EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Part 15 Subpart C
&
Industry Canada (IC) RSS-210, RSS-GEN



A division of Research In Motion Limited

REPORT NO.: RTS-1689-0909-29

PRODUCT MODEL NO.: RCN71UW

TYPE NAME: BlackBerry[®] smartphone

FCC ID: L6ARCN70UW IC: 2503A-RCN70UW

DATE: 14 September, 2009

Copyright 2005-2009 Page 1 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW		
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose	

Statement of Performance:

The BlackBerry® smartphone, model RCN71UW, part number CER-25287-001 Rev 3 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: September 14, 2009

Reviewed by:

Masud S. Attayi, P.Eng.

Manager, Regulatory Compliance

Date: September 14, 2009

Approved by:

Paul G. Cardinal. Ph.D.

Director

Date: September 14, 2009

Copyright 2005-2009 Page 2 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW		
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose	

Table of Contents

A.	Scope	3
B.	Associated Documents	3
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
APPE	ENDIX 1 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS	.11

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
- o Industry Canada, RSS-210, Issue 7, June 2007, Low Power Licence-Exempt Radiocommunication Devices
- Industry Canada, RSS-GEN, Issue 2, June 2007, General Requirements and Information for the Certification of Radiocommunication Equipment

B. Associated Documents

- 1. HW Declaration CER-25287 Rev3
- 2. Cetecom test report number 1-1505-01-03/09
- 3. Cetecom test report number 1-1505-01-13/09
- 4. Cetecom test report number 1-1505-01-06/09

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Copyright 2005-2009 Page 3 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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

CETECOM ICT Services GmbH Untertürkheimer Str. 6 – 10 D-66117 Saarbrücken Germany

The testing was performed from July 14 to August 19, 2009.

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Copyright 2005-2009 Page 4 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW	
Test Report No.	Dates of Test	Author Data
RTS-1689-0909-29	July 14 to August 19, 2009	Kevin Rose

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCN71UW	CER-25287-001 Rev 2	2108867B

Sample 1 was used for BT conducted measurements.

BlackBerry® smartphone Accessories Tested

- 1) Fixed Blade Charger, part number HDW-25966-001, with an output voltage of 5.0 volts dc.
- 2) LadyBug Charger, part number HDW-24480-001, with an output voltage of 5.0 volts dc.
- 3) Stereo Headset, part number HDW-14322-003 with a lead length of 1.3 metres.
- 4) Premium Stereo Headset, part number HDW-15766-005, 1.3 metres long.
- 5) USB Data Cable, part number HDW-06610-005, 1.50 metres long.

D. Support Equipment Used for the Testing of the EUT

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

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Copyright 2005-2009 Page 5 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

E. Test Results Chart

SPECIFIC <i>i</i>	ATION	TEST TYPE Meets Requirements		TEST DATA
FCC CFR 47	IC	TEST THE	weets requirements	APPENDIX
Part 15.207	RSS-210 RSS-GEN	Conducted AC Line Emission	See test Report 1-1505-01-06/09	-
Part 15.209 Part 15.247	RSS-210 RSS-GEN	BT Radiated Spurious Emissions and Radiated Band Edge Compliance	See test Report 1-1505-01-03/09	-
Part 15.209 Part 15.247	RSS-210 RSS-GEN	802.11 b/g Radiated Spurious Emissions and Radiated Band Edge Compliance	See test Report 1-1505-01-13/09	-
Part 15.247(a)	RSS-210	BT, 20 dB Bandwidth	Pass	1
Part 15.247(a)	RSS-210	BT, Carrier Frequency Separation	Pass	1
Part 15.247(a)	RSS-210	BT, Number of Hopping Frequencies	Pass	1
Part 15.247(a)	RSS-210	BT, Time of Occupancy (Dwell Time)	Pass	1
Part 15.247(b)	RSS-210	BT, Maximum Peak Conducted Output Power	Pass	1
Part 15.247(c)	RSS-210	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	1
Part 15.247(c)	RSS-210	BT, Spurious RF Conducted Emissions	Pass	1
Part 15.247(b)	RSS-210	802.11b/g, 6 dB Bandwidth	See test Report RTS-1689-0907-11	-
Part 15.247(b)	RSS-210	802.11b/g, Maximum Conducted Output Power	See test Report RTS-1689-0907-11	-
Part 15.247(b)	RSS-210	802.11b/g, Band-Edge	See test Report RTS-1689-0907-11	-
Part 15.247(b)	RSS-210	802.11b/g, Peak Power Spectral Density	See test Report RTS-1689-0907-11	
Part 15.247(b)	RSS-210	802.11b/g, Spurious RF Conducted Emissions	See test Report RTS-1689-0907-11	-

Copyright 2005-2009 Page 6 of 34

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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW	
Test Report No.	Dates of Test	Author Data
RTS-1689-0909-29	July 14 to August 19, 2009	Kevin Rose

F. Summary of Results

1) AC LINE CONDUCTED EMISSIONS

See test report:

Cetecom test report number 1-1505-01-06/09

2) RADIATED EMISSIONS

See test report:

Cetecom test report number **1-1505-01-03/09** Cetecom test report number **1-1505-01-13/09**

Copyright 2005-2009 Page 7 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

3) BLUETOOTH RF CONDUCTED EMISSIONS

The Bluetooth conducted RF emissions from the BlackBerry® smartphone PIN 2108867B 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) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR.

See APPENDIX 1 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) and RSS-210. Channel 38 to 39 was measured. The result includes both normal data rate and EDR. See APPENDIX 1 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) and RSS-210. The number of hopping channels measured was 79.

See APPENDIX 1 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) and RSS-210. 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 1 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) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR.

See APPENDIX 1 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) and RSS-210. 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.

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Copyright 2005-2009 Page 8 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW		
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose	

See APPENDIX 1 for the test data.

g) Spurious RF Conducted Emissions

The BlackBerry® smartphone met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. 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 1 for the test data.

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Copyright 2005-2009 Page 9 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

G. Compliance Test Equipment Used

<u>UNIT</u>	MANUFACTURER	MODEL	<u>SERIAL</u> <u>NUMBER</u>	<u>CAL DUE</u> <u>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
Spectrum Analyzer	HP	8563E	3745A08112	09-09-22	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	09-09-24	RF Conducted 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	СВТ	100034	09-12-09	RF Conducted 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
Digital Multimeter	Hewlett Packard	34401A	US36042324	09-10-01	Conducted/Radiated Emissions

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Copyright 2005-2009 Page 10 of 34

Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

VDDEVIDIA 1	COMPLICATED	EMICCIONIC	TEST DATA/PI	
APPCINITIA I -	 		1 C 3 L L 1 A L A/PI	

Page 11 of 34

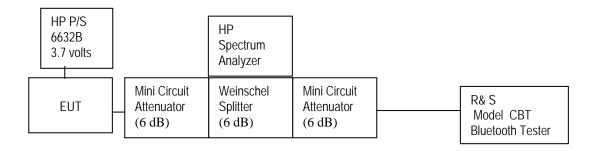
Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Bluetooth power output from BlackBerry[®] smartphone PIN 2108867B was at maximum for all the recorded measurements shown below.

The measurements were performed by Maurice Battler.

Date of test: July 24, 2009

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.

The environmental test conditions were: Temperature: 24 °C

Pressure: 1009 mb Relative Humidity: 31 %

Page 12 of 34

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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

20 dB Bandwidth

*RBW 10kHz

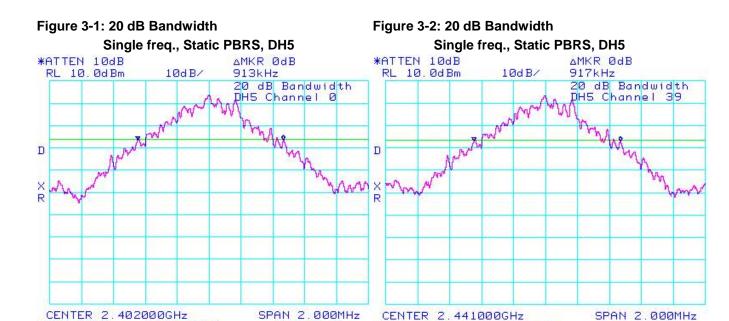
*VBW 30kHz

The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a) and RSS-210. 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	0.913
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.



*RBW 10kHz

*VBW 30kHz

SWP 50.0ms

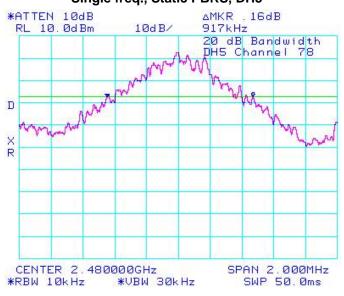
SWP 50.0ms

Copyright 2005-2009 Page 13 of 34

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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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	1.253
39	≤1.5	1.237
78	≤1.5	1.163

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

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Page 14 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Figure 3-4: 20 dB Bandwidth

Figure 3-5: 20 dB Bandwidth

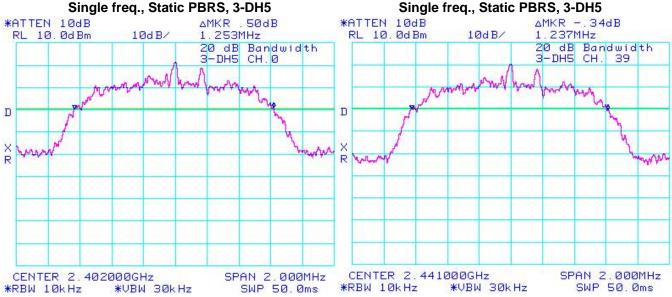
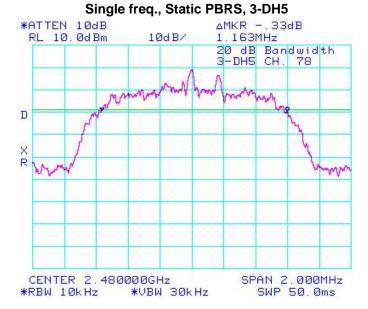


Figure 3-6: 20 dB Bandwidth



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Copyright 2005-2009 Page 15 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Carrier Frequency Separation

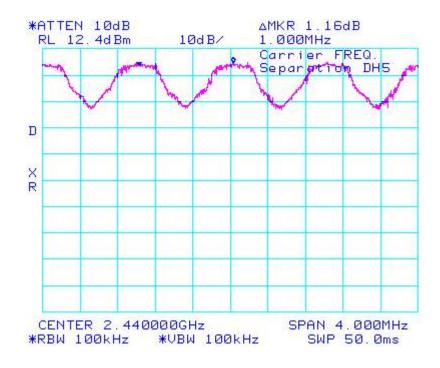
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.

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



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Copyright 2005-2009 Page 16 of 34

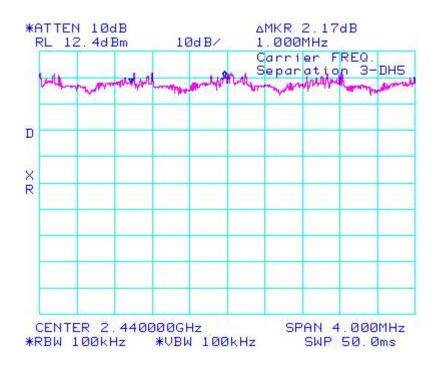
Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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



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Copyright 2005-2009 Page 17 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Number of Hopping Frequencies

The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. 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.

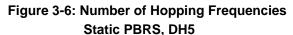
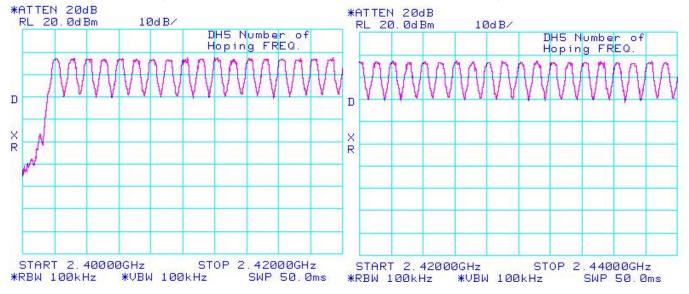


Figure 3-7: Number of Hopping Frequencies Static PBRS, DH5



Copyright 2005-2009 Page 18 of 34

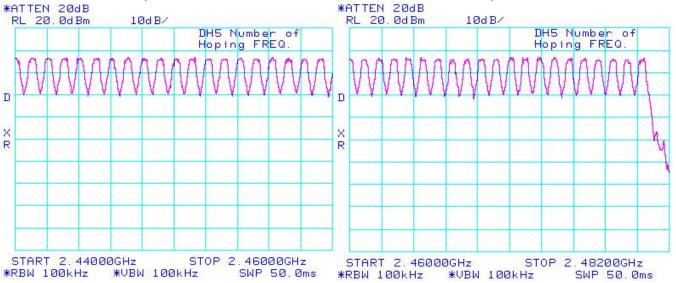
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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Figure 3-8: Number of Hopping Frequencies
Static PBRS, DH5
**ATTEN 20dB

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

**ATTEN 20dB



Time of Occupancy (Dwell Time)

The EUT met the requirements of the time of occupancy (dwell time) as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured in packet types <u>DH1</u>, <u>DH3</u> and <u>DH5</u>. 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 µsec 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 (79x0.4) 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.

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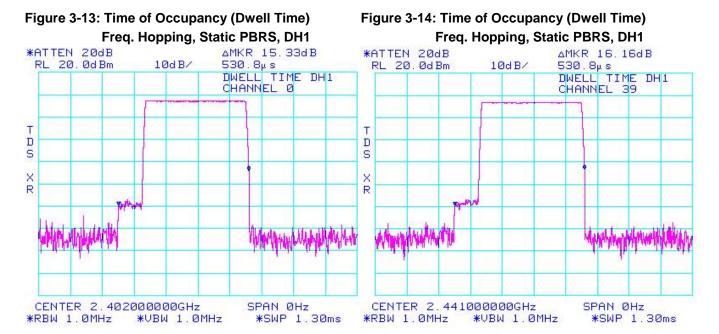
Copyright 2005-2009 Page 19 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1		
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose	

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.5308	0.5308 x 320.0 = 166.4	400	230.14
39	DH1	0.5308	0.5308 x 320.0 = 166.4	400	230.14
78	DH1	0.5308	0.5308 x 320.0 = 166.4	400	230.14
0	DH3	1.7688	1.7688 x 159.9 = 282.83	400	117.17
39	DH3	1.7668	1.7688 x 159.9 = 282.83	400	117.49
78	DH3	1.7625	1.7625 x 159.9 = 281.82	400	118.18
0	DH5	3.0100	3.01 x 106.8 = 321.47	400	78.53
39	DH5	3.0100	3.01 x 106.8 = 321.47	400	78.53
78	DH5	3.0100	3.01 x 106.8 = 321.47	400	78.53

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

Bluetooth RF Conducted Emission Test Results cont'd



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Copyright 2005-2009 Page 20 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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

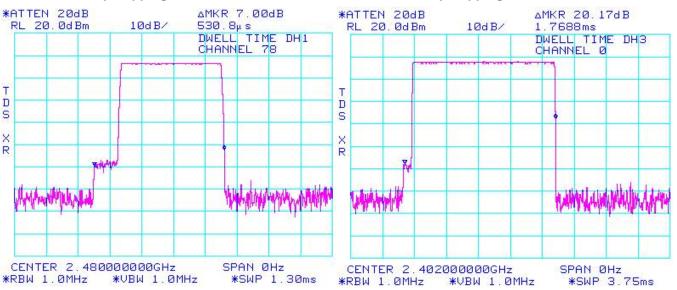
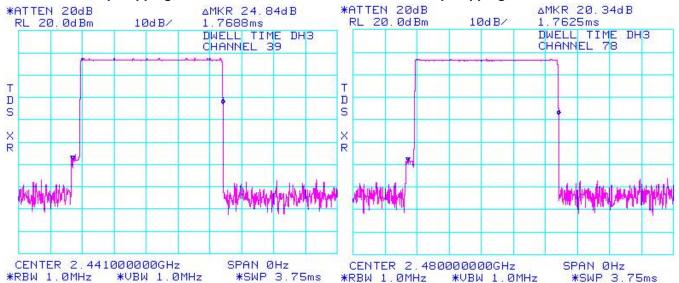


Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

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

Page 21 of 34



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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Figure 3-19: Time of Occupancy (Dwell Time) Figure 3-20: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH5 Freq. Hopping, Static PBRS, DH5 *ATTEN 20dB ΔMKR 22.67dB *ATTEN 20dB ΔMKR 21.17dB RL 20.0dBm 10dB/ 3.0100ms RL 20.0dBm 10dB/ 3.0100ms DWELL TIME DHS CHANNEL Ø DWELL TIME DHS CHANNEL 39 T D D S S X R R

CENTER 2.441000000GHz

*VBW 1.0MHz

*RBW 1.0MHz

SPAN ØHz

Page 22 of 34

*SWP 6.00ms

SPAN ØHz

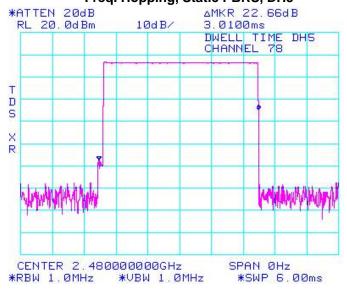
*SWP 6.00ms

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

*VBW 1.0MHz

CENTER 2.402000000GHz

*RBW 1.0MHz



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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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) and RSS-210. 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.

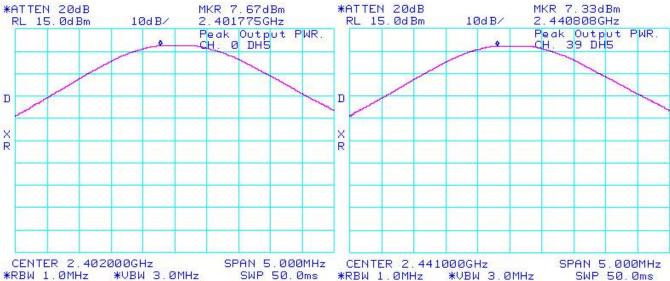
Using pattern type "Static PRBS" and packet type "DH5" during the measurements.

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	7.67	0.00585	0.0 to 20.0
39	7.33	0.00541	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 PBRS, DH5

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

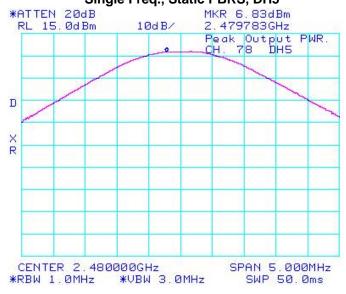


Copyright 2005-2009 Page 23 of 34

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Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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	5.00	0.00316	0.0 to 20.0
39	4.50	0.00282	0.0 to 20.0
78	3.33	0.00215	0.0 to 20.0

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

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Page 24 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose



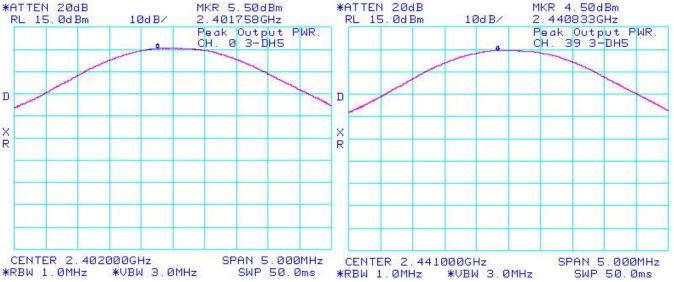
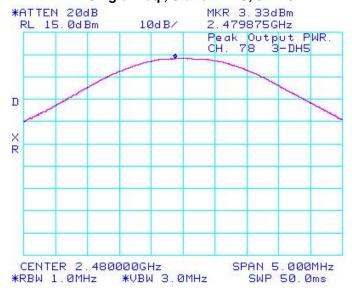


Figure 3-27: Max. Peak Conducted Output Power Single Freq., Static PBRS, 3-DH5



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Copyright 2005-2009 Page 25 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test 9 July 14 to August 19, 2009 Author Data Kevin Rose	

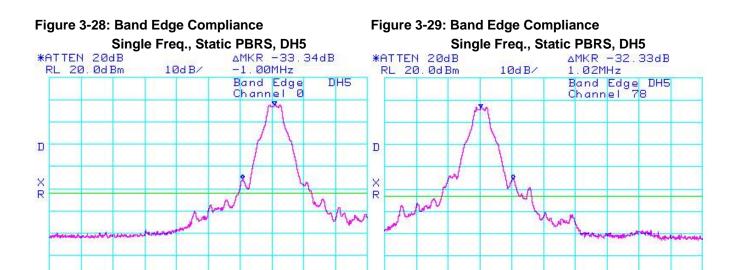
Band Edge Compliance

The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c) and RSS-210. 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	-33.34	-20	-13.34
78	Single Frequency	-32.33	-20	-12.33
0	Hopping	-35.33	-20	-15.33
78	Hopping	-32.00	-20	-12.00

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



CENTER 2.48200GHz

*VBW 100kHz

*RBW 100kHz

SPAN 10.00MHz

SWP 50.0ms

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SPAN 10.00MHz

SWP 50.0ms

*VBW 100kHz

CENTER 2.40000GHz

*RBW 100kHz

Copyright 2005-2009 Page 26 of 34

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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Figure 3-30: Band Edge Compliance Figure 3-31: Band Edge Compliance Freq. Hopping, Static PBRS, DH5 Freq. Hopping, Static PBRS, DH5 *ATTEN 20dB AMKR -32.00dB ΔMKR -35.33dB *ATTEN 20dB 1.02MHz RL 20.0dBm 10dB/ RL 20.0dBm 10dB/ -1.00MHz Band Edge Band Edge DH5 Channel 78 DH5 Channel D XR XR CENTER 2.40000GHz SPAN 10.00MHz CENTER 2.48200GHz SPAN 10.00MHz

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

*RBW 100kHz

*VBW 100kHz

SWP 50.0ms

SWP 50.0ms

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-31.00	-20	-11.00
78	Single Frequency	-38.50	-20	-18.50
0	Hopping	-32.33	-20	-12.33
78	Hopping	-39.34	-20	-19.34

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

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*RBW 100kHz

*VBW 100kHz

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Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
		Author Data Kevin Rose

Figure 3-32: Band Edge Compliance Figure 3-33: Band Edge Compliance Single Freq., Static PBRS, 3-DH5 Single Freq., Static PBRS, 3

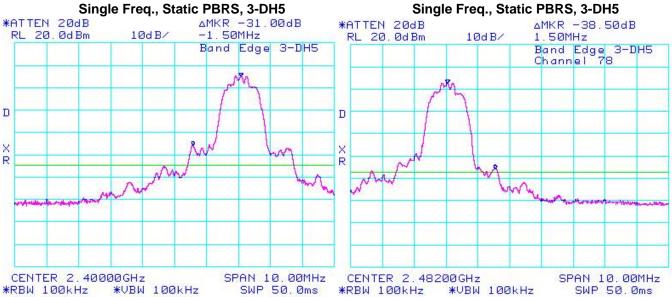


Figure 3-34: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

*ATTEN 20dB

AMKR -31.50dB

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

*ATTEN 20dB

AMKR -39.34dB



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Page 28 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. 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	7.67	-50.17	-42.50	-20
39	7.33	-38.83	-31.50	-20
78	6.83	-44.67	-37.84	-20
Hopping mode	6.83	-36.67	-29.84	-20

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

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Page 29 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Figure 2-36: Spurious RF Conducted Emissions

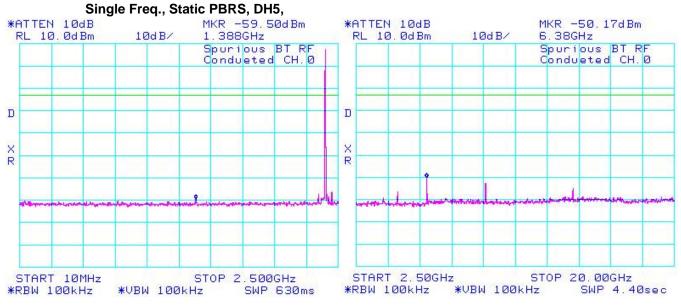
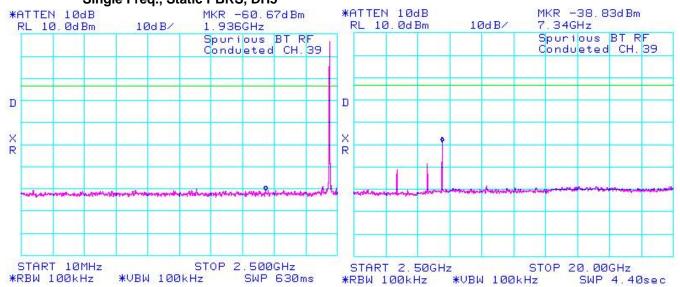


Figure 2-37: Spurious RF Conducted Emissions Single Freq., Static PBRS, DH5



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Copyright 2005-2009 Page 30 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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

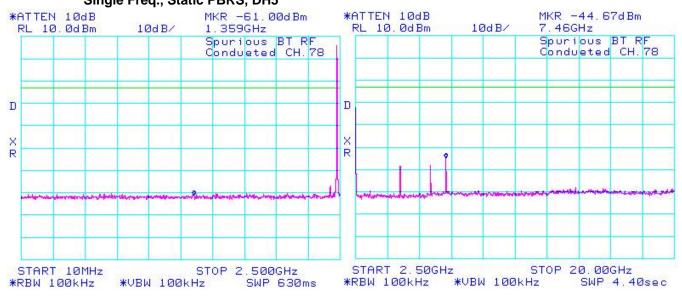
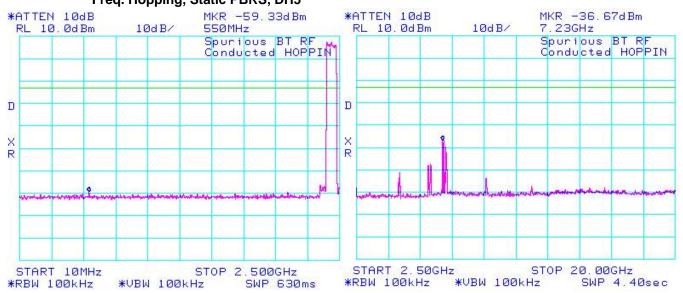


