
| <b>Test Mode :</b> | GSM Link |                      |      |

**99% Occupied Bandwidth Plot on Channel 189**


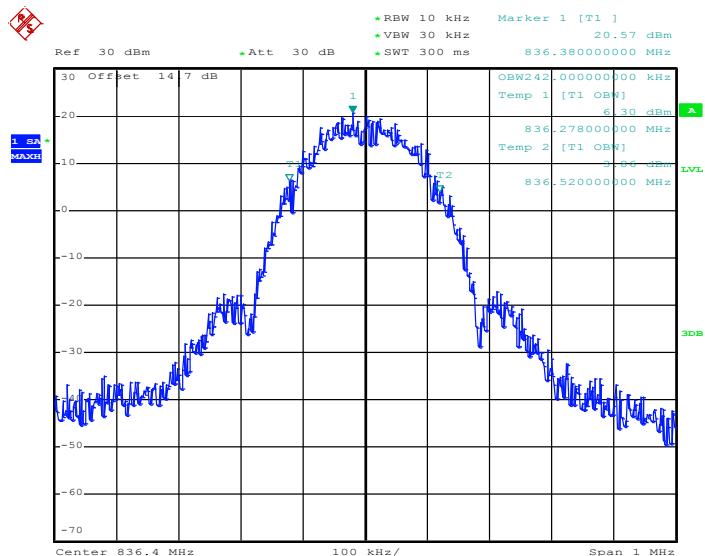
Date: 26.OCT.2011 09:18:40

**26dB Bandwidth Plot on Channel 189**


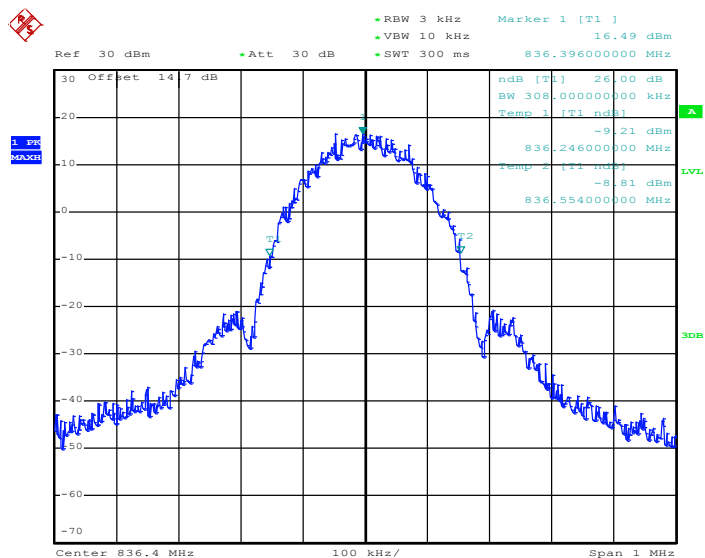
Date: 26.OCT.2011 09:17:19



|                    |             |                      |      |
|--------------------|-------------|----------------------|------|
| <b>Band :</b>      | GSM 850     | <b>Power Stage :</b> | High |
| <b>Test Mode :</b> | EDGE 8 Link |                      |      |

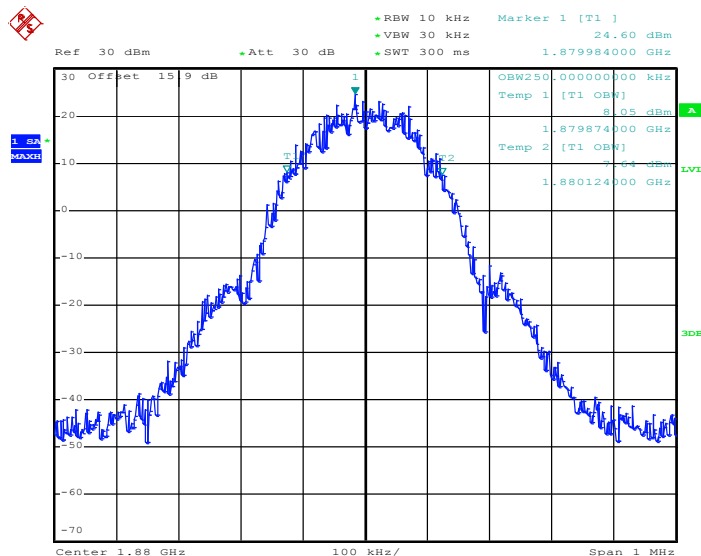
**99% Occupied Bandwidth Plot on Channel 189**


Date: 26.OCT.2011 09:51:08

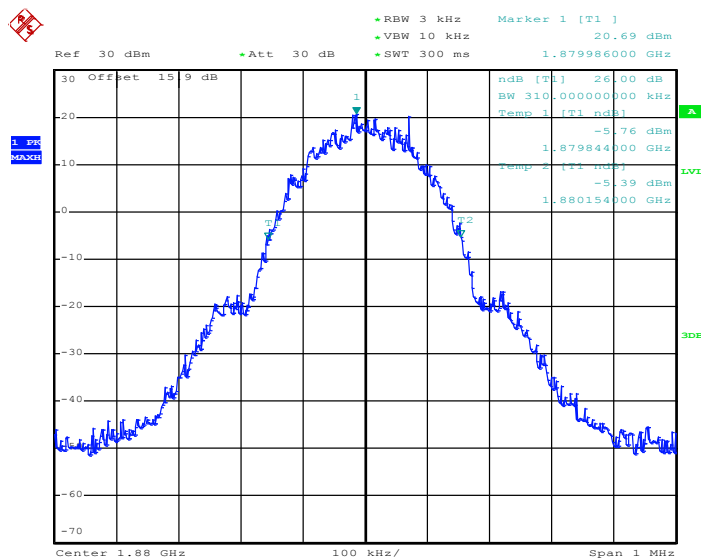
**26dB Bandwidth Plot on Channel 189**


Date: 26.OCT.2011 09:49:47

|                    |             |                      |      |
|--------------------|-------------|----------------------|------|
| <b>Band :</b>      | GSM 1900    | <b>Power Stage :</b> | High |
| <b>Test Mode :</b> | GPRS 8 Link |                      |      |

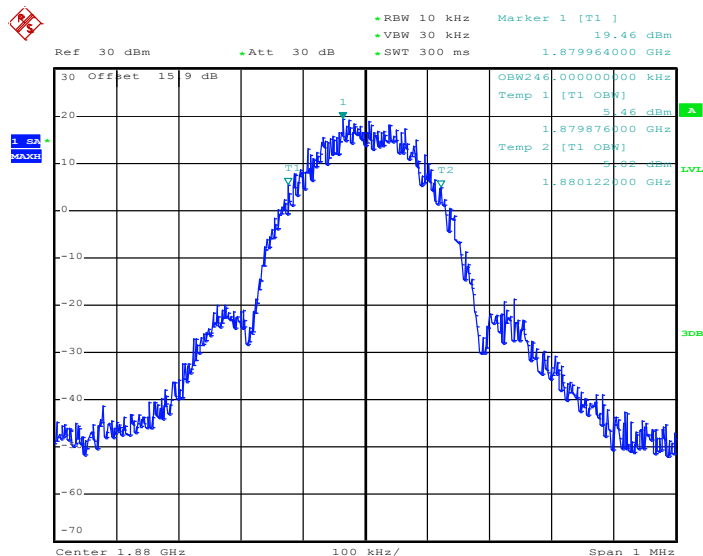
**99% Occupied Bandwidth Plot on Channel 661**


Date: 26.OCT.2011 09:34:43

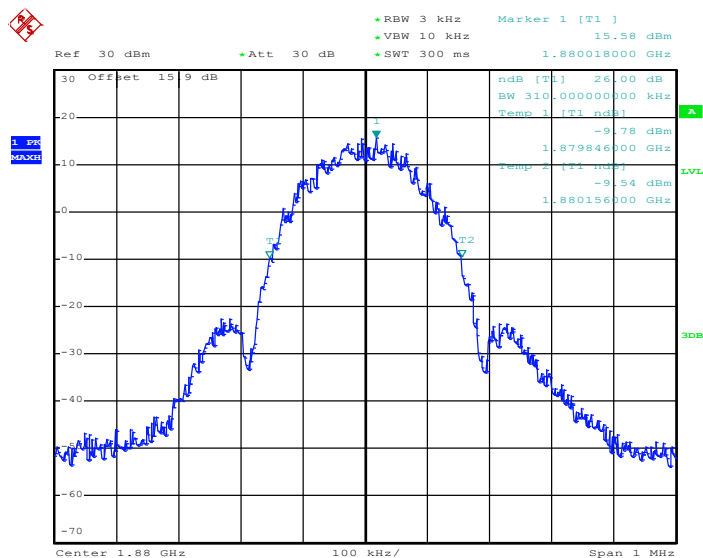
**26dB Bandwidth Plot on Channel 661**


Date: 26.OCT.2011 09:33:22

|                    |             |                      |      |
|--------------------|-------------|----------------------|------|
| <b>Band :</b>      | GSM 1900    | <b>Power Stage :</b> | High |
| <b>Test Mode :</b> | EDGE 8 Link |                      |      |

**99% Occupied Bandwidth Plot on Channel 661**


Date: 26.OCT.2011 10:08:29

**26dB Bandwidth Plot on Channel 661**


Date: 26.OCT.2011 10:07:08

### 3.4 Band Edge Measurement

#### 3.4.1 Description of Band Edge Measurement

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

#### 3.4.2 Measuring Instruments

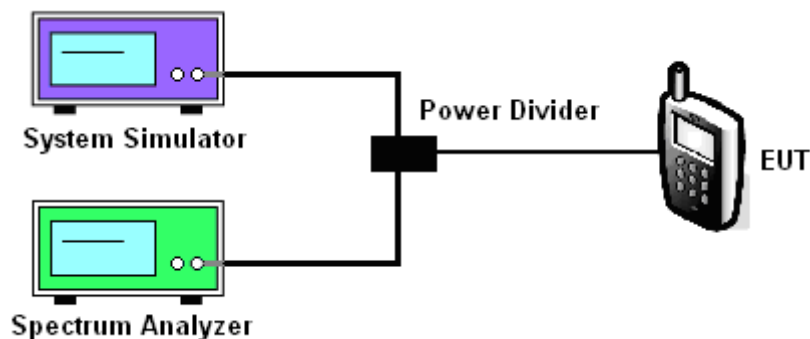
See list of measuring instruments of this test report.

#### 3.4.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.

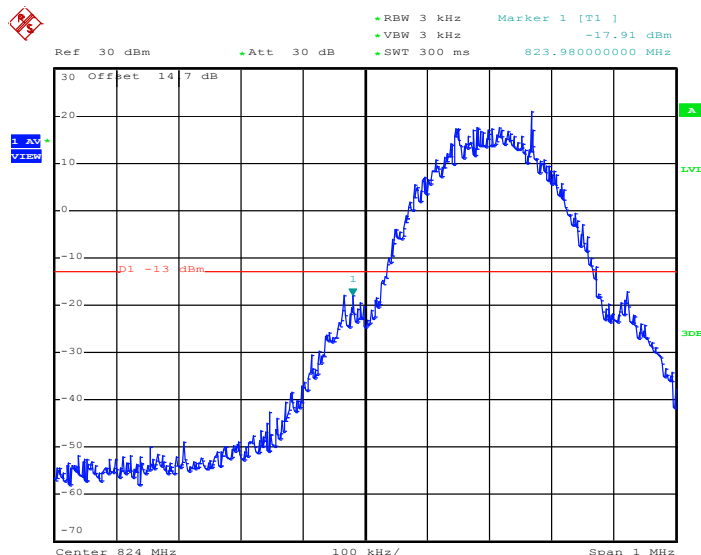
#### 3.4.4 Test Setup

<Conducted Band Edge >

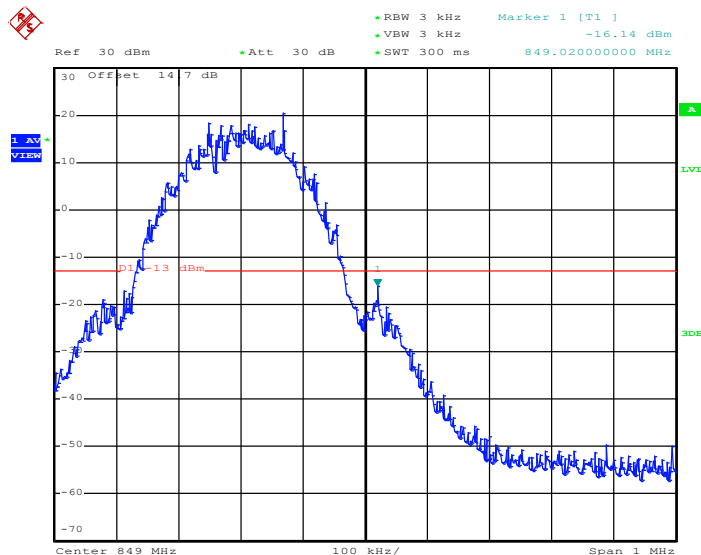


### 3.4.5 Test Result (Plots) of Conducted Band Edge

|                    |          |                      |      |
|--------------------|----------|----------------------|------|
| <b>Band :</b>      | GSM850   | <b>Power Stage :</b> | High |
| <b>Test Mode :</b> | GSM Link |                      |      |

**Lower Band Edge Plot on Channel 128**


Date: 26.OCT.2011 09:20:37

**Higher Band Edge Plot on Channel 251**


Date: 26.OCT.2011 09:21:03



The screenshot shows a Spectrum Analyzer interface. At the top, there's a red crosshair icon. Below it, the main display area shows a noisy signal trace in blue. A red horizontal line is drawn across the plot at -13 dBm, labeled 'P1 -13 dBm'. The x-axis is labeled 'Center 824 MHz' and 'Span 1 MHz'. The y-axis is labeled 'dBm' and ranges from -70 to 30. Various settings are displayed at the top: 'Ref 30 dBm', 'Att 30 dB', 'RBW 3 kHz', 'VBW 3 kHz', 'SWT 300 ms', and 'Marker 1 [T1] -25.93 dBm'. On the left side, there's a button labeled '1. AV VIEW'. On the right side, there's a button labeled 'A' and a label 'LVL'.

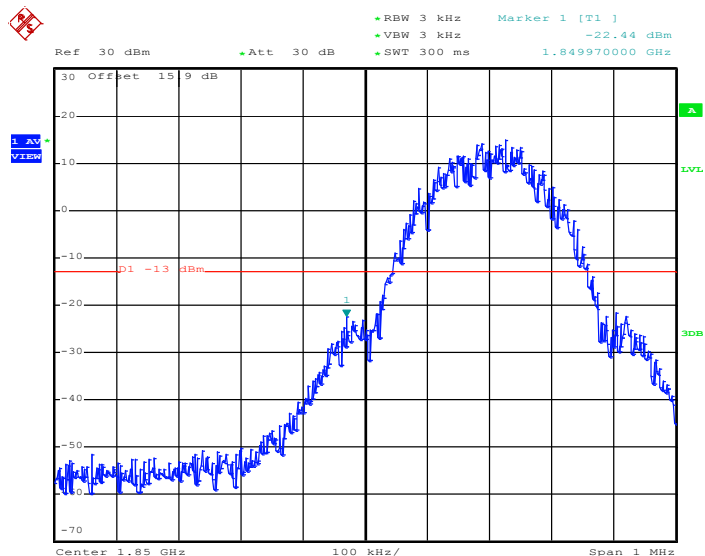
[illegible]

Page Number : 22 of 52  
Report Issued Date : Nov. 29, 2011  
Report Version : Rev. 01



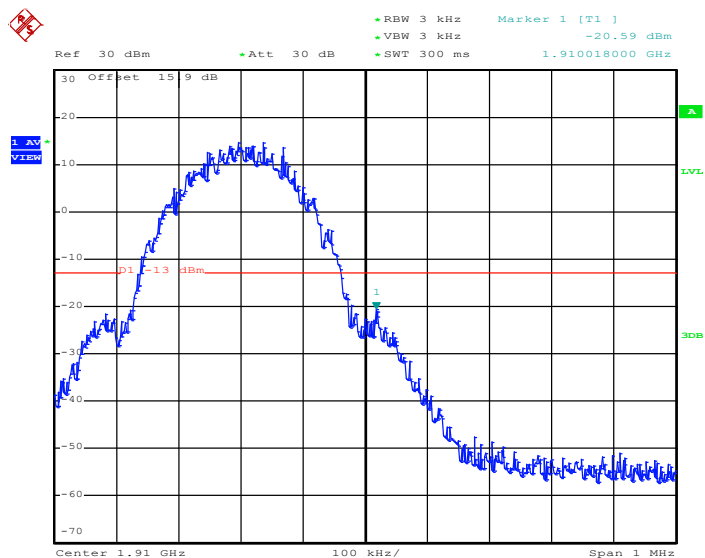
|             |             |               |      |
|-------------|-------------|---------------|------|
| Band :      | GSM1900     | Power Stage : | High |
| Test Mode : | GPRS 8 Link |               |      |

Lower Band Edge Plot on Channel 512



Date: 26.OCT.2011 09:36:39

Higher Band Edge Plot on Channel 810

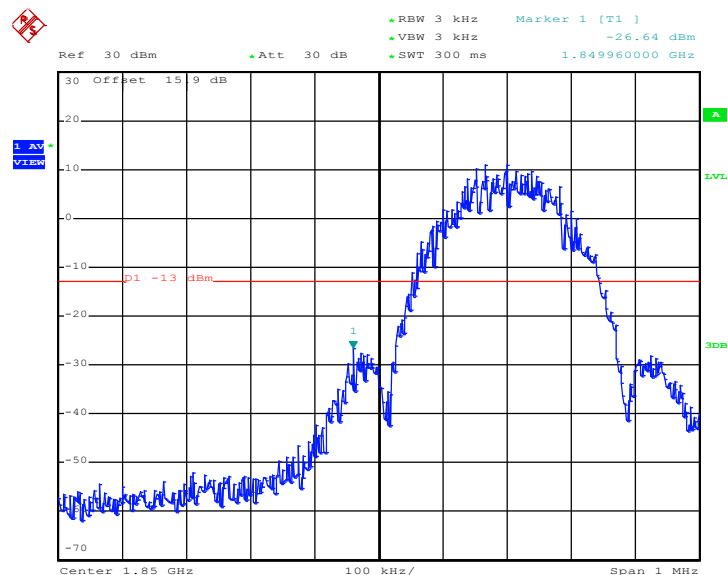


Date: 26.OCT.2011 09:37:06



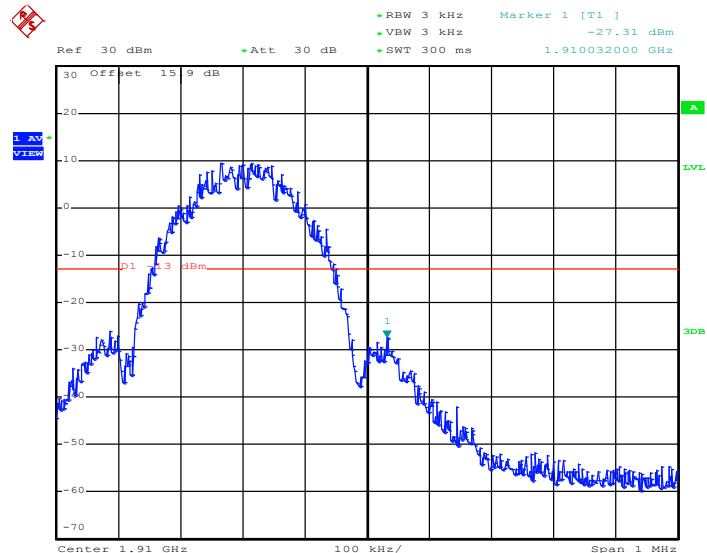
|             |             |               |      |
|-------------|-------------|---------------|------|
| Band :      | GSM1900     | Power Stage : | High |
| Test Mode : | EDGE 8 Link |               |      |

Lower Band Edge Plot on Channel 512



Date: 26.OCT.2011 10:10:25

Higher Band Edge Plot on Channel 810



Date: 26.OCT.2011 10:10:52



### 3.5 Conducted Emission Measurement

#### 3.5.1 Description of Conducted Emission Measurement

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

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

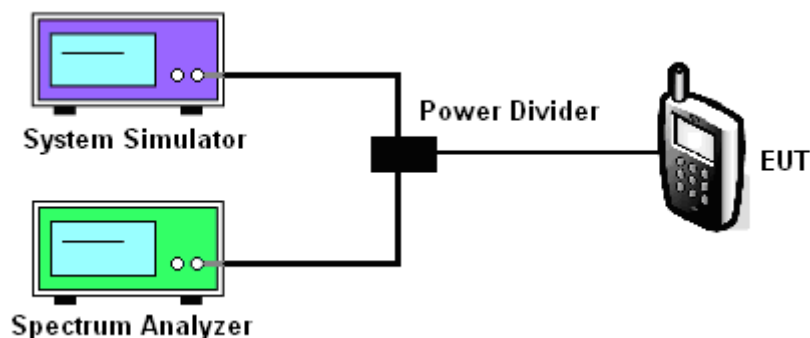
#### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.5.3 Test Procedures

