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-2671-1005-97

PRODUCT MODEL NO:	RDA71UW
TYPE NAME:	BlackBerry® smartphone
FCC ID:	L6ARDA70UW
IC:	2503A–RDA70UW
EMISSION DESIGNATOR (GSM):	248KGXW
EMISSION DESIGNATOR (EDGE):	248KG7W
EMISSION DESIGNATOR (WCDMA):	4M19F9W

DATE: May 24, 2010

Statement of Performance:

The BlackBerry® smartphone, model RDA71UW, part number CER-30953-001 Rev 3 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:

Fahd Faisal
Regulatory Compliance Associate
Date: May 31, 2010

Reviewed by:

Michael Cino
Regulatory Compliance Associate
Date: May 31, 2010

Reviewed and Approved by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: June 03, 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. 9300_RDA71UW_HW_Declaration_CER-30953_Rev2
2. 9300_RDA71UW_HW_Declaration_CER-30953_Rev3
3. MultiSourceDeclaration_9300_b1169

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	440 Phillip Street
Waterloo, Ontario	Waterloo, Ontario,
Canada, N2L 3W8	Canada , N2L 5R9
Phone: 519 888 7465	Phone: 519 888 7465
Fax: 519 888 6906	Fax: 519 888 6906

The testing was performed from April 7 to April 21, May 7 to 12 and May 21, 2010.

The sample EUT included:

SAMPLE	MODEL	CER NUBER	PIN	SOFTWARE
1	RDA71UW	CER-30953-001 Rev 1	22163EFE	V5.0.0.606 (Platform 6.3.0.1) Bundle 1019
2	RDA71UW	CER-30953-001 Rev 1	22163F44	V5.0.0.606 (Platform 6.3.0.1) Bundle 1019
3	RDA71UW	CER-30953-001 Rev 2	222B87D1	V5.0.0.606 (Platform 6.3.0.1) Bundle 1019
4	RDA71UW	CER-30953-001 Rev 3	223B6B88	V5.0.0.684 (Platform 6.3.0.11) Bundle 1169

RF Conducted Emissions testing was performed on sample 1.
RF Radiated Emissions testing was performed on samples 2, 3 and 4.

To view the differences between CER-30953-001 Rev 1 and CER-30953-001 Rev 2, see document number 9300_RDA71UW_HW_Declaration_CER-30953_Rev 2.

To view the differences between CER-30953-001 Rev 2 and CER-30953-001 Rev 3, see document number 9300_RDA71UW_HW_Declaration_CER-30953_Rev 3.

To view the differences between bundles 1019 and 1169, see the document number MultiSourceDeclaration_9300_b1169.

Only the measurements that may have been impacted by the changes from Rev 1 to Rev 3 were retested.

D) Support Equipment Used for the Testing of the EUT

No support equipment required; for list of equipment refer to section H, 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.

Test Results Chart

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	Pass	1A
Part 2.1051 Part 24.238(a)	RSS-GEN, 4.9	GSM PCS Conducted Spurious Emissions	Pass	1A
Part 2.202 Part 22.917	RSS-GEN, 4.6	GSM 850 Occupied Bandwidth and Channel Mask	Pass	1A
Part 2.202 Part 24.238	RSS-GEN, 4.6	GSM PCS Occupied Bandwidth and Channel Mask	Pass	1A
Part 2.1046(a)	RSS-133, 6.4 RSS-132, 4.4	GSM Conducted RF Output Power	Pass	2A
Part 2.1055(a)(d) Part 22.917	RSS-132, 4.3	GSM 850 Frequency Stability vs. Temperature and Voltage	Pass	3A
Part 2.1055(a)(d) Part 24.235	RSS-132, 4.3	GSM PCS Frequency Stability vs. Temperature and Voltage	Pass	3A
Part 22, Subpart H, Part 24, Subpart E	RSS-GEN, 4.9	GSM ERP, EIRP	Pass	4A
Part 2.1051 Part 22.917 Part 22.901	RSS-GEN, 4.9	WCDMA UMTS850 Conducted Spurious Emissions	Pass	1B
Part 2.1051 Part 24.238(a)	RSS-GEN, 4.9	WCDMA UMTS1900 Conducted Spurious Emissions	Pass	1B
Part 2.202 Part 22.917	RSS-GEN, 4.6	WCDMA UMTS850 Occupied Bandwidth and Channel Mask	Pass	1B
Part 2.202 Part 24.238	RSS-GEN, 4.6	WCDMA UMTS1900 Occupied Bandwidth and Channel Mask	Pass	1B
Part 2.1046(a)	RSS-133, 6.4 RSS-132, 4.4	WCDMA Conducted RF Output Power	Pass	2B
Part 2.1055(a)(d) Part 22.917	RSS-132, 4.3	WCDMA UMTS850 Frequency Stability vs. Temperature and Voltage	Pass	3B

Test Results Chart cont'd

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1055(a)(d) Part 24.235	RSS-GEN, 4.7	WCDMA UMTS1900 Frequency Stability vs. Temperature and Voltage	Pass	3B
Part 22, Subpart H	RSS-GEN, 4.9	WCDMA UMTS850 Radiated Spurious/Harmonic Emissions, ERP	Pass	4B
Part 24, Subpart E	RSS-GEN, 4.9	WCDMA UMTS1900 Radiated Spurious/Harmonic Emissions, EIRP	Pass	4B

G) Summary of Results

1) Conducted Emission Measurements

a) The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions requirements in the GSM850 as per 47 CFR 2.1051, 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 1A for test data.

The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions requirements in the PCS1900 as per 47 CFR 2.1051, CFR 24.238(a) and RSS-GEN, 4.9. The EUT was on the low, middle and high channels. The frequency range investigated was from 10 MHz to 20 GHz.
See APPENDIX 1A for test data

b) The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask requirements in the GSM850 as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6. The EUT was measured in GSM and EDGE mode on the low, middle and high channels. The worst case 99% Occupied Bandwidth was 248.3 kHz for GSM mode and 248.3 kHz for EDGE mode.
See APPENDIX 1A for test data.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask requirements in the PCS1900 as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6. The EUT was measured in GSM and EDGE mode on the low, middle and high channels. The worst case 99% Occupied Bandwidth was 248.3 kHz for GSM mode and 248.3 kHz for EDGE mode.
See APPENDIX 1A for test data.

c) The BlackBerry® smartphone met the requirements of the Conducted RF Output Power requirements for the GSM850 and PCS1900 as per 47 CFR 2.1046(a), RSS 133, 6.4 and RSS 132, 4.4. The EUT was measured in GSM and EDGE mode on the low, middle and high channels.
See APPENDIX 2A for the test data.

d) The BlackBerry® smartphone met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for the PCS1900 band as per 47 CFR 2.1055(a), 2.1055(d), 24.235 and RSS-132, 4.3. 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 3A for the test data.

e) 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.

f) 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. The worst case 99% Occupied Bandwidth was 4.175 MHz.
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. The worst case 99% Occupied Bandwidth was 4.192 MHz.
See APPENDIX 1 for the test data.

g) 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.

h) 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.

2) Radiated Emission Measurements

a) Radiated Spurious and Harmonic Emissions

The radiated spurious emissions/harmonics and ERP/EIRP were measured for GSM 850, PCS 1900, UMTS 850 and UMTS 1900 bands (WCDMA band 5 & 2). 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 Dipole antenna was used for the ERP measurements and 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 semi-anechoic chamber (SAC) below 1 GHz and a fully-anechoic room (FAR) above 1 GHz. The SAC's FCC registration number is **778487** and the Industry Canada (IC) file number is **2503B-1**. 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 ERP in the 850 band, GSM mode was measured on BlackBerry® smartphone. The highest ERP measured was 30.91 dBm (1.23 W) at 848.80 MHz (channel 251).

The ERP in the 850 band, EDGE mode was measured on BlackBerry® smartphone. The highest ERP measured was 25.26 dBm (0.34 W) at 848.80 MHz (channel 251).

The EIRP in the PCS band, GSM mode was measured on BlackBerry® smartphone. The highest ERP measured was 32.45 dBm (1.76 W) at 1909.80 MHz (channel 810).

The EIRP in the PCS band, EDGE mode was measured on BlackBerry® smartphone. The highest ERP measured was 28.70 dBm (0.74 W) at 1880.00 MHz (channel 661).

The ERP in the UMTS Band 2 was measured on BlackBerry® smartphone. The highest ERP measured was 26.86 dBm (0.49 W) at 1880.00 MHz (channel 9400).

The ERP in the UMTS Band 5 measured on BlackBerry® smartphone. The highest ERP measured was 23.44 dBm (0.22 W) at 846.60 MHz (channel 4233).

The radiated spurious emission and carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the GSM850 and PCS bands. Each band was measured in GSM and EDGE mode. Both the horizontal and vertical polarizations were measured.

The harmonic emissions in the GSM850 band for both GSM and EDGE modes were more than 25 dB below the limit for all tested frequencies.

The worst harmonic emission in the PCS 1900 band for the GSM and EDGE modes was -28.35 dBm, or 15.35 dB margin below the limit at a frequency of 5460.160 MHz.

The radiated spurious emission and carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the UMTS BAND 2 and UMTS BAND 5. Both the horizontal and vertical polarizations were measured.

The test margin in the UMTS bands harmonic emissions were greater than 25 dB below the accepted limits for all tested frequencies.

b) Co-Location Measurements

The radiated emissions were measured up to 18 GHz for middle channels for simultaneous transmission in the following test configuration combinations: GSM850/Bluetooth/802.11b, PCS1900/Bluetooth/802.11n, UMTS 850 /Bluetooth/802.11b and UMTS 1900/Bluetooth/802.11g.
Both the horizontal and vertical polarizations were measured. The emissions due to different simultaneous transmission did not increase the amplitude of any emissions nor did it produce any new inter-modulation products as a result of mixing.

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

H) 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

Compliance Test Equipment Used cont'd

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
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

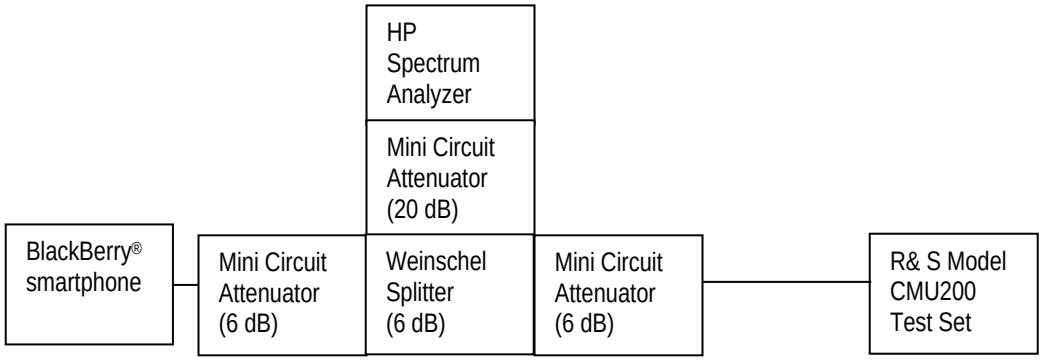
** All the testing done with the respective equipment was completed before the calibration due date*

APPENDIX 1A – GSM CONDUCTED RF EMISSIONS TEST DATA/PLOTS

GSM Conducted RF Emission Test Data

This appendix contains measurement data pertaining to conducted spurious emissions, –26 dBc bandwidth, 99% power bandwidth and the channel mask for the BlackBerry® smartphone.

Test Setup Diagram



Date of Test: April 9, 2010

The environmental test conditions were:

Temperature: 24 ºC
Pressure: 999 mb
Relative Humidity: 22 %

The following measurements were performed by Maurice Battler.

GSM 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 noise floor.
See figures 1-1a to 1-12a for the plots of the conducted spurious emissions.

–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 GSM850 band was measured to be 268 kHz, and for the PCS1900 band was measured to be 275 kHz 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 1 MHz was employed.

Test Data for 850 band and 1900 band selected Frequencies in GSM mode.

850 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
824.2	265	246.7
837.6	265	243.3
848.8	268	248.3

1900 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	270	248.3
1880.0	275	243.3
1909.8	268	245.0

Measurement Plots for 850 and 1900 in GSM mode
Refer to the following measurement plots for more detail.
See Figures 1-13a to 1-24a for the plots of the –26dBc Bandwidth and 99% Occupied Bandwidth.
See Figures 1-25a to 1-28a for plots of the channel mask results.

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

GSM Conducted RF Emission Test Data cont'd

Test Data for 850 and 1900 bands selected Frequencies in EDGE mode.

850 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
824.2	246.7
837.6	243.3
848.8	248.3

1900 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
1850.2	248.3
1880.0	243.3
1909.8	245.0

Measurement Plots for 850 and 1900 bands in EDGE mode
Refer to the following measurement plots for more detail.

See Figures 1-29a to 1-34a for the plots of the 99% Occupied Bandwidth.
See Figures 1-35a to 1-38a for the plots of channel mask EDGE results.

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

GSM Conducted RF Emission Test Data cont'd

Figure 1-1a: GSM850 band, Spurious Conducted Emissions, Low channel

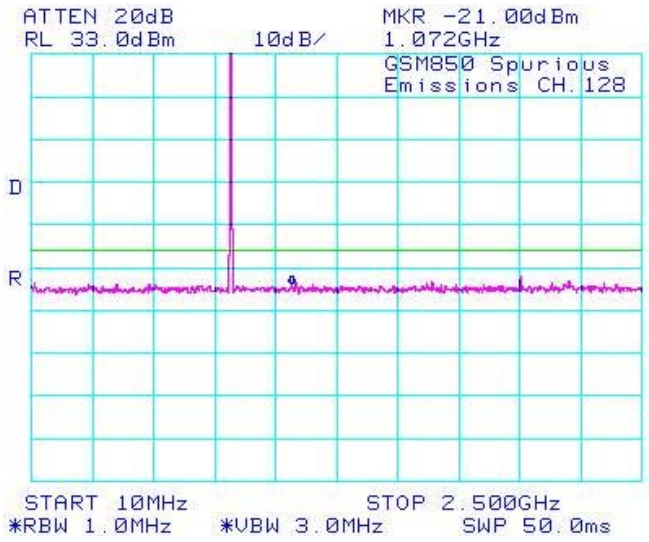


Figure 1-2a: GSM850 band, Spurious Conducted Emissions, Low channel

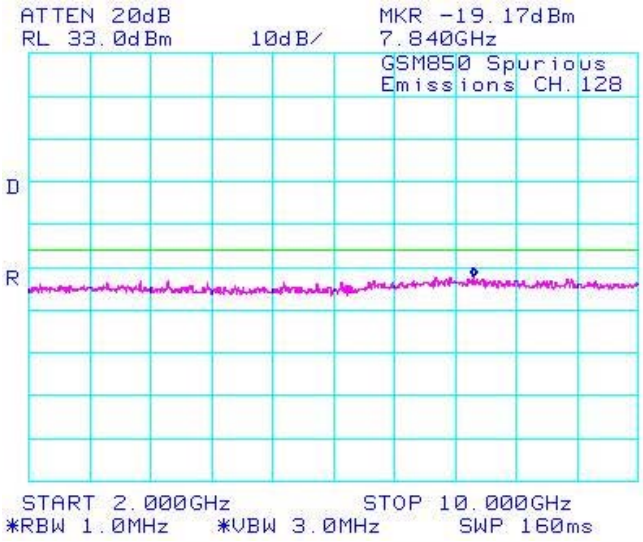


Figure 1-3a: GSM850 band, Spurious Conducted Emissions, Middle Channel

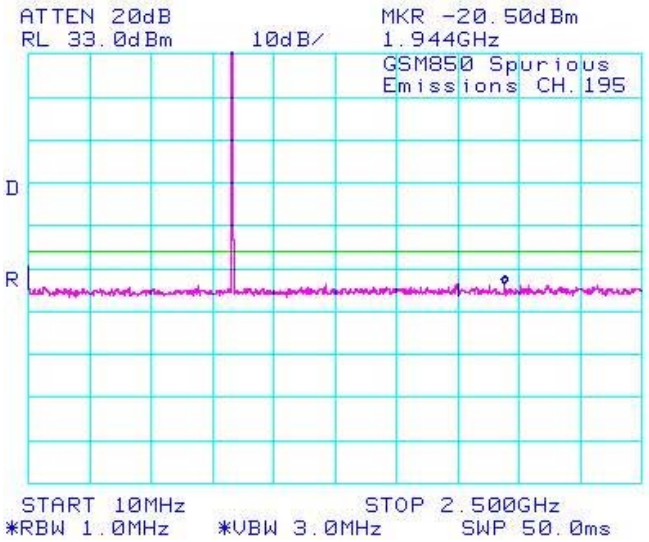
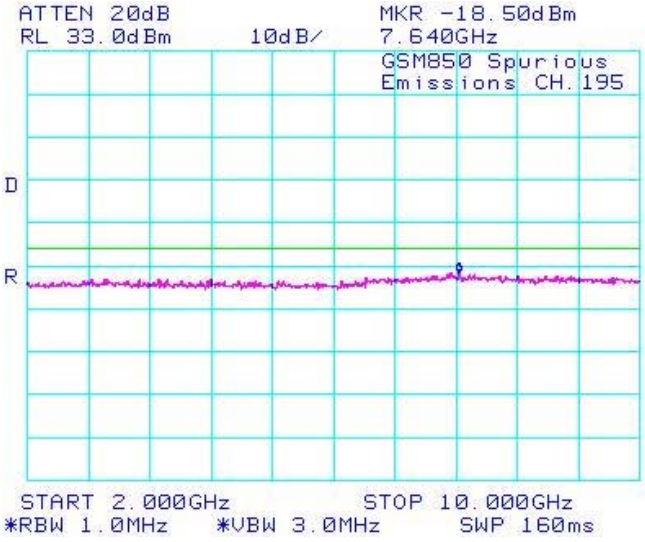


