EMI Test Report

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

A division of Research In Motion Limited

REPORT NO.: RTS-1689-0907-11

PRODUCT MODEL NO.: RCM71UW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARCM70UW
IC: 2503A-RCM70UW

DATE: 10 September, 2009

Statement of Performance:

The BlackBerry® smartphone, model RCM71UW, part number CER-23758-001 Rev. 4, 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.

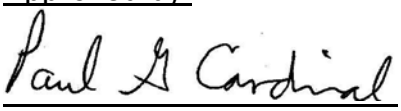
Documented by:

Michael Cino
Regulatory Compliance Intern
Date: September 10, 2009

Reviewed by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: September 11, 2009

Approved by:



Paul G. Cardinal, Ph.D.
Director
Date: September 13, 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, October, 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

1. HW_Declaration_CER-23758-001 Rev 3

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 July 14 to August 19, 2009.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCM71UW	CER-23758-001 Rev. 2	210BAA2E
2	RCM71UW	CER-23758-001 Rev. 2	210BA9E8
3	RCM71UW	CER-23758-001 Rev. 2	210BAA24
4	RCM71UW	CER-23758-001 Rev. 2	210B4F98
5	RCM71UW	CER-23758-001 Rev. 3	211A6FEB
6	RCM71UW	CER-23758-001 Rev. 3	211A6E0A

Samples 1, 2, 3, 5 and 6 were used for Radiated Emissions testing.
Samples 1 and 2 were also used for AC Line Conducted Emissions.
Sample 4 was used for Conducted Emissions testing.

To view the differences between CER-23758-001 Rev. 2 and CER-23758-001 Rev. 3, see document HW_Declaration_CER-23758-001 Rev 3.

Only the characteristics that may have been affected by the changes from Rev 2 to Rev 3 have been re-tested.

BlackBerry® smartphone Accessories Tested

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

D. Support Equipment Used for the Testing of the EUT

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

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

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:

1. The BlackBerry® smartphone, PIN 210BAA2E in 802.11b Tx mode and attached to the Premium Stereo Headset, was connected to the Fixed Blade Charger via the 1.5 metre USB Cable.
2. The BlackBerry® smartphone, PIN 210BA9E8 in Bluetooth Tx mode and connected to the Stereo Headset was connected to the LadyBug Charger via the 1.5 metre USB Cable.

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 14.11 dB below the QP limit at 0.159 MHz using the quasi-peak detector with the Folding Blade Charger in Test Configuration 1.

See APPENDIX 1 for the test data

Measurement Uncertainty ±3.0 dB

2) RADIATED EMISSIONS

a) Radiated Spurious and Harmonic Emissions

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

The measurements were done in a semi-anechoic chamber (SAC) below 1 GHz and a fully-anechoic room (FAR) above 1 GHz. The SAC's FCC registration number is **778487** and the Industry Canada (IC) file number is **2503B-1**. The FAR's FCC registration number is **959115** and the IC file number is **2503C-1**.

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

The BlackBerry® smartphones PIN 210BAA2E, PIN 210BA9E8 and PIN 210BAA24 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 BlackBerry® smartphones PIN 211A6FEB and PIN 211A6E0A 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 Bluetooth harmonics were investigated up to the 10th harmonic. The worst case test margin was 6.07 dB below the accepted limit at 7323.173 MHz .

The 802.11b/g harmonics were investigated up to the 10th harmonic. The sample EUT emissions were in the noise floor (NF).
See APPENDIX 2 for the test data

b) Band-Edge Compliance of RF Radiated Emissions

The BlackBerry® smartphone PIN 210BAA24 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.

Measurement Uncertainty ±4.6 dB
See APPENDIX 2 for the test data

3) BLUETOOTH RF CONDUCTED EMISSIONS

The Bluetooth conducted RF emissions from the BlackBerry® smartphone PIN 210B4F98 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.

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 210B4F98 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.

G. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
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

APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

AC Conducted Emission Test Results

Test Configuration 1

The BlackBerry® smartphone PIN 210BAA2E was tested on July 23, 2009.

The environmental test conditions were: Temperature: 26 ºC
Pressure: 1017 mb
Relative Humidity: 21 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.159	L1	41.37	10.03	51.40	65.52	55.52	**-14.11**
0.164	N	39.33	10.00	49.34	65.28	55.28	-15.95
0.227	L1	31.06	9.88	40.95	62.58	52.58	-21.63
0.240	N	33.50	9.82	43.32	62.10	52.10	-18.78
0.249	N	31.41	9.81	41.22	61.79	51.79	-20.57
0.285	L1	27.75	9.83	37.58	60.67	50.67	-23.09
0.326	L1	29.90	9.80	39.70	59.57	49.57	-19.86
0.353	L1	29.81	9.79	39.60	58.90	48.90	-19.31
0.353	N	28.87	9.84	38.71	58.90	48.90	-20.19
0.411	L1	29.10	9.75	38.85	57.63	47.63	-18.78
0.425	N	32.83	9.87	42.69	57.36	47.36	-14.67

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak detector.See figure 1-9 and figure 1-10 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

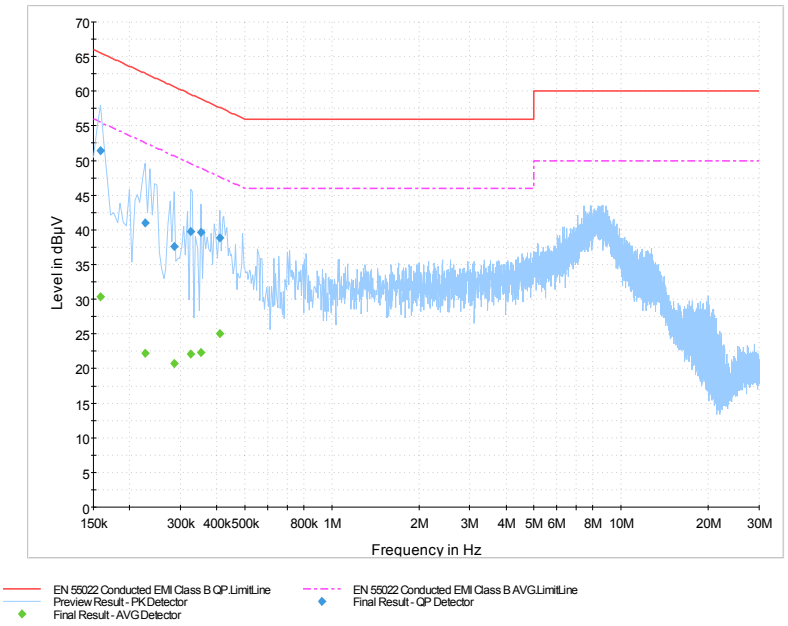
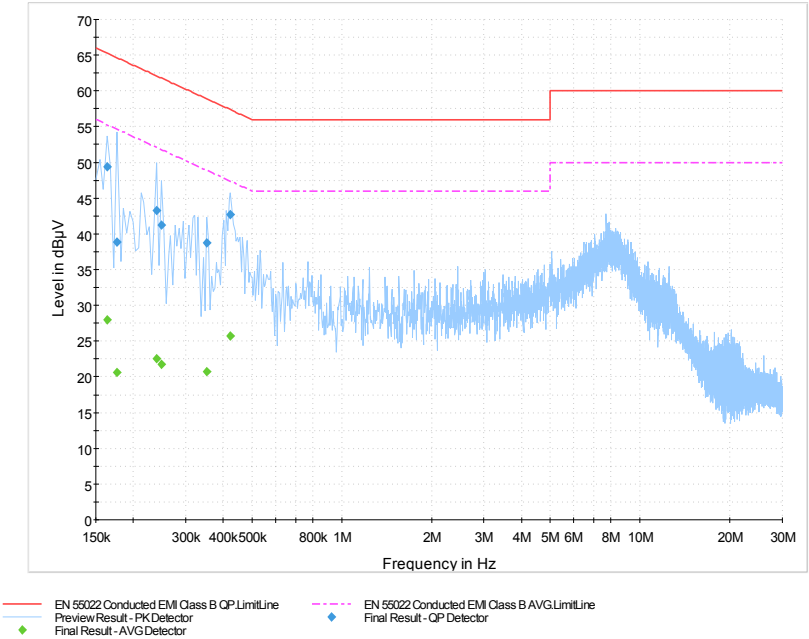


Figure 1-2: N Lines



AC Conducted Emission Test Results

Test Configuration 2

The BlackBerry® smartphone PIN 210BA9E8 was tested on July 14, 2009.

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1018 mb
Relative Humidity: 24 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.155	L1	36.78	10.01	46.79	65.75	55.75	-18.96
0.155	N	35.04	9.85	44.89	65.75	55.75	-20.86
0.303	L1	30.50	9.82	40.32	60.16	50.16	-19.84
0.312	N	28.47	9.82	38.29	59.92	49.92	-21.62
0.465	L1	23.76	9.71	33.47	56.60	46.60	-23.13
0.605	L1	24.70	9.63	34.33	56.00	46.00	-21.67
0.749	L1	27.90	9.58	37.49	56.00	46.00	-18.52
1.041	L1	23.03	9.51	32.55	56.00	46.00	-23.46

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak detector.
See figure 1-11 and figure 1-12 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

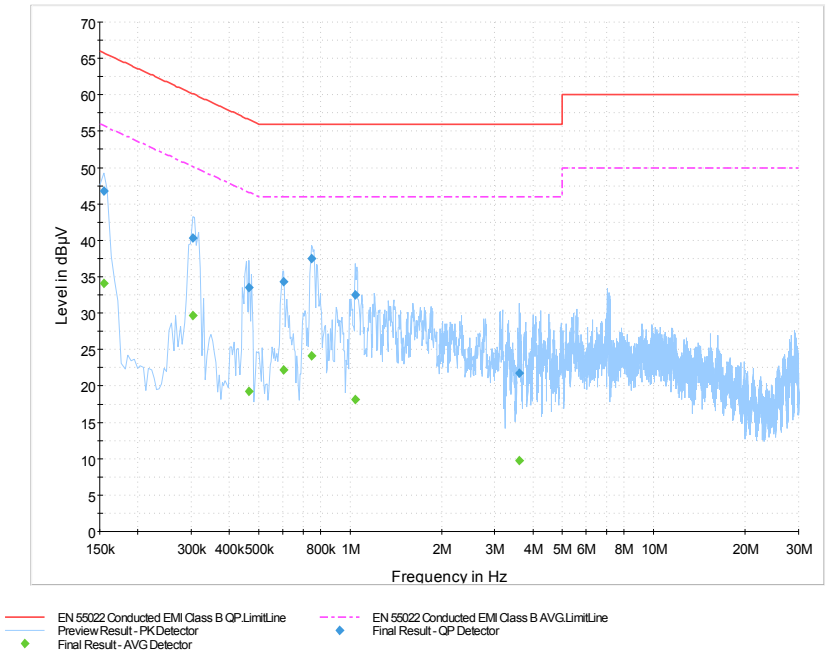
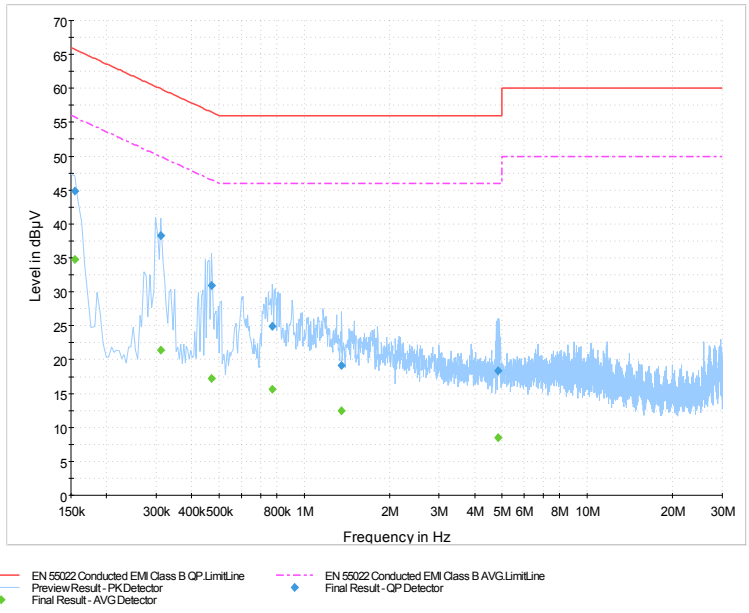


Figure 1-4: N Lines



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

Radiated Emissions Test Results
Bluetooth Band

Date of Test: July 17 to 20, 2009
Measurements were performed by Kevin Rose.

The environmental test conditions were: Temperature: 24 – 26 ºC
Pressure: 1016 – 1018 mb
Relative Humidity: 27 – 32 %

The test distance was 3.0 metres with a EUT height of 0.8 metres, sweep frequency of 30 MHz to 1 GHz.
The BlackBerry® smartphone PIN 210BAA24 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 types "DH5", "2-DH5" and "3-DH5".

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

Date of Test: July 15 to 20, 2009
Measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 23 – 26 ºC
Pressure: 1003 – 1018 mb
Relative Humidity: 27 – 33 %

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

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

The BlackBerry® smartphone PIN 210BA9E8 was tested using all packet types on channels 0 and 39 for the range of 1GHz to 7GHz. This device was also tested on channel 0 using "3DH5" packet type for the range of 7GHz to 18GHz.

The BlackBerry® smartphone PIN 210BAA2E was tested on channel 0 using all packet types and for the range of 7GHz to 25GHz for "DH5" and "2DH5" and for 18GHz to 25GHz for "3DH5". It was tested on channel 39 using all packet types for the range of 7GHz to 25GHz, and also tested on channel 78 for the range of 1GHz to 25GHz.

BlackBerry® smartphone PIN 210BAA2E											
Frequency (MHz)	Channel	Packet Type	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Field Strength Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
7326.202	39	DH5	H	1.74	56.00	PK	38.03	20.36	58.38	74.00	-15.62
7323.173	39	DH5	H	1.67	192.00	PK	27.58	20.35	47.93	54.00	**-6.07**

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

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

Date of test: July 20, 2009
Measurements were performed by Kevin Rose.

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

BlackBerry® smartphone PIN 210BAA24 was in standalone, vertical, Pattern type "Static PBRS" in "DH5" and "3-DH5" modulation during the measurements.

The test distance was 3.0 metres.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna 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	Horn	V	PK	1 MHz	88	47.45	40.55	74	-33.45
0	2402	Horn	H	PK	1 MHz	94.53	53.29	41.24	74	-32.76
0	2402	Horn	V	AVE.	10 Hz	73.93	47.45	26.48	54	-27.52
0	2402	Horn	H	AVE.	10 Hz	77.91	53.29	24.62	54	-29.38
High Channel, Packet Type 3-DH5										
78	2480	Horn	V	PK	1 MHz	89.72	48.43	41.29	74	-32.71
78	2480	Horn	H	PK	1 MHz	92.31	47.88	44.43	74	-29.57
78	2480	Horn	V	AVE.	10 Hz	74.05	48.43	25.62	54	-28.38
78	2480	Horn	H	AVE.	10 Hz	76	47.88	28.12	54	-25.88
High Channel, Packet Type DH5										
78	2480	Horn	V	PK	1 MHz	90.96	50.67	40.29	74	-33.71
78	2480	Horn	H	PK	1 MHz	96.75	55.26	41.49	74	-32.51
78	2480	Horn	V	AVE.	10 Hz	77.63	50.67	26.96	54	-27.04
78	2480	Horn	H	AVE.	10 Hz	81.45	55.26	26.19	54	-27.81

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

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,
3-DH5, Channel 0, Pol: V, Detector: PK

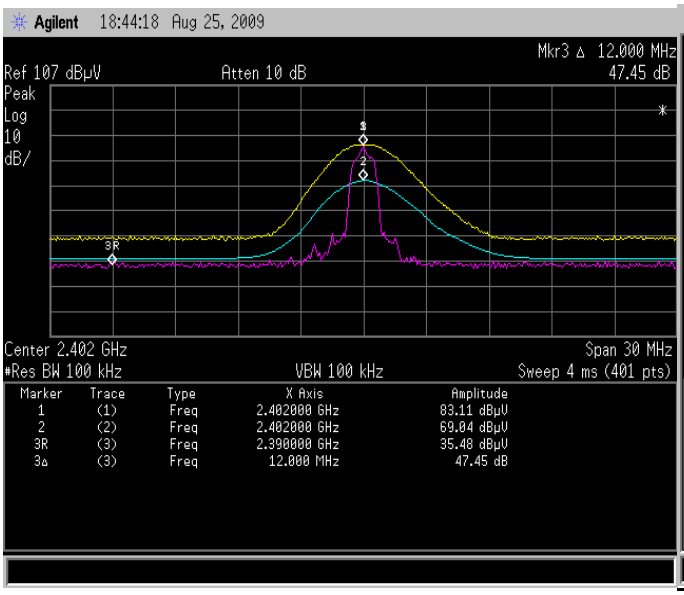


Figure 2-2: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 0, Pol: H, Detector: PK

