EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22, 24, 27, 90

RIM Testing Services™

A division of BlackBerry Limited

REPORT NO.: RTS-6046-1307-38A_rev1

PRODUCT MODEL NO.: RFX101LW, RGB141LW
TYPE NAME: BlackBerry® smartphone
FCC ID: L6ARFX100LW, L6ARGB140LW

This report supersedes the report RTS-6046-1307-38A dated August 28, 2013

DATE: September 13, 2013

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

592

Report Revision History:

Rev1:

1. Editorial changes in the header.
2. Dates of tests and addition of samples tested update in section C.
3. Test result chart update with radiated GSM 850 ERP and PCS 1900 EIRP in section E.
4. Summary of results update with addition of radiated GSM 850 ERP and PCS 1900 EIRP in section F.
5. Equipment List update in section G.
6. Addition of Appendix 7 with radiated GSM 850 ERP and PCS 1900 EIRP.

Statement of Performance:

The BlackBerry® smartphone, model RFX101LW, part number CER-54735-001 Rev 2-x04-02 and its accessories when configured and operated per BlackBerry's operation instructions, performs within the requirements of the test standards.

The BlackBerry® smartphone, model RGB141LW, part number CER-56897-001 Rev 1-x04-00 and its accessories when configured and operated per BlackBerry's operation instructions, performs within the requirements of the test standards.

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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.

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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.
- FCC CFR 47 Part 90, Oct, 2012*

* Applicable to model RGB141LW only

B. Associated Documents

1. RFX101LW_HW_Declaration_CER-54735-001 Rev 2-x04-02
2. BlackBerry_System_Similartity_Declaration_RFX101LW_RGB141LW_Rev5
3. Report: 1-6234_13-03-02
4. Report: 1-6234_13-03-08

C. Product Identification

Manufactured by BlackBerry Limited whose headquarters is located at:
295 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906

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

RTS EMI test facilities

305 Phillip Street
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 June 12 to July 20 and on September 13, 2013.

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BlackBerry® smartphone Samples Tested

Sample	Model	CER NUMBER	PIN	Software Information
1	RFX101LW	CER-54735-001 Rev 1-x04-00	333E28DF	OS: 10.2.0.345
2	RFX101LW	CER-54735-001 Rev 2-x04-02	333E284F	OS: 10.2.0.345
3	RGB141LW	CER-56897-001 Rev 1-x04-00	303E7688	OS: 10.2.0.345
4	RGB141LW	CER-56897-001 Rev 1-x04-00	303E76A7	OS: 10.2.0.345
5	RGB141LW	CER-56897-001 Rev 1-x04-00	303E76A3	OS: 10.2.0.345
6	RFX101LW	CER-54735-001 Rev 1-x04-00	333E286E	OS: 10.2.0.345
7	RFX101LW	CER-54735-001 Rev 2-x04-00	333E2865	OS: 10.2.0.345

RF Conducted Emissions testing was performed on samples 1, 2, 3.

Radiated Emission testing was performed on samples 4, 5, 6 and 7.

Only the characteristics that may have been affected by the changes from RFX101LW Rev 1-x04-00 to RFX101LW Rev 2-x04-02 were re-tested.
For more details, refer to RFX101LW_HW_Declaration_CER-54735-001 Rev 2-x04-02

Only the characteristics that may have been affected by the changes from model RFX101LW to RGB141LW were re-tested. For more information, see BlackBerry_System_Similartity_Declaration_RFX101LW_RGB141LW_Rev5.

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 FCC CFR 47	TEST TYPE	RESULT	TEST DATA APPENDIX
Part 2.1051 Part 22.917 Part 24.238	GSM850 / PCS1900 Conducted Spurious Emissions	Pass	1A
Part 2.1049 Part 22.917 Part 24.238	GSM 850 / PCS1900 Occupied Bandwidth and Channel Mask	Pass	1A
Part 2.1055 Part 24.235	GSM 850 /PCS1900 Frequency Stability vs. Temperature and Voltage	Pass	1B
Part 22.913(a)(2) Part 24.232(c)	**GSM850 ERP** **PCS1900 EIRP**	Pass	7 and 1-6234_13-03-02-B and 1C
Part 2.1053 Part 22.917 Part 24.238	GSM850 / PCS1900 Radiated Spurious/Harmonic Emissions	Pass	1-6234_13-03-02-B and 1C
Part 2.1051 Part 22.917 Part 24.238	WCDMA Band 2/5 Conducted Spurious Emissions	Pass	2A
Part 2.1049 Part 22.917 Part 24.238	WCDMA Band 2/5 Occupied Bandwidth and Channel Mask	Pass	2A
Part 2.1055(a)(d) Part 24.235	WCDMA Band 2/5 Frequency Stability vs. Temperature and Voltage	Pass	2B
Part 22.913(a)(2) Part 24.232(c)	WCDMA Band 5 ERP WCDMA Band 2 EIRP	Pass	1-6234_13-03-02-B and 2C
Part 2.1053 Part 22.917 Part 24.238	WCDMA Band 2/5 Radiated Spurious/Harmonic Emissions	Pass	1-6234_13-03-02-B and 2C
Part 2.1051 Part 22.917 Part 24.238	CDMA CELL / PCS Conducted Spurious Emissions	Pass	3A
Part 2.1051 Part 90.210	CDMA BC10 Conducted Spurious Emissions	Pass	3A
Part 2.1049 Part 22.917 Part 24.238	CDMA CELL / PCS Occupied Bandwidth and Channel Mask	Pass	3A
Part 2.202 Part 90.691	CDMA BC10 Occupied Bandwidth and Channel Mask	Pass	3A
Part 2.1055 Part 24.235	CDMA CELL / PCS Frequency Stability vs. Temperature and Voltage	Pass	3B

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Part 2.1055(a)(d) Part 90.213	CDMA BC10 Frequency Stability vs. Temperature and Voltage	Pass	3B
Part 22.913(a)(2) Part 24.232(c)	CDMA CELL ERP CDMA PCS EIRP	Pass	3C
Part 90, Subpart S	CDMA BC10 ERP	Pass	3C
Part 2.1053 Part 22.917 Part 24.238	CDMA CELL / PCS Radiated Spurious/Harmonic Emissions	Pass	3C
Part 90, Subpart S	BC10 Radiated Spurious/Harmonic Emissions	Pass	3C
Part 2.1051 Part 27.53(h)	LTE Band 4 Conducted Spurious Emissions	Pass	4A
Part 2.1049 Part 27.53(h)(1)	LTE Band 4 Occupied Bandwidth and Channel Mask	Pass	4A
Part 27.50 (d)(5)	LTE Band 4 Peak to Average Ratio measurements	Pass	4A
Part 2.1055 Part 27.54	LTE Band 4 Frequency Stability vs. Temperature and Voltage	Pass	4B
Part 2.1053 Part 27.50(d)(4)	LTE Band 4 EIRP	Pass	1-6234_13-03-08-B
Part 2.1053 Part 27.53(h)	LTE Band 4 Radiated Spurious/Harmonic Emissions	Pass	1-6234_13-03-08-B
Part 2.1051 Part 27.53	LTE Band 13 Conducted Spurious Emissions	Pass	5A
Part 2.1049 Part 27.53(c)(4)	LTE Band 13 Occupied Bandwidth and Channel Mask	Pass	5A
Part 27.50 (d)(5)	LTE Band 13 Peak to Average Ratio measurements	Pass	5A
Part 2.1055 Part 27.54	LTE Band 13 Frequency Stability vs. Temperature and Voltage	Pass	5B
Part 2.1053 Part 27.50(b)(10)	LTE Band 13 ERP	Pass	1-6234_13-03-08-B
Part 2.1053 Part 27.53	LTE Band 13 Radiated Spurious/Harmonic Emissions	Pass	1-6234_13-03-08-B
Part 2.1051 Part 24.238	LTE Band 25 Conducted Spurious Emissions	Pass	6A

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Part 2.1049 Part 24.238	LTE Band 25 Occupied Bandwidth and Channel Mask	Pass	6A
Part 2.1055 Part 24.235	LTE Band 25 Frequency Stability vs. Temperature and Voltage	Pass	6B
Part 24.232(c)	LTE Band 25 ERP	Pass	6C
Part 2.1053 Part 24.238	LTE Band 25 Radiated Spurious/Harmonic Emissions	Pass	6C

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F. Summary of Results

1) Conducted Emission Measurements

The following test configurations were measured for model RFX101LW:

- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the GSM850 as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d). The EUT was measured on the low, middle and high channels. The frequency range investigated was from 30 MHz to 10 GHz.
  See APPENDIX 1A for test data.

  The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the PCS1900 as per 47 CFR 2.1051, CFR 24.238(a). The EUT was measured on the low, middle and high channels. The frequency range investigated was from 30 MHz to 20 GHz.
  See APPENDIX 1A for test data

- The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the GSM850 as per 47 CFR 2.202, CFR 22.917. The EUT was measured in GSM and EDGE mode on the low, middle and high channels. The worst case occupied bandwidth was 244.57 kHz on the middle and high channels in CALL mode, and 244.6 kHz on all channels in EDGE mode.
  See APPENDIX 1A for test data.

  The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the PCS1900 as per 47 CFR 2.202, CFR 24.238. The EUT was measured in GSM and EDGE mode on the low, middle and high channels. The worst case occupied bandwidth was 244.57 kHz on low and mid channels in CALL mode, and 246 kHz on the middle channel in EDGE mode.
  See APPENDIX 1A for test data.

- The BlackBerry® smartphone met the requirements of the Frequency Stability in the GSM850 as per 47 CFR 2.1055. The EUT was measured in GSM850 mode on the low, middle and high channels.
  See APPENDIX 1B 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. The EUT was measured in PCS1900 mode on the low, middle and high channels.
  See APPENDIX1B for test data.

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- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the WCDMA band 5 as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d). The EUT was measured on the low, middle and high channels. The frequency range investigated was from 30 MHz to 10 GHz.
See APPENDIX 2A for test data.

The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the WCDMA band 2 as per 47 CFR 2.1051, CFR 24.238(a). The EUT was measured on the low, middle and high channels. The frequency range investigated was from 30 MHz to 20 GHz.
See APPENDIX 2A for test data

- The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the WCDMA band 5 as per 47 CFR 2.202, CFR 22.917. The EUT was measured in Voice and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.153 MHz on the all channels in Loopback mode, and 4.161 MHz on the high channel in HSUPA mode.
See APPENDIX 2A for test data.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the WCDMA band 2 as per 47 CFR 2.202, CFR 24.238. The EUT was measured in Voice and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.168 MHz on the low channel in Loopback and HSUPA modes.
See APPENDIX 2A for test data.

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

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- The EUT met the requirements of the Conducted Spurious Emissions in the CDMA Cellular band as per 47 CFR 2.1051, CFR 22.917. 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. 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. The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The worst case occupied bandwidth was 1.285 MHz on high channel in Loopback mode and 1.324 MHz on middle channel in 1xEVDO mode.
See APPENDIX 3A for the test data.

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. The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The worst case occupied bandwidth was 1.271 MHz on low and high channels in Loopback mode and 1.316 MHz on low 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. 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. The EUT was measured in CDMA PCS mode on the low, middle and high channels.
See APPENDIX 3B for test data.

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- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the LTE Band 4 as per 47 CFR 2.1051, CFR 27.53. The EUT was measured on the low, middle and high channels in 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz bandwidths for LTE Band 4 with QPSK and 16-QAM modulations. Different resource block allocations were investigated, a minimum one resource block case was also tested. The frequency range investigated was from 30 MHz to 20 GHz.

- The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the LTE Band 4 as per 47 CFR 2.1049, CFR 27.53. The EUT was measured on the low, middle and high channels. The worst case occupied bandwidth was 17.858 MHz on the middle channel in 20MHz BW, 100 resource blocks and QPSK modulation. The worst case occupied bandwidth for 16QAM was 17.585 MHz.
See Appendix 4A for test data

- The BlackBerry® smartphone met the requirements of the Tx Peak to Average Ratio in the LTE Band 4 as per 47 CFR 27.50 (5)(d). The EUT was measured on the low, middle and high channels in 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz bandwidths for LTE Band 4 with QPSK and 16-QAM modulations. Different resource block allocations were also investigated, a minimum one resource block case was also tested. The worst case Peak to Average Ratio was 9.23 dB on middle channel in 10MHz bandwidth with 25 resource blocks.
See APPENDIX 4A for test data

- The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 4 as per 47 CFR 2.1055, CFR 27.54. 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 4B for test data.

- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the LTE Band 13 as per 47 CFR 2.1051, CFR 27.53. The EUT was measured on the low, middle and high channels in 5MHz and 10MHz, bandwidths for LTE Band 13 with QPSK and 16-QAM modulations. Different resource block allocations were investigated, a minimum one resource block case was also tested. The frequency range investigated was from 30 MHz to 20 GHz.
See Appendix 5A for test data

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- The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the LTE Band 13 as per 47 CFR 2.1049, CFR 27.53. The EUT was measured on the low, middle and high channels. The worst case occupied bandwidth was 8.958 MHz on the middle channel in 10MHz BW, 50 resource blocks and QPSK modulation. The worst case occupied bandwidth for 16QAM was 4.949 MHz on the middle channel.
See Appendix 5A for test data

- The BlackBerry® smartphone met the requirements of the Tx Peak to Average Ratio in the LTE Band 13 as per 47 CFR 27.50 (d)(5). The EUT was measured on the low, middle and high channels in 5MHz and 10MHz bandwidths for LTE Band 13 with QPSK and 16-QAM modulations. Different resource block allocations were also investigated, a minimum one resource block case was also tested. The worst case Peak to Average Ratio was 8.61 dB on the low channel in 10MHz bandwidth with 25 resource blocks.
See APPENDIX 5A for test data

- 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 5B for test data.

The following test configurations were measured for model RGB141LW:

- The BlackBerry® smartphone met the requirements of the Conducted Spurious Emissions in the CDMA BC10 as per 47 CFR 2.1051, CFR 90 (J), 90.210, and 90.691. The EUT was measured in BC10 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 Occupied Bandwidth and channel mask in the CDMA BC10 as per 47 CFR 2.202, and CFR 90 (I). The EUT was measured in Loopback and 1xEVDO mode on the low, middle and high channels. The worst case occupied bandwidth was 1.280 MHz on the middle channel in Loopback mode and 1.280 MHz on high channel in 1xEVDO mode.
See APPENDIX 3A for the test data.

- The BlackBerry® smartphone met the requirements of the Frequency Stability requirements in the CDMA BC10 as per 47 CFR 2.1055, and CFR 90.213. The EUT was measured in CDMA BC10 mode on the low, middle and high channels.
See APPENDIX 3B for test data.

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- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the LTE Band 25 as per 47 CFR 2.1051, CFR 24.238(a). The EUT was measured on the low, middle and high channels in 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz bandwidths with QPSK and 16-QAM modulations. Different resource block allocations were investigated, a minimum one resource block case was also tested. The frequency range investigated was from 30 MHz to 20 GHz.
  See Appendix 6A for test data

- The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the LTE Band 25 as per 47 CFR 2.202, CFR 24.238. The EUT was measured on the low, middle and high channels.
  See Appendix 6A for test data

- The BlackBerry® smartphone met the requirements of the Tx Peak to Average Ratio in the LTE Band 25 as per 47 CFR 24.232 (5)(d). The EUT was measured on the low, middle and high channels in 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz bandwidths for LTE Band 25 with QPSK and 16-QAM modulations. Different resource block allocations were also investigated, a minimum one resource block case was also tested. The worst case Peak to Average Ratio was 10.35 dB on middle channel in 20MHz bandwidth with 50 resource blocks.
  See APPENDIX 6A for test data

- The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 25 as per 47 CFR 2.1055, CFR 24.235. The EUT was measured on the low, middle and high channels in 20MHz BW with 100 resource blocks and QPSK modulation.
  See APPENDIX 6B for test data.

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2) Radiated Emission Measurements

The radiated spurious emissions/harmonics and ERP/EIRP were measured for PCS 1900. The results are within the limits. The BlackBerry® smartphone was placed on a nonconductive styrofoam table, 80 cm high that was positioned on a remotely controlled turntable. The test distance used between the BlackBerry® smartphone and the receiving antenna was three meters. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 meters. The turntable was rotated to determine the azimuth of the peak emissions. Both the horizontal and vertical polarizations of the emissions were measured. The maximum emissions level was recorded. The BlackBerry® smartphone was then substituted with an antenna placed in the same location as the BlackBerry® smartphone. A Horn antenna was used for EIRP measurements. The substitution antenna was connected into a signal generator that was set to the test frequency.

The emissions were maximized by elevating the antenna in the range of 1 to 4 meters. The signal generator output was then adjusted to match the BlackBerry® smartphone output reading. The signal generator output was recorded. Both the horizontal and vertical polarizations of the emissions were measured.

The following measurements were done in a semi-anechoic chamber (SAC) below 1 GHz and a Semi-anechoic Chamber ((SAC) with floor absorber) above 1 GHz. The SAC's FCC registration number is **778487** and the Industry Canada (IC) file number is **2503B-1**. The SAC with floor absorber's FCC registration number is **959115** and the IC file number is **2503C-1**. The BlackBerry® smartphone was measured on the low, middle and high channels.

The following test configurations were measured for model RFX101LW:

a) The radiated spurious emissions/harmonics and EIRP were measured for PCS 1900. The results are within the limits.

- The highest ERP in the 850 band Call mode measured was 29.67 dBm (0.93 W) at 824.20 MHz (channel 128).
- The highest EIRP in the PCS band Call mode measured was 30.75 dBm (1.19 W) at 1909.80 MHz (channel 810).

- See Appendix 7 for test data.

The radiated spurious emission and carrier harmonics were measured up to the 10th harmonic for middle channel in the GSM 850 CALL mode and PCS 1900 EDGE mode with both the horizontal and vertical polarizations.

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- All margins in the GSM850 for harmonic emissions were at least 25 dB below the limit for all test frequencies in Call mode.
- All margins in the PCS 1900 for harmonic emissions were at least 25 dB below the limit for all test frequencies in EDGE mode.

See Appendix 1C for test data.

b) The radiated spurious emissions/harmonics and ERP/EIRP were measured for WCDMA Band 5.

- The highest ERP in the WCDMA band 5, Call Service mode was 18.68 dBm (0.07 W) at 836.40 MHz (channel 4182).
- The highest ERP in the WCDMA band 5, HSUPA mode was 17.19 dBm (0.05 W) at 846.60 MHz (channel 4233).
- The highest EIRP in the WCDMA band 2, Call Service mode measured was 26.20 dBm (0.42 W) at 1852.4 MHz (channel 9262).
- The highest EIRP in the WCDMA band 2, HSUPA mode measured was 24.31 dBm (0.27 W) at 1852.4 MHz (channel 9262).

The radiated carrier harmonics were measured up to the 10th harmonic for middle channel in the WCDMA band 5 HSUPA mode and WCDMA Band 2 CALL mode. Both the horizontal and vertical polarizations were measured.

- All margins in the WCDMA Band 5 for harmonic emissions were at least 25 dB below the limit for all test frequencies.
- All margins in the WCDMA Band 2 for harmonic emissions were at least 25 dB below the limit for all test frequencies.

See Appendix 2C for test data.

c) The radiated spurious emissions/harmonics and ERP/EIRP were measured for CDMA Cellular and CDMA PCS. The results are within the limits.

- The highest ERP measured in the CDMA Cellular band, Loopback Service mode, was 21.60 dBm (0.14 W) at 836.52 MHz (channel 384).
- The highest ERP measured in the CDMA Cellular band, 1xEVDO mode, was 20.30 dBm (0.11 W) at 848.32 MHz (channel 777).

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- The highest EIRP measured in the CDMA PCS band, Loopback Service mode, was 21.76 dBm (0.15 W) at 1851.25 MHz (channel 25).
- The highest EIRP measured in the CDMA PCS band, 1xEVDO mode, was 22.76 dBm (0.19 W) at 1851.25 MHz (channel 25).

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the Cellular and PCS. Each band was measured in Loopback, Test Data and EVDO modes, with both the horizontal and vertical polarizations.

- All margins in the CDMA Cellular for harmonic emissions were at least 25 dB below the limit for all test frequencies in Loopback mode.
- All margins in the CDMA Cellular for harmonic emissions were at least 25 dB below the limit for all test frequencies in EDGE mode.
- The worst margin was 20.4 dB below the limit at 3816.824 MHz in Loopback mode in band CDMA PCS.
- The worst margin was 10.5 dB below the limit at 3816.62 MHz in EDGE mode in band CDMA PCS.

See Appendix 3C for test data.

The following tests were measured on model RGB141LW:

The highest EIRP measured in the BC10 band, Loopback Service mode, was 23.15 dBm (0.21 W) at 823.10 MHz (channel 684).

The highest EIRP measured in the BC10 band, 1xEVDO mode, was 22.45 dBm (0.18 W) at 823.10 MHz (channel 684).

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the CDMA BC10 band. Each band was measured in Call, and EVDO modes, with both the horizontal and vertical polarizations.

All test margins in the CDMA BC10 band harmonic emissions were greater than 25 dB below the accepted limits for all test frequencies.

See Appendix 3C for test data.

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d) The radiated spurious emissions/harmonics and EIRP were measured for LTE Band 25.

The EUT was measured on the low, middle and high channels in worse case channel bandwidth, resource block and both modulation QPSK and 16-QAM. Both the horizontal and vertical polarizations were measured.

- The highest EIRP in the LTE Band 25 measured was 22.12 dBm (0.16 W) at 1850.70 MHz (channel 26047) in 1.4MHz BW, 1 resource block and QPSK modulation
- The highest EIRP in the LTE Band 25 measured was 21.60 dBm (0.14 W) at 1850.70 MHz (channel 26047) in 1.4MHz BW, 1 resource block and 16-QAM modulation.

The radiated carrier harmonics were measured up to the 10th harmonic. The EUT was measured on the low, middle and high channels in worse case channel bandwidth, resource block and both modulation QPSK and 16-QAM. Both the horizontal and vertical polarizations were measured.

All test margins in the LTE band 25 harmonic emissions were greater than 25 dB below the accepted limits for all test frequencies.

See Appendix 6C for test data.

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3) Co-Location Radiated Measurements

The radiated emissions were measured up to 18 GHz for middle channels for simultaneous transmission in the following test configuration combinations:

The following tests were measured on model RFX101LW:

- GSM 850 + Bluetooth(DH5) + 802.11b
- PCS 1900 + Bluetooth(2DH5) + 802.11g
- WCDMA B2 + Bluetooth(3DH5)+ 802.11n(2.4GHz)
- WCDMA B5 + Bluetooth(DH5) + 802.11a
- CDMA CELL + Bluetooth(3DH5) + LTE B4
- CDMA PCS + Bluetooth(DH5) + LTE B13

The following tests were measured on model RGB141LW:

- CDMA BC10 + Bluetooth(DH5) + LTE B25

Both the horizontal and vertical polarizations were measured. The emissions due to different simultaneous transmission did not increase the amplitude of any emissions nor did it produce any new inter-modulation products as a result of mixing.

Sample Calculation:

Corrected Signal level (CSL) is calculated as follows:
CSL (dBm) = Measured Level (dBµV) – Antenna Gain (dBi) + Free Space loss (dB) – 107(dB) + Cable Loss (dB) - Preamp (dB) + Filter Loss (dB) -2.15(dB)

Measurement Uncertainty ±4.5 dB

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G. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	13-10-10	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	13-10-10	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	**14-02-13**	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	**14-02-13**	Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017301	**14-08-13**	Radiated Emissions
Horn Antenna	EMC Automation	HRN-0118	030101	14-08-07	Radiated Emissions
Horn Antenna	EMC Automation	HRN-0118	030201	15-05-07	Radiated Emissions
Horn Antenna	Emco	3117	47563	**15-08-07**	Radiated Emissions
Horn Antenna	ETS	3116	2538	14-09-29	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	14-11-27	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	13-11-26	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	112394	13-11-25	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	109747	13-10-18	RF Conducted Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	13-11-30	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESU-40	100162	13-11-30	Radiated Emissions
DC Power Supply	HP	6632B	US37472178	13-09-25	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0380561	13-10-30	Radiated Emissions
Environment Monitor	Omega	iTHX-SD	0340060	13-10-30	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0380567	13-10-30	Radiated Emissions

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Compliance Test Equipment Used cont'd

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	101469	13-12-10	Radiated /RF Conducted Emission
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	109949	13-12-8	Radiated /RF Conducted Emission
Signal Generator	Agilent	E8257D	MY45140527	14-12-10	Radiated Emissions
Signal Generator	Agilent	83630B	3844A00927	14-11-23	Radiated Emissions
Spectrum Analyzer	Rohde & Schwarz	FSV	101820	13-11-28	RF Conducted Emissions
Spectrum Analyzer	Rohde & Schwarz	FSP	100884	13-11-22	RF Conducted Emissions

H. Test Software used

SOFTWARE	COMPANY	VERSION	USE
EMC32	Rohde & Schwarz	8.53.0	Radiated Emissions
TDK Standard Emission Test	TDK RF Solutions	8.53.1.62	Radiated Emissions

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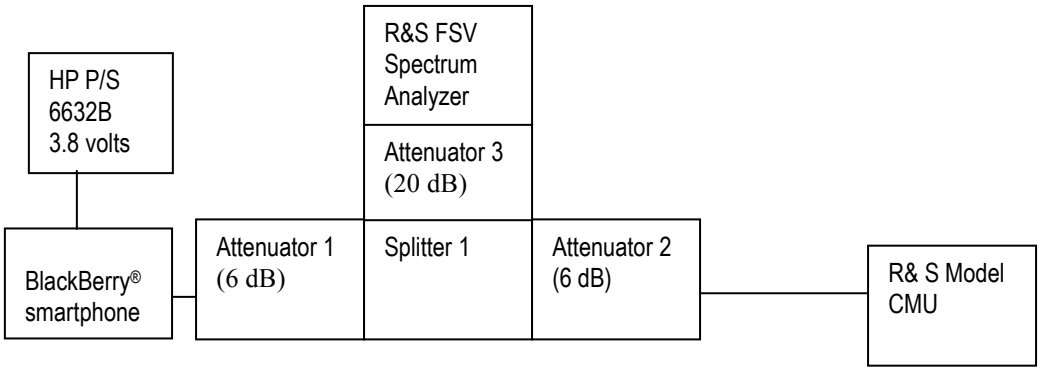
APPENDIX 1A – GSM CONDUCTED RF EMISSIONS TEST DATA/PLOTS

GSM Conducted RF Emission Test Data

This appendix contains measurement data pertaining to conducted spurious emissions, –26 dBc bandwidth, 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.

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

The environmental test conditions were:

Temperature: 25.1 ºC
Relative Humidity: 41.3 %

The following measurements were performed by Berkin Can.

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GSM Conducted RF Emission Test Data cont'd

The following tests were performed on model RFX101LW.

The conducted spurious emissions – As per 47 CFR 2.1051, CRF 22.917, CFR 24.238(a) were measured from 30 MHz to 20 GHz.

–26 dBc Bandwidth and Occupied Bandwidth (99%)

For each carrier frequency of low, middle and high, the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth.
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc bandwidth for the GSM850 band was measured to be 273.5 kHz, and for the PCS1900 band was measured to be 276.4 kHz as shown below. Results were derived in a 3.0 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

Test Data for GSM850 band and PCS1900 band in Call mode

GSM850 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
824.2	266.3	243.12
837.6	273.5	244.57
848.8	272.1	244.57

PCS1900 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	274	244.57
1880.0	276.4	244.57
1909.8	276.4	243.12

Measurement Plots for 850 and 1900 bands in Call mode

See Figures 1-1a to 1-12a for the plots of the conducted spurious emissions.
See Figures 1-13a to 1-24a for the plots of 26dBc/99% Occupied Bandwidth.
See Figures 1-25a to 1-28a for the plots of the Channel mask.

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GSM Conducted RF Emission Test Data cont'd

Test Data for GSM850 and PCS1900 bands in EDGE mode

GSM850 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
824.2	244.6
837.6	244.6
848.8	244.6

PCS1900 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
1850.2	244.6
1880.0	246.0
1909.8	241.7

Measurement Plots for GSM850 and PCS1900 bands in EDGE mode

See Figures 1-29a to 1-34a for the plots of the 99% Occupied Bandwidth EDGE results.
See Figures 1-35a to 1-38a for the plots of channel mask EDGE results.
See Figures 1-39a to 1-50a for the plots of the conducted spurious emissions EDGE results

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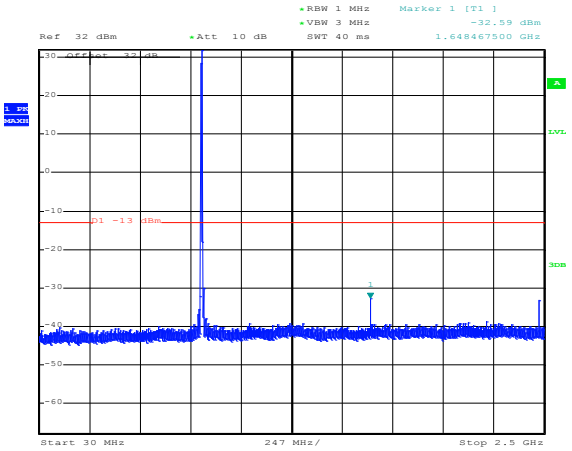
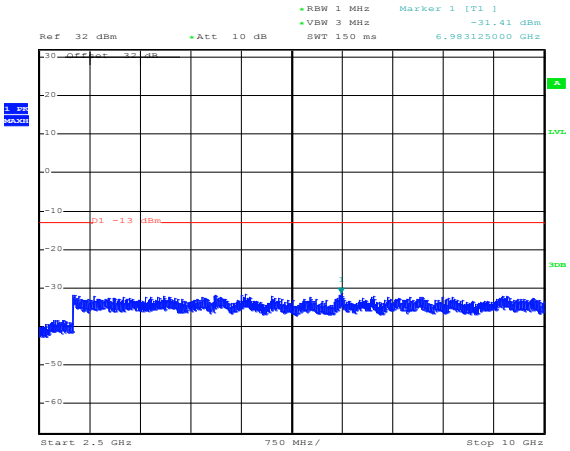
GSM Conducted RF Emission Test Data cont'd

Figure 1-a: GSM850 band, Spurious Conducted Emissions, Low channel



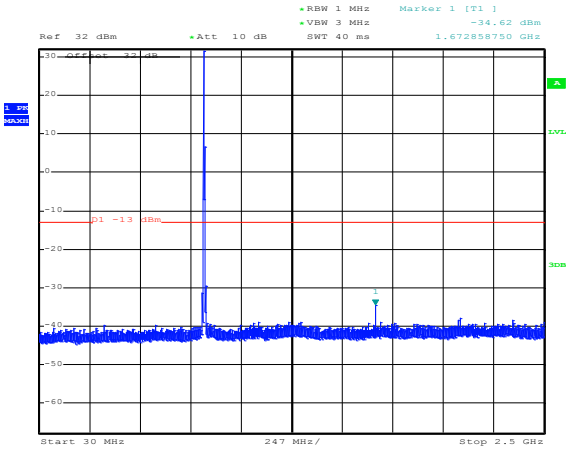
Date: 17.JUN.2013 14:39:48

Figure 1-1a: GSM850 band, Spurious Conducted Emissions, Low channel



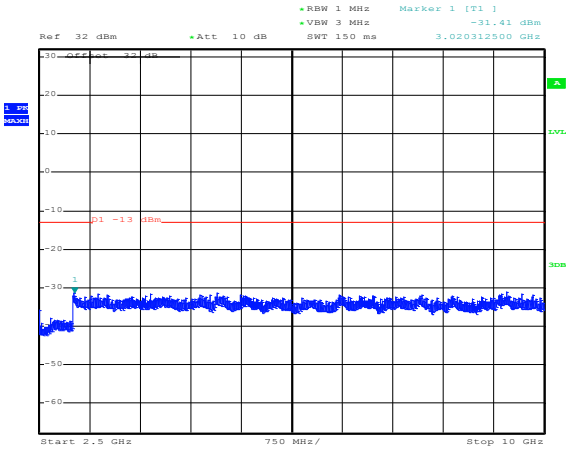
Date: 17.JUN.2013 14:35:59

Figure 1-2a: GSM850 band, Spurious Conducted Emissions, Middle Channel



Date: 17.JUN.2013 14:37:05

Figure 1-3a: GSM850 band, Spurious Conducted Emissions, Middle Channel



Date: 17.JUN.2013 14:38:19

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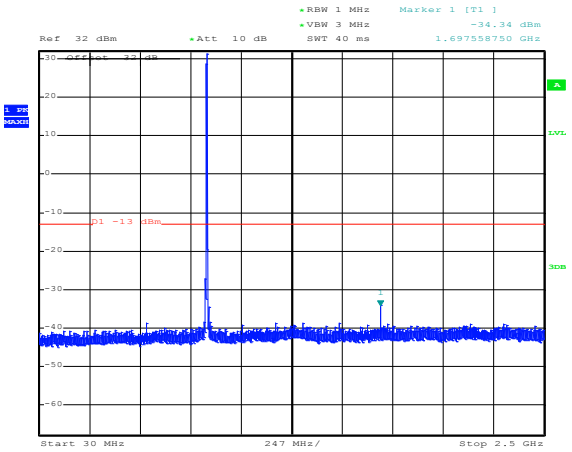
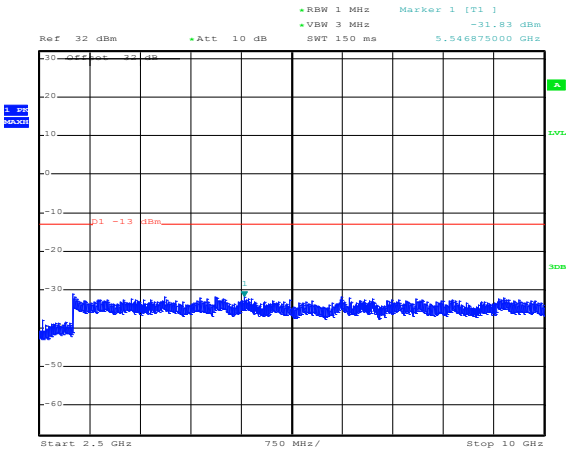
GSM Conducted RF Emission Test Data cont'd

Figure 1-4a: GSM850 band, Spurious Conducted Emissions, High Channel



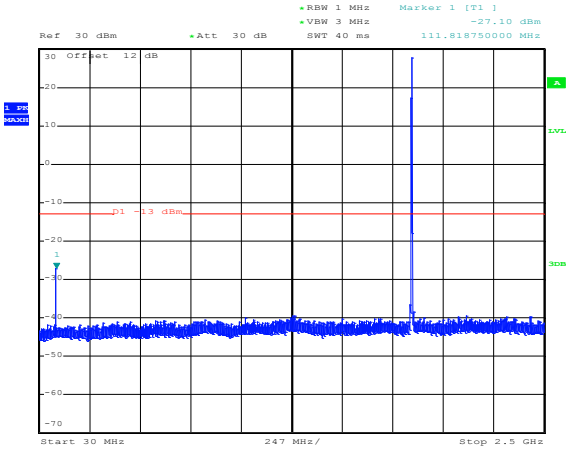
Date: 17.JUN.2013 14:38:53

Figure 1-5a: GSM850 band, Spurious Conducted Emissions, High Channel



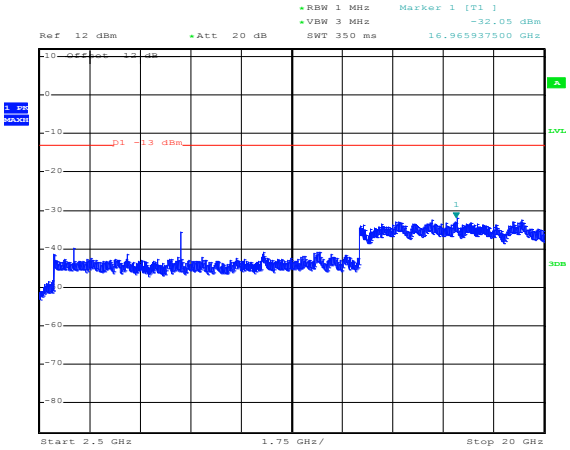
Date: 17.JUN.2013 14:40:42

Figure 1-7a: PCS1900 band, Spurious Conducted Emissions, Low Channel



Date: 17.JUN.2013 15:41:36

Figure 1-8a: PCS1900 band, Spurious Conducted Emissions, Low Channel



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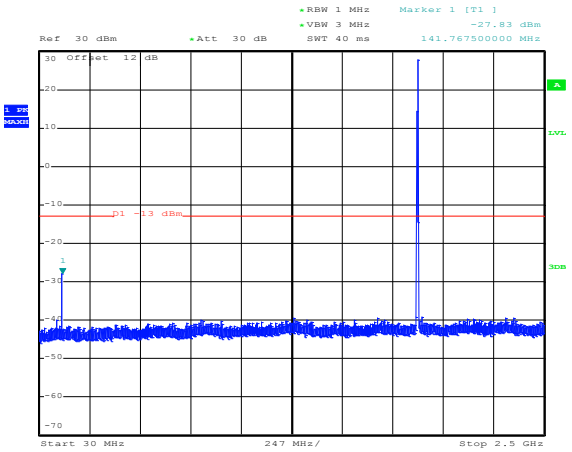
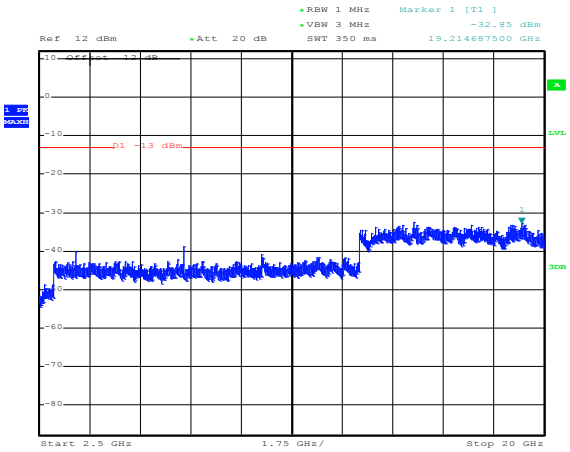
GSM Conducted RF Emission Test Data cont'd

Figure 1-9a: PCS1900 band, Spurious Conducted Emissions, Middle Channel



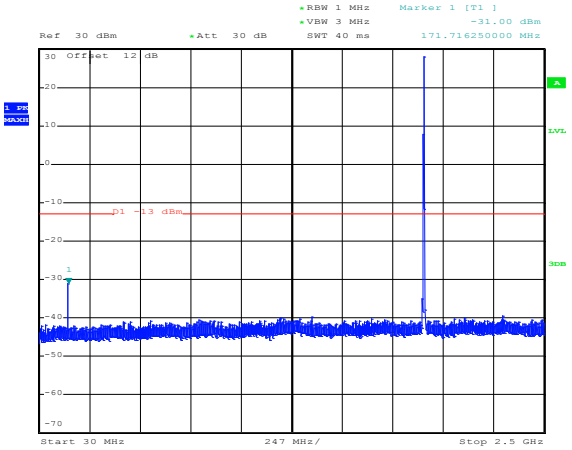
Date: 17.JUN.2013 15:42:52

Figure 1-10a: PCS1900 band, Spurious Conducted Emissions, Middle Channel



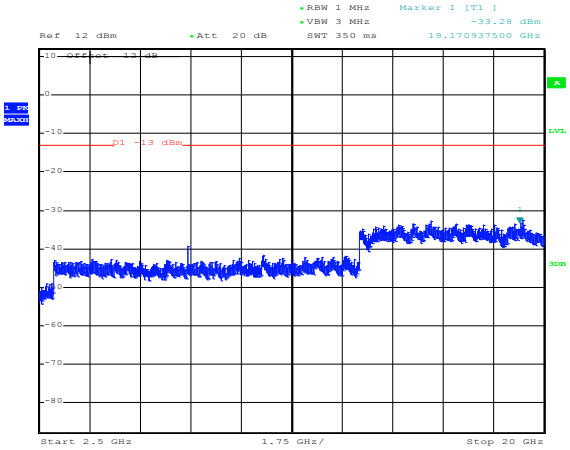
Date: 17.JUN.2013 15:40:21

Figure 1-11a: PCS1900 band, Spurious Conducted Emissions, High Channel



Date: 17.JUN.2013 15:43:07

Figure 1-12a: PCS1900 band, Spurious Conducted Emissions, High Channel



Date: 17.JUN.2013 15:40:43

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GSM Conducted RF Emission Test Data cont'd

Figure 1-13a: -26dBc bandwidth, GSM850 band Low Channel in GSM mode

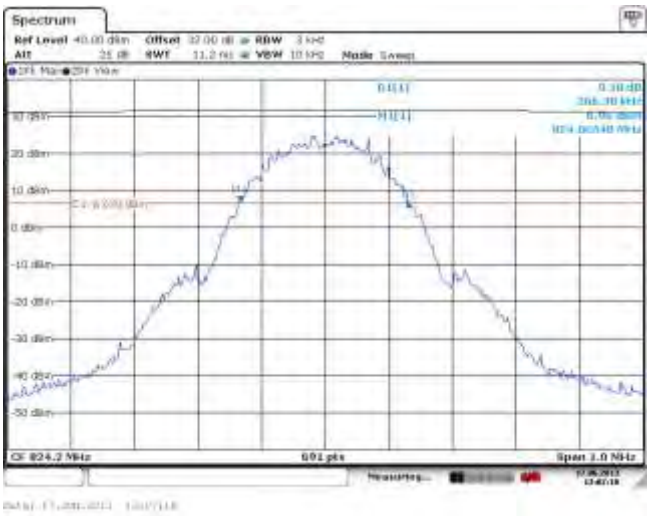


Figure 1-14a: Occupied Bandwidth, GSM850 band Low Channel in GSM mode

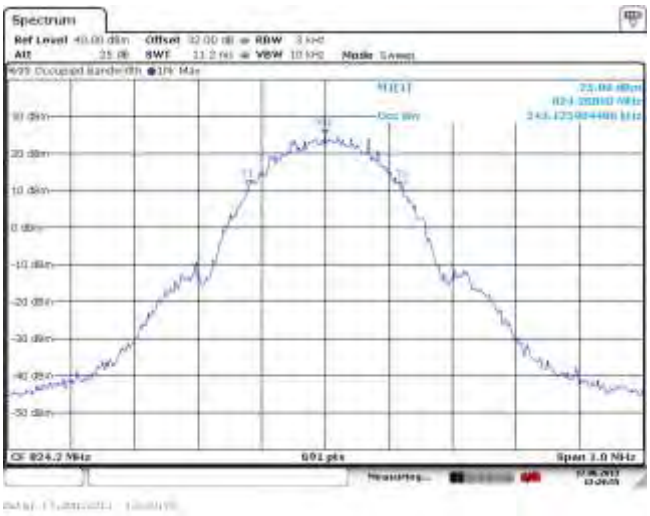


Figure 1-15a: -26dBc bandwidth, GSM850 band Middle Channel in GSM mode

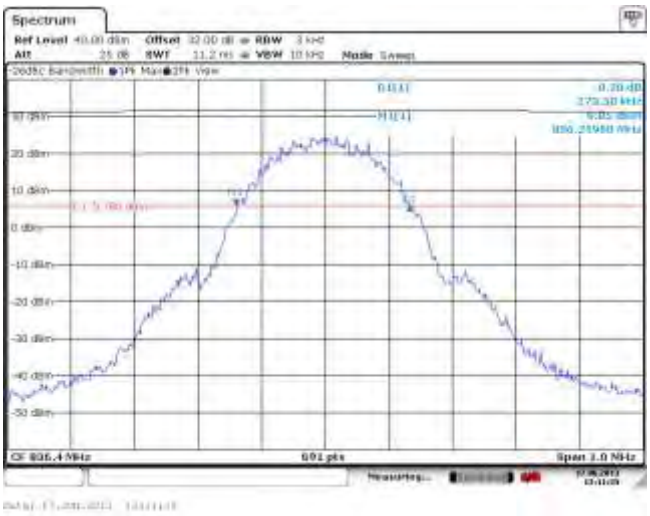
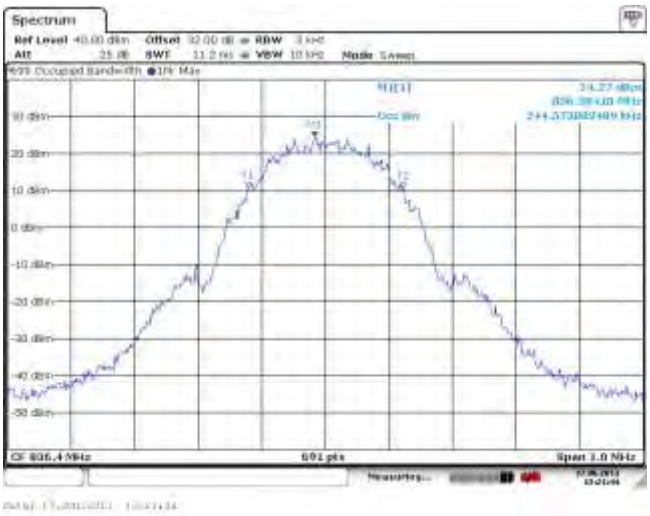


Figure 1-16a: Occupied Bandwidth, GSM850 band Middle Channel in GSM mode



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GSM Conducted RF Emission Test Data cont'd

Figure 1-17a: -26dBc bandwidth, GSM850 band High Channel in GSM mode

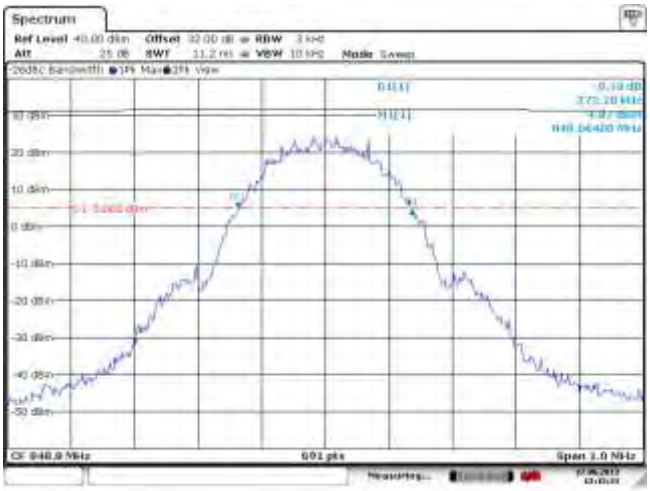

Figure 1-18a: Occupied Bandwidth, GSM850 band High Channel in GSM mode

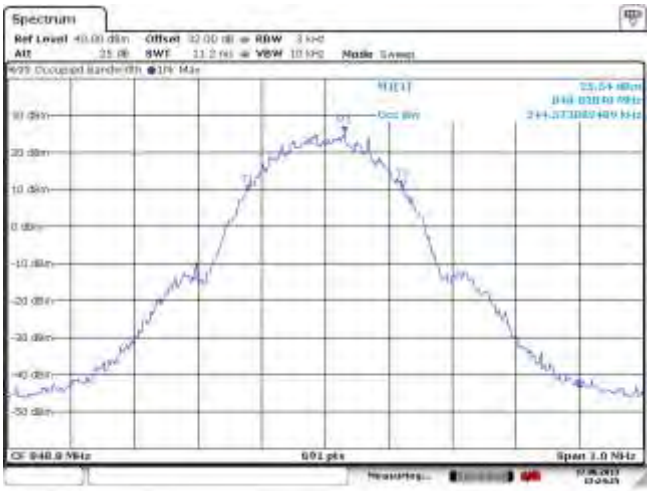

Figure 1-19a: -26dBc bandwidth, PCS1900 Low Channel in GSM mode

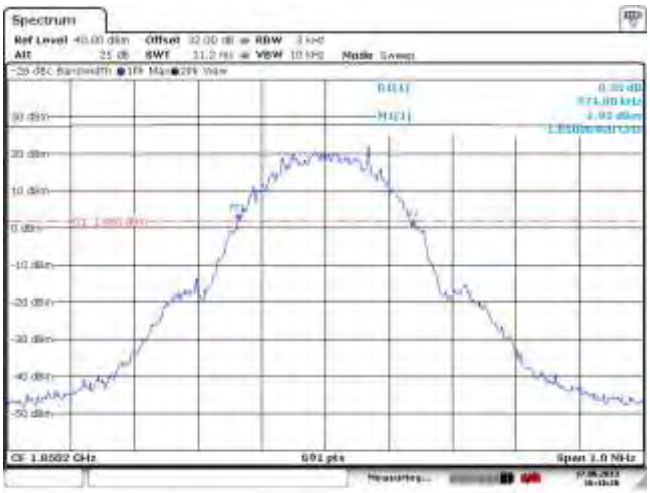

Figure 1-20a: Occupied Bandwidth, PCS1900 Low Channel in GSM mode

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GSM Conducted RF Emission Test Data cont'd

Figure 1-21a: -26dBc bandwidth, PCS1900 Middle Channel in GSM mode

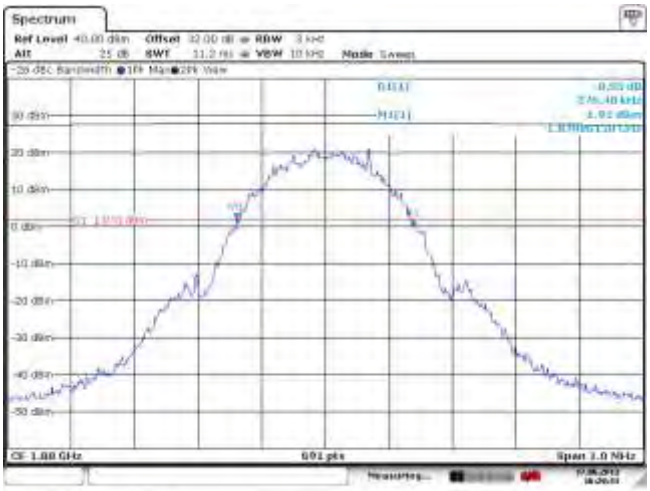

Figure 1-22a: Occupied Bandwidth, PCS1900 Middle Channel in GSM mode

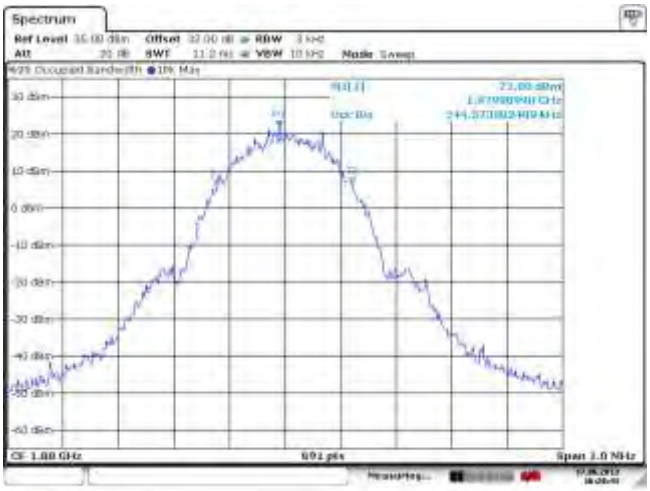

Figure 1-23a: -26dBc bandwidth, PCS1900 High Channel in GSM mode

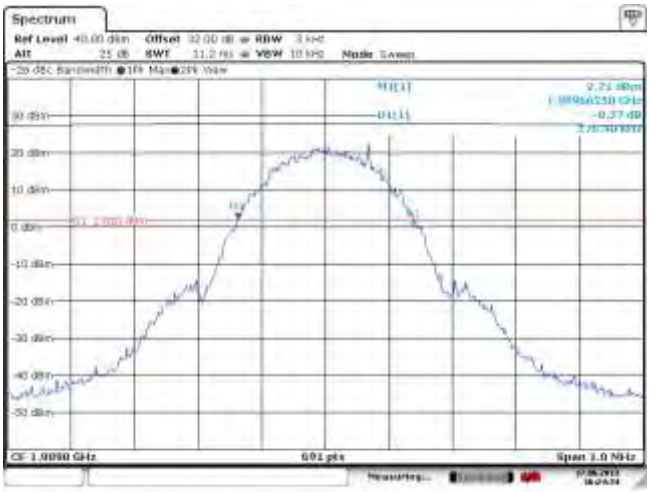

Figure 1-24a: Occupied Bandwidth, PCS1900 High Channel in GSM mode

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GSM Conducted RF Emission Test Data cont'd

Figure 1-25a: GSM850 band, Low Channel Mask in GSM mode

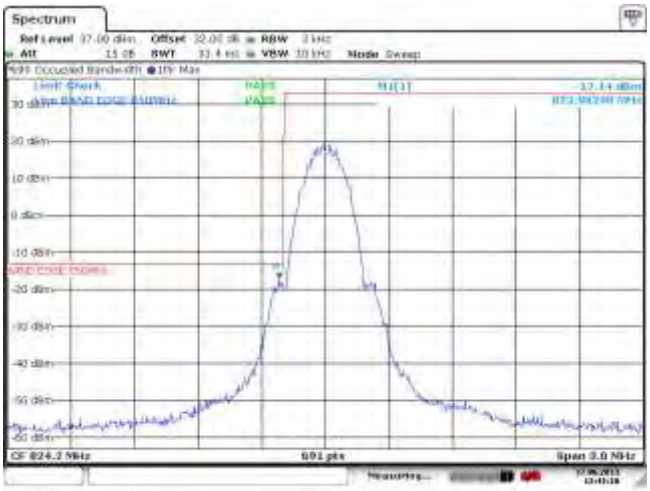


Figure 1-26a: GSM850 band High Channel Mask in GSM mode

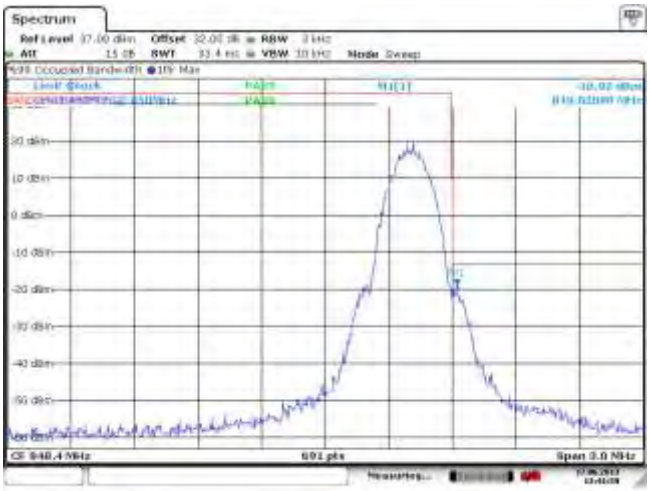


Figure 1-27a: PCS1900, Low Channel Mask in GSM mode

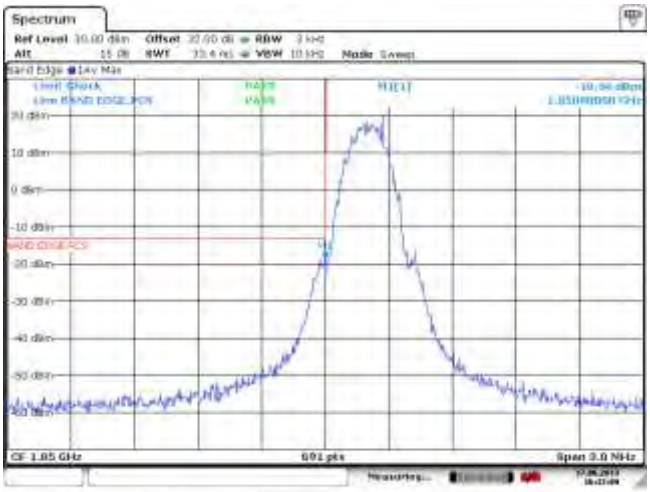
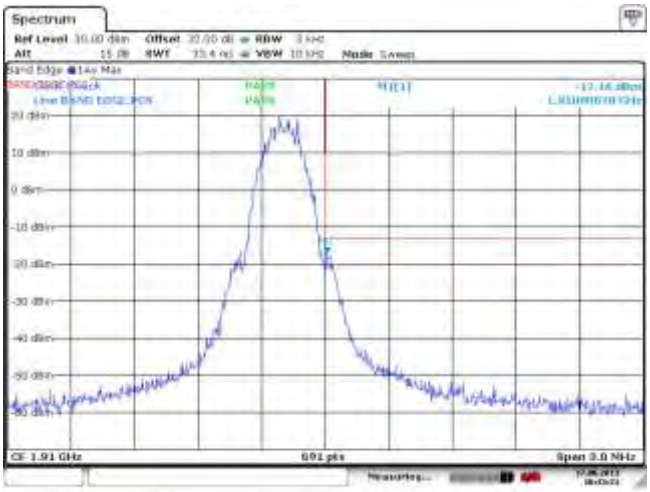


Figure 1-28a: PCS1900, High Channel Mask in GSM mode



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GSM Conducted RF Emission Test Data cont'd

Figure 1-29a: PCS1900 Band, PAR Low Channel

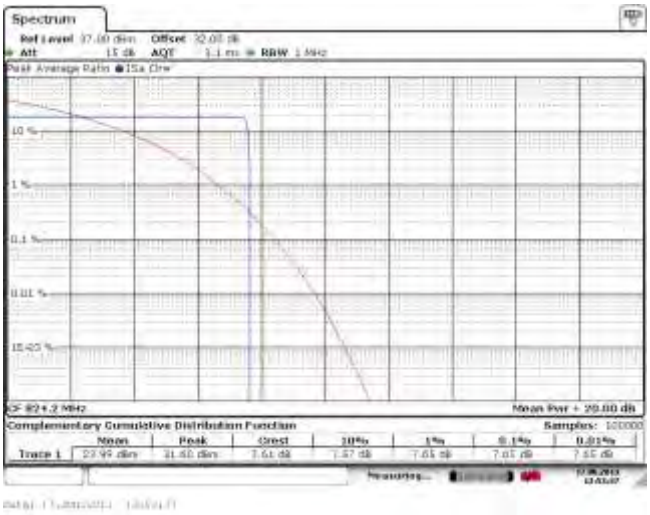


Figure 1-30a: PCS1900 Band, PAR Mid Channel

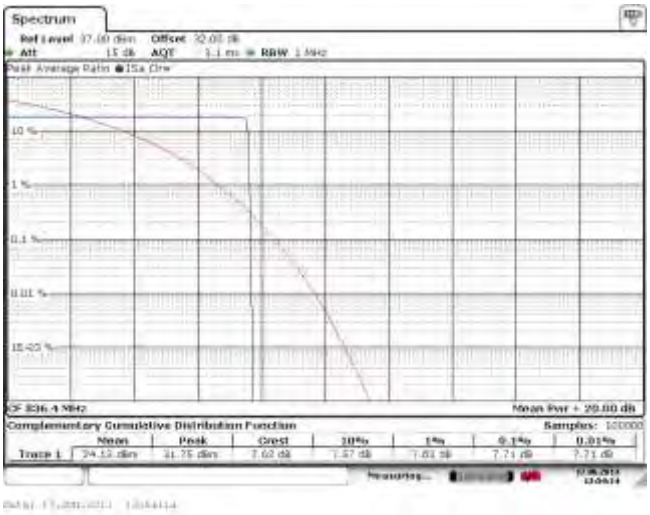
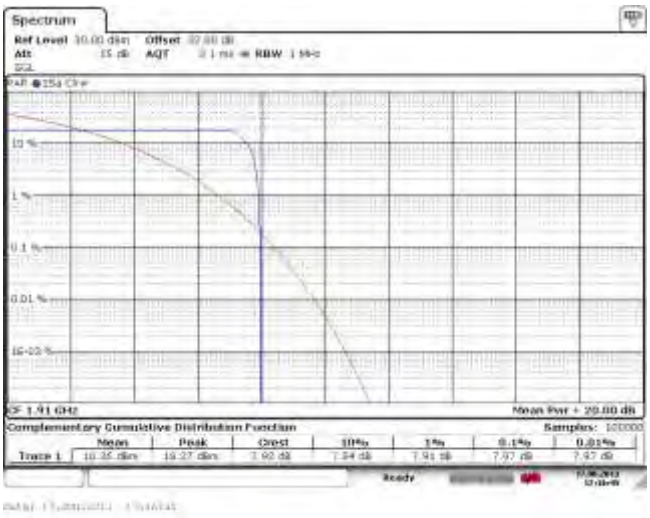


Figure 1-31a: PCS1900 Band, PAR High Channel



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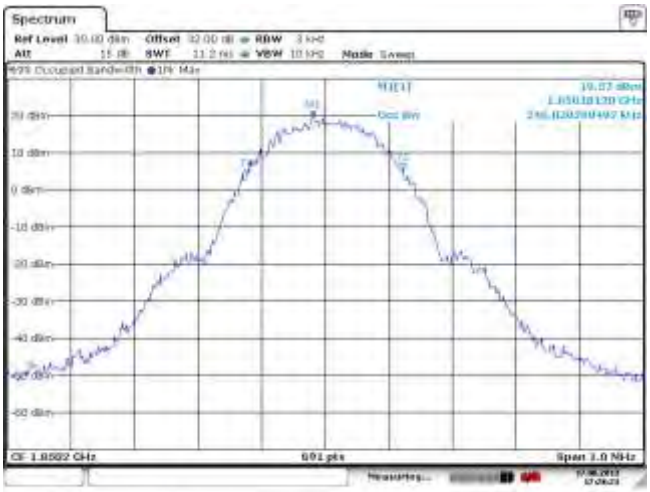
GSM Conducted RF Emission Test Data cont'd

Figure 1-29a: Occupied Bandwidth, GSM850 Band, Low Channel in EDGE mode

Figure 1-30a: Occupied Bandwidth, GSM850 Band, Middle Channel in EDGE mode

Figure 1-31a: Occupied Bandwidth, GSM850 band, High Channel in EDGE mode

Figure 1-32a: Occupied Bandwidth, PCS1900 Band, Low Channel in EDGE mode



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GSM Conducted RF Emission Test Data cont'd

Figure 1-33a: Occupied Bandwidth, PCS1900 Band, Middle Channel in EDGE mode

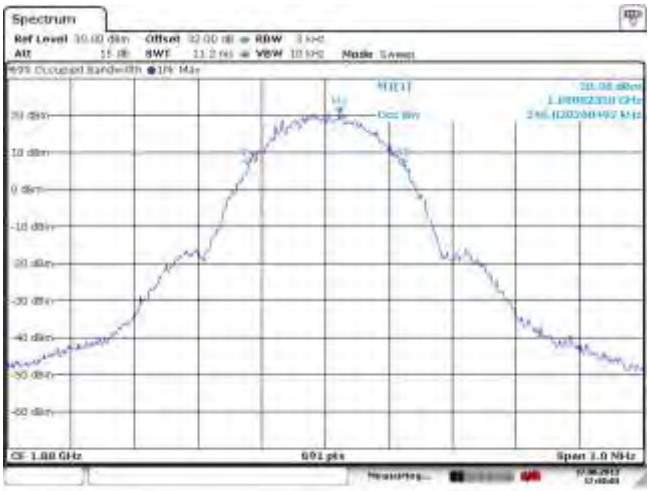


Figure 1-34a: Occupied Bandwidth, PCS1900 Band, High Channel in EDGE mode

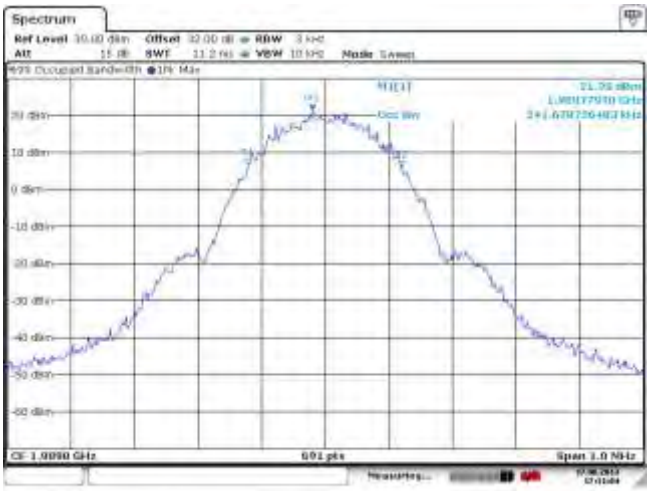


Figure 1-35a: GSM850 Band, Low Channel Mask in EDGE mode

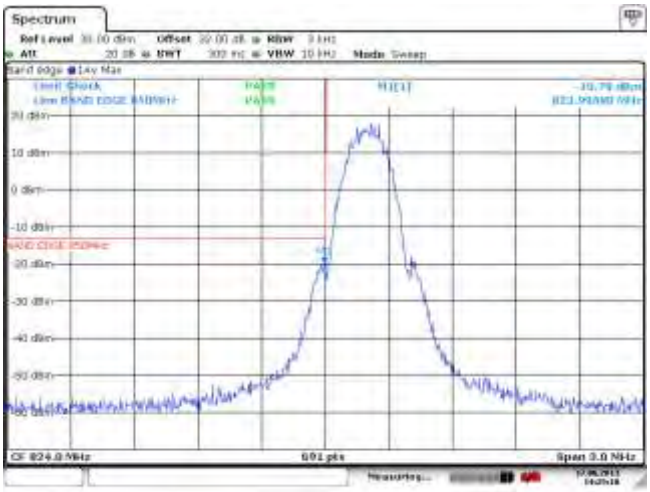
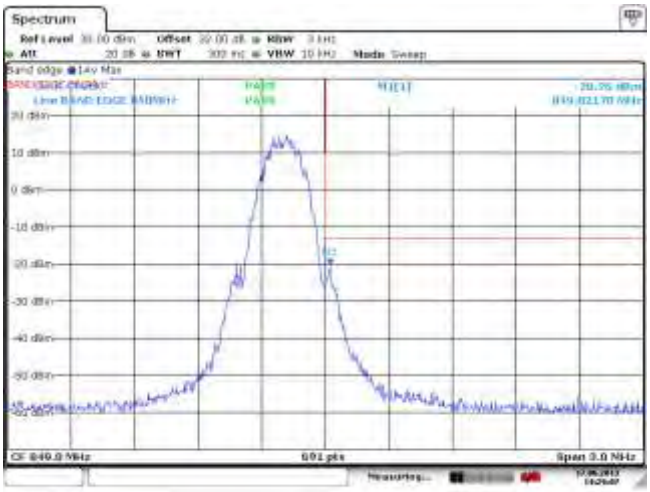


Figure 1-36a: GSM850 Band, High Channel Mask in EDGE mode



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GSM Conducted RF Emission Test Data cont'd

Figure 1-37a: PCS1900 Band, Low Channel Mask in EDGE mode

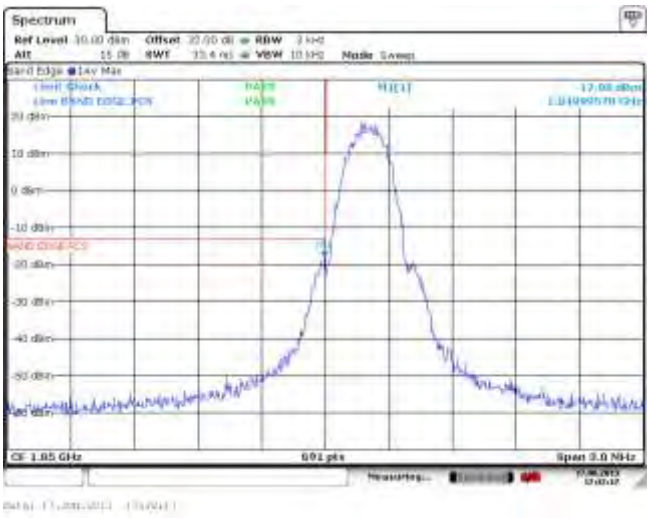
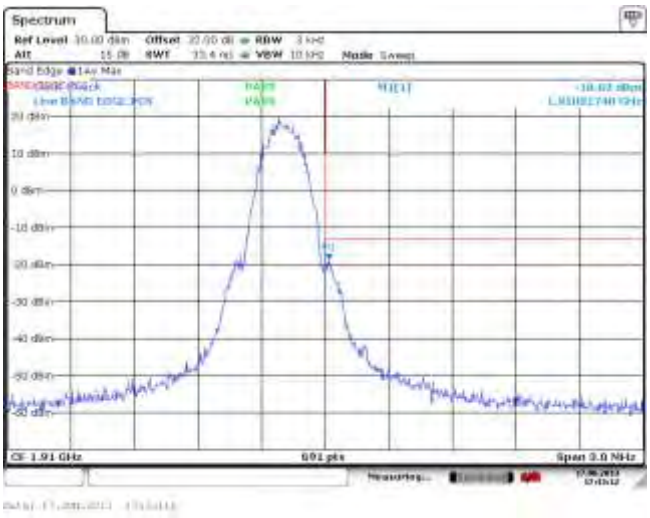


Figure 1-38a: PCS1900 Band, High Channel Mask in EDGE mode



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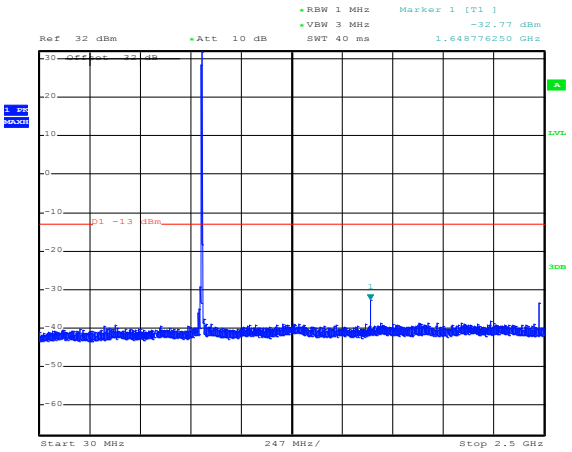
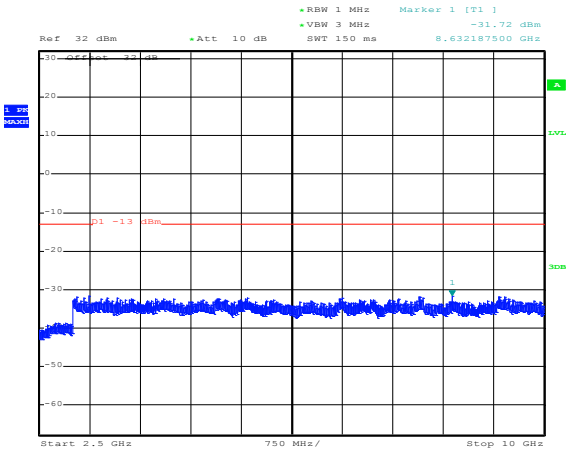
GSM Conducted RF Emission Test Data cont'd

Figure 1-39a: GSM850 band, Spurious Conducted Emissions, Low channel in Edge Mode



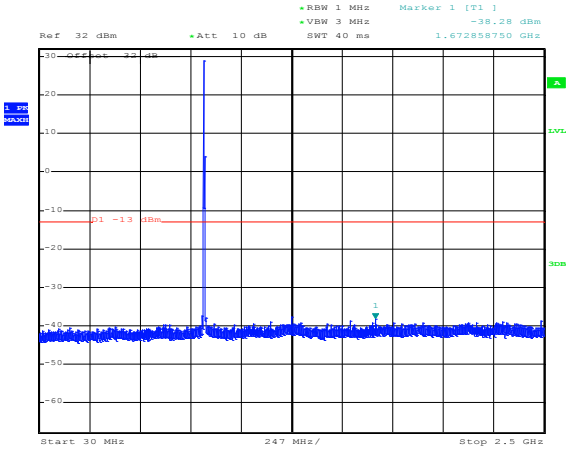
Date: 17.JUN.2013 14:44:44

Figure 1-40a: GSM850 band, Spurious Conducted Emissions, Low channel in Edge Mode



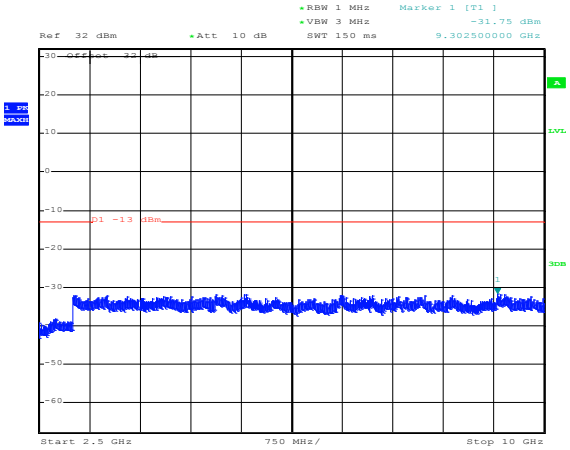
Date: 17.JUN.2013 14:45:28

Figure 1-41a: GSM850 band, Spurious Conducted Emissions, Middle channel in Edge Mode



Date: 17.JUN.2013 14:51:03

Figure 1-42a: GSM850 band, Spurious Conducted Emissions, Middle channel in Edge Mode



Date: 17.JUN.2013 14:51:57

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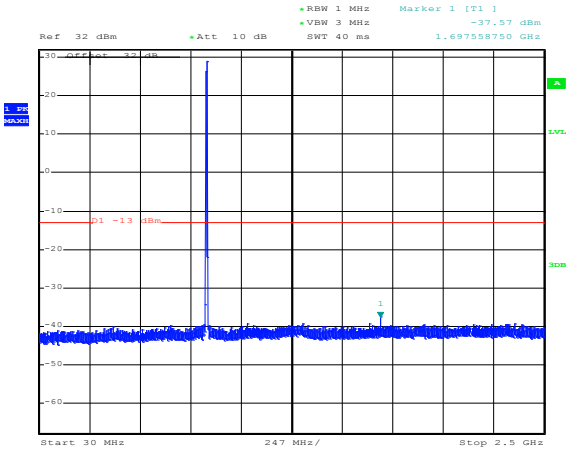
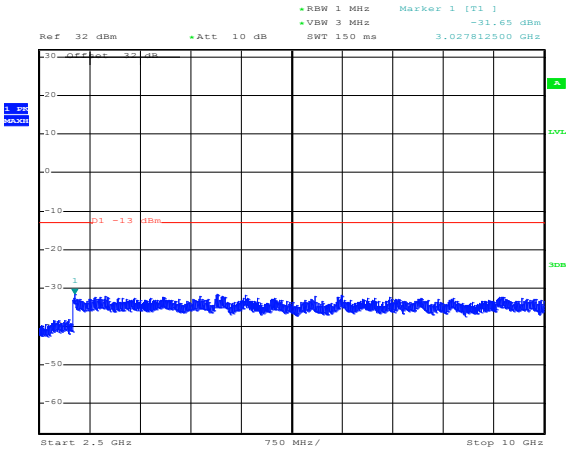
GSM Conducted RF Emission Test Data cont'd

Figure 1-43a: GSM850 band, Spurious Conducted Emissions, High channel in Edge Mode



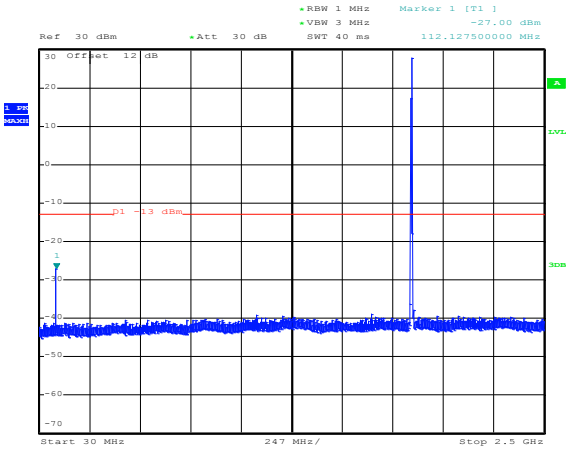
Date: 17.JUN.2013 14:52:57

Figure 1-44a: GSM850 band, Spurious Conducted Emissions, High channel in Edge Mode



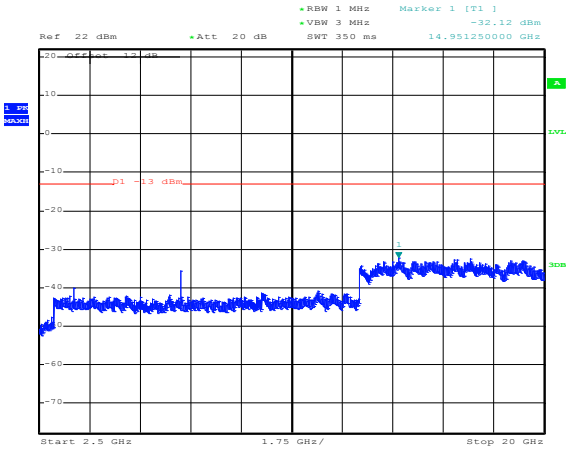
Date: 17.JUN.2013 15:09:35

Figure 1-45a: PCS1900 band, Spurious Conducted Emissions, Low channel in Edge Mode



Date: 17.JUN.2013 15:47:05

Figure 1-46a: PCS1900 band, Spurious Conducted Emissions, Low channel in Edge Mode



Date: 17.JUN.2013 15:49:55

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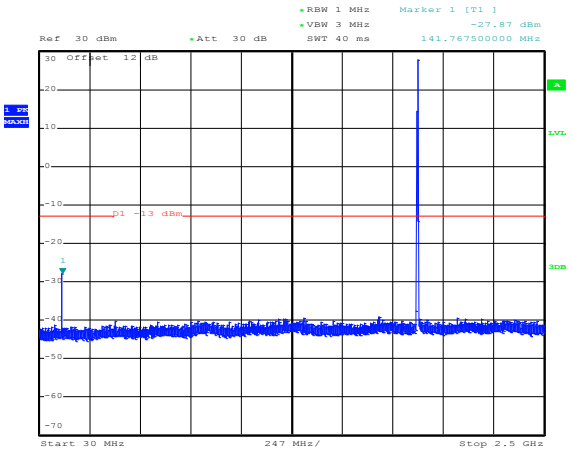
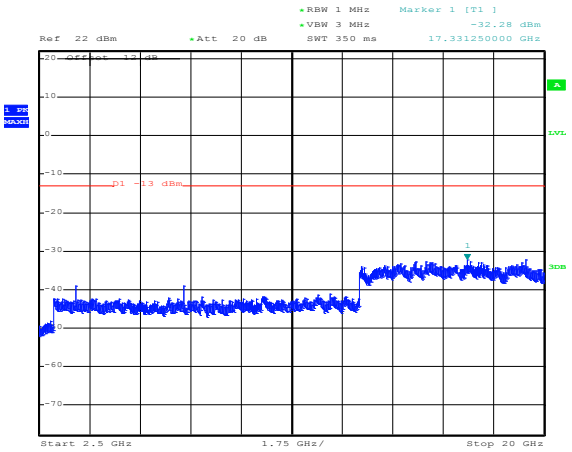
GSM Conducted RF Emission Test Data cont'd

Figure 1-47a: PCS1900 band, Spurious Conducted Emissions, middle channel in Edge Mode



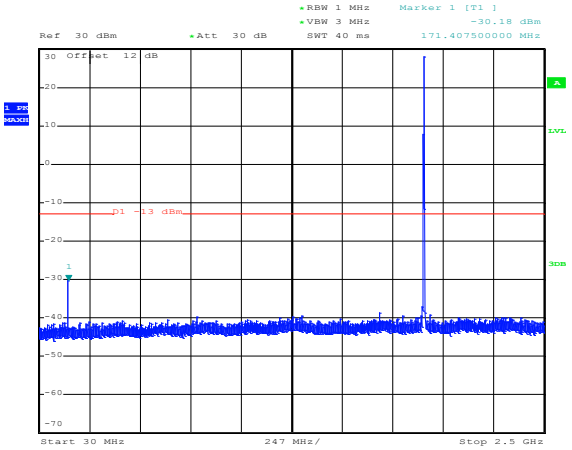
Date: 17.JUN.2013 15:47:45

Figure 1-48a: PCS1900 band, Spurious Conducted Emissions, middle channel in Edge Mode



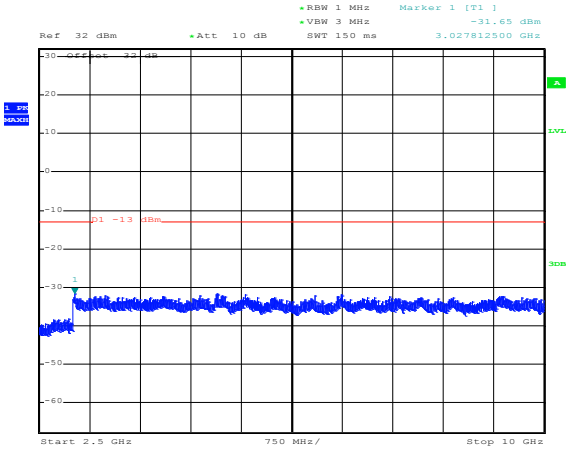
Date: 17.JUN.2013 15:51:00

Figure 1-49a: PCS1900 band, Spurious Conducted Emissions, High channel in Edge Mode



Date: 17.JUN.2013 15:48:12

Figure 1-50a: PCS1900 band, Spurious Conducted Emissions, High channel in Edge Mode



Date: 17.JUN.2013 15:09:35

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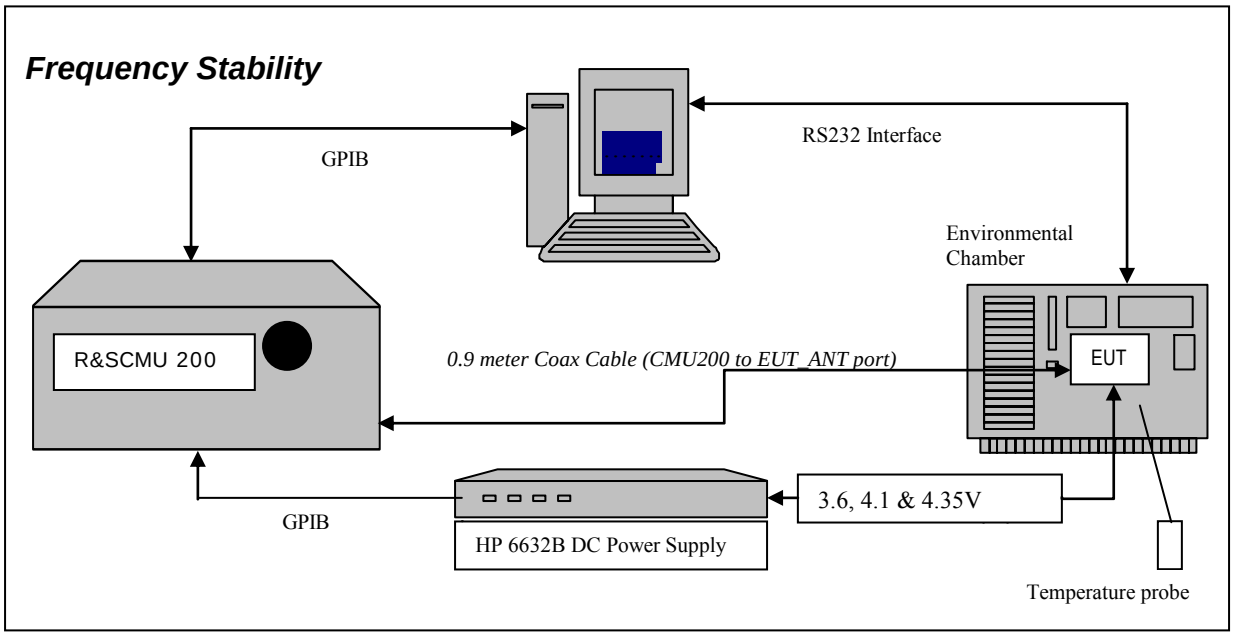
APPENDIX 1B – GSM FREQUENCY STABILITY TEST DATA

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, 4.3 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 following tests were performed on model RFX101LW.

The maximum frequency error in the GSM850 band measured was -**0.0361PPM**.
The maximum frequency error in the PCS1900 band measured was **-0.0172PPM**.

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Date of Test: June 18, 2013

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	-5.20	-0.0063
189	836.40	3.6	20	5.12	0.0061
251	848.60	3.6	20	6.98	0.0082

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.1	20	4.99	0.0061
189	836.40	4.1	20	6.29	0.0075
251	848.60	4.1	20	11.83	0.0139

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.35	20	8.91	0.0108
189	836.40	4.35	20	7.07	0.0085
251	848.60	4.35	20	7.85	0.0092

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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	-12.14	-0.0147
128	824.20	3.6	-20	-16.39	-0.0199
128	824.20	3.6	-10	9.68	0.0117
128	824.20	3.6	0	-2.46	-0.0030
128	824.20	3.6	10	-9.66	-0.0117
128	824.20	3.6	20	-5.20	-0.0063
128	824.20	3.6	30	-5.60	-0.0068
128	824.20	3.6	40	8.16	0.0099
128	824.20	3.6	50	5.79	0.0070
128	824.20	3.6	60	6.44	0.0078
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
128	824.20	4.1	-30	-17.66	-0.0214
128	824.20	4.1	-20	-18.49	-0.0224
128	824.20	4.1	-10	12.32	0.0149
128	824.20	4.1	0	-7.14	-0.0087
128	824.20	4.1	10	-6.26	-0.0076
128	824.20	4.1	20	4.99	0.0061
128	824.20	4.1	30	-22.85	-0.0277
128	824.20	4.1	40	-4.24	-0.0051
128	824.20	4.1	50	-6.16	-0.0075
128	824.20	4.1	60	-5.30	-0.0064
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
128	824.20	4.35	-30	-22.09	-0.0268
128	824.20	4.35	-20	-28.45	-0.0345
128	824.20	4.35	-10	16.60	0.0201
128	824.20	4.35	0	-4.31	-0.0052
128	824.20	4.35	10	-10.41	-0.0126
128	824.20	4.35	20	8.91	0.0108
128	824.20	4.35	30	-12.48	-0.0151
128	824.20	4.35	40	5.39	0.0065
128	824.20	4.35	50	-7.74	-0.0094
128	824.20	4.35	60	-8.00	-0.0097

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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	-11.44	-0.0137
189	836.40	3.6	-20	-18.03	-0.0216
189	836.40	3.6	-10	13.49	0.0161
189	836.40	3.6	0	-3.56	-0.0043
189	836.40	3.6	10	-10.22	-0.0122
189	836.40	3.6	20	5.12	0.0061
189	836.40	3.6	30	-7.66	-0.0092
189	836.40	3.6	40	6.58	0.0079
189	836.40	3.6	50	-2.42	-0.0029
189	836.40	3.6	60	7.05	0.0084
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
189	836.40	4.1	-30	-13.10	-0.0157
189	836.40	4.1	-20	-20.73	-0.0248
189	836.40	4.1	-10	18.18	0.0217
189	836.40	4.1	0	-6.88	-0.0082
189	836.40	4.1	10	-8.05	-0.0096
189	836.40	4.1	20	6.29	0.0075
189	836.40	4.1	30	-15.18	-0.0181
189	836.40	4.1	40	3.09	0.0037
189	836.40	4.1	50	-6.41	-0.0077
189	836.40	4.1	60	-8.06	-0.0096
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
189	836.40	4.35	-30	-23.10	-0.0276
189	836.40	4.35	-20	**-30.16**	**-0.0361**
189	836.40	4.35	-10	20.23	0.0242
189	836.40	4.35	0	-3.80	-0.0045
189	836.40	4.35	10	-10.77	-0.0129
189	836.40	4.35	20	7.07	0.0085
189	836.40	4.35	30	-19.37	-0.0232
189	836.40	4.35	40	-6.45	-0.0077
189	836.40	4.35	50	-8.49	-0.0102
189	836.40	4.35	60	-7.62	-0.0091

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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	-18.15	-0.0214
251	848.8	3.6	-20	-15.62	-0.0184
251	848.8	3.6	-10	14.95	0.0176
251	848.8	3.6	0	-4.27	-0.0050
251	848.8	3.6	10	-7.66	-0.0090
251	848.8	3.6	20	6.98	0.0082
251	848.8	3.6	30	-24.04	-0.0283
251	848.8	3.6	40	9.69	0.0114
251	848.8	3.6	50	6.43	0.0076
251	848.8	3.6	60	6.28	0.0074
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
251	848.8	4.1	-30	-19.67	-0.0232
251	848.8	4.1	-20	-22.29	-0.0263
251	848.8	4.1	-10	14.86	0.0175
251	848.8	4.1	0	-10.72	-0.0126
251	848.8	4.1	10	-10.36	-0.0122
251	848.8	4.1	20	11.83	0.0139
251	848.8	4.1	30	-15.73	-0.0185
251	848.8	4.1	40	-3.80	-0.0045
251	848.8	4.1	50	-5.82	-0.0069
251	848.8	4.1	60	-6.56	-0.0077
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
251	848.8	4.35	-30	-22.76	-0.0268
251	848.8	4.35	-20	-27.11	-0.0319
251	848.8	4.35	-10	19.18	0.0226
251	848.8	4.35	0	4.38	0.0052
251	848.8	4.35	10	-8.76	-0.0103
251	848.8	4.35	20	7.85	0.0092
251	848.8	4.35	30	-13.35	-0.0157
251	848.8	4.35	40	-10.82	-0.0127
251	848.8	4.35	50	-10.64	-0.0125
251	848.8	4.35	60	-9.04	-0.0107

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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	-21.11	-0.0114
661	1880.00	3.6	20	-13.43	-0.0071
810	1909.80	3.6	20	7.55	0.0040

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperatur e (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.1	20	-21.44	-0.0116
661	1880.00	4.1	20	-13.56	-0.0072
810	1909.80	4.1	20	-15.17	-0.0079

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperatur e (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.35	20	-11.88	-0.0064
661	1880.00	4.35	20	-21.57	-0.0115
810	1909.80	4.35	20	-19.57	-0.0102

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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	-29.44	-0.0159
512	1850.20	3.6	-20	-22.99	-0.0124
512	1850.20	3.6	-10	-19.82	-0.0107
512	1850.20	3.6	0	-15.11	-0.0082
512	1850.20	3.6	10	-13.30	-0.0072
512	1850.20	3.6	20	-21.11	-0.0114
512	1850.20	3.6	30	-13.30	-0.0072
512	1850.20	3.6	40	-22.60	-0.0122
512	1850.20	3.6	50	-17.05	-0.0092
512	1850.20	3.6	60	-20.53	-0.0111
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
512	1850.20	4.1	-30	-28.48	-0.0154
512	1850.20	4.1	-20	-31.25	-0.0169
512	1850.20	4.1	-10	-20.47	-0.0111
512	1850.20	4.1	0	-14.08	-0.0076
512	1850.20	4.1	10	-11.82	-0.0064
512	1850.20	4.1	20	-21.44	-0.0116
512	1850.20	4.1	30	-20.34	-0.0110
512	1850.20	4.1	40	-10.53	-0.0057
512	1850.20	4.1	50	-18.53	-0.0100
512	1850.20	4.1	60	-27.83	-0.0150
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
512	1850.20	4.35	-30	-27.77	-0.0150
512	1850.20	4.35	-20	-20.73	-0.0112
512	1850.20	4.35	-10	-23.05	-0.0125
512	1850.20	4.35	0	-23.12	-0.0125
512	1850.20	4.35	10	-19.44	-0.0105
512	1850.20	4.35	20	-11.88	-0.0064
512	1850.20	4.35	30	-17.18	-0.0093
512	1850.20	4.35	40	-21.76	-0.0118
512	1850.20	4.35	50	-21.44	-0.0116
512	1850.20	4.35	60	-18.79	-0.0102

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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	-31.96	-0.0170
661	1880.00	3.6	-20	-26.54	-0.0141
661	1880.00	3.6	-10	-21.24	-0.0113
661	1880.00	3.6	0	-10.91	-0.0058
661	1880.00	3.6	10	-15.63	-0.0083
661	1880.00	3.6	20	-13.43	-0.0071
661	1880.00	3.6	30	-11.69	-0.0062
661	1880.00	3.6	40	-8.91	-0.0047
661	1880.00	3.6	50	-13.95	-0.0074
661	1880.00	3.6	60	-7.23	-0.0038
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
661	1880.00	4.1	-30	-23.31	-0.0124
661	1880.00	4.1	-20	-26.67	-0.0142
661	1880.00	4.1	-10	-23.76	-0.0126
661	1880.00	4.1	0	-18.79	-0.0100
661	1880.00	4.1	10	-14.27	-0.0076
661	1880.00	4.1	20	-13.56	-0.0072
661	1880.00	4.1	30	-15.56	-0.0083
661	1880.00	4.1	40	-21.18	-0.0113
661	1880.00	4.1	50	-21.70	-0.0115
661	1880.00	4.1	60	-21.11	-0.0112
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
661	1880.00	4.35	-30	-15.24	-0.0081
661	1880.00	4.35	-20	-24.47	-0.0130
661	1880.00	4.35	-10	-18.14	-0.0096
661	1880.00	4.35	0	-24.09	-0.0128
661	1880.00	4.35	10	-22.66	-0.0121
661	1880.00	4.35	20	-21.57	-0.0115
661	1880.00	4.35	30	-22.92	-0.0122
661	1880.00	4.35	40	-19.57	-0.0104
661	1880.00	4.35	50	-19.05	-0.0101
661	1880.00	4.35	60	-22.47	-0.0120

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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	-24.47	-0.0128
810	1909.80	3.6	-20	-20.99	-0.0110
810	1909.80	3.6	-10	-25.70	-0.0135
810	1909.80	3.6	0	-12.40	-0.0065
810	1909.80	3.6	10	-12.46	-0.0065
810	1909.80	3.6	20	7.55	0.0040
810	1909.80	3.6	30	-11.43	-0.0060
810	1909.80	3.6	40	-20.02	-0.0105
810	1909.80	3.6	50	-19.95	-0.0104
810	1909.80	3.6	60	-20.21	-0.0106
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
810	1909.80	4.1	-30	**-32.93**	**-0.0172**
810	1909.80	4.1	-20	-17.69	-0.0093
810	1909.80	4.1	-10	-21.05	-0.0110
810	1909.80	4.1	0	-18.53	-0.0097
810	1909.80	4.1	10	-5.68	-0.0030
810	1909.80	4.1	20	-15.17	-0.0079
810	1909.80	4.1	30	-17.76	-0.0093
810	1909.80	4.1	40	-11.49	-0.0060
810	1909.80	4.1	50	-20.60	-0.0108
810	1909.80	4.1	60	-14.79	-0.0077
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
810	1909.80	4.35	-30	-24.21	-0.0127
810	1909.80	4.35	-20	-20.40	-0.0107
810	1909.80	4.35	-10	-17.76	-0.0093
810	1909.80	4.35	0	-28.41	-0.0149
810	1909.80	4.35	10	-26.15	-0.0137
810	1909.80	4.35	20	-19.57	-0.0102
810	1909.80	4.35	30	-20.34	-0.0107
810	1909.80	4.35	40	-20.34	-0.0107
810	1909.80	4.35	50	-13.82	-0.0072
810	1909.80	4.35	60	-19.76	-0.0103

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APPENDIX 1C – GSM RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

The following tests were performed on model RGB141LW.

Date of test: June 28, 2013
The following measurements were performed by Kevin Guo.

The environmental tests conditions were: Temperature: 25.2 °C
Relative Humidity: 37.4 %

The BlackBerry® smartphone was standalone, USB Down with LCD facing to RX antenna when the turntable is at 0 degree position.
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height.

PCS1900 Band in Call Mode

								Substitution Method					
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	512	1850.20	1900	Horn	V	86.05	86.8	V-V	-6.55	28.26	0.67	33	4.74
F0	512	1850.20	1900	Horn	H	86.8		H-H	-6.64				
F0	661	1880.00	1900	Horn	V	84.2	87.01	V-V	-5.28	29.62	0.92	33	3.38
F0	661	1880.00	1900	Horn	H	87.01		H-H	-6.13				
F0	810	1909.80	1900	Horn	V	83.45	87.1	V-V	-4.16	**29.79**	**0.95**	33	3.21
F0	810	1909.80	1900	Horn	H	87.1		H-H	-4.23				

PCS1900 Band in EDGE Mode

								Substitution Method					
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	512	1850.20	1900	Horn	V	84.87	85.86	V-V	-7.49	27.32	0.54	33	5.68
F0	512	1850.20	1900	Horn	H	85.86		H-H	-7.58				
F0	661	1880.00	1900	Horn	V	83.32	86.01	V-V	-6.25	28.65	0.73	33	4.35
F0	661	1880.00	1900	Horn	H	86.01		H-H	-7.11				
F0	810	1909.80	1900	Horn	V	83.65	86.35	V-V	-4.83	**29.12**	**0.82**	33	3.88
F0	810	1909.80	1900	Horn	H	86.35		H-H	-4.98				

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Radiated Emissions Test Data Results cont'd

GSM850 Call Mode

Date of Test: June 27, 2013

The following measurements were performed by Rex Zhang.
The environmental test conditions were: Temperature: 25.7 ºC
Relative Humidity: 17.5 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 30 MHz to 1000 MHz.

The BlackBerry® smartphone was standalone horizontally, with LCD screen facing up and top poitning to the RX antenna when the turntable is at 0 degree position

Measurements were performed in GSM850 Call Tx mode, channels 190.

All emissions were at least 25.0 dB below the limit.

Date of Test: June 26, 2013

The following measurements were performed by Mahmood Ahmed.
The environmental test conditions were: Temperature: 24.5 ºC
Relative Humidity: 41.7 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 1 GHz to 9 GHz.

The BlackBerry® smartphone was standalone horizontally, with LCD screen facing down and top poitning to the RX antenna when the turntable is at 0 degree position

The measurements were performed in GSM850 Call Tx mode, channels 190.

All emissions were at least 25.0 dB below the limit.

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Radiated Emissions Test Data Results cont'd

PCS1900 EDGE Mode

Date of Test: June 27, 2013

The environmental test conditions were: Temperature: 25.7 ºC
Relative Humidity: 17.5 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 30 MHz to 1000 MHz.

The BlackBerry® smartphone was standalone horizontally, with LCD screen facing down and top poitning to the RX antenna when the turntable is at 0 degree position

Measurements were performed in PCS1900 EDGE Tx mode, channels 661.
All emissions were at least 25.0 dB below the limit.

Date of Test: June 27, 2013

The environmental test conditions were: Temperature: 25.4 ºC
Relative Humidity: 42.5 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 1 GHz to 20 GHz.

The BlackBerry® smartphone was standalone, with USB jack pointing down and the LCD facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in PCS1900 EDGE Tx mode, channels 661.

All emissions were at least 25.0 dB below the limit.

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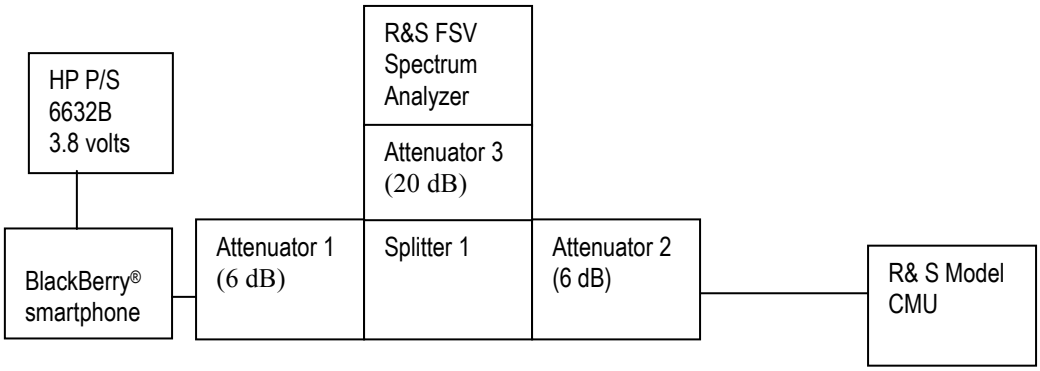
APPENDIX 2A– WCDMA Band 2/5 CONDUCTED RF EMISSIONS TEST DATA/PLOTS

WCDMA BAND 2/5 Conducted RF Emission Test Data

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

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.

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

Date of Test: June 18, 2013

The environmental test conditions were: Temperature: 25.4ºC
Relative Humidity: 35.4%

The following measurements were performed by Berkin Can.

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WCDMA Conducted RF Emission Test Data cont'd

The following tests were performed on model RFX101LW.

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 22.917, CFR 24.238(a) were measured from 30 MHz to 20 GHz.

–26 dBc Bandwidth and Occupied Bandwidth (99%)

For each carrier frequency of low, middle and high, the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth.
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc bandwidth for WCDMA band 5 was measured to be 4.602 MHz, and for the WCDMA band 2 was measured to be 4.595 MHz as shown below. Results were derived in a 100 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

Test Data for WCDMA Band 5/2 selected Frequencies in Voice mode

WCDMA Band 5 Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
826.400	4.573	4.153
836.400	4.580	4.153
846.600	4.573	4.153

WCDMA Band 2 Frequency (MHz)	26dBc Occupied Bandwidth (MHz	99% Occupied Bandwidth (MHz)
1852.400	4.602	4.160
1880.000	4.609	4.153
1907.600	4.599	4.139

Peak to Average Ratio (PAR)

The peak to average ratio was measured on the low, middle and high channels.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.
The worst case measured was 3.70 dB on the low channel.

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Measurement Plots for WCDMA Band 5 and WCDMA Band 2 in Voice mode

See Figures 2-1a to 2-12a for the plots of the conducted spurious emissions.
See Figures 2-13a to 2-24a for the plots of 99% Occupied Bandwidth and -26 dBc Bandwidth.
See Figures 2-25a to 2-28a for the plots of the Channel mask.
See figures 2-29a to 2-31a for the plots of the Peak to Average Ratio (WCDMA Band 2).

Test Data for WCDMA Band 5 / 2 selected Frequencies in HSUPA mode

WCDMA Band 5 Frequency (MHz)	99% Occupied Bandwidth (MHz)
826.400	4.16
836.400	4.153
846.600	4.161

WCDMA Band 2 Frequency (MHz)	99% Occupied Bandwidth (MHz)
1852.400	4.168
1880.000	4.153
1907.600	4.153

Measurement Plots for WCDMA Band 5 and WCDMA Band 2 in HSUPA mode

Refer to the following measurement plots for more detail:

See Figures 2-32a to 2-43a for the plots of the conducted spurious emissions.
See Figures 2-44a to 2-49a for the plots of 99% Occupied Bandwidth.
See Figures 2-50a to 2-53a for the plots of the Channel mask.

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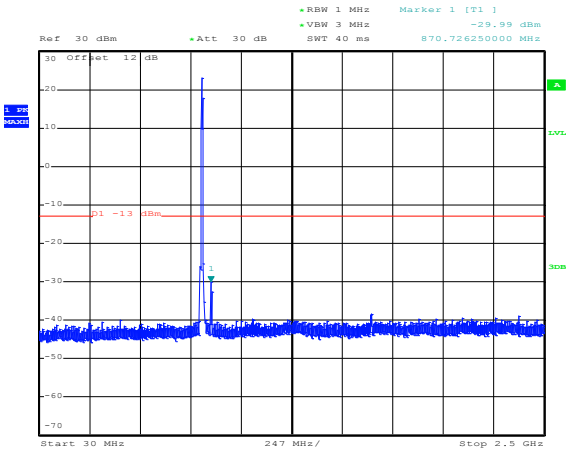
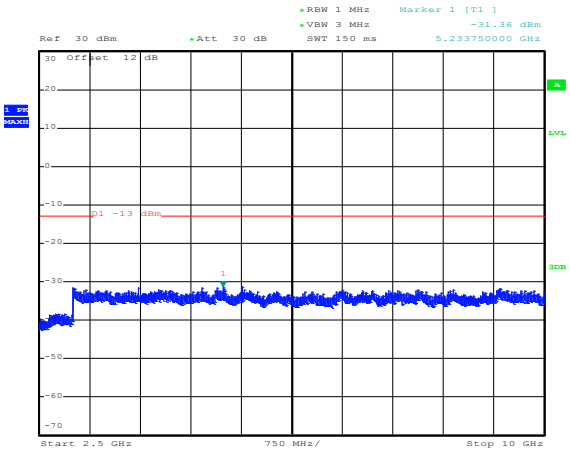
WCDMA Conducted RF Emission Test Data cont'd

Figure 2-1a: Band 5, Spurious Conducted Emissions, Low channel



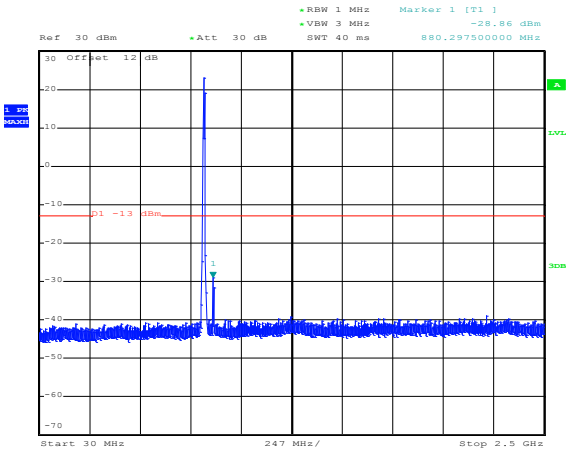
Date: 18.JUN.2013 13:12:49

Figure 2-2a: Band 5, Spurious Conducted Emissions, Low channel



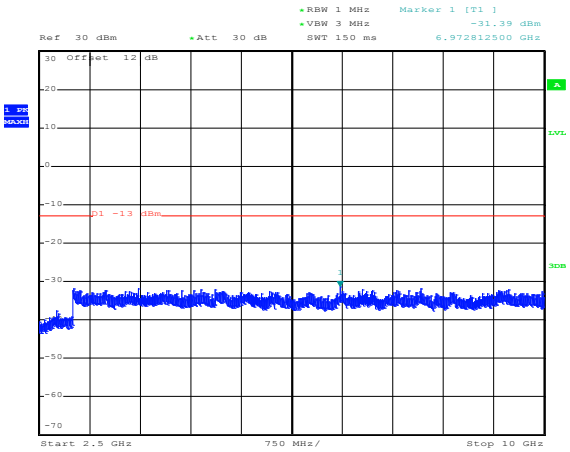
Date: 18.JUN.2013 13:16:21

Figure 2-3a: Band 5, Spurious Conducted Emissions, Middle channel



Date: 18.JUN.2013 13:12:29

Figure 2-4a: Band 5, Spurious Conducted Emissions, Middle channel



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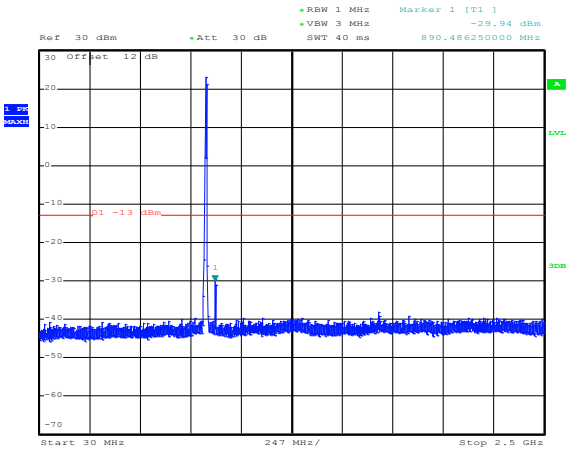
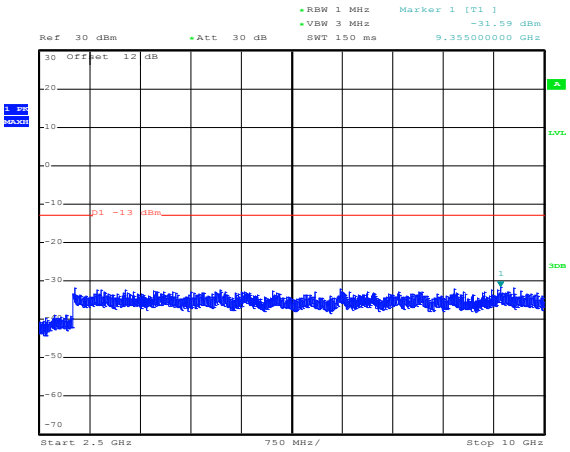
WCDMA Conducted RF Emission Test Data cont'd

Figure 2-5a: Band 5, Spurious Conducted Emissions, High Channel



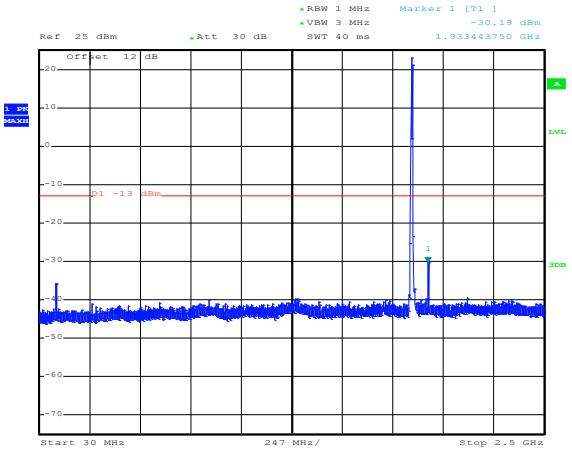
Date: 18.JUN.2013 13:13:15

Figure 2-6a: Band 5, Spurious Conducted Emissions, High Channel



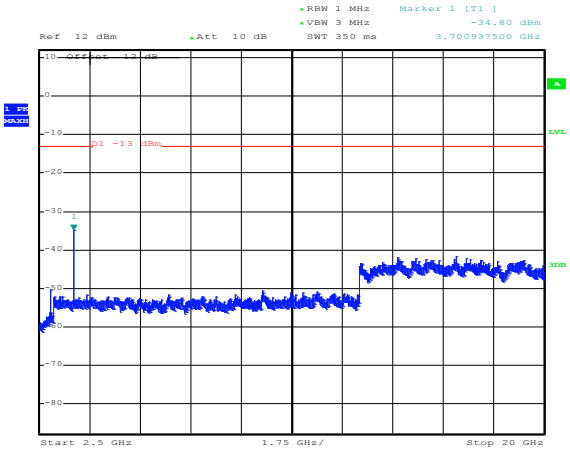
Date: 18.JUN.2013 13:15:02

Figure 2-2a:, BAND 2 Spurious Conducted Emissions, Low Channel



Date: 18.JUN.2013 13:18:15

Figure 2-8a: BAND 2, Spurious Conducted Emissions, Low Channel



Date: 18.JUN.2013 13:22:01

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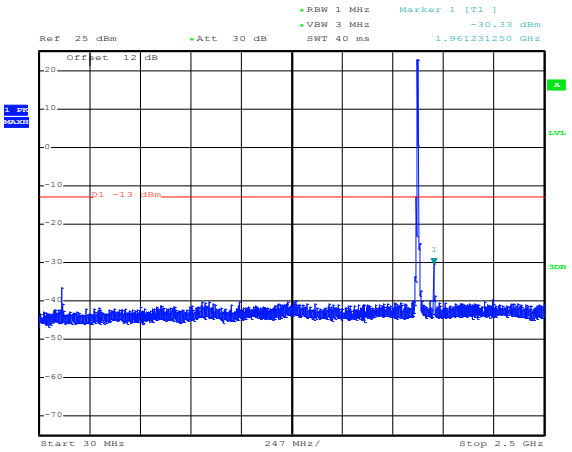
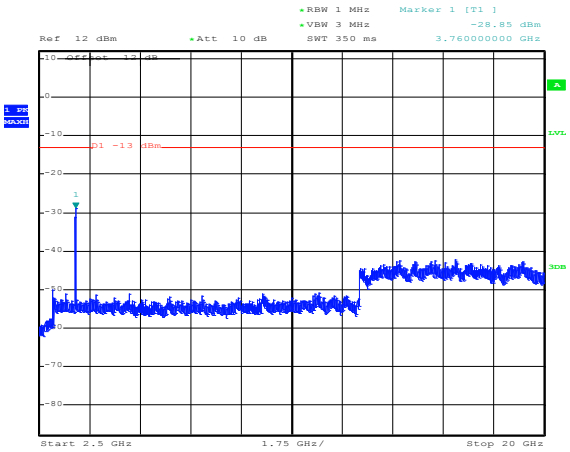
WCDMA Conducted RF Emission Test Data cont'd

Figure 2-9a: BAND 2, Spurious Conducted Emissions, Middle Channel



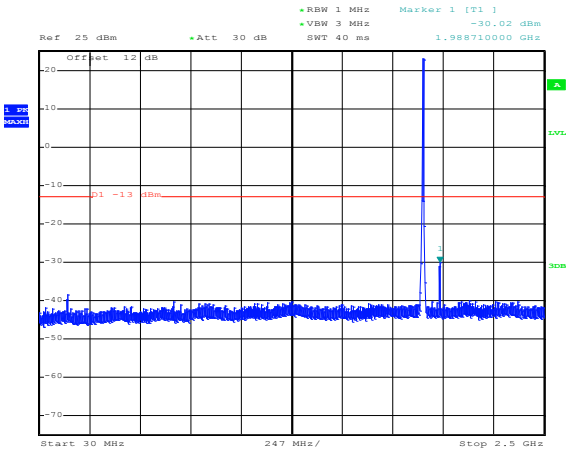
Date: 18.JUN.2013 13:18:58

Figure 2-10a: BAND 2, Spurious Conducted Emissions, Middle Channel



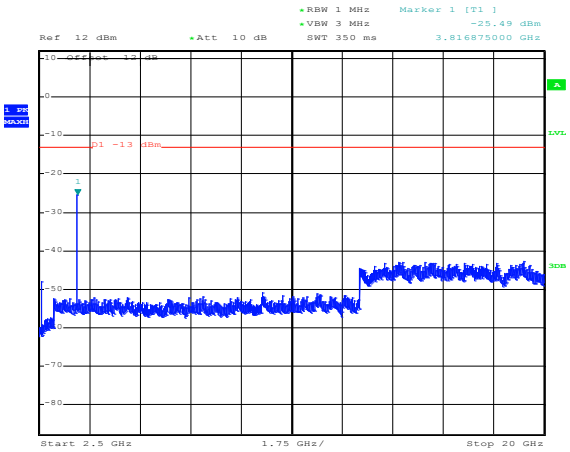
Date: 18.JUN.2013 13:23:00

Figure 2-11a: BAND 2, Spurious Conducted Emissions, High Channel



Date: 18.JUN.2013 13:19:25

Figure 2-12a: BAND 2, Spurious Conducted Emissions, High Channel



Date: 18.JUN.2013 13:24:28

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Figure 2-13a: Occupied Bandwidth, Band 5 Low Channel

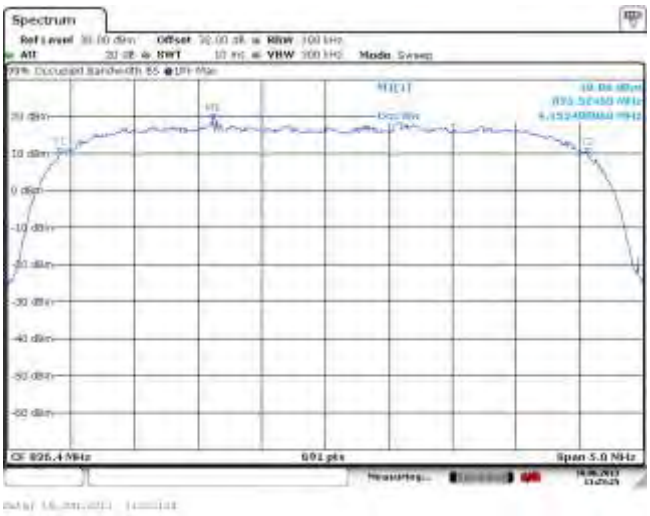

Figure 2-14a: Occupied Bandwidth, Band 5 Middle Channel

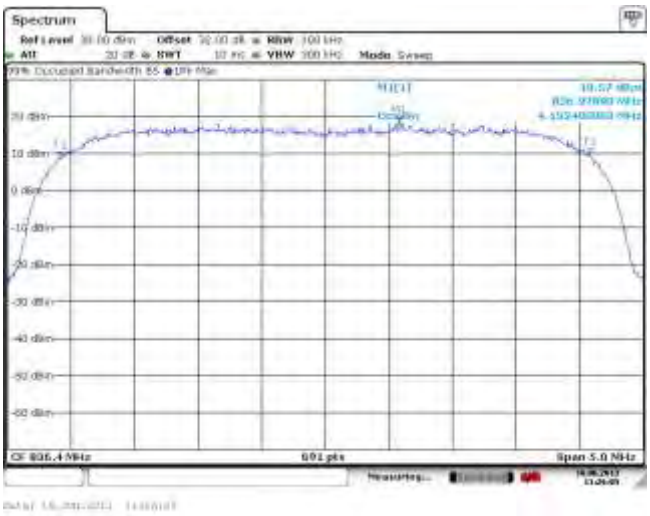

Figure 2-15a: Occupied Bandwidth, Band 5 High Channel

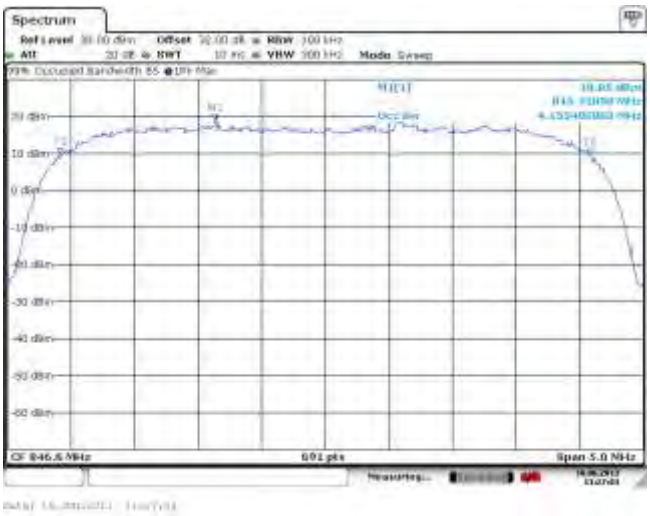

Figure 2-16a: Occupied Bandwidth, Band 2 Low Channel

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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-17a: Occupied Bandwidth, Band 2 Middle Channel

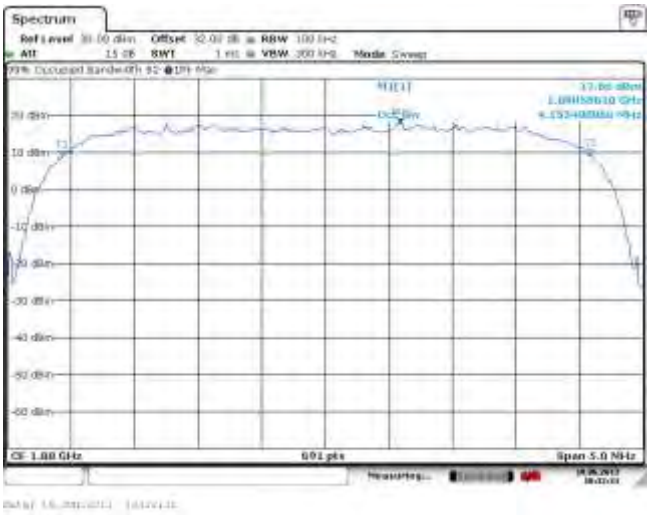


Figure 2-18a: Occupied Bandwidth, Band 2 High Channel

Figure 2-19a: -26 dBc Bandwidth, Band 5 Low Channel

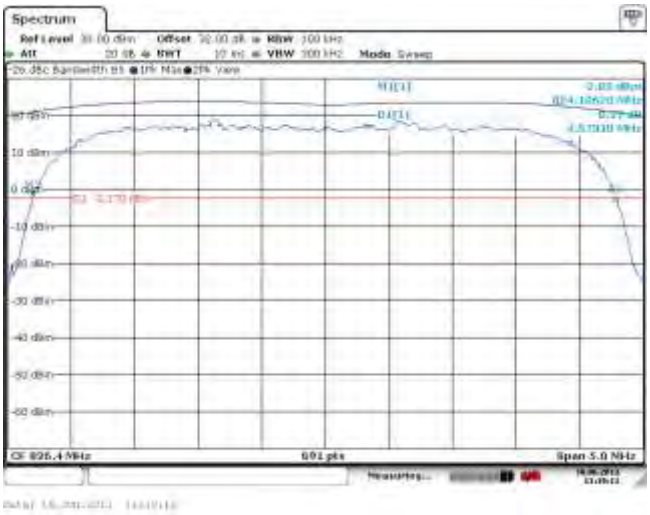
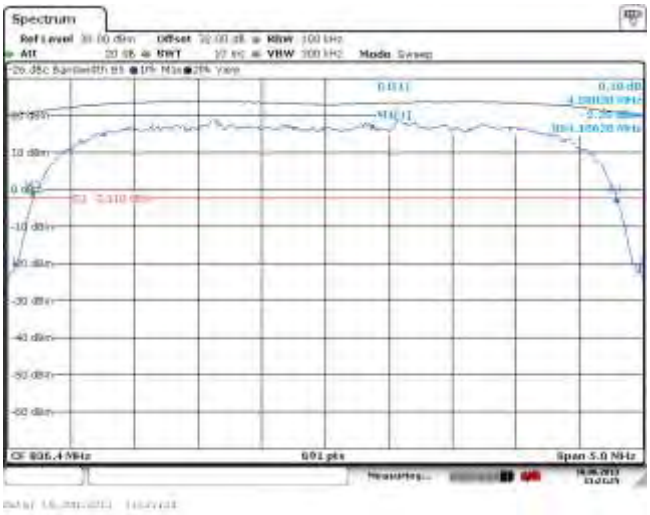


Figure 2-20a: -26 dBc Bandwidth, Band 5 Middle Channel



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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-21a: -26 dBc Bandwidth, Band 5 High Channel

Figure 2-22a: -26 dBc Bandwidth, Band 2 Low Channel

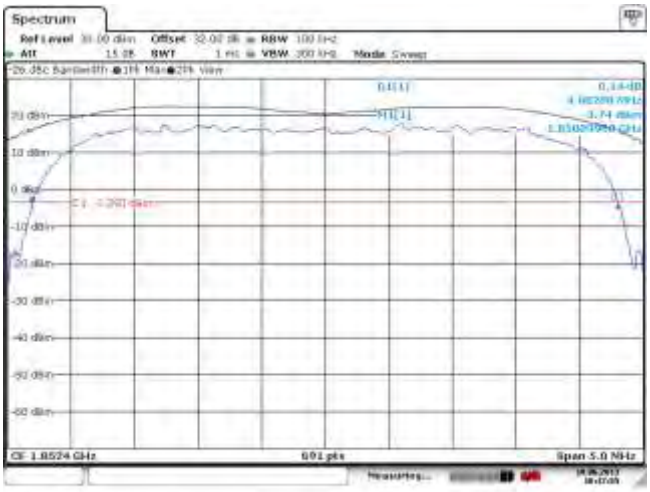


Figure 2-23a: -26 dBc Bandwidth, Band 2 Middle Channel

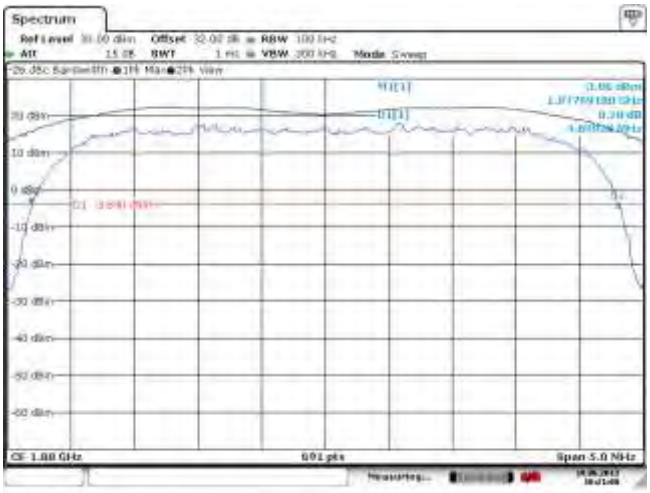
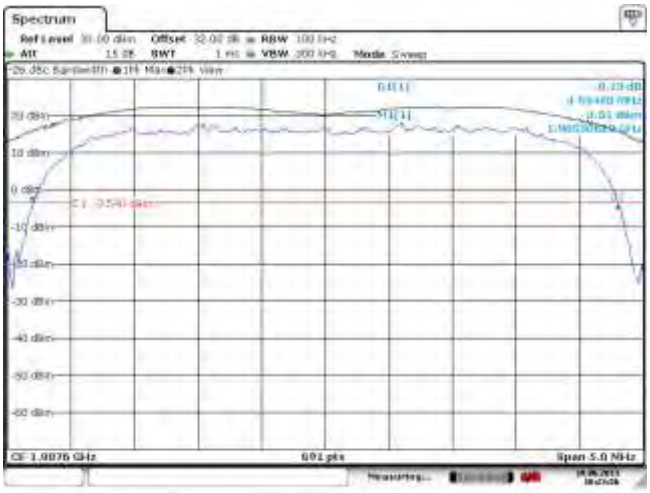


Figure 2-24a: -26 dBc Bandwidth, Band 2 High Channel



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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-25a: Band 5 Low Channel Mask

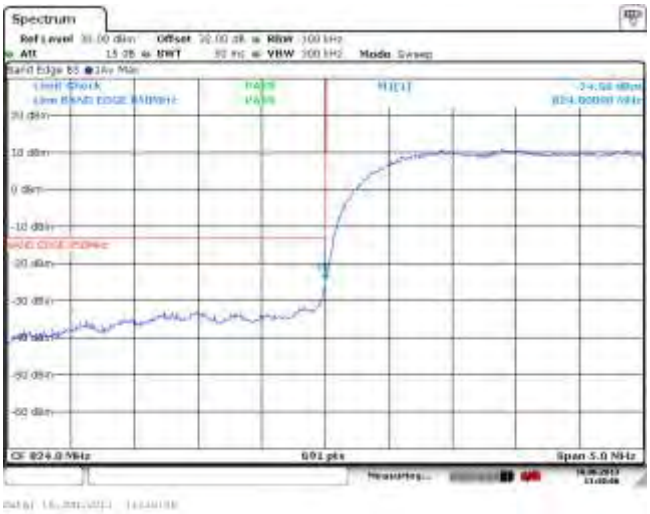


Figure 2-26a: Band 5 High Channel Mask

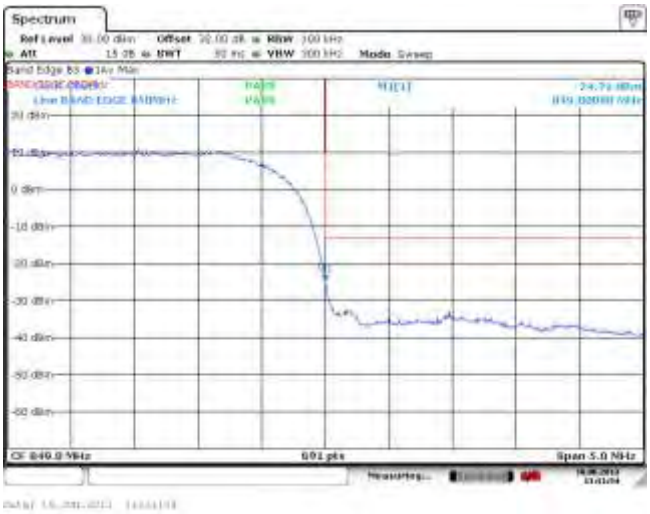


Figure 2-27a: Band 2 Low Channel Mask

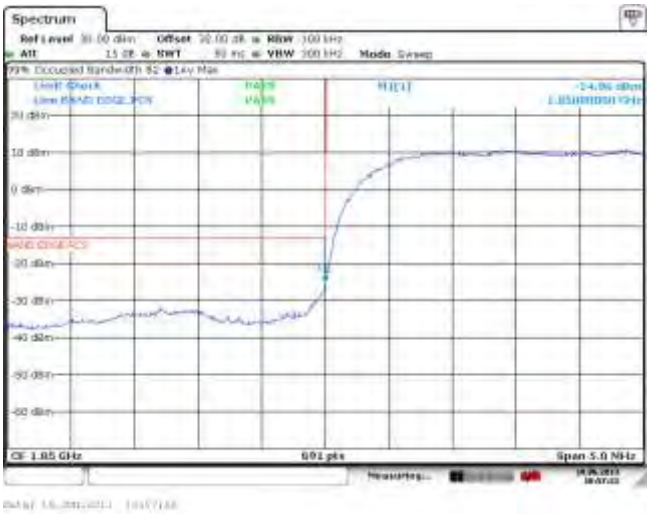
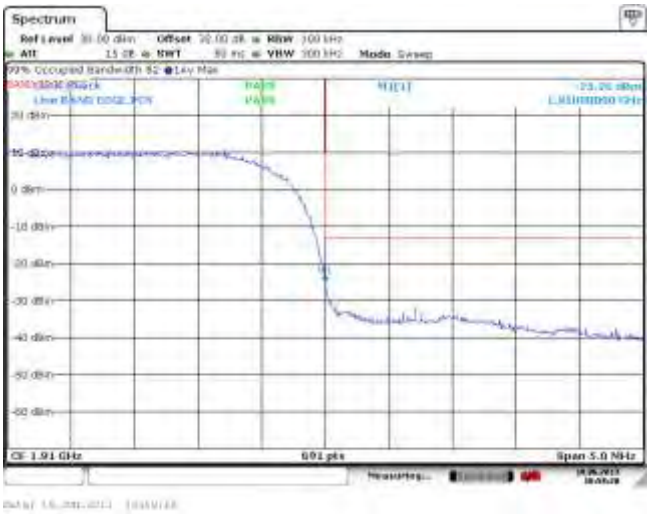


Figure 2-28a: Band 2 High Channel Mask



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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-29a: Band 2, PAR Low Channel

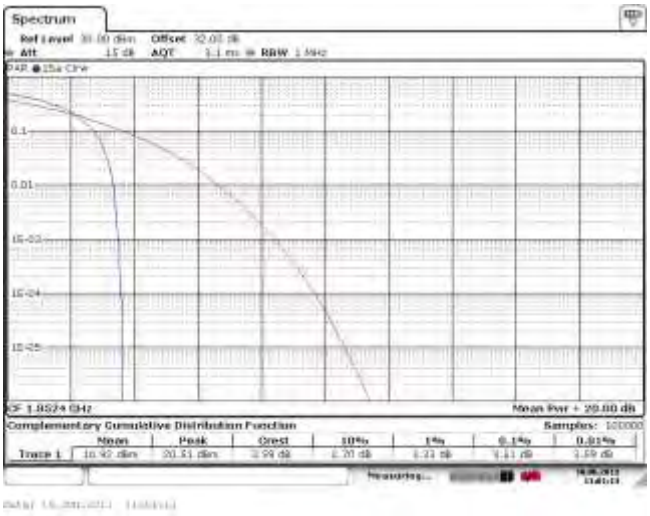


Figure 2-30a: Band 2, PAR Mid Channel

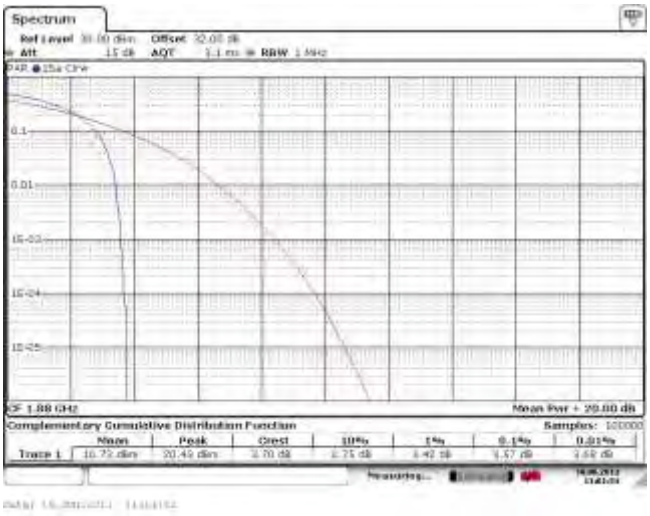
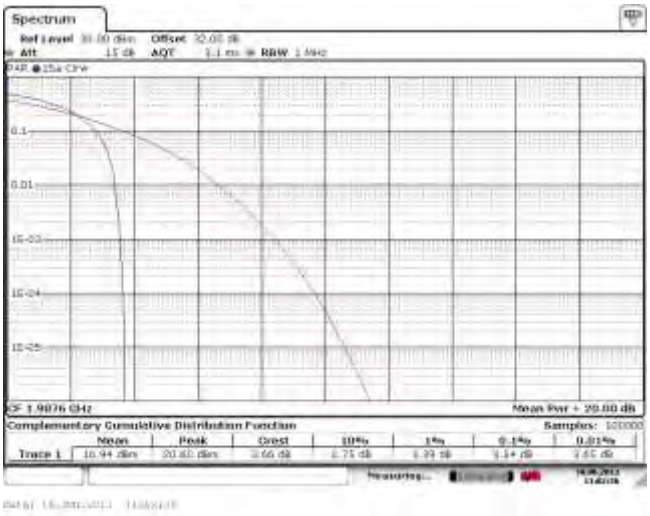


Figure 2-31a: Band 2, PAR High Channel



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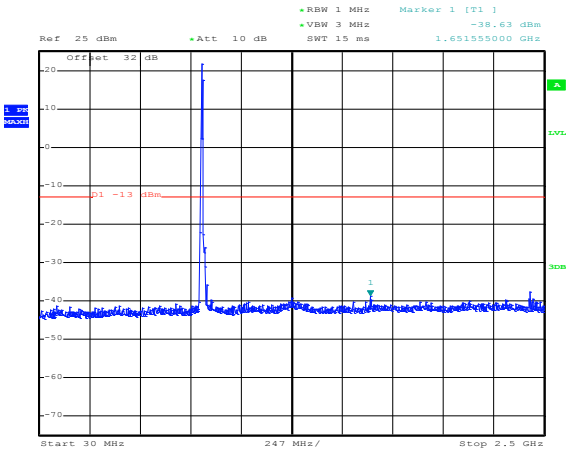
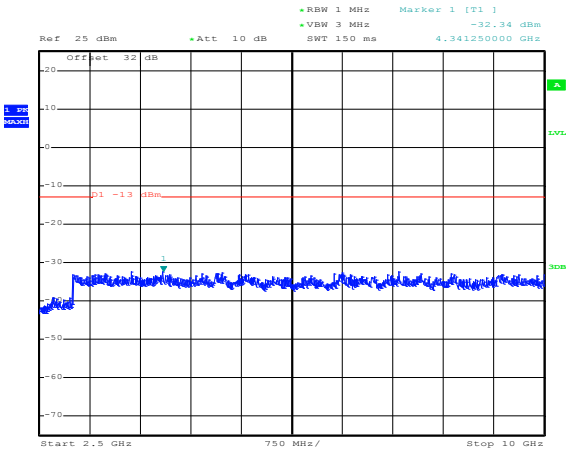
WCDMA Conducted RF Emission Test Data cont'd

Figure 2-32a: Band 5 HSUPA, Spurious Conducted Emissions, Low channel



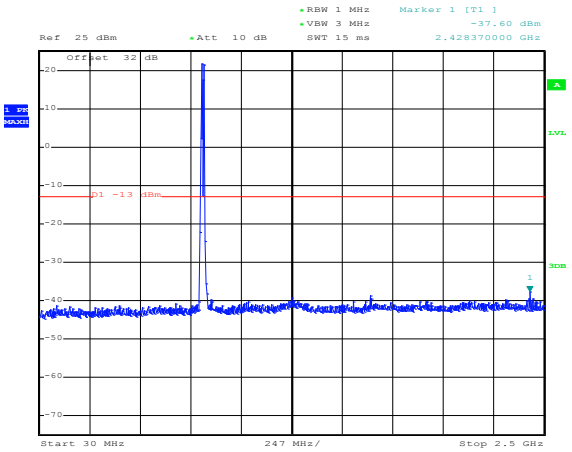
Date: 18.JUN.2013 15:38:23

Figure 2-33a: Band 5 HSUPA, Spurious Conducted Emissions, Low channel



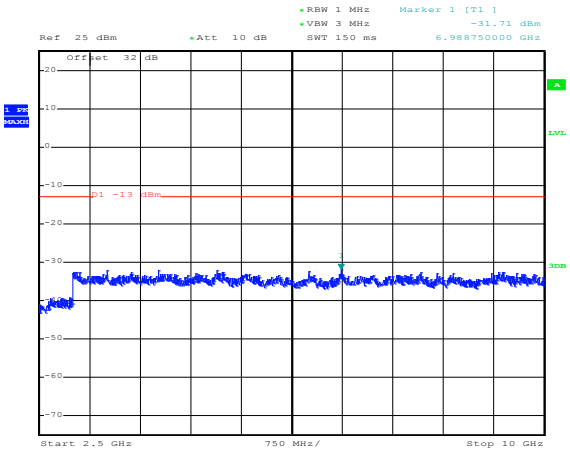
Date: 18.JUN.2013 15:40:00

Figure 2-34a: Band 5 HSUPA, Spurious Conducted Emissions, Middle channel



Date: 18.JUN.2013 15:38:51

Figure 2-35a: Band 5 HSUPA, Spurious Conducted Emissions, Middle channel



Date: 18.JUN.2013 15:40:31

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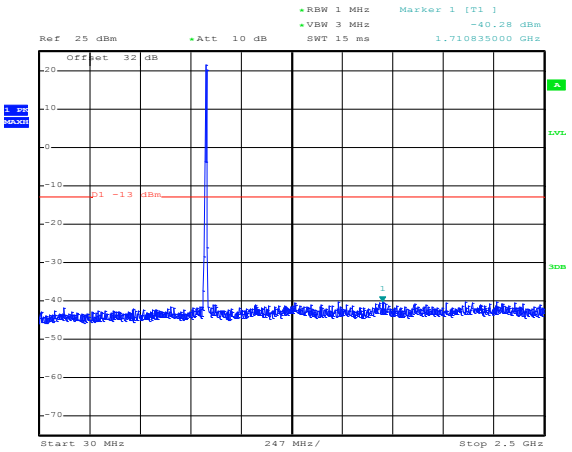
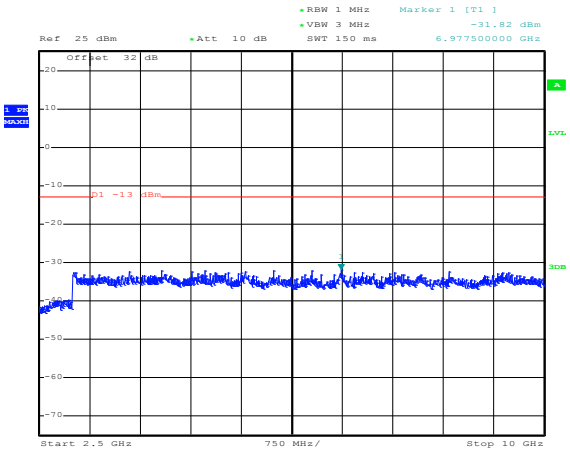
WCDMA Conducted RF Emission Test Data cont'd

Figure 2-36a: Band 5 HSUPA, Spurious Conducted Emissions, High Channel



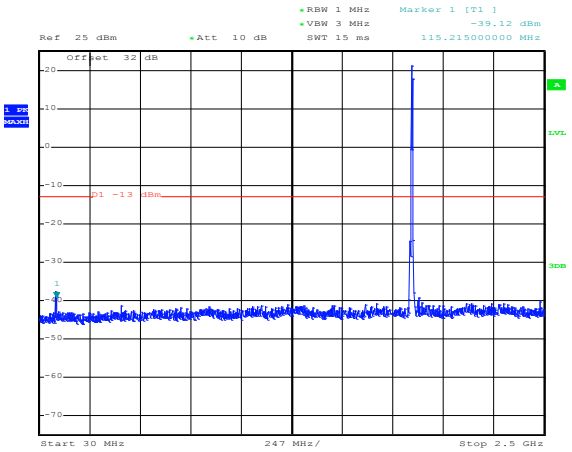
Date: 18.JUN.2013 15:39:15

Figure 2-37a: Band 5 HSUPA, Spurious Conducted Emissions, High Channel



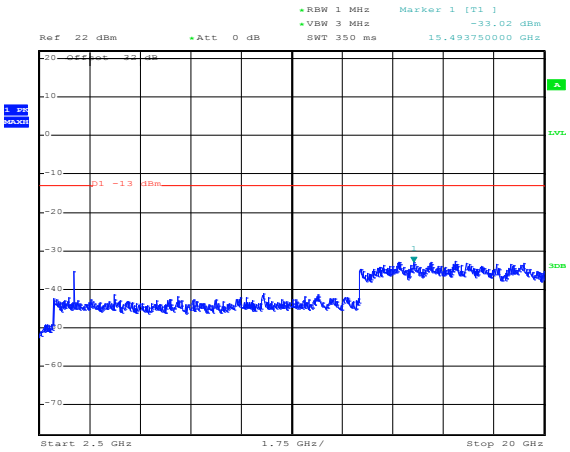
Date: 18.JUN.2013 15:39:40

Figure 2-38a: Band 2 HSUPA, Spurious Conducted Emissions, Low Channel



Date: 18.JUN.2013 15:44:18

Figure 2-39a: Band 2 HSUPA, Spurious Conducted Emissions, Low Channel



Date: 18.JUN.2013 15:41:17

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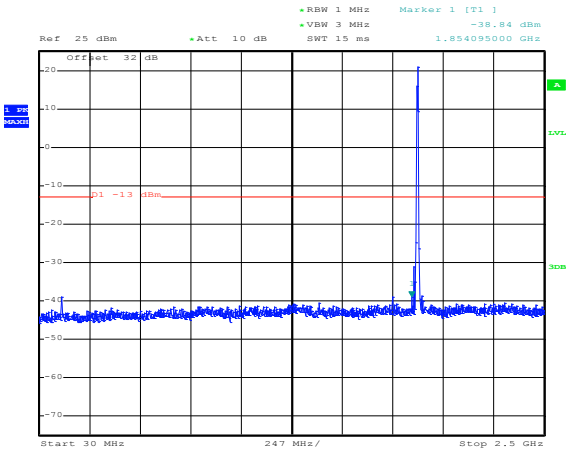
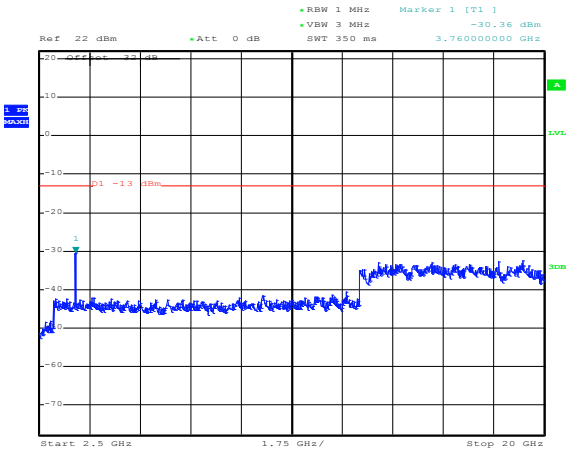
WCDMA Conducted RF Emission Test Data cont'd

Figure 2-40a: Band 2 HSUPA, Spurious Conducted Emissions, Middle Channel



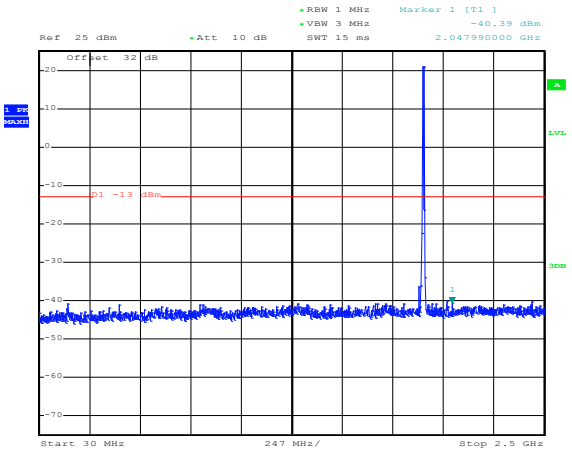
Date: 18.JUN.2013 15:43:57

Figure 2-41a: Band 2 HSUPA, Spurious Conducted Emissions, Middle Channel



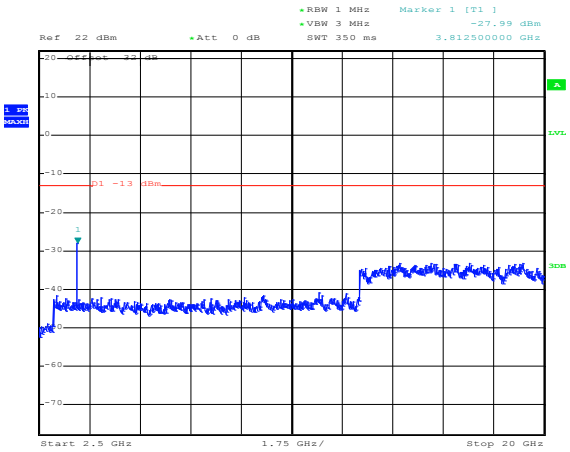
Date: 18.JUN.2013 15:41:39

Figure 2-42a: Band 2 HSUPA, Spurious Conducted Emissions, High Channel



Date: 18.JUN.2013 15:44:40

Figure 2-43a: Band 2 HSUPA, Spurious Conducted Emissions, High Channel



Date: 18.JUN.2013 15:42:16

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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-44a: Occupied Bandwidth, Band 5 HSUPA Low Channel

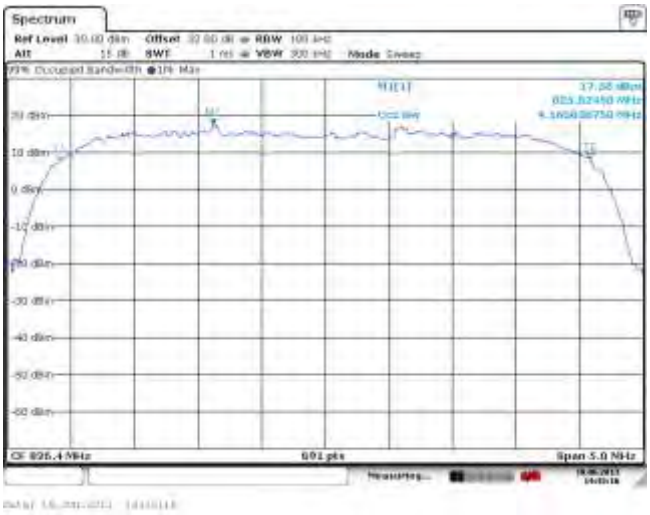

Figure 2-45a: Occupied Bandwidth, Band 5 HSUPA Middle Channel

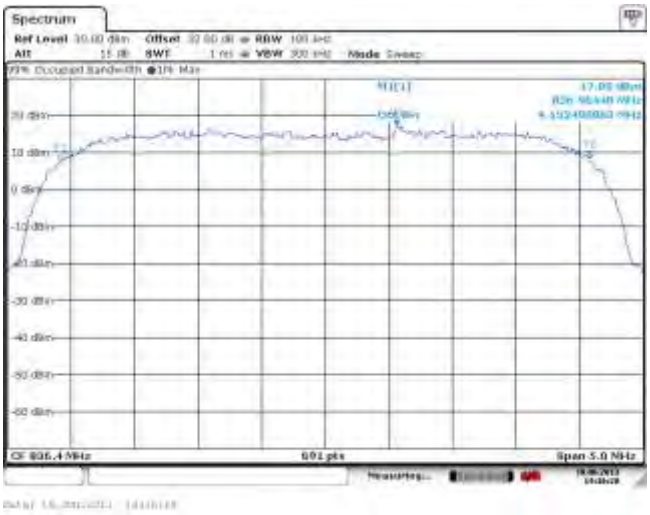

Figure 2-46a: Occupied Bandwidth, Band 5 HSUPA High Channel

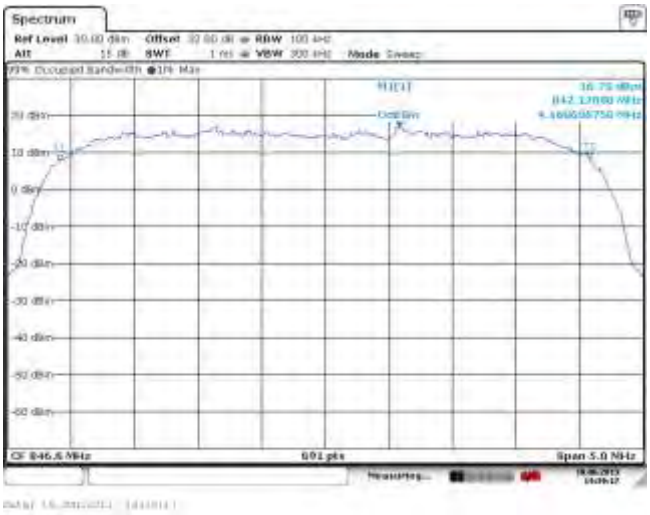

Figure 2-47a: Occupied Bandwidth, Band 2 HSUPA Low Channel

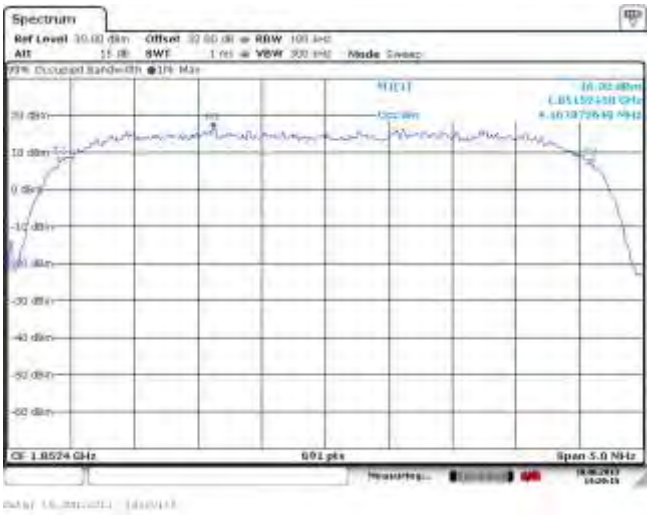

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Figure 2-48a: Occupied Bandwidth, Band 2 HSUPA Middle Channel

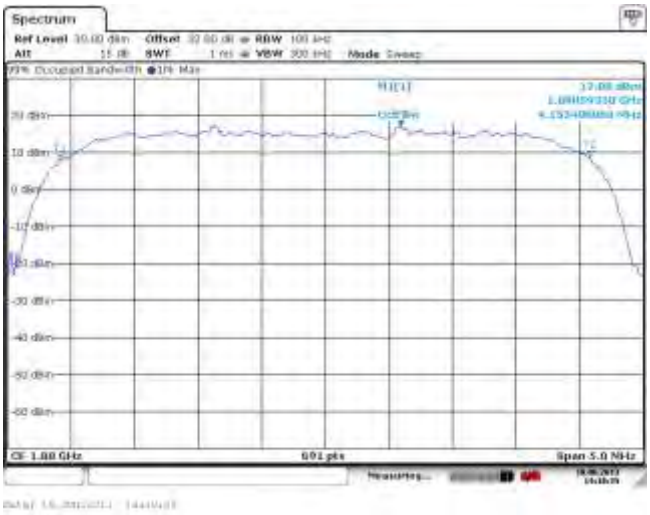


Figure 2-49a: Occupied Bandwidth, Band 2 HSUPA High Channel

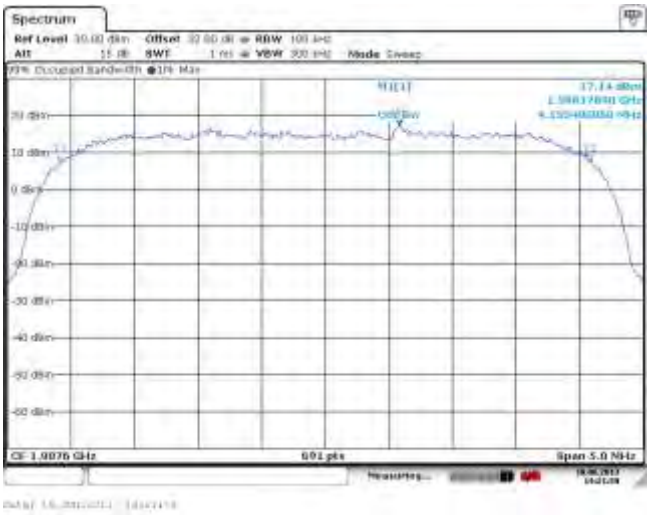


Figure 2-50a: Band 5 , HSUPA Low Channel Mask

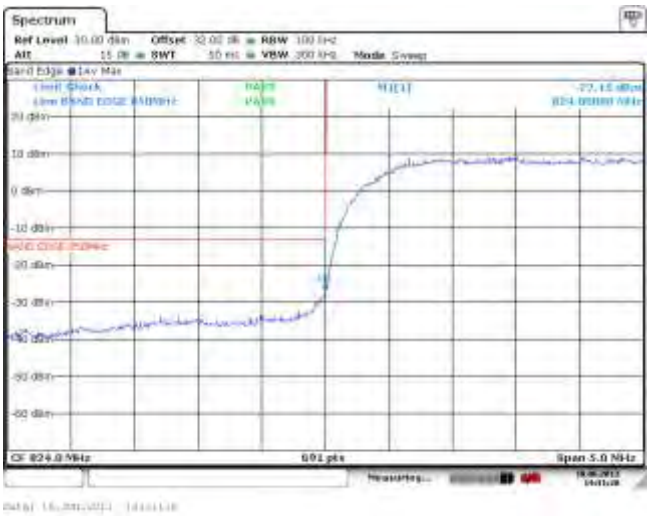
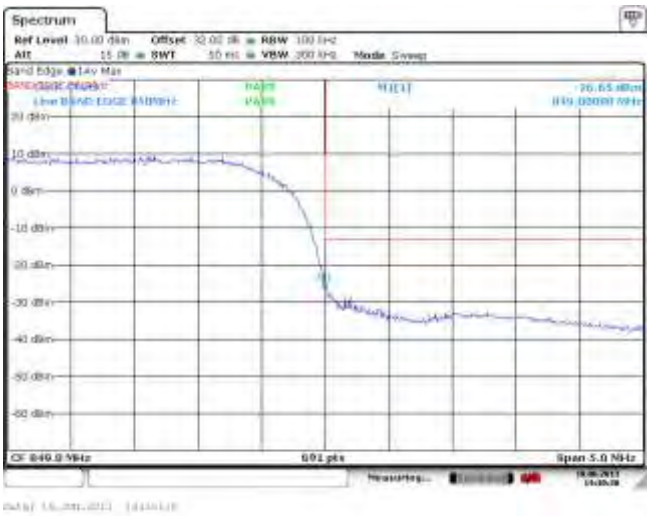


Figure 2-51a: Band 5 , HSUPA High Channel Mask



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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-52a: Band 2, HSUPA Low Channel Mask

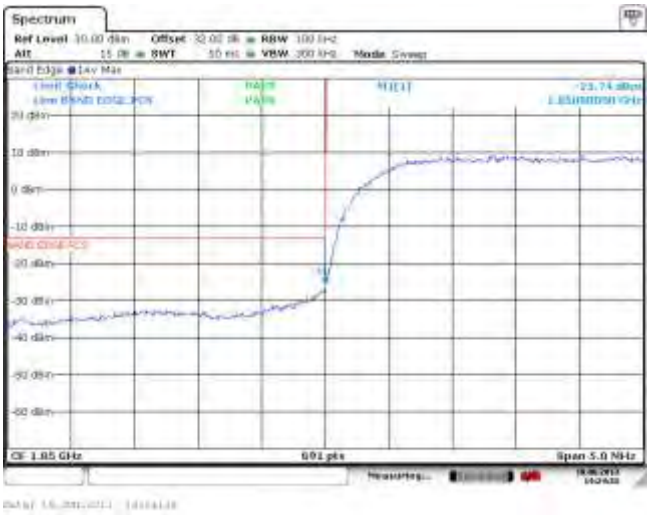
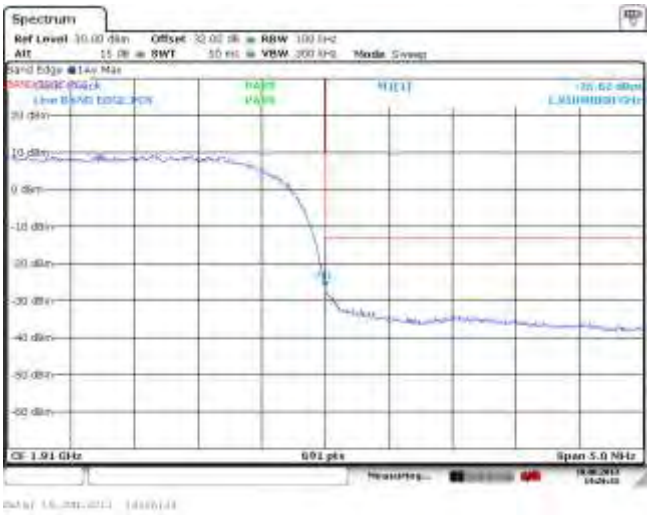


Figure 2-53a: Band 2, HSUPA High Channel Mask



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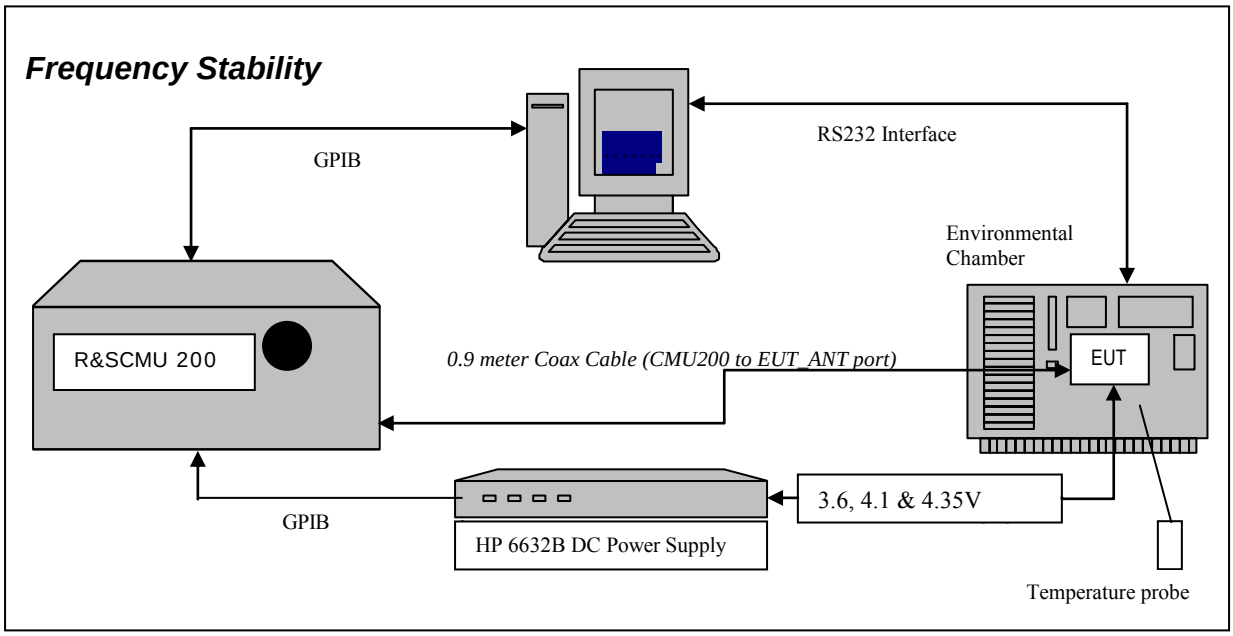
APPENDIX 2B – WCDMA Band 2/5 FREQUENCY STABILITY TEST DATA

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 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.

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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 following tests were performed on model RFX101LW.

The maximum frequency error in the WCDMA band 5 measured was **0.0391 PPM**.
The maximum frequency error in the WCDMA band 2 measured was **0.0156 PPM.**

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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	20.14	0.0244
4182	836.4	3.6	20	-5.67	-0.0068
4233	846.6	3.6	20	-6.49	-0.0077

Traffic Channel Number	WCDMA Band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.1	20	-8.33	-0.0101
4182	836.4	4.1	20	21.79	0.0261
4233	846.6	4.1	20	-13.95	-0.0165

Traffic Channel Number	WCDMA Band 5 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.35	20	-6.64	-0.0080
4182	836.4	4.35	20	-9.99	-0.0119
4233	846.6	4.35	20	-6.88	-0.0081

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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	-10.77	-0.0130
4132	826.4	3.6	-20	-3.00	-0.0036
4132	826.4	3.6	-10	11.91	0.0144
4132	826.4	3.6	0	-4.86	-0.0059
4132	826.4	3.6	10	-6.13	-0.0074
4132	826.4	3.6	20	20.14	0.0244
4132	826.4	3.6	30	-13.86	-0.0168
4132	826.4	3.6	40	17.62	0.0213
4132	826.4	3.6	50	17.74	0.0215
4132	826.4	3.6	60	-3.38	-0.0041
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4132	826.4	4.1	-30	18.22	0.0220
4132	826.4	4.1	-20	-4.81	-0.0058
4132	826.4	4.1	-10	-4.15	-0.0050
4132	826.4	4.1	0	-3.91	-0.0047
4132	826.4	4.1	10	18.04	0.0218
4132	826.4	4.1	20	-8.33	-0.0101
4132	826.4	4.1	30	-2.99	-0.0036
4132	826.4	4.1	40	-2.10	-0.0025
4132	826.4	4.1	50	-2.78	-0.0034
4132	826.4	4.1	60	26.43	0.0320
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4132	826.4	4.35	-30	-14.53	-0.0176
4132	826.4	4.35	-20	-6.69	-0.0081
4132	826.4	4.35	-10	-3.97	-0.0048
4132	826.4	4.35	0	-6.25	-0.0076
4132	826.4	4.35	10	19.31	0.0234
4132	826.4	4.35	20	-6.64	-0.0080
4132	826.4	4.35	30	-2.27	-0.0027
4132	826.4	4.35	40	17.00	0.0206
4132	826.4	4.35	50	20.85	0.0252
4132	826.4	4.35	60	-5.65	-0.0068

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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	13.41	0.0160
4182	836.4	3.6	-20	18.03	0.0216
4182	836.4	3.6	-10	-7.48	-0.0089
4182	836.4	3.6	0	21.35	0.0255
4182	836.4	3.6	10	14.60	0.0175
4182	836.4	3.6	20	-5.67	-0.0068
4182	836.4	3.6	30	19.93	0.0238
4182	836.4	3.6	40	1.36	0.0016
4182	836.4	3.6	50	0.42	0.0005
4182	836.4	3.6	60	**32.74**	**0.0391**
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4182	836.4	4.1	-30	10.73	0.0128
4182	836.4	4.1	-20	-7.16	-0.0086
4182	836.4	4.1	-10	-7.31	-0.0087
4182	836.4	4.1	0	17.44	0.0209
4182	836.4	4.1	10	-6.98	-0.0083
4182	836.4	4.1	20	21.79	0.0261
4182	836.4	4.1	30	14.12	0.0169
4182	836.4	4.1	40	18.83	0.0225
4182	836.4	4.1	50	18.89	0.0226
4182	836.4	4.1	60	-8.64	-0.0103
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4182	836.4	4.35	-30	11.39	0.0136
4182	836.4	4.35	-20	13.11	0.0157
4182	836.4	4.35	-10	13.15	0.0157
4182	836.4	4.35	0	15.84	0.0189
4182	836.4	4.35	10	-7.88	-0.0094
4182	836.4	4.35	20	-9.99	-0.0119
4182	836.4	4.35	30	19.96	0.0239
4182	836.4	4.35	40	-3.45	-0.0041
4182	836.4	4.35	50	-5.87	-0.0070
4182	836.4	4.35	60	31.89	0.0381

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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	14.73	0.0174
4233	846.6	3.6	-20	-5.14	-0.0061
4233	846.6	3.6	-10	-13.54	-0.0160
4233	846.6	3.6	0	17.38	0.0205
4233	846.6	3.6	10	-6.77	-0.0080
4233	846.6	3.6	20	-6.49	-0.0077
4233	846.6	3.6	30	13.22	0.0156
4233	846.6	3.6	40	17.05	0.0201
4233	846.6	3.6	50	22.24	0.0263
4233	846.6	3.6	60	-7.03	-0.0083
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4233	846.6	4.1	-30	16.01	0.0189
4233	846.6	4.1	-20	16.81	0.0199
4233	846.6	4.1	-10	19.64	0.0232
4233	846.6	4.1	0	20.62	0.0244
4233	846.6	4.1	10	16.39	0.0194
4233	846.6	4.1	20	-13.95	-0.0165
4233	846.6	4.1	30	-5.89	-0.0070
4233	846.6	4.1	40	-1.49	-0.0018
4233	846.6	4.1	50	-2.07	-0.0024
4233	846.6	4.1	60	-9.73	-0.0115
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4233	846.6	4.35	-30	-6.58	-0.0078
4233	846.6	4.35	-20	-6.42	-0.0076
4233	846.6	4.35	-10	15.23	0.0180
4233	846.6	4.35	0	17.95	0.0212
4233	846.6	4.35	10	18.57	0.0219
4233	846.6	4.35	20	-6.88	-0.0081
4233	846.6	4.35	30	16.39	0.0194
4233	846.6	4.35	40	-6.84	-0.0081
4233	846.6	4.35	50	-4.72	-0.0056
4233	846.6	4.35	60	-2.83	-0.0033

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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	17.03	0.0092
9400	1880.00	3.6	20	-8.47	-0.0045
9538	1907.60	3.6	20	-12.70	-0.0067

Traffic Channel Number	WCDMA1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.1	20	-7.91	-0.0043
9400	1880.00	4.1	20	14.39	0.0077
9538	1907.60	4.1	20	-13.28	-0.0070

Traffic Channel Number	WCDMA1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.35	20	-8.52	-0.0046
9400	1880.00	4.35	20	-10.01	-0.0053
9538	1907.60	4.35	20	-13.51	-0.0071

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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	-11.86	-0.0064
9262	1852.40	3.6	-20	-3.62	-0.0020
9262	1852.40	3.6	-10	14.97	0.0081
9262	1852.40	3.6	0	-7.67	-0.0041
9262	1852.40	3.6	10	-9.02	-0.0049
9262	1852.40	3.6	20	17.03	0.0092
9262	1852.40	3.6	30	-15.75	-0.0085
9262	1852.40	3.6	40	12.16	0.0066
9262	1852.40	3.6	50	11.76	0.0063
9262	1852.40	3.6	60	-7.17	-0.0039
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9262	1852.40	4.1	-30	17.90	0.0097
9262	1852.40	4.1	-20	-7.49	-0.0040
9262	1852.40	4.1	-10	-10.55	-0.0057
9262	1852.40	4.1	0	-7.52	-0.0041
9262	1852.40	4.1	10	15.82	0.0085
9262	1852.40	4.1	20	-7.91	-0.0043
9262	1852.40	4.1	30	-4.88	-0.0026
9262	1852.40	4.1	40	-9.59	-0.0052
9262	1852.40	4.1	50	-10.57	-0.0057
9262	1852.40	4.1	60	27.31	0.0147
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9262	1852.40	4.35	-30	-13.80	-0.0074
9262	1852.40	4.35	-20	-6.99	-0.0038
9262	1852.40	4.35	-10	-12.13	-0.0065
9262	1852.40	4.35	0	-9.15	-0.0049
9262	1852.40	4.35	10	18.68	0.0101
9262	1852.40	4.35	20	-8.52	-0.0046
9262	1852.40	4.35	30	-4.12	-0.0022
9262	1852.40	4.35	40	17.77	0.0096
9262	1852.40	4.35	50	17.89	0.0097
9262	1852.40	4.35	60	-10.99	-0.0059

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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	12.84	0.0068
9400	1880.00	3.6	-20	14.83	0.0079
9400	1880.00	3.6	-10	-11.78	-0.0063
9400	1880.00	3.6	0	18.49	0.0098
9400	1880.00	3.6	10	12.65	0.0067
9400	1880.00	3.6	20	-8.47	-0.0045
9400	1880.00	3.6	30	15.20	0.0081
9400	1880.00	3.6	40	-6.27	-0.0033
9400	1880.00	3.6	50	-4.57	-0.0024
9400	1880.00	3.6	60	**29.35**	**0.0156**
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9400	1880.00	4.1	-30	11.78	0.0063
9400	1880.00	4.1	-20	-8.10	-0.0043
9400	1880.00	4.1	-10	-7.73	-0.0041
9400	1880.00	4.1	0	14.21	0.0076
9400	1880.00	4.1	10	-8.80	-0.0047
9400	1880.00	4.1	20	14.39	0.0077
9400	1880.00	4.1	30	15.89	0.0085
9400	1880.00	4.1	40	17.16	0.0091
9400	1880.00	4.1	50	15.92	0.0085
9400	1880.00	4.1	60	-10.78	-0.0057
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9400	1880.00	4.35	-30	9.62	0.0051
9400	1880.00	4.35	-20	11.00	0.0059
9400	1880.00	4.35	-10	10.35	0.0055
9400	1880.00	4.35	0	10.42	0.0055
9400	1880.00	4.35	10	-8.29	-0.0044
9400	1880.00	4.35	20	-10.01	-0.0053
9400	1880.00	4.35	30	12.54	0.0067
9400	1880.00	4.35	40	-6.45	-0.0034
9400	1880.00	4.35	50	-10.34	-0.0055
9400	1880.00	4.35	60	28.87	0.0154

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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	15.55	0.0082
9538	1907.60	3.6	-20	-6.19	-0.0032
9538	1907.60	3.6	-10	-10.87	-0.0057
9538	1907.60	3.6	0	17.32	0.0091
9538	1907.60	3.6	10	-9.40	-0.0049
9538	1907.60	3.6	20	-12.70	-0.0067
9538	1907.60	3.6	30	15.60	0.0082
9538	1907.60	3.6	40	15.88	0.0083
9538	1907.60	3.6	50	15.54	0.0081
9538	1907.60	3.6	60	-8.94	-0.0047
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9538	1907.60	4.1	-30	11.66	0.0061
9538	1907.60	4.1	-20	12.11	0.0063
9538	1907.60	4.1	-10	14.50	0.0076
9538	1907.60	4.1	0	14.75	0.0077
9538	1907.60	4.1	10	14.02	0.0073
9538	1907.60	4.1	20	-13.28	-0.0070
9538	1907.60	4.1	30	-9.62	-0.0050
9538	1907.60	4.1	40	-2.89	-0.0015
9538	1907.60	4.1	50	-5.66	-0.0030
9538	1907.60	4.1	60	-13.18	-0.0069
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**21BPPM**
9538	1907.60	4.35	-30	-11.59	-0.0061
9538	1907.60	4.35	-20	-8.75	-0.0046
9538	1907.60	4.35	-10	11.61	0.0061
9538	1907.60	4.35	0	12.63	0.0066
9538	1907.60	4.35	10	18.05	0.0095
9538	1907.60	4.35	20	-13.51	-0.0071
9538	1907.60	4.35	30	12.80	0.0067
9538	1907.60	4.35	40	-8.69	-0.0046
9538	1907.60	4.35	50	-12.67	-0.0066
9538	1907.60	4.35	60	-9.30	-0.0049

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APPENDIX 2C – WCDMA Band 2/5 RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

The following tests were performed on model RGB141LW.

Date of Test: June 28, 2013

The following measurements were performed by Feras Obeid.
The environmental tests conditions were: Temperature: 25.0 °C
Relative Humidity: 29.5 %

The BlackBerry® smartphone was standalone, USB down with LCD facing to the RX antenna when the turntable is at 0 degree position.
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height.

WCDMA Band 5 Call Service Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	4132	826.40	5	Dipole	V	-39.65	-34.63	V-V	0.22	17.33	0.05	38.50	21.17
F0	4132	826.40	5	Dipole	H	-34.63		H-H	-1.20				
F0	4182	836.40	5	Dipole	V	-39.05	-33.52	V-V	1.87	**18.68**	**0.07**	38.50	19.82
F0	4182	836.40	5	Dipole	H	-33.52		H-H	-0.21				
F0	4233	846.60	5	Dipole	V	-38.24	-33.46	V-V	1.85	18.67	0.07	38.50	19.83
F0	4233	846.60	5	Dipole	H	-33.46		H-H	0.29				

WCDMA Band 5 HSUPA Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	4132	826.40	5	Dipole	V	-39.74	-36.11	V-V	-1.31	15.80	0.04	38.50	22.70
F0	4132	826.40	5	Dipole	H	-36.11		H-H	-2.71				
F0	4182	836.40	5	Dipole	V	-40.25	-35.22	V-V	0.14	16.95	0.05	38.50	21.55
F0	4182	836.40	5	Dipole	H	-35.22		H-H	-1.96				
F0	4233	846.60	5	Dipole	V	-39.91	-34.89	V-V	0.37	**17.19**	**0.05**	38.50	21.31
F0	4233	846.60	5	Dipole	H	-34.89		H-H	-1.15				

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Radiated Power Test Data Results cont'd

Date of Test: June 28, 2013

The following measurements were performed by Feras Obeid.
The environmental test conditions were: Temperature: 25.2 ºC
Relative Humidity: 36.8 %

The BlackBerry® smartphone was standalone, horizontally with LCD facing up and top pointing to the RX antenna when the turntable is at 0 degree position.
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height.

WCDMA Band 2 Call Service Mode

								Substitution Method					
EUT				Rx Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic radiator) (dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	9262	1852.40	2	Horn	V	-23.87	-23.87	V-V	-14.18	**26.20**	**0.42**	33.0	6.80
F0	9262	1852.40	2	Horn	H	-24.88		H-H	-13.14				
F0	9400	1880.00	2	Horn	V	-26.58	-25.49	V-V	-15.43	24.25	0.27	33.0	8.75
F0	9400	1880.00	2	Horn	H	-25.49		H-H	-14.74				
F0	9538	1907.60	2	Horn	V	-27.99	-25.82	V-V	-15.55	23.87	0.24	33.0	9.13
F0	9538	1907.60	2	Horn	H	-25.82		H-H	-15.01				

WCDMA Band 2 HSUPA Mode

								Substitution Method					
EUT				Rx Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	9262	1852.40	2	Horn	V	-25.69	-25.69	V-V	-16.00	**24.31**	**0.27**	33.0	8.69
F0	9262	1852.40	2	Horn	H	-26.66		H-H	-15.03				
F0	9400	1880.00	2	Horn	V	-27.96	-27.94	V-V	-17.92	21.77	0.15	33.0	11.23
F0	9400	1880.00	2	Horn	H	-27.94		H-H	-17.22				
F0	9538	1907.60	2	Horn	V	-29.52	-27.55	V-V	-17.29	22.13	0.16	33.0	10.87
F0	9538	1907.60	2	Horn	H	-27.55		H-H	-16.75				

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Radiated Emissions Test Data Results cont'd

WCDMA 5 HSUPA Mode

Date of Test: June 27, 2013

The following measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 23.9 ºC
Relative Humidity: 36.9 %

The BlackBerry® smartphone was standalone, with USB facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 30MHz – 1GHz.

Measurements were performed in WCDMA band 5 HSUPA mode on channels 4182.

All emissions were at least 25.0 dB below the limit.

Date of Test: June 27, 2013

The following measurements were performed by Mahmood Ahmed
The environmental test conditions were: Temperature: 25.6 ºC
Relative Humidity: 31.7 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 1 GHz to 9 GHz.

The BlackBerry® smartphone was standalone, with USB facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band 5 HSUPA mode on channels 4182

All emissions were at least 25.0 dB below the limit.

