Partial 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 and 133

A division of Research In Motion Limited

REPORT NO: RTS-2474-1002-47

PRODUCT MODEL NO:	RCV71UW
TYPE NAME:	BlackBerry® smartphone
FCC ID:	L6ARCV70UW
IC:	2503A–RCV70UW
EMISSION DESIGNATOR (GSM):	247KGXW
EMISSION DESIGNATOR (EDGE):	245KG7W
EMISSION DESIGNATOR (WCDMA):	4M19F9W

DATE: 22 April 2010

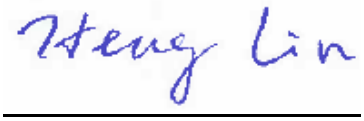
Statement of Performance:

The BlackBerry® smartphone, model RCV71UW, part number CER-27174-001 Rev 8 and accessories performs within the requirements of the test standards when configured and operated per RIM's instructions.

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:



Heng Lin
Regulatory Compliance Specialist
Date: 22 April 2010

Reviewed by:

Michael Cino
Regulatory Compliance Associate
Date: 22 April 2010

Reviewed and Approved by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: 23 April 2010

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, October 2009
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, October 2009
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, October 2009
- 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 5, February 2009, 2 GHz Personal Communications Services.

B) Associated Documents

1) RTS-2474-1002-50
2) Cetecom Report no. 1-2031-01-06/10B
3) RCV71UW_RCX71UW_cct_differences_document_v_2_0
4) HW_Declaration_CER-27174_Rev5
5) HW_Declaration_CER-27174_Rev6
6) HW_Declaration_CER-27174_Rev7
7) HW_Declaration_CER-27174_Rev8

C) Product Identification

Manufactured by Research In Motion Limited whose headquarters is 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 following locations:

RIM Testing Services EMI test facilities

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

440 Phillip Street
Waterloo, Ontario,
Canada , N2L 5R9
Phone: 519 888 7465
Fax: 519 888 6906

The testing was performed from January 28 to April 21 2010.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCV71UW	CER-27174-001 Rev 2	21B865E9
2	RCV71UW	CER-27174-001 Rev 2	21B5AF1A
3	RCV71UW	CER-27174-001 Rev 8	222ABA7F

UMTS conducted emissions testing and UMTS Frequency stability was performed on sample 1.
Conducted RF Output power was performed on sample 2.
PCS EIRP was performed on sample 3.

Model RCV71UW is similar to model RCX71UW except that it contains UMTS bands 1, 2 and 5/6 instead of bands 1, 4, 8. To view the differences between RCV71UW and RCX71UW, see document *RCV71UW_RCX71UW_cct_differences_document*_v_2_0. To view the difference between Rev 2 and Rev 8, see documents HW_Declaration_CER-27174_Rev5, HW_Declaration_CER-27174_Rev6, HW_Declaration_CER-27174_Rev7, and HW_Declaration_CER-27174_Rev8.
Only the characteristics that maybe were impacted by the changes were re-measured.

D) Support Equipment Used for the Testing of the EUT

No support equipment required; for list of equipment refer to section G, Compliance Test Equipment Used.

E) Test Voltage

The ac input voltage was 120 volts, 60 Hz where applicable. This configuration was per RIM's specifications.

F) Summary of Results

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1051 Part 22.917 Part 22.901	RSS-GEN, 4.9	GSM 850 Conducted Spurious Emissions	See Test Report RTS-2474-1002-50	-
Part 2.1051 Part 24.238(a)	RSS-GEN, 4.9	GSM PCS Conducted Spurious Emissions	See Test Report RTS-2474-1002-50	-
Part 2.202 Part 22.917	RSS-GEN, 4.6	GSM 850 Occupied Bandwidth and Channel Mask	See Test Report RTS-2474-1002-50	-
Part 2.202 Part 24.238	RSS-GEN, 4.6	GSM PCS Occupied Bandwidth and Channel Mask	See Test Report RTS-2474-1002-50	-
Part 2.1046(a)	RSS-133, 6.4 RSS-132, 4.4	GSM Conducted RF Output Power	See Test Report RTS-2474-1002-50	-
Part 2.1055(a)(d) Part 22.917	RSS-132, 4.3	GSM 850 Frequency Stability vs. Temperature and Voltage	See Test Report RTS-2474-1002-50	-
Part 2.1055(a)(d) Part 24.235	RSS-132, 4.3	GSM PCS Frequency Stability vs. Temperature and Voltage	See Test Report RTS-2474-1002-50	-
Part 22, Subpart H,	RSS-GEN, 4.9	GSM 850 ERP	See Test Report RTS-2474-1002-50	-
Part 24, Subpart E	RSS-GEN, 4.9	GSM 1900 EIRP	Pass	4
Part 22, Subpart H Part 24, Subpart E	RSS-GEN, 4.9	GSM Radiated Spurious/Harmonic Emissions	See Cetecom Test Report 1-2031-01-06_10B	-
Part 2.1051 Part 22.917 Part 22.901	RSS-GEN, 4.9	WCDMA UMTS850 Conducted Spurious Emissions	Pass	1
Part 2.1051 Part 24.238(a)	RSS-GEN, 4.9	WCDMA UMTS1900 Conducted Spurious Emissions	Pass	1
Part 2.202 Part 22.917	RSS-GEN, 4.6	WCDMA UMTS850 Occupied Bandwidth and Channel Mask	Pass	1
Part 2.202 Part 24.238	RSS-GEN, 4.6	WCDMA UMTS1900 Occupied Bandwidth and Channel Mask	Pass	1
Part 2.1046(a)	RSS-133, 6.4 RSS-132, 4.4	WCDMA Conducted RF Output Power	Pass	2

Part 2.1055(a)(d) Part 22.917	RSS-132, 4.3	WCDMA UMTS850 Frequency Stability vs. Temperature and Voltage	Pass	3
Part 2.1055(a)(d) Part 24.235	RSS-GEN, 4.7	WCDMA UMTS1900 Frequency Stability vs. Temperature and Voltage	Pass	3
Part 22, Subpart H	RSS-GEN, 4.9	WCDMA UMTS850 Radiated Spurious/Harmonic Emissions, ERP	See Cetecom Test Report 1-2031-01-06_10B	-
Part 24, Subpart E	RSS-GEN, 4.9	WCDMA UMTS1900 Radiated Spurious/Harmonic Emissions, EIRP	See Cetecom Test Report 1-2031-01-06_10B	-

Summary of Results cont'd

Conducted Emission Measurements

The BlackBerry® smartphone met the requirements of the Conducted Spurious Emissions in the UMTS850 band as per 47 CFR 1057, CFR 22.917, CFR 22.901(d) and RSS-GEN, 4.9. The EUT was measured on the low, middle and high channels. The frequency range investigated was from 10 MHz to 10 GHz.

See APPENDIX 1 for the test data.

The BlackBerry® smartphone met the requirements of the Conducted Spurious Emissions in the UMTS1900 band as per 47 CFR 2.1057, CFR 24.238 and RSS-GEN, 4.9. The EUT was measured 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.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth in the UMTS850 band as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6. The low, middle and high channels were measured.

See APPENDIX 1 for the test data.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the UMTS1900 band as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6. The low, middle and high channels were measured.

See APPENDIX 1 for the test data.

The BlackBerry® smartphone met the requirements of the Conducted RF Output Power for both the UMTS850 and 1900 bands as per 47 CFR 2.1046(a), RSS-133, 6.4 and RSS-132, 4.4. The low, middle and high channels were measured.

See APPENDIX 2 for the test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability vs. Temperature and Voltage for UMTS850 band as per 47 CFR 2.1055(a)(d), CFR 22.917 and RSS-132, 4.3. 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 BlackBerry® smartphone was measured on low, middle and high channels at each temperature step. The BlackBerry® smartphone 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.

The BlackBerry® smartphone met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for the UMTS1900 band as per 47 CFR 2.1055(a)(d), CFR 24.235 and RSS-GEN, 4.7. 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 BlackBerry® smartphone was measured on low, middle and high channels at each temperature step. The BlackBerry® smartphone 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.

Radiated Emission Measurements

The radiated EIRP was measured for PCS 1900. The results are within the limits. The BlackBerry® smartphone was placed on a nonconductive styrofoam table, 100 cm high that was positioned on a remotely controlled turntable. The test distance used between the BlackBerry® smartphone 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. Both the horizontal and vertical polarizations of the emissions were measured. The maximum emissions level was recorded. The BlackBerry® smartphone was then substituted with an antenna placed in the same location as the BlackBerry® smartphone. A Horn antenna was used for EIRP measurements. The substitution antenna was connected into a signal generator that was set to the test frequency.

The emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The signal generator output was then adjusted to match the BlackBerry® smartphone output reading. The signal generator output was recorded. Both the horizontal and vertical polarizations of the emissions were measured.

The following measurements were done in a fully-anechoic room (FAR). The FAR's FCC registration number is **959115** and the IC file number is **2503C-1**. The BlackBerry® smartphone was measured on the low, middle and high channels.

The EIRP in the PCS band, GSM mode was measured on BlackBerry® smartphone. The highest EIRP measured was 32.51 dBm (1.78 W) at 1880.00 MHz (channel 661).

The EIRP in the PCS band, EDGE mode was measured on BlackBerry® smartphone. The highest EIRP measured was 30.51 dBm (1.12 W) at 1909.80 MHz (channel 810).

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)

To view the test data see APPENDIX 4A and 4B.

Measurement Uncertainty ±4.6 dB

G) Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	10-11-14	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	10-11-06	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	11-02-17	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	11-02-19	Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017301	11-02-02	Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017401	10-09-26	Radiated Emissions
Horn Antenna	EMC Automation	HRN-0118	030101	10-07-22	Radiated Emissions
Horn Antenna	EMC Automation	HRN-0118	030201	11-03-12	Radiated Emissions
Horn Antenna	Emco	3117	47563	11-07-15	Radiated Emissions
Horn Antenna	CMT	LHA 0180	R52734-001	12-01-21	Radiated Emissions
Preamplifier	TDK RF Solutions	18-26	030002	10-11-06	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	1018	11-03-12	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	10-10-16	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	10-11-30	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	112394	10-11-30	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	102204	10-11-25	RF Conducted Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	10-11-30	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESU-40	100162	10-11-29	Radiated Emissions
Spectrum Analyzer	HP	8563E	3745A08112	11-09-30	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	10-06-23	RF Conducted Emissions
Environment Monitor	Control Company	1870	230355190	11-01-08	Radiated Emissions
Environment Monitor	Control Company	1870	230355189	11-01-08	RF Conducted Emissions

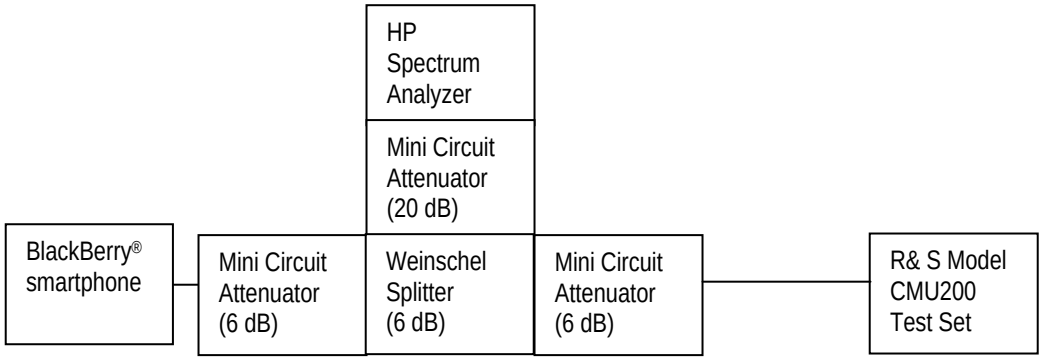
Environment Monitor	Control Company	1870	80117164	11-01-08	Radiated Emissions
Temperature Probe	Control Company	15-077-21	51129471	10-05-01	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91007118	N/R	Frequency Stability
Signal Generator	Agilent	E8257D	MY45140527	11-11-05	Radiated Emissions
Signal Generator	Agilent	83630B	3844A00927	10-10-31	Radiated Emissions

APPENDIX 1 – WCDMA BAND 2 & 5 CONDUCTED EMISSIONS TEST DATA/PLOTS

WCDMA 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.

Test Setup Diagram



Date of Test: February 09, 2010

The environmental test conditions were:	Temperature:	23 ºC
	Pressure:	1008 mb
	Relative Humidity:	22 %

The following measurements were performed by Maurice Battler.

WCDMA Conducted RF Emission Test Data cont'd

The conducted spurious emissions – – As per 47 CFR 2.1051, CFR 24.238(a), CFR 4.202, CFR 22 Subpart H, RSS – 132 and RSS – 133 were measured from 10 MHz to 20 GHz. The EUT emissions were in the noise floor.
See figures 1-1 to 1-12 for the plots of the conducted spurious emissions on Band 5

See figures 2-1 to 2-12 for the plots of the conducted spurious emissions on Band 2

–26 dBc Bandwidth and Occupied Bandwidth (99%)

For each carrier frequency of low, middle and high, the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth.
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc bandwidth for the UMTS850 band was measured to be 4.667 MHz, and for the UMTS1900 band was measured to be 4.667 MHz as shown below. This results in a 3.0 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 2 MHz was employed.

Test Data for band 2 and 5 in UMTS mode.

Band 5 Frequency (MHz)	-26dBc Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
826.4	4.667	4.192
836.4	4.658	4.175
846.6	4.667	4.175

Band 2 Frequency (MHz)	-26dBc Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
1852.4	4.667	4.183
1880.0	4.650	4.167
1907.6	4.667	4.175

Measurement Plots for band 2 and band 5 in UMTS mode
Refer to the following measurement plots for more detail.
See Figures 1-7 to 1-12 (Band 5) & 2-1 to 2-12 (Band 2) for the plots of the –26dBc Bandwidth and 99% Occupied Bandwidth.
See Figures 1-13 to 1-14 & 2-13 to 2-14for plots of the channel mask results.

