# EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22 and 24
&
Industry Canada (IC) RSS-132, 133 and RSS-GEN

# RIM Testing Services (RTS)

## A division of Research In Motion Limited

**REPORT NO.:** RTS-0736-0708-23

**PRODUCT MODEL NO.**: RBS21CW
**TYPE NAME**: BlackBerry® smartphone
**FCC ID**: L6ARBS20CW
**IC**: 2503A-RBS20CW
**EMISSION DESIGNATOR**: 1M30F9W

**DATE**: 04 September 2007

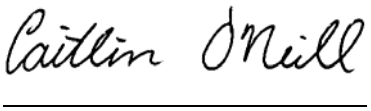
## Statement of Performance:

The BlackBerry® smartphone, model RBS21CW, part number CER-16580-001 Rev. 1, and accessories when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

## Declaration:

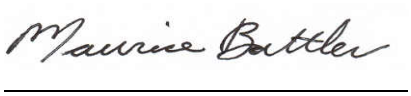
We hereby certify that:
The test data reported herein is an accurate record of the performance of the sample(s) tested.
The test results are valid for the tested unit (s) only.
The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating parameters.
The test methods were consistent with the methods described in the relevant standards.

Documented by:



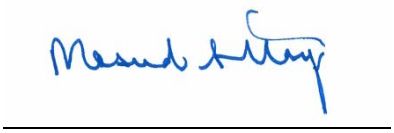
Caitlin O'Neill
Compliance Specialist
Date: 04 Sept 2007

Tested and reviewed by:



Maurice Battler
Compliance Specialist
Date: 07 Sept 2007

Reviewed by:



Masud S. Attayi, P.Eng.
Team Lead, Regulatory Compliance
Date:10 Sept 2007

Approved by:

Paul G. Cardinal, Ph.D.
Director
Date: 10 Sept 2007

# Table of Contents

## A. Scope

This report details the results of compliance tests which were performed in accordance to the requirements of:

- FCC CFR 47 Part 2, Oct. 1, 2006
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct. 1, 2006
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct 1. 2006
- Industry Canada, RSS-132 Issue 2, September 2005, Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz.
- Industry Canada, RSS-133 Issue 3, June 2005, 2 GHz Personal Communications Services.
- Industry Canada, RSS-GEN Issue 2, June 2007, General Requirements and Information for the Certification of Radiocommunication Equipment

## B. Associated Documents

1. None.

## C. Product Identification

Manufactured by Research In Motion Limited located at:

295 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906

The equipment under test (EUT) was tested at the RIM Testing Services (RTS) EMI test facility, located at:

305 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906

The testing was performed August 13 to September 4, 2007.

The sample BlackBerry® smartphones tested were:

| SAMPLE | MODEL | CER NUMBER | PIN |
|---|---|---|---|
| 1 | RBS21CW | CER-16580-001 Rev. 1 | 301AOF89 |
| 2 | RBS21CW | CER-16580-001 Rev. 1 | 301A4237 |

Conducted RF measurements were performed on BlackBerry® smartphone PIN 301AOF89. Radiated Emission measurements were performed on BlackBerry® smartphone PIN 301A4237.

## D. Support Equipment Used for the Testing of the EUT

1) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 102204
2) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 837493/073
3) Communication Tester, Aglient, model 8960, Serial number US41070110
4) DC Power Supply, HP, model 6632B, serial number US37472178

## E. Modifications to EUT

No modifications were required on the EUT.

## F. Summary of Results

| SPECIFICATION | | TEST TYPE | Meets Requirement | TEST DATA APPENDIX |
|---|---|---|---|---|
| FCC CFR 47 | IC | | | |
| Part 2.1051<br>Part 22.917<br>Part 22.901(d) | RSS-GEN, 4.9 | Conducted Spurious Emissions | Yes | 1 |
| Part 2.1051<br>Part 24.238(a) | RSS-GEN, 4.9 | Conducted Spurious Emissions | Yes | 1 |
| Part 2.202<br>Part 22.917 | RSS-GEN, 4.6 | Occupied Bandwidth and Channel Mask | Yes | 1 |
| Part 2.202<br>Part 24.238 | RSS-GEN, 4.6 | Occupied Bandwidth and Channel Mask | Yes | 1 |
| Part 2.1046(a) | RSS-133, 4.3<br>RSS-132, 4.4 | Conducted RF Output Power | Yes | 2 |
| Part 2.1055(a)(d)<br>Part 22.917 | RSS-132, 4.3 | Frequency Stability vs. Temperature and Voltage | Yes | 3 |
| Part 2.1055(a)(d)<br>Part 24.235 | RSS-133, 4.2 | Frequency Stability vs. Temperature and Voltage | Yes | 3 |
| Part 22, Subpart H | RSS-132, 4.5 | Radiated Spurious/Harmonic Emissions, ERP, LO | Yes | 4 |
| Part 24, Subpart E | RSS-133, 4.4 | Radiated Spurious/Harmonic Emissions, EIRP, LO | Yes | 4 |

1) The EUT met the requirements of the Conducted Spurious Emissions in the Cellular band as per 47 CFR 22.917, CFR 22.901(d) and RSS-132. The EUT was measured in CDMA2000 and 1xEVDO mode on the low, middle and high channels. The frequency range investigated was from 10 MHz to 20 GHz.
See APPENDIX 1 for the test data.

2) The EUT met the requirements of the Conducted Spurious Emissions in the PCS band as per 47 CFR 2.1057, CFR 24.238 and RSS-133. The EUT was measured in CDMA2000 and 1xEVDO mode on the low, middle and high channels. The frequency range investigated was from 10 MHz to 26 GHz.
See APPENDIX 1 for the test data.

3) The EUT met the requirements of the Occupied Bandwidth in the Cellular band as per 47 CFR 2.202, CFR 22.917 and RSS-132. The channels were measured in CDMA2000 and 1xEVDO mode on the low, middle and high channels.
See APPENDIX 1 for the test data.

4) The EUT met the requirements of the Occupied Bandwidth and channel mask in the PCS band as per 47 CFR 2.202, CFR 24.238 and RSS-133. The channels were measured in CDMA2000 and 1xEVDO mode on the low, middle and high channels.
See APPENDIX 1 for the test data.

5) The EUT met the requirements of the Conducted RF Output Power for both the Cellular and PCS bands. The channels were measured in CDMA2000 and 1xEVDO mode on the low, middle and high channels.
See APPENDIX 2 for the test data.

6) The EUT met the requirements of the Frequency Stability vs. Temperature and Voltage for Cellular band as per 22.917 and RSS-132.
The maximum frequency error measured was less than 0.1 ppm.
The temperature range was from -30°C to +60°C in 10° temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.6 volts), nominal (3.7 volts) and high (4.2 volts) dc input voltage at each temperature step and channel at maximum output power.
See APPENDIX 3 for the test data.

7) The EUT met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for the PCS band as per 24.235 and RSS-133. The maximum frequency error measured was less than 0.1 ppm.
The temperature range was from -30°C to +60°C in 10 degree temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.6 volts), nominal (3.7 volts) and high (4.2 volts) dc input voltage at each temperature step and channel at maximum output power. See APPENDIX 3 for the test data.

8) The radiated spurious emissions/harmonics and ERP/EIRP were measured for both Cellular and PCS bands. The results are within the limits. The EUT was placed on a nonconductive styrofoam table, 100 cm high that was positioned on a remote controlled turntable. The test distance used between the EUT and the receiving antenna was three metres. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The turntable was rotated to determine the azimuth of the peak emissions. The maximum emissions level was recorded. The measurements were performed in a semi-anechoic chamber. The semi-anechoic chamber FCC registration number is **778487** and the Industry Canada file number is **IC4240**. The EUT was measured on the low, middle and high channels.

   The highest ERP in the Cellular band measured was 21.82 dBm at 824.70 MHz (channel 1013).
   The highest EIRP in the PCS band measured was 26.3 dBm at 1880.00 MHz (channel 600).

   The radiated spurious emissions were measured up to the 10$^{th}$ harmonic for low, middle and high channels in the Cellular and PCS bands.
   The lowest test margin for the cellular band was 21.8 dB below the limit at 2509.56 MHz.
   The lowest test margin for the PCS band was 15.88 dB below the limit at 18703.85 MHz.

   The EUT's RF local oscillator emissions were measured in the Cellular band on the low, middle and high channels (1013, 384 and 777) in the standalone vertical position. Both the horizontal and vertical antenna polarizations were measured. The Cellular RF local oscillator emissions were in the noise floor (NF).

   The EUT's RF local oscillator emissions were measured in the PCS band on the low, middle and high channels (25, 600 and 1175) in the standalone Horizontal position. Both the horizontal and vertical antenna polarizations were measured. The PCS RF local oscillator emissions were in the NF.

**Sample Calculation:**

Field Strength (dBµV/M) is calculated as follows:
FS = Measured Level (dBµV) + A.F. (dB/m) + Cable Loss (dB) - Preamp (dB) + Filter Loss (dB)

Measurement Uncertainty ±4.0 dB

To view the test data see APPENDIX 4.

## H. Compliance Test Equipment Used

| UNIT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL DUE DATE (YY MM DD) | USE |
|---|---|---|---|---|---|
| Preamplifier | Sonoma | 310N/11909A | 185831 | 07-11-23 | Radiated Emissions |
| Preamplifier system | TDK RF Solutions | PA-02 | 080010 | 07-11-22 | Radiated Emissions |
| Hybrid Log Antenna | TDK | HLP-3003C | 017401 | 08-08-04 | Radiated Emissions |
| Horn Antenna | TDK | HRN-0118 | 030101 | 08-07-26 | Radiated Emissions |
| Horn Antenna | TDK | HRN-0118 | 030201 | 09-01-17 | Radiated Emissions |
| Horn Antenna | Emco | 3116 | 2538 | 08-09-25 | Radiated Emissions |
| Preamplifier | TDK | 18-26 | 030002 | 07-11-23 | Radiated Emissions |
| Dipole Antenna | Schwarzbeck | UHAP | 973 | 08-12-18 | Radiated Emissions |
| Dipole Antenna | Schwarzbeck | UHAP | 974 | 08-09-28 | Radiated Emissions |
| EMC Analyzer | Aglient | E7405A | US40240226 | 07-10-20 | Radiated Emissions |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU 200 | 837493/073 | 07-12-01 | Radiated Emissions |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU 200 | 102204 | 08-04-22 | RF Conducted Emissions |
| Spectrum Analyzer | HP | 8563E | 3745A08112 | 07-09-20 | RF Conducted Emissions |
| DC Power Supply | HP | 6632B | US37472178 | 07-09-14 | RF Conducted Emissions |
| Environment Monitor | Control Company | 1870 | 230355190 | 07-12-28 | Radiated Emissions |
| Environment Monitor | Control Company | 1870 | 230199533 | 07-12-01 | RF Conducted Emissions |
| Universal Radio Communication Tester | Agilent | 8960 | US41070110 | 08-08-31 | Frequency Stability |
| Temperature Probe | Control Company | 15-077-21 | 51129471 | 08-05-22 | Frequency Stability |
| Environmental Chamber | ESPEC Corp. | SH-240S1 | 91007118 | N/R | Frequency Stability |
| Signal Generator | Agilent | 8648C | 4037U03155 | 07-09-13 | Frequency Stability |
| Power Meter | Giga-tronics | 8541C | 1837762 | 07-12-15 | Frequency Stability |
| Power Sensor | Giga-tronics | 80401A | 1835838 | 07-12-15 | Frequency Stability |

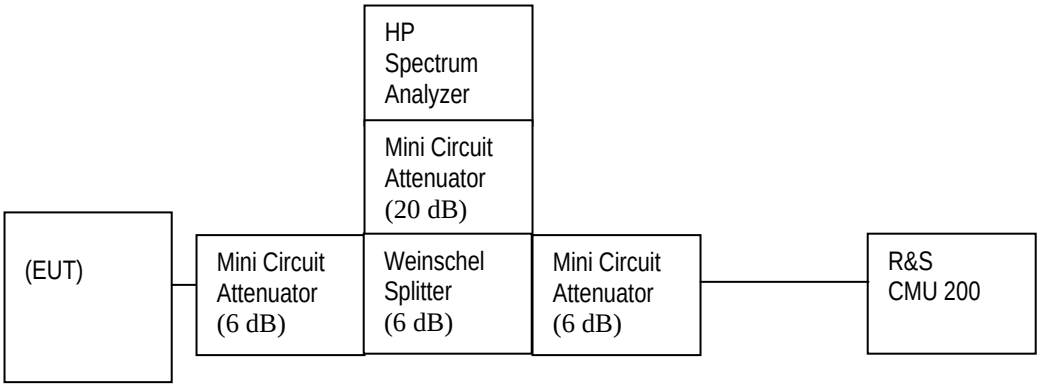
## APPENDIX 1 - CONDUCTED RF EMISSIONS TEST DATA/PLOTS

## Conducted RF Emission Test Data

This appendix contains measurement data pertaining to conducted spurious emissions, 99% power bandwidth and the channel mask on BlackBerry® smartphone PIN 301AOF89.

The measurements were performed by Maurice Battler.

### Test Setup Diagram




The environmental test conditions were:

| | |
|---|---|
| Temperature | 24ºC |
| Pressure | 1016 mb |
| Relative Humidity | 32% |

Conducted RF Emission Test Data cont'd

**The conducted spurious emissions** – As per 47 CFR 2.1051, CFR 24.238(a), RSS-GEN, 4.9, CFR 22 Subpart H and RSS-132 were measured from 10 MHz to 20 GHz. The EUT emissions were in the NF.
See figures 1 to 12 for the plots of the conducted spurious emissions.

Date of Test: August 29, 2007

***Test Data for Cellular and PCS selected Frequencies in CDMA2000 mode***

| Cellular Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|
| 824.700 | 1.287 |
| 836.520 | 1.280 |
| 848.310 | 1.293 |

| PCS Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|
| 1851.200 | 1.320 |
| 1880.000 | 1.290 |
| 1908.750 | 1.290 |

***Measurement Plots for Cellular and PCS in CDMA2000 mode***
Refer to the following measurement plots for more detail.

See Figures 13 to 18 for the plots of the 99% Occupied Bandwidth.
See Figures 19 to 22 for plots of the channel mask results.

The RF power output was at maximum for all the recorded measurements shown below.

Conducted Emission Test Results cont'd

**Figure 1: Cellular, Spurious Conducted Emissions, Low channel**

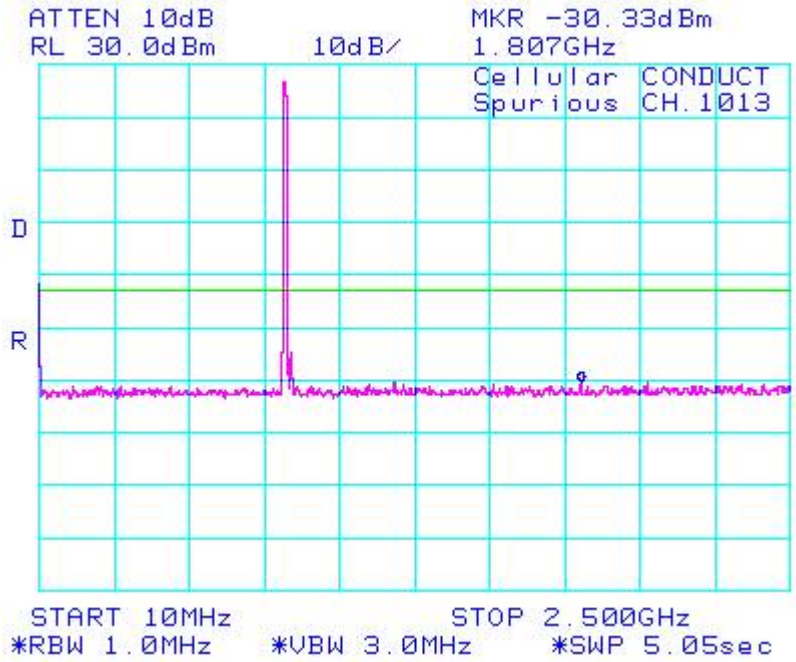
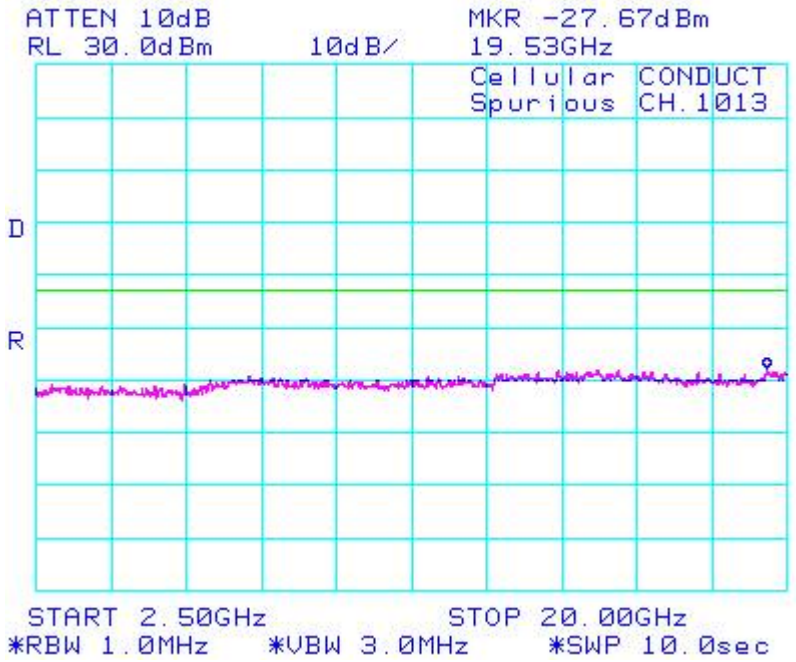



