

EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47 Parts 2, 22, 24 and 27
&
Industry Canada (IC) RSS-132, 133 and 139




A division of Research In Motion Limited

REPORT NO: RTS-1689-1007-29

PRODUCT MODEL NO:	RCN72UW
TYPE NAME:	BlackBerry® smartphone
FCC ID:	L6ARCN70UW
IC:	2503A-RCN70UW
EMISSION DESIGNATOR (GSM):	245KG7W
EMISSION DESIGNATOR (EDGE):	242KGXW
EMISSION DESIGNATOR (WCDMA):	4M17F9W

DATE: 22 July, 2010

	EMI Test Report for the BlackBerry® smartphone Model RCN72UW	
Test Report No. RTS-1689-1007-29	Dates of Test June 14 to July 19, 2010	FCC ID: L6ARCN70UW IC: 2503A-RCN70UW

Statement of Performance:


The BlackBerry® smartphone, model RCN72UW, part number CER-33222-001 Rev 2 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:



Savtej S. Sandhu
Regulatory Compliance Specialist
Date: 22 July, 2010

Reviewed by:



Michael Cino
Regulatory Compliance Associate
Date: 23 July, 2010

Reviewed and Approved by:



Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: 30 July, 2010



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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
- FCC CFR 47 Part 27 Subpart C, Technical Standards, 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.
- Industry Canada, RSS-139 Issue 2, February 2009, Advanced Wireless Services Equipment Operating in the Bands 1710 – 1755 and 2110 – 2155 MHz

B) Associated Documents

- 1) 9700 – 9780 Differences
- 2) HW_Declaration_CER-33222_Rev2
- 3) MultiSourceDeclaration_9780_b236
- 4) RTS-1689-0909-27
- 5) RTS-1689-1007-54
- 6) RCN72UW_RCM72UW_RF_Difference_Document

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 June 14 to July 19, 2010.

 EMI Test Report for the BlackBerry® smartphone Model RCN72UW		
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The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN	Software
1	RCN72UW	CER-33222-001 Rev. 1	226DC9F4	V6.0.0.68 (Platform 6.5.0.6) Bundle 142
2	RCN72UW	CER-33222-001 Rev. 1	226DCA28	V6.0.0.68 (Platform 6.5.0.6) Bundle 142
3	RCN72UW	CER-33222-001 Rev. 2	228EBD43	V6.0.0.68 (Platform 6.5.0.6) Bundle 142
4	RCN72UW	CER-33222-001 Rev. 2	228EBD42	V6.0.0.68 (Platform 6.5.0.6) Bundle 142
5	RCN72UW	CER-33222-001 Rev. 2	228EBC9C	V6.0.0.68 (Platform 6.5.0.14) Bundle 236

UMTS RF Conducted testing was performed on sample 5.
RF Radiated Emissions testing was performed on samples 1, 2, 3 and 4.
PCS EIRP testing was performed on sample 1.
UMTS EIRP testing was performed on sample 2.

To view the differences between CER-33222-001 Rev. 1 and CER-33222-001 Rev. 2, see document HW_Declaration_CER-33222_Rev 2. To view the differences between bundles 142 and 236, see document number MultiSourceDeclaration_9780_b236.


Only the characteristics that may have been affected by the changes from RCN71UW to RCN72UW and from RCM72UW to RCN72UW were re-tested. For more information, see 9700 – 9780 Differences and RCN72UW_RCM72UW_RF_Difference_Document.

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.

