

EMI Test Report

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




A division of Research In Motion Limited

REPORT NO.: RTS-2474-1001-38

PRODUCT MODEL NO.: RCX71UW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARCX70UW
IC: 2503A-RCX70UW

DATE: 22 April, 2010

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|  | EMI Test Report for the BlackBerry® smartphone Model RCX71UW | |
| Test Report No. RTS-2474-1001-38 | Dates of Test January 27 to March 23 & April 20-22, 2010 | Author Data Michael Cino |

Statement of Performance:

The BlackBerry® smartphone, model RCX71UW, part number CER-25285-001 Rev. 8, and its accessories perform within the requirements of the test standards when configured and operated under RIM's operation instructions.

Declaration:

We hereby certify that:

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

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

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

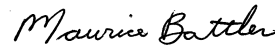
The test methods were consistent with the methods described in the relevant standards.

Documented by:



Michael Cino
Regulatory Compliance Associate
Date: April 22, 2010

Reviewed by:



Maurice Battler
Compliance Specialist
Date: April 22, 2010

Reviewed and Approved by:



Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: April 23, 2010



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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, 2009
- o Industry Canada, RSS-210, Issue 7, June 2007, Low Power Licence-Exempt Radiocommunication Devices
- o Industry Canada, RSS-GEN, Issue 2, June 2007, General Requirements and Information for the Certification of Radiocommunication Equipment

B. Associated Documents

1. HW_Declaration_CER-25285-001 Rev 2
2. HW_Declaration_CER-25285-001 Rev 5
3. HW_Declaration_CER-25285-001 Rev 6
4. HW_Declaration_CER-25285-001 Rev 7
5. HW_Declaration_CER-25285-001 Rev 8

C. Product Identification

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

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


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

RIM Testing Services EMI test facilities

305 Phillip Street
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 January 27 to March 23 & April 20-22, 2010.

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The sample EUT included:

| SAMPLE | MODEL | CER NUMBER | PIN |
|--------|---------|----------------------|----------|
| 1 | RCX71UW | CER-25285-001 Rev. 1 | 21BE0489 |
| 2 | RCX71UW | CER-25285-001 Rev. 1 | 21BE03E5 |
| 3 | RCX71UW | CER-25285-001 Rev. 1 | 21BE0489 |
| 4 | RCX71UW | CER-25285-001 Rev. 1 | 21BE04F2 |
| 5 | RCX71UW | CER-25285-001 Rev. 2 | 21D067C1 |
| 6 | RCX71UW | CER-25285-001 Rev. 2 | 21D06B49 |
| 7 | RCX71UW | CER-25285-001 Rev. 5 | 21F25870 |
| 8 | RCX71UW | CER-25285-001 Rev. 6 | 220CB9BA |
| 9 | RCX71UW | CER-25285-001 Rev. 6 | 220CB9BD |
| 10 | RCX71UW | CER-25285-001 Rev. 8 | 222AC1F4 |

Sample 1 was used for all AC Line Conducted Emissions testing.
Samples 2, 3, 5 and 6 were used for Bluetooth Radiated Emissions testing.
Samples 7, 8, 9 and 10 were used for 802.11b/g/n Radiated Emissions testing.
Sample 4 was used for Bluetooth and 802.11b/g/n Conducted Emissions testing.

To view the differences between CER-25285-001 Rev. 1 and CER-25285-001 Rev. 8, see document HW_Declaration_CER-25285-001 Rev 2, HW_Declaration_CER-25285-001 Rev 5, HW_Declaration_CER-25285-001 Rev 6, HW_Declaration_CER-25285-001 Rev 7 and HW_Declaration_CER-25285-001 Rev 8.


Only the characteristics that may have been affected by the changes from Rev 1 to Rev 8 have been re-tested.

BlackBerry® smartphone Accessories Tested

- 1) Fixed Blade Charger, part number HDW-24481-001, with an output voltage of 5.0 volts dc, 700 mA and attached USB cable with a lead length of 1.80 metres.
- 2) Folding Blade Charger, part number HDW-17955-001, with an output voltage of 5.0 volts dc.
- 3) Stereo Headset, part number HDW-14322-003 with a lead length of 1.3 metres.
- 4) USB Data Cable, part number HDW-06610-005, 1.50 metres long.


D. Support Equipment Used for the Testing of the EUT

No support equipment used. See section *G. Compliance Test Equipment Used*.

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E. Test Results Chart

| SPECIFICATION | | TEST TYPE | Meets Requirements | TEST DATA |
|----------------------------|--------------------|--|--------------------|-----------|
| FCC CFR 47 | IC | | | APPENDIX |
| Part 15.207 | RSS-210 RSS-GEN | Conducted AC Line Emission | Pass | 1 |
| Part 15.209 Part 15.247 | RSS-210 RSS-GEN | BT Radiated Spurious Emissions and Radiated Band Edge Compliance | Pass | 2 |
| Part 15.209 Part 15.247 | RSS-210 RSS-GEN | 802.11 b/g/n Radiated Spurious Emissions and Radiated Band Edge Compliance | Pass | 2 |
| Part 15.247(a) | RSS-210 | BT, 20 dB Bandwidth | Pass | 3 |
| Part 15.247(a) | RSS-210 | BT, Carrier Frequency Separation | Pass | 3 |
| Part 15.247(a) | RSS-210 | BT, Number of Hopping Frequencies | Pass | 3 |
| Part 15.247(a) | RSS-210 | BT, Time of Occupancy (Dwell Time) | Pass | 3 |
| Part 15.247(b) | RSS-210 | BT, Maximum Peak Conducted Output Power | Pass | 3 |
| Part 15.247(c) | RSS-210 | BT, Band-Edge Compliance of RF Conducted Emissions | Pass | 3 |
| Part 15.247(c) | RSS-210 | BT, Spurious RF Conducted Emissions | Pass | 3 |
| Part 15.247(b) | RSS-210 | 802.11b/g/n, 6 dB Bandwidth | Pass | 4 |
| Part 15.247(b) | RSS-210 | 802.11b/g/n, Maximum Conducted Output Power | Pass | 4 |
| Part 15.247(b) | RSS-210 | 802.11b/g/n, Band-Edge | Pass | 4 |
| Part 15.247(b) | RSS-210 | 802.11b/g/n, Peak Power Spectral Density | Pass | 4 |
| Part 15.247(b) | RSS-210 | 802.11b/g/n, Spurious RF Conducted Emissions | Pass | 4 |

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F. Summary of Results

1) AC LINE CONDUCTED EMISSIONS

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

BlackBerry® smartphone was in battery charging mode. The input voltage was 120 V, 60 Hz.


The following test configurations were measured:

1. The BlackBerry® smartphone in 802.11b Tx mode and attached to the Stereo Headset, was connected to the Folding Blade Charger.
2. The BlackBerry® smartphone in Bluetooth Tx mode and connected to the Stereo Headset was connected to the Fixed Blade Charger via the 1.5 metre USB Cable.

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 8.21 dB below the QP limit at 0.150 MHz using the quasi-peak detector with the Fixed Blade Charger in Test Configuration 2.

See APPENDIX 1 for the test data

Measurement Uncertainty ± 3.0 dB

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2) RADIATED EMISSIONS

a) Radiated Spurious and Harmonic Emissions

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

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

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

The BlackBerry® smartphone was measured in standalone configuration with Bluetooth transmitting in single frequency mode at low channel (0), middle channel (39) and high channel (78) for packet type "DH5", "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 transmitting on channels 1, 6 & 11 at 1 Mbps, MCS 0 and MCS 7, and on channel 6 at 6 Mbps for 802.11b/g/n modes. 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 worst case test margin was 4.45 dB below the accepted limit at 12399.103 MHz .

The 802.11b/g/n harmonics were investigated up to the 10th harmonic. The worst case test margin was 13.41 dB below the accepted limit at 2398.377 MHz.


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 and 802.11b/g/n as per the requirements of 15.247, 15.209, and RSS-210/RSS-GEN.

Measurement Uncertainty ± 4.6 dB

See APPENDIX 2 for the test data

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3) 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.

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.


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.

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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.

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. See APPENDIX 4 for the test data.

b) Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power as per 47 CFR 15.247(b) and RSS-210. Low channel (1), middle channel (6) and high channel (11) were measured. See APPENDIX 4 for the test data.

c) Band-Edge Compliance of RF Conducted Emissions


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

d) Peak Power Spectral Density

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


e) Spurious RF Conducted Emissions

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


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G. Compliance Test Equipment Used

| <u>UNIT</u> | <u>MANUFACTURER</u> | <u>MODEL</u> | <u>SERIAL NUMBER</u> | <u>CAL DUE DATE (YY MM DD)</u> | <u>USE</u> |
|-----------------------|---------------------|--------------|--------------------------|--|------------------------------------|
| EMI Test Receiver | Rohde & Schwarz | ESIB 40 | 100255 | 10-12-01 | Conducted/Radiated Emissions |
| EMI Test Receiver | Rohde & Schwarz | ESU 40 | 100162 | 10-04-22 | Conducted/Radiated Emissions |
| Hybrid Log Antenna | EMC Automation | HLP-3003C | 017401 | 10-09-26 | Radiated Emissions |
| Horn Antenna | CMT | LHA 0180 | R52734-001 | 12-01-21 | Radiated Emissions |
| Horn Antenna | ETS-Lindgren | 3117 | 47563 | 11-07-15 | Radiated Emissions |
| Preamplifier | Rohde & Schwarz | TS-ANA4-SP | 001 | 11-02-17 | Radiated Emissions |
| Preamplifier | Sonoma | 310N/11909A | 185831 | 10-11-14 | Radiated Emissions |
| Preamplifier | Rohde & Schwarz | TS-ANA-SP | 001 | 11-02-19 | Radiated Emissions |
| L.I.S.N. | Rohde & Schwarz | ENV216 | 100060 | 10-04-21 | Conducted Emissions |
| Environment Monitor | Control Company | 1870 | 230355190 | 11-01-08 | Radiated Emissions |
| EMC Analyzer | Agilent | E7405A | US40240226 | 10-12-10 | Radiated Emissions |
| Spectrum Analyzer | HP | 8563E | 3745A08112 | 11-09-30 | RF Conducted Emissions |
| DC Power Supply | HP | 6632B | US37472178 | 10-09-03 | RF Conducted Emissions |
| Environment Monitor | Control Company | 1870 | 80117164 | 11-01-08 | RF Conducted Emissions |
| Temperature Probe | Control Company | 15-077-21 | 51129471 | 10-05-01 | Frequency Stability |
| Environmental Chamber | ESPEC Corp. | SH-240S1 | 91005607 | N/R | Frequency Stability |
| Bluetooth Tester | Rohde & Schwarz | CBT | 100034 | 10-11-10 | RF Conducted Emissions |
| Bluetooth Tester | Rohde & Schwarz | CBT35 | 100368 | 10-11-25 | Radiated Emissions |
| Bluetooth Tester | Rohde & Schwarz | CBT35 | 100370 | 10-11-26 | Radiated Emissions |
| Power Meter | Agilent | N1911A | MY45100905 | 11-01-05 | RF Conducted / Frequency Stability |
| Power Sensor | Agilent | N1921A | SG45240281 | 10-05-08 | RF Conducted / Frequency Stability |
| Digital Multimeter | Hewlett Packard | 34401A | US36042324 | 10-10-08 | Conducted/Radiated Emissions |
| Environment Monitor | Control Company | 1870 | 230355159 | 11-01-08 | Radiated Emissions |

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APPENDIX 1 – AC CONDUCTED EMISSIONS TEST DATA/PLOTS

| | | |
|---|---|------------------------------------|
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AC Conducted Emission Test Results

Test Configuration 1


The BlackBerry® smartphone was tested on February 02, 2010.

The environmental test conditions were: Temperature: 26 °C
Pressure: 1017 mb
Relative Humidity: 24 %

| Frequency (MHz) | Line | Reading (QP) (dBμV) | Correction Factor (dB) | Corrected Reading (QP) (dB) | Limit (QP) (dBμV) | Limit (AV) (dBμV) | Margin (QP) Limits (dB) |
|--------------------|------|---------------------------|------------------------------|--------------------------------------|-------------------------|-------------------------|----------------------------------|
| 0.155 | L1 | 33.02 | 11.17 | 44.19 | 65.75 | 55.75 | -21.56 |
| 0.159 | N | 33.74 | 11.17 | 44.91 | 65.52 | 55.52 | -20.61 |
| 0.398 | L1 | 32.13 | 10.01 | 42.14 | 57.91 | 47.91 | -15.77 |
| 0.416 | N | 24.48 | 10.00 | 34.48 | 57.54 | 47.54 | -23.06 |
| 0.474 | L1 | 32.67 | 9.92 | 42.59 | 56.44 | 46.44 | -13.85 |
| 0.677 | L1 | 32.90 | 9.84 | 42.74 | 56.00 | 46.00 | -13.26 |
| 0.681 | N | 29.17 | 9.84 | 39.01 | 56.00 | 46.00 | -16.99 |
| 1.001 | L1 | 32.59 | 9.80 | 42.39 | 56.00 | 46.00 | -13.61 |
| 1.068 | N | 30.19 | 9.81 | 40.00 | 56.00 | 46.00 | -16.00 |
| 1.230 | N | 30.16 | 9.80 | 39.96 | 56.00 | 46.00 | -16.04 |
| 1.235 | L1 | 33.27 | 9.80 | 43.07 | 56.00 | 46.00 | -12.93 |
| 1.338 | N | 28.61 | 9.81 | 38.42 | 56.00 | 46.00 | -17.58 |
| 1.428 | L1 | 28.87 | 9.80 | 38.67 | 56.00 | 46.00 | -17.33 |
| 1.856 | N | 32.52 | 9.82 | 42.35 | 56.00 | 46.00 | -13.65 |
| 2.126 | L1 | 36.80 | 9.83 | 46.63 | 56.00 | 46.00 | -9.37 |
| 3.044 | N | 23.95 | 9.88 | 33.83 | 56.00 | 46.00 | -22.17 |
| 3.395 | L1 | 27.95 | 9.89 | 37.83 | 56.00 | 46.00 | -18.17 |
| 3.651 | N | 21.23 | 9.90 | 31.12 | 56.00 | 46.00 | -24.88 |
| 4.043 | L1 | 26.58 | 9.90 | 36.48 | 56.00 | 46.00 | -19.52 |

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

Measurements were done with the quasi-peak detector. See figure 1-1 and figure 1-2 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

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AC Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

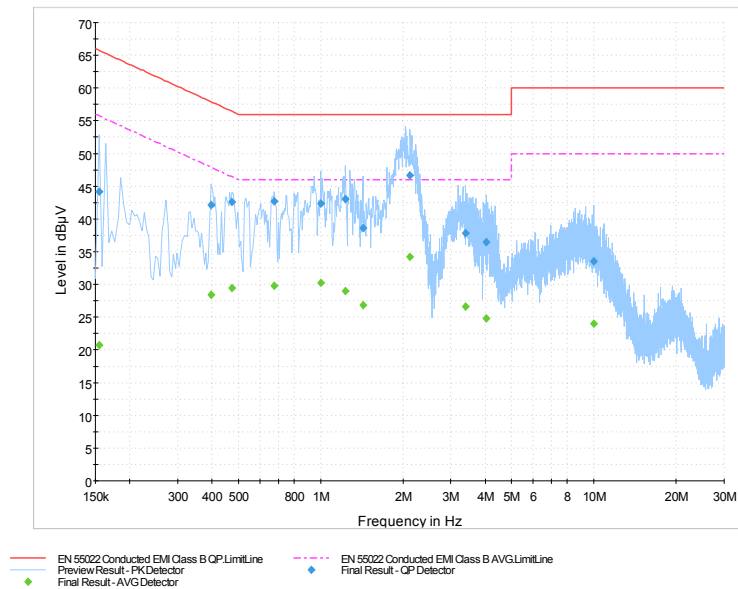
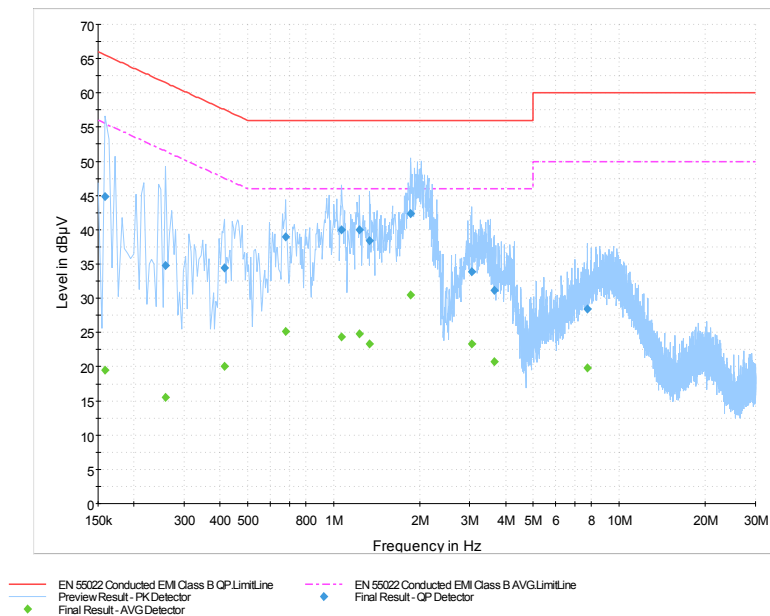



Figure 1-2: N Lines



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AC Conducted Emission Test Results

Test Configuration 2

The BlackBerry® smartphone was tested on February 01, 2010.


The environmental test conditions were: Temperature: 26 °C
Pressure: 1023 mb
Relative Humidity: 24 %

| Frequency (MHz) | Line | Reading (QP) (dBμV) | Correction Factor (dB) | Corrected Reading (QP) (dB) | Limit (QP) (dBμV) | Limit (AV) (dBμV) | Margin (QP) Limits (dB) |
|--------------------|------|---------------------------|------------------------------|--------------------------------------|-------------------------|-------------------------|----------------------------------|
| 0.150 | N | 46.55 | 11.23 | 57.79 | 66.00 | 56.00 | -8.21 |
| 0.155 | L1 | 43.00 | 11.17 | 54.17 | 65.75 | 55.75 | -11.58 |
| 0.164 | N | 45.22 | 11.14 | 56.36 | 65.28 | 55.28 | -8.92 |
| 0.168 | L1 | 41.79 | 11.08 | 52.87 | 65.06 | 55.06 | -12.19 |
| 0.177 | L1 | 40.73 | 11.02 | 51.75 | 64.63 | 54.63 | -12.88 |
| 0.177 | N | 44.36 | 11.05 | 55.40 | 64.63 | 54.63 | -9.22 |
| 0.186 | N | 43.84 | 10.98 | 54.82 | 64.21 | 54.21 | -9.40 |
| 0.195 | N | 42.67 | 10.92 | 53.59 | 63.82 | 53.82 | -10.23 |
| 0.209 | L1 | 39.25 | 10.80 | 50.05 | 63.26 | 53.26 | -13.22 |
| 0.240 | L1 | 37.13 | 10.58 | 47.70 | 62.10 | 52.10 | -14.39 |
| 0.254 | L1 | 36.64 | 10.48 | 47.12 | 61.64 | 51.64 | -14.52 |
| 0.294 | L1 | 33.73 | 10.20 | 43.93 | 60.41 | 50.41 | -16.48 |
| 0.303 | N | 36.66 | 10.17 | 46.83 | 60.16 | 50.16 | -13.33 |
| 0.348 | L1 | 31.20 | 10.09 | 41.29 | 59.01 | 49.01 | -17.72 |
| 0.501 | N | 28.40 | 9.92 | 38.32 | 56.00 | 46.00 | -17.68 |
| 0.515 | L1 | 24.16 | 9.90 | 34.07 | 56.00 | 46.00 | -21.93 |
| 0.609 | L1 | 22.58 | 9.85 | 32.44 | 56.00 | 46.00 | -23.56 |
| 9.771 | L1 | 25.43 | 9.97 | 35.40 | 60.00 | 50.00 | -24.60 |

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

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.

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|  | EMI Test Report for the BlackBerry® smartphone Model RCX71UW APPENDIX 1 | |
| Test Report No. RTS-2474-1001-38 | Dates of Test January 27 to March 23 & April 20-22 2010 | Author Data Michael Cino |

AC Conducted Emissions Test Graphs

Test Configuration 2

Figure 1-3: L1 lines

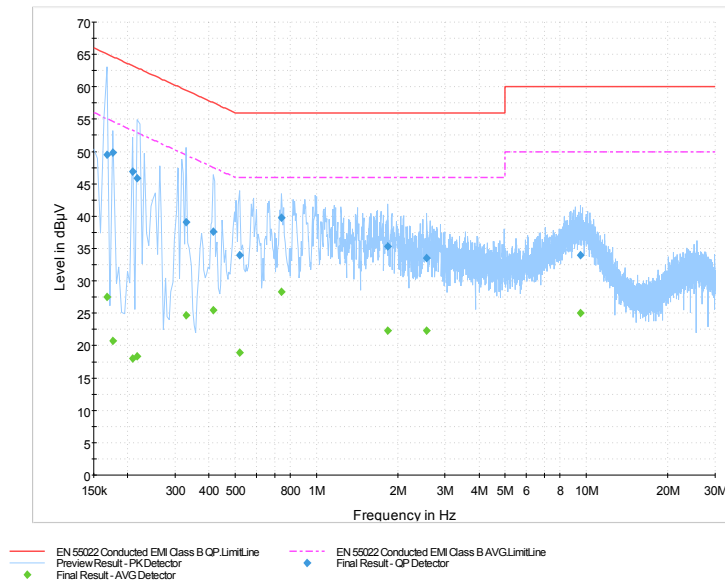
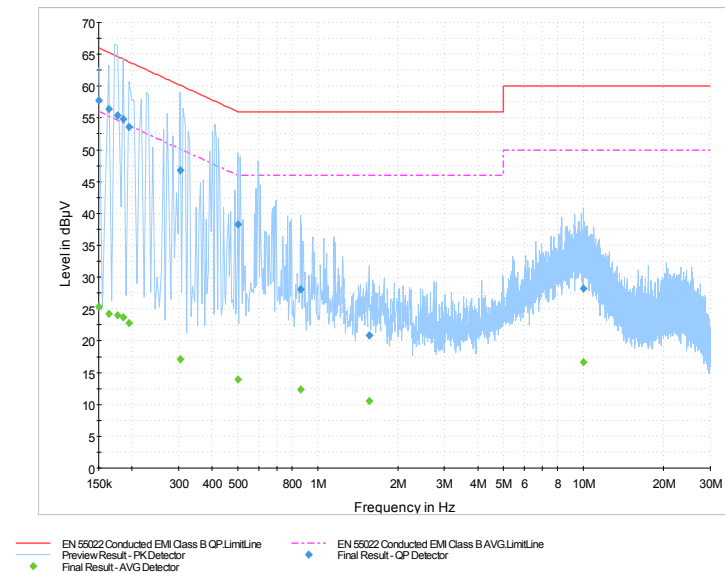




Figure 1-4: N Lines



| | | |
|---|---|------------------------------------|
|  | EMI Test Report for the BlackBerry® smartphone Model RCX71UW APPENDIX 2 | |
| Test Report No. RTS-2474-1001-38 | Dates of Test January 27 to March 23 & April 20-22, 2010 | Author Data Michael Cino |

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

| | | |
|---|---|------------------------------------|
|  | EMI Test Report for the BlackBerry® smartphone Model RCX71UW APPENDIX 2 | |
| Test Report No. RTS-2474-1001-38 | Dates of Test January 27 to March 23 & April 20-22, 2010 | Author Data Michael Cino |

Radiated Emissions Test Results
Bluetooth Band

Date of Test: January 29, 2010
Measurements were performed by Fahd Faisal.

The environmental test conditions were: Temperature: 26 °C
Pressure: 1011 mb
Relative Humidity: 21 %

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

The BlackBerry® smartphone in Bluetooth Tx mode was in vertical, upside down position.

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


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

Date of Test: January 27 to February 22, 2010
Measurements were performed by Heng Lin.


The environmental test conditions were: Temperature: 23 – 26 °C
Pressure: 1008 – 1028 mb
Relative Humidity: 23 – 32 %

The measurements were performed in single frequency Tx mode using packet types “DH5”, “2-DH5” and “3-DH5” on channels 0, 39 and 78. The BlackBerry® smartphone was in standalone, USB down position.

