

EMC Test Report

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



REPORT NO.: RTS-6058-1408-07_rev1

This report supersedes the report RTS-6058-1408-07 dated August 5, 2014


PRODUCT MODEL NO.: RHA111LW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARHA110LW
IC: 2503A- RHA110LW

DATE: August 26, 2014

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



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	EMC Test Report for the BlackBerry® smartphone Model RHA111LW	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Report Revision History:

Rev1:

1. Addition of calibration intervals in section G.
2. Updated referenced test report number in section B and E.

Statement of Performance:

The BlackBerry® smartphone, model RHA111LW, part number CER-59878-001-Rev3-001-02, 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:

Reviewed by:

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Compliance Specialist I

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A. Scope

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

- FCC CFR 47 Part 15, Subpart C, October, 2013
- FCC CFR 47 Part 15, Subpart E, October, 2013
- Industry Canada, RSS-210, Issue 8, December 2010, License-exempt Radio Apparatus
- Industry Canada, RSS-GEN, Issue 3, December 2010, General Requirements and Information for the Certification of Radio Apparatus
- KDB 789033 D02 General UNII Test Procedures
- KDB 905462 D06 802.11 Channel Plans

B. Associated Documents

- 1) RHA111LW-R139-HWD_CER-59878-001-Rev1-001-00
- 2) RHA111LW-R139-HWD_CER-59878-001-Rev2-001-01
- 3) RHA111LW-R139-HWD_CER-59878-001-Rev2-001-02
- 4) RHA111LW-R139-HWD_CER-59878-001-Rev3-001-02
- 5) MultiSourceDeclaration_R139-R140_10.3.0.890_Reg_only
- 6) Test Report RTS-6026-1302-17_rev1

C. Product Identification


Manufactured by BlackBerry Limited whose headquarters is located at:

2200 University Ave. E
Waterloo, Ontario
Canada, N2K 0A7
Phone: 519 888 7465
Fax: 519 888 7884

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

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

The testing was performed from June 24 – August 5 and August 12, 2014.

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SAMPLE	MODEL	CER NUMBER	PIN	SOFTWARE
1	RHA111LW	CER-59878-001-Rev1-001-00	2FFEB281	OS Version: 10.3.0.686 Bundle: 686
2	RHA111LW	CER-59878-001-Rev2-001-01	2FFEC30E	OS Version: 10.3.0.890 Bundle: 890
3	RHA111LW	CER-59878-001-Rev1-001-00	2FFEB2A5	OS Version: 10.3.0.686 Bundle: 686
4	RHA111LW	CER-59878-001-Rev2-001-02	2FFEC30C	OS Version: 10.3.0.890 Bundle: 890
5	RHA111LW	CER-59878-001-Rev1-001-01	2FFEB284	OS Version: 10.3.0.686 Bundle: 686
6	RHA111LW	CER-59878-001-Rev3-001-02	2FFED5C5	OS Version: 10.3.0.890 Bundle: 890

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

Only the characteristics that may have been affected by the changes from RHA111LW Rev1 to Rev2 were re-tested. For more details, please view documents RHA111LW-R139-HWD_CER-59878-001-Rev2-001-01, RHA111LW-R139-HWD_CER-59878-001-Rev2-001-02, and RHA111LW-R139-HWD_CER-59878-001-Rev3-001-02.


To view the differences between software bundles 10.3.0.686 and 10.3.0.890 for RHA111LW, see documents: MultiSourceDeclaration_R139-R140_10.3.0.890_Reg_only.

BlackBerry® smartphone Accessories Tested

- 1) Cobra North America Fixed Blade Charger, part number HDW-47725-001, with an output voltage 5 volts dc, 850mA
- 2) Stereo Wired Headset, part number HDW-49299-005, with a lead length of 1.1 meters
- 3) USB Cable, part number HDW-50071-001, with a lead length of 0.9 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


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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	AC Power Line Conducted Emission	Pass	1
Part 15.209 Part 15.247	RSS-210 RSS-GEN	BT/BLE Radiated Spurious Emissions	Pass	2
Part 15.209 Part 15.247	RSS-210 RSS-GEN	BT/BLE Radiated Band Edge Compliance	Pass	2
Part 15.209 Part 15.247	RSS-210 RSS-GEN	802.11b/g/n Radiated Spurious Emissions	Pass	2
Part 15.209 Part 15.247	RSS-210 RSS-GEN	802.11b/g/n Radiated Band Edge Compliance	Pass	2
Part 15.209 Part 15.407	RSS-210 RSS-GEN	802.11a/n Radiated Spurious Emissions	Pass	3
Part 15.209 Part 15.407	RSS-210 RSS-GEN	802.11a/n Radiated Band Edge Compliance	Pass	3
Part 15.247(a)	RSS-210	BT, 20 dB Bandwidth	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(a)	RSS-210	BT, Carrier Frequency Separation	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(a)	RSS-210	BT, Number of Hopping Frequencies	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(a)	RSS-210	BT, Time of Occupancy (Dwell Time)	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(b)	RSS-210	BT, Maximum Peak Conducted Output Power	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(c)	RSS-210	BT, Band-Edge Compliance of RF Conducted Emissions	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(c)	RSS-210	BT, Spurious RF Conducted Emissions	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(a)	RSS-210	BLE, 6 dB Bandwidth	Pass	See Test Report RTS-6026-1302- 17_rev1
Part 15.247(b)	RSS-210	BLE, Maximum Conducted Output Power	Pass	See Test Report RTS-6026-1302- 17_rev1

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SPECIFICATION		TEST TYPE	Meets Requirements	TEST DATA
FCC CFR 47	IC			APPENDIX
Part 15.247(c)	RSS-210	BLE, Band-Edge	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.247(d)	RSS-210	BLE, Peak Power Spectral Density	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.247(c)	RSS-210	BLE, Spurious RF Conducted Emissions	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.247(a)	RSS-210	802.11b/g/n, 6 dB Bandwidth	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.247(b)	RSS-210	802.11b/g/n, Maximum Conducted Output Power	Pass	4
Part 15.247(c)	RSS-210	802.11b/g/n, Band-Edge	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.247(d)	RSS-210	802.11b/g/n, Peak Power Spectral Density	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.247(c)	RSS-210	802.11b/g/n, Spurious RF Conducted Emissions	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.407	RSS-210	802.11a/n, 6 dB Bandwidth	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.407	RSS-210	802.11a/n, Maximum Conducted Output Power	Pass	5
Part 15.407	RSS-210	802.11a/n, Band-Edge	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.407	RSS-210	802.11a/n, Peak Power Spectral Density	Pass	5
Part 15.407	RSS-210	802.11a/n, Spurious RF Conducted Emissions	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.209 Part 15.225(a)	RSS-210 RSS-GEN	Near Field Communications, Radiated Emissions	Pass	6
Part 15.225(e)	RSS-210	Near Field Communications, Occupied Bandwidth	Pass	See Test Report RTS-6026-1302-17_rev1
Part 15.225(e)	RSS-210	Near Field Communications, Frequency Stability	Pass	See Test Report RTS-6026-1302-17_rev1

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F. Summary of Results

1) AC POWER LINE CONDUCTED EMISSIONS

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

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


The following test configurations were measured:

Test Configuration	Operating Mode(s)	Charger + Accessories
1	NFC TX	Fixed Blade Charger + Stereo Wired Headset + USB Cable 0.90m
2	Bluetooth TX	Fixed Blade Charger + Stereo Wired Headset + USB Cable 0.90m
3	802.11b TX	Fixed Blade Charger + Stereo Wired Headset + USB Cable 0.90m
4	802.11a TX	Fixed Blade Charger + Stereo Wired Headset + USB Cable 0.90m

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart C, Subpart E and IC RSS-210 limits. The sample EUT had a worst case test margin of 10.15 dB below the QP limit at 0.402 MHz with the Fixed Blade Charger in Test Configuration 3.

See APPENDIX 1 for the test data.

Measurement Uncertainty ± 3.2 dB

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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).

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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

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3) 802.11a/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 40.0 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 transmitting on channels 36, 48, 64, 100, 140 and 165 at 6 Mbps for 802.11a mode and at MCS 0 for 802.11n. The system's radiated emission levels were compared with respect to the FCC CFR 47 Part 15 Subpart E, 15.407 and RSS-210/RSS-GEN.


The 802.11a/n harmonics were investigated up to the 10th harmonic. The emissions had a worst case margin of 4.70 dB below the limit at 7093.38 MHz for 802.11a and worst case margin of 1.91 dB below the limit at 7093.39 MHz. See APPENDIX 3 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 802.11a/n as per the requirements of 15.407, 15.209 and RSS-210/ RSS-GEN.

See APPENDIX 3 for the test data

Measurement Uncertainty ±4.2 dB

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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) 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 20.05 dBm (101.16 mW) for channel 6 in 802.11b mode, 19.33 dBm (85.70 mW) for channel 6 in 802.11g mode, and 14.98 dBm (31.48 mW) for channel 6 in 802.11n mode.

See APPENDIX 4 for the test data

5) 802.11a/n RF CONDUCTED EMISSIONS

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

a) Maximum Conducted Output Power


The EUT met the requirements of the maximum conducted output power as per 47 CFR 15.407 and RSS-210. Channels 36, 48, 64, 100, 140 and 165 were measured. The worst case Conducted Output Power level was 14.34 dBm (27.16 mW) for channel 140 in 802.11a mode. The worst case Conducted Output Power level was 14.33 dBm (27.10 mW) for channel 140 in 802.11n mode.

See APPENDIX 5 for the test data

b) Peak Power Spectral Density

The EUT met the requirements of peak power spectral density as per 47 CFR 15.407 and RSS-210. Channels 36, 64, 100, 140 and 165 were measured.

See APPENDIX 5 for the test data.

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6) Near Field Communications (NFC)

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

a) Radiated Emissions

The BlackBerry® smartphone was measured in standalone configuration transmitting at 13.56 MHz. The system’s radiated emission levels were compared with respect to the FCC CFR 47 Part 15 Subpart C, 15.209, 15.225(a) and RSS-210/RSS-GEN.


See APPENDIX 6 for the test data.

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G. Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>	<u>CAL DUE DATE</u> (YY MM DD)	<u>CALIBRATION INTERVAL</u>	<u>USE</u>
EMI Test Receiver	Rohde & Schwarz	ESIB 40	100255	14-12-11	1 Year	Conducted/Radiated Emissions
EMI Test Receiver	Rohde & Schwarz	ESU 40	100162	14-12-08	1 Year	Conducted/Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017301	14-08-13	2 Years	Radiated Emissions
Horn Antenna	CMT	3116	R52734-001	16-03-31	2 Years	Radiated Emissions
Horn Antenna	EMCO	3116	2538	14-10-30	2 Years	Radiated Emissions
Horn Antenna	ETS-Lindgren	3117	2538	15-08-07	2 Years	Radiated Emissions
Active Loop Antenna	EMCO	6507	00032	15-08-21	2 Years	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	14-10-13	1 Year	Radiated Emissions
Preamplifier	Sonoma	310N/11909A	185831	14-10-10	1 Year	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	14-10-13	1 Year	Radiated Emissions
L.I.S.N.	Rohde & Schwarz	ENV216	100060	15-10-08	1 Year	Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0380561	14-10-30	3 Years	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	15-01-23	1 Year	Radiated Emissions
DC Power Supply	HP	6632B	US37472178	14-09-03	1 Year	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0340060	16-09-11	3 Years	RF Conducted Emissions
Environmental Chamber	Test Equity	107	0900246	N/R	N/R	Frequency Stability
Bluetooth Tester	Rohde & Schwarz	CBT	119549	14-11-28	1 Year	RF Conducted Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100368	14-11-28	1 Year	Radiated Emissions
Bluetooth Tester	Rohde & Schwarz	CBT35	100370	14-11-28	1 Year	Radiated Emissions
Power Meter	Agilent	N1911A	MY45100951	15-09-10	1 Year	RF Conducted / Frequency Stability
Power Sensor	Agilent	N1921A	MY45241383	15-09-11	1 Year	RF Conducted / Frequency Stability
Environment Monitor	Omega	iTHX-SD	0380567	14-10-30	3 Years	Radiated Emissions

APPENDIX 1 – AC POWER LINE CONDUCTED EMISSIONS TEST DATA/PLOTS

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AC Powerline Conducted Emission Test Results

The following tests were performed by Kevin Guo

Test Configuration 1

The BlackBerry® smartphone was tested on August 5, 2014


The environmental test conditions were: Temperature: 23.9 °C
Relative Humidity: 38.2 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.389	L1	37.64	10.03	47.67	58.10	48.10	-10.43
0.389	N	36.79	10.04	46.83	58.10	48.10	-11.27
0.411	L1	34.41	9.99	44.41	57.60	47.60	-13.19
0.411	N	33.88	10.01	43.88	57.60	47.60	-13.72
1.388	L1	21.98	9.80	31.79	56.00	46.00	-24.21
1.496	L1	24.70	9.80	34.51	56.00	46.00	-21.50
13.560	L1	27.69	10.07	37.76	60.00	50.00	-22.24
13.560	N	26.95	10.08	37.03	60.00	50.00	-22.97

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

Measurements were done with the quasi-peak detector.

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

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AC Powerline Conducted Emissions Test Graphs

Test Configuration 1

Figure 1-1: L1 lines

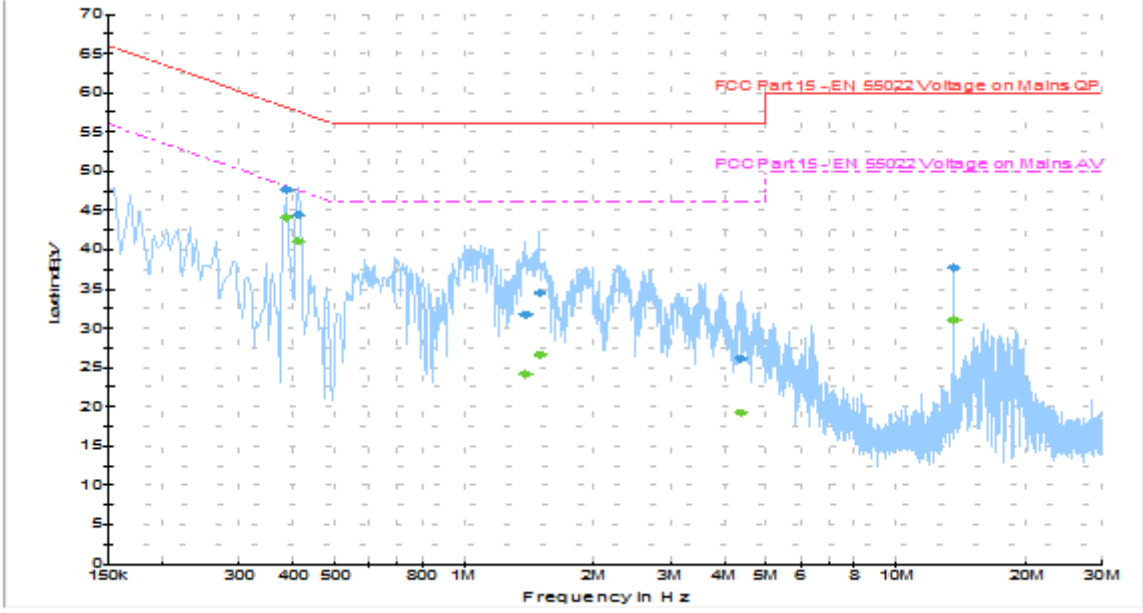
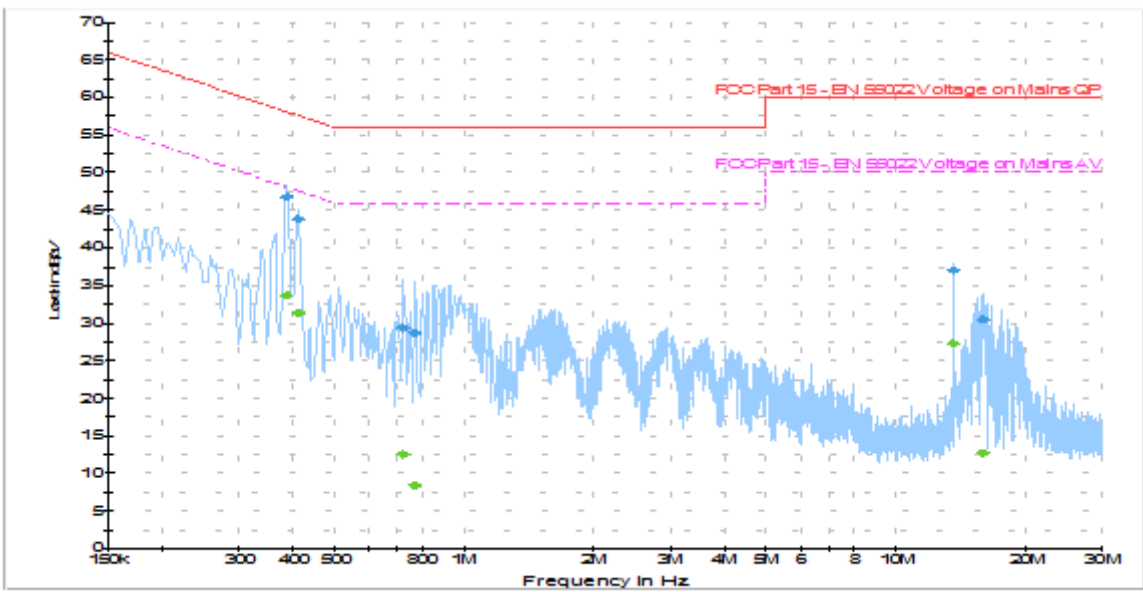



Figure 1-2: N Lines



	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 1	
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AC Powerline Conducted Emission Test Results cont'd

Test Configuration 2

The BlackBerry® smartphone was tested on August 5, 2014

The environmental test conditions were: Temperature: 23.9 °C
Relative Humidity: 38.2 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.402	L1	31.60	10.01	41.61	57.80	47.80	-16.19
0.402	N	35.42	10.02	45.44	57.80	47.80	-12.36
0.425	L1	32.11	9.97	42.09	57.40	47.40	-15.31
0.425	N	30.22	9.98	40.20	57.40	47.40	-17.20
2.139	L1	23.12	9.83	32.95	56.00	46.00	-23.05

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.


	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 1	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Figure 1-3: L1 lines

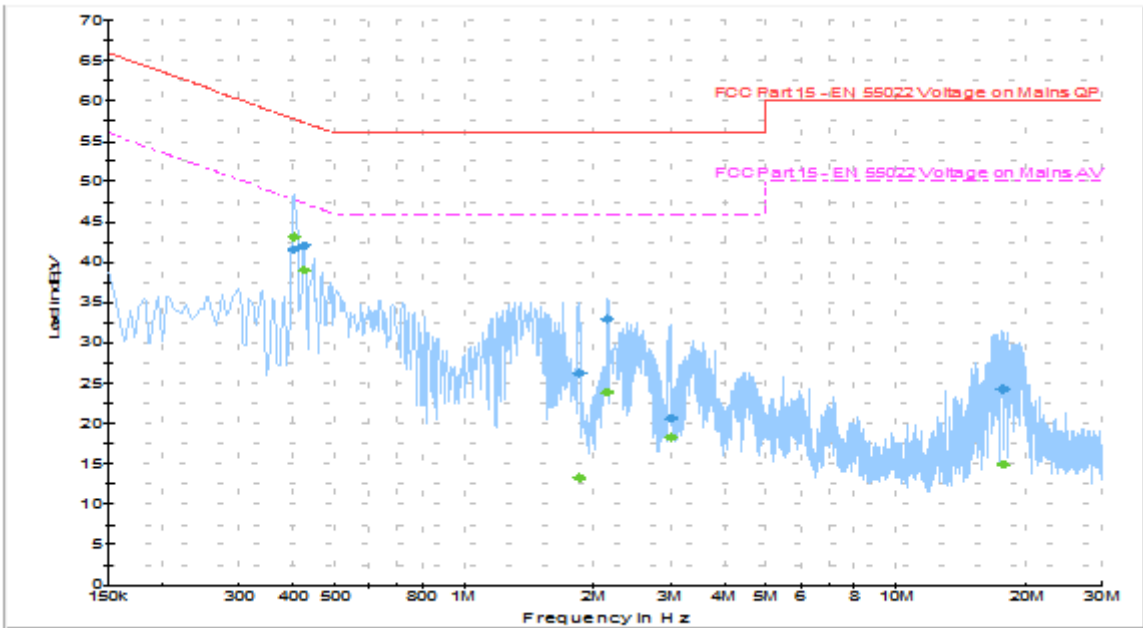
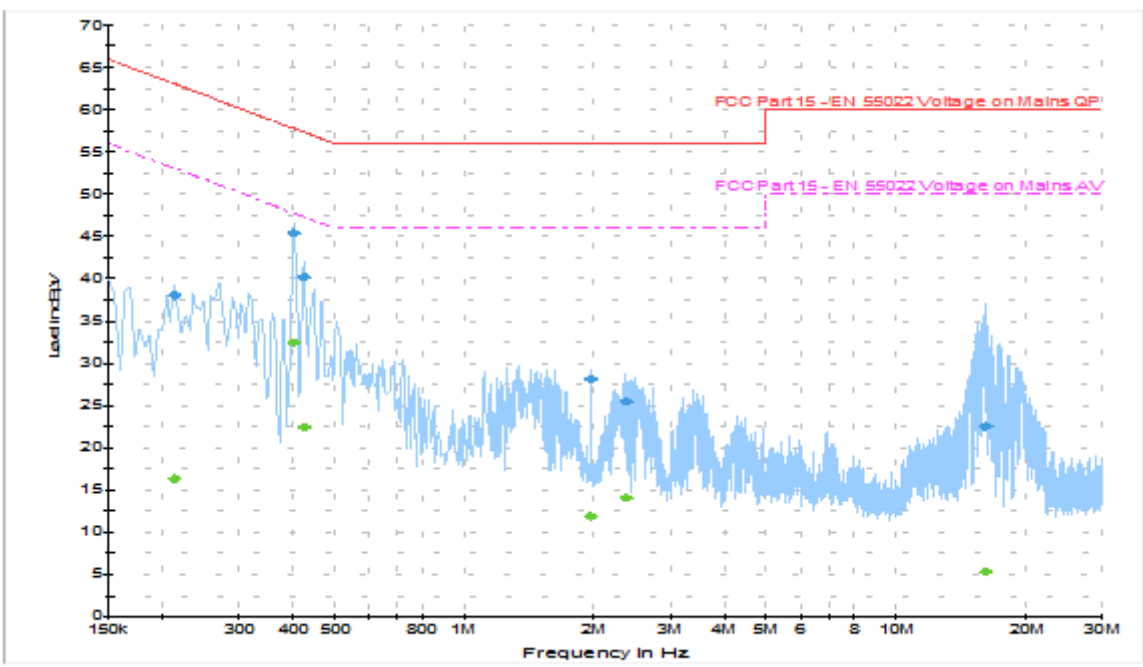



Figure 1-4: N Lines



	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 1	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

AC Powerline Conducted Emissions Test Results cont'd

Test Configuration 3

The BlackBerry® smartphone was tested on August 5, 2014


The environmental test conditions were: Temperature: 23.9 °C
Relative Humidity: 38.2 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.276	N	25.66	10.34	36.01	60.90	50.90	-24.90
0.402	L1	37.65	10.01	47.65	57.80	47.80	-10.15
0.402	N	35.38	10.02	45.39	57.80	47.80	-12.41
0.425	L1	32.11	9.97	42.09	57.40	47.40	-15.32
0.798	N	23.30	9.82	33.12	56.00	46.00	-22.88
2.198	L1	22.31	9.83	32.14	56.00	46.00	-23.86

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

Measurements were done with the quasi-peak detectors

See figure 1-5 and 1-6 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 1	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

AC Powerline Conducted Emissions Test Graphs

Test Configuration 3

Figure 1-5: L1 Lines

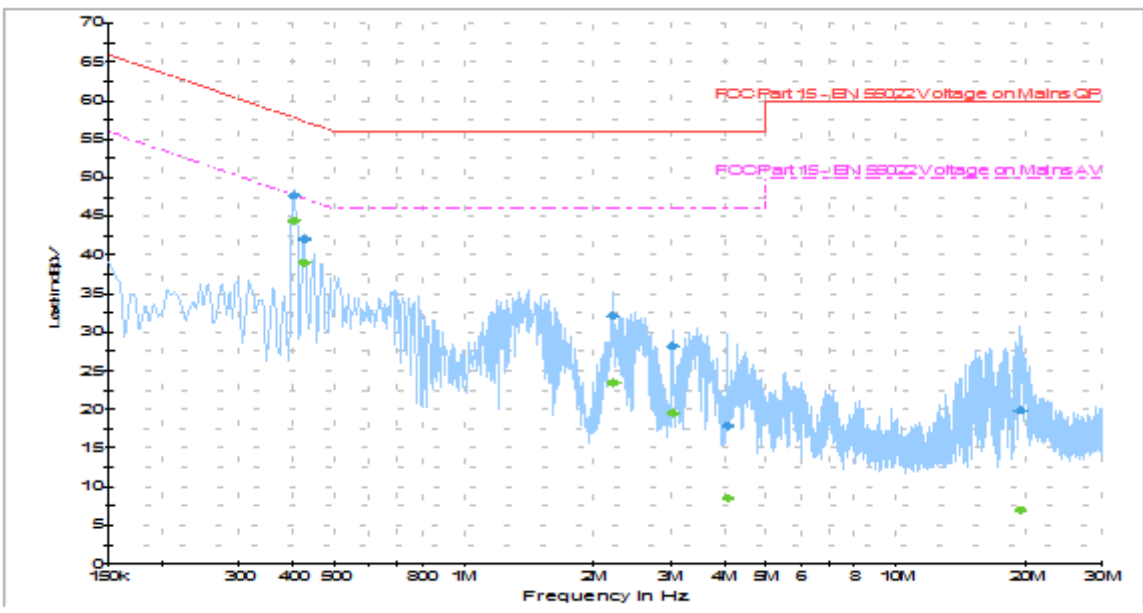
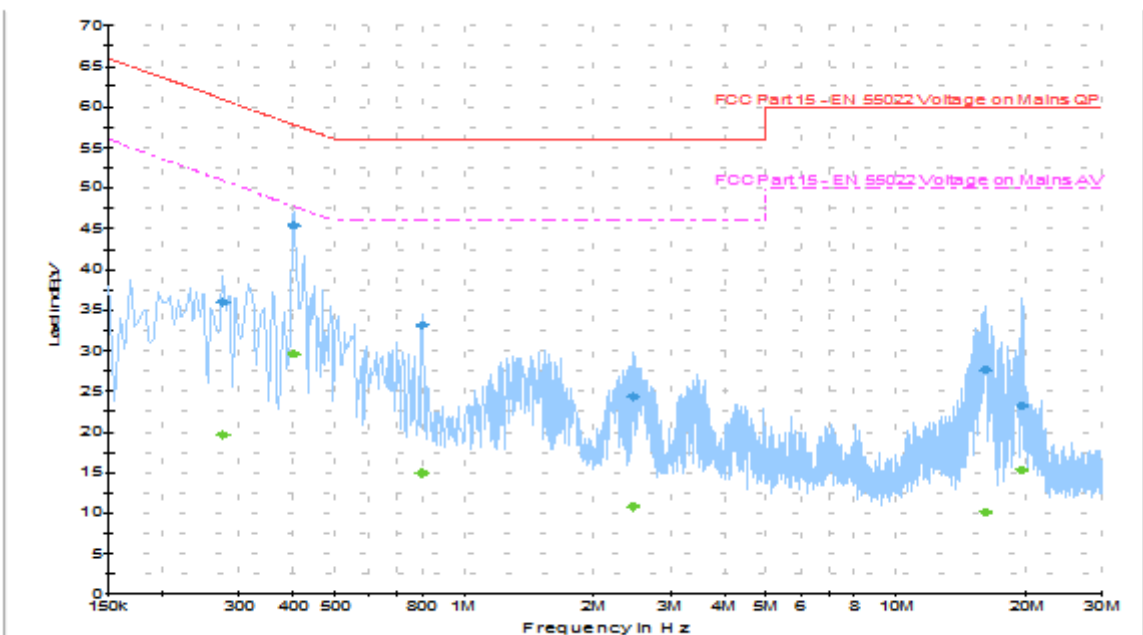



Figure 1-6: N Lines



	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 1	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

AC Powerline Conducted Emission Test Results cont'd

Test Configuration 4

The BlackBerry® smartphone was tested on August 5, 2014


The environmental test conditions were: Temperature: 23.9 °C
Relative Humidity: 38.2 %

Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)
0.402	L1	31.77	10.01	41.78	57.80	47.80	-16.02
0.402	N	35.29	10.02	45.30	57.80	47.80	-12.50
0.425	L1	32.14	9.97	42.12	57.40	47.40	-15.29
0.425	N	27.53	9.98	37.51	57.40	47.40	-19.89
1.550	L1	23.98	9.80	33.79	56.00	46.00	-22.21
2.351	L1	22.93	9.84	32.78	56.00	46.00	-23.22

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

Measurements were done with the quasi-peak detectors.

See figure 1-7 and figure 1-8 for the measurement plot of the L1 and N lines of AC power line conducted emissions.

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 1	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

AC Powerline Conducted Emissions Test Graphs

Test Configuration 4

Figure 1-7: L1 lines

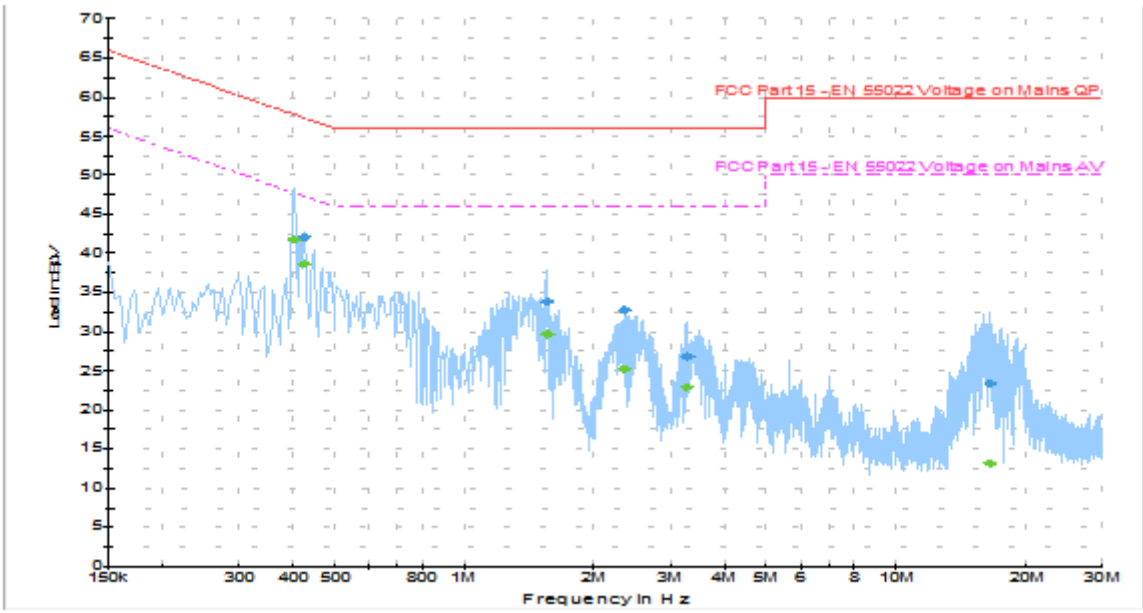
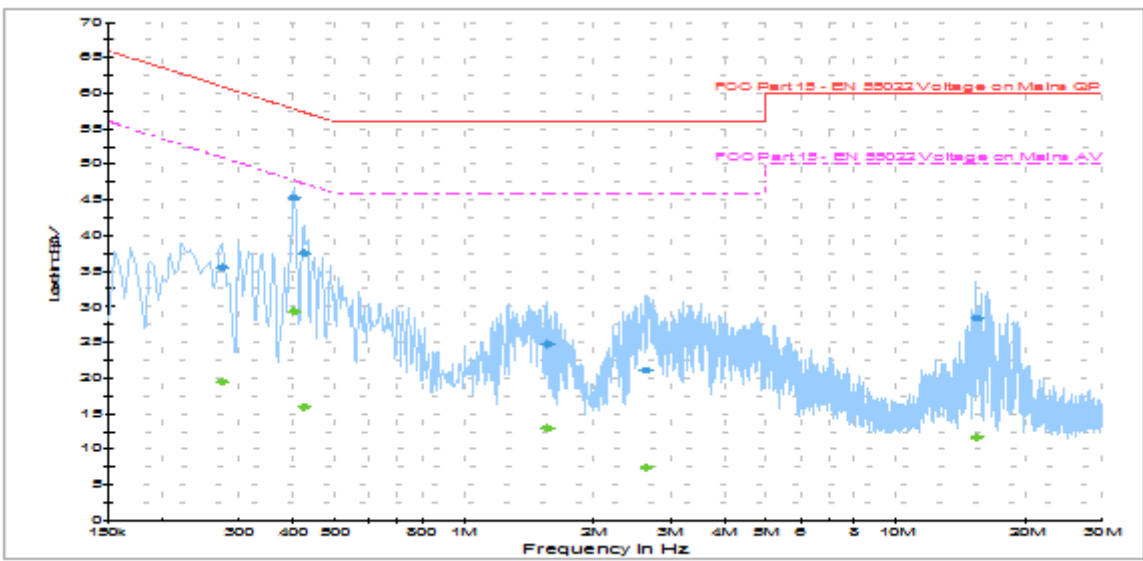



Figure 1-8: N Lines



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

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Radiated Emissions Test Results
Bluetooth Band

Date of Test: June 24, 2014
Measurements were performed by Rex Zhang.