Figure 1-4a: GSM850 band, Spurious Conducted Emissions, Middle Channel



GSM Conducted RF Emission Test Data cont'd

Figure 1-5a: GSM850 band, Spurious Conducted Emissions, High Channel

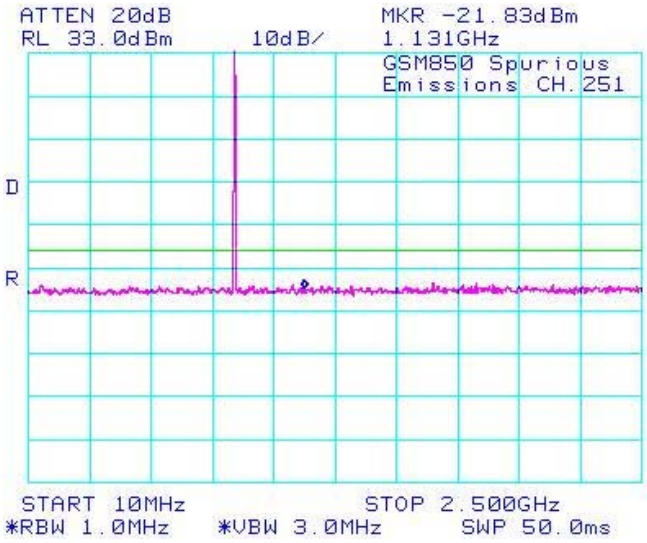


Figure 1-6a: GSM850 band, Spurious Conducted Emissions, High Channel

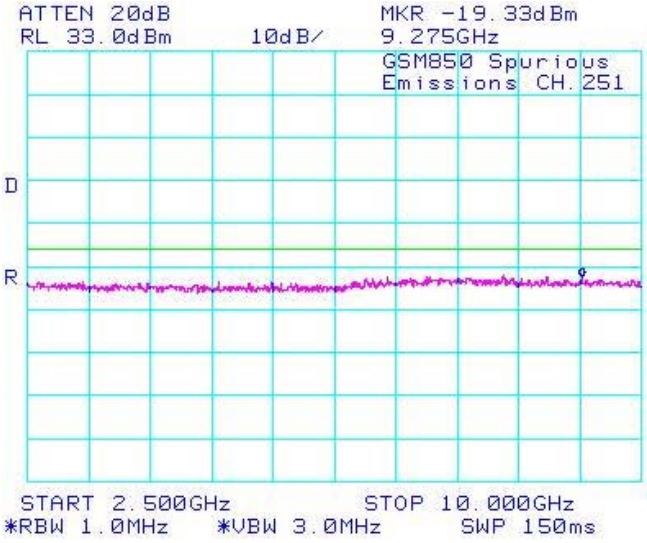


Figure 1-7a: PCS1900 band, Spurious Conducted Emissions, Low Channel

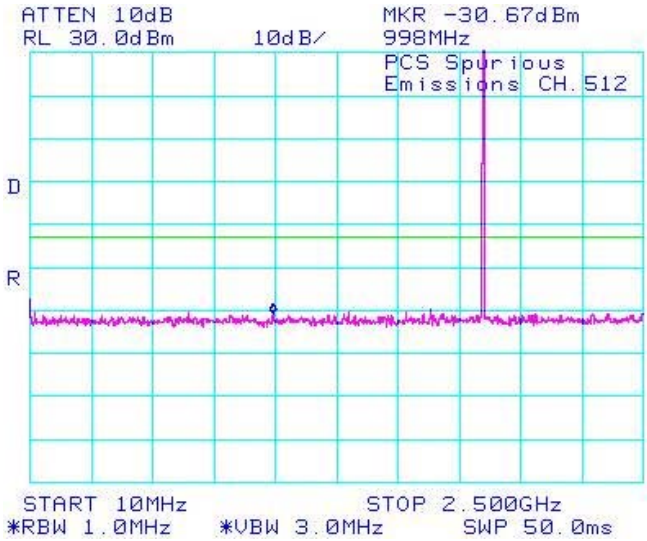
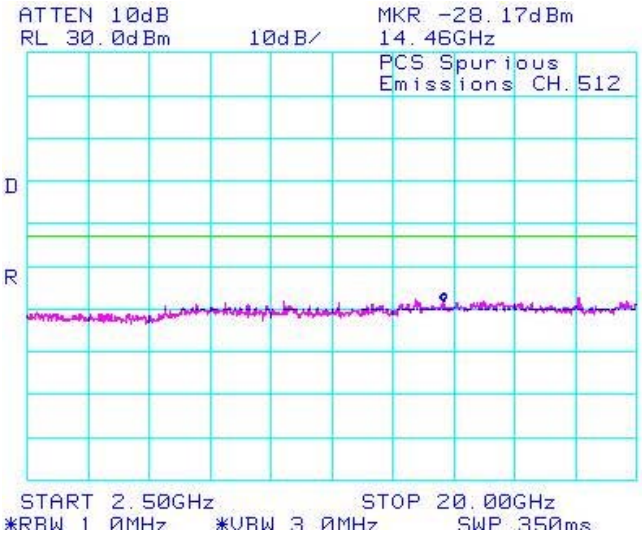


Figure 1-8a: PCS1900 band, Spurious Conducted Emissions, Low Channel



GSM Conducted RF Emission Test Data cont'd

Figure 1-9a: PCS1900 band, Spurious Conducted Emissions, Middle Channel

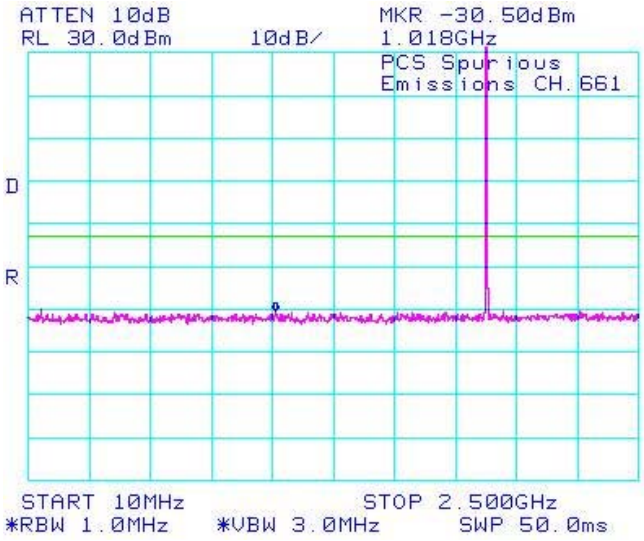


Figure 1-10a: PCS1900 band, Spurious Conducted Emissions, Middle Channel

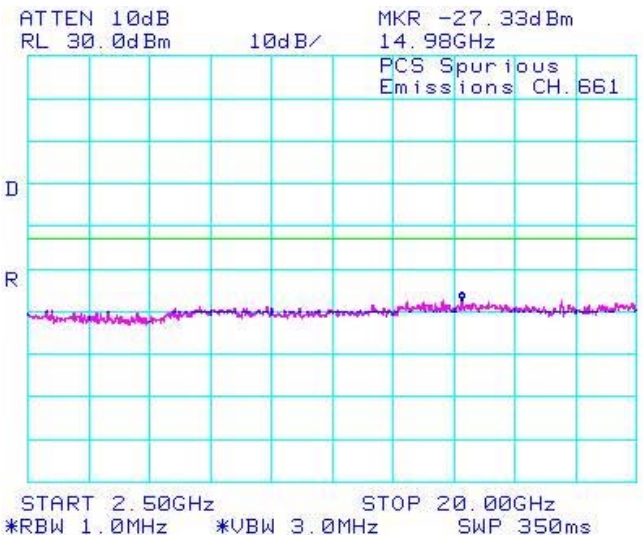


Figure 1-11a: PCS1900 band, Spurious Conducted Emissions, High Channel

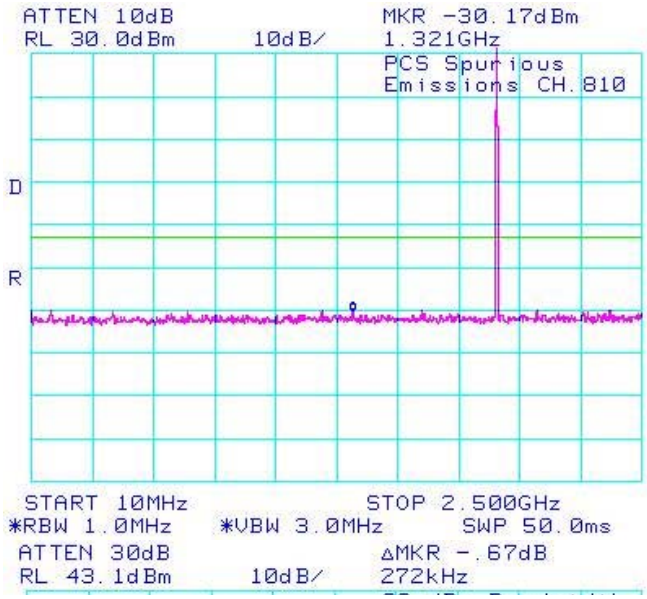
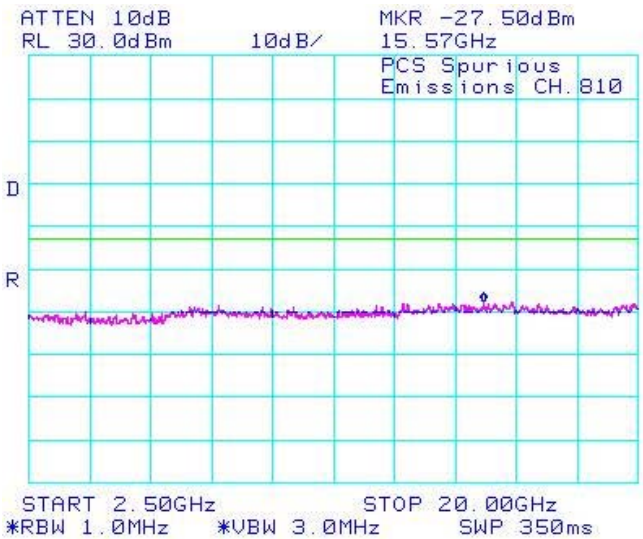


Figure 1-12a: PCS1900 band, Spurious Conducted Emissions, High Channel



GSM Conducted RF Emission Test Data cont'd

Figure 1-13a: -26dBc bandwidth, GSM850 band Low Channel in GSM mode

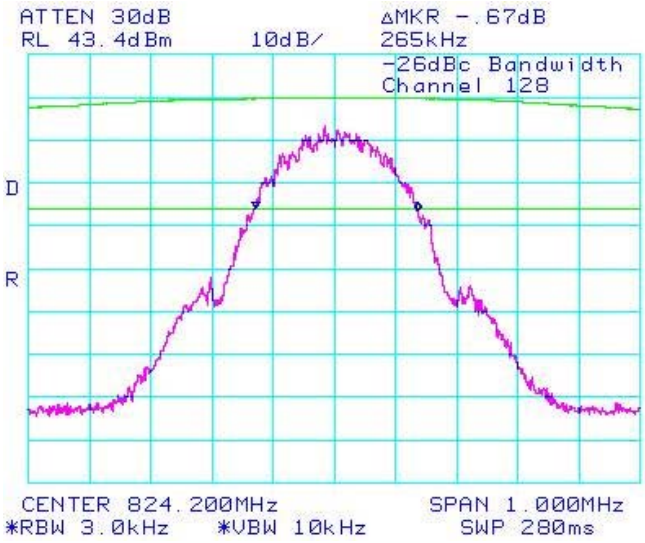


Figure 1-14a: Occupied Bandwidth, GSM850 band Low Channel in GSM mode

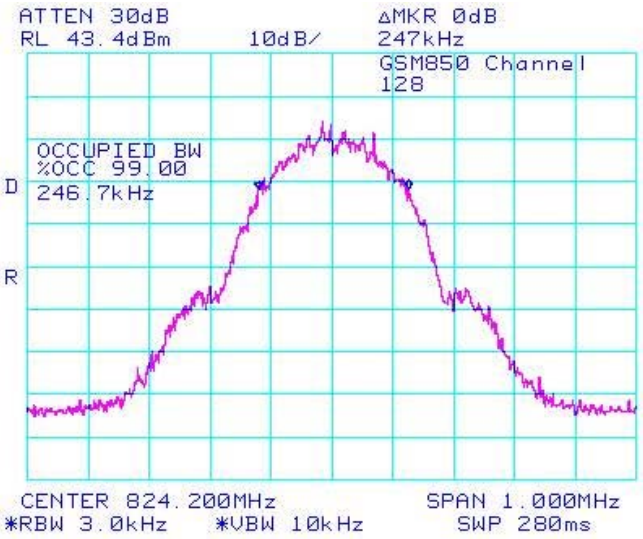
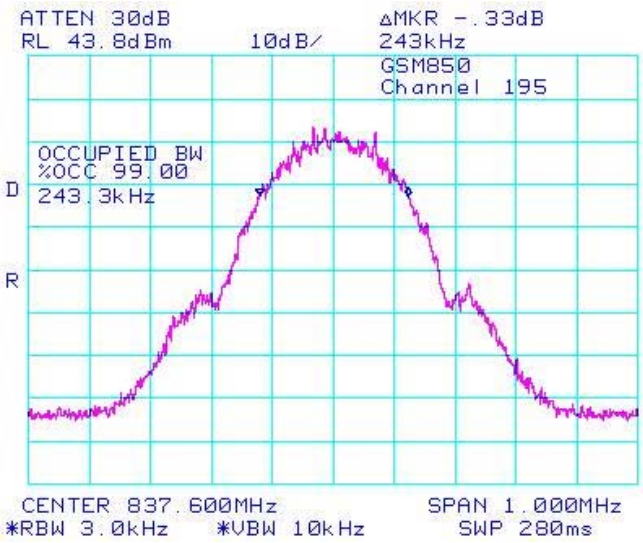


Figure 1-15a: -26dBc bandwidth, GSM850 band Middle Channel in GSM mode

Figure 1-16a: Occupied Bandwidth, GSM850 band Middle Channel in GSM mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-17a: -26dBc bandwidth, GSM850 band High Channel in GSM mode

