

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

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO.: RTS-1528-0904-01_Rev1

PRODUCT MODEL NO.: RCF71CW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARCF70CW
IC: 2503A-RCF70CW

This Rev1 test report supersedes the previous version RTS-1528-0904-01 dated 08 May, 2009

DATE: 21 May, 2009

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Statement of Performance:

The BlackBerry® smartphone, model RCF71CW, part number CER-24239-001 Rev. 2, 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.

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:



Maurice Battler
Compliance Specialist
Date: 21 May, 2009

Reviewed by:



Masud S. Attayi, P.Eng.
Team Lead, Regulatory Compliance
Date: 21 May, 2009

Approved by:



Paul G. Cardinal, Ph.D.
Director
Date: 21 May, 2009

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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, July 10, 2008
- 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

No associated documents.

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 RIM Testing Services (RTS) EMI test facilities, located at:

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 March 09 to 26, 2009.

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The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCF71CW	CER-24239-001 Rev. 2	306FB537
2	RCF71CW	CER-24239-001 Rev. 2	306F59C7
3	RCF71CW	CER-24239-001 Rev. 2	306FB2A7
4	RCF71CW	CER-24239-001 Rev. 2	306F5AAB

BlackBerry® smartphone Accessories Tested

- 1) Folding Blade Charger part number HDW-17955-001 with an output voltage of 5.0 volts, 700 mA and attached USB cable with a lead length of 1.80 metres.
- 2) Captive Cable Charger part number HDW-17957-003 with an output voltage of 5.0 volts dc, 700 mA and attached USB cable with a lead length of 1.80 metres.
- 3) BlackBerry® Charging Pod, part number HDW-22385-001.
- 4) Premium Multi-Button Stereo Headset, part number HDW-15765-001, 1.3 meters long.
- 5) Mono Headset HDW-12420-003, 1.3 metres long.

D. Support Equipment Used for the Testing of the EUT

No support equipment required; for list of equipment refer to section H, Compliance Test Equipment Used.

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E. Test Results Chart

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

F. Modifications to EUT

No modifications were required on the EUT.

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G. 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. BlackBerry® smartphone, PIN 306F59C7 was in battery charging mode and Bluetooth Tx mode. The input voltage was 120 V, 60 Hz.

The following test configuration was measured:

1. The BlackBerry® smartphone with the Premium Multi-Button Stereo Headset connected was sitting 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 and IC RSS-210 limits. The sample EUT had a worse case test margin of 12.70 dB below the limit at 0.393 MHz using the quasi peak detector.

See APPENDIX 1 for the test data

Measurement Uncertainty ±3.0 dB

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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® smartphone PIN 306FB2A7 and PIN 306F5AAB 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 and RSS-210.

The Bluetooth harmonics were investigated up to the 10th harmonic. The sample EUT had a worse case test margin of 3.47 dB below the limit at 4960 MHz using the Average detector.

See APPENDIX 2 for the test data

Measurement Uncertainty ±4.6 dB

Co-Location Measurements

The radiated emissions were measured up to 18 GHz for middle channels for simultaneous transmission in the following test configuration combinations: GSM 850, PCS and Bluetooth as well as CDMA cellular, CDMA PCS and Bluetooth. Both the horizontal and vertical polarizations were measured. The emissions due to different simultaneous transmission did not increase the amplitude of any emissions nor did it produce any new inter-modulation products as a result of mixing.

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3) 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/RSS-GEN.
See APPENDIX 2 for the test data

4) 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. 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 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. The result includes both normal data rate and EDR.
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. 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. 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. 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.

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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. 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**

The EUT 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 3 for the test data.

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H. 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	09-12-02	Conducted/Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	09-06-03	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
Horn Antenna	TDK	HRN-0118	030101	10-07-22	Radiated Emissions
Environment Monitor	Control Company	1870	80117164	10-01-08	Conducted/Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	09-11-17	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	09-05-12	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	100034	09-12-09	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT	100370	09-12-08	Radiated Emissions
Signal Generator	Agilent	8648C	4037U03155	09-09-20	Frequency Stability
Power Meter	Agilent	N1911A	MY45100905	09-04-22	Frequency Stability
Power Sensor	Agilent	N1921A	MY45100905	09-05-09	Frequency Stability
Digital Multimeter	Hewlett Packard	34401A	US36042324	09-10-01	Conducted/Radiated Emissions

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APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

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Bluetooth AC Conducted Emission Test Results

Test Configuration 1

Date of test: March 09, 2009

The environmental test conditions were: Temperature: 24° C
Pressure: 1020 mb
Relative Humidity: 33%

The measurements were performed by Heng Lin.

FCC CFR 47 Part 15, Subpart B and IC ICES-003, Class B

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.150	N	31.41	9.69	41.10	66.00	56.00	-24.90
0.177	L1	35.59	9.81	45.40	64.63	54.63	-19.23
0.213	N	26.01	9.79	35.80	63.09	53.09	-27.29
0.263	L1	30.75	9.85	40.60	61.35	51.35	-20.75
0.317	L1	29.79	9.80	39.60	59.80	49.80	-20.20
0.393	N	35.44	9.86	45.30	58.00	48.00	-12.70
0.492	N	28.11	9.89	38.00	56.13	46.13	-18.13
0.632	L1	30.18	9.62	39.80	56.00	46.00	-16.20
0.771	L1	25.72	9.58	35.30	56.00	46.00	-20.70
1.037	N	25.66	9.64	35.30	56.00	46.00	-20.70
1.464	N	21.70	9.60	31.30	56.00	46.00	-24.70
2.085	L1	27.16	9.54	36.70	56.00	46.00	-19.30
2.760	N	24.49	9.61	34.10	56.00	46.00	-21.90
3.557	L1	27.99	9.61	37.60	56.00	46.00	-18.40
3.917	N	25.49	9.61	35.10	56.00	46.00	-20.90
4.011	L1	28.26	9.64	37.90	56.00	46.00	-18.10
7.949	N	25.77	9.63	35.40	60.00	50.00	-24.60
8.898	L1	30.31	9.79	40.10	60.00	50.00	-19.90
10.401	N	25.72	9.68	35.40	60.00	50.00	-24.60
10.725	L1	28.96	9.84	38.80	60.00	46.00	-21.20

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.

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AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

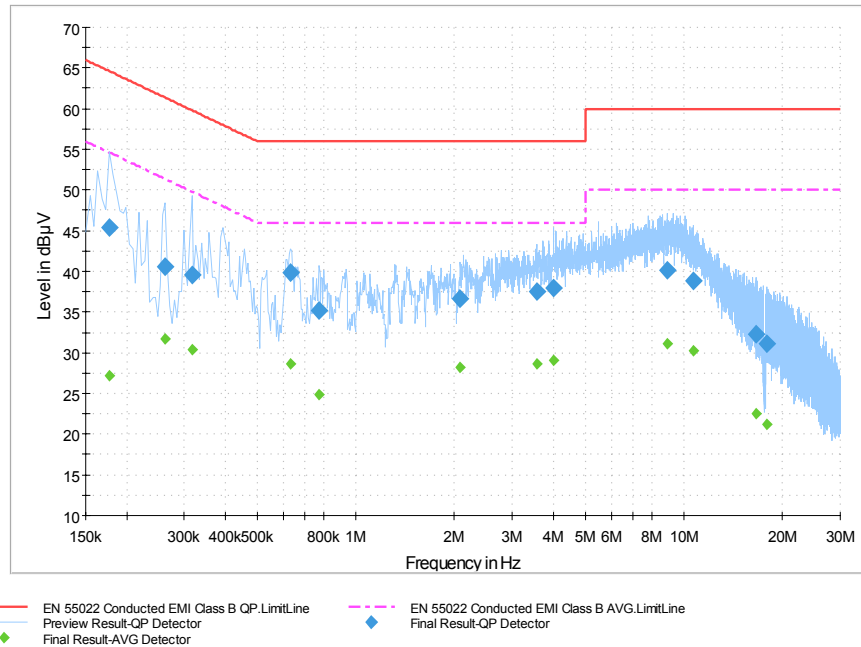
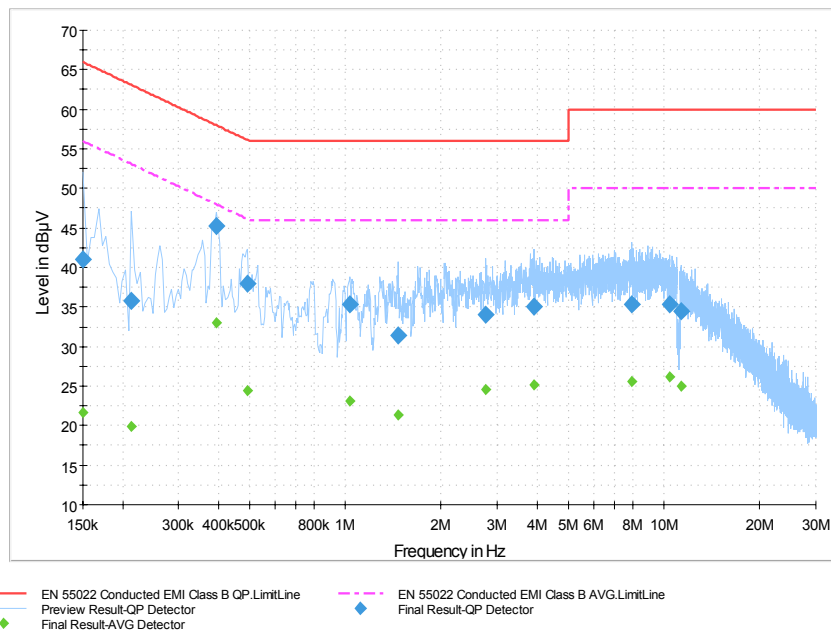


Figure 1-2: N Lines



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APPENDIX 2 – RADIATED EMISSIONS TEST DATA

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Radiated Emissions Test Data Results

Bluetooth Band

Date of Test: March 17 to 23, 2009

The measurements were performed by Arjun Rai Bhatti.

The environmental test conditions were: Temperature: 25°C
Pressure: 1010 mb
Relative Humidity: 22%

Test Distance was 3.0 metres with a EUT height of 0.8 metre, sweep frequency of 30 MHz to 1 GHz

The BlackBerry® smartphone PIN 306FB2A7 in Bluetooth Tx mode was in standalone, vertical position.

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

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

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Radiated Emissions Test Data Results cont'd

Bluetooth Band

Date of Test: March 26, 2009

The environmental test conditions were: Temperature 24°C
Pressure 1008 mb
Relative Humidity 23%

The measurements were performed by Heng Lin.

Test Distance was 3.0 metres with a EUT height of 0.8 metre, sweep frequency of 1 GHz to 25GHz.

The BlackBerry® smartphone PIN 306F5AAB was in Bluetooth Tx mode.

The frequency sweep measurements were performed in single frequency mode using packet type "DH5", "2-DH5" and "3-DH5".

Type	Channel	Frequency (MHz)	Antenna		Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
			Type	Pol					
Single frequency mode Low Channel, packet type "DH5", USB side down									
2 nd	0	4804.0	Horn	V	40.17	58.80	PK.	74	-15.20
2 nd	0	4804.0	Horn	H	-				
2 nd	0	4804.0	Horn	V	29.89	48.25	AVE.	54	-5.48
2 nd	0	4804.0	Horn	H	-				
The emissions were investigated up to the 10 th harmonic. Emissions above the 2 nd harmonic were in the NF.									
Single frequency mode Low Channel, packet type "2-DH5" USB side down.									
2 nd	0	4804.0	Horn	V	-	-	PK.	74	-
2 nd	0	4804.0	Horn	H	-				
The harmonics were investigated up to the 10th harmonic. Emissions were in the noise floor.									
Single frequency mode Low Channel, packet type "3-DH5" USB side down.									
2 nd	0	4804.0	Horn	V	-	-	PK.	74	-
2 nd	0	4804.0	Horn	H	-				
The emissions were investigated up to the 10 th harmonic. Emissions were in the noise floor.									

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Bluetooth Radiated Emissions Test Results cont'd

Bluetooth Band

Type	Channel	Frequency (MHz)	Antenna		Reading (Peak)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
			Type	Pol	(dBuV)				
Single frequency mode Middle Channel, packet type "DH5", USB side down									
2 nd	39	4882.0	Horn	V	38.42	57.26	PK.	74	-16.74
2 nd	39	4882.0	Horn	H	-				
2 nd	39	4882.0	Horn	V	28.27	47.04	AVE.	54	-6.96
2 nd	39	4882.0	Horn	H	-				
The emissions were investigated up to the 10 th harmonic. Emissions above the 2 nd harmonic were in the NF.									
Single frequency mode Middle Channel, packet type "2-DH5" USB side down.									
2 nd	39	4882.0	Horn	V	-	-	PK.	74	-
2 nd	39	4882.0	Horn	H	-				
The harmonics were investigated up to the 10th harmonic. Emissions were in the noise floor.									
Single frequency mode Middle Channel, packet type "3-DH5" USB side down.									
2 nd	39	4882.0	Horn	V	-	-	PK	74	-
2 nd	39	4882.0	Horn	H	-				
The harmonics were investigated up to the 10th harmonic. Emissions were in the noise floor.									

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Bluetooth Radiated Emissions Test Results cont'd

Bluetooth Band

Type	Channel	Frequency (MHz)	Antenna		Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
			Type	Pol					
Single frequency mode high Channel, packet type "DH5", USB side down									
2 nd	78	4960.0	Horn	V	40.17	59.89	PK.	74	-14.11
2 nd	78	4960.0	Horn	H	-				
2 nd	78	4960.0	Horn	V	30.81	50.53	AVE.	54	-3.47
2 nd	78	4960.0	Horn	H	-				
The emissions were investigated up to the 10 th harmonic. Emissions above the 2 nd harmonic were in the NF.									
Single frequency mode high Channel, packet type "2-DH5" USB side down.									
2 nd	78	4960.0	Horn	V	-	-	PK.	74	-
2 nd	78	4960.0	Horn	H	-				
The harmonics were investigated up to the 10th harmonic. Emissions were in the noise floor.									
Single frequency mode High Channel, packet type "3-DH5" USB side down.									
2 nd	78	4960.0	Horn	V	-	-	PK	74	-
2 nd	78	4960.0	Horn	H	-				
The harmonics were investigated up to the 10th harmonic. Emissions were in the noise floor.									

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Band-Edge Compliance of RF Radiated Emissions Test Results

Date of test: March 25, 2009

The environmental test conditions were: Temperature: 23° C
Pressure: 1007 mb
Humidity: 25 %

The measurements were performed by Arjun Rai Bhatti

BlackBerry® smartphone PIN 306FB2A7 was in standalone, vertical, Pattern type “Static PBRS” during the measurements.

The test distance was 3.0 metres.

Channel	Freq. (MHz)	Rx Antenna Type POL.	Detector (PK, AVE.)	VBW (MHz)	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
Low Channel, Packet Type 3-DH5									
0	2402.0	Horn V	PK	1 MHz	95.84	55.47	40.37	74	-33.63
0	2402.0	Horn H	PK	1 MHz	85.51	49.11	36.40	74	-37.60
0	2402.0	Horn V	AVE.	10 Hz	75.48	55.47	20.01	54	-33.99
0	2402.0	Horn H	AVE.	10 Hz	68.40	51.34	17.06	54	-36.94
High Channel, Packet Type 3-DH5									
78	2480.0	Horn V	PK	1 MHz	92.73	44.13	48.60	74	-25.40
78	2480.0	Horn H	PK	1 MHz	87.97	43.12	44.85	74	-29.15
78	2480.0	Horn V	AVE.	10 Hz	73.53	44.13	29.40	54	-24.60
78	2480.0	Horn H	AVE.	10 Hz	70.44	43.12	27.32	54	-26.68
High Channel, Packet Type DH5									
78	2480.0	Horn V	PK	1 MHz	94.74	54.59	40.15	74	-33.85
78	2480.0	Horn H	PK	1 MHz	89.19	48.46	40.73	74	-33.27
78	2480.0	Horn V	AVE.	10 Hz	76.50	54.59	21.91	54	-32.09
78	2480.0	Horn H	AVE.	10 Hz	73.10	48.46	24.64	54	-29.36

See figures 2-1 to 2-6 for the plots of the Bluetooth band-edge compliance.

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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

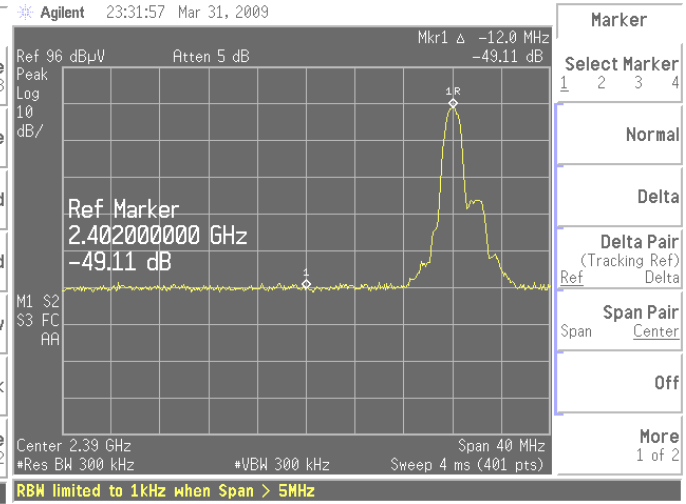
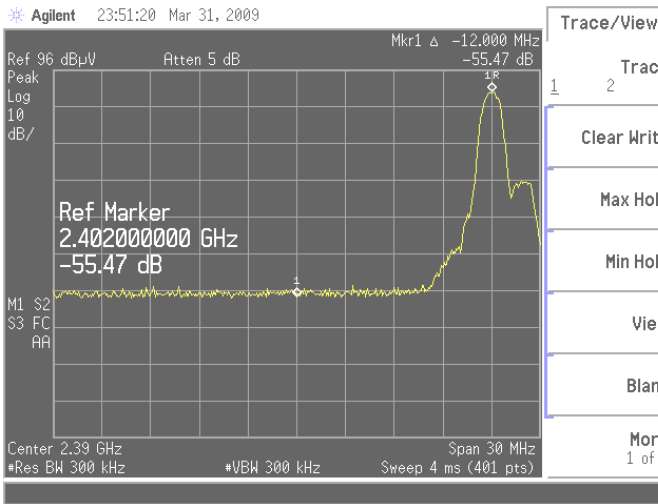
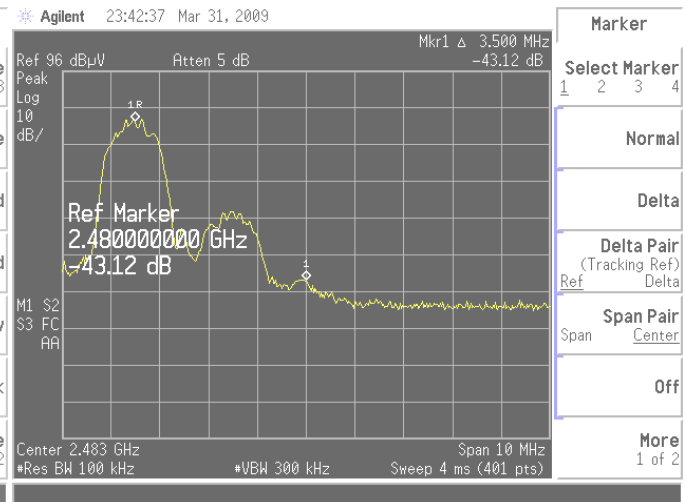
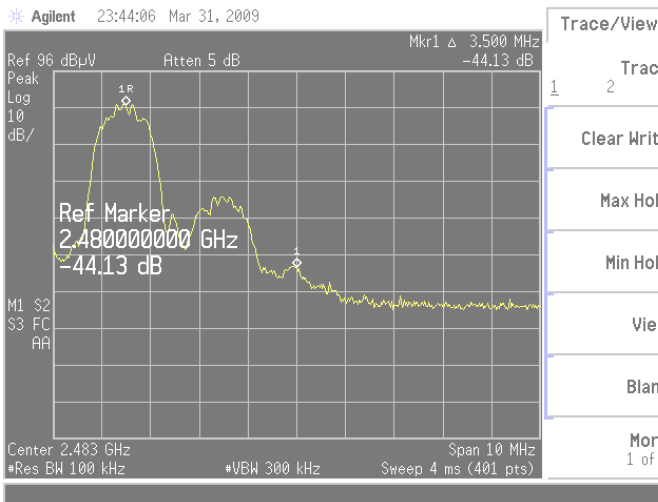


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
DH5, Channel 78, Pol: V, Detector: PK

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

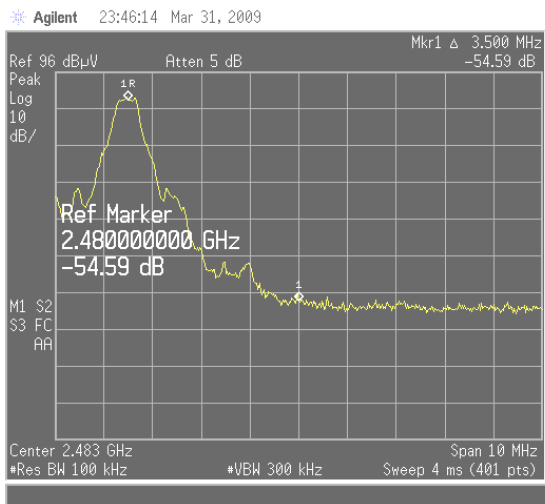


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Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

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

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



Trace/View

Trace 1 2 3

Clear Write

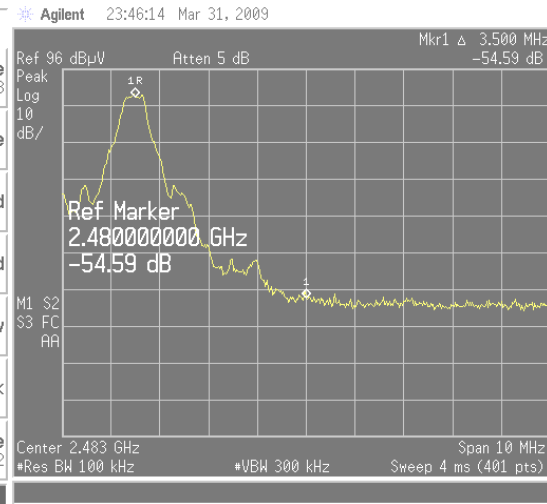
Max Hold

Min Hold

View

Blank

More 1 of 2



Trace/View

Trace 1 2 3

Clear Write

Max Hold

Min Hold

View

Blank

More 1 of 2

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APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

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Bluetooth RF Conducted Emission Test Results

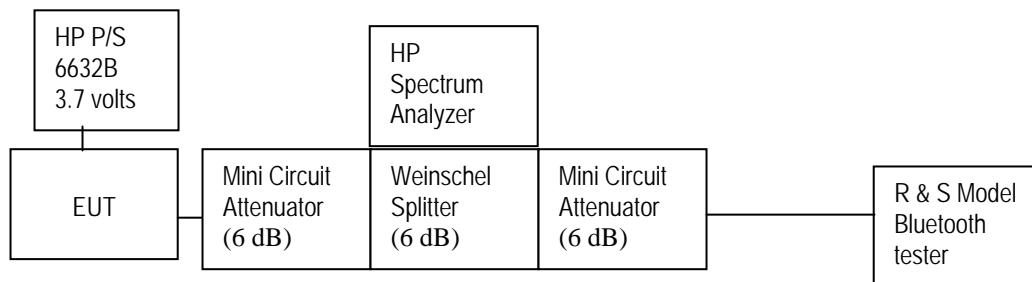
Date of test: March 26, 2009

The environmental test conditions were: Temperature: 23°C
Pressure: 1019 mb
Relative Humidity: 23%

The measurements were performed by Maurice Battler.

Bluetooth power output from BlackBerry® smartphone PIN 306FB537 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 attenuators and coaxial cable loss in the test circuit.

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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. 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	0.877
39	≤1.0	0.913
78	≤1.0	0.920

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

Figure 3-1: 20 dB Bandwidth

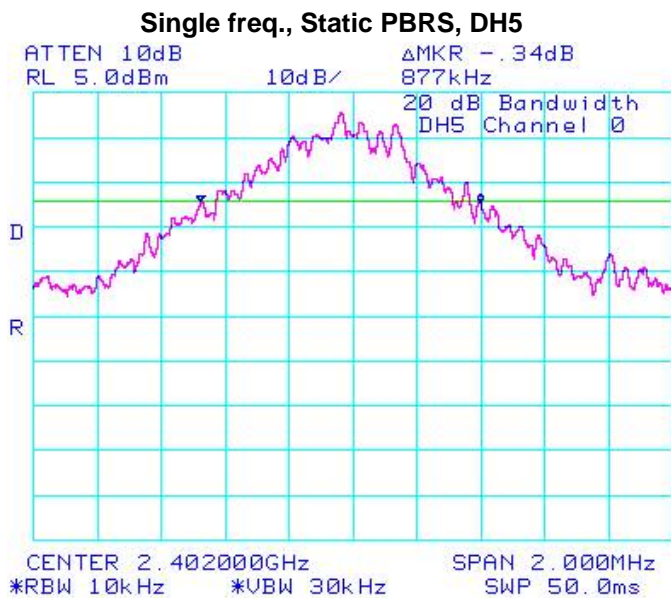
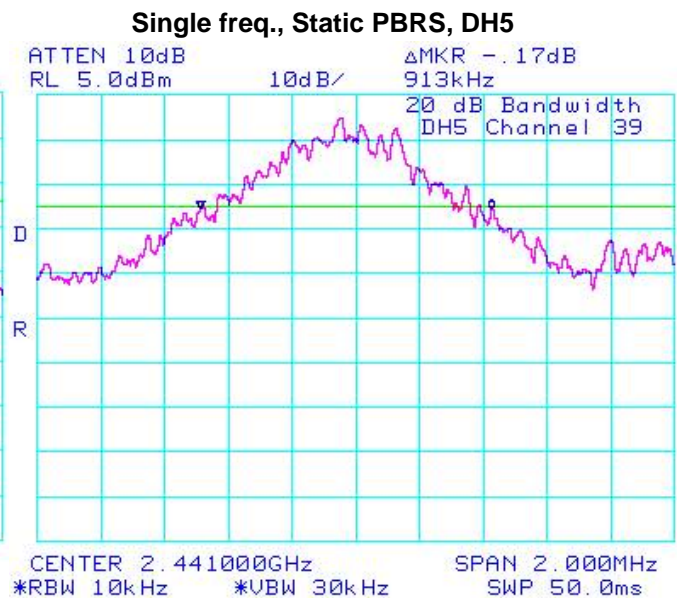


Figure 3-2: 20 dB Bandwidth

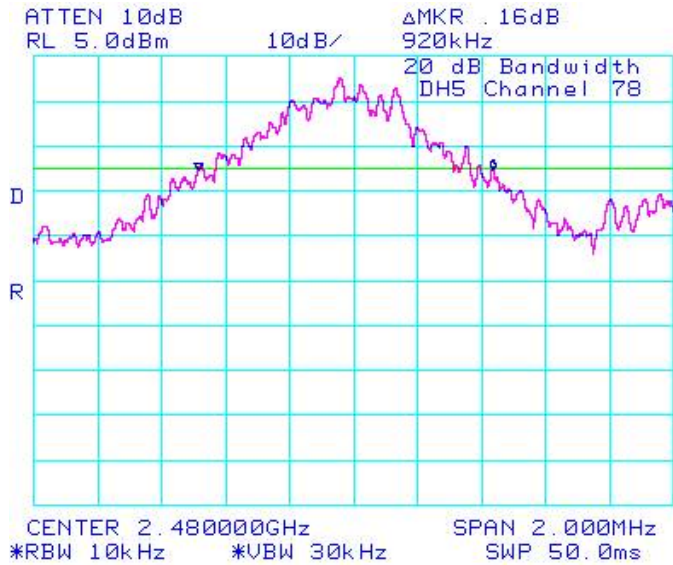


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Bluetooth RF Conducted Emission Test Results cont'd

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	1.200
39	≤1.5	1.230
78	≤1.5	1.197

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

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-4: 20 dB Bandwidth

Single freq., Static PBRs, 3-DH5

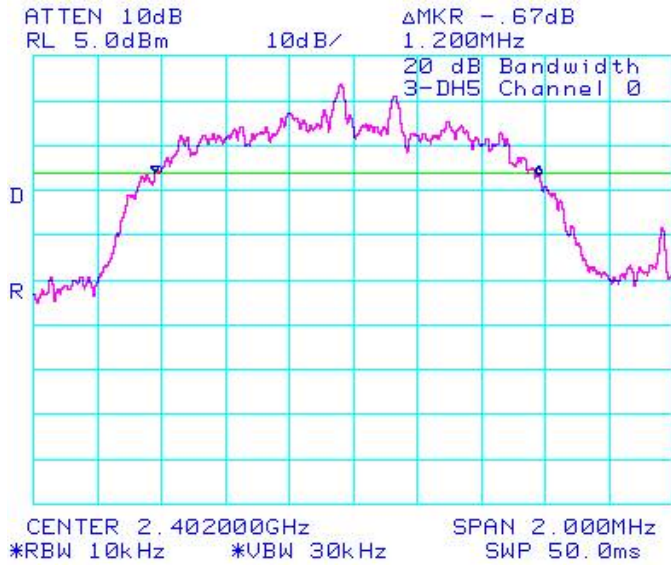


Figure 3-5: 20 dB Bandwidth

Single freq., Static PBRs, 3-DH5

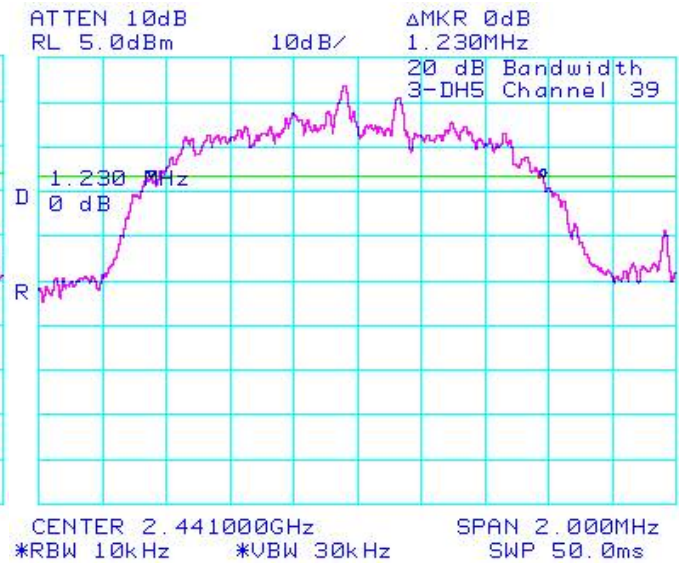
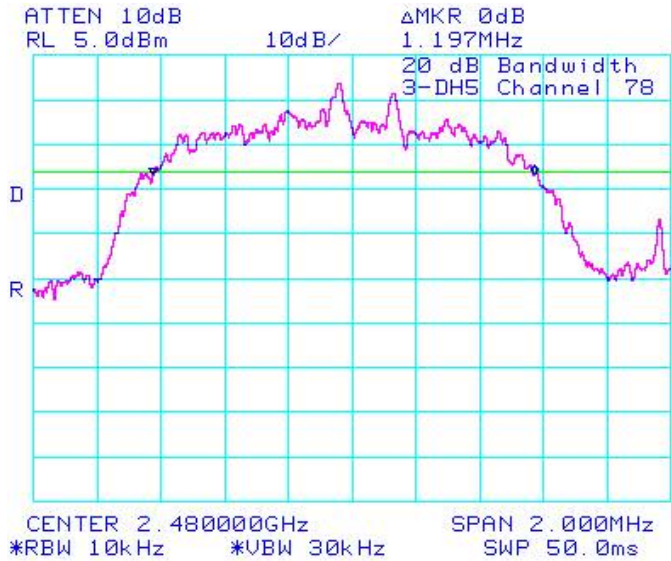


Figure 3-6: 20 dB Bandwidth

Single freq., Static PBRs, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

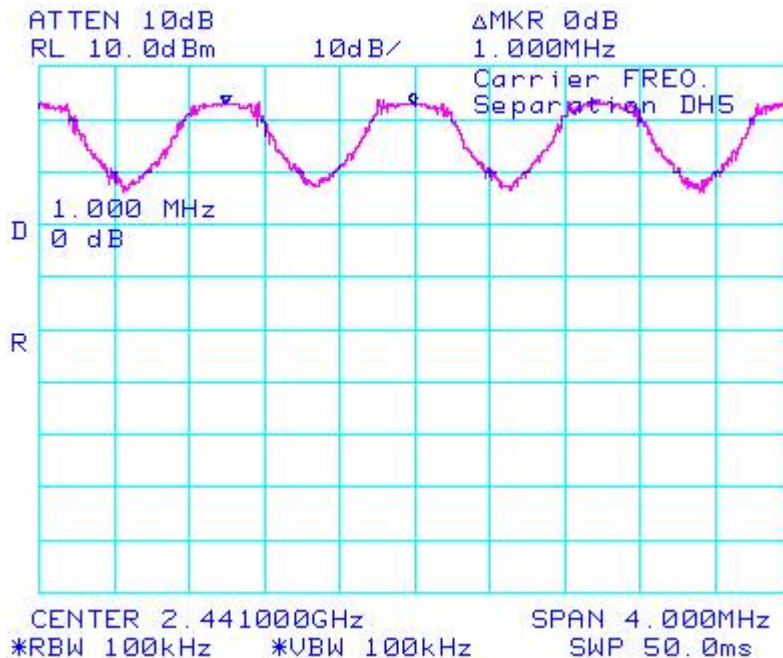
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.

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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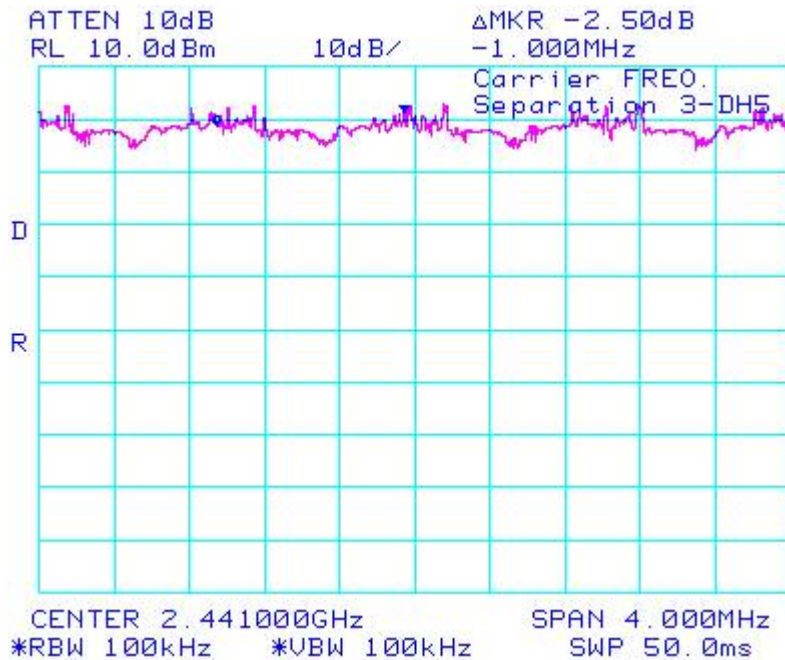
Bluetooth RF Conducted Emission Test Results cont'd

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



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Bluetooth RF Conducted Emission Test Results cont'd

Number of Hopping Frequencies

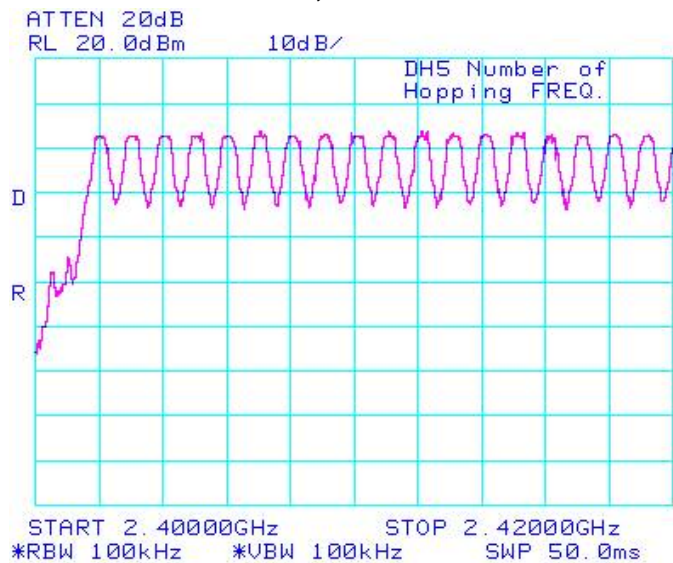
The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. Bluetooth was operating in frequency hopping (Euro/US) mode.

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

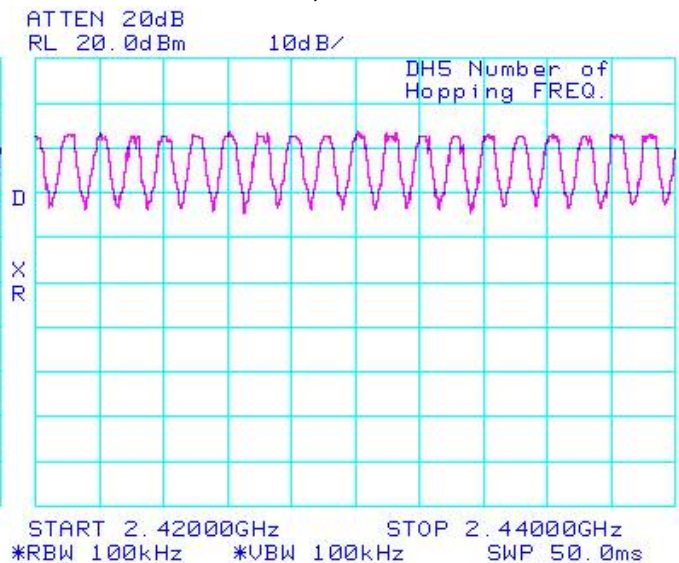
Limit (CH)	Number of Hopping Frequencies (CH)
≥75	79

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

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



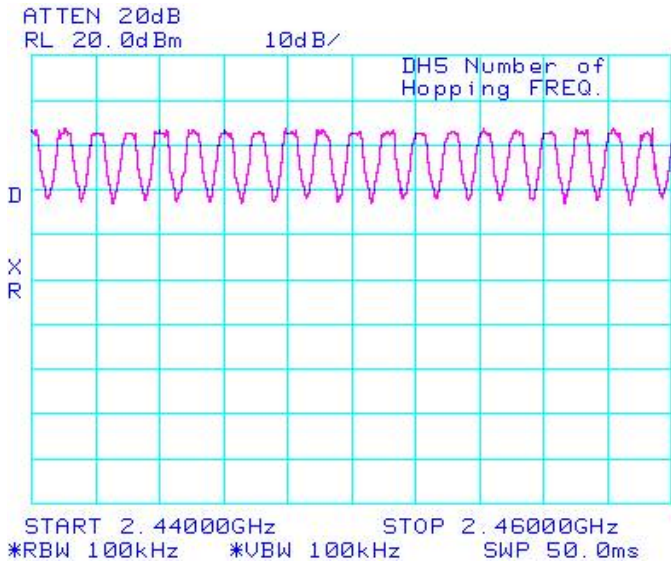
**Figure 3-10: Number of Hopping Frequencies
Static PBRs, DH5**



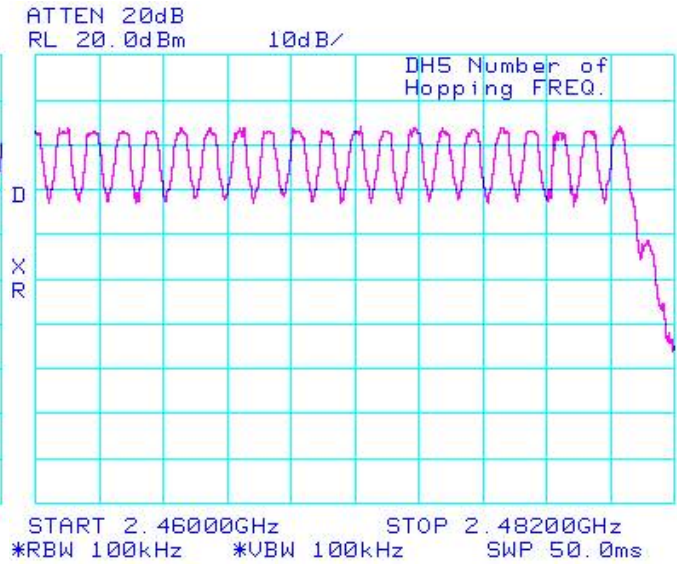
RTS RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCF71CW APPENDIX 3	
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-11: Number of Hopping Frequencies
Static PBRS, DH5**



**Figure 3-12: 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. 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 (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	0.5287	$0.5287 \times 320.0 = 169.18$	400	230.82
39	DH1	0.5243	$0.5243 \times 320.0 = 167.78$	400	232.22
78	DH1	0.5243	$0.5243 \times 320.0 = 160.38$	400	239.62
0	DH3	1.7857	$1.7857 \times 159.9 = 285.53$	400	114.47
39	DH3	1.7767	$1.7767 \times 159.9 = 284.09$	400	115.91
78	DH3	1.7767	$1.7767 \times 159.9 = 284.09$	400	115.91
0	DH5	3.0200	$3.0200 \times 106.8 = 322.54$	400	77.46
39	DH5	3.0300	$3.0300 \times 106.8 = 323.60$	400	76.40
78	DH5	3.0100	$3.0100 \times 106.8 = 321.47$	400	78.53

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

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Bluetooth RF Conducted Emission Test Results cont'd

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

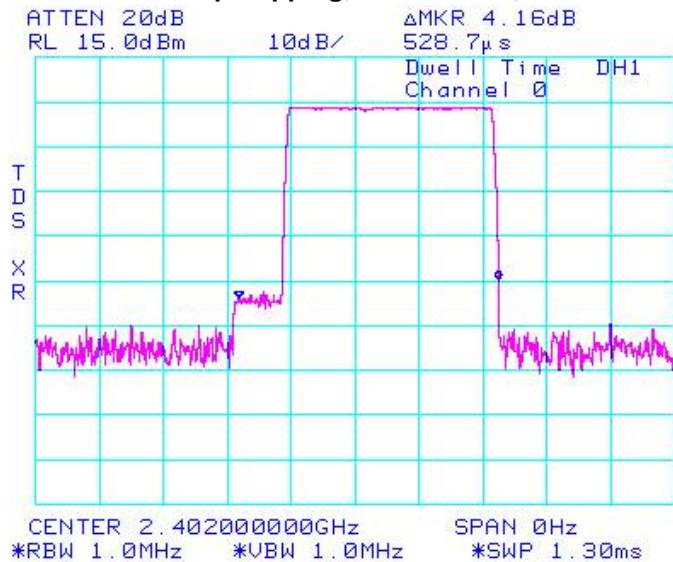


Figure 3-14: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

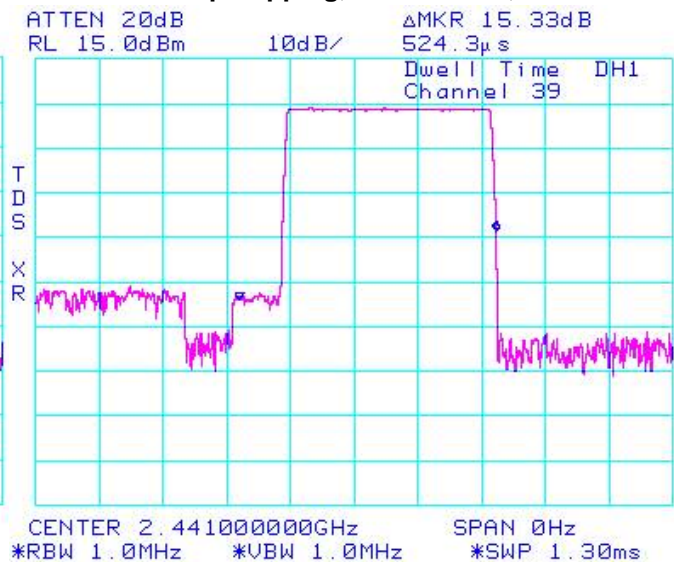


Figure 3-15: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

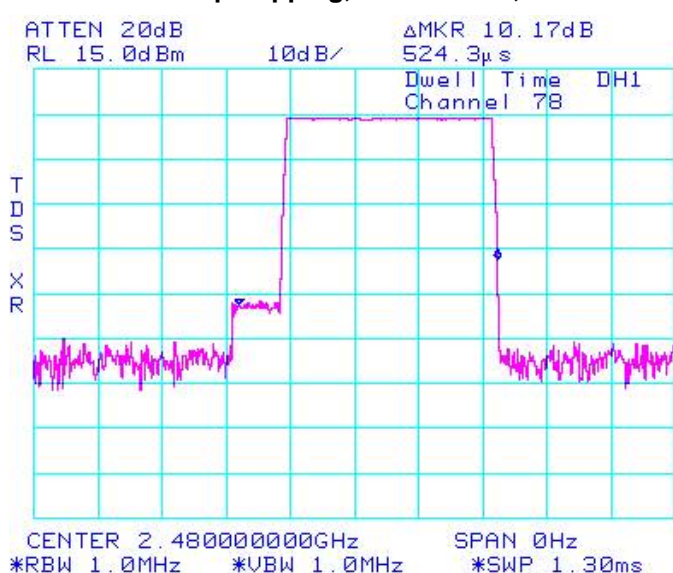
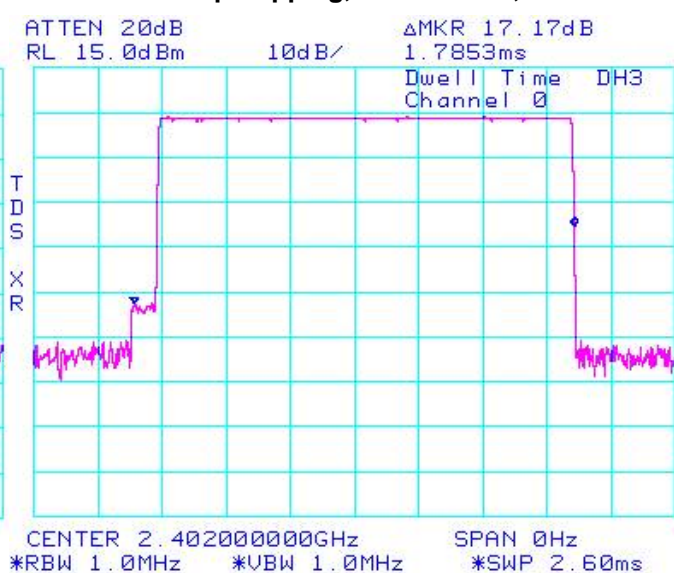


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3



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Bluetooth RF Conducted Emission Test Results cont'd

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

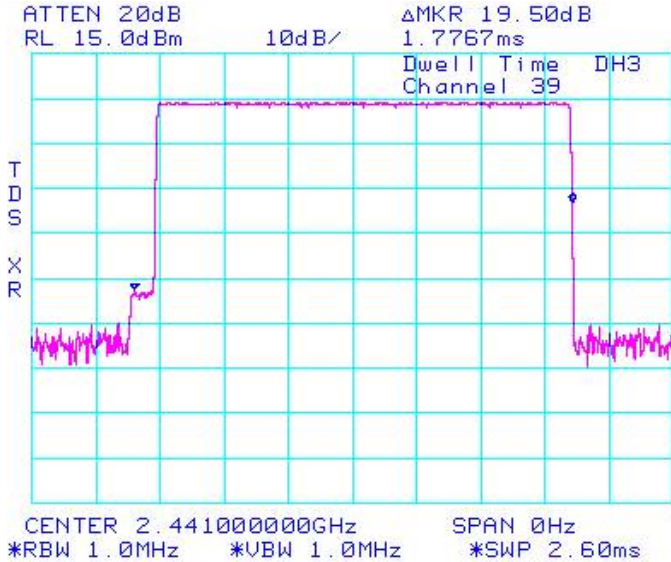


Figure 3-18 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3

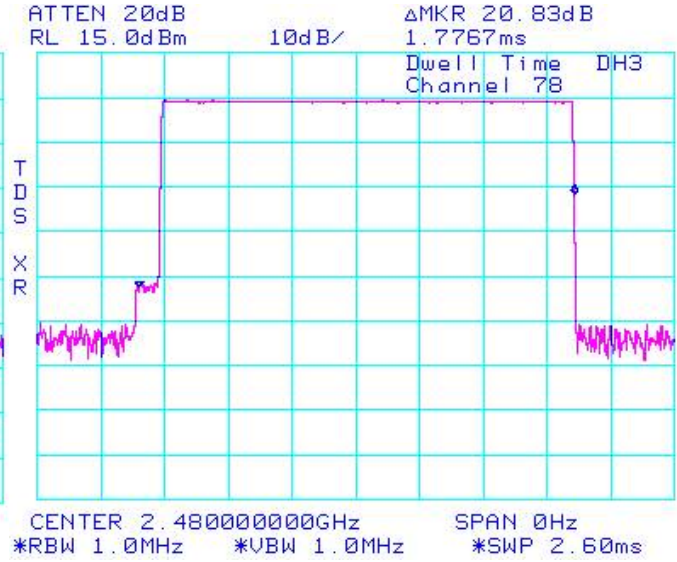


Figure 3-19: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

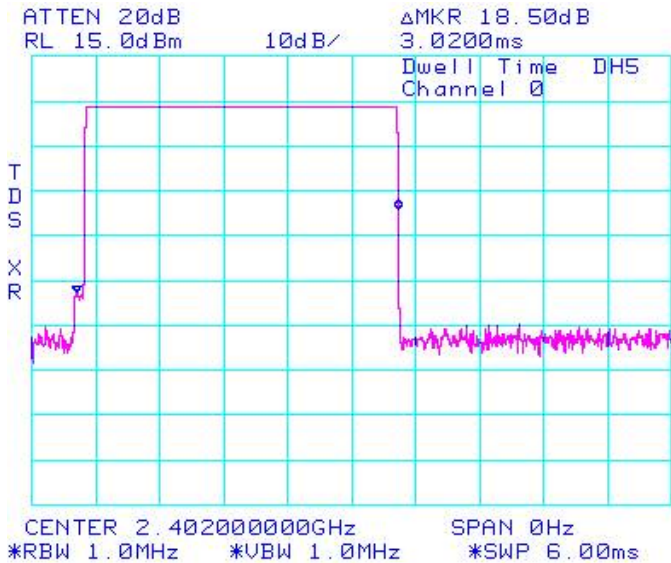
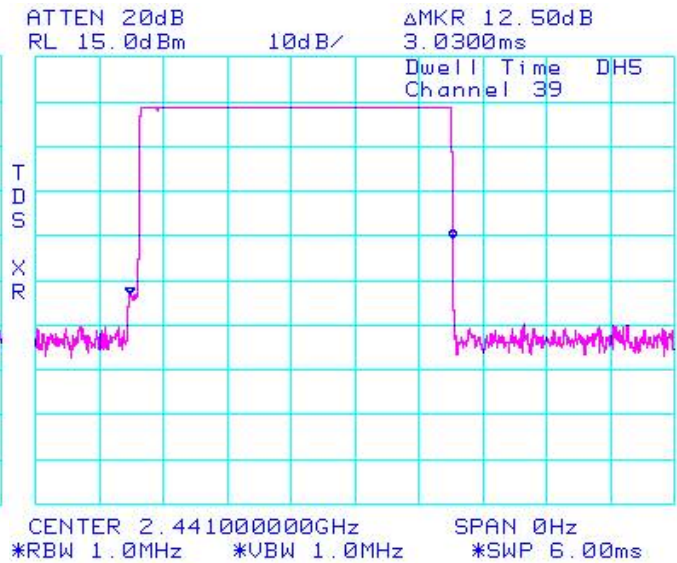


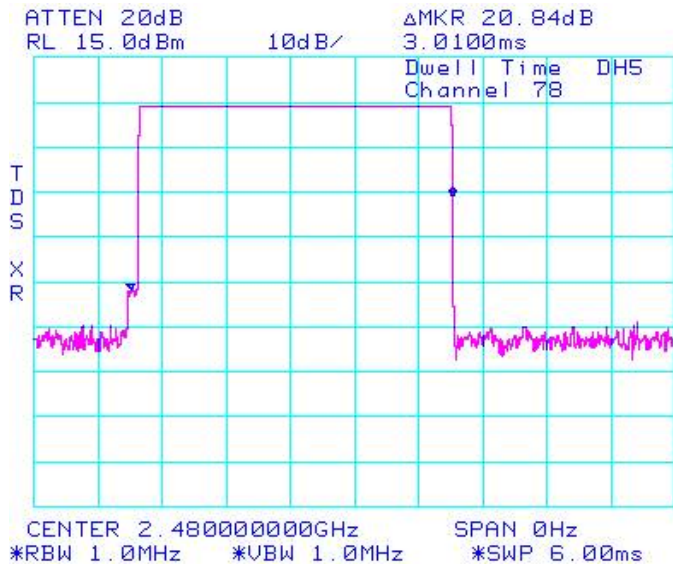
Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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



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.

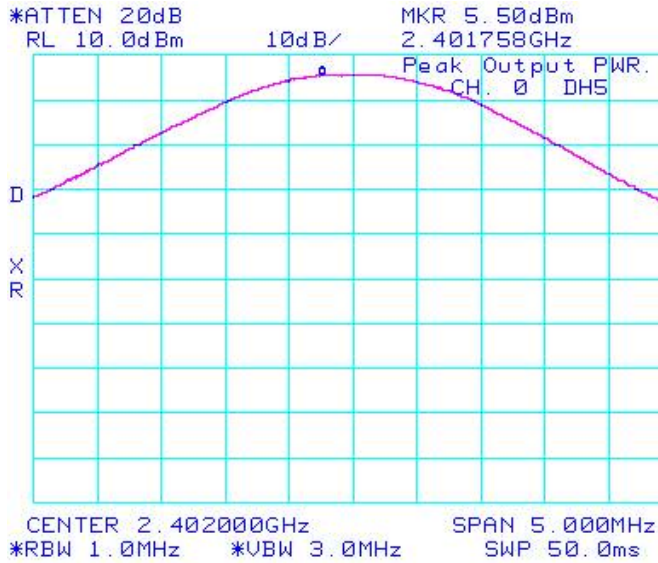
Bluetooth Channel	Measured Level (dBm)	Class 1 Limit (dBm)
0	5.50	0.0 to 20.0
39	5.17	0.0 to 20.0
78	3.83	0.0 to 20.0

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

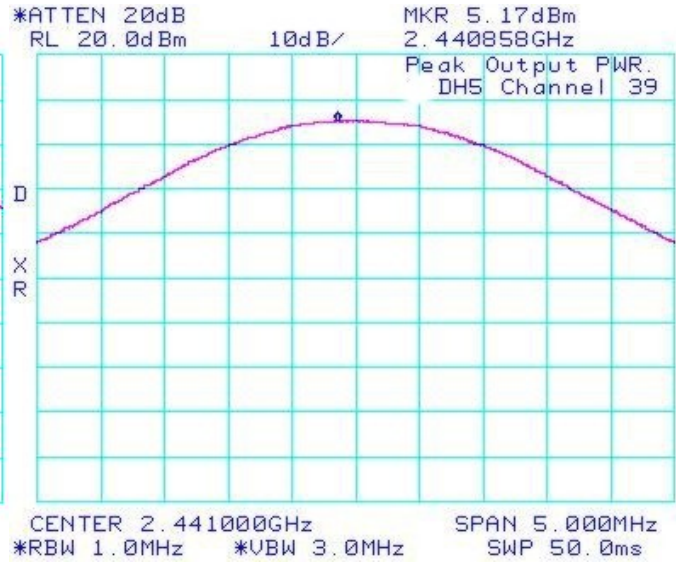
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Bluetooth RF Conducted Emission Test Results cont'd

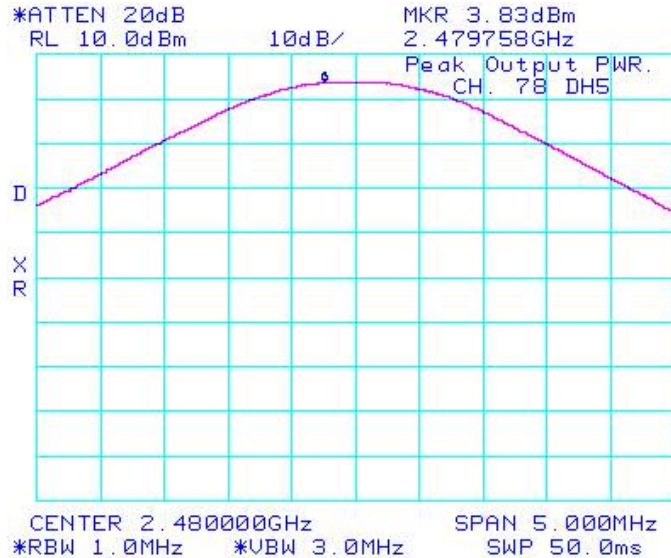
**Figure 3-22: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5**



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



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



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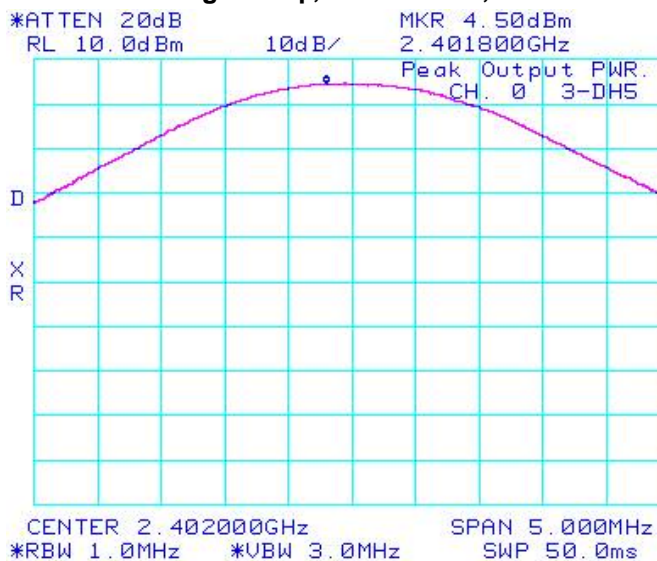
Bluetooth RF Conducted Emission Test Results cont'd

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

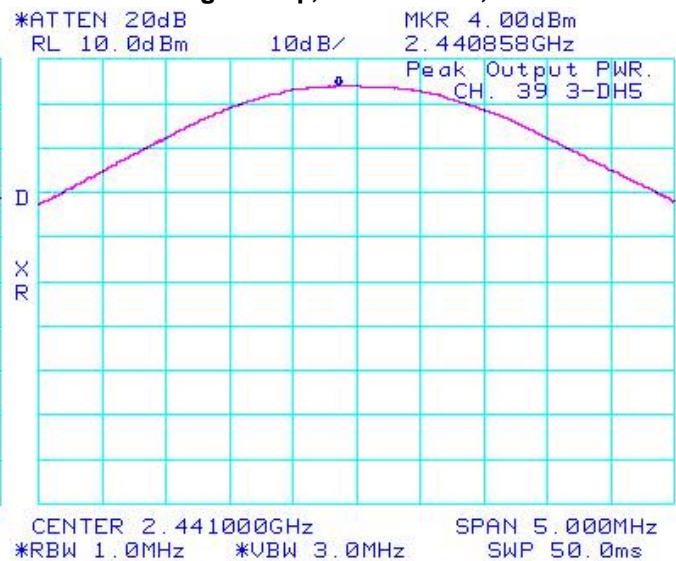
Bluetooth Channel	Measured Level (dBm)	Class 1 Limit (dBm)
0	4.50	0.0 to 20.0
39	4.00	0.0 to 20.0
78	2.17	0.0 to 20.0

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

**Figure 3-25: Max. Peak Conducted Output Power
Single Freq., Static PBRs, 3-DH5**



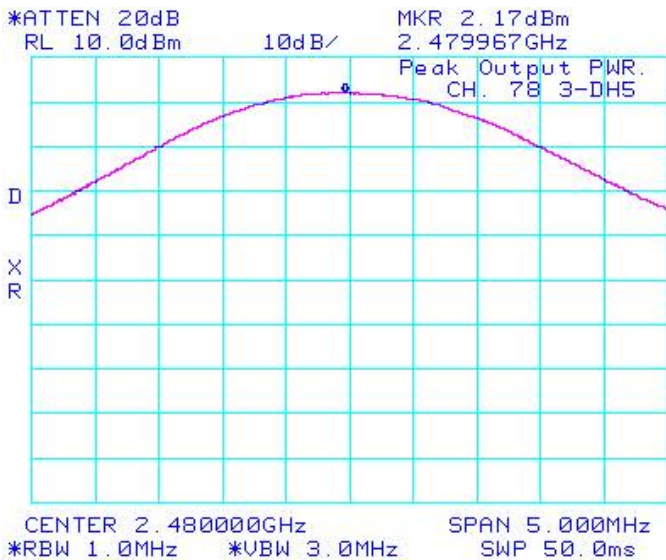
**Figure 3-26: Max. Peak Conducted Output Power
Single Freq., Static PBRs, 3-DH5**



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Bluetooth RF Conducted Emission Test Results cont'd

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



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	-27.83	-20	-7.83
78	Single Frequency	-25.50	-20	-5.50
0	Hopping	-28.16	-20	-8.16
78	Hopping	-25.17	-20	-5.00

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

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-28: Band Edge Compliance

Single Freq., Static PBRS, DH5

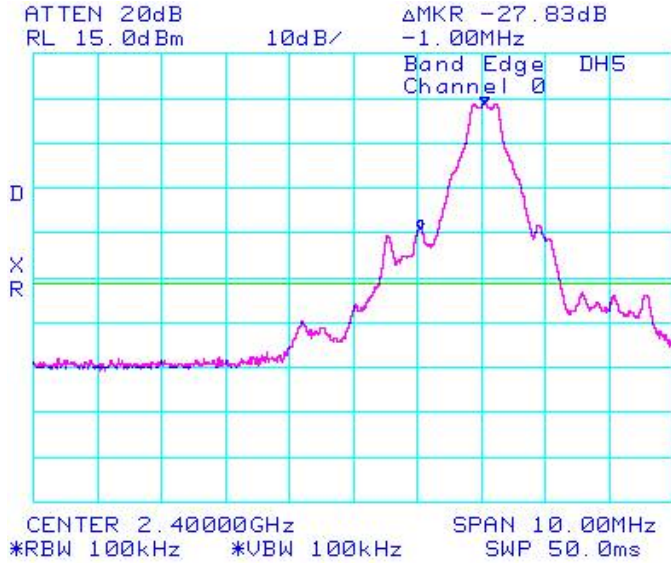


Figure 3-29: Band Edge Compliance

Single Freq., Static PBRS, DH5

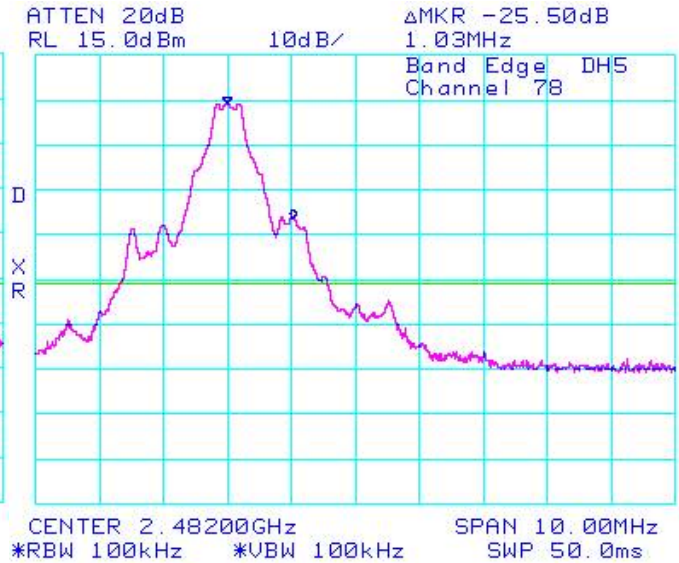


Figure 3-30: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5

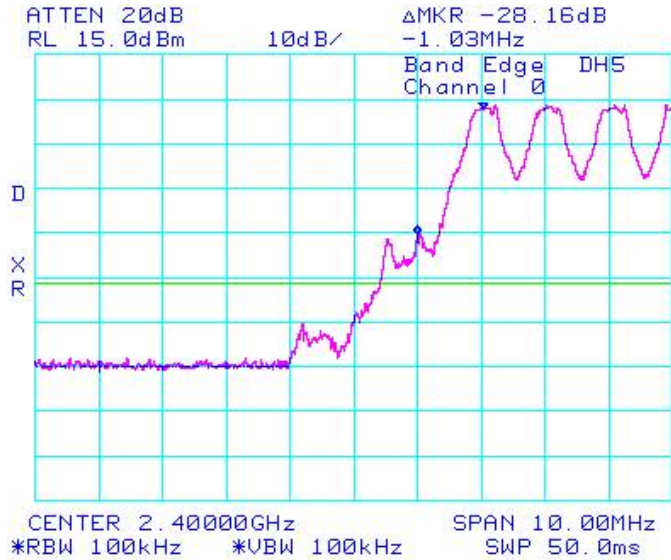
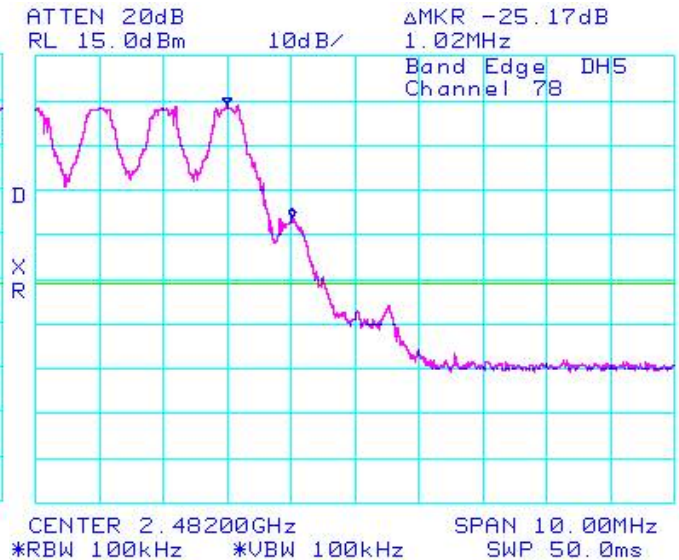


Figure 3-31: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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	-36.33	-20	-16.33
78	Single Frequency	-25.00	-20	-5.00
0 - 78	Hopping	-36.33	-20	-16.33
0 - 78	Hopping	-24.84	-20	-4.84

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

Figure 3-32: Band Edge Compliance

Single Freq., Static PRBS, 3-DH5

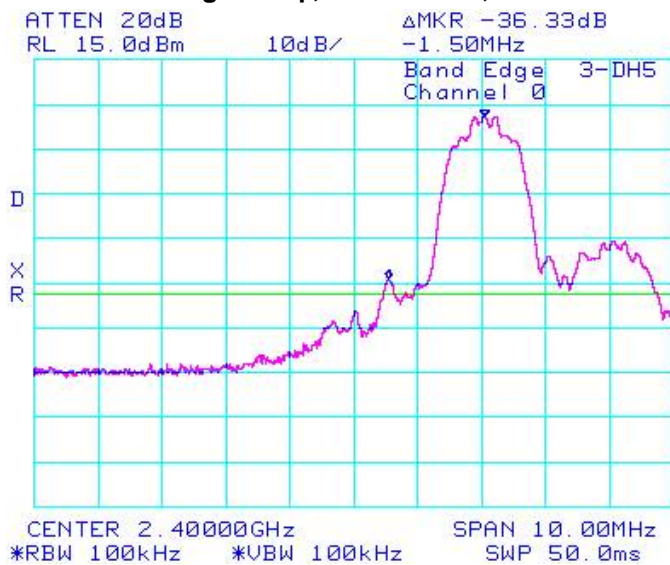
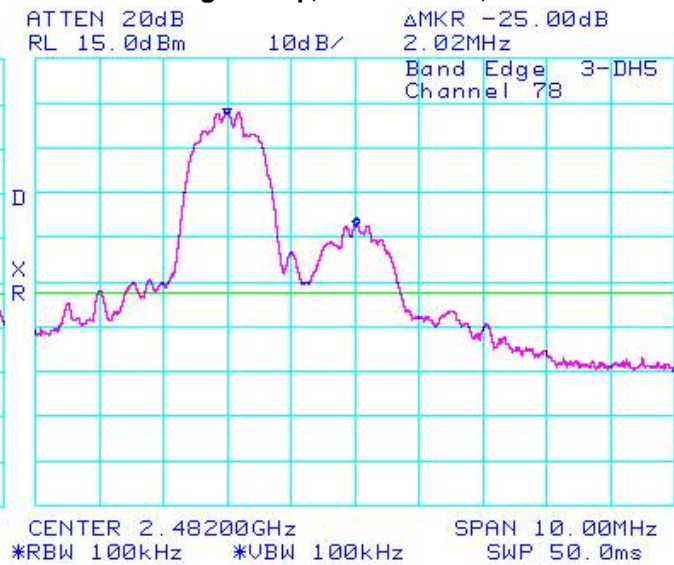


Figure 3-33: Band Edge Compliance

Single Freq., Static PRBS, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-34: Band Edge Compliance

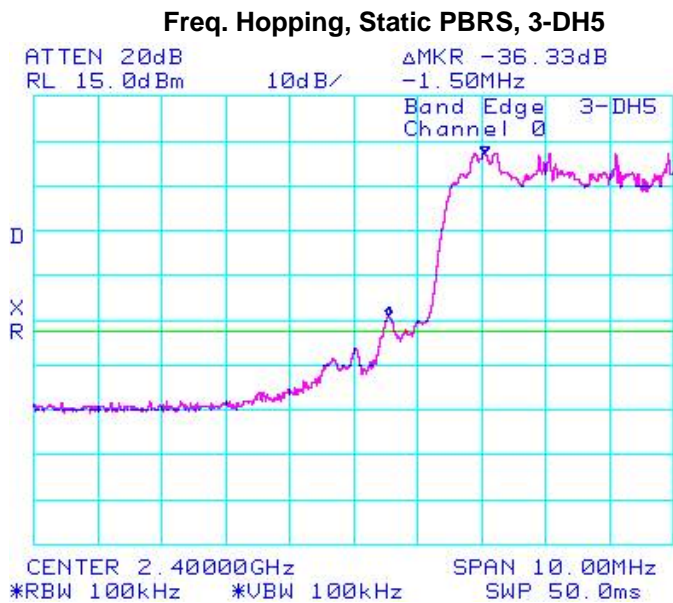
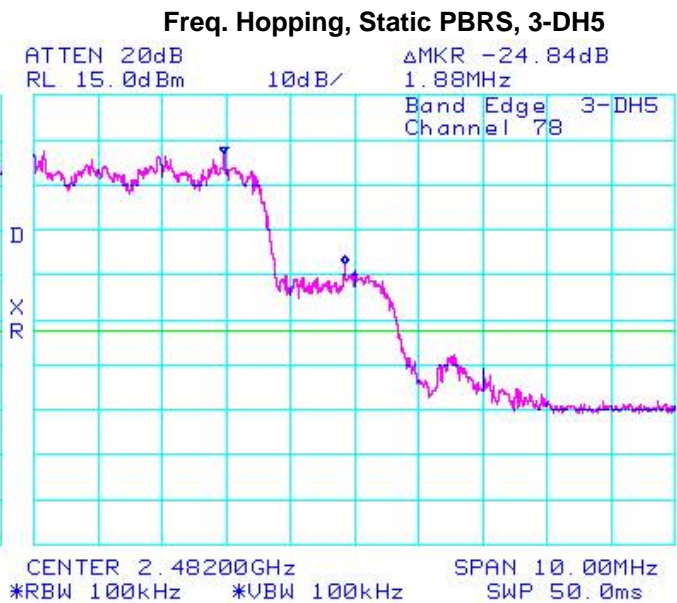


Figure 3-35: Band Edge Compliance



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	5.50	-57.17	-62.67	-20
39	5.17	-57.67	-62.84	-20
78	3.83	-40.67	-44.50	-20
Hopping mode	3.83	-49.17	-53.00	-20

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

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Bluetooth RF Conducted Emission Test Results cont'd

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

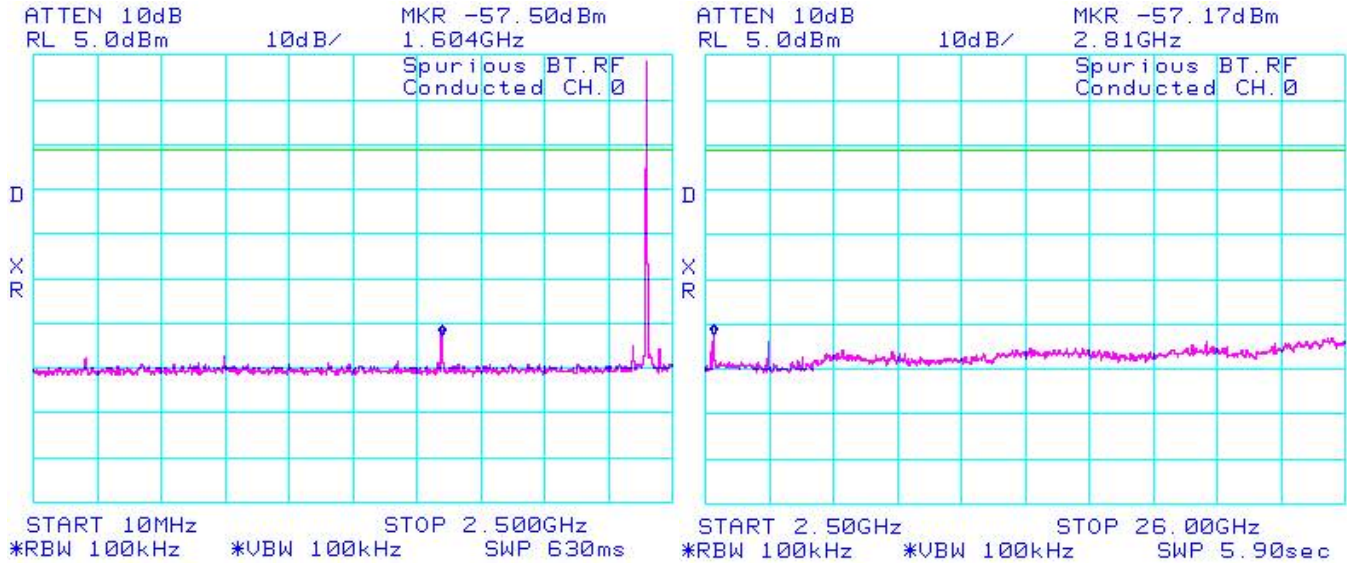
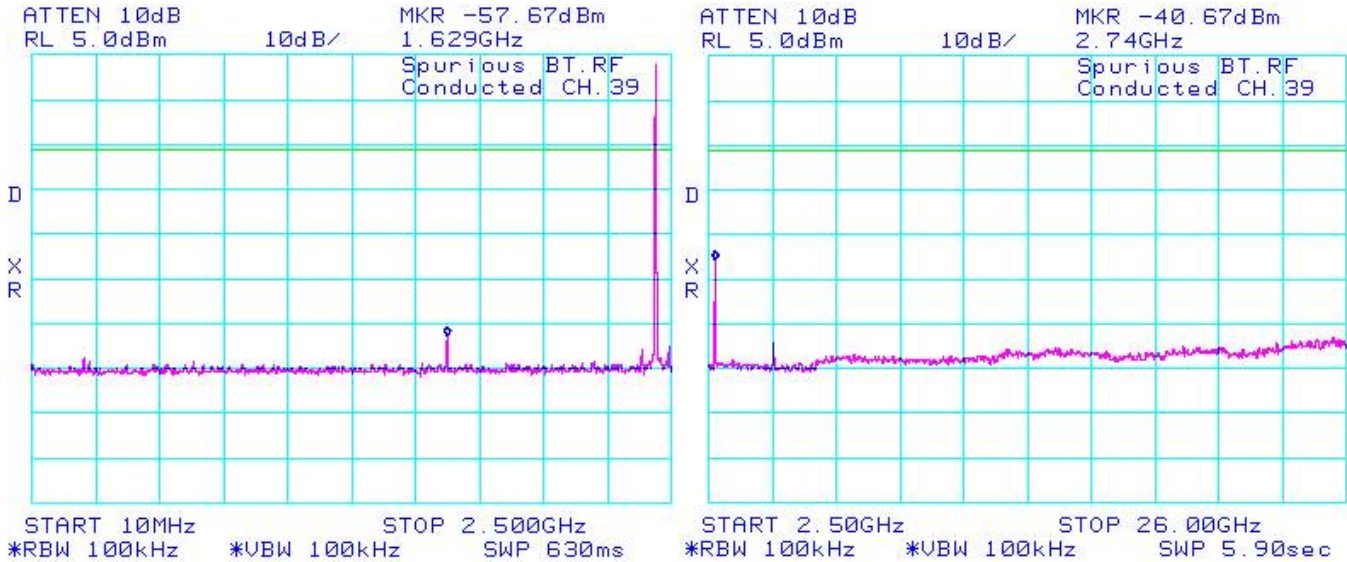


Figure 2-37: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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

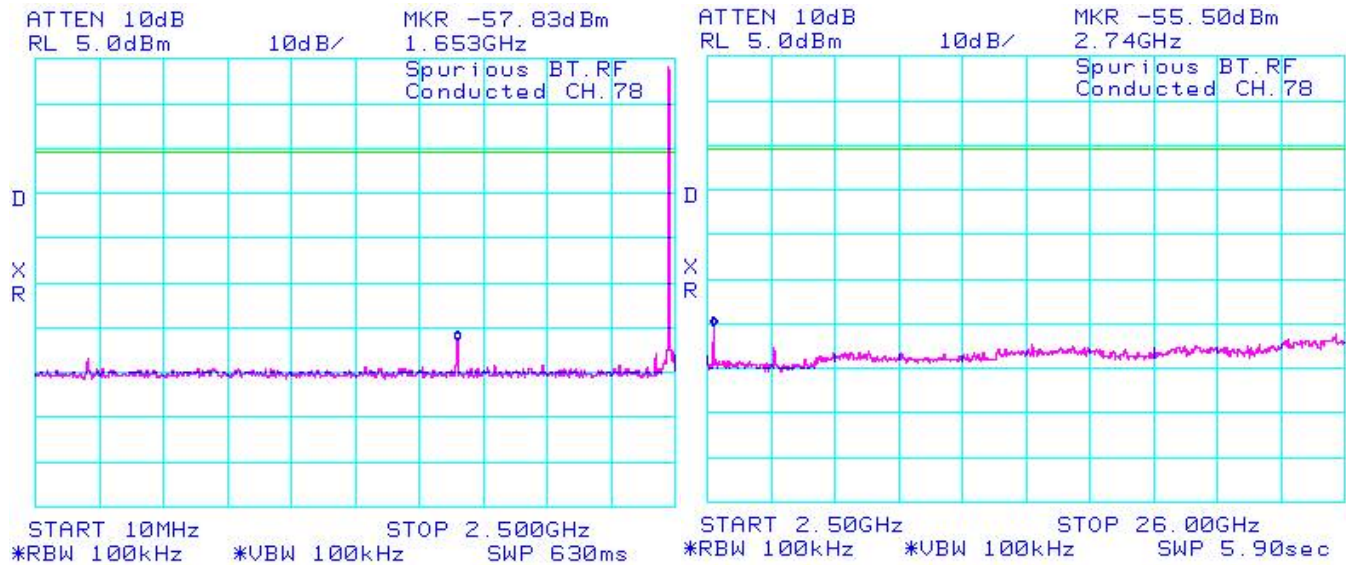
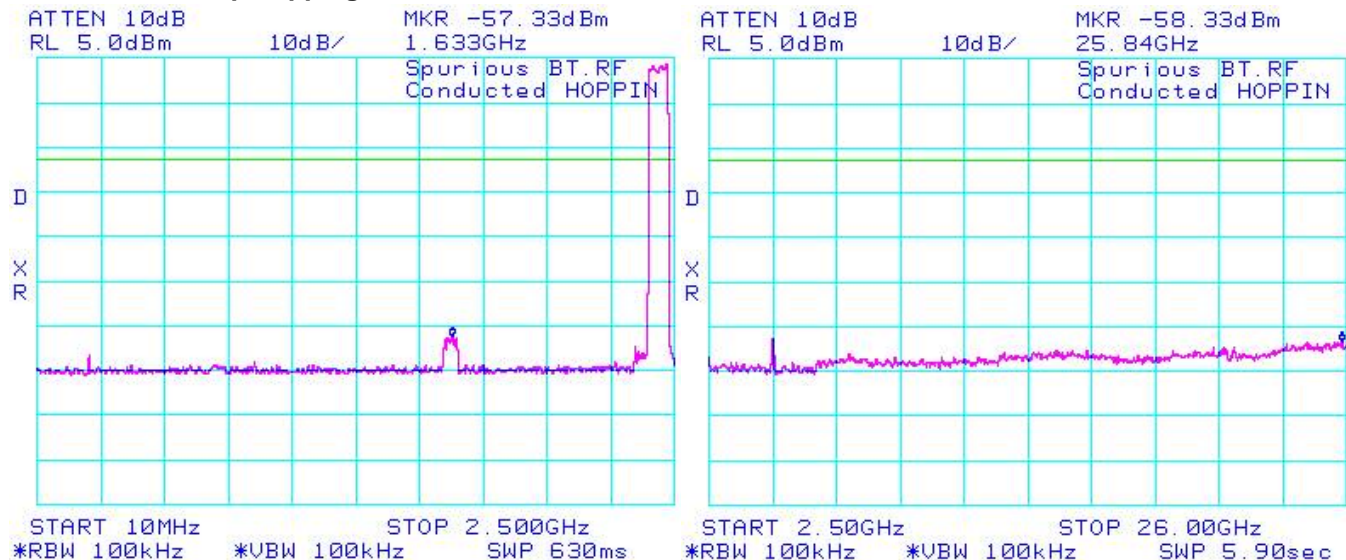


Figure 2-39: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, DH5



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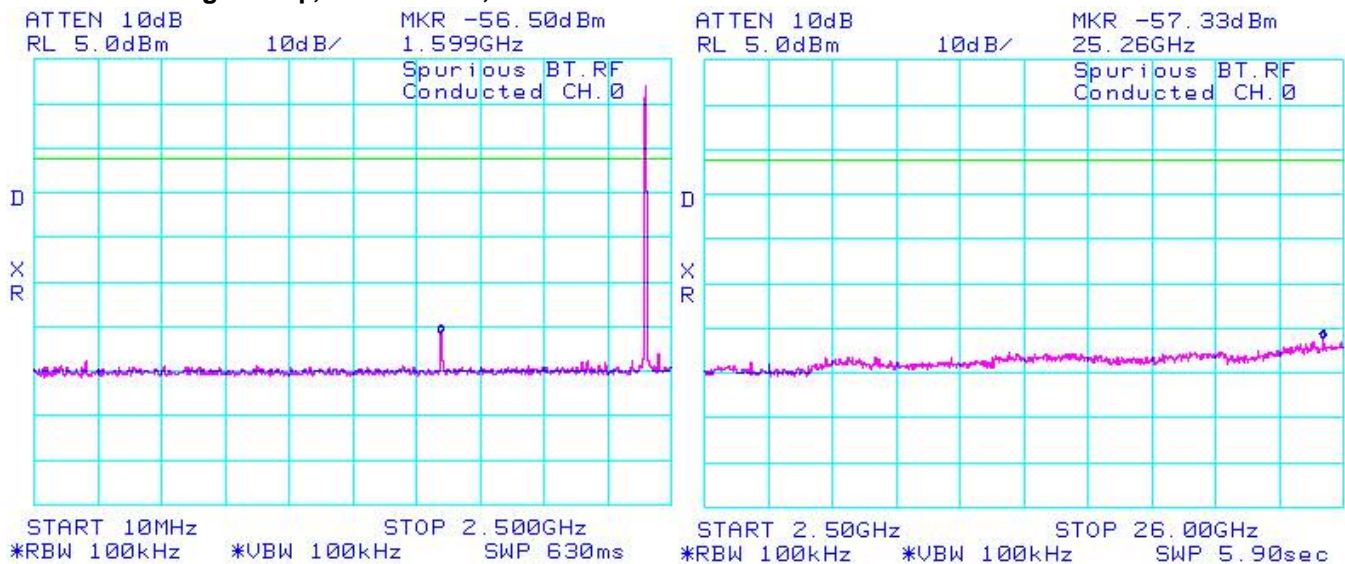
Bluetooth RF Conducted Emission Test Results cont'd

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	4.50	-56.50	-61.00	-20
39	4.00	-58.00	-62.00	-20
78	2.17	-57.33	-59.50	-20
Hopping mode	2.17	-56.50	-58.67	-20

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

Figure 3-40 : Spurious RF Conducted Emissions
Single Freq., Static PBRs, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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

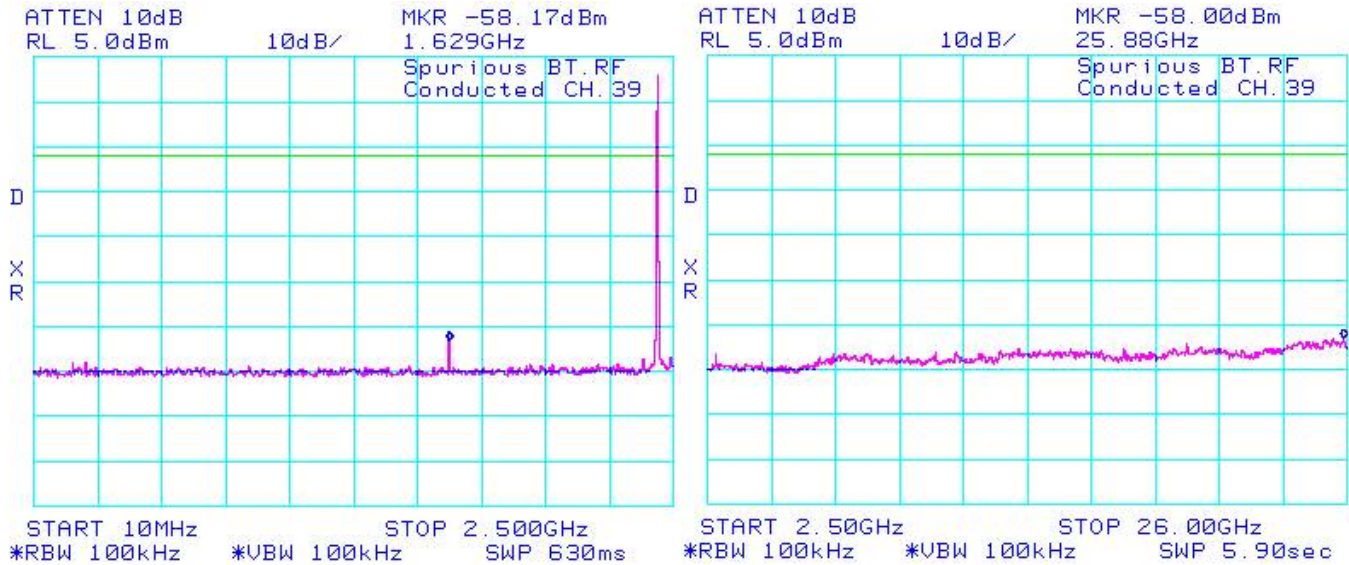
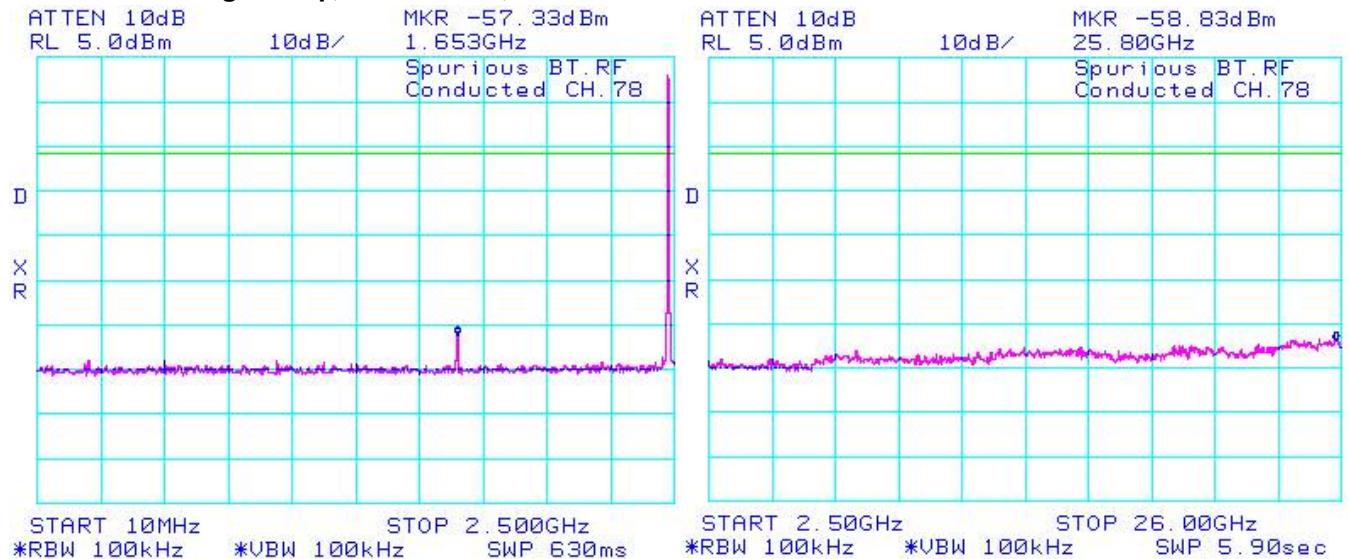


Figure 3-42: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-43 : Spurious RF Conducted Emissions

Freq. Hopping, Static PBRS, 3-DH5

