

EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Part 15 Subpart C and E



A division of BlackBerry Limited

REPORT NO.: RTS-6046-1307-36


PRODUCT MODEL NO.: RFX101LW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6A RFX100LW

DATE: August 06, 2013

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



592

	EMI Test Report for the BlackBerry® smartphone Model RFX101LW	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	FCC ID: L6ARFX100LW

Statement of Performance:

The BlackBerry® smartphone, model RFX101LW, part number CER-54735-001 Rev2-x04-02 and its accessories when configured and operated per BlackBerry’s operation instructions, performs within the requirements of the test standards.

Declaration:

We hereby certify that:

The test data reported herein is an accurate record of the performance of the sample(s) tested.

The test results are valid for the tested unit (s) only.

The test equipment used was suitable for the tests performed and within manufacturer’s published specifications and operating parameters.

The test methods were consistent with the methods described in the relevant standards.

Documented by:

Reviewed by:

Savtej S. Sandhu
Regulatory Compliance Specialist

Forhad Hasnat
Regulatory Compliance Specialist

Reviewed and Approved by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance



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A. Scope

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

- o FCC CFR 47 Part 15, Subpart C, October, 2012
- o FCC CFR 47 Part 15, Subpart E, October, 2012

B. Associated Documents

- 1) MultiSourceDeclaration_RFX101LW_b519
- 2) RFX101LW_HW_Declaration_CER-54731-001_Rev2-x04-02
- 3) Test Report 1-6234_13-03-11-A
- 4) Test Report 1-6234_13-03-13-A
- 5) Test Report 1-6234_13-03-14-C
- 6) Test Report 1-6234_13-03-22-C
- 7) Test Report 1-6234_13-03-23-C


C. Product Identification

Manufactured by BlackBerry 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:

RTS 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 June 14-29 and July 31, 2013

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The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN	SOFTWARE
1	RFX101LW	CER-54735-001 Rev1-x04-00	333E286E	OS Version: 10.2.0.345 Bundle 345
2	RFX101LW	CER-54735-001 Rev1-x04-02	333E287C	OS Version: 10.2.0.345 Bundle 345
3	RFX101LW	CER-54735-001 Rev1-x04-02	333E285E	OS Version: 10.2.0.345 Bundle 345
4a	RFX101LW	CER-54735-001 Rev2-x04-02	333E2BDF	OS Version: 10.2.0.519 Bundle 519
4b	RFX101LW	CER-54735-001 Rev1-x04-00	333E284F	OS Version: 10.2.0.519 Bundle 519
5	RFX101LW	CER-54735-001 Rev1-x04-02	333E286A	OS Version: 10.2.0.345 Bundle 345
6	RFX101LW	CER-54735-001 Rev2-x04-02	33411679	OS Version: 10.2.0.345 Bundle 345

AC Conducted emissions testing were performed on sample 6.
Radiated Emissions testing was performed on samples 1, 2 and 3
Conducted Emissions testing was performed on sample 4a, 4b, and 5
Near Field Communications testing was performed on sample 5

Only the characteristics that may have been affected by the changes from RFX101LW Rev1 to Rev2 were re-tested.

For more details, refer to RFX101LW_HW_Declaration_CER-54731-001_Rev2-x04-02


To view the differences between software bundles 10.2.0.345 to 10.2.0.519 for RFX101LW, see document MultiSourceDeclaration_RFX101LW_b519.

BlackBerry® smartphone Accessories Tested

- 1) World Wide Travel Charger, part number HDW 34725-002, with an output voltage 5 volts dc, 2A
- 2) Wired Headset, part number HDW-55351-001, with a lead length of 1.1 metres


D. Support Equipment Used for the Testing of the EUT

N/A

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E. Test Results Chart

SPECIFICATION FCC CFR 47	TEST TYPE	Meets Requirements	TEST DATA
			APPENDIX
Part 15.207	Conducted AC Line Emission	Pass	1 and Test Reports 1-6234_13-03-14-C
Part 15.209 Part 15.247	BT/BLE Radiated Spurious Emissions	Pass	2
Part 15.209 Part 15.247	BT/BLE Radiated Band Edge Compliance	Pass	2
Part 15.209 Part 15.247	802.11b/g/n Radiated Spurious Emissions	Pass	1-6234_13-03-11-A
Part 15.209 Part 15.247	802.11b/g/n Radiated Band Edge Compliance	Pass	1-6234_13-03-11-A
Part 15.209 Part 15.407	802.11a/n Radiated Spurious Emissions	Pass	Test Reports 1-6234_13-03-22-C 1-6234_13-03-23-C
Part 15.209 Part 15.407	802.11a/n Radiated Band Edge Compliance	Pass	Test Reports 1-6234_13-03-22-C 1-6234_13-03-23-C
Part 15.247(a)	BT, 20 dB Bandwidth	Pass	3
Part 15.247(a)	BT, Carrier Frequency Separation	Pass	3
Part 15.247(a)	BT, Number of Hopping Frequencies	Pass	3
Part 15.247(a)	BT, Time of Occupancy (Dwell Time)	Pass	3
Part 15.247(b)	BT, Maximum Peak Conducted Output Power	Pass	3
Part 15.247(d)	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	3
Part 15.247(d)	BT, Spurious RF Conducted Emissions	Pass	3
Part 15.247(a)	BLE, 6 dB Bandwidth	Pass	3
Part 15.247(b)	BLE, Maximum Conducted Output Power	Pass	3
Part 15.247(d)	BLE, Band-Edge	Pass	3
Part 15.247(e)	BLE, Peak Power Spectral Density	Pass	3
Part 15.247(d)	BLE, Spurious RF Conducted Emissions	Pass	3

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Test Results Chart cont'd

SPECIFICATION	TEST TYPE	Meets Requirements	TEST DATA
FCC CFR 47			APPENDIX
Part 15.247(a)	802.11b/g/n, 6 dB Bandwidth	Pass	4
Part 15.247(b)	802.11b/g/n, Maximum Conducted Output Power	Pass	4
Part 15.247(b)	802.11b/g/n, Band-Edge	Pass	4
Part 15.247(e)	802.11b/g/n, Peak Power Spectral Density	Pass	4
Part 15.247(d)	802.11b/g/n, Spurious RF Conducted Emissions	Pass	4
Part 15.407	802.11a/n, 6 dB Bandwidth	Pass	5
Part 15.407	802.11a/n, Maximum Conducted Output Power	Pass	5
Part 15.407	802.11a/n, Band-Edge	Pass	5
Part 15.407 Part 15.247	802.11a/n, Peak Power Spectral Density	Pass	5
Part 15.407	802.11a/n, Spurious RF Conducted Emissions	Pass	5
Part 15.209 Part 15.225(a)	Near Field Communications, Radiated Emissions	Pass	6 and Test Report 1-6234_13-03-13-A
Part 15.225(e)	Near Field Communications, Occupied Bandwidth	Pass	6 and Test Report 1-6234_13-03-13-A
Part 15.225(e)	Near Field Communications, Frequency Stability	Pass	6 and Test Report 1-6234_13-03-13-A

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F. Summary of Results

1) AC LINE CONDUCTED EMISSIONS

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


The following test configurations were measured:

Test Configuration	Operating Mode(s)	Charger + Accessories
3	NFC Tx	WWTC 2.0A + Wired Headset

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C limits. The sample EUT had a worst case test margin of 16.18 dB below the QP limit at 0.501 MHz in Test Configuration 1

See APPENDIX 1 for the test data.

Measurement Uncertainty ±3.2 dB

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2) BLUETOOTH, BLUETOOTH LOW ENERGY EMISSIONS

a) Radiated Spurious and Harmonic Emissions

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

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

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

The BlackBerry® smartphone was measured in standalone configuration with Bluetooth transmitting in single frequency mode at low channel (0), middle channel (39) and high channel (78) for packet type "DH5", "2-DH5" and "3-DH5". The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart C, 15.247.

The BlackBerry® smartphone was measured in standalone configuration with Bluetooth Low Energy transmitting in single frequency mode at low channel (0), middle channel (20) and high channel (39). The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart C, 15.247


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

The Bluetooth Low Energy harmonics were investigated up to the 10th harmonic. The sample EUT emissions were in the noise floor (NF).

b) Band-Edge Compliance of RF Radiated Emissions

The BlackBerry® smartphone met the requirements for band-edge compliance of RF radiated emissions for Bluetooth, Bluetooth Low Energy and 802.11b/g/n as per the requirements of 15.247 and 15.209

Measurement Uncertainty ±4.5 dB

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See APPENDIX 2 for the test data

3) 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). 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 0.920 MHz for channel 0 in normal data rate mode and 1.320 MHz for channels 0, 39 and 78 in EDR mode.

See APPENDIX 3 for the test data.

b) Carrier Frequency Separation

The BlackBerry® smartphone met the requirements of the carrier frequency separation as per 47 CFR 15.247(a). Channel 38 to 39 was measured. The result includes both normal data rate and EDR.

See APPENDIX 3 for the test data.

c) Number of Hopping Frequencies

The BlackBerry® smartphone met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a). The number of hopping channels measured was 79.

See APPENDIX 3 for the test data.

d) Time of Occupancy (Dwell Time)


The EUT met the requirements of the dwell time as per 47 CFR 15.247(a). Low channel (0), middle channel (39) and high channel (78) were measured in DH1, DH3 and DH5 modes. Bluetooth was operating in frequency hopping (Euro/US) mode during the measurements.

See APPENDIX 3 for the test data.

e) Maximum Peak Conducted Output Power

The BlackBerry® smartphone met the requirements of the maximum peak conducted output power as per 47 CFR 15.247(b). 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 9.50dBm (0.00891 W) for Channel 0 in normal data rate mode and 6.60 dBm (0.00457 W) for channel 0 in EDR mode.

See APPENDIX 3 for the test data.

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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(d). Channels 0 and 78 were measured in frequency hopping (Euro/US) mode and single frequency mode. The result includes both normal data rate and EDR. See APPENDIX 3 for the test data.

g) Spurious RF Conducted Emissions

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

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(a). Low channel (0), middle channel (20) and high channel (39) were measured. The worst case 6 dB Bandwidth was 0.716 MHz for channel 39. 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 15.247(b). Low channel (0), middle channel (20) and high channel (39) were measured. The worst case Conducted Output Power level was 5.78 dBm (0.00378W) for channel 20. 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 15.247(d). Low channel (0) and high channel (39) were measured. See APPENDIX 3 for the test data.

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d) Peak Power Spectral Density

The EUT met the requirements of peak power spectral density as per 47 CFR 15.247(e). Low channel (0), middle channel (20) and high channel (39) 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 15.247(d). The frequency range measured was 30 MHz to 26 GHz. Low channel (0), middle channel (20) and high channel (39) were measured.

See APPENDIX 3 for the test data.

4) 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(a). Low channel (1), middle channel (6) and high channel (11) were measured. The worst case 6 dB Bandwidth was 8.63 MHz for channel 11 in 802.11b mode, 16.38 MHz for channel 11 in 802.11g mode, and 17.63 MHz for channel 6 in 802.11n mode.

See APPENDIX 4 for the test data.

b) Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power as per 47 CFR 15.247(b). Low channel (1), middle channel (6) and high channel (11) were measured. The worst case Conducted Output Power level was 18.47 dBm (0.070W) for channel 6 in 802.11b mode, 18.03 dBm (0.064W) for channel 6 in 802.11g mode, and 18.03 dBm (0.064W) for channel 6 in 802.11n mode.


See APPENDIX 4 for the test data.

c) Band-Edge Compliance of RF Conducted Emissions

The EUT met the requirements of band-edge compliance of RF conducted emissions as per 47 CFR 15.247(b). Low channel (1) and high channel (11) were measured.

See APPENDIX 4 for the test data.

d) Peak Power Spectral Density

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The EUT met the requirements of peak power spectral density as per 47 CFR 15.247(e). Low channel (1), middle channel (6) and high channel (11) were measured.

See APPENDIX 4 for the test data.

e) Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(d). The frequency range measured was 30 MHz to 26 GHz. Low channel (1), middle channel (6) and high channel (11) were measured.

See APPENDIX 4 for the test data.

5) 802.11a/n RF CONDUCTED EMISSIONS

The 802.11a/n 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. Channels 36, 48, 64, 100, 140, and 165 were measured. The worst case 6 dB Bandwidth was 16.38 MHz for channel 100 in 802.11a mode. The worst case 6 dB Bandwidth was 17.57 MHz for channel 36 in 802.11n mode.

See APPENDIX 5 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. Channels 36, 48, 64, 100, 140, and 165 were measured. The worst case Conducted Output Power level was 17.11 dBm (0.0514 W) for channel 36 in 802.11a mode. The worst case Conducted Output Power level was 18.52 dBm (0.071W) for channel 100 in 802.11n mode.

See APPENDIX 5 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. Channels 36, 48, 52, 64, 100, 149, 161 and 165 were measured.

See APPENDIX 5 for the test data.

d) Peak Power Spectral Density

The EUT met the requirements of peak power spectral density as per 47 CFR 15.407/15.247. Channels 36, 44, 48, 52, 60, 64, 149, 157, 161 and 165 were measured.

See APPENDIX 5 for the test data.

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e) Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.407. The frequency range measured was 30 MHz to 40 GHz. Channels 44, 60 and 157 were measured. See APPENDIX 5 for the test data.

7) 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 15.225(e). The EUT was measured in test mode with modulation on and transmitting at 13.56 MHz. See APPENDIX 6 for the test data.

b) Frequency Stability


The EUT met the requirements of the Frequency Stability as per 47 CFR 15.225(e). The EUT was measured in test mode with modulation on and transmitting at 13.56 MHz. See APPENDIX 6 for the test data

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G. Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>	<u>CAL DUE DATE</u> (YY MM DD)	<u>USE</u>
EMI Test Receiver	Rohde & Schwarz	ESIB 40	100255	13-11-30	Conducted/Radiated Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	13-11-30	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	13-10-10	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	13-10-30	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	14-01-15	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	13-10-30	RF Conducted Emissions
Environmental Chamber	Test Equity	107	0900246	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	119549	13-12-04	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100368	13-12-04	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100370	13-12-04	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	13-11-13	Conducted/Radiated Emissions
Environment Monitor	Omega	iTHX-SD	0380567	13-10-30	Radiated Emissions

APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

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	APPENDIX 1	
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AC Conducted Emission Test Results

The following tests were performed by Kevin Guo

Test Configuration 1

The BlackBerry® smartphone was tested on July 23, 2013

The environmental test conditions were: Temperature: 24.3 °C
Relative Humidity: 17.4 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.168	L1	33.52	11.08	44.60	65.10	55.10	-20.50
0.173	N	29.39	11.08	40.47	64.80	54.80	-24.33
0.321	N	22.99	10.14	33.13	59.70	49.70	-26.57
0.389	L1	28.17	10.03	38.20	58.10	48.10	-19.90
0.483	N	26.98	9.93	36.91	56.30	46.30	-19.40
0.501	L1	29.92	9.91	39.82	56.00	46.00	-16.18
0.803	L1	26.31	9.82	36.13	56.00	46.00	-19.87
0.803	N	24.21	9.82	34.04	56.00	46.00	-21.96
0.906	N	27.21	9.81	37.02	56.00	46.00	-18.98
0.920	L1	25.98	9.81	35.78	56.00	46.00	-20.22
0.992	N	27.14	9.81	36.95	56.00	46.00	-19.05
1.320	L1	25.73	9.80	35.54	56.00	46.00	-20.46
1.428	N	28.08	9.81	37.89	56.00	46.00	-18.11

All other emission levels were at least 25 dB below the limit.

Measurements were done with the quasi-peak detector.

See figure 1-1 and figure 1-2 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

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AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

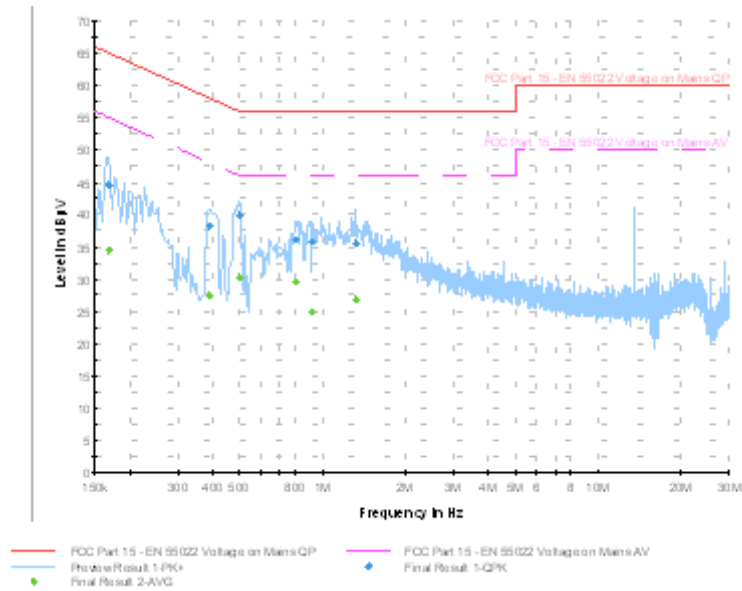
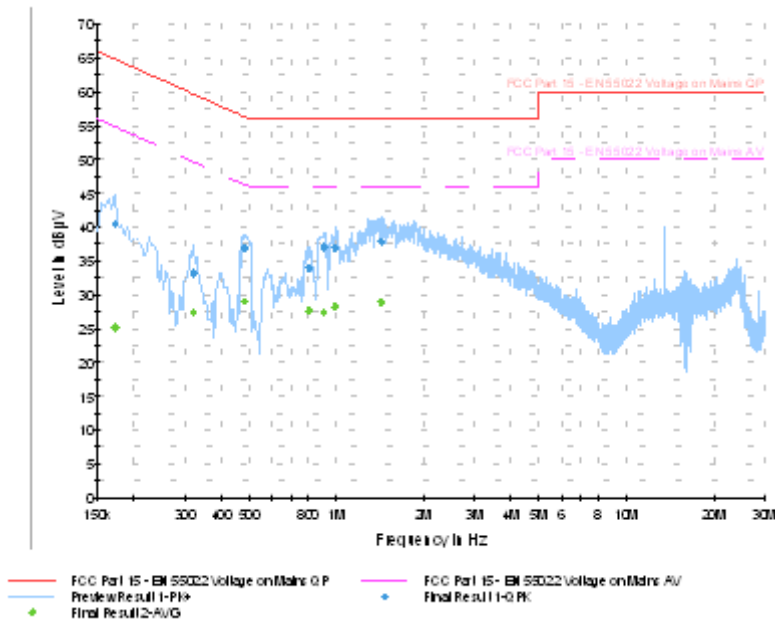



Figure 1-2: N Lines



**APPENDIX 2 – BLUETOOTH, BLUETOOTH LOW ENERGY RADIATED
EMISSIONS TEST DATA**

	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 2	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	FCC ID: L6ARFX100LW

Radiated Emissions Test Results
Bluetooth Band

Date of Test: June 17, 2013

Measurements were performed by Feras Obeid

The environmental test conditions were: Temperature: 24.8-25.2 °C
Relative Humidity: 35.2-38.2 %

The test distance was 3.0 metres with a EUT height of 0.8 metres, and sweep frequency of 30 MHz to 1 GHz.

The BlackBerry® smartphone in Bluetooth Tx mode was in horizontal position.

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

All emission levels were at least 25 dB below the limit.

Radiated Emissions Test Results cont'd
Bluetooth Band cont'd

Date of Test: June 14-20, 2013

Measurements were performed by Mahmood Ahmed and Kevin Guo


The environmental test conditions were: Temperature: 26.0-27.9 °C
Relative Humidity: 27.4-39.8 %

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

The BlackBerry® smartphone in Bluetooth Tx mode was in horizontal down position.

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

All emission levels were at least 25 dB below the limit.

		EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 2	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013		FCC ID: L6ARFX100LW

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

Date of test: March 12, 2013


Measurements were performed by Feras Obeid

The environmental test conditions were: Temperature: 25.0 ° C
Relative Humidity: 17.8%

The BlackBerry® smartphone was in standalone, horizontal position and pattern type “Static PBRS” in “DH5”, “2-DH5” and “3-DH5” modulation during the measurements.

The test distance was 3.0 metres.

Channel	Freq. (MHz)	Rx Antenna Type POL.		Detector	VBW	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
Low Channel, Packet Type DH5										
0	2402	Horn	V	PK	1 MHz	107.3	61.04	46.26	74	-27.74
0	2402	Horn	H	PK	1 MHz	102.95	58.01	44.94	74	-29.06
0	2402	Horn	V	AVE.	10 Hz	100.3	61.04	39.26	54	-14.74
0	2402	Horn	H	AVE.	10 Hz	95.9	58.01	37.89	54	-16.11
High Channel, Packet Type DH5										
78	2480	Horn	V	PK	1 MHz	106.83	59.33	47.5	74	-26.5
78	2480	Horn	H	PK	1 MHz	105.36	57.9	47.46	74	-26.54
78	2480	Horn	V	AVE.	10 Hz	99.74	59.33	40.41	54	-13.59
78	2480	Horn	H	AVE.	10 Hz	98.33	57.9	40.43	54	-13.57
Low Channel, Packet Type 2-DH5										
0	2402	Horn	V	PK	1 MHz	106.51	60.48	46.03	74	-27.97
0	2402	Horn	H	PK	1 MHz	102.23	55.85	46.38	74	-27.62
0	2402	Horn	V	AVE.	10 Hz	91.58	60.48	31.1	54	-22.9
0	2402	Horn	H	AVE.	10 Hz	86.91	55.85	31.06	54	-22.94
High Channel, Packet Type 2-DH5										
78	2480	Horn	V	PK	1 MHz	105.65	57.07	48.58	74	-25.42
78	2480	Horn	H	PK	1 MHz	104.16	56.23	47.93	74	-26.07
78	2480	Horn	V	AVE.	10 Hz	90.51	57.07	33.44	54	-20.56
78	2480	Horn	H	AVE.	10 Hz	88.83	56.23	32.6	54	-21.4

	EMI Test Report for the BlackBerry® smartphone Model RFX101LW	
	APPENDIX 2	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	FCC ID: L6ARFX100LW

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

Channel	Freq. (MHz)	Rx Antenna		Detector	VBW	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
Low Channel, Packet Type 3-DH5										
0	2402	Horn	V	PK	1 MHz	106.64	59.91	46.73	74	-27.27
0	2402	Horn	H	PK	1 MHz	101.98	56.43	45.55	74	-28.45
0	2402	Horn	V	AVE.	10 Hz	97.05	59.91	37.14	54	-16.86
0	2402	Horn	H	AVE.	10 Hz	92.31	56.43	35.88	54	-18.12
High Channel, Packet Type 3-DH5										
78	2480	Horn	V	PK	1 MHz	105.85	56.5	49.35	74	-24.65
78	2480	Horn	H	PK	1 MHz	104.37	55.92	48.45	74	-25.55
78	2480	Horn	V	AVE.	10 Hz	95.83	56.5	39.33	54	-14.67
78	2480	Horn	H	AVE.	10 Hz	94.4	55.92	38.48	54	-15.52

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

Test Report No.
 RTS-6046-1307-36

Dates of Test
 June 14-29, and July 31, 2013

FCC ID: L6ARFX100LW

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

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

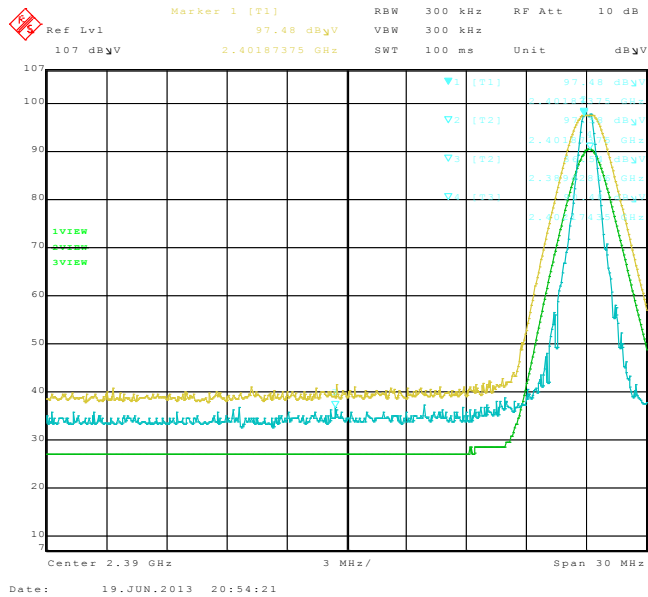


Figure 2-2: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRs,
 DH5, Channel 0, Pol: H, Detector: PK

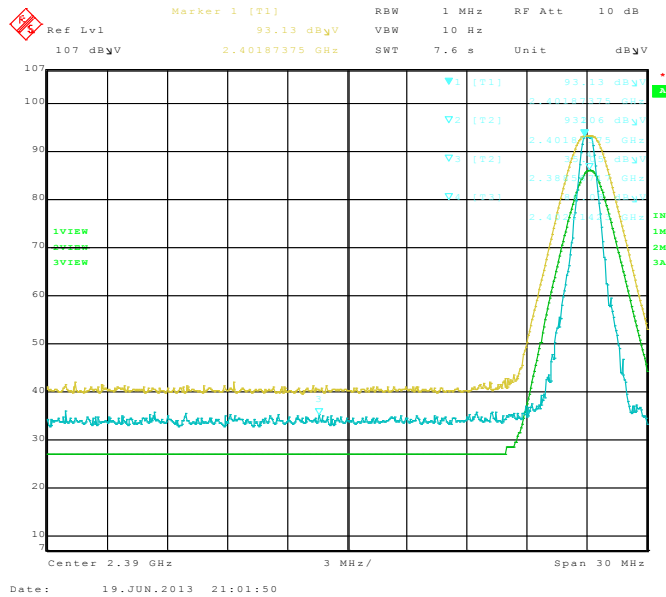


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRs,
 DH5, Channel 78, Pol: V, Detector: PK

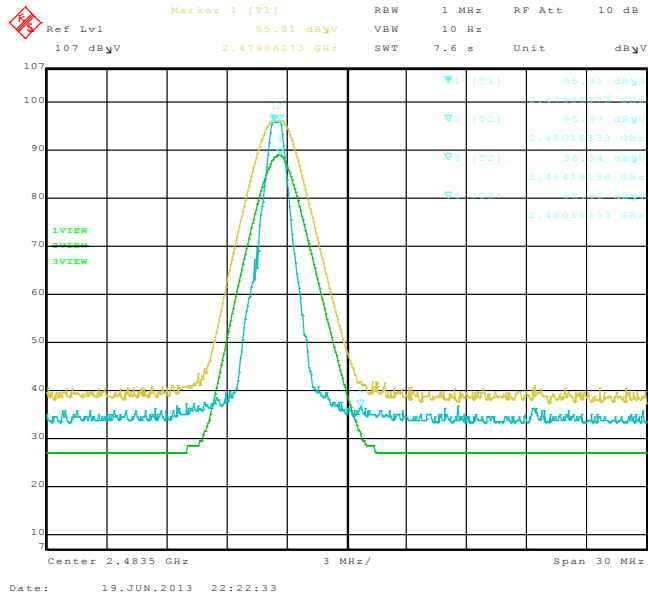
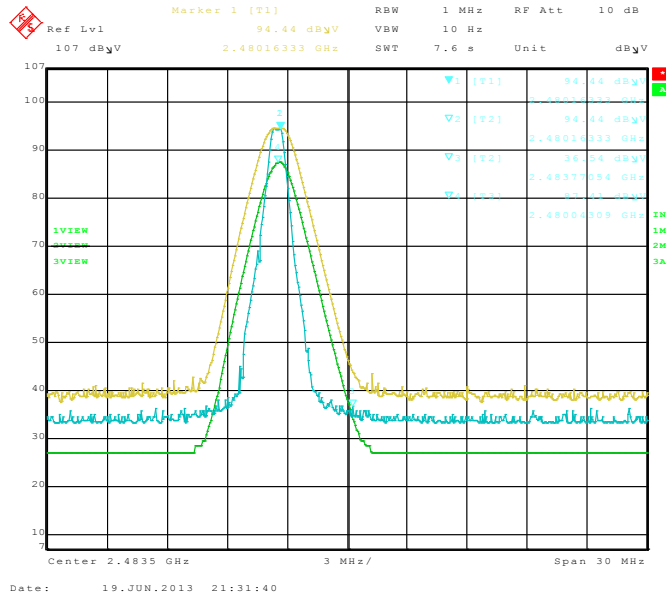


Figure 2-4: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRs,
 DH5, Channel 78, Pol: H, Detector: PK



Test Report No.
RTS-6046-1307-36

Dates of Test
June 14-29, and July 31, 2013

FCC ID: L6ARFX100LW

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

Figure 2-5: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 2-DH5, Channel 0, Pol: V, Detector: PK

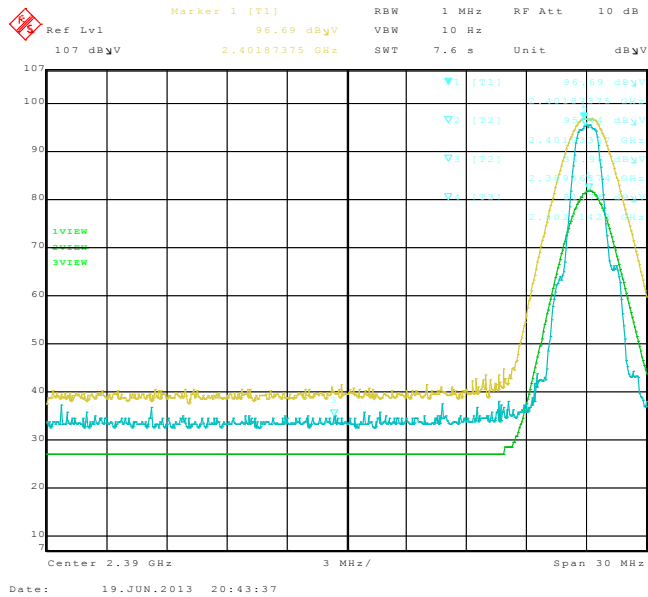


Figure 2-6: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 2-DH5, Channel 0, Pol: H, Detector: PK

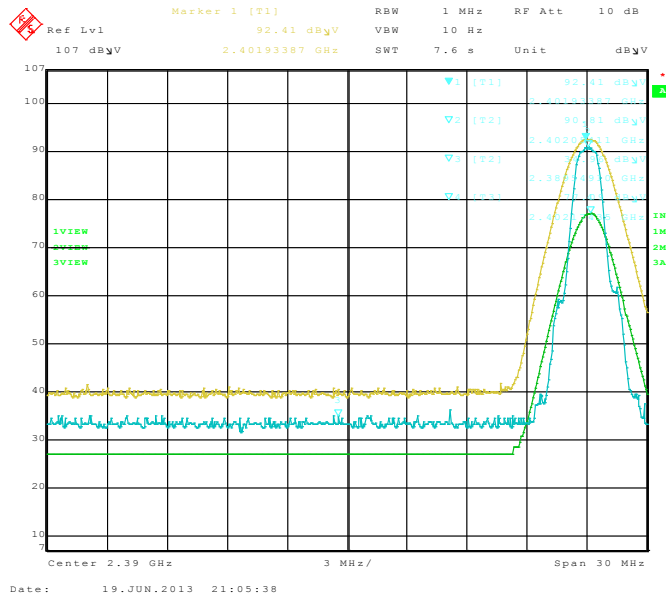


Figure 2-7: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 2-DH5, Channel 78, Pol: V, Detector: PK

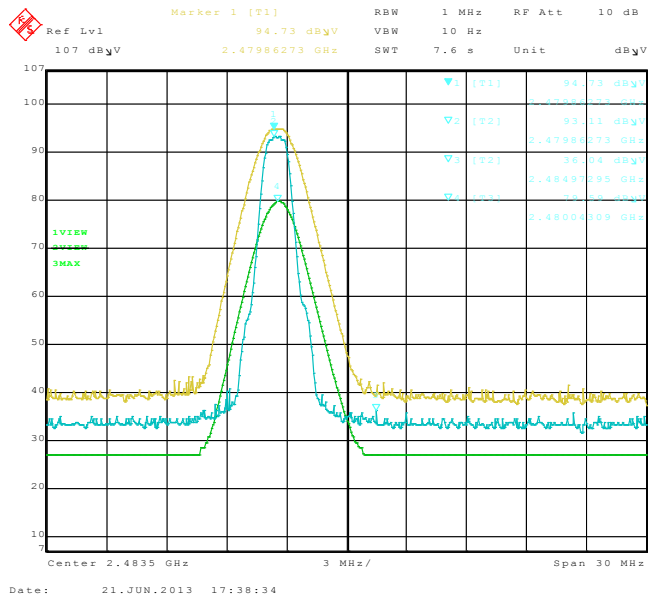
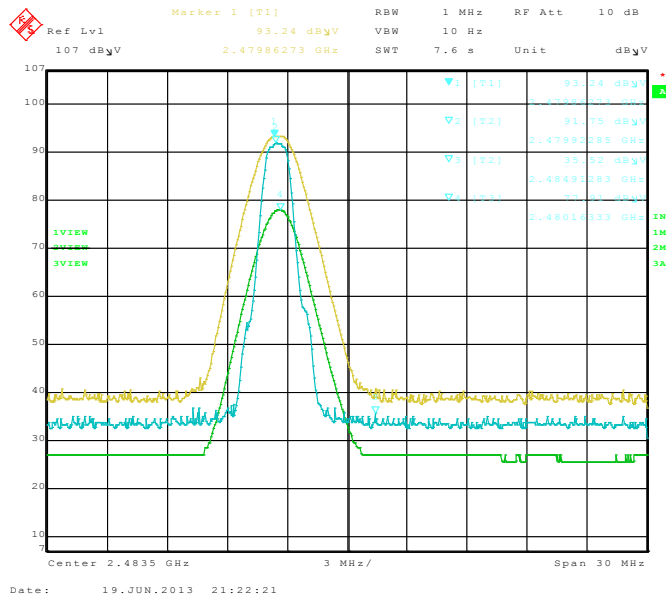


Figure 2-8: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 2-DH5, Channel 78, Pol: H, Detector: PK



Test Report No.
 RTS-6046-1307-36

Dates of Test
 June 14-29, and July 31, 2013

FCC ID: L6ARFX100LW

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

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

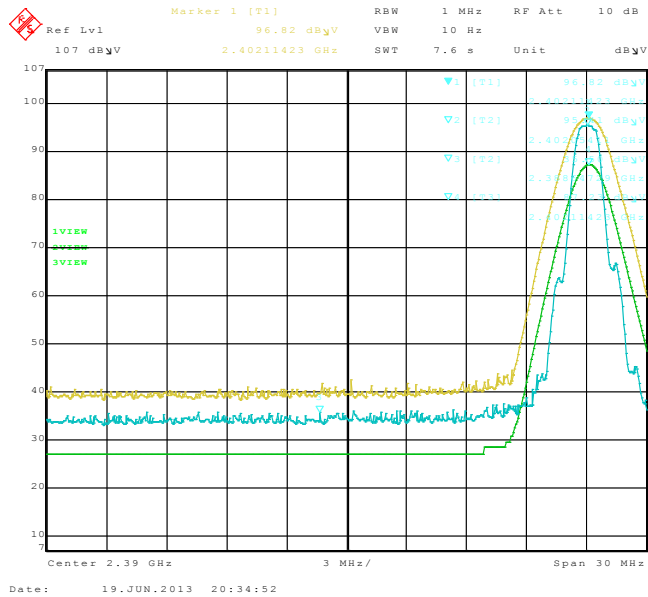


Figure 2-10: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 3-DH5, Channel 0, Pol: H, Detector: PK

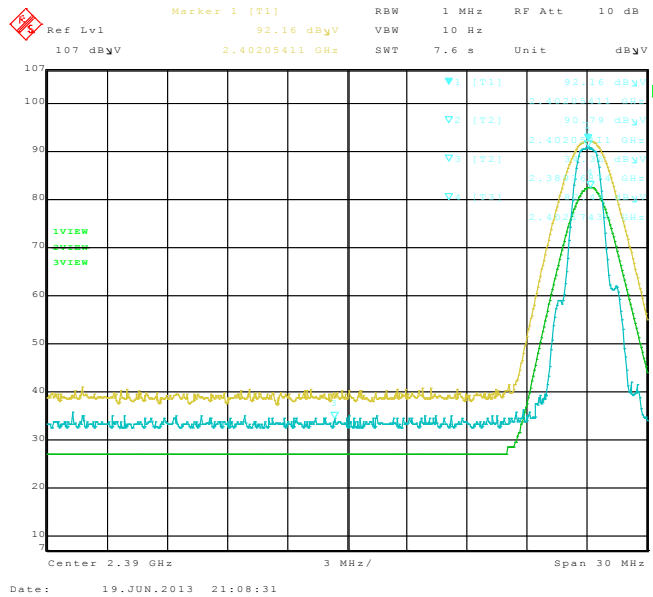


Figure 2-11: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 3-DH5, Channel 78, Pol: V, Detector: PK

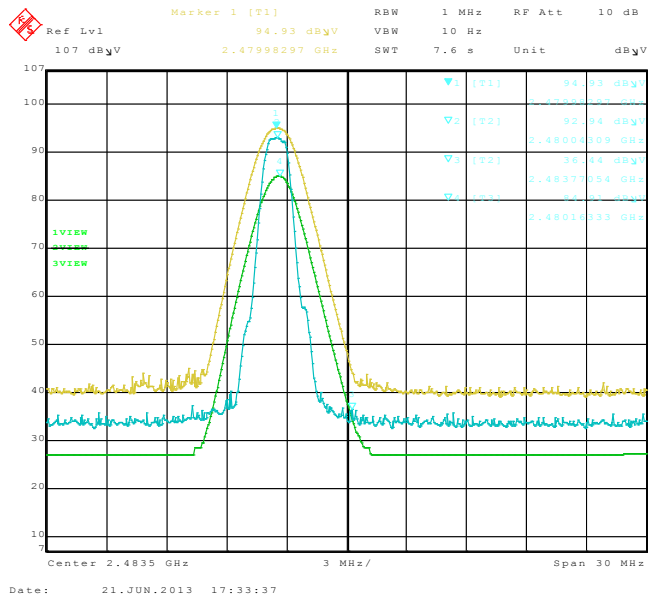
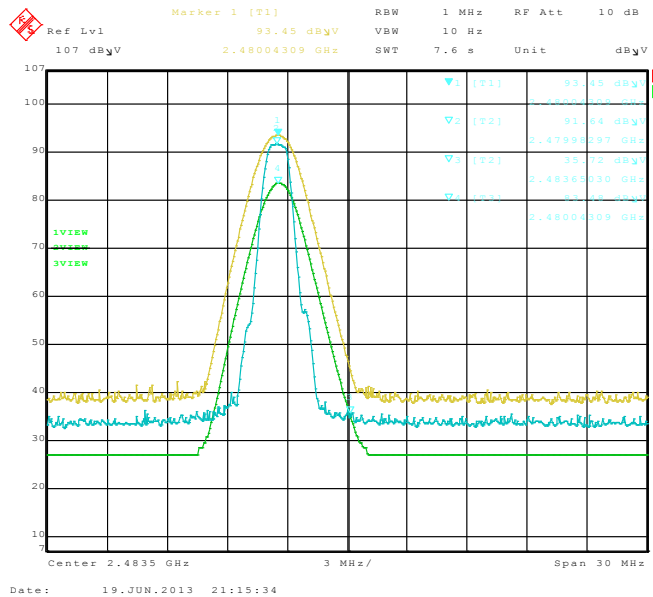



Figure 2-12: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 3-DH5, Channel 78, Pol: H, Detector: PK



	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 2	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	FCC ID: L6ARFX100LW

Radiated Emissions Test Results cont'd
Bluetooth Low Energy Band

Date of Test: June 17, 2013
Measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 25.6 °C
Relative Humidity: 38.6 %

The test distance was 3.0 metres with a EUT height of 0.8 metres, and sweep frequency of 30 MHz to 1 GHz.

The BlackBerry® smartphone in Bluetooth Low Energy Tx mode was in horizontal position.

The frequency sweep measurements were performed in single frequency mode on channels 0, 20 and 39.

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

Date of Test: June 17-21, 2013
Measurements were performed by Heng Lin, Mahmood Ahmed and Kevin Guo


The environmental test conditions were: Temperature: 27.0-28.2°C
Relative Humidity: 27.9.-36.4%

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

The BlackBerry® smartphone in Bluetooth Low Energy Tx mode was in horizontal down position.

The frequency sweep measurements were performed in single frequency mode on channels 0, 20 and 39.

All emission levels were at least 25 dB below the limit.

		EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 2	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	FCC ID: L6ARFX100LW	

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

Date of test: June 19, 2013

Measurements were performed by Rex Zhang

The environmental test conditions were: Temperature: 24.6° C
Relative Humidity: 30.4 %

The BlackBerry® smartphone was in horizontal position.

The test distance was 3.0 metres.

Channel	Freq. (MHz)	Rx Antenna		Detector	VBW	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
Low Channel, LE										
0	2402	Horn	V	PK	1 MHz	104.66	59.61	45.05	74	-28.95
0	2402	Horn	H	PK	1 MHz	100	54.83	45.17	74	-28.83
0	2402	Horn	V	AVE.	10 Hz	99.97	59.61	40.36	54	-13.64
0	2402	Horn	H	AVE.	10 Hz	95.21	54.83	40.38	54	-13.62
High Channel, LE										
39	2480	Horn	V	PK	1 MHz	104.5	57.07	47.43	74	-26.57
39	2480	Horn	H	PK	1 MHz	102.9	56.61	46.29	74	-27.71
39	2480	Horn	V	AVE.	10 Hz	99.75	57.07	42.68	54	-11.32
39	2480	Horn	H	AVE.	10 Hz	98.2	56.61	41.59	54	-12.41

See figures 2-13 to 2-16 for the plots of the Bluetooth Low Energy band-edge compliance.

Test Report No.
 RTS-6046-1307-36

Dates of Test
 June 14-29, and July 31, 2013

FCC ID: L6ARFX100LW

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

Figure 2-13: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 0, Pol: V, Detector: PK

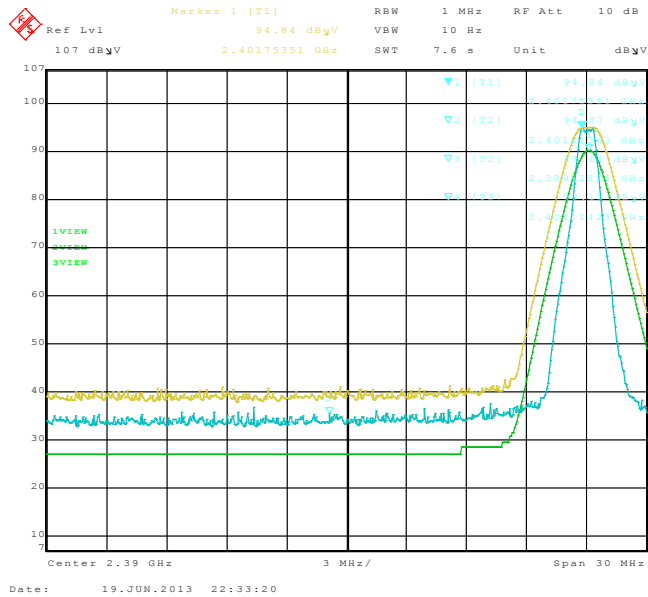


Figure 2-14: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 0, Pol: H, Detector: PK

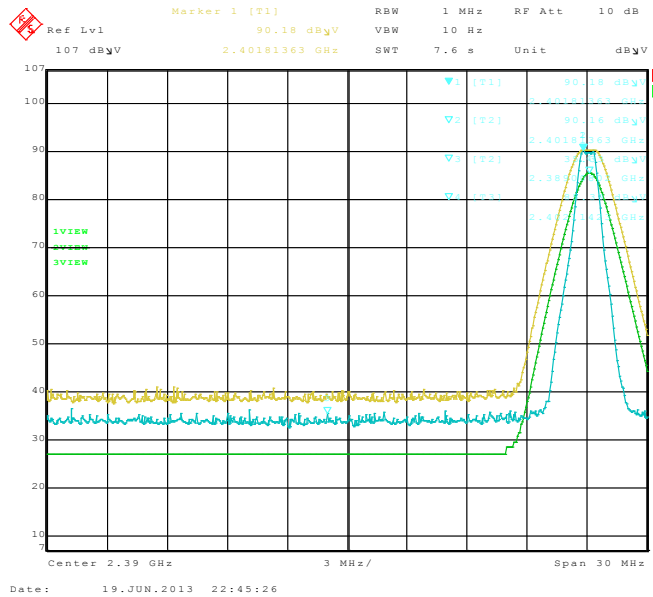


Figure 2-15: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 39, Pol: V, Detector: PK

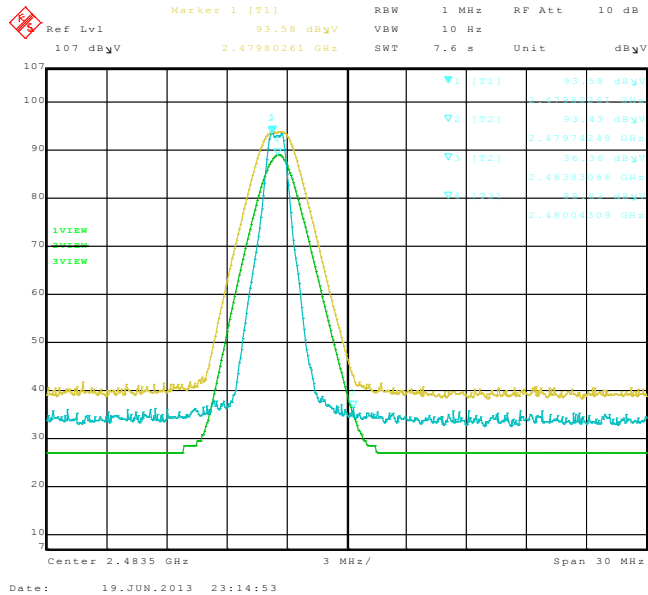
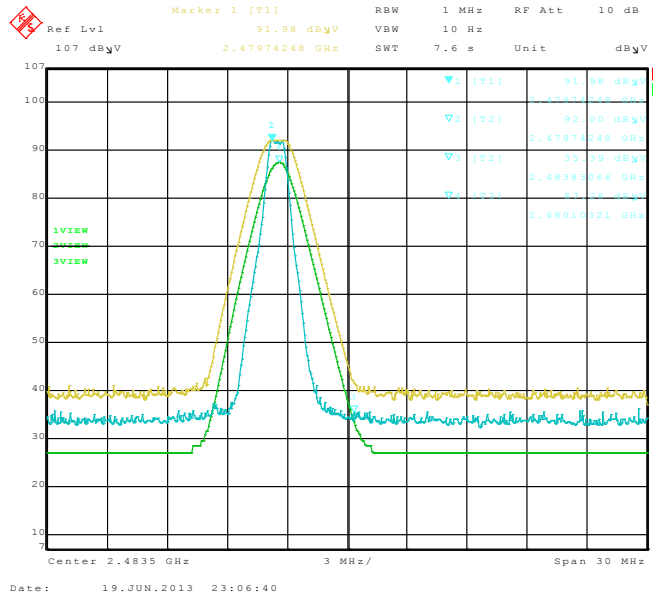



Figure 2-16: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 39, Pol: H, Detector: PK



**APPENDIX 3 – BLUETOOTH AND BLUETOOTH LOW ENERGY CONDUCTED
EMISSIONS TEST DATA/PLOT**

	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	Test Report No. FCC ID: L6ARFX100LW

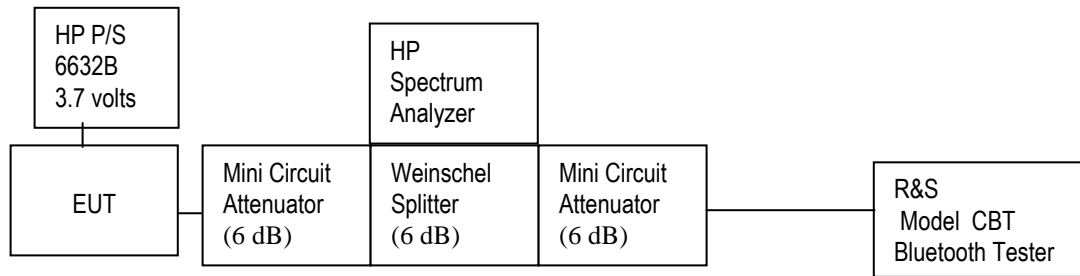
Bluetooth RF Conducted Emission Test Results

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: June 19, 2013


Test Setup Diagram



<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>
Attenuator 1	Mini-Circuits	BW-S6W2+	0647
Attenuator 2	Mini-Circuits	BW-S6W2+	0648
Attenuator 3	Mini-Circuits	BW-S20-2W263+	1234
Splitter 1	Weinschel	1515	MES 92

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

The environmental test conditions were: Temperature: 25 °C
Relative Humidity: 42 %

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Bluetooth RF Conducted Emission Test Results cont'd

20 dB Bandwidth

The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a). 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	0.920
39	≤1.0	0.918
78	≤1.0	0.915

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

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

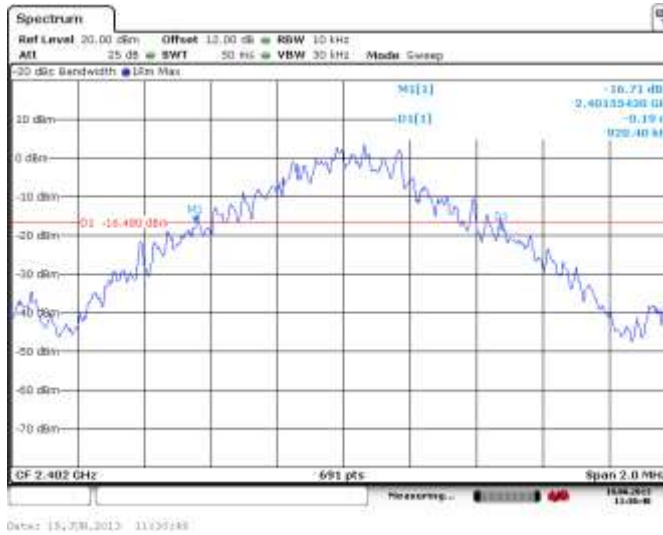
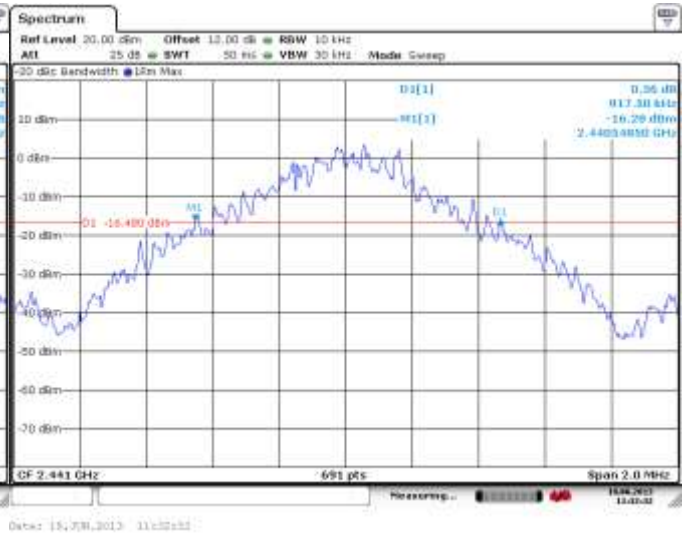



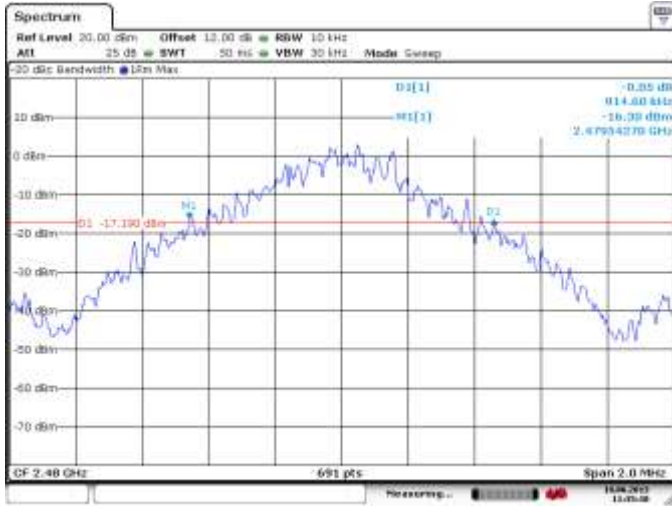
Figure 3-2: 20 dB Bandwidth
Single freq., Static PBRs, DH5



	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
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Bluetooth RF Conducted Emission Test Results cont'd


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



Using Pattern type “Static PBRs” and packet type “2-DH5” during the measurements.

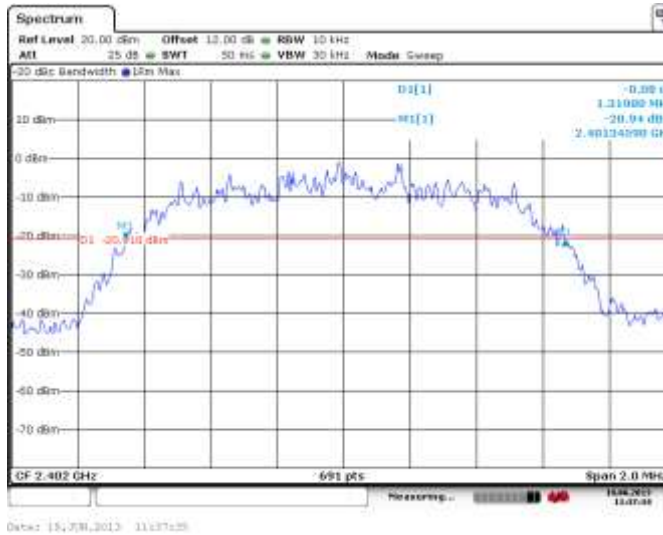
Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.320
39	≤1.5	1.317
78	≤1.5	1.317

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

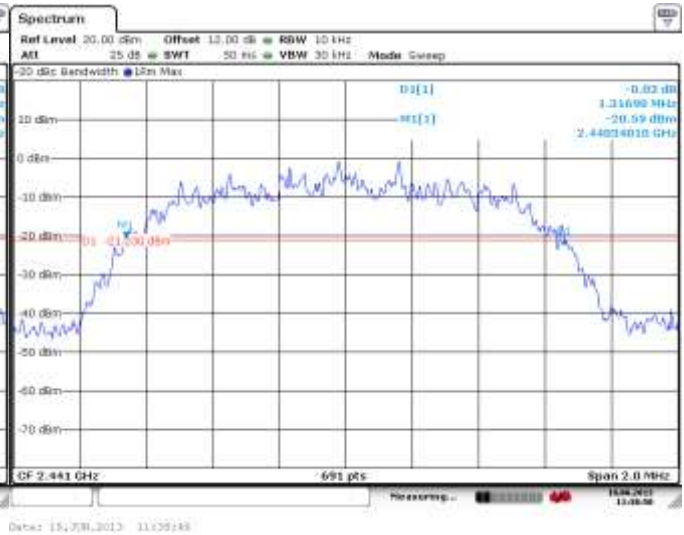
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	Test Report No. FCC ID: L6ARFX100LW

Bluetooth RF Conducted Emission Test Results cont'd

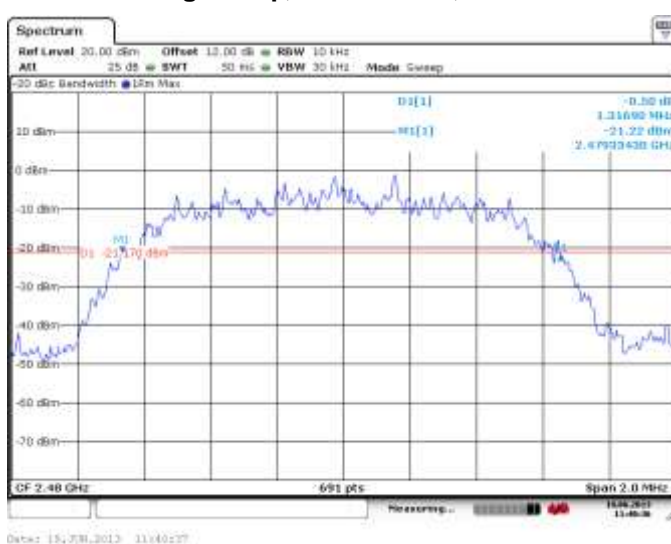
**Figure 3-4: 20 dB Bandwidth
Single freq., Static PBRs, 2-DH5**




**Figure 3-5: 20 dB Bandwidth
Single freq., Static PBRs, 2-DH5**



**Figure 3-6: 20 dB Bandwidth
Single freq., Static PBRs, 2-DH5**



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Bluetooth RF Conducted Emission Test Results cont'd

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

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.320
39	≤1.5	1.320
78	≤1.5	1.320

See figures 3-7 to 3-9 for the plots of the 20 dB bandwidth measurements.

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

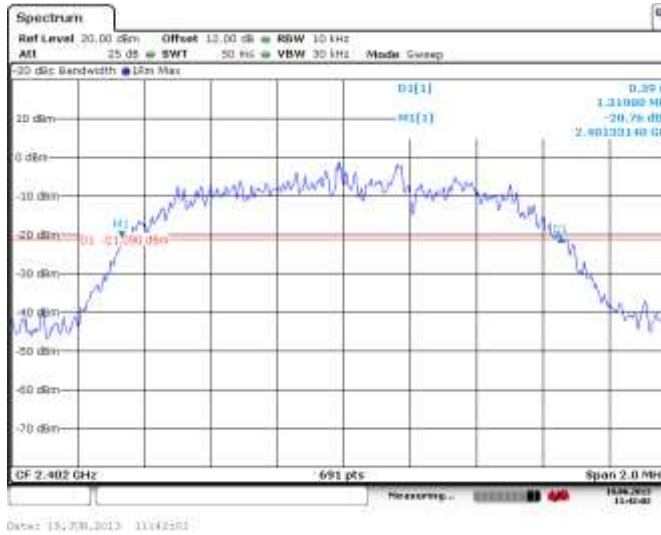
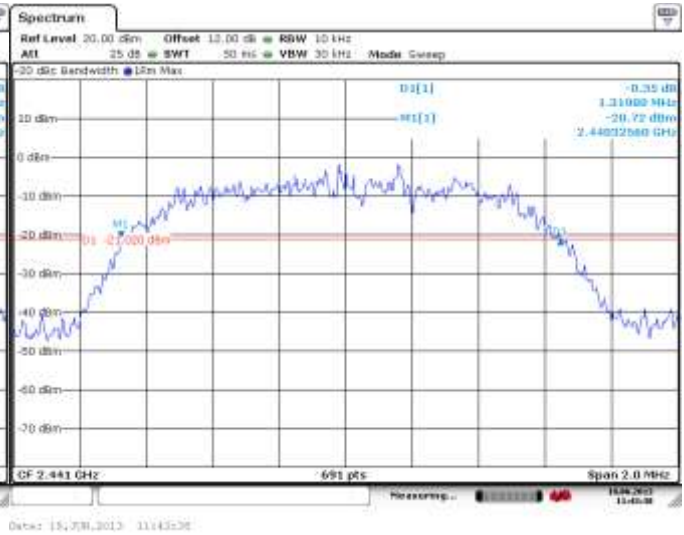



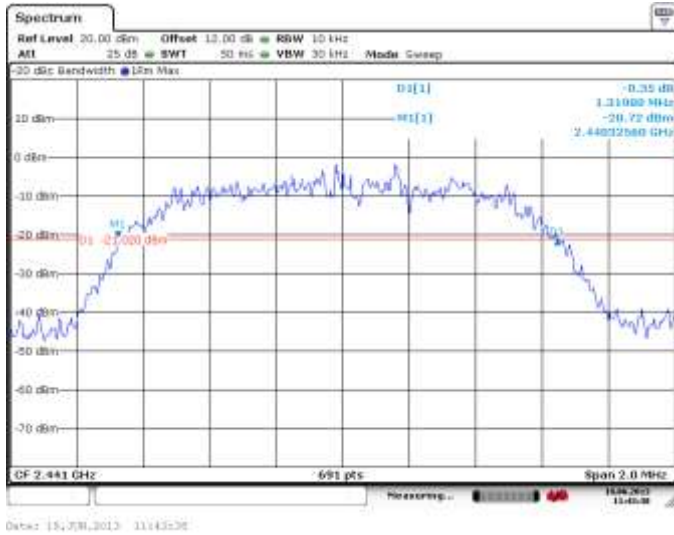
Figure 3-8: 20 dB Bandwidth
 Single freq., Static PBRs, 3-DH5




	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
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Bluetooth RF Conducted Emission Test Results cont'd

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



	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
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Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a). 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	0.9986

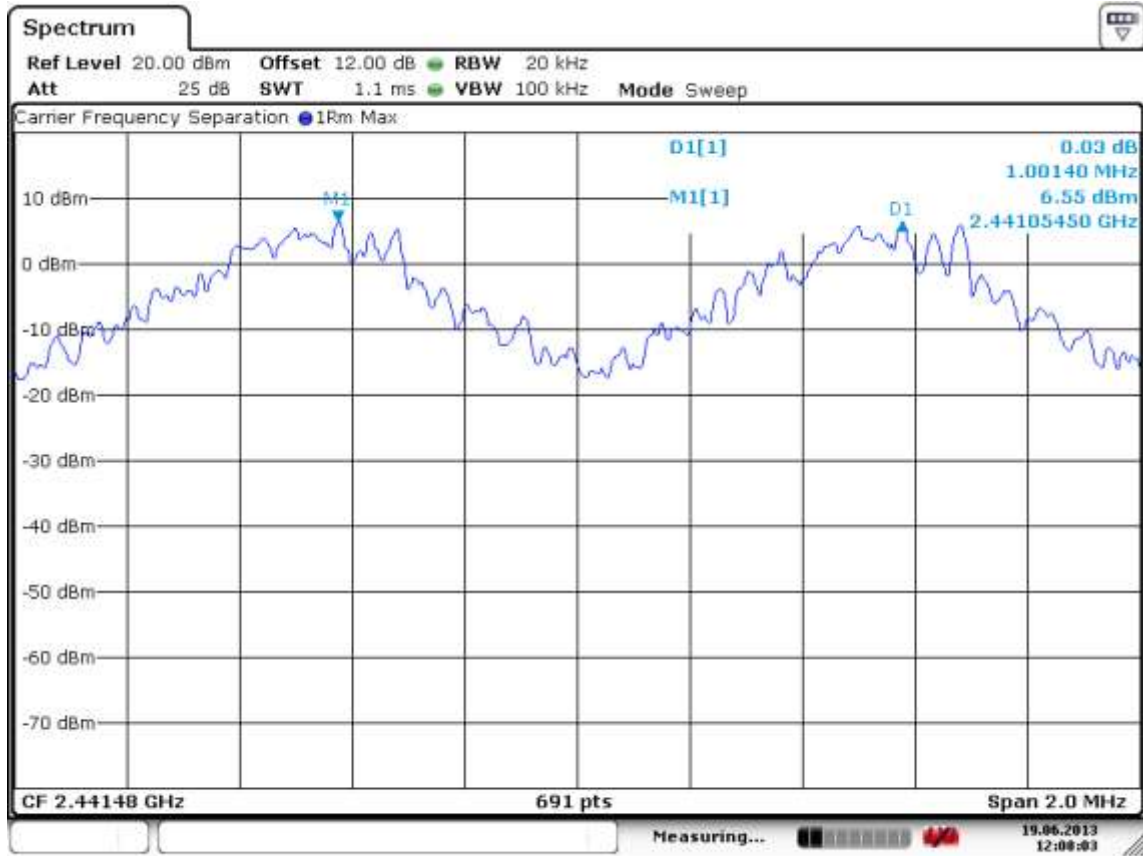
See figure 3-10 for the plot of the Carrier Frequency Separation measurement.

Figure 3-10: Carrier Frequency Separation, Freq. Hopping, Static PBRs, DH5, Channels 38 to 39


Test Report No.
 RTS-6046-1307-36

Dates of Test
 June 14-29, and July 31, 2013

Test Report No.
FCC ID: L6ARFX100LW



Date: 19.JUN.2013 12:08:02

	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
Test Report No. RTS-6046-1307-36	Dates of Test June 14-29, and July 31, 2013	Test Report No. FCC ID: L6ARFX100LW

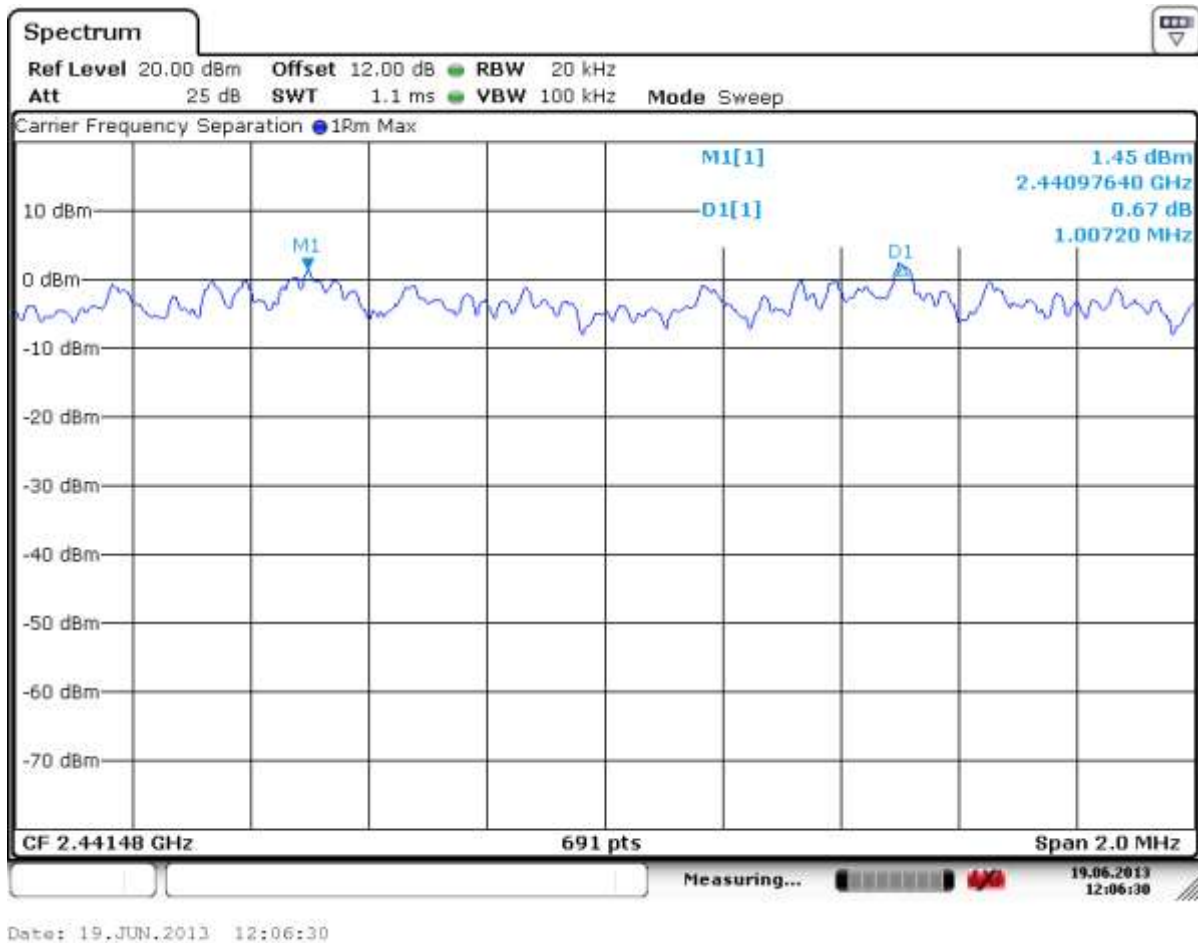
Bluetooth RF Conducted Emission Test Results cont'd


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	1.007

See figure 3-11 for the plot of the Carrier Frequency Separation measurement.

Figure 3-11: Carrier Frequency Separation, Freq. Hopping, Static PBRs, 2-DH5, Channels 38 to 39



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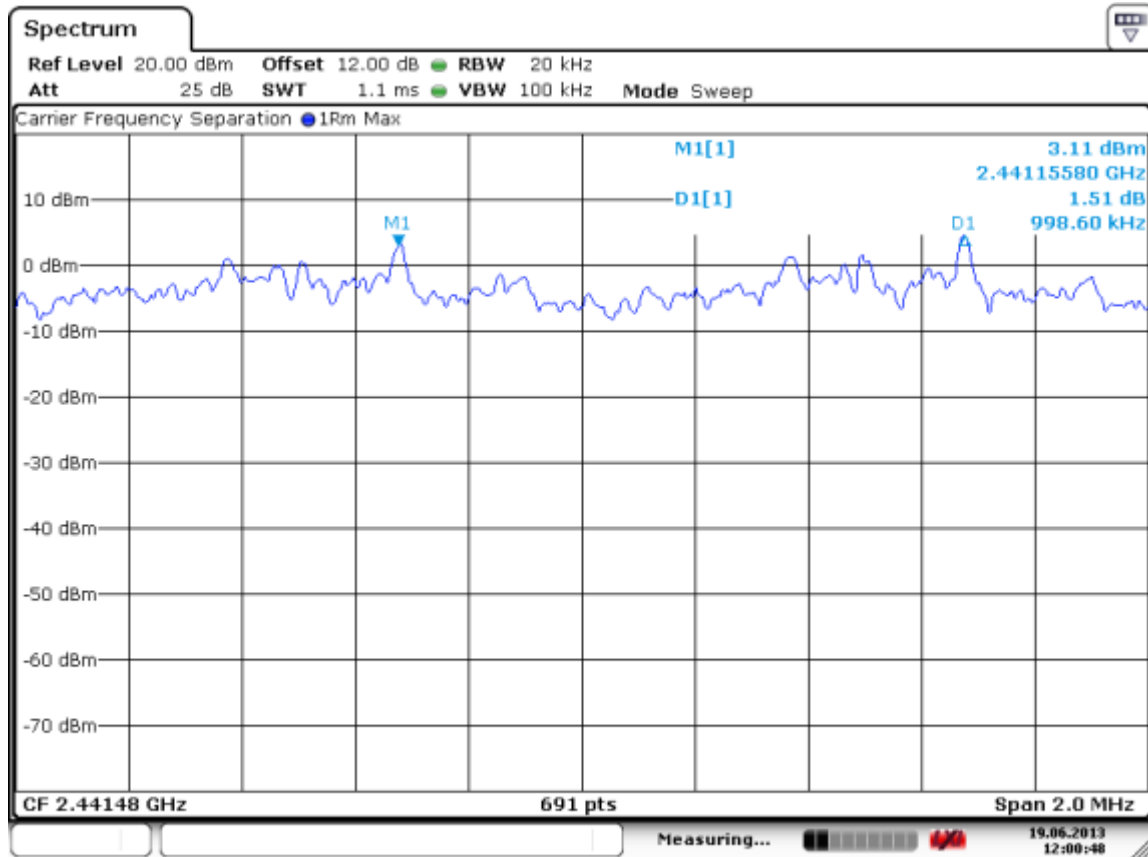
Bluetooth RF Conducted Emission Test Results cont'd

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	1.001

See figure 3-12 for the plot of the Carrier Frequency Separation measurement.

Figure 3-12: Carrier Frequency Separation, Freq. Hopping, Static PBRs, 3-DH5, Channels 38 to 39



Date: 19.JUN.2013 12:00:49

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Bluetooth RF Conducted Emission Test Results cont'd

Number of Hopping Frequencies

The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a). 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 3-13 to 3-16 for the plots of the number of hopping frequencies.

Figure 3-13: Number of Hopping Frequencies Static PBRS, DH5

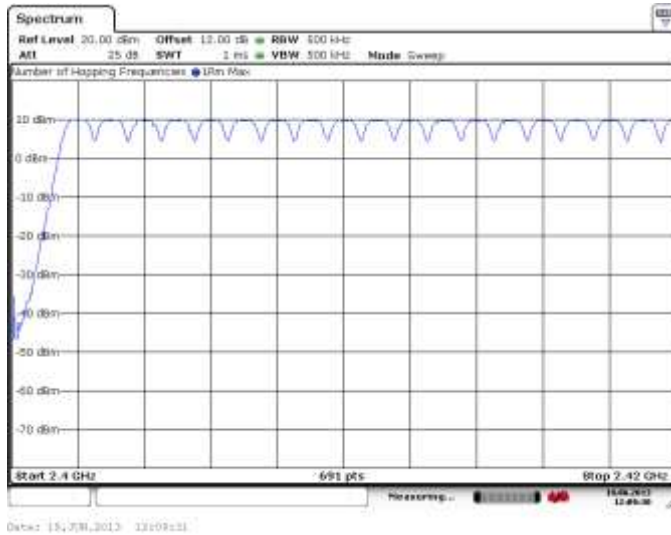
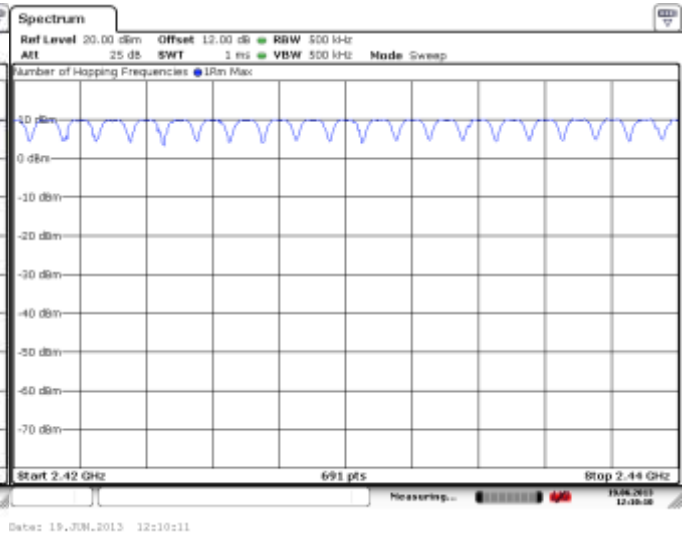



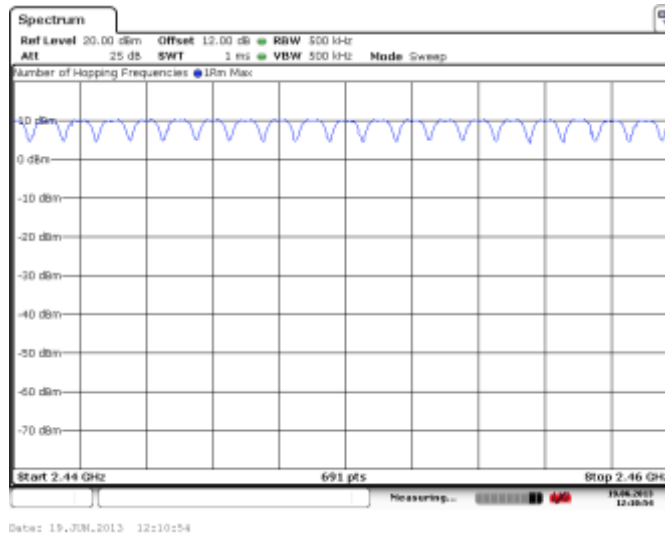
Figure 3-14: Number of Hopping Frequencies Static PBRS, DH5



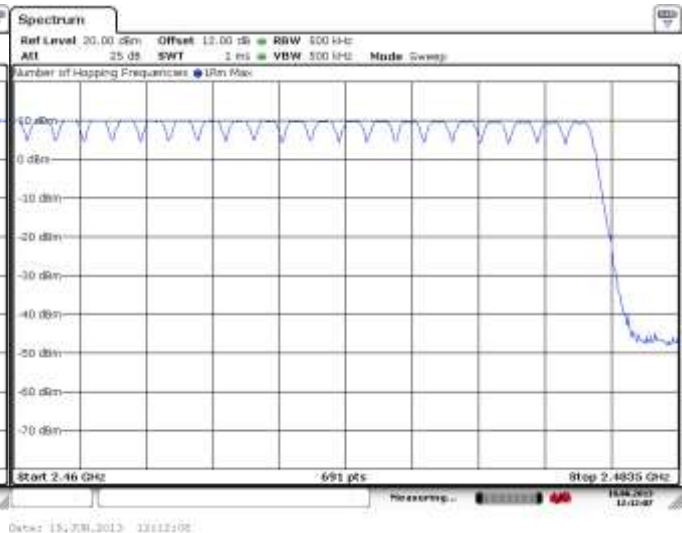
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-15: Number of Hopping Frequencies
Static PBRs, DH5**



**Figure 3-16: 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). 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 usec for 79 channels.

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

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

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

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Bluetooth RF Conducted Emission Test Results cont'd

Bluetooth Channel	Mode	Tx Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.4000	0.4 x 320.0 = 128	400	272.00
39	DH1	0.4000	0.4 x 320.0 = 128	400	272.00
78	DH1	0.4000	0.4 x 320.0 = 128	400	272.00
0	DH3	1.6500	1.65 x 159.9 = 263.84	400	136.17
39	DH3	1.6610	1.661 x 159.9 = 265.59	400	134.41
78	DH3	1.6610	1.661 x 159.9 = 265.59	400	134.41
0	DH5	2.9220	2.922 x 106.8 = 312.07	400	87.93
39	DH5	2.9220	2.922 x 106.8 = 312.07	400	87.93
78	DH5	2.9220	2.922 x 106.8 = 312.07	400	87.93

See figures 3-17 to 3-25 for the plots of the dwell time.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

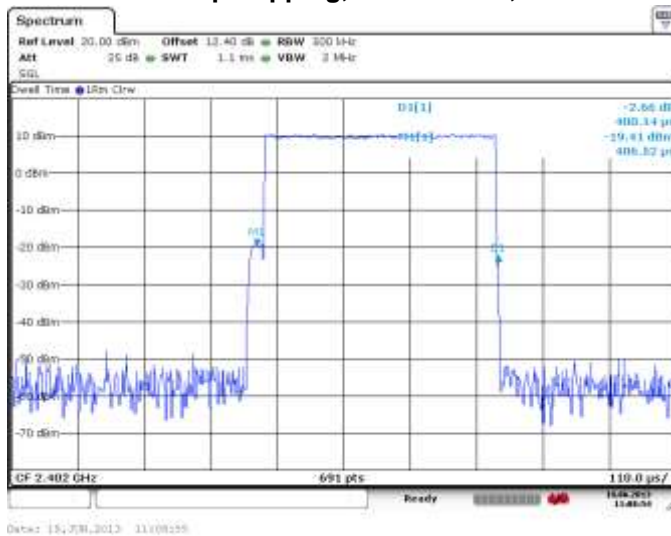
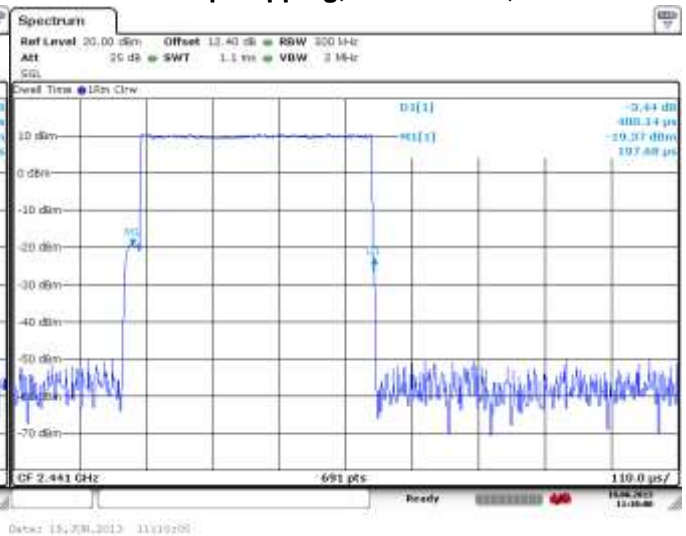



Figure 3-18: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-19: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH1

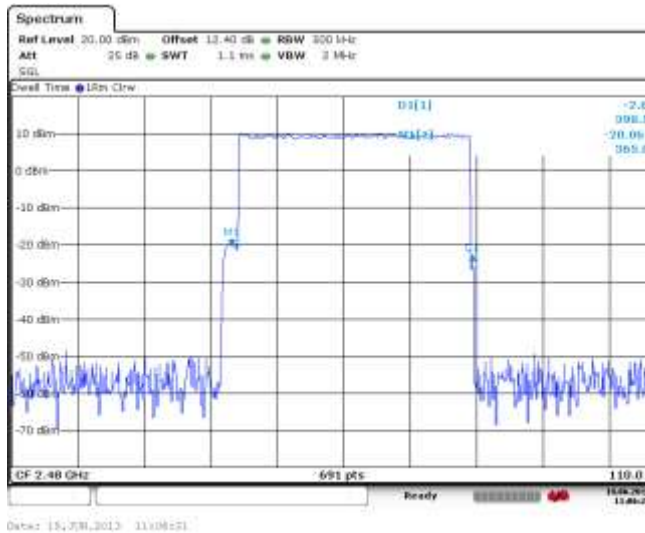


Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3

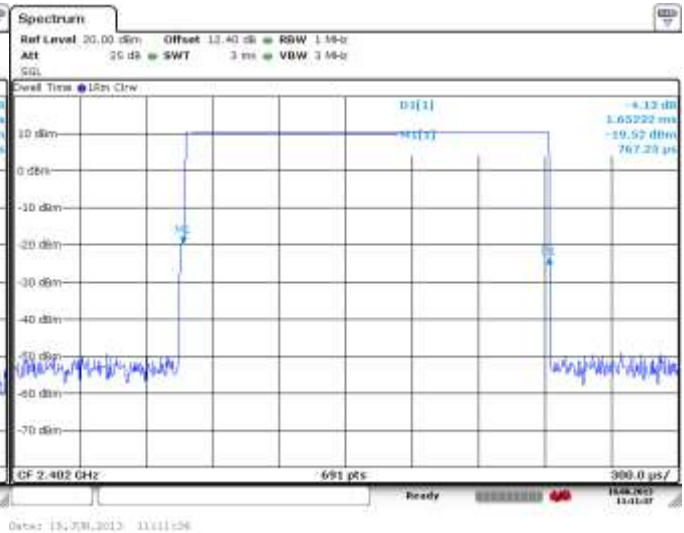


Figure 3-21: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3

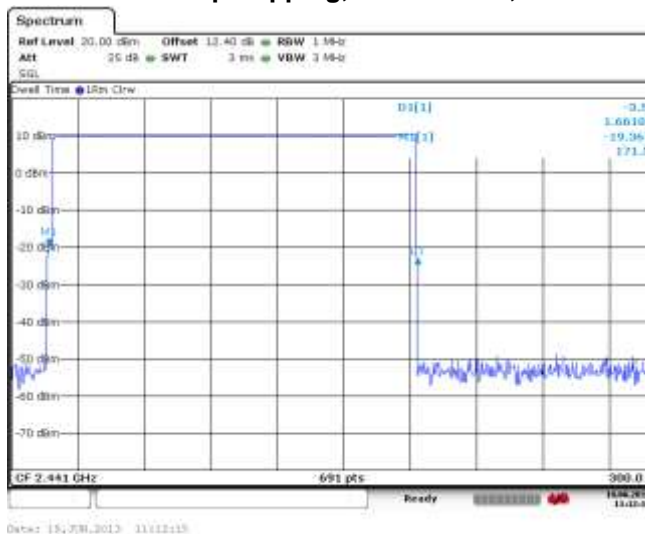
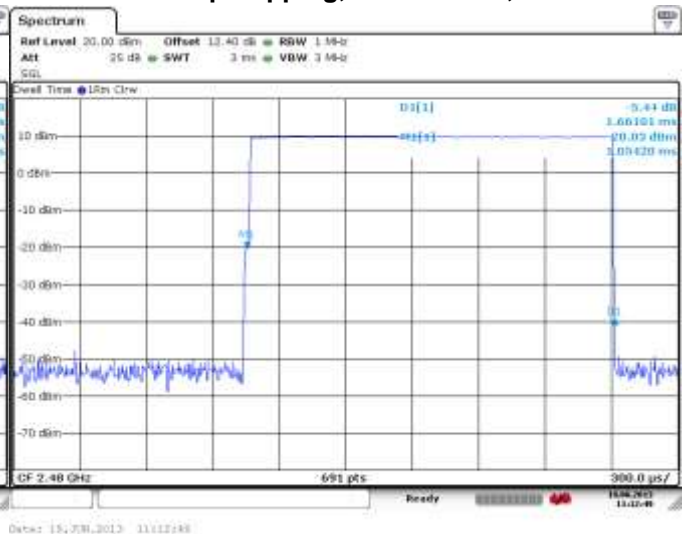



Figure 3-22: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH3



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-23: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

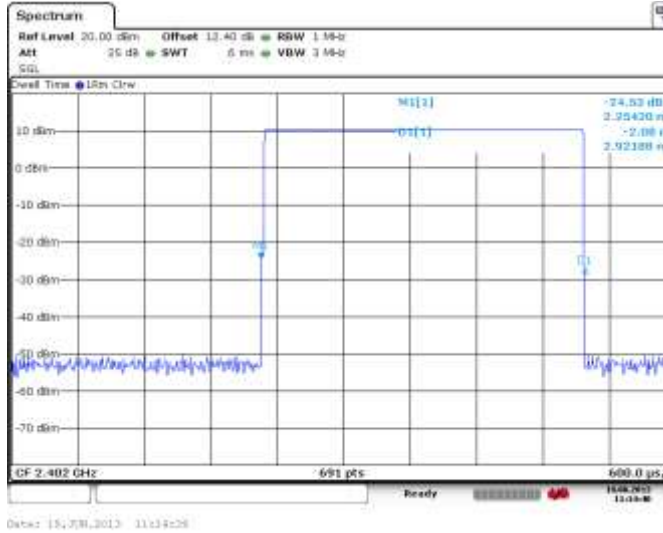


Figure 3-24: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

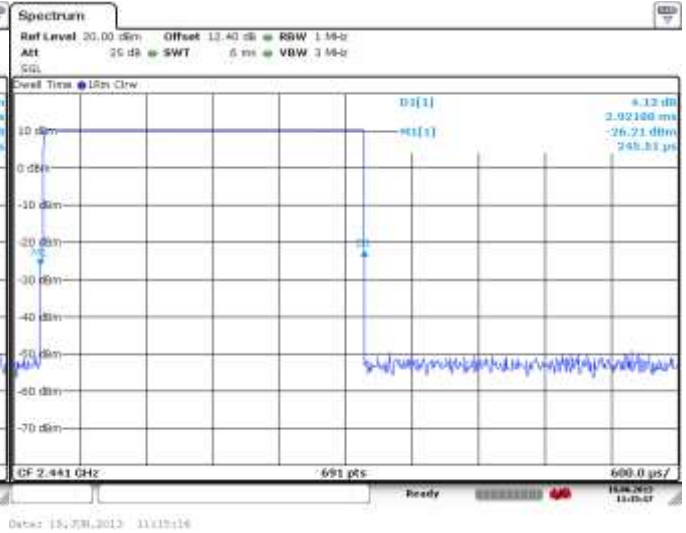
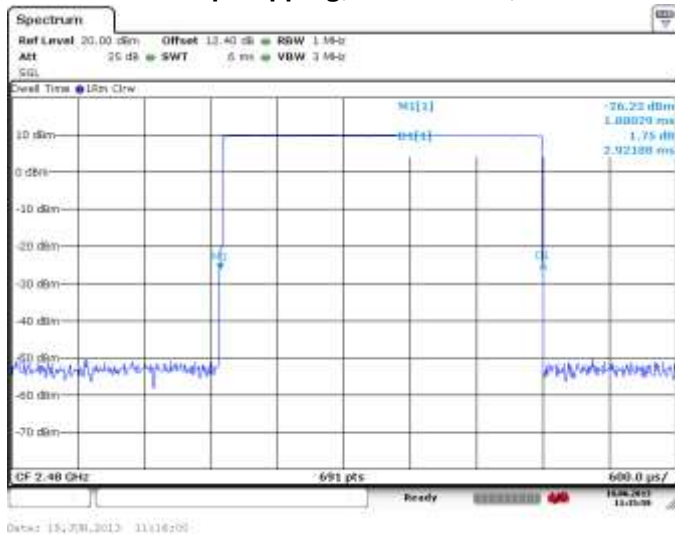



Figure 3-25: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Maximum Peak Conducted Output Power

The EUT met the requirements of the maximum peak conducted output power of class 1 as per 47 CFR 15.247(b). 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	9.50	0.00891	0.0 to 20.0
39	8.80	0.00759	0.0 to 20.0
78	7.80	0.00603	0.0 to 20.0

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	6.60	0.00457	0.0 to 20.0
39	6.40	0.00437	0.0 to 20.0
78	5.20	0.00331	0.0 to 20.0

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	6.60	0.00457	0.0 to 20.0
39	6.30	0.00427	0.0 to 20.0
78	5.10	0.00324	0.0 to 20.0

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Bluetooth RF Conducted Emission Test Results cont'd

Band Edge Compliance

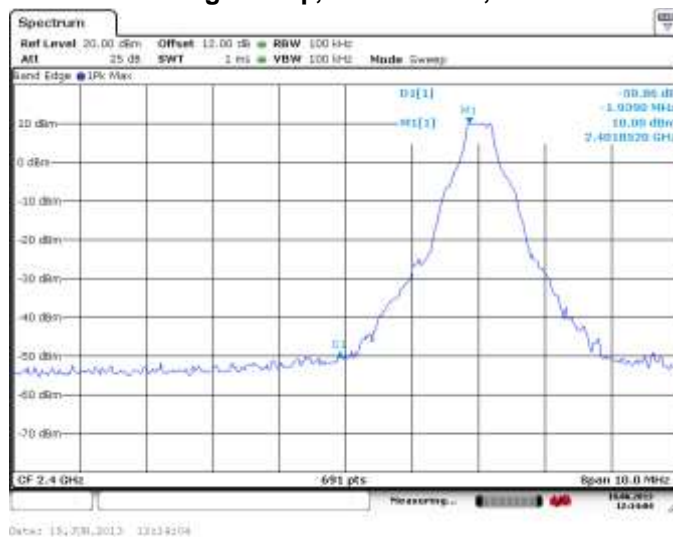
The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c). Low channel (0) and high channel (78) were measured. Bluetooth was operating in single frequency and hopping mode.

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

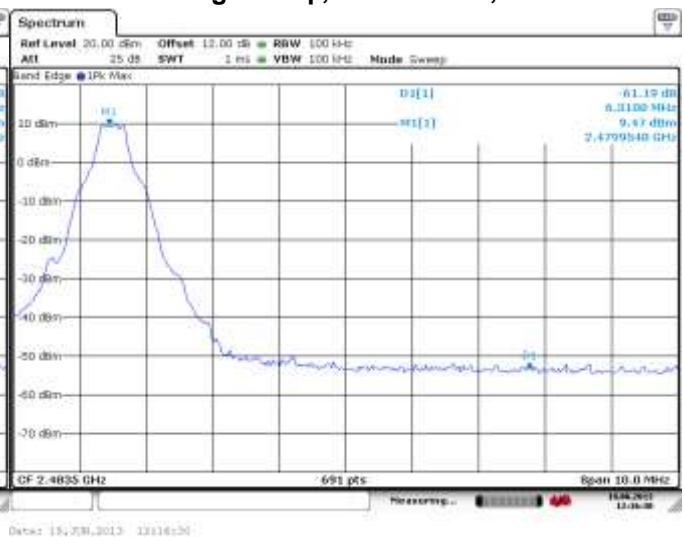
Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-58.86	-20	-38.86
78	Single Frequency	-61.19	-20	-41.19
0	Hopping	-61.44	-20	-41.44
78	Hopping	-60.92	-20	-40.92


See figures 3-26 to 3-38 for the plots of the band edge compliance measurements.

**Figure 3-35: Band Edge Compliance
Single Freq., Static PBRs, DH5**



**Figure 3-36: Band Edge Compliance
Single Freq., Static PBRs, DH5**



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-37: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5

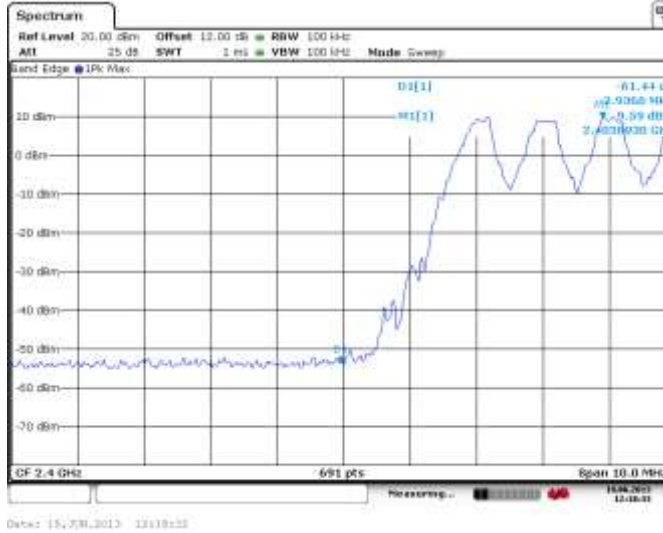
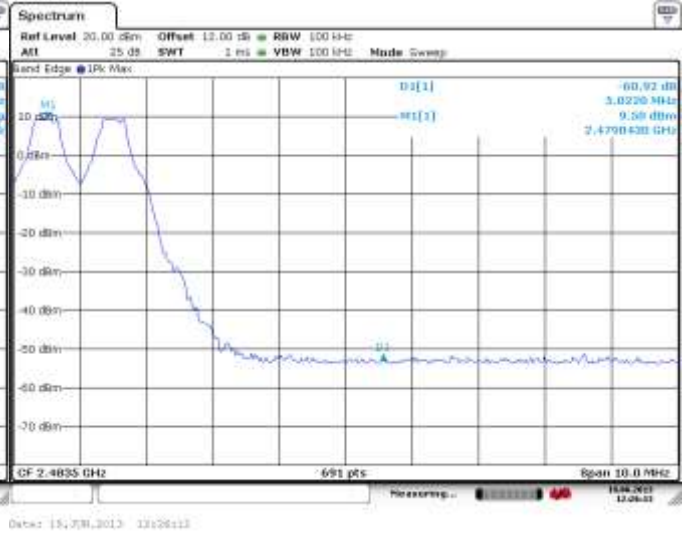



Figure 3-38: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5



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	-55.53	-20	-35.53
78	Single Frequency	-58.66	-20	-38.66
0	Hopping	-57.54	-20	-37.54
78	Hopping	-59.32	-20	-39.32

See figures 4-39 to 4-42 for the plots of the band edge compliance measurements.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-39: Band Edge Compliance
Single Freq., Static PBRs, 2-DH5

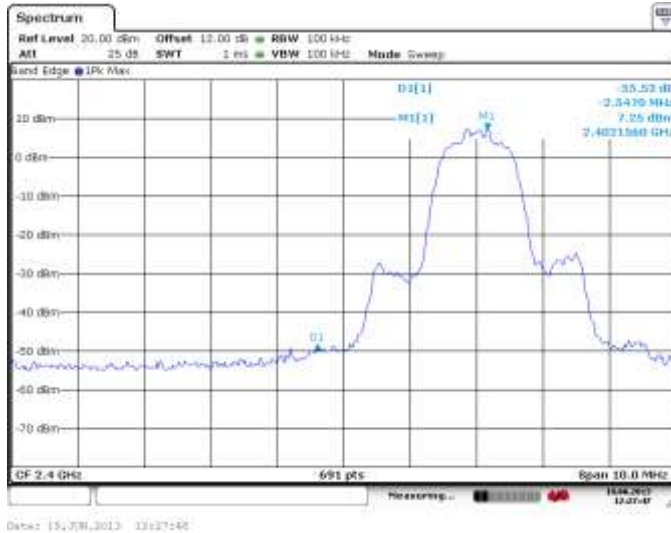


Figure 3-40: Band Edge Compliance
Single Freq., Static PBRs, 2-DH5

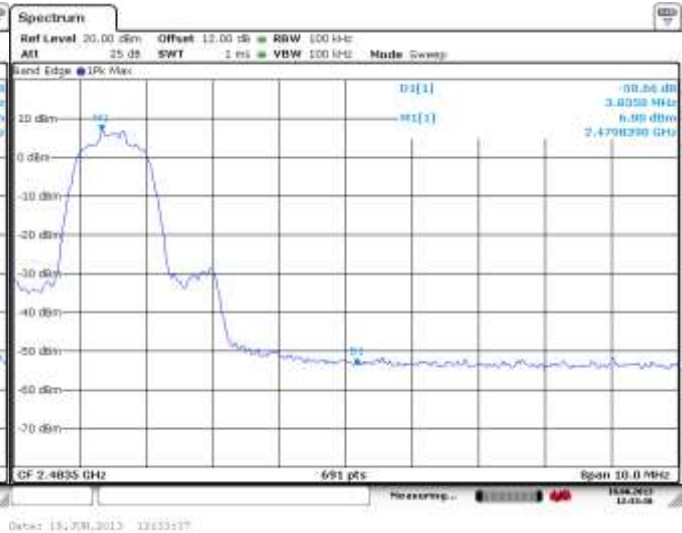
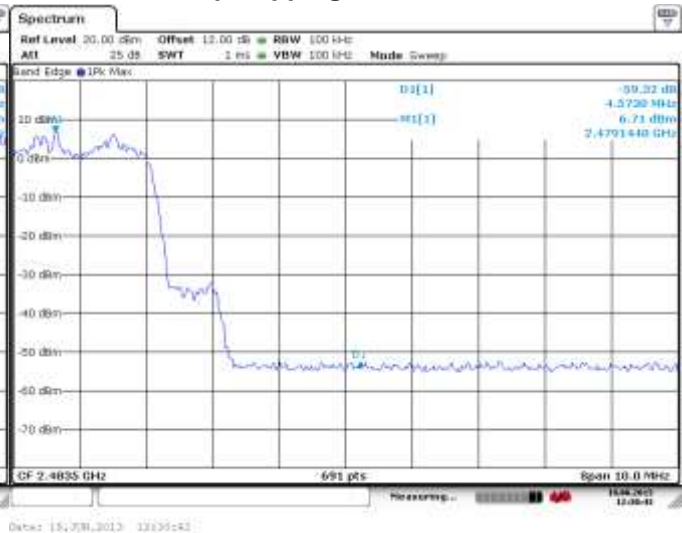



Figure 3-41: Band Edge Compliance
Freq. Hopping, Static PBRs, 2-DH5



Figure 3-42: Band Edge Compliance
Freq. Hopping, Static PBRs, 2-DH5



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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	-55.36	-20	-35.36
78	Single Frequency	-59.57	-20	-39.57
0	Hopping	-57.81	-20	-37.81
78	Hopping	-58.54	-20	-38.54

See figures 3-43 to 3-46 for the plots of the band edge compliance measurements.

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

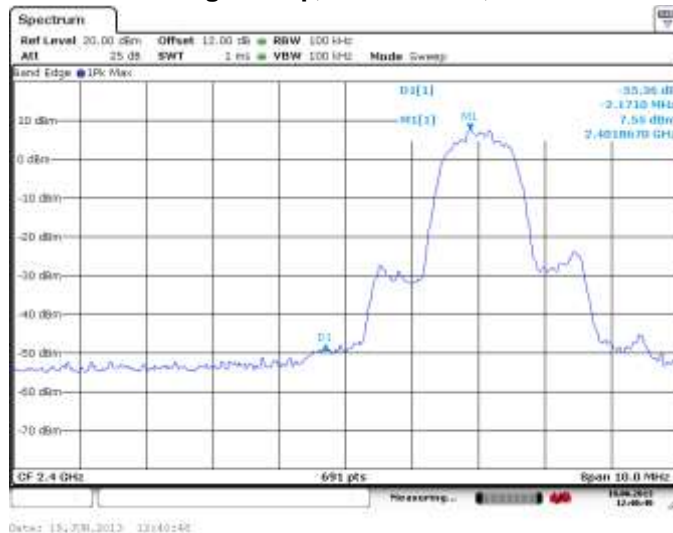
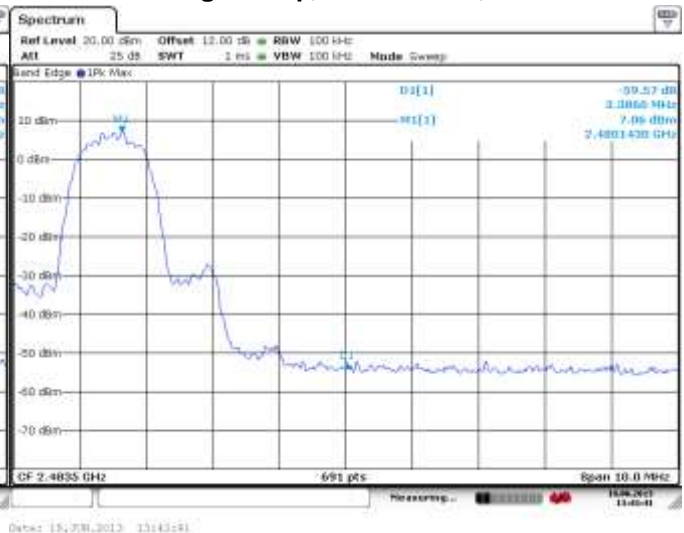



Figure 3-44: Band Edge Compliance
Single Freq., Static PBRs, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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

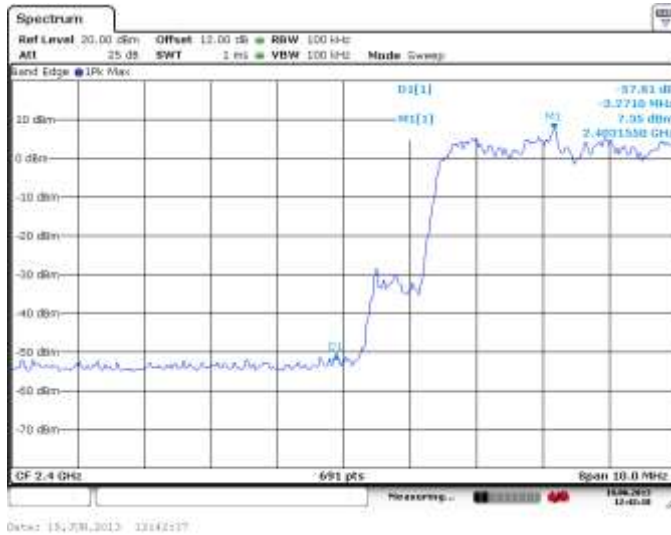
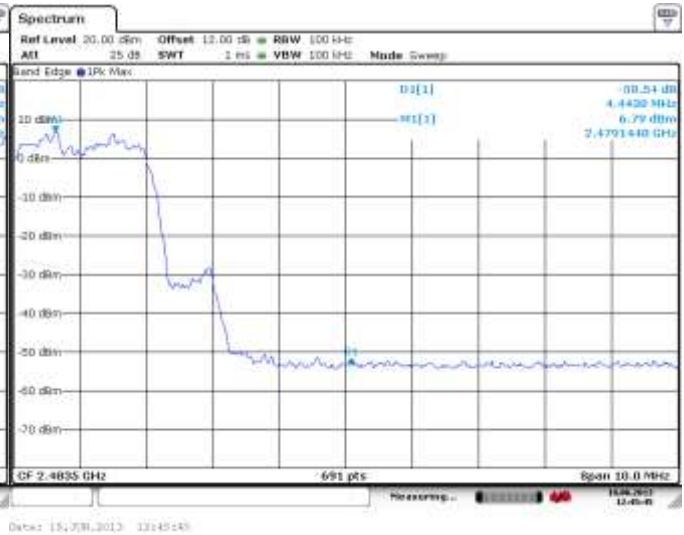



Figure 3-46: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd


Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c). 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	9.50	-31.31	-40.81	-20.00
39	8.80	-31.25	-40.05	-20.00
78	7.80	-30.88	-38.68	-20.00
Hopping mode	7.80	-30.81	-38.61	-20.00

See figures 3-47 to 3-50 for the plots of the spurious RF conducted emissions.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-47: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5,

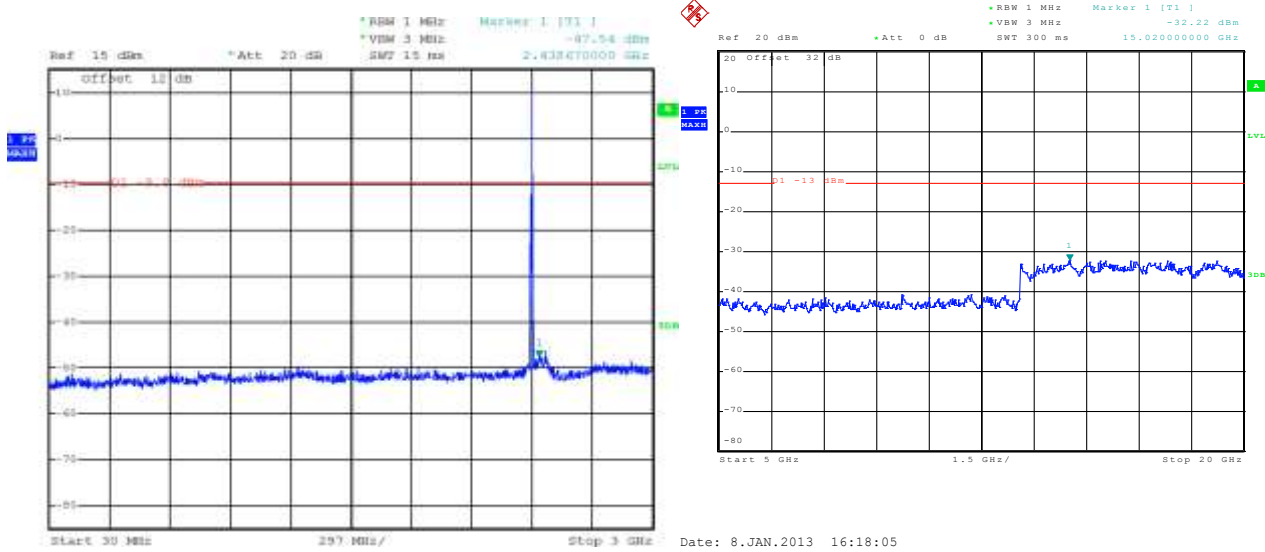
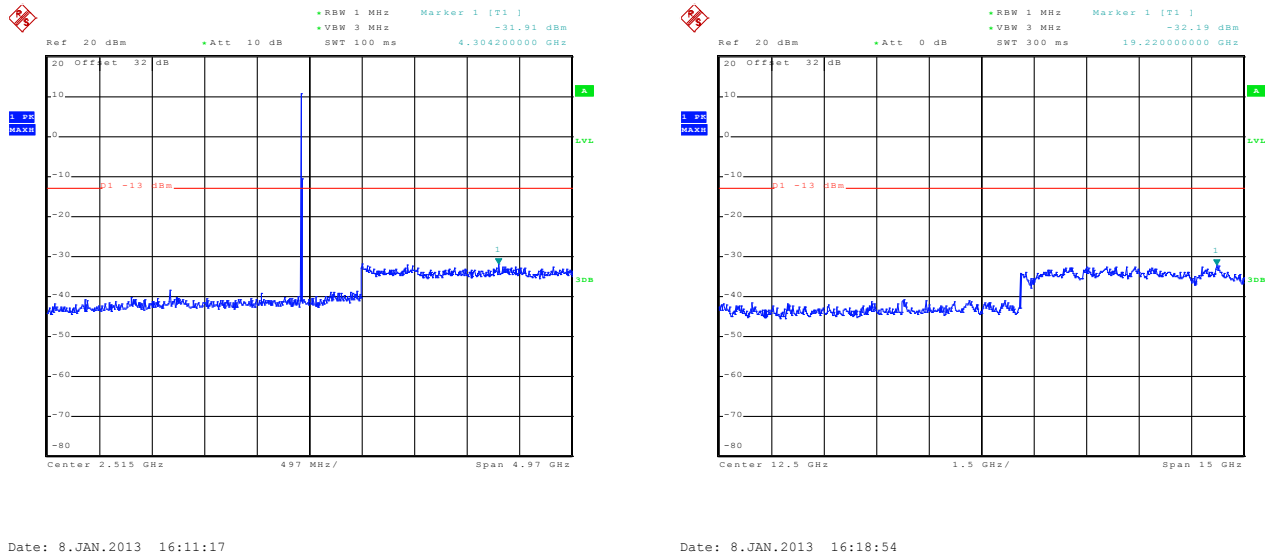



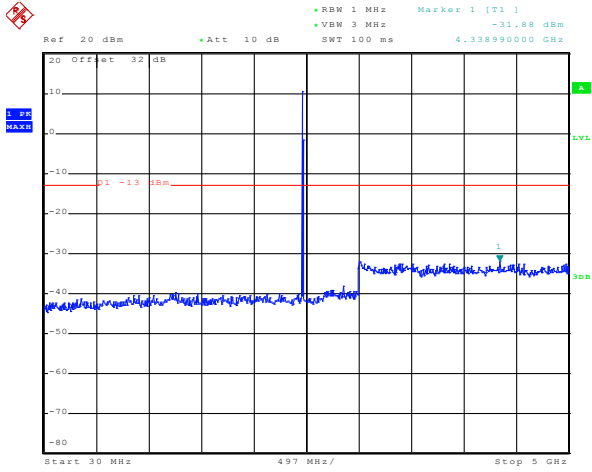
Figure 3-48: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5



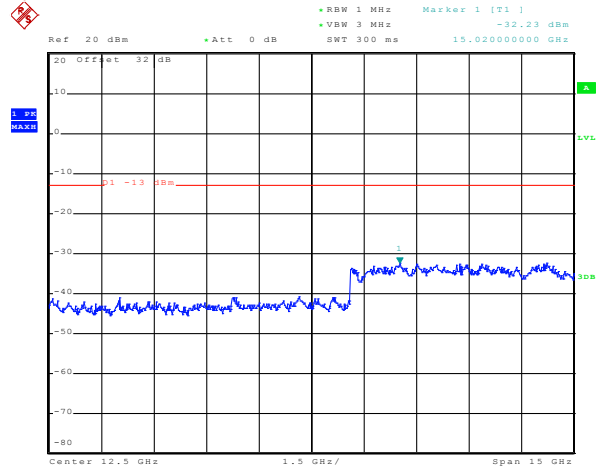
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-49: Spurious RF Conducted Emissions
Single Freq., Static PBRs, DH5**

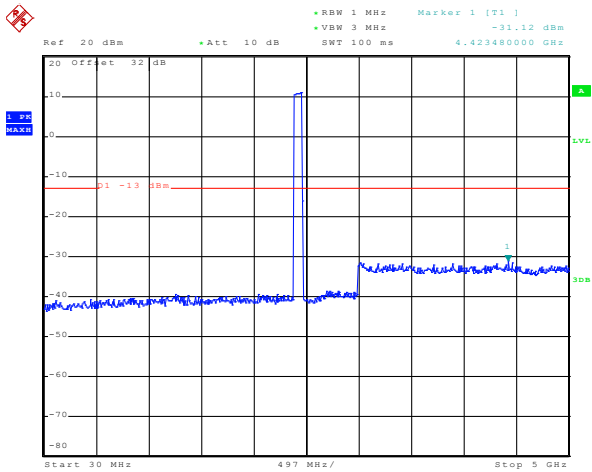


Date: 8.JAN.2013 16:12:06

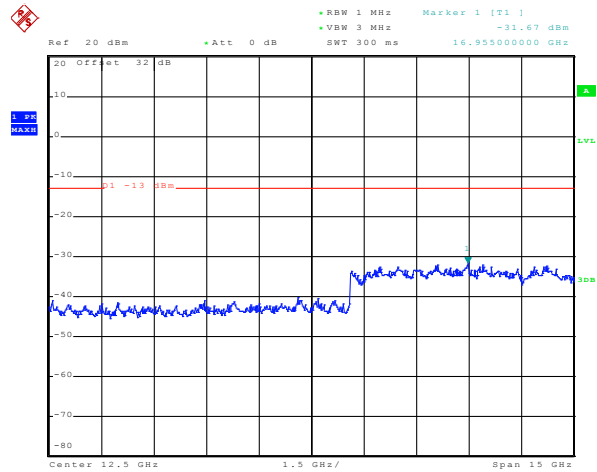


Date: 8.JAN.2013 16:19:48


**Figure 3-50: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, DH5**



Date: 8.JAN.2013 16:13:55



Date: 8.JAN.2013 16:20:38


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

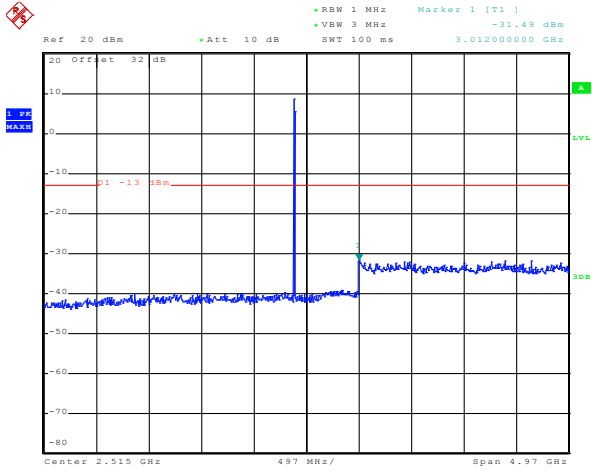
Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0	6.60	-30.73	-37.33	-20.00
39	6.30	-31.31	-37.61	-20.00
78	5.10	-30.82	-35.92	-20.00
Hopping mode	5.10	-31.17	-36.27	-20.00

See figures 3-51 to 3-54 for the plots of the spurious RF conducted emissions.

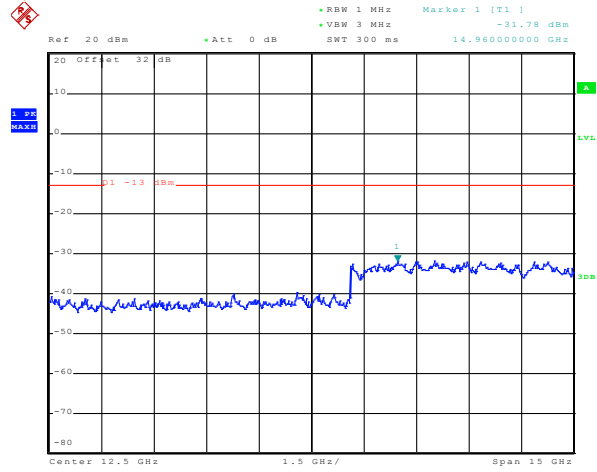
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-51: Spurious RF Conducted Emissions
Single Freq., Static PBRs, 2-DH5**

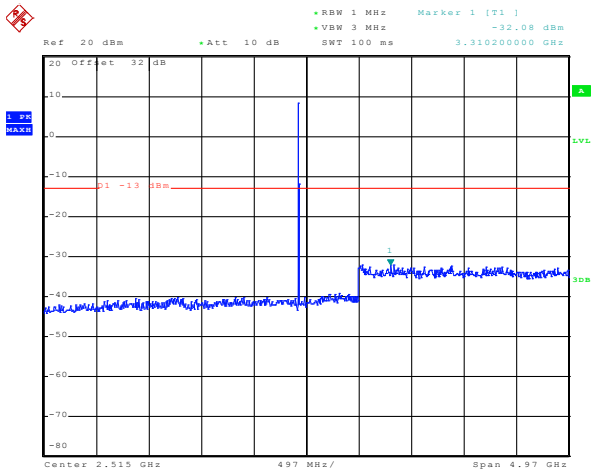


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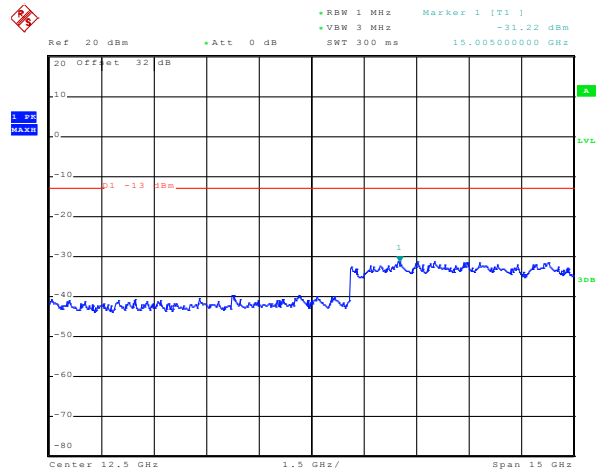


Date: 8.JAN.2013 16:25:30


**Figure 3-52: Spurious RF Conducted Emissions
Single Freq., Static PBRs, 2-DH5**



Date: 8.JAN.2013 17:08:00

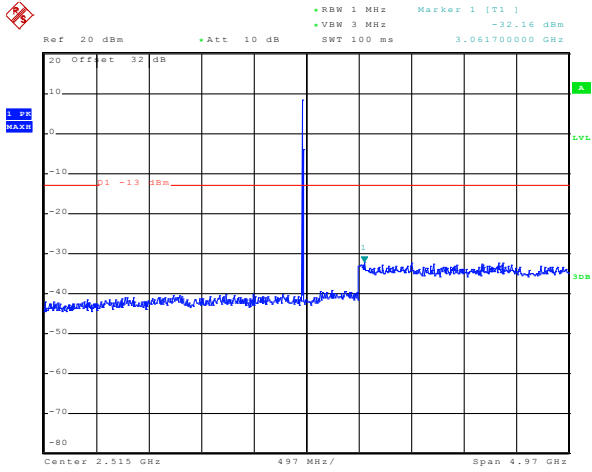


Date: 8.JAN.2013 16:54:55

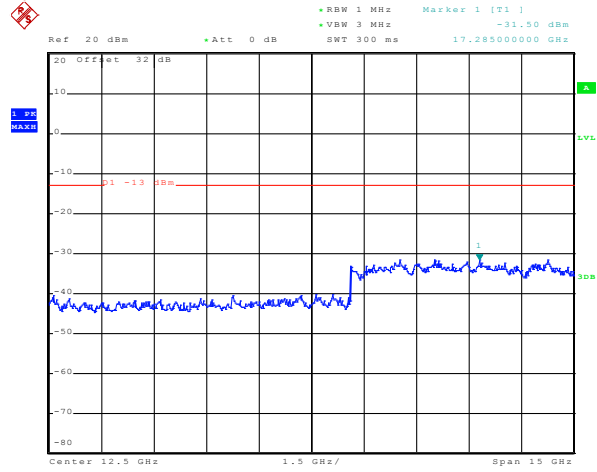
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-53: Spurious RF Conducted Emissions
Single Freq., Static PBRs, 2-DH5**

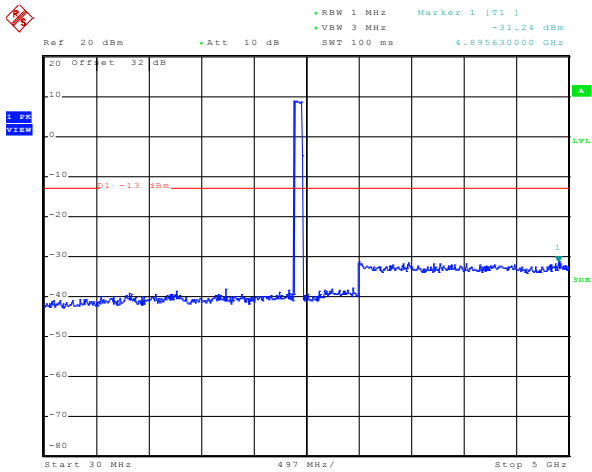


Date: 8.JAN.2013 17:07:18

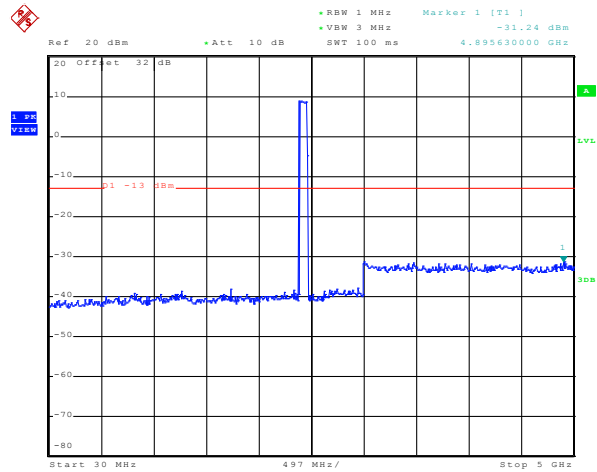


Date: 8.JAN.2013 16:59:08


**Figure 3-54: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, 2-DH5**



Date: 8.JAN.2013 17:06:37



Date: 8.JAN.2013 17:06:37

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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	6.60	-30.95	-37.55	-20.00
39	6.40	-30.95	-37.35	-20.00
78	5.20	-30.37	-35.57	-20.00
Hopping mode	5.20	-31.26	-36.46	-20.00

See figures 3-55 to 3-58 for the plots of the spurious RF conducted emissions.

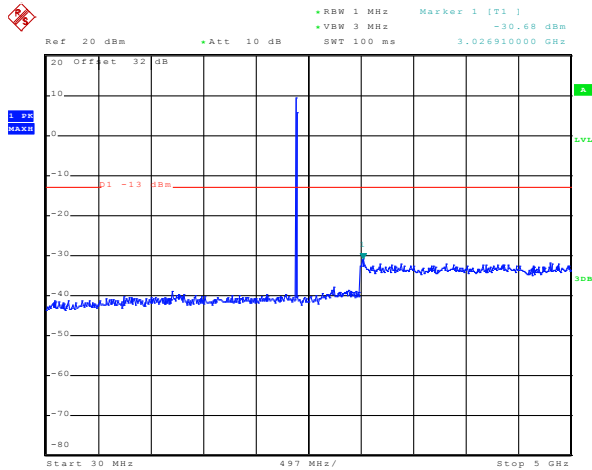
Test Report No.
 RTS-6046-1307-36

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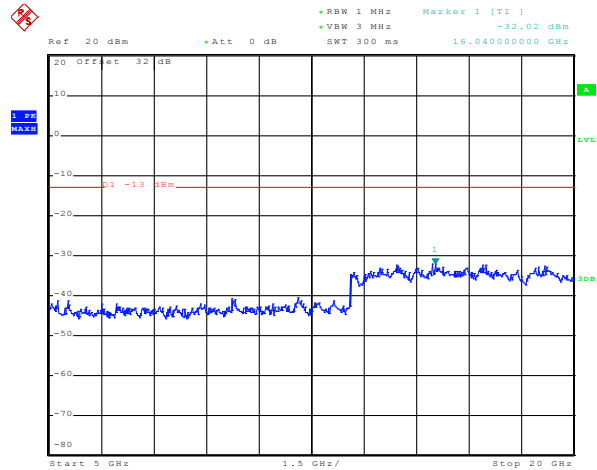
Test Report No.
FCC ID: L6ARFX100LW

Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-55: Spurious RF Conducted Emissions
 Single Freq., Static PBRs, 3-DH5**

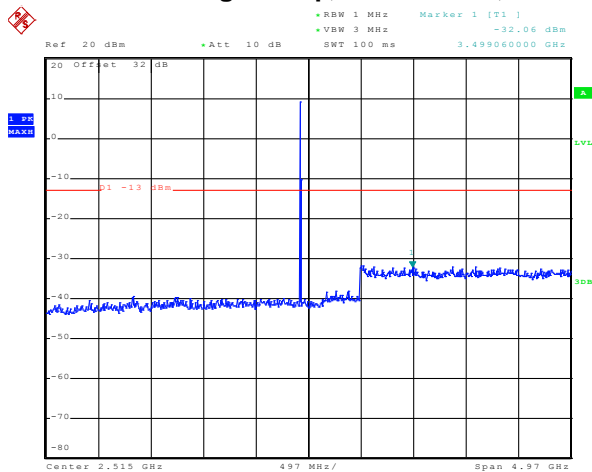


Date: 9.JAN.2013 10:52:25

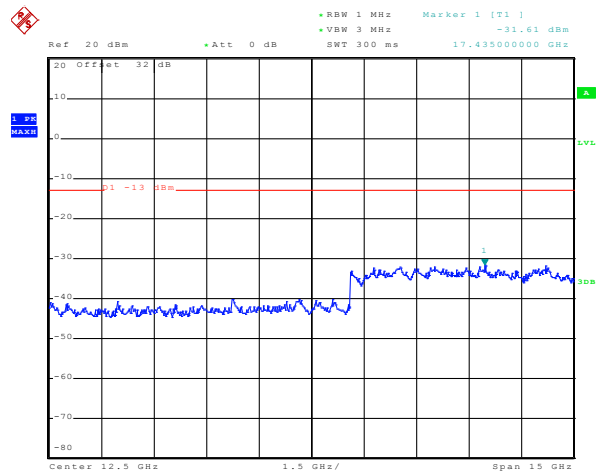


Date: 9.JAN.2013 11:07:28


**Figure 3-56: Spurious RF Conducted Emissions
 Single Freq., Static PBRs, 3-DH5**



Date: 9.JAN.2013 10:53:18

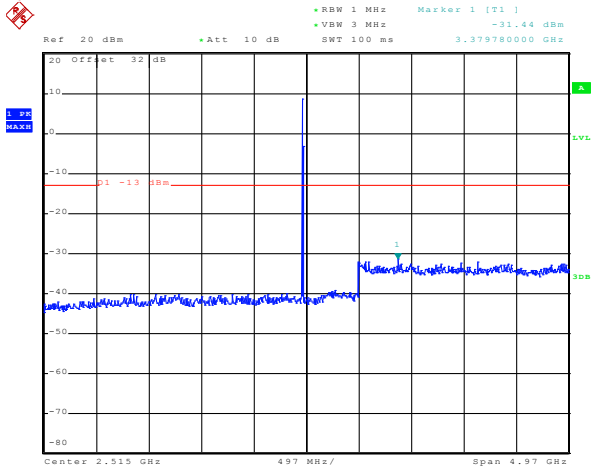


Date: 9.JAN.2013 11:06:47

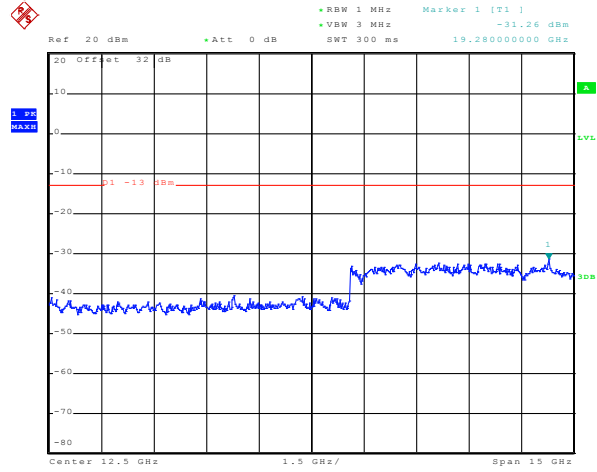
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 3	
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Bluetooth RF Conducted Emission Test Results cont'd

**Figure 3-57: Spurious RF Conducted Emissions
Single Freq., Static PBRs, 3-DH5**

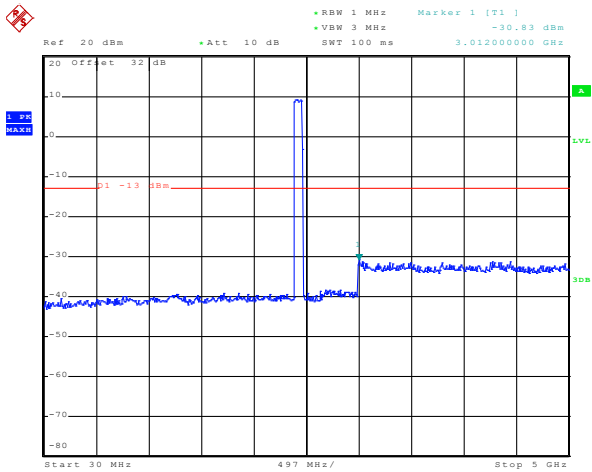


Date: 9.JAN.2013 10:54:23

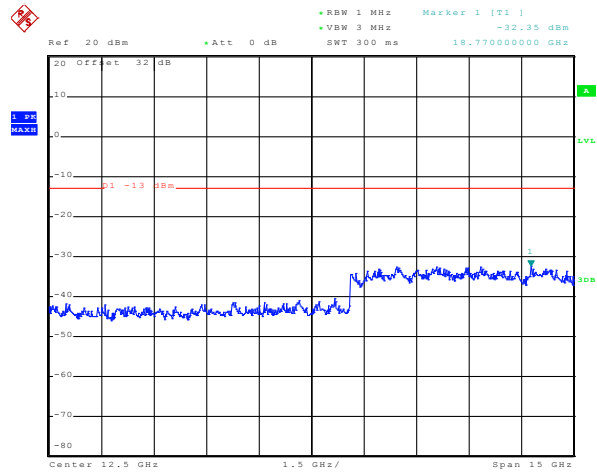


Date: 9.JAN.2013 11:03:17


**Figure 3-58: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRs, 3-DH5**



Date: 9.JAN.2013 10:59:39



Date: 9.JAN.2013 11:01:59

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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). Channels 0, 20 and 39 were measured.

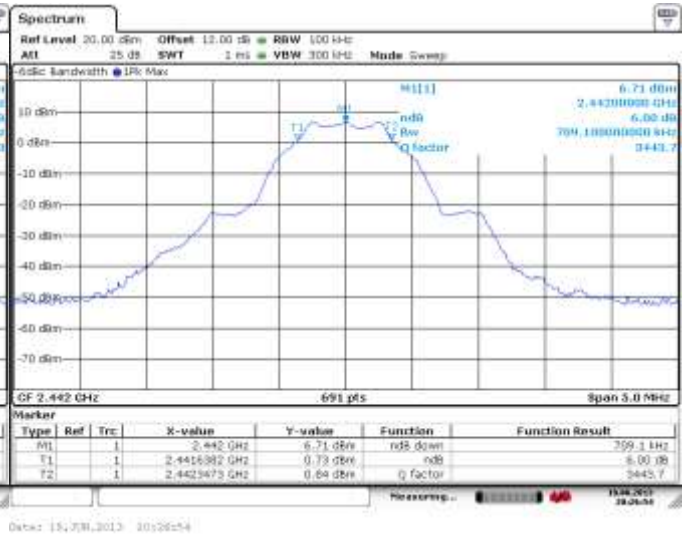
Channel	Limit (kHz)	Measured Level (MHz)
0	≥ 500	709.10
20	≥ 500	709.10
39	≥ 500	716.40


See figures 3-59 to 3-61 for the plots of the 6 dB bandwidth measurements for Channels 0, 20, and 39.

Figure 3-59: 6 dB Bandwidth LE, Channel 0



Figure 3-60: 6 dB Bandwidth LE, Channel 20




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Bluetooth Low Energy RF Conducted Emission Test Results cont'd

**Figure 3-61: 6 dB Bandwidth
LE, Channel 39**




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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). 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	5.4	0.00347
20	< 1.00	5.78	0.00378
39	< 1.00	5.42	0.00348

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Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Band Edge Compliance

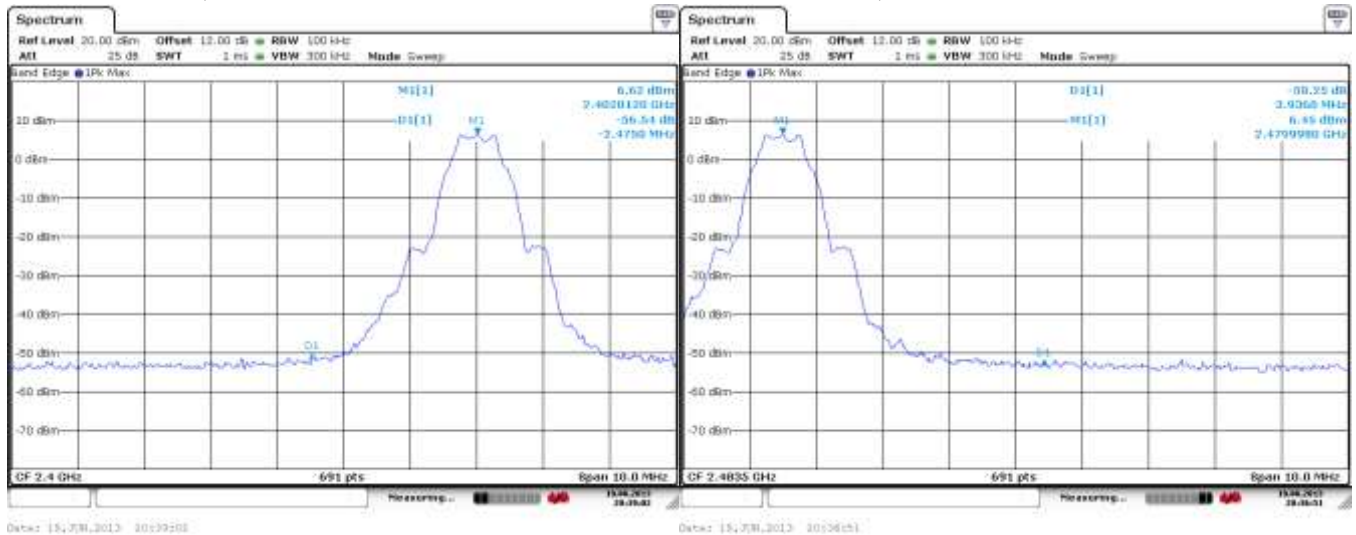
The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c). Channels 0 and 39 were measured.


Channel	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
0	< -20	-56.55	-36.55
39	< -20	-58.25	-38.25

See figures 3-62 to 3-63 for the plots of the band edge compliance measurements for Channels 0 and 39.

**Figure 3-62: Band Edge Compliance
LE, Channel 0**

**Figure 3-63: Band Edge Compliance
LE, Channel 39**




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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. Channels 0, 20 and 39 were measured.

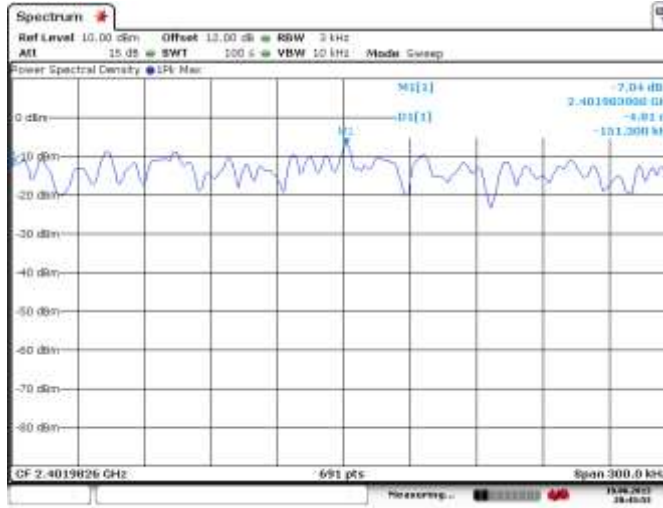
Channel	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
0	< 8.00	-7.04	-15.04
20	< 8.00	-6.79	-14.79
39	< 8.00	-7.08	-15.08

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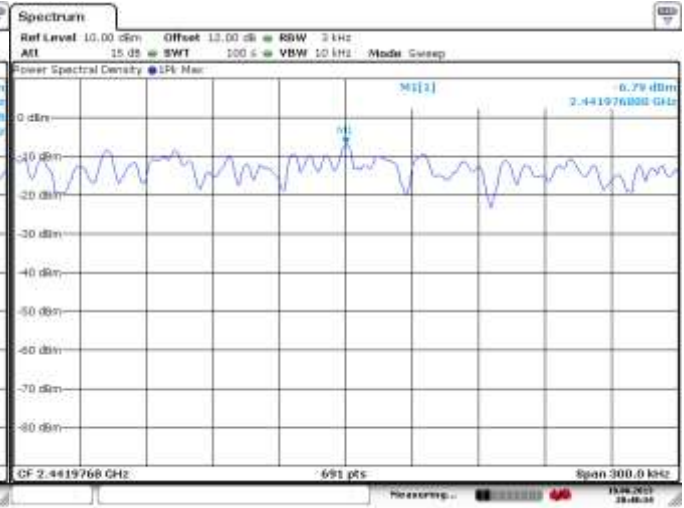
Bluetooth Low Energy RF Conducted Emission Test Results cont'd

See figures 3-64 to 3-66 for the plots of the peak power spectral density for Channels 0, 20 and 39.

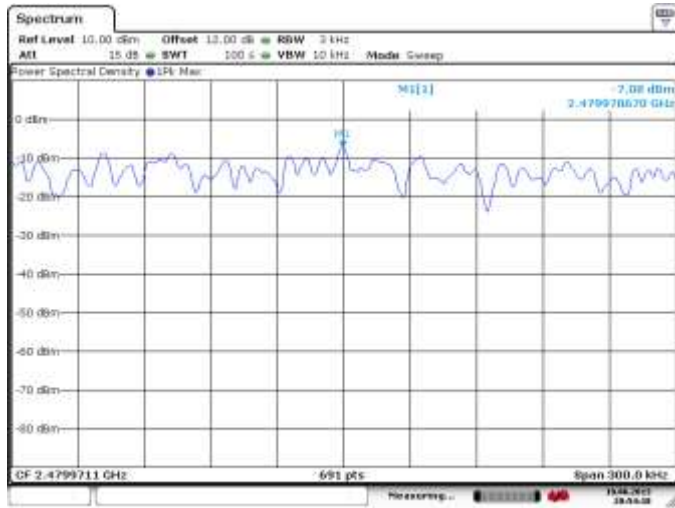
**Figure 3-64: Peak Power Spectral Density
LE, Channel 0**




**Figure 3-65: Peak Power Spectral Density
LE, Channel 20**



**Figure 3-66: Peak Power Spectral Density
LE, Channel 39**



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


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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). 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.

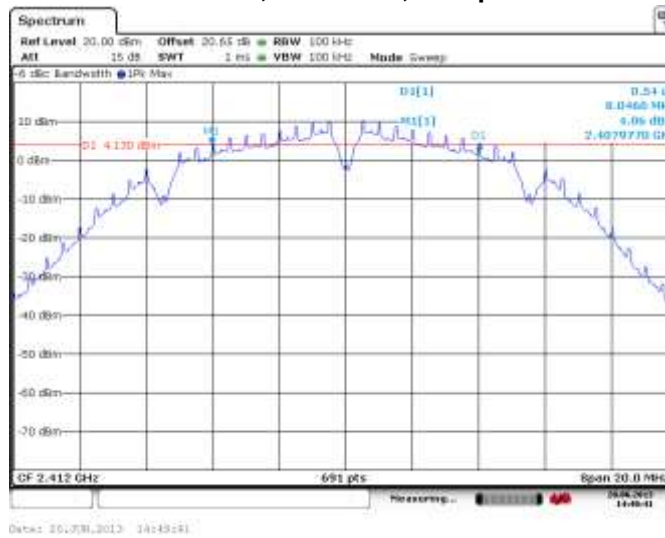
Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
1	1 Mbps	≥ 500	8.05
	5.5 Mbps	≥ 500	8.10
	11 Mbps	≥ 500	8.39
	6 Mbps	≥ 500	16.01
	24 Mbps	≥ 500	16.30
	54 Mbps	≥ 500	16.32
	MCS 0	≥ 500	17.57
	MCS 4	≥ 500	17.54
6	MCS 7	≥ 500	17.48
	1 Mbps	≥ 500	8.08
	5.5 Mbps	≥ 500	8.34
	11 Mbps	≥ 500	8.08
	6 Mbps	≥ 500	15.46
	24 Mbps	≥ 500	16.24
	54 Mbps	≥ 500	16.35
	MCS 0	≥ 500	15.92
11	MCS 4	≥ 500	17.60
	MCS 7	≥ 500	17.63
	1 Mbps	≥ 500	8.54
	5.5 Mbps	≥ 500	8.34
	11 Mbps	≥ 500	8.63
	6 Mbps	≥ 500	15.31
	24 Mbps	≥ 500	16.38
	54 Mbps	≥ 500	16.35
MCS 0	≥ 500	16.09	
MCS 4	≥ 500	17.57	
MCS 7	≥ 500	17.39	

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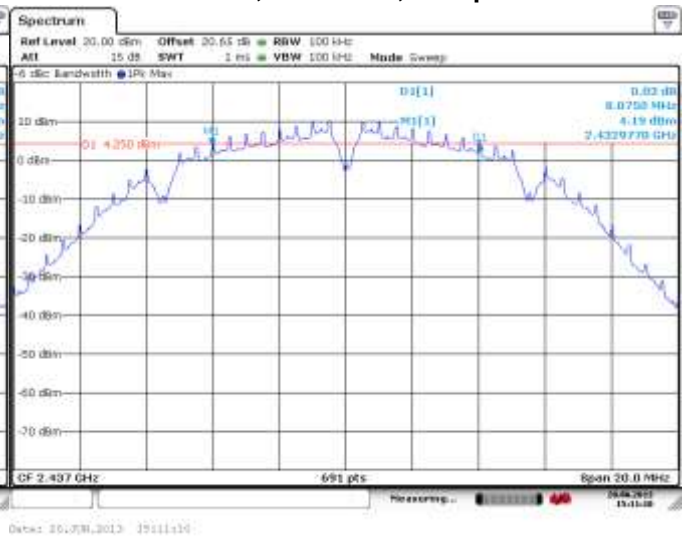
802.11b/g/n RF Conducted Emission Test Results cont'd

See figures 4-1 to 4-9 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.

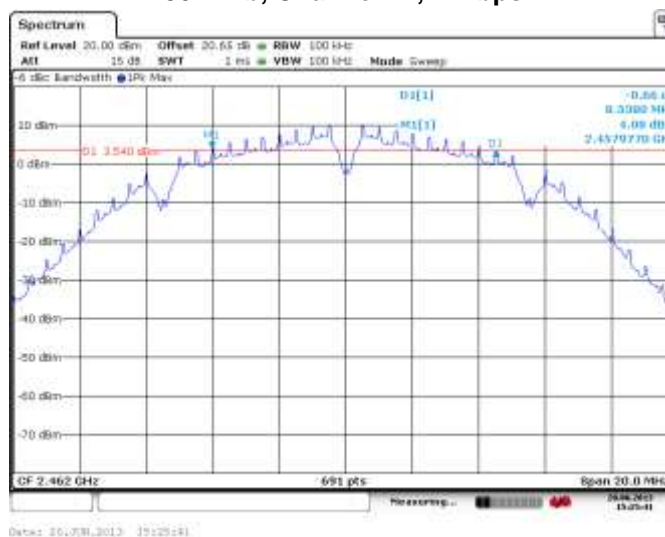
**Figure 4-1: 6 dB Bandwidth
802.11b, Channel 1, 1 Mbps**



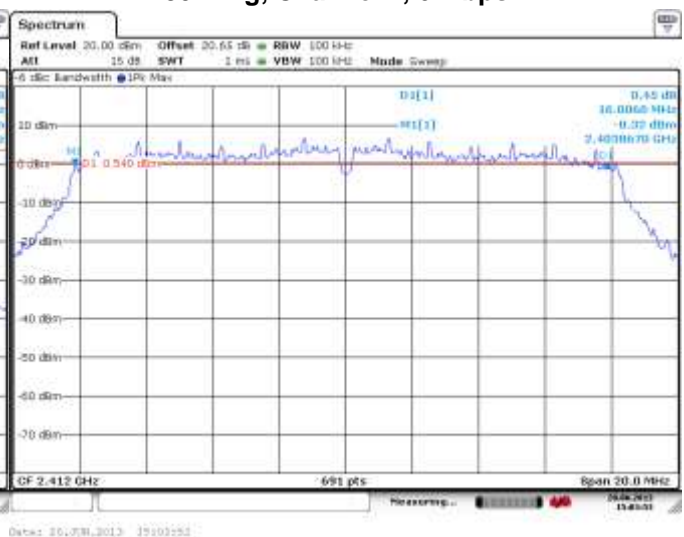
**Figure 4-2: 6 dB Bandwidth
802.11b, Channel 6, 1 Mbps**




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



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



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

Figure 45: 6 dB Bandwidth
802.11g, Channel 6, 6 Mbps

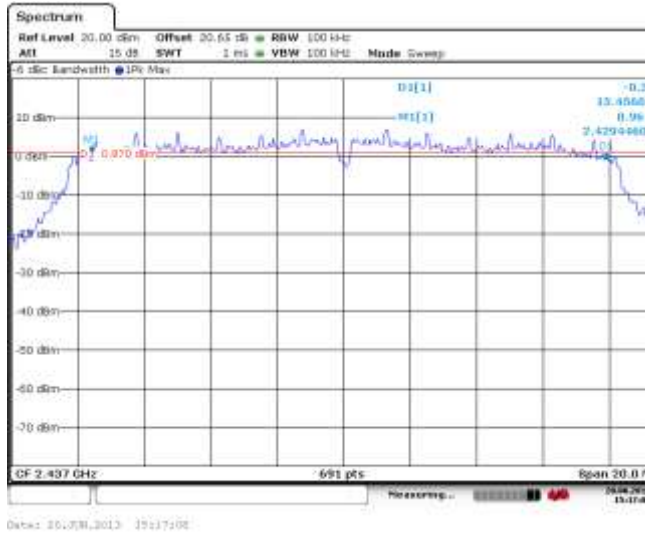


Figure 4-6: 6 dB Bandwidth
802.11g, Channel 11, 6 Mbps

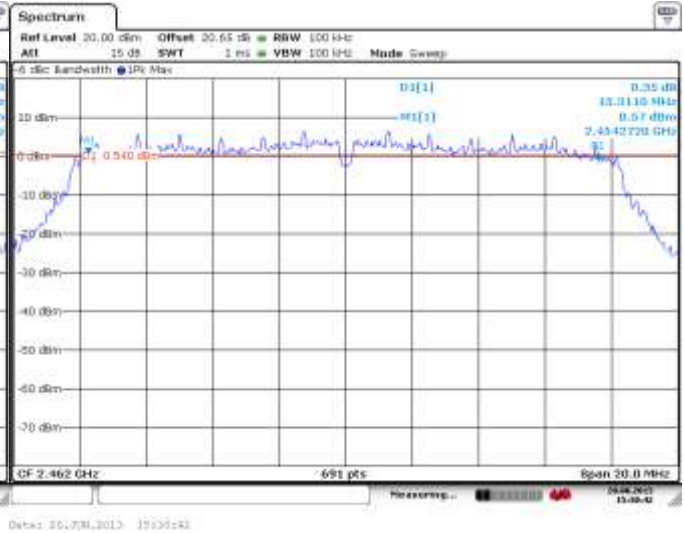


Figure 4-7: 6 dB Bandwidth
802.11n, Channel 1, MCS 0

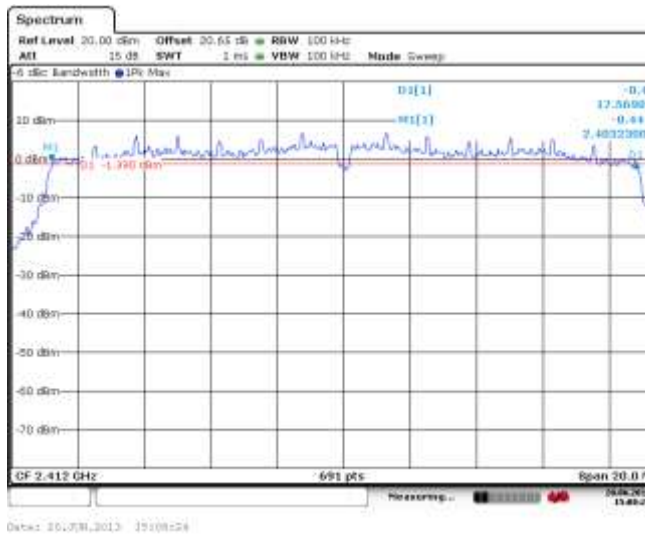
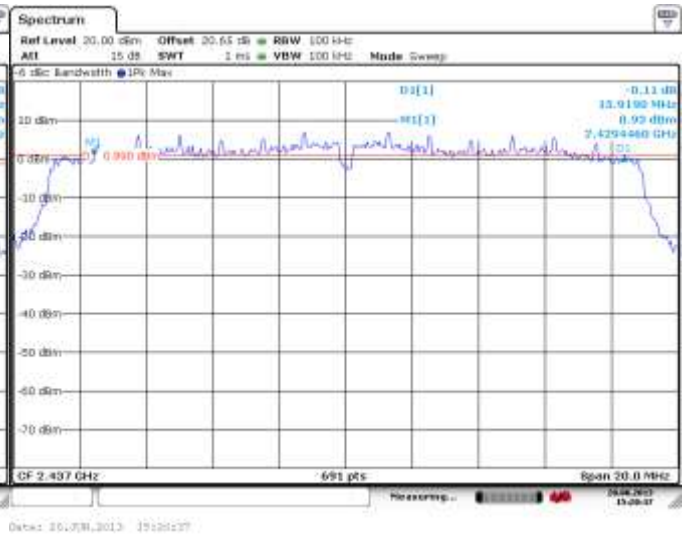


Figure 4-8: 6 dB Bandwidth
802.11n, Channel 6, MCS 0




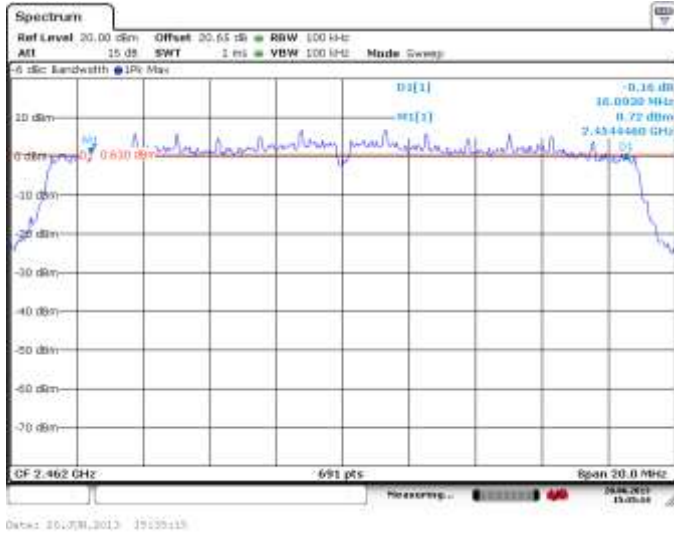

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Figure 4-9: 6 dB Bandwidth
802.11n, Channel 11, MCS 0




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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. 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 (W)
1	1 Mbps	< 1.00	18.08	0.0642
	5.5 Mbps	< 1.00	17.97	0.0627
	11 Mbps	< 1.00	17.85	0.0610
	6 Mbps	< 1.00	17.72	0.0591
	24 Mbps	< 1.00	17.18	0.0522
	54 Mbps	< 1.00	15.66	0.0368
	MCS 0	< 1.00	17.47	0.0558
	MCS 4	< 1.00	14.93	0.0311
	MCS 7	< 1.00	13.51	0.0224
6	1 Mbps	< 1.00	18.47	0.0703
	5.5 Mbps	< 1.00	18.45	0.070
	11 Mbps	< 1.00	18.22	0.0663
	6 Mbps	< 1.00	18.03	0.0636
	24 Mbps	< 1.00	17.60	0.0576
	54 Mbps	< 1.00	16.01	0.0399
	MCS 0	< 1.00	18.03	0.0635
	MCS 4	< 1.00	15.30	0.0339
	MCS 7	< 1.00	13.98	0.0250

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

Channel	Data Rate	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (W)
11	1 Mbps	< 1.00	18.18	0.0658
	5.5 Mbps	< 1.00	18.06	0.0639
	11 Mbps	< 1.00	17.98	0.0628
	6 Mbps	< 1.00	17.79	0.0601
	24 Mbps	< 1.00	17.23	0.0528
	54 Mbps	< 1.00	15.73	0.0375
	MCS 0	< 1.00	17.61	0.0576
	MCS 4	< 1.00	15.09	0.0323
MCS 7	< 1.00	13.49	0.0223	

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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). 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	-45.49	-25.49
	5.5 Mbps	< -20	-48.13	-28.13
	11 Mbps	< -20	-46.68	-26.68
	6 Mbps	< -20	-31.80	-11.80
	24 Mbps	< -20	-32.68	-12.68
	54 Mbps	< -20	-34.56	-14.56
	MCS 0	< -20	-31.80	-11.80
	MCS 4	< -20	-36.75	-16.75
	MCS 7	< -20	-37.18	-17.18
11	1 Mbps	< -20	-44.93	-24.93
	5.5 Mbps	< -20	-46.02	-26.02
	11 Mbps	< -20	-46.50	-26.50
	6 Mbps	< -20	-37.15	-17.15
	24 Mbps	< -20	-39.07	-19.07
	54 Mbps	< -20	-40.14	-20.14
	MCS 0	< -20	-35.71	-15.71
	MCS 4	< -20	-40.78	-20.78
	MCS 7	< -20	-41.72	-21.72

See figures 4-10 to 4-15 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.

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

Figure 4-10: Band Edge Compliance
802.11b, Channel 1, 1 Mbps

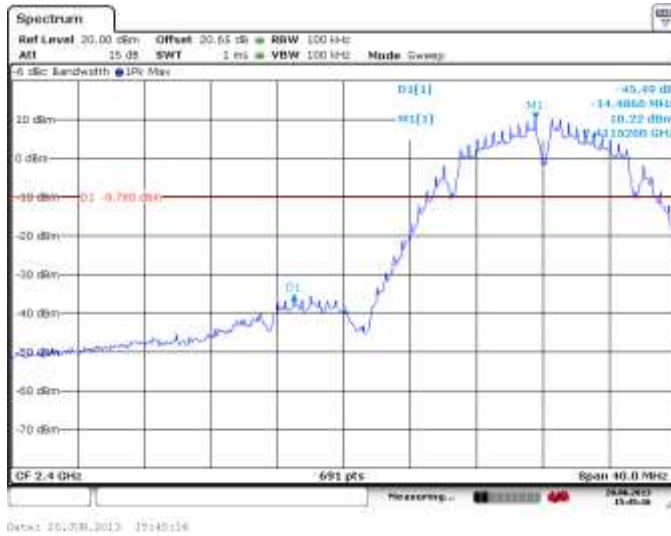


Figure 4-11: Band Edge Compliance
802.11b, Channel 11, 1 Mbps

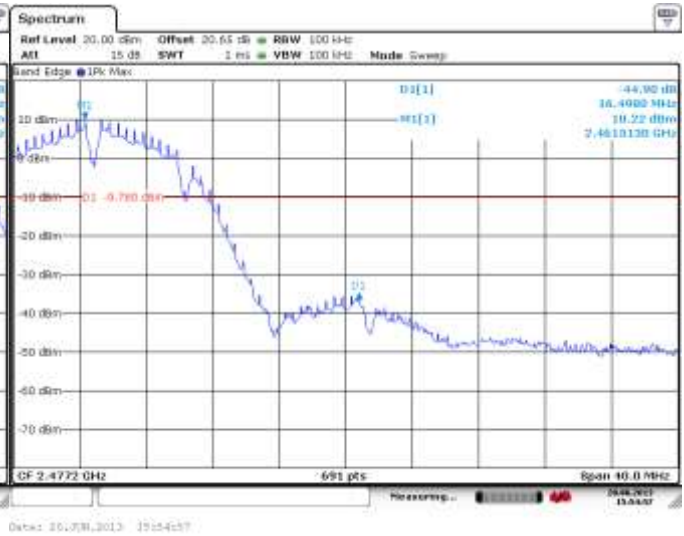


Figure 4-12: Band Edge Compliance
802.11g, Channel 1, 6 Mbps

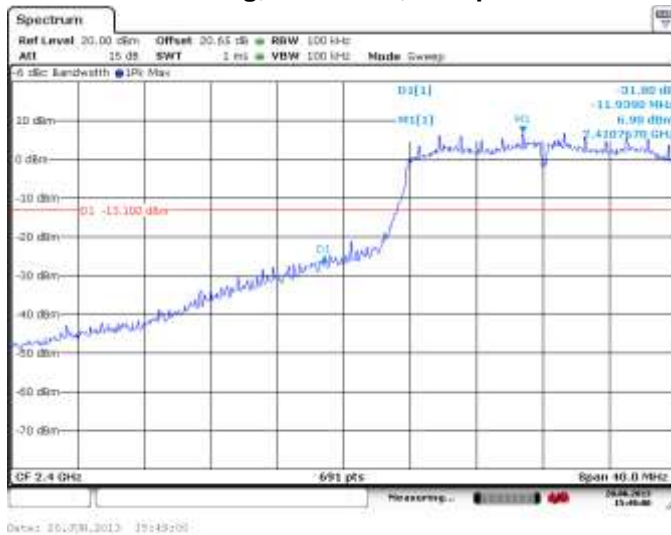
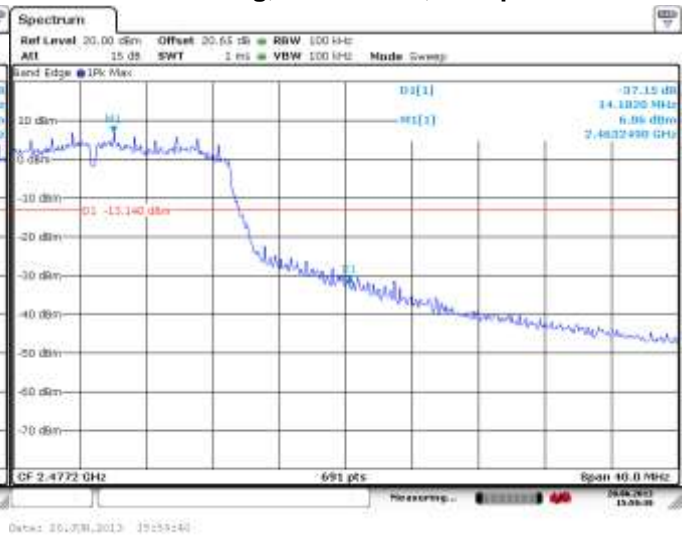



Figure 4-13: Band Edge Compliance
802.11g, Channel 11, 6 Mbps

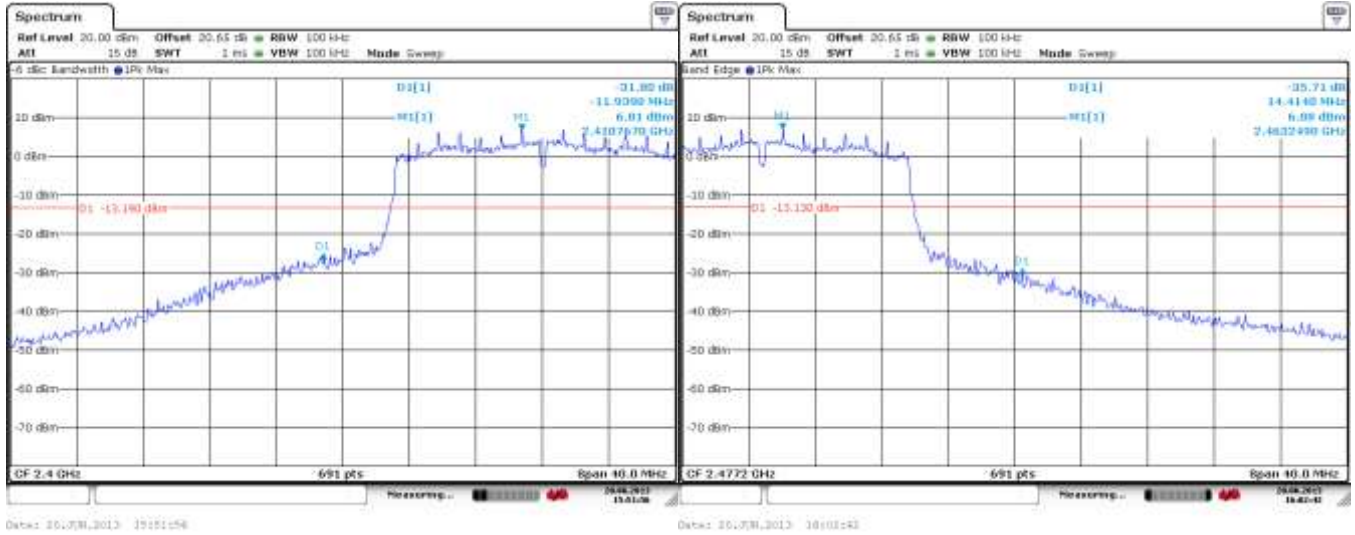



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802.11b/g/n RF Conducted Emission Test Results cont'd

Figure 4-14: Band Edge Compliance
802.11n, Channel 1, MCS 0

Figure 4-15: Band Edge Compliance
802.11n, Channel 11, MCS 0




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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). 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.

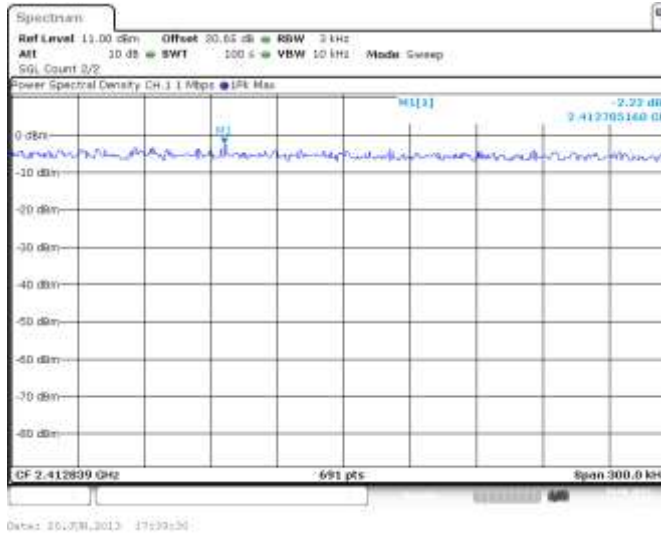
Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
1	1 Mbps	< 8.00	-2.22	-10.22
	5.5 Mbps	< 8.00	-4.62	-12.62
	11 Mbps	< 8.00	-3.72	-11.72
	6 Mbps	< 8.00	-6.08	-14.08
	24 Mbps	< 8.00	-5.66	-13.66
	54 Mbps	< 8.00	-7.41	-15.41
	MCS 0	< 8.00	-6.96	-14.96
	MCS 4	< 8.00	-9.42	-17.42
6	MCS 7	< 8.00	-11.33	-19.33
	1 Mbps	< 8.00	-1.82	-9.82
	5.5 Mbps	< 8.00	-3.97	-11.97
	11 Mbps	< 8.00	-4.28	-12.28
	6 Mbps	< 8.00	-5.88	-13.88
	24 Mbps	< 8.00	-5.08	-13.08
	54 Mbps	< 8.00	-7.39	-15.39
	MCS 0	< 8.00	-6.59	-14.59
11	MCS 4	< 8.00	-8.96	-16.96
	MCS 7	< 8.00	-9.76	-17.76
	1 Mbps	< 8.00	-2.24	-10.24
	5.5 Mbps	< 8.00	-4.45	-12.45
	11 Mbps	< 8.00	-3.61	-11.61
	6 Mbps	< 8.00	-6.36	-14.36
	24 Mbps	< 8.00	-5.86	-13.86
	54 Mbps	< 8.00	-7.71	-15.71
MCS 0	< 8.00	-6.83	-14.83	
MCS 4	< 8.00	-9.41	-17.41	
MCS 7	< 8.00	-10.14	-18.14	

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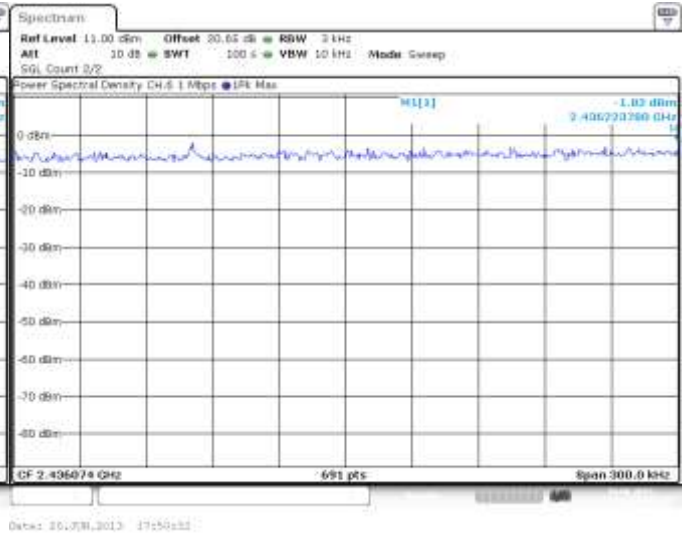
802.11b/g/n RF Conducted Emission Test Results cont'd

See figures 4-16 to 4-24 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.

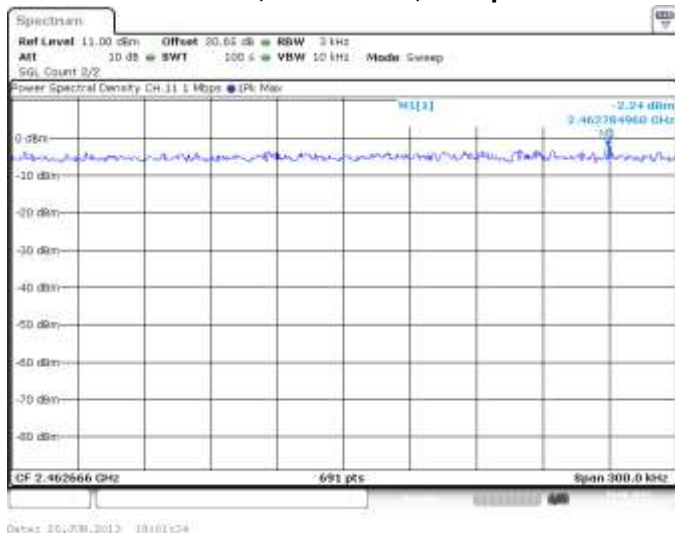
**Figure 4-16: Peak Power Spectral Density
802.11b, Channel 1, 1 Mbps**




**Figure 4-17: Peak Power Spectral Density
802.11b, Channel 6, 1 Mbps**



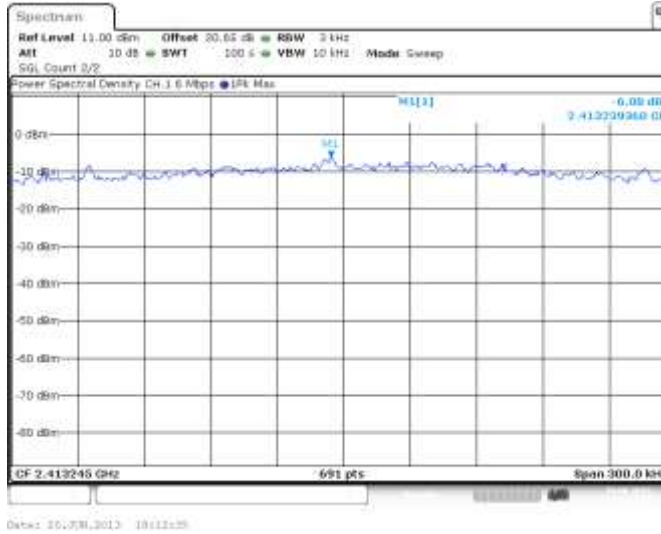
**Figure 4-18: Peak Power Spectral Density
802.11b, Channel 11, 1 Mbps**



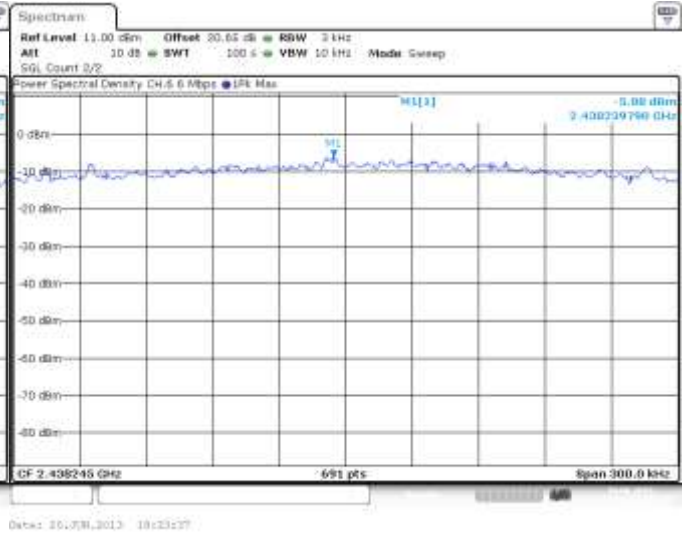
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 4	
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802.11b/g/n RF Conducted Emission Test Results cont'd

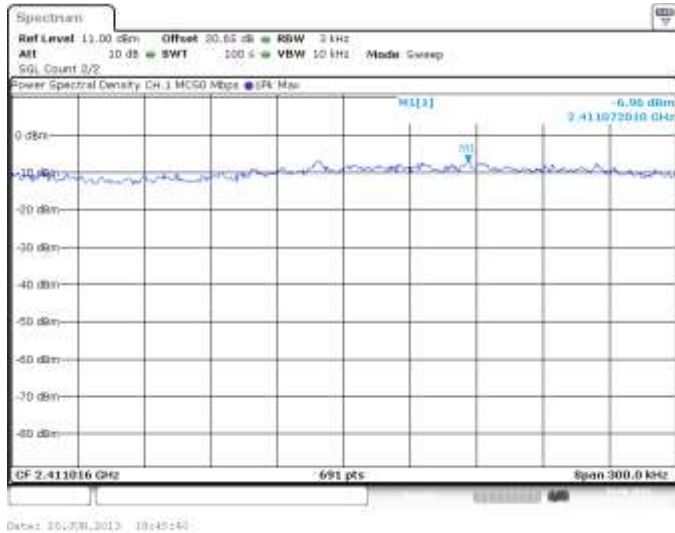
**Figure 4-19: Peak Power Spectral Density
802.11g, Channel 1, 6 Mbps**




**Figure 4-20: Peak Power Spectral Density
802.11g, Channel 6, 6 Mbps**



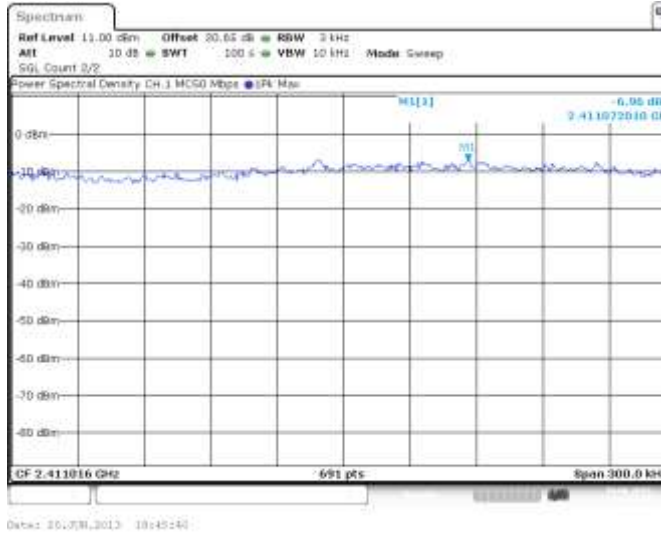
**Figure 4-21: Peak Power Spectral Density
802.11g, Channel 11, 6 Mbps**



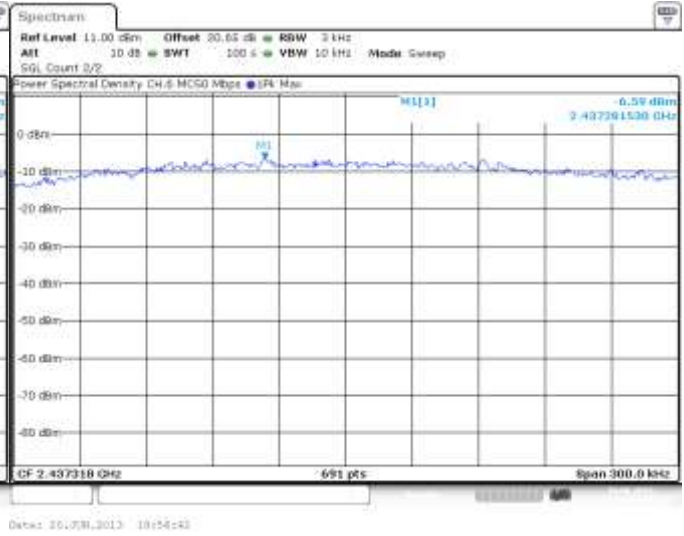
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 4	
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802.11b/g/n RF Conducted Emission Test Results cont'd

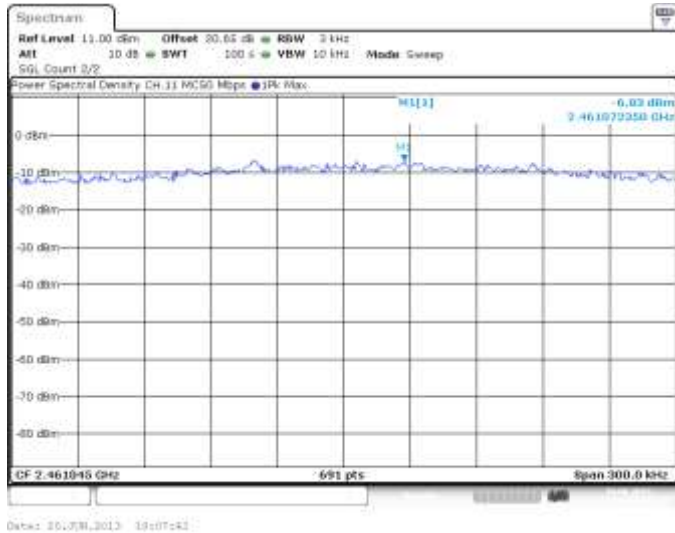
**Figure 4-22: Peak Power Spectral Density
802.11n, Channel 1, MCS 0**




**Figure 4-23: Peak Power Spectral Density
802.11n, Channel 6, MCS 0**



**Figure 4-24: Peak Power Spectral Density
802.11n, Channel 11, MCS 0**




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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). 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	18.0776938	-40.27	-58.3476938	-20
	5.5 Mbps	17.972311	-40.16	-58.132311	-20
	11 Mbps	17.8502764	-41.86	-59.7102764	-20
	6 Mbps	17.7168727	-28.13	-45.8468727	-20
	24 Mbps	17.1768426	-27.16	-44.3368426	-20
	54 Mbps	15.6589037	-34.57	-50.2289037	-20
	MCS 0	17.4697493	-34.83	-52.2997493	-20
	MCS 4	14.9274926	-40.38	-55.3074926	-20
	MCS 7	13.5094298	-37.24	-50.7494298	-20
6	1 Mbps	18.4718232	-36.75	-55.2218232	-20
	5.5 Mbps	18.4501378	-37.51	-55.9601378	-20
	11 Mbps	18.2163968	-36.12	-54.3363968	-20
	6 Mbps	18.0340527	-27.42	-45.4540527	-20
	24 Mbps	17.6007007	-37.46	-55.0607007	-20
	54 Mbps	16.0122346	-37.79	-53.8022346	-20
	MCS 0	18.0299196	-17.12	-35.1499196	-20
	MCS 4	15.2957142	-27.56	-42.857142	-20
	MCS 7	13.9754914	-23.39	-37.3654914	-20


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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	18.1848782	-39.51	-57.6948782	-20
	5.5 Mbps	18.0568377	-36.71	-54.7668377	-20
	11 Mbps	17.9769813	-36.94	-54.9169813	-20
	6 Mbps	17.7894205	-29.04	-46.8294205	-20
	24 Mbps	17.2267576	-37.54	-54.7667576	-20
	54 Mbps	15.7349908	-36.33	-52.0649908	-20
	MCS 0	17.6051476	-33.75	-51.3551476	-20
	MCS 4	15.0882545	-39.54	-54.6282545	-20
	MCS 7	13.4888982	-38.26	-51.7488982	-20

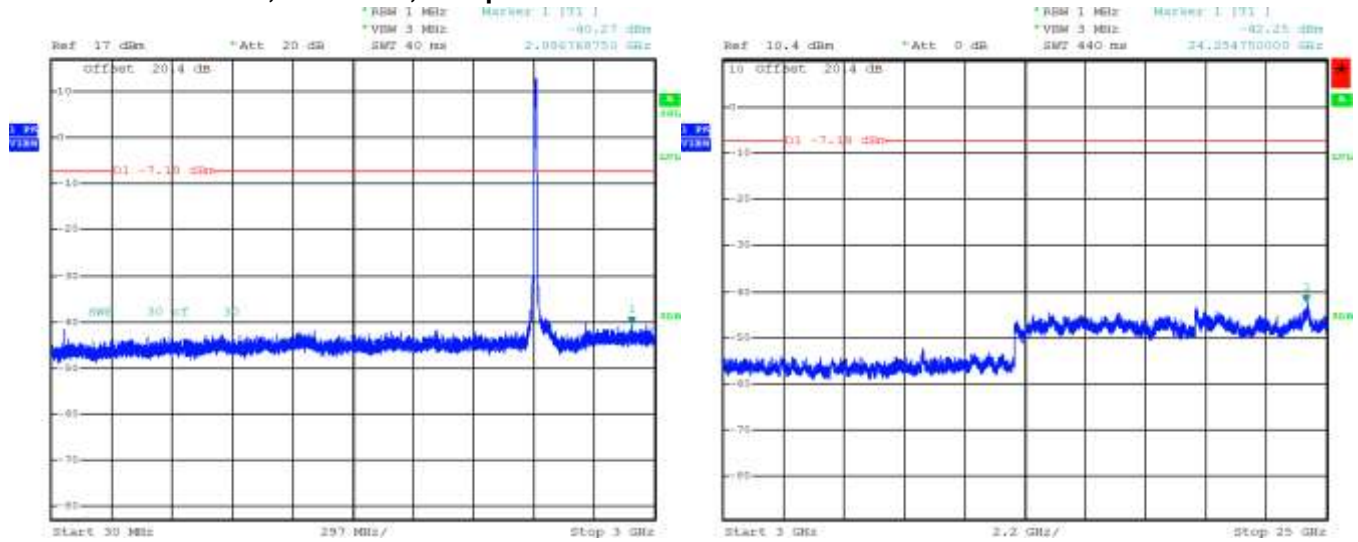
The emissions were in the NF.

See figures 4-25 to 4-33 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.

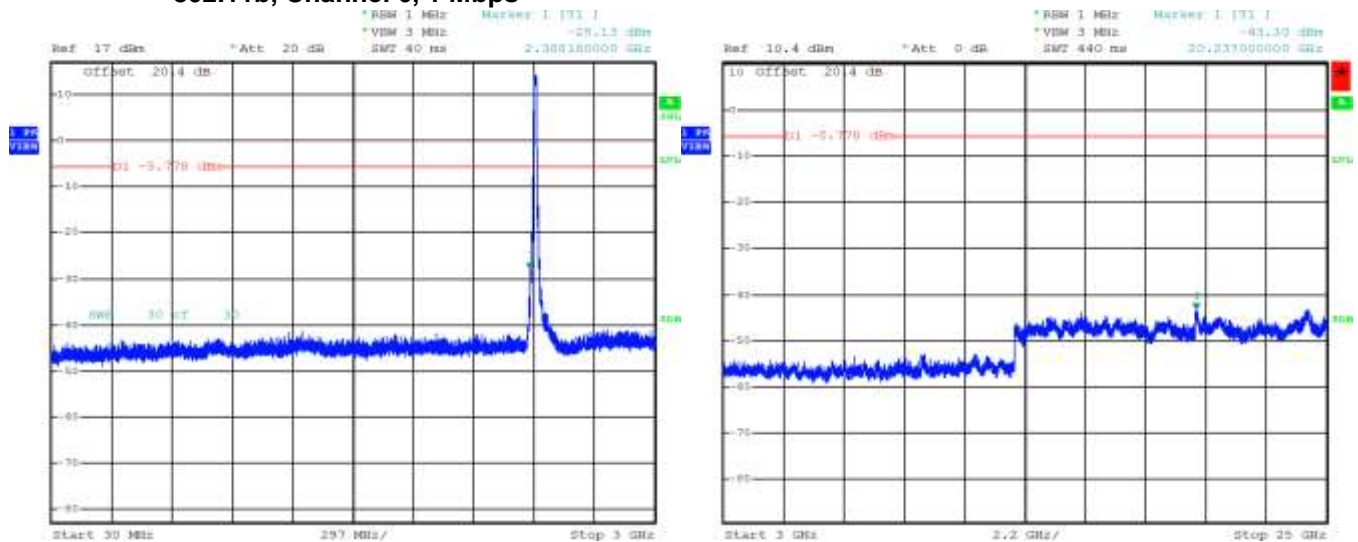
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 4	
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802.11b/g/n RF Conducted Emission Test Results cont'd

**Figure 4-25: Spurious Conducted RF Emissions
802.11b, Channel 1, 1 Mbps**



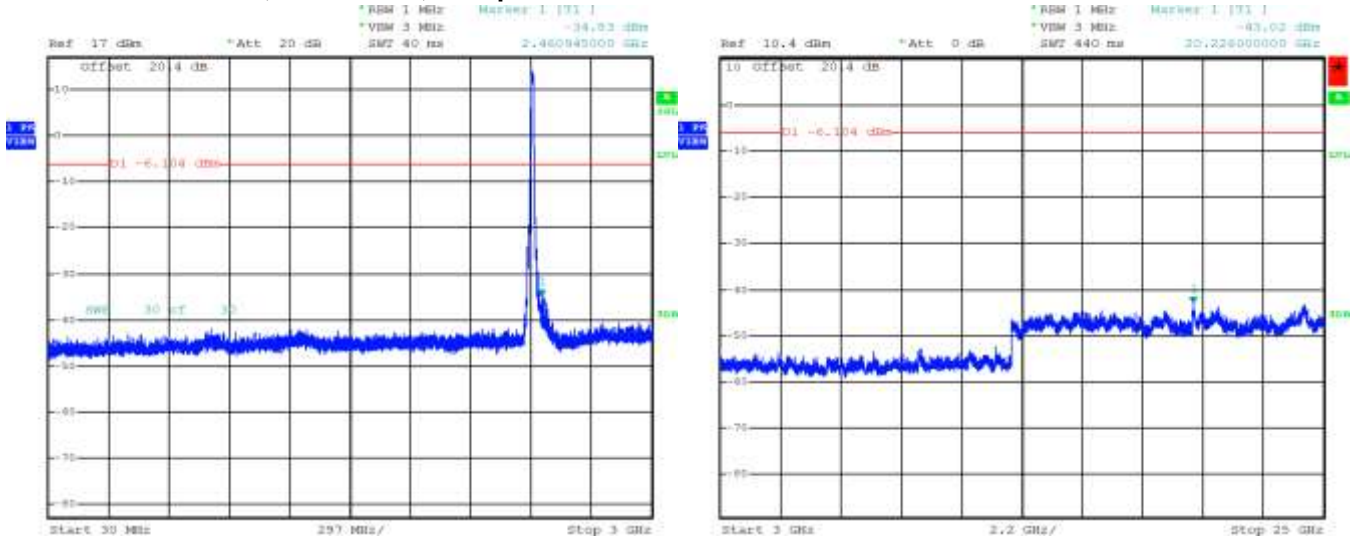
**Figure 4-26 : Spurious Conducted RF Emissions
802.11b, Channel 6, 1 Mbps**



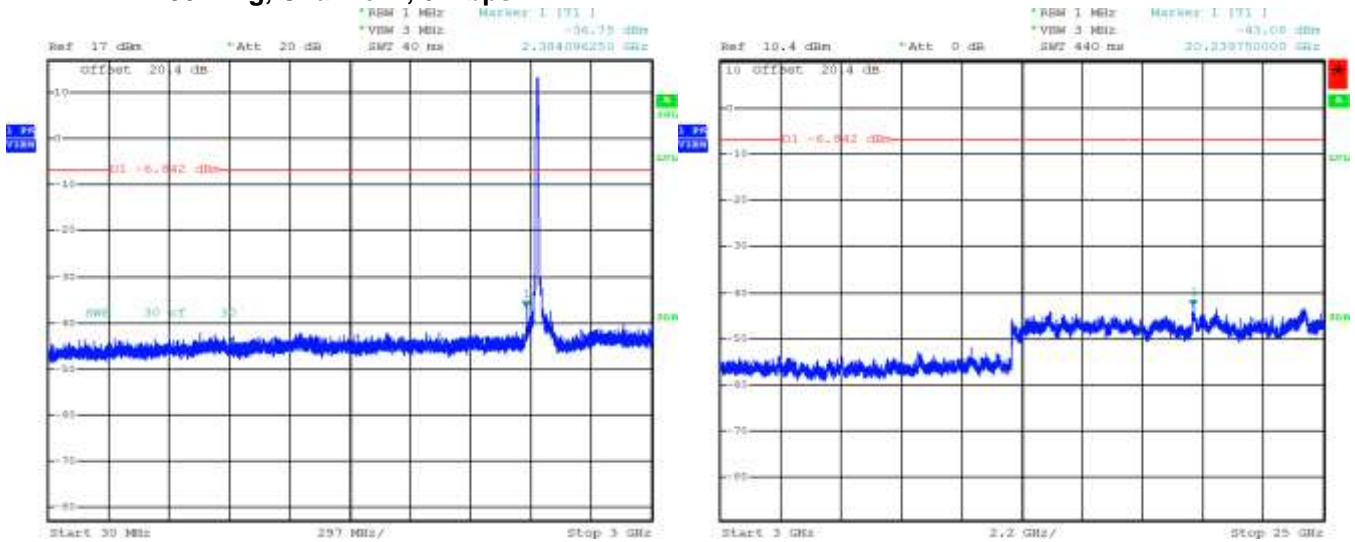
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 4	
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802.11b/g/n RF Conducted Emission Test Results cont'd

**Figure 4-27: Spurious Conducted RF Emissions
802.11b, Channel 11, 1 Mbps**



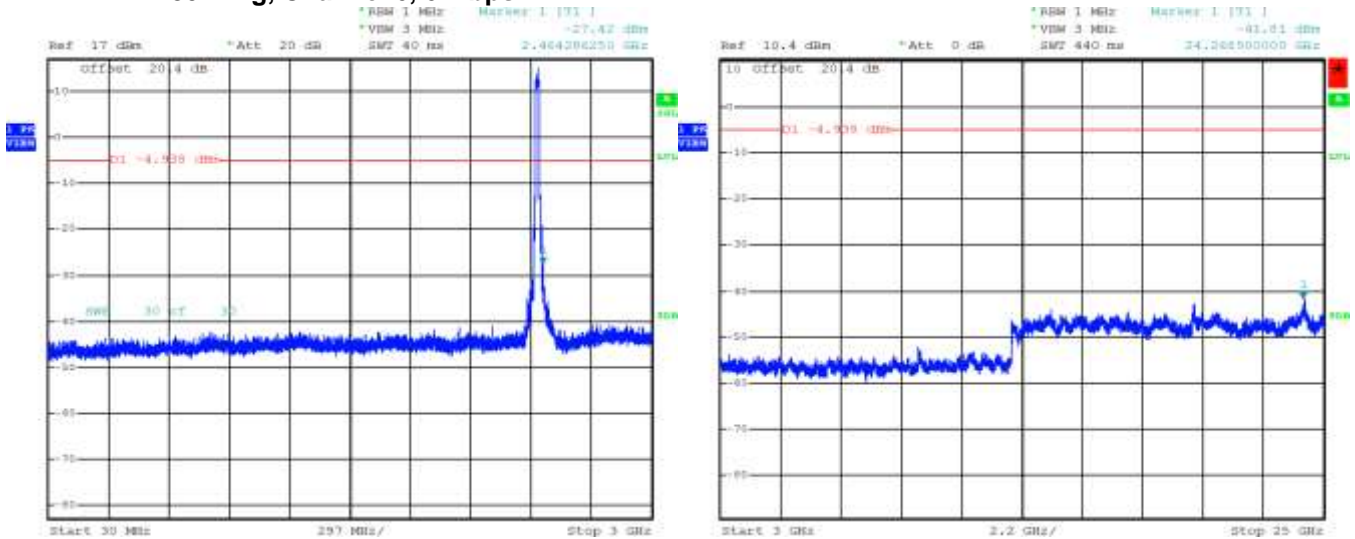
**Figure 4-28: Spurious Conducted RF Emissions
802.11g, Channel 1, 6 Mbps**



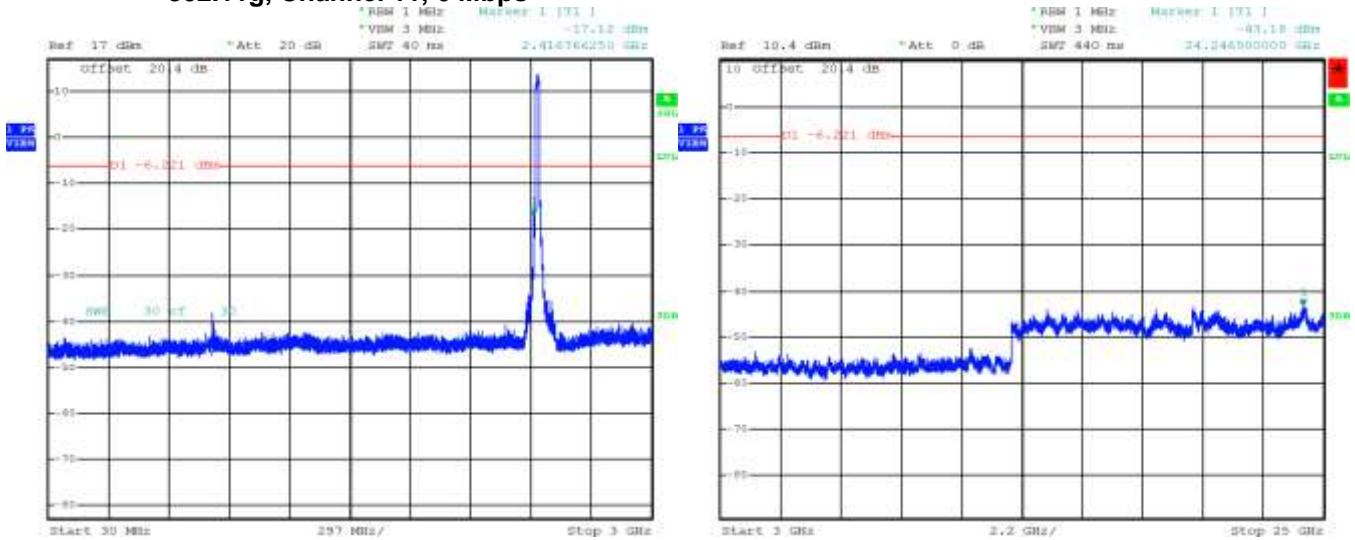
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 4	
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802.11b/g/n RF Conducted Emission Test Results cont'd

**Figure 4-29: Spurious Conducted RF Emissions
802.11g, Channel 6, 6 Mbps**



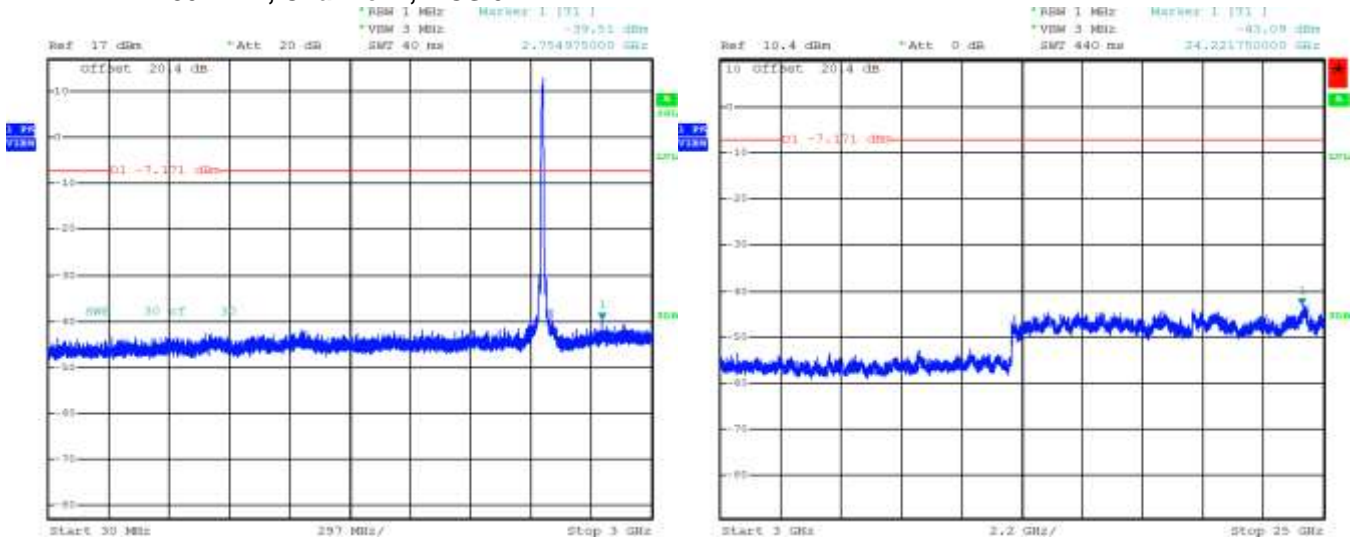
**Figure 4-30: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps**



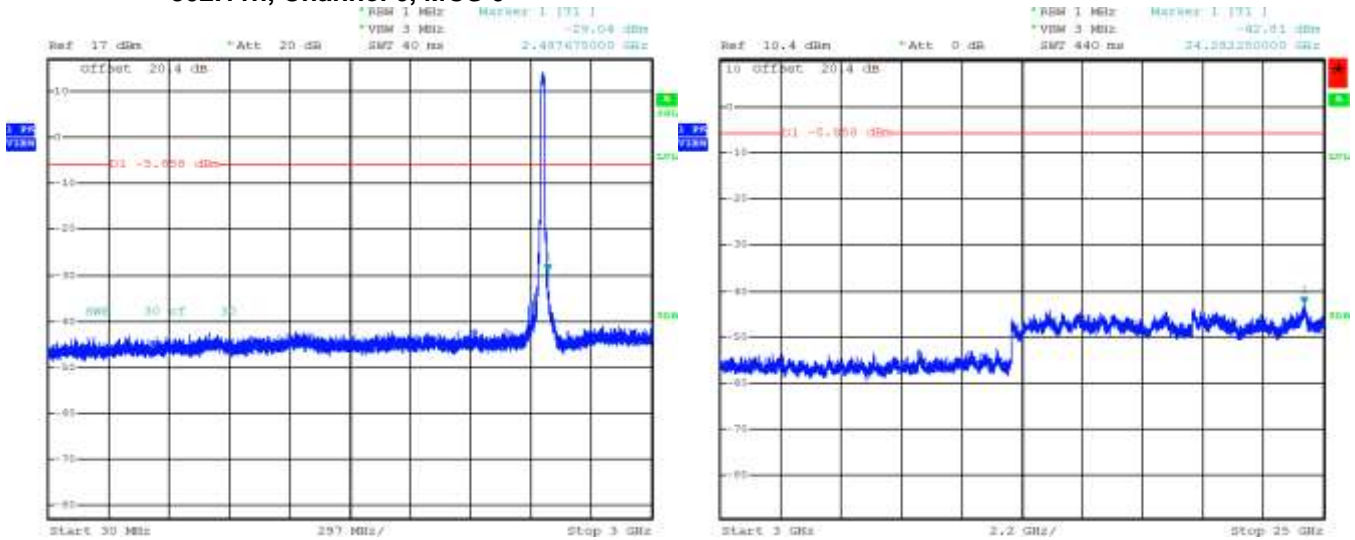
	EMI Test Report for the BlackBerry® smartphone Model RFX101LW APPENDIX 4	
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802.11b/g/n RF Conducted Emission Test Results cont'd

**Figure 4-31: Spurious Conducted RF Emissions
802.11n, Channel 1, MCS 0**



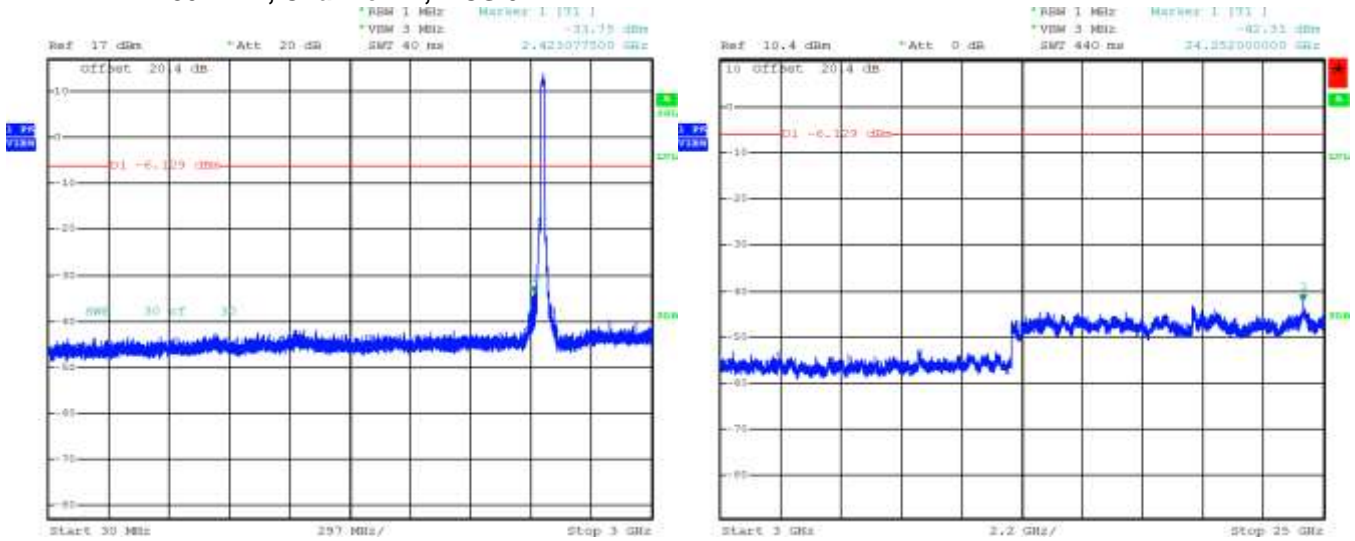
**Figure 4-32: Spurious Conducted RF Emissions
802.11n, Channel 6, MCS 0**




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

**Figure 4-33: Spurious Conducted RF Emissions
802.11n, Channel 11, MCS 0**



APPENDIX 5 – 802.11a/n CONDUCTED EMISSIONS TEST DATA/PLOTS

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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). Channels 36, 48, 64, 100, 140, 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	15.14
	24 Mbps	≥ 500	16.30
	54 Mbps	≥ 500	16.32
48	6 Mbps	≥ 500	15.14
	24 Mbps	≥ 500	16.32
	54 Mbps	≥ 500	16.35
64	6 Mbps	≥ 500	15.14
	24 Mbps	≥ 500	16.32
	54 Mbps	≥ 500	16.35
100	6 Mbps	≥ 500	15.14
	24 Mbps	≥ 500	16.38
	54 Mbps	≥ 500	16.06
140	6 Mbps	≥ 500	15.14
	24 Mbps	≥ 500	16.35
	54 Mbps	≥ 500	16.35
165	6 Mbps	≥ 500	15.14
	24 Mbps	≥ 500	16.24
	54 Mbps	≥ 500	16.35

See figures 5-1 to 5-6 for the plots of the 6 dB bandwidth measurements for Channel 36, 48, 64, 100, 140, and 165 at 6 Mbps each for 802.11a mode.

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802.11n 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). Channels 36, 64 and 165 were measured at MCS 0, MCS 4 and MCS 7 each for 802.11n mode.

Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
36	MCS0	≥ 500	15.14
	MCS4	≥ 500	17.25
	MCS7	≥ 500	17.57
64	MCS0	≥ 500	15.14
	MCS4	≥ 500	17.54
	MCS7	≥ 500	17.54
165	MCS0	≥ 500	15.14
	MCS4	≥ 500	17.54
	MCS7	≥ 500	17.28

See figures 5-7 to 5-9 for the plots of the 6 dB bandwidth measurements for Channel 36, 100 and 165 at MCS 0 each for 802.11n mode.

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802.11a RF Conducted Emission Test Results cont'd

Figure 5-1: 6 dB Bandwidth
802.11a, Channel 36, 6 Mbps

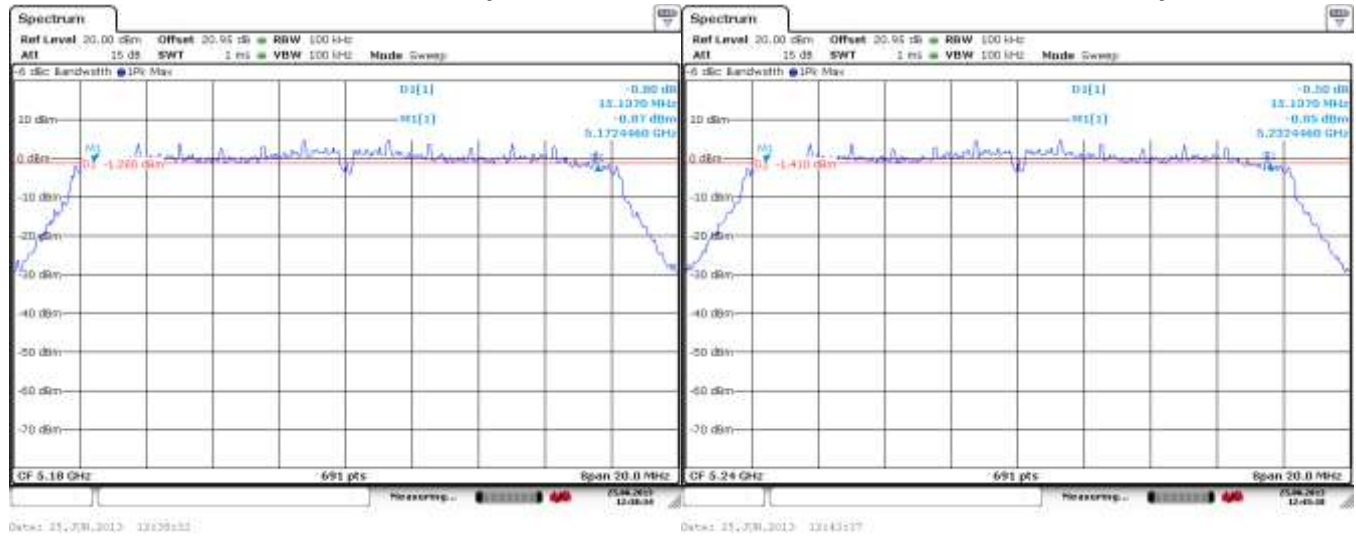


Figure 5-2: 6 dB Bandwidth
802.11a, Channel 48, 6 Mbps

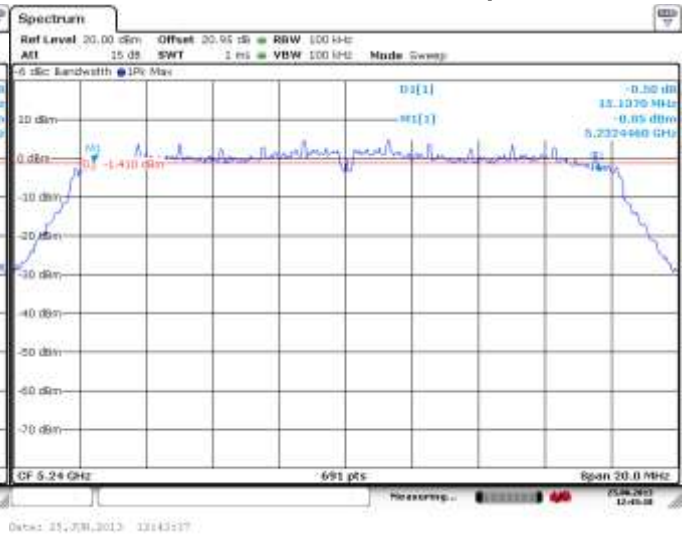


Figure 5-3: 6 dB Bandwidth
802.11a, Channel 64, 6 Mbps

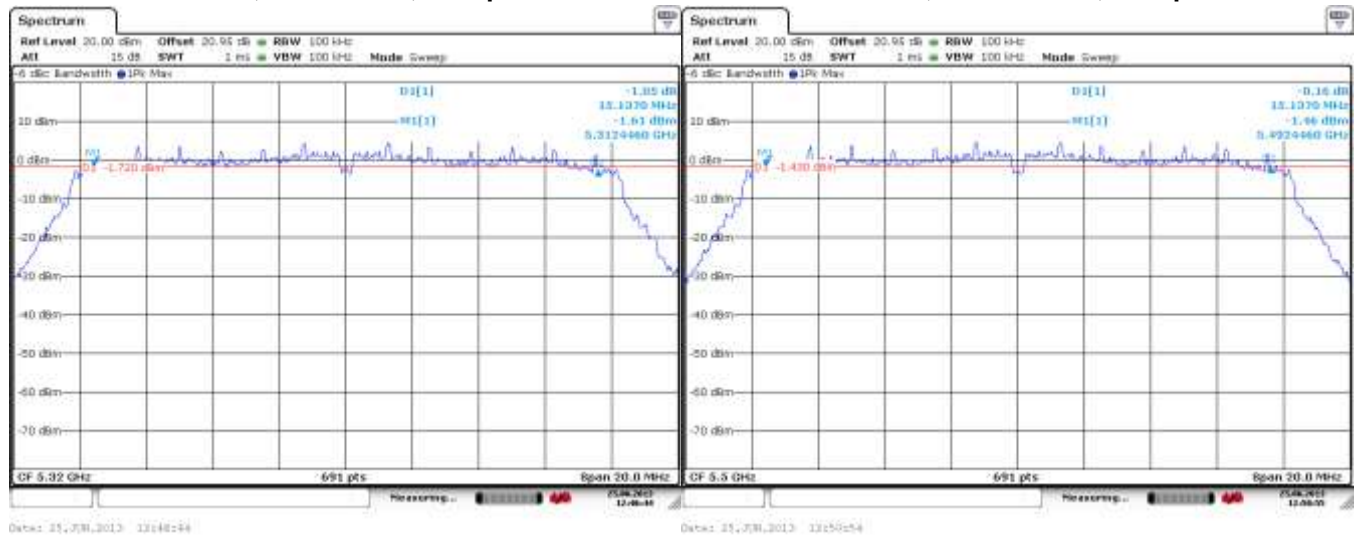
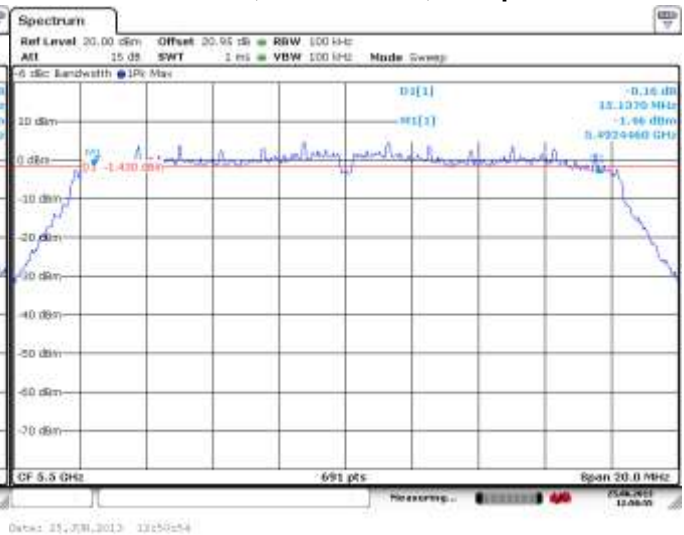



Figure 5-4: 6 dB Bandwidth
802.11a, Channel 100, 6 Mbps

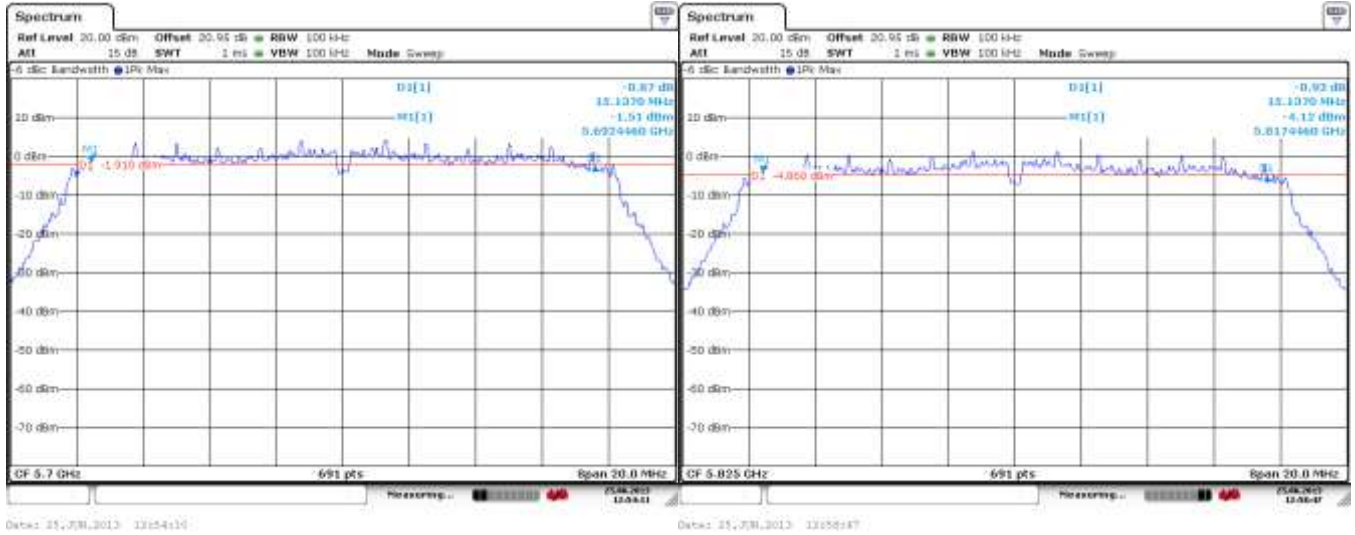



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802.11a RF Conducted Emission Test Results cont'd

**Figure 5-5: 6 dB Bandwidth
802.11a, Channel 140, 6 Mbps**

**Figure 5-6: 6 dB Bandwidth
802.11a, Channel 165, 6 Mbps**



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802.11n RF Conducted Emission Test Results

Figure 5-7: 6 dB Bandwidth
802.11n, Channel 36, MCS 0

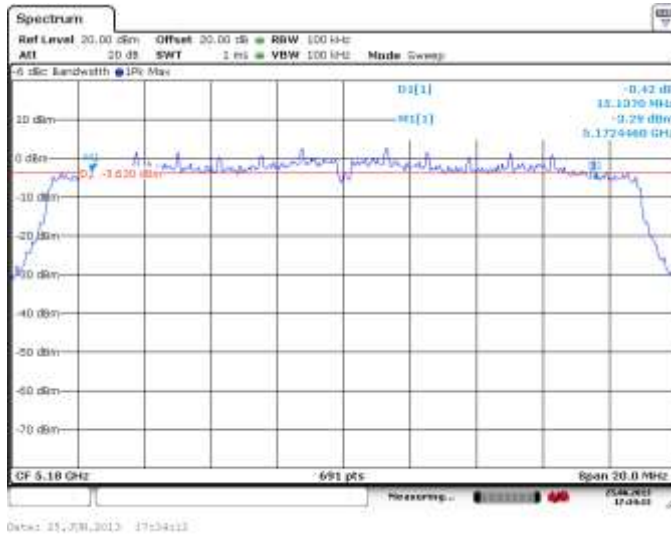


Figure 5-8: 6 dB Bandwidth
802.11n, Channel 100, MCS 0

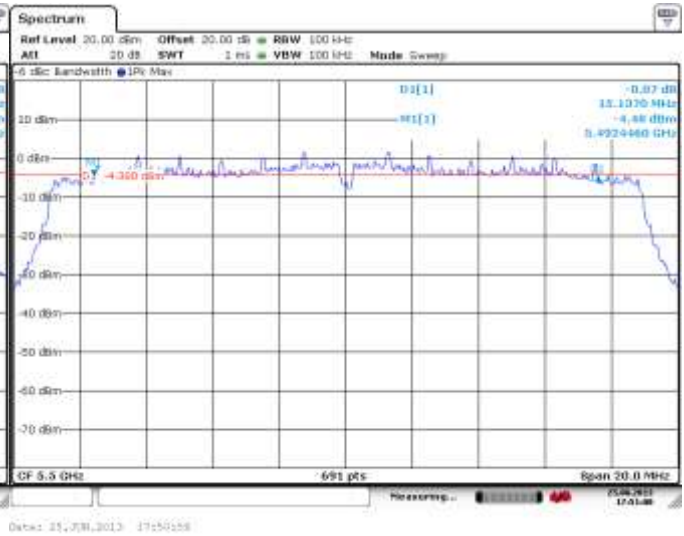
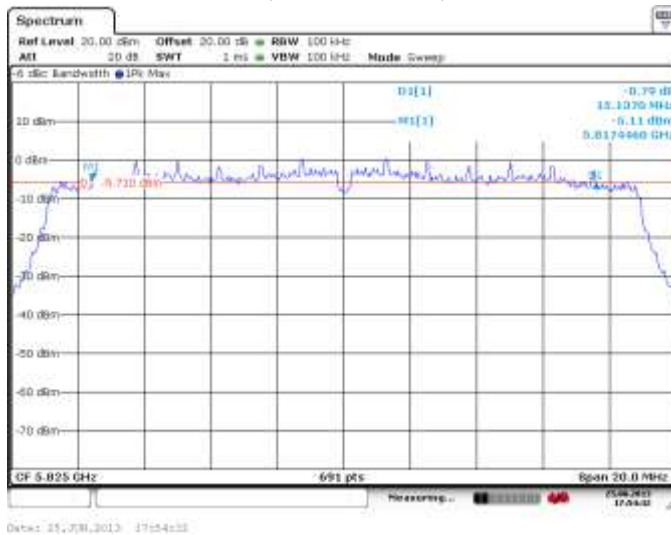



Figure 5-9: 6 dB Bandwidth
802.11n, Channel 165, MCS 0




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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. Channels 36, 48, 52, 60, 64, 100, 140 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 (W)
36	6 Mbps	< 1.00	17.11	0.0514
	24 Mbps	< 1.00	16.72	0.0470
	54 Mbps	< 1.00	16.15	0.0412
48	6 Mbps	< 1.00	16.98	0.0499
	24 Mbps	< 1.00	16.51	0.0448
	54 Mbps	< 1.00	16.00	0.0398
64	6 Mbps	< 1.00	16.71	0.0469
	24 Mbps	< 1.00	16.31	0.0428
	54 Mbps	< 1.00	15.74	0.0375
100	6 Mbps	< 1.00	16.66	0.0464
	24 Mbps	< 1.00	16.26	0.0423
	54 Mbps	< 1.00	15.73	0.0374
140	6 Mbps	< 1.00	16.35	0.0431
	24 Mbps	< 1.00	15.90	0.0389
	54 Mbps	< 1.00	15.34	0.0342
165	6 Mbps	< 1.00	16.21	0.0418
	24 Mbps	< 1.00	15.84	0.0383
	54 Mbps	< 1.00	15.26	0.0336


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802.11n RF Conducted Emission Test Results

Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.407 Channels 36, 64, 100, 140 and 165 were measured for 802.11n 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 (W)
36	6 Mbps	< 1.00	17.16	0.0520
	24 Mbps	< 1.00	13.01	0.0200
	54 Mbps	< 1.00	11.60	0.0145
64	6 Mbps	< 1.00	17.11	0.0515
	24 Mbps	< 1.00	12.84	0.0192
	54 Mbps	< 1.00	11.52	0.0142
100	6 Mbps	< 1.00	18.52	0.0710
	24 Mbps	< 1.00	17.87	0.0612
	54 Mbps	< 1.00	17.60	0.0576
140	6 Mbps	< 1.00	17.73	0.0593
	24 Mbps	< 1.00	17.19	0.0524
	54 Mbps	< 1.00	16.84	0.0483
165	6 Mbps	< 1.00	15.12	0.0325
	24 Mbps	< 1.00	13.55	0.0226
	54 Mbps	< 1.00	12.02	0.0159

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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. Channels 36, 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	-47.8	-27.80
	24 Mbps	< -20	-47.3	-27.30
	54 Mbps	< -20	-48.12	-28.12
64	6 Mbps	< -20	-48.04	-28.04
	24 Mbps	< -20	-47.78	-27.78
	54 Mbps	< -20	-47.03	-27.03
100	6 Mbps	< -20	-47.63	-27.63
	24 Mbps	< -20	-46.76	-26.76
	54 Mbps	< -20	-47.33	-27.33
149	6 Mbps	< -20	-49.10	-29.10
	24 Mbps	< -20	-47.50	-27.50
	54 Mbps	< -20	-47.64	-27.64
161	6 Mbps	< -20	-47.85	-27.85
	24 Mbps	< -20	-46.41	-26.41
	54 Mbps	< -20	-46.89	-26.89
165	6 Mbps	< -20	-46.39	-26.39
	24 Mbps	< -20	-45.83	-25.83
	54 Mbps	< -20	-46.36	-26.36

See figures 5-10 to 5-15 for the plots of the band edge compliance measurements for Channel 36, 64, 100, 149, 161 and 165 at 6 Mbps each for 802.11a mode.

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802.11n RF Conducted Emission Test Results

Band Edge Compliance

The EUT met the requirements of the band edge compliance as per 47 CFR 15.407. Channels 36, 64 and 165 were measured at MCS 0, MCS 4 and MCS 7 each for 802.11n mode.

Channel	Data Rate	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
36	MCS0	< -20	-43.19	-23.19
	MCS4	< -20	-44.25	-24.25
	MCS7	< -20	-43.97	-23.97
64	MCS0	< -20	-45.13	-25.13
	MCS4	< -20	-46.03	-26.03
	MCS7	< -20	-47.05	-27.05
100	MCS0	< -20	-43.92	-23.92
	MCS4	< -20	-45.39	-25.39
	MCS7	< -20	-45.41	-25.41
149	MCS0	< -20	-39.72	-19.72
	MCS4	< -20	-42.47	-22.47
	MCS7	< -20	-42.82	-22.82
161	MCS0	< -20	31.80	51.80
	MCS4	< -20	-32.64	-12.64
	MCS7	< -20	-35.20	-15.20
165	MCS0	< -20	-34.49	-14.49
	MCS4	< -20	-35.85	-15.85
	MCS7	< -20	-35.50	-15.50

See figures 5-16 to 5-21 for the plots of the band edge compliance measurements for Channel 36, 64, 100, 149, 161 and 165 at MCS 0 each for 802.11n mode.

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802.11a RF Conducted Emission Test Results cont'd

Figure 5-10: Band Edge Compliance
802.11a, Channel 36, 6 Mbps

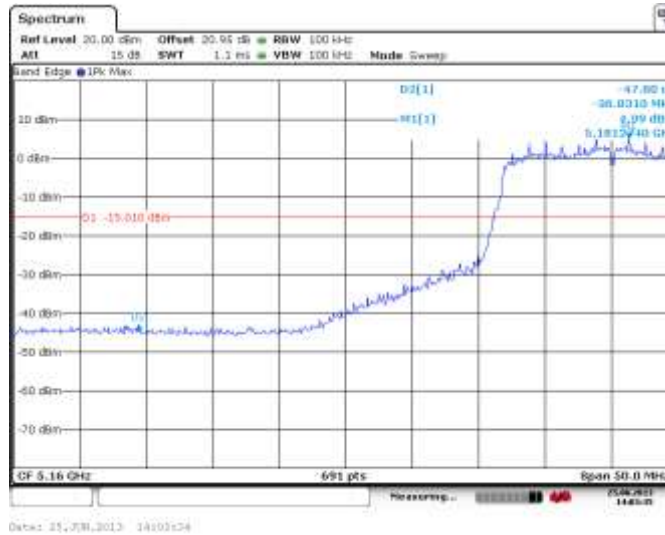


Figure 5-11: Band Edge Compliance
802.11a, Channel 64, 6 Mbps

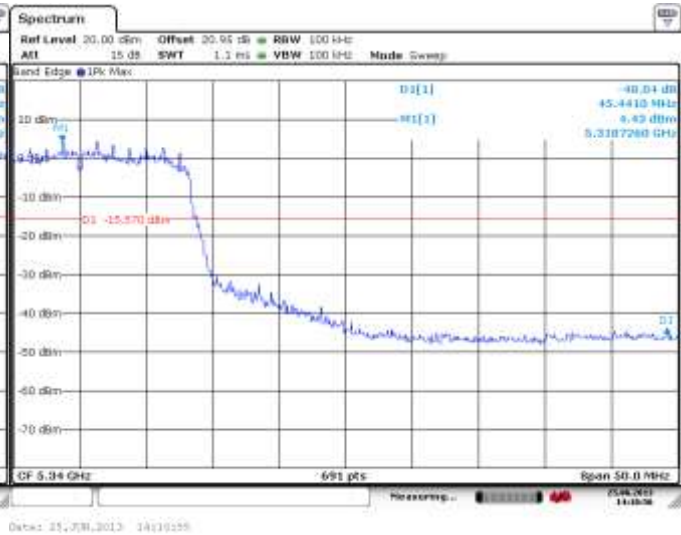


Figure 5-12: Band Edge Compliance
802.11a, Channel 100, 6 Mbps

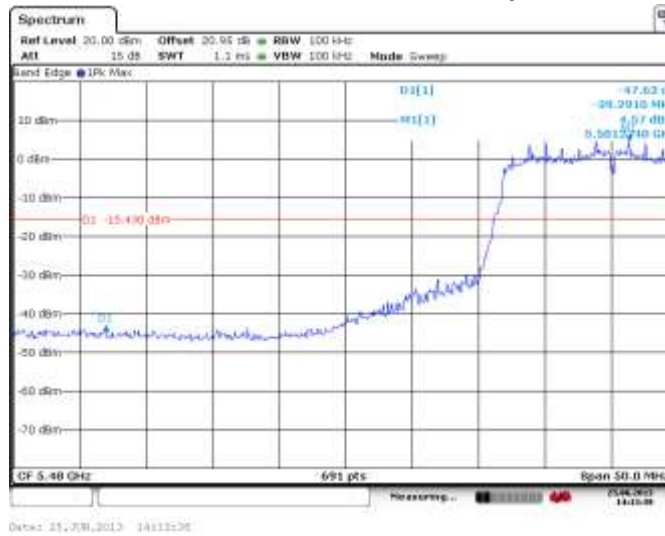
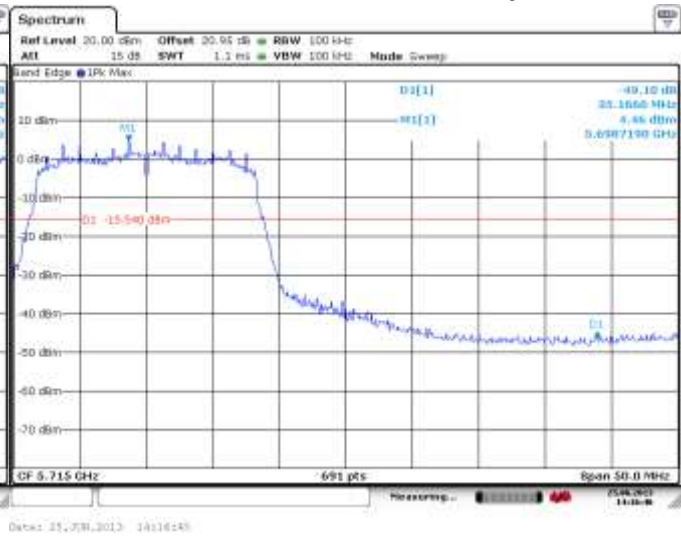



Figure 5-13: Band Edge Compliance
802.11a, Channel 140, 6 Mbps

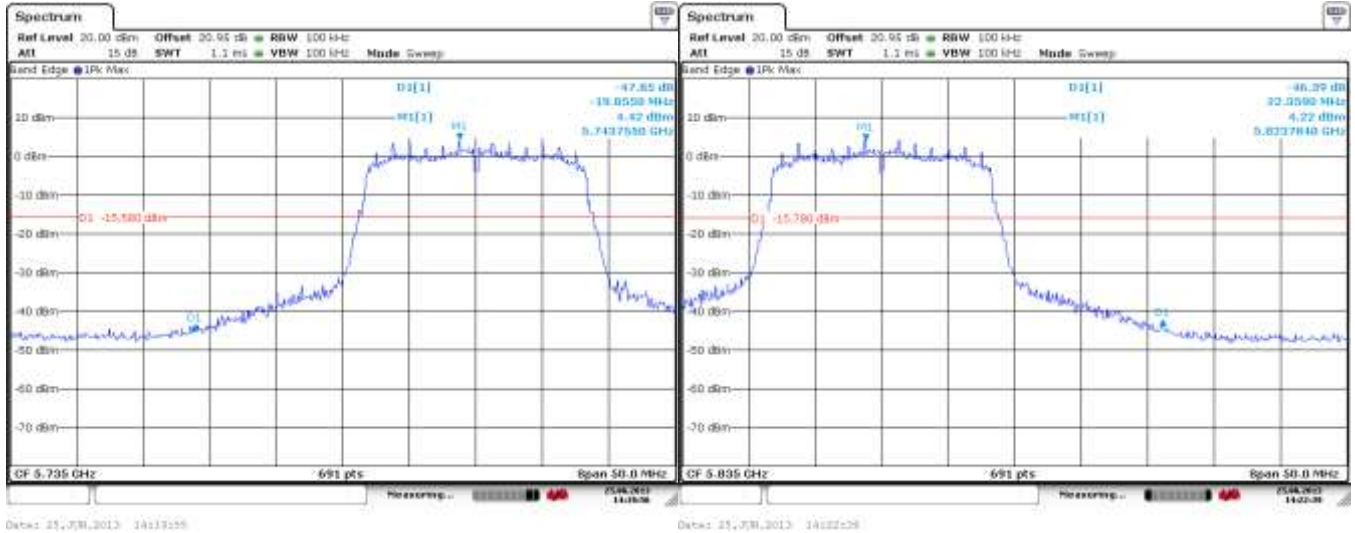



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802.11a RF Conducted Emission Test Results cont'd

Figure 5-14: Band Edge Compliance
802.11a, Channel 149, 6 Mbps

Figure 5-15: Band Edge Compliance
802.11a, Channel 165, 6 Mbps



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802.11n RF Conducted Emission Test Results

Figure 5-16: Band Edge Compliance
802.11n, Channel 36, 6 Mbps

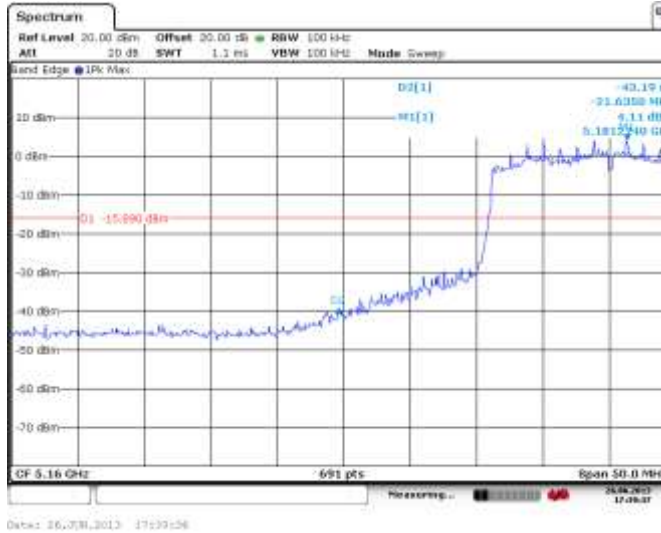


Figure 5-17: Band Edge Compliance
802.11n, Channel 64, 6 Mbps

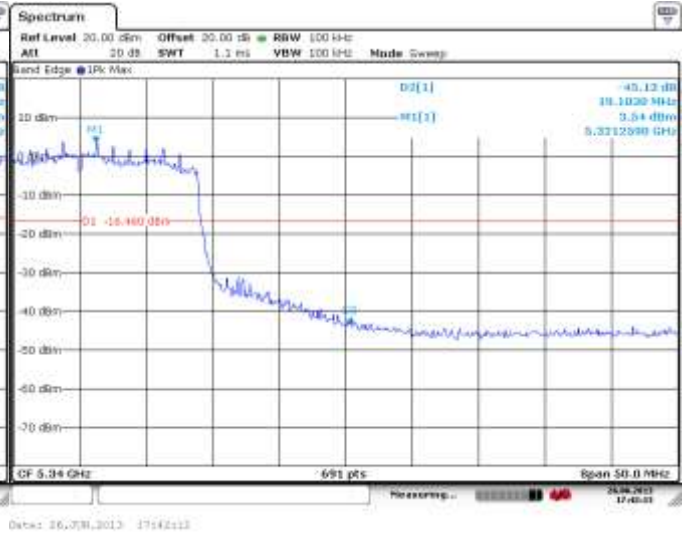


Figure 5-18: Band Edge Compliance
802.11n, Channel 100, 6 Mbps

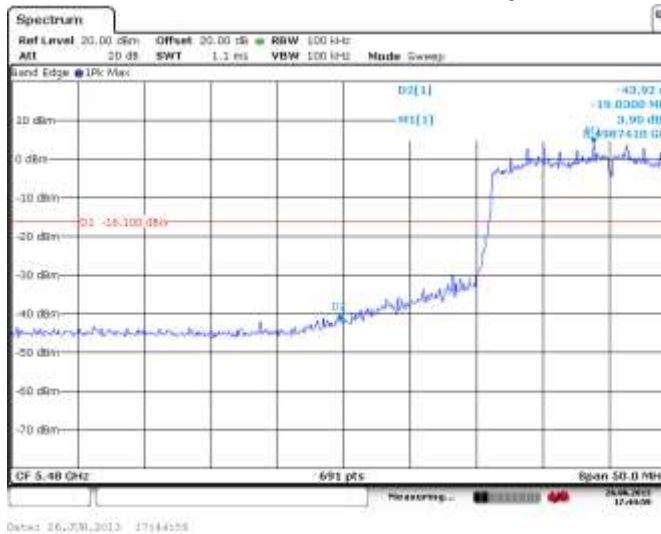
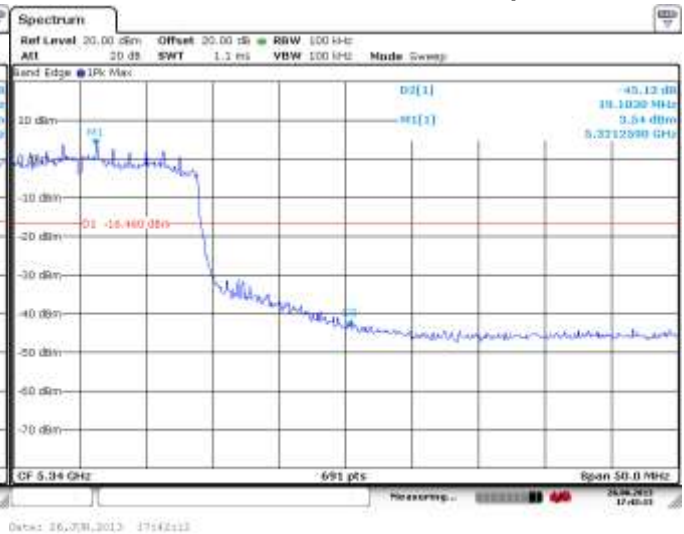



Figure 5-19: Band Edge Compliance
802.11n, Channel 140, 6 Mbps

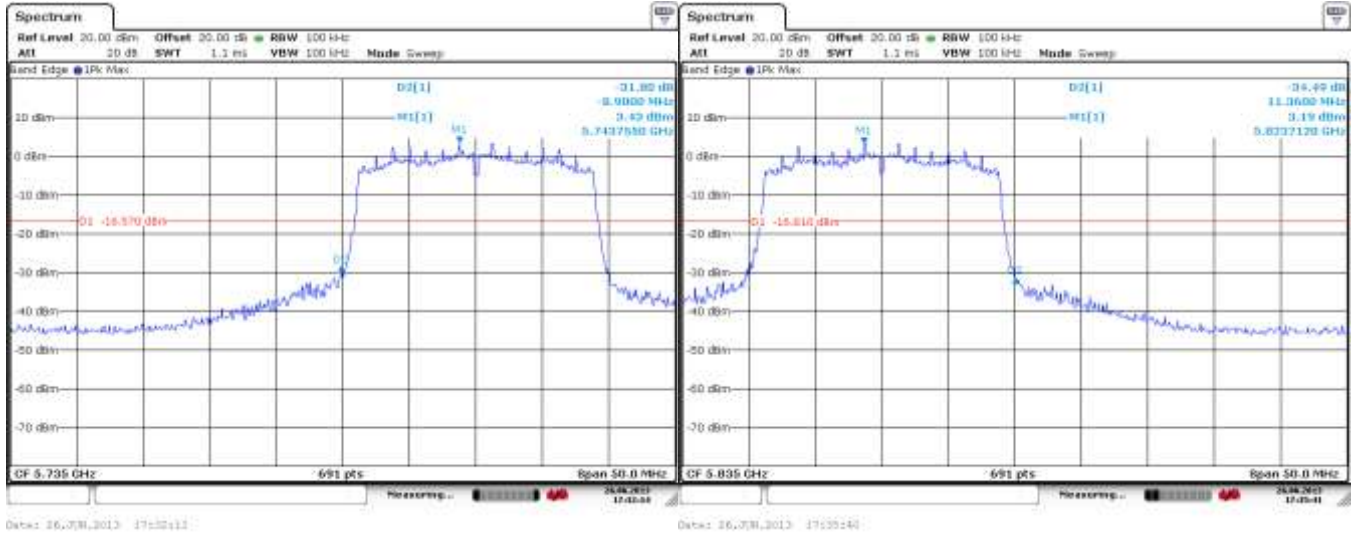



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802.11n RF Conducted Emission Test Results cont'd

Figure 5-20: Band Edge Compliance
802.11n, Channel 149, 6 Mbps

Figure 5-21: Band Edge Compliance
802.11n, Channel 165, 6 Mbps



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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 15.407/15.247. Channels 36, 44, 48, 52, 60, 64, 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	< 4.00	1.22	-2.78
	24 Mbps	< 4.00	1.23	-2.77
	54 Mbps	< 4.00	1.24	-2.76
48	6 Mbps	< 4.00	0.99	-3.01
	24 Mbps	< 4.00	0.97	-3.03
	54 Mbps	< 4.00	0.96	-3.04
64	6 Mbps	< 11.00	0.65	-10.35
	24 Mbps	< 11.00	0.66	-10.34
	54 Mbps	< 11.00	0.66	-10.34
100	6 Mbps	< 11.00	-0.08	-11.08
	24 Mbps	< 11.00	-0.07	-11.07
	54 Mbps	< 11.00	-0.07	-11.07
140	6 Mbps	< 11.00	1.54	-9.46
	24 Mbps	< 11.00	1.56	-9.44
	54 Mbps	< 11.00	1.56	-9.44
165	6 Mbps	< 17.00	-15.98	-32.98
	24 Mbps	< 17.00	-17.30	-34.30
	54 Mbps	< 17.00	-16.65	-33.65

See figures 5-22 to 5-27 for the plots of the peak power spectral density for Channel 36, 48, 64, 100, 140, and 165 at 6 Mbps each for 802.11a mode.

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802.11n RF Conducted Emission Test Results

Peak Power Spectral Density

The EUT met the requirements of the peak power spectral density as per 47 CFR 15.407/15.247. Channels 36, 64 and 165 were measured at MCS 0, MCS 4 and MCS 7 each for 802.11n mode.

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
36	6 Mbps	< 4.00	1.22	-2.78
	24 Mbps	< 4.00	1.22	-2.78
	54 Mbps	< 4.00	1.22	-2.78
64	6 Mbps	< 11.00	0.66	-10.34
	24 Mbps	< 11.00	0.65	-10.35
	54 Mbps	< 11.00	0.66	-10.34
165	6 Mbps	< 17.00	-16.07	-33.07
	24 Mbps	< 17.00	-17.09	-34.09
	54 Mbps	< 17.00	-16.76	-33.76

See figures 5-28 to 5-30 for the plots of the peak power spectral density for Channel 36, 64 and 165 at MCS 0 each for 802.11n mode.

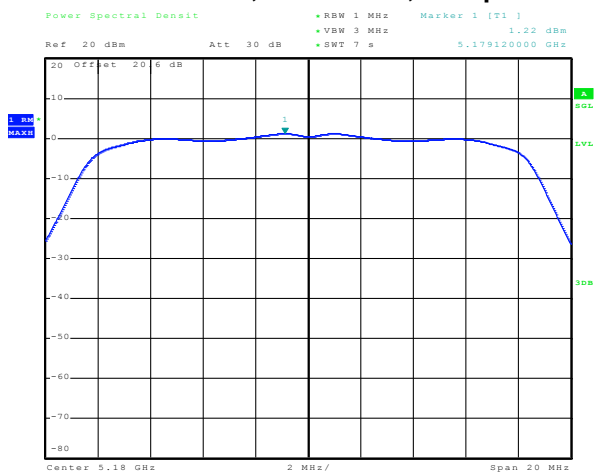
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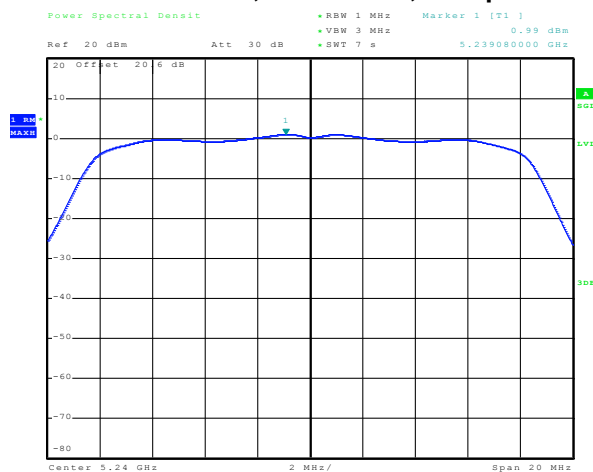
802.11a RF Conducted Emission Test Results cont'd

**Figure 5-22: Peak Power Spectral Density
 802.11a, Channel 36, 6 Mbps**



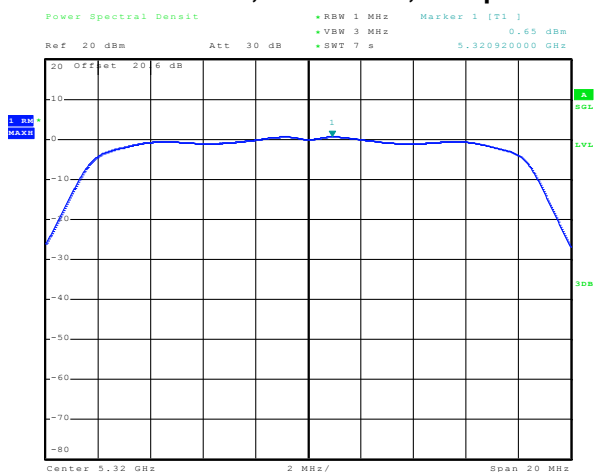
Date: 10.SEP.2013 11:28:32

**Figure 5-23: Peak Power Spectral Density
 802.11a, Channel 48, 6 Mbps**



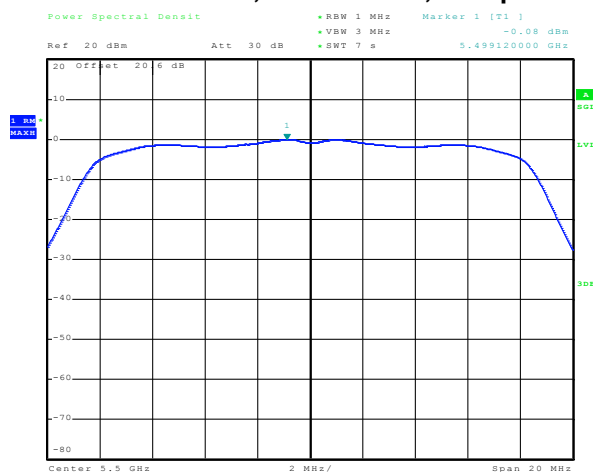
Date: 10.SEP.2013 11:29:36

**Figure 5-24: Peak Power Spectral Density
 802.11a, Channel 64, 6 Mbps**



Date: 10.SEP.2013 11:30:40

**Figure 5-25: Peak Power Spectral Density
 802.11a, Channel 100, 6 Mbps**



Date: 10.SEP.2013 11:31:45

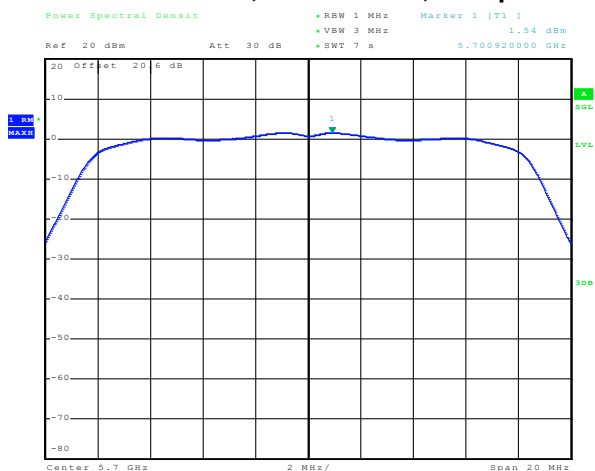
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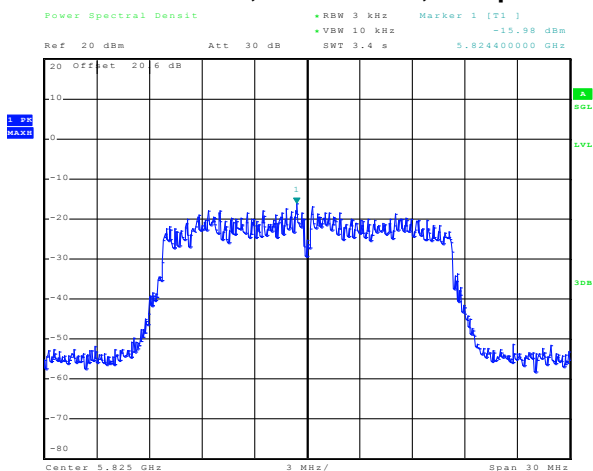
802.11a RF Conducted Emission Test Results cont'd

**Figure 5-26: Peak Power Spectral Density
 802.11a, Channel 140, 6 Mbps**



Date: 10.SEP.2013 11:32:49

**Figure 5-27: Peak Power Spectral Density
 802.11a, Channel 165, 6 Mbps**



Date: 10.SEP.2013 12:19:00

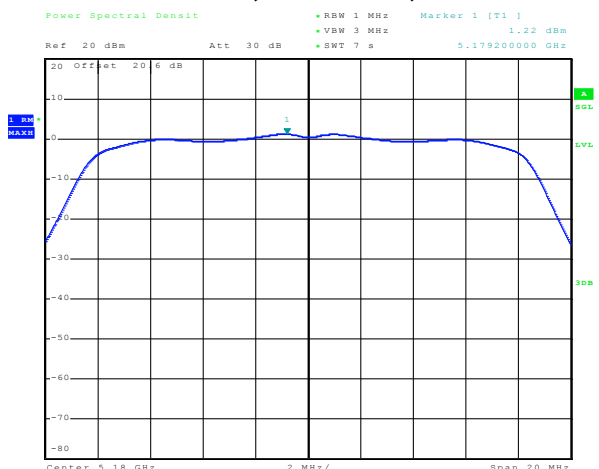
Test Report No.
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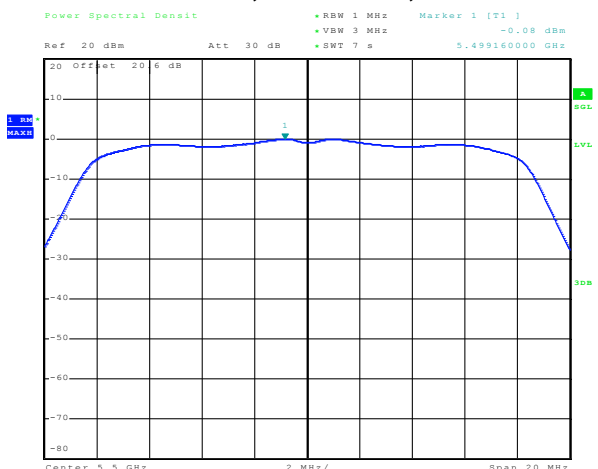
802.11n RF Conducted Emission Test Results

**Figure 5-28: Peak Power Spectral Density
 802.11n, Channel 36, MCS 0**



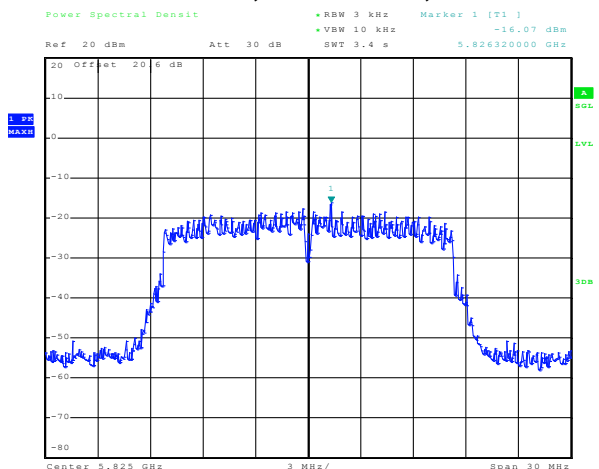
Date: 10.SEP.2013 11:29:04

**Figure 5-29: Peak Power Spectral Density
 802.11n, Channel 64, MCS 0**




Date: 10.SEP.2013 11:32:17

**Figure 5-30: Peak Power Spectral Density
 802.11n, Channel 165, MCS 0**



Date: 10.SEP.2013 12:19:21

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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. 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.

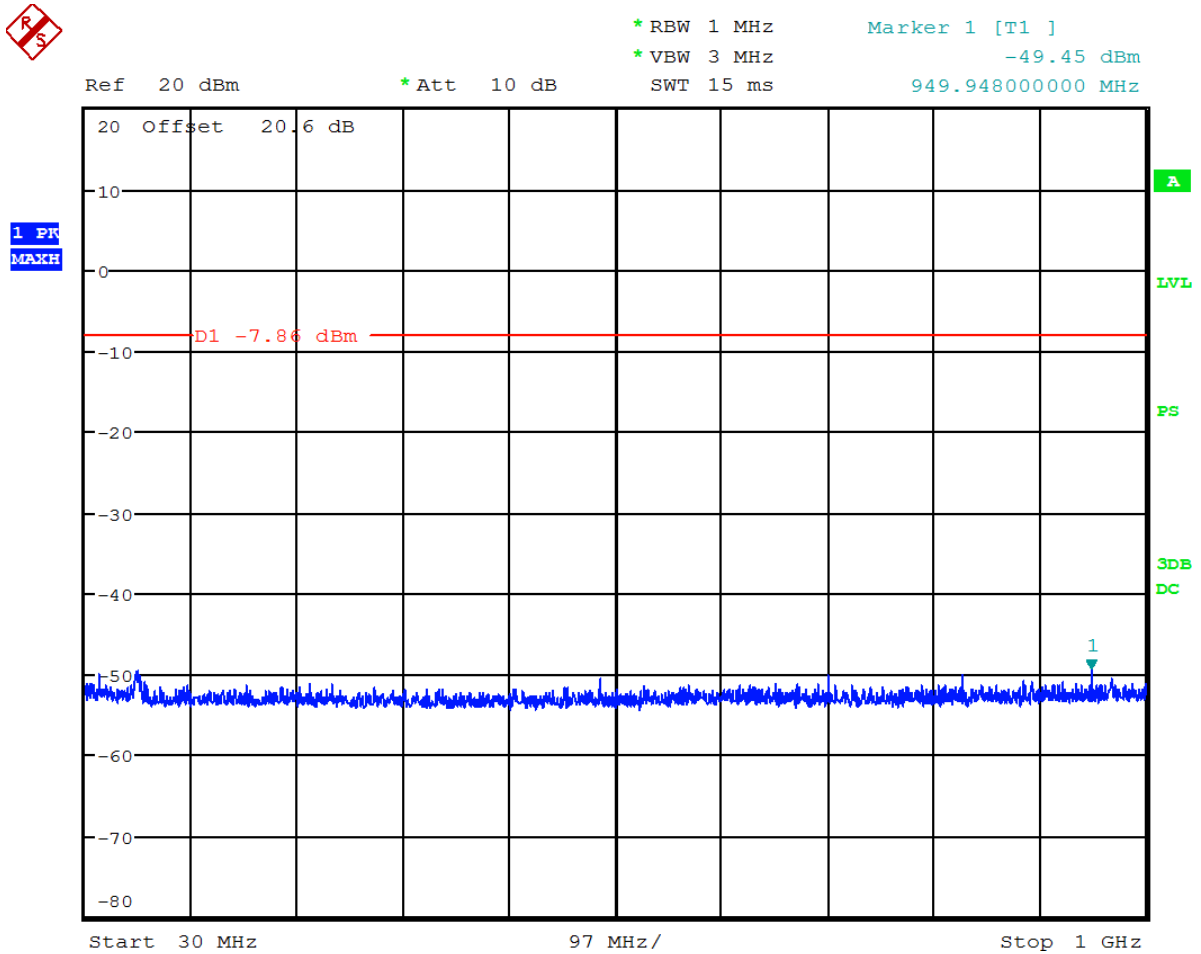
Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Limit (dBc)	Margin (dB)
36	6 Mbps	17.11	-37.73	-54.8366758	-20
	24 Mbps	16.72	-38.95	-55.6702413	-20
	54 Mbps	16.15	-39.51	-55.6613507	-20
64	6 Mbps	16.71	-38.18	-54.8912589	-20
	24 Mbps	16.31	-39.16	-55.4712261	-20
	54 Mbps	15.74	-39.69	-55.4280977	-20
100	6 Mbps	16.66	-39.00	-55.6609829	-20
	24 Mbps	16.26	-39.63	-55.8890094	-20
	54 Mbps	15.73	-38.78	-54.5060563	-20
140	6 Mbps	16.35	-37.15	-53.4979591	-20
	24 Mbps	15.90	-36.79	-52.6921576	-20
	54 Mbps	15.34	-36.58	-51.9162427	-20


See figures 5-31 to 5-33 for the plots of the spurious RF conducted emissions for Channel 64, 60 and 157 at 6 Mbps each for 802.11a mode.

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802.11a RF Conducted Emission Test Results cont'd

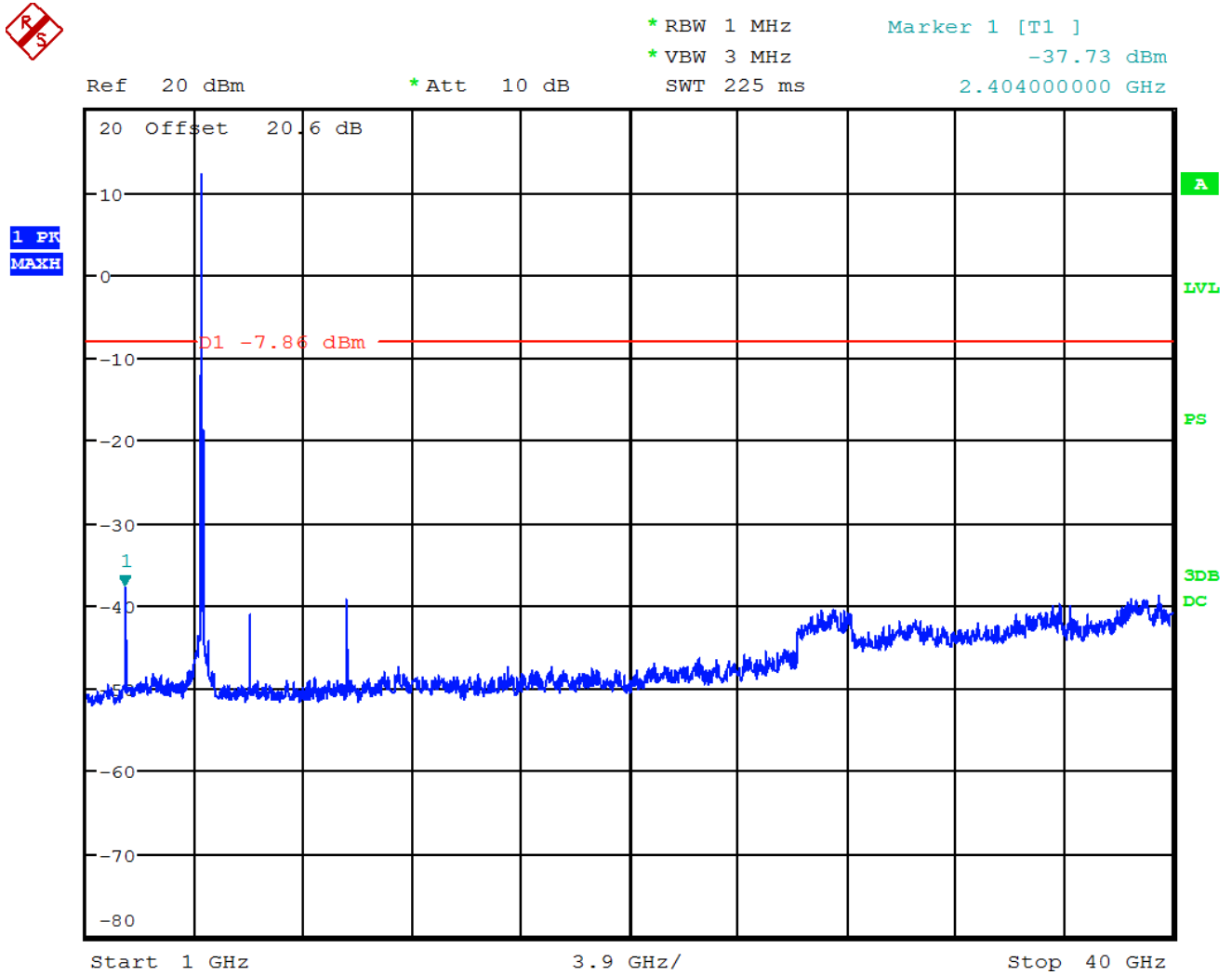
Figure 5-31a: Spurious RF Conducted Emissions, 802.11a Channel 36, 6 Mbps




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802.11a RF Conducted Emission Test Results cont'd

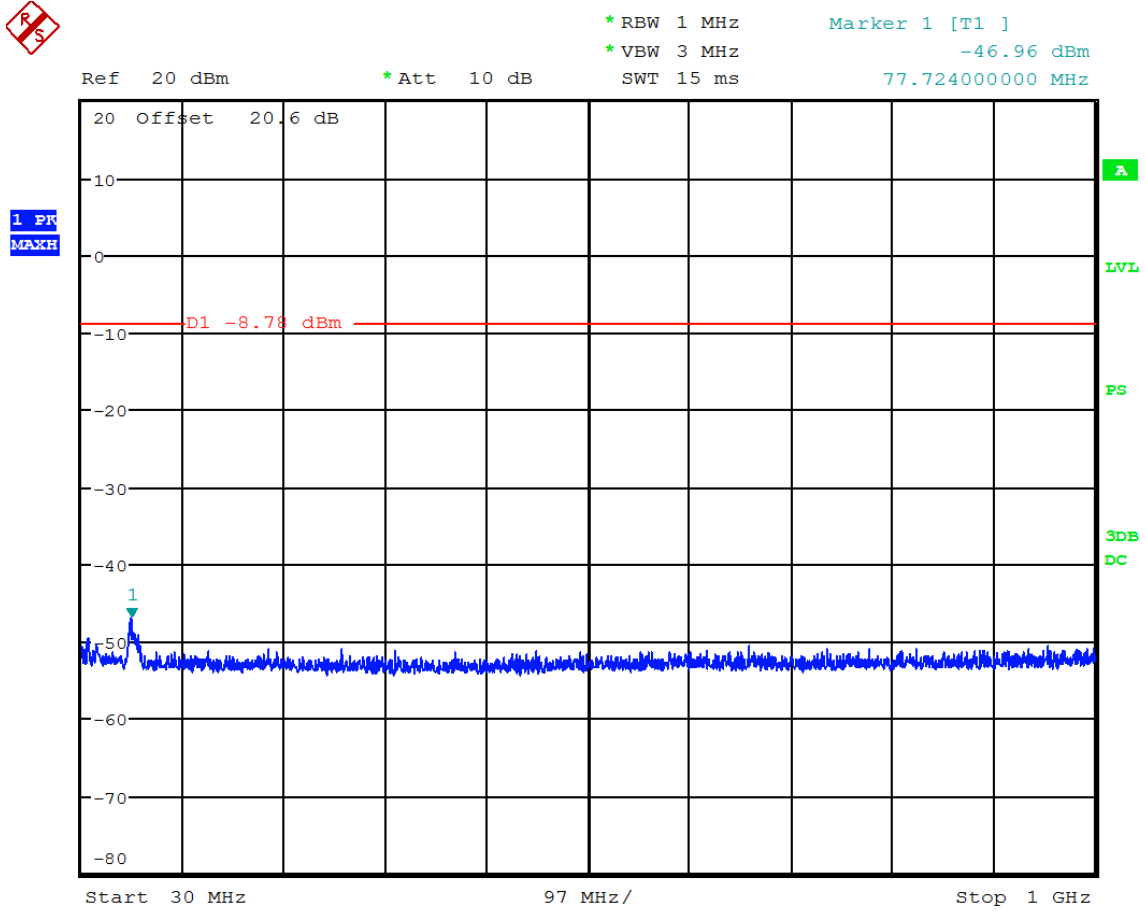
Figure 5-31b: Spurious RF Conducted Emissions, 802.11a Channel 36, 6 Mbps




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802.11a RF Conducted Emission Test Results cont'd

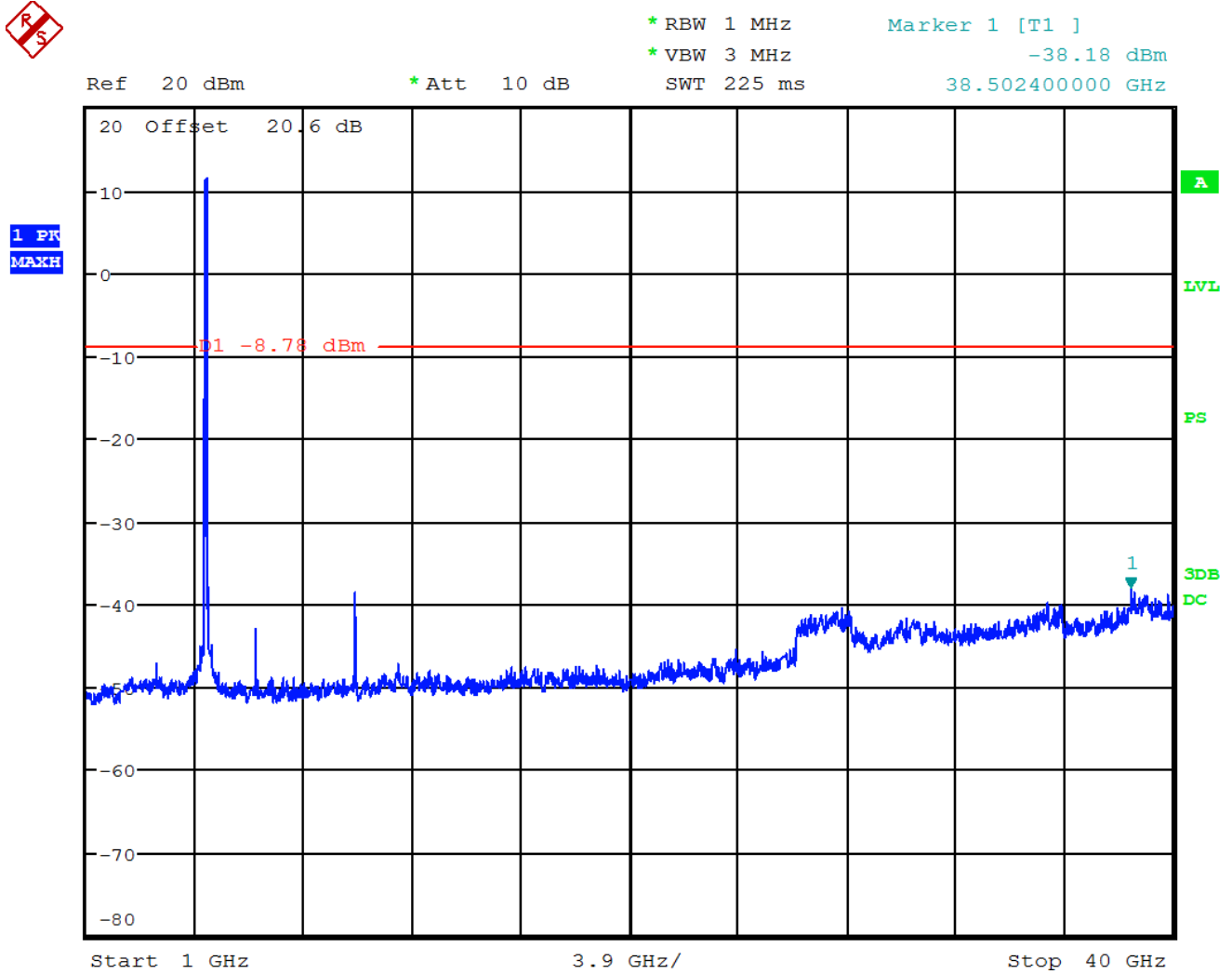
Figure 5-32a: Spurious RF Conducted Emissions, 802.11a Channel 64, 6 Mbps




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802.11a RF Conducted Emission Test Results cont'd

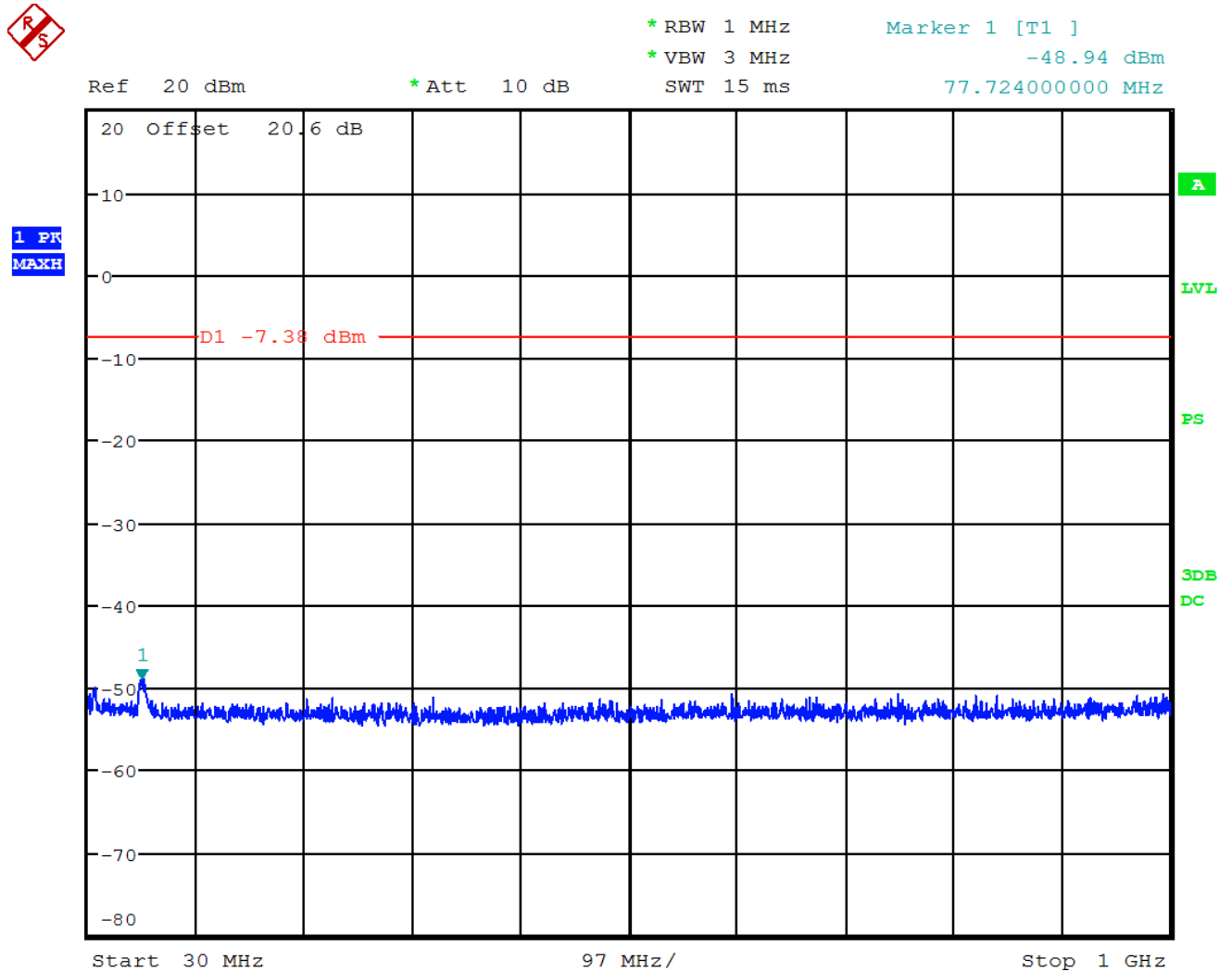
Figure 5-32b: Spurious RF Conducted Emissions, 802.11a Channel 64, 6 Mbps




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802.11a RF Conducted Emission Test Results cont'd

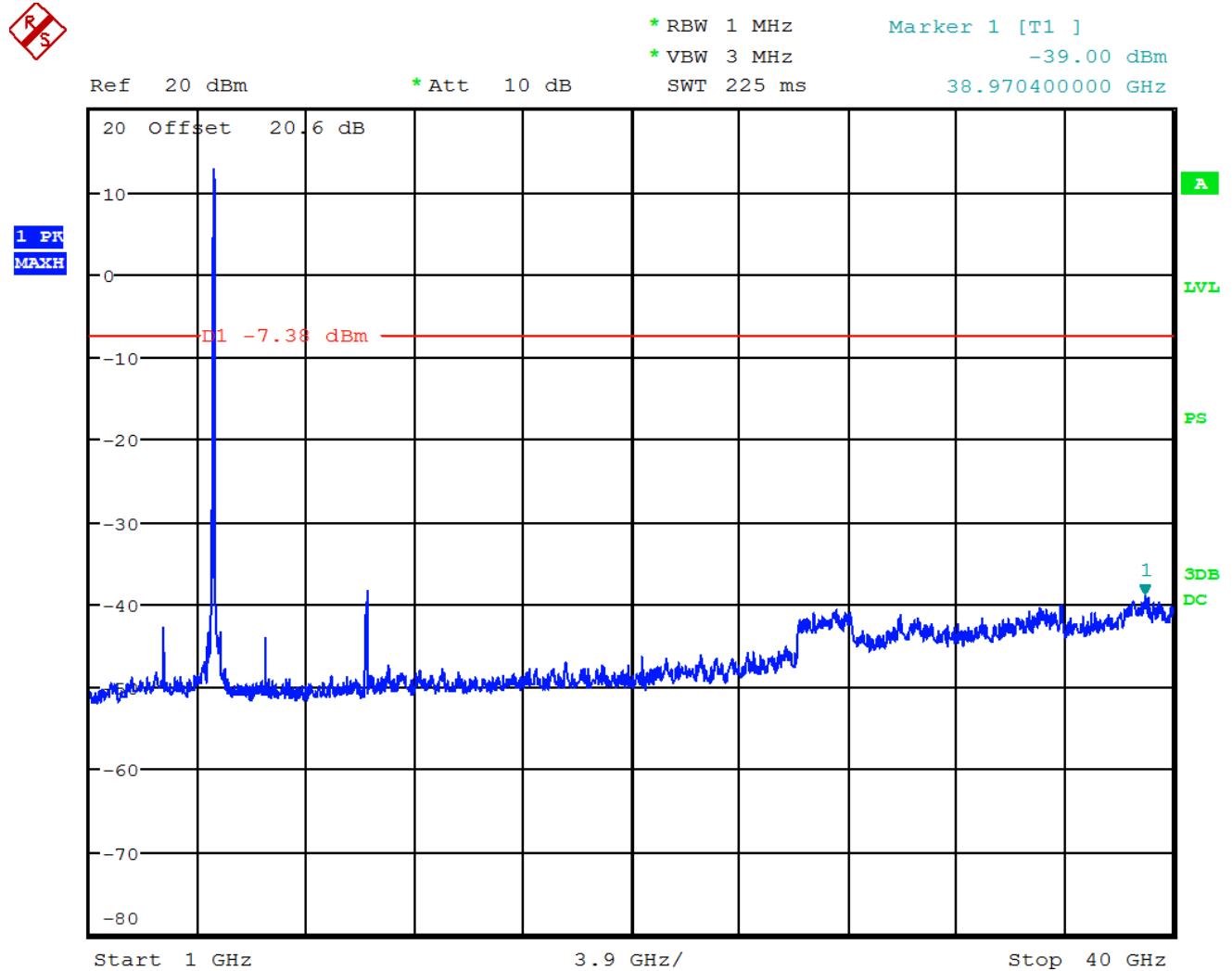
Figure 5-33a: Spurious RF Conducted Emissions, 802.11a Channel 100, 6 Mbps



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802.11a RF Conducted Emission Test Results cont'd

Figure 5-33b: Spurious RF Conducted Emissions, 802.11a Channel 100, 6 Mbps




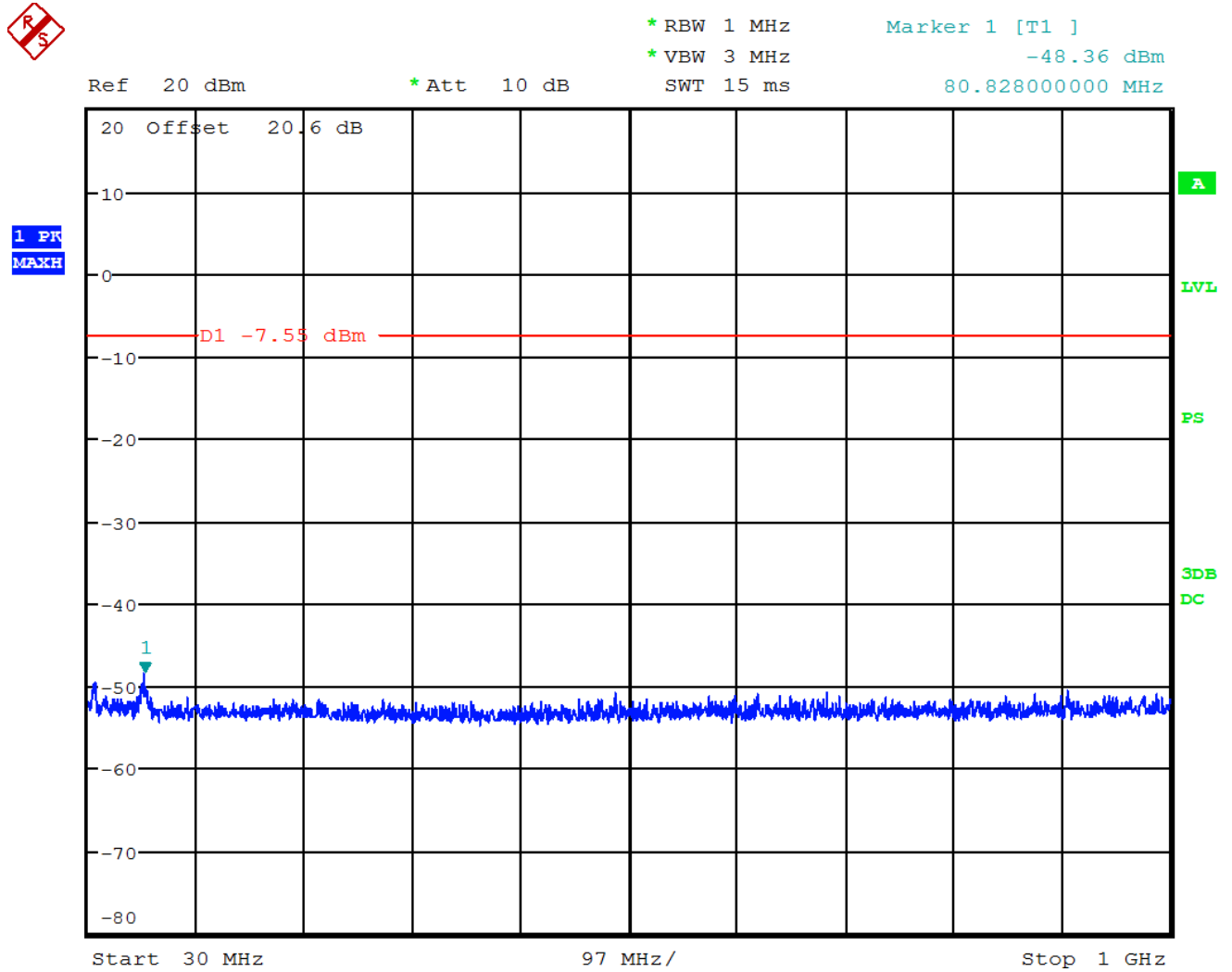
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Figure 5-34a: Spurious RF Conducted Emissions, 802.11a Channel 140, 6 Mbps



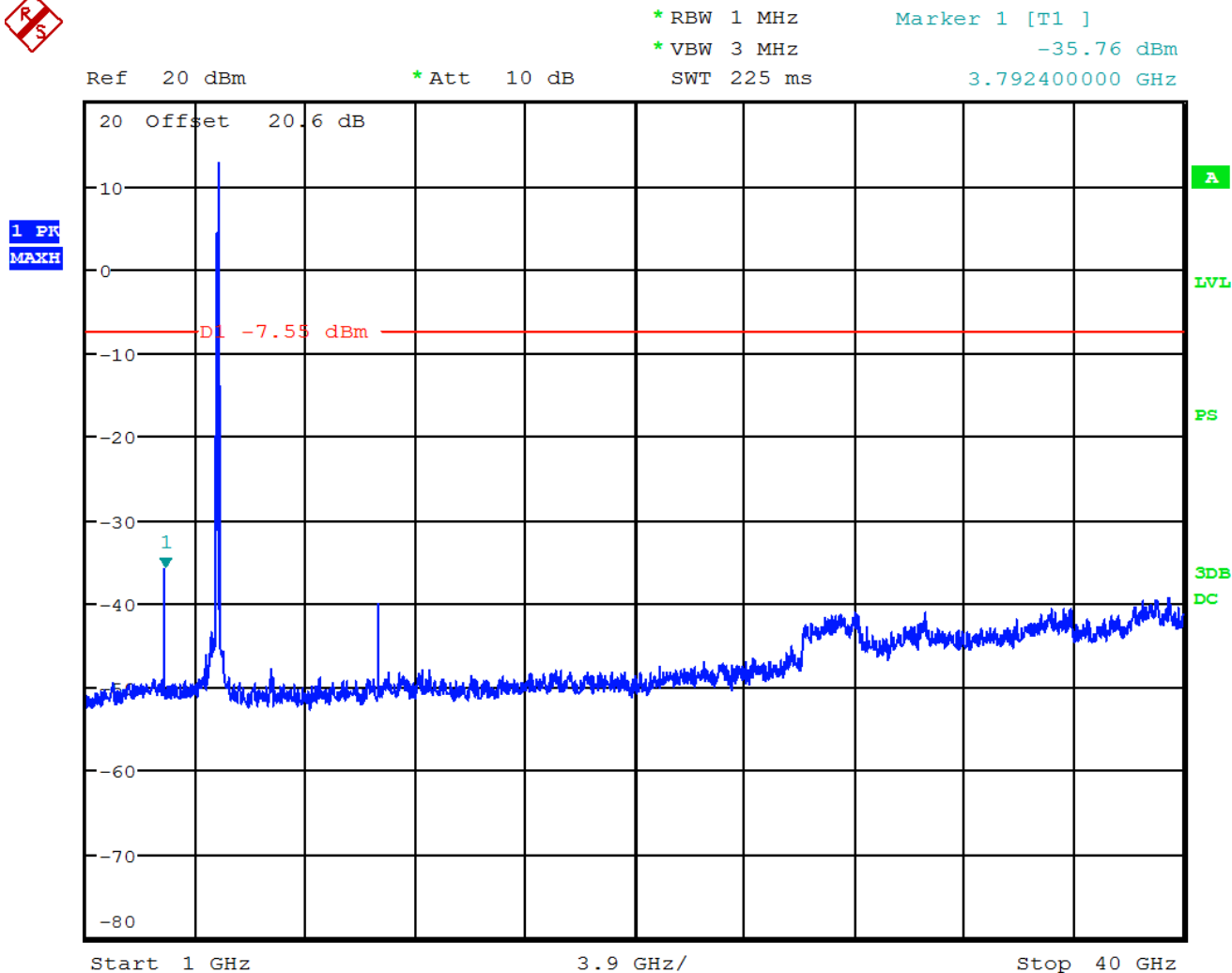
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802.11a RF Conducted Emission Test Results cont'd

Figure 5-34b: Spurious RF Conducted Emissions, 802.11a Channel 140, 6 Mbps

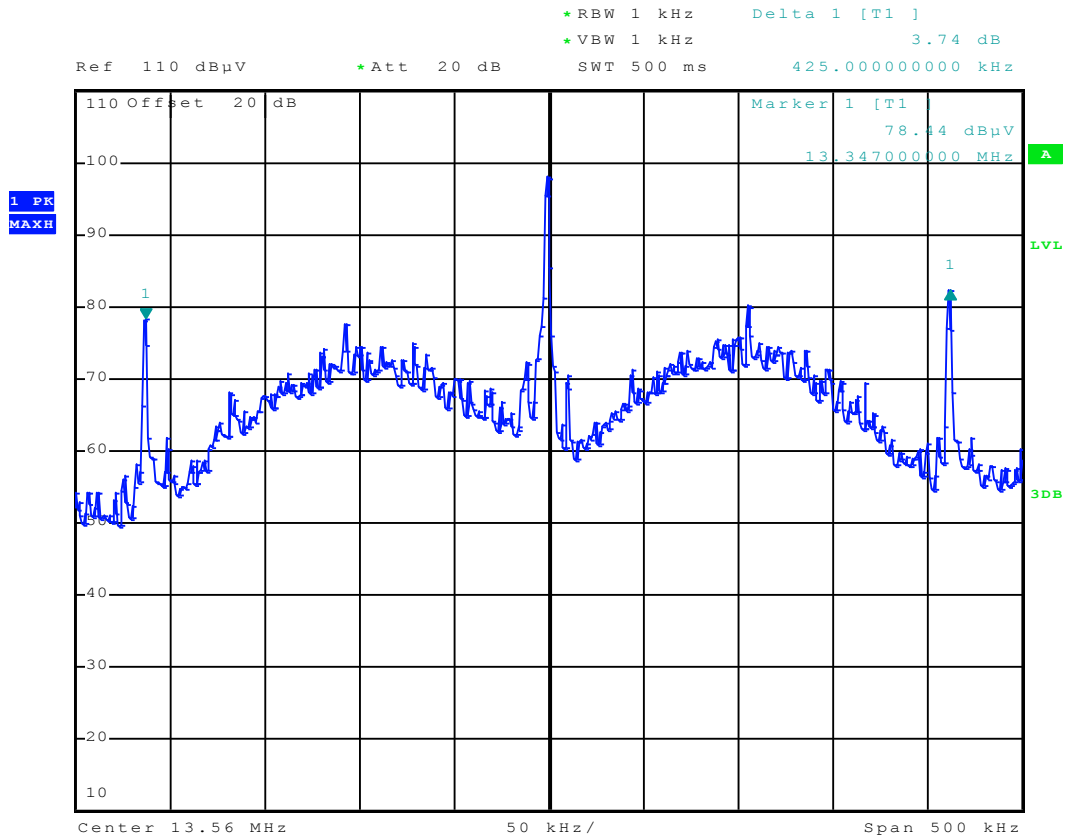


APPENDIX 6 – NEAR FIELD COMMUNICATIONS TEST DATA/PLOTS


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Date: 31.JUL.2013 10:39:03

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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	13.559492	3.6	-0.000508	-508	-0.00375
30	13.56	13.559812	3.8	-0.000188	-188	-0.00139
30	13.56	13.559650	4.35	-0.000350	-350	-0.00258
40	13.56	13.559596	3.6	-0.000404	-404	-0.00298
40	13.56	13.559792	3.8	-0.000208	-208	-0.00153
40	13.56	13.559615	4.35	-0.000385	-385	-0.00284
50	13.56	13.559559	3.6	-0.000441	-441	-0.00325
50	13.56	13.559739	3.8	-0.000261	-261	-0.00192
50	13.56	13.559704	4.35	-0.000296	-296	-0.00218
60	13.56	13.559626	3.6	-0.000374	-374	-0.00276
60	13.56	13.559848	3.8	-0.000152	-152	-0.00112
60	13.56	13.559427	4.35	-0.000573	-573	-0.00423