EMI Test Report

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

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO.: RTS-1114-0806-09

PRODUCT MODEL NO.: RBY41GW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARBY40GW
IC: 2503A-RBY40GW

DATE: 23 July 2008

Statement of Performance:

The BlackBerry® smartphone, model RBY41GW, part number CER-18134-001 Rev. 6, and accessories when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

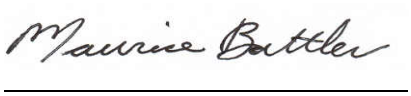
Declaration:

We hereby certify that:
The test data reported herein is an accurate record of the performance of the sample(s) tested.
The test results are valid for the tested unit (s) only.
The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating parameters.
The test methods were consistent with the methods described in the relevant standards.

Documented by:

Jean-Paul Hacquoil
Compliance Specialist
Date: 24 July 2008

Reviewed by:



Maurice Battler
Compliance Specialist
Date: 24 July 2008

Reviewed by:

Masud S. Attayi, P.Eng.
Team Lead, Regulatory Compliance
Date: 25 July, 2008

Approved by:

Paul G. Cardinal, Ph.D.
Director
Date: 29 July, 2008

Table of Contents

A. Scope

This report details the results of compliance tests which were performed in accordance to the requirements of:

- FCC CFR 47 Part 15, Subpart C, July 10, 2008
- Industry Canada, RSS-210, Issue 7, June 2007, Low Power Licence-Exempt Radiocommunication Devices
- Industry Canada, RSS-GEN, Issue 2, June 2007, General Requirements and Information for the Certification of Radiocommunication Equipment

B. Associated Documents

1. Document number RTS-1114-RBY41GW-02
2. Document number RTS-1114-RBY41GW-03
3. Document number RTS-1114-RBY41GW-04

C. Product Identification

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

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

The equipment under test (EUT) was tested at the RIM Testing Services (RTS) EMI test facility, located at:

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

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

The testing was performed on June 01 to July 23, 2008.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RBY41GW	CER-18134-001 Rev. 3	2073EB6F
2	RBY41GW	CER-18134-001 Rev. 4	20746434
3	RBY41GW	CER-18134-001 Rev. 5	20750FEA

To view the differences between CER-18134-001 Rev. 3 and CER-18134-001 Rev. 4, see document number RTS-1114-RBY41GW-02. To view the differences between CER-18134-001 Rev. 4 and CER-18134-001 Rev. 5, see document number RTS-1114-RBY41GW-03. To view the differences between CER-18134-001 Rev. 5 and CER-18134-001 Rev. 6, see document number RTS-1114-RBY41GW-04.
Only the measurements that may have been impacted by the changes from Rev 3 to Rev 6 were re-measured.

BlackBerry® smartphone Accessories Tested

1) Folding Blade Charger, part number HDW-19129-001 with an output voltage of 5.0 volts dc, 750 mA and attached USB cable with a lead length of 1.80 metres.
2) Captive Cable Charger, part number HDW-17957-001 with an output voltage of 5.0 volts dc, 500 mA with an attached USB cable with a length of 1.80 metres.
3) Stereo Headset, 3.5 mm, part number HDW-14322-003, 1.3 metres long.
4) Stereo Multi Button Headset, 3.5 mm, part number HDW-15765-001, 1.1 metres long.

D. Support Equipment Used for the Testing of the EUT

1) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 837493/073
2) DC Power Supply, H/P, model 6632B, serial number US37472178
3) Bluetooth Tester, Rohde & Schwarz, model CBT, serial number 100034
4) Bluetooth Tester, Rohde & Schwarz, model CBT, serial number 100370

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	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. Modifications to EUT

No modifications were required on the EUT.

G. Summary of Results

1) AC LINE CONDUCTED EMISSIONS

The conducted emissions were measured using the test procedure outlined in CISPR Recommendation 22 through a 50 Ohm Line Impedance Stabilization Network (LISN), which was inserted in the power line to the equipment to provide the specified impedance for measurements. The EUT was placed on a nonconductive wooden table, 80 cm high that was positioned 40 cm from a vertical ground plane. The RF output of the network was connected to an EMI receiver system with characteristics that duplicate those of the receiver specified in CISPR Publication 16.
BlackBerry® smartphone, PIN 20750FEA was in battery charging mode. The input voltage was 120 V, 60 Hz.
The following test configurations were measured:

1. The BlackBerry® smartphone in Bluetooth Tx mode with the 3.5 mm Stereo Headset was sitting in the Charging Pod which was connected to the Folding Blade Charger.
2. The BlackBerry® smartphone in 802.11b/g Tx mode with the 3.5 mm Stereo Multi Button Headset was connected to the Captive Cable Charger.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C and IC RSS-210 limits. The sample EUT had a worse case test margin of 1.39 dB below the limit at 0.168 MHz using the quasi peak detector with the Captive Cable Charger, test configuration 2. The sample EUT had a worse case test margin of 18.14 dB below the limit at 0.165 MHz using the average detector with the Captive Cable Charger, test configuration 2.

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® smartphone was measured in standalone configuration with Bluetooth transmitting in single frequency mode at low channel (0), middle channel (39) and high channel (78) for packet type "DH5" and frequency hopping for packet type "3-DH5". The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart C, 15.247 and RSS-210.

The Bluetooth radiated spurious and harmonics were investigated up to the 10th harmonic. The sample EUT had a worse case test margin of 3.7 dB below the Peak limit at 4803.758 MHz using the peak detector.
The results include both normal data rate and EDR for Bluetooth.
See APPENDIX 2 for the test data.

The radiated emissions from the EUT were measured in standalone configuration transmitting at channels 1 & 11 at 6 Mbps, and channel 6 at 1 Mbps for 802.11b/g mode. 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 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 Band-Edge Compliance of RF Radiated Emissions for Bluetooth and 802.11b/g, met the requirements as per 15.247, 15.209, and RSS-210/RSS-GEN.
See APPENDIX 2 for the test data

Measurement Uncertainty ±4.6 dB

3) BLUETOOTH RF CONDUCTED EMISSIONS

a) 20 dB Bandwidth
The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

b) Carrier Frequency Separation
The EUT met the requirements of the carrier frequency separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

c) Number of Hopping Frequencies
The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. The number of hopping channels measured was 79.
See APPENDIX 3 for the test data.

d) Time of Occupancy (Dwell Time)
The EUT met the requirements of the dwell time as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured in DH1, DH3 and DH5 modes. Bluetooth was operating in frequency hopping (Euro/US) mode during the measurements.
See APPENDIX 3 for the test data.

e) Maximum Peak Conducted Output Power
The EUT met the requirements of the maximum peak conducted output power as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

f) Band-Edge Compliance of RF Conducted Emissions
The EUT met the requirements of the band-edge compliance of RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. Channels 0 and 78 were measured in frequency hopping (Euro/US) mode and single frequency mode. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

g) Spurious RF Conducted Emissions
The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. The frequency range measured was 10 MHz to 26 GHz. Low channel (0), middle channel (39) and high channel (78) were measured in single frequency mode and frequency hopping (Euro/US) mode. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

4) WiFi 802.11b/g RF CONDUCTED EMISSIONS

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.

H. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	08-11-21	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	08-11-16	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017401	08-08-04	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030101	08-07-26	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030201	09-01-17	Radiated Emissions
Horn Antenna	ETS	3117	00047563	09-03-09	Radiated Emissions
Horn Antenna	CMT	LHA0180	R52734-001	09-12-17	Radiated Emissions
Preamplifier	TDK	18-26	030002	08-11-20	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	973	08-12-18	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	08-09-28	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	08-09-24	Radiated Emissions
EMI Receiver	Agilent	8546A	3942A00517	08-11-19	Conducted/Radiated Emissions
RF Filter Section	Agilent	85460A	3704A00481	08-11-19	Conducted/Radiated Emissions
Spectrum Analyzer	HP	8563E	3745A08112	08-09-22	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	08-09-24	RF Conducted Emissions
Environment Monitor	Control Company	1870	230355190	08-12-11	Radiated Emissions
Environment Monitor	Control Company	1870	230355189	08-12-11	RF Conducted Emissions
Temperature Probe	Hart Scientific	61161-302	21352860	08-08-14	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	100034	08-12-06	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT	100370	08-12-06	Radiated Emissions
Signal Generator	Agilent	8648C	4037U03155	09-09-20	Frequency Stability
Power Meter	Aglient	N1911A	MY45100905	09-04-16	Frequency Stability
Power Sensor	Agilent	N1921A	SG45240281	09-04-16	Frequency Stability
Digital Multimeter	Hewlett Packard	34401A	US36042324	08-09-28	Conducted/Radiated Emissions
L.I.S.N.	Emco	3816/2	1120	08-08-28	Conducted Emissions
Impulse Limiter	Rohde &	ESHS-Z2	100786	08-09-11	Conducted Emissions

APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth AC Conducted Emission Test Results

The measurements were performed by Vimal Olaganathan and Arjun Rai Bhatti

Test Configuration 1

AC Power Line Conducted Emissions

The EUT met the requirements of the AC Power Line Conducted Emissions as per FCC CFR 47 Part 15, Subpart C and IC RSS-210.

The environmental test conditions were:

Temperature	24ºC
Pressure	1013 mb
Relative Humidity	31%

Date of test: July 23, 2008

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.155	N	40.47	9.87	50.34	65.73	55.73	-15.39	-5.39
0.212	N	32.06	9.87	41.93	63.01	53.01	-21.08	-11.08
0.351	N	27.80	9.89	37.69	58.84	48.84	-21.15	-11.15
0.350	L1	31.64	9.89	41.53	58.84	48.84	-17.31	-7.31
0.490	N	27.47	9.90	37.37	56.17	46.17	-18.79	-8.79
0.529	N	27.01	9.91	36.92	56.00	46.00	-19.08	-9.08
0.536	L1	23.64	9.91	33.55	56.00	46.00	-22.45	-12.45
0.577	N	23.89	9.91	33.80	56.00	46.00	-22.20	-12.20
0.685	L1	24.15	9.94	34.09	56.00	46.00	-21.91	-11.91
0.830	L1	25.68	9.93	35.61	56.00	46.00	-20.39	-10.39
0.986	L1	22.74	9.93	32.67	56.00	46.00	-23.33	-13.33
1.196	L1	22.11	9.95	32.06	56.00	46.00	-23.94	-13.94

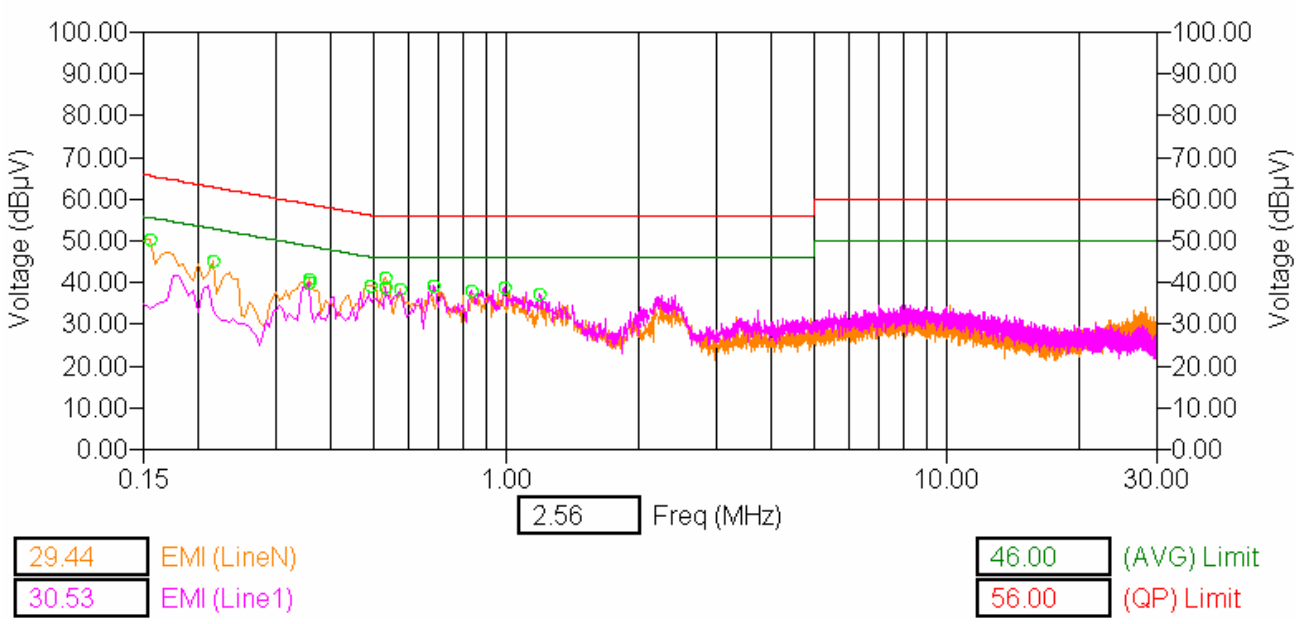
All other emission levels had a test margin of greater than 25 dB.

Measurements were done with the quasi-peak detector.

See figure 1-1 for the measurement plot of AC power line conducted emissions.

Bluetooth AC Conducted Emission Test Graph 1

Figure 1-1



Test Configuration 1

Bluetooth AC Conducted Emission Test Results

Test Configuration 2

AC Power Line Conducted Emissions

The EUT met the requirements of the AC Power Line Conducted Emissions as per FCC CFR 47 Part 15, Subpart C and IC RSS-210.

The environmental test conditions were:

Temperature	24ºC
Pressure	1008 mb
Relative Humidity	31%

Date of test: July 23, 2008

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Margin (QP) Limits (dB)
0.151	L1	54.36	9.87	64.23	66.00	-1.77
0.152	N	53.96	9.87	63.83	65.73	-1.90
0.165	L1	53.47	9.87	63.34	65.46	-2.12
0.172	N	52.67	9.87	62.54	64.72	-2.18
0.168	L1	53.23	9.87	63.10	64.49	**-1.39**
0.191	L1	50.44	9.87	60.31	63.61	-3.30
0.215	N	49.80	9.87	59.67	63.21	-3.54
0.200	L1	50.92	9.87	60.79	63.01	-2.22
0.233	N	49.11	9.87	58.98	61.92	-2.94
0.272	N	46.91	9.88	56.79	61.43	-4.64
0.261	L1	47.76	9.88	57.64	61.43	-3.79
0.301	L1	45.57	9.90	55.47	60.38	-4.92
0.306	N	45.29	9.90	55.19	60.24	-5.05
0.321	N	44.49	9.89	54.38	59.58	-5.19
0.341	L1	44.10	9.89	53.99	59.20	-5.21
0.352	N	43.33	9.89	53.22	58.84	-5.62
0.366	N	42.49	9.89	52.38	58.39	-6.01

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

Measurements were done with the quasi-peak detector.

See figure 1-2 for the measurement plot of AC power line conducted emissions.

Bluetooth AC Conducted Emission Test Results

Test Configuration 2 cont'd

Date of test: July 23, 2008

Frequency (MHz)	Line	Reading (AV) (dBµV)	Correction Factor (dB)	Corrected Reading (AV) (dB)	Limit (AV) (dBµV)	Margin (AV) Limits (dB)
0.155	L1	25.39	9.87	35.26	56.00	-20.74
0.152	N	24.05	9.87	33.92	55.73	-21.81
0.156	L1	25.94	9.87	35.81	55.46	-19.65
0.165	N	26.71	9.87	36.58	54.72	**-18.14**
0.179	L1	24.17	9.87	34.04	54.49	-20.45
0.197	L1	21.38	9.87	31.25	53.61	-22.36
0.213	N	21.10	9.87	30.97	53.21	-22.24
0.193	L1	22.84	9.87	32.71	53.01	-20.30
0.228	N	19.04	9.87	28.91	51.92	-23.01
0.258	N	17.46	9.88	27.34	51.43	-24.09
0.260	L1	17.64	9.88	27.52	51.43	-23.91
0.286	L1	15.91	9.90	25.81	50.38	-24.58
0.287	N	16.80	9.90	26.70	50.24	-23.54
0.323	N	17.38	9.89	27.27	49.58	-22.30
0.329	L1	14.86	9.89	24.75	49.20	-24.45
0.352	N	14.82	9.89	24.71	48.84	-24.13

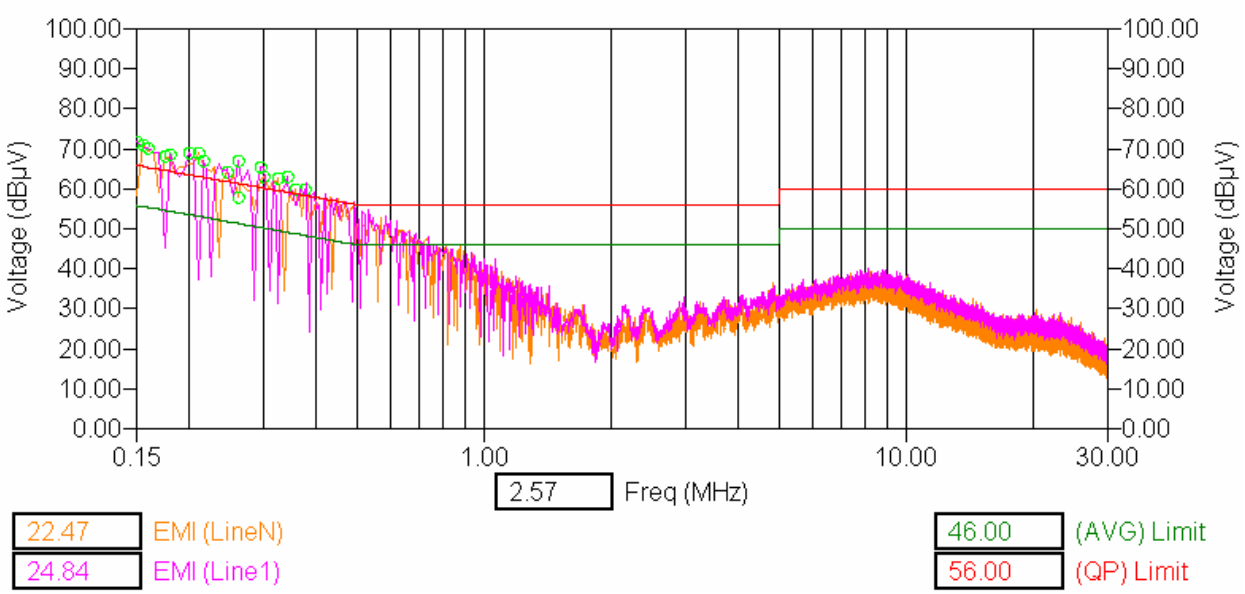
All other emission levels had a test margin of greater than 25 dB.

Measurements were done with the average detector.

See figure 1-2 for the measurement plot of AC power line conducted emissions.

Bluetooth AC Conducted Emission Test Graph 1

Figure 1-2



Test Configuration 2

APPENDIX 2 – RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Results

Bluetooth Band

The environmental test conditions were: Temperature 25ºC
Relative Humidity 31%

The measurements were performed by Gurjeev Singh and Vimal Olaganathan

Date of Test: July 09, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.

The measurements were performed in single frequency Tx mode using packet type "DH5", channel 0. The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

Frequency	Antenna		Test Angle	Detector	Measured Level	Correction Factor for preamp/antenna/ cables/ filter	Field Strength Level (reading+corr)	Limit @ 3.0 m	Test Margin
	Pol.	Height							
(MHz)	(V/H)	(metres)	(Deg.)	(PK or QP)	(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)
36.326	H	2.99	324	PK	40.79	-19.34	21.45	40.00	-18.55
36.371	V	2.23	57	PK	45.83	-19.38	26.45	40.00	-13.55
87.993	V	2.08	66	PK	40.28	-21.15	19.13	43.50	-24.37

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

Radiated Emissions Test Results cont'd

Bluetooth Band

The environmental test conditions were: Temperature 24ºC
Relative Humidity 44%

Date of Test: June 13, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 1GHz to 7GHz, 7GHz to 18GHz and 18GHz to 25GHz.

The measurements were performed in single frequency Tx mode using packet type "DH5", channel 0. The BlackBerry® smartphone PIN 2073EB6F was in standalone, vertical position.

Frequency	Antenna		Test Angle	Detector	Measured Level	Correction Factor for preamp/antenna/ cables/ filter	Field Strength Level (reading+corr)	Limit @ 3.0 m	Test Margin
	Pol.	Height			(dBµV)	(dB/m)			
(MHz)	(V/H)	(metres)	(Deg.)	(PK or QP)			(dBµV/m)	(dBµV/m)	(dB)
4803.758	H	1.00	308	PK	46.91	23.36	70.27	74.00	**-3.73**
4803.938	V	1.00	22	PK	44.11	23.36	67.47	74.00	-6.53

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

Radiated Emissions Test Results cont'd

Bluetooth Band

The environmental test conditions were: Temperature 22ºC
Relative Humidity 31%

Date of Test: June 01, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.

The measurements were performed in single frequency Tx mode using packet type "DH5", channel 39. The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

All emissions had a test margin greater than 25.0 dB.

The environmental test conditions were: Temperature 24ºC
Relative Humidity 44%

Date of Test: June 16, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 1GHz to 7GHz, 7GHz to 18GHz and 18GHz to 25GHz.

The measurements were performed in single frequency Tx mode using packet type "DH5", channel 39. The BlackBerry® smartphone PIN 2073EB6F was in standalone, vertical position.

Frequency	Antenna		Test Angle	Detector	Measured Level	Correction Factor for preamp/antenna/ cables/ filter	Field Strength Level (reading+corr)	Limit @ 3.0 m	Test Margin
	Pol.	Height			(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)
(MHz)	(V/H)	(metres)	(Deg.)	(PK or QP)					
4882.154	V	1.00	0	PK	37.20	23.00	60.20	74.00	-13.80

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

Radiated Emissions Test Results cont'd

Bluetooth Band

The environmental test conditions were: Temperature 25ºC
Relative Humidity 36%

Date of Test: July 08, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.

The measurements were performed in single frequency Tx mode using packet type "3-DH5", channel 39. The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

All emissions had a test margin greater than 25.0 dB.

Test Distance was 3.0 metres with a height of 0.8 metres, 1GHz to 7GHz, 7GHz to 18GHz and 18GHz to 25GHz.

The measurements were performed in single frequency Tx mode using packet type "3-DH5", channel 39. The BlackBerry® smartphone PIN 2073EB6F was in standalone, vertical position.

Frequency	Antenna		Test Angle	Detector	Measured Level	Correction Factor for preamp/antenna/ cables/ filter	Field Strength Level (reading+corr)	Limit @ 3.0 m	Test Margin
	Pol.	Height							
(MHz)	(V/H)	(metres)	(Deg.)	(PK or QP)	(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)
4882.074	H	1.00	228	PK	42.62	23.00	65.62	74.00	-8.38
4881.994	V	1.00	274	PK	38.62	23.00	61.62	74.00	-12.38

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

Radiated Emissions Test Results cont'd

Bluetooth Band

The environmental test conditions were: Temperature 25ºC
Relative Humidity 30%

Date of Test: July 09, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.

The measurements were performed in single frequency Tx mode using packet type "DH5", channel 78. The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

All emissions had a test margin greater than 25.0 dB.

The environmental test conditions were: Temperature 24ºC
Relative Humidity 44%

Date of Test: June 13, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 1GHz to 7GHz, 7GHz to 18GHz and 18GHz to 25GHz.

The measurements were performed in single frequency Tx mode using packet type "DH5", channel 78. The BlackBerry® smartphone PIN 2073EB6F was in standalone, vertical position.

Frequency (MHz)	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/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
4959.609	H	1.00	335	PK	44.52	23.60	68.12	74.00	-5.88
4959.729	V	1.00	10	PK	43.15	23.60	66.75	74.00	-7.25
7439.489	H	1.73	197	PK	40.91	16.52	57.43	74.00	-16.57
7440.311	V	2.98	89	PK	40.51	16.52	57.03	74.00	-16.97

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

Radiated Emissions Test Results cont'd
Bluetooth Band

Date of Test: July 10, 2008 Test Distance was 1.0 metre.
The corrected readings were adjusted to take into account the 3.0 to 1.0 metre distance factor.
The measurements were performed in single frequency and hopping mode (channels 0 to 78) at maximum output power.
Using Pattern type "Static PRBS" and packet type "DH5" during the measurements.

Type	Channel	Frequency (MHz)	Antenna Type	Antenna Pol	Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
BlackBerry® smartphone Standalone, USB up position									
Single frequency mode Low Channel									
2nd	0	4804.0	Horn	V	44.67	45.11	AVE.	54.00	-8.89
2nd	0	4804.0	Horn	H	41.06				
3rd	0	7206.0	Horn	V	29.13	35.08	AVE.	54.00	-18.92
3rd	0	7206.0	Horn	H	28.84				
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF									
Single frequency mode Middle Channel									
2nd	39	4882.0	Horn	V	39.45	39.94	AVE.	54.00	-14.06
2nd	39	4882.0	Horn	H	35.39				
3rd	39	7323.0	Horn	V	33.83	40.10	AVE	54.00	-13.90
3rd	39	7323.0	Horn	H	32.65				
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF									
Single frequency mode High Channel									
2nd	78	4960.0	Horn	V	32.87	33.49	AVE.	54.00	-20.51
2nd	78	4960.0	Horn	H	32.59				
3rd	78	7440.0	Horn	V	32.80	39.82	AVE.	54.00	-14.18
3rd	78	7440.0	Horn	H	33.14				
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF									

Bluetooth Radiated Emissions Test Results cont'd

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

Type	Channel	Frequency (MHz)	Antenna Type	Antenna Pol	Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
BlackBerry® smartphone Standalone, USB up position Hopping mode.									
2nd	39	4882.0	Horn	V	35.67	36.16	AVE.	54.00	-17.84
2nd	39	4882.0	Horn	H	33.10				
3rd	39	7323.0	Horn	V	32.12	38.27	AVE.	54.00	-15.73
3rd	39	7323.0	Horn	H	31.89				
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF									

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

Type	Channel	Frequency (MHz)	Antenna Type	Antenna Pol	Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
BlackBerry® smartphone Standalone, USB up position EDR mode.									
2nd	39	4882.00	Horn	V	36.85	37.34	AVE.	54.00	-16.66
2nd	39	4882.00	Horn	H	33.01				
3rd	39	7323.00	Horn	V	27.91	34.06	AVE.	54.00	-19.94
3rd	39	7323.00	Horn	H	27.24				
The harmonics were investigated up to the 10th harmonic. Emissions above the 3rd harmonic were in the NF									

The environmental test conditions were: Temperature 25ºC
Humidity 31 %

Bluetooth Band-Edge Compliance of RF Radiated Emissions Test Results

The test distance was 3 metres.

BlackBerry® smartphone standalone, vertical position, Pattern type "Static PRBS" and packet type "3-DH5" during the measurements.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	Detector (PK, AVE.)	VBW For Peak (MHz)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
0	2402.0	Horn	V	PK	1.0 MHz	64.84	28.56	36.28	74.00	-37.72
0	2402.0	Horn	H	PK	1.0 MHz	63.85	27.26	36.59	74.00	-37.41
0	2402.0	Horn	V	AV	10 Hz	51.13	28.56	22.57	54.00	-31.43
0	2402.0	Horn	H	AV	10 Hz	50.47	27.26	23.21	54.00	-30.79

BlackBerry® smartphone standalone, vertical, Pattern type "Static PRBS" and packet type "3-DH5" during the measurements.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	Detector (PK, AVE.)	VBW For Peak (MHz)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
78	2480.0	Horn	V	PK	1.0 MHz	63.09	27.69	35.40	74.00	-38.60
78	2480.0	Horn	H	PK	1.0 MHz	61.55	27.60	33.95	74.00	-40.05
78	2480.0	Horn	V	AV	10 Hz	51.38	27.69	23.69	54.00	-30.31
78	2480.0	Horn	H	AV	10 Hz	50.24	27.60	22.64	54.00	-31.36

BlackBerry® smartphone standalone, vertical, Pattern type "Static PRBS" and packet type "DH5" during the measurements.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	Detector (PK, AVE.)	VBW For Peak (MHz)	Peak Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
78	2480.0	Horn	V	PK	1.0 MHz	64.73	29.87	34.86	74.00	-39.14
78	2480.0	Horn	H	PK	1.0 MHz	61.12	26.92	34.20	74.00	-39.80
78	2480.0	Horn	V	AV	10 Hz	54.09	29.87	24.22	54.00	-29.78
78	2480.0	Horn	H	AV	10 Hz	51.66	26.92	24.74	54.00	-29.26

See figures 2-1 to 2-4 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 Radiated Emission.
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 0, Pol: V, Detector: PK

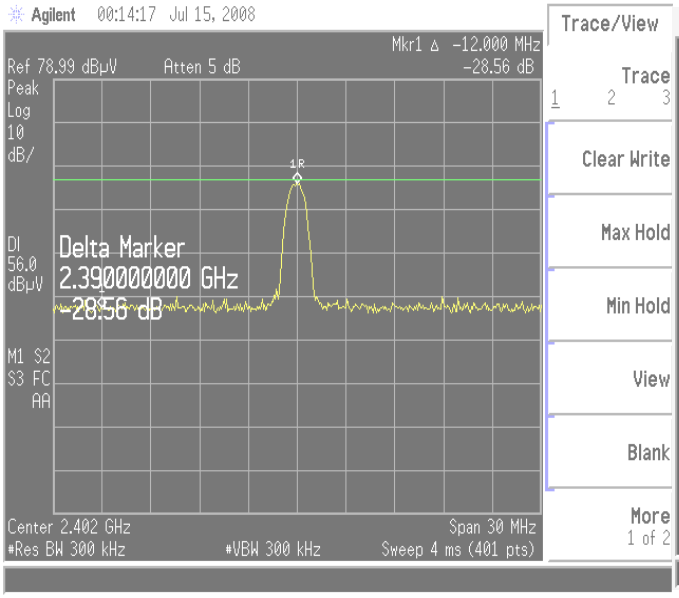


Figure 2-2: Band-Edge Compliance of RF Radiated Emission
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 0, Pol: H, Detector: PK

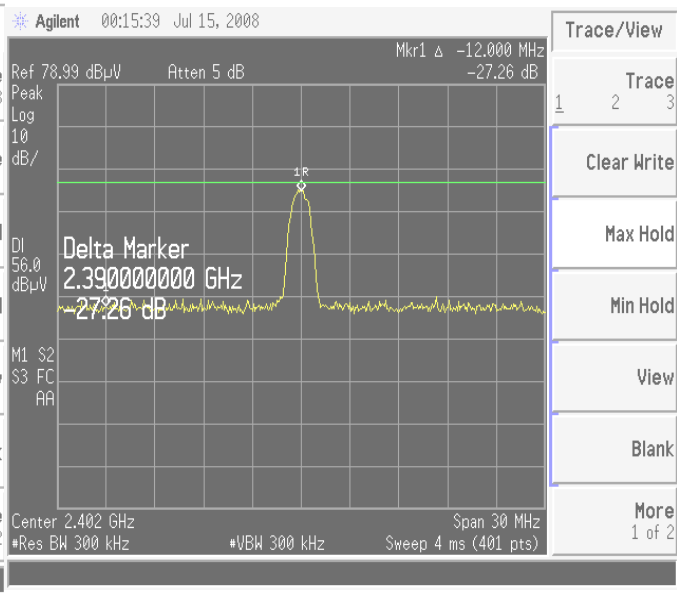


Figure 2-3: Band-Edge Compliance of RF Radiated Emission
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 78, Pol: V, Detector: PK

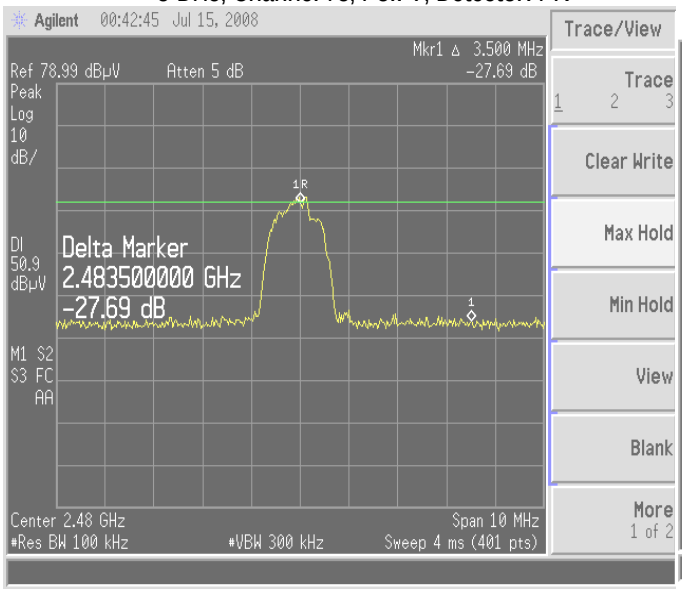
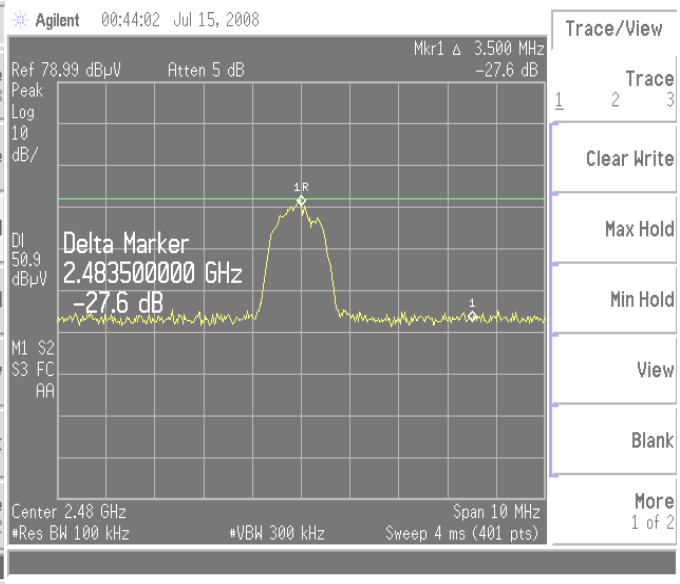


Figure 2-4: Band-Edge Compliance of RF Radiated Emission
Bluetooth, Single freq., Static PBRS,
3-DH5, Channel 78, Pol: H, Detector: PK



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

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

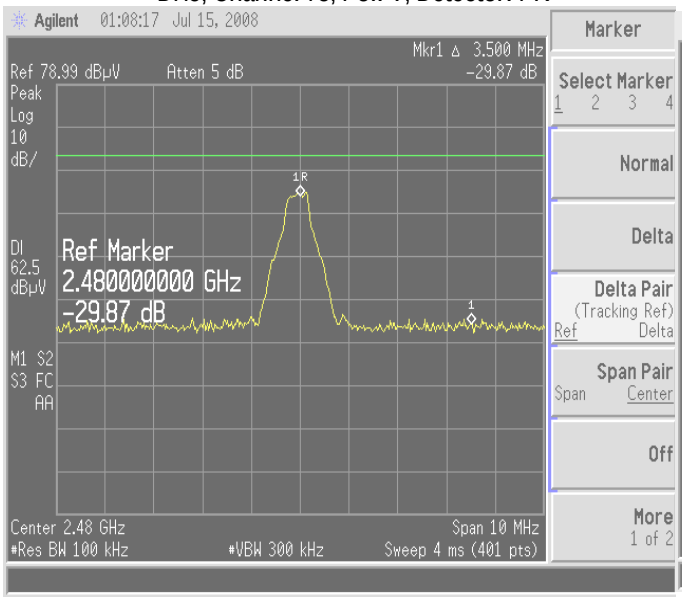
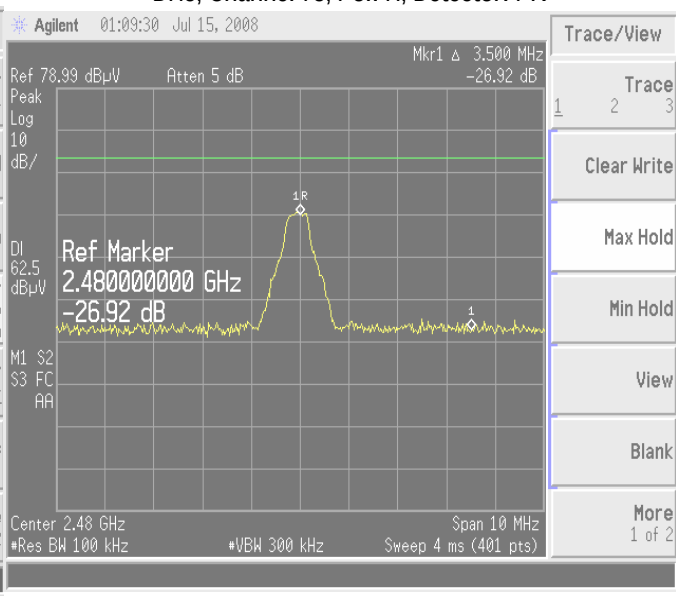


Figure 2-6: Band-Edge Compliance of RF Radiated Emission
Bluetooth, Single freq., Static PBRS,
DH5, Channel 78, Pol: H, Detector: PK



802.11b/g Band

The environmental test conditions were: Temperature 25ºC
Relative Humidity 30%

Date of Test: July 09, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.
The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

The measurements were performed in 802.11b/g Tx mode, channel 1, 2412 MHz.

All emissions had a test margin greater than 25.0 dB.

The environmental test conditions were: Temperature 25ºC
Relative Humidity 30%

Date of Test: July 09, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.
The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

The measurements were performed in 802.11b/g Tx mode, channel 6, 2437 MHz.

All emissions had a test margin greater than 25.0 dB.

The environmental test conditions were: Temperature 24ºC
Relative Humidity 34%

Date of Test: July 10, 2008

Test Distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.
The BlackBerry® smartphone PIN 20750FEA was in standalone, vertical position.

The measurements were performed in 802.11b/g Tx mode, channel 11, 2462 MHz.

All emissions had a test margin greater than 25.0 dB.

Radiated Emissions Test Results cont'd

802.11b/g Band

Date of Test: July 10, 2008
Test Distance was 1.0 metre, with a height of 0.8 m, 1 to 25 GHz.

The corrected readings were adjusted to take into account the 3.0 to 1.0 metre distance factor.
The measurements were performed on channels 1, 6 and 11 for 802.11 b/g mode.

Type	Channel	Frequency (MHz)	Antenna Type	Antenna Pol	Reading (Peak) (dBuV)	Corrected Reading (dBuV)	Detector (AVE/PK)	Peak Limit (dBuV/m)	Diff. To Limit (dB)
Handheld Standalone, USB side up									
Single frequency mode Low Channel									
2nd	1	4824.0	Horn	V	NF	NF	PK	74.00	-
2nd	1	4824.0	Horn	H	NF				
2nd	1	4824.0	Horn	V	NF	NF	AVE	54.00	-
2nd	1	4824.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. Emissions were in the NF.									
Single frequency mode Middle Channel									
2nd	6	4874.0	Horn	V	NF	NF	PK	74.00	-
2nd	6	4874.0	Horn	H	NF				
2nd	6	4874.0	Horn	V	NF	NF	AVE	54.00	-
2nd	6	4874.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. Emissions were in the NF									
Single frequency mode High Channel									
2nd	11	4924.00	Horn	V	NF	NF	PK	74.00	-
2nd	11	4924.00	Horn	H	NF				
2nd	11	4924.00	Horn	V	NF	NF	AVE	54.00	-
2nd	11	4924.00	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. Emissions were in the NF									

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

Date of Test: July 10, 2008 The test distance was 3 metres.

