

# 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-2068-0909-23

**PRODUCT MODEL NO.:** RCL21CW  
**TYPE NAME:** BlackBerry® smartphone  
**FCC ID:** L6ARCL20CW  
**IC:** 2503A-RCL20CW

**DATE:** 1 October, 2009

	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
Test Report No. RTS-2068-0909-23	Dates of Test August 28 to October 1, 2009	Author Data Kevin Rose

**Statement of Performance:**

The BlackBerry® smartphone, model RCL21CW, part number CER-27171-001 Rev 2, 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: October 1, 2009

Reviewed by:




Michael Cino  
Regulatory Compliance Intern  
Date: October 6, 2009

Reviewed and Approved by:




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Manager, Regulatory Compliance  
Date: October 8, 2009

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## 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
- o 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-27171-001 Rev 2

## C. Product Identification

Manufactured by Research In Motion Limited whose headquarters is located at:

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


The equipment under test (EUT) was tested at the following locations:

### RIM Testing Services EMI test facilities

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

440 Phillip Street  
 Waterloo, Ontario  
 Canada, N2L 5R9  
 Phone: 519 888 7465  
 Fax: 519 888 6906

The testing was performed from August 28 to October 1, 2009.

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The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCL21CW	CER-27171-001 Rev 1	30D9ECAC
2	RCL21CW	CER-27171-001 Rev 1	30D9EABA
3	RCL21CW	CER-27171-001 Rev 1	30D9EBA0
4	RCL21CW	CER-27171-001 Rev 1	30D9E9CF
5	RCL21CW	CER-27171-001 Rev 1	30D9EF53
6	RCL21CW	CER-27171-001 Rev 3	30EC2ACF
7	RCL21CW	CER-27171-001 Rev 3	30EC2AD9

Conducted Emissions testing was performed on samples 2 and 4.

Radiated Emissions testing was performed on samples 1, 3, 4, and 6

RF Conducted testing was performed on sample 5.


Bluetooth band edge testing was performed on sample 3 and 7.

#### BlackBerry® smartphone Accessories Tested

- 1) Folding Blade Charger, part number HDW-17955-001 with an output voltage of 5.0 volts dc, 700 mA and attached USB cable with a lead length of 1.80 metres.
- 2) 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) Fixed Blade Charger, part number HDW-25966-001, with an output voltage of 5.0 volts dc.
- 4) Bluetooth Headset, part number HDW-23439-001.
- 5) M-S1 Series External Battery Charger, (EBC), part number HDW-16222-001.
- 6) BlackBerry® Remote Stereo Gateway, part number HDW-16007-001.
- 7) USB Y-Cable, part number HDW-19137-002, lead lengths of 26 cm and 11 cm.
- 8) Stereo Headset, part number HDW-14322-003 with a lead length of 1.3 metres.
- 9) Premium Stereo Headset, part number HDW-15766-005, 1.3 metres long.
- 10) USB Data Cable, part number HDW-06610-013, 0.30 metres long.
- 11) USB Data Cable, part number HDW-06610-009, 1.00 metres long.
- 12) USB Data Cable, part number HDW-06610-005, 1.50 metres long.
- 13) Visor Mount, part number HDW-23438-001.
- 14) USB Mini-to-Micro Adapter, part number HDW-26160-002


#### **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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## E. Test Results Chart

SPECIFICATION		TEST TYPE	Meets Requirements	TEST DATA
FCC CFR 47	IC			APPENDIX
Part 15.207	RSS-210 RSS-GEN	Conducted AC Line Emission	Pass	1
Part 15.209 Part 15.247	RSS-210 RSS-GEN	BT Radiated Spurious Emissions and Radiated Band Edge Compliance	Pass	2
Part 15.209 Part 15.247	RSS-210 RSS-GEN	802.11 b/g Radiated Spurious Emissions and Radiated Band Edge Compliance	Pass	2
Part 15.247(a)	RSS-210	BT, 20 dB Bandwidth	Pass	3
Part 15.247(a)	RSS-210	BT, Carrier Frequency Separation	Pass	3
Part 15.247(a)	RSS-210	BT, Number of Hopping Frequencies	Pass	3
Part 15.247(a)	RSS-210	BT, Time of Occupancy (Dwell Time)	Pass	3
Part 15.247(b)	RSS-210	BT, Maximum Peak Conducted Output Power	Pass	3
Part 15.247(c)	RSS-210	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	3
Part 15.247(c)	RSS-210	BT, Spurious RF Conducted Emissions	Pass	3
Part 15.247(b)	RSS-210	802.11b/g, 6 dB Bandwidth	Pass	4
Part 15.247(b)	RSS-210	802.11b/g, Maximum Conducted Output Power	Pass	4
Part 15.247(b)	RSS-210	802.11b/g, Band-Edge	Pass	4
Part 15.247(b)	RSS-210	802.11b/g, Peak Power Spectral Density	Pass	4
Part 15.247(b)	RSS-210	802.11b/g, Spurious RF Conducted Emissions	Pass	4

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## F. Summary of Results

### 1) AC LINE CONDUCTED EMISSIONS

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

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

The following test configurations were measured:


a) The BlackBerry® smartphone, PIN 30D9E9CF with the Stereo Headset attached, was in 802.11b TX mode and connected to the CCC. The mini to micro adapter is installed between the CCC and the EBC. The 0.3m USB cable goes from the EBC to the BlackBerry® smartphone

b) The BlackBerry® smartphone, PIN 30D9EABA with the Premium Stereo Headset attached, was in Bluetooth Tx mode. The EBC was connected in parallel to the smartphone using a Mini-to-Micro USB Adapter and a USB Y-Cable. The USB Y-Cable was connected to the Folding Blade Charger (FBC).

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 worst case test margin of 6.85 dB below the QP limit at 2.364 MHz using the quasi-peak detector with the Folding Blade Charger in Test Configuration 2.

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.

i)The BlackBerry® smartphones PIN 30D9ECAC and 30EC2ACF was measured in a standalone configuration with Bluetooth transmitting in single frequency mode at low channel (0), middle channel (39) and high channel (78) for packet types "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.

ii)The BlackBerry® smartphones PIN 30D9E9CF and 30D9EBA0 were measured in standalone configuration transmitting at channels 1, 6 & 11 at 1 Mbps, and channel 6 at 6 Mbps for 802.11b/g modes. 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 sample EUT's Radiated emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C and IC RSS-210 limits. The sample EUT had a worst case test margin of 3.37dB below the limit at 4959.840MHz Test Configuration 2.

See APPENDIX 1 for the test data


### b) Band-Edge Compliance of RF Radiated Emissions

The BlackBerry® smartphone PIN 30D9EBA0 and 30EC2AD9 met the requirements for band-edge compliance of RF radiated emissions for Bluetooth and 802.11b/g as per the requirements of 15.247, 15.209, and RSS-210/RSS-GEN.

See APPENDIX 2 for the test data.

### **Measurement Uncertainty ±4.6 dB**



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### 3) BLUETOOTH RF CONDUCTED EMISSIONS

The Bluetooth conducted RF emissions from the BlackBerry® smartphone PIN 30D9EF53 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 3 for the test data.

b) Carrier Frequency Separation

The BlackBerry® smartphone met the requirements of the carrier frequency separation as per 47 CFR 15.247(a) 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 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 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 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 3 for the test data.

f) Band-Edge Compliance of RF Conducted Emissions

The BlackBerry® smartphone met the requirements of the band-edge compliance of RF conducted emissions as per 47 CFR 15.247(c) 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.

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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 3 for the test data.

4) 802.11b/g RF CONDUCTED EMISSIONS

The 802.11b/g conducted RF emissions from the BlackBerry® smartphone PIN 30D9EF53 were measured using the methods outlined in FCC CFR 47 Part 15, Subpart C.

a) 6dB Bandwidth

The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. See APPENDIX 4 for the test data.

b) Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. See APPENDIX 4 for the test data

c) Band-Edge Compliance of RF Conducted Emissions


The EUT met the requirements of band-edge compliance of RF conducted emissions as per 47 CFR 15.247(b) and RSS-210. Low channel (1) and high channel (11) were measured. See APPENDIX 4 for the test data.

d) Peak Power Spectral Density

The EUT met the requirements of peak power spectral density as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. See APPENDIX 4 for the test data.

e) 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 30 MHz to 26 GHz. Low channel (1), middle channel (6) and high channel (11) were measured. See APPENDIX 4 for the test data.

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### G. Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURE R</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>	<u>CAL DUE DATE (YY MM DD)</u>	<u>USE</u>
EMI Test Receiver	Rohde & Schwarz	ESIB 40	100255	09-12-03	Conducted/Radiated Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	10-04-22	Conducted/Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017401	10-09-26	Radiated Emissions
Horn Antenna	CMT	LHA 0180	R52734-001	09-12-17	Radiated Emissions
Horn Antenna	ETS-Lindgren	3117	47563	11-07-15	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	10-05-08	Radiated Emissions
Preamplifier	Sonoma	310N/11909A	185831	09-11-07	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	10-03-31	Radiated Emissions
L.I.S.N.	Rohde & Schwarz	ENV216	100060	10-04-21	Conducted Emissions
Environment Monitor	Control Company	1870	230355190	10-01-30	Radiated Emissions
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	10-05-01	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	CBT35	100368	09-12-09	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100370	09-12-09	Radiated Emissions
Power Meter	Agilent	N1911A	MY45100905	11-01-05	RF Conducted / Frequency Stability
Power Sensor	Agilent	N1921A	SG45240281	10-05-08	RF Conducted / Frequency Stability
Digital Multimeter	Hewlett Packard	34401A	US36042324	09-10-01	Conducted/Radiated Emissions
Environment Monitor	Control Company	1870	230355159	10-01-30	Radiated Emissions

\* The selected equipment was in calibration at the time of its respective test.

 RIM Testing Services™	EMI Test Report for the BlackBerry® smartphone Model RCL21CW <b>APPENDIX 1</b>	
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## APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

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AC Conducted Emissions Test Results  
Test Configuration 1

The measurements were performed by Steven Wang.

The BlackBerry® smartphone PIN 30D9E9CF was tested on September 03, 2009.

The environmental test conditions were: Temperature: 26 °C  
Pressure: 1026 mb  
Relative Humidity: 22 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.182	N	29.35	10.04	39.39	64.42	54.42	-25.02
0.245	L1	30.63	9.87	40.50	61.94	51.94	-21.44
0.299	L1	28.32	9.83	38.14	60.28	50.28	-22.14
0.384	L1	28.00	9.76	37.77	58.19	48.19	-20.43

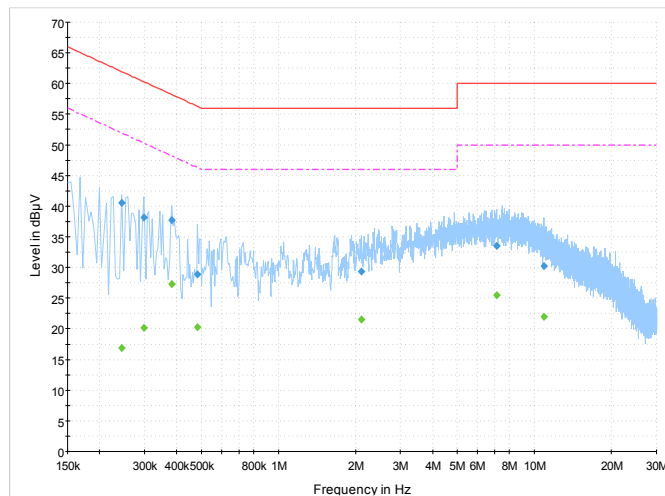
All other emission levels had a test margin of greater than 25 dB.

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.

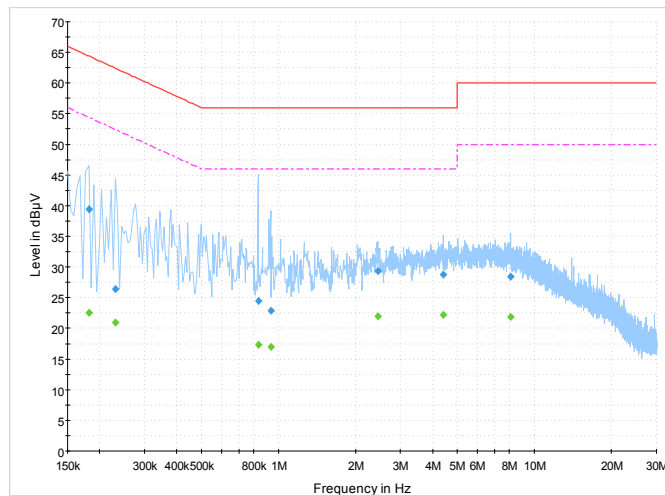
AC Conducted Emissions Test Graphs

Test Configuration 1




— EN 55022 Conducted EMI Class B QP Limit Line      - - - EN 55022 Conducted EMI Class B AVG Limit Line  
 Preview Result - PK Detector      Final Result - QP Detector  
 Final Result - AVG Detector

**Figure 1-1: L1 lines**



— EN 55022 Conducted EMI Class B QP Limit Line      - - - EN 55022 Conducted EMI Class B AVG Limit Line  
 Preview Result - PK Detector      Final Result - QP Detector  
 Final Result - AVG Detector

**Figure 1-2: N Lines**

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AC Conducted Emissions Test Results  
Test Configuration 2

The measurements were performed by Steven Wang.

The BlackBerry® smartphone PIN 30D9EABA was tested on September 03, 2009.

The environmental test conditions were: Temperature: 26 °C  
Pressure: 1026 mb  
Relative Humidity: 22 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.182	N	31.59	10.04	41.63	64.42	54.42	-22.79
0.182	L1	34.85	9.78	44.63	64.42	54.42	-19.79
0.263	L1	30.00	9.85	39.85	61.35	51.35	-21.50
0.308	N	29.54	9.82	39.36	60.04	50.04	-20.68
0.443	L1	32.27	9.72	41.99	57.01	47.01	-15.03
0.447	N	36.89	9.88	46.76	56.93	46.93	-10.17
0.812	L1	28.92	9.57	38.49	56.00	46.00	-17.51
0.893	N	31.27	9.69	40.96	56.00	46.00	-15.04
1.887	L1	35.34	9.53	44.87	56.00	46.00	-11.13
1.977	N	34.87	9.62	44.49	56.00	46.00	-11.51
2.283	N	36.24	9.61	45.85	56.00	46.00	-10.15
2.364	L1	39.60	9.55	49.15	56.00	46.00	<b>-6.85</b>
3.530	N	28.76	9.61	38.36	56.00	46.00	-17.64
4.911	L1	29.23	9.67	38.91	56.00	46.00	-17.09
8.619	L1	29.85	9.77	39.62	60.00	50.00	-20.38

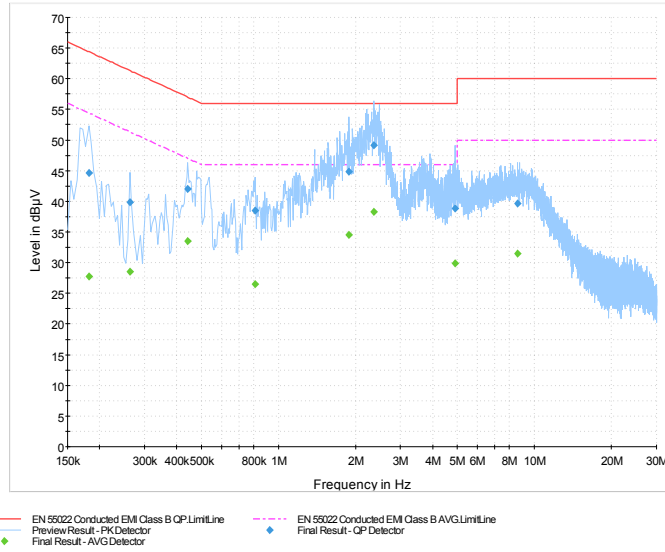
All other emission levels had a test margin of greater than 25 dB.

Measurements were done with the quasi-peak detector.

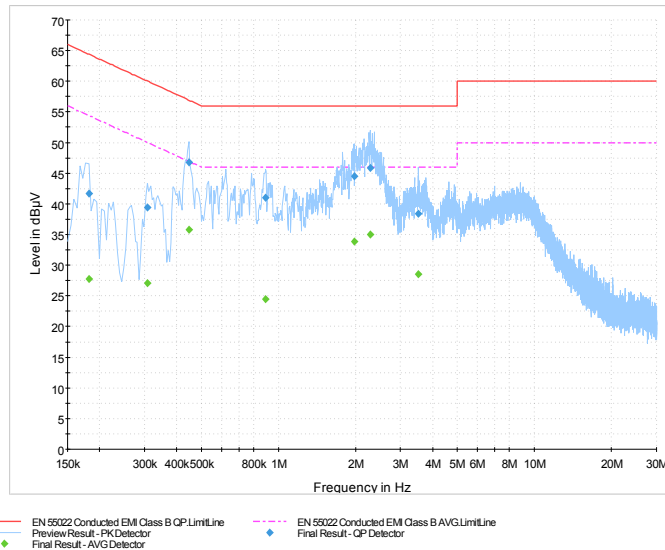
See figure 1-3 and figure 1-4 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 2




**Figure 1-3: L1 lines**




**Figure 1-4: N Lines**



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**APPENDIX 2 – BLUETOOTH AND 802.11b/g RADIATED EMISSIONS TEST DATA**

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Radiated Emissions Test Results  
Test Configuration 1

The following measurements were performed by Fahd Faisal.  
The EUT was in Bluetooth Tx mode and was in standalone, vertical position.  
The BlackBerry® smartphone, PIN 30D9ECAC was tested on September 01, 2009.

The environmental test conditions were: Temperature: 23 °C  
Pressure: 1023 mb  
Relative Humidity: 31 %

The frequency sweep measurements were performed in single frequency tx mode on channels 0, 39 and 78 using packet types “DH5”, “2-DH5” and “3-DH5”.  
The test distance was 3.0 metres with an EUT height of 0.8m, at a frequency of 30-1000MHz  
All emissions had a test margin of greater than 25.0 dB.

The following measurements were performed by Steven Wang  
The EUT was in Bluetooth Tx mode and was in standalone, vertical position.  
The BlackBerry® smartphone, PIN 30EC2ACF was tested on September 22, 2009.


The environmental test conditions were: Temperature: 25 °C  
Pressure: 981 mb  
Relative Humidity: 31 %

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

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

Frequency (MHz)	Antenna		Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor (dB/m)	Field Strength Level (reading +corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
	Pol. (V/H)	Height (metres)							
4960.272	V	4.00	207.00	PK	38.96	19.04	58.01	74.00	-16.00
4959.840	H	1.75	144.00	PK	31.59	19.04	50.63	54.00	<b>-3.37</b>

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

	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
	<b>APPENDIX 2</b>	
Test Report No. RTS-2068-0909-23	Dates of Test August 28 to October 1, 2009	Author Data Kevin Rose

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

Date of test: October 1, 2009


The following measurements were performed by Fahd Fasial.

The environmental test conditions were: Temperature: 25 °C  
Pressure: 986 mb  
Relative Humidity: 31 %

BlackBerry® smartphone PIN 30EC2AD9 was in standalone, vertical, position, pattern type “Static PBRs” in “DH5”, “2-DH5” and “3-DH5” modulation during the measurements.

The test distance was 3.0 metres.


Channel	Freq. (MHz)	Rx Antenna 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 DH5										
0	2402	Horn	V	PK	1 MHz	92.72	43.83	48.89	74.00	-25.11
0	2402	Horn	H	PK	1 MHz	99.37	50.84	48.53	74.00	-25.47
0	2402	Horn	V	AVE.	10 Hz	76.08	43.83	32.25	54.00	-21.75
0	2402	Horn	H	AVE.	10 Hz	81.81	50.84	30.97	54.00	-23.03
High Channel, Packet Type DH5										
78	2480	Horn	V	PK	1 MHz	90.72	48.93	41.79	74.00	-32.21
78	2480	Horn	H	PK	1 MHz	100.01	56.12	43.89	74.00	-30.11
78	2480	Horn	V	AVE.	10 Hz	75.52	48.93	26.59	54.00	-27.41
78	2480	Horn	H	AVE.	10 Hz	82.80	56.12	26.68	54.00	-27.32
Low Channel, Packet Type 2-DH5										
0	2402	Horn	V	PK	1 MHz	89.08	40.08	49.00	74.00	-25.00
0	2402	Horn	H	PK	1 MHz	95.45	48.10	47.35	74.00	-26.65
0	2402	Horn	V	AVE.	10 Hz	74.94	40.08	34.86	54.00	-19.14
0	2402	Horn	H	AVE.	10 Hz	77.01	48.10	28.91	54.00	-25.09
High Channel, Packet Type 2-DH5										
78	2480	Horn	V	PK	1 MHz	87.01	40.25	46.76	74.00	-27.24
78	2480	Horn	H	PK	1 MHz	96.41	44.66	51.75	74.00	-22.25
78	2480	Horn	V	AVE.	10 Hz	74.50	40.25	34.25	54.00	-19.75
78	2480	Horn	H	AVE.	10 Hz	75.98	44.66	31.32	54.00	-22.68

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

Low Channel, Packet Type 3-DH5										
0	2402	Horn	V	PK	1 MHz	89.02	40.41	48.61	74.00	-25.39
0	2402	Horn	H	PK	1 MHz	95.15	47.53	47.62	74.00	-26.38
0	2402	Horn	V	AVE.	10 Hz	74.20	40.41	33.79	54.00	-20.21
0	2402	Horn	H	AVE.	10 Hz	76.86	47.53	29.33	54.00	-24.67
High Channel, Packet Type 3-DH5										
78	2480	Horn	V	PK	1 MHz	87.94	42.13	45.81	74.00	-28.19
78	2480	Horn	H	PK	1 MHz	96.41	45.20	51.21	74.00	-22.79
78	2480	Horn	V	AVE.	10 Hz	73.05	42.13	30.92	54.00	-23.08
78	2480	Horn	V	AVE.	10 Hz	75.57	45.20	30.37	54.00	-23.63

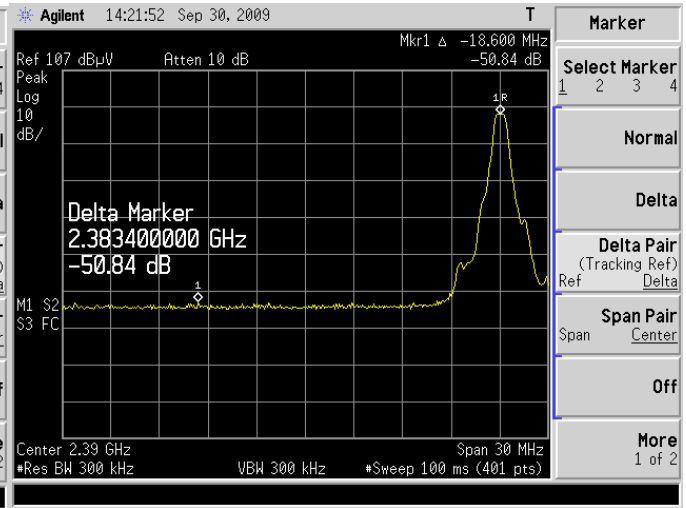
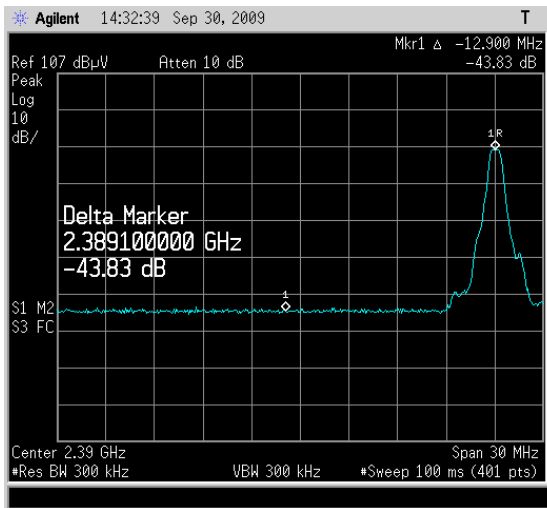
See figures 2-1 to 2-12 for the plots of the Bluetooth band-edge compliance.

	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
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Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

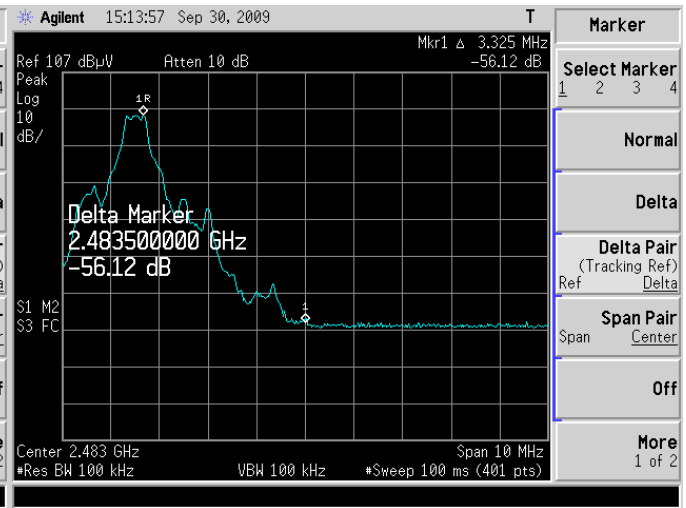
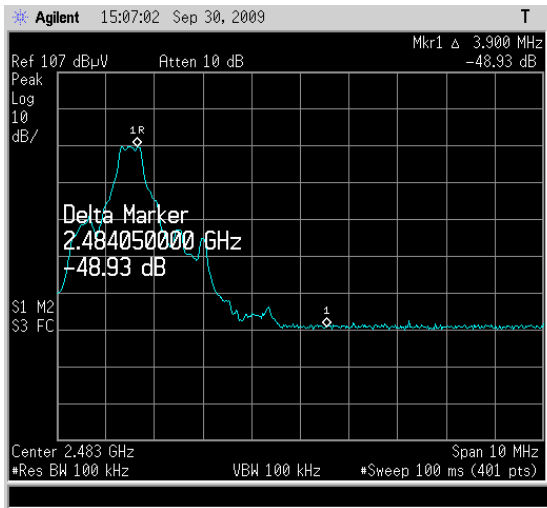
**Figure 2-1:** Band-Edge Compliance of RF Rad. Emissions.  
Bluetooth, Single freq., Static PBRs,  
DH5, Channel 0, Pol: V, Detector: PK

**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

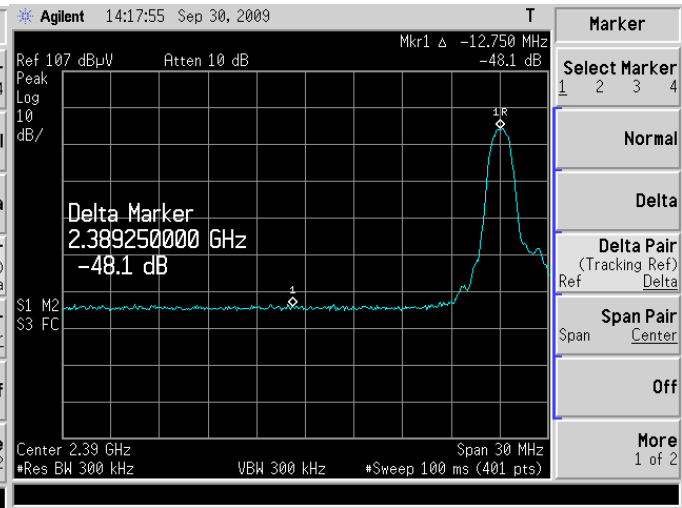
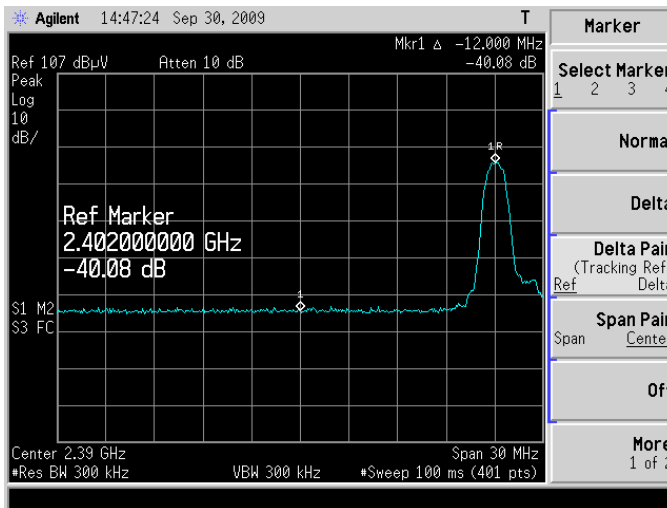


Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
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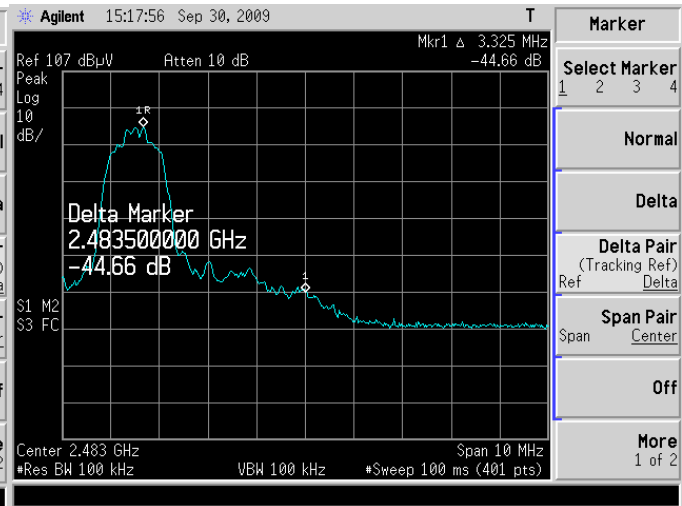
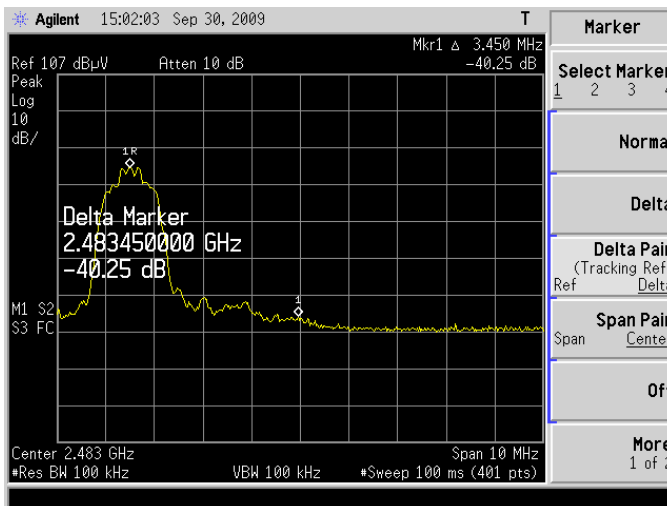
**Figure 2-5: Band-Edge Compliance of RF Rad. Emissions.**  
Bluetooth, Single freq., Static PBRS,  
2-DH5, Channel 0, Pol: V, Detector: PK


**Figure 2-6: Band-Edge Compliance of RF Rad. Emissions.**  
Bluetooth, Single freq., Static PBRS,  
2-DH5, Channel 0, Pol: H, Detector: PK



**Figure 2-7: Band-Edge Compliance of RF Rad. Emissions.**  
Bluetooth, Single freq., Static PBRS,  
2-DH5, Channel 78, Pol: V, Detector: PK

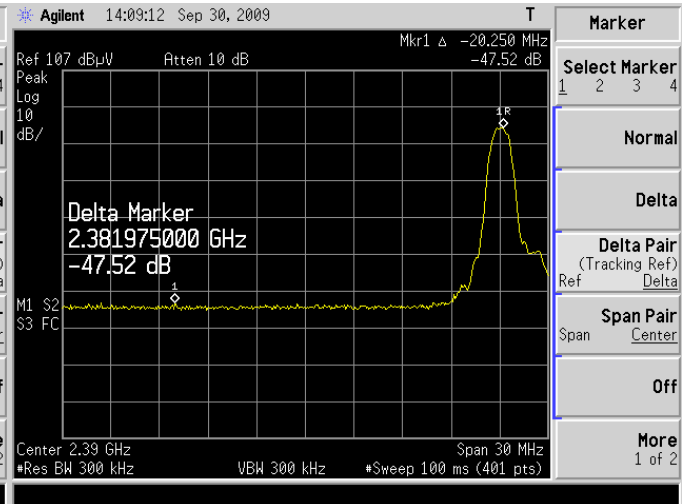
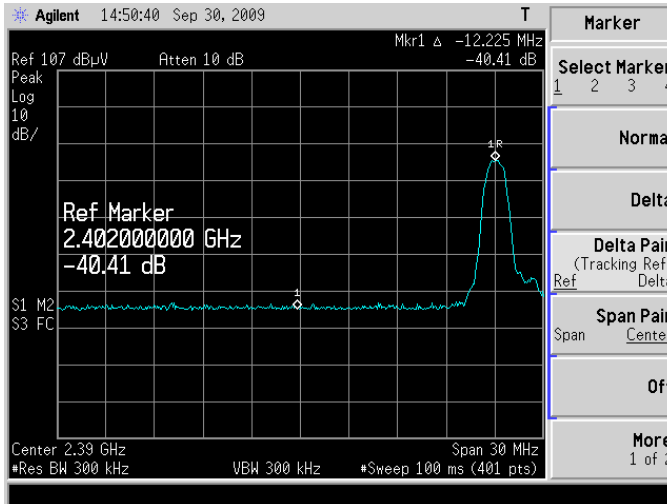
**Figure 2-8: Band-Edge Compliance of RF Rad. Emissions.**  
Bluetooth, Single freq., Static PBRS,  
2-DH5, Channel 78, Pol: H, Detector: PK



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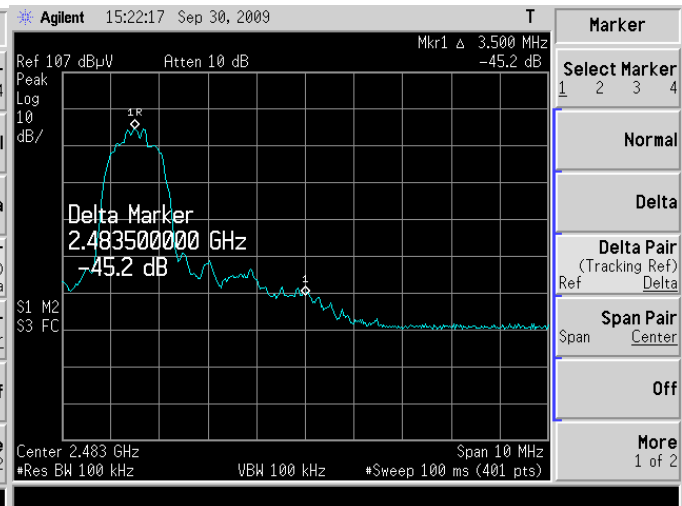
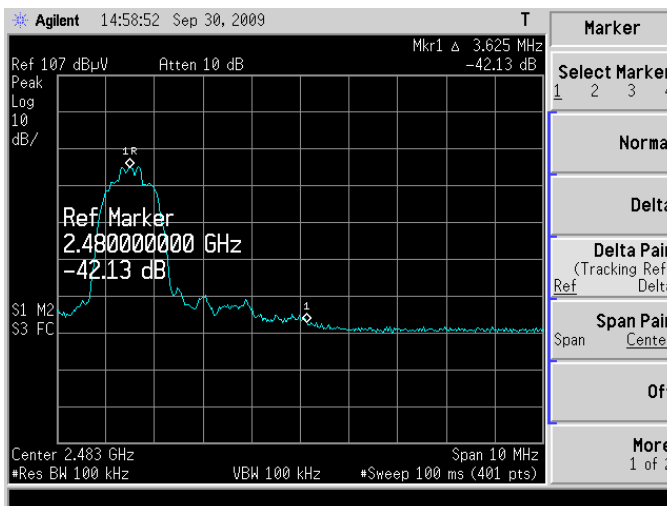
**Figure 2-9:** Band-Edge Compliance of RF Rad. Emissions.  
Bluetooth, Single freq., Static PBRs,  
3-DH5, Channel 0, Pol: V, Detector: PK


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



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

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



	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
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Radiated Emissions Test Results cont'd  
802.11b/g Band

Date of Test: September 02, 2009

The following measurements were performed by Kevin Rose.

The environmental test conditions were: Temperature: 23 °C  
Pressure: 1010 mb  
Relative Humidity: 31 %

The frequency sweep measurements were performed in 802.11b Tx mode at 1 Mbps on channels 1, 6 and 11, and in 802.11g Tx mode at 6 Mbps on channel 6.

The BlackBerry® smartphone PIN 30D9EBA0 was in standalone, vertical position.

The test distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.

All emissions had a test margin greater than 25.0 dB.

Date of Test: September 03, 2009.

Measurements were performed by Heng Lin.

The environmental test conditions were: Temperature: 25°C  
Pressure: 1022 mb  
Relative Humidity: 26 %


The frequency sweep measurements were performed in 802.11b Tx mode at 1 Mbps on channels 1, 6 and 11, and in 802.11g Tx mode at 6 Mbps on channel 6.

The BlackBerry® smartphone PIN 30D9E9CF was in standalone, vertical down position.

The test distance was 1.0 metres with a height of 0.8 metres, 1GHz to 25GHz.

All emissions, including harmonics, had a test margin greater than 25.0 dB.



	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
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802.11b/g Band-Edge Compliance of RF Radiated Emissions

Date of Test: September 02, 2009

The following measurements performed by Kevin Rose

The environmental test conditions were: Temperature: 24 °C  
Pressure: 1006 mb  
Relative Humidity: 30 %


802.11b Band

The measurements were performed on BlackBerry® smartphone PIN 30D9EBA0, in vertical standalone configuration on channels 1 and 11 for 802.11b mode at 1 Mbps.

The test distance was 3 metres.

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
1	2412.00	Horn	V	PK	1 MHz	102.24	50.24	52.00	74.00	-22.00
1	2412.00	Horn	H	PK	1 MHz	101.40	49.90	51.50	74.00	-22.50
1	2412.00	Horn	V	AV	10 Hz	98.73	50.24	48.49	54.00	-5.51
1	2412.00	Horn	H	AV	10 Hz	97.95	49.90	48.05	54.00	-5.95

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
11	2462.00	Horn	V	PK	1 MHz	96.55	46.02	50.53	74.00	-23.47
11	2462.00	Horn	H	PK	1 MHz	103.57	51.02	52.55	74.00	-21.45
11	2462.00	Horn	V	AV	10 Hz	93.29	46.02	47.27	54.00	-6.73
11	2462.00	Horn	H	AV	10 Hz	99.73	51.02	48.71	54.00	-5.29

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### 802.11g Band


The measurements were performed on BlackBerry® smartphone PIN 30D9EBA0, standalone, vertical configuration on channels 1 and 11 for 802.11g mode at 6 Mbps.

The test distance was 3 metres.

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
1	2412.00	Horn	V	PK	1 MHz	99.32	43.74	55.58	74.00	-18.42
1	2412.00	Horn	H	PK	1 MHz	98.79	46.11	52.68	74.00	-21.32
1	2412.00	Horn	V	AV	10 Hz	88.29	43.74	44.55	54.00	-9.45
1	2412.00	Horn	H	AV	10 Hz	87.86	46.11	41.75	54.00	-12.25

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
11	2462.00	Horn	V	PK	1 MHz	93.76	41.34	52.42	74.00	-21.58
11	2462.00	Horn	H	PK	1 MHz	100.76	44.64	56.12	74.00	-17.88
11	2462.00	Horn	V	AV	10 Hz	83.30	41.34	41.96	54.00	-12.04
11	2462.00	Horn	H	AV	10 Hz	89.54	44.64	44.90	54.00	-9.10

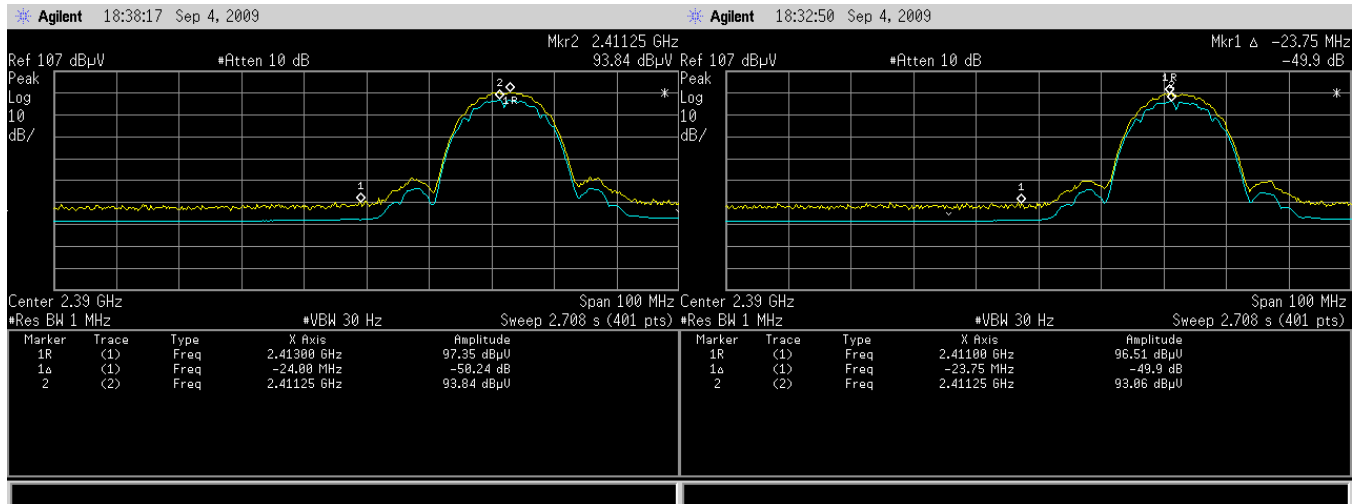
See figures 2-13 to 2-16 for the plots of the 802.11b band-edge compliance.  
See figures 2-17 to 2-20 for the plots of the 802.11g band-edge compliance.

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### 802.11b/g Band-Edge Compliance of RF Radiated Emissions cont'd

Figure 2-13: Band-Edge Compliance of RF Radiated Emission  
802.11b, Channel 1, 2412 MHz, Max Pol: V,  
Detector: PK

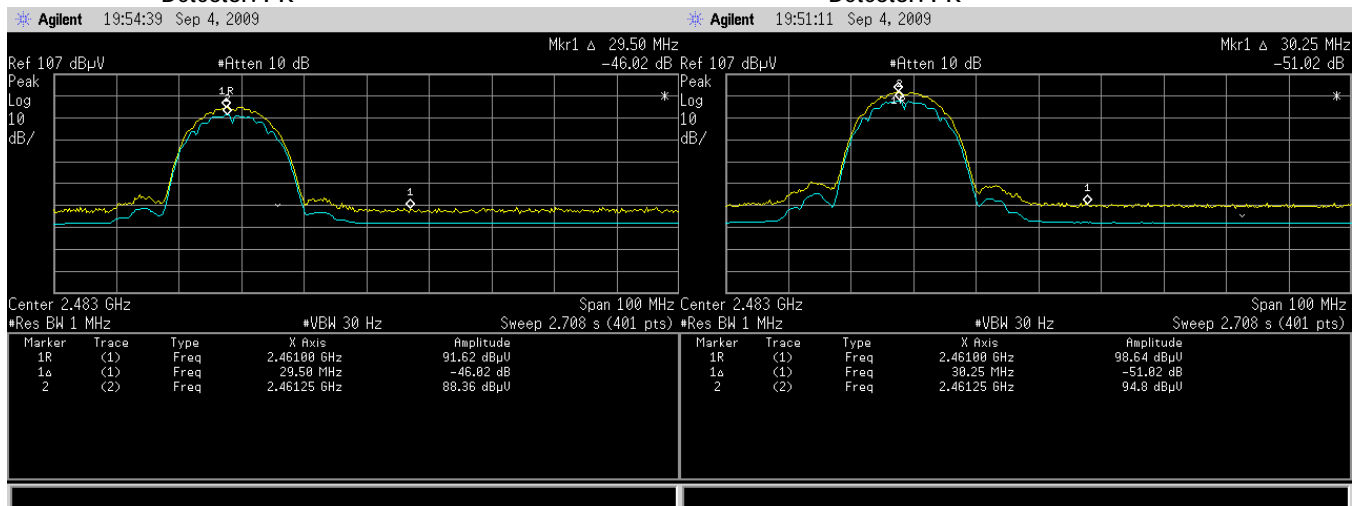
Figure 2-14: Band-Edge Compliance of RF Radiated Emission  
802.11b, Channel 1, 2412 MHz, Max Pol: H,  
Detector: PK



**Marker 1R shows the peak detector**  
**Marker 2 shows the average detector**

Figure 2-15: Band-Edge Compliance of RF Radiated Emission  
802.11b, Channel 11, 2462 MHz, Max Pol: V,  
Detector: PK

Figure 2-16: Band-Edge Compliance of RF Radiated Emission  
802.11b, Channel 11, 2462 MHz, Max Pol: H,  
Detector: PK



**Marker 1R shows the peak detector**  
**Marker 2 shows the average detector**


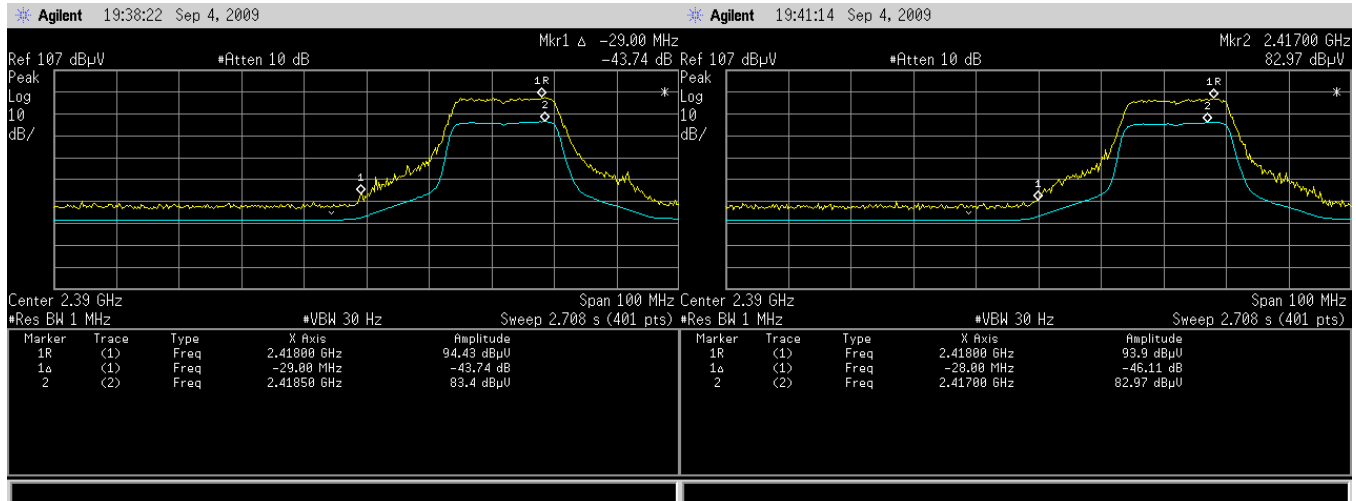
	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
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Figure 2-17: Band-Edge Compliance of RF Radiated Emission  
802.11g, Channel 1, 2412 MHz, Max Pol: V,  
Detector: PK

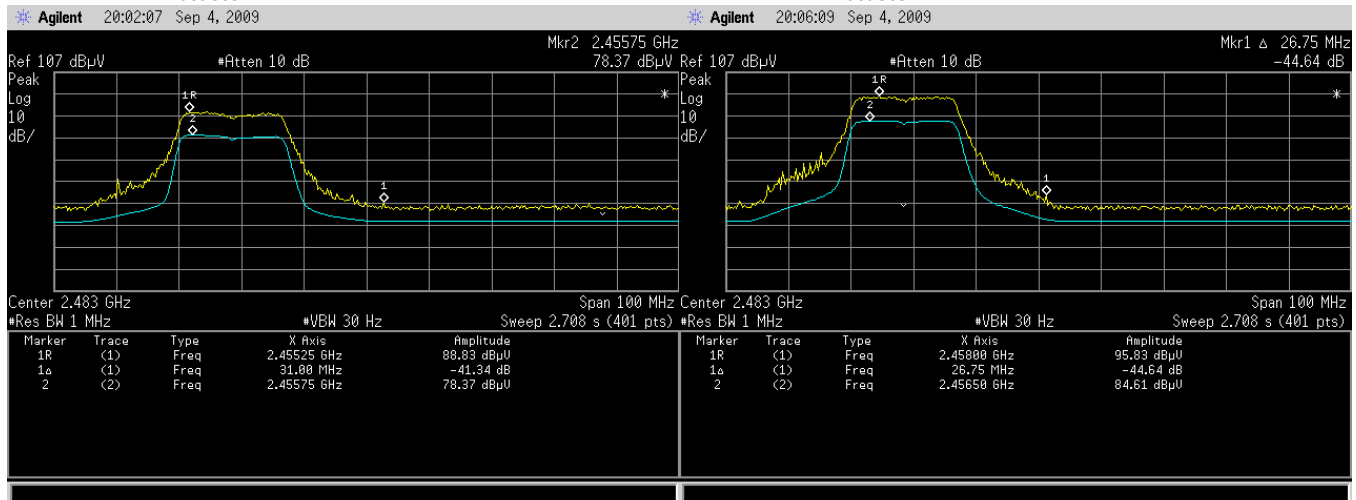
Figure 2-18: Band-Edge Compliance of RF Radiated Emission  
802.11g, Channel 1, 2412 MHz, Max Pol: H,  
Detector: PK




Marker 1R shows the peak detector  
Marker 2 shows the average detector

Figure 2-19: Band-Edge Compliance of RF Radiated Emission  
802.11g, Channel 11, 2462 MHz, Max Pol: V,  
Detector: PK


Figure 2-20: Band-Edge Compliance of RF Radiated Emission  
802.11g, Channel 11, 2462 MHz, Max Pol: H,  
Detector: PK



Marker 1R shows the peak detector  
Marker 2 shows the average detector

	EMI Test Report for the BlackBerry® smartphone Model RCL21CW <b>APPENDIX 3</b>	
<b>Test Report No.</b> RTS-2068-0909-23	<b>Dates of Test</b> August 28 to October 1, 2009	<b>Author Data</b> Kevin Rose

## APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

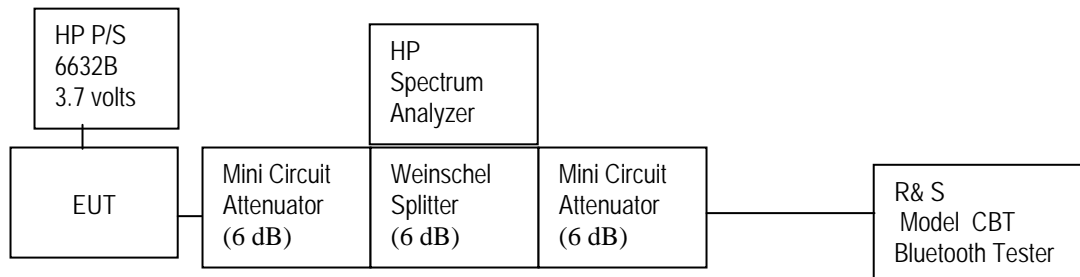
	EMI Test Report for the BlackBerry® smartphone Model RCL21CW	
	<b>APPENDIX 3</b>	
<b>Test Report No.</b> RTS-2068-0909-23	<b>Dates of Test</b> August 28 to October 1, 2009	<b>Author Data</b> Kevin Rose

Bluetooth RF Conducted Emission Test Results

Bluetooth power output from BlackBerry® smartphone PIN 30D93EF53 was at maximum for all the recorded measurements shown below. The measurements were performed by Maurice Battler.


Date of test: August 31, 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: 25 °C  
 Pressure: 1006 mb  
 Relative Humidity: 31 %

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Bluetooth RF Conducted Emission Test Results cont'd

**20 dB Bandwidth**

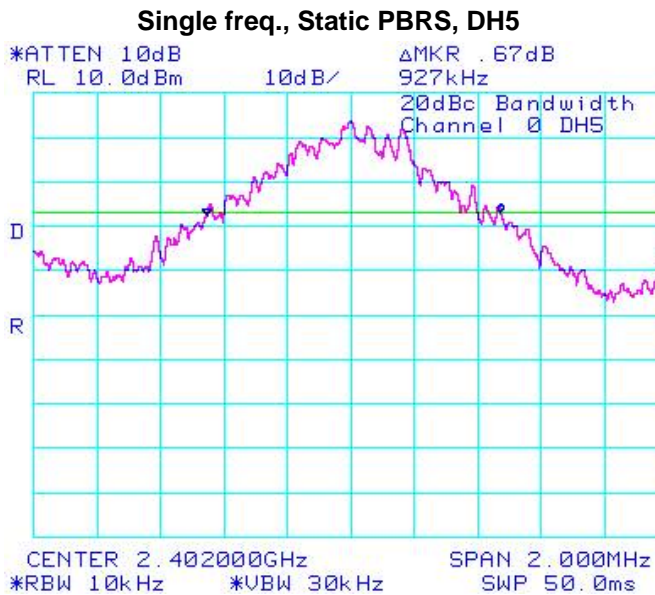
The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode.

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

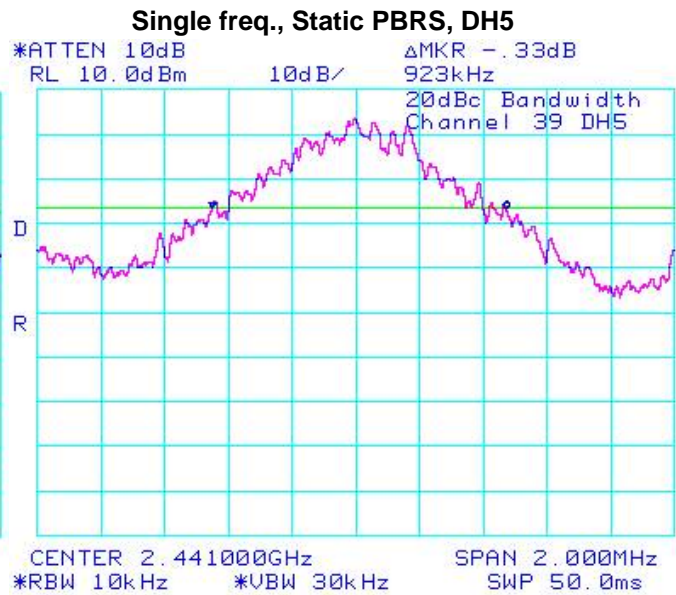
Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.0	0.927
39	≤1.0	0.923
78	≤1.0	0.957


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	1.210
39	≤1.5	1.243
78	≤1.5	1.230

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



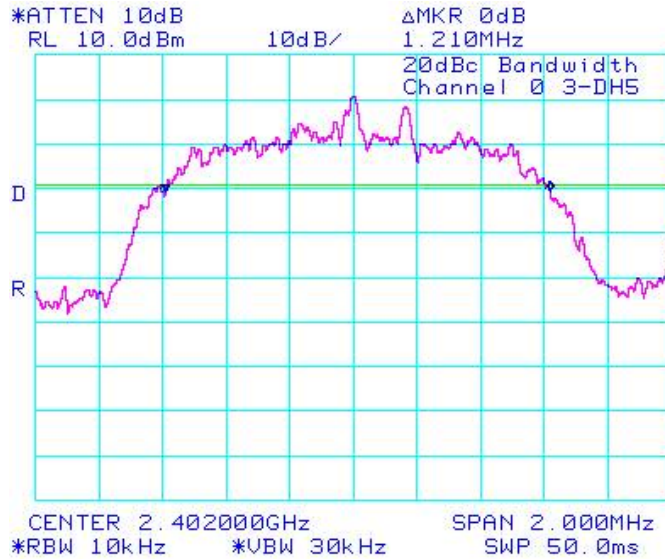
Test Report No.  
 RTS-2068-0909-23

Dates of Test  
 August 28 to October 1, 2009

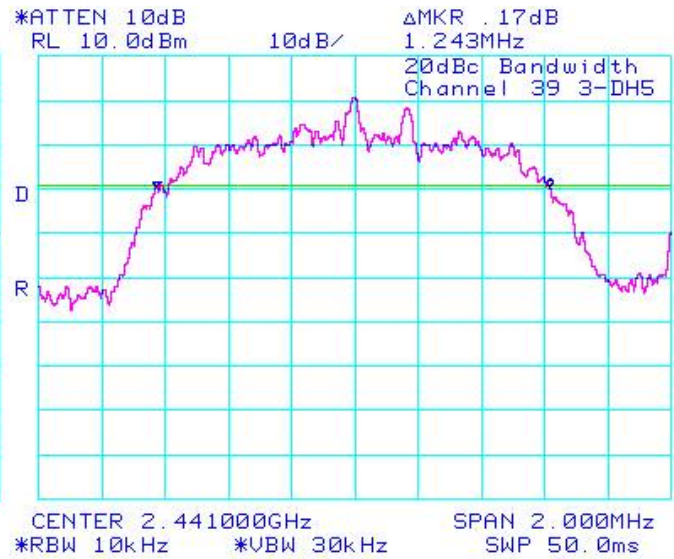
Author Data  
 Kevin Rose

Bluetooth RF Conducted Emission Test Results cont'd

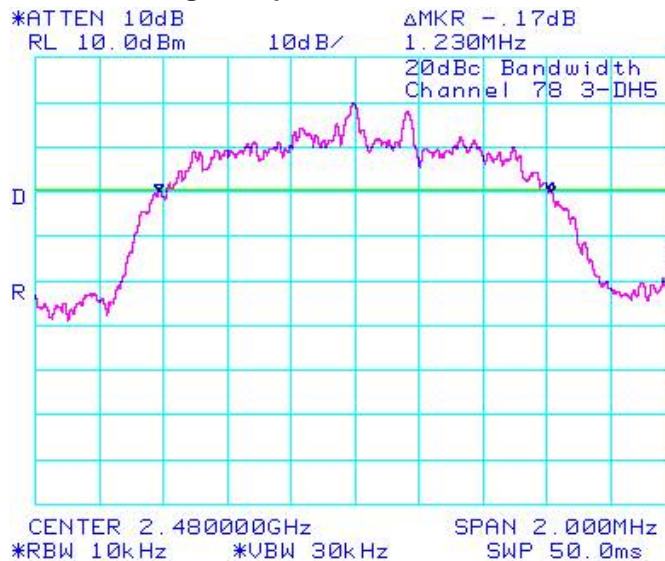
**Figure 3-4: 20 dB Bandwidth**  
 Single freq., Static PBRs, 3-DH5




**Figure 3-5: 20 dB Bandwidth**  
 Single freq., Static PBRs, 3-DH5



**Figure 3-6: 20 dB Bandwidth**  
 Single freq., Static PBRs, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

**Carrier Frequency Separation**

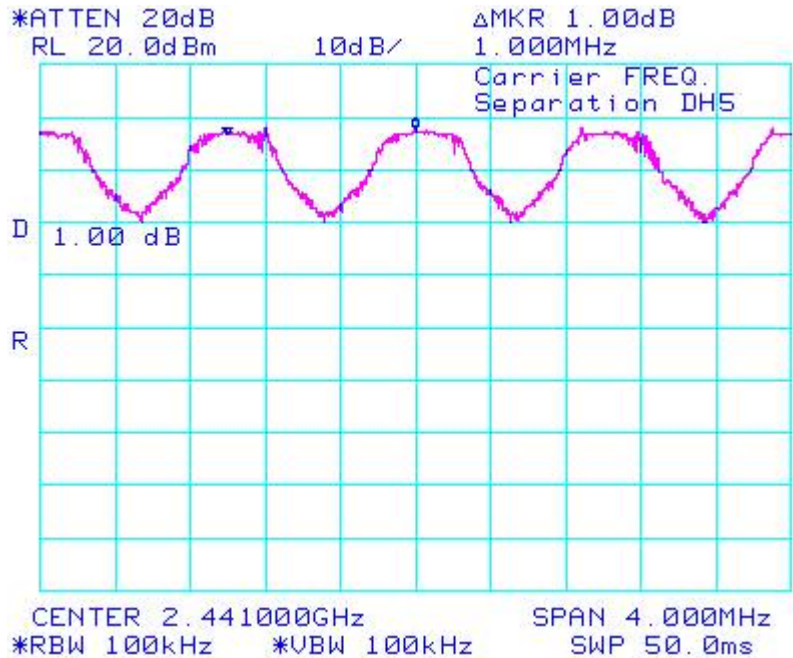
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.


