EMC Test Report

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

REPORT NO.: RTS-6063-1503-07

PRODUCT MODEL NO.: RHC161LW (STR100-2)
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARHC160LW
IC: 2503A-RHC160LW

DATE: March 17, 2015

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

592

Statement of Performance:

The BlackBerry® smartphone, model RHC161LW, part number DVT Rev3-04 and its accessories perform within the requirements of the test standards when configured and operated under BlackBerry's operation instructions.

Declaration:

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

Documented by:

Savtej S. Sandhu
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Reviewed by:

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Compliance Specialist I

Reviewed and Approved by:

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Manager, Regulatory Certification and 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, 2014
- o Industry Canada, RSS-210, Issue 8, December 2010, and ammendment1, February 2015 License-Exempt, Low Power Radio Apparatus operating in the Television Bands
- o Industry Canada, RSS-GEN, Issue 04, November 2014, General Requirements for Compliance of Radio Apparatus

B. Associated Documents

1) HW Declaration - RHC161LW – EVT Rev2-02
2) HW Declaration - RHC161LW – EVT Rev2-03
3) HW Declaration - RHC161LW – EVT Rev2-04
4) HW Declaration - RHC161LW – DVT Rev3-01
5) HW Declaration - RHC161LW – DVT Rev3-02
6) HW Declaration - RHC161LW – DVT Rev3-03
7) HW Declaration - RHC161LW – DVT Rev3-04

C. Product Identification

Manufactured by Wistron Mobile Solutions, which is located at:

2550 W. Golf Rd, Suite 400
Rolling Meadows, IL 60008,
US.
Phone:+1 (847)- 258-2611

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

BlackBerry RTS EMC test facilities:

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

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

The testing was performed from February 09 – March 02,17, 2015.

SAMPLE	MODEL	HARDWARE REVISION	PIN	SOFTWARE
1	RHC161LW (STR100-2)	DVT Rev3-01	2FFE780A	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
1a	RHC161LW (STR100-2)	DVT Rev3-04	2FFE780A	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
2	RHC161LW (STR100-2)	DVT Rev3-01	2FFE7801	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
2a	RHC161LW (STR100-2)	DVT Rev3-04	2FFE7801	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
3	RHC161LW (STR100-2)	DVT Rev3-01	2FFE7828	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
3a	RHC161LW (STR100-2)	DVT Rev3-04	2FFE7828	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
4	RHC161LW (STR100-2)	DVT Rev3-01	2FFF470E	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
4a	RHC161LW (STR100-2)	DVT Rev3-04	2FFF470E	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
5	RHC161LW (STR100-2)	EVT Rev2-01	2FFE76C5	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
5a	RHC161LW (STR100-2)	DVT Rev3-01	2FFE76C5	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
5b	RHC161LW (STR100-2)	DVT Rev3-04	2FFE76C5	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
6	RHC161LW (STR100-2)	DVT Rev3-01	2FFE7804	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
6a	RHC161LW (STR100-2)	DVT Rev3-04	2FFE7804	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518

AC Power Line Conducted Emissions testing was performed on samples 6 and 6a.

RF Conducted Emissions testing was performed on samples 5, 5a and 5b.
Radiated Emissions testing was performed on samples 1, 1a, 2, 2a, 3, 3a, 4 and 4a.

The characteristics that may have been affected by the changes from EVT Rev2-01 to DVT Rev3-04 were verified/re-tested. For more details, refer to documents HW Declaration - RHC161LW-EVT Rev2-02, Rev2-03, Rev2-04, RHC161LW-DVT Rev3-01, Rev3-02, Rev3-03, and Rev3-04.

BlackBerry® smartphone Accessories Tested

1) NA Fixed Blade Charger, part number HDW-58920-001, with an output voltage 5 volts dc, 1300mA
2) Alt. NA Fixed Blade Charger, part number HDW-46445-001, with an output voltage 5 volts dc, 850mA
3) Headset, part number HDW-49299-002, with a lead length of 1.1 meters
4) Alt. Headset, part number HDW-55351-002, with a lead length of 1.1 meters
5) USB Cable, part number HDW-50071-001, with a lead length of 1.2 meters
6) Alt. USB Cable, part number HDW-51800-001, with a lead length of 1.2 meters

D. Support Equipment Used for the Testing of the EUT

1) Lenovo Thinkpad laptop, type 4236-D84, S/N PB-HX502 12/02, product ID 4236D84

E. Test Results Chart

SPECIFICATION FCC CFR 47	TEST TYPE	Meets Requirements	TEST DATA APPENDIX
Part 15.207	AC Powerline Conducted Emission	Pass	1
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	2
Part 15.209 Part 15.247	802.11b/g/n Radiated Band Edge Compliance	Pass	2
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(c)	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	3
Part 15.247(c)	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(c)	BLE, Band-Edge	Pass	3
Part 15.247(d)	BLE, Peak Power Spectral Density	Pass	3
Part 15.247(c)	BLE, Spurious RF Conducted Emissions	Pass	3

Test Results Chart cont'd

SPECIFICATION FCC CFR 47	TEST TYPE	Meets Requirements	TEST DATA APPENDIX
Part 15.247(a)	802.11b/g/n, 6 dB Bandwidth	Pass	4
RSS-GEN, 6.6	802.11b/g/n, Occupied Bandwidth	Pass	4
Part 15.247(b)	802.11b/g/n, Maximum Conducted Output Power	Pass	4
Part 15.247(c)	802.11b/g/n, Band-Edge	Pass	4
Part 15.247(d)	802.11b/g/n, Peak Power Spectral Density	Pass	4
Part 15.247(c)	802.11b/g/n, Spurious RF Conducted Emissions	Pass	4

F. Summary of Results

1) AC POWER LINE CONDUCTED EMISSIONS

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

The following test configurations were measured:

Test Configuration	Operating Mode(s)	Charger + Accessories
1	Bluetooth TX	NA Fixed Blade Charger + Headset + USB Cable 1.20m
2	802.11b TX	Alt NA Fixed Blade Charger + Alt Headset + Alt USB Cable 1.20m

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C and IC RSS-210 limits. The sample EUT had a worst case test margin of 12.76 dB below the QP limit at 0.497 MHz with the Fixed Blade Charger in Test Configuration 2.

See APPENDIX 1 for the test data.

Measurement Uncertainty ±3.2 dB

2) BLUETOOTH, BLUETOOTH LOW ENERGY AND 802.11b/g/n RADIATED EMISSIONS

a) Radiated Spurious and Harmonic Emissions

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

The measurements were done in a semi-anechoic chamber (SAC) below 1 GHz and a modified semi-anechoic chamber (modified 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 modified SAC'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 and RSS-210.

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 and RSS-210.

The BlackBerry® smartphone was measured in standalone configuration transmitting on channels 1, 6 & 11 at 1 Mbps for 802.11b mode, at 6 Mbps for 802.11g mode, and at MCS 0 for 802.11n mode. The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15 Subpart C, 15.247 and RSS-210.

The 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).

The 802.11b/g/n harmonics were investigated up to the 10th harmonic. The sample EUT emissions were in the noise floor (NF).

See APPENDIX 2 for the test data.

b) Band-Edge Compliance of RF Radiated Emissions
The BlackBerry® smartphone 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, 15.209, and RSS-210/RSS-GEN.

Measurement Uncertainty ±4.2 dB

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) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR. The worst case 20 dB Bandwidth was 0.924 MHz for channel 39 in normal data rate mode and 1.338 MHz for channel 39 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) and RSS-210. Channel 38 to 39 was measured. The result includes both normal data rate and EDR.
See APPENDIX 3 for the test data.

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

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

e) Maximum Peak Conducted Output Power
The BlackBerry® smartphone met the requirements of the maximum peak conducted output power as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. The result includes both normal data rate and EDR. The worst case Conducted Output Power level was 11.4 dBm (0.01380 W) for Channel 39 in normal data rate mode and 7.90 dBm (0.00617 W) for channels 39 in EDR mode.
See APPENDIX 3 for the test data.

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

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

ii) BLUETOOTH LOW ENERGY RF CONDUCTED EMISSIONS

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

a) 6dB Bandwidth
The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (20) and high channel (39) were measured. The worst case 6 dB Bandwidth was 0.721 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) and RSS-210. Low channel (0), middle channel (20) and high channel (39) were measured. The worst case Conducted Output Power level was 6.53 dBm (4.50 mW) 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(b) and RSS-210. Low channel (0) and high channel (39) were measured.
See APPENDIX 3 for the test data.

d) Peak Power Spectral Density
The EUT met the requirements of peak power spectral density as per 47 CFR 15.247(b) and RSS-210. 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(c) and RSS-210. The frequency range measured was 30 MHz to 26 GHz. Low channel (0), middle channel (20) and high channel (39) were measured.
See APPENDIX 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(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. The worst case 6 dB Bandwidth was 8.88 MHz for channel 11 in 802.11b mode, 16.40 MHz for channels 11 in 802.11g mode, and 17.64 MHz for channels 11 in 802.11n mode.
See APPENDIX 4 for the test data.

b) Occupied Bandwidth
The EUT met the requirements of the Occupied Bandwidth as per RSS-GEN, 6.6. Low channel (1), middle channel (6) and high channel (11) were measured. The worst case Occupied Bandwidth was 12.64 MHz for channel 11 in 802.11b mode, 16.73 MHz for channels 6 and 11 in 802.11g mode, and 17.69 MHz for channel 11 in 802.11n mode.
See APPENDIX 4 for the test data

c) Maximum Conducted Output Power
The EUT met the requirements of the maximum conducted output power as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. The worst case Conducted Output Power level was 17.95 dBm (62.35 mW) for channel 6 in 802.11b mode, 17.13 dBm (51.63 mW) for channel 6 in 802.11g mode, and 15.26 dBm (33.60 mW) for channel 6 in 802.11n mode.
See APPENDIX 4 for the test data

d) Band-Edge Compliance of RF Conducted Emissions
The EUT met the requirements of band-edge compliance of RF conducted emissions as per 47 CFR 15.247(b) and RSS-210. Low channel (1) and high channel (11) were measured.
See APPENDIX 4 for the test data.

e) Peak Power Spectral Density
The EUT met the requirements of peak power spectral density as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured.
See APPENDIX 4 for the test data.

f) Spurious RF Conducted Emissions
The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. The frequency range measured was 30 MHz to 26 GHz. Low channel (1), middle channel (6) and high channel (11) were measured.
See APPENDIX 4 for the test data.

G. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
EMI Test Receiver	Rohde & Schwarz	ESIB 40	100255	15-12-04	Conducted/Radiated Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	15-12-02	Conducted/Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017401	16-02-03	Radiated Emissions
Horn Antenna	CMT	3116	R52734-001	17-03-02	Radiated Emissions
Horn Antenna	ETS-Lindgren	3117	2538	15-08-07	Radiated Emissions
Active Loop Antenna	EMCO	6507	00032	15-08-21	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	15-09-10	Radiated Emissions
Preamplifier	Sonoma	310N/11909A	185831	15-10-22	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	15-09-10	Radiated Emissions
L.I.S.N.	Rohde & Schwarz	ENV216	100060	15-10-08	Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0380561	16-11-15	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	16-01-23	Radiated Emissions
DC Power Supply	HP	6632B	US37472178	15-10-20	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0340060	16-09-11	RF Conducted Emissions
Environmental Chamber	Test Equity	107	0900246	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	119549	15-12-04	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100368	15-11-25	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100370	15-12-04	Radiated Emissions
Power Meter	Agilent	N1911A	MY45100951	15-09-10	RF Conducted / Frequency Stability
Power Sensor	Agilent	N1921A	MY45241383	15-09-05	RF Conducted / Frequency Stability
Environment Monitor	Omega	iTHX-SD	0380567	16-11-15	Radiated Emissions

APPENDIX 1 – AC POWER CONDUCTED EMISSIONS TEST DATA/PLOTS

AC Powerline Conducted Emission Test Results

The following tests were performed by Winston Vernon.

Test Configuration 1

The BlackBerry® smartphone was tested on February 25, 2015

The environmental test conditions were: Temperature: 24.5 ºC
Relative Humidity: 14.4 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.470	L1	26.87	9.93	36.79	56.50	46.50	-19.71
0.470	N	28.98	9.93	38.92	56.50	46.50	-17.59
0.938	L1	27.65	9.81	37.46	56.00	46.00	-18.54
0.969	N	23.30	9.81	33.11	56.00	46.00	-22.89
2.009	N	22.21	9.83	32.04	56.00	46.00	-23.96
2.162	L1	27.01	9.83	36.85	56.00	46.00	-19.16
3.323	L1	24.62	9.89	34.50	56.00	46.00	-21.50

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.

AC Powerline Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

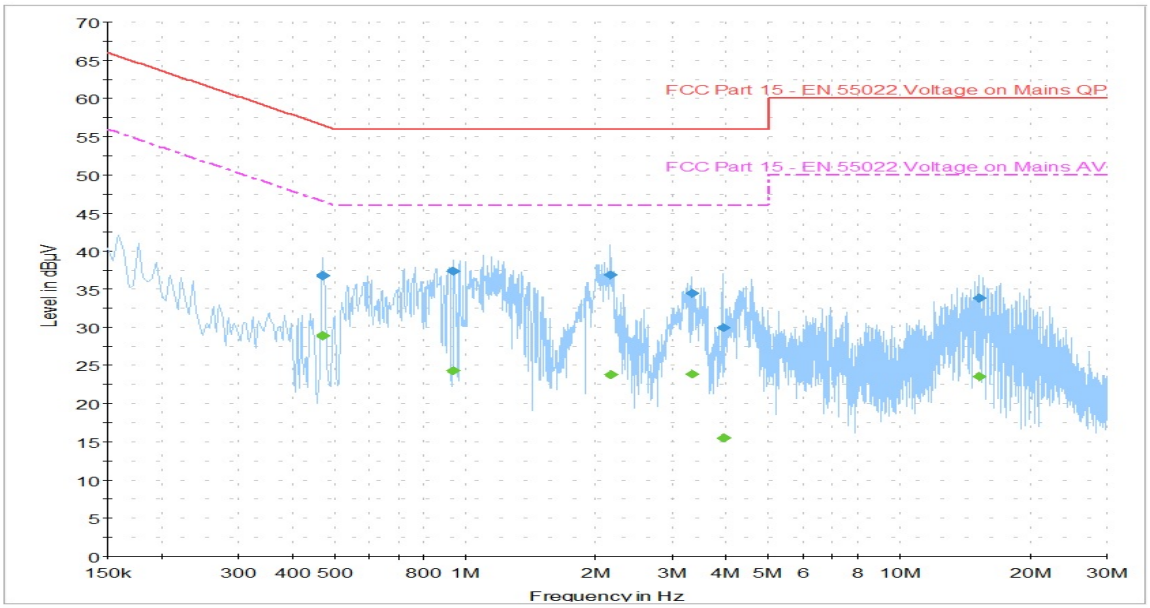
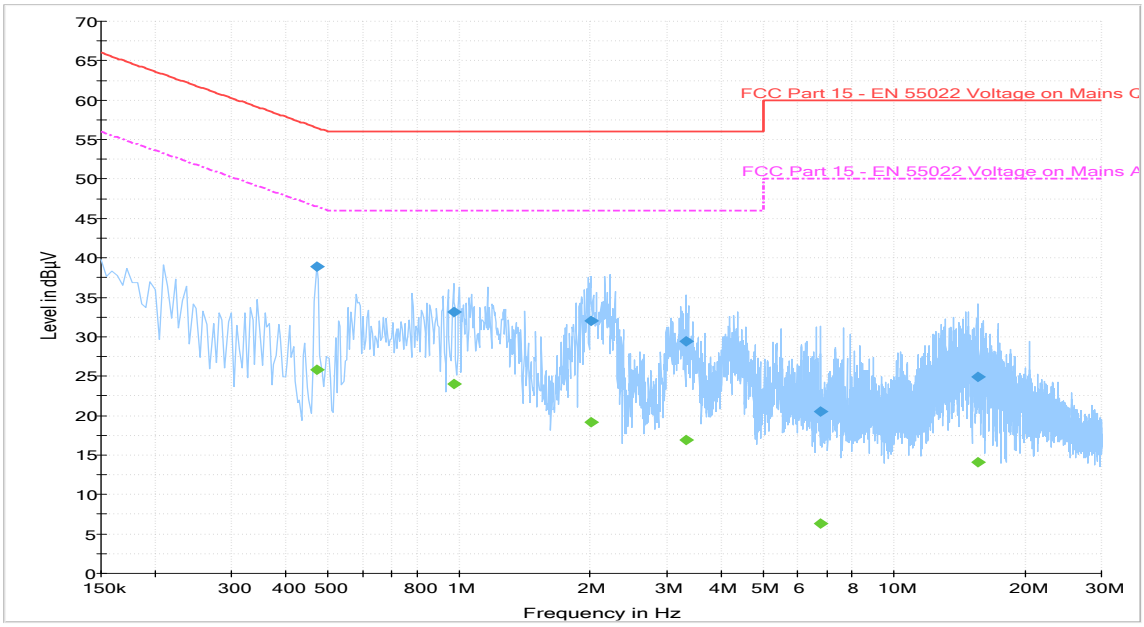


Figure 1-2: N Lines



AC Powerline Conducted Emission Test Results cont'd

Test Configuration 2

The BlackBerry® smartphone was tested on February 25, 2015

The environmental test conditions were: Temperature: 24.5 ºC
Relative Humidity: 14.4 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.231	L1	28.03	10.64	38.67	62.40	52.40	-23.73
0.497	L1	33.43	9.91	43.34	56.10	46.10	**-12.76**
0.497	N	31.60	9.92	41.52	56.10	46.10	-14.58
0.794	L1	27.66	9.82	37.48	56.00	46.00	-18.52
0.879	N	26.59	9.82	36.41	56.00	46.00	-19.59
1.091	N	28.70	9.81	38.51	56.00	46.00	-17.50
1.172	L1	27.41	9.80	37.21	56.00	46.00	-18.79
2.459	N	22.13	9.85	31.99	56.00	46.00	-24.01
2.652	L1	25.35	9.86	35.21	56.00	46.00	-20.79
14.901	L1	28.38	10.07	38.44	60.00	50.00	-21.56

All other emission levels were at least 25 dB below the limit.
Measurements were done with the quasi-peak detector
See figure 1-3 and figure 1-4 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

Figure 1-3: L1 lines

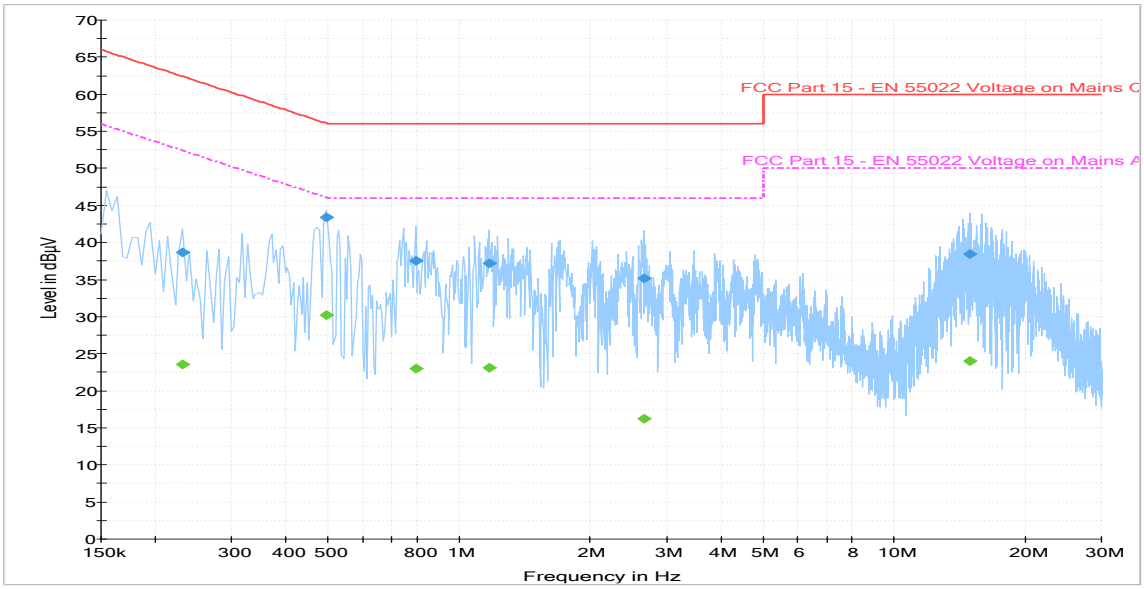
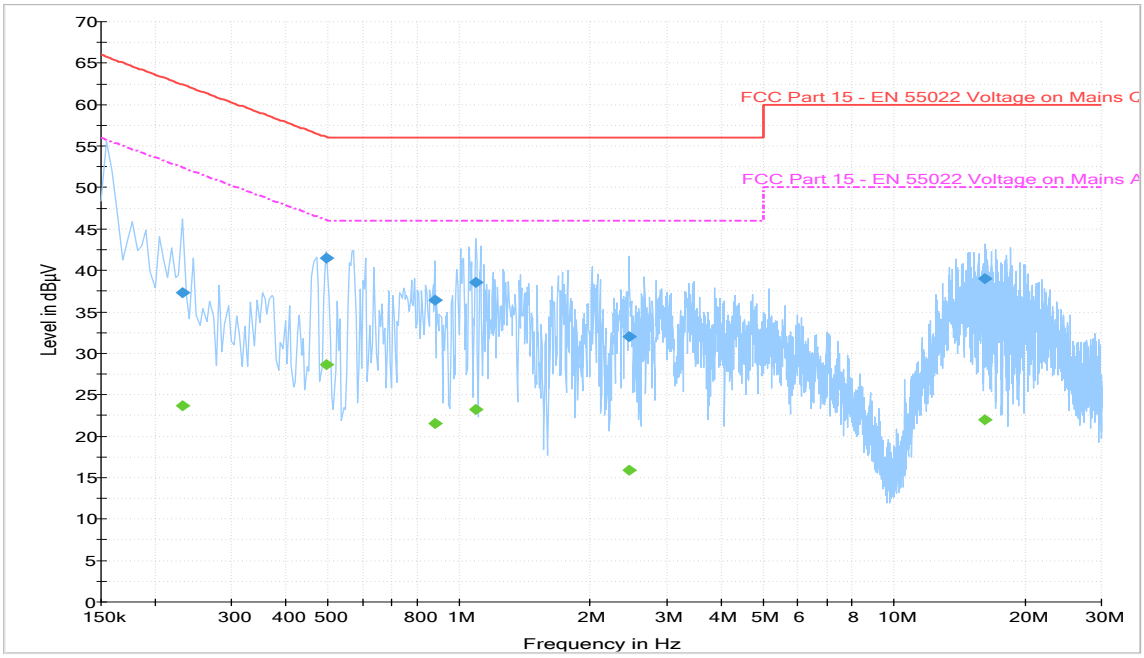


Figure 1-4: N Lines



APPENDIX 2 – BLUETOOTH, BLUETOOTH LOW ENERGY AND 802.11b/g/n RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Results
Bluetooth Band

Date of Test: February 6, 2015
Measurements were performed by Shiva Kumbham.

The environmental test conditions were: Temperature: 27.6ºC
Relative Humidity: 5.2 %

The test distance was 3.0 meters with a EUT height of 1.5 meters, and sweep frequency of 30 MHz to 1 GHz.

The BlackBerry® smartphone in Bluetooth TX mode was in volume key up 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: February 17, and February 24, 2015
Measurements were performed by Winston Vernon

The environmental test conditions were: Temperature: 24.6ºC
Relative Humidity: 14.4 %

The test distance was 3.0 meters with a EUT height of 1.5 meters, and sweep frequency of 1GHz to 25GHz.

The BlackBerry® smartphone in Bluetooth TX mode was in horizontal up 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.

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

Date of test: February 9, 2015
Measurements were performed by Shiva Kumbham.

The environmental test conditions were: Temperature: 26.4 º C
Relative Humidity: 6.7 %

The BlackBerry® smartphone was in standalone, volume key up position and pattern type "Static PBRS" in "DH5", "2-DH5" and "3-DH5" modulation during the measurements.

The test distance was 3.0 meters.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna 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	104.61	60.16	44.45	74.00	-29.55
0	2402	Horn	H	PK	1 MHz	105.37	62.15	43.22	74.00	-30.78
0	2402	Horn	V	AVE.	10 Hz	94.54	60.16	34.38	54.00	-19.62
0	2402	Horn	H	AVE.	10 Hz	96.08	62.15	33.93	54.00	-20.07
High Channel, Packet Type DH5										
78	2480	Horn	V	PK	1 MHz	102.44	58.34	44.10	74.00	-29.90
78	2480	Horn	H	PK	1 MHz	105.09	59.27	45.82	74.00	-28.18
78	2480	Horn	V	AVE.	10 Hz	92.36	58.34	34.02	54.00	-19.98
78	2480	Horn	H	AVE.	10 Hz	94.95	59.27	35.68	54.00	-18.32
Low Channel, Packet Type 2-DH5										
0	2402	Horn	V	PK	1 MHz	103.81	61.56	42.25	74.00	-31.75
0	2402	Horn	H	PK	1 MHz	105.28	62.36	42.92	74.00	-31.08
0	2402	Horn	V	AVE.	10 Hz	94.50	61.56	32.94	54.00	-21.06
0	2402	Horn	H	AVE.	10 Hz	95.83	62.36	33.47	54.00	-20.53
High Channel, Packet Type 2-DH5										
78	2480	Horn	V	PK	1 MHz	102.15	57.11	45.04	74.00	-28.96
78	2480	Horn	H	PK	1 MHz	104.83	58.99	45.84	74.00	-28.16
78	2480	Horn	V	AVE.	10 Hz	92.29	57.11	35.18	54.00	-18.82
78	2480	Horn	H	AVE.	10 Hz	94.66	58.99	35.67	54.00	-18.33

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

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna 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 3-DH5										
0	2402	Horn	V	PK	1 MHz	105.23	64.46	40.77	74.00	-33.23
0	2402	Horn	H	PK	1 MHz	106.52	65.80	40.72	74.00	-33.28
0	2402	Horn	V	AVE.	10 Hz	98.25	64.46	33.79	54.00	-20.21
0	2402	Horn	H	AVE.	10 Hz	99.60	65.80	33.80	54.00	-20.20
High Channel, Packet Type 3-DH5										
78	2480	Horn	V	PK	1 MHz	103.91	60.90	43.01	74.00	-30.99
78	2480	Horn	H	PK	1 MHz	106.55	60.99	45.56	74.00	-28.44
78	2480	Horn	V	AVE.	10 Hz	96.69	60.90	35.79	54.00	-18.21
78	2480	Horn	H	AVE.	10 Hz	99.56	60.99	38.57	54.00	-15.43

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

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

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

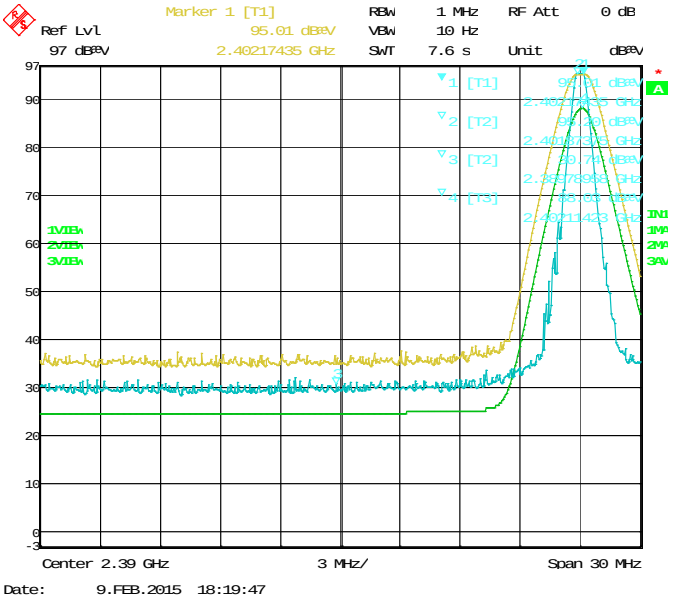


Figure 2-2: Band-Edge Compliance of RF Rad. Emi**ssions.**
Bluetooth, Single freq., Static PBRS,
DH5, Channel 0, Pol: H