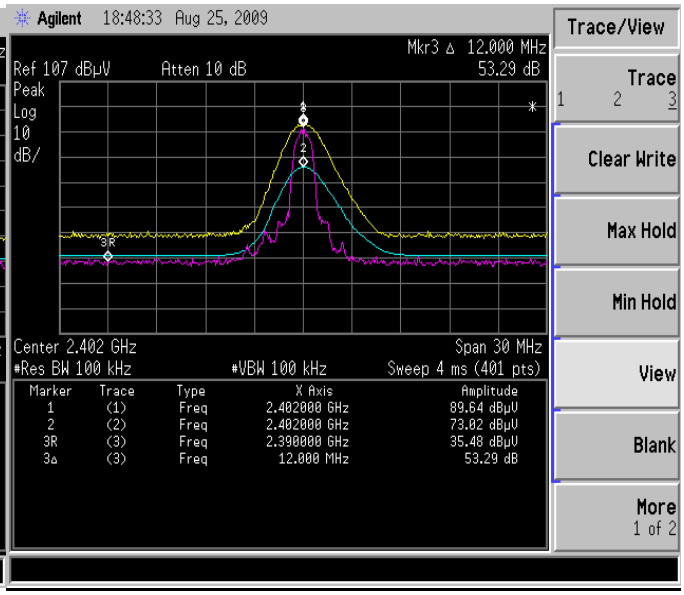


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 78, Pol: V, Detector: PK

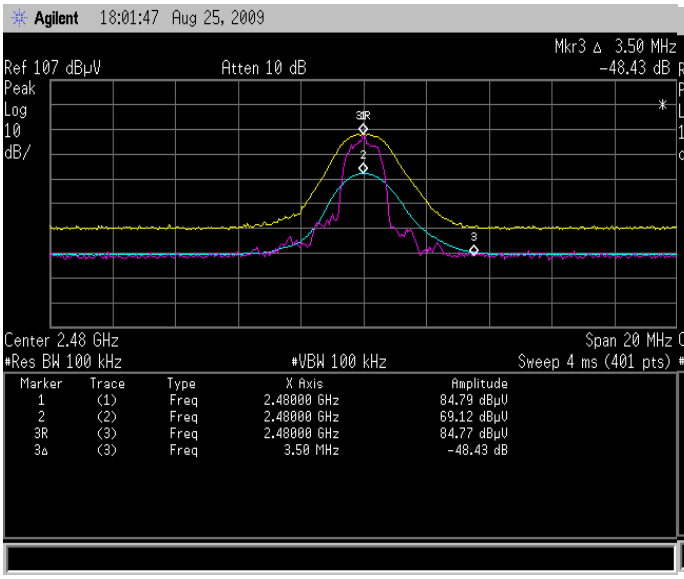
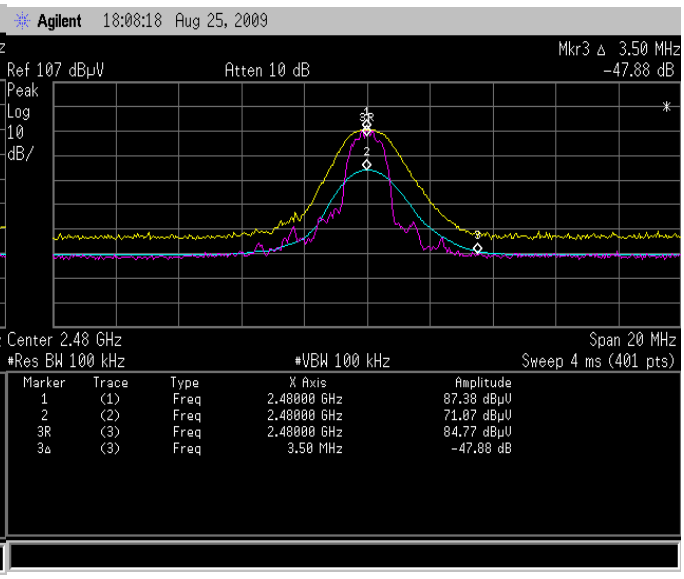


Figure 2-4: Band-Edge Compliance of RF Rad. Emissions
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 78, Pol: H, Detector: PK



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

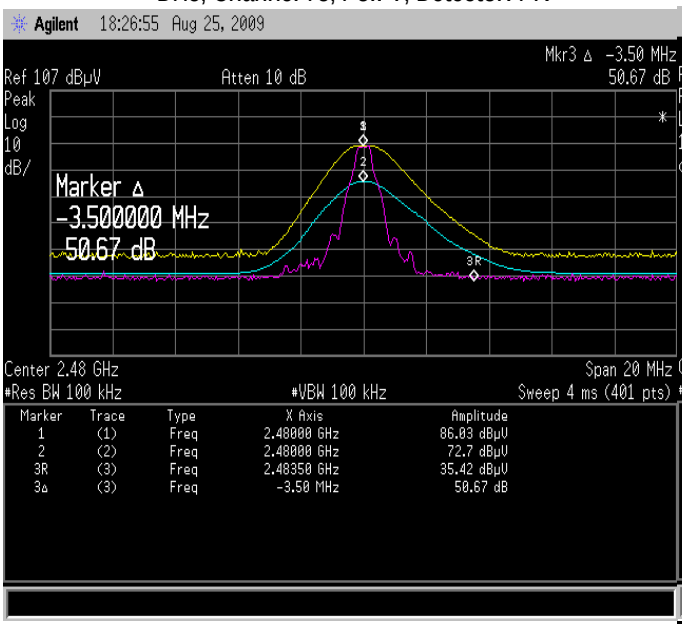
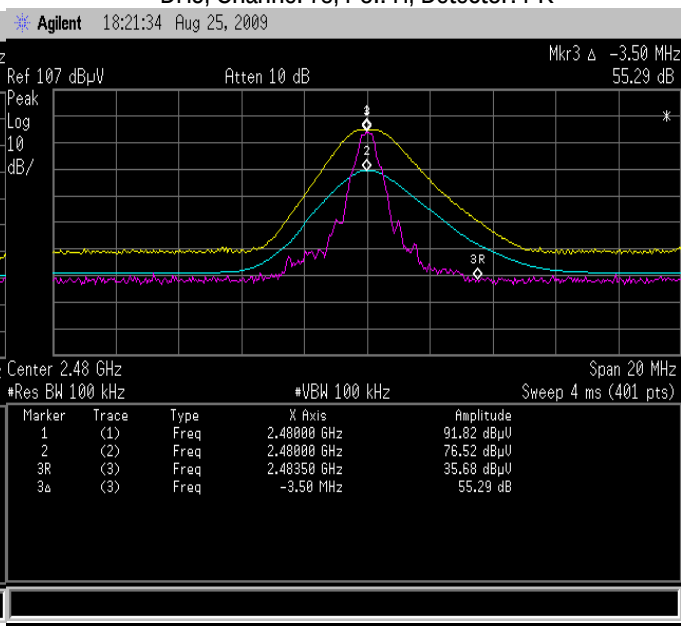


Figure 2-6: Band-Edge Compliance of RF Rad. Emi**ssions.**
Bluetooth, Single freq., Static PBRS,
DH5, Channel 78, Pol: H, Detector: PK



Radiated Emissions Test Results cont'd
802.11b/g Band

Date of Test: August 11, 2009
Measurements were performed by Kevin Rose.

The environmental test conditions were: Temperature: 24 ºC
Pressure: 1008 mb
Relative Humidity: 35 %

The test distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.
The BlackBerry® smartphone PIN 211A6FEB was in standalone, vertical position.

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.

All emissions had a test margin greater than 25.0 dB.

Date of Test: August 11 to 19, 2009.
Measurements were performed by Heng Lin.

The environmental test conditions were: Temperature: 26 – 28 ºC
Pressure: 1013 – 1015 mb
Relative Humidity: 25 – 29 %

The test distance was 1.0 metres with a height of 0.8 metres, 1GHz to 25GHz.
The BlackBerry® smartphone PIN 211A6E0A was in standalone, vertical down position.

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.

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

802.11b/g Band-Edge Compliance of RF Radiated Emissions

Date of Tests: July 20, 2009
Measurements performed by Kevin Rose.

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

802.11b Band

The measurements were performed on BlackBerry® smartphone PIN 210BAA24, standalone in vertical configuration on channels 1 and 11 for 802.11b mode at 1 Mbps.

The test distance was 3 metres.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	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)
1.0	2412.00	Horn	V	PK	1 MHz	96.19	44.68	51.51	74.00	-22.49
1.0	2412.00	Horn	H	PK	1 MHz	102.66	51.17	51.49	74.00	-22.51
1.0	2412.00	Horn	V	AV	10 Hz	92.86	44.68	48.18	54.00	-5.82
1.0	2412.00	Horn	H	AV	10 Hz	99.16	51.17	47.99	54.00	-6.01

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	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)
11.0	2462.00	Horn	V	PK	1 MHz	97.31	46.36	50.95	74.00	-23.05
11.0	2462.00	Horn	H	PK	1 MHz	102.79	50.86	51.93	74.00	-22.07
11.0	2462.00	Horn	V	AV	10 Hz	93.90	46.36	47.54	54.00	-6.46
11.0	2462.00	Horn	H	AV	10 Hz	99.41	50.86	48.55	54.00	**-5.45**

802.11g Band

The measurements were performed on BlackBerry® smartphone PIN 210BAA24, standalone in 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 Type	Rx Antenna POL.	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)
1.0	2412.00	Horn	V	PK	1 MHz	93.93	43.47	50.46	74.00	-23.54
1.0	2412.00	Horn	H	PK	1 MHz	100.96	44.89	56.07	74.00	-17.93
1.0	2412.00	Horn	V	AV	10 Hz	82.72	43.47	39.25	54.00	-14.75
1.0	2412.00	Horn	H	AV	10 Hz	88.39	44.89	43.50	54.00	-10.50

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	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)
11.0	2462.00	Horn	V	PK	1 MHz	95.77	41.42	54.35	74.00	-19.65
11.0	2462.00	Horn	H	PK	1 MHz	102.17	44.00	58.17	74.00	-15.83
11.0	2462.00	Horn	V	AV	10 Hz	85.13	41.42	43.71	54.00	-10.29
11.0	2462.00	Horn	H	AV	10 Hz	90.60	44.00	46.60	54.00	-7.40

See figures 2-7 to 2-10 for the plots of the 802.11b band-edge compliance.
See figures 2-11 to 2-14 for the plots of the 802.11b band-edge compliance.

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

Figure 2-7: Band-Edge Compliance of RF Radiated Emission 802.11b, Channel 1, 2412 MHz, Max Pol: V, Detector: PK

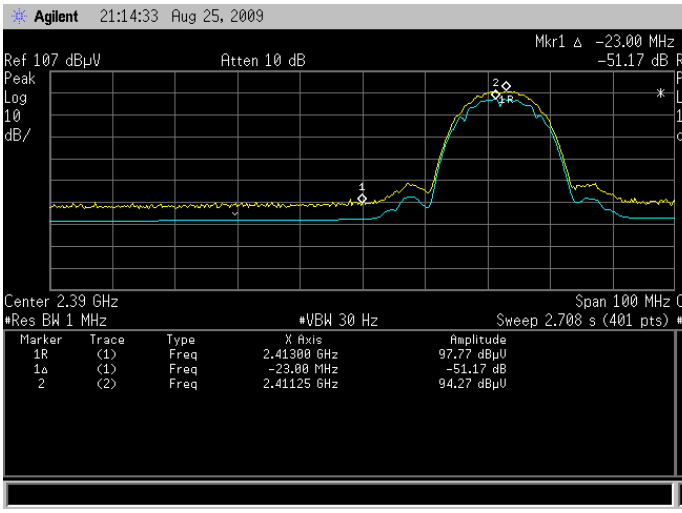


Figure 2-8: Band-Edge Compliance of RF Radiated Emission 802.11b, Channel 1, 2412 MHz, Max Pol: H, Detector: PK

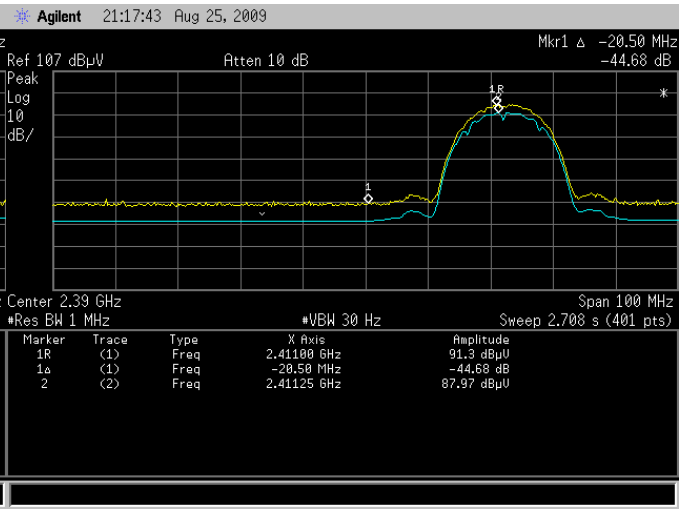


Figure 2-9: Band-Edge Compliance of RF Radiated Emission 802.11b, Channel 11, 2462 MHz, Max Pol: V, Detector: PK

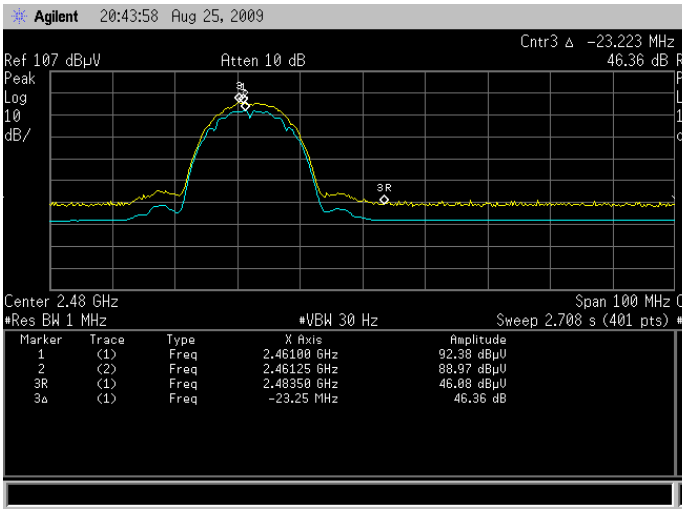


Figure 2-10: Band-Edge Compliance of RF Radiated Emission 802.11b, Channel 11, 2462 MHz, Max Pol: H, Detector: PK

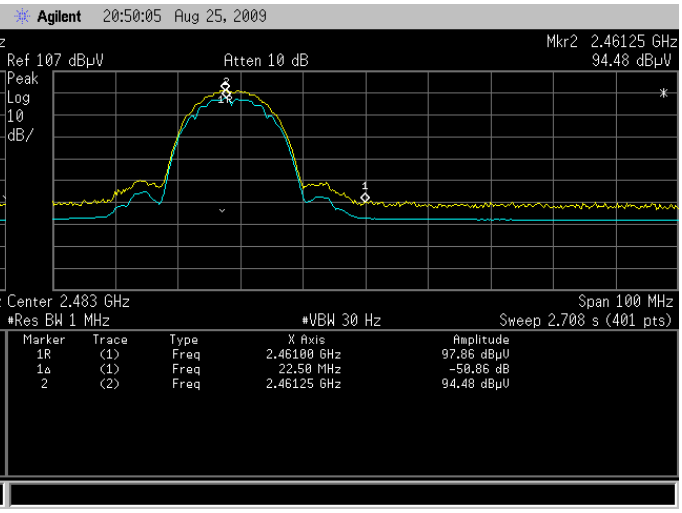


Figure 2-11: Band-Edge Compliance of RF Radiated Emission 802.11g, Channel 1, 2412 MHz, Max Pol: V, Detector: PK

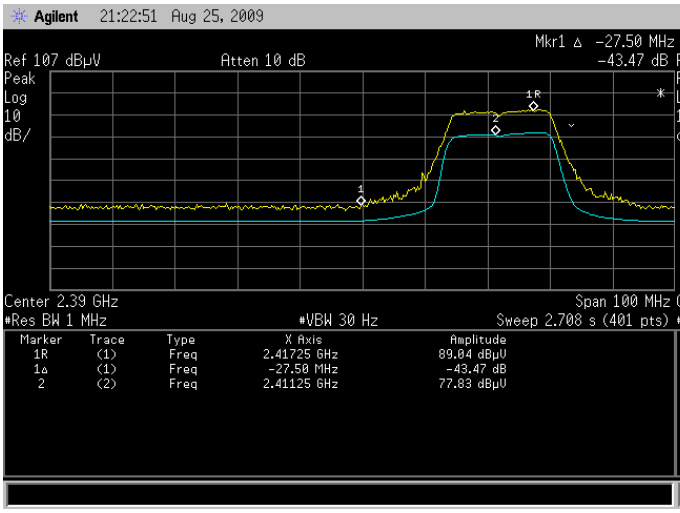


Figure 2-12: Band-Edge Compliance of RF Radiated Emission 802.11g, Channel 1, 2412 MHz, Max Pol: H, Detector: PK

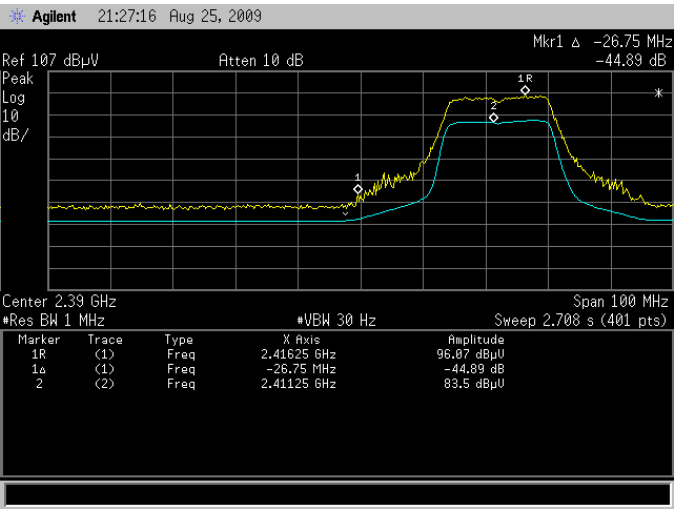


Figure 2-13: Band-Edge Compliance of RF Radiated Emission 802.11g, Channel 11, 2462 MHz, Max Pol: V, Detector: PK

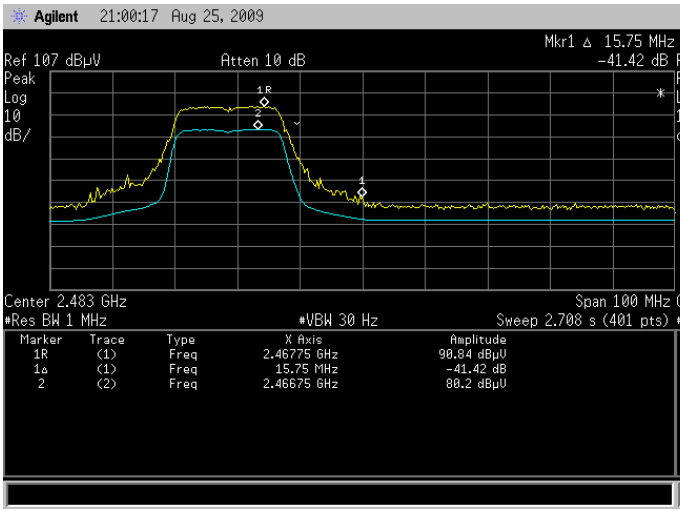
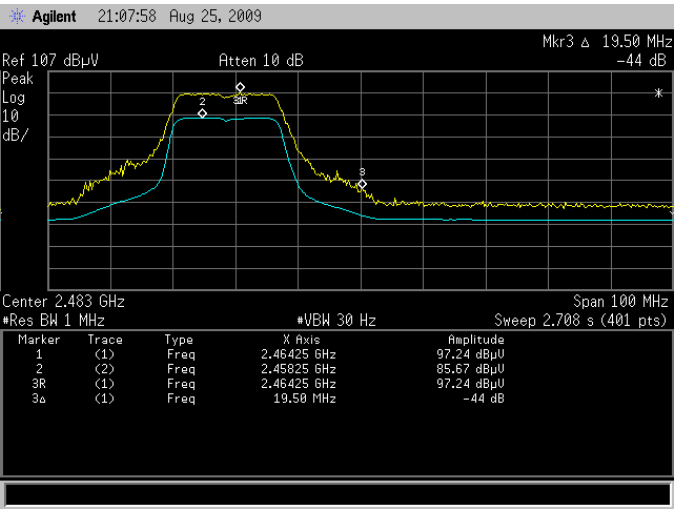


Figure 2-14: Band-Edge Compliance of RF Radiated Emission 802.11g, Channel 11, 2462 MHz, Max Pol: H, Detector: PK



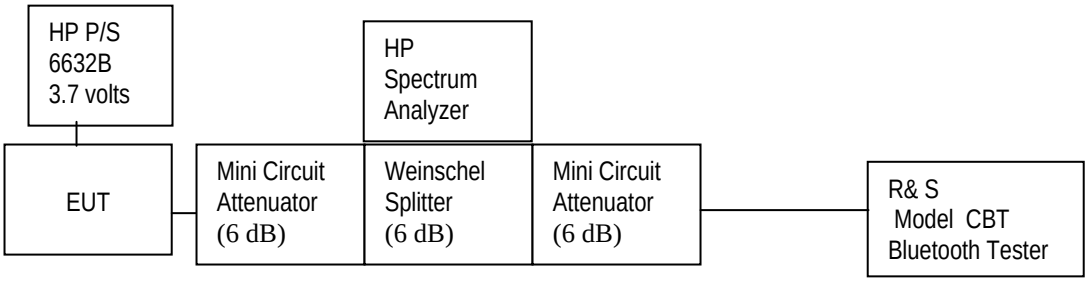
APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth RF Conducted Emission Test Results

Bluetooth power output from BlackBerry® smartphone PIN 210B4F98 was at maximum for all the recorded measurements shown below.
The measurements were performed by Maurice Battler.

Date of test: July 17, 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 ºC
Pressure: 1006 mb
Relative Humidity: 31 %

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	0.920
39	≤1.0	0.913
78	≤1.0	0.923

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

Figure 3-1: 20 dB Bandwidth
Single freq., Static PBRS, DH5

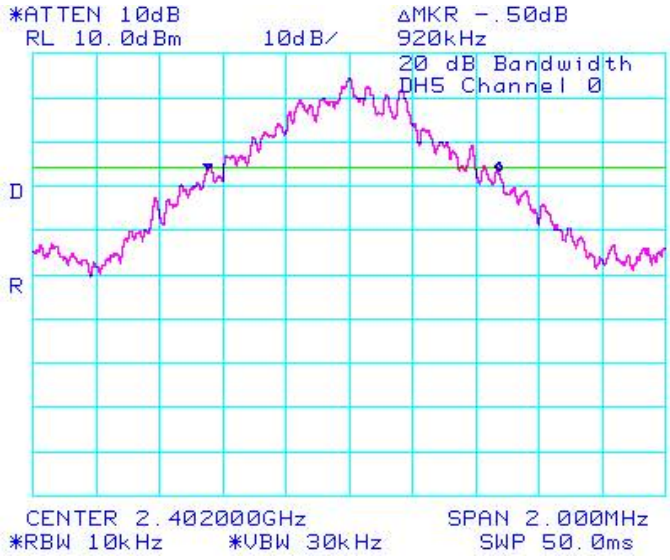
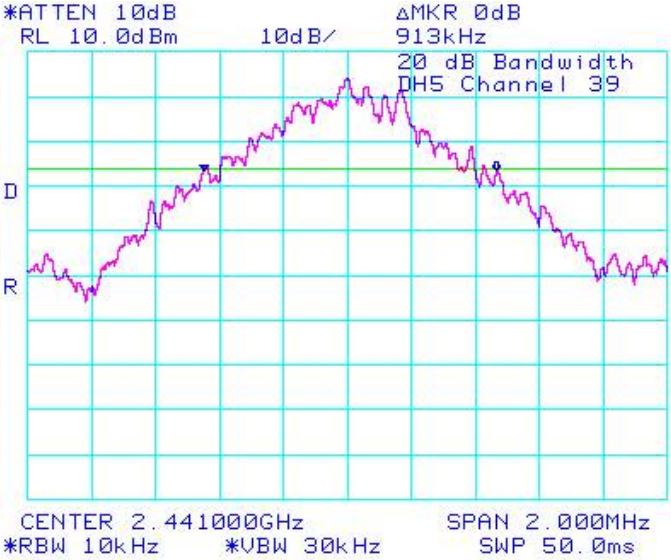


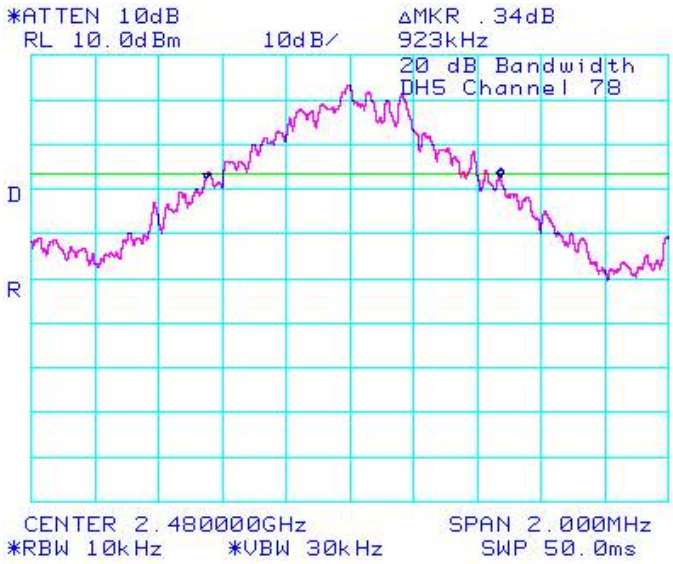
Figure 3-2: 20 dB Bandwidth
Single freq., Static PBRS, DH5



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	1.233
39	≤1.5	1.243
78	≤1.5	1.227

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

Bluetooth RF Conducted Emission Test Results cont'd

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

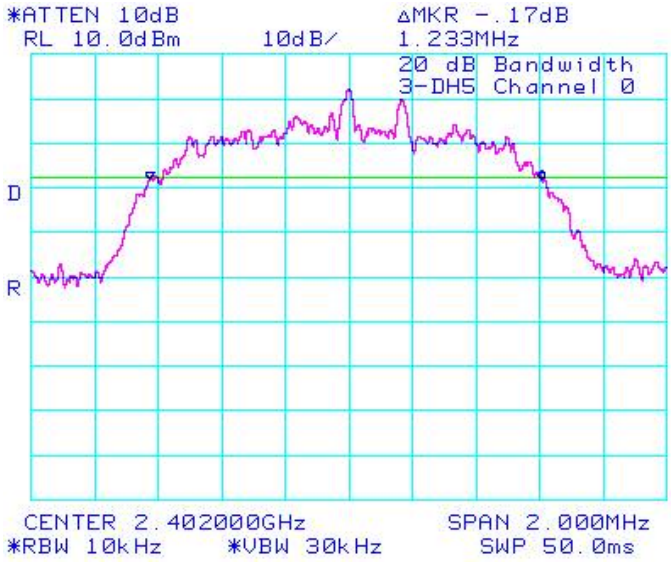


Figure 3-5: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5

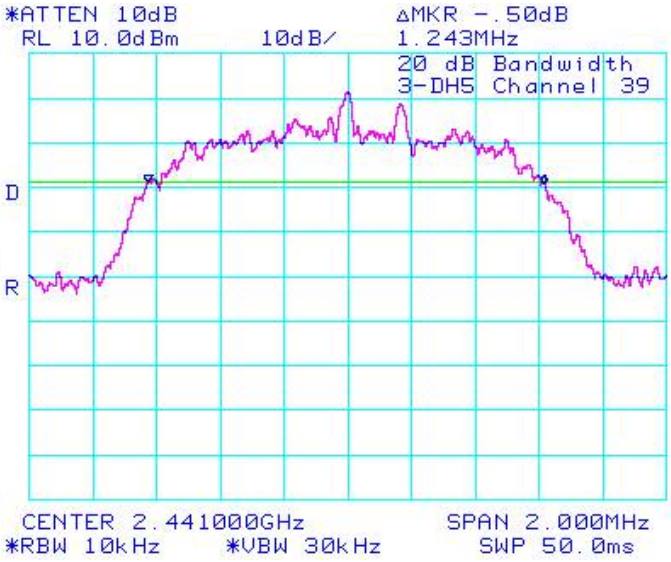
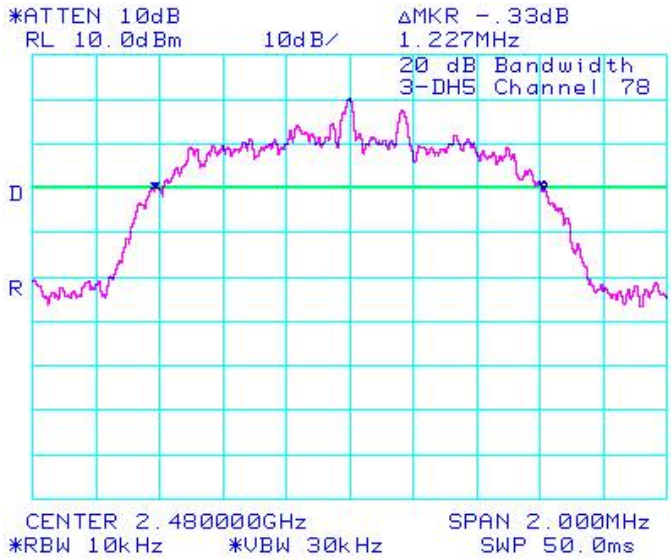


Figure 3-6: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

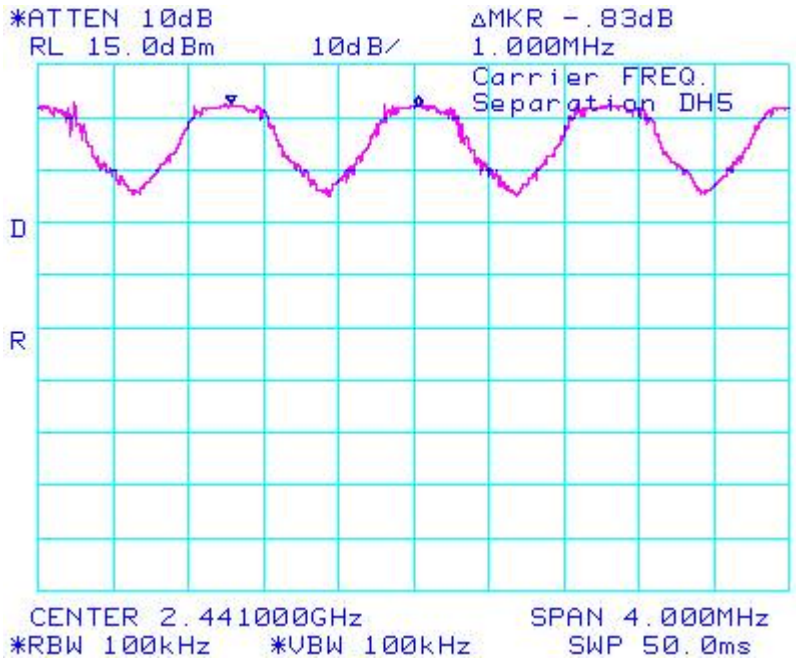
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.

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



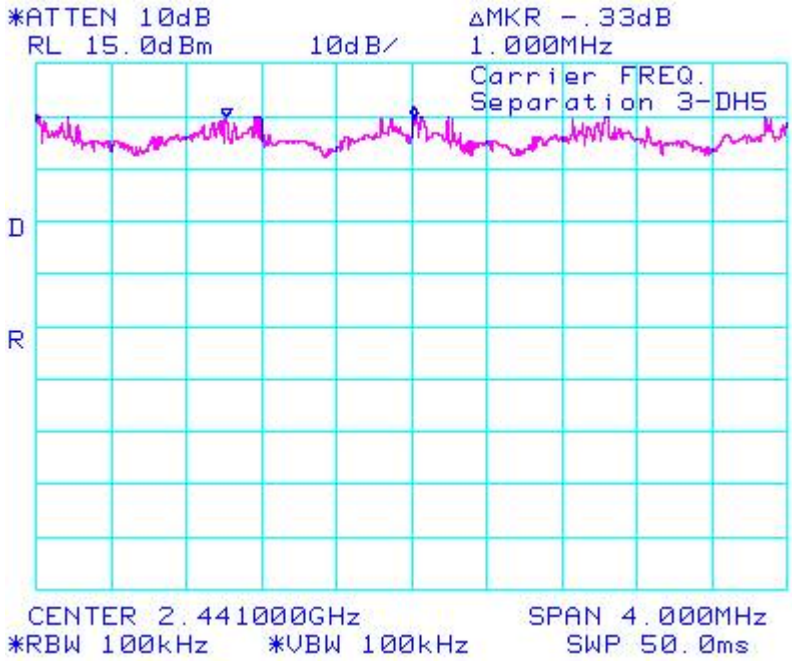
Bluetooth RF Conducted Emission Test Results cont'd

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



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

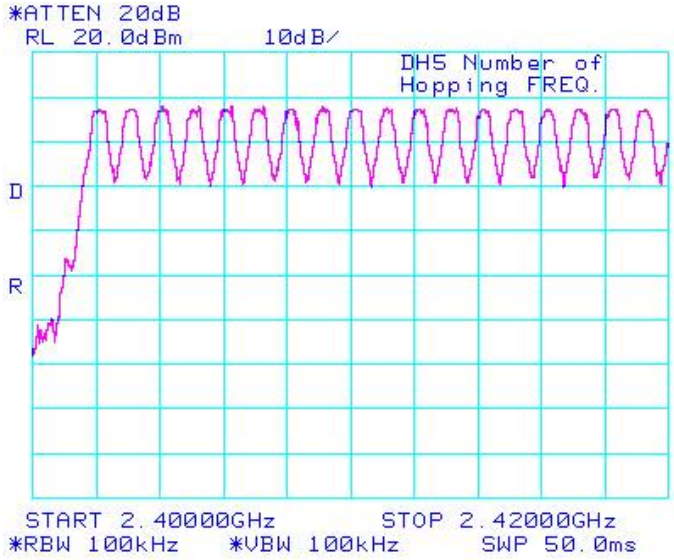
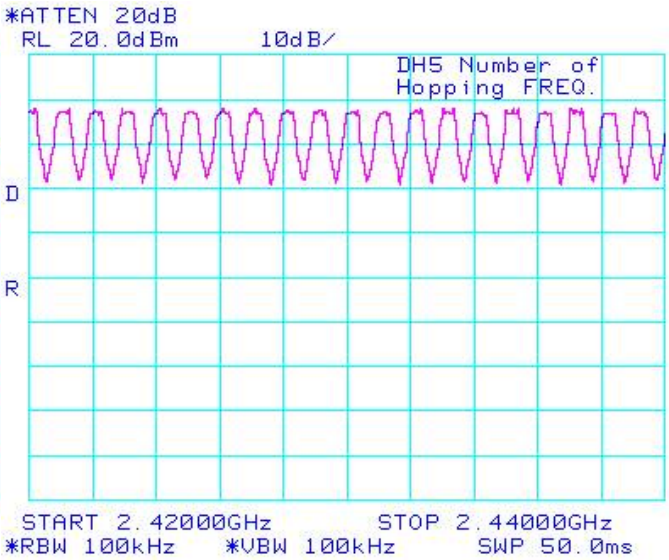


Figure 3-7: Number of Hopping Frequencies
Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

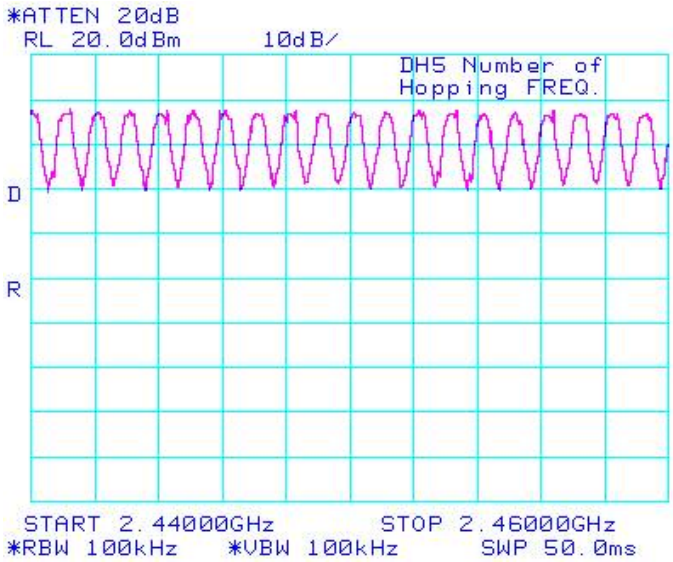
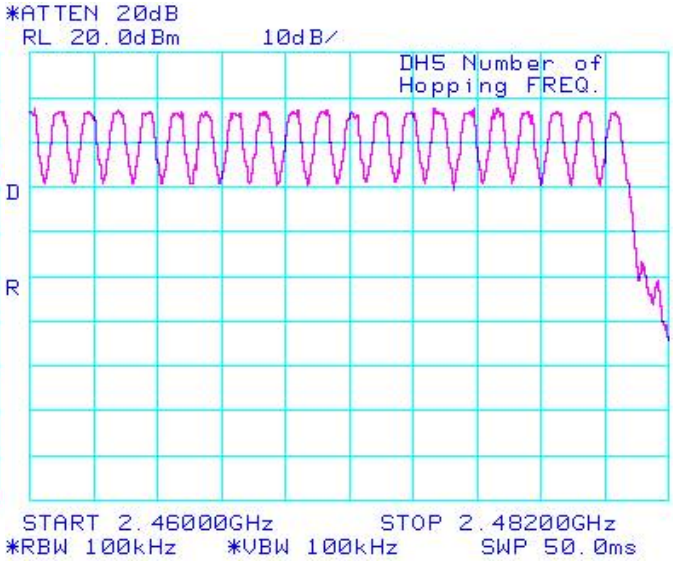


Figure 3-9: Number of Hopping Frequencies
Static PBRS, DH5



Time of Occupancy (Dwell Time)

The EUT met the requirements of the time of occupancy (dwell time) as per 47 CFR 15.247(a) 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.

