

EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22, 24, 27
&
Industry Canada (IC), RSS-GEN, 132, 133 and 139



A division of Research In Motion Limited

REPORT NO.: RTS-6026-1304-16


PRODUCT MODEL NO.:	RFM121LW
TYPE NAME:	BlackBerry® smartphone
FCC ID:	L6ARFM120LW
IC:	2503A-RFM120LW
EMISSION DESIGNATOR (CDMA):	1M28F9W

DATE: April 10, 2013

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



592

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

Statement of Performance:

The BlackBerry® smartphone, model RFM121LW, part number CER-53013-001 Rev2-905-00 and accessories perform within the requirements of the test standards when configured and operated per 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:

Reviewed by:

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Regulatory Compliance Specialist

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Regulatory Compliance Specialist

Reviewed and Approved by:

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Manager, Regulatory Compliance



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A. Scope

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

- FCC CFR 47 Part 2, Subpart J, Equipment Authorization Procedures, Oct, 2012.
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct., 2012.
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct., 2012.
- FCC CFR 47 Part 27, Subpart C, Technical Standards, Oct, 2012.
- Industry Canada, RSS-132 Issue 3, January 2013, Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz.
- Industry Canada, RSS-133 Issue 6, January 2013, 2 GHz Personal Communications Services.
- Industry Canada, RSS-GEN Issue 3, December 2010, General Requirements and Information for the Certification of Radio communication Equipment.
- Industry Canada, RSS-139 Issue 2, February 2009, Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz.

B. Associated Documents

1. Test Report 1-5579/12-02-02-B
2. Test Report 1-5579/12-02-04-D
3. Test Report 1-5579/12-02-09-D

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 March 12 to 18 and April 9 – 10, 2013.

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BlackBerry® smartphone Samples Tested

Sample	Model	CER NUMBER	PIN	Software Information
1	RFM121LW	CER-53013-001 Rev2-905-00	303E5B46	OS: 127.0.1.4183


Frequency Stability Testing was performed on samples 1.

BlackBerry® smartphone Accessories Tested

None

D. Support Equipment Used for the Testing of the EUT

No support equipment required; for list of equipment refer to section G, Compliance Test Equipment Used.

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E. Test Results Chart


SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1051 Part 22.917 Part 24.238	RSS-GEN, 4.9 RSS-132, 5.5 RSS-133, 6.5	GSM850 / PCS1900 Conducted Spurious Emissions	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1049 Part 22.917 Part 24.238	RSS-GEN, 4.6	GSM 850 / PCS1900 Occupied Bandwidth and Channel Mask	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1055 Part 24.235	RSS-132, 5.3 RSS-133, 6.3	GSM 850 /PCS1900 Frequency Stability vs. Temperature and Voltage	Pass	1
Part 22.913(a)(2) Part 24.232(c)	RSS-132, 5.4 RSS-133, 6.4	GSM850 ERP PCS1900 EIRP	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1053 Part 22.917 Part 24.238	RSS-GEN, 4.9 RSS-132, 4.5 RSS-133, 6.5	GSM850 / PCS1900 Radiated Spurious/Harmonic Emissions	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1051 Part 22.917 Part 24.238	RSS-GEN, 4.9 RSS-132, 5.5 RSS-133, 6.5	WCDMA Band 2/5 Conducted Spurious Emissions	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1049 Part 22.917 Part 24.238	RSS-GEN, 4.6	WCDMA Band 2/5 Occupied Bandwidth and Channel Mask	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1055(a)(d) Part 24.235	RSS-132, 5.3 RSS-133, 6.3	WCDMA Band 2/5 Frequency Stability vs. Temperature and Voltage	Pass	2
Part 22.913(a)(2) Part 24.232(c)	RSS-132, 5.4 RSS-133, 6.4	WCDMA Band 5 ERP WCDMA Band 2 EIRP	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1053 Part 22.917 Part 24.238	RSS-GEN, 4.9 RSS-132, 5.5 RSS-133, 6.5	WCDMA Band 2/5 Radiated Spurious/Harmonic Emissions	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1051 Part 22.917 Part 24.238	RSS-GEN, 4.9 RSS-132, 4.5	CDMA CELL/PCS Conducted Spurious Emissions	Pass	3A
Part 2.1049 Part 22.917 Part 24.238	RSS-GEN, 4.6	CDMA CELL / PCS Occupied Bandwidth and Channel Mask	Pass	3A
Part 2.1055 Part 24.235	RSS-132, 4.3	CDMA CELL / PCS Frequency Stability vs. Temperature and Voltage	Pass	3B
Part 22.913(a)(2) Part 24.232(c)	RSS-132, 4.4	CDMA CELL ERP / CDMA PCS EIRP	Pass	See Test Report 1-5579/12-02-02-B
Part 2.1053 Part 22.917 Part 24.238	RSS-GEN, 4.9 RSS-132, 4.5	CDMA CELL / PCS Radiated Spurious/Harmonic Emissions	Pass	See Test Report 1-5579/12-02-02-B



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SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1051 Part 27.53(h)	RSS-139, 6.5	LTE Band 4 Conducted Spurious Emissions	Pass	See Test Report 1-5579/12-02-09-D
Part 2.1049 Part 27.53(h)(1)	RSS-GEN, 4.6	LTE Band 4 Occupied Bandwidth and Channel Mask	Pass	See Test Report 1-5579/12-02-09-D
Part 27.50 (d)(5)	RSS-139, 6.4	LTE Band 4 Peak to Average Ratio measurements	Pass	See Test Report 1-5579/12-02-09-D
Part 2.1055 Part 27.54	RSS-139, 6.3	LTE Band 4 Frequency Stability vs. Temperature and Voltage	Pass	4
Part 2.1053 Part 27.50(d)(4)	RSS-139, 6.4	LTE Band 4 EIRP	Pass	See Test Report 1-5579/12-02-09-D
Part 2.1053 Part 27.53(h)	RSS-139, 6.5	LTE Band 4 Radiated Spurious/Harmonic Emissions	Pass	See Test Report 1-5579/12-02-09-D
Part 2.1051 Part 27.53	-	LTE Band 13 Conducted Spurious Emissions	Pass	See Test Report 1-5579/12-02-04-D
Part 2.1049 Part 27.53(c)(4)	-	LTE Band 13 Occupied Bandwidth and Channel Mask	Pass	See Test Report 1-5579/12-02-04-D
Part 27.50 (d)(5)	-	LTE Band 13 Peak to Average Ratio measurements	Pass	See Test Report 1-5579/12-02-04-D
Part 2.1055 Part 27.54	-	LTE Band 13 Frequency Stability vs. Temperature and Voltage	Pass	5
Part 2.1053 Part 27.50(b)(10)	-	LTE Band 13 ERP	Pass	See Test Report 1-5579/12-02-04-D
Part 2.1053 Part 27.53	-	LTE Band 13 Radiated Spurious/Harmonic Emissions	Pass	See Test Report 1-5579/12-02-04-D

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F. Summary of Results

1) Conducted Emission Measurements

- a) The BlackBerry® smartphone met the requirements of the Frequency Stability in the GSM850 as per 47 CFR 2.1055 and RSS-132, 5.3. The EUT was measured in GSM850 mode on the low, middle and high channels.
See APPENDIX 1 for test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability in the PCS1900 as per 47 CFR 2.1055, CFR 24.235 and RSS-133, 6.3. The EUT was measured in PCS1900 mode on the low, middle and high channels.
See APPENDIX1 for test data.


- b) The BlackBerry® smartphone met the requirements of the Frequency Stability in the WCDMA Band 5 as per 47 CFR 2.1055 and RSS-132, 5.3. The EUT was measured in WCDMA band 5 mode on the low, middle and high channels.
See APPENDIX 2B for test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability in the WCDMA Band 2 as per 47 CFR 2.1055, CFR 24.235 and RSS-133, 6.3. The EUT was measured in WCDMA band 2 mode on the low, middle and high channels.
See APPENDIX 2 for test data.

- c) The BlackBerry® met the requirements of the Conducted Spurious Emissions in the CDMA Cellular band as per 47 CFR 2.1051, CFR 22.917, RSS-132, 5.5 and RSS-Gen, 4.9. The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The frequency range investigated was from 30 MHz to 10 GHz.
See APPENDIX 3A for the test data.

The BlackBerry® smartphone met the requirements of the Conducted Spurious Emissions in the CDMA PCS band as per 47 CFR 2.1051, CFR 24.238, RSS-133, 6.5 and RSS-Gen, 4.9. The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The frequency range investigated was from 30 MHz to 20 GHz
See APPENDIX 3A for the test data.

- The BlackBerry® smartphone met the requirements of the Occupied Bandwidth in the CDMA Cellular band as per 47 CFR 2.1049, CFR 22.917 and RSS-Gen, 4.6. The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The worst case occupied bandwidth was 1.279 MHz on low channel in Loopback mode and 1.274 MHz on all low and middle channels in 1xEVDO mode.
See APPENDIX 3A for the test data.

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The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the CDMA PCS band as per 47 CFR 2.1049, CFR 24.238 and RSS-Gen, 4.6. The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The worst case occupied bandwidth was 1.279 MHz on all channels in Loopback mode and 1.276 MHz on high channel in 1xEVDO mode.

See APPENDIX 3A for the test data.

- The BlackBerry® smartphone met the requirements of the Frequency Stability vs. Temperature and Voltage for CDMA Cellular band as per 47 CFR 2.1055 and RSS-132, 5.3. The EUT was measured in Cellular mode on the low, middle and high channels.

See APPENDIX 3B for test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability vs. Temperature and Voltage requirements for the PCS band as per 47 CFR 2.1055, CFR 24.238 and RSS-133, 6.3. The EUT was measured in CDMA PCS mode on the low, middle and high channels.


See APPENDIX 3B for test data.

- d) The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 4 as per 47 CFR 2.1055, CFR 27.54 and RSS-139, 6.3. The EUT was measured in LTE Band 4 mode on the low, middle and high channels in 20MHz BW with 100 resource blocks and QPSK modulation.

See APPENDIX 4 for test data.

- e) The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 13 as per 47 CFR 2.1055, CFR 27.54. The EUT was measured in LTE Band 13 mode on the low, middle and high channels in 10MHz BW with 50 resource blocks and QPSK modulation.


See APPENDIX 5 for test data.

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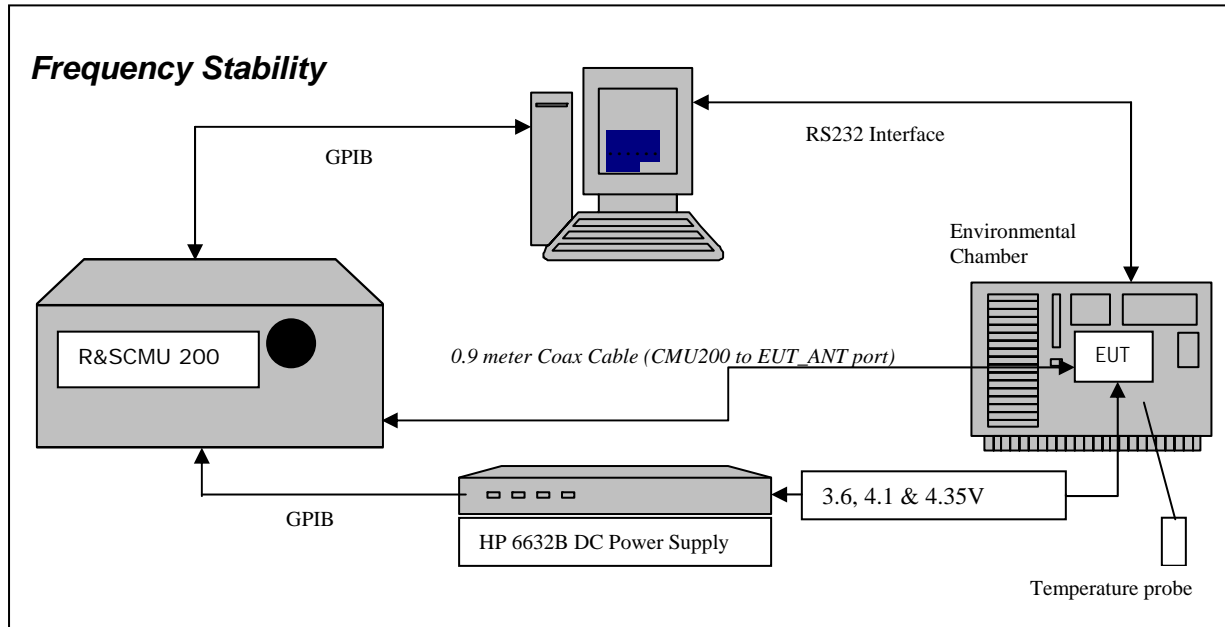
G. Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>	<u>CAL DUE DATE</u> (YY MM DD)	<u>USE</u>
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	109747	13-10-18	RF Conducted Emissions
DC Power Supply	HP	6632B	US37472178	13-09-25	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0340060	13-10-30	RF Conducted Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	109949	13-12-8	Radiated /RF Conducted Emission
Spectrum Analyzer	Rohde & Schwarz	FSV	101820	13-11-28	RF Conducted Emissions
Spectrum Analyzer	Rohde & Schwarz	FSP	100884	13-11-22	RF Conducted Emissions

APPENDIX 1 – GSM FREQUENCY STABILITY TEST DATA

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GSM Frequency Stability Test Data



The measurements were performed by Berkin Can.

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements

2.995 Frequency Stability - Procedures

(a,b) Frequency Stability - Temperature Variation

(d) Frequency Stability - Voltage Variation


24.235 Frequency Stability.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, CFR 47 chapter 1, Section 22.917 RSS-132, 4.3 Frequency Stability, and RSS-133, 6.3 Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMU 200 and the EUT antenna port.

Calibration for the Cable Loss was performed in the RF Laboratory using the Agilent power meter and Agilent Signal Generator.

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Test setup:


The EUT was placed in the Temperature chamber and connected to CMU 200 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the measurements were to be made.

The chamber was switched on and the temperature was set to -30°C. After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled. The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMU 200 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, to 4.1 and to 4.35 volts maximum voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 4.1 and 4.35 volts. The transmit frequency was varied in 3 steps consisting of 824.2, 836.4, and 848.8 MHz for the GSM850 band, 1850.2, 1880.0 and 1909.8 MHz for the PCS1900 band. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million. After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

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Procedure:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

1. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.6 volts.
5. Set up CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
10. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 4.1 Volts
12. Increase temperature by 10°C and soak for 1/2 hour.
13. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
14. Repeat steps 5 to 10 changing the supply voltage to 4.35 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 4.1 and 4.35 volts.

The maximum frequency error in the GSM850 band measured was **-0.0454 PPM**.
The maximum frequency error in the PCS1900 band measured was **-0.0257PPM**.

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GSM850 results: channels 128, 189 and 251 @ 20°C maximum transmitted power

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.6	20	-6.20	-0.0075
189	836.40	3.6	20	-10.14	-0.0121
251	848.60	3.6	20	-8.33	-0.0098

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.1	20	-11.17	-0.0136
189	836.40	4.1	20	-4.52	-0.0054
251	848.60	4.1	20	6.07	0.0072

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.35	20	-6.59	-0.0080
189	836.40	4.35	20	-10.14	-0.0121
251	848.60	4.35	20	-7.04	-0.0083

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GSM850 Results: channel 128 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	3.6	-30	-24.21	-0.0294
128	824.20	3.6	-20	-19.89	-0.0241
128	824.20	3.6	-10	-17.56	-0.0213
128	824.20	3.6	0	-4.13	-0.0050
128	824.20	3.6	10	8.98	0.0109
128	824.20	3.6	20	-6.20	-0.0075
128	824.20	3.6	30	-5.81	-0.0070
128	824.20	3.6	40	9.88	0.0120
128	824.20	3.6	50	-18.85	-0.0229
128	824.20	3.6	60	-19.89	-0.0241
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.1	-30	-31.77	-0.0385
128	824.20	4.1	-20	-27.38	-0.0332
128	824.20	4.1	-10	-17.11	-0.0208
128	824.20	4.1	0	-5.04	-0.0061
128	824.20	4.1	10	-21.50	-0.0261
128	824.20	4.1	20	-11.17	-0.0136
128	824.20	4.1	30	-7.04	-0.0085
128	824.20	4.1	40	6.72	0.0082
128	824.20	4.1	50	-20.40	-0.0248
128	824.20	4.1	60	-22.34	-0.0271
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.35	-30	-31.32	-0.0380
128	824.20	4.35	-20	-23.63	-0.0287
128	824.20	4.35	-10	-4.26	-0.0052
128	824.20	4.35	0	-7.10	-0.0086
128	824.20	4.35	10	-37.39	-0.0454
128	824.20	4.35	20	-6.59	-0.0080
128	824.20	4.35	30	-3.36	-0.0041
128	824.20	4.35	40	7.04	0.0085
128	824.20	4.35	50	-23.05	-0.0280
128	824.20	4.35	60	-22.66	-0.0275

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GSM850 Results: channel 189 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	3.6	-30	-24.80	-0.0297
189	836.40	3.6	-20	-24.15	-0.0289
189	836.40	3.6	-10	-18.85	-0.0225
189	836.40	3.6	0	-3.62	-0.0043
189	836.40	3.6	10	-2.91	-0.0035
189	836.40	3.6	20	-10.14	-0.0121
189	836.40	3.6	30	-3.75	-0.0045
189	836.40	3.6	40	11.04	0.0132
189	836.40	3.6	50	-19.69	-0.0235
189	836.40	3.6	60	-17.56	-0.0210
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	4.1	-30	-28.99	-0.0347
189	836.40	4.1	-20	-21.24	-0.0254
189	836.40	4.1	-10	-13.17	-0.0157
189	836.40	4.1	0	-4.00	-0.0048
189	836.40	4.1	10	-33.25	-0.0398
189	836.40	4.1	20	-4.52	-0.0054
189	836.40	4.1	30	-5.88	-0.0070
189	836.40	4.1	40	9.62	0.0115
189	836.40	4.1	50	-20.53	-0.0245
189	836.40	4.1	60	-20.53	-0.0245
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.40	4.35	-30	-30.09	-0.0360
189	836.40	4.35	-20	-19.44	-0.0232
189	836.40	4.35	-10	5.62	0.0067
189	836.40	4.35	0	-6.33	-0.0076
189	836.40	4.35	10	-31.38	-0.0375
189	836.40	4.35	20	-10.14	-0.0121
189	836.40	4.35	30	-8.33	-0.0100
189	836.40	4.35	40	9.62	0.0115
189	836.40	4.35	50	-23.18	-0.0277
189	836.40	4.35	60	-22.02	-0.0263


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GSM850 Results: channel 251 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
251	848.8	3.6	-30	-22.99	-0.0271
251	848.8	3.6	-20	-25.51	-0.0301
251	848.8	3.6	-10	-17.69	-0.0208
251	848.8	3.6	0	5.36	0.0063
251	848.8	3.6	10	-10.27	-0.0121
251	848.8	3.6	20	-8.33	-0.0098
251	848.8	3.6	30	-6.91	-0.0081
251	848.8	3.6	40	12.07	0.0142
251	848.8	3.6	50	-19.31	-0.0227
251	848.8	3.6	60	-17.95	-0.0211
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
251	848.8	4.1	-30	-29.51	-0.0348
251	848.8	4.1	-20	-24.34	-0.0287
251	848.8	4.1	-10	-4.33	-0.0051
251	848.8	4.1	0	-5.55	-0.0065
251	848.8	4.1	10	-37.19	-0.0438
251	848.8	4.1	20	6.07	0.0072
251	848.8	4.1	30	3.75	0.0044
251	848.8	4.1	40	13.30	0.0157
251	848.8	4.1	50	-17.18	-0.0202
251	848.8	4.1	60	-20.02	-0.0236
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
251	848.8	4.35	-30	-29.90	-0.0352
251	848.8	4.35	-20	-23.50	-0.0277
251	848.8	4.35	-10	5.68	0.0067
251	848.8	4.35	0	-7.17	-0.0084
251	848.8	4.35	10	-26.15	-0.0308
251	848.8	4.35	20	-7.04	-0.0083
251	848.8	4.35	30	-4.91	-0.0058
251	848.8	4.35	40	12.40	0.0146
251	848.8	4.35	50	-18.79	-0.0221
251	848.8	4.35	60	-19.95	-0.0235

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 1	
	Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013

PCS results: channels 512, 661, & 810 @ 20°C maximum transmitted power

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	3.6	20	10.46	0.0057
661	1880.00	3.6	20	8.85	0.0047
810	1909.80	3.6	20	11.04	0.0058

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.1	20	6.26	0.0034
661	1880.00	4.1	20	11.24	0.0060
810	1909.80	4.1	20	16.40	0.0086

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.35	20	10.07	0.0054
661	1880.00	4.35	20	11.11	0.0059
810	1909.80	4.35	20	12.59	0.0066

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PCS1900 Results: channel 512 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	3.6	-30	-13.37	-0.0072
512	1850.20	3.6	-20	-24.21	-0.0131
512	1850.20	3.6	-10	16.72	0.0090
512	1850.20	3.6	0	20.02	0.0108
512	1850.20	3.6	10	10.98	0.0059
512	1850.20	3.6	20	10.46	0.0057
512	1850.20	3.6	30	18.08	0.0098
512	1850.20	3.6	40	-13.88	-0.0075
512	1850.20	3.6	50	-38.03	-0.0206
512	1850.20	3.6	60	-24.86	-0.0134
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.1	-30	-26.99	-0.0146
512	1850.20	4.1	-20	-33.45	-0.0181
512	1850.20	4.1	-10	8.65	0.0047
512	1850.20	4.1	0	-8.91	-0.0048
512	1850.20	4.1	10	12.14	0.0066
512	1850.20	4.1	20	6.26	0.0034
512	1850.20	4.1	30	-5.29	-0.0029
512	1850.20	4.1	40	-17.63	-0.0095
512	1850.20	4.1	50	9.81	0.0053
512	1850.20	4.1	60	-43.72	-0.0236
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.35	-30	-29.19	-0.0158
512	1850.20	4.35	-20	-29.90	-0.0162
512	1850.20	4.35	-10	12.33	0.0067
512	1850.20	4.35	0	-6.65	-0.0036
512	1850.20	4.35	10	9.75	0.0053
512	1850.20	4.35	20	10.07	0.0054
512	1850.20	4.35	30	-7.43	-0.0040
512	1850.20	4.35	40	-28.41	-0.0154
512	1850.20	4.35	50	-38.29	-0.0207
512	1850.20	4.35	60	-45.65	-0.0247

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PCS1900 Results: channel 661 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880.00	3.6	-30	-14.98	-0.0080
661	1880.00	3.6	-20	-27.25	-0.0145
661	1880.00	3.6	-10	12.85	0.0068
661	1880.00	3.6	0	15.69	0.0083
661	1880.00	3.6	10	9.94	0.0053
661	1880.00	3.6	20	8.85	0.0047
661	1880.00	3.6	30	12.07	0.0064
661	1880.00	3.6	40	-16.34	-0.0087
661	1880.00	3.6	50	-41.00	-0.0218
661	1880.00	3.6	60	-37.32	-0.0199
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880.00	4.1	-30	-19.82	-0.0105
661	1880.00	4.1	-20	-22.66	-0.0121
661	1880.00	4.1	-10	13.17	0.0070
661	1880.00	4.1	0	11.36	0.0060
661	1880.00	4.1	10	15.50	0.0082
661	1880.00	4.1	20	11.24	0.0060
661	1880.00	4.1	30	-6.13	-0.0033
661	1880.00	4.1	40	-17.50	-0.0093
661	1880.00	4.1	50	-19.44	-0.0103
661	1880.00	4.1	60	-21.89	-0.0116
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
661	1880.00	4.35	-30	-27.57	-0.0147
661	1880.00	4.35	-20	-30.48	-0.0162
661	1880.00	4.35	-10	16.27	0.0087
661	1880.00	4.35	0	7.75	0.0041
661	1880.00	4.35	10	12.01	0.0064
661	1880.00	4.35	20	11.11	0.0059
661	1880.00	4.35	30	-13.37	-0.0071
661	1880.00	4.35	40	-27.31	-0.0145
661	1880.00	4.35	50	-42.29	-0.0225
661	1880.00	4.35	60	-46.69	-0.0248

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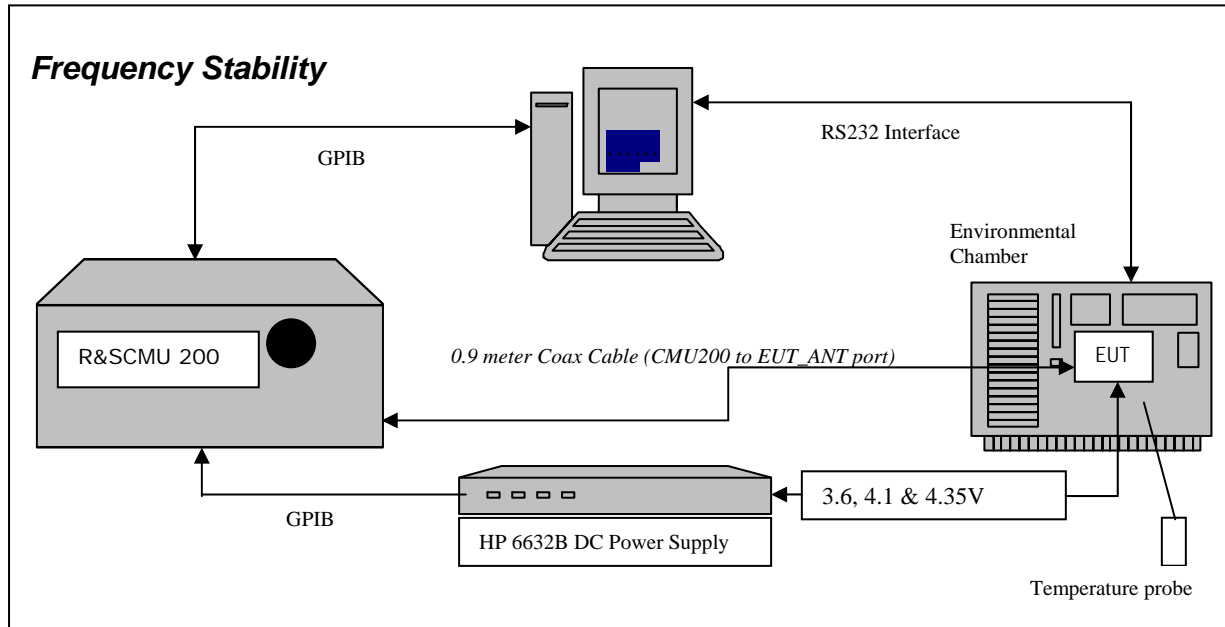
PCS1900 Results: channel 810 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.80	3.6	-30	-15.56	-0.0081
810	1909.80	3.6	-20	-26.15	-0.0137
810	1909.80	3.6	-10	11.95	0.0063
810	1909.80	3.6	0	13.04	0.0068
810	1909.80	3.6	10	15.69	0.0082
810	1909.80	3.6	20	11.04	0.0058
810	1909.80	3.6	30	13.30	0.0070
810	1909.80	3.6	40	-13.11	-0.0069
810	1909.80	3.6	50	-49.01	-0.0257
810	1909.80	3.6	60	-46.69	-0.0244
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.80	4.1	-30	-23.25	-0.0122
810	1909.80	4.1	-20	-21.44	-0.0112
810	1909.80	4.1	-10	12.27	0.0064
810	1909.80	4.1	0	17.76	0.0093
810	1909.80	4.1	10	14.79	0.0077
810	1909.80	4.1	20	16.40	0.0086
810	1909.80	4.1	30	7.10	0.0037
810	1909.80	4.1	40	-18.08	-0.0095
810	1909.80	4.1	50	-33.00	-0.0173
810	1909.80	4.1	60	-32.93	-0.0172
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
810	1909.80	4.35	-30	-27.31	-0.0143
810	1909.80	4.35	-20	-32.22	-0.0169
810	1909.80	4.35	-10	12.79	0.0067
810	1909.80	4.35	0	13.95	0.0073
810	1909.80	4.35	10	10.27	0.0054
810	1909.80	4.35	20	12.59	0.0066
810	1909.80	4.35	30	-9.56	-0.0050
810	1909.80	4.35	40	-27.18	-0.0142
810	1909.80	4.35	50	-41.78	-0.0219
810	1909.80	4.35	60	-37.84	-0.0198

APPENDIX 2 – WCDMA Band 2/5 FREQUENCY STABILITY TEST DATA

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 2	
	Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013

WCDMA Frequency Stability Test Data



The following measurements were performed by Berkin Can.

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements


- 2.1055** Frequency Stability - Procedures
- (a,b) Frequency Stability - Temperature Variation
- (d) Frequency Stability - Voltage Variation

24.235 *Frequency Stability.*

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 27.54, CFR 47 and RSS-139, 6.3 Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMU 200 and the EUT antenna port.

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Test Setup:

The EUT was placed in the Temperature chamber and connected to CMU 200 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the following measurements were to be made.


The chamber was switched on and the temperature was set to -30°C. After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled. The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMU 200 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, 4.1 volts and to 4.35 volts maximum voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 4.1 volts and 4.35 volts. The transmit frequency was varied in 3 steps consisting of 1852.4, 1880.0 and 1907.6 MHz for the WCDMA band 2. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.

After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 2	
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Procedure:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

1. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.6 volts.
5. Set up CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
10. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 4.1 Volts
12. Increase temperature by 10°C and soak for 1/2 hour.
13. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
14. Repeat steps 5 to 10 changing the supply voltage to 4.35 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 4.1 and 4.35 volts

The maximum frequency error in the WCDMA band 5 measured was **0.0278 PPM**.
The maximum frequency error in the WCDMA band 2 measured was **-0.0223 PPM**.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 2	
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Date of Test: March 18, 2013

WCDMA Band 5 results: channels 4132, 4182 and 4233 @ 20°C maximum transmitted power

Traffic Channel Number	WCDMA Band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.6	20	-6.00	-0.0073
4182	836.4	3.6	20	-5.00	-0.0060
4233	846.6	3.6	20	6.00	0.0071

Traffic Channel Number	WCDMA Band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.1	20	-4.00	-0.0048
4182	836.4	4.1	20	-7.00	-0.0084
4233	846.6	4.1	20	-5.00	-0.0059

Traffic Channel Number	WCDMA Band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.35	20	-6.00	-0.0073
4182	836.4	4.35	20	-5.00	-0.0060
4233	846.6	4.35	20	5.00	0.0059

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WCDMA Band 5 Results: channel 4132 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.6	-30	-5.00	-0.0061
4132	826.4	3.6	-20	1.00	0.0012
4132	826.4	3.6	-10	4.00	0.0048
4132	826.4	3.6	0	-7.00	-0.0085
4132	826.4	3.6	10	-2.00	-0.0024
4132	826.4	3.6	20	-6.00	-0.0073
4132	826.4	3.6	30	23.00	0.0278
4132	826.4	3.6	40	20.00	0.0242
4132	826.4	3.6	50	20.00	0.0242
4132	826.4	3.6	60	8.00	0.0097
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.1	-30	5.00	0.0061
4132	826.4	4.1	-20	16.00	0.0194
4132	826.4	4.1	-10	12.00	0.0145
4132	826.4	4.1	0	-9.00	-0.0109
4132	826.4	4.1	10	-5.00	-0.0061
4132	826.4	4.1	20	-4.00	-0.0048
4132	826.4	4.1	30	18.00	0.0218
4132	826.4	4.1	40	13.00	0.0157
4132	826.4	4.1	50	23.00	0.0278
4132	826.4	4.1	60	7.00	0.0085
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.35	-30	-5.00	-0.0061
4132	826.4	4.35	-20	4.00	0.0048
4132	826.4	4.35	-10	1.00	0.0012
4132	826.4	4.35	0	-8.00	-0.0097
4132	826.4	4.35	10	-2.00	-0.0024
4132	826.4	4.35	20	-6.00	-0.0073
4132	826.4	4.35	30	23.00	0.0278
4132	826.4	4.35	40	21.00	0.0254
4132	826.4	4.35	50	20.00	0.0242
4132	826.4	4.35	60	8.00	0.0097

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FCC ID: L6ARFM120LW
IC: 2503A-RFM120LW

WCDMA Band 5 Results: channel 4182 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	3.6	-30	-6.00	-0.0072
4182	836.4	3.6	-20	2.00	0.0024
4182	836.4	3.6	-10	3.00	0.0036
4182	836.4	3.6	0	-6.00	-0.0072
4182	836.4	3.6	10	2.00	0.0024
4182	836.4	3.6	20	-5.00	-0.0060
4182	836.4	3.6	30	4.00	0.0048
4182	836.4	3.6	40	9.00	0.0108
4182	836.4	3.6	50	9.00	0.0108
4182	836.4	3.6	60	-6.00	-0.0072
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	4.1	-30	-6.00	-0.0072
4182	836.4	4.1	-20	3.00	0.0036
4182	836.4	4.1	-10	3.00	0.0036
4182	836.4	4.1	0	-3.00	-0.0036
4182	836.4	4.1	10	0.00	0.0000
4182	836.4	4.1	20	-7.00	-0.0084
4182	836.4	4.1	30	14.00	0.0167
4182	836.4	4.1	40	15.00	0.0179
4182	836.4	4.1	50	19.00	0.0227
4182	836.4	4.1	60	7.00	0.0084
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4182	836.4	4.35	-30	6.00	0.0072
4182	836.4	4.35	-20	12.00	0.0143
4182	836.4	4.35	-10	11.00	0.0132
4182	836.4	4.35	0	-6.00	-0.0072
4182	836.4	4.35	10	2.00	0.0024
4182	836.4	4.35	20	-5.00	-0.0060
4182	836.4	4.35	30	19.00	0.0227
4182	836.4	4.35	40	17.00	0.0203
4182	836.4	4.35	50	13.00	0.0155
4182	836.4	4.35	60	7.00	0.0084