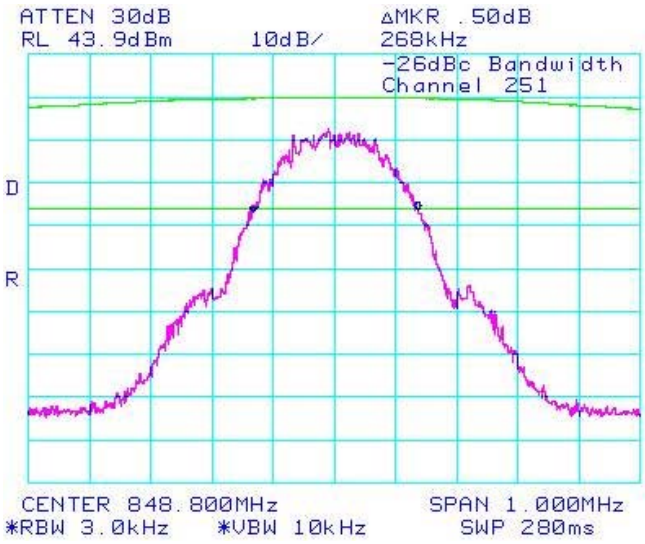


Figure 1-18a: Occupied Bandwidth, GSM850 band High Channel in GSM mode

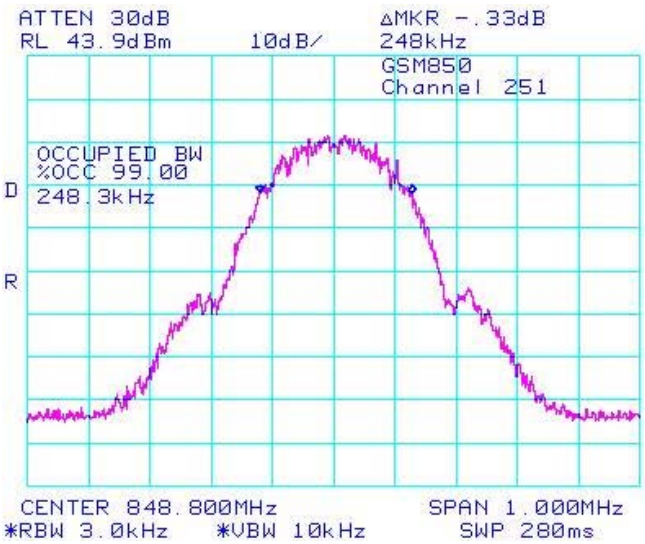
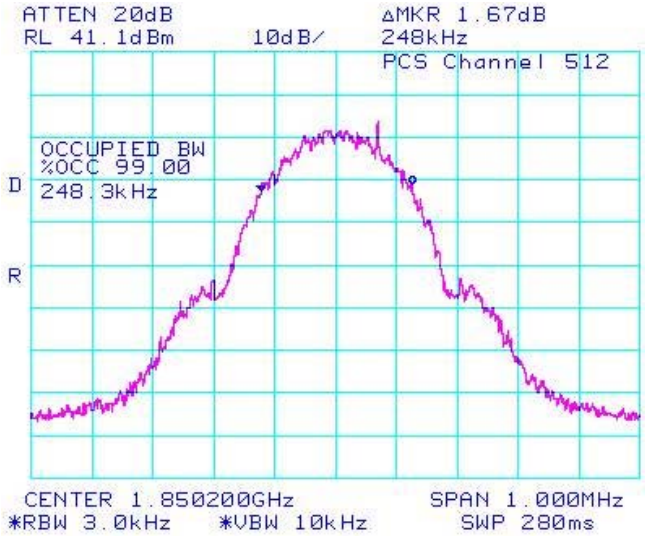


Figure 1-19a: -26dBc bandwidth, PCS1900 Low Channel in GSM mode

Figure 1-20a: Occupied Bandwidth, PCS1900 Low Channel in GSM mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-21a: -26dBc bandwidth, PCS1900 Middle Channel in GSM mode

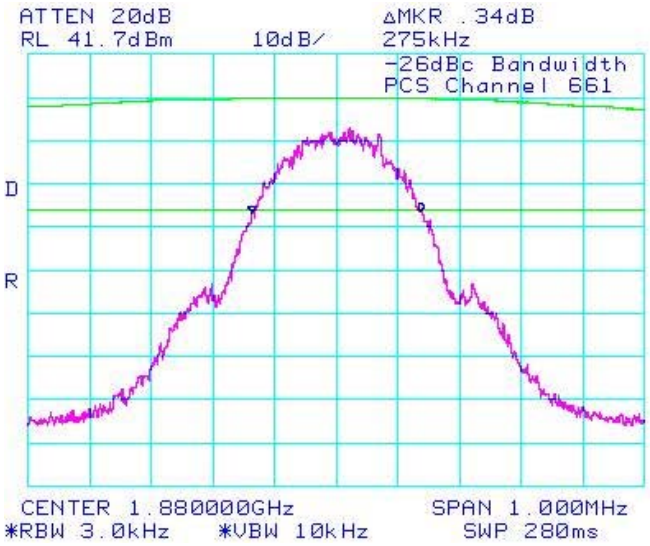


Figure 1-22a: Occupied Bandwidth, PCS1900 Middle Channel in GSM mode

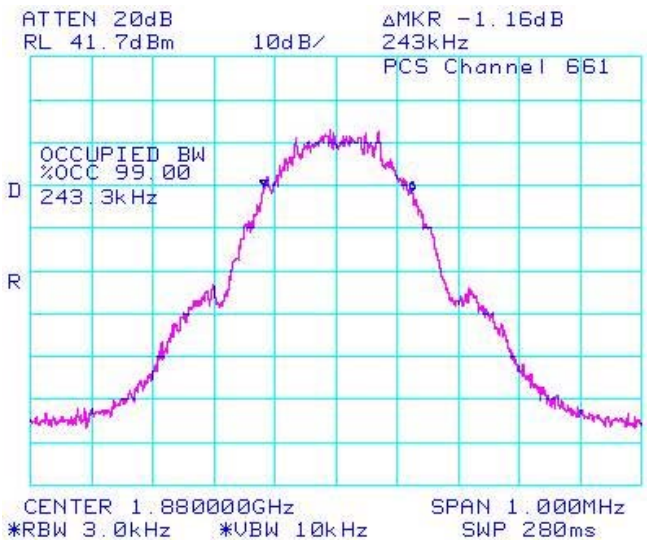


Figure 1-23a: -26dBc bandwidth, PCS1900 High Channel in GSM mode

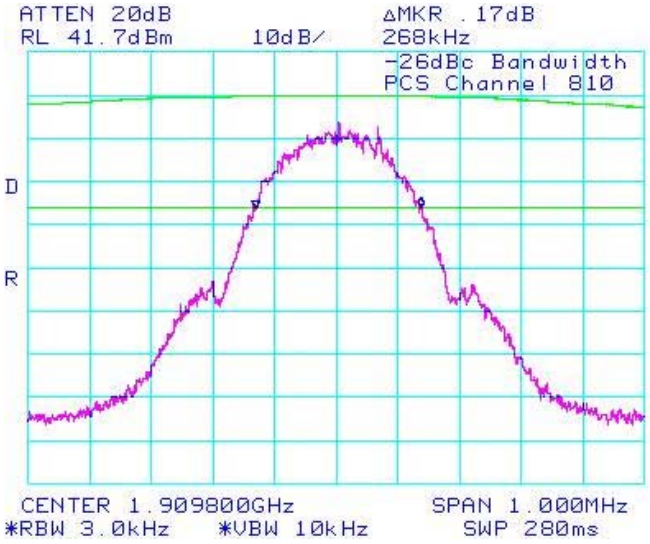
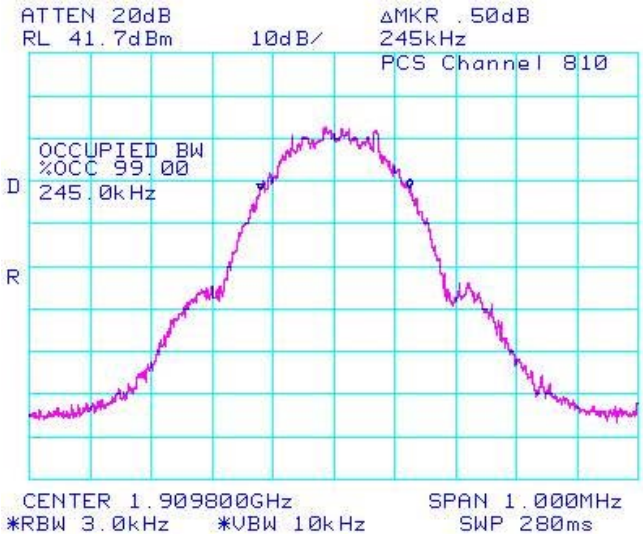


Figure 1-24a: Occupied Bandwidth, PCS1900 High Channel in GSM mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-25a: GSM850 band, Low Channel Mask in GSM mode

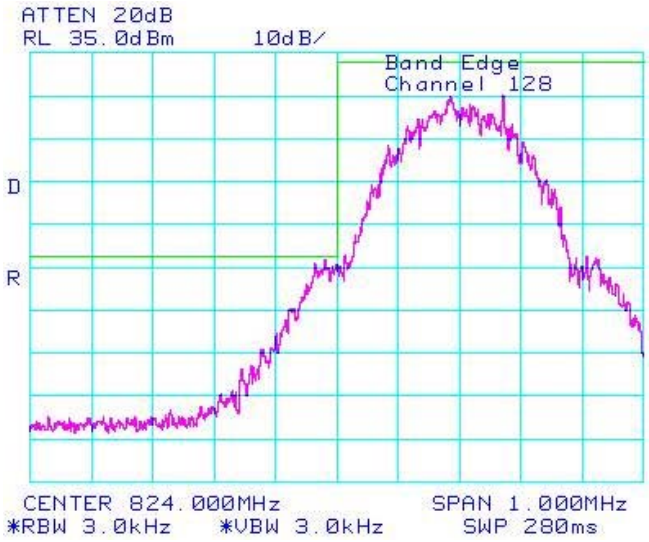


Figure 1-26a: GSM850 band High Channel Mask in GSM mode

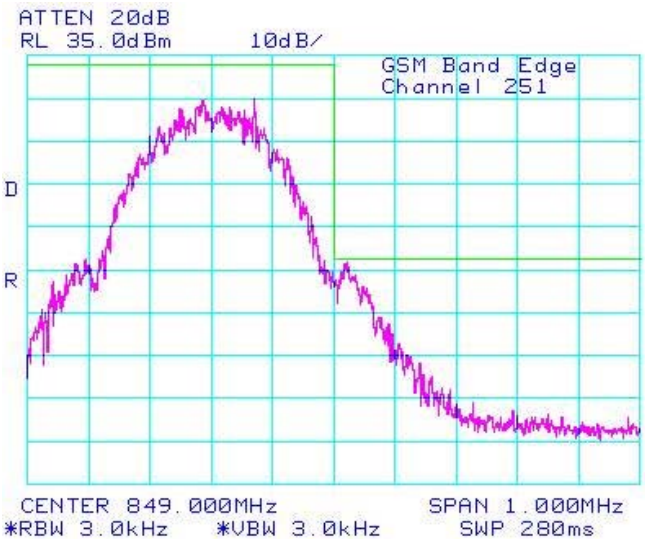


Figure 1-27a: PCS1900, Low Channel Mask in GSM mode

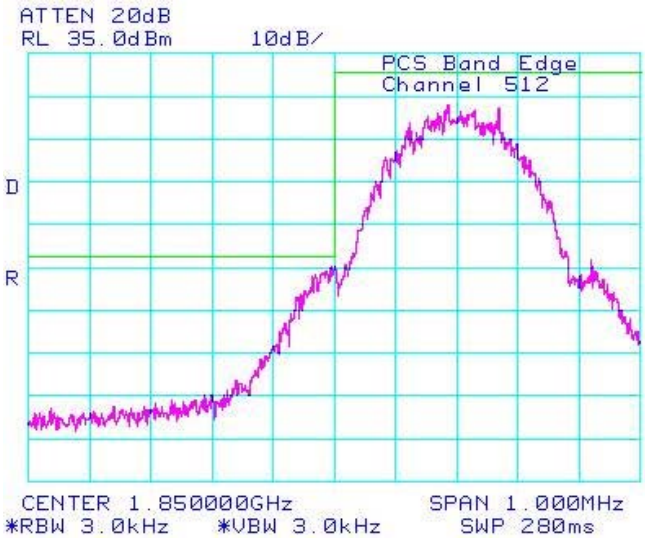
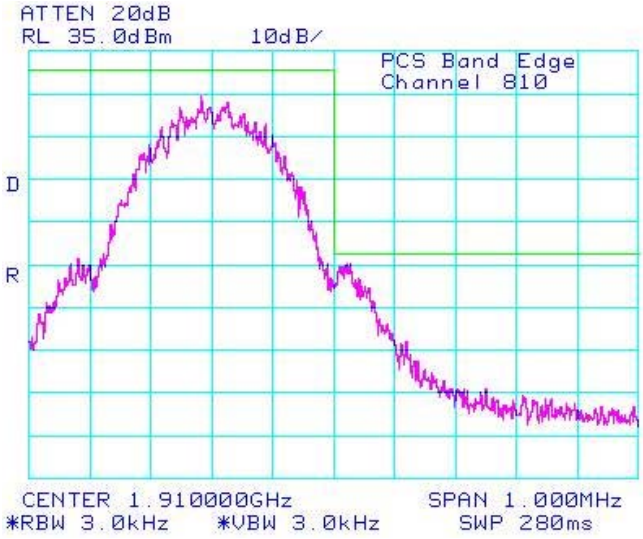


Figure 1-28a: PCS1900, High Channel Mask in GSM mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-29a: Occupied Bandwidth, GSM850 Band, Low Channel in EDGE mode

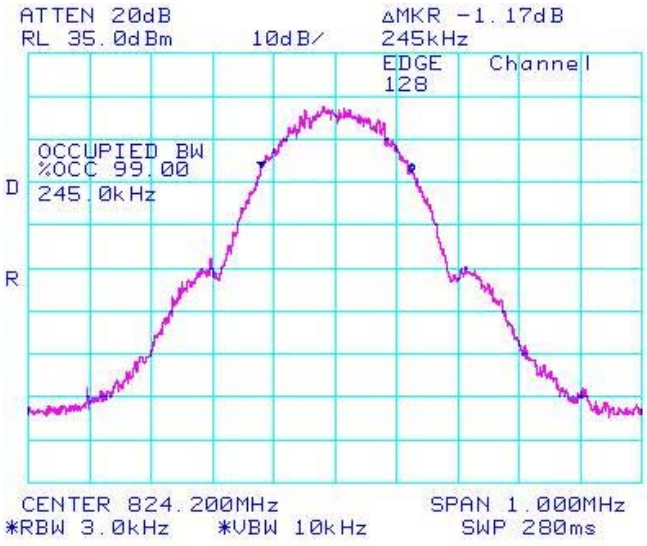


Figure 1-30a: Occupied Bandwidth, GSM850 Band, Middle Channel in EDGE mode

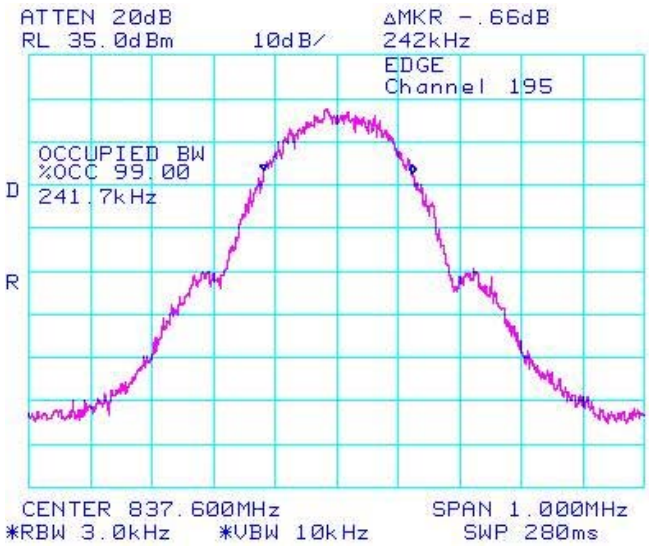


Figure 1-31a: Occupied Bandwidth, GSM850 band, High Channel in EDGE mode

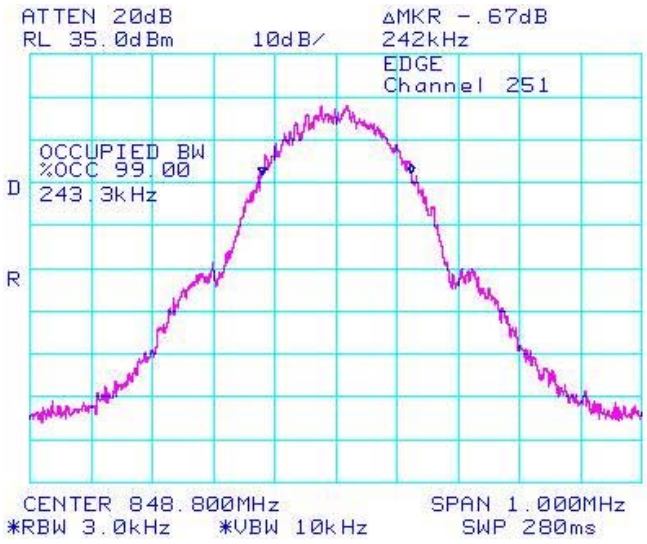
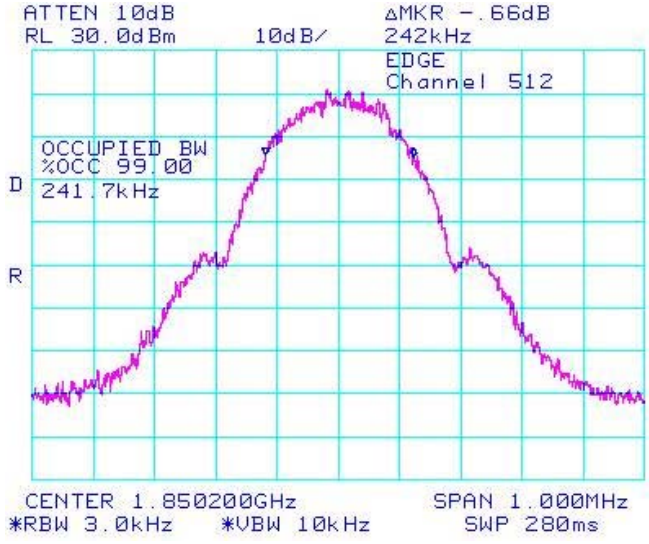