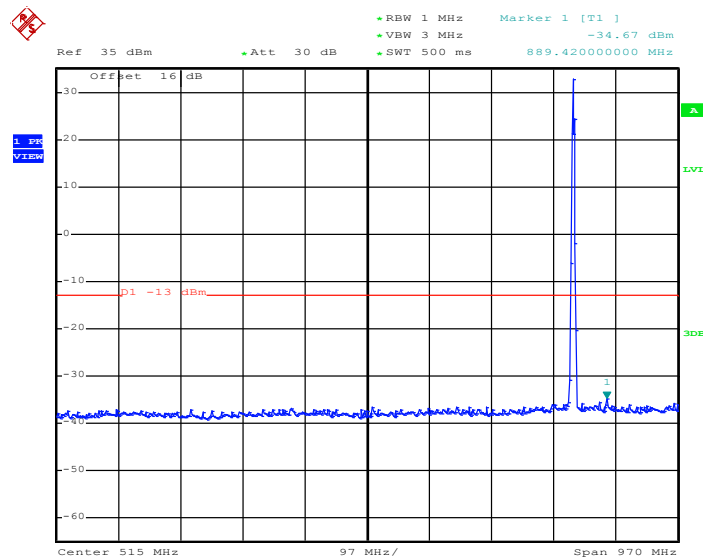
1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.

#### 3.5.4 Test Setup

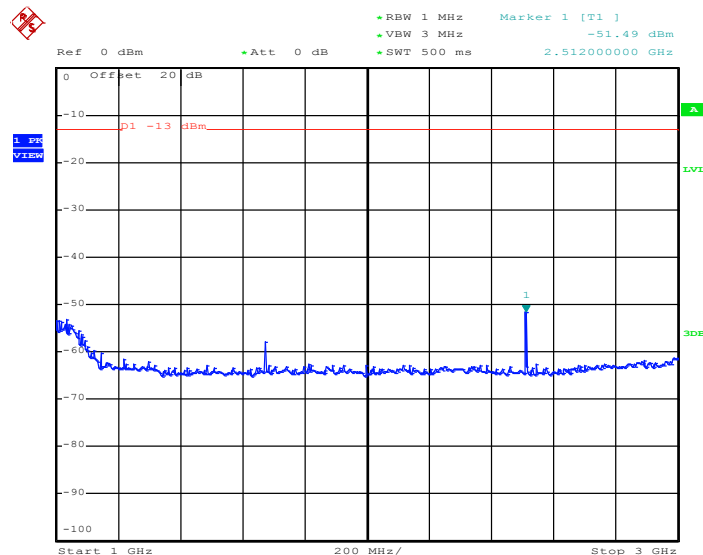


### 3.5.5 Test Result (Plots) of Conducted Emission

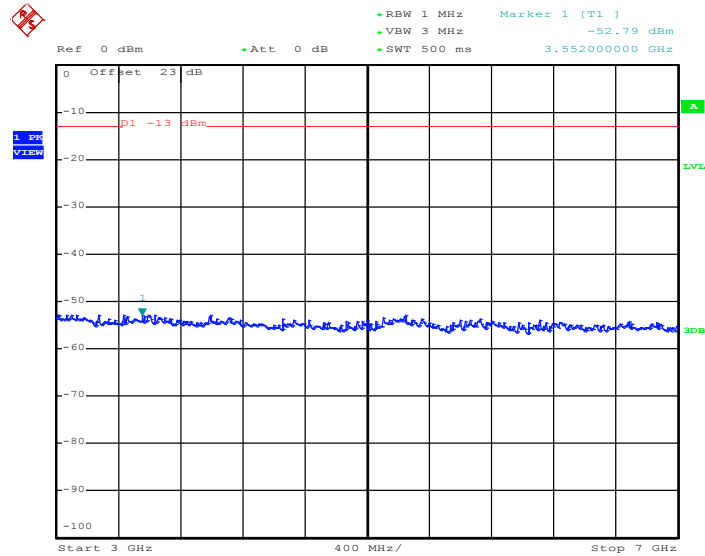
|                    |          |                  |       |
|--------------------|----------|------------------|-------|
| <b>Band :</b>      | GSM850   | <b>Channel :</b> | CH189 |
| <b>Test Mode :</b> | GSM Link |                  |       |

**Conducted Emission Plot between 30MHz ~ 1GHz**


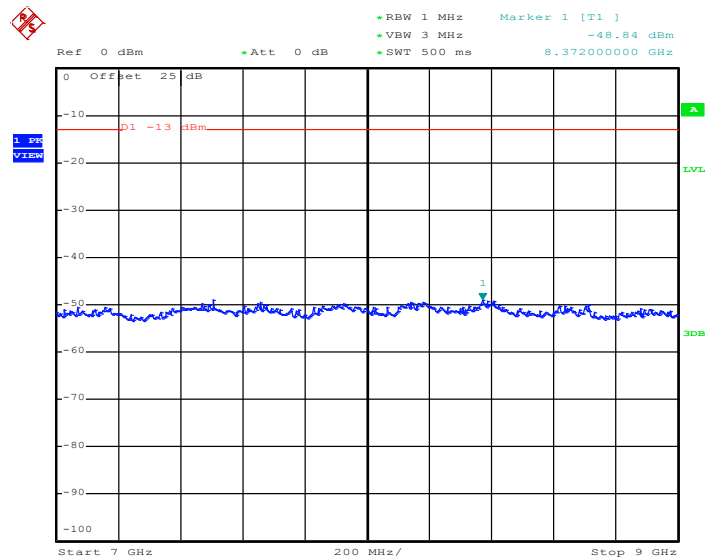
Date: 26.OCT.2011 09:11:39

**Conducted Emission Plot between 1GHz ~ 3GHz**


Date: 26.OCT.2011 09:11:56

**Conducted Emission Plot between 3GHz ~ 7GHz**


Date: 26.OCT.2011 09:12:10

**Conducted Emission Plot between 7GHz ~ 9GHz**


Date: 26.OCT.2011 09:12:23



The screenshot displays a Spectrum Analyzer interface. At the top, a red crosshair icon is in the upper left corner. The main display area shows a frequency spectrum with a blue trace. A prominent signal peak is visible at 864.2 MHz, reaching a level of approximately -35.45 dBm. The background is a grid. The x-axis represents frequency, with labels for Start 30 MHz, 97 MHz/, and Stop 1 GHz. The y-axis represents power level in dBm, ranging from -60 to 30. A red horizontal line is drawn at -13 dBm, labeled 'D1 -13 dBm'. The top status bar shows various settings: Ref 35 dBm, Att 30 dB, RBW 1 MHz, VBW 3 MHz, SWT 500 ms, Marker 1 [T1], and the current reading -35.45 dBm at 864.20000000 MHz. On the left side, there is a blue button labeled 'F5 VIEW'. On the right side, there are green labels 'A', 'ENV', and '3DB'.

Ref 35 dBm      Att 30 dB      RBW 1 MHz      VBW 3 MHz      SWT 500 ms      Marker 1 [T1]      -35.45 dBm      864.20000000 MHz

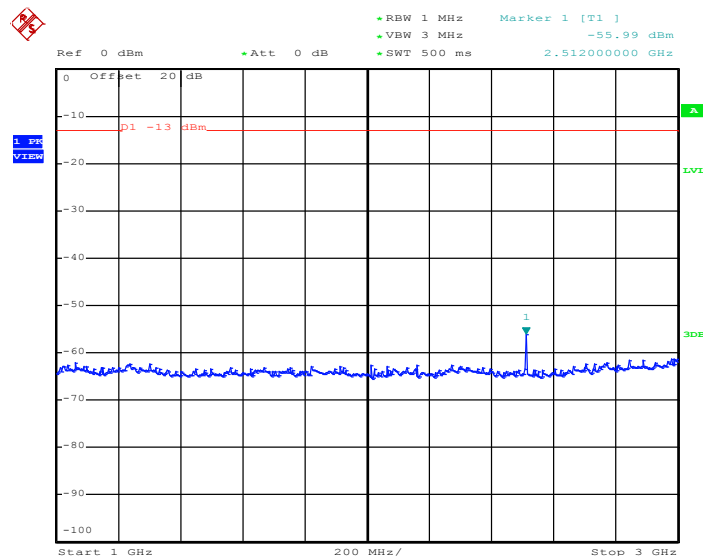
Offset 16 dB

D1 -13 dBm

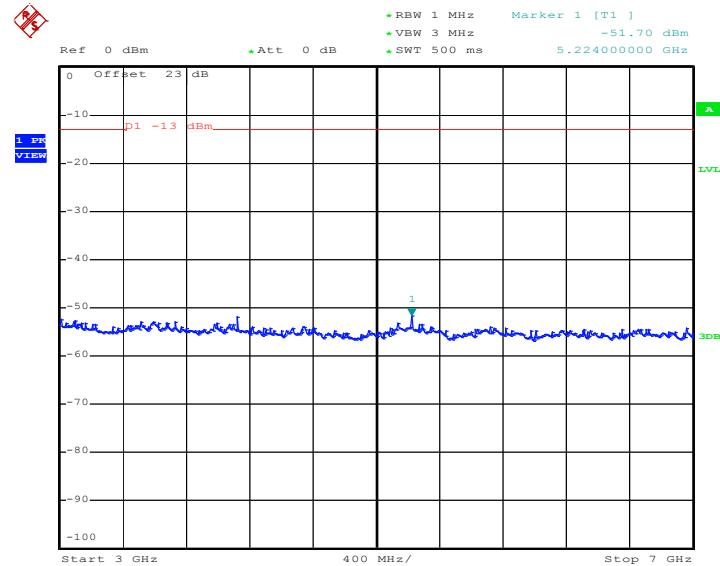
1

Start 30 MHz      97 MHz/      Stop 1 GHz

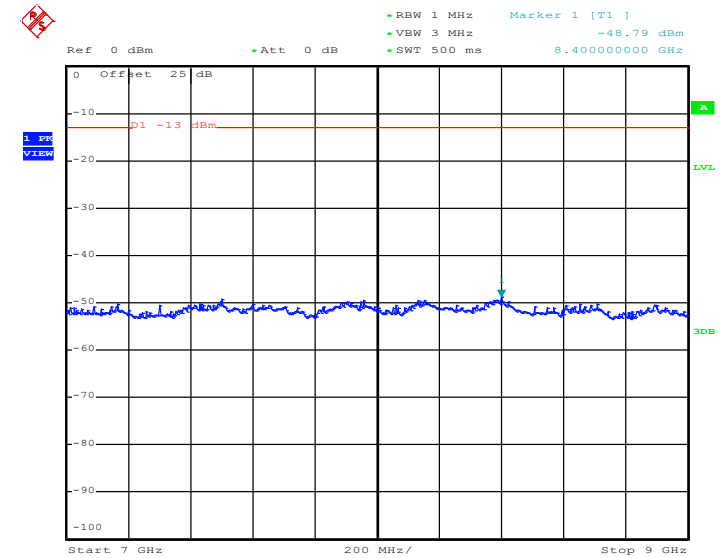
### Conducted Emission Plot between 1GHz ~ 3GHz



Date: 26.OCT.2011 09:48:28

**Conducted Emission Plot between 3GHz ~ 7GHz**


Date: 26.OCT.2011 09:45:03

**Conducted Emission Plot between 7GHz ~ 9GHz**


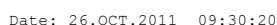
Date: 26.OCT.2011 09:45:16



### Conducted Emission Plot between 30MHz ~ 1GHz



### Conducted Emission Plot between 1GHz ~ 3GHz





The screenshot displays a Spectrum Analyzer interface. At the top, a red crosshair icon is visible. The main display area shows a frequency spectrum with a blue noise floor and a red trace. The y-axis represents power in dBm, ranging from 0 to -100. The x-axis represents frequency in GHz, ranging from 3 to 7. A red trace is labeled 'D1 -13 dBm'. A green trace is labeled '1 -54.64 dBm'. The status bar at the bottom shows 'Start 3 GHz', '400 MHz/' (likely resolution bandwidth), and 'Stop 7 GHz'.

Parameters displayed at the top right:

- RBW 1 MHz
- VBW 3 MHz
- SWT 500 ms
- Marker 1 [T1 ]
- 54.64 dBm
- 3.760000000 GHz

Controls and labels on the left side include 'Ref 0 dBm', 'Att 0 dB', and a '1. dB VIEW' button.

Date: 26.OCT.2011 09:32:06

RBW 1 MHz  
 VBW 3 MHz  
 SWT 500 ms  
 Marker 1 [T1]  
 -43.00 dBm  
 10.220800000 GHz

Ref 0 dBm  
 Att 0 dB

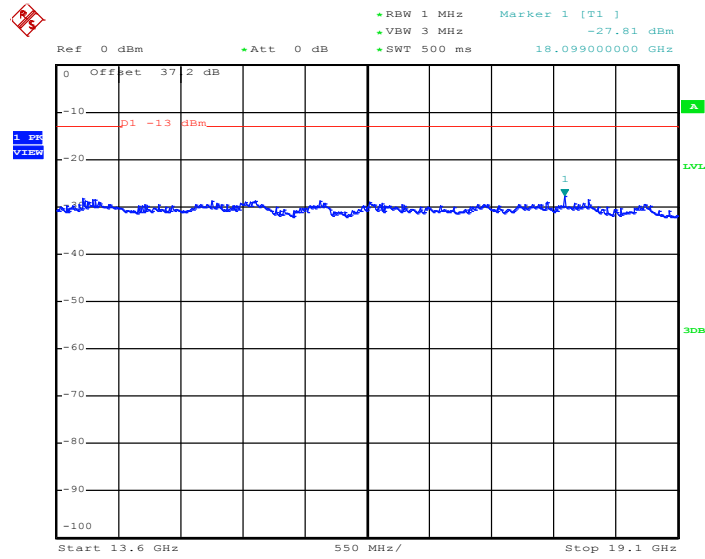
Offset 30.2 dB  
 P1 -13 dBm

1.500  
 7.500

A  
 LVL  
 3DB

Start 7 GHz  
 660 MHz/  
 Stop 13.6 GHz

Date: 26.OCT.2011 09:30:54

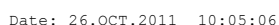
**Conducted Emission Plot between 13.6GHz ~ 19.1GHz**


Date: 26.OCT.2011 09:31:07



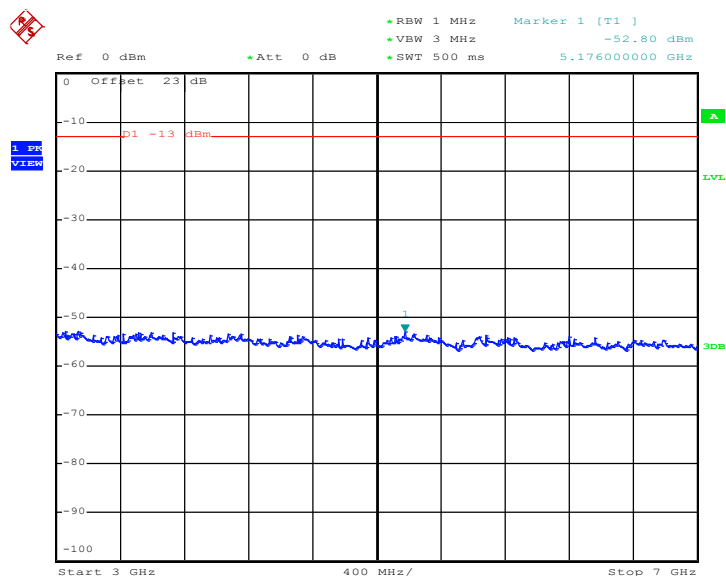


### Conducted Emission Plot between 1GHz ~ 3GHz



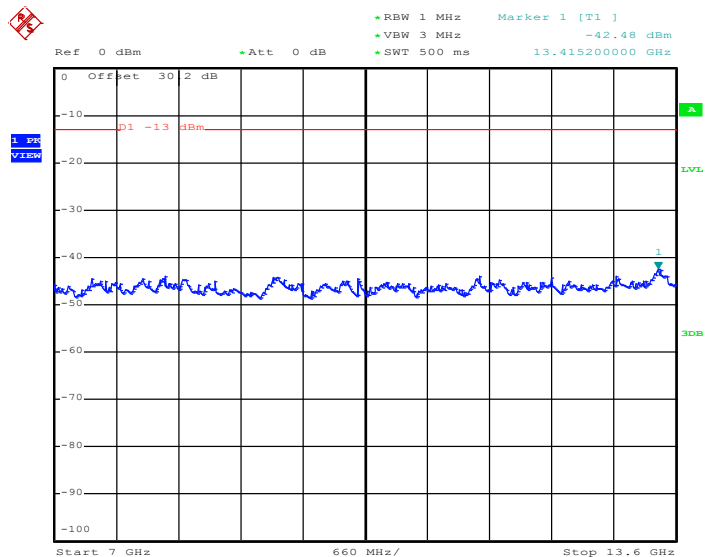


### Conducted Emission Plot between 3GHz ~ 7GHz



Date: 26.OCT.2011 10:05:24

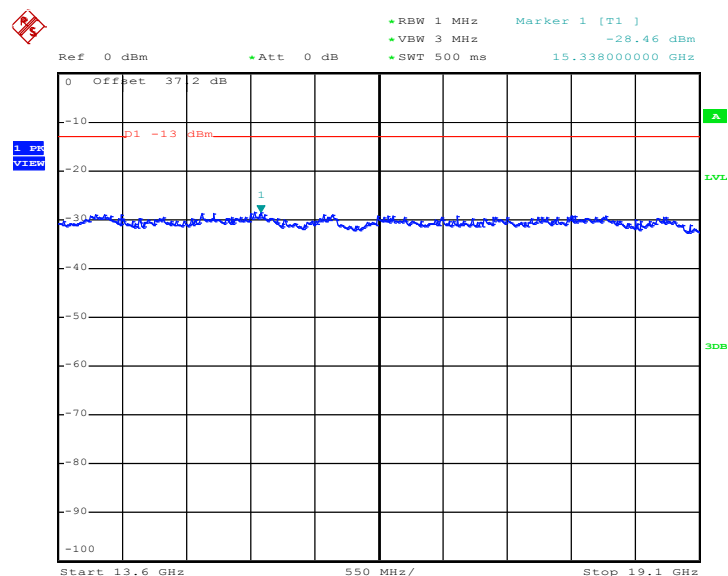
### Conducted Emission Plot between 7GHz ~ 13.6GHz



Date: 26.OCT.2011 10:05:36



Conducted Emission Plot between 13.6GHz ~ 19.1GHz



Date: 26.OCT.2011 10:05:50

## **3.6 Field Strength of Spurious Radiation Measurement**

### **3.6.1 Description of Field Strength of Spurious Radiated Measurement**

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

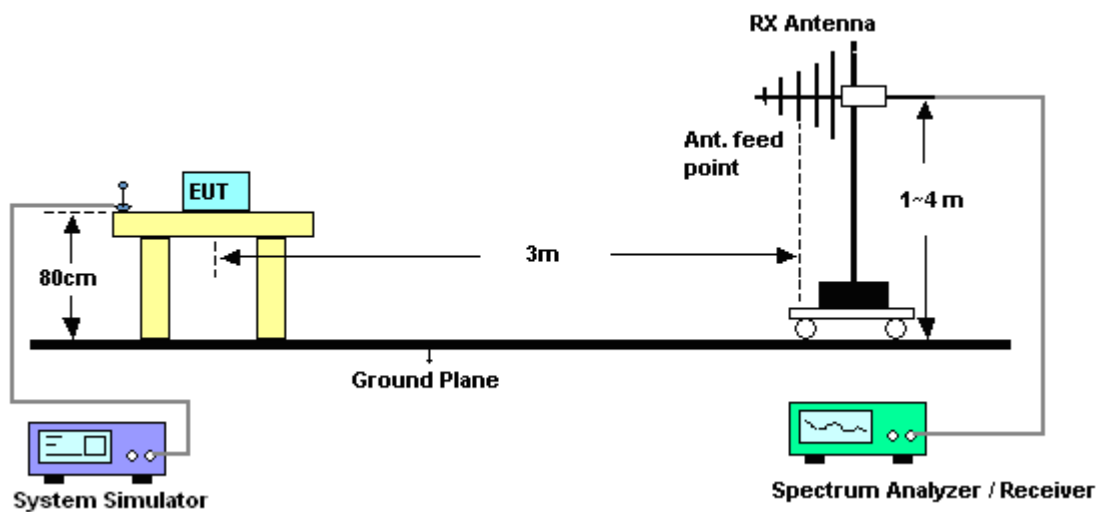
### **3.6.2 Measuring Instruments**

See list of measuring instruments of this test report.

### **3.6.3 Test Procedures**

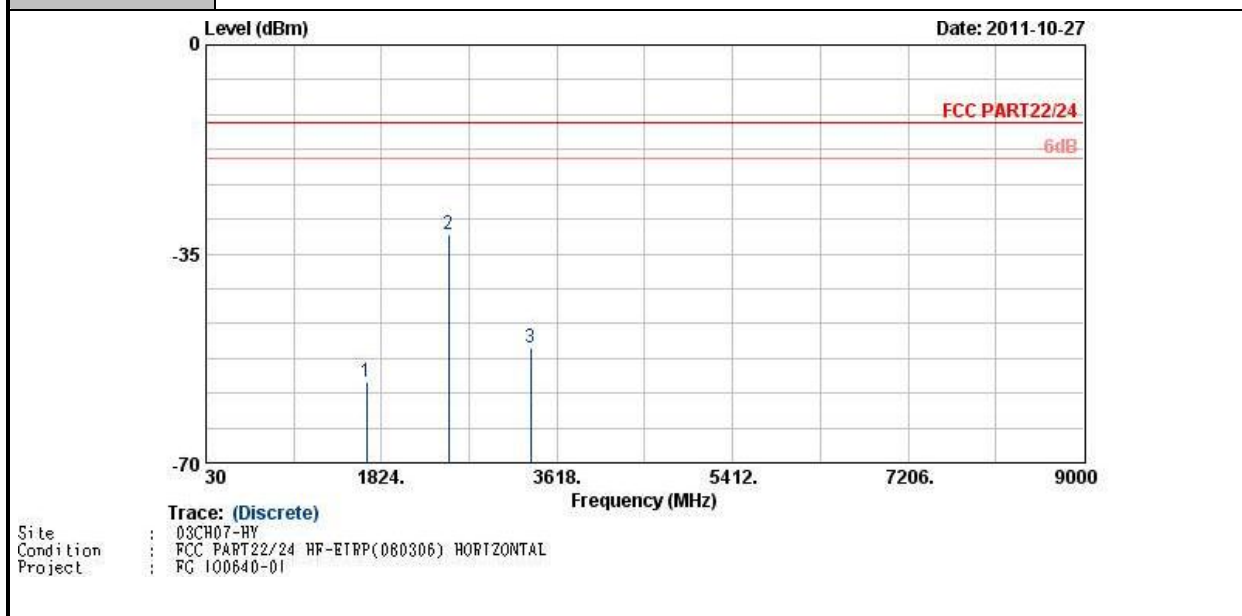
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11.  $ERP \text{ (dBm)} = EIRP - 2.15$

### 3.6.4 Test Setup



**3.6.5 Test Result of Field Strength of Spurious Radiated**

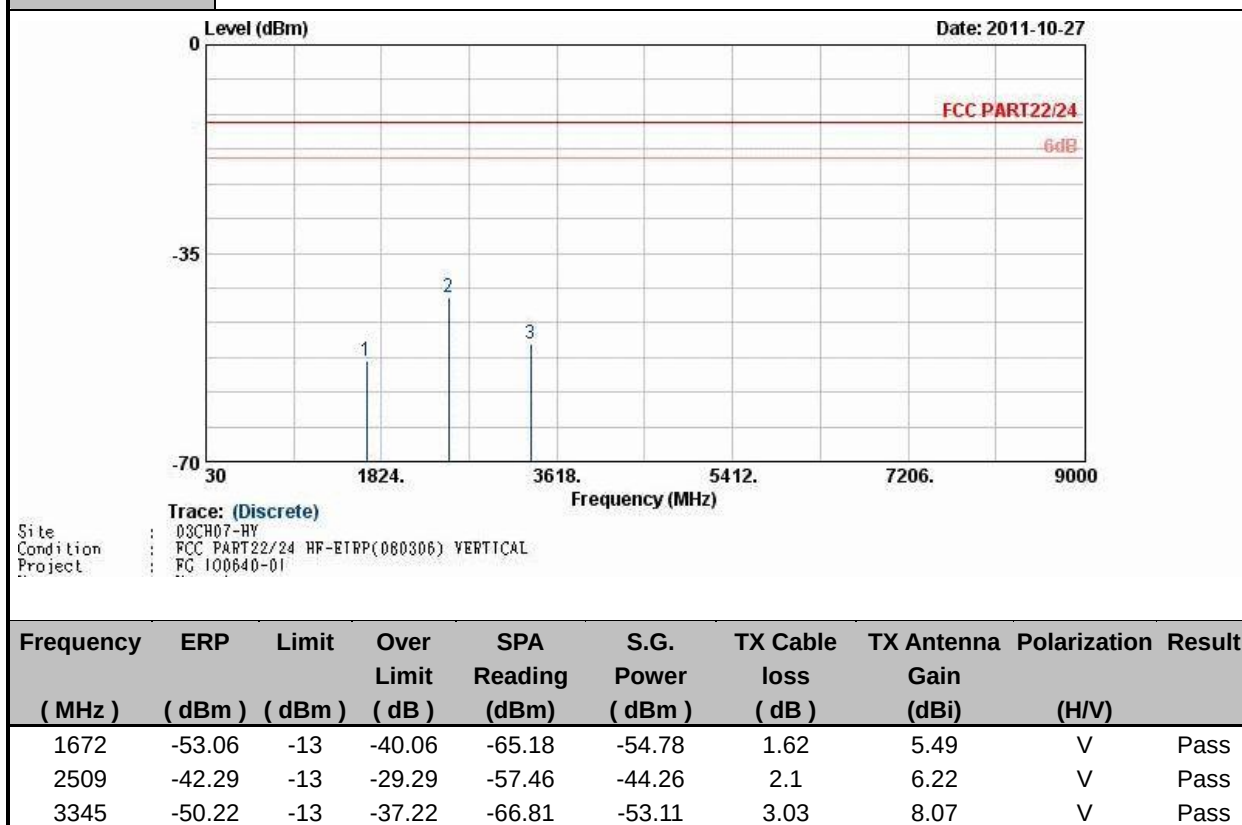
|                        |                                                                                  |                            |            |
|------------------------|----------------------------------------------------------------------------------|----------------------------|------------|
| <b>Band :</b>          | GSM850                                                                           | <b>Temperature :</b>       | 22~23°C    |
| <b>Test Mode :</b>     | GSM Link                                                                         | <b>Relative Humidity :</b> | 48~49%     |
| <b>Test Engineer :</b> | David Yang                                                                       | <b>Polarization :</b>      | Horizontal |
| <b>Remark :</b>        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                            |            |



| Frequency<br>( MHz ) | ERP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | SPA<br>Reading<br>(dBm) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>(dBi) | Polarization<br>(H/V) | Result |
|----------------------|----------------|------------------|-------------------------|-------------------------|--------------------------|----------------------------|-----------------------------|-----------------------|--------|
| 1672                 | -56.40         | -13              | -43.40                  | -65.96                  | -58.12                   | 1.62                       | 5.49                        | H                     | Pass   |
| 2509                 | -31.70         | -13              | -18.70                  | -46.18                  | -33.67                   | 2.1                        | 6.22                        | H                     | Pass   |
| 3345                 | -50.85         | -13              | -37.85                  | -66.31                  | -53.74                   | 3.03                       | 8.07                        | H                     | Pass   |

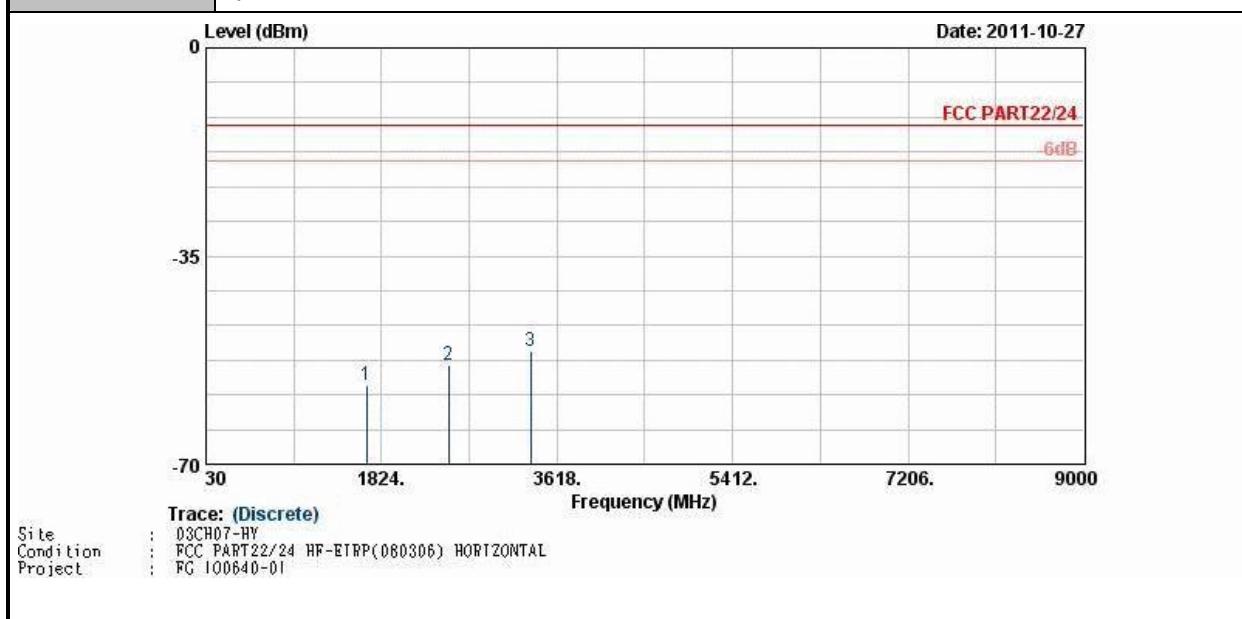


|                 |                                                                                  |                     |          |
|-----------------|----------------------------------------------------------------------------------|---------------------|----------|
| Band :          | GSM850                                                                           | Temperature :       | 22~23°C  |
| Test Mode :     | GSM Link                                                                         | Relative Humidity : | 48~49%   |
| Test Engineer : | David Yang                                                                       | Polarization :      | Vertical |
| Remark :        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                     |          |





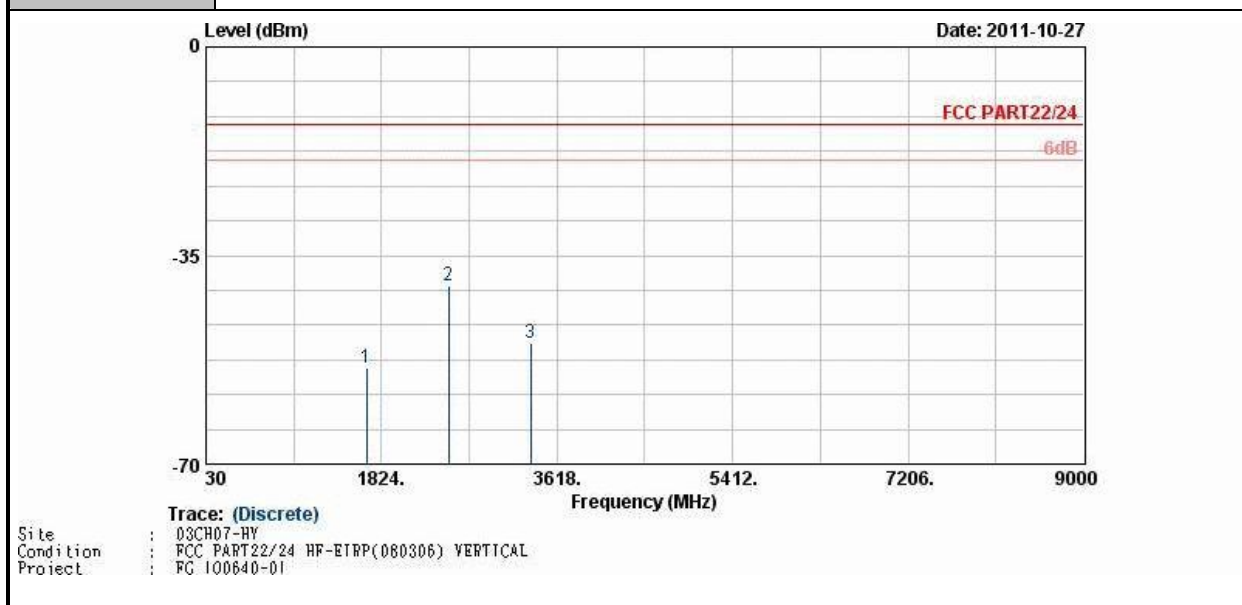
|                 |                                                                                  |                     |            |
|-----------------|----------------------------------------------------------------------------------|---------------------|------------|
| Band :          | GSM850                                                                           | Temperature :       | 22~23°C    |
| Test Mode :     | EDGE 8 Link                                                                      | Relative Humidity : | 48~49%     |
| Test Engineer : | David Yang                                                                       | Polarization :      | Horizontal |
| Remark :        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                     |            |



| Frequency<br>( MHz ) | ERP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | SPA<br>Reading<br>( dBm ) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>( dBi ) | Polarization<br>( H/V ) | Result |
|----------------------|----------------|------------------|-------------------------|---------------------------|--------------------------|----------------------------|-------------------------------|-------------------------|--------|
| 1672                 | -56.64         | -13              | -43.64                  | -66.25                    | -58.36                   | 1.62                       | 5.49                          | H                       | Pass   |
| 2509                 | -53.44         | -13              | -40.44                  | -67.44                    | -55.41                   | 2.1                        | 6.22                          | H                       | Pass   |
| 3345                 | -51.09         | -13              | -38.09                  | -66.51                    | -53.98                   | 3.03                       | 8.07                          | H                       | Pass   |

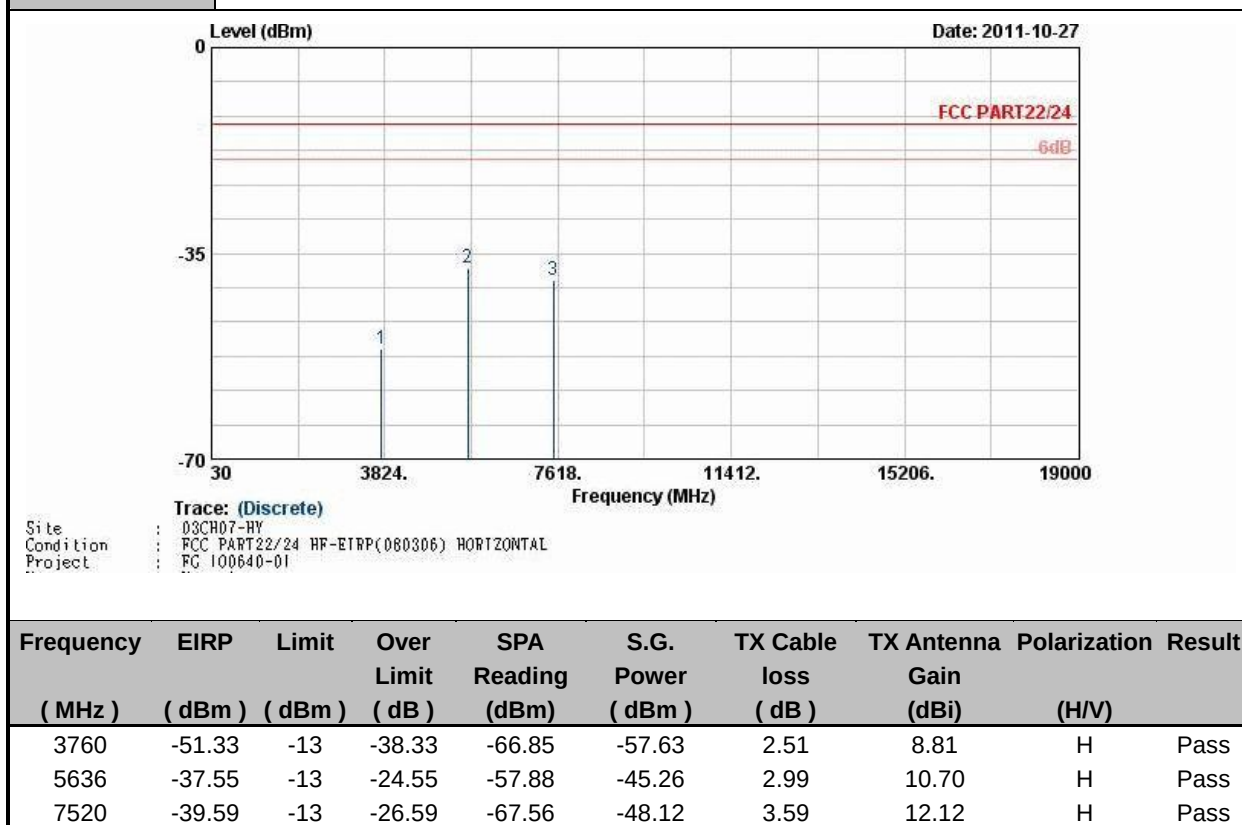


|                        |                                                                                  |                            |          |
|------------------------|----------------------------------------------------------------------------------|----------------------------|----------|
| <b>Band :</b>          | GSM850                                                                           | <b>Temperature :</b>       | 22~23°C  |
| <b>Test Mode :</b>     | EDGE 8 Link                                                                      | <b>Relative Humidity :</b> | 48~49%   |
| <b>Test Engineer :</b> | David Yang                                                                       | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                            |          |



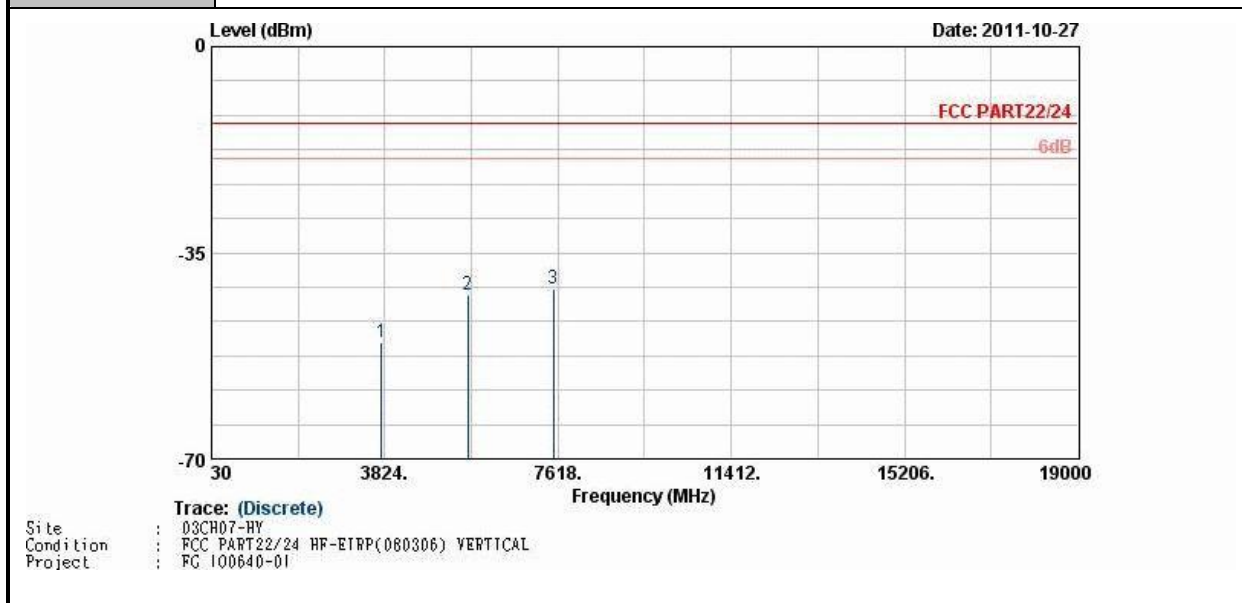
| Frequency<br>( MHz ) | ERP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | SPA<br>Reading<br>( dBm ) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>( dBi ) | Polarization<br>( H/V ) | Result |
|----------------------|----------------|------------------|-------------------------|---------------------------|--------------------------|----------------------------|-------------------------------|-------------------------|--------|
| 1672                 | -53.91         | -13              | -40.91                  | -66.07                    | -55.63                   | 1.62                       | 5.49                          | V                       | Pass   |
| 2509                 | -40.19         | -13              | -27.19                  | -54.81                    | -42.16                   | 2.1                        | 6.22                          | V                       | Pass   |
| 3345                 | -49.59         | -13              | -36.59                  | -66.55                    | -52.48                   | 3.03                       | 8.07                          | V                       | Pass   |

|                        |                                                                                  |                            |            |
|------------------------|----------------------------------------------------------------------------------|----------------------------|------------|
| <b>Band :</b>          | GSM1900                                                                          | <b>Temperature :</b>       | 22~23°C    |
| <b>Test Mode :</b>     | GPRS 8 Link                                                                      | <b>Relative Humidity :</b> | 48~49%     |
| <b>Test Engineer :</b> | David Yang                                                                       | <b>Polarization :</b>      | Horizontal |
| <b>Remark :</b>        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                            |            |





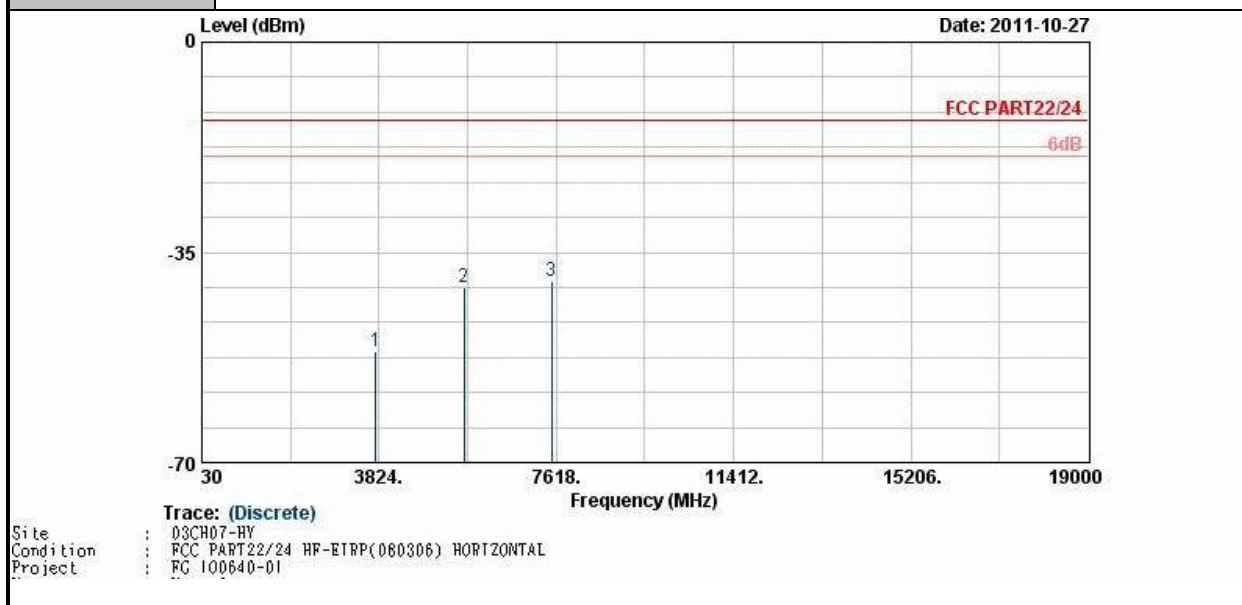
|                        |                                                                                  |                            |          |
|------------------------|----------------------------------------------------------------------------------|----------------------------|----------|
| <b>Band :</b>          | GSM1900                                                                          | <b>Temperature :</b>       | 22~23°C  |
| <b>Test Mode :</b>     | GPRS 8 Link                                                                      | <b>Relative Humidity :</b> | 48~49%   |
| <b>Test Engineer :</b> | David Yang                                                                       | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                            |          |



| Frequency<br>( MHz ) | EIRP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | SPA<br>Reading<br>( dBm ) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>( dBi ) | Polarization<br>( H/V ) | Result |
|----------------------|-----------------|------------------|-------------------------|---------------------------|--------------------------|----------------------------|-------------------------------|-------------------------|--------|
| 3760                 | -50.19          | -13              | -37.19                  | -67.03                    | -56.49                   | 2.51                       | 8.81                          | V                       | Pass   |
| 5636                 | -42.12          | -13              | -29.12                  | -63.1                     | -49.83                   | 2.99                       | 10.70                         | V                       | Pass   |
| 7520                 | -41.19          | -13              | -28.19                  | -68.21                    | -49.72                   | 3.59                       | 12.12                         | V                       | Pass   |



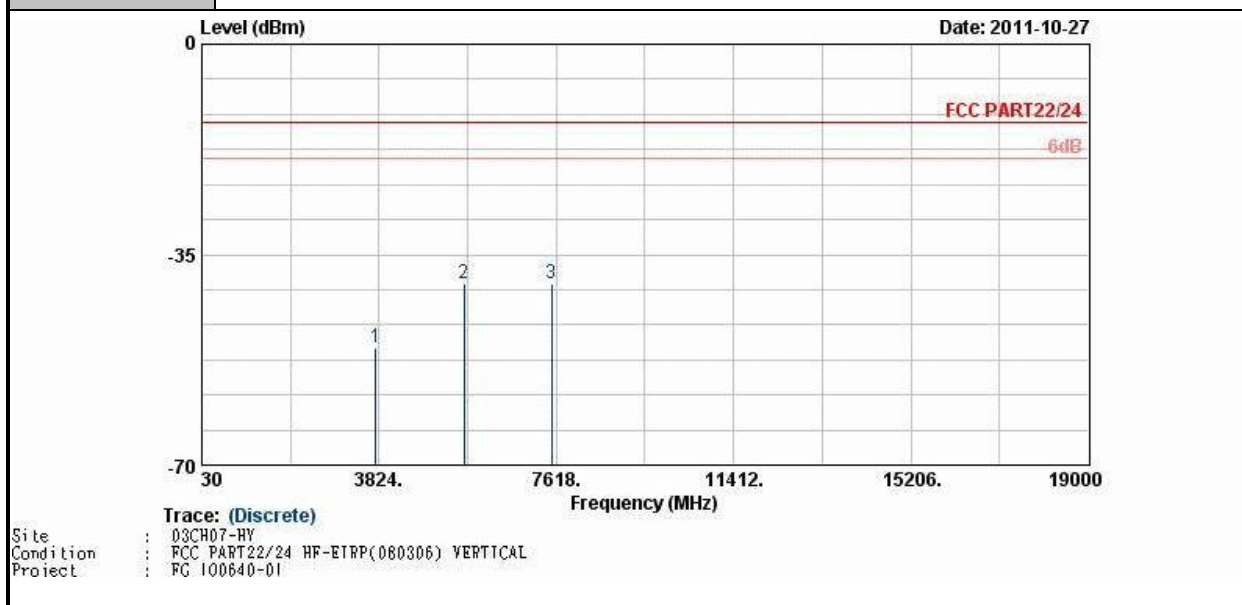
|                 |                                                                                  |                     |            |
|-----------------|----------------------------------------------------------------------------------|---------------------|------------|
| Band :          | GSM1900                                                                          | Temperature :       | 22~23°C    |
| Test Mode :     | EDGE 8 Link                                                                      | Relative Humidity : | 48~49%     |
| Test Engineer : | David Yang                                                                       | Polarization :      | Horizontal |
| Remark :        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                     |            |



| Frequency<br>( MHz ) | EIRP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | SPA<br>Reading<br>( dBm ) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>( dBi ) | Polarization<br>( H/V ) | Result |
|----------------------|-----------------|------------------|-------------------------|---------------------------|--------------------------|----------------------------|-------------------------------|-------------------------|--------|
| 3760                 | -51.63          | -13              | -38.63                  | -66.58                    | -57.93                   | 2.51                       | 8.81                          | H                       | Pass   |
| 5636                 | -40.81          | -13              | -27.81                  | -61.23                    | -48.52                   | 2.99                       | 10.70                         | H                       | Pass   |
| 7520                 | -39.83          | -13              | -26.83                  | -67.99                    | -48.36                   | 3.59                       | 12.12                         | H                       | Pass   |



|                        |                                                                                  |                            |          |
|------------------------|----------------------------------------------------------------------------------|----------------------------|----------|
| <b>Band :</b>          | GSM1900                                                                          | <b>Temperature :</b>       | 22~23°C  |
| <b>Test Mode :</b>     | EDGE 8 Link                                                                      | <b>Relative Humidity :</b> | 48~49%   |
| <b>Test Engineer :</b> | David Yang                                                                       | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | Spurious emissions within 30-1000MHz were found more than 20dB below limit line. |                            |          |



| Frequency<br>( MHz ) | EIRP<br>( dBm ) | Limit<br>( dBm ) | Over<br>Limit<br>( dB ) | SPA<br>Reading<br>( dBm ) | S.G.<br>Power<br>( dBm ) | TX Cable<br>loss<br>( dB ) | TX Antenna<br>Gain<br>( dBi ) | Polarization<br>( H/V ) | Result |
|----------------------|-----------------|------------------|-------------------------|---------------------------|--------------------------|----------------------------|-------------------------------|-------------------------|--------|
| 3760                 | -50.43          | -13              | -37.43                  | -66.63                    | -56.73                   | 2.51                       | 8.81                          | V                       | Pass   |
| 5636                 | -39.90          | -13              | -26.90                  | -60.66                    | -47.61                   | 2.99                       | 10.70                         | V                       | Pass   |
| 7520                 | -39.91          | -13              | -26.91                  | -67.68                    | -48.44                   | 3.59                       | 12.12                         | V                       | Pass   |

### 3.7 Frequency Stability Measurement

#### 3.7.1 Description of Frequency Stability Measurement

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

#### 3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

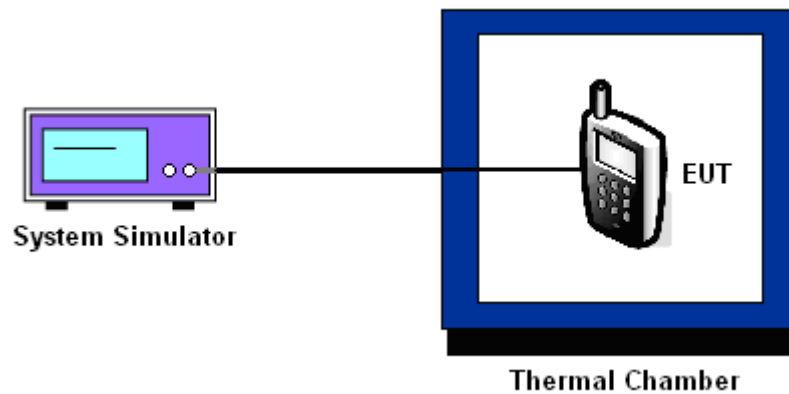
#### 3.7.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT can not be turned on at  $-30^{\circ}\text{C}$ , the testing lowest temperature will be raised in  $10^{\circ}\text{C}$  step until the EUT can be turned on.

#### 3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

### 3.7.5 Test Setup



**3.7.6 Test Result of Temperature Variation**

|                      |         |                  |     |
|----------------------|---------|------------------|-----|
| <b>Band :</b>        | GSM 850 | <b>Channel :</b> | 189 |
| <b>Limit (ppm) :</b> | 2.5     |                  |     |

| Temperature<br>(°C) | GSM                |                    | EDGE 8             |                    | Result |
|---------------------|--------------------|--------------------|--------------------|--------------------|--------|
|                     | Freq. Dev.<br>(Hz) | Deviation<br>(ppm) | Freq. Dev.<br>(Hz) | Deviation<br>(ppm) |        |
| -30                 | N/A                | N/A                | N/A                | N/A                | PASS   |
| -20                 | 33                 | 0.04               | 30                 | 0.04               |        |
| -10                 | 19                 | 0.02               | 31                 | 0.04               |        |
| 0                   | 28                 | 0.03               | 25                 | 0.03               |        |
| 10                  | 20                 | 0.02               | 23                 | 0.03               |        |
| 20                  | 19                 | 0.02               | 39                 | 0.05               |        |
| 30                  | -26                | -0.03              | 31                 | 0.04               |        |
| 40                  | -16                | -0.02              | 23                 | 0.03               |        |
| 50                  | -18                | -0.02              | 26                 | 0.03               |        |

**Note:**

1. The EUT stops transmitting at temperatures -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -20°C~50°C.



|                      |          |                  |     |
|----------------------|----------|------------------|-----|
| <b>Band :</b>        | GSM 1900 | <b>Channel :</b> | 661 |
| <b>Limit (ppm) :</b> | 2.5      |                  |     |

| Temperature<br>(°C) | GPRS 8             |                    | EDGE 8             |                    | Result |
|---------------------|--------------------|--------------------|--------------------|--------------------|--------|
|                     | Freq. Dev.<br>(Hz) | Deviation<br>(ppm) | Freq. Dev.<br>(Hz) | Deviation<br>(ppm) |        |
| -30                 | N/A                | N/A                | N/A                | N/A                | PASS   |
| -20                 | 83                 | 0.04               | 84                 | 0.04               |        |
| -10                 | 85                 | 0.04               | 78                 | 0.04               |        |
| 0                   | 87                 | 0.05               | 80                 | 0.04               |        |
| 10                  | 46                 | 0.02               | 59                 | 0.03               |        |
| 20                  | 36                 | 0.02               | 43                 | 0.02               |        |
| 30                  | 32                 | 0.02               | 66                 | 0.03               |        |
| 40                  | 35                 | 0.02               | 31                 | 0.02               |        |
| 50                  | 40                 | 0.02               | 36                 | 0.02               |        |

**Note:**

1. The EUT stops transmitting at temperatures -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -20°C~50°C.

**3.7.7 Test Result of Voltage Variation**

| Band & Channel    | Mode   | Voltage (Volt) | Freq. Dev. (Hz) | Deviation (ppm) | Limit (ppm) | Result |
|-------------------|--------|----------------|-----------------|-----------------|-------------|--------|
| GSM 850<br>CH189  | GSM    | 3.8            | 16              | 0.02            | 2.5         | PASS   |
|                   |        | BEP            | 14              | 0.02            |             |        |
|                   |        | 4.2            | 17              | 0.02            |             |        |
|                   | EDGE 8 | 3.8            | 31              | 0.04            |             |        |
|                   |        | BEP            | 27              | 0.03            |             |        |
|                   |        | 4.2            | 32              | 0.04            |             |        |
| GSM 1900<br>CH661 | GPRS 8 | 3.8            | 32              | 0.02            |             |        |
|                   |        | BEP            | 31              | 0.02            |             |        |
|                   |        | 4.2            | 38              | 0.02            |             |        |
|                   | EDGE 8 | 3.8            | 62              | 0.03            |             |        |
|                   |        | BEP            | 59              | 0.03            |             |        |
|                   |        | 4.2            | 68              | 0.04            |             |        |

**Note:**

1. Normal Voltage = 3.8V.
2. Battery End Point (BEP) = 3.6 V.

## 4 List of Measuring Equipment

| Instrument                | Manufacturer | Model No.                | Serial No. | Characteristics       | Calibration Date | Test Date     | Due Date      | Remark                |
|---------------------------|--------------|--------------------------|------------|-----------------------|------------------|---------------|---------------|-----------------------|
| System Simulator          | R&S          | CMU200                   | 117995     | N/A                   | Jul. 28, 2011    | Oct. 26, 2011 | Jul. 27, 2012 | Conducted (TH02-HY)   |
| Spectrum Analyzer         | R&S          | FSP40                    | 100055     | 9kHz~40GHz            | Jun. 13, 2011    | Oct. 26, 2011 | Jun. 12, 2012 | Conducted (TH02-HY)   |
| Power Meter               | Anritsu      | ML2495A                  | 0932001    | N/A                   | Sep. 18, 2011    | Oct. 26, 2011 | Sep. 17, 2012 | Conducted (TH02-HY)   |
| Bilog Antenna             | SCHAFFNER    | CBL6111C                 | 2726       | 30MHz ~ 1GHz          | Oct. 22, 2011    | Oct. 27, 2011 | Oct. 21, 2012 | Radiation (03CH07-HY) |
| Spectrum Analyzer         | R&S          | FSP30                    | 101067     | 9KHz ~ 30GHz          | Dec. 03, 2010    | Oct. 27, 2011 | Dec. 02, 2011 | Radiation (03CH07-HY) |
| Double Ridge Horn Antenna | ESCO         | 3117                     | 00075962   | 1GHz ~ 18GHz          | Aug. 10, 2011    | Oct. 27, 2011 | Aug. 09, 2012 | Radiation (03CH07-HY) |
| Pre Amplifier             | Agilent      | 8449B                    | 3008A02362 | 1GHz~ 26.5GHz         | Dec. 06, 2010    | Oct. 27, 2011 | Dec. 05, 2011 | Radiation (03CH07-HY) |
| Pre Amplifier             | COM-POWER    | PA-103A                  | 161241     | 10-1000MHz.32dB. GAIN | Mar. 29, 2011    | Oct. 27, 2011 | Mar. 28, 2012 | Radiation (03CH07-HY) |
| EMI TEST RECEIVER         | R&S          | ESCI 7                   | 100724     | 9kHz~7GHz             | Aug. 22, 2011    | Oct. 27, 2011 | Aug. 21, 2012 | Radiation (03CH07-HY) |
| Pre Amplifier             | MITEQ        | AMF-7D-00<br>101800-30-1 | 159088     | 1GHz ~ 18GHz          | Feb. 21, 2011    | Oct. 27, 2011 | Feb. 20, 2012 | Radiation (03CH07-HY) |
| System Simulator          | R&S          | CMU200                   | 112403     | N/A                   | Feb. 22, 2011    | Oct. 27, 2011 | Feb. 21, 2012 | Radiation (03CH07-HY) |

## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

| Contribution                                                                             | Uncertainty of $X_i$ |                          | $u(X_i)$ |
|------------------------------------------------------------------------------------------|----------------------|--------------------------|----------|
|                                                                                          | dB                   | Probability Distribution |          |
| Receiver Reading                                                                         | 0.41                 | Normal (k=2)             | 0.21     |
| Antenna Factor Calibration                                                               | 0.83                 | Normal (k=2)             | 0.42     |
| Cable Loss Calibration                                                                   | 0.25                 | Normal (k=2)             | 0.13     |
| Pre-Amplifier Gain Calibration                                                           | 0.27                 | Normal (k=2)             | 0.14     |
| RCV/SPA Specification                                                                    | 2.50                 | Rectangular              | 0.72     |
| Antenna Factor Interpolation for Frequency                                               | 1.00                 | Rectangular              | 0.29     |
| Site Imperfection                                                                        | 1.43                 | Rectangular              | 0.83     |
| Mismatch                                                                                 | +0.39 / -0.41        | U-Shape                  | 0.28     |
| <b>Combined Standard Uncertainty <math>U_c(y)</math></b>                                 | <b>1.27</b>          |                          |          |
| <b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b> | <b>2.54</b>          |                          |          |

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

| Contribution                                                                                                                  | Uncertainty of $X_i$ |                          | $u(X_i)$ | $C_i$ | $C_i * u(X_i)$ |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------|----------|-------|----------------|
|                                                                                                                               | dB                   | Probability Distribution |          |       |                |
| Receiver Reading                                                                                                              | $\pm 0.10$           | Normal (k=2)             | 0.10     | 1     | 0.10           |
| Antenna Factor Calibration                                                                                                    | $\pm 1.70$           | Normal (k=2)             | 0.85     | 1     | 0.85           |
| Cable Loss Calibration                                                                                                        | $\pm 0.50$           | Normal (k=2)             | 0.25     | 1     | 0.25           |
| Receiver Correction                                                                                                           | $\pm 2.00$           | Rectangular              | 1.15     | 1     | 1.15           |
| Antenna Factor Directional                                                                                                    | $\pm 1.50$           | Rectangular              | 0.87     | 1     | 0.87           |
| Site Imperfection                                                                                                             | $\pm 2.80$           | Triangular               | 1.14     | 1     | 1.14           |
| Mismatch<br>Receiver VSWR $\Gamma_1 = 0.197$<br>Antenna VSWR $\Gamma_2 = 0.194$<br>Uncertainty = $20\log(1-\Gamma_1\Gamma_2)$ | +0.34 / -0.35        | U-Shape                  | 0.244    | 1     | 0.244          |
| <b>Combined Standard Uncertainty <math>U_c(y)</math></b>                                                                      | <b>2.36</b>          |                          |          |       |                |
| <b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>                                      | <b>4.72</b>          |                          |          |       |                |