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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-1689-1007-54	-
Part 2.1051 Part 24.238(a)	RSS-GEN, 4.9	GSM PCS Conducted Spurious Emissions	See Test Report RTS-1689-1007-54	-
Part 2.202 Part 22.917	RSS-GEN, 4.6	GSM 850 Occupied Bandwidth and Channel Mask	See Test Report RTS-1689-1007-54	-
Part 2.202 Part 24.238	RSS-GEN, 4.6	GSM PCS Occupied Bandwidth and Channel Mask	See Test Report RTS-1689-1007-54	-
Part 2.1046(a)	RSS-133, 6.4 RSS-132, 4.4	GSM Conducted RF Output Power	See Test Report RTS-1689-0909-27	-
Part 2.1055(a)(d) Part 22.917	RSS-132, 4.3	GSM 850 Frequency Stability vs. Temperature and Voltage	See Test Report RTS-1689-0909-27	-
Part 2.1055(a)(d) Part 24.235	RSS-132, 4.3	GSM PCS Frequency Stability vs. Temperature and Voltage	See Test Report RTS-1689-0909-27	-
Part 22, Subpart H, Part 24, Subpart E	RSS-GEN, 4.9	GSM ERP, EIRP	See Test Report RTS-1689-1007-54	-
Part 22, Subpart H Part 24, Subpart E	RSS-GEN, 4.9	GSM Radiated Spurious/Harmonic Emissions	Pass	2A
Part 27.53	RSS-139, 6.5	WCDMA UMTS1700 Conducted Spurious Emissions	Pass	1
Part 2.202 Part 27.53	RSS-GEN, 2.3	WCDMA UMTS1700 Occupied Bandwidth and Channel Mask	Pass	1
Part 2.1046(a)	RSS-139, 6.4	WCDMA UMTS1700 Conducted RF Output Power	See Test Report RTS-1689-0909-27	-
Part 2.1055(a)(d) Part 27.54	RSS-139, 6.3	WCDMA UMTS1700 Frequency Stability vs. Temperature and Voltage	See Test Report RTS-1689-0909-27	-
Part 27.53	RSS-139, 6.5	WCDMA UMTS1700 Radiated Spurious/Harmonic Emissions	Pass	2B
Part 27.50	RSS-139, 6.4	WCDMA UMTS1700 EIRP	Pass	2B

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Summary of Results cont'd

1) Conducted Emission Measurements

- a) The BlackBerry® smartphone met the requirements of the Conducted Spurious Emissions in the UMTS1700 band as per 47 CFR 2.1051, CFR 2.202, CFR 22.917, CFR 22 Subpart H 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.
- b) The BlackBerry® smartphone met the requirements of the Occupied Bandwidth in the UMTS1700 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 Occupied Bandwidth was 4.167 MHz for both the low and high channels. See APPENDIX 1 for the test data.


2) Radiated Emission Measurements

Radiated Spurious and Harmonic Emissions

The radiated spurious emissions/harmonics and EIRP were measured for GSM 850, PCS 1900, and UMTS 1700 bands (WCDMA band 4). 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 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.

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The EIRP in the 1700 band, UMTS mode was measured on BlackBerry® smartphone. The highest ERP measured was 22.14 dBm (0.16 W) at 1712.40 MHz (channel 1312).

The radiated spurious emission and carrier harmonics were measured up to the 10th harmonic for high channel in the GSM850 band and for low channel in the PCS1900 bands. Each band was measured in GSM mode. Both the horizontal and vertical polarizations were measured.

The worst case emission level in the 850 band for GSM mode harmonic emissions was -29.56 dBm or test margin of 16.56 dB below the limit at 1698.173 MHz.

The worst case emission level in the PCS band for GSM mode harmonic emissions was -35.01 dBm or test margin of 22.01 dB below the limit at 3700.593 MHz.

The radiated spurious emission and carrier harmonics were measured up to the 10th harmonic for middle channel in the UMTS1700 band. Both the horizontal and vertical polarizations were measured.

The test margin in the UMTS1700 band harmonic emissions were greater than 25 dB below the accepted limits for all tested frequencies.


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 1A and 1B.