The measurements were performed on BlackBerry® smartphone standalone in vertical configuration on channel 1 for 802.11 b/g mode.

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	2412.0	Horn	V	PK	1.0 MHz	75.20	31.41	43.79	74	-30.21
1	2412.0	Horn	H	PK	1.0 MHz	72.16	29.85	42.31	74	-31.69
1	2412.0	Horn	V	AVE.	10 Hz	64.68	31.41	33.27	54	-20.73
1	2412.0	Horn	H	AVE.	10 Hz	62.07	29.85	32.22	54	-21.78

The measurements were performed on the BlackBerry® smartphone standalone in vertical position, on channel 11 for 802.11 b/g mode.

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	2462.0	Horn	V	PK	1.0 MHz	72.56	31.59	40.97	74.00	-33.03
11	2462.0	Horn	H	PK	1.0 MHz	67.64	25.51	42.13	74.00	-31.87
11	2462.0	Horn	V	AVE.	10 Hz	62.32	31.59	30.73	54.00	-23.27
11	2462.0	Horn	H	AVE.	10 Hz	56.92	25.51	31.41	54.00	-22.59

See figures 2-5 to 2-8 for the plots of the 802.11b/g band-edge compliance.

The environmental test conditions were: Temperature 25ºC
Relative Humidity 31%

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

Figure 2-5: Band-Edge Compliance of RF Radiated Emission 802.11b/g, Channel 1, 2412 MHz, Max Pol: V, Detector: PK

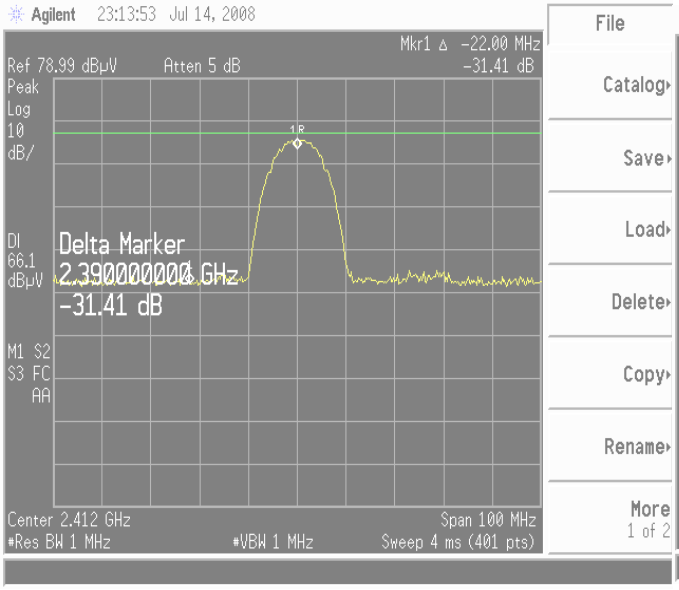


Figure 2-6: Band-Edge Compliance of RF Radiated Emission 802.11b/g, Channel 1, 2412 MHz, Max Pol: H, Detector: PK

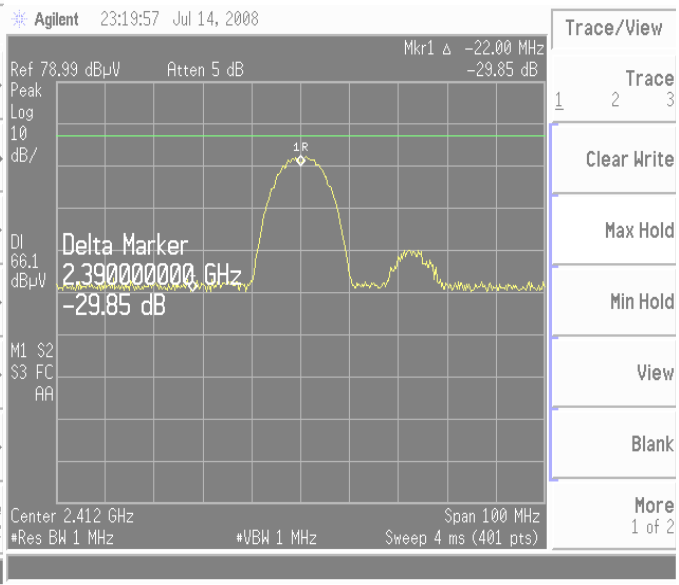


Figure 2-7: Band-Edge Compliance of RF Radiated Emission 802.11b/g, Channel 11, 2462 MHz, Max Pol: V, Detector: PK

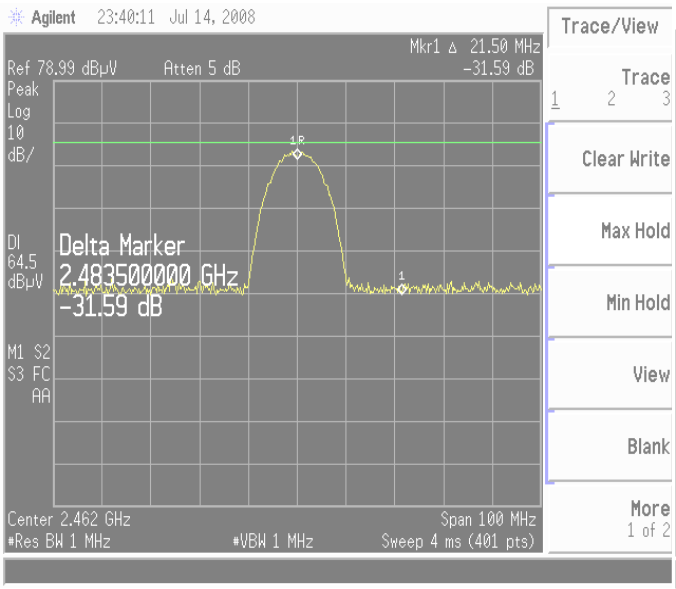
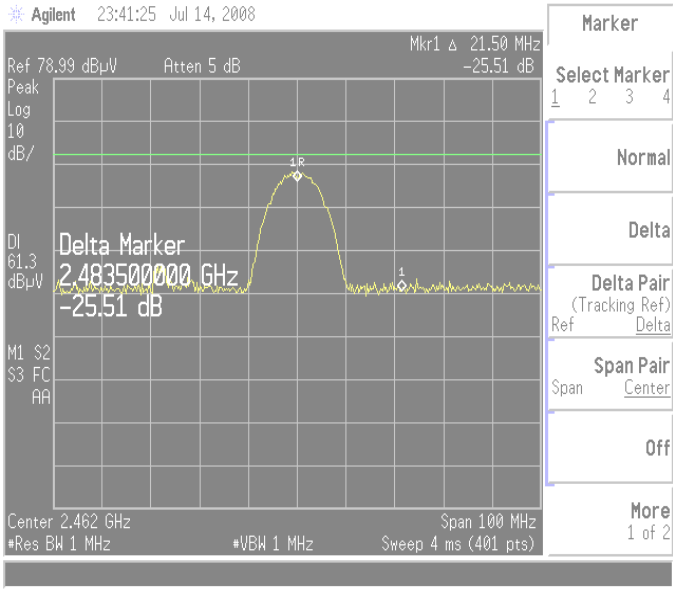


Figure 2-8: Band-Edge Compliance of RF Radiated Emission 802.11b/g, Channel 11, 2462 MHz, Max Pol: H, Detector: PK



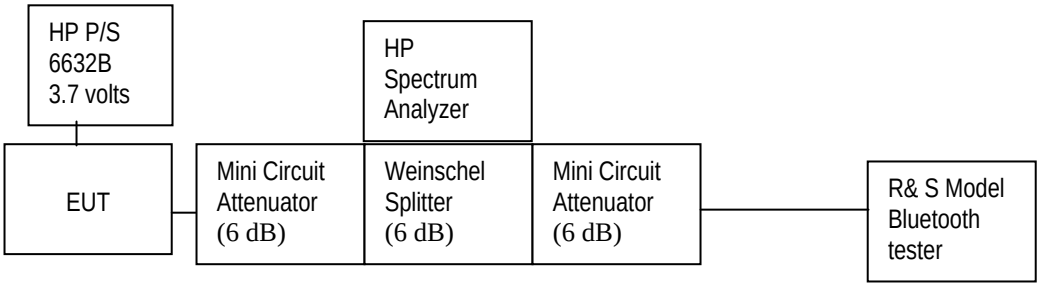
APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth RF Conducted Emission Test Results

Bluetooth power output from BlackBerry® smartphone PIN 20746434 was at maximum for all the recorded measurements shown below.
The measurements were performed by Maurice Battler.

Date of test: June 30, 2008

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.

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	0.933
39	≤1.0	0.933
78	≤1.0	0.933

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

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	41%

Bluetooth RF Conducted Emission Test Results cont'd

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

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

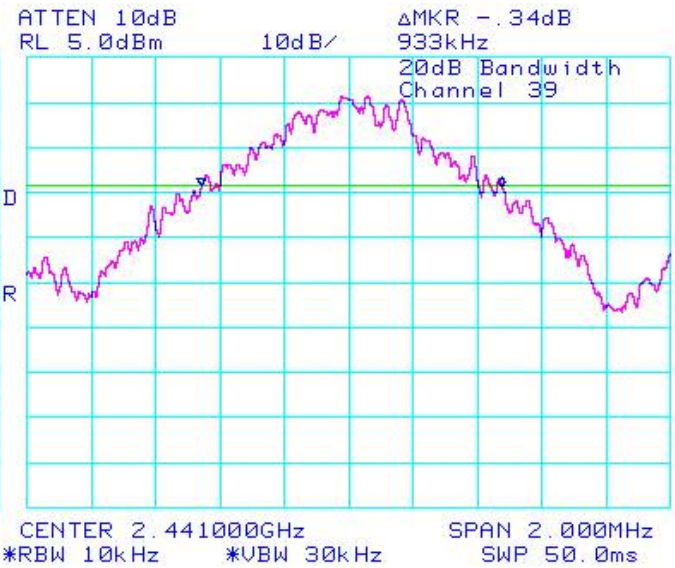
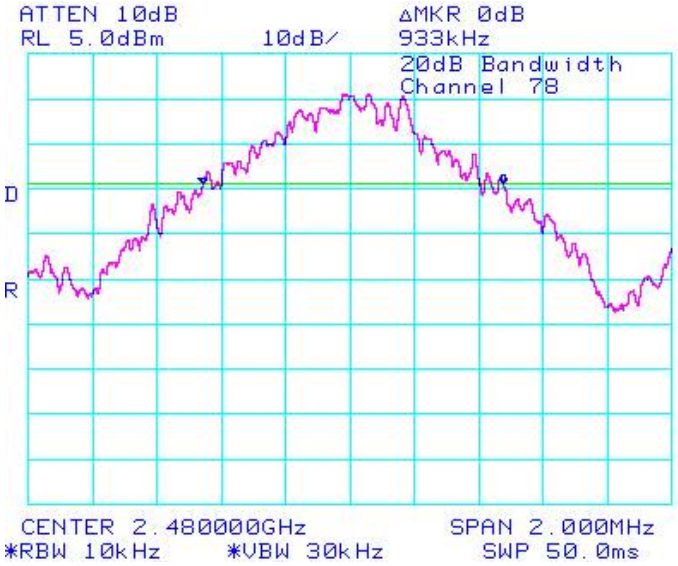


Figure 3-3: 20 dB Bandwidth
Single freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.267
39	≤1.5	1.260
78	≤1.5	1.263

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	41%

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

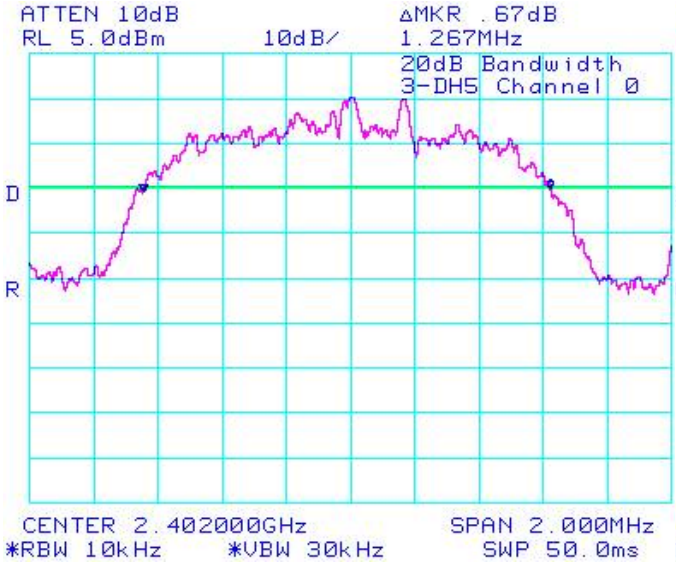


Figure 3-5: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5

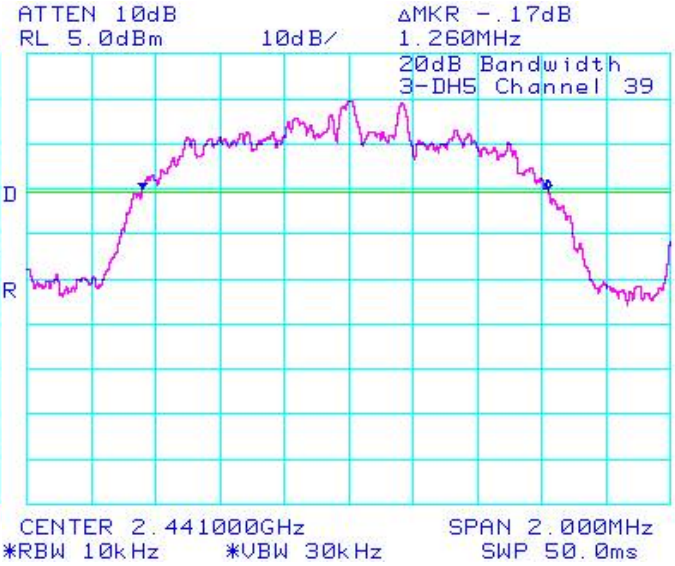
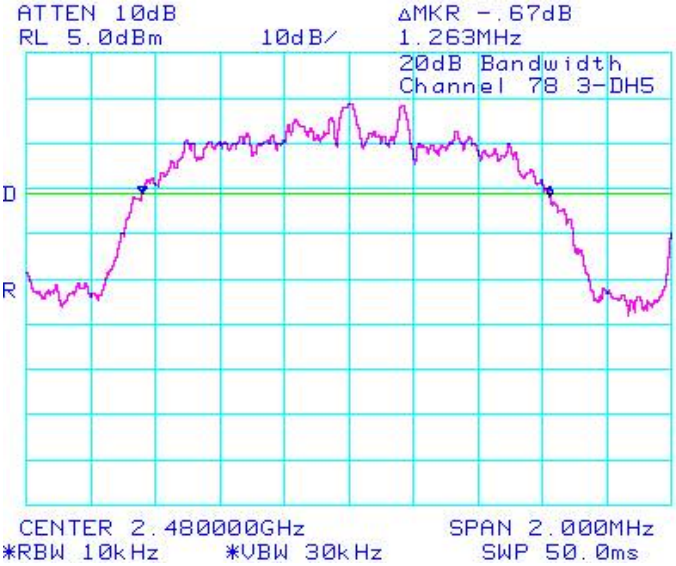


Figure 3-6: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5



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.

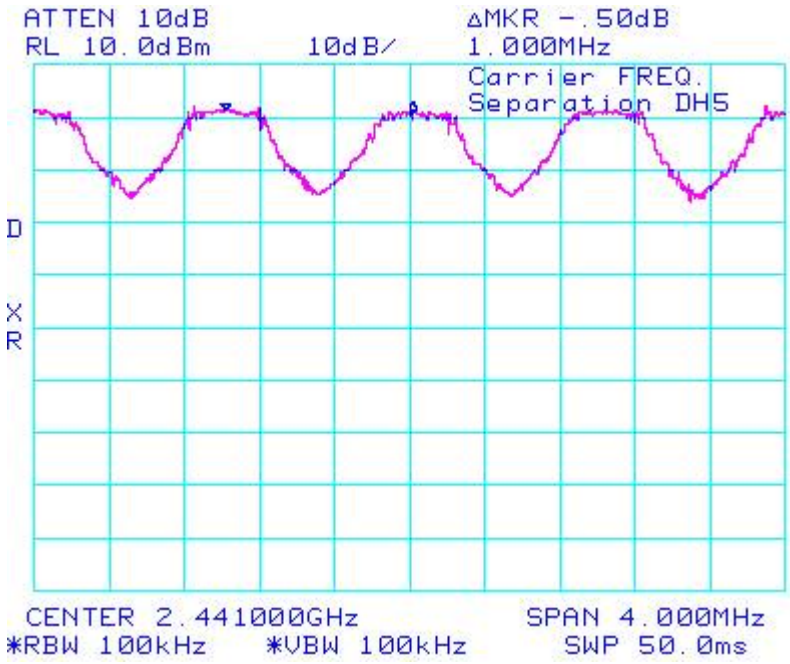
Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	41%

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.

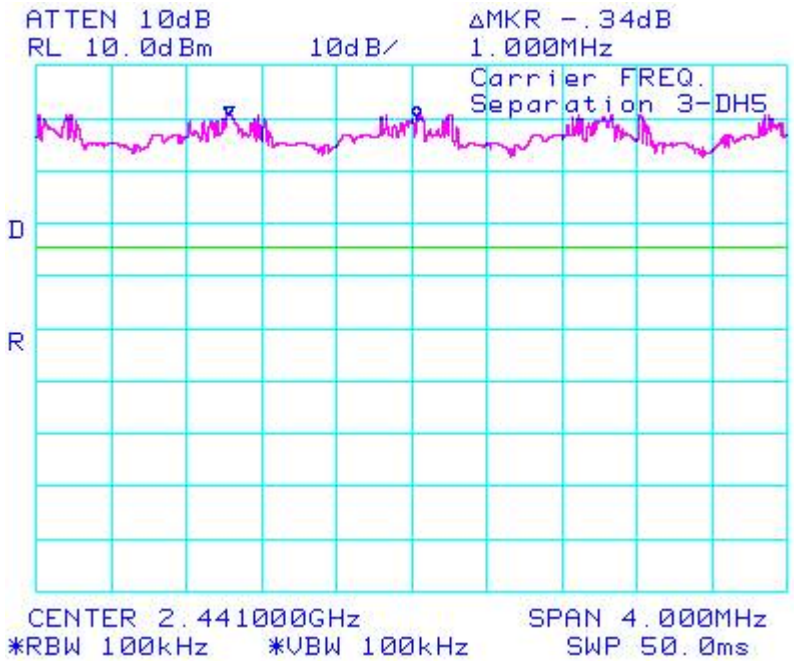
Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	41%

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

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	41%

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

Bluetooth RF Conducted Emission Test Results cont'd

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

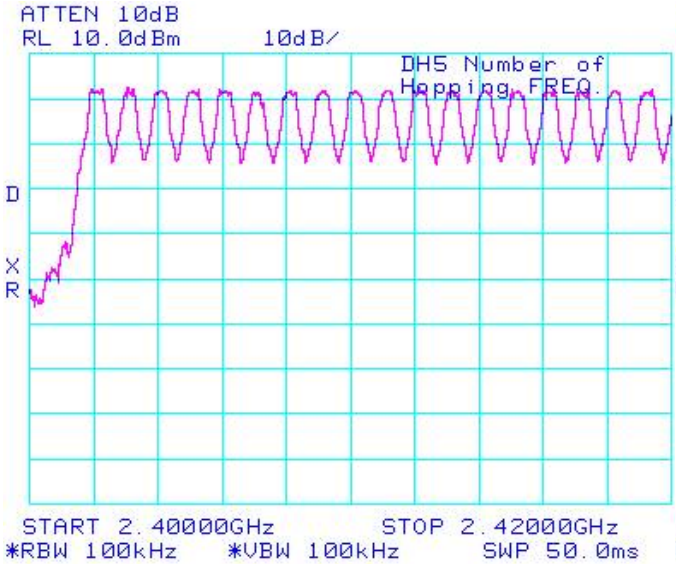


Figure 3-7: Number of Hopping Frequencies Static PBRS, DH5

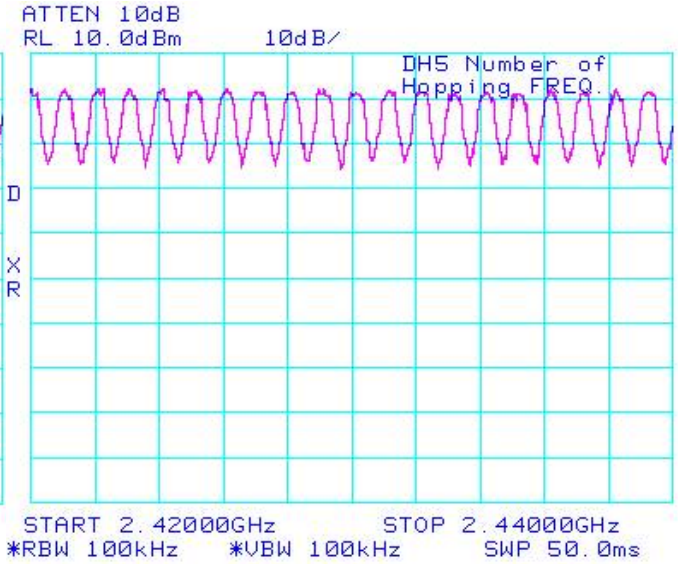


Figure 3-8: Number of Hopping Frequencies Static PBRS, DH5

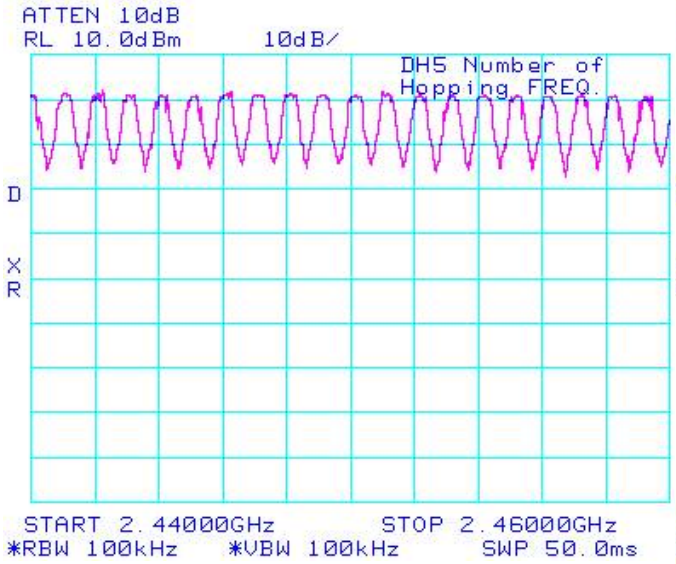
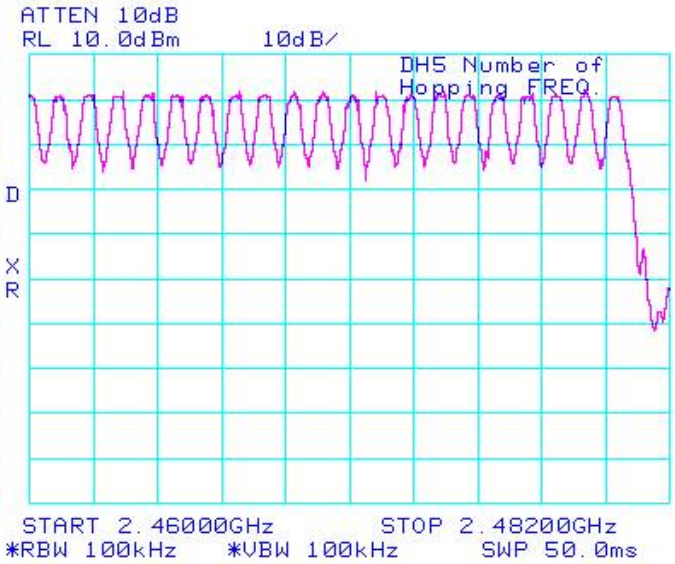


Figure 3-9: Number of Hopping Frequencies Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Time of Occupancy (Dwell Time)

The EUT met the requirements of the time of occupancy (dwell time) as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured in packet types DH1, DH3 and DH5. Bluetooth was operating in frequency hopping (Euro/US) mode during the measurements. The frequency hopping is 1600 hops per second for a dwell time of 625 µsec for 79 channels.

A DH1 packet needs one time slot for transmitting and one time slot for receiving. The frequency hopping is 800 hops per second with 79 channels which is 10.127 times per second. As per 15.247(a) (iii) "The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed". Therefore for 31.6 seconds (79x0.4) there are 320.0 times of appearance.

A DH3 packet needs one time slot for transmitting and one time slot for receiving. The frequency hopping is 400 hops per second with 79 channels which is 5.06 times per second. Therefore for 31.6 seconds there are 159.9 times of appearance.

A DH5 packet needs one time slot for transmitting and one time slot for receiving. The frequency hopping is 266.7 hops per second with 79 channels which is 3.38 times per second. Therefore for 31.6 seconds there are 106.8 times of appearance.

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.5015	0.5015 x 320.0 = 160.38	400	239.62
39	DH1	0.5072	0.5072 x 320.0 = 162.30	400	237.70
78	DH1	0.5015	0.5015 x 320.0 = 160.38	400	239.62
0	DH3	1.7507	1.7507 x 159.9 = 279.94	400	120.06
39	DH3	1.7593	1.7593 x 159.9 = 281.31	400	118.69
78	DH3	1.7420	1.7420 x 159.9 = 278.54	400	121.46
0	DH5	2.9900	2.9900 x 106.8 = 319.33	400	80.67
39	DH5	3.0000	3.0000 x 106.8 = 320.40	400	79.60
78	DH5	2.9800	2.9800 x 106.8 = 318.26	400	81.74

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	41%

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

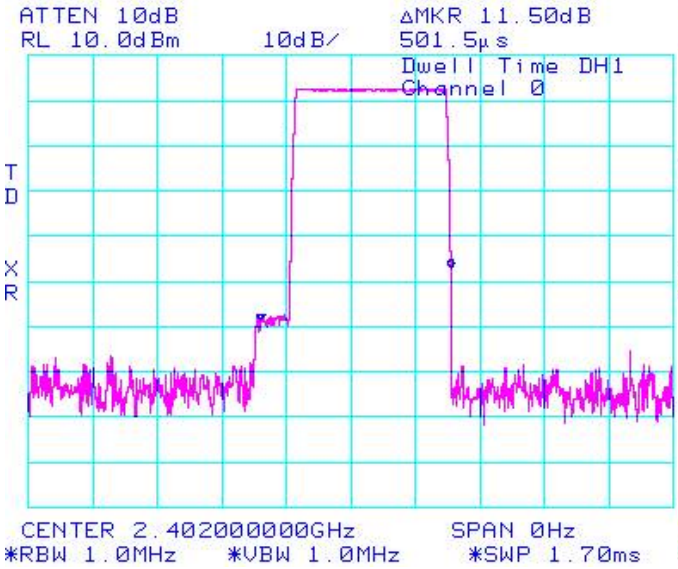


Figure 3-14: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

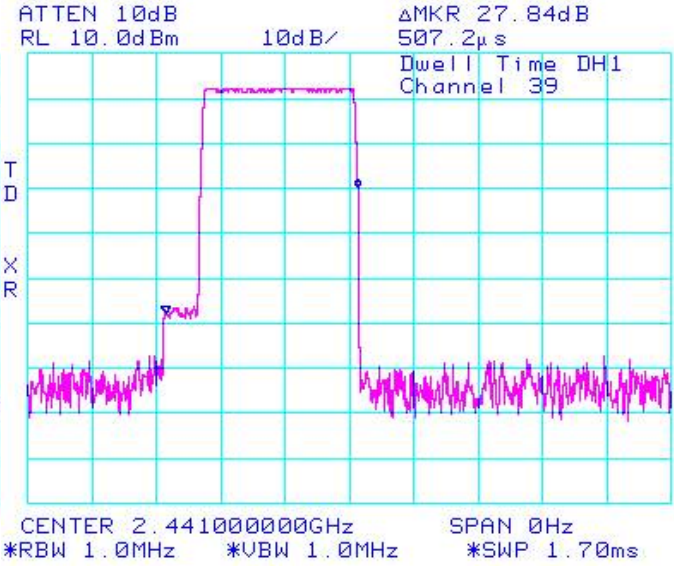


Figure 3-15: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

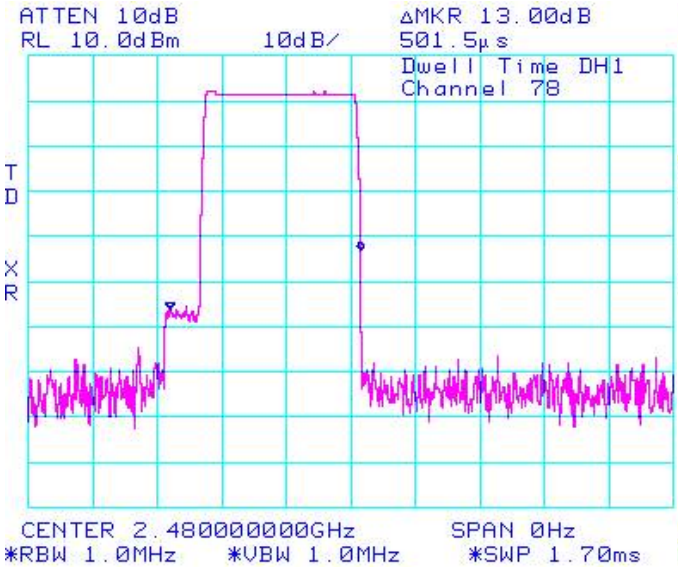
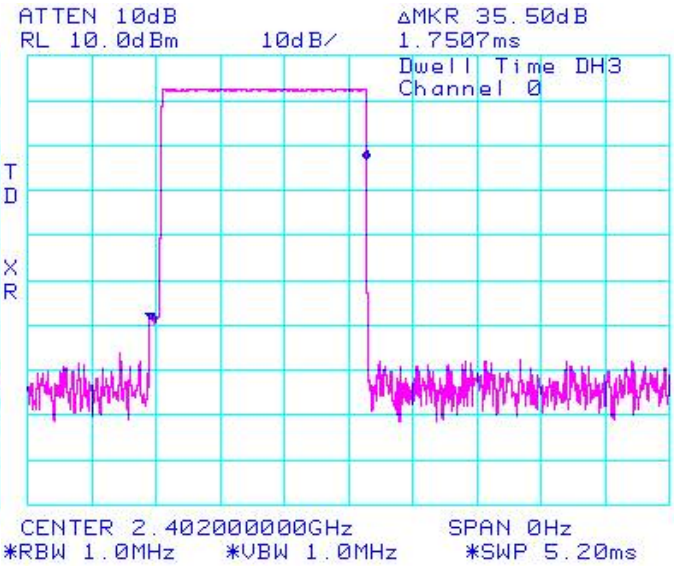


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3



Bluetooth RF Conducted Emission Test Results cont'd

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

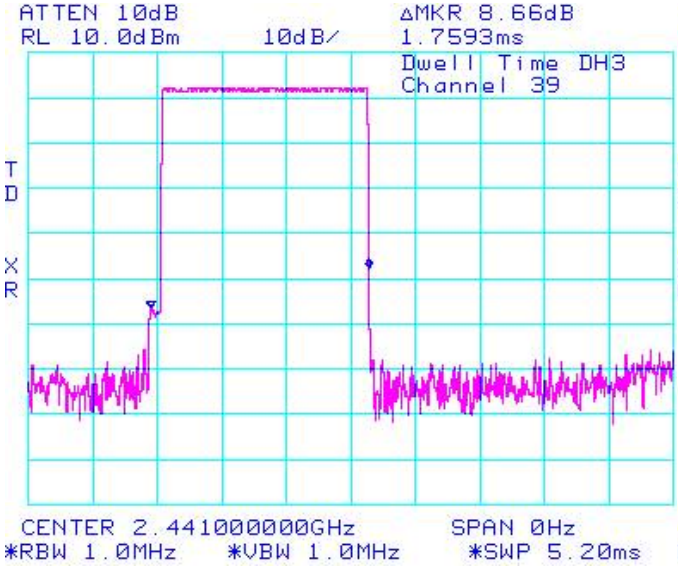


Figure 3-18 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

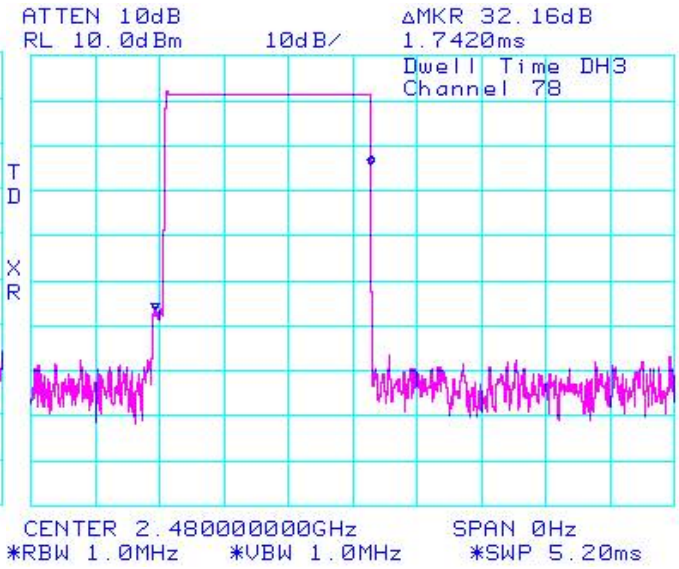


Figure 3-19: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5

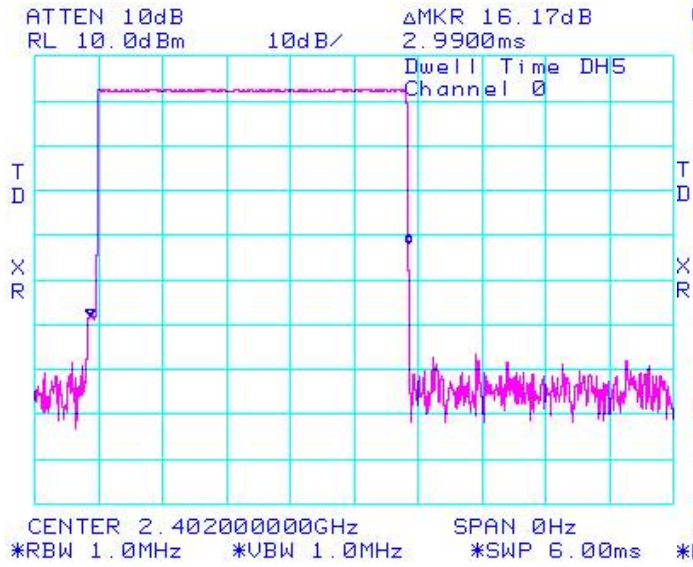
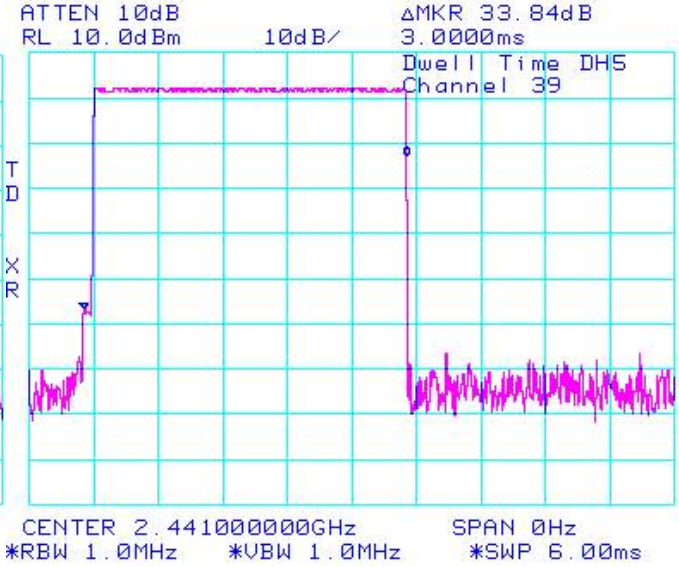
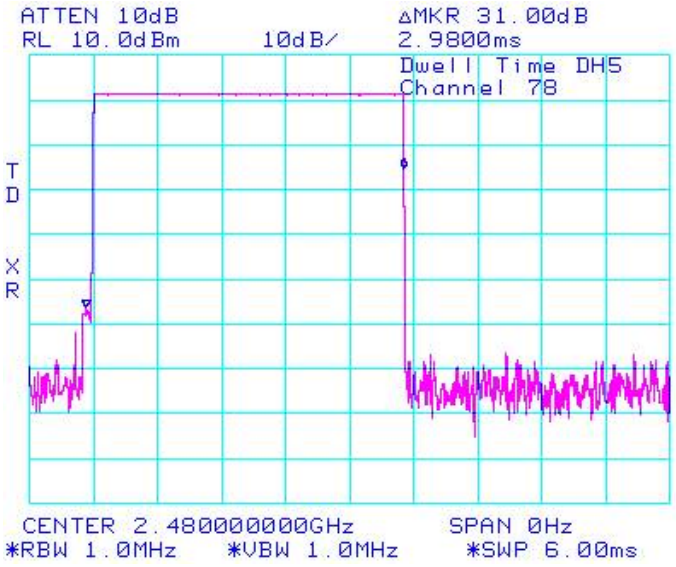


Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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



Maximum Peak Conducted Output Power

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

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

Bluetooth Channel	Measured Level (dBm)	Class 2 Limit (dBm)
0	2.67	-6.0 to 4.0
39	2.17	-6.0 to 4.0
78	1.83	-6.0 to 4.0

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	38%

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

Bluetooth RF Conducted Emission Test Results cont'd

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

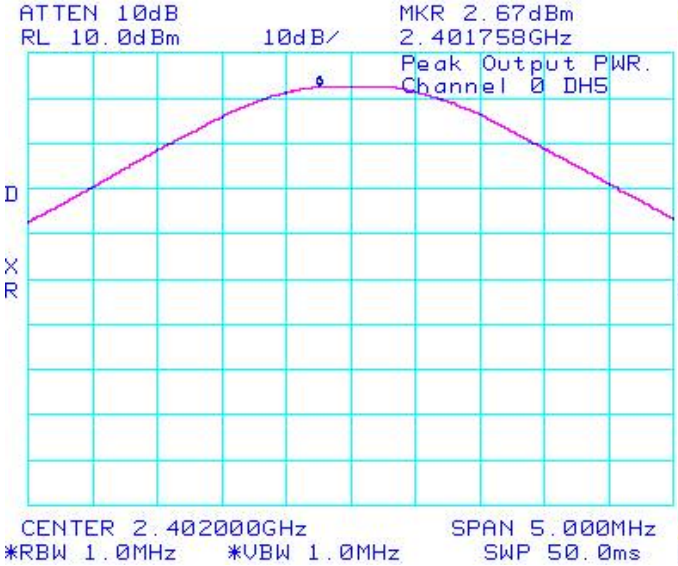


Figure 3-23: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5

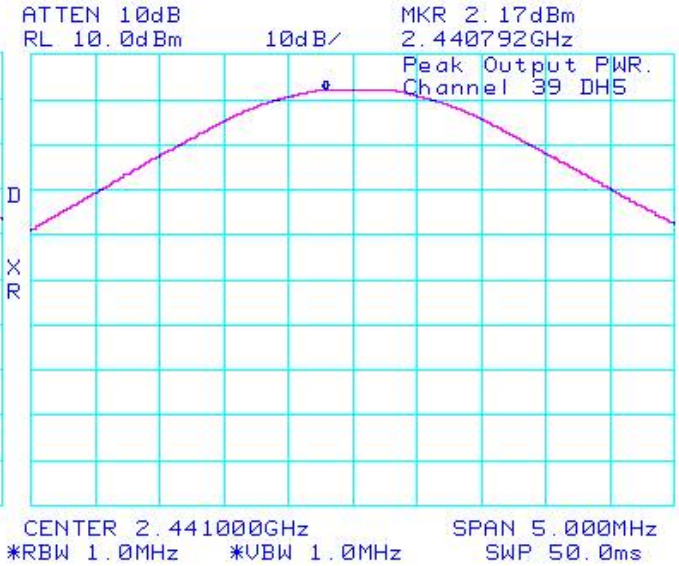
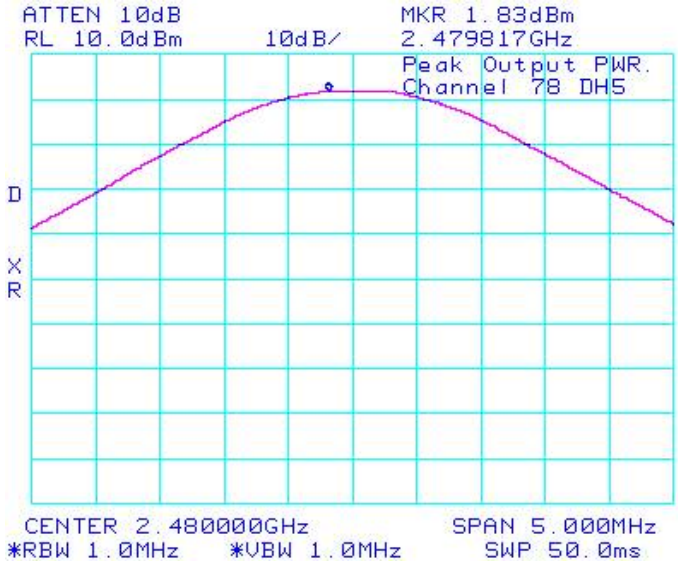


Figure 3-24: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

Bluetooth Channel	Measured Level (dBm)	Class 2 Limit (dBm)
0	1.67	-6.0 to 4.0
39	0.83	-6.0 to 4.0
78	0.17	-6.0 to 4.0

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	38%

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

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

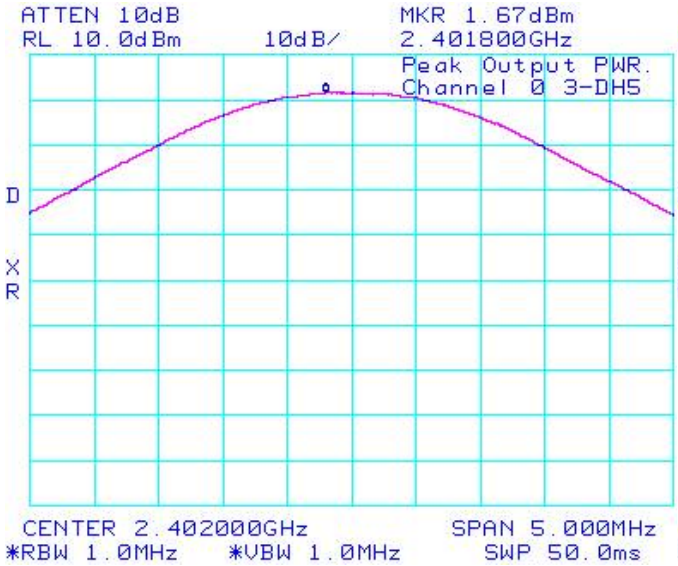
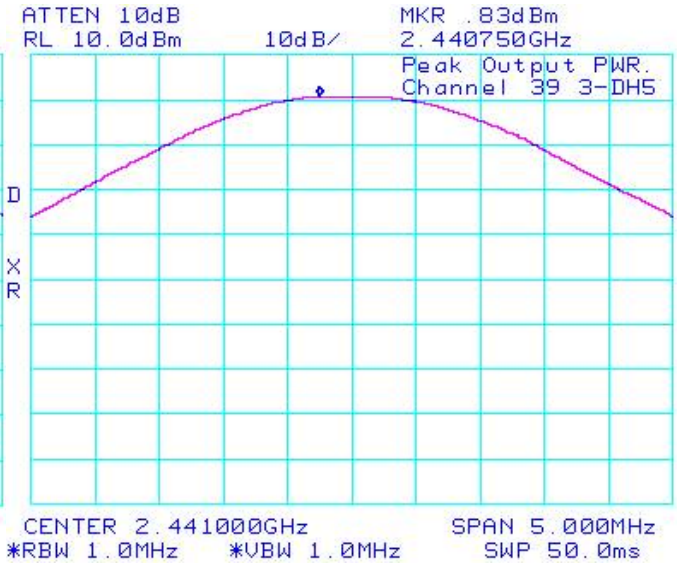
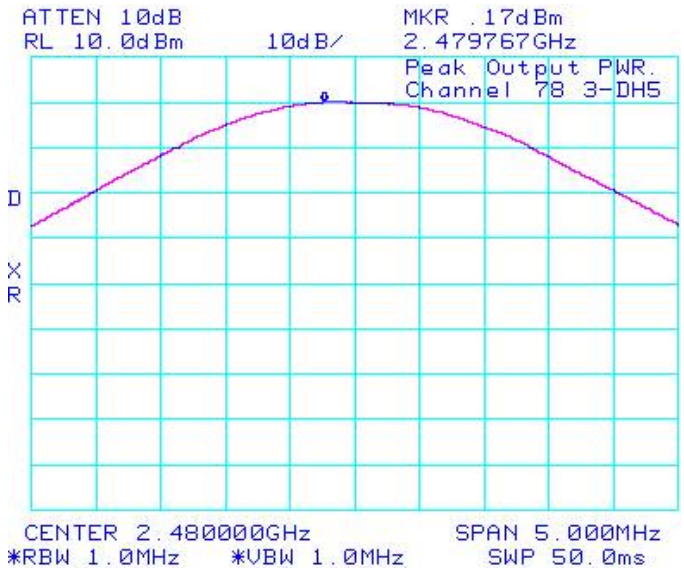


Figure 3-26: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

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



Band Edge Compliance

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

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

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-32.33	-20	-12.33
78	Single Frequency	-34.66	-20	-14.66
0 - 78	Hopping	-35.66	-20	-15.66
0 - 78	Hopping	-33.50	-20	-13.50

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	38%

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

Bluetooth RF Conducted Emission Test Results cont'd

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

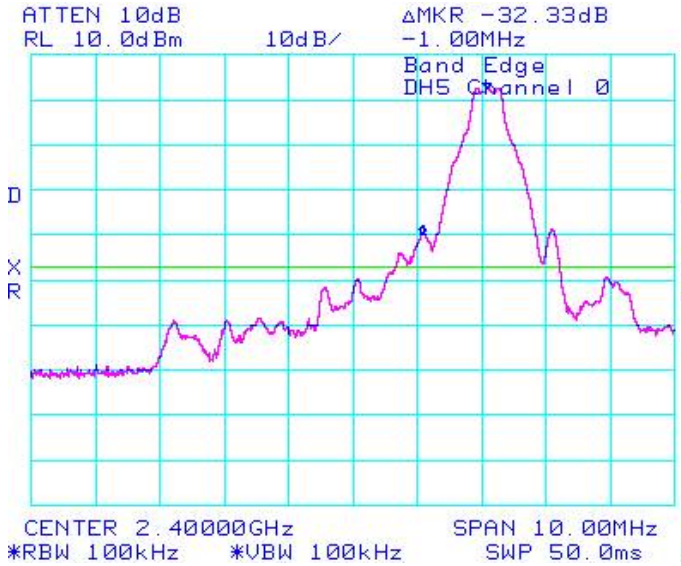


Figure 3-29: Band Edge Compliance
Single Freq., Static PBRS, DH5

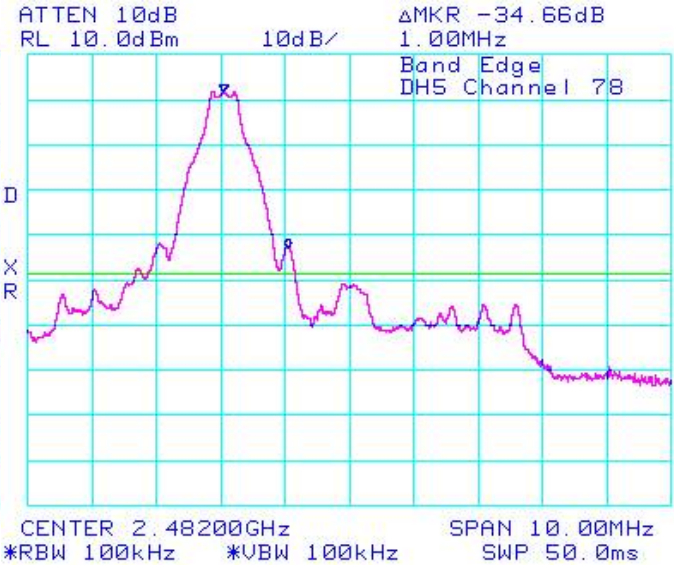


Figure 3-30: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5

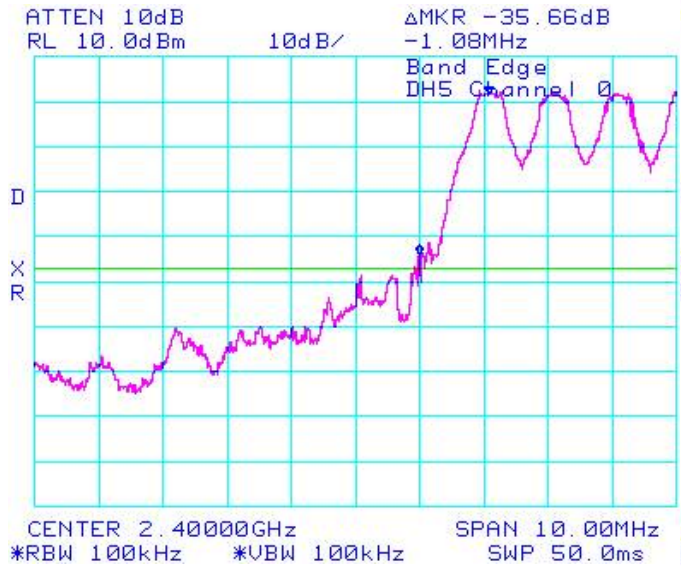
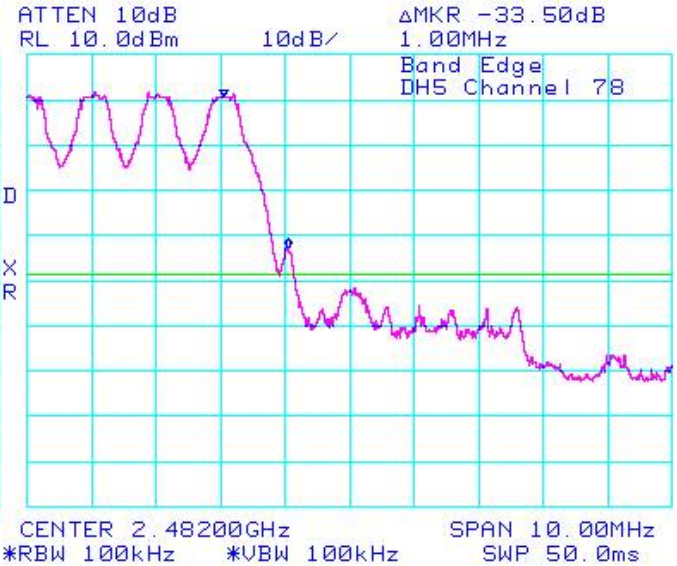


Figure 3-31: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-32.83	-20	-12.83
78	Single Frequency	-31.33	-20	-11.33
0 - 78	Hopping	-32.34	-20	-12.34
0 - 78	Hopping	-32.17	-20	-12.17

The environmental test conditions were:

Temperature	22ºC
Pressure	1005 mb
Relative Humidity	38%

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

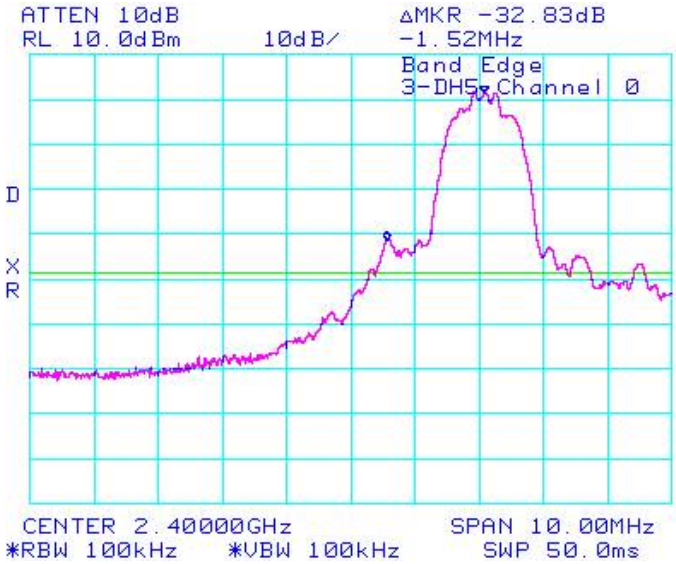


Figure 3-33: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5

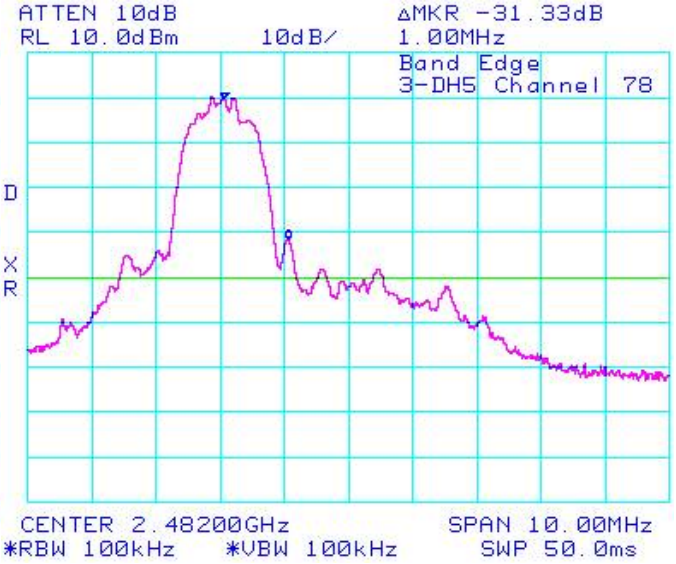


Figure 3-34: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

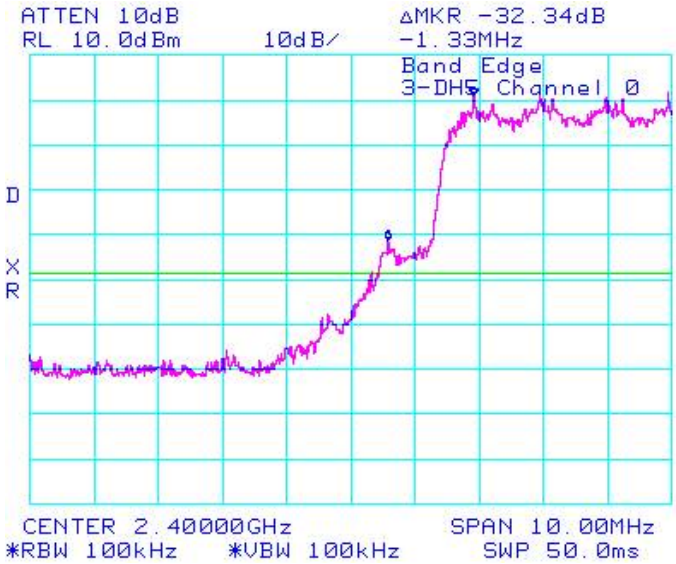


Figure 3-35: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

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	2.67	-41.83	-44.50	-20
39	2.17	-52.00	-54.17	-20
78	1.83	-55.33	-57.16	-20
Hopping mode	1.83	-49.17	-51.00	-20

The environmental test conditions were:

Temperature	23ºC
Pressure	1006 mb
Relative Humidity	37%

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,

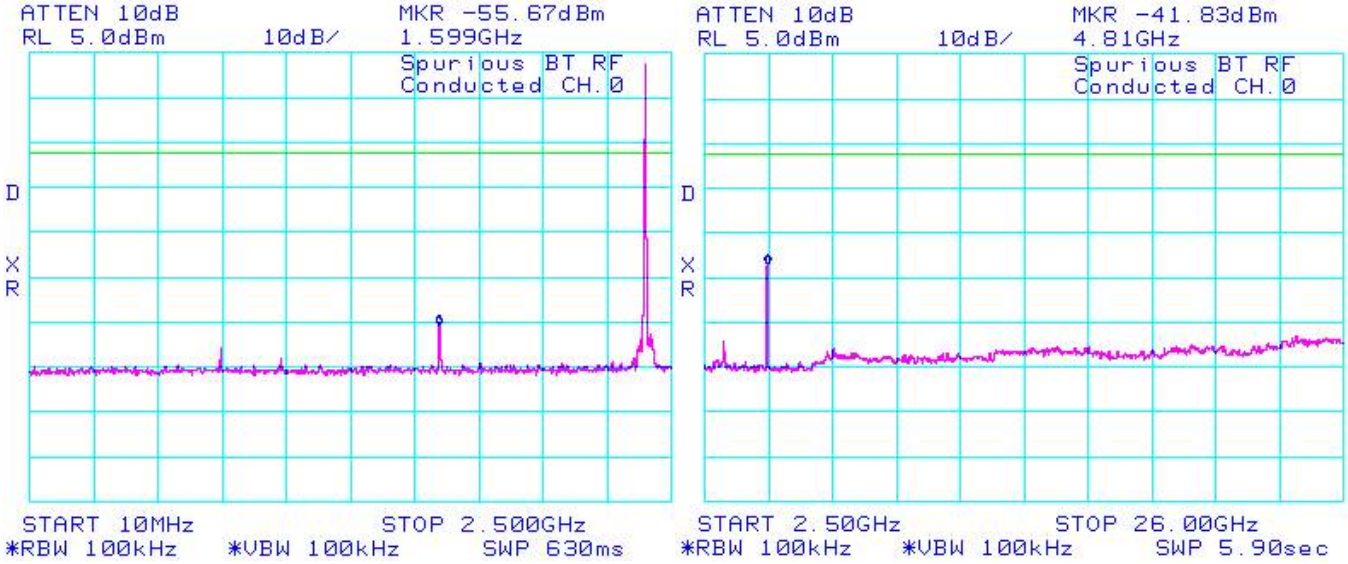
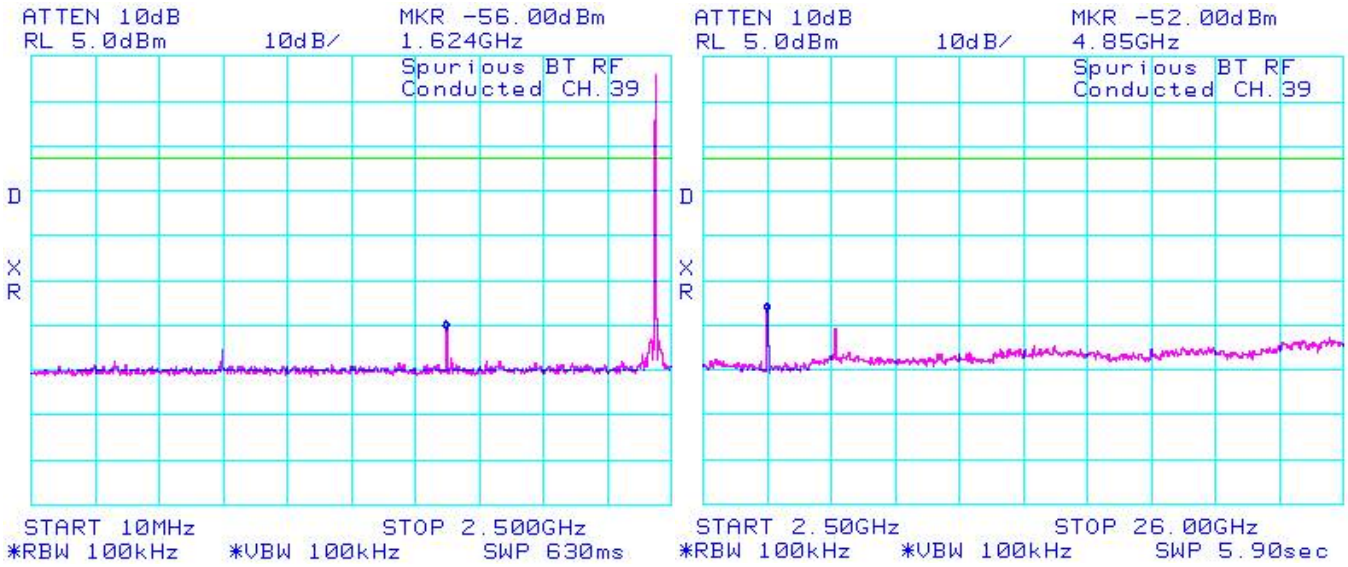


Figure 2-37: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

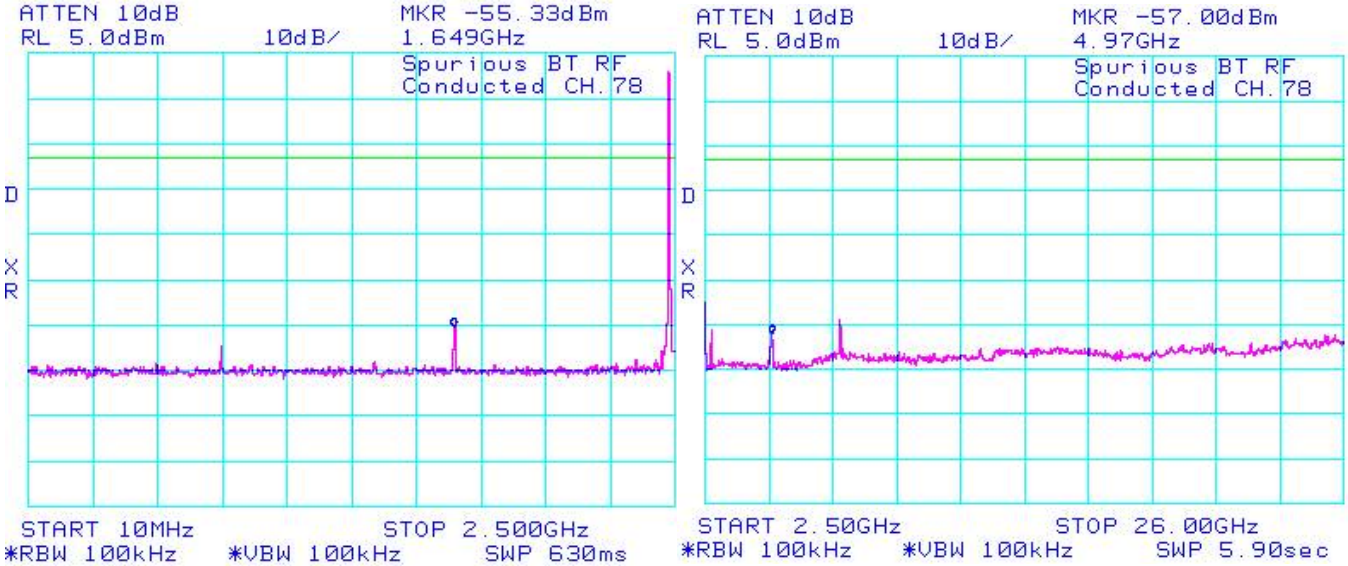
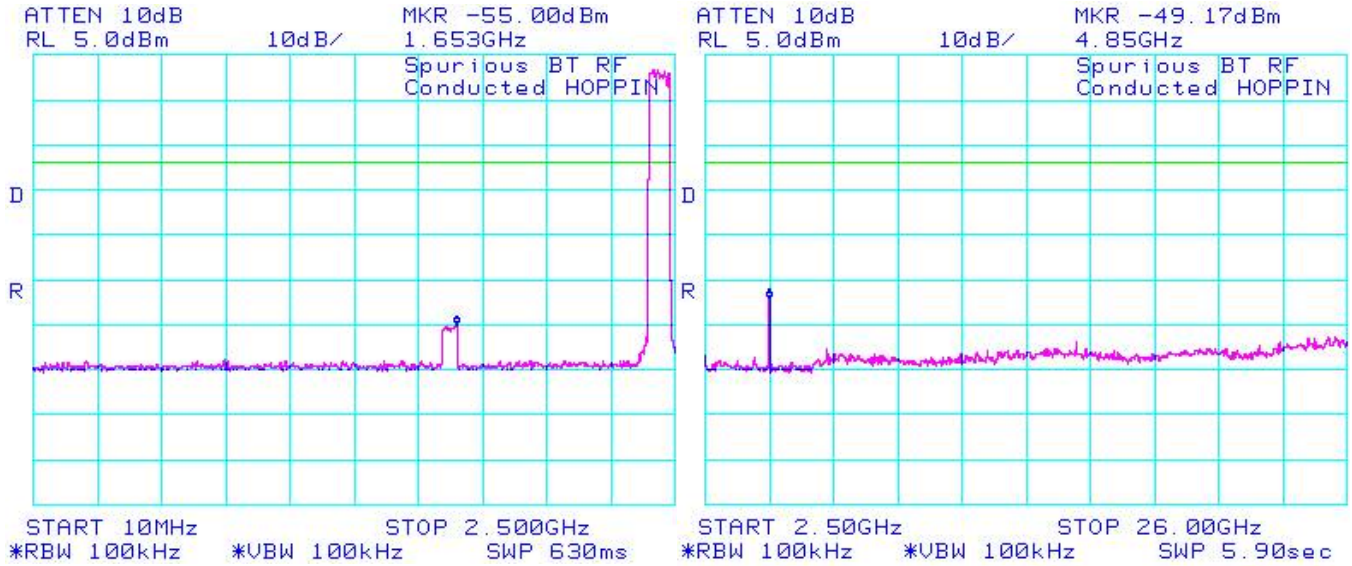


Figure 2-39: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, DH5



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	1.67	-55.83	-57.50	-20
39	0.83	-53.67	-54.50	-20
78	0.17	-55.17	-55.34	-20
Hopping mode	0.17	-55.33	-55.50	-20

The environmental test conditions were: Temperature 23ºC
Pressure 1006 mb
Relative Humidity 37%

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

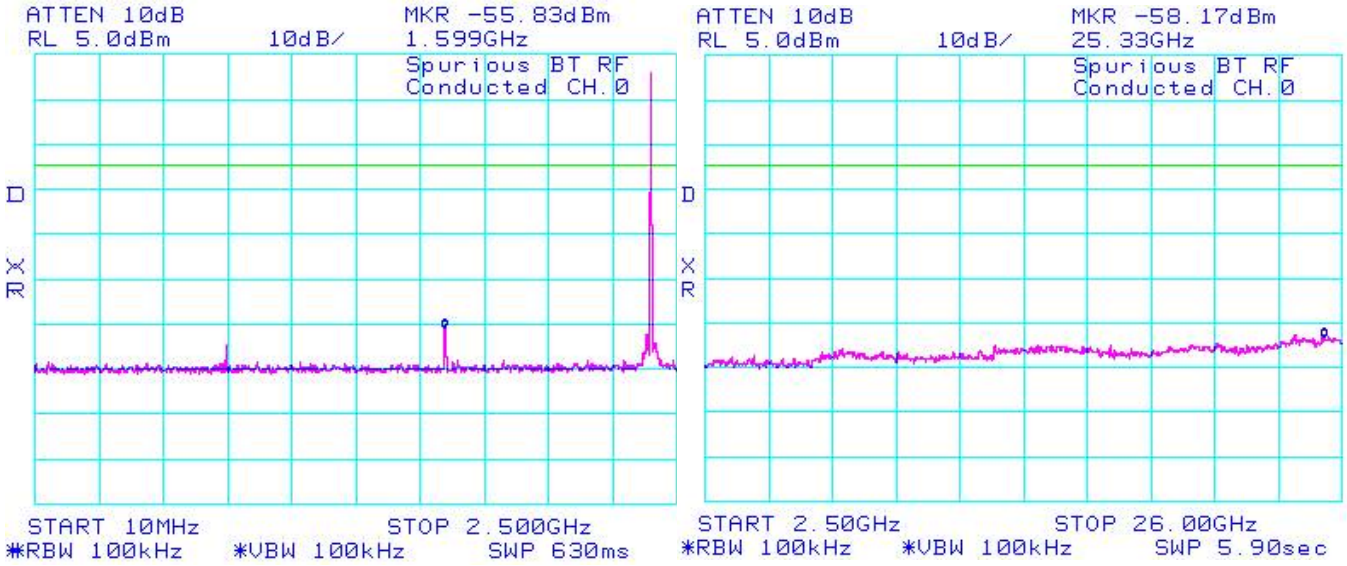
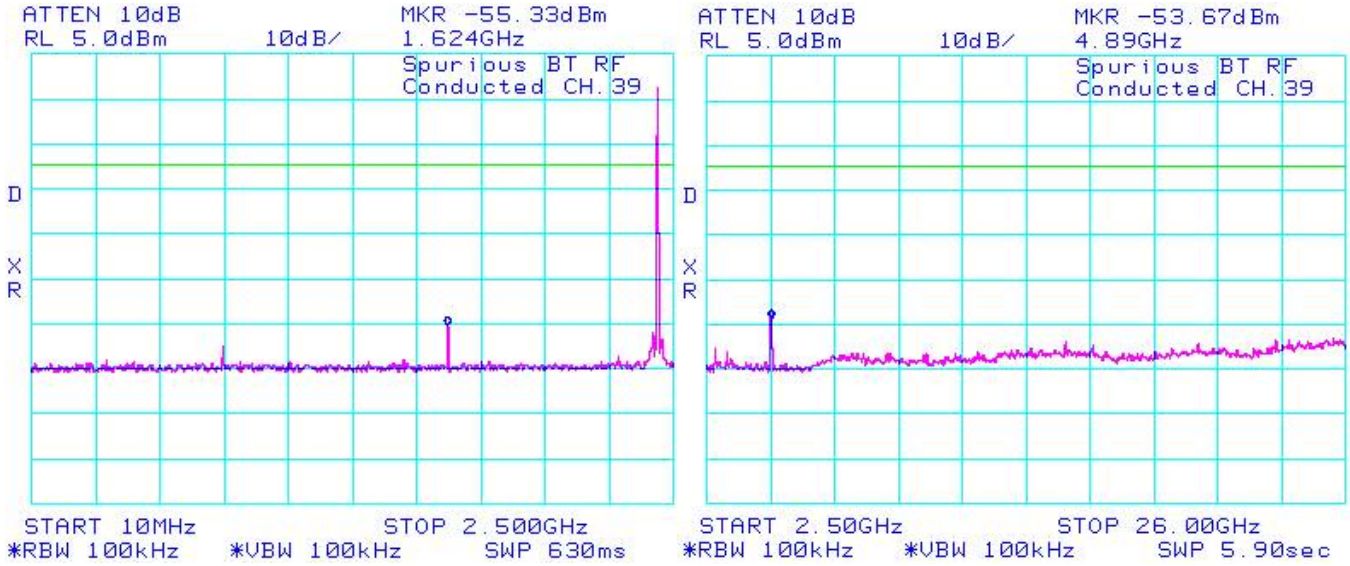


Figure 3-41: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

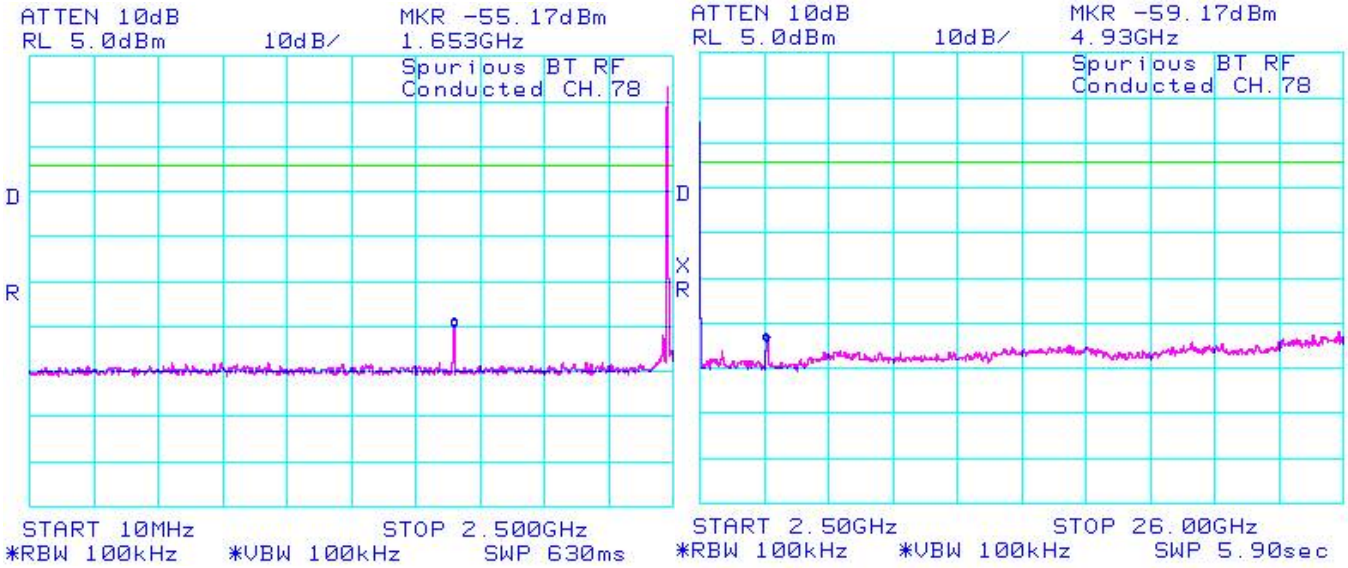
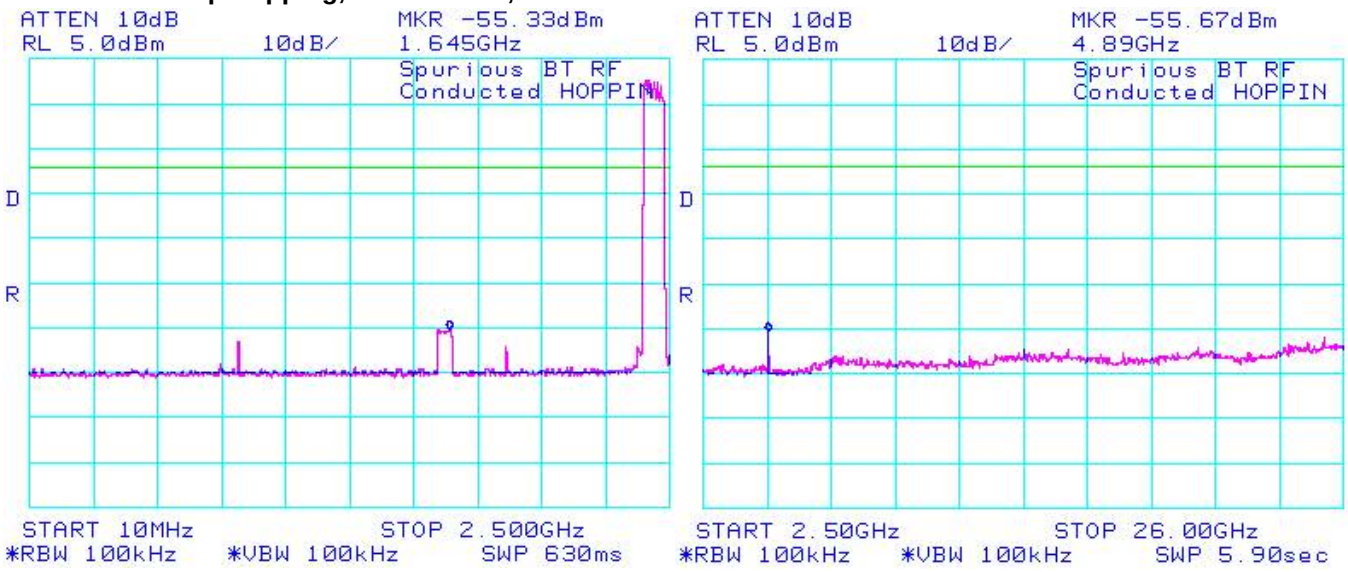


Figure 3-43 : Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 3-DH5



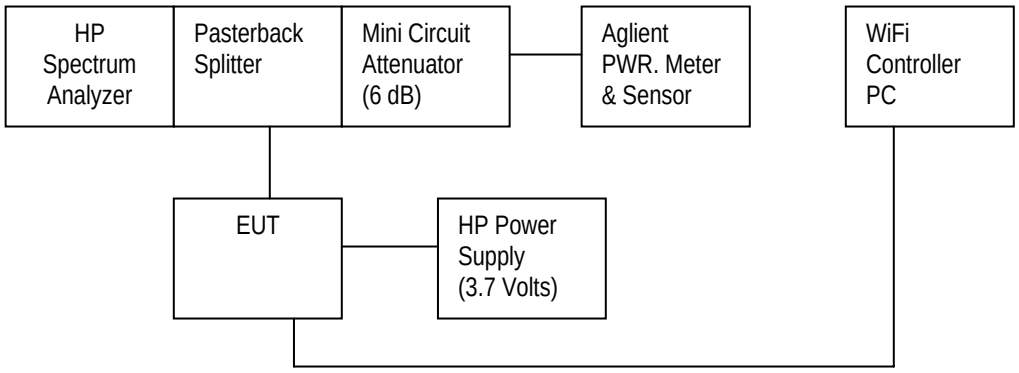
APPENDIX 4 – 802.11b/g CONDUCTED EMISSIONS TEST DATA/PLOTS

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	17.5
		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 6.4 dB was applied to the Power Meter reference level for the attenuators and coaxial cable loss in the test circuit.

Date of test: July 03, 2008
The measurements on BlackBerry® smartphone PIN 20746434 were performed by Maurice Battler.

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	10.50
	11 Mbps	≥ 500	10.27
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.67
6	1 Mbps	≥ 500	10.23
	5.5 Mbps	≥ 500	10.33
	11 Mbps	≥ 500	10.43
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.67
11	1 Mbps	≥ 500	10.23
	5.5 Mbps	≥ 500	10.57
	11 Mbps	≥ 500	10.27
	6 Mbps	≥ 500	16.53
	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.

The environmental test conditions were:

Temperature	23ºC
Pressure	1010 mb
Relative Humidity	35%

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

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

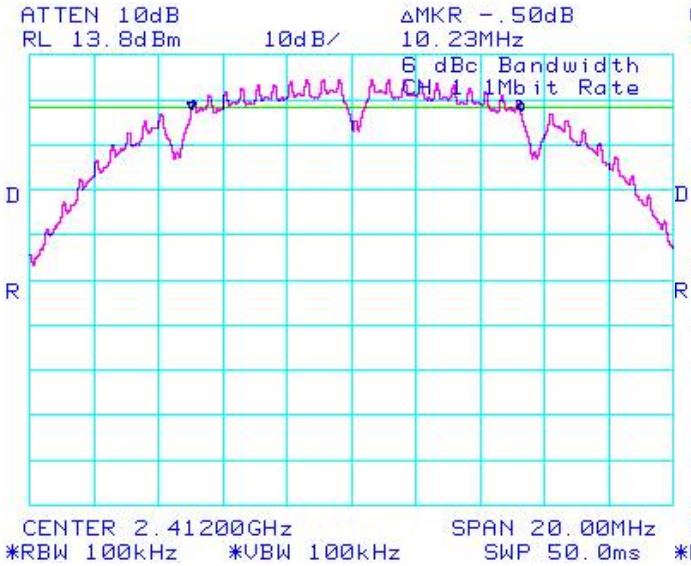


Figure 4-2: 6 dB Bandwidth
802.11b, Channel 6, 1 Mbps

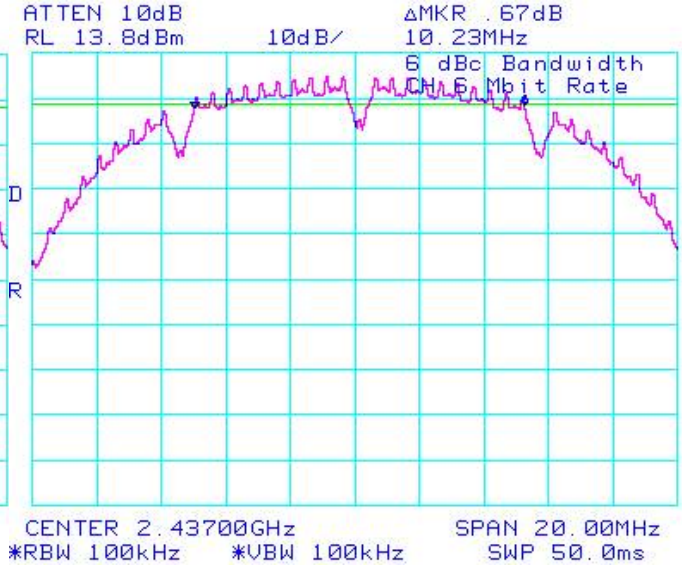
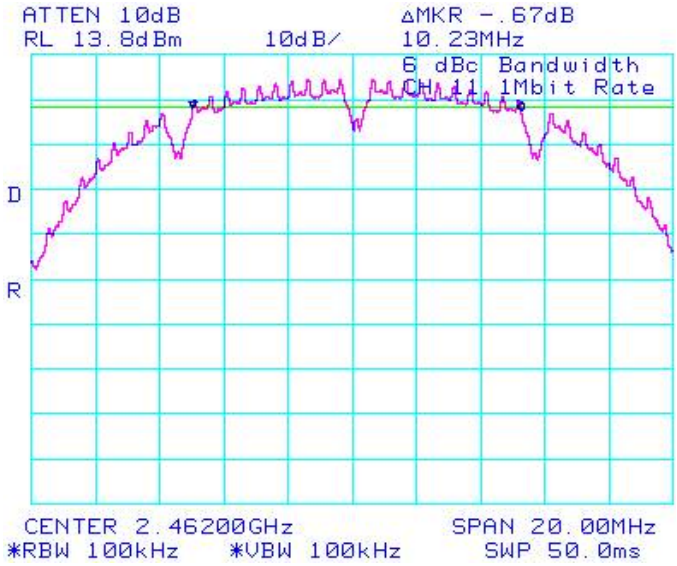


Figure 4-3: 6 dB Bandwidth
802.11b, Channel 11, 1 Mbps



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

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

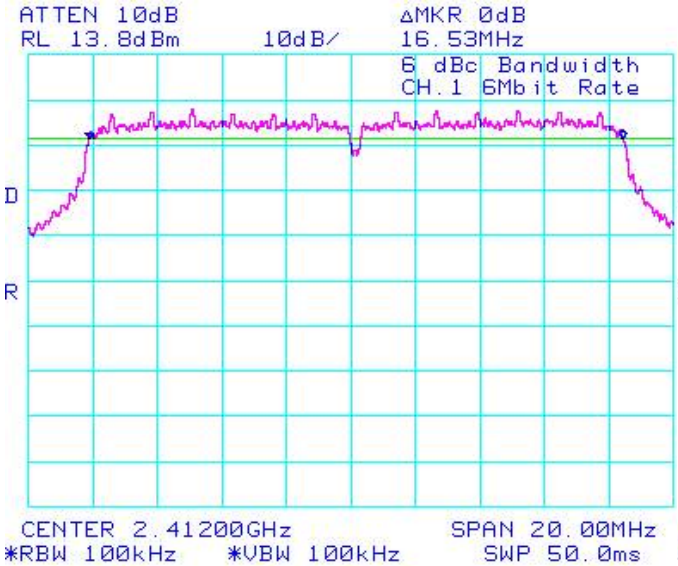


Figure 4-5: 6 dB Bandwidth
802.11g, Channel 6, 6 Mbps

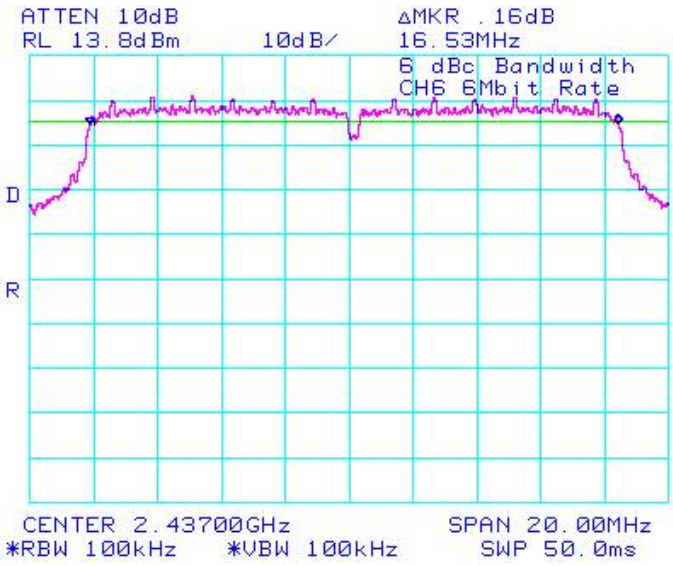
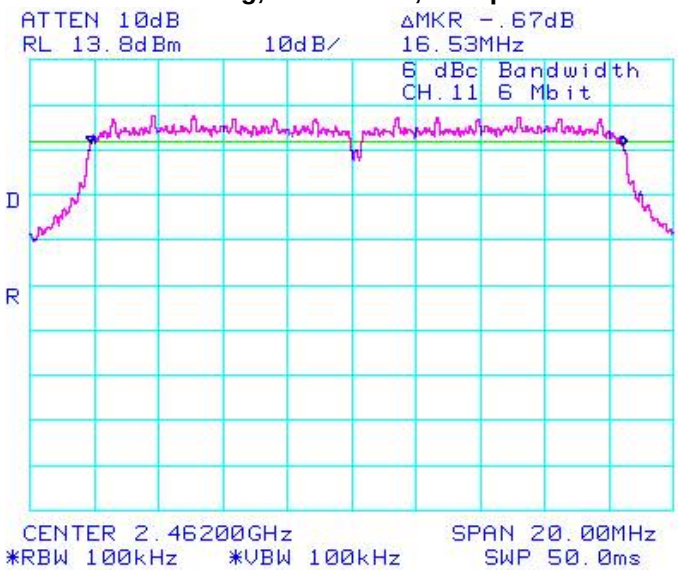


Figure 4-6: 6 dB Bandwidth
802.11g, Channel 11, 6 Mbps



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	17.14	51.76
	5.5 Mbps	< 1.00	17.15	51.88
	11 Mbps	< 1.00	17.15	51.88
	6 Mbps	< 1.00	13.16	20.70
	24 Mbps	< 1.00	13.08	20.32
	54 Mbps	< 1.00	12.32	17.06
6	1 Mbps	< 1.00	17.45	55.59
	5.5 Mbps	< 1.00	17.57	57.15
	11 Mbps	< 1.00	17.45	55.59
	6 Mbps	< 1.00	16.34	43.05
	24 Mbps	< 1.00	13.82	24.10
	54 Mbps	< 1.00	12.45	17.58
11	1 Mbps	< 1.00	17.45	55.59
	5.5 Mbps	< 1.00	17.47	55.85
	11 Mbps	< 1.00	17.48	55.98
	6 Mbps	< 1.00	13.29	21.33
	24 Mbps	< 1.00	13.37	21.73
	54 Mbps	< 1.00	12.56	18.03

The environmental test conditions were:

Temperature	24ºC
Pressure	1000 mb
Relative Humidity	24%

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	-40.17	-20.17
	5.5 Mbps	< -20	-43.84	-23.84
	11 Mbps	< -20	-42.67	-22.67
	6 Mbps	< -20	-30.17	-10.17
	24 Mbps	< -20	-29.67	-9.67
	54 Mbps	< -20	-30.50	-10.50
11	1 Mbps	< -20	-48.16	-28.16
	5.5 Mbps	< -20	-51.33	-31.33
	11 Mbps	< -20	-50.83	-30.83
	6 Mbps	< -20	-43.67	-23.67
	24 Mbps	< -20	-42.50	-22.50
	54 Mbps	< -20	-42.50	-22.50

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.

The environmental test conditions were:

Temperature	24ºC
Pressure	1012 mb
Relative Humidity	31%

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

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

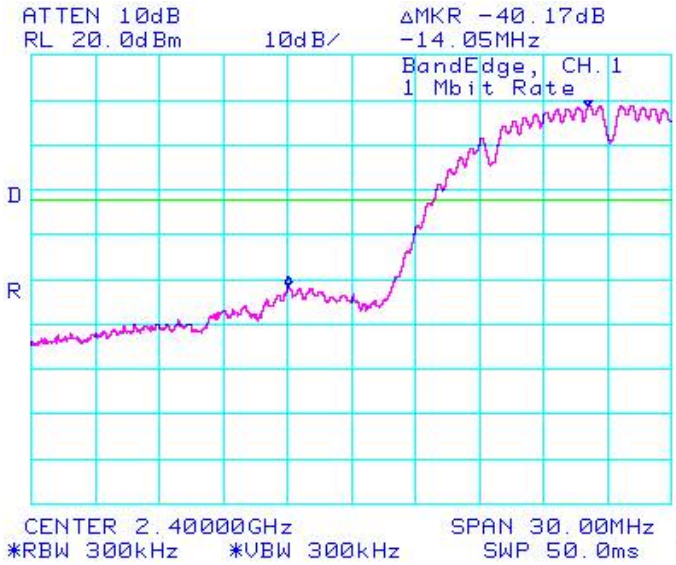


Figure 4-8: Band Edge Compliance 802.11b, Channel 11, 1 Mbps

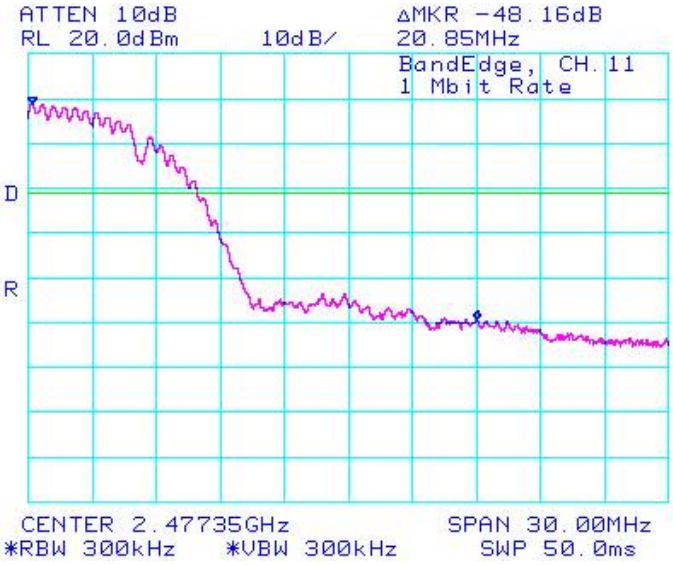


Figure 4-9: Band Edge Compliance 802.11g, Channel 1, 6 Mbps

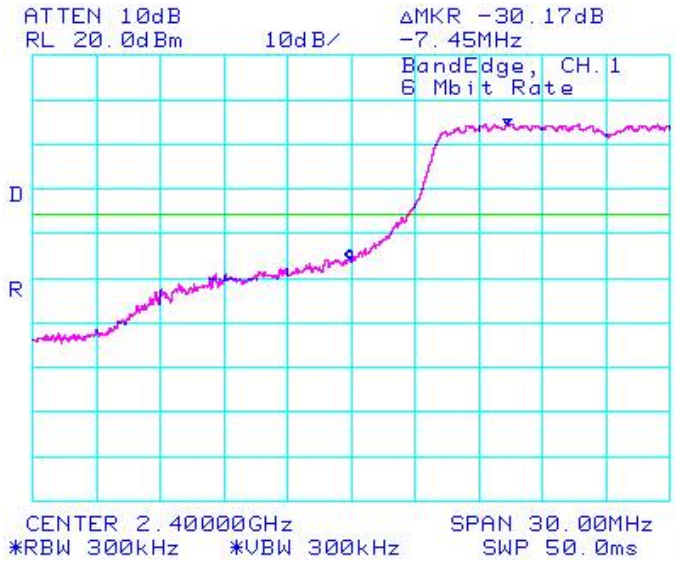
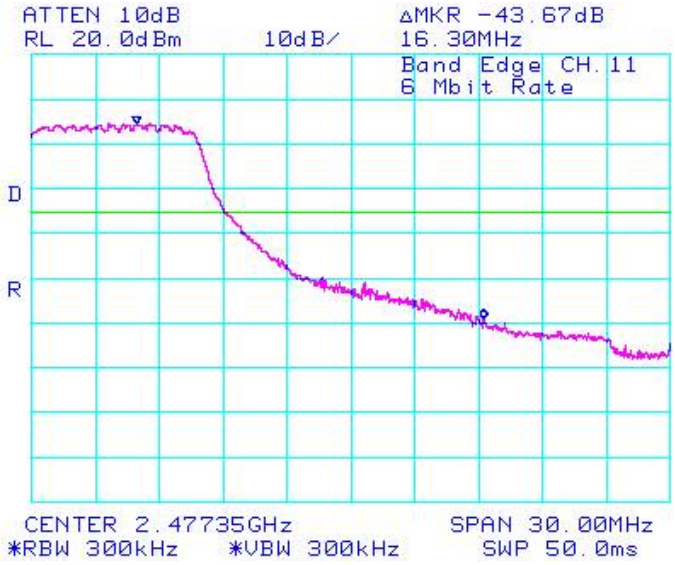


Figure 4-10: Band Edge Compliance 802.11g, Channel 11, 6 Mbps



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	-5.00	-13.00
	5.5 Mbps	< 8.00	-6.50	-14.50
	11 Mbps	< 8.00	-6.50	-14.50
	6 Mbps	< 8.00	-11.33	-19.33
	24 Mbps	< 8.00	-10.00	-18.00
	54 Mbps	< 8.00	-12.00	-20.00
6	1 Mbps	< 8.00	-4.83	-12.83
	5.5 Mbps	< 8.00	-6.33	-14.33
	11 Mbps	< 8.00	-6.33	-14.33
	6 Mbps	< 8.00	-8.33	-16.33
	24 Mbps	< 8.00	-9.83	-17.83
	54 Mbps	< 8.00	-11.83	-19.83
11	1 Mbps	< 8.00	-5.17	-13.17
	5.5 Mbps	< 8.00	-6.50	-14.50
	11 Mbps	< 8.00	-6.67	-14.67
	6 Mbps	< 8.00	-11.67	-19.67
	24 Mbps	< 8.00	-10.50	-18.50
	54 Mbps	< 8.00	-12.17	-20.17

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.

The environmental test conditions were:

Temperature	24ºC
Pressure	1017 mb
Relative Humidity	31%

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

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

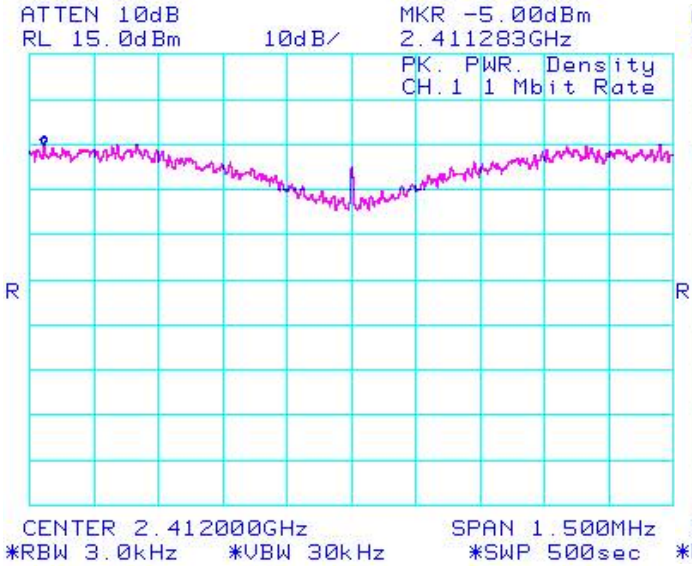


Figure 4-12: Peak Power Spectral Density
802.11b, Channel 6, 1 Mbps

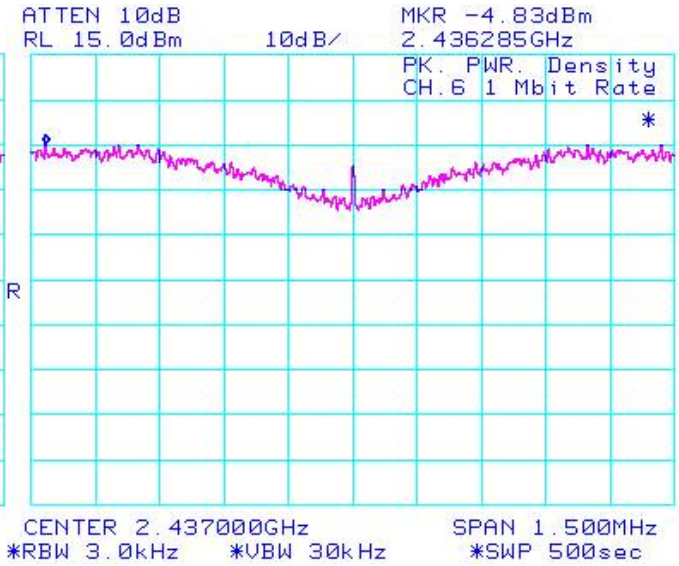
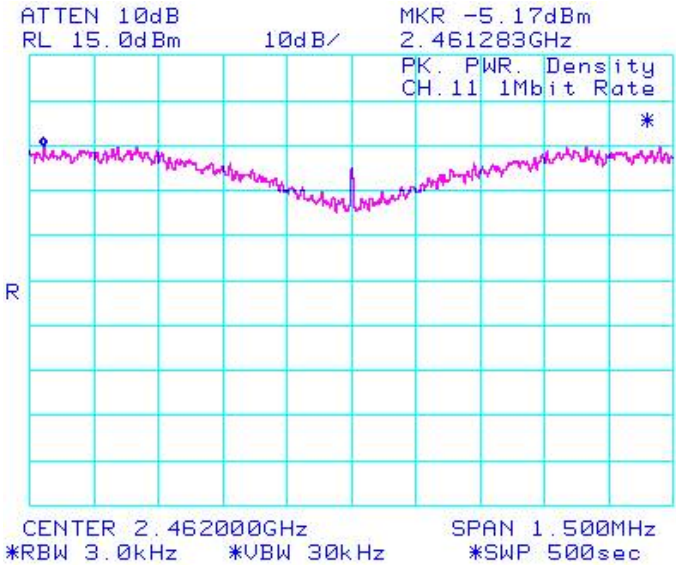


Figure 4-13: Peak Power Spectral Density
802.11b, Channel 11, 1 Mbps



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

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

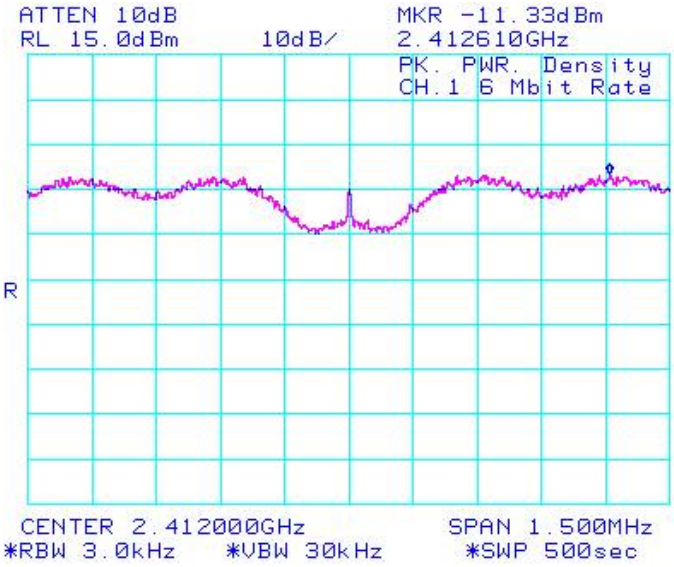


Figure 4-15: Peak Power Spectral Density 802.11g, Channel 6, 6 Mbps

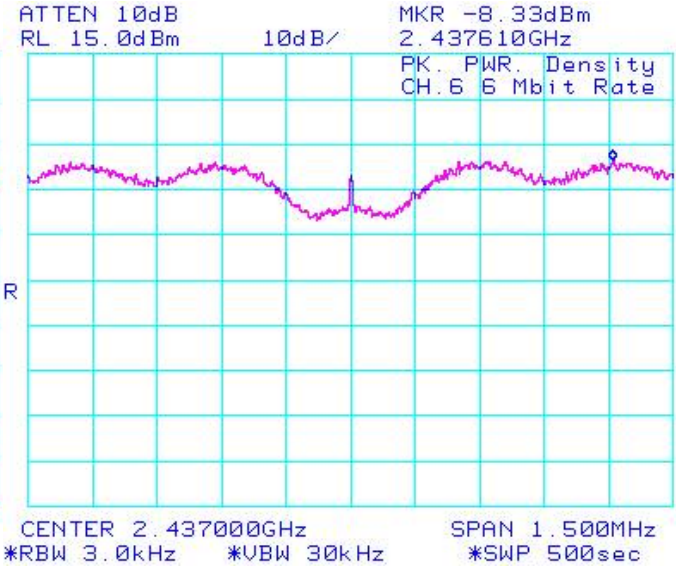
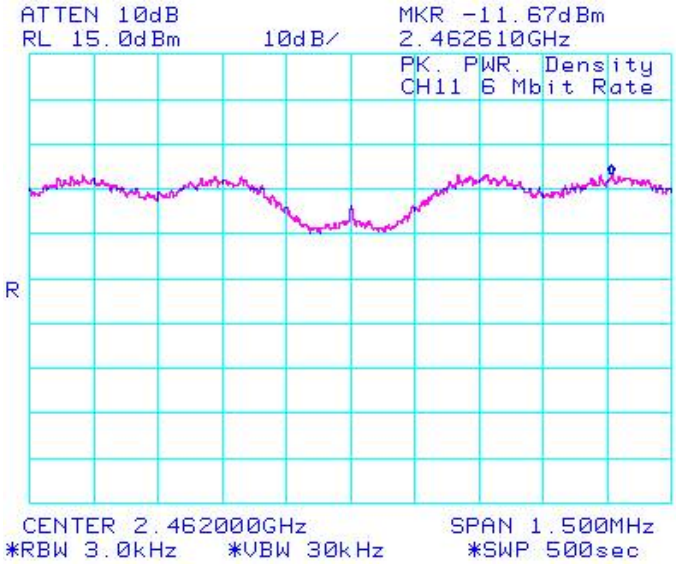


Figure 4-16: Peak Power Spectral Density 802.11g, Channel 11, 6 Mbps



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 from the spectrum analyzer. A reference offset of 18.4 dB was applied to the spectrum analyzer reference level for the attenuators and coaxial cable loss in the test circuit.

Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
1	1 Mbps	17.14	-52.3	-69.44	-20
	5.5 Mbps	17.15	-49.6	-66.75	-20
	11 Mbps	17.15	-48.4	-65.55	-20
	6 Mbps	13.16	-54.2	-67.36	-20
	24 Mbps	13.08	-53.6	-66.68	-20
	54 Mbps	12.32	-54.6	-66.92	-20
6	1 Mbps	17.45	-52.1	-69.55	-20
	5.5 Mbps	17.57	-50.0	-67.57	-20
	11 Mbps	17.45	-48.9	-66.35	-20
	6 Mbps	16.34	-51.6	-67.94	-20
	24 Mbps	13.82	-53.6	-67.42	-20
	54 Mbps	12.45	-55.1	-67.55	-20
11	1 Mbps	17.45	-52.9	-70.35	-20
	5.5 Mbps	17.47	-50.2	-67.67	-20
	11 Mbps	17.48	-49.0	-66.48	-20
	6 Mbps	13.29	-51.6	-64.89	-20
	24 Mbps	13.37	-53.6	-66.97	-20
	54 Mbps	12.56	-55.1	-67.66	-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.

The environmental test conditions were:

Temperature	24ºC
Pressure	1017 mb
Relative Humidity	30%

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

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

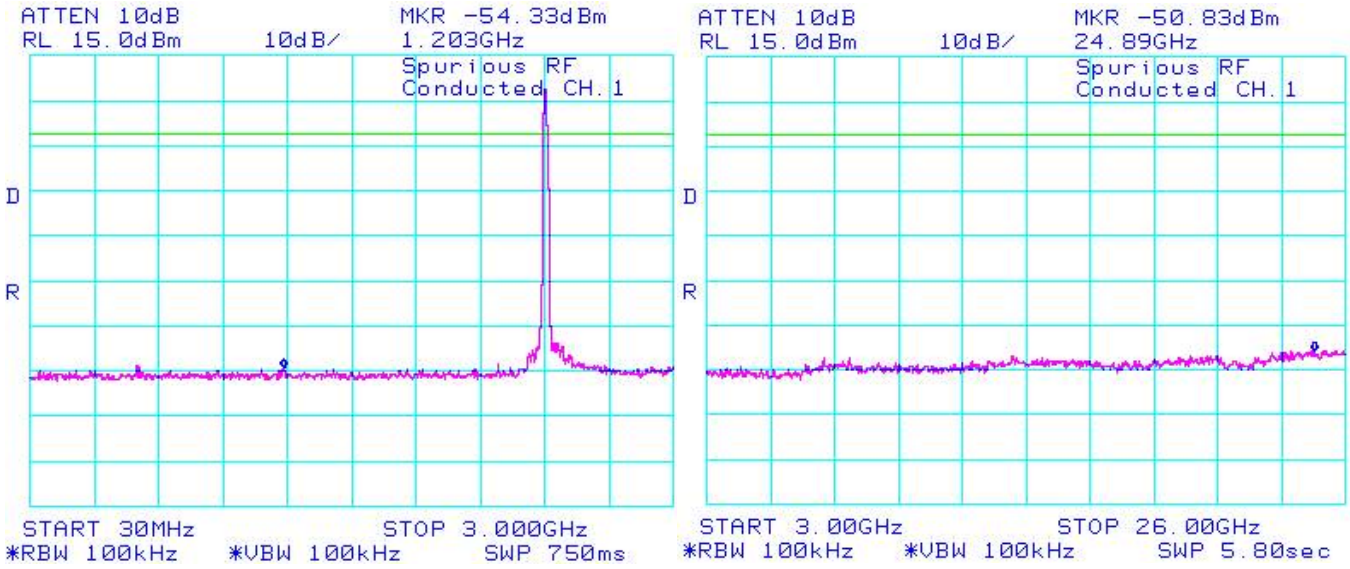
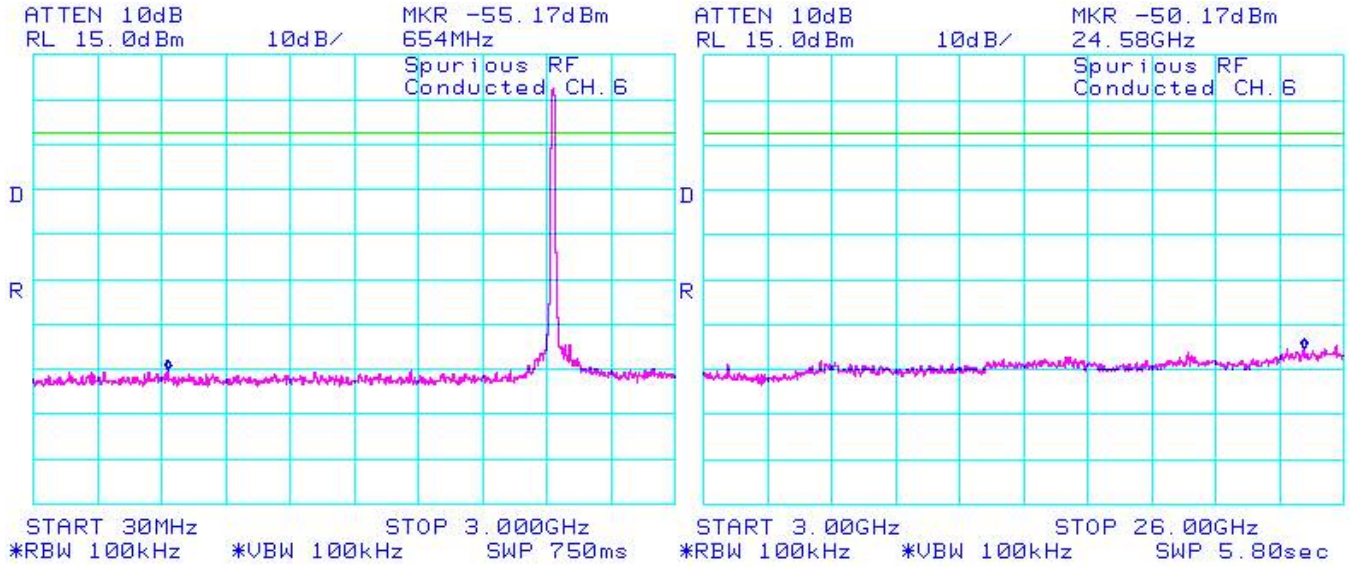


Figure 4-18 : Spurious Conducted RF Emissions
802.11b, Channel 6, 1 Mbps



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

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

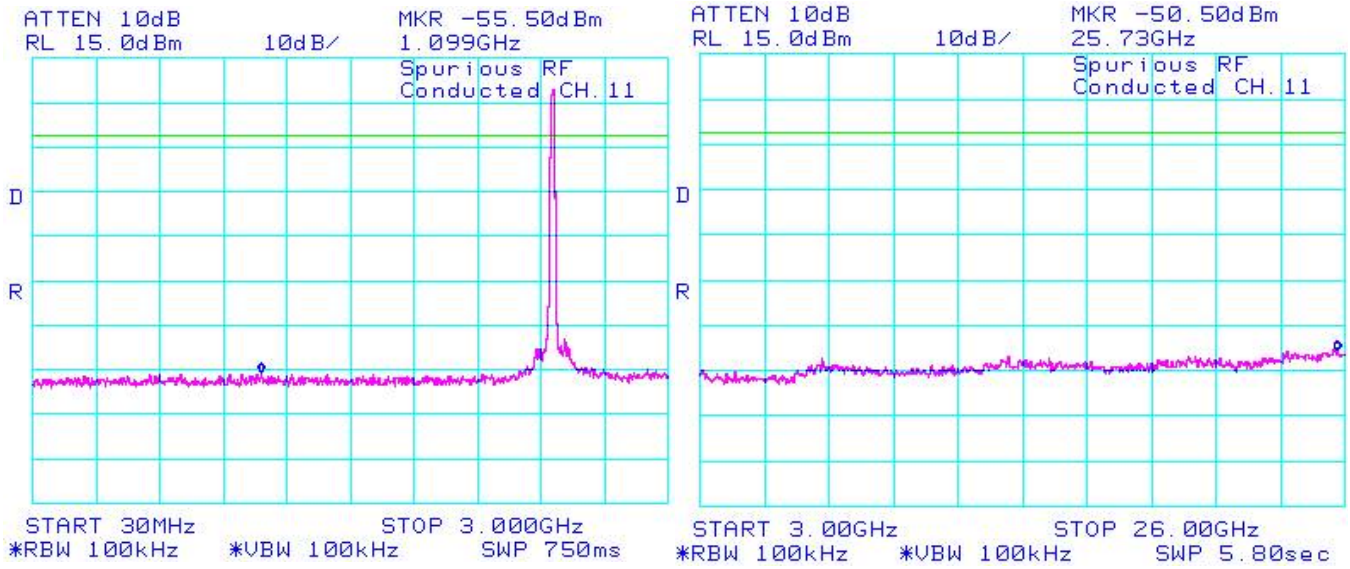
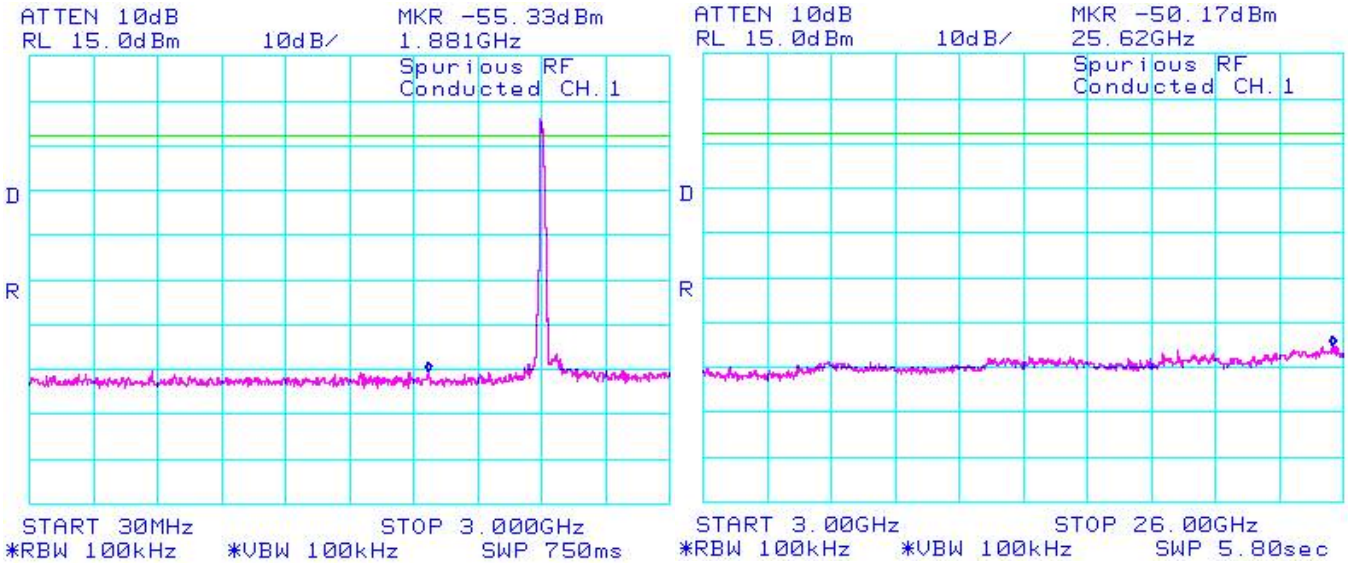


Figure 4-20: Spurious Conducted RF Emissions
802.11g, Channel 1, 6 Mbps



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

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

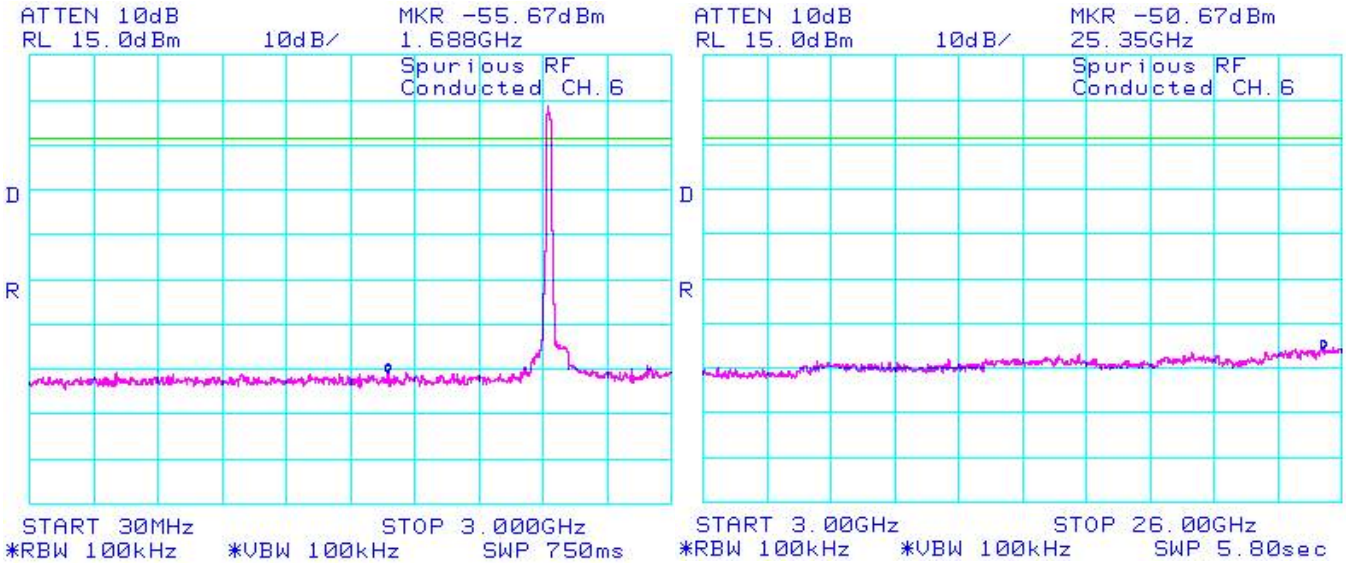


Figure 4-22: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps