

EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Part 15 Subpart C




A division of Research In Motion Limited

REPORT NO.: RTS-2582-0912-22

PRODUCT MODEL NO.: RCT41GW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARCT40GW
IC: 2503A- RCT40GW

DATE: 20 November, 2009

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Statement of Performance:

The BlackBerry® smartphone, model RCT41GW , part number CER -27173 Rev 1 and its accessories perform within the requirements of the test standards when configured and operated under RIM's operation 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:



Kevin Rose
Regulatory Compliance Specialist
Date: December 15, 2009

Reviewed by:



Michael Cino
Regulatory Compliance Associate
Date: December 15, 2009

Reviewed by:



Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: December 16, 2009



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Table of Contents

A.	Scope	4
B.	Associated Documents	4
C.	Product Identification	4
D.	Support Equipment Used for the Testing of the EUT	5
E.	Test Results Chart	6
F.	Summary of Results	7
G.	Compliance Test Equipment Used	10
	APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS	11
	APPENDIX 2 – BLUETOOTH RADIATED EMISSIONS TEST DATA	14
	APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS	22

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

A. Scope

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

- o FCC CFR 47 Part 15, Subpart C, October, 2008

B. Associated Documents

None

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 November 16 to 26, 2009.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCT41GW	CER -27173 Rev 1	2151BF6E
2	RCT41GW	CER -27173 Rev 1	2151BEF0
3	RCT41GW	CER -27173 Rev 1	2151BFF8

Sample 1 was used for AC Line Conducted Emissions.

Samples 1 and 2 were used for Radiated Emissions testing.


Sample 3 was used for Conducted Emissions testing.

BlackBerry® smartphone Accessories Tested

- 1) Folding Blade Charger, part number HDW-17955-001 with an output voltage of 5.0 volts dc, 700 mA and attached USB cable with a lead length of 1.80 metres.
- 2) Stereo Headset, part number HDW-14322-003 with a lead length of 1.3 metres.
- 3) Premium Stereo Headset, part number HDW-15766-005, 1.3 metres long.
- 4) Charging POD, part number HDW-22385-001.


D. Support Equipment Used for the Testing of the EUT

No support equipment used. See section *G, Compliance Test Equipment Used*.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

E. Test Results Chart

SPECIFICATION	TEST TYPE	Meets Requirements	TEST DATA
FCC CFR 47			APPENDIX
Part 15.207	Conducted AC Line Emission	Pass	1
Part 15.209 Part 15.247	BT Radiated Spurious Emissions and Radiated Band Edge Compliance	Pass	2
Part 15.247(a)	BT, 20 dB Bandwidth	Pass	3
Part 15.247(a)	BT, Carrier Frequency Separation	Pass	3
Part 15.247(a)	BT, Number of Hopping Frequencies	Pass	3
Part 15.247(a)	BT, Time of Occupancy (Dwell Time)	Pass	3
Part 15.247(b)	BT, Maximum Peak Conducted Output Power	Pass	3
Part 15.247(c)	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	3
Part 15.247(c)	BT, Spurious RF Conducted Emissions	Pass	3

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

F. Summary of Results

1) AC LINE CONDUCTED EMISSIONS

The conducted emissions were measured using the test procedure outlined in CISPR Recommendation 22 through a 50 Ohm Line Impedance Stabilization Network (LISN), which was inserted in the power line to the equipment to provide the specified impedance for measurements. The EUT was placed on a nonconductive wooden table, 80 cm high that was positioned 40 cm from a vertical ground plane. The RF output of the network was connected to an EMI receiver system with characteristics that duplicate those of the receiver specified in CISPR Publication 16.

The BlackBerry® smartphone was in battery charging mode and the input voltage was 120 V, 60 Hz.


The BlackBerry® smartphone was tested in the following test configuration:

- 1) The BlackBerry® smartphone, PIN 2151BF6E in Bluetooth Tx mode and MP3 Audio playback mode with the Premium Single Button Stereo Headset attached, was positioned in the Charging Pod which was connected to the Folding Blade Charger.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C limits. The sample EUT had a worst case test margin of 17.17dB below the QP limit at 0.173 MHz using the quasi-peak detector in Test Configuration 1.

See APPENDIX 1 for the test data

Measurement Uncertainty ± 3.0 dB

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

2) RADIATED EMISSIONS

a) Radiated Spurious and Harmonic Emissions

The EUT was placed on a nonconductive styrofoam table, 80 cm high that was positioned on a remotely controlled turntable. The test distance used between the EUT and the receiving antenna was three metres. The turntable was rotated to determine the azimuth of the peak emissions. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The maximum emission level was recorded. The frequency range measured was from 30 MHz to 25.0 GHz. Both the horizontal and vertical polarizations of the emissions were measured.

The 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 EUT was configured and operated to produce the maximum radiated emissions while still keeping within RIM's specifications.


The BlackBerry® smartphones PIN 2151BEF0 and 2151BF6E were measured in standalone configuration with Bluetooth transmitting in single frequency mode at low channel (0), middle channel (39) and high channel (78) for packet type "DH5", "2-DH5" and "3-DH5". The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart C, 15.247.

The Bluetooth harmonics were investigated up to the 10th harmonic. The worst case test margin was 4.09 dB below the average limit at 7205.962 MHz.

See APPENDIX 2 for the test data

Measurement Uncertainty ±4.6 dB

See APPENDIX 2 for the test data

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

3) BLUETOOTH RF CONDUCTED EMISSIONS

The Bluetooth conducted RF emissions from the BlackBerry® smartphone PIN 2151BFF8 were measured using the methods outlined in FCC CFR 47 Part 15, Subpart C.

a) 20 dB Bandwidth

The BlackBerry® smartphone met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a). Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR. See APPENDIX 3 for the test data.

b) Carrier Frequency Separation

The BlackBerry® smartphone met the requirements of the carrier frequency separation as per 47 CFR 15.247(a). Channel 38 to 39 was measured. The result includes both normal data rate and EDR. See APPENDIX 3 for the test data.

c) Number of Hopping Frequencies

The BlackBerry® smartphone met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a). The number of hopping channels measured was 79. See APPENDIX 3 for the test data.

d) Time of Occupancy (Dwell Time)

The EUT met the requirements of the dwell time as per 47 CFR 15.247(a). Low channel (0), middle channel (39) and high channel (78) were measured in DH1, DH3 and DH5 modes. Bluetooth was operating in frequency hopping (Euro/US) mode during the measurements. See APPENDIX 3 for the test data.


e) Maximum Peak Conducted Output Power

The BlackBerry® smartphone met the requirements of the maximum peak conducted output power as per 47 CFR 15.247(b). Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR. See APPENDIX 3 for the test data.

f) Band-Edge Compliance of RF Conducted Emissions

The BlackBerry® smartphone met the requirements of the band-edge compliance of RF conducted emissions as per 47 CFR 15.247(c). Channels 0 and 78 were measured in frequency hopping (Euro/US) mode and single frequency mode. The result includes both normal data rate and EDR. See APPENDIX 3 for the test data.


g) Spurious RF Conducted Emissions

 EMI Test Report for the BlackBerry® smartphone Model RCT41GW		
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose


The BlackBerry® smartphone met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c). The frequency range measured was 10 MHz to 26 GHz. Low channel (0), middle channel (39) and high channel (78) were measured in single frequency mode and frequency hopping (Euro/US) mode. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

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>
EMI Test Receiver	Rohde & Schwarz	ESIB 40	100255	09-12-03	Conducted/Radiated Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	10-04-22	Conducted/Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017401	10-09-26	Radiated Emissions
Horn Antenna	CMT	LHA 0180	R52734-001	09-12-17	Radiated Emissions
Horn Antenna	ETS-Lindgren	3117	47563	11-07-15	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	10-05-08	Radiated Emissions
Preamplifier	Sonoma	310N/11909A	185831	10-11-06	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	10-03-31	Radiated Emissions
L.I.S.N.	Rohde & Schwarz	ENV216	100060	10-04-21	Conducted Emissions
Environment Monitor	Control Company	1870	230355190	10-01-30	Radiated Emissions
Environment Monitor	Control Company	1870	80117164	10-01-08	RF Conducted Emissions
Temperature Probe	Control Company	15-077-21	51129471	10-05-01	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	100034	10-11-26	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100368	09-12-09	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100370	09-12-09	Radiated Emissions
Power Meter	Agilent	N1911A	MY45100905	11-01-05	RF Conducted / Frequency Stability
Power Sensor	Agilent	N1921A	SG45240281	10-05-08	RF Conducted / Frequency Stability
Environment Monitor	Control Company	1870	230355159	10-01-30	Radiated Emissions

	EMI Test Report for the BlackBerry® smartphone Model RCS71CW APPENDIX 1	
Test Report No. RTS-2340-0911-16	Dates of Test October 22 to November 20 2009	Author Data Kevin Rose

APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

	EMI Test Report for the BlackBerry® smartphone Model RCS71CW APPENDIX 1	
Test Report No. RTS-2340-0911-16	Dates of Test October 22 to November 20 2009	Author Data Kevin Rose

AC Conducted Emission Test Results

The measurements were performed by Steven Wang.

Test Configuration 1


The BlackBerry® smartphone PIN 2151BF6E was tested on November 23, 2009.

The environmental test conditions were: Temperature: 24 °C
Pressure: 1021 mb
Relative Humidity: 22 %

Frequency (MHz)	Line	Reading (QP) (dBμV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBμV)	Limit (AV) (dBμV)	Margin (QP) Limits (dB)
0.164	N	38.05	10	48.05	65.28	55.28	-17.24
0.173	N	37.63	10.04	47.67	64.84	54.84	-17.17
0.209	L1	35.43	9.89	45.33	63.26	53.26	-17.94
0.218	L1	34.29	9.89	44.18	62.91	52.91	-18.73
0.276	N	30.61	9.81	40.42	60.94	50.94	-20.52
0.308	L1	28.34	9.81	38.15	60.04	50.04	-21.89
0.393	L1	24.26	9.76	34.02	58	48	-23.98
0.483	N	23.82	9.89	33.71	56.29	46.29	-22.58
1.901	N	24.62	9.62	34.24	56	46	-21.76
2.063	L1	27.6	9.54	37.14	56	46	-18.86
2.153	N	22.31	9.63	31.94	56	46	-24.06

All other emission levels had a test margin of greater than 25 dB.

Measurements were done with the quasi-peak detector. See figure 1-1 and figure 1-2 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

	EMI Test Report for the BlackBerry® smartphone Model RCS71CW APPENDIX 1	
Test Report No. RTS-2340-0911-16	Dates of Test October 22 to November 20 2009	Author Data Kevin Rose

AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

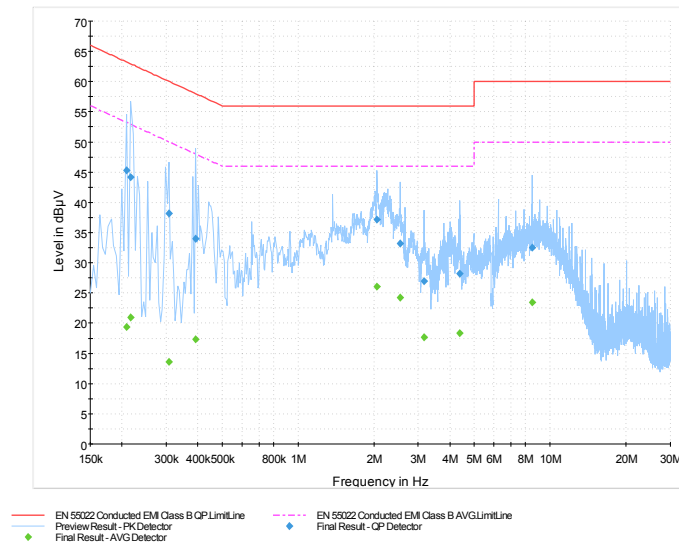
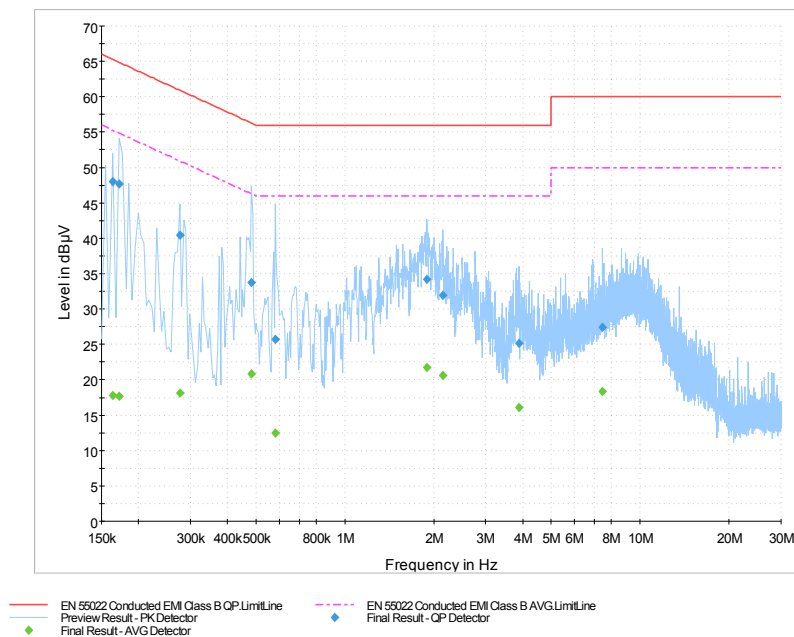




Figure 1-2: N Lines



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

APPENDIX 2 – BLUETOOTH RADIATED EMISSIONS TEST DATA

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Radiated Emissions Test Results
Bluetooth Band


Date of Test: November 17 to 24, 2009
Measurements were performed by Kevin Rose.