Measurement Uncertainty ±4.6 dB

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G) Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>	<u>CAL DUE DATE</u> (YY MM DD)	<u>USE</u>
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
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	10-11-30	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESU-40	100162	10-11-29	Radiated Emissions
Environment Monitor	Control Company	1870	230355190	11-01-08	Radiated Emissions
Environment Monitor	Control Company	1870	80117164	11-01-08	Radiated Emissions
Signal Generator	Agilent	E8257D	MY45140527	11-11-05	Radiated Emissions
Signal Generator	Agilent	83630B	3844A00927	10-10-31	Radiated Emissions

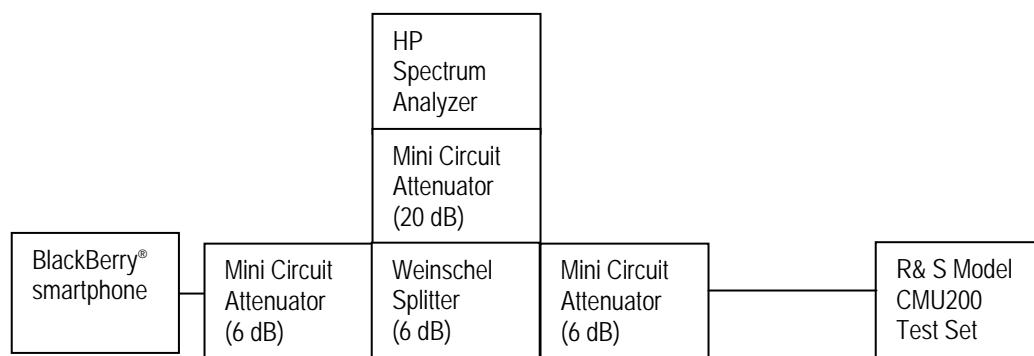
APPENDIX 1 – WCDMA CONDUCTED RF EMISSIONS TEST DATA/PLOTS

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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: July 19, 2010

The environmental test conditions were:

Temperature:	21 °C
Pressure:	1008 mb
Relative Humidity:	42 %

The following measurements were performed by Maurice Battler.

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WCDMA Conducted RF Emission Test Data cont'd

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 2.202, CFR 22.917, 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 1-1 to 1-6 for the plots of the conducted spurious emissions on Band 4

–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 UMTS1700 band was measured to be 4.658 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 4 in UMTS mode.

Band 4 Frequency (MHz)	-26dBc Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
1712.4	4.642	4.167
1732.6	4.633	4.158
1752.6	4.658	4.167


Measurement Plots for band 4 in UMTS mode

Refer to the following measurement plots for more detail.

See Figures 1-7 to 1-12 (Band 4) for the plots of the –26dBc Bandwidth and 99% Occupied Bandwidth.

See Figures 1-13 to 1-14 for plots of the channel mask results.

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

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WCDMA Conducted RF Emission Test Data cont'd

Figure 1-1: UMTS band 4, Spurious Conducted Emissions, Low channel

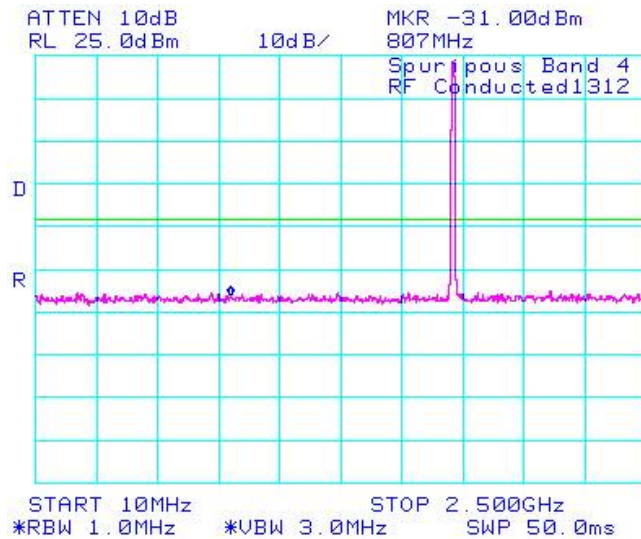


Figure 1-2: UMTS band 4, Spurious Conducted Emissions, Low channel

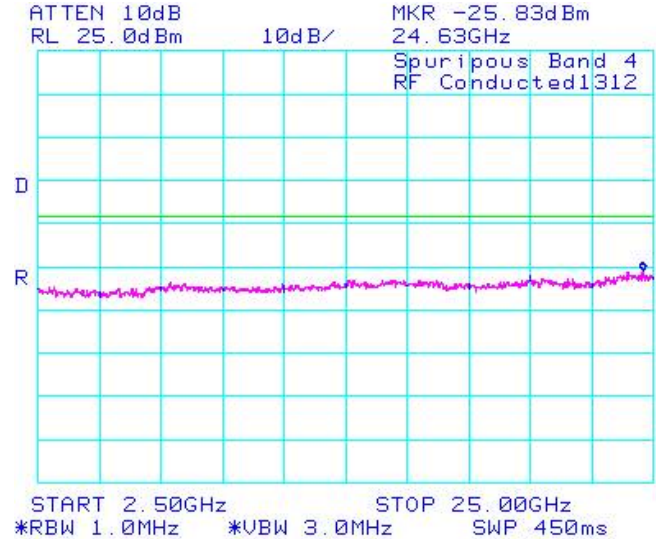


Figure 1-3: UMTS band 4, Spurious Conducted Emissions, Middle Channel

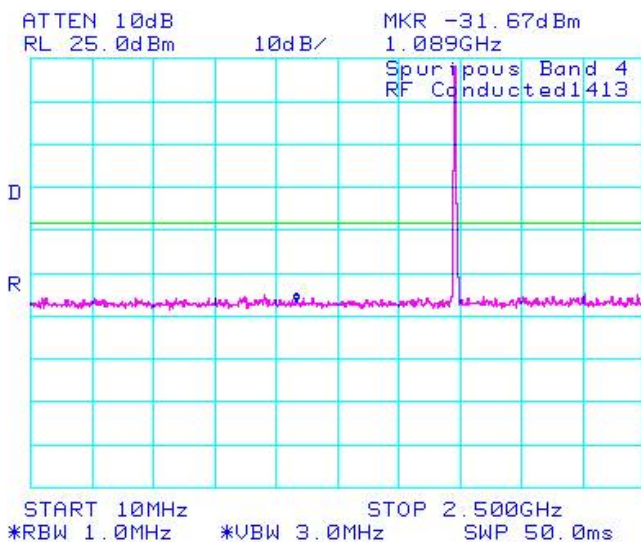
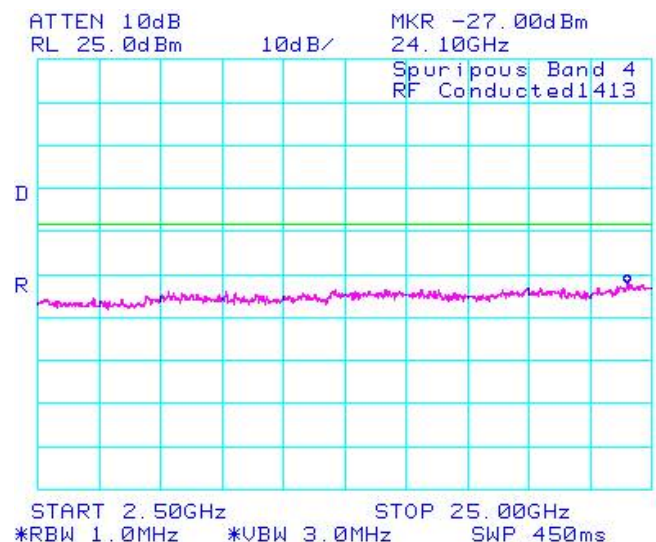



Figure 1-4: UMTS band 4, Spurious Conducted Emissions, Middle Channel



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WCDMA Conducted RF Emission Test Data cont'd

