

EMI Test Report

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

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO.: RTS-0671-0706-16_REV2

PRODUCT MODEL NO.: RBN41GW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARBN40GW
IC: 2503A-RBN40GW

This Rev2 test report supersedes the previous version RTS-0671-0706-16_REV1 dated July 06, 2007

DATE: 16 July 2007

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Statement of Performance:

The BlackBerry® smartphone, model RBN41GW, part number CER-15664-001 Rev. 4 and accessories when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

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.

This device supports Bluetooth Frequency Hopping.

The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating parameters.

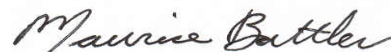
The test methods were consistent with the methods described in the relevant standards.

Documented and tested by:



Caitlin O'Neill
Compliance Specialist
Date: 16 July 2007

Tested and reviewed by:



Maurice Battler
Compliance Specialist
Date: 16 July 2007

Tested and reviewed by:



Masud S. Attayi, P.Eng.
Team Lead, Regulatory Compliance
Date: 16 July 2007

Approved by:



Paul G. Cardinal, Ph.D.
Director
Date: 16 July 2007

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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 15, Subpart C, Aug. 14, 2006
- 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. Document number RTS-0671-RBN41GW-03

C. Product Identification

Manufactured by Research In Motion Limited 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 RIM Testing Services (RTS) EMI test facility, located at:

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

The testing was performed May 24 to June 20, 2007.

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The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RBN41GW	CER-15664-001 Rev. 2	205E10F5
2	RBN41GW	CER-15664-001 Rev. 3	205DFB15
3	RBN41GW	CER-15664-001 Rev. 3	205DF476

Bluetooth RF Conducted Emissions testing was performed on sample 3. AC Conducted and Radiated Emission testing were performed on sample 1 and 2.

To view the differences between CER-15664-001 Rev 2 to CER-15664-001 Rev 3, see document number RTS-0671-RBN41GW-03.

Only the differences that maybe impacted by the changes were re-measured.

BlackBerry® smartphone Accessories Tested

- 1) Captive Cable Charger, part number ASY-07559-001 with an output voltage of 5.0 volts dc, 0.5 amps and attached USB cable with a lead length of 1.80 metres.
- 2) Alternative Folding Blade Charger, part number ASY-12709-001 with an output voltage of 5.0 volts dc, 0.75 amps with an attached USB cable with a length of 1.80 metres.
- 3) TTY adapter, part number HDW-12420-001.
- 4) Stereo Headset, 2.5mm, part number HDW-13019-001, 1.3 metres long

D. Support Equipment Used for the Testing of the EUT

- 1) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 837493/073
- 2) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 102204
- 3) DC Power Supply, H/P, model 6632B, serial number US37472178
- 4) Bluetooth Tester, Rohde & Schwarz, model CBT, serial number 100368

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E. Test Voltage

The ac input voltage was 120/230 volts, 60/50 Hz where applicable. This configuration was per RIM's specifications.

F. Test Results Chart

SPECIFICATION	TEST TYPE	MEETS REQUIREMENTS	PERFORMED BY
FCC CFR 47 Part 15.207 IC RSS-210/RSS-GEN	AC Line Conducted Emissions	Yes	Caitlin O'Neill Vimal Olaganathan
FCC CFR 47 Part 15.209, 15.247 IC RSS-210/RSS-GEN	Radiated Emissions Radiated Band Edge Compliance	Yes	Masud Attayi Vimal Olaganathan
FCC CFR 47 Part 15.247(a), (b), (c) IC RSS-210/RSS-GEN	20 dB Bandwidth Carrier Freq. Separation Number of Hopping freq. Dwell Time Max. Peak Output Power Band Edge Compliance Spurious RF Conducted Emissions	Yes	Maurice Battler

G. Modifications to EUT

No modifications were required on the EUT.

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H. Summary of Results

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 15.207	RSS-GEN 7.2.2	Conducted AC Line Emission	Pass	1
Part 15.209 Part 15.247	RSS-210 A8.5	Radiated Spurious Emissions and Radiated Band Edge Compliance	Pass	2
Part 15.247(a)	RSS-210 A8.1	20 dB Bandwidth	Pass	3
Part 15.247(a)	RSS-210 A8.1	Carrier Frequency Separation	Pass	3
Part 15.247(a)	RSS-210 A8.1d	Number of Hopping Frequencies	Pass	3
Part 15.247(a)	RSS-210 A8.1c	Time of Occupancy (Dwell Time)	Pass	3
Part 15.247(b)	RSS-210 A8.4	Maximum Peak Conducted Output Power	Pass	3
Part 15.247(c)	RSS-210 A8.5	Band-Edge Compliance of RF Conducted Emissions	Pass	3
Part 15.247(c)	RSS-210 A8.5	Spurious RF Conducted Emissions	Pass	3

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 following test configurations were measured, input ac voltage was 230 V, 50 Hz:

1. The BlackBerry® smartphone PIN 205E10F5 in battery charging mode, was connected to the Captive Cable Charger and connected to a Stereo Headset through the TTY adapter.

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2. The BlackBerry® smartphone PIN 205E10F5 in battery charging mode, was connected to the Alternative Folding Blade Charger.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15.207, Subpart C and IC RSS-Gen 7.2.2 limit. The sample EUT had a worse case test margin of 16.68 dB below the QP limit at 0.264 MHz using the Quasi-peak for the Alternative Folding Blade Charger, test configuration 2.

See APPENDIX 1 for the test data

Measurement Uncertainty ±2.0 dB

2) RADIATED EMISSIONS

a) Radiated Spurious and Harmonic Emissions

The BlackBerry® smartphone PIN 205DFB15 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 polarisations of the emissions were measured.

The measurements were performed in a semi-anechoic chamber. The semi-anechoic chamber's FCC registration number is **778487** and the Industry Canada file number is **IC4240**.

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

The BlackBerry® smartphone PIN 205DFB15 was 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" and frequency hopping for packet type "DH5" and EDR mode at middle channel (39) for packet type "3-DH5". The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart C, 15.247 and RSS-210, A8.5

The Bluetooth radiated spurious and harmonics were investigated up to the 10th harmonic. The worse case spurious emission floor was -21.65 dB below the limit at 479.26 MHz. All other emissions were in the noise floor (NF).

See APPENDIX 2 for the test data

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b) Band-Edge Compliance of RF Radiated Emissions

The Band-Edge Compliance of RF Radiated Emissions for Bluetooth met the requirements as per 15.247, 15.209, and RSS-210, A8.5.

The results include both normal data rate and EDR for Bluetooth.
See APPENDIX 2 for the test data.

Measurement Uncertainty ±4.0 dB

3) BLUETOOTH RF CONDUCTED EMISSIONS

a) 20 dB Bandwidth

The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a) and RSS-210, A8.1 Low channel (0), middle channel (39) and high channel (78) were measured.

See APPENDIX 3 for the test data.

b) Carrier Frequency Separation

The EUT met the requirements of the carrier frequency separation as per 47 CFR 15.247(a) and RSS-210, A8.1. Channel 38 to 39 was measured.

See APPENDIX 3 for the test data.

c) 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, A8.1d. 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) and RSS-210, A8.1c. 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 EUT met the requirements of the maximum peak conducted output power as per 47 CFR 15.247(b) and RSS-210, A8.4. Low channel (0), middle channel (39) and high channel (78) were measured. The results include both normal data rate and EDR.

See APPENDIX 3 for the test data.

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f) **Band-Edge Compliance of RF Conducted Emissions**

The EUT met the requirements of the band-edge compliance of RF conducted emissions as per 47 CFR 15.247(c) and RSS-210, A8.5. Channels 0 and 78 were measured in frequency hopping (Euro/US) mode and single frequency mode.

The results include both normal data rate and EDR.

See APPENDIX 3 for the test data.

g) **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, A8.5. 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 results include both normal data rate and EDR.

See APPENDIX 3 for the test data.

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I. 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	07-11-23	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	07-11-22	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017401	08-08-04	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030101	08-07-26	Radiated Emissions
Horn Antenna	Emco	3116	2538	08-09-25	Radiated Emissions
Preamplifier	TDK	18-26	030002	07-11-23	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	07-12-01	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	07-10-20	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	08-06-05	Radiated Emissions
EMI Receiver	Agilent	8546A	3942A00517	07-09-21	Conducted/Radiated Emissions
RF Filter Section	Agilent	85460A	3704A00481	07-09-21	Conducted/Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	102204	08-04-22	Conducted Emissions
Spectrum Analyzer	HP	8563E	3745A08112	07-09-20	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	07-09-14	RF Conducted Emissions
Environment Monitor	Control Company	1870	230355190	07-12-28	Radiated Emissions
Environment Monitor	Control Company	1870	230355189	07-12-28	RF Conducted Emissions
Temperature Probe	Hart Scientific	61161-302	21352860	07-08-31	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	100368	08-04-26	Conducted/Radiated Emissions
Signal Generator	Agilent	8648C	4037U03155	07-09-13	Frequency Stability
Digital Multimeter	Hewlett Packard	34401A	US36042324	07-09-19	Conducted/Radiated Emissions
L.I.S.N.	Emco	3816/2	1120	08-08-28	Conducted Emissions
Impulse Limiter	Rohde &	ESHS-Z2	836248/052	07-11-20	Conducted Emissions

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APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

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Bluetooth AC Conducted Emission Test Results

AC Power Line Conducted Emissions

The EUT met the requirements of the AC Power Line Conducted Emissions as per FCC CFR 47 Part 15.207, Subpart C and IC RSS-GEN 7.2.2.

The environmental test conditions were:

Temperature	24°C
Pressure	1018 mb
Relative Humidity	31%

Test Configuration 1

Date of test: May 25, 2007

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.154	N	36.78	9.82	46.60	66.00	56.00	-19.40	-9.40
0.152	L1	38.47	9.82	48.29	66.00	56.00	-17.71	-7.71
0.251	N	26.71	9.86	36.57	62.10	52.10	-25.53	-15.53
0.265	N	29.41	9.86	39.27	61.43	51.43	-22.16	-12.16
0.265	L1	33.87	9.86	43.73	61.27	51.27	-17.55	-7.55
0.401	N	25.02	9.82	34.84	57.85	47.85	-23.01	-13.01
0.398	L1	28.74	9.82	38.56	57.65	47.65	-19.08	-9.08

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

Measurements were done with the quasi-peak detector.