Figure 1-32a: Occupied Bandwidth, PCS1900 Band, Low Channel in EDGE mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-33a: Occupied Bandwidth, PCS1900 Band, Middle Channel in EDGE mode

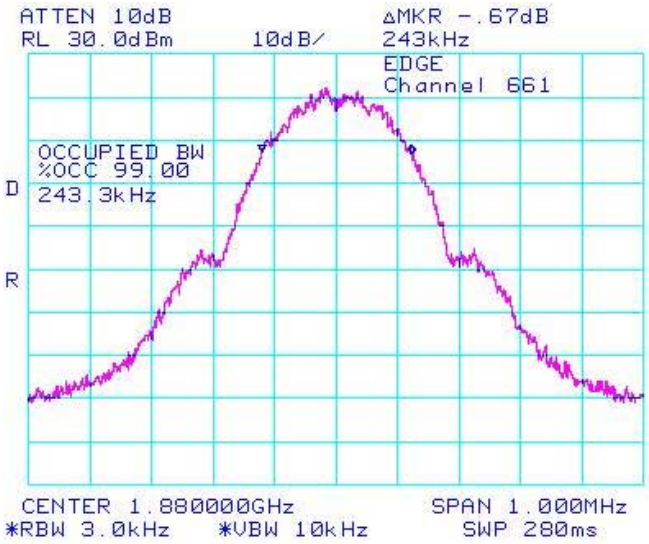


Figure 1-34a: Occupied Bandwidth, PCS1900 Band, High Channel in EDGE mode

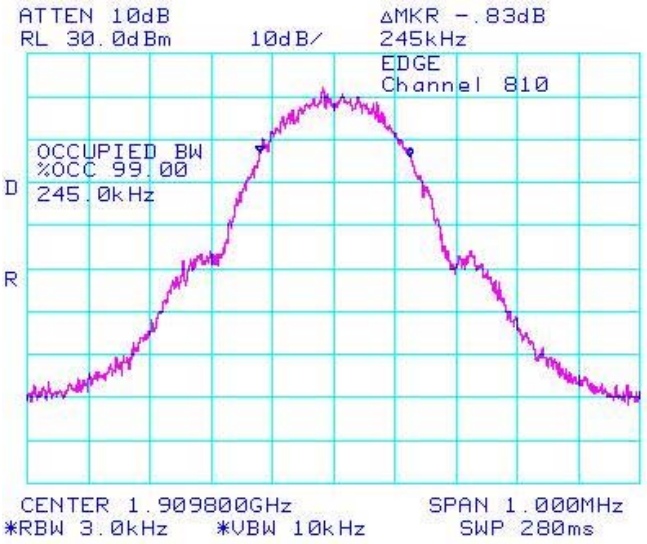


Figure 1-35a: GSM850 Band, Low Channel Mask in EDGE mode

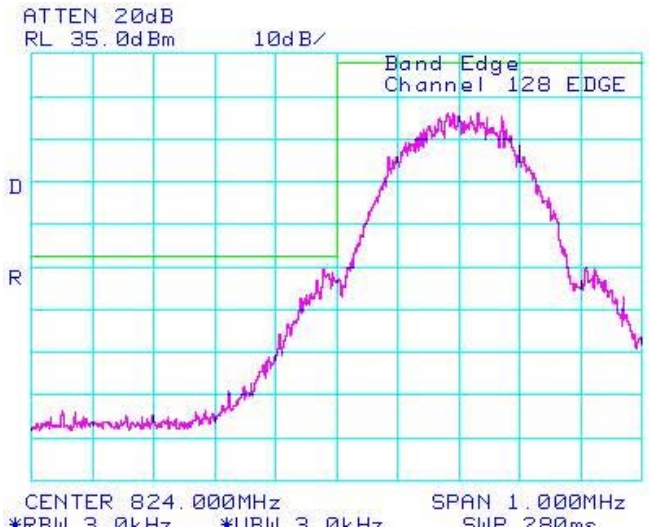
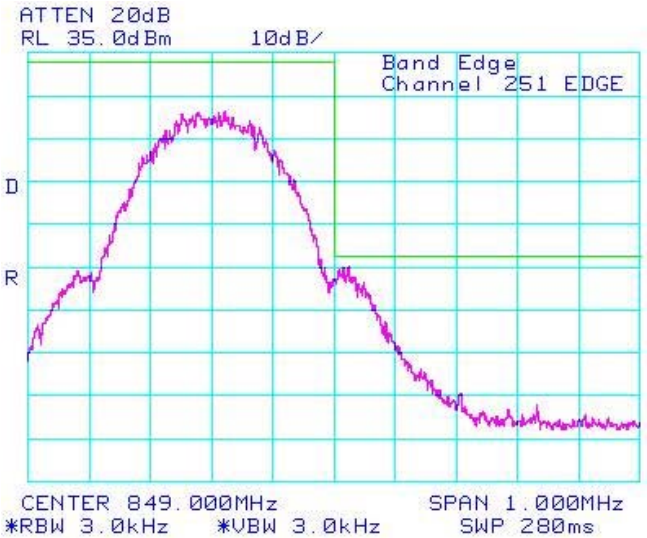


Figure 1-36a: GSM850 Band, High Channel Mask in EDGE mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-37a: PCS1900 Band, Low Channel Mask in EDGE mode

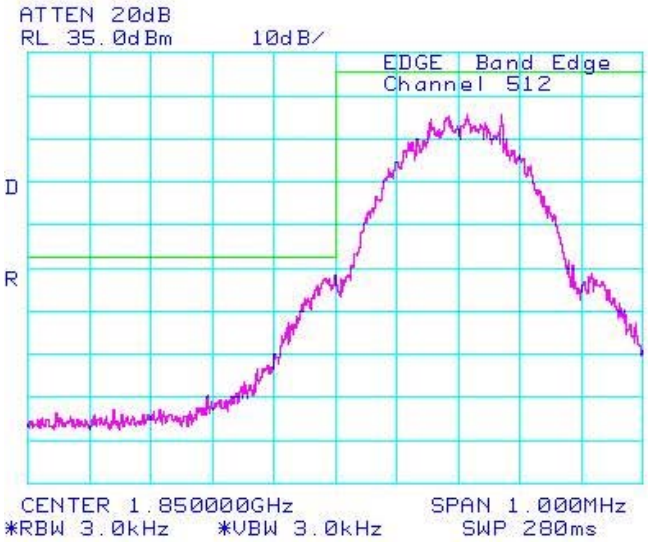


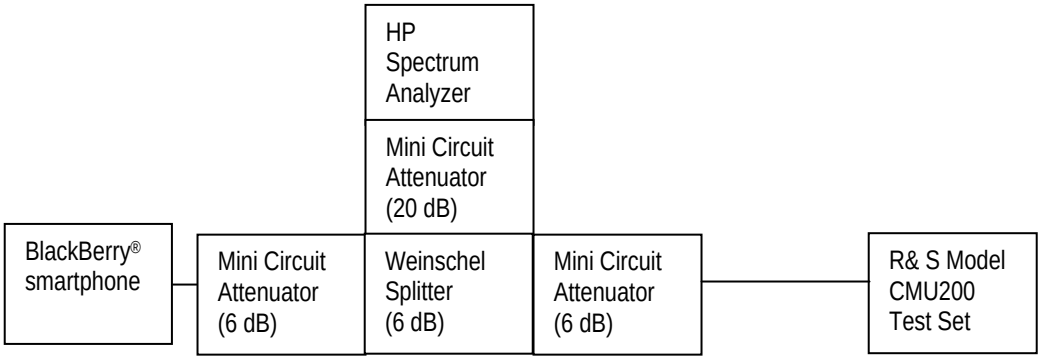
Figure 1-38a: PCS1900 Band, High Channel Mask in EDGE mode

APPENDIX 1B – WCDMA CONDUCTED RF 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: May 4, 2010

The environmental test conditions were:	Temperature:	22 ºC
	Pressure:	1007 mb
	Relative Humidity:	31 %

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 4.692 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 5 and 2 in UMTS mode.

Band 5 Frequency (MHz)	-26dBc Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
826.4	4.642	4.150
836.4	4.667	4.175
846.6	4.625	4.167

Band 2 Frequency (MHz)	-26dBc Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
1852.4	4.692	4.175
1880.0	4.658	4.167
1907.6	4.683	4.192

Measurement Plots for band 5 and band 2 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

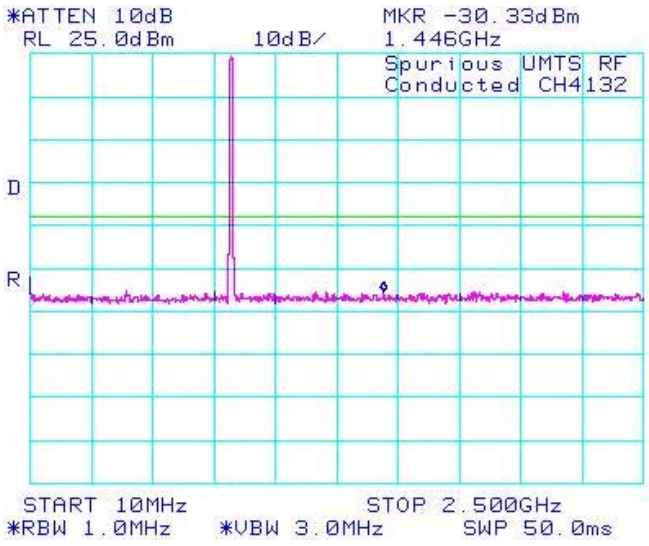


Figure 1-2: UMTS band 5, Spurious Conducted Emissions, Low channel

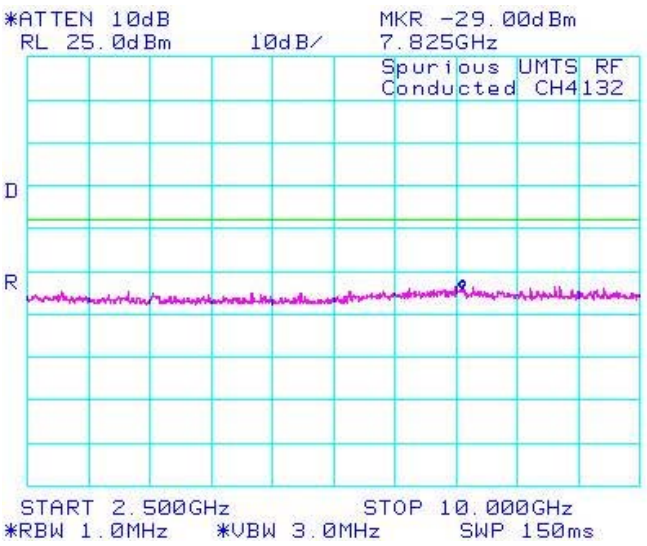


Figure 1-3: UMTS band 5, Spurious Conducted Emissions, Middle Channel

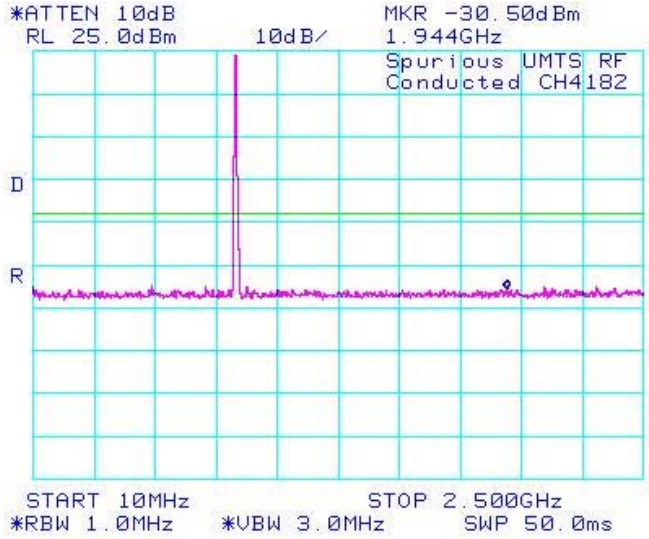
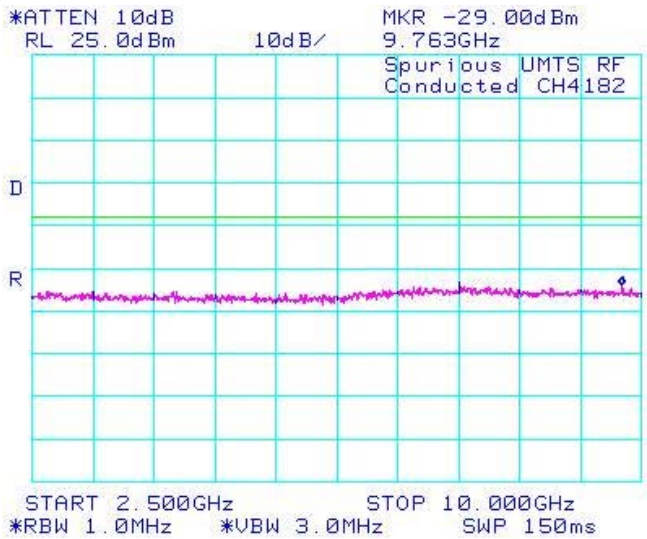


Figure 1-4: UMTS band 5, Spurious Conducted Emissions, Middle Channel



WCDMA Conducted RF Emission Test Data cont'd

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

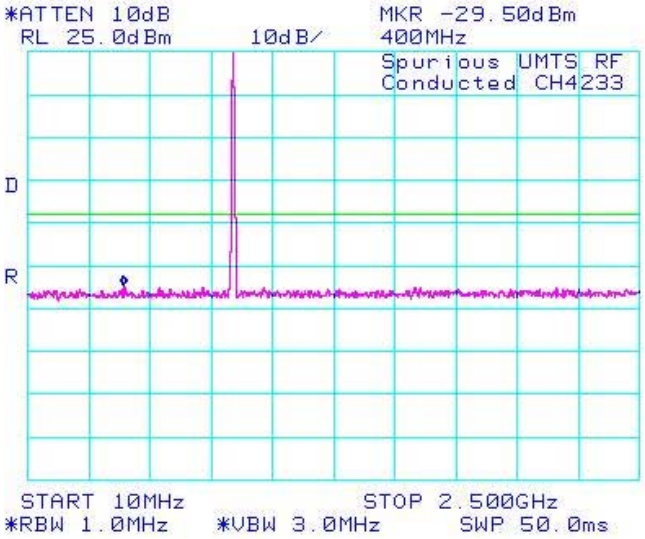


Figure 1-6: UMTS band 5, Spurious Conducted Emissions, High Channel

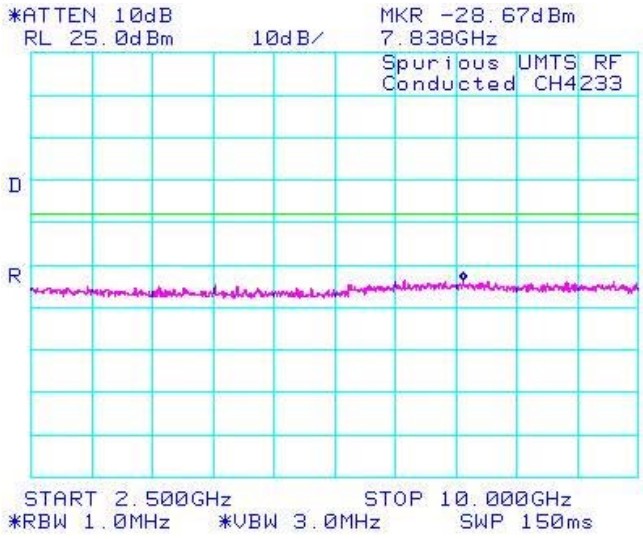


Figure 1-7: -26dBc bandwidth, UMTS band 5 Low Channel

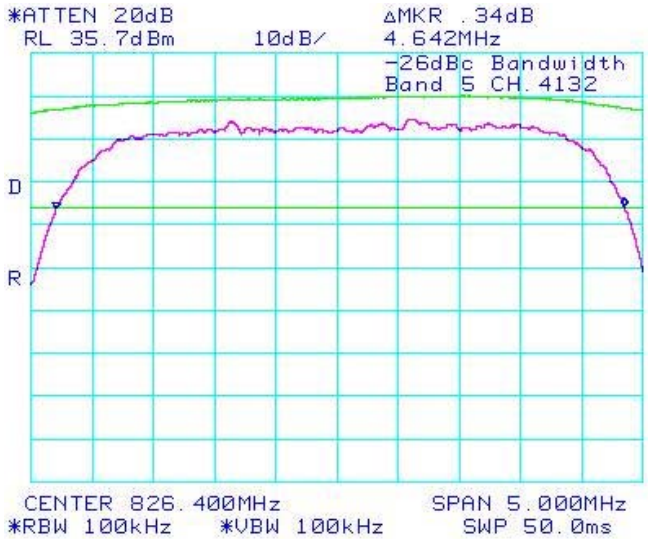
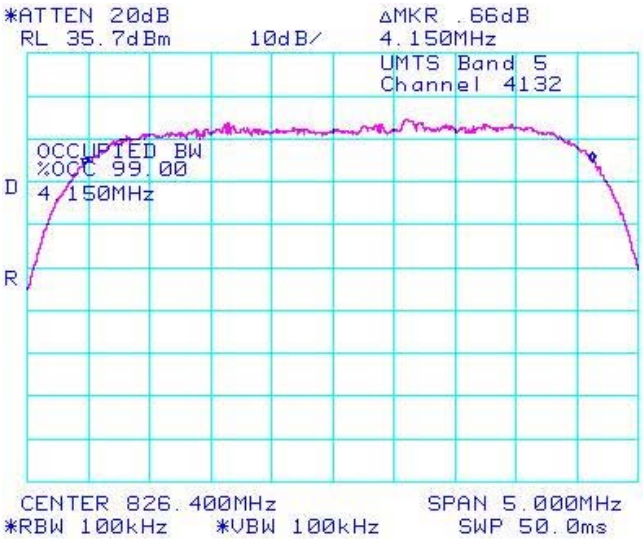


Figure 1-8: Occupied Bandwidth, UMTS band 5 Low Channel



WCDMA Conducted RF Emission Test Data cont'd

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

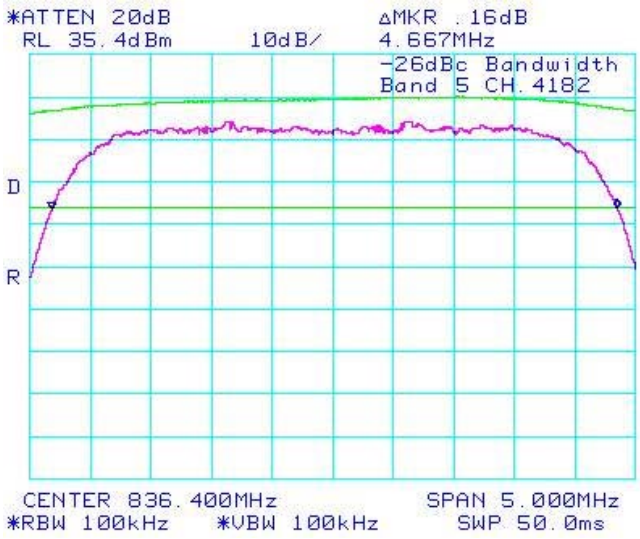


Figure 1-10: Occupied Bandwidth, UMTS band 5 Middle Channel

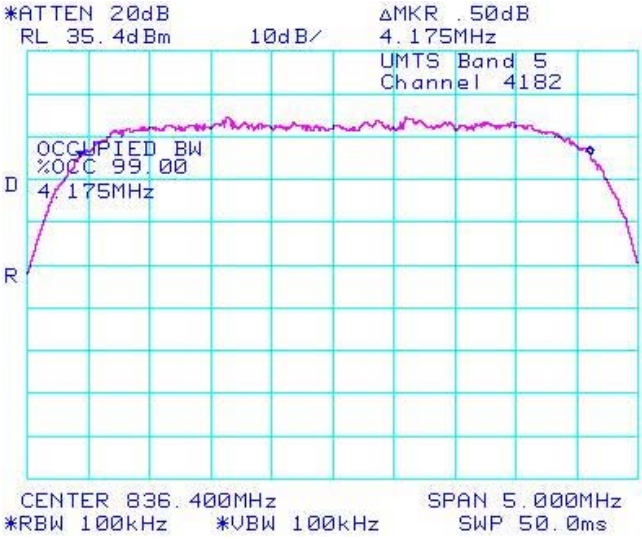


Figure 1-11: -26dBc bandwidth, UMTS band 5 High Channel

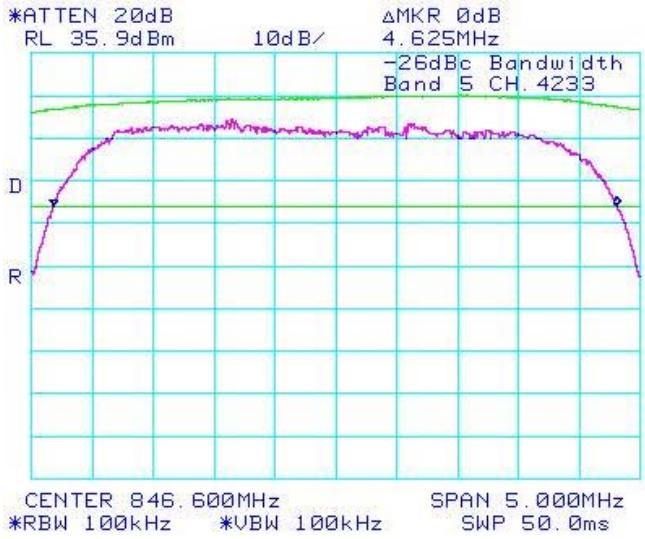
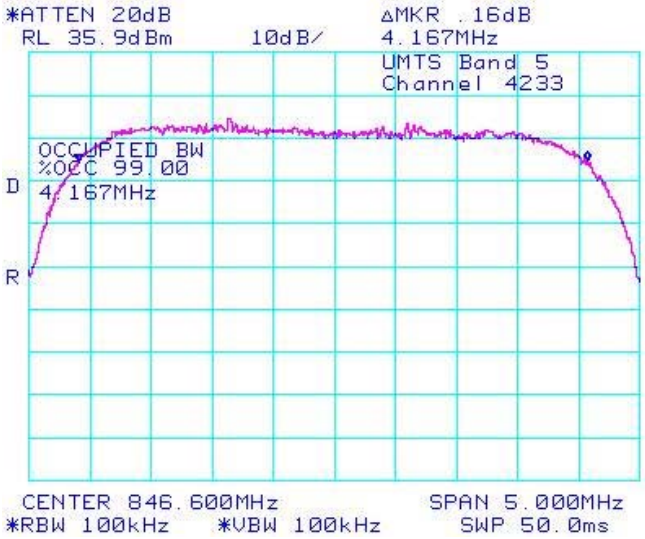


Figure 1-12: Occupied Bandwidth, UMTS band 5 High Channel



WCDMA Conducted RF Emission Test Data cont'd

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

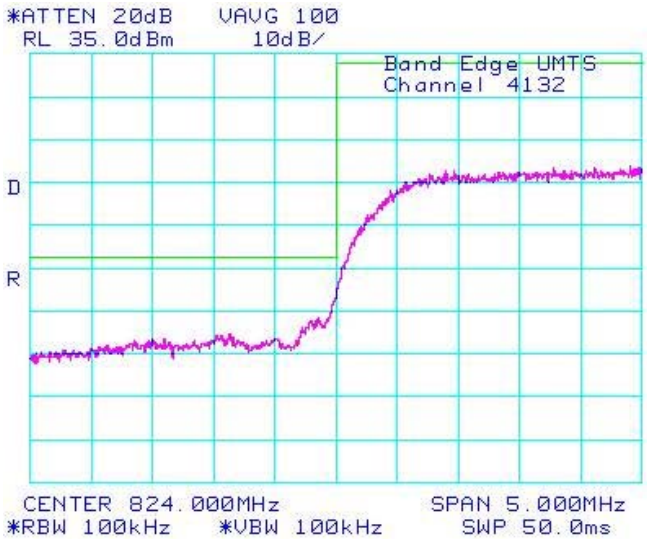
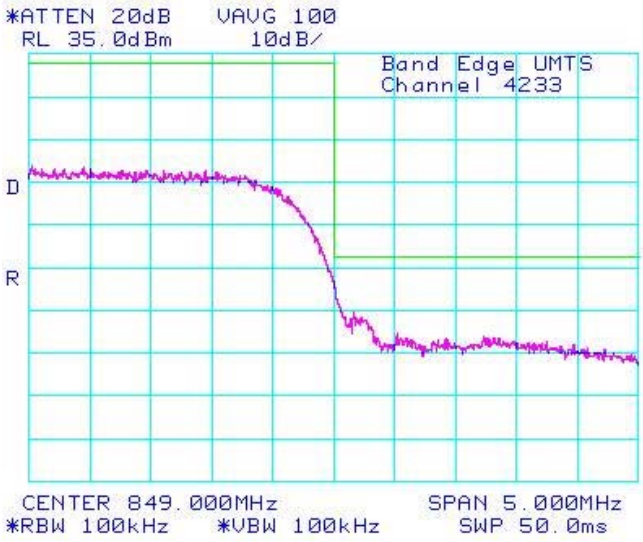


Figure 1-14: UMTS band 5, High Channel Mask



WCDMA Conducted RF Emission Test Data cont'd

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

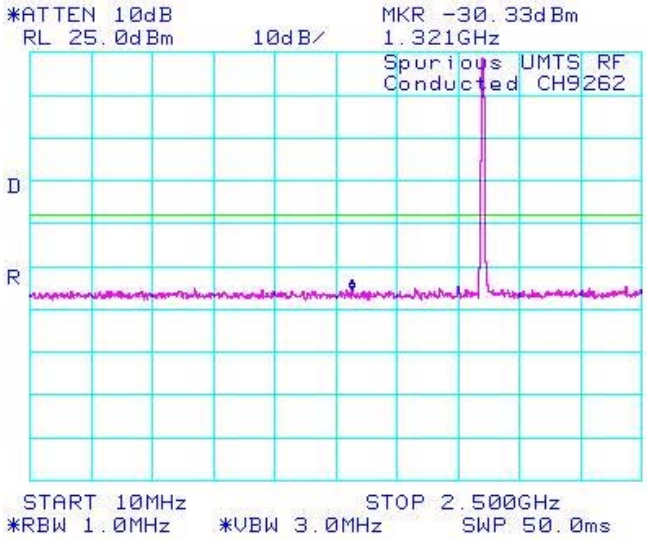


Figure 2-2: UMTS band 2, Spurious Conducted Emissions, Low channel

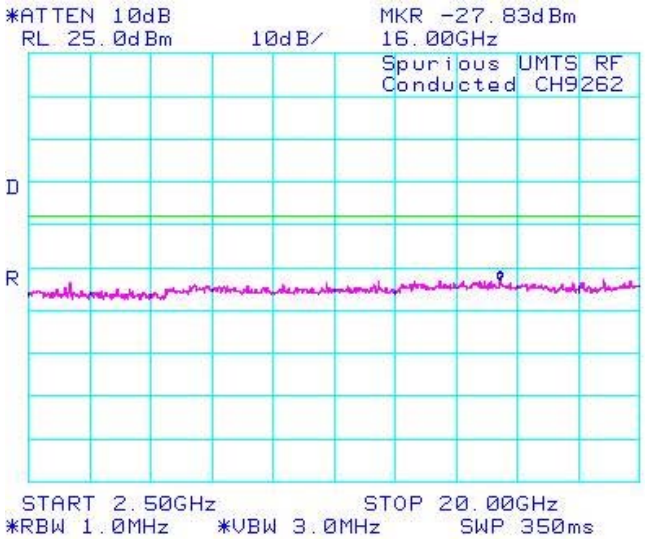


Figure 2-3: UMTS band 2, Spurious Conducted Emissions, Middle Channel

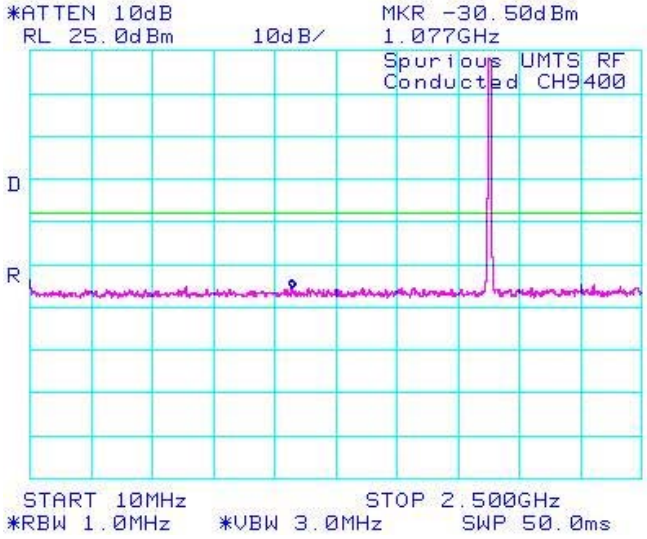
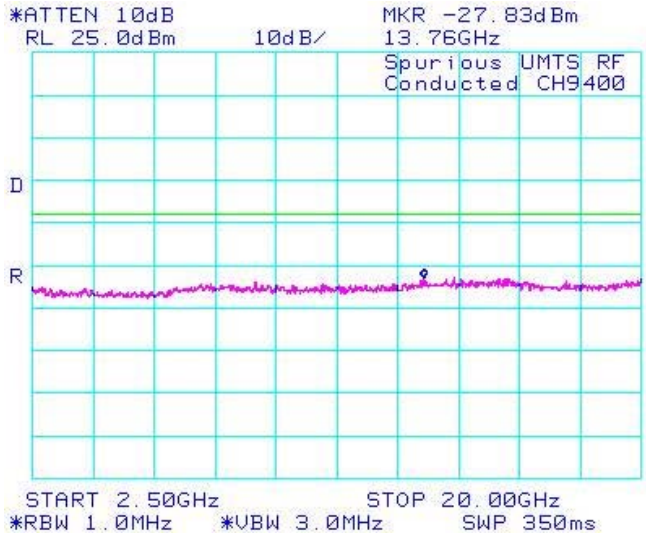


Figure 2-4: UMTS band 2, Spurious Conducted Emissions, Middle Channel



WCDMA Conducted RF Emission Test Data cont'd

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

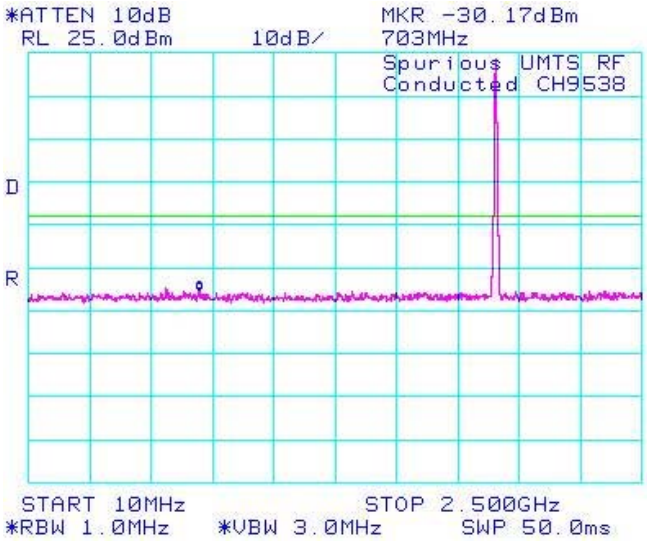


Figure 2-6: UMTS band 2, Spurious Conducted Emissions, High Channel

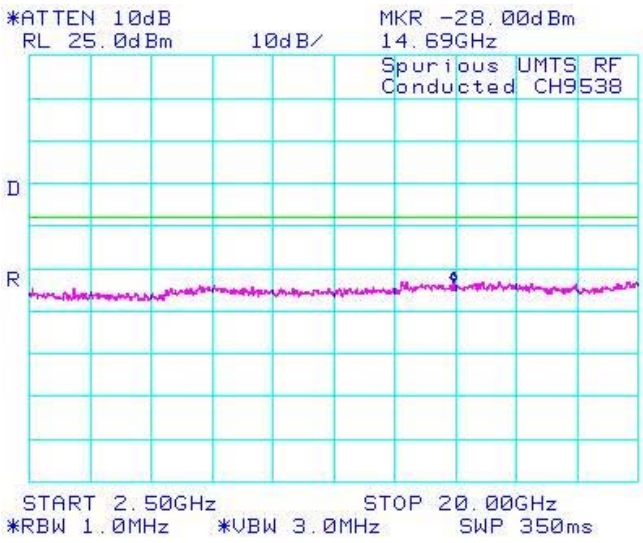


Figure 2-7: -26dBc bandwidth, UMTS band 2 Low Channel

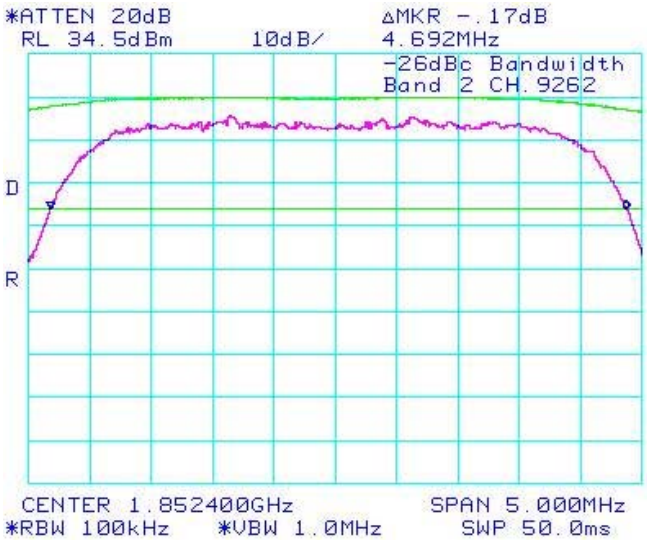
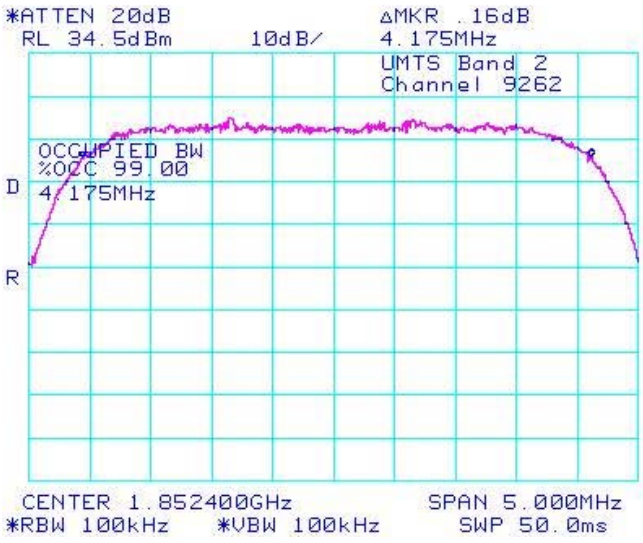


Figure 2-8: Occupied Bandwidth, UMTS band 2 Low Channel



WCDMA Conducted RF Emission Test Data cont'd

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

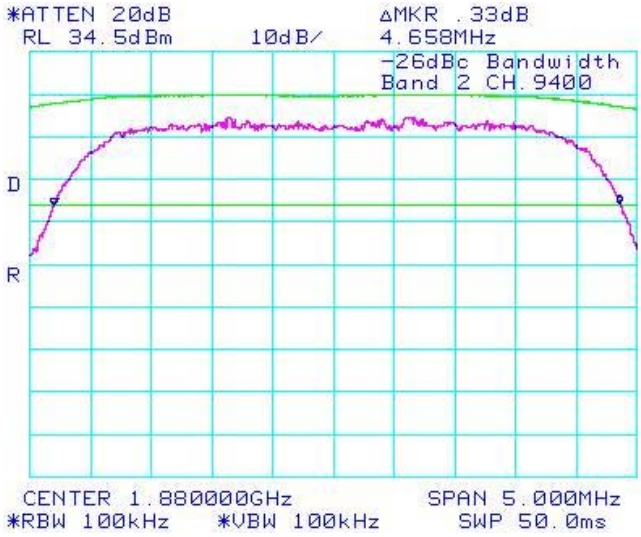


Figure 2-10: Occupied Bandwidth, UMTS band 2 Middle Channel

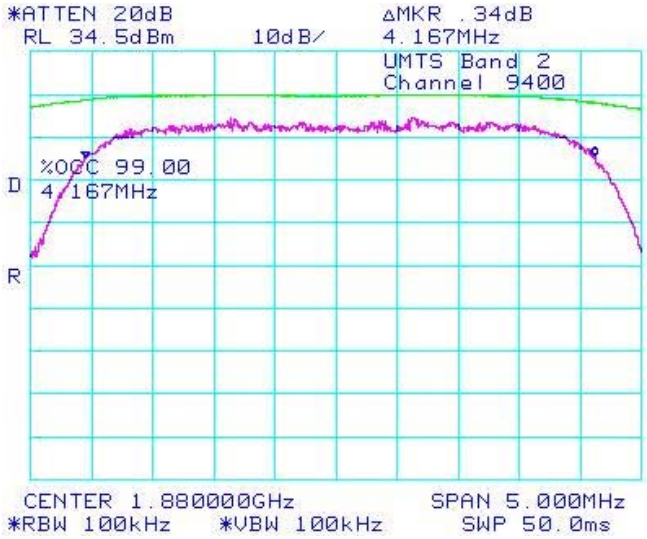


Figure 2-11: -26dBc bandwidth, UMTS band 2 High Channel

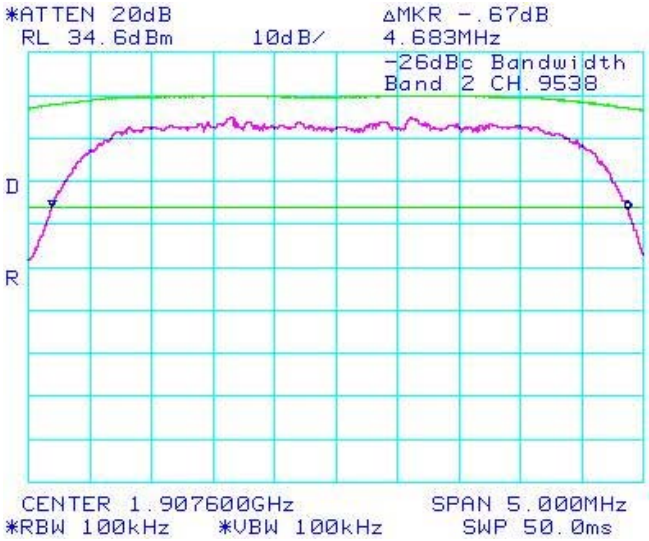
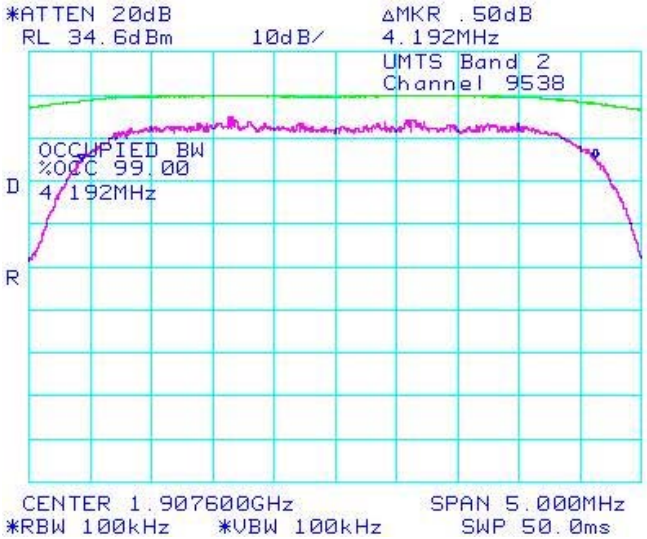


Figure 2-12: Occupied Bandwidth, UMTS band 2 High Channel



WCDMA Conducted RF Emission Test Data cont'd

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

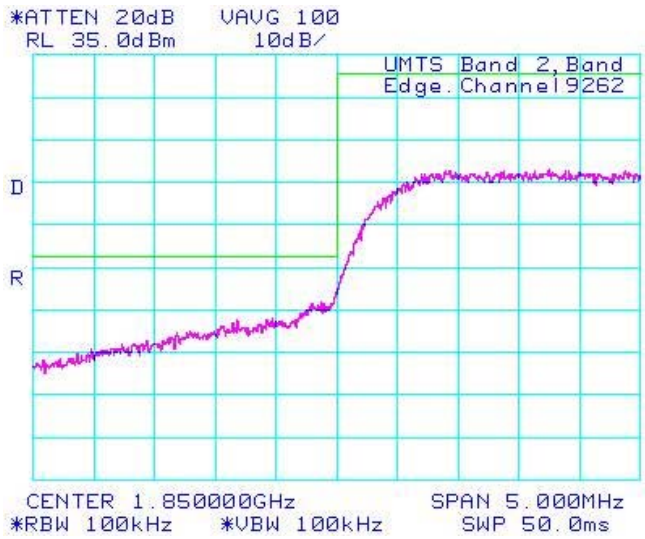


Figure 2-14: UMTS band 2, High Channel Mask

APPENDIX 2A – GSM CONDUCTED RF OUTPUT POWER TEST DATA

GSM 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 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 32.5 dBm ±0.5 dB for GSM850 and 30.5 dBm ±0.5 dB for PCS.

Peak nominal output power is 30.0 dBm ±0.5 dB for GSM850 EDGE Mode (2-timeslot uplink) and 28.5 dBm ±0.5 dB for PCS EDGE Mode (2-timeslot uplink).

Date of Test: May 21, 2010

The environmental test conditions were:

Temperature:	22.5 – 24 ºC
Pressure:	1002 – 1013 mb
Relative Humidity:	23 – 24 %

Channel	Frequency (MHz)	Maximum Output Power (dBm)	Maximum Output Power (Watts)	Channel	Frequency (MHz)	Maximum Output Power (dBm)	Maximum Output Power (Watts)
GSM850				GSM850 EDGE/GPRS/GSM (2-timeslot)			
128	824.2	31.2	1.32	128	824.2	29.2	0.83
189	837.6	32.0	1.58	189	837.6	29.9	0.98
251	848.8	32.7	1.86	251	848.8	30.5	1.12
PCS				PCS EDGE/GPRS/GSM (2-timeslot)			
512	1850.2	29.6	0.91	512	1850.2	27.6	0.58
661	1880.0	30.5	1.12	661	1880.0	28.5	0.71
810	1909.8	30.5	1.12	810	1909.8	28.6	0.72

APPENDIX 2B – WCDMA 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 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 23.50 dBm ±0.5 dB for UMTS850 and 23.00 dBm ±0.5 dB for UMTS1900.

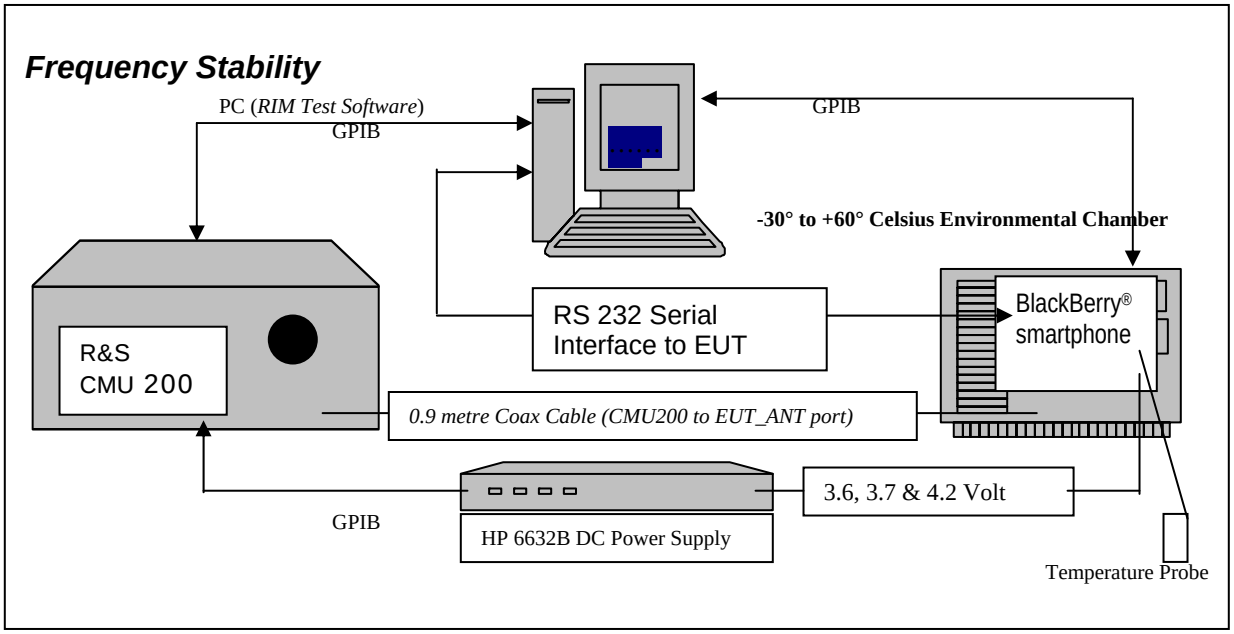
Date of Test: May 7-12, 2010

The environmental tests conditions were: Temperature: 23-24 °C
Pressure: 1002-1013 mb
Relative Humidity: 23-24 %

	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	23.63	23.62	23.57	22.98	22.90	23.38
Rel99	12.2 kbps, voice, AMR, SRB 3.4 kbps	23.63	23.62	23.56	22.88	22.91	23.36
Rel5 HSDPA	1	23.52	23.30	23.30	22.23	22.40	22.75
Rel5 HSDPA	2	23.59	23.50	23.52	22.27	22.45	22..75
Rel5 HSDPA	3	23.40	23.40	23.30	22.16	22.33	22.73
Rel5 HSDPA	4	23.60	23.50	23.50	22.24	22.31	22.72

APPENDIX 3A – GSM FREQUENCY STABILITY TEST DATA

GSM 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:

PCS1900 Frequency (MHz)	Cable loss (dB)
1850.2	1.20
1880.0	1.20
1909.8	1.20

GSM850 Frequency (MHz)	Cable loss (dB)
824.2	0.90
836.4	0.90
848.6	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 parametres 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 824.2, 836.4, and 848.6 MHz for the GSM850 band, 1850.2, 1880.0 and 1909.8 MHz for the PCS1900 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 GSM850 band measured was **-0.0614 PPM**.
The maximum frequency error in the PCS1900 band measured was **-0.0386 PPM**.

GSM850 Channel results: channels 128, 189 and 250 @ 20°C maximum transmitted power

The BlackBerry® smartphone was tested on April 13, 2010.

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.6	20	15.88	0.0193
189	836.40	3.6	20	12.66	0.0151
250	848.60	3.6	20	10.98	0.0129

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.7	20	9.62	0.0117
189	836.40	3.7	20	9.43	0.0113
250	848.60	3.7	20	9.23	0.0109

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.2	20	11.30	0.0137
189	836.40	4.2	20	10.59	0.0127
250	848.60	4.2	20	12.85	0.0151

GSM850 Results: channel 128 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.6	-30	37.71	0.0458
128	824.20	3.6	-20	-25.57	-0.0310
128	824.20	3.6	-10	29.19	0.0354
128	824.20	3.6	0	4.33	0.0053
128	824.20	3.6	10	19.82	0.0240
128	824.20	3.6	20	15.88	0.0193
128	824.20	3.6	30	-38.94	-0.0472
128	824.20	3.6	40	-14.72	-0.0179
128	824.20	3.6	50	-26.47	-0.0321
128	824.20	3.6	60	-45.78	-0.0555

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.7	-30	16.92	0.0205
128	824.20	3.7	-20	-30.67	-0.0372
128	824.20	3.7	-10	22.41	0.0272
128	824.20	3.7	0	-29.51	-0.0358
128	824.20	3.7	10	-3.10	-0.0038
128	824.20	3.7	20	9.62	0.0117
128	824.20	3.7	30	-37.52	-0.0455
128	824.20	3.7	40	-9.94	-0.0121
128	824.20	3.7	50	-19.82	-0.0240
128	824.20	3.7	60	-50.62	**-0.0614**

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.2	-30	-10.53	-0.0128
128	824.20	4.2	-20	-26.28	-0.0319
128	824.20	4.2	-10	26.09	0.0317
128	824.20	4.2	0	-14.79	-0.0179
128	824.20	4.2	10	7.88	0.0096
128	824.20	4.2	20	11.30	0.0137
128	824.20	4.2	30	-37.06	-0.0450
128	824.20	4.2	40	-12.14	-0.0147
128	824.20	4.2	50	-22.60	-0.0274
128	824.20	4.2	60	9.23	0.0112

GSM850 Results: channel 189 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	3.6	-30	4.97	0.0059
189	836.40	3.6	-20	-30.28	-0.0362
189	836.40	3.6	-10	28.02	0.0335
189	836.40	3.6	0	-13.11	-0.0157
189	836.40	3.6	10	11.30	0.0135
189	836.40	3.6	20	12.66	0.0151
189	836.40	3.6	30	-38.29	-0.0458
189	836.40	3.6	40	-11.04	-0.0132
189	836.40	3.6	50	-22.54	-0.0269
189	836.40	3.6	60	-48.95	-0.0585

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	3.7	-30	24.67	0.0295
189	836.40	3.7	-20	-30.87	-0.0369
189	836.40	3.7	-10	21.37	0.0255
189	836.40	3.7	0	-35.58	-0.0425
189	836.40	3.7	10	-5.81	-0.0069
189	836.40	3.7	20	9.43	0.0113
189	836.40	3.7	30	-37.26	-0.0445
189	836.40	3.7	40	-9.36	-0.0112
189	836.40	3.7	50	-19.82	-0.0237
189	836.40	3.7	60	7.04	0.0084

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	4.2	-30	-12.20	-0.0146
189	836.40	4.2	-20	-27.57	-0.0330
189	836.40	4.2	-10	26.80	0.0320
189	836.40	4.2	0	-15.30	-0.0183
189	836.40	4.2	10	9.23	0.0110
189	836.40	4.2	20	10.59	0.0127
189	836.40	4.2	30	-38.36	-0.0459
189	836.40	4.2	40	-12.98	-0.0155
189	836.40	4.2	50	-23.31	-0.0279
189	836.40	4.2	60	9.43	0.0113

GSM850 Results: channel 250 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.60	3.6	-30	11.56	0.0136
250	848.60	3.6	-20	-31.45	-0.0371
250	848.60	3.6	-10	23.89	0.0282
250	848.60	3.6	0	-25.51	-0.0301
250	848.60	3.6	10	4.46	0.0053
250	848.60	3.6	20	10.98	0.0129
250	848.60	3.6	30	-39.13	-0.0461
250	848.60	3.6	40	-10.78	-0.0127
250	848.60	3.6	50	-22.15	-0.0261
250	848.60	3.6	60	-51.72	-0.0609

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.60	3.7	-30	21.70	0.0256
250	848.60	3.7	-20	-32.22	-0.0380
250	848.60	3.7	-10	22.73	0.0268
250	848.60	3.7	0	-36.10	-0.0425
250	848.60	3.7	10	-6.52	-0.0077
250	848.60	3.7	20	9.23	0.0109
250	848.60	3.7	30	-38.55	-0.0454
250	848.60	3.7	40	-9.56	-0.0113
250	848.60	3.7	50	-20.47	-0.0241
250	848.60	3.7	60	6.65	0.0078

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.60	4.2	-30	-18.66	-0.0220
250	848.60	4.2	-20	-28.15	-0.0332
250	848.60	4.2	-10	27.96	0.0329
250	848.60	4.2	0	-9.94	-0.0117
250	848.60	4.2	10	10.20	0.0120
250	848.60	4.2	20	12.85	0.0151
250	848.60	4.2	30	-40.87	-0.0482
250	848.60	4.2	40	-13.95	-0.0164
250	848.60	4.2	50	-25.38	-0.0299
250	848.60	4.2	60	8.98	0.0106

PCS Channel results: channels 512, 661, & 810 @ 20°C maximum transmitted power

Date of Test: April 15, 2010

Traffic Channel Number	PCS Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	*PPM*
512	1850.2	3.6	20	15.88	0.0086
661	1880.0	3.6	20	-11.56	-0.0061
810	1909.8	3.6	20	-16.79	-0.0088

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.7	20	-13.50	-0.0073
661	1880.0	3.7	20	-19.82	-0.0105
810	1909.8	3.7	20	-22.34	-0.0117

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	4.2	20	-12.98	-0.0070
661	1880.0	4.2	20	-15.30	-0.0081
810	1909.8	4.2	20	-19.69	-0.0103

PCS1900 Results: channel 512 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.6	-30	-51.72	-0.0280
512	1850.2	3.6	-20	-63.47	-0.0343
512	1850.2	3.6	-10	-31.64	-0.0171
512	1850.2	3.6	0	-19.63	-0.0106
512	1850.2	3.6	10	-10.53	-0.0057
512	1850.2	3.6	20	15.88	0.0086
512	1850.2	3.6	30	-21.57	-0.0117
512	1850.2	3.6	40	-73.03	-0.0395
512	1850.2	3.6	50	-43.78	-0.0237
512	1850.2	3.6	60	-43.07	-0.0233

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	3.7	-30	-34.93	-0.0189
512	1850.2	3.7	-20	-60.63	-0.0328
512	1850.2	3.7	-10	-44.55	-0.0241
512	1850.2	3.7	0	-53.72	-0.0290
512	1850.2	3.7	10	-47.98	-0.0259
512	1850.2	3.7	20	-13.50	-0.0073
512	1850.2	3.7	30	-15.37	-0.0083
512	1850.2	3.7	40	-59.92	-0.0324
512	1850.2	3.7	50	-35.06	-0.0189
512	1850.2	3.7	60	-48.36	-0.0261

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.2	4.2	-30	-71.48	**-0.0386**
512	1850.2	4.2	-20	-59.41	-0.0321
512	1850.2	4.2	-10	-36.16	-0.0195
512	1850.2	4.2	0	-43.20	-0.0233
512	1850.2	4.2	10	-35.45	-0.0192
512	1850.2	4.2	20	-12.98	-0.0070
512	1850.2	4.2	30	-19.63	-0.0106
512	1850.2	4.2	40	-64.12	-0.0347
512	1850.2	4.2	50	-37.06	-0.0200
512	1850.2	4.2	60	-48.75	-0.0263

PCS1900 Results: channel 661 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880	3.6	-30	13.04	0.0069
661	1880	3.6	-20	-65.02	-0.0346
661	1880	3.6	-10	-42.88	-0.0228
661	1880	3.6	0	-43.33	-0.0230
661	1880	3.6	10	-38.55	-0.0205
661	1880	3.6	20	-11.56	-0.0061
661	1880	3.6	30	-22.99	-0.0122
661	1880	3.6	40	-67.74	-0.0360
661	1880	3.6	50	-41.78	-0.0222
661	1880	3.6	60	-46.88	-0.0249

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880	3.7	-30	-25.89	-0.0138
661	1880	3.7	-20	-63.15	-0.0336
661	1880	3.7	-10	-48.43	-0.0258
661	1880	3.7	0	-62.83	-0.0334
661	1880	3.7	10	-59.47	-0.0316
661	1880	3.7	20	-19.82	-0.0105
661	1880	3.7	30	-21.50	-0.0114
661	1880	3.7	40	-64.51	-0.0343
661	1880	3.7	50	-35.32	-0.0188
661	1880	3.7	60	-52.37	-0.0279

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880	4.2	-30	-71.16	-0.0379
661	1880	4.2	-20	-62.05	-0.0330
661	1880	4.2	-10	-39.07	-0.0208
661	1880	4.2	0	-47.98	-0.0255
661	1880	4.2	10	-40.55	-0.0216
661	1880	4.2	20	-15.30	-0.0081
661	1880	4.2	30	-25.76	-0.0137
661	1880	4.2	40	-70.51	-0.0375
661	1880	4.2	50	-41.00	-0.0218
661	1880	4.2	60	-52.82	-0.0281

PCS1900 Results: channel 810 @ maximum transmitted power

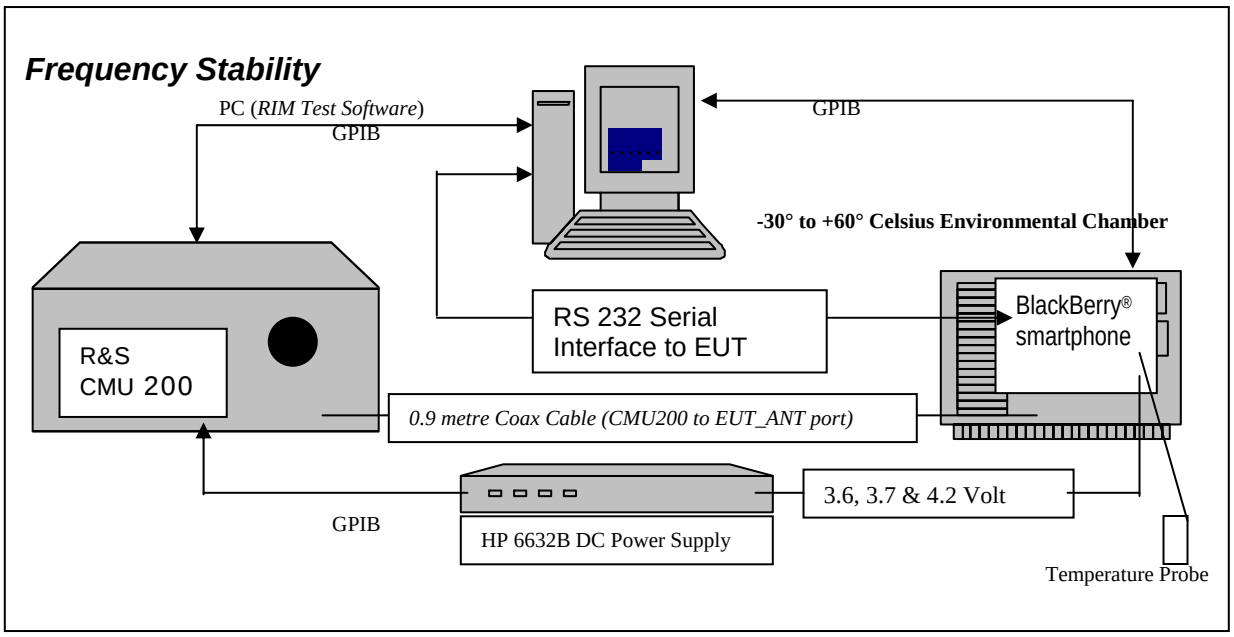
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	3.6	-30	-55.47	-0.0290
810	1909.8	3.6	-20	-68.06	-0.0356
810	1909.8	3.6	-10	-44.68	-0.0234
810	1909.8	3.6	0	-54.89	-0.0287
810	1909.8	3.6	10	-48.24	-0.0253
810	1909.8	3.6	20	-16.79	-0.0088
810	1909.8	3.6	30	-20.40	-0.0107
810	1909.8	3.6	40	-64.44	-0.0337
810	1909.8	3.6	50	-39.84	-0.0209
810	1909.8	3.6	60	-49.07	-0.0257

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	3.7	-30	-33.71	-0.0177
810	1909.8	3.7	-20	-64.51	-0.0338
810	1909.8	3.7	-10	-50.04	-0.0262
810	1909.8	3.7	0	-65.73	-0.0344
810	1909.8	3.7	10	-59.86	-0.0313
810	1909.8	3.7	20	-22.34	-0.0117
810	1909.8	3.7	30	-21.63	-0.0113
810	1909.8	3.7	40	-63.28	-0.0331
810	1909.8	3.7	50	-36.35	-0.0190
810	1909.8	3.7	60	-52.37	-0.0274

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.8	4.2	-30	-92.72	-0.0485
810	1909.8	4.2	-20	-66.12	-0.0346
810	1909.8	4.2	-10	-41.71	-0.0218
810	1909.8	4.2	0	-48.49	-0.0254
810	1909.8	4.2	10	-39.91	-0.0209
810	1909.8	4.2	20	-19.69	-0.0103
810	1909.8	4.2	30	-26.73	-0.0140
810	1909.8	4.2	40	-72.13	-0.0378
810	1909.8	4.2	50	-42.49	-0.0222
810	1909.8	4.2	60	-53.47	-0.0280

APPENDIX 3B – 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 27.54, CFR 47 and RSS-139, 6.3 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:

UMTS1700 Frequency (MHz)	Cable loss (dB)
1712.4	0.90
1732.6	0.90
1752.6	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 parametres 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 1712.4, 1732.6 and 1752.5 MHz for the UMTS1700 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 **0.0240 PPM**.
The maximum frequency error in the UMTS band 2 measured was **-0.0147 PPM.**

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

The BlackBerry® smartphone was tested on April 8, 2010.

Traffic Channel Number	UMTS band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.6	20	-5.04	-0.0061
4182	836.4	3.6	20	15.69	0.0188
4233	846.6	3.6	20	4.52	0.0053

Traffic Channel Number	UMTS band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.7	20	4.41	0.0053
4182	836.4	3.7	20	8.13	0.0097
4233	846.6	3.7	20	-8.51	-0.0101

Traffic Channel Number	UMTS band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.2	20	-1.98	-0.0024
4182	836.4	4.2	20	12.36	0.0148
4233	846.6	4.2	20	2.81	0.0033

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	9.78	0.0118
4132	826.4	3.6	-20	-4.84	-0.0059
4132	826.4	3.6	-10	5.66	0.0069
4132	826.4	3.6	0	-5.05	-0.0061
4132	826.4	3.6	10	-3.97	-0.0048
4132	826.4	3.6	20	-5.04	-0.0061
4132	826.4	3.6	30	7.58	0.0092
4132	826.4	3.6	40	-15.50	-0.0188
4132	826.4	3.6	50	-12.28	-0.0149
4132	826.4	3.6	60	-5.58	-0.0068

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.7	-30	-10.04	-0.0121
4132	826.4	3.7	-20	12.71	0.0154
4132	826.4	3.7	-10	-6.52	-0.0079
4132	826.4	3.7	0	18.17	0.0220
4132	826.4	3.7	10	6.59	0.0080
4132	826.4	3.7	20	4.41	0.0053
4132	826.4	3.7	30	-8.26	-0.0100
4132	826.4	3.7	40	-10.73	-0.0130
4132	826.4	3.7	50	-4.84	-0.0059
4132	826.4	3.7	60	-3.10	-0.0037

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.2	-30	-3.86	-0.0047
4132	826.4	4.2	-20	8.39	0.0102
4132	826.4	4.2	-10	-7.81	-0.0095
4132	826.4	4.2	0	-6.13	-0.0074
4132	826.4	4.2	10	-8.33	-0.0101
4132	826.4	4.2	20	-1.98	-0.0024
4132	826.4	4.2	30	6.32	0.0076
4132	826.4	4.2	40	7.37	0.0089
4132	826.4	4.2	50	5.63	0.0068
4132	826.4	4.2	60	-13.44	-0.0163

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	-8.68	-0.0104
4182	836.4	3.6	-20	17.61	0.0211
4182	836.4	3.6	-10	-8.53	-0.0102
4182	836.4	3.6	0	5.16	0.0062
4182	836.4	3.6	10	-7.11	-0.0085
4182	836.4	3.6	20	15.69	0.0188
4182	836.4	3.6	30	15.82	0.0189
4182	836.4	3.6	40	-7.93	-0.0095
4182	836.4	3.6	50	-7.34	-0.0088
4182	836.4	3.6	60	11.99	0.0143

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	3.7	-30	-17.47	-0.0209
4182	836.4	3.7	-20	-4.76	-0.0057
4182	836.4	3.7	-10	10.27	0.0123
4182	836.4	3.7	0	5.42	0.0065
4182	836.4	3.7	10	13.00	0.0155
4182	836.4	3.7	20	8.13	0.0097
4182	836.4	3.7	30	9.14	0.0109
4182	836.4	3.7	40	-11.92	-0.0142
4182	836.4	3.7	50	-3.37	-0.0040
4182	836.4	3.7	60	6.36	0.0076

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	4.2	-30	13.93	0.0167
4182	836.4	4.2	-20	20.07	**0.0240**
4182	836.4	4.2	-10	-6.88	-0.0082
4182	836.4	4.2	0	14.85	0.0178
4182	836.4	4.2	10	11.34	0.0136
4182	836.4	4.2	20	12.36	0.0148
4182	836.4	4.2	30	16.89	0.0202
4182	836.4	4.2	40	17.21	0.0206
4182	836.4	4.2	50	15.03	0.0180
4182	836.4	4.2	60	-3.19	-0.0038

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	9.06	0.0107
4233	846.6	3.6	-20	8.22	0.0097
4233	846.6	3.6	-10	-8.94	-0.0106
4233	846.6	3.6	0	6.94	0.0082
4233	846.6	3.6	10	-10.85	-0.0128
4233	846.6	3.6	20	4.52	0.0053
4233	846.6	3.6	30	-2.27	-0.0027
4233	846.6	3.6	40	-5.36	-0.0063
4233	846.6	3.6	50	-8.47	-0.0100
4233	846.6	3.6	60	-8.13	-0.0096

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	3.7	-30	-3.02	-0.0036
4233	846.6	3.7	-20	6.84	0.0081
4233	846.6	3.7	-10	-3.91	-0.0046
4233	846.6	3.7	0	8.47	0.0100
4233	846.6	3.7	10	6.88	0.0081
4233	846.6	3.7	20	-8.51	-0.0101
4233	846.6	3.7	30	-3.97	-0.0047
4233	846.6	3.7	40	10.35	0.0122
4233	846.6	3.7	50	3.78	0.0045
4233	846.6	3.7	60	-7.77	-0.0092

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	4.2	-30	-9.08	-0.0107
4233	846.6	4.2	-20	10.25	0.0121
4233	846.6	4.2	-10	16.17	0.0191
4233	846.6	4.2	0	-4.75	-0.0056
4233	846.6	4.2	10	-1.94	-0.0023
4233	846.6	4.2	20	2.81	0.0033
4233	846.6	4.2	30	3.62	0.0043
4233	846.6	4.2	40	4.79	0.0057
4233	846.6	4.2	50	-2.24	-0.0027
4233	846.6	4.2	60	-12.86	-0.0152

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

Date of Test: April 8, 2010

Traffic Channel Number	UMTS1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	*PPM*
9262	1852.4	3.6	20	-4.79	-0.0026
9400	1880.0	3.6	20	-15.00	-0.0080
9538	1907.6	3.6	20	-6.12	-0.0032