The environmental test conditions were: Temperature: 25.1°C
Relative Humidity: 48.6 %

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

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

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

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

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Date of Test: July 18 and 25, 2014
Measurements were performed by Masud Attayi.


The environmental test conditions were: Temperature: 23.2 – 24.8°C
Relative Humidity: 33.9 – 44.5%

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

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

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

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

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Date of test: July 18, 2014


Measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 24.1 °C
Relative Humidity: 38.1 %

The BlackBerry® smartphone was in standalone, Vertical 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	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	95.18	53.63	41.55	74.00	-32.45
0	2402	Horn	H	PK	1 MHz	95.11	51.69	43.42	74.00	-30.58
0	2402	Horn	V	AVE.	10 Hz	88.19	53.63	34.56	54.00	-19.44
0	2402	Horn	H	AVE.	10 Hz	88.11	51.69	36.42	54.00	-17.58
High Channel, Packet Type DH5										
78	2480	Horn	V	PK	1 MHz	96.51	54.24	42.27	74.00	-31.73
78	2480	Horn	H	PK	1 MHz	94.04	51.00	43.04	74.00	-30.96
78	2480	Horn	V	AVE.	10 Hz	89.41	54.24	35.17	54.00	-18.83
78	2480	Horn	H	AVE.	10 Hz	86.96	51.00	35.96	54.00	-18.04
Low Channel, Packet Type 2-DH5										
0	2402	Horn	V	PK	1 MHz	94.13	51.03	43.10	74.00	-30.9
0	2402	Horn	H	PK	1 MHz	94.12	51.11	43.01	74.00	-30.99
0	2402	Horn	V	AVE.	10 Hz	84.56	51.03	33.53	54.00	-20.47
0	2402	Horn	H	AVE.	10 Hz	84.52	51.11	33.41	54.00	-20.59
High Channel, Packet Type 2-DH5										
78	2480	Horn	V	PK	1 MHz	95.10	50.97	44.13	74.00	-29.87
78	2480	Horn	H	PK	1 MHz	92.62	48.30	44.32	74.00	-29.68
78	2480	Horn	V	AVE.	10 Hz	85.48	50.97	34.51	54.00	-19.49
78	2480	Horn	H	AVE.	10 Hz	83.01	48.30	34.71	54.00	-19.29

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Channel	Freq. (MHz)	Rx Antenna		Detector	VBW	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
Low Channel, Packet Type 3-DH5										
0	2402	Horn	V	PK	1 MHz	94.54	53.84	40.70	74.00	-33.30
0	2402	Horn	H	PK	1 MHz	94.38	50.03	44.35	74.00	-29.65
0	2402	Horn	V	AVE.	10 Hz	84.51	53.84	30.67	54.00	-23.33
0	2402	Horn	H	AVE.	10 Hz	84.52	50.03	34.49	54.00	-19.51
High Channel, Packet Type 3-DH5										
78	2480	Horn	V	PK	1 MHz	95.49	51.21	44.28	74.00	-29.72
78	2480	Horn	H	PK	1 MHz	92.98	47.88	45.10	74.00	-28.90
78	2480	Horn	V	AVE.	10 Hz	85.36	51.21	34.15	54.00	-19.85
78	2480	Horn	H	AVE.	10 Hz	82.93	47.88	35.05	54.00	-18.95

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

Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

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

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

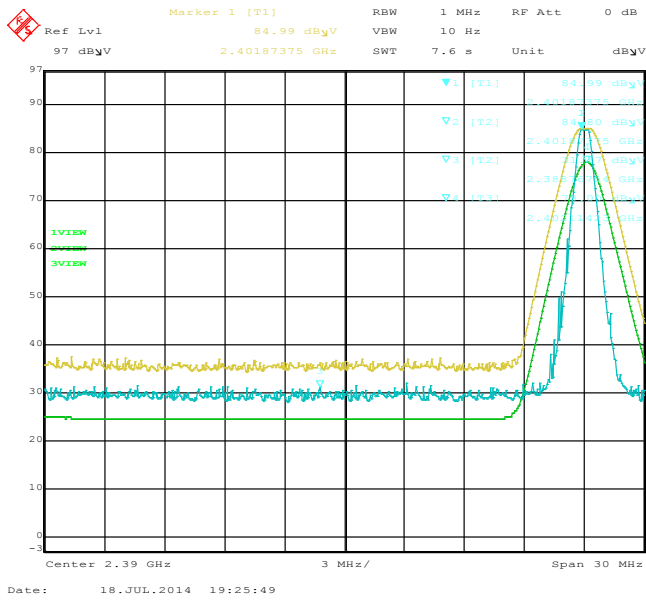


Figure 2-2: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRs,
 DH5, Channel 0, Pol: H, Detector: PK

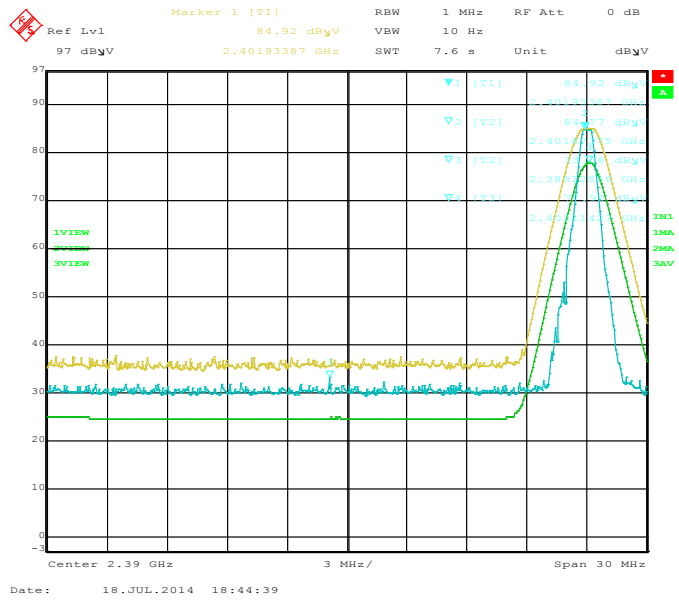


Figure 2-3: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRs,
 DH5, Channel 78, Pol: V, Detector: PK

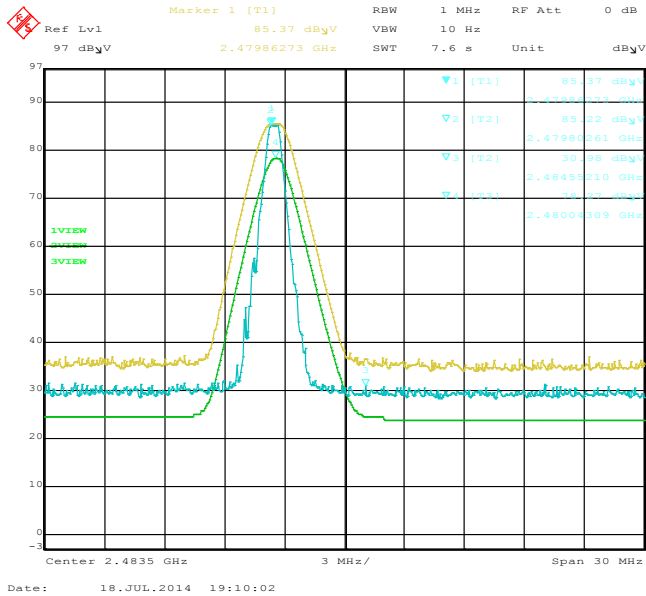
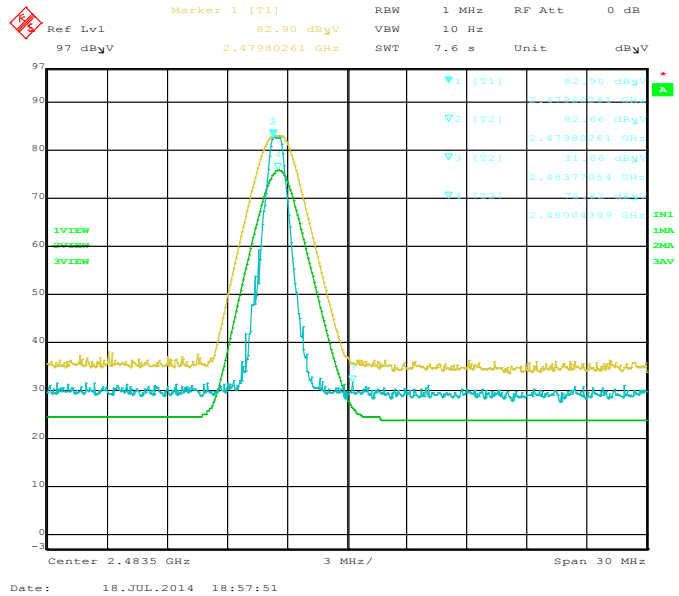


Figure 2-4: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRs,
 DH5, Channel 78, Pol: H, Detector: PK



Test Report No.:
RTS-6058-1408-07_rev1

Dates of Test:
June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

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

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

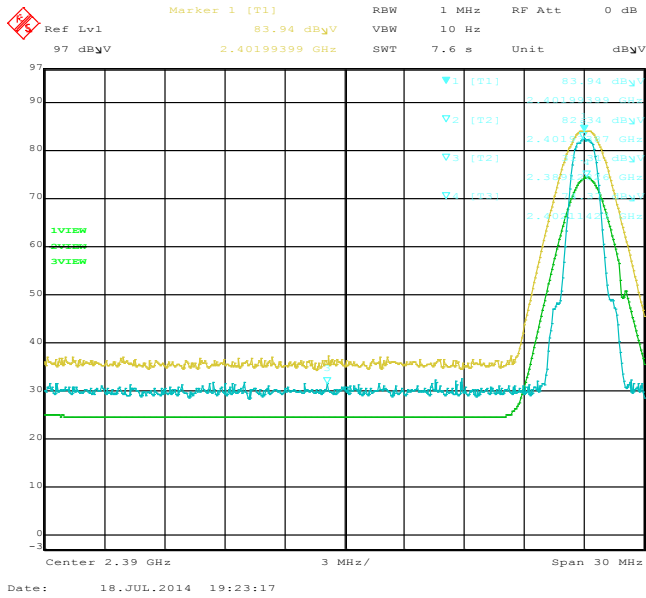


Figure 2-6: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
2-DH5, Channel 0, Pol: H, Detector: PK

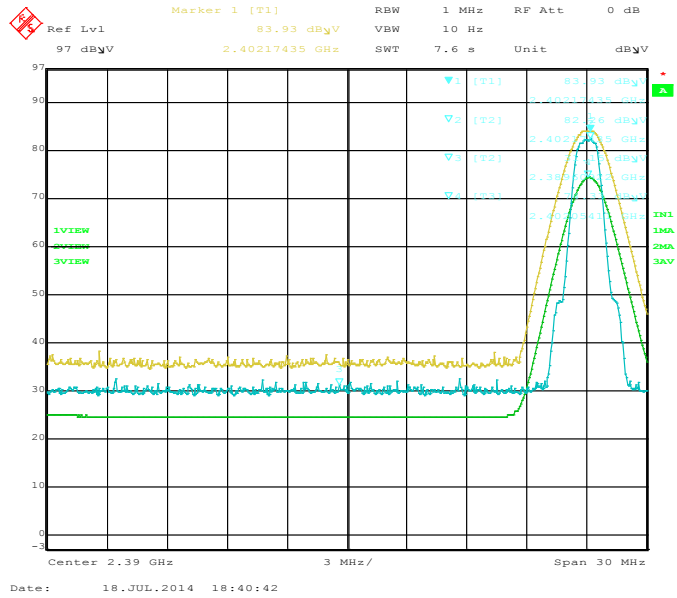


Figure 2-7: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
2-DH5, Channel 78, Pol: V, Detector: PK

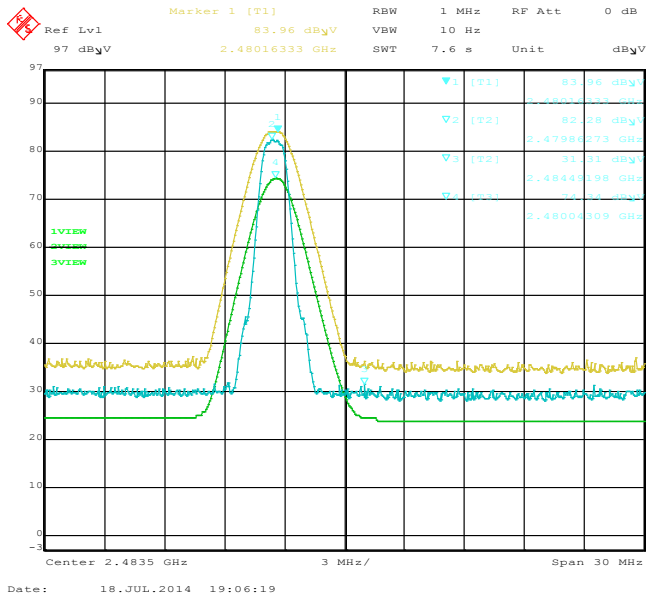
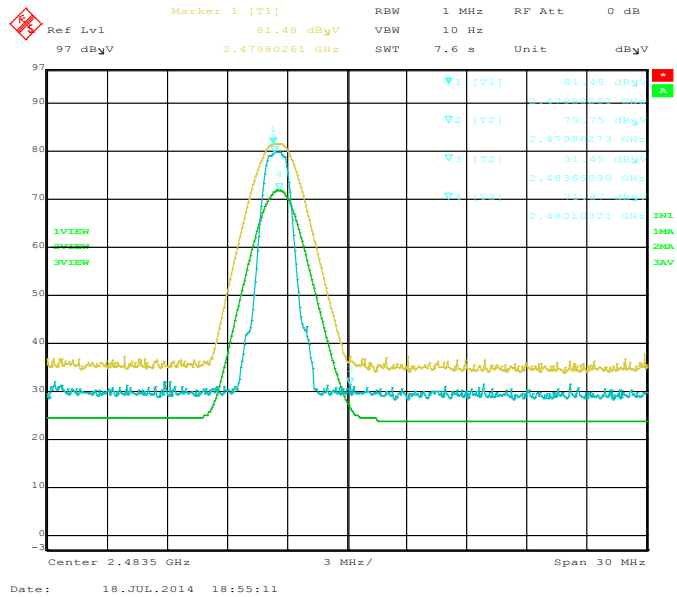


Figure 2-8: Band-Edge Compliance of RF Rad. Emissions.
Bluetooth, Single freq., Static PBRs,
2-DH5, Channel 78, Pol: H, Detector: PK



Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

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

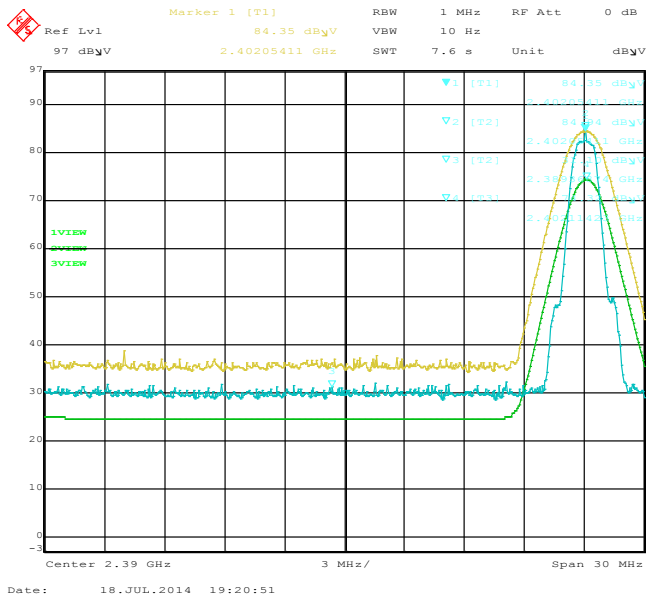


Figure 2-10: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 3-DH5, Channel 0, Pol: H, Detector: PK

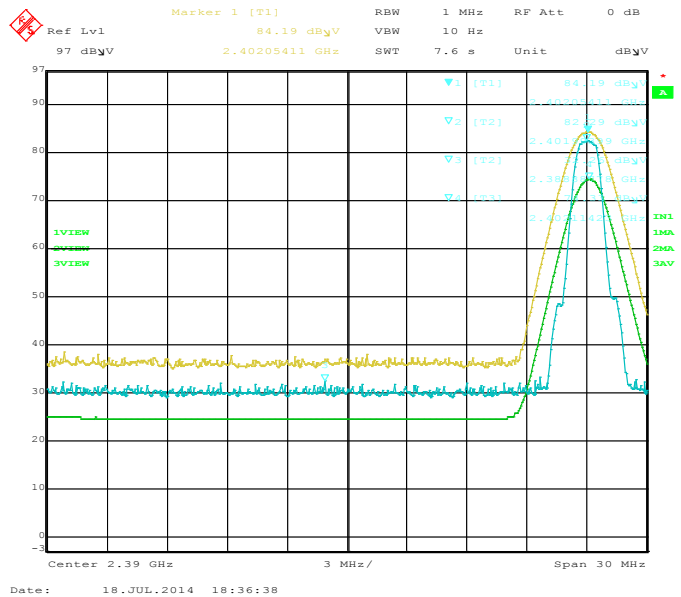


Figure 2-11: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 3-DH5, Channel 78, Pol: V, Detector: PK

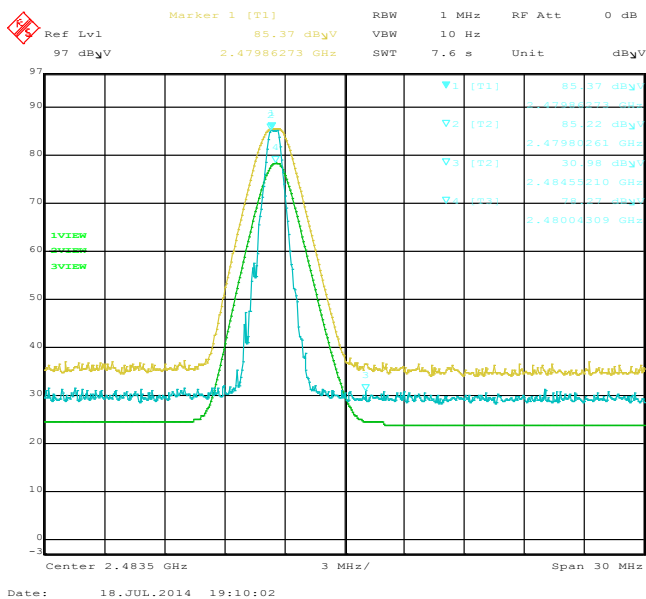
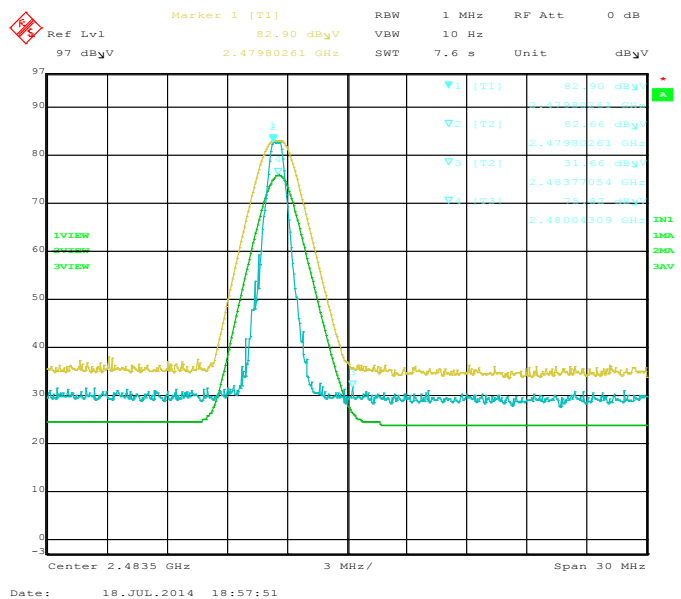



Figure 2-12: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth, Single freq., Static PBRS,
 3-DH5, Channel 78, Pol: H, Detector: PK



	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Radiated Emissions Test Results cont'd
Bluetooth Low Energy Band

Date of Test: June 24, 2014
Measurements were performed by Rex Zhang.

The environmental test conditions were: Temperature: 25.1 °C
Relative Humidity: 48.6 %

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

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

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

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

Date of Test: July 18 and 25, 2014
Measurements were performed by Kevin Guo.


The environmental test conditions were: Temperature: 23.2 – 24.8°C
Relative Humidity: 33.9 – 44.5%

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

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

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

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

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Date of test: July 18, 2014

Measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 24.1° C
Relative Humidity: 38.1 %

The BlackBerry® smartphone was in Vertical Up position.

The test distance was 3.0 meters.

Channel	Freq. (MHz)	Rx Antenna		Detector	VBW	Corrected Reading (dBuV/m)	Delta Marker (dB)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.							
Low Channel, LE										
0	2402	Horn	V	PK	1 MHz	93.74	52.39	41.35	74.00	-32.65
0	2402	Horn	H	PK	1 MHz	92.52	51.06	41.46	74.00	-32.54
0	2402	Horn	V	AVE.	10 Hz	88.96	52.39	36.57	54.00	-17.43
0	2402	Horn	H	AVE.	10 Hz	87.79	51.06	36.73	54.00	-17.27
High Channel, LE										
39	2480	Horn	V	PK	1 MHz	95.12	53.07	42.05	74.00	-31.95
39	2480	Horn	H	PK	1 MHz	92.57	50.36	42.21	74.00	-31.79
39	2480	Horn	V	AVE.	10 Hz	90.32	53.07	37.25	54.00	-16.75
39	2480	Horn	H	AVE.	10 Hz	87.75	50.36	37.39	54.00	-16.61

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

Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

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

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

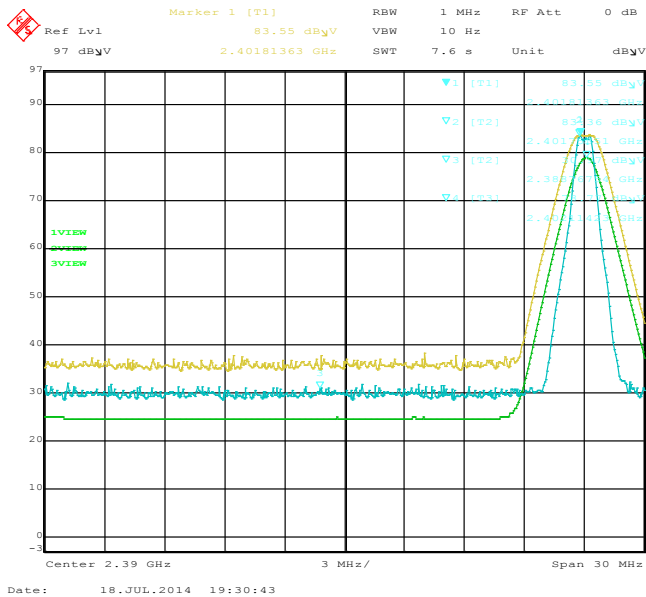


Figure 2-14: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 0, Pol: H, Detector: PK

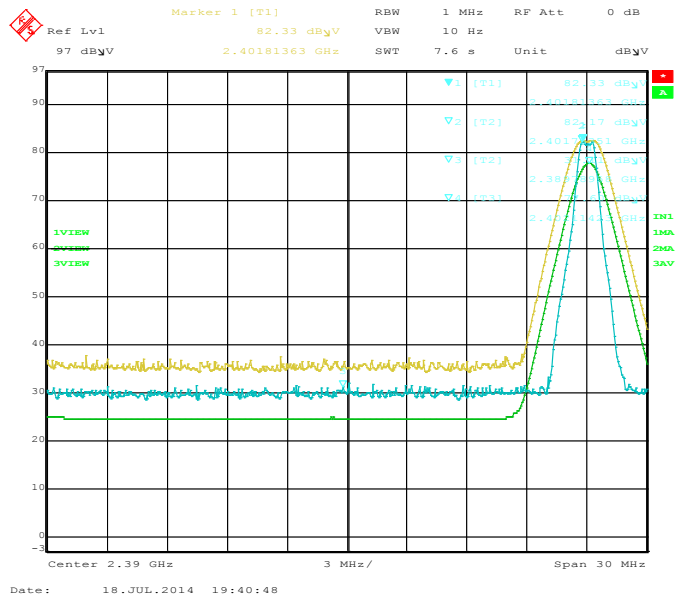


Figure 2-15: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 39, Pol: V, Detector: PK

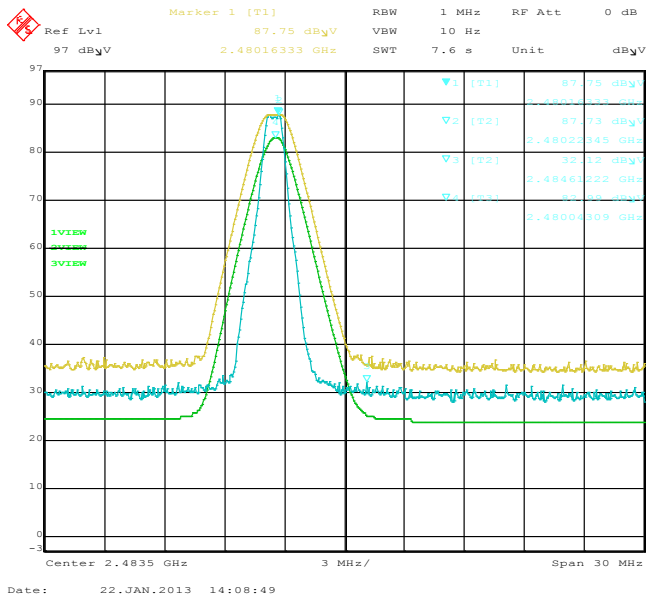
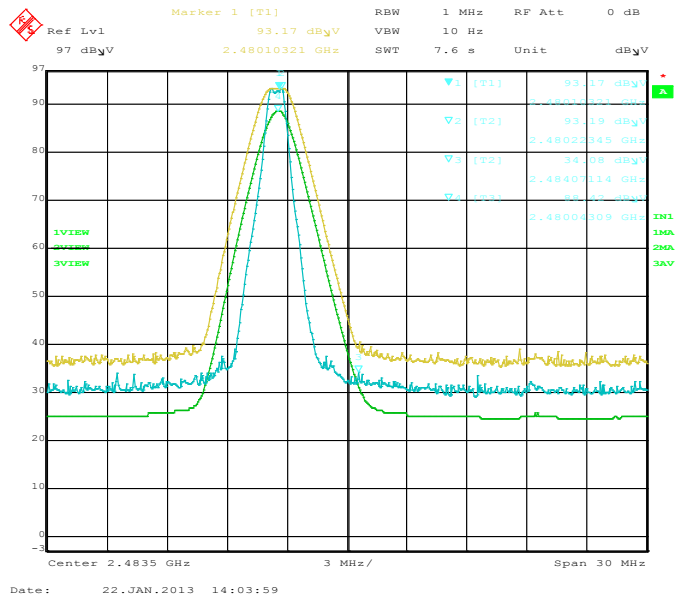



Figure 2-16: Band-Edge Compliance of RF Rad. Emissions.
 Bluetooth Low Energy, Single freq.,
 LE, Channel 39, Pol: H, Detector: PK



	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Date of Test: July 21, 2014
Measurements performed by Savtej Sandhu.


The environmental test conditions were: Temperature: 24.3 °C
Relative Humidity: 46.1%

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

The BlackBerry® smartphone was in USB Vertical 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 other emission levels were at least 25 dB below the limit.

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Date of Test: July 18 - 25, 2014
Measurements performed by Masud Attayi.


The environmental test conditions were: Temperature: 22.4 – 24.5 °C
Relative Humidity: 33.2 -44.5 %

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

The BlackBerry® smartphone was in horizontal 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.

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Date of Tests: July 22, 2014
Measurements performed by Rex Zhang.

The environmental test conditions were: Temperature: 25.2 °C
Relative Humidity: 47.7 %

802.11b Band

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

The test distance was 3 meters.

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
1.0	2412.00	Horn	V	PK	1 MHz	54.40	54.40	74.00	-19.60
1.0	2412.00	Horn	H	PK	1 MHz	56.99	56.99	74.00	-17.01
1.0	2412.00	Horn	V	AV	10 Hz	42.25	42.25	54.00	-11.75
1.0	2412.00	Horn	H	AV	10 Hz	46.27	46.27	54.00	-7.73

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
11.0	2462.00	Horn	V	PK	1 MHz	53.40	53.40	74.00	-20.60
11.0	2462.00	Horn	H	PK	1 MHz	56.44	56.44	74.00	-17.56
11.0	2462.00	Horn	V	AV	10 Hz	41.82	41.82	54.00	-12.18
11.0	2462.00	Horn	H	AV	10 Hz	45.64	45.64	54.00	-8.36



EMC Test Report for the BlackBerry® smartphone Model RHA111LW
APPENDIX 2

Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW
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802.11g Band

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

The test distance was 3 meters.

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
1.0	2412.00	Horn	V	PK	1 MHz	66.49	66.49	74.00	-7.51
1.0	2412.00	Horn	H	PK	1 MHz	69.85	69.85	74.00	-4.15
1.0	2412.00	Horn	V	AV	10 Hz	46.43	46.43	54.00	-7.57
1.0	2412.00	Horn	H	AV	10 Hz	49.58	49.58	54.00	-4.42

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
11.0	2462.00	Horn	V	PK	1 MHz	58.09	58.09	74.00	-15.91
11.0	2462.00	Horn	H	PK	1 MHz	60.78	60.78	74.00	-13.22
11.0	2462.00	Horn	V	AV	10 Hz	40.53	40.53	54.00	-13.47
11.0	2462.00	Horn	H	AV	10 Hz	44.17	44.17	54.00	-9.83

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 2	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11n Band

The measurements were performed on the BlackBerry® smartphone in standalone, Vertical 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		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
1.0	2412.00	Horn	V	PK	1 MHz	66.85	66.85	74.00	-7.15
1.0	2412.00	Horn	H	PK	1 MHz	69.42	69.42	74.00	-4.58
1.0	2412.00	Horn	V	AV	10 Hz	46.27	46.27	54.00	-7.73
1.0	2412.00	Horn	H	AV	10 Hz	50.51	50.51	54.00	-3.49

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
11.0	2462.00	Horn	V	PK	1 MHz	55.69	55.69	74.00	-18.31
11.0	2462.00	Horn	H	PK	1 MHz	62.16	62.16	74.00	-11.84
11.0	2462.00	Horn	V	AV	10 Hz	40.53	40.53	54.00	-13.47
11.0	2462.00	Horn	H	AV	10 Hz	43.94	43.94	54.00	-10.06

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.

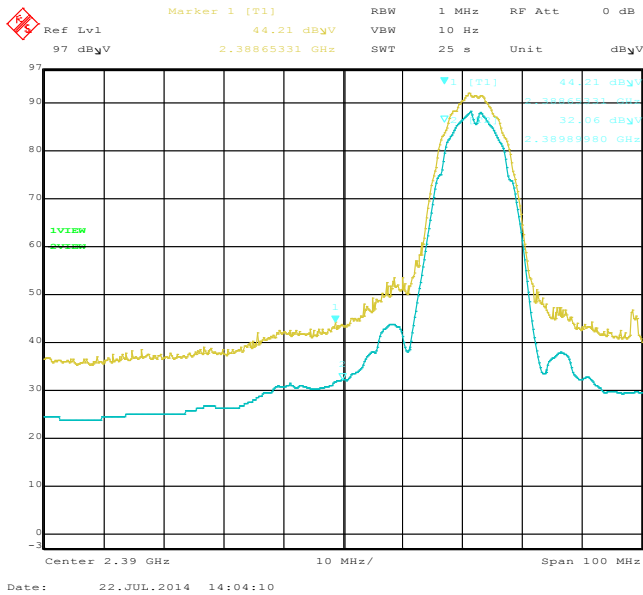
Test Report No.:
 RTS-6058-1408-07_rev1

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 June 24 – August 5 and August 12, 2014

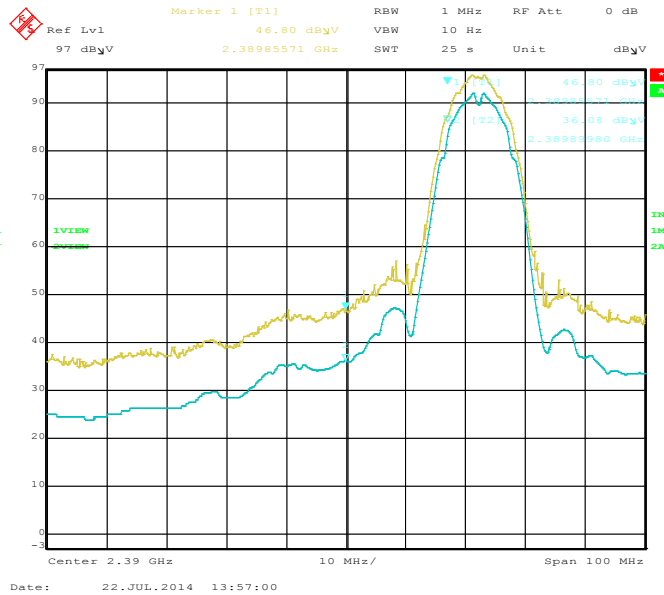
FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