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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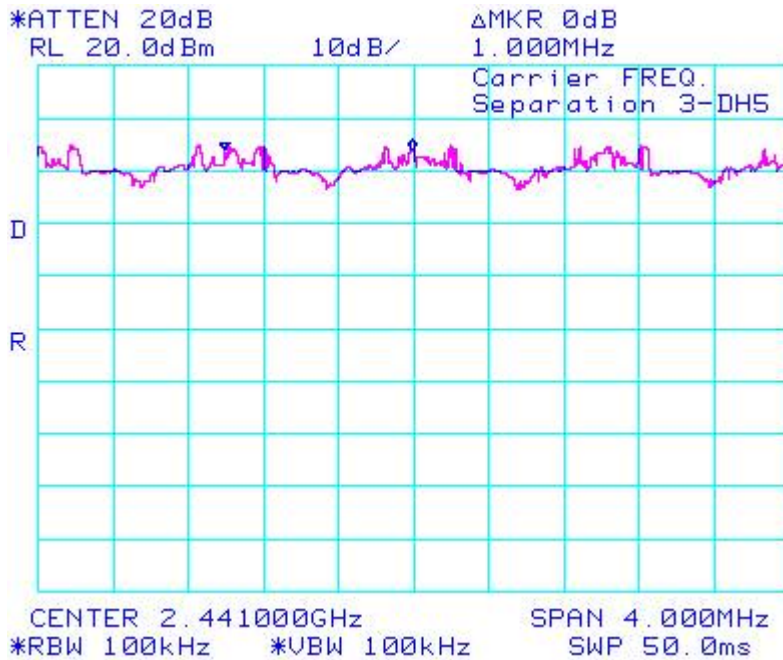
Bluetooth RF Conducted Emission Test Results cont'd


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**

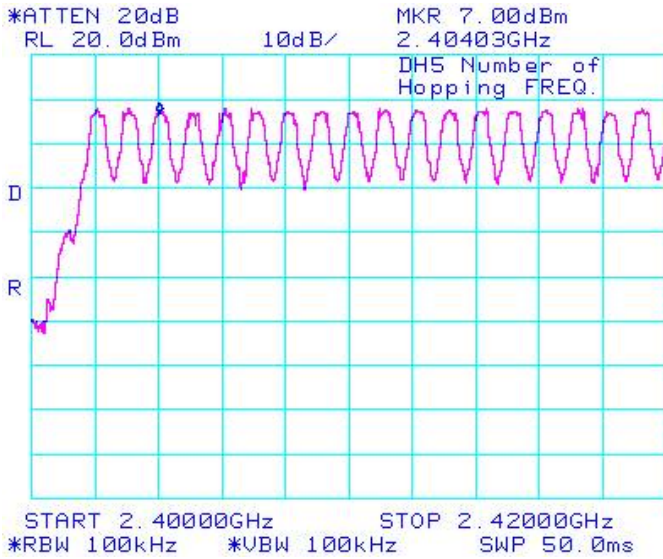
The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. Bluetooth was operating in frequency hopping (Euro/US) mode.

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

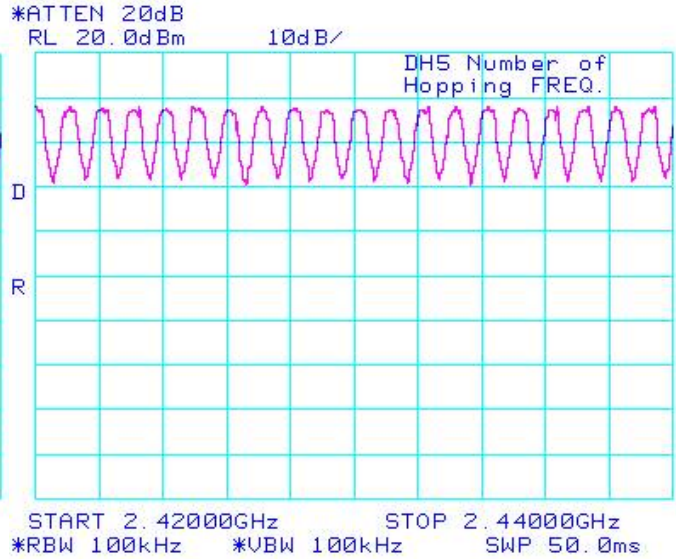
Limit (CH)	Number of Hopping Frequencies (CH)
≥75	79


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

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



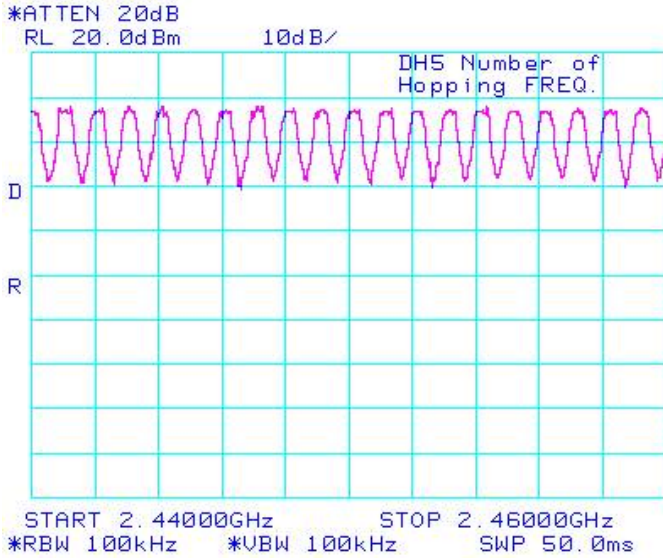
**Figure 3-7: Number of Hopping Frequencies  
Static PBRs, DH5**



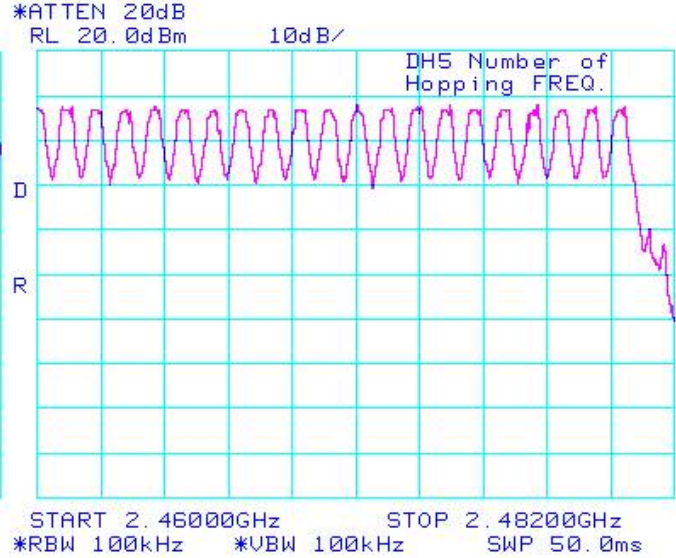
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**Figure 3-8: Number of Hopping Frequencies  
Static PBRs, DH5**



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



**Time of Occupancy (Dwell Time)**


The EUT met the requirements of the time of occupancy (dwell time) as per 47 CFR 15.247(a) 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 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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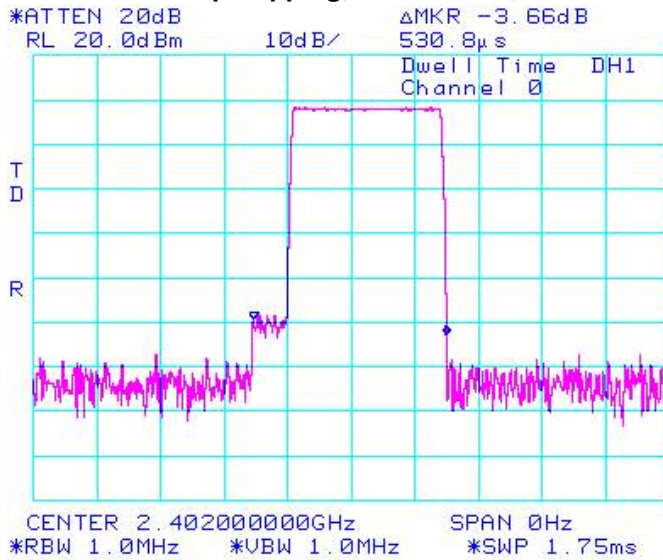
Bluetooth RF Conducted Emission Test Results cont'd

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.5308	0.5308 x 320.0 = 169.86	400	230.14
39	DH1	0.5308	0.5308 x 320.0 = 169.86	400	230.14
78	DH1	0.5308	0.5308 x 320.0 = 169.86	400	230.14
0	DH3	1.7800	1.7800 x 159.9 = 284.62	400	115.38
39	DH3	1.7733	1.7733 x 159.9 = 283.55	400	116.45
78	DH3	1.7800	1.7800 x 159.9 = 284.62	400	115.38
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	3.0250	3.0250 x 106.8 = 323.07	400	76.93

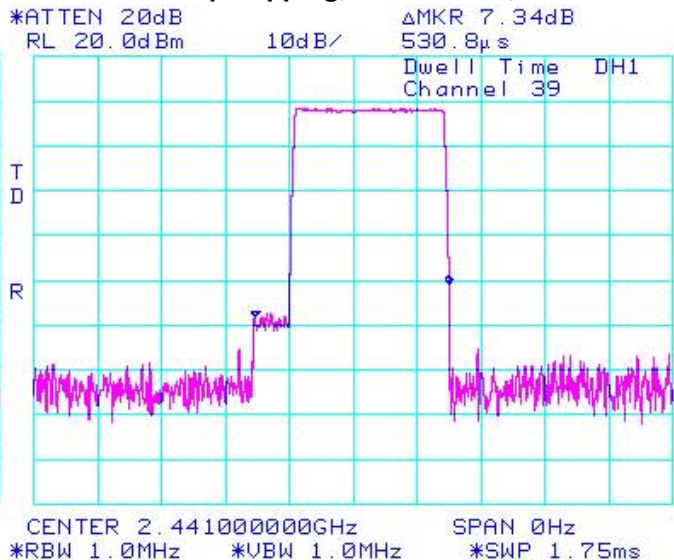
See figures 3-13 to 3-21 for the plots of the dwell time.

Bluetooth RF Conducted Emission Test Results cont'd

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

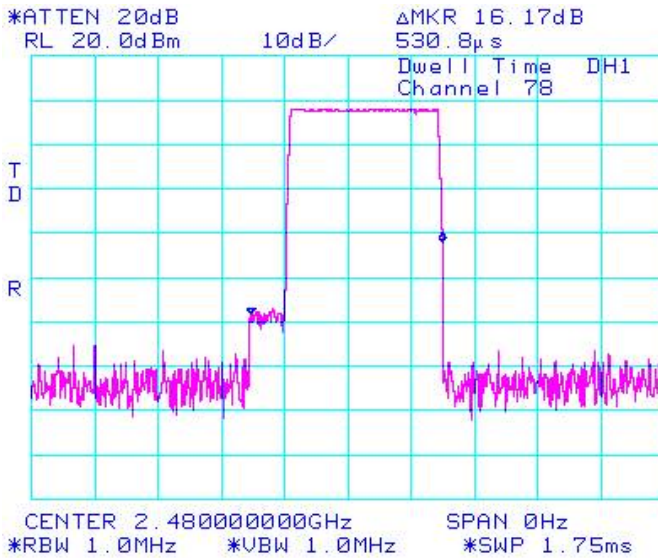


**Figure 3-14: Time of Occupancy (Dwell Time)**  
Freq. Hopping, Static PBRS, DH1

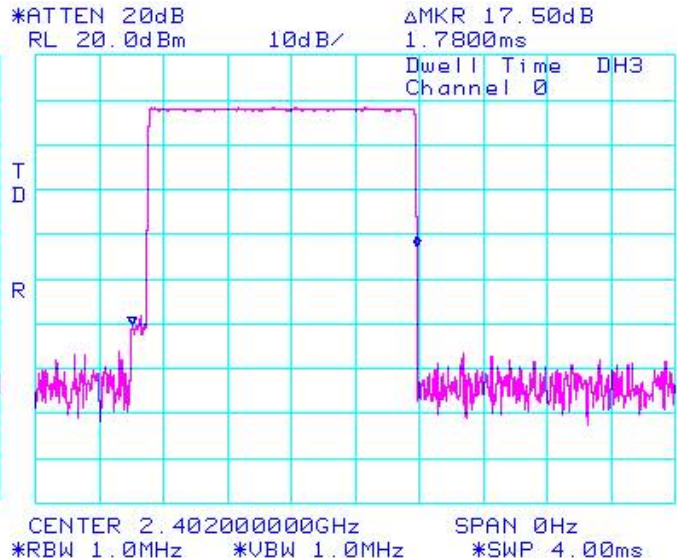


Bluetooth RF Conducted Emission Test Results cont'd

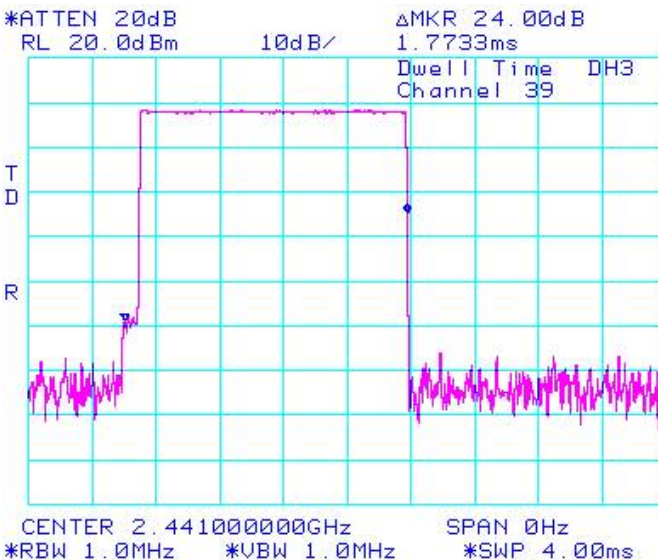
**Figure 3-15: Time of Occupancy (Dwell Time)**  
**Freq. Hopping, Static PBRs, DH1**



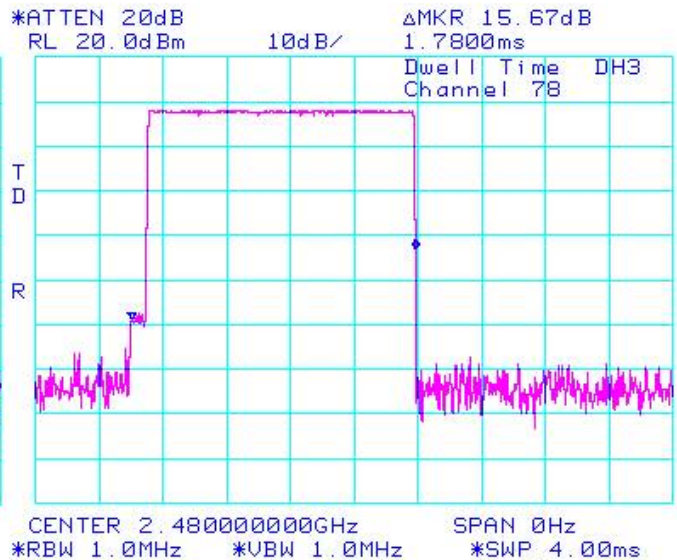
**Figure 3-16: Time of Occupancy (Dwell Time)**  
**Freq. Hopping, Static PBRs, DH3**



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



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

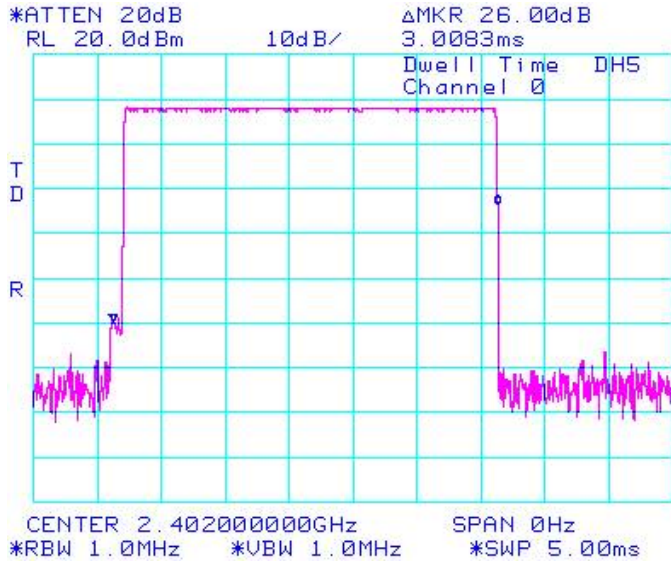


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Bluetooth RF Conducted Emission Test Results cont'd

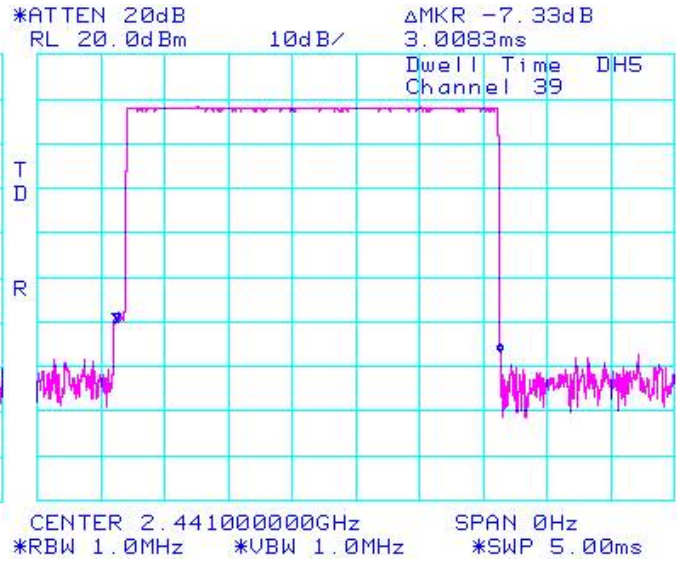
**Figure 3-19: Time of Occupancy (Dwell Time)**

**Freq. Hopping, Static PBRs, DH5**



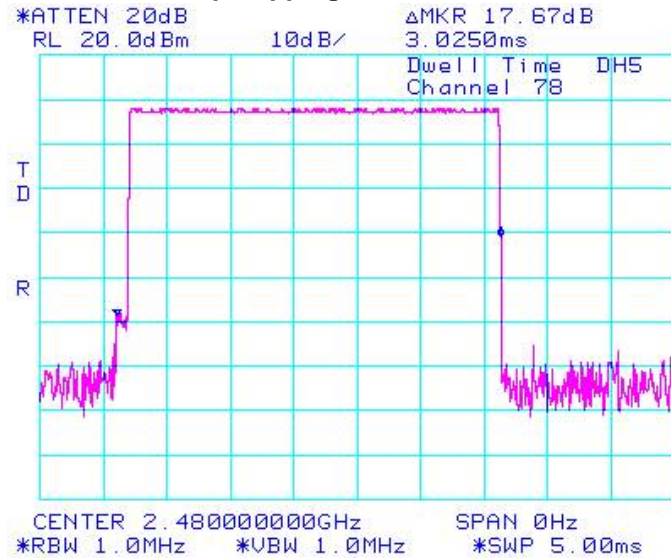
**Figure 3-20: Time of Occupancy (Dwell Time)**

**Freq. Hopping, Static PBRs, DH5**




**Figure 3-21: Time of Occupancy (Dwell Time)**

**Freq. Hopping, Static PBRs, DH5**





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Bluetooth RF Conducted Emission Test Results cont'd

**Maximum Peak Conducted Output Power**

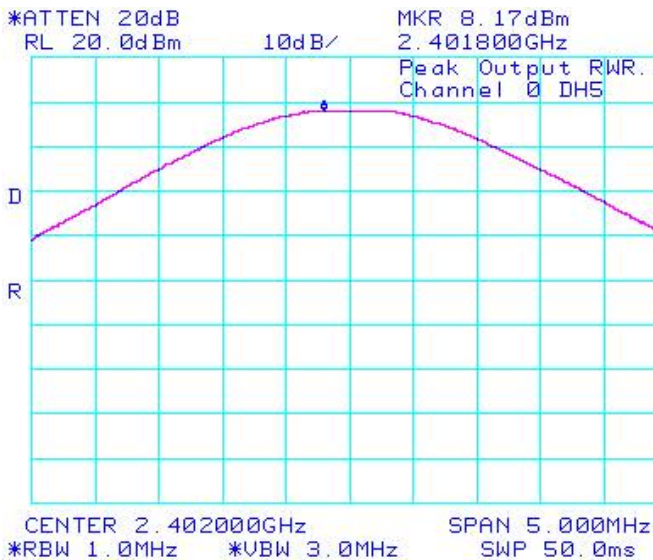
The EUT met the requirements of the maximum peak conducted output power of class 2 as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode during the measurements. A reference offset of 12.4 dB was 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.