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


| | | | |
|---|--|--|------------------------------------|
|  | | EMI Test Report for the BlackBerry® smartphone Model RCX71UW | |
| | | APPENDIX 2 | |
| Test Report No. RTS-2474-1001-38 | | Dates of Test January 27 to March 23 & April 20-22, 2010 | Author Data Michael Cino |

| Frequency (MHz) | Channel | Packet Type | Antenna | | Test Angle (Deg.) | RBW / VBW | Measured Level (dBμV) | Correction Factor for preamp/antenna/ cables/ filter (dB) | Field Strength Level (reading+corr) (dBμV/m) | Limit @ 3.0 m (dBμV/m) | Test Margin (dB) |
|--------------------|---------|----------------|---------------|--------------------|-------------------------|------------------|-----------------------------|---|---|------------------------------|------------------------|
| | | | Pol. (V/H) | Height (metres) | | | | | | | |
| 4804.311 | 0 | DH5 | V | 3.21 | 224.00 | 1 MHz / 1 MHz | 41.82 | 18.11 | 59.93 | 74.00 | -14.07 |
| 4804.006 | 0 | DH5 | H | 3.00 | 291.00 | 1 MHz / 10 Hz | 28.30 | 18.11 | 46.41 | 54.00 | -7.59 |
| 3202.628 | 0 | 3DH5 | V | 4.00 | 178.00 | 1 MHz / 1 MHz | 46.49 | 12.54 | 59.03 | 74.00 | -14.97 |
| 4882.468 | 39 | DH5 | V | 2.23 | 278.00 | 1 MHz / 1 MHz | 37.61 | 18.53 | 56.14 | 74.00 | -17.86 |
| 4882.035 | 39 | DH5 | V | 2.23 | 278.00 | 1 MHz / 10 Hz | 27.18 | 18.53 | 45.71 | 54.00 | -8.29 |
| 7323.494 | 39 | DH5 | H | 2.00 | 210.00 | 1MHz / 1MHz | 46.78 | 15.50 | 62.28 | 74.00 | -11.72 |
| 12205.817 | 39 | DH5 | V | 1.91 | 177.00 | 1 MHz / 1 MHz | 35.72 | 24.63 | 60.34 | 74.00 | -13.66 |
| 7323.494 | 39 | DH5 | H | 2.00 | 210.00 | 1 MHz / 10 Hz | 25.64 | 15.50 | 41.14 | 54.00 | -12.86 |
| 12205.817 | 39 | DH5 | V | 1.91 | 177.00 | 1 MHz / 10 Hz | 24.56 | 24.63 | 49.19 | 54.00 | -4.81 |
| 2388.442 | 39 | 3DH5 | V | 4.00 | 178.00 | 1 MHz / 1 MHz | 50.34 | 8.59 | 58.93 | 74.00 | -15.07 |
| 2388.442 | 39 | 3DH5 | V | 4.00 | 178.00 | 1 MHz / 10 Hz | 27.61 | 8.59 | 36.20 | 54.00 | -17.80 |
| 4960.064 | 78 | DH5 | H | 3.14 | 228.00 | 1 MHz / 1 MHz | 35.68 | 19.51 | 55.19 | 74.00 | -18.81 |
| 4960.064 | 78 | DH5 | H | 3.14 | 228.00 | 1 MHz / 10 Hz | 27.31 | 19.51 | 46.82 | 54.00 | -7.18 |
| 2369.740 | 78 | 2DH5 | V | 3.48 | 56.00 | 1 MHz / 1 MHz | 44.51 | 8.72 | 53.23 | 74.00 | -20.77 |
| 2369.740 | 78 | 2DH5 | V | 3.48 | 56.00 | 1 MHz / 10 Hz | 27.53 | 8.72 | 36.25 | 54.00 | -17.75 |
| 2388.506 | 78 | 3DH5 | V | 4.00 | 158.00 | 1 MHz / 1 MHz | 50.77 | 8.59 | 59.36 | 74.00 | -14.64 |

| | | | |
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| | | APPENDIX 2 | |
| Test Report No. RTS-2474-1001-38 | | Dates of Test January 27 to March 23 & April 20-22, 2010 | Author Data Michael Cino |


| Frequency (MHz) | Channel | Packet Type | Antenna | | Test Angle (Deg.) | RBW / VBW | Measured Level (dBμV) | Correction Factor for preamp/antenna/ cables/ filter (dB) | Field Strength Level (reading+corr) (dBμV/m) | Limit @ 3.0 m (dBμV/m) | Test Margin (dB) |
|--------------------|---------|----------------|---------------|--------------------|-------------------------|------------------|-----------------------------|---|---|------------------------------|------------------------|
| | | | Pol. (V/H) | Height (metres) | | | | | | | |
| 7205.753 | 0 | DH5 | H | 2.00 | 150.00 | 1 MHz / 1 MHz | 46.35 | 15.88 | 62.23 | 74.00 | -11.77 |
| 7205.753 | 0 | DH5 | H | 2.00 | 150.00 | 1 MHz / 10 Hz | 28.58 | 15.88 | 44.46 | 54.00 | -9.54 |
| 7205.994 | 0 | 3DH5 | H | 1.95 | 143.00 | 1 MHz / 1 MHz | 43.51 | 15.88 | 59.40 | 74.00 | -14.61 |
| 7205.994 | 0 | 3DH5 | H | 1.95 | 143.00 | 1 MHz / 10 Hz | 26.91 | 15.88 | 42.79 | 54.00 | -11.21 |
| 7322.644 | 39 | 2DH5 | H | 2.35 | 150.00 | 1 MHz / 1 MHz | 42.55 | 15.51 | 58.06 | 74.00 | -15.94 |
| 7322.644 | 39 | 2DH5 | H | 2.35 | 150.00 | 1 MHz / 10 Hz | 29.63 | 15.51 | 45.14 | 54.00 | -8.86 |
| 19526.891 | 39 | 2DH5 | H | 1.00 | 116.00 | 1 MHz / 1 MHz | 38.00 | 15.70 | 53.69 | 74.00 | -20.31 |
| 19526.891 | 39 | 2DH5 | H | 1.00 | 116.00 | 1 MHz / 10 Hz | 27.35 | 15.70 | 43.05 | 54.00 | -10.95 |
| 7323.205 | 39 | 3DH5 | H | 1.89 | 137.00 | 1 MHz / 1 MHz | 41.87 | 15.50 | 57.38 | 74.00 | -16.62 |
| 7323.205 | 39 | 3DH5 | H | 1.89 | 137.00 | 1 MHz / 10 Hz | 26.22 | 15.50 | 41.72 | 54.00 | -12.28 |
| 19528.830 | 39 | 3DH5 | H | 3.13 | 110.00 | 1 MHz / 1 MHz | 38.83 | 15.69 | 54.53 | 74.00 | -19.48 |
| 19528.830 | 39 | 3DH5 | H | 3.13 | 110.00 | 1 MHz / 10 Hz | 29.73 | 15.69 | 45.42 | 54.00 | -8.58 |
| 19841.554 | 78 | DH5 | H | 1.00 | 124.00 | 1 MHz / 1 MHz | 41.65 | 15.96 | 57.61 | 74.00 | -16.39 |
| 19841.554 | 78 | DH5 | H | 1.00 | 124.00 | 1 MHz / 10 Hz | 25.80 | 15.96 | 41.76 | 54.00 | -12.24 |
| 7439.503 | 78 | 2DH5 | H | 2.51 | 151.00 | 1 MHz / 1 MHz | 44.54 | 15.71 | 60.24 | 74.00 | -13.76 |
| 12399.103 | 78 | 2DH5 | V | 1.61 | 84.00 | 1 MHz / 1 MHz | 35.27 | 23.82 | 59.10 | 74.00 | -14.90 |
| 7439.503 | 78 | 2DH5 | H | 2.51 | 151.00 | 1 MHz / 10 Hz | 30.52 | 15.71 | 46.23 | 54.00 | -7.77 |
| 12399.103 | 78 | 2DH5 | V | 1.61 | 84.00 | 1 MHz / 10 Hz | 25.73 | 23.82 | 49.55 | 54.00 | -4.45 |
| 19838.622 | 78 | 2DH5 | H | 1.24 | 250.00 | 1 MHz / 1 MHz | 40.60 | 15.95 | 56.56 | 74.00 | -17.44 |
| 19838.622 | 78 | 2DH5 | H | 1.24 | 250.00 | 1 MHz / 10 Hz | 27.15 | 15.95 | 43.10 | 54.00 | -10.90 |
| 7439.984 | 78 | 3DH5 | H | 2.17 | 152.00 | 1 MHz / 1 MHz | 45.96 | 15.71 | 61.67 | 74.00 | -12.33 |

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| | | | | | | | | | | | |
|-----------|----|------|---|------|--------|------------------|-------|-------|-------|-------|--------|
| 7439.984 | 78 | 3DH5 | H | 2.17 | 152.00 | AV | 27.02 | 15.71 | 42.73 | 54.00 | -11.27 |
| 19840.016 | 78 | 3DH5 | H | 1.77 | 177.00 | 1 MHz / 1 MHz | 36.59 | 15.95 | 52.55 | 74.00 | -21.45 |
| 19840.016 | 78 | 3DH5 | H | 1.77 | 177.00 | 1 MHz / 10 Hz | 25.80 | 15.95 | 41.75 | 54.00 | -12.25 |

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

| | | | | |
|---|---|---|--|-----------------------------|
|  | | EMI Test Report for the BlackBerry® smartphone Model RCX71UW APPENDIX 2 | | |
| Test Report No. RTS-2474-1001-38 | Dates of Test January 27 to March 23 & April 20-22, 2010 | | | Author Data Michael Cino |

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

Date of test: February 18, 2010


Measurements were performed by Kevin Rose.

The environmental test conditions were: Temperature: 25 ° C
Pressure: 1013 mb
Relative Humidity: 23 %

The BlackBerry® smartphone was in standalone, vertical, Pattern type “Static PBRs” in “DH5”, “2-DH5” and “3-DH5” modulation during the measurements.

The test distance was 3.0 metres.


| Channel | Freq. (MHz) | Rx Antenna | | Detector | VBW | Corrected Reading | Delta Marker | Corrected Band edge | Limit | Diff. To Limit |
|---------------------------------|----------------|------------|------|------------|-------|----------------------|-----------------|------------------------|----------|-------------------|
| | | Type | POL. | (PK, AVE.) | (MHz) | (dBuV/m) | (dB) | (dBuV/m) | (dBuV/m) | (dB) |
| Low Channel, Packet Type DH5 | | | | | | | | | | |
| 0 | 2402 | Horn | V | PK | 1 MHz | 103.06 | 54.05 | 49.01 | 74 | -24.99 |
| 0 | 2402 | Horn | H | PK | 1 MHz | 97.31 | 47.78 | 49.53 | 74 | -24.47 |
| 0 | 2402 | Horn | V | AVE. | 10 Hz | 66.57 | 54.05 | 12.52 | 54 | -41.48 |
| 0 | 2402 | Horn | H | AVE. | 10 Hz | 63.73 | 47.78 | 15.95 | 54 | -38.05 |
| High Channel, Packet Type DH5 | | | | | | | | | | |
| 78 | 2480 | Horn | V | PK | 1 MHz | 104.47 | 55.12 | 49.35 | 74 | -24.65 |
| 78 | 2480 | Horn | H | PK | 1 MHz | 100.99 | 52.75 | 48.24 | 74 | -25.76 |
| 78 | 2480 | Horn | V | AVE. | 10 Hz | 70.17 | 55.12 | 15.05 | 54 | -38.95 |
| 78 | 2480 | Horn | H | AVE. | 10 Hz | 69.12 | 52.75 | 16.37 | 54 | -37.63 |
| Low Channel, Packet Type 2-DH5 | | | | | | | | | | |
| 0 | 2402 | Horn | V | PK | 1 MHz | 102.48 | 52.7 | 49.78 | 74 | -24.22 |
| 0 | 2402 | Horn | H | PK | 1 MHz | 96.69 | 47.16 | 49.53 | 74 | -24.47 |
| 0 | 2402 | Horn | V | AVE. | 10 Hz | 66.41 | 52.7 | 13.71 | 54 | -40.29 |
| 0 | 2402 | Horn | H | AVE. | 10 Hz | 63.39 | 47.16 | 16.23 | 54 | -37.77 |
| High Channel, Packet Type 2-DH5 | | | | | | | | | | |
| 78 | 2480 | Horn | V | PK | 1 MHz | 103.79 | 52.67 | 51.12 | 74 | -22.88 |
| 78 | 2480 | Horn | H | PK | 1 MHz | 100.49 | 49.19 | 51.3 | 74 | -22.70 |
| 78 | 2480 | Horn | V | AVE. | 10 Hz | 69.72 | 52.67 | 17.05 | 54 | -36.95 |
| 78 | 2480 | Horn | H | AVE. | 10 Hz | 68.9 | 49.19 | 19.71 | 54 | -34.29 |

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

| Channel | Freq. (MHz) | Rx Antenna | | Detector (PK, AVE.) | VBW (MHz) | Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------------------------------|----------------|------------|------|------------------------|--------------|----------------------------------|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| Low Channel, Packet Type 3-DH5 | | | | | | | | | | |
| 0 | 2402 | Horn | V | PK | 1 MHz | 102.71 | 52.93 | 49.78 | 74 | -24.22 |
| 0 | 2402 | Horn | H | PK | 1 MHz | 96.96 | 46.26 | 50.7 | 74 | -23.30 |
| 0 | 2402 | Horn | V | AVE. | 10 Hz | 66.44 | 52.93 | 13.51 | 54 | -40.49 |
| 0 | 2402 | Horn | H | AVE. | 10 Hz | 63.49 | 46.26 | 17.23 | 54 | -36.77 |
| High Channel, Packet Type 3-DH5 | | | | | | | | | | |
| 78 | 2480 | Horn | V | PK | 1 MHz | 104.32 | 52.13 | 52.19 | 74 | -21.81 |
| 78 | 2480 | Horn | H | PK | 1 MHz | 100.69 | 48.71 | 51.98 | 74 | -22.02 |
| 78 | 2480 | Horn | V | AVE. | 10 Hz | 69.75 | 52.13 | 17.62 | 54 | -36.38 |
| 78 | 2480 | Horn | H | AVE. | 10 Hz | 68.85 | 48.71 | 20.14 | 54 | -33.86 |

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

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

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

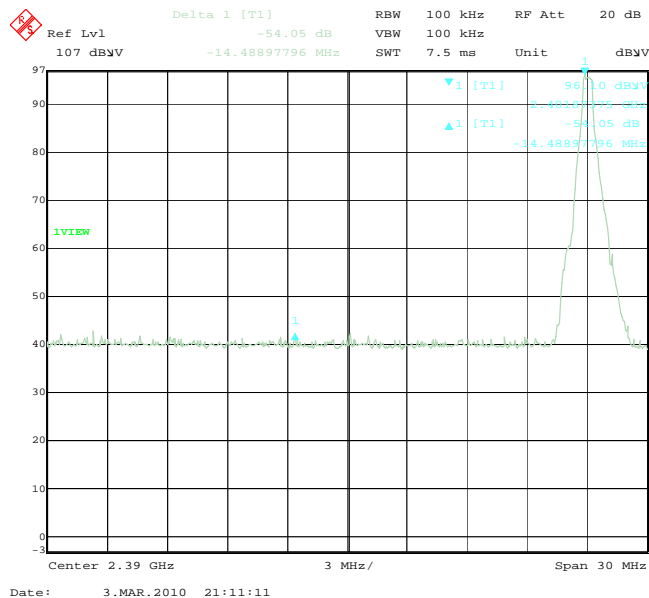


Figure 2-2: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
DH5, Channel 0, Pol: H, Detector: PK

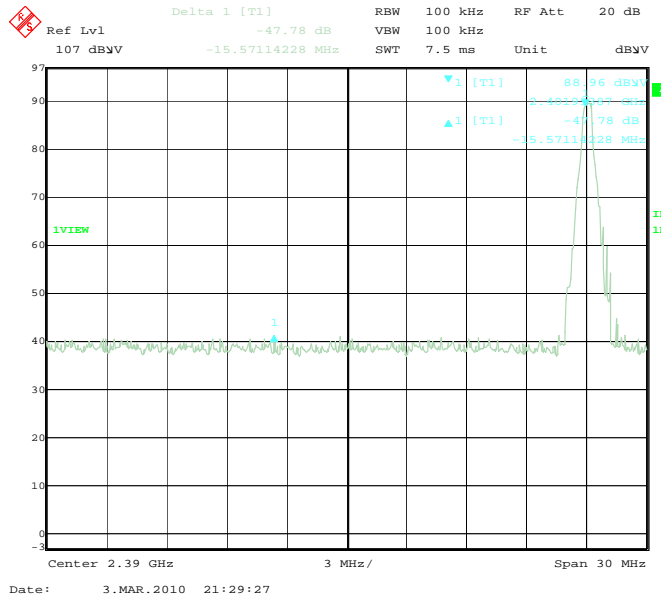


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
DH5, Channel 78, Pol: V, Detector: PK

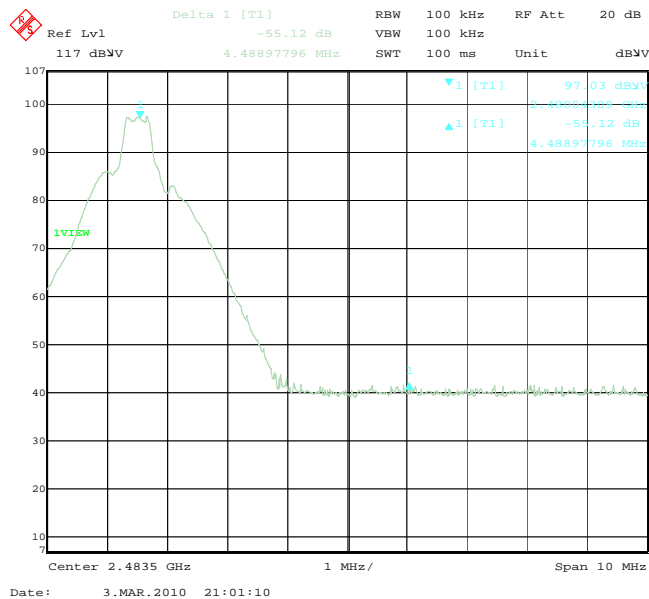
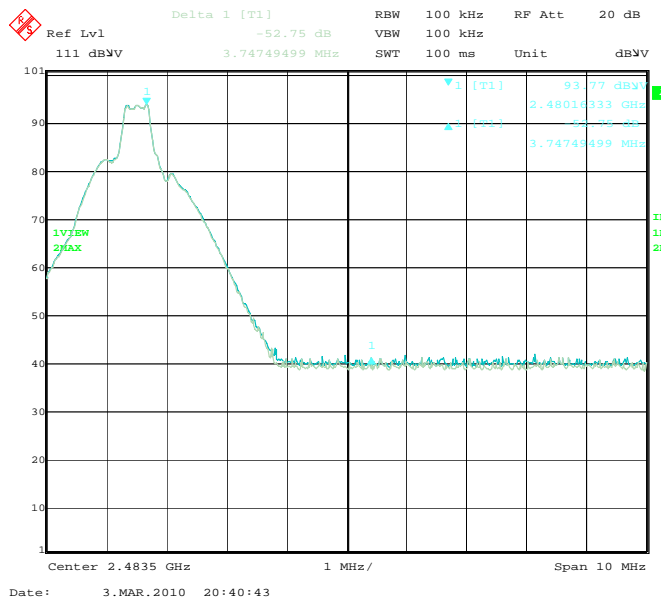



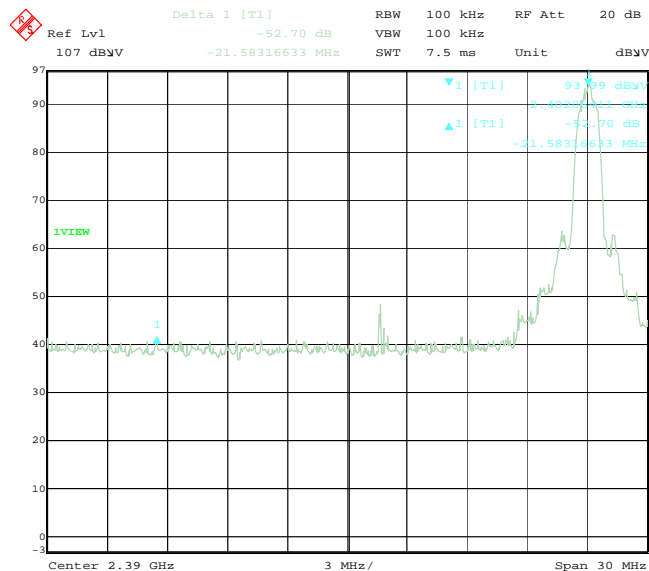
Figure 2-4: Band-Edge Compliance of RF Rad. Emissions
Bluetooth, Single freq., Static PBRs,
DH5, Channel 78, Pol: H, Detector: PK



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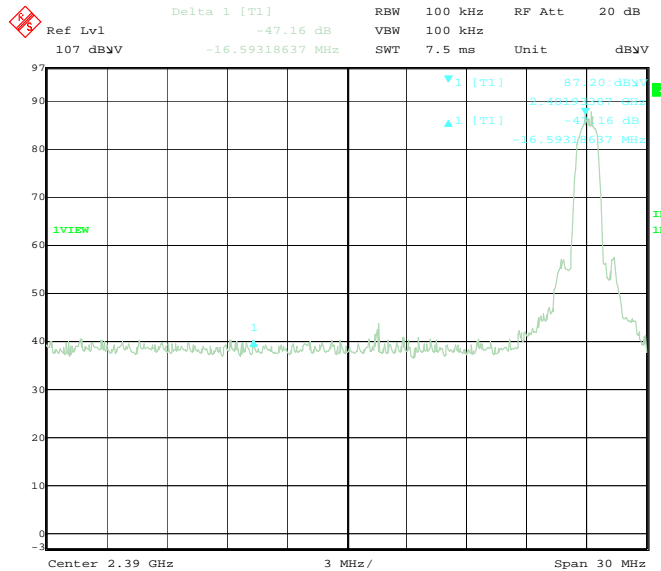
Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

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



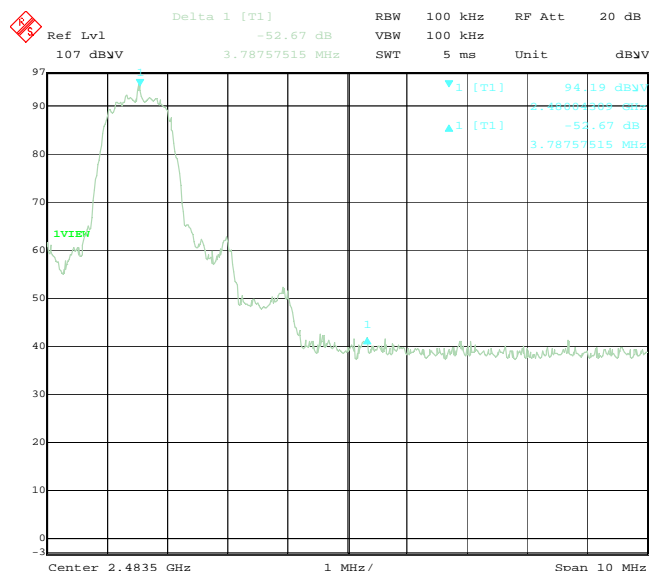
Date: 3.MAR.2010 21:12:37

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



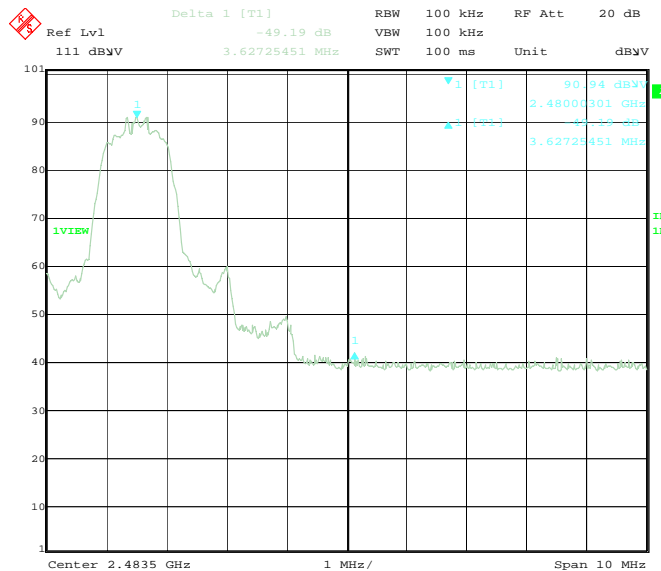
Date: 3.MAR.2010 21:28:11

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




Date: 3.MAR.2010 20:58:46

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



Date: 3.MAR.2010 20:44:54

| | | |
|---|---|------------------------------------|
|  | EMI Test Report for the BlackBerry® smartphone Model RCX71UW APPENDIX 2 | |
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Bluetooth Band-Edge Compliance of RF Radiated Emissions cont'd

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

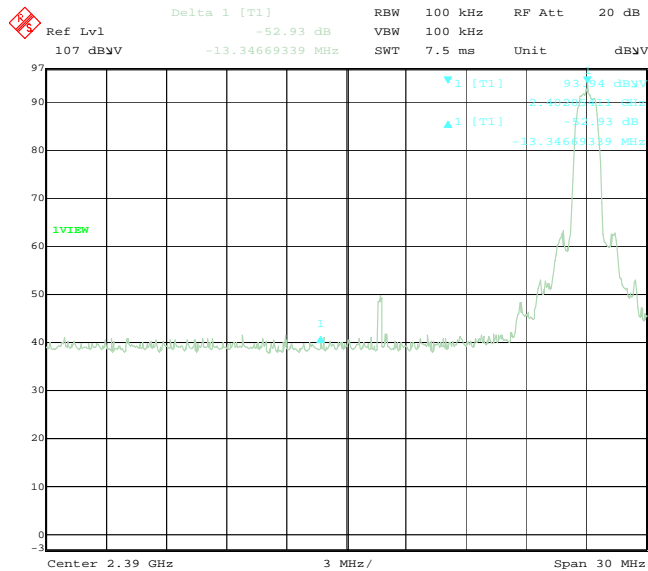


Figure 2-10: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
3-DH5, Channel 0, Pol: H, Detector: PK

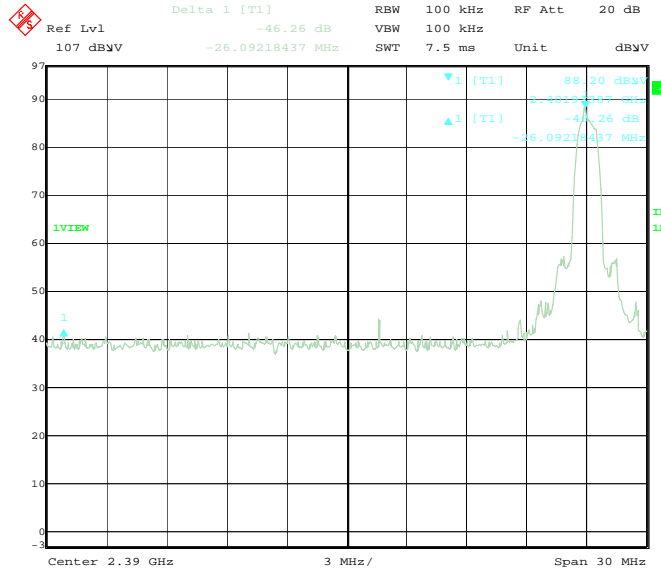


Figure 2-11: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
3-DH5, Channel 78, Pol: V, Detector: PK

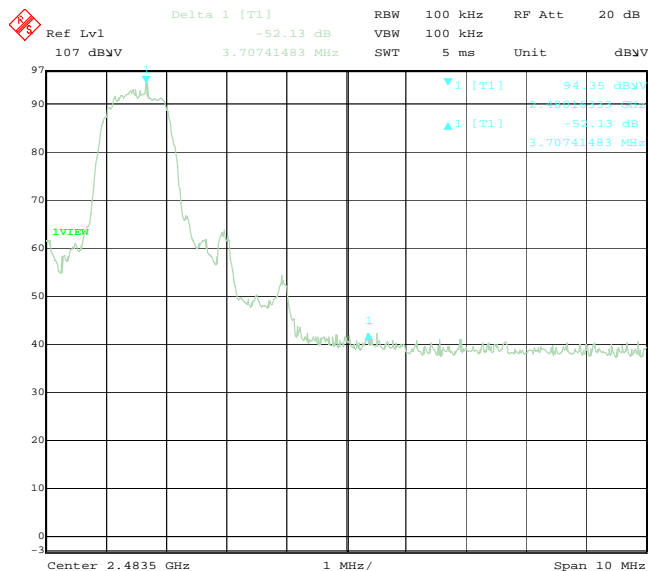
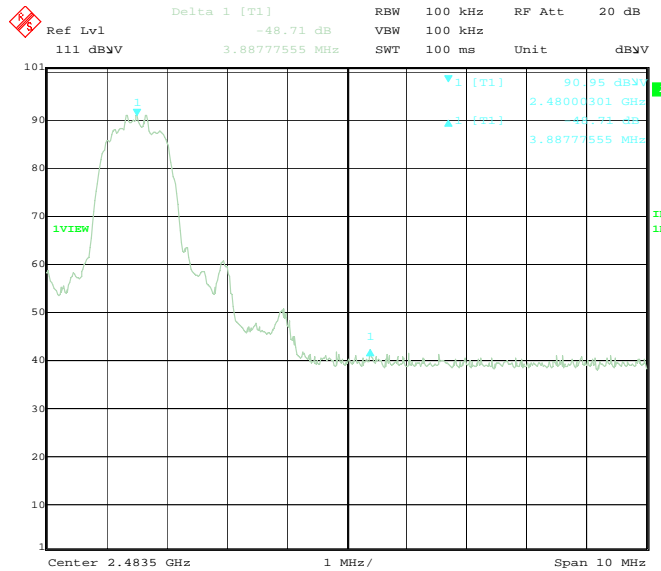



Figure 2-12: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
3-DH5, Channel 78, Pol: H, Detector: PK



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

Date of Test: February 18 and March 23, 2009
Measurements were performed by Fahd Faisal.

The environmental test conditions were: Temperature: 21 – 25 °C
Pressure: 1010 – 1013 mb
Relative Humidity: 23 – 24 %

The test distance was 3.0 metres with a height of 0.8 metres, 30 MHz to 1000 MHz.
The BlackBerry® smartphone was in standalone, vertical 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 channel 6, and in 802.11n Tx mode at MCS 0 and MCS7 on channels 1, 6, and 11.
All emissions had a test margin greater than 25.0 dB.

Date of Test: March 08 and March 23 to 24 & April 20-22, 2010
Measurements were performed by Heng Lin.


The environmental test conditions were: Temperature: 24 – 25 °C
Pressure: 1015 – 1017 mb
Relative Humidity: 27 – 30 %

The test distance was 1.0 metres with a height of 0.8 metres, 1GHz to 25GHz.
The BlackBerry® smartphone was in standalone, vertical 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 channel 6, and in 802.11n Tx mode at MCS 0 and MCS 7 on channels 1, 6, and 11 as well.

| Frequency (MHz) | Channel | Mbps | Antenna | | Test Angle (Deg.) | RBW / VBW | Measured Level (dBµV) | Correction Factor for preamp/antenna/ cables/ filter (dB) | Field Strength Level (reading+corr) (dBµV/m) | Limit @ 3.0 m (dBµV/m) | Test Margin (dB) |
|--------------------|---------|------|---------------|--------------------|-------------------------|------------------|-----------------------------|---|---|------------------------------|------------------------|
| | | | Pol. (V/H) | Height (metres) | | | | | | | |
| 2359.091 | 6 | 6 | H | 4.00 | 184.00 | 1 MHz / 1 MHz | 45.26 | 8.75 | 54.01 | 74.00 | -19.99 |
| 2398.377 | 6 | 6 | H | 3.88 | 188.00 | 1 MHz / 1 MHz | 44.31 | 8.54 | 52.85 | 74.00 | -21.15 |
| 2359.091 | 6 | 6 | H | 4.00 | 184.00 | 1 MHz / 10 Hz | 29.06 | 8.75 | 37.81 | 54.00 | -16.19 |
| 2398.377 | 6 | 6 | H | 3.88 | 188.00 | 1 MHz / 10 Hz | 32.05 | 8.54 | 40.59 | 54.00 | -13.41 |

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

| | | | |
|---|---|---|-----------------------------|
|  | | EMI Test Report for the BlackBerry® smartphone Model RCX71UW APPENDIX 2 | |
| Test Report No. RTS-2474-1001-38 | Dates of Test January 27 to March 23 & April 20-22, 2010 | | Author Data Michael Cino |

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

Date of Tests: March 22, 2010

Measurements performed by Kevin Rose.

The environmental test conditions were: Temperature: 25 °C
Pressure: 1013 mb
Relative Humidity: 23 %


802.11b Band

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

The test distance was 3 metres.

| Channel | Freq. (MHz) | Rx Antenna | | Detector (MHz) | VBW For Peak (dBuV/m) | Peak Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------|----------------|------------|------|-------------------|-----------------------------|--|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| 1.0 | 2412.00 | Horn | V | PK | 1 MHz | 53.18 | 0.00 | 53.18 | 74.00 | -20.82 |
| 1.0 | 2412.00 | Horn | H | PK | 1 MHz | 57.19 | 0.00 | 57.19 | 74.00 | -16.81 |
| 1.0 | 2412.00 | Horn | V | AV | 10 Hz | 45.23 | 0.00 | 45.23 | 54.00 | -8.77 |
| 1.0 | 2412.00 | Horn | H | AV | 10 Hz | 49.96 | 0.00 | 49.96 | 54.00 | -4.04 |

| Channel | Freq. (MHz) | Rx Antenna | | Detector (MHz) | VBW For Peak (dBuV/m) | Peak Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------|----------------|------------|------|-------------------|-----------------------------|--|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| 11.0 | 2480.00 | Horn | V | PK | 1 MHz | 100.60 | 50.17 | 50.43 | 74.00 | -23.57 |
| 11.0 | 2480.00 | Horn | H | PK | 1 MHz | 104.36 | 50.70 | 53.66 | 74.00 | -20.34 |
| 11.0 | 2480.00 | Horn | V | AV | 10 Hz | 96.49 | 50.17 | 46.32 | 54.00 | -7.68 |
| 11.0 | 2480.00 | Horn | H | AV | 10 Hz | 100.28 | 50.70 | 49.58 | 54.00 | -4.42 |

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802.11g Band

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

The test distance was 3 metres.

| Channel | Freq. (MHz) | Rx Antenna | | Detector (MHz) | VBW For Peak (dBuV/m) | Peak Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------|----------------|------------|------|-------------------|-----------------------------|--|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| 1.0 | 2412.00 | Horn | V | PK | 1 MHz | 64.74 | 0.00 | 64.74 | 74.00 | -9.26 |
| 1.0 | 2412.00 | Horn | H | PK | 1 MHz | 66.94 | 0.00 | 66.94 | 74.00 | -7.06 |
| 1.0 | 2412.00 | Horn | V | AV | 10 Hz | 49.84 | 0.00 | 49.84 | 54.00 | -4.16 |
| 1.0 | 2412.00 | Horn | H | AV | 10 Hz | 51.16 | 0.00 | 51.16 | 54.00 | -2.84 |

| Channel | Freq. (MHz) | Rx Antenna | | Detector (MHz) | VBW For Peak (dBuV/m) | Peak Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------|----------------|------------|------|-------------------|-----------------------------|--|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| 11.0 | 2480.00 | Horn | V | PK | 1 MHz | 97.94 | 42.60 | 55.34 | 74.00 | -18.66 |
| 11.0 | 2480.00 | Horn | H | PK | 1 MHz | 104.68 | 43.77 | 60.91 | 74.00 | -13.09 |
| 11.0 | 2480.00 | Horn | V | AV | 10 Hz | 84.53 | 42.60 | 41.93 | 54.00 | -12.07 |
| 11.0 | 2480.00 | Horn | H | AV | 10 Hz | 91.22 | 43.77 | 47.45 | 54.00 | -6.55 |

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802.11n Band

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

The test distance was 3 metres.


| Channel | Freq. (MHz) | Rx Antenna | | Detector (MHz) | VBW For Peak (dBuV/m) | Peak Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------|----------------|------------|------|-------------------|-----------------------------|--|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| 1.0 | 2412.00 | Horn | V | PK | 1 MHz | 64.89 | 0.00 | 64.89 | 74.00 | -9.11 |
| 1.0 | 2412.00 | Horn | H | PK | 1 MHz | 69.91 | 0.00 | 69.91 | 74.00 | -4.09 |
| 1.0 | 2412.00 | Horn | V | AV | 10 Hz | 46.20 | 0.00 | 46.20 | 54.00 | -7.80 |
| 1.0 | 2412.00 | Horn | H | AV | 10 Hz | 52.42 | 0.00 | 52.42 | 54.00 | -1.58 |

| Channel | Freq. (MHz) | Rx Antenna | | Detector (MHz) | VBW For Peak (dBuV/m) | Peak Corrected Reading (dBuV/m) | Delta Marker (dB) | Corrected Band edge (dBuV/m) | Limit (dBuV/m) | Diff. To Limit (dB) |
|---------|----------------|------------|------|-------------------|-----------------------------|--|-------------------------|------------------------------------|-------------------|---------------------------|
| | | Type | POL. | | | | | | | |
| 11.0 | 2480.00 | Horn | V | PK | 1 MHz | 101.70 | 42.31 | 59.39 | 74.00 | -14.61 |
| 11.0 | 2480.00 | Horn | H | PK | 1 MHz | 105.26 | 43.67 | 61.59 | 74.00 | -12.41 |
| 11.0 | 2480.00 | Horn | V | AV | 10 Hz | 87.88 | 42.31 | 45.57 | 54.00 | -8.43 |
| 11.0 | 2480.00 | Horn | H | AV | 10 Hz | 90.79 | 43.67 | 47.12 | 54.00 | -6.88 |

See figures 2-13 to 2-16 for the plots of the 802.11b band-edge compliance.

See figures 2-17 to 2-20 for the plots of the 802.11g band-edge compliance.

See figures 2-21 to 2-24 for the plots of the 802.11n band-edge compliance.

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

Figure 2-13: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 1, 2412 MHz, Max Pol: V,
Detector: PK

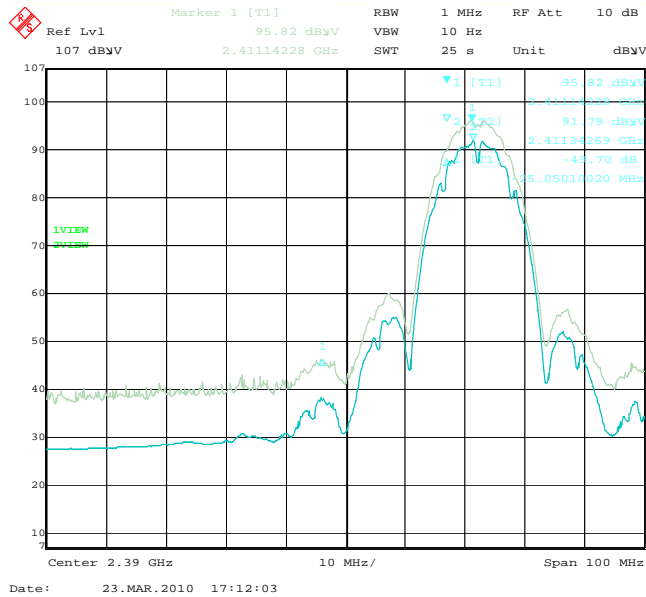


Figure 2-14: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 1, 2412 MHz, Max Pol: H,
Detector: PK

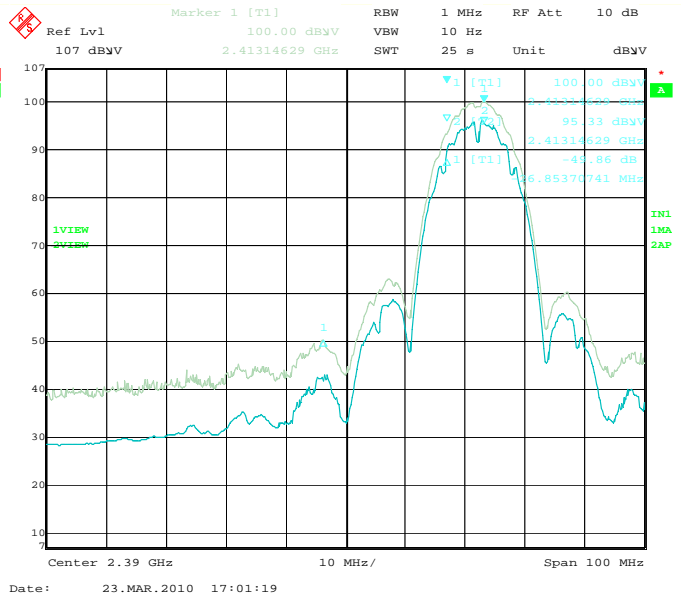


Figure 2-15: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 11, 2462 MHz, Max Pol: V,
Detector: PK

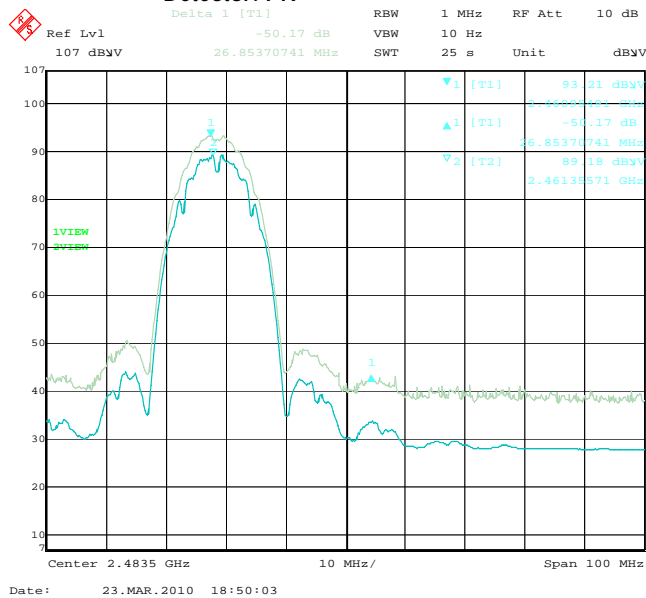
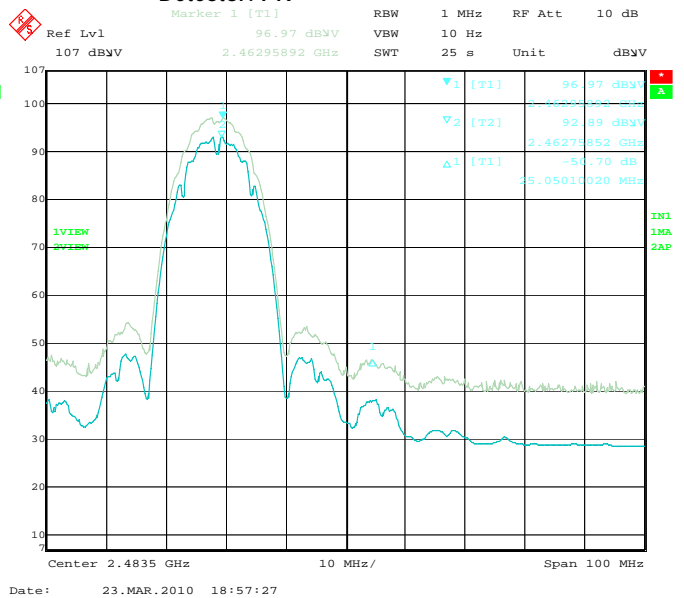


Figure 2-16: Band-Edge Compliance of RF Radiated Emission
802.11b, Channel 11, 2462 MHz, Max Pol: H,
Detector: PK




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

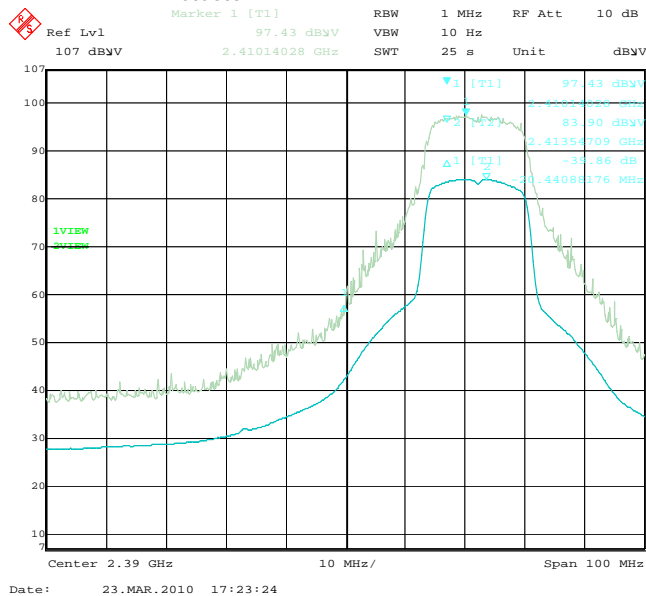


Figure 2-18: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 1, 2412 MHz, Max Pol: H,
Detector: PK

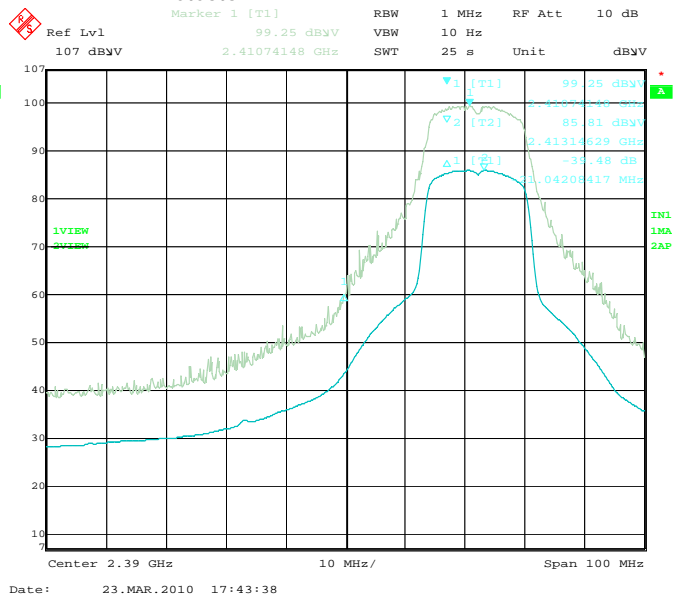


Figure 2-19: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 11, 2462 MHz, Max Pol: V,
Detector: PK

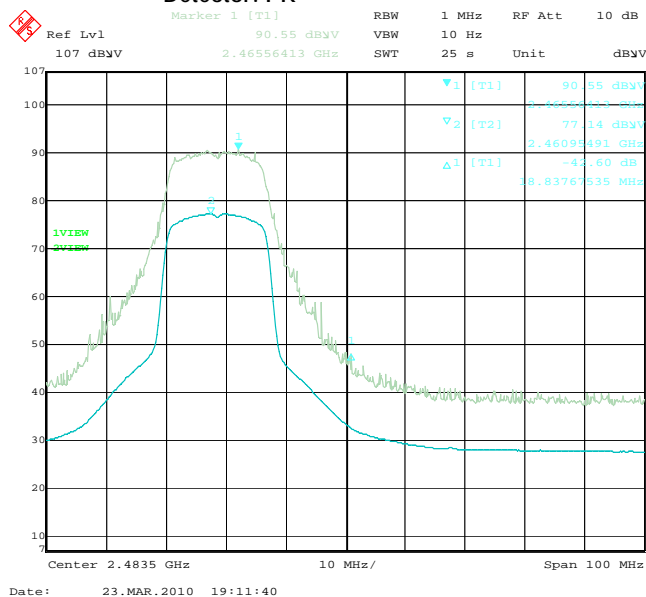
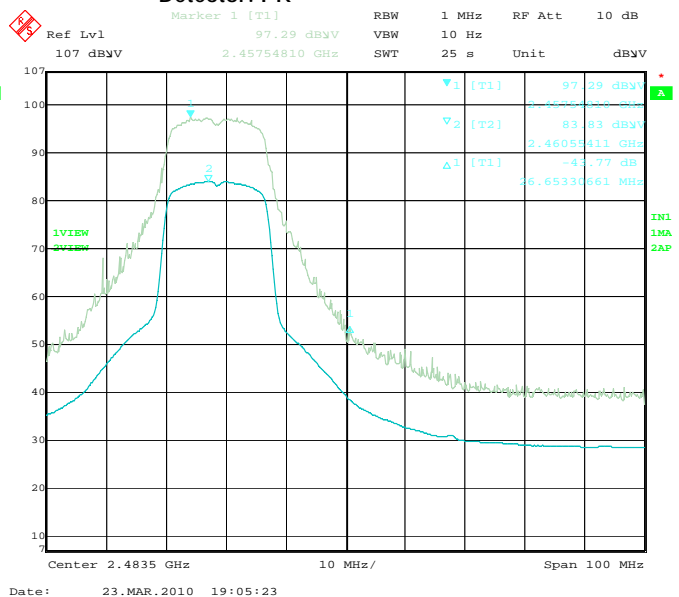


Figure 2-20: Band-Edge Compliance of RF Radiated Emission
802.11g, Channel 11, 2462 MHz, Max Pol: H,
Detector: PK




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

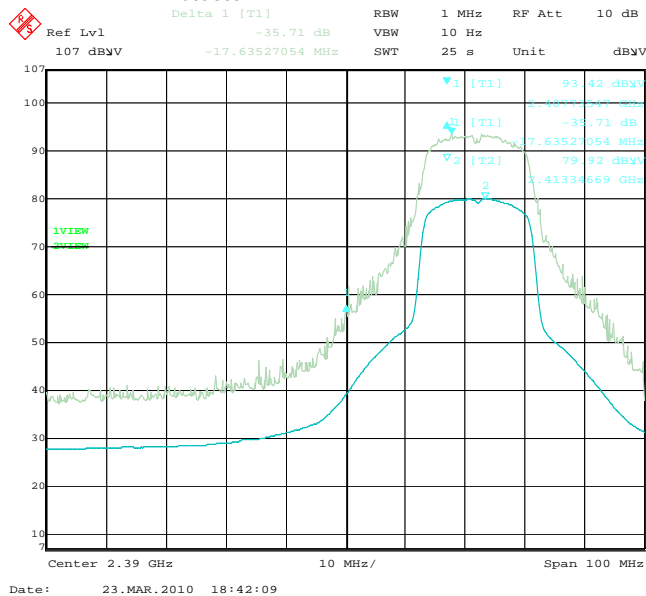


Figure 2-22: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 1, 2412 MHz, Max Pol: H,
Detector: PK

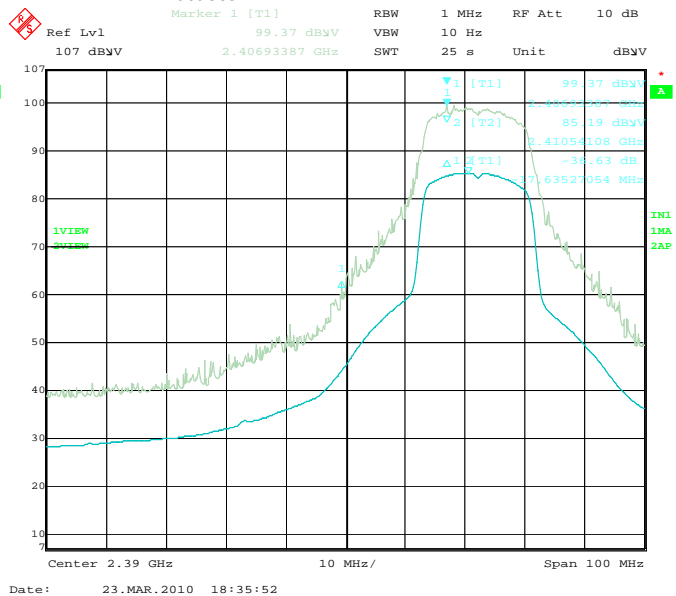


Figure 2-23: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 11, 2462 MHz, Max Pol: V,
Detector: PK

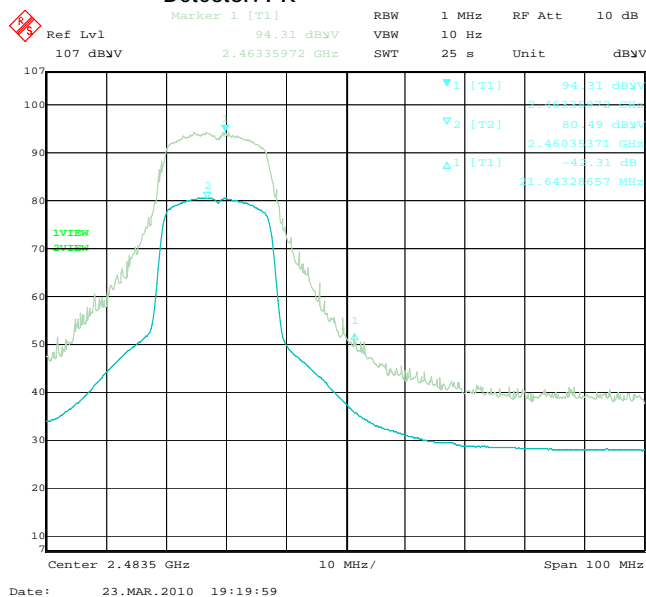
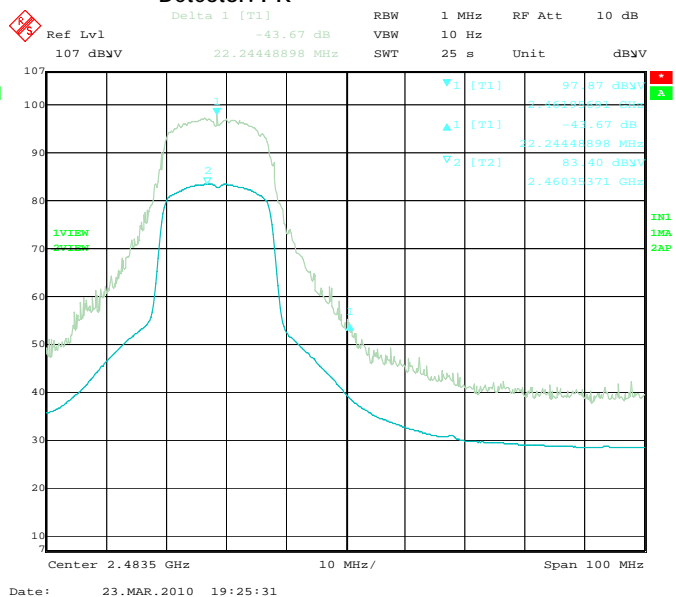




Figure 2-24: Band-Edge Compliance of RF Radiated Emission
802.11n, Channel 11, 2462 MHz, Max Pol: H,
Detector: PK



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APPENDIX 3 – BLUETOOTH CONDUCTED EMISSIONS TEST DATA/PLOTS

| | | |
|---|---|------------------------------------|
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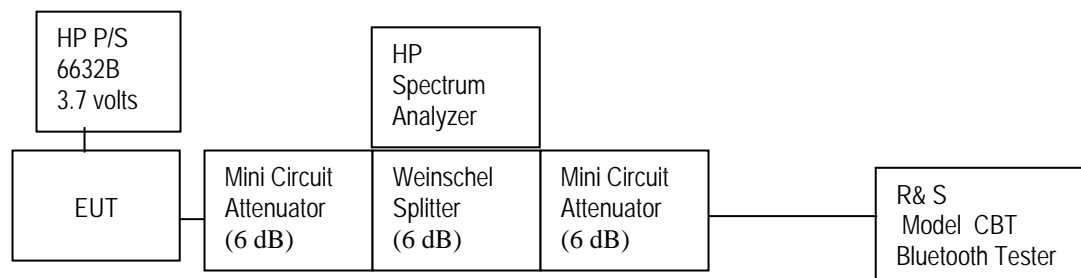
Bluetooth RF Conducted Emission Test Results

Bluetooth power output from BlackBerry® smartphone was at maximum for all the recorded measurements shown below.

The measurements were performed by Maurice Battler.


Date of test: February 02, 2010

Test Setup Diagram



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

The environmental test conditions were: Temperature: 24 °C
Pressure: 1016 mb
Relative Humidity: 21 %

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Bluetooth RF Conducted Emission Test Results cont'd

20 dB Bandwidth

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

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

| Bluetooth Channel | Limit (MHz) | Measured Level (MHz) |
|-------------------|-------------|----------------------|
| 0 | ≤1.0 | 0.923 |
| 39 | ≤1.0 | 0.923 |
| 78 | ≤1.0 | 0.927 |

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

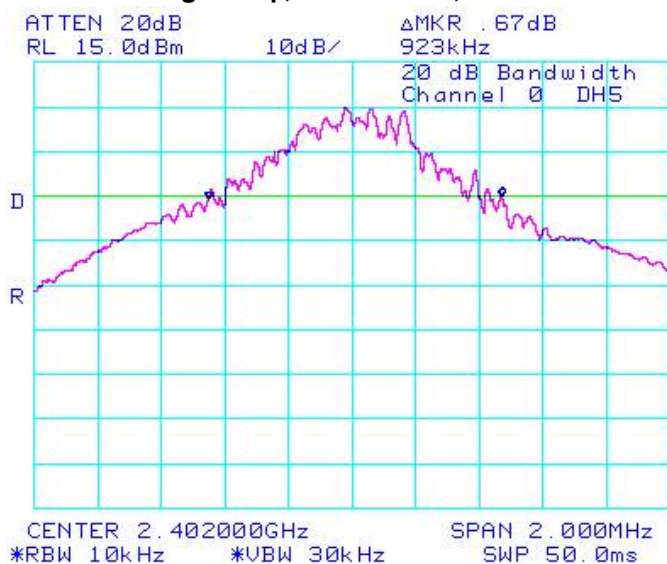



Figure 3-2: 20 dB Bandwidth

Single freq., Static PBRS, DH5

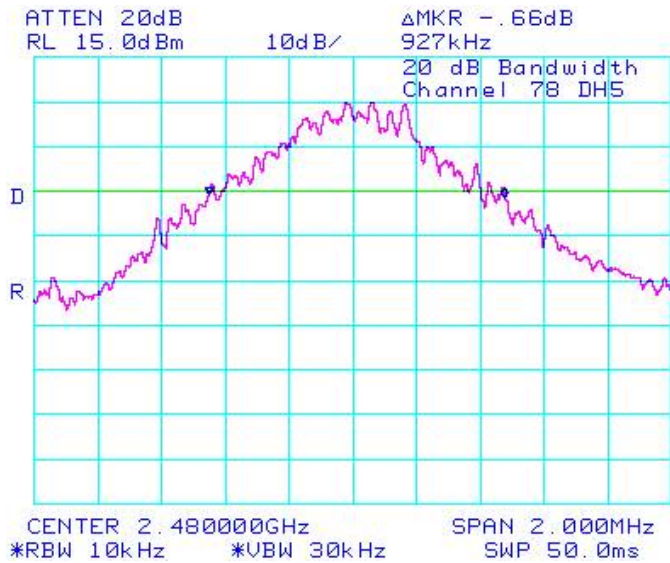


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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-3: 20 dB Bandwidth


Single freq., Static PBRs, DH5



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

| Bluetooth Channel | Limit (MHz) | Measured Level (MHz) |
|-------------------|-------------|----------------------|
| 0 | ≤1.5 | 1.303 |
| 39 | ≤1.5 | 1.307 |
| 78 | ≤1.5 | 1.307 |

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

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-4: 20 dB Bandwidth

Single freq., Static PBRS, 3-DH5

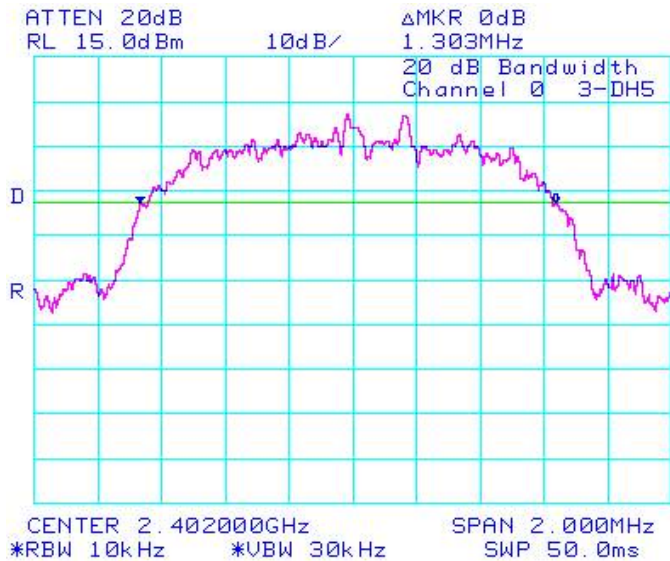


Figure 3-5: 20 dB Bandwidth

Single freq., Static PBRS, 3-DH5

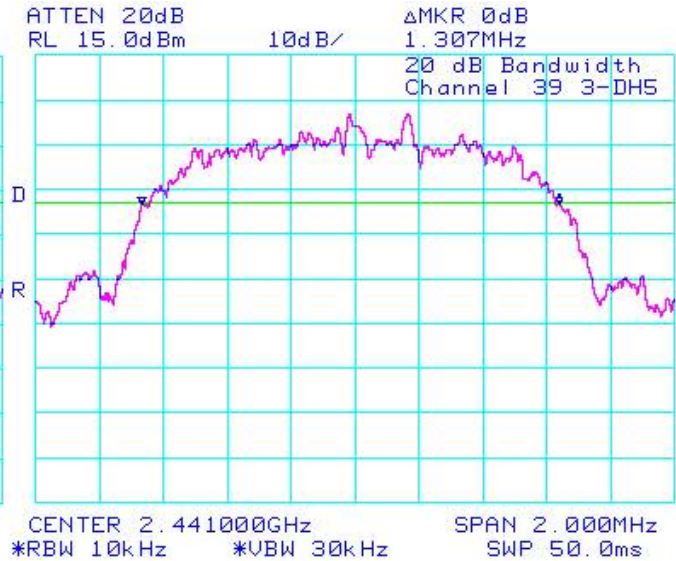
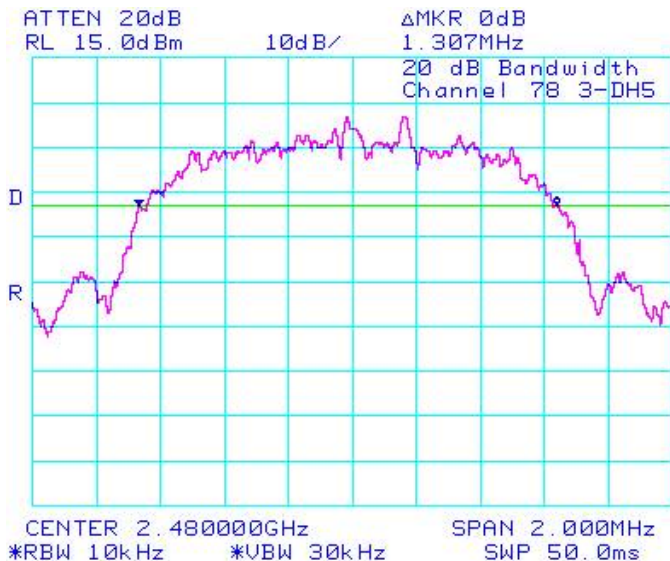



Figure 3-6: 20 dB Bandwidth

Single freq., Static PBRS, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Carrier Frequency Separation

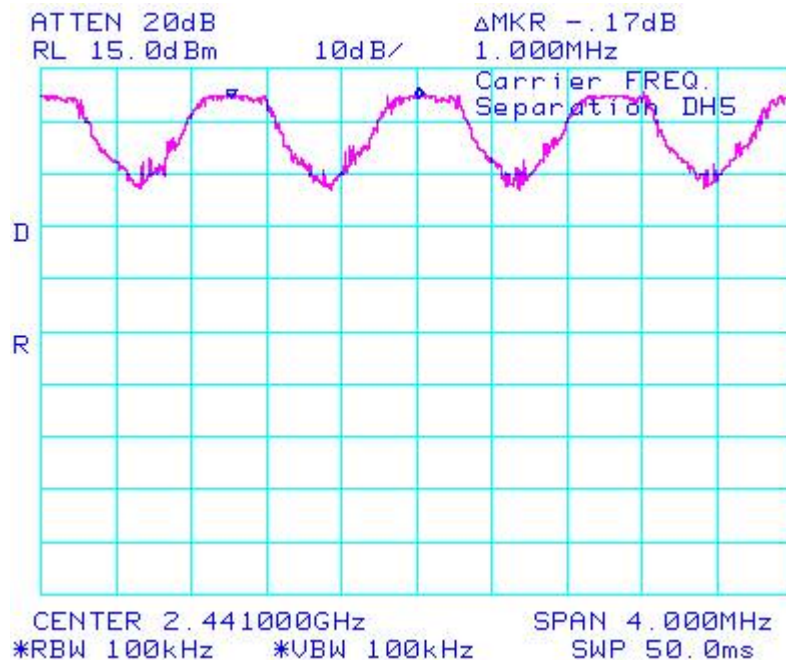
The EUT met the requirements of the Carrier Frequency Separation as per 47 CFR 15.247(a) and RSS-210. Channel 38 to 39 was measured. Bluetooth was operating in frequency hopping (Euro/US) mode.


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

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

See figure 3-7 for the plot of the Carrier Frequency Separation measurement.

Figure 3-7: Carrier Frequency Separation, Freq. Hopping, Static PBRs, DH5, Channels 38 to 39



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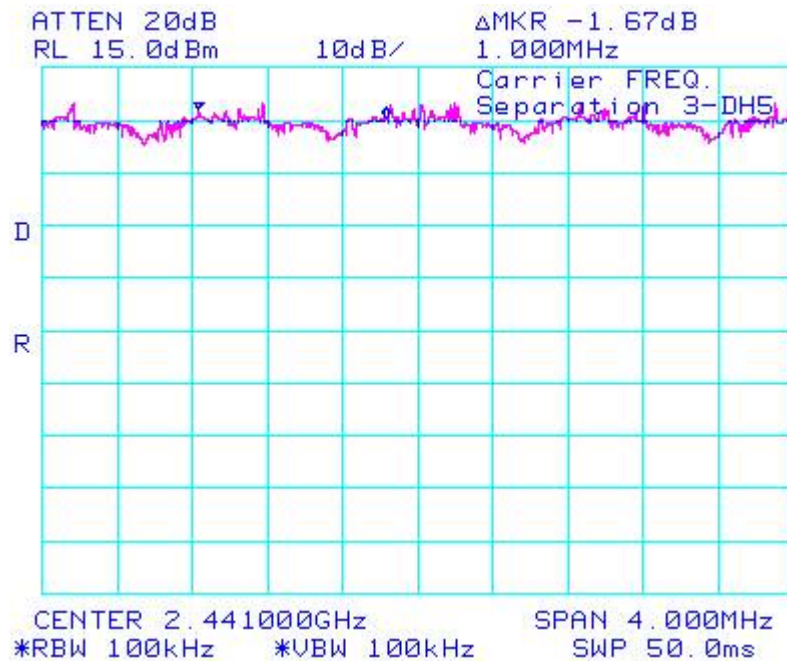
Bluetooth RF Conducted Emission Test Results cont'd


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

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

See figure 3-8 for the plot of the Carrier Frequency Separation measurement.

Figure 3-8: Carrier Frequency Separation, Freq. Hopping, Static PBRS, 3-DH5, Channels 38 to 39



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Bluetooth RF Conducted Emission Test Results cont'd

Number of Hopping Frequencies

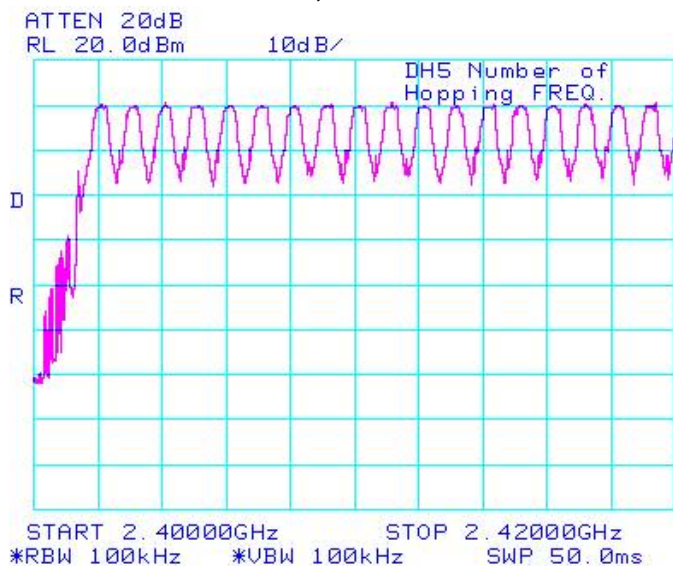
The EUT met the requirements of the number of hopping frequencies as per 47 CFR 15.247(a) and RSS-210. Bluetooth was operating in frequency hopping (Euro/US) mode.

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

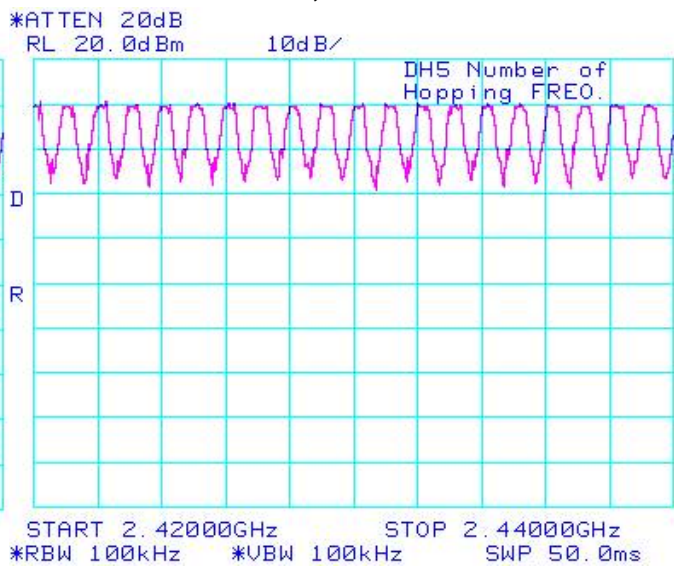
| Limit (CH) | Number of Hopping Frequencies (CH) |
|---------------|---------------------------------------|
| ≥75 | 79 |


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

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



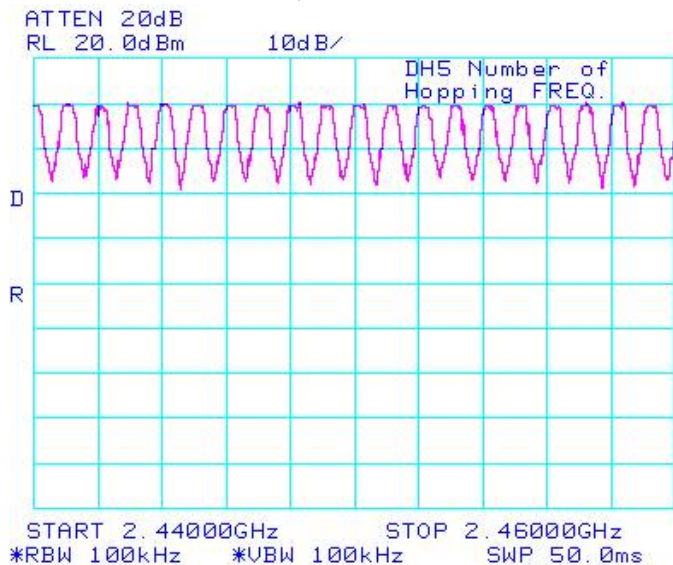
**Figure 3-7: Number of Hopping Frequencies
Static PBRs, DH5**



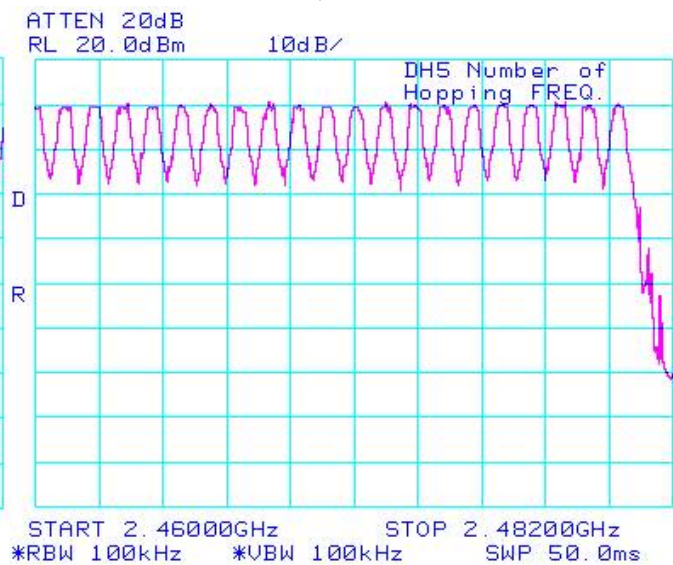
| | | |
|---|---|------------------------------------|
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Bluetooth RF Conducted Emission Test Results cont'd

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



**Figure 3-9: 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 μ sec for 79 channels.

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

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

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

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Bluetooth RF Conducted Emission Test Results cont'd

| Bluetooth Channel | Mode | Tx Time (ms) | Dwell Time/31.6 sec. (msec.) | Limit (msec.) | Margin (msec.) |
|-------------------|------|--------------|--------------------------------|---------------|----------------|
| 0 | DH1 | 0.3997 | $0.3997 \times 320.0 = 127.90$ | 400 | 272.10 |
| 39 | DH1 | 0.3997 | $0.3997 \times 320.0 = 127.90$ | 400 | 272.10 |
| 78 | DH1 | 0.3978 | $0.3978 \times 320.0 = 127.30$ | 400 | 272.70 |
| 0 | DH3 | 1.6667 | $1.6667 \times 159.9 = 266.51$ | 400 | 133.49 |
| 39 | DH3 | 1.6600 | $1.6600 \times 159.9 = 265.43$ | 400 | 134.57 |
| 78 | DH3 | 1.6600 | $1.6600 \times 159.9 = 265.43$ | 400 | 134.57 |
| 0 | DH5 | 2.9150 | $2.9150 \times 106.8 = 311.32$ | 400 | 88.68 |
| 39 | DH5 | 2.9150 | $2.9150 \times 106.8 = 311.32$ | 400 | 88.68 |
| 78 | DH5 | 2.9150 | $2.9150 \times 106.8 = 311.32$ | 400 | 88.68 |

See figures 3-13 to 3-21 for the plots of the dwell time.

Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-13: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1

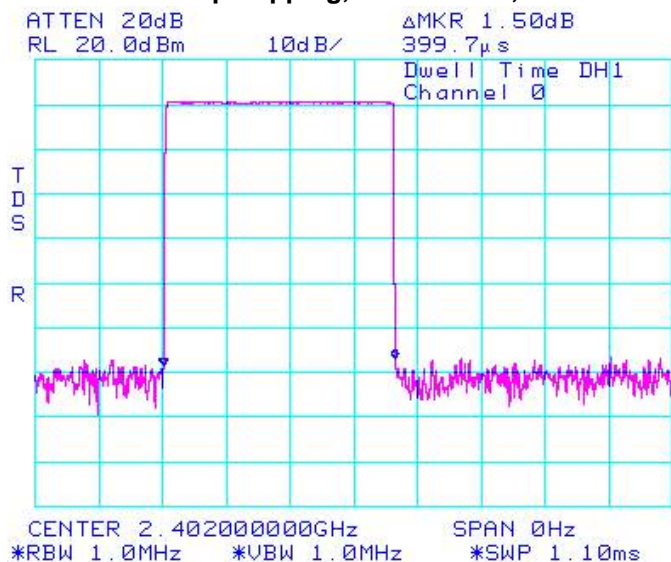
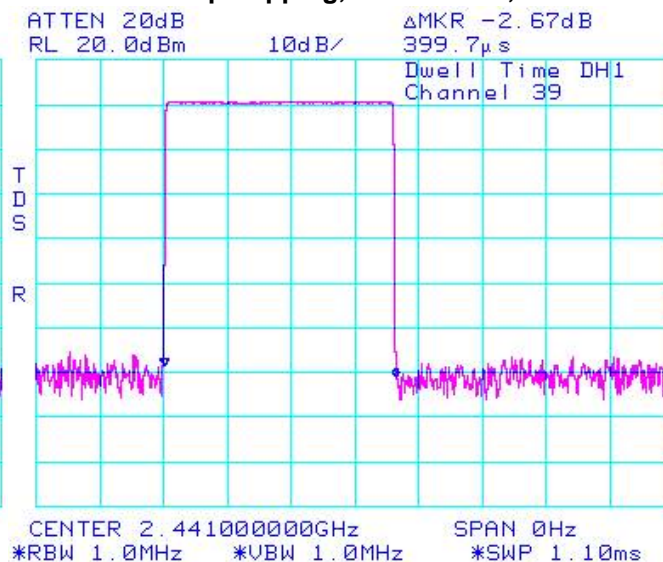



Figure 3-14: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH1



| | | |
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Bluetooth RF Conducted Emission Test Results cont'd

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

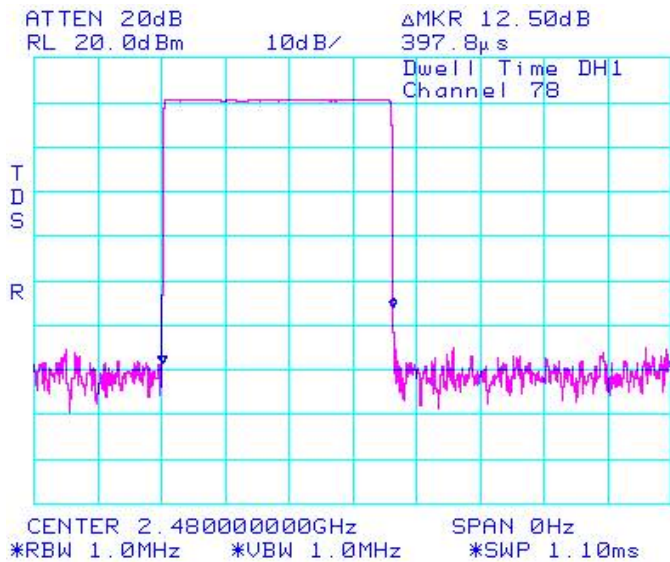


Figure 3-16: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

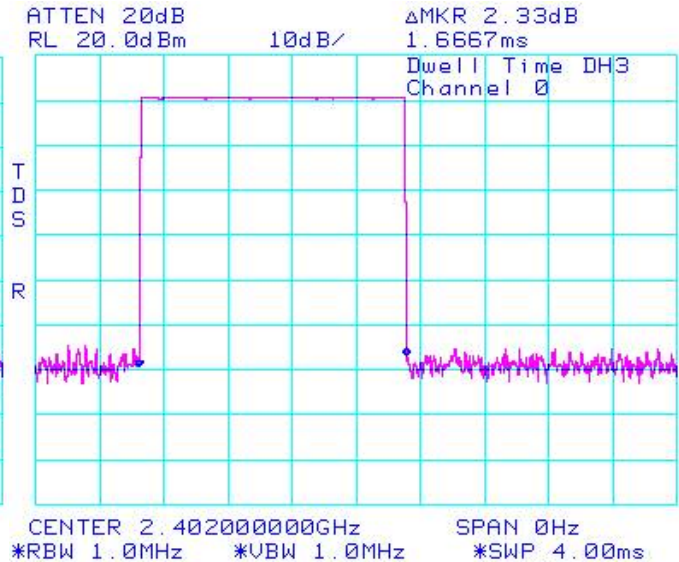


Figure 3-17: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3

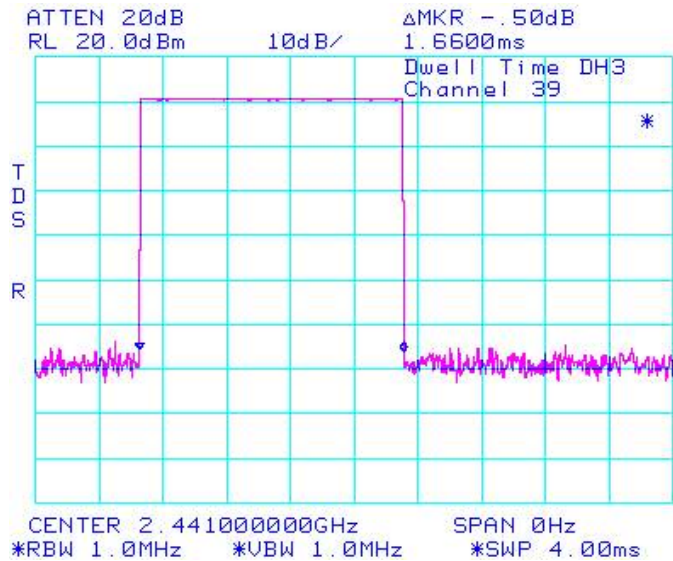
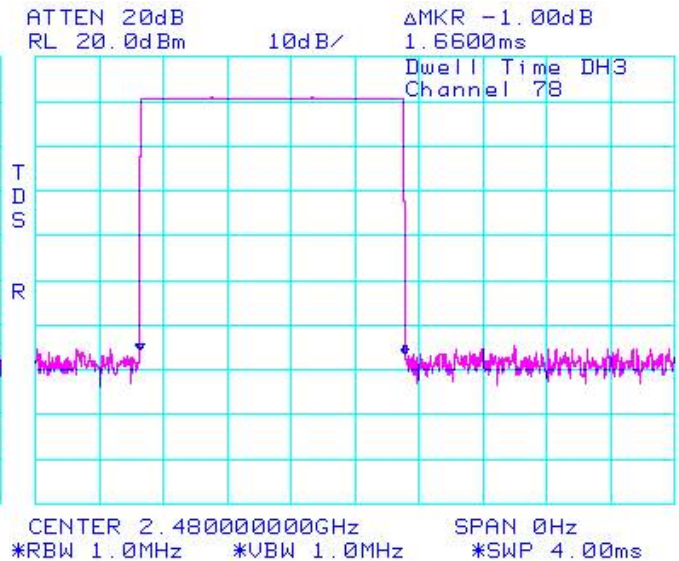



Figure 3-18 : Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRS, DH3



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Bluetooth RF Conducted Emission Test Results cont'd

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

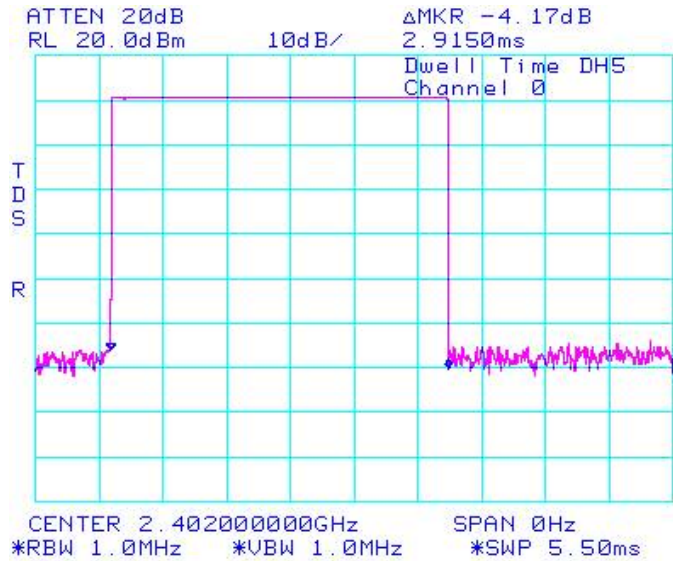


Figure 3-20: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5

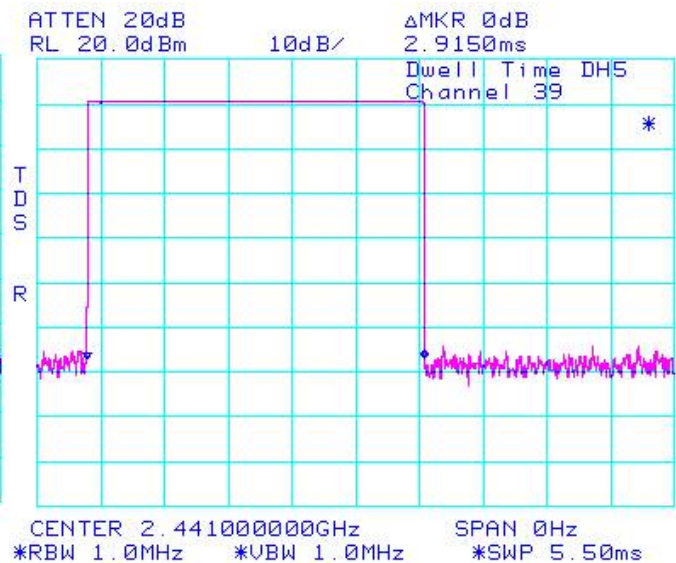
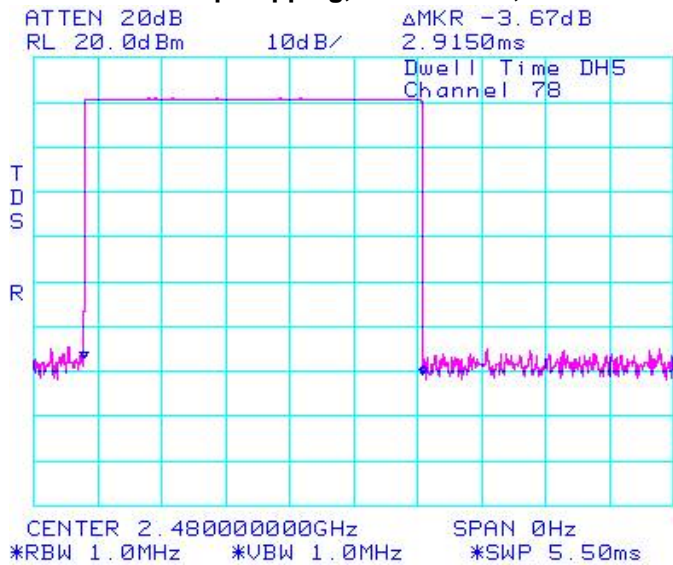