Traffic Channel Number	UMTS1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	3.7	20	-13.38	-0.0072
9400	1880.0	3.7	20	-27.04	-0.0144
9538	1907.6	3.7	20	2.06	0.0011

Traffic Channel Number	UMTS1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	4.2	20	-16.74	-0.0090
9400	1880.0	4.2	20	7.19	0.0038
9538	1907.6	4.2	20	-10.12	-0.0053

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	6.65	0.0036
9262	1852.4	3.6	-20	-25.51	-0.0138
9262	1852.4	3.6	-10	-19.27	-0.0104
9262	1852.4	3.6	0	-9.93	-0.0054
9262	1852.4	3.6	10	-17.72	-0.0096
9262	1852.4	3.6	20	-4.79	-0.0026
9262	1852.4	3.6	30	-4.55	-0.0025
9262	1852.4	3.6	40	-11.84	-0.0064
9262	1852.4	3.6	50	-25.88	-0.0140
9262	1852.4	3.6	60	-20.97	-0.0113

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	3.7	-30	-21.96	-0.0119
9262	1852.4	3.7	-20	-19.99	-0.0108
9262	1852.4	3.7	-10	-20.75	-0.0112
9262	1852.4	3.7	0	-26.12	-0.0141
9262	1852.4	3.7	10	-27.15	**-0.0147**
9262	1852.4	3.7	20	-13.38	-0.0072
9262	1852.4	3.7	30	-25.85	-0.0140
9262	1852.4	3.7	40	-21.16	-0.0114
9262	1852.4	3.7	50	-19.70	-0.0106
9262	1852.4	3.7	60	-14.08	-0.0076

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.4	4.2	-30	-13.38	-0.0072
9262	1852.4	4.2	-20	-23.51	-0.0127
9262	1852.4	4.2	-10	6.93	0.0037
9262	1852.4	4.2	0	-16.16	-0.0087
9262	1852.4	4.2	10	-25.09	-0.0135
9262	1852.4	4.2	20	-16.74	-0.0090
9262	1852.4	4.2	30	-23.54	-0.0127
9262	1852.4	4.2	40	-16.91	-0.0140
9262	1852.4	4.2	50	-22.51	-0.0122
9262	1852.4	4.2	60	-25.91	-0.0140

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	-26.31	-0.0140
9400	1880.0	3.6	-20	7.60	0.0040
9400	1880.0	3.6	-10	-12.16	-0.0065
9400	1880.0	3.6	0	4.17	0.0022
9400	1880.0	3.6	10	-9.32	-0.0050
9400	1880.0	3.6	20	-15.00	-0.0080
9400	1880.0	3.6	30	-26.50	-0.0141
9400	1880.0	3.6	40	-13.35	-0.0071
9400	1880.0	3.6	50	-14.37	-0.0076
9400	1880.0	3.6	60	-27.15	-0.0144

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.0	3.7	-30	-23.10	-0.0123
9400	1880.0	3.7	-20	6.15	0.0033
9400	1880.0	3.7	-10	-14.19	-0.0075
9400	1880.0	3.7	0	-1.88	-0.0010
9400	1880.0	3.7	10	11.35	0.0060
9400	1880.0	3.7	20	-27.04	-0.0144
9400	1880.0	3.7	30	-12.36	-0.0066
9400	1880.0	3.7	40	-25.53	-0.0136
9400	1880.0	3.7	50	-5.63	-0.0030
9400	1880.0	3.7	60	-6.59	-0.0035

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.0	4.2	-30	-13.28	-0.0071
9400	1880.0	4.2	-20	4.85	0.0026
9400	1880.0	4.2	-10	7.23	0.0038
9400	1880.0	4.2	0	4.41	0.0023
9400	1880.0	4.2	10	-21.12	-0.0112
9400	1880.0	4.2	20	7.19	0.0038
9400	1880.0	4.2	30	-9.22	-0.0049
9400	1880.0	4.2	40	-20.36	-0.0108
9400	1880.0	4.2	50	-8.22	-0.0044
9400	1880.0	4.2	60	-28.03	-0.0149

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	-24.99	-0.0131
9538	1907.6	3.6	-20	-4.17	-0.0022
9538	1907.6	3.6	-10	8.27	0.0043
9538	1907.6	3.6	0	-11.66	-0.0061
9538	1907.6	3.6	10	-16.02	-0.0084
9538	1907.6	3.6	20	-6.12	-0.0032
9538	1907.6	3.6	30	-24.40	-0.0128
9538	1907.6	3.6	40	-18.22	-0.0096
9538	1907.6	3.6	50	-19.09	-0.0100
9538	1907.6	3.6	60	-14.05	-0.0074

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.6	3.7	-30	-10.04	-0.0053
9538	1907.6	3.7	-20	-24.60	-0.0129
9538	1907.6	3.7	-10	-4.18	-0.0022
9538	1907.6	3.7	0	8.33	0.0044
9538	1907.6	3.7	10	11.22	0.0059
9538	1907.6	3.7	20	2.06	0.0011
9538	1907.6	3.7	30	-16.97	-0.0089
9538	1907.6	3.7	40	8.70	0.0046
9538	1907.6	3.7	50	-11.83	-0.0062
9538	1907.6	3.7	60	-14.60	-0.0077

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.6	4.2	-30	-23.12	-0.0121
9538	1907.6	4.2	-20	-6.96	-0.0036
9538	1907.6	4.2	-10	16.24	0.0085
9538	1907.6	4.2	0	-4.50	-0.0024
9538	1907.6	4.2	10	-10.44	-0.0055
9538	1907.6	4.2	20	-10.12	-0.0053
9538	1907.6	4.2	30	-7.58	-0.0040
9538	1907.6	4.2	40	3.89	0.0020
9538	1907.6	4.2	50	-24.60	-0.0129
9538	1907.6	4.2	60	-15.46	-0.0081

APPENDIX 4A – GSM RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

Date of test: April 12, 2010

The measurements were performed by Kevin Rose.
The environmental tests conditions were: Temperature: 22 °C
Pressure: 1002 mb
Relative Humidity: 24 %

The BlackBerry® smartphone was in standalone, USB up position.
Test distance is 3.0 metres

GSM850 Band

GSM 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) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	128	824.20	850	Dipole	V	73.12	86.63	V-V	12.25	29.90	0.98	38.50	-8.60
F0	128	824.20	850	Dipole	H	86.63		H-H	11.38				
F0	190	837.60	850	Dipole	V	70.37	86.22	V-V	13.17	29.96	0.99	38.50	-8.54
F0	190	837.60	850	Dipole	H	86.22		H-H	12.15				
F0	251	848.80	850	Dipole	V	67.37	87.68	V-V	13.82	30.91	1.23	38.50	**-7.59**
F0	251	848.80	850	Dipole	H	87.68		H-H	12.62				

EDGE 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) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	128	824.20	850	Dipole	V	72.12	81.48	V-V	6.84	24.49	0.28	38.50	-14.01
F0	128	824.20	850	Dipole	H	81.48		H-H	6.07				
F0	190	837.60	850	Dipole	V	72.19	80.69	V-V	7.55	24.34	0.27	38.50	-14.16
F0	190	837.60	850	Dipole	H	80.69		H-H	6.57				
F0	251	848.80	850	Dipole	V	71.5	82.8	V-V	8.17	25.26	0.34	38.50	**-13.24**
F0	251	848.80	850	Dipole	H	82.8		H-H	6.63				

Radiated Power Test Data Results cont'd

Date of test: April 12, 2010

The measurements were performed by Kevin Rose.
The environmental tests conditions were: Temperature: 22 °C
Pressure: 1002 mb
Relative Humidity: 24 %

The BlackBerry® smartphone was in standalone, USB up 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	86.42	86.42	V-V	-1.76	31.77	1.50	33.00	-1.23
F0	512	1850.20	1900	Horn	H	92.16		H-H	-1.82				
F0	661	1880.00	1900	Horn	V	87.24	87.24	V-V	-1.48	32.28	1.69	33.00	-0.72
F0	661	1880.00	1900	Horn	H	92.27		H-H	-1.64				
F0	810	1909.80	1900	Horn	V	85.67	85.67	V-V	-0.39	32.45	1.76	33.00	**-0.55**
F0	810	1909.80	1900	Horn	H	92.04		H-H	-0.79				

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	86.58	86.58	V-V	-5.75	27.78	0.60	33.00	-5.22
F0	512	1850.20	1900	Horn	H	88.23		H-H	-5.84				
F0	661	1880.00	1900	Horn	V	86.6	86.56	V-V	-5.06	28.70	0.74	33.00	**-4.30**
F0	661	1880.00	1900	Horn	H	88.67		H-H	-5.16				
F0	810	1909.80	1900	Horn	V	85.05	85.05	V-V	-4.81	28.03	0.64	33.00	-4.97
F0	810	1909.80	1900	Horn	H	87.76		H-H	-5.26				

Radiated Emissions Test Data Results

GSM850

GSM Mode

Date of Test: April 7, 2010
The measurements were performed by Fahd Faisal.

The environmental test conditions were: Temperature: 23 ºC
Pressure: 1012 mb
Relative Humidity: 32 %

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

The measurements were performed in GSM850 Tx mode on channels 128, 190 and 251.

All emissions had a test margin greater than 25.0 dB.

Date of Test: April 9, 2010
The measurements were performed by Steven Wang.

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1003 mb
Relative Humidity: 25 %

Test Distance was 3.0 metres with a height of 1.0 metre, 1 GHz to 9 GHz.
The BlackBerry® smartphone was in standalone, vertical position.

The measurements were performed in GSM850 Tx mode on channels 128, 190 and 251.

All emissions had a test margin greater than 25.0 dB.

Radiated Emissions Test Data Results cont'd

GSM850

EDGE Mode

Date of Test: April 7, 2010

The environmental test conditions were: Temperature: 23 ºC
Pressure: 1012 mb
Relative Humidity: 32 %

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

The measurements were performed in GSM850 EDGE Tx mode on channels 128, 190 and 251.

All emissions had a test margin greater than 25.0 dB.

Date of Test: April 9, 2010

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1003 mb
Relative Humidity: 25 %

Test Distance was 3.0 metres with a height of 1.0 metre, 1 GHz to 9 GHz.
The BlackBerry® smartphone was in standalone, vertical position.

The measurements were performed in GSM850 EDGE Tx mode on channels 128, 190 and 251.

All emissions had a test margin greater than 25.0 dB.

PCS1900

GSM Mode

Date of Test: April 7, 2010

The environmental test conditions were: Temperature: 22 ºC
Pressure: 996 mb
Relative Humidity: 22 %

Test Distance was 3.0 metres with a height of 1.0 metre, 30 MHz to 1000 MHz.
The BlackBerry® smartphone was in standalone, USB down position.

The measurements were performed in PCS1900 Tx mode on channels 512, 661 and 810.

All emissions had a test margin greater than 25.0 dB.

Date of Test: April 7-9, April 30 & May 3, 2010

The environmental test conditions were: Temperature: 23 – 25 ºC
Pressure: 1009 – 1023 mb
Relative Humidity: 25 – 30 %

Test Distance was 3.0 metres with a height of 1.0 metre, 1 GHz to 20 GHz.
The BlackBerry® smartphone was in standalone, USB down position.

The measurements were performed in PCS1900 Tx mode on channels 512, 661 and 810.

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Corrected Reading (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
3760.080	V	3.00	149.00	PK	45.27	-82.23	-36.96	-13.00	-23.96
5550.288	H	3.06	202.00	PK	44.05	-74.73	-30.68	-13.00	-17.68
5640.160	H	3.00	164.00	PK	45.58	-73.93	-28.35	-13.00	**-15.35**

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

Radiated Emissions Test Data Results cont'd

PCS1900

EDGE Mode

Date of Test: April 7, 2010

The environmental test conditions were: Temperature: 22 ºC
Pressure: 996 mb
Relative Humidity: 22 %

Test Distance was 3.0 metres with a height of 1.0 metre, 30 MHz to 1000 MHz.
The BlackBerry® smartphone was in standalone, USB down position.

The measurements were performed in PCS1900 EDGE Tx mode on channels 512, 661 and 810.

All emissions had a test margin greater than 25.0 dB.

Date of Test: April 7- 9, 2010

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1003-1009 mb
Relative Humidity: 25-30 %

Test Distance was 3.0 metres with a height of 1.0 metre, 1 GHz to 20 GHz.
The BlackBerry® smartphone was in standalone, USB down position.

The measurements were performed in PCS1900 EDGE Tx mode on channels 512, 661 and 810.

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Corrected Reading (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
3760.032	H	3.18	231.00	PK	45.72	-81.49	-35.77	-13.00	-22.77
3760.080	V	3.00	149.00	PK	45.27	-82.23	-36.96	-13.00	-23.96
5550.865	H	2.35	3.00	PK	40.51	-74.74	-34.24	-13.00	-21.24
5640.128	H	3.00	161.00	PK	41.64	-73.93	-32.29	-13.00	-19.29
5640.160	H	3.00	164.00	PK	45.58	-73.93	-28.35	-13.00	-15.35
5729.439	H	3.00	69.00	PK	42.43	-73.43	-31.00	-13.00	-18.00

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

APPENDIX 4B – WCDMA RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

Date of test: April 21, 2010

The measurements were performed by Kevin Rose.
The environmental tests conditions were: Temperature: 22 °C
Pressure: 1002 mb
Relative Humidity: 24 %

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

UMTS Band 2 (1900 MHz)

Call 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) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	9262	1852.40	1900	Horn	V	85.66	88.23	V-V	-13.52	26.80	0.48	33.00	-6.20
F0	9262	1852.40	1900	Horn	H	88.23		H-H	-12.38				
F0	9400	1880.00	1900	Horn	V	85.53	88.67	V-V	-13.07	26.86	0.49	33.00	**-6.14**
F0	9400	1880.00	1900	Horn	H	88.67		H-H	-12.07				
F0	9538	1907.60	1900	Horn	V	85.21	87.76	V-V	-12.82	26.77	0.48	33.00	-6.23
F0	9538	1907.60	1900	Horn	H	87.76		H-H	-12.21				

Radiated Emissions Test Data Results

UMTS Band 2 (1800 MHz)

Date of Test: April 8, 2010
The measurements were performed by Fahd Faisal

The environmental test conditions were: Temperature: 22 ºC
Pressure: 994 mb
Relative Humidity: 32 %

Test Distance was 3.0 metres with a height of 1.0 metre, 30 MHz to 1000 MHz.
The BlackBerry® smartphone was in standalone, Horizontal position.

The measurements were performed in Call Tx mode, on channels 9262, 9400 and 9538.

All emissions had a test margin greater than 25.0 dB.

Date of Test: April 8 – 12 & May 3, 2010
The measurements were performed by Steven Wang.

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1009-1031 mb
Relative Humidity: 26 - 30%

Test Distance was 3.0 metres with a height of 1.0 metre, 1 GHz to 20 GHz.
The BlackBerry® smartphone was in standalone, Horizontal position.

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

Radiated Power Test Data Results

Date of test: April 21, 2009

The measurements were performed by Kevin Rose.
The environmental tests conditions were: Temperature: 22 °C
Pressure: 1002 mb
Relative Humidity: 24 %

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

UMTS Band 5 (850 MHz)

Call 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) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	4132	826.40	UMTS 5	Dipole	V	71.21	78.91	V-V	4.38	22.03	0.16	33.00	-10.97
F0	4132	826.40	UMTS 5	Dipole	H	78.91		H-H	3.57				
F0	4182	836.40	UMTS 5	Dipole	V	70.15	79.68	V-V	6.32	23.11	0.20	33.00	-9.89
F0	4182	836.40	UMTS 5	Dipole	H	79.68		H-H	5.62				
F0	4233	846.60	UMTS 5	Dipole	V	70.1	80.57	V-V	6.35	23.44	0.22	33.00	**-9.56**
F0	4233	846.60	UMTS 5	Dipole	H	80.57		H-H	5.78				

Radiated Emissions Test Data Results

UMTS Band 5 (850 MHz)

Date of Test: April 8, 2010
The measurements were performed by Fahd Faisal

The environmental test conditions were: Temperature: 22 ºC
Pressure: 994 mb
Relative Humidity: 32 %

Test Distance was 3.0 metres with a height of 1.0 metre, 30 MHz to 1000 MHz.
The BlackBerry® smartphone was in standalone, Vertical position.

The measurements were performed in Call Tx mode, on channels 4132, 1413 and 1513.

All emissions had a test margin greater than 25.0 dB.

Date of Test: April 7 - 12, 2010.
The measurements were performed by Mike Cino.

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1006 mb
Relative Humidity: 28 %

Test Distance was 3.0 metres with a height of 1.0 metre, 1 GHz to 9 GHz.
The BlackBerry® smartphone was in standalone, Vertical position.

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