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

WCDMA Conducted RF Emission Test Data cont'd

Figure 1-1: UMTS band 5, Spurious Conducted Emissions, Low channel

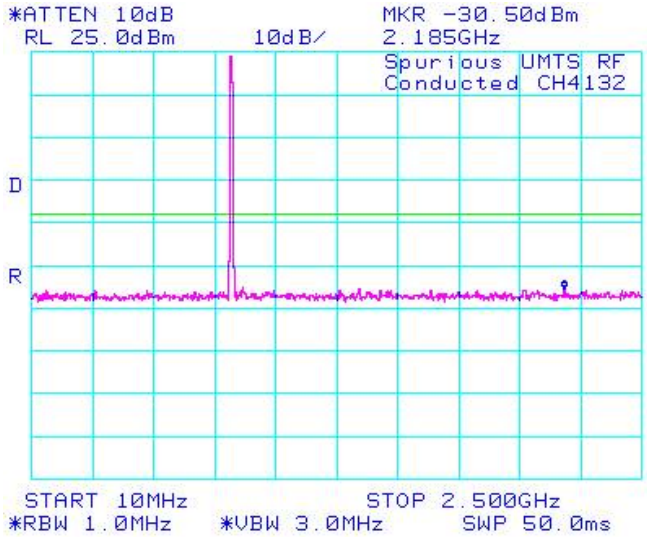


Figure 1-2: UMTS band 5, Spurious Conducted Emissions, Low channel

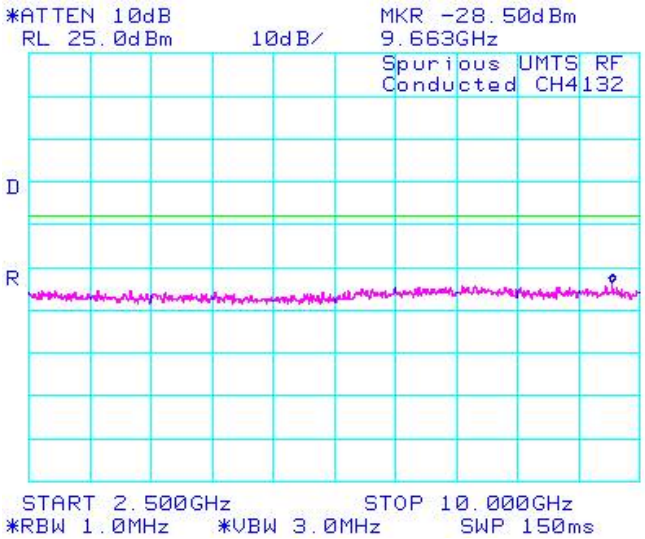


Figure 1-3: UMTS band 5, Spurious Conducted Emissions, Middle Channel

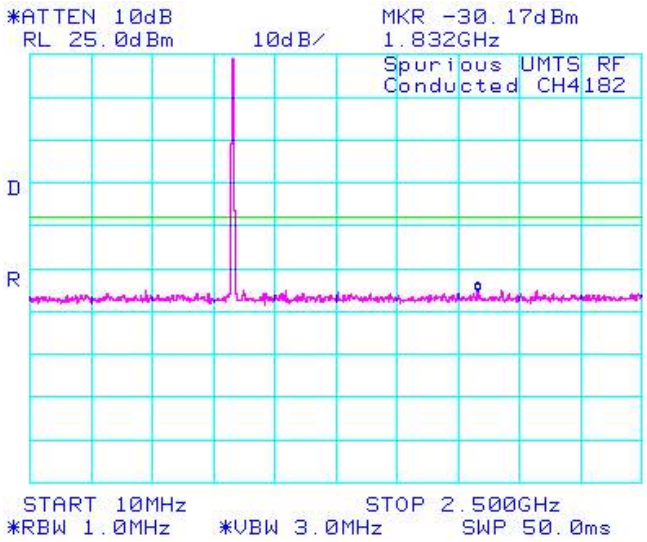
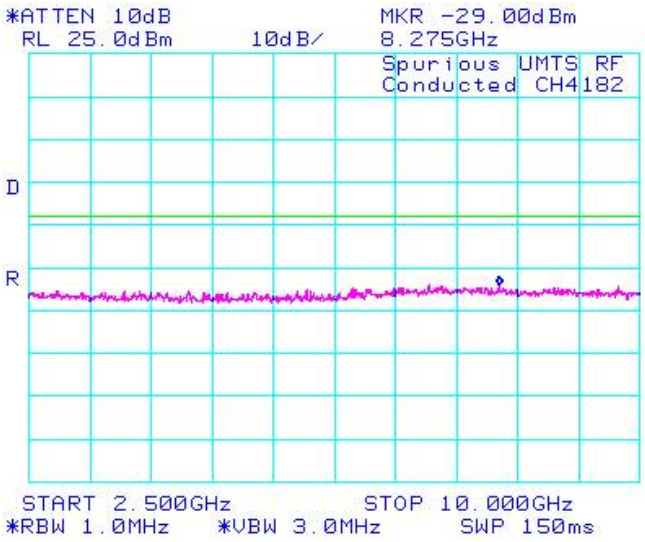


Figure 1-4: UMTS band 5, Spurious Conducted Emissions, Middle Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 1-5: UMTS band 5, Spurious Conducted Emissions, High Channel

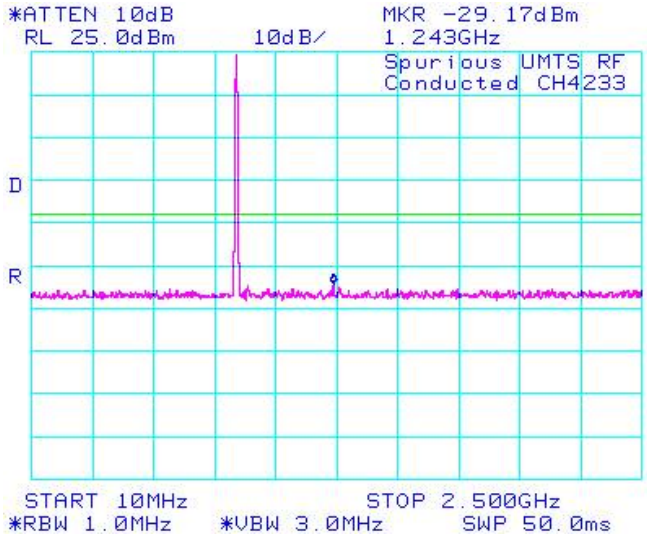


Figure 1-6: UMTS band 5, Spurious Conducted Emissions, High Channel

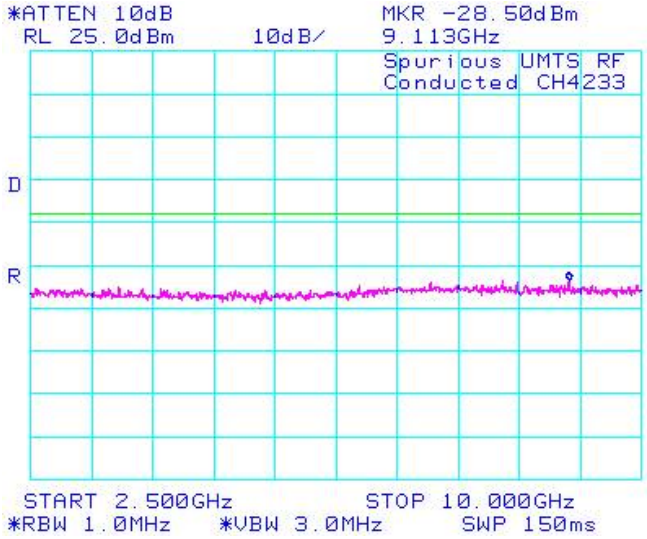


Figure 1-7: -26dBc bandwidth, UMTS band 5 Low Channel

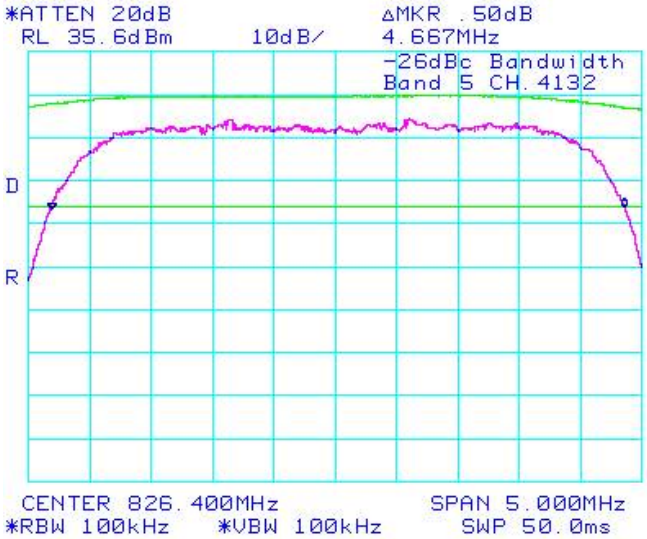
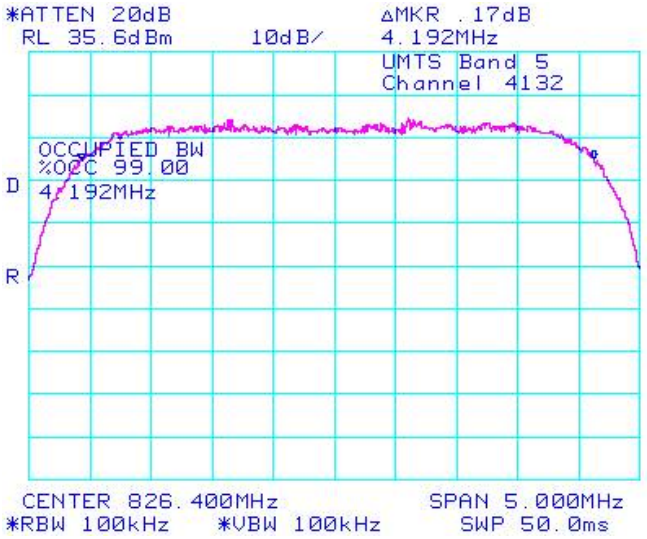


Figure 1-8: Occupied Bandwidth, UMTS band 5 Low Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 1-9: -26dBc bandwidth, UMTS band 5 Middle Channel