Test Report No.:
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FCC ID: L6ARFM120LW
IC: 2503A-RFM120LW

WCDMA Band 5 Results: channel 4233 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	3.6	-30	-7.00	-0.0083
4233	846.6	3.6	-20	-4.00	-0.0047
4233	846.6	3.6	-10	2.00	0.0024
4233	846.6	3.6	0	8.00	0.0094
4233	846.6	3.6	10	11.00	0.0130
4233	846.6	3.6	20	6.00	0.0071
4233	846.6	3.6	30	8.00	0.0094
4233	846.6	3.6	40	4.00	0.0047
4233	846.6	3.6	50	11.00	0.0130
4233	846.6	3.6	60	-7.00	-0.0083
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	4.1	-30	-5.00	-0.0059
4233	846.6	4.1	-20	0.00	0.0000
4233	846.6	4.1	-10	6.00	0.0071
4233	846.6	4.1	0	8.00	0.0094
4233	846.6	4.1	10	15.00	0.0177
4233	846.6	4.1	20	-5.00	-0.0059
4233	846.6	4.1	30	7.00	0.0083
4233	846.6	4.1	40	3.00	0.0035
4233	846.6	4.1	50	3.00	0.0035
4233	846.6	4.1	60	-6.00	-0.0071
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4233	846.6	4.35	-30	7.00	0.0083
4233	846.6	4.35	-20	15.00	0.0177
4233	846.6	4.35	-10	20.00	0.0236
4233	846.6	4.35	0	7.00	0.0083
4233	846.6	4.35	10	14.00	0.0165
4233	846.6	4.35	20	5.00	0.0059
4233	846.6	4.35	30	10.00	0.0118
4233	846.6	4.35	40	-1.00	-0.0012
4233	846.6	4.35	50	4.00	0.0047
4233	846.6	4.35	60	-6.00	-0.0071

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 2	
	Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013

WCDMA Band 2 results: channels 9262, 9400, & 9538 @ 20°C maximum transmitted power

Traffic Channel Number	WCDMA1900 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	3.6	20	-17.00	-0.0092
9400	1880.00	3.6	20	-18.00	-0.0096
9538	1907.60	3.6	20	-8.00	-0.0042

Traffic Channel Number	WCDMA1900 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.1	20	-12.00	-0.0065
9400	1880.00	4.1	20	-17.00	-0.0090
9538	1907.60	4.1	20	-12.00	-0.0063

Traffic Channel Number	WCDMA1900 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.35	20	-16.00	-0.0086
9400	1880.00	4.35	20	22.00	0.0117
9538	1907.60	4.35	20	-15.00	-0.0079

Test Report No.:
 RTS-6026-1304-16

Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
IC: 2503A-RFM120LW

WCDMA Band 2 Results: channel 9262 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	3.6	-30	-20.00	-0.0108
9262	1852.40	3.6	-20	-4.00	-0.0022
9262	1852.40	3.6	-10	-27.00	-0.0146
9262	1852.40	3.6	0	32.00	0.0173
9262	1852.40	3.6	10	-15.00	-0.0081
9262	1852.40	3.6	20	-17.00	-0.0092
9262	1852.40	3.6	30	15.00	0.0081
9262	1852.40	3.6	40	-17.00	-0.0092
9262	1852.40	3.6	50	-13.00	-0.0070
9262	1852.40	3.6	60	-17.00	-0.0092
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.1	-30	-12.00	-0.0065
9262	1852.40	4.1	-20	18.00	0.0097
9262	1852.40	4.1	-10	-19.00	-0.0103
9262	1852.40	4.1	0	-16.00	-0.0086
9262	1852.40	4.1	10	-24.00	-0.0130
9262	1852.40	4.1	20	-12.00	-0.0065
9262	1852.40	4.1	30	25.00	0.0135
9262	1852.40	4.1	40	-15.00	-0.0081
9262	1852.40	4.1	50	-27.00	-0.0146
9262	1852.40	4.1	60	-18.00	-0.0097
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.35	-30	-18.00	-0.0097
9262	1852.40	4.35	-20	29.00	0.0157
9262	1852.40	4.35	-10	12.00	0.0065
9262	1852.40	4.35	0	15.00	0.0081
9262	1852.40	4.35	10	15.00	0.0081
9262	1852.40	4.35	20	-16.00	-0.0086
9262	1852.40	4.35	30	-15.00	-0.0081
9262	1852.40	4.35	40	-19.00	-0.0103
9262	1852.40	4.35	50	-16.00	-0.0086
9262	1852.40	4.35	60	-27.00	-0.0146

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 RTS-6026-1304-16

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 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
 IC: 2503A-RFM120LW

WCDMA Band 2 Results: channel 9400 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.00	3.6	-30	-12.00	-0.0064
9400	1880.00	3.6	-20	23.00	0.0122
9400	1880.00	3.6	-10	31.00	0.0165
9400	1880.00	3.6	0	-15.00	-0.0080
9400	1880.00	3.6	10	-26.00	-0.0138
9400	1880.00	3.6	20	-18.00	-0.0096
9400	1880.00	3.6	30	26.00	0.0138
9400	1880.00	3.6	40	6.00	0.0032
9400	1880.00	3.6	50	-15.00	-0.0080
9400	1880.00	3.6	60	-13.00	-0.0069
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.00	4.1	-30	-23.00	-0.0122
9400	1880.00	4.1	-20	-5.00	-0.0027
9400	1880.00	4.1	-10	-24.00	-0.0128
9400	1880.00	4.1	0	-31.00	-0.0165
9400	1880.00	4.1	10	12.00	0.0064
9400	1880.00	4.1	20	-17.00	-0.0090
9400	1880.00	4.1	30	-42.00	-0.0223
9400	1880.00	4.1	40	24.00	0.0128
9400	1880.00	4.1	50	-29.00	-0.0154
9400	1880.00	4.1	60	12.00	0.0064
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9400	1880.00	4.35	-30	-7.00	-0.0037
9400	1880.00	4.35	-20	-15.00	-0.0080
9400	1880.00	4.35	-10	23.00	0.0122
9400	1880.00	4.35	0	26.00	0.0138
9400	1880.00	4.35	10	-24.00	-0.0128
9400	1880.00	4.35	20	22.00	0.0117
9400	1880.00	4.35	30	-24.00	-0.0128
9400	1880.00	4.35	40	21.00	0.0112
9400	1880.00	4.35	50	14.00	0.0074
9400	1880.00	4.35	60	-15.00	-0.0080

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Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
 IC: 2503A-RFM120LW

WCDMA Band 2 Results: channel 9538 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	21BPPM
9538	1907.60	3.6	-30	-7.00	-0.0037
9538	1907.60	3.6	-20	21.00	0.0110
9538	1907.60	3.6	-10	23.00	0.0121
9538	1907.60	3.6	0	-24.00	-0.0126
9538	1907.60	3.6	10	-31.00	-0.0163
9538	1907.60	3.6	20	-8.00	-0.0042
9538	1907.60	3.6	30	24.00	0.0126
9538	1907.60	3.6	40	24.00	0.0126
9538	1907.60	3.6	50	-14.00	-0.0073
9538	1907.60	3.6	60	-15.00	-0.0079
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.60	4.1	-30	-24.00	-0.0126
9538	1907.60	4.1	-20	16.00	0.0084
9538	1907.60	4.1	-10	-26.00	-0.0136
9538	1907.60	4.1	0	24.00	0.0126
9538	1907.60	4.1	10	13.00	0.0068
9538	1907.60	4.1	20	-12.00	-0.0063
9538	1907.60	4.1	30	-31.00	-0.0163
9538	1907.60	4.1	40	-17.00	-0.0089
9538	1907.60	4.1	50	15.00	0.0079
9538	1907.60	4.1	60	13.00	0.0068
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	21BPPM
9538	1907.60	4.35	-30	16.00	0.0084
9538	1907.60	4.35	-20	-23.00	-0.0121
9538	1907.60	4.35	-10	21.00	0.0110
9538	1907.60	4.35	0	24.00	0.0126
9538	1907.60	4.35	10	-16.00	-0.0084
9538	1907.60	4.35	20	-15.00	-0.0079
9538	1907.60	4.35	30	-18.00	-0.0094
9538	1907.60	4.35	40	-12.00	-0.0063
9538	1907.60	4.35	50	24.00	0.0126
9538	1907.60	4.35	60	-27.00	-0.0142

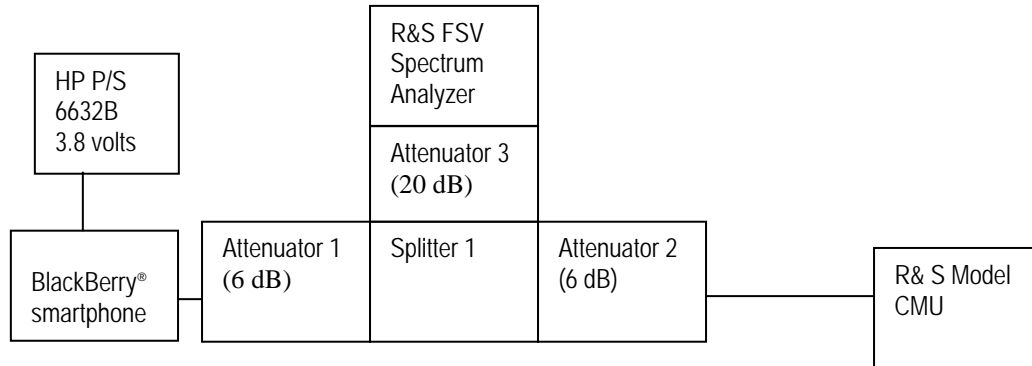
APPENDIX 3A– CDMA CONDUCTED RF EMISSIONS TEST DATA/PLOTS

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

CDMA Conducted RF Emission Test Data

This appendix contains measurement data pertaining to conducted spurious emissions, 99% power bandwidth and the channel mask on BlackBerry® smartphone.

Test Setup Diagram



A reference offset of 31.4 dB was applied to the spectrum analyzer reference level for the attenuators and coaxial cable loss in the test circuit.


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

The environmental test conditions were:

Date of Test: April 9 - 10, 2013

The environmental test conditions were: Temperature: 22 - 24.0 °C
Relative Humidity: 27 - 35.0 %

The following measurements were performed by Berkin Can.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 3A	
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CDMA Conducted RF Emission Test Data cont'd

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 22.917, CFR 24.238 and RSS-132 4.5 and RSS-133, 6.5 were measured from 30 MHz to 20 GHz. The EUT emissions were in the noise floor.

Test Data for CDMA Cellular and PCS selected Frequencies in Loopback mode

CDMA Cellular Frequency (MHz)	99% Occupied Bandwidth (MHz)
824.70	1.279
836.52	1.274
848.31	1.274

CDMA PCS Frequency (MHz)	99% Occupied Bandwidth (MHz)
1851.20	1.279
1880.00	1.279
1908.75	1.279

Test Data for CDMA Cellular and PCS selected Frequencies in Loopback mode


Refer to the following measurement plots for more detail.

See Figures 3-1a to 3-12a for the plots of the conducted spurious emissions.

See Figures 3-13a to 3-18a for the plots of 99% Occupied Bandwidth.

See Figures 3-19a to 3-24a for the plots of the Channel mask.

The RF power output was at maximum for all the recorded measurements shown below.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
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CDMA Conducted RF Emission Test Data cont'd

Test Data for CDMA Cellular and CDMA PCS selected Frequencies in EVDO mode

Cellular Frequency (MHz)	99% Occupied Bandwidth (MHz)
824.70	1.274
836.52	1.274
848.31	1.271

PCS Frequency (MHz)	99% Occupied Bandwidth (MHz)
1851.20	1.271
1880.00	1.271
1908.75	1.276

Measurement Plots for CDMA Cellular and CDMA PCS in EVDO mode


Refer to the following measurement plots for more detail.

See Figures 3-25a to 3-36a for the plots of the conducted spurious emissions.

See Figures 3-37a to 3-42a for the plots of 99% Occupied Bandwidth.

See Figures 3-43a to 3-46a for the plots of the Channel mask.

The RF power output was at maximum for all the recorded measurements shown below.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
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CDMA Conducted RF Emission Test Data cont'd

Figure 3-1a: Spurious Conducted Emissions Cellular Loopback mode, Low channel

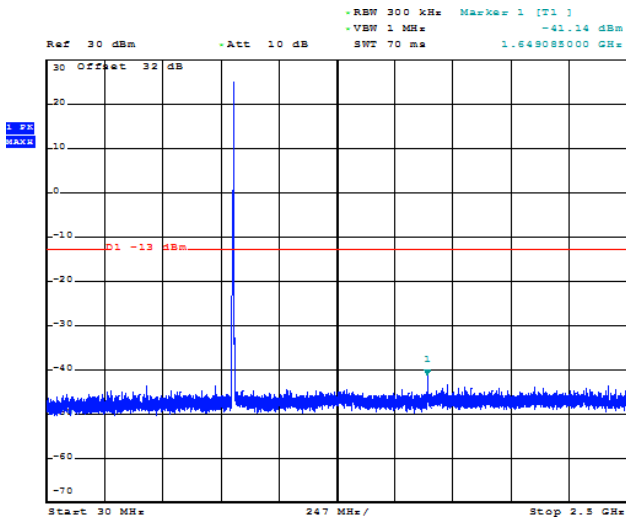


Figure 3-2a: Spurious Conducted Emissions Cellular Loopback mode, Low channel

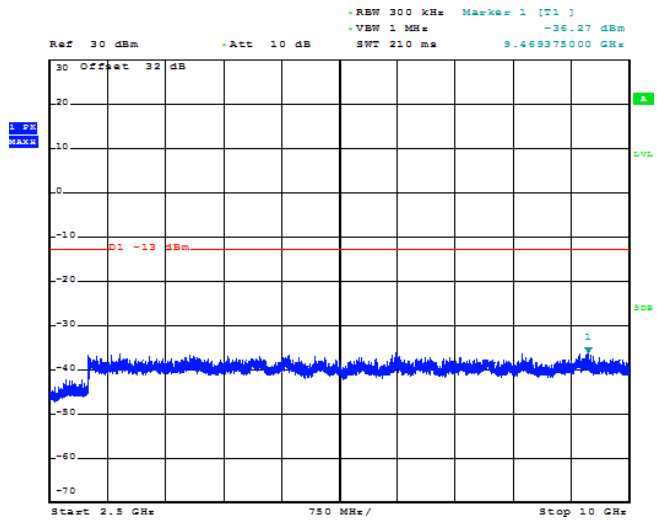


Figure 3-3a: Spurious Conducted Emissions Cellular Loopback mode, Middle channel

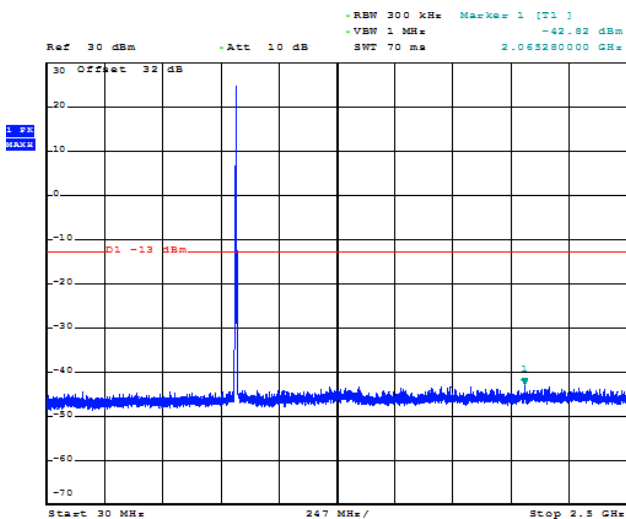
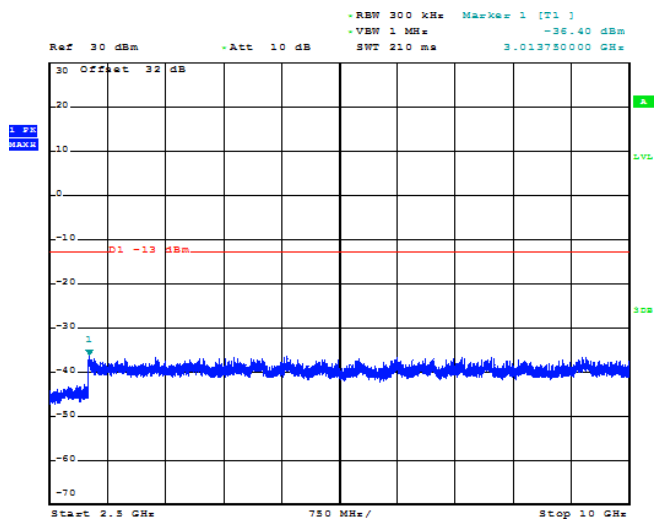


Figure 3-4a: Spurious Conducted Emissions Cellular Loopback mode, Middle channel



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CDMA Conducted RF Emission Test Data cont'd

Figure 3-5a: Spurious Conducted Emissions Cellular Loopback mode, High Channel

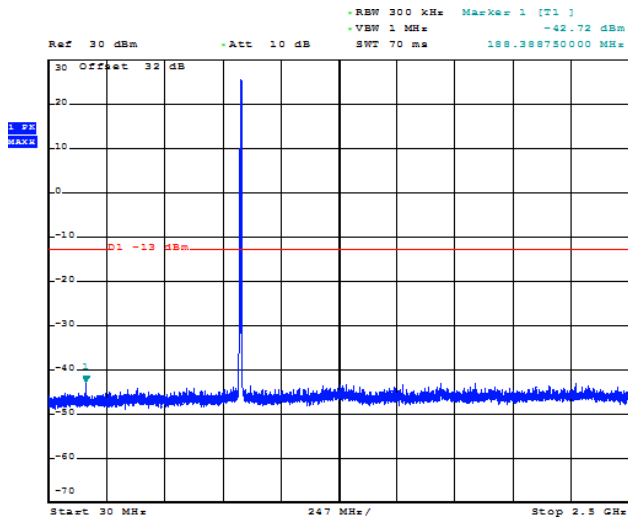


Figure 3-6a: Spurious Conducted Emissions Cellular Loopback mode, High Channel

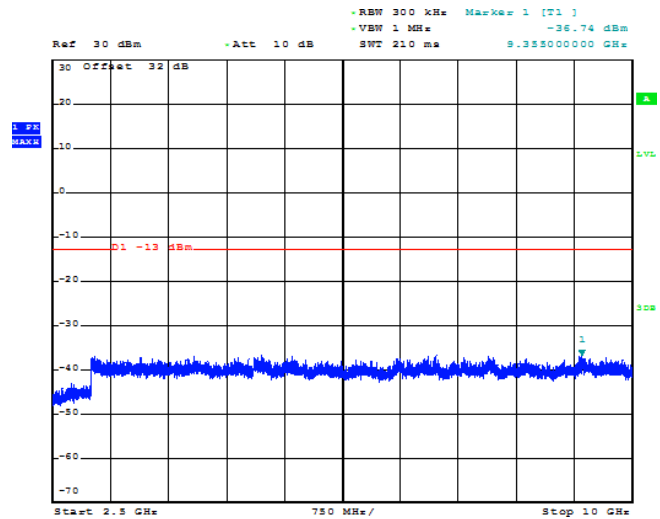


Figure 3-7a: Spurious Conducted Emissions PCS Loopback mode, Low Channel

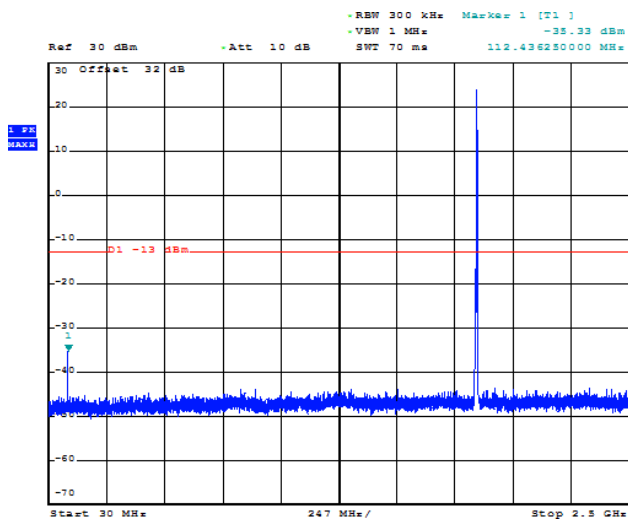
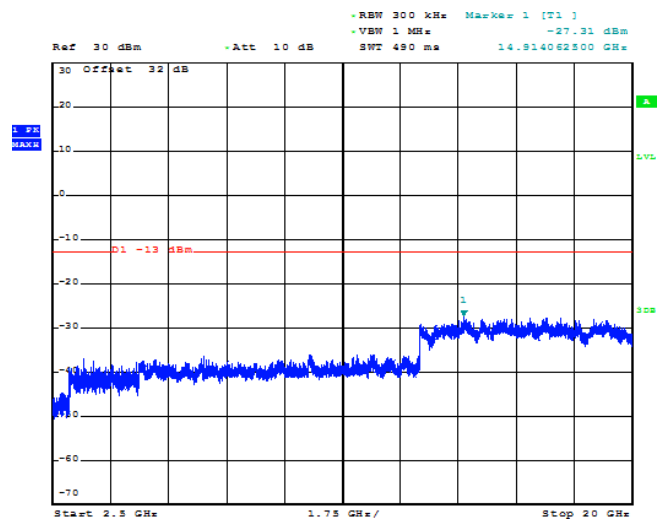


Figure 3-8a: Spurious Conducted Emissions PCS Loopback mode, Low Channel



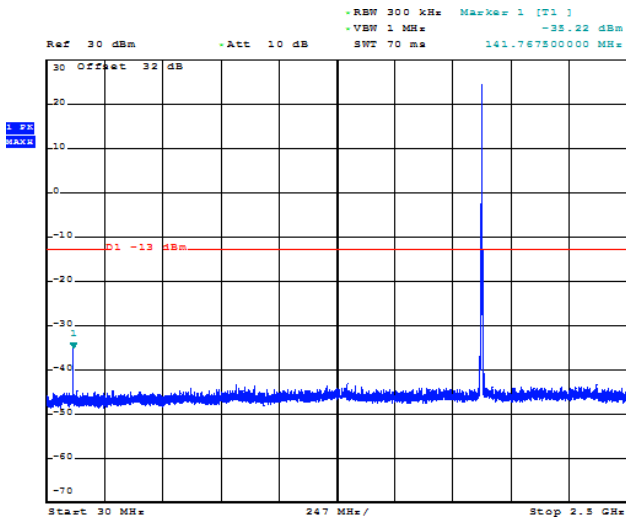
Test Report No.:
 RTS-6026-1304-16

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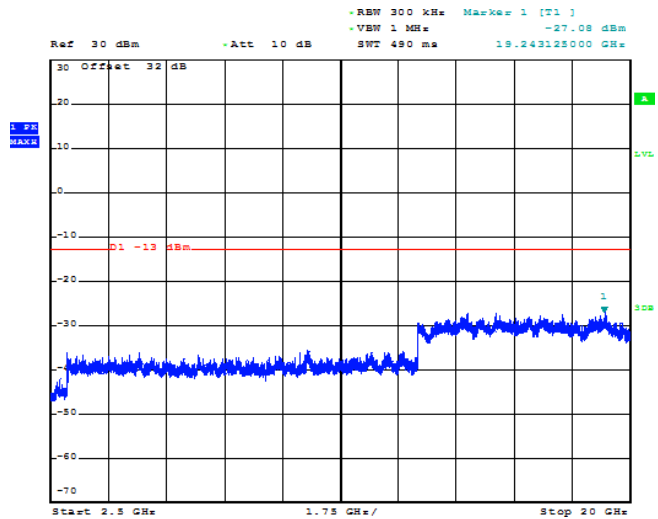
FCC ID: L6ARFM120LW
 IC: 2503A-RFM120LW

CDMA Conducted RF Emission Test Data cont'd

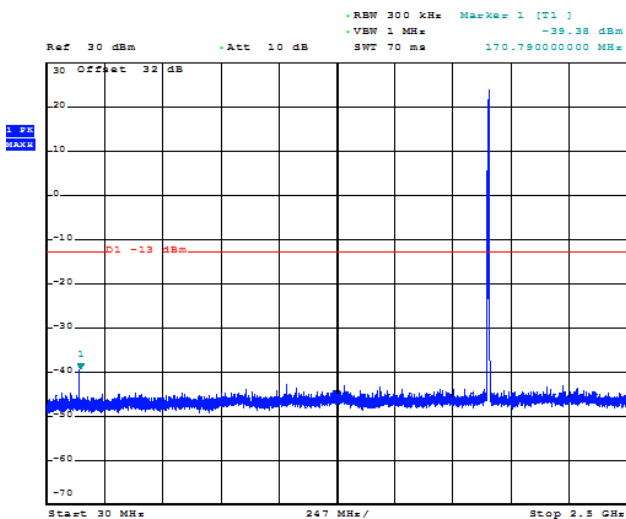
**Figure 3-9a: Spurious Conducted Emissions
 PCS Loopback mode, Middle Channel**



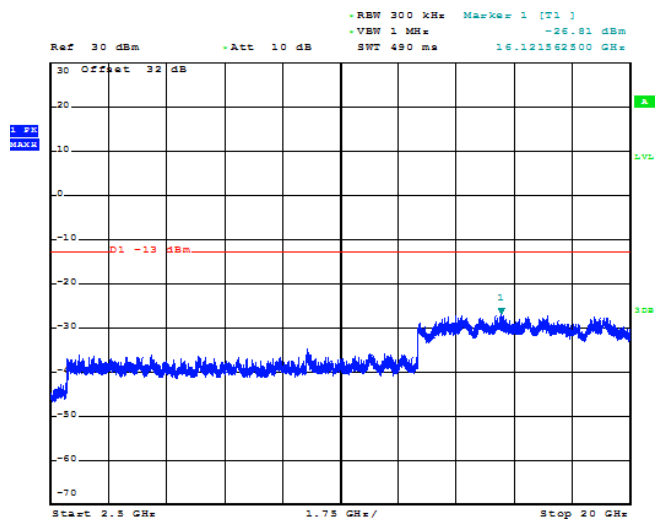
**Figure 3-10a: Spurious Conducted Emissions
 PCS Loopback mode, Middle Channel**




**Figure 3-11a: Spurious Conducted Emissions
 PCS Loopback mode, High Channel**



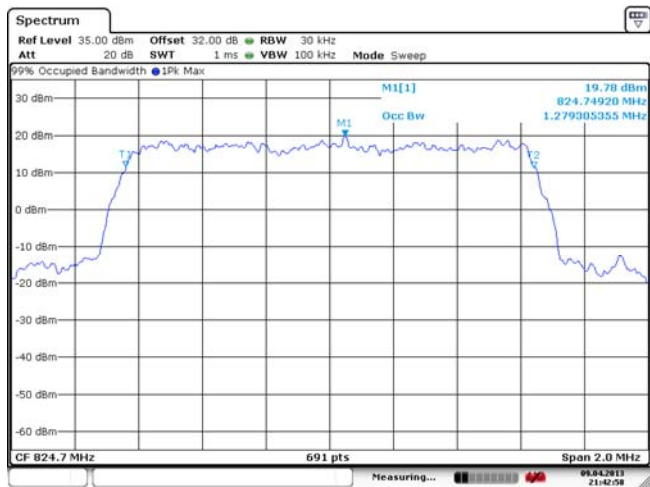
**Figure 3-12a: Spurious Conducted Emissions
 PCS Loopback mode, High Channel**



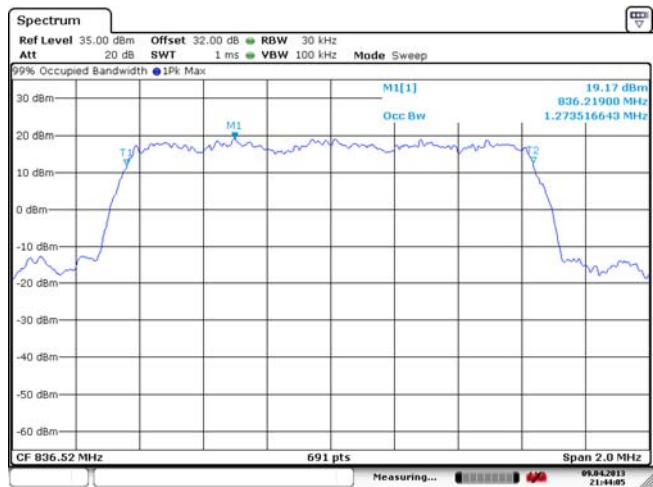
	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
	Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013

CDMA Conducted RF Emission Test Data cont'd

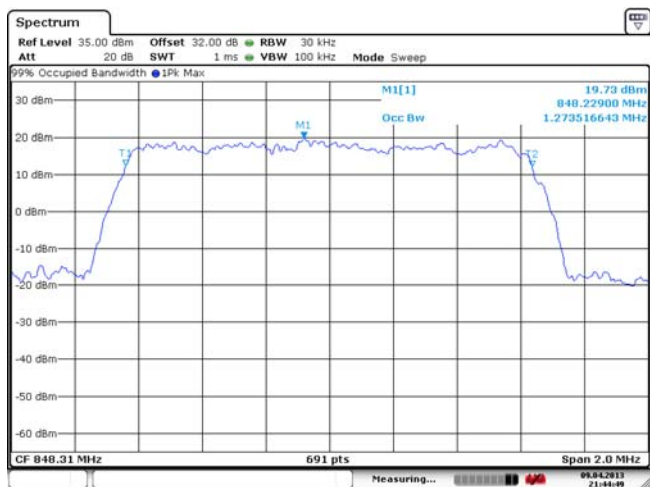
**Figure 3-13a: Occupied Bandwidth
Cellular Loopback mode, Low Channel**



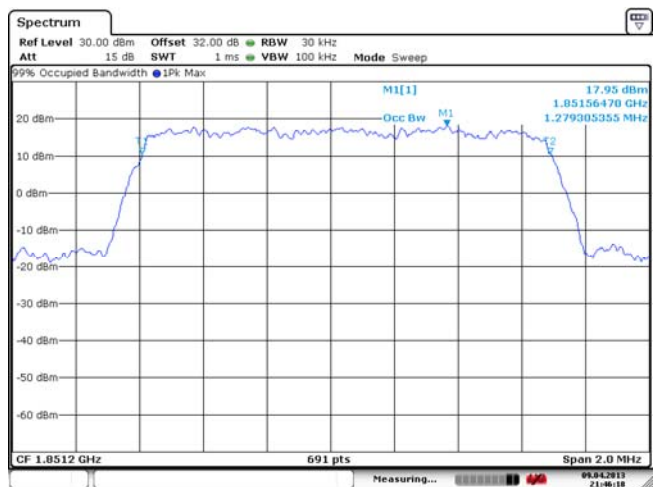
**Figure 3-14a: Occupied Bandwidth
Cellular Loopback mode, Middle Channel**




**Figure 3-15a: Occupied Bandwidth
Cellular Loopback mode, High Channel**



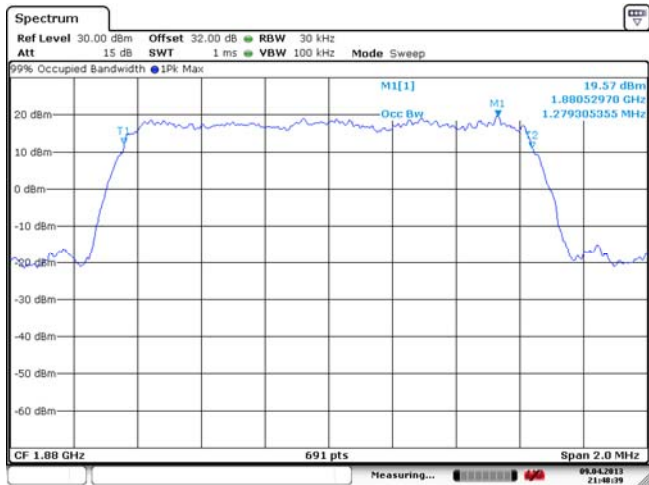
**Figure 3-16a: Occupied Bandwidth
PCS Loopback mode, Low Channel**



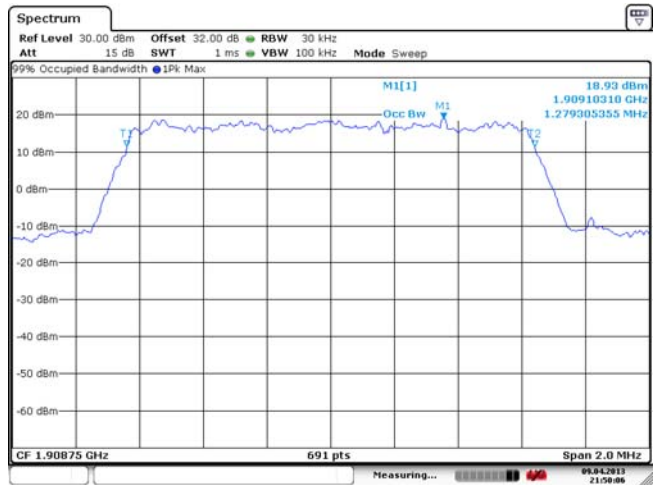
	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
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CDMA Conducted RF Emission Test Data cont'd

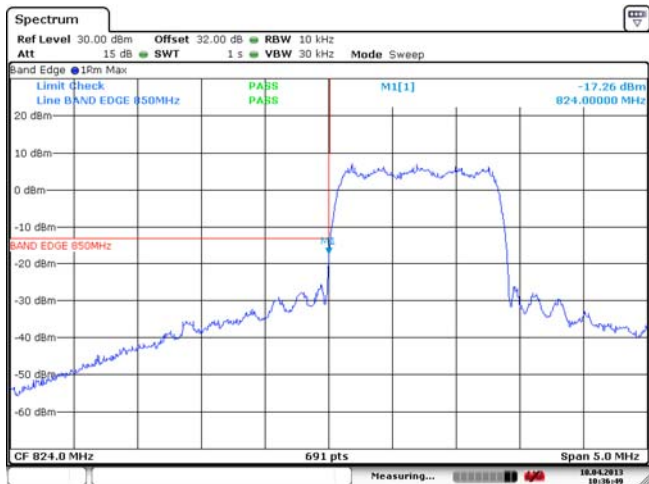
**Figure 3-17a: Occupied Bandwidth
PCS Loopback mode, Middle Channel**



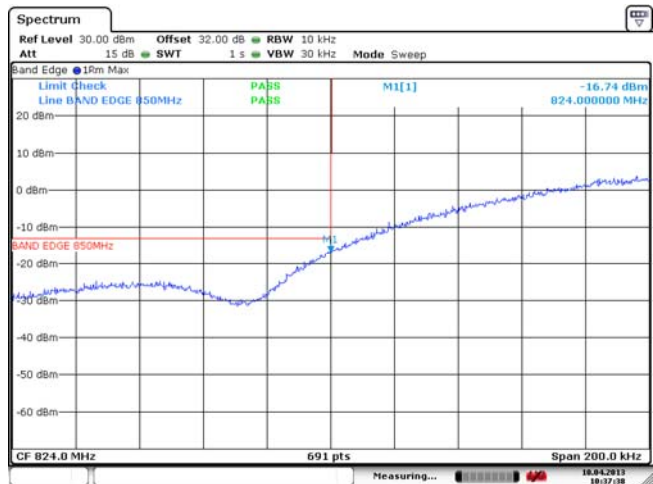
**Figure 3-18a: Occupied Bandwidth
PCS Loopback mode, High Channel**




**Figure 3-19a: Low Channel Mask
Cellular Loopback mode**



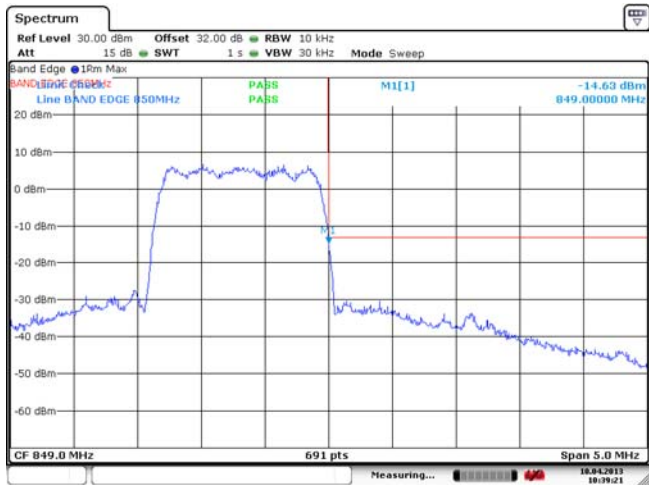
**Figure 3-20a: Low Channel Mask
Cellular Loopback mode**



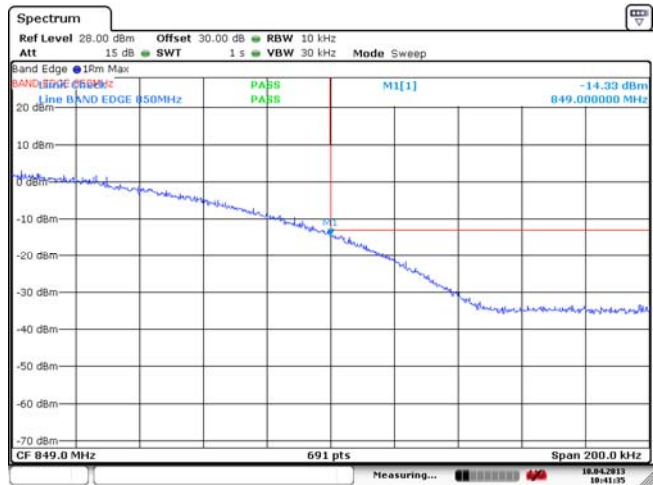
	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
	Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013

CDMA Conducted RF Emission Test Data cont'd

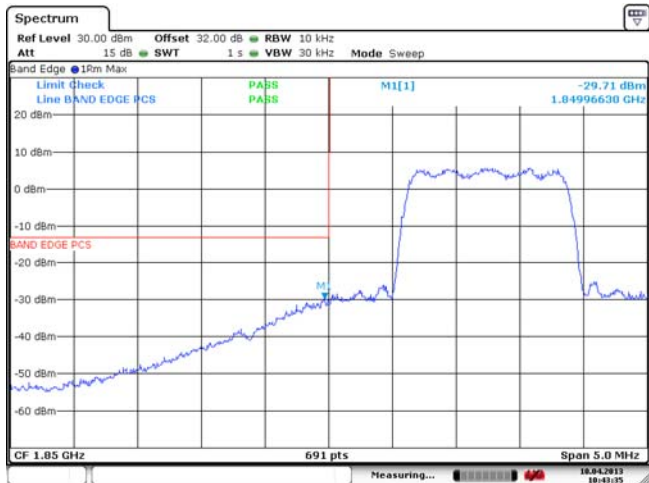
**Figure 3-21a: High Channel Mask
Cellular Loopback mode**



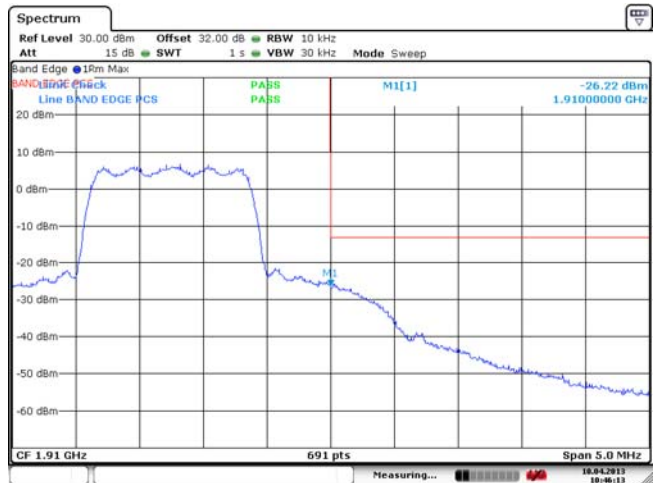
**Figure 3-22a: High Channel Mask
Cellular Loopback mode**



**Figure 3-23a: Low Channel Mask
PCS Loopback mode**



**Figure 3-24a: High Channel Mask
PCS Loopback mode**



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CDMA Conducted RF Emission Test Data cont'd

Figure 3-25a: Spurious Conducted Emissions Cellular EVDO mode, Low channel

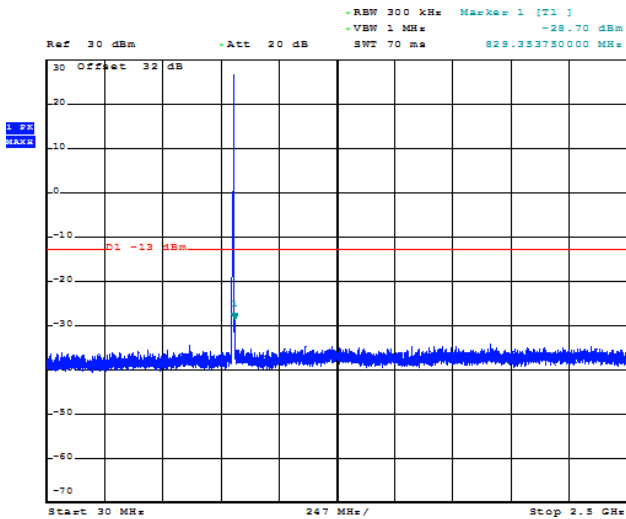


Figure 3-26b: Spurious Conducted Emissions Cellular EVDO mode, Low channel

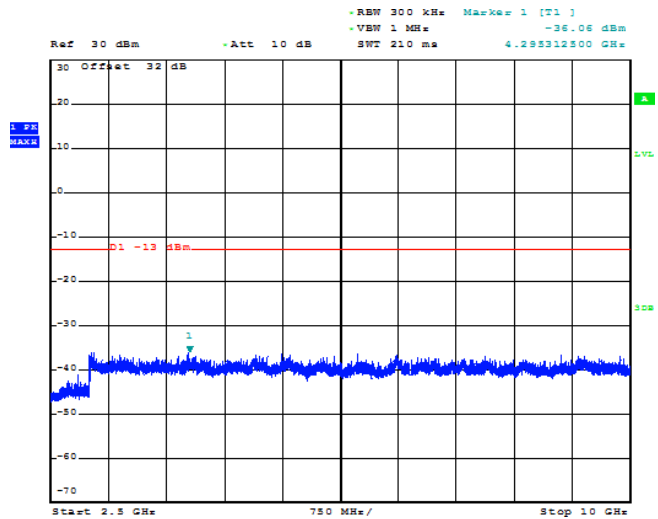


Figure 3-27a: Spurious Conducted Emissions Cellular EVDO mode, Middle channel

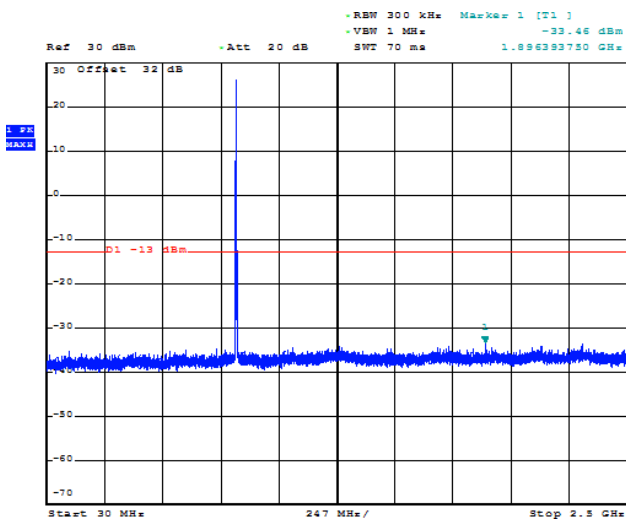
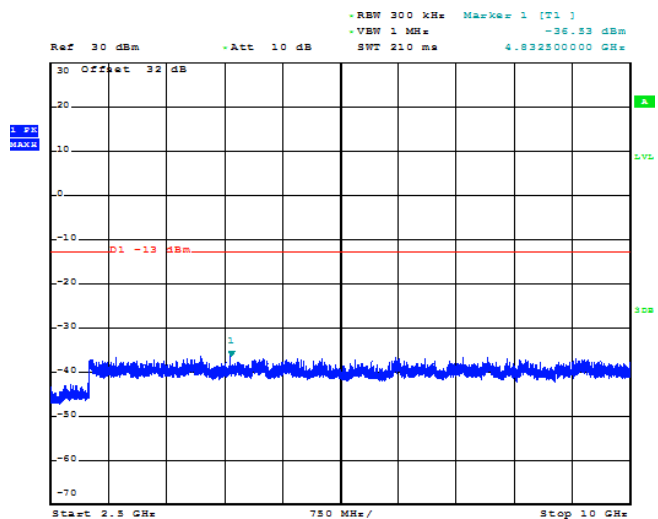



Figure 3-28a: Spurious Conducted Emissions Cellular EVDO mode, Middle channel



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CDMA Conducted RF Emission Test Data cont'd

Figure 3-29a: Spurious Conducted Emissions Cellular EVDO mode, High Channel

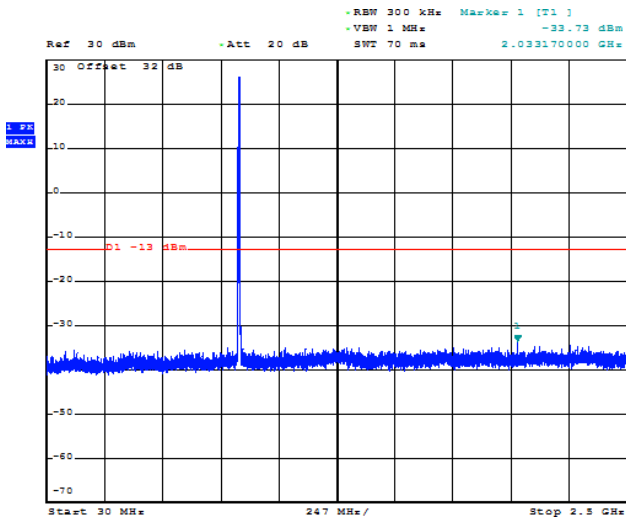


Figure 3-30a: Spurious Conducted Emissions Cellular EVDO mode, High Channel

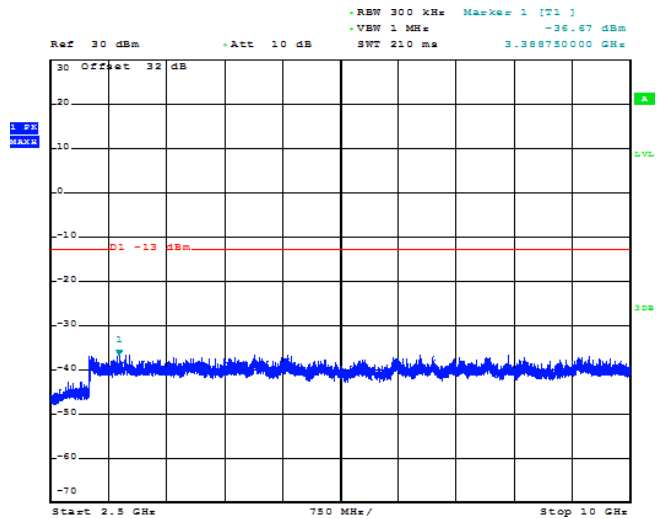


Figure 3-31a: Spurious Conducted Emissions PCS EVDO mode, Low Channel

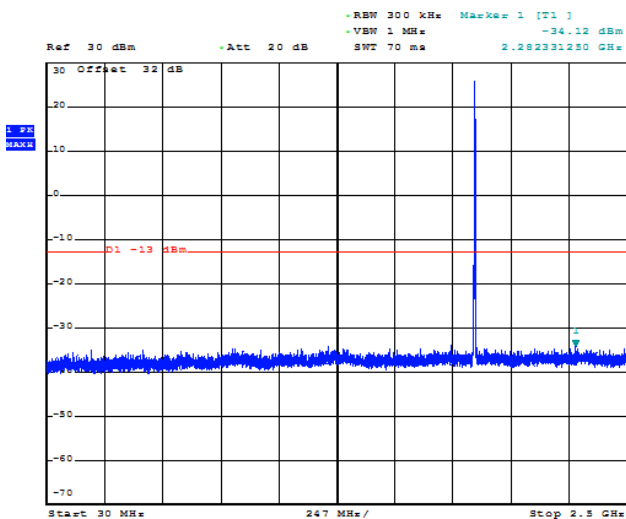
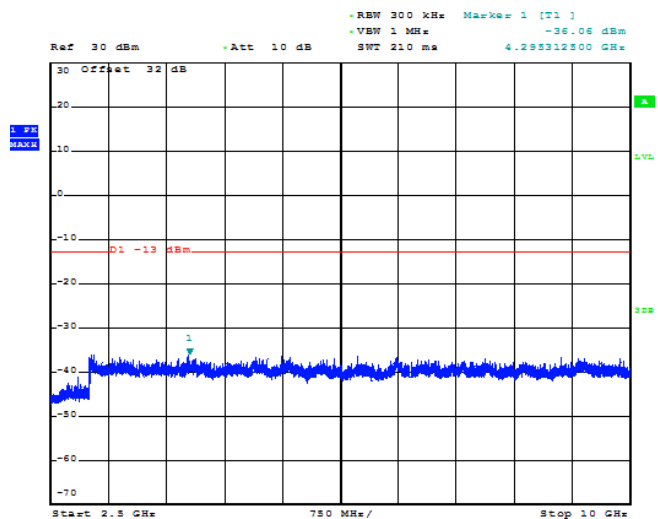



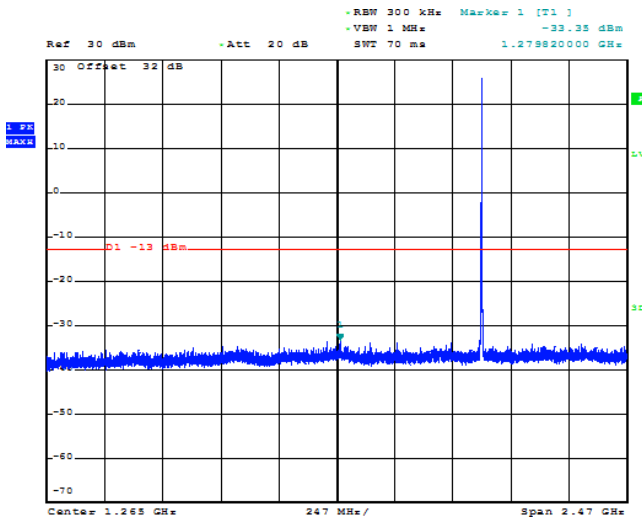
Figure 3-32a: Spurious Conducted Emissions PCS EVDO mode, Low Channel



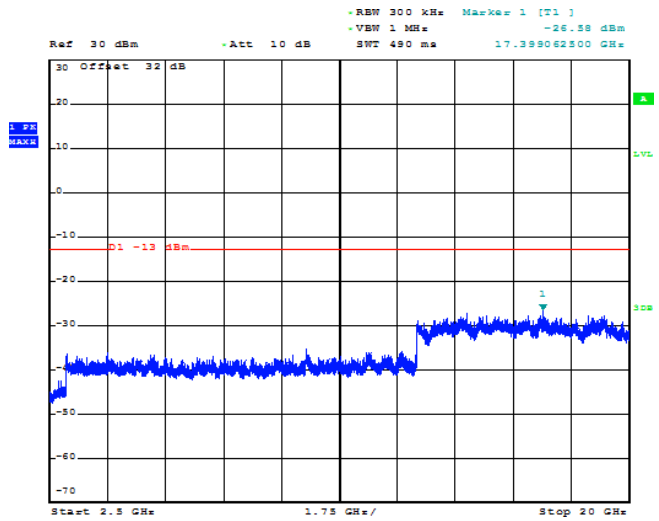
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CDMA Conducted RF Emission Test Data cont'd

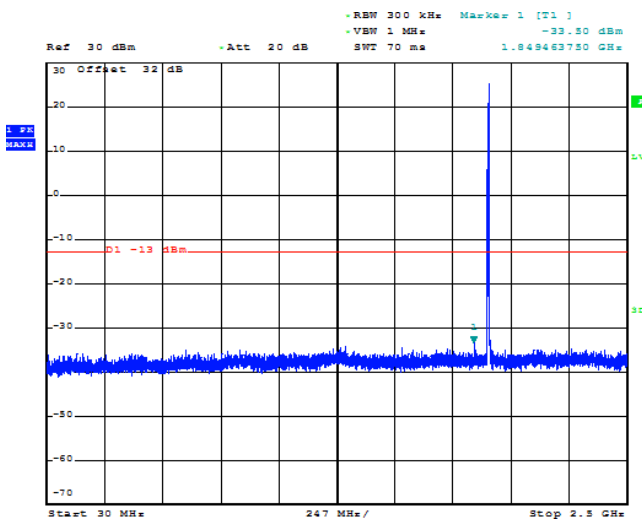
**Figure 3-33a: Spurious Conducted Emissions
PCS EVDO mode, Middle Channel**



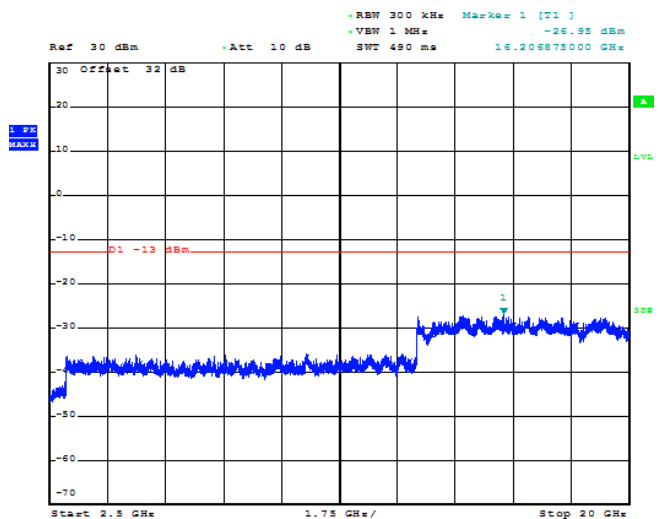
**Figure 3-34a: Spurious Conducted Emissions
PCS EVDO mode, Middle Channel**



**Figure 3-35a: Spurious Conducted Emissions
PCS EVDO mode, High Channel**



**Figure 3-36a: Spurious Conducted Emissions
PCS EVDO mode, High Channel**



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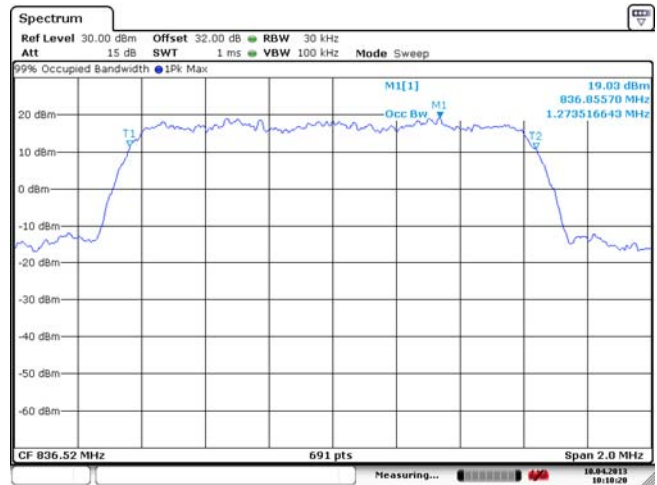
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CDMA Conducted RF Emission Test Data cont'd

**Figure 3-37a: Occupied Bandwidth
 Cellular EVDO mode, Low Channel**



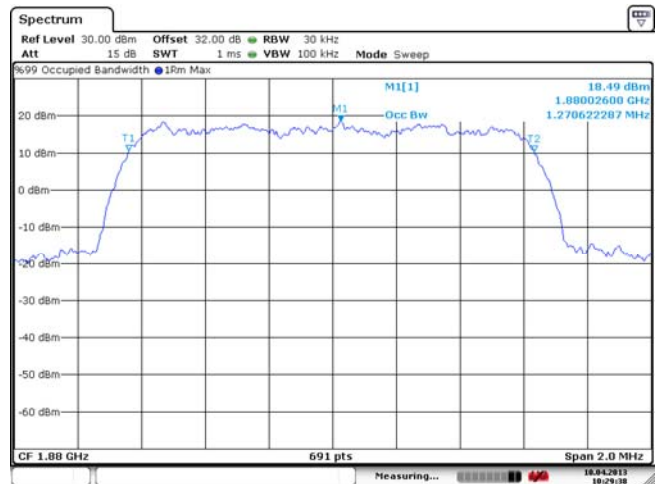
**Figure 3-38a: Occupied Bandwidth
 Cellular EVDO mode, Middle Channel**




**Figure 3-39a: Occupied Bandwidth
 Cellular EVDO mode, High Channel**



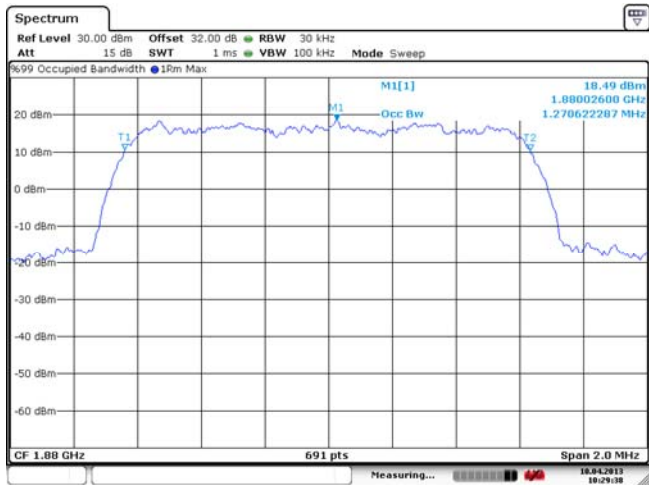
**Figure 3-40a: Occupied Bandwidth
 PCS EVDO mode, Low Channel**



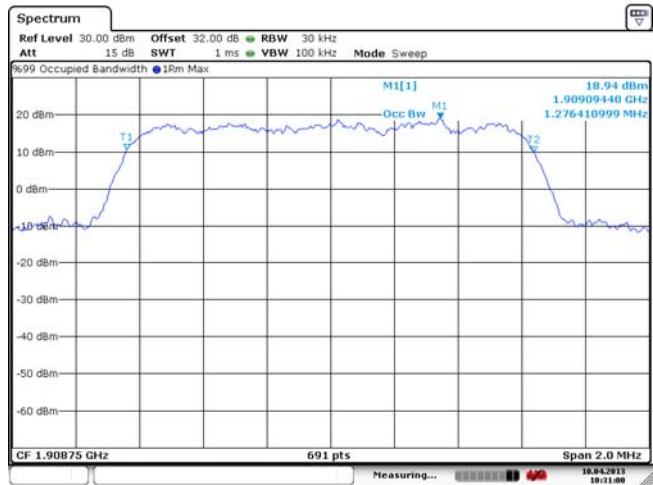
	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3A	
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CDMA Conducted RF Emission Test Data cont'd

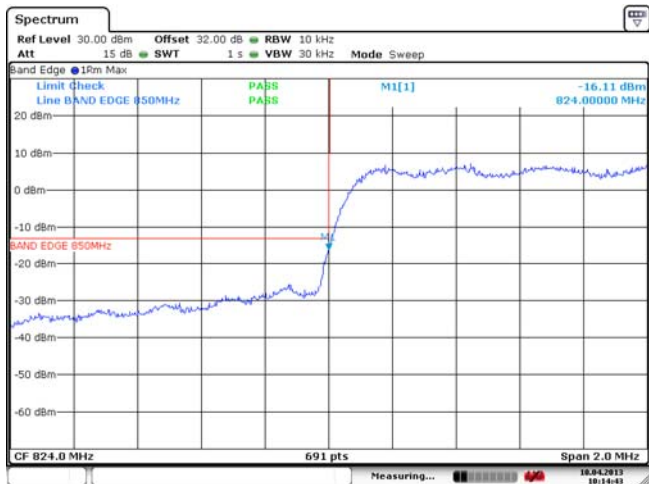
**Figure 3-41a: Occupied Bandwidth
PCS EVDO mode, Middle Channel**



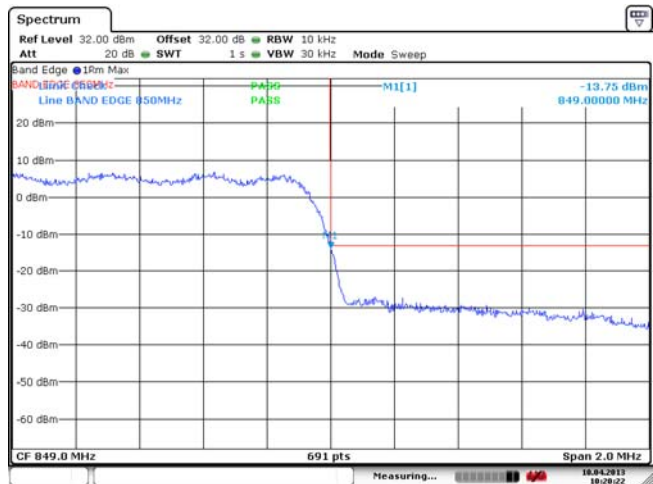
**Figure 3-42a: Occupied Bandwidth
PCS EVDO mode, High Channel**




**Figure 3-43a: Low Channel Mask
Cellular EVDO mode**



**Figure 3-44a: High Channel Mask
Cellular EVDO mode**

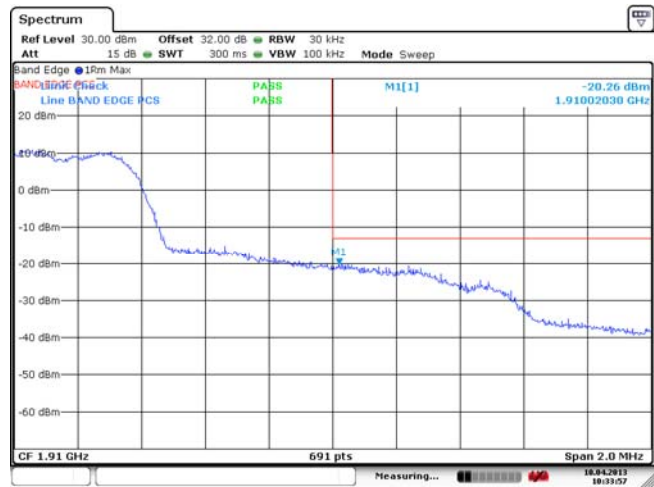
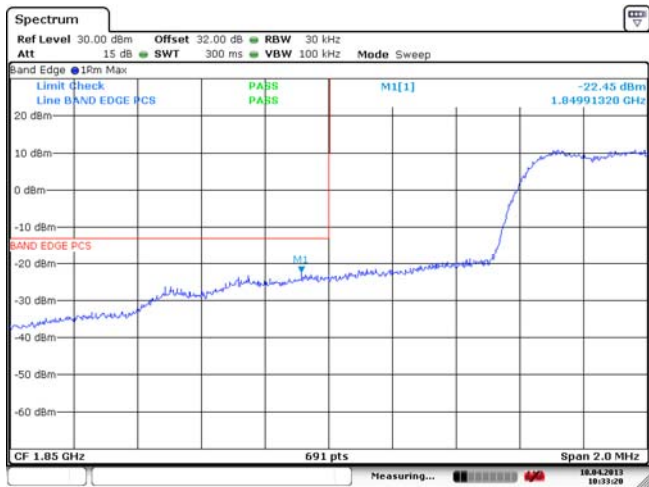


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CDMA Conducted RF Emission Test Data cont'd

**Figure 3-45a: Low Channel Mask
PCS EVDO mode**

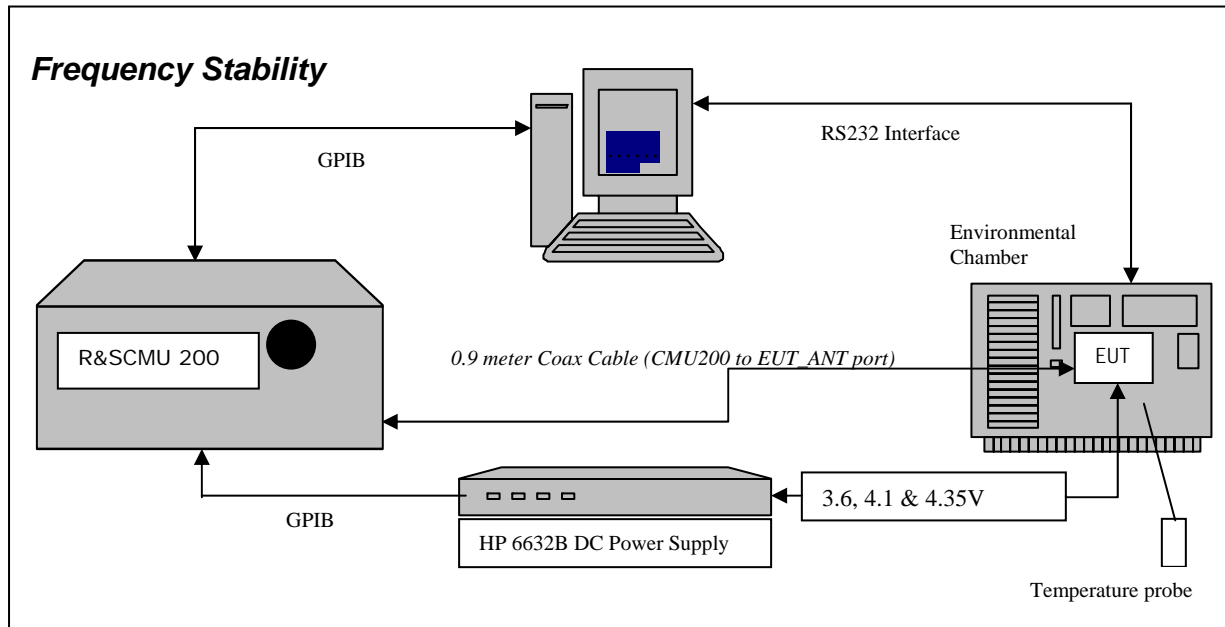
**Figure 3-46a: High Channel Mask
PCS EVDO mode**



APPENDIX 3B – CDMA FREQUENCY STABILITY TEST DATA

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 3B	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM110LW

CDMA Frequency Stability Test Data



The following measurements were performed by Berkin Can.

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements

2.1055 Frequency Stability - Procedures

(a,b) Frequency Stability - Temperature Variation


(d) Frequency Stability - Voltage Variation

24.235 Frequency Stability.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, CFR 47 chapter 1, Section 22.917 RSS-132, 4.3 Frequency Stability, and RSS-133, 6.3 Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMU 200 and the EUT antenna port.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 3B	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM110LW

Test Setup:


The EUT was placed in the Temperature chamber and connected to CMU 200 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the following measurements were to be made.