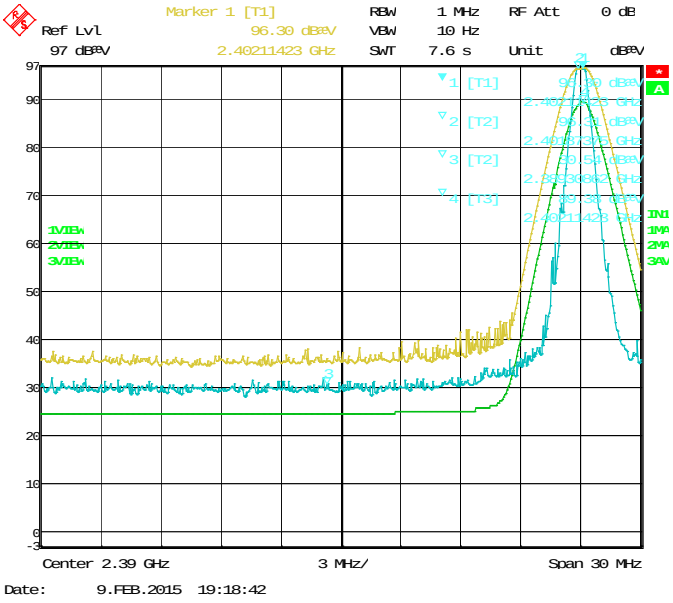


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRS,
DH5, Channel 78, Pol: V

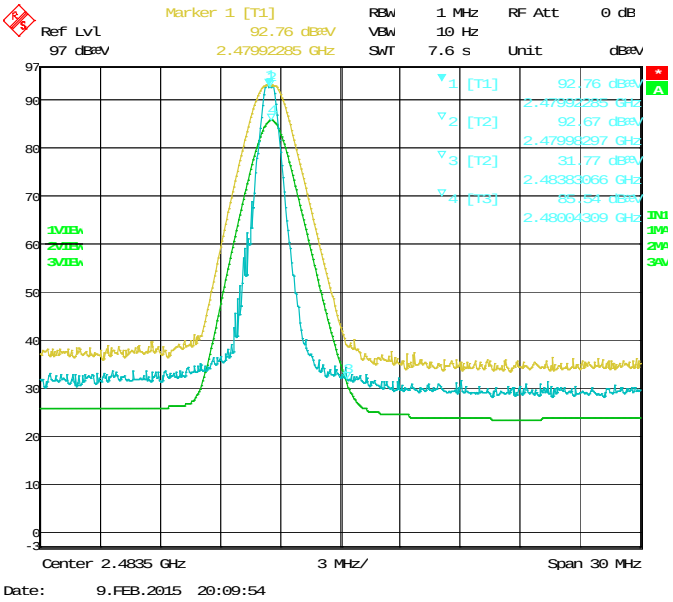
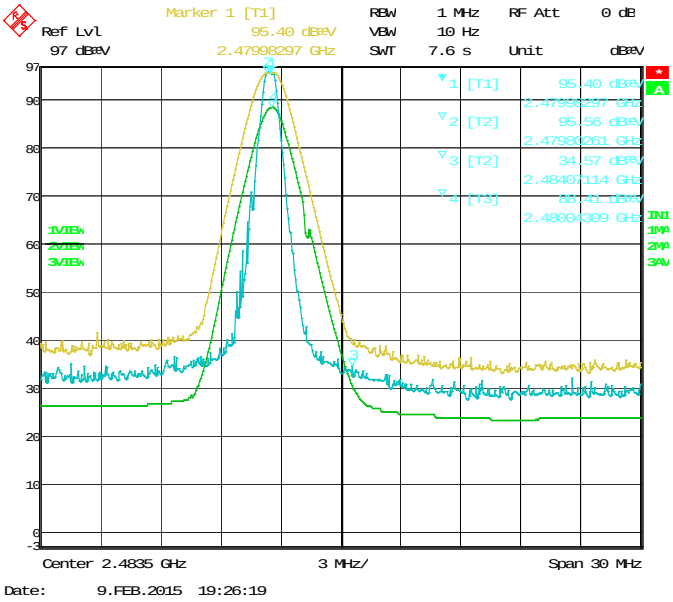


Figure 2-4: Band-Edge Compliance of RF Rad. Emissions
Bluetooth, Single freq., Static PBRS,
DH5, Channel 78, Pol: H



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

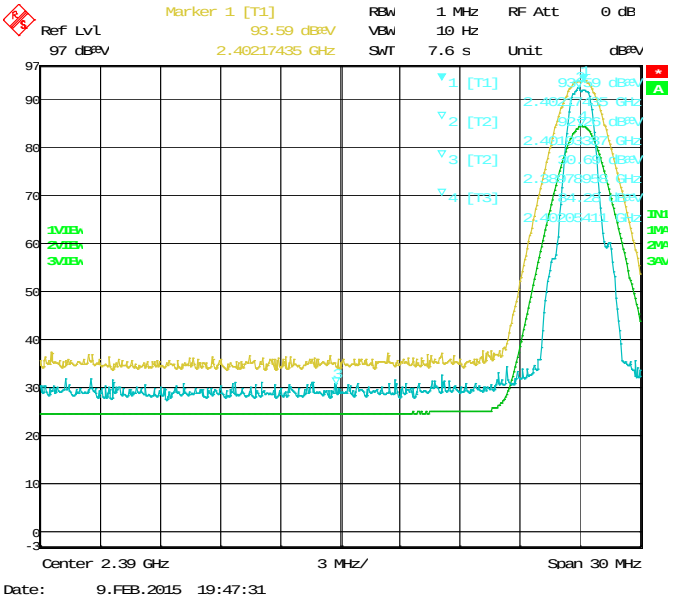


Figure 2-6: Band-Edge Compliance of RF Rad. Emissions. Bluetooth, Single freq., Static PBRS, 2-DH5, Channel 0, Pol: H

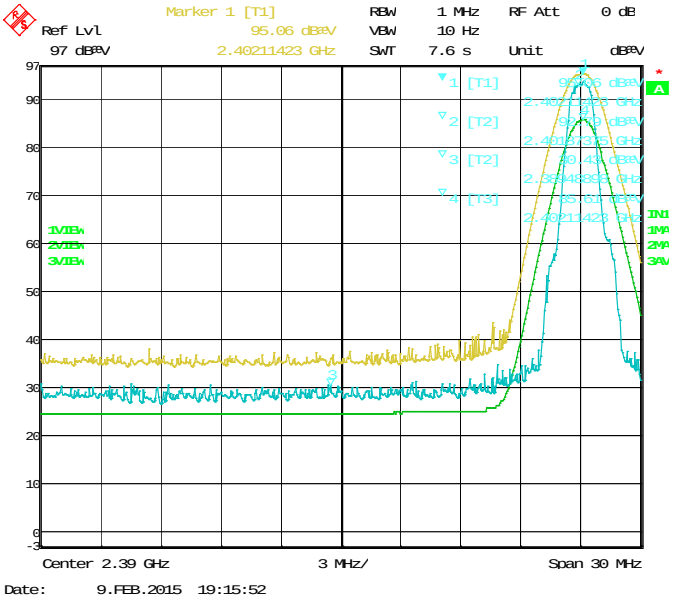


Figure 2-7: Band-Edge Compliance of RF Rad. Emissions. Bluetooth, Single freq., Static PBRS, 2-DH5, Channel 78, Pol: V

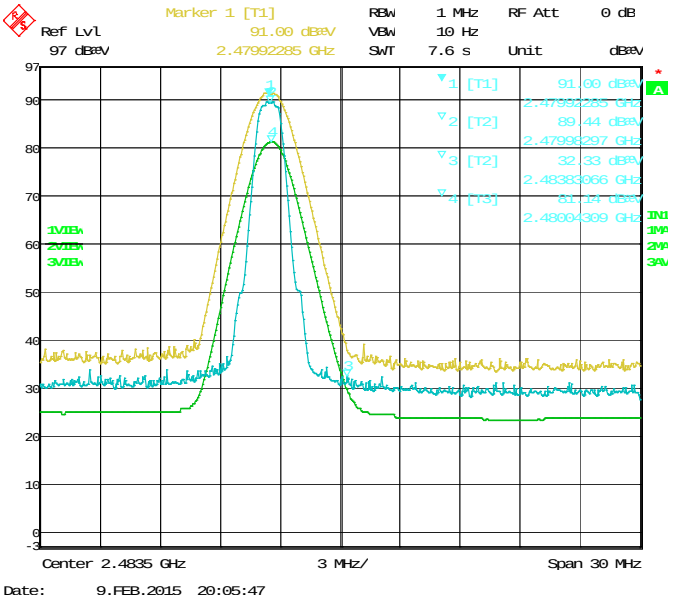
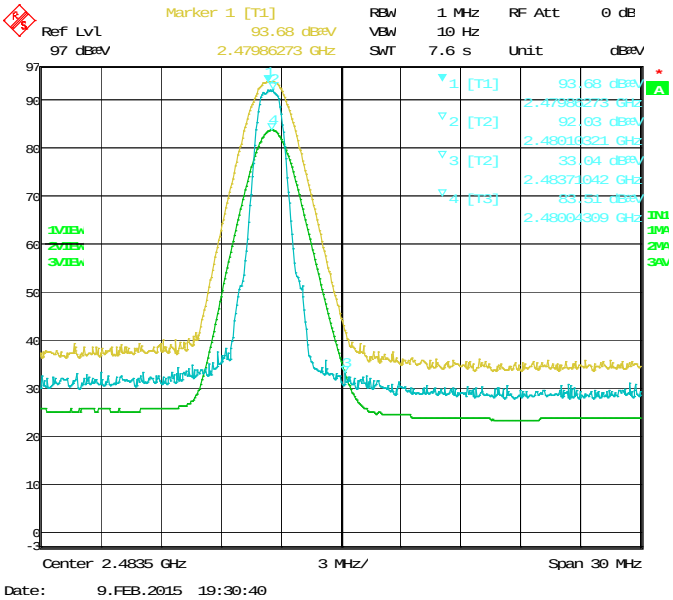


Figure 2-8: Band-Edge Compliance of RF Rad. Emissions. Bluetooth, Single freq., Static PBRS, 2-DH5, Channel 78, Pol: H



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

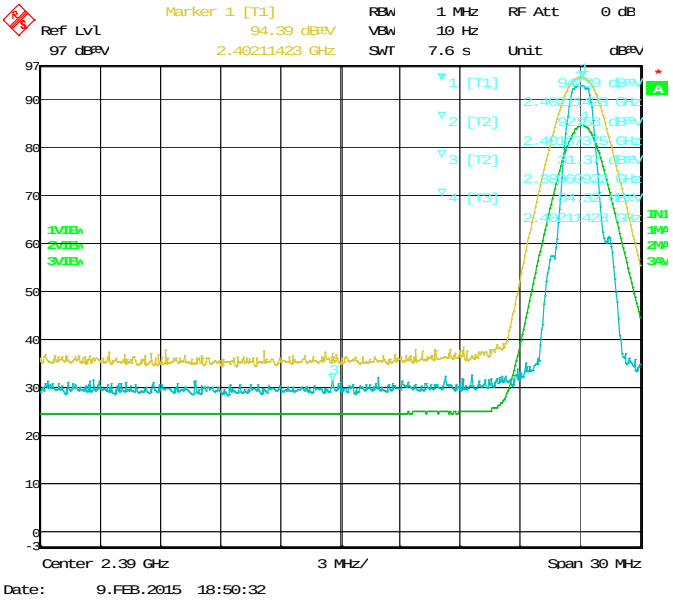


Figure 2-10: Band-Edge Compliance of RF Rad. Emissions. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 0, Pol: H

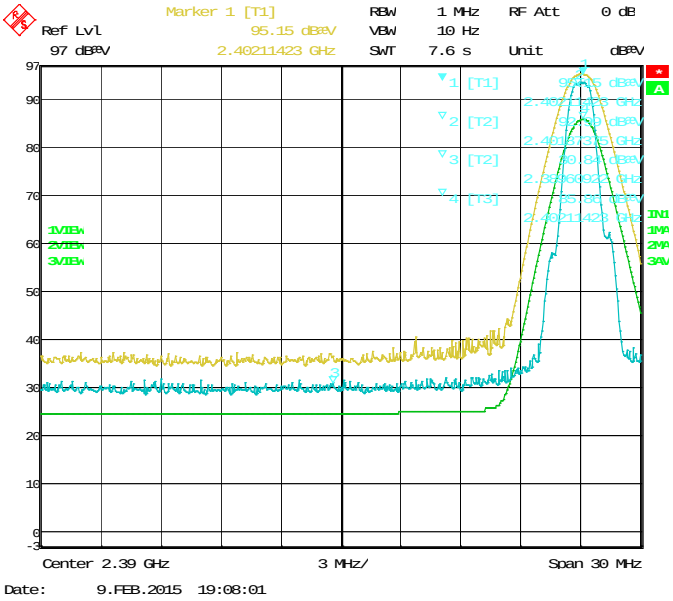


Figure 2-11: Band-Edge Compliance of RF Rad. Emissions. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 78, Pol: V

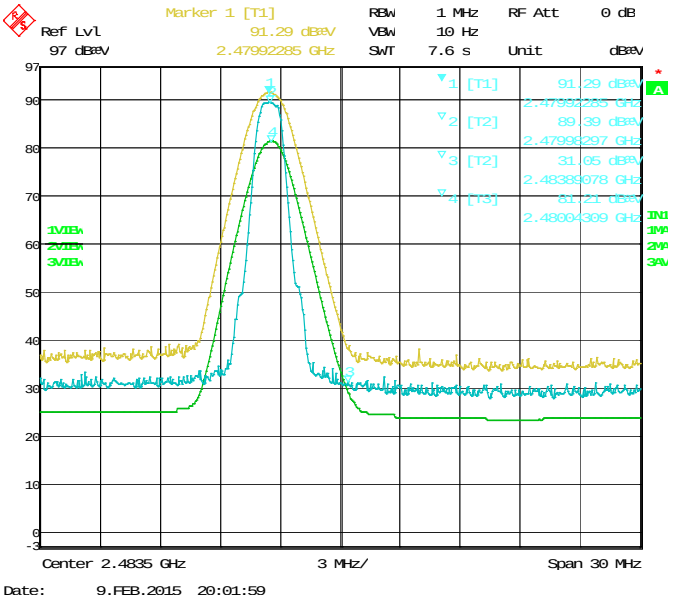
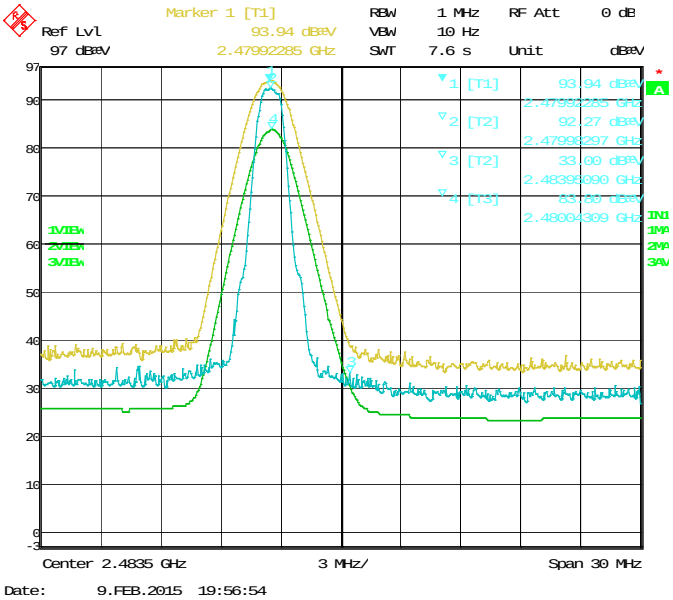


Figure 2-12: Band-Edge Compliance of RF Rad. Emissions. Bluetooth, Single freq., Static PBRS, 3-DH5, Channel 78, Pol: H



Radiated Emissions Test Results cont'd
Bluetooth Low Energy Band

Date of Test: February 6, 2015
Measurements were performed by Shiva Kumbham.

The environmental test conditions were: Temperature: 27.6 ºC
Relative Humidity: 5.2 %

The test distance was 3.0 meters with a EUT height of 1.5meters, and sweep frequency of 30 MHz to 1 GHz.

The BlackBerry® smartphone in Bluetooth Low Energy TX mode was in volume key up 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: February 24, 2015
Measurements were performed by Winston Vernon.

The environmental test conditions were: Temperature: 24.5ºC
Relative Humidity: 15.3%

The test distance was 3.0 meters with a EUT height of 1.5 meters, and sweep frequency of 1GHz to 25GHz.

The BlackBerry® smartphone in Bluetooth Low Energy TX mode was in horizontal up 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 dB.

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

Date of test: February 9, 2015
Measurements were performed by Shiva Kumbham.

The environmental test conditions were: Temperature: 26.4º C
Relative Humidity: 6.7 %

The BlackBerry® smartphone was in volume key up position.

The test distance was 3.0 meters.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	Detector	VBW	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
Low Channel, LE										
0	2402	Horn	V	PK	1 MHz	104.02	61.32	42.70	74.00	-31.30
0	2402	Horn	H	PK	1 MHz	104.83	64.22	40.61	74.00	-33.39
0	2402	Horn	V	AVE.	10 Hz	99.04	61.32	37.72	54.00	-16.28
0	2402	Horn	H	AVE.	10 Hz	99.85	64.22	35.63	54.00	-18.37
High Channel, LE										
39	2480	Horn	V	PK	1 MHz	101.78	58.96	42.82	74.00	-31.18
39	2480	Horn	H	PK	1 MHz	104.56	59.10	45.46	74.00	-28.54
39	2480	Horn	V	AVE.	10 Hz	97.00	58.96	38.04	54.00	-15.96
39	2480	Horn	H	AVE.	10 Hz	99.44	59.10	40.34	54.00	-13.66

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

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

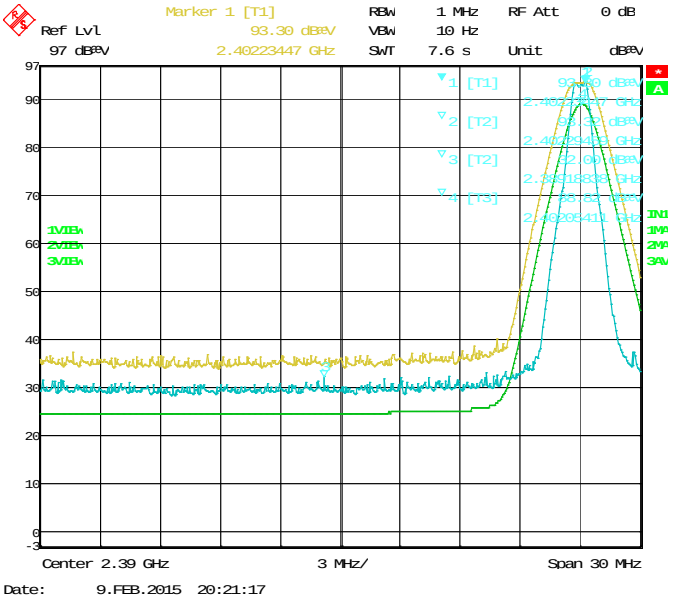


Figure 2-14: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth Low Energy, Single freq.,
LE, Channel 0, Pol: H

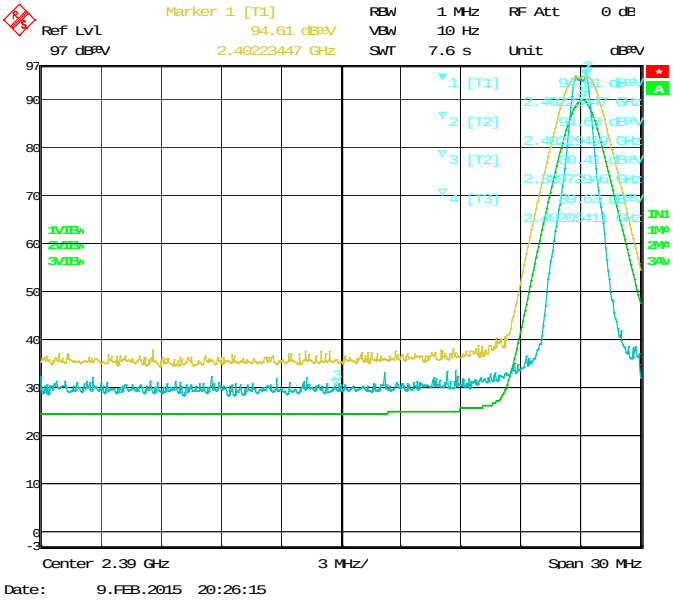


Figure 2-15: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth Low Energy, Single freq.,
LE, Channel 39, Pol: V

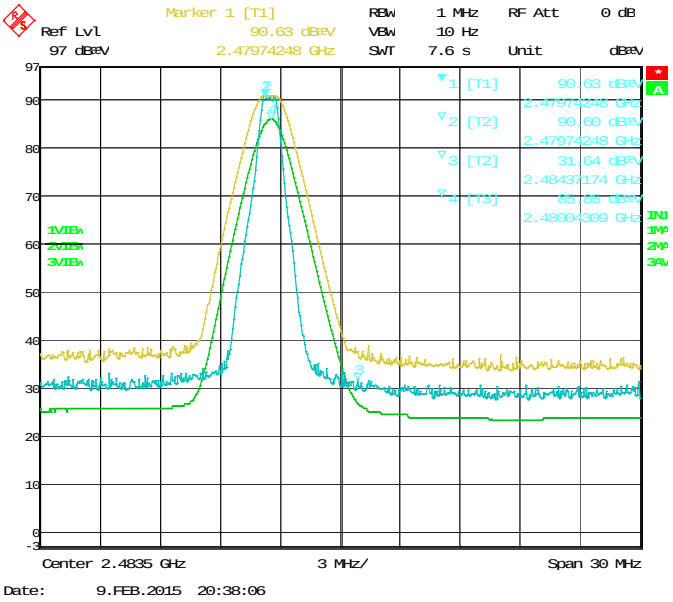
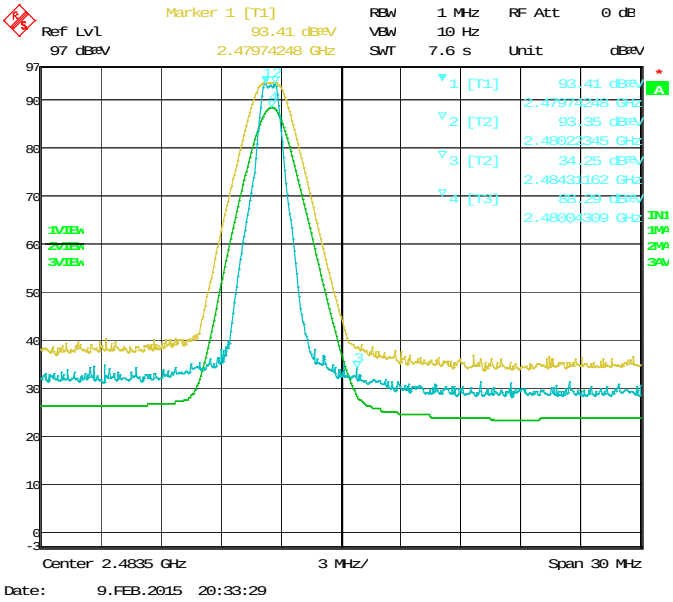


Figure 2-16: Band-Edge Compliance of RF Rad. Emissions
Bluetooth Low Energy, Single freq.,
LE, Channel 39, Pol: H



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

Date of Test: February 9, 2015
Measurements performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 27.3 ºC
Relative Humidity: 4.6%

The test distance was 3.0 meters with a EUT height of 1.5 meters, and sweep frequency of 30 MHz to 1 GHz.

The BlackBerry® smartphone was in volume key up position.

The frequency sweep measurements were performed in 802.11b TX mode at 1 Mbps on channels 1, 6 and 11, in 802.11g TX mode at 6 Mbps on channels 1, 6 and 11, and in 802.11n TX mode at MCS 0 on channels 1, 6 and 11.

All emissions had a test margin of greater than 25dB.

Date of Test: February 18, and February 25, 2015
Measurements performed by Kevin Guo.

The environmental test conditions were: Temperature: 24.3 ºC
Relative Humidity: 15.1 %

The test distance was 3.0 meters with a EUT height of 1.5 meters, and sweep frequency of 1GHz to 25GHz.

The BlackBerry® smartphone was in horizontal up position.

The frequency sweep measurements were performed in 802.11b TX mode at 1 Mbps on channels 1, 6 and 11, in 802.11g TX mode at 6 Mbps on channels 1, 6 and 11, and in 802.11n TX mode at MCS 0 on channels 1, 6 and 11.

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

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

Date of Tests: February 10, 2015
Measurements performed by Shiva kumbham.

The environmental test conditions were: Temperature: 23.1 ºC
Relative Humidity: 16.7 %

802.11b Band

The measurements were performed on BlackBerry® smartphone in standalone, volume key up configuration on channels 1 and 11 for 802.11b mode at 1 Mbps.

The test distance was 3 meters.

Channel	Freq.	Rx Antenna		Detector	VBW For Peak	Corrected Band edge	Limit	Diff. To Limit
	(MHz)	Type	POL.	(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
Low channel 802.11b,1Mbps								
1.0	2412.00	Horn	V	PK	1 MHz	47.39	74.00	-26.61
1.0	2412.00	Horn	H	PK	1 MHz	46.88	74.00	-27.12
1.0	2412.00	Horn	V	AV	10 Hz	35.18	54.00	-18.82
1.0	2412.00	Horn	H	AV	10 Hz	35.18	54.00	-18.82
High channel 802.11b,1Mbps								
11.0	2462.00	Horn	V	PK	1 MHz	50.42	74.00	-23.58
11.0	2462.00	Horn	H	PK	1 MHz	50.75	74.00	-23.25
11.0	2462.00	Horn	V	AV	10 Hz	39.03	54.00	-14.97
11.0	2462.00	Horn	H	AV	10 Hz	39.03	54.00	-14.97

802.11g Band

The measurements were performed on the BlackBerry® smartphone in standalone, volume key up configuration on channels 1 and 11 for 802.11g mode at 6 Mbps.

The test distance was 3 meters.

Channel	Freq.	Rx Antenna		Detector	VBW For Peak	Corrected Band edge	Limit	Diff. To Limit
	(MHz)	Type	POL.	(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
Low channel 802.11g,6Mbps								
1.0	2412.00	Horn	V	PK	1 MHz	51.65	74.00	-22.35
1.0	2412.00	Horn	H	PK	1 MHz	52.26	74.00	-21.74
1.0	2412.00	Horn	V	AV	10 Hz	38.56	54.00	-15.44
1.0	2412.00	Horn	H	AV	10 Hz	38.56	54.00	-15.44
High channel 802.11g,6Mbps								
11.0	2462.00	Horn	V	PK	1 MHz	53.78	74.00	-20.22
11.0	2462.00	Horn	H	PK	1 MHz	54.47	74.00	-19.53
11.0	2462.00	Horn	V	AV	10 Hz	41.67	54.00	-12.33
11.0	2462.00	Horn	H	AV	10 Hz	42.58	54.00	-11.42

802.11n Band

The measurements were performed on the BlackBerry® smartphone in standalone, volume key up configuration on channels 1 and 11 for 802.11n mode at MCS 0.

The test distance was 3 meters.

Channel	Freq. (MHz)	Rx Antenna Type	Rx Antenna POL.	Detector (MHz)	VBW For Peak (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
Low channel 802.11n, MCS0								
1.0	2412.00	Horn	V	PK	1 MHz	53.03	74.00	-20.97
1.0	2412.00	Horn	H	PK	1 MHz	52.26	74.00	-21.74
1.0	2412.00	Horn	V	AV	10 Hz	38.56	54.00	-15.44
1.0	2412.00	Horn	H	AV	10 Hz	38.56	54.00	-15.44
High channel 802.11n, MCS0								
11.0	2462.00	Horn	V	PK	1 MHz	54.67	74.00	-19.33
11.0	2462.00	Horn	H	PK	1 MHz	56.57	74.00	-17.43
11.0	2462.00	Horn	V	AV	10 Hz	41.67	54.00	-12.33
11.0	2462.00	Horn	H	AV	10 Hz	43.41	54.00	-10.59

See figures 2-17 to 2-20 for the plots of the 802.11b band-edge compliance.
See figures 2-21 to 2-24 for the plots of the 802.11g band-edge compliance.
See figures 2-25 to 2-28 for the plots of the 802.11n band-edge compliance.