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	0.5200	0.5200 x 320.0 = 166.4	400	233.60
39	DH1	0.5200	0.5200 x 320.0 = 166.4	400	233.60
78	DH1	0.5220	0.5220 x 320.0 = 167.04	400	232.96
0	DH3	1.7500	1.7500 x 159.9 = 279.83	400	120.18
39	DH3	1.7500	1.7500 x 159.9 = 279.83	400	120.18
78	DH3	1.7750	1.7750 x 159.9 = 283.82	400	116.18
0	DH5	2.9400	2.9400 x 106.8 = 313.99	400	86.01
39	DH5	2.9900	2.9900 x 106.8 = 319.33	400	80.67
78	DH5	3.0200	3.0200 x 106.8 = 322.54	400	77.46

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

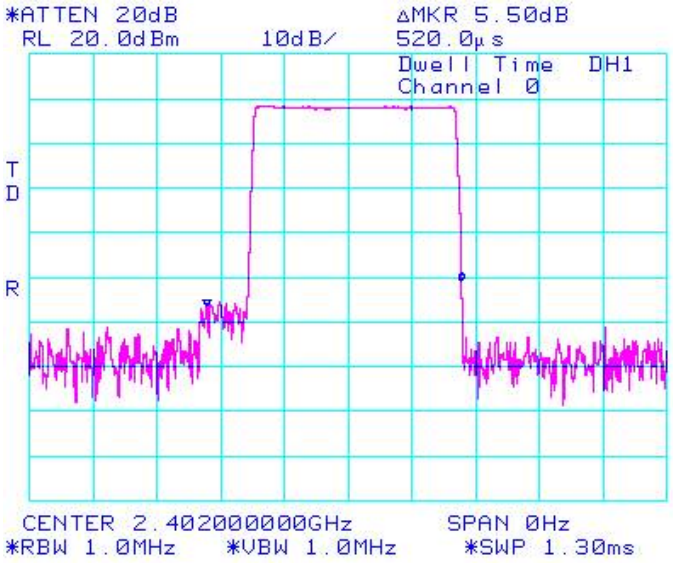
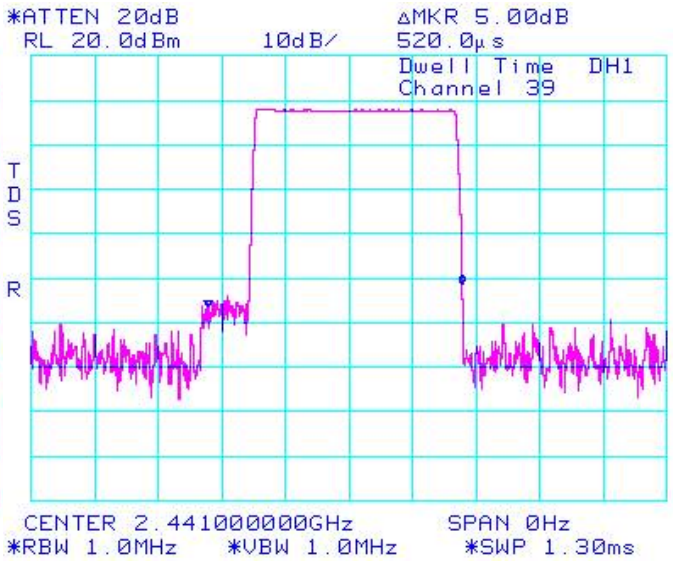


Figure 3-14: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1



Bluetooth RF Conducted Emission Test Results cont'd

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

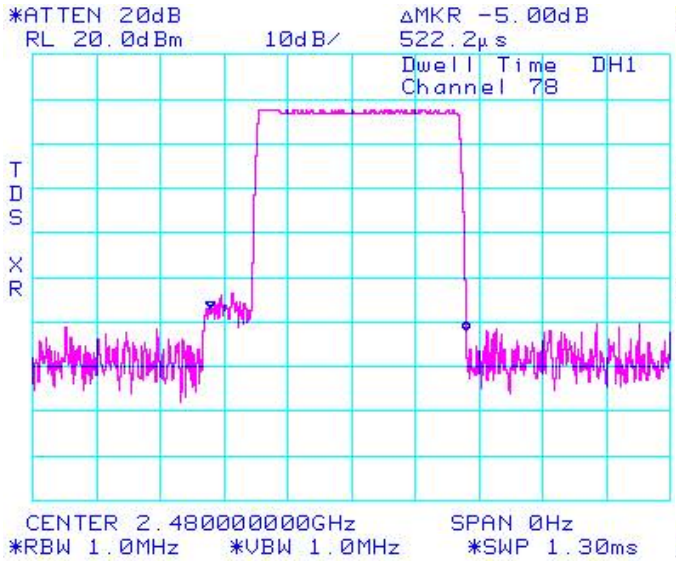


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

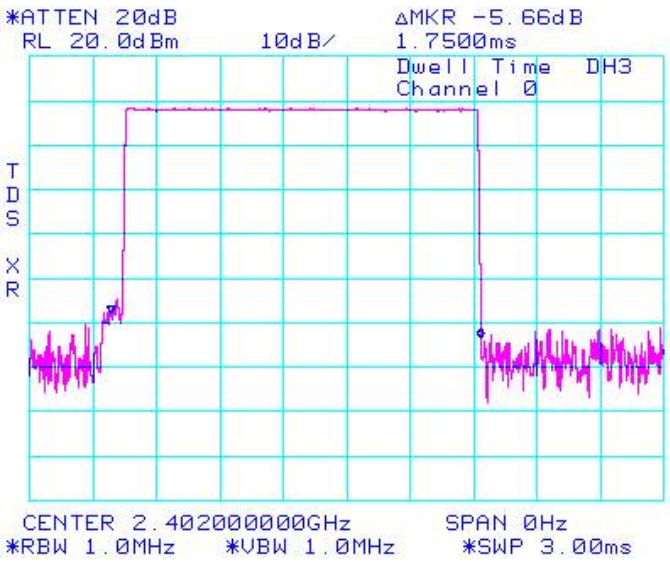


Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

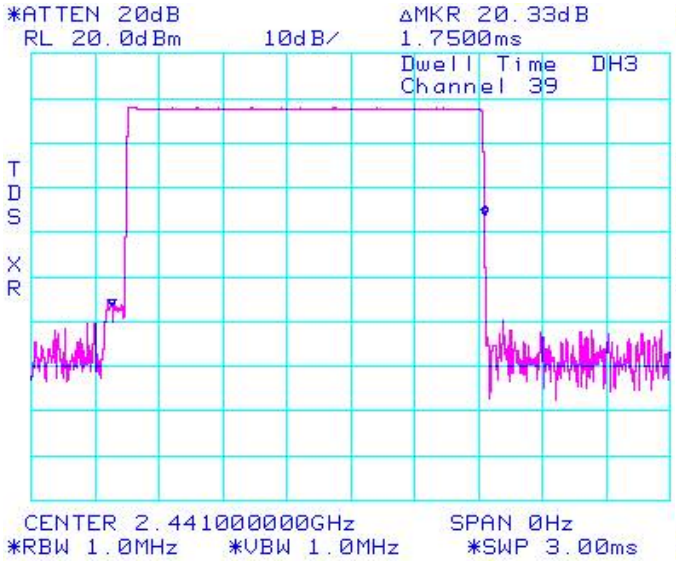
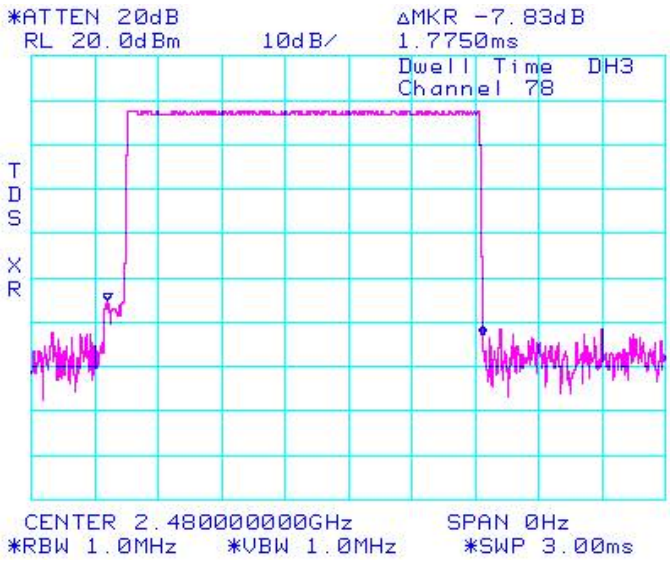


Figure 3-18 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3



Bluetooth RF Conducted Emission Test Results cont'd

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

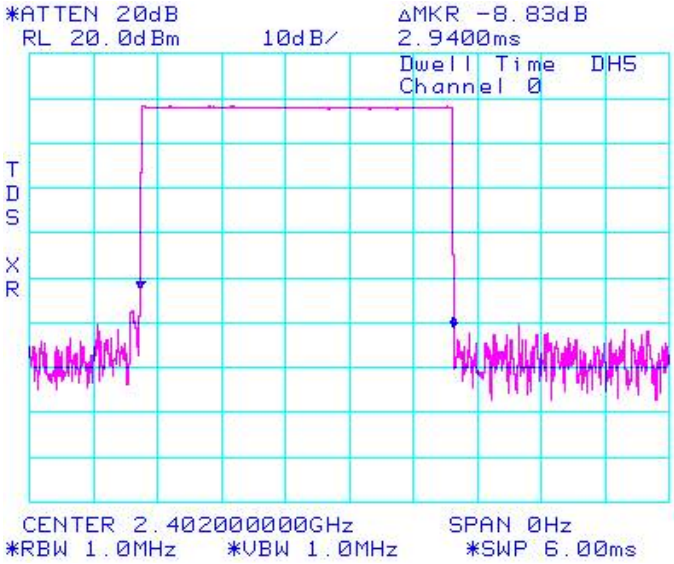


Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5

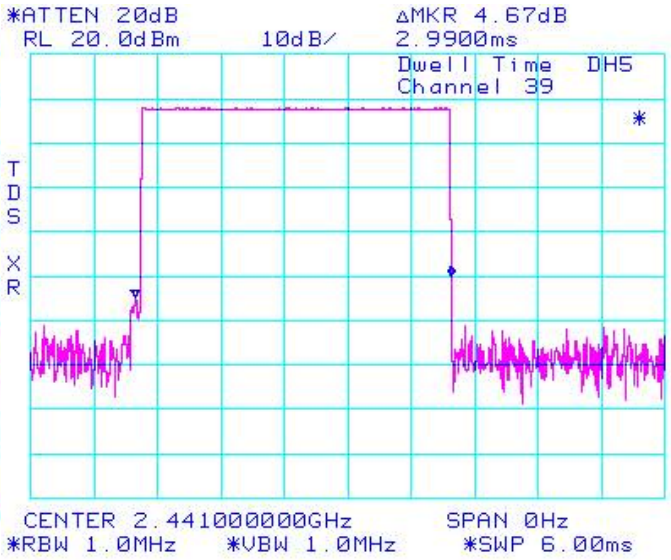
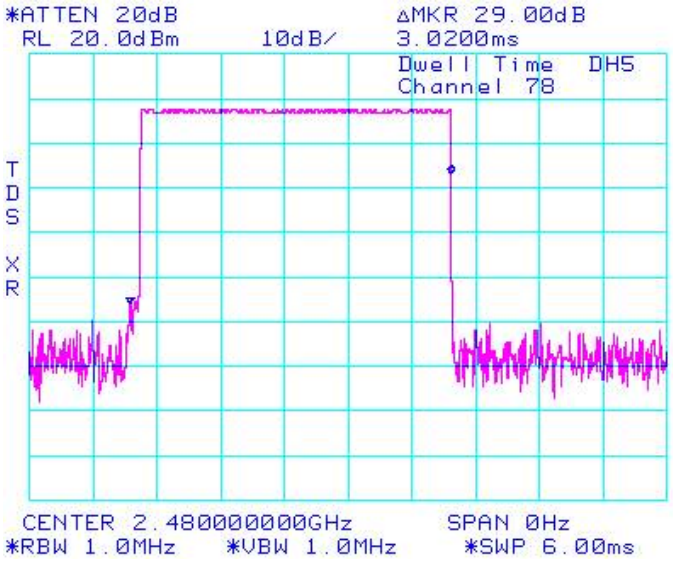


Figure 3-21: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5



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	8.33	0.00681	0.0 to 20.0
39	8.00	0.00631	0.0 to 20.0
78	7.50	0.00562	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

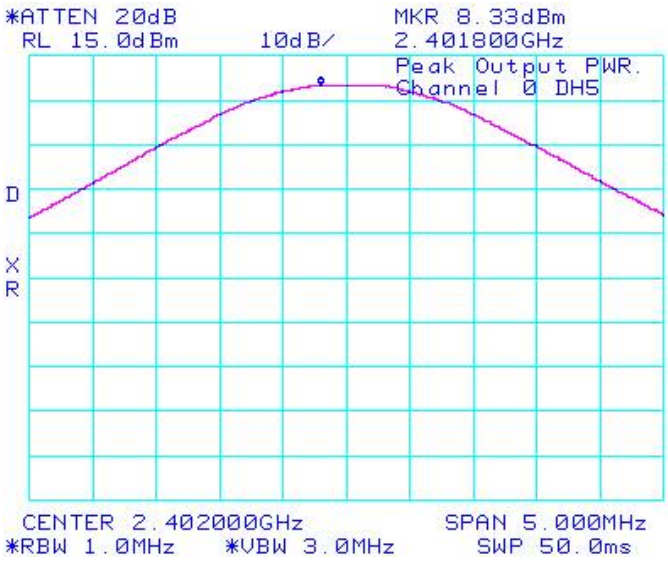
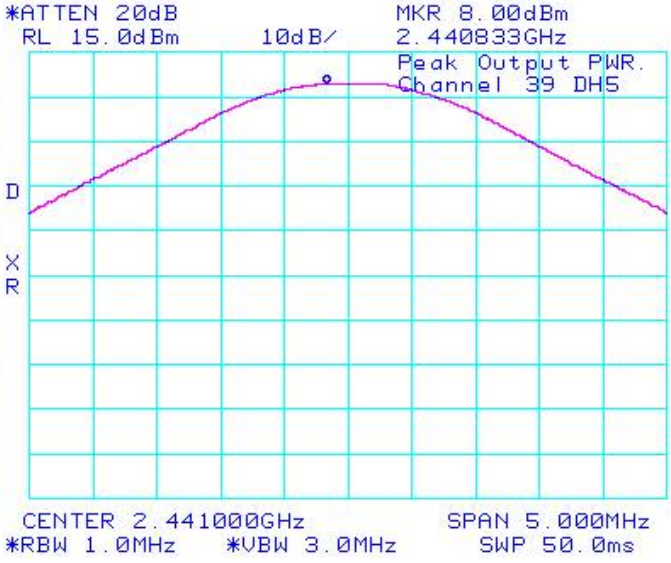
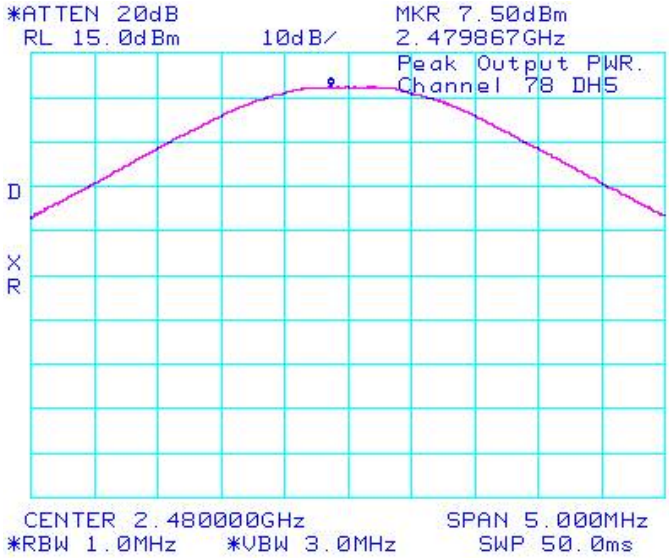