Figure 3-21: Time of Occupancy (Dwell Time)
Freq. Hopping, Static PBRs, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Maximum Peak Conducted Output Power

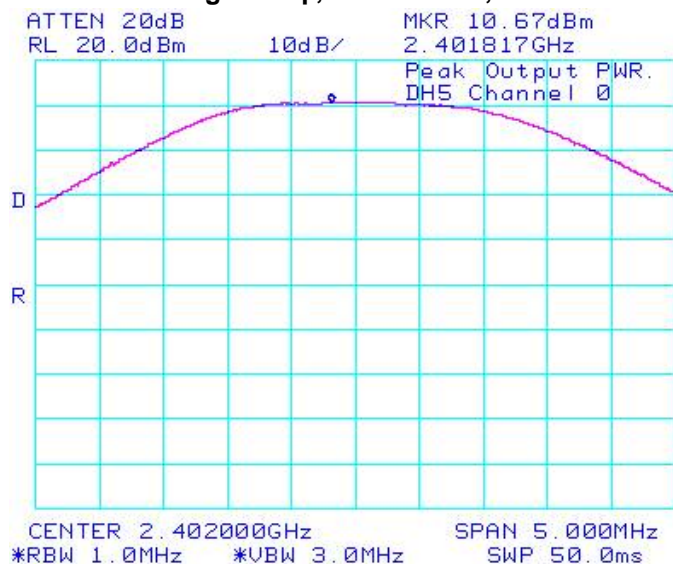
The EUT met the requirements of the maximum peak conducted output power of class 2 as per 47 CFR 15.247(b) and RSS-210. Low channel (0), middle channel (39) and high channel (78) were measured. Bluetooth was operating in single frequency mode during the measurements. A reference offset of 12.4 dB was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

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

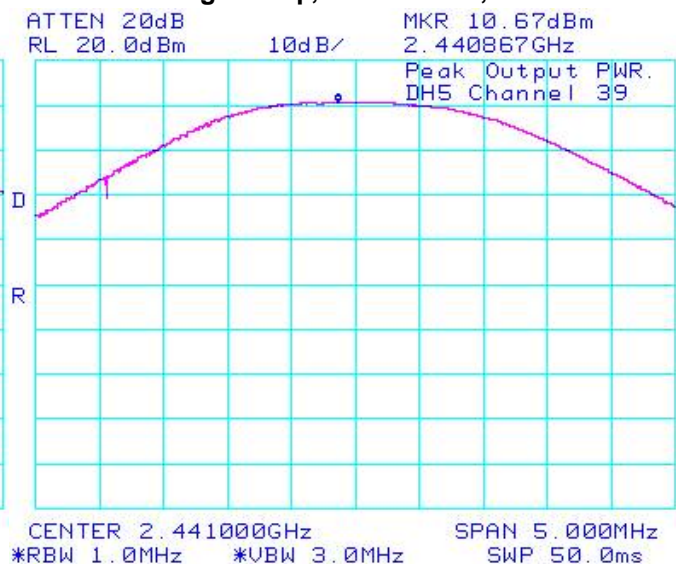
| Bluetooth Channel | Measured Level (dBm) | Measured Level (W) | Class 1 Limit (dBm) |
|-------------------|----------------------|--------------------|---------------------|
| 0 | 10.67 | 0.01167 | 0.0 to 20.0 |
| 39 | 10.67 | 0.01167 | 0.0 to 20.0 |
| 78 | 11.00 | 0.01259 | 0.0 to 20.0 |


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

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



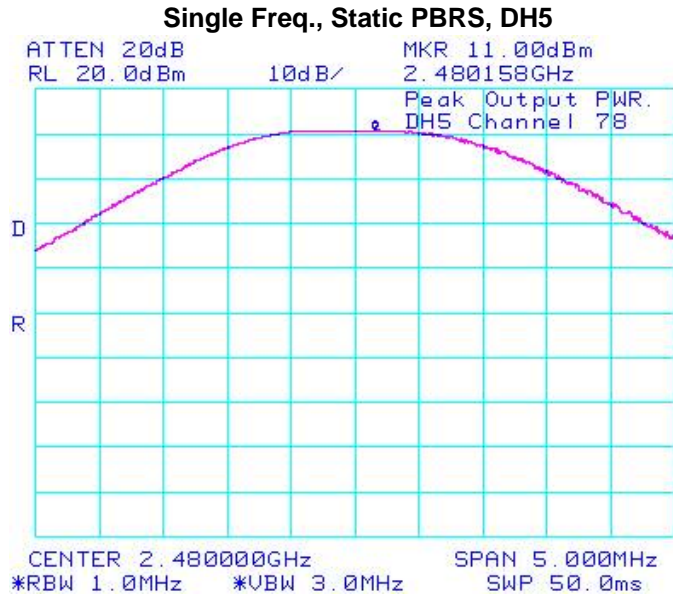
**Figure 3-23: Max. Peak Conducted Output Power
Single Freq., Static PRBS, DH5**



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Bluetooth RF Conducted Emission Test Results cont'd


Figure 3-24: Max. Peak Conducted Output Power



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

| Bluetooth Channel | Measured Level (dBm) | Measured Level (W) | Class 1 Limit (dBm) |
|-------------------|----------------------|--------------------|---------------------|
| 0 | 10.33 | 0.01079 | 0.0 to 20.0 |
| 39 | 10.17 | 0.01040 | 0.0 to 20.0 |
| 78 | 10.50 | 0.01122 | 0.0 to 20.0 |

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

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Bluetooth RF Conducted Emission Test Results cont'd

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

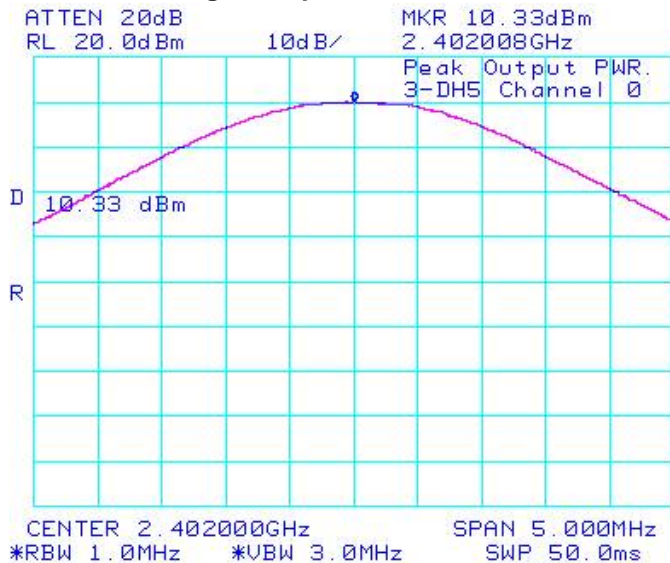


Figure 3-26: Max. Peak Conducted Output Power
Single Freq., Static PBRs, 3-DH5

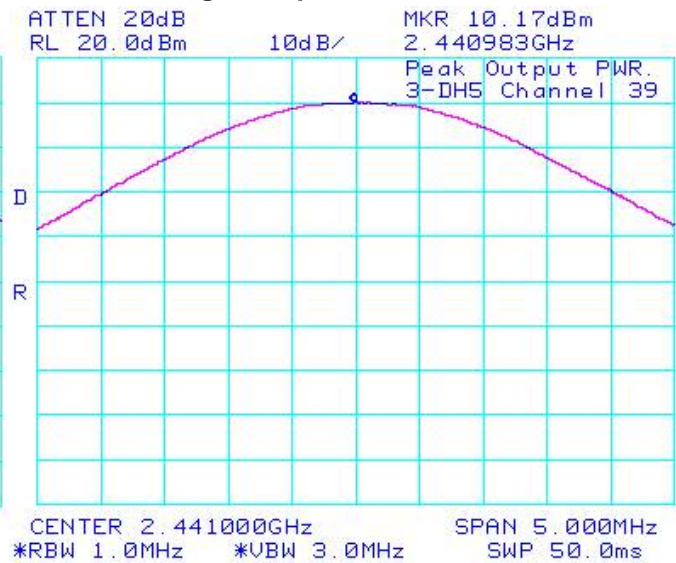
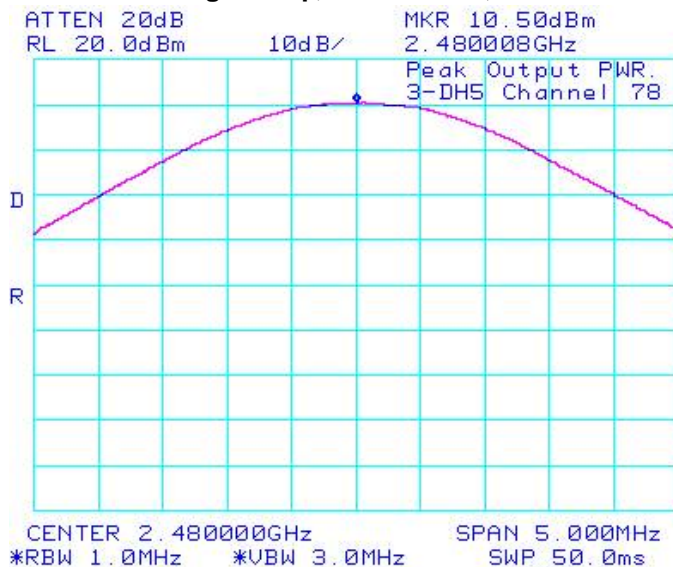



Figure 3-27: Max. Peak Conducted Output Power
Single Freq., Static PBRs, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Band Edge Compliance

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

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

| Bluetooth Channel | Operating Mode | Measured Level (dBc) | Limit (dBc) | Margin (dB) |
|-------------------|------------------|----------------------|-------------|-------------|
| 0 | Single Frequency | -27.67 | -20 | -7.67 |
| 78 | Single Frequency | -31.17 | -20 | -11.17 |
| 0 | Hopping | -27.83 | -20 | -7.83 |
| 78 | Hopping | -31.84 | -20 | -11.84 |

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

Figure 3-28: Band Edge Compliance

Single Freq., Static PRBS, DH5

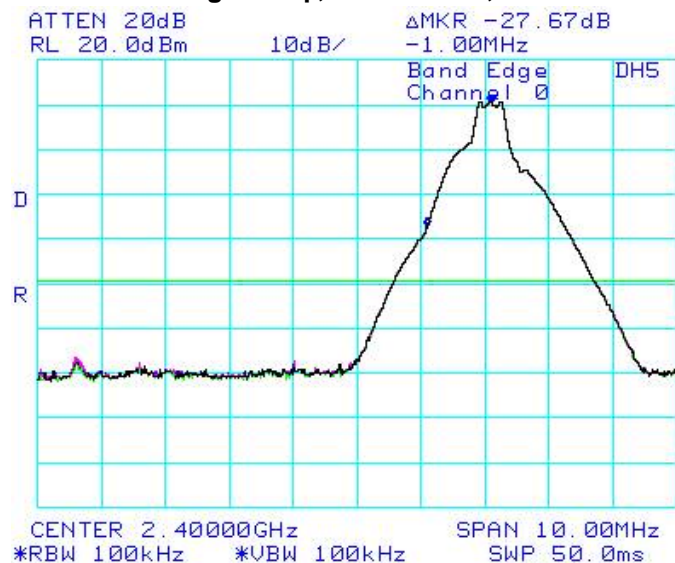
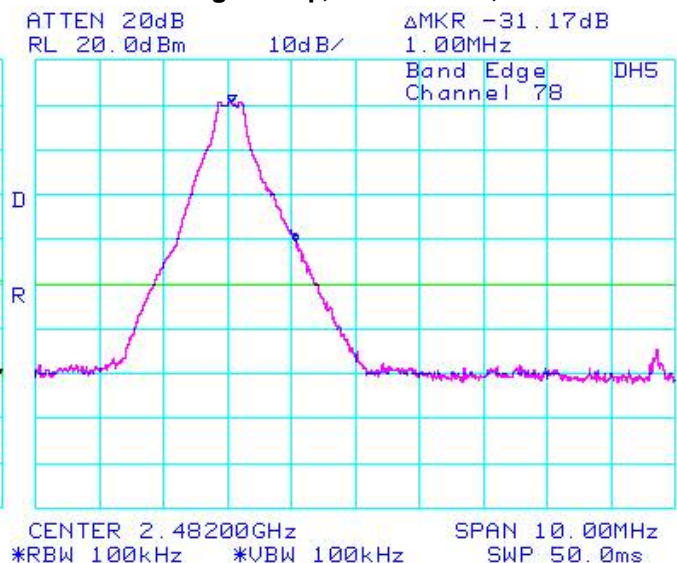



Figure 3-29: Band Edge Compliance

Single Freq., Static PRBS, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-30: Band Edge Compliance

Freq. Hopping, Static PBRS, DH5

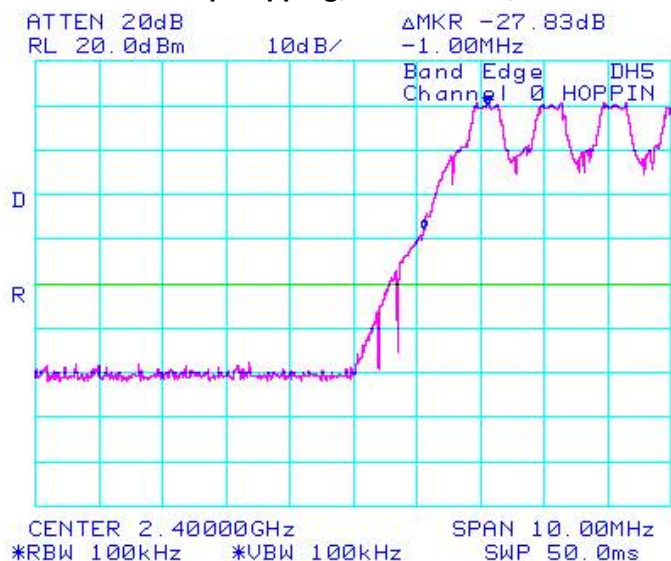
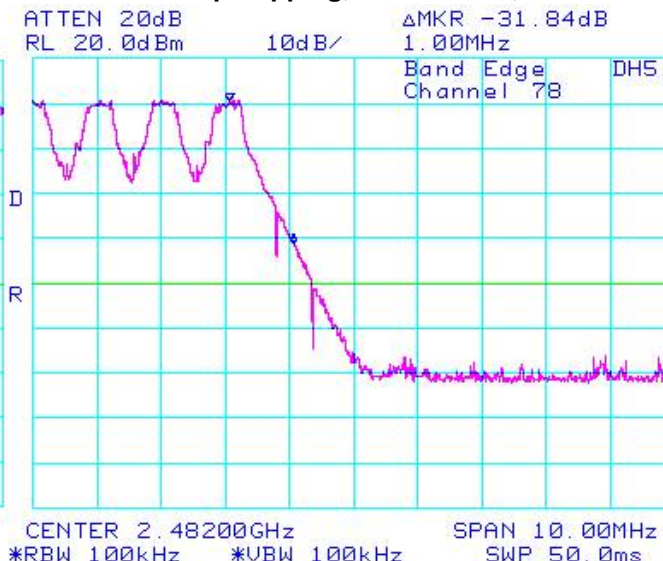


Figure 3-31: Band Edge Compliance


Freq. Hopping, Static PBRS, DH5



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

| Bluetooth Channel | Operating Mode | Measured Level (dBc) | Limit (dBc) | Margin (dB) |
|-------------------|------------------|----------------------|-------------|-------------|
| 0 | Single Frequency | -28.16 | -20 | -8.16 |
| 78 | Single Frequency | -33.00 | -20 | -13.00 |
| 0 | Hopping | -28.33 | -20 | -8.33 |
| 78 | Hopping | -30.50 | -20 | -10.50 |

See figures 3-32 to 3-35 for the plots of the band edge compliance measurements.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-32: Band Edge Compliance

Single Freq., Static PBRS, 3-DH5

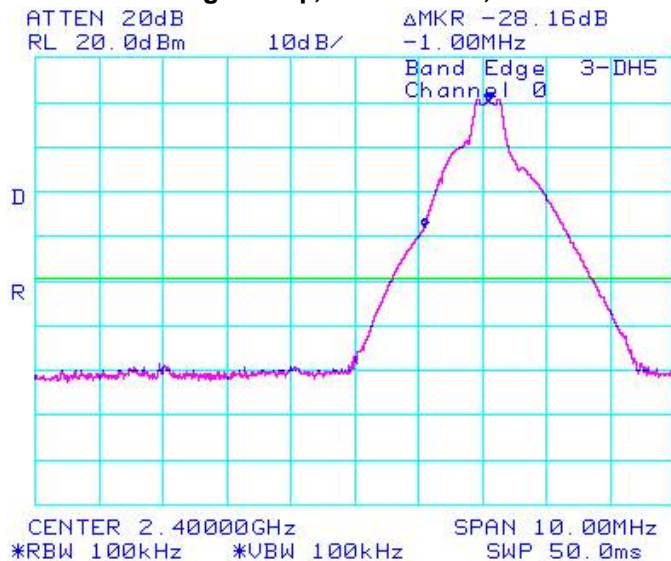


Figure 3-33: Band Edge Compliance

Single Freq., Static PBRS, 3-DH5

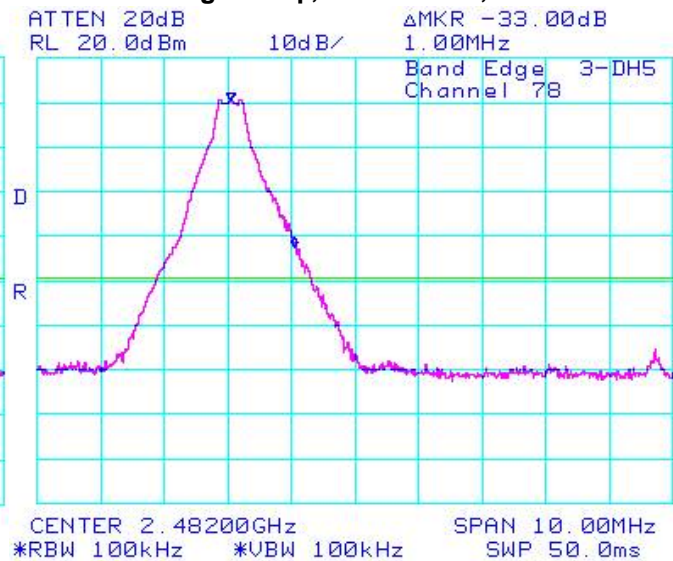


Figure 3-34: Band Edge Compliance

Freq. Hopping, Static PBRS, 3-DH5

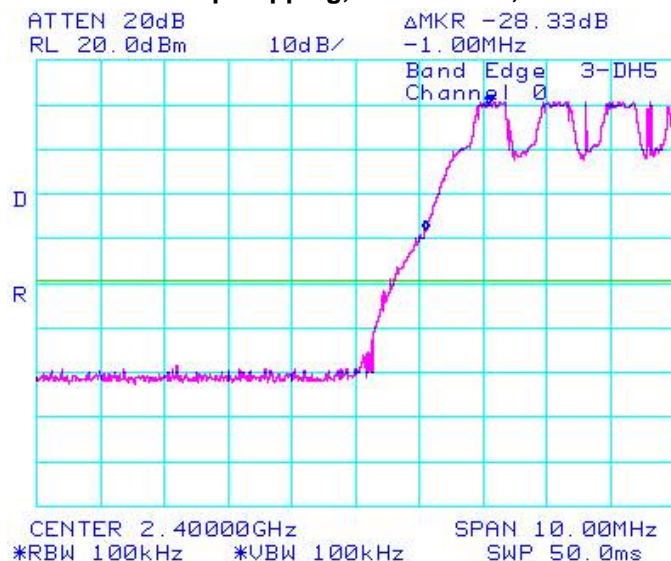
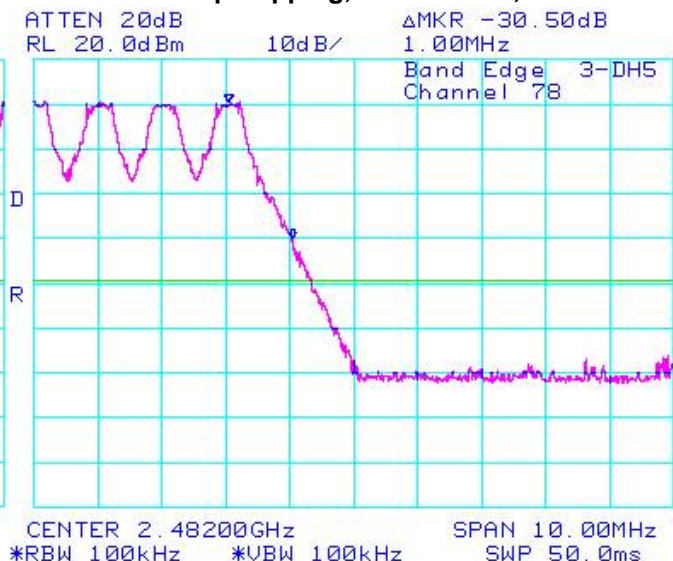



Figure 3-35: Band Edge Compliance

Freq. Hopping, Static PBRS, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd


Spurious RF Conducted Emissions

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

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

| Bluetooth Channel | Channel Power (dBm) | Max. Measured Level (dBm) | Max. Measured Level from carrier (dBc) | Limit (dBc) |
|-------------------|---------------------|---------------------------|--|-------------|
| 0 | 10.67 | -30.67 | 41.34 | -20 |
| 39 | 10.67 | -30.67 | 41.34 | -20 |
| 78 | 11.00 | -33.67 | 44.67 | -20 |
| Hopping mode | 10.67 | -31.33 | 42 | -20 |

See figures 2-36 to 2-39 for the plots of the spurious RF conducted emissions.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 2-36: Spurious RF Conducted Emissions

Single Freq., Static PBRs, DH5,

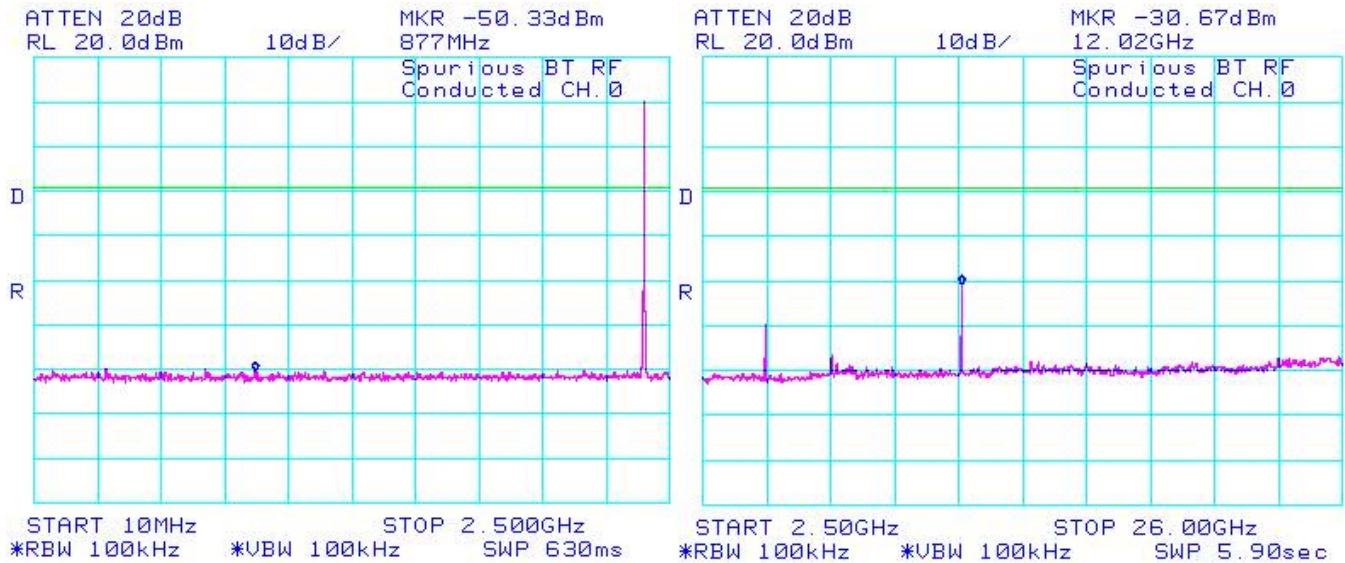
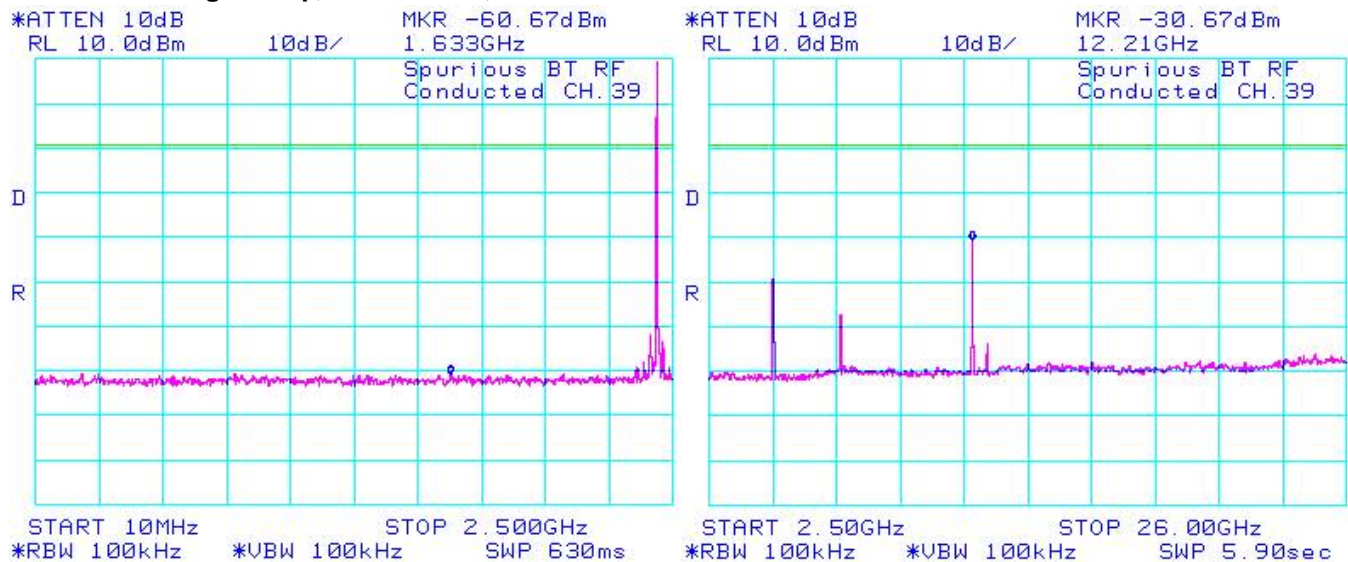



Figure 2-37: Spurious RF Conducted Emissions

Single Freq., Static PBRs, DH5



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Bluetooth RF Conducted Emission Test Results cont'd

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

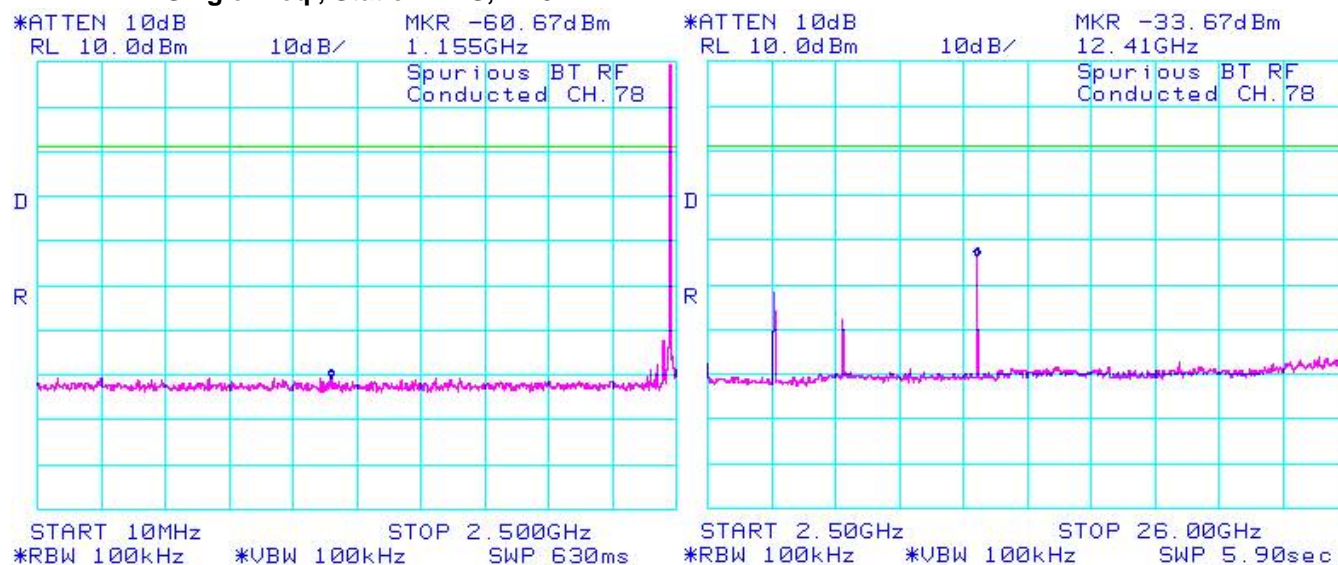
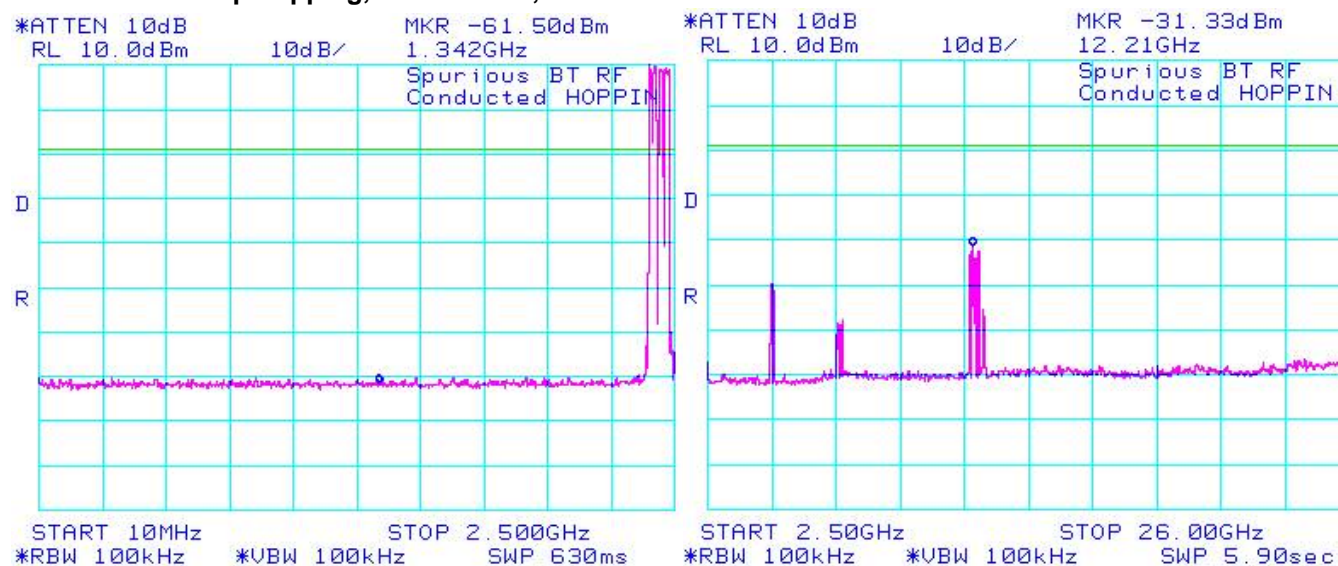



Figure 2-39: Spurious RF Conducted Emissions
Freq. Hopping, Static PBRS, DH5




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Bluetooth RF Conducted Emission Test Results cont'd

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

| Bluetooth Channel | Channel Power (dBm) | Max. Measured Level (dBm) | Max. Measured Level from carrier (dBc) | Limit (dBc) |
|-------------------|---------------------|---------------------------|--|-------------|
| 0 | 10.33 | -42.00 | 52.33 | -20 |
| 39 | 10.17 | -38.83 | 49.00 | -20 |
| 78 | 10.50 | -38.38 | 48.88 | -20 |
| Hopping mode | 10.17 | -40.17 | 50.34 | -20 |

See figures 3-40 to 3-43 for the plots of the spurious RF conducted emissions.

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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-40 : Spurious RF Conducted Emissions

Single Freq., Static PBRS, 3-DH5

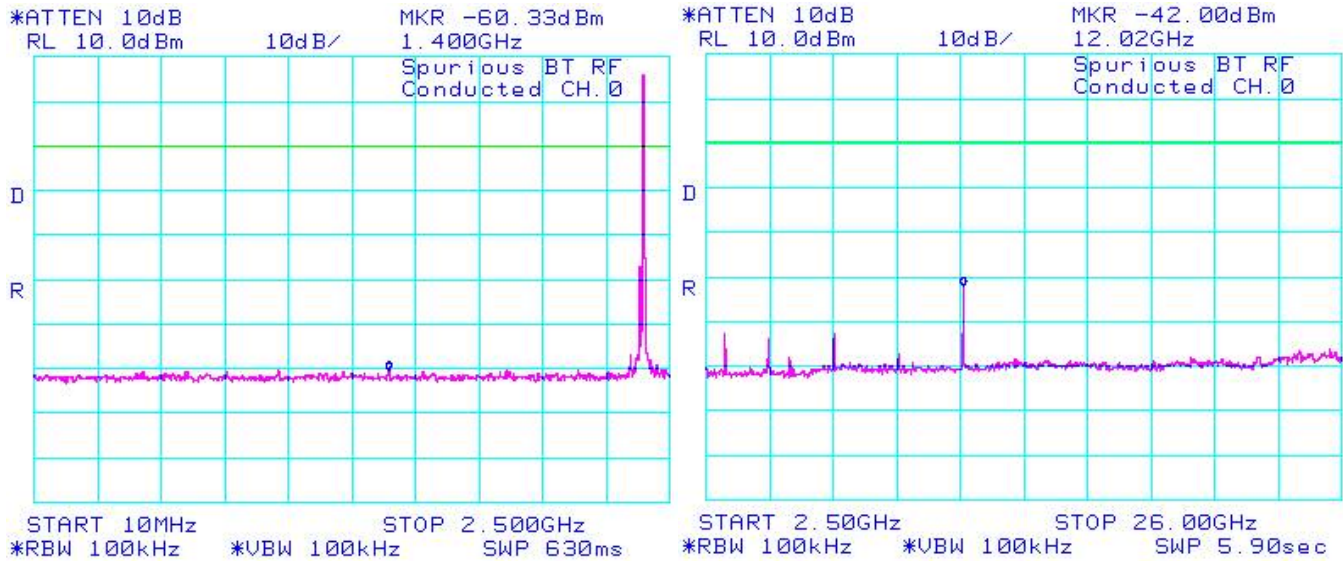
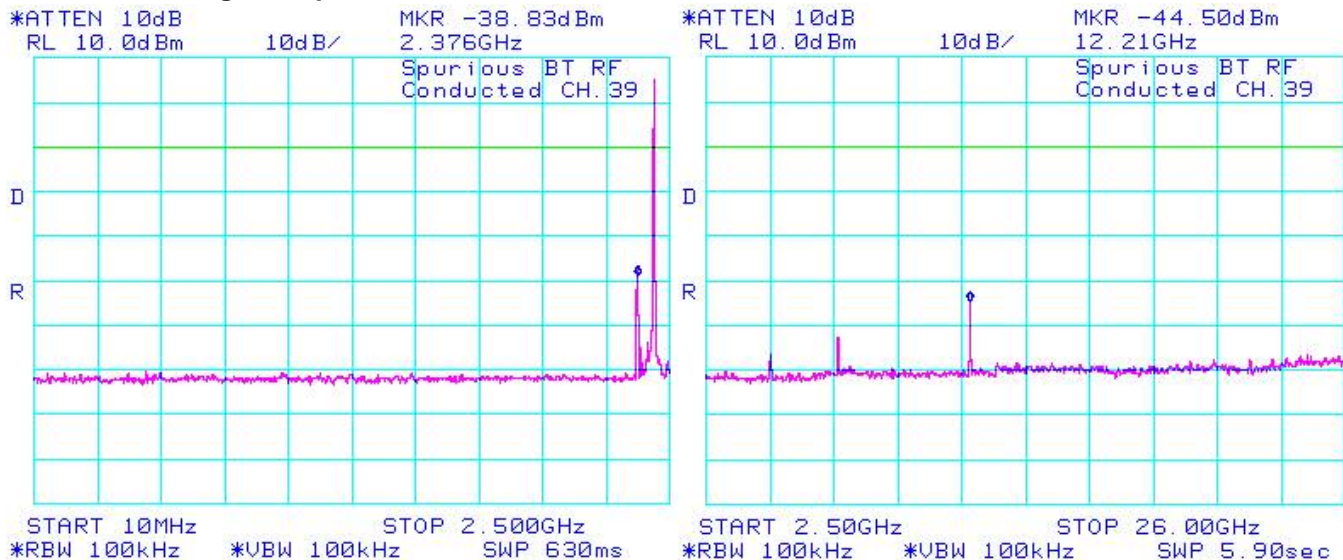



Figure 3-41: Spurious RF Conducted Emissions

Single Freq., Static PBRS, 3-DH5



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Bluetooth RF Conducted Emission Test Results cont'd

Figure 3-42: Spurious RF Conducted Emissions

Single Freq., Static PBRS, 3-DH5

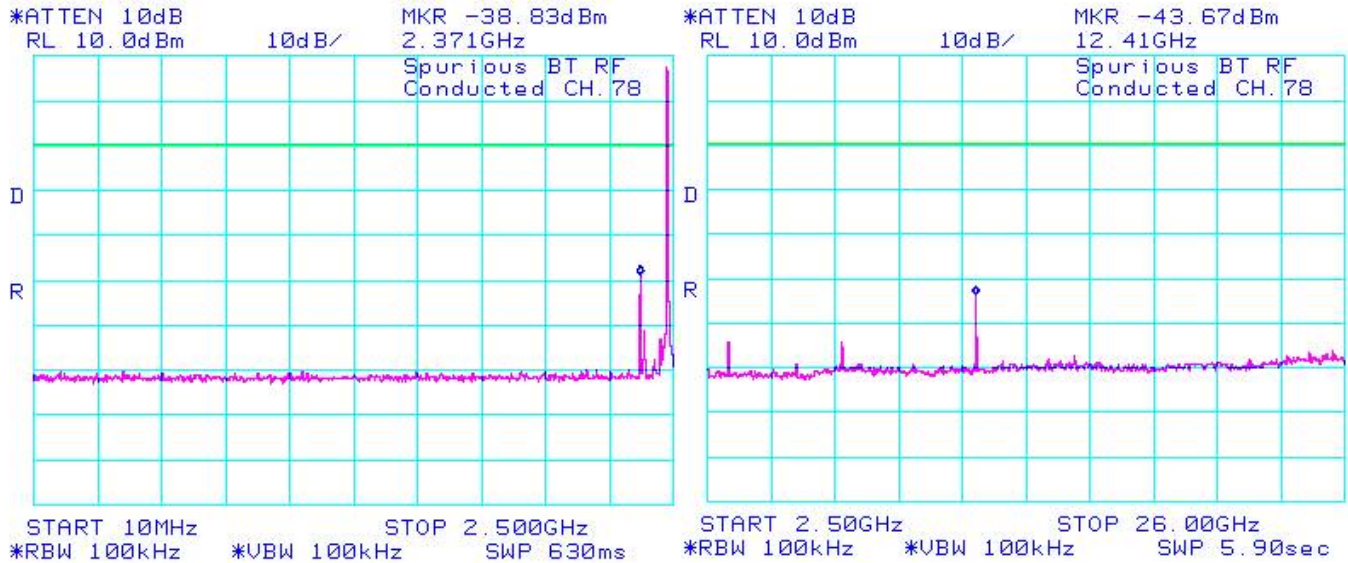
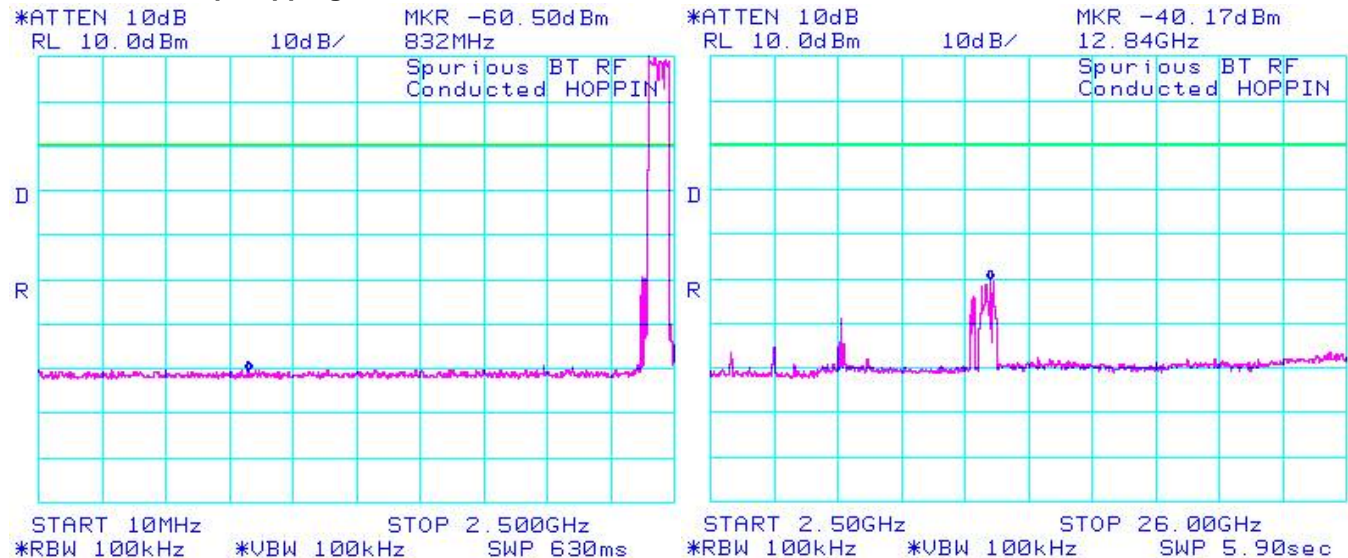




Figure 3-43 : Spurious RF Conducted Emissions

Freq. Hopping, Static PBRS, 3-DH5



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

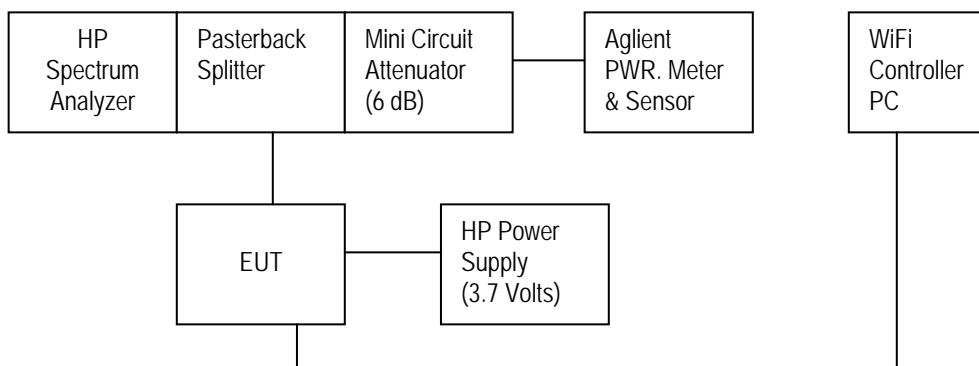
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802.11b/g/n RF Conducted Emission Test Results

802.11b/g/n Target Power Output for all the recorded measurements shown below:

| Channel | Frequency | 802.11b | | 802.11g | | 802.11n | |
|---------|-----------|-----------|--------------------|-----------|--------------------|-----------|--------------------|
| | | Data Rate | Power output (dBm) | Data Rate | Power output (dBm) | Data Rate | Power output (dBm) |
| 1 | 2412 MHz | 1 Mbps | 18.0 | 6 Mbps | 14.0 | MCS 0 | 15.0 |
| | | 5.5 Mbps | 18.0 | 24 Mbps | 14.0 | MCS 4 | 14.5 |
| | | 11 Mbps | 18.0 | 54 Mbps | 13.0 | MCS 7 | 12.0 |
| 6 | 2437 MHz | 1 Mbps | 18.0 | 6 Mbps | 17.0 | MCS 0 | 17.0 |
| | | 5.5 Mbps | 18.0 | 24 Mbps | 14.5 | MCS 4 | 14.5 |
| | | 11 Mbps | 18.0 | 54 Mbps | 13.0 | MCS 7 | 12.0 |
| 11 | 2462 MHz | 1 Mbps | 18.0 | 6 Mbps | 14.0 | MCS 0 | 15.0 |
| | | 5.5 Mbps | 18.0 | 24 Mbps | 14.0 | MCS 4 | 14.5 |
| | | 11 Mbps | 18.0 | 54 Mbps | 13.0 | MCS 7 | 12.0 |

Test Setup Diagram




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

Date of test: February 02, 2010

The measurements on the BlackBerry® smartphone were performed by Maurice Battler.

The environmental test conditions were:

| | |
|--------------------|---------|
| Temperature: | 24 °C |
| Pressure: | 1014 mb |
| Relative Humidity: | 21 % |

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

6 dB Bandwidth

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

| Channel | Data Rate | Limit (kHz) | Measured Level (MHz) |
|---------|-----------|-------------|----------------------|
| 1 | 1 Mbps | ≥ 500 | 10.13 |
| | 5.5 Mbps | ≥ 500 | 10.57 |
| | 11 Mbps | ≥ 500 | 11.20 |
| | 6 Mbps | ≥ 500 | 16.20 |
| | 24 Mbps | ≥ 500 | 16.60 |
| | 54 Mbps | ≥ 500 | 16.57 |
| | MCS 0 | ≥ 500 | 17.67 |
| | MCS 4 | ≥ 500 | 17.83 |
| | MCS 7 | ≥ 500 | 17.70 |
| 6 | 1 Mbps | ≥ 500 | 10.13 |
| | 5.5 Mbps | ≥ 500 | 10.67 |
| | 11 Mbps | ≥ 500 | 10.57 |
| | 6 Mbps | ≥ 500 | 16.40 |
| | 24 Mbps | ≥ 500 | 16.57 |
| | 54 Mbps | ≥ 500 | 16.60 |
| | MCS 0 | ≥ 500 | 17.07 |
| | MCS 4 | ≥ 500 | 17.80 |
| | MCS 7 | ≥ 500 | 17.77 |
| 11 | 1 Mbps | ≥ 500 | 10.13 |
| | 5.5 Mbps | ≥ 500 | 11.10 |
| | 11 Mbps | ≥ 500 | 10.53 |
| | 6 Mbps | ≥ 500 | 16.37 |
| | 24 Mbps | ≥ 500 | 16.53 |
| | 54 Mbps | ≥ 500 | 16.60 |
| | MCS 0 | ≥ 500 | 17.77 |
| | MCS 4 | ≥ 500 | 17.80 |
| | MCS 7 | ≥ 500 | 17.73 |

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

See figures 4-1 to 4-9 for the plots of the 6 dB bandwidth measurements for Channels 1, 6, and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

Figure 4-1: 6 dB Bandwidth

802.11b, Channel 1, 1 Mbps

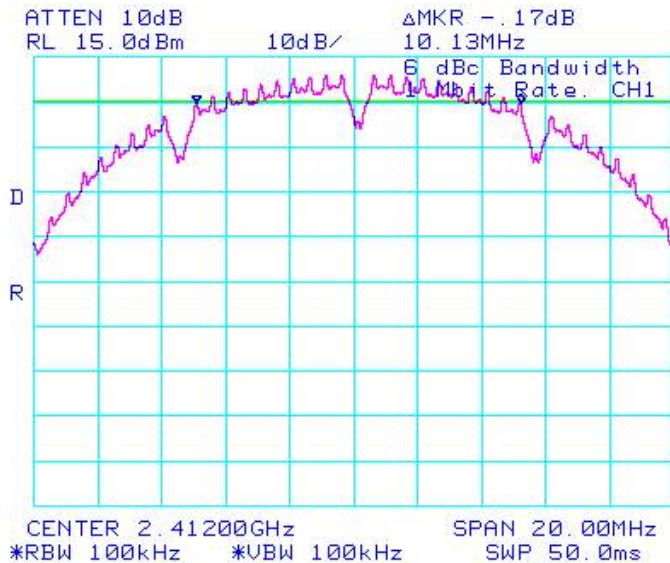


Figure 4-2: 6 dB Bandwidth

802.11b, Channel 6, 1 Mbps

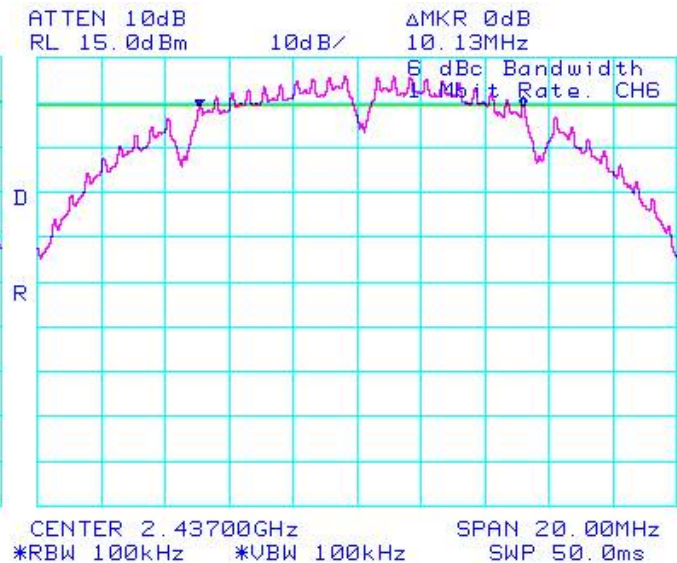


Figure 4-3: 6 dB Bandwidth

802.11b, Channel 11, 1 Mbps

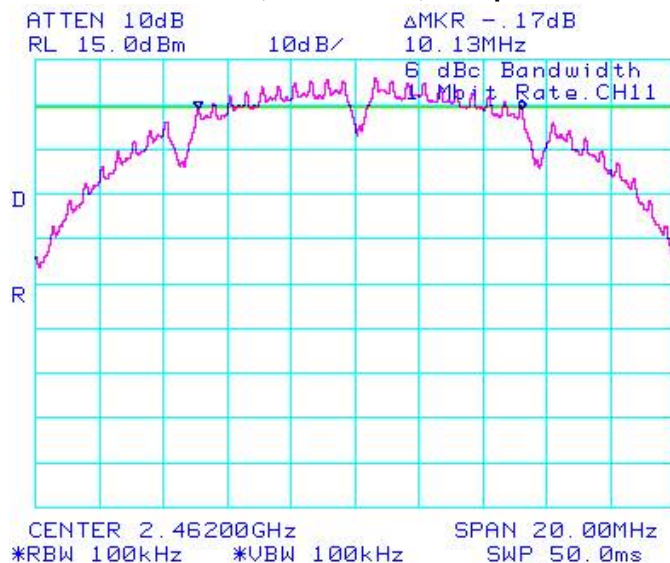
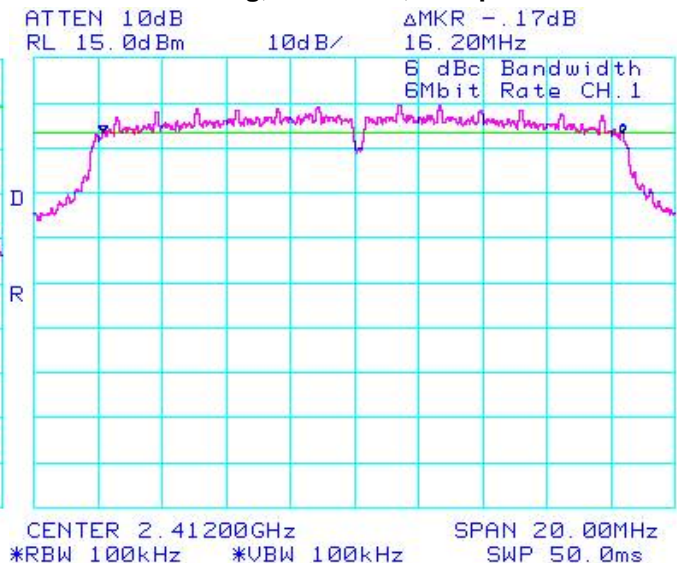



Figure 4-4: 6 dB Bandwidth

802.11g, Channel 1, 6 Mbps



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

Figure 4-5: 6 dB Bandwidth

802.11g, Channel 6, 6 Mbps

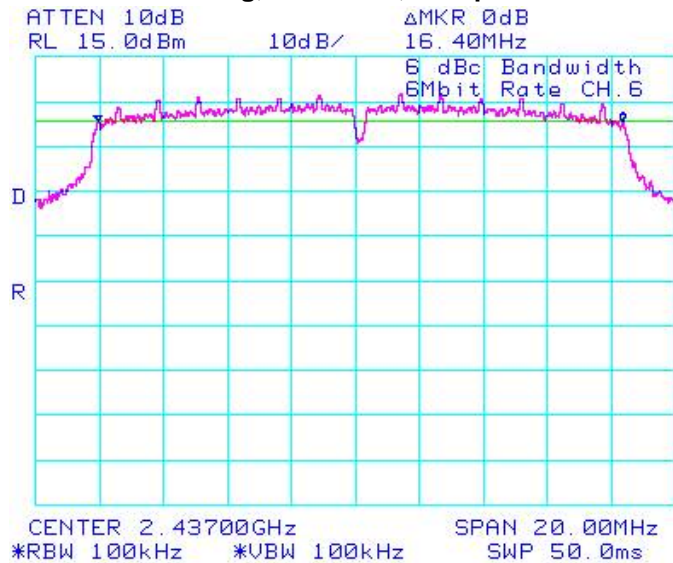


Figure 4-6: 6 dB Bandwidth

802.11g, Channel 11, 6 Mbps

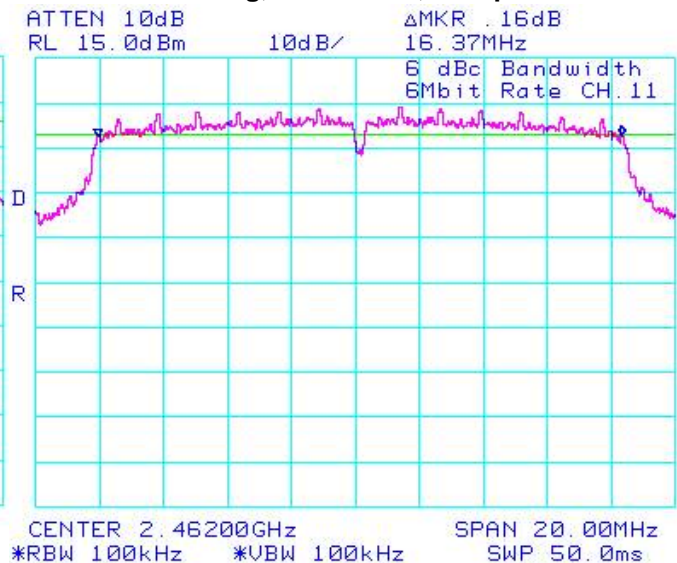


Figure 4-7: 6 dB Bandwidth

802.11n, Channel 1, MCS 0

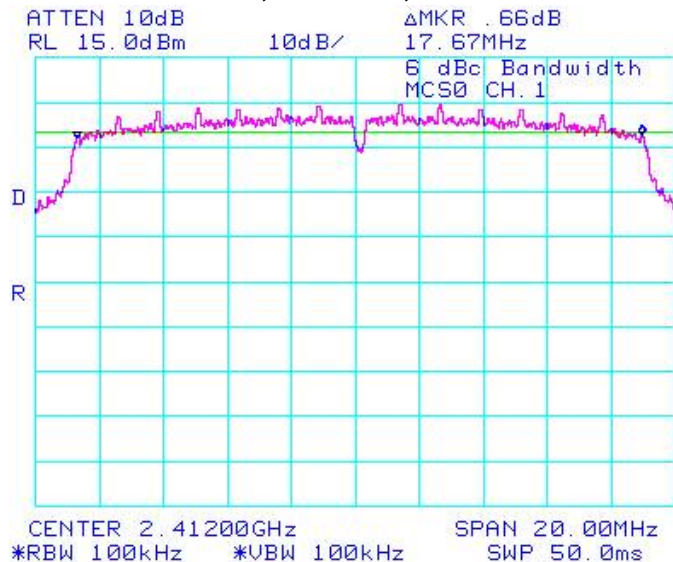
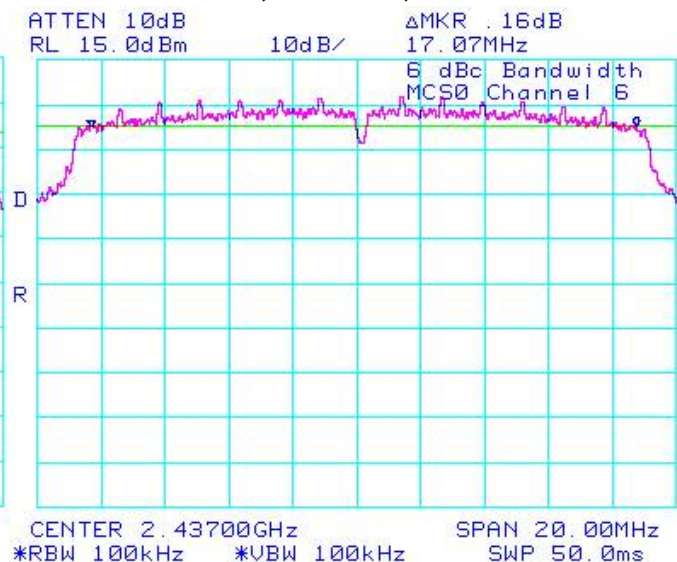


Figure 4-8: 6 dB Bandwidth

802.11n, Channel 6, MCS 0




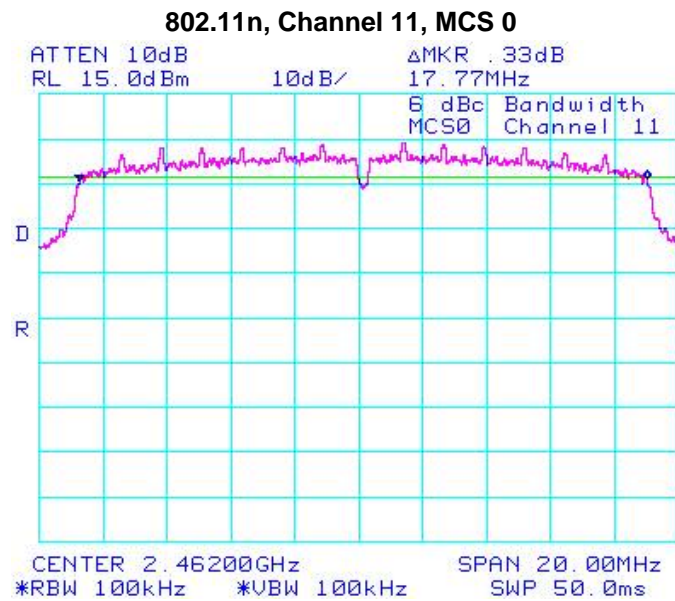

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Figure 4-9: 6 dB Bandwidth




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

Maximum Conducted Output Power


The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.247(b)(3) and RSS-210. Channels 1, 6 and 11 were measured at 1 Mbps, 5.5 Mbps, and 11 Mbps each for 802.11b mode, 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11g mode, and MCS 0, 4 and 7 for 802.11n mode using an Aglient power meter, model N1911A with model N1921A power sensor. A reference offset of 18.4 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

| Channel | Data Rate | Class 2 Limit (W) | Measured Level (dBm) | Measured Level (mW) |
|---------|-----------|-------------------|----------------------|---------------------|
| 1 | 1 Mbps | < 1.00 | 17.72 | 59.16 |
| | 5.5 Mbps | < 1.00 | 17.67 | 58.48 |
| | 11 Mbps | < 1.00 | 17.67 | 58.48 |
| | 6 Mbps | < 1.00 | 14.87 | 30.69 |
| | 24 Mbps | < 1.00 | 14.20 | 26.30 |
| | 54 Mbps | < 1.00 | 12.50 | 17.78 |
| | MCS 0 | < 1.00 | 14.72 | 29.65 |
| | MCS 4 | < 1.00 | 14.78 | 30.06 |
| | MCS 7 | < 1.00 | 11.90 | 15.49 |
| 6 | 1 Mbps | < 1.00 | 17.65 | 58.21 |
| | 5.5 Mbps | < 1.00 | 17.60 | 57.54 |
| | 11 Mbps | < 1.00 | 17.58 | 57.28 |
| | 6 Mbps | < 1.00 | 17.17 | 52.12 |
| | 24 Mbps | < 1.00 | 14.02 | 25.23 |
| | 54 Mbps | < 1.00 | 13.01 | 20.00 |
| | MCS 0 | < 1.00 | 17.05 | 50.70 |
| | MCS 4 | < 1.00 | 14.81 | 30.27 |
| | MCS 7 | < 1.00 | 11.90 | 15.49 |

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

| Channel | Data Rate | Class 2 Limit (W) | Measured Level (dBm) | Measured Level (mW) |
|---------|-----------|----------------------|-------------------------|------------------------|
| 11 | 1 Mbps | < 1.00 | 17.52 | 56.49 |
| | 5.5 Mbps | < 1.00 | 17.46 | 55.72 |
| | 11 Mbps | < 1.00 | 17.50 | 56.23 |
| | 6 Mbps | < 1.00 | 14.95 | 31.26 |
| | 24 Mbps | < 1.00 | 14.05 | 25.41 |
| | 54 Mbps | < 1.00 | 13.04 | 20.14 |
| | MCS 0 | < 1.00 | 14.79 | 30.13 |
| | MCS 4 | < 1.00 | 14.80 | 30.20 |
| | MCS 7 | < 1.00 | 11.10 | 12.88 |

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

Band Edge Compliance

The EUT met the requirements of the band edge compliance as per 47 CFR 15.247(c) 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 | -39.34 | -19.34 |
| | 5.5 Mbps | < -20 | -41.38 | -21.38 |
| | 11 Mbps | < -20 | -40.17 | -20.17 |
| | 6 Mbps | < -20 | -25.66 | -5.66 |
| | 24 Mbps | < -20 | -26.66 | -6.66 |
| | 54 Mbps | < -20 | -29.00 | -9.00 |
| | MCS 0 | < -20 | -24.84 | -4.84 |
| | MCS 4 | < -20 | -26.50 | -6.50 |
| | MCS 7 | < -20 | -28.00 | -8.00 |
| 11 | 1 Mbps | < -20 | -41.50 | -21.50 |
| | 5.5 Mbps | < -20 | -46.33 | -26.33 |
| | 11 Mbps | < -20 | -45.67 | -25.67 |
| | 6 Mbps | < -20 | -37.50 | -17.50 |
| | 24 Mbps | < -20 | -39.17 | -19.17 |
| | 54 Mbps | < -20 | -37.50 | -17.50 |
| | MCS 0 | < -20 | -37.50 | -17.50 |
| | MCS 4 | < -20 | -39.17 | -19.17 |
| | MCS 7 | < -20 | -40.17 | -20.17 |

See figures 4-10 to 4-15 for the plots of the band edge compliance measurements for Channels 1 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

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

Figure 4-10: Band Edge Compliance

802.11b, Channel 1, 1 Mbps

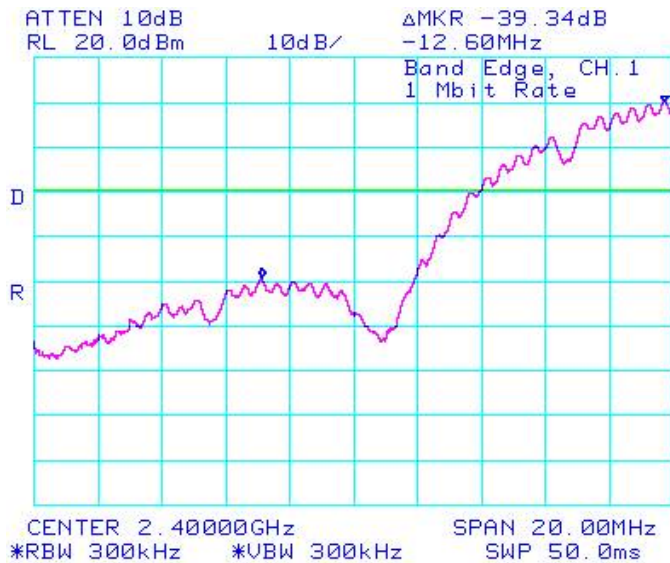


Figure 4-11: Band Edge Compliance

802.11b, Channel 11, 1 Mbps

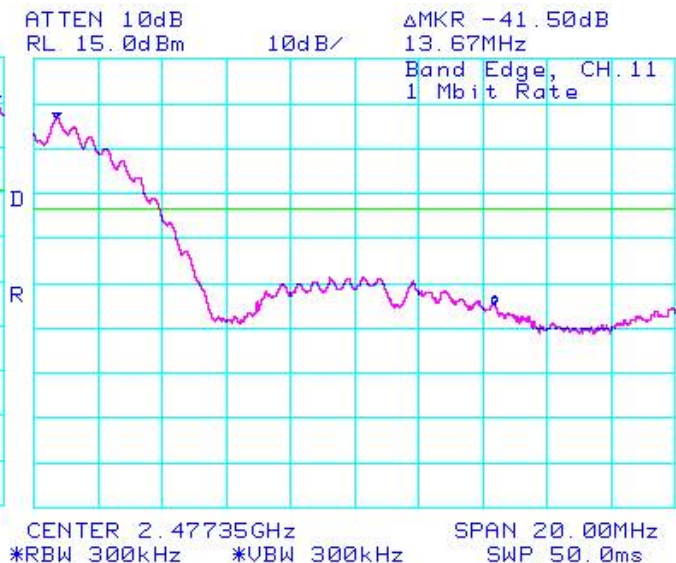


Figure 4-12: Band Edge Compliance

802.11g, Channel 1, 6 Mbps

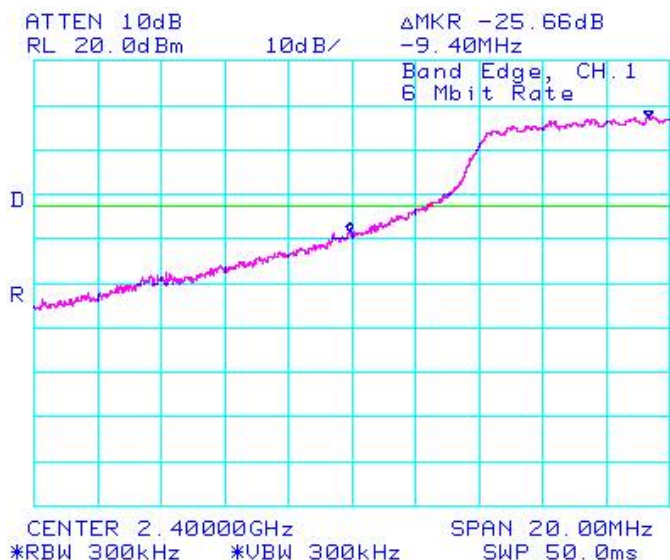



Figure 4-13: Band Edge Compliance

802.11g, Channel 11, 6 Mbps



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Figure 4-14: Band Edge Compliance

802.11n, Channel 1, MCS 0

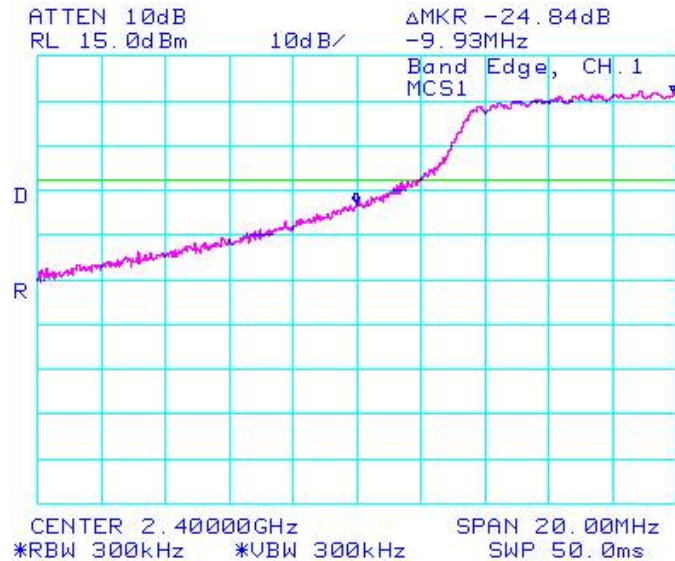
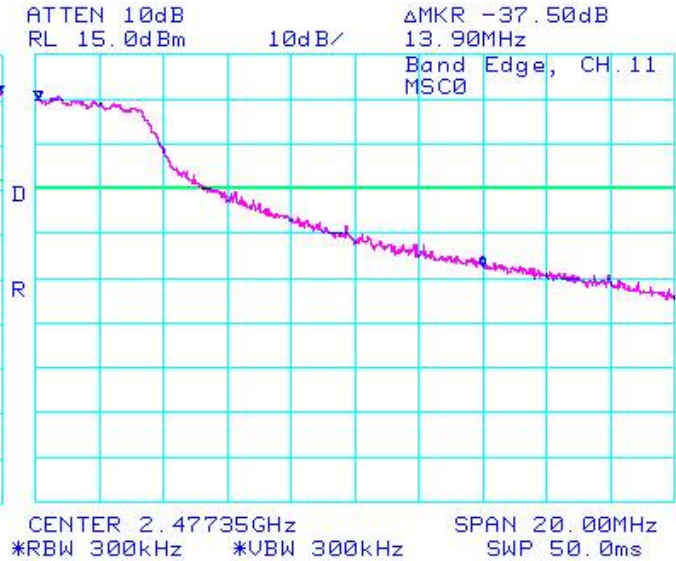



Figure 4-15: Band Edge Compliance

802.11n, Channel 11, MCS 0



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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 | -2.33 | -10.33 |
| | 5.5 Mbps | < 8.00 | -3.83 | -11.83 |
| | 11 Mbps | < 8.00 | -3.00 | -11.00 |
| | 6 Mbps | < 8.00 | -8.33 | -16.33 |
| | 24 Mbps | < 8.00 | -7.83 | -15.83 |
| | 54 Mbps | < 8.00 | -9.33 | -17.33 |
| | MCS 0 | < 8.00 | -7.50 | -15.50 |
| | MCS 4 | < 8.00 | -8.50 | -16.50 |
| | MCS 7 | < 8.00 | -10.83 | -18.83 |
| 6 | 1 Mbps | < 8.00 | -2.17 | -10.17 |
| | 5.5 Mbps | < 8.00 | -4.00 | -12.00 |
| | 11 Mbps | < 8.00 | -3.33 | -11.33 |
| | 6 Mbps | < 8.00 | -6.17 | -14.17 |
| | 24 Mbps | < 8.00 | -8.00 | -16.00 |
| | 54 Mbps | < 8.00 | -10.50 | -18.50 |
| | MCS 0 | < 8.00 | -5.67 | -13.67 |
| | MCS 4 | < 8.00 | -8.50 | -16.50 |
| | MCS 7 | < 8.00 | -11.00 | -19.00 |
| 11 | 1 Mbps | < 8.00 | -2.67 | -10.67 |
| | 5.5 Mbps | < 8.00 | -4.33 | -12.33 |
| | 11 Mbps | < 8.00 | -3.67 | -11.67 |
| | 6 Mbps | < 8.00 | -9.00 | -17.00 |
| | 24 Mbps | < 8.00 | -8.67 | -16.67 |
| | 54 Mbps | < 8.00 | -10.33 | -18.33 |
| | MCS 0 | < 8.00 | -8.33 | -16.33 |
| | MCS 4 | < 8.00 | -8.83 | -16.83 |
| | MCS 7 | < 8.00 | -11.50 | -19.50 |

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See figures 4-16 to 4-24 for the plots of the peak power spectral density for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 for 802.11n mode.

Figure 4-16: Peak Power Spectral Density

802.11b, Channel 1, 1 Mbps

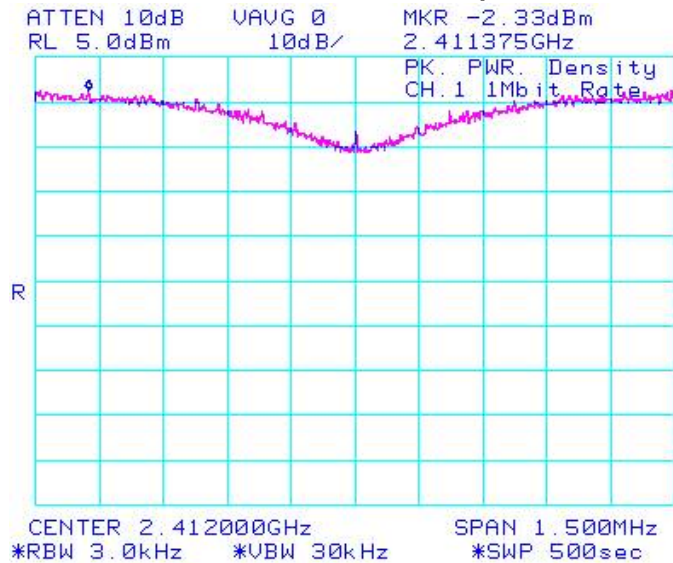


Figure 4-17: Peak Power Spectral Density

802.11b, Channel 6, 1 Mbps

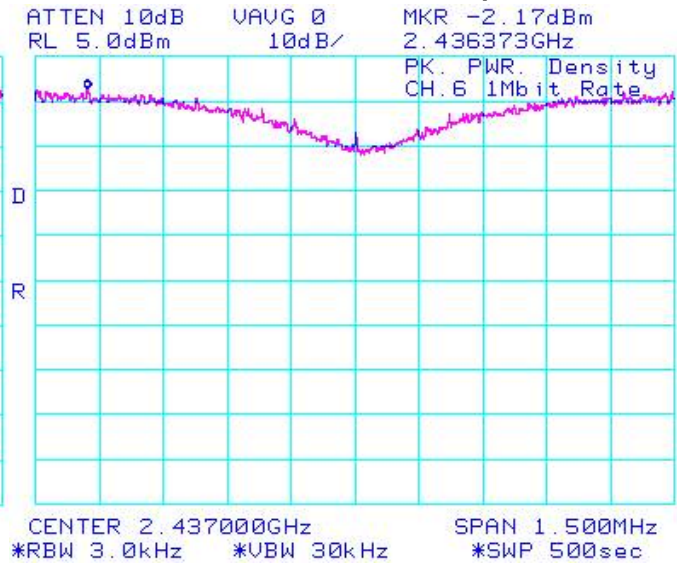
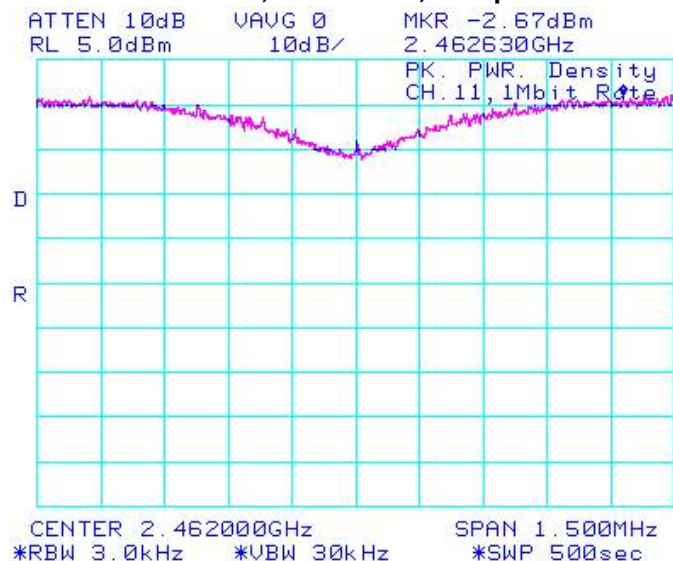



Figure 4-18: Peak Power Spectral Density

802.11b, Channel 11, 1 Mbps



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

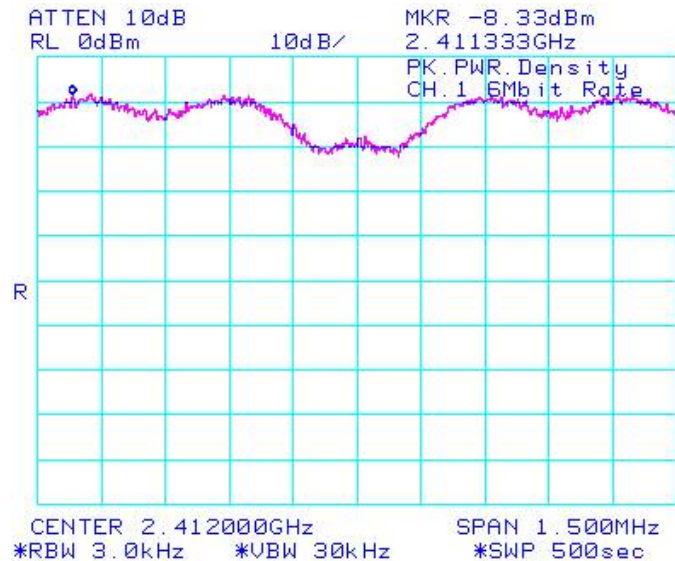


Figure 4-20: Peak Power Spectral Density
802.11g, Channel 6, 6 Mbps

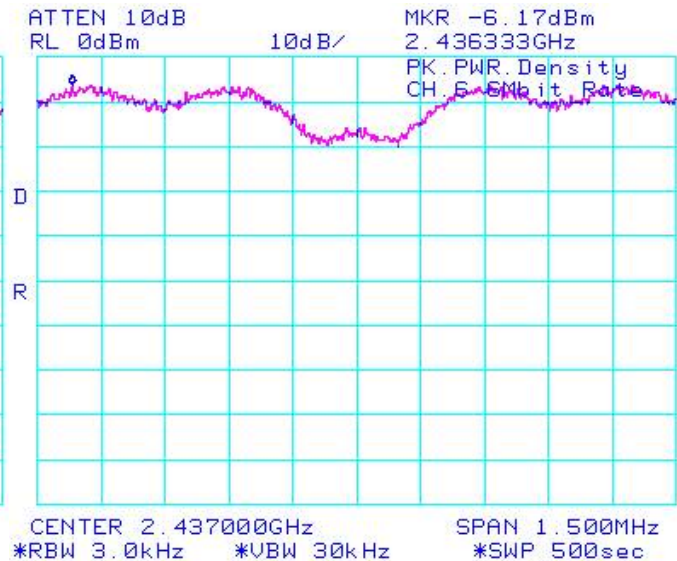
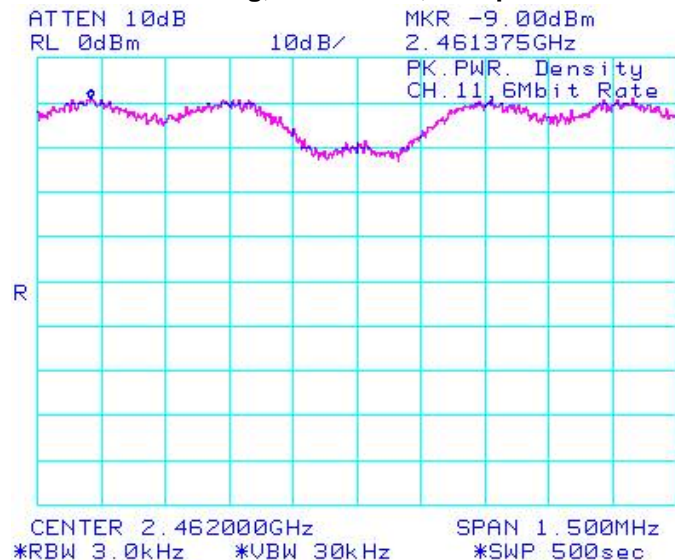



Figure 4-21: Peak Power Spectral Density
802.11g, Channel 11, 6 Mbps



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

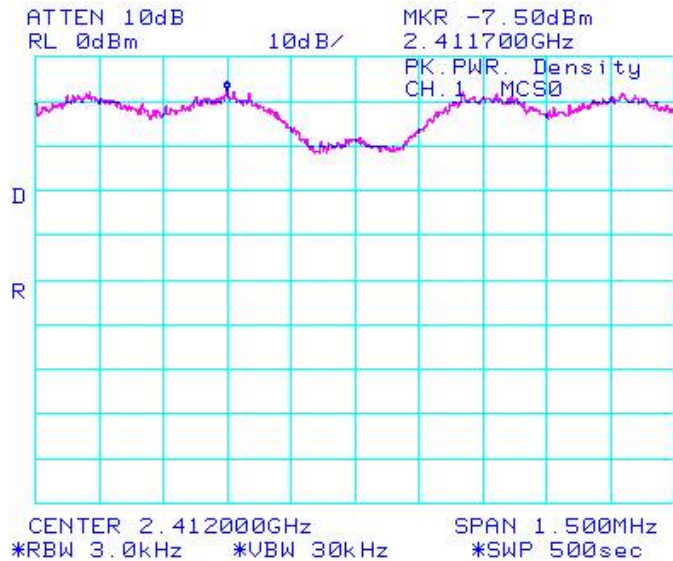


Figure 4-23: Peak Power Spectral Density
802.11n, Channel 6, MCS 0

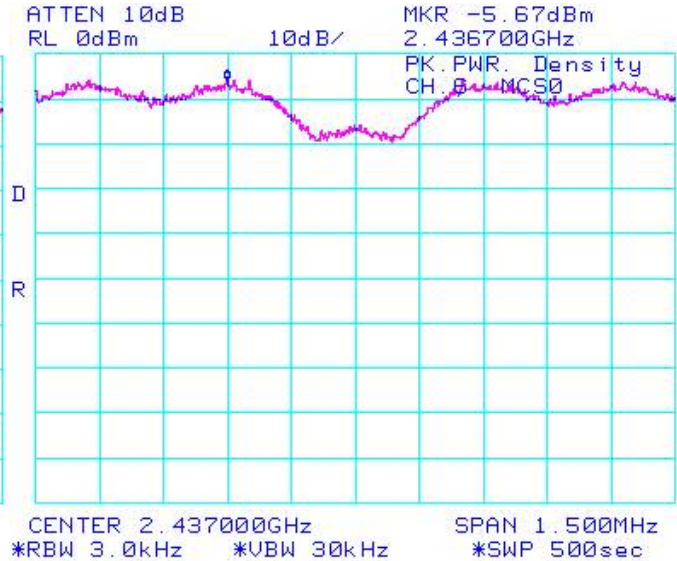
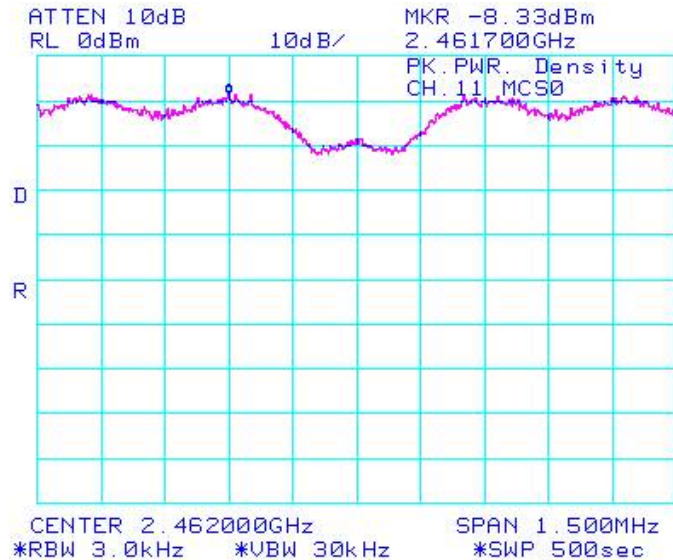



Figure 4-24: Peak Power Spectral Density
802.11n, Channel 11, MCS 0




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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 | -45.50 | -63.22 | -20 |
| | 5.5 Mbps | 17.67 | -42.33 | -60.00 | -20 |
| | 11 Mbps | 17.67 | -43.83 | -61.50 | -20 |
| | 6 Mbps | 14.87 | -45.67 | -60.54 | -20 |
| | 24 Mbps | 14.20 | -46.67 | -60.87 | -20 |
| | 54 Mbps | 12.50 | -47.83 | -60.33 | -20 |
| | MCS 0 | 14.72 | -46.33 | -61.05 | -20 |
| | MCS 4 | 14.78 | -46.83 | -61.61 | -20 |
| | MCS 7 | 11.90 | -49.00 | -60.90 | -20 |
| 6 | 1 Mbps | 17.65 | -49.67 | -67.32 | -20 |
| | 5.5 Mbps | 17.60 | -46.33 | -63.93 | -20 |
| | 11 Mbps | 17.58 | -45.00 | -62.58 | -20 |
| | 6 Mbps | 17.17 | -49.83 | -67.00 | -20 |
| | 24 Mbps | 14.02 | -47.33 | -61.35 | -20 |
| | 54 Mbps | 13.01 | -48.17 | -61.18 | -20 |
| | MCS 0 | 17.05 | -47.67 | -64.72 | -20 |
| | MCS 4 | 14.81 | -47.33 | -62.14 | -20 |
| | MCS 7 | 11.90 | -48.50 | -60.40 | -20 |


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

| Channel | Data Rate | Power (dBm) | Max. Measured Level (dBm) | Max. Measured Level from Carrier (dBc) | Limit (dBc) |
|---------|-----------|-------------|---------------------------|--|-------------|
| 11 | 1 Mbps | 17.52 | -46.00 | -63.52 | -20 |
| | 5.5 Mbps | 17.46 | -48.00 | -65.46 | -20 |
| | 11 Mbps | 17.50 | -45.67 | -63.17 | -20 |
| | 6 Mbps | 14.95 | -49.17 | -64.12 | -20 |
| | 24 Mbps | 14.05 | -48.67 | -62.72 | -20 |
| | 54 Mbps | 13.04 | -49.50 | -62.54 | -20 |
| | MCS 0 | 14.79 | -49.83 | -64.62 | -20 |
| | MCS 4 | 14.80 | -48.00 | -62.80 | -20 |
| | MCS 7 | 11.10 | -49.83 | -60.93 | -20 |

The emissions were in the NF.

See figures 4-25 to 4-33 for the plots of the spurious RF conducted emissions for Channels 1, 6 and 11, at 1 Mbps each for 802.11b mode, 6 Mbps each for 802.11g mode, and MCS 0 each for 802.11n mode.

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Figure 4-25: Spurious Conducted RF Emissions

802.11b, Channel 1, 1 Mbps

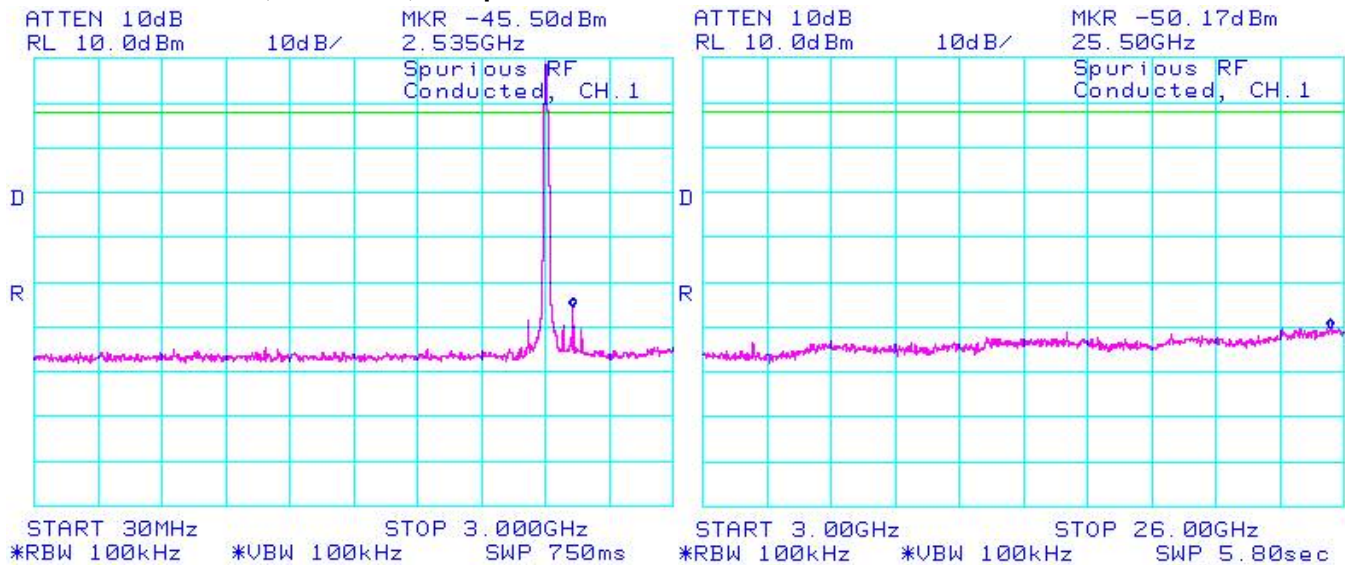
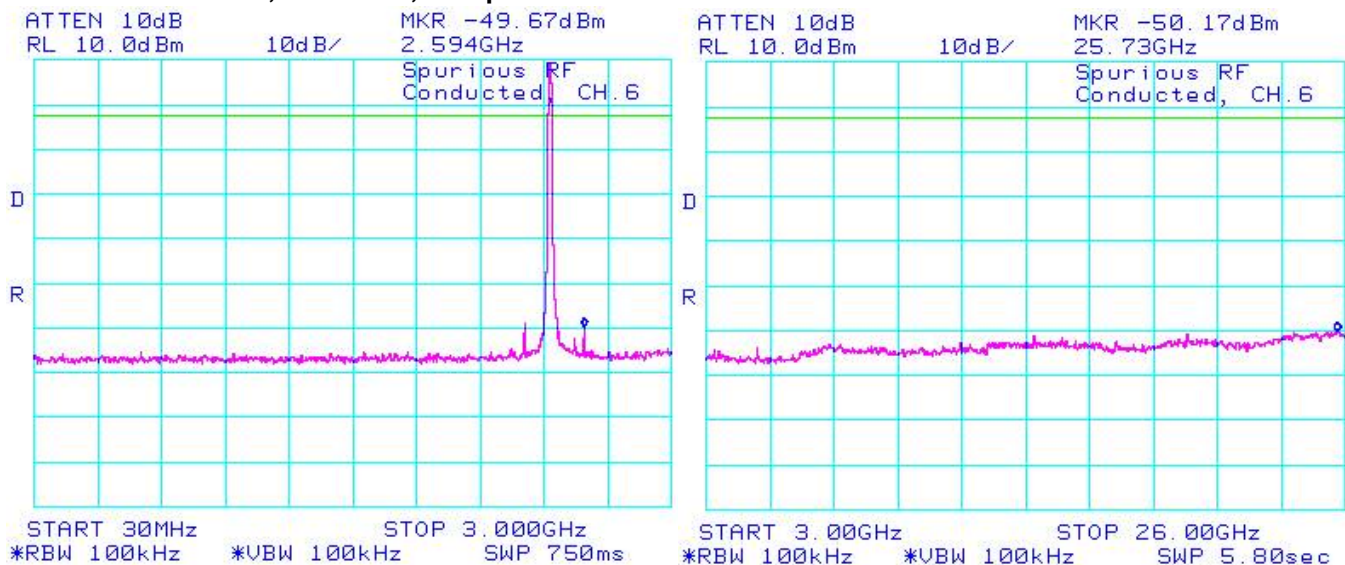



Figure 4-26 : Spurious Conducted RF Emissions

802.11b, Channel 6, 1 Mbps



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

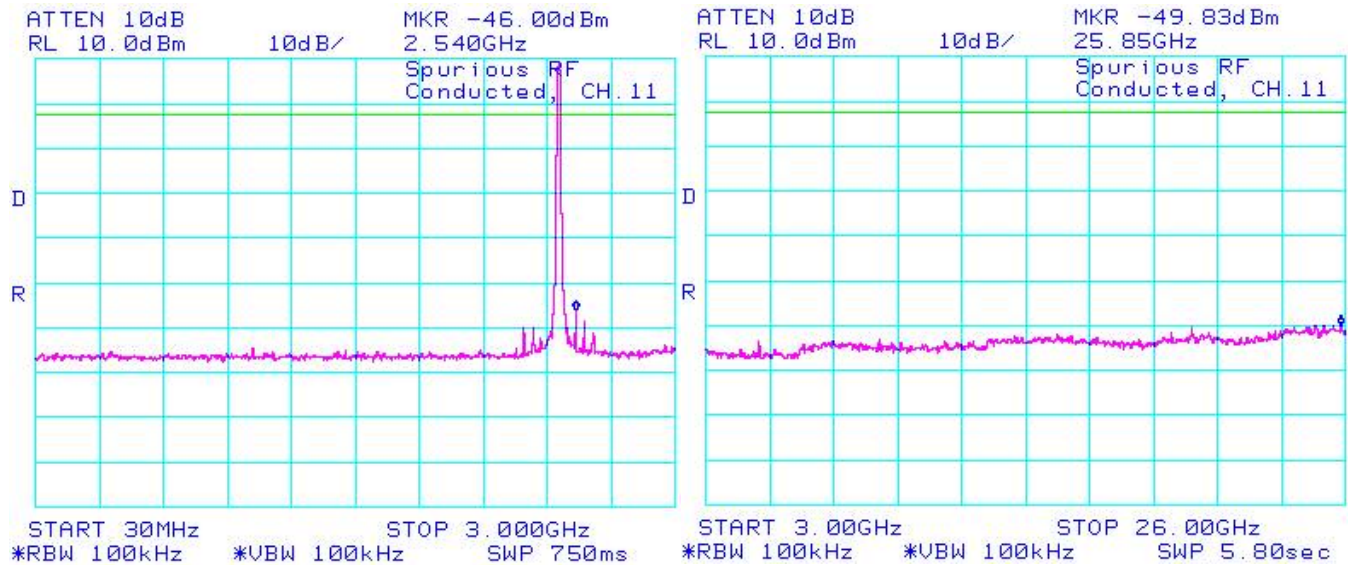
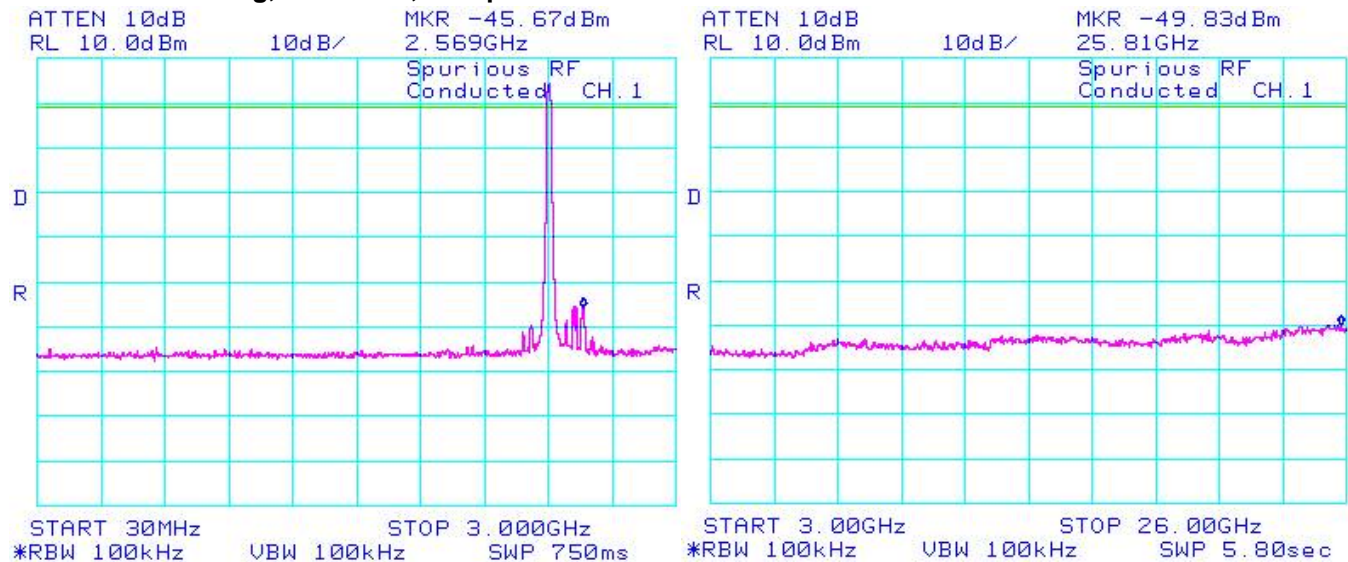



Figure 4-28: Spurious Conducted RF Emissions
802.11g, Channel 1, 6 Mbps



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

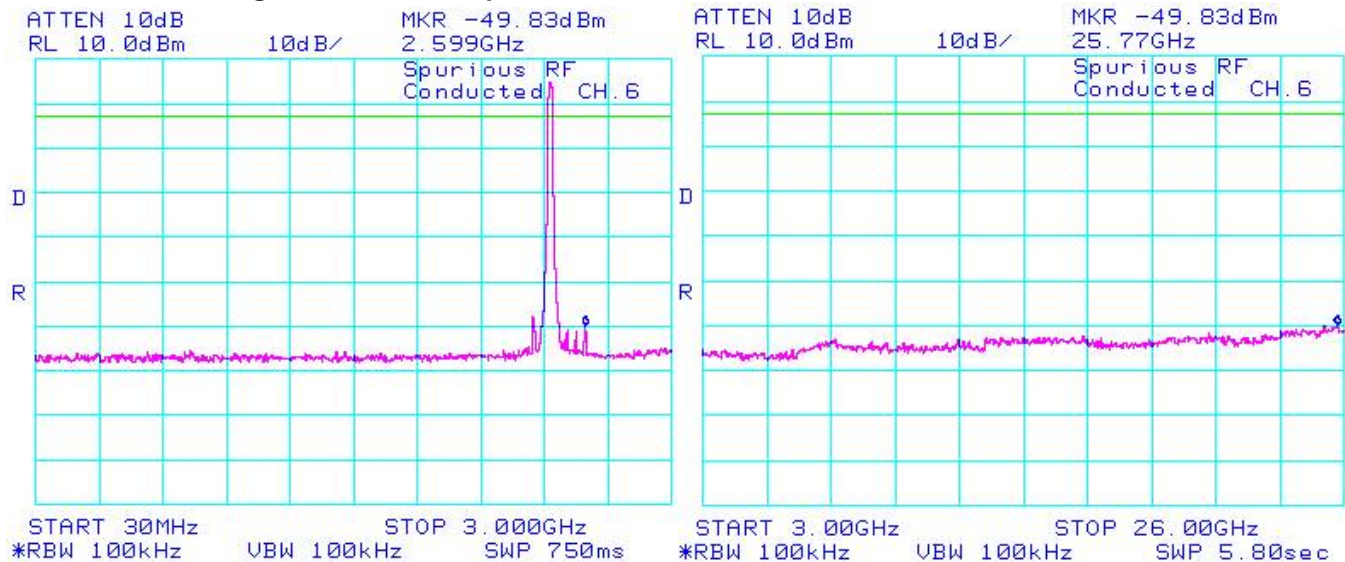
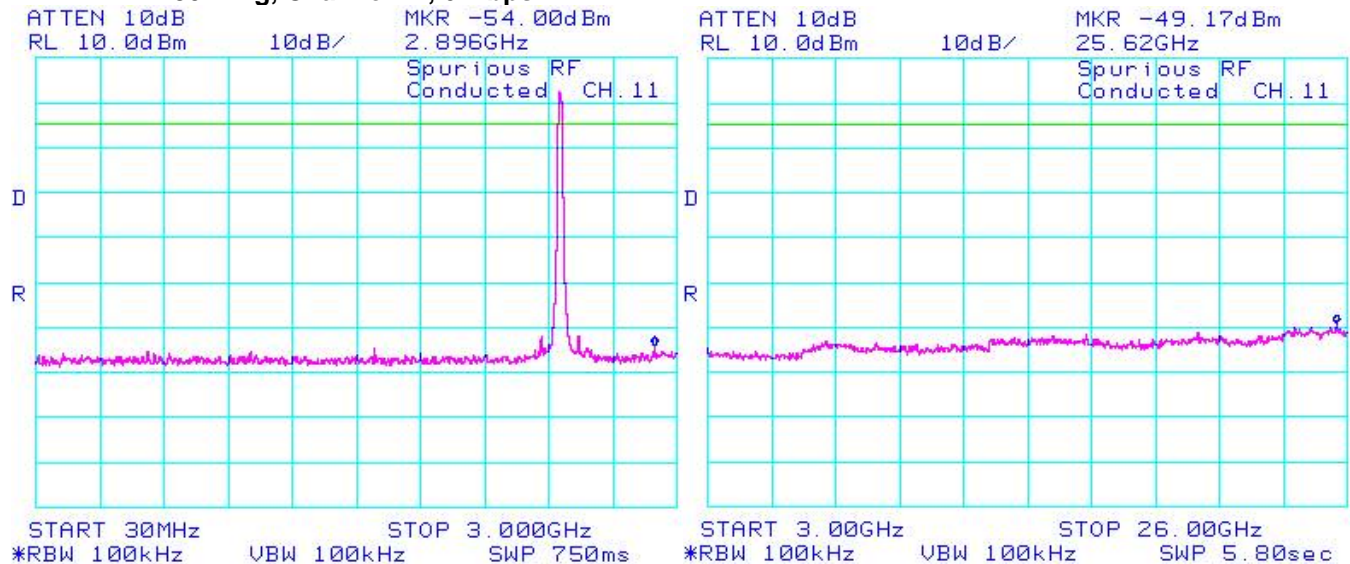



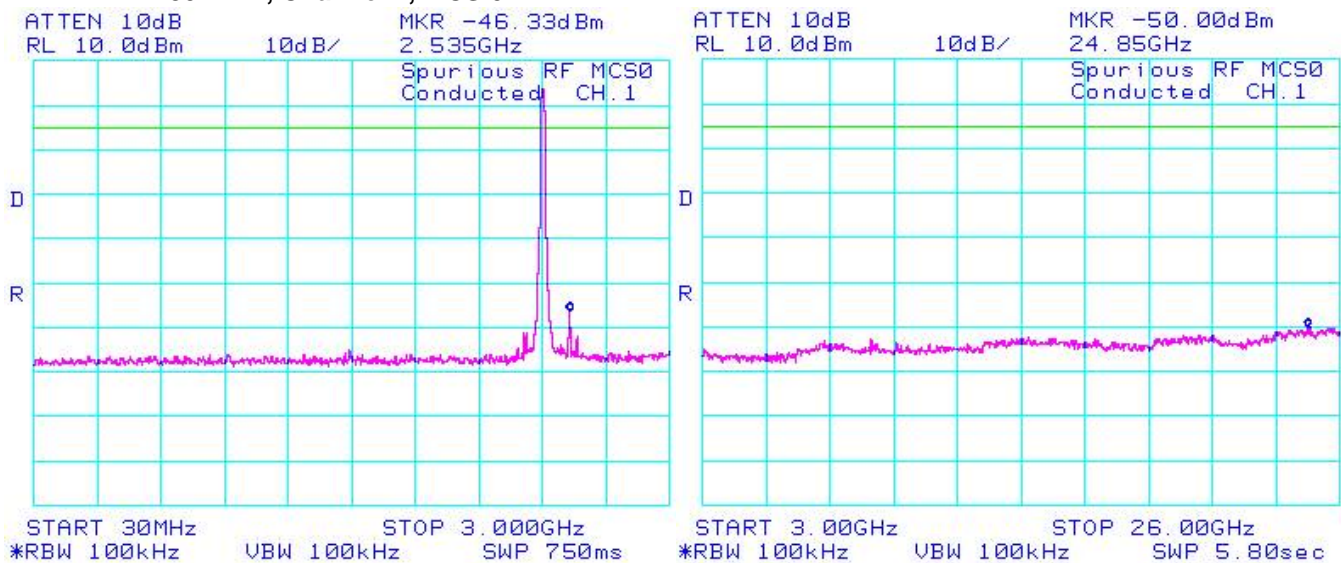
Figure 4-30: Spurious Conducted RF Emissions
802.11g, Channel 11, 6 Mbps



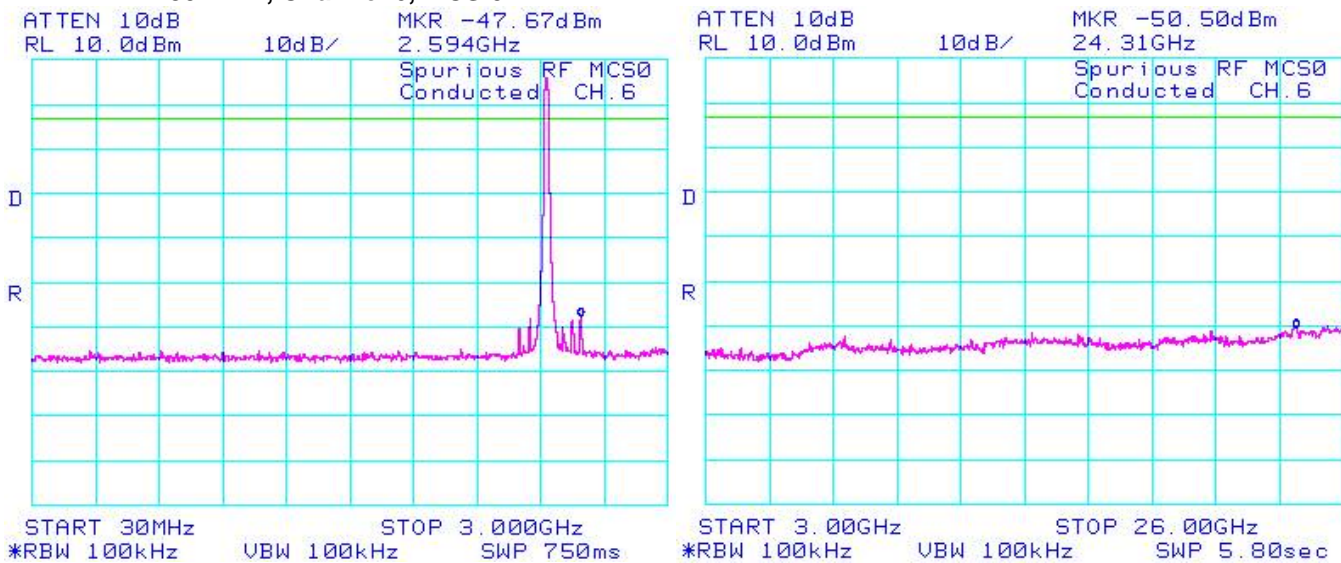
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802.11b/g/n RF Conducted Emission Test Results cont'd

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



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



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