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Radiated Emissions Test Data Results cont'd

WCDMA Band 2 Call Service mode

Date of Test: June 27, 2013

The following measurements were performed by Savtej Sandhu.

The environmental test conditions were: Temperature: 23.9 ºC
Relative Humidity: 36.9 %

The BlackBerry® smartphone was standalone, with USB facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band 2 Call mode on channels 9400.

All emissions were at least 25.0 dB below the limit.

Date of Test: June 27, 2013

The following measurements were performed by Mahmood Ahmed
The environmental test conditions were: Temperature: 25.6 ºC
Relative Humidity: 31.7 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 1GHz to 20 GHz.

The BlackBerry® smartphone was standalone, with USB facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band 2 Call mode on channels 9400.

All emissions were at least 25.0 dB below the limit.

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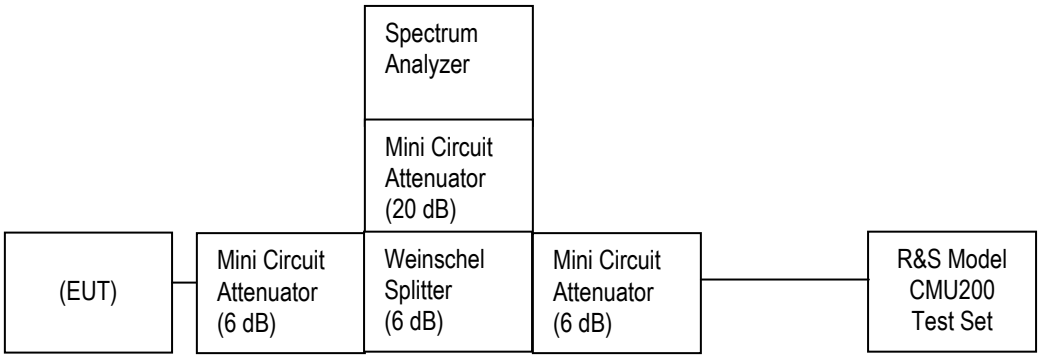
APPENDIX 3A– CDMA CONDUCTED RF EMISSIONS TEST DATA/PLOTS

CDMA Conducted RF Emission Test Data

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

Test Setup Diagram



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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 were measured from 30 MHz to 20 GHz. The EUT emissions were in the noise floor.

Date of Test: June 19, 2013

The environmental test conditions were: Temperature: 24.0 ºC
Relative Humidity: 47.0 %

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

The following tests were performed on model RFX101LW.

CDMA Cellular Frequency (MHz)	99% Occupied Bandwidth (MHz)
824.70	1.282
836.52	1.276
848.31	1.285

CDMA PCS Frequency (MHz)	99% Occupied Bandwidth (MHz)
1851.20	1.271
1880.00	1.268
1908.75	1.271

The following tests were performed on model RGB141LW.

BC10 Frequency (MHz)	99% Occupied Bandwidth (MHz)
817.90	1.270
820.50	1.280
823.10	1.270

Test Data for CDMA Cellular, PCS and BC10 selected Frequencies in Loopback mode

Refer to the following measurement plots for more detail.
See Figures 2-1a to 2-12a, 2-47a to 2-52a for the plots of the conducted spurious emissions.
See Figures 2-13a to 2-18a, 2-53a to 2-55a for the plots of 99% Occupied Bandwidth.
See Figures 2-19a to 2-24a, 2-56a to 2-57a for the plots of the Channel mask.

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

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CDMA Conducted RF Emission Test Data cont'd

Test Data for CDMA Cellular, CDMA PCS and BC10 selected Frequencies in EVDO mode

The following tests were performed on model RFX101LW:

Cellular Frequency (MHz)	99% Occupied Bandwidth (MHz)
824.70	1.318
836.52	1.324
848.31	1.322

PCS Frequency (MHz)	99% Occupied Bandwidth (MHz)
1851.20	1.316
1880.00	1.312
1908.75	1.311

The following tests were performed on model RGB141LW:

BC10 Frequency (MHz)	99% Occupied Bandwidth (MHz)
817.90	1.270
820.50	1.270
823.10	1.280

Measurement Plots for CDMA Cellular and CDMA PCS in EVDO mode

Refer to the following measurement plots for more detail.

See Figures 2-25a to 2-36a, 2-58a to 2-63a for the plots of the conducted spurious emissions.
See Figures 2-37a to 2-42a, 2-64a to 2-66a for the plots of 99% Occupied Bandwidth.
See Figures 2-43a to 2-46a, 2-67a to 2-68a for the plots of the Channel mask.

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

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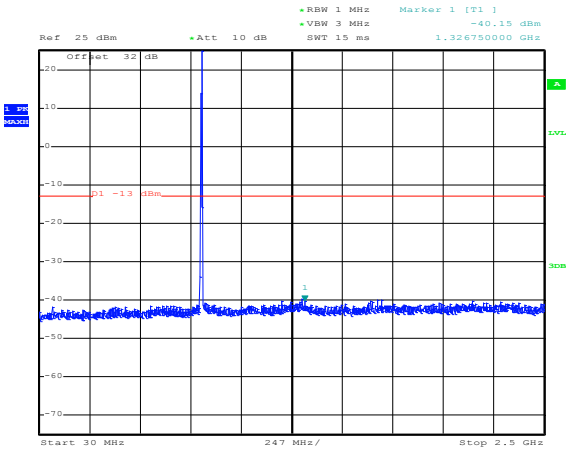
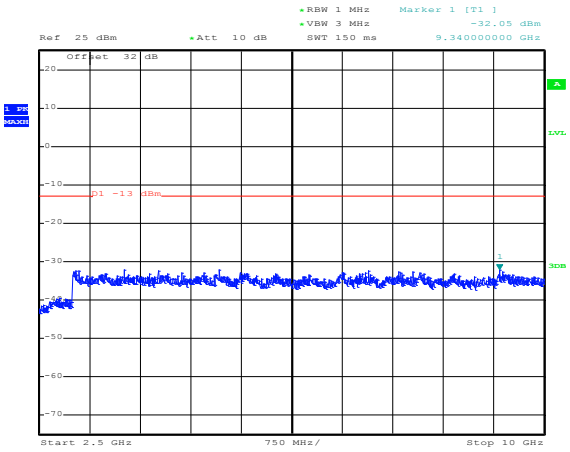
CDMA Conducted RF Emission Test Data cont'd

Figure 2-1a: Spurious Conducted Emissions Cellular Loopback mode, Low channel



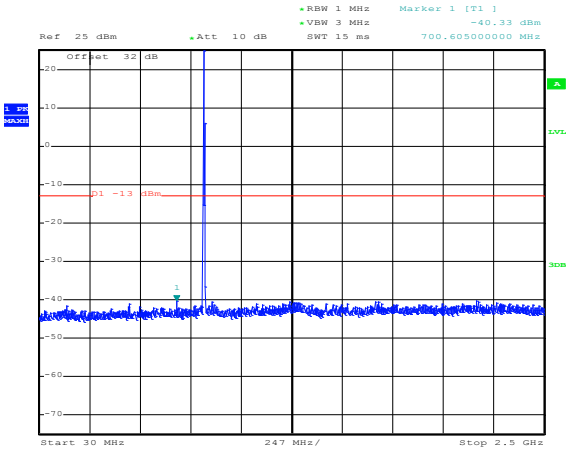
Date: 18.JUN.2013 19:56:14

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



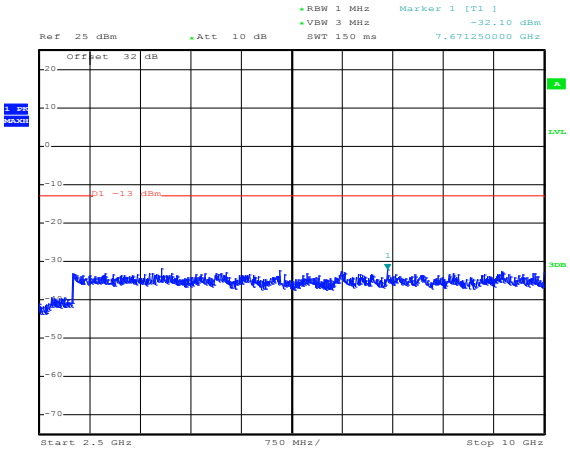
Date: 18.JUN.2013 19:57:26

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



Date: 18.JUN.2013 19:56:43

Figure 2-4a: Spurious Conducted Emissions Cellular Loopback mode, Middle channel



Date: 18.JUN.2013 19:57:42

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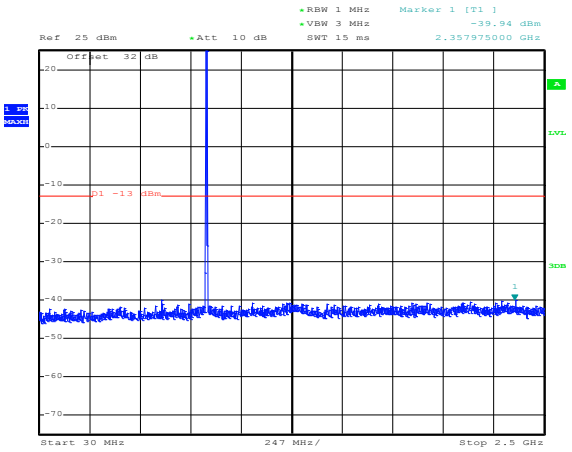
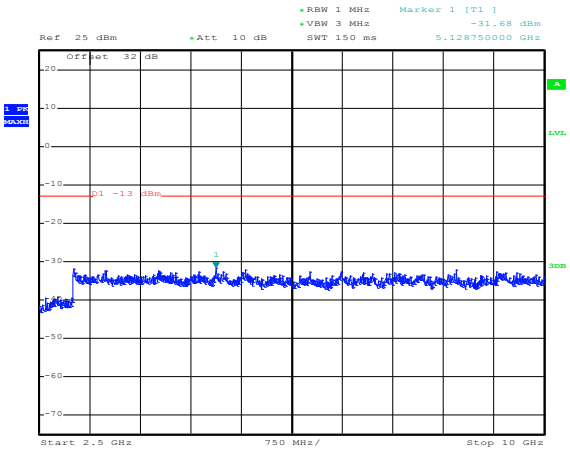
CDMA Conducted RF Emission Test Data cont'd

Figure 2-5a: Spurious Conducted Emissions Cellular Loopback mode, High Channel



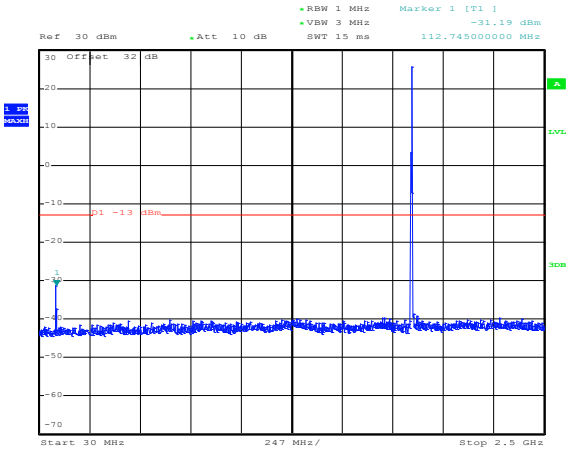
Date: 18.JUN.2013 19:57:02

Figure 2-6a: Spurious Conducted Emissions Cellular Loopback mode, High Channel



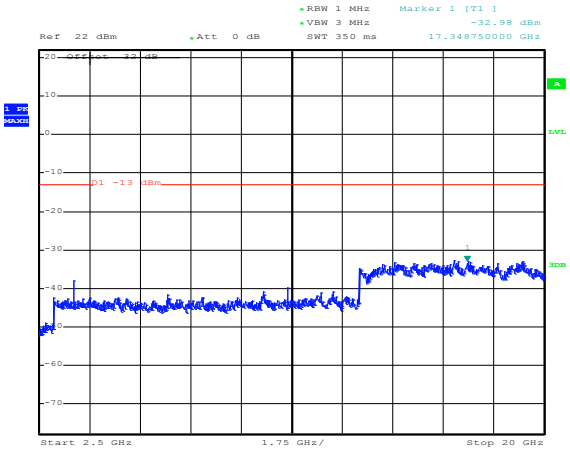
Date: 18.JUN.2013 19:58:02

Figure 2-7a: Spurious Conducted Emissions PCS Loopback mode, Low Channel



Date: 18.JUN.2013 19:59:12

Figure 2-8a: Spurious Conducted Emissions PCS Loopback mode, Low Channel



Date: 18.JUN.2013 20:01:05

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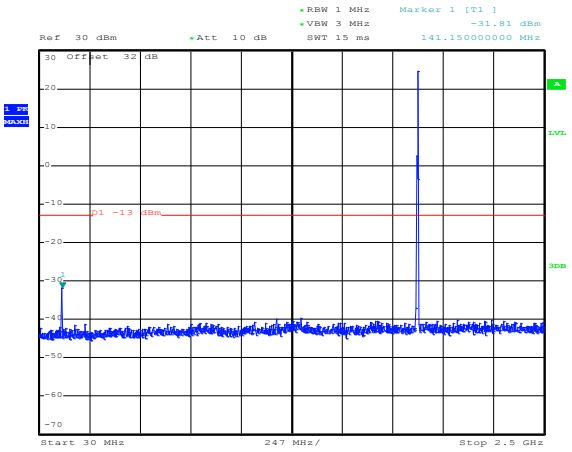
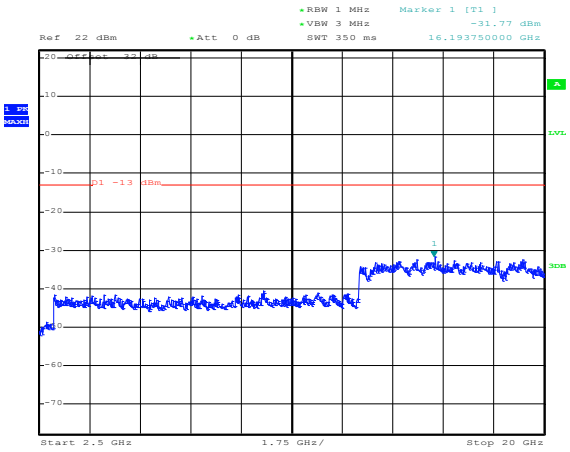
CDMA Conducted RF Emission Test Data cont'd

Figure 2-9a: Spurious Conducted Emissions PCS Loopback mode, Middle Channel



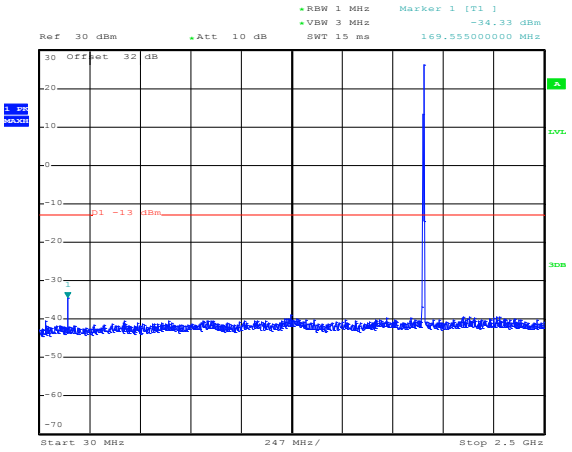
Date: 18.JUN.2013 19:59:28

Figure 2-10a: Spurious Conducted Emissions PCS Loopback mode, Middle Channel



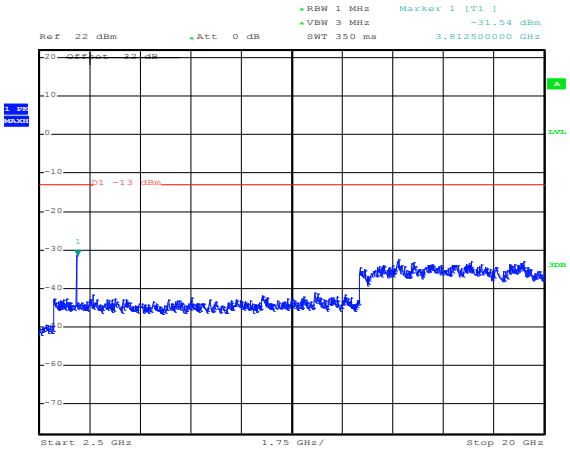
Date: 18.JUN.2013 20:01:55

Figure 2-11a: Spurious Conducted Emissions PCS Loopback mode, High Channel



Date: 18.JUN.2013 20:00:28

Figure 2-12a: Spurious Conducted Emissions PCS Loopback mode, High Channel



Date: 18.JUN.2013 20:02:21

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CDMA Conducted RF Emission Test Data cont'd

Figure 2-13a: Occupied Bandwidth
Cellular Loopback mode, Low Channel

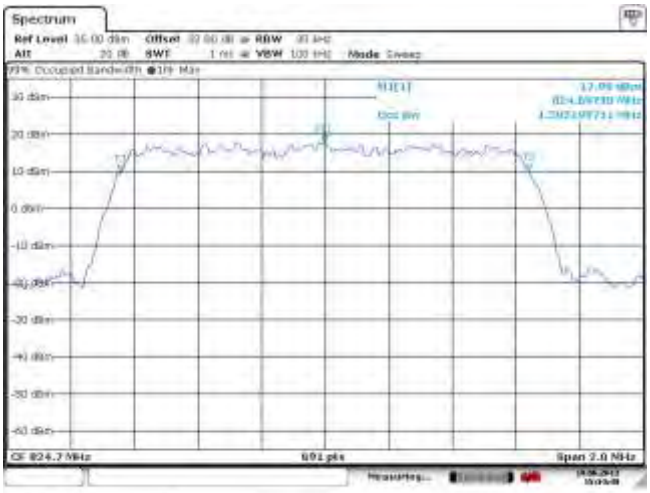


Figure 2-14a: Occupied Bandwidth
Cellular Loopback mode, Middle Channel

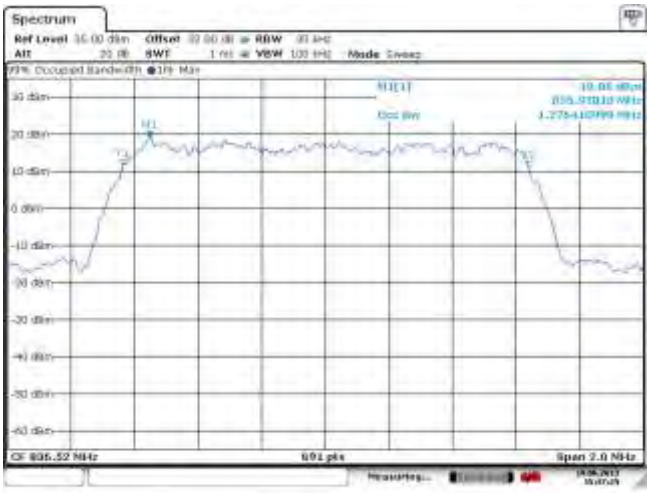


Figure 2-15a: Occupied Bandwidth
Cellular Loopback mode, High Channel

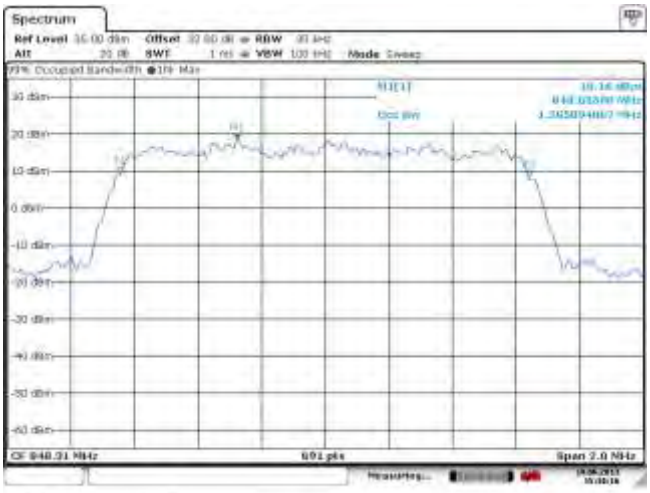
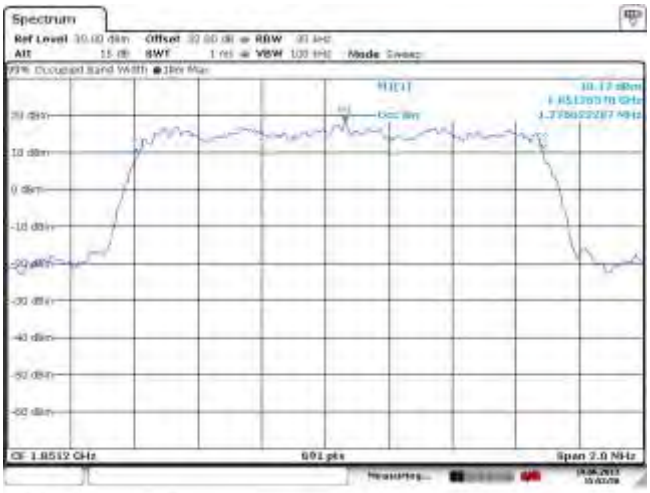


Figure 2-16a: Occupied Bandwidth
PCS Loopback mode, Low Channel



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CDMA Conducted RF Emission Test Data cont'd

Figure 2-17a: Occupied Bandwidth
PCS Loopback mode, Middle Channel

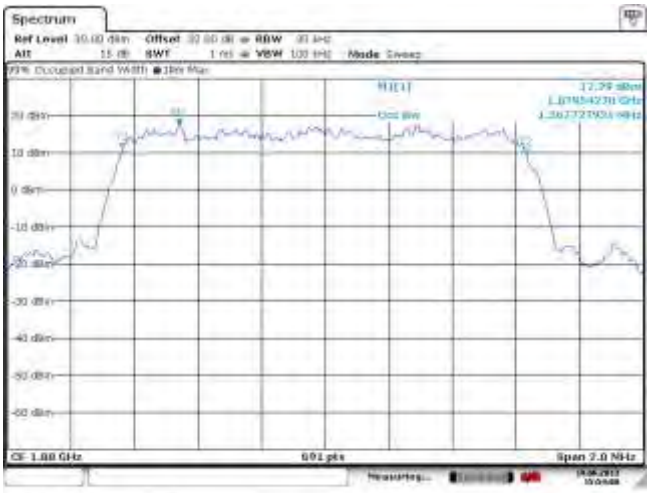


Figure 2-18a: Occupied Bandwidth
PCS Loopback mode, High Channel

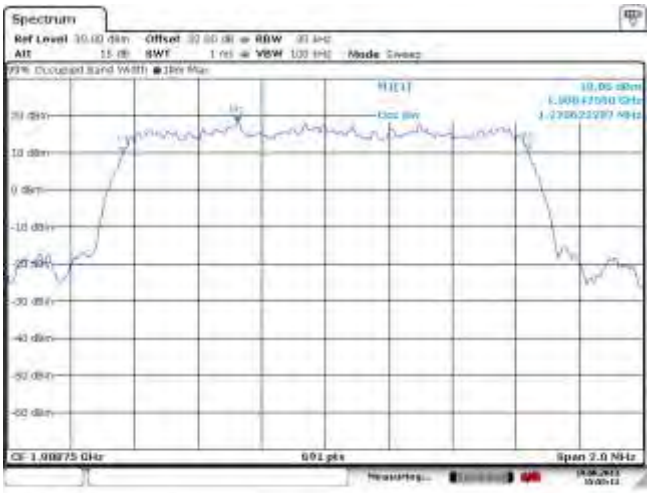


Figure 2-19a: Low Channel Mask
Cellular Loopback mode

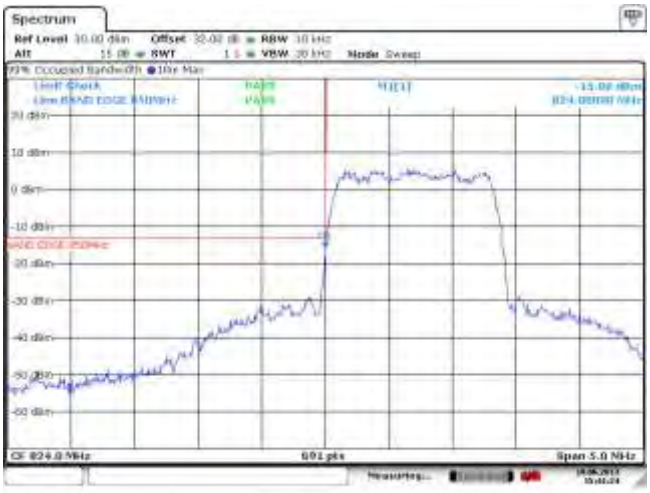
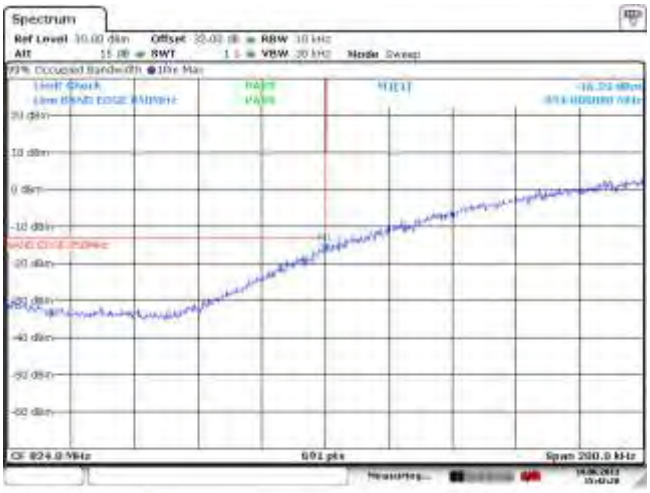


Figure 2-20a: Low Channel Mask
Cellular Loopback mode



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CDMA Conducted RF Emission Test Data cont'd

Figure 2-21a: High Channel Mask
Cellular Loopback mode

Figure 2-22a: High Channel Mask
Cellular Loopback mode

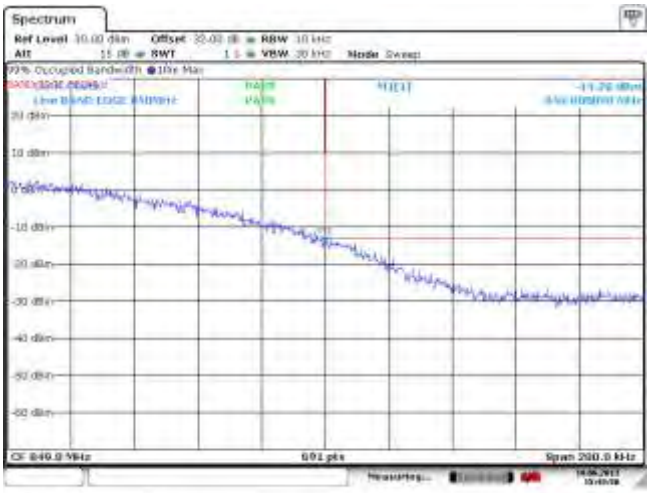

Figure 2-23a: Low Channel Mask
PCS Loopback mode

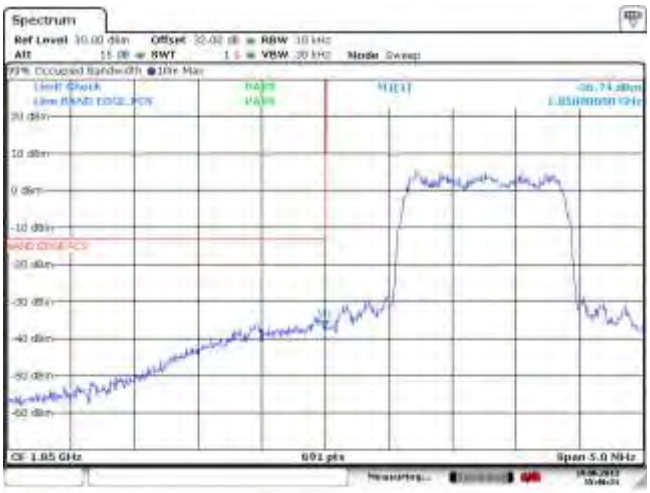

Figure 2-24a: High Channel Mask
PCS Loopback mode

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CDMA Conducted RF Emission Test Data cont'd

Figure 2-25a: Spurious Conducted Emissions Cellular EVDO mode, Low channel

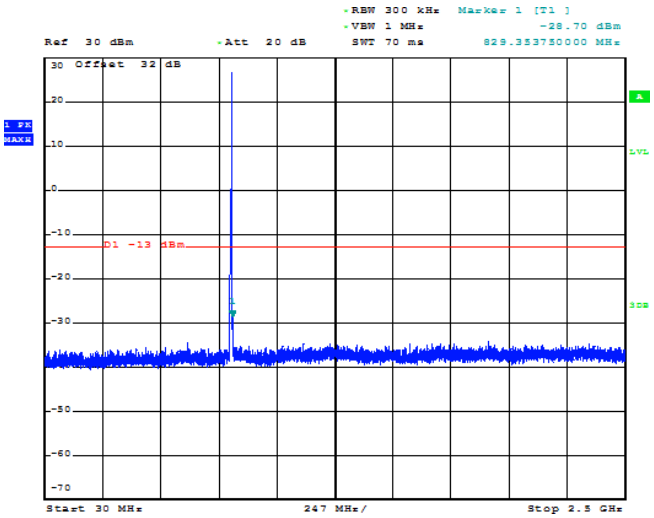


Figure 2-26b: Spurious Conducted Emissions Cellular EVDO mode, Low channel

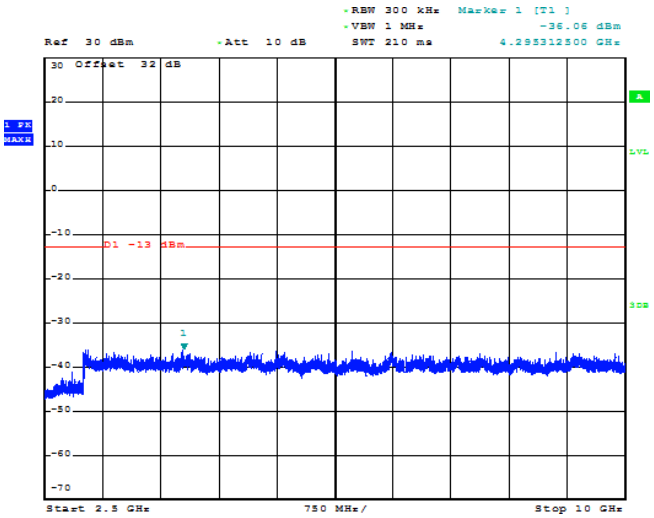


Figure 2-27a: Spurious Conducted Emissions Cellular EVDO mode, Middle channel

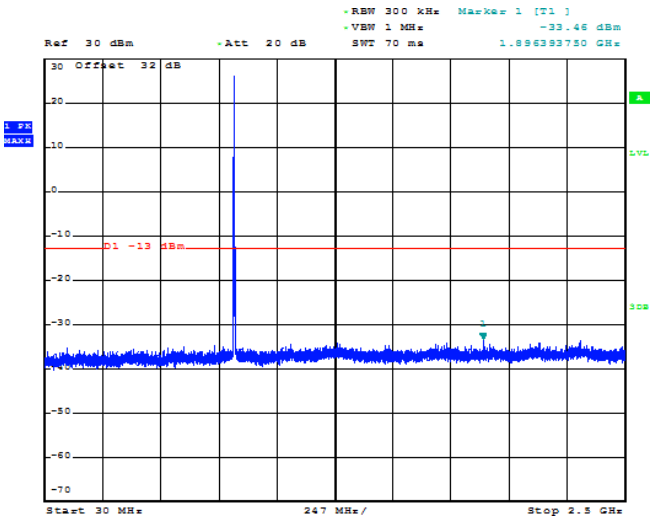
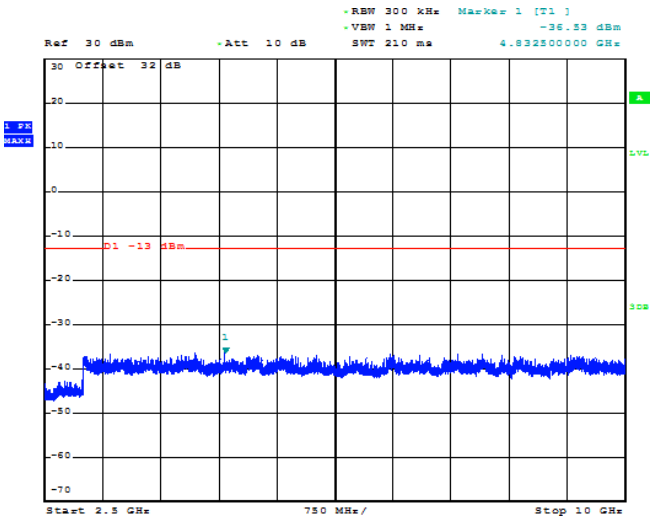


Figure 2-28a: Spurious Conducted Emissions Cellular EVDO mode, Middle channel



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CDMA Conducted RF Emission Test Data cont'd

Figure 6-29a: Spurious Conducted Emissions Cellular EVDO mode, High Channel

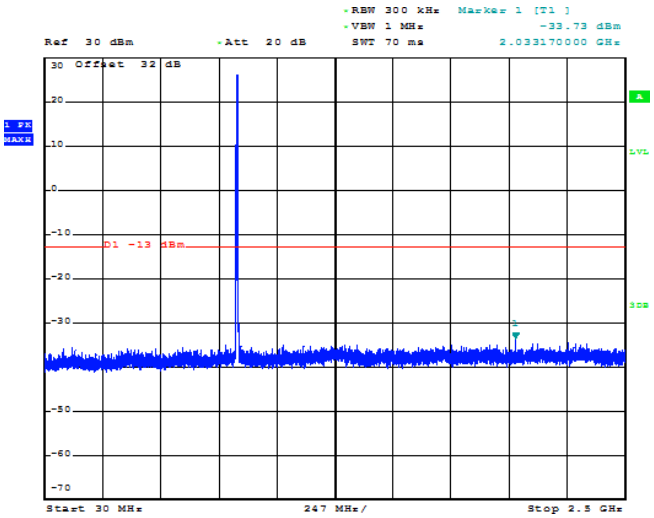


Figure 2-30a: Spurious Conducted Emissions Cellular EVDO mode, High Channel

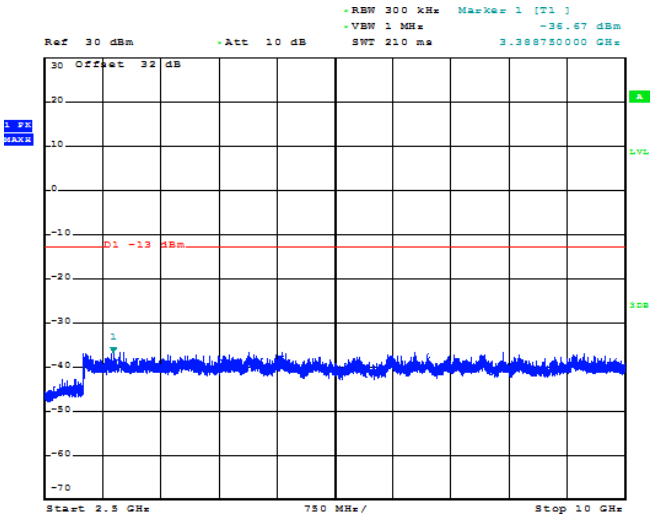
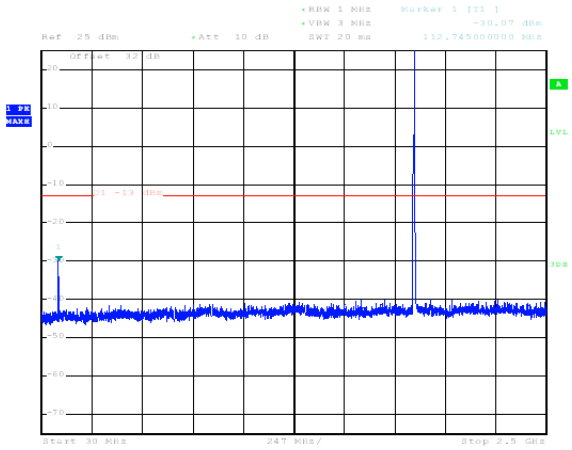
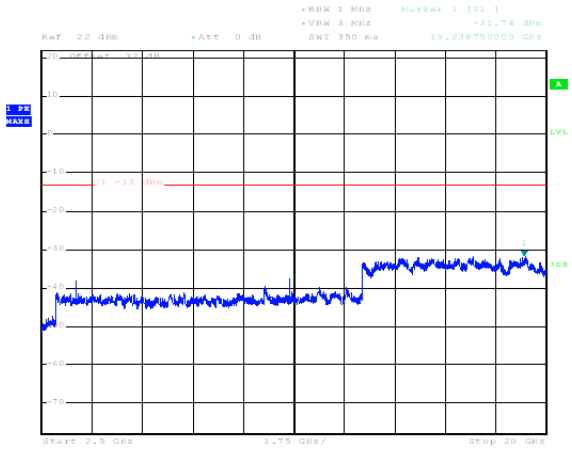


Figure 2-31a: Spurious Conducted Emissions PCS EVDO mode, Low Channel



Date: 30.APR.2013 17:22:02

Figure 2-32a: Spurious Conducted Emissions PCS EVDO mode, Low Channel



Date: 30.APR.2013 17:20:25

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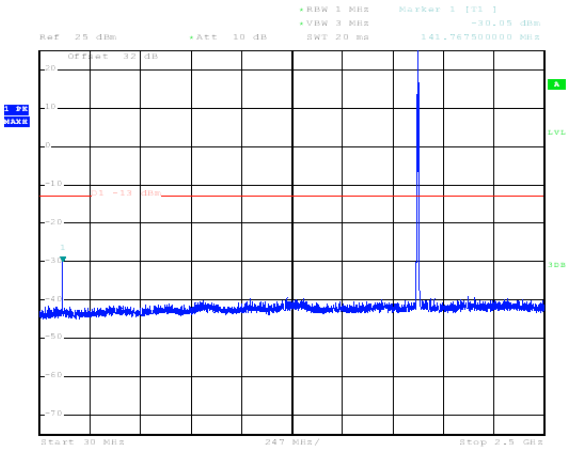
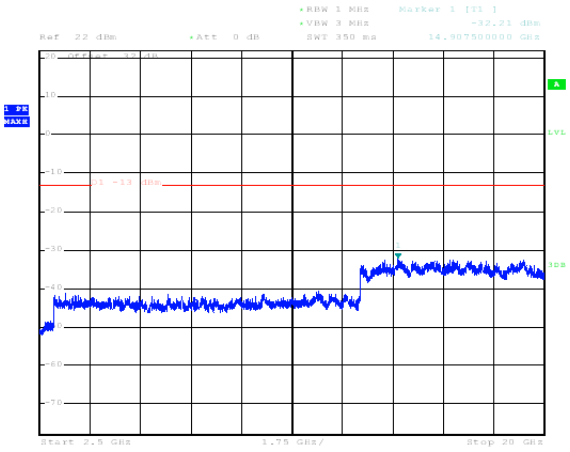
CDMA Conducted RF Emission Test Data cont'd

Figure 2-33a: Spurious Conducted Emissions PCS EVDO mode, Middle Channel



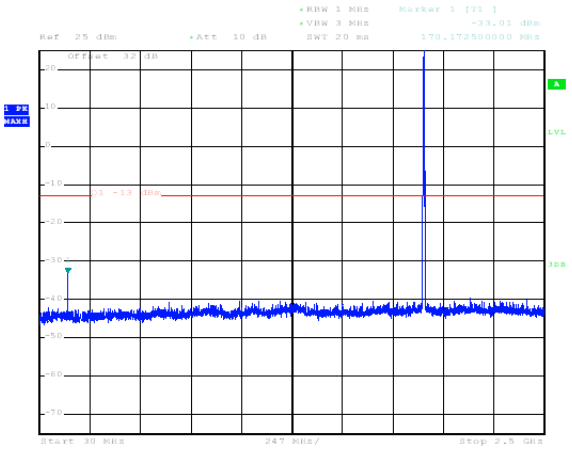
Date: 30.APR.2013 17:23:36

Figure 2-34a: Spurious Conducted Emissions PCS EVDO mode, Middle Channel



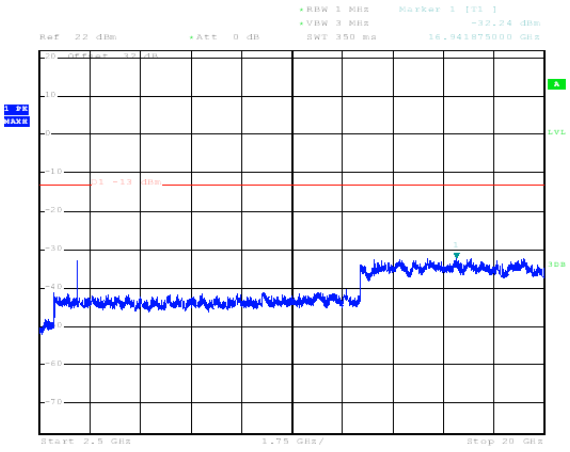
Date: 30.APR.2013 17:17:41

Figure 2-35a: Spurious Conducted Emissions PCS EVDO mode, High Channel



Date: 30.APR.2013 17:24:38

Figure 2-36a: Spurious Conducted Emissions PCS EVDO mode, High Channel



Date: 30.APR.2013 17:16:52

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CDMA Conducted RF Emission Test Data cont'd

Figure 2-37a: Occupied Bandwidth
Cellular EVDO mode, Low Channel

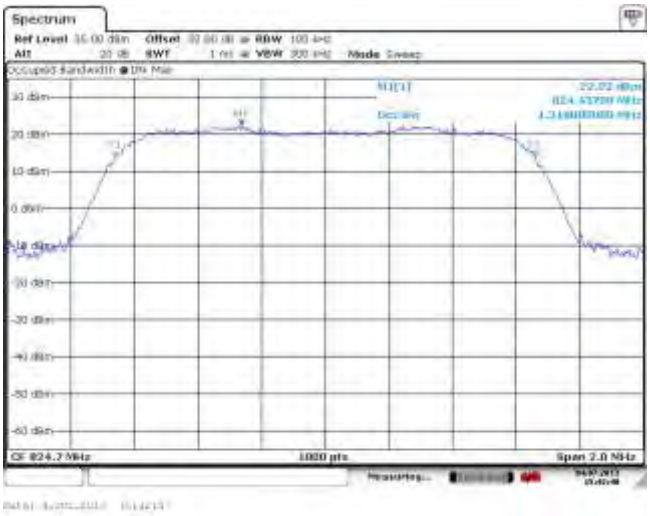


Figure 2-38a: Occupied Bandwidth
Cellular EVDO mode, Middle Channel

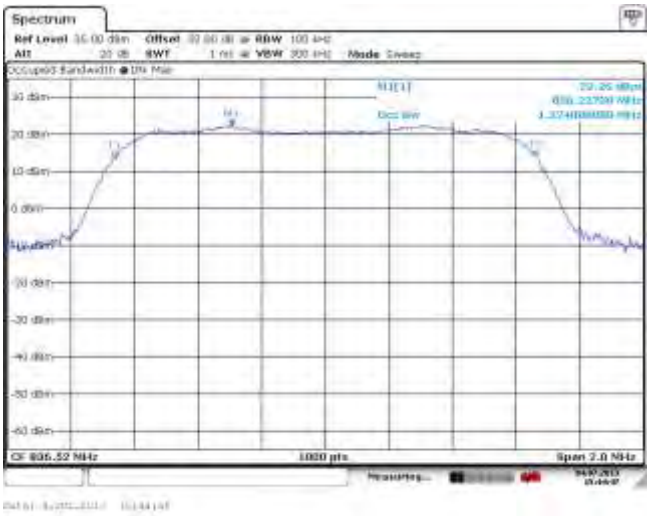


Figure 2-39a: Occupied Bandwidth
Cellular EVDO mode, High Channel

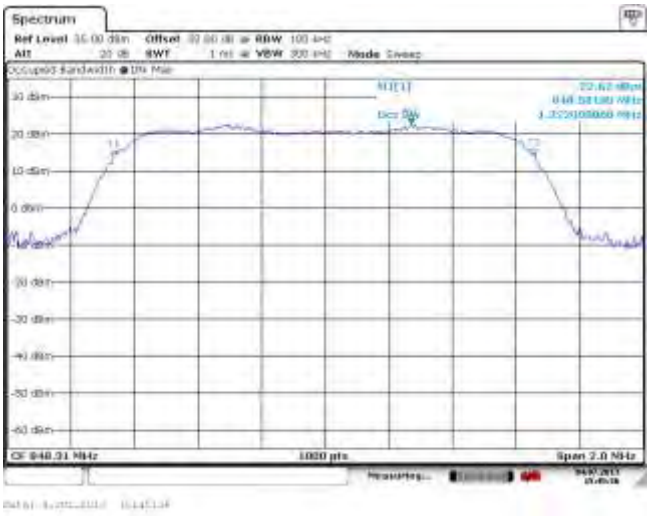
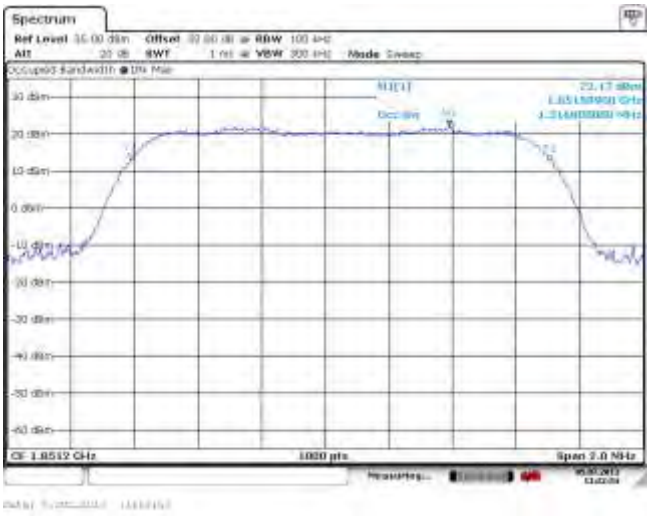


Figure 2-40a: Occupied Bandwidth
PCS EVDO mode, Low Channel



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CDMA Conducted RF Emission Test Data cont'd

Figure 2-41a: Occupied Bandwidth
PCS EVDO mode, Middle Channel

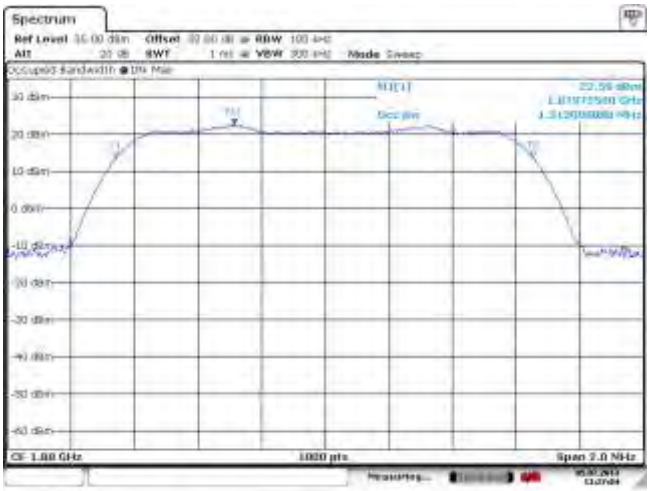


Figure 2-42a: Occupied Bandwidth
PCS EVDO mode, High Channel

Figure 2-43a: Low Channel Mask
Cellular EVDO mode

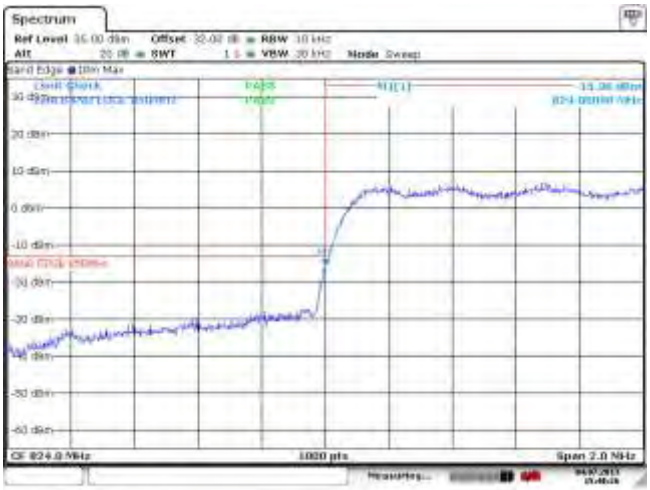
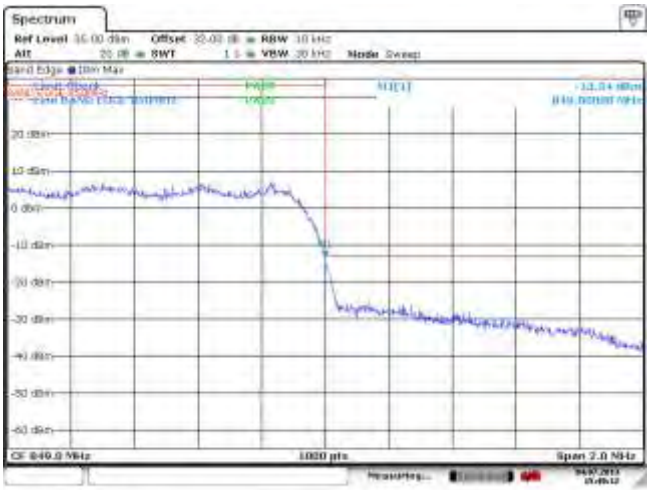


Figure 2-44a: High Channel Mask
Cellular EVDO mode



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CDMA Conducted RF Emission Test Data cont'd

Figure 2-45a: Low Channel Mask
PCS EVDO mode

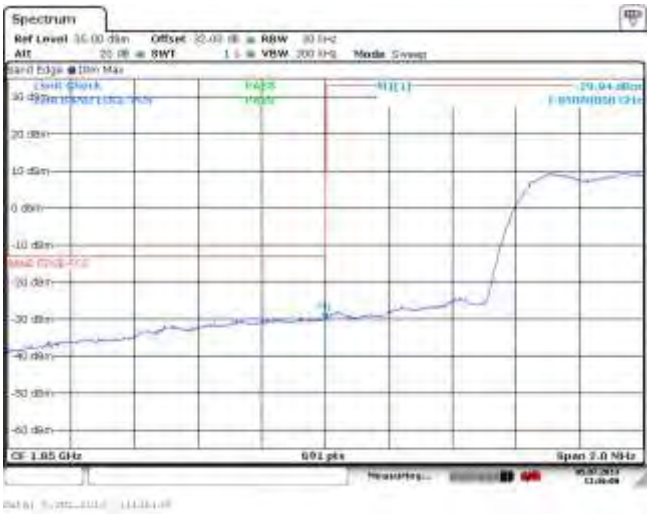
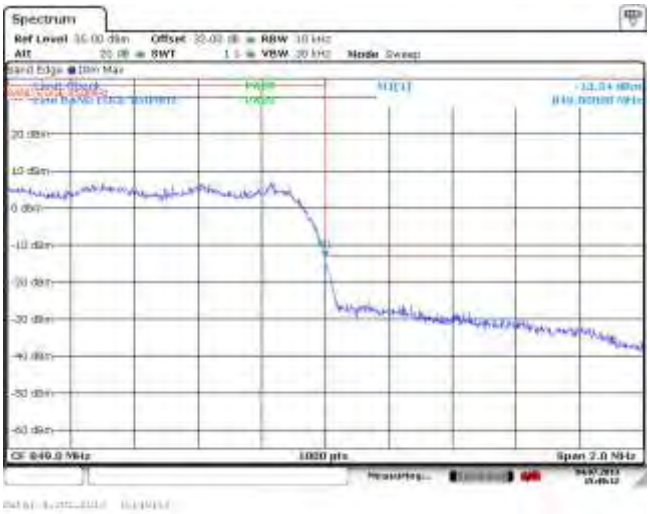


Figure 2-46a: High Channel Mask
PCS EVDO mode



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CDMA BC10 Conducted RF Emission Test Data cont'd

Figure 2-47a: BC10, Spurious Conducted Emissions, Low channel

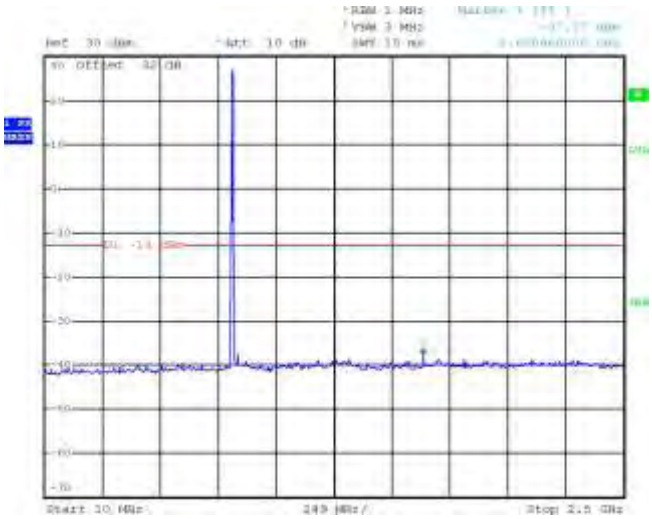


Figure 2-48a: BC10, Spurious Conducted Emissions, Low channel

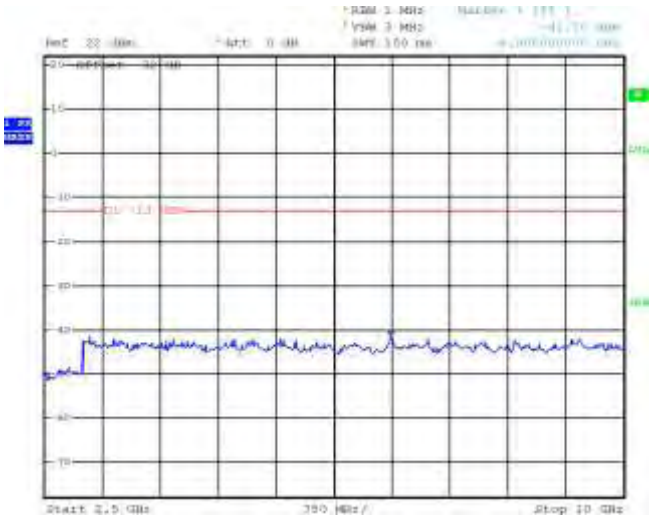


Figure 2-49a: BC10, Spurious Conducted Emissions, Middle channel

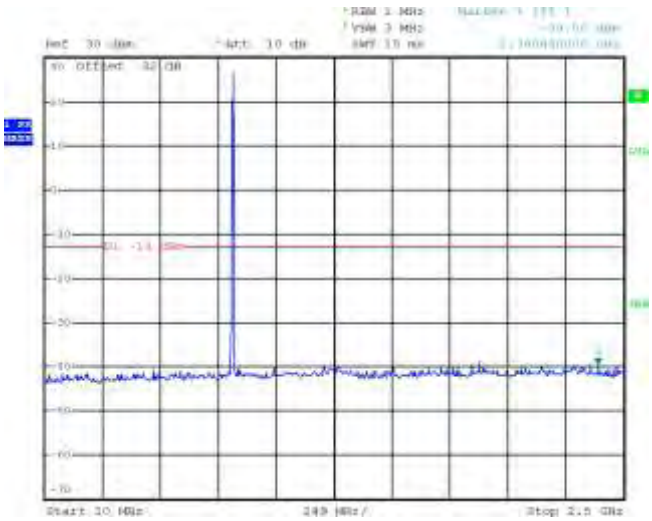
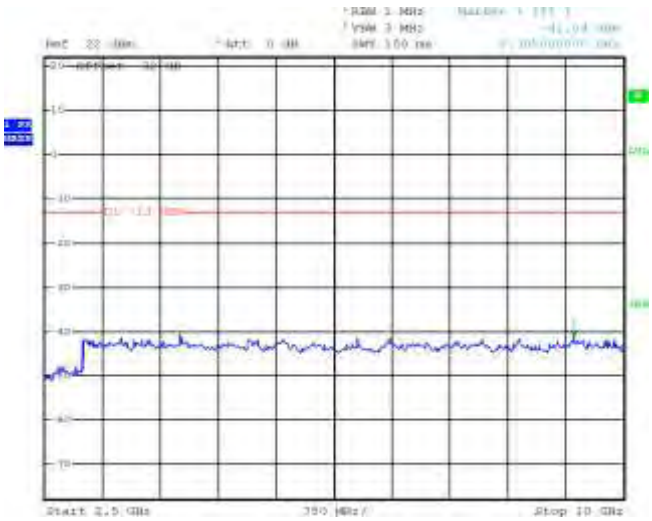


Figure 2-50a: BC10, Spurious Conducted Emissions, Middle channel



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CDMA BC10 Conducted RF Emission Test Data cont'd

Figure 2-51a: BC10, Spurious Conducted Emissions, High Channel

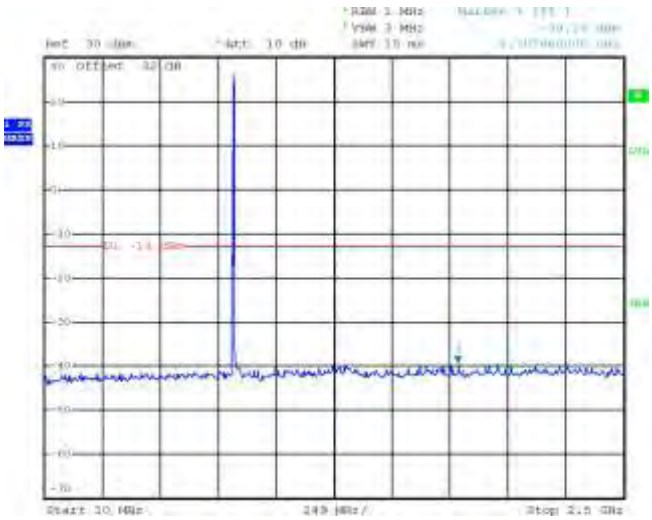


Figure 2-52b: BC10, Spurious Conducted Emissions, High Channel

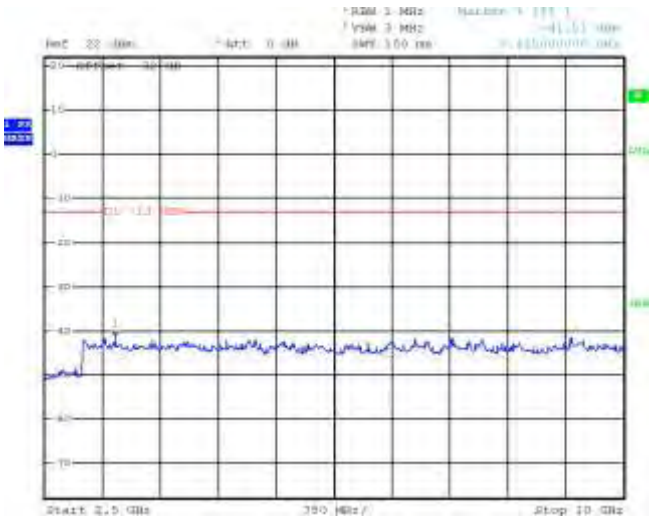


Figure 2-53a: Occupied Bandwidth, BC10 Low Channel

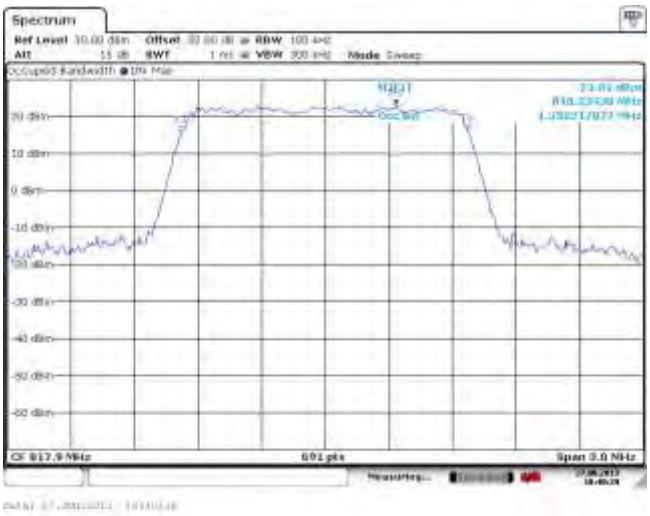
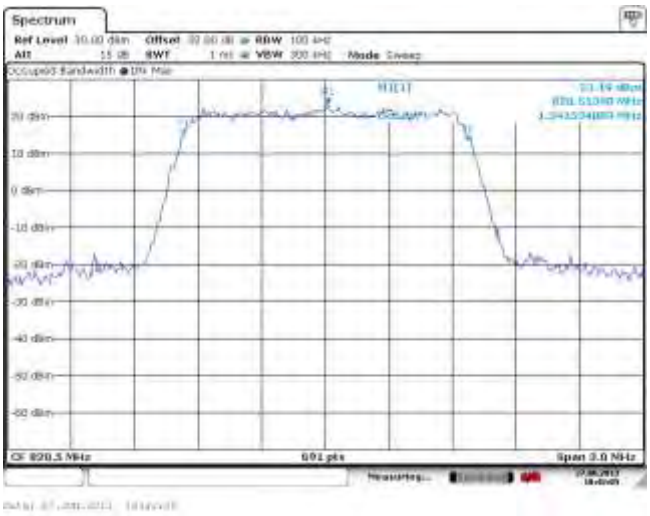


Figure 2-54a: Occupied Bandwidth, BC10 Middle Channel



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CDMA BC10 Conducted RF Emission Test Data cont'd

Figure 2-55a: Occupied Bandwidth, BC10 High Channel

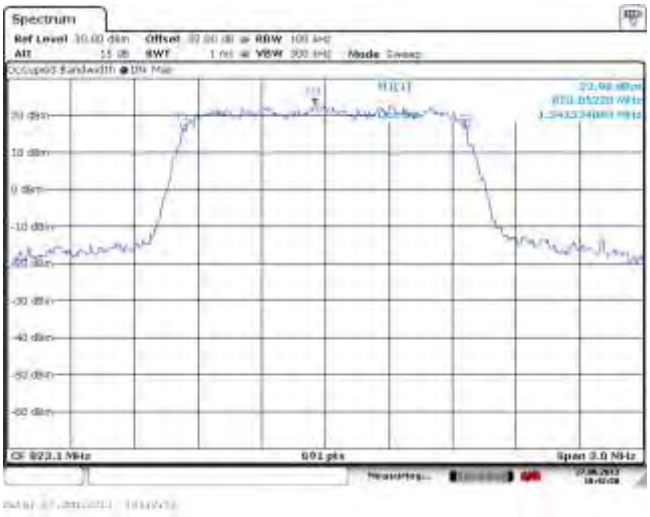


Figure 2-56a: BC10, Low Channel Mask

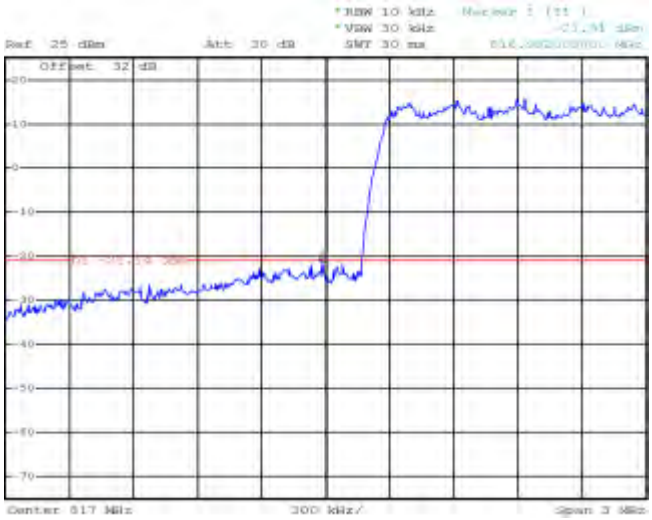
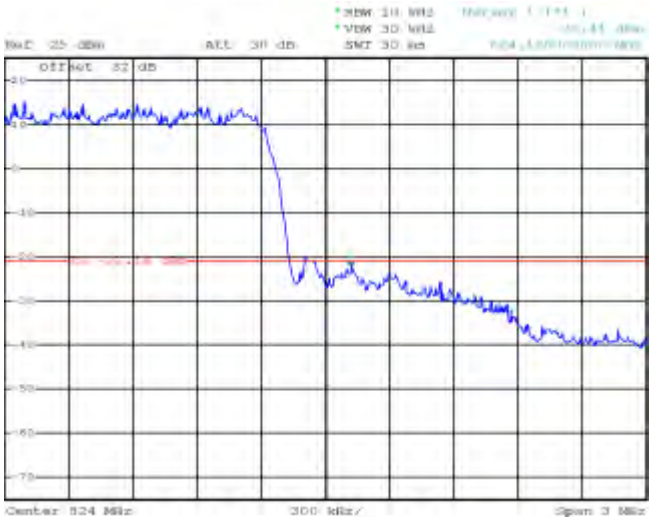


Figure 2-57a: BC10, High Channel Mask



**Since the Spectrum Analyzer's RBW cannot be set to 13 kHz, the measurement for channel masks was done at 10 kHz and the limit adjusted using the calculation 10log (13kHz/10kHz) = 1.14 dB. -20dBm – 1.14 dBm = -21.14 dBm adjusted

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CDMA BC10 Conducted RF Emission Test Data cont'd

Figure 2-58a: BC10, Spurious Conducted Emissions, Low channel

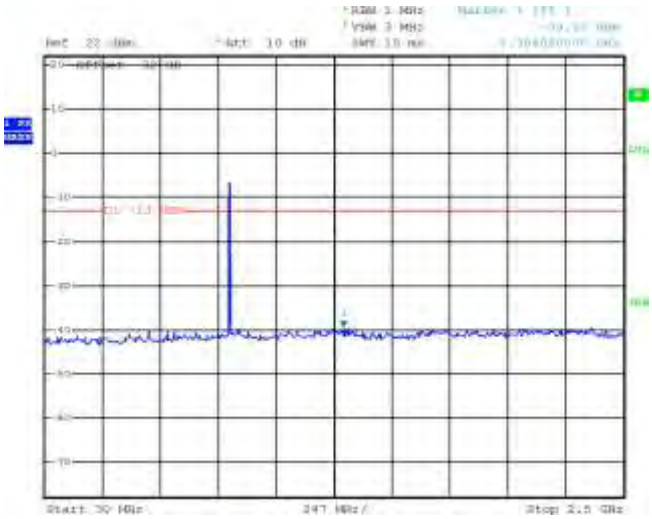


Figure 2-59a: BC10, Spurious Conducted Emissions, Low channel

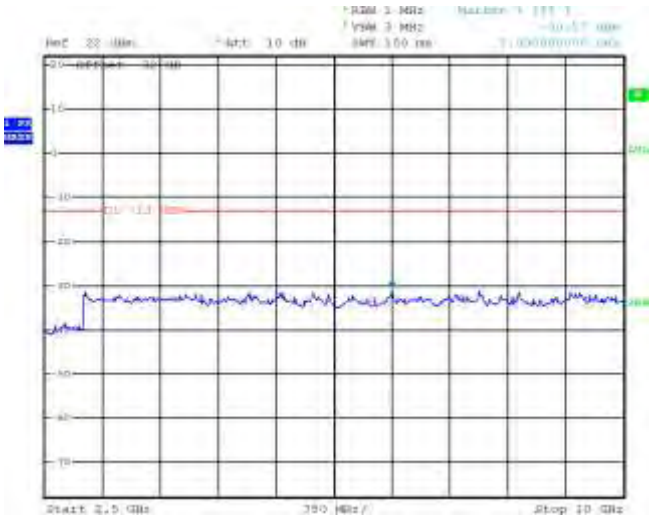


Figure 2-60a: BC10, Spurious Conducted Emissions, Middle channel

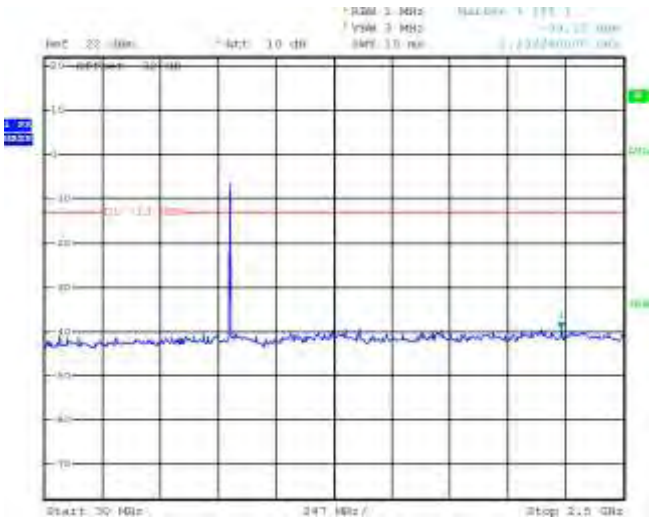
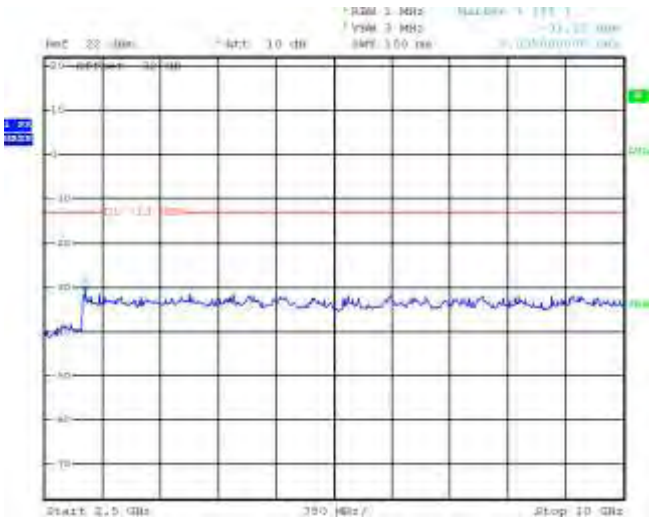


Figure 2-61a: BC10, Spurious Conducted Emissions, Middle channel



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CDMA BC10 Conducted RF Emission Test Data cont'd

Figure 2-62a: BC10, Spurious Conducted Emissions, High Channel

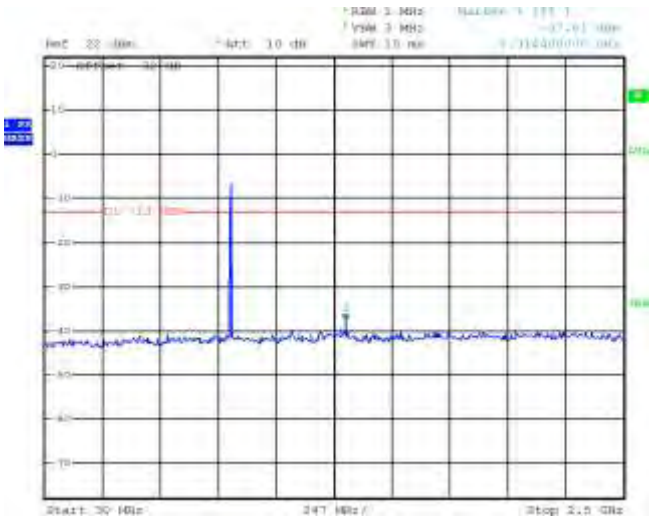


Figure 2-63a: BC10, Spurious Conducted Emissions, High Channel

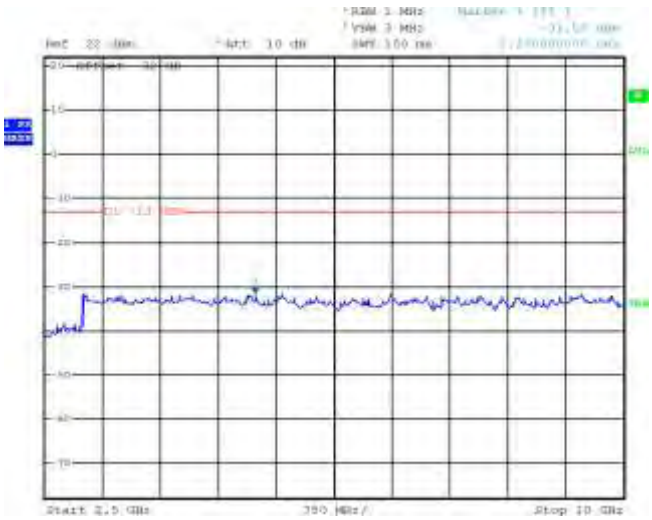


Figure 2-64a: Occupied Bandwidth, BC10 Low Channel

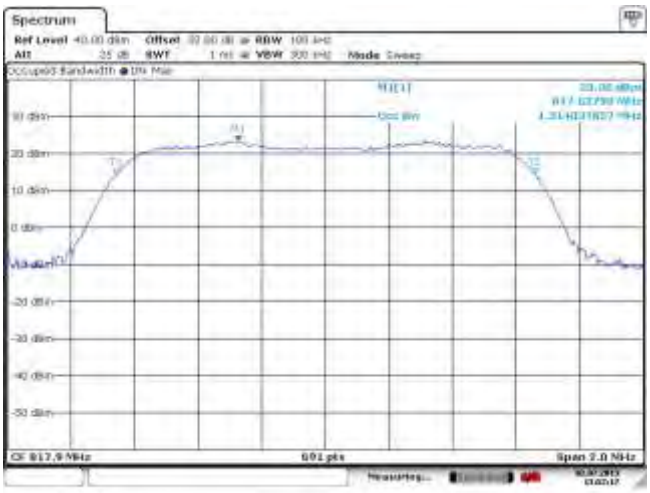
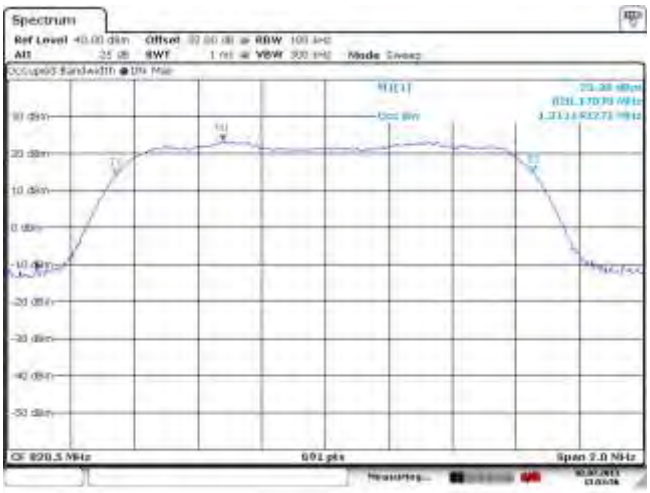


Figure 2-65a: Occupied Bandwidth, BC10 Middle Channel



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CDMA BC10 Conducted RF Emission Test Data cont'd

Figure 2-66a: Occupied Bandwidth, BC10 High Channel

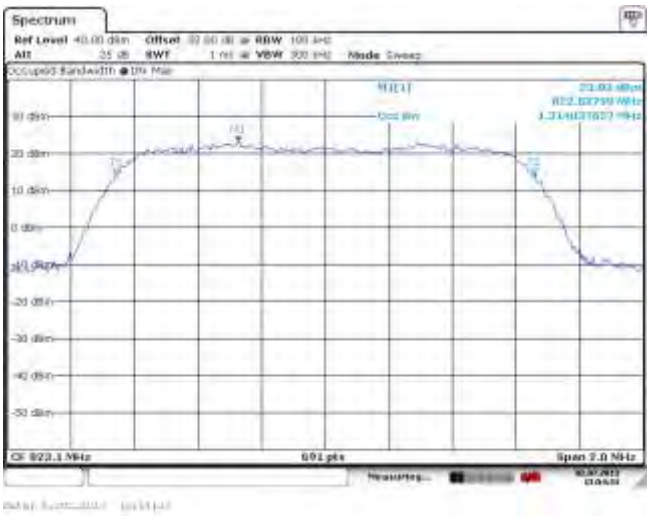

Figure 2-67a: BC10, Low Channel Mask

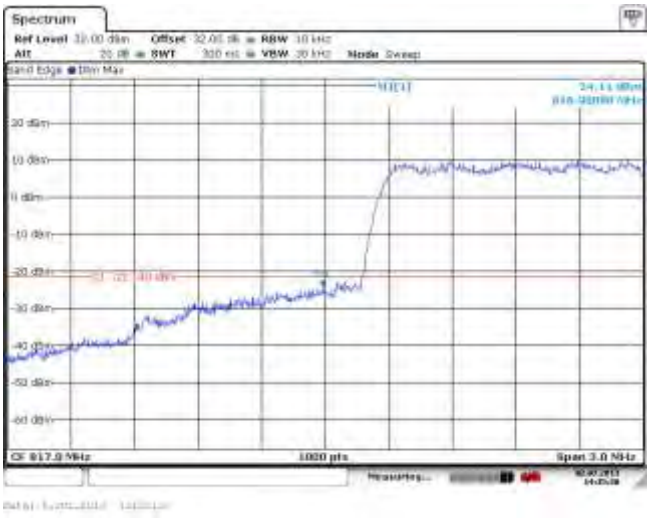

Figure 2-68a: BC10, High Channel Mask

**Since the Spectrum Analyzer's RBW cannot be set to 13 kHz, the measurement for channel masks was done at 10 kHz and the limit adjusted using the calculation 10log (13kHz/10kHz) = 1.14 dB. -20dBm – 1.14 dBm = -21.14 dBm adjusted

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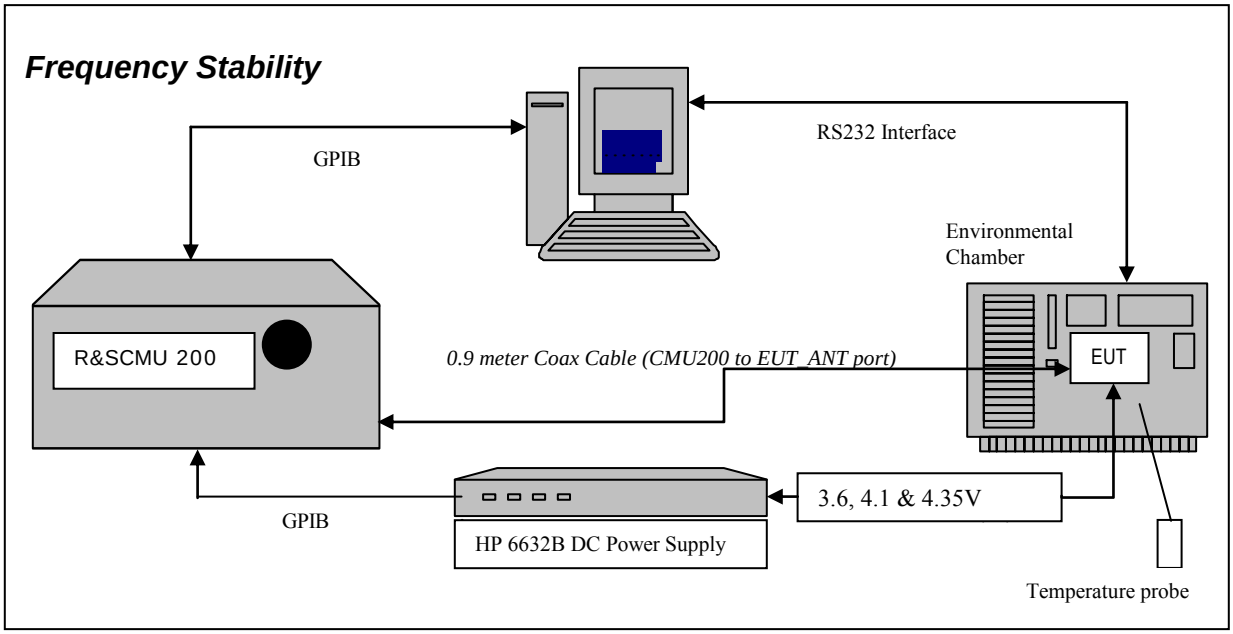
APPENDIX 3B – CDMA FREQUENCY STABILITY TEST DATA

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 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 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.

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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 -**0.0461 PPM**.
The maximum frequency error in the CDMA PCS measured was -**0.0152 PPM**.
The maximum frequency error in the CDMA BC10 measured was -**0.0267 PPM**.

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Date of test: July 4, 2013
The following tests were performed on model RFX101LW.

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	-23.00	-0.0279
384	836.52	3.6	20	-27.00	-0.0323
777	848.31	3.6	20	-25.00	-0.0295

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	4.1	20	-21.00	-0.0255
384	836.52	4.1	20	-35.00	-0.0418
777	848.31	4.1	20	-25.00	-0.0295

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1013	824.70	4.35	20	-22.00	-0.0267
384	836.52	4.35	20	-28.00	-0.0335
777	848.31	4.35	20	-20.00	-0.0236

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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	-30.00	-0.0364
1013	824.70	3.6	-20	-21.00	-0.0255
1013	824.70	3.6	-10	-22.00	-0.0267
1013	824.70	3.6	0	-25.00	-0.0303
1013	824.70	3.6	10	-19.00	-0.0230
1013	824.70	3.6	20	-23.00	-0.0279
1013	824.70	3.6	30	-9.00	-0.0109
1013	824.70	3.6	40	-20.00	-0.0243
1013	824.70	3.6	50	-14.00	-0.0170
1013	824.70	3.6	60	-16.00	-0.0194
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1013	824.70	4.1	-30	-28.00	-0.0340
1013	824.70	4.1	-20	-24.00	-0.0291
1013	824.70	4.1	-10	-21.00	-0.0255
1013	824.70	4.1	0	-16.00	-0.0194
1013	824.70	4.1	10	-21.00	-0.0255
1013	824.70	4.1	20	-21.00	-0.0255
1013	824.70	4.1	30	18.00	0.0218
1013	824.70	4.1	40	16.00	0.0194
1013	824.70	4.1	50	-15.00	-0.0182
1013	824.70	4.1	60	14.00	0.0170
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	**-38.00**	**-0.0461**
1013	824.70	4.35	-10	-27.00	-0.0327
1013	824.70	4.35	0	37.00	0.0449
1013	824.70	4.35	10	-37.00	-0.0449
1013	824.70	4.35	20	-22.00	-0.0267
1013	824.70	4.35	30	-18.00	-0.0218
1013	824.70	4.35	40	-20.00	-0.0243
1013	824.70	4.35	50	-21.00	-0.0255
1013	824.70	4.35	60	-25.00	-0.0303

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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	-30.00	-0.0354
384	836.52	3.6	-20	-24.00	-0.0283
384	836.52	3.6	-10	-27.00	-0.0318
384	836.52	3.6	0	-30.00	-0.0354
384	836.52	3.6	10	-22.00	-0.0259
384	836.52	3.6	20	-25.00	-0.0295
384	836.52	3.6	30	-3.00	-0.0035
384	836.52	3.6	40	-15.00	-0.0177
384	836.52	3.6	50	-19.00	-0.0224
384	836.52	3.6	60	-12.00	-0.0141
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
384	836.52	4.1	-30	-31.00	-0.0365
384	836.52	4.1	-20	-23.00	-0.0271
384	836.52	4.1	-10	-20.00	-0.0236
384	836.52	4.1	0	-26.00	-0.0306
384	836.52	4.1	10	-25.00	-0.0295
384	836.52	4.1	20	-25.00	-0.0295
384	836.52	4.1	30	-12.00	-0.0141
384	836.52	4.1	40	-10.00	-0.0118
384	836.52	4.1	50	-12.00	-0.0141
384	836.52	4.1	60	-15.00	-0.0177
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
384	836.52	4.35	-30	-27.00	-0.0318
384	836.52	4.35	-20	-19.00	-0.0224
384	836.52	4.35	-10	-21.00	-0.0248
384	836.52	4.35	0	-25.00	-0.0295
384	836.52	4.35	10	-21.00	-0.0248
384	836.52	4.35	20	-20.00	-0.0236
384	836.52	4.35	30	-16.00	-0.0189
384	836.52	4.35	40	-11.00	-0.0130
384	836.52	4.35	50	-14.00	-0.0165
384	836.52	4.35	60	-16.00	-0.0189

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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	-35.00	-0.0418
777	848.31	3.6	-20	-26.00	-0.0311
777	848.31	3.6	-10	-29.00	-0.0347
777	848.31	3.6	0	-27.00	-0.0323
777	848.31	3.6	10	-26.00	-0.0311
777	848.31	3.6	20	-27.00	-0.0323
777	848.31	3.6	30	-19.00	-0.0227
777	848.31	3.6	40	-22.00	-0.0263
777	848.31	3.6	50	-17.00	-0.0203
777	848.31	3.6	60	-24.00	-0.0287
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
777	848.31	4.1	-30	-34.00	-0.0406
777	848.31	4.1	-20	-30.00	-0.0359
777	848.31	4.1	-10	-34.00	-0.0406
777	848.31	4.1	0	-29.00	-0.0347
777	848.31	4.1	10	-29.00	-0.0347
777	848.31	4.1	20	-35.00	-0.0418
777	848.31	4.1	30	-13.00	-0.0155
777	848.31	4.1	40	-16.00	-0.0191
777	848.31	4.1	50	-15.00	-0.0179
777	848.31	4.1	60	-18.00	-0.0215
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
777	848.31	4.35	-30	-34.00	-0.0406
777	848.31	4.35	-20	-33.00	-0.0394
777	848.31	4.35	-10	-32.00	-0.0383
777	848.31	4.35	0	-29.00	-0.0347
777	848.31	4.35	10	-26.00	-0.0311
777	848.31	4.35	20	-28.00	-0.0335
777	848.31	4.35	30	-19.00	-0.0227
777	848.31	4.35	40	-16.00	-0.0191
777	848.31	4.35	50	-13.00	-0.0155
777	848.31	4.35	60	-18.00	-0.0215

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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	13.00	0.0070
600	1880.00	3.6	20	18.00	0.0096
1175	1908.75	3.6	20	-27.00	-0.0141

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	4.1	20	16.00	0.0086
600	1880.00	4.1	20	19.00	0.0101
1175	1908.75	4.1	20	-17.00	-0.0089

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
25	1851.20	4.35	20	15.00	0.0081
600	1880.00	4.35	20	19.00	0.0101
1175	1908.75	4.35	20	-18.00	-0.0094

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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	15.00	0.0081
25	1851.20	3.6	-10	14.00	0.0076
25	1851.20	3.6	0	13.00	0.0070
25	1851.20	3.6	10	15.00	0.0081
25	1851.20	3.6	20	13.00	0.0070
25	1851.20	3.6	30	15.00	0.0081
25	1851.20	3.6	40	15.00	0.0081
25	1851.20	3.6	50	18.00	0.0097
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	18.00	0.0097
25	1851.20	4.1	-10	15.00	0.0081
25	1851.20	4.1	0	16.00	0.0086
25	1851.20	4.1	10	16.00	0.0086
25	1851.20	4.1	20	16.00	0.0086
25	1851.20	4.1	30	23.00	0.0124
25	1851.20	4.1	40	17.00	0.0092
25	1851.20	4.1	50	17.00	0.0092
25	1851.20	4.1	60	17.00	0.0092
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
25	1851.20	4.35	-30	14.00	0.0076
25	1851.20	4.35	-20	14.00	0.0076
25	1851.20	4.35	-10	13.00	0.0070
25	1851.20	4.35	0	13.00	0.0070
25	1851.20	4.35	10	15.00	0.0081
25	1851.20	4.35	20	15.00	0.0081
25	1851.20	4.35	30	15.00	0.0081
25	1851.20	4.35	40	15.00	0.0081
25	1851.20	4.35	50	13.00	0.0070
25	1851.20	4.35	60	13.00	0.0070

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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	15.00	0.0080
600	1880.00	3.6	-10	19.00	0.0101
600	1880.00	3.6	0	18.00	0.0096
600	1880.00	3.6	10	19.00	0.0101
600	1880.00	3.6	20	18.00	0.0096
600	1880.00	3.6	30	-14.00	-0.0074
600	1880.00	3.6	40	14.00	0.0074
600	1880.00	3.6	50	15.00	0.0080
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	20.00	0.0106
600	1880.00	4.1	-10	19.00	0.0101
600	1880.00	4.1	0	20.00	0.0106
600	1880.00	4.1	10	20.00	0.0106
600	1880.00	4.1	20	19.00	0.0101
600	1880.00	4.1	30	-14.00	-0.0074
600	1880.00	4.1	40	25.00	0.0133
600	1880.00	4.1	50	23.00	0.0122
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	19.00	0.0101
600	1880.00	4.35	-10	21.00	0.0112
600	1880.00	4.35	0	18.00	0.0096
600	1880.00	4.35	10	20.00	0.0106
600	1880.00	4.35	20	19.00	0.0101
600	1880.00	4.35	30	-20.00	-0.0106
600	1880.00	4.35	40	14.00	0.0074
600	1880.00	4.35	50	15.00	0.0080
600	1880.00	4.35	60	14.00	0.0074

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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	-26.00	-0.0136
1175	1908.75	3.6	-10	-27.00	-0.0141
1175	1908.75	3.6	0	-28.00	-0.0147
1175	1908.75	3.6	10	**-29.00**	**-0.0152**
1175	1908.75	3.6	20	-27.00	-0.0141
1175	1908.75	3.6	30	17.00	0.0089
1175	1908.75	3.6	40	-11.00	-0.0058
1175	1908.75	3.6	50	-14.00	-0.0073
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	-15.00	-0.0079
1175	1908.75	4.1	-10	-15.00	-0.0079
1175	1908.75	4.1	0	-17.00	-0.0089
1175	1908.75	4.1	10	-17.00	-0.0089
1175	1908.75	4.1	20	-17.00	-0.0089
1175	1908.75	4.1	30	15.00	0.0079
1175	1908.75	4.1	40	-13.00	-0.0068
1175	1908.75	4.1	50	-15.00	-0.0079
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	-17.00	-0.0089
1175	1908.75	4.35	-10	-16.00	-0.0084
1175	1908.75	4.35	0	-17.00	-0.0089
1175	1908.75	4.35	10	-20.00	-0.0105
1175	1908.75	4.35	20	-18.00	-0.0094
1175	1908.75	4.35	30	-17.00	-0.0089
1175	1908.75	4.35	40	-21.00	-0.0110
1175	1908.75	4.35	50	-21.00	-0.0110
1175	1908.75	4.35	60	-21.00	-0.0110

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The following tests were performed on model RGB141LW:

BC10 band results: channels 476, 580 and 684 @ 20°C maximum transmitted power

Traffic Channel Number	Cellular Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	*PPM*
476	817.900	3.6	20	9	0.0110
580	820.500	3.6	20	-13	-0.0158
684	823.100	3.6	20	17	0.0207

Traffic Channel Number	Cellular Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
476	817.900	4.1	20	-6	-0.0073
580	820.500	4.1	20	-6	-0.0073
684	823.100	4.1	20	8	0.0097

Traffic Channel Number	Cellular Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
476	817.900	4.35	20	10	0.0122
580	820.500	4.35	20	-8	-0.0098
684	823.100	4.35	20	20	0.0243

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BC10 Results: channel 476 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
476	817.900	3.6	-30	9	0.0110
476	817.900	3.6	-20	10	0.0122
476	817.900	3.6	-10	10	0.0122
476	817.900	3.6	0	8	0.0098
476	817.900	3.6	10	9	0.0110
476	817.900	3.6	20	9	0.0110
476	817.900	3.6	30	11	0.0134
476	817.900	3.6	40	10	0.0122
476	817.900	3.6	50	10	0.0122
476	817.900	3.6	60	7	0.0086

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
476	817.900	4.1	-30	-7	-0.0086
476	817.900	4.1	-20	-6	-0.0073
476	817.900	4.1	-10	-7	-0.0086
476	817.900	4.1	0	-6	-0.0073
476	817.900	4.1	10	-6	-0.0073
476	817.900	4.1	20	-6	-0.0073
476	817.900	4.1	30	-5	-0.0061
476	817.900	4.1	40	-8	-0.0098
476	817.900	4.1	50	-4	-0.0049
476	817.900	4.1	60	-9	-0.0110

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
476	817.900	4.35	-30	7	0.0086
476	817.900	4.35	-20	7	0.0086
476	817.900	4.35	-10	7	0.0086
476	817.900	4.35	0	9	0.0110
476	817.900	4.35	10	7	0.0086
476	817.900	4.35	20	10	0.0122
476	817.900	4.35	30	11	0.0134
476	817.900	4.35	40	11	0.0134
476	817.900	4.35	50	10	0.0122
476	817.900	4.35	60	10	0.0122

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BC10 Results: channel 580 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
580	820.500	3.6	-30	-9	-0.0110
580	820.500	3.6	-20	-9	-0.0110
580	820.500	3.6	-10	-9	-0.0110
580	820.500	3.6	0	-9	-0.0110
580	820.500	3.6	10	-7	-0.0085
580	820.500	3.6	20	-13	-0.0158
580	820.500	3.6	30	-12	-0.0146
580	820.500	3.6	40	-12	-0.0146
580	820.500	3.6	50	-11	-0.0134
580	820.500	3.6	60	-9	-0.0110

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
580	820.500	4.1	-30	-4	-0.0049
580	820.500	4.1	-20	-4	-0.0049
580	820.500	4.1	-10	-4	-0.0049
580	820.500	4.1	0	-4	-0.0049
580	820.500	4.1	10	-3	-0.0037
580	820.500	4.1	20	-6	-0.0073
580	820.500	4.1	30	-6	-0.0073
580	820.500	4.1	40	-5	-0.0061
580	820.500	4.1	50	-5	-0.0061
580	820.500	4.1	60	10	0.0122

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
580	820.500	4.35	-30	13	0.0158
580	820.500	4.35	-20	12	0.0146
580	820.500	4.35	-10	12	0.0146
580	820.500	4.35	0	15	0.0183
580	820.500	4.35	10	13	0.0158
580	820.500	4.35	20	-8	-0.0098
580	820.500	4.35	30	-7	-0.0085
580	820.500	4.35	40	-8	-0.0098
580	820.500	4.35	50	-8	-0.0098
580	820.500	4.35	60	8	0.0098

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BC10 Results: channel 684 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
684	823.100	3.6	-30	12	0.0146
684	823.100	3.6	-20	12	0.0146
684	823.100	3.6	-10	13	0.0158
684	823.100	3.6	0	11	0.0134
684	823.100	3.6	10	12	0.0146
684	823.100	3.6	20	17	0.0207
684	823.100	3.6	30	19	0.0231
684	823.100	3.6	40	17	0.0207
684	823.100	3.6	50	19	0.0231
684	823.100	3.6	60	17	0.0207

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
684	823.100	4.1	-30	9	0.0109
684	823.100	4.1	-20	8	0.0097
684	823.100	4.1	-10	10	0.0121
684	823.100	4.1	0	10	0.0121
684	823.100	4.1	10	10	0.0121
684	823.100	4.1	20	8	0.0097
684	823.100	4.1	30	8	0.0097
684	823.100	4.1	40	9	0.0109
684	823.100	4.1	50	7	0.0085
684	823.100	4.1	60	16	0.0194

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
684	823.100	4.35	-30	16	0.0194
684	823.100	4.35	-20	17	0.0207
684	823.100	4.35	-10	18	0.0219
684	823.100	4.35	0	15	0.0182
684	823.100	4.35	10	18	0.0219
684	823.100	4.35	20	20	0.0243
684	823.100	4.35	30	**22**	**0.0267**
684	823.100	4.35	40	20	0.0243
684	823.100	4.35	50	19	0.0231
684	823.100	4.35	60	16	0.0194

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APPENDIX 3C – CDMA RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

The following tests were performed on model RFX101LW.

Date of Test: July 18, 2013

The following measurements were performed by Feras Obeid.
The environmental tests conditions were: Temperature: 26.2 °C
Relative Humidity: 38.4 %

The BlackBerry® smartphone was standalone, horizontally with LCD facing down and top pointing to RX antenna when the turntable is at 0 degree position.
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height.

CDMA Cellular Loopback Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	1013	824.70	Cellular	Dipole	V	-41.09	-31.77	V-V	3.36	20.41	0.11	38.50	18.09
F0	1013	824.70	Cellular	Dipole	H	-31.77		H-H	1.73				
F0	384	836.52	Cellular	Dipole	V	-39.00	-31.03	V-V	4.77	**21.60**	**0.14**	38.50	16.90
F0	384	836.52	Cellular	Dipole	H	-31.03		H-H	2.80				
F0	777	848.32	Cellular	Dipole	V	-39.87	-31.65	V-V	3.78	20.69	0.12	38.50	17.81
F0	777	848.32	Cellular	Dipole	H	-31.65		H-H	2.46				

CDMA Cellular EVDO Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	1013	824.70	Cellular	Dipole	V	-40.38	-31.99	V-V	3.12	20.17	0.10	38.50	18.33
F0	1013	824.70	Cellular	Dipole	H	-31.99		H-H	1.48				
F0	384	836.52	Cellular	Dipole	V	-40.56	-32.37	V-V	3.43	20.26	0.11	38.50	18.24
F0	384	836.52	Cellular	Dipole	H	-32.37		H-H	1.38				
F0	777	848.32	Cellular	Dipole	V	-40.18	-32.04	V-V	3.39	**20.30**	**0.11**	38.50	18.20
F0	777	848.32	Cellular	Dipole	H	-32.04		H-H	2.01				

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Radiated Emissions Test Data Results cont'd

Date of Test: July 18, 2013

The following measurements were performed by Feras Obeid.
The environmental tests conditions were: Temperature: 26.2 °C
Relative Humidity: 38.4 %

The BlackBerry® smartphone was standalone, USB UP with LCD facing to RX antenna when the turntable is at 0 degree position.
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height.

CDMA PCS Loopback Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	25	1851.25	PCS	Horn	V	-28.75	-28.15	V-V	-17.54	**21.76**	**0.15**	33.0	11.24
F0	25	1851.25	PCS	Horn	H	-28.15		H-H	-17.66				
F0	600	1880.00	PCS	Horn	V	-28.60	-28.60	V-V	-17.54	21.60	0.14	33.0	11.40
F0	600	1880.00	PCS	Horn	H	-28.87		H-H	-17.39				
F0	1175	1908.75	PCS	Horn	V	-28.27	-28.27	V-V	-17.64	21.76	0.15	33.0	11.24
F0	1175	1908.75	PCS	Horn	H	-30.15		H-H	-17.17				

CDMA PCS EVDO Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	25	1851.25	PCS	Horn	V	-27.15	-27.15	V-V	-16.54	**22.76**	**0.19**	33.0	10.24
F0	25	1851.25	PCS	Horn	H	-29.54		H-H	-16.62				
F0	600	1880.00	PCS	Horn	V	-28.17	-28.17	V-V	-17.14	22.06	0.16	33.0	10.94
F0	600	1880.00	PCS	Horn	H	-29.62		H-H	-16.93				
F0	1175	1908.75	PCS	Horn	V	-28.10	-28.10	V-V	-17.44	21.97	0.16	33.0	11.03
F0	1175	1908.75	PCS	Horn	H	-30.44		H-H	-16.96				

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Radiated Power Test Data Results cont'd

The following test configurations were measured for model RGB141LW:

Date of Test: July 2, 2013
The following measurements were performed by Feras Obeid.

The environmental tests conditions were: Temperature: 25.8 °C
Relative Humidity: 33.2 %

The BlackBerry® smartphone was standalone horizontally, with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height.

BC10 Loopback Service Mode

								Substitution Method					
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	(dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	476	817.90	BC10	Horn	V	-40.84	-30.67	VV	4.68	21.52	0.14	38.50	16.98
F0	476	817.90	BC10	Horn	H	-30.67		HH	3.42				
F0	580	820.50	BC10	Horn	V	-40.11	-30.87	VV	4.65	21.73	0.15	38.50	16.77
F0	580	820.50	BC10	Horn	H	-30.87		HH	3.61				
F0	684	823.10	BC10	Horn	V	-39.57	-30.40	VV	6.02	**23.15**	**0.21**	38.50	15.35
F0	684	823.10	BC10	Horn	H	-30.40		HH	4.18				

BC10 EVDO Mode

								Substitution Method					
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	(dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	476	817.90	BC10	Horn	V	-41.23	-30.99	VV	4.01	20.85	0.12	38.50	17.65
F0	476	817.90	BC10	Horn	H	-30.99		HH	2.69				
F0	580	820.50	BC10	Horn	V	-40.66	-31.03	VV	4.14	21.22	0.13	38.50	17.28
F0	580	820.50	BC10	Horn	H	-31.03		HH	2.42				
F0	684	823.10	BC10	Horn	V	-40.22	-30.84	VV	5.32	**22.45**	**0.18**	38.50	16.05

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F0	684	823.10	BC10	Horn	H	-30.84		HH	3.75				

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Radiated Emissions Test Data Results cont'd

CDMA Cellular Loopback and Test Data Mode

The following tests were performed on model RFX101LW.

Date of Test: July 15 - 17, 2013

The following measurements were performed by Feras Obeid.
The environmental tests conditions were: Temperature: 25.1 – 26.4 °C
Relative Humidity: 40.1 – 40.4 %

The BlackBerry® smartphone was standalone, horizontal with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 30MHz – 1GHz.

Measurements were performed in CDMA Cellular Band Loopback and Test Data Mode on channels 1013, 384, and 777.

All emissions had test margins greater than 25.0 dB.

Date of Test: July 13 - 17, 2013

The following measurements were performed by Mahmood Ahmed
The environmental test conditions were: Temperature: 23.2 - 26.8 ºC
Relative Humidity: 38.3 - 41.7 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 1 GHz to 9 GHz.

The BlackBerry® smartphone was standalone, horizontal with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in CDMA Cellular Band Loopback and Test Data Mode on channels 1013, 384, and 777.

All emissions had test margins greater than 25.0 dB.

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Radiated Emissions Test Data Results cont'd

CDMA Cellular EVDO Mode

Date of Test: July 15 - 17, 2013

The environmental tests conditions were: Temperature: 25.1 – 26.4 °C
Relative Humidity: 40.1 – 40.4 %

The BlackBerry® smartphone was standalone, horizontal with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 30MHz – 1GHz.

Measurements were performed in CDMA Cellular Band EVDO Mode on channels 1013, 384, and 777.

All emissions had test margins greater than 25.0 dB.

Date of Test: July 13 - 17, 2013

The environmental test conditions were: Temperature: 23.2 - 26.8 ºC
Relative Humidity: 38.3 - 41.7 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and a frequency range of 1 GHz to 9 GHz.

The BlackBerry® smartphone was standalone, horizontal with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in CDMA Cellular Band EVDO Mode on channels 1013, 384, and 777.

All emissions had test margins greater than 25.0 dB.

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Radiated Emissions Test Data Results cont'd

CDMA PCS Loopback and Test Data Mode

Date of Test: July 15 - 17, 2013

The environmental tests conditions were: Temperature: 25.1 – 26.4 °C
Relative Humidity: 40.1 – 40.4 %

Test Distance was 3.0 metres with a height of 1-4 metres, and a frequency range of 30 MHz to 1000 MHz.

The BlackBerry® smartphone was standalone, with USB Up and LCD facing to the RX antenna when the turntable is at 0 degree position.

The measurements were performed in CDMA PCS band Loopback and Test Data mode on channels 25, 600 and 1175.

All emissions had a test margin greater than 25.0 dB.

Date of Test: July 13 - 22, 2013

The environmental test conditions were: Temperature: 23.2 – 28.6 ºC
Relative Humidity: 38.3 - 42.7 %

Test Distance was 3.0 metres with a height of 1-4 metres, and a frequency range of 1GHz-20GHz.

The BlackBerry® smartphone was standalone, horizontal with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

The following measurements were performed in CDMA PCS band Loopback and Test Data mode on channels 25, 600 and 1175.

BlackBerry® smartphone PIN 33411585										
Frequency (MHz)	Channel Of Occurrence	Antenna Pol. (V/H)	Antenna Height (meters)	Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Field Strength Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
3816.824	1175	H	1.00	198	PK	50.70	-80.97	**-33.374**	-13.00	-20.4

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

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Radiated Emissions Test Data Results cont'd

CDMA PCS EVDO Mode

Date of Test: July 15 - 17, 2013

The environmental tests conditions were: Temperature: 25.1 – 26.4 °C
Relative Humidity: 40.1 – 40.4 %

Test Distance was 3.0 metres with a height of 1-4 metres, and a frequency range of 30 MHz to 1000 MHz.

The BlackBerry® smartphone was standalone, with USB Up and LCD facing to the RX antenna when the turntable is at 0 degree position.

The following measurements were performed in CDMA PCS band EVDO mode on channels 25, 600 and 1175.

All emissions had a test margin greater than 25.0 dB.

Date of Test: July 13 - 22, 2013

The environmental test conditions were: Temperature: 23.2 – 28.6 ºC
Relative Humidity: 38.3 - 42.7 %

Test Distance was 3.0 metres with a height of 1-4 metres, and a frequency range of 1GHz-20GHz.

The BlackBerry® smartphone was standalone, horizontal with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

The following measurements were performed in CDMA PCS band EVDO mode on channels 25, 600 and 1175.

BlackBerry® smartphone PIN 33411585										
Frequency (MHz)	Channel Of Occurrence	Antenna Pol. (V/H)	Antenna Height (meters)	Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/ cables/ filter (dB)	Field Strength Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
3816.62	1175	H	1.00	165	PK	50.70	-80.97	**-23.548**	-13.00	-10.5

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

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Radiated Emissions Test Data Results cont'd

BC10 Loopback Service Mode

The following test configurations were measured for model RGB141LW:

Date of Test: June 29, 2012
The following measurements were performed by Feras Obeid.

The environmental test conditions were: Temperature: 25.4 ºC
Relative Humidity: 32.1 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 30MHz – 1GHz.

The BlackBerry® smartphone was standalone horizontally, with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in CDMA BC10 Loopback Tx mode on channels 476, 580 and 684.

All emissions had test margins of greater than 25.0 dB.

Date of Test: June 28-July 2, 2012

The following measurements were performed by Mahmood Ahmed.

The environmental test conditions were: Temperature: 25.8 ºC
Relative Humidity: 33.1 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 1 - 20 GHz.

The BlackBerry® smartphone was standalone, with USB Port facing up and screen pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in CDMA BC10 Loopback Tx mode on channels 476, 580 and 684.

All emissions had test margins of greater than 25.0 dB.

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Radiated Emissions Test Data Results cont'd

BC10 1xEVDO Mode

The following test configurations were measured for model RGB141LW:

Date of Test: June 29, 2012
The following measurements were performed by Feras Obeid.

The environmental test conditions were: Temperature: 25.4 ºC
Relative Humidity: 32.1 %

Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 30MHz – 1GHz.

The BlackBerry® smartphone was standalone horizontally, with LCD facing down and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in CDMA BC10 EVDO Tx mode on channels 476, 580 and 684.

All emissions had test margins of greater than 25.0 dB.

Date of Test: June 28-July 2, 2012
The following measurements were performed by Mahmood Ahmed.

The environmental test conditions were: Temperature: 25.8 ºC
Relative Humidity: 33.1 %
Test Distance was 3.0 meters with the RX antenna height scans between 1-4 meters height, and the frequency range scanned was 1 - 20 GHz.

The BlackBerry® smartphone was standalone, with USB Port facing up and screen pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in CDMA BC10 EVDO Tx mode on channels 476, 580 and 684.

All emissions had test margins of greater than 25.0 dB.

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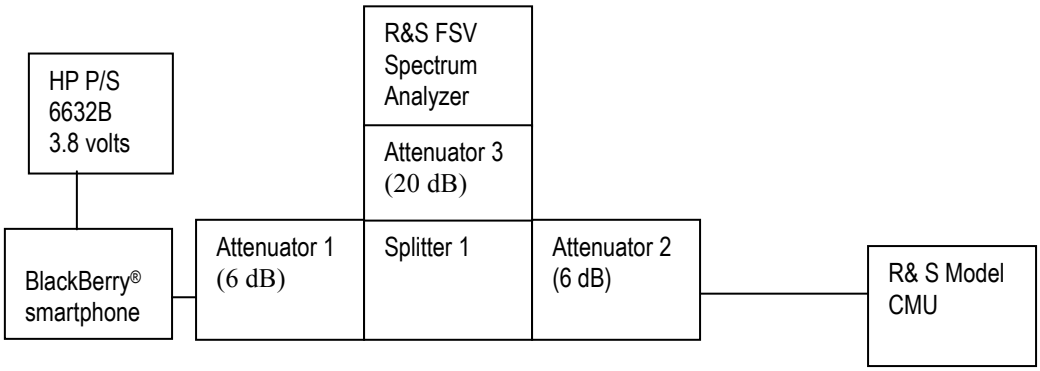
APPENDIX 4A– LTE Band 4 CONDUCTED RF EMISSIONS TEST DATA/PLOTS

LTE Band 4 Conducted RF Emission Test Data

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

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.

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

Date of Test: June 20 - 24, 2013

The environmental test conditions were: Temperature: 23.2ºC
Relative Humidity: 21.1 %

The following measurements were performed by Berkin Can.

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LTE Band 4 Conducted RF Emission Test Data cont'd

The following tests were performed on model RFX101LW.

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 27.53 were measured from 30 MHz to 20 GHz.

–26 dBc Bandwidth and Occupied Bandwidth (99%)
The modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth For each 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz with different number of resource blocks for LTE band 4,.
QPSK and 16-QAM modulations were applied to each of the bandwidths. Only the worst case measurements are documented in this report.
A minimum resource block condition was also measured (RB = 1).
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc bandwidth for LTE band 4 was measured to be 18.64 MHz. Results were derived in a 200 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

Test Data for LTE Band 4 selected Frequencies in 20MHz BW (RB = 100)

LTE Band 4 Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	
	QPSK	QPSK	16-QAM
1720.0	18.64	17.829	17.829
1732.5	18.759	17.858	17.858
1745.0	18.66	17.829	17.829

Peak to Average Ratio (PAR)
For each 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz with different number of resource blocks as per scalable bandwidths for LTE band 4, the peak to average ratio was measured on the low, middle and high channels with QPSK modulation.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.
The worst case measured was 9.23 dB in 10MHz bandwidth with 25 resource blocks.

Measurement Plots for LTE Band 4
See Figures 5-1a to 5-18a for the plots of the conducted spurious emissions.
See Figures 5-19a to 5-34a and 5-51a to 5-53a for the plots of 99% Occupied Bandwidth and -26 dBc Bandwidth.
See Figures 5-35a to 5-44a for the plots of the Channel mask.
See Figures 5-45a to 5-50a for the plots of the Peak to Average Ratios.

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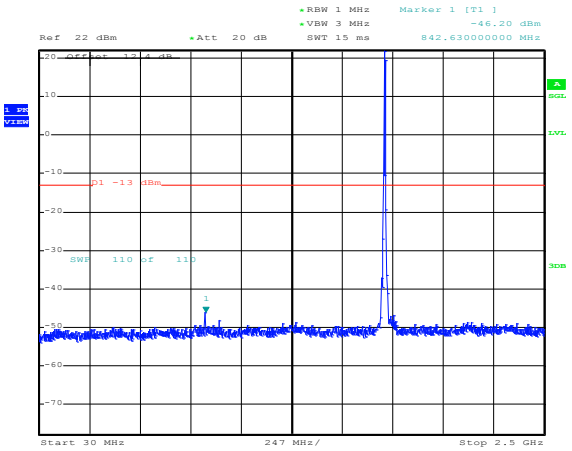
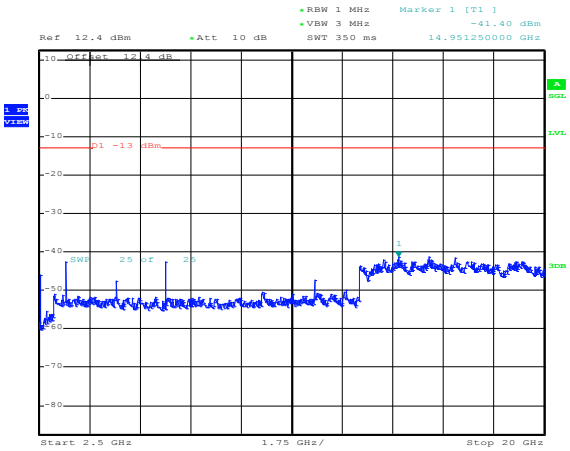
LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-1a: Band 4, Spurious Conducted Emissions, Low channel, 20MHz BW (RB= 1)



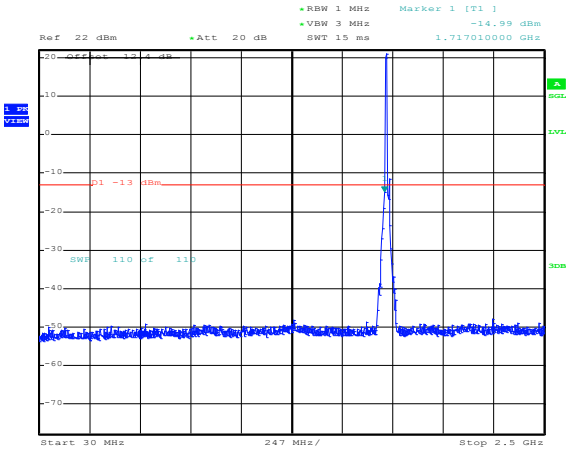
Date: 25.JUN.2013 16:34:22

Figure 5-2a: Band 4, Spurious Conducted Emissions, Low channel, 20MHz BW (RB= 1)



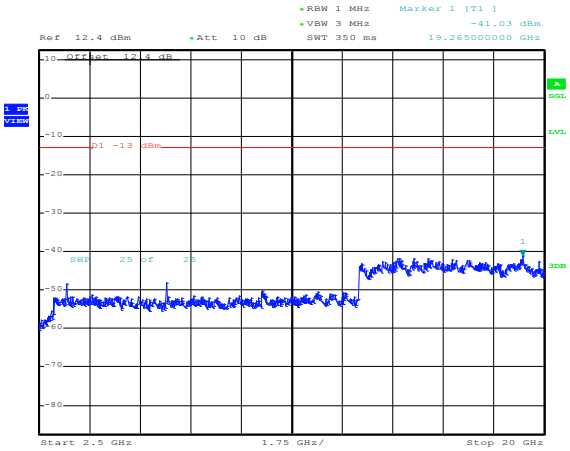
Date: 25.JUN.2013 16:35:00

Figure 5-3a: Band 4, Spurious Conducted Emissions, Middle channel, 20MHz BW (RB= 50)



Date: 25.JUN.2013 16:35:37

Figure 5-4a: Band 4, Spurious Conducted Emissions, Middle channel, 20MHz BW (RB= 50)



Date: 25.JUN.2013 16:36:16

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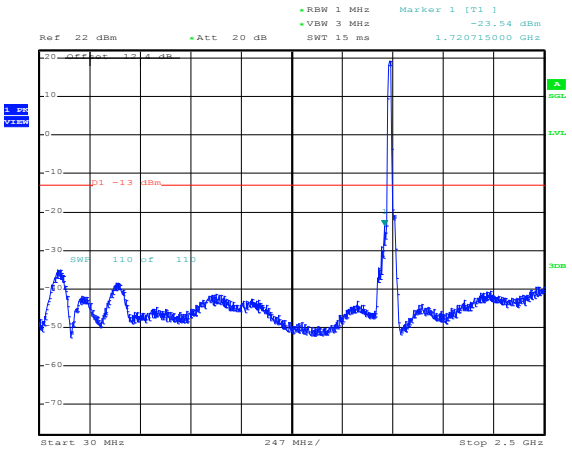
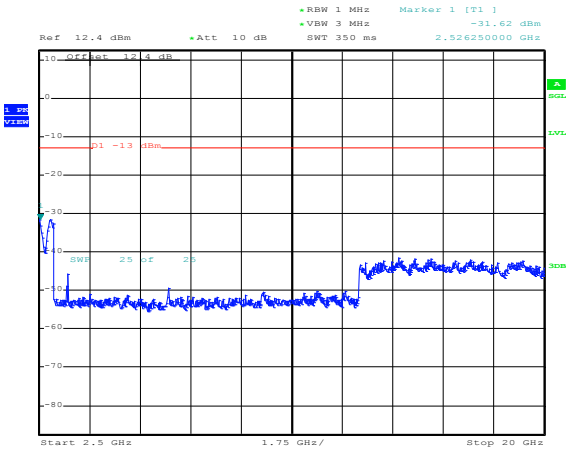
LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-5a: Band 4, Spurious Conducted Emissions, High Channel, 20MHz BW (RB= 100)



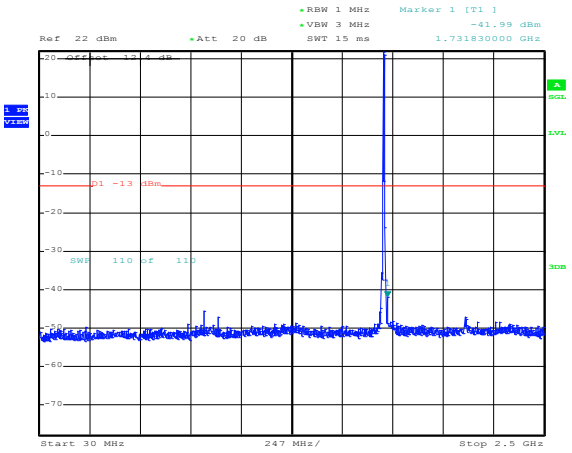
Date: 25.JUN.2013 16:36:56

Figure 5-6a: Band 4, Spurious Conducted Emissions, High Channel, 20MHz BW (RB= 100)



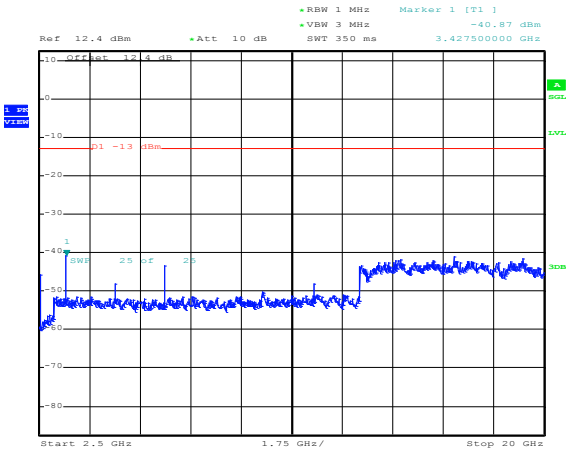
Date: 25.JUN.2013 16:37:36

Figure 5-7a: Band 4, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 1)



Date: 25.JUN.2013 16:38:13

Figure 5-8a: Band 4, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 1)



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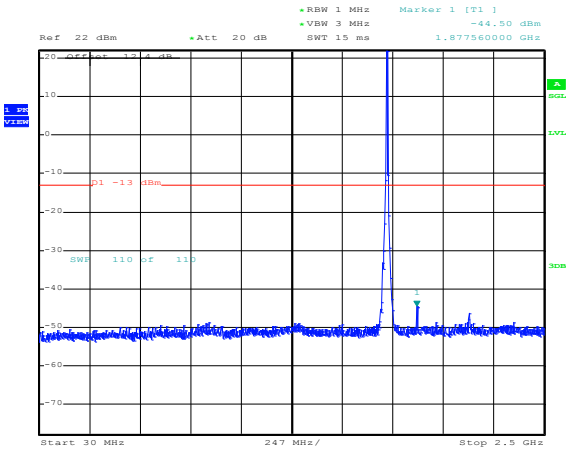
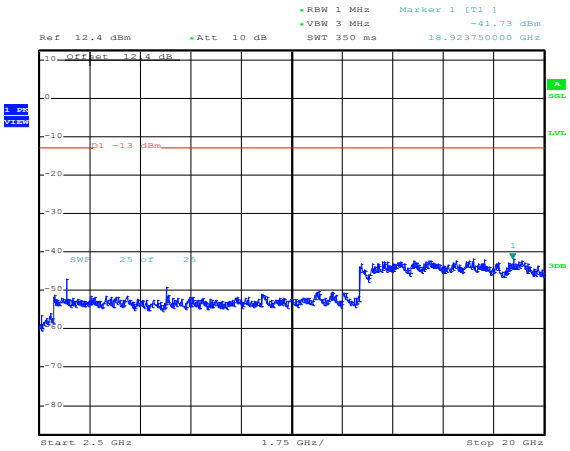
LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-9a: Band 4, Spurious Conducted Emissions, Middle Channel, 10MHz BW (RB= 25)



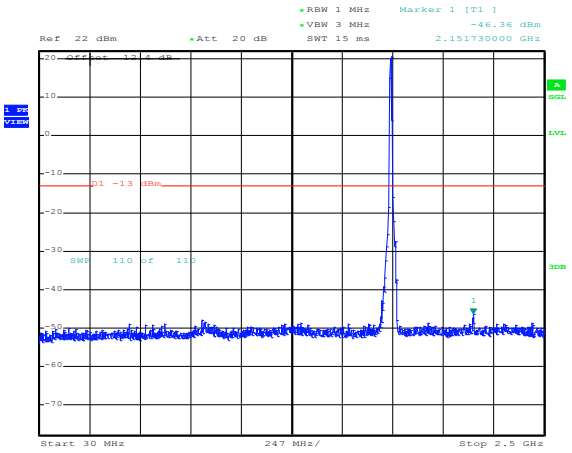
Date: 25.JUN.2013 16:39:26

Figure 5-10a: Band 4, Spurious Conducted Emissions, Middle Channel, 10MHz BW (RB= 25)



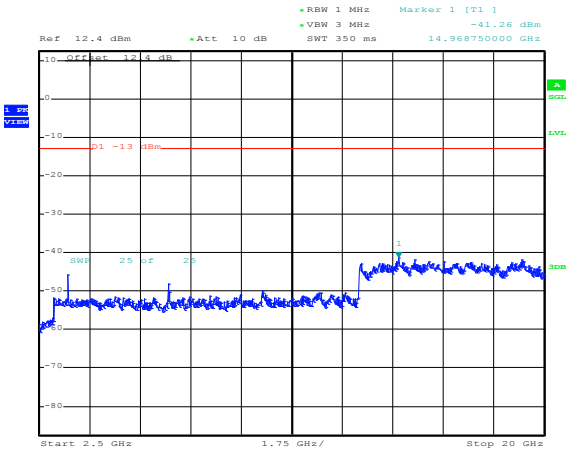
Date: 25.JUN.2013 16:40:03

Figure 5-11a: Band 4, Spurious Conducted Emissions, High channel, 10MHz BW (RB= 50)



Date: 25.JUN.2013 16:40:41

Figure 5-12a: Band 4, Spurious Conducted Emissions, High channel, 10MHz BW (RB= 50)



Date: 25.JUN.2013 16:41:19

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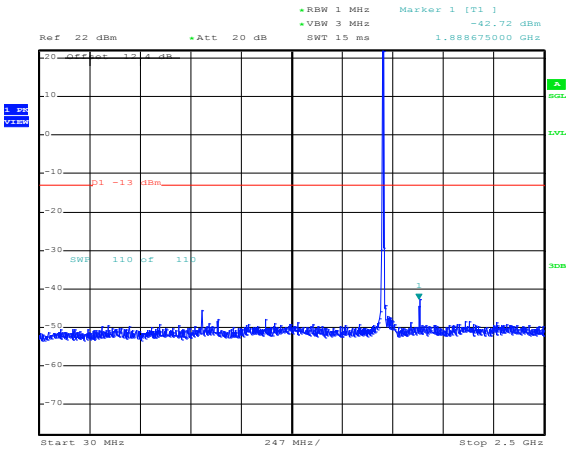
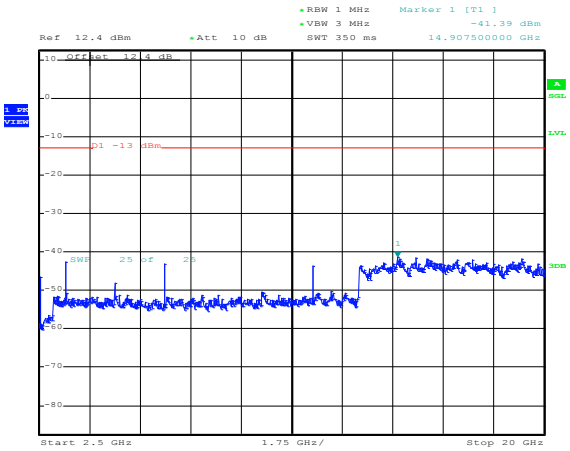
LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-13a: Band 4, Spurious Conducted Emissions, Low Channel, 1.4MHz BW (RB= 1)



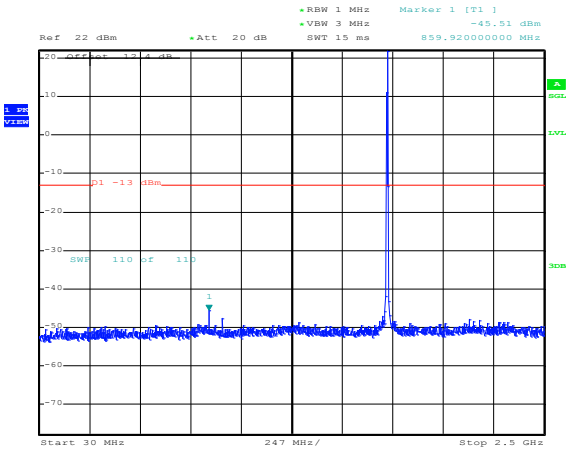
Date: 25.JUN.2013 16:42:06

Figure 5-14a: Band 4, Spurious Conducted Emissions, Low Channel, 1.4MHz BW (RB= 1)



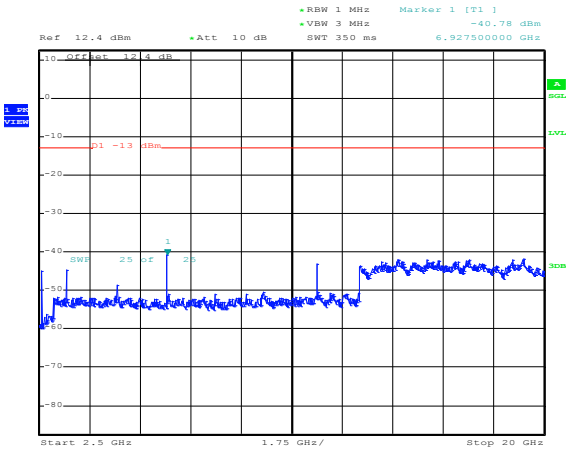
Date: 25.JUN.2013 16:42:43

Figure 5-15a: Band 4, Spurious Conducted Emissions, Middle channel, 1.4MHz BW (RB= 3)



Date: 25.JUN.2013 16:43:19

Figure 5-16a: Band 4, Spurious Conducted Emissions, Middle channel, 1.4MHz BW (RB= 3)



Date: 25.JUN.2013 16:43:56

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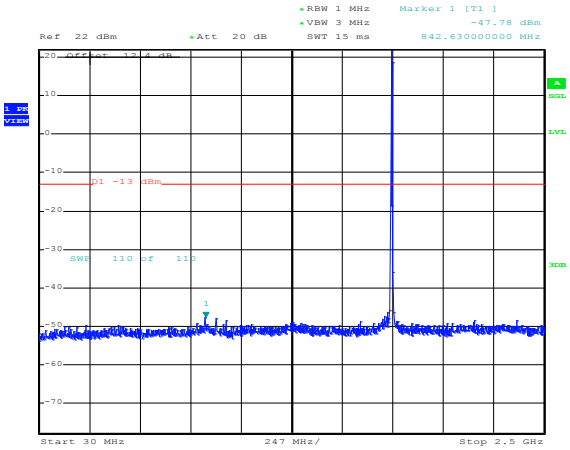
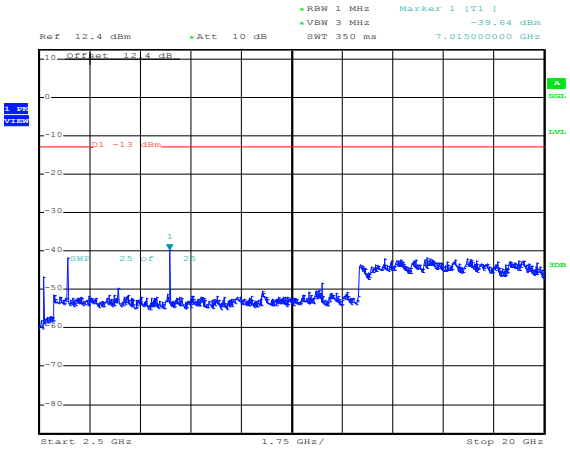
LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-17a: Band 4, Spurious Conducted Emissions, High channel, 1.4MHz BW (RB= 6)



Date: 25.JUN.2013 16:44:32

Figure 5-18a: Band 4, Spurious Conducted Emissions, High channel, 1.4MHz BW (RB= 6)



Date: 25.JUN.2013 16:45:09

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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-19a: Occupied Bandwidth, Band 4 Low Channel, 20MHz BW, RB=100

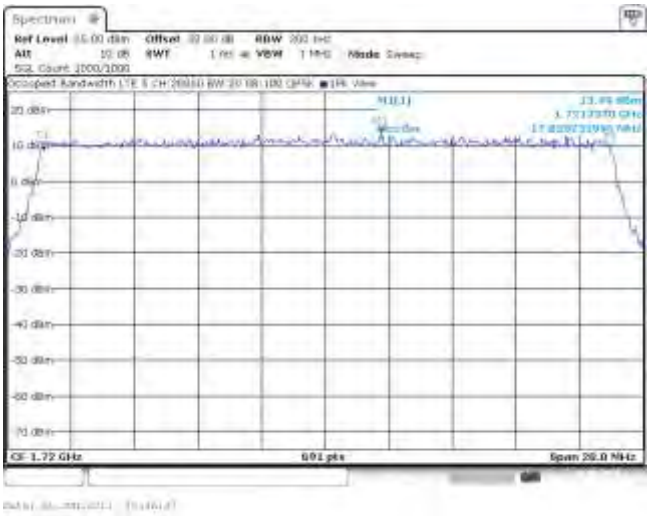


Figure 5-20a: Occupied Bandwidth, Band 4 Middle Channel, 20MHz BW, RB=100

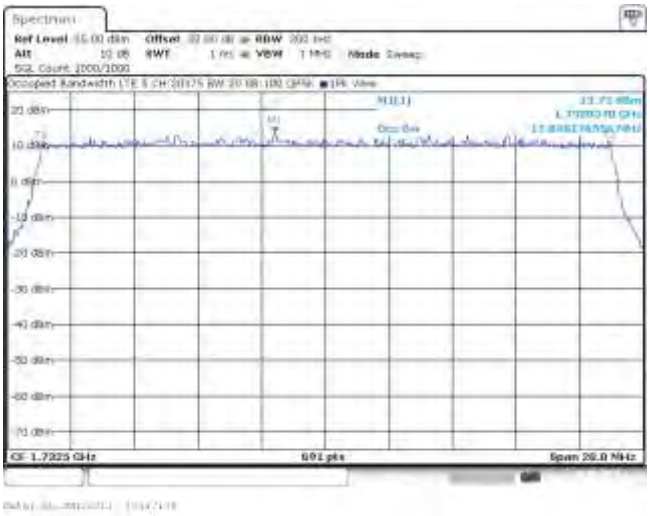
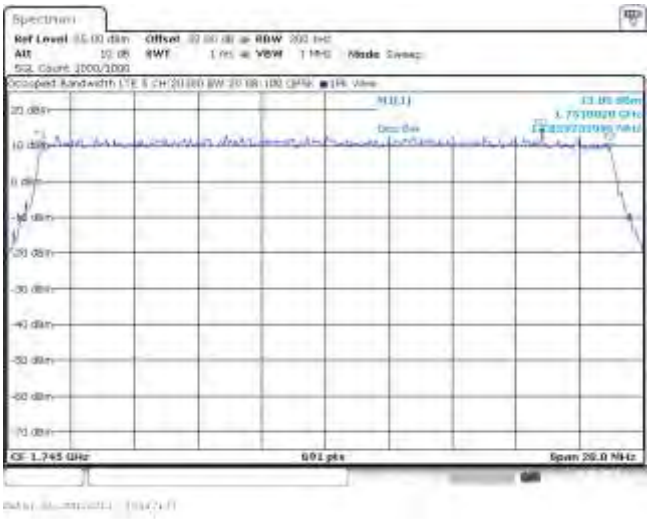


Figure 5-21a: Occupied Bandwidth, Band 4 High Channel, 20MHz BW, RB=100



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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-22a: Occupied Bandwidth, Band 4 Low Channel, 10MHz BW, RB=50

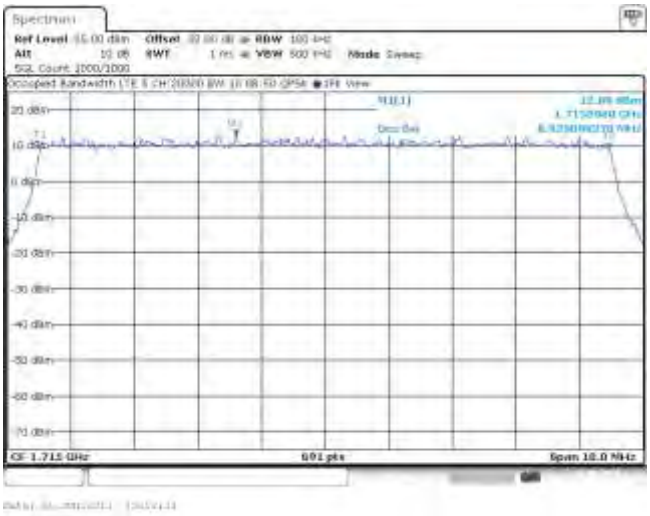


Figure 5-23a: Occupied Bandwidth, Band Middle Channel, 10MHz BW, RB=50

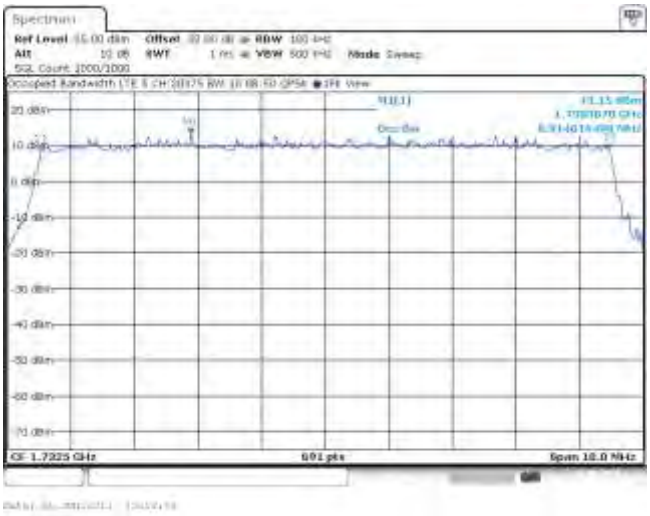
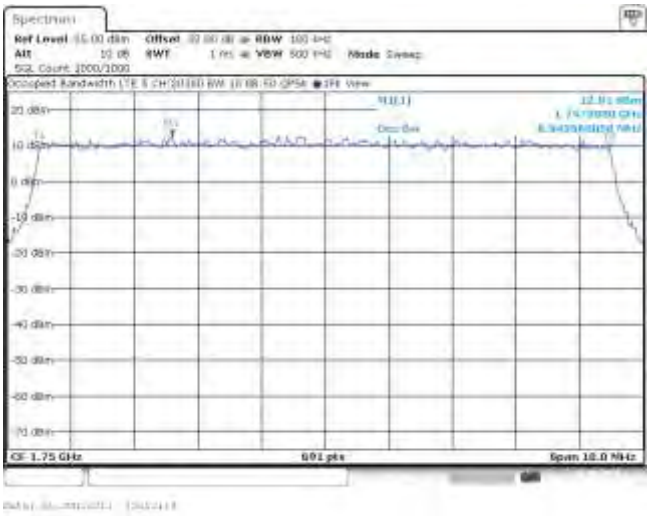


Figure 5-24a: Occupied Bandwidth, Band 4 High Channel, 10MHz BW, RB=50



LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-25a: Occupied Bandwidth, Band 4 Low Channel, 1.4MHz BW, RB=6

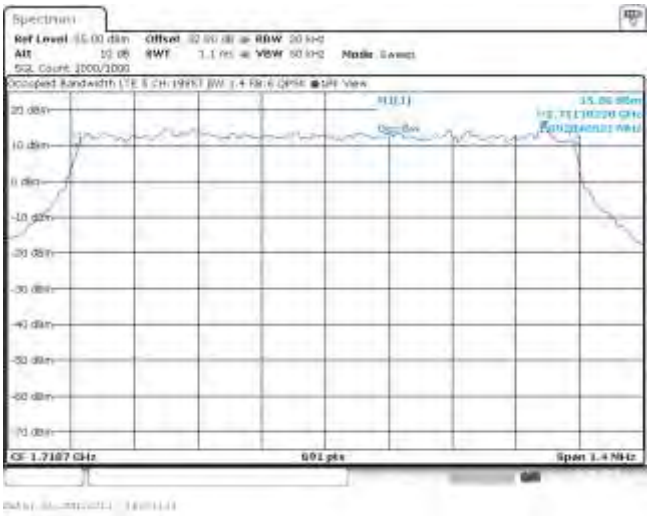


Figure 5-26a: Occupied Bandwidth, Band 4 Middle Channel, 1.4MHz BW, RB=6

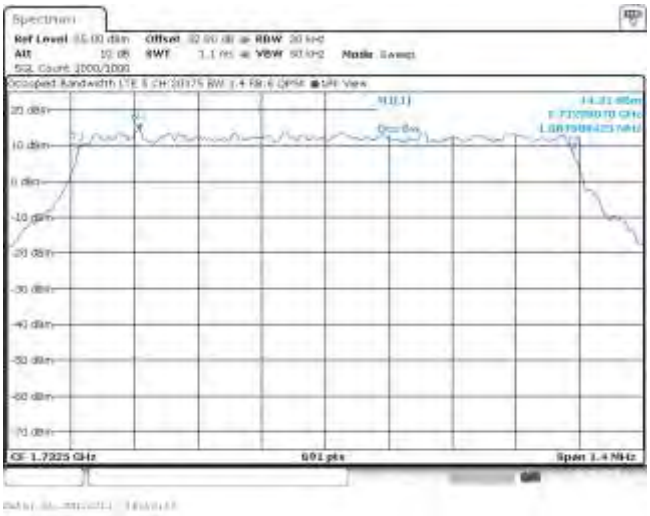
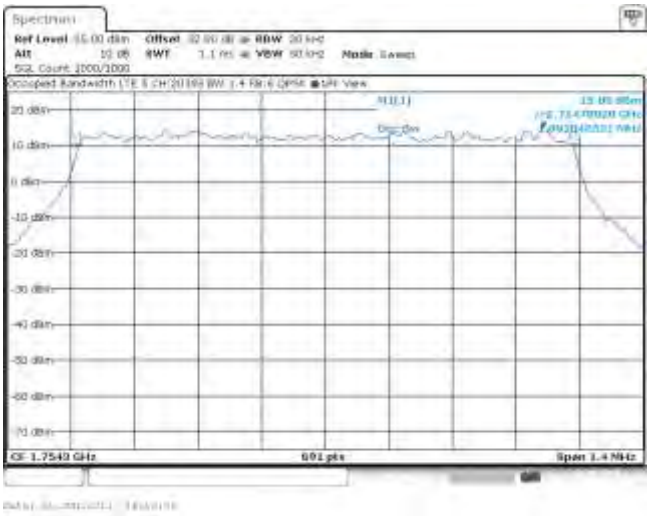


Figure 5-27a: Occupied Bandwidth, Band 4 High Channel, 1.4MHz BW, RB=6



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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-28a: -26 dBc Bandwidth, Band 4 Low Channel, 20MHz BW, RB=100

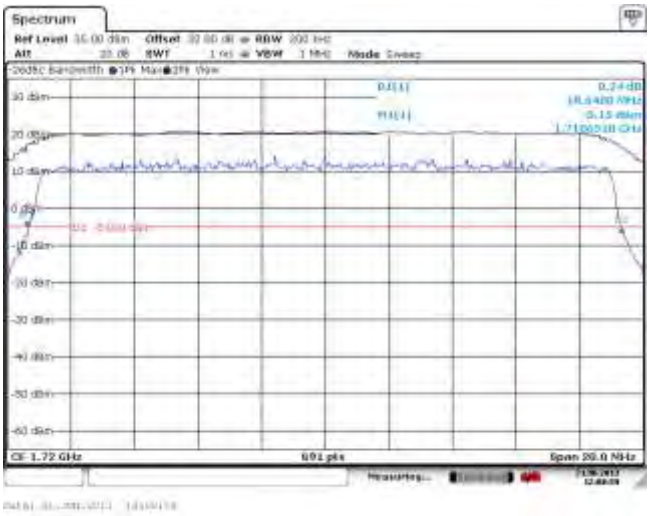


Figure 5-29a: -26 dBc Bandwidth, Band 4 Middle Channel, 20MHz BW, RB=100

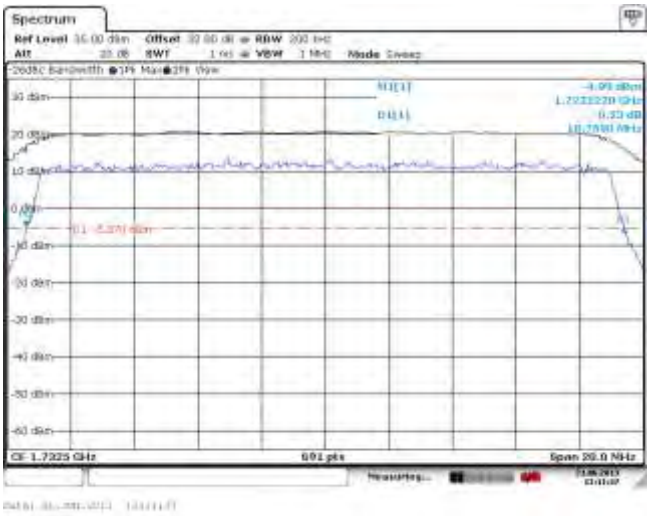


Figure 5-30a: -26 dBc Bandwidth, Band 4 High Channel, 20MHz BW, RB=100

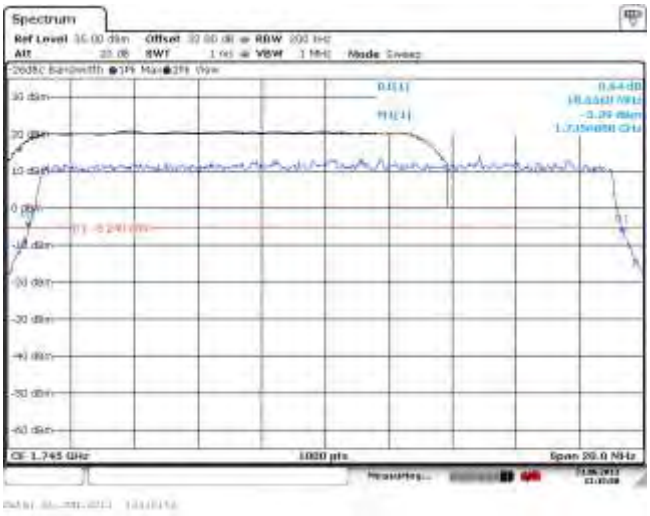
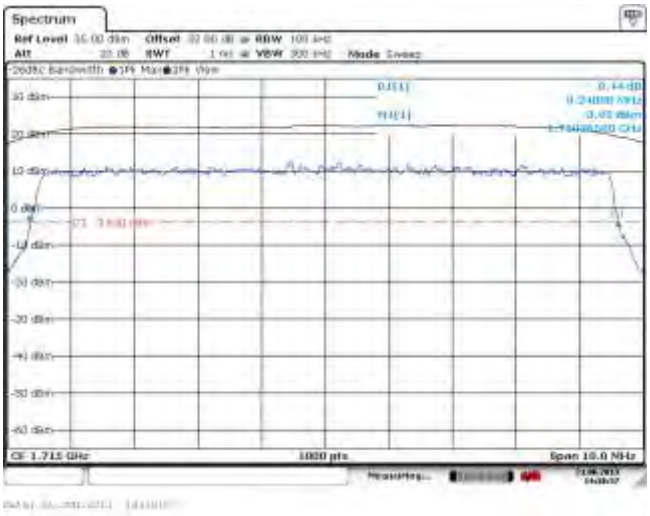


Figure 5-31a: -26 dBc Bandwidth, Band 4 Low Channel, 10MHz BW, RB=50



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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-32a: -26 dBc Bandwidth, Band 4 Middle Channel, 10MHz BW, RB=50

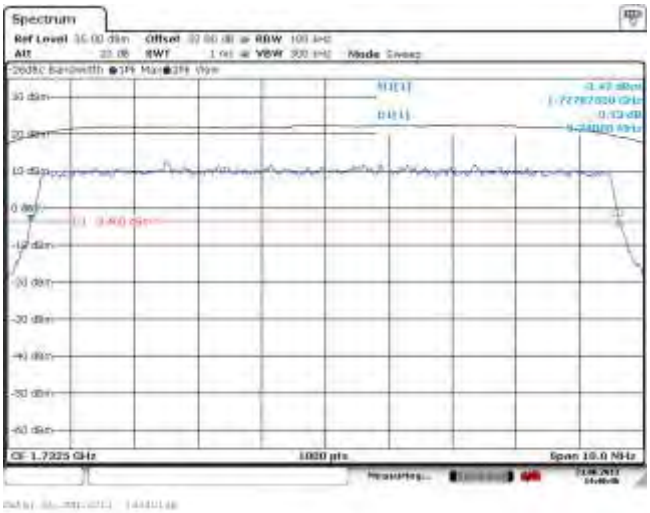


Figure 5-33a: -26 dBc Bandwidth, Band 4 High Channel, 10MHz BW, RB=50

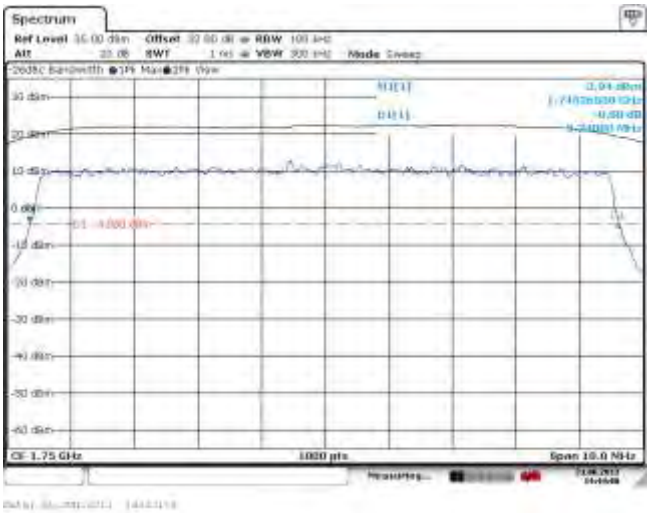
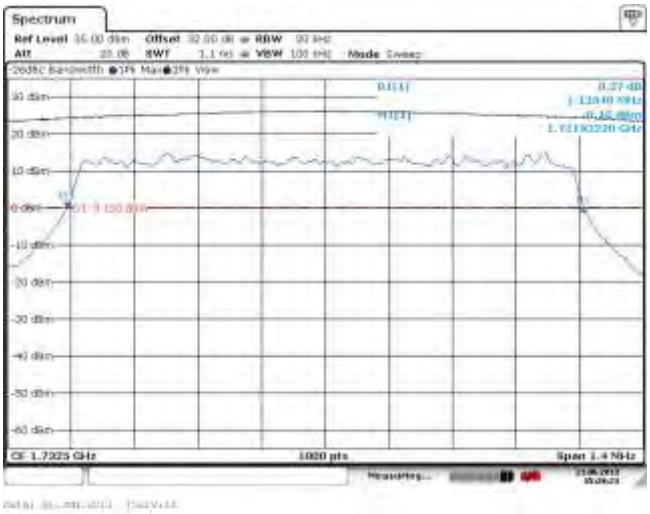


Figure 5-34a: -26 dBc Bandwidth, Band 4 Low Channel, 1.4MHz BW, RB=6

Figure 5-35a: -26 dBc Bandwidth, Band 4 Middle Channel, 1.4MHz BW, RB=6



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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-36a: -26 dBc Bandwidth, Band 4 High Channel, 1.4MHz BW, RB=6

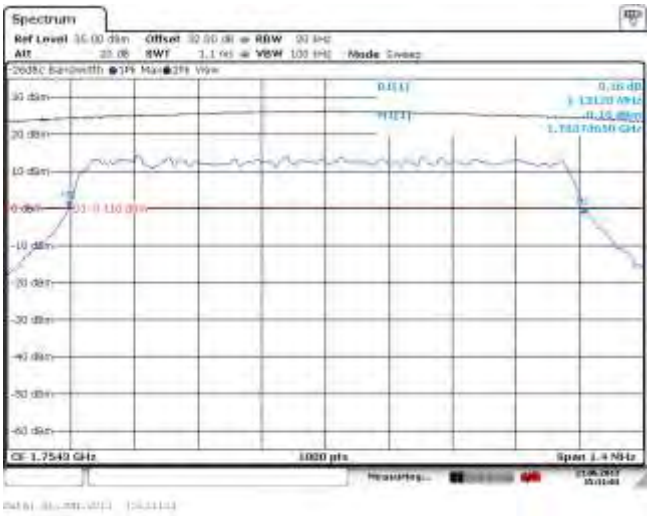

Figure 5-37a: Band 4 Low Channel Mask, 20MHz BW, RB=100

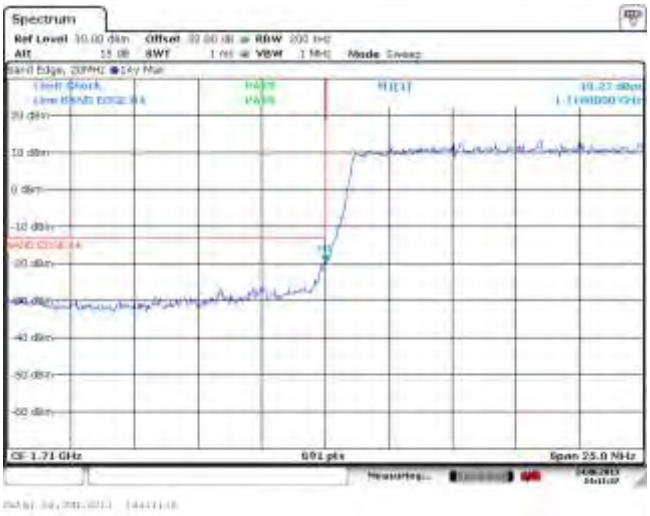

Figure 5-38a: Band 4 High Channel Mask, 20MHz BW, RB=100

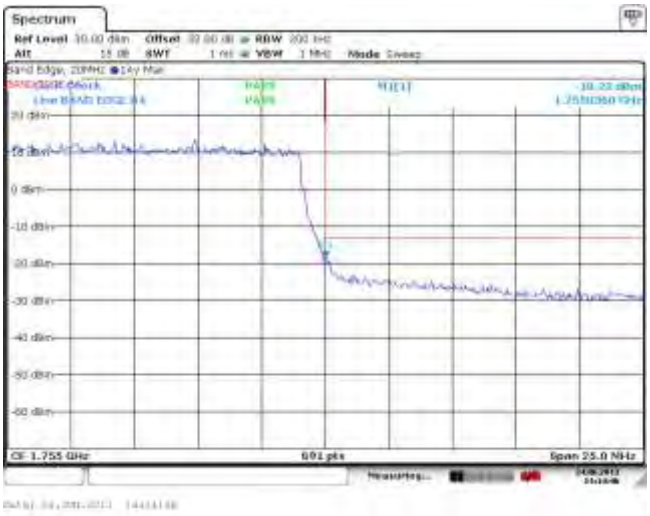

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Figure 5-39a: Band 4 Low Channel Mask, 10MHz BW, RB=50

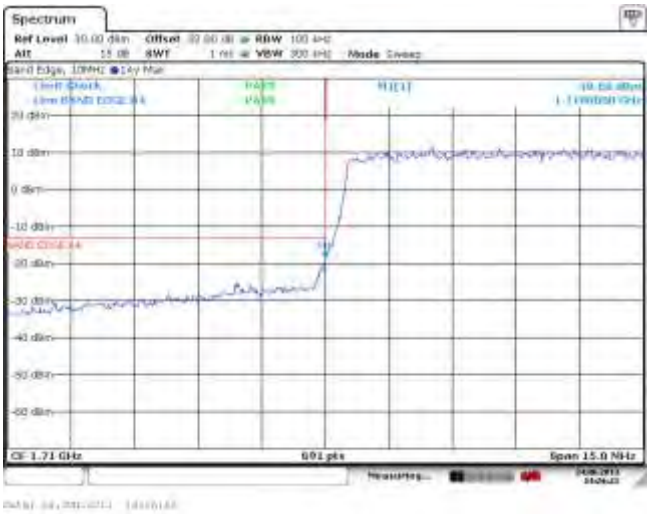


Figure 5-40a: Band 4 High Channel Mask, 10MHz BW, RB=50

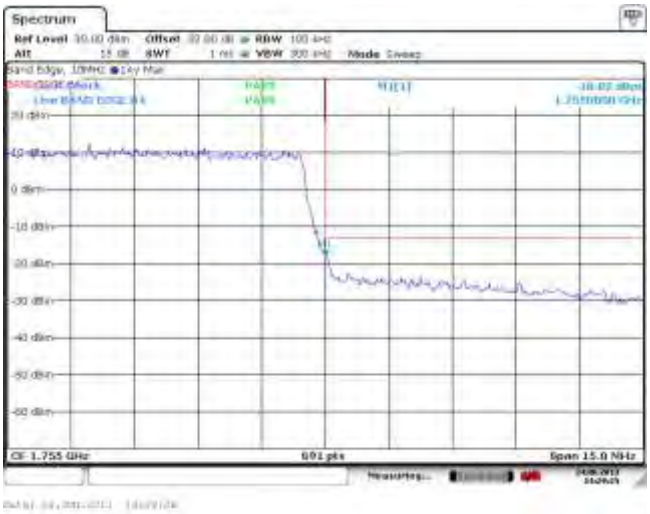


Figure 5-41a: Band 4 Low Channel Mask, 1.4MHz BW, RB=6

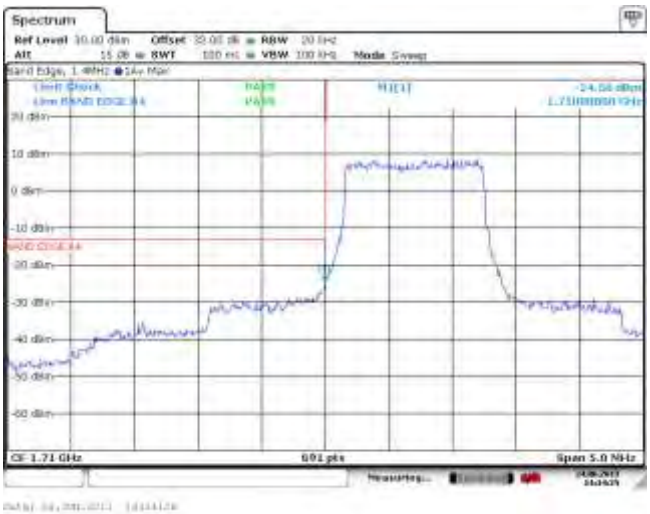
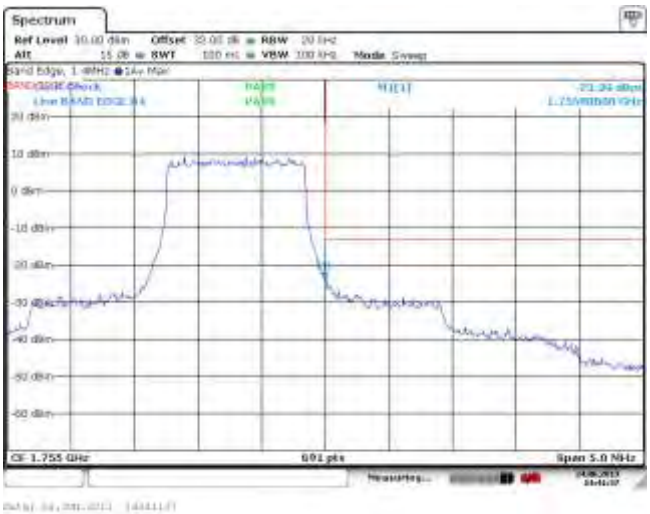


Figure 5-42a: Band 4 High Channel Mask, 1.4MHz BW, RB=6



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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-43a: Band 4 Low Channel Mask, 20MHz BW, RB=1

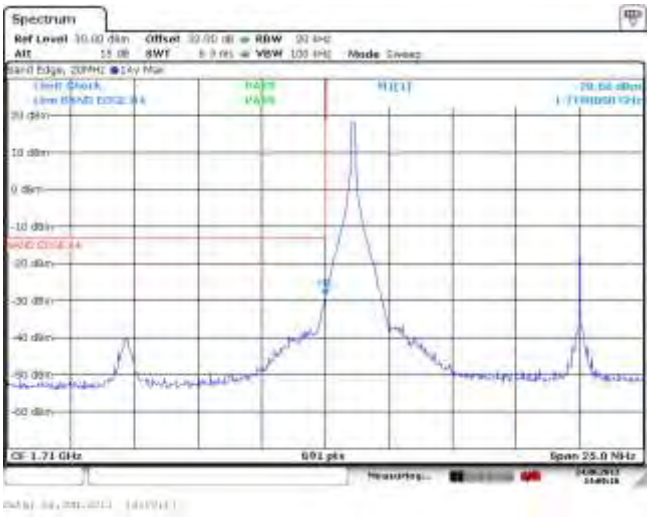


Figure 5-44a: Band 4 High Channel Mask, 20MHz BW, RB=1

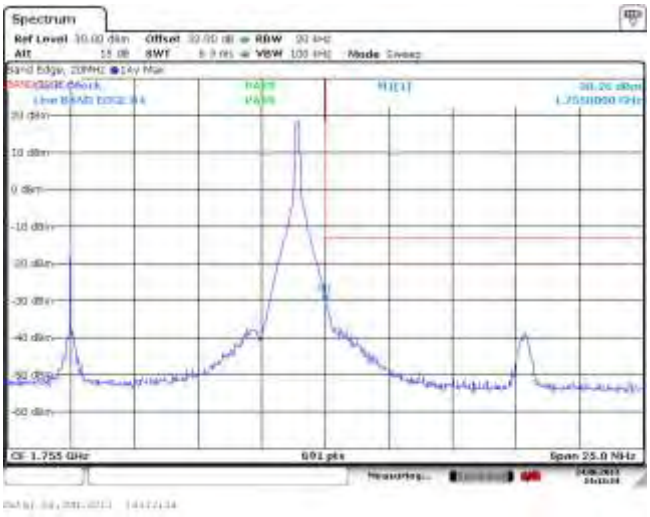


Figure 5-45a: Band 4 Mid Channel PAR, 20MHz BW, RB=50, QPSK

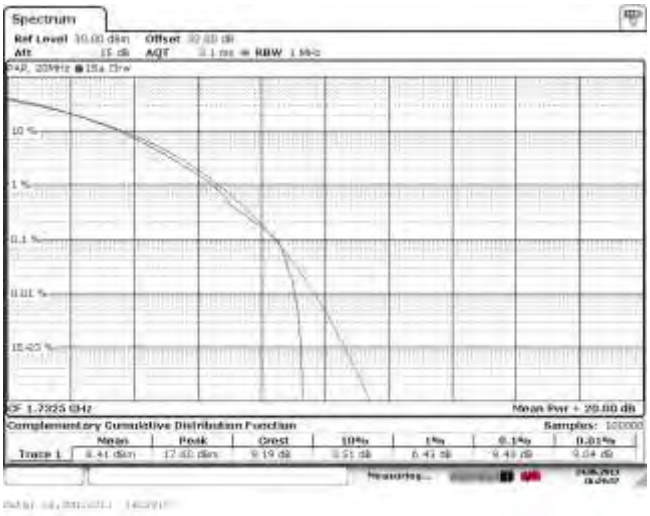
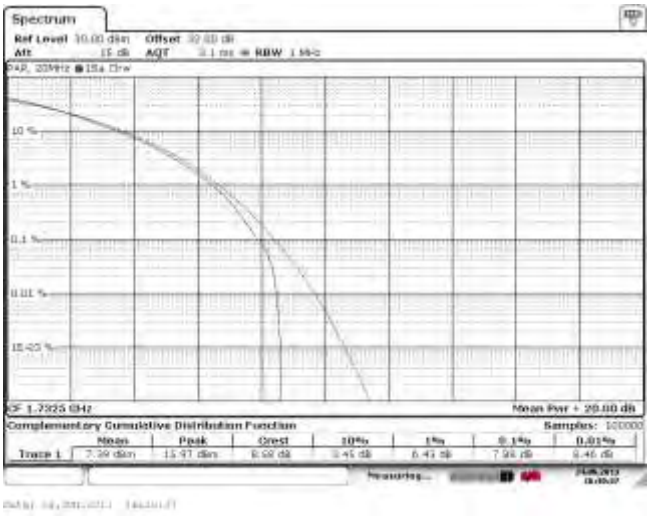


Figure 5-46a: Band 4 Middle Channel Mask, 20MHz BW, RB=100, 16-QAM



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LTE Band 4 Conducted RF Emission Test Data cont'd

Figure 5-47a: Band 4 Mid Channel PAR, 10MHz BW, RB=25, QPSK

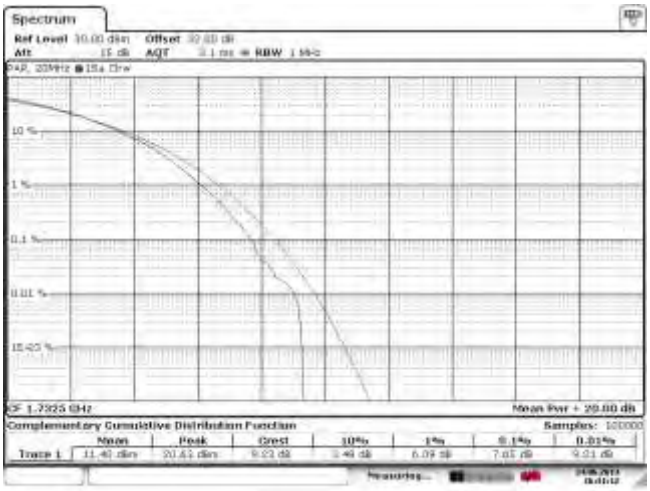

Figure 5-48a: Band 4 Mid Channel PAR, 10MHz BW, RB=50, 16-QAM

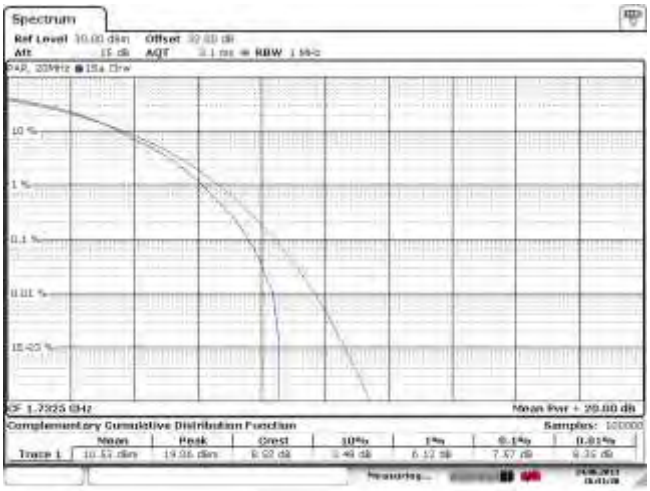

Figure 5-49a: Band 4 Mid Channel PAR, 1.4MHz BW, RB=3, QPSK

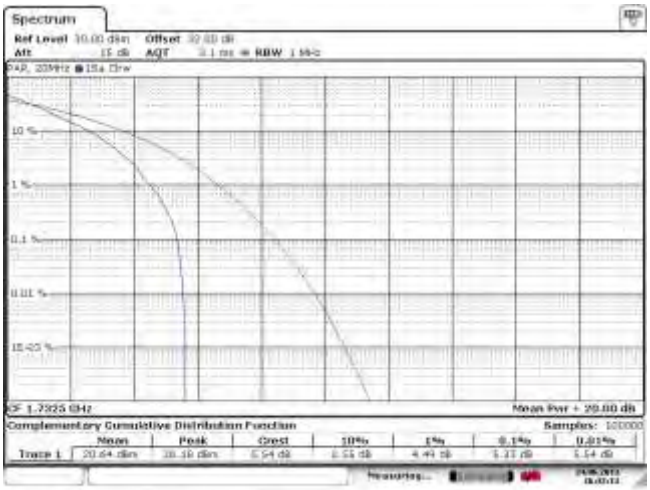

Figure 5-50a: Band 4 Middle Channel Mask, 5MHz BW, RB=6, 16-QAM

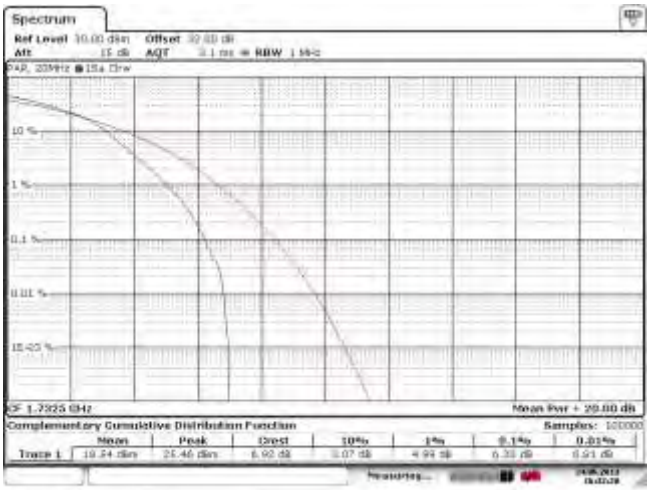

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Figure 5-51a: Occupied Bandwidth, Band 4 Low Channel, 20MHz BW (RB= 100) 16-QAM

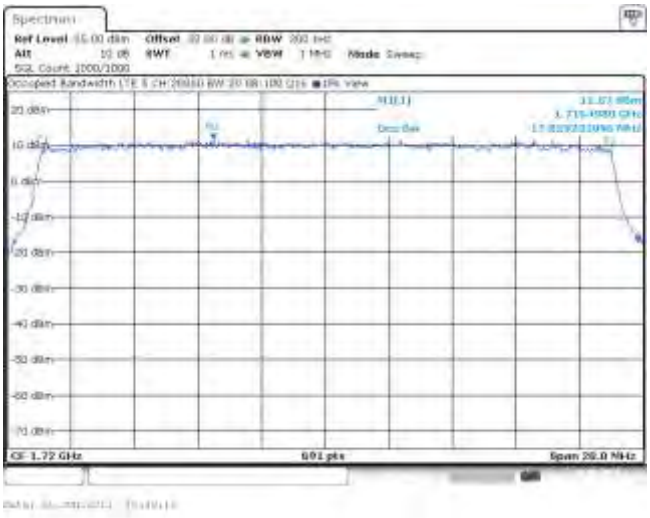


Figure 5-52a: Occupied Bandwidth, Band 4 Mid Channel, 20MHz BW (RB= 100) 16-QAM

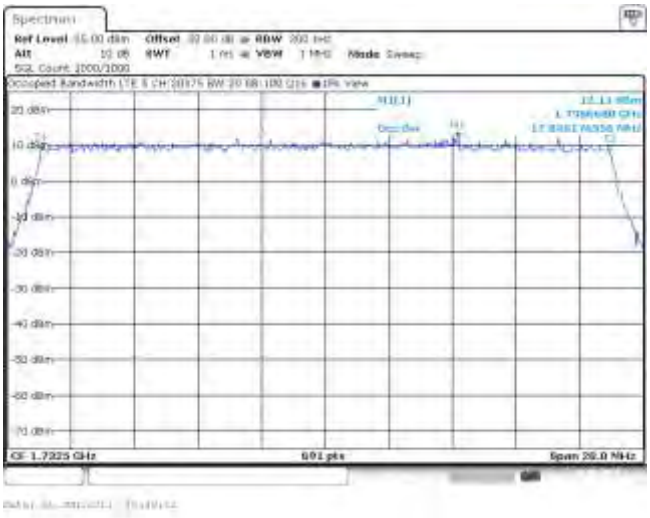
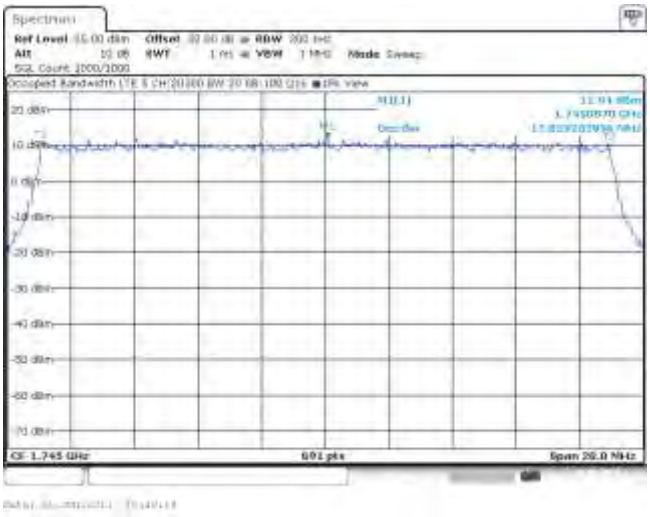


Figure 5-53a: Occupied Bandwidth, Band 4 High Channel, 20MHz BW (RB= 100) 16-QAM



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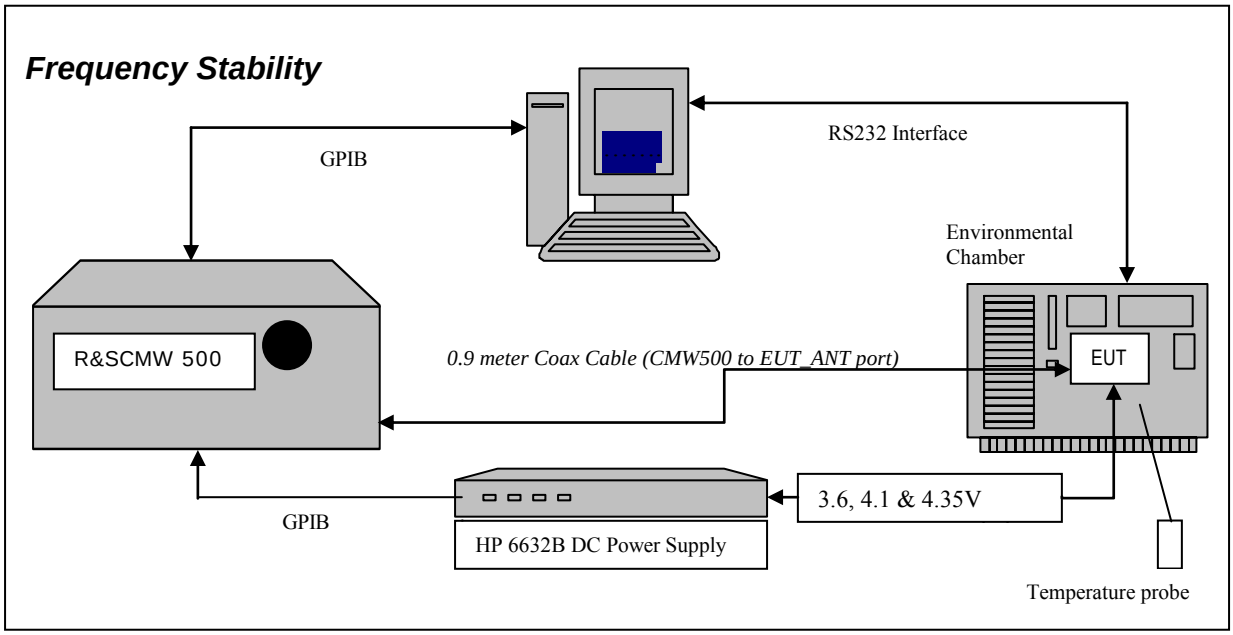
APPENDIX 4B – LTE Band 4 FREQUENCY STABILITY TEST DATA

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 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.

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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.

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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 following tests were performed on model RFX101LW.

The maximum frequency error in the LTE band 4 measured was **0.0234 PPM**.

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Date of test: July 20, 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	18.21	0.0106
20175	1732.5	3.6	20	5.68	0.0033
20300	1745.0	3.6	20	17.33	0.0099

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	4.1	20	18.84	0.0110
20175	1732.5	4.1	20	3.19	0.0018
20300	1745.0	4.1	20	21.20	0.0121

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
20050	1720.0	4.35	20	24.22	0.0141
20175	1732.5	4.35	20	10.17	0.0059
20300	1745.0	4.35	20	5.09	0.0029

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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	14.55	0.0085
20050	1720.0	3.6	-20	18.77	0.0109
20050	1720.0	3.6	-10	13.13	0.0076
20050	1720.0	3.6	0	20.59	0.0120
20050	1720.0	3.6	10	18.32	0.0107
20050	1720.0	3.6	20	18.21	0.0106
20050	1720.0	3.6	30	18.59	0.0108
20050	1720.0	3.6	40	18.61	0.0108
20050	1720.0	3.6	50	26.74	0.0155
20050	1720.0	3.6	60	18.40	0.0107
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
20050	1720.0	4.1	-30	19.49	0.0113
20050	1720.0	4.1	-20	20.10	0.0117
20050	1720.0	4.1	-10	22.76	0.0132
20050	1720.0	4.1	0	22.45	0.0131
20050	1720.0	4.1	10	25.55	0.0149
20050	1720.0	4.1	20	18.84	0.0110
20050	1720.0	4.1	30	33.10	0.0192
20050	1720.0	4.1	40	17.75	0.0103
20050	1720.0	4.1	50	12.37	0.0072
20050	1720.0	4.1	60	20.29	0.0118
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
20050	1720.0	4.35	-30	16.19	0.0094
20050	1720.0	4.35	-20	16.03	0.0093
20050	1720.0	4.35	-10	22.25	0.0129
20050	1720.0	4.35	0	18.32	0.0107
20050	1720.0	4.35	10	19.29	0.0112
20050	1720.0	4.35	20	24.22	0.0141
20050	1720.0	4.35	30	23.33	0.0136
20050	1720.0	4.35	40	17.20	0.0100
20050	1720.0	4.35	50	10.91	0.0063
20050	1720.0	4.35	60	20.61	0.0120

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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	17.83	0.0103
20175	1732.5	3.6	-20	15.21	0.0088
20175	1732.5	3.6	-10	4.64	0.0027
20175	1732.5	3.6	0	7.62	0.0044
20175	1732.5	3.6	10	14.48	0.0084
20175	1732.5	3.6	20	5.68	0.0033
20175	1732.5	3.6	30	8.14	0.0047
20175	1732.5	3.6	40	-0.20	-0.0001
20175	1732.5	3.6	50	22.41	0.0129
20175	1732.5	3.6	60	10.27	0.0059
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
20175	1732.5	4.1	-30	6.98	0.0040
20175	1732.5	4.1	-20	9.30	0.0054
20175	1732.5	4.1	-10	17.32	0.0100
20175	1732.5	4.1	0	21.34	0.0123
20175	1732.5	4.1	10	3.53	0.0020
20175	1732.5	4.1	20	3.19	0.0018
20175	1732.5	4.1	30	4.36	0.0025
20175	1732.5	4.1	40	-0.63	-0.0004
20175	1732.5	4.1	50	17.54	0.0101
20175	1732.5	4.1	60	4.19	0.0024
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
20175	1732.5	4.35	-30	-0.51	-0.0003
20175	1732.5	4.35	-20	-2.23	-0.0013
20175	1732.5	4.35	-10	17.69	0.0102
20175	1732.5	4.35	0	17.42	0.0101
20175	1732.5	4.35	10	4.01	0.0023
20175	1732.5	4.35	20	10.17	0.0059
20175	1732.5	4.35	30	18.88	0.0109
20175	1732.5	4.35	40	0.06	0.0000
20175	1732.5	4.35	50	16.14	0.0093
20175	1732.5	4.35	60	11.26	0.0065

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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	6.93	0.0040
20300	1745.0	3.6	-20	7.98	0.0046
20300	1745.0	3.6	-10	0.35	0.0002
20300	1745.0	3.6	0	11.88	0.0068
20300	1745.0	3.6	10	3.23	0.0019
20300	1745.0	3.6	20	17.33	0.0099
20300	1745.0	3.6	30	**40.90**	**0.0234**
20300	1745.0	3.6	40	1.54	0.0009
20300	1745.0	3.6	50	23.80	0.0136
20300	1745.0	3.6	60	6.83	0.0039
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
20300	1745.0	4.1	-30	-3.72	-0.0021
20300	1745.0	4.1	-20	22.51	0.0129
20300	1745.0	4.1	-10	-2.80	-0.0016
20300	1745.0	4.1	0	4.09	0.0023
20300	1745.0	4.1	10	17.06	0.0098
20300	1745.0	4.1	20	21.20	0.0121
20300	1745.0	4.1	30	1.43	0.0008
20300	1745.0	4.1	40	22.74	0.0130
20300	1745.0	4.1	50	5.31	0.0030
20300	1745.0	4.1	60	2.40	0.0014
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
20300	1745.0	4.35	-30	19.97	0.0114
20300	1745.0	4.35	-20	18.44	0.0106
20300	1745.0	4.35	-10	11.31	0.0065
20300	1745.0	4.35	0	5.10	0.0029
20300	1745.0	4.35	10	11.13	0.0064
20300	1745.0	4.35	20	5.09	0.0029
20300	1745.0	4.35	30	6.29	0.0036
20300	1745.0	4.35	40	23.81	0.0136
20300	1745.0	4.35	50	17.94	0.0103
20300	1745.0	4.35	60	26.25	0.0150

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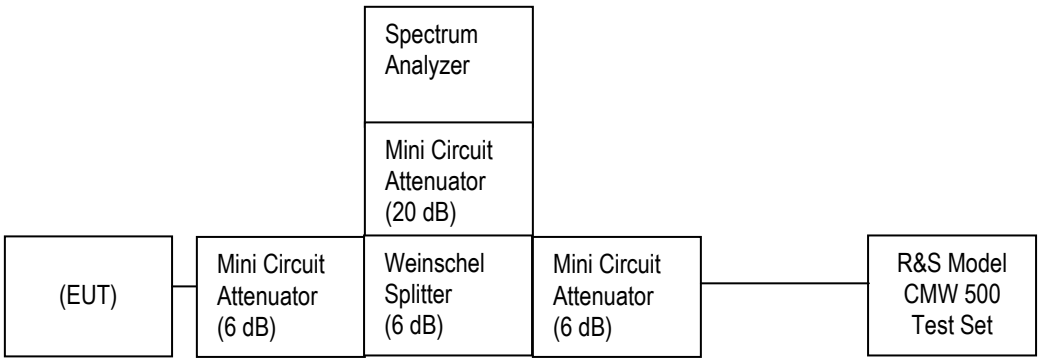
APPENDIX 5A– LTE Band 13 CONDUCTED RF EMISSIONS TEST DATA/PLOTS

LTE Band 13 Conducted RF Emission Test Data

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

Test Setup Diagram



Date of Test: June 20 - 24, 2013

The environmental test conditions were: Temperature: 21.2 – 23.2 ºC
Relative Humidity: 20.3 – 23.3 %

The following measurements were performed by Berkin Can.

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LTE Band 13 Conducted RF Emission Test Data cont'd

The following tests were performed on model RFX101LW.

The conducted spurious emissions – As per 47 CFR 2.202, CFR 2.1046, CFR 27.53 CFR 27.54, CFR 27.50 were measured from 30 MHz to 20 GHz.

–26 dBc Bandwidth and Occupied Bandwidth (99%)
the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth for each 5MHz and 10MHz with different number of resource blocks for LTE Band 13.

QPSK and 16-QAM modulations were applied to each of the bandwidths. Only the worst case measurements are documented in this report.
A minimum resource block condition was also measured (RB = 1).
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.

The worst case –26dBc bandwidth for LTE Band 13 was measured to be 9.28MHz. Results were derived in a 100 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

Test Data for LTE Band 13 QPSK selected Frequencies in 10MHz BW (RB = 50)

LTE Band 13 Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
777.0	9.19	-
782.0	9.34	8.958
787.0	9.23	-

Test Data for LTE Band 13 QPSK selected Frequencies in 5MHz BW (RB = 25)

LTE Band 13 Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
779.5	4.62	4.479
782.0	4.635	4.949
784.5	4.623	4.472

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Peak to Average Ratio (PAR)

For each 5MHz and 10MHz with different number of resource blocks as per scalable bandwidths for LTE band 13, the peak to average ratio was measured on the low, middle and high channels with QPSK modulation.

On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

The worst case measured was 8.61 dB on the low channel in 10MHz bandwidth with 25 resource blocks.

Measurement Plots for LTE Band 13

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

See Figures 3-13a to 3-24a for the plots of 99% Occupied Bandwidth and -26 dBc Bandwidth.

See Figures 3-25a to 3-32a for the plots of the Channel mask.

See Figures 3-33a to 3-35a for the plots of the Peak to Average Ratio.

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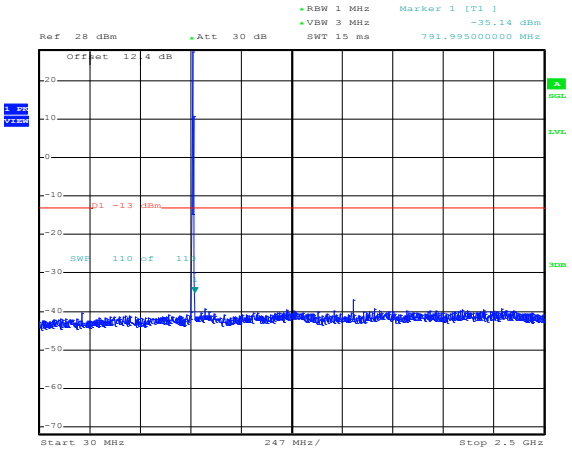
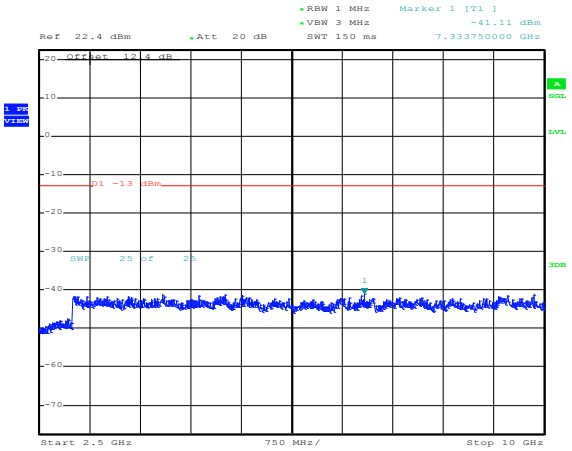
LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-1a: Band 13, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 50)



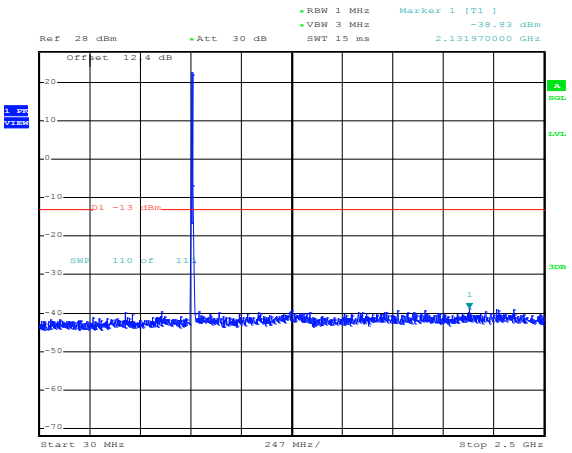
Date: 25.JUN.2013 17:00:31

Figure 3-2a: Band 13, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 50)



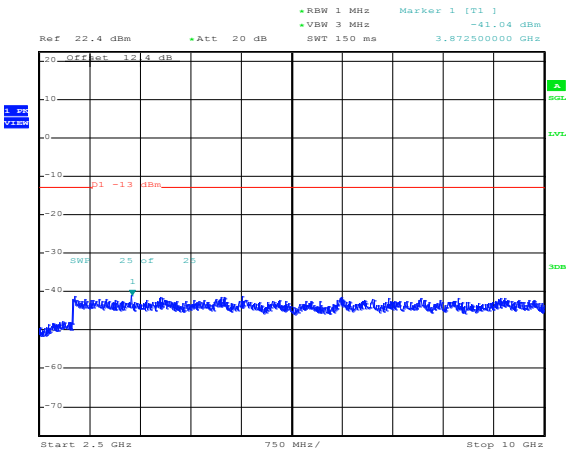
Date: 25.JUN.2013 17:00:54

Figure 3-3a: Band 13, Spurious Conducted Emissions, Middle channel, 10MHz BW (RB= 50)



Date: 25.JUN.2013 17:01:28

Figure 3-4a: Band 13, Spurious Conducted Emissions, Middle channel, 10MHz BW (RB= 50)



Date: 25.JUN.2013 17:01:51

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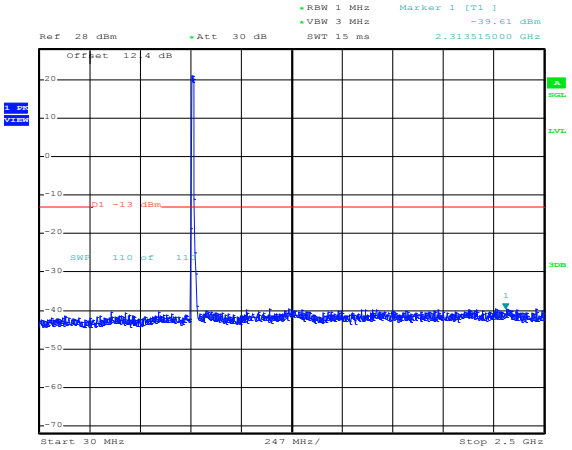
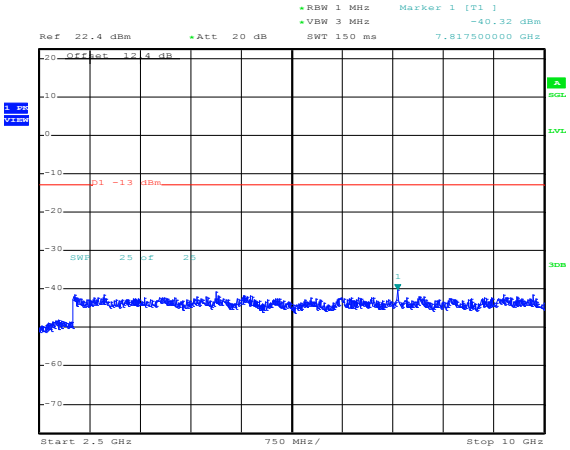
LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-5a: Band 13, Spurious Conducted Emissions, High Channel, 10MHz BW (RB= 50)



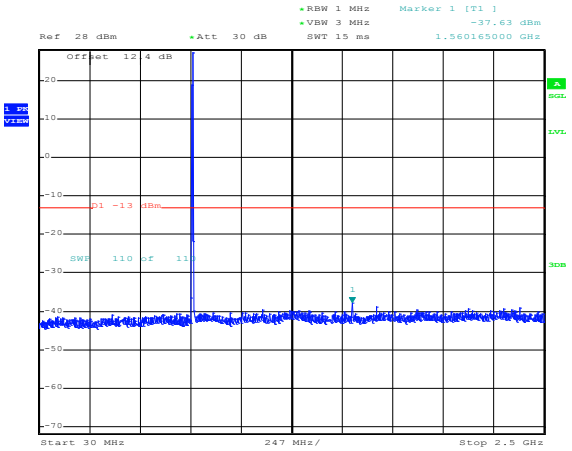
Date: 25.JUN.2013 17:02:25

Figure 3-6a: Band 13, Spurious Conducted Emissions, High Channel, 10MHz BW (RB= 50)



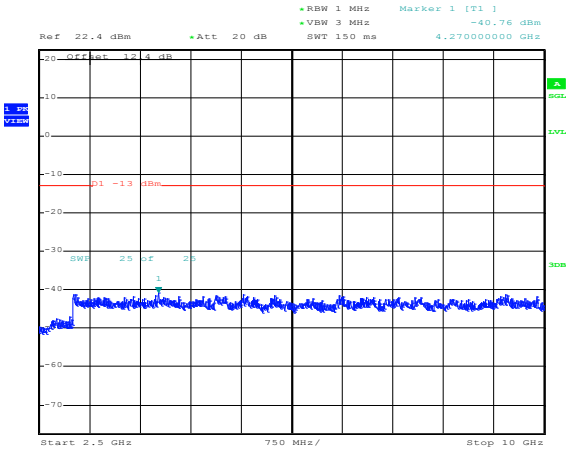
Date: 25.JUN.2013 17:02:47

Figure 3-7a: Band 13, Spurious Conducted Emissions, Low channel, 5MHz BW (RB= 25)



Date: 25.JUN.2013 17:03:24

Figure 3-8a: Band 13, Spurious Conducted Emissions, Low channel, 5MHz BW (RB= 25)



Date: 25.JUN.2013 17:03:46

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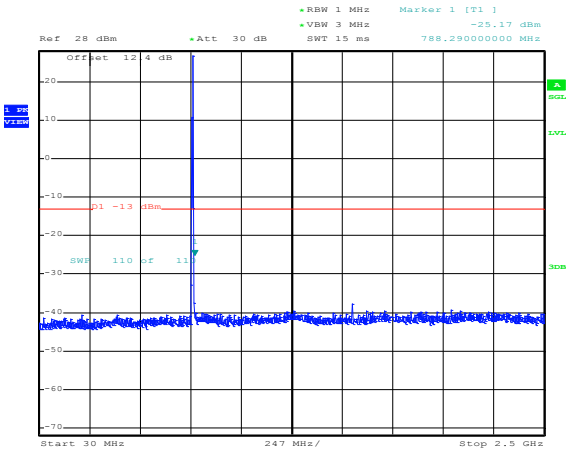
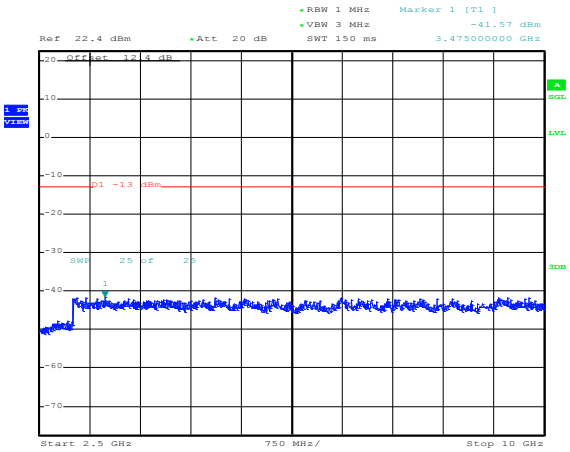
LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-9a: Band 13, Spurious Conducted Emissions, Middle Channel, 5MHz BW (RB= 25)



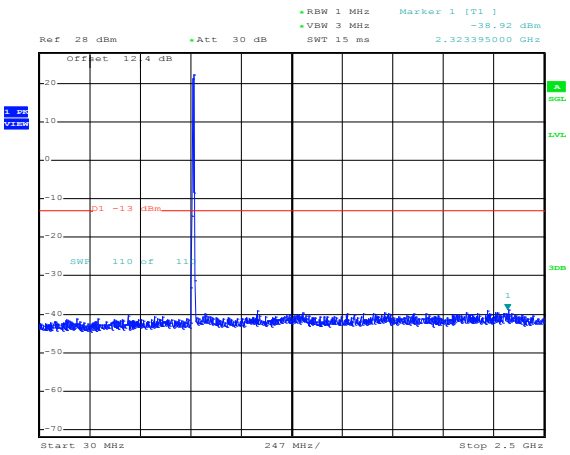
Date: 25.JUN.2013 17:04:22

Figure 3-10a: Band 13, Spurious Conducted Emissions, High Channel, 5MHz BW (RB= 25)



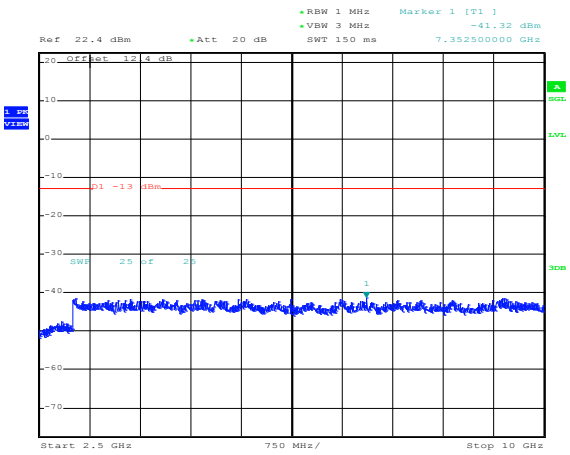
Date: 25.JUN.2013 17:04:44

Figure 3-11a: Band 13, Spurious Conducted Emissions, High channel, 5MHz BW (RB= 25)



Date: 25.JUN.2013 17:05:22

Figure 3-12a: Band 13, Spurious Conducted Emissions, High channel, 5MHz BW (RB= 25)



Date: 25.JUN.2013 17:05:45

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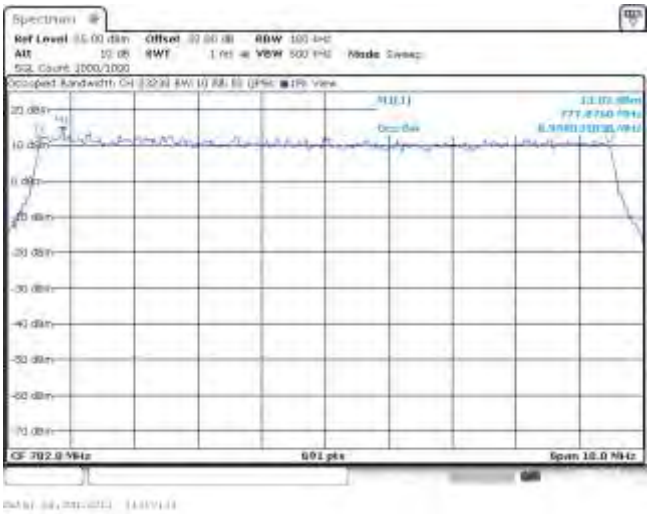
LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-14a: Occupied Bandwidth, Band 13
Middle Channel, 10MHz BW, RB=50



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LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-16a: Occupied Bandwidth, Band 5 Low Channel, 5MHz BW, RB=25

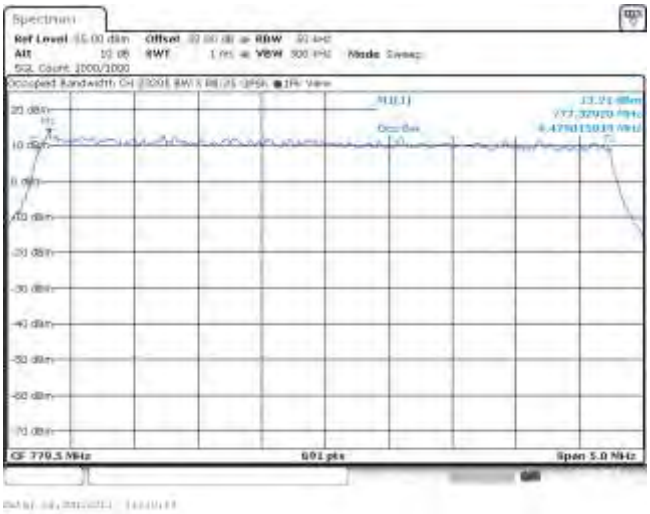


Figure 3-17a: Occupied Bandwidth, Band 5 Middle Channel, 5MHz BW, RB=25

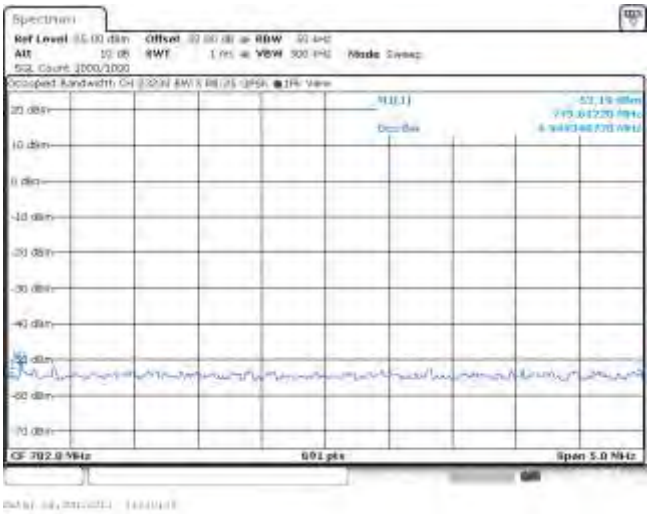
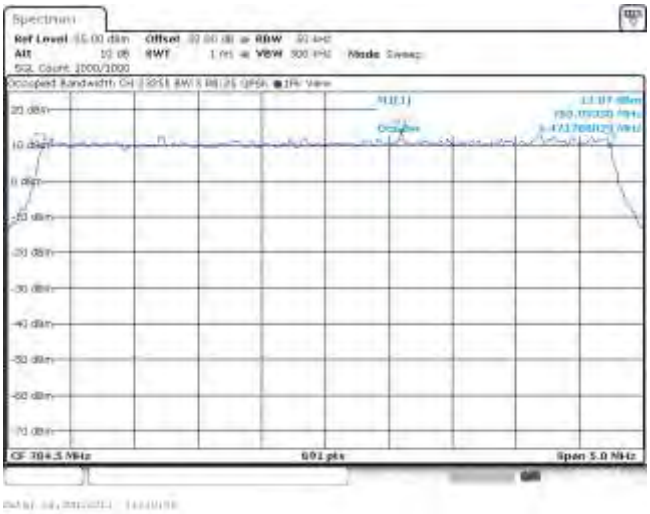


Figure 3-18a: Occupied Bandwidth, Band 5 High Channel, 5MHz BW, RB=25



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LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-19a: -26 dBc Bandwidth, Band 13 Low Channel, 10MHz BW, RB=50

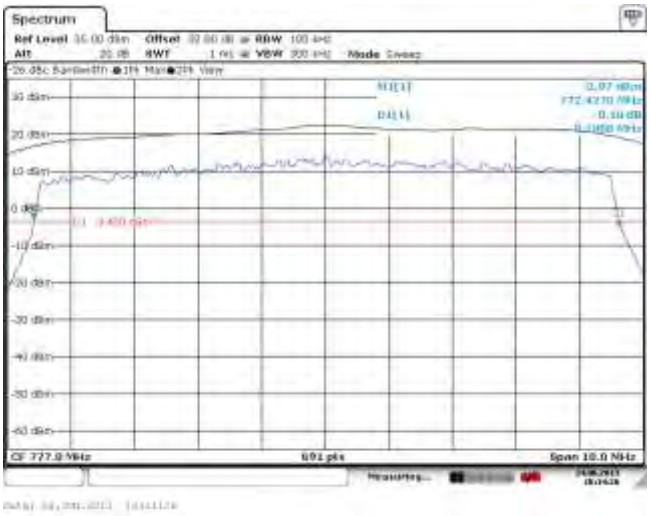


Figure 3-20a: -26 dBc Bandwidth, Band 13 Middle Channel, 10MHz BW, RB=50

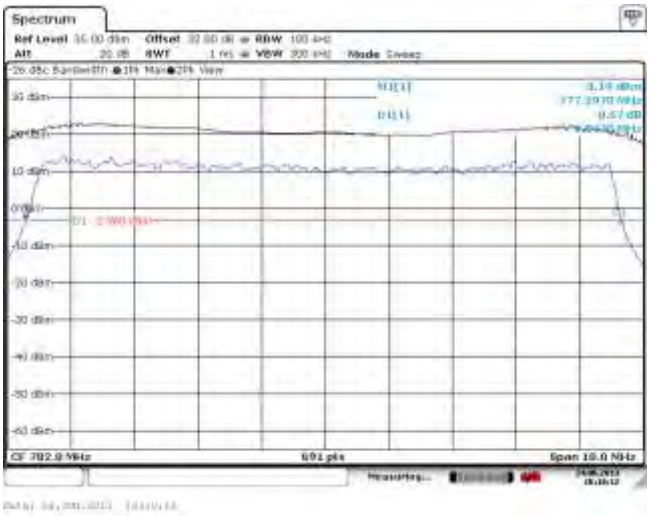


Figure 3-21a: -26 dBc Bandwidth, Band 13 High Channel, 10MHz BW, RB=50

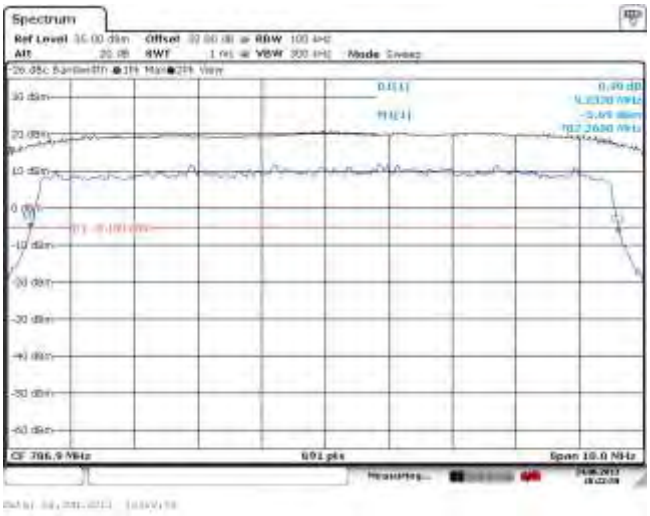
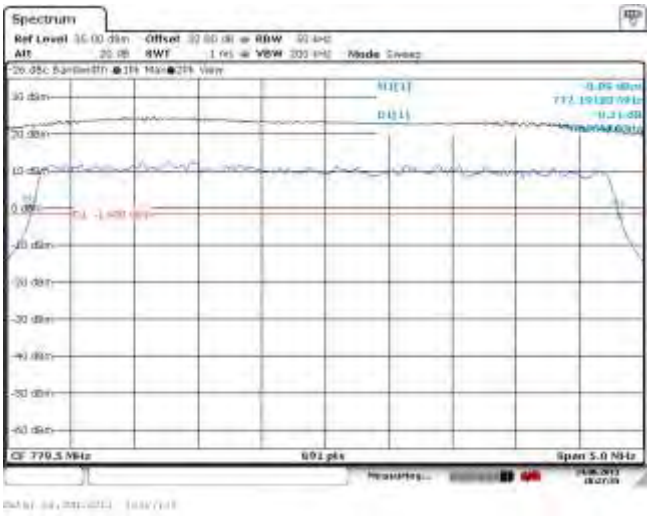


Figure 3-22a: -26 dBc Bandwidth, Band 13 Low Channel, 5MHz BW, RB=25



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LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-23a: -26 dBc Bandwidth, Band 13 Middle Channel, 5MHz BW, RB=25

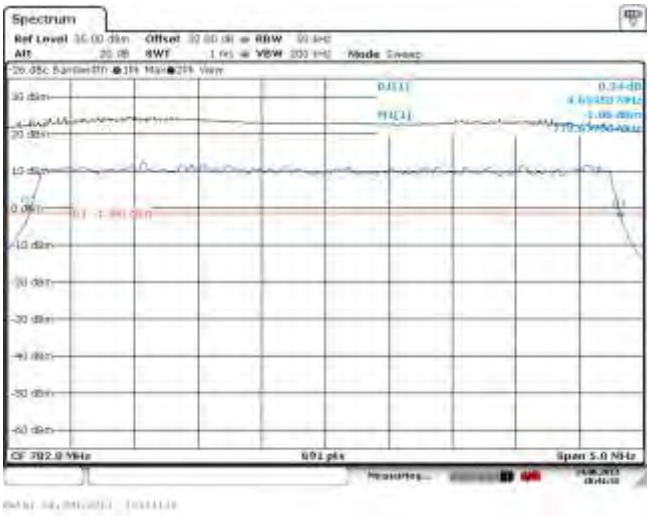


Figure 3-24a: -26 dBc Bandwidth, Band 13 High Channel, 5MHz BW, RB=25

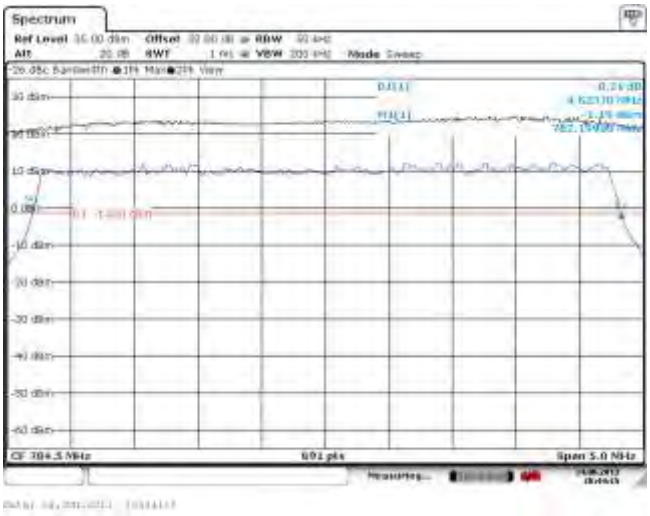


Figure 3-25a: Band 13 Low Channel Mask, 10MHz BW, RB=1

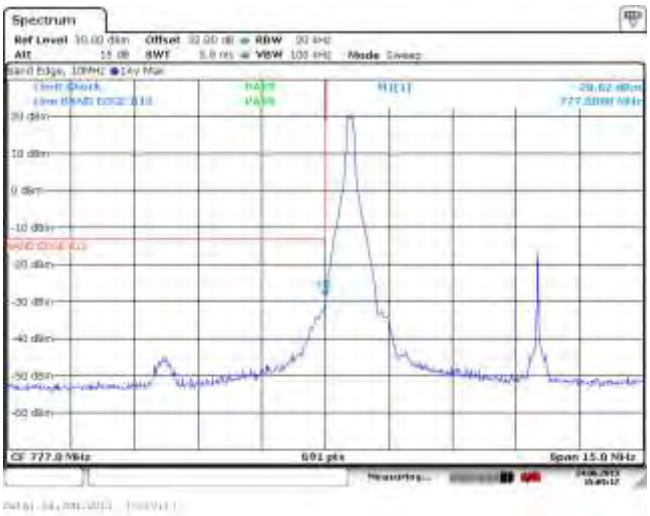
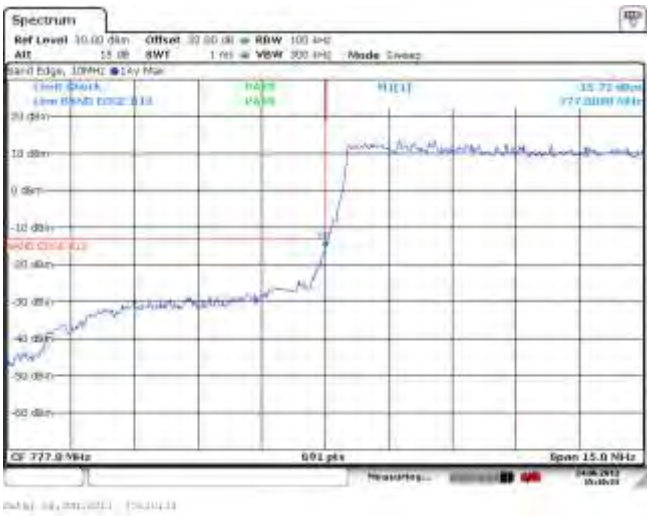


Figure 3-26a: Band 13 Low Channel Mask, 10MHz BW, RB=50



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LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-27a: Band 13 High Channel Mask, 10MHz BW, RB=1

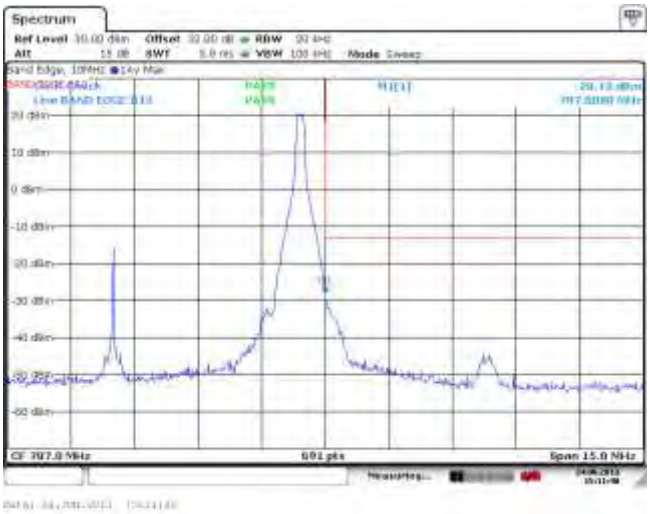


Figure 3-28a: Band 13 High Channel Mask,10MHz BW, RB=50

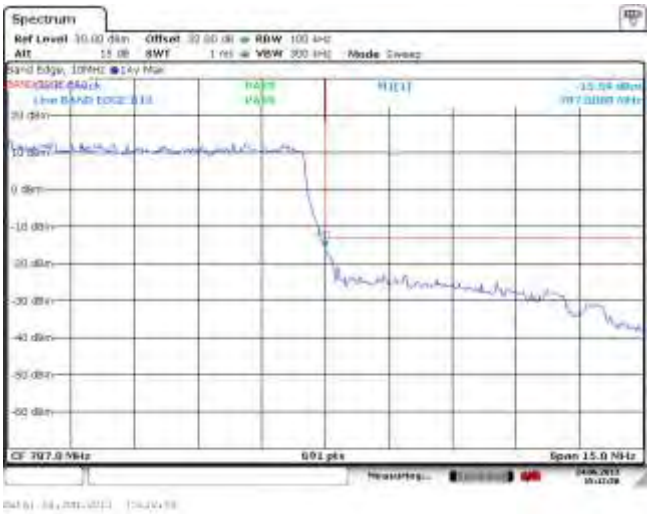


Figure 3-29a: Band 13 Low Channel Mask, 5MHz BW, RB=1

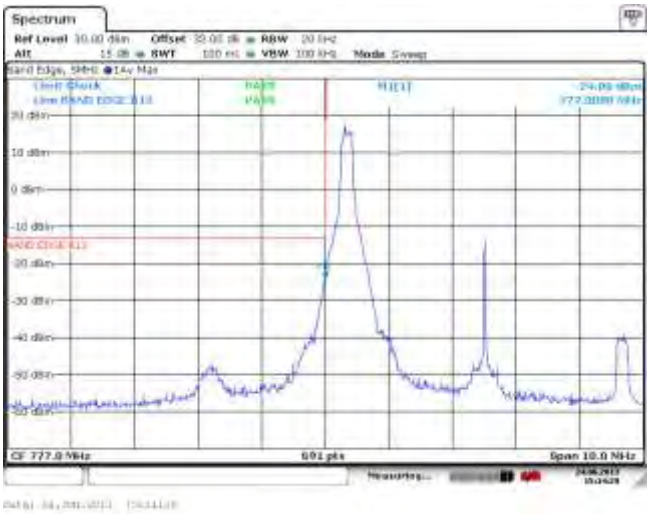
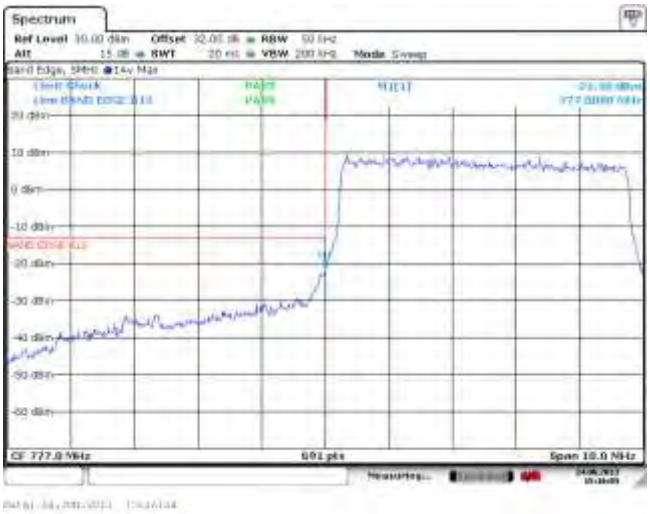


Figure 3-30a: Band 13 Low Channel Mask, 5MHz BW, RB=25



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LTE Band 13 Conducted RF Emission Test Data cont'd

Figure 3-31a: Band 13 High Channel Mask, 5MHz BW, RB=1

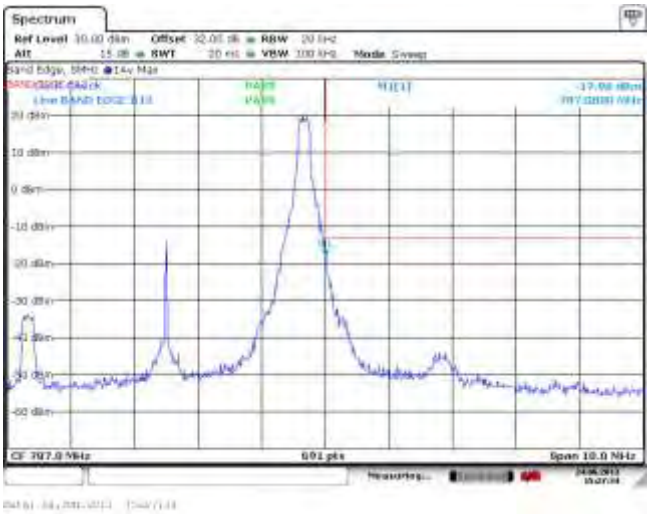

Figure 3-32a: Band 13 High Channel Mask, 5MHz BW, RB=25

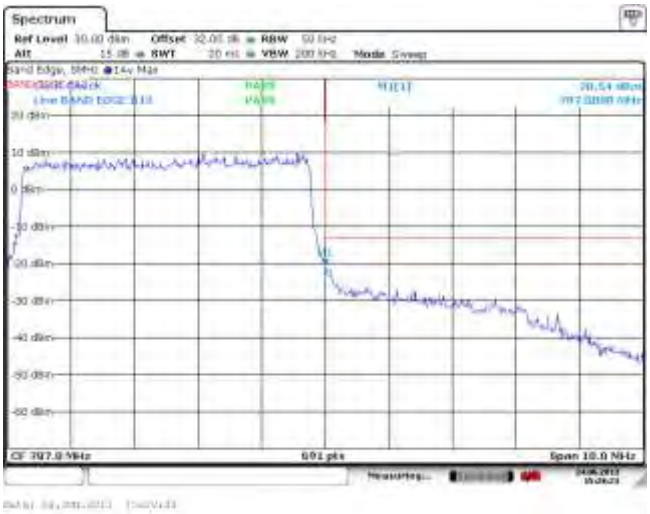

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Figure 3-33a: Band 13 Low Channel PAR, 10MHz BW, RB=25

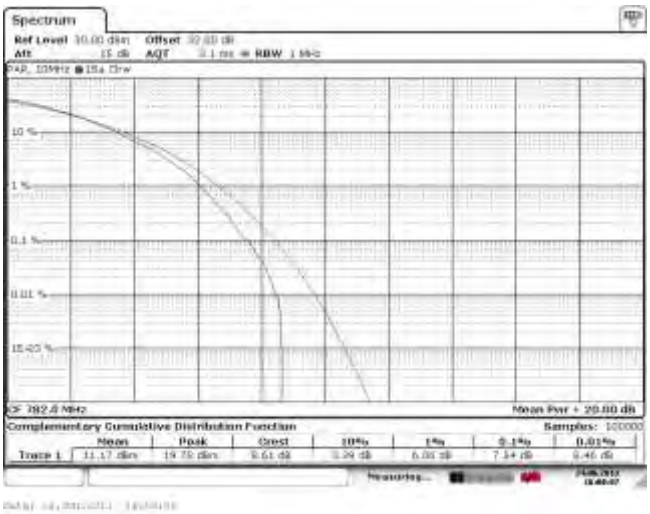
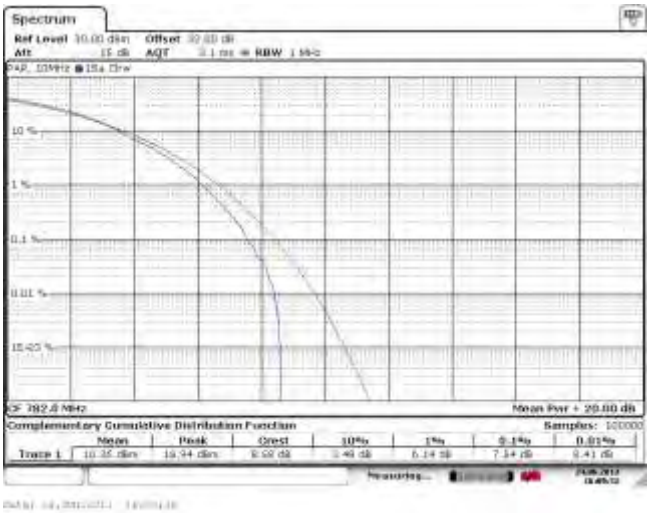


Figure 3-35a: Band 13 High Channel PAR 10MHz BW, RB=25



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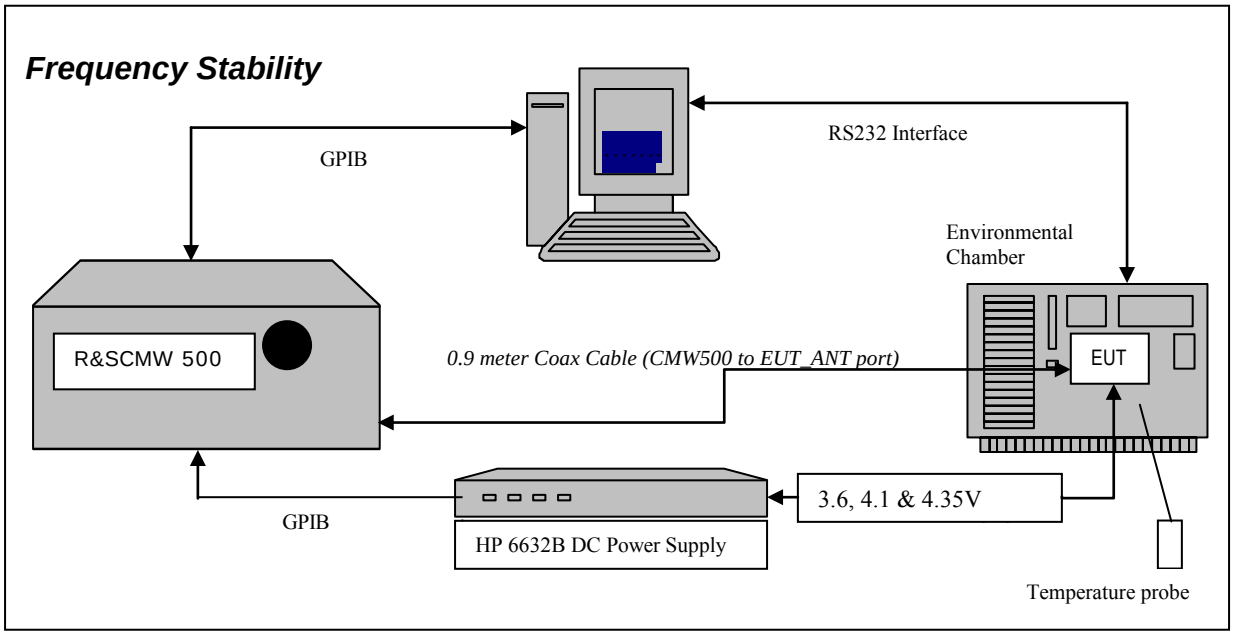
APPENDIX 5B – LTE Band 13 FREQUENCY STABILITY TEST DATA

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.

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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 varied in 3 steps consisting of 777.0 MHz, 782.0 MHz and 787.0 MHz each was measured under 10 MHz bandwidth with maximum (50) 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.

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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 following tests were performed on model RFX101LW.

The maximum frequency error in the LTE Band 13 measured was **0.0234 PPM**.

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Date of test: June 24, 2013

LTE Band 13 results: channels 23180, 23230 and 23279 @ 20°C maximum transmitted power

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23180	777.00	3.6	20	18.21	0.0106
23230	782.00	3.6	20	5.68	0.0033
23279	787.00	3.6	20	17.33	0.0099

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23180	777.00	4.1	20	18.84	0.0110
23230	782.00	4.1	20	3.19	0.0018
23279	787.00	4.1	20	21.20	0.0121

Traffic Channel Number	LTE Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23180	777.00	4.35	20	24.22	0.0141
23230	782.00	4.35	20	10.17	0.0059
23279	787.00	4.35	20	5.09	0.0029

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LTE Band 13 Results: channel 23180 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23180	777.00	3.6	-30	14.55	0.0085
23180	777.00	3.6	-20	18.77	0.0109
23180	777.00	3.6	-10	13.13	0.0076
23180	777.00	3.6	0	20.59	0.0120
23180	777.00	3.6	10	18.32	0.0107
23180	777.00	3.6	20	18.21	0.0106
23180	777.00	3.6	30	18.59	0.0108
23180	777.00	3.6	40	18.61	0.0108
23180	777.00	3.6	50	26.74	0.0155
23180	777.00	3.6	60	18.40	0.0107

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23180	777.00	4.1	-30	19.49	0.0113
23180	777.00	4.1	-20	20.10	0.0117
23180	777.00	4.1	-10	22.76	0.0132
23180	777.00	4.1	0	22.45	0.0131
23180	777.00	4.1	10	25.55	0.0149
23180	777.00	4.1	20	18.84	0.0110
23180	777.00	4.1	30	33.10	0.0192
23180	777.00	4.1	40	17.75	0.0103
23180	777.00	4.1	50	12.37	0.0072
23180	777.00	4.1	60	20.29	0.0118

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23180	777.00	4.35	-30	16.19	0.0094
23180	777.00	4.35	-20	16.03	0.0093
23180	777.00	4.35	-10	22.25	0.0129
23180	777.00	4.35	0	18.32	0.0107
23180	777.00	4.35	10	19.29	0.0112
23180	777.00	4.35	20	24.22	0.0141
23180	777.00	4.35	30	23.33	0.0136
23180	777.00	4.35	40	17.20	0.0100
23180	777.00	4.35	50	10.91	0.0063
23180	777.00	4.35	60	20.61	0.0120

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LTE Band 13 Results: 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	17.83	0.0103
23230	782.00	3.6	-20	15.21	0.0088
23230	782.00	3.6	-10	4.64	0.0027
23230	782.00	3.6	0	7.62	0.0044
23230	782.00	3.6	10	14.48	0.0084
23230	782.00	3.6	20	5.68	0.0033
23230	782.00	3.6	30	8.14	0.0047
23230	782.00	3.6	40	-0.20	-0.0001
23230	782.00	3.6	50	22.41	0.0129
23230	782.00	3.6	60	10.27	0.0059

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23230	782.00	4.1	-30	6.98	0.0040
23230	782.00	4.1	-20	9.30	0.0054
23230	782.00	4.1	-10	17.32	0.0100
23230	782.00	4.1	0	21.34	0.0123
23230	782.00	4.1	10	3.53	0.0020
23230	782.00	4.1	20	3.19	0.0018
23230	782.00	4.1	30	4.36	0.0025
23230	782.00	4.1	40	-0.63	-0.0004
23230	782.00	4.1	50	17.54	0.0101
23230	782.00	4.1	60	4.19	0.0024

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23230	782.00	4.35	-30	-0.51	-0.0003
23230	782.00	4.35	-20	-2.23	-0.0013
23230	782.00	4.35	-10	17.69	0.0102
23230	782.00	4.35	0	17.42	0.0101
23230	782.00	4.35	10	4.01	0.0023
23230	782.00	4.35	20	10.17	0.0059
23230	782.00	4.35	30	18.88	0.0109
23230	782.00	4.35	40	0.06	0.0000
23230	782.00	4.35	50	16.14	0.0093
23230	782.00	4.35	60	11.26	0.0065

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LTE Band 13 Results: channel 23279 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23279	787.00	3.6	-30	6.93	0.0040
23279	787.00	3.6	-20	7.98	0.0046
23279	787.00	3.6	-10	0.35	0.0002
23279	787.00	3.6	0	11.88	0.0068
23279	787.00	3.6	10	3.23	0.0019
23279	787.00	3.6	20	17.33	0.0099
23279	787.00	3.6	30	**40.90**	**0.0234**
23279	787.00	3.6	40	1.54	0.0009
23279	787.00	3.6	50	23.80	0.0136
23279	787.00	3.6	60	6.83	0.0039

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23279	787.00	4.1	-30	-3.72	-0.0021
23279	787.00	4.1	-20	22.51	0.0129
23279	787.00	4.1	-10	-2.80	-0.0016
23279	787.00	4.1	0	4.09	0.0023
23279	787.00	4.1	10	17.06	0.0098
23279	787.00	4.1	20	21.20	0.0121
23279	787.00	4.1	30	1.43	0.0008
23279	787.00	4.1	40	22.74	0.0130
23279	787.00	4.1	50	5.31	0.0030
23279	787.00	4.1	60	2.40	0.0014

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
23279	787.00	4.35	-30	19.97	0.0114
23279	787.00	4.35	-20	18.44	0.0106
23279	787.00	4.35	-10	11.31	0.0065
23279	787.00	4.35	0	5.10	0.0029
23279	787.00	4.35	10	11.13	0.0064
23279	787.00	4.35	20	5.09	0.0029
23279	787.00	4.35	30	6.29	0.0036
23279	787.00	4.35	40	23.81	0.0136
23279	787.00	4.35	50	17.94	0.0103
23279	787.00	4.35	60	26.25	0.0150

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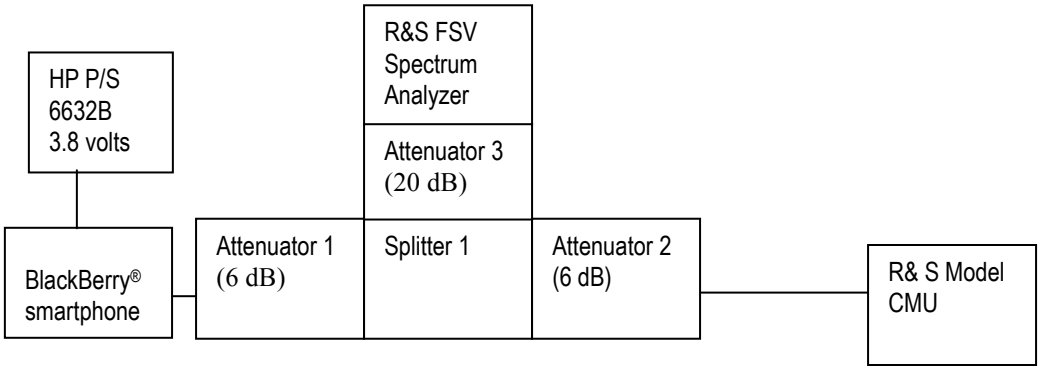
APPENDIX 6A – LTE Band 25 CONDUCTED RF EMISSIONS TEST DATA/PLOTS

LTE Band 25 Conducted RF Emission Test Data

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

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.

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

Date of Test: April 18 – 24 and May 24, 2013

The environmental test conditions were: Temperature: 22.9 – 24.3ºC
Relative Humidity: 21.4 – 26.4%

The following measurements were performed by Berkin Can.

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LTE Band 25 Conducted RF Emission Test Data cont'd

The following tests were performed on model RGB141LW.

Emission Designator Table

Frequency Range (MHz)	Conducted Output Power (dBm)	Emission Designator	Band	Bandwidth (MHz)	Modulation
1850.7-1914.3	19.94	1M09G7D	LTE B25	1.4	QPSK
1850.7-1914.3	18.68	1M09D7W	LTE B25	1.4	16QAM
1851.5-1913.5	19.68	2M69G7D	LTE B25	3	QPSK
1851.5-1913.5	18.98	2M69D7W	LTE B25	3	16QAM
1852.5-1912.5	19.64	4M48G7D	LTE B25	5	QPSK
1852.5-1912.5	18.69	4M48D7W	LTE B25	5	16QAM
1855-1910	20.07	8M93G7D	LTE B25	10	QPSK
1855-1910	19.12	8M94D7W	LTE B25	10	16QAM
1857.5-1907.5	19.77	13M4G7D	LTE B25	15	QPSK
1857.5-1907.5	19.01	13M4D7W	LTE B25	15	16QAM
1860-1905	19.84	17M8G7D	LTE B25	20	QPSK
1860-1905	18.74	17M8D7W	LTE B25	20	16QAM

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 24.232(d), CFR 2.202 were measured from 30 MHz to 20 GHz.

–26 dBc Bandwidth and Occupied Bandwidth (99%)
For each 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20MHz with different number of resource blocks as per scalable bandwidths for LTE Band 25, the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth.
QPSK and 16-QAM modulations were applied to each of the bandwidths. Only the worst case measurements are documented in this report.
A minimum resource block condition was also measured (RB = 1).
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc bandwidth for LTE Band 25 was measured to be 18.54 MHz as shown below. Results were derived in a 200 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

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Occupied Bandwidth for LTE Band 25 selected Frequencies

Bandwidth (MHz)	LTE Band 25 Frequency (MHz)		99% Occupied Bandwidth (MHz)	
	Frequency	Channel	QPSK	16QAM
20	1860	26140	17.829	17.829
	1882.5	26365	17.829	17.829
	1905	26590	17.829	17.829
15	1857.5	26115	13.350	13.393
	1882.5	26365	13.393	13.415
	1907.5	26615	13.415	13.393
10	1855	26090	8.929	8.929
	1882.5	26365	8.929	8.944
	1910	26640	8.929	8.929
5	1852.5	26065	4.479	4.472
	1882.5	26365	4.479	4.479
	1912.5	26665	4.472	4.465
3	1851.5	26055	2.687	2.687
	1882.5	26365	2.683	2.679
	1913.5	26675	2.687	2.683
1.4	1850.7	26047	1.088	1.088
	1882.5	26365	1.088	1.090
	1914.3	26683	1.079	1.079

-26dBc Bandwidth for LTE Band 25 selected Frequencies

Bandwidth (MHz)	LTE Band 25 Frequency (MHz)		99% Occupied Bandwidth (MHz)	
	Frequency	Channel	QPSK	16QAM
20	1860	26140	18.54	-
	1882.5	26365	18.69	-
	1905	26590	18.63	-
10	1857.5	26115	-	9.23
	1882.5	26365	-	9.26
	1907.5	26615	-	9.20
1.4	1855	26090	1.13	-
	1882.5	26365	1.14	-
	1910	26640	1.14	-

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Peak to Average Ratio (PAR)

For each 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20 MHz with different number of resource blocks as per scalable bandwidths for LTE Band 25, the peak to average ratio was measured on the low, middle and high channels with QPSK and 16-QAM modulation.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.
The worst case measured was 10.35 dB on middle channel in 20MHz bandwidth with 50 resource blocks.

Measurement Plots for LTE Band 25

Refer to the following measurement plots for more detail:
See Figures 3-1a to 3-18a for the plots of the conducted spurious emissions.
See Figures 3-19a to 3-30a for the plots of the Channel mask.
See Figures 3-31a to 3-37a for the plots of the Peak to Average Ratio.