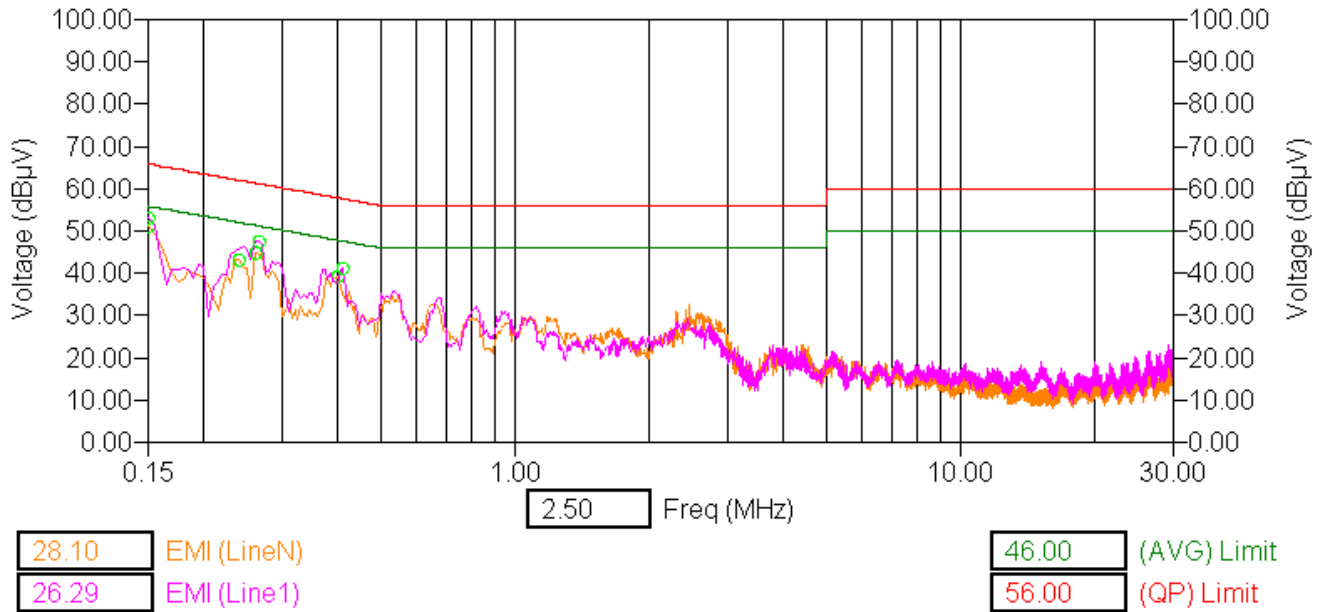
See graph 1 for the measurement plot.

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Bluetooth AC Conducted Emission Test Results cont'd

Test Configuration 1

Graph 1



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AC Conducted Emissions Test Results

The environmental test conditions were:

Temperature	24°C
Pressure	1017 mb
Relative Humidity	30%

Test Configuration 2

Date of test: May 24, 2007

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.198	N	31.73	9.85	41.58	63.82	53.82	-22.24	-12.24
0.264	N	34.58	9.86	44.44	61.12	51.12	-16.68	-6.68
0.330	L1	25.85	9.85	35.70	59.45	49.45	-23.75	-13.75
0.333	N	28.22	9.85	38.07	59.45	49.45	-21.38	-11.38
0.461	N	25.48	9.84	35.32	56.51	46.51	-21.19	-11.19
0.534	N	28.61	9.84	38.45	56.00	46.00	-17.55	-7.55
0.533	L1	26.30	9.84	36.14	56.00	46.00	-19.86	-9.86
0.562	L1	24.09	9.84	33.93	56.00	46.00	-22.07	-12.07
0.593	N	25.03	9.84	34.87	56.00	46.00	-21.13	-11.13
0.595	L1	23.91	9.84	33.75	56.00	46.00	-22.25	-12.25
0.658	L1	26.67	9.86	36.53	56.00	46.00	-19.47	-9.47
0.707	L1	23.71	9.86	33.57	56.00	46.00	-22.43	-12.43

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

Measurements were done with the quasi-peak detector.

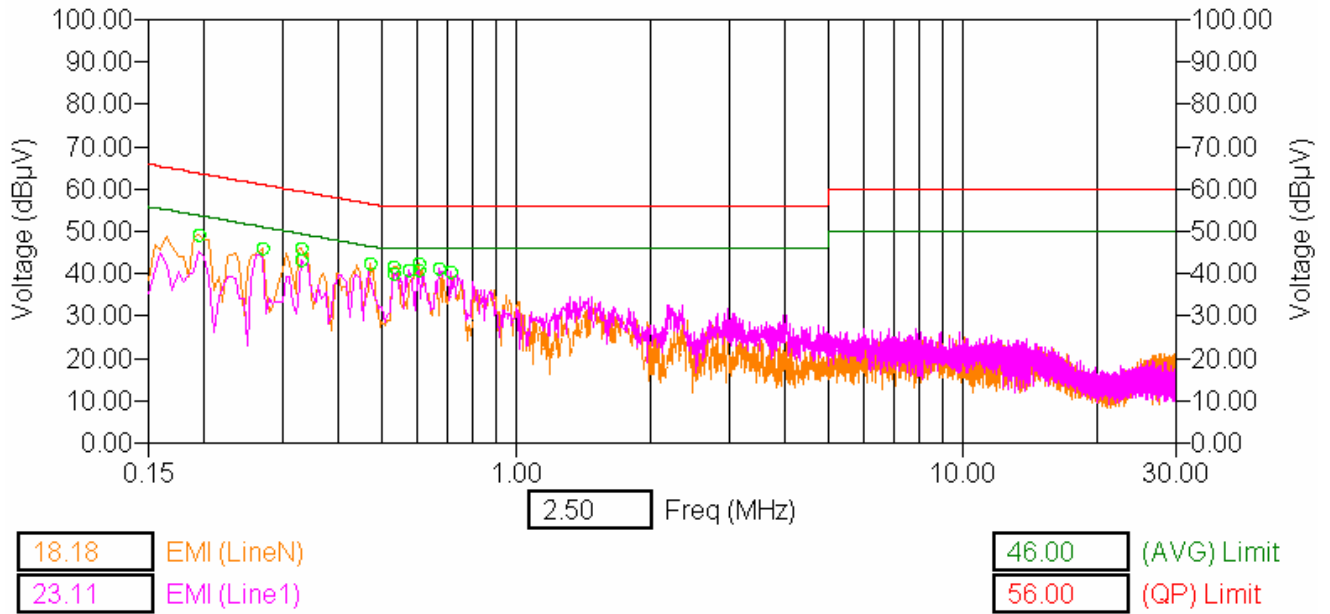
See graph 2 for the measurement plot.

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Bluetooth AC Conducted Emission Test Results cont'd

Test Configuration 2

Graph 2



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APPENDIX 2 – RADIATED EMISSIONS TEST DATA

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Radiated Emissions Test Data Results

The EUT met the requirements of the Radiated Spurious and Band Edge Emissions as per FCC CFR 47 Part 15.247, Subpart C and IC RSS-210, A8.5.

The environmental test conditions were:

Temperature	24°C
Pressure	1004 mb
Relative Humidity	31%

Date of Test: June 02 2007

Test Distance was 3.0 metres with a EUT height of 0.8 metres, 30 MHz to 1000 MHz. The Handheld PIN 205DFB15 was in standalone, vertical position.

The measurements were performed in single frequency mode using packet type "DH5", channel 39.

Frequency (MHz)	Antenna		Test Angle (Deg.)	Detector (PK or AV)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dB)	Test Margin (dB)
	Pol. (V/H)	Height (metres)							
479.26	H	2.24	126	PK	31.15	-6.80	24.35	46.00	-21.65

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

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Bluetooth Radiated Emissions Test Results cont'd

Single frequency mode High Channel									
2 nd	78	4960.0	Horn	V	NF	-	PK.	74	-
2 nd	78	4960.0	Horn	H	NF				
2 nd	78	4960.0	Horn	V	NF	-	AVE.	54	-
2 nd	78	4960.0	Horn	H	NF				
The harmonics were investigated up to the 10 th harmonic. All emissions were in the NF									

Using Pattern type "Static PRBS" and packet type "DH5" hopping mode during the measurements.

Type	Channel	Frequency (MHz)	Antenna		Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
			Type	Pol					
Handheld Standalone, USB side down Hopping mode.									
2 nd	0-78	4960.0	Horn	V	NF	-	PK.	74	-
2 nd	0-78	4960.0	Horn	H	NF				
2 nd	0-78	4960.0	Horn	V	NF	-	AVE.	54	-
2 nd	0-78	4960.0	Horn	H	NF				
The harmonics were investigated up to the 10 th harmonic. All emissions were in the NF									

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Bluetooth Radiated Emissions Test Results cont'd

Using Pattern type "Static PRBS" and packet type "3-DH5", EDR single channel mode during the measurements.

Type	Channel	Frequency (MHz)	Antenna		Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
			Type	Pol					
Handheld Standalone, USB side down EDR mode.									
2 nd	39	4960.0	Horn	V	NF	-	PK.	74	-
2 nd	39	4960.0	Horn	H	NF				
2 nd	39	4960.0	Horn	V	NF	-	AVE.	54	-
2 nd	39	4960.0	Horn	H	NF				
The harmonics were investigated up to the 10 th harmonic. All emissions were in the NF									

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

Figure 2-1: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRs, DH5, Channel 78, Pol: V, Detector: PK

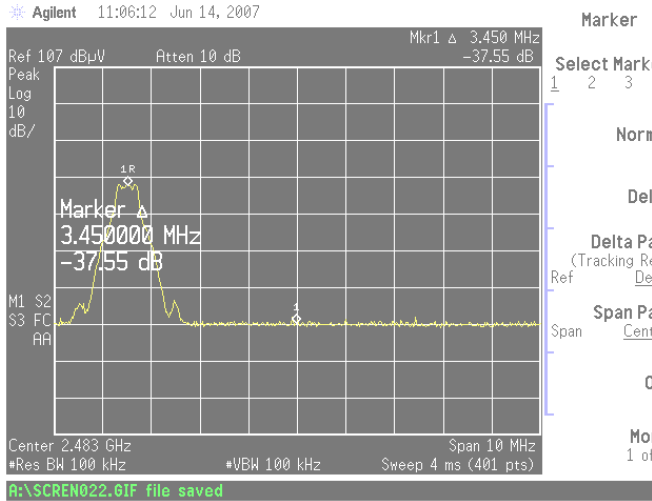


Figure 2-2: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRs, DH5, Channel 78, Pol: H, Detector: PK

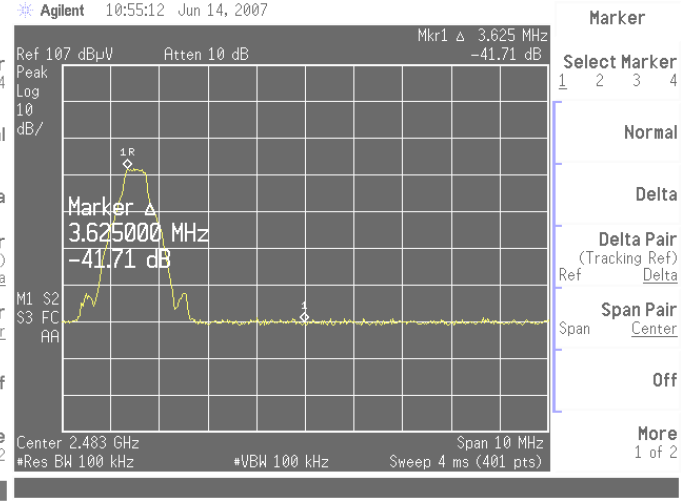


Figure 2-3: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRs, 3-DH5, Channel 0, Pol: V, Detector: PK

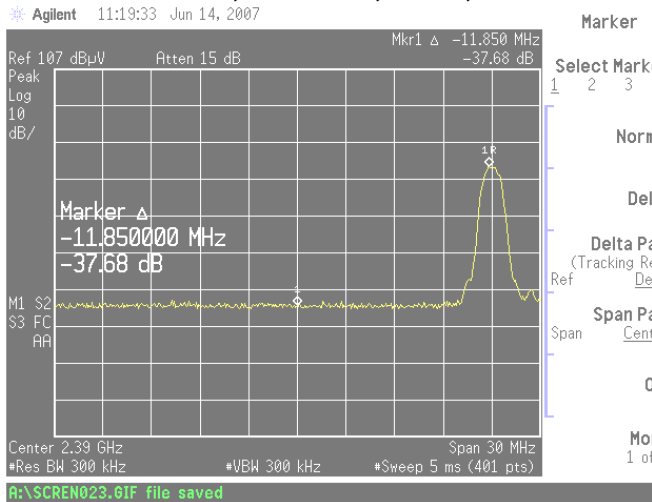
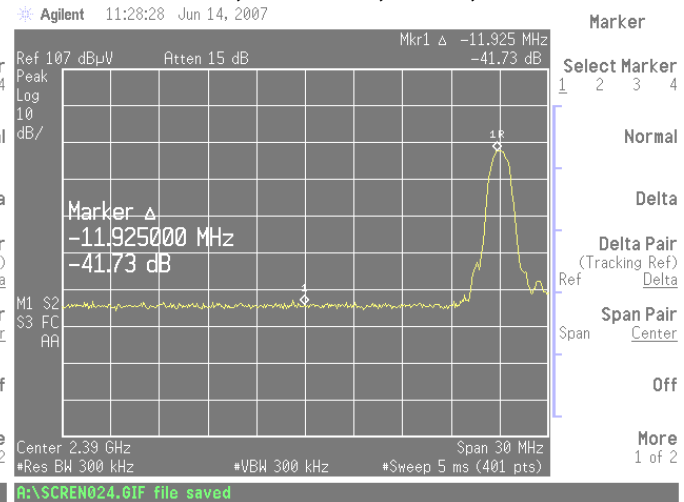


Figure 2-4: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRs, 3-DH5, Channel 0, Pol: H, Detector: PK



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Figure 2-5: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRs, 3-DH5, Channel 78, Pol: V, Detector: PK

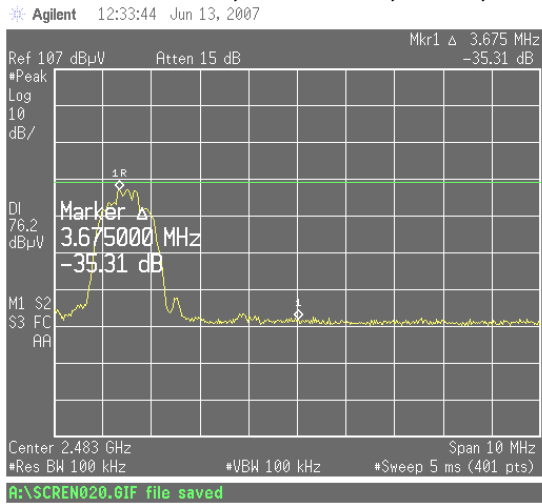
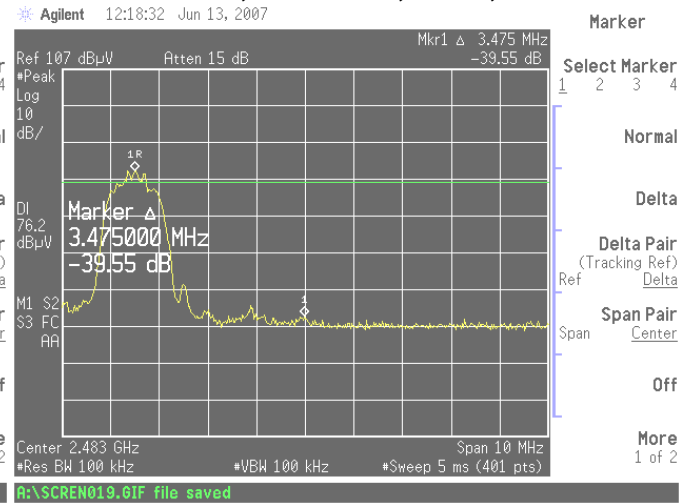


Figure 2-6: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRs, 3-DH5, Channel 78, Pol: H, Detector: PK



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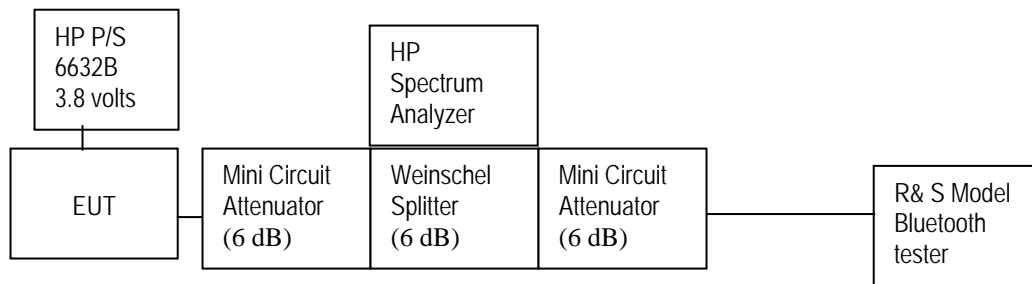
APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

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Bluetooth RF Conducted Emission Test Results

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

Test Setup Diagram



A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the Handheld 2 which was used for measurements.

Date of Tests: June 4-11, 2007

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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) and RSS-210, A8.1. 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	0.933
39	≤1.0	0.937
78	≤1.0	0.937

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

The environmental test conditions were:

Temperature	22°C
Pressure	1012 mb
Relative Humidity	32%

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-1: 20 dB Bandwidth

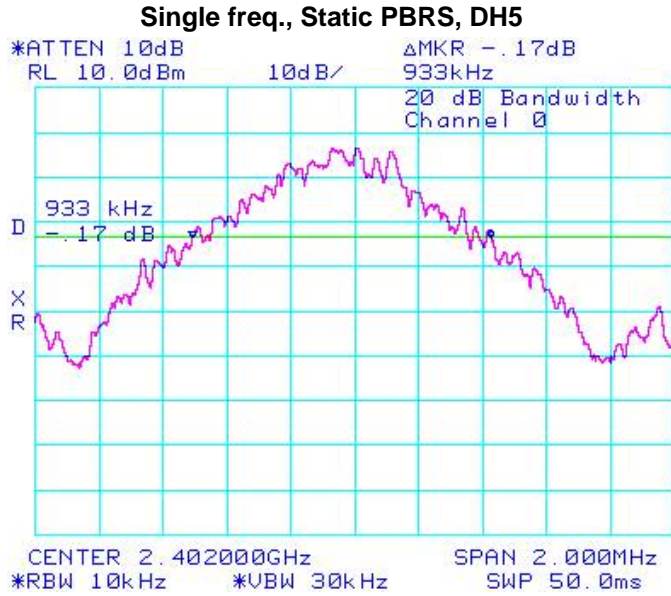


Figure 3-2: 20 dB Bandwidth

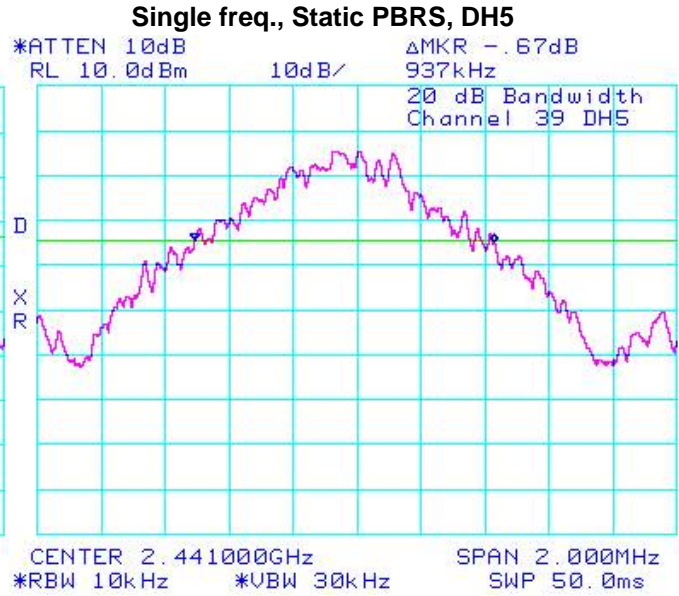
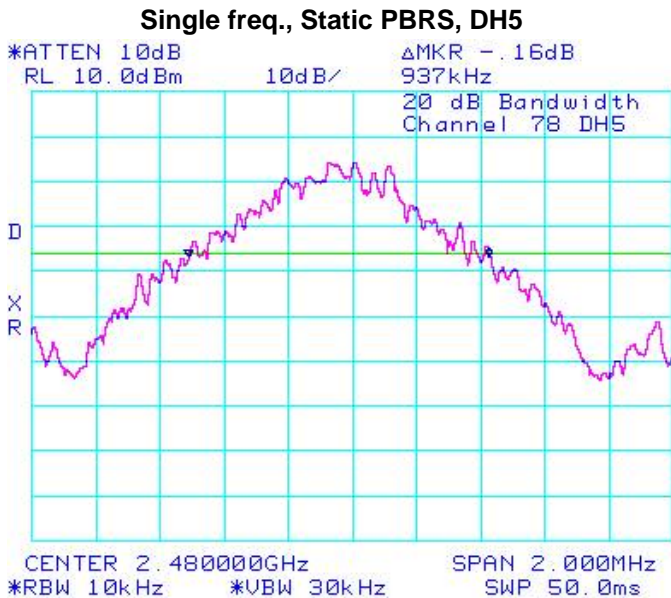


Figure 3-3: 20 dB Bandwidth



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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) and RSS-210, A8.1. 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.

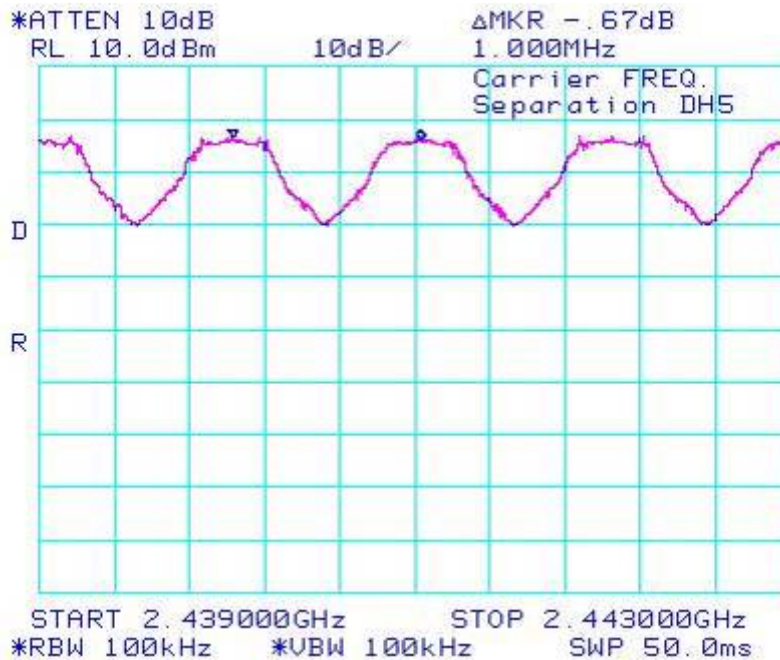
Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

The environmental test conditions were:

Temperature	22°C
Pressure	1012 mb
Relative Humidity	32%

See figure 3-4 for the plot of the Carrier Frequency Separation measurement.

Figure 3-4: Carrier Frequency Separation, Freq. Hopping, Static PBRs, DH5, Channels 38 to 39



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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) and RSS-210, A8.1d. 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)
≥ 74	79

The environmental test conditions were:

Temperature	22°C
Pressure	1012 mb
Relative Humidity	32%

See figures 3-6 to 3-9 for the plots of the number of hopping frequencies.

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Bluetooth RF Conducted Emission Test Results cont'd

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

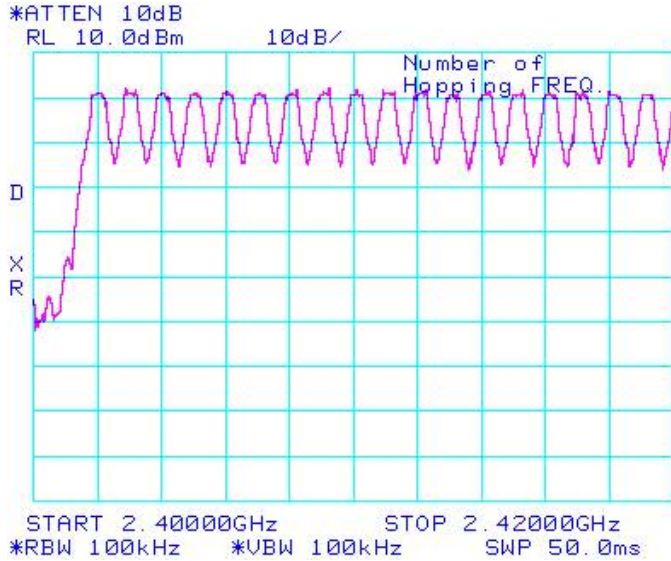


Figure 3-7: Number of Hopping Frequencies
Static PBRs, DH5

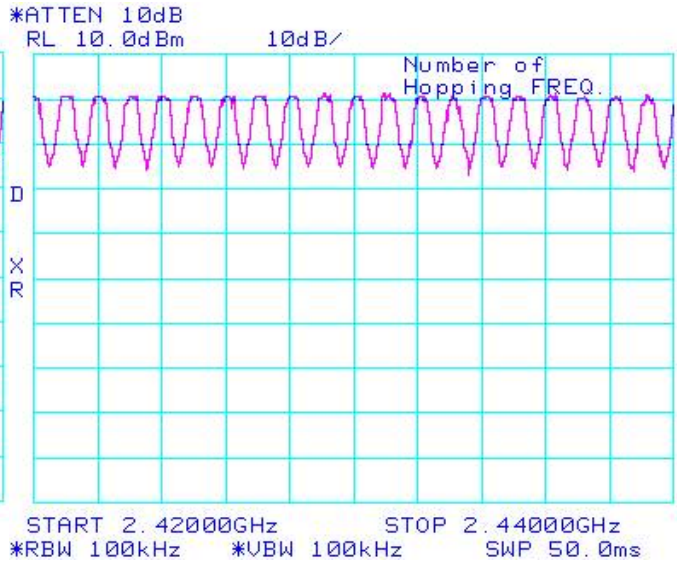


Figure 3-8: Number of Hopping Frequencies
Static PBRs, DH5

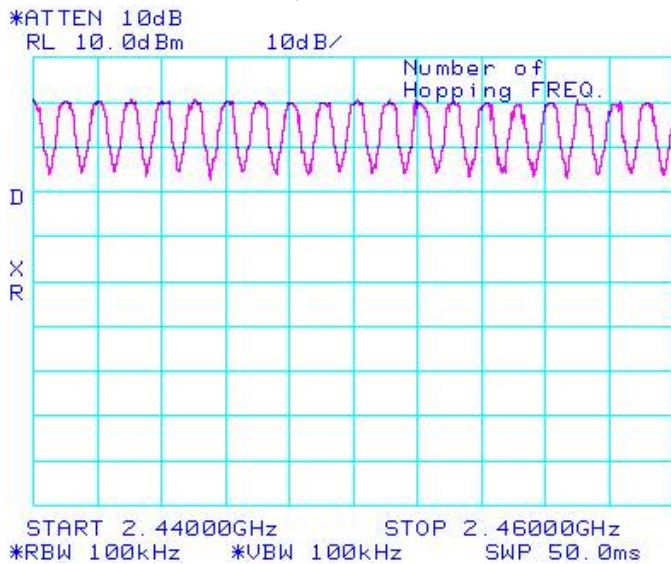
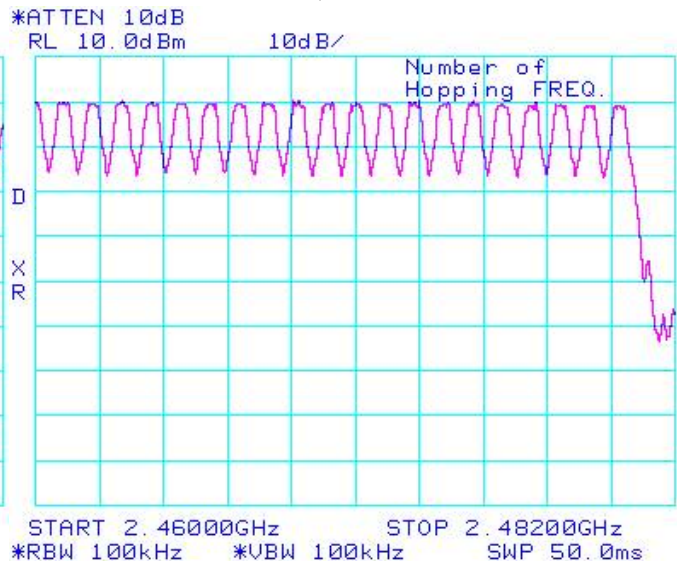


Figure 3-9: Number of Hopping Frequencies
Static PBRs, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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, A8.1c. 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 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.

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.5100	0.5100 x 320.0 = 163.20	400	236.80
39	DH1	0.5133	0.5133 x 320.0 = 164.26	400	235.74
78	DH1	0.5100	0.5100 x 320.0 = 163.20	400	236.80
0	DH3	1.7665	1.7665 x 159.9 = 282.46	400	117.50
39	DH3	1.7667	1.7667 x 159.9 = 282.50	400	118.58
78	DH3	1.7600	1.7600 x 159.9 = 281.42	400	118.58
0	DH5	3.0083	3.0083 x 106.8 = 321.29	400	78.71
39	DH5	3.0083	3.0083 x 106.8 = 321.29	400	78.71
78	DH5	3.0083	3.0083 x 106.8 = 321.29	400	78.71

The environmental test conditions were: Temperature 22°C
Pressure 1012 mb
Relative Humidity 32%

See figures 3-10 to 3-18 for the plots of the dwell time.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-10: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

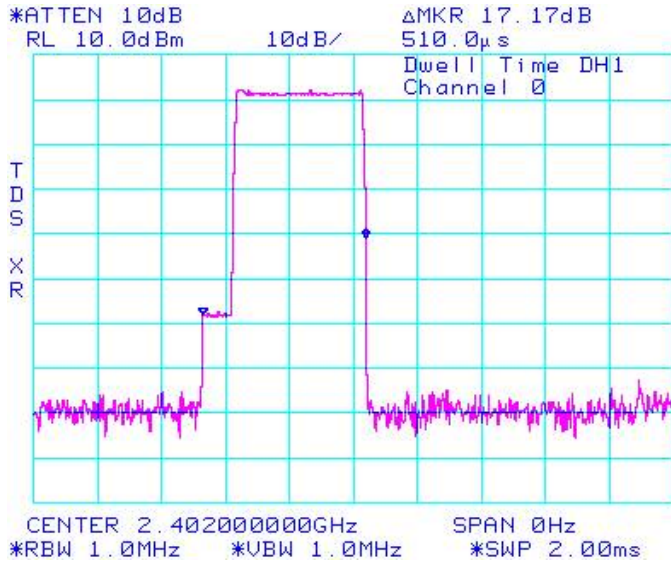


Figure 3-11: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

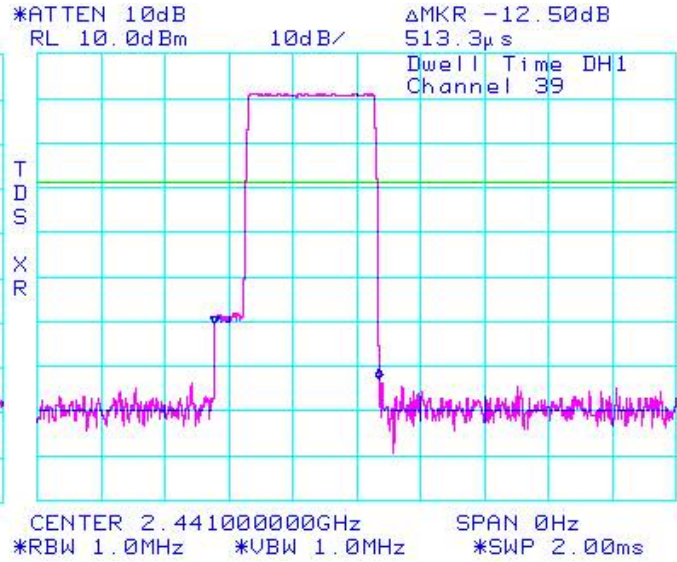


Figure 3-12: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

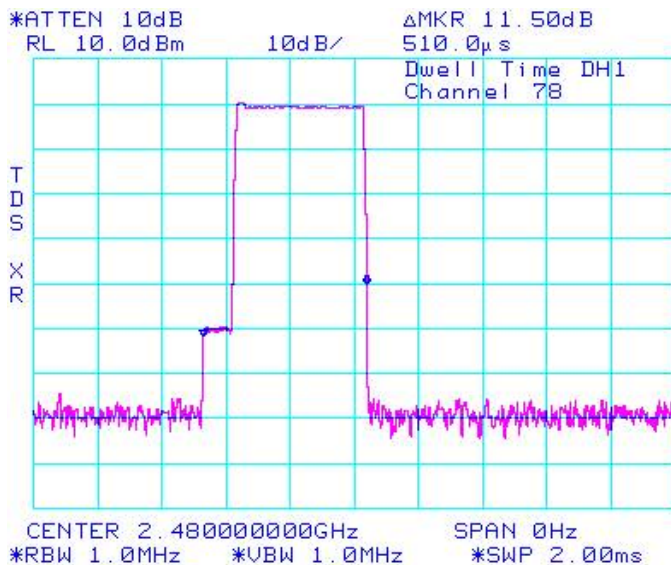
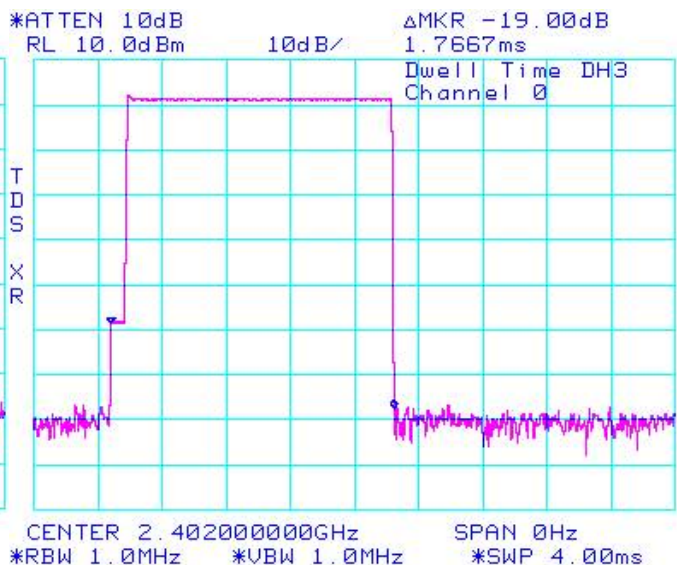


Figure 3-13: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-14: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3

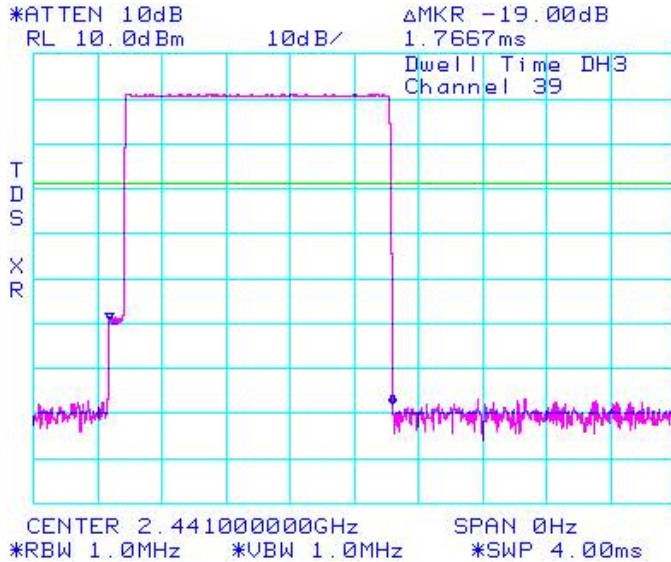


Figure 3-5 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3

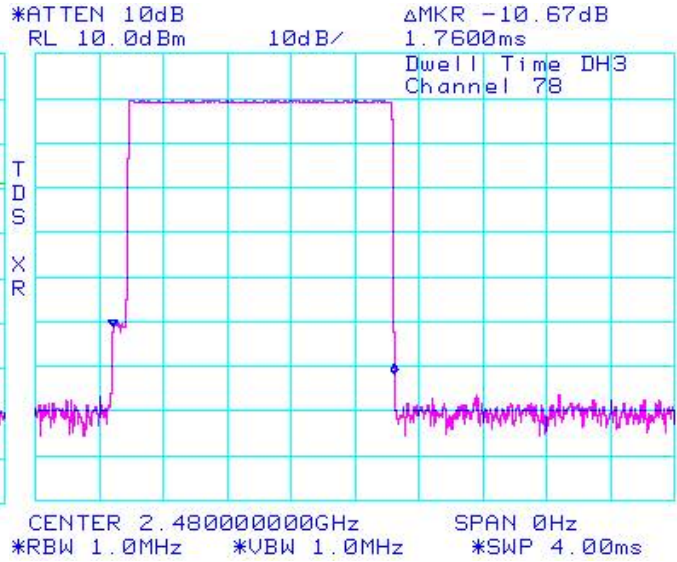


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

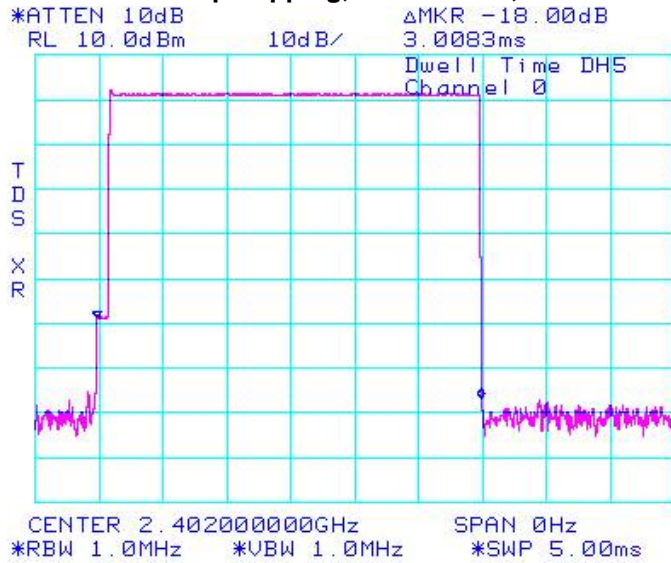
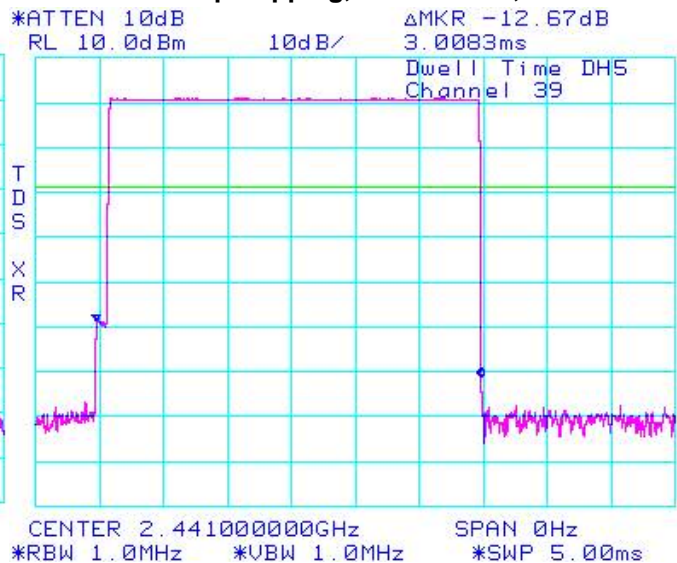


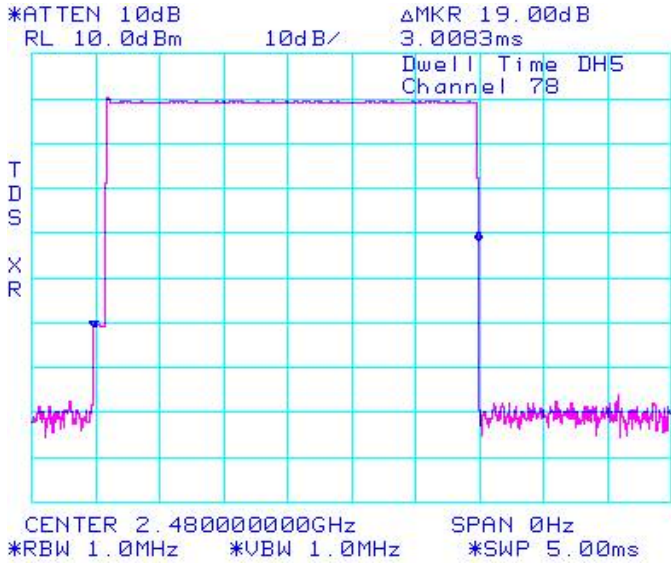
Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-18: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5



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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) and RSS-210, A8.4. 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 (mW)	Limit (W)
0	2.00	1.58	1.0
39	1.33	1.36	1.0
78	0.00	1.00	1.0

The environmental test conditions were:

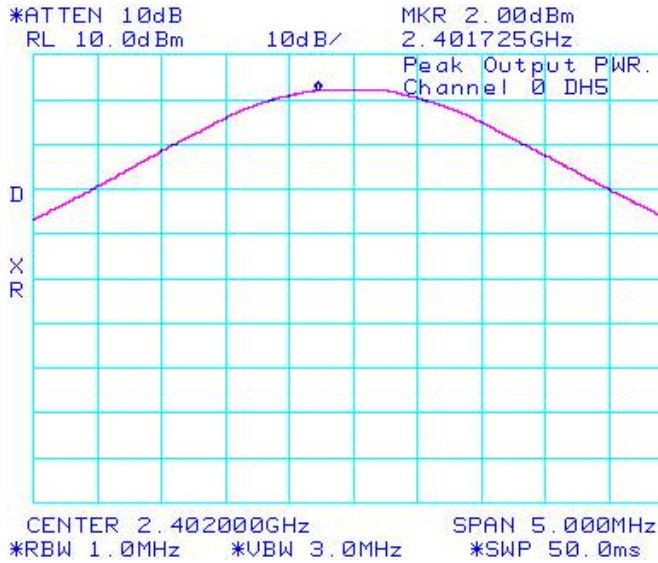
Temperature	22°C
Pressure	1012 mb
Relative Humidity	32%

See figures 3-19 to 3-21 for the plots of the maximum peak conducted output power.

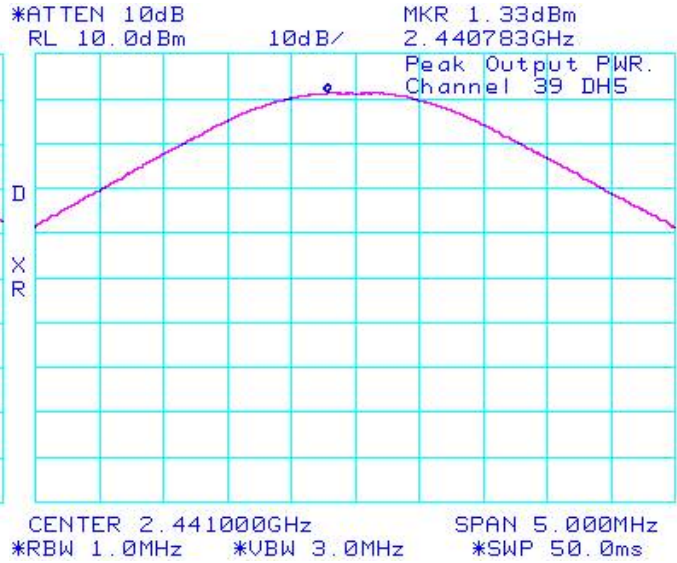
RTS RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBN41GW	
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Bluetooth RF Conducted Emission Test Results cont'd

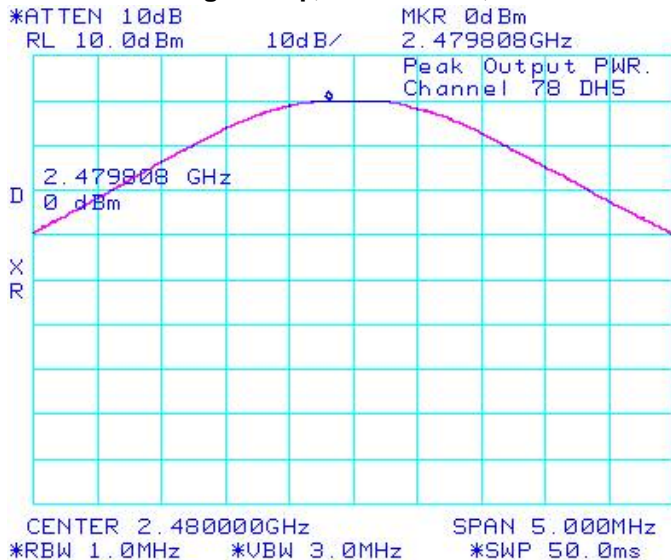
**Figure 3-19: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5**



**Figure 3-20: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5**



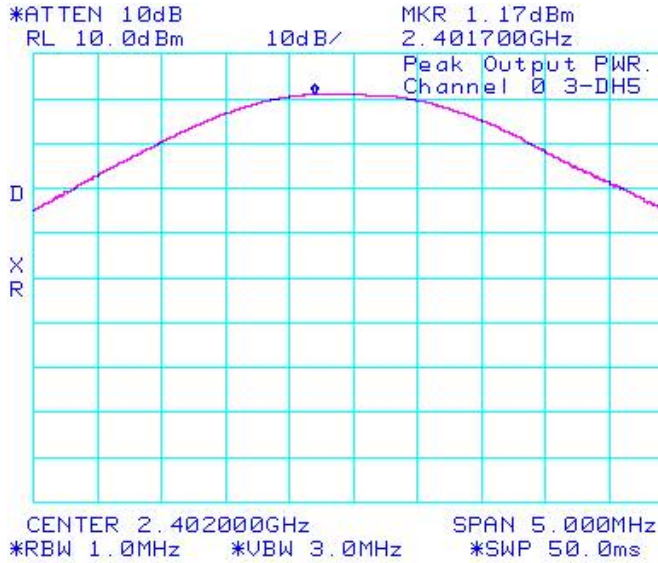
**Figure 3-21: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5**



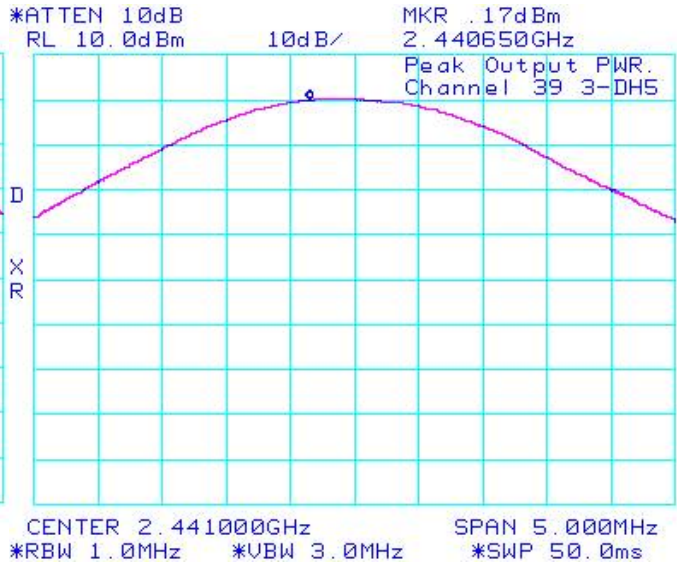
RTS RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBN41GW	
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Bluetooth RF Conducted Emission Test Results cont'd

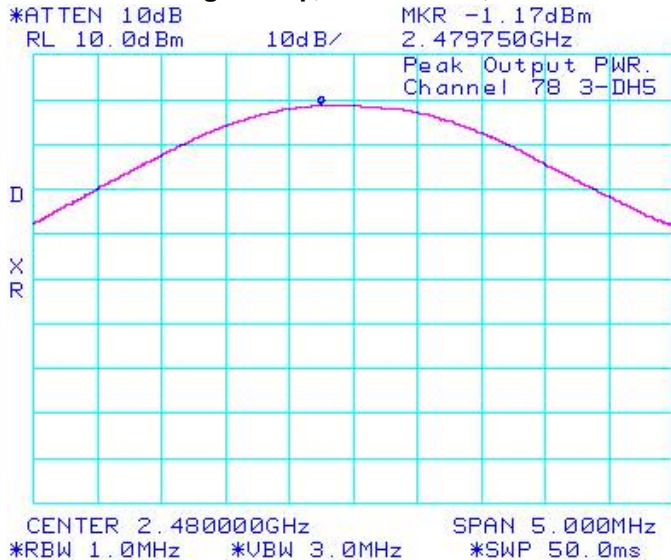
**Figure 3-22: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5**



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



**Figure 3-24: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5**



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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) and RSS-210, A8.5. 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	-36.67	-20	-16.67
78	Single Frequency	-34.66	-20	-14.66
0	Hopping	-36.34	-20	-16.34
78	Hopping	-34.67	-20	-14.67

The environmental test conditions were:

Temperature	22°C
Pressure	1012 mb
Relative Humidity	32%

See figures 3-25 to 3-28 for the plots of the band edge compliance measurements.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-25: Band Edge Compliance

Single Freq., Static PBRS, DH5

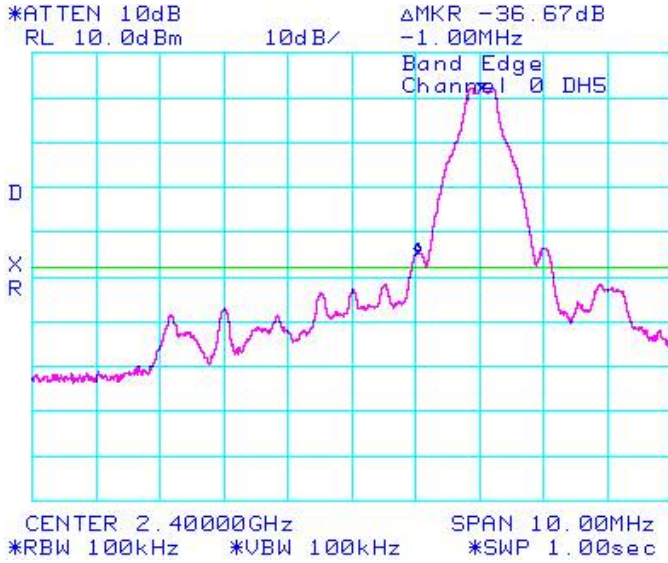


Figure 3-26: Band Edge Compliance

Single Freq., Static PBRS, DH5

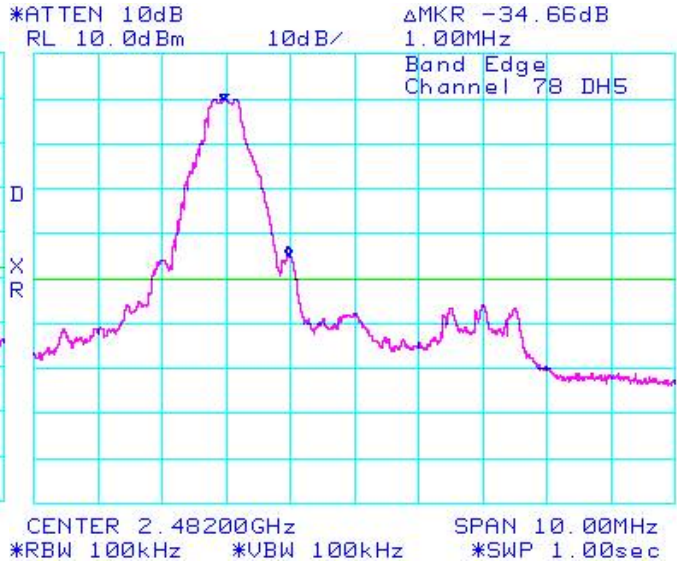


Figure 3-27: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5

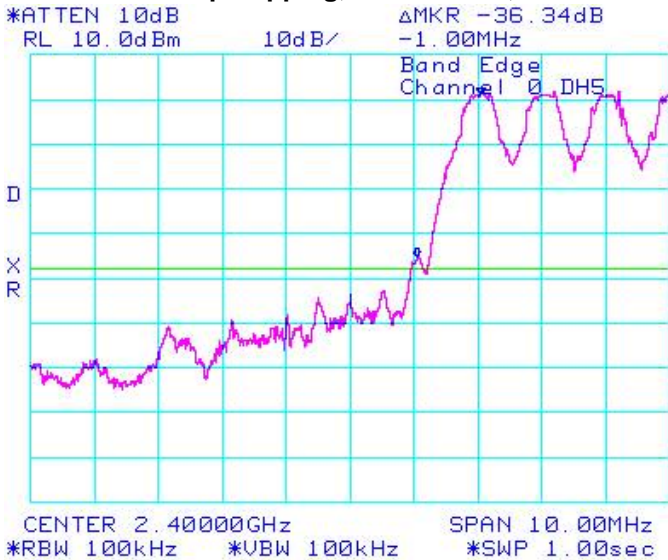
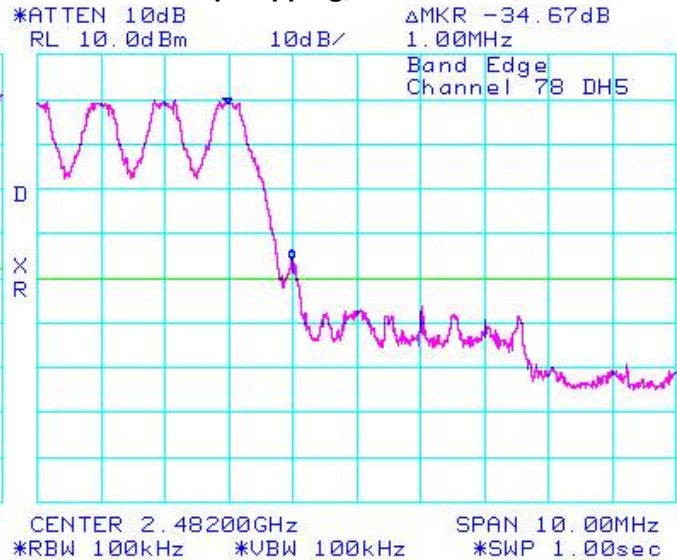


Figure 3-28: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-29: Band Edge Compliance
Single Freq., Static PBRs, 3-DH5

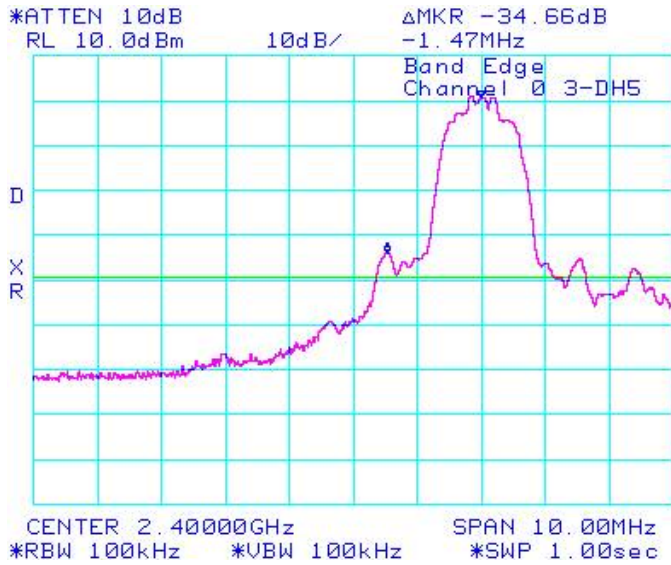


Figure 3-30: Band Edge Compliance
Single Freq., Static PBRs, 3-DH5

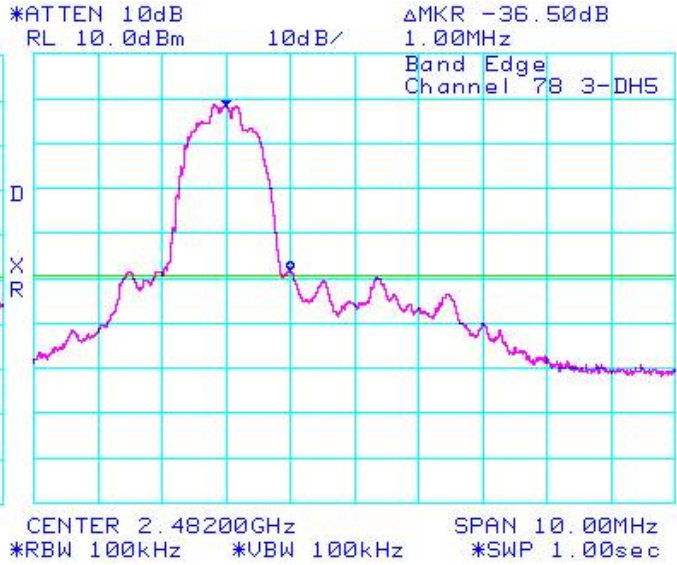


Figure 3-31: Band Edge Compliance
Freq. Hopping, Static PBRs, 3-DH5

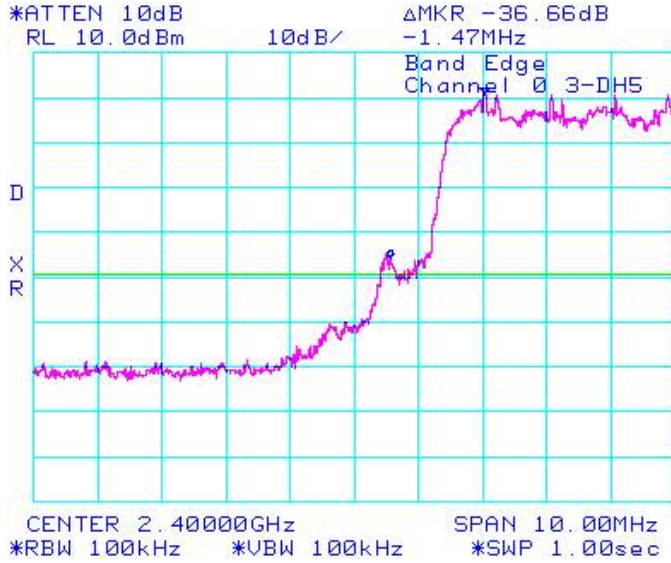


Figure 3-32: Band Edge Compliance
Freq. Hopping, Static PBRs, 3-DH5



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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) and RSS-210, A8.5. 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	2.00	-50.67	-52.67	-20
39	1.33	-55.33	-56.66	-20
78	0.00	-55.17	-55.17	-20
Hopping mode	0.00	-51.33	-51.33	-20

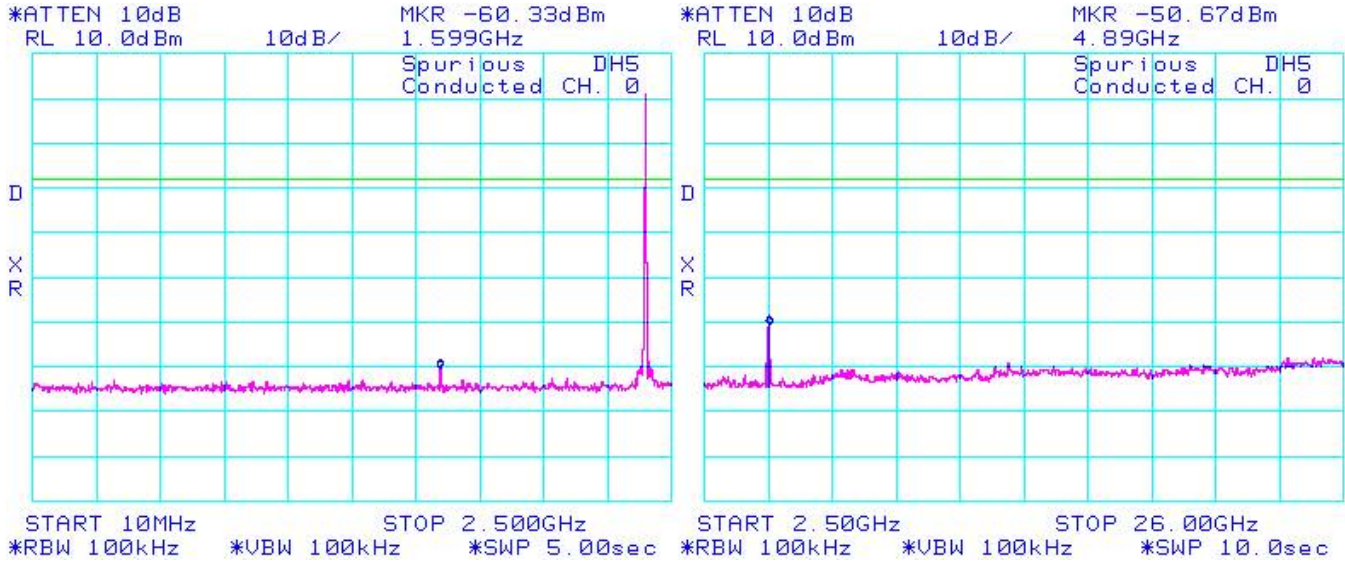
The environmental test conditions were: Temperature 22°C
 Pressure 1012 mb
 Relative Humidity 32%

See figures 3-33 to 3-36 for the plots of the spurious RF conducted emissions.

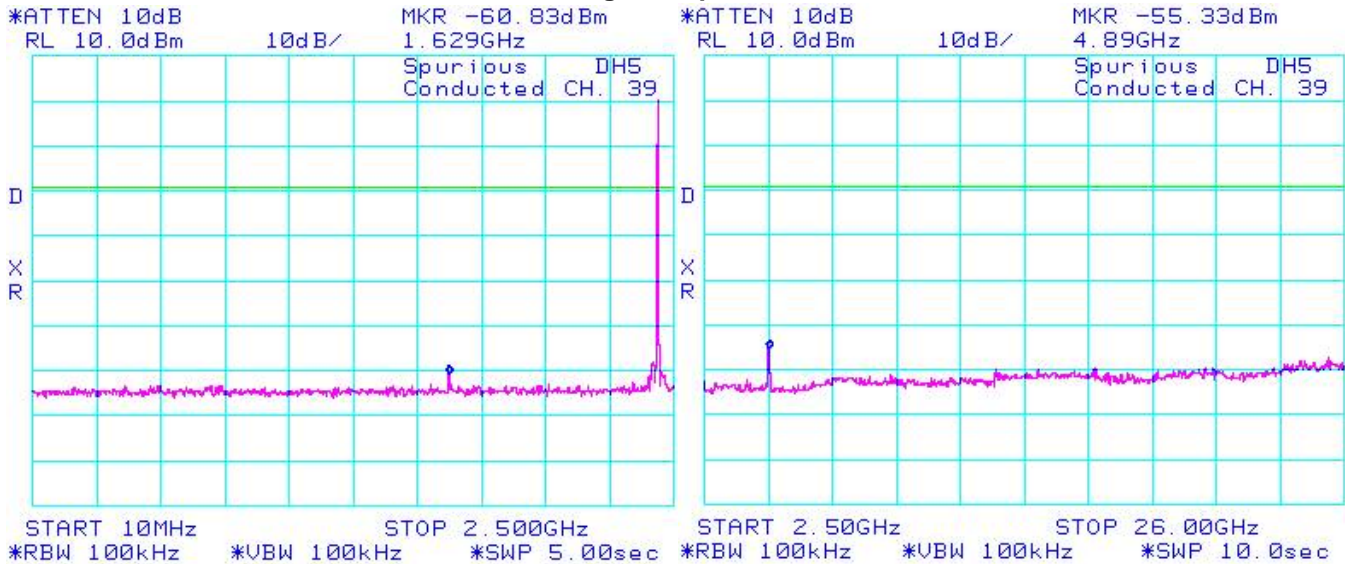
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-33: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5,**



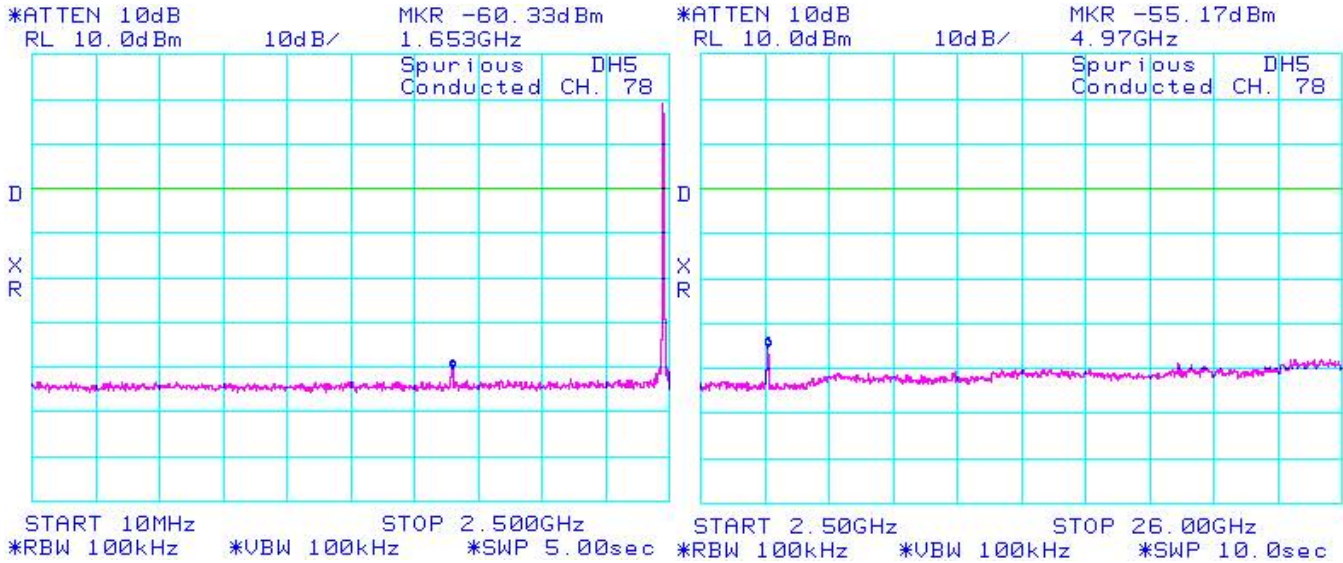
**Figure 3-34: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5**



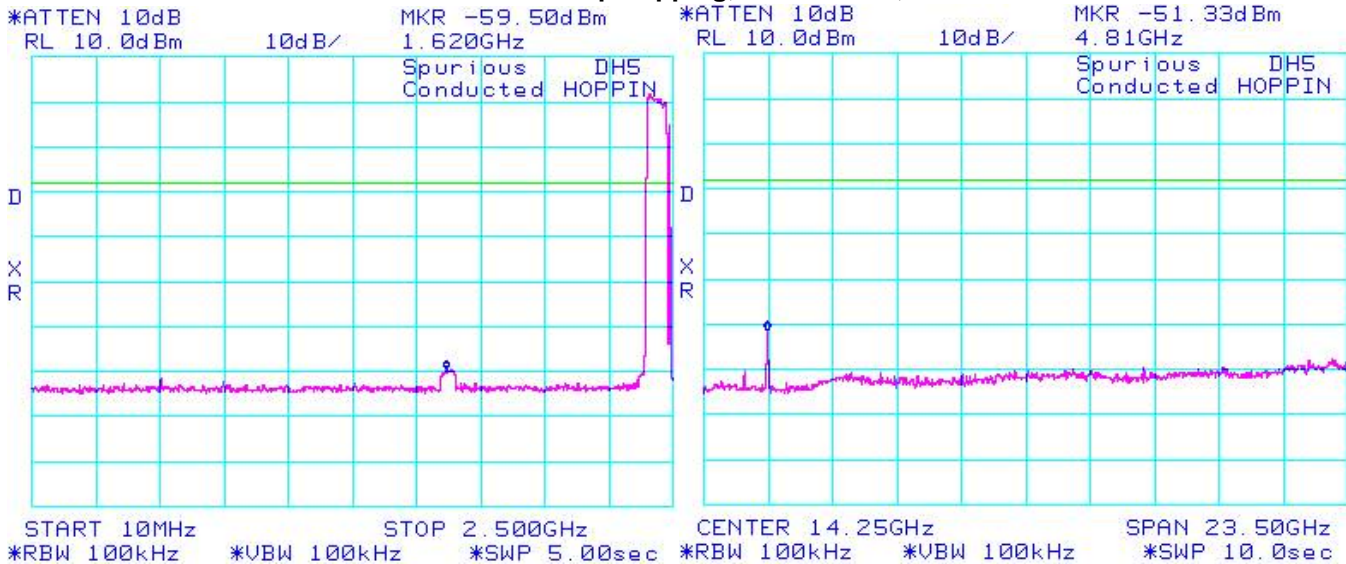
RTS RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBN41GW	
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-35: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5**



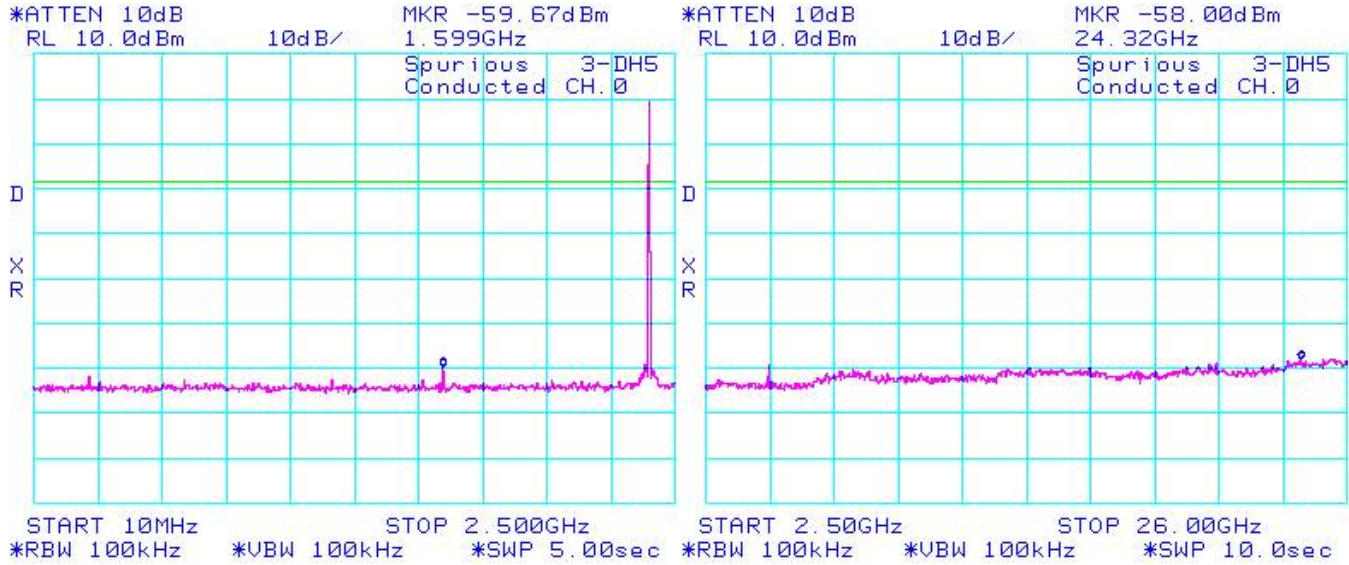
**Figure 3-36: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, DH5**



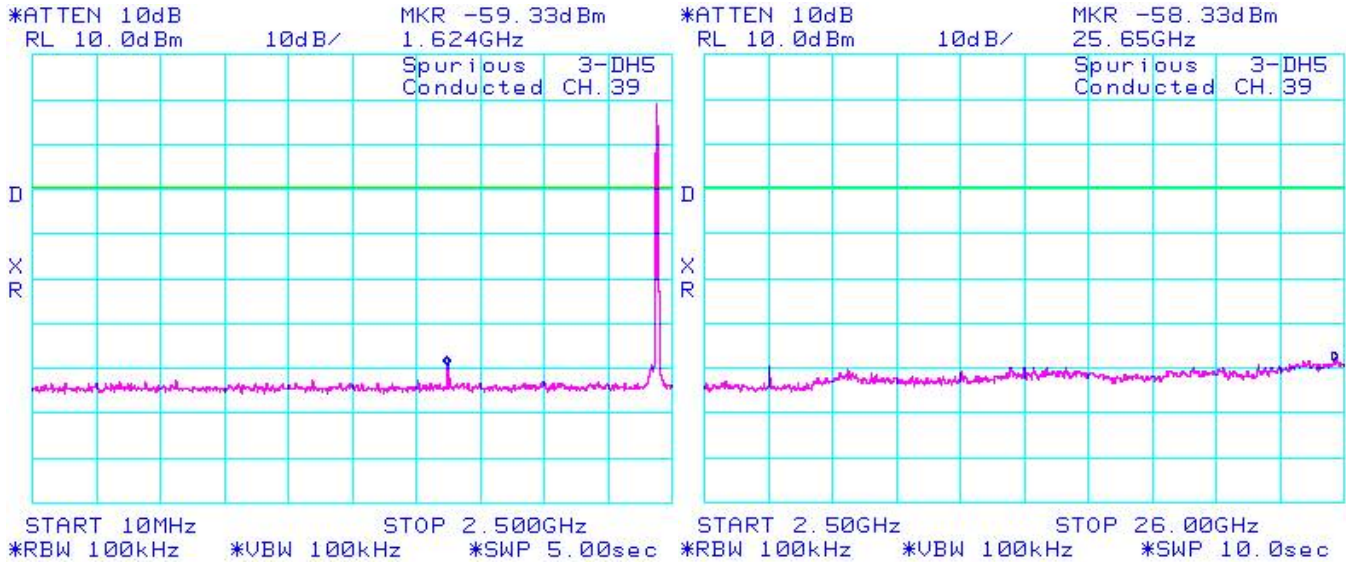
RTS RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBN41GW	
	Test Report No. RTS-0671-0706-16_REV2	Dates of Test May 24 to June 15, 2007

Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-37 : Spurious RF Conducted Emissions
Single Freq., Static PBRs, 3-DH5**



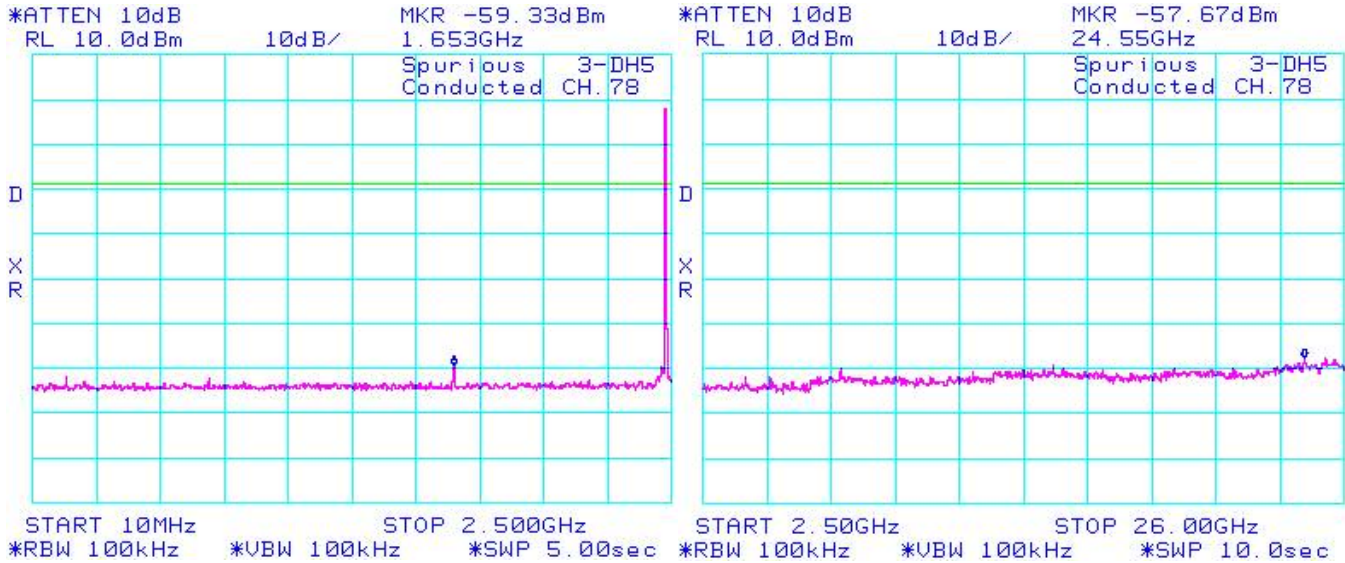
**Figure 3-38: Spurious RF Conducted Emissions
Single Freq., Static PBRs, 3-DH5**



RTS RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBN41GW	
	Test Report No. RTS-0671-0706-16_REV2	Dates of Test May 24 to June 15, 2007

Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-39: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5**



**Figure 3-40 : Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 3-DH5**