The environmental test conditions were: Temperature: 23 – 29 °C
Pressure: 1003 – 1028 mb
Relative Humidity: 22 – 34 %

The test distance was 3.0 metres with a EUT height of 0.8 metres, sweep frequency of 30 MHz to 1 GHz.
The BlackBerry® smartphone PIN 2151BF6E in Bluetooth Tx mode was in standalone, USB Up position.

The frequency sweep measurements were performed in single frequency mode on channels 0, 39 and 78 using packet types “DH5”, “2-DH5” and “3-DH5”.

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

 EMI Test Report for the BlackBerry® smartphone Model RCT41GW		
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Radiated Emissions Test Results
Bluetooth Band con'd

Date of Test: November 17 to 24, 2009
Measurements were performed by Heng Lin.


The environmental test conditions were: Temperature: 23 – 29 °C
Pressure: 1003 – 1028 mb
Relative Humidity: 22 – 34 %

The measurements were performed in single frequency Tx mode using packet types “DH5”, “2-DH5” and “3-DH5” on channels 0, 39 and 78. The BlackBerry® smartphone 215BEF0 and was in standalone, USB down position.

The test distance was 3.0 metres with a height of 0.8 metres, 1GHz to 25GHz.

Frequency (MHz)	Channel of Occurrence	Packet Type	Antenna		Test Angle (Deg.)	Detector (PK or AV)	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)							
7206.330	0	DH5	V	1.00	356	PK	35.43	18.96	54.39	74	-19.61
7205.962	0	DH5	V	1.00	123	AV	30.96	18.95	49.92	54	-4.09
7322.644	39	DH5	V	1.00	261	PK	33.39	18.59	51.99	74	-22.02
7322.837	39	DH5	V	1.00	105	AV	26.47	18.59	45.07	54	-8.93
7440.577	78	DH5	V	1.00	250	PK	31.79	19.05	50.85	74	-23.15
7440.000	78	DH5	V	1.00	270.	AV	24.18	19.05	43.22	54	-10.78

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

		EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009		Author Data Kevin Rose

Band-Edge Compliance of RF Radiated Emissions Test Results Bluetooth Band

Date of test: November 26, 2009


Measurements were performed by Kevin Rose.

The environmental test conditions were: Temperature: 24 ° C
Pressure: 1016 mb
Relative Humidity: 30 %

BlackBerry® smartphone PIN 2151BEF0 was in standalone, vertical, Pattern type “Static PBRS” in “DH5”, “2-DH5” and “3-DH5” modulation during the measurements.

The test distance was 3.0 metres.


Channel	Freq. (MHz)	Rx Antenna		Detector (PK, AVE.)	VBW (MHz)	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
Low Channel, Packet Type DH5										
0	2402	Horn	V	PK	1 MHz	97.97	46.32	51.65	74	-22.35
0	2402	Horn	H	PK	1 MHz	85.61	35.05	50.56	74	-23.44
0	2402	Horn	V	AVE.	10 Hz	69.36	46.32	23.04	54	-30.96
0	2402	Horn	H	AVE.	10 Hz	60.8	35.05	25.75	54	-28.25
High Channel, Packet Type DH5										
78	2480	Horn	V	PK	1 MHz	94.24	44.15	50.09	74	-23.91
78	2480	Horn	H	PK	1 MHz	86.02	37.1	48.92	74	-25.08
78	2480	Horn	V	AVE.	10 Hz	67.4	44.15	23.25	54	-30.75
78	2480	Horn	H	AVE.	10 Hz	63	37.1	25.9	54	-28.1
Low Channel, Packet Type 2-DH5										
0	2402	Horn	V	PK	1 MHz	98.02	46.38	51.64	74	-22.36
0	2402	Horn	H	PK	1 MHz	86.34	34.94	51.4	74	-22.6
0	2402	Horn	V	AVE.	10 Hz	69.63	46.38	23.25	54	-30.75
0	2402	Horn	H	AVE.	10 Hz	65.41	34.94	30.47	54	-23.53
High Channel, Packet Type 2-DH5										
78	2480	Horn	V	PK	1 MHz	94.16	44.89	49.27	74	-24.73
78	2480	Horn	H	PK	1 MHz	85.84	37.53	48.31	74	-25.69
78	2480	Horn	V	AVE.	10 Hz	67.5	44.89	22.61	54	-31.39
78	2480	Horn	H	AVE.	10 Hz	63.08	37.53	25.55	54	-28.45

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Band-Edge Compliance of RF Radiated Emissions Test Results cont'd
Bluetooth Band

Low Channel, Packet Type 3-DH5										
0	2402	Horn	V	PK	1 MHz	100.42	50.32	50.1	74	-23.9
0	2402	Horn	H	PK	1 MHz	88.58	38.19	50.39	74	-23.61
0	2402	Horn	V	AVE.	10 Hz	74.12	50.32	23.8	54	-30.2
0	2402	Horn	H	AVE.	10 Hz	67.86	38.19	29.67	54	-24.33
High Channel, Packet Type 3-DH5										
78	2480	Horn	V	PK	1 MHz	97.51	48.01	49.5	74	-24.5
78	2480	Horn	H	PK	1 MHz	89.29	39.69	49.6	74	-24.4
78	2480	Horn	V	AVE.	10 Hz	70.65	48.01	22.64	54	-31.36
78	2480	Horn	H	AVE.	10 Hz	66.3	39.69	26.61	54	-27.39

See figures 2-1 to 2-12 for the plots of the Bluetooth band-edge compliance.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

Figure 2-1: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
DH5, Channel 0, Pol: V, Detector: PK

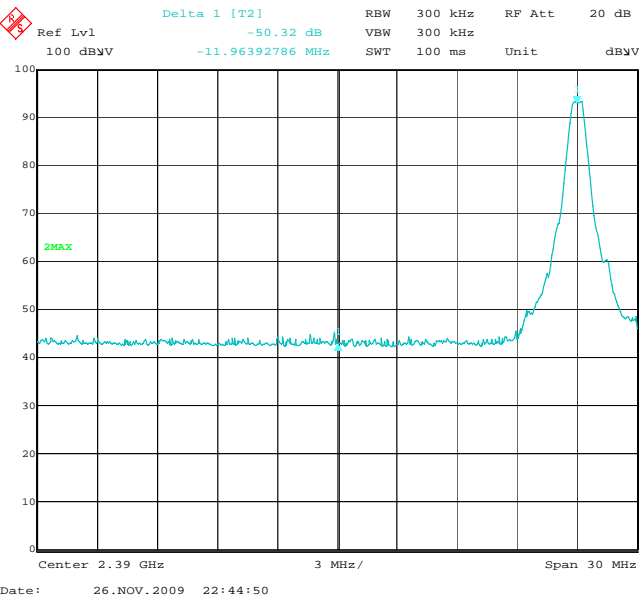


Figure 2-2: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
DH5, Channel 0, Pol: H, Detector: PK

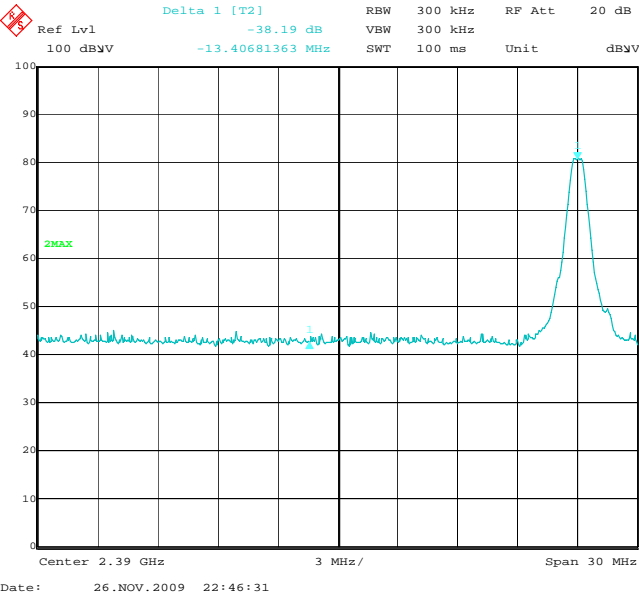


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
DH5, Channel 78, Pol: V, Detector: PK

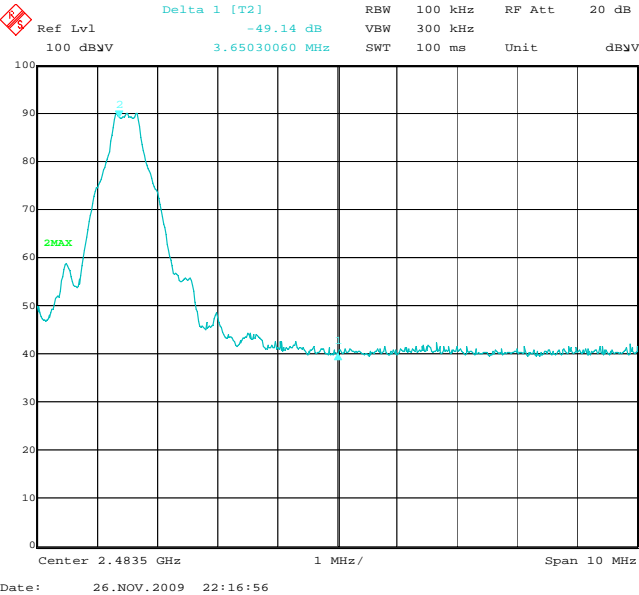
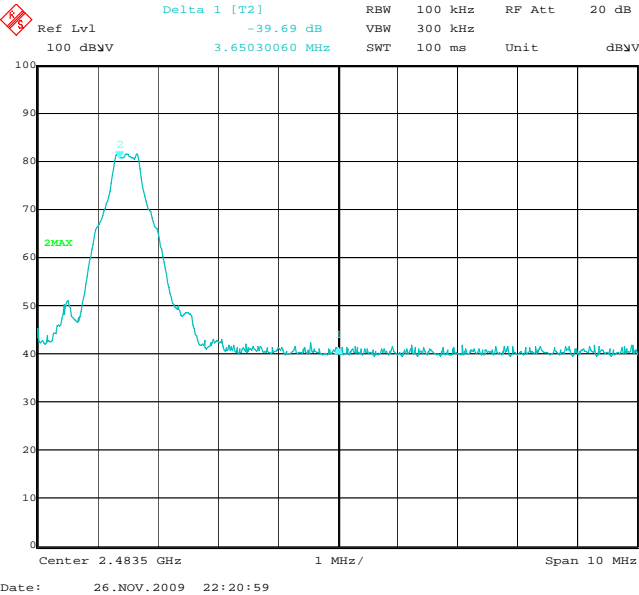



Figure 2-4: Band-Edge Compliance of RF Rad. Emissions
Bluetooth, Single freq., Static PBRS,
DH5, Channel 78, Pol: H, Detector: PK



			EMI Test Report for the BlackBerry® smartphone Model RCT41GW		
Test Report No. RTS-2582-0912-22		Dates of Test November 16 to 26, 2009			Author Data Kevin Rose

Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

Figure 2-5: Band-Edge Compliance of RF Rad. Emissions.

Bluetooth, Single freq., Static PBRS,
2-DH5, Channel 0, Pol: V, Detector: PK

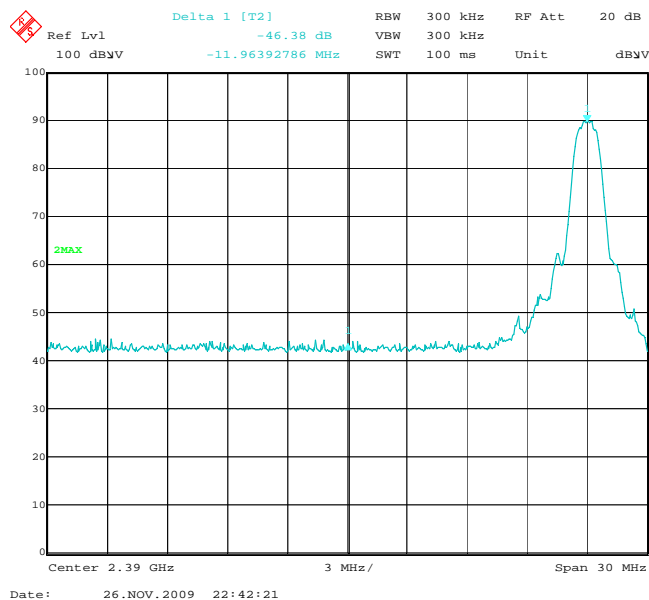


Figure 2-6: Band-Edge Compliance of RF Rad. Emissions.

Bluetooth, Single freq., Static PBRS,
2-DH5, Channel 0, Pol: H, Detector: PK

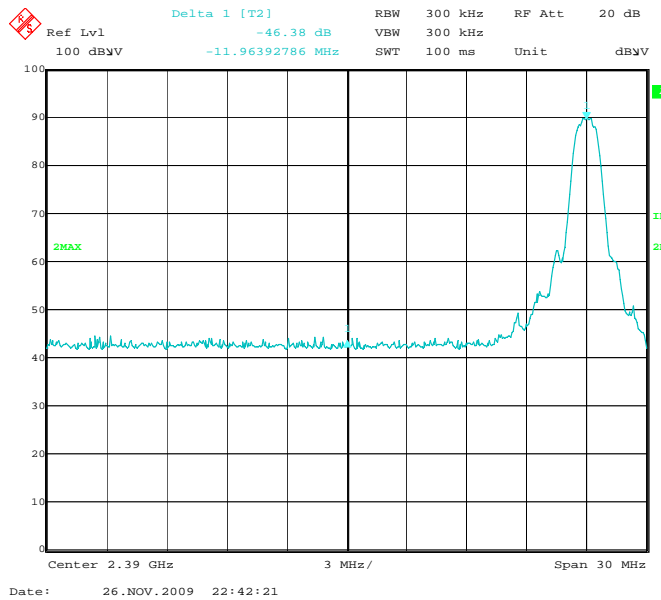


Figure 2-7: Band-Edge Compliance of RF Rad. Emissions.

Bluetooth, Single freq., Static PBRS,
2-DH5, Channel 78, Pol: V, Detector: PK

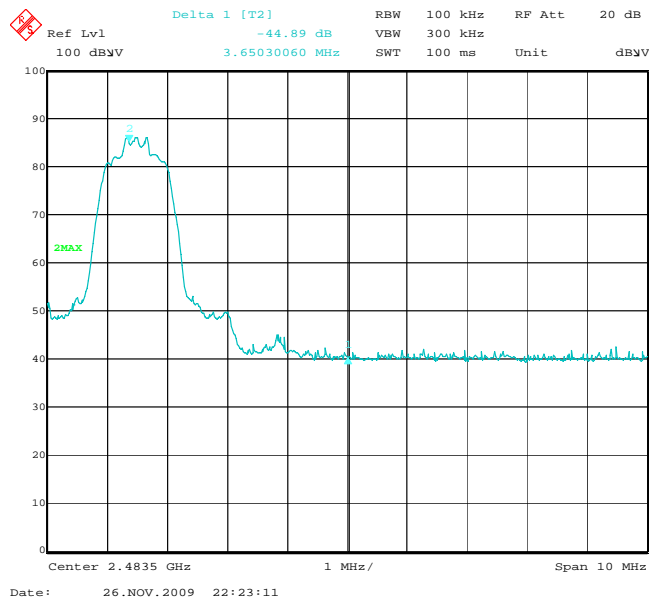
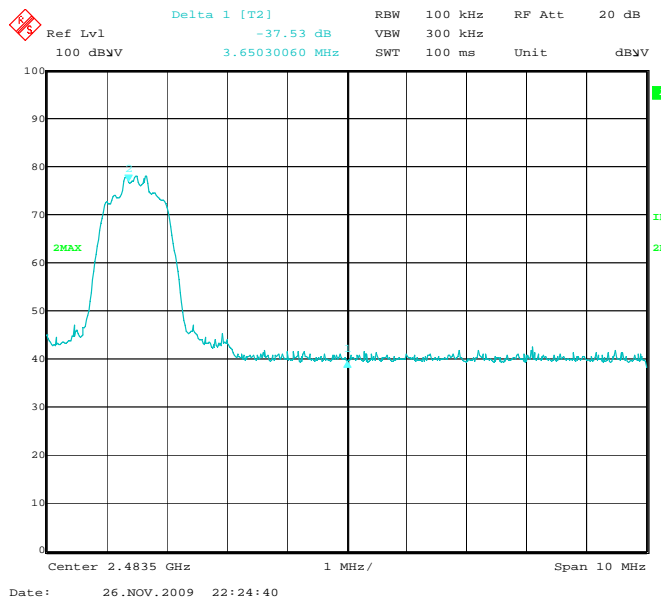



Figure 2-8: Band-Edge Compliance of RF Rad. Emissions

Bluetooth, Single freq., Static PBRS,
2-DH5, Channel 78, Pol: H, Detector: PK



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Radiated Emissions Test Results cont'd

Figure 2-9: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 0, Pol: V, Detector: PK

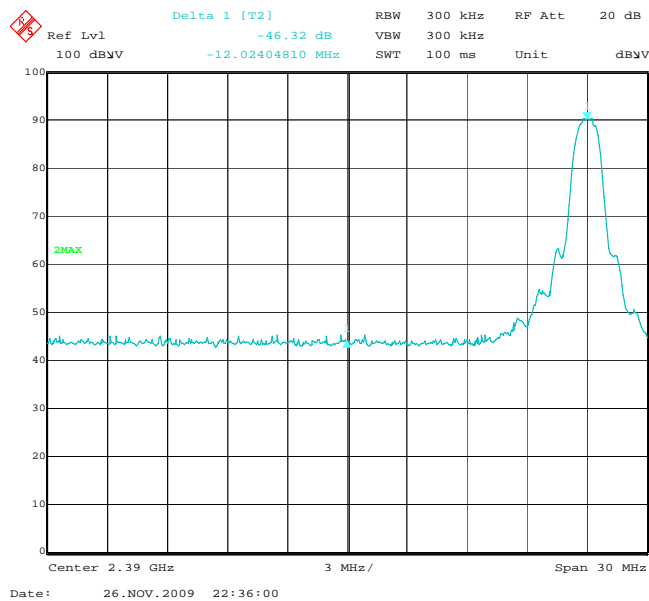


Figure 2-10: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 0, Pol: H, Detector: PK

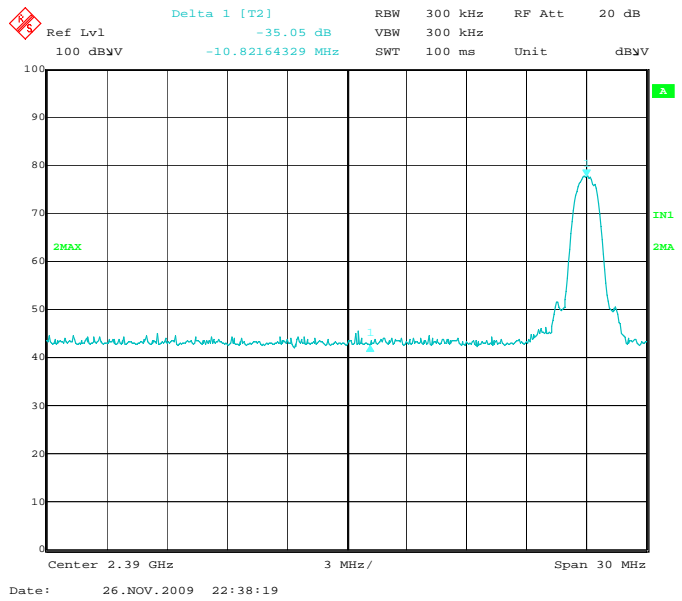


Figure 2-11: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 78, Pol: V, Detector: PK

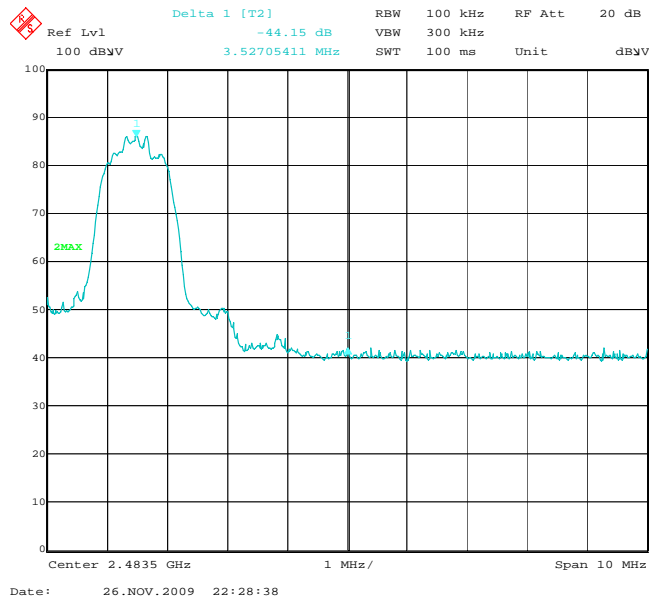
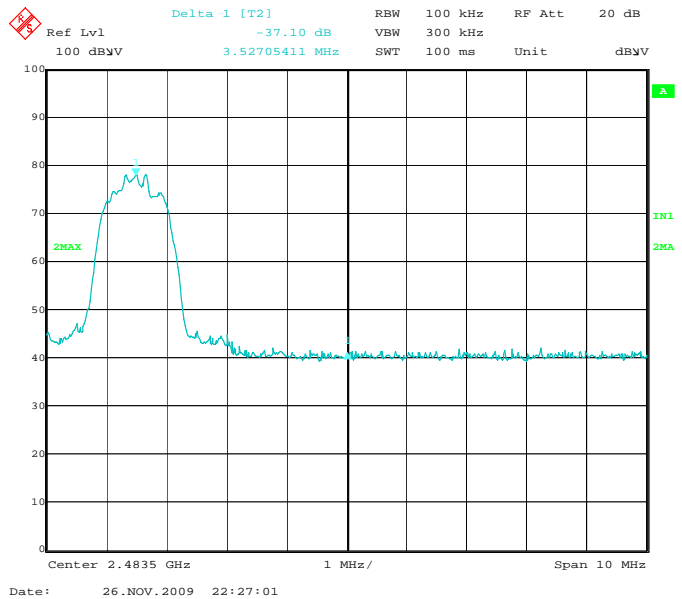




Figure 2-12: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 78, Pol: H, Detector: PK



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

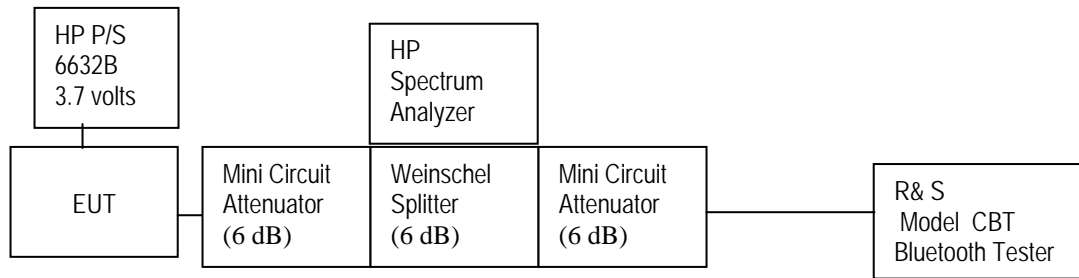
APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results

Bluetooth power output from BlackBerry® smartphone PIN 2151BFF8 was at maximum for all the recorded measurements shown below.
The measurements were performed by Maurice Battler.


Test Setup Diagram



A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the attenuators and coaxial cable loss in the test circuit.

Date of test: November 16, 2009

The environmental test conditions were: Temperature: 25 °C
Pressure: 1021 mb
Relative Humidity: 23 %

 EMI Test Report for the BlackBerry® smartphone Model RCT41GW		
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

20 dB Bandwidth

The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a). Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode.

Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.0	0.917
39	≤1.0	0.917
78	≤1.0	0.917

See figures 3-1 to 3-3 for the plots of the 20 dB bandwidth measurements.

Figure 3-1: 20 dB Bandwidth

Single freq., Static PRBS, DH5

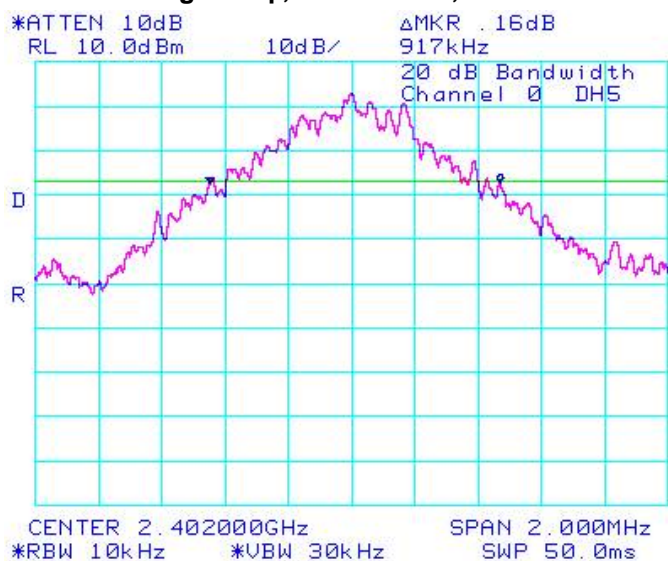



Figure 3-2: 20 dB Bandwidth

Single freq., Static PRBS, DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-3: 20 dB Bandwidth


Single freq., Static PBRs, DH5



Using Pattern type “Static PRBS” and packet type “3-DH5” during the measurements.

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.240
39	≤1.5	1.243
78	≤1.5	1.177

See figures 3-4 to 3-6 for the plots of the 20 dB bandwidth measurements.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-4: 20 dB Bandwidth

Single freq., Static PBRs, 3-DH5

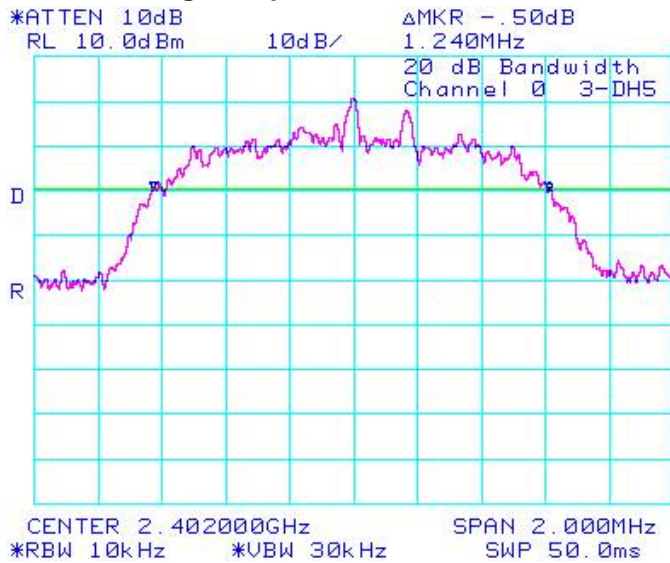


Figure 3-5: 20 dB Bandwidth

Single freq., Static PBRs, 3-DH5

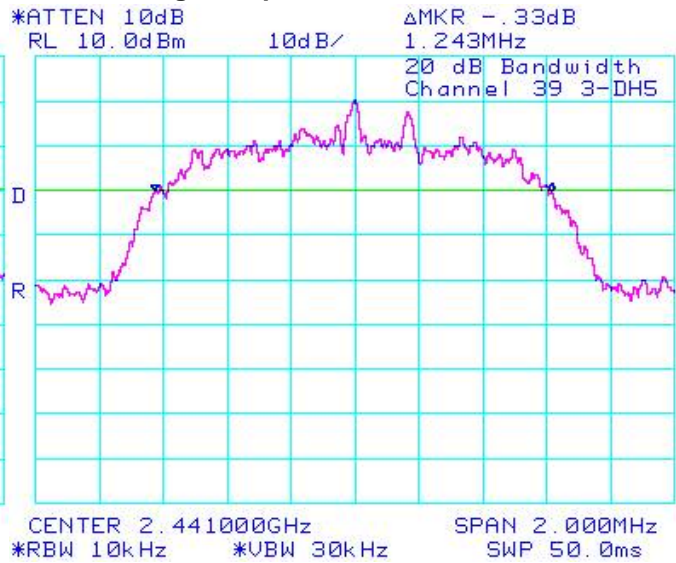
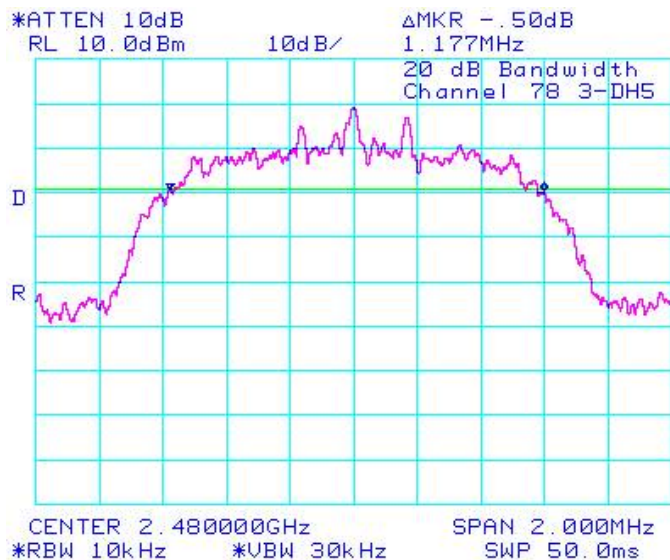



Figure 3-6: 20 dB Bandwidth

Single freq., Static PBRs, 3-DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

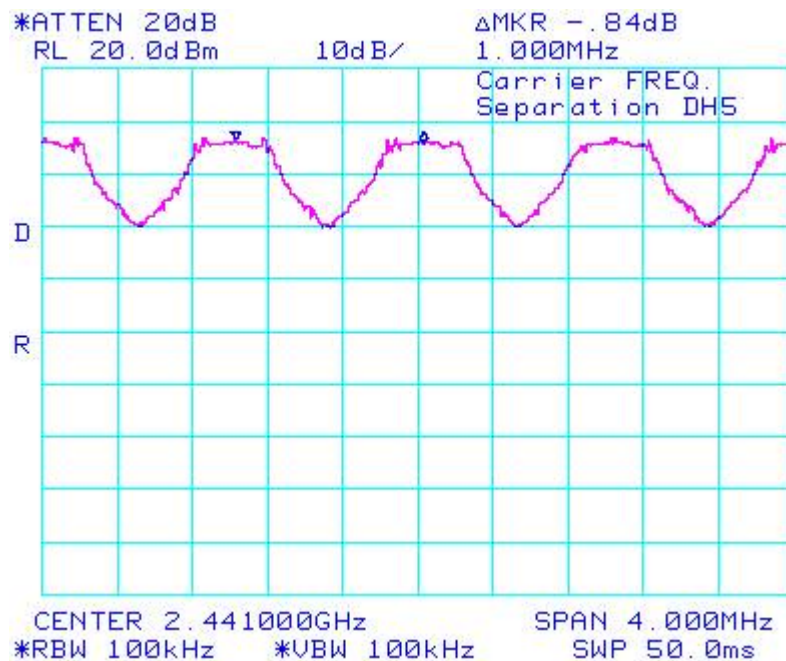
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a). Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.


Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

See figure 3-7 for the plot of the Carrier Frequency Separation measurement.

Figure 3-7: Carrier Frequency Separation, Freq. Hopping, Static PBRs, DH5, Channels 38 to 39



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

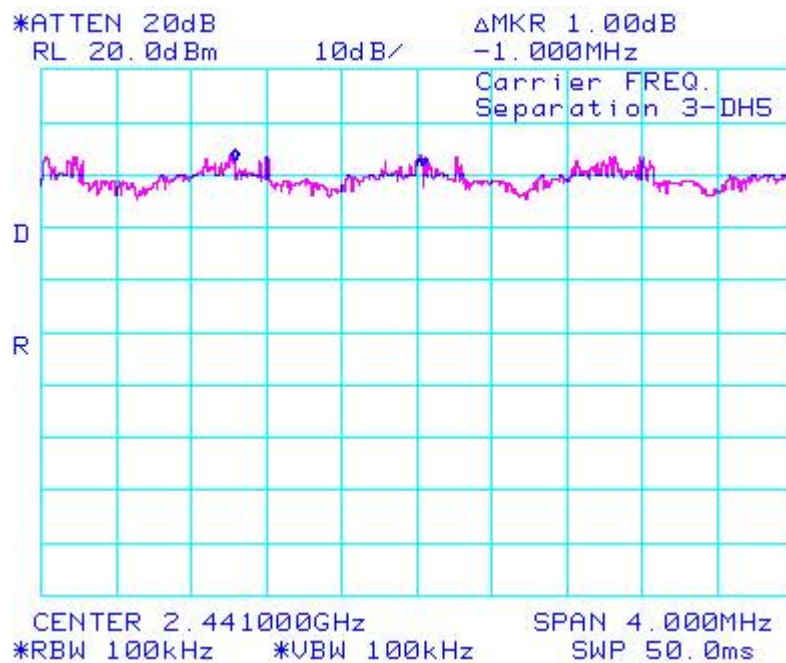
Bluetooth RF Conducted Emission Test Results cont'd


Using Pattern type “Static PRBS” and packet type “3-DH5” during the measurements.

Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

See figure 3-8 for the plot of the Carrier Frequency Separation measurement.

Figure 3-8: Carrier Frequency Separation, Freq. Hopping, Static PBRS, 3-DH5, Channels 38 to 39



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Number of Hopping Frequencies

The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a). Bluetooth was operating in frequency hopping (Euro/US) mode.

Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Limit (CH)	Number of Hopping Frequencies (CH)
≥75	79

See figures 3-9 to 3-12 for the plots of the number of hopping frequencies.

Figure 3-6: Number of Hopping Frequencies
Static PRBS, DH5

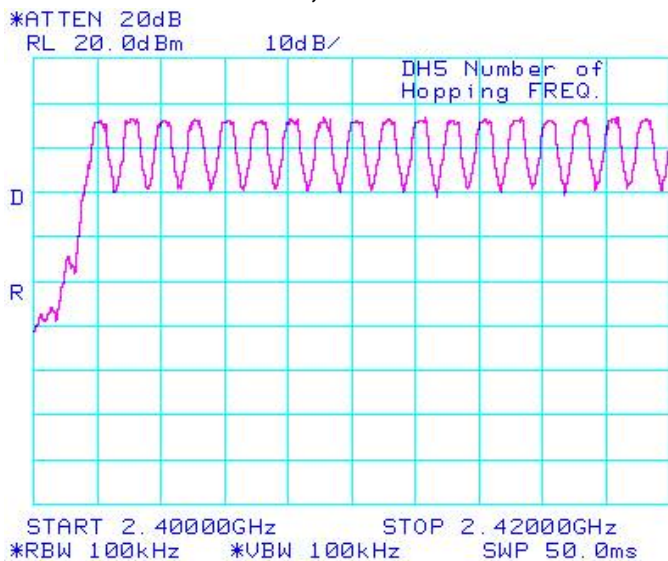
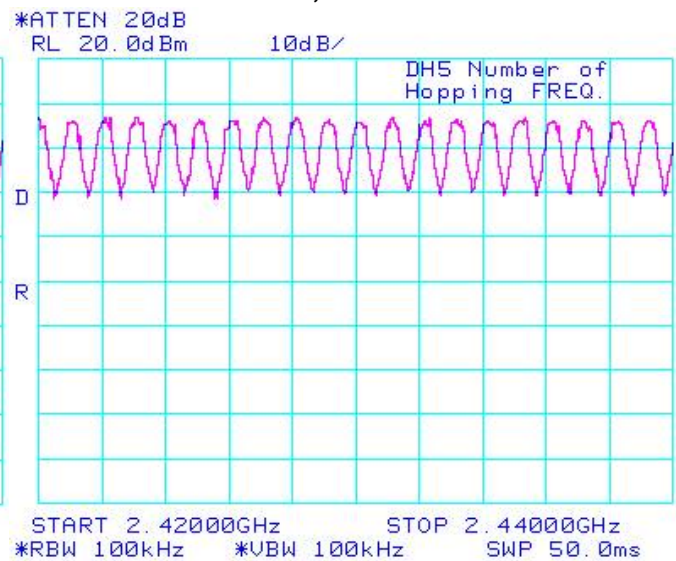



Figure 3-7: Number of Hopping Frequencies
Static PRBS, DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-8: Number of Hopping Frequencies
Static PBRs, DH5

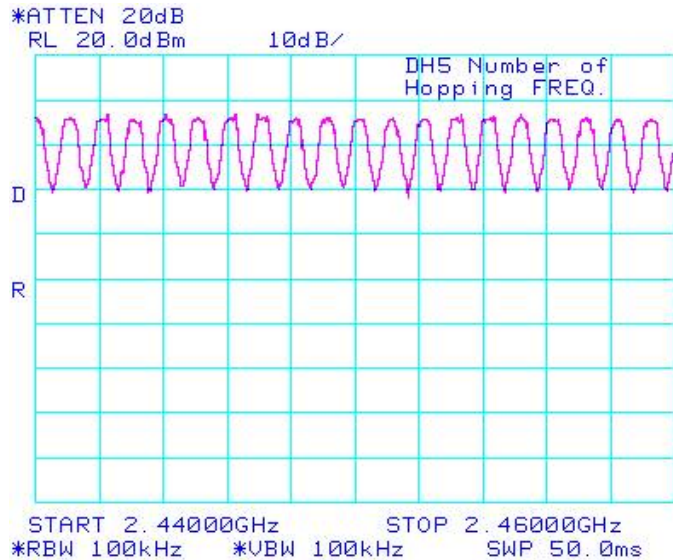
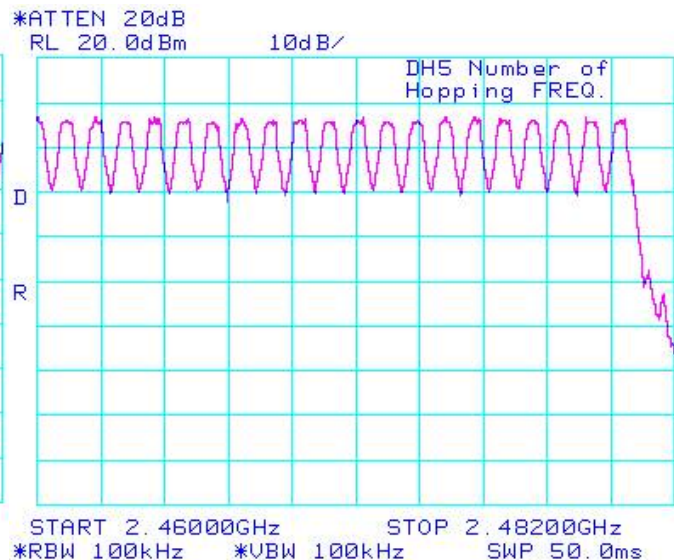


Figure 3-9: Number of Hopping Frequencies
Static PBRs, DH5




Time of Occupancy (Dwell Time)

The EUT met the requirements of the time of occupancy (dwell time) as per 47 CFR 15.247(a). Low channel (0), middle channel (39) and high channel (78) were measured in packet types DH1, DH3 and DH5. Bluetooth was operating in frequency hopping (Euro/US) mode during the measurements. The frequency hopping is 1600 hops per second for a dwell time of 625 μ sec for 79 channels.

A DH1 packet needs one time slot for transmitting and one time slot for receiving. The frequency hopping is 800 hops per second with 79 channels which is 10.127 times per second. As per 15.247(a) (iii) "The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed". Therefore for 31.6 seconds (79×0.4) there are 320.0 times of appearance.

A DH3 packet needs one time slot for transmitting and one time slot for receiving. The frequency hopping is 400 hops per second with 79 channels which is 5.06 times per second. Therefore for 31.6 seconds there are 159.9 times of appearance.

A DH5 packet needs one time slot for transmitting and one time slot for receiving. The frequency hopping is 266.7 hops per second with 79 channels which is 3.38 times per second. Therefore for 31.6 seconds there are 106.8 times of appearance.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.5308	$0.5308 \times 320.0 = 169.86$	400	230.14
39	DH1	0.5221	$0.5221 \times 320.0 = 167.40$	400	232.93
78	DH1	0.5221	$0.5221 \times 320.0 = 167.40$	400	232.93
0	DH3	1.7867	$1.7867 \times 159.9 = 285.69$	400	114.31
39	DH3	1.7933	$1.7933 \times 159.9 = 286.75$	400	113.25
78	DH3	1.7800	$1.7800 \times 159.9 = 284.62$	400	115.38
0	DH5	3.0417	$3.0417 \times 106.8 = 324.84$	400	75.15
39	DH5	3.0333	$3.0333 \times 106.8 = 323.96$	400	76.04
78	DH5	3.0000	$3.0000 \times 106.8 = 320.40$	400	79.60

See figures 3-13 to 3-21 for the plots of the dwell time.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-13: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

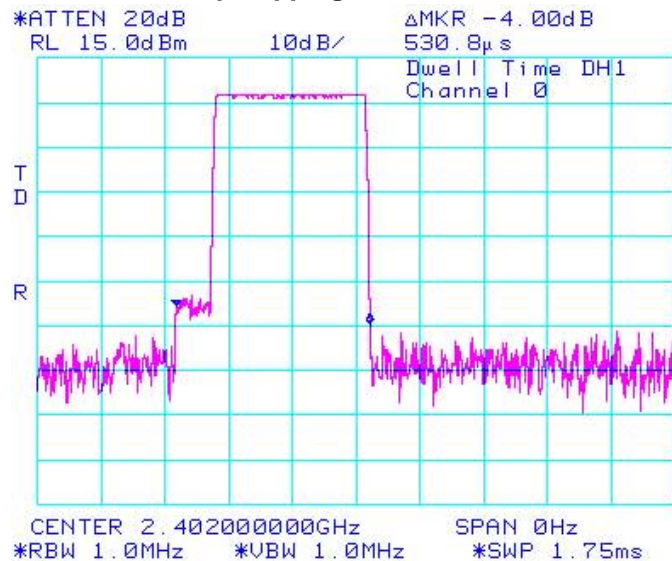
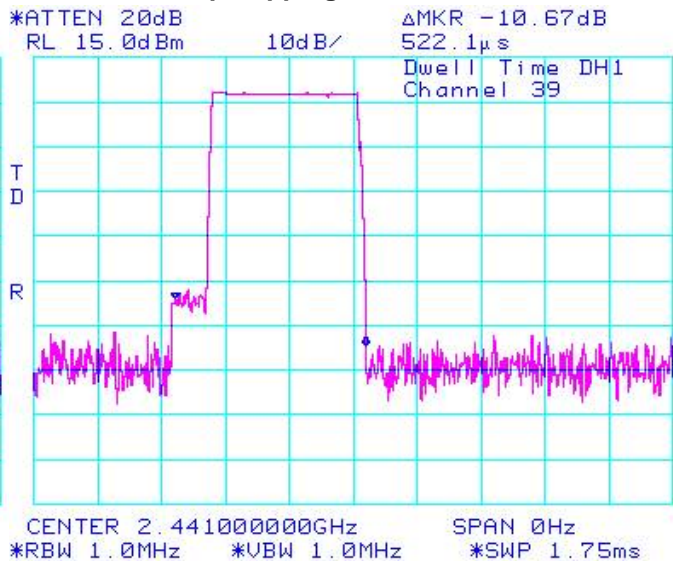



Figure 3-14: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-15: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

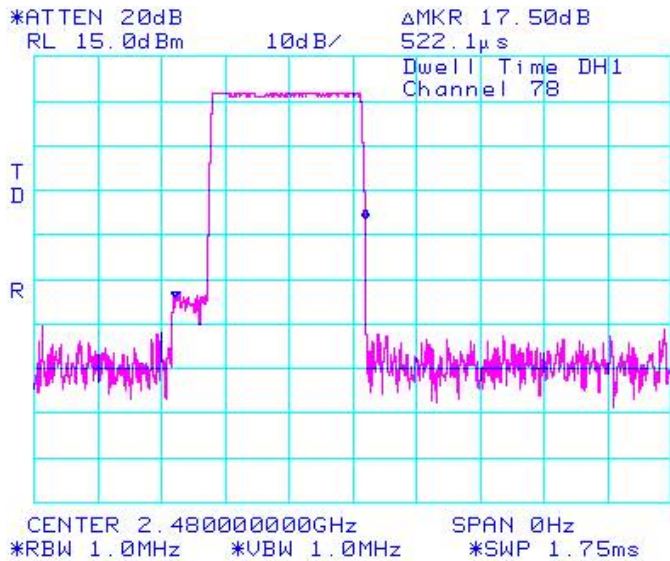


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

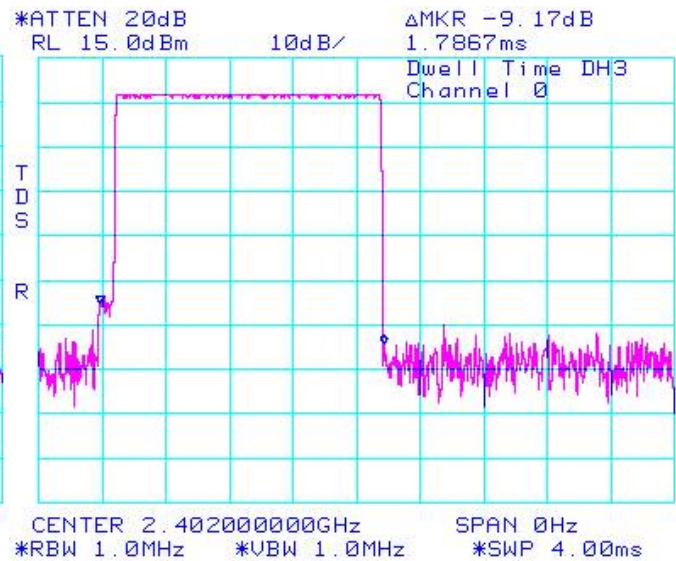


Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

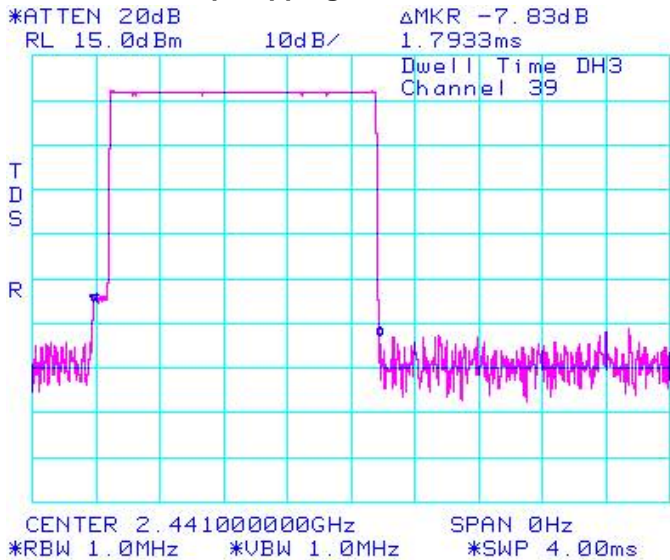
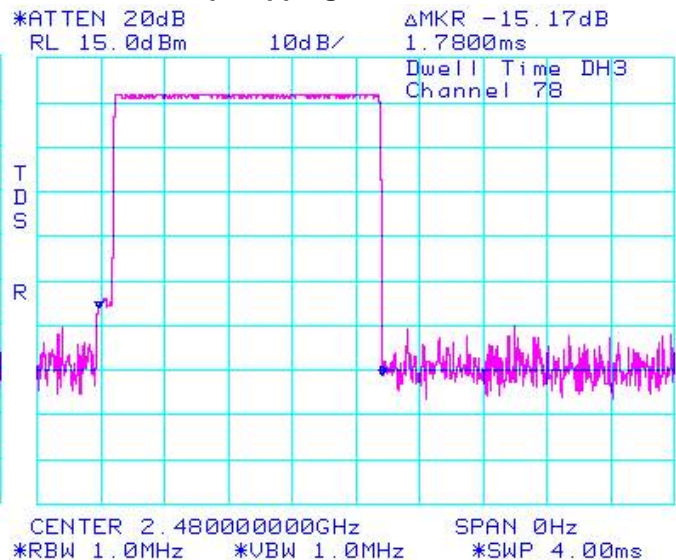



Figure 3-18 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-19: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

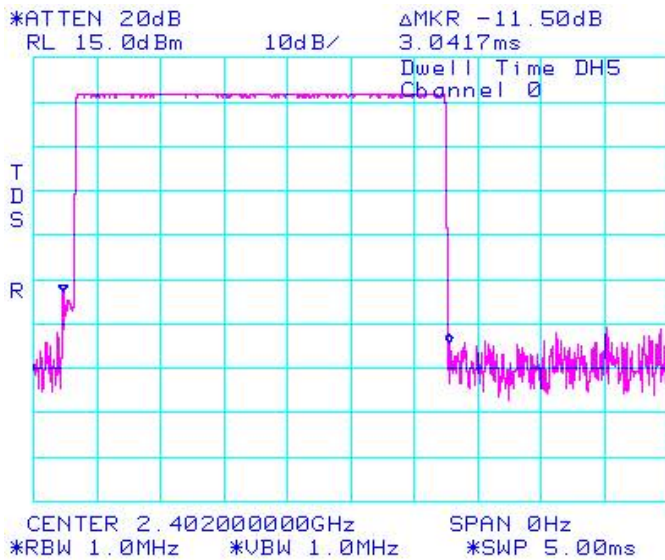


Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

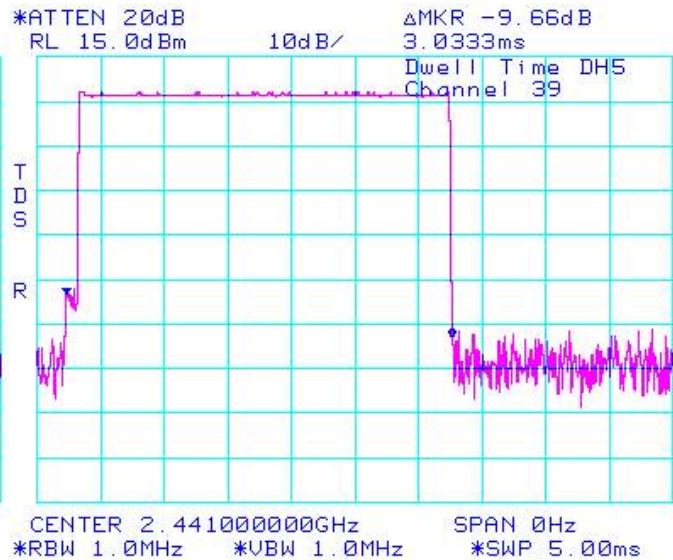
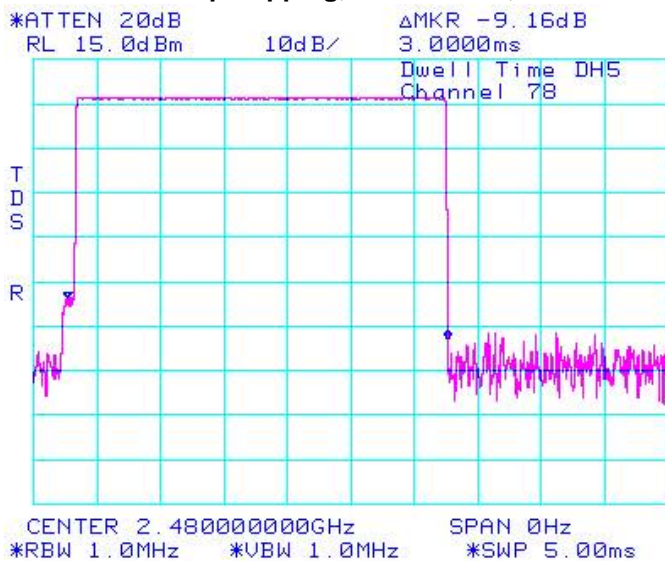



Figure 3-21: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5



 EMI Test Report for the BlackBerry® smartphone Model RCT41GW		
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Maximum Peak Conducted Output Power

The EUT met the requirements of the maximum peak conducted output power of class 2 as per 47 CFR 15.247(b). Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode during the measurements. A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the coaxial cable loss and attenuators in the test circuit.

Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	7.00	0.00501	0.0 to 20.0
39	7.00	0.00501	0.0 to 20.0
78	6.83	0.00482	0.0 to 20.0

See figures 3-22 to 3-24 for the plots of the maximum peak conducted output power.

Figure 3-22: Max. Peak Conducted Output Power
Single Freq., Static PRBS, DH5

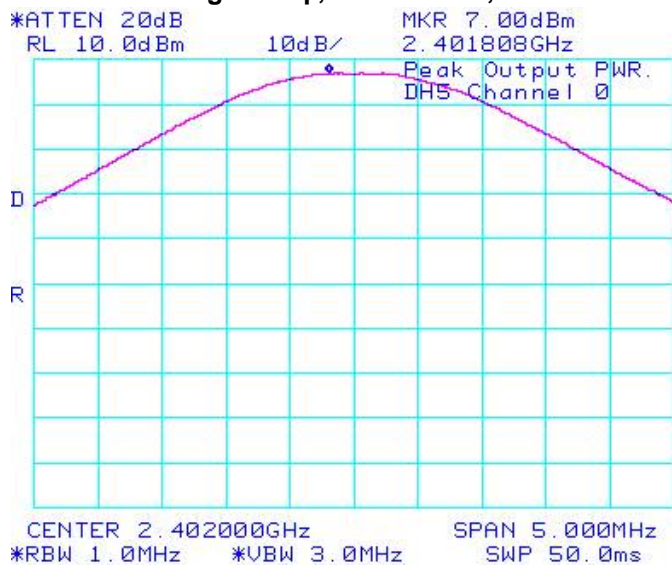
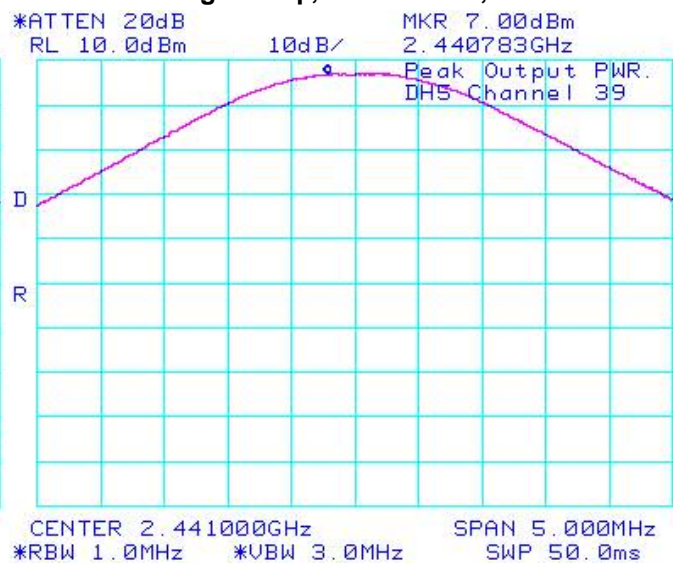



Figure 3-23: Max. Peak Conducted Output Power
Single Freq., Static PRBS, DH5

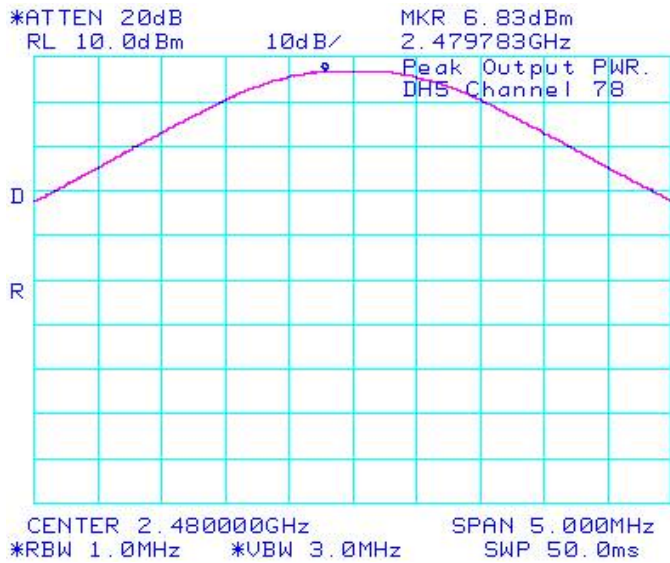


	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-24: Max. Peak Conducted Output Power


Single Freq., Static PBRs, DH5



Using Pattern type “Static PRBS” and packet type “3-DH5” during the measurements.

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	4.83	0.00304	0.0 to 20.0
39	4.17	0.00261	0.0 to 20.0
78	3.17	0.00207	0.0 to 20.0

See figures 3-25 to 3-27 for the plots of the maximum peak conducted output power.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-25: Max. Peak Conducted Output Power

Single Freq., Static PBRs, 3-DH5

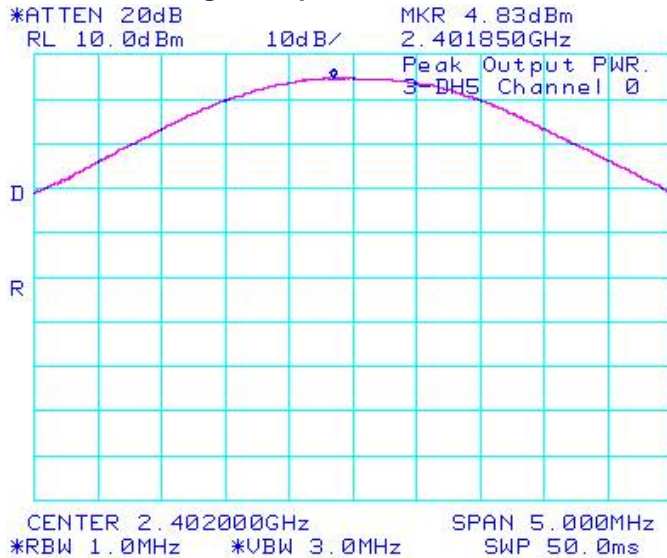


Figure 3-26: Max. Peak Conducted Output Power

Single Freq., Static PBRs, 3-DH5

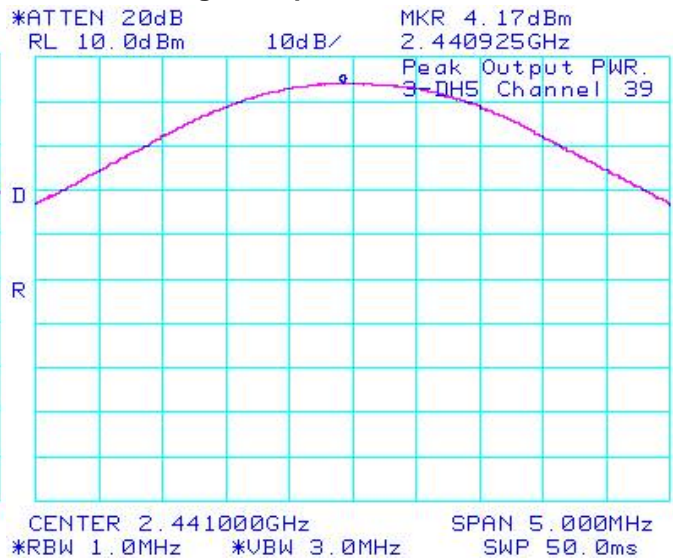
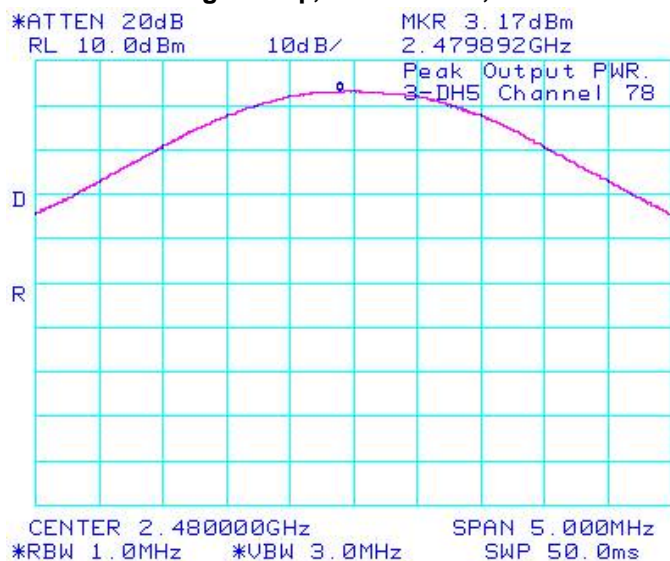



Figure 3-27: Max. Peak Conducted Output Power

Single Freq., Static PBRs, 3-DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Band Edge Compliance

The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c). Low channel (0) and high channel (78) were measured. Bluetooth was operating in single frequency and hopping mode.

Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-28.83	-20	-8.83
78	Single Frequency	-34.33	-20	-14.33
0	Hopping	-29.00	-20	-9.00
78	Hopping	-34.50	-20	-14.50

See figures 3-28 to 3-31 for the plots of the band edge compliance measurements.

Figure 3-28: Band Edge Compliance

Single Freq., Static PRBS, DH5

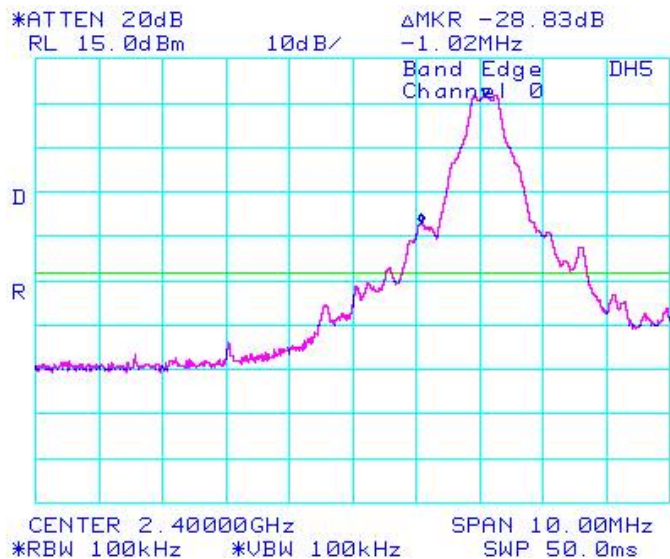
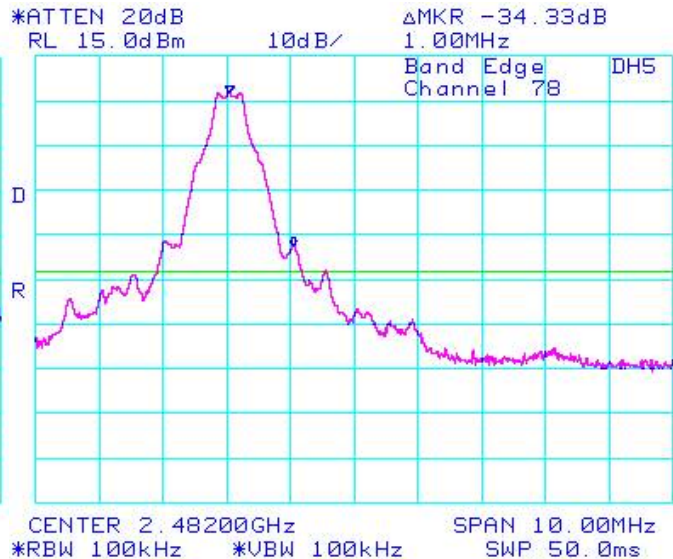



Figure 3-29: Band Edge Compliance

Single Freq., Static PRBS, DH5



 EMI Test Report for the BlackBerry® smartphone Model RCT41GW		
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-30: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5

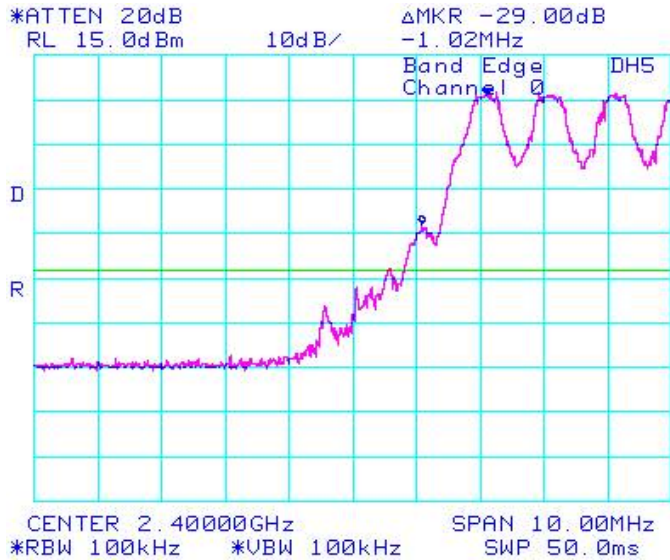
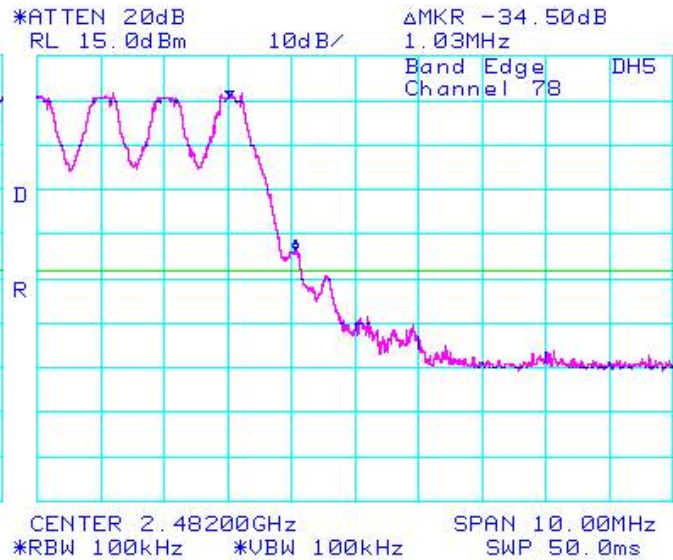


Figure 3-31: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5



Using pattern type "Static PRBS" and packet type "3-DH5" during the measurements.

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-31.33	-20	-11.33
78	Single Frequency	-37.83	-20	-17.83
0	Hopping	-29.16	-20	-9.16
78	Hopping	-35.16	-20	-15.16

See figures 3-32 to 3-35 for the plots of the band edge compliance measurements.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-32: Band Edge Compliance
Single Freq., Static PBRs, 3-DH5

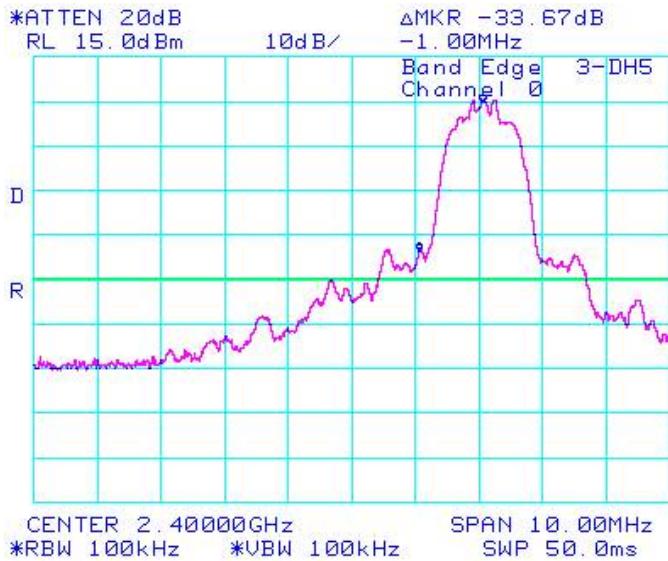


Figure 3-33: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5

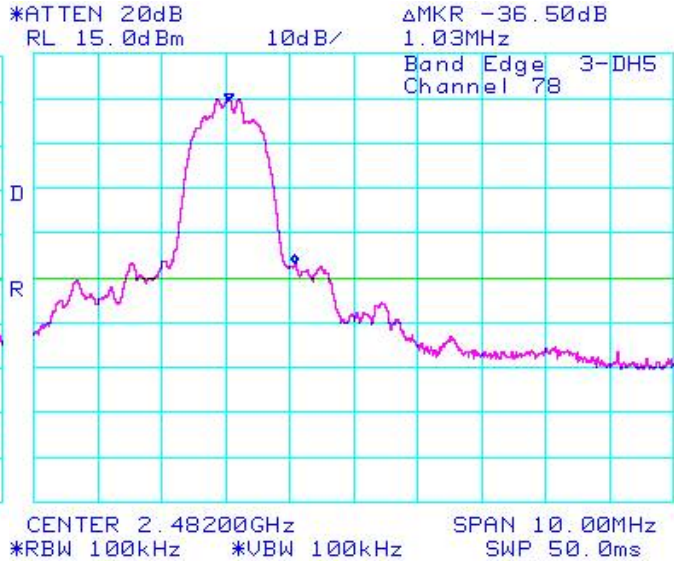


Figure 3-34: Band Edge Compliance
Freq. Hopping, Static PBRs, 3-DH5

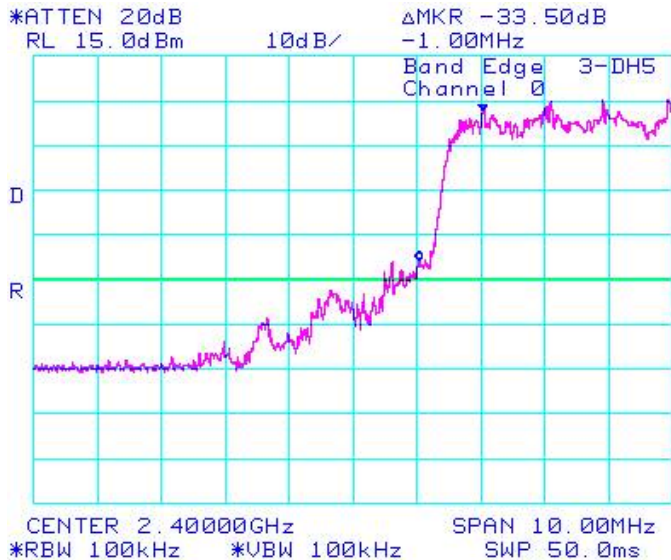
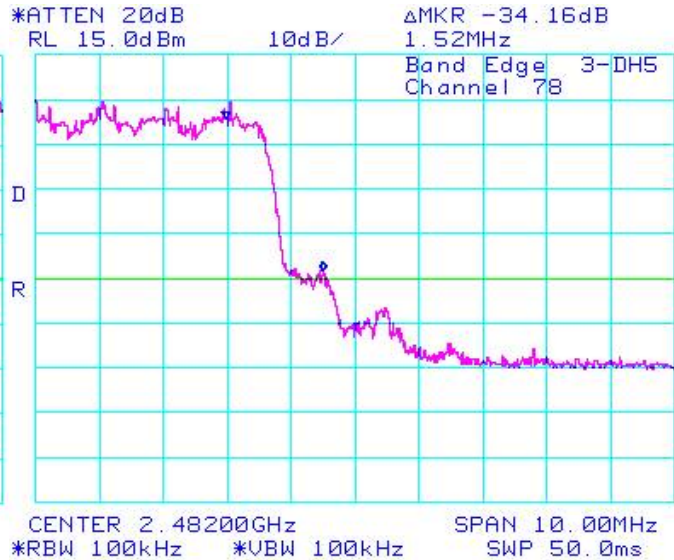



Figure 3-35: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd


Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c). Low channel (0), mid channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency and hopping mode. A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the attenuators and coaxial cable loss in the test circuit.

Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0	7.00	-35.83	-42.83	-20
39	7.00	-40.67	-47.67	-20
78	6.83	-46.50	-53.33	-20
Hopping mode	6.83	-41.17	-48	-20

See figures 2-36 to 2-39 for the plots of the spurious RF conducted emissions.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 2-36: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5,

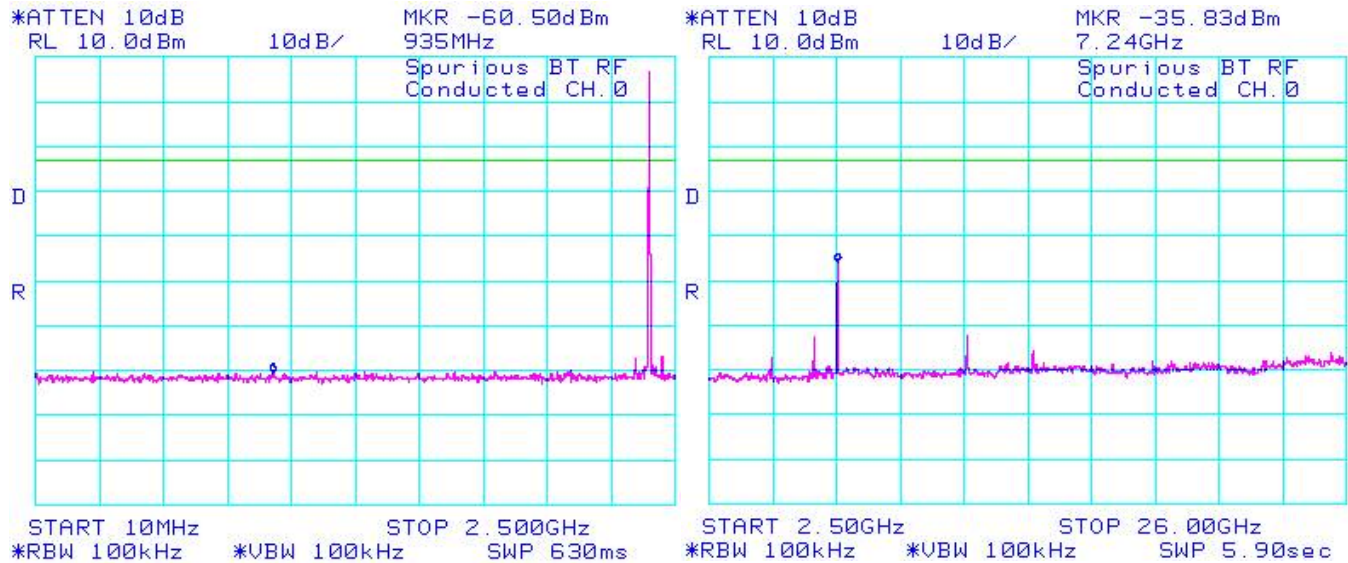
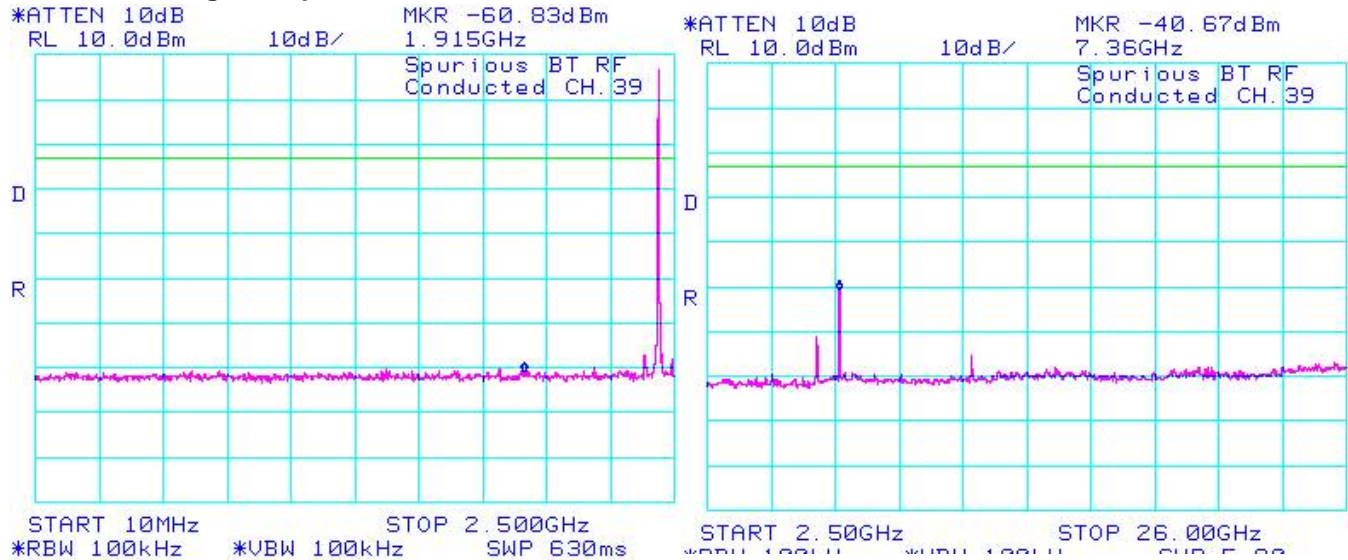



Figure 2-37: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 2-38: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5

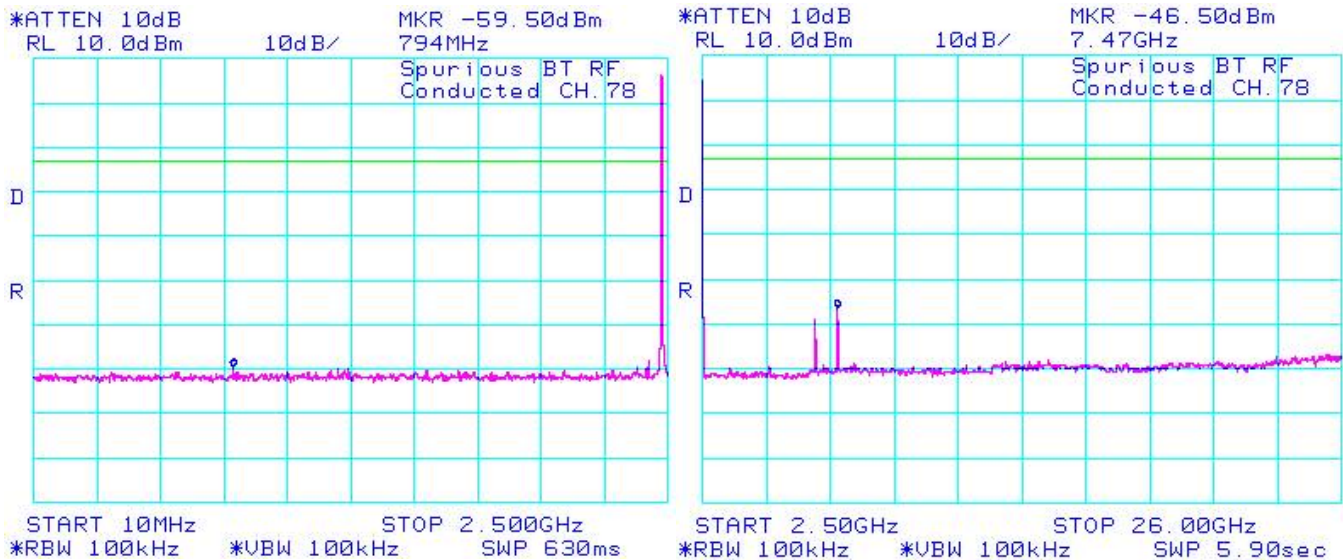
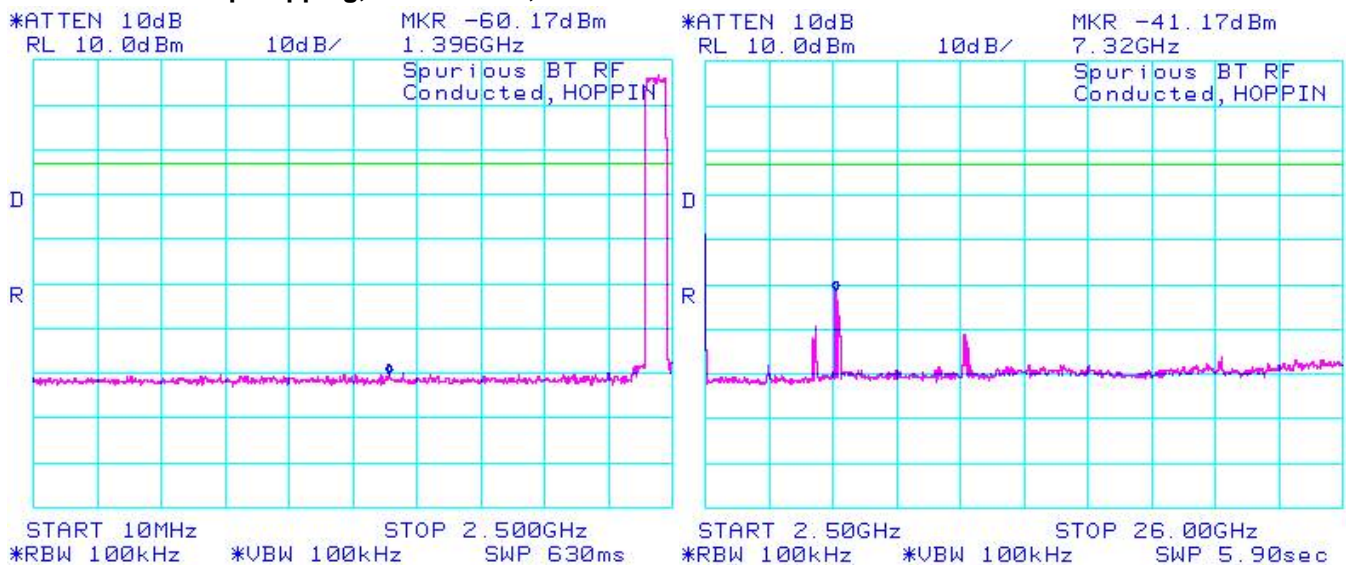



Figure 2-39: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, DH5




	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Using pattern type "Static PRBS" and packet type "3-DH5" during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0	4.83	-46.50	-51.33	-20
39	4.17	-49.00	-53.17	-20
78	3.17	-48.00	-51.17	-20
Hopping mode	3.17	-47.67	-50.84	-20

See figures 3-40 to 3-43 for the plots of the spurious RF conducted emissions.

	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-40 : Spurious RF Conducted Emissions

Single Freq., Static PBRs, 3-DH5

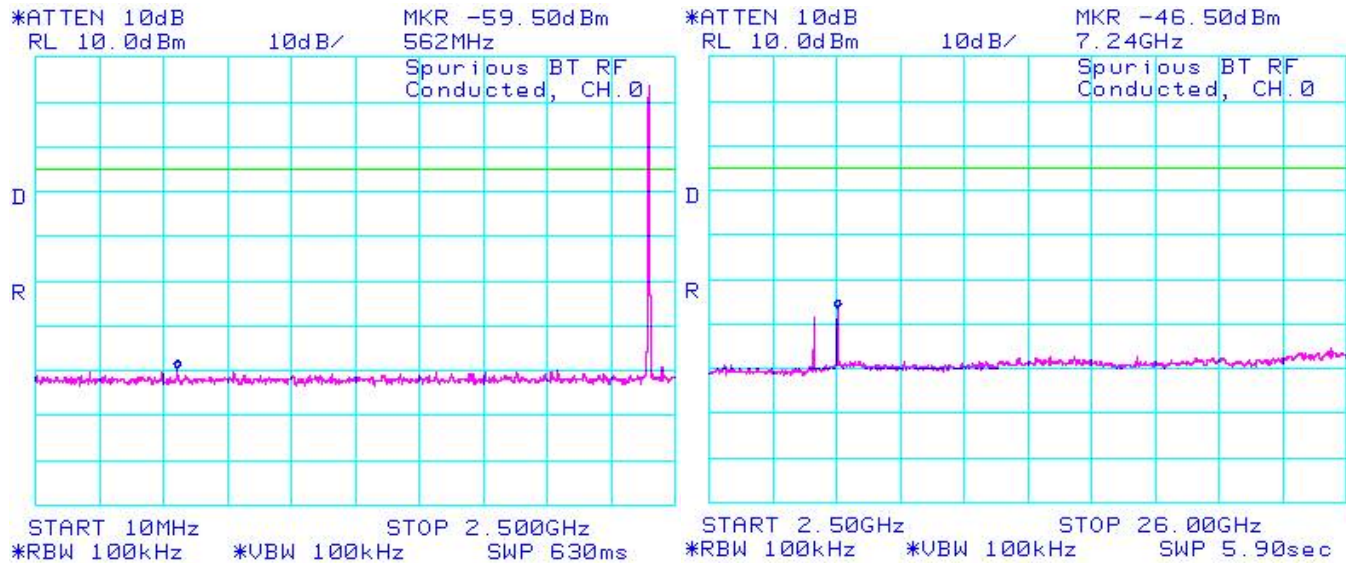
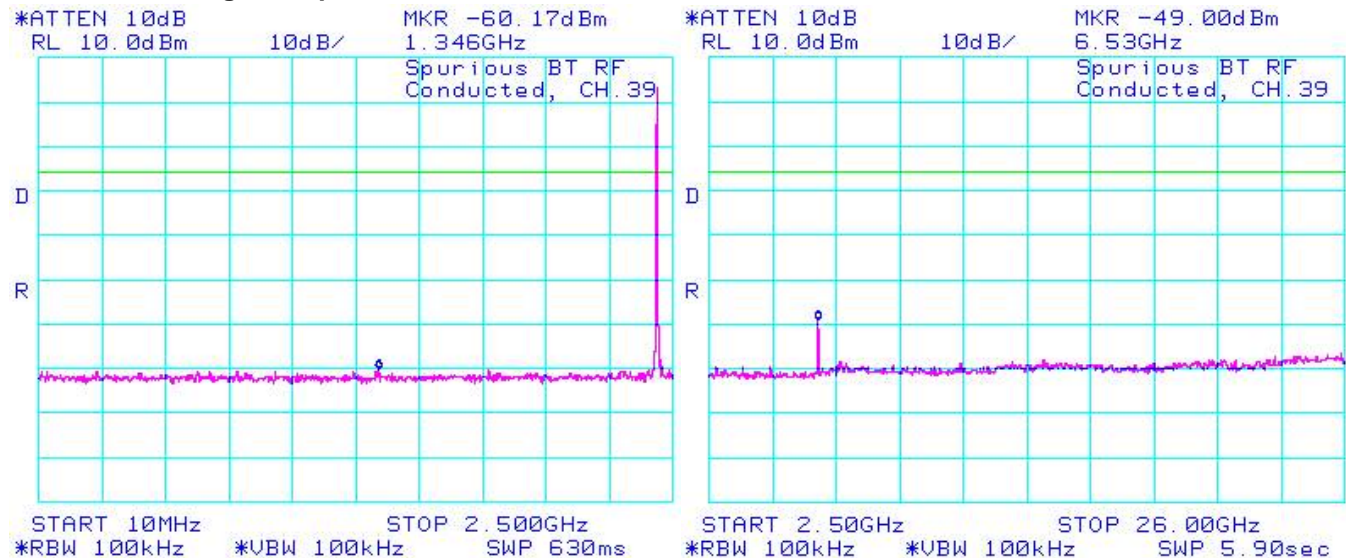



Figure 3-41: Spurious RF Conducted Emissions

Single Freq., Static PBRs, 3-DH5



	EMI Test Report for the BlackBerry® smartphone Model RCT41GW	
Test Report No. RTS-2582-0912-22	Dates of Test November 16 to 26, 2009	Author Data Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-42: Spurious RF Conducted Emissions
Single Freq., Static PBRs, 3-DH5

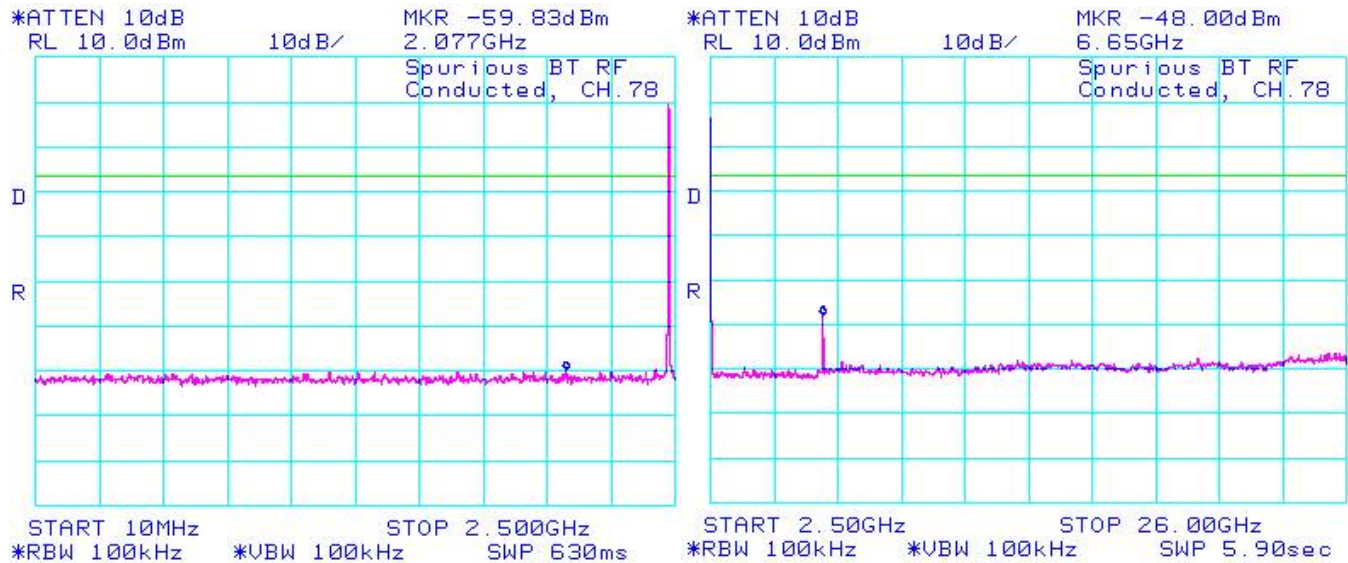


Figure 3-43 : Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, 3-DH5