The chamber was switched on and the temperature was set to -30°C. After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled. The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMU 200 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, 4.1 volts and to 4.35 volts maximum voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 4.1 volts and 4.35 volts. The transmit frequency was varied in 3 steps consisting of 824.70, 836.52, and 848.31 MHz for the cellular band and 1851.20, 1880.00 and 1908.75 MHz for the PCS band. This frequency was recorded in MHz and deviation from nominal, in Parts per Million. After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
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Procedure:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

15. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
16. Start test program
17. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
18. Set power supply voltage to 3.6 volts.
19. Set up CMU 200 Radio Communication Tester.
20. Command the CMU 200 to switch to the low channel.
21. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
22. EUT is commanded to Transmit 100 Bursts.
23. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
24. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
25. Repeat steps 5 to 10 changing the supply voltage to 3.6 Volts
26. Increase temperature by 10°C and soak for 1/2 hour.
27. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
28. Repeat steps 5 to 10 changing the supply voltage to 4.1 volts
29. Repeat steps 5 to 10 changing the supply voltage to 4.35 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 4.1 and 4.35 volts

The maximum frequency error in the CDMA Cellular measured was **0.0594 PPM**.
The maximum frequency error in the CDMA PCS measured was **0.0186 PPM**.

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	APPENDIX 3B	
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Date of test: March 16 - 17, 2013

CDMA Cellular Channel results: channels 1013, 384 and 777 @ 20°C maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	3.6	20	-15.00	-0.0182
384	836.52	3.6	20	-24.00	-0.0287
777	848.31	3.6	20	-17.00	-0.0200

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	4.1	20	-12.00	-0.0146
384	836.52	4.1	20	-20.00	-0.0239
777	848.31	4.1	20	-15.00	-0.0177

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	4.35	20	44.00	0.0534
384	836.52	4.35	20	-17.00	-0.0203
777	848.31	4.35	20	-16.00	-0.0189

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CDMA Cellular Results:: channel 4132 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	3.6	-30	-29.00	-0.0352
1013	824.70	3.6	-20	-16.00	-0.0194
1013	824.70	3.6	-10	-18.00	-0.0218
1013	824.70	3.6	0	-20.00	-0.0243
1013	824.70	3.6	10	-18.00	-0.0218
1013	824.70	3.6	20	-15.00	-0.0182
1013	824.70	3.6	30	-20.00	-0.0243
1013	824.70	3.6	40	-15.00	-0.0182
1013	824.70	3.6	50	-14.00	-0.0170
1013	824.70	3.6	60	-14.00	-0.0170
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	4.1	-30	-27.00	-0.0327
1013	824.70	4.1	-20	-12.00	-0.0146
1013	824.70	4.1	-10	-10.00	-0.0121
1013	824.70	4.1	0	-16.00	-0.0194
1013	824.70	4.1	10	-14.00	-0.0170
1013	824.70	4.1	20	-12.00	-0.0146
1013	824.70	4.1	30	-14.00	-0.0170
1013	824.70	4.1	40	-12.00	-0.0146
1013	824.70	4.1	50	-10.00	-0.0121
1013	824.70	4.1	60	12.00	0.0146
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	4.35	-30	31.00	0.0376
1013	824.70	4.35	-20	44.00	0.0534
1013	824.70	4.35	-10	45.00	0.0546
1013	824.70	4.35	0	41.00	0.0497
1013	824.70	4.35	10	49.00	0.0594
1013	824.70	4.35	20	44.00	0.0534
1013	824.70	4.35	30	39.00	0.0473
1013	824.70	4.35	40	49.00	0.0594
1013	824.70	4.35	50	43.00	0.0521
1013	824.70	4.35	60	-24.00	-0.0291

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CDMA Cellular Results: channel 384 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
384	836.52	3.6	-30	-34.00	-0.0406
384	836.52	3.6	-20	-19.00	-0.0227
384	836.52	3.6	-10	-24.00	-0.0287
384	836.52	3.6	0	-21.00	-0.0251
384	836.52	3.6	10	-24.00	-0.0287
384	836.52	3.6	20	-24.00	-0.0287
384	836.52	3.6	30	-23.00	-0.0275
384	836.52	3.6	40	-23.00	-0.0275
384	836.52	3.6	50	-20.00	-0.0239
384	836.52	3.6	60	-23.00	-0.0275
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
384	836.52	4.1	-30	-36.00	-0.0430
384	836.52	4.1	-20	-22.00	-0.0263
384	836.52	4.1	-10	-16.00	-0.0191
384	836.52	4.1	0	-22.00	-0.0263
384	836.52	4.1	10	-20.00	-0.0239
384	836.52	4.1	20	-20.00	-0.0239
384	836.52	4.1	30	-23.00	-0.0275
384	836.52	4.1	40	-30.00	-0.0359
384	836.52	4.1	50	-22.00	-0.0263
384	836.52	4.1	60	-18.00	-0.0215
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
384	836.52	4.35	-30	-35.00	-0.0418
384	836.52	4.35	-20	-18.00	-0.0215
384	836.52	4.35	-10	-19.00	-0.0227
384	836.52	4.35	0	-20.00	-0.0239
384	836.52	4.35	10	-20.00	-0.0239
384	836.52	4.35	20	-17.00	-0.0203
384	836.52	4.35	30	-20.00	-0.0239
384	836.52	4.35	40	-25.00	-0.0299
384	836.52	4.35	50	-20.00	-0.0239
384	836.52	4.35	60	-20.00	-0.0239


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CDMA Cellular Results: channel 777 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
777	848.31	3.6	-30	-30.00	-0.0354
777	848.31	3.6	-20	-21.00	-0.0248
777	848.31	3.6	-10	-21.00	-0.0248
777	848.31	3.6	0	-18.00	-0.0212
777	848.31	3.6	10	-13.00	-0.0153
777	848.31	3.6	20	-17.00	-0.0200
777	848.31	3.6	30	-15.00	-0.0177
777	848.31	3.6	40	-10.00	-0.0118
777	848.31	3.6	50	-15.00	-0.0177
777	848.31	3.6	60	-12.00	-0.0141
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
777	848.31	4.1	-30	-30.00	-0.0354
777	848.31	4.1	-20	-15.00	-0.0177
777	848.31	4.1	-10	-18.00	-0.0212
777	848.31	4.1	0	-23.00	-0.0271
777	848.31	4.1	10	-13.00	-0.0153
777	848.31	4.1	20	-15.00	-0.0177
777	848.31	4.1	30	-17.00	-0.0200
777	848.31	4.1	40	-17.00	-0.0200
777	848.31	4.1	50	-20.00	-0.0236
777	848.31	4.1	60	-15.00	-0.0177
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
777	848.31	4.35	-30	-28.00	-0.0330
777	848.31	4.35	-20	-8.00	-0.0094
777	848.31	4.35	-10	-10.00	-0.0118
777	848.31	4.35	0	-10.00	-0.0118
777	848.31	4.35	10	-19.00	-0.0224
777	848.31	4.35	20	-16.00	-0.0189
777	848.31	4.35	30	-12.00	-0.0141
777	848.31	4.35	40	-18.00	-0.0212
777	848.31	4.35	50	-15.00	-0.0177
777	848.31	4.35	60	-16.00	-0.0189

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CDMA PCS Channel results: channels 25, 600, & 1175 @ 20°C maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	3.6	20	28.00	0.0151
600	1880.00	3.6	20	26.00	0.0138
1175	1908.75	3.6	20	-18.00	-0.0094

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	4.1	20	30.00	0.0162
600	1880.00	4.1	20	30.00	0.0160
1175	1908.75	4.1	20	-10.00	-0.0052

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	4.35	20	19.00	0.0103
600	1880.00	4.35	20	30.00	0.0160
1175	1908.75	4.35	20	-11.00	-0.0058

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CDMA PCS Results: channel 25 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	3.6	-30	14.00	0.0076
25	1851.20	3.6	-20	26.00	0.0140
25	1851.20	3.6	-10	26.00	0.0140
25	1851.20	3.6	0	21.00	0.0113
25	1851.20	3.6	10	25.00	0.0135
25	1851.20	3.6	20	28.00	0.0151
25	1851.20	3.6	30	29.00	0.0157
25	1851.20	3.6	40	24.00	0.0130
25	1851.20	3.6	50	25.00	0.0135
25	1851.20	3.6	-30	17.00	0.0092
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	4.1	-30	16.00	0.0086
25	1851.20	4.1	-20	23.00	0.0124
25	1851.20	4.1	-10	23.00	0.0124
25	1851.20	4.1	0	29.00	0.0157
25	1851.20	4.1	10	30.00	0.0162
25	1851.20	4.1	20	30.00	0.0162
25	1851.20	4.1	30	25.00	0.0135
25	1851.20	4.1	40	27.00	0.0146
25	1851.20	4.1	50	30.00	0.0162
25	1851.20	4.1	60	16.00	0.0086
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	4.35	-30	17.00	0.0092
25	1851.20	4.35	-20	14.00	0.0076
25	1851.20	4.35	-10	28.00	0.0151
25	1851.20	4.35	0	27.00	0.0146
25	1851.20	4.35	10	30.00	0.0162
25	1851.20	4.35	20	24.00	0.0130
25	1851.20	4.35	30	19.00	0.0103
25	1851.20	4.35	40	25.00	0.0135
25	1851.20	4.35	50	31.00	0.0167
25	1851.20	4.35	60	22.00	0.0119

Test Report No.:
 RTS-6026-1304-16

Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
 IC: 2503A-RFM110LW

CDMA PCS Results: channel 600 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
600	1880.00	3.6	-30	17.00	0.0090
600	1880.00	3.6	-20	32.00	0.0170
600	1880.00	3.6	-10	24.00	0.0128
600	1880.00	3.6	0	30.00	0.0160
600	1880.00	3.6	10	34.00	0.0181
600	1880.00	3.6	20	26.00	0.0138
600	1880.00	3.6	30	29.00	0.0154
600	1880.00	3.6	40	30.00	0.0160
600	1880.00	3.6	50	32.00	0.0170
600	1880.00	3.6	60	15.00	0.0080
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
600	1880.00	4.1	-30	18.00	0.0096
600	1880.00	4.1	-20	29.00	0.0154
600	1880.00	4.1	-10	24.00	0.0128
600	1880.00	4.1	0	31.00	0.0165
600	1880.00	4.1	10	26.00	0.0138
600	1880.00	4.1	20	30.00	0.0160
600	1880.00	4.1	30	33.00	0.0176
600	1880.00	4.1	40	28.00	0.0149
600	1880.00	4.1	50	25.00	0.0133
600	1880.00	4.1	60	22.00	0.0117
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
600	1880.00	4.35	-30	19.00	0.0101
600	1880.00	4.35	-20	28.00	0.0149
600	1880.00	4.35	-10	28.00	0.0149
600	1880.00	4.35	0	27.00	0.0144
600	1880.00	4.35	10	27.00	0.0144
600	1880.00	4.35	20	30.00	0.0160
600	1880.00	4.35	30	23.00	0.0122
600	1880.00	4.35	40	35.00	0.0186
600	1880.00	4.35	50	31.00	0.0165
600	1880.00	4.35	60	14.00	0.0074

Test Report No.:
 RTS-6026-1304-16


Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
IC: 2503A-RFM110LW

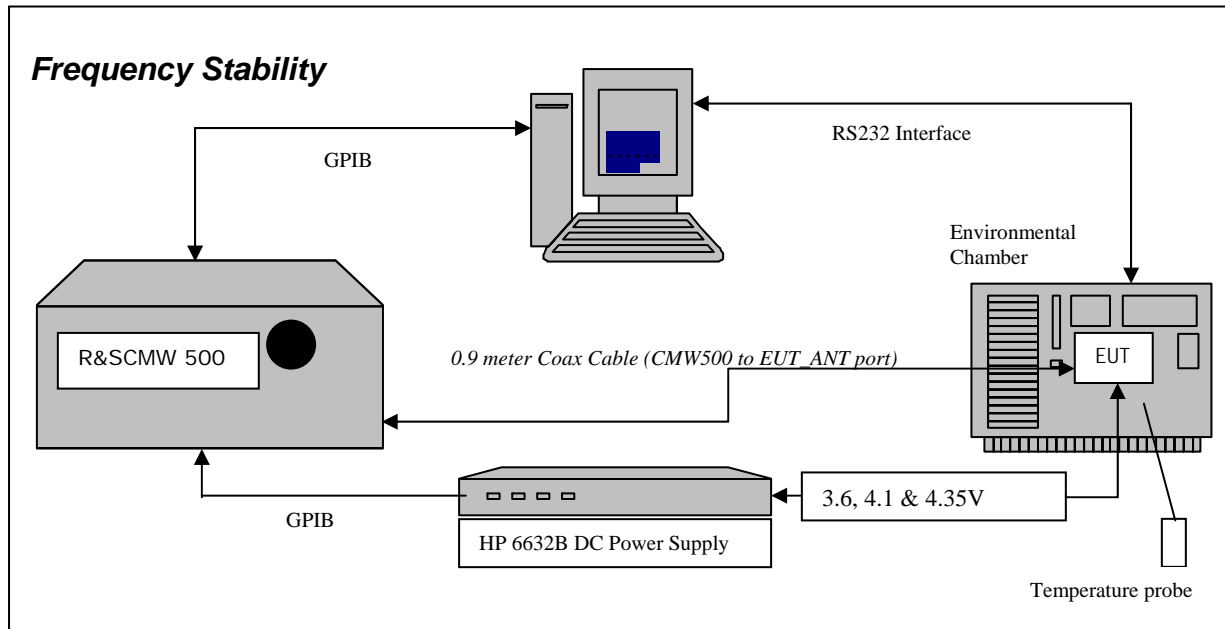
CDMA PCS Results: channel 1175 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1175	1908.75	3.6	-30	-28.00	-0.0147
1175	1908.75	3.6	-20	-12.00	-0.0063
1175	1908.75	3.6	-10	-17.00	-0.0089
1175	1908.75	3.6	0	-16.00	-0.0084
1175	1908.75	3.6	10	-17.00	-0.0089
1175	1908.75	3.6	20	-18.00	-0.0094
1175	1908.75	3.6	30	-14.00	-0.0073
1175	1908.75	3.6	40	-15.00	-0.0079
1175	1908.75	3.6	50	-16.00	-0.0084
1175	1908.75	3.6	60	-13.00	-0.0068
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1175	1908.75	4.1	-30	-18.00	-0.0094
1175	1908.75	4.1	-20	-6.00	-0.0031
1175	1908.75	4.1	-10	-1.00	-0.0005
1175	1908.75	4.1	0	-13.00	-0.0068
1175	1908.75	4.1	10	-8.00	-0.0042
1175	1908.75	4.1	20	-10.00	-0.0052
1175	1908.75	4.1	30	-4.00	-0.0021
1175	1908.75	4.1	40	-5.00	-0.0026
1175	1908.75	4.1	50	-9.00	-0.0047
1175	1908.75	4.1	60	-15.00	-0.0079
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1175	1908.75	4.35	-30	-19.00	-0.0100
1175	1908.75	4.35	-20	-2.00	-0.0010
1175	1908.75	4.35	-10	-6.00	-0.0031
1175	1908.75	4.35	0	-12.00	-0.0063
1175	1908.75	4.35	10	-7.00	-0.0037
1175	1908.75	4.35	20	-11.00	-0.0058
1175	1908.75	4.35	30	-7.00	-0.0037
1175	1908.75	4.35	40	-4.00	-0.0021
1175	1908.75	4.35	50	-12.00	-0.0063
1175	1908.75	4.35	60	-21.00	-0.0110

APPENDIX 4 – LTE Band 4 FREQUENCY STABILITY TEST DATA

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 4	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

LTE Band 4 Frequency Stability Test Data



The following measurements were performed by Berkin Can.


CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements

- 2.1055** Frequency Stability - Procedures
- (a,b) Frequency Stability - Temperature Variation
- (d) Frequency Stability - Voltage Variation

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 27.54, CFR 47 and RSS-139, 6.3 Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMW 500 and the EUT antenna port.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 4	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

Test Setup:

The EUT was placed in the Temperature chamber and connected to CMW 500 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the following measurements were to be made.


The chamber was switched on and the temperature was set to -30°C. After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled. The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMW 500 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, to 4.1 volts and to 4.35 volts maximum voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 4.1 volts and 4.35 volts. The transmit frequency was varied in 3 steps consisting of 1720.0 MHz, 1732.5 MHz and 1745.0 MHz each was measured under 20 MHz bandwidth with maximum (100) resource blocks. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.

After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 4	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW


Procedure:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

30. Switch on the HP 6632B power supply; CMW 500 Communications test Set, and Environmental Chamber.
31. Start test program
32. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
33. Set power supply voltage to 3.6 volts.
34. Set up CMW 500 Radio Communication Tester.
35. Command the CMW 500 to switch to the low channel.
36. Enable the voltage to the EUT, and connect a link to the CMW 500 test set.
37. EUT is commanded to Transmit 100 Bursts.
38. Software logs the following data from the CMW 500, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
39. The CMW 500 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
40. Repeat steps 5 to 10 changing the supply voltage to 4.1 Volts
41. Increase temperature by 10°C and soak for 1/2 hour.
42. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
43. Repeat steps 5 to 10 changing the supply voltage to 4.35 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 4.1 and 4.35 volts

The maximum frequency error in the LTE band 4 measured was **0.0229 PPM**.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 4	
Test Report No.: RTS-6026-1304-16	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

Date of test: March 12, 2013

LTE Band 4 results: channels 20050, 20175 and 20300 @ 20°C maximum transmitted power

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	3.6	20	22.14	0.0119
20175	1732.5	3.6	20	9.62	0.0051
20300	1745.0	3.6	20	21.29	0.0112

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	4.1	20	20.54	0.0110
20175	1732.5	4.1	20	6.03	0.0032
20300	1745.0	4.1	20	23.73	0.0125

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	4.35	20	26.36	0.0142
20175	1732.5	4.35	20	12.69	0.0068
20300	1745.0	4.35	20	7.86	0.0041

Test Report No.:
 RTS-6026-1304-16

Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
IC: 2503A-RFM120LW

LTE band 4 Results: channel 20050 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	3.6	-30	17.64	0.0095
20050	1720.0	3.6	-20	22.41	0.0120
20050	1720.0	3.6	-10	16.23	0.0087
20050	1720.0	3.6	0	24.46	0.0132
20050	1720.0	3.6	10	22.27	0.0120
20050	1720.0	3.6	20	22.14	0.0119
20050	1720.0	3.6	30	20.35	0.0109
20050	1720.0	3.6	40	20.54	0.0110
20050	1720.0	3.6	50	28.60	0.0154
20050	1720.0	3.6	60	21.99	0.0118
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	4.1	-30	21.78	0.0117
20050	1720.0	4.1	-20	23.20	0.0125
20050	1720.0	4.1	-10	24.85	0.0134
20050	1720.0	4.1	0	24.85	0.0134
20050	1720.0	4.1	10	28.28	0.0152
20050	1720.0	4.1	20	20.54	0.0110
20050	1720.0	4.1	30	35.20	0.0189
20050	1720.0	4.1	40	19.74	0.0106
20050	1720.0	4.1	50	16.17	0.0087
20050	1720.0	4.1	60	23.23	0.0125
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	4.35	-30	19.66	0.0106
20050	1720.0	4.35	-20	19.25	0.0103
20050	1720.0	4.35	-10	24.47	0.0132
20050	1720.0	4.35	0	21.54	0.0116
20050	1720.0	4.35	10	22.07	0.0119
20050	1720.0	4.35	20	26.36	0.0142
20050	1720.0	4.35	30	26.97	0.0145
20050	1720.0	4.35	40	20.07	0.0108
20050	1720.0	4.35	50	13.72	0.0074
20050	1720.0	4.35	60	23.33	0.0125

Test Report No.:
 RTS-6026-1304-16

Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
IC: 2503A-RFM120LW

LTE band 4 Results: channel 20175 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20175	1732.5	3.6	-30	21.83	0.0116
20175	1732.5	3.6	-20	17.52	0.0093
20175	1732.5	3.6	-10	7.08	0.0038
20175	1732.5	3.6	0	11.57	0.0062
20175	1732.5	3.6	10	16.49	0.0088
20175	1732.5	3.6	20	9.62	0.0051
20175	1732.5	3.6	30	10.65	0.0057
20175	1732.5	3.6	40	3.46	0.0018
20175	1732.5	3.6	50	26.26	0.0140
20175	1732.5	3.6	60	13.22	0.0070
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20175	1732.5	4.1	-30	8.83	0.0047
20175	1732.5	4.1	-20	10.93	0.0058
20175	1732.5	4.1	-10	19.89	0.0106
20175	1732.5	4.1	0	23.37	0.0124
20175	1732.5	4.1	10	5.49	0.0029
20175	1732.5	4.1	20	6.03	0.0032
20175	1732.5	4.1	30	7.49	0.0040
20175	1732.5	4.1	40	2.32	0.0012
20175	1732.5	4.1	50	20.19	0.0107
20175	1732.5	4.1	60	5.98	0.0032
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20175	1732.5	4.35	-30	0.88	0.0005
20175	1732.5	4.35	-20	0.89	0.0005
20175	1732.5	4.35	-10	20.19	0.0107
20175	1732.5	4.35	0	19.43	0.0103
20175	1732.5	4.35	10	5.90	0.0031
20175	1732.5	4.35	20	12.69	0.0068
20175	1732.5	4.35	30	21.94	0.0117
20175	1732.5	4.35	40	3.76	0.0020
20175	1732.5	4.35	50	17.94	0.0095
20175	1732.5	4.35	60	13.42	0.0071

Test Report No.:
 RTS-6026-1304-16


Dates of Test:
 March 12 to 18 and April 9 – 10, 2013

FCC ID: L6ARFM120LW
 IC: 2503A-RFM120LW

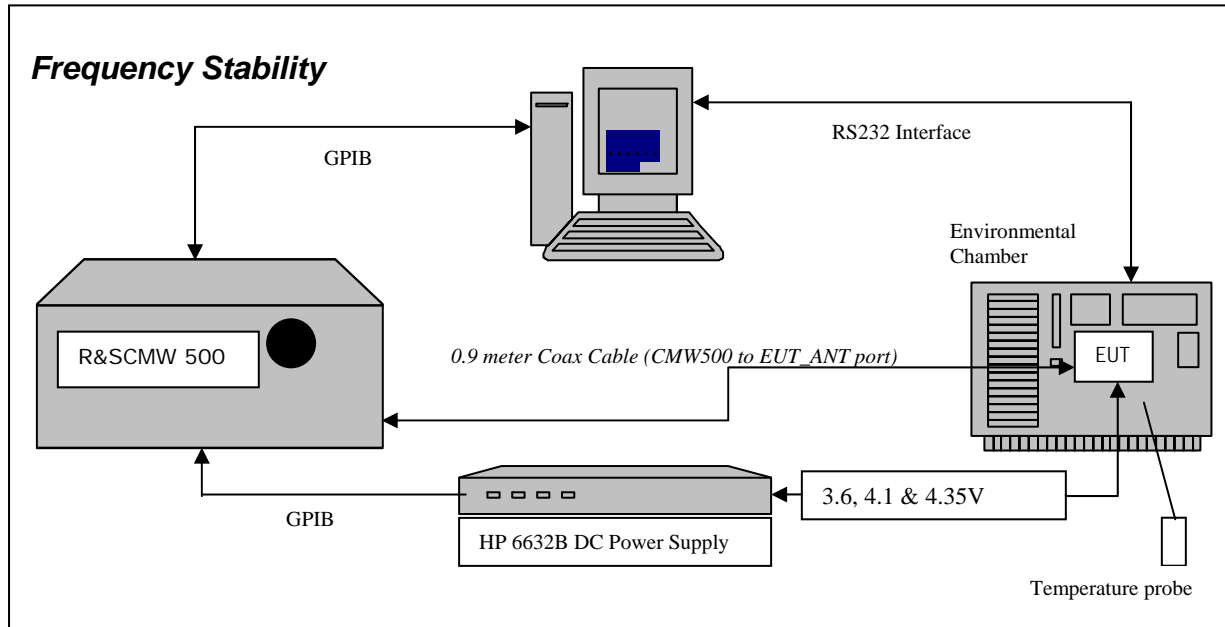
LTE band 4 Results: channel 20300 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20300	1745.0	3.6	-30	9.90	0.0052
20300	1745.0	3.6	-20	11.03	0.0058
20300	1745.0	3.6	-10	2.14	0.0011
20300	1745.0	3.6	0	14.00	0.0074
20300	1745.0	3.6	10	6.62	0.0035
20300	1745.0	3.6	20	21.29	0.0112
20300	1745.0	3.6	30	43.59	0.0229
20300	1745.0	3.6	40	3.92	0.0021
20300	1745.0	3.6	50	26.89	0.0142
20300	1745.0	3.6	60	9.51	0.0050
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20300	1745.0	4.1	-30	-0.99	-0.0005
20300	1745.0	4.1	-20	24.62	0.0130
20300	1745.0	4.1	-10	-0.15	-0.0001
20300	1745.0	4.1	0	7.93	0.0042
20300	1745.0	4.1	10	19.22	0.0101
20300	1745.0	4.1	20	23.73	0.0125
20300	1745.0	4.1	30	5.67	0.0030
20300	1745.0	4.1	40	26.20	0.0138
20300	1745.0	4.1	50	6.61	0.0035
20300	1745.0	4.1	60	5.74	0.0030
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20300	1745.0	4.35	-30	21.99	0.0116
20300	1745.0	4.35	-20	21.47	0.0113
20300	1745.0	4.35	-10	13.00	0.0068
20300	1745.0	4.35	0	8.43	0.0044
20300	1745.0	4.35	10	13.59	0.0072
20300	1745.0	4.35	20	7.86	0.0041
20300	1745.0	4.35	30	9.09	0.0048
20300	1745.0	4.35	40	27.18	0.0143
20300	1745.0	4.35	50	20.59	0.0108
20300	1745.0	4.35	60	28.92	0.0152

APPENDIX 5 – LTE Band 13 FREQUENCY STABILITY TEST DATA

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 5	
Test Report No.: RTS-6026-1302-12	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

LTE Band 13 Frequency Stability Test Data



The following measurements were performed by Berkin Can.


CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements

- 2.1055** Frequency Stability - Procedures
- (a,b) Frequency Stability - Temperature Variation
- (d) Frequency Stability - Voltage Variation

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 27.54, Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMW 500 and the EUT antenna port.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW APPENDIX 5	
Test Report No.: RTS-6026-1302-12	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW

Test Setup:

The EUT was placed in the Temperature chamber and connected to CMW 500 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the following measurements were to be made.


The chamber was switched on and the temperature was set to -30°C. After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled. The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMW 500 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, 4.1 volts and to 4.35 volts maximum voltage. The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.6 volts, 4.1 volts and 4.35 volts. The transmit frequency was measured on 782MHz for 10MHz bandwidth with maximum (50) resource block. The transmit frequency was varied in 3 steps consisting of 779.5 MHz, 782.0 MHz and 784.5 MHz each was measured under 5 MHz bandwidth with maximum (25) resource blocks. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.

After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 5	
Test Report No.: RTS-6026-1302-12	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW


Procedure:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

44. Switch on the HP 6632B power supply; CMW 500 Communications test Set, and Environmental Chamber.
45. Start test program
46. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
47. Set power supply voltage to 3.6 volts.
48. Set up CMW 500 Radio Communication Tester.
49. Command the CMW 500 to switch to the low channel.
50. Enable the voltage to the EUT, and connect a link to the CMW 500 test set.
51. EUT is commanded to Transmit 100 Bursts.
52. Software logs the following data from the CMW 500, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
53. The CMW 500 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
54. Repeat steps 5 to 10 changing the supply voltage to 4.1 Volts
55. Increase temperature by 10°C and soak for 1/2 hour.
56. Repeat steps 4 - 12 for temperatures –30°C to 60°C.
57. Repeat steps 5 to 10 changing the supply voltage to 4.35 volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.6, 4.1 and 4.35 volts

The maximum frequency error in the LTE Band 13 measured was **-0.0087 PPM**.

	EMI Test Report for the BlackBerry® smartphone Model RFM121LW	
	APPENDIX 5	
Test Report No.: RTS-6026-1302-12	Dates of Test: March 12 to 18 and April 9 – 10, 2013	FCC ID: L6ARFM120LW IC: 2503A-RFM120LW


Date of test: March 14, 2013

**LTE Band 13 results (5MHz Bandwidth): channels 23205, 23230 and 23255 @ 20°C
maximum transmitted power**

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23205	779.50	3.6	20	-5.91	-0.0076
23230	782.00	3.6	20	-4.86	-0.0062
23255	784.50	3.6	20	-6.55	-0.0083


Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23205	779.50	4.1	20	-5.87	-0.0075
23230	782.00	4.1	20	-5.18	-0.0066
23255	784.50	4.1	20	-6.28	-0.0080

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23205	779.50	4.35	20	-5.89	-0.0076
23230	782.00	4.35	20	-5.14	-0.0066
23255	784.50	4.35	20	-5.79	-0.0074

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LTE Band 13 Results(5MHz Bandwidth): channel 23205 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23205	779.50	3.6	-30	-4.92	-0.0063
23205	779.50	3.6	-20	-4.10	-0.0053
23205	779.50	3.6	-10	-3.16	-0.0041
23205	779.50	3.6	0	-5.15	-0.0066
23205	779.50	3.6	10	-3.48	-0.0045
23205	779.50	3.6	20	-5.91	-0.0076
23205	779.50	3.6	30	-5.25	-0.0067
23205	779.50	3.6	40	-3.92	-0.0050
23205	779.50	3.6	50	-3.71	-0.0048
23205	779.50	3.6	60	-5.79	-0.0074
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23205	779.50	4.1	-30	4.99	0.0064
23205	779.50	4.1	-20	6.74	0.0086
23205	779.50	4.1	-10	6.82	0.0087
23205	779.50	4.1	0	-4.19	-0.0054
23205	779.50	4.1	10	-2.81	-0.0036
23205	779.50	4.1	20	-5.87	-0.0075
23205	779.50	4.1	30	-5.58	-0.0072
23205	779.50	4.1	40	-3.03	-0.0039
23205	779.50	4.1	50	-4.85	-0.0062
23205	779.50	4.1	60	-5.87	-0.0075
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23205	779.50	4.35	-30	-5.84	-0.0075
23205	779.50	4.35	-20	-4.17	-0.0053
23205	779.50	4.35	-10	-4.88	-0.0063
23205	779.50	4.35	0	-5.24	-0.0067
23205	779.50	4.35	10	-3.79	-0.0049
23205	779.50	4.35	20	-5.89	-0.0076
23205	779.50	4.35	30	-3.30	-0.0042
23205	779.50	4.35	40	-4.61	-0.0059
23205	779.50	4.35	50	-4.44	-0.0057
23205	779.50	4.35	60	-5.05	-0.0065

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LTE Band 13 Results(5MHz Bandwidth): channel 23230 @ maximum transmitted power (cont'd)

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23230	782.00	3.6	-30	-3.89	-0.0050
23230	782.00	3.6	-20	-2.20	-0.0028
23230	782.00	3.6	-10	-2.33	-0.0030
23230	782.00	3.6	0	-4.81	-0.0062
23230	782.00	3.6	10	-3.75	-0.0048
23230	782.00	3.6	20	-4.86	-0.0062
23230	782.00	3.6	30	-4.07	-0.0052
23230	782.00	3.6	40	-3.85	-0.0049
23230	782.00	3.6	50	-3.15	-0.0040
23230	782.00	3.6	60	-5.25	-0.0067
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23230	782.00	4.1	-30	-4.39	-0.0056
23230	782.00	4.1	-20	-2.69	-0.0034
23230	782.00	4.1	-10	-2.89	-0.0037
23230	782.00	4.1	0	3.82	0.0049
23230	782.00	4.1	10	5.18	0.0066
23230	782.00	4.1	20	-5.18	-0.0066
23230	782.00	4.1	30	-5.15	-0.0066
23230	782.00	4.1	40	-4.38	-0.0056
23230	782.00	4.1	50	-4.77	-0.0061
23230	782.00	4.1	60	-4.84	-0.0062
Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23230	782.00	4.35	-30	-3.92	-0.0050
23230	782.00	4.35	-20	-2.88	-0.0037
23230	782.00	4.35	-10	-3.00	-0.0038
23230	782.00	4.35	0	5.19	0.0066
23230	782.00	4.35	10	6.58	0.0084
23230	782.00	4.35	20	-5.14	-0.0066
23230	782.00	4.35	30	-4.50	-0.0058
23230	782.00	4.35	40	-4.07	-0.0052
23230	782.00	4.35	50	-4.42	-0.0057
23230	782.00	4.35	60	-3.73	-0.0048

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LTE Band 13 Results(5MHz Bandwidth): channel 23255 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23255	784.50	3.6	-30	4.63	0.0059
23255	784.50	3.6	-20	5.13	0.0065
23255	784.50	3.6	-10	5.80	0.0074
23255	784.50	3.6	0	4.66	0.0059
23255	784.50	3.6	10	6.53	0.0083
23255	784.50	3.6	20	-6.55	-0.0083
23255	784.50	3.6	30	-4.04	-0.0051
23255	784.50	3.6	40	-4.29	-0.0055
23255	784.50	3.6	50	-3.41	-0.0043
23255	784.50	3.6	60	-6.02	-0.0077

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23255	784.50	4.1	-30	-4.99	-0.0064
23255	784.50	4.1	-20	-3.79	-0.0048
23255	784.50	4.1	-10	-2.88	-0.0037
23255	784.50	4.1	0	-5.55	-0.0071
23255	784.50	4.1	10	-4.48	-0.0057
23255	784.50	4.1	20	-6.28	-0.0080
23255	784.50	4.1	30	-3.09	-0.0039
23255	784.50	4.1	40	-5.64	-0.0072
23255	784.50	4.1	50	-3.94	-0.0050
23255	784.50	4.1	60	-6.85	-0.0087

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23255	784.50	4.35	-30	-4.85	-0.0062
23255	784.50	4.35	-20	-3.39	-0.0043
23255	784.50	4.35	-10	-2.74	-0.0035
23255	784.50	4.35	0	4.29	0.0055
23255	784.50	4.35	10	6.18	0.0079
23255	784.50	4.35	20	-5.79	-0.0074
23255	784.50	4.35	30	-3.96	-0.0050
23255	784.50	4.35	40	-4.72	-0.0060
23255	784.50	4.35	50	-3.25	-0.0041
23255	784.50	4.35	60	-5.51	-0.0070