EMI Test Report

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

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO.: RTS-0510-0706-14

PRODUCT MODEL NO.: RBJ41GW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARBJ40GW
IC: 2503A-RBJ40GW

DATE: 27 June 2007

Statement of Performance:

The BlackBerry® smartphone, model RBJ41GW, part number CER-15665-001 Rev 3 and accessories when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

Declaration:

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

Tested and documented by:

Caitlin O'Neill
Compliance Specialist
Date: 27 Jun 2007

Reviewed by:

Maurice Battler
Compliance Specialist
Date: 28 Jun 2007

Tested and reviewed by:

Masud S. Attayi, P.Eng.
Team Lead, Regulatory Compliance
Date: 29 Jun 2007

Approved by:

Paul G. Cardinal, Ph.D.
Director
Date: 29 Jun 2007

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A. Scope

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

- FCC CFR 47 Part 15, Subpart C, Aug. 14, 2006
- Industry Canada, RSS-210, Issue 7, June 2007, Low Power Licence-Exempt Radiocommunication Devices
- Industry Canada, RSS-GEN, Issue 2, June 2007 General Requirements and Information for the Certification of Radiocommunication Equipment

B. Associated Document

1. Document number RTS-0510-RBJ41GW-03

C. Product Identification

Manufactured by Research In Motion Limited located at:

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

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

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

The testing was performed May 25 to June 15, 2007.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RBJ41GW	CER-15665-001 Rev. 2	205E51F4
2	RBJ41GW	CER-15665-001 Rev. 3	205C6EEA
3	RBJ41GW	CER-15665-001 Rev. 3	205E3FC5

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

To view the differences between CER-15665-001 Rev 2 to CER-15665-001 Rev 3, see document number RTS-0510-RBJ41GW-03.

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

BlackBerry Wireless Handheld Accessories Tested

1) Folding Blade Charger, part number ASY-07040-001 with an output voltage of 5.0 volts dc, 0.75 amps and attached USB cable with a lead length of 1.80 metres.
2) BlackBerry® Power Station, part number HDW-12736-001 Rev. 1 with an output voltage of 5.0 volts dc, 0.5 amps and attached USB cable with a lead length of 1.60 metres.
3) BlackBerry® Power Station, part number HDW-12736-001 Rev. 2 with an output voltage of 5.0 volts dc, 0.5 amps and attached USB cable with a lead length of 1.60 metres.
4) Stereo Headset, part number HDW-13019-001, 1.50 metres long
5) Mono Headset, part number HDW-12420-001, 1.25 metres long.
6) TTY adapter, part number HDW-12420-001.
7) Bluetooth Headset including Charging Pocket, part number ASY-12747-001
8) USB data cable, part number HDW-06610-001, 1.45 metres long

D. Support Equipment Used for the Testing of the EUT

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

E. Test Voltage

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

F. Test Results Chart

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

G. Modifications to EUT

No modifications were required on the EUT.

H. Summary of Results

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
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	20 dB Bandwidth	Pass	3
Part 15.247(a)	RSS-210	Carrier Frequency Separation	Pass	3
Part 15.247(a)	RSS-210	Number of Hopping Frequencies	Pass	3
Part 15.247(a)	RSS-210	Time of Occupancy (Dwell Time)	Pass	3
Part 15.247(b)	RSS-210	Maximum Peak Conducted Output Power	Pass	3
Part 15.247(c)	RSS-210	Band-Edge Compliance of RF Conducted Emissions	Pass	3
Part 15.247(c)	RSS-210	Spurious RF Conducted Emissions	Pass	3

1) AC LINE CONDUCTED EMISSIONS

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

The following test configurations were measured. The input voltage was 120 V, 60 Hz for modes 2, 4 and 230 V, 50 Hz for modes 1, 3:

1. The BlackBerry® smartphone PIN 205E51F4 in Bluetooth transmit mode and battery charging mode, was connected to the Folding Blade Charger and the Mono Headset connected through the TTY adapter.

2. The BlackBerry® smartphone PIN 205C6EEA in Bluetooth transmit mode and battery charging mode, was connected to the Folding Blade Charger and the Mono Headset connected through the TTY adapter.
3. The BlackBerry® smartphone PIN 205E51F4 in Bluetooth transmit mode and battery charging mode, was connected to the BlackBerry® Power Station, part number HDW-12736-001 Rev. 1.
4. The BlackBerry® smartphone PIN 205E51F4 in wi-fi 802.11b/g transmit mode and battery charging mode was connected to the BlackBerry® Power Station, part number HDW-12736-001 Rev. 2 and connected to the Stereo Headset. The BlackBerry® Power Station was connected to a Bluetooth Headset in battery charging mode.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C and IC RSS-210 limit. The sample EUT had a worse case test margin of 4.91 dB below the QP limit at 0.918 MHz using the Quasi-peak detector and 20.49 dB below the AV limit at 1.044 MHz using the Average detector for the Folding Blade Charger, test configuration 1.

See APPENDIX 1 for the test data

Measurement Uncertainty ±2.0 dB

2) RADIATED EMISSIONS

a) Radiated Spurious and Harmonic Emissions

The BlackBerry® smartphone PIN 205C6EEA was placed on a nonconductive styrofoam table, 80 cm high that was positioned on a remotely controlled turntable. The test distance used between the EUT and the receiving antenna was three metres. The turntable was rotated to determine the azimuth of the peak emissions. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The maximum emission level was recorded. The frequency range measured was from 30 MHz to 25.0 GHz. Both the horizontal and vertical polarisations of the emissions were measured.

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

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

The BlackBerry® smartphone PIN 205C6EEA was measured in standalone configuration with Bluetooth transmitting in single frequency mode at low channel (0), middle channel (39) and high channel (78) for packet type "DH5" and frequency hopping for packet type "DH5" and EDR mode at middle channel (39) for packet type

"3-DH5". The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart C, 15.247 and RSS-210.

The Bluetooth harmonics were investigated up to the 10th harmonic. All emissions were in the noise floor (NF).

The radiated emissions from the EUT were also measured in standalone configuration transmitting at channels 1 & 11 at 6 Mbps, and channel 6 at 1 Mbps for 802.11bg 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 had a worse case test margin of 19.96 dB at 4874 MHz using the average detector.

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.

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

Measurement Uncertainty ±4.0 dB

3) BLUETOOTH RF CONDUCTED EMISSIONS

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

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

c) Number of Hopping Frequencies

The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. 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 results include 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 results include both normal data rate and EDR.
See APPENDIX 3 for the test data.

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

4) 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), middle channel (6) 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.

I. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	07-11-23	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	07-11-22	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017401	08-08-04	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030101	08-07-26	Radiated Emissions
Horn Antenna	Emco	3116	2538	08-09-25	Radiated Emissions
Preamplifier	TDK	18-26	030002	07-11-23	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	07-12-01	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	07-10-20	Radiated Emissions
EMI Receiver	Agilent	8546A	3942A00517	07-09-21	Conducted/Radiated Emissions
RF Filter Section	Agilent	85460A	3704A00481	07-09-21	Conducted/Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	08-06-05	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	102204	08-04-22	Conducted Emissions
Spectrum Analyzer	HP	8563E	3745A08112	07-09-20	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	07-09-14	RF Conducted Emissions
Environment Monitor	Control Company	1870	230355190	07-12-28	Radiated Emissions
Environment Monitor	Control Company	1870	230355189	07-12-28	RF Conducted Emissions
Temperature Probe	Hart Scientific	61161-302	21352860	07-08-31	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	100368	08-04-26	Conducted/Radiated Emissions
Signal Generator	Agilent	8648C	4037U03155	07-09-13	Frequency Stability
Digital Multimeter	Hewlett Packard	34401A	US36042324	07-09-19	Conducted/Radiated Emissions
L.I.S.N.	Emco	3816/2	1120	08-08-28	Conducted Emissions
Impulse Limiter	Rohde &	ESHS-Z2	836248/052	07-11-20	Conducted Emissions

APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth AC Conducted Emission Test Results

AC Power Line Conducted Emissions

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

The environmental test conditions were:

Temperature	24ºC
Pressure	1018 mb
Relative Humidity	30%

Test Configuration 1

Date of test: May 25, 2007

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Margin (QP) Limits (dB)
0.918	L1	41.22	9.87	51.09	56.00	**-4.91**
0.919	N	40.29	9.87	50.16	56.00	-5.84
1.022	L1	31.66	9.87	41.53	56.00	-14.47
1.533	L1	29.01	9.89	38.9	56.00	-17.10
1.688	L1	29.15	9.89	39.04	56.00	-16.96
1.694	N	34.08	9.89	43.97	56.00	-12.03
1.695	N	34.73	9.89	44.62	56.00	-11.38
1.798	L1	33.47	9.89	43.36	56.00	-12.64
2.393	L1	31.19	9.83	41.02	56.00	-14.98

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

Measurements were done with the quasi-peak detector.

See graph 1 for the measurement plot.

Date of test: May 25, 2007

Frequency (MHz)	Line	Reading (AV) (dBµV)	Correction Factor (dB)	Corrected Reading (AV) (dBµV)	Limit (AV) (dBµV)	Margin (AV) Limits (dB)
0.946	L1	14.24	9.87	24.11	46.00	-21.89
0.956	N	12.94	9.87	22.81	46.00	-23.19
1.044	L1	15.64	9.87	25.51	46.00	**-20.49**
1.061	N	14.62	9.87	24.49	46.00	-21.51
1.151	N	15.51	9.88	25.39	46.00	-20.61
1.663	L1	11.64	9.89	21.53	46.00	-24.47

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

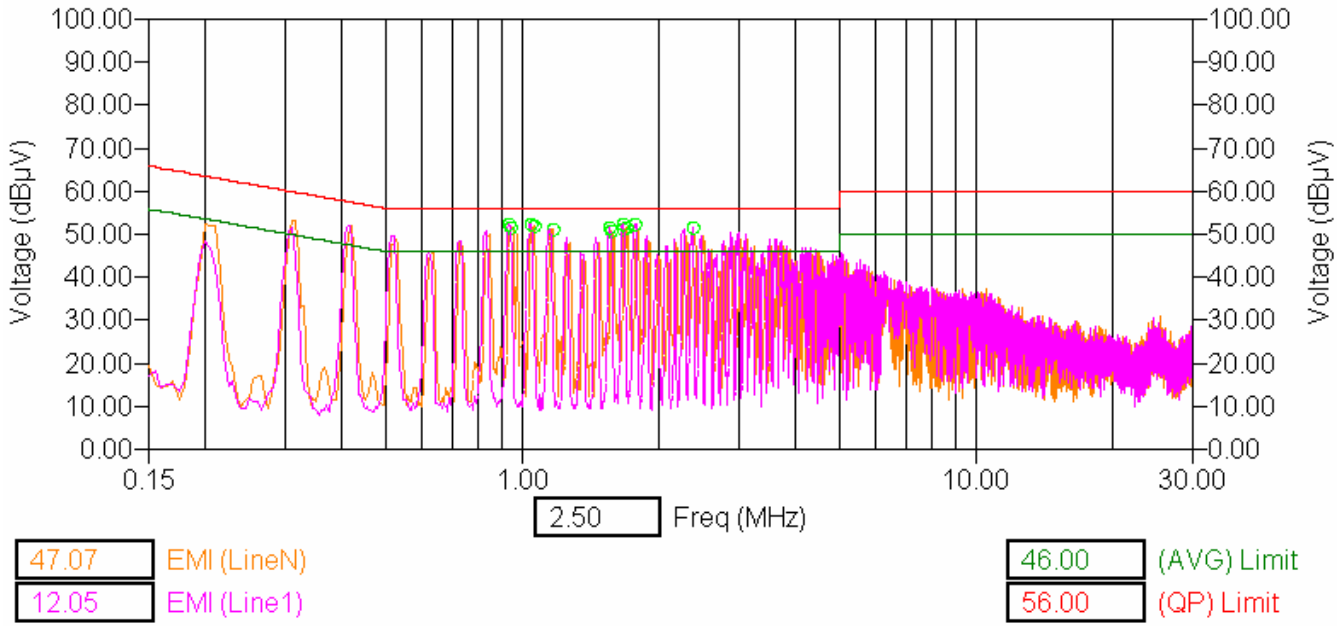
Measurements were done with the average detector.

See graph 1 for the measurement plot.

Bluetooth AC Conducted Emission Test Results cont'd

Test Configuration 1

Graph 1



AC Conducted Emissions Test Results

The environmental test conditions were:

Temperature	24ºC
Pressure	1016mb
Relative Humidity	30%

Test Configuration 2

Date of test: May 31, 2007

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.477	N	35.49	9.85	35.49	56.25	46.25	-10.92	-0.92
0.594	N	35.12	9.84	35.12	56.00	46.00	-11.04	-1.04
0.614	L1	31.35	9.86	31.35	56.00	46.00	-14.79	-4.79
0.628	N	34.59	9.87	34.59	56.00	46.00	-11.54	-1.54
0.712	N	35.61	9.86	35.61	56.00	46.00	-10.53	-0.53
0.743	L1	32.79	9.86	32.79	56.00	46.00	-13.35	-3.35
0.820	N	33.25	9.87	33.25	56.00	46.00	-12.88	-2.88
0.908	L1	34.07	9.87	34.07	56.00	46.00	-12.06	-2.06
1.028	L1	34.15	9.87	34.15	56.00	46.00	-11.98	-1.98
1.129	N	31.05	9.88	31.05	56.00	46.00	-15.07	-5.07
1.367	L1	29.26	9.88	29.26	56.00	46.00	-16.86	-6.86
1.562	L1	30.85	9.89	30.85	56.00	46.00	-15.26	-5.26

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

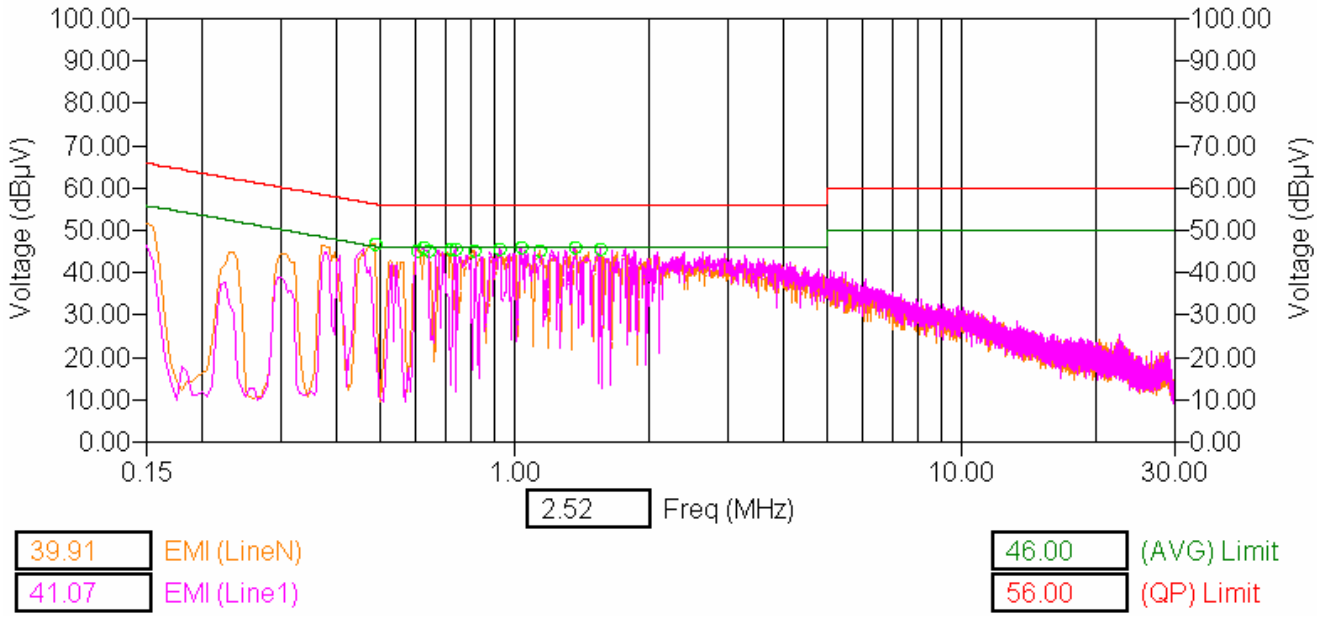
Measurements were done with the quasi-peak detector.

See graph 2 for the measurement plot.

Bluetooth AC Conducted Emission Test Results cont'd

Test Configuration 2

Graph 2



AC Conducted Emissions Test Results

The environmental test conditions were:

Temperature	23ºC
Pressure	1013mb
Relative Humidity	39%

Test Configuration 3

Date of test: May 27, 2007

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.156	L1	42.33	9.82	52.15	65.73	55.73	-13.57	-3.57
0.162	N	39.99	9.84	49.83	64.72	54.72	-14.89	-4.89
0.181	L1	40.30	9.84	50.14	64.26	54.26	-14.12	-4.12
0.223	L1	32.17	9.86	42.03	62.27	52.27	-20.24	-10.24
0.257	N	35.60	9.86	45.46	61.43	51.43	-15.97	-5.97
0.260	L1	34.63	9.86	44.49	61.43	51.43	-16.94	-6.94
0.280	L1	28.34	9.85	38.19	60.52	50.52	-22.33	-12.33
0.313	N	27.69	9.85	37.54	59.58	49.58	-22.04	-12.04
0.337	N	26.60	9.85	36.45	59.33	49.33	-22.88	-12.88
0.383	L1	28.50	9.83	38.33	58.06	48.06	-19.74	-9.74
0.391	N	25.45	9.82	35.27	57.96	47.96	-22.69	-12.69
0.448	N	24.23	9.84	34.07	56.78	46.78	-22.71	-12.71

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

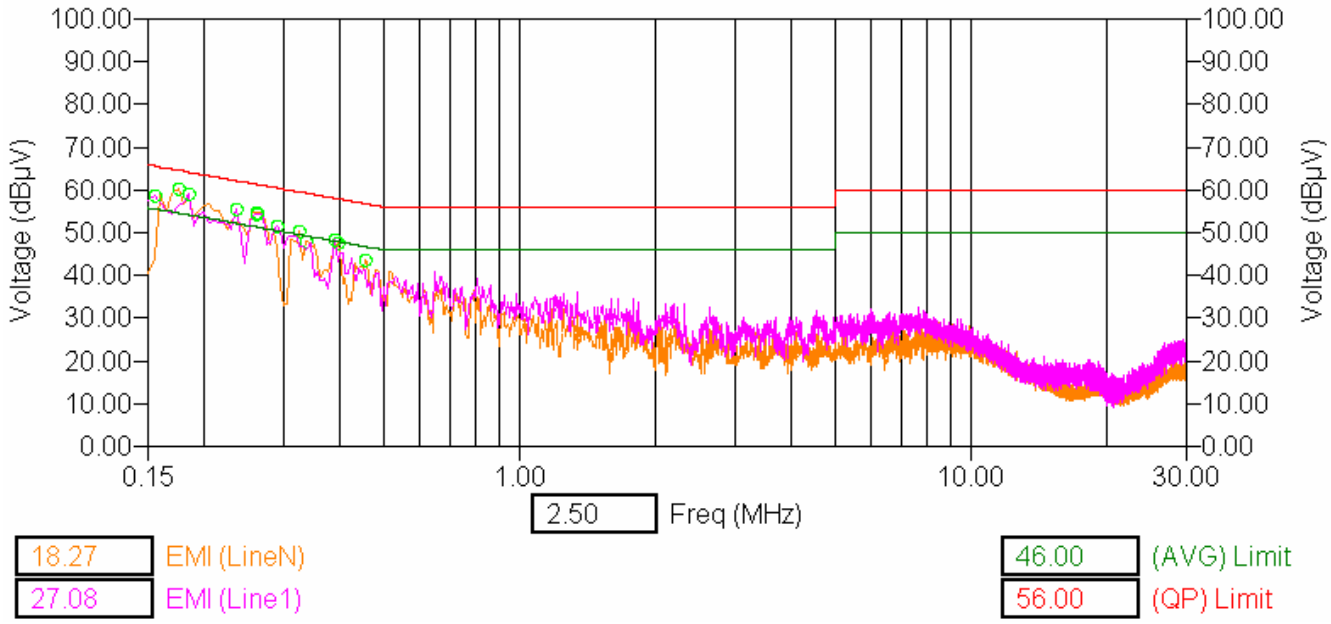
Measurements were done with the quasi-peak detector.

See graph 3 for the measurement plot.

Bluetooth AC Conducted Emission Test Results cont'd

Test Configuration 3

Graph 3



AC Conducted Emissions Test Results

The environmental test conditions were:

Temperature	24ºC
Pressure	1019mb
Relative Humidity	31%

Test Configuration 4

Date of test: May 25, 2007

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.152	N	41.25	9.83	51.08	65.46	55.46	-14.39	-4.39
0.165	L1	40.51	9.84	50.35	64.72	54.72	-14.37	-4.37
0.203	N	37.66	9.85	47.51	63.01	53.01	-15.50	-5.50
0.214	L1	37.01	9.85	46.86	63.01	53.01	-16.15	-6.15
0.230	N	35.70	9.86	45.56	61.92	51.92	-16.37	-6.37
0.252	L1	34.86	9.86	44.72	61.76	51.76	-17.04	-7.04
0.305	L1	29.76	9.85	39.61	60.52	50.52	-20.91	-10.91
0.322	N	27.20	9.85	37.05	59.58	49.58	-22.53	-12.53
0.351	L1	25.27	9.85	35.12	58.84	48.84	-23.73	-13.73
0.379	N	25.75	9.83	35.58	58.17	48.17	-22.59	-12.59
0.382	L1	26.84	9.83	36.67	58.17	48.17	-21.50	-11.50
0.501	N	21.92	9.85	31.77	56.00	46.00	-24.23	-14.23

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

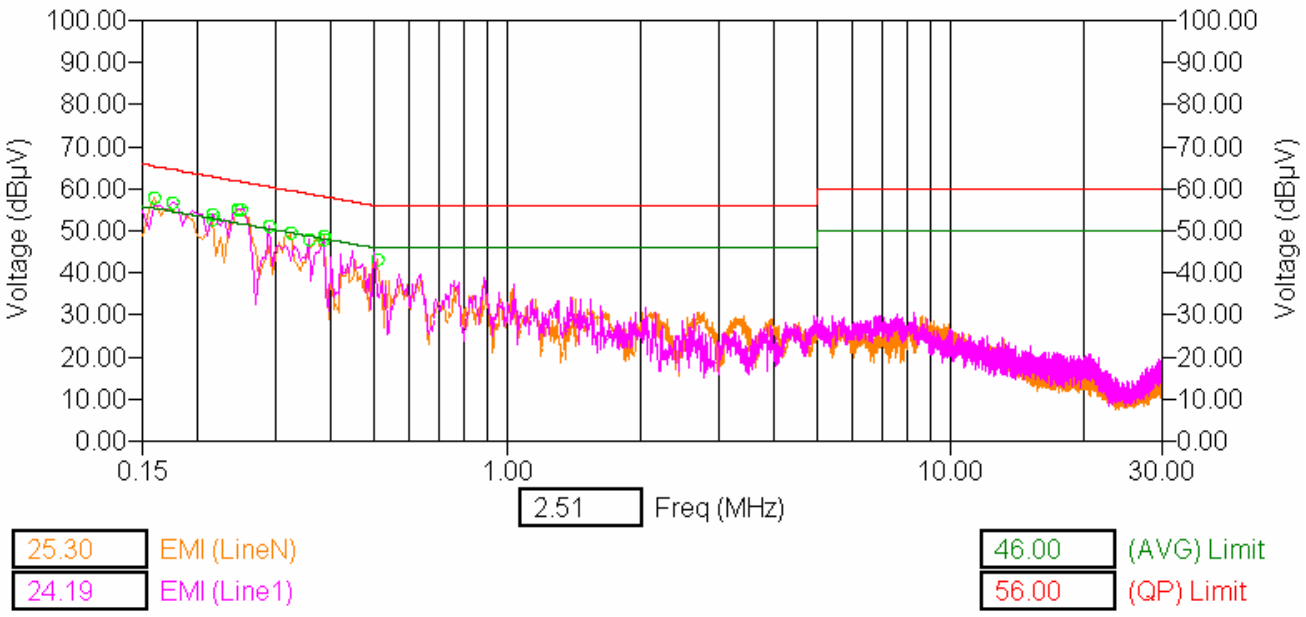
Measurements were done with the quasi-peak detector.

See graph 4 for the measurement plot.

Bluetooth AC Conducted Emission Test Results cont'd

Test Configuration 4

Graph 4



APPENDIX 2 – RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Data Results

Bluetooth Band

The environmental test conditions were:

Temperature	24ºC
Pressure	1009 mb
Relative Humidity	31%

Date of Test: June 02 2007

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

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

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)	(dB)	(dB)
(MHz)	(V/H)	(metres)	(Deg.)	(PK or AV)					
450.01	H	1.82	184	PK	31.33	-7.42	23.91	46.00	-22.09

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

Radiated Emissions Test Results

The environmental test conditions were: Temperature 24ºC
Pressure 992 mb
Humidity 31 %

Date of test: June 4, 2007

The measurements were performed in single frequency, hopping mode (channels 0 to 78), and EDR mode at maximum output power. Test distance was 1.0 metre.
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)
Handheld Standalone, USB side down									
Single frequency mode Low Channel									
2nd	0	4804.0	Horn	V	NF	-	PK.	74	-
2nd	0	4804.0	Horn	H	NF				
2nd	0	4804.0	Horn	V	NF	-	AVE.	54	-
2nd	0	4804.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. All emissions were in the noise floor (NF)									
Single frequency mode Middle Channel									
2nd	39	4882.0	Horn	V	NF	-	PK.	74	-
2nd	39	4882.0	Horn	H	NF				
2nd	39	4882.0	Horn	V	NF	-	AVE.	54	-
2nd	39	4882.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. All emissions were in the noise floor (NF)									
Single frequency mode High Channel									
2nd	78	4960.0	Horn	V	NF	-	PK.	74	-
2nd	78	4960.0	Horn	H	NF				
2nd	78	4960.0	Horn	V	NF	-	AVE.	54	-
2nd	78	4960.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. All emissions were in the noise floor (NF)									

Bluetooth Radiated Emissions Test Results cont'd

Using Pattern type "Static PRBS" and packet type "DH5" hopping mode 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)
Handheld Standalone, USB side down Hopping mode.									
2nd	0-78	4960.0	Horn	V	NF	-	PK.	74	-
2nd	0-78	4960.0	Horn	H	NF				
2nd	0-78	4960.0	Horn	V	NF	-	AVE.	54	-
2nd	0-78	4960.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. All emissions were in the noise floor (NF)									

Using Pattern type "Static PRBS" and packet type "3-DH5", EDR mode 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)
Handheld Standalone, USB side down EDR mode.									
2nd	39	4960.0	Horn	V	NF	-	PK.	74	-
2nd	39	4960.0	Horn	H	NF				
2nd	39	4960.0	Horn	V	NF	-	AVE.	54	-
2nd	39	4960.0	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. All emissions were in the noise floor (NF)									

Bluetooth Band-Edge Compliance of RF Radiated Emissions Test Results

The environmental test conditions were: Temperature 23ºC
Pressure 1015 mb
Humidity 32 %

The test distance was 3.0 metres.
Date of test: June 13-14, 2007

Channel	Freq. (MHz)	Rx Antenna Type	POL.	Detector (PK, AVE.)	VBW (MHz)	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
Centre at Bandedge 2483.5 MHz Pattern type "Static PBRS" and packet type "DH5", Handheld standalone Vertical										
78	2480.0	Horn	V	PK	1.0 MHz	90.3	40.9	49.4	74	-24.6
78	2480.0	Horn	H	PK	1.0 MHz	93.6	41.2	52.4	74	-21.6
78	2480.0	Horn	V	AVE.	10 Hz	83.1	40.9	42.2	54	-11.8
78	2480.0	Horn	H	AVE.	10 Hz	86.5	41.2	45.3	54	-8.7

Channel	Freq. (MHz)	Rx Antenna Type	POL.	Detector (PK, AVE.)	VBW (MHz)	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
Centre at Bandedge 2390 MHz Pattern type "Static PBRS" and packet type "3-DH5" EDR mode, Handheld standalone Vertical										
0	2402.0	Horn	V	PK	1.0 MHz	90.3	35.9	54.4	74	-19.6
0	2402.0	Horn	H	PK	1.0 MHz	92.7	39.5	53.2	74	-20.8
0	2402.0	Horn	V	AVE.	10 Hz	80.5	35.9	44.6	54	-9.4
0	2402.0	Horn	H	AVE.	10 Hz	83.2	39.5	43.7	54	-10.3
Cantre at Bandedge 2483.5 MHz Pattern type "Static PBRS" and packet type "3-DH5" EDR mode, Handheld standalone Vertical										
78	2480.0	Horn	V	PK	1.0 MHz	89.1	36.9	52.2	74	-21.8
78	2480.0	Horn	H	PK	1.0 MHz	92.4	42	50.4	74	-23.6
78	2480.0	Horn	V	AVE.	10 Hz	79.4	36.9	42.5	54	-11.5
78	2480.0	Horn	H	AVE.	10 Hz	81.9	42	39.9	54	-14.1

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. Emi. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 0, Pol: V, Detector: PK

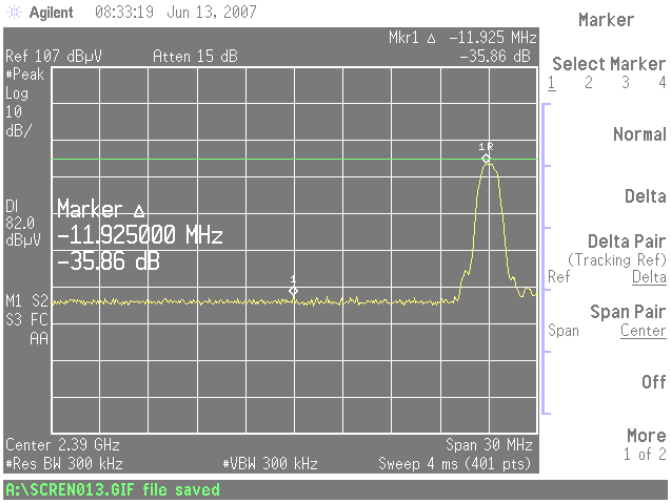


Figure 2-2: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 0, Pol: H, Detector: PK

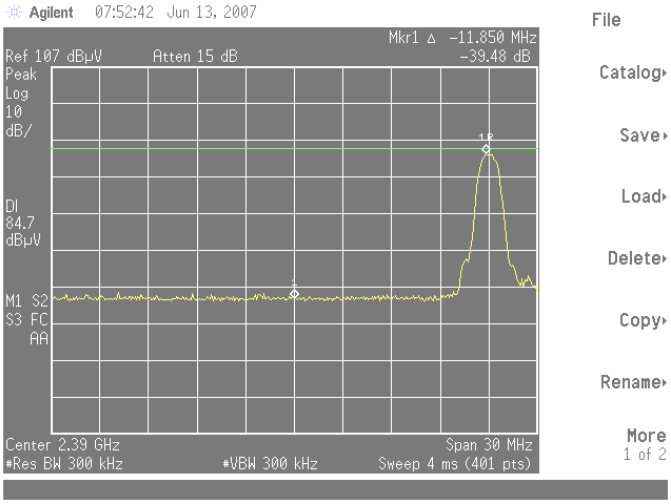


Figure 2-3: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 78, Pol: V, Detector: PK

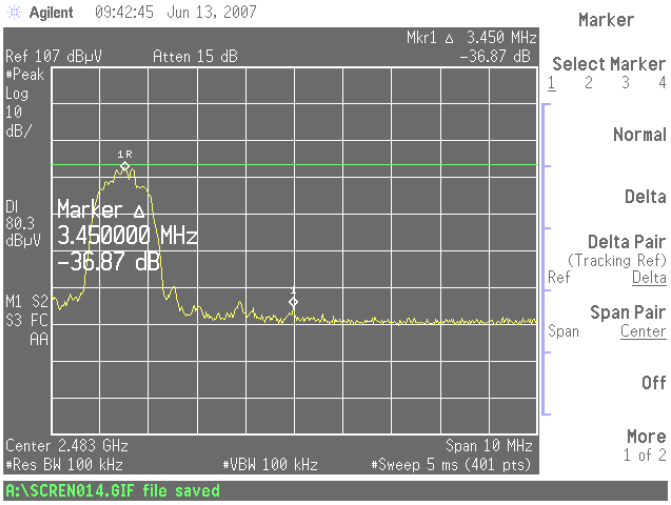
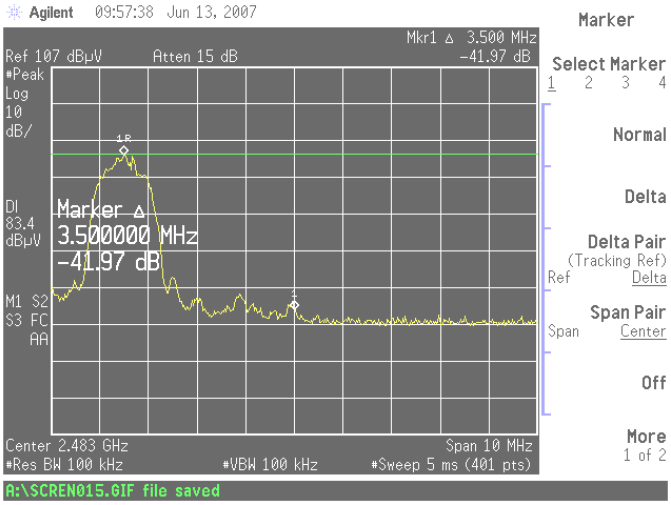


Figure 2-4: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 78, Pol: H, Detector: PK



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

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

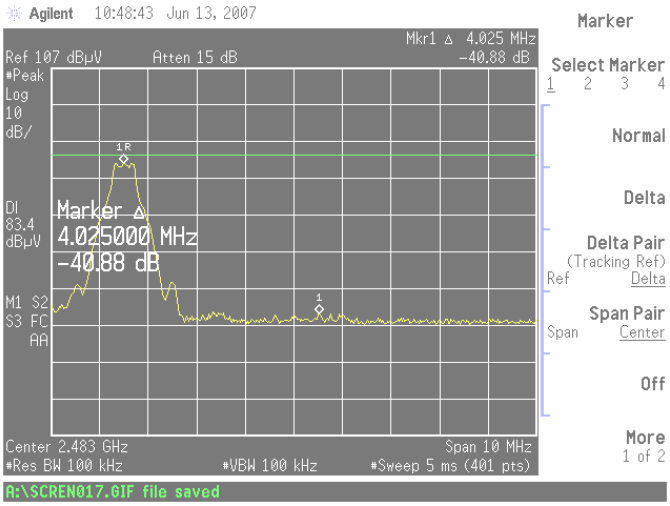
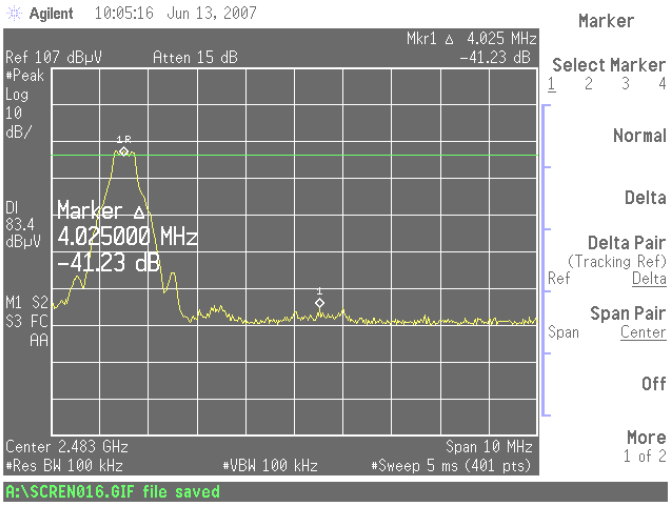


Figure 2-6: Band-Edge Compliance of RF Rad. Emi. Bluetooth, Single freq., Static PBRS, DH5, Channel 78, Pol: H, Detector: PK



Radiated Emissions Test Data Results

802.11b/g Band

The environmental test conditions were:

Temperature	23ºC
Pressure	1017 mb
Relative Humidity	31%

Date of Test: June 11 2007

Test Distance was 3.0 metres with a EUT height of 0.8 metres, 30 MHz to 1000 MHz.
The Handheld PIN 205C6EEA was in standalone, vertical position.

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

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

All emissions had a test margin greater than 25.0 dB.

Test Distance was 3.0 metres with a EUT height of 0.8 metres, 1.0 GHz to 25.0 GHz.
The Handheld PIN 205C6EEA was in standalone, vertical position.

Frequency (MHz)	Antenna Pol. (V/H)	Antenna Height (metres)	Test Angle (Deg.)	Detector (PK or AVE)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dB)	Test Margin (dB)
1261.02	V	2.66	16	PK	51.02	-1.49	49.53	74.00	-24.47
1683.05	H	1.03	66	PK	26.26	2.28	50.70	74.00	-23.30
1701.40	V	3.13	337	PK	26.39	2.58	50.06	74.00	-23.94

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

Radiated Emissions Test Data Results

802.11b/g Band

The environmental test conditions were:

Temperature	24ºC
Pressure	1015 mb
Relative Humidity	30%

Date of Test: June 11 2007

Test Distance was 3.0 metres with a EUT height of 0.8 metres, 30 MHz to 1000 MHz.
The Handheld PIN 205C6EEA was in standalone, vertical position.

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

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				(dB/m)			
(MHz)	(V/H)	(metres)	(Deg.)	(PK or AV)	(dBµV)		(dBµV/m)	(dB)	(dB)
570.87	V	2.33	205	PK	29.14	4.44	24.01	46.00	-21.99

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

Radiated Emissions Test Data Results

802.11b/g Band

The environmental test conditions were:

Temperature	26ºC
Pressure	1016 mb
Relative Humidity	30%

Date of Test: June 11 2007

Test Distance was 3.0 metres with a EUT height of 0.8 metres, 30 MHz to 1000 MHz. The Handheld PIN 205C6EEA was in standalone, vertical position.

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

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)	(dB)	(dB)
(MHz)	(V/H)	(metres)	(Deg.)	(PK or AV)					
-	-	-	-	-	-	-	-	-	-

All emissions had a test margin greater than 25.0 dB.

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

Test Distance was 1.0 metre.

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 down									
Single frequency mode Low Channel									
2nd	1	4824.00	Horn	V	NF	35.65	PK.	74	-38.35
2nd	1	4824.00	Horn	H	42.66				
2nd	1	4824.00	Horn	V	NF	-	AVE.	54	-
2nd	1	4824.00	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the noise floor (NF)									
Single frequency mode Middle Channel									
2nd	6	4874.00	Horn	V	48.18	44.19	PK.	74	-29.81
2nd	6	4874.00	Horn	H	50.91				
2nd	6	4874.00	Horn	V	38.34	34.04	AVE.	54	**-19.96**
2nd	6	4874.00	Horn	H	40.76				
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF									
Single frequency mode High Channel									
2nd	11	4924.00	Horn	V	42.94	36.36	PK.	74	-37.64
2nd	11	4924.00	Horn	H	42.20				
2nd	11	4924.00	Horn	V	NF	-	AVE.	54	-
2nd	11	4924.00	Horn	H	NF				
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF									

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

The environmental test conditions were: Temperature 23ºC
Pressure 1015 mb
Humidity 32 %

Date of Test: June 13-14, 2007

Test distance was 3.0 metres.

Handheld standalone, vertical, the measurements were performed on channel 1

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)
1	2412.0	Horn	V	PK	1.0 MHz	96.5	38.7	57.8	74	-16.2
1	2412.0	Horn	H	PK	1.0 MHz	106.6	38.2	68.4	74	-5.6
1	2412.0	Horn	V	AVE.	10 Hz	71.8	38.7	33.1	54	-20.9
1	2412.0	Horn	H	AVE.	10 Hz	79	38.2	40.8	54	-13.2

Handheld standalone, vertical, the measurements were performed on channel 11

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)
11	2462.0	Horn	V	PK	1.0 MHz	98.7	40.2	58.5	74	-15.5
11	2462.0	Horn	H	PK	1.0 MHz	108	39.7	68.3	74	-5.7
11	2462.0	Horn	V	AVE.	10 Hz	71.1	40.2	30.9	54	-23.1
11	2462.0	Horn	H	AVE.	10 Hz	80.1	39.7	40.4	54	-13.6

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

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

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

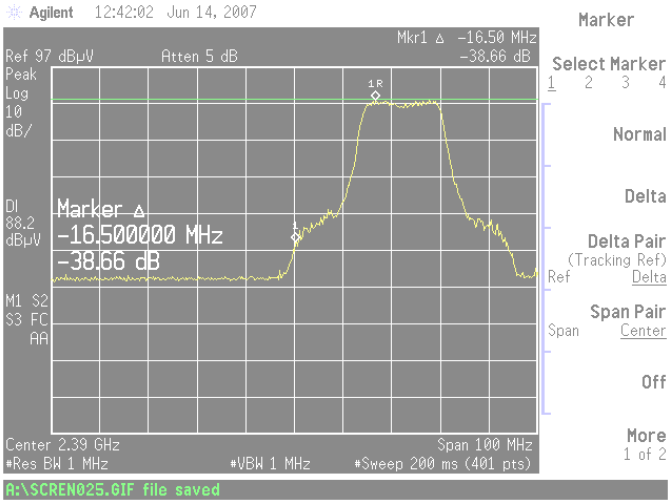


Figure 2-6: Band-Edge Compliance of RF Rad. Emi. 802.11b/g, Channel 1, 2412 MHz, Max Pol: H, Detector: PK

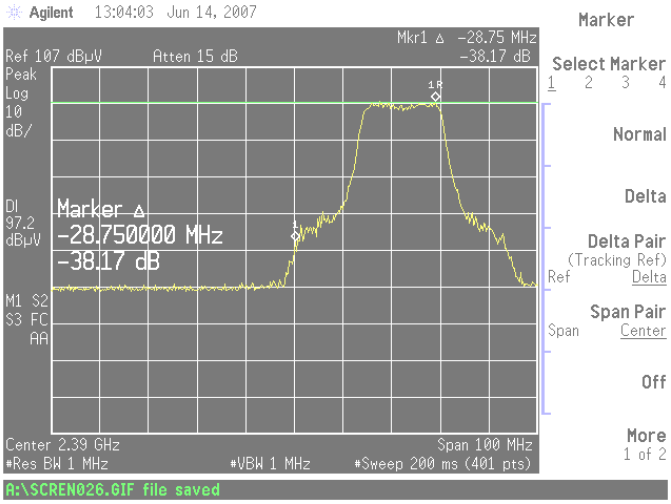


Figure 2-7: Band-Edge Compliance of RF Rad. Emi. 802.11b/g, Channel 11, 2462 MHz, Max Pol: V, Detector: PK

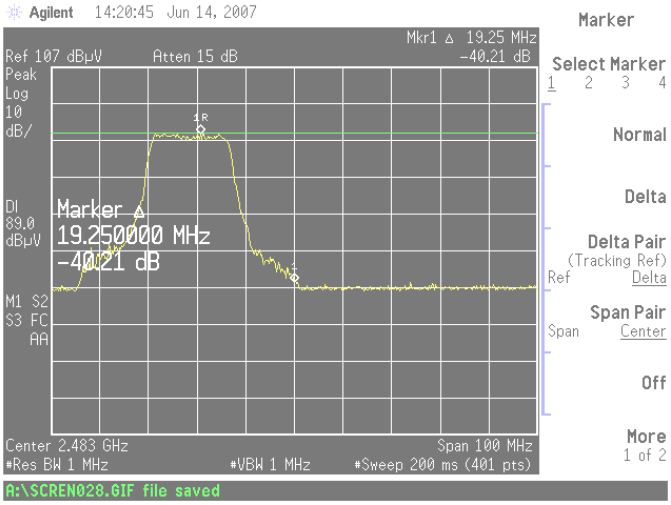
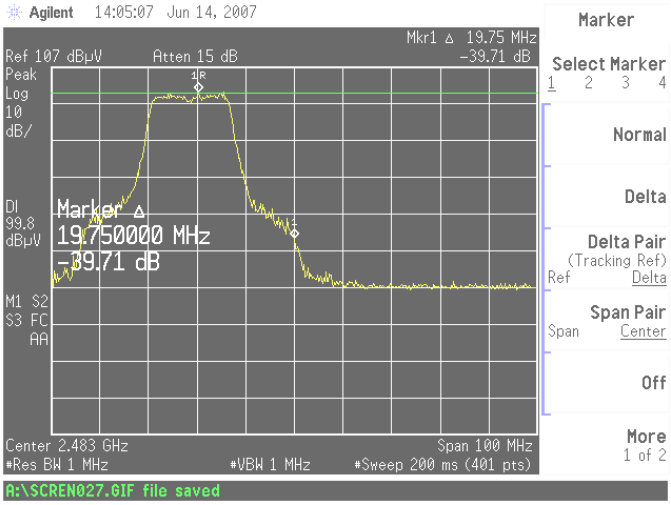


Figure 2-8: Band-Edge Compliance of RF Rad. Emi. 802.11b/g, Channel 11, 2462 MHz, Max Pol: H, Detector: PK

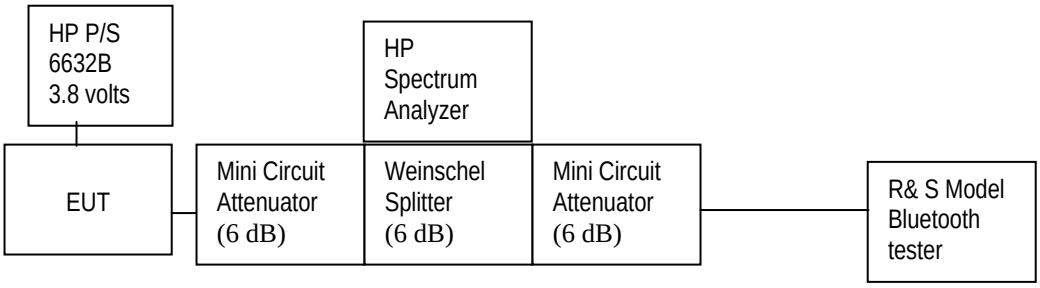


APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth RF Conducted Emission Test Results

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

Test Setup Diagram



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

Date of Tests: June 4-11, 2007

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	0.937
39	≤1.0	0.937
78	≤1.0	0.937

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

The environmental test conditions were:

Temperature	23ºC
Pressure	1002 mb
Relative Humidity	37%

Bluetooth RF Conducted Emission Test Results cont'd

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

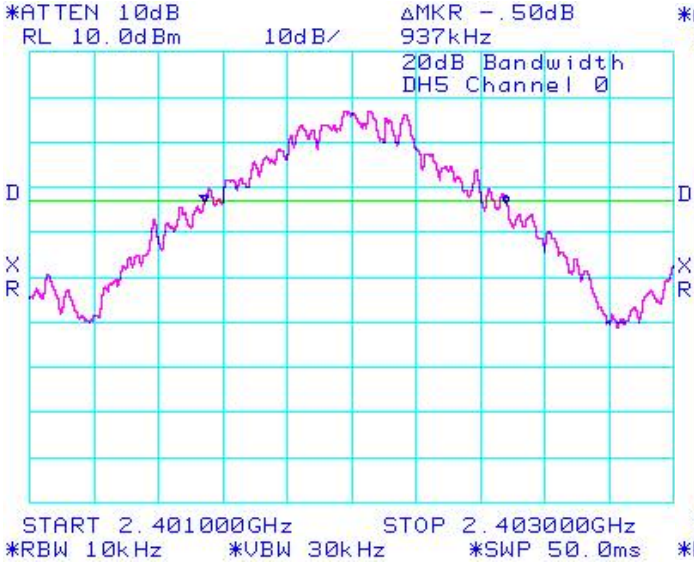


Figure 3-2: 20 dB Bandwidth
Single freq., Static PBRS, DH5

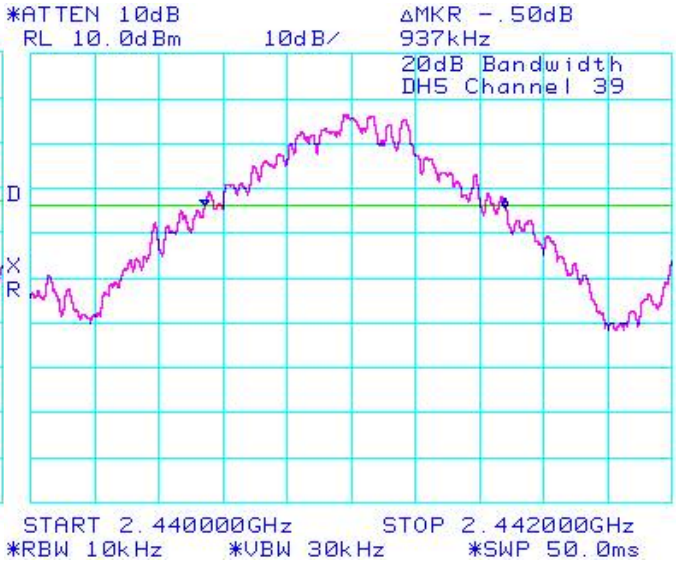
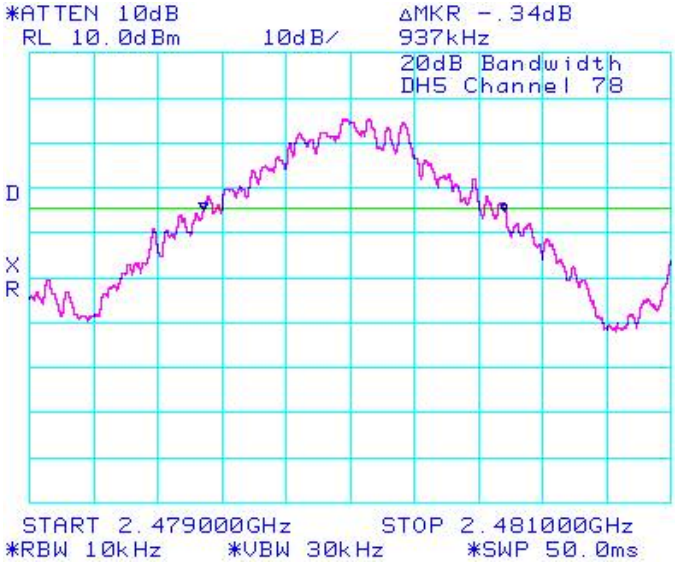


Figure 3-3: 20 dB Bandwidth
Single freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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.

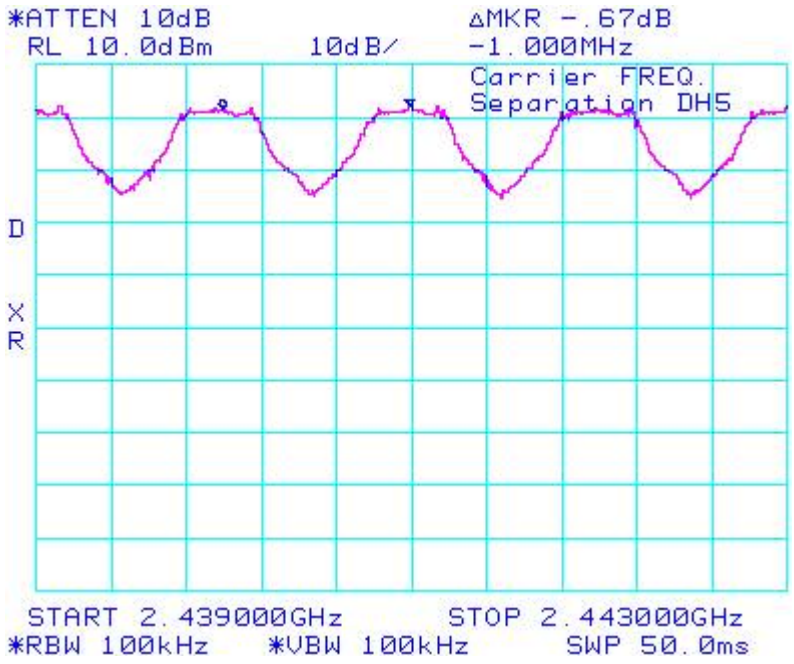
Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

The environmental test conditions were:

Temperature	24ºC
Pressure	993 mb
Relative Humidity	32%

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

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



Bluetooth RF Conducted Emission Test Results cont'd

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

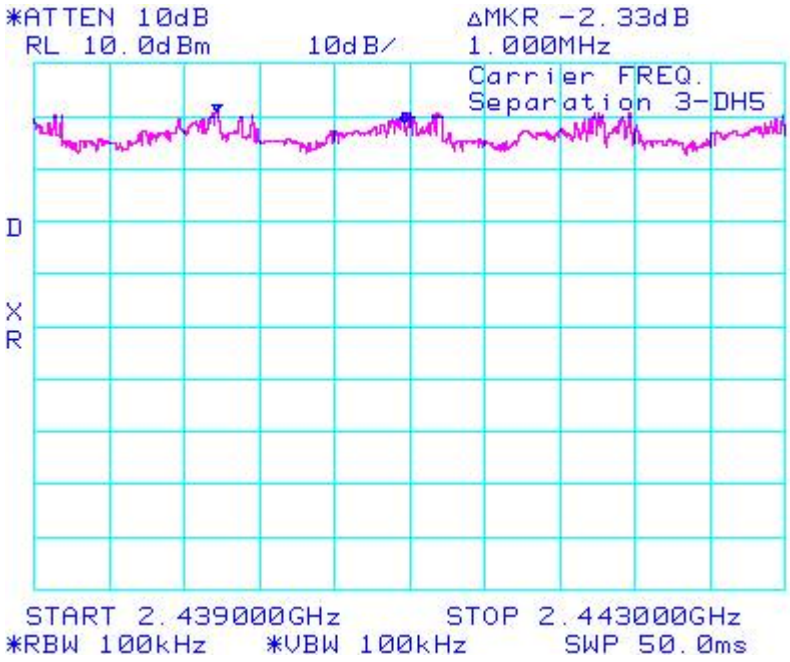
Bluetooth Channels	Limit (MHz)	Measured Level (MHz)
38 to 39	≥ 0.025 or 20 dB bandwidth	1.000

The environmental test conditions were:

Temperature	24ºC
Pressure	993 mb
Relative Humidity	32%

See figure 3-5 for the plot of the Carrier Frequency Separation measurement.

Figure 3-5: 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	24ºC
Pressure	993 mb
Relative Humidity	32%

See figures 3-6 to 3-9 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

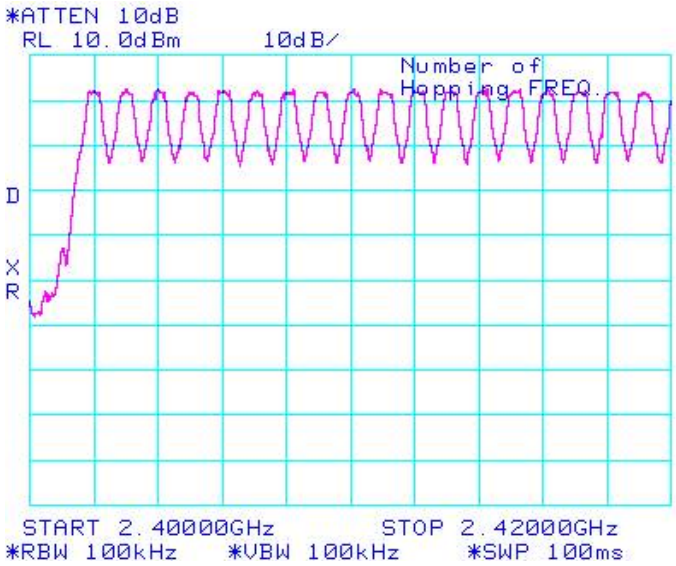


Figure 3-7: Number of Hopping Frequencies
Static PBRS, DH5

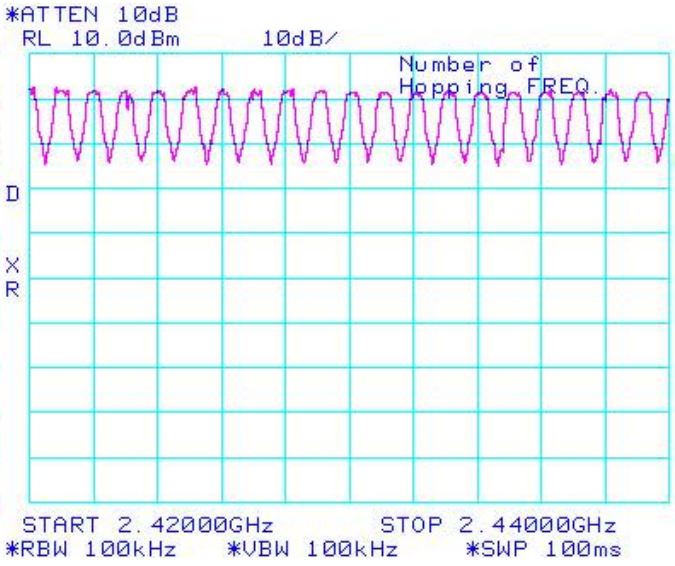


Figure 3-8: Number of Hopping Frequencies
Static PBRS, DH5

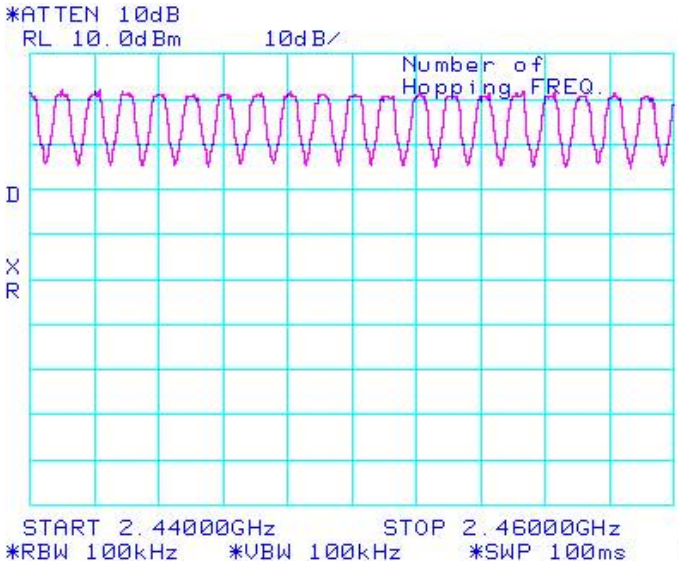
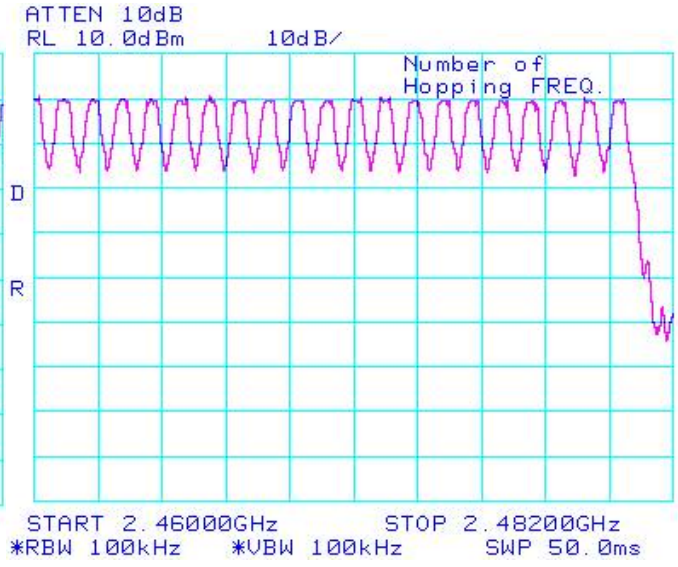


Figure 3-9: Number of Hopping Frequencies
Static PBRS, DH5



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	0.5133	0.5133 x 320.0 = 164.26	400	235.74
39	DH1	0.5133	0.5133 x 320.0 = 164.26	400	235.74
78	DH1	0.5133	0.5133 x 320.0 = 164.26	400	235.74
0	DH3	1.7667	1.7667 x 159.9 = 282.50	400	117.50
39	DH3	1.7600	1.7600 x 159.9 = 281.42	400	118.58
78	DH3	1.7600	1.7600 x 159.9 = 281.42	400	118.58
0	DH5	3.0083	3.0083 x 106.8 = 321.29	400	78.71
39	DH5	3.0083	3.0083 x 106.8 = 321.29	400	78.71
78	DH5	3.0083	3.0083 x 106.8 = 321.29	400	78.71

The environmental test conditions were:

Temperature	23ºC
Pressure	1002 mb
Relative Humidity	37%

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

Bluetooth RF Conducted Emission Test Results cont'd

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

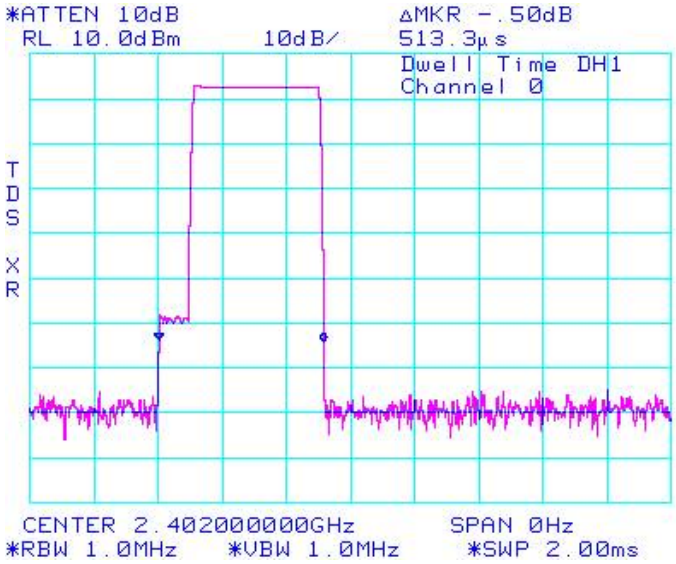


Figure 3-11: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

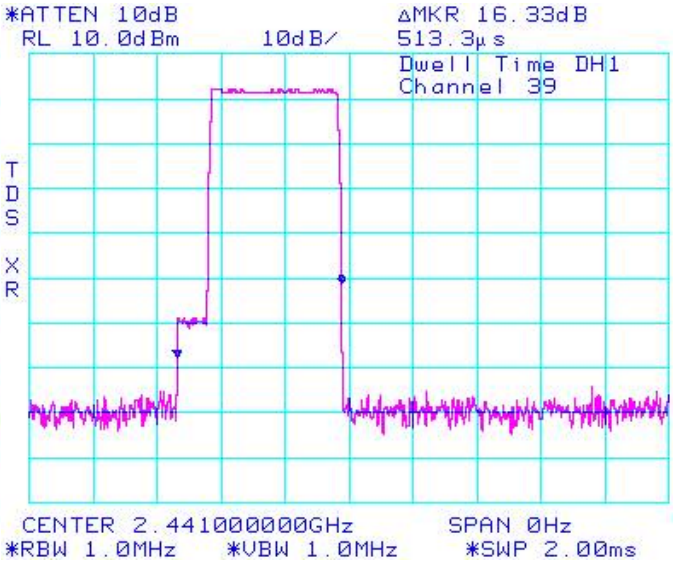


Figure 3-12: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

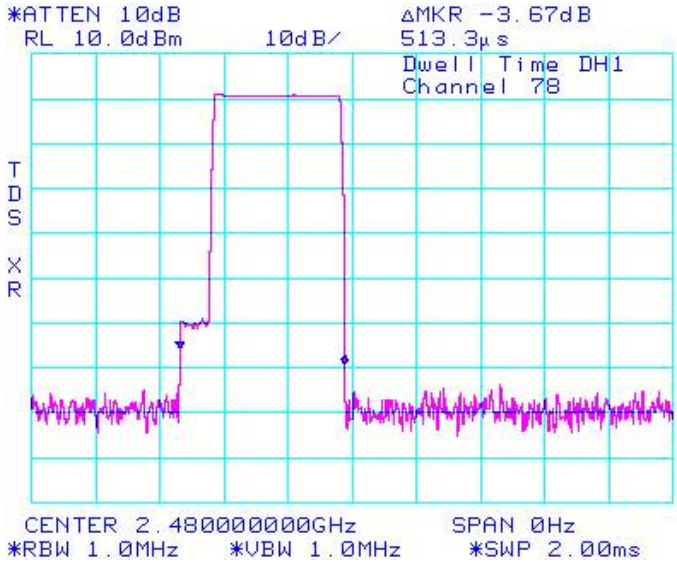
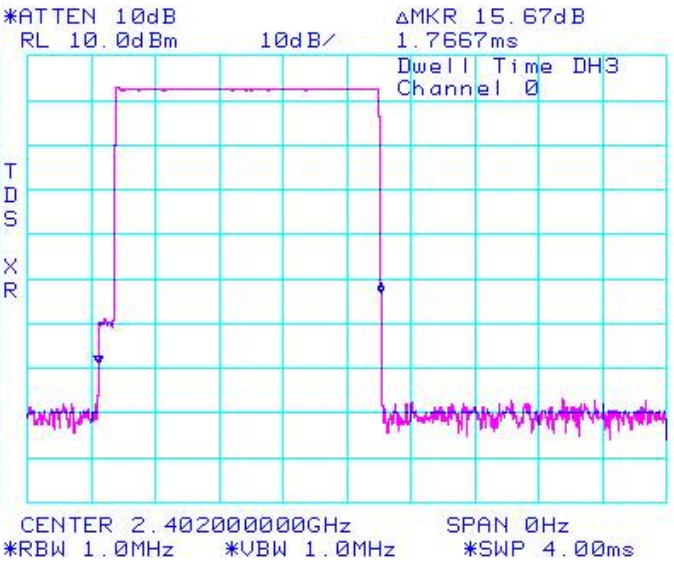


Figure 3-13: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3



Bluetooth RF Conducted Emission Test Results cont'd

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

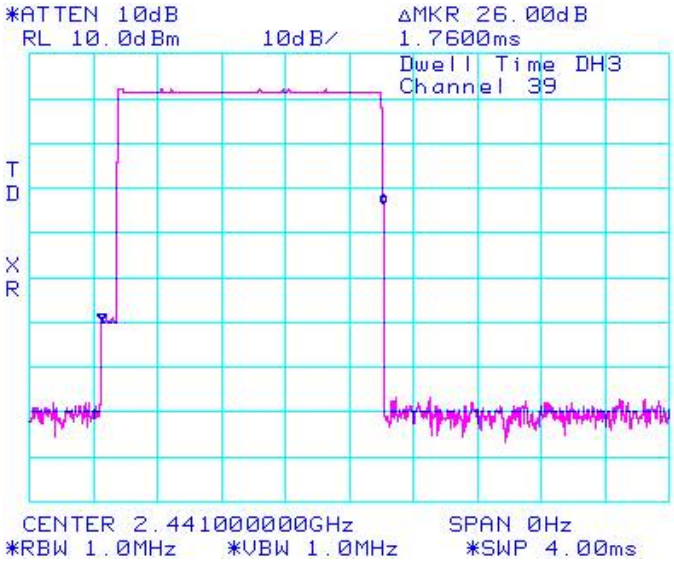


Figure 3-5 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

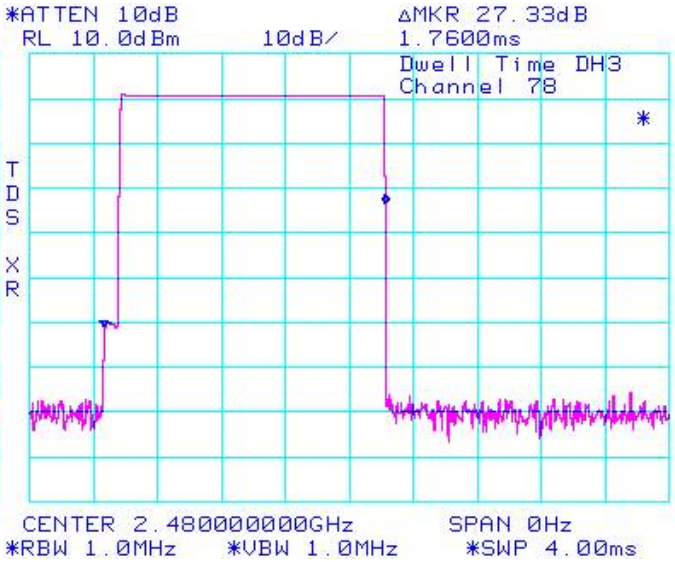


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5

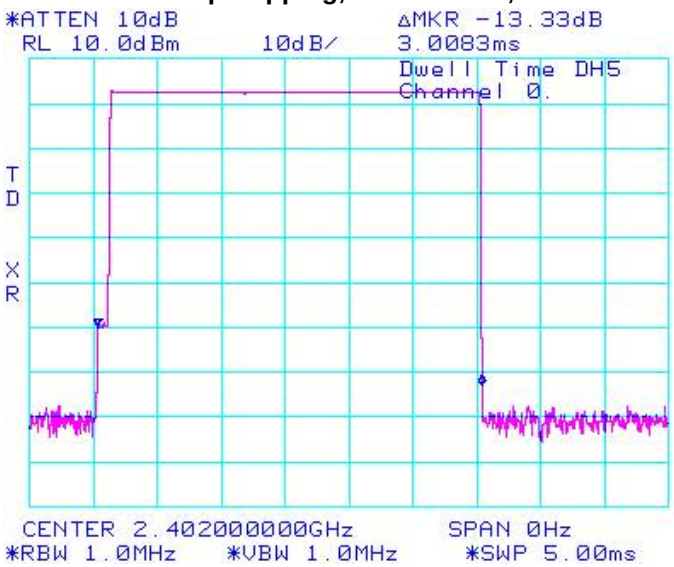
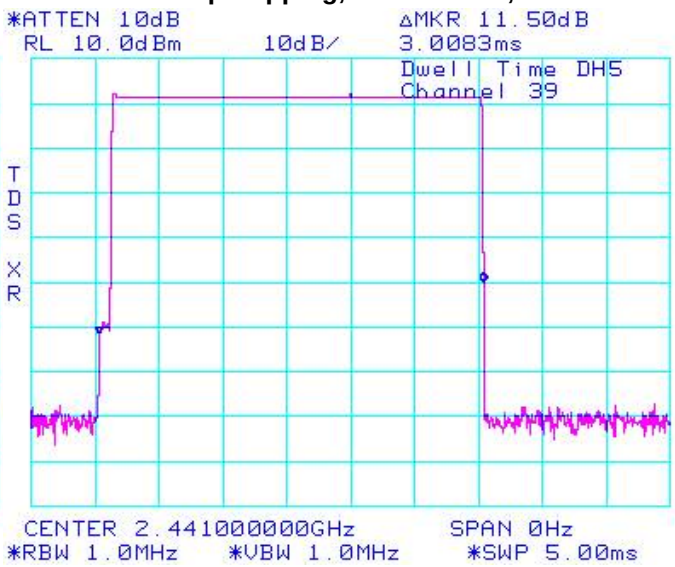


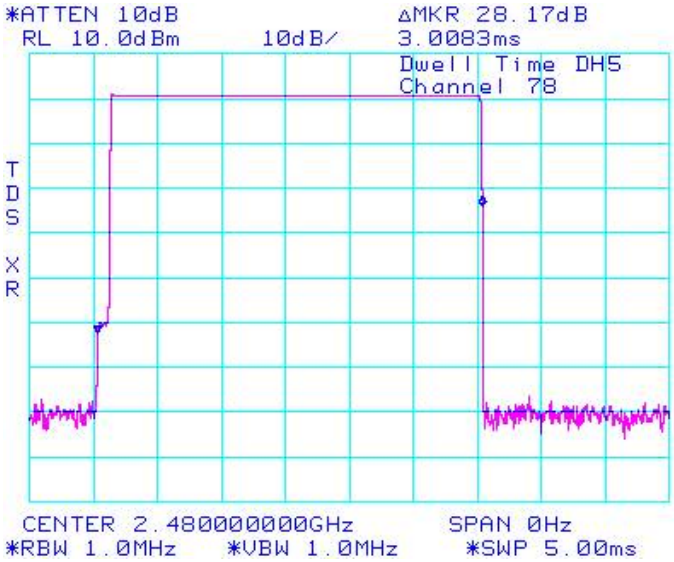
Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-18: 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 (mW)	Class 2 Limit (dBm)	Class 2 Limit (mW)
0	2.67	1.85	-6.0 to 4.0	-0.25 to 2.51
39	2.17	1.65	-6.0 to 4.0	-0.25 to 2.51
78	1.00	1.26	-6.0 to 4.0	-0.25 to 2.51

The environmental test conditions were:

Temperature	24ºC
Pressure	993 mb
Relative Humidity	32%

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

Bluetooth RF Conducted Emission Test Results cont'd

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

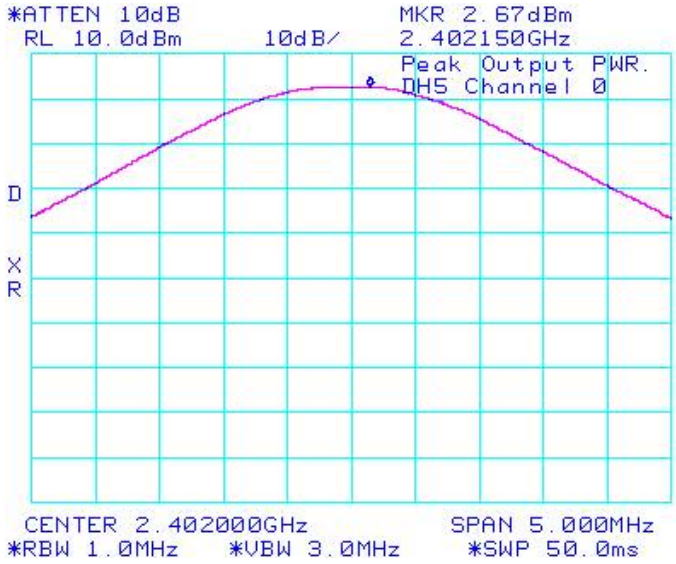


Figure 3-20: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5

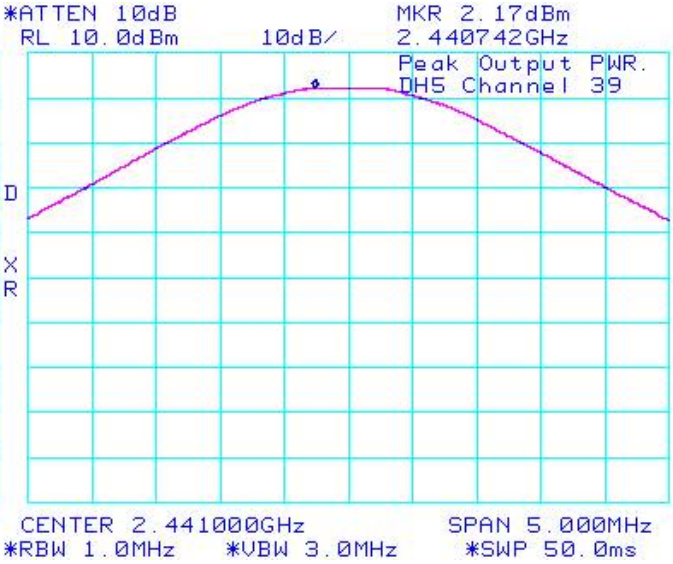
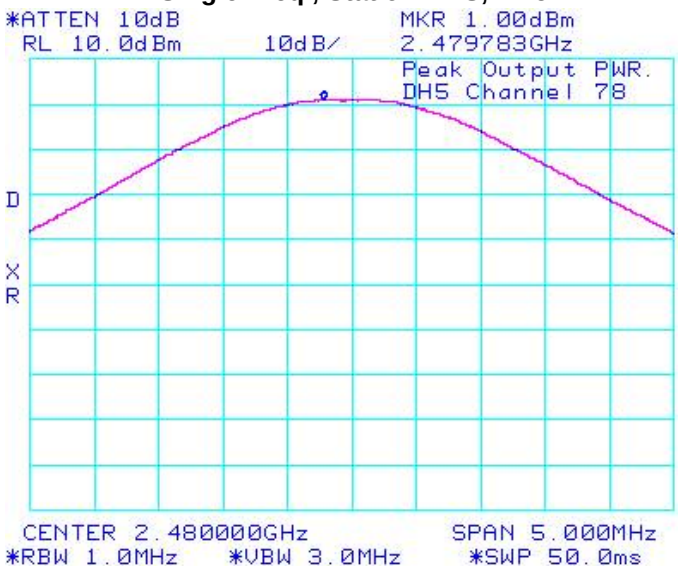


Figure 3-21: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5



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)	Measured Level (mW)	Class 2 Limit (dBm)	Class 2 Limit (mW)
0	2.17	1.65	-6.0 to 4.0	-0.25 to 2.51
39	1.00	1.26	-6.0 to 4.0	-0.25 to 2.51
78	-0.17	-1.04	-6.0 to 4.0	-0.25 to 2.51

The environmental test conditions were:

Temperature	24ºC
Pressure	993 mb
Relative Humidity	32%

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, 3-DH5

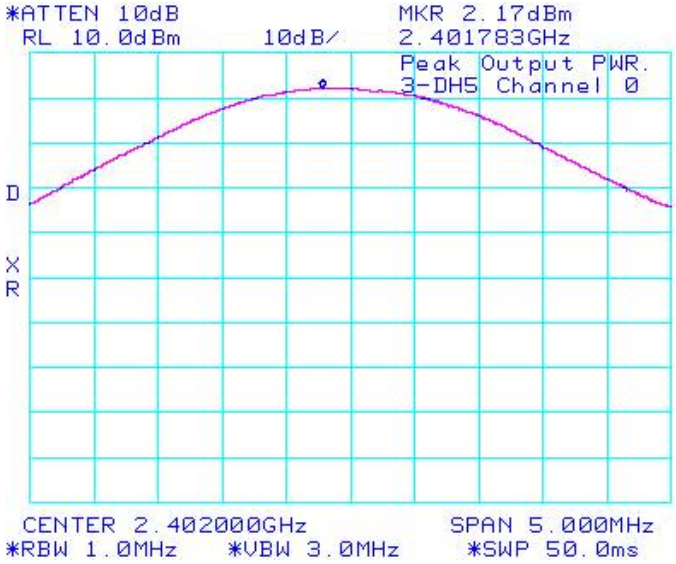


Figure 3-23: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5

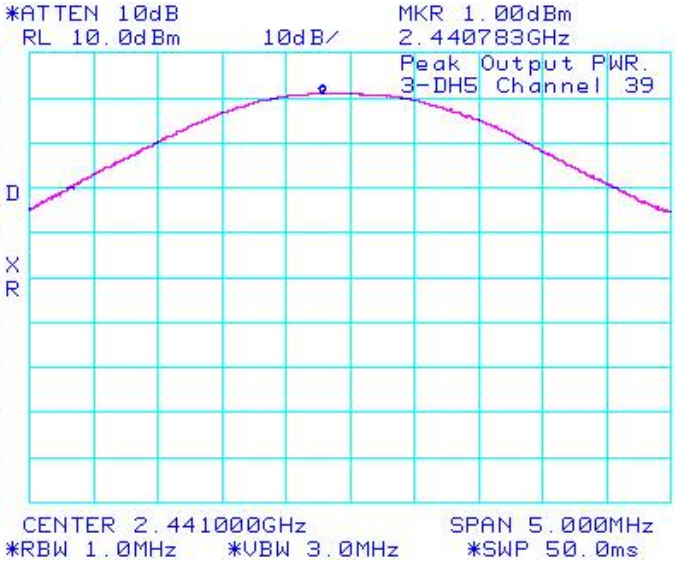
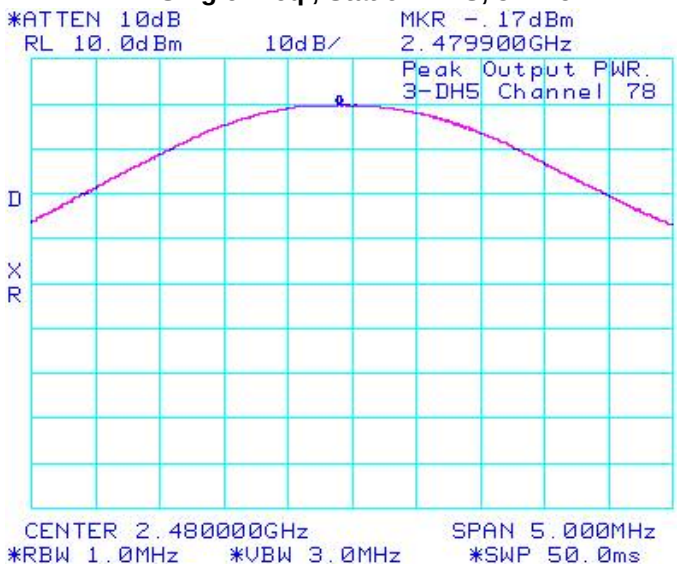


Figure 3-24: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5



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	-35.16	-20	-15.16
78	Single Frequency	-32.66	-20	-12.66
0	Hopping	-34.84	-20	-14.84
78	Hopping	-32.67	-20	-12.67

The environmental test conditions were: Temperature 23ºC
Pressure 1002 mb
Relative Humidity 37%

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

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-25: Band Edge Compliance
Single Freq., Static PBRS, DH5

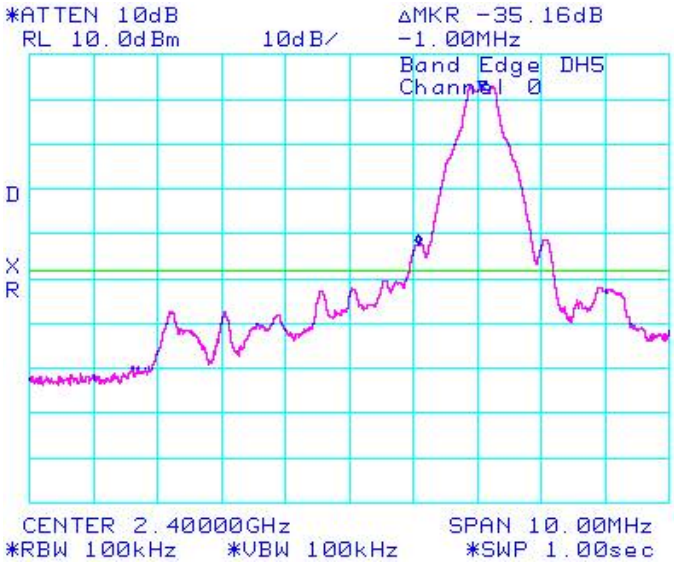


Figure 3-26: Band Edge Compliance
Single Freq., Static PBRS, DH5

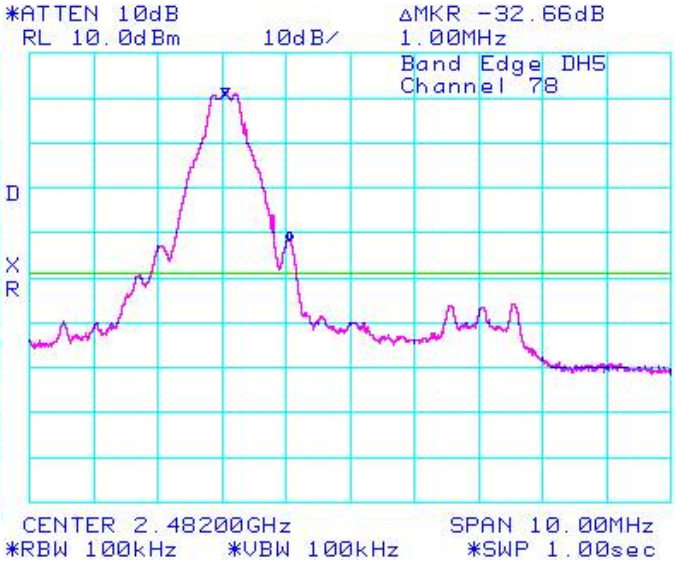


Figure 3-27: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5

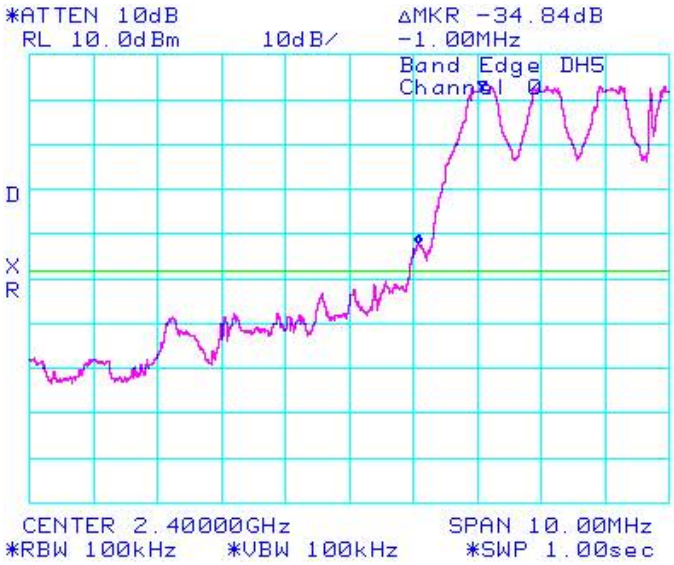
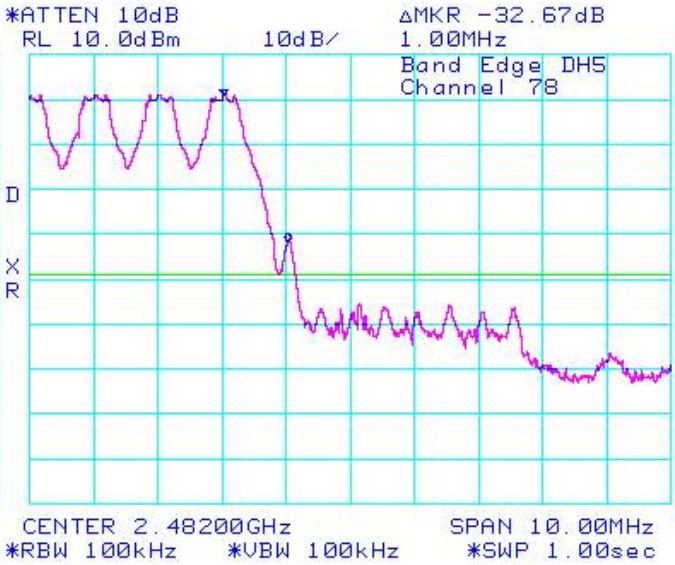


Figure 3-28: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5



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	-35.50	-20	-15.50
78	Single Frequency	-31.67	-20	-11.67
0	Hopping	-36.00	-20	-16.00
78	Hopping	-31.84	-20	-11.84

The environmental test conditions were: Temperature 23ºC
Pressure 1002 mb
Relative Humidity 37%

See figures 3-29 to 3-32 for the plots of the band edge compliance measurements.

Bluetooth RF Conducted Emission Test Results cont'd

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

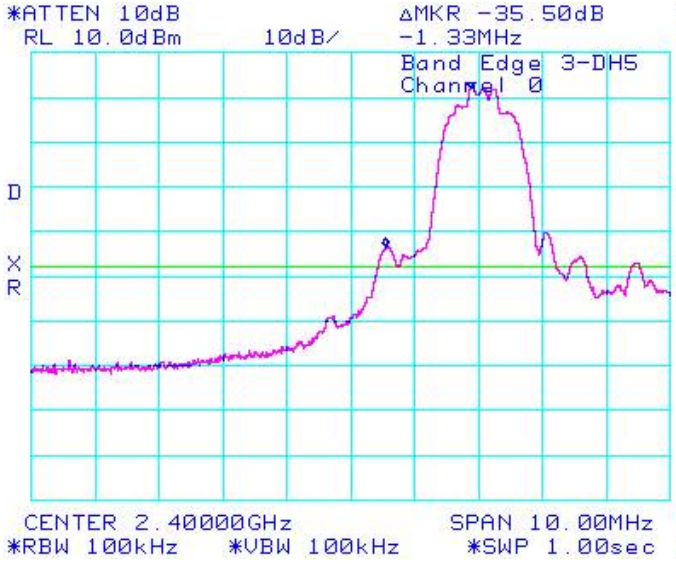


Figure 3-30: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5

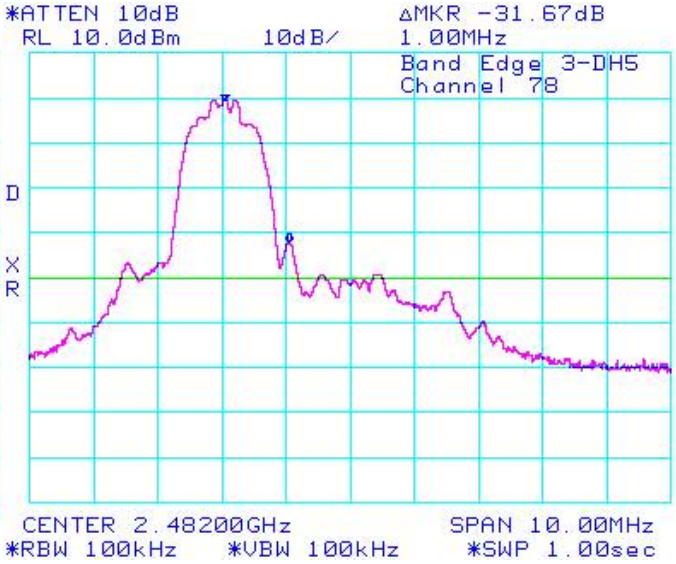


Figure 3-31: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

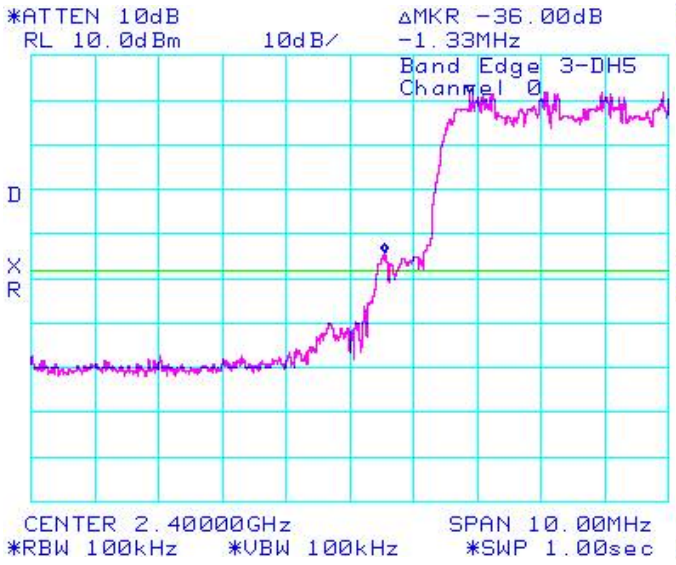


Figure 3-32: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

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	-49.00	-51.67	-20
39	2.17	-52.33	-54.50	-20
78	1.00	-56.50	-57.50	-20
Hopping mode	2.67	-53.50	-56.17	-20

The environmental test conditions were:

Temperature	24ºC
Pressure	995 mb
Relative Humidity	33%

See figures 2-33 to 2-36 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 2-33: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5,

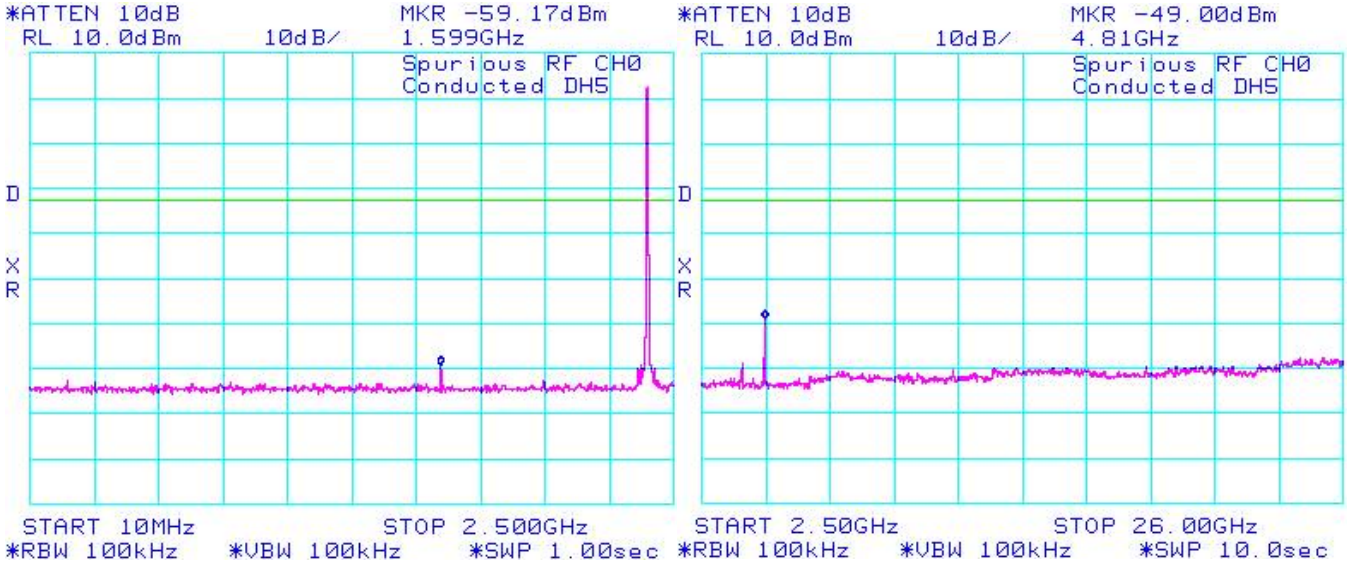
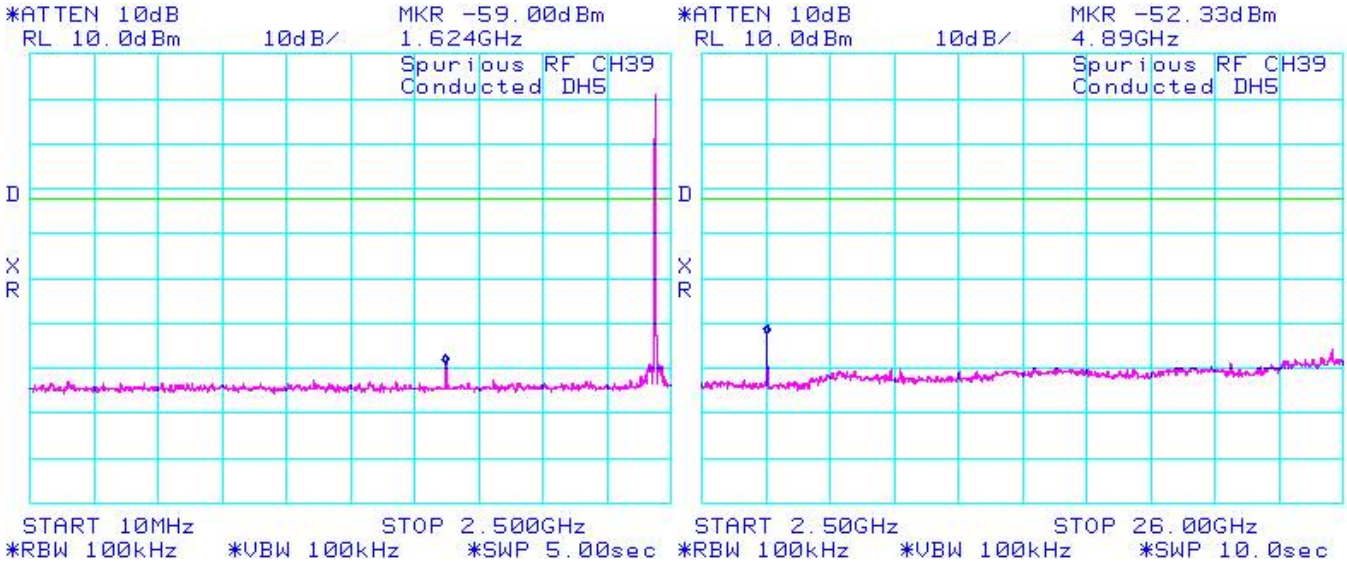


Figure 2-34: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 2-35: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5

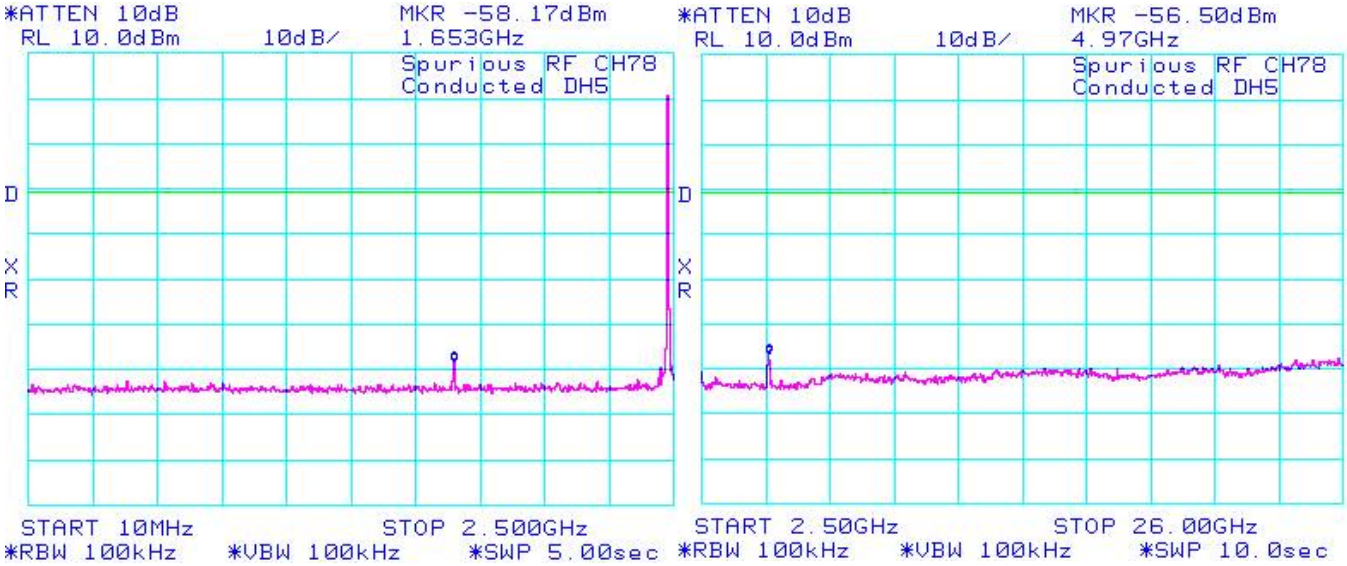
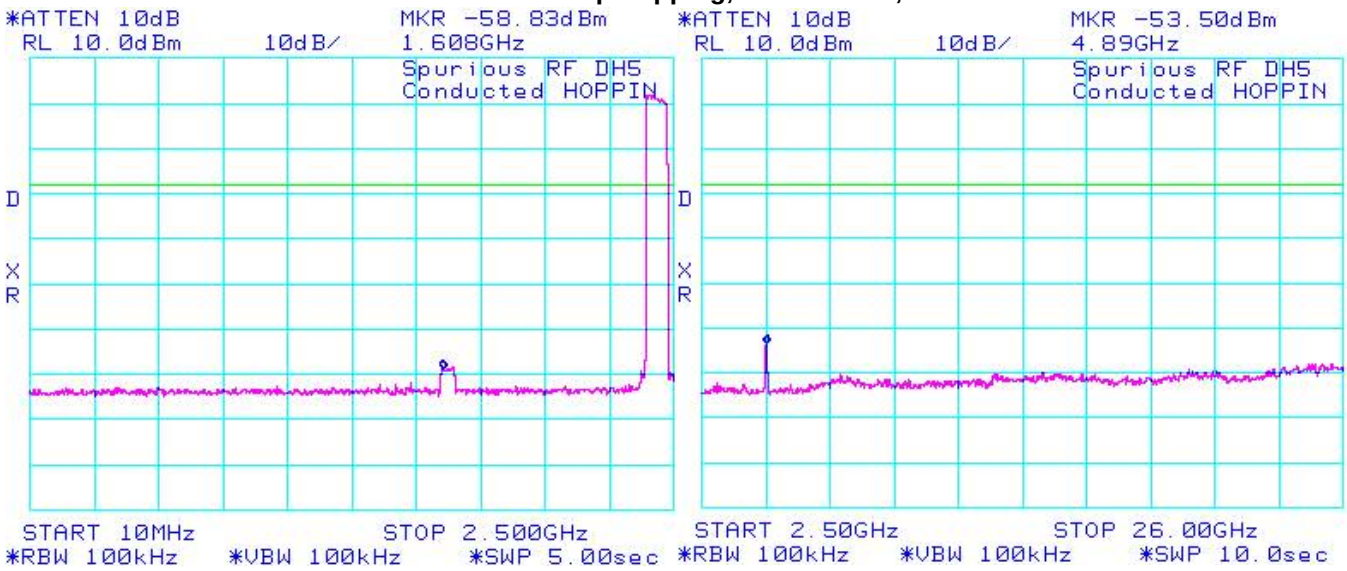


Figure 2-36: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, DH5



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	2.17	-57.67	-60.37	-20
39	1.00	-57.67	-58.67	-20
78	-0.17	-58.00	-57.30	-20
Hopping mode	2.17	-58.33	-60.50	-20

The environmental test conditions were:

Temperature	24ºC
Pressure	995 mb
Relative Humidity	33%

See figures 3-37 to 3-40 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

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

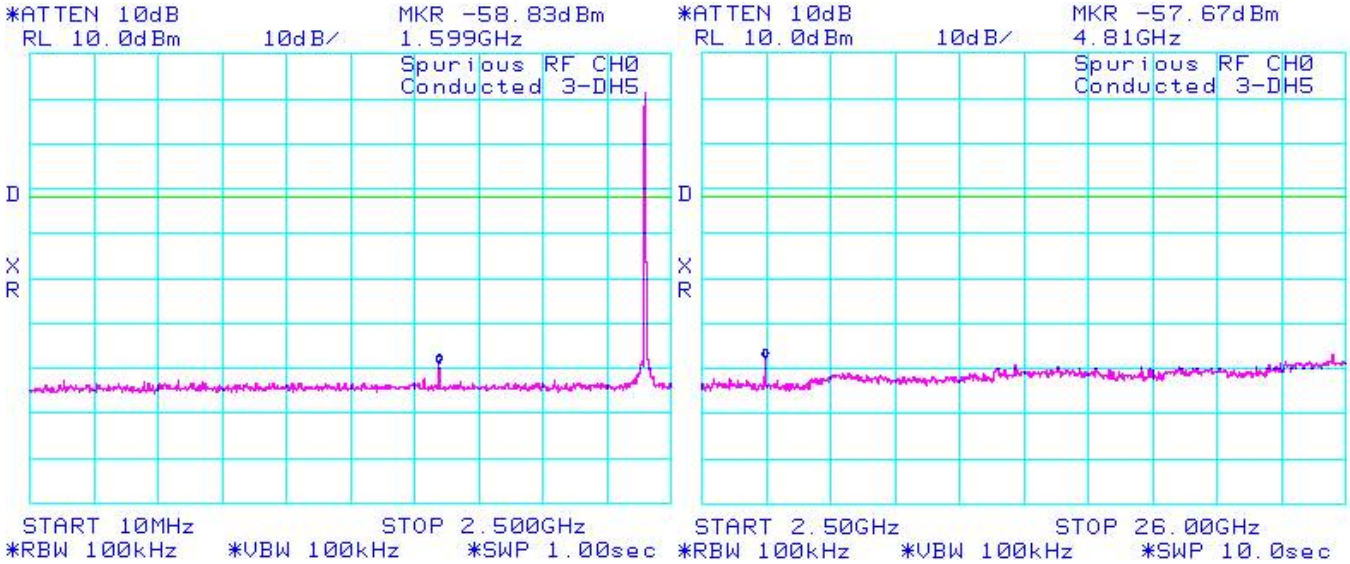
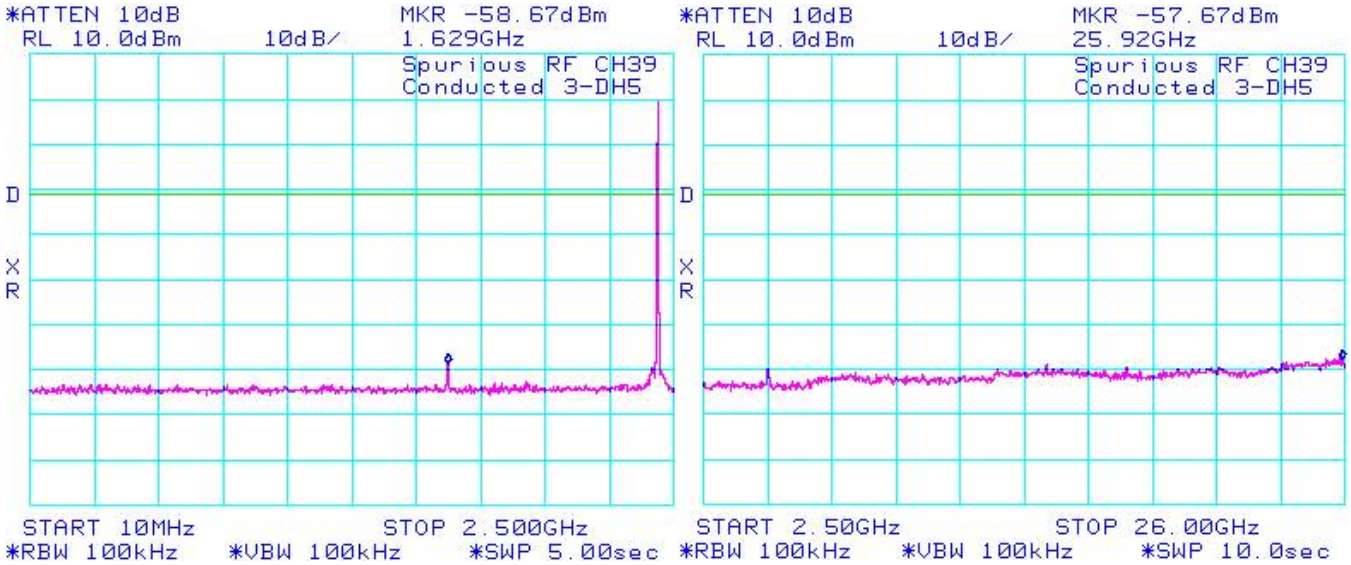


Figure 3-38: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

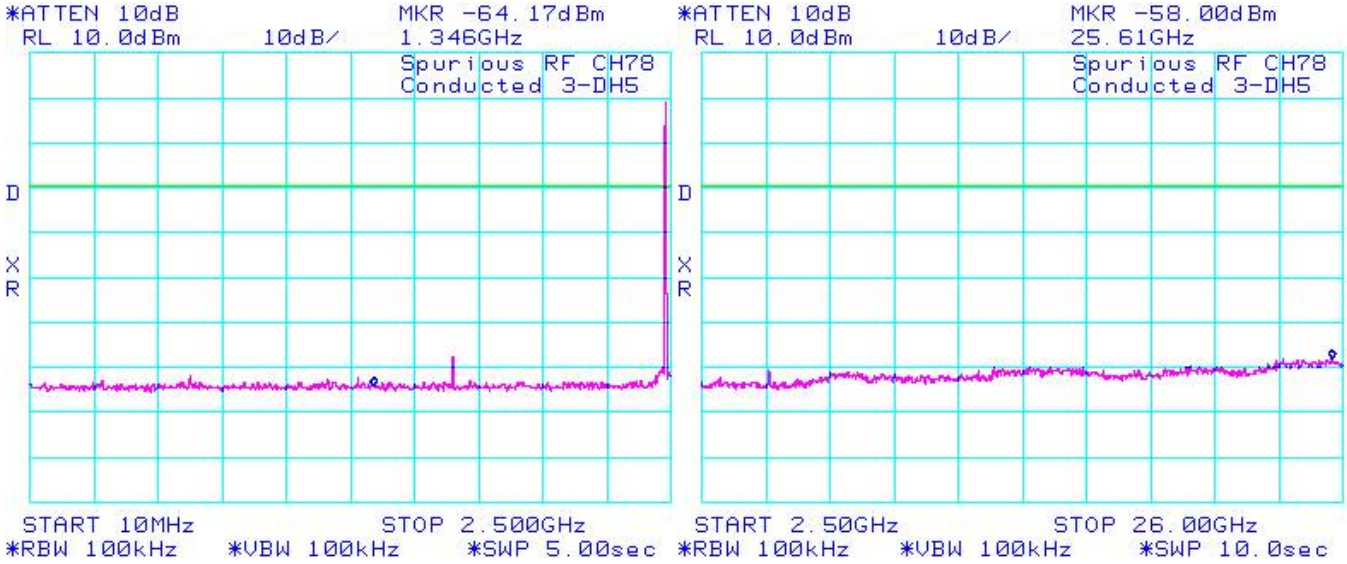
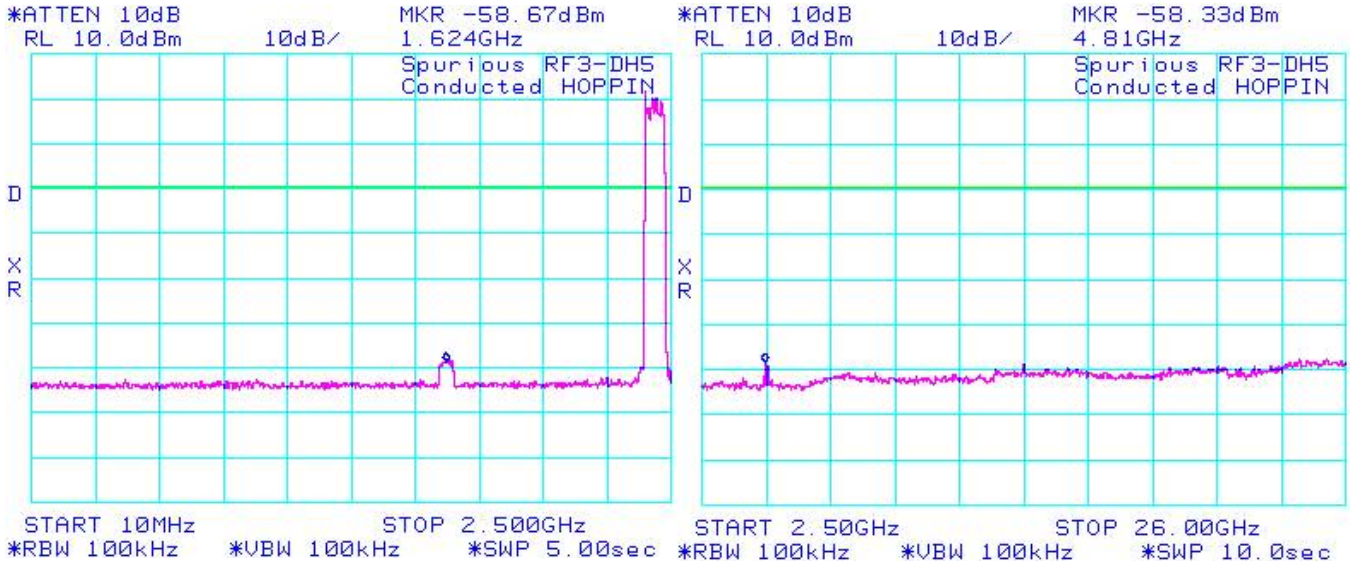


Figure 3-40 : Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 3-DH5



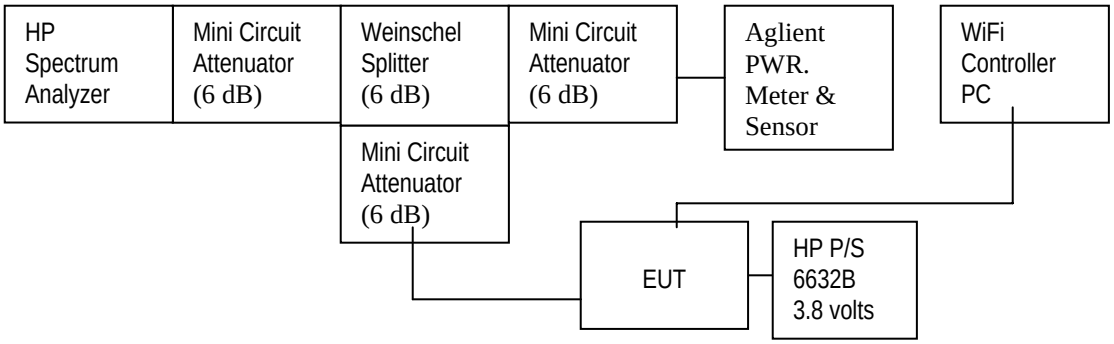
APPENDIX 4 – 802.11b/g CONDUCTED EMISSIONS TEST DATA/PLOTS

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 18.4 dB was applied to the spectrum analyzer and Power Meter reference level for the attenuators and coaxial cable loss in the test circuit.

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	10.20
	5.5 Mbps	≥ 500	11.20
	11 Mbps	≥ 500	10.20
	6 Mbps	≥ 500	16.57
	24 Mbps	≥ 500	16.70
	54 Mbps	≥ 500	16.67
6	1 Mbps	≥ 500	10.27
	5.5 Mbps	≥ 500	11.17
	11 Mbps	≥ 500	10.63
	6 Mbps	≥ 500	16.63
	24 Mbps	≥ 500	16.70
	54 Mbps	≥ 500	16.70
11	1 Mbps	≥ 500	10.20
	5.5 Mbps	≥ 500	11.17
	11 Mbps	≥ 500	10.70
	6 Mbps	≥ 500	16.53
	24 Mbps	≥ 500	16.67
	54 Mbps	≥ 500	16.70

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

The environmental test conditions were:

Temperature	24ºC
Pressure	1014 mb
Relative Humidity	31%

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

Figure 4-1: 6 dB Bandwidth

802.11b, Channel 1, 1 Mbps

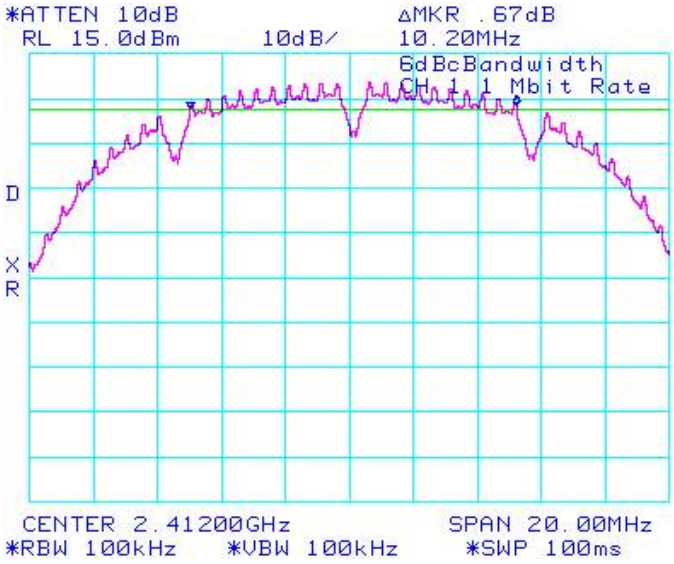


Figure 4-2: 6 dB Bandwidth

802.11b, Channel 6, 1 Mbps

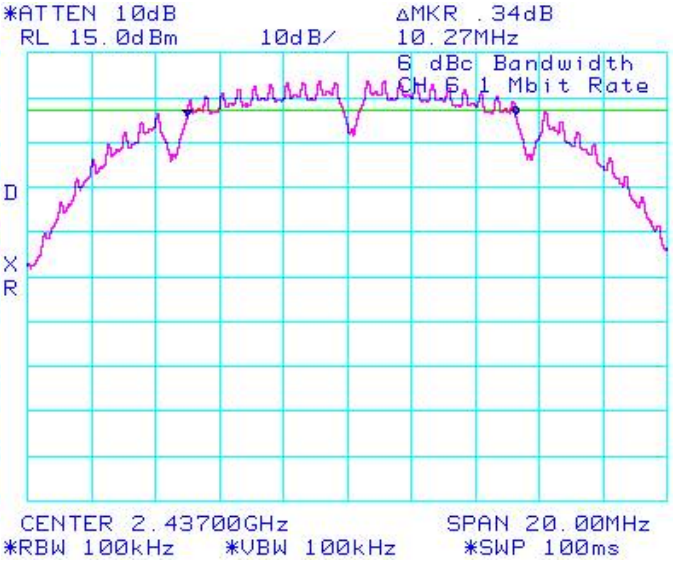
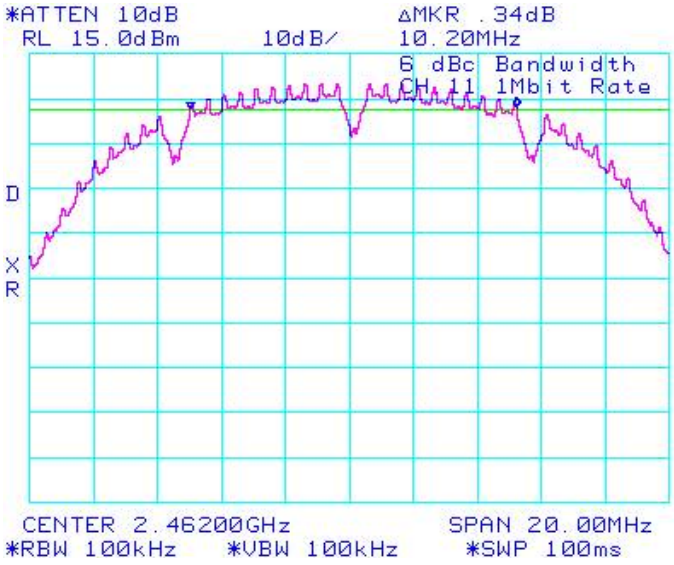


Figure 4-3: 6 dB Bandwidth

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

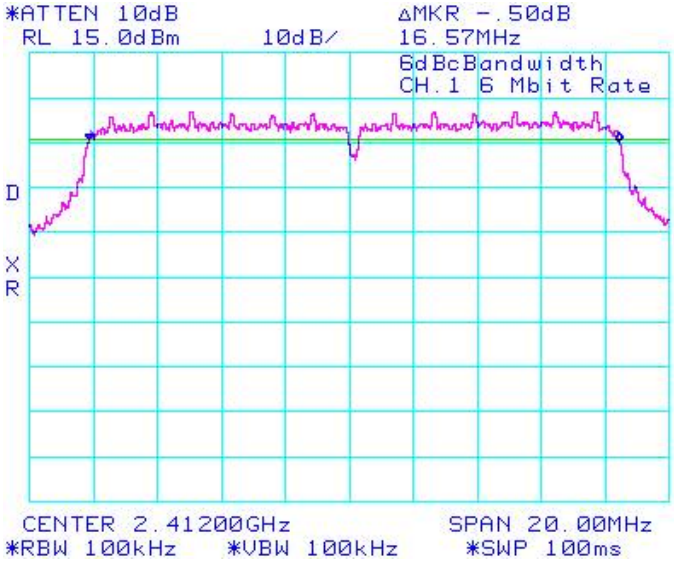


Figure 4-5: 6 dB Bandwidth
802.11g, Channel 6, 6 Mbps

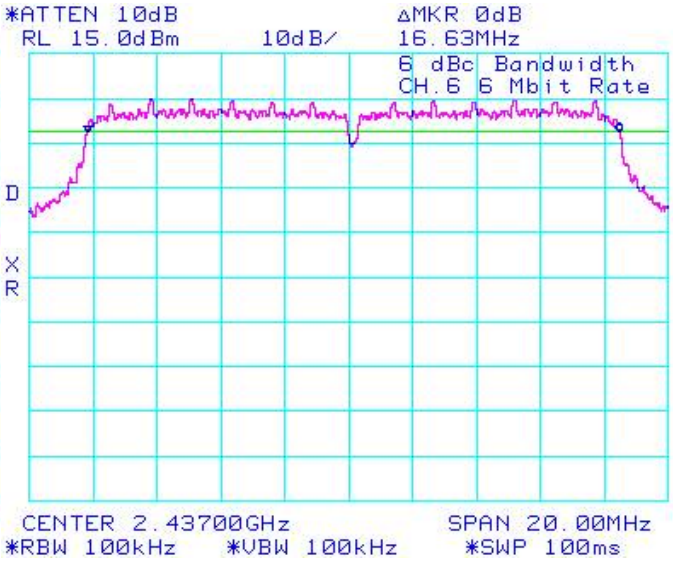
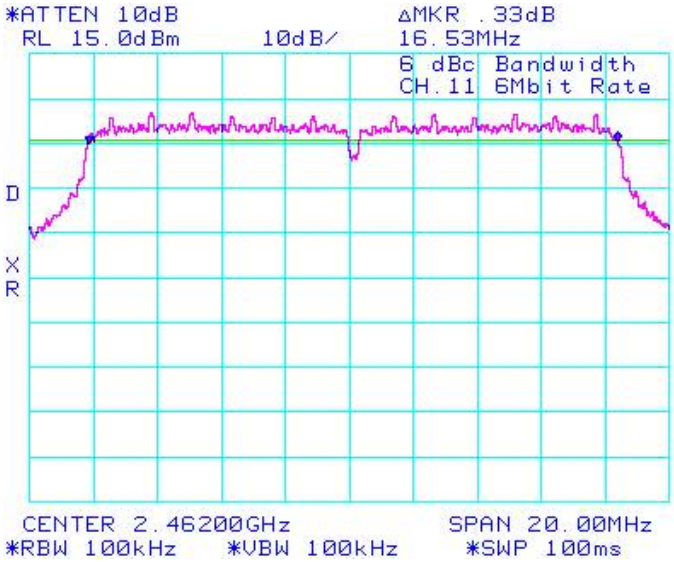


Figure 4-6: 6 dB Bandwidth
802.11g, Channel 11, 6 Mbps



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 11Mbps 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	17.40	54.95
	5.5 Mbps	< 1.00	17.35	54.33
	11 Mbps	< 1.00	17.37	54.58
	6 Mbps	< 1.00	13.53	22.54
	24 Mbps	< 1.00	13.44	22.08
	54 Mbps	< 1.00	12.40	17.38
6	1 Mbps	< 1.00	17.47	55.85
	5.5 Mbps	< 1.00	17.47	55.85
	11 Mbps	< 1.00	17.44	55.46
	6 Mbps	< 1.00	16.30	42.66
	24 Mbps	< 1.00	13.77	23.82
	54 Mbps	< 1.00	12.41	17.42
11	1 Mbps	< 1.00	17.67	58.48
	5.5 Mbps	< 1.00	17.45	55.59
	11 Mbps	< 1.00	17.40	54.95
	6 Mbps	< 1.00	13.50	22.39
	24 Mbps	< 1.00	13.46	22.18
	54 Mbps	< 1.00	12.40	17.38

The environmental test conditions were:

Temperature	24ºC
Pressure	1014 mb
Relative Humidity	31%

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 11Mbps 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	-41.17	-21.17
	5.5 Mbps	< -20	-43.18	-23.18
	11 Mbps	< -20	-44.66	-24.66
	6 Mbps	< -20	-31.00	-11.00
	24 Mbps	< -20	-31.16	-11.16
	54 Mbps	< -20	-31.17	-11.17
11	1 Mbps	< -20	-46.33	-26.33
	5.5 Mbps	< -20	-38.67	-18.67
	11 Mbps	< -20	-50.83	-30.83
	6 Mbps	< -20	-42.17	-22.17
	24 Mbps	< -20	-44.00	-24.00
	54 Mbps	< -20	-42.66	-22.66

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	23ºC
Pressure	1014 mb
Relative Humidity	33%

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

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

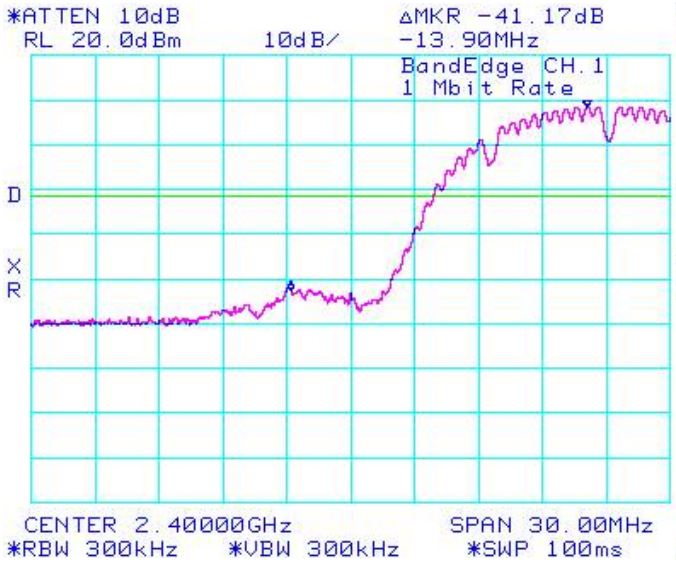


Figure 4-8: Band Edge Compliance
802.11b, Channel 11, 1 Mbps

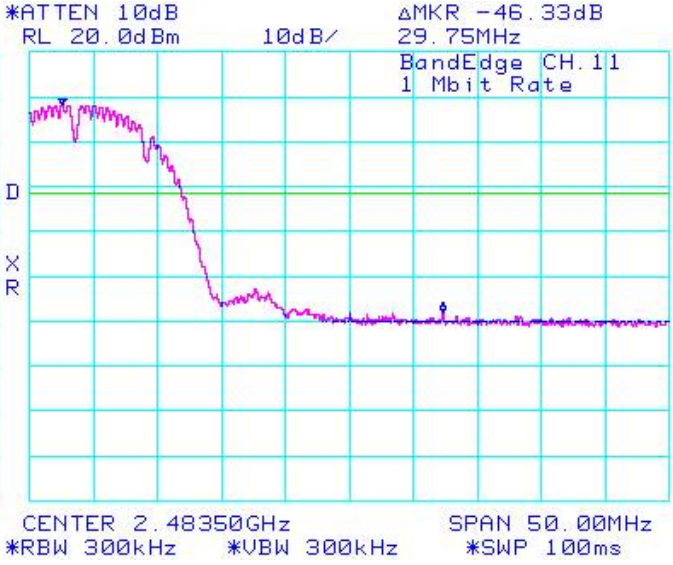


Figure 4-9: Band Edge Compliance
802.11g, Channel 1, 6 Mbps

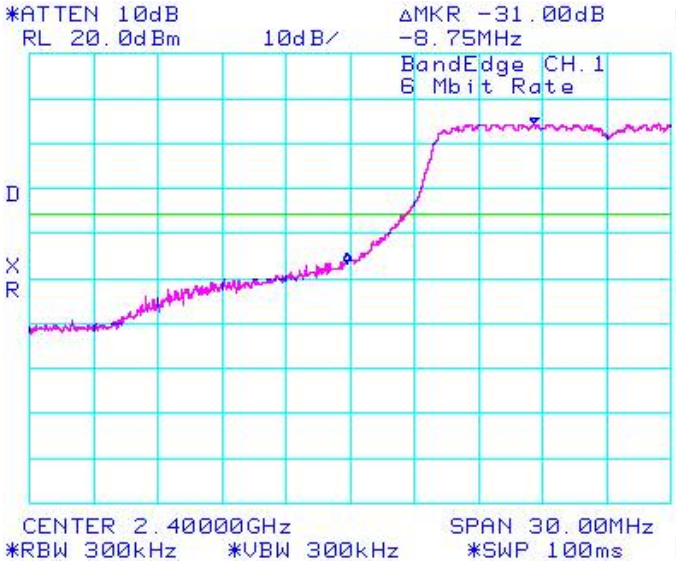
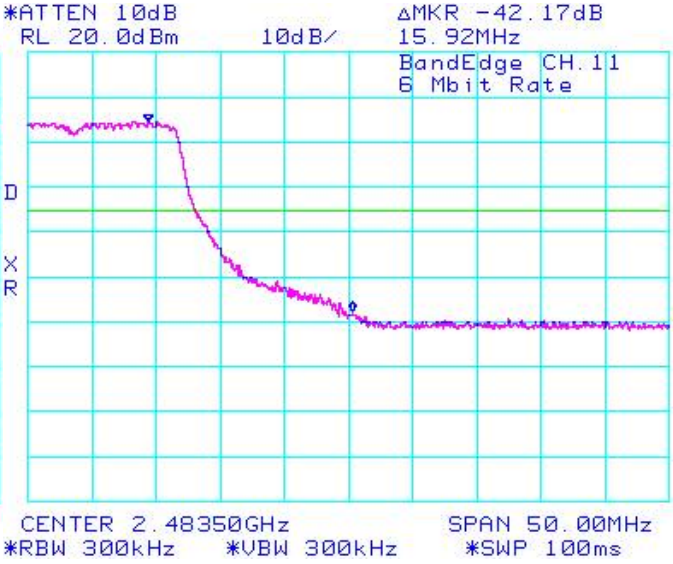


Figure 4-10: Band Edge Compliance
802.11g, Channel 11, 6 Mbps



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 11Mbps 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	-5.17	13.17
	5.5 Mbps	< 8.00	-6.33	14.33
	11 Mbps	< 8.00	-6.50	14.50
	6 Mbps	< 8.00	-10.67	18.67
	24 Mbps	< 8.00	-10.50	18.50
	54 Mbps	< 8.00	-11.67	19.67
6	1 Mbps	< 8.00	-5.00	13.00
	5.5 Mbps	< 8.00	-6.17	14.17
	11 Mbps	< 8.00	-6.50	14.50
	6 Mbps	< 8.00	-8.00	16.00
	24 Mbps	< 8.00	-10.00	18.00
	54 Mbps	< 8.00	-11.83	19.83
11	1 Mbps	< 8.00	-5.17	13.17
	5.5 Mbps	< 8.00	-6.33	14.33
	11 Mbps	< 8.00	-6.17	14.17
	6 Mbps	< 8.00	-11.00	19.00
	24 Mbps	< 8.00	-10.83	18.83
	54 Mbps	< 8.00	-11.83	19.83

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	22ºC
Pressure	1014 mb
Relative Humidity	32%

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

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

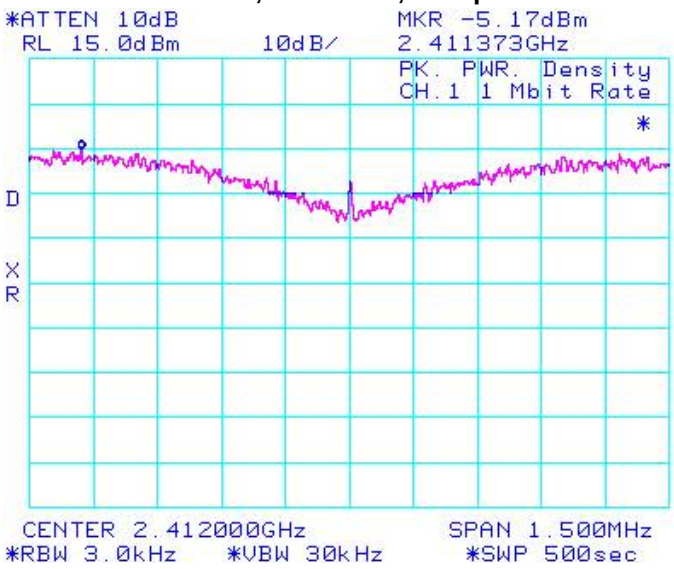


Figure 4-12: Peak Power Spectral Density
802.11b, Channel 6, 1 Mbps

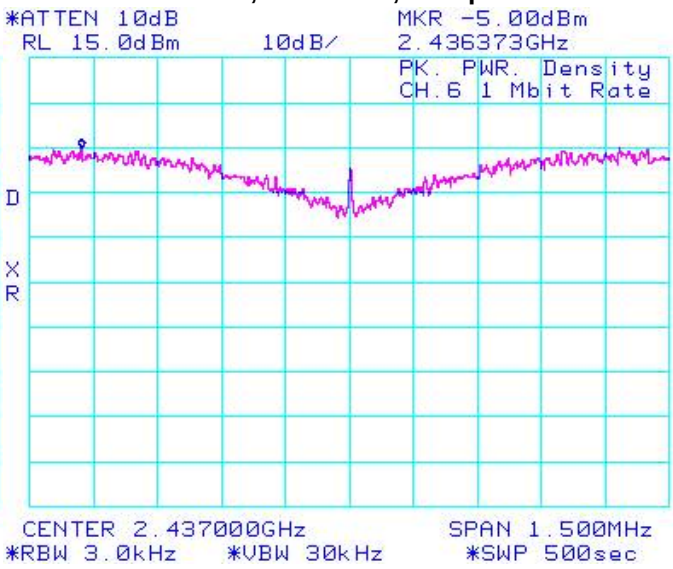
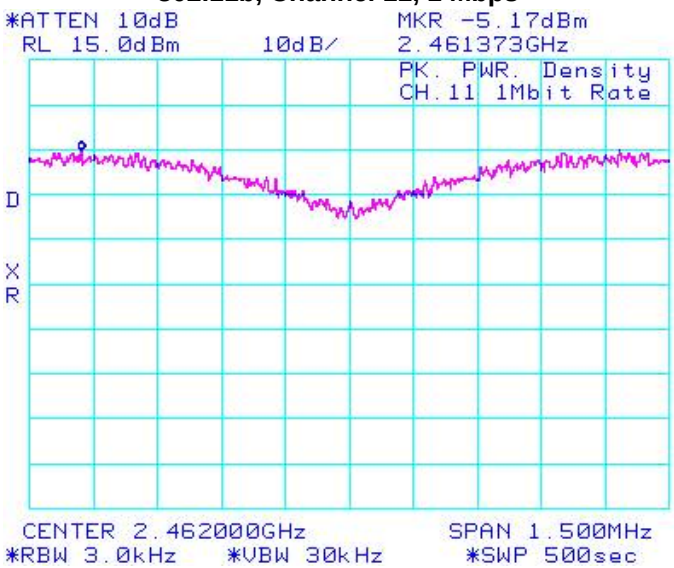


Figure 4-13: Peak Power Spectral Density
802.11b, Channel 11, 1 Mbps



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

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

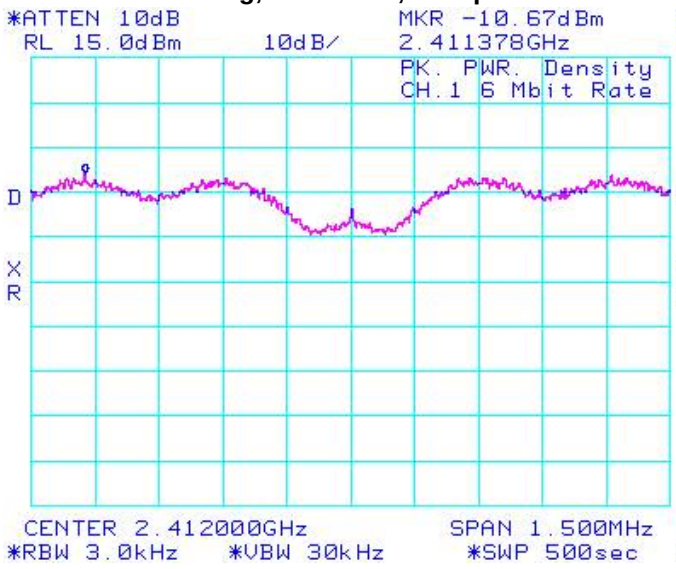


Figure 4-15: Peak Power Spectral Density
802.11g, Channel 6, 6 Mbps

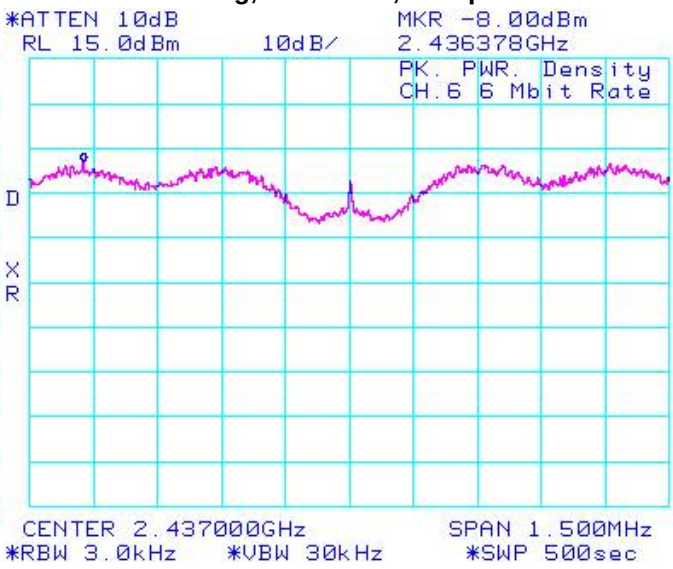
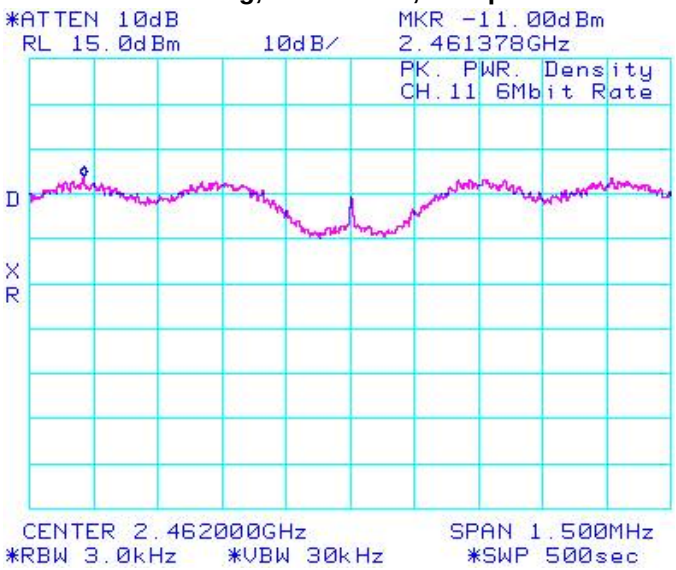


Figure 4-16: Peak Power Spectral Density
802.11g, Channel 11, 6 Mbps



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	Peak Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
1	1 Mbps	17.40	-38.67	-56.07	-20
	5.5 Mbps	17.35	-39.00	-56.35	-20
	11 Mbps	17.37	-38.83	-56.20	-20
	6 Mbps	13.53	-38.33	-51.86	-20
	24 Mbps	13.44	-38.50	-51.94	-20
	54 Mbps	12.40	-38.67	-51.07	-20
6	1 Mbps	17.47	-38.83	-56.30	-20
	5.5 Mbps	17.47	-38.67	-56.14	-20
	11 Mbps	17.44	-38.67	-56.11	-20
	6 Mbps	16.30	-38.83	-55.13	-20
	24 Mbps	13.77	-38.17	-51.94	-20
	54 Mbps	12.41	-38.50	-50.91	-20
11	1 Mbps	17.67	-38.67	-56.34	-20
	5.5 Mbps	17.45	-38.50	-55.95	-20
	11 Mbps	17.40	-38.33	-55.73	-20
	6 Mbps	13.50	-38.67	-52.17	-20
	24 Mbps	13.46	-39.17	-52.63	-20
	54 Mbps	12.40	-39.17	-51.57	-20

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	1013 mb
Relative Humidity	31%

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

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

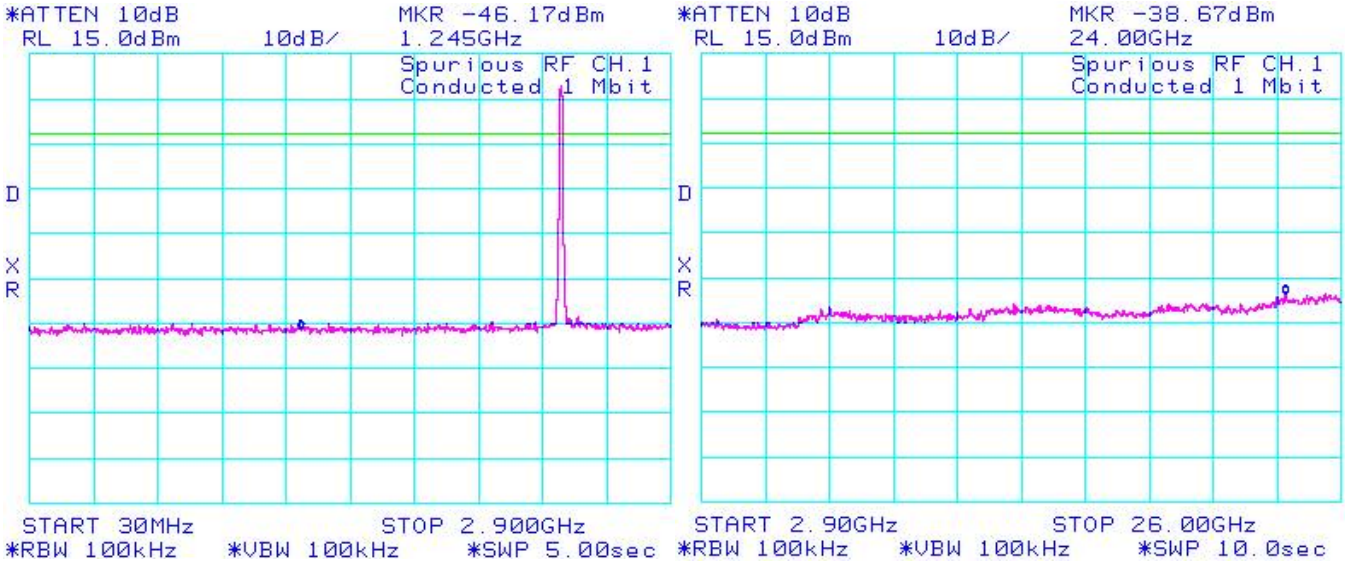
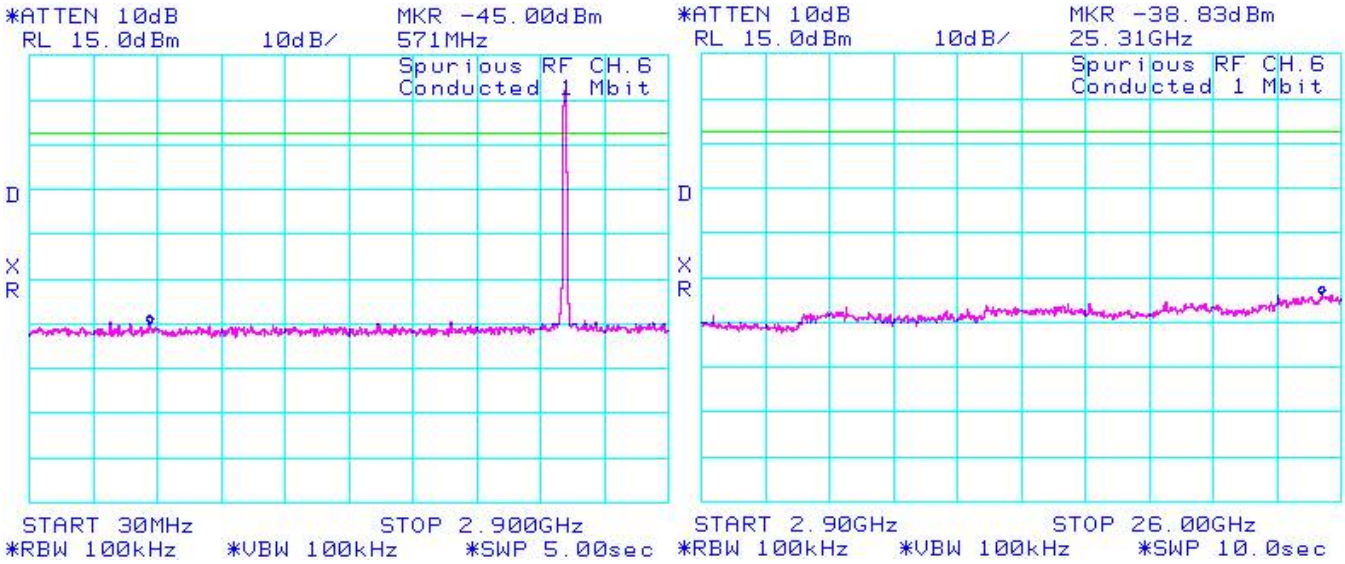


Figure 4-18 : Spurious Conducted RF Emissions
802.11b, Channel 6, 1 Mbps



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

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

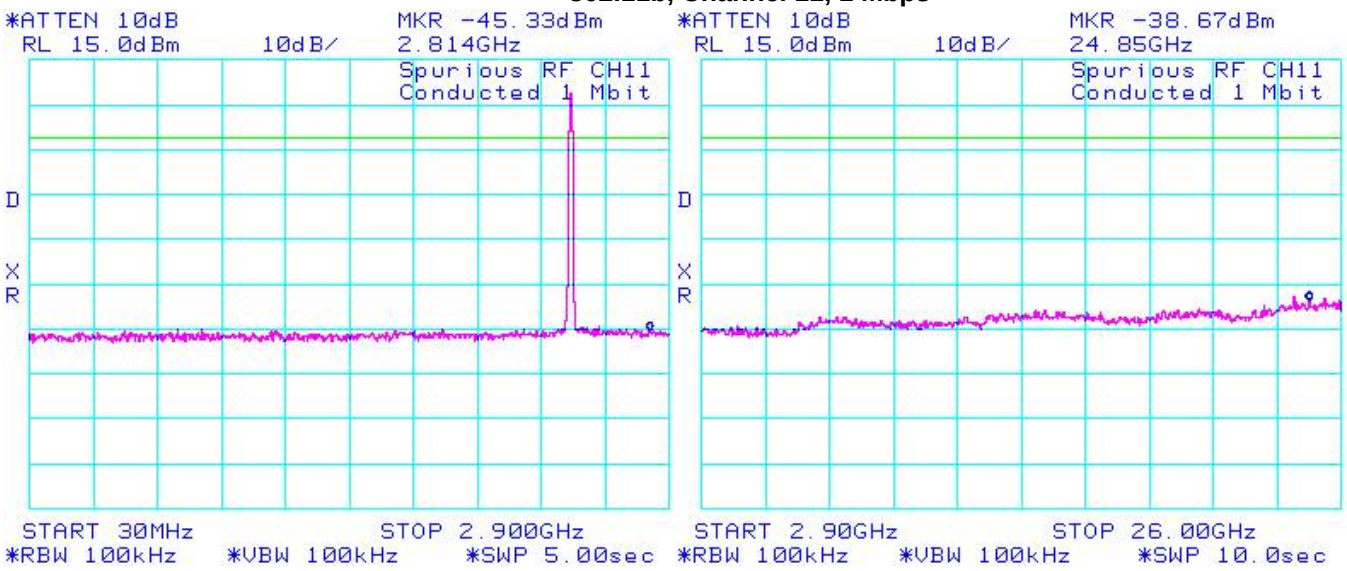
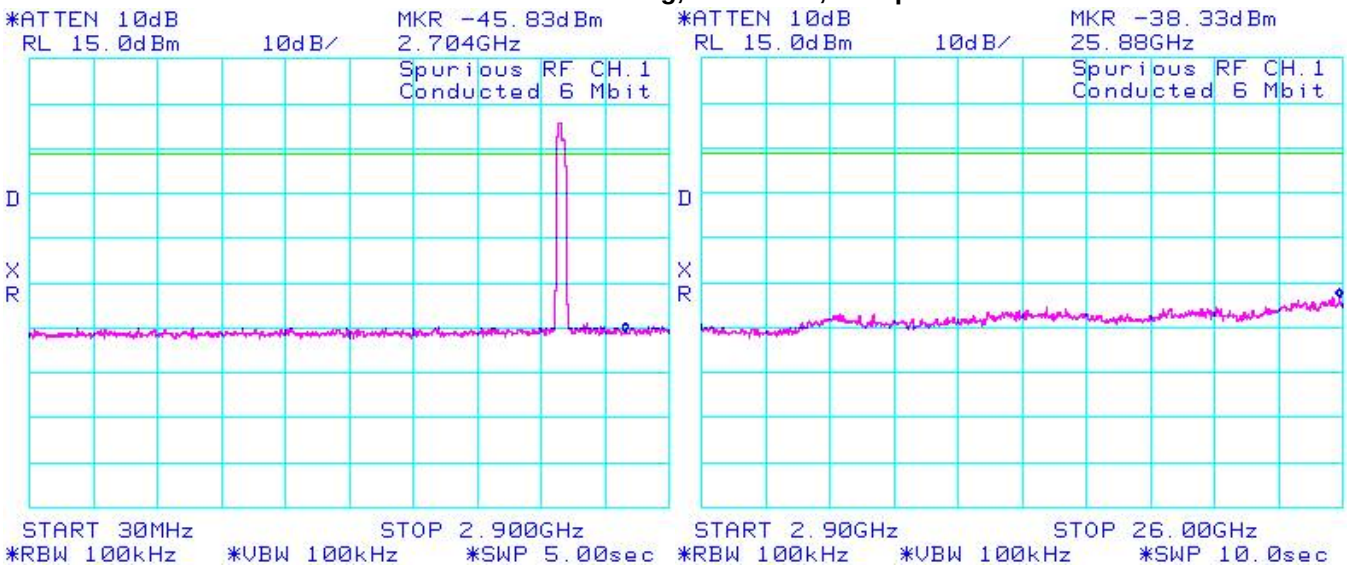


Figure 4-20: Spurious Conducted RF Emissions
802.11g, Channel 1, 6 Mbps



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

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

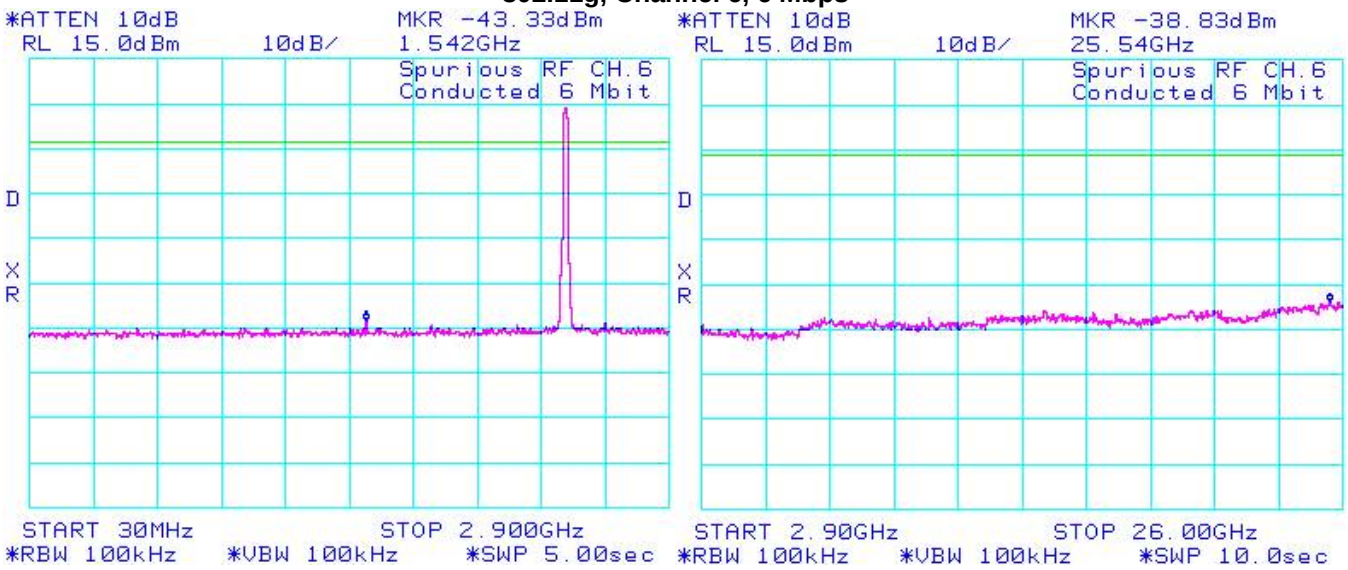


Figure 4-22: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps