



# FCC TEST REPORT

|              |                          |
|--------------|--------------------------|
| Product Name | GSM Phone with Bluetooth |
| Model Name   | KU990                    |
| Applicant    | LG Electronics Inc.      |
| FCC ID       | BEJKU990                 |

## ESTECH CO., LTD

Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,  
Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204



## FCC Test Report

|                                                                                                                                                         |                                          |                                                      |                   |                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------|-------------------|-------------------------|
| Report Number                                                                                                                                           | ESTR0705-                                |                                                      |                   |                         |
| Applicant                                                                                                                                               | Company Name                             | LG Electronics Inc.                                  |                   |                         |
|                                                                                                                                                         | Address                                  | 60-39, Gasan-dong, Gumchon-gu, Seoul, 153-023, Korea |                   |                         |
| Product                                                                                                                                                 | Product Name                             | GSM Phone with Bluetooth                             |                   |                         |
|                                                                                                                                                         | Additional Model(s)                      | U990                                                 |                   |                         |
|                                                                                                                                                         | Model No.                                | KU990                                                | Manufacturer      | LG Electronics Inc.     |
|                                                                                                                                                         | Serial No.                               | 706KPTM191169                                        | Country of origin | KOREA                   |
| Other                                                                                                                                                   | Issued Date                              | 2007-07-12                                           | Tested Date       | 2007-06-22 ~ 2007-07-12 |
| Test Result                                                                                                                                             | Pass                                     |                                                      |                   |                         |
| Standard                                                                                                                                                | FCC PART 24 Subpart E                    |                                                      |                   |                         |
| Tested by                                                                                                                                               | S.R. Kim/ Engineer (Signature)           |                                                      |                   |                         |
| Approved by                                                                                                                                             | Jay Kim/ Engineering Manager (Signature) |                                                      |                   |                         |
| <b>ESTECH CO., LTD</b><br>Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,<br>Seoul, 153-803, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204 |                                          |                                                      |                   |                         |
| o This is certified that the above mentioned products have been tested for the sample provided by client.                                               |                                          |                                                      |                   |                         |
| o No part of this document may not be duplicated or reproduced by any means without the express written permission of Estech Co., Ltd.                  |                                          |                                                      |                   |                         |



## Contents

|                                                              |         |
|--------------------------------------------------------------|---------|
| <b>1. General Information</b>                                | Page 4  |
| <b>2. Laboratory Information</b>                             | Page 5  |
| <b>3. Summary of Test Results</b>                            | Page 5  |
| <b>4. RF Output Power</b>                                    | Page 6  |
| <b>5. Occupied Bandwidth</b>                                 | Page 8  |
| <b>6. Spurious and Harmonic Emission at Antenna Terminal</b> | Page 11 |
| <b>7. Field Strength of Spurious Radiation</b>               | Page 19 |
| <b>8. Frequency stability</b>                                | Page 22 |



## 1. General Information

### 1.1 EUT Description

|                 |                                          |
|-----------------|------------------------------------------|
| FCC ID          | <b>BEJKU990</b>                          |
| Product Name    | <b>GSM Phone with Bluetooth</b>          |
| Model Name      | <b>KU990</b>                             |
| Frequency       | <b>Tx :1850.20 ~ 1909.80MHz(PCS1900)</b> |
|                 | <b>Rx :1930.20 ~ 1989.80MHz(PCS1900)</b> |
| Channel         | <b>PCS1900(512/661/810)</b>              |
| Modulation Type | <b>GMSK, 8PSK</b>                        |
| Power Rating    | <b>3.7VDC(3.2 ~ 4.3VDC)</b>              |



## 2. Laboratory Information

**2.1 Laboratory Name** Estech Co., Ltd.

**2.2 Location**

**Head Office** Rm. 1015, World Venture Center II, 426-5 Gasan-dong  
 Geumcheon-gu, Seoul, 153-803. Korea.

**EMC Lab(Ichon)** 58-1, Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea

**EMC Lab(Yanggi)** 97-1, Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea

**2.3 Quality System** Accredited by KOLAS(ISO/IEC 17025)

**2.4 Major Accredited Mark**



**Industry Canada** **Industrie Canada**



## 3. Summary of Test Results

| Test Item                                          | Standard | Result |
|----------------------------------------------------|----------|--------|
| RF Output Power                                    | Part 24  | PASS   |
| Occupied Bandwidth                                 |          | PASS   |
| Spurious and Harmonic Emission at Antenna Terminal |          | PASS   |
| Field Strength of Spurious Radiation               |          | PASS   |
| Frequency stability                                |          | PASS   |
|                                                    |          |        |
|                                                    |          |        |



## 4. RF Output Power

### 4.1 Test Procedure

The EUT was placed on a wooden turn table 3 meters from the receive antenna. The receive antenna height and turn table rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW = VBW = 3MHz. For AMPS, GSM, and NADC TDMA signals, a peak detector is used, with RBW = VBW = 1MHz. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For reading 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

### 4.2 Test Equipments

The following test equipments are used during tests

| Equipment                        | Manufacturer    | Model       | Cal. Due Date |
|----------------------------------|-----------------|-------------|---------------|
| Receiver                         | Rohde & Schwarz | ESPI7       | 2007-08-24    |
| Signal Generator                 | HP              | 83620B      | 2007-09-07    |
| Power Meter                      | HP              | EPM-442A    | 2008-03-02    |
| Wireless Communications Test Set | Agilent         | E5515C      | 2008-02-07    |
| Pre Amplifier                    | HP              | 8449B       | 2008-03-06    |
| Horn Antenna                     | SCHWARZBECK     | BBHA 9120 D | 2008-03-31    |

### 4.3. Test Results

#### 4.3.1 PCS1900

(GSM)

| Ch No. | Freq (MHz) | Peak Power Meter(dBm) | Peak Power EIRP(dBm) |
|--------|------------|-----------------------|----------------------|
| 512    | 1850.20    | 29.43                 | 30.50                |
| 661    | 1880.00    | 29.45                 | 30.73                |
| 810    | 1909.80    | 29.34                 | 29.14                |



| FREQ<br>(MHz) | Receiver<br>Reading<br>(dBuV) | Correction Factor<br>(dB) |                    | SG Reading<br>(dBm) | EIRP<br>(dBm) | Limit<br>(dBm) | POL<br>(H/V) |
|---------------|-------------------------------|---------------------------|--------------------|---------------------|---------------|----------------|--------------|
|               |                               | Antenna<br>gain(dBi)      | Cable Loss<br>(dB) |                     |               |                |              |
| 1850.20       | 99.83                         | 10.40                     | 3.41               | 23.51               | 30.50         | 33             | V            |
| 1880.00       | 101.50                        | 10.43                     | 3.33               | 23.63               | 30.73         | 33             | V            |
| 1909.80       | 98.83                         | 10.44                     | 3.33               | 22.03               | 29.14         | 33             | V            |

**(EDGE)**

| Ch No. | Freq (MHz) | Peak Power Meter(dBm) | Peak Power ERP(dBm) |
|--------|------------|-----------------------|---------------------|
| 512    | 1850.20    | 25.86                 | 30.50               |
| 661    | 1880.00    | 25.78                 | 27.53               |
| 810    | 1909.80    | 25.64                 | 28.64               |

| FREQ<br>(MHz) | Receiver<br>Reading<br>(dBuV) | Correction Factor<br>(dB) |                    | SG Reading<br>(dBm) | EIRP<br>(dBm) | Limit<br>(dBm) | POL<br>(H/V) |
|---------------|-------------------------------|---------------------------|--------------------|---------------------|---------------|----------------|--------------|
|               |                               | Antenna<br>gain(dBi)      | Cable Loss<br>(dB) |                     |               |                |              |
| 1850.20       | 99.83                         | 10.40                     | 3.41               | 23.51               | 30.50         | 33             | V            |
| 1880.00       | 98.33                         | 10.43                     | 3.33               | 20.43               | 27.53         | 33             | V            |
| 1909.80       | 98.33                         | 10.44                     | 3.33               | 21.53               | 28.64         | 33             | V            |



## 5. Occupied Bandwidth

### 5.1 Test Procedure

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% of the Emission bandwidth.

The VBW is set to 3 times the RBW. The sweep time is coupled.

### 5.2 Test Equipments

The following test equipments are used during tests

| Equipment                        | Manufacturer | Model  | Cal. Due Date |
|----------------------------------|--------------|--------|---------------|
| Spectrum Analyzer                | Agilent      | E4407B | 2008-03-02    |
| Dual Directional Coupler         | HP           | 778D   | 2008-03-02    |
| Wireless Communications Test Set | Agilent      | E5515C | 2008-02-07    |

### 5.3 Test Results

#### 5.3.1 PCS1900

(GSM)

| Channel | Frequency(MHz) | 26dB Bandwidth(kHz) |
|---------|----------------|---------------------|
| 512     | 1850.20        | 300.12              |
| 661     | 1880.00        | 300.47              |
| 810     | 1909.80        | 297.01              |

(EDGE)

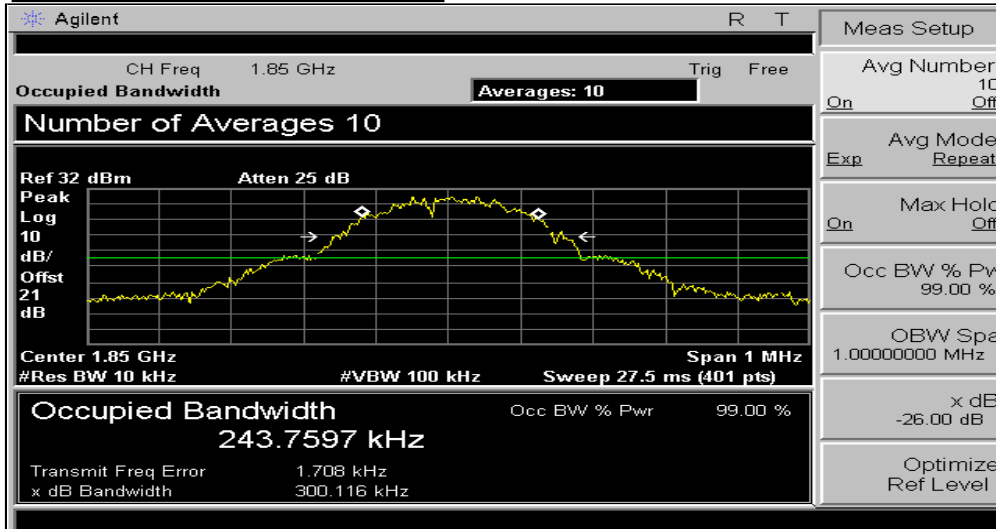
| Channel | Frequency(MHz) | 26dB Bandwidth(kHz) |
|---------|----------------|---------------------|
| 512     | 1850.20        | 299.88              |
| 661     | 1880.00        | 290.03              |
| 810     | 1909.80        | 300.41              |



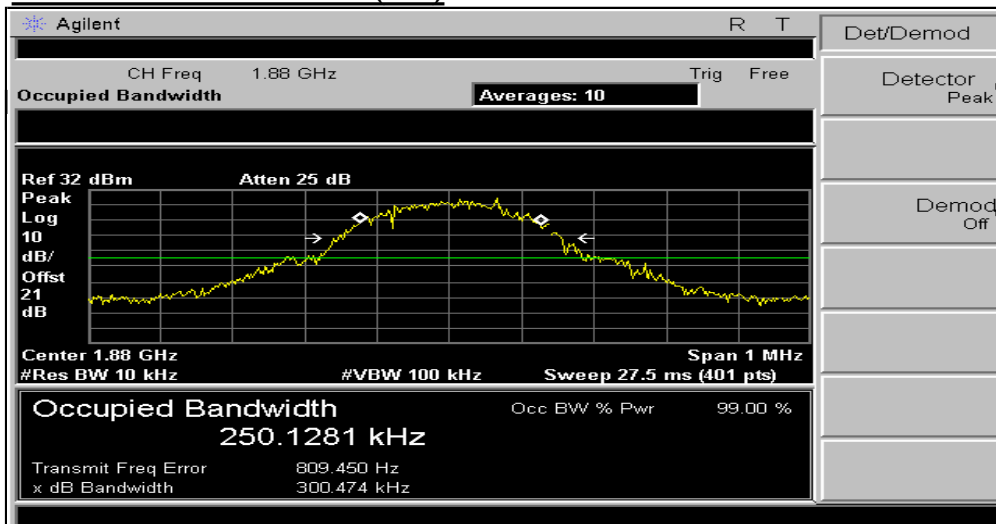
## 5.4 Test Plot

### PCS1900 GSM

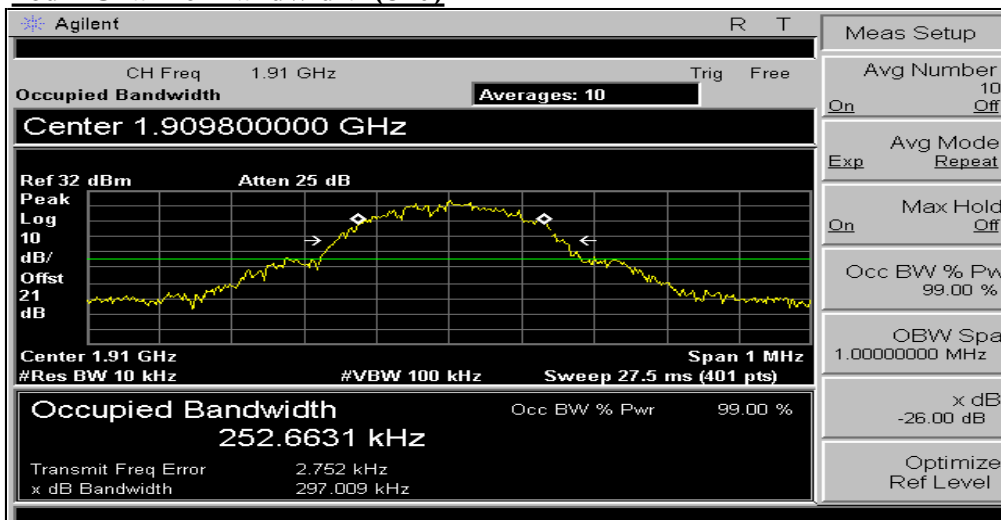
#### 26dB Channel Bandwidth(512)