**Figure 2: Cellular, Spurious Conducted Emissions, Low channel**



Conducted Emission Test Results cont'd

**Figure 3: Cellular, Spurious Conducted Emissions, Middle Channel**

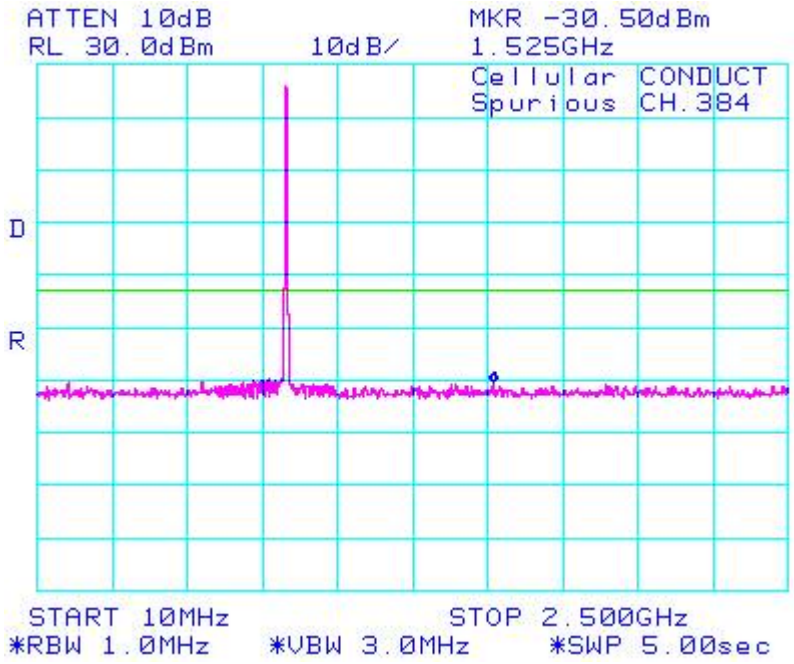
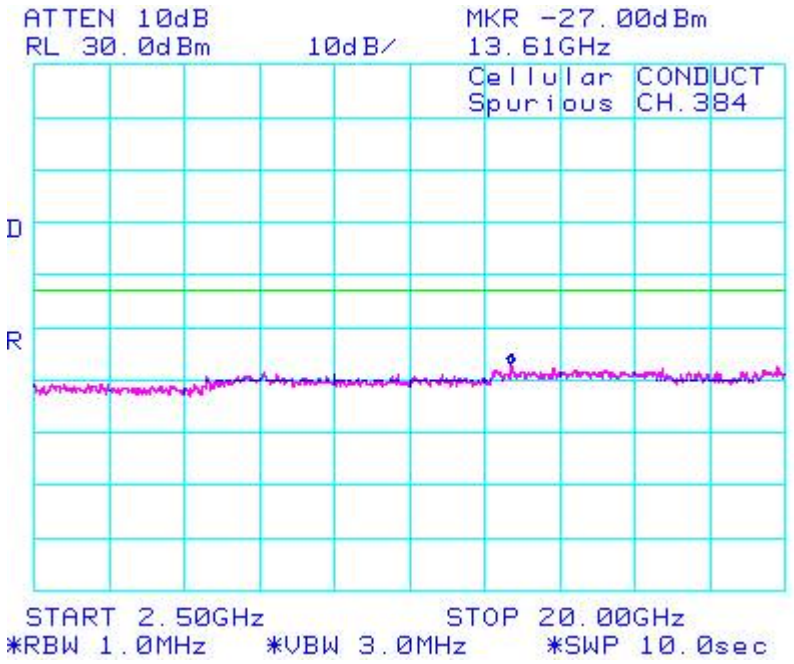



**Figure 4: Cellular, Spurious Conducted Emissions, Middle Channel**



Conducted Emission Test Results cont'd

**Figure 5: Cellular, Spurious Conducted Emissions, High Channel**

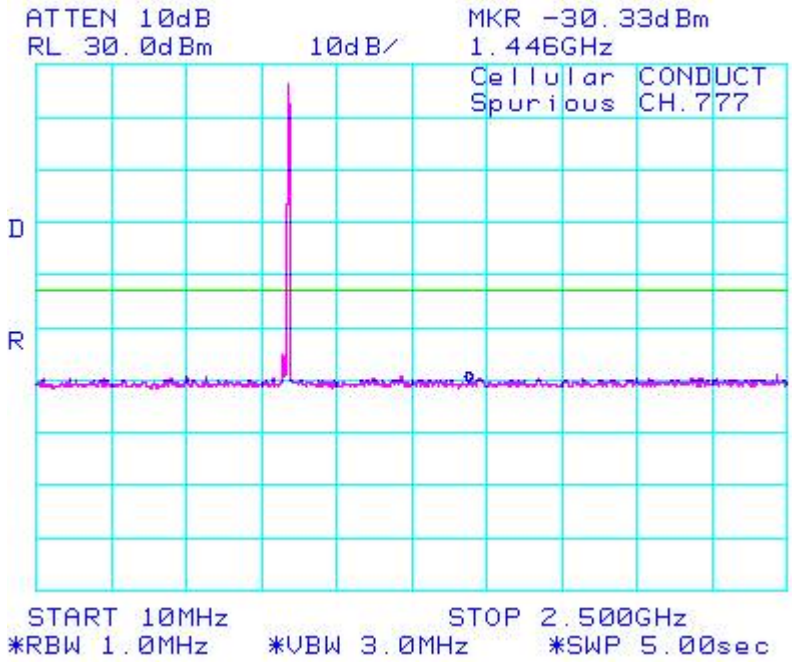
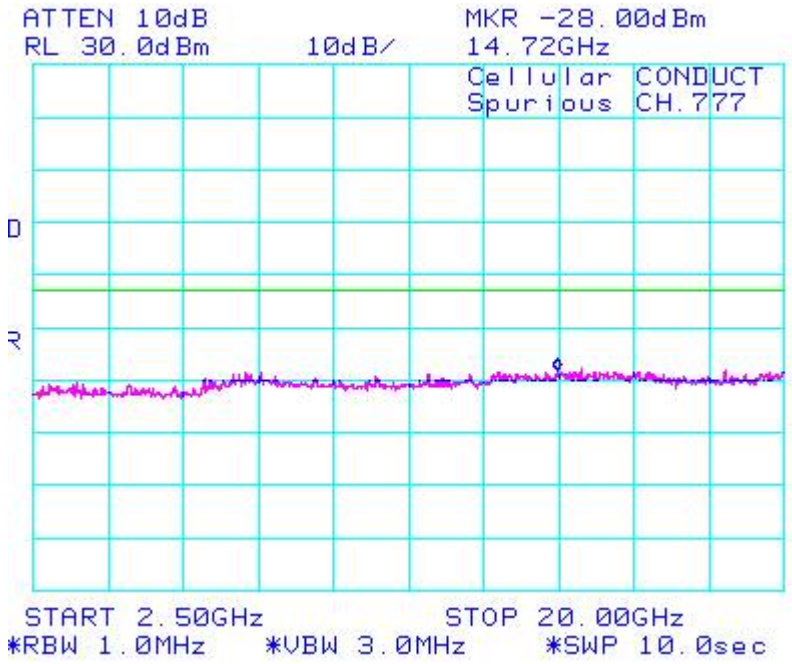



**Figure 6: Cellular, Spurious Conducted Emissions, High Channel**



Conducted Emission Test Results cont'd

**Figure 7: PCS, Spurious Conducted Emissions, Low Channel**

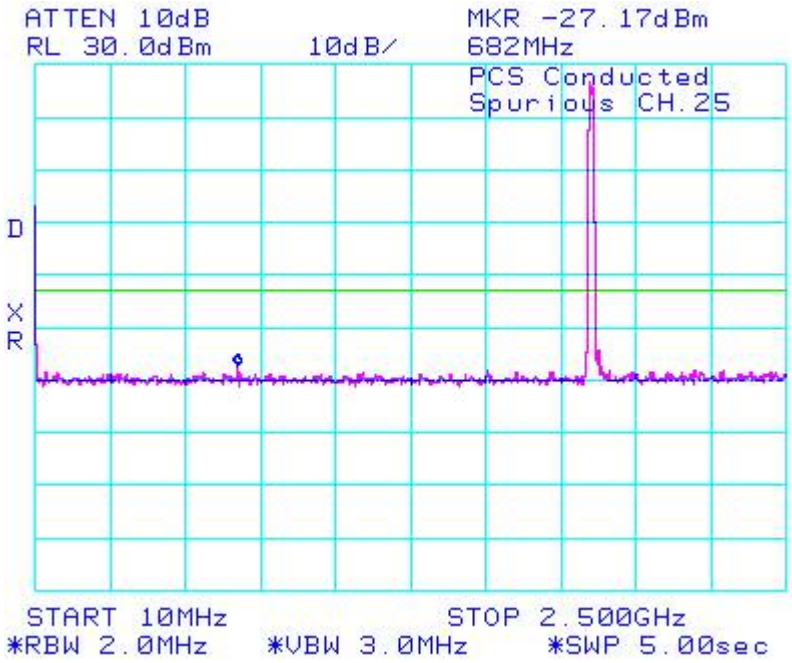
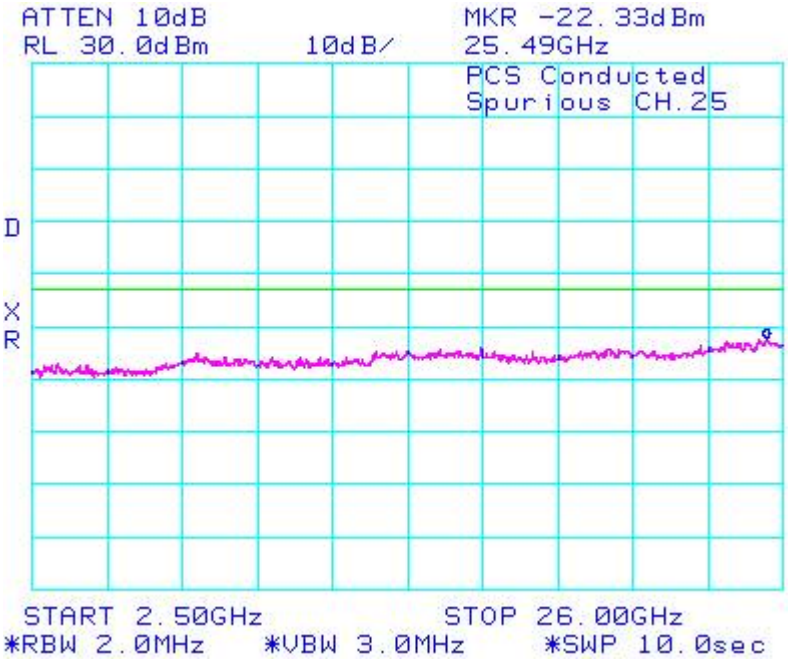



**Figure 8: PCS, Spurious Conducted Emissions, Low Channel**



Conducted Emission Test Results cont'd

**Figure 9: PCS, Spurious Conducted Emissions, Middle Channel**

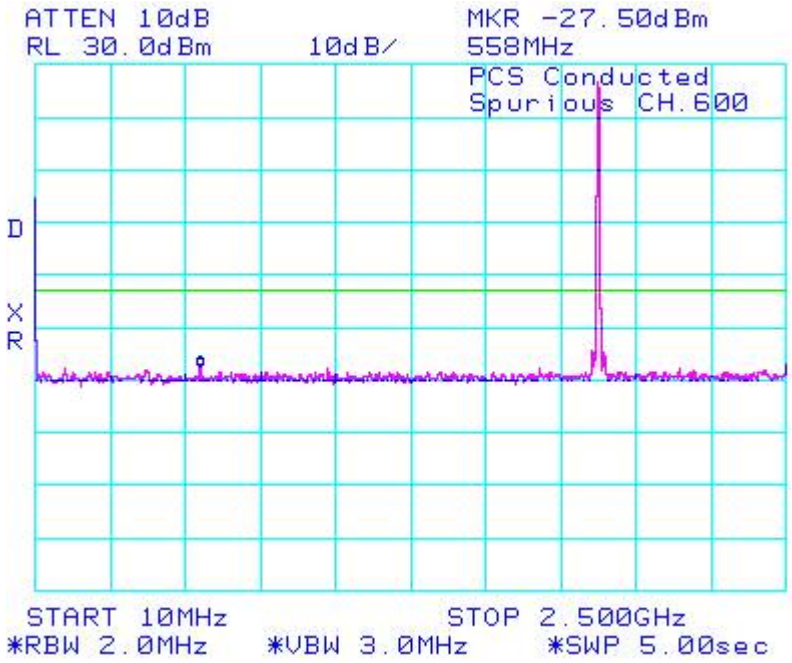
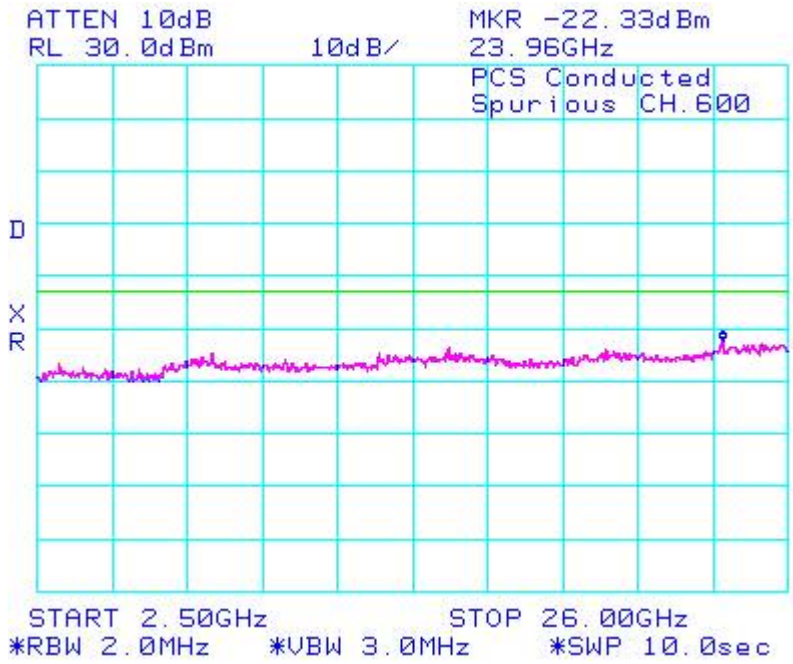



**Figure 10: PCS, Spurious Conducted Emissions, Middle Channel**



Conducted Emission Test Results cont'd

**Figure 11: PCS, Spurious Conducted Emissions, High Channel**

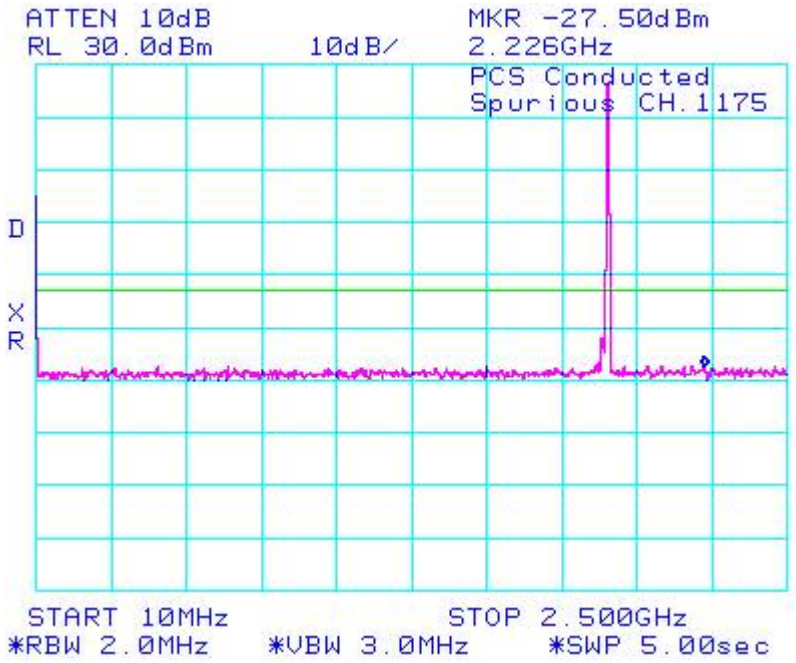
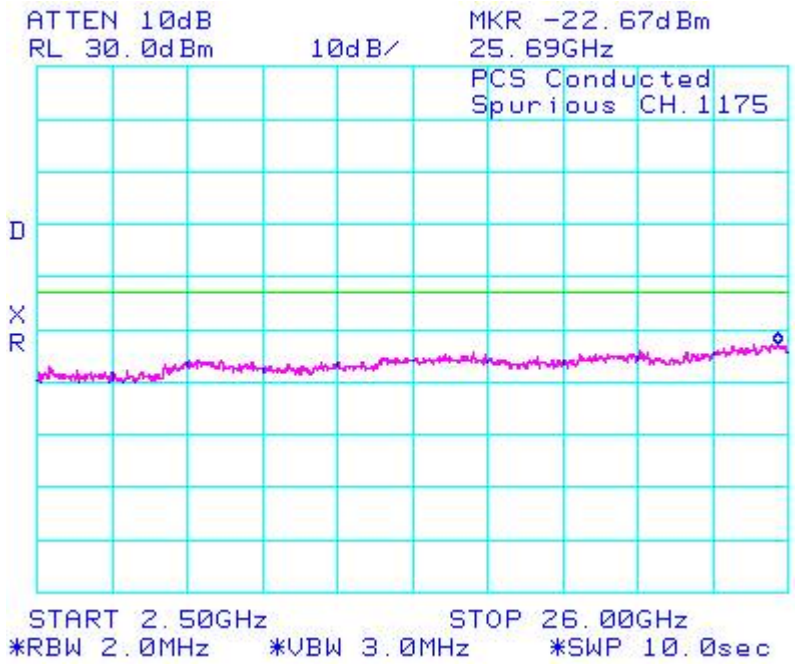



**Figure 12: PCS, Spurious Conducted Emissions, High Channel**



Conducted Emission Test Results cont'd

**Figure 13: Occupied Bandwidth, Cellular Low Channel**

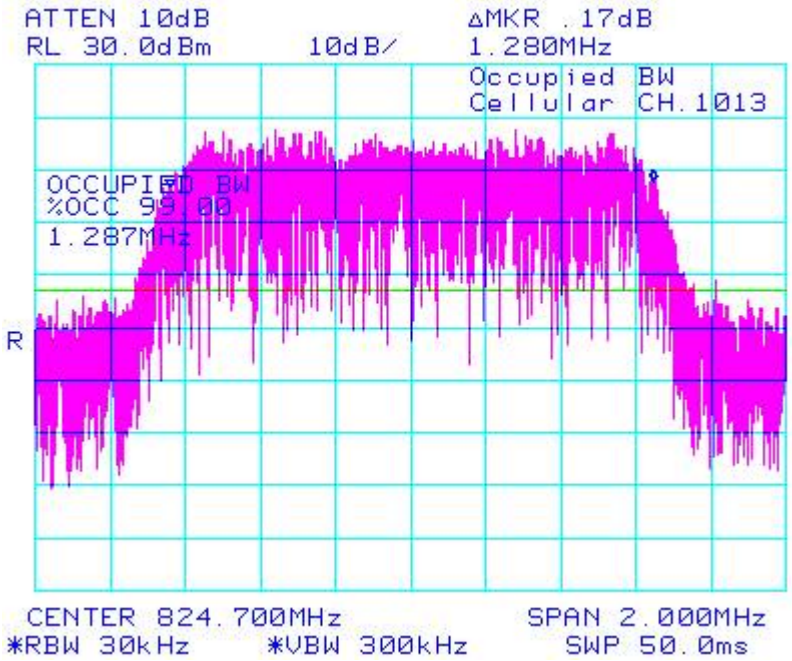
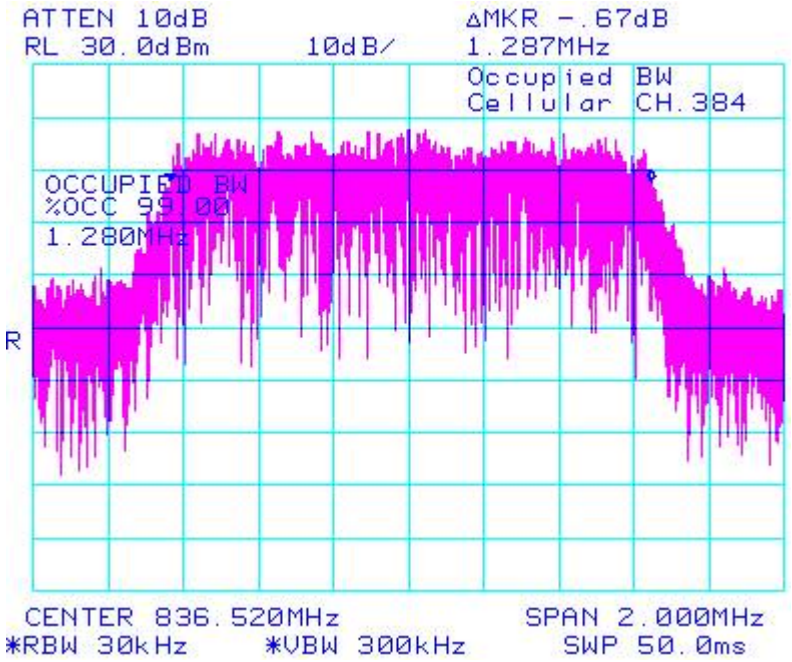



**Figure 14: Occupied Bandwidth, Cellular Middle Channel**



Conducted Emission Test Results cont'd

**Figure 15: Occupied Bandwidth, Cellular High Channel**

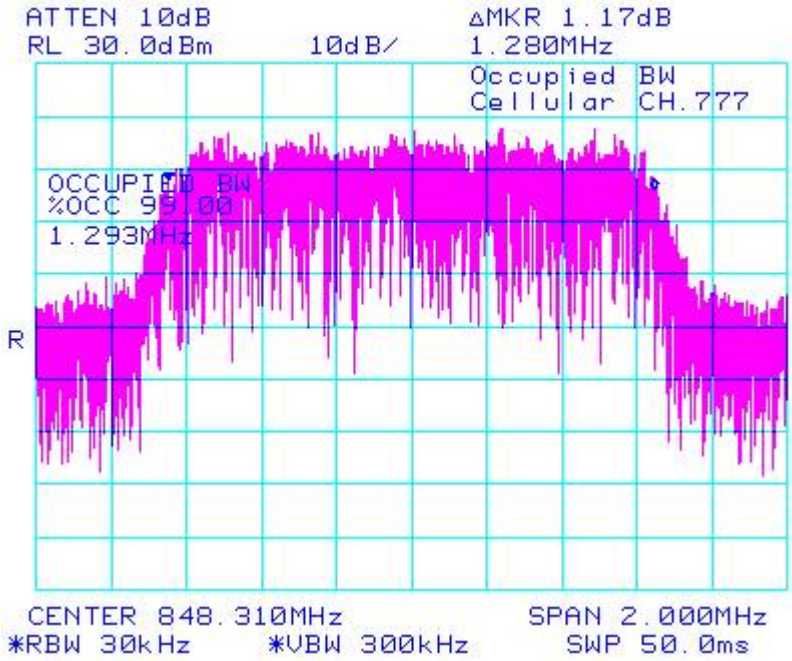
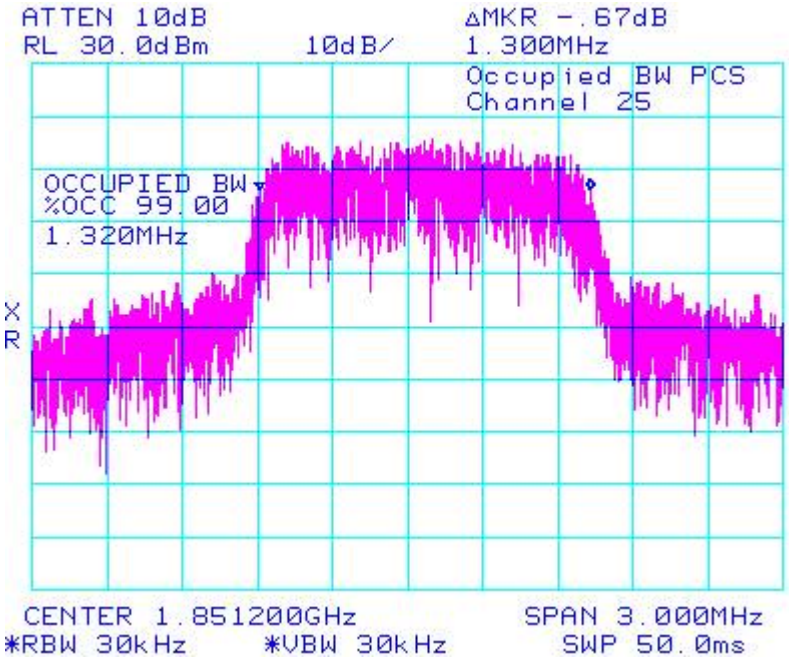



**Figure 16: Occupied Bandwidth, PCS Low Channel**



Conducted Emission Test Results cont'd

**Figure 17: Occupied Bandwidth, PCS Middle Channel**

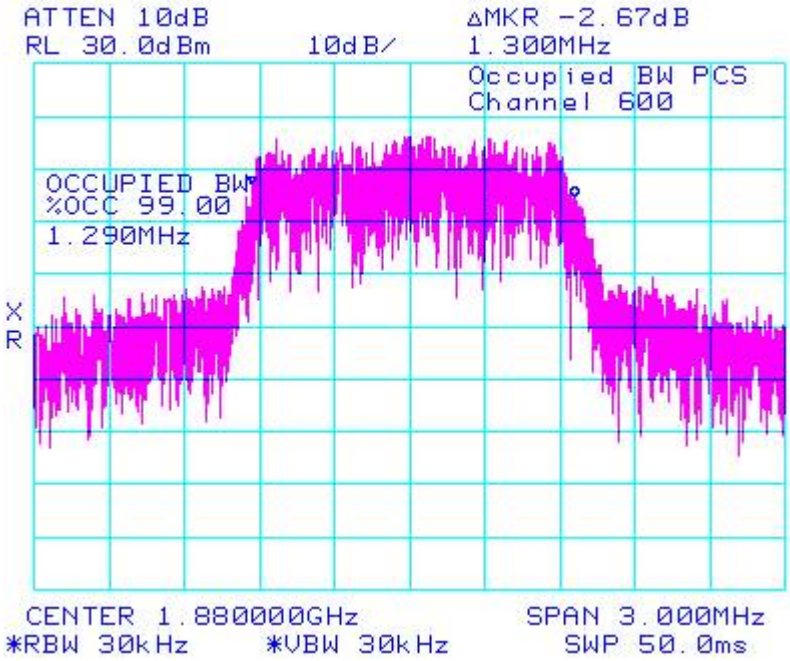
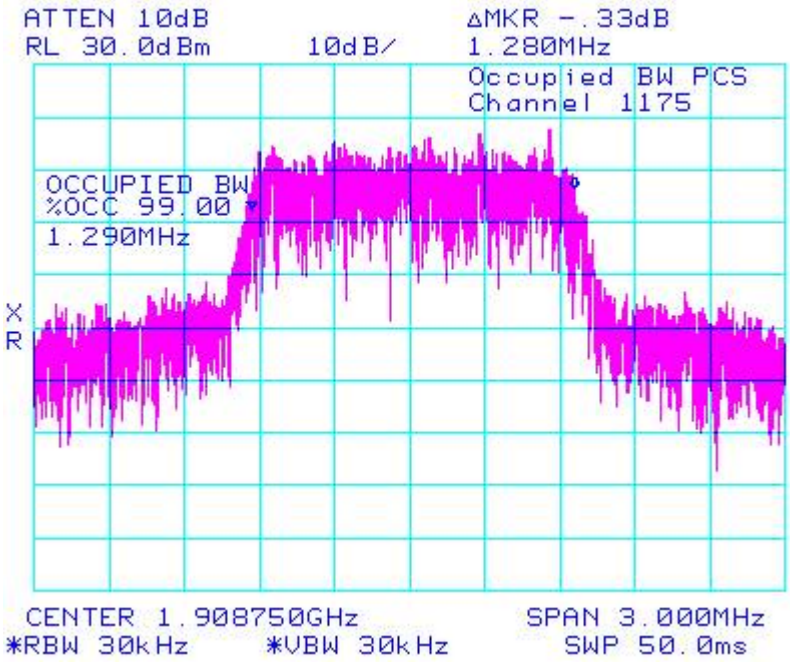



**Figure 18: Occupied Bandwidth, PCS High Channel**



Conducted Emission Test Results cont'd

**Figure 19a: Cellular CDMA2000, Low Channel Mask**

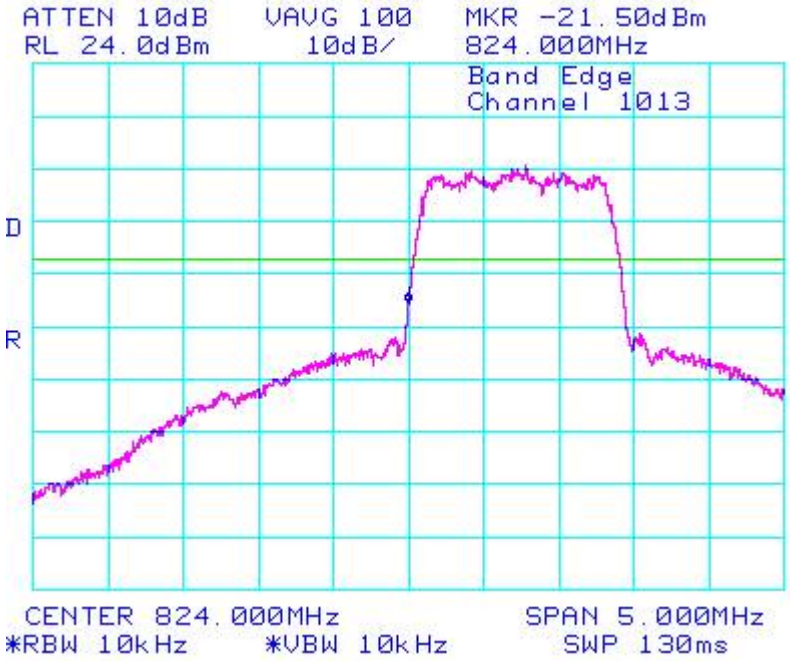
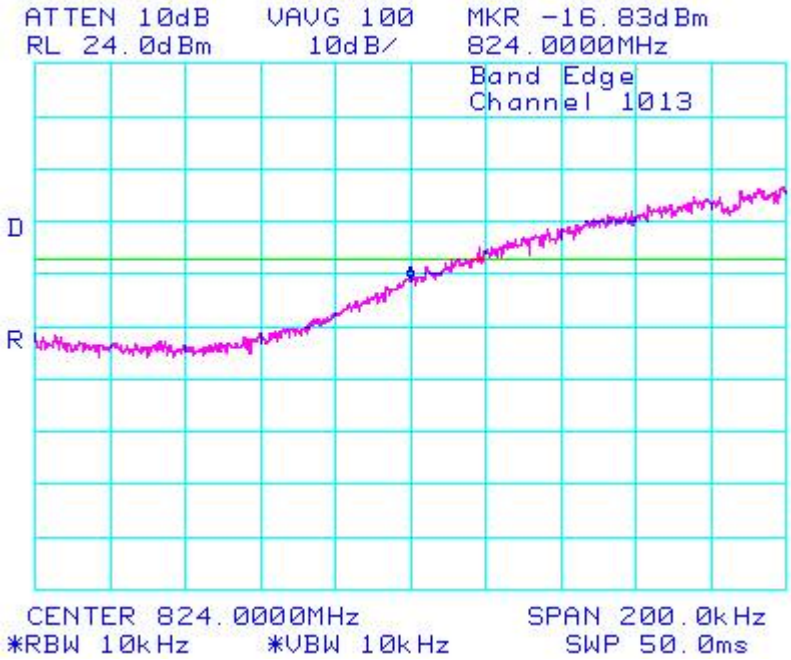



**Figure 19b: Cellular CDMA2000, Low Channel Mask**



Conducted Emission Test Results cont'd

**Figure 20a: Cellular CDMA2000, High Channel Mask**

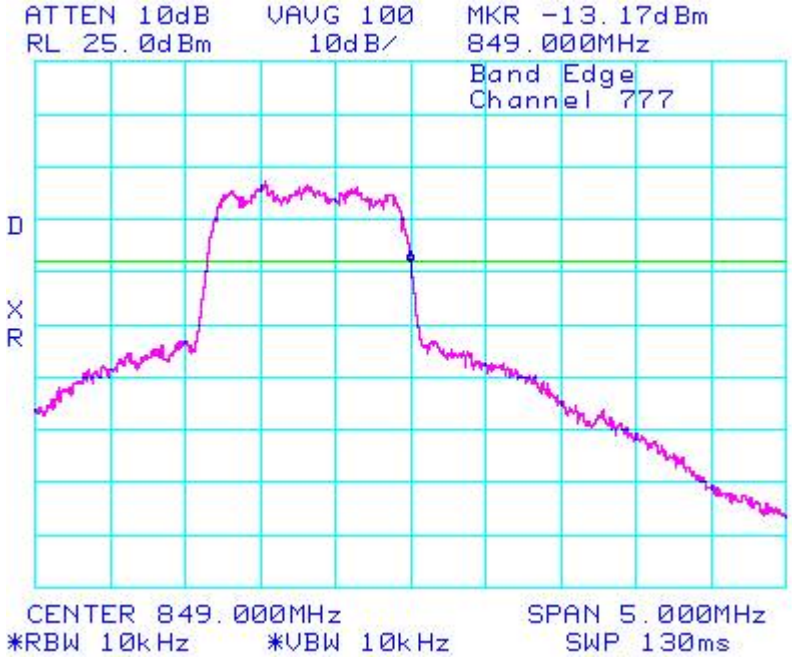
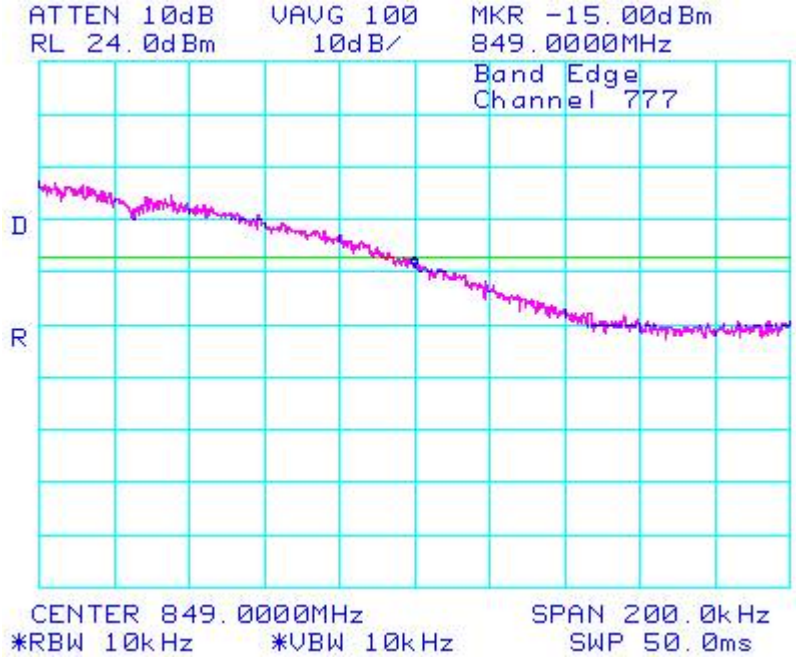



**Figure 20b: Cellular CDMA2000, Low Channel Mask**



## Conducted Emission Test Results cont'd

**Figure 21: PCS, Low Channel Mask**

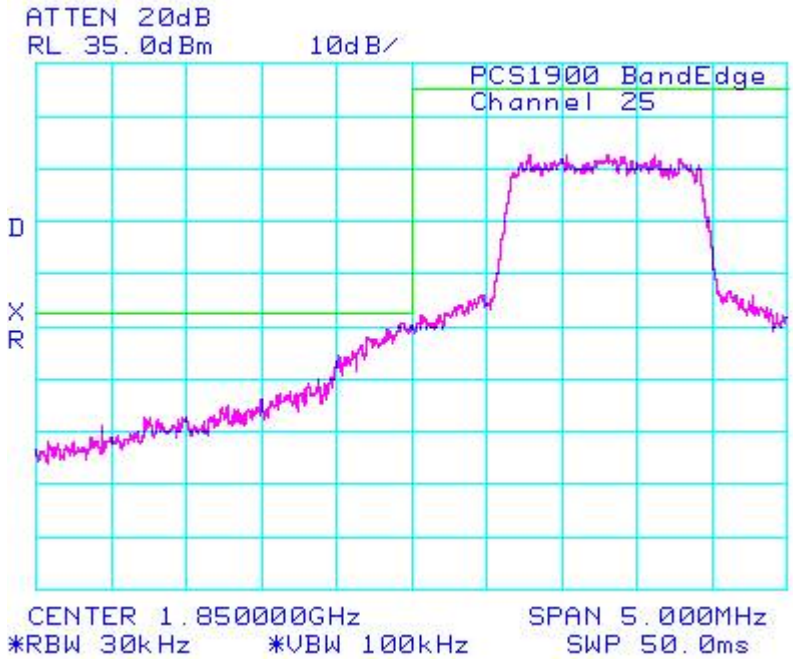
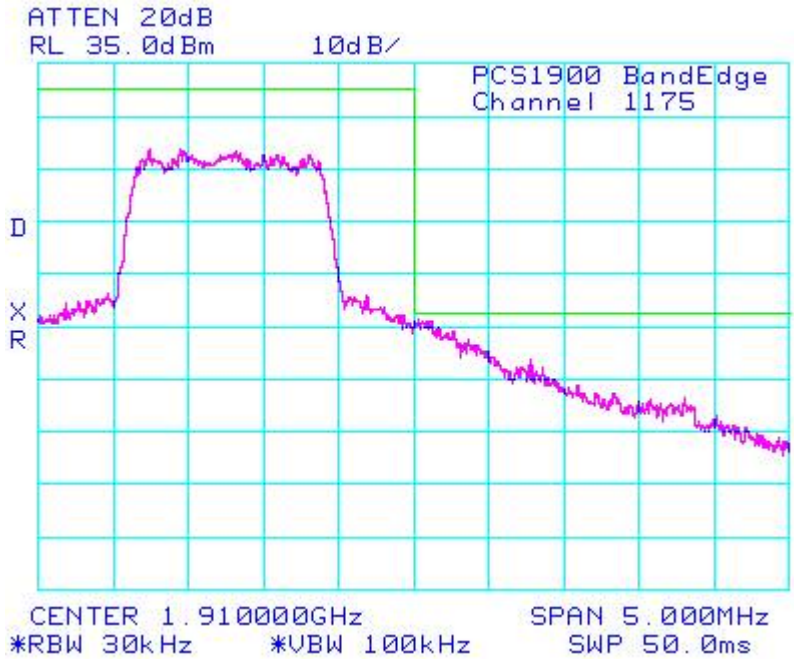



**Figure 22: PCS, High Channel Mask**



Conducted RF Emission Test Data cont'd

**The conducted spurious emissions** – As per 47 CFR 2.1051, CFR 24.238(a), RSS-GEN, 4.9, CFR 22 Subpart H and RSS-132 were measured from 10 MHz to 20 GHz. The EUT emissions were in the NF.
See figures 23 to 34 for the plots of the conducted spurious emissions.
Date of Test: August 29, 2007

***Test Data for Cellular and PCS selected Frequencies in 1xEVDO mode***

| Cellular Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|
| 824.700 | 1.287 |
| 836.520 | 1.293 |
| 848.310 | 1.293 |

| PCS Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|
| 1851.200 | 1.290 |
| 1880.000 | 1.300 |
| 1908.750 | 1.300 |

***Measurement Plots for Cellular and PCS in 1xEVDO mode***
Refer to the following measurement plots for more detail.

See Figures 35 to 40 for the plots of the 99% Occupied Bandwidth.
See Figures 41 to 44 for plots of the channel mask results.

The RF power output was at maximum for all the recorded measurements shown below.

Conducted Emission Test Results cont'd

**Figure 23: Cellular, Spurious Conducted Emissions, Low channel**

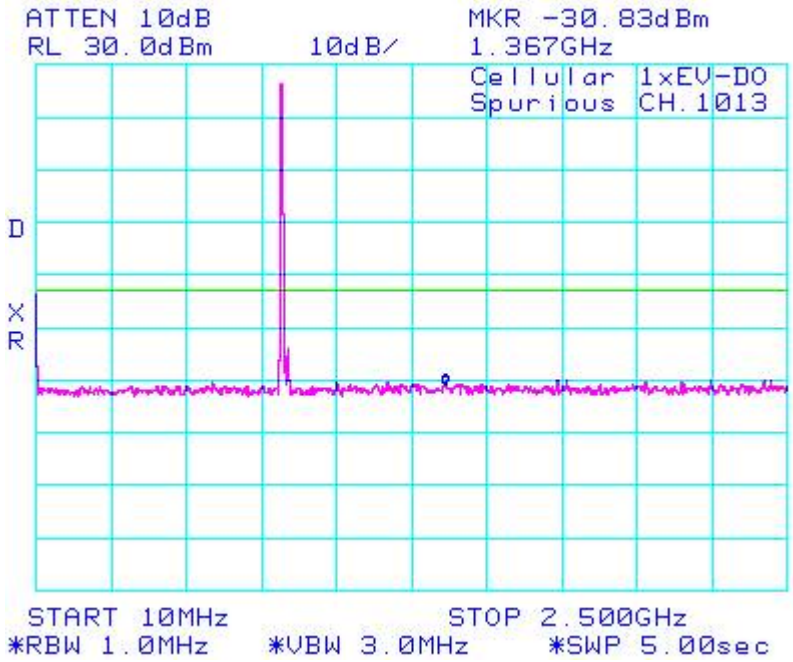
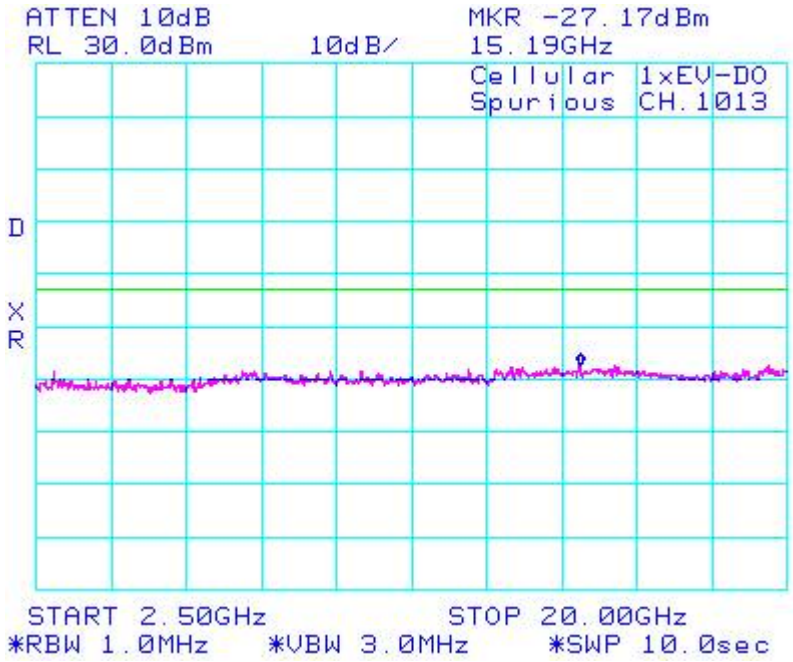



**Figure 24: Cellular, Spurious Conducted Emissions, Low channel**



Conducted Emission Test Results cont'd

**Figure 25: Cellular, Spurious Conducted Emissions, Middle Channel**

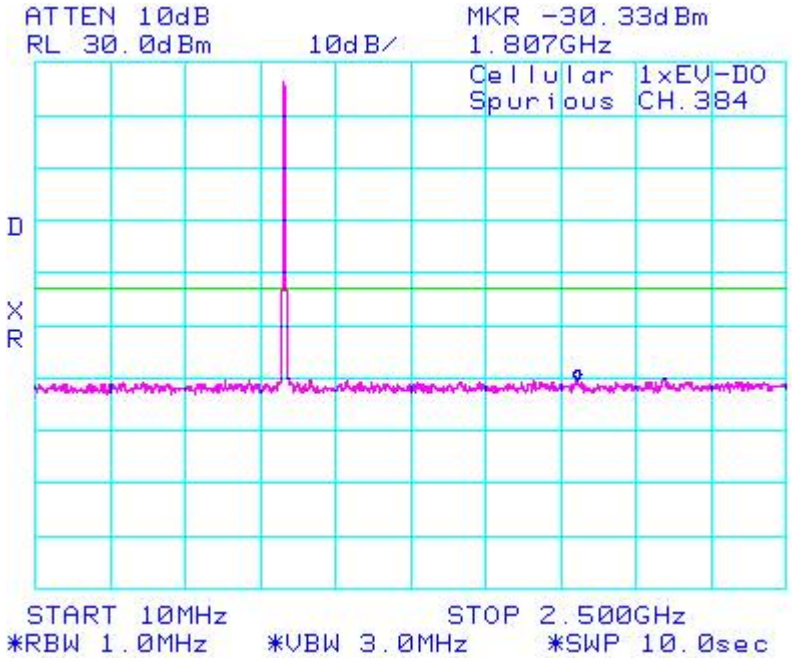
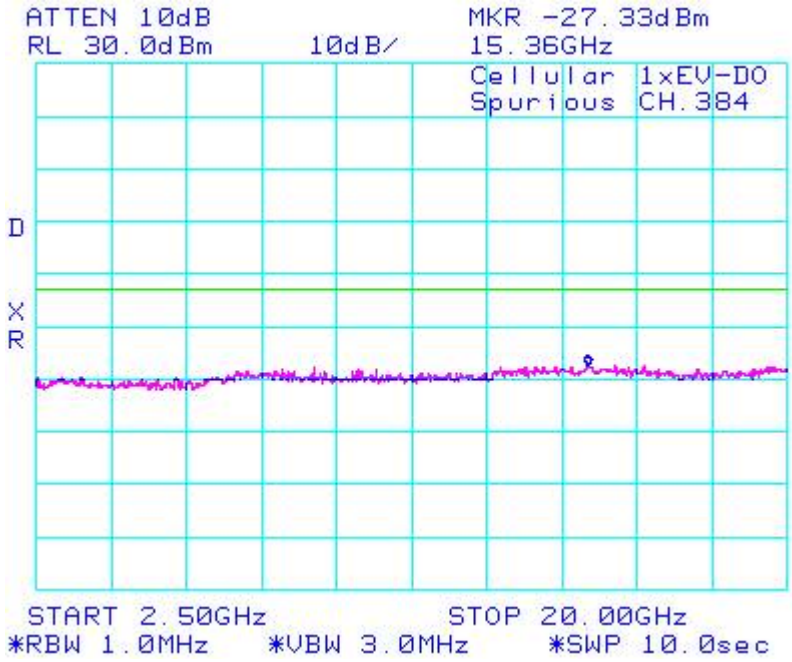



**Figure 26: Cellular, Spurious Conducted Emissions, Middle Channel**



Conducted Emission Test Results cont'd

**Figure 27: Cellular, Spurious Conducted Emissions, High Channel**

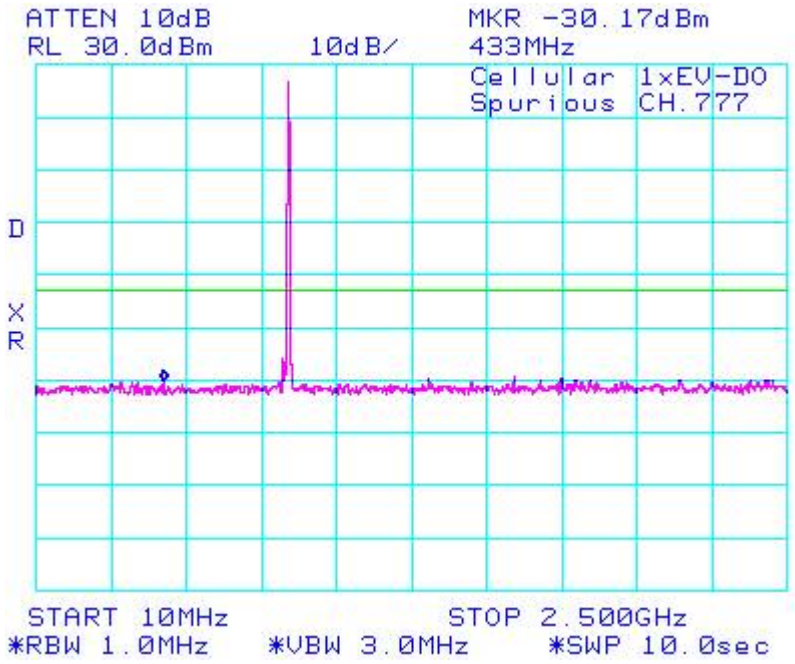
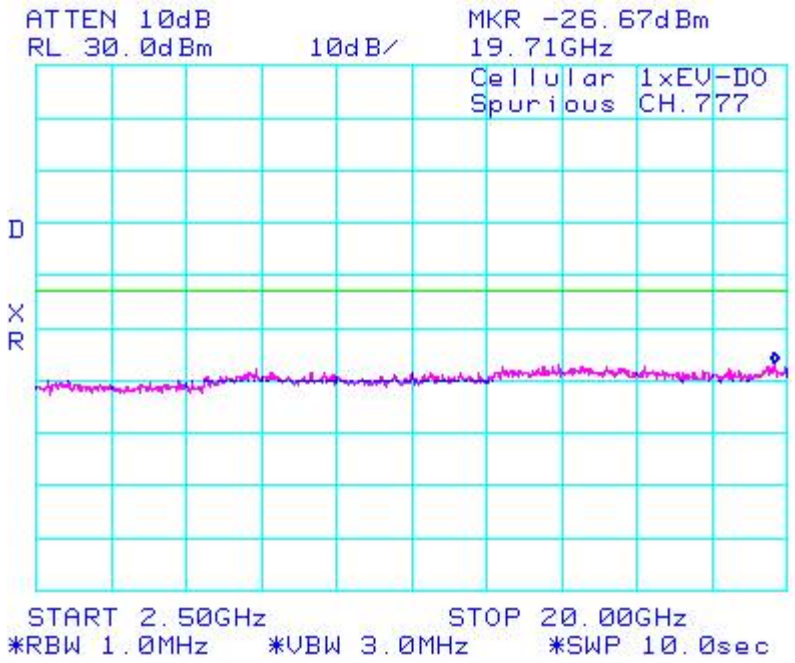



**Figure 28: Cellular, Spurious Conducted Emissions, High Channel**



Conducted Emission Test Results cont'd

**Figure 29: PCS, Spurious Conducted Emissions, Low Channel**

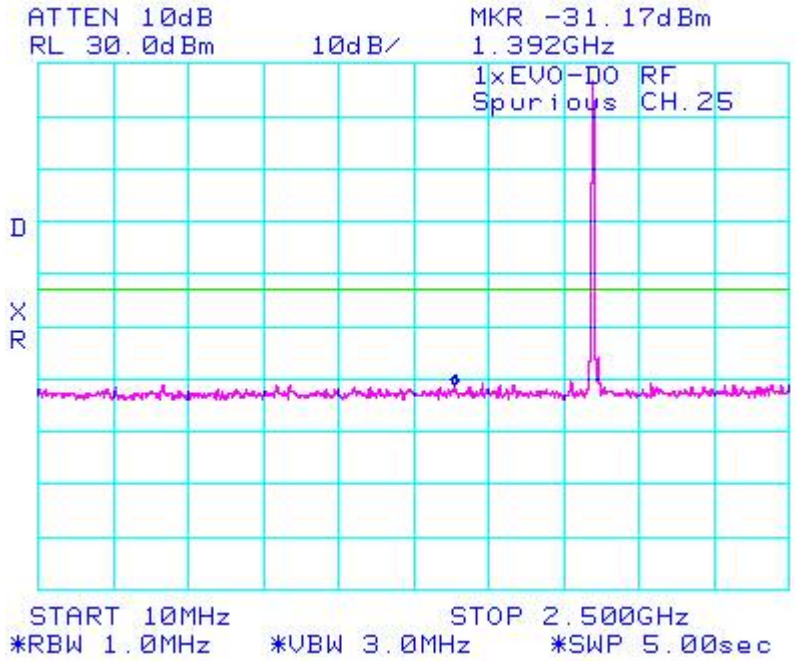
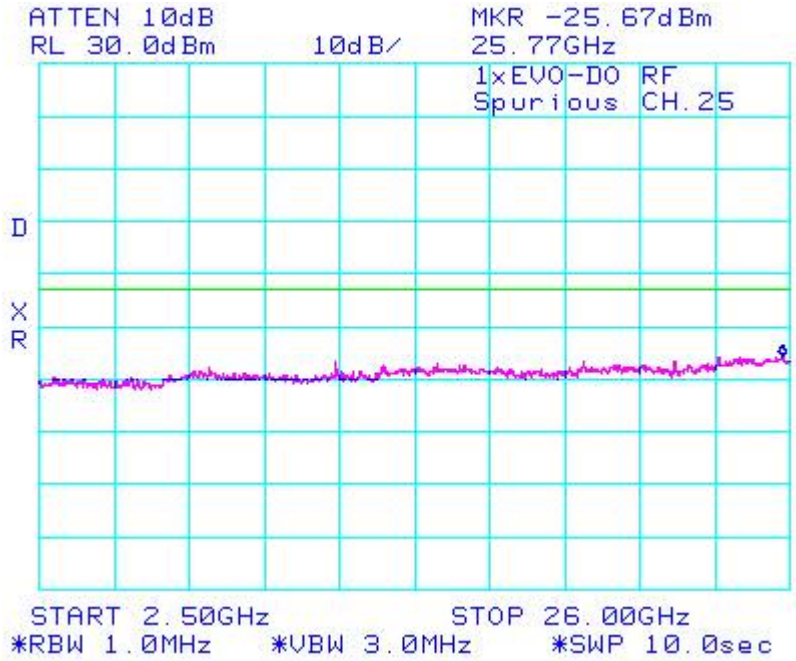



**Figure 30: PCS, Spurious Conducted Emissions, Low Channel**



Conducted Emission Test Results cont'd

**Figure 31: PCS, Spurious Conducted Emissions, Middle Channel**

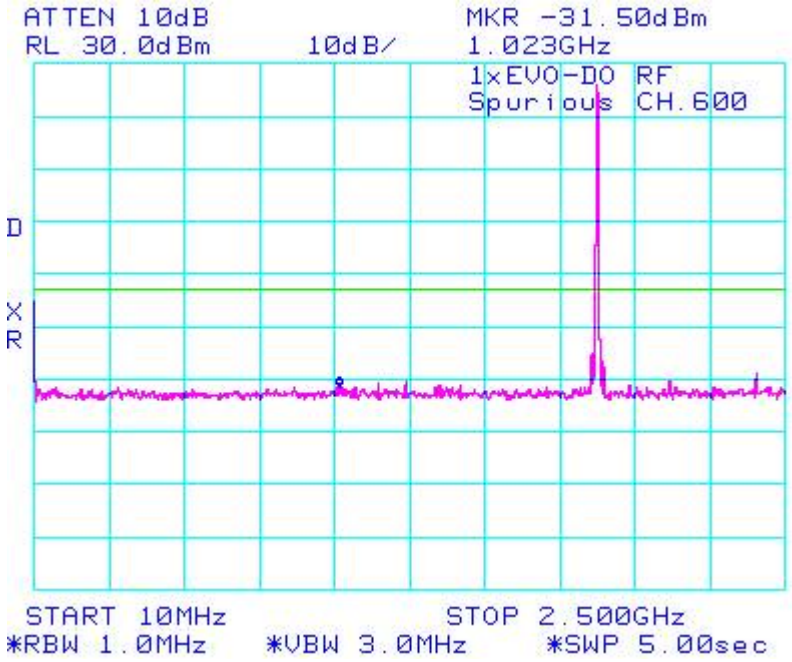
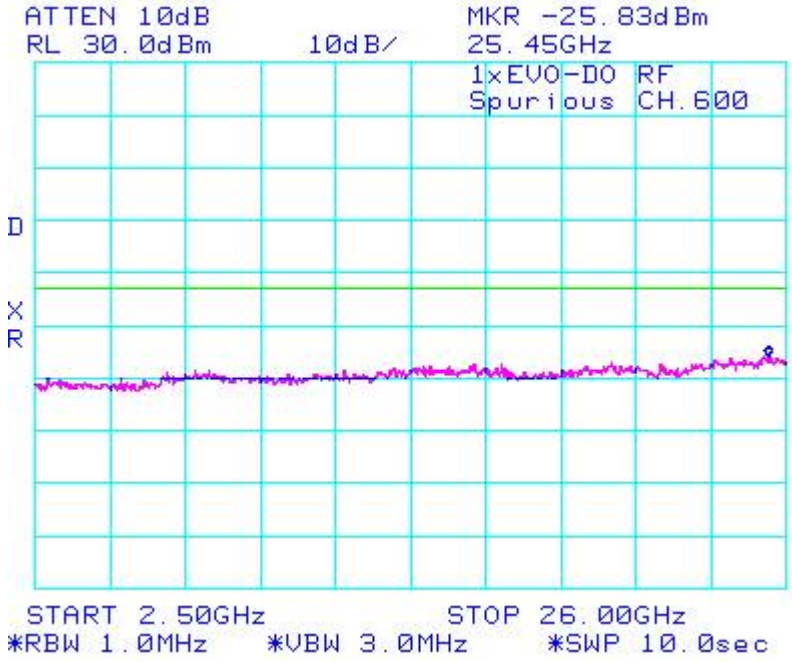



**Figure 32: PCS, Spurious Conducted Emissions, Middle Channel**



Conducted Emission Test Results cont'd

**Figure 33: PCS, Spurious Conducted Emissions, High Channel**

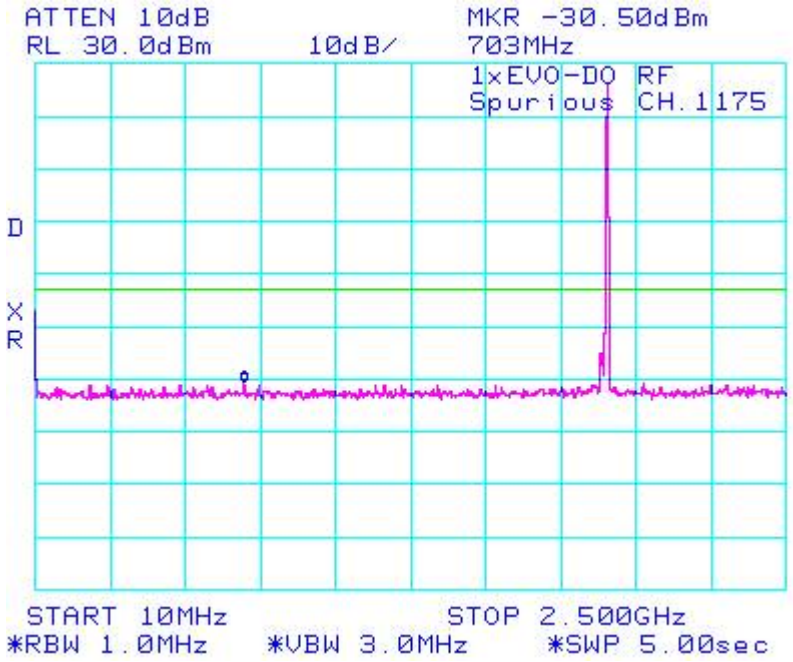
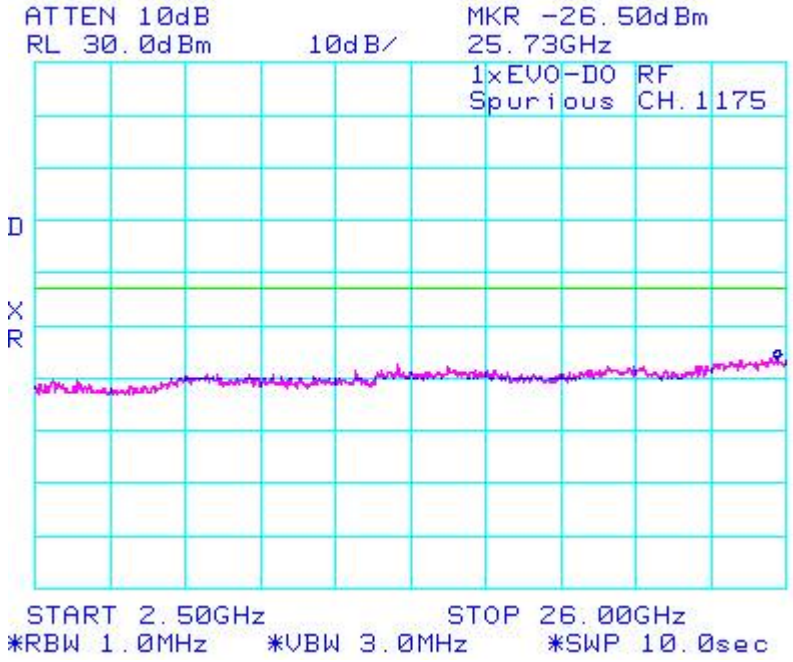



**Figure 34: PCS, Spurious Conducted Emissions, High Channel**



Conducted Emission Test Results cont'd

**Figure 35: Occupied Bandwidth, Cellular Low Channel**

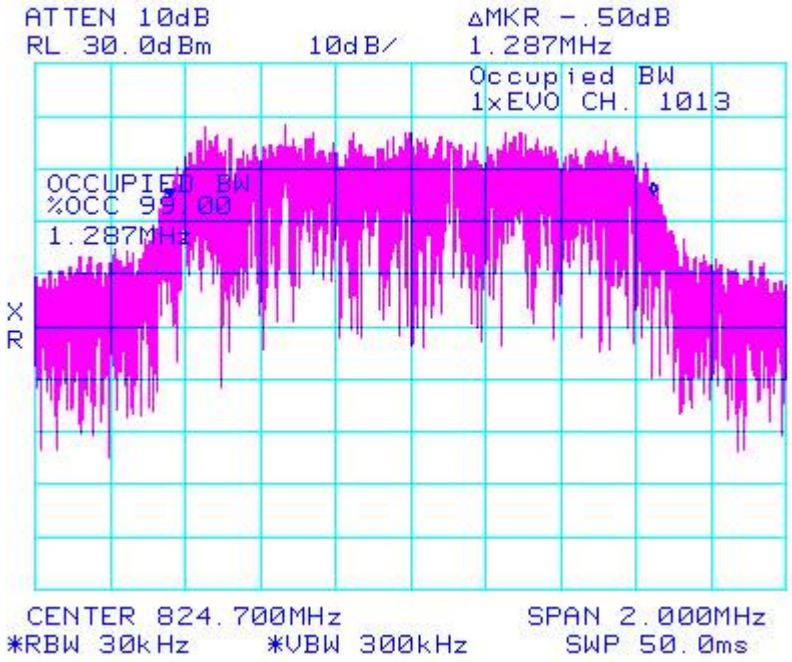
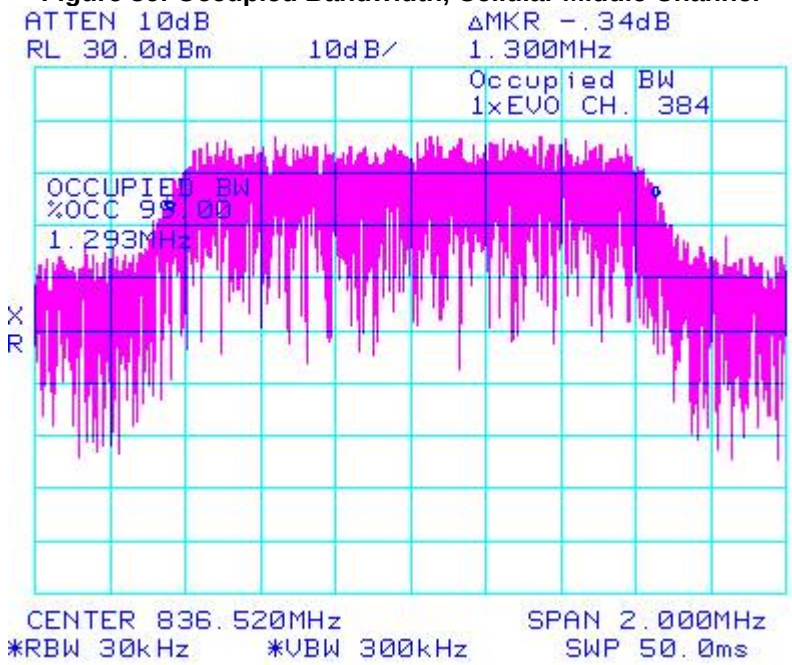



**Figure 36: Occupied Bandwidth, Cellular Middle Channel**



Conducted Emission Test Results cont'd

**Figure 37: Occupied Bandwidth, Cellular High Channel**

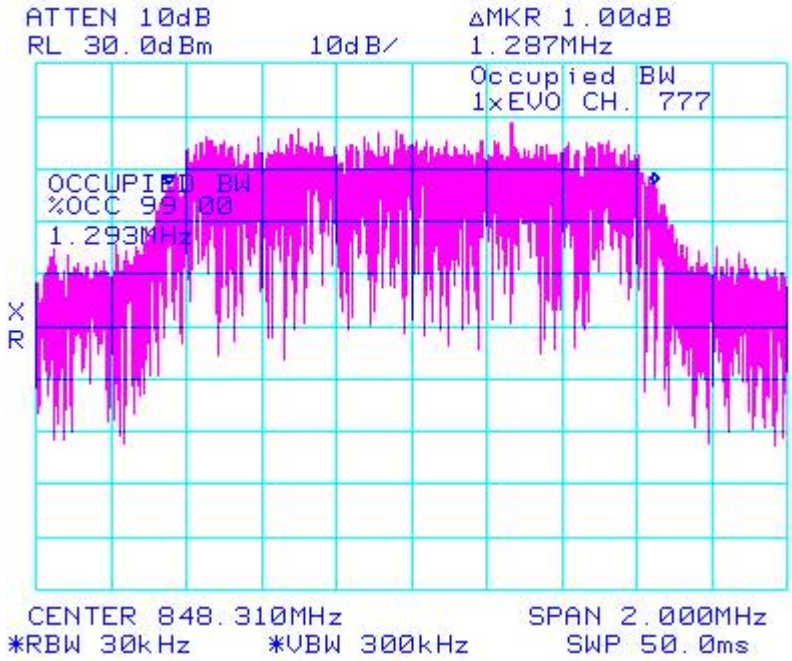
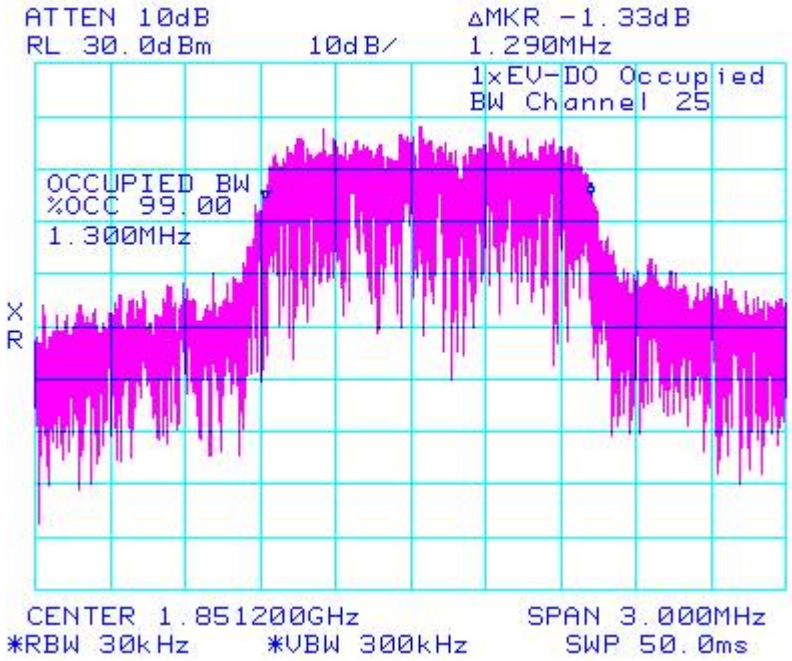



**Figure 38: Occupied Bandwidth, PCS Low Channel**



Conducted Emission Test Results cont'd

**Figure 39: Occupied Bandwidth, PCS Middle Channel**

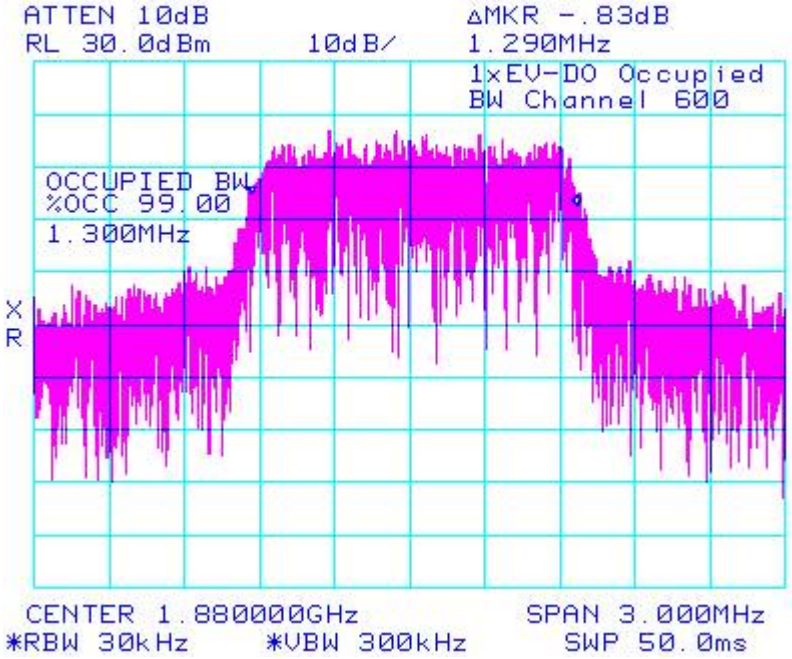
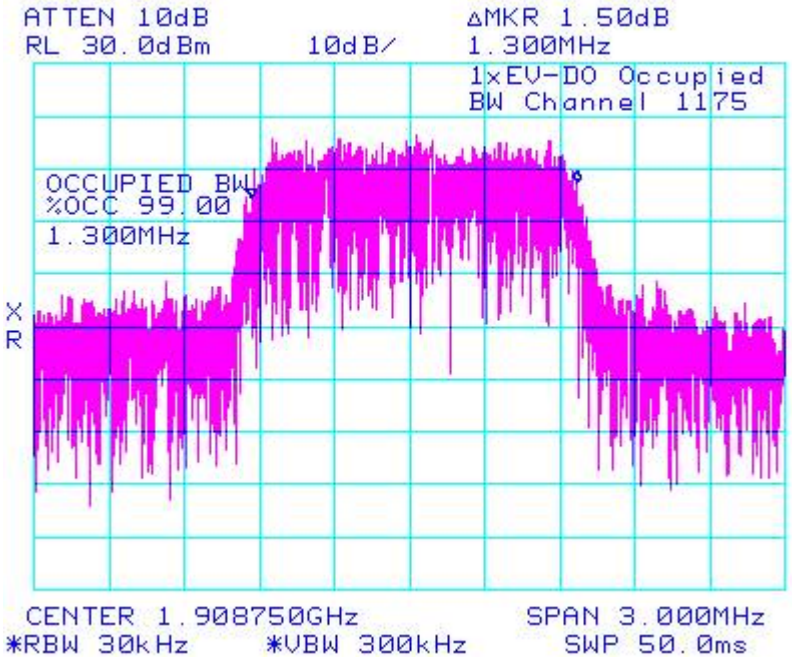



**Figure 40: Occupied Bandwidth, PCS High Channel**



Conducted Emission Test Results cont'd

**Figure 41a: Cellular 1xEVDO, Low Channel Mask**

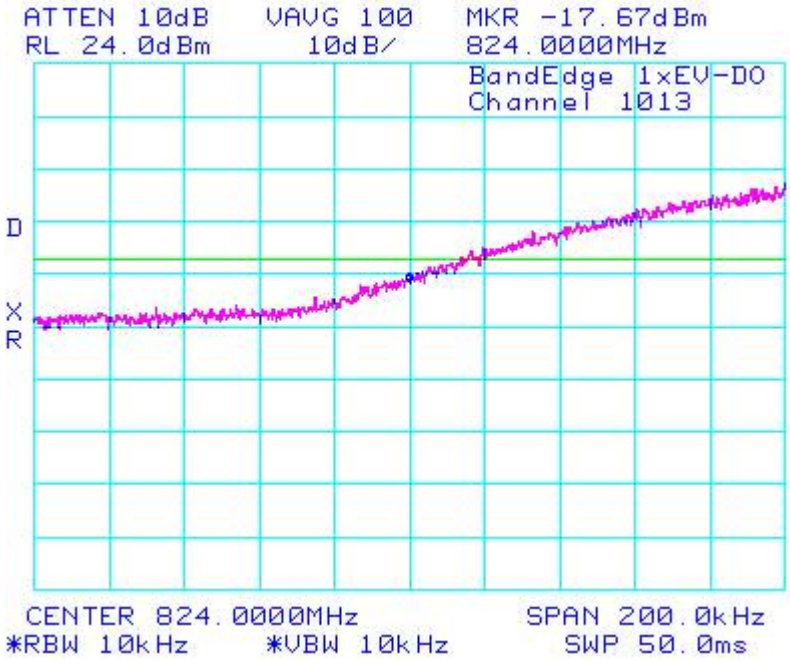
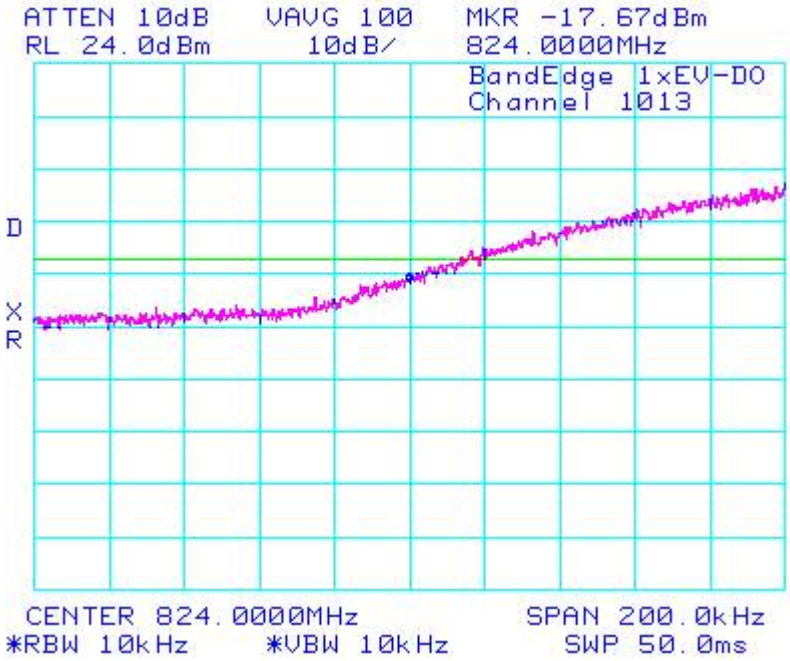



**Figure 41b: Cellular 1xEVDO, Low Channel Mask**



Conducted Emission Test Results cont'd

**Figure 42a: Cellular 1xEVDO, High Channel Mask**

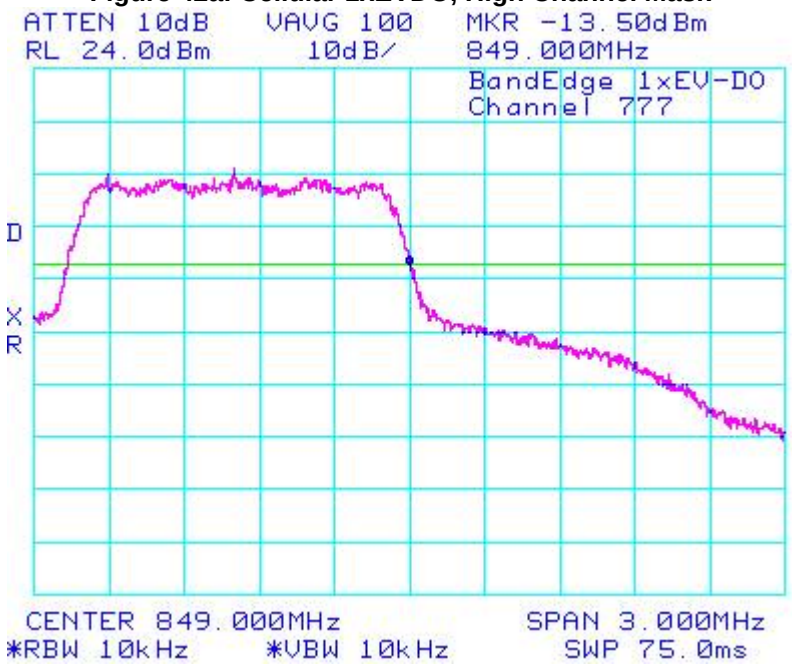
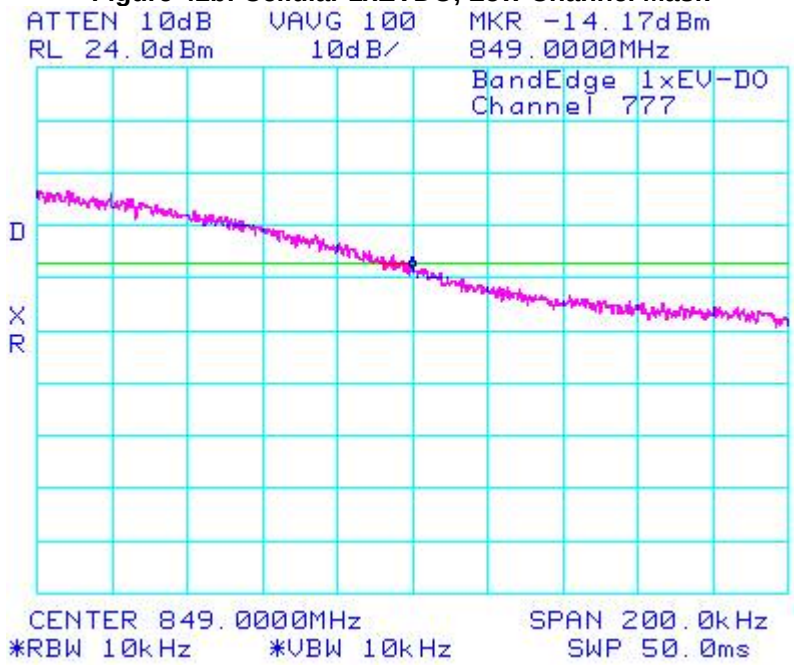



**Figure 42b: Cellular 1xEVDO, Low Channel Mask**



Conducted Emission Test Results cont'd

**Figure 43: PCS, Low Channel Mask**

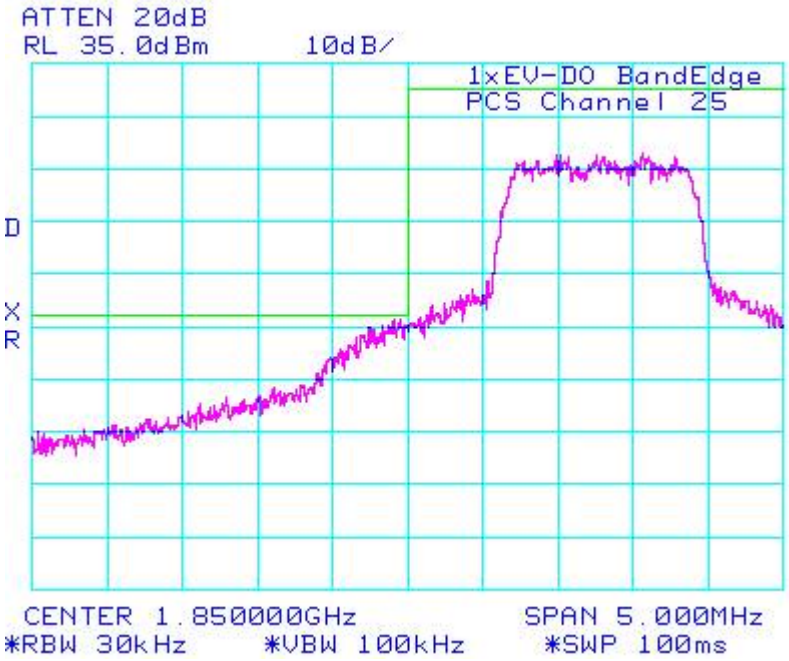
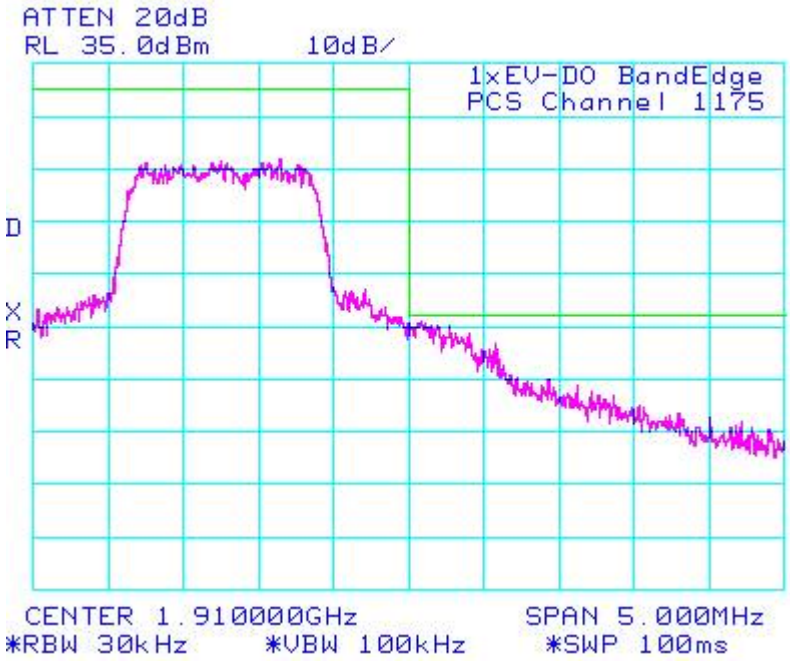



**Figure 44: PCS, High Channel Mask**



# APPENDIX 2 – CONDUCTED RF OUTPUT POWER TEST DATA

## Conducted RF Output Power Test Data

The measurements were performed by Maurice Battler.

The conducted RF output power was measured using the CDMA base station simulator. Low, middle and high channels were measured at maximum radio output power at different service options and modes.
Peak nominal output power is 24.50 dBm ±0.5 dB for Cellular and 23.50 dBm ±0.5 dB for PCS.

Date of Test: August 13, 2007

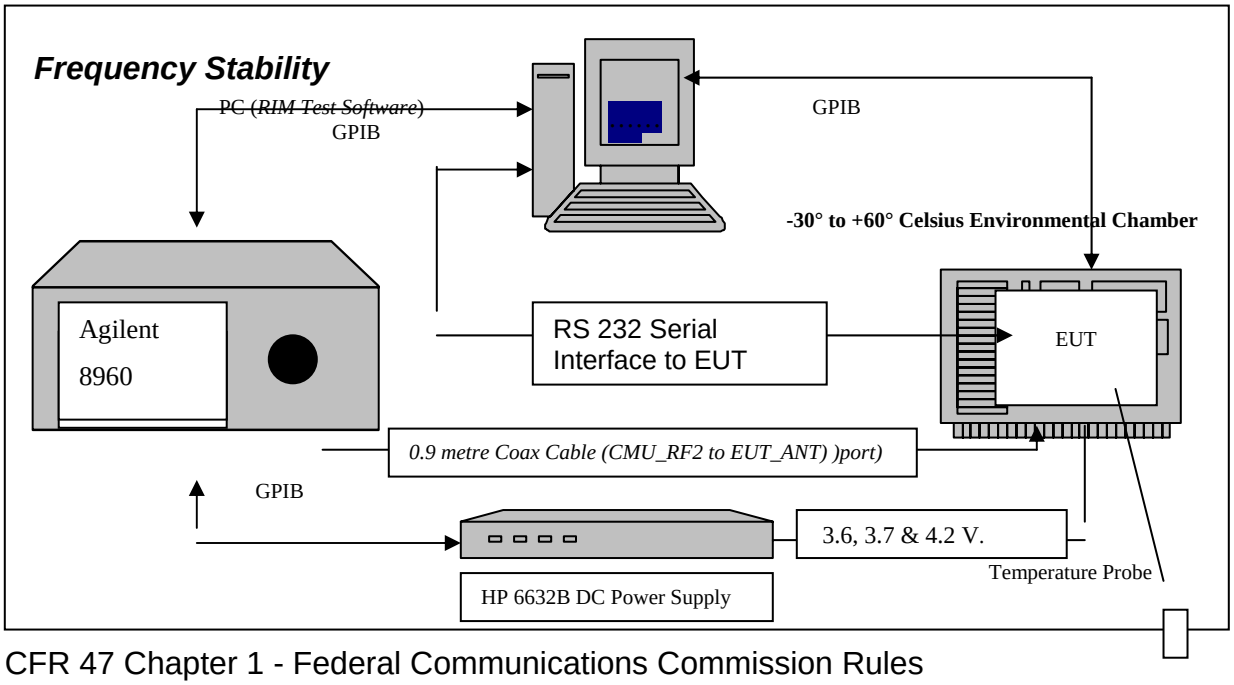
### Test Results

| Band | Channel | 1x EvDO (153.6kbps) | | CDMA2000 RC | SO2 Loopback | | SO55 Loopback | | TDSO SO32 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (dBm) | (Watts) | | (dBm) | (Watts) | (dBm) | (Watts) | (dBm) | (Watts) |
| CDMA 800 | 1013 | 24.1 | 0.257 | RC1 | 24.46 | 0.279 | 24.09 | 0.256 | - | - |
| | | | | RC3 | 24.25 | 0.266 | 24.18 | 0.262 | 24.23 | 0.265 |
| | 384 | 24.1 | 0.257 | RC1 | 24.40 | 0.275 | 24.05 | 0.254 | - | - |
| | | | | RC3 | 24.24 | 0.266 | 24.13 | 0.259 | 24.18 | 0.262 |
| | 777 | 24.0 | 0.251 | RC1 | 24.20 | 0.263 | 24.02 | 0.252 | - | - |
| | | | | RC3 | 24.06 | 0.255 | 24.00 | 0.251 | 24.02 | 0.252 |

| Band | Channel | 1x EvDO (153.6kbps) | | CDMA2000 RC | SO2 Loopback | | SO55 Loopback | | TDSO SO32 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (dBm) | (Watts) | | (dBm) | (Watts) | (dBm) | (Watts) | (dBm) | (Watts) |
| CDMA 1900 | 25 | 23.3 | 0.214 | RC1 | 23.42 | 0.220 | 23.54 | 0.226 | - | - |
| | | | | RC3 | 23.54 | 0.226 | 23.70 | 0.234 | 23.75 | 0.237 |
| | 600 | 23.2 | 0.209 | RC1 | 23.59 | 0.229 | 23.73 | 0.236 | - | - |
| | | | | RC3 | 23.67 | 0.233 | 23.89 | 0.245 | 23.90 | 0.246 |
| | 1175 | 23.4 | 0.219 | RC1 | 23.84 | 0.242 | 23.91 | 0.246 | - | - |
| | | | | RC3 | 23.90 | 0.246 | 24.00 | 0.251 | 23.99 | 0.251 |

# APPENDIX 3 – FREQUENCY STABILITY TEST DATA

## Frequency Stability Test Data




CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements
2.995 Frequency Stability - Procedures
(a,b) Frequency Stability - Temperature Variation
(d) Frequency Stability - Voltage Variation

**24.235** *Frequency Stability*.

*The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.*

The RBS21CW BlackBerry® smartphone, (referred as EUT herein and after) transmitted frequencies are less than 0.1 ppm of the received frequency from the Agilent 8960 CDMA Base Station Simulator

*The EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, RSS-133, CFR 47 chapter 1, Section 22.917 and RSS-132 Frequency Stability.*

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the baste station simulator and the EUT antenna port; located inside the environmental chamber.

Calibration for the Cable Loss was performed in the RF Laboratory using the Giga-tronics power metre and Agilent Signal Generator.

The cable assembly from the RF input to the RF output was measured at the following Frequencies:

| PCS Frequency (MHz) | Cable loss (dB) |
|---|---|
| 1851.20 | 1.40 |
| 1880.00 | 1.40 |
| 1908.75 | 1.40 |

| Cellular Frequency (MHz) | Cable loss (dB) |
|---|---|
| 824.70 | 0.90 |
| 836.52 | 0.90 |
| 848.31 | 0.90 |

Procedure:

The EUT was placed in the Temperature chamber and connected to the Agilent 8960 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the measurements were to be made.

The chamber was switched on and the temperature was set to -30°C.
After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled.
The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the base station simulator via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, to 3.7 volts nominal voltage to 4.2 volts maximum voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 3.7 volts and 4.2 volts. The transmit frequency was varied in 3 steps consisting of 824.70, 836.52, and 848.31 MHz for the cellular band and 1851.20, 1880.00 and 1908.75 MHz for the PCS band. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.
After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

PROCEDURE:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

1. Switch on the HP 6632B power supply; AGILENT 8960, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.6 volts.
5. Set up base station simulator.
6. Command the base station simulator to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the base station simulator.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the base station simulator, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power, Frequency Error.
10. The base station simulator commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 3.7 Volts
12. Increase temperature by 10°C and soak for 1/2 hour.
13. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
14. Repeat steps 5 to 10 changing the supply voltage to 4.2 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 3.7 and 4.2 volts.

The maximum frequency error in the Cellular band measured was --0.0237 PPM.
The maximum frequency error in the PCS band measured was -0.0296 PPM.

Date of test, September 04, 2007.

The measurements were performed by Maurice Battler.

Cellular Channel results: channels 1013, 384 and 777 @ 20°C maximum transmitted power

| Traffic Channel Number | Cellular Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | *PPM* |
|---|---|---|---|---|---|
| 1013 | 824.700 | 3.6 | 20 | -6.09 | -0.0074 |
| 384 | 836.520 | 3.6 | 20 | -0.32 | -0.0004 |
| 777 | 848.310 | 3.6 | 20 | -0.44 | -0.0005 |

| Traffic Channel Number | Cellular Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1013 | 824.700 | 3.7 | 20 | -2.86 | -0.0035 |
| 384 | 836.520 | 3.7 | 20 | -5.33 | -0.0064 |
| 777 | 848.310 | 3.7 | 20 | -2.23 | -0.0025 |

| Traffic Channel Number | Cellular Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1013 | 824.700 | 4.2 | 20 | -3.40 | -0.0041 |
| 384 | 836.520 | 4.2 | 20 | -5.93 | -0.0071 |
| 777 | 848.310 | 4.2 | 20 | -0.91 | -0.0010 |

Cellular Results: channel 1013 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1013 | 824.700 | 3.6 | -30 | -19.57 | **-0.0237** |
| 1013 | 824.700 | 3.6 | -20 | -10.17 | -0.0123 |
| 1013 | 824.700 | 3.6 | -10 | -9.23 | -0.0112 |
| 1013 | 824.700 | 3.6 | 0 | -6.94 | -0.0084 |
| 1013 | 824.700 | 3.6 | 10 | -1.29 | -0.0016 |
| 1013 | 824.700 | 3.6 | 20 | -6.09 | -0.0074 |
| 1013 | 824.700 | 3.6 | 30 | -15.64 | -0.0190 |
| 1013 | 824.700 | 3.6 | 40 | -18.74 | -0.0227 |
| 1013 | 824.700 | 3.6 | 50 | -18.16 | -0.0220 |
| 1013 | 824.700 | 3.6 | 60 | -13.69 | -0.0166 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1013 | 824.700 | 3.7 | -30 | -3.96 | -0.0048 |
| 1013 | 824.700 | 3.7 | -20 | -7.34 | -0.0089 |
| 1013 | 824.700 | 3.7 | -10 | -4.32 | -0.0052 |
| 1013 | 824.700 | 3.7 | 0 | -4.89 | -0.0059 |
| 1013 | 824.700 | 3.7 | 10 | -3.61 | -0.0044 |
| 1013 | 824.700 | 3.7 | 20 | -2.86 | -0.0035 |
| 1013 | 824.700 | 3.7 | 30 | -3.05 | -0.0037 |
| 1013 | 824.700 | 3.7 | 40 | -3.10 | -0.0038 |
| 1013 | 824.700 | 3.7 | 50 | -4.08 | -0.0049 |
| 1013 | 824.700 | 3.7 | 60 | -5.80 | -0.0070 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1013 | 824.700 | 4.2 | -30 | -2.37 | -0.0029 |
| 1013 | 824.700 | 4.2 | -20 | -8.57 | -0.0104 |
| 1013 | 824.700 | 4.2 | -10 | -4.75 | -0.0058 |
| 1013 | 824.700 | 4.2 | 0 | -9.53 | -0.0116 |
| 1013 | 824.700 | 4.2 | 10 | -7.94 | -0.0096 |
| 1013 | 824.700 | 4.2 | 20 | -3.40 | -0.0041 |
| 1013 | 824.700 | 4.2 | 30 | -0.24 | -0.0003 |
| 1013 | 824.700 | 4.2 | 40 | -2.26 | -0.0027 |
| 1013 | 824.700 | 4.2 | 50 | -4.83 | -0.0059 |
| 1013 | 824.700 | 4.2 | 60 | -11.11 | -0.0135 |

Cellular Results: channel 384 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 384 | 836.520 | 3.6 | -30 | -18.39 | -0.0220 |
| 384 | 836.520 | 3.6 | -20 | -2.38 | -0.0028 |
| 384 | 836.520 | 3.6 | -10 | -4.33 | -0.0052 |
| 384 | 836.520 | 3.6 | 0 | 1.45 | 0.0017 |
| 384 | 836.520 | 3.6 | 10 | 7.73 | 0.0092 |
| 384 | 836.520 | 3.6 | 20 | -0.32 | -0.0004 |
| 384 | 836.520 | 3.6 | 30 | -9.67 | -0.0116 |
| 384 | 836.520 | 3.6 | 40 | -11.84 | -0.0141 |
| 384 | 836.520 | 3.6 | 50 | -9.21 | -0.0110 |
| 384 | 836.520 | 3.6 | 60 | -2.02 | -0.0024 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 384 | 836.520 | 3.7 | -30 | -11.18 | -0.0134 |
| 384 | 836.520 | 3.7 | -20 | -6.79 | -0.0081 |
| 384 | 836.520 | 3.7 | -10 | -6.29 | -0.0075 |
| 384 | 836.520 | 3.7 | 0 | -4.49 | -0.0054 |
| 384 | 836.520 | 3.7 | 10 | -3.21 | -0.0038 |
| 384 | 836.520 | 3.7 | 20 | -5.33 | -0.0064 |
| 384 | 836.520 | 3.7 | 30 | -6.86 | -0.0082 |
| 384 | 836.520 | 3.7 | 40 | -7.70 | -0.0092 |
| 384 | 836.520 | 3.7 | 50 | -7.07 | -0.0084 |
| 384 | 836.520 | 3.7 | 60 | -6.94 | -0.0083 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 384 | 836.520 | 4.2 | -30 | -8.17 | -0.0098 |
| 384 | 836.520 | 4.2 | -20 | -9.53 | -0.0114 |
| 384 | 836.520 | 4.2 | -10 | -7.41 | -0.0089 |
| 384 | 836.520 | 4.2 | 0 | -7.70 | -0.0092 |
| 384 | 836.520 | 4.2 | 10 | -7.45 | -0.0089 |
| 384 | 836.520 | 4.2 | 20 | -5.93 | -0.0071 |
| 384 | 836.520 | 4.2 | 30 | -4.82 | -0.0058 |
| 384 | 836.520 | 4.2 | 40 | -6.41 | -0.0077 |
| 384 | 836.520 | 4.2 | 50 | -7.96 | -0.0095 |
| 384 | 836.520 | 4.2 | 60 | -9.71 | -0.0116 |

Cellular Results: channel 777 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 777 | 848.310 | 3.6 | -30 | -6.34 | -0.0072 |
| 777 | 848.310 | 3.6 | -20 | -2.93 | -0.0033 |
| 777 | 848.310 | 3.6 | -10 | -3.09 | -0.0035 |
| 777 | 848.310 | 3.6 | 0 | 1.10 | 0.0012 |
| 777 | 848.310 | 3.6 | 10 | 2.74 | 0.0031 |
| 777 | 848.310 | 3.6 | 20 | -0.44 | -0.0005 |
| 777 | 848.310 | 3.6 | 30 | -3.58 | -0.0041 |
| 777 | 848.310 | 3.6 | 40 | -3.63 | -0.0041 |
| 777 | 848.310 | 3.6 | 50 | -3.04 | -0.0035 |
| 777 | 848.310 | 3.6 | 60 | -0.75 | -0.0009 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 777 | 848.310 | 3.7 | -30 | -2.41 | -0.0027 |
| 777 | 848.310 | 3.7 | -20 | -5.27 | -0.0060 |
| 777 | 848.310 | 3.7 | -10 | -3.20 | -0.0036 |
| 777 | 848.310 | 3.7 | 0 | -3.24 | -0.0037 |
| 777 | 848.310 | 3.7 | 10 | -1.82 | -0.0021 |
| 777 | 848.310 | 3.7 | 20 | -2.23 | -0.0025 |
| 777 | 848.310 | 3.7 | 30 | -2.12 | -0.0024 |
| 777 | 848.310 | 3.7 | 40 | -2.49 | -0.0028 |
| 777 | 848.310 | 3.7 | 50 | -2.76 | -0.0031 |
| 777 | 848.310 | 3.7 | 60 | -3.48 | -0.0040 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 777 | 848.310 | 4.2 | -30 | -1.61 | -0.0018 |
| 777 | 848.310 | 4.2 | -20 | -5.08 | -0.0058 |
| 777 | 848.310 | 4.2 | -10 | -3.22 | -0.0037 |
| 777 | 848.310 | 4.2 | 0 | -5.92 | -0.0067 |
| 777 | 848.310 | 4.2 | 10 | -4.12 | -0.0047 |
| 777 | 848.310 | 4.2 | 20 | -0.91 | -0.0010 |
| 777 | 848.310 | 4.2 | 30 | 0.11 | 0.0001 |
| 777 | 848.310 | 4.2 | 40 | -1.59 | -0.0018 |
| 777 | 848.310 | 4.2 | 50 | -2.60 | -0.0030 |
| 777 | 848.310 | 4.2 | 60 | -5.32 | -0.0061 |

PCS Channel results: channels 25, 600, & 1175 @ 20°C maximum transmitted power

| Traffic Channel Number | PCS Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 25 | 1851.20 | 3.6 | 20 | -20.97 | -0.0113 |
| 600 | 1880.00 | 3.6 | 20 | -4.26 | -0.0023 |
| 1175 | 1908.75 | 3.6 | 20 | -18.35 | -0.0096 |

| Traffic Channel Number | PCS Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 25 | 1851.20 | 3.7 | 20 | -7.44 | -0.0040 |
| 600 | 1880.00 | 3.7 | 20 | -12.32 | -0.0066 |
| 1175 | 1908.75 | 3.7 | 20 | -21.10 | -0.0111 |

| Traffic Channel Number | PCS Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 25 | 1851.20 | 4.2 | 20 | -9.49 | -0.0051 |
| 600 | 1880.00 | 4.2 | 20 | -13.21 | -0.0070 |
| 1175 | 1908.75 | 4.2 | 20 | -23.12 | -0.0121 |

PCS Results: channel 25 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 25 | 1851.20 | 3.6 | -30 | -48.77 | -0.0263 |
| 25 | 1851.20 | 3.6 | -20 | -19.65 | -0.0106 |
| 25 | 1851.20 | 3.6 | -10 | -30.93 | -0.0167 |
| 25 | 1851.20 | 3.6 | 0 | -11.92 | -0.0064 |
| 25 | 1851.20 | 3.6 | 10 | 2.18 | 0.0012 |
| 25 | 1851.20 | 3.6 | 20 | -20.97 | -0.0113 |
| 25 | 1851.20 | 3.6 | 30 | -49.69 | -0.0268 |
| 25 | 1851.20 | 3.6 | 40 | -54.72 | **-0.0296** |
| 25 | 1851.20 | 3.6 | 50 | -49.66 | -0.0268 |
| 25 | 1851.20 | 3.6 | 60 | -33.52 | -0.0181 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 25 | 1851.20 | 3.7 | -30 | -20.98 | -0.0113 |
| 25 | 1851.20 | 3.7 | -20 | -22.26 | -0.0120 |
| 25 | 1851.20 | 3.7 | -10 | -11.28 | -0.0061 |
| 25 | 1851.20 | 3.7 | 0 | -13.62 | -0.0074 |
| 25 | 1851.20 | 3.7 | 10 | -7.67 | -0.0041 |
| 25 | 1851.20 | 3.7 | 20 | -7.44 | -0.0040 |
| 25 | 1851.20 | 3.7 | 30 | -13.32 | -0.0072 |
| 25 | 1851.20 | 3.7 | 40 | -14.13 | -0.0076 |
| 25 | 1851.20 | 3.7 | 50 | -16.37 | -0.0088 |
| 25 | 1851.20 | 3.7 | 60 | -18.42 | -0.0100 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 25 | 1851.20 | 4.2 | -30 | -24.13 | -0.0130 |
| 25 | 1851.20 | 4.2 | -20 | -15.90 | -0.0086 |
| 25 | 1851.20 | 4.2 | -10 | -16.61 | -0.0090 |
| 25 | 1851.20 | 4.2 | 0 | -24.10 | -0.0130 |
| 25 | 1851.20 | 4.2 | 10 | -19.87 | -0.0107 |
| 25 | 1851.20 | 4.2 | 20 | -9.49 | -0.0051 |
| 25 | 1851.20 | 4.2 | 30 | -4.97 | -0.0027 |
| 25 | 1851.20 | 4.2 | 40 | -8.95 | -0.0048 |
| 25 | 1851.20 | 4.2 | 50 | -15.48 | -0.0084 |
| 25 | 1851.20 | 4.2 | 60 | -29.42 | -0.0159 |

PCS Results: channel 600 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 600 | 1880.00 | 3.6 | -30 | -41.97 | -0.0223 |
| 600 | 1880.00 | 3.6 | -20 | -1.35 | -0.0007 |
| 600 | 1880.00 | 3.6 | -10 | -12.12 | -0.0064 |
| 600 | 1880.00 | 3.6 | 0 | 6.02 | 0.0032 |
| 600 | 1880.00 | 3.6 | 10 | 13.01 | 0.0069 |
| 600 | 1880.00 | 3.6 | 20 | -4.26 | -0.0023 |
| 600 | 1880.00 | 3.6 | 30 | -23.68 | -0.0126 |
| 600 | 1880.00 | 3.6 | 40 | -25.77 | -0.0137 |
| 600 | 1880.00 | 3.6 | 50 | -21.11 | -0.0112 |
| 600 | 1880.00 | 3.6 | 60 | -4.87 | -0.0026 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 600 | 1880.00 | 3.7 | -30 | -21.25 | -0.0113 |
| 600 | 1880.00 | 3.7 | -20 | -16.62 | -0.0088 |
| 600 | 1880.00 | 3.7 | -10 | -15.68 | -0.0083 |
| 600 | 1880.00 | 3.7 | 0 | -15.35 | -0.0082 |
| 600 | 1880.00 | 3.7 | 10 | -15.19 | -0.0081 |
| 600 | 1880.00 | 3.7 | 20 | -12.32 | -0.0066 |
| 600 | 1880.00 | 3.7 | 30 | -16.64 | -0.0089 |
| 600 | 1880.00 | 3.7 | 40 | -15.71 | -0.0084 |
| 600 | 1880.00 | 3.7 | 50 | -14.32 | -0.0076 |
| 600 | 1880.00 | 3.7 | 60 | -16.75 | -0.0089 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 600 | 1880.00 | 4.2 | -30 | -22.60 | -0.0120 |
| 600 | 1880.00 | 4.2 | -20 | -22.69 | -0.0121 |
| 600 | 1880.00 | 4.2 | -10 | -19.44 | -0.0103 |
| 600 | 1880.00 | 4.2 | 0 | -26.91 | -0.0143 |
| 600 | 1880.00 | 4.2 | 10 | -21.84 | -0.0116 |
| 600 | 1880.00 | 4.2 | 20 | -13.21 | -0.0070 |
| 600 | 1880.00 | 4.2 | 30 | -11.51 | -0.0061 |
| 600 | 1880.00 | 4.2 | 40 | -12.75 | -0.0068 |
| 600 | 1880.00 | 4.2 | 50 | -17.72 | -0.0094 |
| 600 | 1880.00 | 4.2 | 60 | -23.36 | -0.0124 |

PCS Results: channel 1175 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1175 | 1908.75 | 3.6 | -30 | -47.67 | -0.0250 |
| 1175 | 1908.75 | 3.6 | -20 | -17.54 | -0.0092 |
| 1175 | 1908.75 | 3.6 | -10 | -23.95 | -0.0125 |
| 1175 | 1908.75 | 3.6 | 0 | -6.32 | -0.0033 |
| 1175 | 1908.75 | 3.6 | 10 | -3.06 | -0.0016 |
| 1175 | 1908.75 | 3.6 | 20 | -18.35 | -0.0096 |
| 1175 | 1908.75 | 3.6 | 30 | -31.87 | -0.0167 |
| 1175 | 1908.75 | 3.6 | 40 | -33.42 | -0.0175 |
| 1175 | 1908.75 | 3.6 | 50 | -31.36 | -0.0164 |
| 1175 | 1908.75 | 3.6 | 60 | -15.25 | -0.0080 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1175 | 1908.75 | 3.7 | -30 | -39.81 | -0.0209 |
| 1175 | 1908.75 | 3.7 | -20 | -25.62 | -0.0134 |
| 1175 | 1908.75 | 3.7 | -10 | -25.29 | -0.0132 |
| 1175 | 1908.75 | 3.7 | 0 | -15.76 | -0.0083 |
| 1175 | 1908.75 | 3.7 | 10 | -16.18 | -0.0085 |
| 1175 | 1908.75 | 3.7 | 20 | -21.10 | -0.0111 |
| 1175 | 1908.75 | 3.7 | 30 | -28.09 | -0.0147 |
| 1175 | 1908.75 | 3.7 | 40 | -30.28 | -0.0159 |
| 1175 | 1908.75 | 3.7 | 50 | -30.35 | -0.0159 |
| 1175 | 1908.75 | 3.7 | 60 | -21.54 | -0.0113 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 1175 | 1908.75 | 4.2 | -30 | -33.60 | -0.0176 |
| 1175 | 1908.75 | 4.2 | -20 | -26.63 | -0.0140 |
| 1175 | 1908.75 | 4.2 | -10 | -23.85 | -0.0125 |
| 1175 | 1908.75 | 4.2 | 0 | -20.13 | -0.0105 |
| 1175 | 1908.75 | 4.2 | 10 | -21.36 | -0.0112 |
| 1175 | 1908.75 | 4.2 | 20 | -23.12 | -0.0121 |
| 1175 | 1908.75 | 4.2 | 30 | -26.67 | -0.0140 |
| 1175 | 1908.75 | 4.2 | 40 | -28.25 | -0.0148 |
| 1175 | 1908.75 | 4.2 | 50 | -28.78 | -0.0151 |
| 1175 | 1908.75 | 4.2 | 60 | -27.63 | -0.0145 |

# APPENDIX 4 - RADIATED EMISSIONS TEST DATA

## Radiated Emissions Test Data Results
## **Cellular Band**

The measurements were performed by Vimal Olaganathan and Anas Hawari.

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Dates of test: August 21, 2007

Test distance was 3.0 metres.

| EUT | | | | Rx Antenna | | Spectrum Analyzer | | Substitution Method Tracking Generator | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to dipole) (dBm) | (Watts) | Limit (dBm) | Diff to Limit (dBm) |
| Cellular Band (ERP), CDMA2000, (RC3, SO55), CH 1013, CH 384, CH 777<br>BlackBerry® smartphone Standalone, USB up | | | | | | | | | | | | | |
| F0 | 1013 | 824.70 | 800 | Dipole | V | 69.35 | 82.53 | V V | 8.02 | **21.82** | 0.1520 | 39.00 | -17.2 |
| F0 | 1013 | 824.70 | 800 | Dipole | H | 82.53 | | H H | 6.36 | | | | |
| F0 | 384 | 836.52 | 800 | Dipole | V | 69.57 | 81.87 | V V | 7.22 | 20.92 | 0.1236 | 39.00 | -18.1 |
| F0 | 384 | 836.52 | 800 | Dipole | H | 82.41 | | H H | 5.62 | | | | |
| F0 | 777 | 848.32 | 800 | Dipole | V | 67.78 | 82.78 | V V | 7.86 | 21.26 | 0.1337 | 39.00 | -17.7 |
| F0 | 777 | 848.32 | 800 | Dipole | H | 82.78 | | H H | 7.04 | | | | |

ERP = Tracking Generator Level + Antenna Gain – Cable Loss + Preamp

Radiated Emissions Test Data Results cont'd

**Cellular Band**

The environmental test conditions were:

| | |
|---|---|
| Temperature | 24ºC |
| Pressure | 1015 mb |
| Relative Humidity | 30% |

Date of Test: August 17, 2007

Test Distance was 3.0 metres with a EUT height of 1.0 metres, 30 MHz to 9 GHz.
The BlackBerry® smartphone PIN 301A4237 was in standalone, vertical position.

The frequency sweep spurious measurements were performed in CDMA2000 (RC3, SO55) mode, channel 384.

| Frequency | Antenna | | Test Angle | Detector | Measured Level | Correction Factor for preamp/antenna/ cables/ filter | Field Strength Level (reading+corr) | Limit @ 3.0 m | Test Margin |
|---|---|---|---|---|---|---|---|---|---|
| | Pol. | Height | | (PK or AVE) | (dBµV) | (dB/m) | (dBµV/m) | (dB) | (dB) |
| (MHz) | (V/H) | (metres) | (Deg.) | | | | | | |
| - | - | - | - | - | - | - | - | - | - |

All emissions were in the NF.

Radiated Emissions Test Data Results cont'd

**Cellular Band**

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

The harmonic measurements were performed in CDMA2000 (RC 3, Loopback SO 55) mode.

| EUT | | | | Rx Antenna | | Spectrum Analyzer | | Substitution Method Tracking Generator | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to dipole) | Limit (dBm) | Diff to Limit (dBm) |
| **Cellular Band (Harmonics)**<br>CDMA2000, (RC3, Loopback, SO55), CH 1013, CH 384, CH 777<br>BlackBerry® smartphone Standalone, USB down<br>**Low Channel –** 824.70 MHz | | | | | | | | | | | | |
| 2nd | 1013 | 1649.40 | 800 | Horn | V | 47.89 | 49.19 | V-V | -16.64 | -52.3 | -13 | -39.3 |
| 2nd | 1013 | 1649.40 | 800 | Horn | H | 49.19 | | H-H | -15.60 | | | |
| 3rd | 1013 | 2474.10 | 800 | Horn | V | 52.15 | 52.15 | V-V | -2.20 | -39.8 | -13 | -26.8 |
| 3rd | 1013 | 2474.10 | 800 | Horn | H | 47.48 | | H-H | -10.20 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF.<br>**Middle Channel** – 836.52 MHz | | | | | | | | | | | | |
| 2nd | 384 | 1673.04 | 800 | Horn | V | NF | 50.36 | V-V | -15.16 | -50.74 | -13 | -37.7 |
| 2nd | 384 | 1673.04 | 800 | Horn | H | 50.36 | | H-H | -14.04 | | | |
| 3rd | 384 | 2509.56 | 800 | Horn | V | 54.41 | 54.41 | V-V | 1.00 | -36.60 | -13 | -23.6 |
| 3rd | 384 | 2509.56 | 800 | Horn | H | 49.17 | | H-H | -5.76 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF.<br>**High Channel** – 848.32 MHz | | | | | | | | | | | | |
| 2nd | 777 | 1696.64 | 800 | Horn | V | 48.13 | 49.42 | V-V | -16.02 | -51.64 | -13 | -38.6 |
| 2nd | 777 | 1696.64 | 800 | Horn | H | 49.42 | | H-H | -14.84 | | | |
| 3rd | 777 | 2544.96 | 800 | Horn | V | 51.68 | 51.68 | V-V | -1.96 | -39.46 | -13 | -26.5 |
| 3rd | 777 | 2544.96 | 800 | Horn | H | 47.77 | | H-H | -12.30 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF. | | | | | | | | | | | | |

Radiated Emissions Test Data Results cont'd

## Cellular Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007
The harmonic measurements were performed in CDMA 2000 (RC 3, TDS SO 32) mode.

| EUT | | | | Rx Antenna | | Spectrum Analyzer | | Substitution Method Tracking Generator | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to dipole) | Limit (dBm) | Diff to Limit (dBm) |
| **Cellular Band (Harmonics)**<br>CDMA2000, (RC3, TDSO SO32), CH 1013, CH 384, CH 777<br>BlackBerry® smartphone Standalone, USB down<br>**Low Channel –** 824.70 MHz | | | | | | | | | | | | |
| 2nd | 1013 | 1649.40 | 800 | Horn | V | 47.71 | 49.41 | V-V | -18.58 | -51.80 | -13 | -38.8 |
| 2nd | 1013 | 1649.40 | 800 | Horn | H | 49.41 | | H-H | -15.10 | | | |
| 3rd | 1013 | 2474.10 | 800 | Horn | V | 51.76 | 51.76 | V-V | -2.98 | -40.58 | -13 | -27.6 |
| 3rd | 1013 | 2474.10 | 800 | Horn | H | 47.89 | | H-H | -11.80 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF<br>**Middle Channel** – 836.52 MHz | | | | | | | | | | | | |
| 2nd | 384 | 1673.04 | 800 | Horn | V | 47.85 | 47.85 | V-V | -18.70 | -53.92 | -13 | -40.9 |
| 2nd | 384 | 1673.04 | 800 | Horn | H | NF | | H-H | -17.12 | | | |
| 3rd | 384 | 2509.56 | 800 | Horn | V | 54.37 | 54.37 | V-V | 0.84 | -36.76 | -13 | -23.8 |
| 3rd | 384 | 2509.56 | 800 | Horn | H | 48.81 | | H-H | -6.46 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF.<br>**High Channel** – 848.32 MHz | | | | | | | | | | | | |
| 2nd | 777 | 1696.64 | 800 | Horn | V | 48.18 | 49.56 | V-V | -16.10 | -51.64 | -13 | -38.6 |
| 2nd | 777 | 1696.64 | 800 | Horn | H | 49.56 | | H-H | -14.84 | | | |
| 3rd | 777 | 2544.96 | 800 | Horn | V | 51.22 | 51.22 | V-V | -2.54 | -40.04 | -13 | -27.0 |
| 3rd | 777 | 2544.96 | 800 | Horn | H | 48.44 | | H-H | -14.14 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF. | | | | | | | | | | | | |

Radiated Emissions Test Data Results cont'd

**Cellular Band**

The environmental test conditions were:

| | |
|---|---|
| Temperature | 24ºC |
| Pressure | 1020 mb |
| Relative Humidity | 30% |

Date of Test: August 18, 2007

Test Distance was 3.0 metres with a EUT height of 1.0 metres, 30 MHz to 9 GHz.
The BlackBerry® smartphone PIN 301A4237 was in standalone, vertical position.

The frequency sweep spurious measurements were performed in 1xEVDO mode, channel 384.

| Frequency (MHz) | Antenna Pol. (V/H) | Antenna Height (metres) | Test Angle (Deg.) | Detector (PK or AVE) | Measured Level (dBµV) | Correction Factor for preamp/antenna/ cables/ filter (dB/m) | Field Strength Level (reading+corr) (dBµV/m) | Limit @ 3.0 m (dB) | Test Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - |

All emissions were in the NF.

Radiated Emissions Test Data Results cont'd

**Cellular Band**

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

The harmonic measurements were performed in 1xEVDO (153.6 Kbps) mode.

| EUT | | | | Rx Antenna | | Spectrum Analyzer | | Substitution Method Tracking Generator | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to dipole) | Limit (dBm) | Diff to Limit (dBm) |
| **Cellular Band (Harmonics)**<br>1xEVDO, CH 1013, CH 384, CH 777<br>BlackBerry® smartphone Standalone, USB down<br>**Low Channel –** 824.70 MHz | | | | | | | | | | | | |
| 2nd | 1013 | 1649.40 | 800 | Horn | V | 48.31 | 50.01 | V-V | -15.76 | -51.20 | -13 | -38.2 |
| 2nd | 1013 | 1649.40 | 800 | Horn | H | 50.01 | | H-H | -14.50 | | | |
| 3rd | 1013 | 2474.10 | 800 | Horn | V | 53.72 | 53.72 | V-V | -0.46 | -38.06 | -13 | -25.1 |
| 3rd | 1013 | 2474.10 | 800 | Horn | H | 49.60 | | H-H | -6.66 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF.<br>**Middle Channel** – 836.52 MHz | | | | | | | | | | | | |
| 2nd | 384 | 1673.04 | 800 | Horn | V | 48.31 | 48.31 | V-V | -17.98 | -53.34 | -13 | -40.3 |
| 2nd | 384 | 1673.04 | 800 | Horn | H | NF | | H-H | -16.54 | | | |
| 3rd | 384 | 2509.56 | 800 | Horn | V | 56.02 | 26.02 | V-V | 2.80 | -34.80 | -13 | **-21.8** |
| 3rd | 384 | 2509.56 | 800 | Horn | H | 50.85 | | H-H | -2.18 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF.<br>**High Channel** – 848.32 MHz | | | | | | | | | | | | |
| 2nd | 777 | 1696.64 | 800 | Horn | V | 48.49 | 49.91 | V-V | -15.56 | -50.96 | -13 | -38.0 |
| 2nd | 777 | 1696.64 | 800 | Horn | H | 49.91 | | H-H | -14.16 | | | |
| 3rd | 777 | 2544.96 | 800 | Horn | V | 52.97 | 52.97 | V-V | -0.32 | -37.82 | -13 | -24.8 |
| 3rd | 777 | 2544.96 | 800 | Horn | H | 48.99 | | H-H | -8.56 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 3rd harmonic were in the NF. | | | | | | | | | | | | |

Radiated Emissions Test Data Results cont'd

## Cellular Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

| EUT | | | | Rx Antenna | | Spectrum Analyzer | | Substitution Method Tracking Generator | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to dipole) (dBm) | Limit (dBm) | Diff to Limit (dB) |
| **Cellular BAND**<br>**RF Local Oscillator (LO)**<br>BlackBerry® smartphone Standalone, vertical position<br>**Low Channel** | | | | | | | | | | | | |
| F0 | 1013 | 1739.40 | 800 | Horn | V | NF | - | V-V | - | - | - | - |
| F0 | 1013 | 1739.40 | 800 | Horn | H | NF | | H-H | - | | | |
| Emissions were in the NF.<br>**Middle Channel** | | | | | | | | | | | | |
| F0 | 384 | 1763.04 | 800 | Horn | V | NF | - | V-V | - | - | - | - |
| F0 | 384 | 1763.04 | 800 | Horn | H | NF | | H-H | - | | | |
| Emissions were in the NF.<br>**High Channel** | | | | | | | | | | | | |
| F0 | 777 | 1786.62 | 800 | Horn | V | NF | - | V-V | - | - | - | - |
| F0 | 777 | 1786.62 | 800 | Horn | H | NF | | H-H | - | | | |
| Emissions were in the NF. | | | | | | | | | | | | |

Radiated Emissions Test Data Results

## PCS Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

| | | | | | | | | Substitution Method | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EUT | | | | Receive Antenna | | Spectrum Analyzer | | Tracking Generator | | | | | |
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) dBuV | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to Isotropic Radiator) (dBm) | Corrected Reading (relative to Isotropic Radiator) (Watts) | Limit (dBm) | Diff to Limit (dBm) |
| PCS BAND (EIRP), CDMA2000, (RC3, SO55) - CH 25, CH 600, CH 1175<br>BlackBerry® smartphone, Standalone, USB down | | | | | | | | | | | | | |
| F0 | 25 | 1851.25 | 1900 | Horn | V | 84.28 | 87.57 | V-V | -12.22 | 24.8 | 0.302 | 33 | -8.2 |
| F0 | 25 | 1851.25 | 1900 | Horn | H | 87.57 | | H-H | -10.54 | | | | |
| F0 | 600 | 1880.00 | 1900 | Horn | V | 81.46 | 88.15 | V-V | -10.42 | **26.3** | 0.427 | 33 | -6.7 |
| F0 | 600 | 1880.00 | 1900 | Horn | H | 88.15 | | H-H | -8.80 | | | | |
| F0 | 1175 | 1908.75 | 1900 | Horn | V | 81.65 | 87.48 | V-V | -10.76 | 25.1 | 0.324 | 33 | -7.9 |
| F0 | 1175 | 1908.75 | 1900 | Horn | H | 87.48 | | H-H | -9.84 | | | | |

EIRP = Tracking Generator Level + Antenna Factor – Cable Loss + Preamp Gain

Radiated Emissions Test Data Results cont'd

**PCS Band**

The environmental test conditions were:

| | |
|---|---|
| Temperature | 24ºC |
| Pressure | 1020mb |
| Relative Humidity | 30% |

Date of Test: August 18, 2007

Test Distance was 3.0 metres with a EUT height of 1.0 metres, 30 MHz to 1000 MHz. The BlackBerry® smartphone PIN 301A4237 was in standalone, vertical position.

The frequency sweep spurious measurements were performed in CDMA2000 (RC3, SO55) mode, channel 600.

| Frequency (MHz) | Antenna Pol. (V/H) | Antenna Height (metres) | Test Angle (Deg.) | Detector (PK or AVE) | Measured Level (dBµV) | Correction Factor for preamp/antenna/ cables/ filter (dB/m) | Field Strength Level (reading+corr) (dBµV/m) | Limit @ 3.0 m (dB) | Test Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - |

All emissions were in the NF.

Radiated Emissions Test Data Results cont'd

**PCS Band**

The environmental test conditions were:

| | |
|---|---|
| Temperature | 25ºC |
| Pressure | 1016 mb |
| Relative Humidity | 30% |

Date of Test: August 19, 2007

Test Distance was 3.0 metres with a EUT height of 1.0 metres, 1 GHz to 20 GHz.
The BlackBerry® smartphone PIN 301A4237 was in standalone, vertical position.

The frequency sweep spurious measurements were performed in CDMA2000 (RC3, SO55) mode, channel 600.

| Frequency (MHz) | Antenna Pol. (V/H) | Antenna Height (metres) | Test Angle (Deg.) | Detector (PK or AVE) | Measured Level (dBµV) | Correction Factor for preamp/antenna/ cables/ filter (dB/m) | Field Strength Level (reading+corr) (dBµV/m) | Limit @ 3.0 m (dB) | Test Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 18705.93 | V | 3.00 | 79 | PK | 44.04 | -73.04 | -29.00 | -13 | -16.00 |
| 18707.26 | H | 1.87 | 71 | PK | 44.25 | -73.16 | -28.91 | -13 | -15.91 |

All other emissions had a test margin greater than 25.0 dB.

Radiated Emissions Test Data Results cont'd

## PCS Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

The harmonic measurements were performed in CDMA2000 (RC3, Loopback, SO55) mode.

| | | | | | | | | Substitution Method | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EUT | | | | Receive Antenna | | Spectrum Analyzer | | Tracking Generator | | | | |
| Type | Ch | Frequency (MHz) | Band | Pol. Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to Isotropic Radiator) (dBm) | Limit (dBm) | Diff to Limit (dBm) |
| **PCS BAND (Harmonics)**<br>CDMA2000, (RC3, SO55) - CH 25, CH 600, CH 1175<br>BlackBerry® smartphone Standalone, vertical<br>**Low Channel** 1851.25 MHz | | | | | | | | | | | | |
| 2nd | 25 | 3702.50 | 1900 | Horn | V | NF | - | V-V | - | - | -13 | - |
| 2nd | 25 | 3702.50 | 1900 | Horn | H | NF | | H-H | - | | | |
| The emissions were investigated up to the 10th harmonic.<br>All emissions were in the NF.<br>**Middle Channel** 1880.00 MHz | | | | | | | | | | | | |
| 2nd | 600 | 3760.00 | 1900 | Horn | V | 46.85 | 46.85 | V-V | -0.98 | -36.12 | -13 | -23.1 |
| 2nd | 600 | 3760.00 | 1900 | Horn | H | NF | | H-H | - | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2rd harmonic were in the NF.<br>**High Channel** 1908.75 MHz | | | | | | | | | | | | |
| 2nd | 600 | 3760.00 | 1900 | Horn | V | 45.84 | 45.84 | V-V | -3.50 | -38.04 | -13 | -25.0 |
| 2nd | 600 | 3760.00 | 1900 | Horn | H | NF | | H-H | - | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2rd harmonic were in the NF. | | | | | | | | | | | | |

Radiated Emissions Test Data Results cont'd

## PCS Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

The harmonics measurements were performed in CDMA2000 (RC3, TDS, SO32)

| | | | | | | | | Substitution Method | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EUT | | | | Receive Antenna | | Spectrum Analyzer | | Tracking Generator | | | | |
| Type | Ch | Frequency (MHz) | Band | Pol. Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to Isotropic Radiator) (dBm) | Limit (dBm) | Diff to Limit (dBm) |
| **PCS BAND (Harmonics)**<br>CDMA2000, (RC3, TDSO SO32) - CH 25, CH 600, CH 1175<br>BlackBerry® smartphone Standalone, USB down<br>**Low Channel** 1851.25 MHz | | | | | | | | | | | | |
| 2nd | 25 | 3702.50 | 1900 | Horn | V | 45.63 | 45.63 | V-V | -3.94 | -38.28 | -13 | -25.3 |
| 2nd | 25 | 3702.50 | 1900 | Horn | H | 45.25 | | H-H | -2.18 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2nd harmonic were in the NF.<br>**Middle Channel** 1880.00 MHz | | | | | | | | | | | | |
| 2nd | 600 | 3760.00 | 1900 | Horn | V | 45.80 | 45.80 | V-V | -2.52 | -37.64 | -13 | -24.6 |
| 2nd | 600 | 3760.00 | 1900 | Horn | H | 45.68 | | H-H | -1.44 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2nd harmonic were in the NF<br>**High Channel** 1908.75 MHz | | | | | | | | | | | | |
| 2nd | 600 | 3760.00 | 1900 | Horn | V | 45.88 | 45.88 | V-V | -3.04 | -37.66 | -13 | -24.7 |
| 2nd | 600 | 3760.00 | 1900 | Horn | H | 45.88 | | H-H | -1.46 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2nd harmonic were in the NF | | | | | | | | | | | | |

Radiated Emissions Test Data Results cont'd

**PCS Band**

The environmental test conditions were:

| | |
|---|---|
| Temperature | 24ºC |
| Pressure | 1021mb |
| Relative Humidity | 30% |

Date of Test: August 18, 2007

Test Distance was 3.0 metres with a EUT height of 1.0 metres, 30 MHz to 1000 MHz. The BlackBerry® smartphone PIN 3016B678 was in standalone, vertical position.

The frequency sweep spurious measurements were performed in 1xEVDO mode, channel 600.

| Frequency (MHz) | Antenna Pol. (V/H) | Antenna Height (metres) | Test Angle (Deg.) | Detector (PK or AVE) | Measured Level (dBµV) | Correction Factor for preamp/antenna/ cables/ filter (dB/m) | Field Strength Level (reading+corr) (dBµV/m) | Limit @ 3.0 m (dB) | Test Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - |

All emissions were in the NF.

Radiated Emissions Test Data Results cont'd

**PCS Band**

The environmental test conditions were:

| | |
|---|---|
| Temperature | 25ºC |
| Pressure | 1016 mb |
| Relative Humidity | 30% |

Date of Test: August 19, 2007

Test Distance was 3.0 metres with a EUT height of 1.0 metres, 1 GHz to 20 GHz.
The BlackBerry® smartphone PIN 301A4237 was in standalone, vertical position.

The frequency sweep spurious measurements were performed in 1xEVDO mode, channel 600.

| Frequency | Antenna | | Test Angle | Detector | Measured Level | Correction Factor for preamp/antenna/ cables/ filter | Field Strength Level (reading+corr) | Limit @ 3.0 m | Test Margin |
|---|---|---|---|---|---|---|---|---|---|
| | Pol. | Height | | (PK or AVE) | (dBµV) | (dB/m) | (dBµV/m) | (dB) | (dB) |
| (MHz) | (V/H) | (metres) | (Deg.) | | | | | | |
| 18703.85 | H | 2.99 | 149 | PK | 44.15 | -73.03 | -28.88 | -13 | **-15.88** |
| 18706.75 | V | 1.88 | 36 | PK | 44.41 | -73.66 | -29.25 | -13 | -16.25 |

All other emissions had a test margin greater than 25.0 dB.

Radiated Emissions Test Data Results cont'd

## PCS Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

The harmonic measurements were performed in 1xEVDO (153.6 Kbps) mode.

| | | | | | | | | Substitution Method | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EUT | | | | Receive Antenna | | Spectrum Analyzer | | Tracking Generator | | | | |
| Type | Ch | Frequency (MHz) | Band | Pol. Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to Isotropic Radiator) (dBm) | Limit (dBm) | Diff to Limit (dB) |
| **PCS BAND (Harmonics)**<br>1xEVDO - CH 25, CH 600, CH 1175<br>BlackBerry® smartphone Standalone, USB down<br>**Low Channel** 1851.25 MHz | | | | | | | | | | | | |
| 2nd | 25 | 3702.50 | 1900 | Horn | V | NF | - | V-V | - | - | -13 | - |
| 2nd | 25 | 3702.50 | 1900 | Horn | H | NF | | H-H | - | | | |
| The emissions were investigated up to the 10th harmonic.<br>All emissions were in the NF.<br>**Middle Channel** 1880.00 MHz | | | | | | | | | | | | |
| 2nd | 600 | 3760.00 | 1900 | Horn | V | 46.70 | 46.70 | V-V | -1.26 | -36.32 | -13 | -23.3 |
| 2nd | 600 | 3760.00 | 1900 | Horn | H | 45.38 | | H-H | -0.12 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2nd harmonic were in the NF.<br>**High Channel** 1908.75 MHz | | | | | | | | | | | | |
| 2nd | 600 | 3760.00 | 1900 | Horn | V | 46.08 | 46.08 | V-V | -2.96 | -37.34 | -13 | -24.3 |
| 2nd | 600 | 3760.00 | 1900 | Horn | H | 44.62 | | H-H | -1.14 | | | |
| The emissions were investigated up to the 10th harmonic.<br>Emissions above the 2nd harmonic were in the NF. | | | | | | | | | | | | |

Radiated Emissions Test Data Results cont'd

## PCS Band

The environmental test conditions were: Temperature 22ºC
Pressure 1011mb
Relative Humidity 22%

Date of test: August 21, 2007

| | | | | | | | | Substitution Method | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EUT | | | | Receive Antenna | | Spectrum Analyzer | | Tracking Generator | | | | |
| Type | Ch | Frequency (MHz) | Band | Type | Pol. | Reading (dBuV) | Max (V,H) (dBuV) | Pol. Tx-Rx | Reading (dBm) | Corrected Reading (relative to Isotropic Radiator) (dBm) | Limit (dBm) | Diff to Limit (dB) |
| **PCS Band – RF LO**<br>Transmit mode with the BlackBerry® smartphone in standalone USB down position. | | | | | | | | | | | | |
| **Low Channel** | | | | | | | | | | | | |
| F0 | 25 | 1716.67 | 1900 | Horn | V | NF | - | V-V | - | - | - | - |
| F0 | 25 | 1716.67 | 1900 | Horn | H | NF | | H-H | - | | | |
| Emissions were in the NF. | | | | | | | | | | | | |
| **Middle Channel** | | | | | | | | | | | | |
| F0 | 600 | 1742.22 | 1900 | Horn | V | NF | - | V-V | - | - | - | - |
| F0 | 600 | 1742.22 | 1900 | Horn | H | NF | | H-H | - | | | |
| Emissions were in the NF. | | | | | | | | | | | | |
| **High Channel** | | | | | | | | | | | | |
| F0 | 1175 | 1767.78 | 1900 | Horn | V | NF | - | V-V | - | - | - | - |
| F0 | 1175 | 1767.78 | 1900 | Horn | H | NF | | H-H | - | | | |
| Emissions were in the NF. | | | | | | | | | | | | |