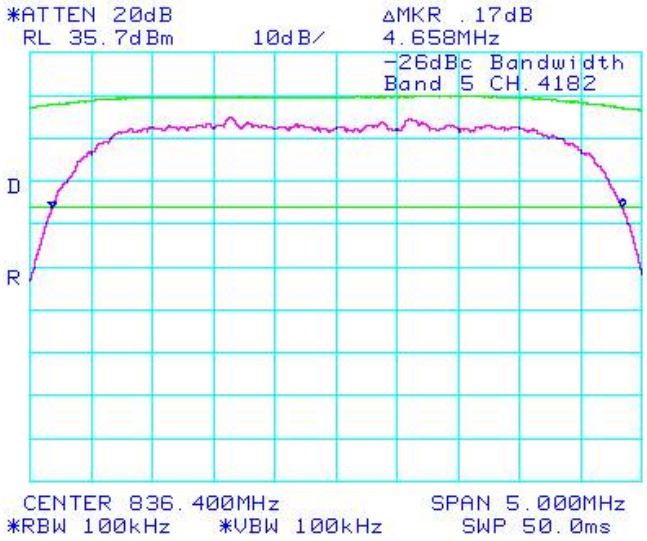


Figure 1-10: Occupied Bandwidth, UMTS band 5 Middle Channel

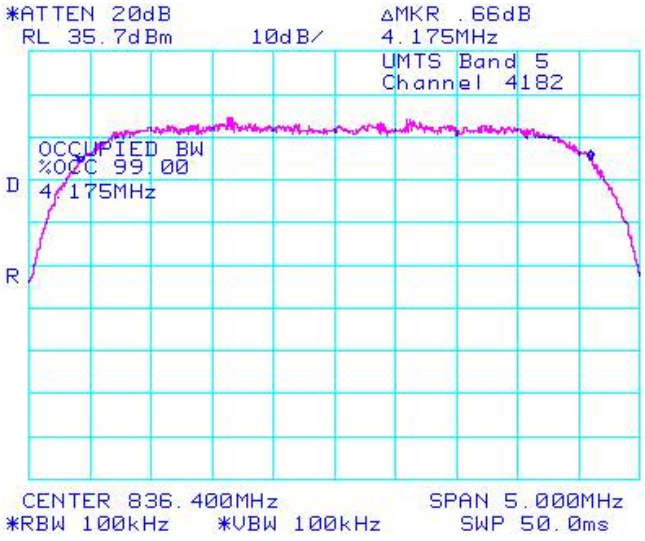


Figure 1-11: -26dBc bandwidth, UMTS band 5 High Channel

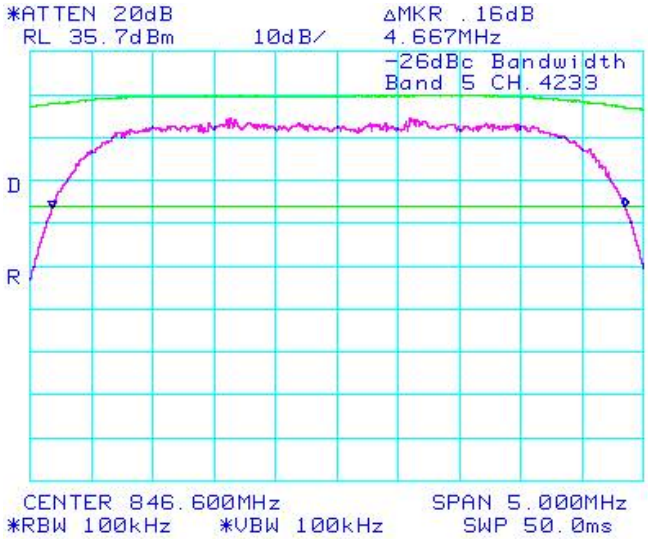
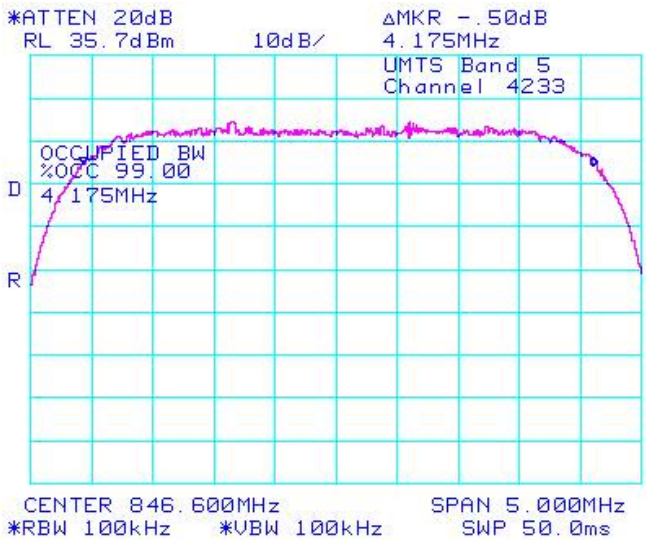


Figure 1-12: Occupied Bandwidth, UMTS band 5 High Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 1-13: UMTS band 5, Low Channel Mask

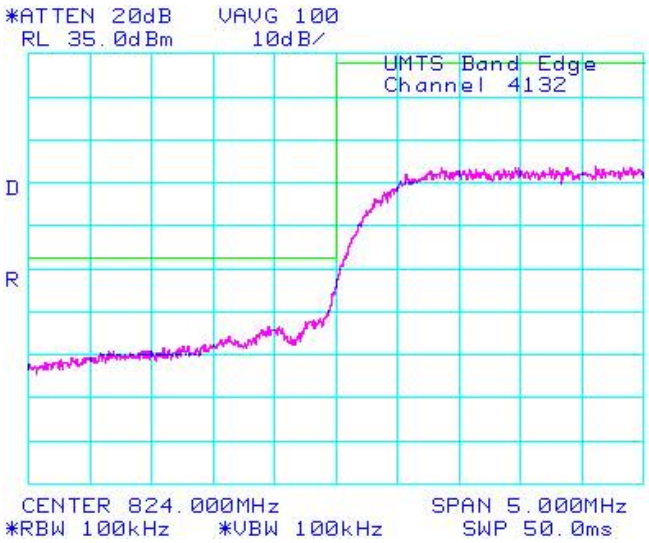


Figure 1-14: UMTS band 5, High Channel Mask

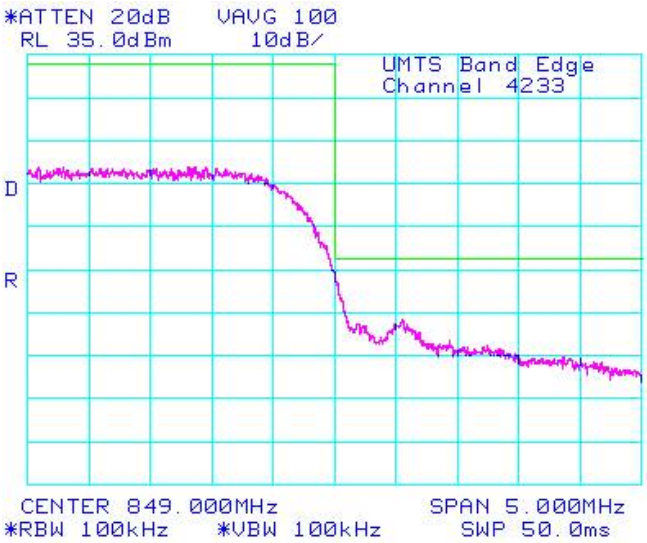


Figure 2-1: UMTS band 2, Spurious Conducted Emissions, Low channel

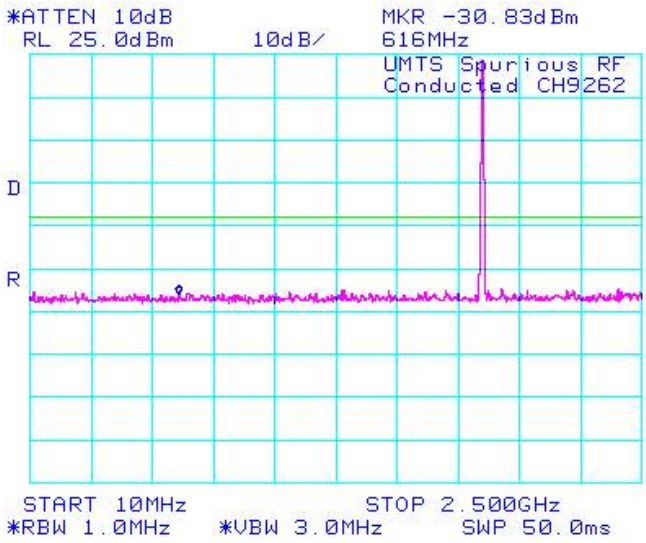


Figure 2-2: UMTS band 2, Spurious Conducted Emissions, Low channel

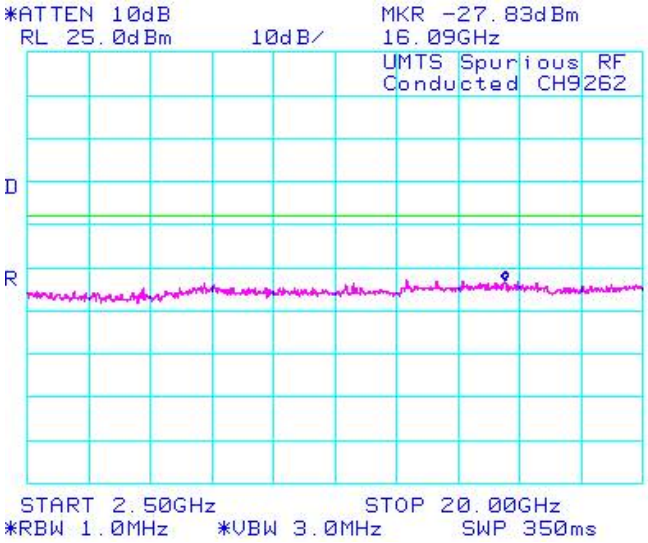


Figure 2-3: UMTS band 2, Spurious Conducted Emissions, Middle Channel

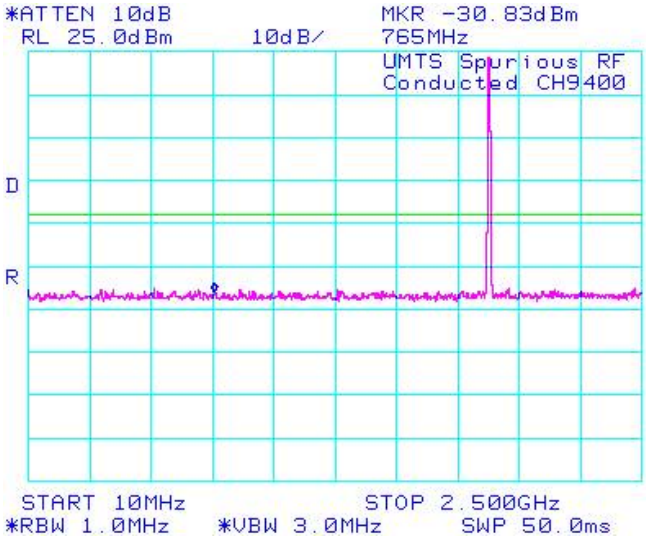
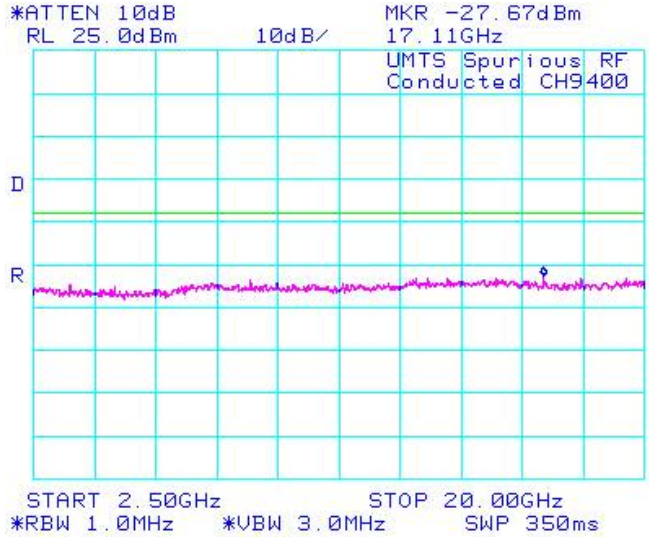


Figure 2-4: UMTS band 2, Spurious Conducted Emissions, Middle Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-5: UMTS band 2, Spurious Conducted Emissions, High Channel

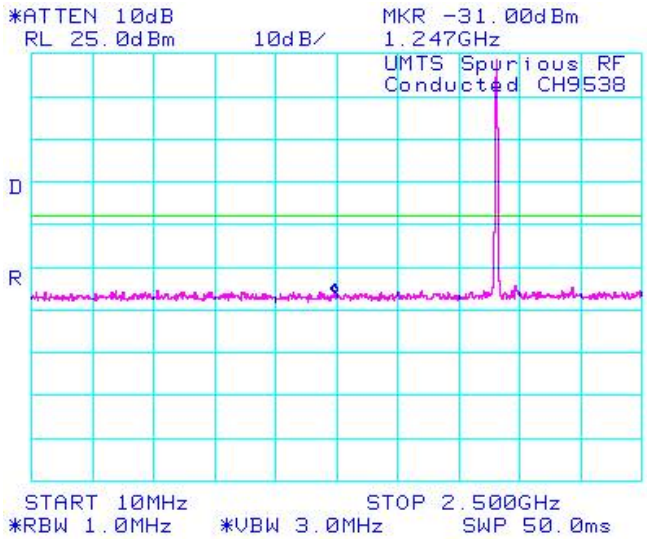


Figure 2-6: UMTS band 2, Spurious Conducted Emissions, High Channel

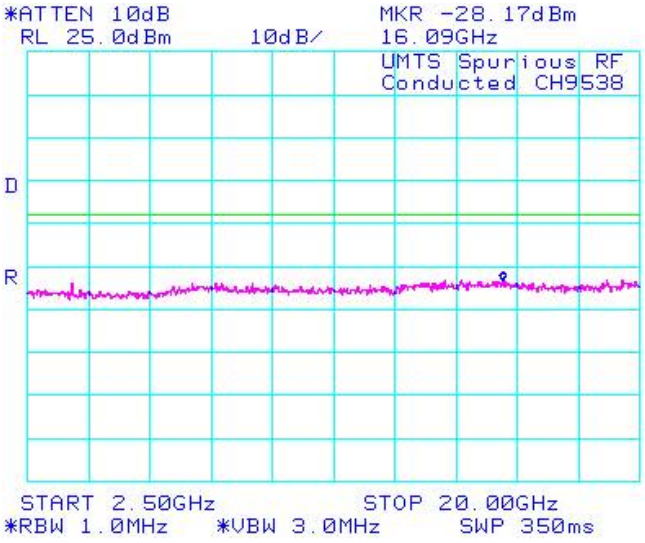


Figure 2-7: -26dBc bandwidth, UMTS band 2 Low Channel

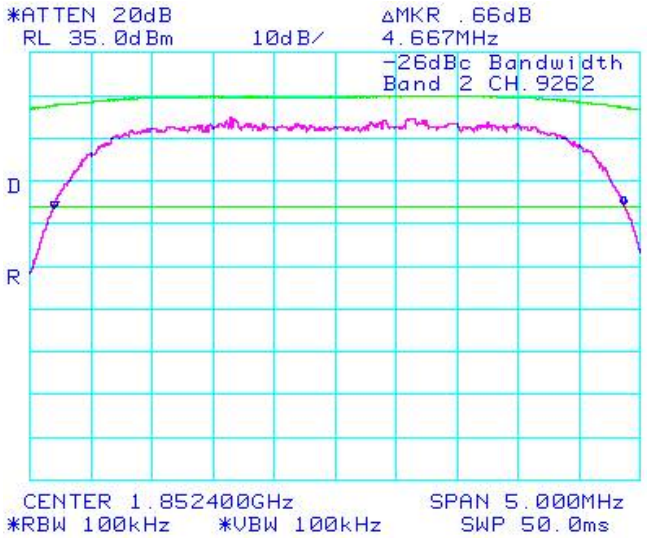
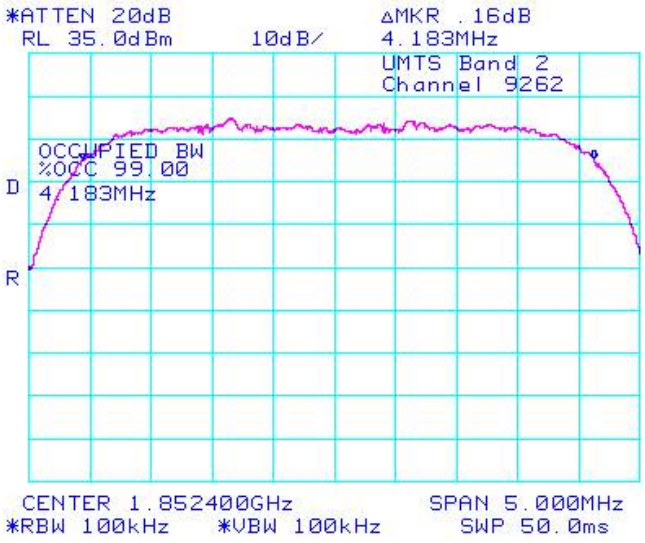


Figure 2-8: Occupied Bandwidth, UMTS band 2 Low Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-9b: -26dBc bandwidth, UMTS band 2 Middle Channel

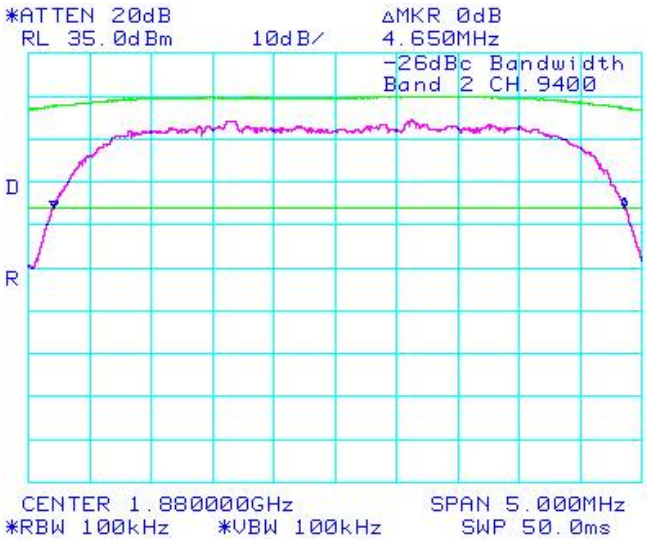


Figure 2-10: Occupied Bandwidth, UMTS band 2 Middle Channel

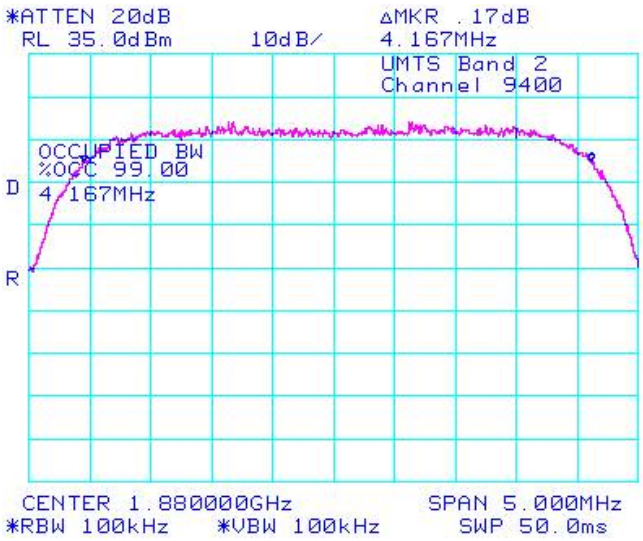


Figure 2-11: -26dBc bandwidth, UMTS band 2 High Channel

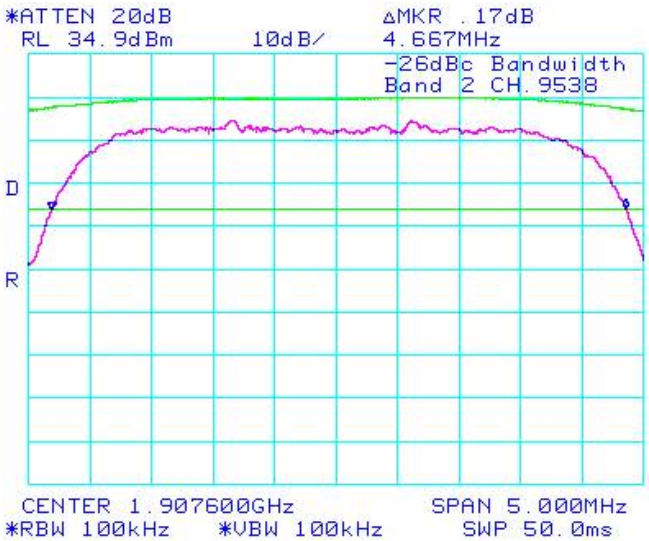
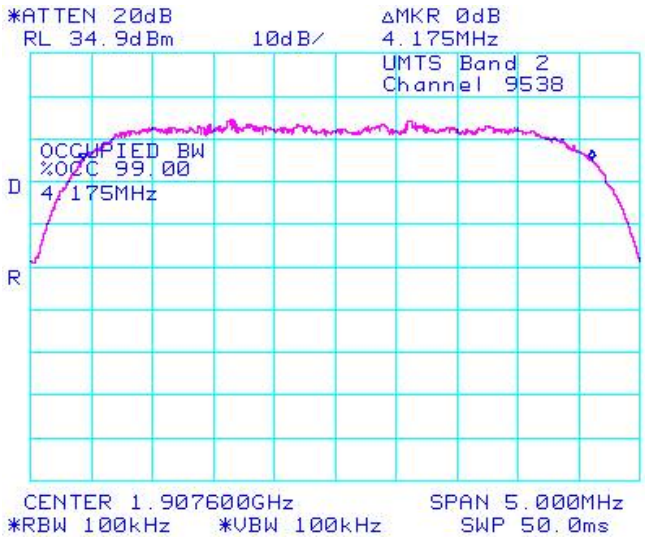


Figure 2-12: Occupied Bandwidth, UMTS band 2 High Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-13: UMTS band 2, Low Channel Mask

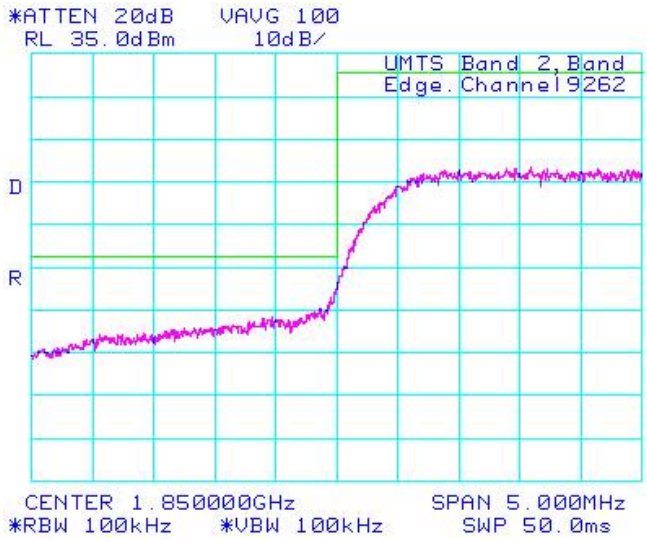
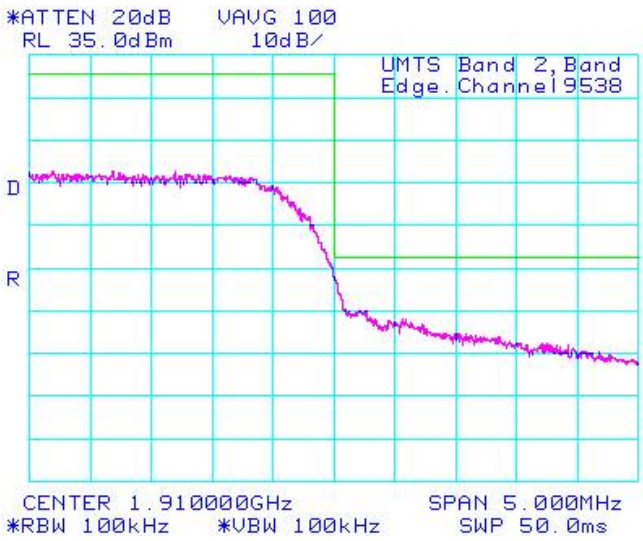


Figure 2-14: UMTS band 2, High Channel Mask



APPENDIX 2 – WCDMA BAND 2 & 5 CONDUCTED RF OUTPUT POWER TEST DATA

WCDMA Conducted RF Output Power Test Data

The following measurements were performed by Daoud Attayi.

The conducted RF output power was measured on the BlackBerry® smartphone using the Communication Tester, Rohde & Schwarz, model CMU 200. The low, middle and high channels were measured at maximum radio output power. The insertion loss of the coaxial cable from the CMU 200 to the BlackBerry® smartphone was compensated for in the measurements.
Peak nominal output power is 24.03 dBm ±0.5 dB for UMTS850 and 23.66 dBm ±0.5 dB for UMTS1900.

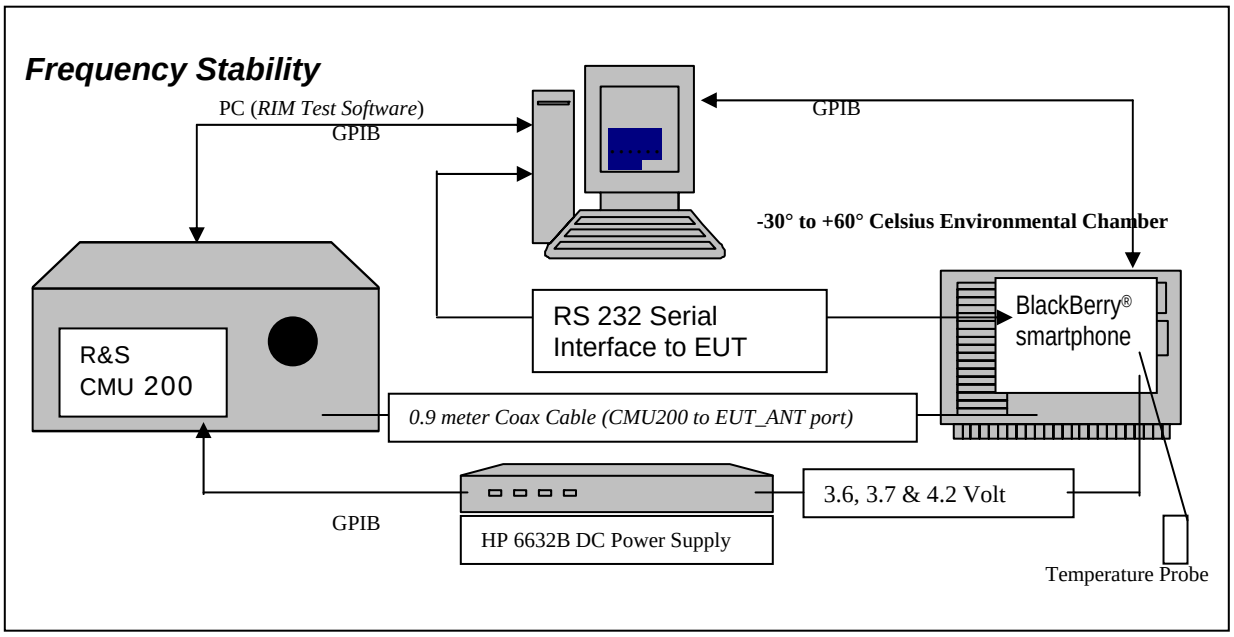
Date of Test: February 19, 2010

The environmental tests conditions were: Temperature: 22 °C
Pressure: 1009 mb
Relative Humidity: 32 %

	Band	**UMTS850**			**UMTS1900**		
	Channel	4132	4182	4233	9262	9400	9538
	Freq (MHz)	826.4	836.4	846.6	1852.4	1880.0	1907.6
Mode	**Subtest**	**Conducted Transmit Power (dBm)**			**Conducted Transmit Power (dBm)**		
Rel99	12.2 kbps RMC	23.72	24.00	24.03	23.66	23.49	23.40
Rel99	12.2 kbps, voice, AMR, SRB 3.4 kbps	23.71	23.95	23.98	23.63	23.51	23.42
Rel5 HSDPA	1	23.44	23.61	23.66	23.35	23.30	23.20
Rel5 HSDPA	2	23.30	23.60	23.70	23.30	23.40	23.15
Rel5 HSDPA	3	23.75	23.70	23.65	23.25	23.30	23.25
Rel5 HSDPA	4	23.32	23.65	23.70	23.20	23.35	23.28

APPENDIX 3 – WCDMA FREQUENCY STABILITY TEST DATA

WCDMA Frequency Stability Test Data



The following measurements were performed by Maurice Battler.

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements
2.1055 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 EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, CFR 47 chapter 1, Section 22.917 and RSS-132, 4.3 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 CMU 200 and the EUT antenna port.

Calibration for the Cable Loss was performed in the RF Laboratory using the Agilent power meter and Agilent Signal Generator.

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

UMTS1900 Frequency (MHz)	Cable loss (dB)
1852.4	1.20
1880.0	1.20
1907.6	1.20

UMTS850 Frequency (MHz)	Cable loss (dB)
826.4	0.90
836.4	0.90
846.6	0.90

Procedure:

The EUT was placed in the Temperature chamber and connected to CMU 200 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 following 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 CMU 200 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 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 826.4, 836.4, and 846.6 MHz for the UMTS850 band, 1852.4, 1880.0 and 1907.6 MHz for the UMTS1900 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; CMU 200 Communications test Set, 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 CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
10. The CMU 200 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 UMTS band 5 measured was **0.3381 PPM**.
The maximum frequency error in the UMTS band 2 measured was **-0.0166 PPM.**

UMTS Band 5 Channel results: channels 4132, 4182 and 4233 @ 20°C maximum transmitted power

The BlackBerry® smartphone was tested on February 17, 2010.

Traffic Channel Number	UMTS band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.6	20	8.44	0.1318
4182	836.4	3.6	20	-12.18	-0.1903
4233	846.6	3.6	20	-3.40	-0.0532

Traffic Channel Number	UMTS band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.7	20	-11.28	-0.1762
4182	836.4	3.7	20	-15.70	-0.2453
4233	846.6	3.7	20	-5.74	-0.0896

Traffic Channel Number	UMTS band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.2	20	-8.35	-0.1304
4182	836.4	4.2	20	6.71	0.1049
4233	846.6	4.2	20	-10.91	-0.1705

UMTS band 5 Results: channel 4132 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.6	-30	-16.13	-0.2520
4132	826.4	3.6	-20	5.08	0.0794
4132	826.4	3.6	-10	-2.26	-0.0353
4132	826.4	3.6	0	20.32	0.3176
4132	826.4	3.6	10	2.30	0.0360
4132	826.4	3.6	20	8.44	0.1318
4132	826.4	3.6	30	-15.43	-0.2410
4132	826.4	3.6	40	9.46	0.1478
4132	826.4	3.6	50	-17.23	-0.2692
4132	826.4	3.6	60	-3.77	-0.0589

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.7	-30	2.47	0.0386
4132	826.4	3.7	-20	-3.62	-0.0565
4132	826.4	3.7	-10	-6.79	-0.1061
4132	826.4	3.7	0	-11.83	-0.1848
4132	826.4	3.7	10	9.08	0.1419
4132	826.4	3.7	20	-11.28	-0.1762
4132	826.4	3.7	30	-9.66	-0.1509
4132	826.4	3.7	40	-5.04	-0.0787
4132	826.4	3.7	50	8.54	0.1335
4132	826.4	3.7	60	7.72	0.1206

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.2	-30	-15.44	-0.2413
4132	826.4	4.2	-20	-14.11	-0.2205
4132	826.4	4.2	-10	12.31	0.1924
4132	826.4	4.2	0	-7.42	-0.1159
4132	826.4	4.2	10	-11.93	-0.1864
4132	826.4	4.2	20	-8.35	-0.1304
4132	826.4	4.2	30	-9.49	-0.1483
4132	826.4	4.2	40	5.54	0.0865
4132	826.4	4.2	50	-8.01	-0.1252
4132	826.4	4.2	60	4.01	0.0627

UMTS band 5 Results: channel 4182 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	3.6	-30	-12.48	-0.1950
4182	836.4	3.6	-20	8.51	0.1330
4182	836.4	3.6	-10	5.83	0.0911
4182	836.4	3.6	0	21.64	0.3381
4182	836.4	3.6	10	7.23	0.1130
4182	836.4	3.6	20	-12.18	-0.1903
4182	836.4	3.6	30	-7.14	-0.1116
4182	836.4	3.6	40	-7.34	-0.1147
4182	836.4	3.6	50	-4.49	-0.0701
4182	836.4	3.6	60	7.83	0.1223

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	3.7	-30	8.90	0.1390
4182	836.4	3.7	-20	-12.54	-0.1960
4182	836.4	3.7	-10	10.30	0.1609
4182	836.4	3.7	0	11.80	0.1843
4182	836.4	3.7	10	5.63	0.0880
4182	836.4	3.7	20	-15.70	-0.2453
4182	836.4	3.7	30	-5.68	-0.0887
4182	836.4	3.7	40	2.50	0.0391
4182	836.4	3.7	50	-7.74	-0.1209
4182	836.4	3.7	60	12.33	0.1926

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	4.2	-30	8.68	0.1357
4182	836.4	4.2	-20	-9.08	-0.1419
4182	836.4	4.2	-10	17.50	0.2735
4182	836.4	4.2	0	20.00	0.3126
4182	836.4	4.2	10	2.41	0.0377
4182	836.4	4.2	20	6.71	0.1049
4182	836.4	4.2	30	-4.46	-0.0696
4182	836.4	4.2	40	14.01	0.2189
4182	836.4	4.2	50	-3.08	-0.0482
4182	836.4	4.2	60	4.41	0.0689

UMTS band 5 Results: channel 4233 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	3.6	-30	-3.04	-0.0474
4233	846.6	3.6	-20	5.04	0.0787
4233	846.6	3.6	-10	-2.21	-0.0346
4233	846.6	3.6	0	-10.24	-0.1600
4233	846.6	3.6	10	-14.28	-0.2232
4233	846.6	3.6	20	-3.40	-0.0532
4233	846.6	3.6	30	6.81	0.1063
4233	846.6	3.6	40	3.95	0.0618
4233	846.6	3.6	50	-17.76	-0.2775
4233	846.6	3.6	60	-13.57	-0.2120

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	3.7	-30	7.80	0.1218
4233	846.6	3.7	-20	18.74	0.2928
4233	846.6	3.7	-10	3.95	0.0618
4233	846.6	3.7	0	10.99	0.1717
4233	846.6	3.7	10	5.13	0.0801
4233	846.6	3.7	20	-5.74	-0.0896
4233	846.6	3.7	30	5.37	0.0839
4233	846.6	3.7	40	17.06	0.2666
4233	846.6	3.7	50	7.11	0.1111
4233	846.6	3.7	60	-9.45	-0.1476

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	4.2	-30	4.23	0.0660
4233	846.6	4.2	-20	-15.11	-0.2360
4233	846.6	4.2	-10	5.95	0.0930
4233	846.6	4.2	0	-9.63	-0.1504
4233	846.6	4.2	10	-3.88	-0.0606
4233	846.6	4.2	20	-10.91	-0.1705
4233	846.6	4.2	30	7.74	0.1209
4233	846.6	4.2	40	-1.86	-0.0291
4233	846.6	4.2	50	5.68	0.0887
4233	846.6	4.2	60	-13.70	-0.2141

UMTS band 2 Channel results: channels 9262, 9400, & 9538 @ 20°C maximum transmitted power

Date of Test: February 17, 2010

Traffic Channel Number	UMTS1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	*PPM*
9262	1852.4	3.6	20	-24.32	-0.0131
9400	1880.0	3.6	20	-22.02	-0.0117
9538	1907.6	3.6	20	-23.36	-0.0122

Traffic Channel Number	UMTS1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	3.7	20	-23.79	-0.0128
9400	1880.0	3.7	20	-21.06	-0.0112
9538	1907.6	3.7	20	-22.96	-0.0120

Traffic Channel Number	UMTS1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	4.2	20	-26.78	-0.0145
9400	1880.0	4.2	20	-20.71	-0.0110
9538	1907.6	4.2	20	-22.60	-0.0118

UMTS band 2 Results: channel 9262 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	3.6	-30	-24.75	-0.0134
9262	1852.4	3.6	-20	-22.83	-0.0123
9262	1852.4	3.6	-10	-11.70	-0.0063
9262	1852.4	3.6	0	-25.71	-0.0139
9262	1852.4	3.6	10	-20.29	-0.0110
9262	1852.4	3.6	20	-24.32	-0.0131
9262	1852.4	3.6	30	-17.91	-0.0097
9262	1852.4	3.6	40	-28.43	-0.0153
9262	1852.4	3.6	50	-20.65	-0.0111
9262	1852.4	3.6	60	-23.41	-0.0126

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	3.7	-30	-30.79	-0.0166
9262	1852.4	3.7	-20	-17.40	-0.0094
9262	1852.4	3.7	-10	-13.09	-0.0071
9262	1852.4	3.7	0	-17.44	-0.0094
9262	1852.4	3.7	10	-23.24	-0.0125
9262	1852.4	3.7	20	-23.79	-0.0128
9262	1852.4	3.7	30	-25.63	-0.0138
9262	1852.4	3.7	40	-26.09	-0.0141
9262	1852.4	3.7	50	-27.31	-0.0147
9262	1852.4	3.7	60	-25.45	-0.0137

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	4.2	-30	-26.64	-0.0144
9262	1852.4	4.2	-20	-21.42	-0.0116
9262	1852.4	4.2	-10	-22.92	-0.0124
9262	1852.4	4.2	0	-19.67	-0.0106
9262	1852.4	4.2	10	-28.78	-0.0155
9262	1852.4	4.2	20	-26.78	-0.0145
9262	1852.4	4.2	30	-27.69	-0.0150
9262	1852.4	4.2	40	-27.16	-0.0147
9262	1852.4	4.2	50	-30.56	-0.0165
9262	1852.4	4.2	60	-18.91	-0.0102

UMTS band 2 Results: channel 9400 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.0	3.6	-30	12.94	0.0069
9400	1880.0	3.6	-20	-5.71	-0.0030
9400	1880.0	3.6	-10	-18.26	-0.0097
9400	1880.0	3.6	0	7.13	0.0038
9400	1880.0	3.6	10	-18.68	-0.0099
9400	1880.0	3.6	20	-22.02	-0.0117
9400	1880.0	3.6	30	-16.28	-0.0087
9400	1880.0	3.6	40	-24.37	-0.0130
9400	1880.0	3.6	50	-24.34	-0.0129
9400	1880.0	3.6	60	-20.02	-0.0106

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.0	3.7	-30	-29.22	-0.0155
9400	1880.0	3.7	-20	-19.67	-0.0105
9400	1880.0	3.7	-10	-18.37	-0.0098
9400	1880.0	3.7	0	-7.17	-0.0038
9400	1880.0	3.7	10	-8.93	-0.0047
9400	1880.0	3.7	20	-21.06	-0.0112
9400	1880.0	3.7	30	-27.24	-0.0145
9400	1880.0	3.7	40	-24.22	-0.0129
9400	1880.0	3.7	50	-13.75	-0.0073
9400	1880.0	3.7	60	-16.43	-0.0087

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.0	4.2	-30	-27.30	-0.0145
9400	1880.0	4.2	-20	-4.64	-0.0025
9400	1880.0	4.2	-10	-12.85	-0.0068
9400	1880.0	4.2	0	2.06	0.0011
9400	1880.0	4.2	10	-20.51	-0.0109
9400	1880.0	4.2	20	-20.71	-0.0110
9400	1880.0	4.2	30	-21.27	-0.0113
9400	1880.0	4.2	40	-13.09	-0.0070
9400	1880.0	4.2	50	-27.54	-0.0147
9400	1880.0	4.2	60	-20.66	-0.0110

UMTS band 2 Results: channel 9538 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.6	3.6	-30	-24.60	-0.0129
9538	1907.6	3.6	-20	-28.67	-0.0150
9538	1907.6	3.6	-10	-21.04	-0.0110
9538	1907.6	3.6	0	6.44	0.0034
9538	1907.6	3.6	10	-10.79	-0.0057
9538	1907.6	3.6	20	-23.36	-0.0122
9538	1907.6	3.6	30	-13.69	-0.0072
9538	1907.6	3.6	40	-20.16	-0.0106
9538	1907.6	3.6	50	-24.57	-0.0129
9538	1907.6	3.6	60	-20.74	-0.0109

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.6	3.7	-30	-23.73	-0.0124
9538	1907.6	3.7	-20	-19.33	-0.0101
9538	1907.6	3.7	-10	-21.62	-0.0113
9538	1907.6	3.7	0	-12.25	-0.0064
9538	1907.6	3.7	10	-14.69	-0.0077
9538	1907.6	3.7	20	-22.96	-0.0120
9538	1907.6	3.7	30	-20.72	-0.0109
9538	1907.6	3.7	40	-14.77	-0.0077
9538	1907.6	3.7	50	-24.15	-0.0127
9538	1907.6	3.7	60	-13.28	-0.0070

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.6	4.2	-30	-11.81	-0.0062
9538	1907.6	4.2	-20	-18.19	-0.0095
9538	1907.6	4.2	-10	-24.38	-0.0128
9538	1907.6	4.2	0	-23.38	-0.0123
9538	1907.6	4.2	10	-14.39	-0.0075
9538	1907.6	4.2	20	-22.60	-0.0118
9538	1907.6	4.2	30	-22.37	-0.0117
9538	1907.6	4.2	40	-19.70	-0.0103
9538	1907.6	4.2	50	-26.34	-0.0138
9538	1907.6	4.2	60	-24.29	-0.0127

APPENDIX 4 – GSM 1900 RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

Date of test: April 21, 2010

The measurements were performed by Heng Lin.
The environmental tests conditions were: Temperature: 25 °C
Pressure: 1013 mb
Relative Humidity: 23 %

The BlackBerry® smartphone was in standalone, Horizontal face down position.
Test distance is 3.0 metres

PCS1900 Band

GSM Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
										Corrected Reading (relative to Isotropic Radiator)			
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	(dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	512	1850.20	1900	Horn	V	76.41	88.49	V-V	-2.59	31.74	1.49	33.00	-1.26
F0	512	1850.20	1900	Horn	H	88.49		H-H	-3.29				
F0	661	1880.00	1900	Horn	V	76.17	89.4	V-V	-2.49	**32.51**	1.78	33.00	-0.49
F0	661	1880.00	1900	Horn	H	89.4		H-H	-2.07				
F0	810	1909.80	1900	Horn	V	75.5	89.14	V-V	-1.39	32.31	1.70	33.00	-0.69
F0	810	1909.80	1900	Horn	H	89.14		H-H	-1.31				

EDGE Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
										Corrected Reading (relative to Isotropic Radiator)			
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	(dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	512	1850.20	1900	Horn	V	74.58	87.54	V-V	-4.98	29.35	0.86	33.00	-3.65
F0	512	1850.20	1900	Horn	H	87.54		H-H	-5.55				
F0	661	1880.00	1900	Horn	V	76.49	88.03	V-V	-4.78	29.80	0.95	33.00	-3.20
F0	661	1880.00	1900	Horn	H	88.03		H-H	-4.84				
F0	810	1909.80	1900	Horn	V	75.57	88.09	V-V	-3.11	**30.51**	1.12	33.00	-2.49
F0	810	1909.80	1900	Horn	H	88.09		H-H	-3.17				