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

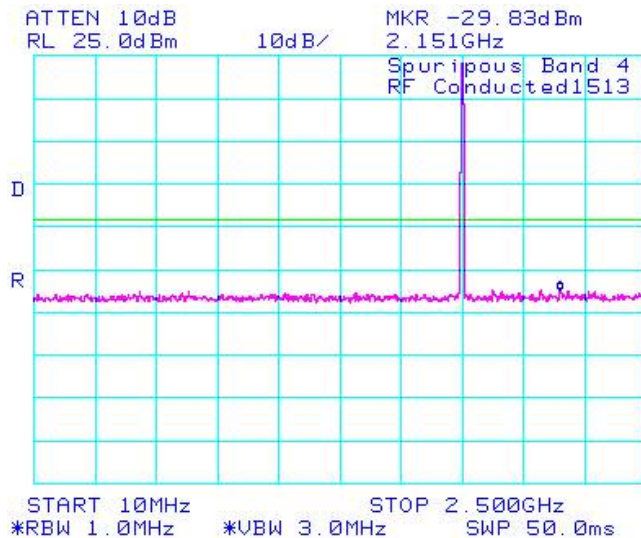


Figure 1-6: UMTS band 4, Spurious Conducted Emissions, High Channel

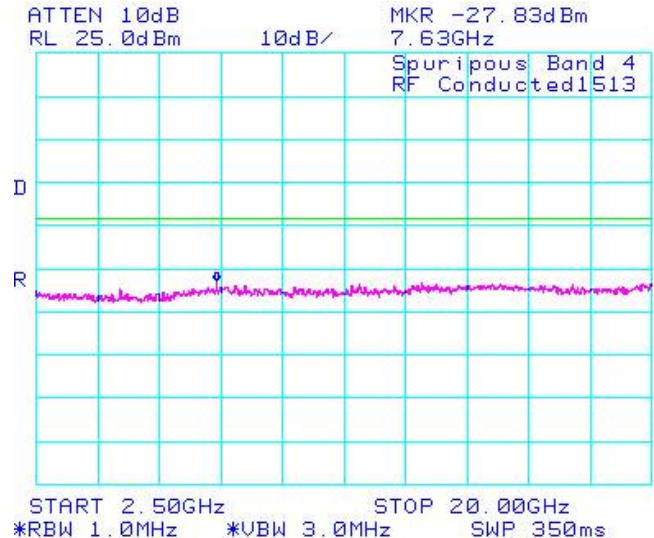


Figure 1-7: -26dBc bandwidth, UMTS band 4 Low Channel

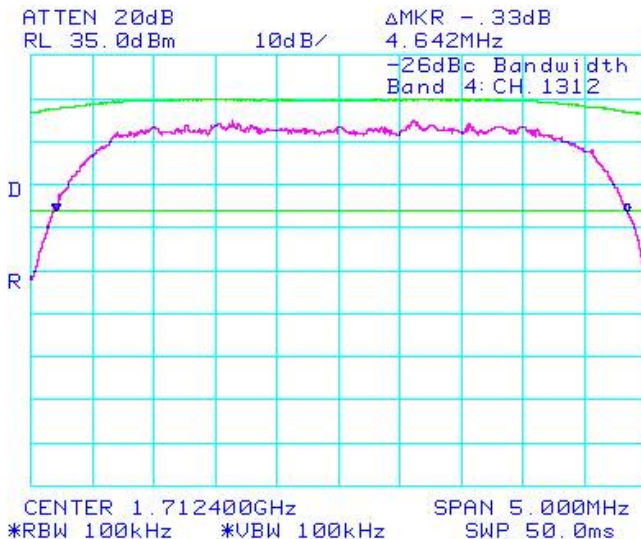
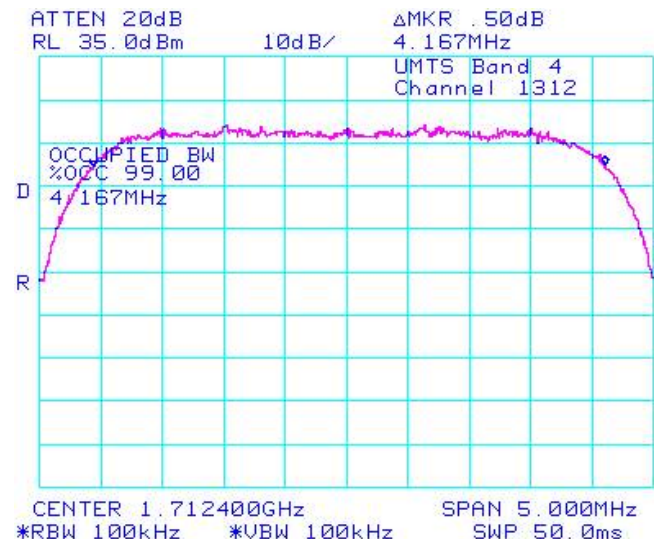