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

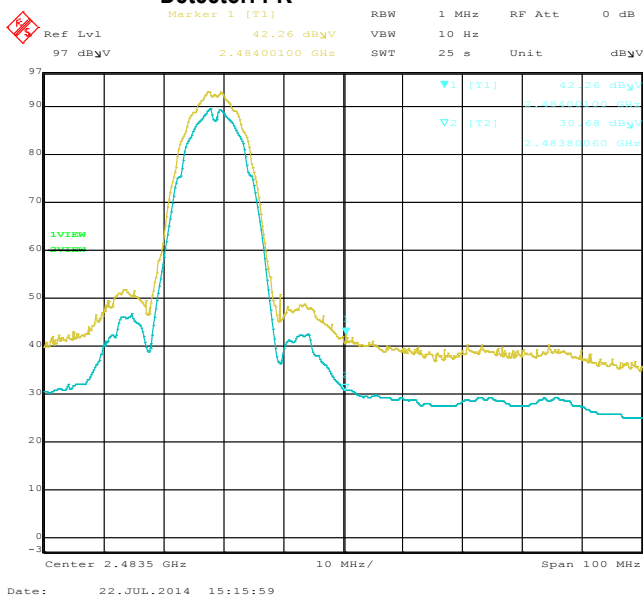
**Figure 2-17: Band-Edge Compliance of RF Radiated Emission
 802.11b, Channel 1, 2412 MHz, Max Pol: V,
 Detector: PK**



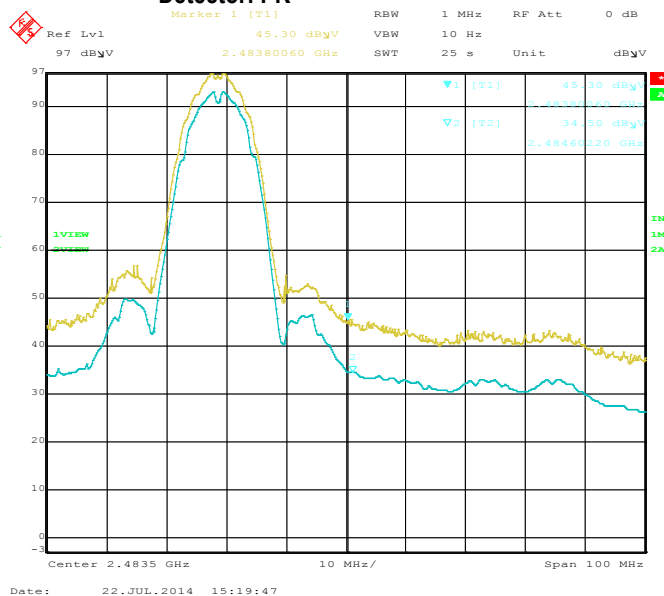
**Figure 2-18: Band-Edge Compliance of RF Radiated Emission
 802.11b, Channel 1, 2412 MHz, Max Pol: H,
 Detector: PK**



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



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

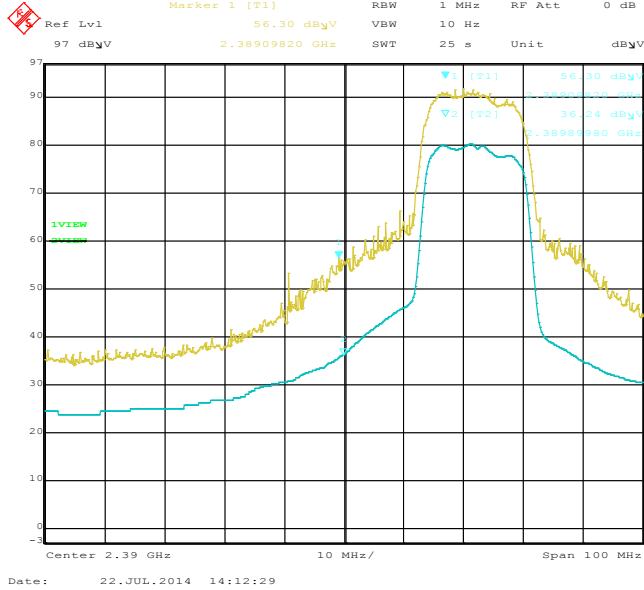


Test Report No.:
 RTS-6058-1408-07_rev1

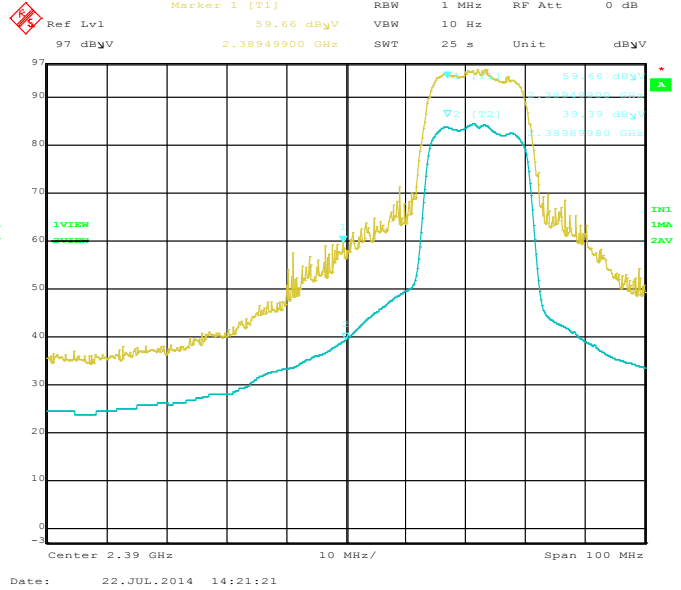
Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

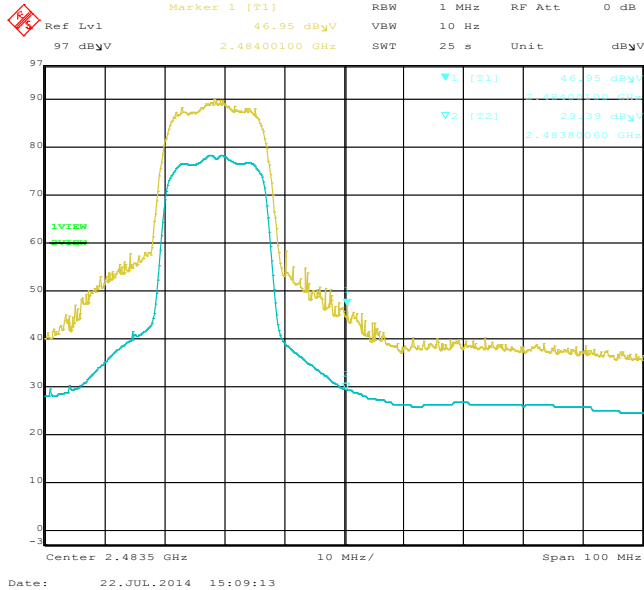
**Figure 2-21: Band-Edge Compliance of RF Radiated Emission
 802.11g, Channel 1, 2412 MHz, Max Pol: V,
 Detector: PK**



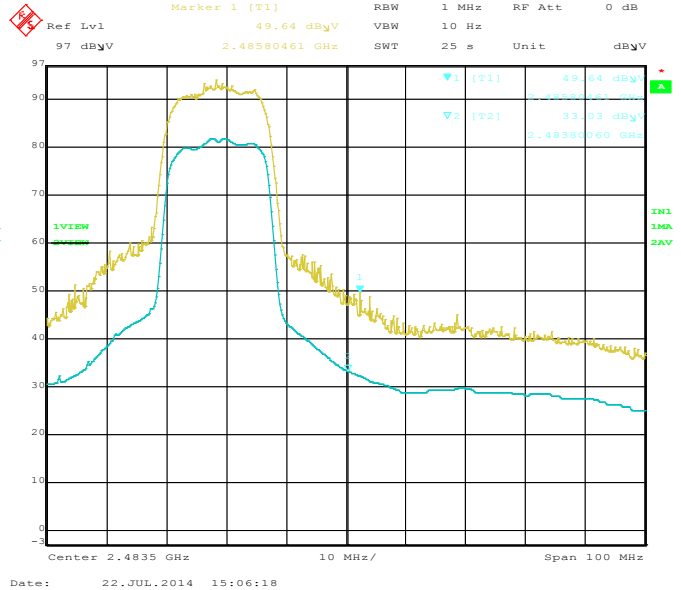
**Figure 2-22: Band-Edge Compliance of RF Radiated Emission
 802.11g, Channel 1, 2412 MHz, Max Pol: H,
 Detector: PK**



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



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

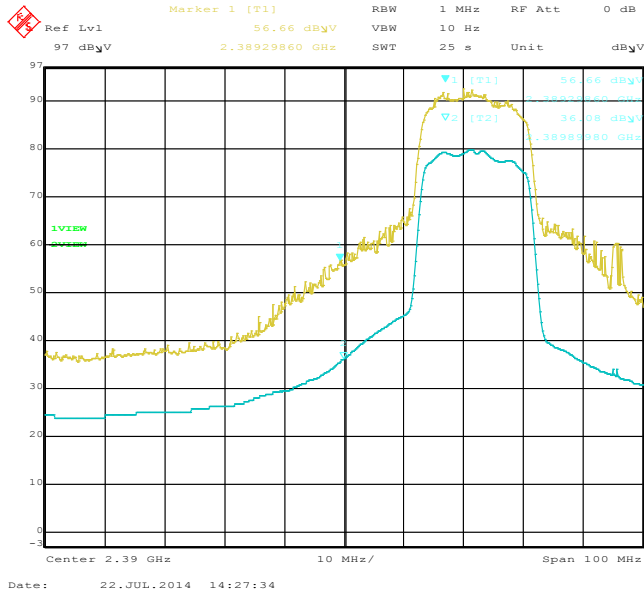


Test Report No.:
 RTS-6058-1408-07_rev1

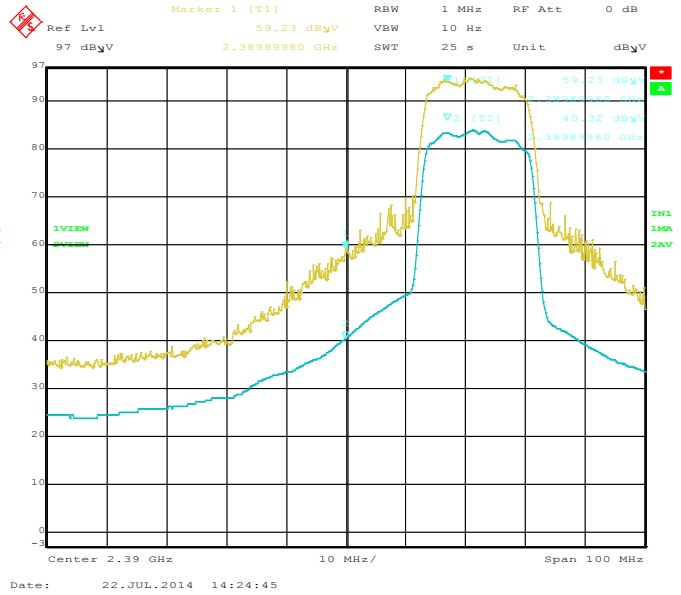
Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

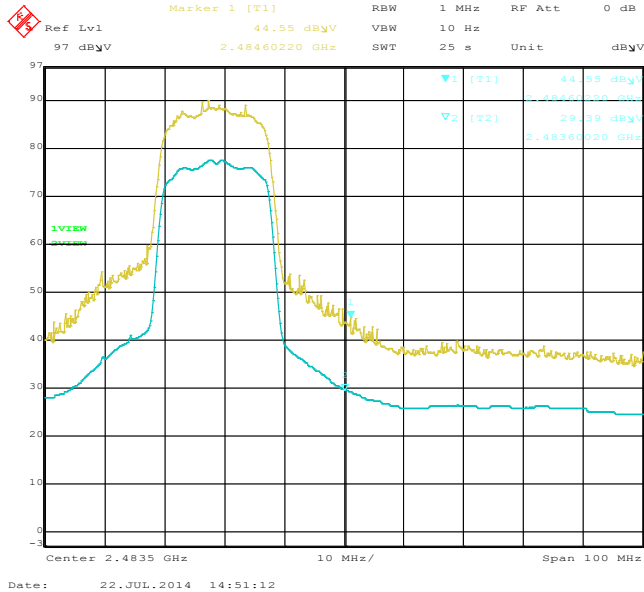
**Figure 2-25: Band-Edge Compliance of RF Radiated Emission
 802.11n, Channel 1, 2412 MHz, Max Pol: V,
 Detector: PK**



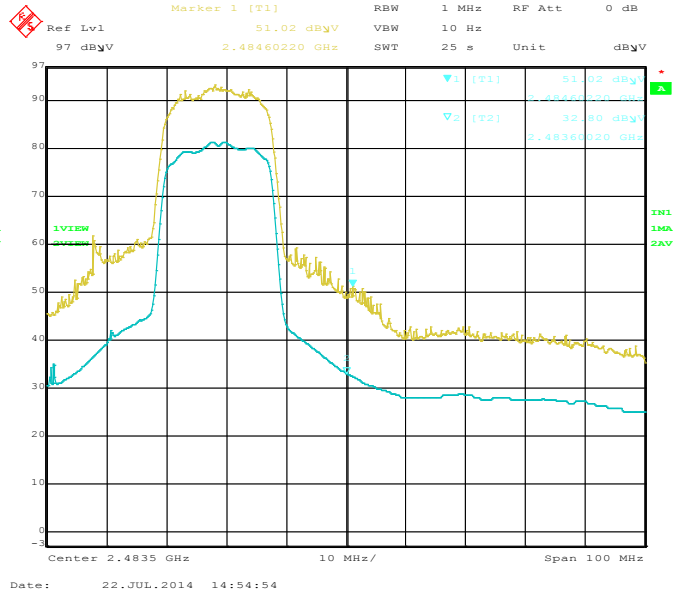
**Figure 2-26: Band-Edge Compliance of RF Radiated Emission
 802.11n, Channel 1, 2412 MHz, Max Pol: H,
 Detector: PK**




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



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



APPENDIX 3 – 802.11a/n RADIATED EMISSIONS TEST DATA

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 3	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Radiated Emissions Test Results
802.11a Band

Date of Test: July 21, 2014

Measurements were performed by Savtej Sandhu

The environmental test conditions were: Temperature: 24.3 °C
Relative Humidity: 46.1 %

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

The BlackBerry® smartphone was in Vertical Down position.

The frequency sweep measurements were performed in 802.11a TX mode at 6 Mbps on channels 36, 48, 64, 100, 140 and 165.

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

802.11a Band

Date of Test: July 21 - August 5 and August 12, 2014

Measurements were performed by Kevin Guo.

The environmental test conditions were: Temperature: 23.4 – 25.2 °C
Relative Humidity: 38.2 – 44.5 %


The test distance was 3.0 meters with a EUT height of 0.8 meters, and sweep frequency of 1GHz to 40GHz.

The BlackBerry® smartphone was in Volume Key Up position.

The frequency sweep measurements were performed in 802.11a TX mode at 6 Mbps on channels 36, 48, 64, 100, 140 and 165.

Frequency (MHz)	Channel	Antenna		Test Angle (Deg.)	Detector (PK or AV)	Measured Level (dBuV)	Correction Factor for preamp/antenna/ cables/ filter (dB/m)	Corrected Signal Level (reading+corr) (dBuV/m)	Limit @ 3.0 m (dBuV/m)	Test Margin (dB)
		Pol. (V/H)	Height (metres)							
7093.384	64	H	2.85	271	AV	32.65	16.65	49.30	54.00	-4.70
7333.392	100	H	2.65	173	AV	31.37	17.81	49.18	54.00	-4.82

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

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 3	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Radiated Emissions Test Results cont'd
802.11n Band

Date of Test: July 21, 2014

Measurements were performed by Savtej Sandhu

The environmental test conditions were: Temperature: 24.3 °C
Relative Humidity: 46.1 %

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

The BlackBerry® smartphone was in Vertical Down position.

The frequency sweep measurements were performed in 802.11n TX mode at MCS 0 on channels 36, 64 and 165.

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

802.11n Band

Date of Test: July 21 - August 5 and August 12, 2014

Measurements were performed by Kevin Guo.

The environmental test conditions were: Temperature: 23.4 – 25.2 °C
Relative Humidity: 38.2 – 44.5 %


The test distance was 3.0 meters with a EUT height of 0.8 meters, and sweep frequency of 1GHz to 40GHz.

The BlackBerry® smartphone was in Volume Key Up.

The frequency sweep measurements were performed in 802.11n TX mode at MCS 0 on channels 36, 48, 64, 100, 140 and 165.

Frequency (MHz)	Channel	Antenna		Test Angle (Deg.)	Detector (PK or AV)	Measured Level (dBuV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Corrected Signal Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
		Pol. (V/H)	Height (metres)							
7093.392	64	H	1.36	105	AV	35.44	16.65	52.09	54.00	-1.91
7333.464	100	H	1.05	110	AV	33.80	17.81	51.61	54.00	-2.39

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

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 3	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11a Band-Edge Compliance of RF Radiated Emissions

Date of Tests: July 22, 2014
Measurements performed by Rex Zhang.

The environmental test conditions were: Temperature: 25.2 °C
Relative Humidity: 47.7 %

The measurements were performed on BlackBerry® smartphone in standalone, Vertical Down configuration on channels 36, 64, 100, 140 for 802.11a mode at 6 Mbps.


The test distance was performed at a distance of 3 meters.

Centre at Band-Edge: 5150 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/ m)	Diff. To Limit (dB)
		Type	POL.						
36.0	5180.00	Horn	V	PK	1 MHz	62.67	62.67	74.00	-11.33
36.0	5180.00	Horn	H	PK	1 MHz	62.32	62.32	74.00	-11.68
36.0	5180.00	Horn	V	AV	10 Hz	49.38	49.38	54.00	-4.62
36.0	5180.00	Horn	H	AV	10 Hz	48.30	48.30	54.00	-5.70

Centre at Band-Edge: 5350 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/ m)	Diff. To Limit (dB)
		Type	POL.						
64.0	5320.00	Horn	V	PK	1 MHz	64.47	64.47	74.00	-9.53
64.0	5320.00	Horn	H	PK	1 MHz	61.67	61.67	74.00	-12.33
64.0	5320.00	Horn	V	AV	10 Hz	50.47	50.47	54.00	-3.53
64.0	5320.00	Horn	H	AV	10 Hz	48.29	48.29	54.00	-5.71

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 3	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11a Band-Edge Compliance of RF Radiated Emissions cont'd


Centre at Band-Edge: 5470 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
100.0	5500.00	Horn	V	PK	1 MHz	64.29	64.29	74.00	-9.71
100.0	5500.00	Horn	H	PK	1 MHz	63.32	63.32	74.00	-10.68
100.0	5500.00	Horn	V	AV	10 Hz	51.06	51.06	54.00	-2.94
100.0	5500.00	Horn	H	AV	10 Hz	49.38	49.38	54.00	-4.62

Centre at Band-Edge: 5725 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
140.0	5700.00	Horn	V	PK	1 MHz	67.71	67.71	68.20	-0.49
140.0	5700.00	Horn	H	PK	1 MHz	66.19	66.19	68.20	-2.01

See figures 3-1 to 3-8 for the plots of the 802.11a band-edge compliance.

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 3	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11n Band-Edge Compliance of RF Radiated Emissions

Date of Tests: July 22, 2014
Measurements performed by Rex Zhang.

The environmental test conditions were: Temperature: 25.2 °C
Relative Humidity: 47.7 %

The measurements were performed on BlackBerry® smartphone in standalone, Vertical Down configuration on channels 36, 64, 100 and 140 for 802.11n mode at MCS 0.


The test distance was performed at a distance of 3 meters.

Centre at Band-Edge: 5150 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
36.0	5180.00	Horn	V	PK	1 MHz	63.06	63.06	74.00	-10.94
36.0	5180.00	Horn	H	PK	1 MHz	61.94	61.94	74.00	-12.06
36.0	5180.00	Horn	V	AV	10 Hz	49.38	49.38	54.00	-4.62
36.0	5180.00	Horn	H	AV	10 Hz	48.86	48.86	54.00	-5.14

Centre at Band-Edge: 5350 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
64.0	5320.00	Horn	V	PK	1 MHz	63.19	63.19	74.00	-10.81
64.0	5320.00	Horn	H	PK	1 MHz	61.40	61.40	74.00	-12.60
64.0	5320.00	Horn	V	AV	10 Hz	49.97	49.97	54.00	-4.03
64.0	5320.00	Horn	H	AV	10 Hz	48.89	48.89	54.00	-5.11

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 3	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

Centre at Band-Edge: 5470 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Corrected Band edge (dBuV/m)	Limit (dBuV/ m)	Diff. To Limit (dB)
		Type	POL.						
100.0	5500.00	Horn	V	PK	1 MHz	64.63	64.63	74.00	-9.37
100.0	5500.00	Horn	H	PK	1 MHz	63.08	63.08	74.00	-10.92
100.0	5500.00	Horn	V	AV	10 Hz	51.06	51.06	54.00	-2.94
100.0	5500.00	Horn	H	AV	10 Hz	49.98	49.98	54.00	-4.02

Centre at Band-Edge: 5725 MHz

Channel	Freq. (MHz)	Rx Antenna		Detector (MHz)	VBW For Peak (dBuV/m)	Peak Corrected Reading (dBuV/m)	Correcte d Band edge (dBuV/m)	Limit (dBuV/m)	Diff. To Limit (dB)
		Type	POL.						
140.0	5700.00	Horn	V	PK	1 MHz	64.04	64.04	68.20	-4.16
140.0	5700.00	Horn	H	PK	1 MHz	63.48	63.48	68.20	-4.72

See figures 3-9 to 3-16 for the plots of the 802.11n band-edge compliance.

Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

802.11a Band-Edge Compliance of RF Radiated Emissions cont'd

Figure 3-1: Band-Edge Compliance of RF Radiated Emission 802.11a, Ch. 36, 5180 MHz, Centre of Band-Edge: 5150 MHz Pol: V, Detector: PK

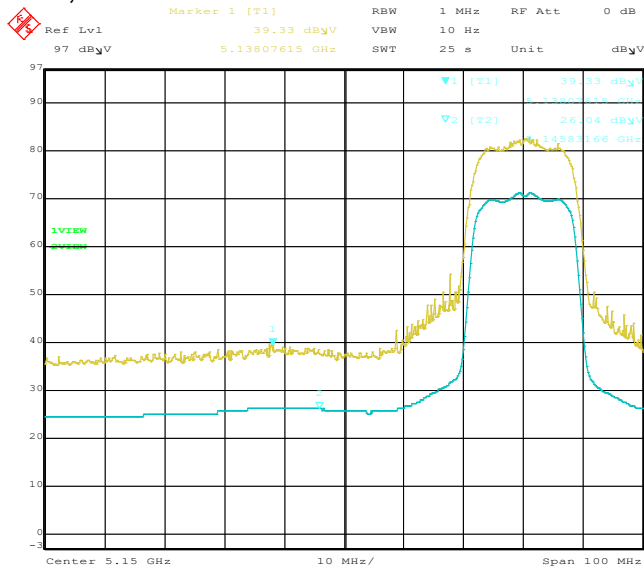


Figure 3-2: Band-Edge Compliance of RF Radiated Emission 802.11a, Ch. 36, 5180 MHz, Centre of Band-Edge: 5150 MHz Pol: H, Detector: PK

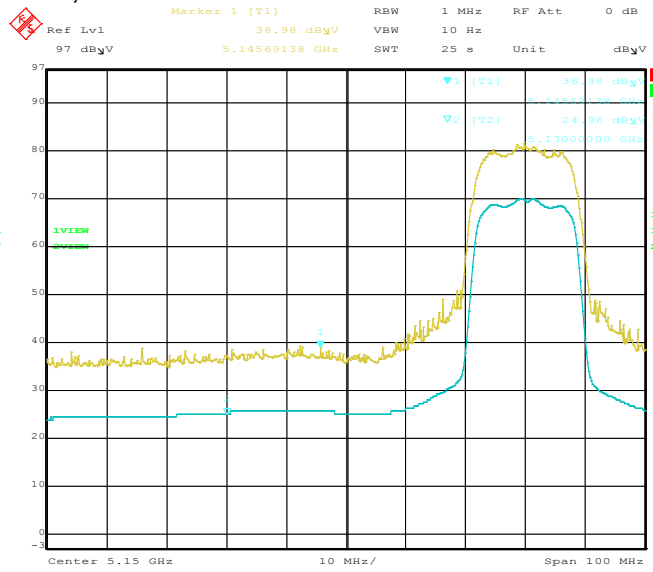


Figure 3-3: Band-Edge Compliance of RF Radiated Emission 802.11a, Ch. 64, 5320 MHz, Centre of Band-Edge: 5350 MHz Pol: V, Detector: PK

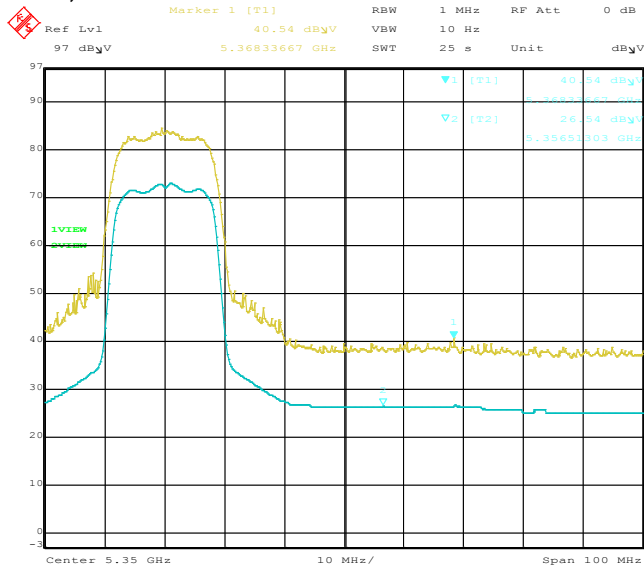
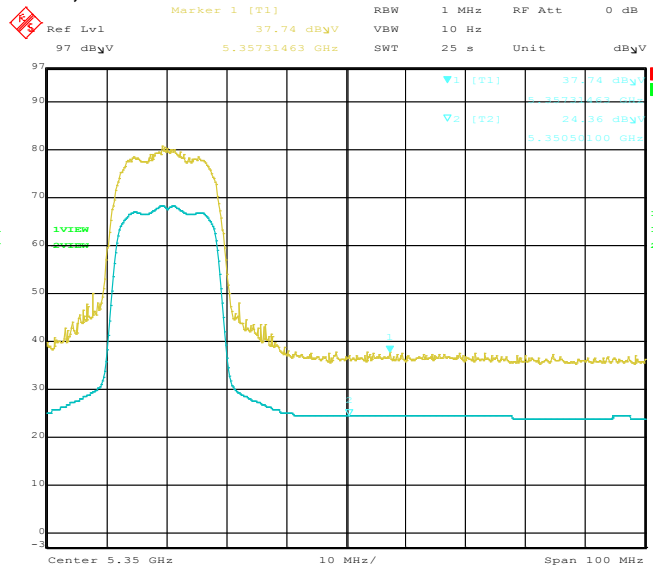


Figure 3-4: Band-Edge Compliance of RF Radiated Emission 802.11a, Ch. 64, 5320 MHz, Centre of Band-Edge: 5350 MHz Pol: H, Detector: PK



Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

802.11a Band-Edge Compliance of RF Radiated Emissions cont'd

Figure 3-5: Band-Edge Compliance of RF Radiated Emission 802.11a, Ch. 100, 5500 MHz, Centre of Band-Edge: 5460 MHz Pol: V, Detector: PK

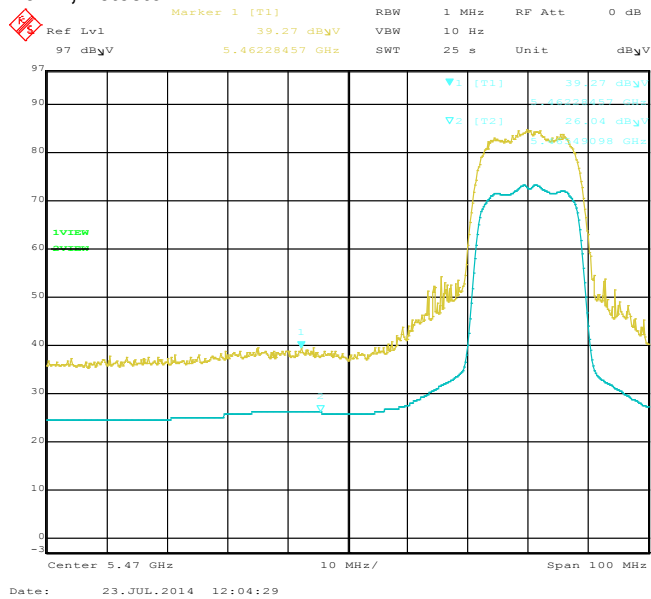


Figure 3-6: Band-Edge Compliance of RF Radiated Emission. 802.11a, Ch. 100, 5500 MHz, Centre of Band-Edge: 5460 MHz Pol: H, Detector: PK

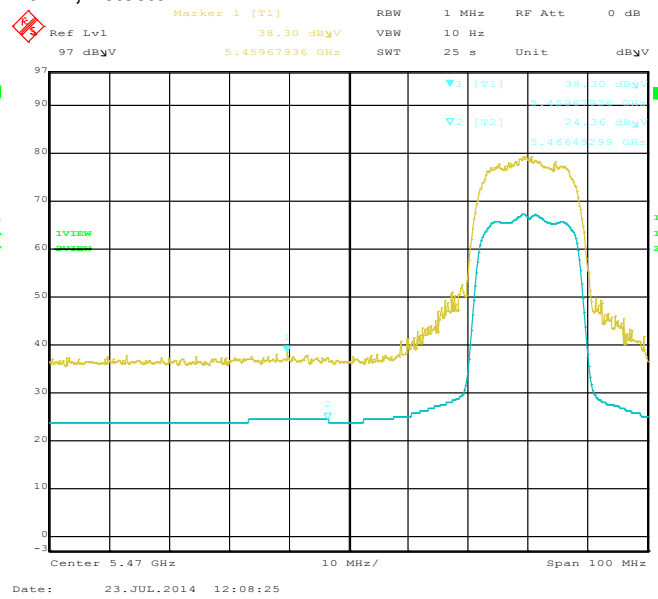


Figure 3-7: Band-Edge Compliance of RF Radiated Emission. 802.11a, Ch. 140, 5700 MHz, Centre of Band-Edge: 5725 MHz Pol: V, Detector: PK

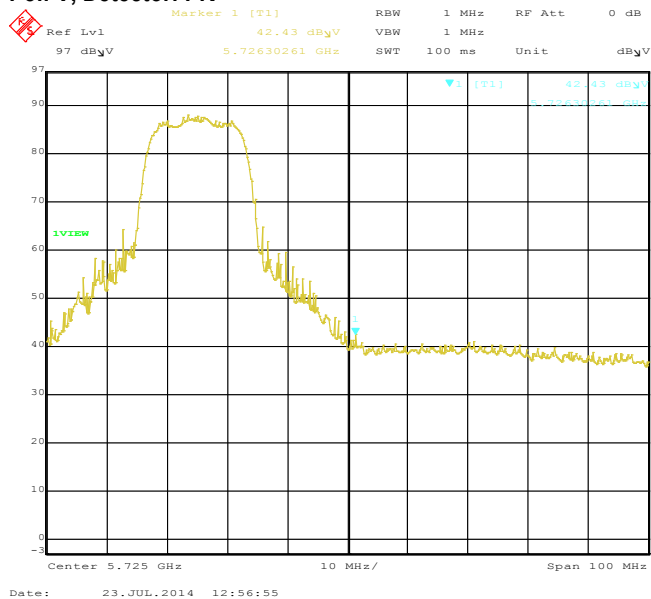
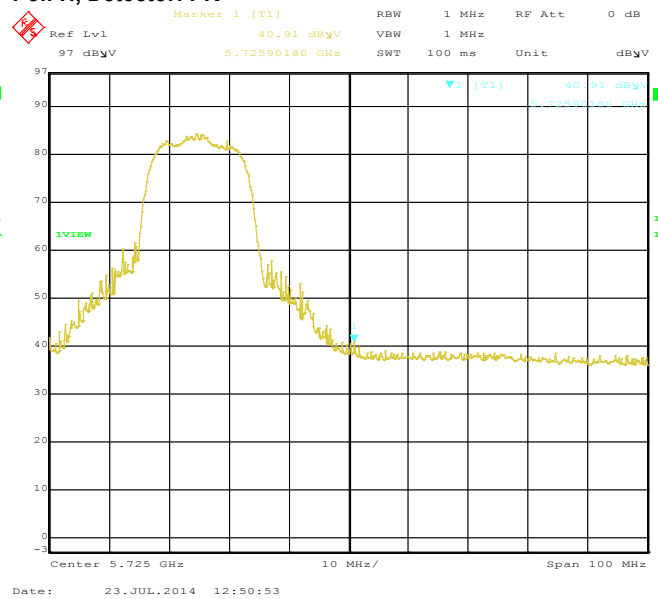


Figure 3-8: Band-Edge Compliance of RF Radiated Emission. 802.11a, Ch. 140, 5700 MHz, Centre of Band-Edge: 5725 MHz Pol: H, Detector: PK



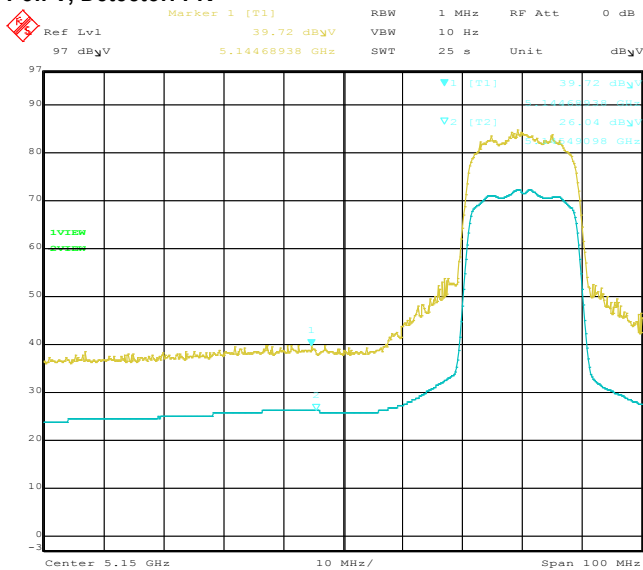
Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

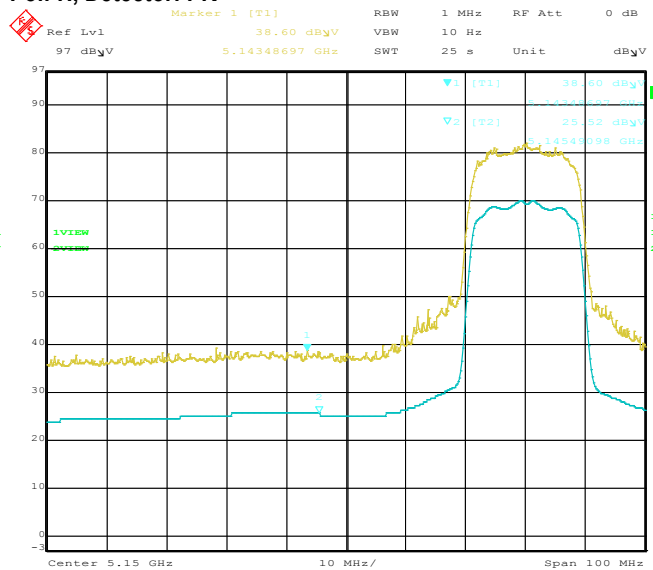
802.11n Band-Edge Compliance of RF Radiated Emissions

Figure 3-9: Band-Edge Compliance of RF Radiated Emission 802.11n, Ch. 36, 5180 MHz, Centre of Band-Edge: 5150 MHz Pol: V, Detector: PK



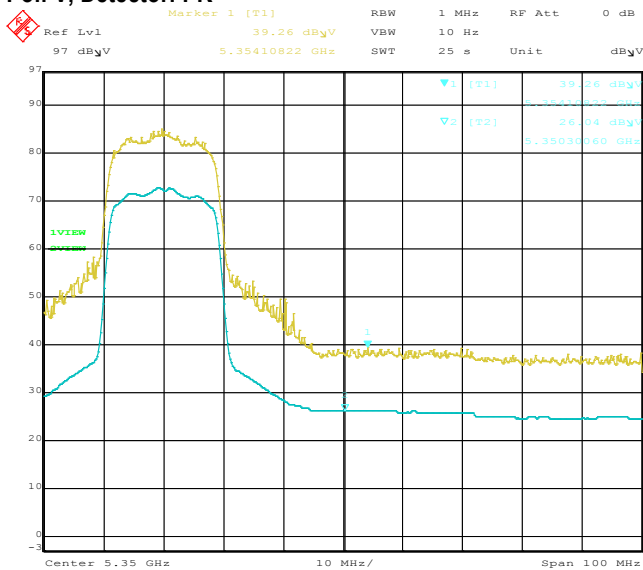
Date: 23.JUL.2014 11:18:39

Figure 3-10: Band-Edge Compliance of RF Radiated Emission 802.11n, Ch. 36, 5180 MHz, Centre of Band-Edge: 5150 MHz Pol: H, Detector: PK



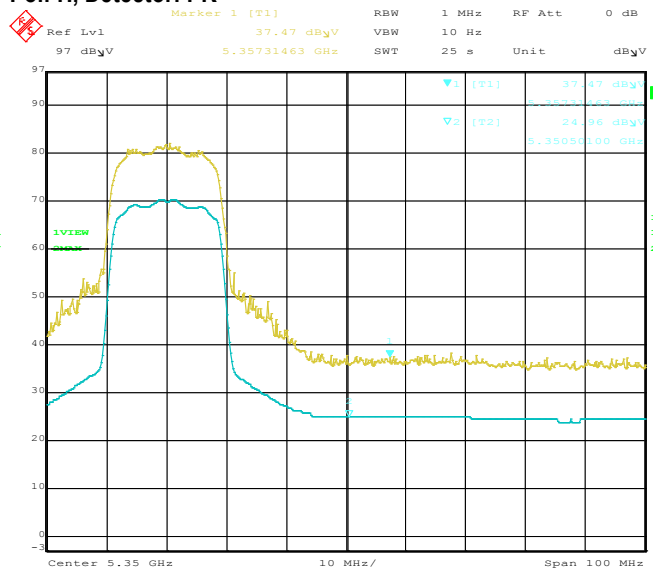
Date: 23.JUL.2014 10:54:35

Figure 3-11: Band-Edge Compliance of RF Radiated Emission 802.11n, Ch. 64, 5320 MHz, Centre of Band-Edge: 5350 MHz Pol: V, Detector: PK



Date: 23.JUL.2014 11:31:12

Figure 3-12: Band-Edge Compliance of RF Radiated Emission 802.11n Ch. 64, 5320 MHz, Centre of Band-Edge: 5350 MHz Pol: H, Detector: PK



Date: 23.JUL.2014 11:38:06

Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

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

Figure 3-13: Band-Edge Compliance of RF Radiated Emission
 802.11n, Ch. 100, 5500 MHz, Centre of Band-Edge: 5460 MHz
 Pol: V, Detector: PK

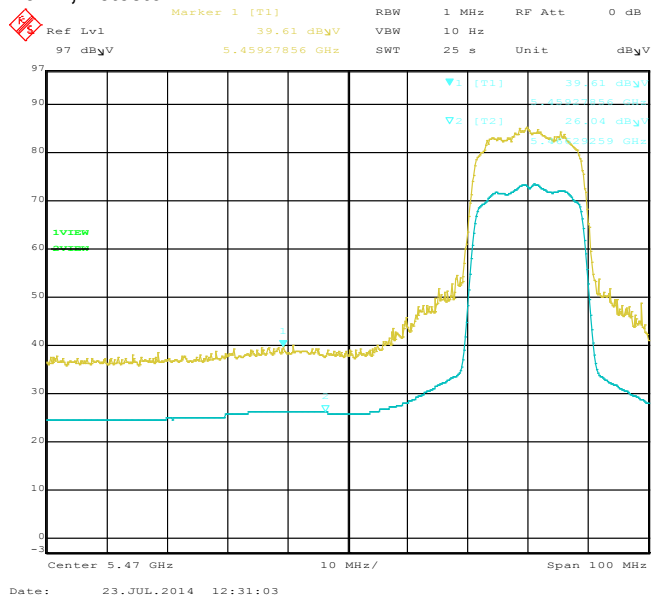


Figure 3-14: Band-Edge Compliance of RF Radiated Emission.
 802.11n, Ch. 100, 5500 MHz, Centre of Band-Edge: 5460 MHz
 Pol: H, Detector: PK

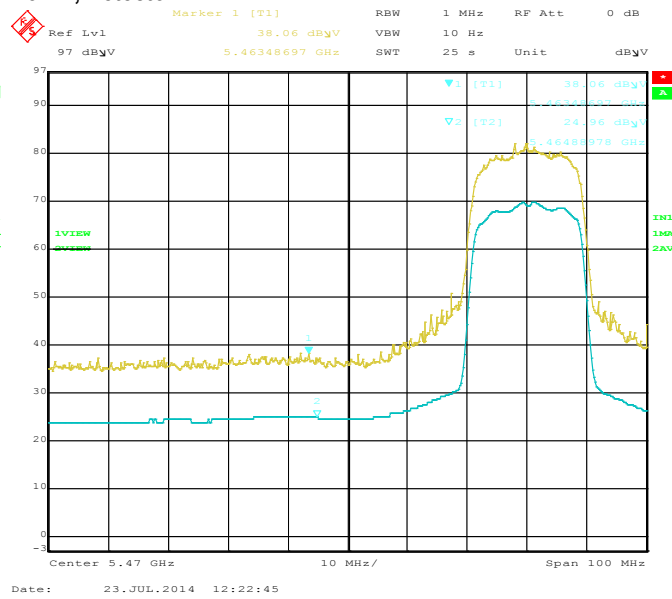


Figure 3-15: Band-Edge Compliance of RF Radiated Emission.
 802.11n, Ch. 140, 5700 MHz, Centre of Band-Edge: 5725 MHz
 Pol: V, Detector: PK

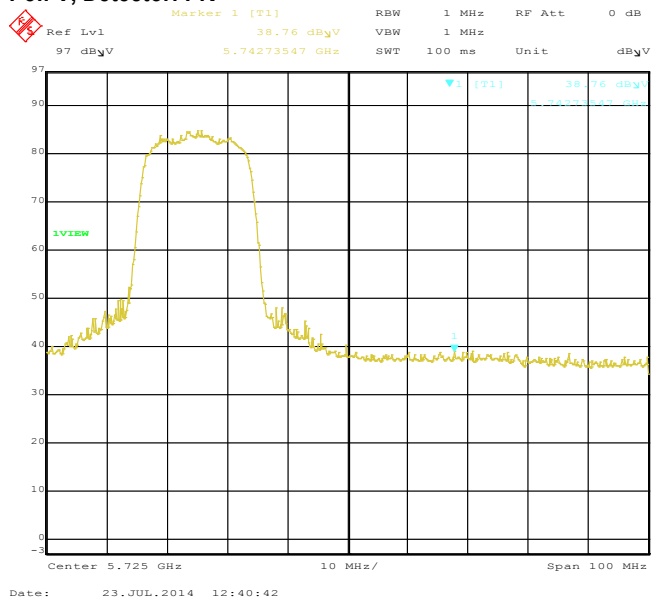
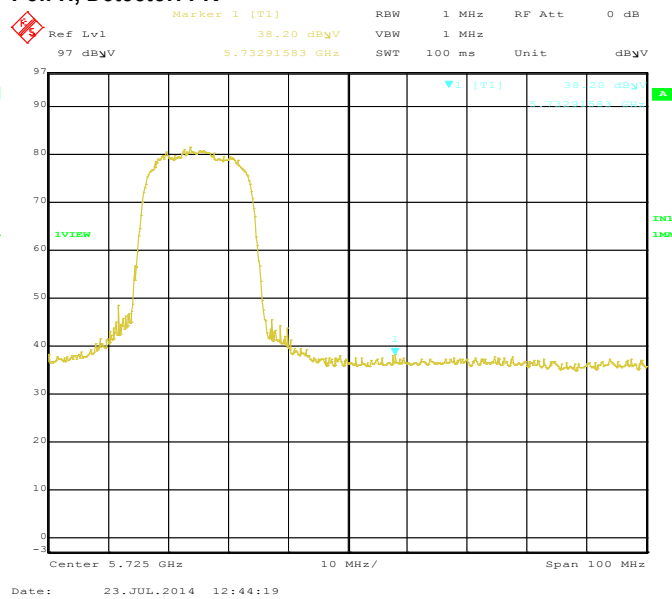



Figure 3-16: Band-Edge Compliance of RF Radiated Emission.
 802.11n, Ch. 140, 5700 MHz, Centre of Band-Edge: 5725 MHz
 Pol: H, Detector: PK



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


	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 4	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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	19.62	91.62
	5.5 Mbps	< 1.00	19.58	90.78
	11 Mbps	< 1.00	19.42	87.50
	6 Mbps	< 1.00	16.57	45.39
	24 Mbps	< 1.00	16.17	41.40
	54 Mbps	< 1.00	14.81	30.27
	MCS 0	< 1.00	14.84	30.48
	MCS 4	< 1.00	14.82	30.34
	MCS 7	< 1.00	14.83	30.41
6	1 Mbps	< 1.00	20.05	101.16
	5.5 Mbps	< 1.00	20.04	100.93
	11 Mbps	< 1.00	19.86	96.83
	6 Mbps	< 1.00	19.33	85.70
	24 Mbps	< 1.00	16.59	45.60
	54 Mbps	< 1.00	14.97	31.41
	MCS 0	< 1.00	14.98	31.48
	MCS 4	< 1.00	14.94	31.19
	MCS 7	< 1.00	14.98	31.48

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 4	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

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

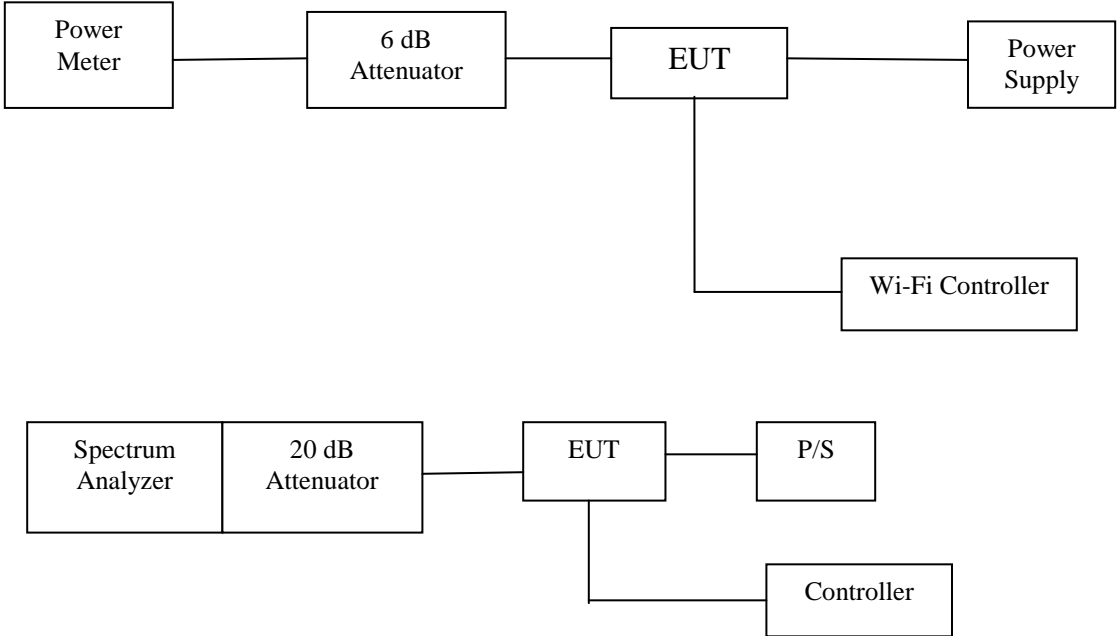
Channel	Data Rate	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
11	1 Mbps	< 1.00	19.62	91.62
	5.5 Mbps	< 1.00	19.57	90.57
	11 Mbps	< 1.00	19.37	86.50
	6 Mbps	< 1.00	13.25	21.13
	24 Mbps	< 1.00	12.91	19.54
	54 Mbps	< 1.00	12.43	17.50
	MCS 0	< 1.00	12.42	17.46
	MCS 4	< 1.00	12.44	17.54
	MCS 7	< 1.00	12.47	17.66

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

BlackBerry	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 5	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11a/n RF Conducted Emission Test Results


Test Setup Diagram



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

Date of test: July 24 and August 12, 2014
 The measurements were performed by Chuan Pao Tran.

The environmental test conditions were: Temperature: 23.2 °C
 Relative Humidity: 32.5 %


	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 5	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11a RF Conducted Emission Test Results cont'd

Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.407 and RSS-210. Channels 36, 48, 64, 100, 140 and 165 were measured for 802.11a mode using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 8.9 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Data Rate	Power Limit (mW)	Measured Level (dBm)	Measured Level (mW)
36	6 Mbps	< 250.0	13.37	21.73
	24 Mbps	< 250.0	13.05	20.18
	54 Mbps	< 250.0	12.49	17.74
48	6 Mbps	< 250.0	13.21	20.94
	24 Mbps	< 250.0	12.81	19.10
	54 Mbps	< 250.0	12.30	16.98
64	6 Mbps	< 250.0	12.99	19.91
	24 Mbps	< 250.0	12.96	19.77
	54 Mbps	< 250.0	12.98	19.86
100	6 Mbps	< 250.0	13.10	20.42
	24 Mbps	< 250.0	13.12	20.51
	54 Mbps	< 250.0	13.11	20.46
140	6 Mbps	< 250.0	14.32	27.04
	24 Mbps	< 250.0	14.32	27.04
	54 Mbps	< 250.0	14.34	27.16
165	6 Mbps	< 1000	11.63	14.55
	24 Mbps	< 1000	11.23	13.27
	54 Mbps	< 1000	10.77	11.94


	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 5	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11n RF Conducted Emission Test Results

Maximum Conducted Output Power

The EUT met the requirements of the maximum conducted output power of class 2 as per 47 CFR 15.407 and RSS-210. Channels 36, 48, 64, 100, 140 and 165 were measured for 802.11n mode using an Agilent power meter, model N1911A with model N1921A power sensor. A reference offset of 8.9 dB was applied to the power meter reference level for the coaxial cable loss and attenuators in the test circuit.

Channel	Data Rate	Class 2 Limit (W)	Measured Level (dBm)	Measured Level (mW)
36	MCS0	< 250.0	12.50	17.78
	MCS4	< 250.0	12.50	17.78
	MCS7	< 250.0	12.59	18.16
48	MCS0	< 250.0	12.31	17.02
	MCS4	< 250.0	12.31	17.02
	MCS7	< 250.0	12.31	17.02
64	MCS0	< 250.0	13.00	19.95
	MCS4	< 250.0	13.01	20.00
	MCS7	< 250.0	13.01	20.00
100	MCS0	< 250.0	13.04	20.14
	MCS4	< 250.0	13.14	20.61
	MCS7	< 250.0	13.10	20.42
140	MCS0	< 250.0	14.32	27.04
	MCS4	< 250.0	14.33	27.10
	MCS7	< 250.0	14.32	27.04
165	MCS0	< 1000	10.65	11.61
	MCS4	< 1000	10.66	11.64
	MCS7	< 1000	10.69	11.72

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 5	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW


802.11a RF Conducted Emission Test Results cont'd

Peak Power Spectral Density

The EUT met the requirements of the peak power spectral density as per 47 CFR 15.407 and RSS-210. Channels 36, 48, 64, 100, 140 and 165 were measured at 6 Mbps, 24 Mbps, and 54 Mbps each for 802.11a mode.

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
36	6 Mbps	< 11.00	1.36	-9.64
	24 Mbps	< 11.00	1.00	-10.00
	54 Mbps	< 11.00	0.50	-10.50
48	6 Mbps	< 11.00	1.15	-9.85
	24 Mbps	< 11.00	0.78	-10.22
	54 Mbps	< 11.00	0.28	-10.72
64	6 Mbps	< 11.00	0.66	-10.34
	24 Mbps	< 11.00	0.71	-10.29
	54 Mbps	< 11.00	0.71	-10.29
100	6 Mbps	< 11.00	0.95	-10.05
	24 Mbps	< 11.00	0.97	-10.03
	54 Mbps	< 11.00	1.01	-9.99
140	6 Mbps	< 11.00	3.44	-7.56
	24 Mbps	< 11.00	3.43	-7.57
	54 Mbps	< 11.00	3.41	-7.59
165	6 Mbps	< 33.00	-13.91	-30.91
	24 Mbps	< 33.00	-13.51	-30.51
	54 Mbps	< 33.00	-13.34	-30.34

See figures 5-1 to 5-6 for the plots of the peak power spectral density for Channel 36, 48, 64, 100, 140, and 165 at 6 Mbps each for 802.11a mode.

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 5	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11n RF Conducted Emission Test Results

Peak Power Spectral Density

The EUT met the requirements of the peak power spectral density as per 47 CFR 15.407 and RSS-210. Channels 36, 64 and 165 were measured at MCS 0, MCS 4 and MCS 7 each for 802.11n mode.

Channel	Data Rate	Limit (dBm)	Measured Level (dBm)	Margin (dBm)
36	6 Mbps	< 11.00	14.10	25.70
	24 Mbps	< 11.00	14.20	26.30
	54 Mbps	< 11.00	14.20	26.30
64	6 Mbps	< 11.00	13.50	22.39
	24 Mbps	< 11.00	13.50	22.39
	54 Mbps	< 11.00	13.50	22.39
165	6 Mbps	< 33.00	13.10	20.42
	24 Mbps	< 33.00	13.10	20.42
	54 Mbps	< 33.00	13.10	20.42

See figures 5-7 to 5-9 for the plots of the peak power spectral density for Channel 36, 64 and 165 at MCS 0 each for 802.11n mode.

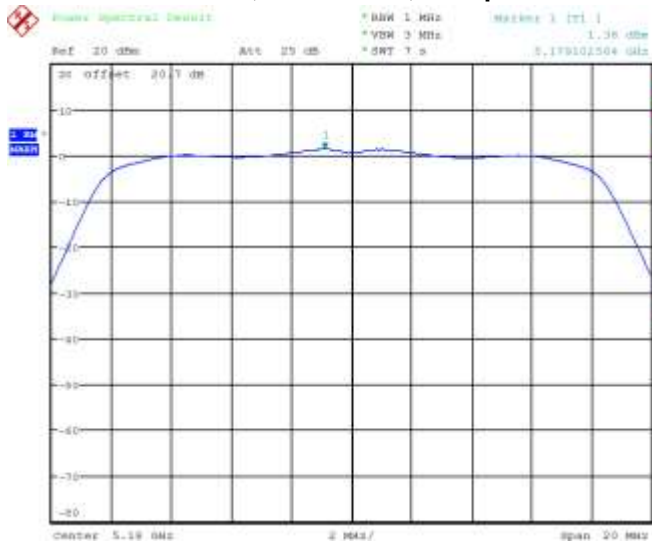
Test Report No.:
RTS-6058-1408-07_rev1

Dates of Test:
June 24 – August 5 and August 12, 2014

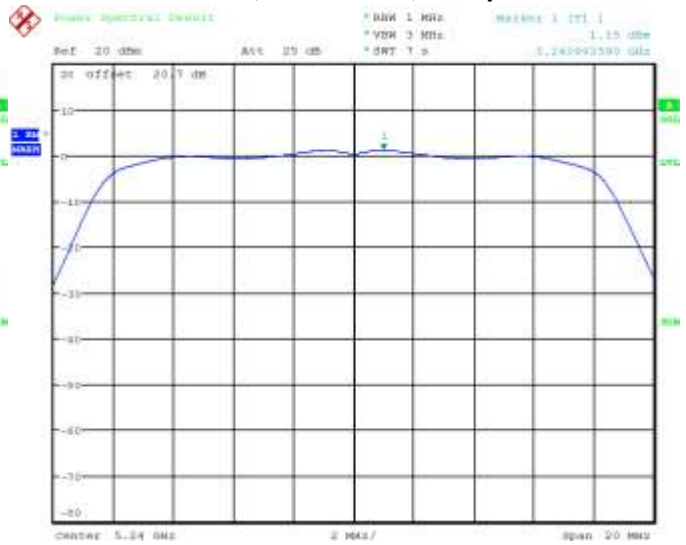
FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

802.11a RF Conducted Emission Test Results cont'd

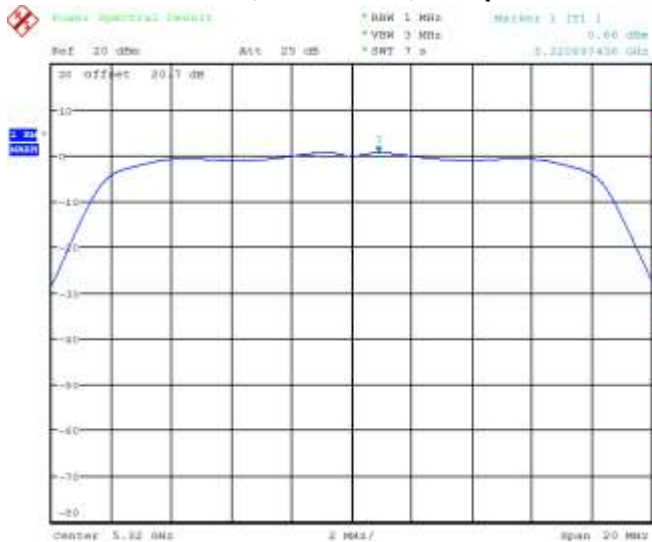
**Figure 5-1: Peak Power Spectral Density
802.11a, Channel 36, 6 Mbps**



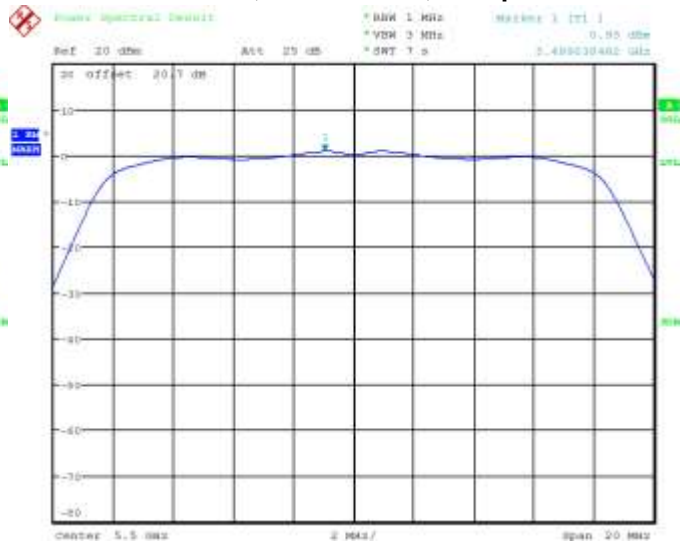
**Figure 5-2: Peak Power Spectral Density
802.11a, Channel 48, 6 Mbps**




**Figure 5-3: Peak Power Spectral Density
802.11a, Channel 64, 6 Mbps**



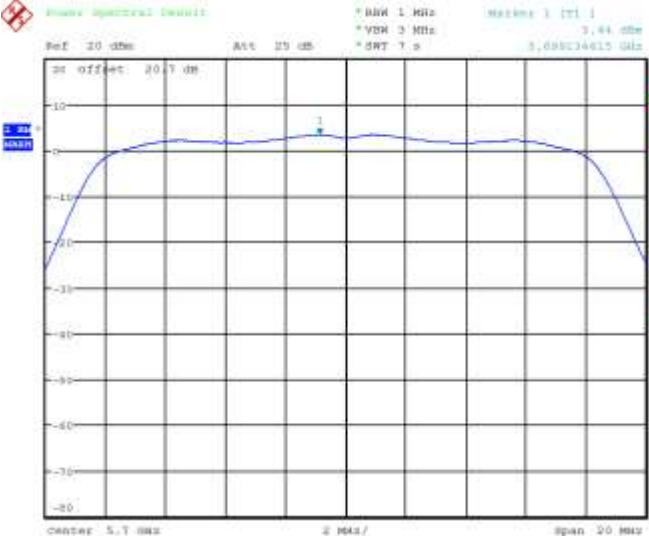
**Figure 5-4: Peak Power Spectral Density
802.11a, Channel 100, 6 Mbps**



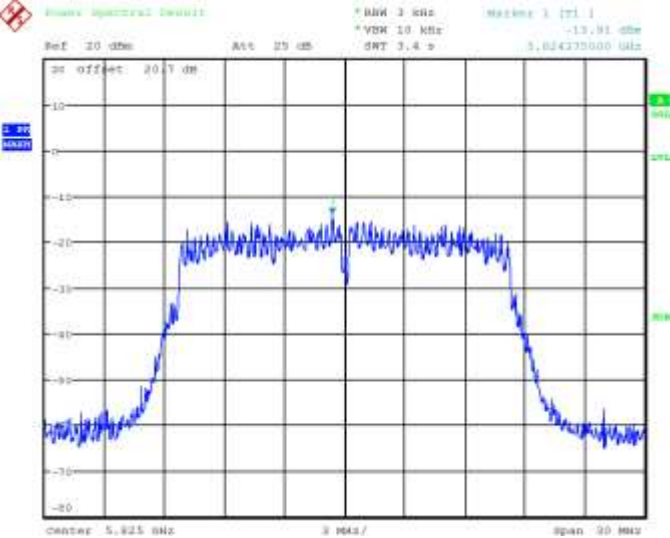
	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 5	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5 and August 12, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

802.11a RF Conducted Emission Test Results cont'd

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



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



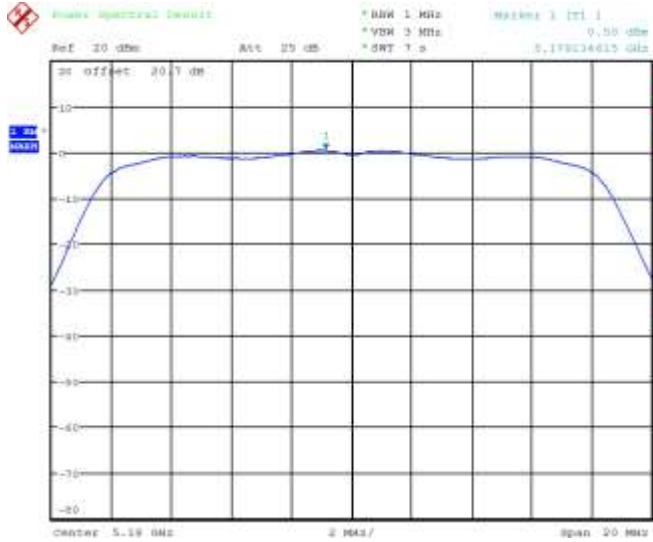
Test Report No.:
 RTS-6058-1408-07_rev1

Dates of Test:
 June 24 – August 5 and August 12, 2014

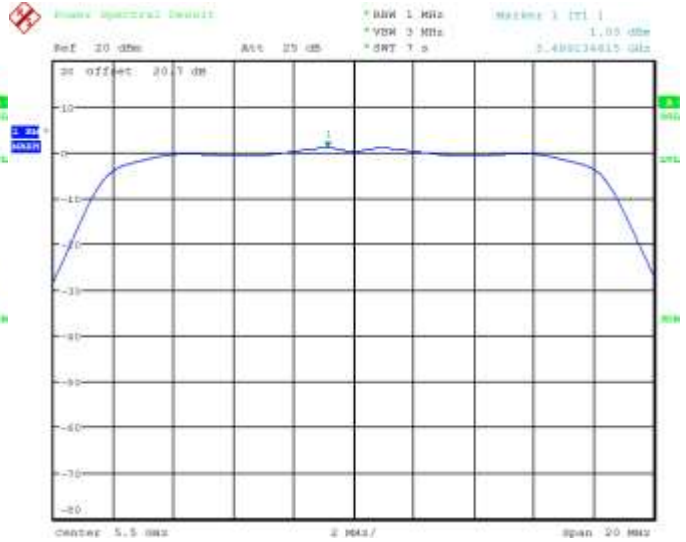
FCC ID: L6ARHA110LW
IC: 2503A-RHA110LW

802.11n RF Conducted Emission Test Results

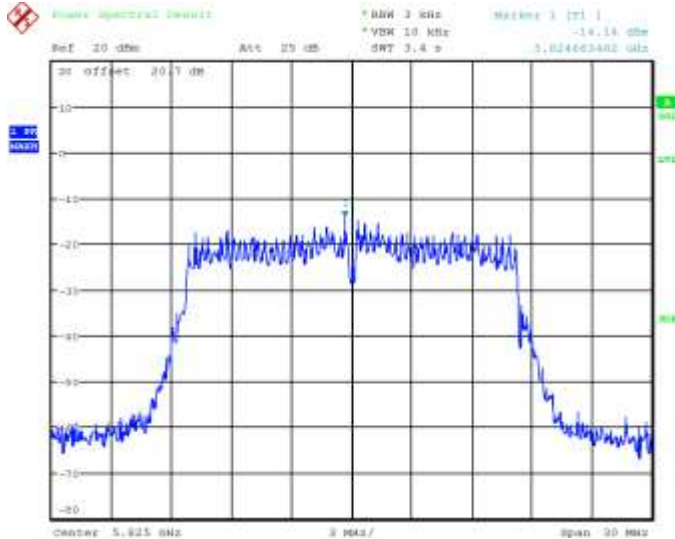
**Figure 5-7: Peak Power Spectral Density
 802.11n, Channel 36, MCS 0**




**Figure 5-8: Peak Power Spectral Density
 802.11n, Channel 64, MCS 0**



**Figure 5-9: Peak Power Spectral Density
 802.11n, Channel 165, MCS 0**



APPENDIX 6 – NEAR FIELD COMMUNICATIONS TEST DATA/PLOTS

	EMC Test Report for the BlackBerry® smartphone Model RHA111LW APPENDIX 6	
Test Report No.: RTS-6058-1408-07_rev1	Dates of Test: June 24 – August 5, 2014	FCC ID: L6ARHA110LW IC: 2503A-RHA110LW

Near Field Communications (NFC) Test Results

Radiated Emissions

Date of Test: July 23, 2014

Measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 27.2 °C
Relative Humidity: 38.3 %

The test distance was 3.0 meters with a EUT height of 0.8 meters, and sweep frequency of 9 kHz to 1 GHz.

The BlackBerry® smartphone was in vertical position.

The frequency sweep measurements were performed in Near Field Communications Tx mode at 13.56 MHz

Frequency (MHz)	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dBµV/m)	Limit (dBµV/m)	Test Margin (dB)
13.56	35.58	16.67	52.8	124.00	-71.2

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