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LTE Band 25 Conducted RF Emission Test Data (cont'd)

Figure 3-1a: Band 25, Spurious Conducted Emissions, Low channel, 20MHz BW (RB= 1)

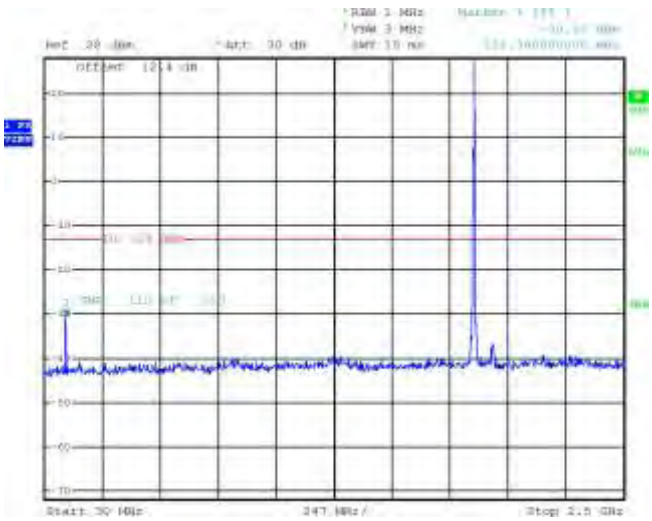


Figure 3-2a: Band 25, Spurious Conducted Emissions, Low channel, 20MHz BW (RB= 1)

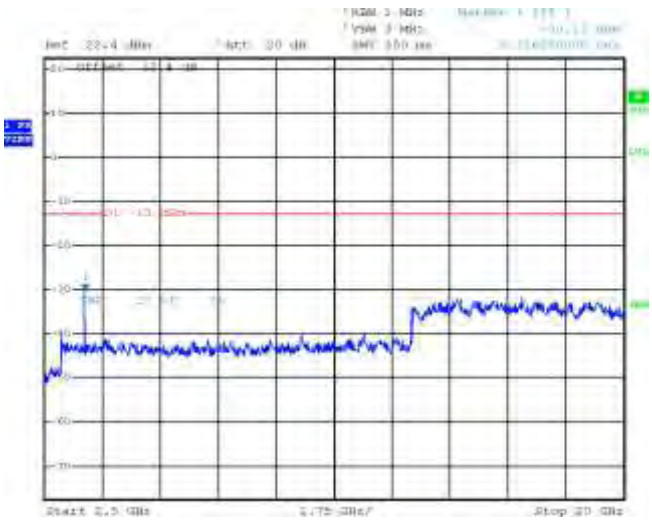


Figure 3-3a: Band 25, Spurious Conducted Emissions, Middle channel, 20MHz BW (RB= 50)

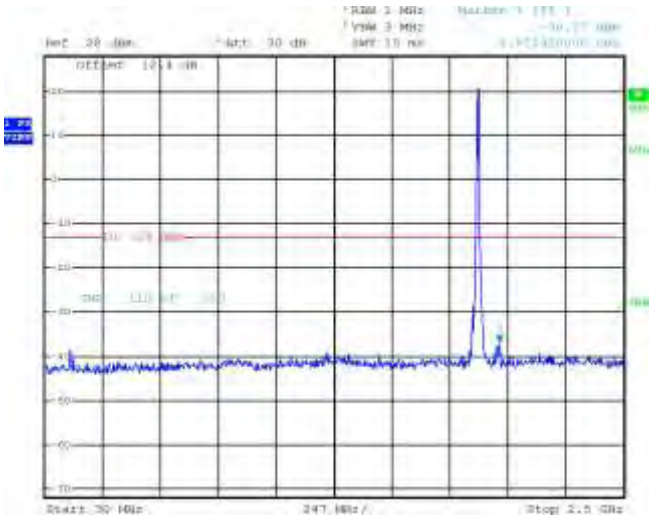
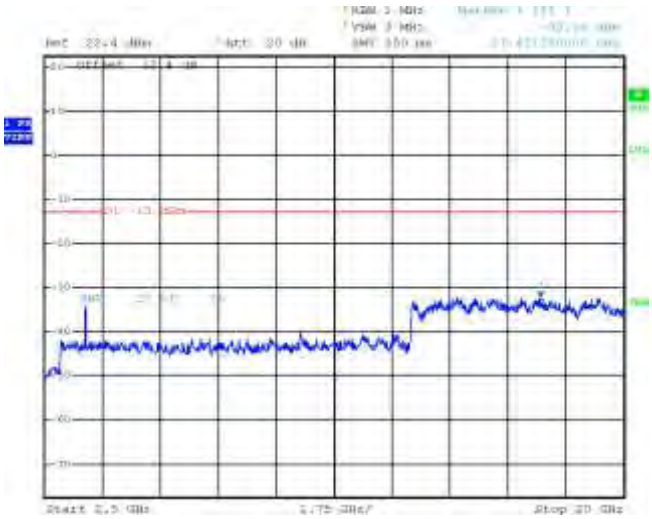


Figure 3-4a: Band 25, Spurious Conducted Emissions, Middle channel, 20MHz BW (RB= 50)



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-5a: Band 25, Spurious Conducted Emissions, High Channel, 20MHz BW (RB= 100)

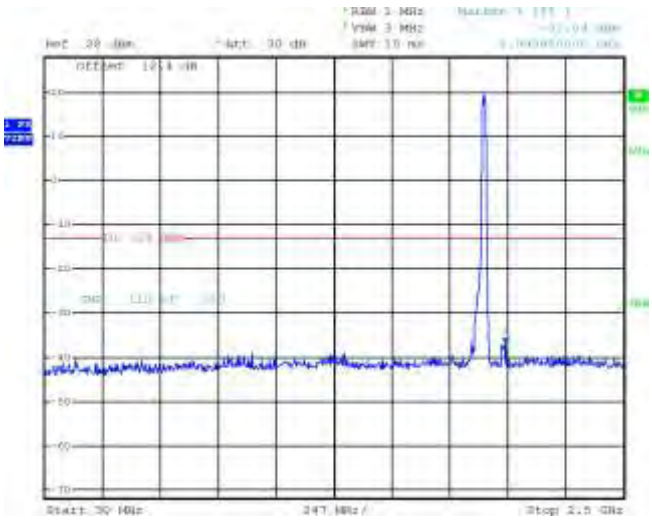


Figure 3-6a: Band 25, Spurious Conducted Emissions, High Channel, 20MHz BW (RB= 100)

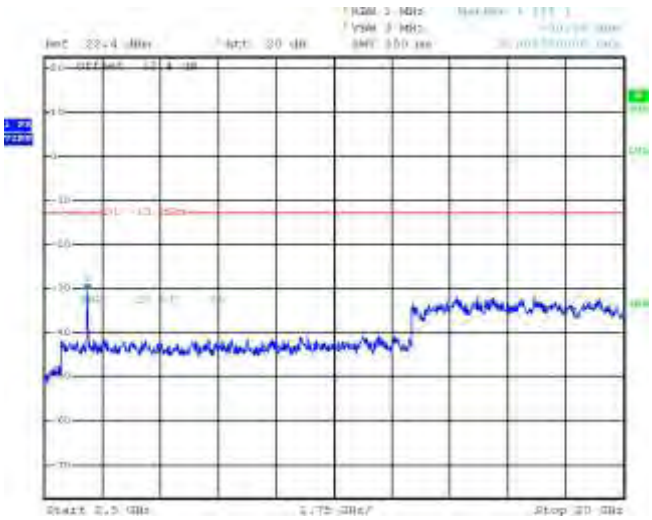


Figure 3-7a: Band 25, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 1)

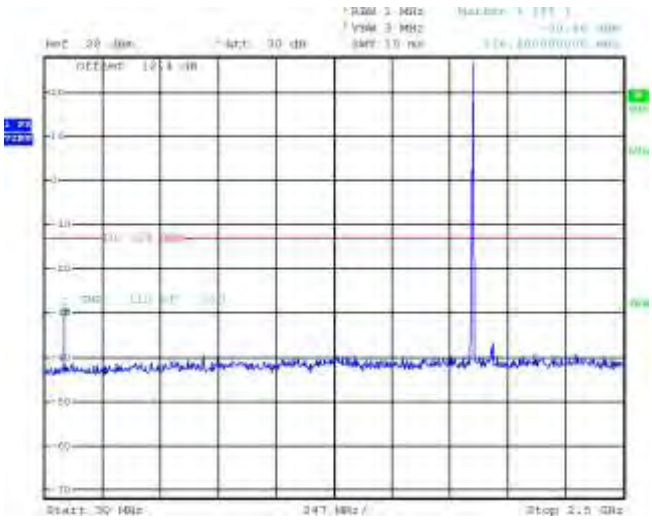
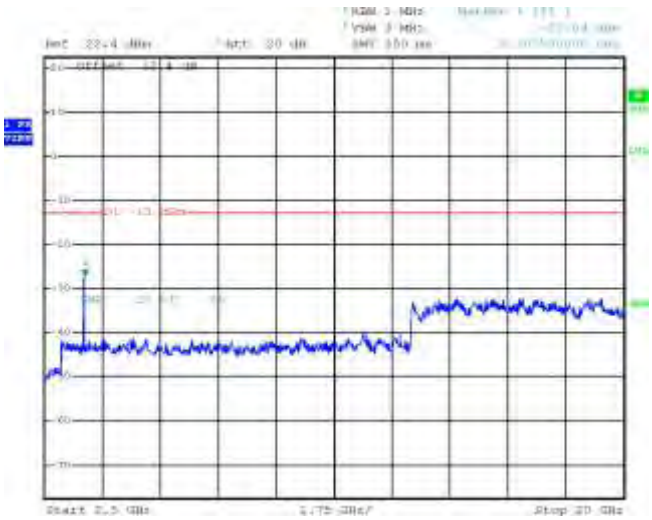


Figure 3-8a: Band 25, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 1)



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-9a: Band 25, Spurious Conducted Emissions, Middle channel, 10MHz BW (RB= 25)

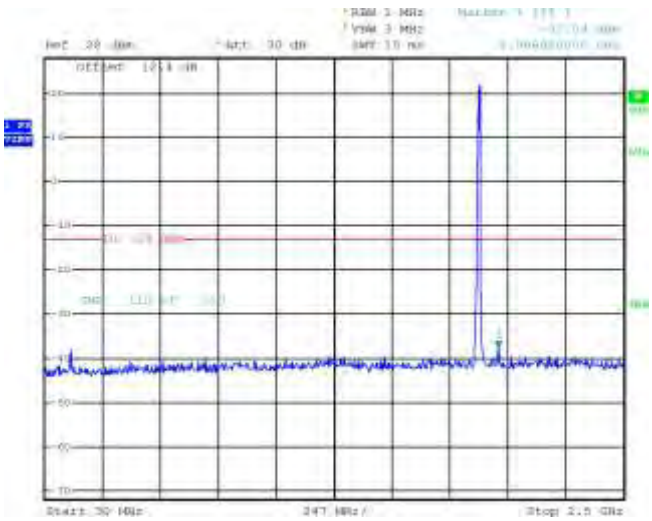


Figure 3-10a: Band 25, Spurious Conducted Emissions, Middle channel, 10MHz BW (RB= 25)

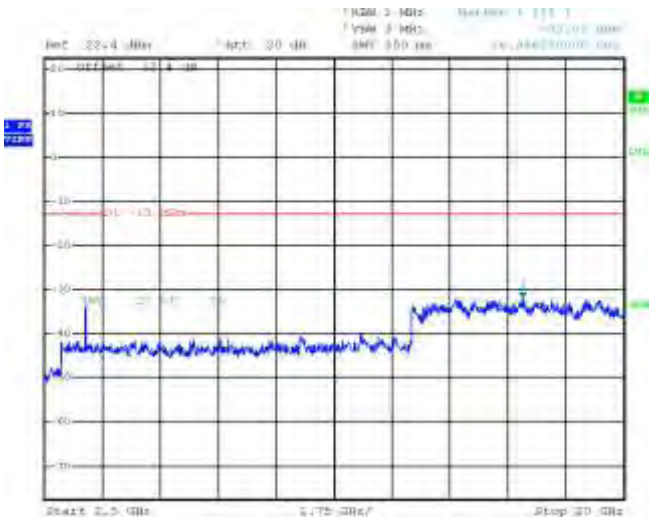


Figure 3-11a: Band 25, Spurious Conducted Emissions, High Channel, 10MHz BW (RB= 50)

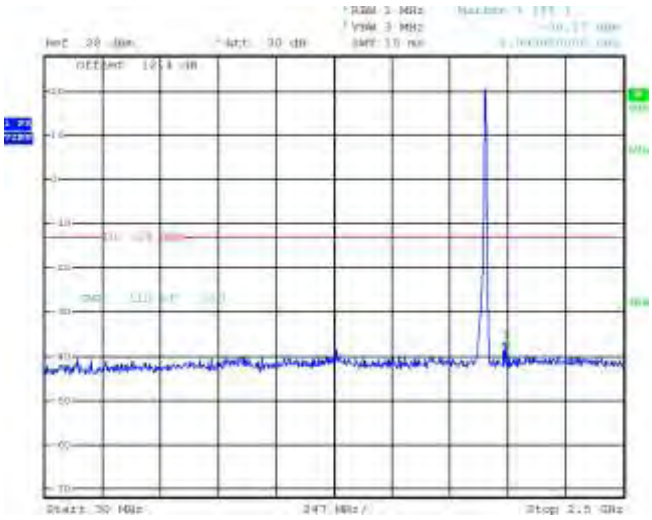
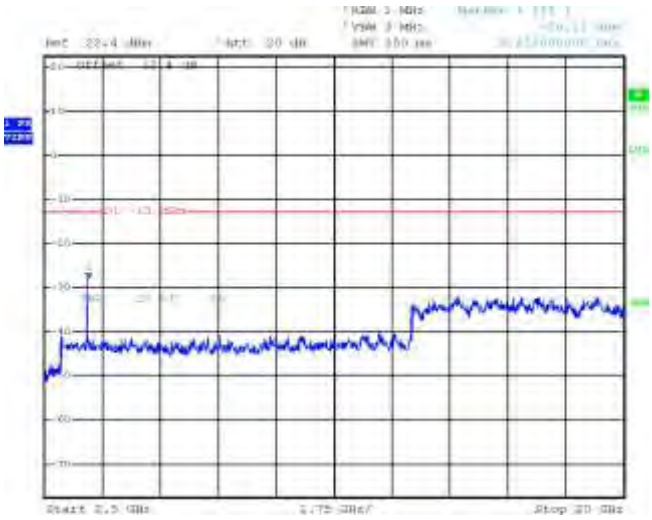


Figure 3-12a: Band 25, Spurious Conducted Emissions, High Channel, 10MHz BW (RB= 50)



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-13a: Band 25, Spurious Conducted Emissions, Low channel, 1.4MHz BW (RB= 1)

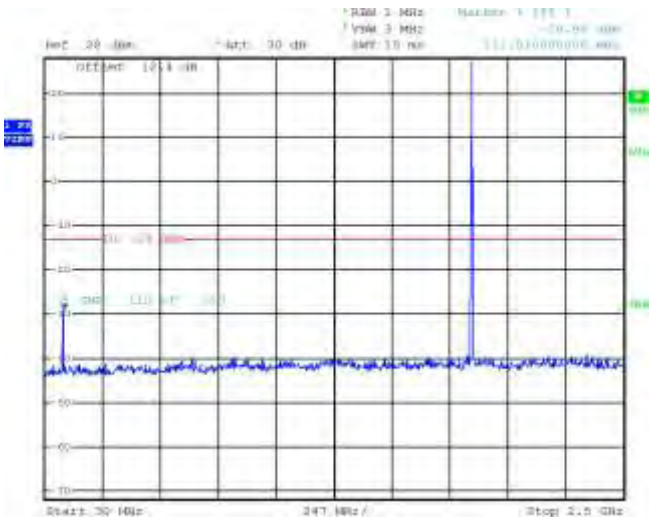


Figure 3-14a: Band 25, Spurious Conducted Emissions, Low channel, 1.4MHz BW (RB= 1)

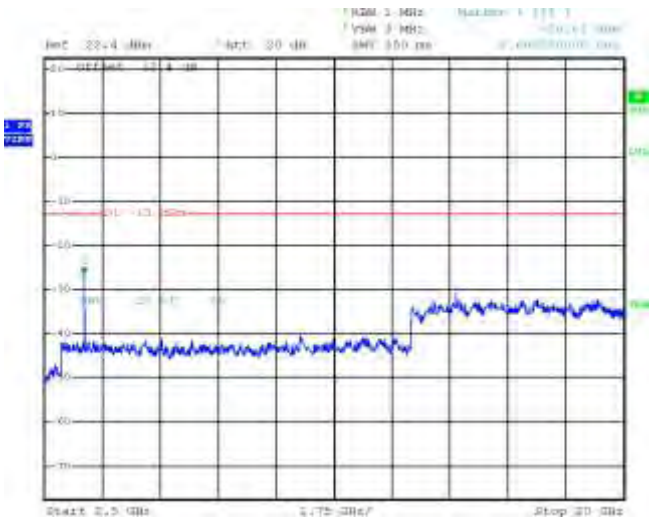


Figure 3-15a: Band 25, Spurious Conducted Emissions, Middle channel, 1.4MHz BW (RB= 3)

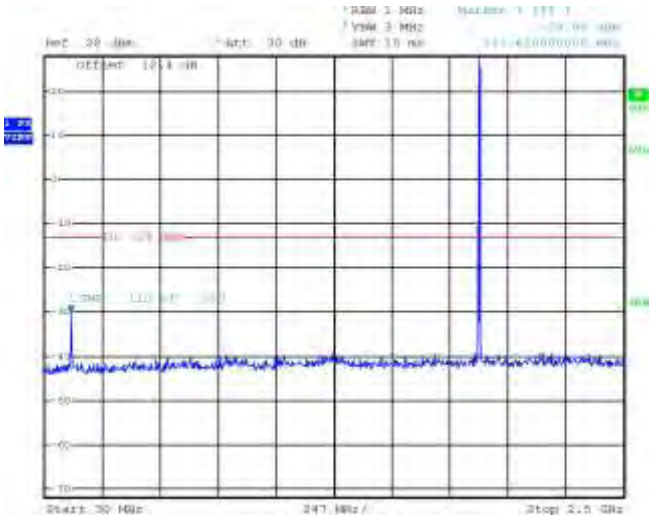
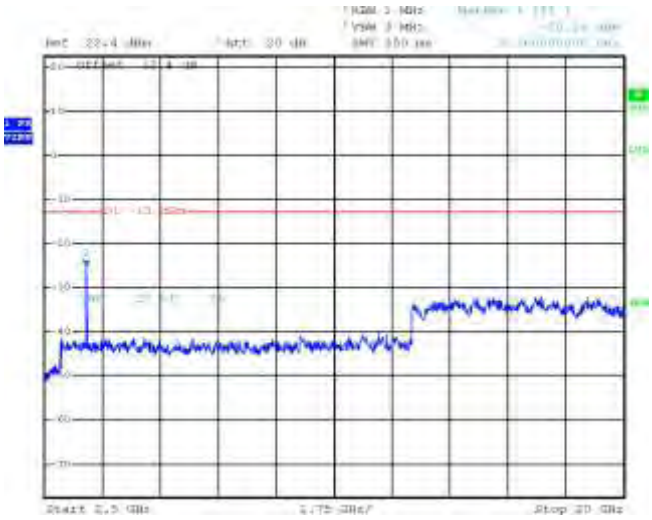


Figure 3-16a: Band 25, Spurious Conducted Emissions, Middle channel, 1.4MHz BW (RB= 3)



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-17a: Band 25, Spurious Conducted Emissions, High Channel, 1.4MHz BW (RB= 6)

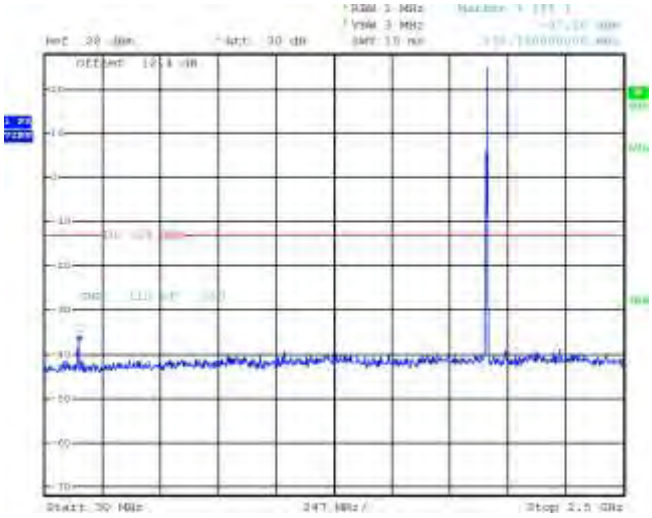


Figure 3-18a: Band 25, Spurious Conducted Emissions, High Channel, 1.4MHz BW (RB= 6)

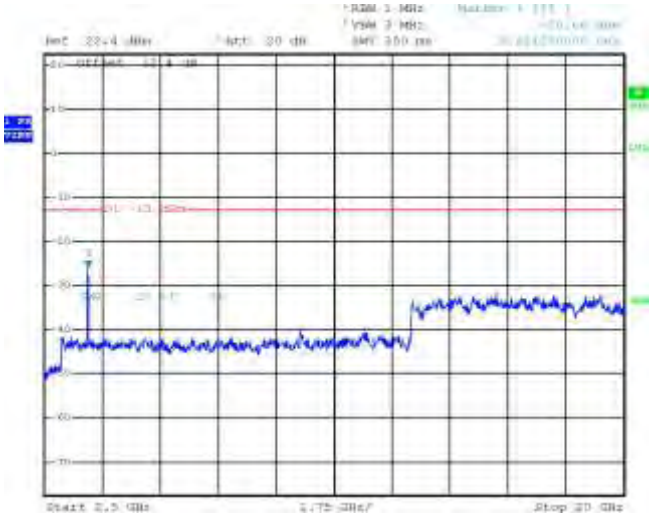


Figure 3-19a: Band 25 Low Channel Mask, 20MHz BW, RB = 1

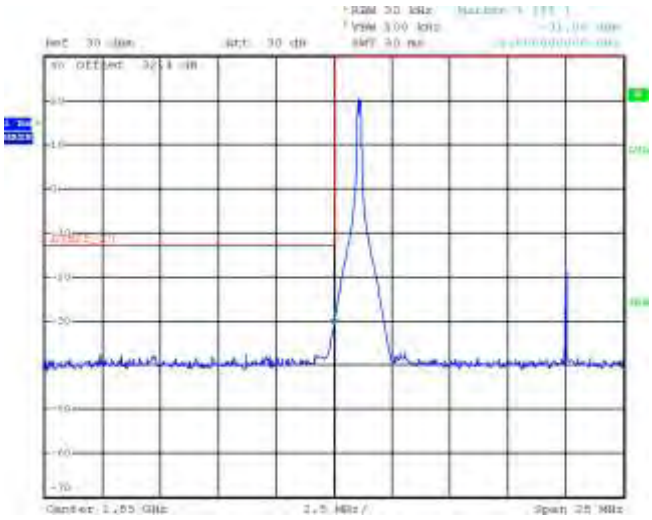
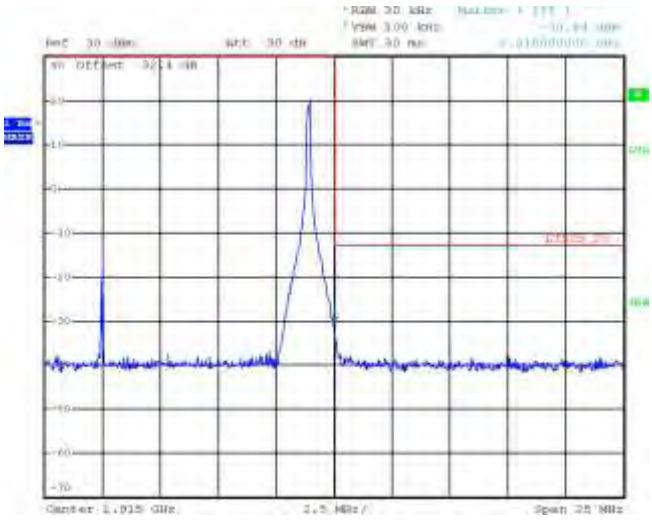


Figure 3-20a: Band 25 High Channel Mask, 20MHz BW, RB = 1



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-21a: Band 25 Low Channel Mask, 20MHz BW, RB = 100

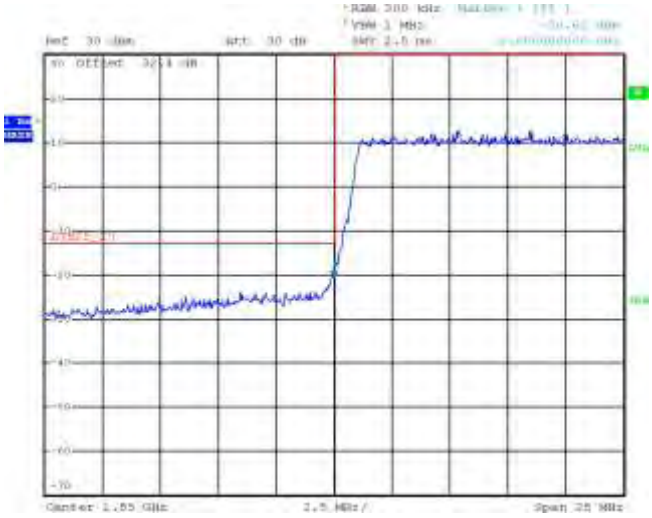


Figure 3-22a: Band 25 High Channel Mask, 20MHz BW, RB = 100

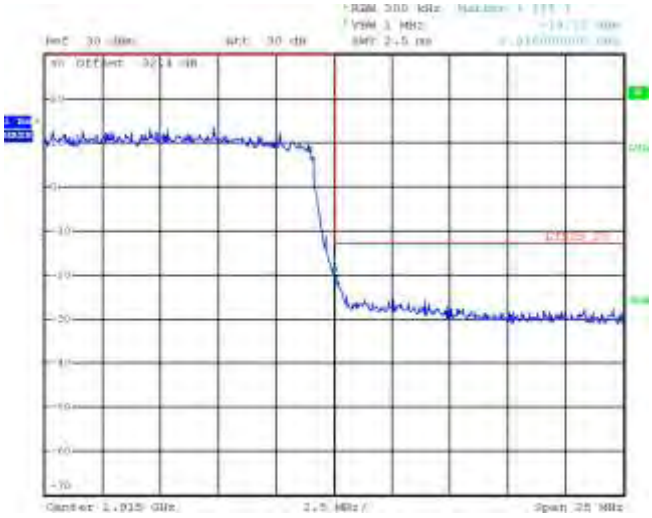


Figure 3-23a: Band 25 Low Channel Mask, 10MHz BW, RB = 1

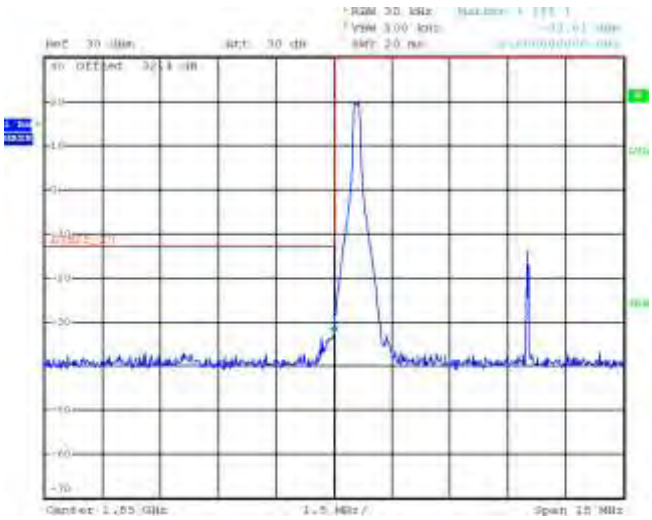
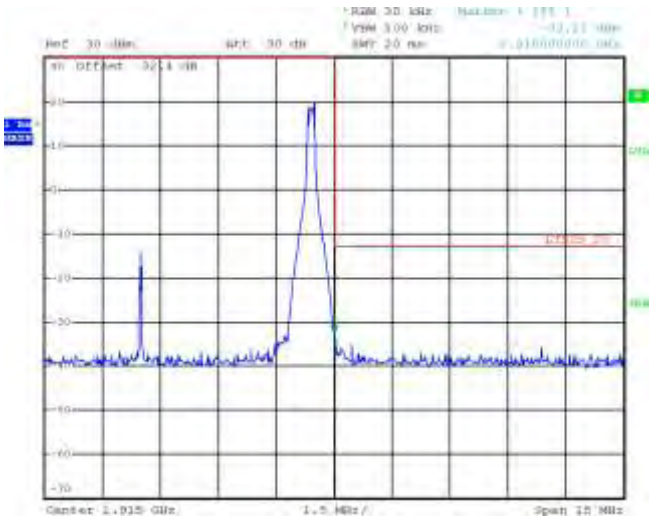


Figure 3-24a: Band 25 High Channel Mask, 10MHz BW, RB = 1



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-25a: Band 25 Low Channel Mask, 10MHz BW, RB = 50

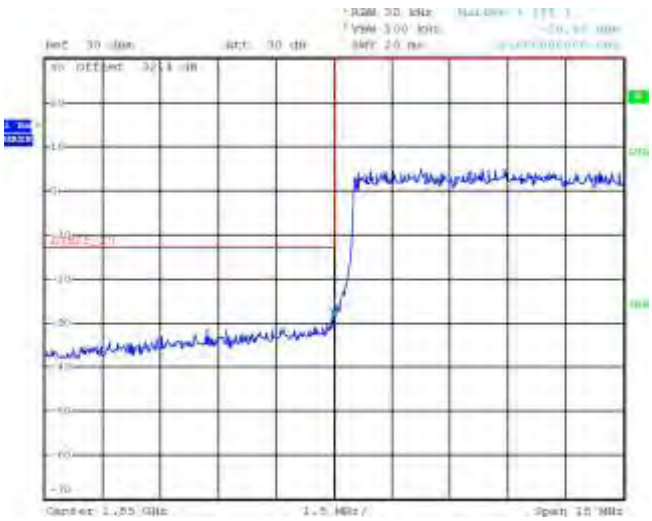


Figure 3-26a: High Channel Mask, 10MHz BW, RB = 50

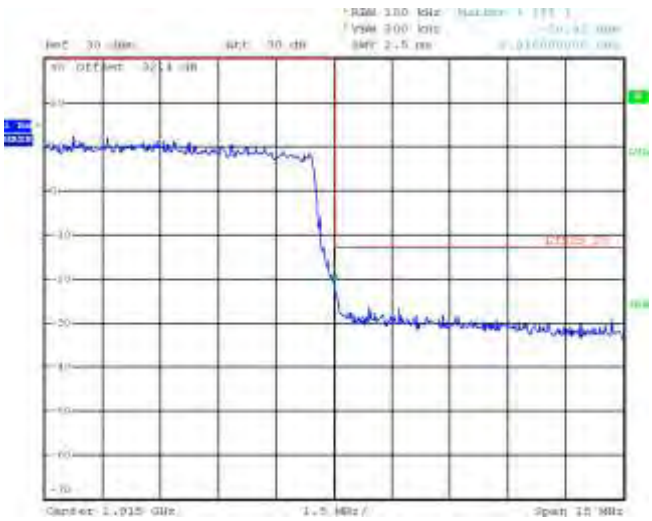


Figure 3-27a: Band 25 Low Channel Mask, 1.4MHz BW, RB = 1

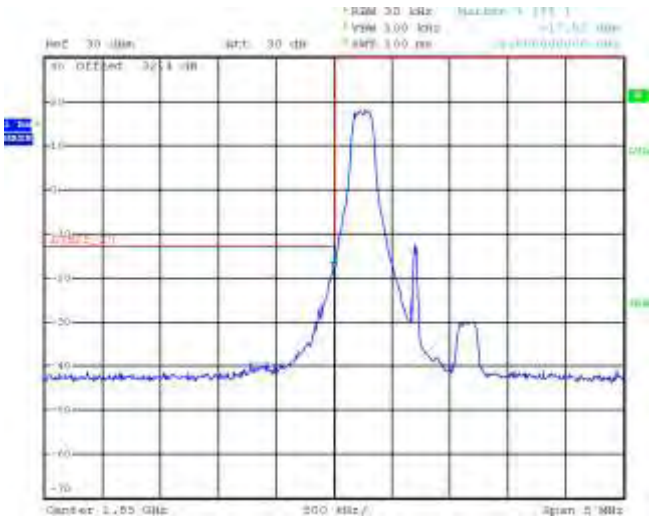
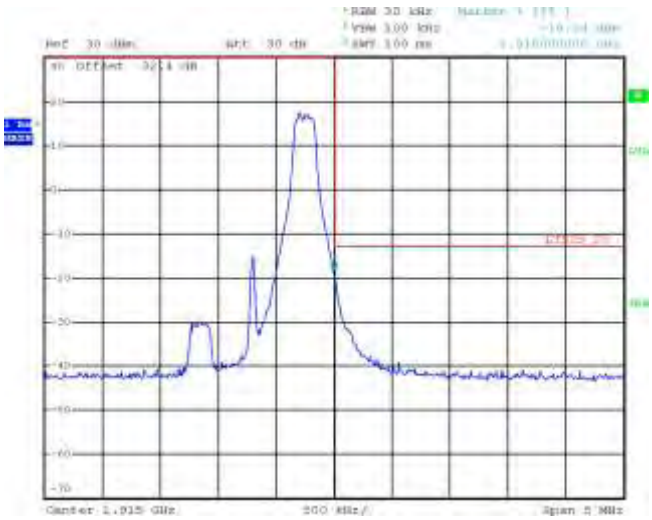


Figure 3-28a: Band 25 High Channel Mask, 1.4MHz BW, RB = 1



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-29a: Band 25 Low Channel Mask, 1.4MHz BW, RB = 6

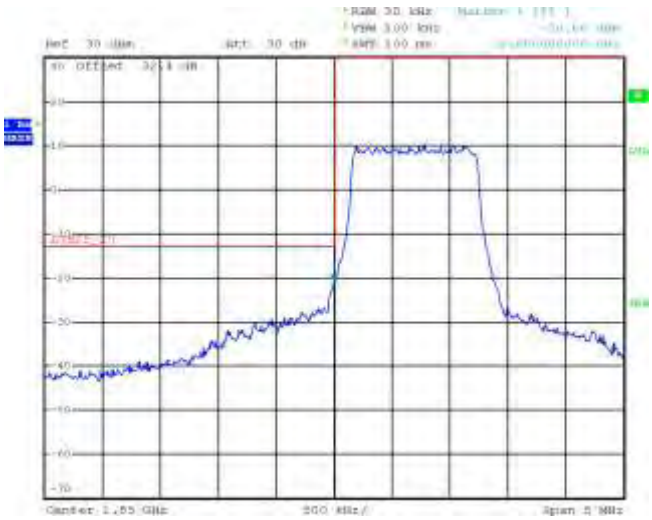


Figure 3-30a: Band 25 High Channel Mask, 1.4MHz BW, RB = 6

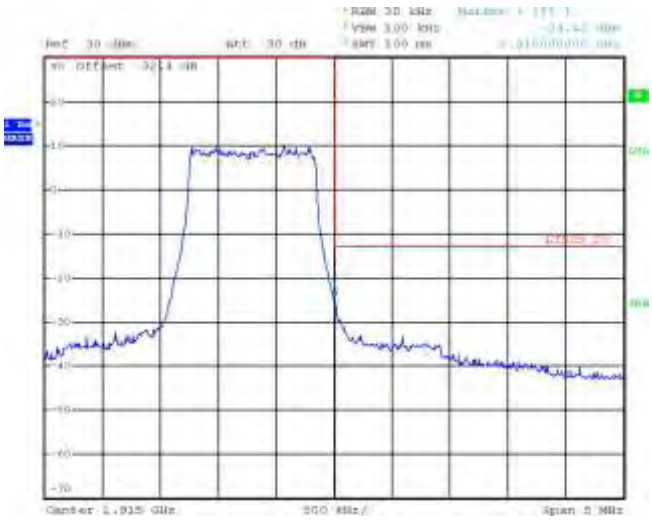


Figure 3-31a: Band 25, PAR, Mid Channel 20 MHz BW, RB = 50, QPSK

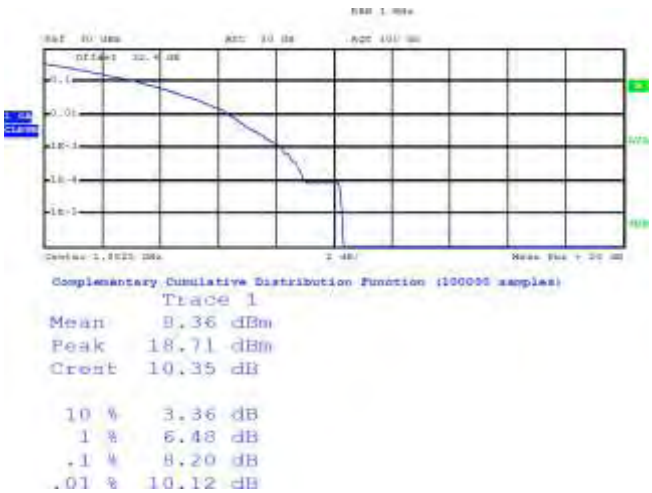
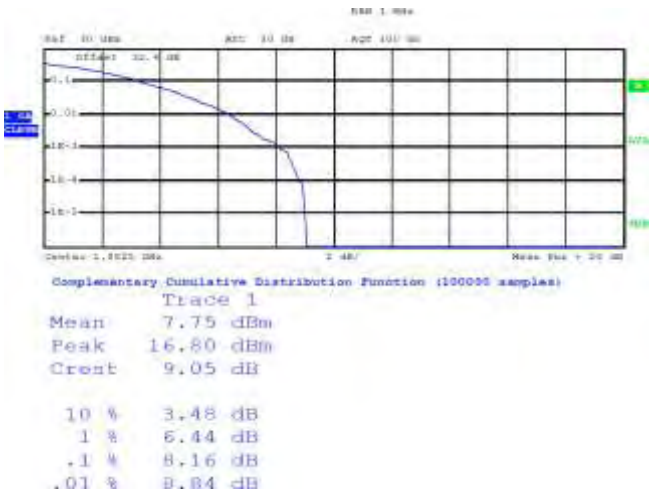


Figure 3-32a: Band 25, PAR, Mid Channel 20 MHz BW, RB = 100, 16-QAM



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LTE Band 25 Conducted RF Emission Test Data cont'd

Figure 3-33a: Band 25, PAR, Mid Channel 10 MHz BW, RB = 25, QPSK

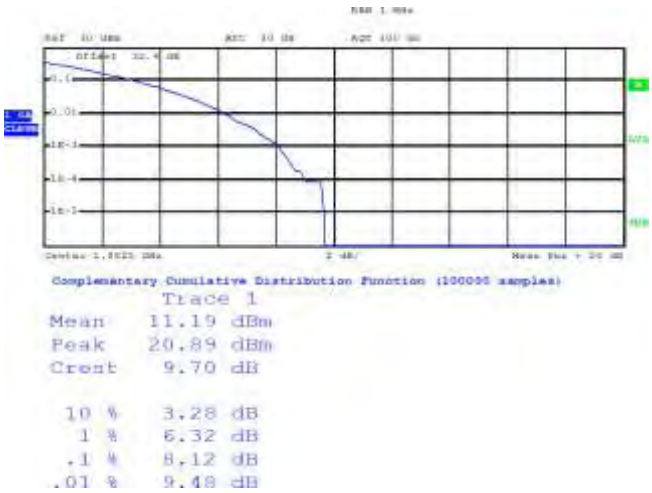


Figure 3-34a: Band 25, PAR, Mid Channel 10 MHz BW, RB = 50, 16-QAM

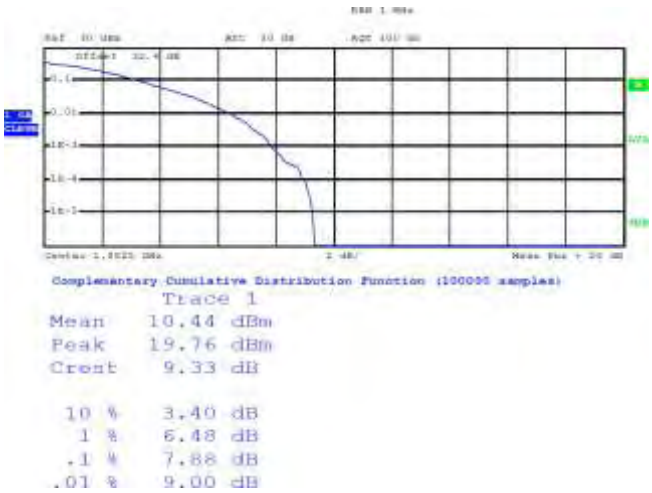


Figure 3-35a: Band 25, PAR, Mid Channel 1.4MHz BW, RB = 3, QPSK

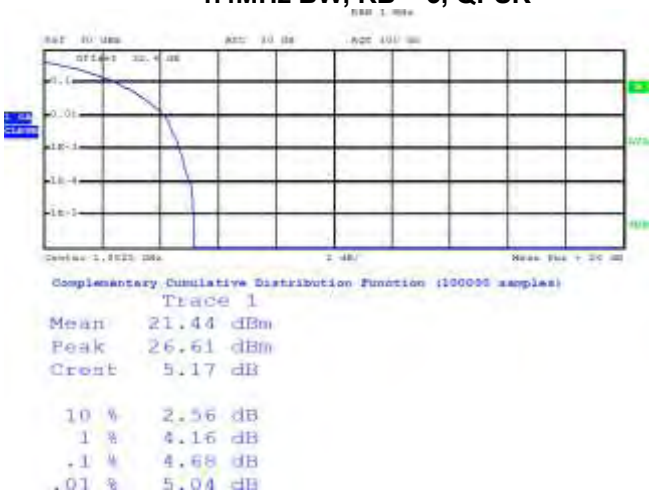
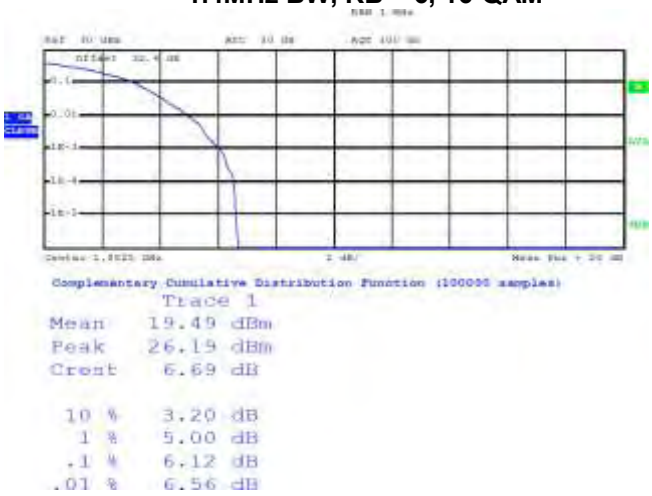


Figure 3-36a: Band 26, PAR, Mid Channel 1.4MHz BW, RB = 6, 16-QAM



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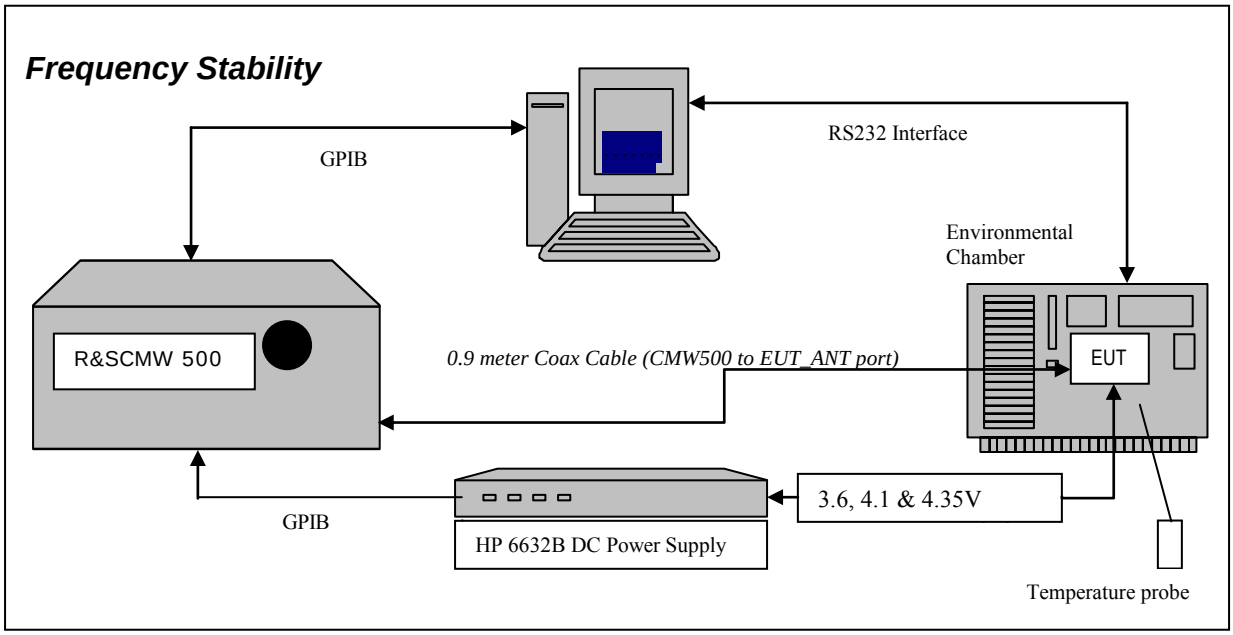
APPENDIX 6B – LTE Band 25 FREQUENCY STABILITY TEST DATA

LTE 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

24.236 *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.
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.

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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 1860.0, 1880.0 and 1900.0 MHz each was measured under bandwidth of 20 MHz 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.

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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; CMW 500 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 CMW 500 Radio Communication Tester.
6. Command the CMW 500 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMW 500 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. 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.
10. The CMW 500 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 following tests were performed on model RGB141LW.

The maximum frequency error in the LTE band 25 measured was **0.0094 PPM**.

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Date of test: July 1, 2013

LTE band 25 results: channels 26140, 26365, & 26590 @ 20°C maximum transmitted power

Traffic Channel Number	LTE Band 2 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
26140	1860.00	3.6	20	11.64	0.0063
26365	1882.50	3.6	20	14.32	0.0076
26590	1905.00	3.6	20	9.14	0.0048

Traffic Channel Number	LTE Band 2 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
26140	1860.00	4.1	20	7.62	0.0041
26365	1882.50	4.1	20	12.32	0.0065
26590	1905.00	4.1	20	-3.27	-0.0017

Traffic Channel Number	LTE Band 2 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
26140	1860.00	4.35	20	10.68	0.0057
26365	1882.50	4.35	20	12.14	0.0064
26590	1905.00	4.35	20	0.19	0.0001

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LTE band 25 Results: channel 26140 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
26140	1860.00	3.6	-30	12.88	0.0069
26140	1860.00	3.6	-20	11.24	0.0060
26140	1860.00	3.6	-10	6.91	0.0037
26140	1860.00	3.6	0	11.42	0.0061
26140	1860.00	3.6	10	12.68	0.0068
26140	1860.00	3.6	20	11.64	0.0063
26140	1860.00	3.6	30	10.81	0.0058
26140	1860.00	3.6	40	14.57	0.0078
26140	1860.00	3.6	50	-6.80	-0.0037
26140	1860.00	3.6	60	11.35	0.0061
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
26140	1860.00	4.1	-30	10.82	0.0058
26140	1860.00	4.1	-20	13.21	0.0071
26140	1860.00	4.1	-10	16.99	0.0091
26140	1860.00	4.1	0	11.93	0.0064
26140	1860.00	4.1	10	14.08	0.0076
26140	1860.00	4.1	20	7.62	0.0041
26140	1860.00	4.1	30	9.75	0.0052
26140	1860.00	4.1	40	15.52	0.0083
26140	1860.00	4.1	50	-3.73	-0.0020
26140	1860.00	4.1	60	9.76	0.0052
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
26140	1860.00	4.35	-30	9.44	0.0051
26140	1860.00	4.35	-20	7.23	0.0039
26140	1860.00	4.35	-10	15.25	0.0082
26140	1860.00	4.35	0	11.53	0.0062
26140	1860.00	4.35	10	13.07	0.0070
26140	1860.00	4.35	20	10.68	0.0057
26140	1860.00	4.35	30	19.21	0.0103
26140	1860.00	4.35	40	-5.80	-0.0031
26140	1860.00	4.35	50	15.58	0.0084
26140	1860.00	4.35	60	15.33	0.0082

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LTE band 25 Results: channel 26365 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
26365	1882.50	3.6	-30	13.48	0.0072
26365	1882.50	3.6	-20	9.02	0.0048
26365	1882.50	3.6	-10	11.22	0.0060
26365	1882.50	3.6	0	-3.31	-0.0018
26365	1882.50	3.6	10	8.90	0.0047
26365	1882.50	3.6	20	14.32	0.0076
26365	1882.50	3.6	30	13.20	0.0070
26365	1882.50	3.6	40	14.72	0.0078
26365	1882.50	3.6	50	14.01	0.0074
26365	1882.50	3.6	60	15.46	0.0082
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
26365	1882.50	4.1	-30	11.94	0.0063
26365	1882.50	4.1	-20	-9.01	-0.0048
26365	1882.50	4.1	-10	-0.52	-0.0003
26365	1882.50	4.1	0	15.15	0.0080
26365	1882.50	4.1	10	9.72	0.0052
26365	1882.50	4.1	20	12.32	0.0065
26365	1882.50	4.1	30	12.56	0.0067
26365	1882.50	4.1	40	11.02	0.0059
26365	1882.50	4.1	50	-10.80	-0.0057
26365	1882.50	4.1	60	12.43	0.0066
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
26365	1882.50	4.35	-30	-12.75	-0.0068
26365	1882.50	4.35	-20	5.42	0.0029
26365	1882.50	4.35	-10	13.79	0.0073
26365	1882.50	4.35	0	11.63	0.0062
26365	1882.50	4.35	10	13.08	0.0069
26365	1882.50	4.35	20	12.14	0.0064
26365	1882.50	4.35	30	16.00	0.0085
26365	1882.50	4.35	40	**17.70**	**0.0094**
26365	1882.50	4.35	50	12.96	0.0069
26365	1882.50	4.35	60	14.57	0.0077

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LTE band 25 Results: channel 26590 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
26590	1905.00	3.6	-30	-7.07	-0.0037
26590	1905.00	3.6	-20	-3.93	-0.0021
26590	1905.00	3.6	-10	6.28	0.0033
26590	1905.00	3.6	0	10.63	0.0056
26590	1905.00	3.6	10	-6.23	-0.0033
26590	1905.00	3.6	20	9.14	0.0048
26590	1905.00	3.6	30	-4.07	-0.0021
26590	1905.00	3.6	40	-4.54	-0.0024
26590	1905.00	3.6	50	6.70	0.0035
26590	1905.00	3.6	60	-3.83	-0.0020
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
26590	1905.00	4.1	-30	-2.60	-0.0014
26590	1905.00	4.1	-20	-1.15	-0.0006
26590	1905.00	4.1	-10	-8.46	-0.0044
26590	1905.00	4.1	0	-1.53	-0.0008
26590	1905.00	4.1	10	-4.50	-0.0024
26590	1905.00	4.1	20	-3.27	-0.0017
26590	1905.00	4.1	30	-3.77	-0.0020
26590	1905.00	4.1	40	-4.44	-0.0023
26590	1905.00	4.1	50	-8.15	-0.0043
26590	1905.00	4.1	60	-6.12	-0.0032
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
26590	1905.00	4.35	-30	-1.46	-0.0008
26590	1905.00	4.35	-20	-5.88	-0.0031
26590	1905.00	4.35	-10	-7.39	-0.0039
26590	1905.00	4.35	0	-4.62	-0.0024
26590	1905.00	4.35	10	-3.86	-0.0020
26590	1905.00	4.35	20	0.19	0.0001
26590	1905.00	4.35	30	-9.42	-0.0049
26590	1905.00	4.35	40	14.29	0.0075
26590	1905.00	4.35	50	-3.83	-0.0020
26590	1905.00	4.35	60	10.65	0.0056

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APPENDIX 6C – LTE Band 25 RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

The following tests were performed on model RGB141LW.

Date of Test: June 27, 2013
The following measurements were performed by Rex Zhang.
The environmental tests conditions were: Temperature: 26.1 °C
Relative Humidity: 14.7 %

The BlackBerry® smartphone was standalone, USB Down with LCD facing the RX antenna when the turntable is at 0 degree position.
Measurements were performed with QPSK and 16QAM modulations. The smallest test margins are reported below.
Test Distance was 3.0 meters with the RX antenna height scans between 3-4 meters height.

LTE Band 25, 20MHz BW, RB=1, QPSK modulation

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
1st	26140	1860.00	LTE 25	Horn	V	-29.76	-29.65	V-V	-20.06	20.08	0.10	33.00	-12.92
1st	26140	1860.00	LTE 25	Horn	H	-29.65		H-H	-19.03				
1st	26365	1882.50	LTE 25	Horn	V	-29.82	-28.16	V-V	-18.60	21.53	0.14	33.00	-11.47
1st	26365	1882.50	LTE 25	Horn	H	-28.16		H-H	-17.41				
1st	26590	1905.00	LTE 25	Horn	V	-31.57	-29.02	V-V	-19.03	21.25	0.13	33.00	-11.75
1st	26590	1905.00	LTE 25	Horn	H	-29.02		H-H	-17.90				

LTE Band 25, 20MHz BW, RB=1, 16QAM modulation

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
1st	26140	1860.00	LTE 25	Horn	V	-30.97	-30.85	V-V	-21.29	18.73	0.07	33.00	-14.27
1st	26140	1860.00	LTE 25	Horn	H	-30.85		H-H	-20.38				
1st	26365	1882.50	LTE 25	Horn	V	-31.06	-29.31	V-V	-19.70	20.42	0.11	33.00	-12.58
1st	26365	1882.50	LTE 25	Horn	H	-29.31		H-H	-18.52				
1st	26590	1905.00	LTE 25	Horn	V	-32.84	-30.44	V-V	-20.53	19.93	0.10	33.00	-13.07
1st	26590	1905.00	LTE 25	Horn	H	-30.44		H-H	-19.22				

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Radiated Emissions Test Data Results cont'd

LTE Band 25, 10MHz BW, RB=1, QPSK modulation

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
1st	26090	1855.00	LTE 25	Horn	V	-29.23	-28.98	V-V	-18.95	21.00	0.13	33.00	-12.00
1st	26090	1855.00	LTE 25	Horn	H	-28.98		H-H	-18.11				
1st	26365	1882.50	LTE 25	Horn	V	-30.73	-27.82	V-V	-18.25	21.87	0.15	33.00	-11.13
1st	26365	1882.50	LTE 25	Horn	H	-27.82		H-H	-17.07				
1st	26640	1910.00	LTE 25	Horn	V	-31.99	-28.79	V-V	-18.70	21.53	0.14	33.00	-11.47
1st	26640	1910.00	LTE 25	Horn	H	-28.79		H-H	-17.62				

LTE Band 25, 10MHz BW, RB=1, 16QAM modulation

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
1st	26090	1855.00	LTE 25	Horn	V	-30.31	-29.98	V-V	-20.01	20.01	0.10	33.00	-12.99
1st	26090	1855.00	LTE 25	Horn	H	-29.98		H-H	-19.10				
1st	26365	1882.50	LTE 25	Horn	V	-31.88	-29.09	V-V	-19.51	20.59	0.11	33.00	-12.41
1st	26365	1882.50	LTE 25	Horn	H	-29.09		H-H	-18.35				
1st	26640	1910.00	LTE 25	Horn	V	-33.10	-29.72	V-V	-19.68	20.61	0.12	33.00	-12.39
1st	26640	1910.00	LTE 25	Horn	H	-29.72		H-H	-18.54				

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Radiated Emissions Test Data Results cont'd

LTE Band 25, 1.4MHz BW, RB=1, QPSK modulation

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
1st	26047	1850.70	LTE 25	Horn	V	-27.64	-27.64	V-V	-17.91	**22.12**	**0.16**	33.00	-10.88
1st	26047	1850.70	LTE 25	Horn	H	-29.44		H-H	-16.99				
1st	26365	1882.50	LTE 25	Horn	V	-30.84	-27.91	V-V	-18.37	21.79	0.15	33.00	-11.21
1st	26365	1882.50	LTE 25	Horn	H	-27.91		H-H	-17.15				
1st	26683	1914.30	LTE 25	Horn	V	-32.82	-31.90	V-V	-21.82	18.59	0.07	33.00	-14.41
1st	26683	1914.30	LTE 25	Horn	H	-31.90		H-H	-20.56				

LTE Band 25, 1.4MHz BW, RB=1, 16QAM modulation

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
1st	26047	1850.70	LTE 25	Horn	V	-28.13	-28.13	V-V	-18.40	**21.60**	**0.14**	33.00	-11.40
1st	26047	1850.70	LTE 25	Horn	H	-30.73		H-H	-17.51				
1st	26365	1882.50	LTE 25	Horn	V	-31.97	-29.08	V-V	-19.50	20.59	0.11	33.00	-12.41
1st	26365	1882.50	LTE 25	Horn	H	-29.08		H-H	-18.35				
1st	26683	1914.30	LTE 25	Horn	V	-33.63	-33.04	V-V	-22.99	17.40	0.05	33.00	-15.60
1st	26683	1914.30	LTE 25	Horn	H	-33.04		H-H	-21.75				

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Radiated Emissions Test Data Results cont'd

Date of Test: June 26, 2013

The following measurements were performed by Rex Zhang.

The environmental test conditions were: Temperature: 26.1 ºC
Relative Humidity: 37.1 %

Test Distance was 3.0 meters with the RX antenna height scans between 3-4 meters height, and the frequency range scanned was 30MHz – 1GHz.

The BlackBerry® smartphone was standalone, USB Down with LCD facing the RX antenna when the turntable is at 0 degree position.

Measurements were performed in LTE band 25 with both QPSK and 16-QAM modulation for 10MHz BW (channel 26090, 26365 and 26640 with RB = 1).

All emissions were at least 25.0 dB below the limits.

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Radiated Emissions Test Data Results cont'd

Date of Test: June 26 – July 3, 2013

The following measurements were performed by Mahmmod Ahmed
The environmental test conditions were: Temperature: 23.4 – 27.5ºC
Relative Humidity: 26.8 – 39.5 %

Test Distance was 3.0 meters with the RX antenna height scans between 3-4 meters height, and a frequency range of 1 GHz to 10 GHz.

The BlackBerry® smartphone was standalone, USB Down with LCD facing the RX antenna when the turntable is at 0 degree position.

Measurements were performed in LTE band 25 with both QPSK and 16-QAM modulation for 10MHz BW (channel 26090, 26365 and 26640 with RB = 1).

All emissions were at least 25.0 dB below the limit.

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APPENDIX 7 – GSM RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

The following tests were measured on RFX101LW.

Date of test: September 13, 2013

The following measurements were performed by Rex Zhang.

The environmental tests conditions were: Temperature: 25.3 °C
Relative Humidity: 36.5 %

The BlackBerry® smartphone was in standalone, horizontal face down position.
Test distance was 3.0 metres.

GSM850 Band Call Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBm)	Max (V,H) (dBm)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole) (dBm)	(W)	Limit (dBm)	Diff. To Limit (dB)
F0	128	824.20	850	Dipole	V	-31.46	-22.26	V-V	12.54	**29.67**	**0.93**	38.50	**8.83**
F0	128	824.20	850	Dipole	H	-22.26		H-H	11.26				
F0	190	836.60	850	Dipole	V	-31.41	-22.65	V-V	11.96	28.76	0.75	38.50	9.74
F0	190	836.60	850	Dipole	H	-22.65		H-H	11.31				
F0	251	848.80	850	Dipole	V	-31.54	-22.99	V-V	11.71	28.49	0.71	38.50	10.01
F0	251	848.80	850	Dipole	H	-22.99		H-H	11.54				

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Radiated Power Test Data Results cont'd

The following tests were measured on RFX101LW.

Date of test: September 13, 2013

The following measurements were performed by Kevin Guo.

The environmental tests conditions were: Temperature: 26.1 °C
Relative Humidity: 28.2%

The BlackBerry® smartphone was in standalone, horizontal face down position.
Test distance is 3.0 metres.

PCS1900 Band Call Mode

								Substitution Method					
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	(W)	Limit (dBm)	Diff to Limit (dB)
F0	512	1850.20	1900	Horn	V	86.75	87.58	V-V	-6.82	29.26	0.84	33.00	3.74
F0	512	1850.20	1900	Horn	H	87.58		H-H	-5.55				
F0	661	1880.00	1900	Horn	V	85.74	86.34	V-V	-5.76	29.56	0.90	33.00	3.44
F0	661	1880.00	1900	Horn	H	86.34		H-H	-5.34				
F0	810	1909.80	1900	Horn	V	85.18	86.41	V-V	-3.75	**30.75**	**1.19**	33.00	**2.25**
F0	810	1909.80	1900	Horn	H	86.41		H-H	-3.20				

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