



**MOBILE DEVICES BUSINESS**

**PRODUCT SAFETY AND COMPLIANCE  
EMC LABORATORY**

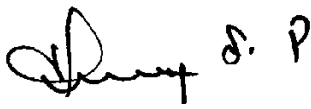
**EMC TEST REPORT**

**Test Report Number** – 23822-1

**Report Date** – August 2, 2010

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature: 

Name: Thanigaiselvan Palaniswami

Title: EMC Engineer

Date: August 2, 2010

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**THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY A2LA OR ANY AGENCY OF THE U.S. GOVERNMENT.**

A2LA Certificate Number: 2518-02

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**Test Report Details**

Tests Performed By: Motorola Mobile Devices business (MDb)  
 Product Safety and Compliance Group  
 600 North US Hwy 45  
 Libertyville, IL 60048  
 PH (847) 523-6167 Fax (847) 523-4538  
 Motorola MDb FRN: 0004321311  
 FCC Registration Number: 316588  
 Industry Canada Number: 1090-1

Tests Requested By: Motorola Inc.  
 Mobile Devices Business  
 600 North US Hwy 45  
 Libertyville, IL 60048

Product Type: Cellular Phone

Signaling Capability: CDMA 800 & 1900, Bluetooth, WLAN

FCC ID: IHDP56LF1

Serial Numbers: A000000E39347F, A000000E93572

Testing Complete Date: July 29, 2010

**Applicable Standards**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

- X   Part 2
- X   Part 22 Subpart H - Public Mobile Services
- X   Part 24 Subpart E – Personal Communications Services

Applicable Standards: ANSI 63.4 2003, ANSI/TIA-603-C-2004, RSS-Gen Issue 2, RSS-129 Issue2, RSS-132 Issue 2, RSS-133 Issue 5,

**Summary of Testing**

| Test # | Test Name                                 | Pass/Fail |
|--------|---|-----------|
| 1      | RF Power Output                           | NA        |
| 2      | ERP (Effective Radiated Power)            | Pass      |
| 3      | EIRP (Effective Isotropic Radiated Power) | Pass      |
| 4      | Occupied Bandwidth                        | Pass      |
| 5      | Spurious Emissions at Antenna Terminal    | Pass      |
| 6      | Field Strength of Spurious Emissions      | Pass      |
| 7      | Frequency Stability                       | Pass      |

| Test # | Test Name                                 | Margin with respect to the Limit |
|--------|---|----------------------------------|
| 1      | RF Power Output                           | NA                               |
| 2      | ERP (Effective Radiated Power)            | See results                      |
| 3      | EIRP (Effective Isotropic Radiated Power) | See results                      |
| 4      | Occupied Bandwidth                        | See Plots                        |
| 5      | Spurious Emissions at Antenna Terminal    | See results                      |
| 6      | Field Strength of Spurious Emissions      | See results                      |
| 7      | Frequency Stability                       | See results                      |

The margin with respect to the limit is the minimum margin for all modes and bands.

**General and Special Conditions**

The EUT was tested using a fully charged battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized.

The temperature and the relative humidity were maintained within the ANSI C63.4 2003 Standard requirements during the entire duration of testing.

**Equipment and Cable Configurations**

The EUT was tested in a stand-alone configuration that is representative of typical use.

| <b>Manufacturer</b> | <b>Equipment Type</b>  | <b>Model No.</b> | <b>Serial Number</b> | <b>Calibration Due Date</b> |
|---------------------|------------------------|------------------|----------------------|-----------------------------|
| Rohde & Schwarz     | Receiver               | ESIB26           | 100001               | 12/02/10                    |
| Rohde & Schwarz     | Receiver               | ESIB40           | 100226               | 4/08/11                     |
| Hewlett Packard     | EMC Analyzer           | E7405A           | US39440191           | 11/03/10                    |
| Agilent             | Spectrum Analyzer      | N9020A           | US46470586           | 12/18/11                    |
| Hewlett Packard     | Signal Generator       | 83623B           | 3844A00935           | 4/24/11                     |
| ETS-Lindgren        | Horn Antenna           | 3115             | 6222                 | 10/02/10                    |
| A. H. Systems       | DRG Horn Antenna       | SAS 200/571      | 365                  | 4/07/11                     |
| ETS                 | Log-Periodic Antenna   | 3148             | 1189                 | 6/12/10                     |
| ETS                 | Log-Periodic Antenna   | 3148             | 1188                 | 2/02/11                     |
| ETS                 | Biconical Antenna      | 3110B            | 3370                 | 10/02/10                    |
| Attenuator          | Weinschel              | AS-6             | 6675                 | NCR                         |
| Attenuator          | Weinschel              | AS-6             | 6677                 | NCR                         |
| Thermotron          | Environmental Chamber  | S-4              | 31580                | 1/19/11                     |
| Agilent             | Power Meter            | E4416A           | GB41293263           | 9/11/11                     |
| Agilent             | Power Sensor           | E9323A           | US40412067           | 9/11/11                     |
| Agilent             | Microwave Preamplifier | 8449B            | 3008A00535           | 10/05/11                    |
| ETS                 | LISN                   | 3810/2NM         | 0023630              | 10/05/10                    |
| ETS                 | LISN                   | 3810/2NM         | 2179                 | 10/06/10                    |

All test equipment was within their calibration date during the time of testing. When equipment went out of calibration during testing it was replaced using a similar piece of calibrated equipment. All these equipments are listed in the equipment list.

**Measurement Procedures and Data**

**RF POWER OUTPUT**

**Measurement Procedure**

The RF output port of the equipment under test is directly coupled to the input of an Agilent power meter through a 30dB passive attenuator, adaptor (if needed), and specialized RF connector. The average power output is measured for all channels.

CFR47 Part 2.1046

**Measurement Results**

**CDMA 800**

| Frequency (MHz) | Power (dBm) |
|-----------------|-------------|
| 824.70          | 24.93       |
| 836.52          | 25.12       |
| 848.31          | 24.90       |

**CDMA 1900**

| Frequency (MHz) | Power (dBm) |
|-----------------|-------------|
| 1851.25         | 24.97       |
| 1880.00         | 25.09       |
| 1908.75         | 24.84       |

Conducted Power was measured according to the “SAR Measurement Procedure for 3G Devices” released on October, 2007. .

| Band      | Channel | Conducted power (dBm)<br>for CDMA modes |            |             |            |  | Conducted power (dBm) for EV-DO modes |                |  |
|-----------|---------|---|------------|-------------|------------|--|---------------------------------------|----------------|--|
|           |         |   |            |             |            |  |                                       | Rev 0          |  |
|           |         | RC3<br>SO55                             | RC3<br>SO2 | RC1<br>SO55 | RC1<br>SO2 | RC3 (FCH + SCH)  | FTAP<br>307.2K                        | RTAP<br>153.6K |  |
| CDMA 800  | 1013    | 24.93                                   | 24.97      | 24.87       | 24.86      | Per Motorola designs, the maximum power, when in a mode that allows supplemental channels, will always be less than the RC3/RC1 maximum conducted power limit. | 24.75                                 | 24.85          |  |
|           | 384     | 25.12                                   | 25.20      | 25.11       | 25.07      |  | 25.06                                 | 24.98          |  |
|           | 777     | 24.90                                   | 24.93      | 25.00       | 24.98      |  | 24.85                                 | 24.92          |  |
| CDMA 1900 | 25      | 24.97                                   | 25.19      | 25.11       | 25.13      |  | 24.98                                 | 24.93          |  |
|           | 600     | 25.09                                   | 25.09      | 25.08       | 25.10      |  | 24.83                                 | 25.08          |  |
|           | 1175    | 24.84                                   | 25.04      | 24.95       | 24.88      |  | 24.78                                 | 24.77          |  |

Based on the above power measurements, all testing was performed in RC3/SO55 CDMA mode.

**RADIATED POWER (EIRP AND ERP)**

**Measurement Procedure**

The phone was tested in a 16’ anechoic chamber with a 2-axis position system that permits taking complete spherical scans of the EUT’s radiation patterns. For all tests, the phone was supported in a free space type environment, vertically oriented in the chamber.

All measurements were made with the phone placed in a call using a mobile station test set. The phone was weakly coupled to the test set and configured to transmit in full data rate mode. Radiated power was measured at each 15 degree step. The radiated power was measured using a Rhode & Schwarz FSP Spectrum Analyzer using the Peak Detector for the 800 and 1900 band. From these measurements, the software calculates the angle at which maximum radiated power occurs for each case, and the radiated power at this angle was extracted from the data. To get ERP (effective radiated power referenced to a half-wave dipole) subtract 2.1 dB from these numbers.

**Measurement Results**

| <b>Band</b> | <b>EIRP dBm</b> | <b>ERP dBm</b> |
|-------------|-----------------|----------------|
| CDMA 800    | 28.33           | <b>26.23</b>   |
| CDMA 1900   | <b>30.58</b>    | 28.48          |

**OCCUPIED BANDWIDTH**

**Measurement Procedure**

The RF output port of the equipment under test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The amplitude of the spectrum analyzer is corrected for the attenuator and any other applicable losses. The analyzer is set for Peak Detector and each trace is set for Max Hold. A fully charged battery was used for the supply voltage.

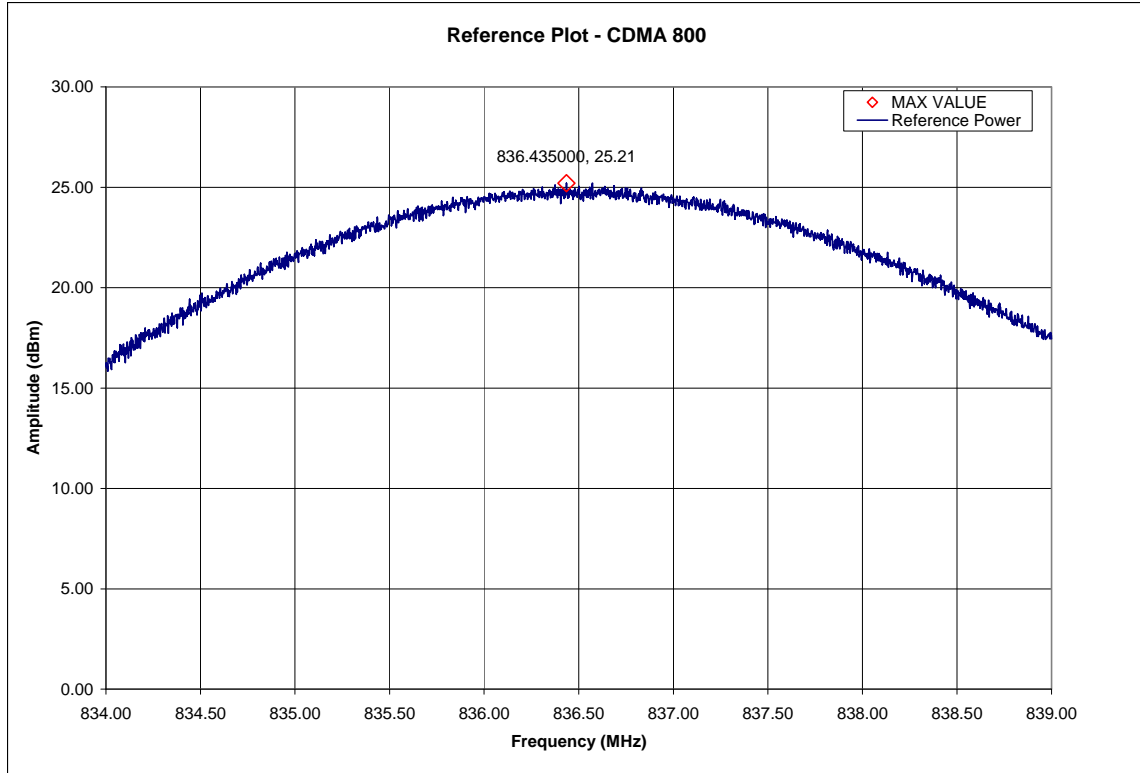
The middle channel within the designated frequency block was measured. For digital modulation, the lower and upper band edge plots are displayed.

Measurement Results  
Attached

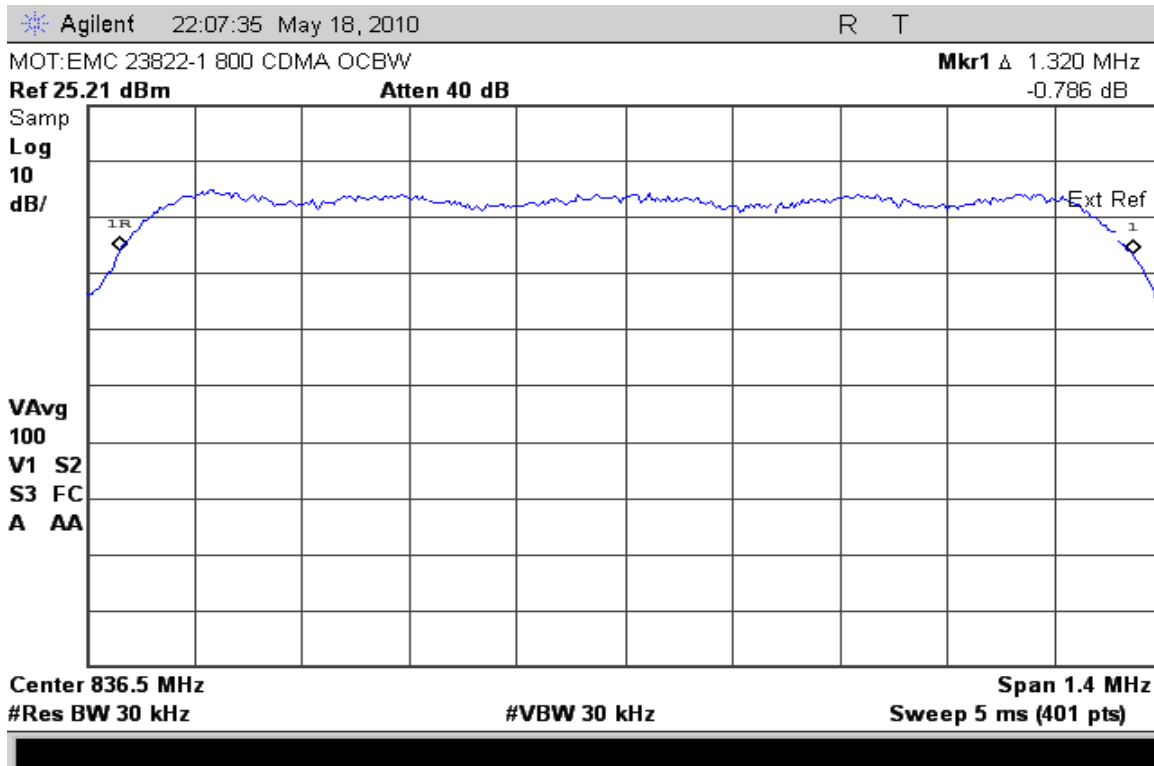
**Measurement Results – CDMA 800**

| Equipment Settings         |                            |                       |                  |            |          |               |
|----------------------------|----------------------------|-----------------------|------------------|------------|----------|---------------|
| Plot                       | Resolution Bandwidth (kHz) | Video Bandwidth (kHz) | Sweep Points (#) | Trace Mode | Detector | Samples (≥ #) |
| Reference Plot - CDMA 800  | 3000                       | Auto                  | 2001             | Max Hold   | Peak     | 100           |
| Lower Band Edge - CDMA 800 | 1                          | Auto                  | 2004             | Max Hold   | Peak     | 30            |
| Upper Band Edge - CDMA 800 | 1                          | Auto                  | 2004             | Max Hold   | Peak     | 30            |

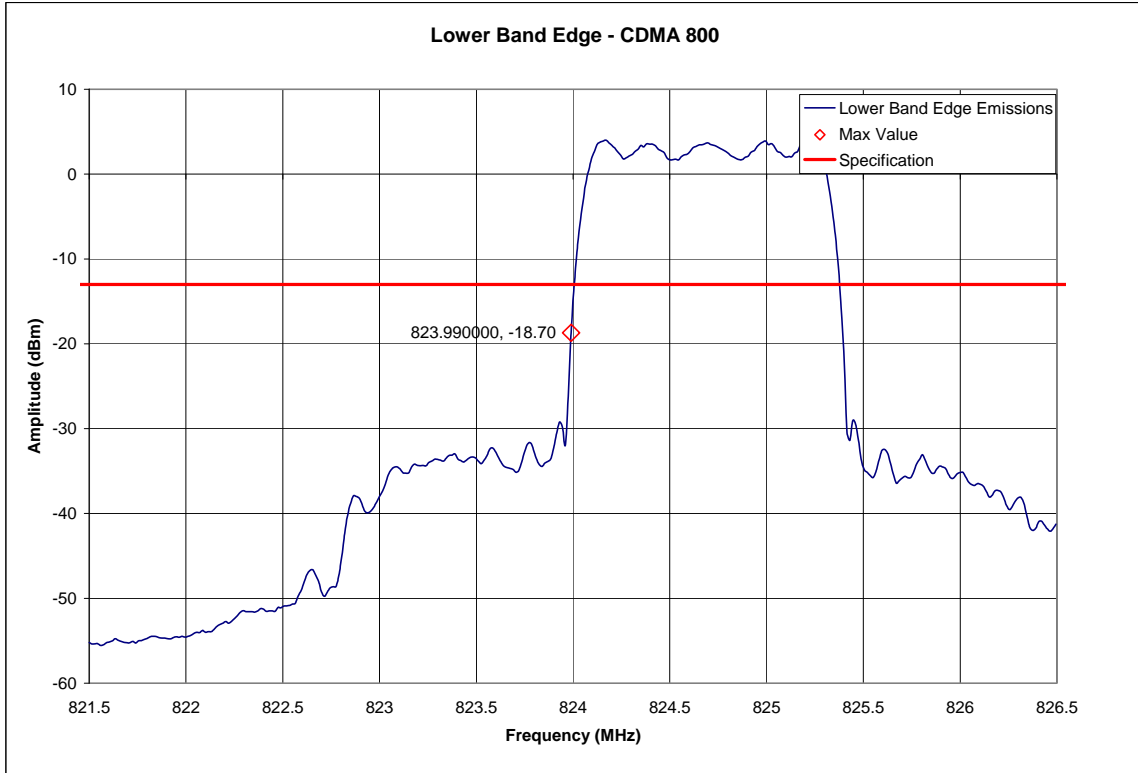
- Notes: 1) When the video bandwidth is set to Auto the video bandwidth self adjusts for <sup>3</sup> the resolution bandwidth.  
 2) The plotted data shown for the band edge measurements is representative of data taken with a true 13 kHz resolution bandwidth filter. The raw data was taken using a 1 kHz resolution bandwidth and was integrated to produce a response representative of data taken using a true 13 kHz resolution bandwidth filter.



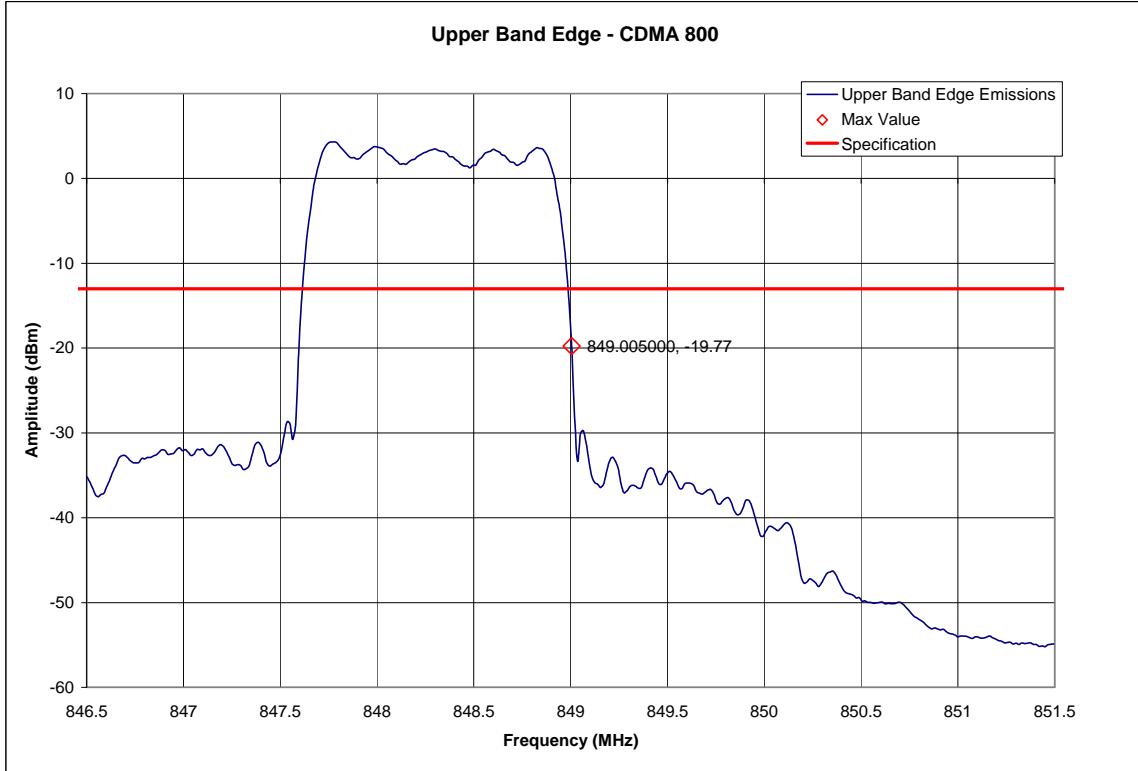
CDMA 800 – Reference Level Plot – Channel 384 (836.52MHz)



CDMA 800 – Occupied Bandwidth – Channel 384 (836.52MHz)

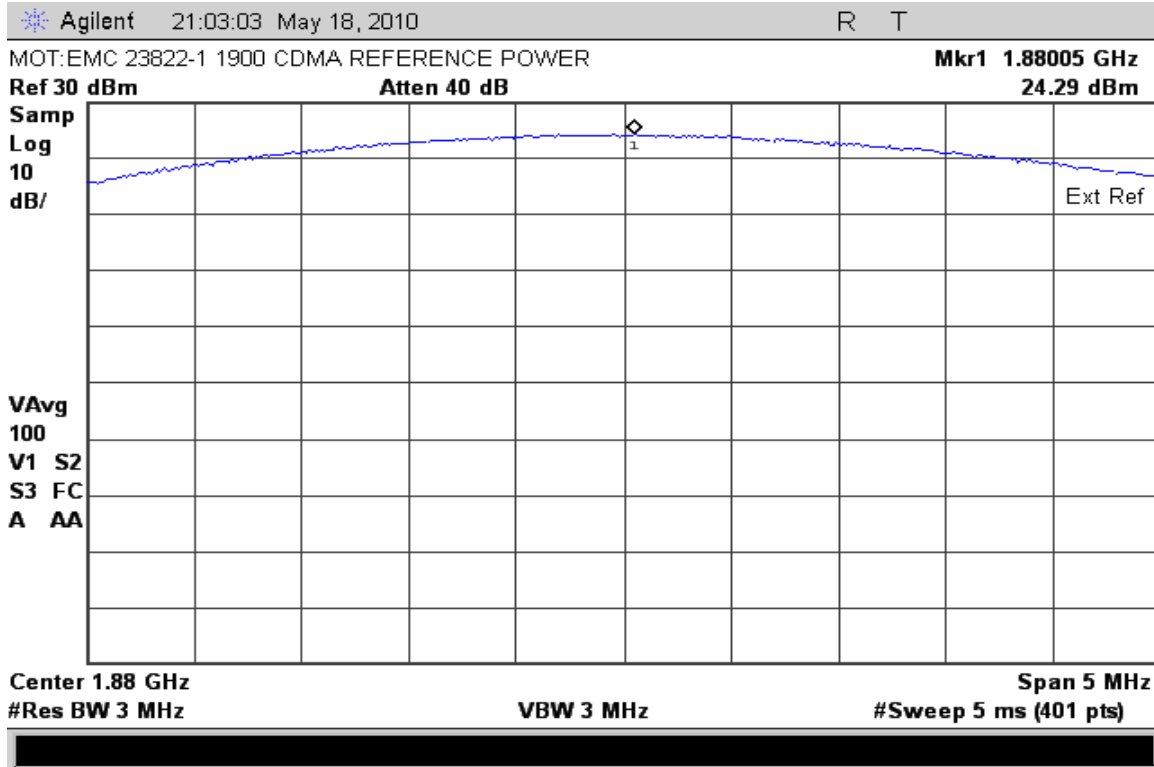


**CDMA 800 – Lower Band Edge – Channel 1013 (824.702MHz)**

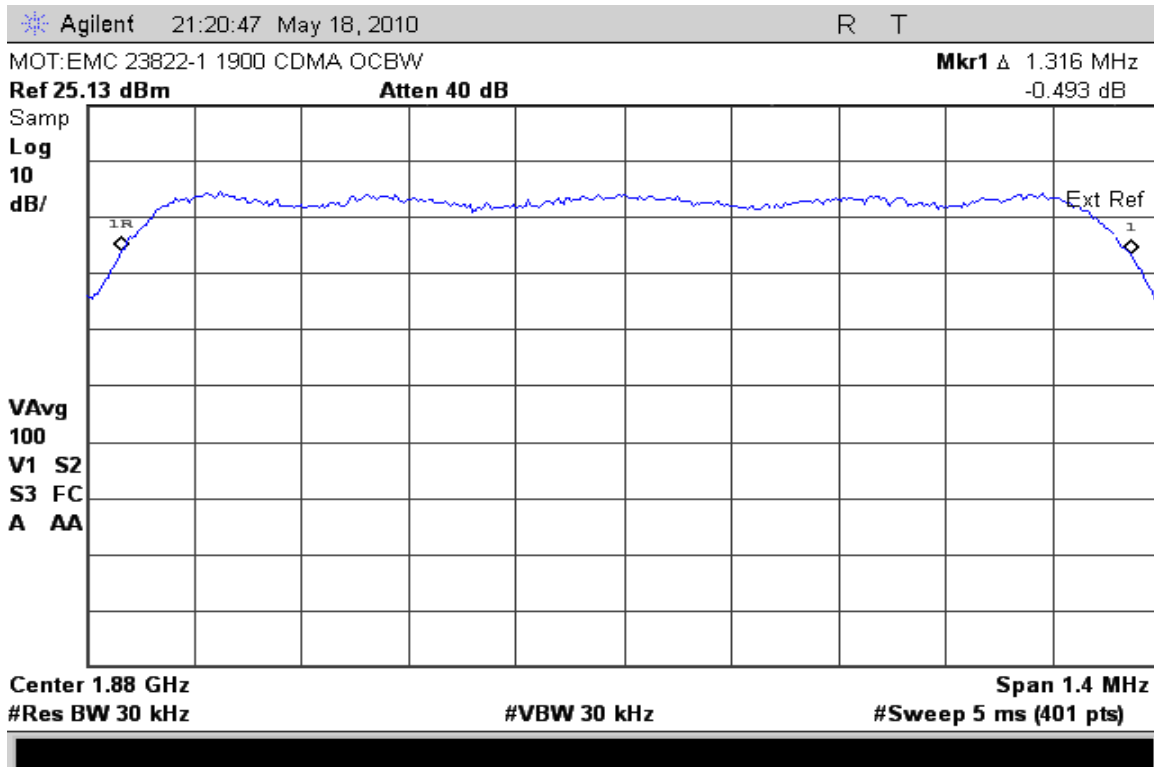


**CDMA 800 – Upper Band Edge – Channel 777 (848.31MHz)**

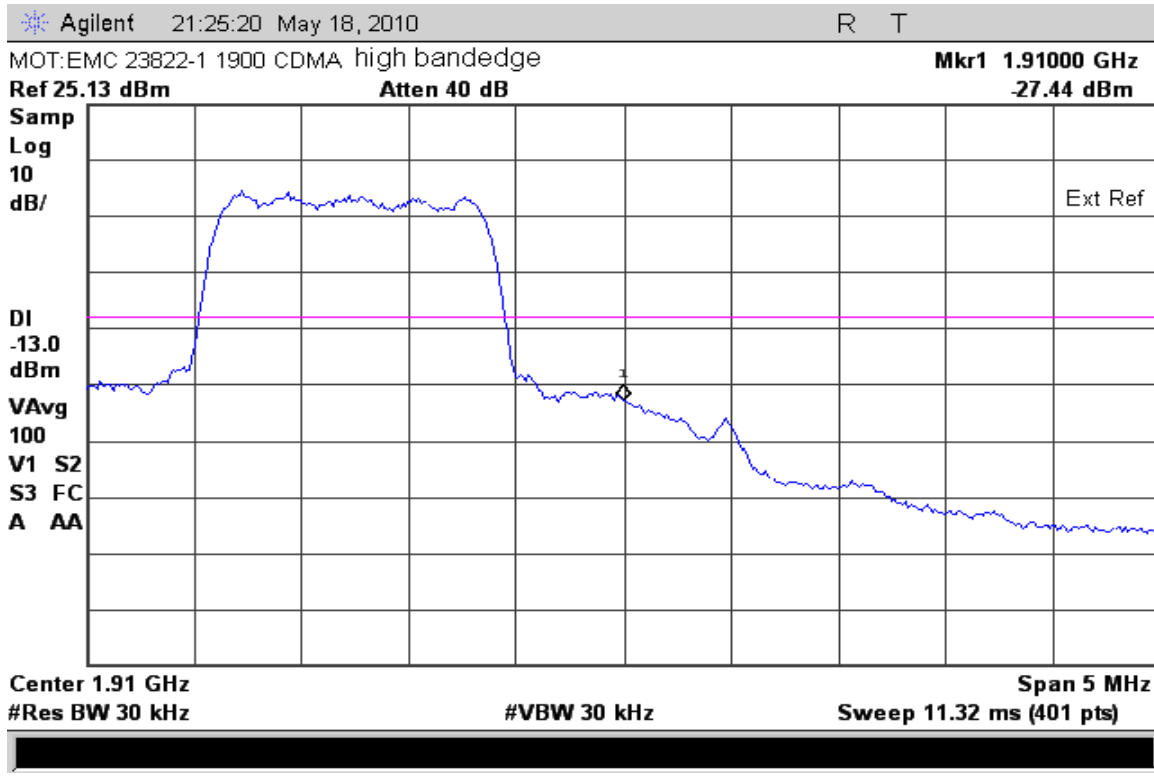
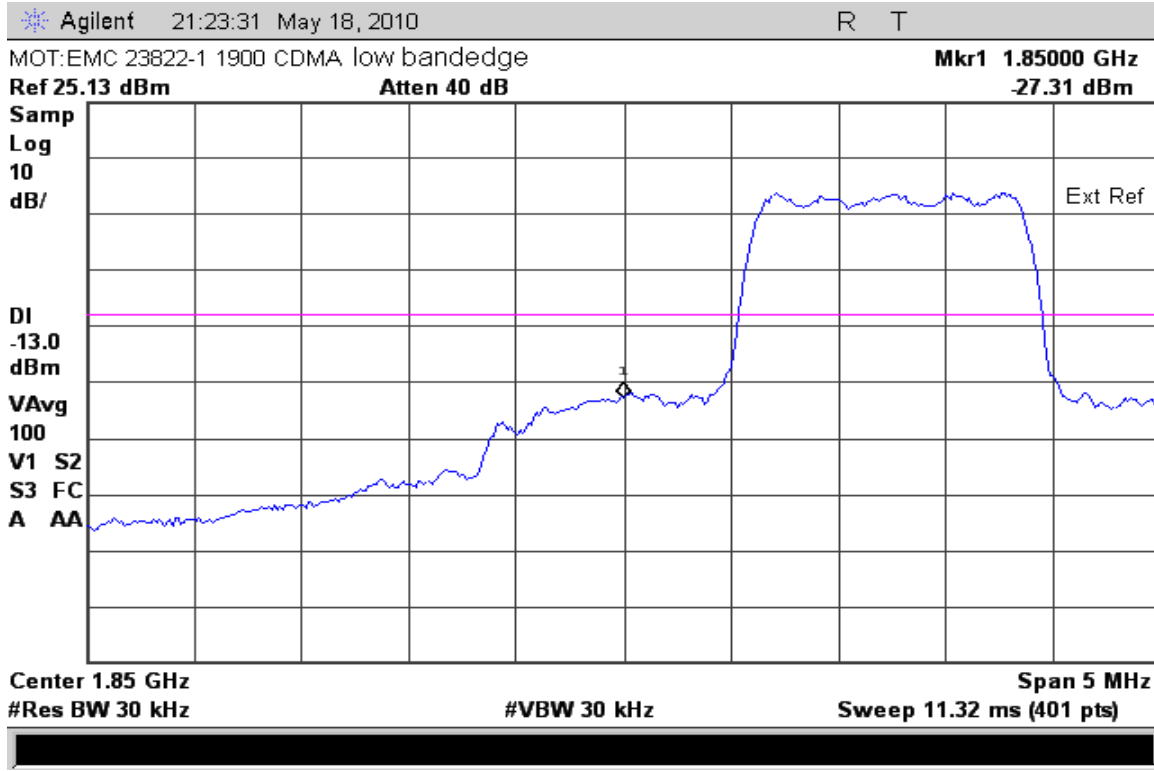
Measurement Results – CDMA 1900



CDMA 1900 – Reference Level Plot – Channel 600 (1880.00 MHz)



CDMA 1900 – Channel 600 (1880.00 MHz) – Occupied Bandwidth



## **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

### **Measurement Procedure**

The RF output port of the Equipment Under Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

The spectrum was investigated from the lowest frequency signal generated, without going below 9 kHz, up to at least the tenth harmonic of the fundamental or 40 GHz, whichever is lower.

The spectrum analyzer settings were as follows:

|                       |               |
|-----------------------|---------------|
| Units                 | dBm           |
| Divisions             | 10 dB         |
| Detector              | Peak Detector |
| Resolution Bandwidth  | 1 MHz         |
| Video Bandwidth (AVG) | Auto          |
| Sweep Time            | Auto          |

### **Measurement Results**

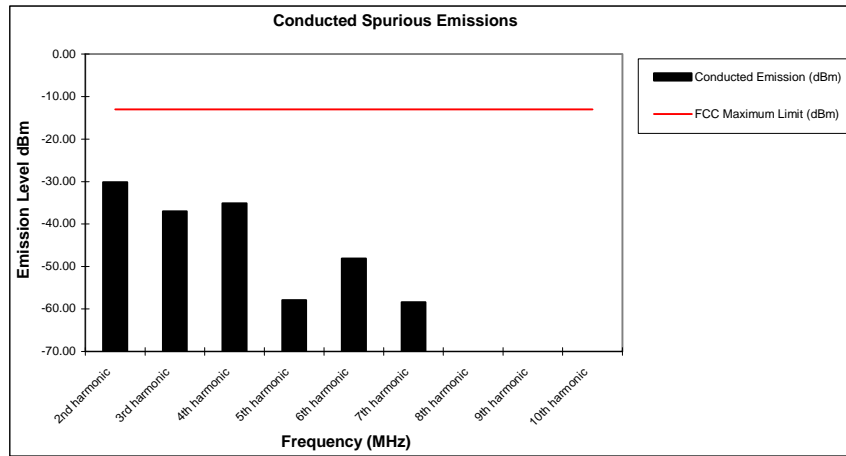
Attached

**Measurement Results**

**Modulation: CDMA 800**

**Conducted Spurious and Harmonic Emissions**

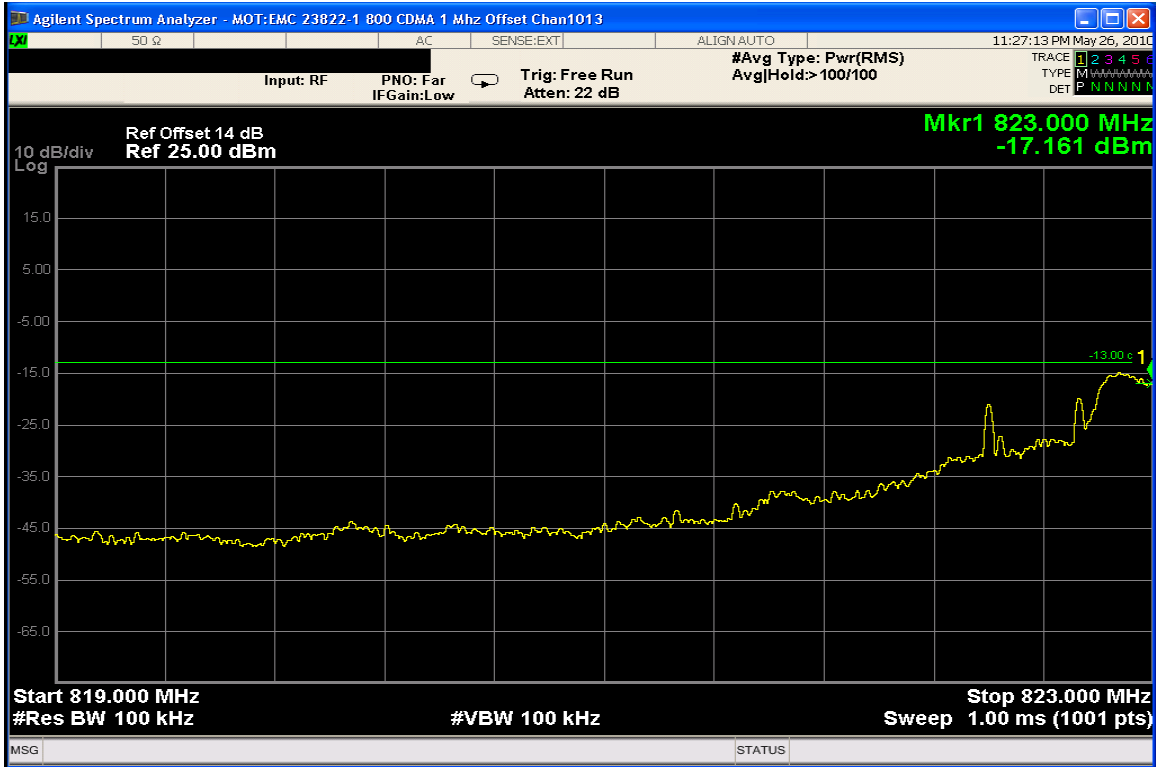
| Harmonic of Fundamental | FCC Maximum Limit (dBm) | Conducted Emission (dBm) |
|-------------------------|-------------------------|--------------------------|
| 2nd harmonic            | -13                     | -30.13                   |
| 3rd harmonic            | -13                     | -37.00                   |
| 4th harmonic            | -13                     | -35.14                   |
| 5th harmonic            | -13                     | -57.90                   |
| 6th harmonic            | -13                     | -48.09                   |
| 7th harmonic            | -13                     | -58.42                   |
| 8th harmonic            | -13                     | *                        |
| 9th harmonic            | -13                     | *                        |
| 10th harmonic           | -13                     | *                        |



**Notes:**

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic of the fundamental.

The margin with respect to the limit is the minimum margin for all modes and bands.



Cellular Conducted Spurious Emissions (Lower adjacent 1 MHz band)



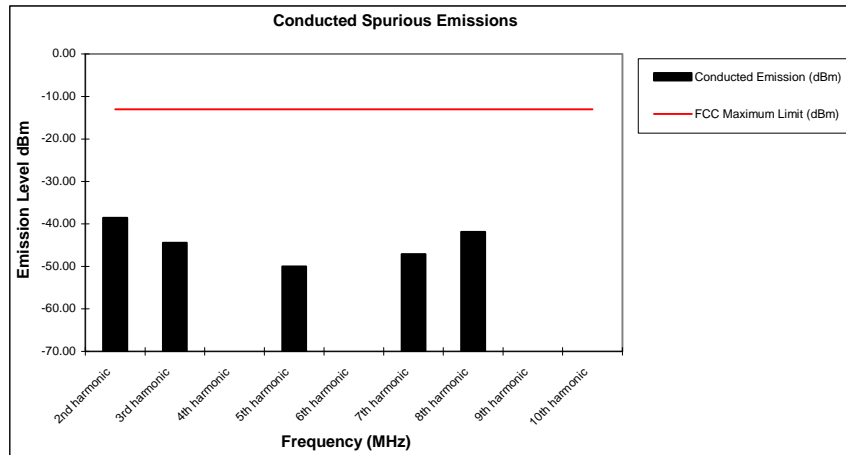
Cellular Conducted Spurious Emissions (Upper adjacent 1 MHz band)

**Measurement Results**

**Modulation: CDMA 1900**

**Conducted Spurious and Harmonic Emissions**

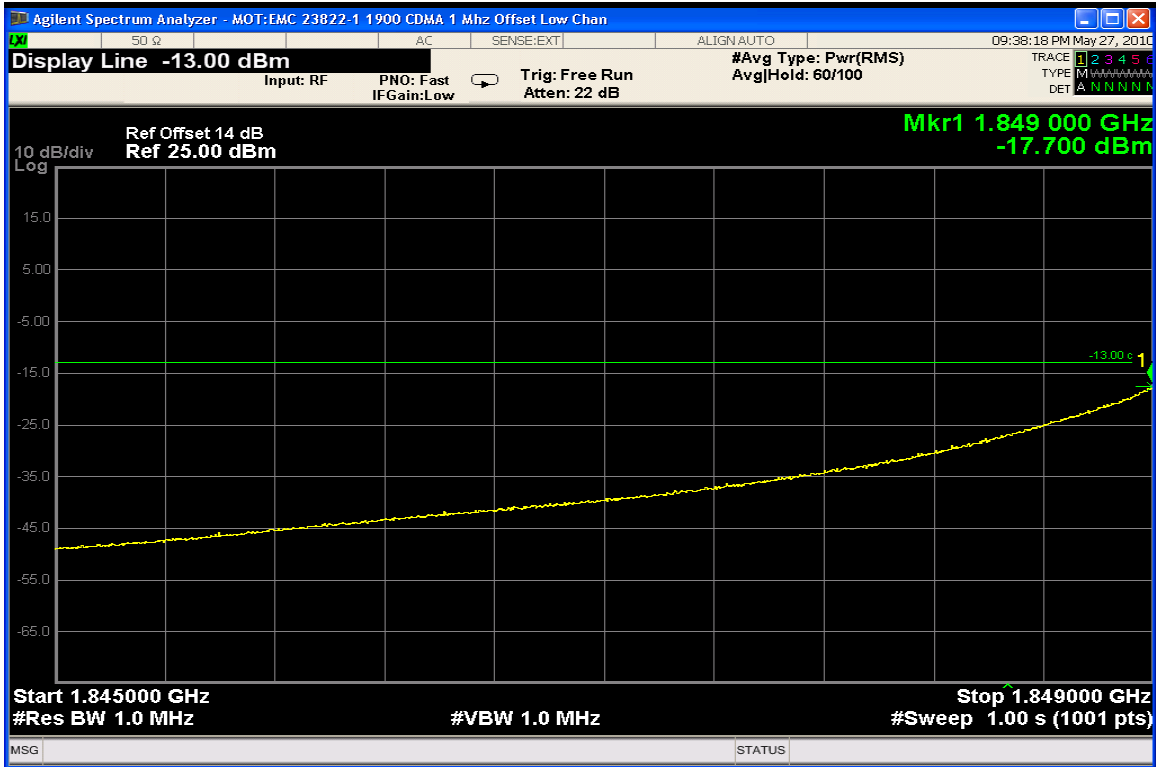
| Harmonic of Fundamental | FCC Maximum Limit (dBm) | Conducted Emission (dBm) |
|-------------------------|-------------------------|--------------------------|
| 2nd harmonic            | -13                     | -38.56                   |
| 3rd harmonic            | -13                     | -44.39                   |
| 4th harmonic            | -13                     | *                        |
| 5th harmonic            | -13                     | -50.01                   |
| 6th harmonic            | -13                     | *                        |
| 7th harmonic            | -13                     | -47.10                   |
| 8th harmonic            | -13                     | -41.87                   |
| 9th harmonic            | -13                     | *                        |
| 10th harmonic           | -13                     | *                        |



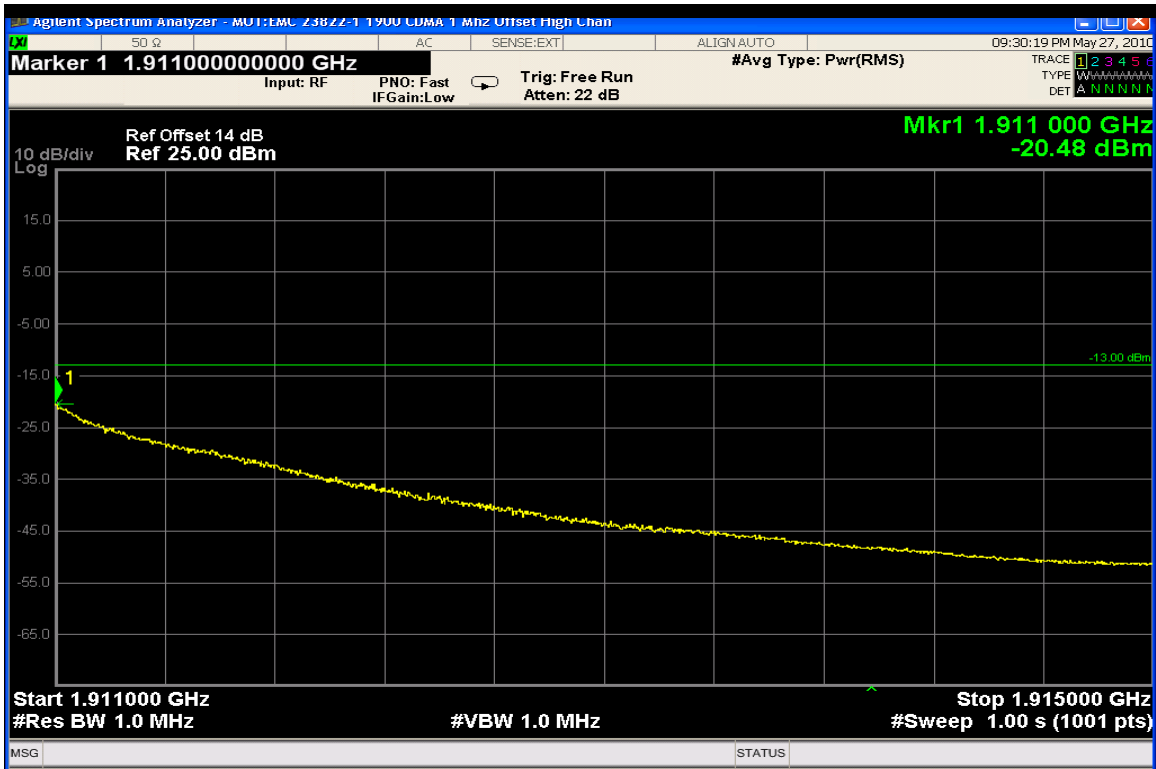
Notes:

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic of the fundamental.

The margin with respect to the limit is the minimum margin for all modes and bands.



PCS Conducted Spurious Emissions (Lower adjacent 1 MHz band)



PCS Conducted Spurious Emissions (Upper adjacent 1 MHz band)

**FIELD STRENGTH OF SPURIOUS EMISSIONS**

**Measurement Procedure**

The equipment under test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer. This is repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. With the signal generator tuned to a particular spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters to obtain a maximum reading at the spectrum analyzer. The output of the signal generator is then adjusted until a reading identical to that obtained with the actual transmitter is achieved.

The power in dBm of each spurious emission is calculated by correcting the signal generator level for cable loss and gain of the substitution antenna referenced to a dipole. A fully charged battery was used for the supply voltage.

The settings of the receiver were as follows:

|                       |               |
|-----------------------|---------------|
| Units                 | dBm           |
| Divisions             | 5 dB          |
| Detector              | Peak Detector |
| Resolution Bandwidth  | 1 MHz         |
| Video Bandwidth (AVG) | Auto          |
| Sweep Time            | Auto          |

**Measurement Results**

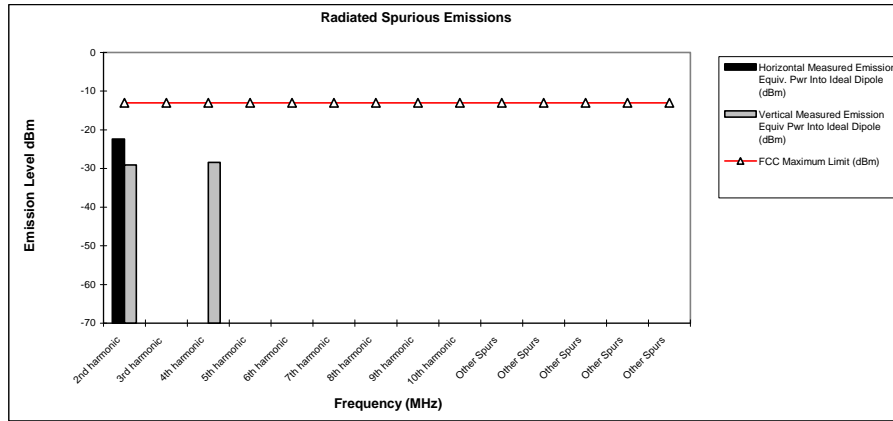
Attached

**Measurement Results**

**Modulation: CDMA 800**

**Radiated Spurious and Harmonic Emissions**

| Frequency (MHz) | FCC Maximum Limit (dBm) | Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm) |
|-----------------|-------------------------|---|--|
| 2nd harmonic    | -13                     | -22.4   | -29.1  |
| 3rd harmonic    | -13                     | *   | *  |
| 4th harmonic    | -13                     | *   | -28.4  |
| 5th harmonic    | -13                     | *   | *  |
| 6th harmonic    | -13                     | *   | *  |
| 7th harmonic    | -13                     | *   | *  |
| 8th harmonic    | -13                     | *   | *  |
| 9th harmonic    | -13                     | *   | *  |
| 10th harmonic   | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |



Notes:

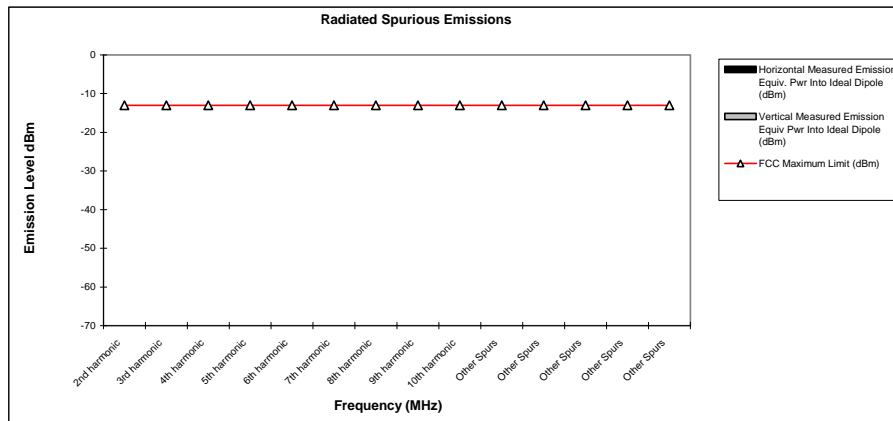
- \* Indicates the spurious emission could not be detected due to noise limitations or ambients or the emissions are lower than -33 dBm.
- Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
- The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

The margin with respect to the limit is the minimum margin for all modes and bands.

**Modulation: CDMA 1900,**

**Radiated Spurious and Harmonic Emissions**

| Frequency (MHz) | FCC Maximum Limit (dBm) | Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm) | Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm) |
|-----------------|-------------------------|---|--|
| 2nd harmonic    | -13                     | *   | *  |
| 3rd harmonic    | -13                     | *   | *  |
| 4th harmonic    | -13                     | *   | *  |
| 5th harmonic    | -13                     | *   | *  |
| 6th harmonic    | -13                     | *   | *  |
| 7th harmonic    | -13                     | *   | *  |
| 8th harmonic    | -13                     | *   | *  |
| 9th harmonic    | -13                     | *   | *  |
| 10th harmonic   | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |
| Other Spurs     | -13                     | *   | *  |



Notes:

1. \* Indicates the spurious emission could not be detected due to noise limitations or ambients or the emissions are lower than -33 dBm.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

The margin with respect to the limit is the minimum margin for all modes and bands.

## **FREQUENCY STABILITY**

### **Measurement Procedure**

The equipment under test is placed in an environmental chamber. The antenna port of the Equipment Under Test is directly coupled to the input of the measurement equipment through a specialized RF connector. A power supply is attached as the primary voltage supply.

Frequency measurements are made at the extremes of the temperature range  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  and at intervals of  $10^{\circ}\text{C}$  with the primary supply voltage set to the nominal battery operating voltage. A period of time sufficient to stabilize all components of the equipment is allowed at each frequency measurement. The maximum variation of frequency is measured.

At room temperature, the primary supply voltage is reduced to the battery operating endpoint of the equipment under test. The maximum variation of frequency is measured. A battery eliminator was used for the input supply voltage.

### **Measurement Results**

Attached

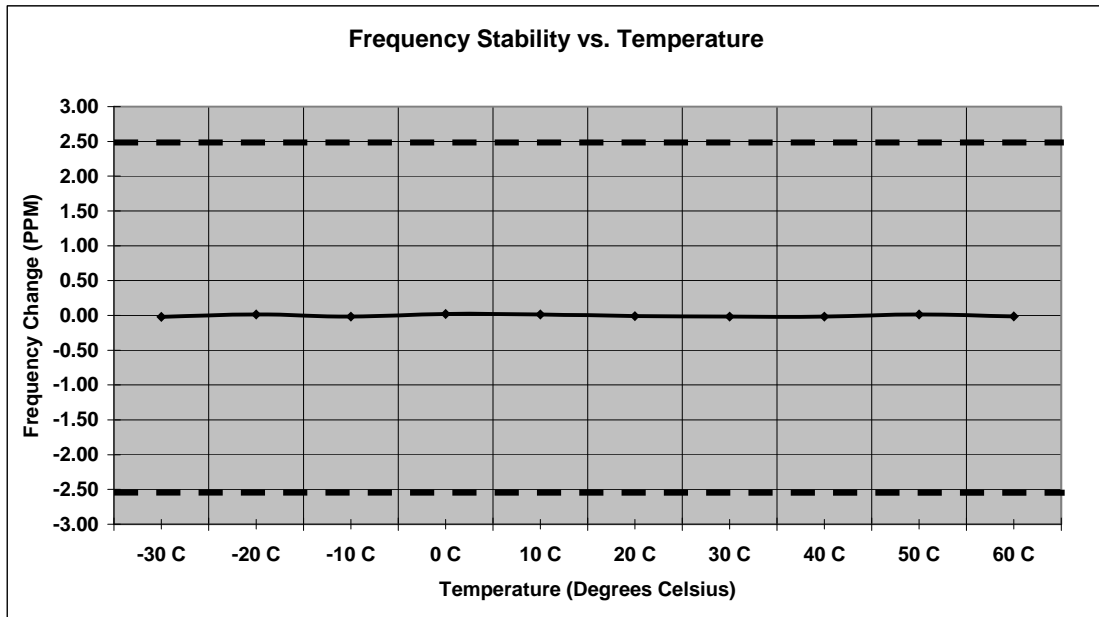
**Measurement Results**

**Modulation: CDMA 800**

**Frequency Stability**

**Mode:** CDMA 800      **Operating Frequency:** 836.52 MHz  
**Channel:** 384      **Deviation Limit (PPM):** 2.5 ppm

| Temperature<br>C | Frequency Error<br>HZ | Frequency Error<br>(PPM) | Voltage<br>(%)   | Voltage<br>(VDC) |
|------------------|-----------------------|--------------------------|------------------|------------------|
| -30 C            | -18.45                | -0.022                   | 100%             | 4.20             |
| -20 C            | 12.32                 | 0.015                    | 100%             | 4.20             |
| -10 C            | -14.80                | -0.018                   | 100%             | 4.20             |
| 0 C              | 16.98                 | 0.020                    | 100%             | 4.20             |
| 10 C             | 11.57                 | 0.014                    | 100%             | 4.20             |
| 20 C             | -8.72                 | -0.010                   | 100%             | 4.20             |
| 30 C             | -14.04                | -0.017                   | 100%             | 4.20             |
| 40 C             | -13.19                | -0.016                   | 100%             | 4.20             |
| 50 C             | 12.91                 | 0.015                    | 100%             | 4.20             |
| 60 C             | -12.89                | -0.015                   | 100%             | 4.20             |
| 20 C             | -10.48                | -0.013                   | Battery Endpoint | 3.20             |



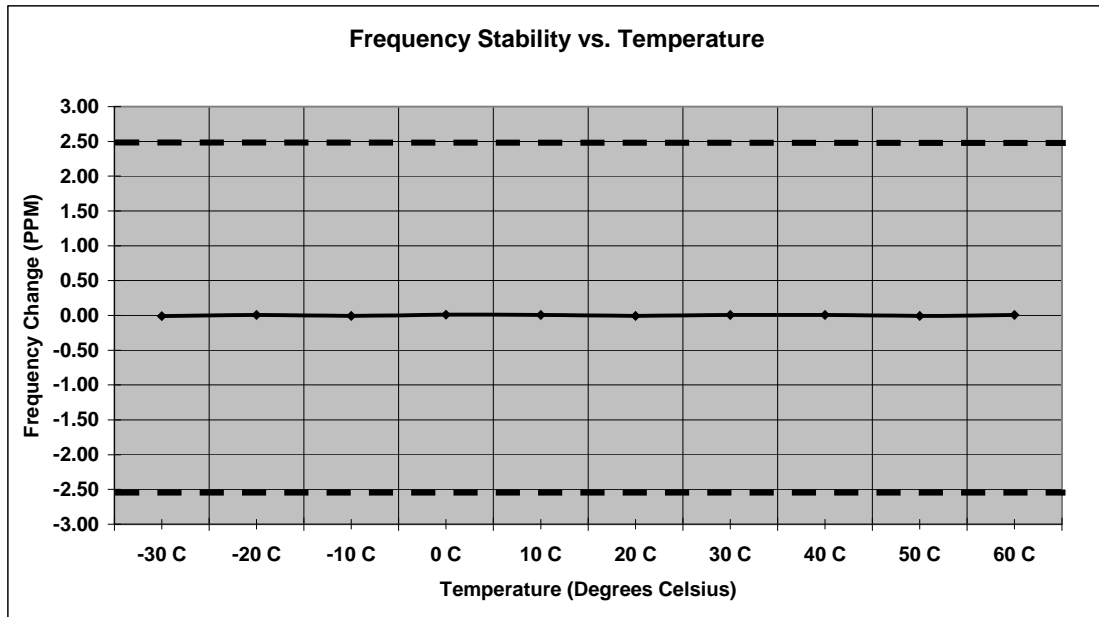
**Measurement Results**

**Modulation: CDMA 1900**

**Frequency Stability**

**Mode:** CDMA 1900      **Operating Frequency:** 1880.0 MHz  
**Channel:** 600      **Deviation Limit (PPM):** 2.5 ppm

| Temperature<br>C | Frequency Error<br>HZ | Frequency Error<br>(PPM) | Voltage<br>(%)   | Voltage<br>(VDC) |
|------------------|-----------------------|--------------------------|------------------|------------------|
| -30 C            | -18.41                | -0.010                   | 100%             | 4.20             |
| -20 C            | 13.78                 | 0.007                    | 100%             | 4.20             |
| -10 C            | -15.80                | -0.008                   | 100%             | 4.20             |
| 0 C              | 17.66                 | 0.009                    | 100%             | 4.20             |
| 10 C             | 15.99                 | 0.009                    | 100%             | 4.20             |
| 20 C             | -14.91                | -0.008                   | 100%             | 4.20             |
| 30 C             | 13.94                 | 0.007                    | 100%             | 4.20             |
| 40 C             | 15.45                 | 0.008                    | 100%             | 4.20             |
| 50 C             | -13.67                | -0.007                   | 100%             | 4.20             |
| 60 C             | 13.30                 | 0.007                    | 100%             | 4.20             |
| 20 C             | -14.61                | -0.008                   | Battery Endpoint | 3.20             |



**End of Test Report**