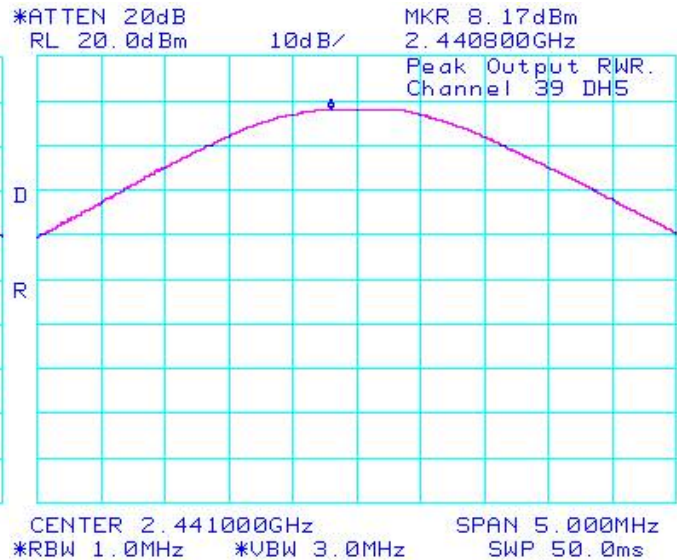
Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	8.17	0.00656	0.0 to 20.0
39	8.17	0.00656	0.0 to 20.0
78	8.00	0.00631	0.0 to 20.0

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**

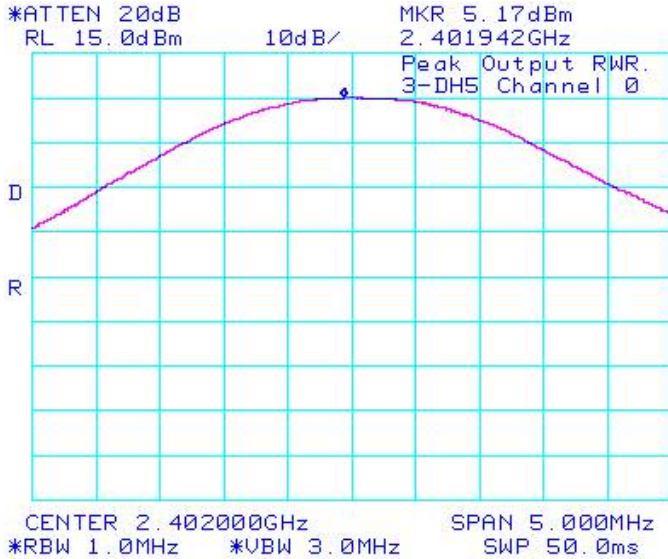




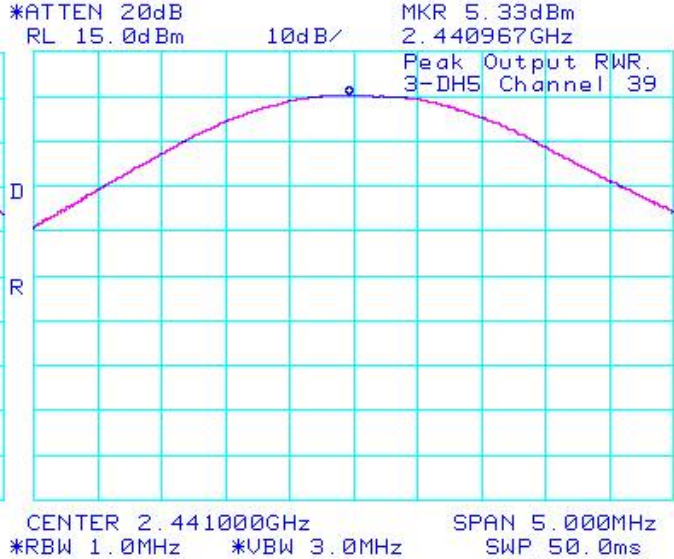
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Bluetooth RF Conducted Emission Test Results cont'd

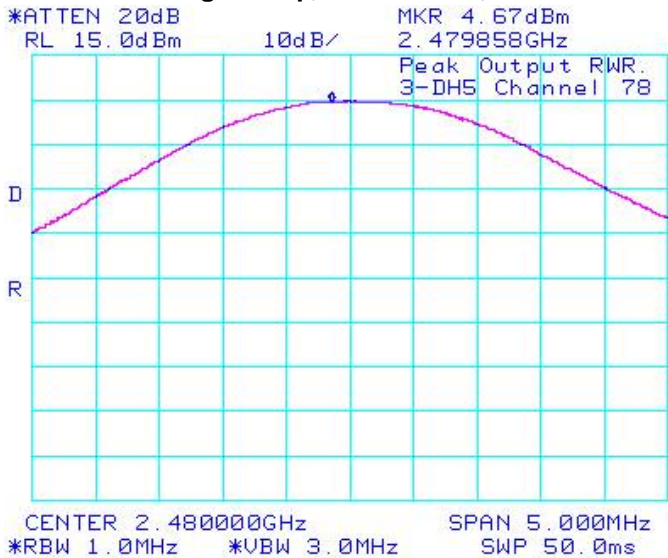
**Figure 3-25: Max. Peak Conducted Output Power  
Single Freq., Static PBRs, 3-DH5**




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



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



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Bluetooth RF Conducted Emission Test Results cont'd

**Band Edge Compliance**

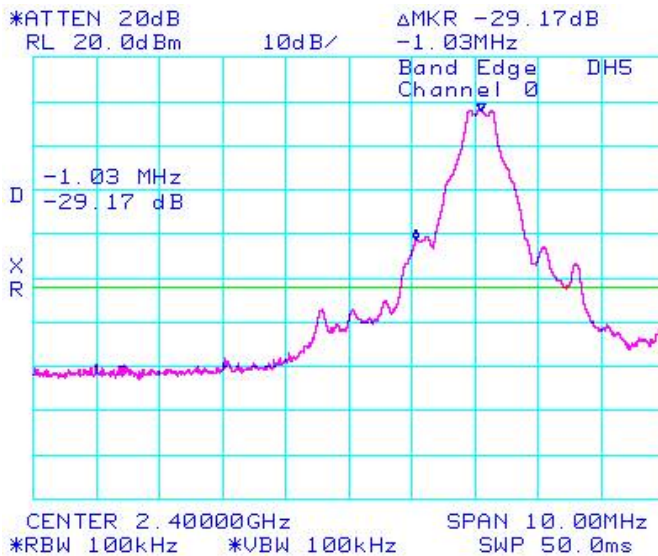
The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c) and RSS-210. Low channel (0) and high channel (78) were measured. Bluetooth was operating in single frequency and hopping mode.

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

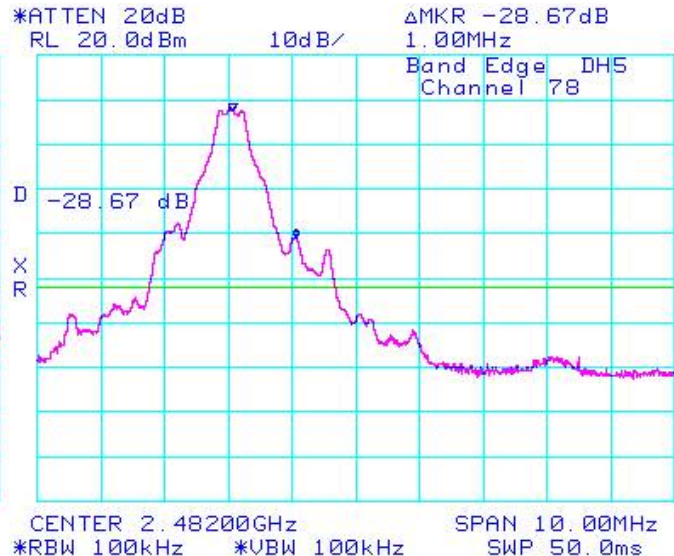
Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-29.17	-20	-9.17
78	Single Frequency	-28.67	-20	-8.67
0	Hopping	-29.17	-20	-9.17
78	Hopping	-28.00	-20	-8.00


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

**Figure 3-28: Band Edge Compliance**  
Single Freq., Static PRBS, DH5



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

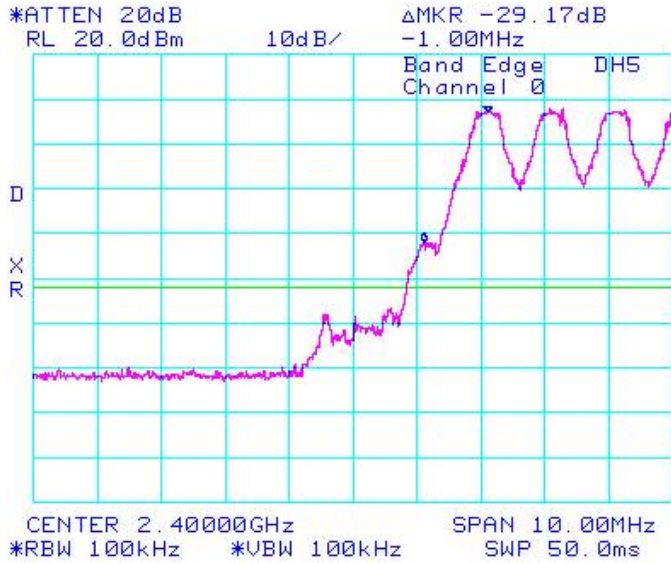


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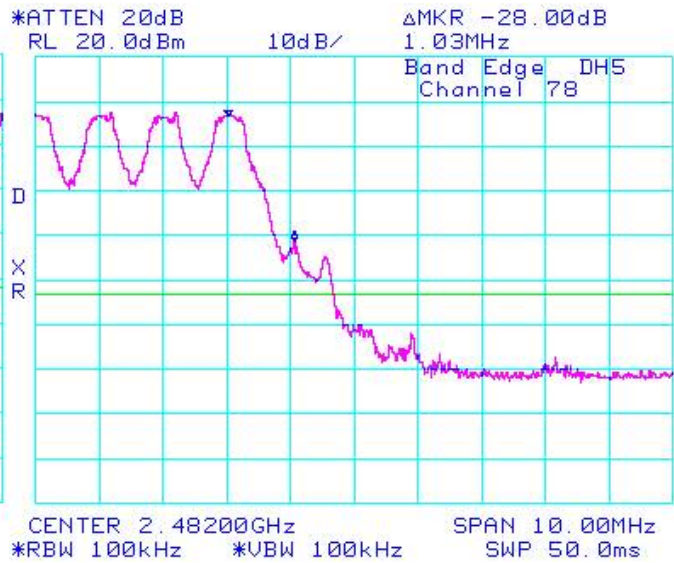
**Figure 3-30: Band Edge Compliance**

**Freq. Hopping, Static PRBS, DH5**



**Figure 3-31: Band Edge Compliance**

**Freq. Hopping, Static PRBS, DH5**



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

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-37.50	-20	-17.50
78	Single Frequency	-31.34	-20	-11.34
0	Hopping	-34.16	-20	-14.16
78	Hopping	-31.33	-20	-11.33

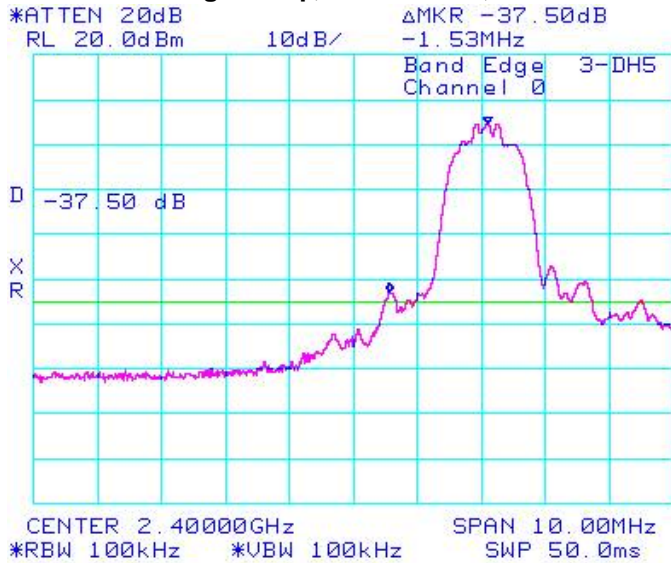
See figures 3-32 to 3-35 for the plots of the band edge compliance measurements.



Bluetooth RF Conducted Emission Test Results cont'd

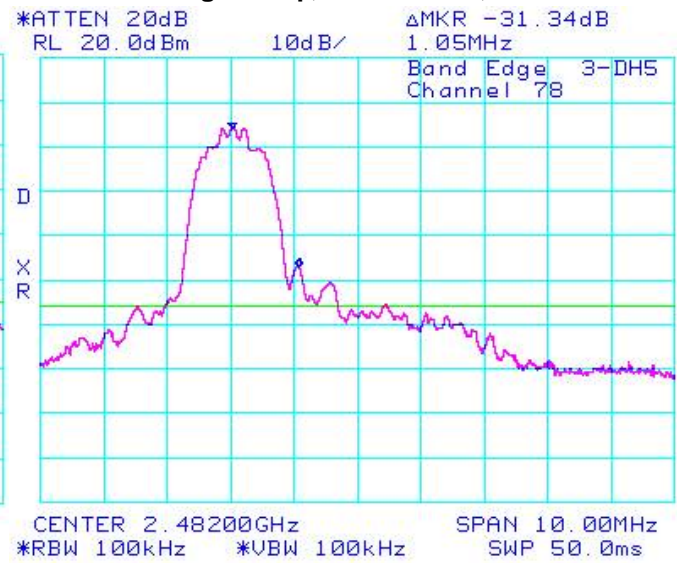
**Figure 3-32: Band Edge Compliance**

Single Freq., Static PBRS, 3-DH5



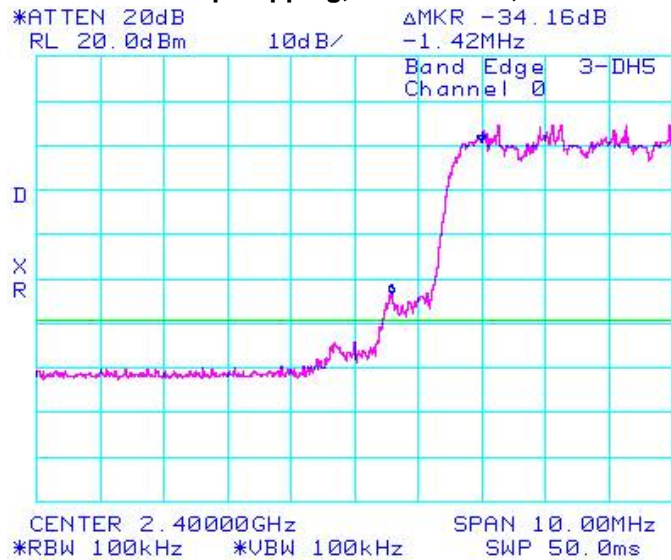
**Figure 3-33: Band Edge Compliance**

Single Freq., Static PBRS, 3-DH5



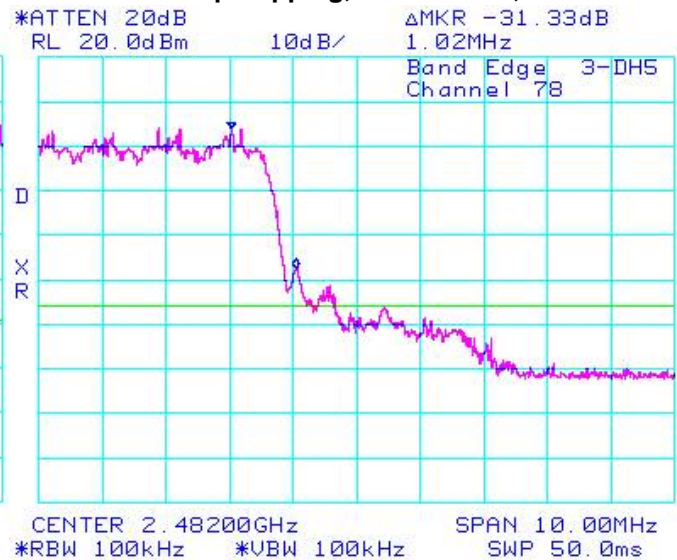
**Figure 3-34: Band Edge Compliance**


Freq. Hopping, Static PBRS, 3-DH5



**Figure 3-35: Band Edge Compliance**

Freq. Hopping, Static PBRS, 3-DH5



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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. 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.

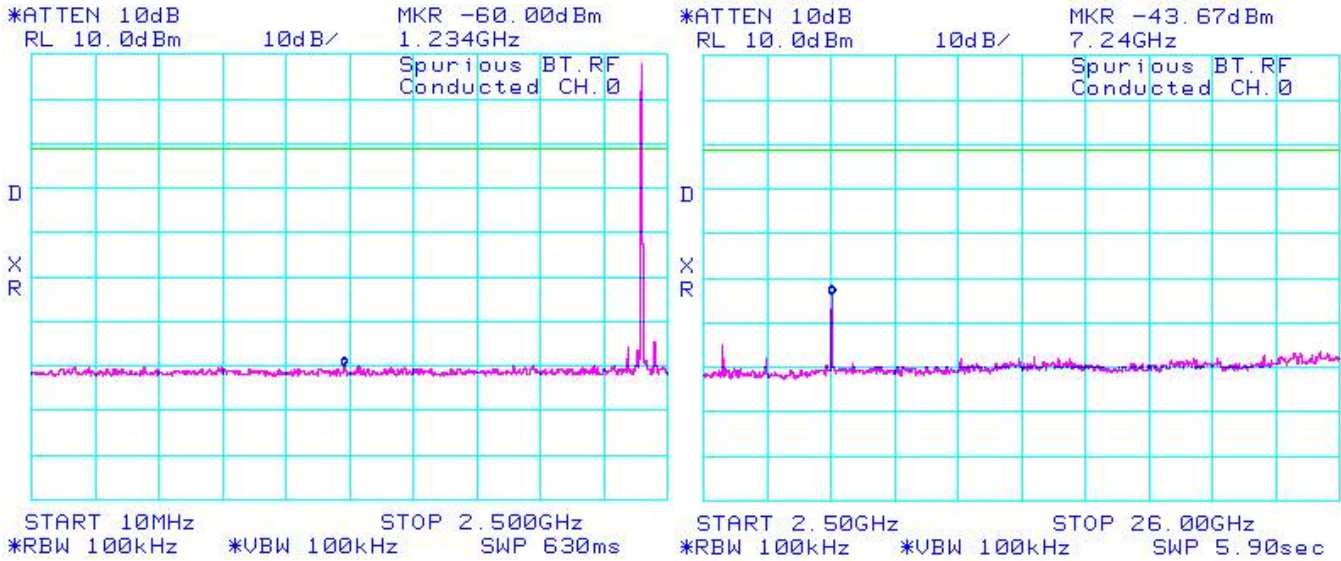
Using pattern type “Static PRBS” and packet type “DH5” during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0	8.17	-43.67	-51.84	-20
39	8.17	-56.67	-64.84	-20
78	8.00	-56.50	-64.50	-20
Hopping mode	8.00	-45.33	-53.33	-20

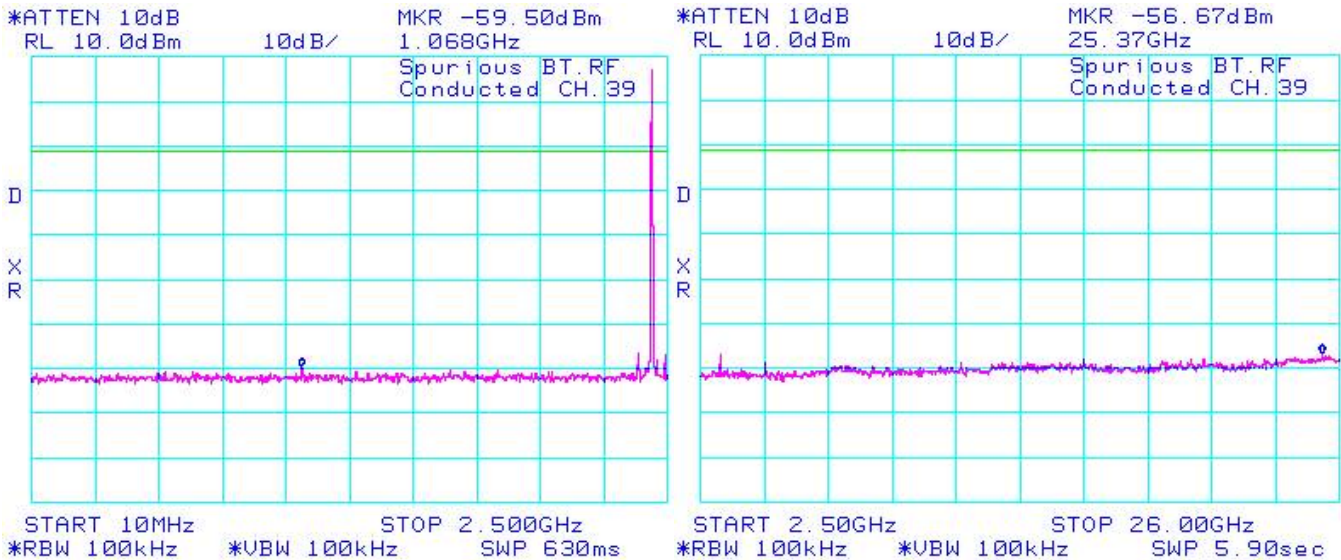
See figures 2-36 to 2-39 for the plots of the spurious RF conducted emissions.

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



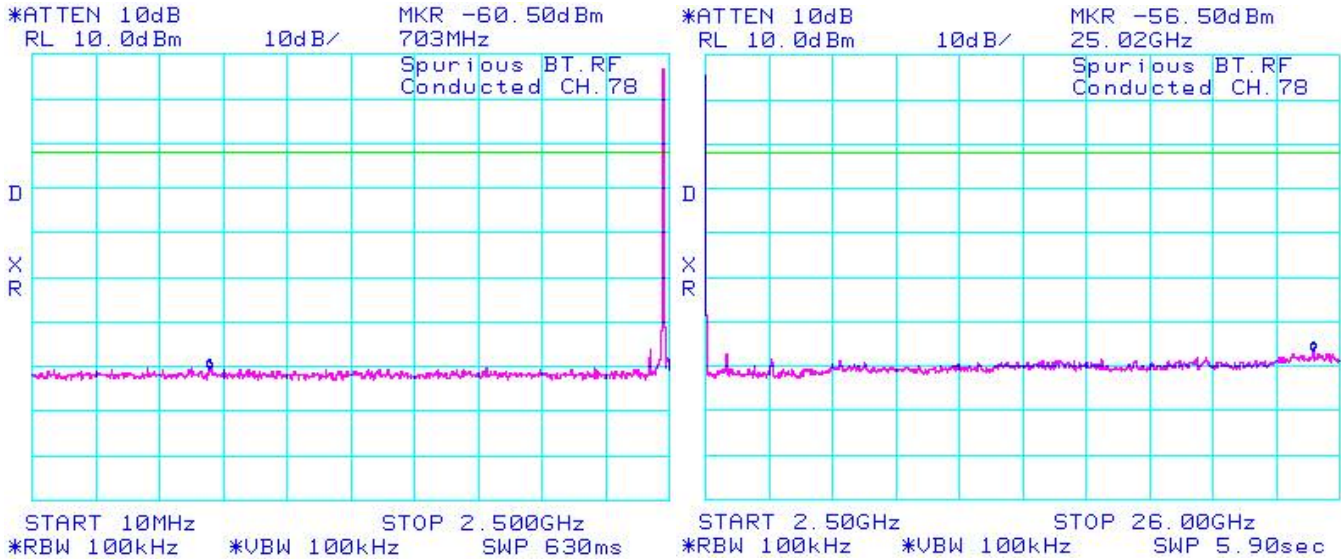


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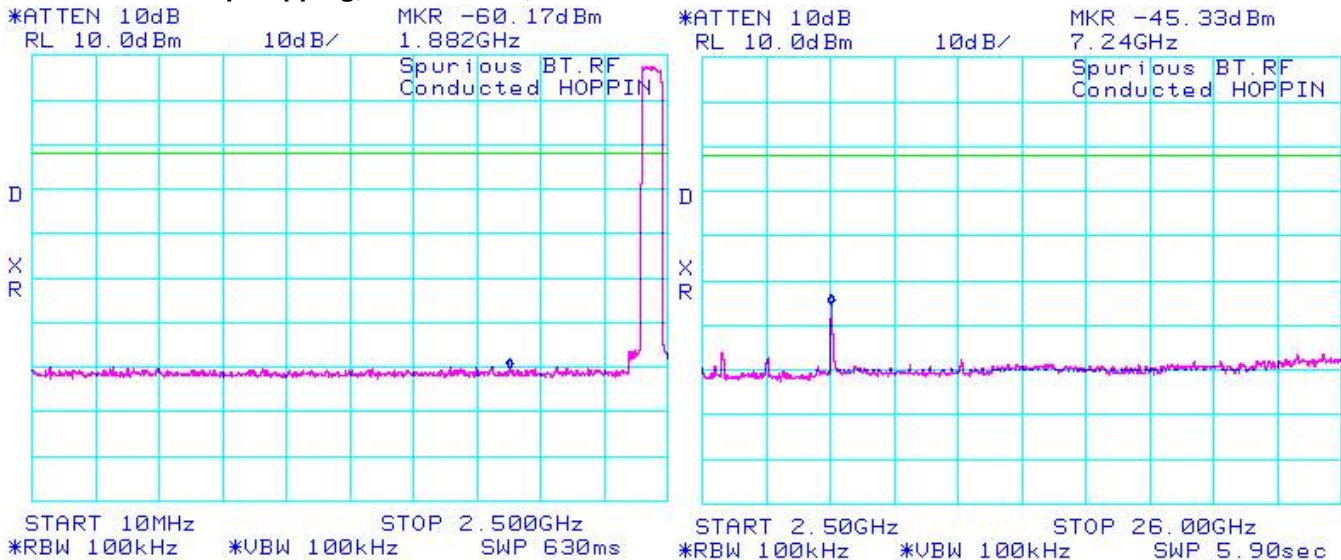
**Figure 2-38: Spurious RF Conducted Emissions**


**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	5.17	-53.83	-59	-20
39	5.33	-54.50	-59.83	-20
78	4.67	-57.50	-62.17	-20
Hopping mode	4.67	-54.50	-59.17	-20

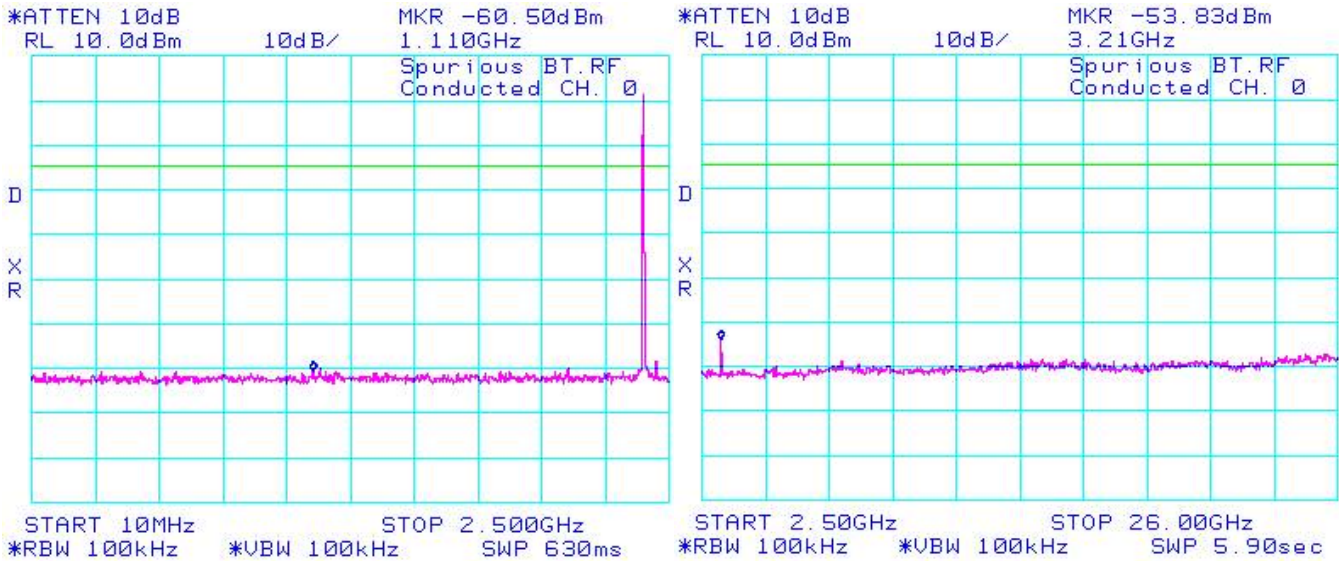
See figures 3-40 to 3-43 for the plots of the spurious RF conducted emissions.

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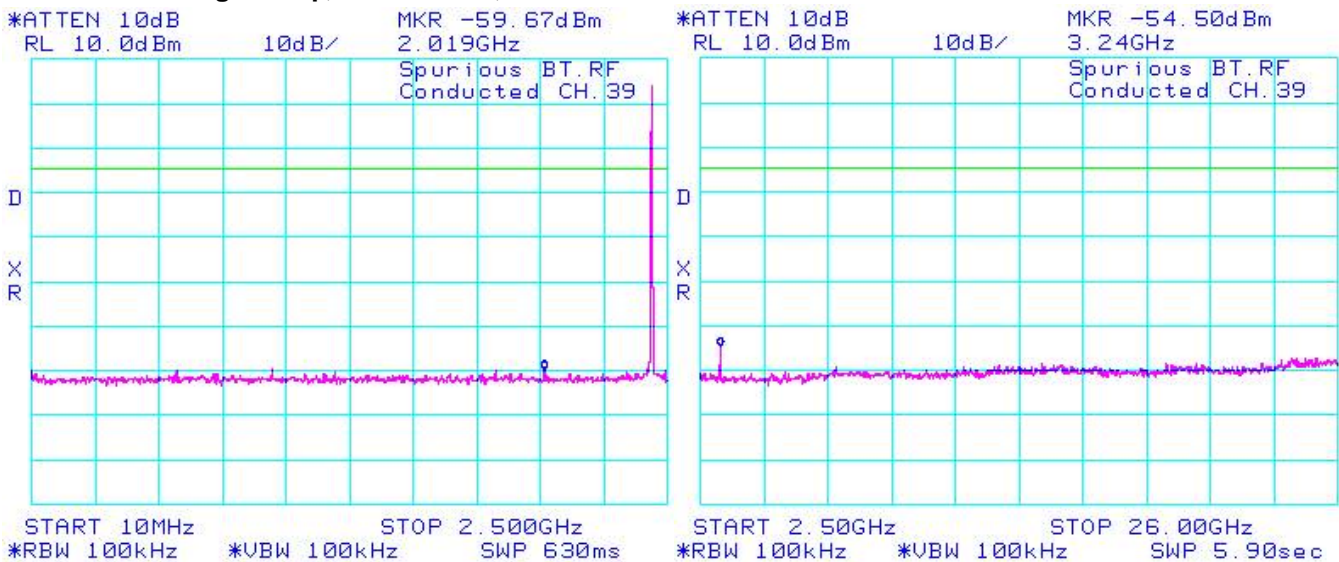
**Figure 3-40 : Spurious RF Conducted Emissions**


**Single Freq., Static PBRs, 3-DH5**



**Figure 3-41: Spurious RF Conducted Emissions**

**Single Freq., Static PBRs, 3-DH5**

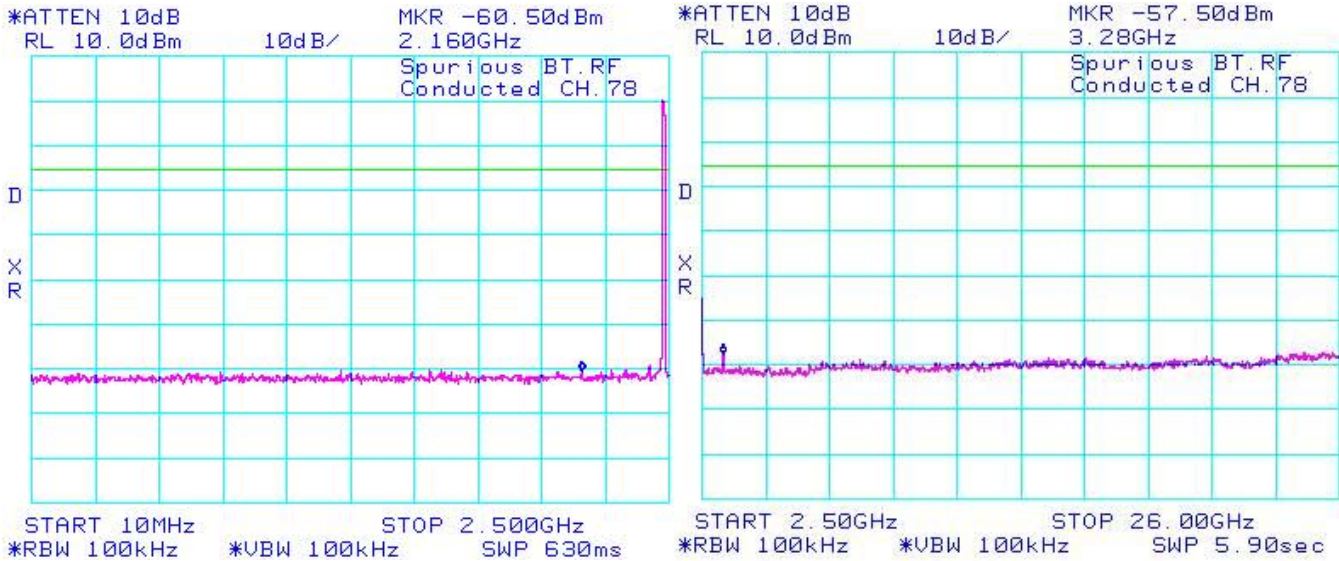


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Bluetooth RF Conducted Emission Test Results cont'd

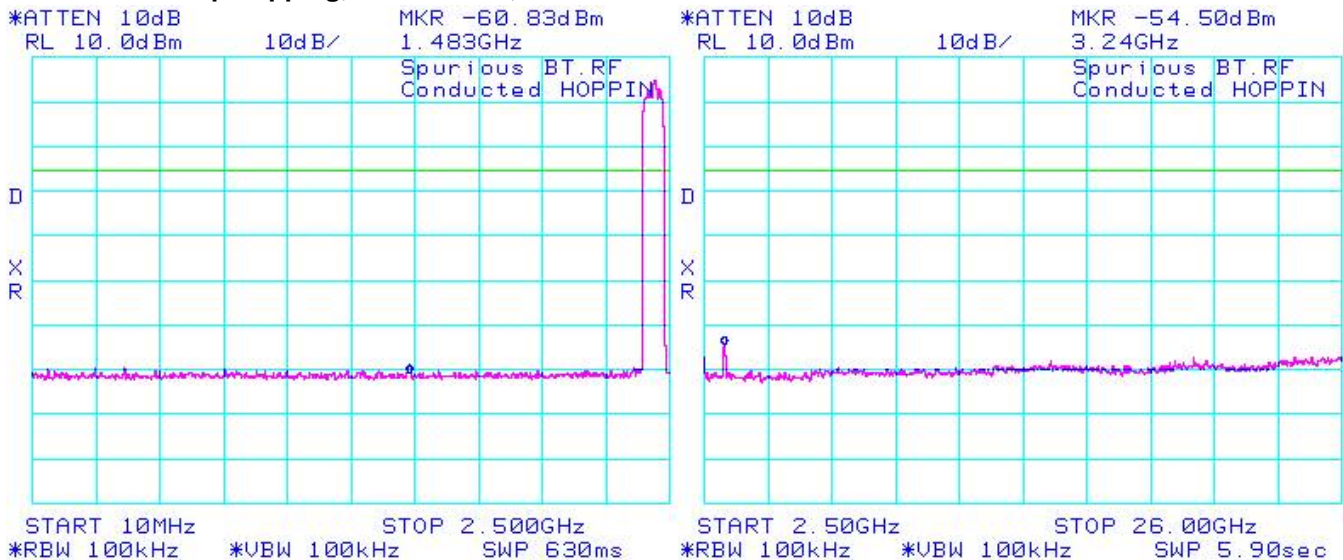
**Figure 3-42: Spurious RF Conducted Emissions**


**Single Freq., Static PBRs, 3-DH5**



**Figure 3-43 : Spurious RF Conducted Emissions**


**Freq. Hopping, Static PBRs, 3-DH5**



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## APPENDIX 4 – 802.11b/g CONDUCTED EMISSIONS TEST DATA/PLOTS



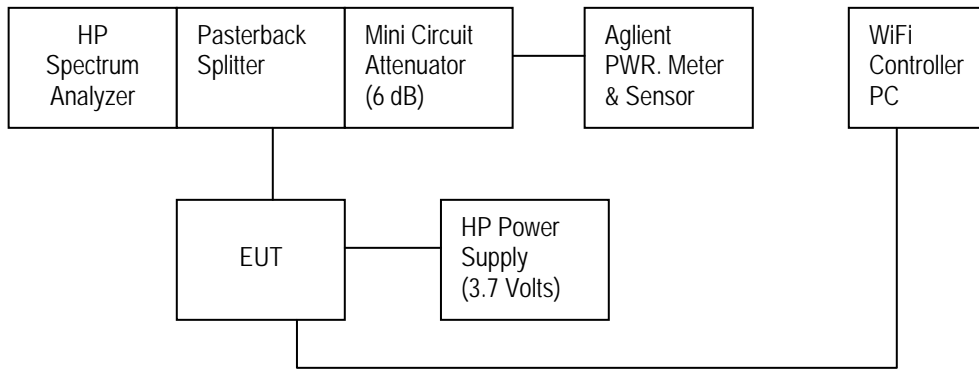
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### 802.11b/g RF Conducted Emission Test Results

**802.11b/g Target Power Output for all the recorded measurements shown below:**

Channel	Frequency	802.11b		802.11g	
		Data Rate	Power output (dBm)	Data Rate	Power output (dBm)
1	2412 MHz	1 Mbps	18.0	6 Mbps	14.0
		5.5 Mbps	18.0	24 Mbps	14.0
		11 Mbps	18.0	54 Mbps	13.0
6	2437 MHz	1 Mbps	18.0	6 Mbps	17.0
		5.5 Mbps	18.0	24 Mbps	14.5
		11 Mbps	18.0	54 Mbps	13.0
11	2462 MHz	1 Mbps	18.0	6 Mbps	14.0
		5.5 Mbps	18.0	24 Mbps	14.0
		11 Mbps	18.0	54 Mbps	13.0

### Test Setup Diagram




A reference offset of 20.4 dB was applied to the spectrum analyzer and 6.6 dB was applied to the Power Meter reference level for the attenuators and coaxial cable loss in the test circuit.

Date of test: September 10, 2009

The measurements on BlackBerry® smartphone PIN 30D9EF53 were performed by Maurice Battler.

The environmental test conditions were:

Temperature:	22 °C
Pressure:	1025 mb
Relative Humidity:	33 %

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802.11b/g RF Conducted Emission Test Results cont'd

**6 dB Bandwidth**

The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(a)(2) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11Mbps each for 802.11b mode and 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode.

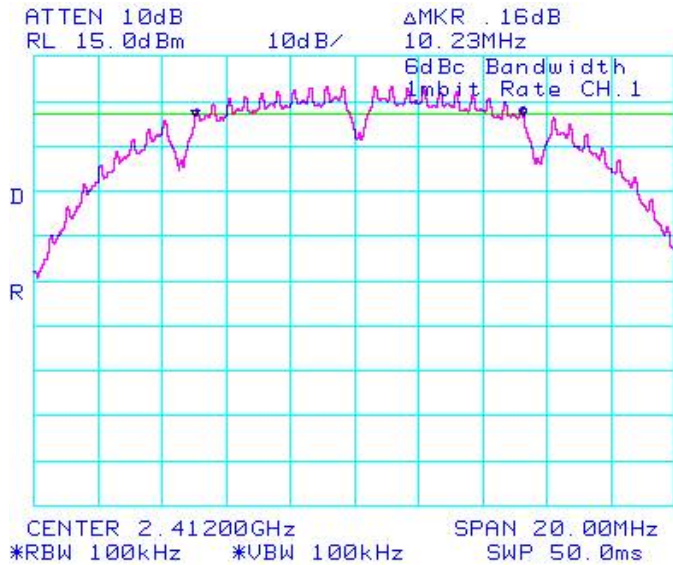
Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
1	1 Mbps	≥ 500	10.23
	5.5 Mbps	≥ 500	10.70
	11 Mbps	≥ 500	10.80
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.67
6	1 Mbps	≥ 500	10.27
	5.5 Mbps	≥ 500	11.13
	11 Mbps	≥ 500	10.63
	6 Mbps	≥ 500	16.63
	24 Mbps	≥ 500	16.70
	54 Mbps	≥ 500	16.67
11	1 Mbps	≥ 500	10.23
	5.5 Mbps	≥ 500	11.13
	11 Mbps	≥ 500	10.53
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.70

See figures 4-1 to 4-6 for the plots of the 6 dB bandwidth measurements for Channels 1, 6, and 11, at 1 Mbps each for 802.11b mode and at 6 Mbps each for 802.11g mode.

802.11b/g RF Conducted Emission Test Results cont'd

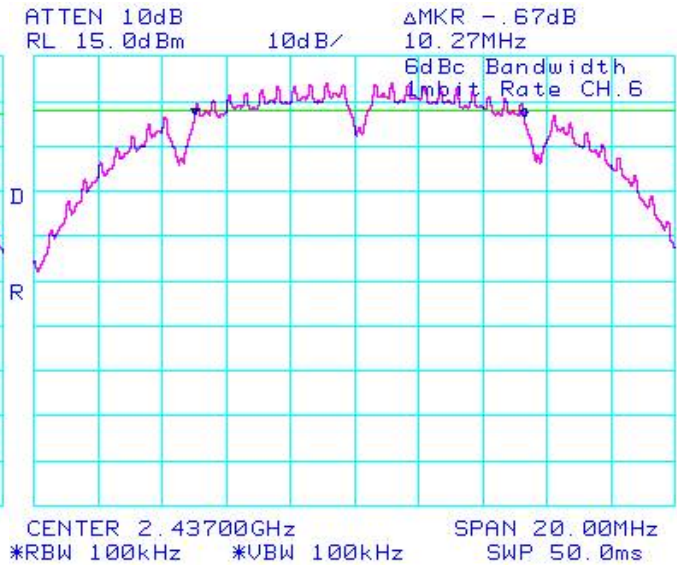
**Figure 4-1: 6 dB Bandwidth**

**802.11b, Channel 1, 1 Mbps**



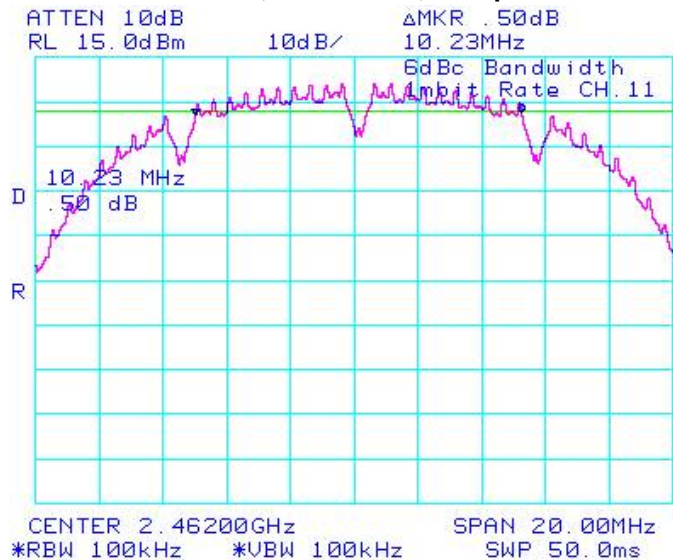
**Figure 4-2: 6 dB Bandwidth**

**802.11b, Channel 6, 1 Mbps**



**Figure 4-3: 6 dB Bandwidth**

**802.11b, Channel 11, 1 Mbps**



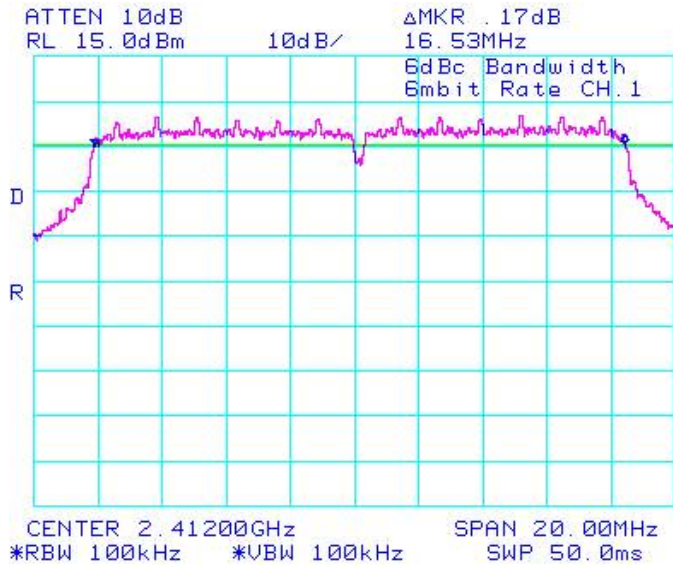


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802.11b/g RF Conducted Emission Test Results cont'd

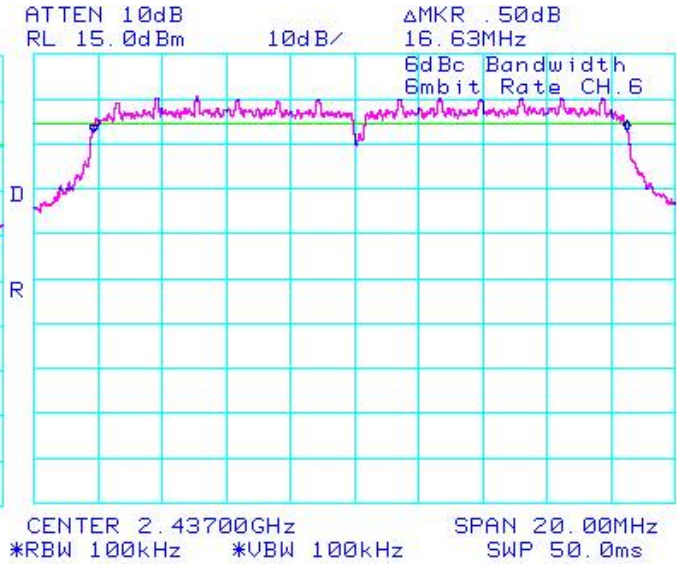
**Figure 4-4: 6 dB Bandwidth**

**802.11g, Channel 1, 6 Mbps**



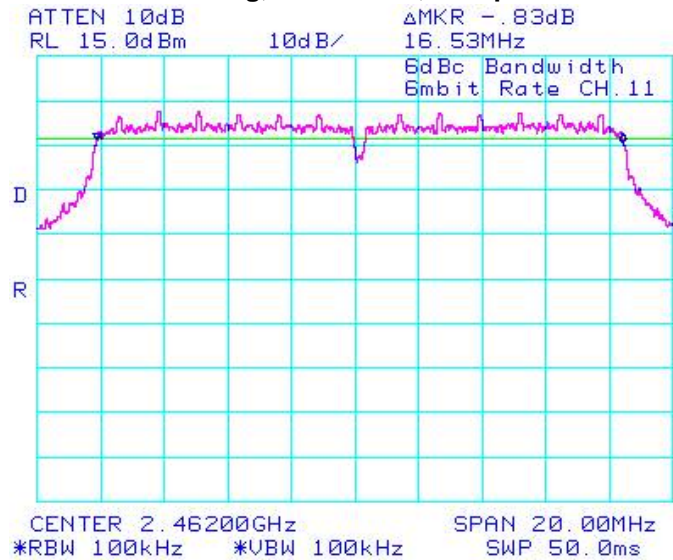
**Figure 4-5: 6 dB Bandwidth**


**802.11g, Channel 6, 6 Mbps**



**Figure 4-6: 6 dB Bandwidth**

**802.11g, Channel 11, 6 Mbps**




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**Maximum Conducted Output Power**

The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.247(b)(3) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode and 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 18.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Data Rate	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
1	1 Mbps	< 1.00	17.20	52.48
	5.5 Mbps	< 1.00	17.26	53.21
	11 Mbps	< 1.00	17.27	53.33
	6 Mbps	< 1.00	13.27	21.23
	24 Mbps	< 1.00	13.38	21.78
	54 Mbps	< 1.00	12.48	17.70
6	1 Mbps	< 1.00	17.91	61.80
	5.5 Mbps	< 1.00	17.20	52.48
	11 Mbps	< 1.00	17.90	61.66
	6 Mbps	< 1.00	16.95	49.55
	24 Mbps	< 1.00	14.54	28.44
	54 Mbps	< 1.00	13.18	20.80
11	1 Mbps	< 1.00	18.25	66.83
	5.5 Mbps	< 1.00	18.20	66.07
	11 Mbps	< 1.00	18.21	66.22
	6 Mbps	< 1.00	14.25	26.61
	24 Mbps	< 1.00	14.26	26.67
	54 Mbps	< 1.00	13.45	22.13

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### 802.11b/g 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. Channels 1 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode and 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode.

Channel	Data Rate	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
1	1 Mbps	< -20	-40.50	-20.50
	5.5 Mbps	< -20	-44.00	-24.00
	11 Mbps	< -20	-42.50	-22.50
	6 Mbps	< -20	-28.50	-8.50
	24 Mbps	< -20	-31.00	-11.00
	54 Mbps	< -20	-30.33	-10.33
11	1 Mbps	< -20	-45.00	-25.00
	5.5 Mbps	< -20	-49.50	-29.50
	11 Mbps	< -20	-48.83	-28.83
	6 Mbps	< -20	-42.34	-22.34
	24 Mbps	< -20	-42.66	-22.66
	54 Mbps	< -20	-45.00	-25.00

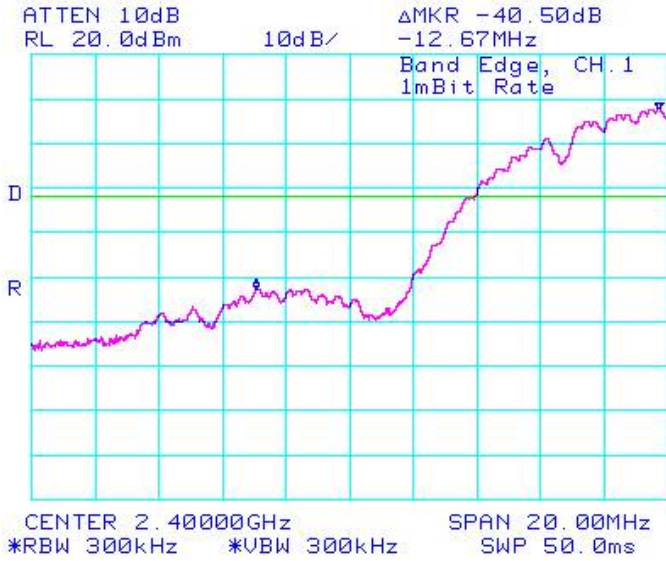
See figures 4-7 to 4-10 for the plots of the band edge compliance measurements for Channels 1, and 11, at 1 Mbps each for 802.11b mode and at 6 Mbps each for 802.11g mode.

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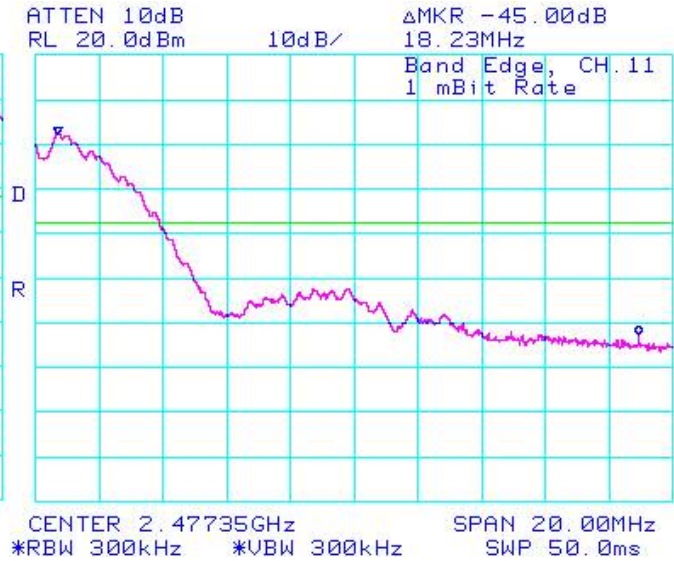
**Figure 4-7: Band Edge Compliance**

**802.11b, Channel 1, 1 Mbps**



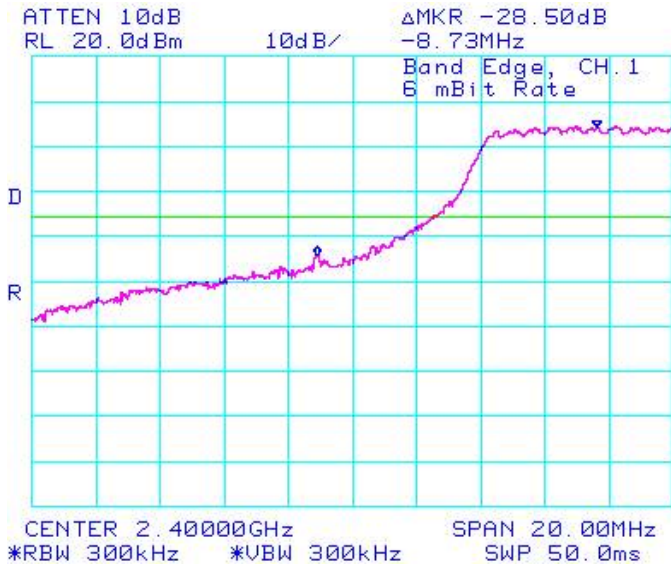
**Figure 4-8: Band Edge Compliance**

**802.11b, Channel 11, 1 Mbps**



**Figure 4-9: Band Edge Compliance**


**802.11g, Channel 1, 6 Mbps**



**Figure 4-10: Band Edge Compliance**

**802.11g, Channel 11, 6 Mbps**



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802.11b/g RF Conducted Emission Test Results cont'd

**Peak Power Spectral Density**

The EUT met the requirements of the peak power spectral density as per 47 CFR 15.247(d) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode and 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode.

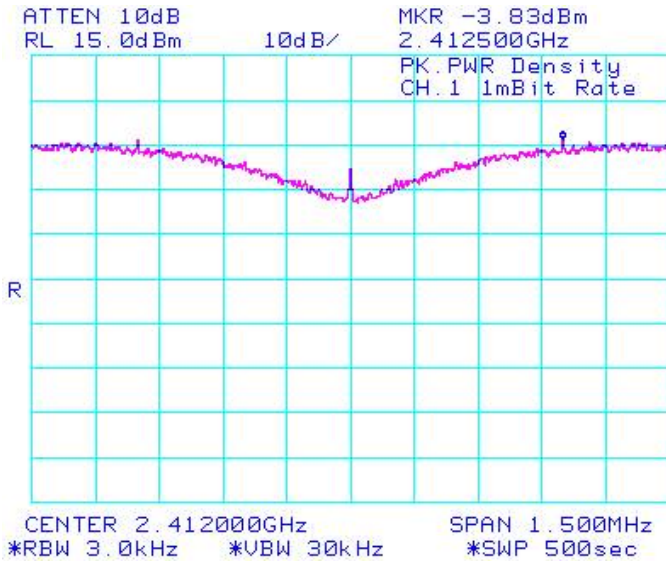
Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
1	1 Mbps	< 8.00	-3.83	-11.83
	5.5 Mbps	< 8.00	-4.83	-12.83
	11 Mbps	< 8.00	-5.00	-13.00
	6 Mbps	< 8.00	-11.17	-19.17
	24 Mbps	< 8.00	-12.17	-20.17
	54 Mbps	< 8.00	-14.33	-22.33
6	1 Mbps	< 8.00	-3.17	-11.17
	5.5 Mbps	< 8.00	-4.17	-12.17
	11 Mbps	< 8.00	-4.17	-12.17
	6 Mbps	< 8.00	-7.83	-15.83
	24 Mbps	< 8.00	-11.17	-19.17
	54 Mbps	< 8.00	-13.50	-21.50
11	1 Mbps	< 8.00	-3.00	-11.00
	5.5 Mbps	< 8.00	-4.00	-12.00
	11 Mbps	< 8.00	-4.50	-12.50
	6 Mbps	< 8.00	-10.33	-18.33
	24 Mbps	< 8.00	-11.33	-19.33
	54 Mbps	< 8.00	-12.50	-20.50

See figures 4-11 to 4-16 for the plots of the peak power spectral density for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode and at 6 Mbps each for 802.11g mode.

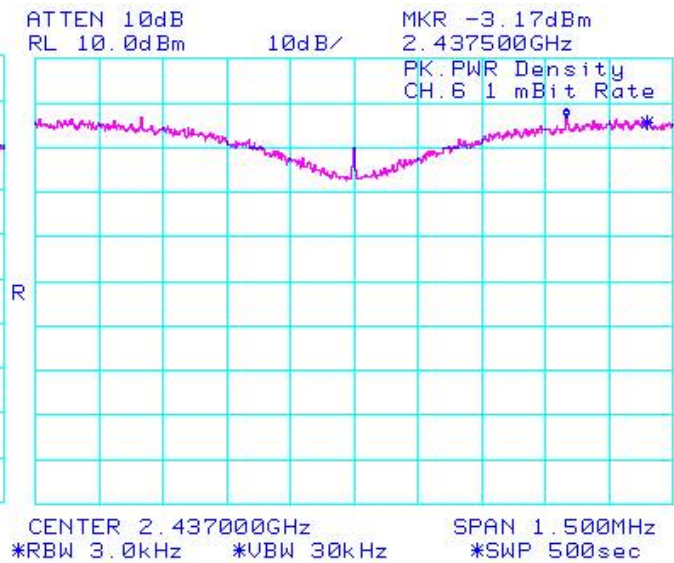


802.11b/g RF Conducted Emission Test Results cont'd

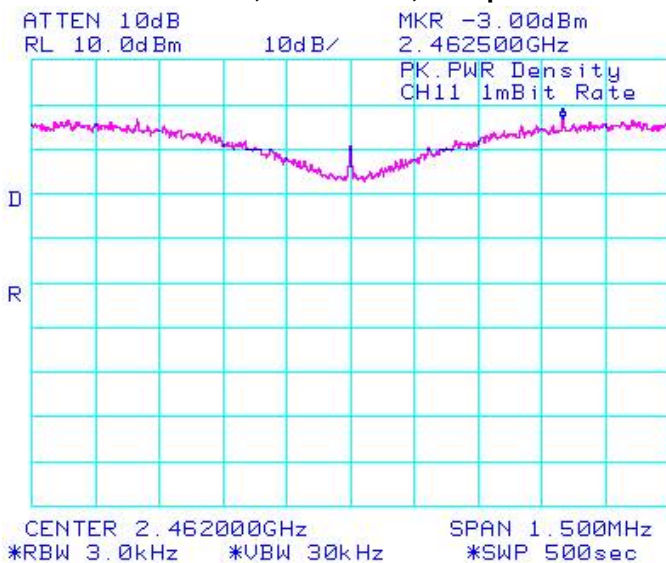
**Figure 4-11: Peak Power Spectral Density**  
**802.11b, Channel 1, 1 Mbps**



**Figure 4-12: Peak Power Spectral Density**  
**802.11b, Channel 6, 1 Mbps**



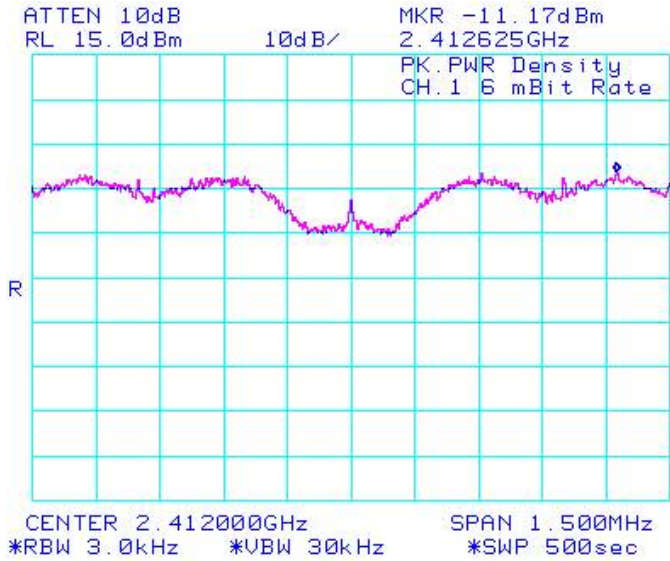
**Figure 4-13: Peak Power Spectral Density**  
**802.11b, Channel 11, 1 Mbps**



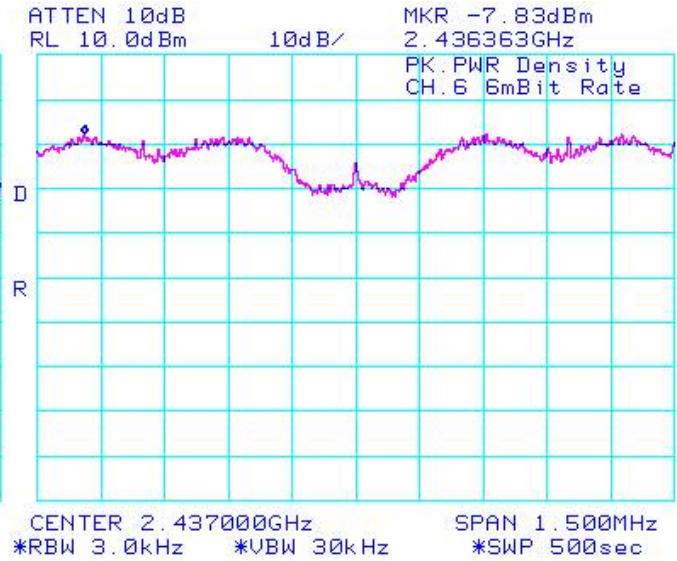
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802.11b/g RF Conducted Emission Test Results cont'd

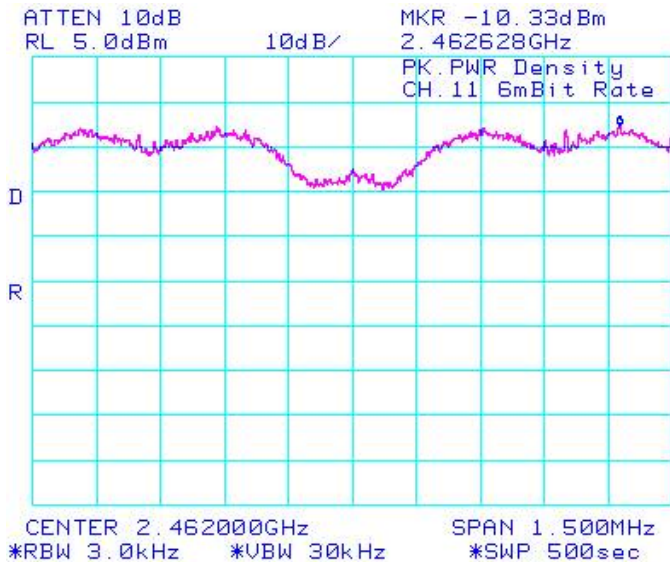
**Figure 4-14: Peak Power Spectral Density**  
**802.11g, Channel 1, 6 Mbps**




**Figure 4-15: Peak Power Spectral Density**  
**802.11g, Channel 6, 6 Mbps**



**Figure 4-16: Peak Power Spectral Density**  
**802.11g, Channel 11, 6 Mbps**



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**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. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode and 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode. Peak power was measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 18.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
1	1 Mbps	17.20	-49.67	-66.87	-20
	5.5 Mbps	17.26	-49.67	-66.93	-20
	11 Mbps	17.27	-49.67	-66.94	-20
	6 Mbps	13.27	-50.33	-63.6	-20
	24 Mbps	13.38	-50.00	-63.38	-20
	54 Mbps	12.48	-50.17	-62.65	-20
6	1 Mbps	17.91	-50.33	-68.24	-20
	5.5 Mbps	17.20	-50.00	-67.2	-20
	11 Mbps	17.90	-50.33	-68.23	-20
	6 Mbps	16.95	-49.33	-66.28	-20
	24 Mbps	14.54	-51.00	-65.54	-20
	54 Mbps	13.18	-50.17	-63.35	-20
11	1 Mbps	18.25	-50.67	-68.92	-20
	5.5 Mbps	18.20	-49.67	-67.87	-20
	11 Mbps	18.21	-49.83	-68.04	-20
	6 Mbps	14.25	-49.67	-63.92	-20
	24 Mbps	14.26	-49.67	-63.93	-20
	54 Mbps	13.45	-50.33	-63.78	-20

The emissions were in the NF.

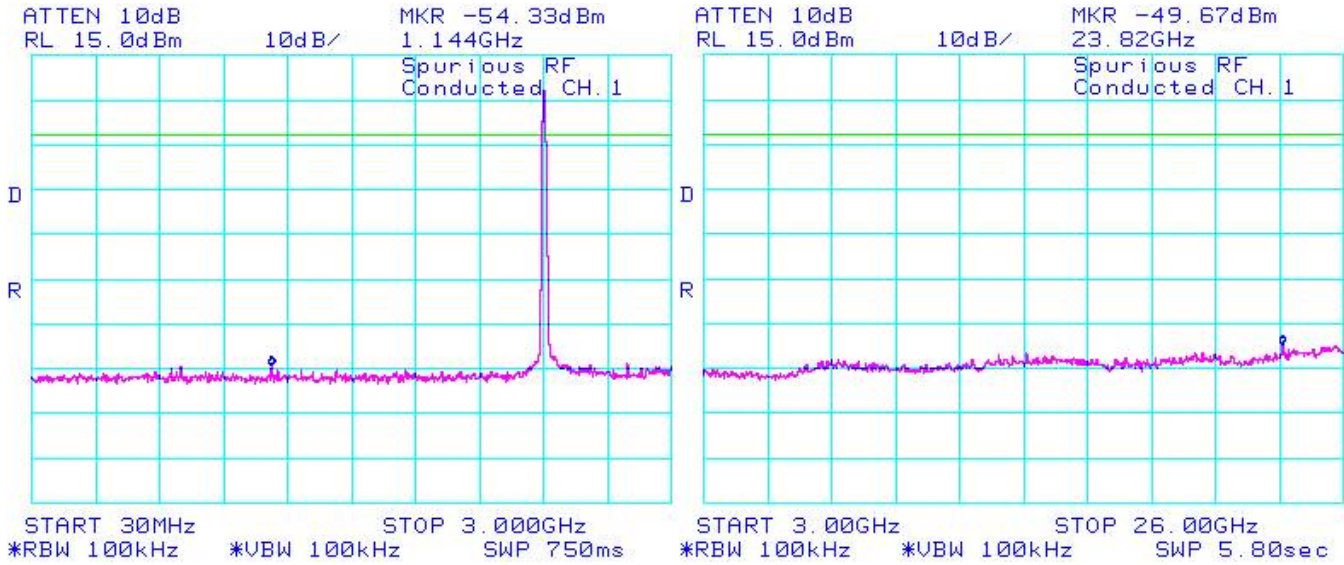
See figures 4-17 to 4-22 for the plots of the spurious RF conducted emissions for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode and at 6 Mbps each for 802.11g mode.



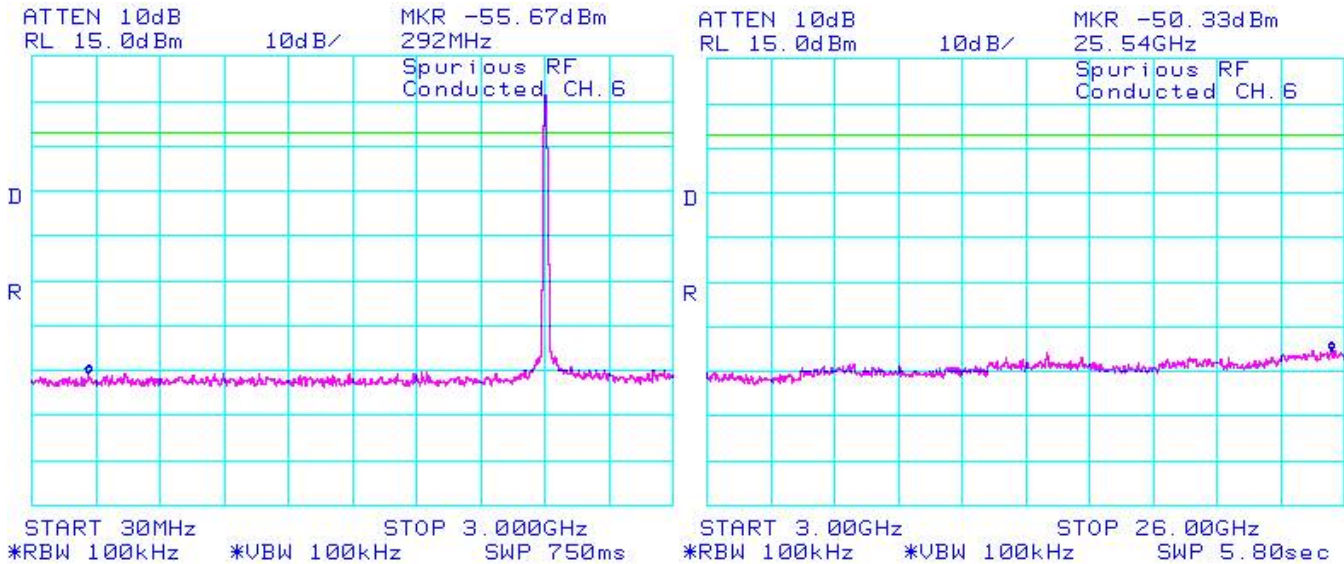
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### 802.11b/g RF Conducted Emission Test Results cont'd

**Figure 4-17: Spurious Conducted RF Emissions**  
802.11b, Channel 1, 1 Mbps



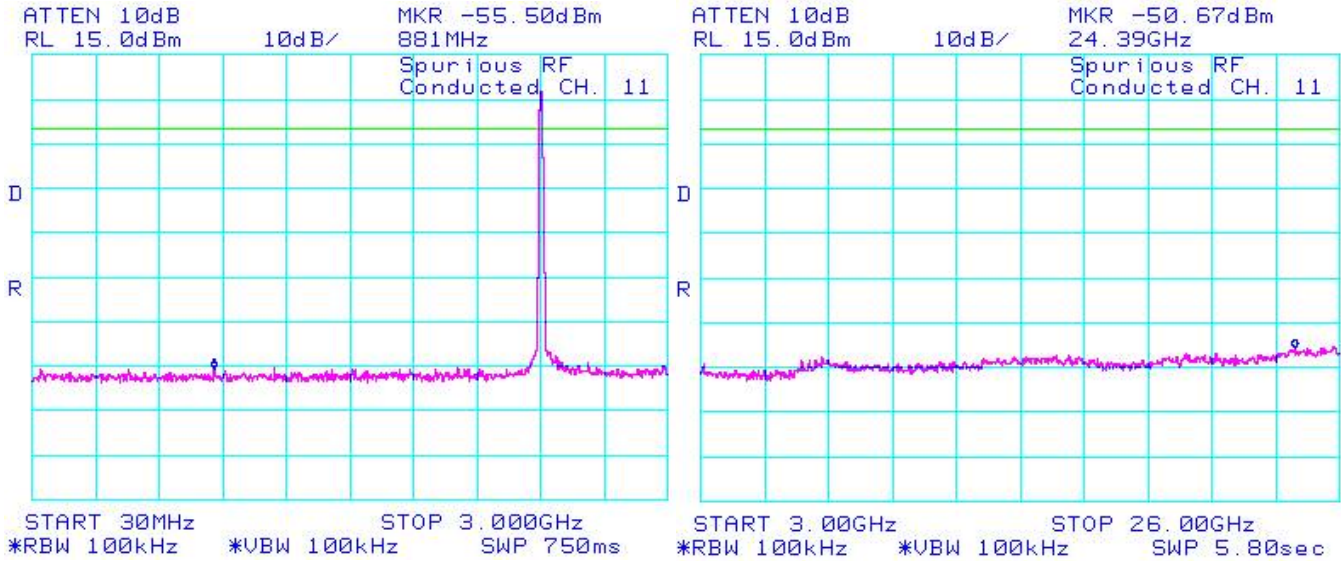
**Figure 4-18 : Spurious Conducted RF Emissions**  
802.11b, Channel 6, 1 Mbps



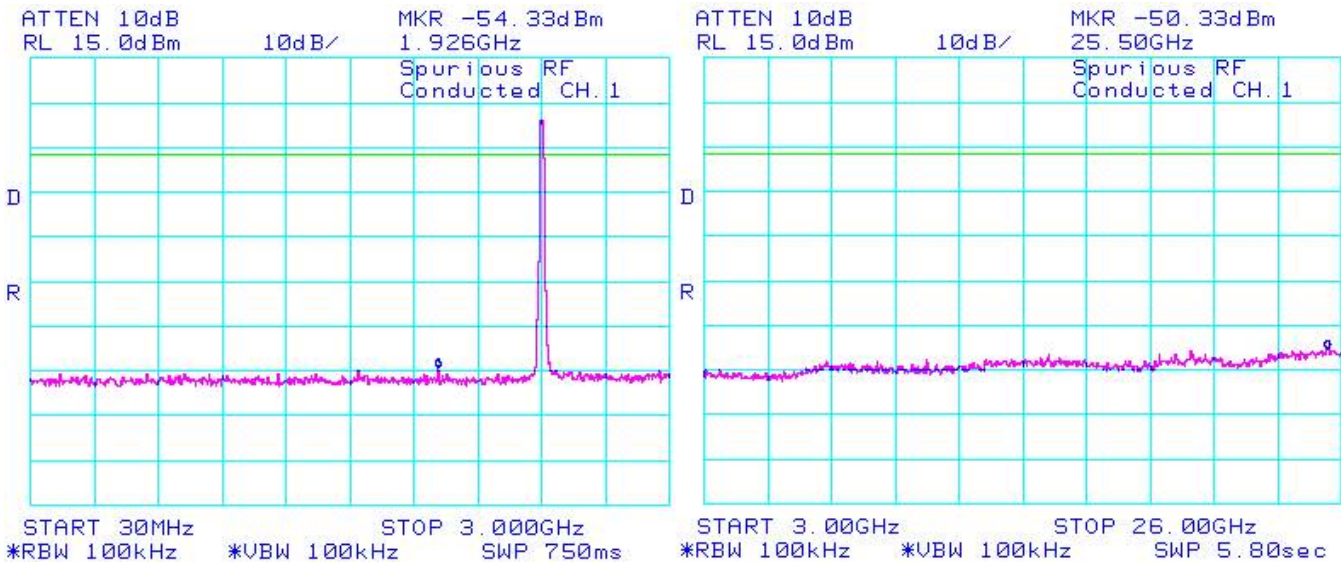
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### 802.11b/g RF Conducted Emission Test Results cont'd

**Figure 4-19: Spurious Conducted RF Emissions**  
802.11b, Channel 11, 1 Mbps



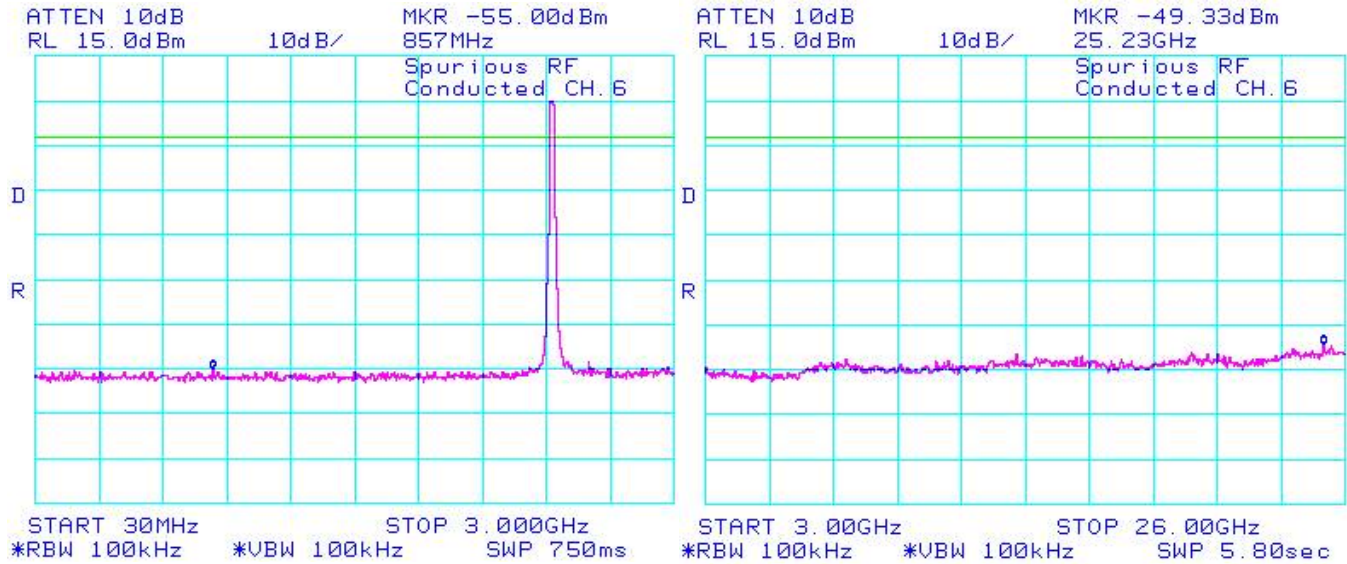
**Figure 4-20: Spurious Conducted RF Emissions**  
802.11g, Channel 1, 6 Mbps



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### 802.11b/g RF Conducted Emission Test Results cont'd

**Figure 4-21: Spurious Conducted RF Emissions  
802.11g, Channel 6, 6 Mbps**



**Figure 4-22: Spurious Conducted RF Emissions  
802.11g, Channel 11, 6 Mbps**