Figure 3-23: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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



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

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	6.17	0.00414	0.0 to 20.0
39	5.50	0.00355	0.0 to 20.0
78	4.50	0.00282	0.0 to 20.0

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

Bluetooth RF Conducted Emission Test Results cont'd

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

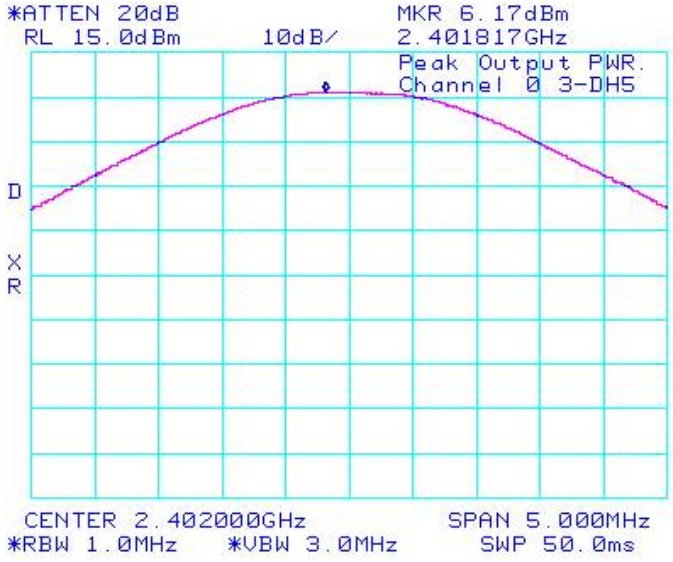


Figure 3-26: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5

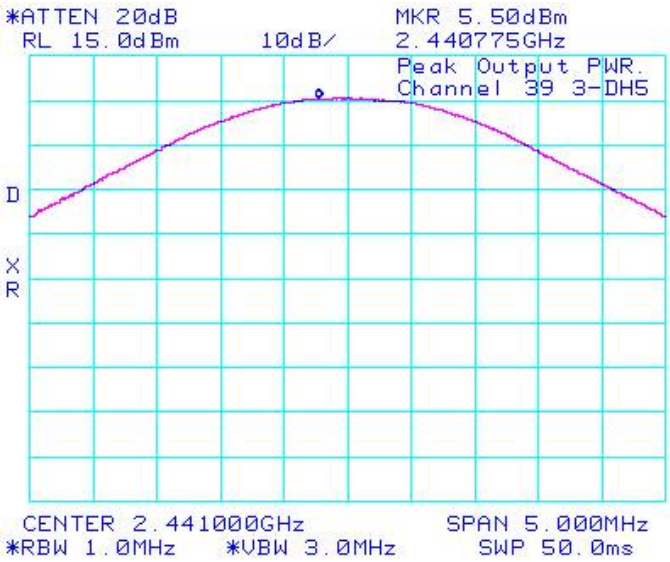
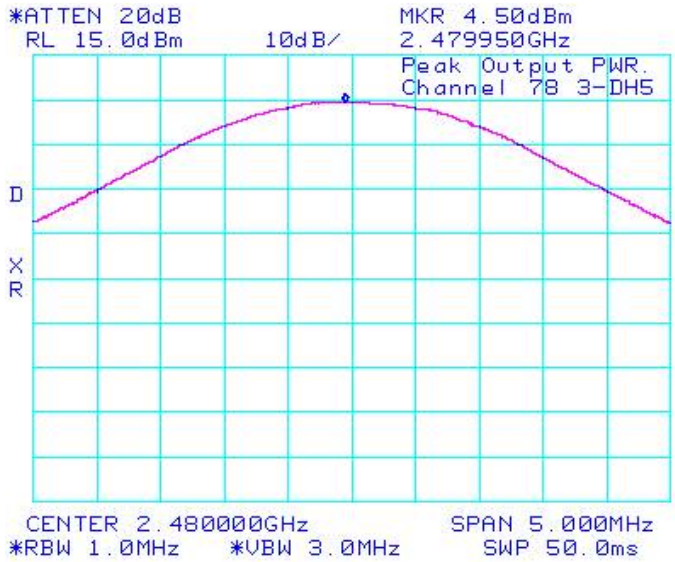


Figure 3-27: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5



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	-34.16	-20	-14.16
78	Single Frequency	-33.16	-20	-13.16
0	Hopping	-33.33	-20	-13.33
78	Hopping	-34.00	-20	-14.00

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 PBRS, DH5

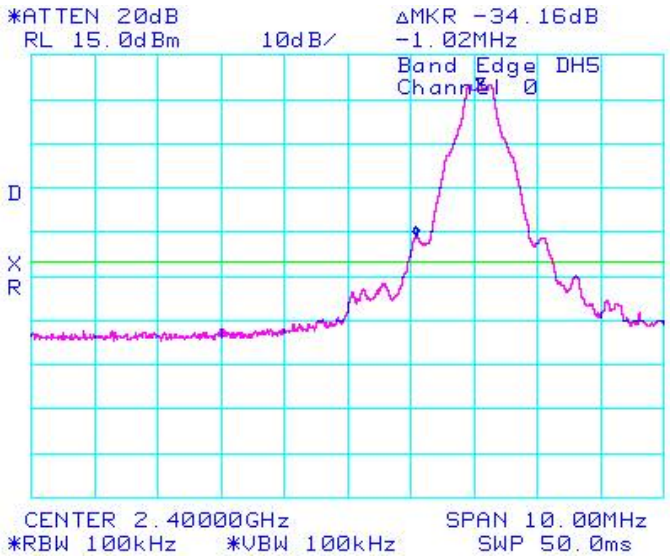
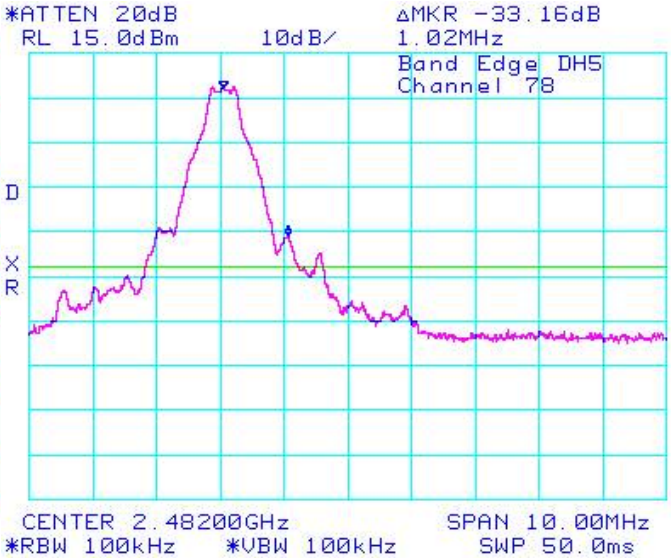


Figure 3-29: Band Edge Compliance
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-30: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5

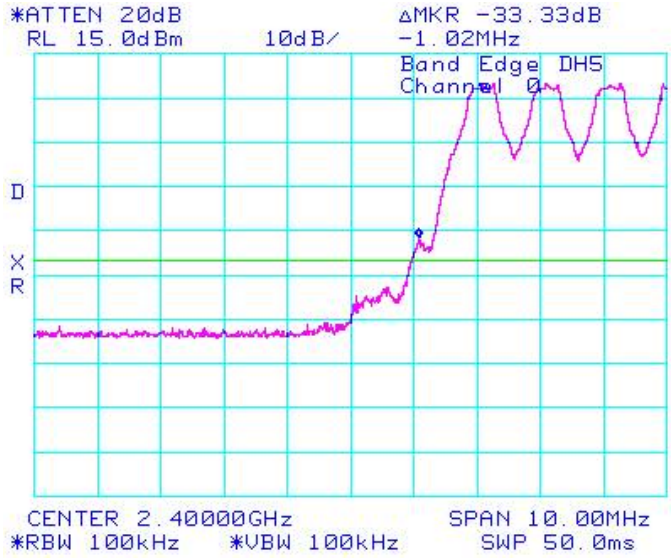
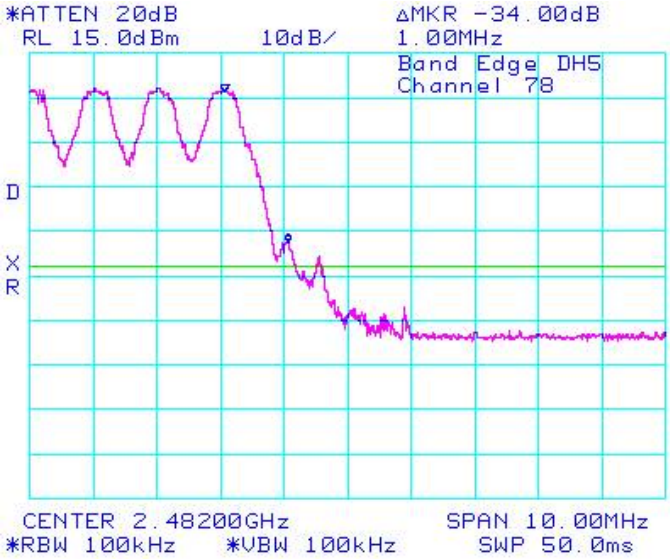


Figure 3-31: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5



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

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-31.50	-20	-11.50
78	Single Frequency	-37.17	-20	-17.17
0	Hopping	-30.17	-20	-10.17
78	Hopping	-36.50	-20	-16.50

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

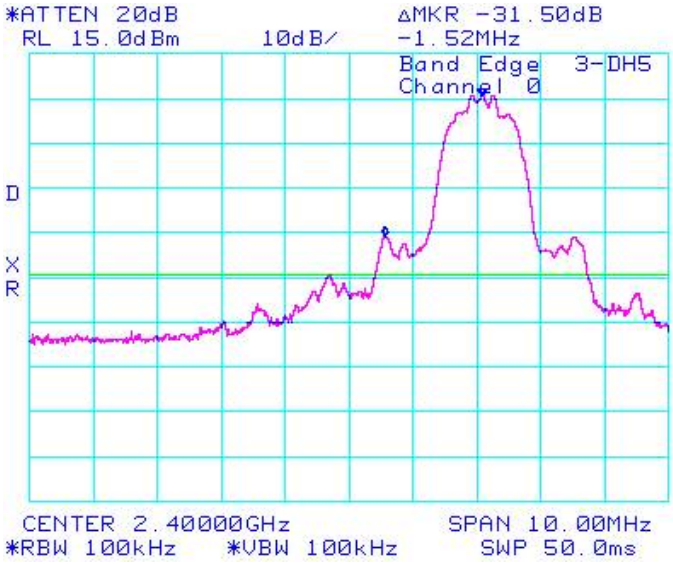


Figure 3-33: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5

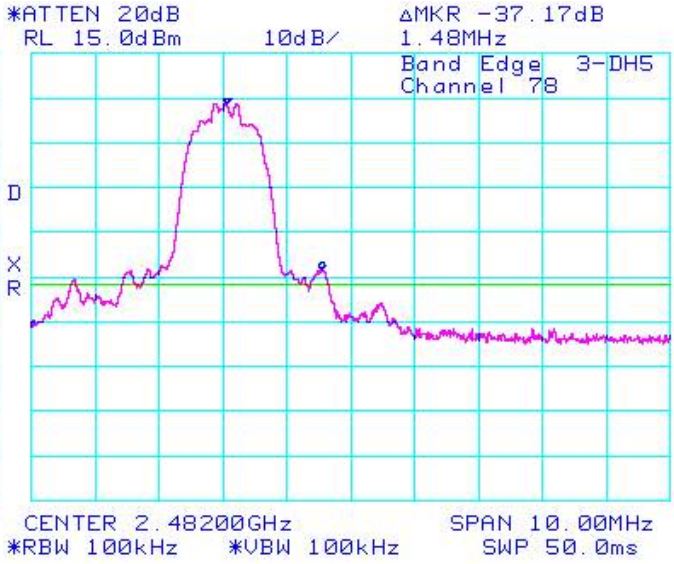


Figure 3-34: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

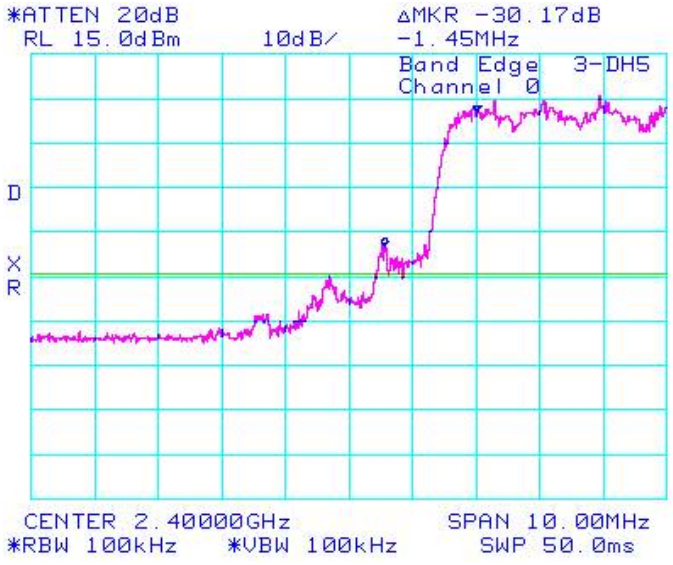


Figure 3-35: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

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	8.33	-36.83	-45.16	-20
39	8.00	-38.17	-46.17	-20
78	7.50	-37.67	-45.17	-20
Hopping mode	7.50	-36.83	-44.33	-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,

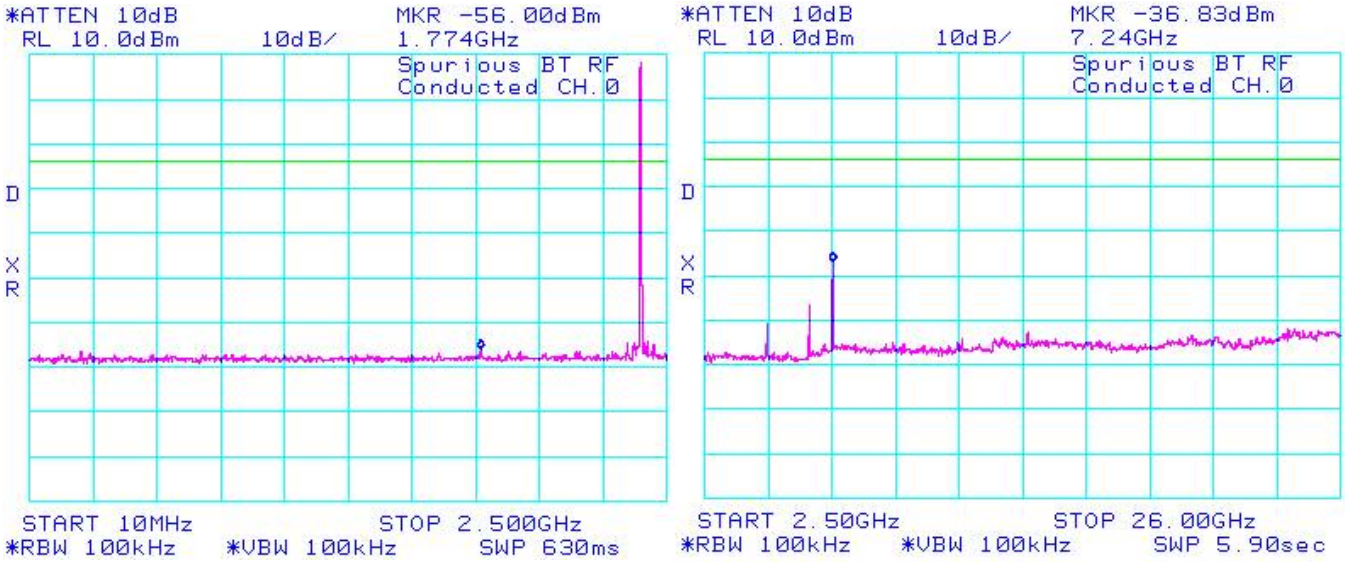
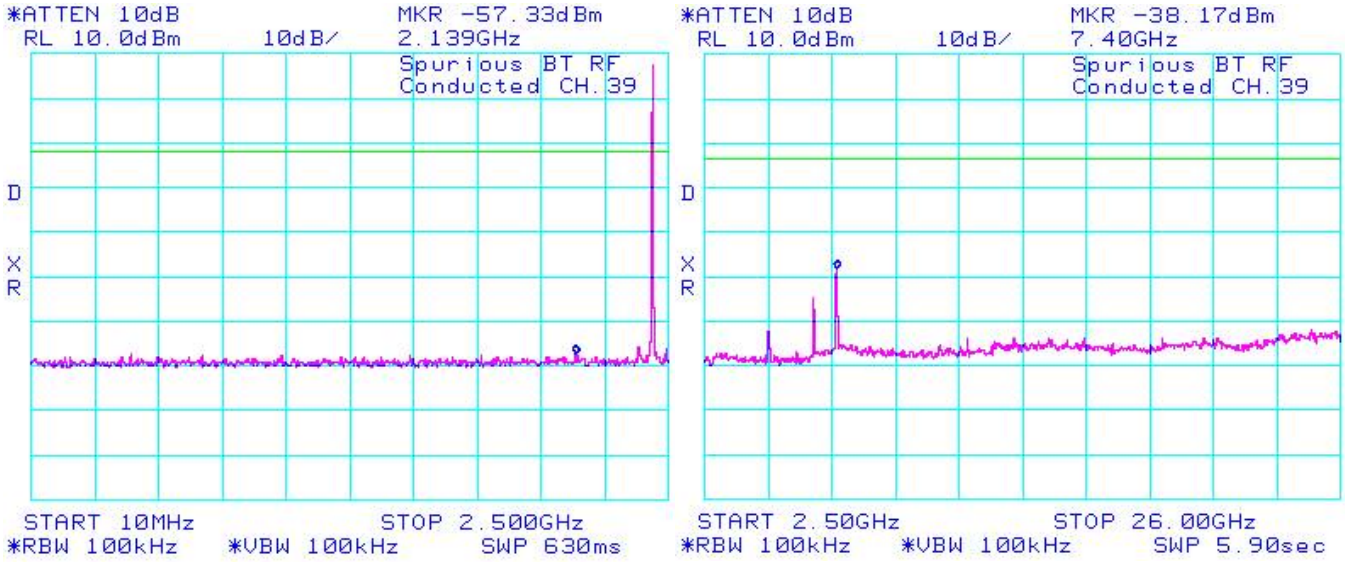


Figure 2-37: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

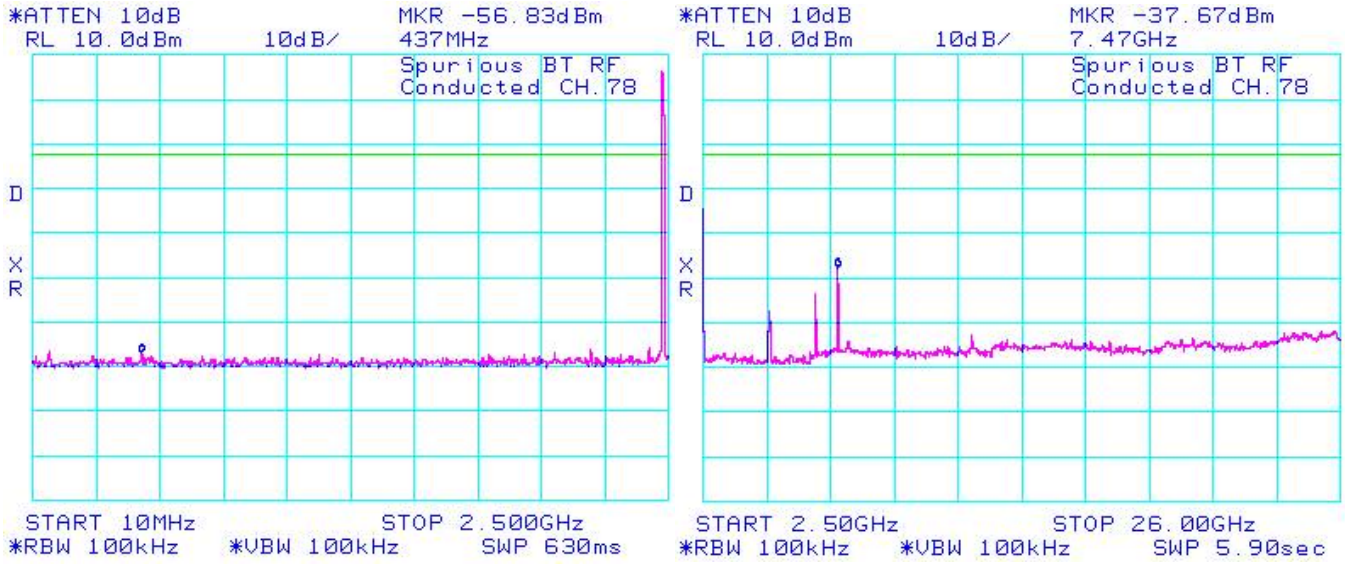
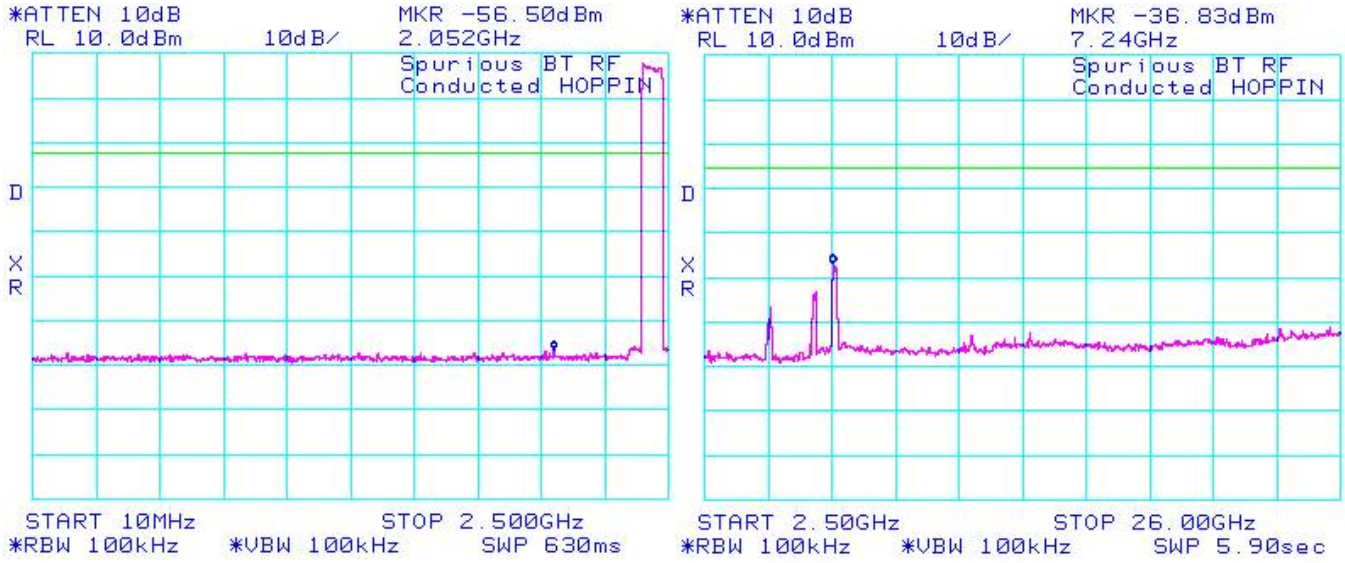


Figure 2-39: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, DH5



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	6.17	-42.17	-48.34	-20
39	5.50	-41.33	-46.83	-20
78	4.50	-41.33	-45.83	-20
Hopping mode	4.50	-40.67	-45.17	-20

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

Bluetooth RF Conducted Emission Test Results cont'd

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

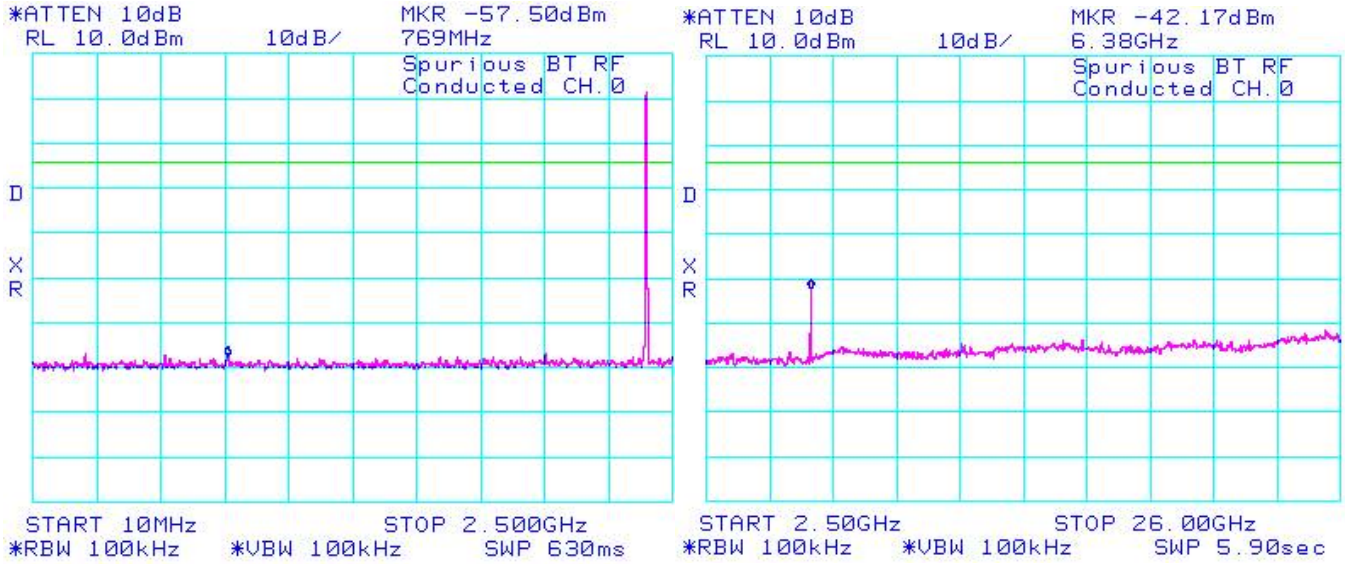
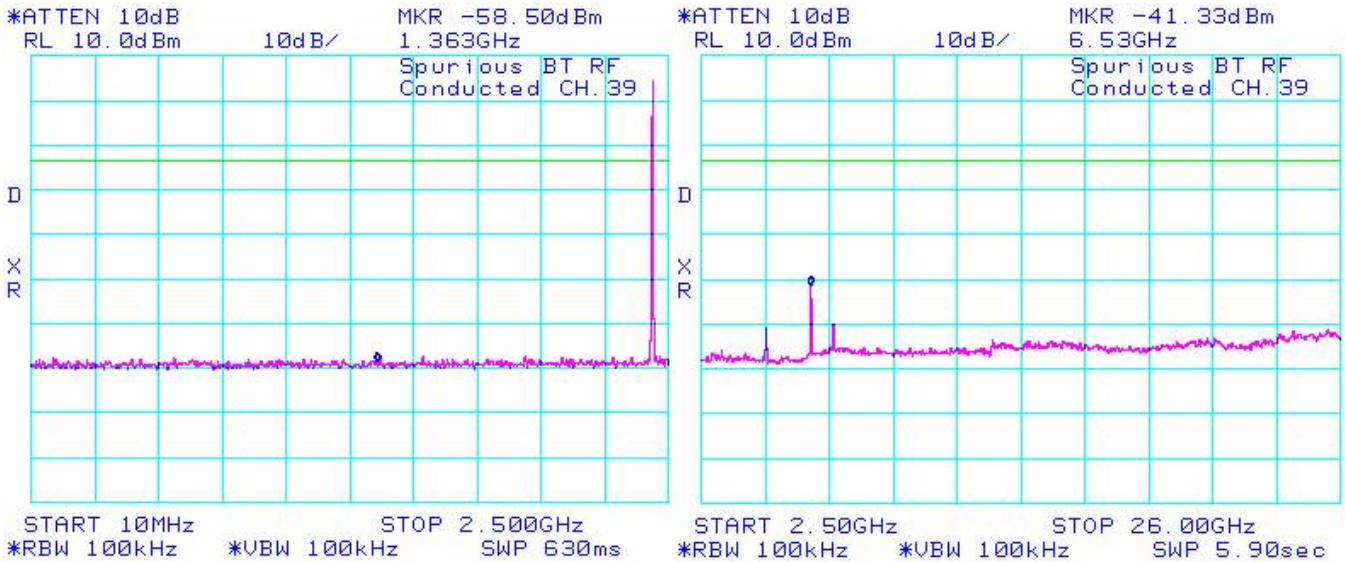


Figure 3-41: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

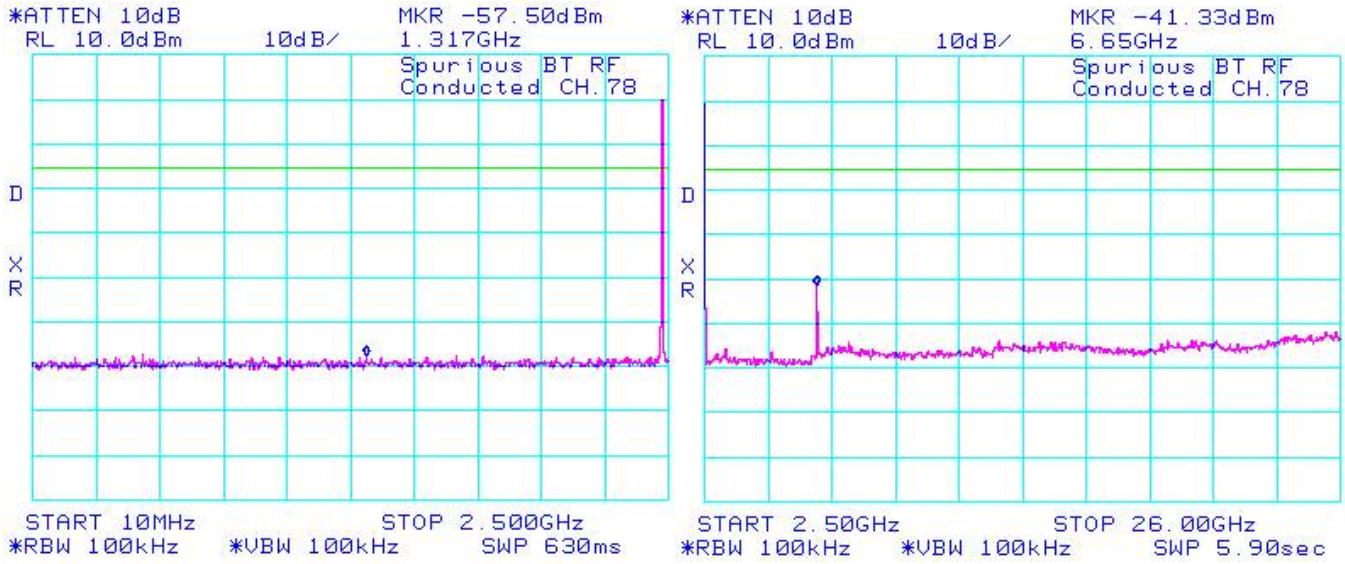
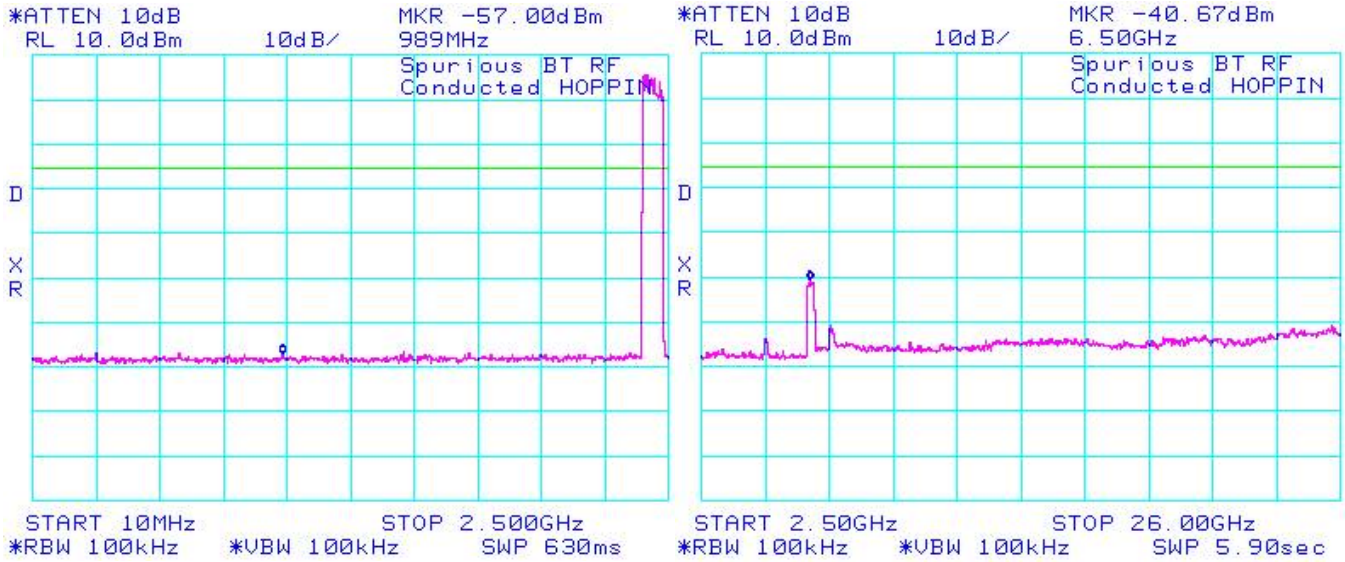


Figure 3-43 : Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 3-DH5



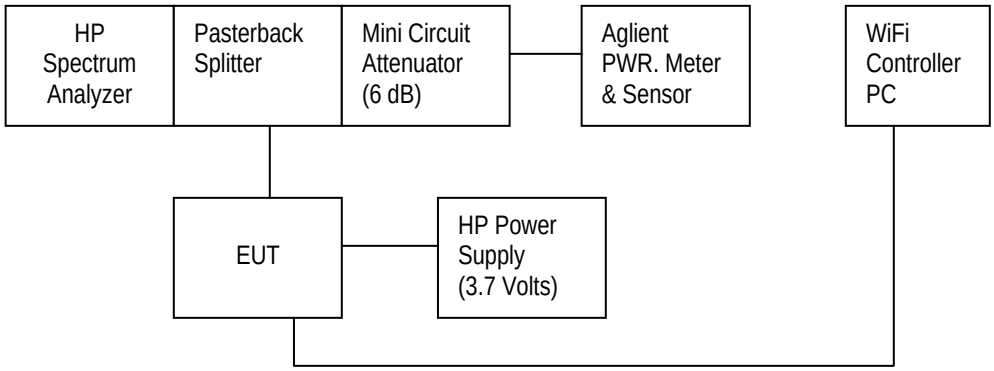
APPENDIX 4 – 802.11b/g CONDUCTED EMISSIONS TEST DATA/PLOTS

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: July 21, 2009
The measurements on BlackBerry® smartphone PIN 210B4F98 were performed by Maurice Battler.

The environmental test conditions were:

Temperature:	25 ºC
Pressure:	1019 mb
Relative Humidity:	30 %

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	11.10
	11 Mbps	≥ 500	10.77
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.67
6	1 Mbps	≥ 500	11.20
	5.5 Mbps	≥ 500	10.77
	11 Mbps	≥ 500	11.43
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.67
11	1 Mbps	≥ 500	10.10
	5.5 Mbps	≥ 500	10.23
	11 Mbps	≥ 500	11.63
	6 Mbps	≥ 500	16.57
	24 Mbps	≥ 500	16.63
	54 Mbps	≥ 500	16.67

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

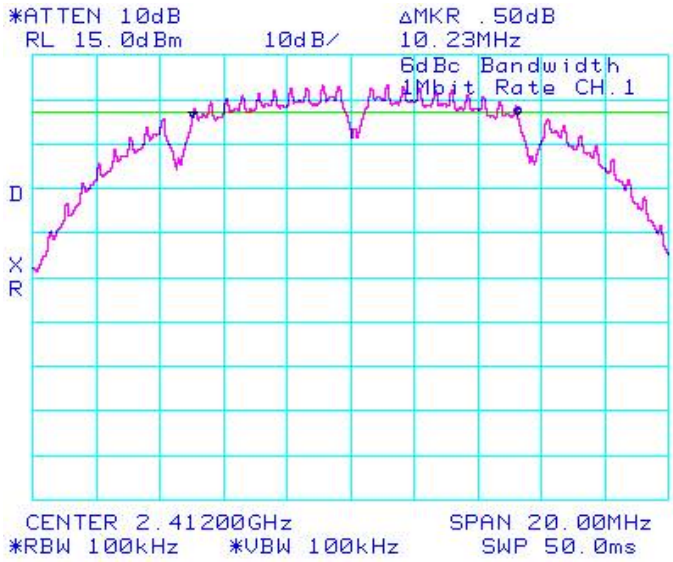


Figure 4-2: 6 dB Bandwidth
802.11b, Channel 6, 1 Mbps

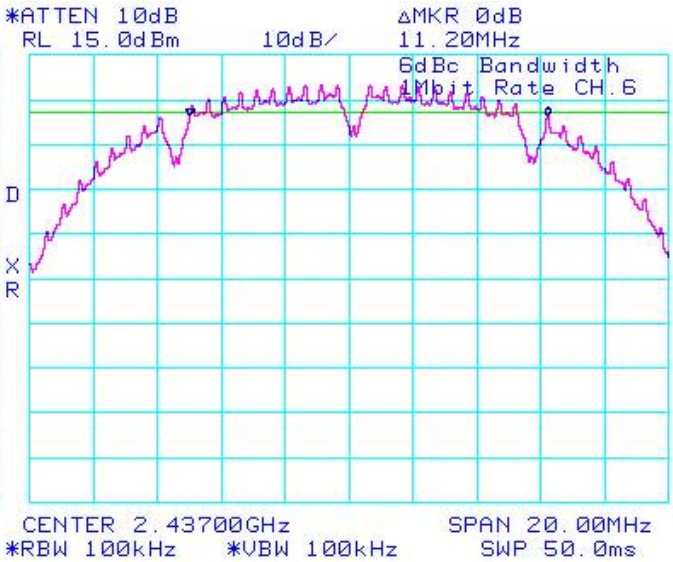
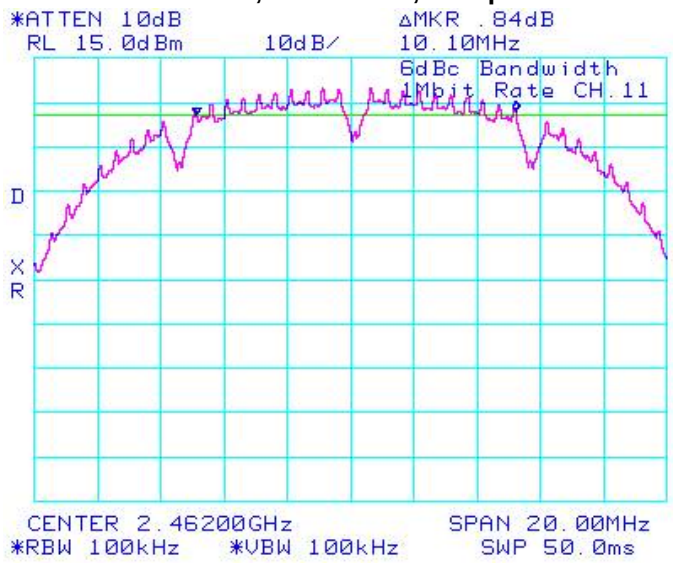


Figure 4-3: 6 dB Bandwidth
802.11b, Channel 11, 1 Mbps



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

Figure 4-4: 6 dB Bandwidth
802.11g, Channel 1, 6 Mbps

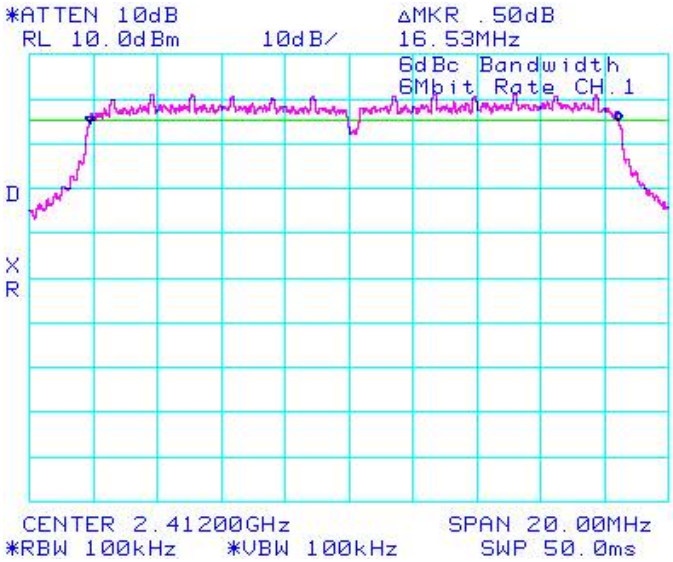
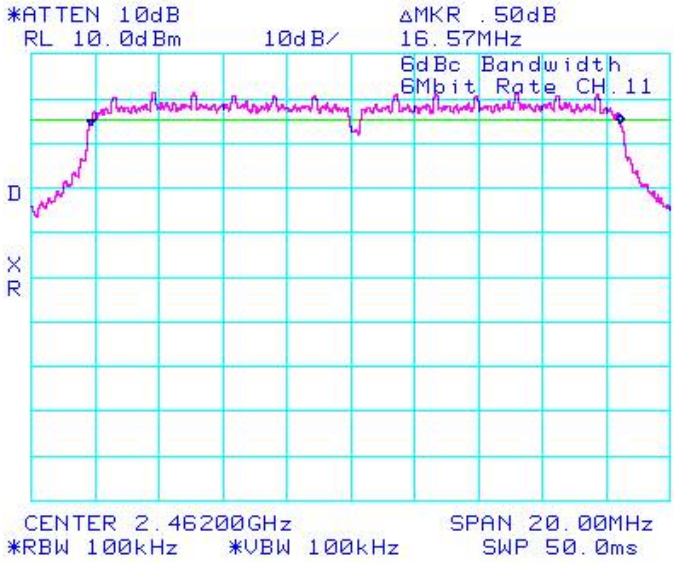


Figure 4-5: 6 dB Bandwidth
802.11g, Channel 6, 6 Mbps

Figure 4-6: 6 dB Bandwidth
802.11g, Channel 11, 6 Mbps



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

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 Aglient 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	17.02	50.35
	5.5 Mbps	< 1.00	17.03	50.47
	11 Mbps	< 1.00	17.07	50.93
	6 Mbps	< 1.00	13.02	20.04
	24 Mbps	< 1.00	12.15	16.41
	54 Mbps	< 1.00	10.85	12.16
6	1 Mbps	< 1.00	17.42	55.21
	5.5 Mbps	< 1.00	17.50	56.23
	11 Mbps	< 1.00	17.45	55.59
	6 Mbps	< 1.00	16.83	48.19
	24 Mbps	< 1.00	13.05	20.18
	54 Mbps	< 1.00	11.05	12.74
11	1 Mbps	< 1.00	11.28	13.43
	5.5 Mbps	< 1.00	17.41	55.08
	11 Mbps	< 1.00	17.32	53.95
	6 Mbps	< 1.00	13.40	21.88
	24 Mbps	< 1.00	12.45	17.58
	54 Mbps	< 1.00	11.05	12.74

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	-45.50	-25.50
	11 Mbps	< -20	-44.10	-24.10
	6 Mbps	< -20	-31.50	-11.50
	24 Mbps	< -20	-31.34	-11.34
	54 Mbps	< -20	-32.00	-12.00
11	1 Mbps	< -20	-43.00	-23.00
	5.5 Mbps	< -20	-47.33	-27.33
	11 Mbps	< -20	-47.50	-27.50
	6 Mbps	< -20	-40.66	-20.66
	24 Mbps	< -20	-42.66	-22.66
	54 Mbps	< -20	-43.83	-23.83

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.

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

Figure 4-7: Band Edge Compliance
802.11b, Channel 1, 1 Mbps

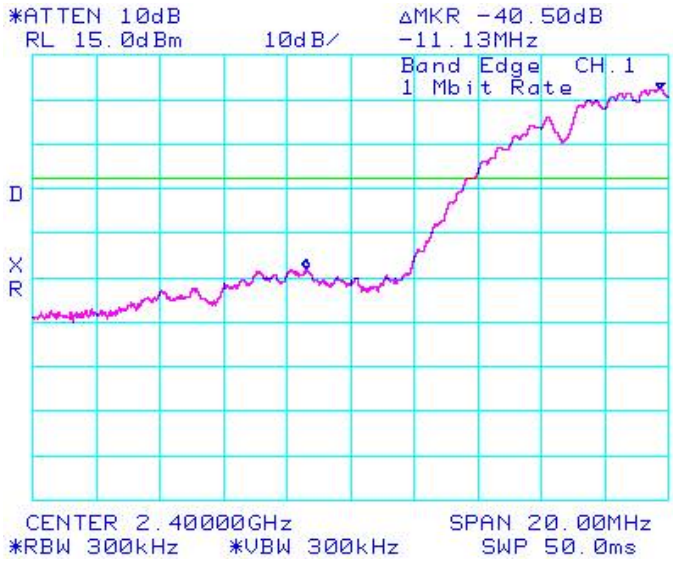


Figure 4-8: Band Edge Compliance
802.11b, Channel 11, 1 Mbps

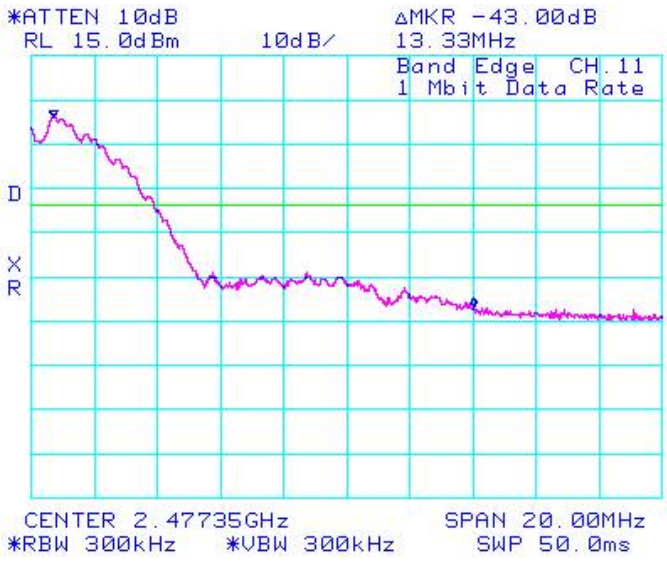


Figure 4-9: Band Edge Compliance
802.11g, Channel 1, 6 Mbps

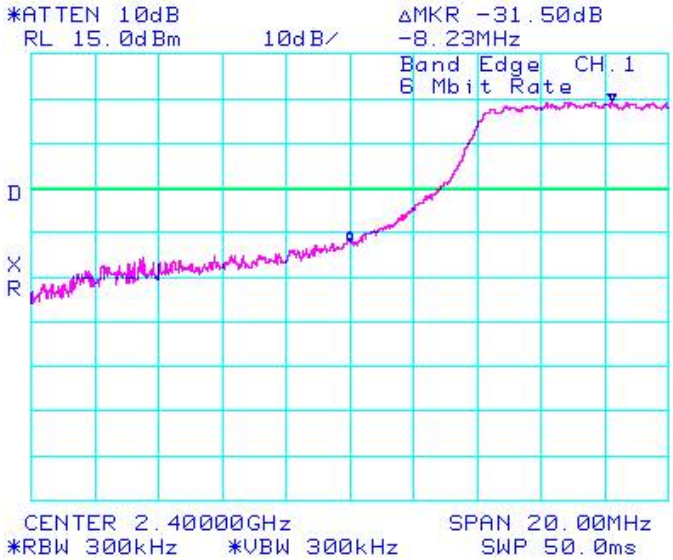


Figure 4-10: Band Edge Compliance
802.11g, Channel 11, 6 Mbps

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	-4.00	4.00
	5.5 Mbps	< 8.00	-4.17	3.83
	11 Mbps	< 8.00	-5.83	2.17
	6 Mbps	< 8.00	-9.83	-1.83
	24 Mbps	< 8.00	-12.33	-4.33
	54 Mbps	< 8.00	-13.83	-5.83
6	1 Mbps	< 8.00	-3.67	4.33
	5.5 Mbps	< 8.00	-4.17	3.83
	11 Mbps	< 8.00	-5.17	2.83
	6 Mbps	< 8.00	-6.50	1.50
	24 Mbps	< 8.00	-11.33	-3.33
	54 Mbps	< 8.00	-14.00	-6.00
11	1 Mbps	< 8.00	-4.17	3.83
	5.5 Mbps	< 8.00	-4.50	3.50
	11 Mbps	< 8.00	-5.50	2.50
	6 Mbps	< 8.00	-10.17	-2.17
	24 Mbps	< 8.00	-12.33	-4.33
	54 Mbps	< 8.00	-14.17	-6.17

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

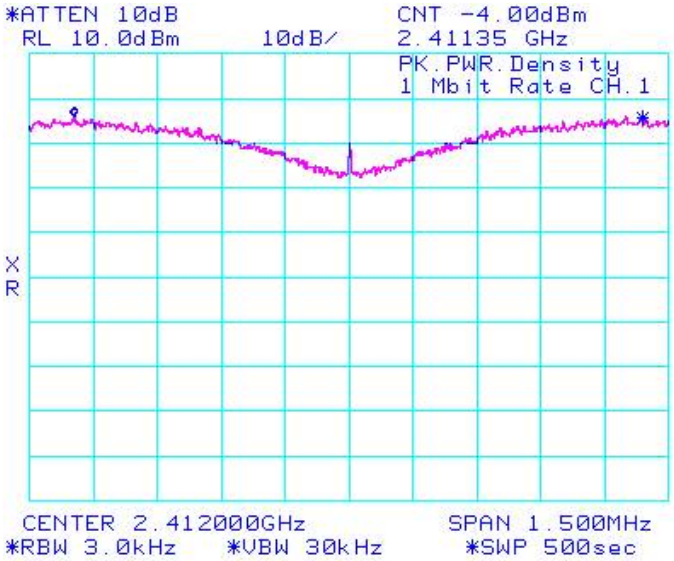


Figure 4-12: Peak Power Spectral Density
802.11b, Channel 6, 1 Mbps

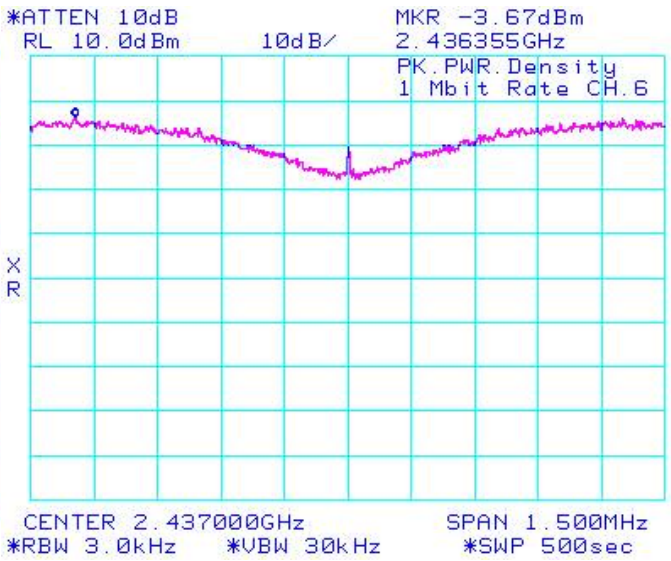
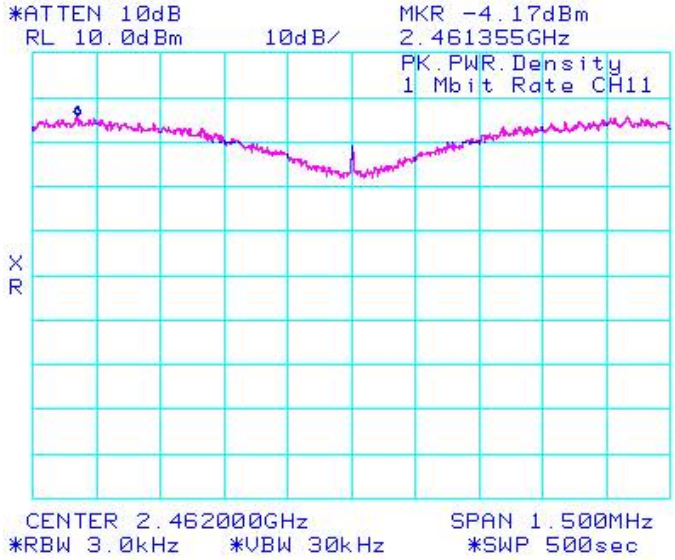


Figure 4-13: Peak Power Spectral Density
802.11b, Channel 11, 1 Mbps



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

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

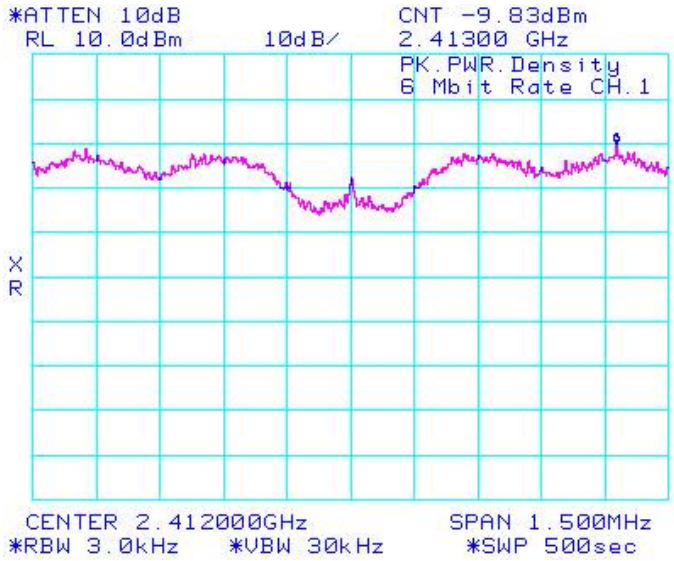


Figure 4-15: Peak Power Spectral Density
802.11g, Channel 6, 6 Mbps

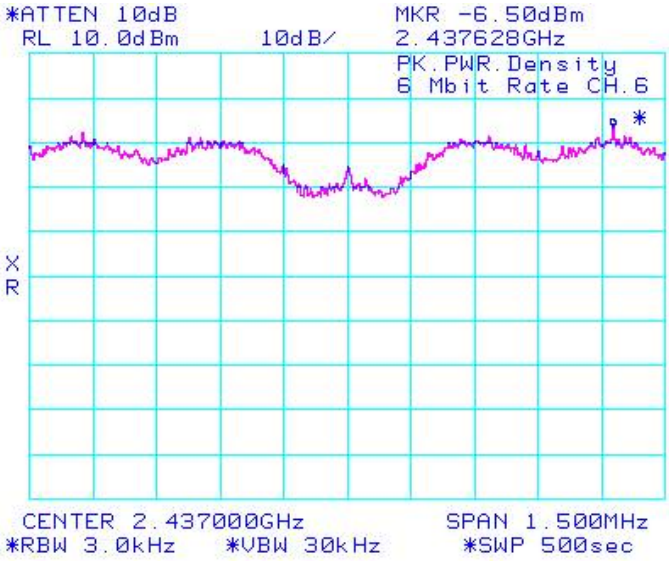
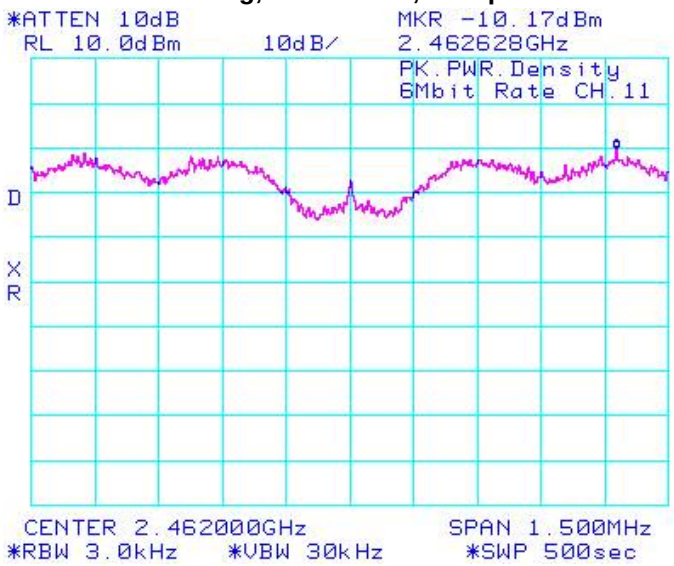


Figure 4-16: Peak Power Spectral Density
802.11g, Channel 11, 6 Mbps



802.11b/g 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. 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	17.02	-49.67	-32.65	-20
	5.5 Mbps	17.03	-49.67	-32.64	-20
	11 Mbps	17.07	-49.33	-32.26	-20
	6 Mbps	13.02	-50.17	-37.15	-20
	24 Mbps	12.15	-50.17	-38.02	-20
	54 Mbps	10.85	-49.17	-38.32	-20
6	1 Mbps	17.42	-49.83	-32.41	-20
	5.5 Mbps	17.50	-49.83	-32.33	-20
	11 Mbps	17.45	-50.00	-32.55	-20
	6 Mbps	16.83	-50.00	-33.17	-20
	24 Mbps	13.05	-49.83	-36.78	-20
	54 Mbps	11.05	-50.33	-39.28	-20
11	1 Mbps	11.28	-49.83	-38.55	-20
	5.5 Mbps	17.41	-50.33	-32.92	-20
	11 Mbps	17.32	-50.00	-32.68	-20
	6 Mbps	13.40	-50.50	-37.10	-20
	24 Mbps	12.45	-49.67	-37.22	-20
	54 Mbps	11.05	-50.17	-39.12	-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.

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

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

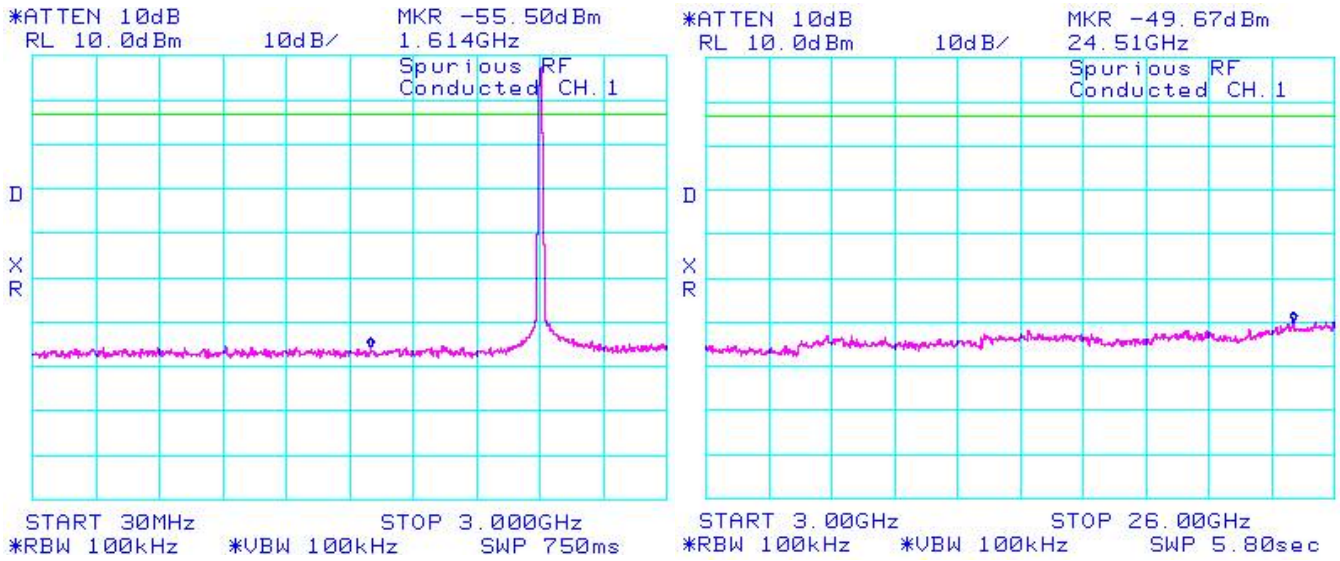
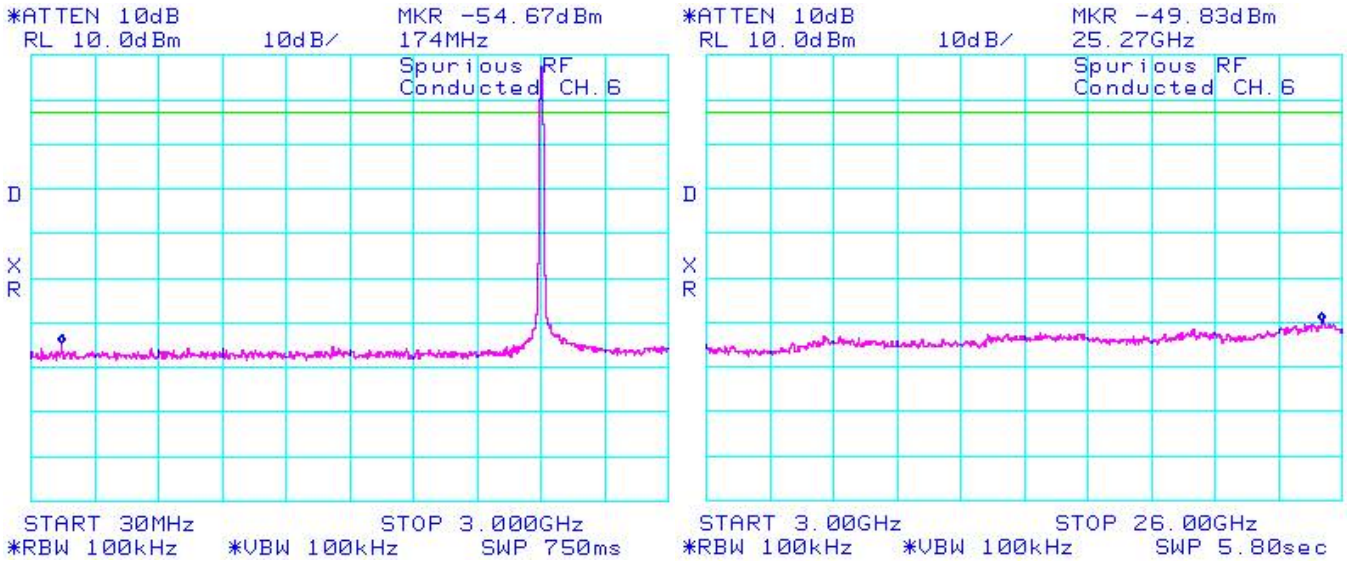


Figure 4-18 : Spurious Conducted RF Emissions
802.11b, Channel 6, 1 Mbps



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

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

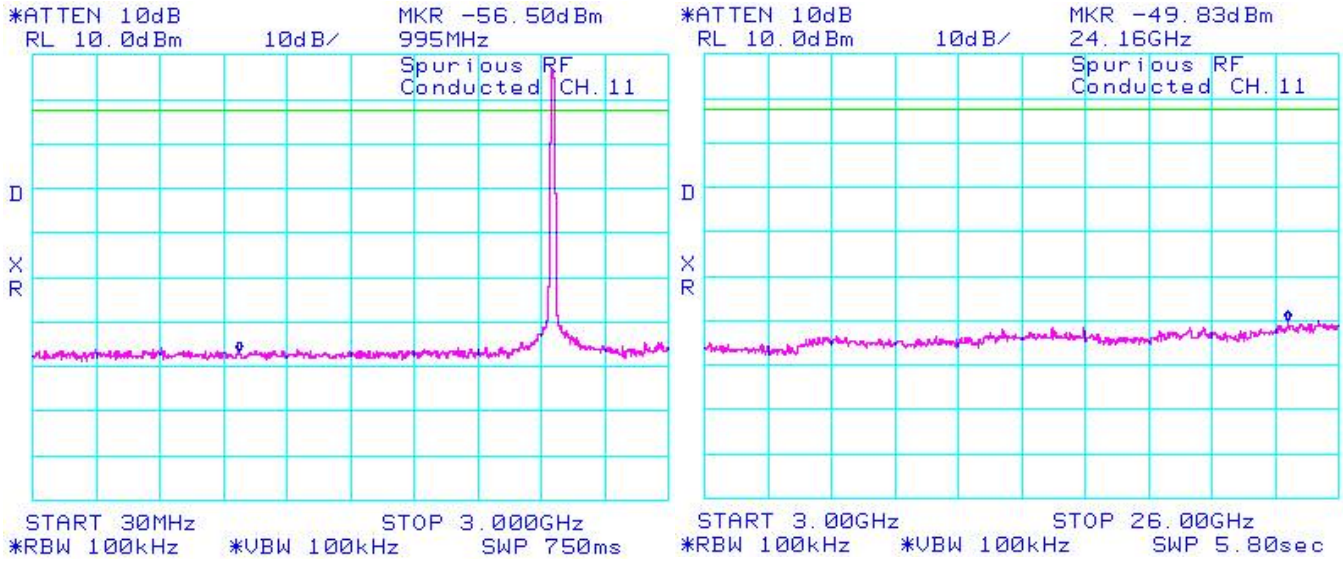
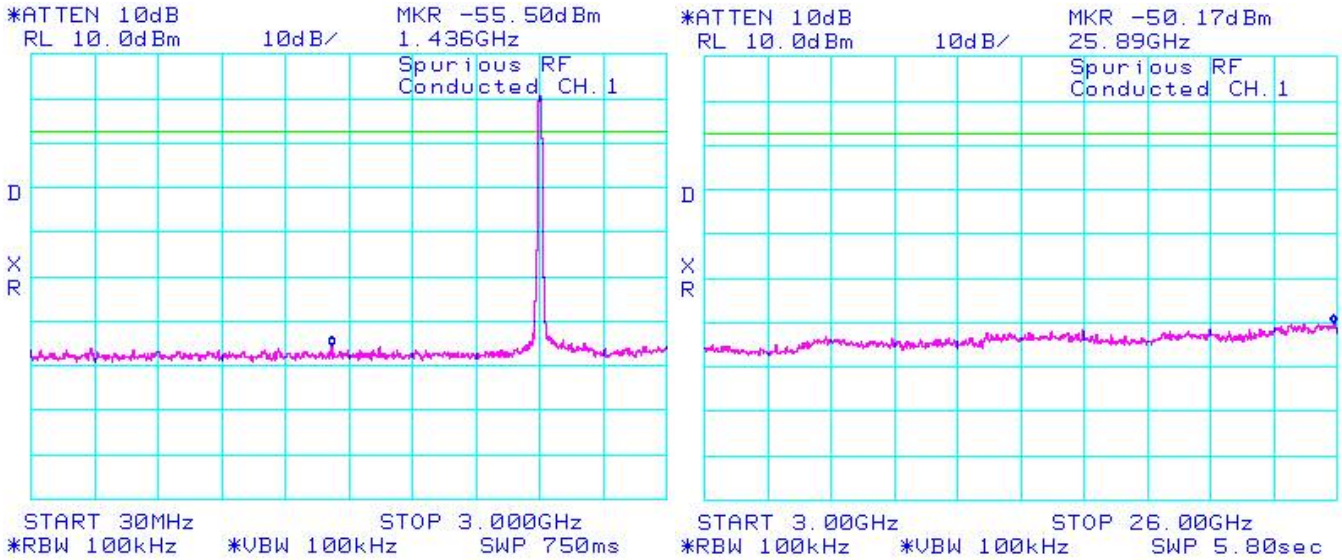


Figure 4-20: Spurious Conducted RF Emissions
802.11g, Channel 1, 6 Mbps



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

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

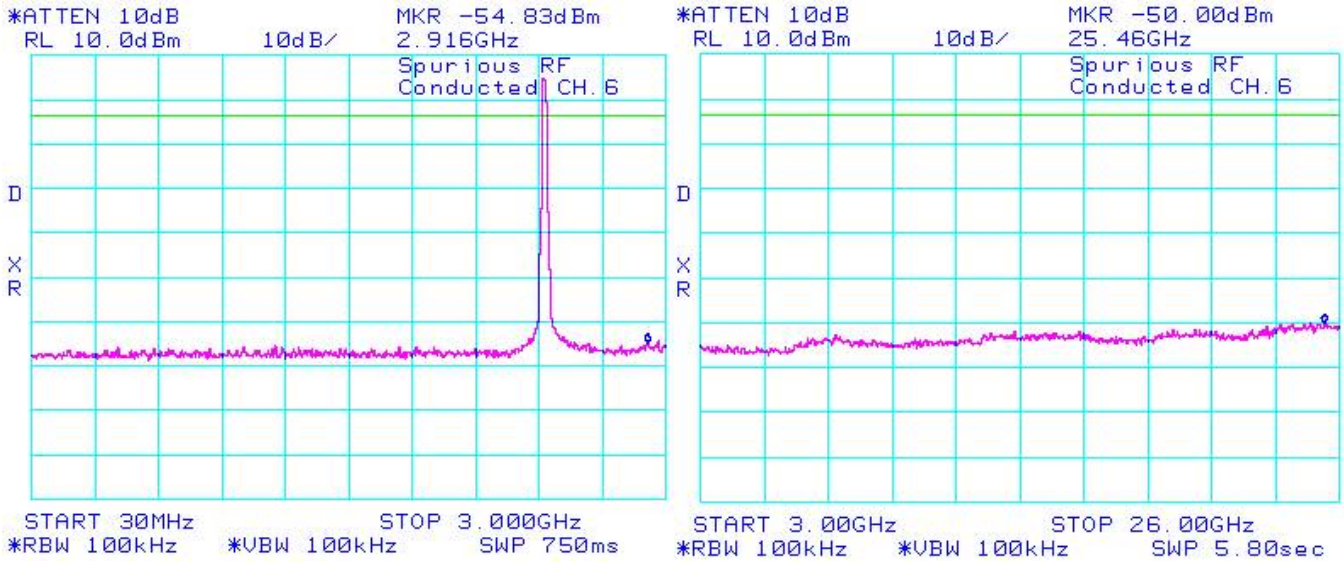


Figure 4-22: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps