EMI Test Report

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

A division of Research In Motion Limited

REPORT NO.: RTS-6011-1209-07

PRODUCT MODEL NO.: RFG81UW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARFG80UW
IC: 2503A-RFG80UW

DATE: October 15, 2012

RTS is accredited according to EN ISO/IEC 17025 by:

592

Statement of Performance:

The BlackBerry® smartphone, model RFG81UW, part number CER-48928-001 Rev3, and its accessories perform within the requirements of the test standards when configured and operated under RIM's operation instructions.

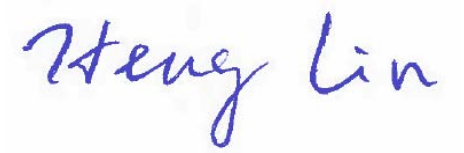
Declaration:

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

Documented by:

Savtej S. Sandhu
Regulatory Compliance Specialist
Date: October 15, 2012

Reviewed by:



Heng Lin
Regulatory Compliance Specialist
Date: October 15, 2012

Reviewed and Approved by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: October 16, 2012

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A. Scope

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

- FCC CFR 47 Part 15, Subpart C, October, 2011
- FCC CFR 47 Part 15, Subpart E, October, 2011
- Industry Canada, RSS-210, Issue 8, December 2010, Licence-exempt Radio Apparatus
- Industry Canada, RSS-GEN, Issue 3, December 2010, General Requirements and Information for the Certification of Radio Apparatus

B. Associated Documents

1) RFG81UW_HW_Declaration_CER-48928-001_Rev3
2) MultiSourceDeclaration_RFG81UW_b1917
3) MultiSourceDeclaration_RFG81UW_b171
4) MultiSourceDeclaration_RFG81UW_b218
5) Test Report TR2-0037-12-1-1J
6) Test Report TR2-0037-12-1-1J-A4
7) Test Report TR2-0037-12-1-1JJ
8) Test Report TR2-0037-12-1-1JJ-A4
9) Test Report TR2-0037-12-1-1k
10) Test Report TR2-0037-12-1-1k-A4
11) Test Report TR2-0037-12-1-1L
12) Test Report TR2-0037-12-1-1L-A4
13) Test Report TR2-0037-12-1-1m
14) Test Report TR2-0037-12-1-1m-A4

C. Product Identification

Manufactured by Research In Motion Limited whose headquarters is located at:
295 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906

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

RIM Testing Services EMI test facilities

305 Phillip Street	440 Phillip Street
Waterloo, Ontario	Waterloo, Ontario
Canada, N2L 3W8	Canada, N2L 5R9
Phone: 519 888 7465	Phone: 519 888 7465
Fax: 519 888 6906	Fax: 519 888 6906

The testing was performed from July 12, 24-26, August 14, 21, 22, September 17, and October 03, 2012.

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN	SOFTWARE
1a	RFG81UW	CER-48928-001 Rev2	2A4A5504	OS Version: 10.0.6.420 Bundle 420
1b	RFG81UW	CER-48928-001 Rev2	2A4A5504	OS Version: 10.0.6.1917 Bundle 1917
2	RFG81UW	CER-48928-001 Rev2	2A4A59C6	OS Version: 10.0.7.171 Bundle 171
3	RFG81UW	CER-48928-001 Rev3	2A918B37	OS Version: 10.0.9.218 Bundle 218

Conducted Emissions testing was performed on samples 1a and 1b.
Near Field Communications testing was performed on sample 1a.
AC Line Conducted Emissions testing was performed on samples 2 and 3.

Only the characteristics that may have been affected by the changes from RFG81UW Rev2 to RFG81UW Rev3 were re-tested.
For more details, refer to RFG81UW_HW_Declaration_CER-48928-001_Rev3.

To view the differences between software bundles for RFG81UW, see document MultiSourceDeclaration_RFG81UW_b1917, MultiSourceDeclaration_RFG81UW_b171 and MultiSourceDeclaration_RFG81UW_b218.

BlackBerry® smartphone Accessories Tested

1) World Wide Travel Charger, part number HDW 34725-001, with an output voltage of 5.0 volts, dc, 2A.
2) Wired Headset, part number HDW-44306-001, with a lead length of 1.1 metres.
3) Alt. 2 Wired Headset, part number HDW-44306-003, with a lead length of 1.1 metres.
4) Alt. Fixed Blade Charger, part number HDW-47725-001, with an output voltage of 5.0 volts, dc, 850mA.
5) USB Data Cable, part number HDW-48415-001, 1.0 metre long.
6) HDMI Cable, part number HDW-29572-001, 1.8 metres long.
7) Bat. LS1, part number BAT-47277-001.

D. Support Equipment Used for the Testing of the EUT

1) Philips Monitor, type MWE12244T, product ID 2444E1SB/27

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	5 and See Test Report TR2-0037-12-1-1J TR2-0037-12-1-1k TR2-0037-12-1-1L
Part 15.209 Part 15.247	RSS-210 RSS-GEN	BT/BLE Radiated Spurious Emissions	Pass	See Test Report TR2-0037-12-1-1J TR2-0037-12-1-1J-A4 TR2-0037-12-1-1JJ TR2-0037-12-1-1JJ-A4
Part 15.209 Part 15.247	RSS-210 RSS-GEN	BT/BLE Radiated Band Edge Compliance	Pass	See Test Report TR2-0037-12-1-1J TR2-0037-12-1-1J-A4 TR2-0037-12-1-1JJ TR2-0037-12-1-1JJ-A4
Part 15.209 Part 15.247	RSS-210 RSS-GEN	802.11b/g/n Radiated Spurious Emissions	Pass	See Test Report TR2-0037-12-1-1k TR2-0037-12-1-1k-A4
Part 15.209 Part 15.247	RSS-210 RSS-GEN	802.11b/g/n Radiated Band Edge Compliance	Pass	See Test Report TR2-0037-12-1-1k TR2-0037-12-1-1k-A4
Part 15.209 Part 15.407	RSS-210 RSS-GEN	802.11a Radiated Spurious Emissions	Pass	See Test Report TR2-0037-12-1-1L TR2-0037-12-1-1L-A4
Part 15.209 Part 15.407	RSS-210 RSS-GEN	802.11a Radiated Band Edge Compliance	Pass	See Test Report TR2-0037-12-1-1L TR2-0037-12-1-1L-A4
Part 15.247(a)	RSS-210	BT, 20 dB Bandwidth	Pass	1
Part 15.247(a)	RSS-210	BT, Carrier Frequency Separation	Pass	1
Part 15.247(a)	RSS-210	BT, Number of Hopping Frequencies	Pass	1
Part 15.247(a)	RSS-210	BT, Time of Occupancy (Dwell Time)	Pass	1
Part 15.247(b)	RSS-210	BT, Maximum Peak Conducted Output Power	Pass	1
Part 15.247(c)	RSS-210	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	1
Part 15.247(c)	RSS-210	BT, Spurious RF Conducted Emissions	Pass	1

Test Results Chart cont'd

SPECIFICATION		TEST TYPE	Meets Requirements	TEST DATA
FCC CFR 47	IC			APPENDIX
Part 15.247(a)	RSS-210	BLE, 6 dB Bandwidth	Pass	1
Part 15.247(b)	RSS-210	BLE, Maximum Conducted Output Power	Pass	1
Part 15.247(c)	RSS-210	BLE, Band-Edge	Pass	1
Part 15.247(d)	RSS-210	BLE, Peak Power Spectral Density	Pass	1
Part 15.247(c)	RSS-210	BLE, Spurious RF Conducted Emissions	Pass	1
Part 15.247(a)	RSS-210	802.11b/g/n, 6 dB Bandwidth	Pass	2
Part 15.247(b)	RSS-210	802.11b/g/n, Maximum Conducted Output Power	Pass	2
Part 15.247(c)	RSS-210	802.11b/g/n, Band-Edge	Pass	2
Part 15.247(d)	RSS-210	802.11b/g/n, Peak Power Spectral Density	Pass	2
Part 15.247(c)	RSS-210	802.11b/g/n, Spurious RF Conducted Emissions	Pass	2
Part 15.407	RSS-210	802.11a, 6 dB Bandwidth	Pass	3
Part 15.407	RSS-210	802.11a, Maximum Conducted Output Power	Pass	3
Part 15.407	RSS-210	802.11a, Band-Edge	Pass	3
Part 15.407	RSS-210	802.11a, Peak Power Spectral Density	Pass	3
Part 15.407	RSS-210	802.11a, Spurious RF Conducted Emissions	Pass	3
Part 15.209 Part 15.225(a)	RSS-210 RSS-GEN	Near Field Communications, Radiated Emissions	Pass	See Test Report TR2-0037-12-1-1m TR2-0037-12-1-1m-A4
Part 15.225(e)	RSS-210	Near Field Communications, Occupied Bandwidth	Pass	4
Part 15.225(e)	RSS-210	Near Field Communications, Frequency Stability	Pass	4

F. Summary of Results

1) i) BLUETOOTH RF CONDUCTED EMISSIONS

The Bluetooth conducted RF emissions from the BlackBerry® smartphone were measured using the methods outlined in FCC CFR 47 Part 15, Subpart C.

a) 20 dB Bandwidth
The BlackBerry® smartphone met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR. The worst case 20 dB Bandwidth was 0.923 MHz for channels 39 and 78 in normal data rate mode and 1.319 MHz for channel 78 in EDR mode.
See APPENDIX 1 for the test data.

b) Carrier Frequency Separation
The BlackBerry® smartphone met the requirements of the carrier frequency separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. The result includes both normal data rate and EDR.
See APPENDIX 1 for the test data.

c) Number of Hopping Frequencies
The BlackBerry® smartphone met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. The number of hopping channels measured was 79.
See APPENDIX 1 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 1 for the test data.

e) Maximum Peak Conducted Output Power
The BlackBerry® smartphone met the requirements of the maximum peak conducted output power as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR. The worst case Conducted Output Power level was 8.40 dBm (0.00692 W) for Channel 78 in normal data rate mode and 8.07 dBm (0.00641 W) for channel 78 in EDR mode.
See APPENDIX 1 for the test data.

f) Band-Edge Compliance of RF Conducted Emissions
The BlackBerry® smartphone met the requirements of the band-edge compliance of RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. Channels 0 and 78 were measured in frequency hopping (Euro/US) mode and single frequency mode. The result includes both normal data rate and EDR.
See APPENDIX 1 for the test data.

g) Spurious RF Conducted Emissions
The BlackBerry® smartphone met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. The frequency range measured was 10 MHz to 26 GHz. Low channel (0), middle channel (39) and high channel (78) were measured in single frequency mode and frequency hopping (Euro/US) mode. The result includes both normal data rate and EDR.
See APPENDIX 1 for the test data.

1) ii) BLUETOOTH LOW ENERGY RF CONDUCTED EMISSIONS

The Bluetooth Low Energy conducted RF emissions from the BlackBerry® smartphone were measured using the methods outlined in FCC CFR 47 Part 15, Subpart C.

a) 6dB Bandwidth
The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (20) and high channel (39) were measured. The worst case 6 dB Bandwidth was 0.682 MHz for channel 39.
See APPENDIX 1 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 (0), middle channel (20) and high channel (39) were measured. The worst case Conducted Output Power level was 7.60 dBm (0.00575 W) for channel 39.
See APPENDIX 1 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 (0) and high channel (39) were measured.
See APPENDIX 1 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 (0), middle channel (20) and high channel (39) were measured.
See APPENDIX 1 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 (0), middle channel (20) and high channel (39) were measured.
See APPENDIX 1 for the test data.

2) 802.11b/g/n RF CONDUCTED EMISSIONS

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

a) 6dB Bandwidth
The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. The worst case 6 dB Bandwidth was 11.06 MHz for channel 1 in 802.11b mode, 17.13 MHz for channels 6 in 802.11g mode, and 17.88 MHz for channel 6 in 802.11n mode.
See APPENDIX 2 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. The worst case Conducted Output Power level was 14.82 dBm (30.34 mW) for channels 6 and 11 in 802.11b mode, 14.70 dBm (29.51 mW) for channel 6 in 802.11g mode, and 14.65 dBm (29.17 mW) for channel 6 in 802.11n mode.
See APPENDIX 2 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 2 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 2 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 2 for the test data.

3) 802.11a RF CONDUCTED EMISSIONS

The 802.11a conducted RF emissions from the BlackBerry® smartphone were measured using the methods outlined in FCC CFR 47 Part 15, Subpart E.

a) 6 dB Bandwidth
The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.407 and RSS-210. Channels 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 were measured. The worst case 6 dB Bandwidth was 16.61 MHz for channel 165 in 802.11a mode.
See APPENDIX 3 for the test data.

b) Maximum Conducted Output Power
The EUT met the requirements of the maximum conducted output power as per 47 CFR 15.407 and RSS-210. Channels 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 were measured. The worst case Conducted Output Power level was 13.53 dBm (22.54 mW) for channel 36 in 802.11a mode.
See APPENDIX 3 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 15.407 and RSS-210. Channels 36, 48, 52, 64, 100, 149, 161 and 165 were measured.
See APPENDIX 3 for the test data.

d) Peak Power Spectral Density
The EUT met the requirements of peak power spectral density as per 47 CFR 15.407 and RSS-210. Channels 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 were measured.
See APPENDIX 3 for the test data.

e) Spurious RF Conducted Emissions
The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.407 and RSS-210. The frequency range measured was 30 MHz to 40 GHz. Channels 44, 60 and 157 were measured.
See APPENDIX 3 for the test data.

4) Near Field Communications (NFC)

The Near Field Communications emissions from the BlackBerry® smartphone were measured using the methods outlined in FCC CFR 47 Part 15, Subpart C.

a) Occupied Bandwidth
The EUT met the requirements of the Occupied bandwidth as per 47 CFR 15 C and RSS-210. The EUT was measured in test mode with modulation on and transmitting at 13.56 MHz.
See APPENDIX 4 for the test data.

b) Frequency Stability
The EUT met the requirements of the Frequency Stability as per 47 CFR 15.225(e) and RSS-210. The EUT was measured in test mode with modulation on and transmitting at 13.56 MHz.
See APPENDIX 4 for the test data.

5) AC LINE CONDUCTED EMISSIONS

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

The following test configurations were measured:

Test Configuration	Operating Mode(s)	Charger + Accessories
1	NFC Tx	World Wide Travel Charger + Wired Headset
2	BT Tx	Alt. Fixed Blade Charger + Wired Headset + 1.0m USB Cable + HDMI Cable + Monitor

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C and IC RSS-210 limits. The sample EUT had a worst case test margin of 12.08 dB below the QP limit at 1.365 MHz with the World Wide Travel Charger in Test Configuration 2.

See APPENDIX 5 for the test data.

Measurement Uncertainty ±3.2 dB

G. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
EMI Test Receiver	Rohde & Schwarz	ESIB 40	100255	12-12-08	Conducted/Radiated Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	12-12-07	Conducted/Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017301	13-08-23	Radiated Emissions
Horn Antenna	CMT	3116	R52734-001	14-08-02	Radiated Emissions
Horn Antenna	ETS-Lindgren	3117	2538	13-08-04	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	13-09-01	Radiated Emissions
Preamplifier	Sonoma	310N/11909A	185831	12-10-17	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	13-09-01	Radiated Emissions
L.I.S.N.	Rohde & Schwarz	ENV216	100060	13-10-25	Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0380561	12-10-20	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	13-01-03	Radiated Emissions
Spectrum Analyzer	HP	8563E	3745A08113	13-10-05	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	13-09-25	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0340060	12-10-20	RF Conducted Emissions
Environmental Chamber	Test Equity	107	0900246	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	119549	12-12-01	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100368	12-11-30	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100370	12-11-30	Radiated Emissions
Power Meter	Agilent	N1911A	MY45100951	13-08-16	RF Conducted / Frequency Stability
Power Sensor	Agilent	N1921A	MY45241383	13-09-11	RF Conducted / Frequency Stability
Digital Multimeter	Hewlett Packard	34401A	US36042324	12-11-16	Conducted/Radiated Emissions
Environment Monitor	Omega	iTHX-SD	0380567	12-10-20	Radiated Emissions

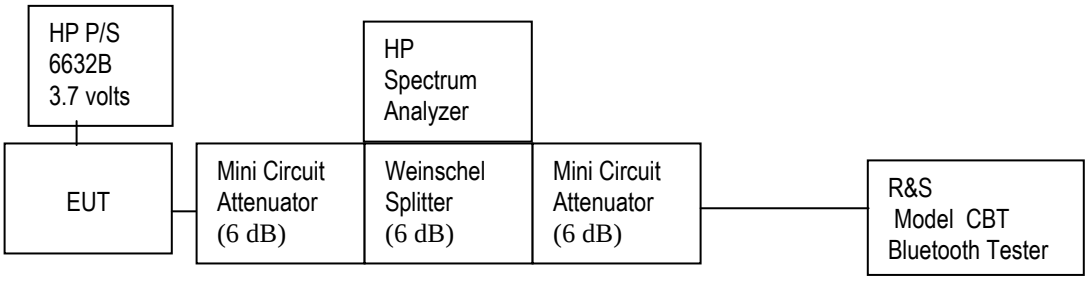
APPENDIX 1 – BLUETOOTH AND BLUETOOTH LOW ENERGY CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth RF Conducted Emission Test Results

Bluetooth power output from BlackBerry® smartphone was at maximum for all the recorded measurements shown below.
The measurements were performed by Berkin Can.

Date of test: July 12 and August 22, 2012

Test Setup Diagram



A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the attenuators and coaxial cable loss in the test circuit.

The environmental test conditions were: Temperature: 24 ºC
Relative Humidity: 47 %

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 PBRS" and packet type "DH5" during the measurements.

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.0	0.918
39	≤1.0	0.923
78	≤1.0	0.923

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

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

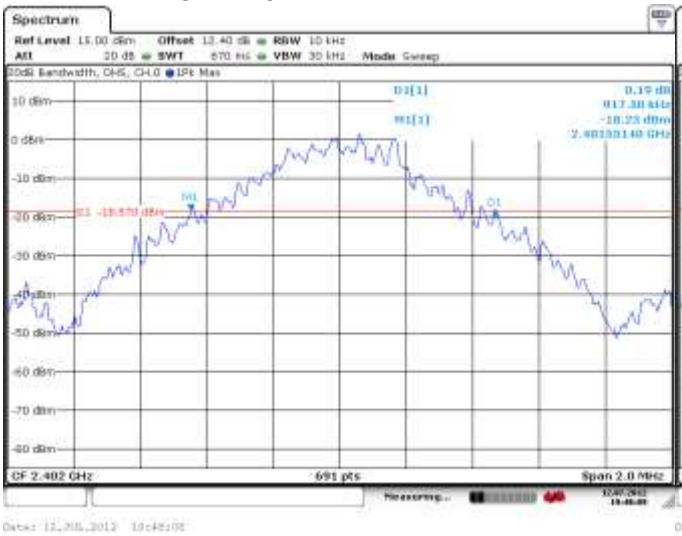
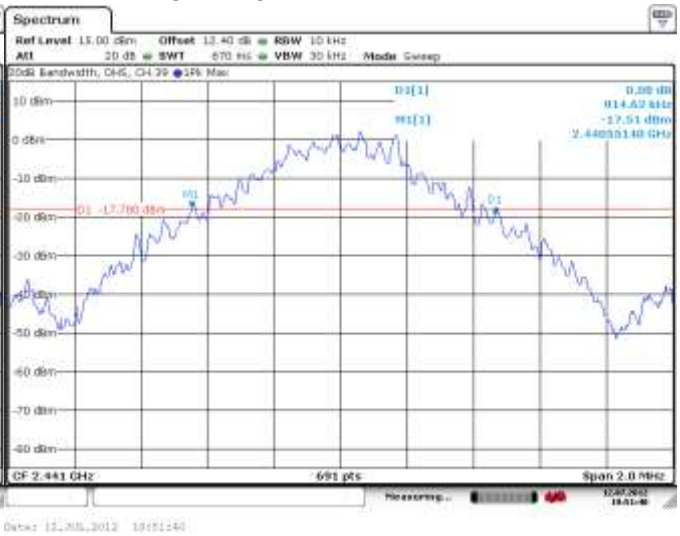
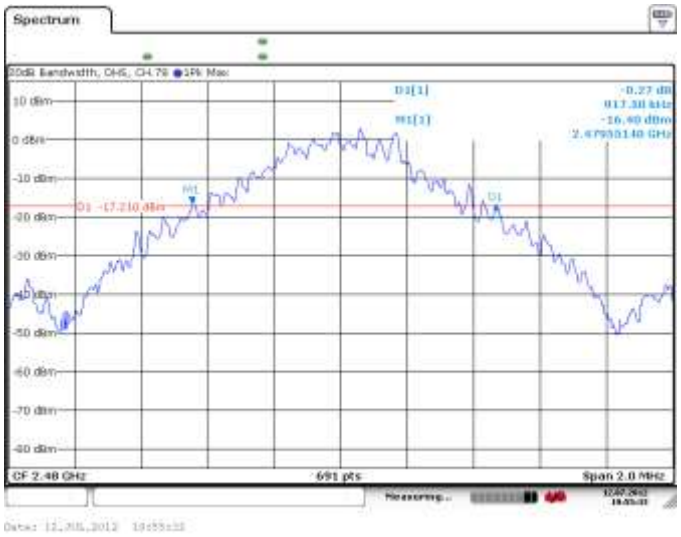


Figure 1-2: 20 dB Bandwidth
Single freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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



Using Pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.259
39	≤1.5	1.316
78	≤1.5	1.319

See figures 1-4 to 1-6 for the plots of the 20 dB bandwidth measurements.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-4: 20 dB Bandwidth
Single freq., Static PBRS, 2-DH5

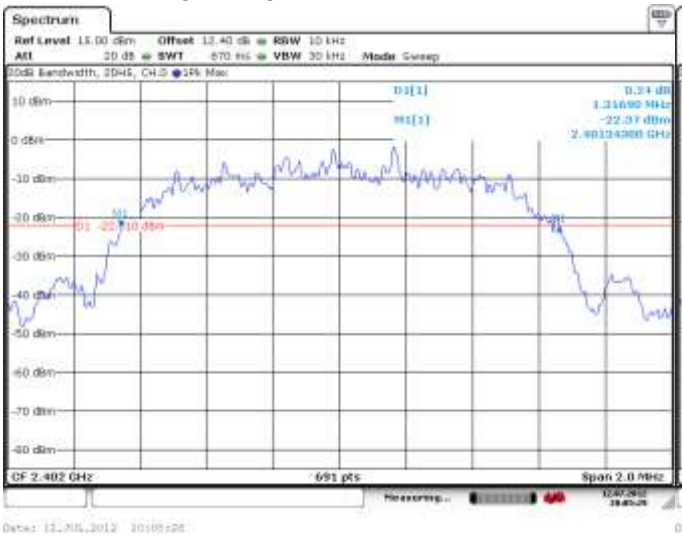


Figure 1-5: 20 dB Bandwidth
Single freq., Static PBRS, 2-DH5

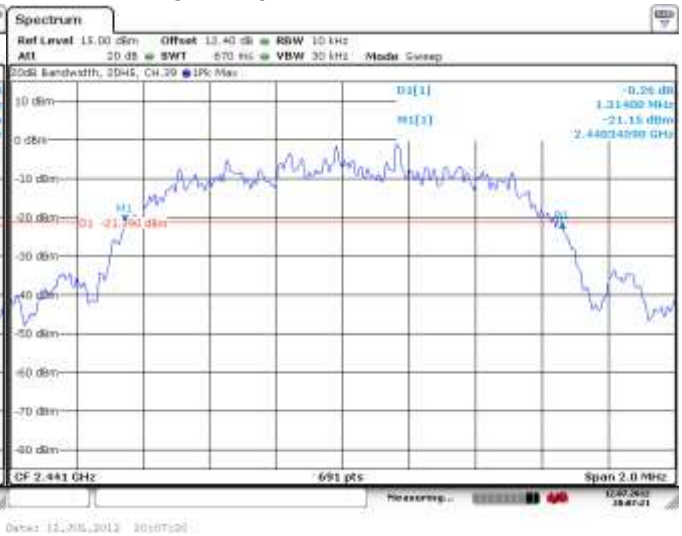
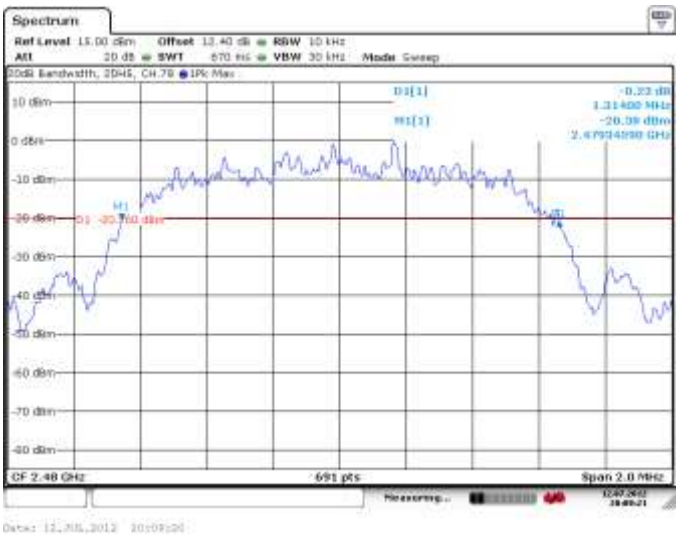


Figure 1-6: 20 dB Bandwidth
Single freq., Static PBRS, 2-DH5



Using Pattern type “Static PBRS” and packet type “3-DH5” during the measurements.

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.314
39	≤1.5	1.311
78	≤1.5	1.314

See figures 1-7 to 1-9 for the plots of the 20 dB bandwidth measurements.

Figure 1-7: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5

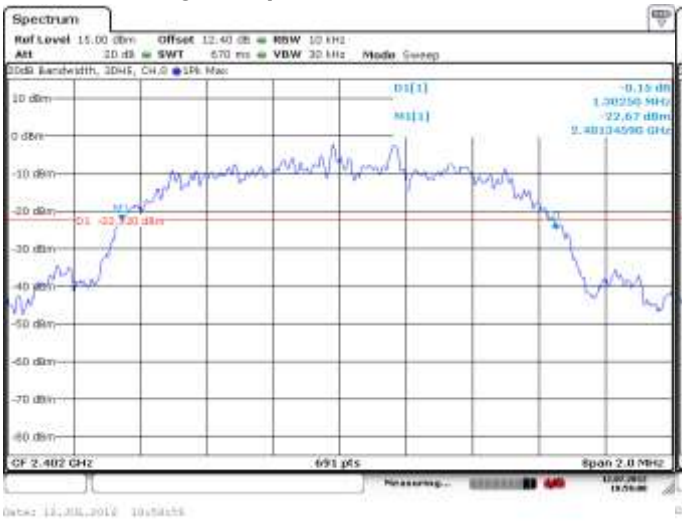


Figure 1-8: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5

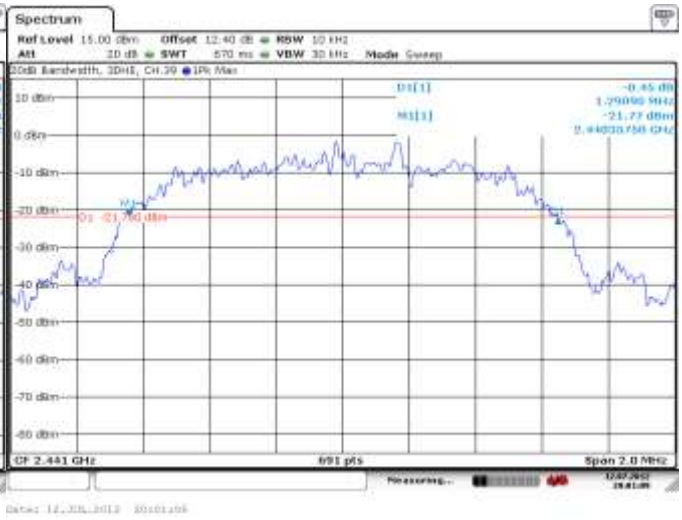
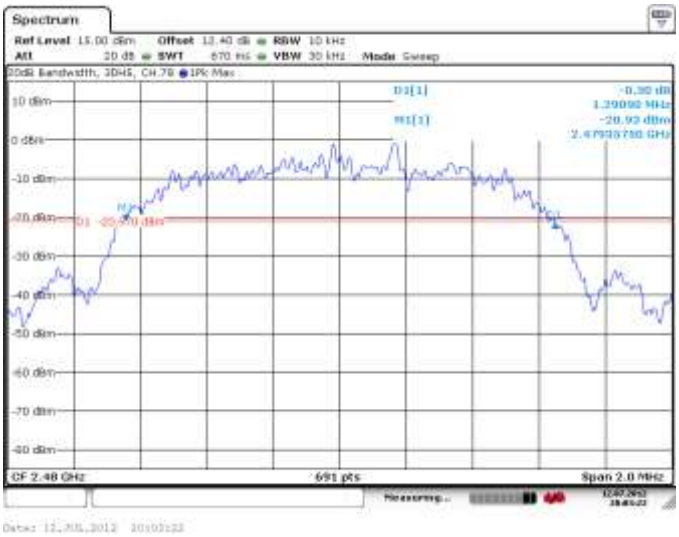


Figure 1-9: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

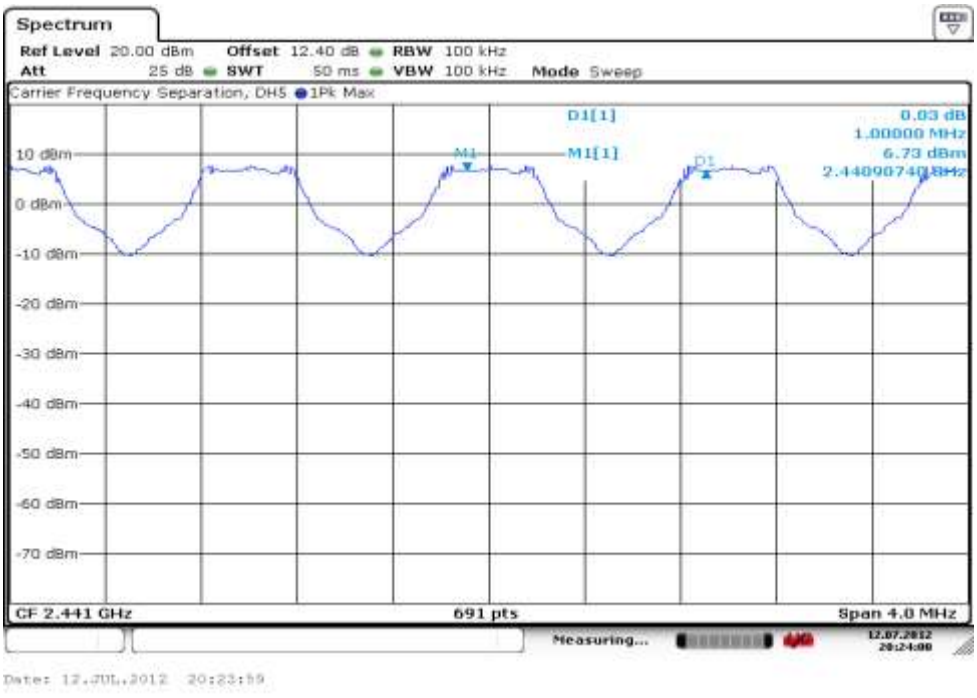
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.

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

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

See figure 1-10 for the plot of the Carrier Frequency Separation measurement.

Figure 1-10: Carrier Frequency Separation, Freq. Hopping, Static PBRS, DH5, Channels 38 to 39



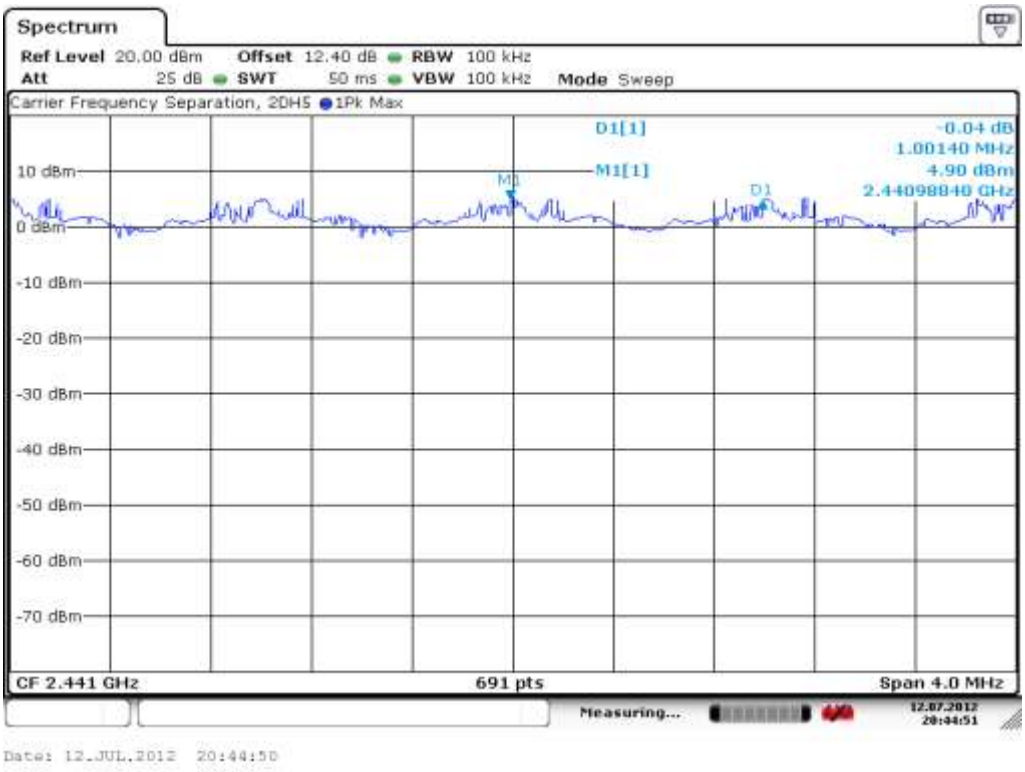
Bluetooth RF Conducted Emission Test Results cont'd

Using Pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

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

See figure 1-11 for the plot of the Carrier Frequency Separation measurement.

Figure 1-11: Carrier Frequency Separation, Freq. Hopping, Static PBRS, 2-DH5, Channels 38 to 39



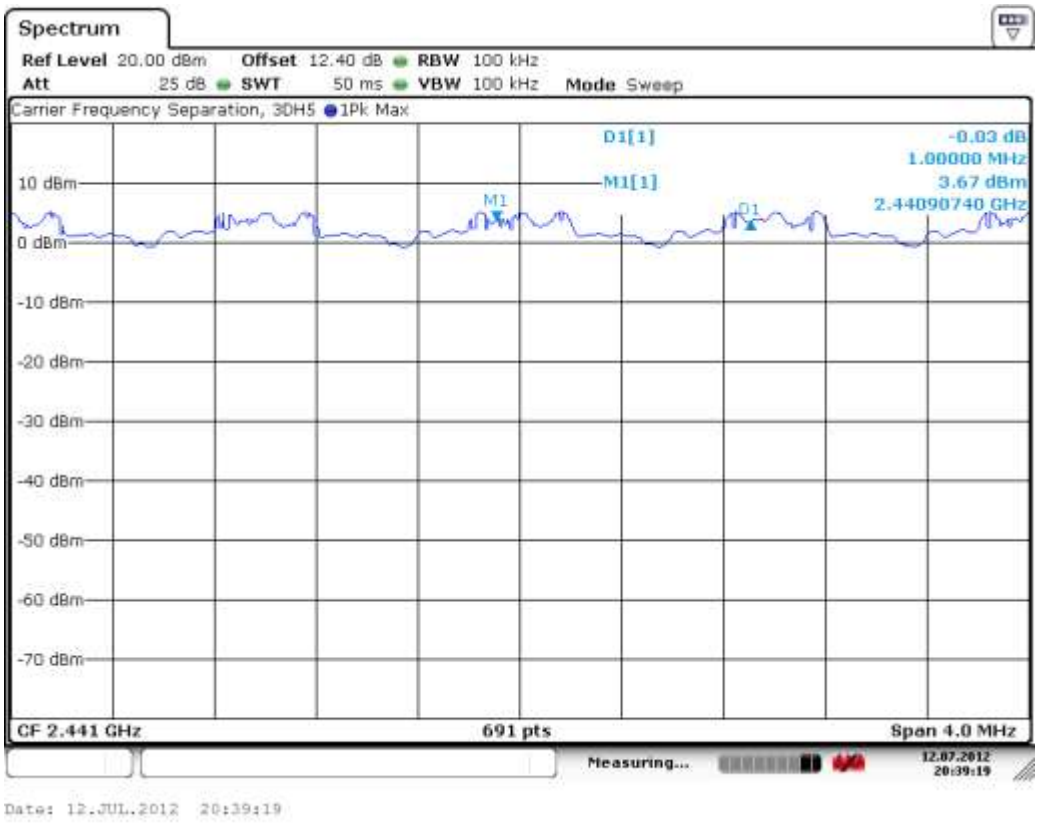
Bluetooth RF Conducted Emission Test Results cont'd

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

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

See figure 1-12 for the plot of the Carrier Frequency Separation measurement.

Figure 1-12: 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 PBRS" and packet type "DH5" during the measurements.

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

See figures 1-13 to 1-16 for the plots of the number of hopping frequencies.

Figure 1-13: Number of Hopping Frequencies Static PBRS, DH5

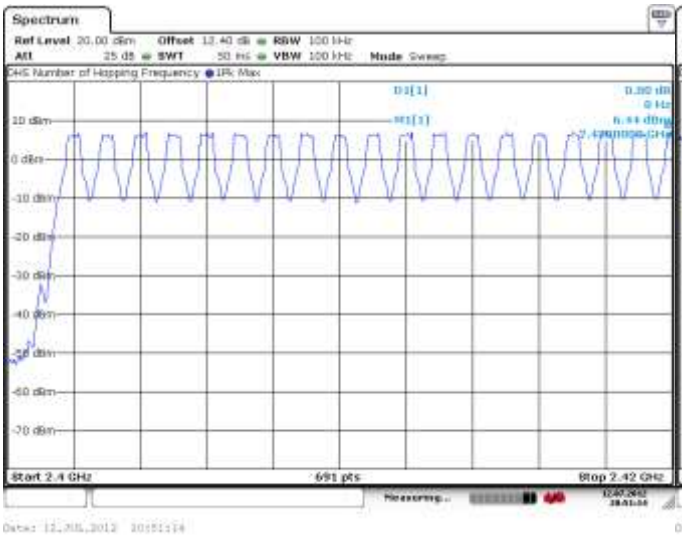
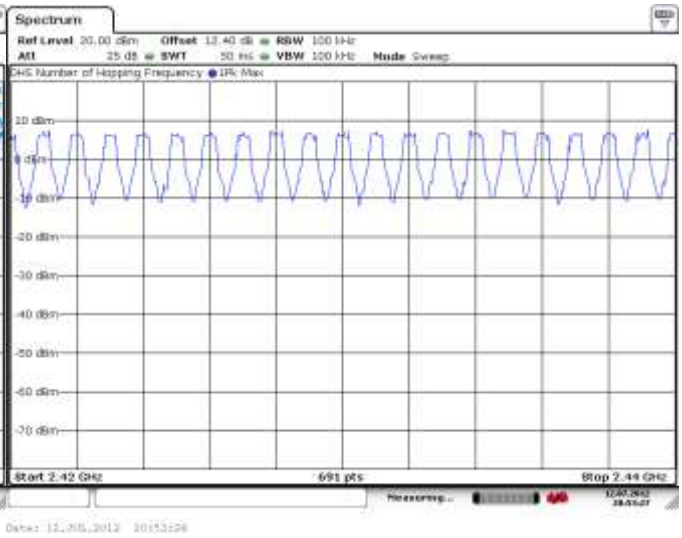


Figure 1-14: Number of Hopping Frequencies Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-15: Number of Hopping Frequencies Static PBRS, DH5

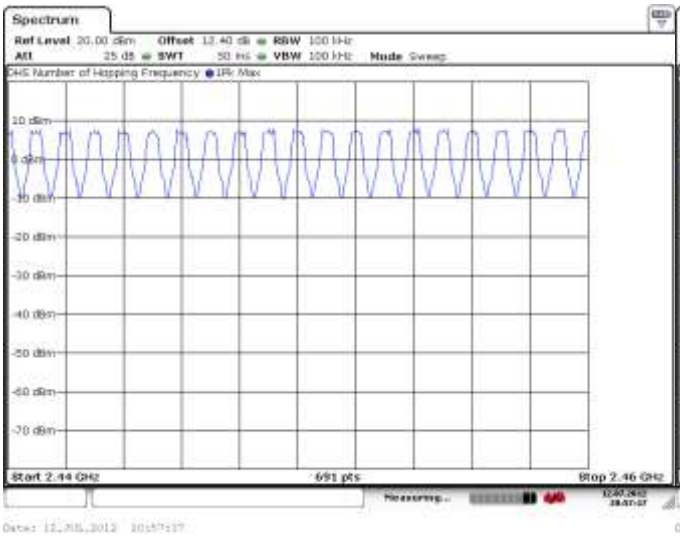
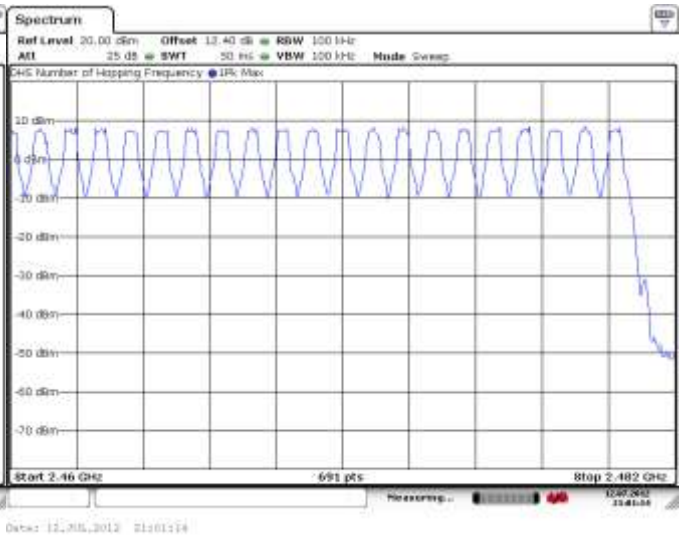


Figure 1-16: Number of Hopping Frequencies Static PBRS, DH5



Time of Occupancy (Dwell Time)

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

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

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

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

Bluetooth RF Conducted Emission Test Results cont'd

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.3986	0.3986 x 320.0 = 127.55	400	272.45
39	DH1	0.4129	0.4129 x 320.0 = 132.13	400	267.87
78	DH1	0.4097	0.4097 x 320.0 = 131.10	400	268.90
0	DH3	1.6646	1.6646 x 159.9 = 266.17	400	133.83
39	DH3	1.6696	1.6696 x 159.9 = 266.97	400	133.03
78	DH3	1.6609	1.6609 x 159.9 = 265.57	400	134.43
0	DH5	2.9130	2.9130 x 106.8 = 311.11	400	88.89
39	DH5	2.9217	2.9217 x 106.8 = 312.04	400	87.96
78	DH5	2.9217	2.9217 x 106.8 = 312.04	400	87.96

See figures 1-17 to 1-25 for the plots of the dwell time.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-17: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH1

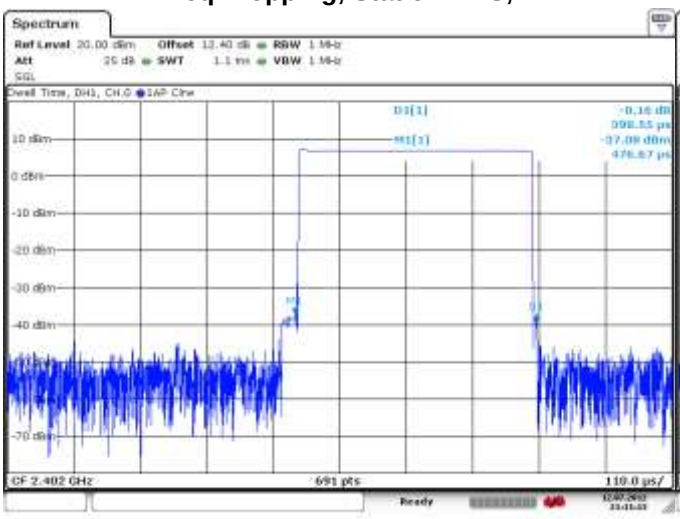
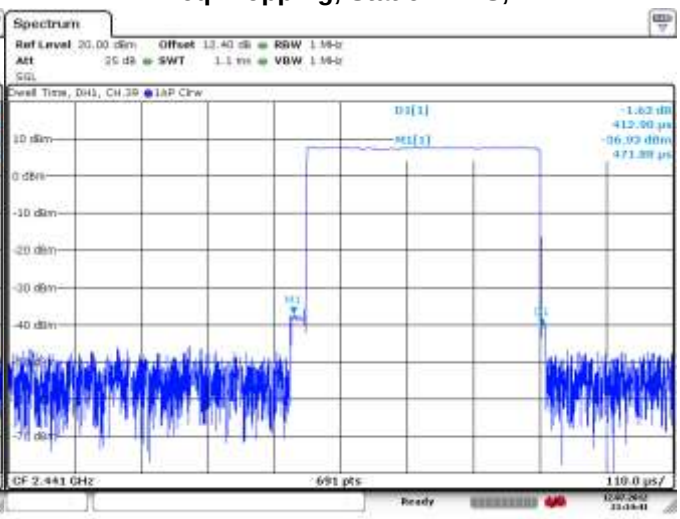


Figure 1-18: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH1



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-19: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH1

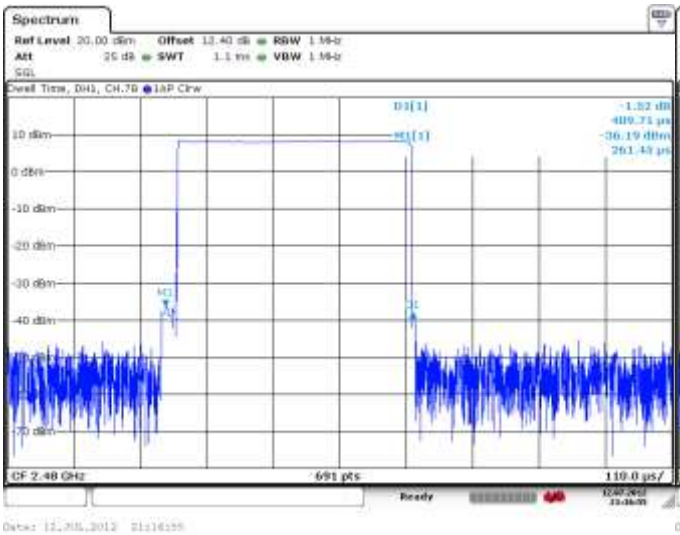


Figure 1-20: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH3

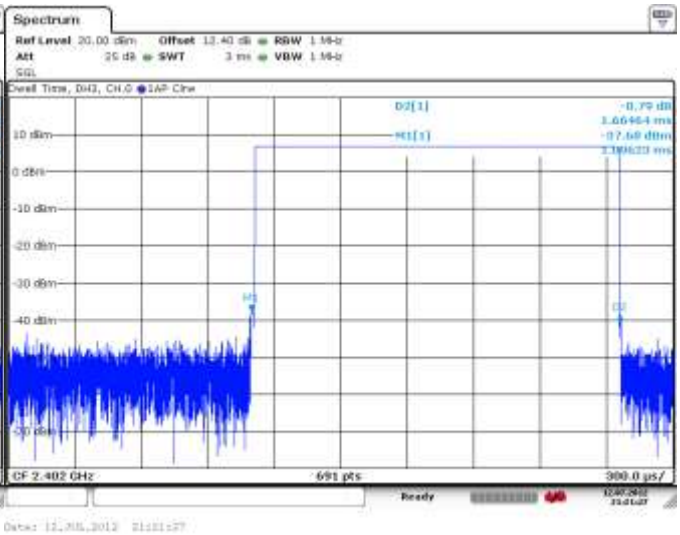


Figure 1-21: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH3

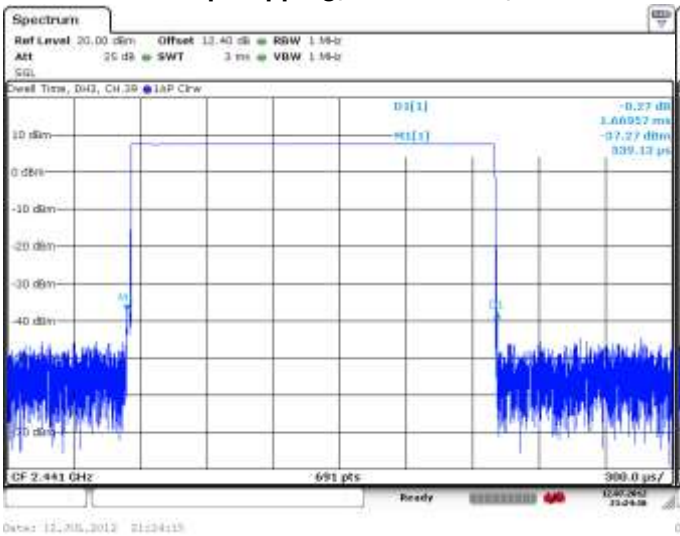
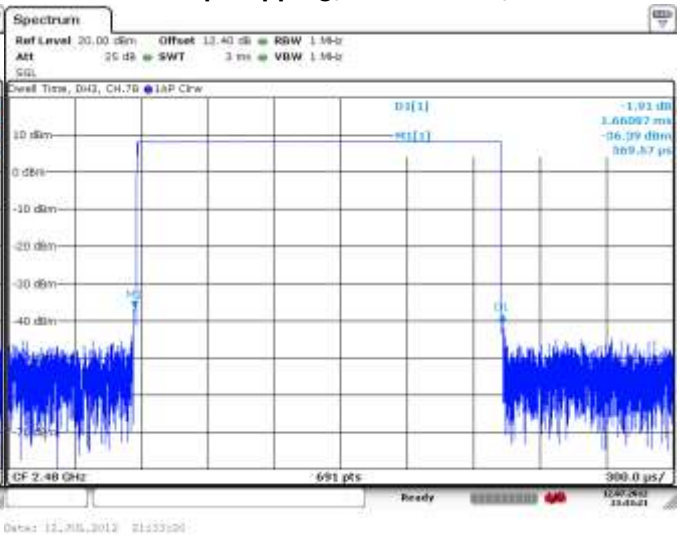


Figure 1-22: Time of Occupancy (Dwell Time) Freq. Hopping, Static PBRS, DH3



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-23: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5

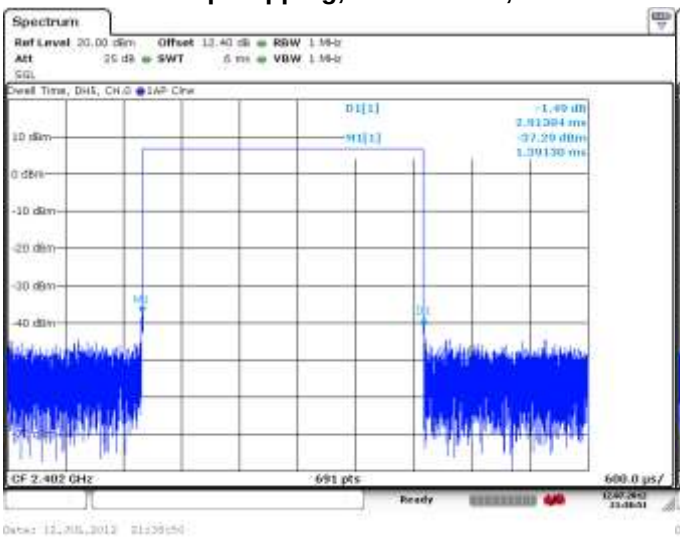


Figure 1-24: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5

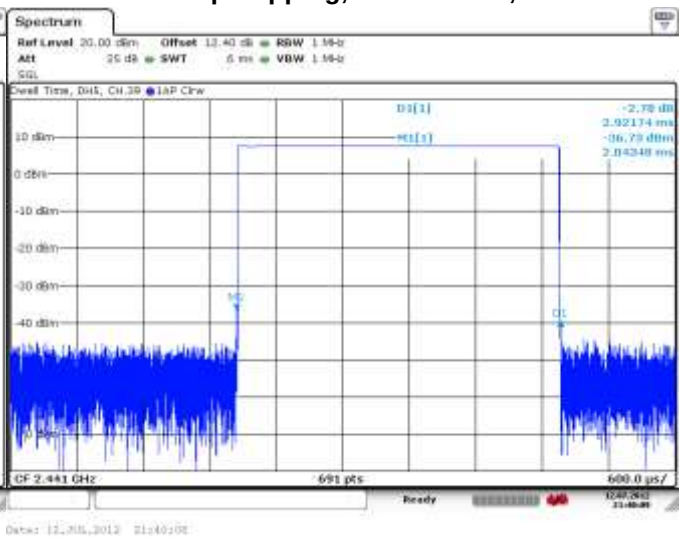
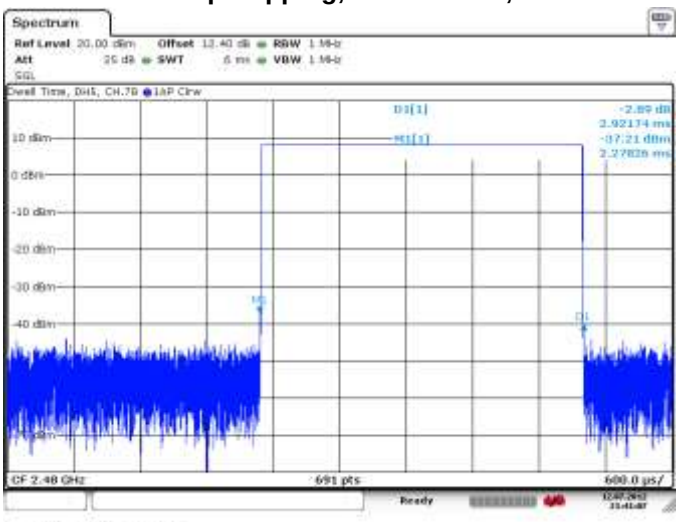


Figure 1-25: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5



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 1 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 PBRS" and packet type "DH5" during the measurements.

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	7.00	0.00501	0.0 to 20.0
39	7.74	0.00594	0.0 to 20.0
78	8.40	0.00692	0.0 to 20.0

See figures 1-26 to 1-28 for the plots of the maximum peak conducted output power.

Figure 1-26: Max. Peak Conducted Output Power Single Freq., Static PBRS, DH5

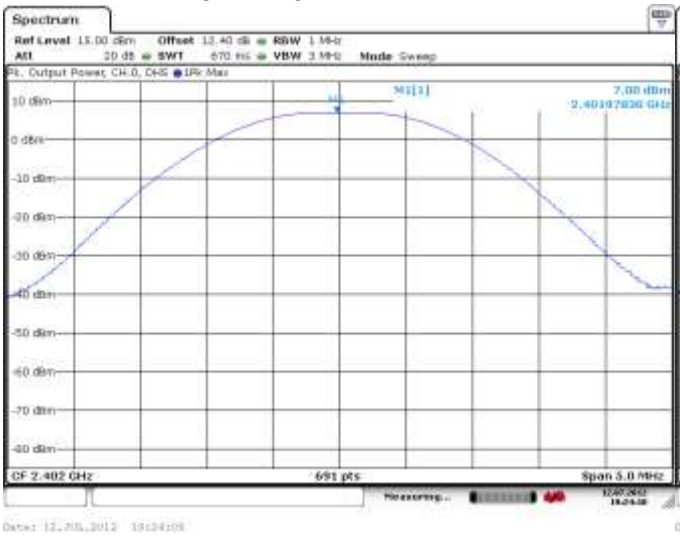
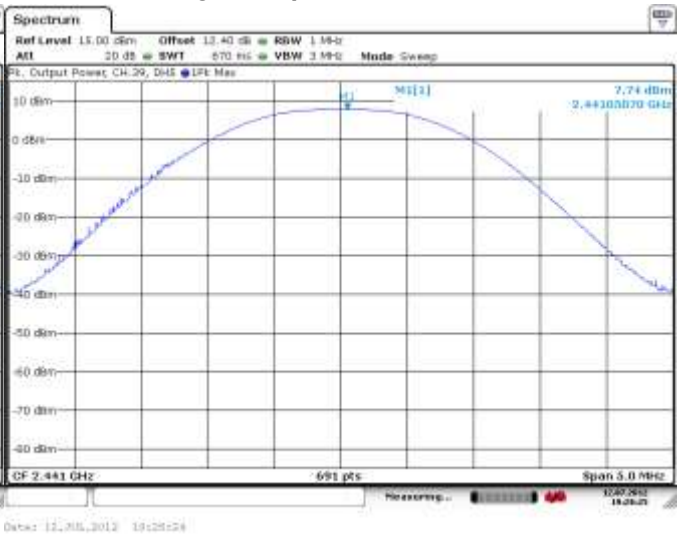
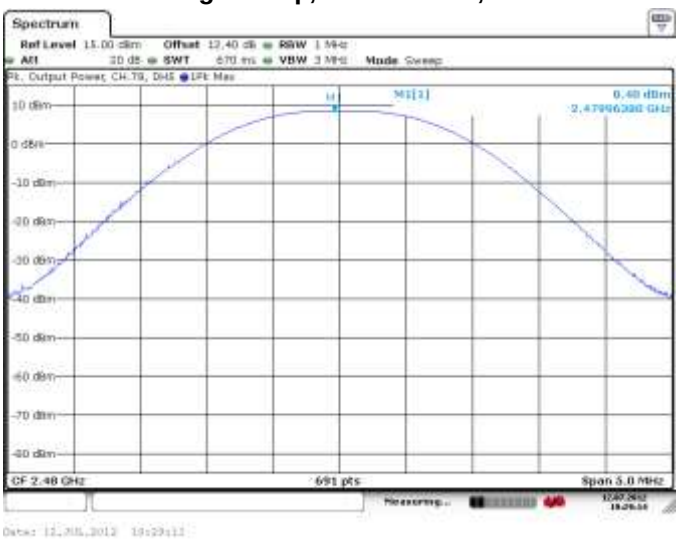


Figure 1-27: Max. Peak Conducted Output Power Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-28: Max. Peak Conducted Output Power
Single Freq., Static PBRS, DH5



Using Pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	6.67	0.00465	0.0 to 20.0
39	7.41	0.00551	0.0 to 20.0
78	8.07	0.00641	0.0 to 20.0

See figures 1-29 to 1-31 for the plots of the maximum peak conducted output power.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-29: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 2-DH5

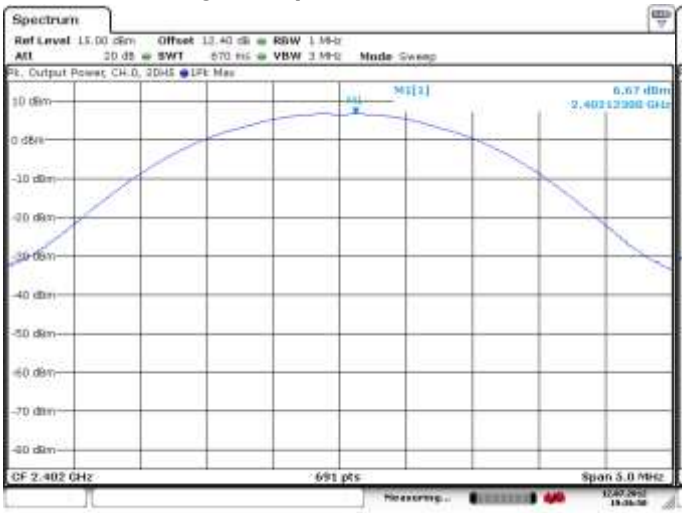


Figure 1-30: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 2-DH5

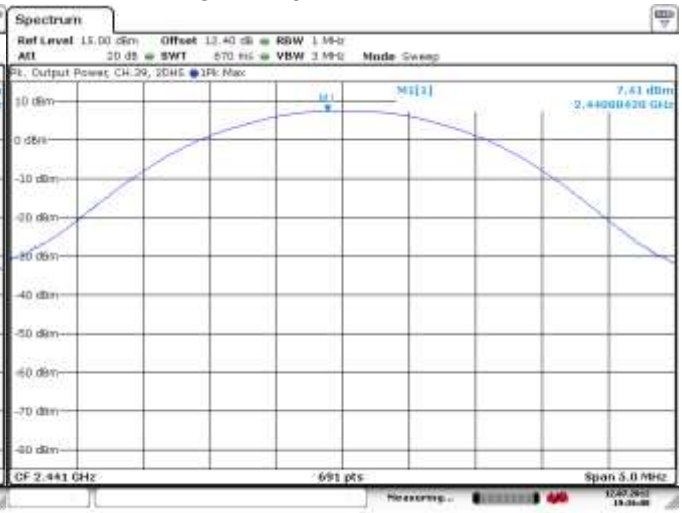
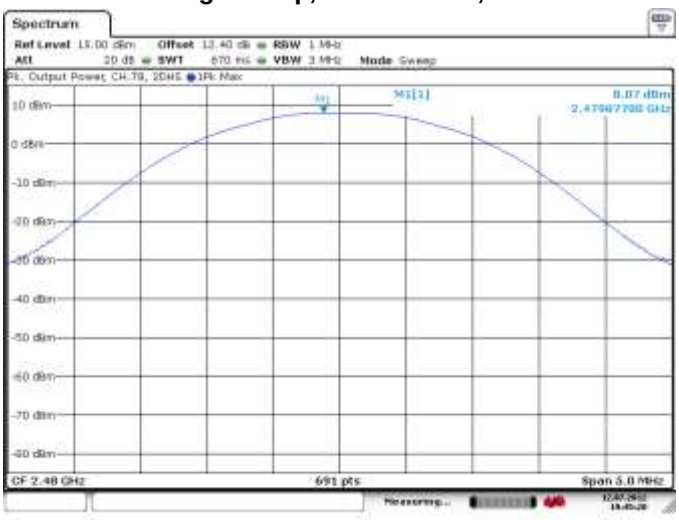


Figure 1-31: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 2-DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	7.22	0.00527	0.0 to 20.0
39	7.98	0.00628	0.0 to 20.0
78	6.67	0.00465	0.0 to 20.0

See figures 1-32 to 1-34 for the plots of the maximum peak conducted output power.

Figure 1-32: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5

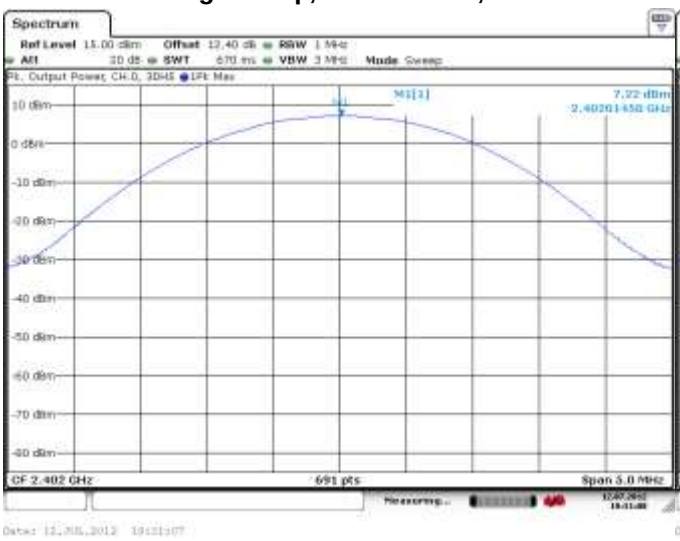
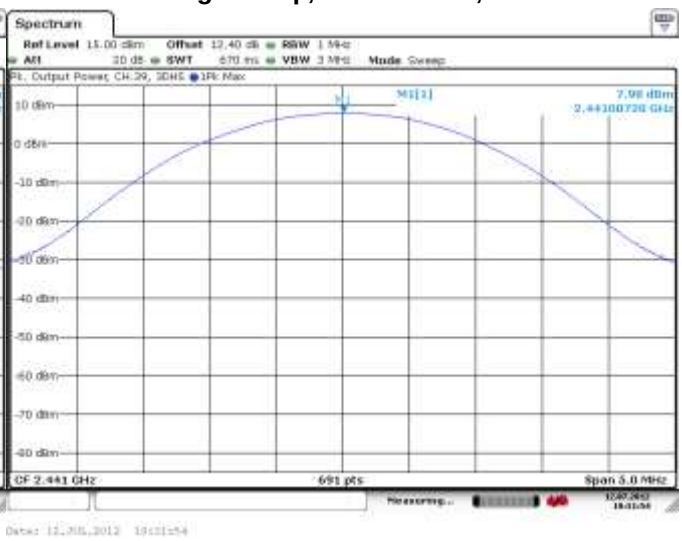
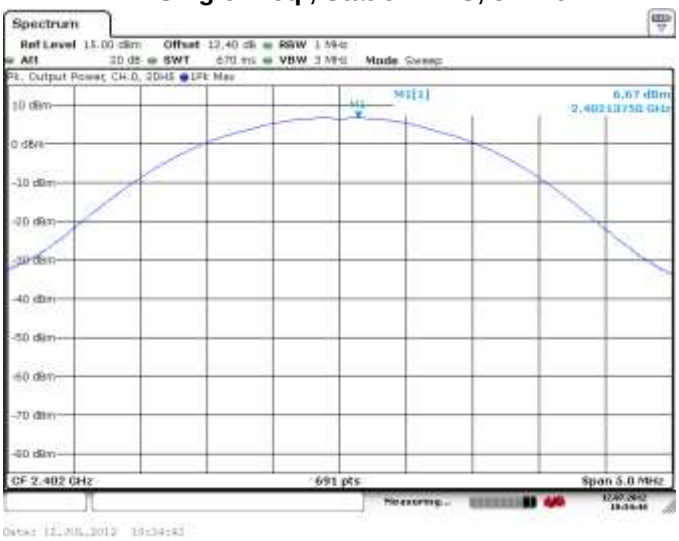


Figure 1-33: Max. Peak Conducted Output Power
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-34: 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 PBRS" and packet type "DH5" during the measurements.

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-38.82	-20	-18.82
78	Single Frequency	-38.86	-20	-18.86
0	Hopping	-39.60	-20	-19.60
78	Hopping	-39.16	-20	-19.16

See figures 1-35 to 1-38 for the plots of the band edge compliance measurements.

Figure 1-35: Band Edge Compliance
Single Freq., Static PBRS, DH5

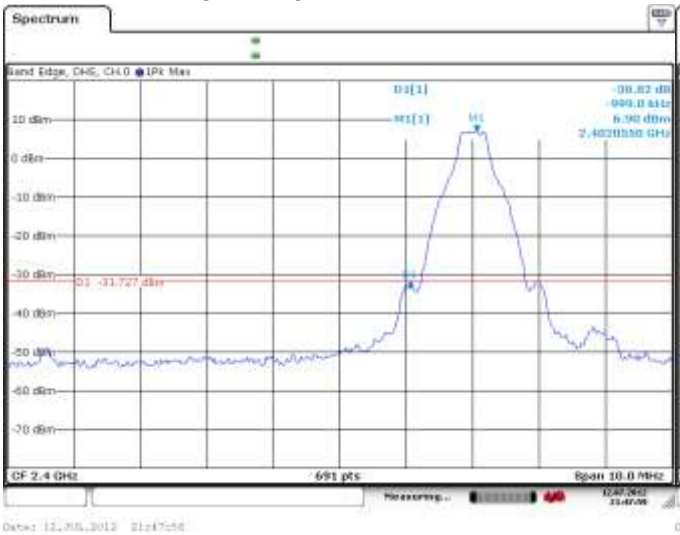
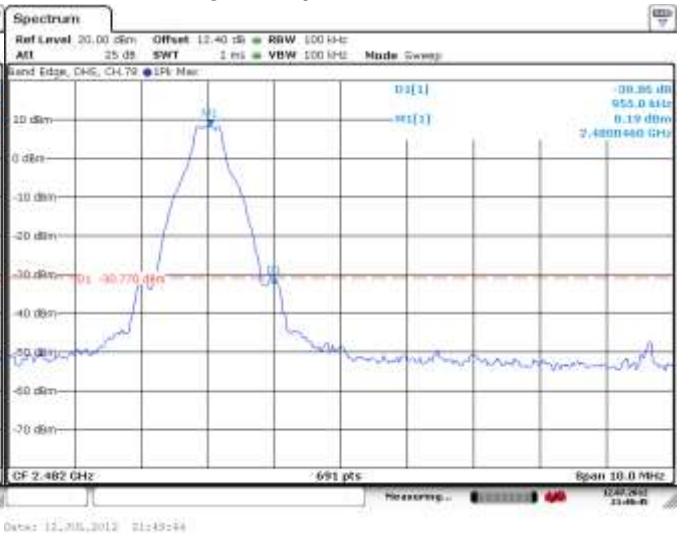


Figure 1-36: Band Edge Compliance
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-37: Band Edge Compliance Freq. Hopping, Static PBRS, DH5

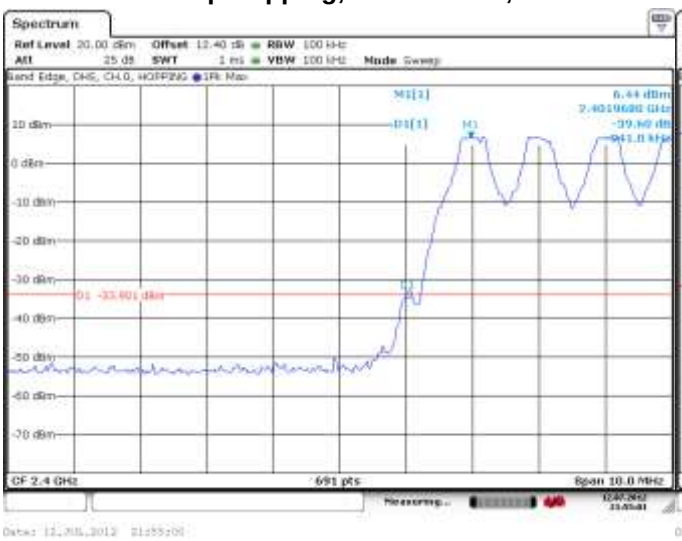
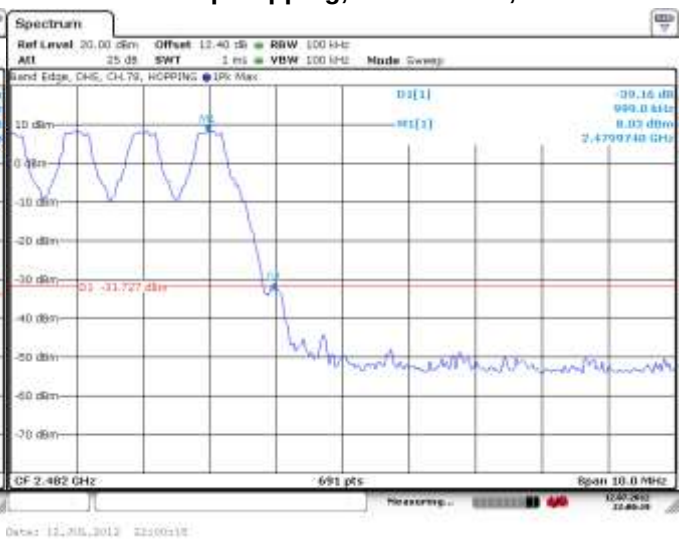


Figure 1-38: Band Edge Compliance Freq. Hopping, Static PBRS, DH5



Using pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-35.00	-20	-15.00
78	Single Frequency	-34.98	-20	-14.98
0	Hopping	-36.35	-20	-16.35
78	Hopping	-35.25	-20	-15.25

See figures 1-39 to 1-42 for the plots of the band edge compliance measurements.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-39: Band Edge Compliance
Single Freq., Static PBRS, 2-DH5

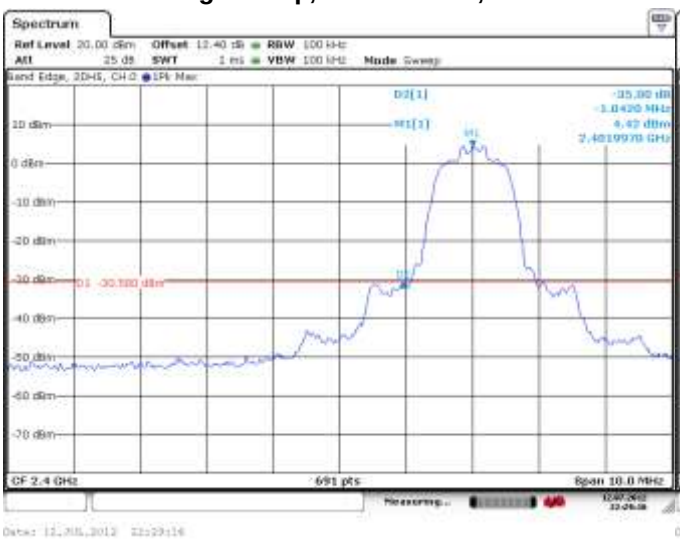


Figure 1-40: Band Edge Compliance
Single Freq., Static PBRS, 2-DH5

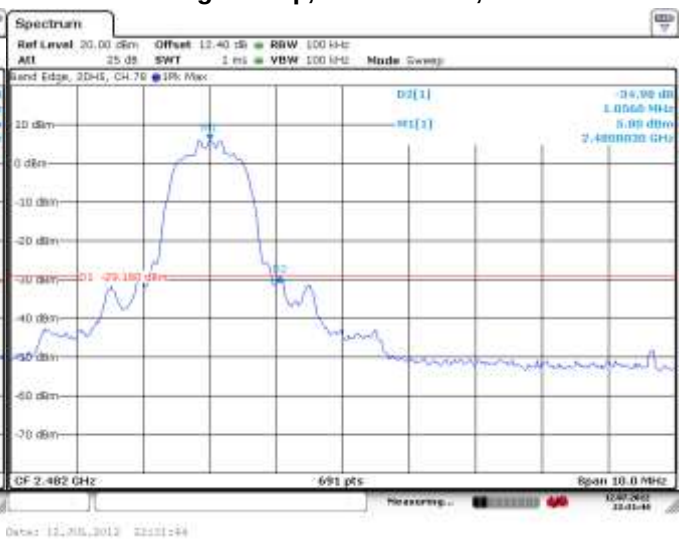


Figure 1-41: Band Edge Compliance
Freq. Hopping, Static PBRS, 2-DH5

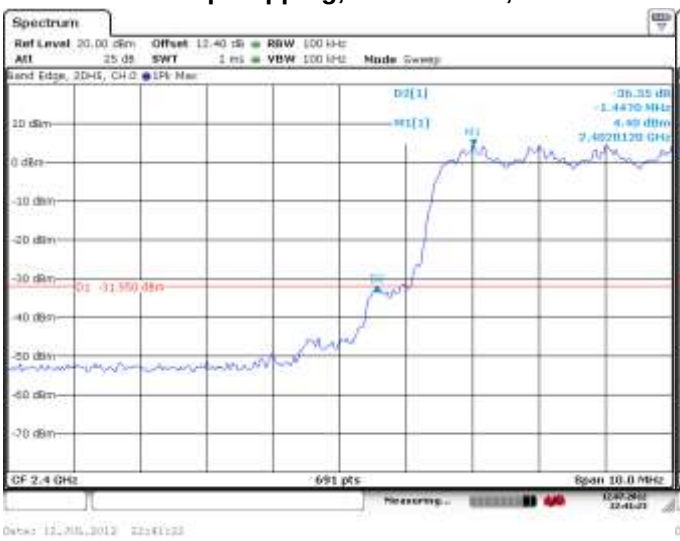


Figure 1-42: Band Edge Compliance
Freq. Hopping, Static PBRS, 2-DH5

Bluetooth RF Conducted Emission Test Results cont'd

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

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-35.36	-20	-15.36
78	Single Frequency	-36.84	-20	-16.84
0	Hopping	-35.29	-20	-15.29
78	Hopping	-36.59	-20	-16.59

See figures 1-43 to 1-46 for the plots of the band edge compliance measurements.

Figure 1-43: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5

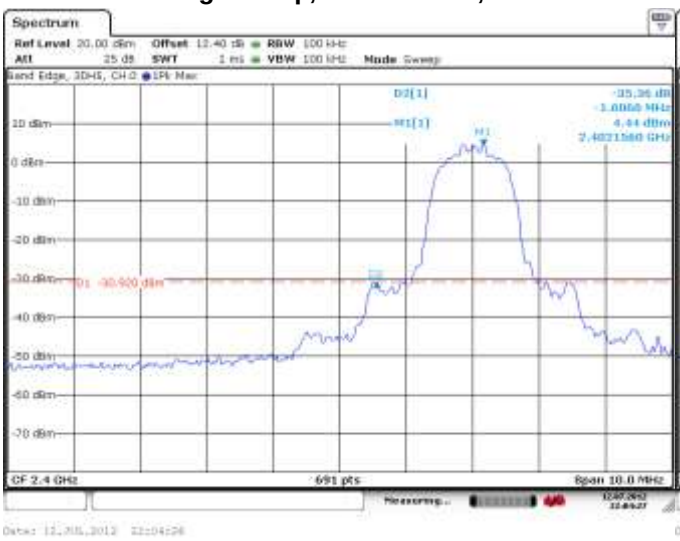
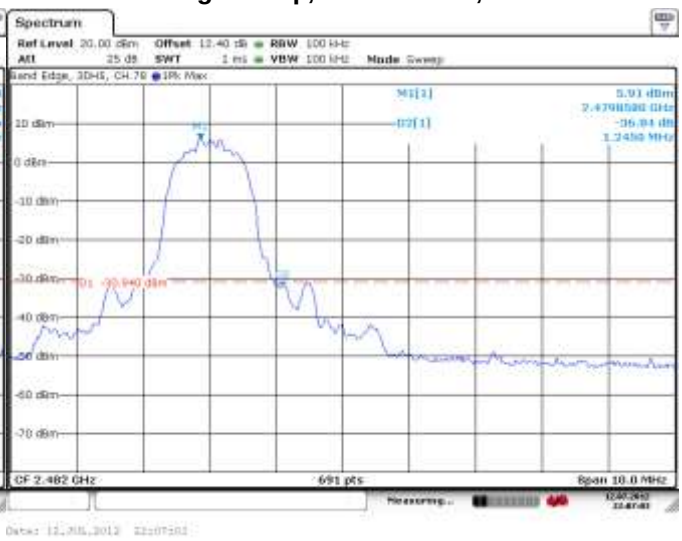


Figure 1-44: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-45: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

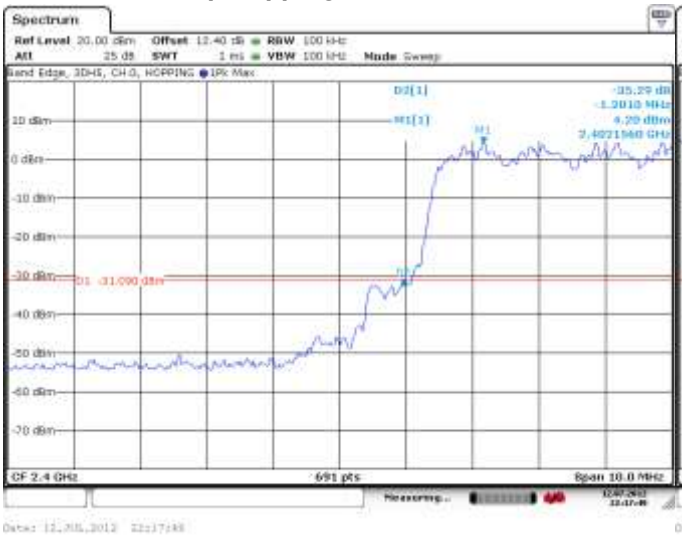
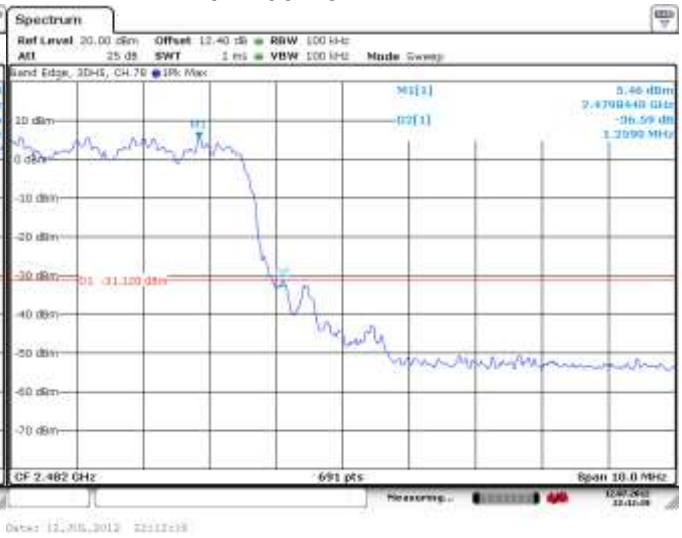


Figure 1-46: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5



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 PBRS" 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	7.00	-40.00	-47.00	-20
39	7.74	-32.83	-40.57	-20
78	8.40	-32.50	-40.90	-20
Hopping mode	7.00	-38.83	-45.83	-20

See figures 1-47 to 1-50 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-47: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5,

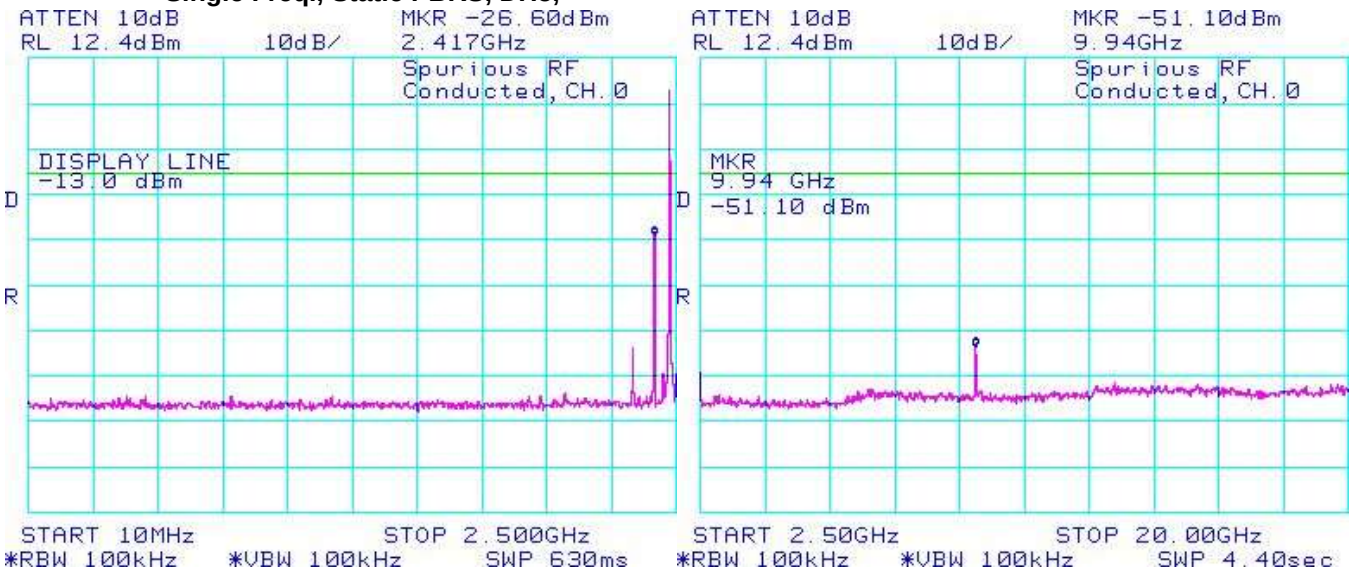
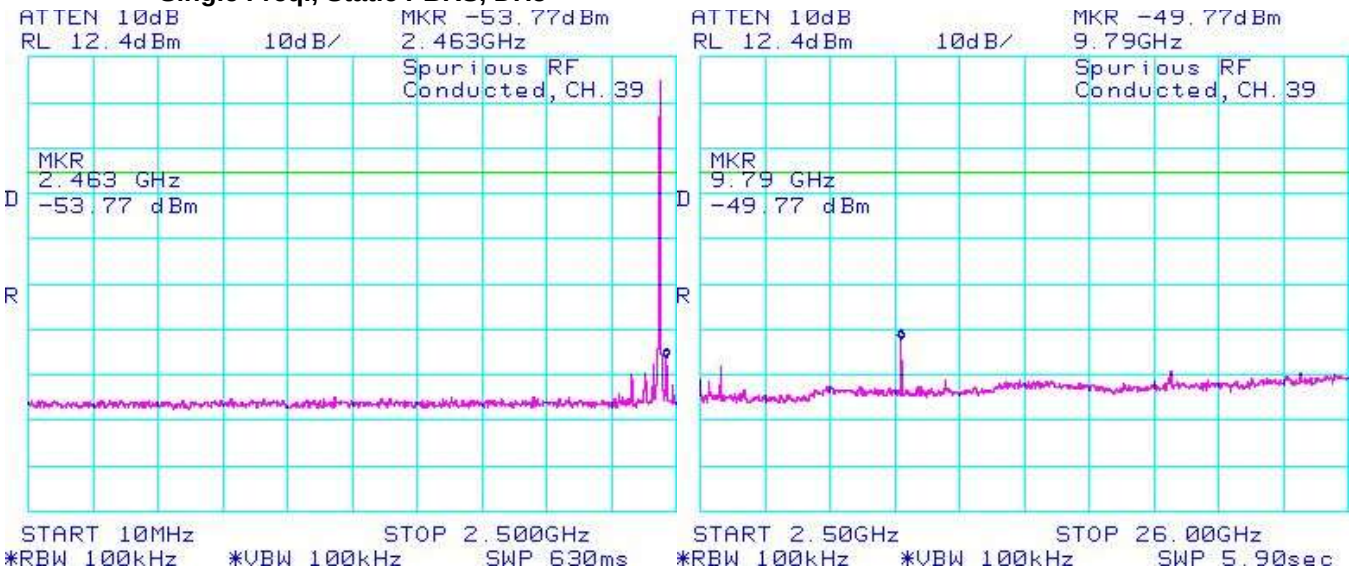


Figure 1-48: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-49: Spurious RF Conducted Emissions
Single Freq., Static PBRS, DH5

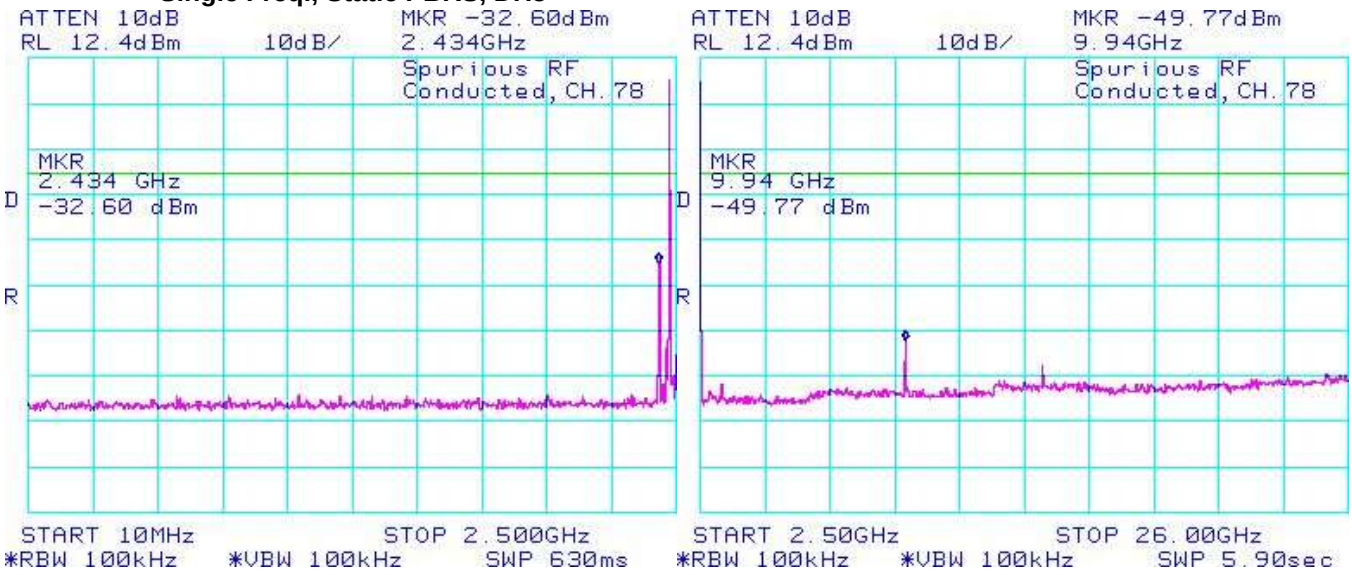
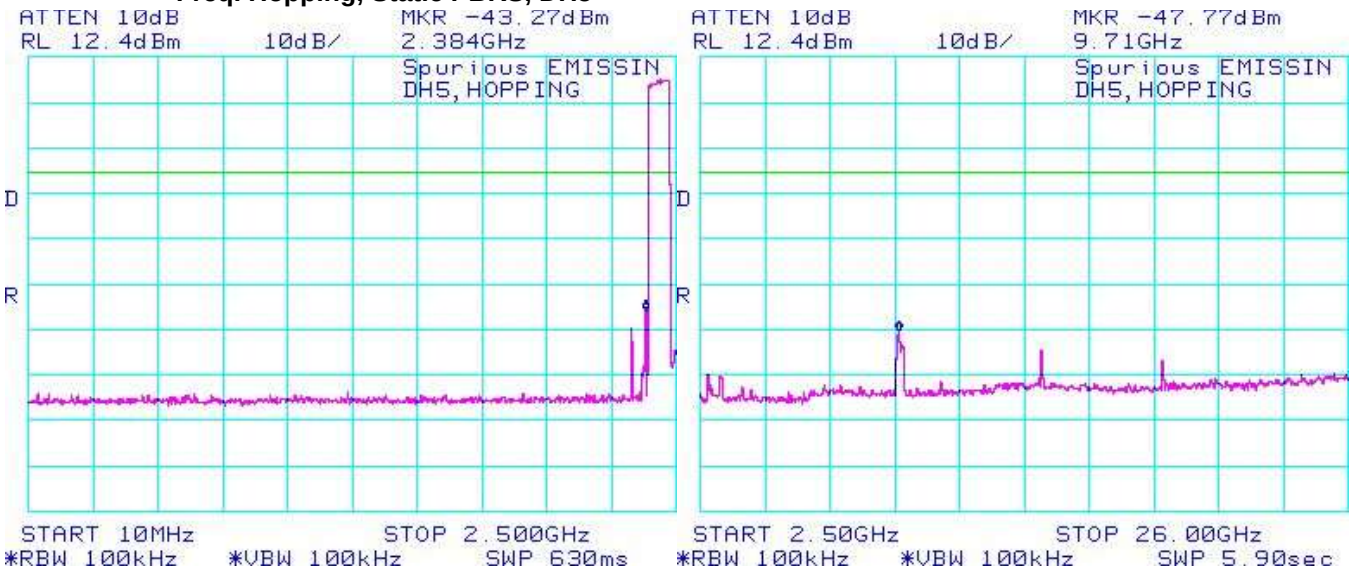


Figure 1-50: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Using pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0	6.67	-46.17	-52.84	-20
39	7.41	-34.83	-42.24	-20
78	8.07	-33.67	-41.74	-20
Hopping mode	6.67	-44.83	-51.50	-20

See figures 1-51 to 1-54 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-51: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 2-DH5

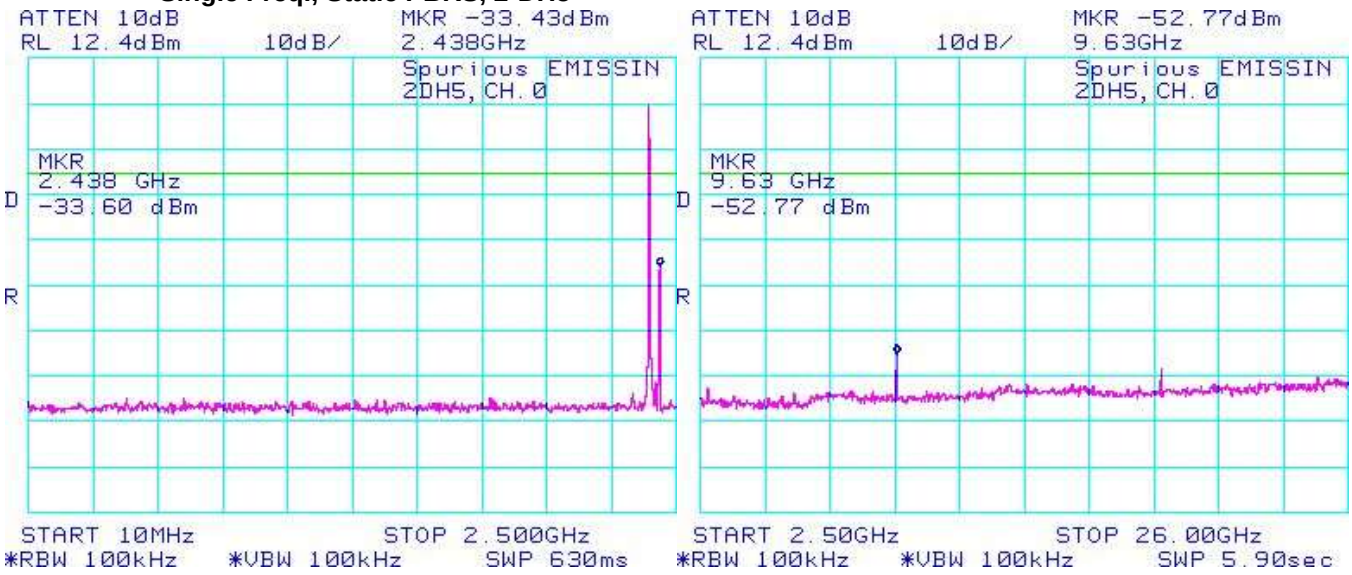
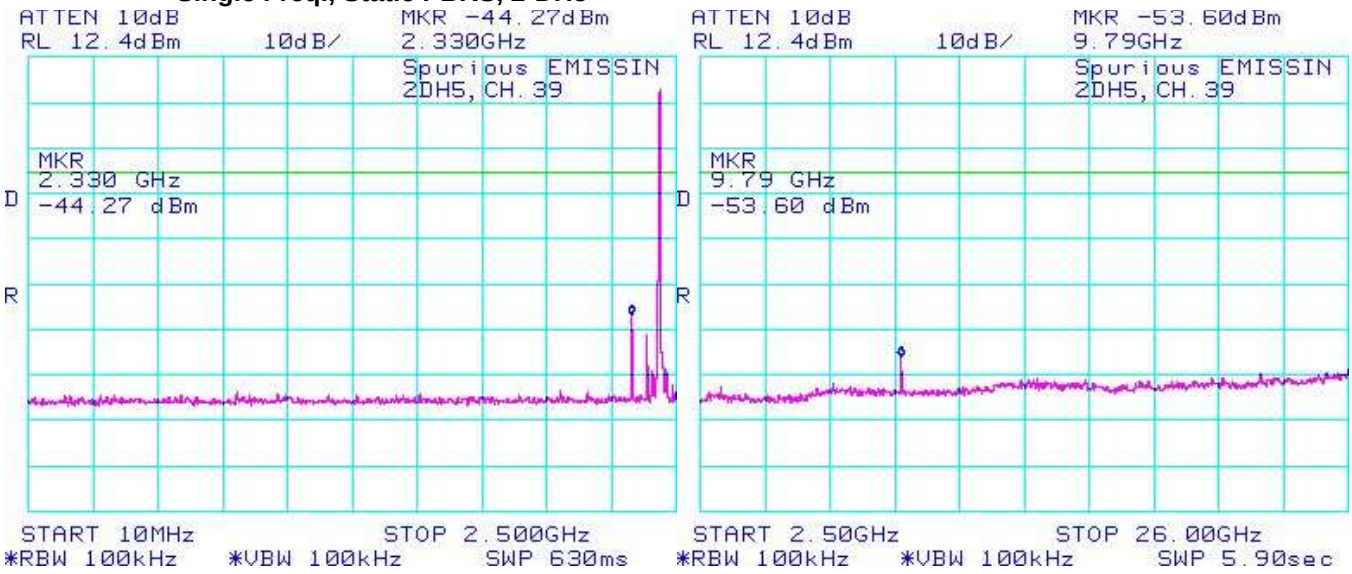


Figure 1-52: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 2-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-53: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 2-DH5

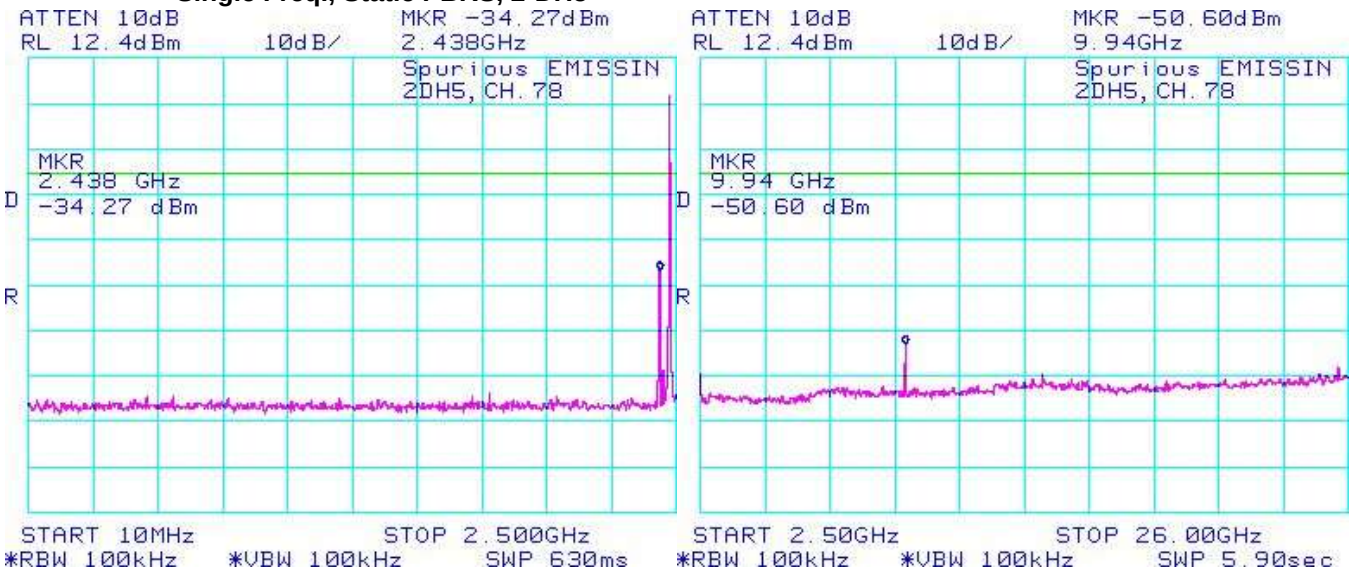
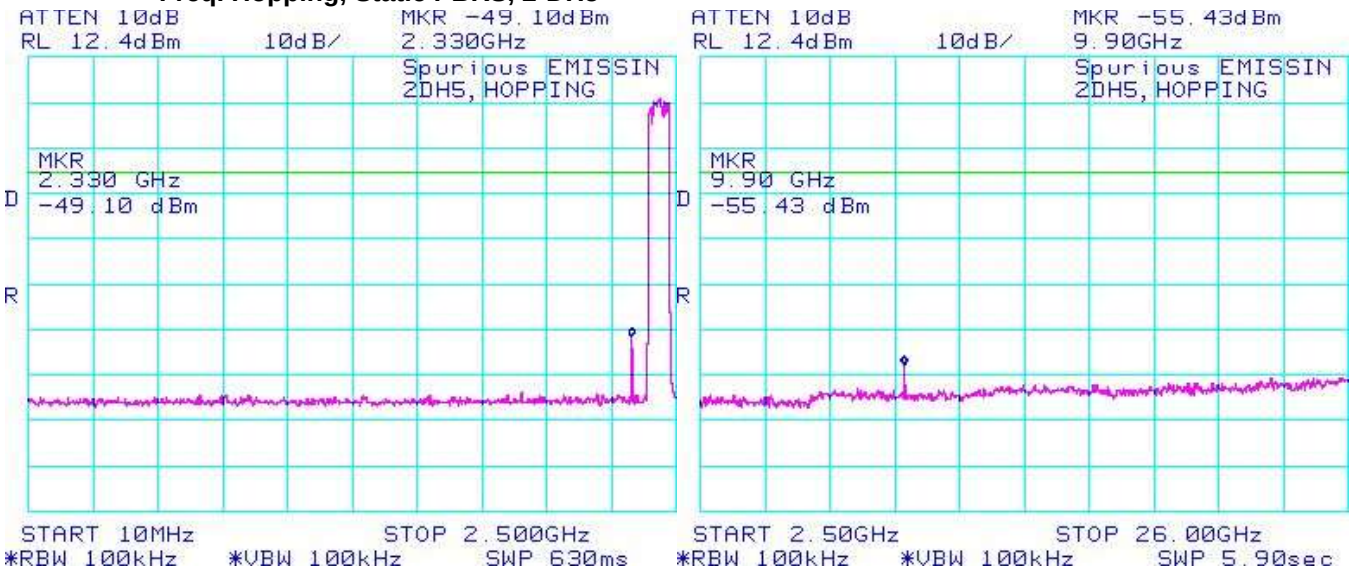


Figure 1-54: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 2-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Using pattern type "Static PBRS" 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	7.52	-44.50	-52.02	-20
39	7.16	-32.83	-39.99	-20
78	6.10	-33.67	-39.77	-20
Hopping mode	6.10	-38.50	-44.60	-20

See figures 1-55 to 1-58 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-55: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5

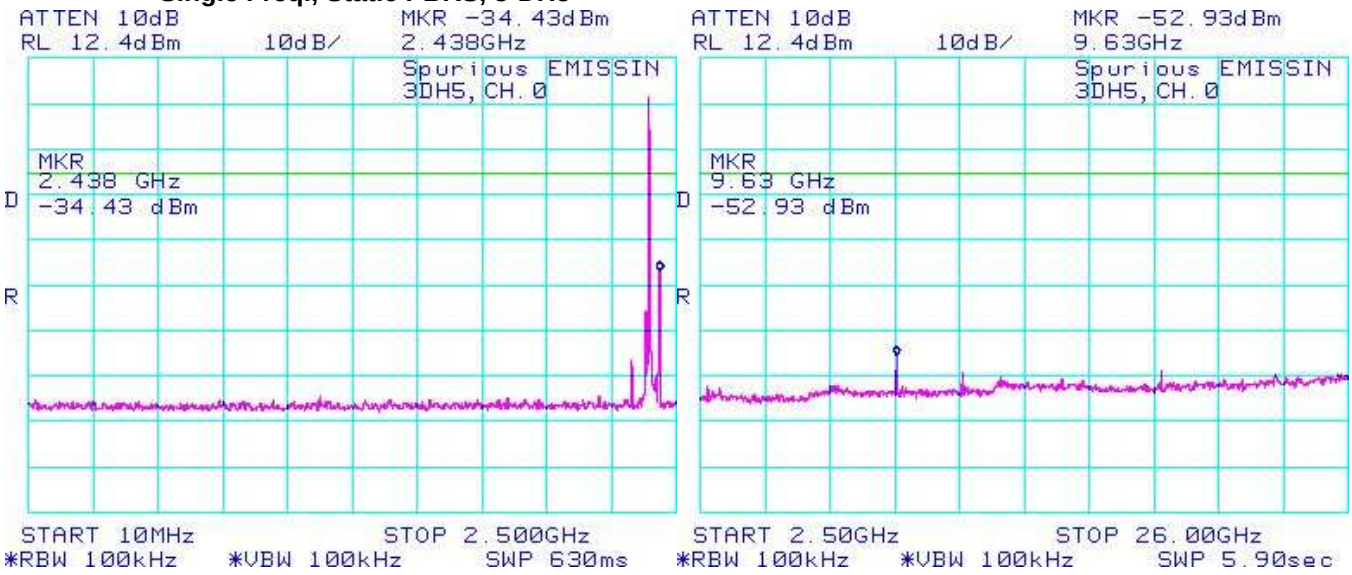
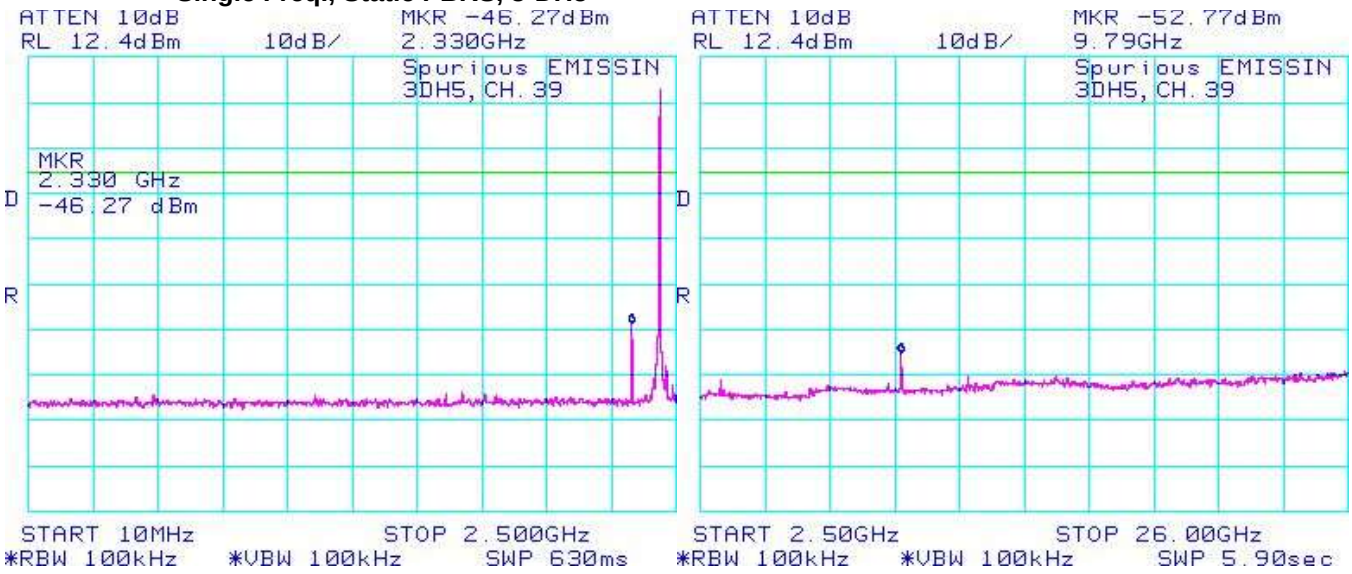


Figure 1-56: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 1-57: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5

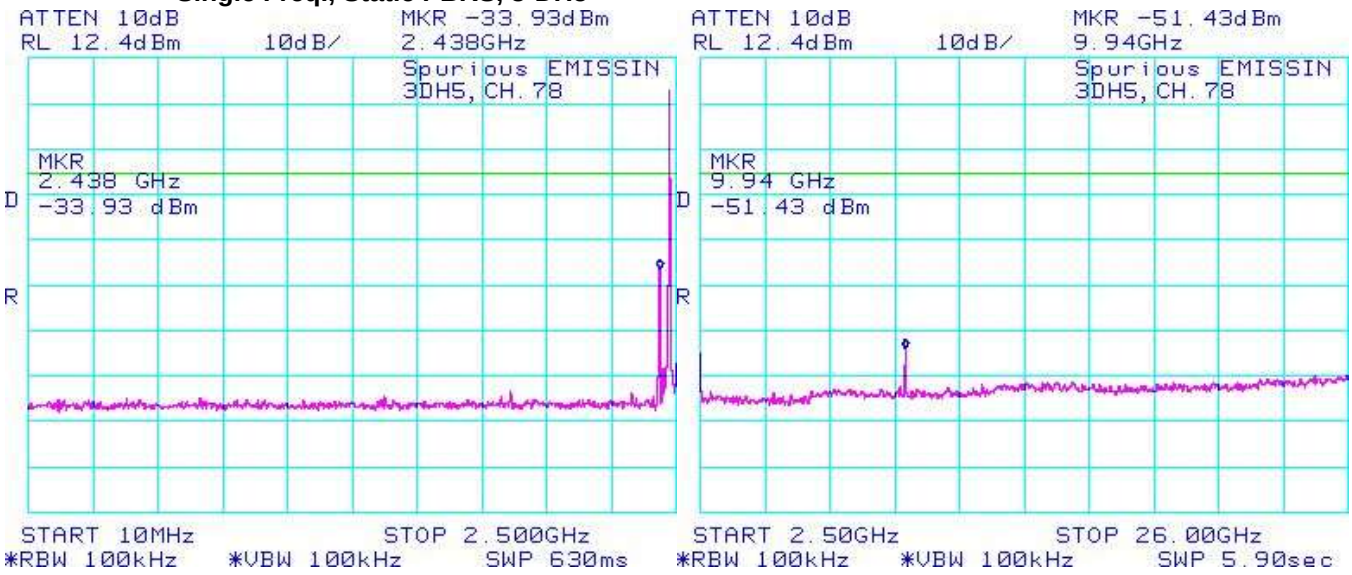
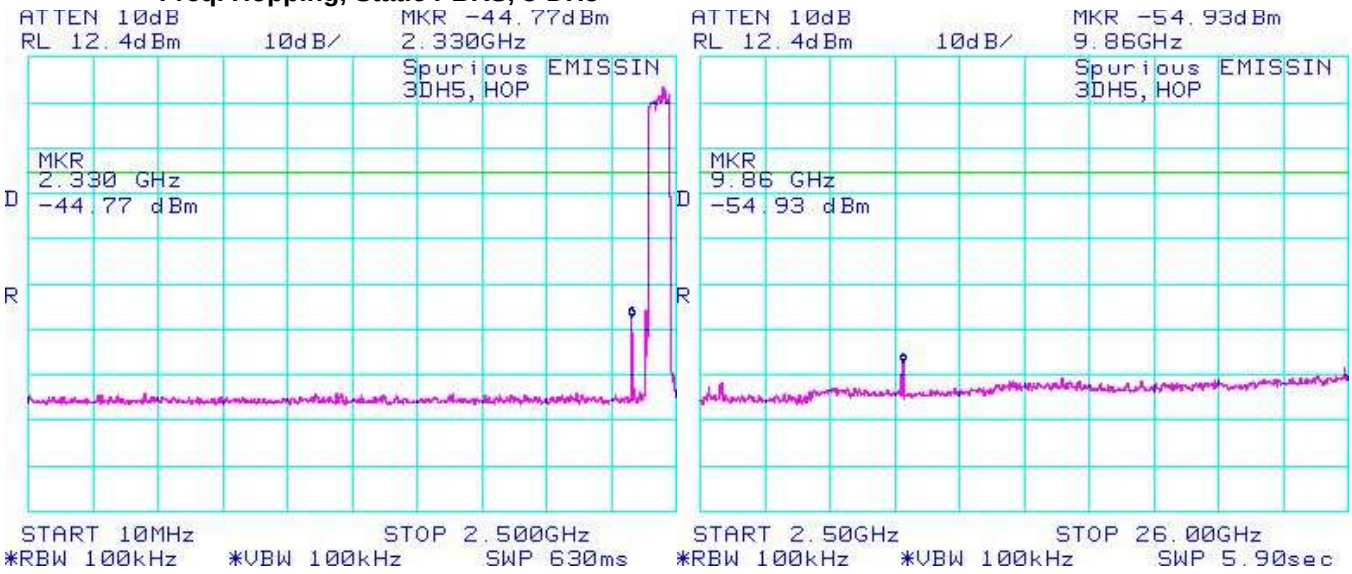


Figure 1-58: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 3-DH5



Bluetooth Low Energy RF Conducted Emission Test Results

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 0, 20 and 39 were measured.

Channel	Limit (kHz)	Measured Level (MHz)
0	≥ 500	0.675
20	≥ 500	0.674
39	≥ 500	0.682

See figures 1-59 to 1-61 for the plots of the 6 dB bandwidth measurements for Channels 0, 20, and 39.

Figure 1-59: 6 dB Bandwidth LE, Channel 0

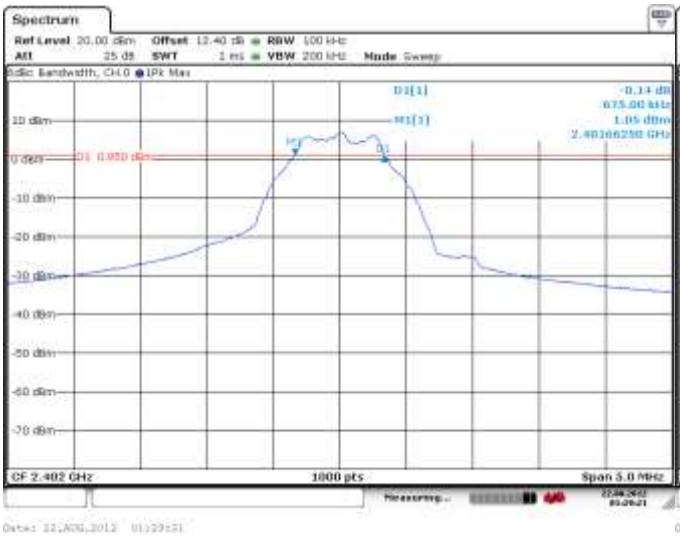
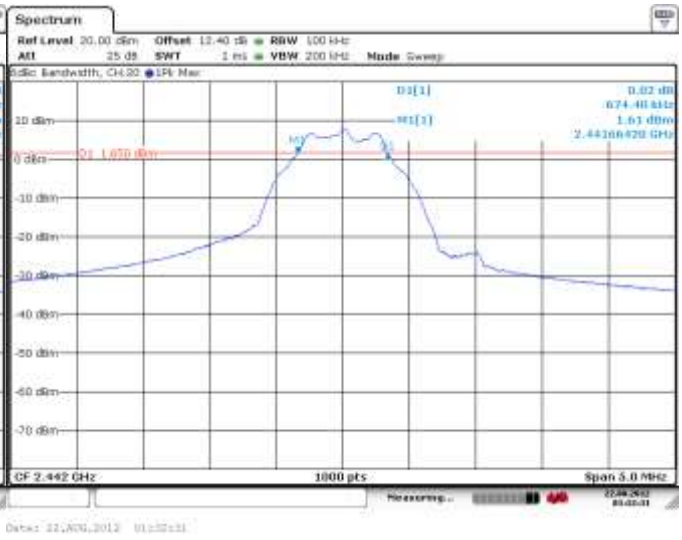
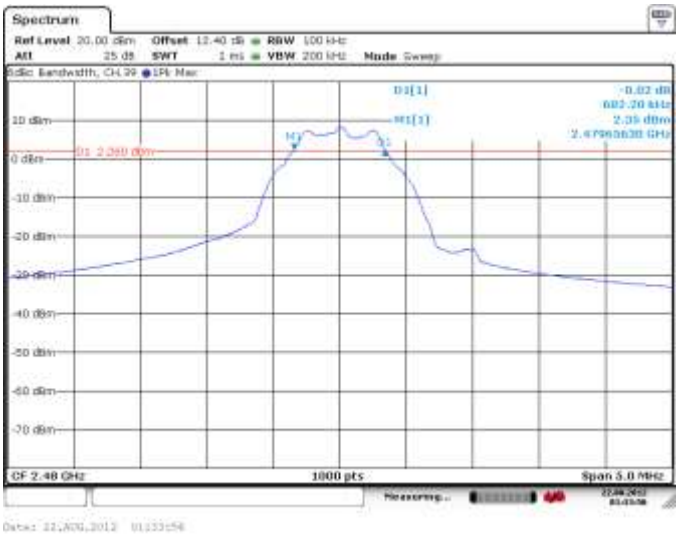


Figure 1-60: 6 dB Bandwidth LE, Channel 20



Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Figure 1-61: 6 dB Bandwidth
LE, Channel 39



Bluetooth Low Energy 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 0, 20 and 39 were measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 6.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (W)
0	< 1.00	6.50	0.00447
20	< 1.00	6.90	0.00490
39	< 1.00	7.60	0.00575

Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Band Edge Compliance

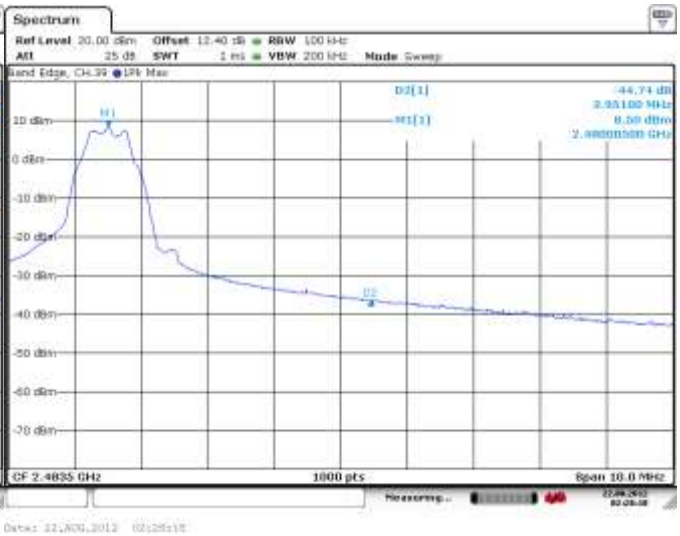
The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c) and RSS-210. Channels 0 and 39 were measured.

Channel	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
0	< -20	-48.73	-28.73
39	< -20	-44.74	-24.74

See figures 1-62 to 1-63 for the plots of the band edge compliance measurements for Channels 0 and 39.

Figure 1-62: Band Edge Compliance LE, Channel 0

Figure 1-63: Band Edge Compliance LE, Channel 39



Bluetooth Low Energy 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 0, 20 and 39 were measured.

Channel	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
0	< 8.00	-7.65	-15.65
20	< 8.00	-6.70	-14.70
39	< 8.00	-6.08	-14.08

See figures 1-64 to 1-66 for the plots of the peak power spectral density for Channels 0, 20 and 39.

Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Figure 1-64: Peak Power Spectral Density LE, Channel 0

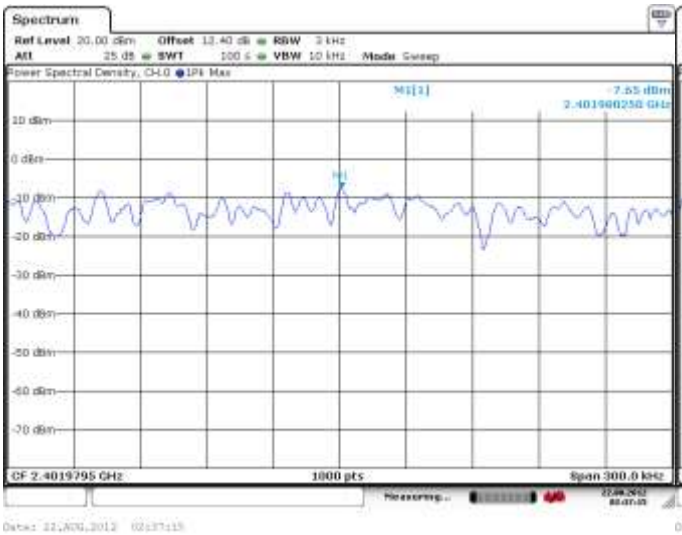


Figure 1-65: Peak Power Spectral Density LE, Channel 20

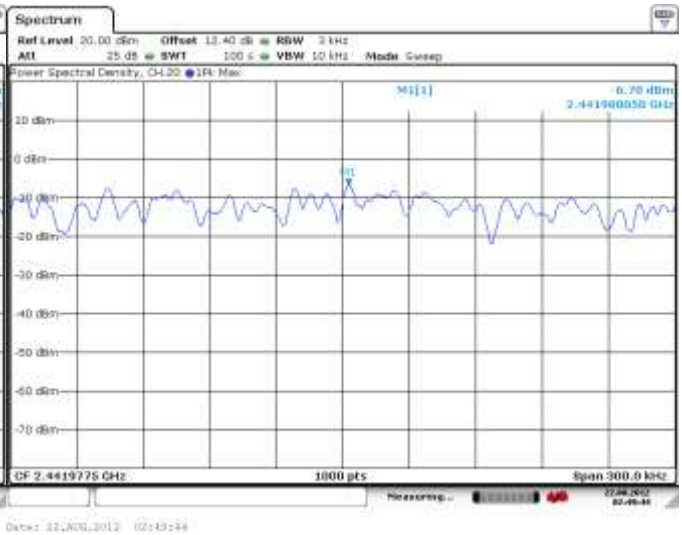
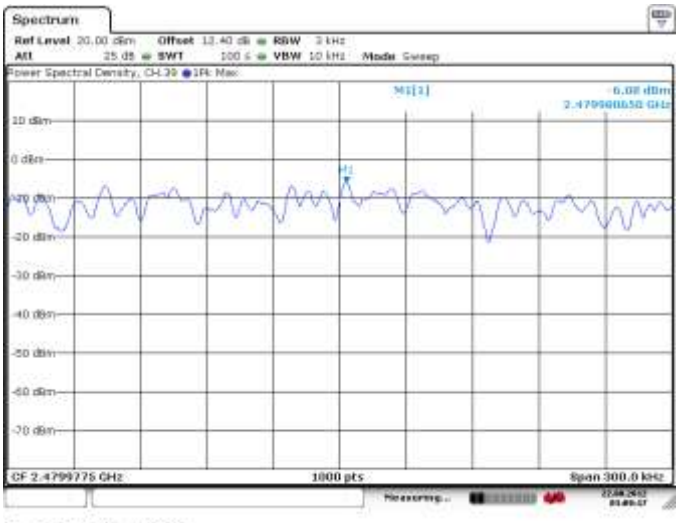


Figure 1-66: Peak Power Spectral Density LE, Channel 39



Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Spurious RF Conducted Emissions

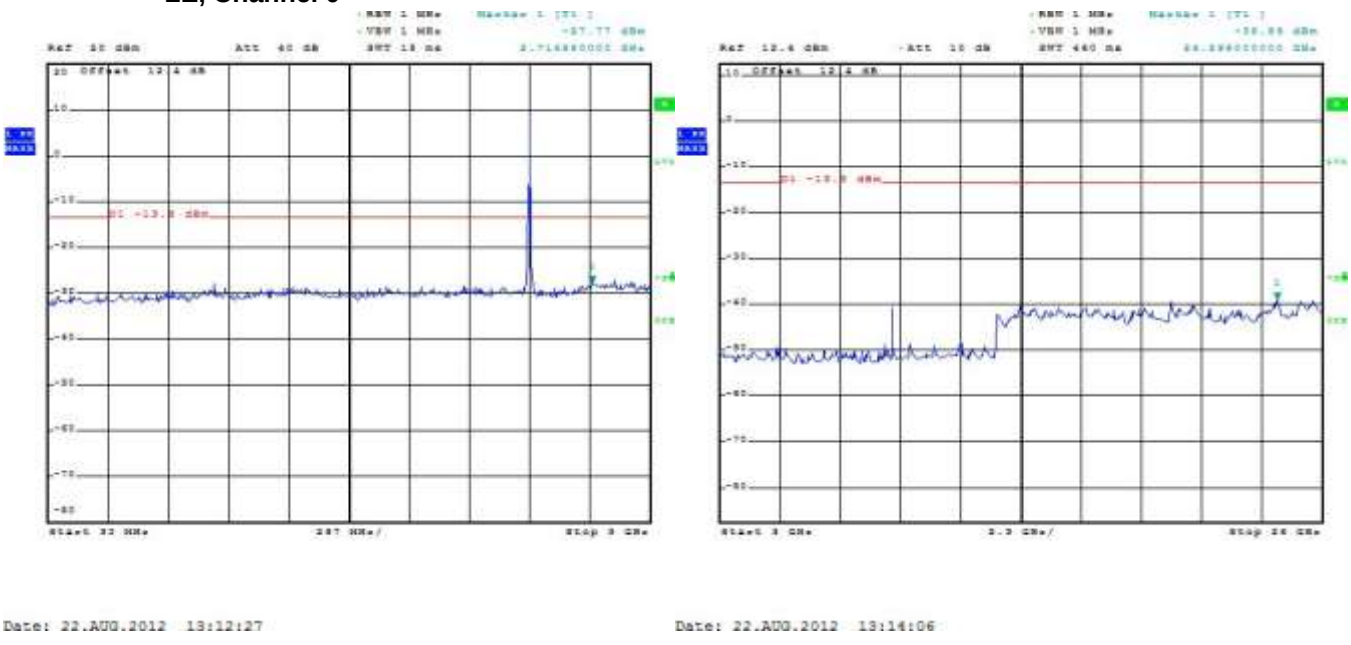
The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. Channels 0, 20 and 39 were measured. Peak power was measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 6.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
0	6.50	-27.77	-34.20	-20
20	6.90	-36.33	-43.23	-20
39	7.20	-28.41	-35.61	-20

The emissions were in the NF.

See figures 1-67 to 1-69 for the plots of the spurious RF conducted emissions for Channels 0, 20 and 39.

Figure 1-67: Spurious Conducted RF Emissions
LE, Channel 0



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Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Figure 1-68 : Spurious Conducted RF Emissions
LE, Channel 20

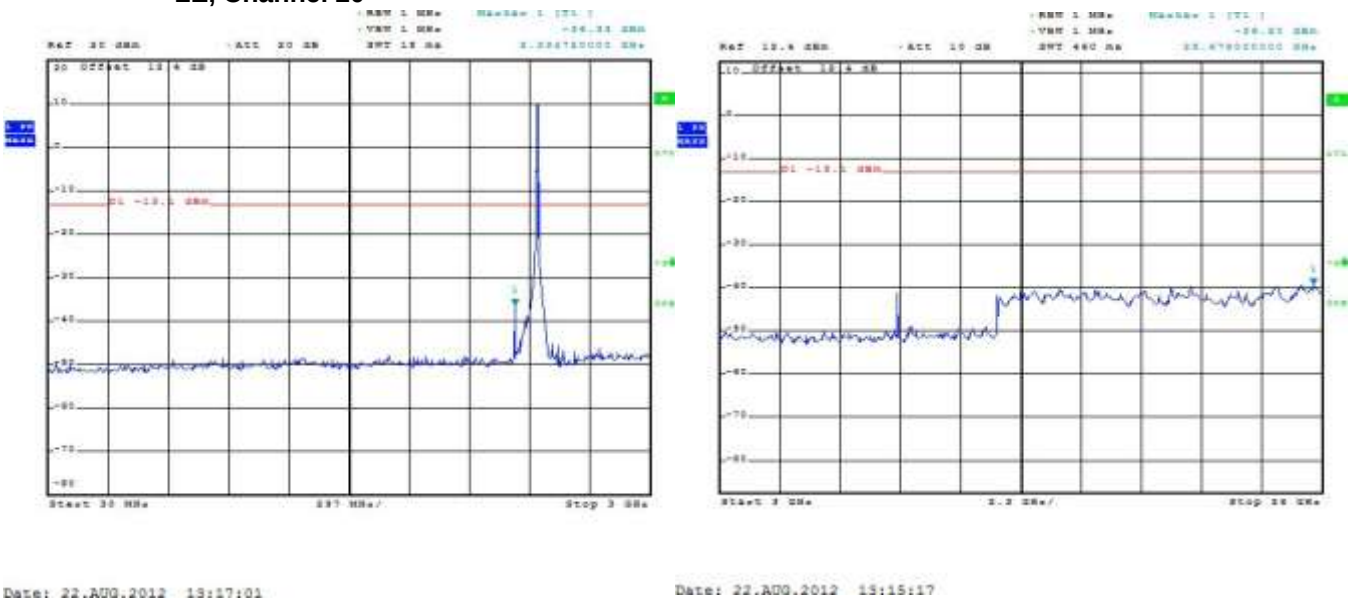
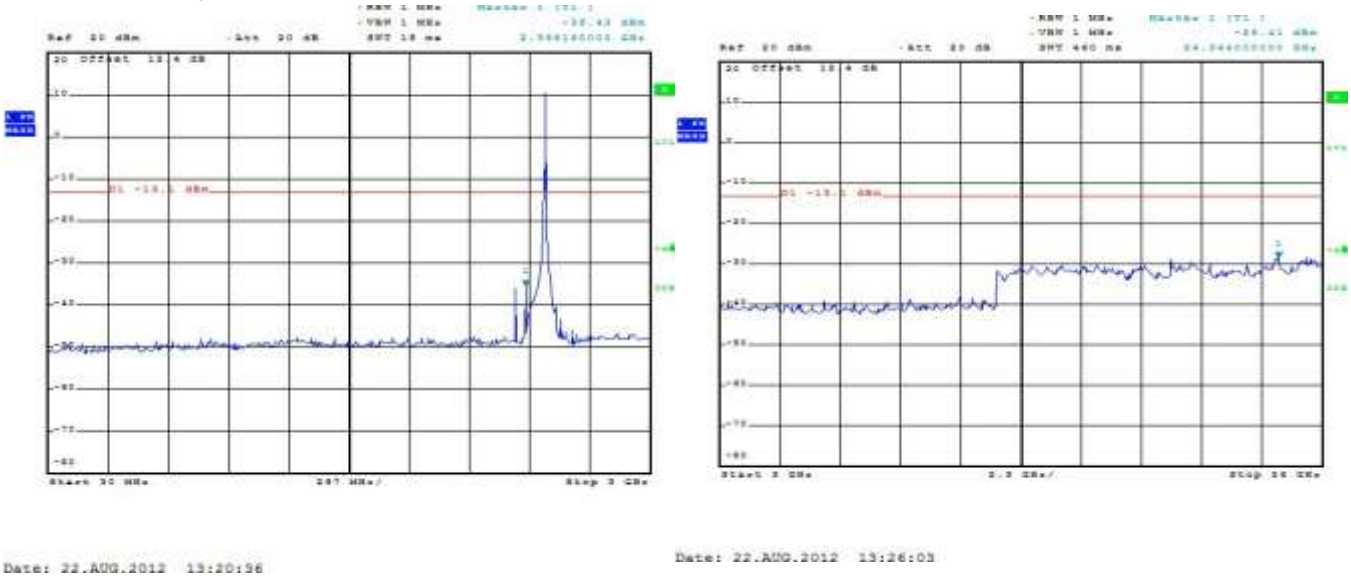


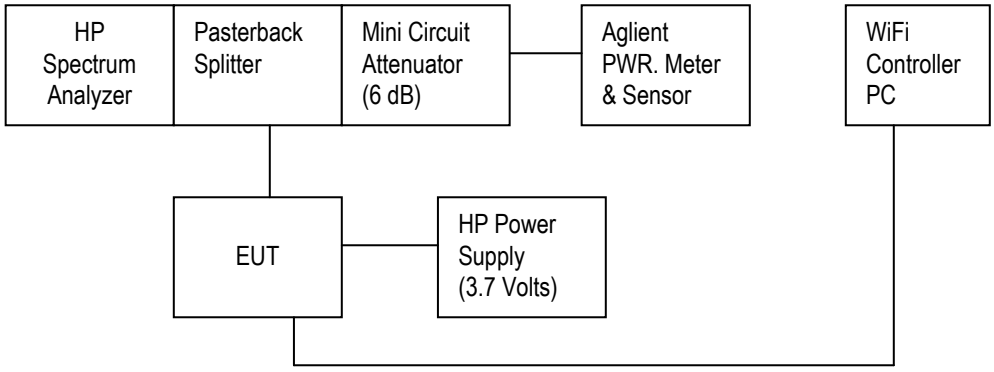
Figure 1-69: Spurious Conducted RF Emissions
LE, Channel 39



APPENDIX 2 – 802.11b/g/n CONDUCTED EMISSIONS TEST DATA/PLOTS

802.11b/g/n RF Conducted Emission Test Results

Test Setup Diagram



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

Date of test: July 24, 2012
The measurements on the BlackBerry® smartphone were performed by Kevin Guo.

The environmental test conditions were: Temperature: 24 ºC
Relative Humidity: 36 %

802.11b/g/n 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, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4, and 7 for 802.11n mode.

Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
1	1 Mbps	≥ 500	10.00
	5.5 Mbps	≥ 500	11.06
	11 Mbps	≥ 500	9.37
	6 Mbps	≥ 500	15.69
	24 Mbps	≥ 500	16.51
	54 Mbps	≥ 500	16.60
	MCS 0	≥ 500	16.06
	MCS 4	≥ 500	17.68
	MCS 7	≥ 500	17.81
6	1 Mbps	≥ 500	10.03
	5.5 Mbps	≥ 500	10.82
	11 Mbps	≥ 500	9.73
	6 Mbps	≥ 500	15.63
	24 Mbps	≥ 500	17.13
	54 Mbps	≥ 500	16.88
	MCS 0	≥ 500	16.51
	MCS 4	≥ 500	17.82
	MCS 7	≥ 500	17.88
11	1 Mbps	≥ 500	9.97
	5.5 Mbps	≥ 500	10.29
	11 Mbps	≥ 500	9.75
	6 Mbps	≥ 500	15.46
	24 Mbps	≥ 500	16.51
	54 Mbps	≥ 500	16.45
	MCS 0	≥ 500	16.77
	MCS 4	≥ 500	17.71
	MCS 7	≥ 500	17.73

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

See figures 2-1 to 2-9 for the plots of the 6 dB bandwidth measurements for Channels 1, 6, and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

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

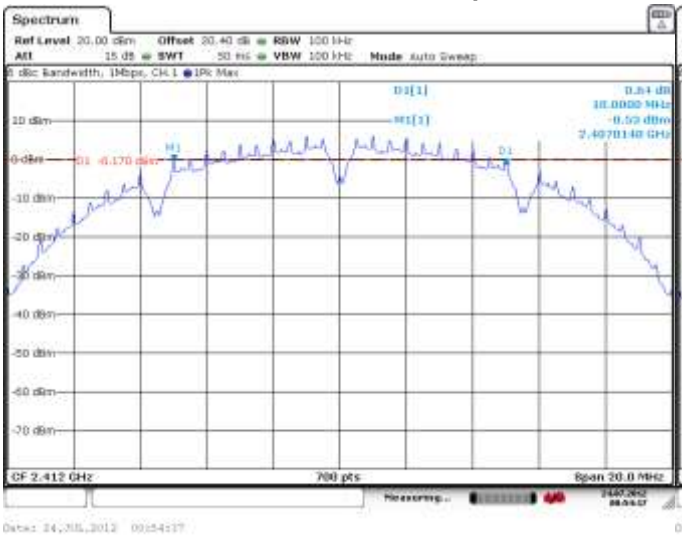


Figure 2-2: 6 dB Bandwidth
802.11b, Channel 6, 1 Mbps

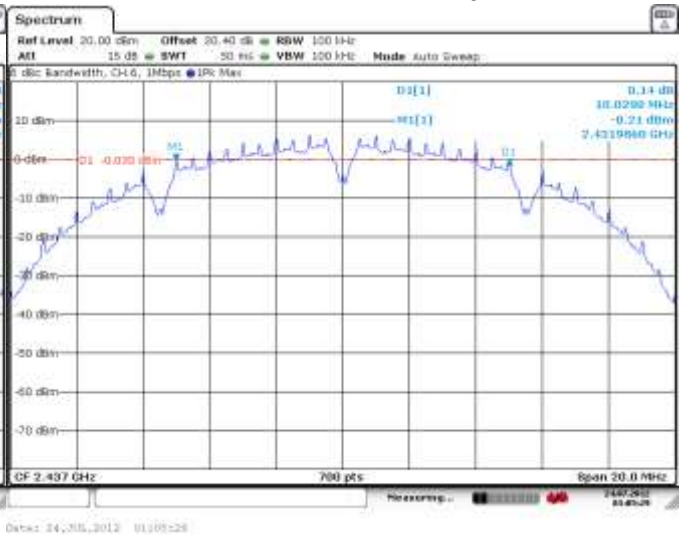


Figure 2-3: 6 dB Bandwidth
802.11b, Channel 11, 1 Mbps

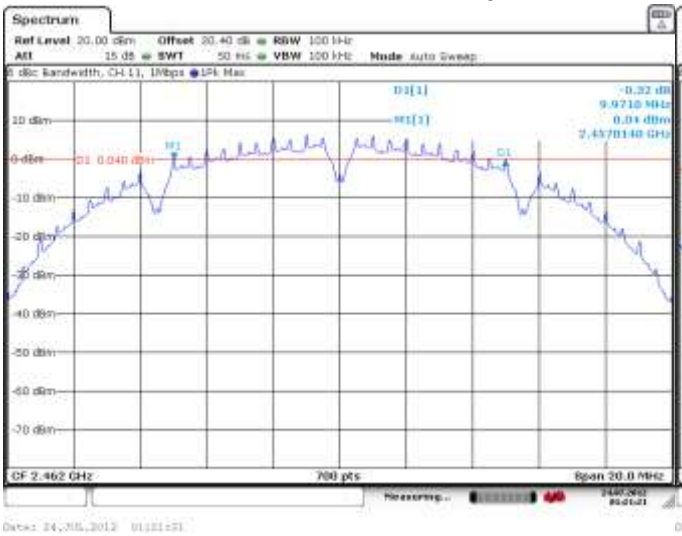
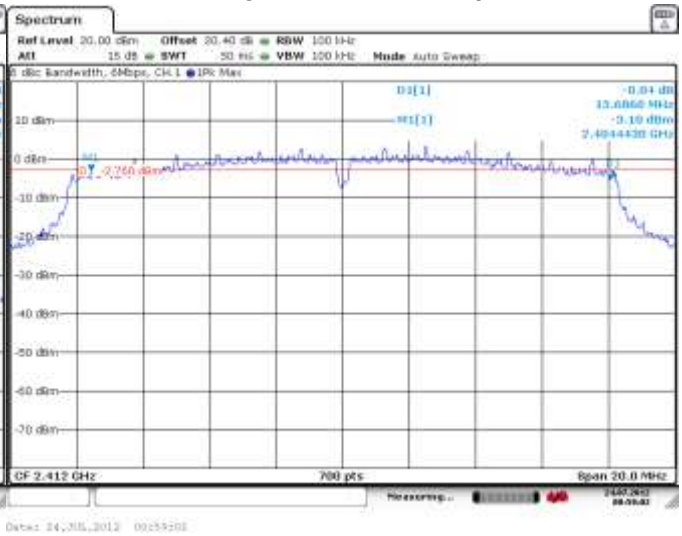


Figure 2-4: 6 dB Bandwidth
802.11g, Channel 1, 6 Mbps



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

Figure 2-5: 6 dB Bandwidth
802.11g, Channel 6, 6 Mbps

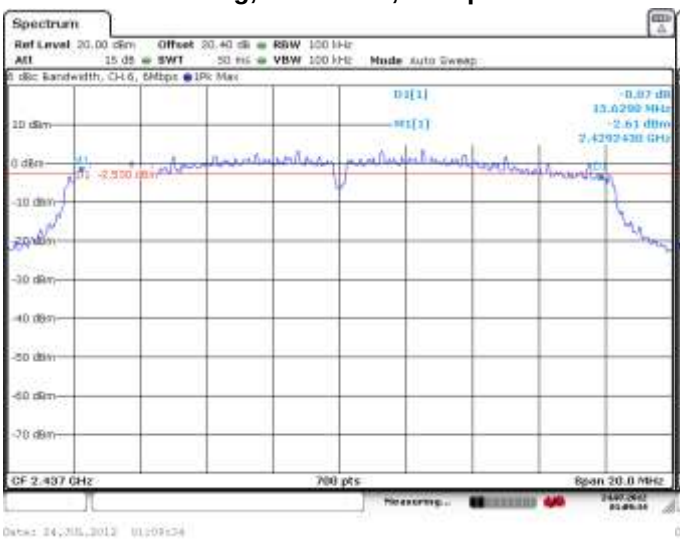


Figure 2-6: 6 dB Bandwidth
802.11g, Channel 11, 6 Mbps

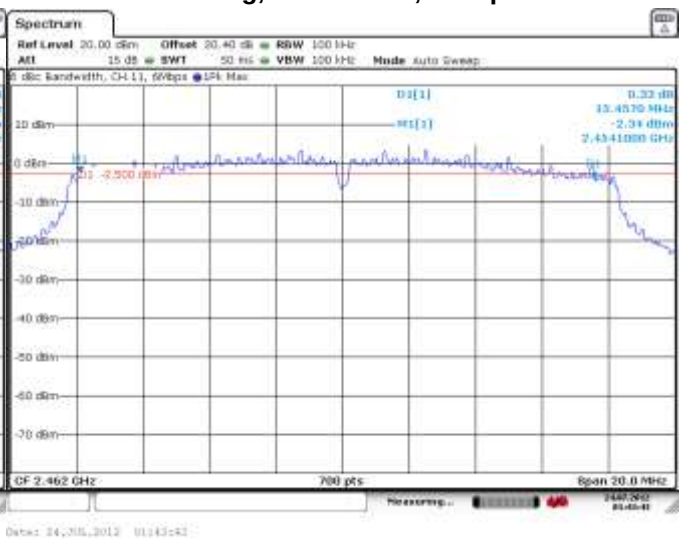


Figure 2-7: 6 dB Bandwidth
802.11n, Channel 1, MCS 0

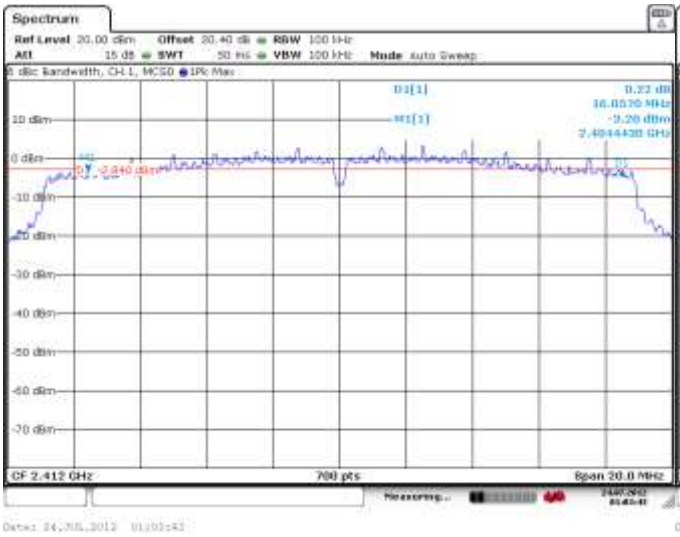


Figure 2-8: 6 dB Bandwidth
802.11n, Channel 6, MCS 0

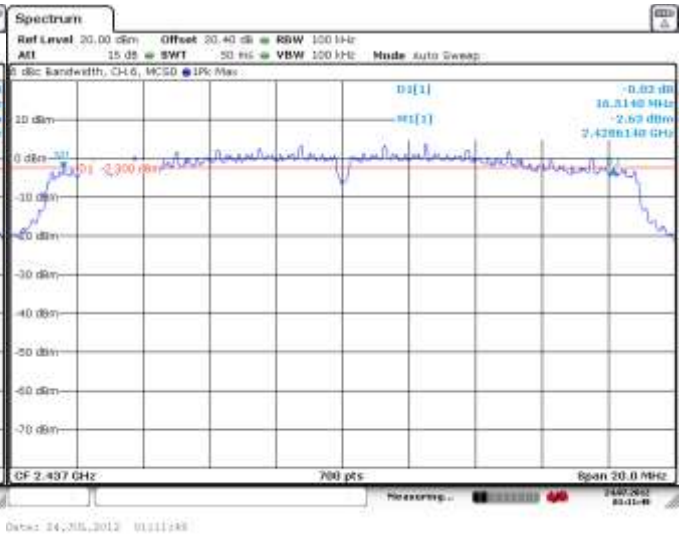
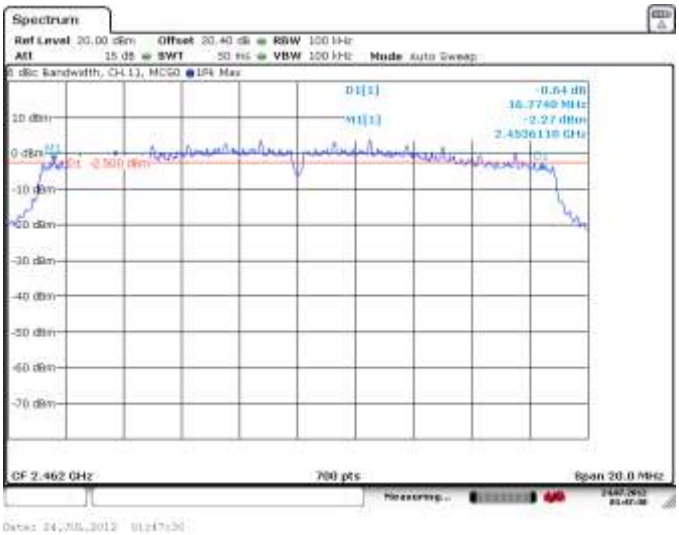


Figure 2-9: 6 dB Bandwidth
802.11n, Channel 11, MCS 0



802.11b/g/n 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, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4 and 7 for 802.11n 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	14.78	30.06
	5.5 Mbps	< 1.00	14.63	29.04
	11 Mbps	< 1.00	14.56	28.58
	6 Mbps	< 1.00	14.32	27.04
	24 Mbps	< 1.00	14.37	27.35
	54 Mbps	< 1.00	14.23	26.49
	MCS 0	< 1.00	14.29	26.85
	MCS 4	< 1.00	14.42	27.67
	MCS 7	< 1.00	14.15	26.00
6	1 Mbps	< 1.00	14.82	30.34
	5.5 Mbps	< 1.00	14.76	29.92
	11 Mbps	< 1.00	14.71	29.58
	6 Mbps	< 1.00	14.70	29.51
	24 Mbps	< 1.00	14.42	27.67
	54 Mbps	< 1.00	14.34	27.16
	MCS 0	< 1.00	14.63	29.04
	MCS 4	< 1.00	14.65	29.17
	MCS 7	< 1.00	14.59	28.77

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

Channel	Data Rate	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
11	1 Mbps	< 1.00	14.82	30.34
	5.5 Mbps	< 1.00	14.77	29.99
	11 Mbps	< 1.00	14.75	29.85
	6 Mbps	< 1.00	14.61	28.91
	24 Mbps	< 1.00	14.59	28.77
	54 Mbps	< 1.00	14.38	27.42
	MCS 0	< 1.00	14.52	28.31
	MCS 4	< 1.00	14.37	27.35
	MCS 7	< 1.00	14.34	27.16

802.11b/g/n 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, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4 and 7 for 802.11n mode.

Channel	Data Rate	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
1	1 Mbps	< -20	-41.33	-21.33
	5.5 Mbps	< -20	-40.57	-20.57
	11 Mbps	< -20	-41.68	-21.68
	6 Mbps	< -20	-26.32	-6.32
	24 Mbps	< -20	-26.70	-6.70
	54 Mbps	< -20	-27.12	-7.12
	MCS 0	< -20	-26.01	-6.01
	MCS 4	< -20	-25.68	-5.68
	MCS 7	< -20	-26.33	-6.33
11	1 Mbps	< -20	-46.21	-26.21
	5.5 Mbps	< -20	-45.68	-25.68
	11 Mbps	< -20	-46.45	-26.45
	6 Mbps	< -20	-35.85	-15.85
	24 Mbps	< -20	-33.79	-13.79
	54 Mbps	< -20	-35.13	-15.13
	MCS 0	< -20	-34.64	-14.64
	MCS 4	< -20	-35.23	-15.23
	MCS 7	< -20	-35.77	-15.77

See figures 2-10 to 2-15 for the plots of the band edge compliance measurements for Channels 1 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

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

Figure 2-10: Band Edge Compliance
802.11b, Channel 1, 1 Mbps

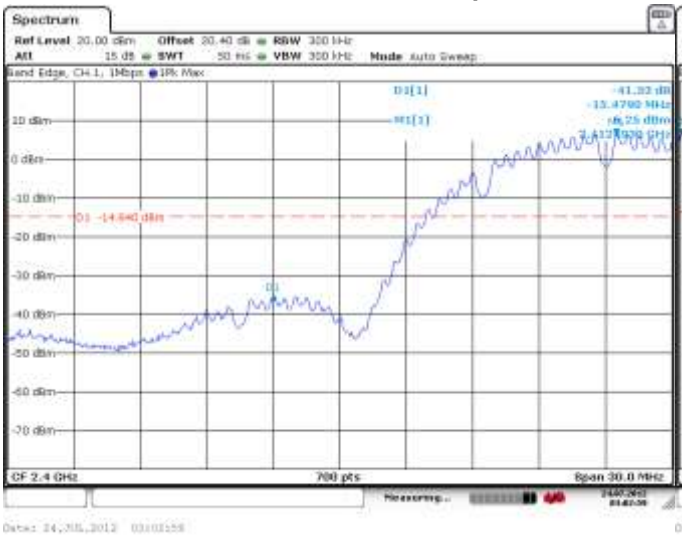


Figure 2-11: Band Edge Compliance
802.11b, Channel 11, 1 Mbps

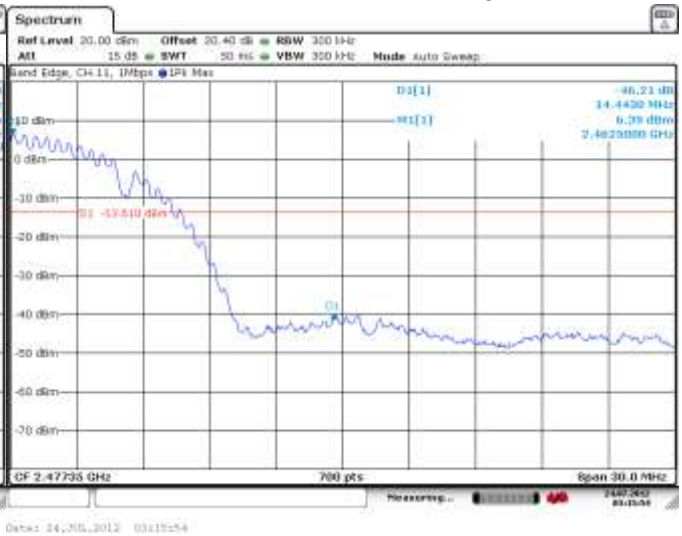


Figure 2-12: Band Edge Compliance
802.11g, Channel 1, 6 Mbps

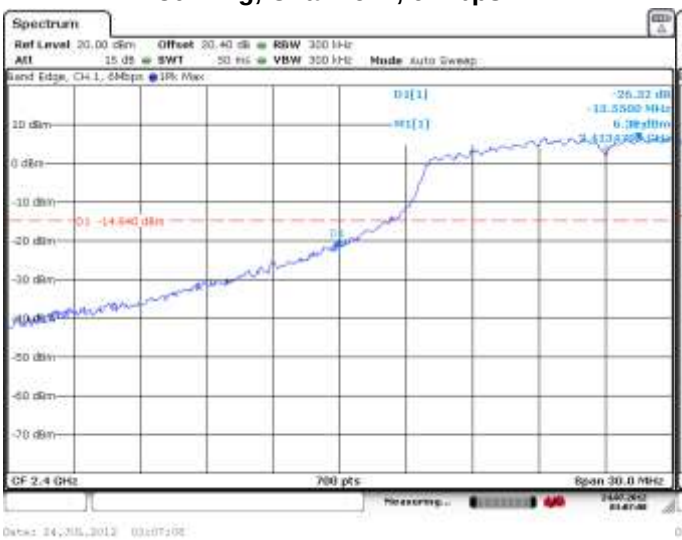
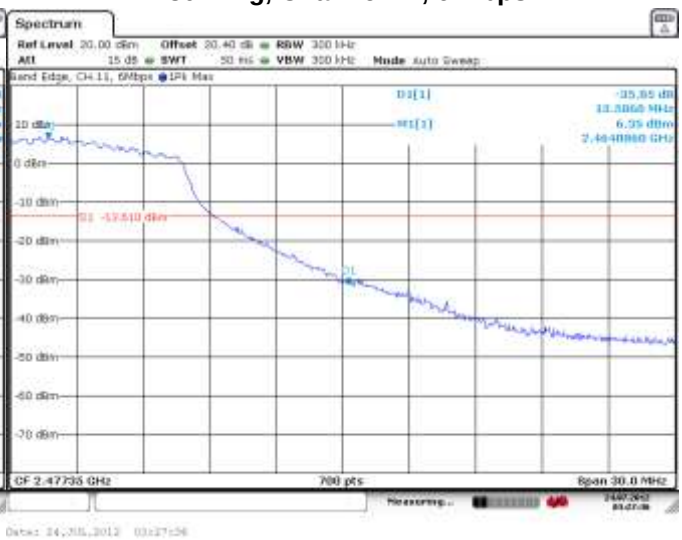


Figure 2-13: Band Edge Compliance
802.11g, Channel 11, 6 Mbps



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

Figure 2-14: Band Edge Compliance 802.11n, Channel 1, MCS 0

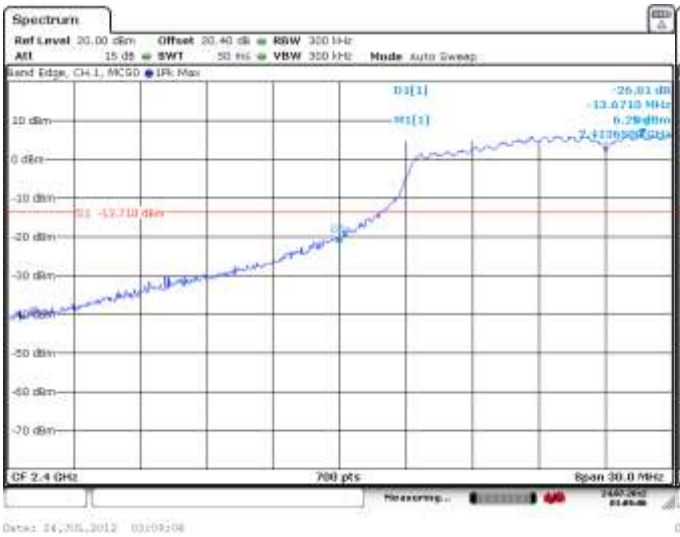
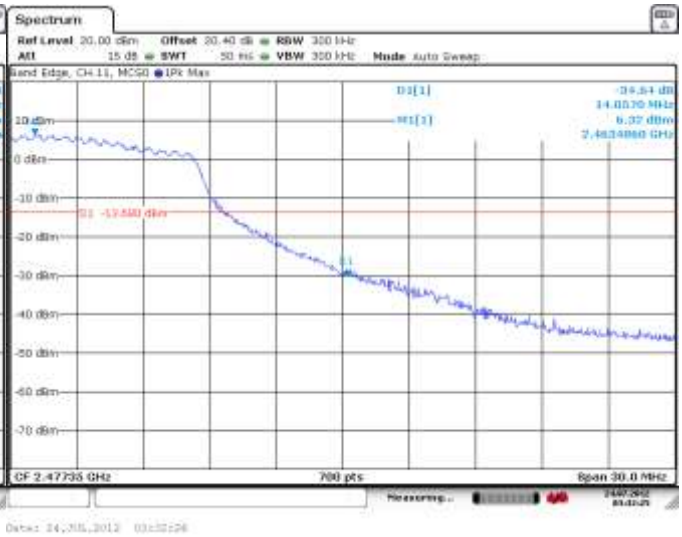


Figure 2-15: Band Edge Compliance 802.11n, Channel 11, MCS 0



802.11b/g/n 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, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4, and 7 for 802.11n mode.

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
1	1 Mbps	< 8.00	-6.20	-14.20
	5.5 Mbps	< 8.00	-7.13	-15.13
	11 Mbps	< 8.00	-7.59	-15.59
	6 Mbps	< 8.00	-9.59	-17.59
	24 Mbps	< 8.00	-10.56	-18.56
	54 Mbps	< 8.00	-11.38	-19.38
	MCS 0	< 8.00	-9.83	-17.83
	MCS 4	< 8.00	-11.25	-19.25
	MCS 7	< 8.00	-11.51	-19.51
6	1 Mbps	< 8.00	-5.99	-13.99
	5.5 Mbps	< 8.00	-6.64	-14.64
	11 Mbps	< 8.00	-6.13	-14.13
	6 Mbps	< 8.00	-7.70	-15.70
	24 Mbps	< 8.00	-7.58	-15.58
	54 Mbps	< 8.00	-9.05	-17.05
	MCS 0	< 8.00	-8.97	-16.97
	MCS 4	< 8.00	-10.15	-18.15
	MCS 7	< 8.00	-10.38	-18.38
11	1 Mbps	< 8.00	-6.00	-14.00
	5.5 Mbps	< 8.00	-6.35	-14.35
	11 Mbps	< 8.00	-6.89	-14.89
	6 Mbps	< 8.00	-7.80	-15.80
	24 Mbps	< 8.00	-9.61	-17.61
	54 Mbps	< 8.00	-10.86	-18.86
	MCS 0	< 8.00	-9.50	-17.50
	MCS 4	< 8.00	-10.61	-18.61
	MCS 7	< 8.00	-10.55	-18.55

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

See figures 2-16 to 2-24 for the plots of the peak power spectral density for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 for 802.11n mode.

Figure 2-16: Peak Power Spectral Density 802.11b, Channel 1, 1 Mbps

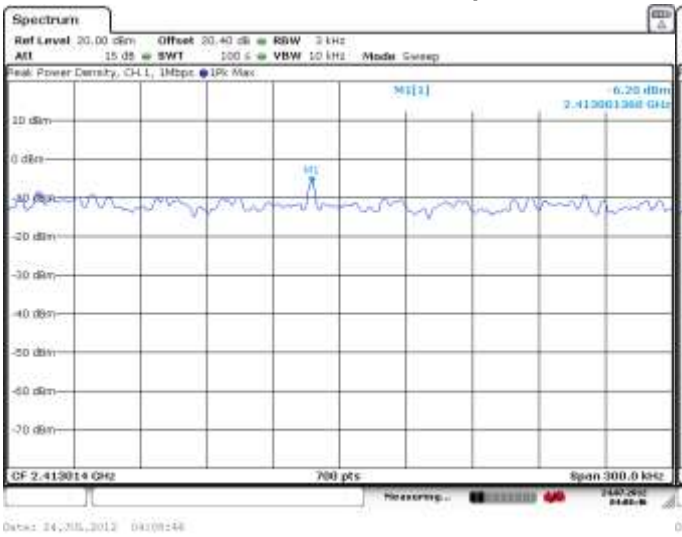


Figure 2-17: Peak Power Spectral Density 802.11b, Channel 6, 1 Mbps

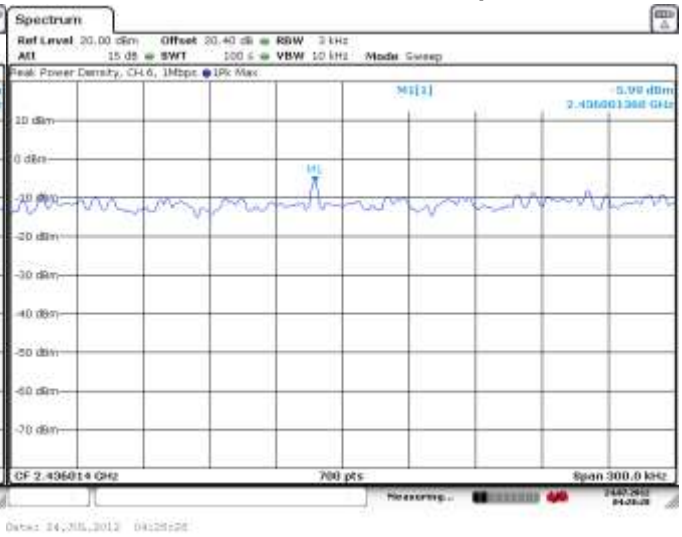
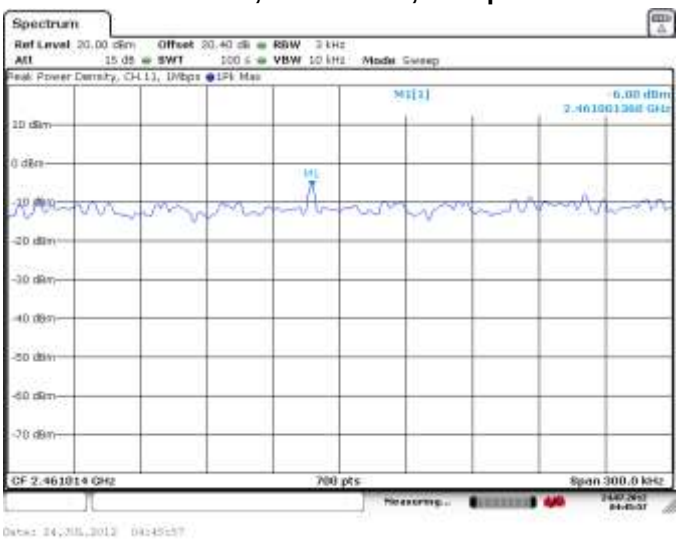


Figure 2-18: Peak Power Spectral Density 802.11b, Channel 11, 1 Mbps



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

Figure 2-19: Peak Power Spectral Density
802.11g, Channel 1, 6 Mbps

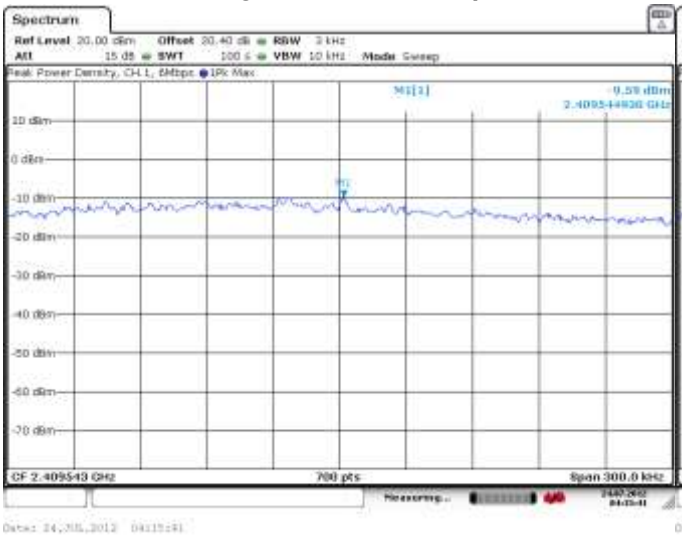


Figure 2-20: Peak Power Spectral Density
802.11g, Channel 6, 6 Mbps

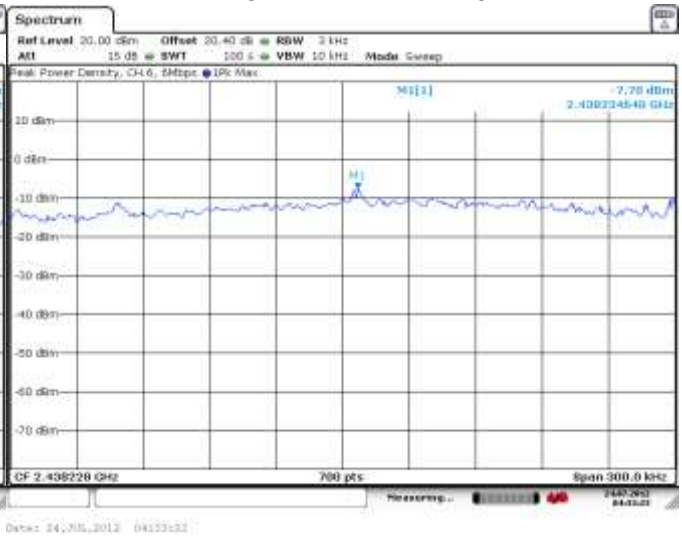
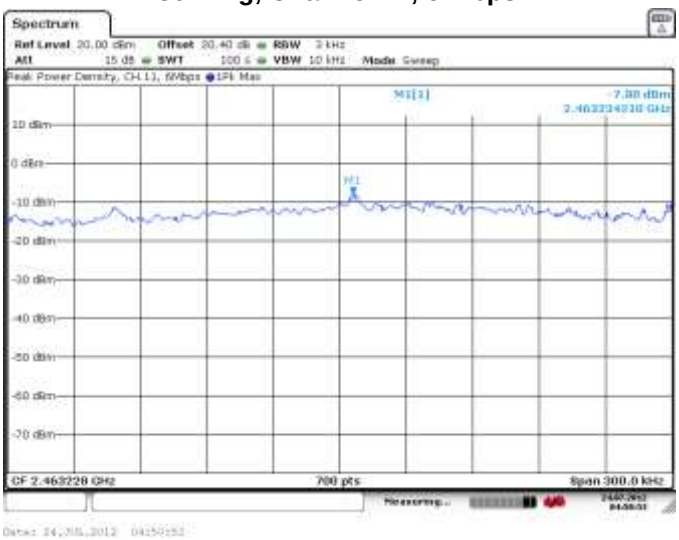


Figure 2-21: Peak Power Spectral Density
802.11g, Channel 11, 6 Mbps



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

Figure 2-22: Peak Power Spectral Density
802.11n, Channel 1, MCS 0

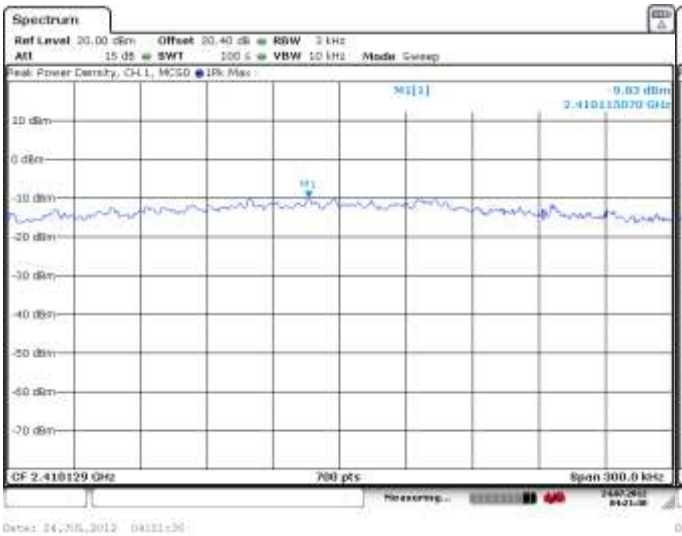


Figure 2-23: Peak Power Spectral Density
802.11n, Channel 6, MCS 0

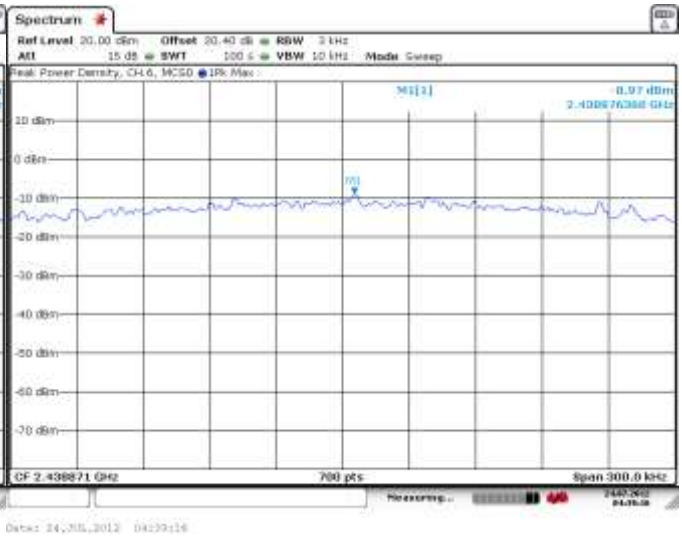
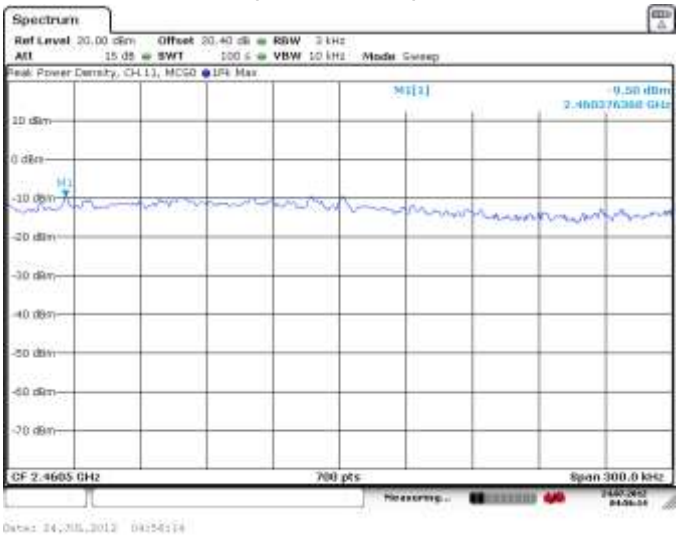


Figure 2-24: Peak Power Spectral Density
802.11n, Channel 11, MCS 0



802.11b/g/n 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, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4, and 7 for 802.11n mode. Peak power was measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 18.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
1	1 Mbps	14.78	-50.33	-65.11	-20
	5.5 Mbps	14.63	-50.50	-65.13	-20
	11 Mbps	14.56	-50.33	-64.89	-20
	6 Mbps	14.32	-50.00	-64.32	-20
	24 Mbps	14.37	-49.50	-63.87	-20
	54 Mbps	14.23	-50.00	-64.23	-20
	MCS 0	14.29	-50.17	-64.46	-20
	MCS 4	14.42	-49.83	-64.25	-20
	MCS 7	14.15	-50.17	-64.32	-20
6	1 Mbps	14.82	-50.00	-64.82	-20
	5.5 Mbps	14.76	-50.83	-65.59	-20
	11 Mbps	14.71	-49.67	-64.38	-20
	6 Mbps	14.70	-50.17	-64.87	-20
	24 Mbps	14.42	-50.83	-65.25	-20
	54 Mbps	14.34	-50.00	-64.34	-20
	MCS 0	14.63	-50.33	-64.96	-20
	MCS 4	14.65	-50.67	-65.32	-20
	MCS 7	14.59	-50.17	-64.76	-20

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

Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
11	1 Mbps	14.82	-50.33	-65.15	-20
	5.5 Mbps	14.77	-50.67	-65.44	-20
	11 Mbps	14.75	-50.17	-64.92	-20
	6 Mbps	14.61	-49.67	-64.28	-20
	24 Mbps	14.59	-50.50	-65.09	-20
	54 Mbps	14.38	-50.00	-64.38	-20
	MCS 0	14.52	-50.33	-64.85	-20
	MCS 4	14.37	-50.50	-64.87	-20
	MCS 7	14.34	-49.67	-64.01	-20

The emissions were in the NF.

See figures 2-25 to 2-33 for the plots of the spurious RF conducted emissions for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

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

Figure 2-25: Spurious Conducted RF Emissions

802.11b, Channel 1, 1 Mbps

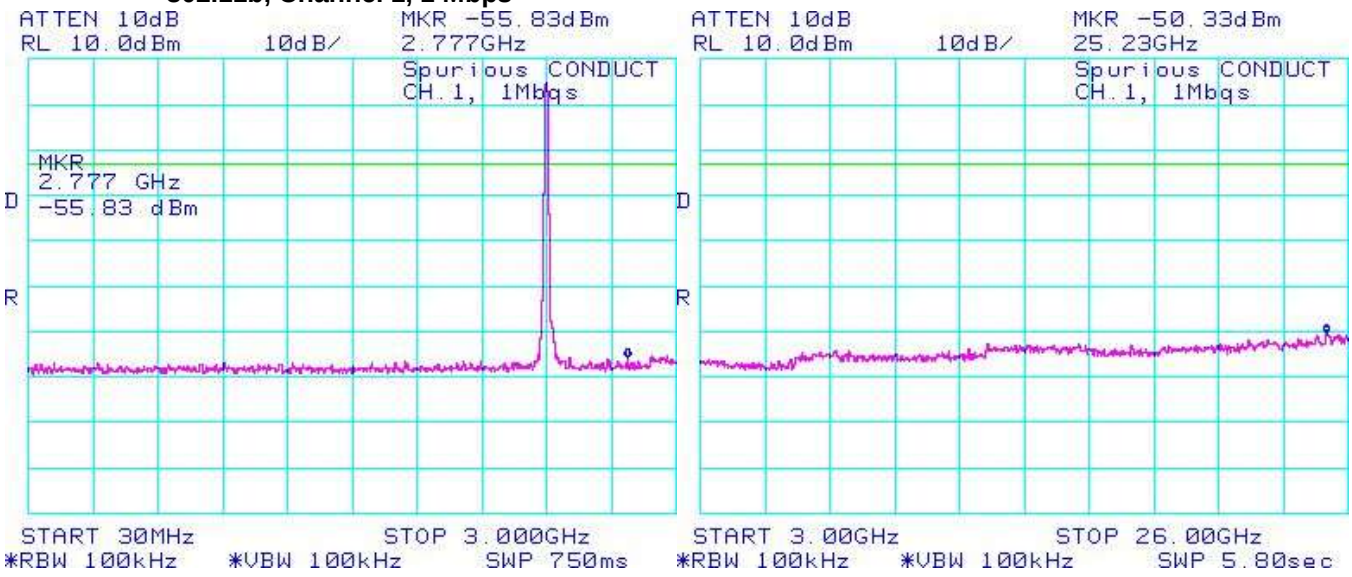
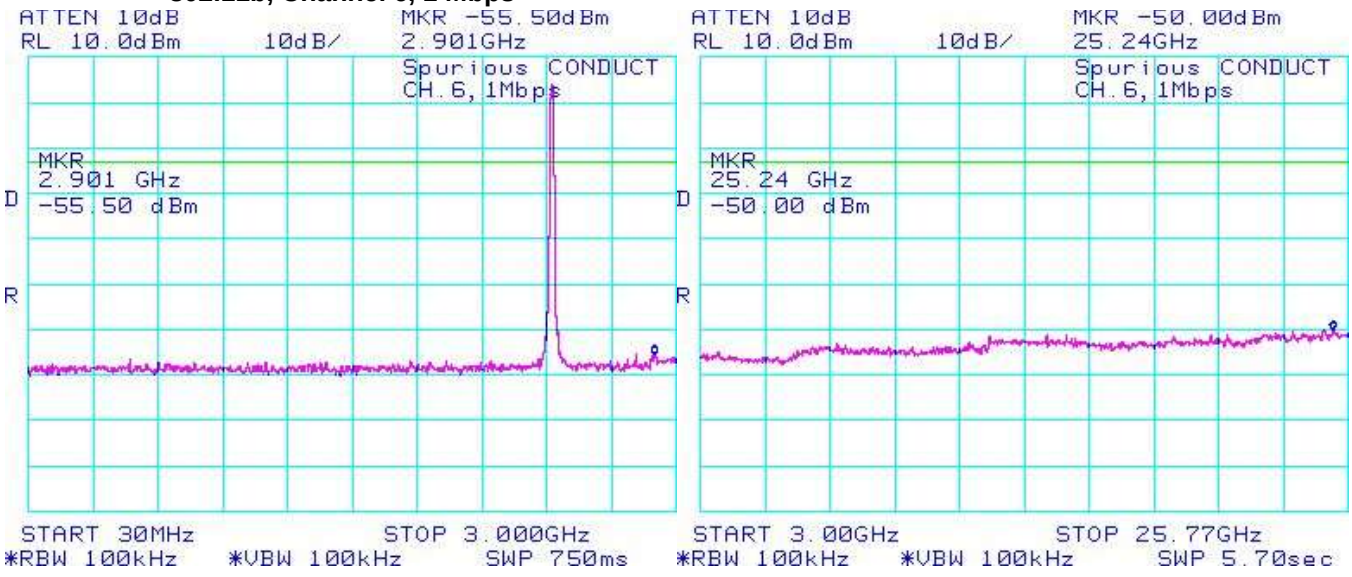


Figure 2-26 : Spurious Conducted RF Emissions

802.11b, Channel 6, 1 Mbps



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

Figure 2-27: Spurious Conducted RF Emissions

802.11b, Channel 11, 1 Mbps

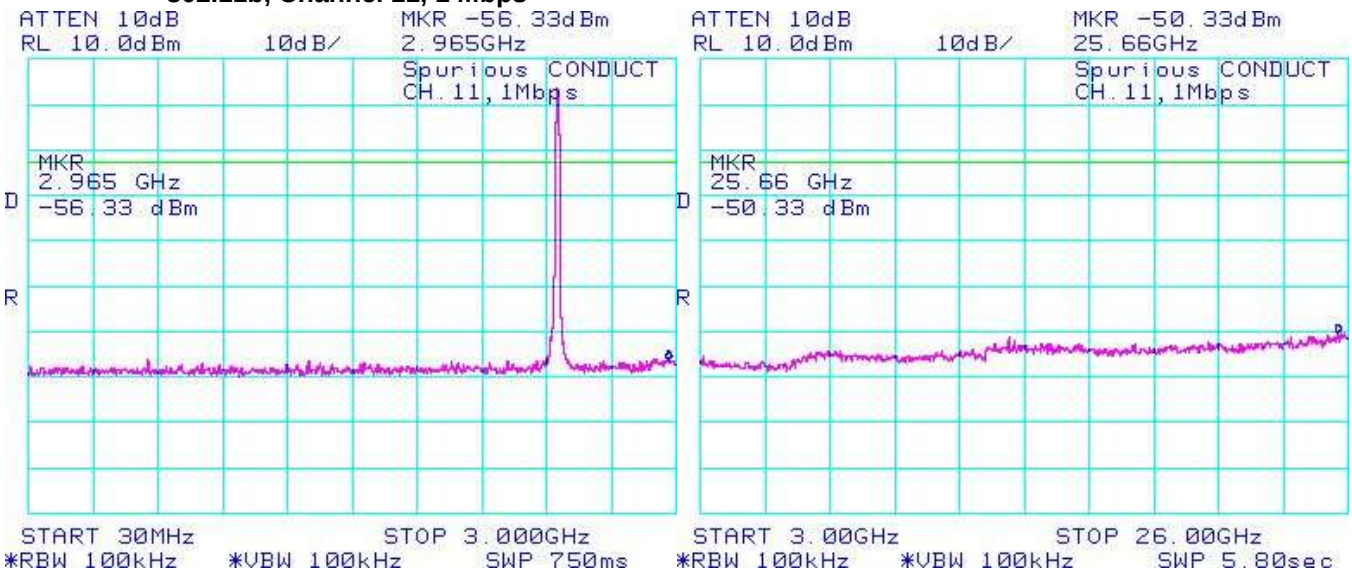
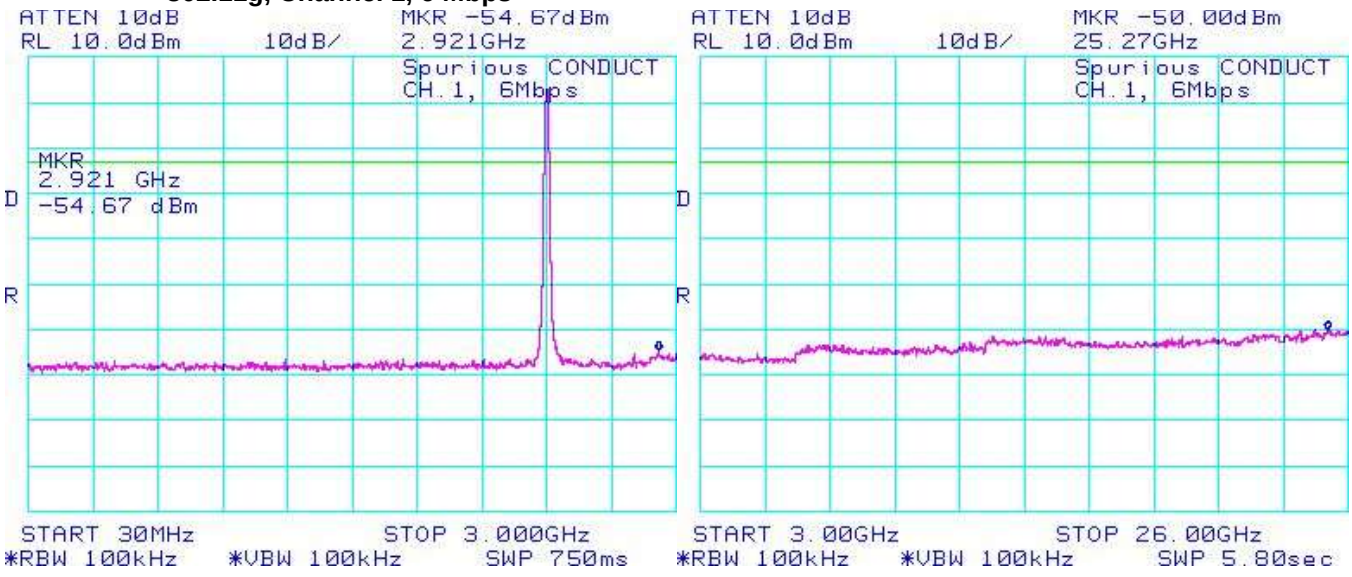


Figure 2-28: Spurious Conducted RF Emissions

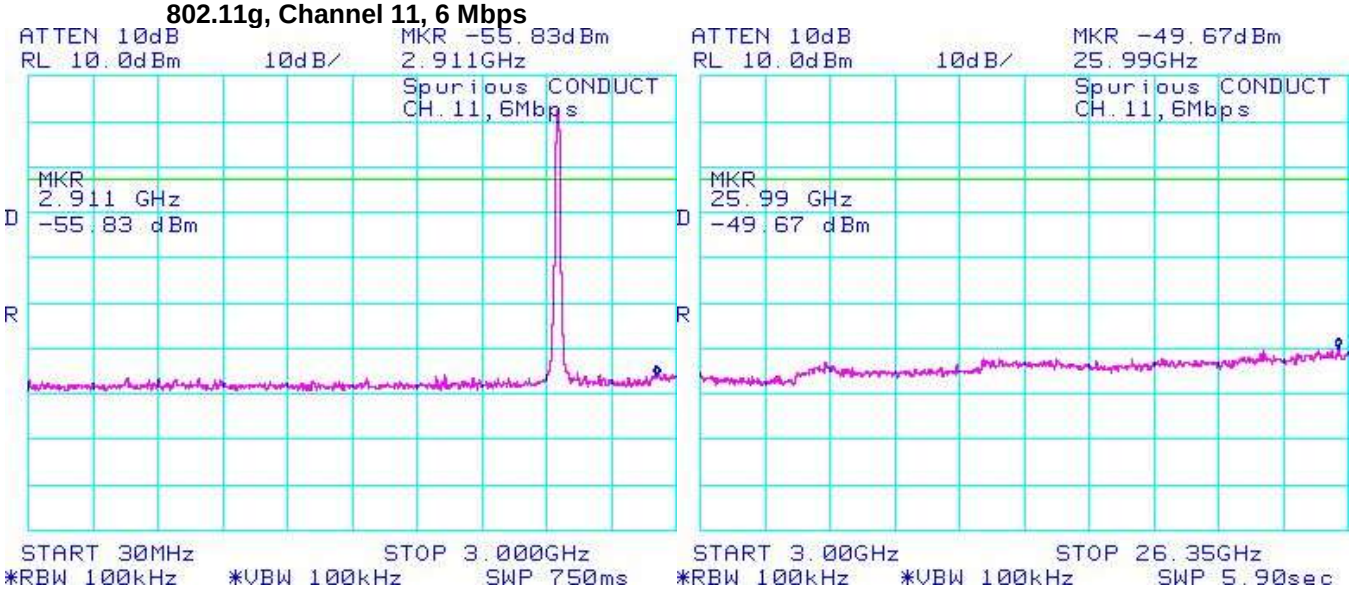
802.11g, Channel 1, 6 Mbps



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

Figure 2-29: Spurious Conducted RF Emissions
802.11g, Channel 6, 6 Mbps

Figure 2-30: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps



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

Figure 2-31: Spurious Conducted RF Emissions
802.11n, Channel 1, MCS 0

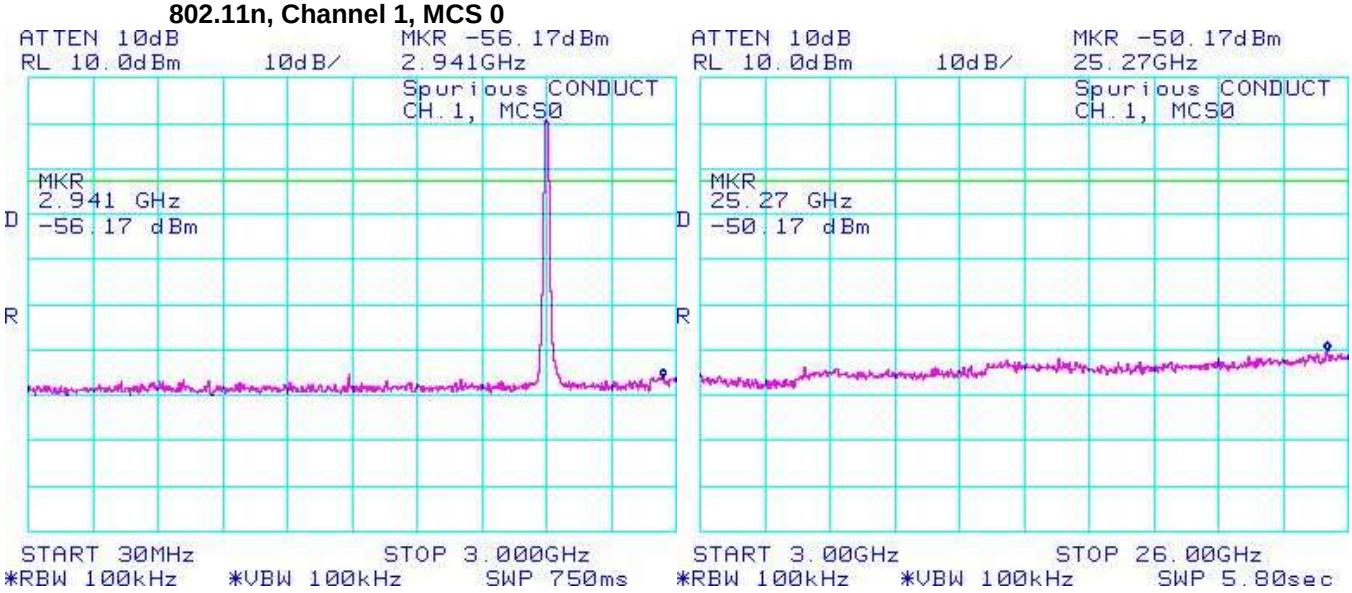
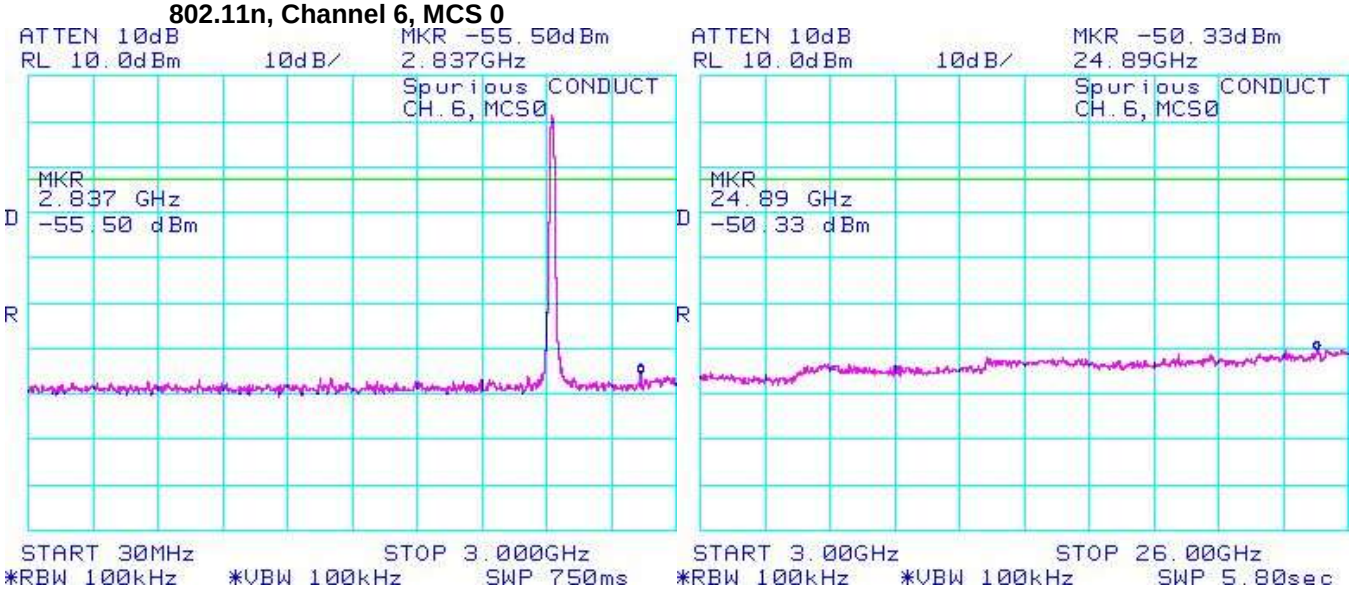
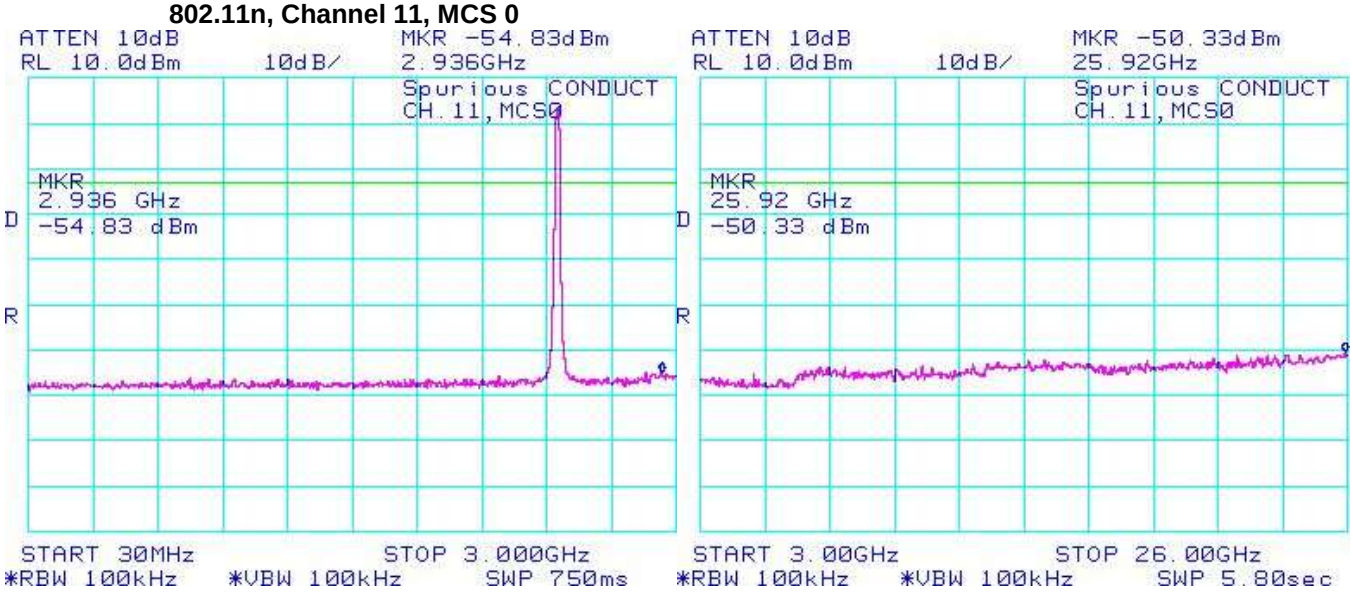


Figure 2-32: Spurious Conducted RF Emissions
802.11n, Channel 6, MCS 0



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

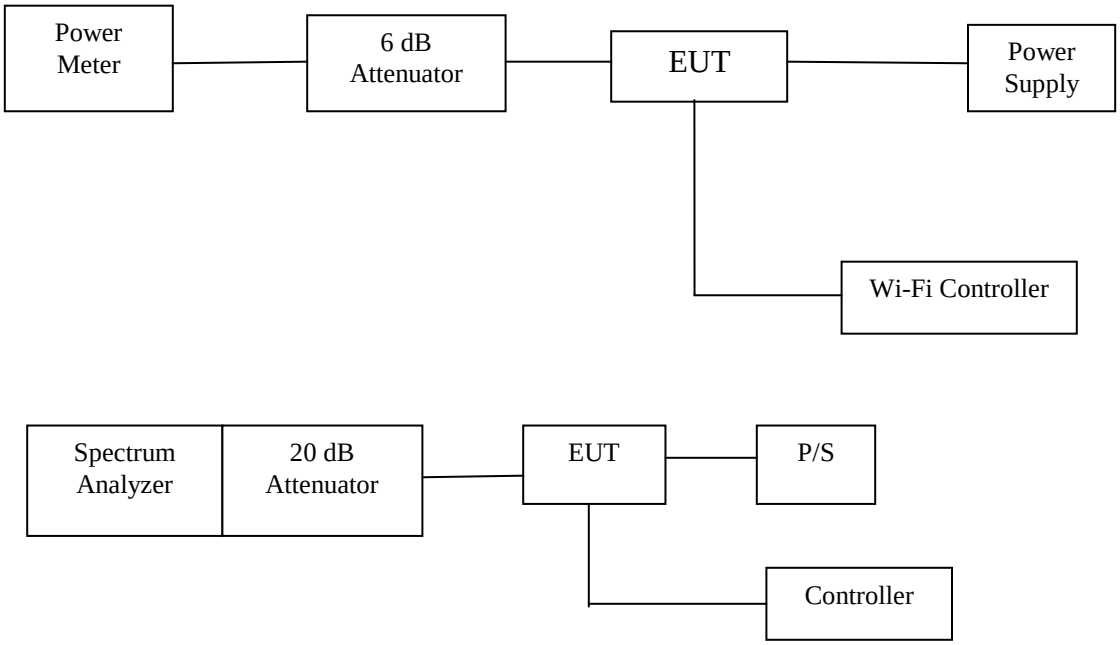
Figure 2-33: Spurious Conducted RF Emissions
802.11n, Channel 11, MCS 0



APPENDIX 3 – 802.11a CONDUCTED EMISSIONS TEST DATA/PLOTS

802.11a RF Conducted Emission Test Results

Test Setup Diagram



A reference offset of 8.9 dB was applied to the spectrum analyzer and 7.4 dB to the Power Meter reference level for the attenuators and coaxial cable loss in the test circuit.

Date of test: July 24, 25, 26 and August 14, 2012.
The measurements were performed by Kevin Guo.

The environmental test conditions were:	Temperature:	24 ºC
	Relative Humidity:	42 %

802.11a 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 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 were measured at 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11a mode.

Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
36	6 Mbps	>= 500	15.34
	24 Mbps	>= 500	16.53
	54 Mbps	>= 500	16.54
44	6 Mbps	>= 500	15.31
	24 Mbps	>= 500	16.53
	54 Mbps	>= 500	16.53
48	6 Mbps	>= 500	15.31
	24 Mbps	>= 500	16.43
	54 Mbps	>= 500	16.56
52	6 Mbps	>= 500	15.34
	24 Mbps	>= 500	16.53
	54 Mbps	>= 500	16.52
60	6 Mbps	>= 500	15.34
	24 Mbps	>= 500	16.48
	54 Mbps	>= 500	16.54
64	6 Mbps	>= 500	15.51
	24 Mbps	>= 500	16.53
	54 Mbps	>= 500	16.52
100	6 Mbps	>= 500	15.51
	24 Mbps	>= 500	16.54
	54 Mbps	>= 500	16.53

802.11a RF Conducted Emission Test Results cont'd

Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
140	6 Mbps	>= 500	14.41
	24 Mbps	>= 500	16.53
	54 Mbps	>= 500	16.53
149	6 Mbps	>= 500	15.51
	24 Mbps	>= 500	16.52
	54 Mbps	>= 500	16.51
157	6 Mbps	>= 500	15.33
	24 Mbps	>= 500	16.52
	54 Mbps	>= 500	16.55
161	6 Mbps	>= 500	15.34
	24 Mbps	>= 500	16.46
	54 Mbps	>= 500	16.48
165	6 Mbps	>= 500	15.46
	24 Mbps	>= 500	16.61
	54 Mbps	>= 500	16.60

See figures 3-1 to 3-12 for the plots of the 6 dB bandwidth measurements for Channel 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 at 6 Mbps each for 802.11a mode.

802.11a RF Conducted Emission Test Results cont'd

Figure 3-1: 6 dB Bandwidth
802.11a, Channel 36, 6 Mbps

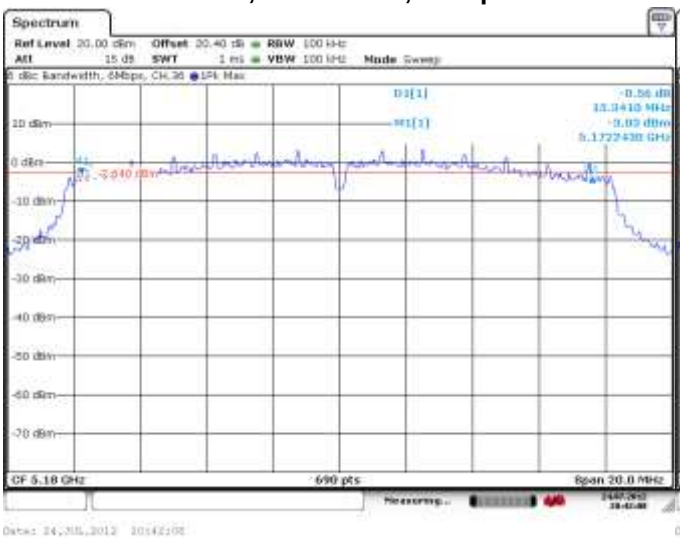


Figure 3-2: 6 dB Bandwidth
802.11a, Channel 44, 6 Mbps

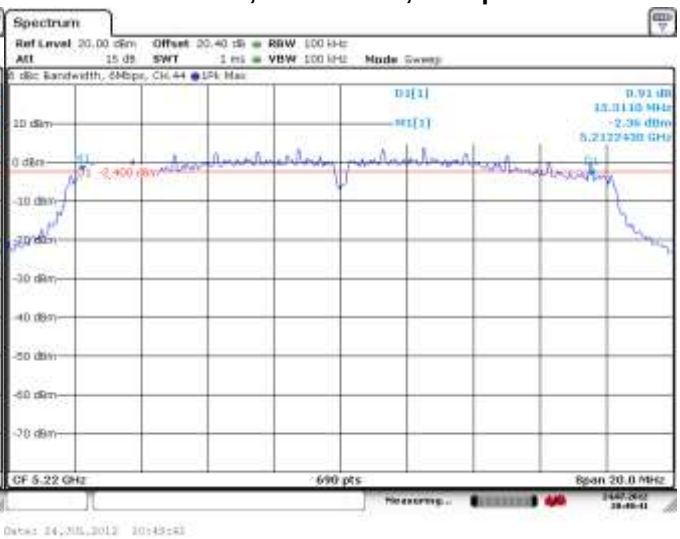


Figure 3-3: 6 dB Bandwidth
802.11a, Channel 48, 6 Mbps

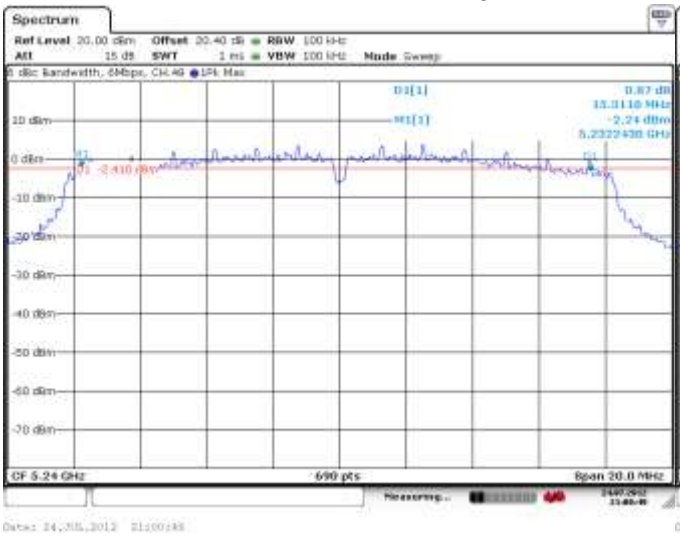
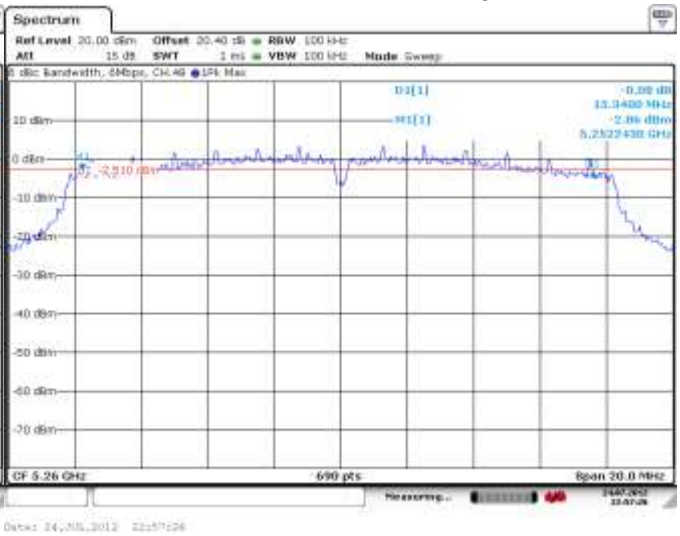


Figure 3-4: 6 dB Bandwidth
802.11a, Channel 52, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-5: 6 dB Bandwidth
802.11a, Channel 60, 6 Mbps

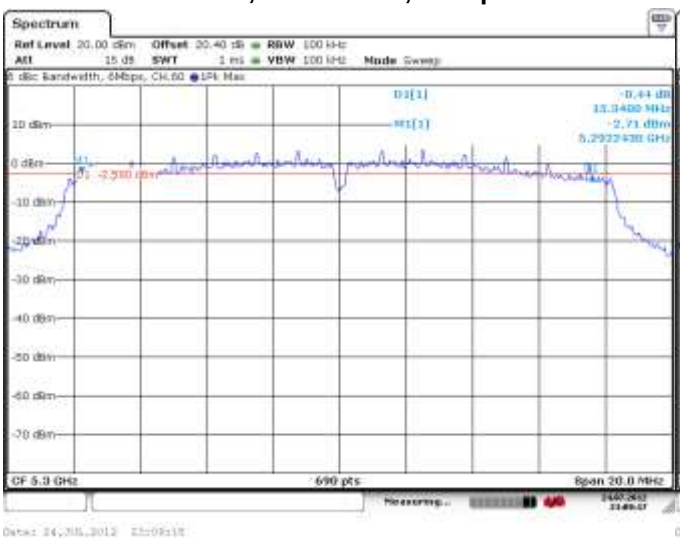


Figure 3-6: 6 dB Bandwidth
802.11a, Channel 64, 6 Mbps

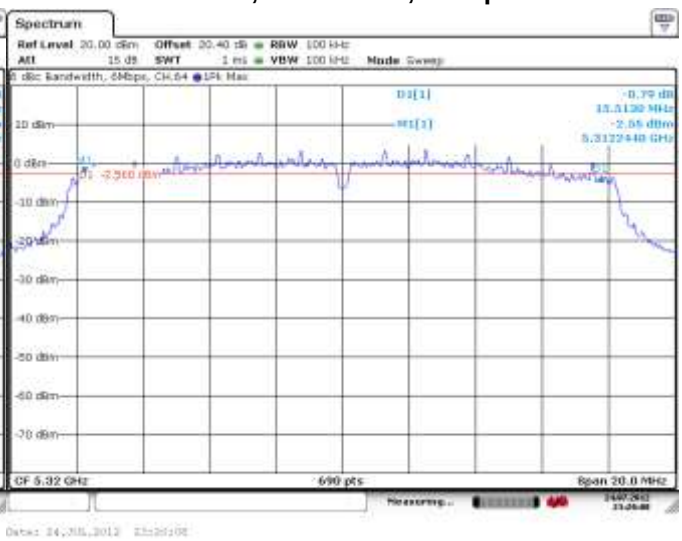


Figure 3-7: 6 dB Bandwidth
802.11a, Channel 100, 6 Mbps

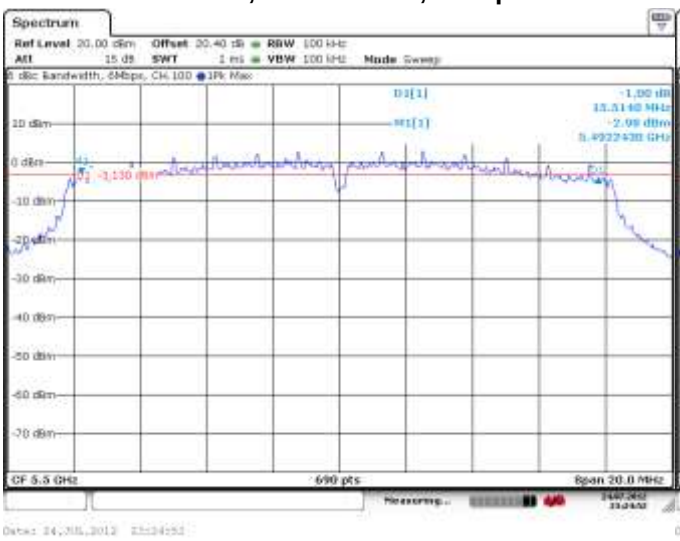
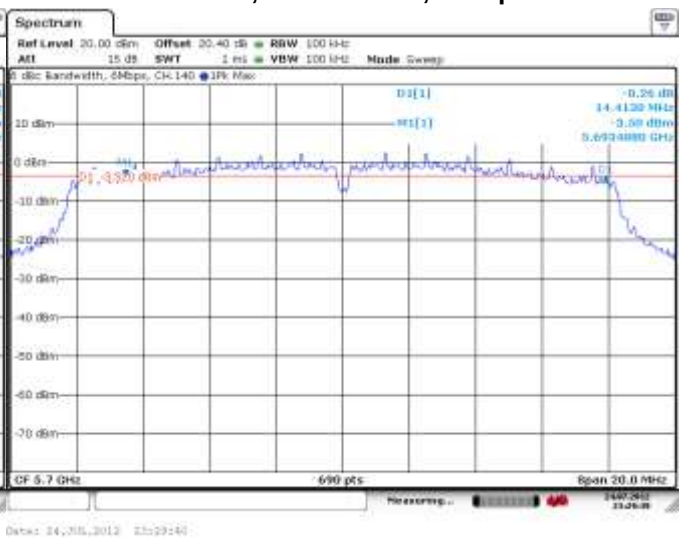


Figure 3-8: 6 dB Bandwidth
802.11a, Channel 140, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-9: 6 dB Bandwidth
802.11a, Channel 149, 6 Mbps

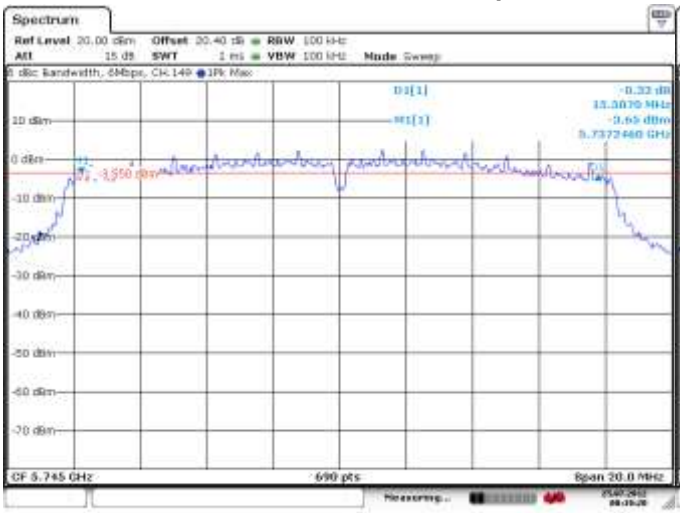


Figure 3-10: 6 dB Bandwidth
802.11a, Channel 157, 6 Mbps

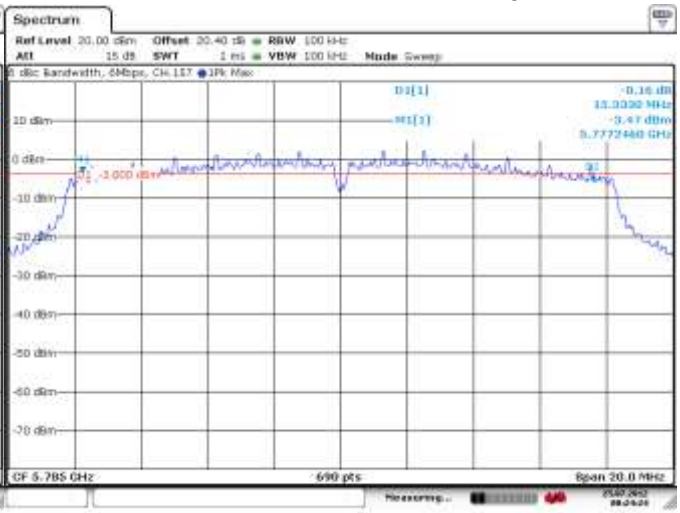


Figure 3-11: 6 dB Bandwidth
802.11a, Channel 161, 6 Mbps

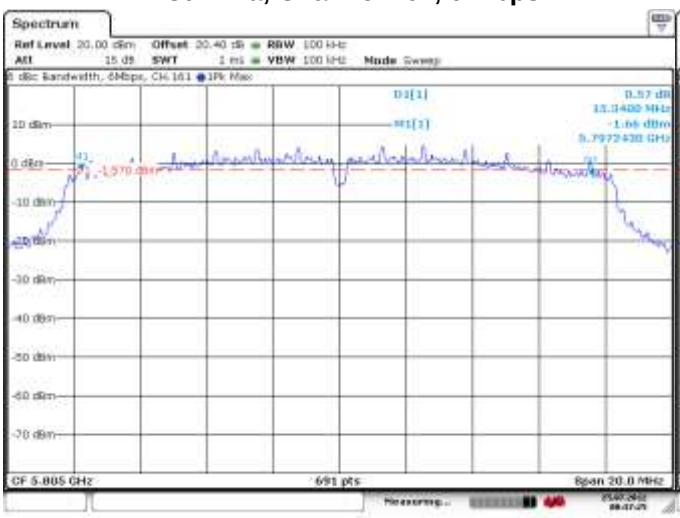
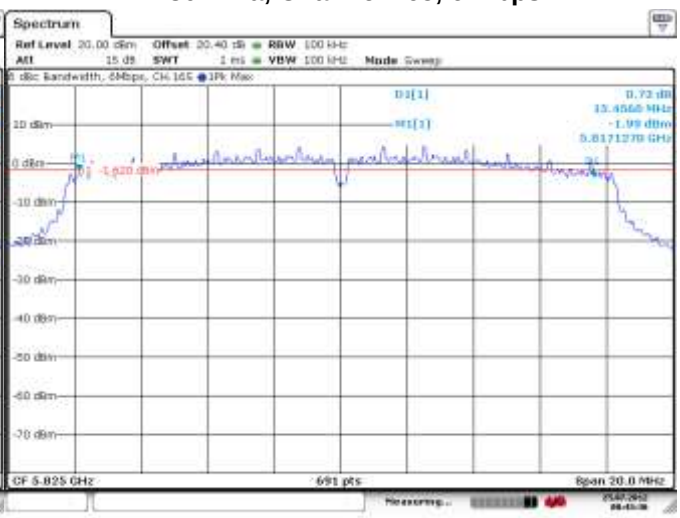


Figure 3-12: 6 dB Bandwidth
802.11a, Channel 165, 6 Mbps



802.11a 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 15.407 and RSS-210. Channels 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 were measured for 802.11a mode using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 8.9 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)
36	6 Mbps	< 1.00	13.51	22.44
	24 Mbps	< 1.00	13.46	22.18
	54 Mbps	< 1.00	13.53	22.54
44	6 Mbps	< 1.00	12.21	16.63
	24 Mbps	< 1.00	12.34	17.14
	54 Mbps	< 1.00	12.13	16.33
48	6 Mbps	< 1.00	12.19	16.56
	24 Mbps	< 1.00	12.24	16.75
	54 Mbps	< 1.00	12.22	16.67
52	6 Mbps	< 1.00	12.23	16.71
	24 Mbps	< 1.00	12.17	16.48
	54 Mbps	< 1.00	12.28	16.90
60	6 Mbps	< 1.00	12.22	16.67
	24 Mbps	< 1.00	12.34	17.14
	54 Mbps	< 1.00	12.28	16.90
64	6 Mbps	< 1.00	12.29	16.94
	24 Mbps	< 1.00	12.33	17.10
	54 Mbps	< 1.00	12.42	17.46
100	6 Mbps	< 1.00	12.30	16.98
	24 Mbps	< 1.00	12.22	16.67
	54 Mbps	< 1.00	12.34	17.14

802.11a RF Conducted Emission Test Results cont'd

Channel	Data Rate	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
140	6 Mbps	< 1.00	12.35	17.18
	24 Mbps	< 1.00	12.28	16.90
	54 Mbps	< 1.00	12.30	16.98
149	6 Mbps	< 1.00	12.24	16.75
	24 Mbps	< 1.00	12.22	16.67
	54 Mbps	< 1.00	12.28	16.90
157	6 Mbps	< 1.00	12.27	16.87
	24 Mbps	< 1.00	12.31	17.02
	54 Mbps	< 1.00	12.33	17.10
161	6 Mbps	< 1.00	12.35	17.18
	24 Mbps	< 1.00	12.28	16.90
	54 Mbps	< 1.00	12.26	16.83
165	6 Mbps	< 1.00	12.31	17.02
	24 Mbps	< 1.00	12.29	16.94
	54 Mbps	< 1.00	12.30	16.98

802.11a RF Conducted Emission Test Results cont'd

Band Edge Compliance

The EUT met the requirements of the band edge compliance as per 47 CFR 15.407 and RSS-210. Channels 36, 48, 52, 64, 100, 149, 161 and 165 were measured at 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11a mode.

Channel	Data Rate	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
36	6 Mbps	< -20	-37.58	-17.58
	24 Mbps	< -20	-38.23	-18.23
	54 Mbps	< -20	-38.45	-18.45
48	6 Mbps	< -20	-26.75	-6.75
	24 Mbps	< -20	-25.71	-5.71
	54 Mbps	< -20	-25.58	-5.58
52	6 Mbps	< -20	-23.83	-3.83
	24 Mbps	< -20	-24.18	-4.18
	54 Mbps	< -20	-24.72	-4.72
64	6 Mbps	< -20	-38.36	-18.36
	24 Mbps	< -20	-39.78	-19.78
	54 Mbps	< -20	-40.13	-20.13
100	6 Mbps	< -20	-40.37	-20.37
	24 Mbps	< -20	-41.20	-21.2
	54 Mbps	< -20	-40.71	-20.71
149	6 Mbps	< -20	-35.58	-15.58
	24 Mbps	< -20	-36.03	-16.03
	54 Mbps	< -20	-35.77	-15.77
161	6 Mbps	< -20	-50.67	-30.67
	24 Mbps	< -20	-51.22	-31.22
	54 Mbps	< -20	-51.89	-31.89
165	6 Mbps	< -20	-20.28	-0.28
	24 Mbps	< -20	-20.13	-0.13
	54 Mbps	< -20	-20.16	-0.16

See figures 3-13 to 3-20 for the plots of the band edge compliance measurements for Channel 36, 48, 52, 64, 100, 149, 161 and 165 at 6 Mbps each for 802.11a mode.

802.11a RF Conducted Emission Test Results cont'd

Figure 3-13: Band Edge Compliance 802.11a, Channel 36, 6 Mbps

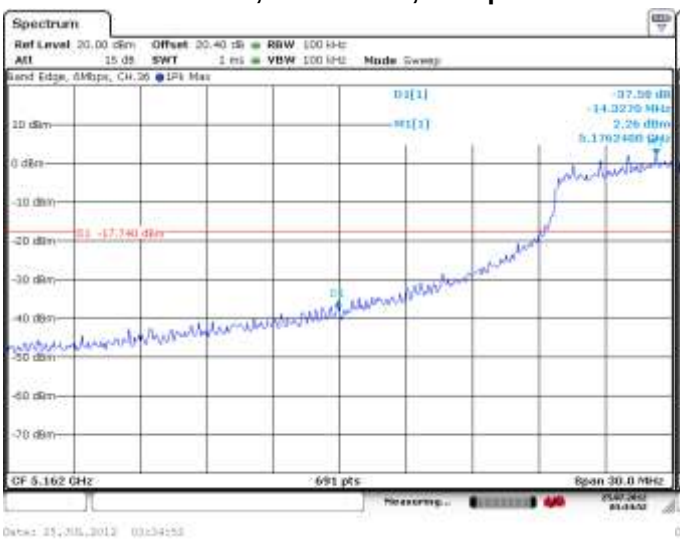


Figure 3-14: Band Edge Compliance 802.11a, Channel 48, 6 Mbps

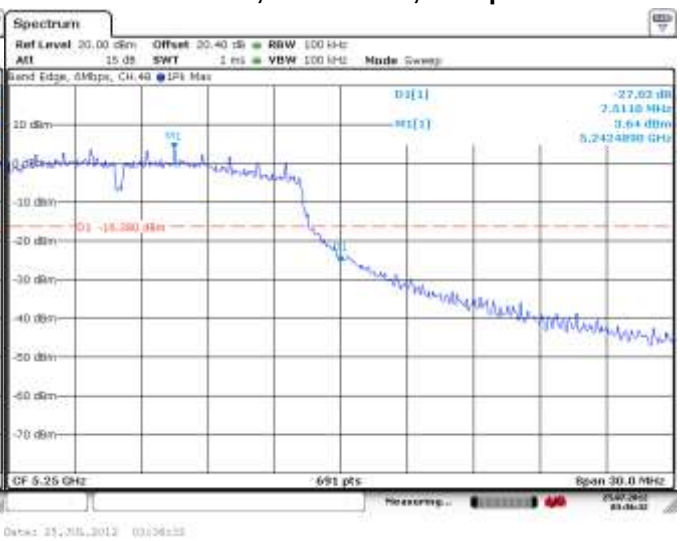


Figure 3-15: Band Edge Compliance 802.11a, Channel 52, 6 Mbps

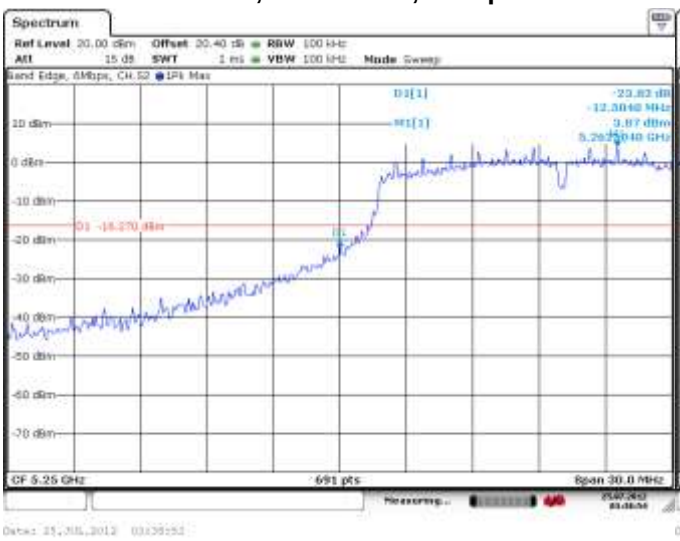
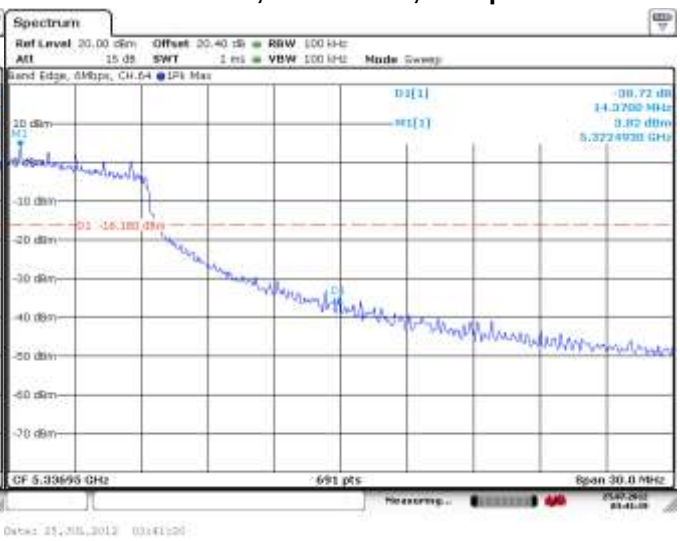


Figure 3-16: Band Edge Compliance 802.11a, Channel 64, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-17: Band Edge Compliance
802.11a, Channel 100, 6 Mbps

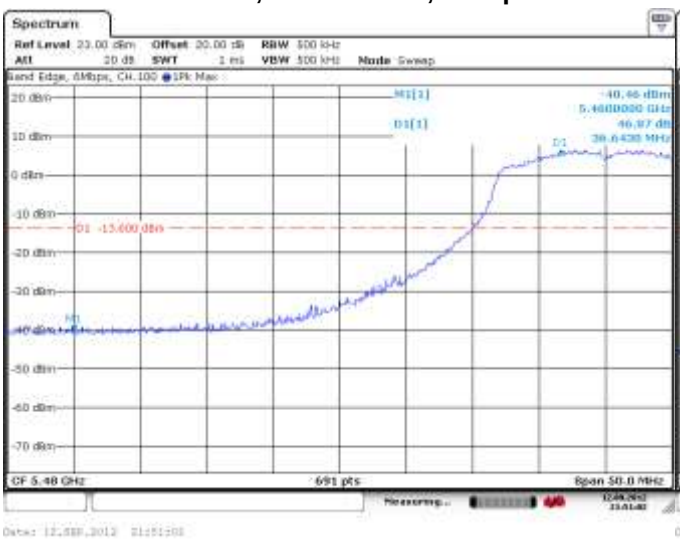


Figure 3-18: Band Edge Compliance
802.11a, Channel 149, 6 Mbps

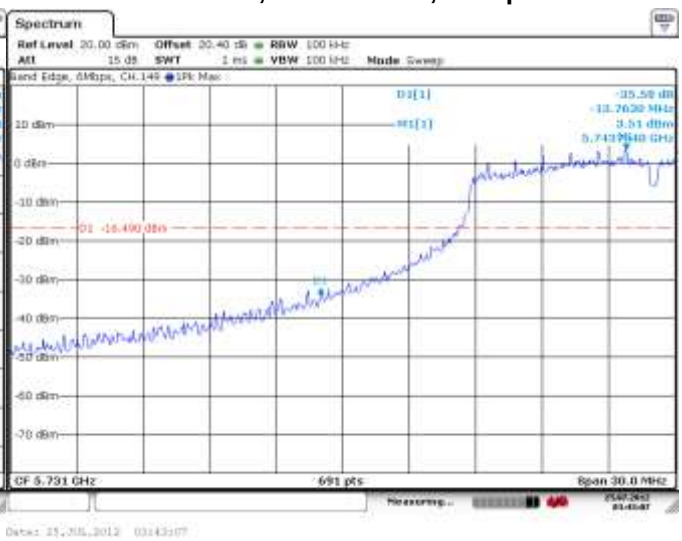


Figure 3-19: Band Edge Compliance
802.11a, Channel 161, 6 Mbps

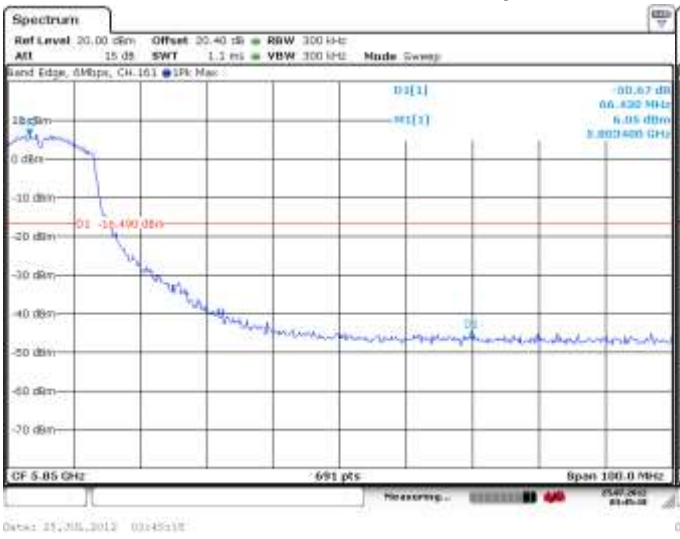


Figure 3-20: Band Edge Compliance
802.11a, Channel 165, 6 Mbps

802.11a 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 15.407 and RSS-210. Channels 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 were measured at 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11a mode.

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
36	6 Mbps	< 8.00	-8.88	-16.88
	24 Mbps	< 8.00	-10.86	-18.86
	54 Mbps	< 8.00	-11.61	-19.61
44	6 Mbps	< 8.00	-8.02	-16.02
	24 Mbps	< 8.00	-10.21	-18.21
	54 Mbps	< 8.00	-11.35	-19.35
48	6 Mbps	< 8.00	-7.88	-15.88
	24 Mbps	< 8.00	-10.77	-18.77
	54 Mbps	< 8.00	-11.27	-19.27
52	6 Mbps	< 8.00	-8.87	-16.87
	24 Mbps	< 8.00	-9.90	-17.9
	54 Mbps	< 8.00	-11.12	-19.12
60	6 Mbps	< 8.00	-9.12	-17.12
	24 Mbps	< 8.00	-10.20	-18.20
	54 Mbps	< 8.00	-11.28	-19.28
64	6 Mbps	< 8.00	-9.49	-17.49
	24 Mbps	< 8.00	-10.06	-18.06
	54 Mbps	< 8.00	-11.31	-19.31
100	6 Mbps	< 8.00	-8.79	-16.79
	24 Mbps	< 8.00	-10.69	-18.69
	54 Mbps	< 8.00	-11.37	-19.37
140	6 Mbps	< 8.00	-8.95	-16.95
	24 Mbps	< 8.00	-10.38	-18.38
	54 Mbps	< 8.00	-10.82	-18.82
149	6 Mbps	< 8.00	-7.92	-15.92
	24 Mbps	< 8.00	-9.85	-17.85
	54 Mbps	< 8.00	-10.33	-18.33

802.11a RF Conducted Emission Test Results cont'd

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
157	6 Mbps	< 8.00	-7.36	-15.36
	24 Mbps	< 8.00	-8.89	-16.89
	54 Mbps	< 8.00	-10.02	-18.02
161	6 Mbps	< 8.00	-8.35	-16.35
	24 Mbps	< 8.00	-8.79	-16.79
	54 Mbps	< 8.00	-9.24	-17.24
165	6 Mbps	< 8.00	-7.28	-15.28
	24 Mbps	< 8.00	-8.56	-16.56
	54 Mbps	< 8.00	-9.18	-17.18

See figures 3-21 to 3-32 for the plots of the peak power spectral density for Channel 36, 44, 48, 52, 60, 64, 100, 140, 149, 157, 161 and 165 at 6 Mbps each for 802.11a mode.

802.11a RF Conducted Emission Test Results cont'd

Figure 3-21: Peak Power Spectral Density 802.11a, Channel 36, 6 Mbps

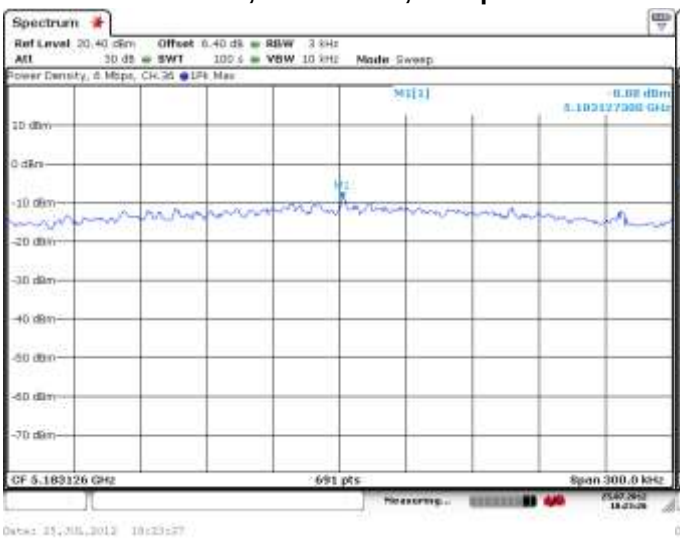


Figure 3-22: Peak Power Spectral Density 802.11a, Channel 44, 6 Mbps

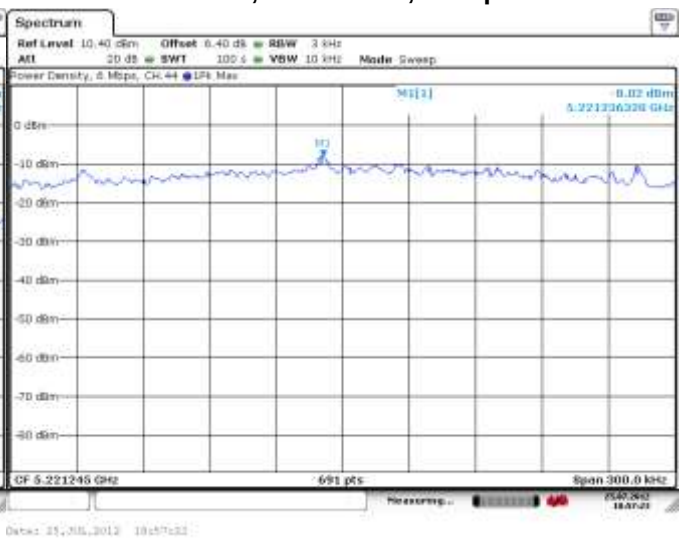


Figure 3-23: Peak Power Spectral Density 802.11a, Channel 48, 6 Mbps

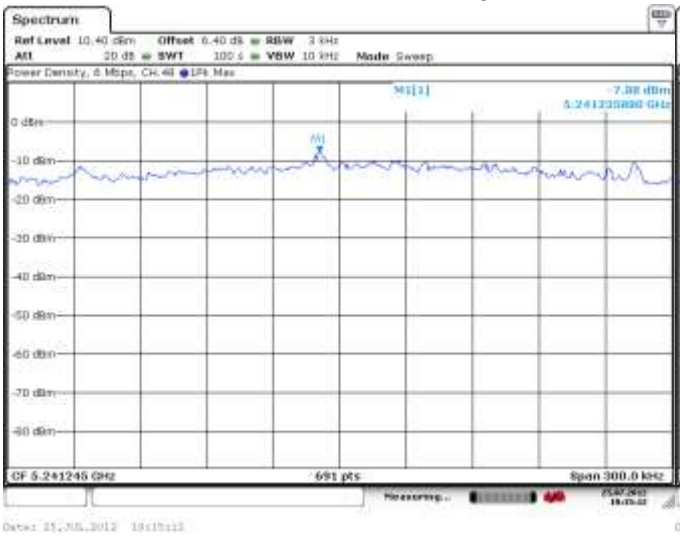
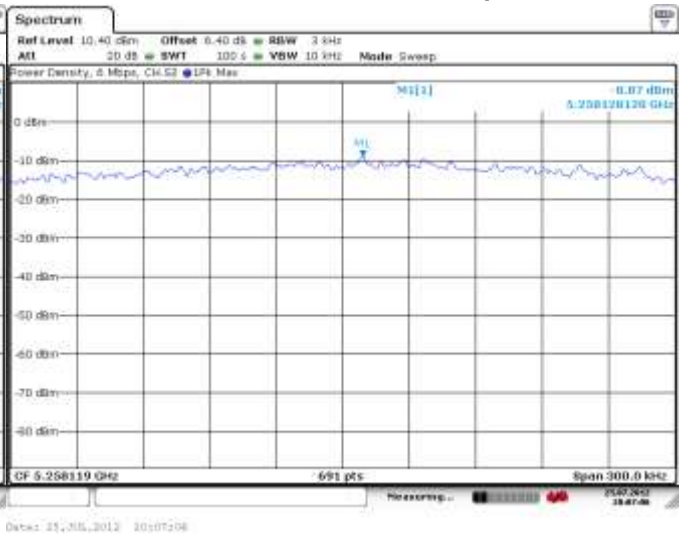


Figure 3-24: Peak Power Spectral Density 802.11a, Channel 52, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-25: Peak Power Spectral Density
802.11a, Channel 60, 6 Mbps

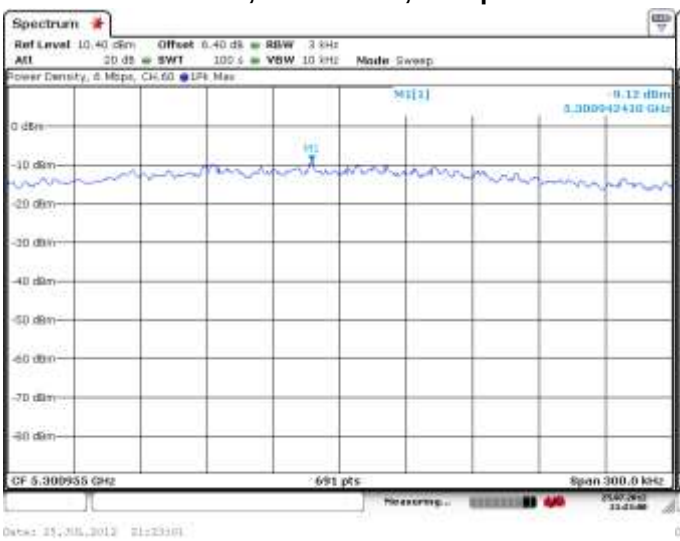


Figure 3-26: Peak Power Spectral Density
802.11a, Channel 64, 6 Mbps

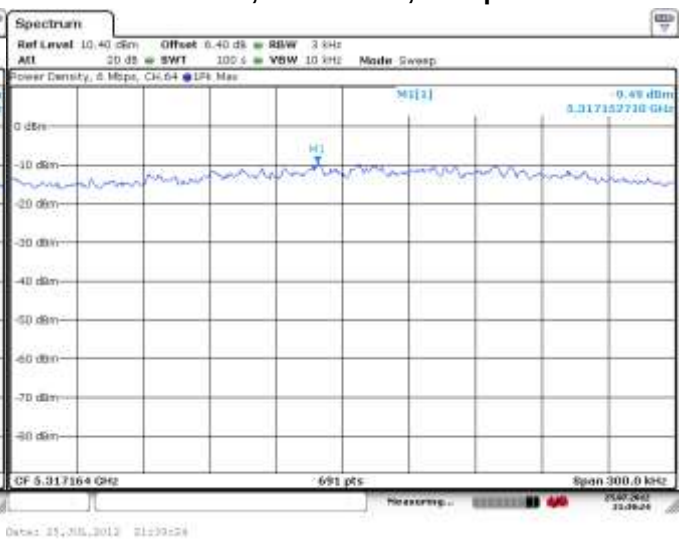


Figure 3-27: Peak Power Spectral Density
802.11a, Channel 100, 6 Mbps

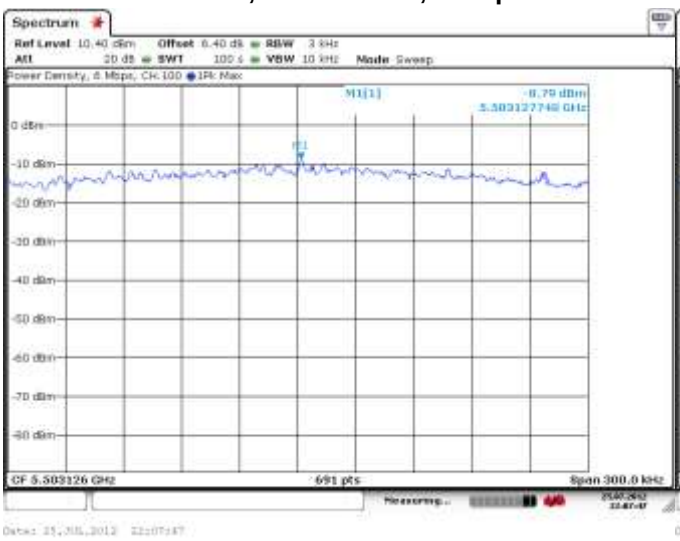
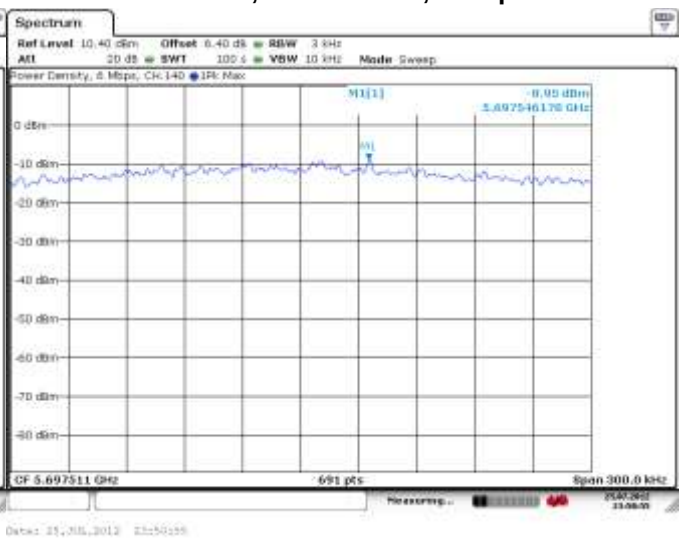


Figure 3-28: Peak Power Spectral Density
802.11a, Channel 140, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-29: Peak Power Spectral Density 802.11a, Channel 149, 6 Mbps

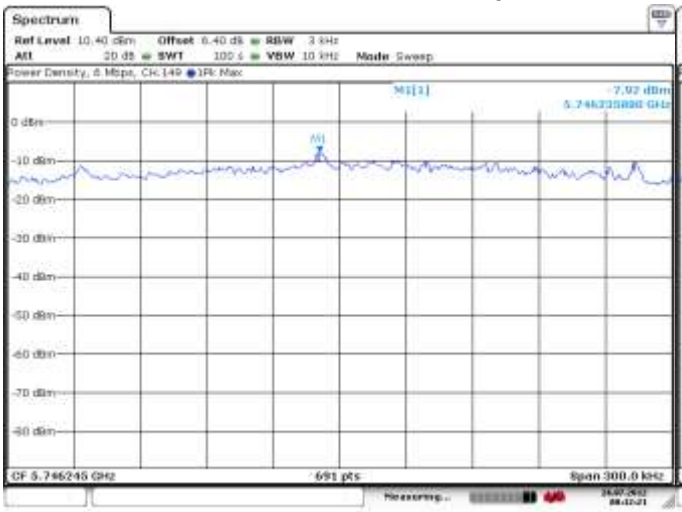


Figure 3-30: Peak Power Spectral Density 802.11a, Channel 157, 6 Mbps

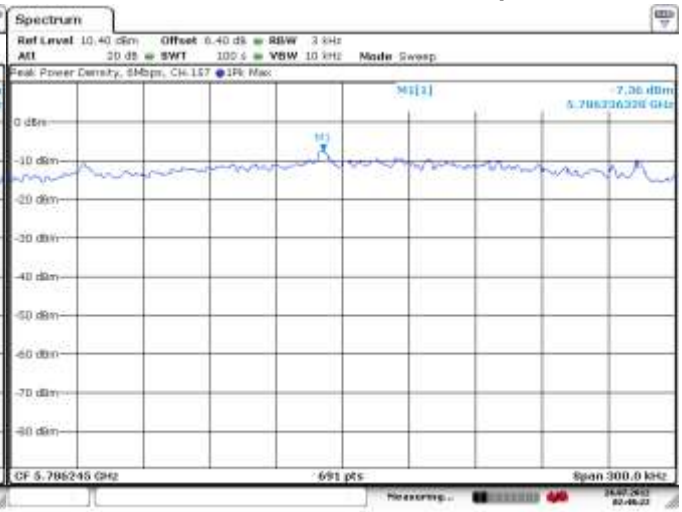


Figure 3-31: Peak Power Spectral Density 802.11a, Channel 161, 6 Mbps

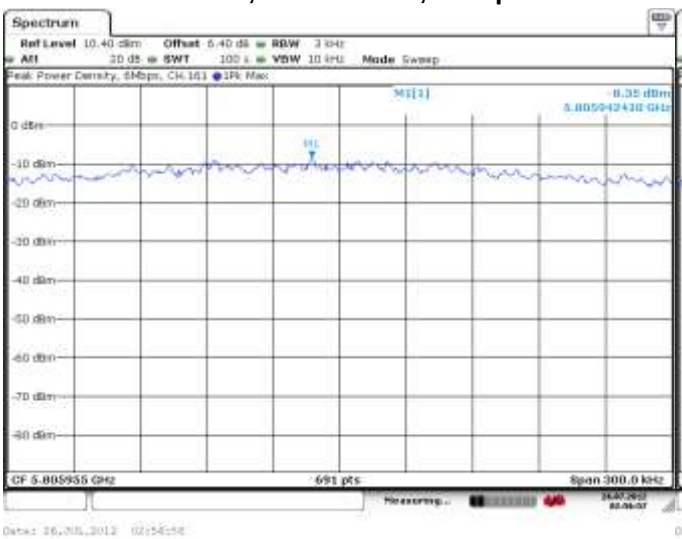
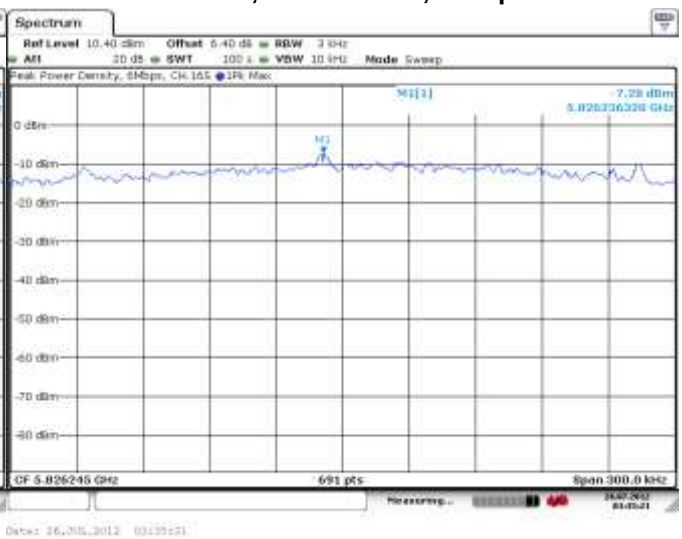


Figure 3-32: Peak Power Spectral Density 802.11a, Channel 165, 6 Mbps



802.11a 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 15.407 and RSS-210. Channels 44, 60, and 157 were measured at 6 Mbps each for 802.11a mode. Peak power was measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 29.0 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)	Limit (dBc)	Margin (dB)
44	6 Mbps	12.21	-33.65	-20	-13.65
60	6 Mbps	12.22	-33.05	-20	-13.05
157	6 Mbps	12.27	-33.31	-20	-13.31

See figures 3-33 to 6-35 for the plots of the spurious RF conducted emissions for Channel 44, 60 and 157 at 6 Mbps each for 802.11a mode.

802.11a RF Conducted Emission Test Results cont'd

Figure 3-33a: Spurious RF Conducted Emissions, 802.11a Channel 44, 6 Mbps

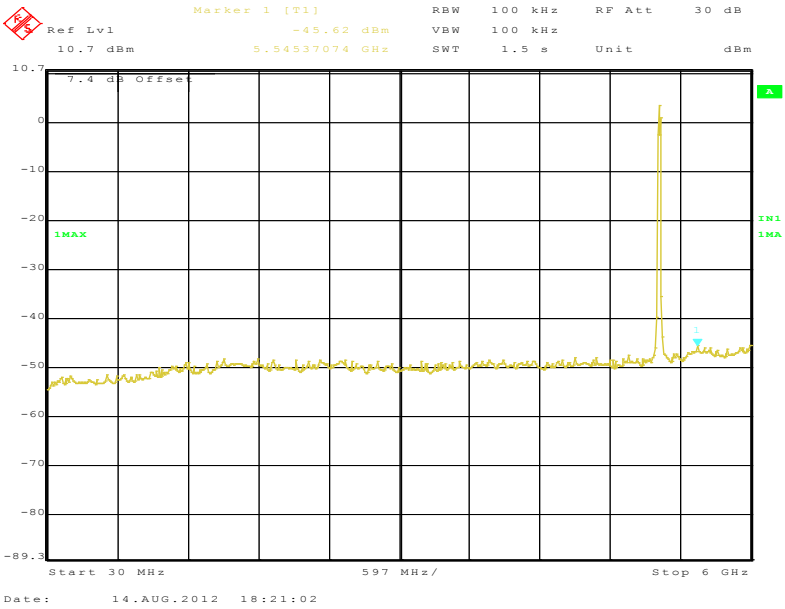
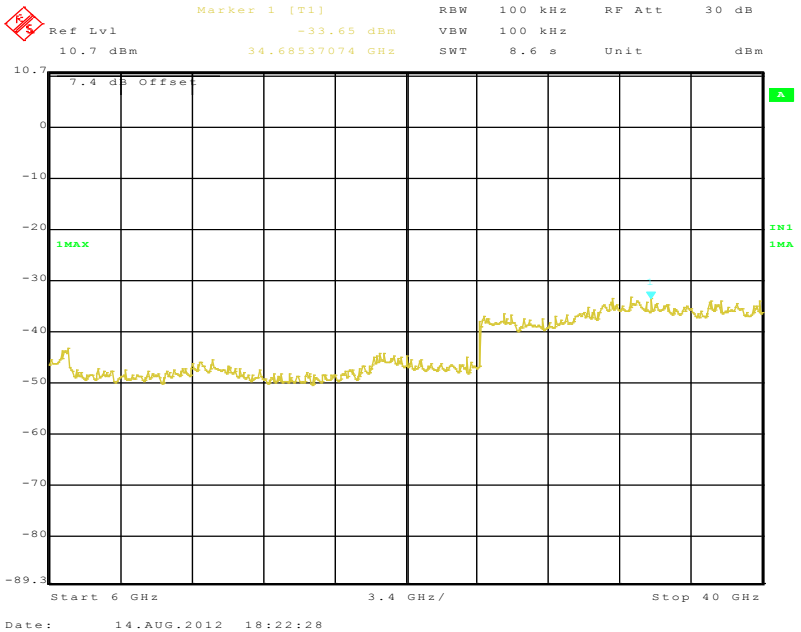


Figure 3-33b: Spurious RF Conducted Emissions, 802.11a Channel 44, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-34a: Spurious RF Conducted Emissions, 802.11a Channel 60, 6 Mbps

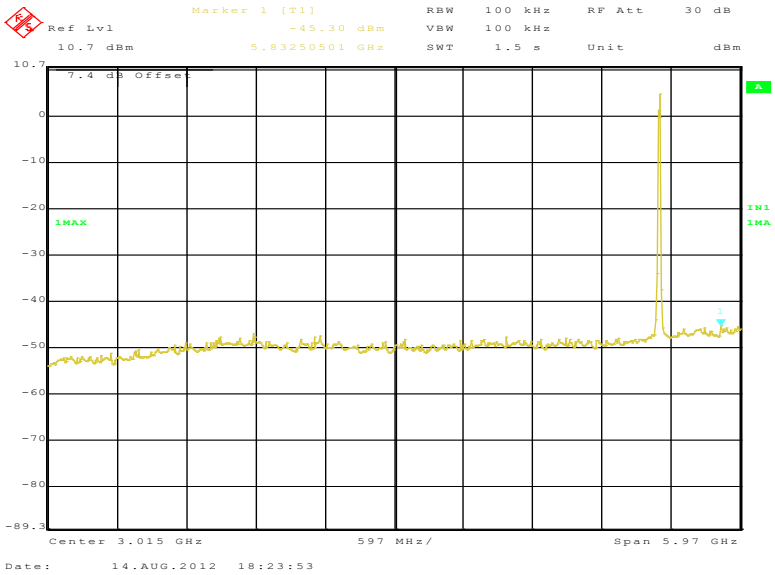
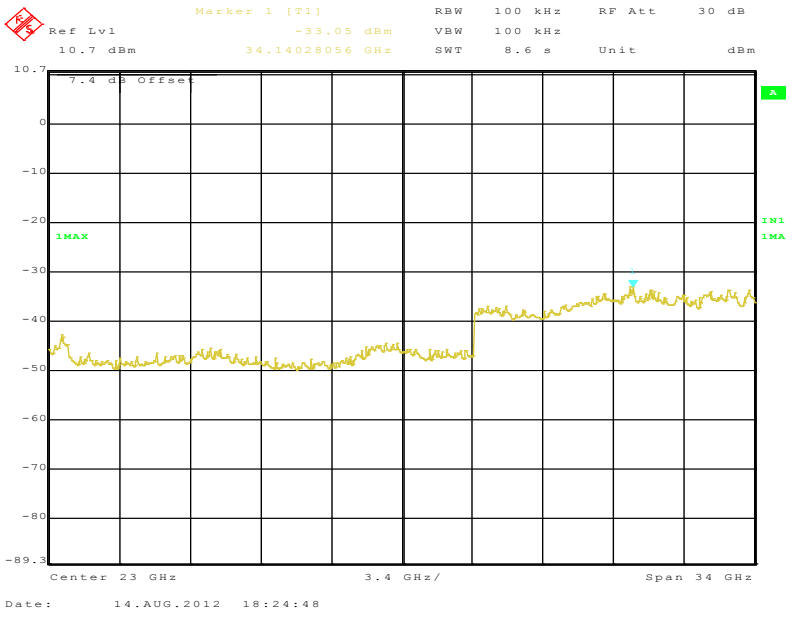


Figure 3-34b: Spurious RF Conducted Emissions, 802.11a Channel 60, 6 Mbps



802.11a RF Conducted Emission Test Results cont'd

Figure 3-35a: Spurious RF Conducted Emissions, 802.11a Channel 157, 6 Mbps

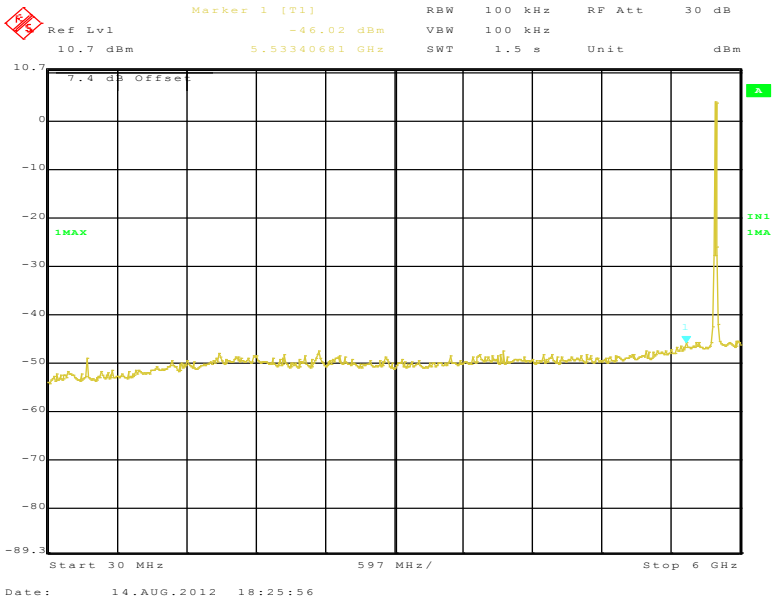
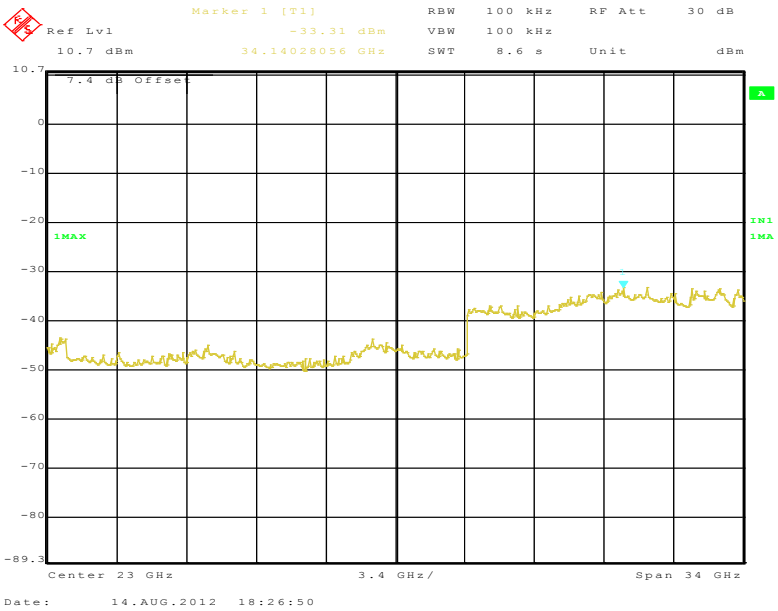


Figure 3-35b: Spurious RF Conducted Emissions, 802.11a Channel 157, 6 Mbps



APPENDIX 4 – NEAR FIELD COMMUNICATIONS TEST DATA/PLOTS

Near Field Communications (NFC) Test Results

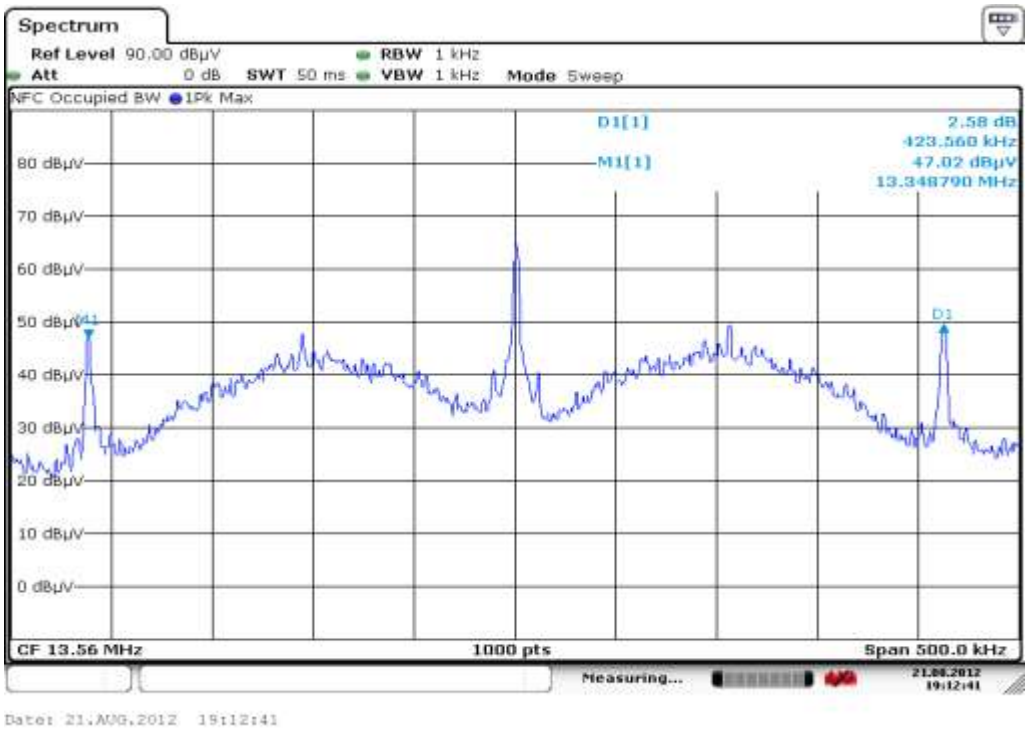
Occupied Bandwidth

Date of test: August 21, 2012.
The measurements were performed by Kevin Guo.

The environmental test conditions were: Temperature: 24 ºC
Relative Humidity: 46 %

Operation mode (TX ON)	Occupied Bandwidth (kHz)
NFC, modulated	423.56

Figure 4-1: Occupied Bandwidth, NFC TX Frequency = 13.56 MHz



Near Field Communications (NFC) Test Results cont'd

Frequency Stability

Date of test: August 20, 2012.
The measurements were performed by Kevin Guo.

The environmental test conditions were: Temperature: 24 ºC
Relative Humidity: 46 %

Test Temperature (Celsius)	Nominal Freq. (MHz)	Measured Freq. (MHz)	Input Voltage (Volts)	Max Freq Error (Hz)	% Deviation (Limit .01%)	PPM
-20	13.56	13.559313	3.6	-687	-0.00507	-50.7006
-20	13.56	13.559225	3.8	-775	-0.00571	-57.1445
-20	13.56	13.559245	4.35	-755	-0.00557	-55.6785
-10	13.56	13.559252	3.6	-749	-0.00552	-55.1991
-10	13.56	13.559174	3.8	-826	-0.00609	-60.8886
-10	13.56	13.559202	4.35	-798	-0.00589	-58.8805
0	13.56	13.559204	3.6	-796	-0.00587	-58.7021
0	13.56	13.559262	3.8	-738	-0.00544	-54.4248
0	13.56	13.559284	4.35	-716	-0.00528	-52.8024
10	13.56	13.559262	3.6	-738	-0.00544	-54.4248
10	13.56	13.559269	3.8	-731	-0.00539	-53.9086
10	13.56	13.559095	4.35	-905	-0.00667	-66.7404
20	13.56	13.559262	3.6	-738	-0.00544	-54.4248
20	13.56	13.559182	3.8	-818	-0.00603	-60.3245
20	13.56	13.559066	4.35	-934	-0.00689	-68.8791

Near Field Communications (NFC) Test Results cont'd

Frequency Stability cont'd

Test Temperature (Celsius)	Nominal Freq. (MHz)	Measured Freq. (MHz)	Input Voltage (Volts)	Max Freq Error (Hz)	% Deviation (Limit .01%)	PPM
30	13.56	13.559095	3.6	-905	-0.00667	-66.7404
30	13.56	13.559262	3.8	-738	-0.00544	-54.4248
30	13.56	13.559045	4.35	-955	-0.00704	-70.4277
40	13.56	13.559066	3.6	-934	-0.00689	-68.8791
40	13.56	13.559103	3.8	-897	-0.00662	-66.1504
40	13.56	13.559161	4.35	-839	-0.00619	-61.8732
50	13.56	13.559081	3.6	-919	-0.00678	-67.7729
50	13.56	13.559023	3.8	-977	-0.00721	-72.0501
50	13.56	13.559153	4.35	-847	-0.00625	-62.4631
60	13.56	13.559052	3.6	-948	-0.00699	-69.9115
60	13.56	13.559168	3.8	-832	-0.00614	-61.3569
60	13.56	13.559081	4.35	-919	-0.00678	-67.7729

APPENDIX 5 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

AC Conducted Emission Test Results

The following tests were performed by Shuo Wang.

Test Configuration 1

The BlackBerry® smartphone was tested on September 17, 2012.

The environmental test conditions were: Temperature: 25 ºC
Relative Humidity: 33 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.200	L1	28.54	10.86	39.40	63.60	53.60	-24.21
0.299	L1	26.29	10.17	36.46	60.30	50.30	-23.84
0.398	N	27.22	10.03	37.25	57.90	47.90	-20.66
0.420	L1	25.11	9.98	35.10	57.40	47.40	-22.31

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak detector.
See figure 5-1 and figure 5-2 for the measurement plot of the L1 and N lines of AC power line conducted emissions. Emission at 13.56MHz is the NFC TX signal.

AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 5-1: L1 lines

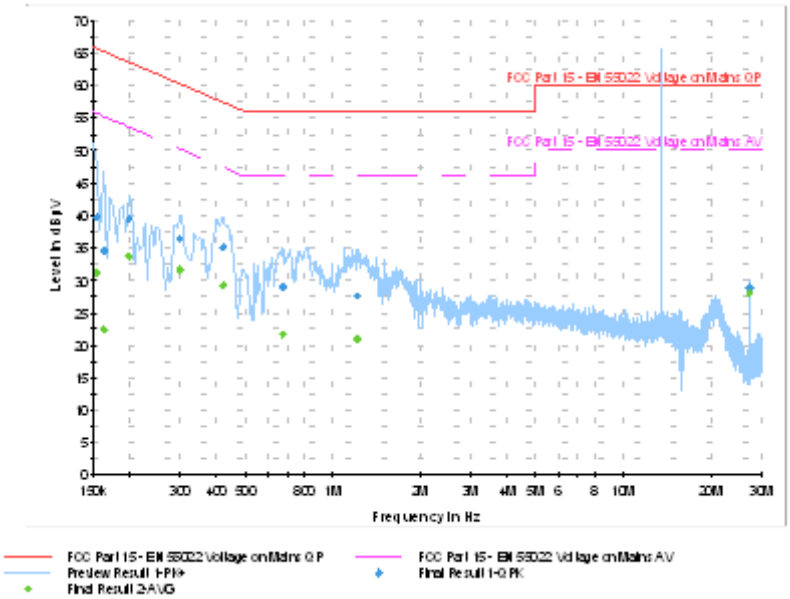
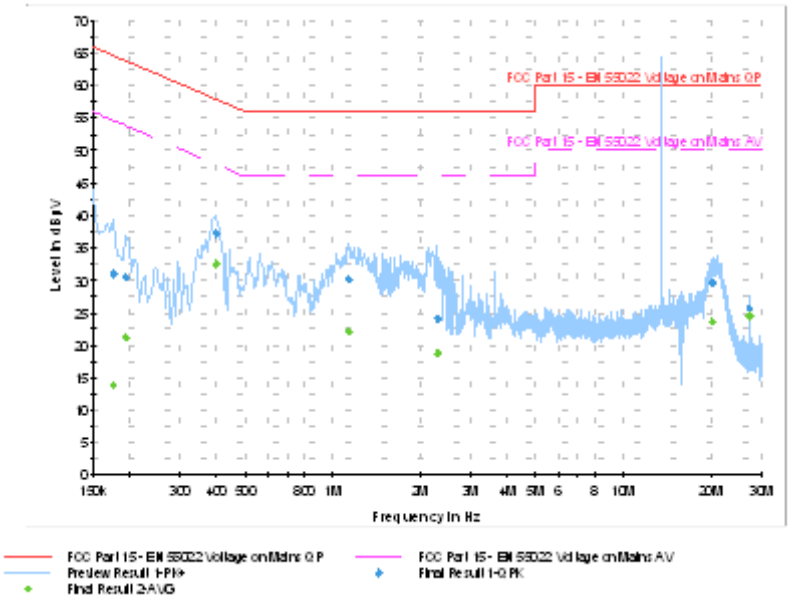


Figure 5-2: N Lines



*****With NFC antenna normal back cover. Emission at 13.56MHz is the NFC TX signal.**

AC Conducted Emission Test Results cont'd

Test Configuration 1 cont'd

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
13.560	N	26.62	10.08	36.71	60.00	50.00	-23.29

Measurements were done with the quasi-peak detector.
See figure 5-3 and figure 5-4 for the measurement plot of the L1 and N lines of AC power line conducted emissions. This measurement is of the NFC TX operating frequency, 13.56MHz, with the antenna dummy load.

AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 5-3: L1 lines

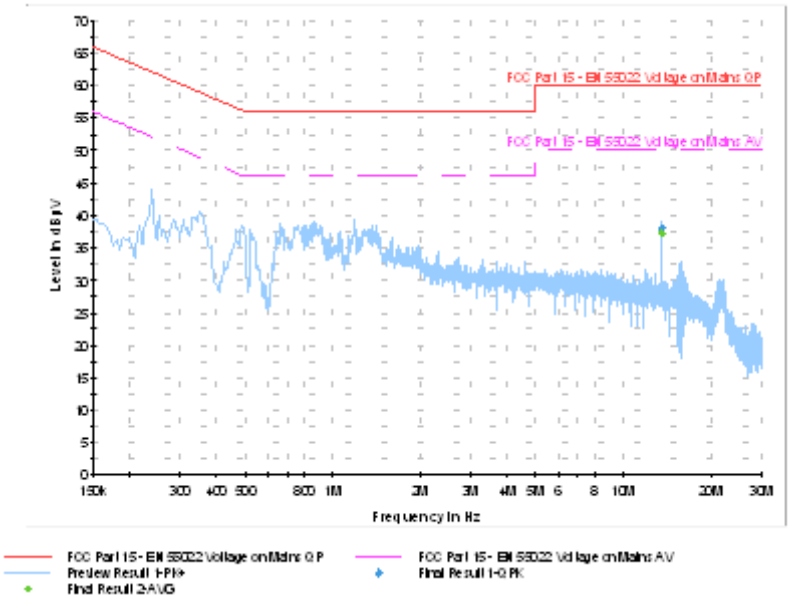
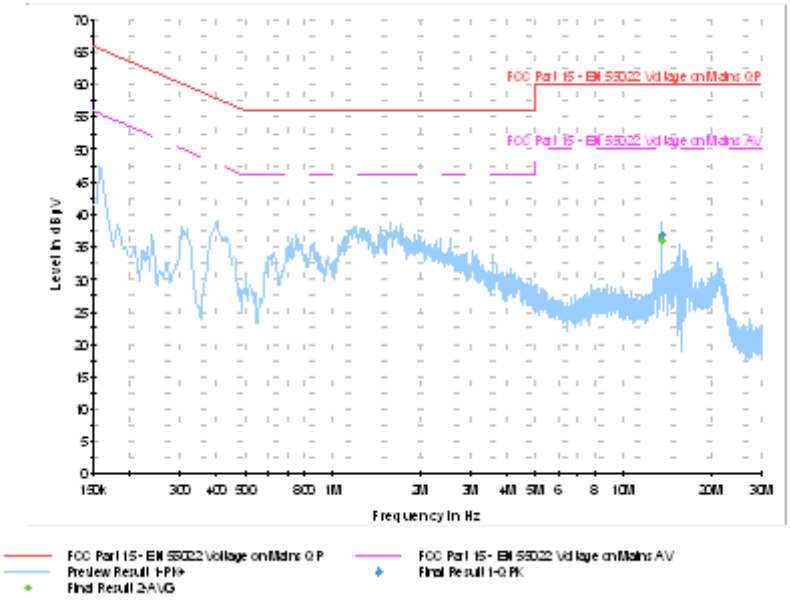


Figure 5-4: N Lines



***** AC line Emission with antenna dummy load**

AC Conducted Emission Test Results

The following tests were performed by Shuo Wang.

Test Configuration 2

The BlackBerry® smartphone was tested on October 03, 2012.

The environmental test conditions were: Temperature: 26 ºC
Relative Humidity: 29 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.173	N	31.32	11.08	42.40	64.80	54.80	-22.40
0.227	N	28.55	10.69	39.25	62.60	52.60	-23.36
0.398	N	23.68	10.03	33.71	57.90	47.90	-24.19
0.434	L1	28.32	9.96	38.28	57.20	47.20	-18.92
1.140	N	31.87	9.80	41.68	56.00	46.00	-14.32
1.262	N	32.57	9.80	42.37	56.00	46.00	-13.63
1.293	L1	32.77	9.80	42.58	56.00	46.00	-13.42
1.365	L1	34.12	9.80	43.92	56.00	46.00	**-12.08**
1.653	L1	31.37	9.81	41.19	56.00	46.00	-14.81
2.603	L1	29.16	9.86	39.01	56.00	46.00	-16.99
9.213	N	30.59	9.98	40.57	60.00	50.00	-19.43
13.520	N	30.45	10.08	40.54	60.00	50.00	-19.47
19.235	L1	28.50	10.21	38.71	60.00	50.00	-21.29

All other emission levels had a test margin of greater than 25 dB.
Measurements were done with the quasi-peak detector.
See figure 5-5 and figure 5-6 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

AC Conducted Emissions Test Graphs

Test Configuration 2

Figure 5-5: L1 lines

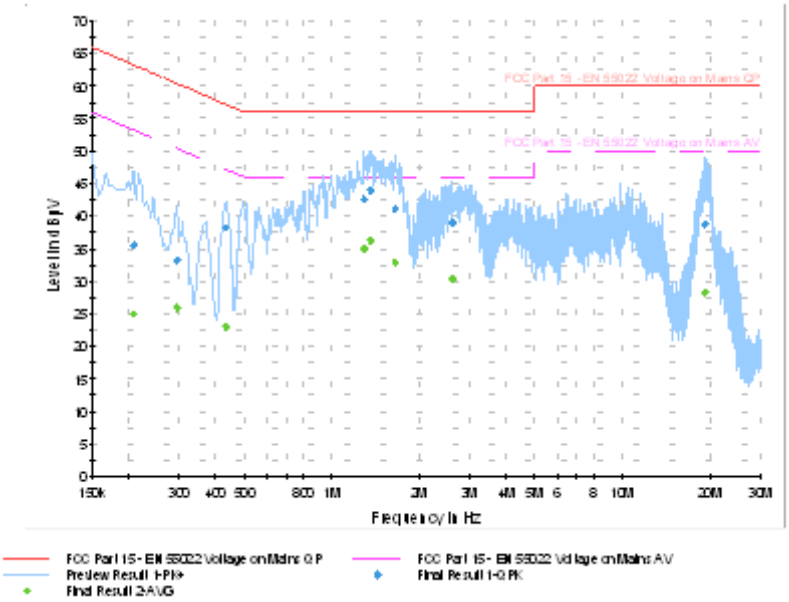


Figure 5-6: N Lines