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

Figure 2-17: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 1, 2412 MHz, Max Pol: V

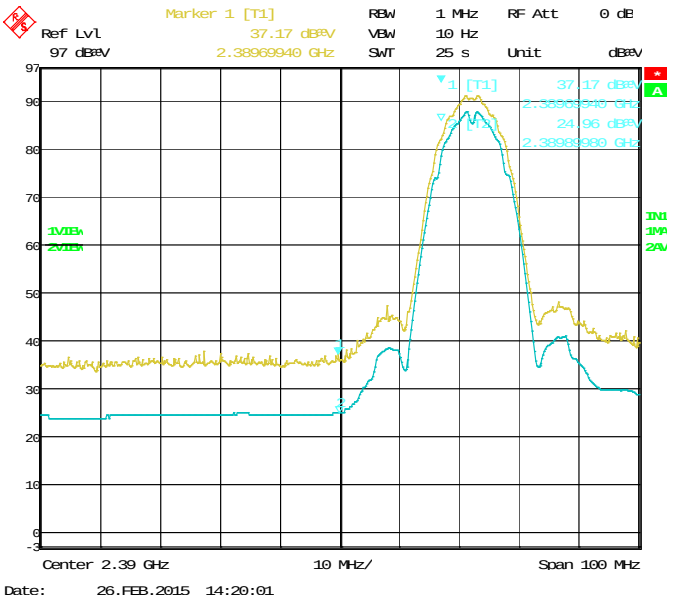


Figure 2-18: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 1, 2412 MHz, Max Pol: H

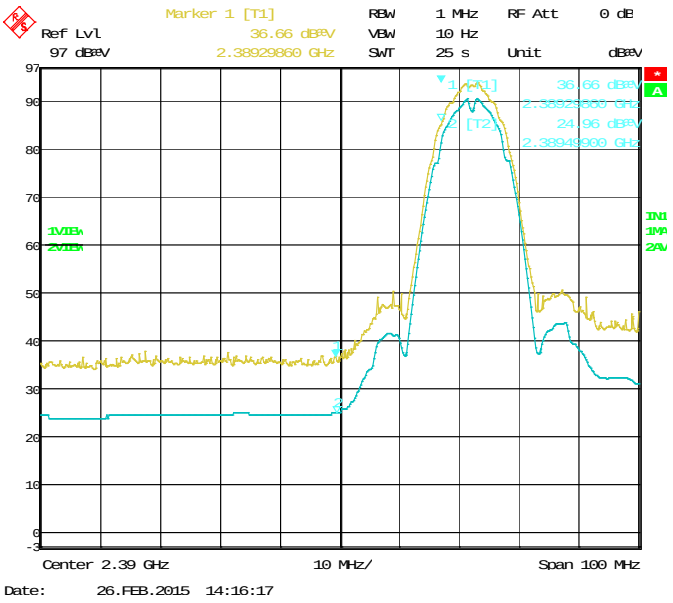


Figure 2-19: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 11, 2462 MHz, Max Pol: V

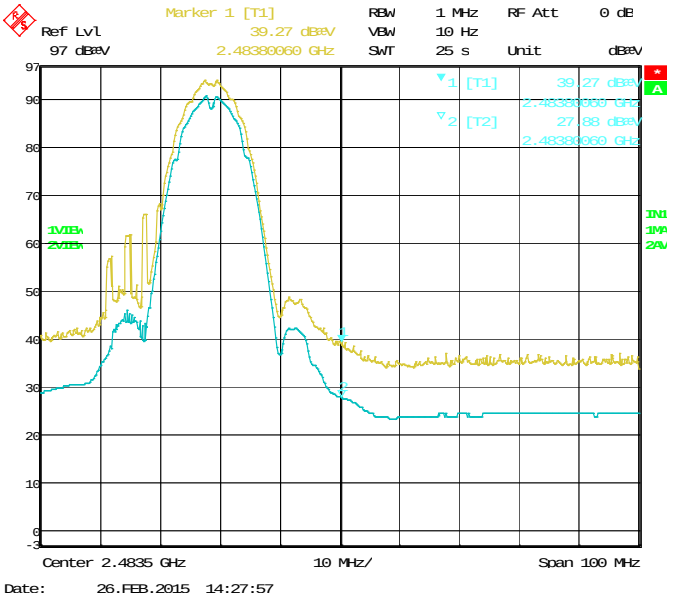


Figure 2-20: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 11, 2462 MHz, Max Pol: H

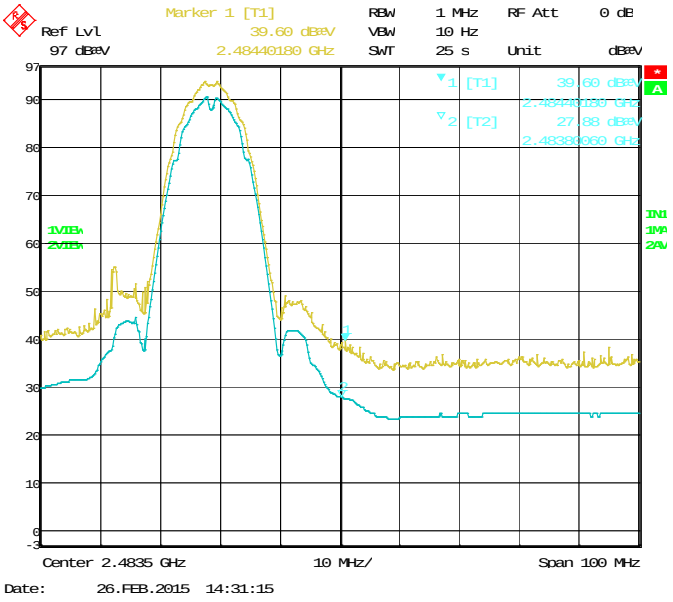


Figure 2-21: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 1, 2412 MHz, Max Pol: V

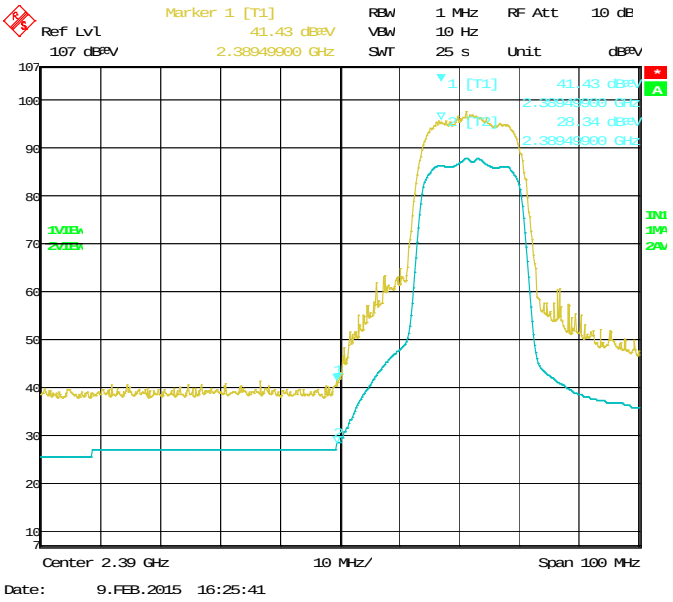


Figure 2-22: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 1, 2412 MHz, Max Pol: H

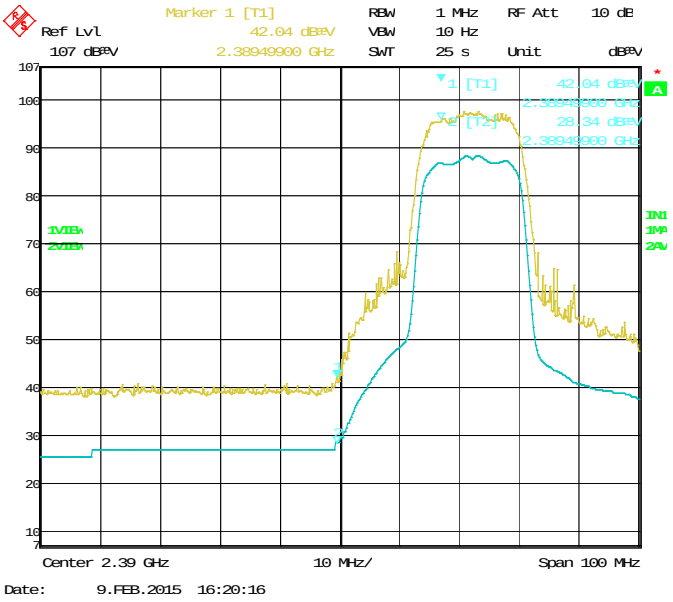


Figure 2-23: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 11, 2462 MHz, Max Pol: V

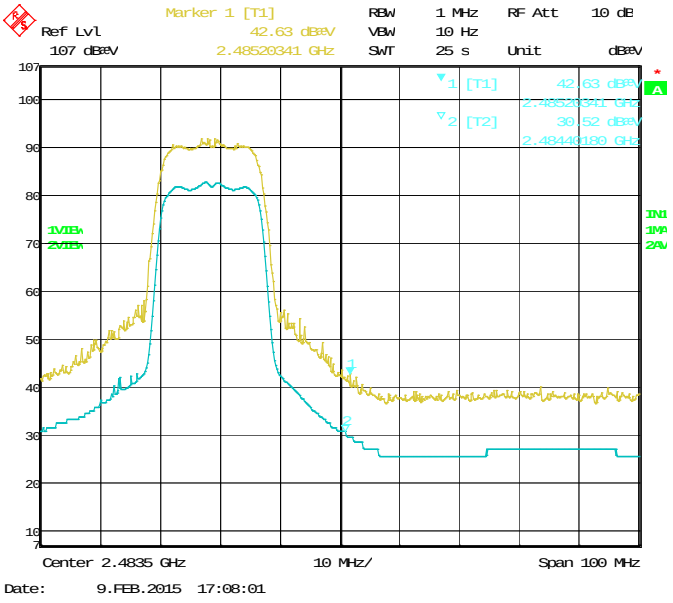


Figure 2-24: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 11, 2462 MHz, Max Pol: H

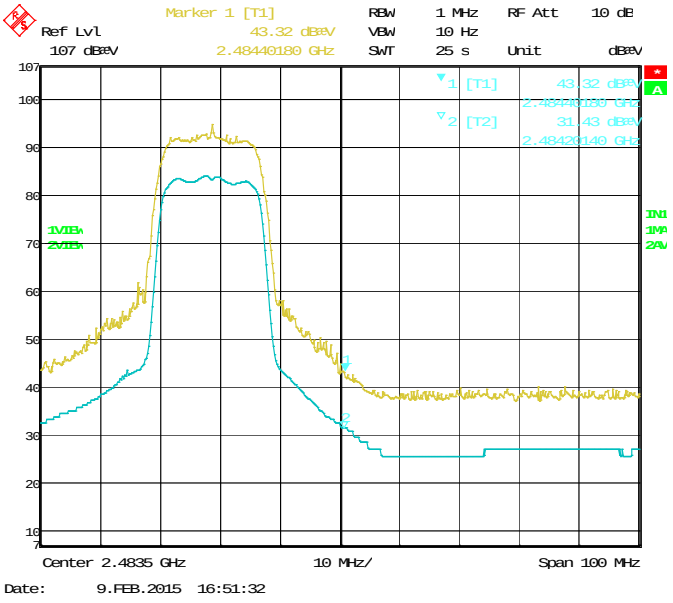


Figure 2-25: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 1, 2412 MHz, Max Pol: V

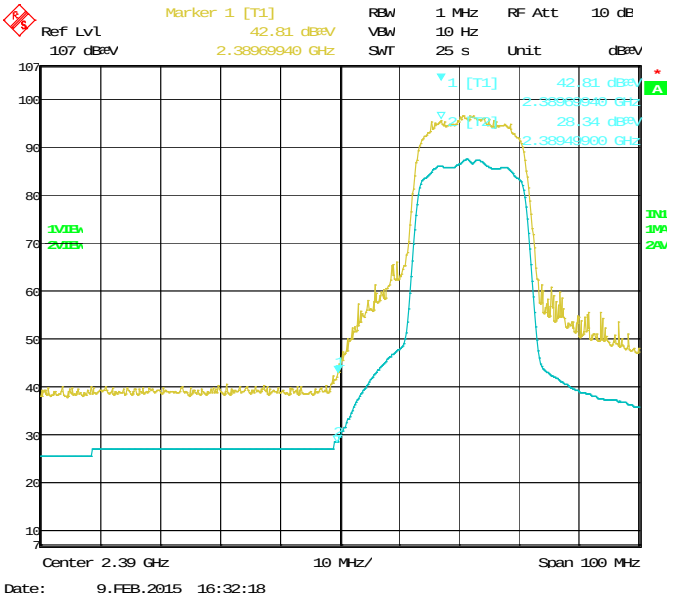


Figure 2-26: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 1, 2412 MHz, Max Pol: H

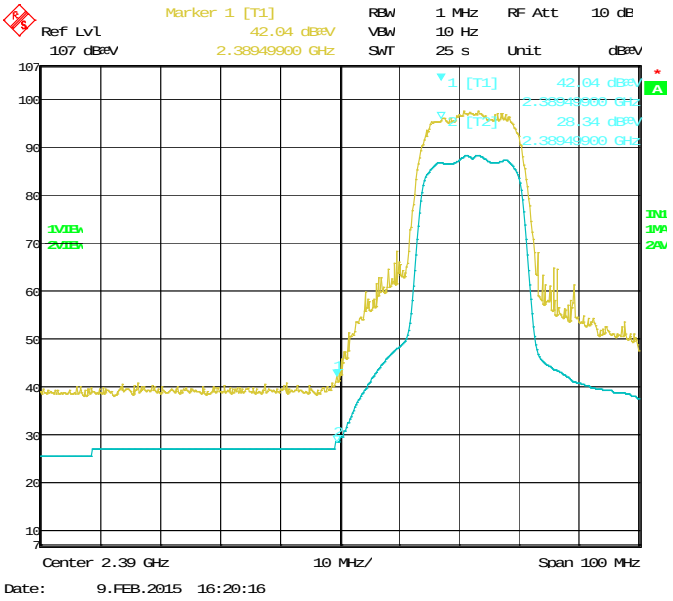


Figure 2-27: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 11, 2462 MHz, Max Pol: V

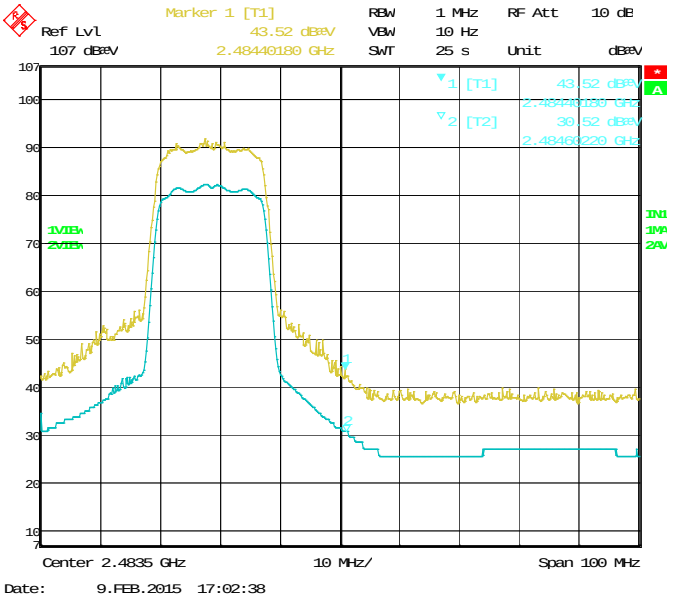
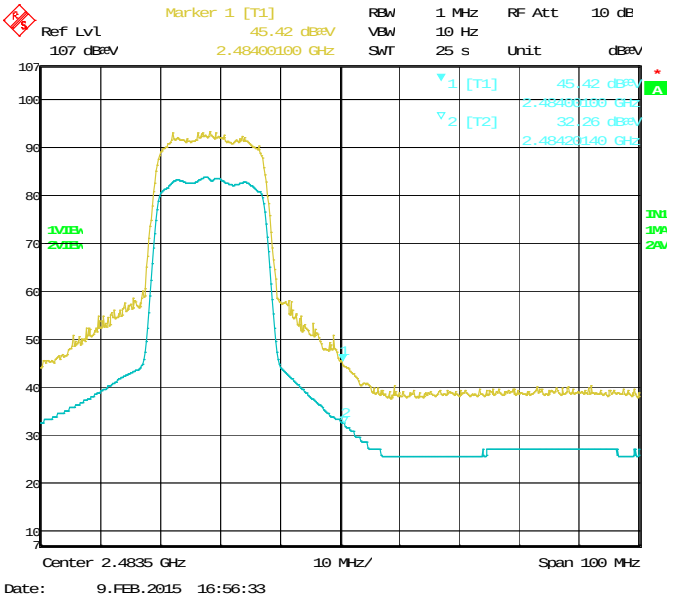


Figure 2-28: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 11, 2462 MHz, Max Pol: H



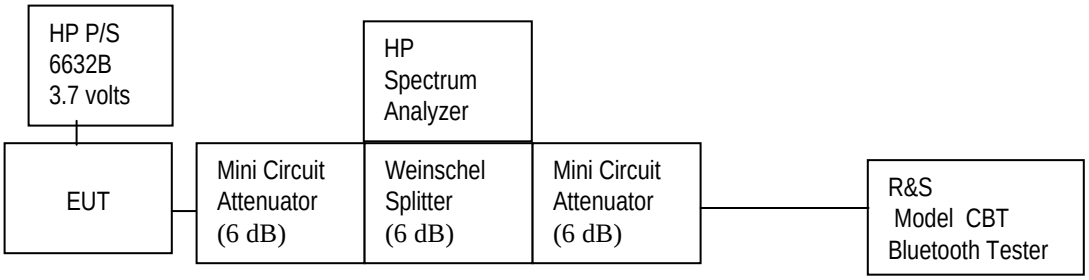
APPENDIX 3 – BLUETOOTH AND BLUETOOTH LOW ENERGY CONDUCTED EMISSIONS TEST DATA/PLOTS

Bluetooth RF Conducted Emission Test Results

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

Date of test: February 11, 2015

Test Setup Diagram



UNIT	MANUFACTURER	MODEL	SERIAL NUMBER
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: 24.8 ºC
Relative Humidity: 33.5 %

Bluetooth RF Conducted Emission Test Results cont'd

20 dB Bandwidth

The EUT met the requirements of the 20 dB bandwidth as per 47 CFR 15.247(a) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode.

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

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.0	0.922
39	≤1.0	**0.924**
78	≤1.0	0.922

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

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

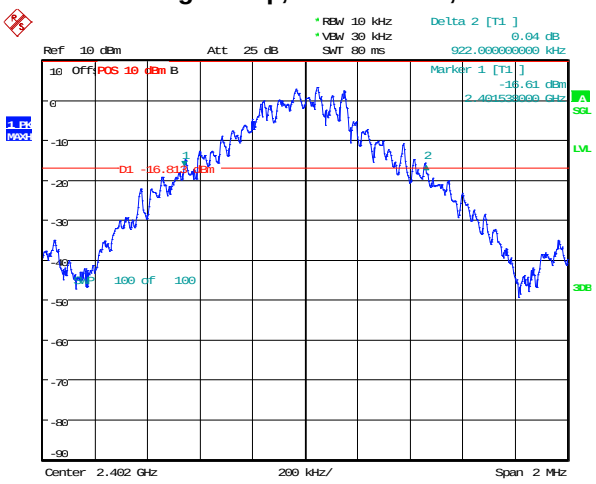
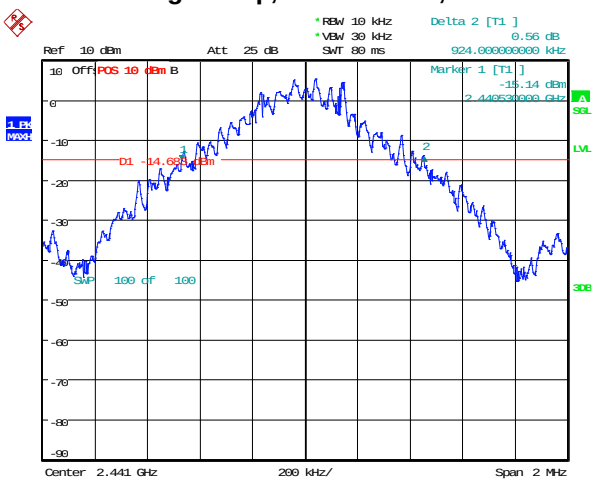


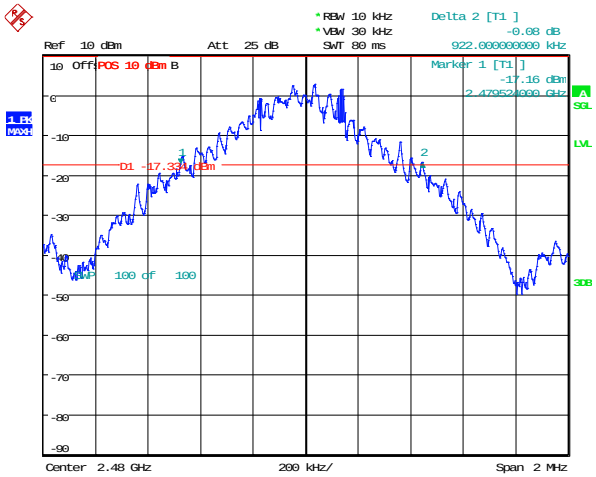
Figure 3-2: 20 dB Bandwidth
Single freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-3: 20 dB Bandwidth

Single freq., Static PBRS, DH5



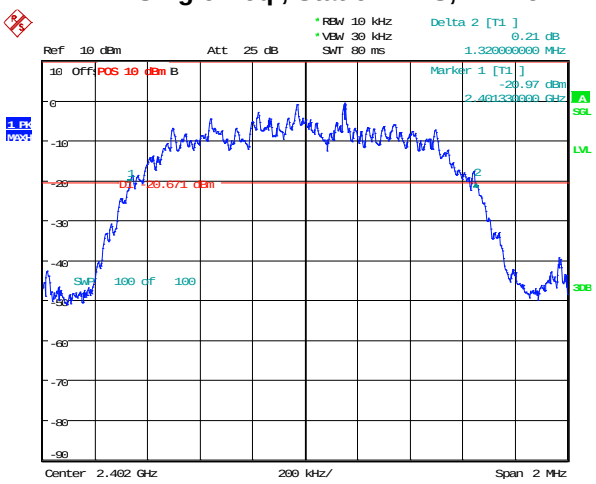
Using Pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.320
39	≤1.5	1.318
78	≤1.5	1.318

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

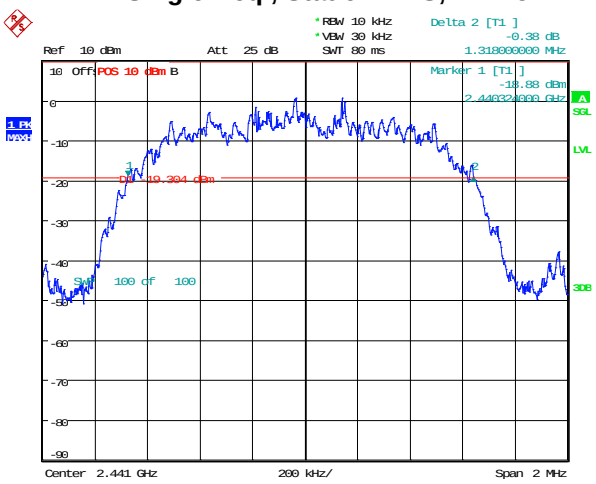
Bluetooth RF Conducted Emission Test Results cont'd

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



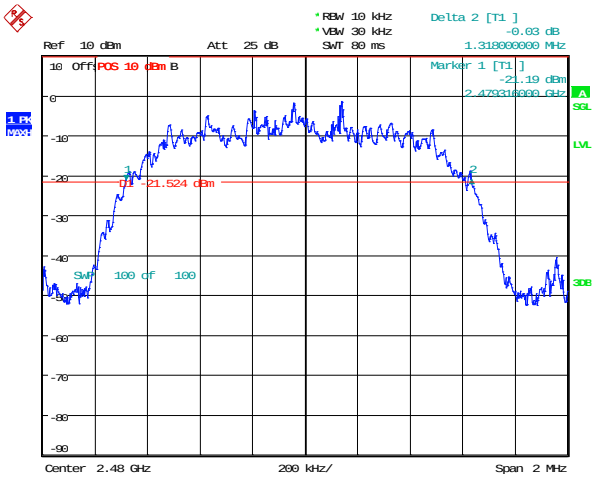
Date: 11.FEB.2015 12:39:28

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



Date: 11.FEB.2015 12:39:42

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



Date: 11.FEB.2015 12:39:56

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

Bluetooth Channel	Limit (MHz)	Measured Level (MHz)
0	≤1.5	1.336
39	≤1.5	**1.338**
78	≤1.5	1.316

See figures 5-7 to 5-9 for the plots of the 20 dB bandwidth measurements.

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

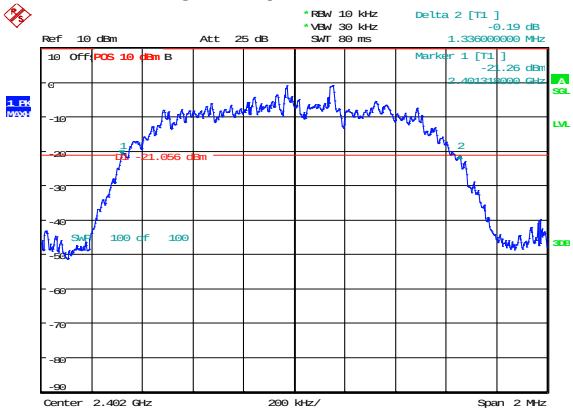


Figure 3-8: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5

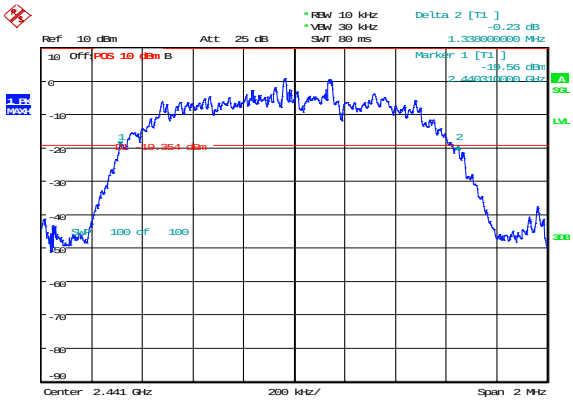
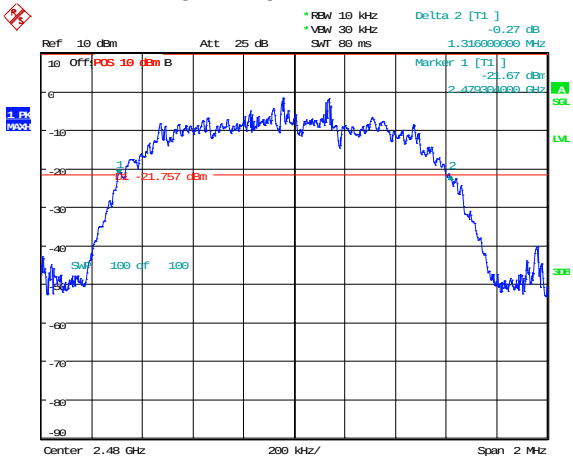


Figure 3-9: 20 dB Bandwidth
Single freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

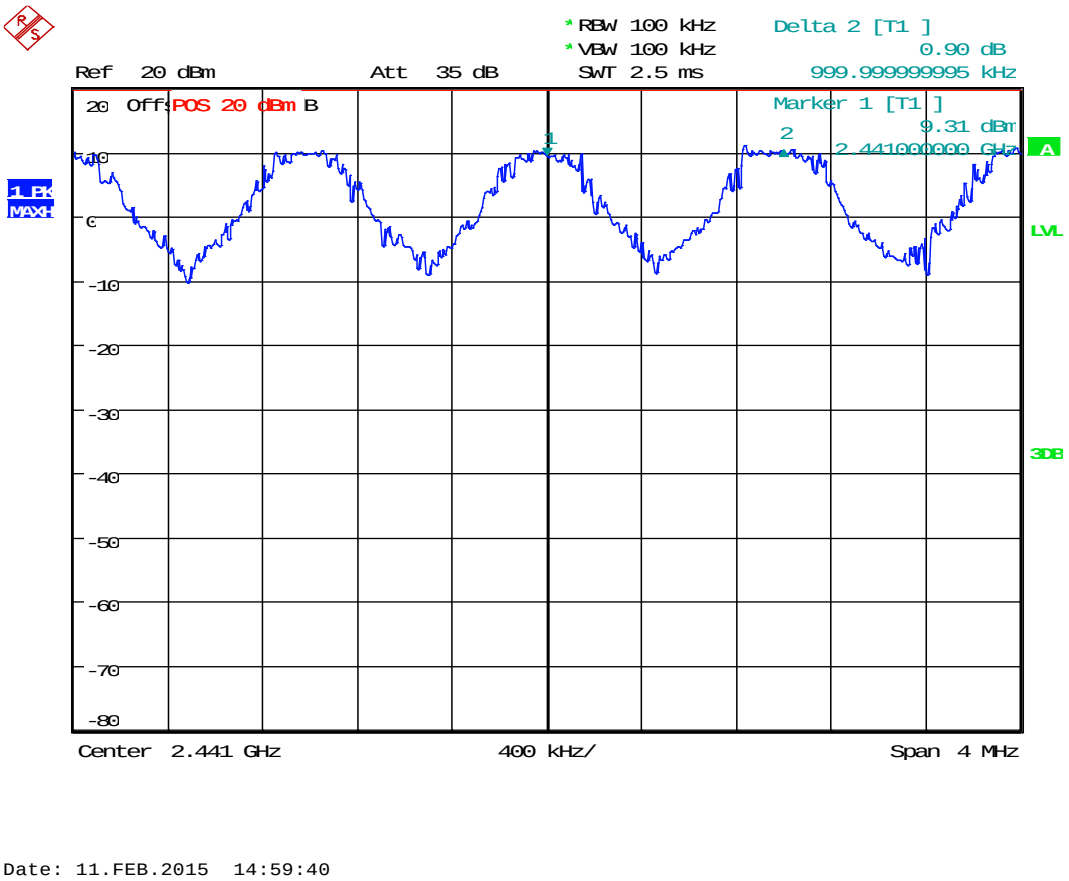
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.

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

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

See figure 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



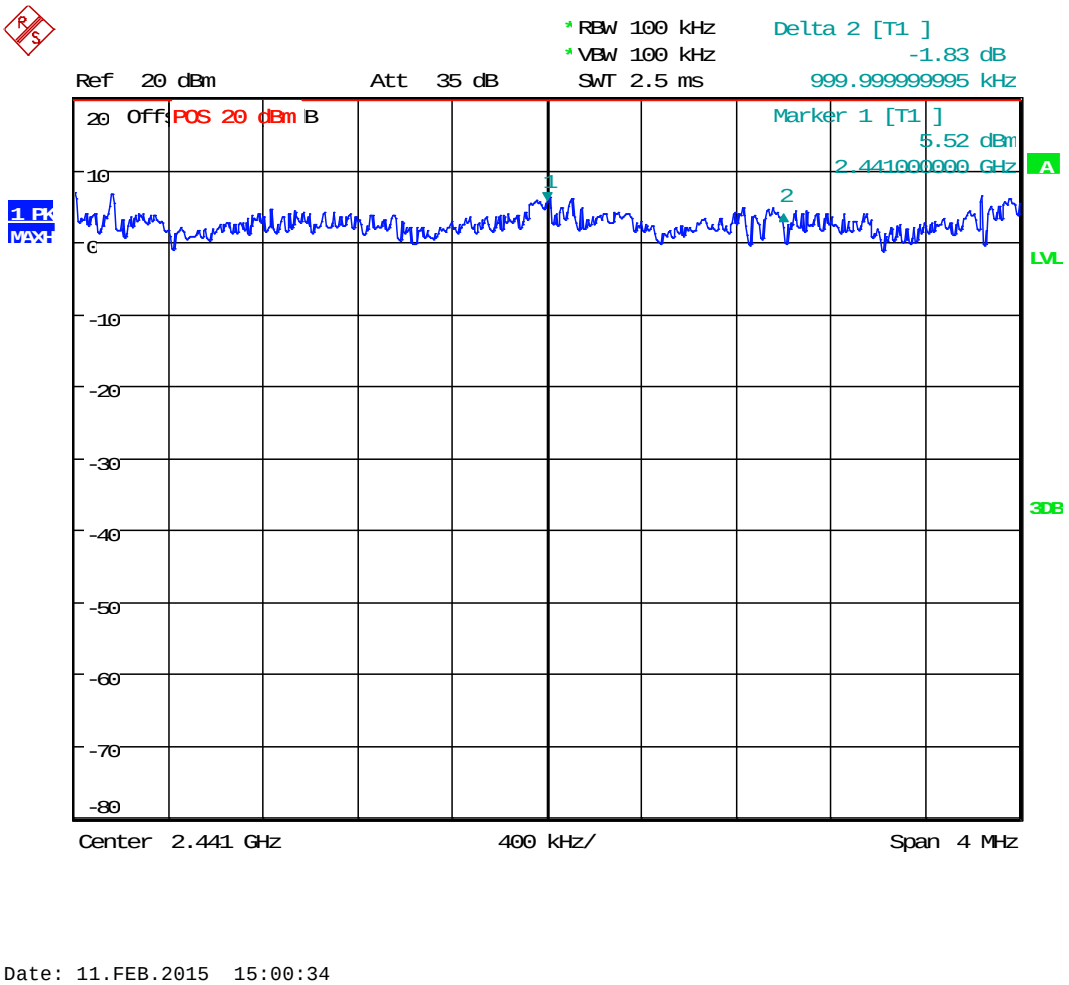
Bluetooth RF Conducted Emission Test Results cont'd

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

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

See figure 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



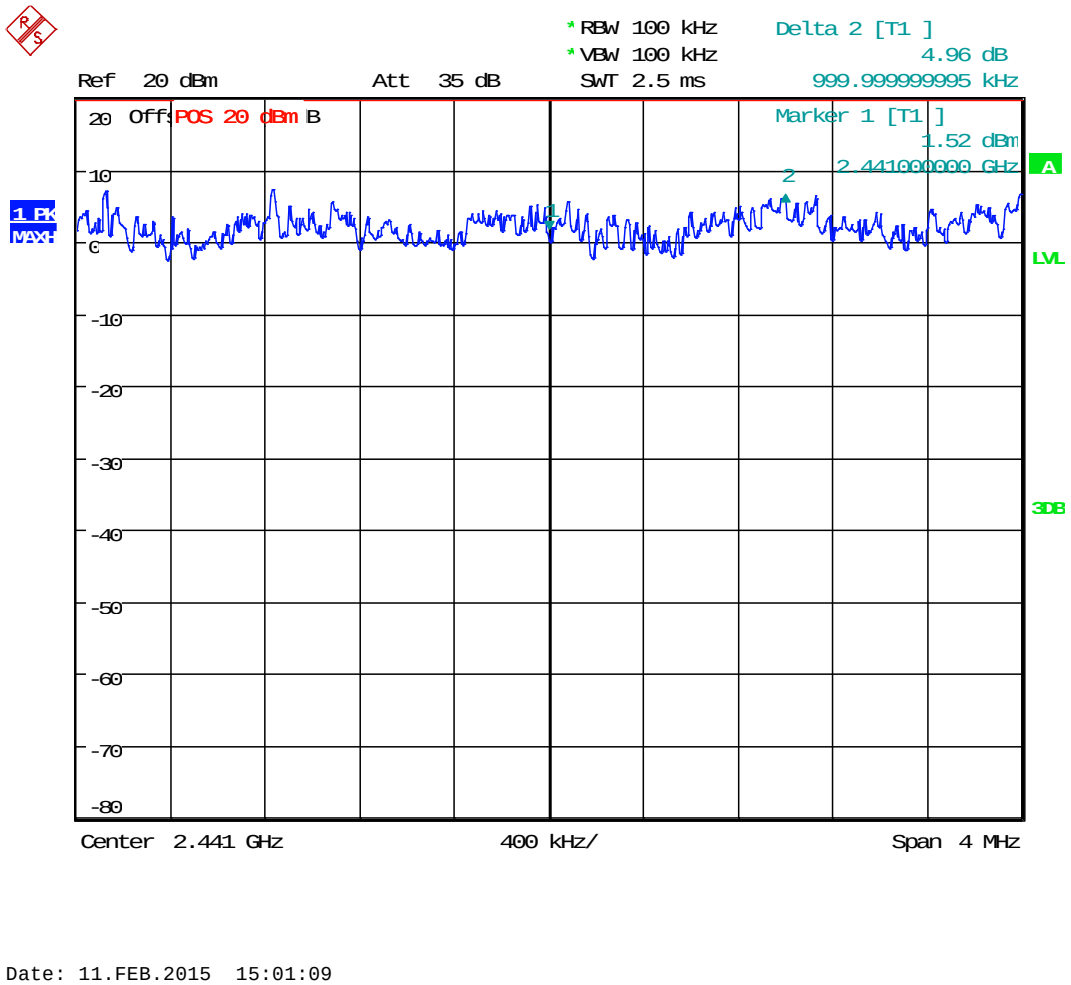
Bluetooth RF Conducted Emission Test Results cont'd

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

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

See figure 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



Bluetooth RF Conducted Emission Test Results cont'd

Number of Hopping Frequencies

The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. Bluetooth was operating in frequency hopping (Euro/US) mode.

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

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

See figures 5-13 to 5-16 for the plots of the number of hopping frequencies.

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

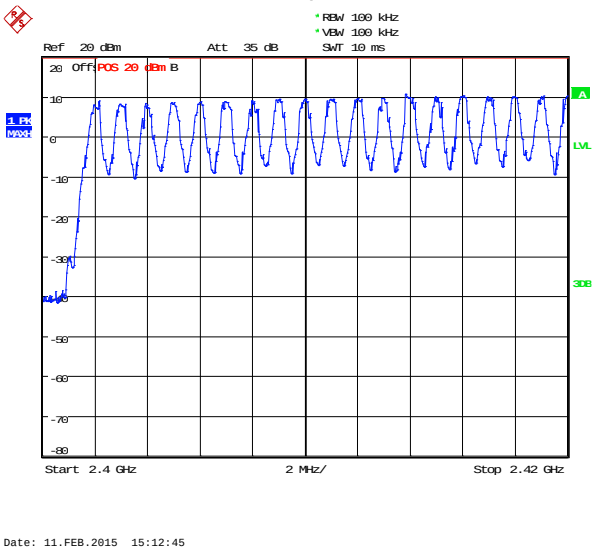
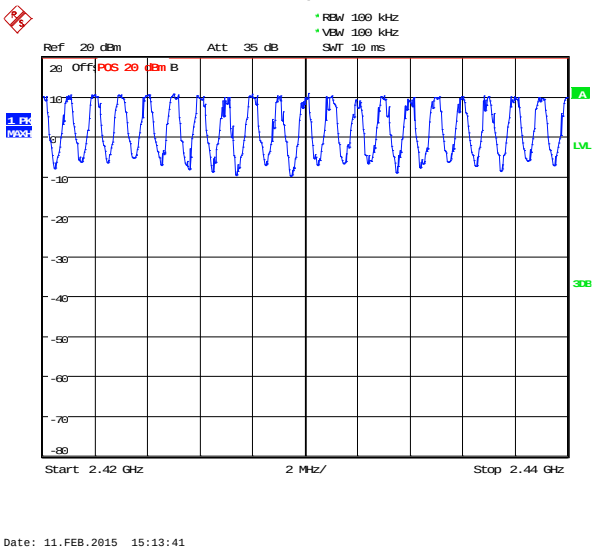


Figure 3-14: Number of Hopping Frequencies Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

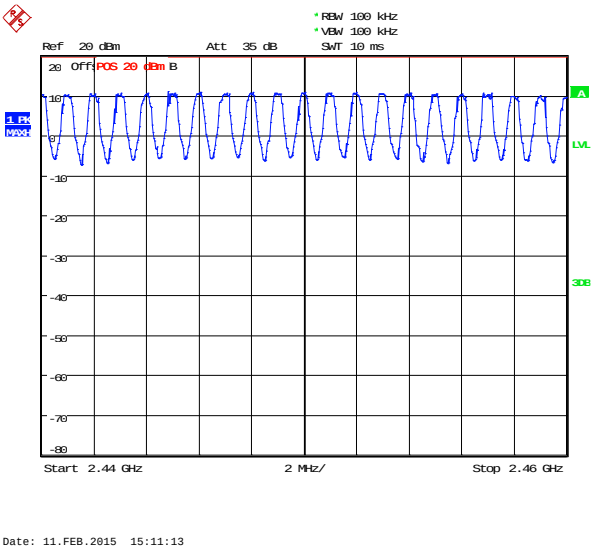
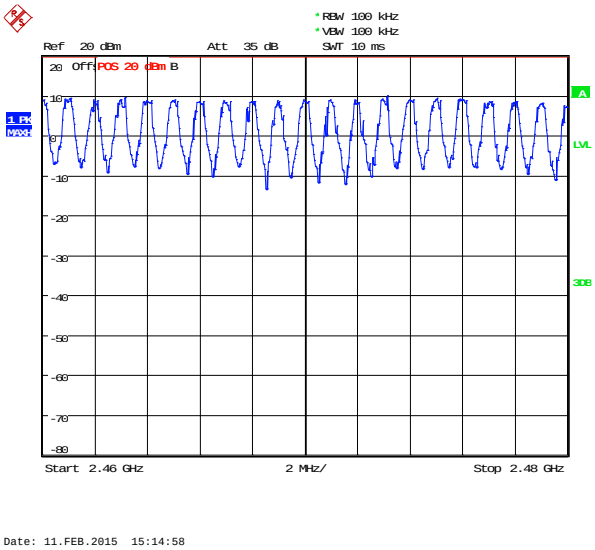


Figure 3-16: Number of Hopping Frequencies
Static PBRS, DH5



Time of Occupancy (Dwell Time)

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

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

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

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

Bluetooth Channel	Mode	TX Time (ms)	Dwell Time/31.6 sec. (msec.)	Limit (msec.)	Margin (msec.)
0	DH1	0.3970	0.397 x 320.0 = 127.04	400	272.96
39	DH1	0.3960	0.396 x 320.0 = 126.72	400	273.28
78	DH1	0.3940	0.394 x 320.0 = 126.08	400	273.92
0	DH3	1.6880	1.688 x 159.9 = 269.91	400	130.09
39	DH3	1.6800	1.68 x 159.9 = 268.63	400	131.37
78	DH3	1.6800	1.68 x 159.9 = 268.63	400	131.37
0	DH5	2.9400	2.94 x 106.8 = 313.99	400	86.01
39	DH5	2.9500	2.95 x 106.8 = 315.06	400	84.94
78	DH5	2.9300	2.93 x 106.8 = 312.92	400	87.08

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

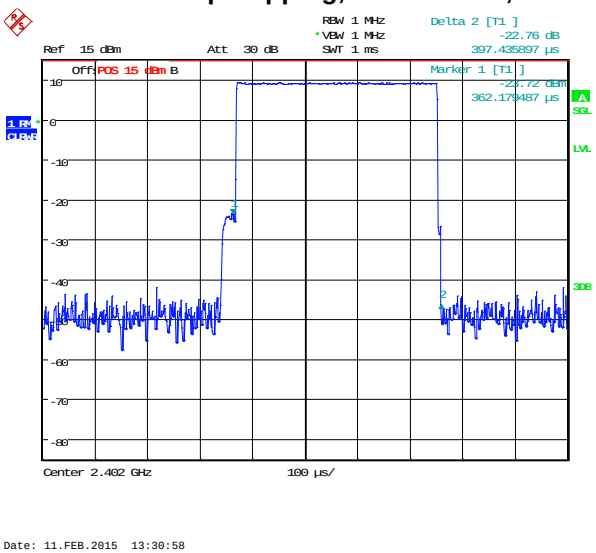


Figure 3-18: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

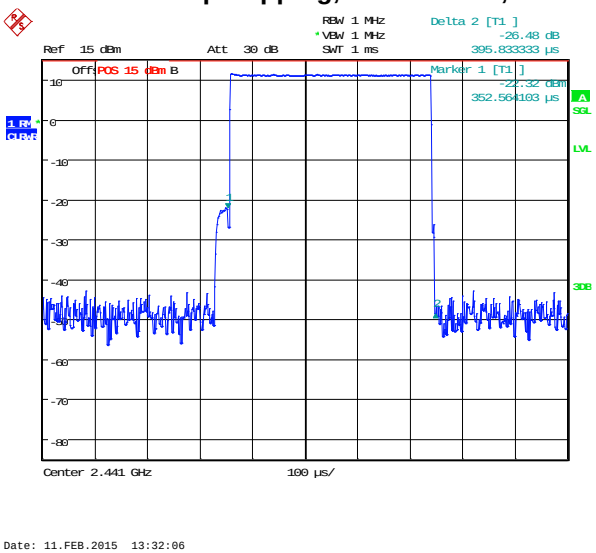


Figure 3-19: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

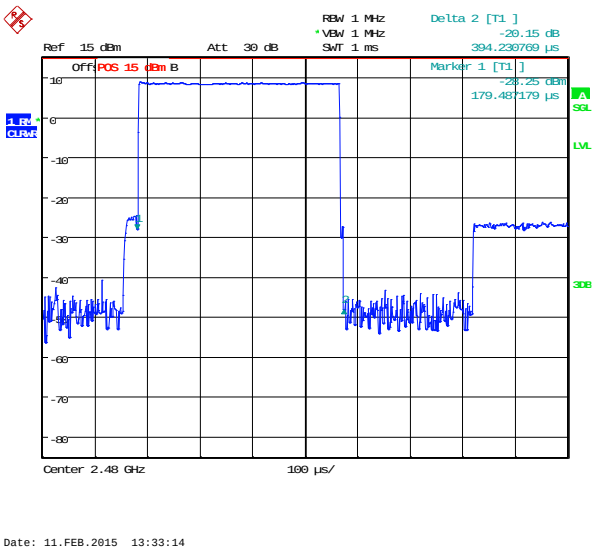
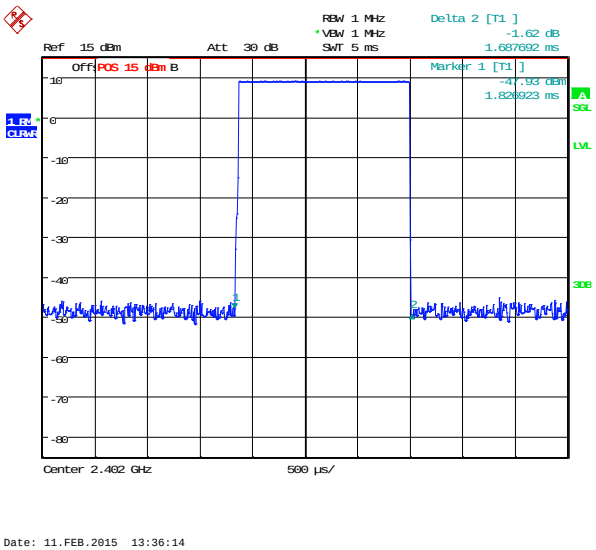


Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3



Bluetooth RF Conducted Emission Test Results cont'd

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

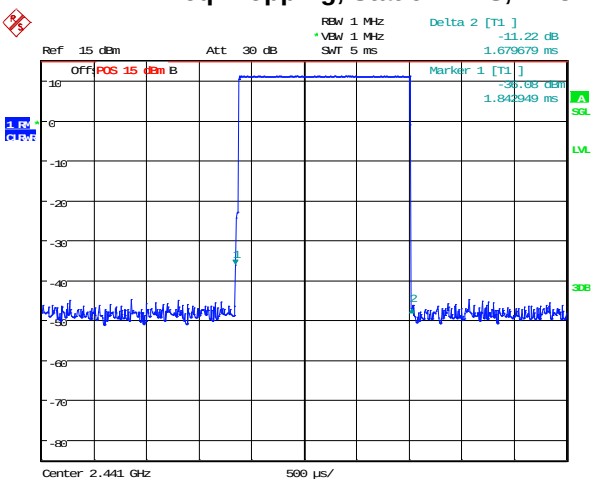


Figure 3-22: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

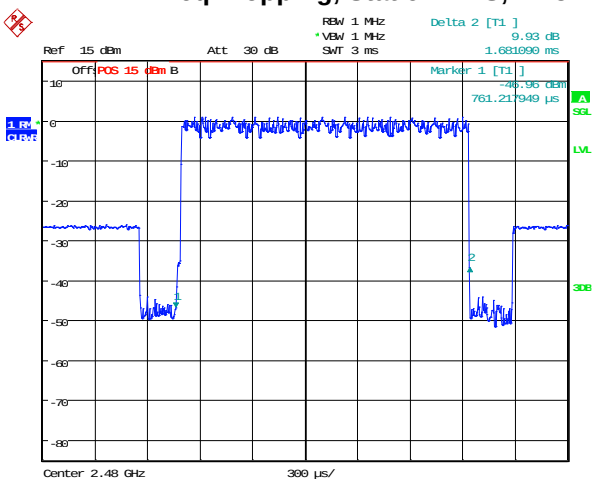


Figure 3-23: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5

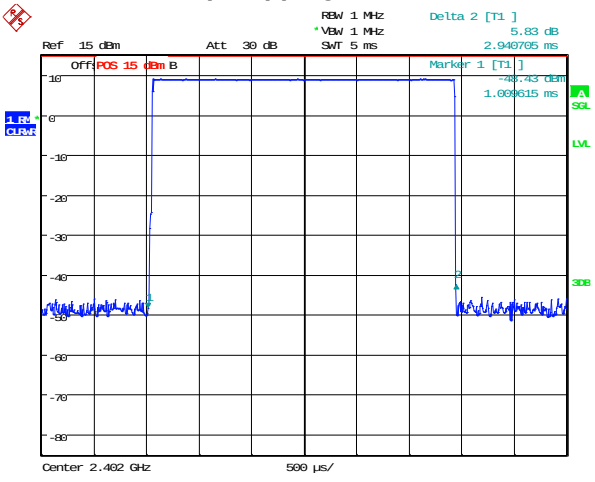
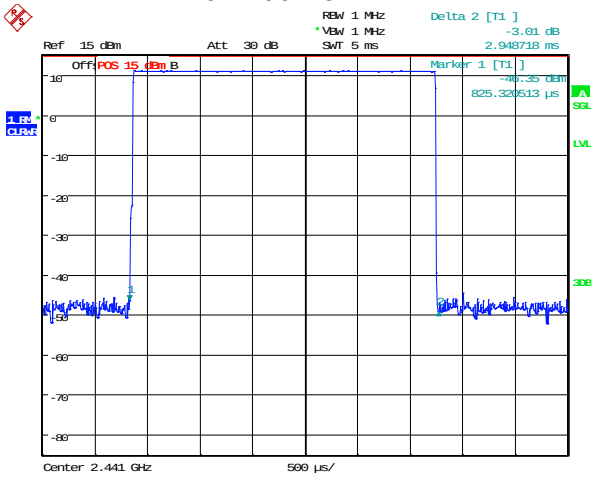
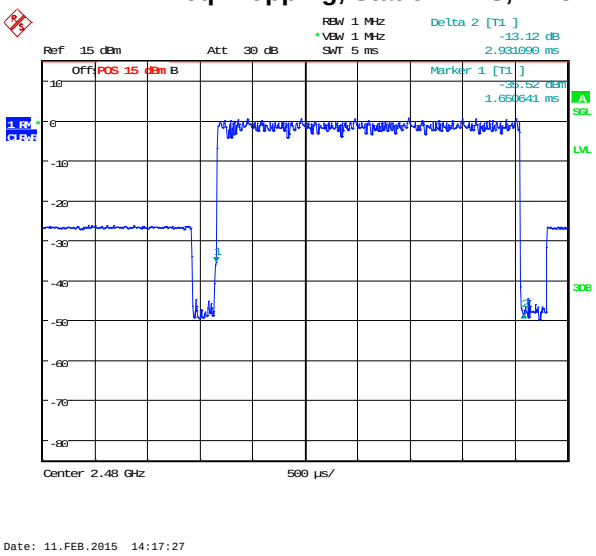


Figure 3-24: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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



Bluetooth RF Conducted Emission Test Results cont'd

Maximum Peak Conducted Output Power

The EUT met the requirements of the maximum peak conducted output power of class 1 as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode during the measurements. A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the coaxial cable loss and attenuators in the test circuit.

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

Bluetooth Channel	Measured Level (dBm)	Measured Level (W)	Class 1 Limit (dBm)
0	9.30	0.00851	0.0 to 20.0
39	**11.40**	**0.01380**	0.0 to 20.0
78	8.80	0.00759	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	5.90	0.00389	0.0 to 20.0
39	**7.90**	**0.00617**	0.0 to 20.0
78	5.50	0.00355	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	5.90	0.00389	0.0 to 20.0
39	**7.90**	**0.00617**	0.0 to 20.0
78	5.60	0.00363	0.0 to 20.0

Bluetooth RF Conducted Emission Test Results cont'd

Band Edge Compliance

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

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

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-52.57	-20	-32.57
78	Single Frequency	-50.66	-20	-30.66
0	Hopping	-52.24	-20	-32.24
78	Hopping	-52.22	-20	-32.22

See figures 5-26 to 5-29 for the plots of the band edge compliance measurements.

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

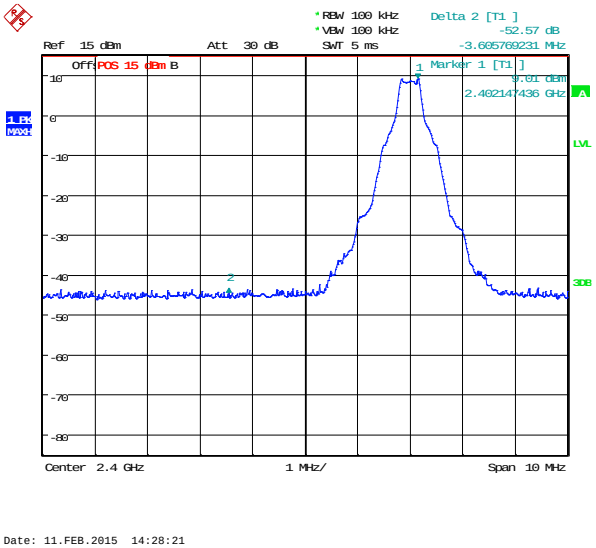
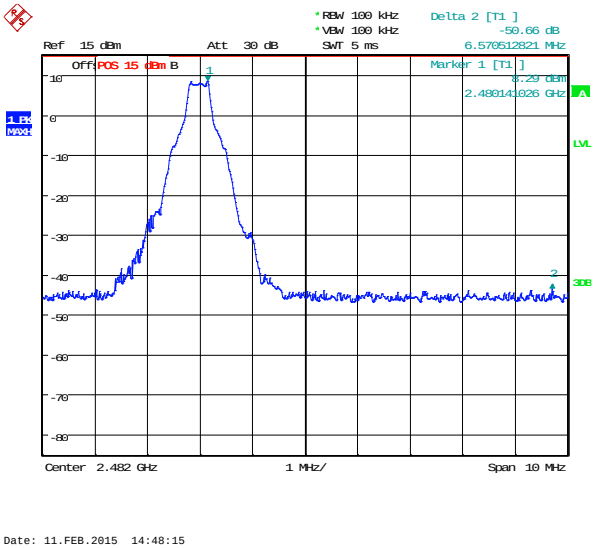


Figure 3-27: Band Edge Compliance
Single Freq., Static PBRS, DH5



Bluetooth RF Conducted Emission Test Results cont'd

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

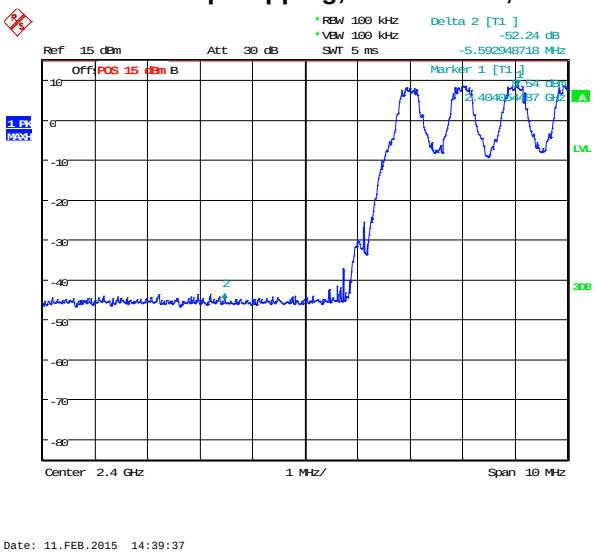
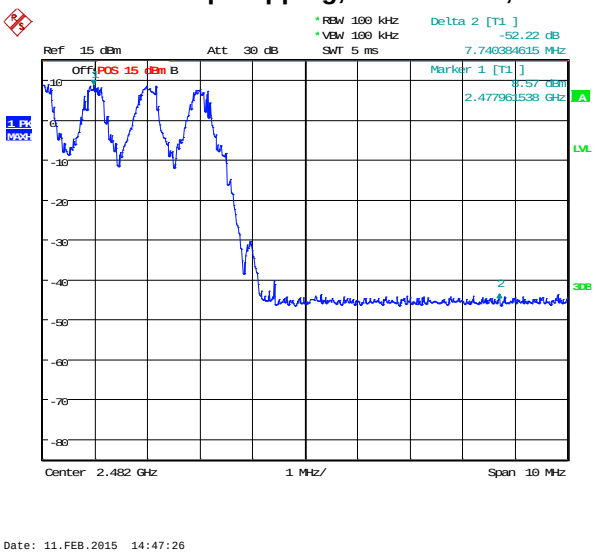


Figure 3-29: Band Edge Compliance
Freq. Hopping, Static PBRS, DH5



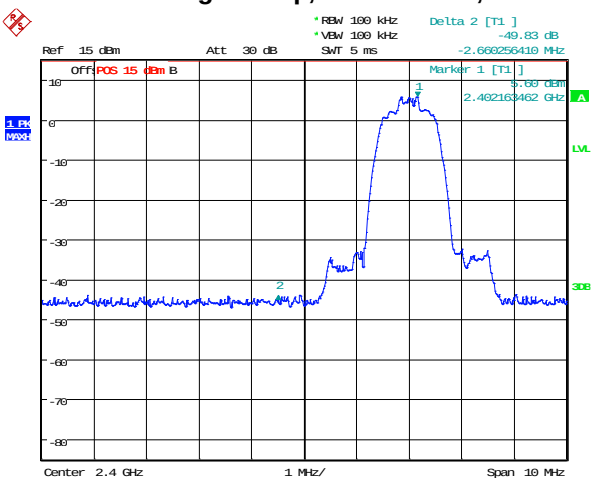
Using pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Operating Mode	Measured Level (dBc)	Limit (dBc)	Margin (dB)
0	Single Frequency	-49.83	-20	-29.83
78	Single Frequency	-47.87	-20	-27.87
0	Hopping	-49.50	-20	-29.50
78	Hopping	-47.11	-20	-27.11

See figures 3-30 to 3-33 for the plots of the band edge compliance measurements.

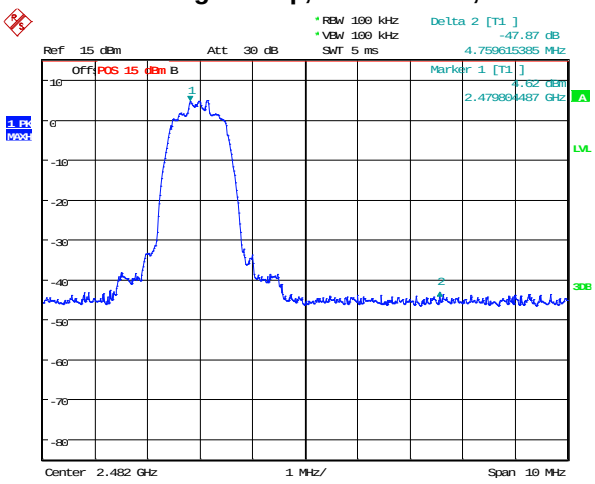
Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-30: Band Edge Compliance
Single Freq., Static PBRS, 2-DH5



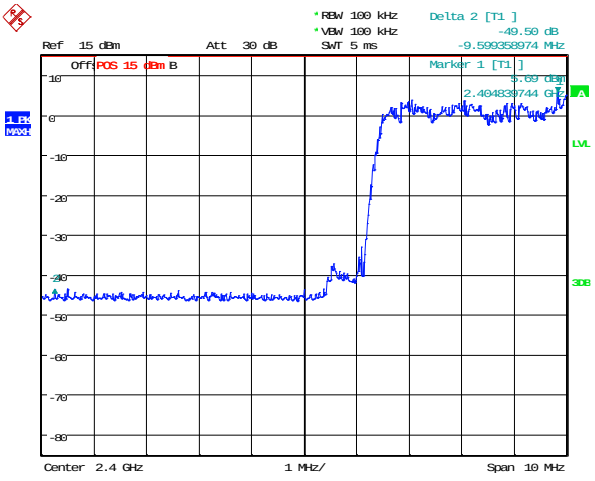
Date: 11.FEB.2015 14:41:42

Figure 3-31: Band Edge Compliance
Single Freq., Static PBRS, 2-DH5



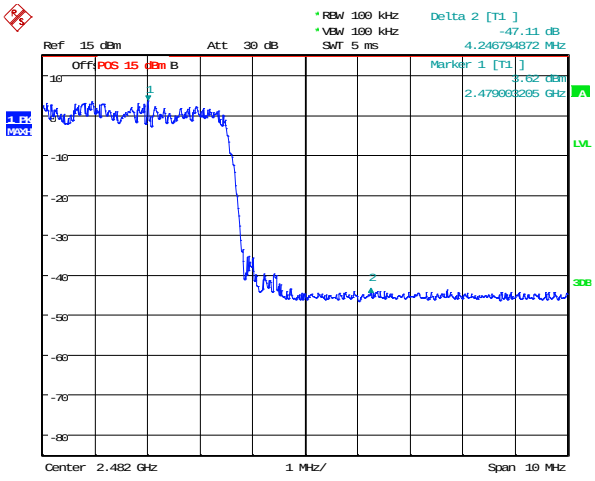
Date: 11.FEB.2015 14:49:06

Figure 3-32: Band Edge Compliance
Freq. Hopping, Static PBRS, 2-DH5



Date: 11.FEB.2015 14:40:50

Figure 3-33: Band Edge Compliance
Freq. Hopping, Static PBRS, 2-DH5



Date: 11.FEB.2015 14:46:37

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	-49.67	-20	-29.67
78	Single Frequency	-47.85	-20	-27.85
0	Hopping	-48.27	-20	-28.27
78	Hopping	-48.14	-20	-28.14

See figures 3-34 to 3-37 for the plots of the band edge compliance measurements.

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

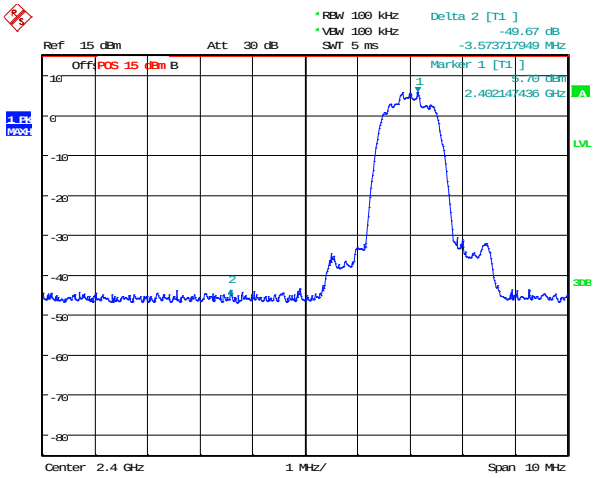
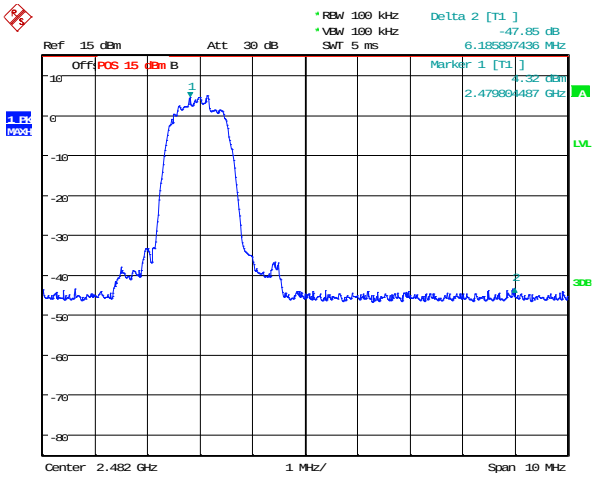


Figure 3-35: Band Edge Compliance
Single Freq., Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-36: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5

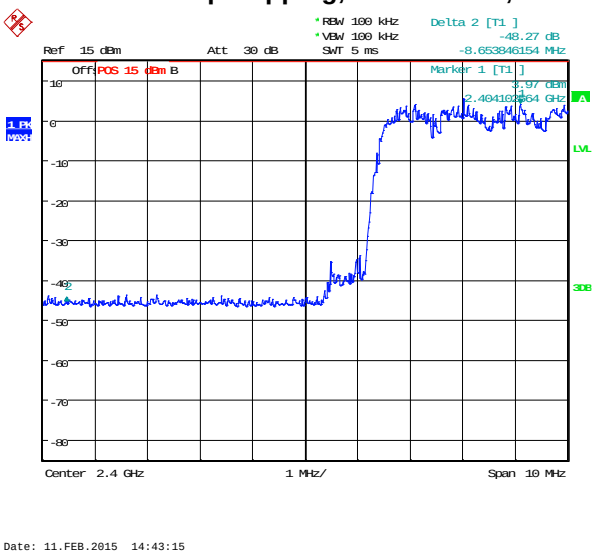
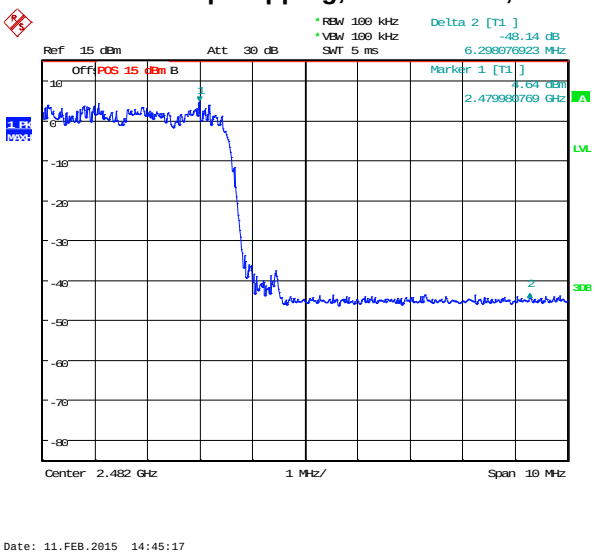


Figure 3-37: Band Edge Compliance
Freq. Hopping, Static PBRS, 3-DH5



Bluetooth RF Conducted Emission Test Results cont'd

Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. Low channel (0), mid channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency and hopping mode. A reference offset of 12.4 dB was applied to the spectrum analyzer reference level for the attenuators and coaxial cable loss in the test circuit.

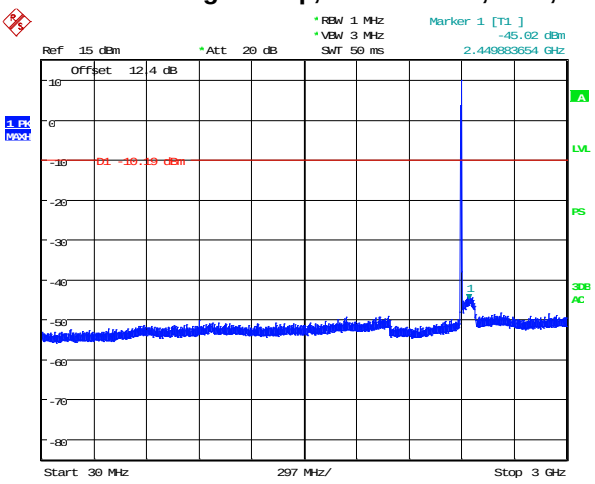
Using pattern type "Static PBRS" and packet type "DH5" during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0.00	9.30	-36.07	-45.37	-20.00
39.00	11.40	-42.62	-54.02	-20.00
78.00	8.80	-41.08	-49.88	-20.00
Hopping mode	8.80	-39.80	-48.60	-20.00

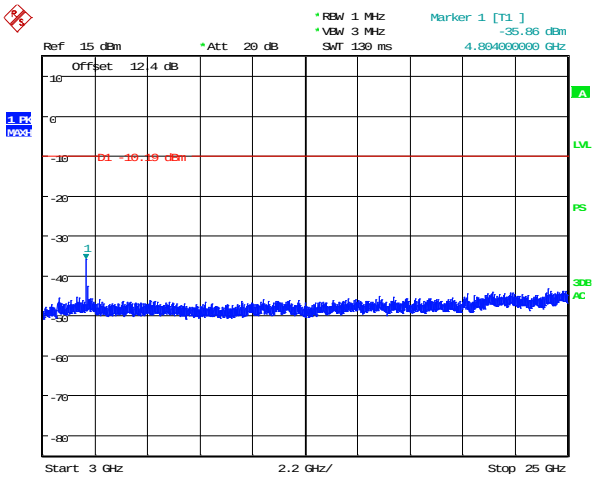
See figures 3-38 to 3-41 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

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

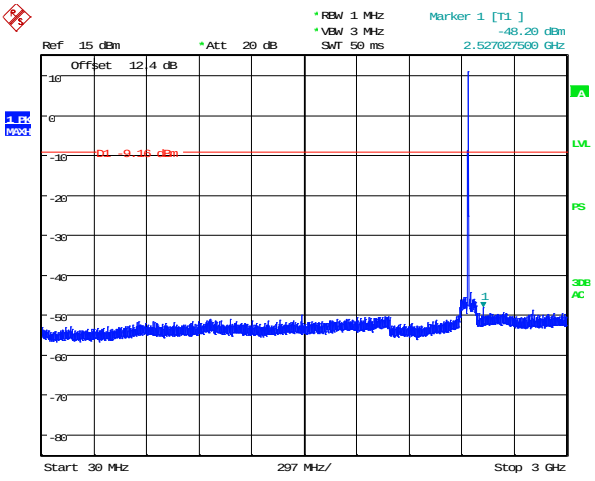


Date: 26.FEB.2015 11:14:25

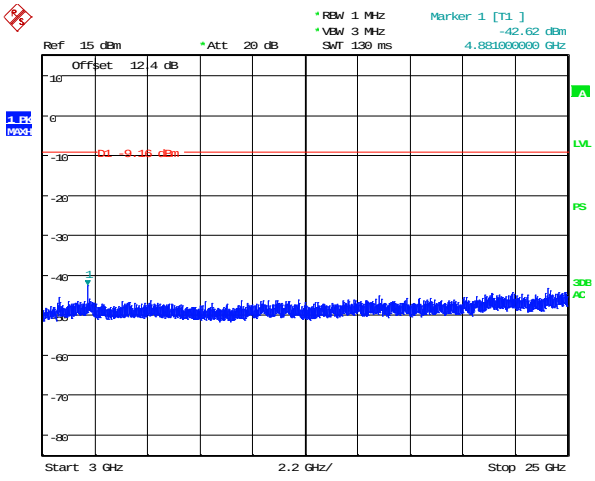


Date: 26.FEB.2015 11:19:53

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



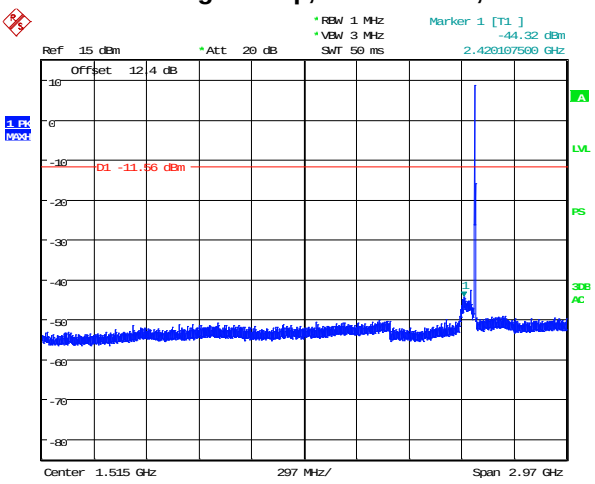
Date: 26.FEB.2015 11:17:31



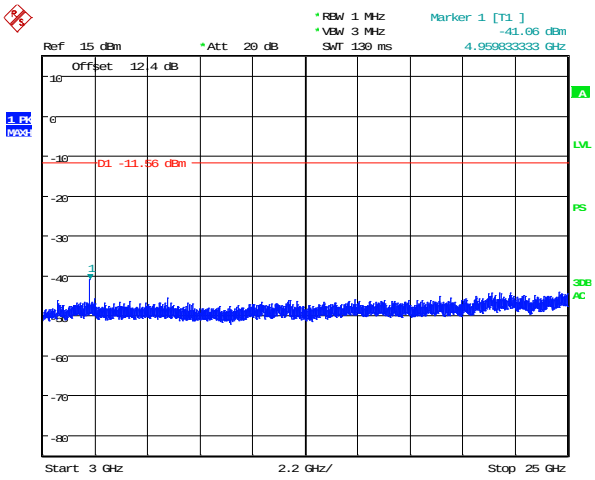
Date: 26.FEB.2015 11:18:19

Bluetooth RF Conducted Emission Test Results cont'd

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

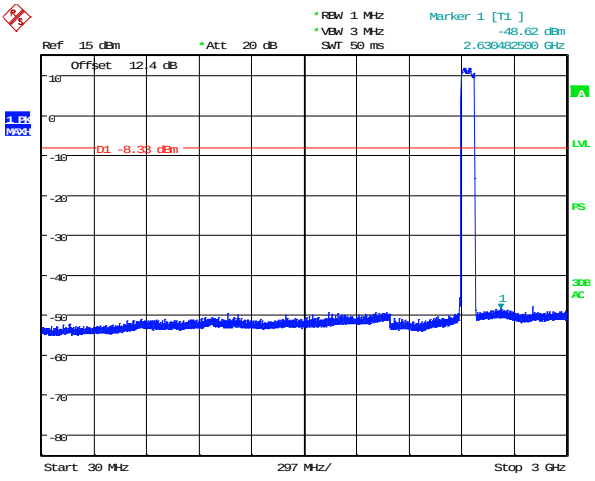


Date: 26.FEB.2015 11:21:16

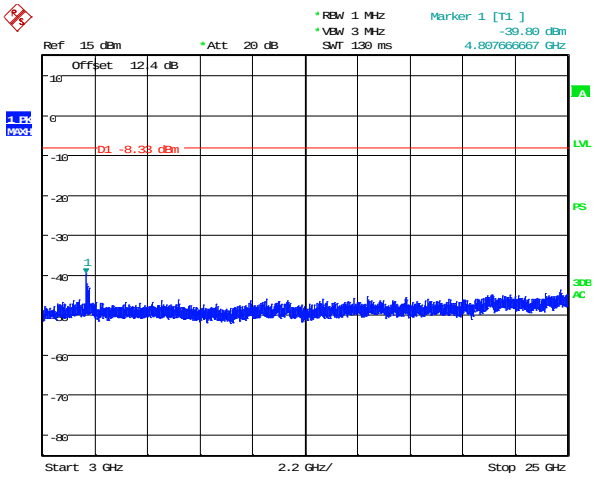


Date: 26.FEB.2015 11:22:03

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



Date: 26.FEB.2015 11:46:16



Date: 26.FEB.2015 11:46:55

Bluetooth RF Conducted Emission Test Results cont'd

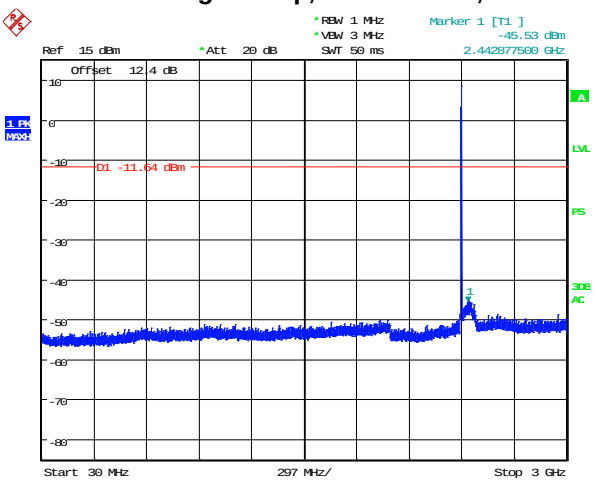
Using pattern type "Static PBRS" and packet type "2-DH5" during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0.00	5.90	-38.78	-44.68	-20.00
39.00	7.90	-44.73	-52.63	-20.00
78.00	5.60	-43.67	-49.27	-20.00
Hopping mode	5.60	-41.44	-47.04	-20.00

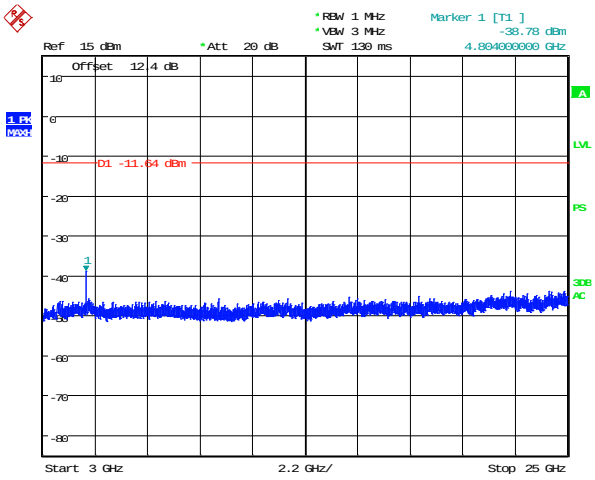
See figures 3-42 to 3-45 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-42: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 2-DH5

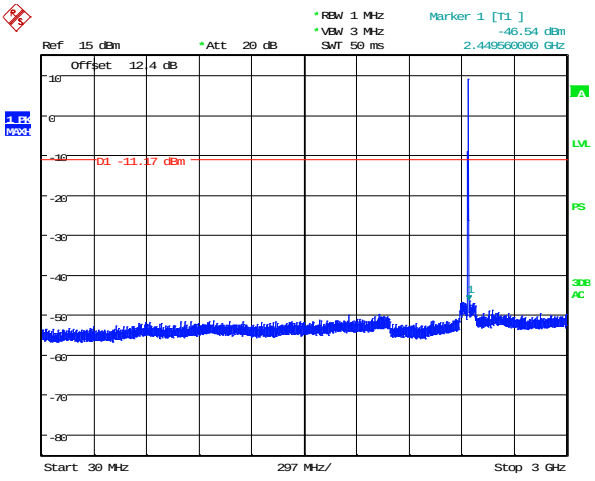


Date: 26.FEB.2015 11:48:17

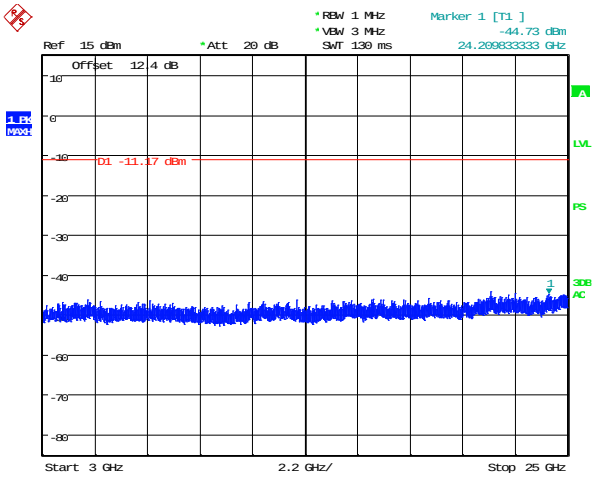


Date: 26.FEB.2015 11:49:13

Figure 3-43: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 2-DH5



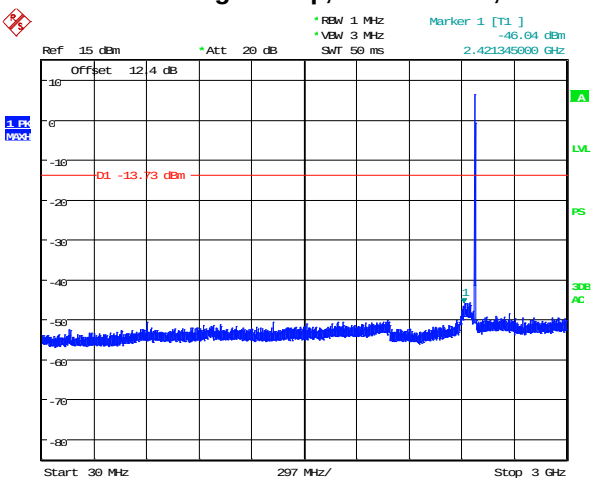
Date: 26.FEB.2015 11:50:19



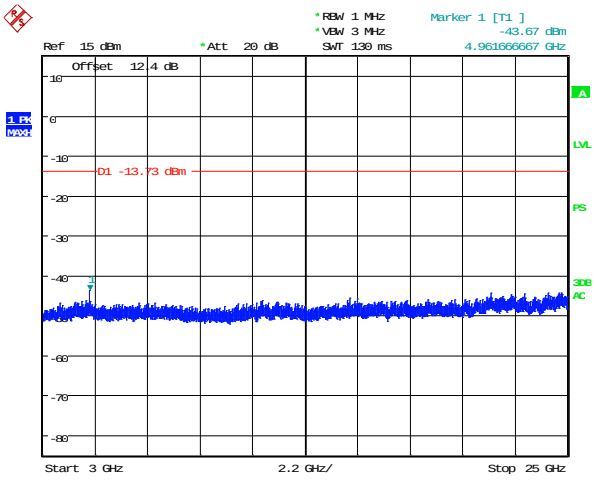
Date: 26.FEB.2015 11:50:38

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-44: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 2-DH5

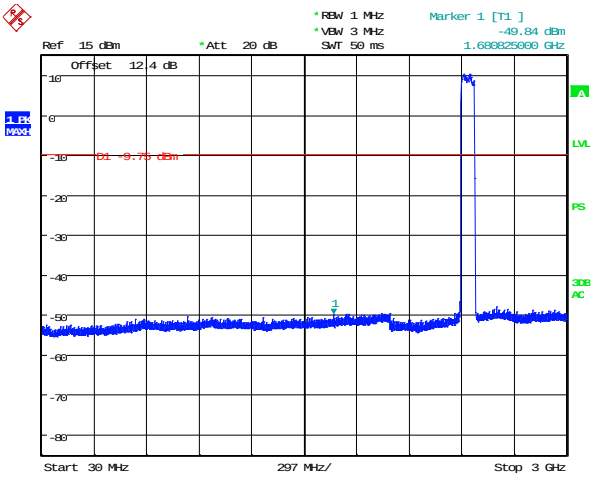


Date: 26.FEB.2015 11:51:41

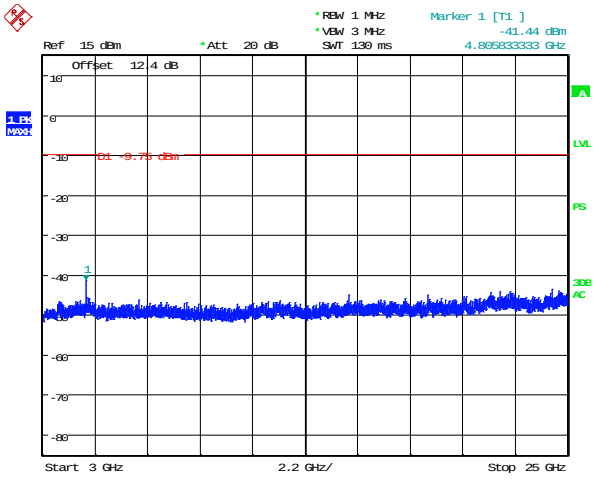


Date: 26.FEB.2015 11:52:18

Figure 3-45: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 2-DH5



Date: 26.FEB.2015 12:02:39



Date: 26.FEB.2015 12:03:19

Bluetooth RF Conducted Emission Test Results cont'd

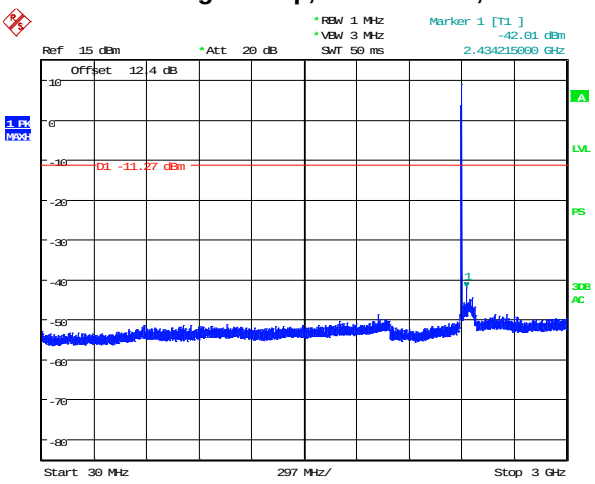
Using pattern type "Static PBRS" and packet type "3-DH5" during the measurements.

Bluetooth Channel	Channel Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from carrier (dBc)	Limit (dBc)
0.00	5.90	-38.42	-44.32	-20.00
39.00	7.90	-42.90	-50.80	-20.00
78.00	5.50	-43.64	-49.14	-20.00
Hopping mode	5.50	-41.22	-46.72	-20.00

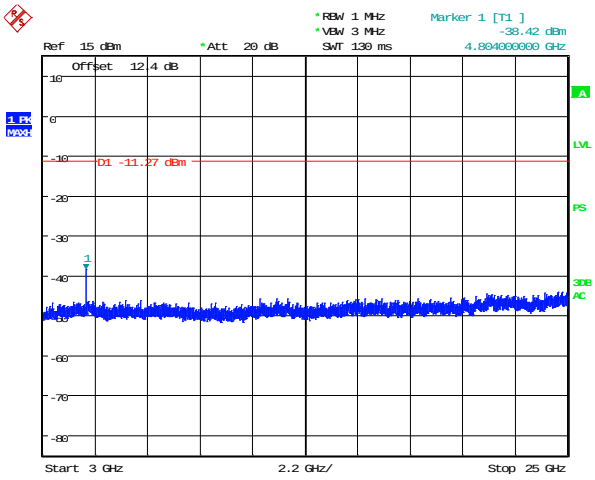
See figures 3-46 to 3-49 for the plots of the spurious RF conducted emissions.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-46: Spurious RF Conducted Emissions
Single Freq., Static PBRS, 3-DH5

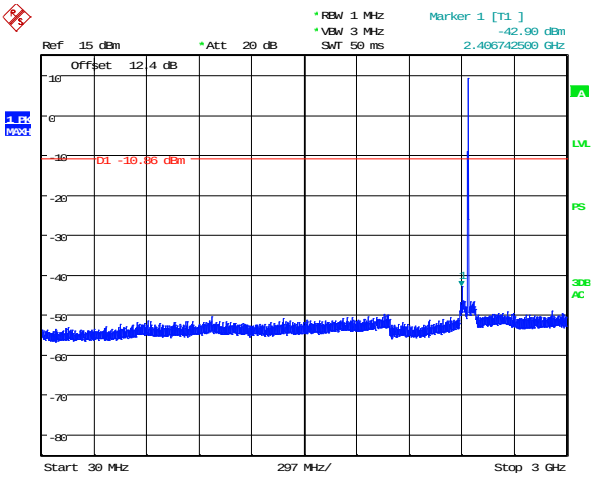


Date: 26.FEB.2015 12:04:30

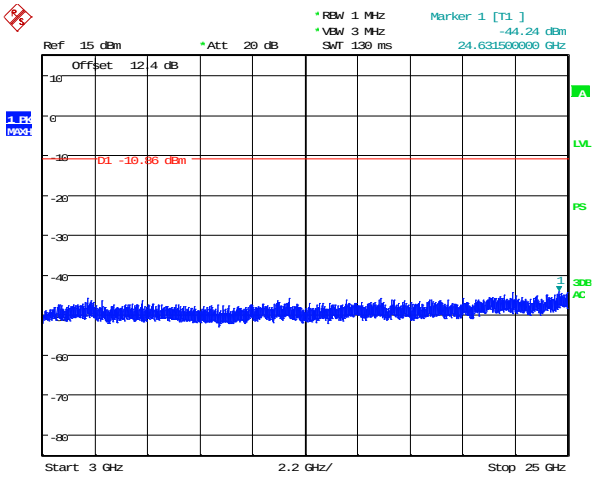


Date: 26.FEB.2015 12:05:21

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



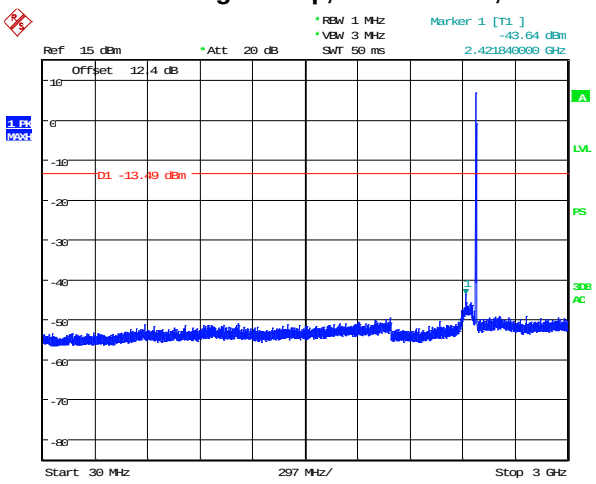
Date: 26.FEB.2015 12:06:13



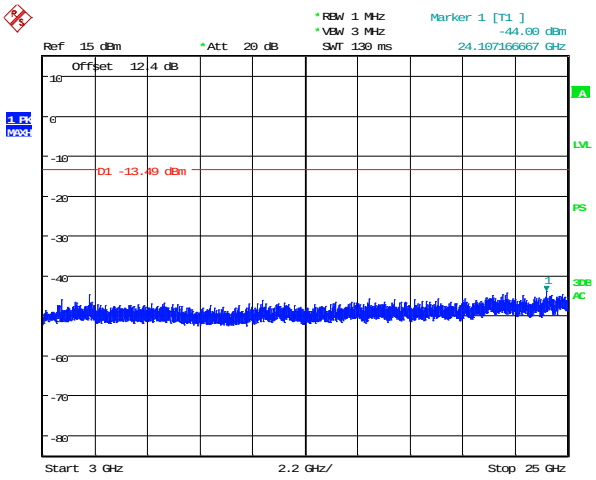
Date: 26.FEB.2015 12:06:36

Bluetooth RF Conducted Emission Test Results cont'd

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

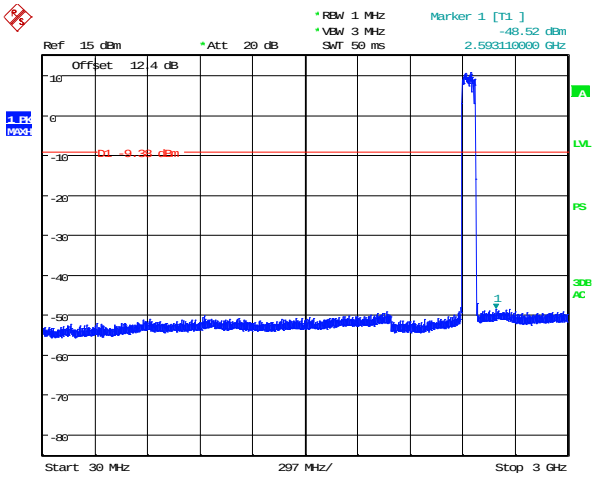


Date: 26.FEB.2015 12:07:25

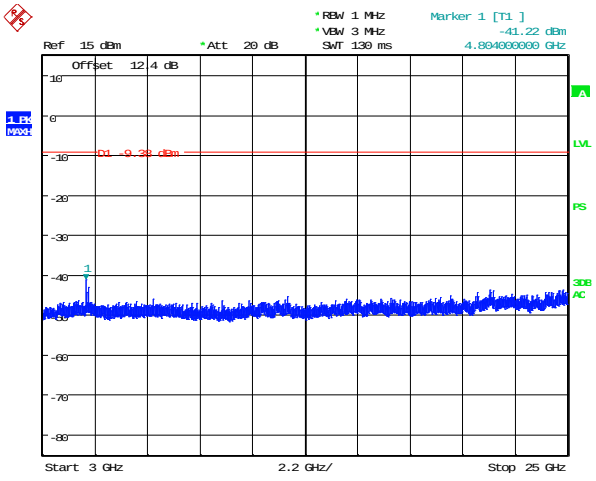


Date: 26.FEB.2015 12:07:41

Figure 3-49: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, 3-DH5



Date: 26.FEB.2015 12:12:49



Date: 26.FEB.2015 12:13:39

Bluetooth Low Energy RF Conducted Emission Test Results

6 dB Bandwidth

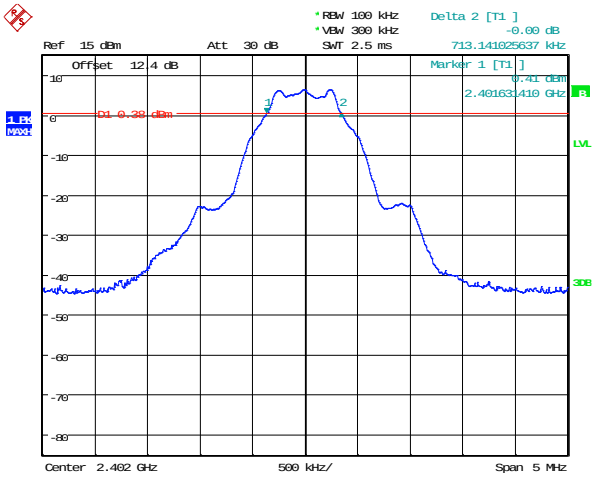
The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(a)(2) and RSS-210.

Channels 0, 20 and 39 were measured.

Channel	Limit (kHz)	Measured Level (KHz)
0	≥ 500	713.10
20	≥ 500	713.14
39	≥ 500	**721.15**

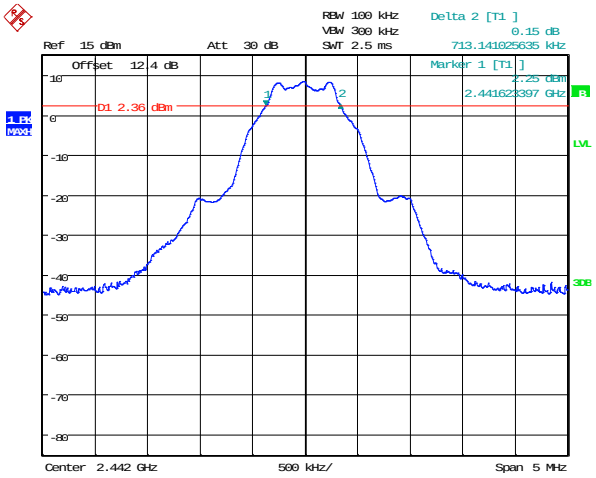
See figures 3-50 to 3-52 for the plots of the 6 dB bandwidth measurements for Channels 0, 20, and 39.

Figure 3-50: 6 dB Bandwidth
LE, Channel 0



Date: 12.FEB.2015 11:23:26

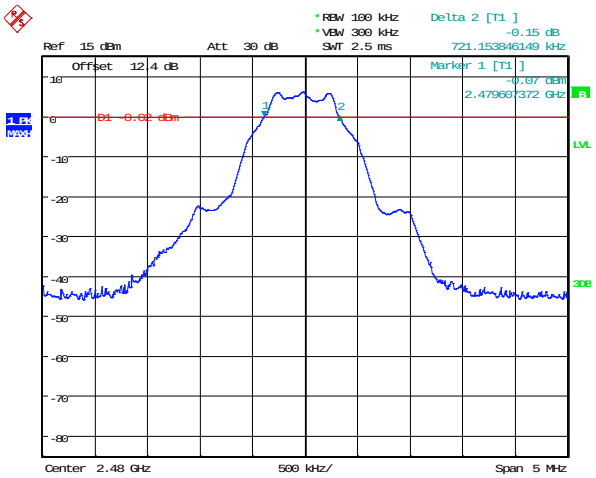
Figure 3-51: 6 dB Bandwidth
LE, Channel 20



Date: 12.FEB.2015 11:33:40

Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Figure 3-52: 6 dB Bandwidth
LE, Channel 39



Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.247(b)(3) and RSS-210. Channels 0, 20 and 39 were measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 6.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
0	< 1.00	6.42	4.38
20	< 1.00	**6.53**	**4.50**
39	< 1.00	5.83	3.83

Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Band Edge Compliance

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

Channel	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
0	< -20	-49.54	-29.54
39	< -20	-48.23	-28.23

See figures 3-53 to 3-54 for the plots of the band edge compliance measurements for Channels 0 and 39.

Figure 3-53: Band Edge Compliance LE, Channel 0

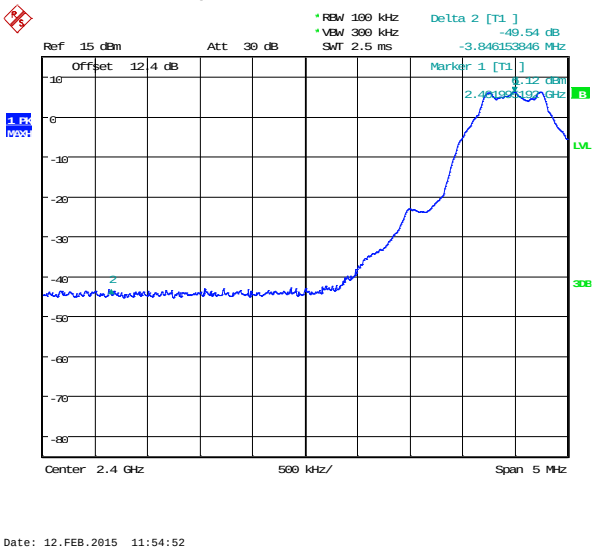
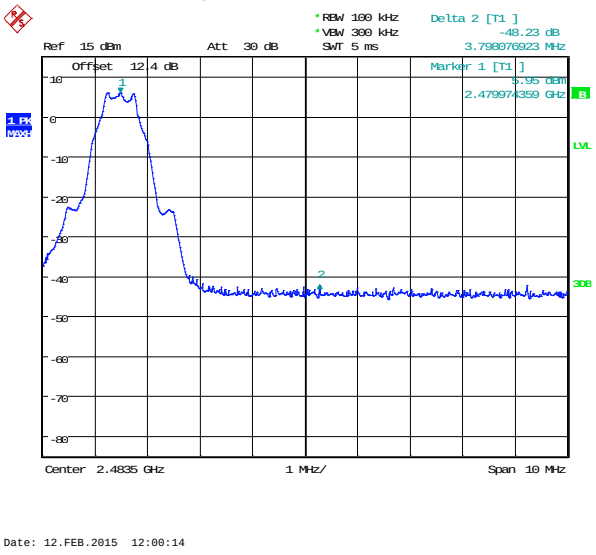


Figure 3-54: Band Edge Compliance LE, Channel 39



Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Peak Power Spectral Density

The EUT met the requirements of the peak power spectral density as per 47 CFR 15.247(d) and RSS-210. Channels 0, 20 and 39 were measured.

Channel	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
0	< 8.00	-7.76	-15.76
20	< 8.00	-5.57	-13.57
39	< 8.00	-7.89	-15.89

See figures 3-55 to 3-57 for the plots of the peak power spectral density for Channels 0, 20 and 39.

Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Figure 3-55: Peak Power Spectral Density LE, Channel 0

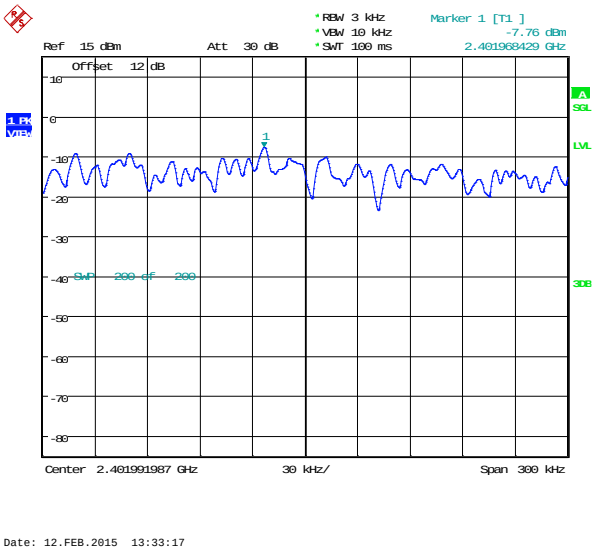


Figure 3-56: Peak Power Spectral Density LE, Channel 20

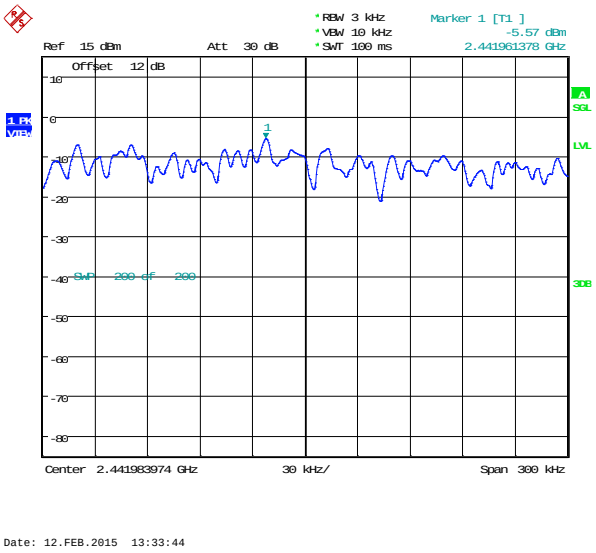
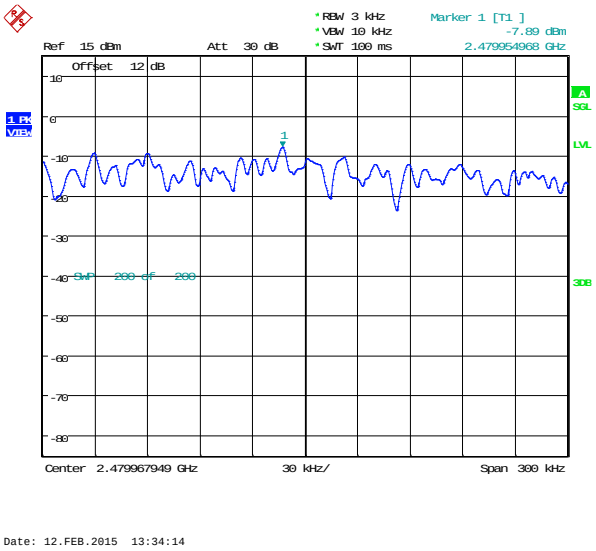


Figure 3-57: Peak Power Spectral Density LE, Channel 39



Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Spurious RF Conducted Emissions

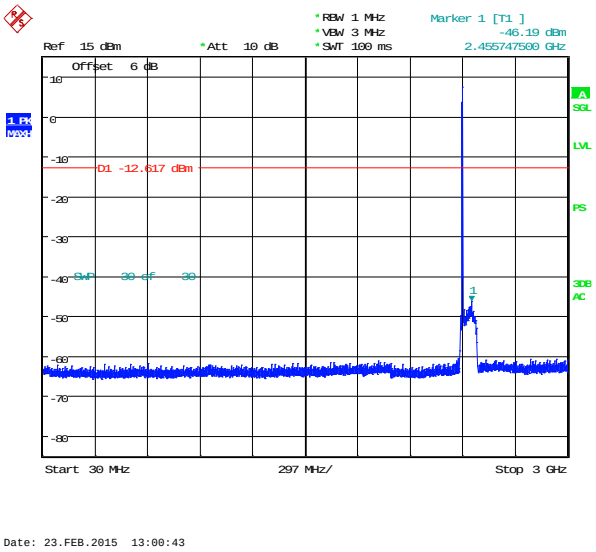
The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. Channels 0, 20 and 39 were measured. Peak power was measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 6.4 dB was applied to the power meter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

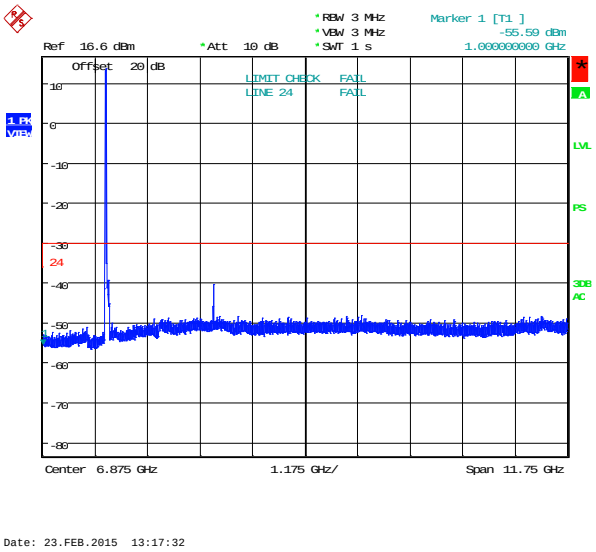
Channel	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
0	6.4	-43.0	-49.4	-20.0
20	6.5	-44.5	-51.1	-20.0
39	5.8	-43.9	-49.7	-20.0

The emissions were in the NF.

See figures 3-58 to 3-60 for the plots of the spurious RF conducted emissions for Channels 0, 20 and 39.

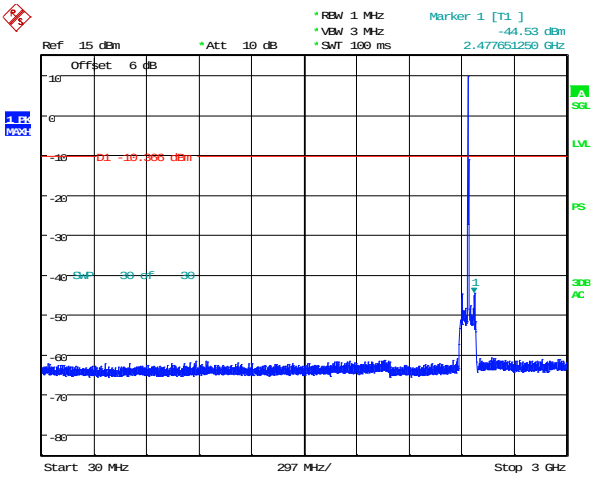
Figure 3-58: Spurious Conducted RF Emissions LE, Channel 0





Bluetooth Low Energy RF Conducted Emission Test Results cont'd

Figure 3-59 : Spurious Conducted RF Emissions
LE, Channel 20



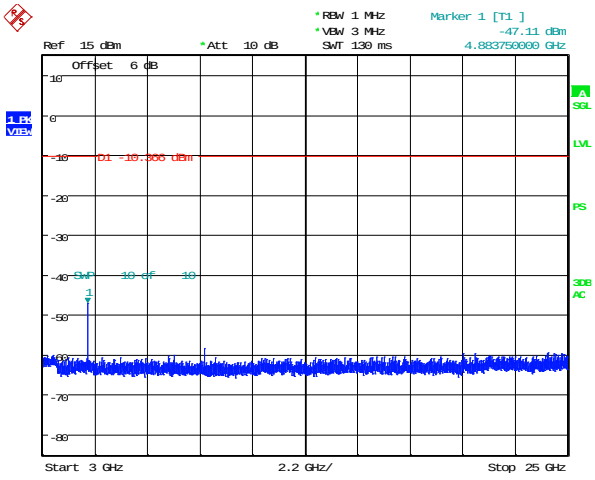
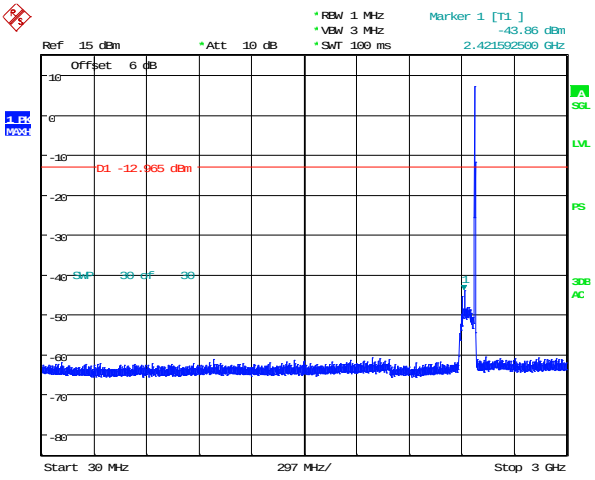
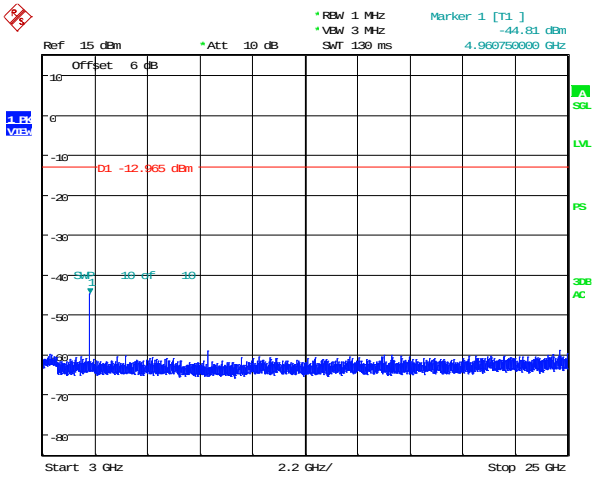


Figure 3-60: Spurious Conducted RF Emissions
LE, Channel 39

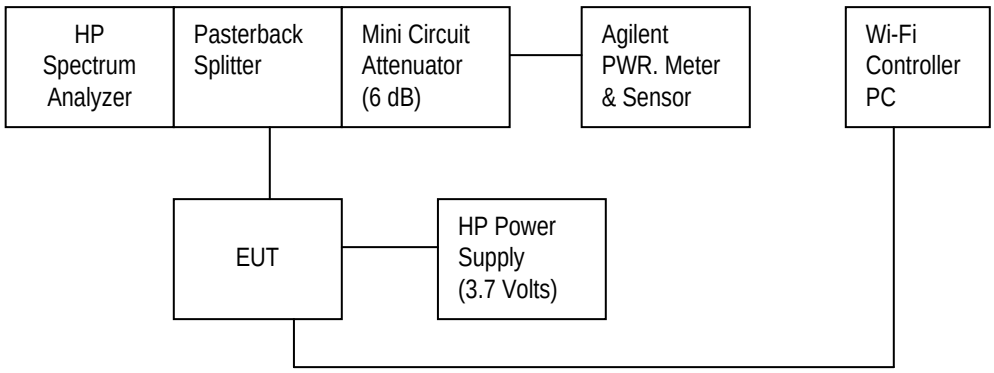




APPENDIX 4– 802.11b/g/n CONDUCTED EMISSIONS TEST DATA/PLOTS

802.11b/g/n RF Conducted Emission Test Results

Test Setup Diagram



UNIT	MANUFACTURER	MODEL	SERIAL NUMBER
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 20.4 dB was applied to the spectrum analyzer and 6.6 dB was applied to the Power Meter reference level for the attenuators and coaxial cable loss in the test circuit.

Date of test: February 09 and March 17, 2015
The measurements on the BlackBerry® smartphone were performed by Sijia Li.

The environmental test conditions were: Temperature: 23.2 ºC
Relative Humidity: 28.3 %

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

Following tests were performed on the model RHC161LW.

6 dB Bandwidth

The EUT met the requirements of the 6 dB bandwidth as per 47 CFR 15.247(a)(2) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11Mbps each for 802.11b mode, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4, and 7 for 802.11n mode.

Channel	Data Rate	Limit (kHz)	Measured Level (MHz)
1	1 Mbps	≥ 500	8.50
	5.5 Mbps	≥ 500	8.39
	11 Mbps	≥ 500	8.30
	6 Mbps	≥ 500	15.66
	24 Mbps	≥ 500	15.70
	54 Mbps	≥ 500	15.70
	MCS 0	≥ 500	16.08
	MCS 4	≥ 500	16.30
	MCS 7	≥ 500	16.28
6	1 Mbps	≥ 500	8.48
	5.5 Mbps	≥ 500	8.22
	11 Mbps	≥ 500	8.48
	6 Mbps	≥ 500	15.90
	24 Mbps	≥ 500	16.30
	54 Mbps	≥ 500	16.32
	MCS 0	≥ 500	17.28
	MCS 4	≥ 500	17.52
	MCS 7	≥ 500	17.62
11	1 Mbps	≥ 500	8.54
	5.5 Mbps	≥ 500	8.27
	11 Mbps	≥ 500	**8.88**
	6 Mbps	≥ 500	16.29
	24 Mbps	≥ 500	**16.40**
	54 Mbps	≥ 500	16.38
	MCS 0	≥ 500	17.28
	MCS 4	≥ 500	**17.64**
	MCS 7	≥ 500	17.58

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

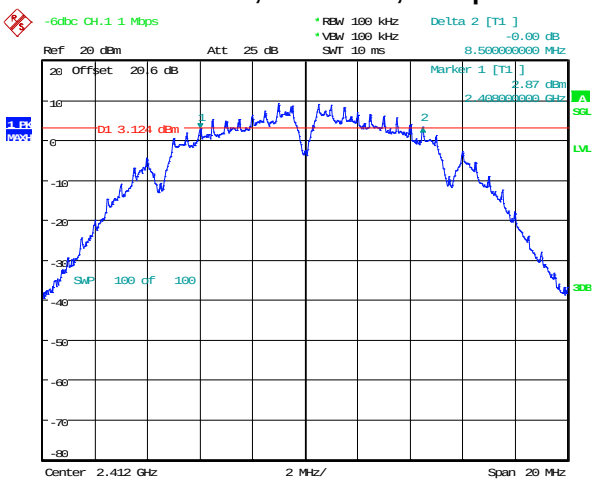


Figure 4-2: 6 dB Bandwidth
802.11b, Channel 6, 1 Mbps

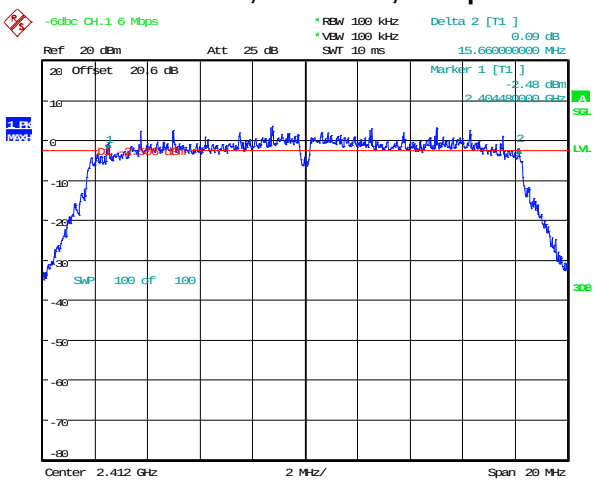


Figure 4-3: 6 dB Bandwidth
802.11b, Channel 11, 1 Mbps

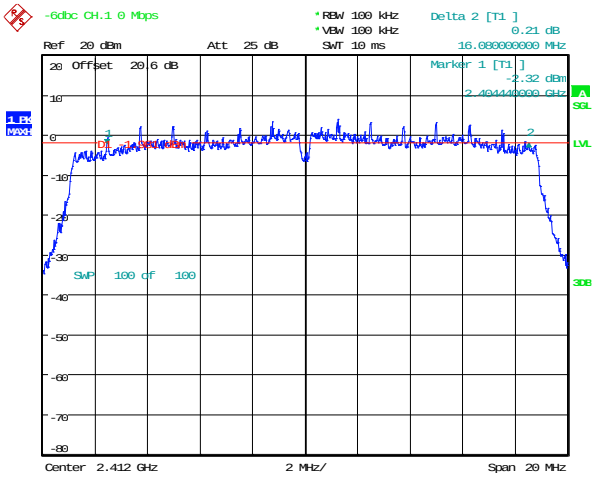
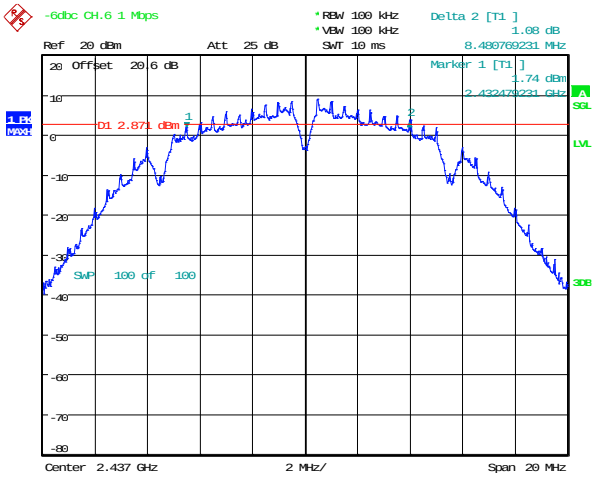


Figure 4-4: 6 dB Bandwidth
802.11g, Channel 1, 6 Mbps



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

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

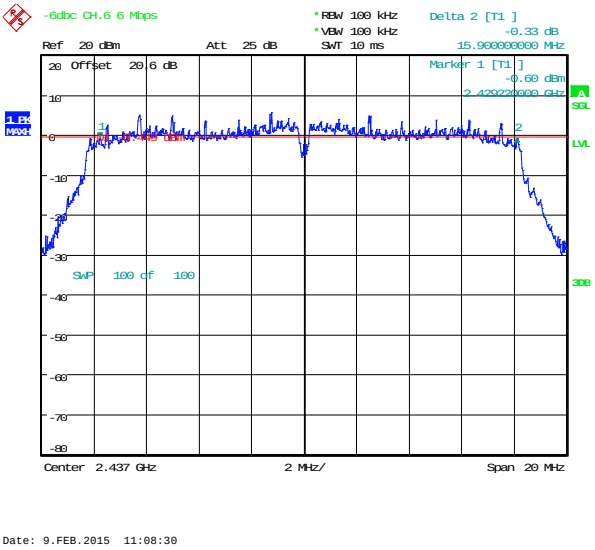


Figure 4-6: 6 dB Bandwidth
802.11g, Channel 11, 6 Mbps

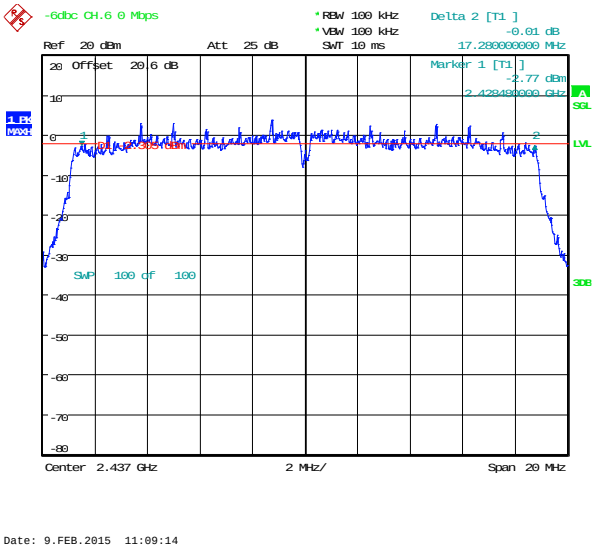


Figure 4-7: 6 dB Bandwidth
802.11n, Channel 1, MCS 0

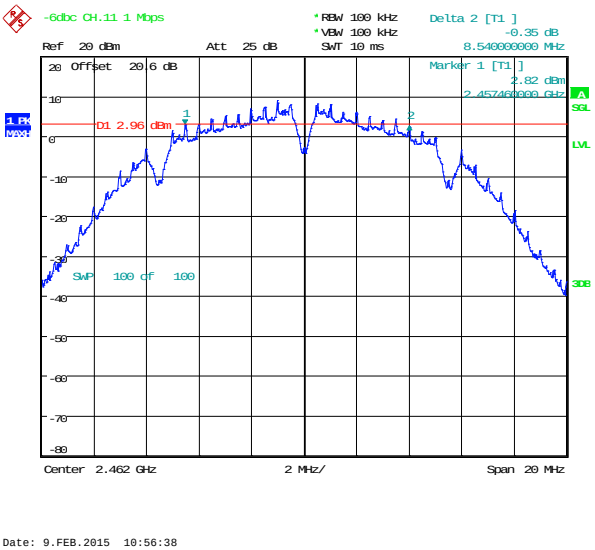


Figure 4-8: 6 dB Bandwidth
802.11n, Channel 6, MCS 0

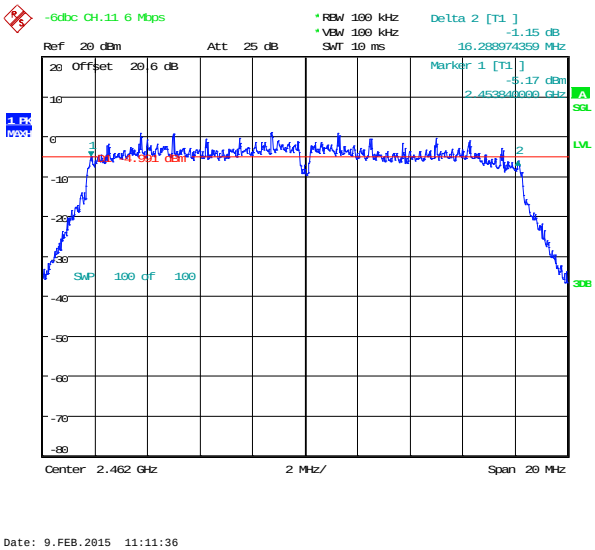
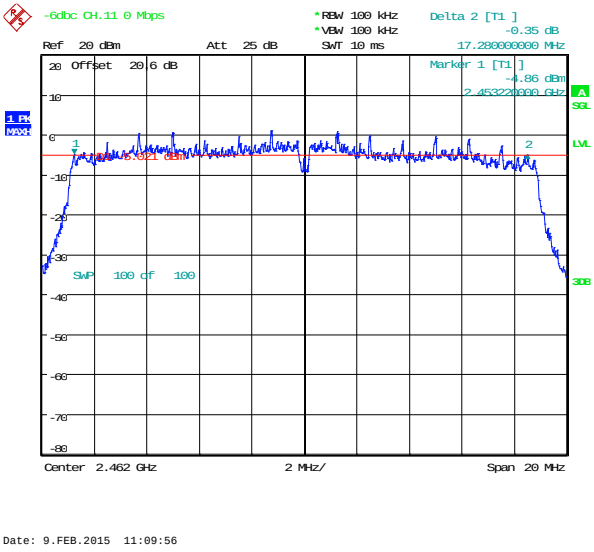


Figure 4-9: 6 dB Bandwidth

802.11n, Channel 11, MCS 0



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

Occupied Bandwidth

The EUT met the requirements of the occupied bandwidth as per RSS-GEN, 6.6. 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	12.45
	5.5 Mbps	≥ 500	12.21
	11 Mbps	≥ 500	12.21
	6 Mbps	≥ 500	16.59
	24 Mbps	≥ 500	16.54
	54 Mbps	≥ 500	16.54
	MCS 0	≥ 500	17.60
	MCS 4	≥ 500	17.60
	MCS 7	≥ 500	17.60
6	1 Mbps	≥ 500	12.60
	5.5 Mbps	≥ 500	12.26
	11 Mbps	≥ 500	12.36
	6 Mbps	≥ 500	**16.73**
	24 Mbps	≥ 500	16.63
	54 Mbps	≥ 500	16.54
	MCS 0	≥ 500	17.64
	MCS 4	≥ 500	17.60
	MCS 7	≥ 500	17.60
11	1 Mbps	≥ 500	**12.64**
	5.5 Mbps	≥ 500	12.26
	11 Mbps	≥ 500	12.40
	6 Mbps	≥ 500	**16.73**
	24 Mbps	≥ 500	16.54
	54 Mbps	≥ 500	16.63
	MCS 0	≥ 500	17.60
	MCS 4	≥ 500	**17.69**
	MCS 7	≥ 500	17.64

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

See figures 4-10 to 4-18 for the plots of the occupied 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 4-10: Occupied Bandwidth
802.11b, Channel 1, 1 Mbps

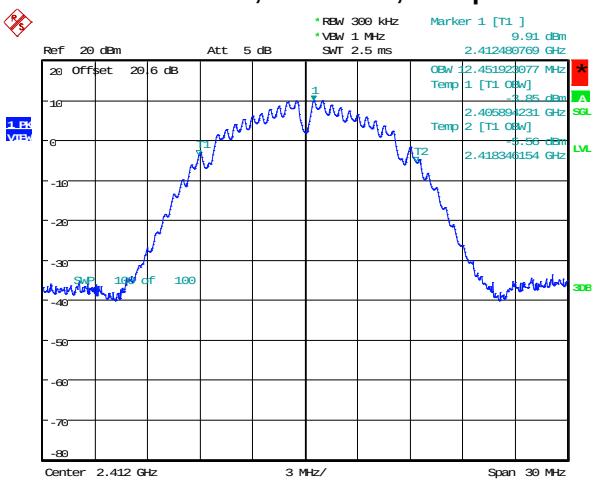


Figure 4-11: Occupied Bandwidth
802.11b, Channel 6, 1 Mbps

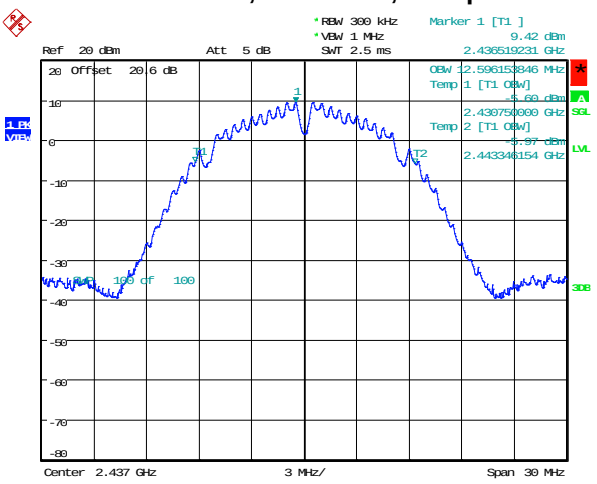


Figure 4-12: Occupied Bandwidth
802.11b, Channel 11, 1 Mbps

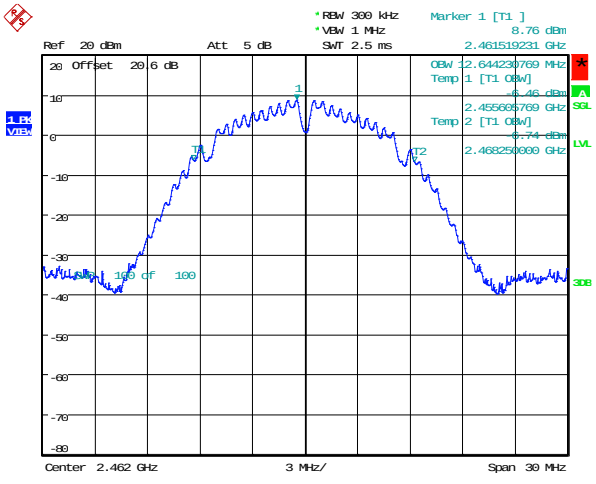
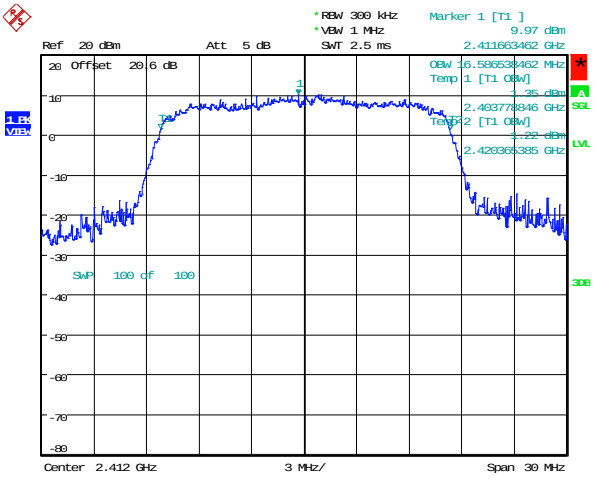
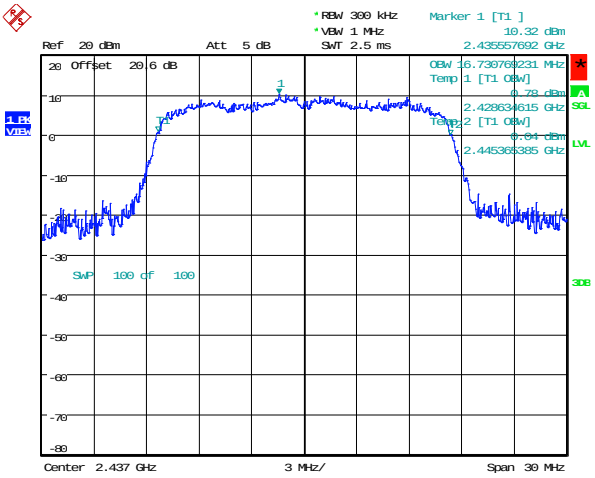


Figure 4-13: Occupied Bandwidth
802.11g, Channel 1, 6 Mbps



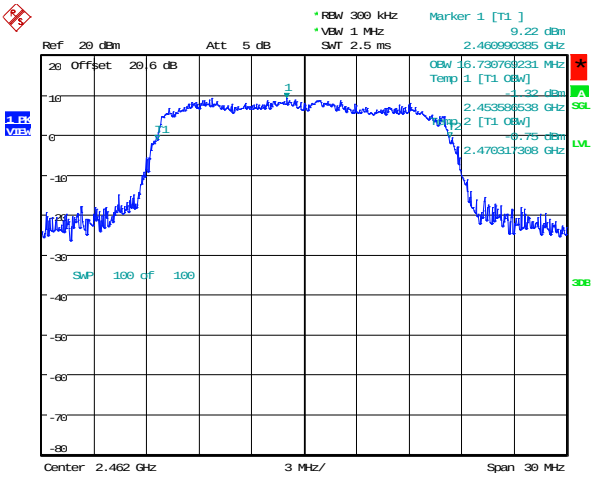
802.11b/g/n RF Conducted Emission Test Results cont'd

Figure 4-14: Occupied Bandwidth
802.11g, Channel 6, 6 Mbps



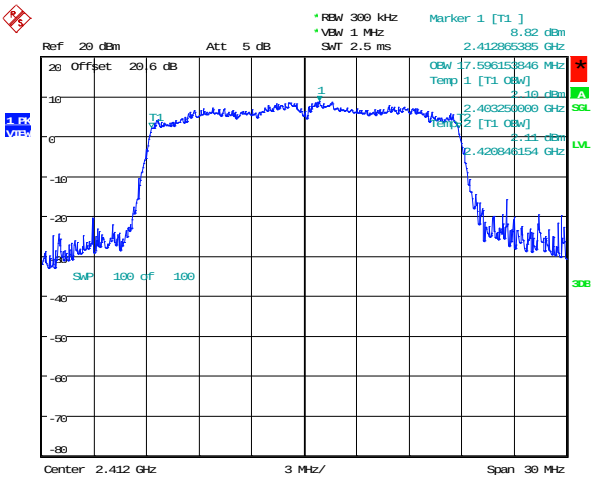
Date: 17.MAR.2015 11:15:02

Figure 4-15: Occupied Bandwidth
802.11g, Channel 11, 6 Mbps



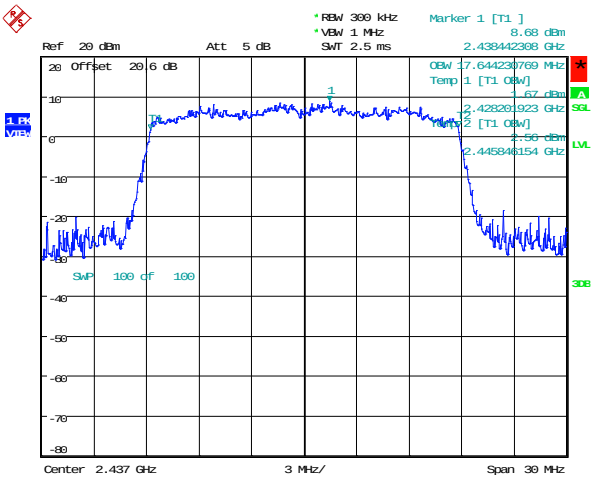
Date: 17.MAR.2015 11:15:39

Figure 4-16: Occupied Bandwidth
802.11n, Channel 1, MCS 0



Date: 17.MAR.2015 11:14:36

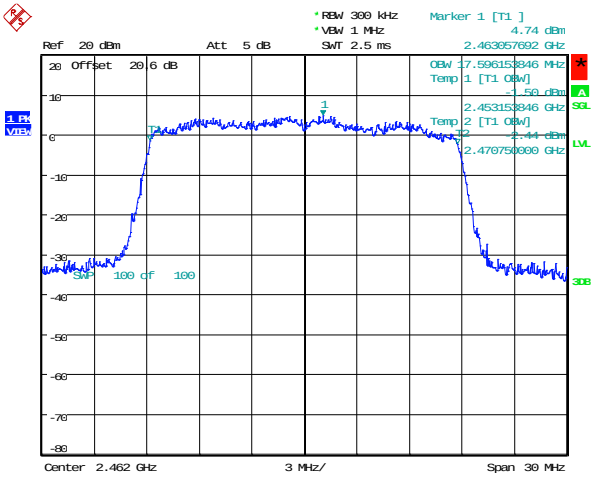
Figure 4-17: Occupied Bandwidth
802.11n, Channel 6, MCS 0



Date: 17.MAR.2015 11:15:14

Figure 4-18: Occupied Bandwidth

802.11n, Channel 11, MCS 0



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

Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.247(b)(3) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4 and 7 for 802.11n mode using an 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	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
1	1 Mbps	< 1.00	17.72	59.09
	5.5 Mbps	< 1.00	17.81	60.46
	11 Mbps	< 1.00	17.76	59.69
	6 Mbps	< 1.00	15.32	34.06
	24 Mbps	< 1.00	13.23	21.06
	54 Mbps	< 1.00	14.31	26.97
	MCS 0	< 1.00	13.76	23.79
	MCS 4	< 1.00	14.73	29.74
	MCS 7	< 1.00	12.01	15.87
6	1 Mbps	< 1.00	**17.95**	**62.35**
	5.5 Mbps	< 1.00	17.91	61.87
	11 Mbps	< 1.00	17.69	58.81
	6 Mbps	< 1.00	**17.13**	**51.63**
	24 Mbps	< 1.00	15.37	34.40
	54 Mbps	< 1.00	12.80	19.04
	MCS 0	< 1.00	**15.26**	**33.60**
	MCS 4	< 1.00	14.72	29.63
	MCS 7	< 1.00	12.69	18.56

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	17.12	51.56
	5.5 Mbps	< 1.00	16.76	47.41
	11 Mbps	< 1.00	16.92	49.17
	6 Mbps	< 1.00	12.35	17.16
	24 Mbps	< 1.00	12.34	17.14
	54 Mbps	< 1.00	11.93	15.58
	MCS 0	< 1.00	12.38	17.29
	MCS 4	< 1.00	11.09	12.87
	MCS 7	< 1.00	9.86	9.69

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

Band Edge Compliance

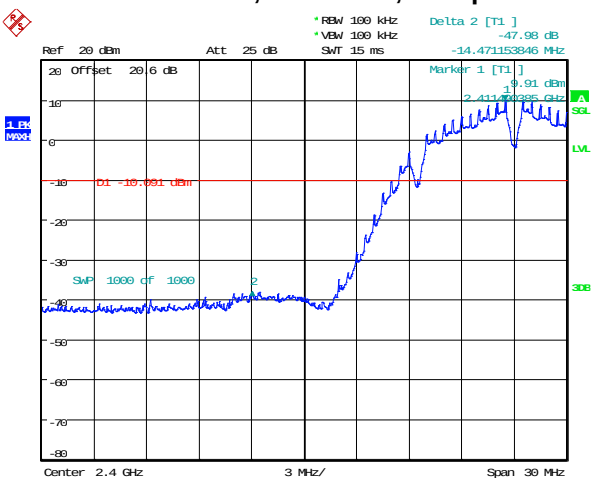
The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c) and RSS-210. Channels 1 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4 and 7 for 802.11n mode.

Channel	Data Rate	Limit (dBc)	Measured Level (dBc)	Margin (dBc)
1	1 Mbps	< -20	-47.97	-27.98
	5.5 Mbps	< -20	-48.09	-28.09
	11 Mbps	< -20	-48.34	-28.34
	6 Mbps	< -20	-39.32	-19.32
	24 Mbps	< -20	-39.96	-19.96
	54 Mbps	< -20	-40.65	-20.65
	MCS 0	< -20	-39.68	-19.68
	MCS 4	< -20	-39.66	-19.66
	MCS 7	< -20	-40.33	-20.33
11	1 Mbps	< -20	-46.19	-26.19
	5.5 Mbps	< -20	-47.36	-27.36
	11 Mbps	< -20	-46.09	-26.09
	6 Mbps	< -20	-39.77	-19.77
	24 Mbps	< -20	-39.71	-19.71
	54 Mbps	< -20	-40.18	-20.18
	MCS 0	< -20	-39.93	-19.93
	MCS 4	< -20	-39.56	-19.56
	MCS 7	< -20	-39.84	-19.84

See figures 4-19 to 4-24 for the plots of the band edge compliance measurements for Channels 1 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

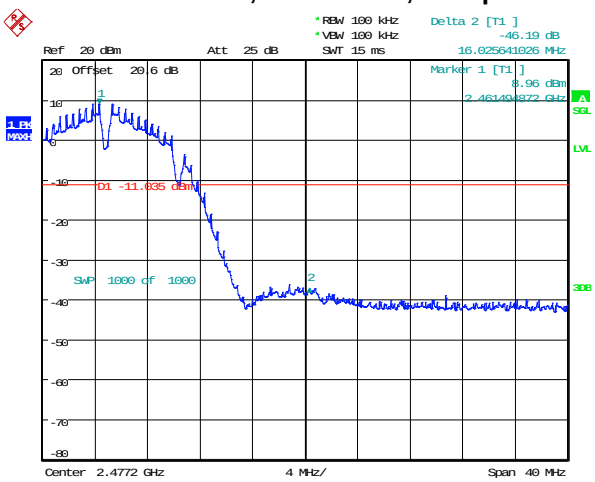
802.11b/g/n RF Conducted Emission Test Results cont'd

Figure 4-19: Band Edge Compliance
802.11b, Channel 1, 1 Mbps



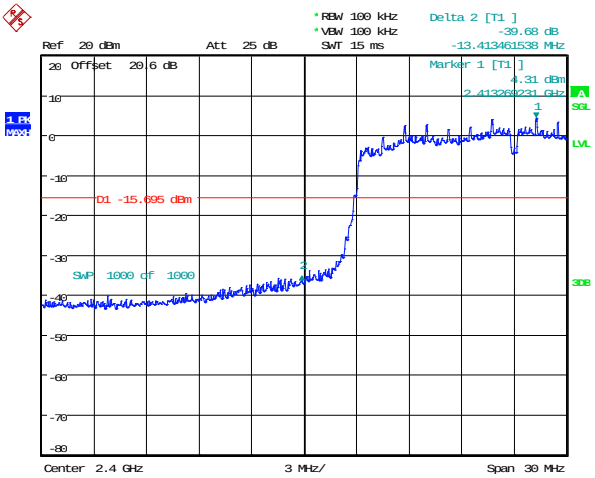
Date: 10.FEB.2015 15:47:30

Figure 4-20: Band Edge Compliance
802.11b, Channel 11, 1 Mbps



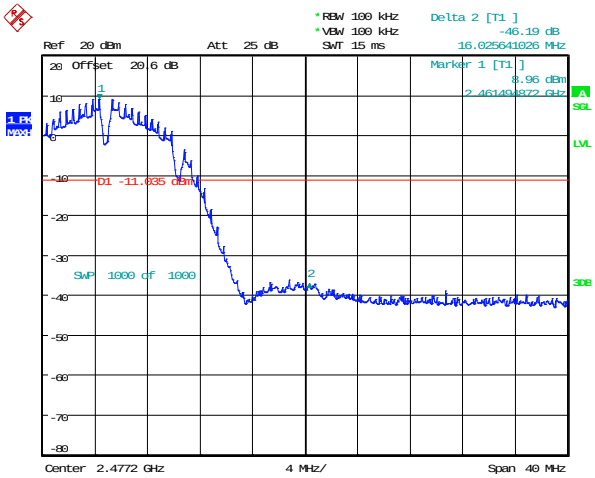
Date: 10.FEB.2015 16:01:01

Figure 4-21: Band Edge Compliance
802.11g, Channel 1, 6 Mbps



Date: 10.FEB.2015 15:54:24

Figure 4-22: Band Edge Compliance
802.11g, Channel 11, 6 Mbps



Date: 10.FEB.2015 16:01:01

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

Figure 4-23: Band Edge Compliance
802.11n, Channel 1, MCS 0

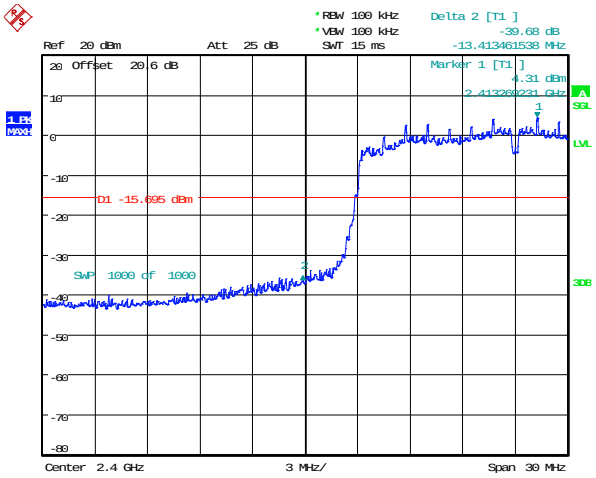
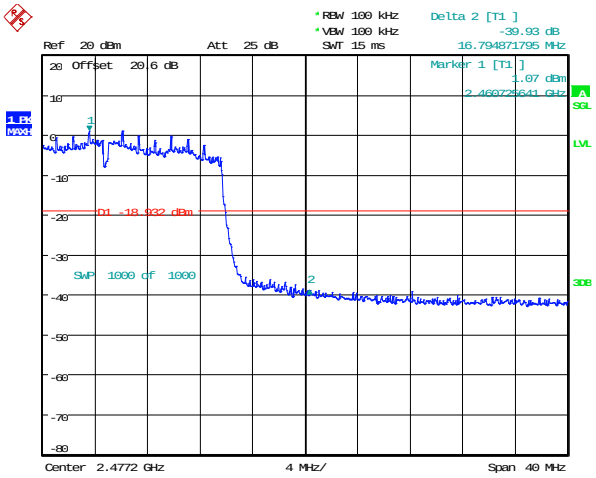


Figure 4-24: Band Edge Compliance
802.11n, Channel 11, MCS 0



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

Peak Power Spectral Density

The EUT met the requirements of the peak power spectral density as per 47 CFR 15.247(d) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4, and 7 for 802.11n mode.

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
1	1 Mbps	< 8.00	-2.10	-10.10
	5.5 Mbps	< 8.00	-4.16	-12.16
	11 Mbps	< 8.00	-4.29	-12.29
	6 Mbps	< 8.00	-8.39	-16.39
	24 Mbps	< 8.00	-8.35	-16.35
	54 Mbps	< 8.00	-9.58	-17.58
	MCS 0	< 8.00	-8.94	-16.94
	MCS 4	< 8.00	-9.63	-17.63
	MCS 7	< 8.00	-11.47	-19.47
6	1 Mbps	< 8.00	-2.20	-10.20
	5.5 Mbps	< 8.00	-3.44	-11.44
	11 Mbps	< 8.00	-4.33	-12.33
	6 Mbps	< 8.00	-6.80	-14.80
	24 Mbps	< 8.00	-7.89	-15.89
	54 Mbps	< 8.00	-9.97	-17.97
	MCS 0	< 8.00	-8.37	-16.37
	MCS 4	< 8.00	-9.86	-17.86
	MCS 7	< 8.00	-12.19	-20.19
11	1 Mbps	< 8.00	-3.80	-11.80
	5.5 Mbps	< 8.00	-5.06	-13.06
	11 Mbps	< 8.00	-4.47	-12.47
	6 Mbps	< 8.00	-11.80	-19.80
	24 Mbps	< 8.00	-11.42	-19.42
	54 Mbps	< 8.00	-11.86	-19.86
	MCS 0	< 8.00	-12.20	-20.20
	MCS 4	< 8.00	-12.26	-20.26
	MCS 7	< 8.00	-13.21	-21.21

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

See figures 4-25 to 4-33 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 4-25: Peak Power Spectral Density
802.11b, Channel 1, 1 Mbps

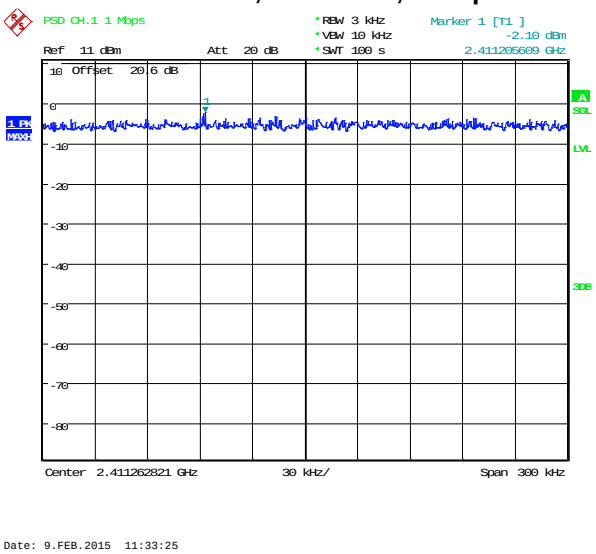


Figure 4-26: Peak Power Spectral Density
802.11b, Channel 6, 1 Mbps

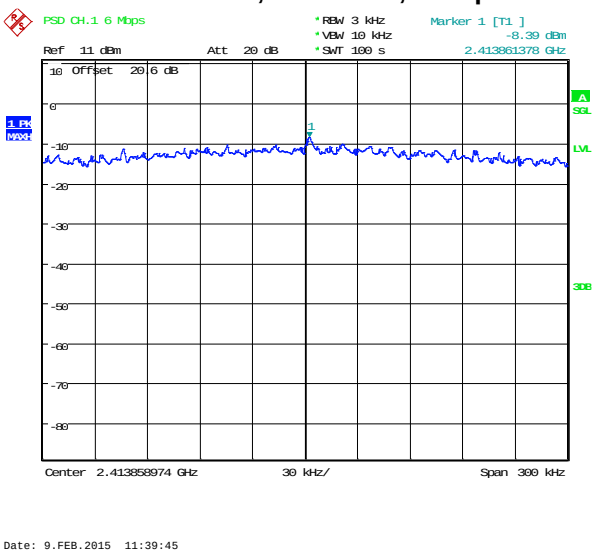
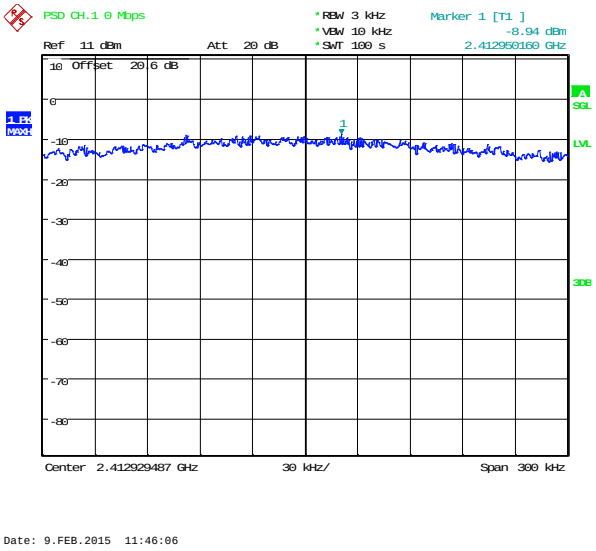
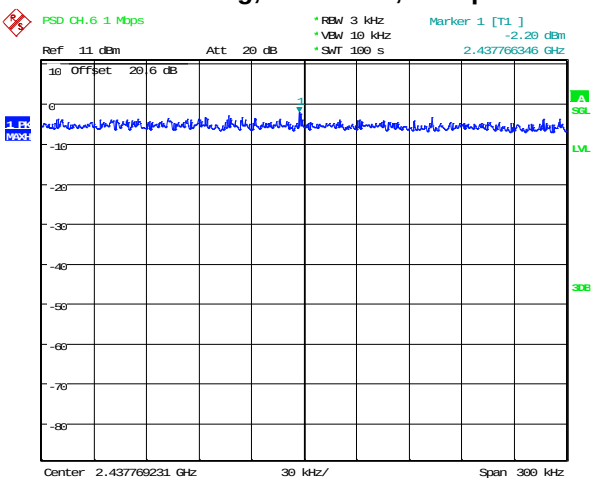


Figure 4-27: Peak Power Spectral Density
802.11b, Channel 11, 1 Mbps



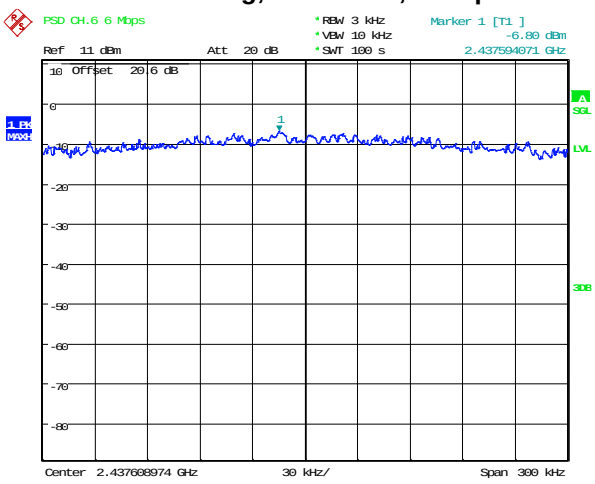
802.11b/g/n RF Conducted Emission Test Results cont'd

Figure 4-28: Peak Power Spectral Density
802.11g, Channel 1, 6 Mbps



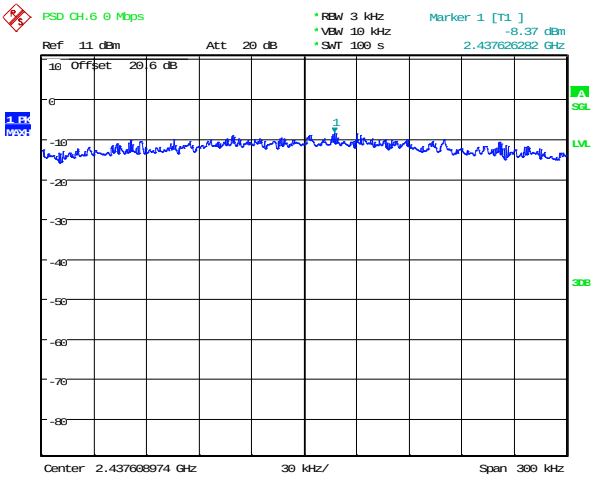
Date: 9.FEB.2015 11:52:29

Figure 4-29: Peak Power Spectral Density
802.11g, Channel 6, 6 Mbps



Date: 9.FEB.2015 11:58:54

Figure 4-30: Peak Power Spectral Density
802.11g, Channel 11, 6 Mbps



Date: 9.FEB.2015 12:05:19

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

Figure 4-31: Peak Power Spectral Density
802.11n, Channel 1, MCS 0

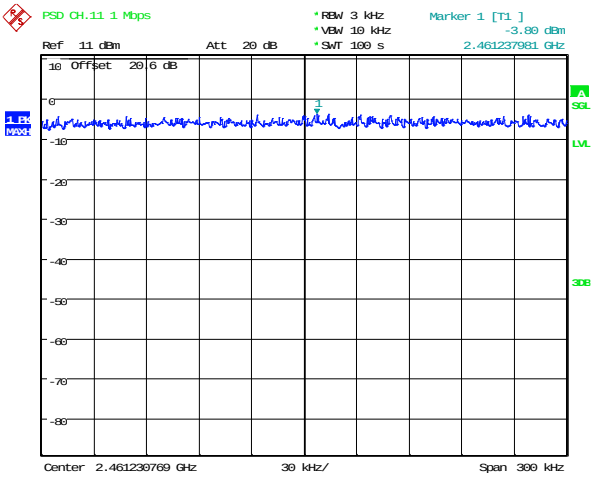


Figure 4-32: Peak Power Spectral Density
802.11n, Channel 6, MCS 0

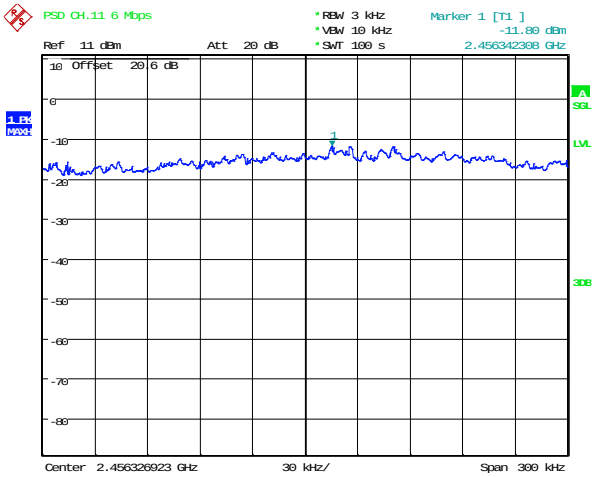
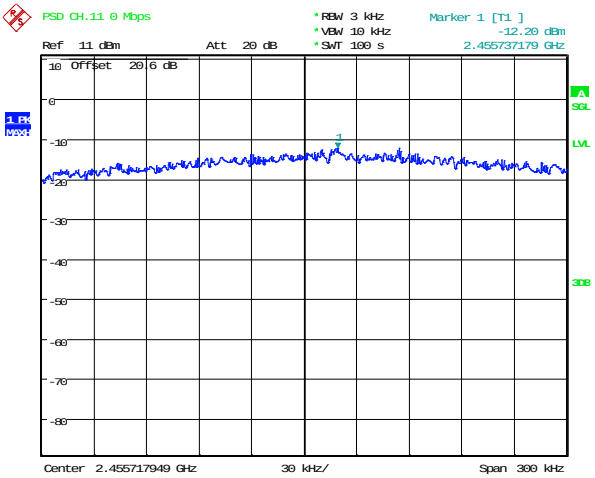


Figure 4-33: Peak Power Spectral Density
802.11n, Channel 11, MCS 0



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

Spurious RF Conducted Emissions

The EUT met the requirements of the spurious RF conducted emissions as per 47 CFR 15.247(c) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4, and 7 for 802.11n mode. Peak power was measured using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 18.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
1	1 Mbps	17.72	-34.72	-52.44	-20
	5.5 Mbps	17.81	-33.36	-51.17	-20
	11 Mbps	17.76	-32.63	-50.39	-20
	6 Mbps	15.32	-21.19	-36.51	-20
	24 Mbps	13.23	-41.21	-54.45	-20
	54 Mbps	14.31	-41.35	-55.66	-20
	MCS 0	13.76	-23.12	-36.88	-20
	MCS 4	14.73	-41.10	-55.84	-20
	MCS 7	12.01	-40.98	-52.99	-20
6	1 Mbps	17.95	-35.91	-53.86	-20
	5.5 Mbps	17.91	-35.72	-53.63	-20
	11 Mbps	17.69	-35.09	-52.78	-20
	6 Mbps	17.13	-15.59	-32.72	-20
	24 Mbps	15.37	-41.59	-56.95	-20
	54 Mbps	12.80	-37.70	-50.50	-20
	MCS 0	15.26	-20.96	-36.22	-20
	MCS 4	14.72	-41.10	-55.82	-20
	MCS 7	12.69	-41.16	-53.85	-20

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

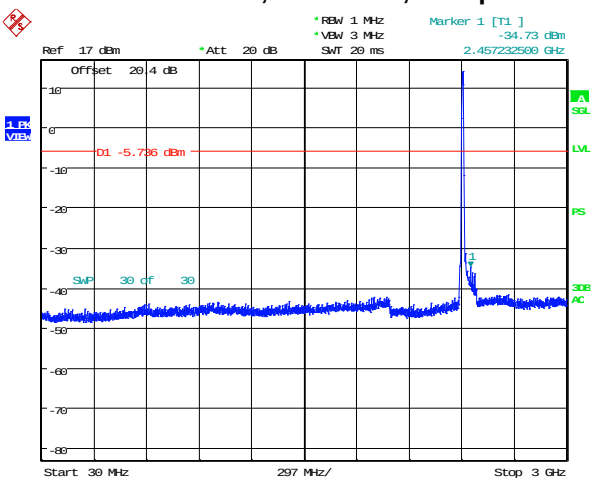
Channel	Data Rate	Power (dBm)	Max. Measured Level (dBm)	Max. Measured Level from Carrier (dBc)	Limit (dBc)
11	1 Mbps	17.12	-40.10	-57.22	-20
	5.5 Mbps	16.76	-35.06	-51.82	-20
	11 Mbps	16.92	-34.49	-51.41	-20
	6 Mbps	12.35	-31.04	-43.39	-20
	24 Mbps	12.34	-41.46	-53.80	-20
	54 Mbps	11.93	-41.65	-53.57	-20
	MCS 0	12.38	-33.90	-46.27	-20
	MCS 4	11.09	-40.41	-51.51	-20
	MCS 7	9.86	-39.57	-49.44	-20

The emissions were in the NF.

See figures 4-34 to 4-42 for the plots of the spurious RF conducted emissions for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

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

Figure 4-34: Spurious Conducted RF Emissions
802.11b, Channel 1, 1 Mbps



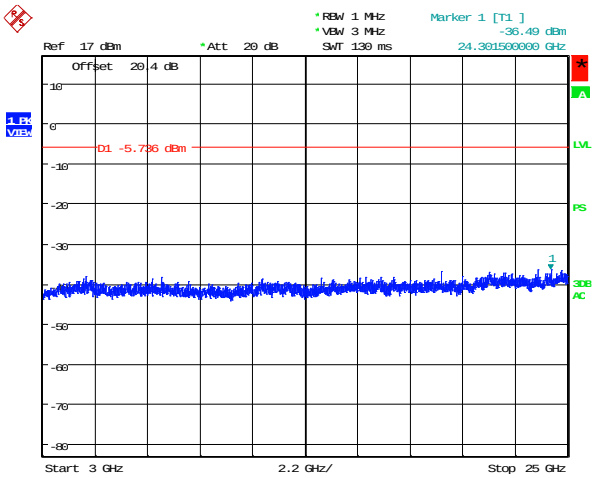
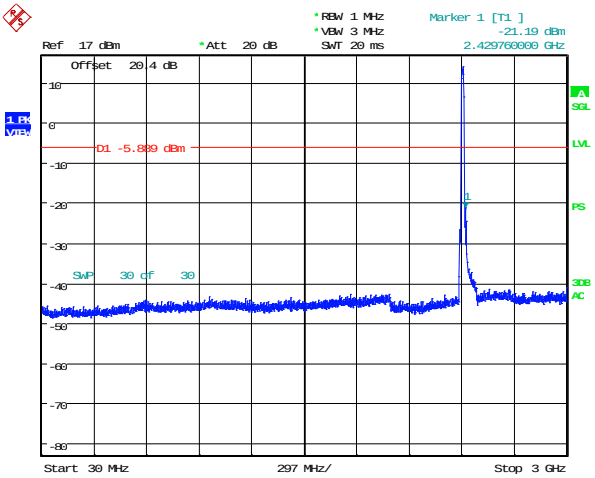
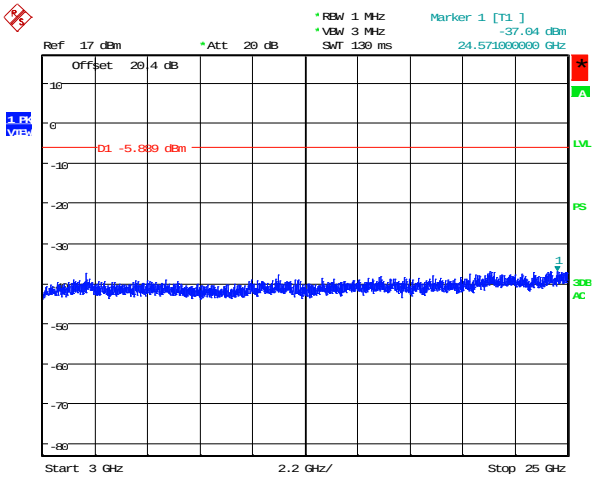


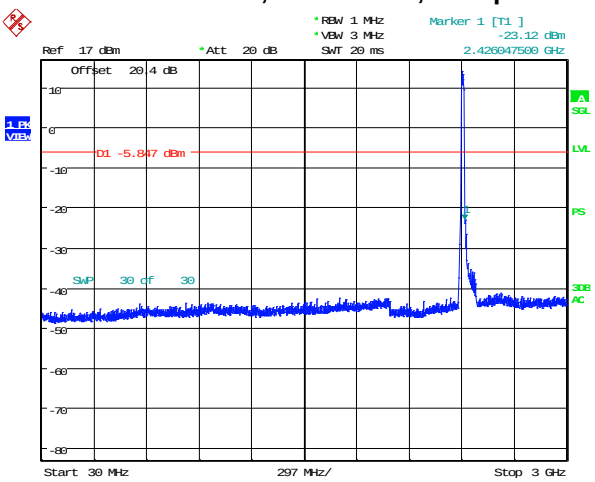
Figure 4-35 : Spurious Conducted RF Emissions
802.11b, Channel 6, 1 Mbps





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

Figure 4-36: Spurious Conducted RF Emissions
802.11b, Channel 11, 1 Mbps



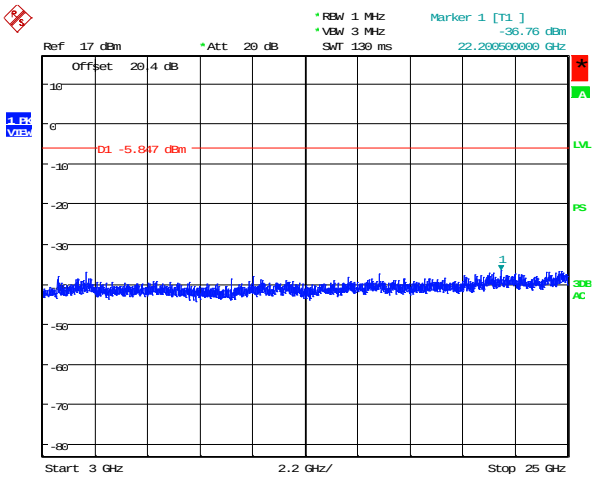
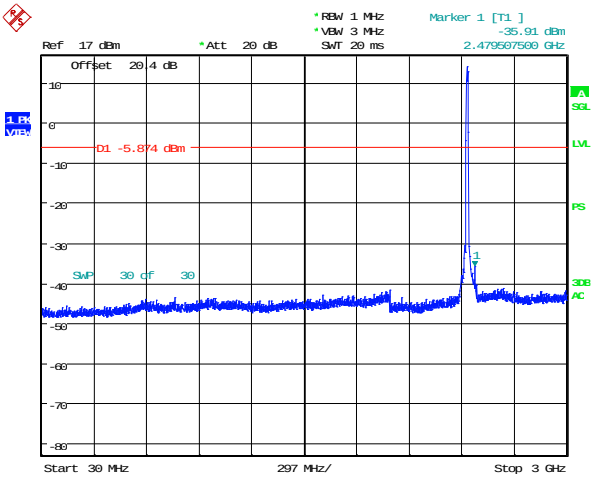
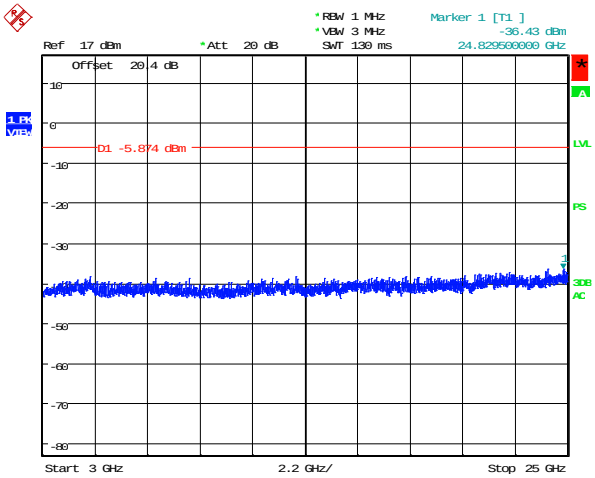


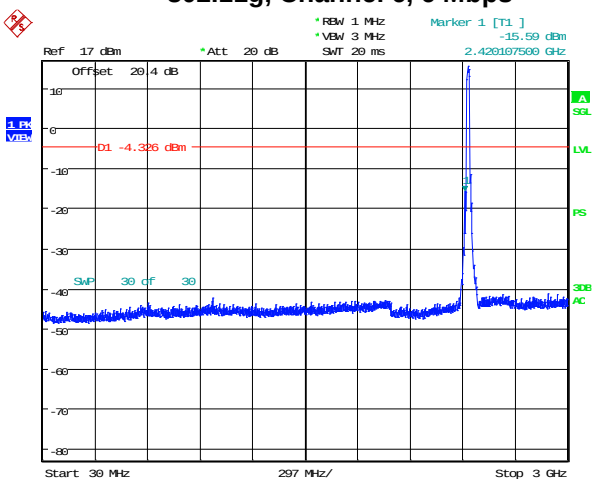
Figure 4-37: Spurious Conducted RF Emissions
802.11g, Channel 1, 6 Mbps





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

Figure 4-38: Spurious Conducted RF Emissions
802.11g, Channel 6, 6 Mbps



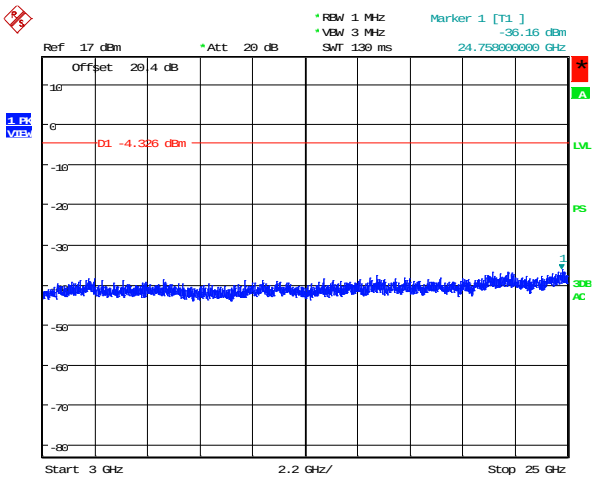
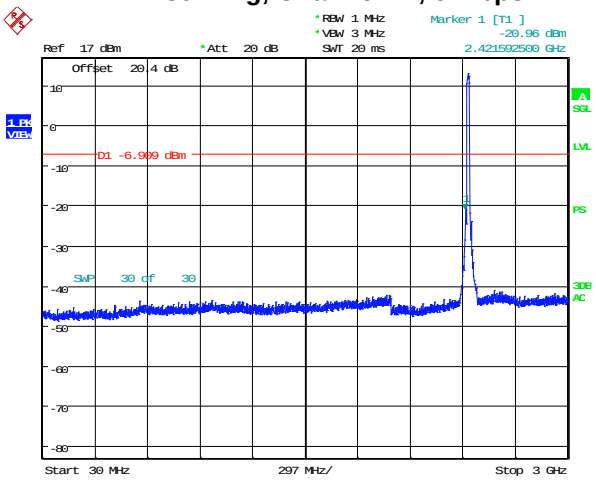
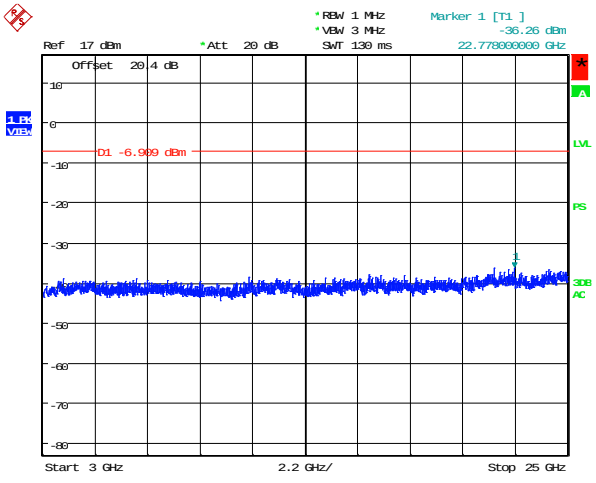


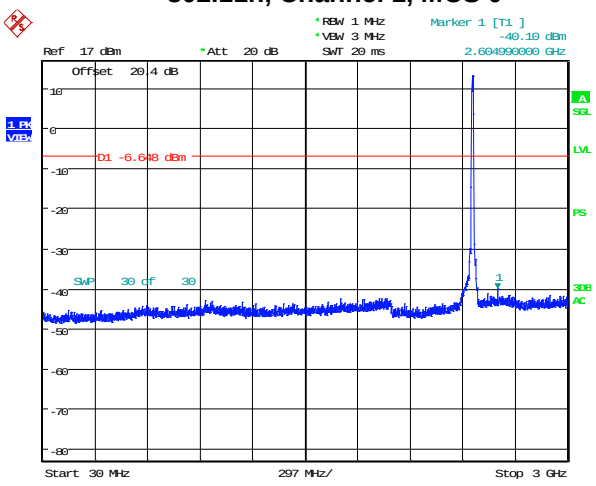
Figure 4-39: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps





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

Figure 4-40: Spurious Conducted RF Emissions
802.11n, Channel 1, MCS 0



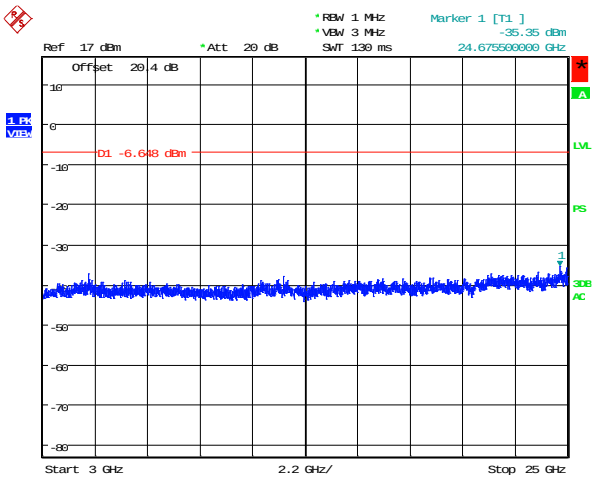
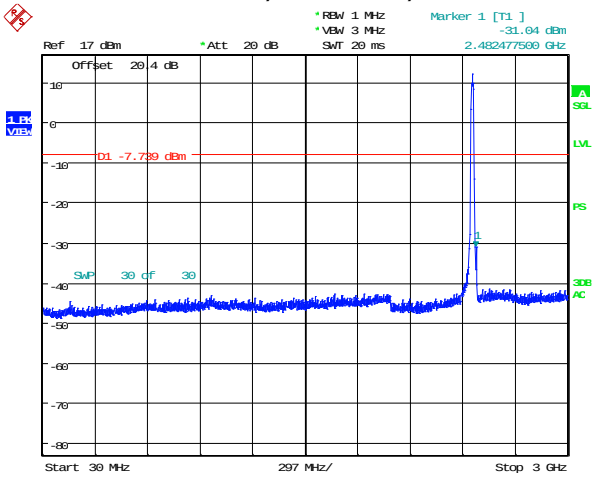
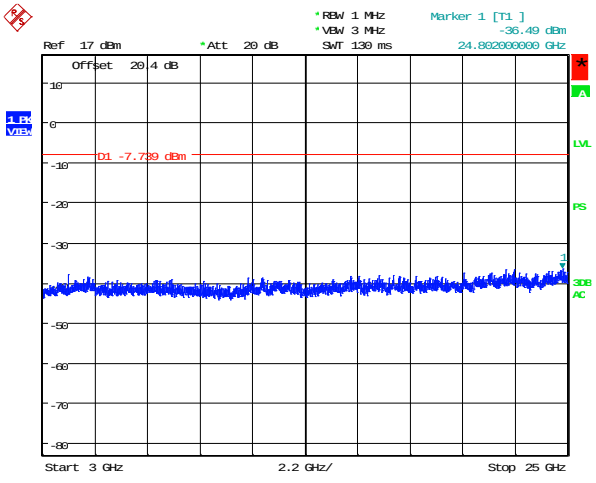


Figure 4-41: Spurious Conducted RF Emissions
802.11n, Channel 6, MCS 0





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

Figure 4-42: Spurious Conducted RF Emissions
802.11n, Channel 11, MCS 0