Figure 2-39: Spurious RF Conducted Emissions Freq. Hopping, Static PBRS, DH5



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Copyright 2005-2009 Page 31 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
		Author Data Kevin Rose

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	6.17	-46.50	-41.00	-20
39	5.50	-45.67	-41.17	-20
78	4.50	-46.50	-43.17	-20
Hopping mode	4.50	-45.33	-40.83	-20

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

Copyright 2005-2009 Page 32 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

Figure 3-40 : Spurious RF Conducted Emissions

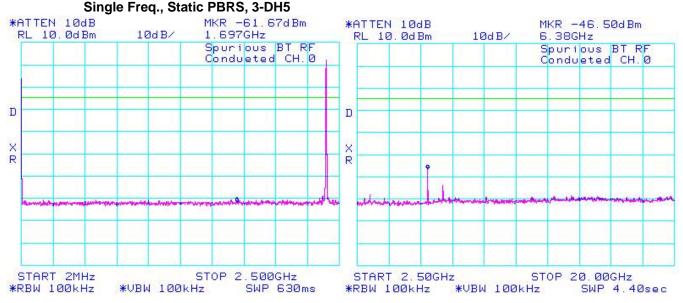
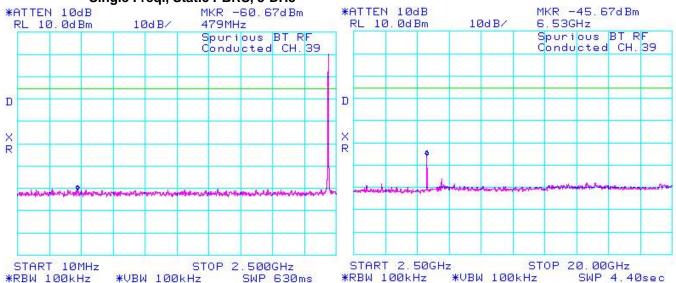


Figure 3-41: Spurious RF Conducted Emissions Single Freq., Static PBRS, 3-DH5



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Copyright 2005-2009 Page 33 of 34

Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCN71UW APPENDIX 1	
Test Report No. RTS-1689-0909-29	Dates of Test July 14 to August 19, 2009	Author Data Kevin Rose

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

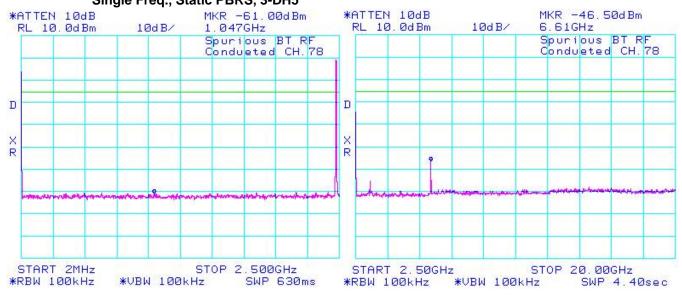
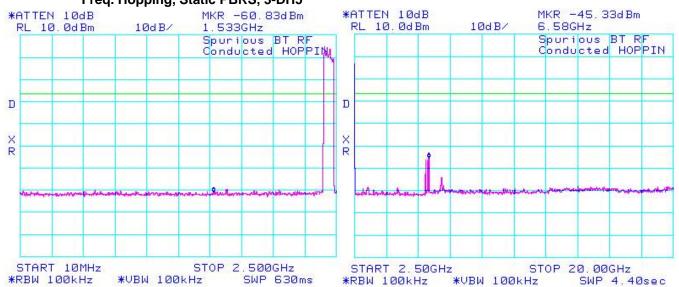


Figure 3-43 : Spurious RF Conducted Emissions Freq. Hopping, Static PBRS, 3-DH5



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