#### 26dB Channel Bandwidth(661)



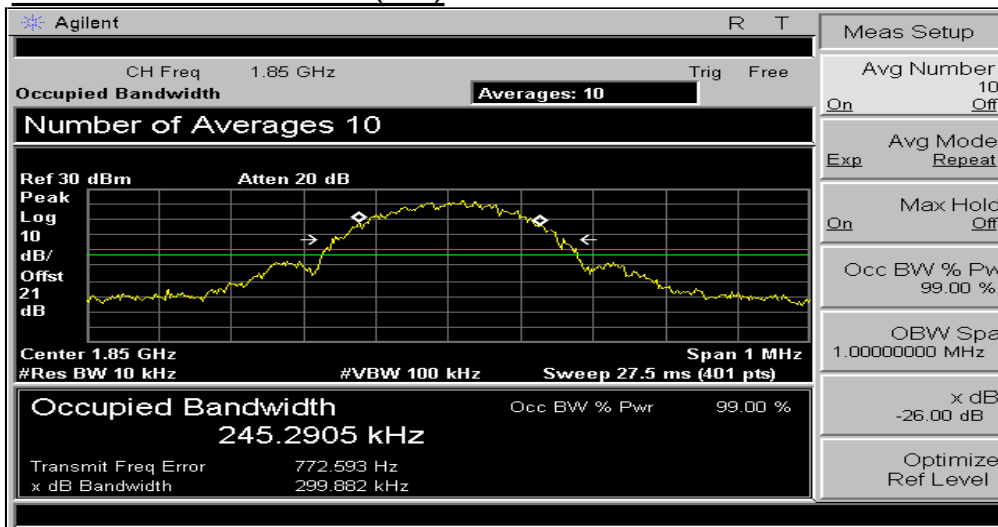
#### 26dB Channel Bandwidth(810)



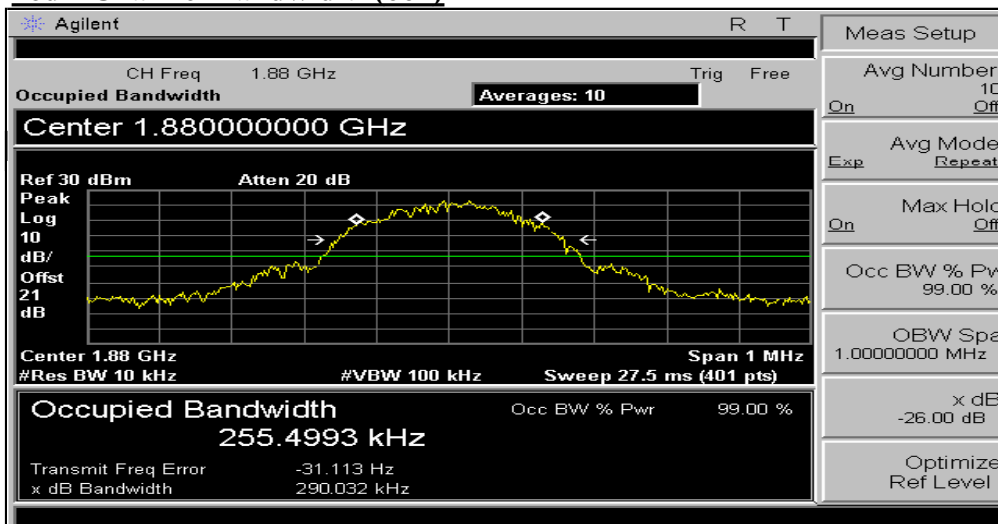


**PCS1900 EDGE**

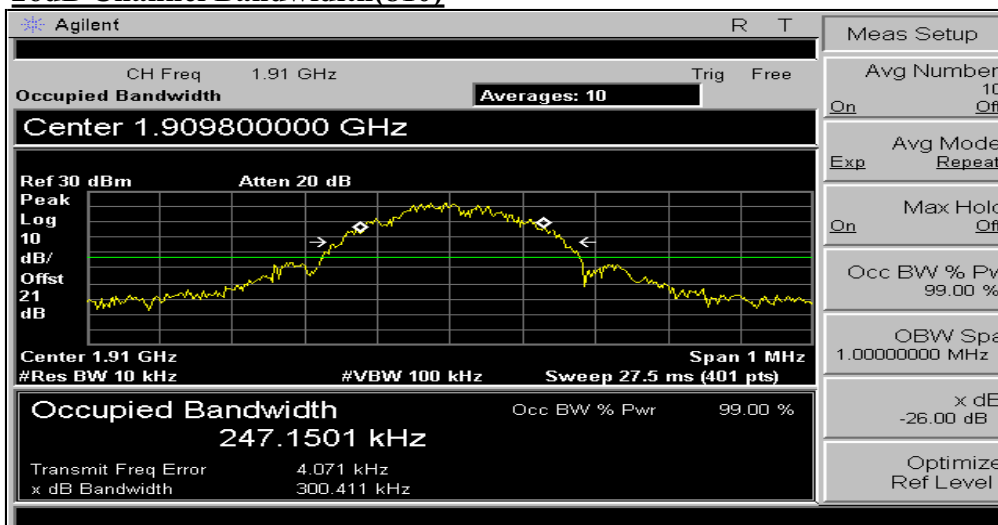
**26dB Channel Bandwidth(512)**



**26dB Channel Bandwidth(661)**



**26dB Channel Bandwidth(810)**





## 6. Spurious and Harmonic Emission at Antenna Terminal

### 6.1 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to 10GHz. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13dBm, limit, in the 1MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

For the Out-of-Band measurements a 1MHz RBW was used to scan from 10MHz to 10xfo of the fundamental carrier for all frequency block. A display line was placed at -13dBm to show compliance for spurious, and harmonics.

22.917(f): Mobile emission in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed -80dBm at the transmit antenna connector.

### 6.2 Test Equipments

The following test equipments are used during tests

| Equipment                        | Manufacturer | Model  | Cal. Due Date |
|----------------------------------|--------------|--------|---------------|
| Spectrum Analyzer                | Agilent      | E4407B | 2008-03-02    |
| Dual Directional Coupler         | HP           | 778D   | 2008-03-02    |
| Wireless Communications Test Set | Agilent      | E5515C | 2008-02-07    |

### 6.3 Test Results

#### 6.3.1 PCS1900

GSM(Spurious Emission: Band Edge)

| Channel | Frequency | Result | Limit  | Margin |
|---------|-----------|--------|--------|--------|
| 512     | 1850.20   | -17.82 | -13.00 | 4.82   |
| 810     | 1909.80   | -17.29 | -13.00 | 4.29   |

GSM (Spurious Emission: Out of Band)

| Channel | Frequency | Result | Limit  | Margin |
|---------|-----------|--------|--------|--------|
| 512     | 1850.20   | -23.20 | -13.00 | 10.20  |
| 661     | 1880.00   | -23.73 | -13.00 | 10.73  |
| 810     | 1909.80   | -23.23 | -13.00 | 10.23  |



**(EDGE)**

EDGE(Spurious Emission: Band Edge)

| Channel | Frequency | Result | Limit  | Margin |
|---------|-----------|--------|--------|--------|
| 512     | 1850.20   | -22.12 | -13.00 | 9.12   |
| 661     | 1880.00   | -23.73 | -13.00 | 10.73  |

EDGE (Spurious Emission: Out of Band)

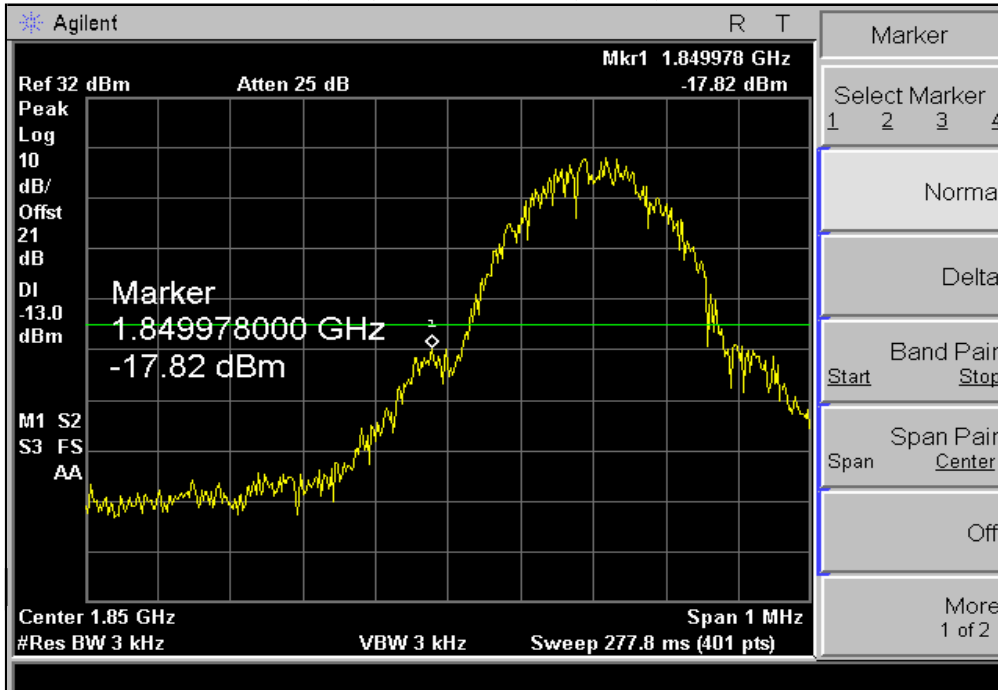
| Channel | Frequency | Result | Limit  | Margin |
|---------|-----------|--------|--------|--------|
| 512     | 1850.20   | -25.51 | -13.00 | 12.51  |
| 661     | 1880.00   | -25.79 | -13.00 | 12.79  |
| 810     | 1909.80   | -24.79 | -13.00 | 11.79  |



## 6.5 Test Plot

### PCS1900

PLOTS OF EMISSION (GSM): BAND EDGE(Ch512)



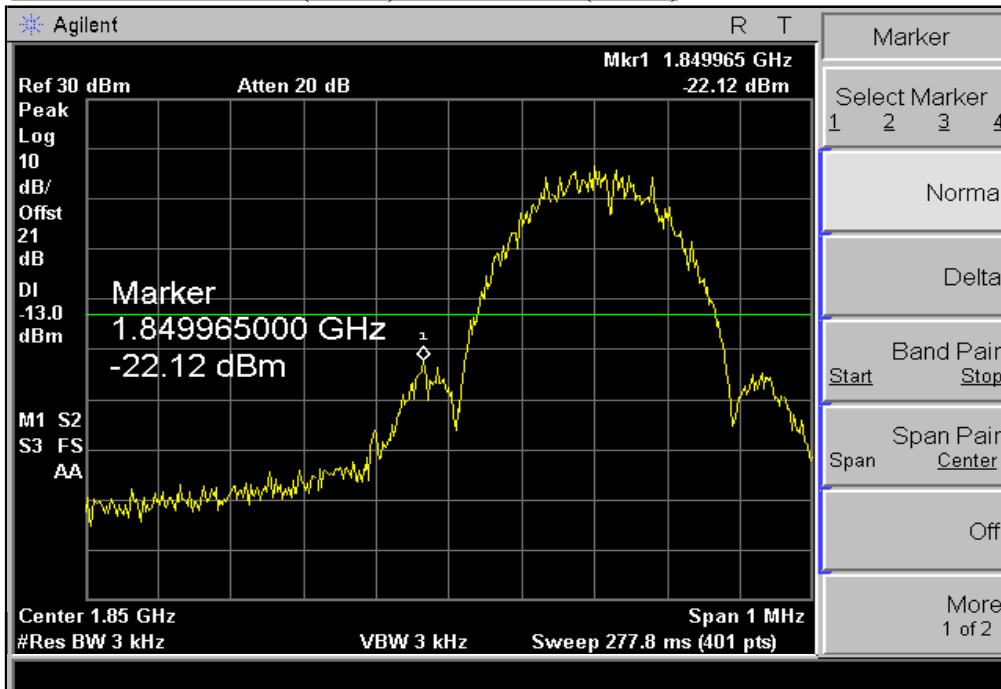
PLOTS OF EMISSION (GSM): BAND EDGE(Ch810)



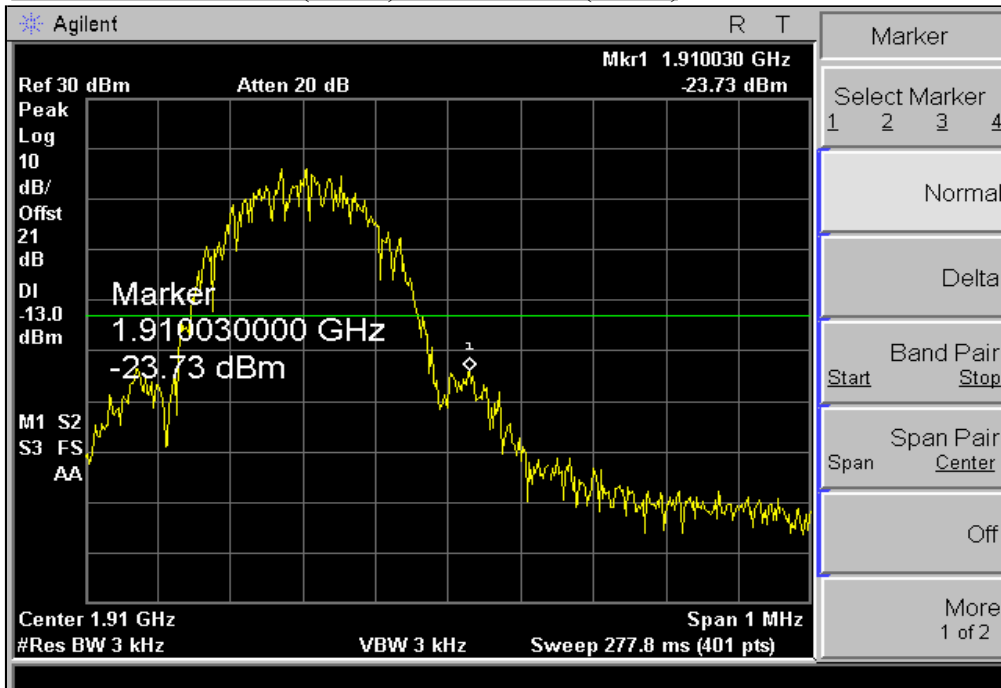


## PCS1900 EDGE

### PLOTS OF EMISSION (EDGE): BAND EDGE(Ch512)



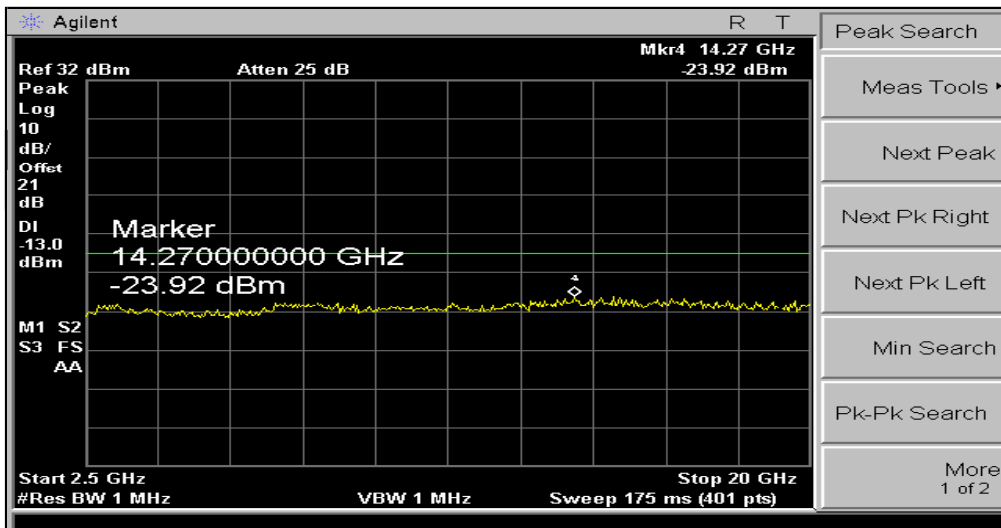
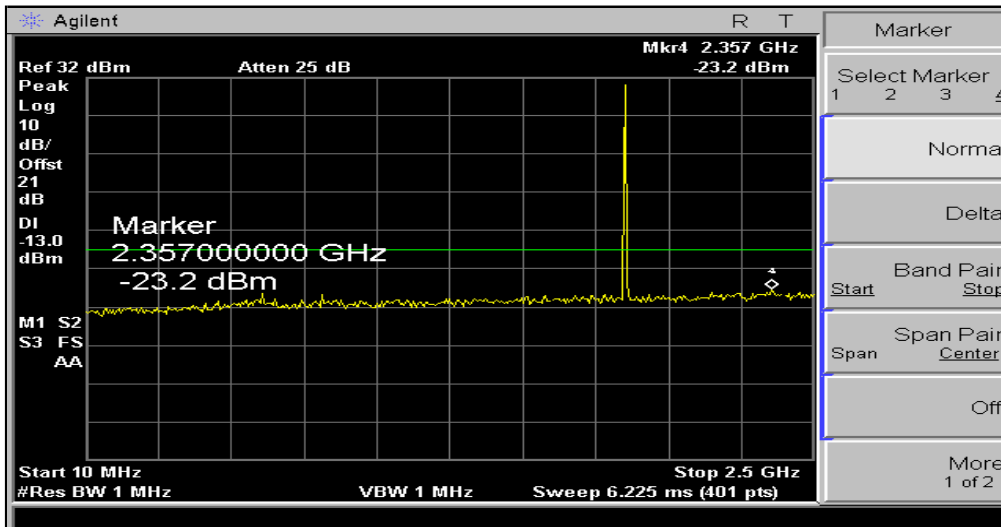
### PLOTS OF EMISSION (EDGE): BAND EDGE(Ch810)



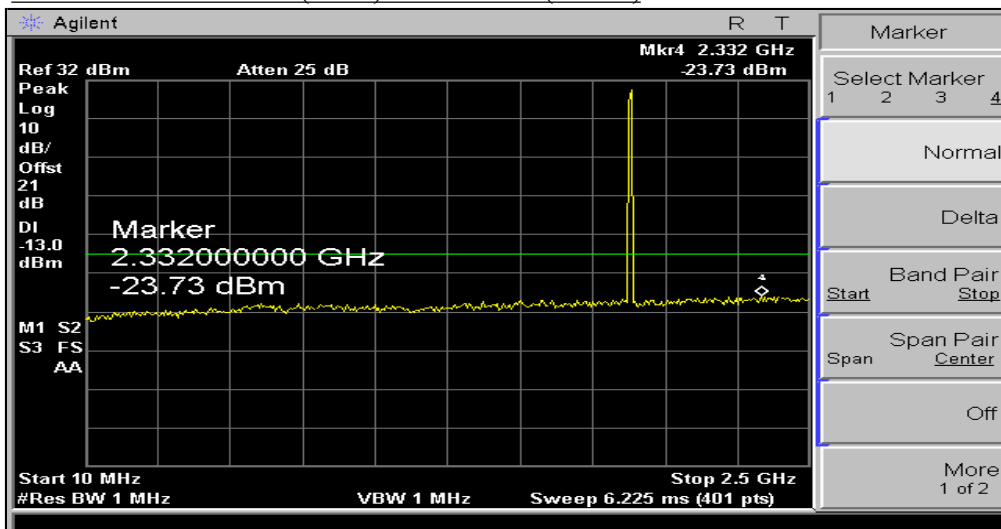


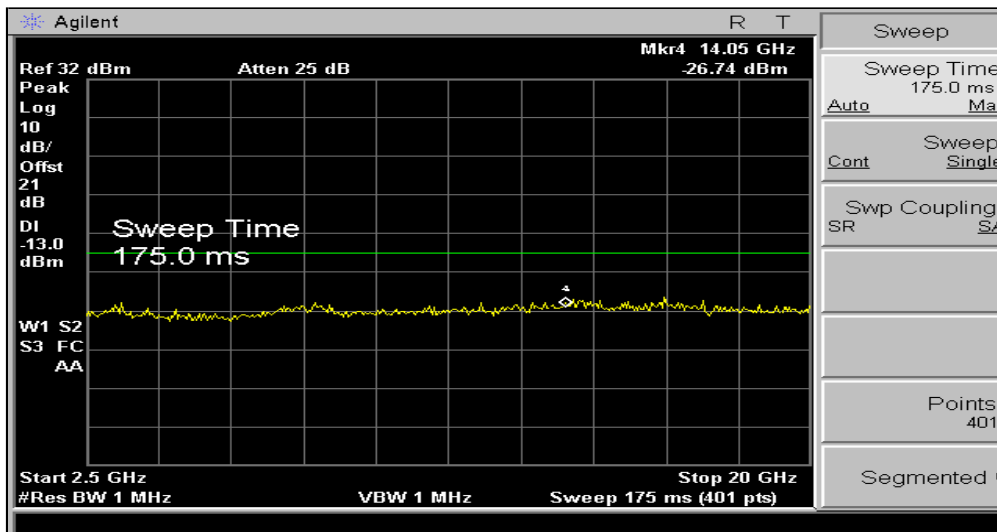
**PCS1900**

**PLOTS OF EMISSION (GSM): Out of Band(Ch512)**

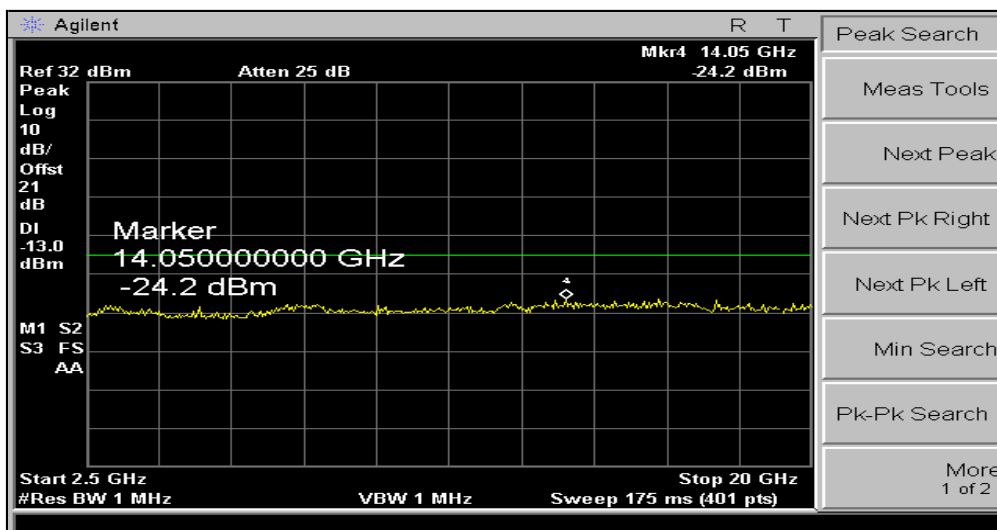
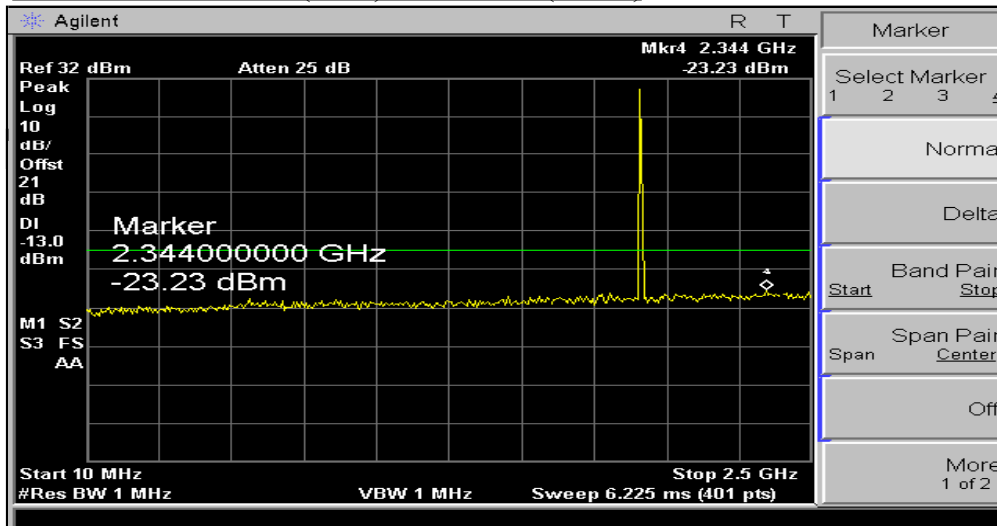


**PLOTS OF EMISSION (GSM): Out of Band(Ch661)**





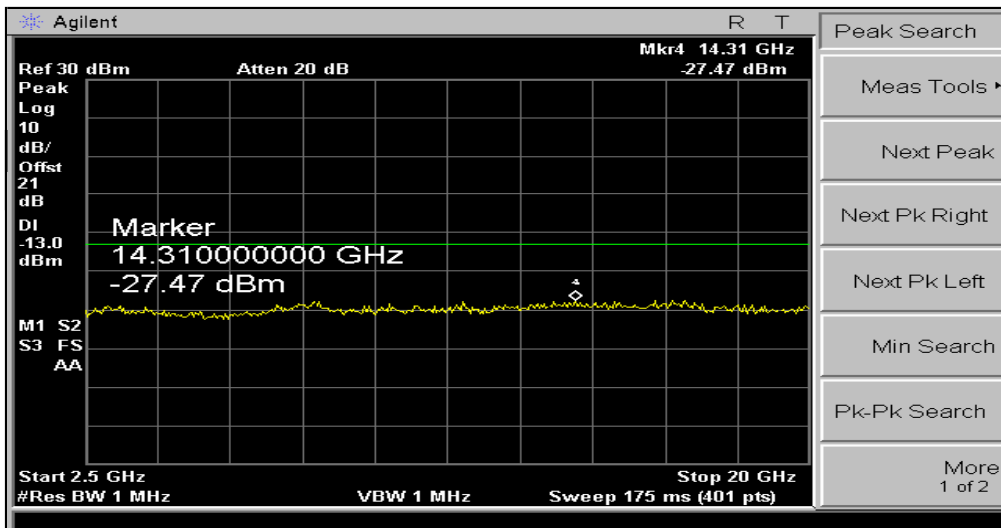
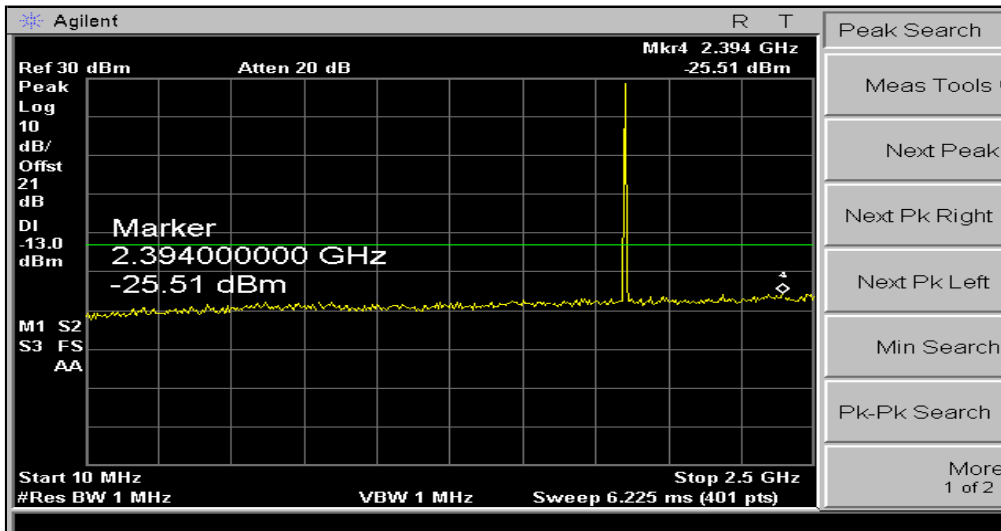
PLOTS OF EMISSION (GSM): Out of Band(Ch810)



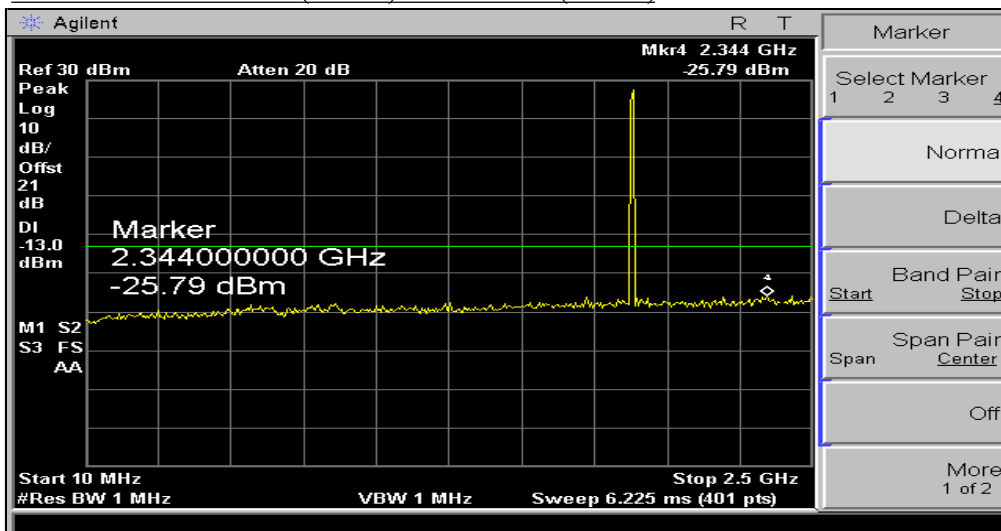


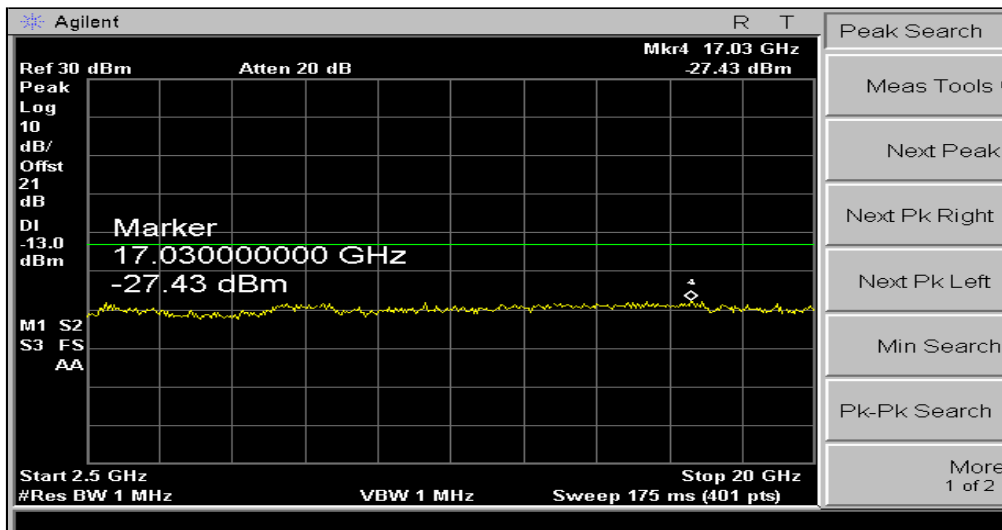
**PCS1900 EDGE**

**PLOTS OF EMISSION (EDGE): Out of Band(Ch512)**

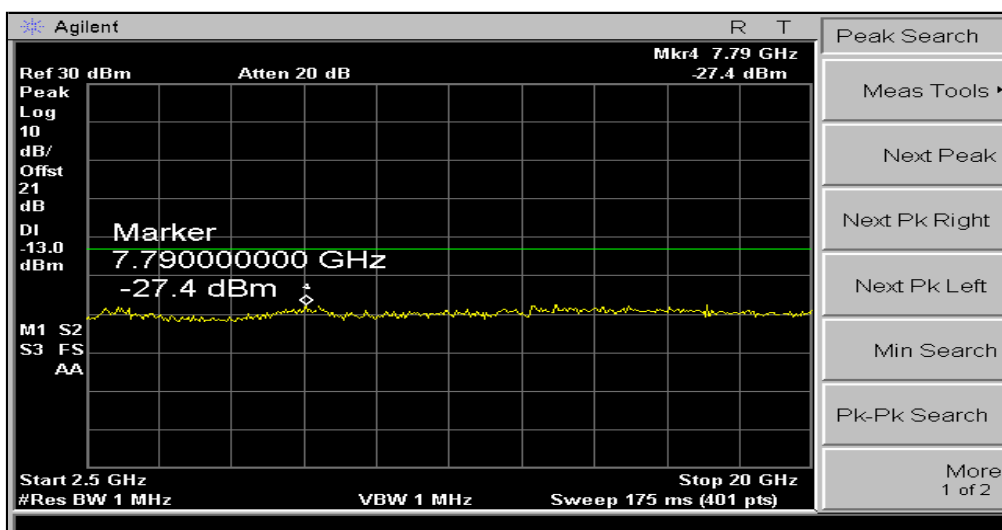
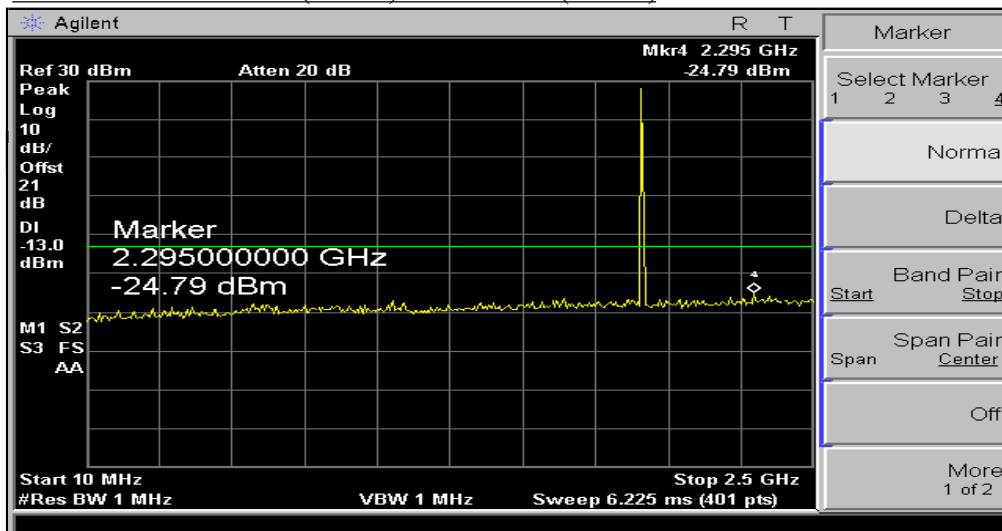


**PLOTS OF EMISSION (EDGE): Out of Band(Ch661)**





PLOTS OF EMISSION (EDGE): Out of Band(Ch810)





## 7. Field Strength of Spurious Radiation

### 7.1 Test Procedure

Radiation and harmonic emission are measured outdoors at our 3 meters test range. The equipment under test is placed on a wooden turntable 3 meters from the receive antenna. The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer (or receiver). A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

### 7.2 Test Equipments

The following test equipments are used during tests

| Equipment                        | Manufacturer    | Model       | Cal. Due Date |
|----------------------------------|-----------------|-------------|---------------|
| Receiver                         | Rohde & Schwarz | ESPI7       | 2007-08-24    |
| Signal Generator                 | HP              | 83620B      | 2007-09-07    |
| Wireless Communications Test Set | Agilent         | E5515C      | 2008-02-07    |
| Pre Amplifier                    | HP              | 8449B       | 2008-03-06    |
| Horn Antenna                     | SCHWARZBECK     | BBHA 9120 D | 2008-03-31    |

\* The TX signal isn't detected from 3rd harmonics.



### 7.3 Test Results

#### PCS1900

##### GSM(Ch 512)

**Mesured output power: 30.50dBm = 1.122W, Limit: 43+10log<sub>10</sub>(W)= 43.50dBc**

| Frequency<br>(MHz) | Receiver<br>Reading(dBuV) | Correction Factor(dB) |        | EIRP(dBm)  |        | dBc   | Polarity |
|--------------------|---------------------------|-----------------------|--------|------------|--------|-------|----------|
|                    |                           | AG(dBi)               | CL(dB) | SG Reading | Result |       |          |
| 3700.40            | 67.50                     | 12.69                 | 11.30  | -29.20     | -27.81 | 58.31 | H        |
| 5550.60            | 52.33                     | 13.15                 | 12.70  | -36.20     | -35.75 | 66.25 | V        |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |

##### GSM(Ch 661)

**Mesured output power: 30.73dBm = 1.183W, Limit: 43+10log<sub>10</sub>(W)= 43.73dBc**

| Frequency<br>(MHz) | Receiver<br>Reading(dBuV) | Correction Factor(dB) |        | EIRP(dBm)  |        | dBc   | Polarity |
|--------------------|---------------------------|-----------------------|--------|------------|--------|-------|----------|
|                    |                           | AG(dBi)               | CL(dB) | SG Reading | Result |       |          |
| 3760.00            | 69.67                     | 12.75                 | 11.50  | -27.80     | -26.55 | 57.28 | H        |
| 5640.00            | 56.00                     | 13.15                 | 13.30  | -31.30     | -31.45 | 62.18 | V        |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |

##### GSM(Ch 810)

**Mesured output power: 29.14dBm = 0.820W, Limit: 43+10log<sub>10</sub>(W)= 42.14dBc**

| Frequency<br>(MHz) | Receiver<br>Reading(dBuV) | Correction Factor(dB) |        | EIRP(dBm)  |        | dBc   | Polarity |
|--------------------|---------------------------|-----------------------|--------|------------|--------|-------|----------|
|                    |                           | AG(dBi)               | CL(dB) | SG Reading | Result |       |          |
| 3819.60            | 69.67                     | 12.75                 | 11.50  | -26.50     | -25.25 | 54.39 | H        |
| 5729.40            | 58.50                     | 13.09                 | 12.20  | -28.70     | -27.81 | 56.95 | V        |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |



**EDGE(Ch 512)**

**Mesured output power: 30.50dBm = 1.122W, Limit: 43+10log<sub>10</sub>(W)= 43.50dBc**

| Frequency<br>(MHz) | Receiver<br>Reading(dBuV) | Correction Factor(dB) |        | EIRP(dBm)  |        | dBc   | Polarity |
|--------------------|---------------------------|-----------------------|--------|------------|--------|-------|----------|
|                    |                           | AG(dBi)               | CL(dB) | SG Reading | Result |       |          |
| 3700.40            | 67.33                     | 12.69                 | 11.30  | -29.40     | -28.01 | 58.51 | H        |
| 5550.60            | 49.00                     | 13.15                 | 12.70  | -39.50     | -39.05 | 69.55 | H        |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |

**EDGE(Ch 661)**

**Mesured output power: 27.53dBm = 0.566W, Limit: 43+10log<sub>10</sub>(W)= 40.53dBc**

| Frequency<br>(MHz) | Receiver<br>Reading(dBuV) | Correction Factor(dB) |        | EIRP(dBm)  |        | dBc   | Polarity |
|--------------------|---------------------------|-----------------------|--------|------------|--------|-------|----------|
|                    |                           | AG(dBi)               | CL(dB) | SG Reading | Result |       |          |
| 3760.00            | 69.33                     | 12.75                 | 11.50  | -28.20     | -26.95 | 54.48 | H        |
| 5640.00            | 51.17                     | 13.15                 | 13.30  | -36.10     | -36.25 | 63.78 | V        |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |

**EDGE(Ch 810)**

**Mesured output power: 28.64dBm = 0.731W, Limit: 43+10log<sub>10</sub>(W)= 41.64dBc**

| Frequency<br>(MHz) | Receiver<br>Reading(dBuV) | Correction Factor(dB) |        | EIRP(dBm)  |        | dBc   | Polarity |
|--------------------|---------------------------|-----------------------|--------|------------|--------|-------|----------|
|                    |                           | AG(dBi)               | CL(dB) | SG Reading | Result |       |          |
| 3819.60            | 68.50                     | 12.75                 | 11.50  | -27.70     | -26.45 | 55.09 | H        |
| 5729.40            | 54.50                     | 13.09                 | 12.20  | -32.70     | -31.81 | 60.45 | V        |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |
|                    |                           |                       |        |            |        |       |          |



## 8. Frequency stability

### 8.1 Test Procedure

The frequency stability of the transmitter is measured by:

a) **Temperature:** The temperature is varied from -30 °C to +60 °C using an environmental chamber.

b) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

※ The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 2.5$ ppm of the center frequency.

### 8.2 Test Equipments

The following test equipments are used during tests

| Equipment           | Manufacturer     | Model    | Cal. Due Date |
|---------------------|------------------|----------|---------------|
| Communications Test | Agilent          | E5515C   | 2008-02-07    |
| DC Power Supply     | INTERACT         | AK-3010  | 2008-03-02    |
| Tem/Hum Chamber     | Myung Technology | SM-150-2 | 2008-03-02    |



### 8.3 Test Results

#### PCS1900

|                      |               |
|----------------------|---------------|
| Operting Frequency : | 1,880,000,000 |
| Channel :            | 661           |
| Reference Voltage :  | 3.70          |
| Deviatin Limit :     | 0.00025       |

| Voltage<br>(%) | Power<br>(VDC) | Temperature<br>(°C) | Frequency<br>(Hz) | Deviation |
|----------------|----------------|---------------------|-------------------|-----------|
| 100            | 3.70           | +20 °C (Ref)        | 1,880,000,001     | 0.000000  |
| 100            |                | -30                 | 1,879,999,973     | 0.000001  |
| 100            |                | -20                 | 1,879,999,975     | 0.000001  |
| 100            |                | -10                 | 1,879,999,976     | 0.000001  |
| 100            |                | 0                   | 1,879,999,978     | 0.000001  |
| 100            |                | 10                  | 1,879,999,980     | 0.000001  |
| 100            |                | 20                  | 1,880,000,001     | 0.000000  |
| 100            |                | 25                  | 1,879,999,973     | 0.000001  |
| 100            |                | 30                  | 1,879,999,976     | 0.000001  |
| 100            |                | 40                  | 1,879,999,981     | 0.000001  |
| 100            |                | 50                  | 1,879,999,973     | 0.000001  |
| 100            |                | 60                  | 1,879,999,971     | 0.000002  |
| 85             | 3.15           | 20                  | 1,879,999,970     | 0.000002  |
| 115            | 4.26           | 20                  | 1,879,999,976     | 0.000001  |
| Batt EndPoint  | 3.00           | 20                  | 1,879,999,976     | 0.000001  |