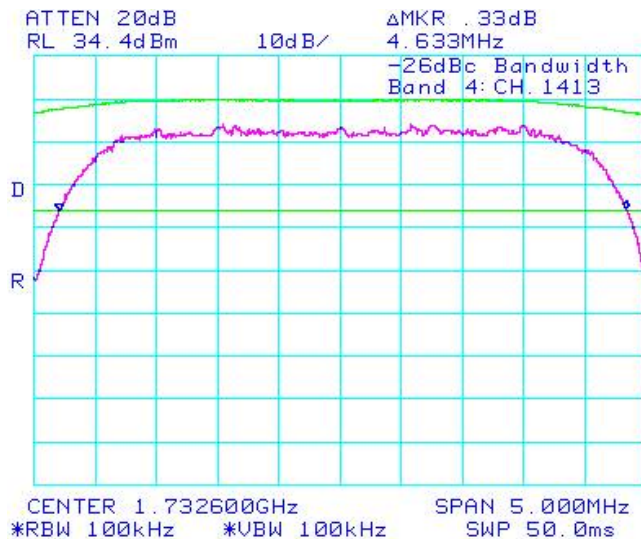
Figure 1-8: Occupied Bandwidth, UMTS band 4 Low Channel



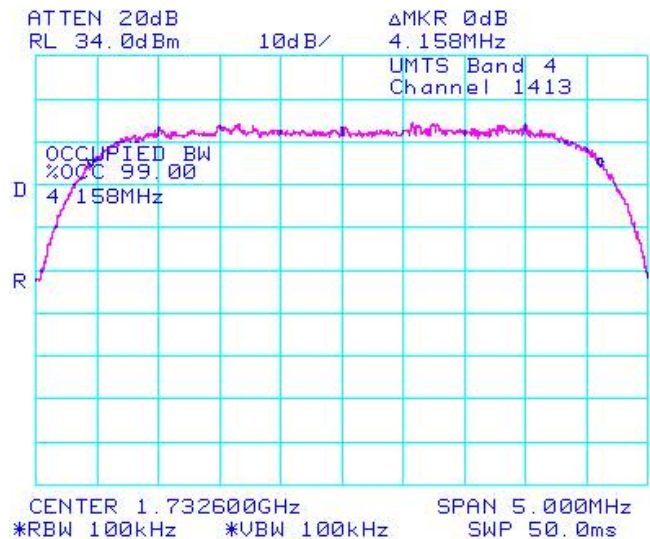
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WCDMA Conducted RF Emission Test Data cont'd

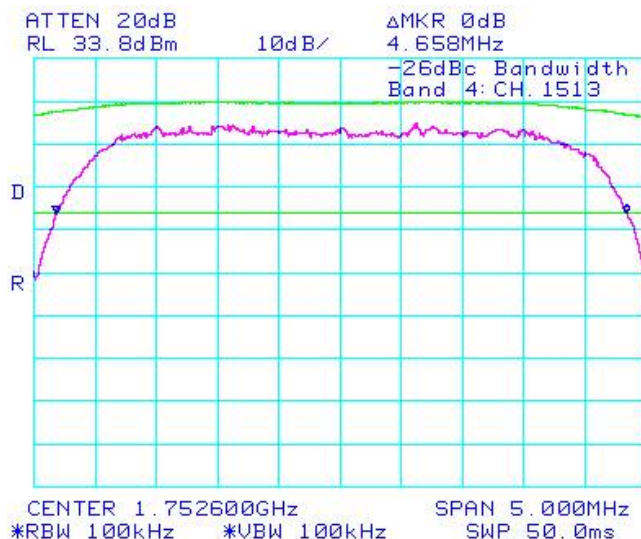
**Figure 1-9: -26dBc bandwidth, UMTS band 4
Middle Channel**



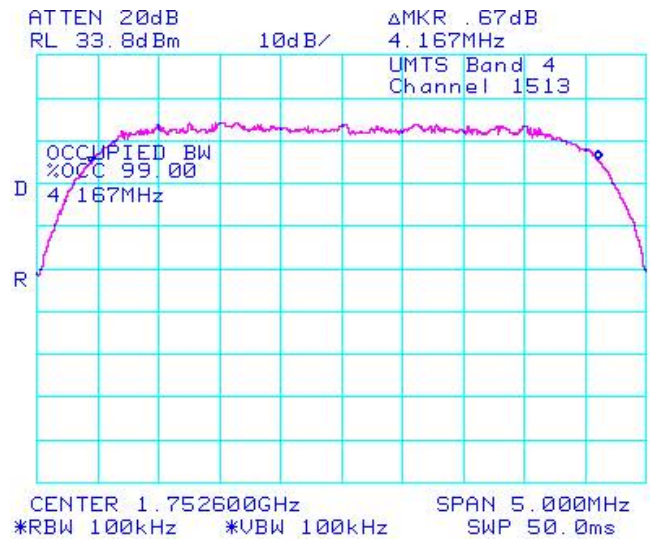
**Figure 1-10: Occupied Bandwidth, UMTS band 4
Middle Channel**




**Figure 1-11: -26dBc bandwidth, UMTS band 4 High
Channel**



**Figure 1-12: Occupied Bandwidth, UMTS band 4
High Channel**



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WCDMA Conducted RF Emission Test Data cont'd

Figure 1-13: UMTS band 4, Low Channel Mask

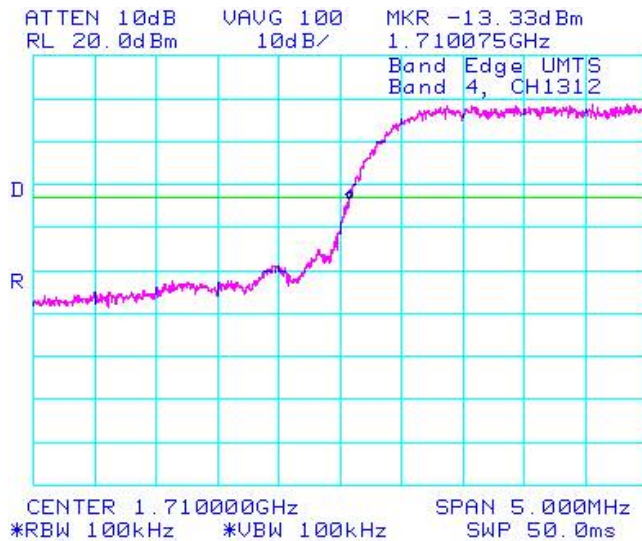
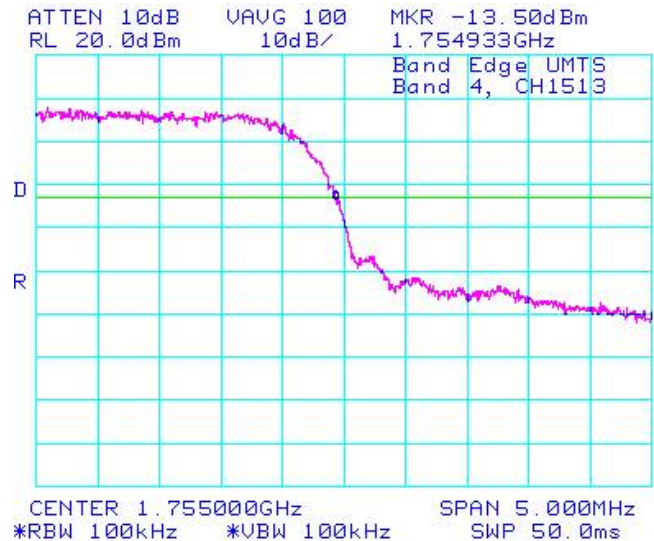



Figure 1-14: UMTS band 4, High Channel Mask



APPENDIX 2A – GSM RADIATED EMISSIONS TEST DATA

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Radiated Emissions Test Data Results

GSM850

GSM Mode

Date of Test: June 18, 2010

The measurements were performed by Fahd Faisal.

The environmental test conditions were: Temperature: 24 °C
Pressure: 1023 mb
Relative Humidity: 25 %

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 GSM850 Tx mode on channel 251.

All emissions had a test margin greater than 25.0 dB.

Date of Test: June 21, 2010

The measurements were performed by Steven Wang.


The environmental test conditions were: Temperature: 24 °C
Pressure: 1023 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, USB down position.

The measurements were performed in GSM850 Tx mode on channel 251.

BlackBerry® smartphone PIN 226DC9F4										
Frequency (MHz)	Channel Of Occurrence	Antenna		Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Field Strength Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
		Pol. (V/H)	Height (metres)							
1698.173	251	V	4.00	133.00	PK	62.28	-91.84	-29.56	-13.00	-16.56

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

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Radiated Emissions Test Data Results cont'd

PCS1900

GSM Mode

Date of Test: June 18, 2010

The measurements were performed by Fahd Faisal.

The environmental test conditions were: Temperature: 24 °C
Pressure: 1002 mb
Relative Humidity: 30 %

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 PCS1900 Tx mode on channel 512.

All emissions had a test margin greater than 25.0 dB.

Date of Test: June 15-23, 2010

The measurements were performed by Steven Wang.

The environmental test conditions were: Temperature: 24 °C
Pressure: 1018 – 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, Horizontal position.

The measurements were performed in PCS1900 Tx mode on channel 512.

BlackBerry® smartphone PIN 226DC9F4										
Frequency (MHz)	Channel Of Occurrence	Antenna		Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Field Strength Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
		Pol. (V/H)	Height (metres)							
3700.593	512	H	3.77	183.00	PK	46.00	-81.01	-35.01	-13.00	-22.01

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

APPENDIX 2B – WCDMA RADIATED EMISSIONS TEST DATA

		EMI Test Report for the BlackBerry® smartphone Model RCN72UW APPENDIX 2B	
Test Report No. RTS-1689-1007-29	Dates of Test June 14 to July 19, 2010		FCC ID: L6ARCN70UW IC: 2503A-RCN70UW

Radiated Power Test Data Results

Date of test: July 07, 2010

The measurements were performed by Kevin Rose.


The environmental tests conditions were: Temperature: 25 °C
Pressure: 1013 mb
Relative Humidity: 23 %

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

UMTS Band IV (1700 MHz)

Call Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method					
								Tracking Generator					
Type	Ch	Frequency	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol.	Reading (dBm)	Corrected Reading (relative to Dipole)		Limit (dBm)	Diff. To Limit (dB)
		(MHz)						Tx-Rx		(dBm)	(W)		
F0	1312	1712.40	UMTS 4	Horn	V	74.55	84.8	V-V	-15.12	22.14	0.16	33.00	-10.86
F0	1312	1712.40	UMTS 4	Horn	H	84.8		H-H	-14.24				
F0	1413	1732.60	UMTS 4	Horn	V	74.45	83.91	V-V	-15.66	21.35	0.14	33.00	-11.65
F0	1413	1732.60	UMTS 4	Horn	H	83.91		H-H	-14.93				
F0	1513	1752.60	UMTS 4	Horn	V	76.2	84.14	V-V	-15.46	21.62	0.15	33.00	-11.38
F0	1513	1752.60	UMTS 4	Horn	H	84.14		H-H	-14.70				

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Radiated Emissions Test Data Results

UMTS 1700 MHz Band

Date of Test: June 18, 2010

The measurements were performed by Fahd Faisal

The environmental test conditions were: Temperature: 23 °C
Pressure: 997 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, Vertical upside down position.

The measurements were performed in Call Tx mode, on channel 1413.

All emissions had a test margin greater than 25.0 dB.

Date of Test: June 14-23, 2010.

The measurements were performed by Steven Wang.

The environmental test conditions were: Temperature: 24 °C
Pressure: 1022 – 1023 mb
Relative Humidity: 29 – 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, Vertical upside down position.

The measurements were performed in Call Tx mode, on channel 1413.

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