EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22, 24, 27
IC RSS-130, 132, 133, 139 and RSS-GEN

REPORT NO.: RTS-6063-1503-19_Rev1

PRODUCT MODEL NO.:	RHC161LW (STR100-2)
TYPE NAME:	BlackBerry® smartphone
FCC ID:	L6ARHC160LW
IC:	2503A-RHC160LW
EMISSION DESIGNATOR (GSM):	247KGXW
EMISSION DESIGNATOR (EDGE):	246KG7W
EMISSION DESIGNATOR (WCDMA):	4M17F9W
EMISSION DESIGNATOR (LTE QPSK):	See details in Appendix
EMISSION DESIGNATOR (LTE 16QAM):	See details in Appendix

This report supersedes the report RTS-6063-1503-19 dated March 10, 2015

DATE: March 18, 2015

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

592

Report Revision History:

Rev1:

1. Editorial changes in the header.
2. Updated LTE B13/17 IC Frequency Stability in Appendix 6B and 7B.

Statement of Performance:

The BlackBerry® smartphone, model RHC161LW (STR100-2), part number DVT Rev3-01 and accessories when configured and operated per BlackBerry's operation instructions, performs within the requirements of the test standards.

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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Table of Contents

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, October 1, 2014.
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, October 1, 2014.
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, October 1, 2014.
- FCC CFR 47 Part 27, Subpart C, Technical Standards, October 1, 2014.
- Industry Canada, RSS-132 Issue 3, January 2013, Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz.
- Industry Canada, RSS-133 Issue 6, January 2013, 2 GHz Personal Communications Services.
- Industry Canada, RSS-GEN Issue 4, November 2014, General Requirements for Compliance of Radio Apparatus.
- Industry Canada, RSS-139 Issue 2, February 2009, Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz.
- Industry Canada, RSS-130 Issue 1, October 2013, Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz.

B. Associated Documents

None

C. Product Identification

Manufactured by Wistron Mobile Solutions located at:
2550 W. Golf Rd Suite 400
Rolling Meadows, IL
USA, 60008
Phone: +1 (847) 258-2611

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

BlackBerry RTS EMC test facilities

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

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

The testing was performed from February 2 to March 3 and 18, 2015.

BlackBerry® smartphone Samples Tested

Sample	Model	CER NUMBER	PIN	Software Information
1	RHC161LW (STR100-2)	DVT Rev3-01	2FFE76C5	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
2	RHC161LW (STR100-2)	DVT Rev3-01	2FFE76C5	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
3	RHC161LW (STR100-2)	DVT Rev3-01	2FFE7803	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
4	RHC161LW (STR100-2)	DVT Rev3-01	2FFE7804	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
5	RHC161LW (STR100-2)	DVT Rev3-01	2FFE780A	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518
6	RHC161LW (STR100-2)	DVT Rev3-01	2FFE7801	OS Version: 10.3.1.2174 Radio Version: 10.3.1.2175 SW Release Version: 10.3.1.1518

RF Conducted Emissions testing was performed on samples 1, 2.
Radiated Emissions testing was performed on samples 3, 4, 5, 6.

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.

E. Test Results Chart

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1051 Part 2.1057 Part 22.917 Part 24.238	RSS-132, 5.5 RSS-133, 6.5	GSM850 / PCS1900 Conducted Spurious Emissions	Pass	1A
Part 2.202 Part 2.1049 Part 22.917 Part 24.238	RSS-GEN, 6.6	GSM 850 / PCS1900 Occupied Bandwidth and Band Edge	Pass	1A
Part 2.1055 Part 22.863 Part 24.235	RSS-132, 5.3 RSS-133, 6.3	GSM 850 /PCS 1900 Frequency Stability vs. Temperature and Voltage	Pass	1B
Part 22.913(a)(2) Part 24.232(b)(c)	RSS-132, 5.4 RSS-133, 6.4	GSM850 ERP PCS1900 EIRP	Pass	1C
Part 2.1053 Part 22.917 Part 24.238	RSS-132, 5.5 RSS-133, 6.5	GSM850 / PCS1900 Radiated Spurious/Harmonic Emissions	Pass	1C
Part 2.1051 Part 22.917 Part 24.238 Part 27.53(h)	RSS-132, 5.5 RSS-133, 6.5	WCDMA Band V/II/IV Conducted Spurious Emissions	Pass	2A
Part 2.1049 Part 22.917 Part 24.238 Part 27.53(h)(1)	RSS-GEN, 6.6	WCDMA Band V/II/IV Occupied Bandwidth and Band Edge	Pass	2A
Part 2.1055(a)(d) Part 22.917 Part 24.235 Part 27.54	RSS-132, 5.3 RSS-133, 6.3	WCDMA Band V/II/IV Frequency Stability vs. Temperature and Voltage	Pass	2B
Part 22.913(a)(2) Part 24.232(c) Part 27.50(d)(4)	RSS-132, 5.4 RSS-133, 6.4	WCDMA Band V ERP WCDMA Band II EIRP WCDMA Band IV EIRP	Pass	2C
Part 22.917 Part 24.238 Part 27.53(h)	RSS-132, 5.5 RSS-133, 6.5	WCDMA Band V/II/IV Radiated Spurious/Harmonic Emissions	Pass	2C
Part 2.1051 Part 24.238(a) Part 24.50 (d)	RSS-133, 6.5	LTE Band 2 Conducted Spurious Emissions	Pass	3A
Part 2.1049 Part 24.238	RSS-GEN, 6.6	LTE Band 2 Occupied Bandwidth and Band Edge	Pass	3A
Part 24.232 (d)	RSS-133, 6.4	LTE Band 2 Peak to Average Ratio measurements	Pass	3A

Part 2.1055(a)(d) Part 24.235	RSS-133, 6.3	LTE Band 2 Frequency Stability vs. Temperature and Voltage	Pass	3B
Part 24.232(b)(c)	RSS-133, 6.4	LTE Band 2 EIRP	Pass	3C
Part 24.238	RSS-133, 6.5	LTE Band 2 Radiated Spurious/Harmonic Emissions	Pass	3C
Part 2.1051 Part 27.53(h)	RSS-139, 6.5	LTE Band 4 Conducted Spurious Emissions	Pass	4A
Part 2.1049 Part 27.53(h)(1)	RSS-GEN, 6.6	LTE Band 4 Occupied Bandwidth and Band Edge	Pass	4A
Part 27.50 (d)(5)	RSS-139, 6.4	LTE Band 4 Peak to Average Ratio measurements	Pass	4A
Part 2.1055 Part 27.54	RSS-139, 6.3	LTE Band 4 Frequency Stability vs. Temperature and Voltage	Pass	4B
Part 2.1053 Part 27.50(d)(4)	RSS-139, 6.4	LTE Band 4 EIRP	Pass	4C
Part 2.1053 Part 27.53(h)	RSS-139, 6.5	LTE Band 4 Radiated Spurious/Harmonic Emissions	Pass	4C
Part 2.1051 Part 22.917	RSS-132, 5.5	LTE Band 5 Conducted Spurious Emissions	Pass	5A
Part 2.1049 Part 22.917	RSS-GEN, 6.6	LTE Band 5 Occupied Bandwidth and Band Edge	Pass	5A
Part 2.1055(a)(d) Part 22.917	RSS-132, 5.3	LTE Band 5 Frequency Stability vs. Temperature and Voltage	Pass	5B
Part 22.913(a)(2)	RSS-132, 5.4	LTE Band 5 ERP	Pass	5C
Part 22.917	RSS-132, 5.5	LTE Band 5 Radiated Spurious/Harmonic Emissions	Pass	5C
Part 2.1051 Part 27.53(g)	RSS-130, 4.6	LTE Band 13 Conducted Spurious Emissions	Pass	6A
Part 2.1049 Part 27.53(g)	RSS-GEN, 6.6	LTE Band 13 Occupied Bandwidth and Band Edge	Pass	6A
Part 2.1055 Part 27.54	RSS-130, 4.3	LTE Band 13 Frequency Stability vs. Temperature and Voltage	Pass	6B
Part 2.1053 Part 27.50(c)(9)	RSS-130, 4.4	LTE Band 13 ERP	Pass	6C

Part 2.1053 Part 27.53(g)	RSS-130, 4.6	LTE Band 13 Radiated Spurious/Harmonic Emissions	Pass	6C
Part 2.1051 Part 27.53(g)	RSS-130, 4.6	LTE Band 17 Conducted Spurious Emissions	Pass	7A
Part 2.1049 Part 27.53(g)	RSS-GEN, 6.6	LTE Band 17 Occupied Bandwidth and Band Edge	Pass	7A
Part 2.1055 Part 27.54	RSS-130, 4.3	LTE Band 17 Frequency Stability vs. Temperature and Voltage	Pass	7B
Part 2.1053 Part 27.50(c)(9)	RSS-130, 4.4	LTE Band 17 ERP	Pass	7C
Part 2.1053 Part 27.53(g)	RSS-130, 4.6	LTE Band 17 Radiated Spurious/Harmonic Emissions	Pass	7C

F.Summary of Results

1) Conducted RF Emission Measurements

- 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) and RSS-GEN, 4.9.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) and RSS-GEN, 4.9. 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 and RSS-GEN, 4.6. The EUT was measured in GSM and EDGE mode on the low, middle and high channels. The worst case occupied bandwidth was 247 kHz on the low channel in CALL mode, and 245 kHz on low and mid channel 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 and RSS-GEN, 4.6. The EUT was measured in GSM and EDGE mode on the low, middle and high channels. The worst case occupied bandwidth was 246.0 kHz on low channel in CALL mode, and 246 kHz on the mid 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, CFR 22.917 and RSS-GEN, 4.3. 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 and RSS-GEN, 4.7. The EUT was measured in PCS1900 mode on the low, middle and high channels.
See APPENDIX1B for test data.

- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the WCDMA band V as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d) and RSS-GEN, 4.9. 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 II as per 47 CFR 2.1051, CFR 24.238(a) and RSS-GEN, 4.9. 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 Tx Conducted Spurious Emissions in the WCDMA Band IV as per 47 CFR 2.1051, CFR 27.53 and RSS-139, 6.5. 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 V as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6. . The EUT was measured in Voice and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.160 MHz on the all channels in Loopback mode, and 4.170 MHz on the mid 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 II as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6. The EUT was measured in Voice and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.165 MHz on mid channel in Loopback mode, and 4.175 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 IV as per 47 CFR 2.1051, CFR 27.53 and RSS-139, 6.5. The EUT was measured in Voice and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.165 MHz on the low channel in Loopback mode, and 4.165 MHz on the high channel in HSUPA mode.
See APPENDIX 2A for test data.

- The BlackBerry® smartphone met the requirements of the Frequency Stability in the WCDMA band V as per 47 CFR 2.1055. The EUT was measured in WCDMA band V 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 II as per 47 CFR 2.1055, CFR 24.235. The EUT was measured in WCDMA band II 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 IV as per 47 CFR 2.1055, CFR 27.54 and RSS-139, 6.3. The EUT was measured in WCDMA Band IV mode on the low, middle and high channels.
See APPENDIX 2B for test data.

- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the LTE Band 2 as per 47 CFR 2.1051, CFR 24.238, CFR 24.50(d), RSS-133, 6.5 and RSS-GEN, 4.9. The EUT was measured on the low, middle and high channels in all bandwidths for LTE Band 2 with both QPSK and 16-QAM modulations. Different Resource Block allocations were investigated; a minimum one RB case was also tested. The frequency range investigated was from 30 MHz to 20 GHz.
See APPENDIX 3A for test data.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the LTE Band 2 as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6. The EUT was measured on the low, middle and high channels in all bandwidth and both modulations. The worst case occupied bandwidth was 17.93 MHz on the middle channel in 20MHz BW, 100 RB and QPSK modulation. The worst case occupied bandwidth was 17.98 MHz on the high channel in 20MHz BW, 100 RB and 16QAM modulation.
See Appendix 3A for test data

The BlackBerry® smartphone met the requirements of the Tx Peak to Average Ratio in the LTE Band 2 as per 47 CFR 24.232 (5)(d). The EUT was measured on the low, middle and high channels in all bandwidths for LTE Band 2 with QPSK and 16-QAM modulations. Different RB allocations were also investigated, a minimum one RB case was also tested. The worst case Peak to Average Ratio was 9.1 dB on mid channel in 20MHz bandwidth with 100 RB.
See APPENDIX 3A for test data

The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 2 as per 47 CFR 2.1055, CFR 24.235 and RSS-133, 6.3. The EUT was measured in LTE Band 2 mode on the low, middle and high channels in 20MHz BW with 100 RB and QPSK modulation.
See APPENDIX 3B for test data.

- 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 and RSS-139, 6.5. The EUT was measured on the low, middle and high channels in all bandwidths for LTE Band 4 with QPSK and 16-QAM modulations. Different RB allocations were investigated, a minimum one RB 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 and RSS-GEN, 4.6. The EUT was measured on the low, middle and high channels in all bandwidths and both modulations. The worst case occupied bandwidth was 17.93 MHz on the mid channel in 20MHz BW, 100 RBs and QPSK/16QAM modulation.
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) and RSS-139, 6.4. The EUT was measured on the low, middle and high channels in all bandwidths for LTE Band 4 with QPSK and 16-QAM modulations. Different RB allocations were also investigated, a minimum one RB case was also tested. The worst case Peak to Average Ratio was 11.32 dB on middle channel in 10MHz bandwidth with 50 RBs.
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 and RSS-139, 6.3. The EUT was measured in LTE Band 4 mode on the low, middle and high channels in 20MHz BW with 100 RBs 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 5 as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d), RSS-132, 5.5 and RSS-GEN, 4.9. The EUT was measured on the low, middle and high channels in all bandwidths for LTE Band 5 with QPSK and 16-QAM modulations. Different RB allocations were investigated, a minimum one RB case was also tested. The frequency range investigated was from 30 MHz to 10 GHz.
See APPENDIX 5A for test data.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the LTE Band 5 as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6. The EUT was measured on the low, middle and high channels in 1.4MHz, 3MHz, 5MHz and 10MHz bandwidths for LTE Band 5 with QPSK and 16-QAM modulations. Different RB allocations were investigated, a minimum one RB case was also tested. The worst case occupied bandwidth was 8.94 MHz on the all channels in 10MHz BW, 50 RB and QPSK/16QAM modulation.
See APPENDIX 5A for test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 5 as per 47 CFR 2.1055, CFR 22.917 and RSS-132, 5.3. The EUT was measured on the low, middle and high channels in all bandwidths for LTE Band 5 with QPSK and 16-QAM modulations. Different RB allocations were investigated, a minimum one RB case was also tested.
See APPENDIX 5B 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 RB allocations were investigated, a minimum one RB 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 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 8.942 MHz on the mid channel in 10MHz BW, 50 RBs and QPSK modulation.
See Appendix 6A 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 (5)(d). 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 RB allocations were also investigated, a minimum one RB case was also tested. The worst case Peak to Average Ratio was 9.51 dB on middle channel in 10MHz bandwidth with 100 RBs.
See APPENDIX 6A 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 20MHz BW with 100 RB and QPSK modulation.
See APPENDIX 6B for test data.

- The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions in the LTE Band 17 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 17 with QPSK and 16-QAM modulations. Different RB allocations were investigated, a minimum one RB case was also tested. The frequency range investigated was from 30 MHz to 20 GHz.
See Appendix 7A for test data

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask in the LTE Band 17 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 8.966MHz on the low and high channels in 10MHz BW, 50 RBs and QPSK/16QAM modulation.
See Appendix 7A for test data

The BlackBerry® smartphone met the requirements of the Tx Peak to Average Ratio in the LTE Band 17 as per 47 CFR 27.50 (5)(d). The EUT was measured on the low, middle and high channels in 5MHz and 10MHz bandwidths for LTE Band 17 with QPSK and 16-QAM modulations. Different RB allocations were also investigated, a minimum one RB case was also tested. The worst case Peak to Average Ratio was 10.48 dB on middle channel in 10MHz bandwidth with 100 RBs.
See APPENDIX 7A for test data

The BlackBerry® smartphone met the requirements of the Frequency Stability in the LTE Band 17 as per 47 CFR 2.1055, CFR 27.54. The EUT was measured in LTE Band 17 mode on the low, middle and high channels in 20MHz BW with 100 RBs and QPSK modulation.
See APPENDIX 7B for test data.

2) Radiated Emission Measurements

The radiated spurious emissions, harmonics and ERP/EIRP were measured for GSM 850 and PCS 1900. The results are within the required 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. 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 (herein referred to as EUT) was then substituted with an antenna placed in the same location as the EUT. A Dipole antenna was used for the ERP measurements and 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 signal generator output was then adjusted to match the EUT output reading. The signal generator output was recorded.

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

a) The radiated spurious emissions/harmonics and ERP/EIRP were measured for GSM 850 and PCS 1900. The results are within the limits.

- The highest ERP in the 850 band Call mode measured was 31.35 dBm (1.36 W) at 848.80 MHz (channel 251)

- The highest ERP in the 850 band EDGE mode measured was 27.76 dBm (0.60 W) at 824.20 MHz (channel 128).

- The highest EIRP in the PCS band Call mode measured was 32.49 dBm (1.77 W) at 1909.80 MHz (channel 810).

- The highest EIRP in the PCS band EDGE mode measured was 29.95 dBm (0.99 W) at 1909.80 MHz (channel 810).

The radiated spurious emission and carrier harmonics were measured up to the 10th harmonic for low, middle, and high channels in the GSM 850 and PCS 1900. Each band was measured in CALL and EDGE modes, with both the horizontal and vertical polarizations.

- The worst margin was 21.0 dB below the limit at 2546.416 MHz in Call mode in GSM850 band.
- The worst margin was 20.0 dB below the limit at 2472.58 MHz in EDGE mode in GSM850 band.
- All margins in the PCS1900 for harmonic emissions were at least 25 dB below the limit for all test frequencies in CALL mode.
- All margins in the PCS1900 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 V/II/IV.

- The highest ERP in the WCDMA band V, Call Service mode was 23.33 dBm (0.22 W) at 846.60 MHz (channel 4233).
- The highest ERP in the WCDMA band V, HSUPA mode was 21.71 dBm (0.15 W) at 846.60 MHz (channel 4233).
- The highest EIRP in the WCDMA band II, Call Service mode measured was 29.41 dBm (0.87 W) at 1880.0 MHz (channel 9400).
- The highest EIRP in the WCDMA band II, HSUPA mode measured was 28.43 dBm (0.70 W) at 1880.0 MHz (channel 9400).
- The highest EIRP in the WCDMA band IV, Call Service mode measured was 28.63 dBm (0.73 W) at 1712.4 MHz (channel 1312).
- The highest EIRP in the WCDMA band IV, HSUPA mode measured was 27.14 dBm (0.52 W) at 1712.4 MHz (channel 1312).

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the WCDMA Band V, WCDMA Band II, and WCDMA Band IV. Each band was measured in Call, and HSUPA modes. Both the horizontal and vertical polarizations were measured.

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

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

- All margins in the WCDMA Band IV 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 were measured for LTE Band 2.

The EUT was measured on the low, middle and high channels in 20MHz bandwidths for LTE Band 2 with QPSK and 16-QAM modulations. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- The highest EIRP in the LTE Band 2 measured was 25.52 dBm (0.36 W) at 1880.00 MHz (channel 18900) in 20 MHz BW, 1 RB and QPSK modulation and
- The highest EIRP in the LTE Band 2 measured was 25.01 dBm (0.32 W) at 1880.00 MHz (channel 18900) in 20 MHz BW, 1 RB 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 the worst bandwidth 15MHz bandwidth for LTE Band 2 with QPSK and 16-QAM modulations as per conducted power. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- The worst margin was 21.9 dB below the limit at 3799.764 MHz in QPSK mode in LTE Band 2.

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

See Appendix 3C for test data.

d) The radiated spurious emissions/harmonics and ERP were measured for LTE Band 5.

The EUT was measured on the low, middle and high channels in 10 MHz bandwidth for LTE Band 5 with QPSK and 16-QAM modulations. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- The highest EIRP in the LTE Band 5 measured was 23.92 dBm (0.25 W) at 836.50 MHz (channel 20525) in 5 MHz BW, 1 RB and QPSK modulation.

- The highest EIRP in the LTE Band 5 measured was 22.57 dBm (0.18 W) at 834.00 MHz (channel 20500) in 10 MHz BW, 1 RB 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 the worst bandwidth 3MHz bandwidths for LTE Band 5 with QPSK and 16-QAM modulations as per conducted

power. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- All margins in the LTE Band 5 for harmonic emissions were at least 25 dB below the accepted limits for all test frequencies.

See Appendix 4C for test data.

e) The radiated spurious emissions/harmonics and ERP were measured for LTE Band 4.

The EUT was measured on the low, middle and high channels in 1.4MHz, 5MHz and 20MHz bandwidths for LTE Band 4 with QPSK and 16-QAM modulations. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- The highest EIRP in the LTE Band 4 measured was 28.13 dBm (0.65 W) at 1712.50 MHz (channel 19975) in 5MHz BW, 1 RB and QPSK modulation.
- The highest EIRP in the LTE Band 4 measured was 27.20 dBm (0.52 W) at 1744.90 MHz (channel 20299) in 20MHz BW, 1 RB and 16-QAM modulation.

The radiated carrier harmonics were measured up to the 10^{th} harmonic. The EUT was measured on the low, middle and high channels in the worst bandwidth 5MHz bandwidth for LTE Band 4 with QPSK and 16-QAM modulations as per conducted power. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- All margins in the LTE Band 4 for harmonic emissions were at least 25 dB below the limit for all test frequencies.

See Appendix 5C for test data.

f) The radiated spurious emissions/harmonics and ERP were measured for LTE Band 13.

The EUT was measured on the low, middle and high channels in 5MHz and 10MHz bandwidths for LTE band 17 with QPSK and 16-QAM modulations. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- The highest EIRP in the LTE band 13 measured was 24.36 dBm (0.27 W) at 779.50 MHz (channel 23205) in 5MHz BW, 1 RB and QPSK modulation.
- The highest EIRP in the LTE band 13 measured was 23.08 dBm (0.20 W) at 779.50 MHz (channel 23205) in 5MHz BW, 1 RB 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 the worst bandwidth 10MHz bandwidth for LTE Band 13 with QPSK and 16-QAM modulations as per conducted power. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- All margins in the LTE Band 13 for harmonic emissions were at least 25 dB below the limit for all test frequencies.

See Appendix 6C for test data.

g) The radiated spurious emissions/harmonics and ERP were measured for LTE Band 17.

The EUT was measured on the low, middle and high channels in 5MHz and 10 MHz bandwidths for LTE band 17 with QPSK and 16-QAM modulations. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- The highest EIRP in the LTE band 17 measured was 19.63 dBm (0.09 W) at 710.00 MHz (channel 23780) in 5MHz BW, 1 RB and QPSK modulation.
- The highest EIRP in the LTE band 17 measured was 18.65 dBm (0.07 W) at 710.90 MHz (channel 23799) in 10MHz BW, 1 RB 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 the worst bandwidth 10 MHz bandwidth for LTE Band 17 with QPSK and 16-QAM modulations as per conducted power. Worst RB case was tested. Both the horizontal and vertical polarizations were measured.

- All margins in the LTE Band 17 for harmonic emissions were at least 25 dB below the limit for all test frequencies.

See Appendix 7C for test data.

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:

- GSM 850 + Bluetooth(DH5) + 802.11b
- PCS 1900 + Bluetooth(2DH5) + 802.11ac
- WCDMA Band II + Bluetooth(3DH5)+ 802.11n(2.4GHz).
- WCDMA Band IV + Bluetooth(DH5) + 802.11b
- WCDMA Band V + Bluetooth(2DH5) + 802.11g
- LTE B2 + Bluetooth(3DH5) + 802.11n
- LTE B4 + Bluetooth(DH5) + 802.11b
- LTE B5 + Bluetooth(2DH5) + 802.11g
- LTE B13 + Bluetooth(DH5) + 802.11b
- LTE B17 + Bluetooth(2DH5) + 802.11g

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 ±4.3 dB

G. Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Preamplifier	Sonoma	310N/11909A	185831	15-10-22	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	15-10-22	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	15-10-23	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	15-09-10	Radiated Emissions
Hybrid Log Antenna	EMC Automation	HLP-3003C	017301	16-02-03	Radiated Emissions
Horn Antenna	EMC Automation	HRN-0118	030101	16-08-14	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	16-09-29	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	16-11-27	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	15-12-09	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	112394	15-12-05	Radiated Emission
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	101469	16-11-27	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	109949	16-11-27	Radiated Emission
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	15-12-11	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESU-40	100162	15-12-08	Radiated Emissions
Environment Monitor	Omega	iTHX-SD	0380561	16-11-15	Radiated Emissions
Environment Monitor	Omega	iTHX-SD	0340060	16-11-15	RF Conducted Emissions
Environment Monitor	Omega	iTHX-SD	0380567	16-11-15	Radiated Emissions

Compliance Test Equipment Used cont'd

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Signal Generator	Agilent	E8257D	MY45140527	15-12-10	Radiated Emissions
Signal Generator	Agilent	83630B	3844A00927	15-11-23	Radiated Emissions
Spectrum Analyzer	Rohde & Schwarz	FSV	101820	15-11-21	RF Conducted Emissions
Spectrum Analyzer	Rohde & Schwarz	FSP	100884	15-11-21	RF Conducted Emissions

H. Test Software used

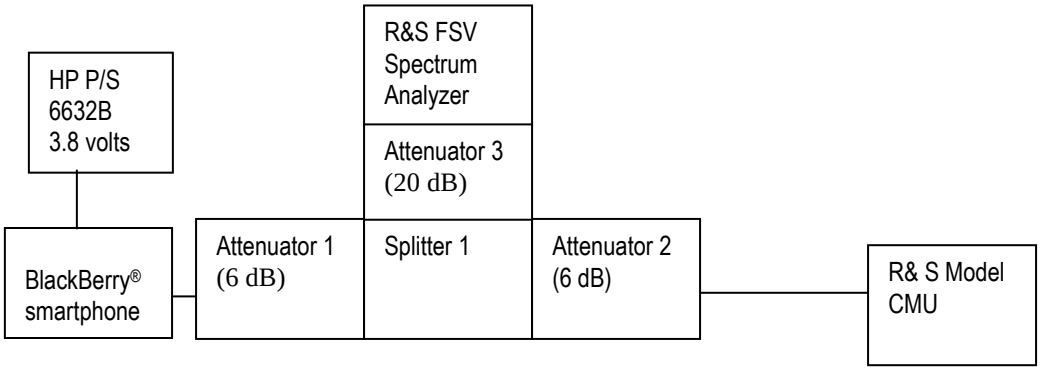
SOFTWARE	COMPANY	VERSION	USE
EMC32	Rohde & Schwarz	8.53.0	Radiated Emissions
TDK Standard Emission Test	TDK RF Solutions	8.53.1.62	Radiated Emissions

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

Test Date: Feb 2, 2015

The environmental test conditions were:

Temperature: 25.1 ºC
Relative Humidity: 14.3 %

The following measurements were performed by Sijia Li.

GSM Conducted RF Emission Test Data cont'd

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 269kHz, and for the PCS1900 band was measured to be 274kHz 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	263	**247**
837.6	269	246
848.8	255	243

PCS1900 band Frequency (MHz)	-26dBc Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	263	**246**
1880.0	274	244
1909.8	256	244

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.
See figures 1-51a to 1-53a for the plots of Peak to Average Ratio.

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	**245**
837.6	**245**
848.8	244

PCS1900 band Frequency (MHz)	99% Occupied Bandwidth (kHz)
1850.2	244
1880.0	**246**
1909.8	244

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

GSM Conducted RF Emission Test Data cont'd

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

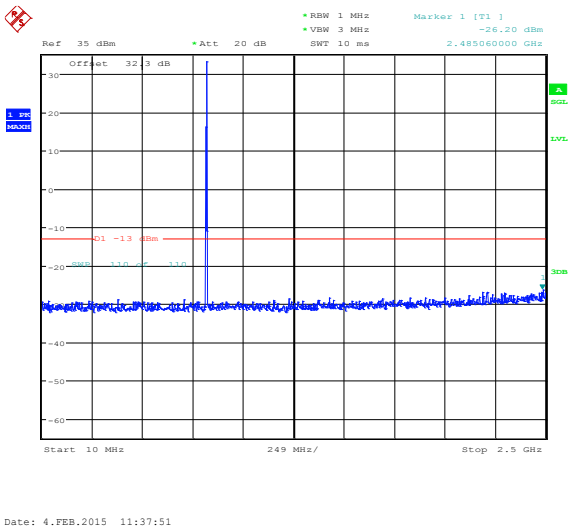


Figure 1-1a: GSM850 band, Spurious Conducted Emissions, Low channel

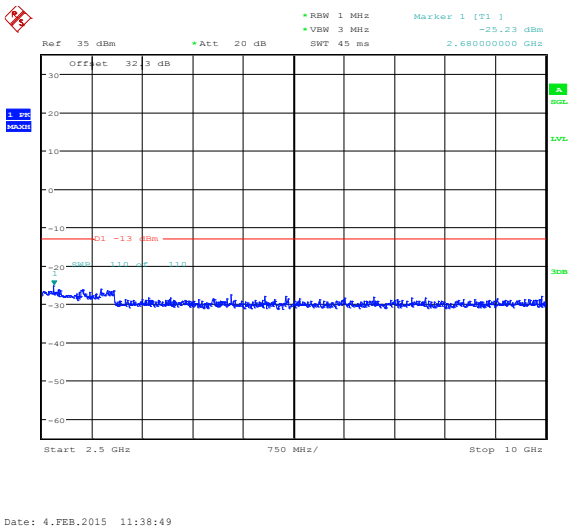


Figure 1-2a: GSM850 band, Spurious Conducted Emissions, Middle Channel

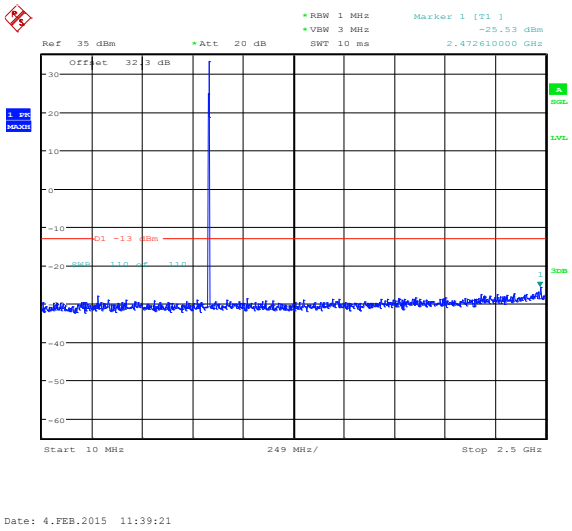
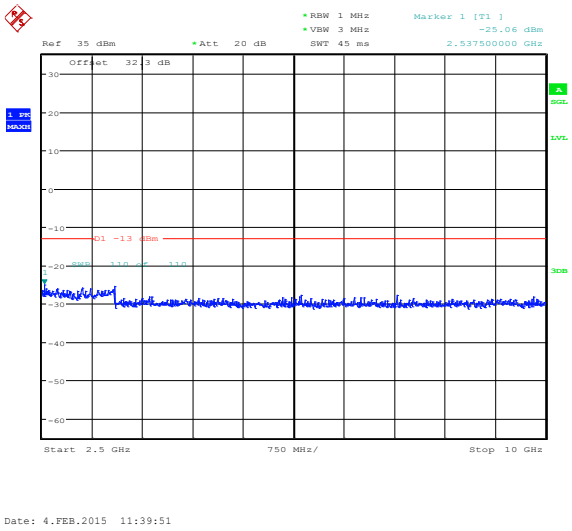


Figure 1-3a: GSM850 band, Spurious Conducted Emissions, Middle Channel



GSM Conducted RF Emission Test Data cont'd

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

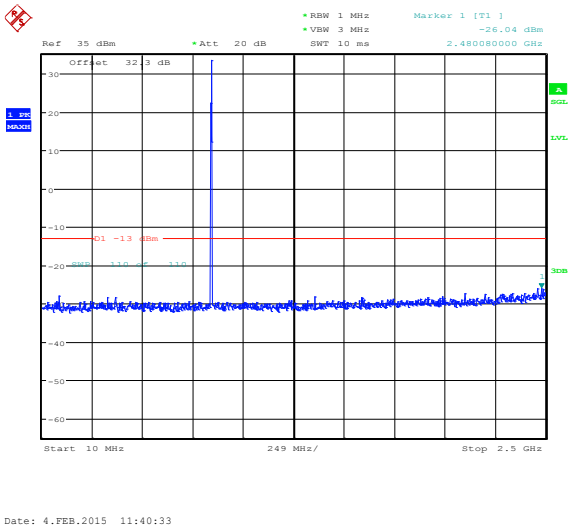


Figure 1-5a: GSM850 band, Spurious Conducted Emissions, High Channel

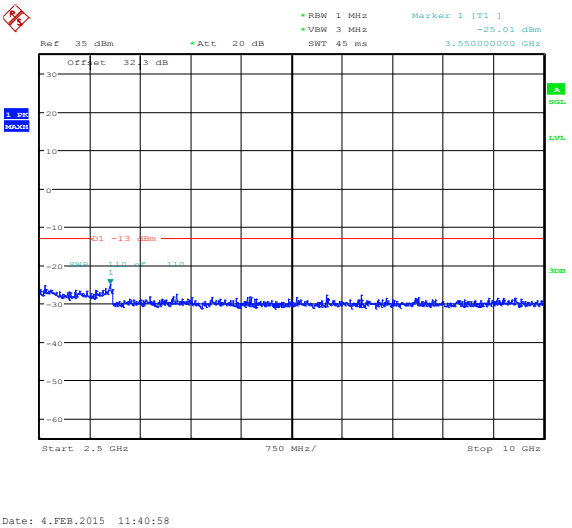


Figure 1-7a: PCS1900 band, Spurious Conducted Emissions, Low Channel

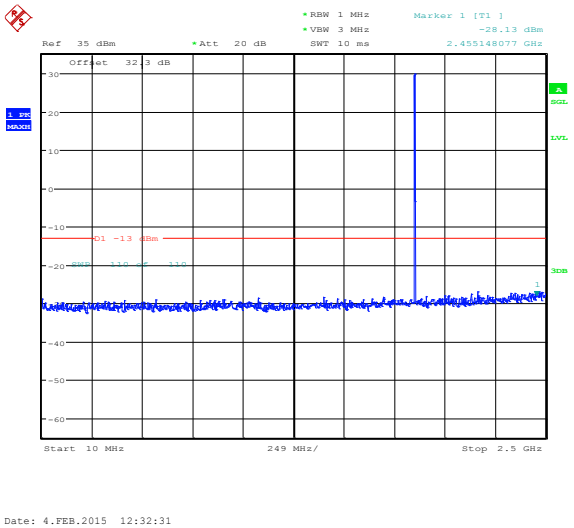
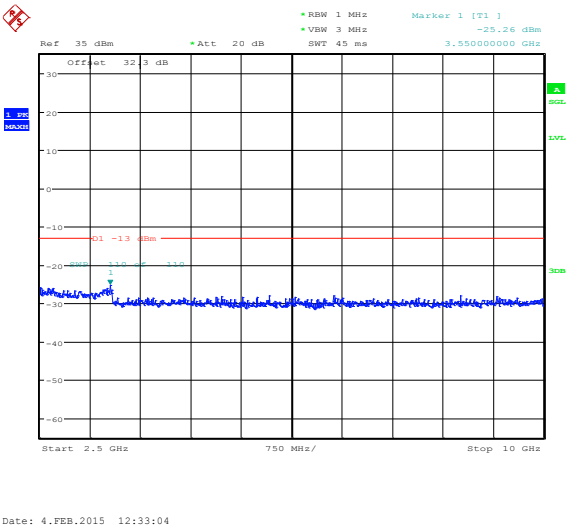


Figure 1-8a: PCS1900 band, Spurious Conducted Emissions, Low Channel



GSM Conducted RF Emission Test Data cont'd

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

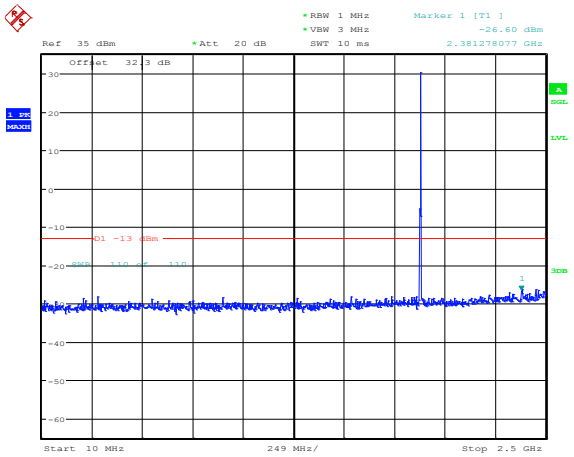


Figure 1-10a: PCS1900 band, Spurious Conducted Emissions, Middle Channel

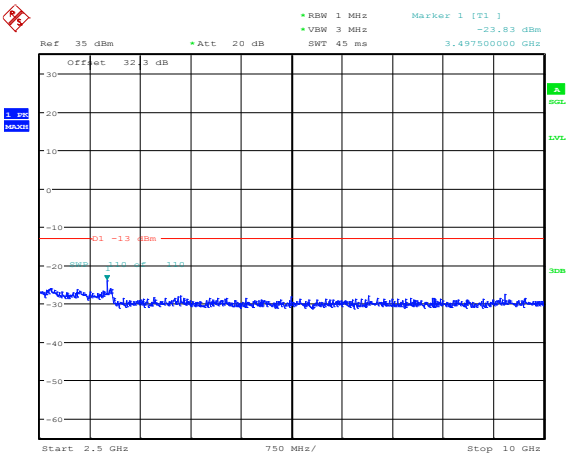


Figure 1-11a: PCS1900 band, Spurious Conducted Emissions, High Channel

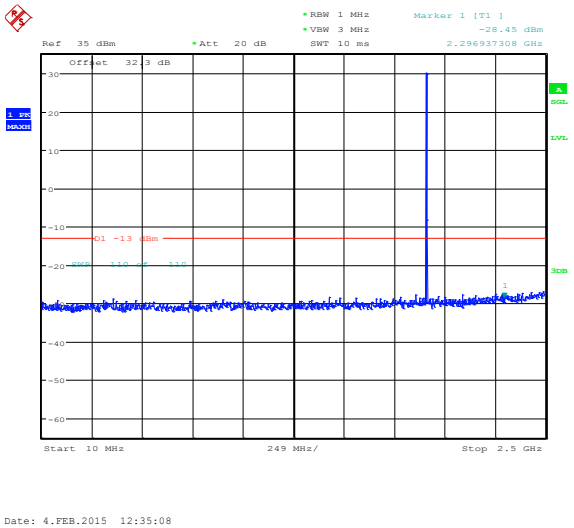
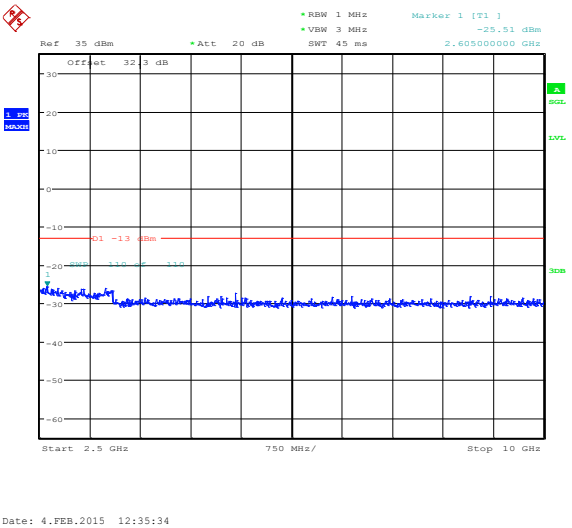


Figure 1-12a: PCS1900 band, Spurious Conducted Emissions, High Channel



GSM Conducted RF Emission Test Data cont'd

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

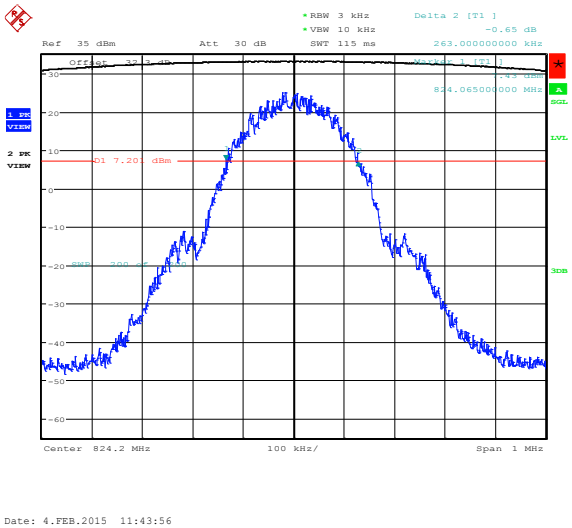


Figure 1-14a: Occupied Bandwidth, GSM850 band Low Channel in GSM mode

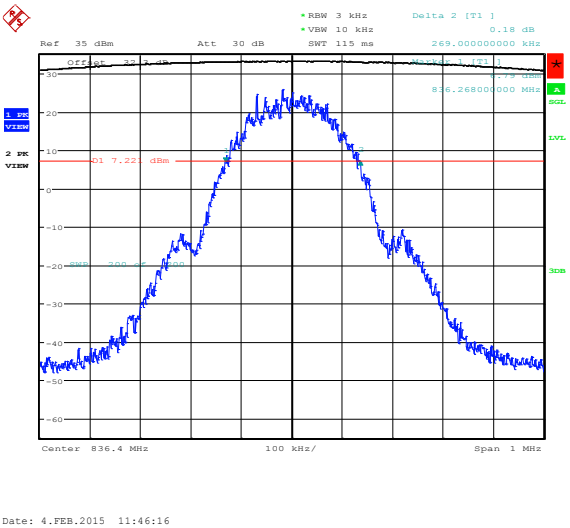


Figure 1-15a: -26dBc bandwidth, GSM850 band Middle Channel in GSM mode

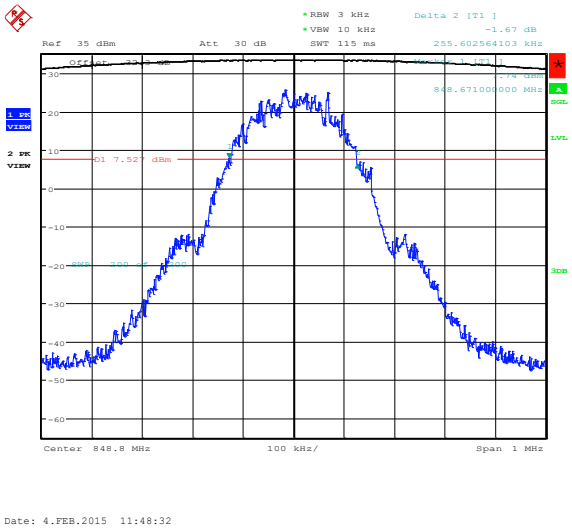
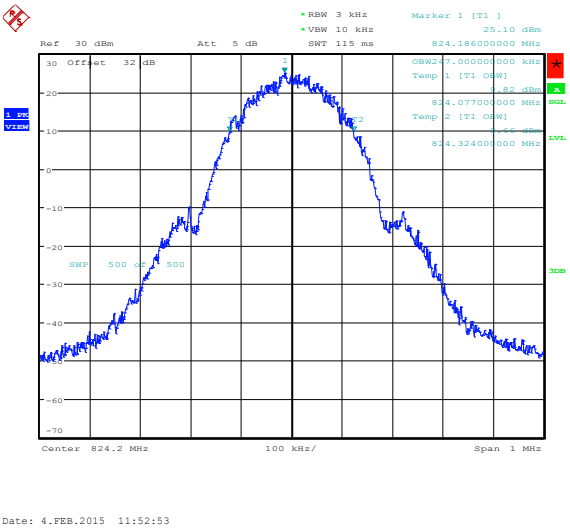


Figure 1-16a: Occupied Bandwidth, GSM850 band Middle Channel in GSM mode



GSM Conducted RF Emission Test Data cont'd

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

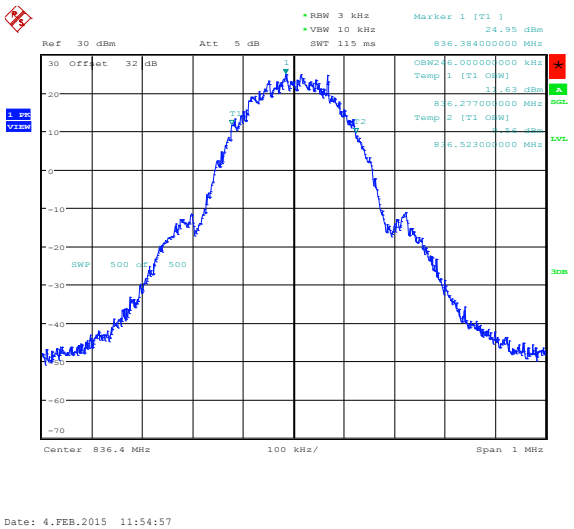


Figure 1-18a: Occupied Bandwidth, GSM850 band High Channel in GSM mode

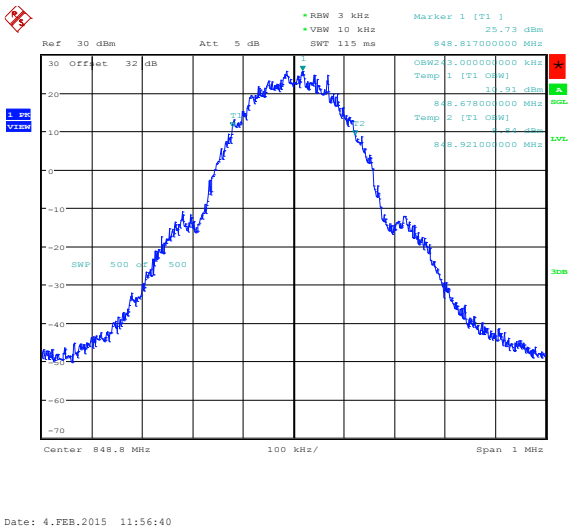


Figure 1-19a: -26dBc bandwidth, PCS1900 Low Channel in GSM mode

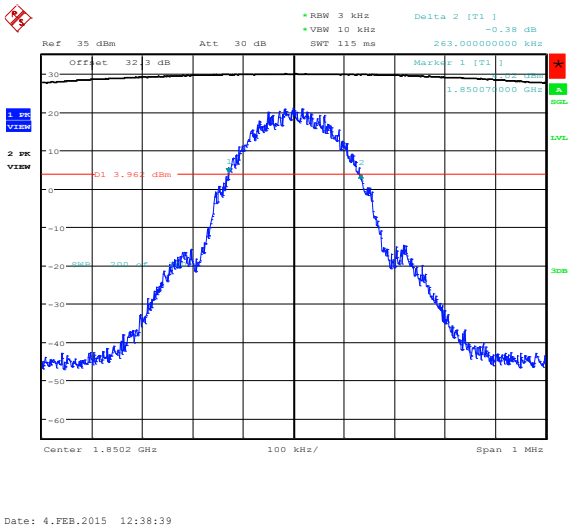
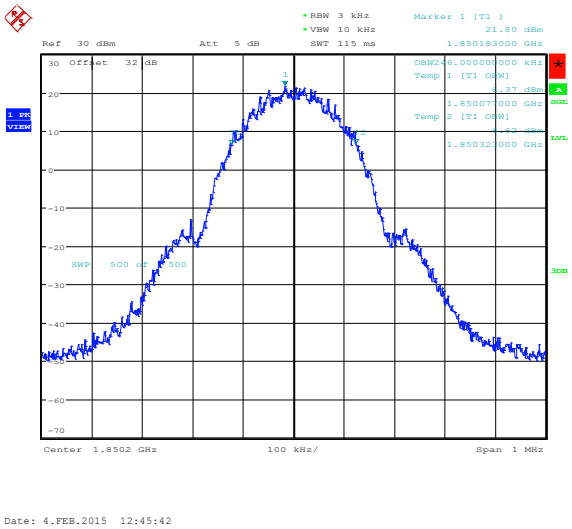


Figure 1-20a: Occupied Bandwidth, PCS1900 Low Channel in GSM mode



GSM Conducted RF Emission Test Data cont'd

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

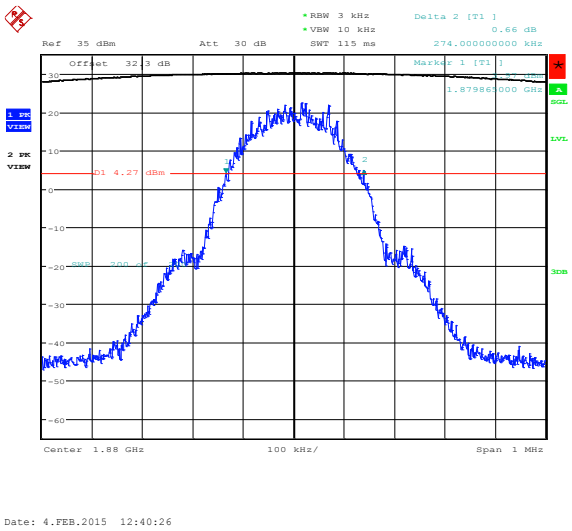


Figure 1-22a: Occupied Bandwidth, PCS1900 Middle Channel in GSM mode

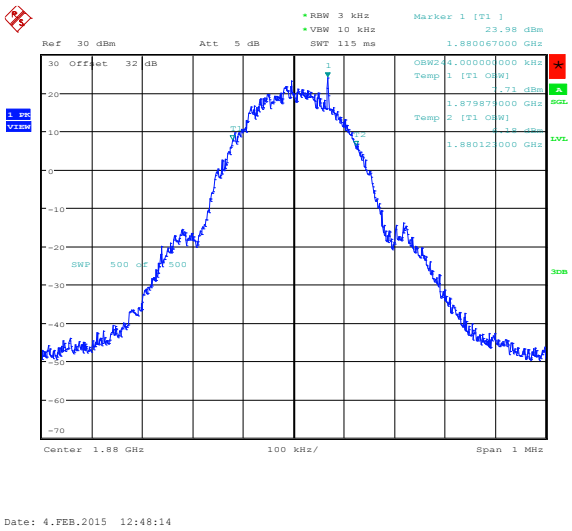


Figure 1-23a: -26dBc bandwidth, PCS1900 High Channel in GSM mode

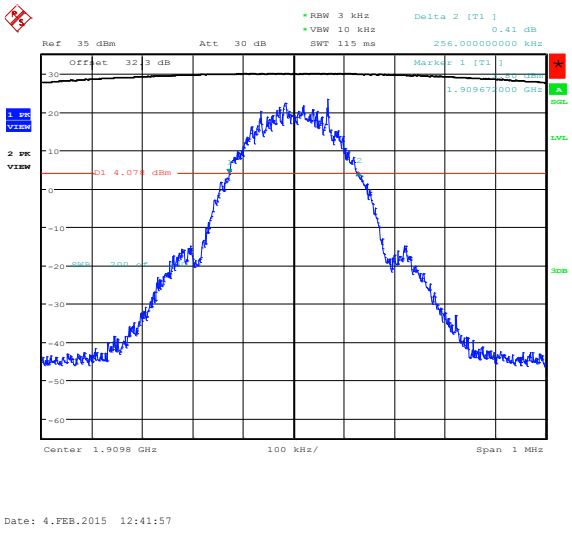
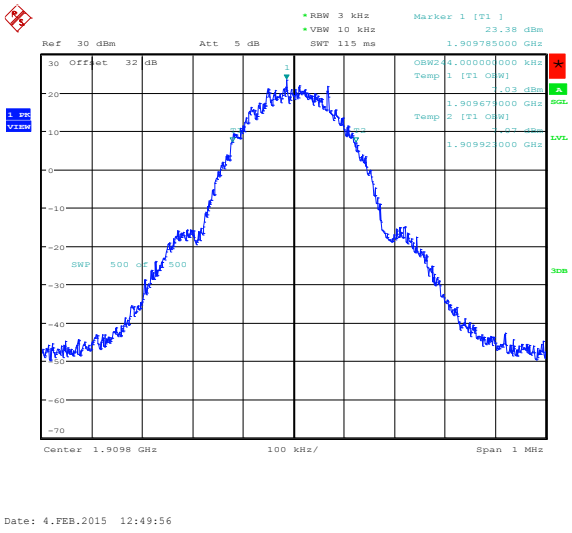


Figure 1-24a: Occupied Bandwidth, PCS1900 High Channel in GSM mode



GSM Conducted RF Emission Test Data cont'd

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

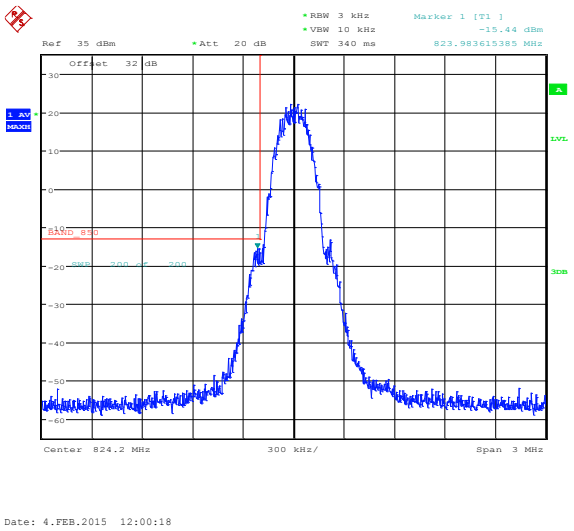


Figure 1-26a: GSM850 band High Channel Mask in GSM mode

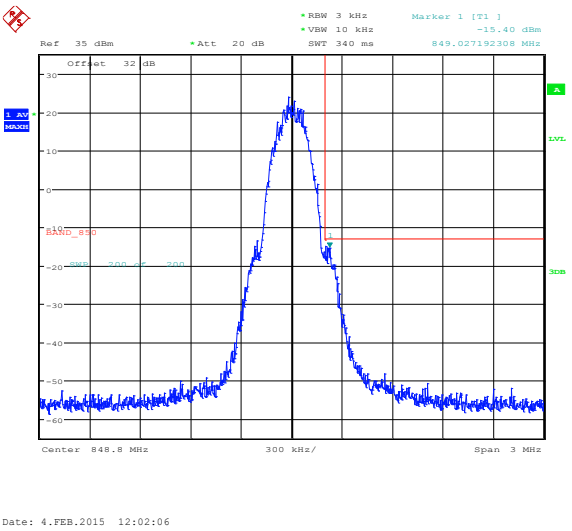


Figure 1-27a: PCS1900, Low Channel Mask in GSM mode

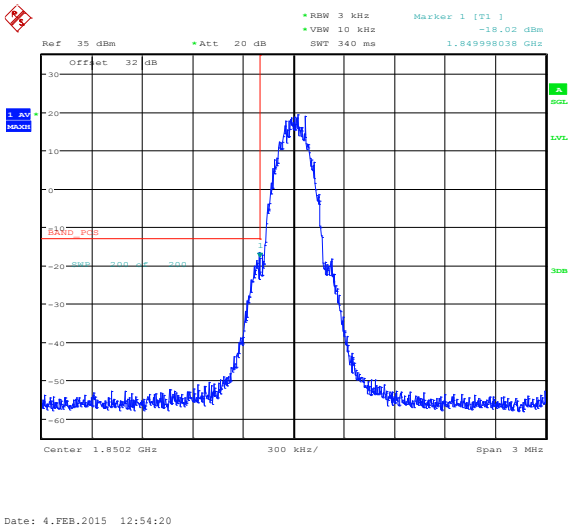
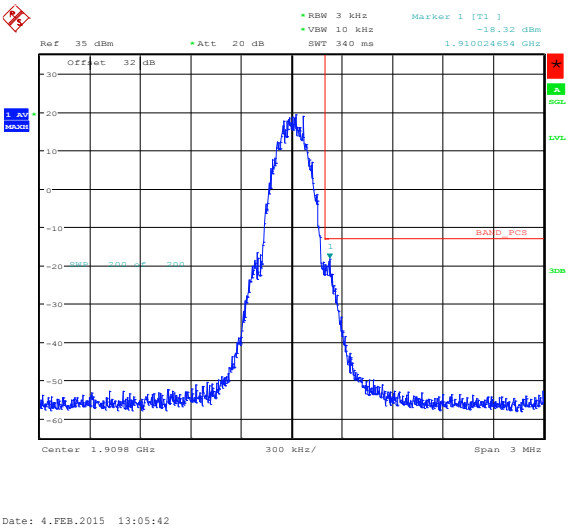


Figure 1-28a: PCS1900, High Channel Mask in GSM mode



GSM Conducted RF Emission Test Data cont'd

Figure 1-51a: PCS1900 Band, PAR Low Channel

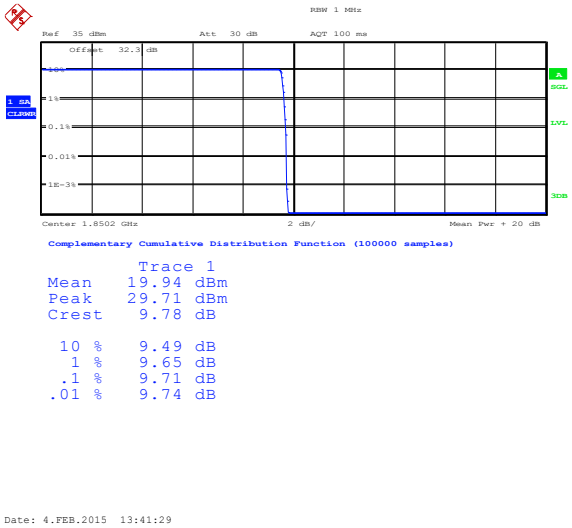


Figure 1-52a: PCS1900 Band, PAR Mid Channel

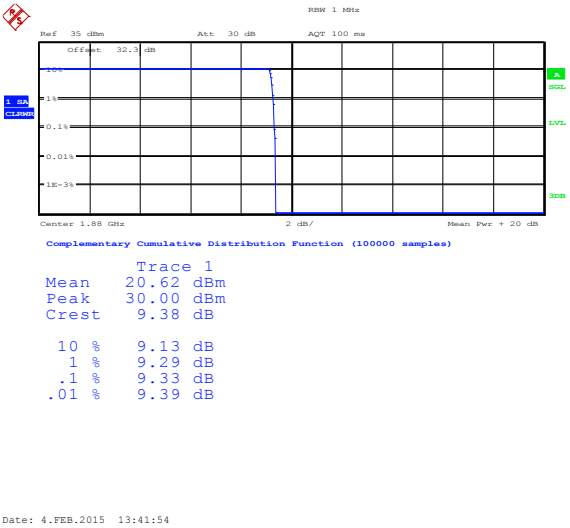
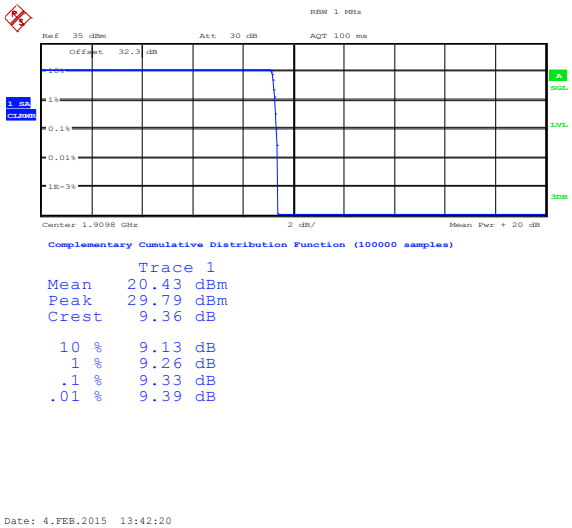
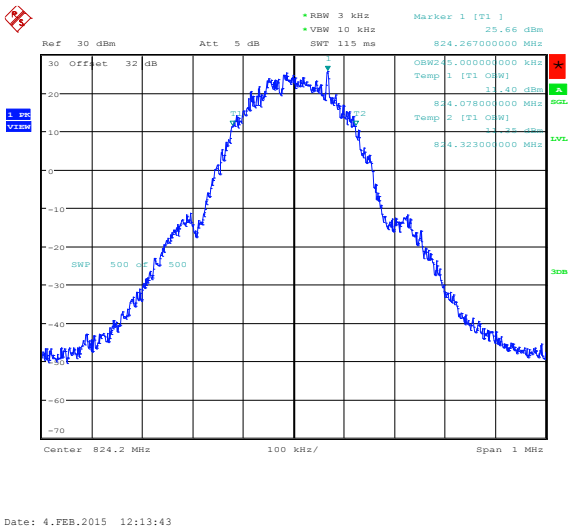


Figure 1-53a: PCS1900 Band, PAR High Channel



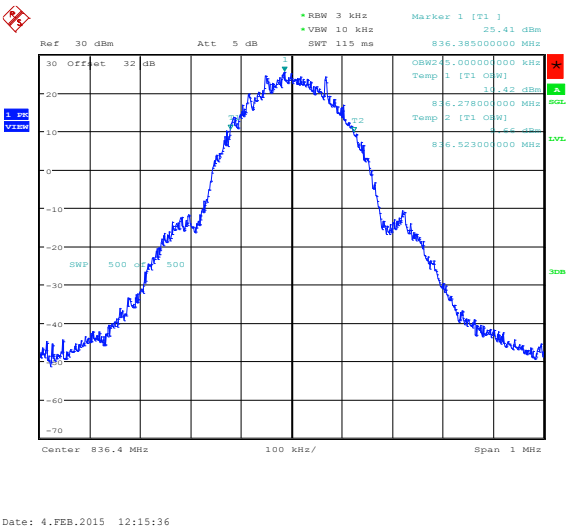
GSM Conducted RF Emission Test Data cont'd

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



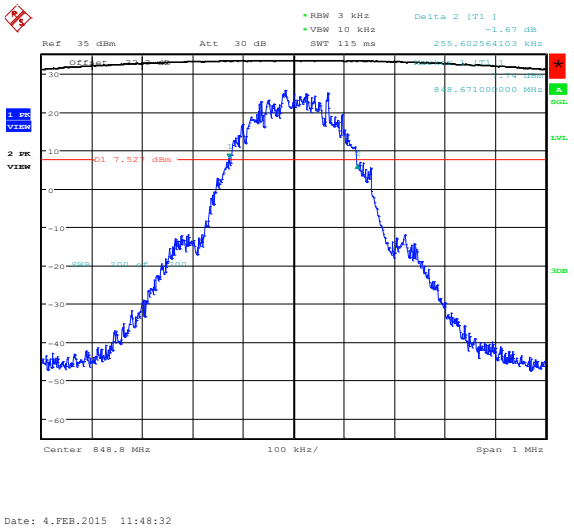
Date: 4.FEB.2015 12:13:43

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



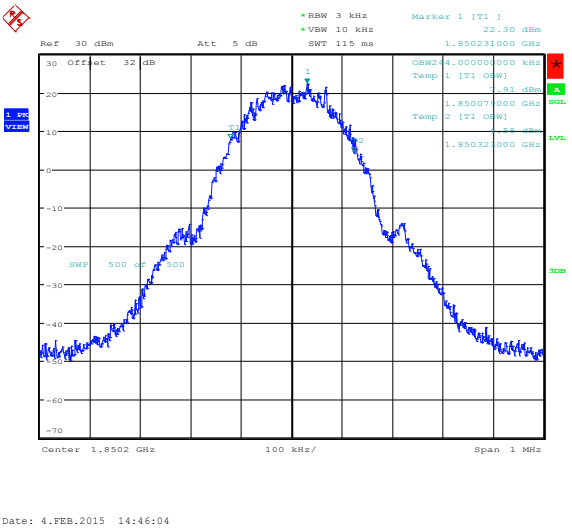
Date: 4.FEB.2015 12:15:36

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



Date: 4.FEB.2015 11:48:32

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



Date: 4.FEB.2015 14:46:04

GSM Conducted RF Emission Test Data cont'd

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

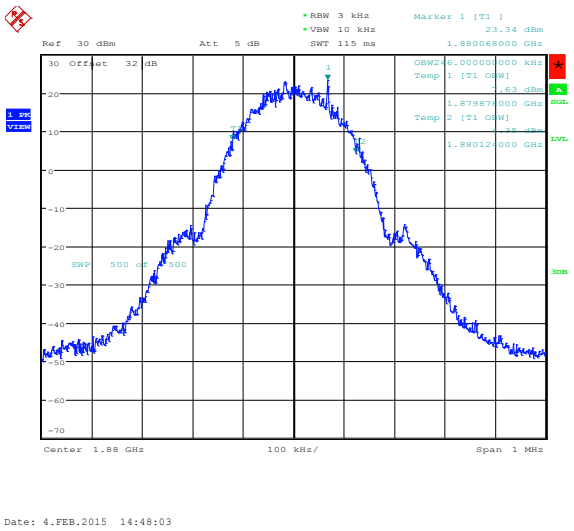


Figure 1-34a: Occupied Bandwidth, PCS1900 Band, High Channel in EDGE mode

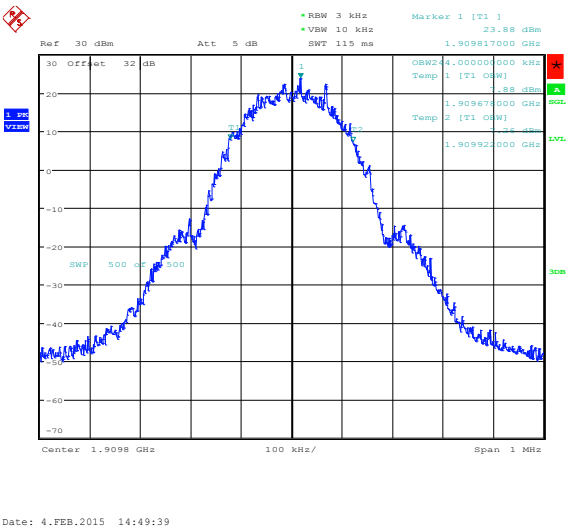


Figure 1-35a: GSM850 Band, Low Channel Mask in EDGE mode

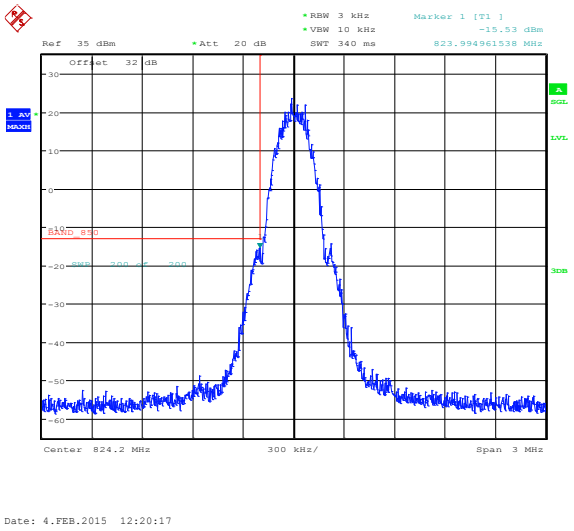
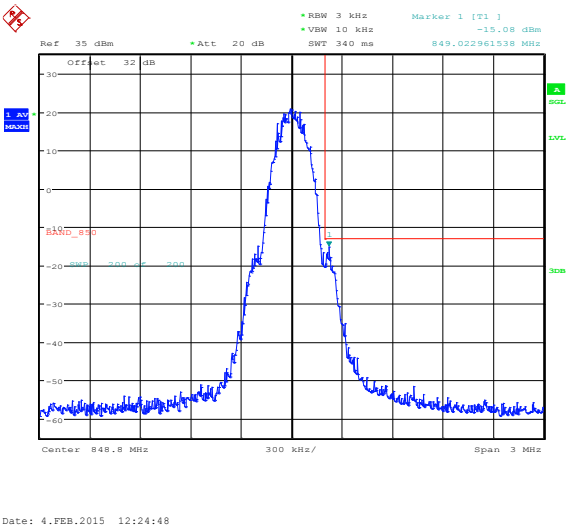


Figure 1-36a: GSM850 Band, High Channel Mask in EDGE mode



GSM Conducted RF Emission Test Data cont'd

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

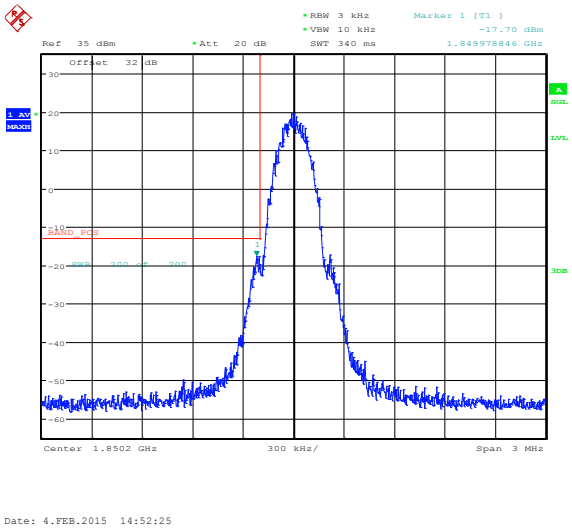
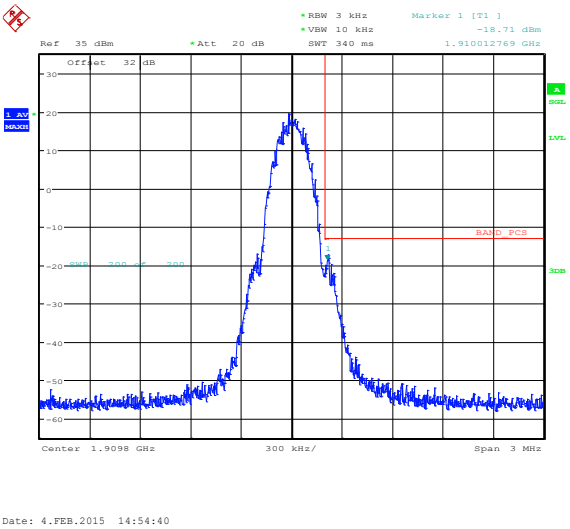


Figure 1-38a: PCS1900 Band, High Channel Mask in EDGE mode



GSM Conducted RF Emission Test Data cont'd

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

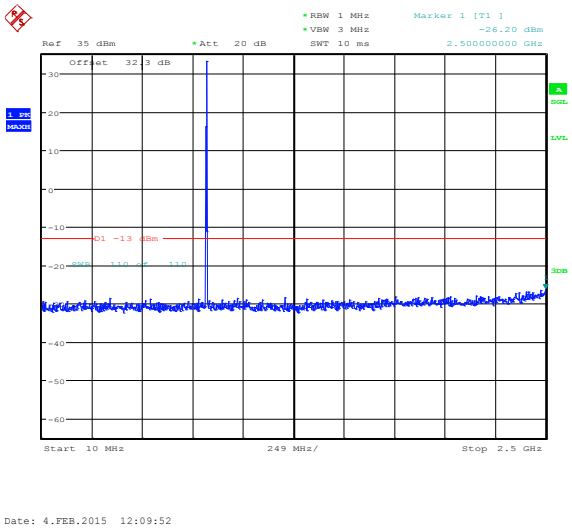


Figure 1-40a: GSM850 band, Spurious Conducted Emissions, Low channel in Edge Mode

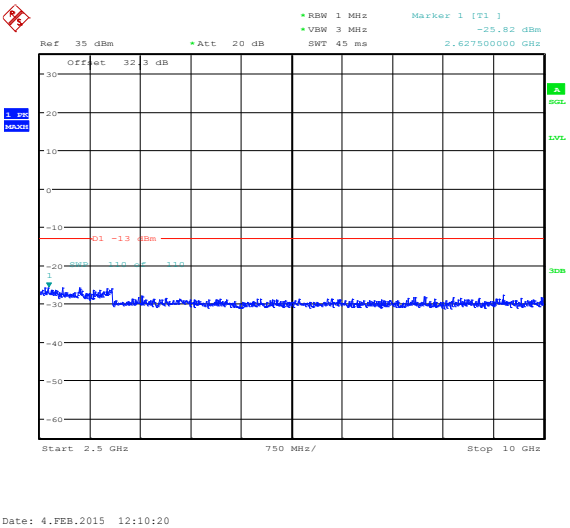


Figure 1-41a: GSM850 band, Spurious Conducted Emissions, Middle channel in Edge Mode

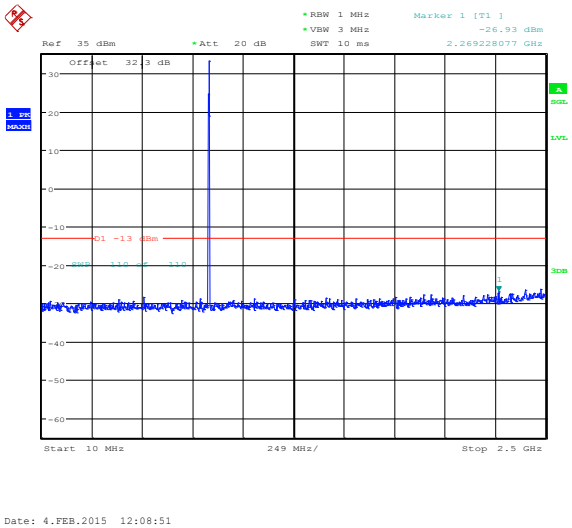
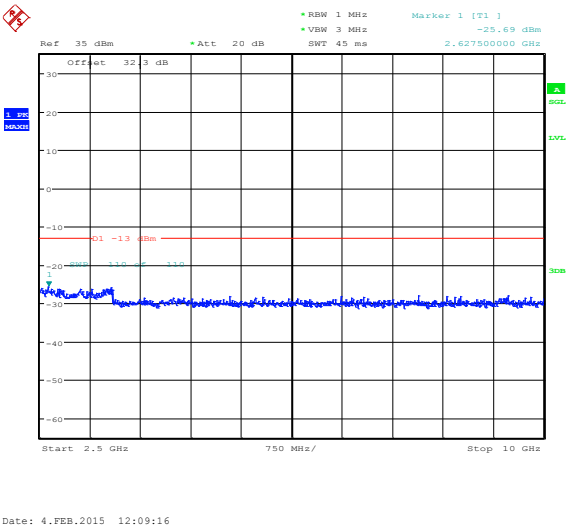


Figure 1-42a: GSM850 band, Spurious Conducted Emissions, Middle channel in Edge Mode



GSM Conducted RF Emission Test Data cont'd

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

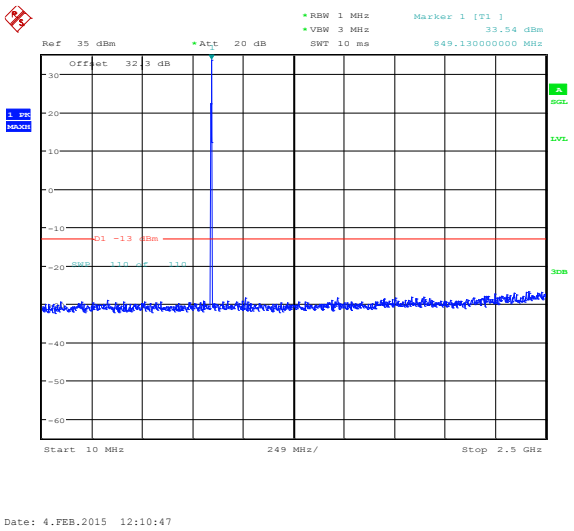


Figure 1-44a: GSM850 band, Spurious Conducted Emissions, High channel in Edge Mode

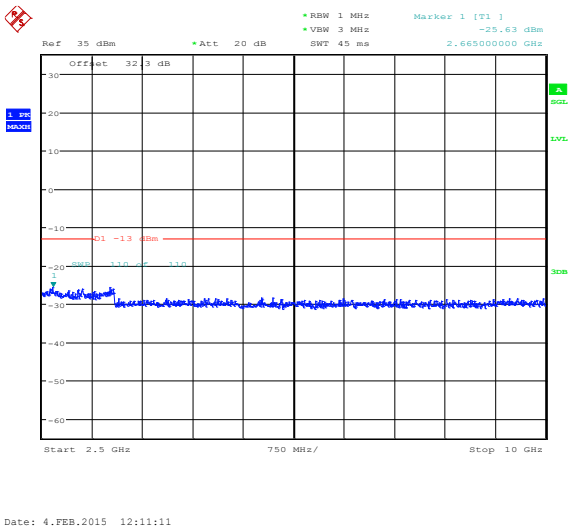


Figure 1-45a: PCS1900 band, Spurious Conducted Emissions, Low channel in Edge Mode

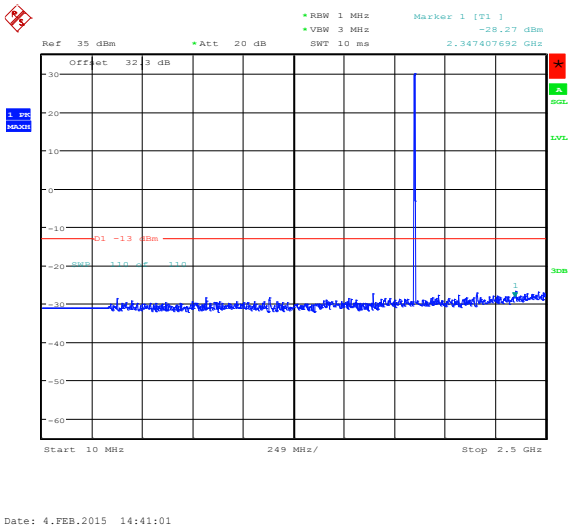
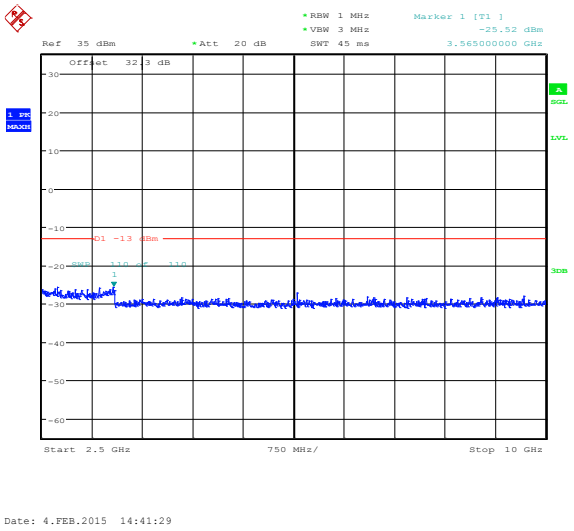


Figure 1-46a: PCS1900 band, Spurious Conducted Emissions, Low channel in Edge Mode



GSM Conducted RF Emission Test Data cont'd

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

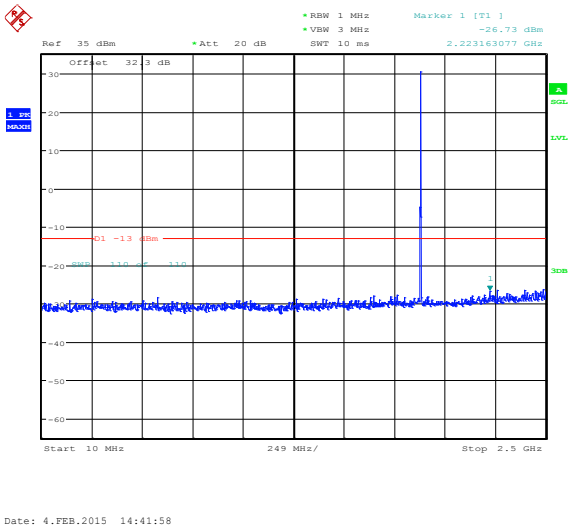


Figure 1-48a: PCS1900 band, Spurious Conducted Emissions, middle channel in Edge Mode

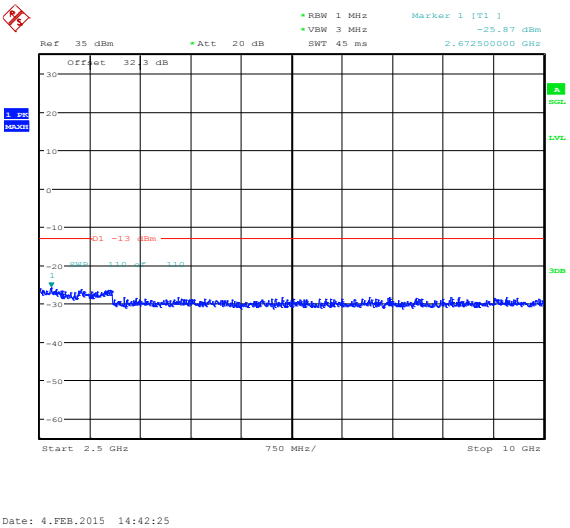


Figure 1-49a: PCS1900 band, Spurious Conducted Emissions, High channel in Edge Mode

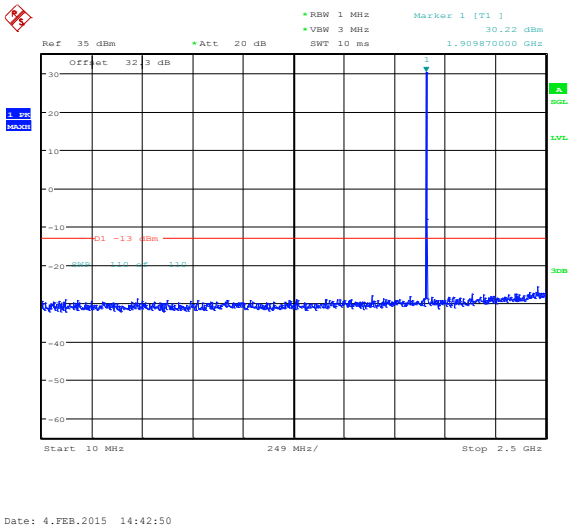
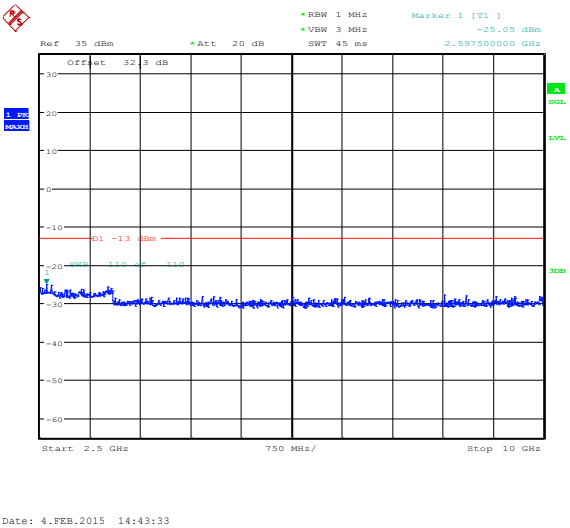
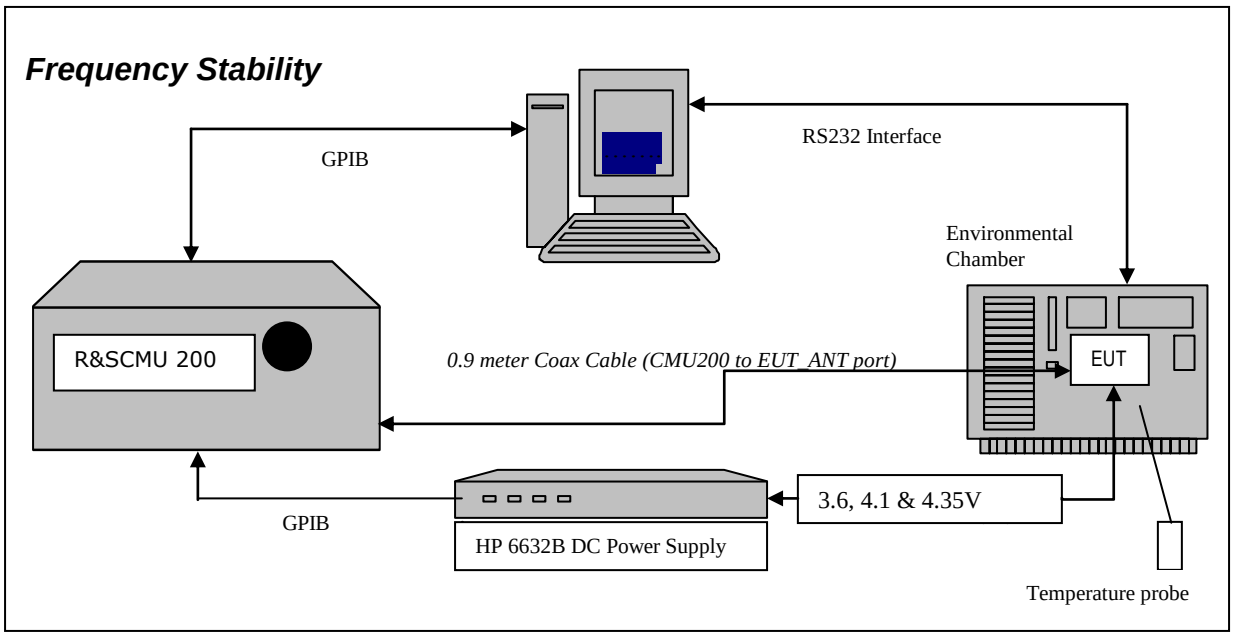


Figure 1-50a: PCS1900 band, Spurious Conducted Emissions, High channel in Edge Mode



APPENDIX 1B – GSM FREQUENCY STABILITY TEST DATA

GSM Frequency Stability Test Data



The measurements were performed by Sijia Li.

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 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.

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.

Procedure:

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

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

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

The maximum frequency error in the GSM850 band measured was -0.0348 PPM.
The maximum frequency error in the PCS1900 band measured was -0.0191PPM.

Date of Test: Feb 3, 2015

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	-14.79	-0.0179
189	836.40	3.6	20	-9.43	-0.0113
251	848.60	3.6	20	-12.40	-0.0146

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.1	20	-12.33	-0.0150
189	836.40	4.1	20	-12.91	-0.0154
251	848.60	4.1	20	-8.72	-0.0103

Traffic Channel Number	GSM850 Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.20	4.35	20	-15.05	-0.0183
189	836.40	4.35	20	-12.59	-0.0151
251	848.60	4.35	20	-17.56	-0.0207

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	6.52	0.0079
128	824.20	3.6	-20	-14.27	-0.0173
128	824.20	3.6	-10	-7.81	-0.0095
128	824.20	3.6	0	-15.76	-0.0191
128	824.20	3.6	10	-19.89	-0.0241
128	824.20	3.6	20	-14.79	-0.0179
128	824.20	3.6	30	-15.37	-0.0186
128	824.20	3.6	40	-6.91	-0.0084
128	824.20	3.6	50	-11.75	-0.0143
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
128	824.20	4.1	-30	-20.15	-0.0244
128	824.20	4.1	-20	-10.65	-0.0129
128	824.20	4.1	-10	-9.88	-0.0120
128	824.20	4.1	0	-14.53	-0.0176
128	824.20	4.1	10	-19.11	-0.0232
128	824.20	4.1	20	-12.33	-0.0150
128	824.20	4.1	30	-13.37	-0.0162
128	824.20	4.1	40	-12.98	-0.0157
128	824.20	4.1	50	-6.52	-0.0079
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
128	824.20	4.35	-30	-19.63	-0.0238
128	824.20	4.35	-20	-9.94	-0.0121
128	824.20	4.35	-10	-13.88	-0.0168
128	824.20	4.35	0	-13.43	-0.0163
128	824.20	4.35	10	-15.17	-0.0184
128	824.20	4.35	20	-15.05	-0.0183
128	824.20	4.35	30	-28.67	**-0.0348**
128	824.20	4.35	40	-12.91	-0.0157
128	824.20	4.35	50	-9.43	-0.0114

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	-8.33	-0.0100
189	836.40	3.6	-20	-7.55	-0.0090
189	836.40	3.6	-10	-15.56	-0.0186
189	836.40	3.6	0	-17.18	-0.0205
189	836.40	3.6	10	-7.23	-0.0086
189	836.40	3.6	20	-9.43	-0.0113
189	836.40	3.6	30	-11.11	-0.0133
189	836.40	3.6	40	-12.98	-0.0155
189	836.40	3.6	50	-9.30	-0.0111
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
189	836.40	4.1	-30	-9.04	-0.0108
189	836.40	4.1	-20	-8.91	-0.0107
189	836.40	4.1	-10	-9.81	-0.0117
189	836.40	4.1	0	-10.07	-0.0120
189	836.40	4.1	10	-8.72	-0.0104
189	836.40	4.1	20	-12.91	-0.0154
189	836.40	4.1	30	-16.59	-0.0198
189	836.40	4.1	40	-8.59	-0.0103
189	836.40	4.1	50	-8.78	-0.0105
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
189	836.40	4.35	-30	-11.82	-0.0141
189	836.40	4.35	-20	-16.85	-0.0201
189	836.40	4.35	-10	-8.33	-0.0100
189	836.40	4.35	0	-10.01	-0.0120
189	836.40	4.35	10	-12.46	-0.0149
189	836.40	4.35	20	-12.59	-0.0151
189	836.40	4.35	30	-24.41	-0.0292
189	836.40	4.35	40	7.62	0.0091
189	836.40	4.35	50	-5.36	-0.0064

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	-11.30	-0.0133
251	848.8	3.6	-20	-11.82	-0.0139
251	848.8	3.6	-10	-12.40	-0.0146
251	848.8	3.6	0	-10.27	-0.0121
251	848.8	3.6	10	-12.27	-0.0145
251	848.8	3.6	20	-12.40	-0.0146
251	848.8	3.6	30	-13.88	-0.0164
251	848.8	3.6	40	-13.30	-0.0157
251	848.8	3.6	50	-9.49	-0.0112
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
251	848.8	4.1	-30	-15.69	-0.0185
251	848.8	4.1	-20	-4.78	-0.0056
251	848.8	4.1	-10	-13.17	-0.0155
251	848.8	4.1	0	-13.82	-0.0163
251	848.8	4.1	10	-13.04	-0.0154
251	848.8	4.1	20	-8.72	-0.0103
251	848.8	4.1	30	-18.08	-0.0213
251	848.8	4.1	40	-12.14	-0.0143
251	848.8	4.1	50	-7.36	-0.0087
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
251	848.8	4.35	-30	-14.21	-0.0167
251	848.8	4.35	-20	-12.79	-0.0151
251	848.8	4.35	-10	-15.05	-0.0177
251	848.8	4.35	0	-10.53	-0.0124
251	848.8	4.35	10	-15.24	-0.0180
251	848.8	4.35	20	-17.56	-0.0207
251	848.8	4.35	30	-15.17	-0.0179
251	848.8	4.35	40	-13.04	-0.0154
251	848.8	4.35	50	-13.69	-0.0161

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	-15.56	-0.0084
661	1880.00	3.6	20	-22.79	-0.0121
810	1909.80	3.6	20	-17.43	-0.0091

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperatur e (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.1	20	-16.92	-0.0091
661	1880.00	4.1	20	-16.59	-0.0088
810	1909.80	4.1	20	-30.15	-0.0158

Traffic Channel Number	PCS Frequency (MHz)	Voltage (Volts)	Temperatur e (Celsius)	Frequency Error (Hz)	PPM
512	1850.20	4.35	20	-27.12	-0.0153
661	1880.00	4.35	20	-22.60	-0.0102
810	1909.80	4.35	20	-25.44	-0.0113

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	-28.35	-0.0153
512	1850.20	3.6	-20	-18.92	-0.0102
512	1850.20	3.6	-10	-20.99	-0.0113
512	1850.20	3.6	0	-11.43	-0.0062
512	1850.20	3.6	10	-13.43	-0.0073
512	1850.20	3.6	20	-15.56	-0.0084
512	1850.20	3.6	30	-15.37	-0.0083
512	1850.20	3.6	40	-20.47	-0.0111
512	1850.20	3.6	50	-20.60	-0.0111
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
512	1850.20	4.1	-30	-35.26	**-0.0191**
512	1850.20	4.1	-20	-33.38	-0.0180
512	1850.20	4.1	-10	-20.60	-0.0111
512	1850.20	4.1	0	-23.37	-0.0126
512	1850.20	4.1	10	-18.85	-0.0102
512	1850.20	4.1	20	-16.92	-0.0091
512	1850.20	4.1	30	-11.17	-0.0060
512	1850.20	4.1	40	-15.63	-0.0084
512	1850.20	4.1	50	-27.44	-0.0148
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
512	1850.20	4.35	-30	-33.71	-0.0182
512	1850.20	4.35	-20	-27.25	-0.0147
512	1850.20	4.35	-10	-22.41	-0.0121
512	1850.20	4.35	0	-28.22	-0.0153
512	1850.20	4.35	10	-21.44	-0.0116
512	1850.20	4.35	20	-27.12	-0.0147
512	1850.20	4.35	30	-15.88	-0.0086
512	1850.20	4.35	40	-21.37	-0.0116
512	1850.20	4.35	50	-22.66	-0.0122

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	-20.53	-0.0109
661	1880.00	3.6	-20	-18.27	-0.0097
661	1880.00	3.6	-10	-20.21	-0.0108
661	1880.00	3.6	0	-20.73	-0.0110
661	1880.00	3.6	10	-22.02	-0.0117
661	1880.00	3.6	20	-22.79	-0.0121
661	1880.00	3.6	30	-20.73	-0.0110
661	1880.00	3.6	40	-17.11	-0.0091
661	1880.00	3.6	50	-17.31	-0.0092
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
661	1880.00	4.1	-30	-15.69	-0.0083
661	1880.00	4.1	-20	-27.44	-0.0146
661	1880.00	4.1	-10	-25.51	-0.0136
661	1880.00	4.1	0	-27.44	-0.0146
661	1880.00	4.1	10	-21.11	-0.0112
661	1880.00	4.1	20	-16.59	-0.0088
661	1880.00	4.1	30	-16.85	-0.0090
661	1880.00	4.1	40	-18.47	-0.0098
661	1880.00	4.1	50	-25.25	-0.0134
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
661	1880.00	4.35	-30	-21.63	-0.0115
661	1880.00	4.35	-20	-26.67	-0.0142
661	1880.00	4.35	-10	-17.76	-0.0094
661	1880.00	4.35	0	-25.83	-0.0137
661	1880.00	4.35	10	-25.05	-0.0133
661	1880.00	4.35	20	-22.60	-0.0120
661	1880.00	4.35	30	-14.92	-0.0079
661	1880.00	4.35	40	-24.73	-0.0132
661	1880.00	4.35	50	-28.02	-0.0149

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	-28.09	-0.0147
810	1909.80	3.6	-20	-24.54	-0.0128
810	1909.80	3.6	-10	-27.12	-0.0142
810	1909.80	3.6	0	-17.18	-0.0090
810	1909.80	3.6	10	-26.35	-0.0138
810	1909.80	3.6	20	-17.43	-0.0091
810	1909.80	3.6	30	-20.15	-0.0106
810	1909.80	3.6	40	-15.17	-0.0079
810	1909.80	3.6	50	-24.21	-0.0127
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
810	1909.80	4.1	-30	-31.96	-0.0167
810	1909.80	4.1	-20	-17.43	-0.0091
810	1909.80	4.1	-10	-30.67	-0.0161
810	1909.80	4.1	0	-18.14	-0.0095
810	1909.80	4.1	10	-18.27	-0.0096
810	1909.80	4.1	20	-30.15	-0.0158
810	1909.80	4.1	30	-18.27	-0.0096
810	1909.80	4.1	40	-23.12	-0.0121
810	1909.80	4.1	50	-13.50	-0.0071
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
810	1909.80	4.35	-30	-31.45	-0.0165
810	1909.80	4.35	-20	-17.63	-0.0092
810	1909.80	4.35	-10	-12.72	-0.0067
810	1909.80	4.35	0	-22.47	-0.0118
810	1909.80	4.35	10	-26.41	-0.0138
810	1909.80	4.35	20	-25.44	-0.0133
810	1909.80	4.35	30	-14.01	-0.0073
810	1909.80	4.35	40	-22.34	-0.0117
810	1909.80	4.35	50	-21.24	-0.0111

APPENDIX 1C – GSM RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

Date of test: February 11, 2015

The following measurements were performed by Shiva Kumbham.
The environmental tests conditions were: Temperature: 27 °C
Relative Humidity: 9.9 %

The BlackBerry® smartphone was standalone, Volume Key Up with the screen of the device 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.

GSM850 Band in Call Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	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	-30.74	-22.39	V-V	11.26	29.24	0.84	38.50	9.26
F0	128	824.20	850	Dipole	H	-22.39		H-H	10.71				
F0	190	836.60	850	Dipole	V	-32.71	-24.49	V-V	10.02	27.68	0.59	38.50	10.82
F0	190	836.60	850	Dipole	H	-24.49		H-H	9.61				
F0	251	848.80	850	Dipole	V	-32.81	-23.63	V-V	13.72	**31.35**	1.36	38.50	7.15
F0	251	848.80	850	Dipole	H	-23.63		H-H	10.54				

GSM850 Band in EDGE Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	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	-32.95	-24.31	V-V	9.78	**27.76**	0.60	38.50	10.74
F0	128	824.20	850	Dipole	H	-24.31		H-H	8.70				
F0	190	836.60	850	Dipole	V	-34.49	-25.79	V-V	9.66	27.32	0.54	38.50	11.18
F0	190	836.60	850	Dipole	H	-25.79		H-H	8.68				
F0	251	848.80	850	Dipole	V	-34.38	-25.88	V-V	10.03	27.66	0.58	38.50	10.84
F0	251	848.80	850	Dipole	H	-25.88		H-H	8.06				

Radiated Power Test Data Results cont'd

Date of test: February 11, 2015.
The following measurements were performed by Shiva Kumbham.

The environmental tests conditions were: Temperature: 27 °C
Relative Humidity: 9.9 %

The BlackBerry® smartphone was standalone, horizontal up 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.

PCS1900 Band in Call Mode

								Substitution Method					
EUT				Receive 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	512	1850.20	1900	Horn	V	-24.26	-17.50	V-V	-8.63	31.70	1.48	33.00	1.30
F0	512	1850.20	1900	Horn	H	-17.50		H-H	-7.98				
F0	661	1880.00	1900	Horn	V	-24.77	-17.33	V-V	-8.24	31.92	1.56	33.00	1.08
F0	661	1880.00	1900	Horn	H	-17.33		H-H	-7.48				
F0	810	1909.80	1900	Horn	V	-25.31	-17.22	V-V	-7.91	**32.49**	1.77	33.00	0.51
F0	810	1909.80	1900	Horn	H	-17.22		H-H	-6.95				

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	-24.67	-19.77	V-V	-10.22	29.69	0.93	33.00	3.31
F0	512	1850.20	1900	Horn	H	-19.77		H-H	-9.99				
F0	661	1880.00	1900	Horn	V	-24.65	-19.71	V-V	-9.99	29.56	0.90	33.00	3.44
F0	661	1880.00	1900	Horn	H	-19.71		H-H	-9.84				
F0	810	1909.80	1900	Horn	V	-24.25	-19.74	V-V	-9.99	**29.95**	0.99	33.00	3.05
F0	810	1909.80	1900	Horn	H	-19.74		H-H	-9.49				

Radiated Emissions Test Data Results cont'd

GSM850 Call Mode

The following measurements were performed by Shiva Kumbham.

Date of Test: February 9, 2015
The environmental test conditions were: Temperature: 26.4 ºC
Relative Humidity: 6.7 %

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, with volume keys up and the screen pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in GSM850 Call Tx mode, channels 128, 190, 251.

All emissions were at least 25.0 dB below the limit.

The following measurements were performed by Winston Vernon.

Date of Test: February 9 and 13, 2015
The environmental test conditions were: Temperature: 24.7 ºC
Relative Humidity: 14.8 %

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 volume key down and the screen to the RX antenna when the turntable is at 0 degree position.

The measurements were performed in GSM850 Call Tx mode, channels 128, 190, 251.

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)
2472.612	128	V	2.14	95	PK	53.13	-87.48	-34.355	-13.00	21.4
2509.836	190	V	1.00	229	PK	53.83	-88.09	-34.263	-13.00	21.3
2546.416	251	V	2.59	266	PK	53.08	-87.0487	-33.973	-13.00	**21.0**

All other emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

GSM850 EDGE Mode

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 26.8 ºC
Relative Humidity: 5.5 %

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, with volume keys up and screen of the device pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in GSM850 EDGE Tx mode, channels 128, 190, 251.
All emissions were at least 25.0 dB below the limit.

Date of Test: February 9 and 13, 2015

The environmental test conditions were: Temperature: 24.7 ºC
Relative Humidity: 14.8 %

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 volume key down and the screen pointing to the RX antenna when the turntable is at 0 degree position.

The measurements were performed in GSM850 EDGE Tx mode, channels 128, 190, 251.

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)
2472.584	128	V	2.19	103	PK	54.52	-87.4763	-32.958	-13.00	**20.0**
2510.036	190	V	1.00	223	PK	54.20	-88.0929	-33.888	-13.00	20.9

All other emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

PCS1900 CALL Mode

Date of Test: February 9, 2015

The environmental test conditions were: Temperature: 27.6 ºC
Relative Humidity: 5.1 %

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, in the horizontal up position and the top facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in PCS1900 Call Tx mode, channels 512, 661, 810.
All emissions were at least 25.0 dB below the limit.

Date of Test: February 10, 13 and March 2, 2015

The environmental test conditions were: Temperature: 24.3 – 24.7 ºC
Relative Humidity: 14.8 – 16.0 %

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 in the horizontal up position and the screen facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in PCS1900 Call Tx mode, channels 512, 661, 810.

All emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

PCS1900 EDGE Mode

Date of Test: February 9, 2015

The environmental test conditions were: Temperature: 27.6 ºC
Relative Humidity: 5.1 %

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, in the horizontal up position and the top facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in PCS1900 EDGE Tx mode, channels 512, 661, 810.
All emissions were at least 25.0 dB below the limit.

Date of Test: February 10, 13 and March 2, 2015

The environmental test conditions were: Temperature: 24.3 – 24.7 ºC
Relative Humidity: 14.8 – 16.0 %

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 in the horizontal up position and the screen facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in PCS1900 EDGE Tx mode, channels 512, 661, 810.

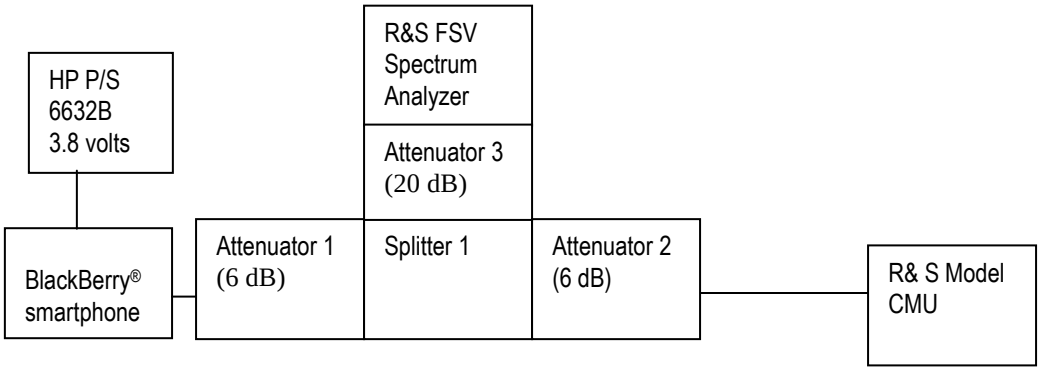
All emissions were at least 25.0 dB below the limit.

APPENDIX 2A– WCDMA Band V/II/IV CONDUCTED RF EMISSIONS TEST DATA/PLOTS

WCDMA Band V/II/IV 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: Feb 5, 2015

The environmental test conditions were: Temperature: 25.1ºC
Relative Humidity: 19%

The following measurements were performed by Sijia Li.

WCDMA Conducted RF Emission Test Data cont'd

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 22.917, CFR 24.238(a), RSS-132, 5.5, RSS – 133, 6.5, CFR 27.53 and RSS-139, 6.5 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 V was measured to be 4.590 MHz, WCDMA Band II was measured to be 4.575 MHz and for the WCDMA Band IV it was measured to be 4.590 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 V/II/IV selected Frequencies in Loopback mode

WCDMA Band V Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
826.400	4.580	**4.160**
836.400	4.570	**4.160**
846.600	4.590	**4.160**

WCDMA Band II Frequency (MHz)	26dBc Occupied Bandwidth (MHz	99% Occupied Bandwidth (MHz)
1852.400	4.575	4.160
1880.000	4.570	**4.165**
1907.600	4.570	4.150

WCDMA Band IV Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
1712.4	4.590	**4.165**
1732.6	4.580	4.155
1752.6	4.590	4.160

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 6.91 dB on the low channel of WCDMA Band II.
The worst case measured was 6.68 dB on low and high channels of WCDMA Band IV.

Measurement Plots for WCDMA Band V/II/IV 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 II).

See Figures 2-1b to 2-6b for the plots of the conducted spurious emissions.
See Figures 2-7b to 2-12b for the plots of 99% Occupied Bandwidth and -26 dBc Bandwidth.
See Figures 2-13b to 2-14b for the plots of the Channel mask.
See Figures 2-15b to 2-17b for the plots of the Peak to Average Ratio (WCDMA Band IV).

Test Data for WCDMA Band V/II/IV selected Frequencies in HSUPA mode

WCDMA Band V Frequency (MHz)	99% Occupied Bandwidth (MHz)
826.400	4.160
836.400	**4.170**
846.600	4.160

WCDMA Band II Frequency (MHz)	99% Occupied Bandwidth (MHz)
1852.400	4.170
1880.000	4.165
1907.600	**4.175**

WCDMA Band IV Frequency (MHz)	99% Occupied Bandwidth (MHz)
1712.4	4.160
1732.6	4.155
1752.6	**4.165**

Measurement Plots for WCDMA Band V/II/IV 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.

See Figures 2-18b to 2-23b for the plots of the conducted spurious emissions.
See Figures 2-24b to 2-26b for the plots of 99% Occupied Bandwidth.
See Figures 2-27b to 2-28b for the plots of the Channel mask.

WCDMA Conducted RF Emission Test Data cont'd

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

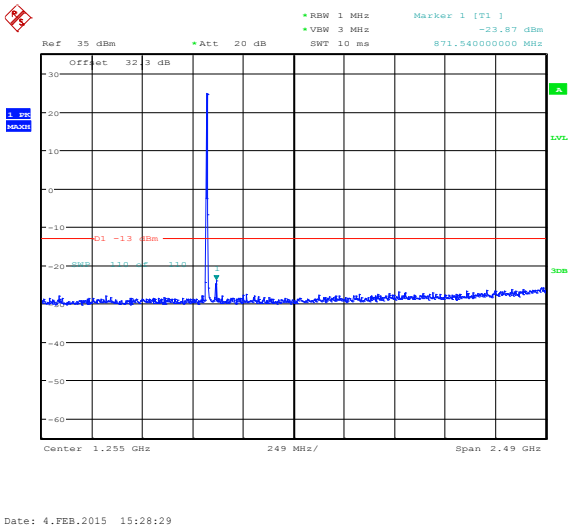


Figure 2-2a: Band V, Spurious Conducted Emissions, Low channel

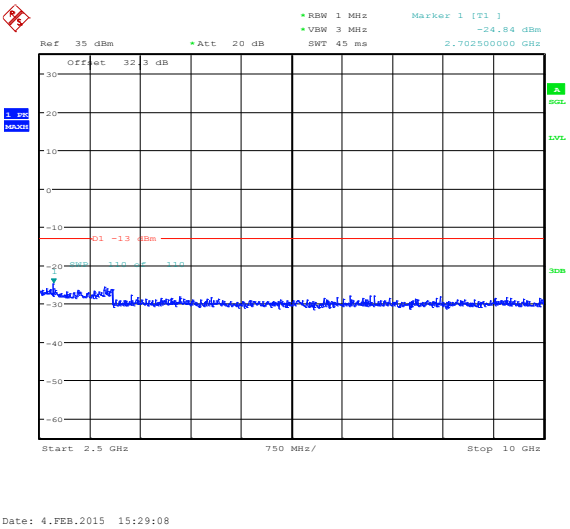


Figure 2-3a: Band V, Spurious Conducted Emissions, Middle channel

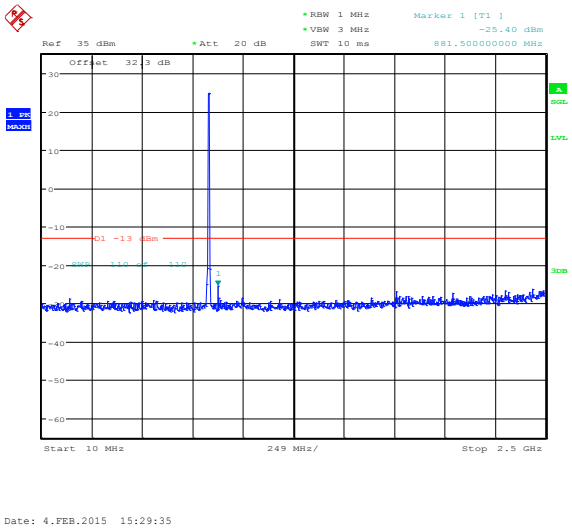
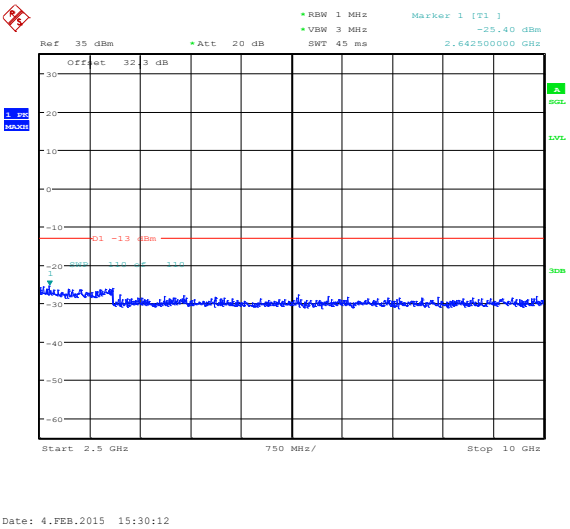


Figure 2-4a: Band V, Spurious Conducted Emissions, Middle channel



WCDMA Conducted RF Emission Test Data cont'd

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

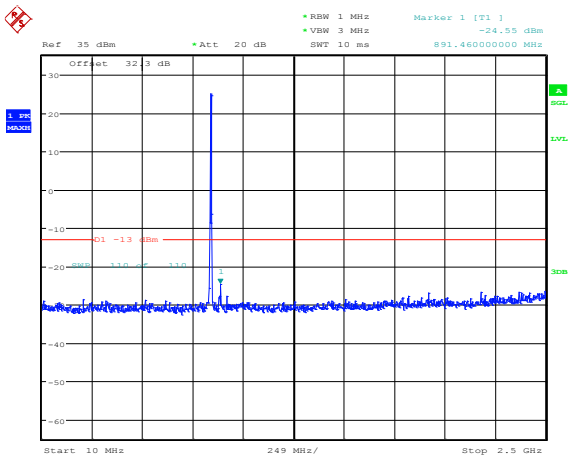


Figure 2-6a: Band V, Spurious Conducted Emissions, High Channel

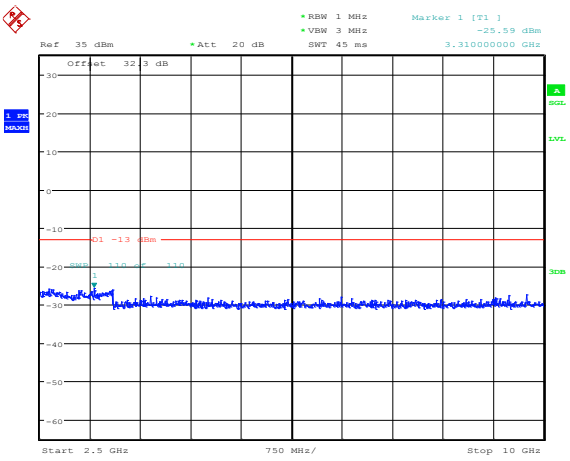


Figure 2-2a:, BAND II Spurious Conducted Emissions, Low Channel

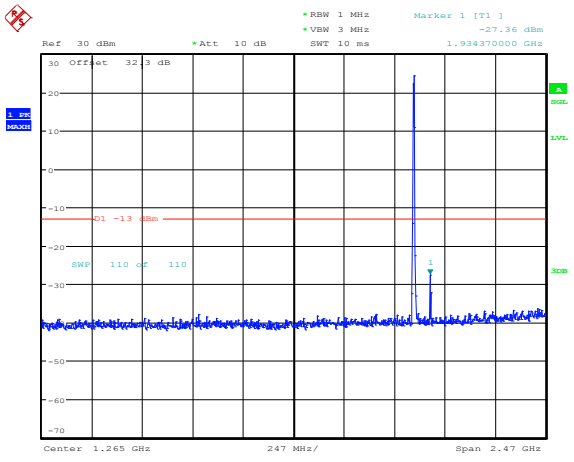
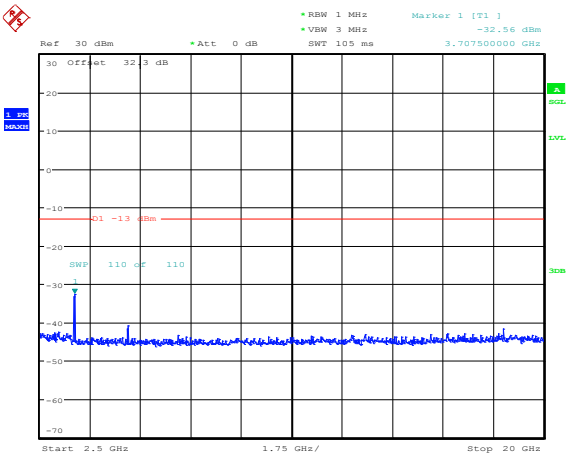


Figure 2-8a: BAND II, Spurious Conducted Emissions, Low Channel



WCDMA Conducted RF Emission Test Data cont'd

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

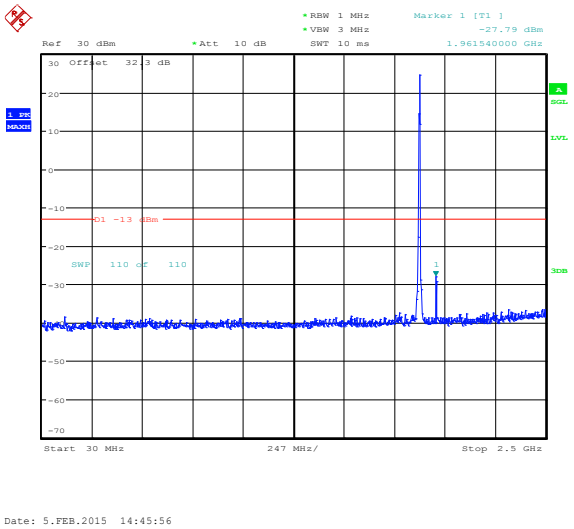


Figure 2-10a: BAND II, Spurious Conducted Emissions, Middle Channel

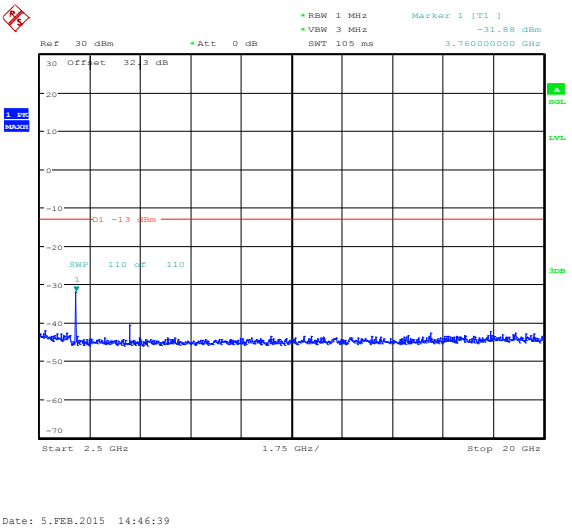


Figure 2-11a: BAND II, Spurious Conducted Emissions, High Channel

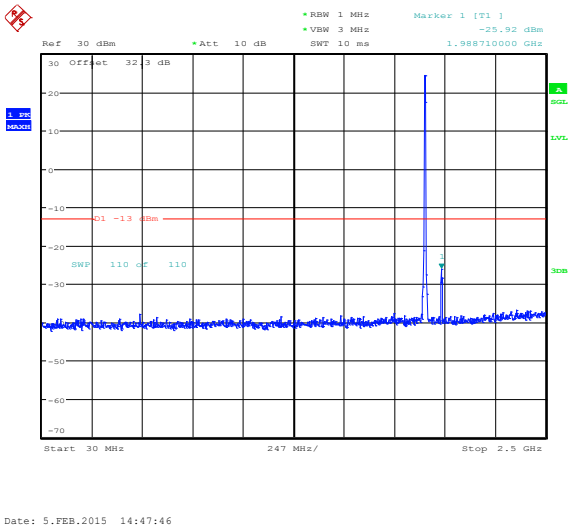
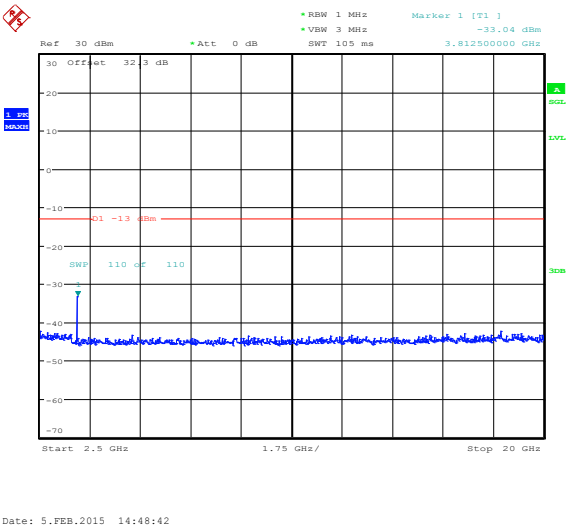


Figure 2-12a: BAND II, Spurious Conducted Emissions, High Channel



WCDMA Conducted RF Emission Test Data cont'd

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

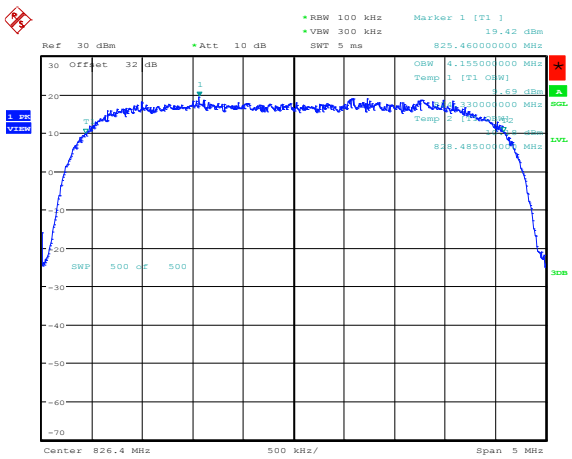


Figure 2-14a: Occupied Bandwidth, Band V Middle Channel

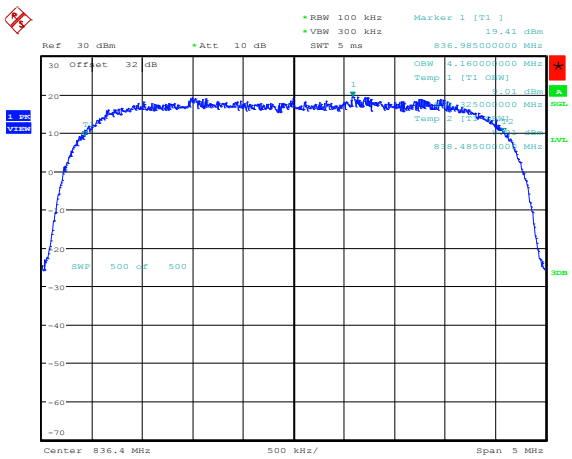


Figure 2-15a: Occupied Bandwidth, Band V High Channel

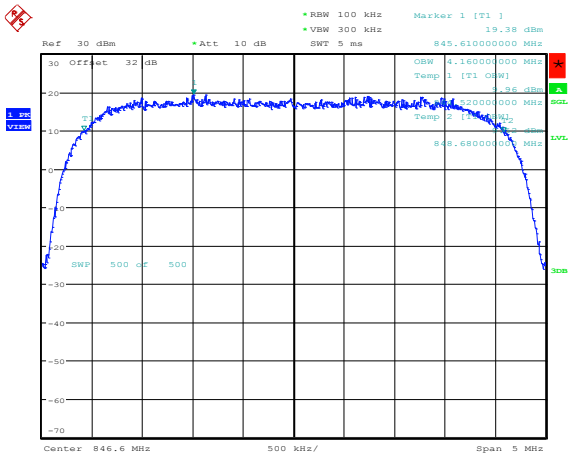
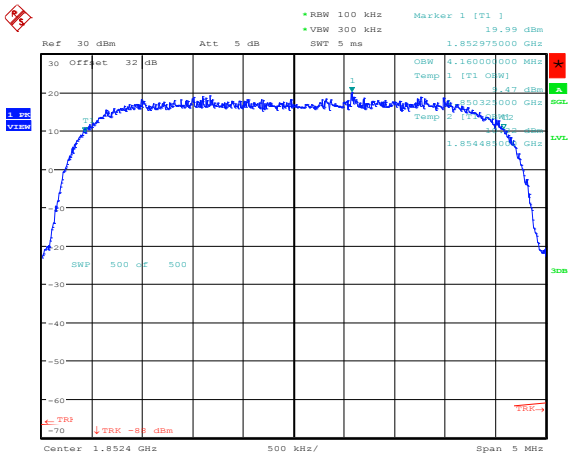


Figure 2-16a: Occupied Bandwidth, Band II Low Channel



WCDMA Conducted RF Emission Test Data cont'd

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

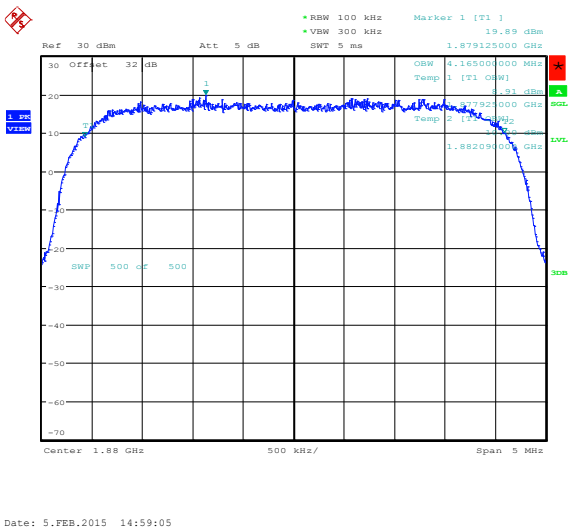


Figure 2-18a: Occupied Bandwidth, Band II High Channel

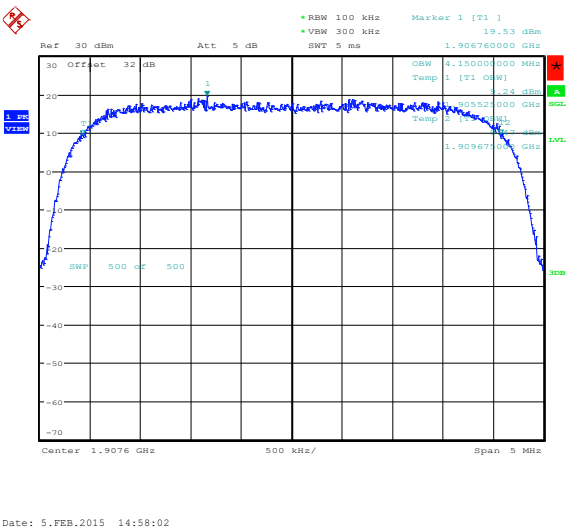


Figure 2-19a: -26 dBc Bandwidth, Band V Low Channel

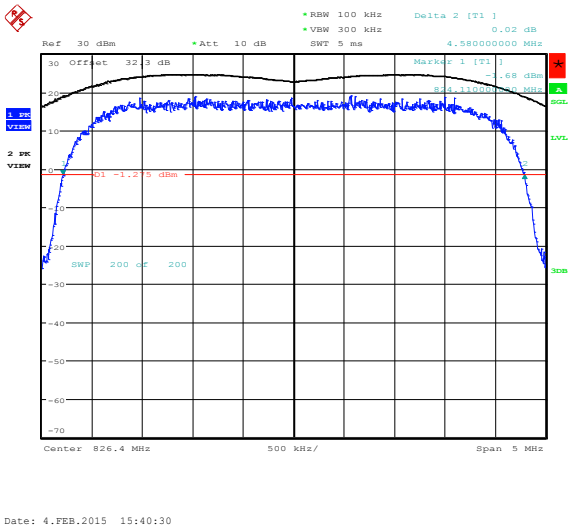
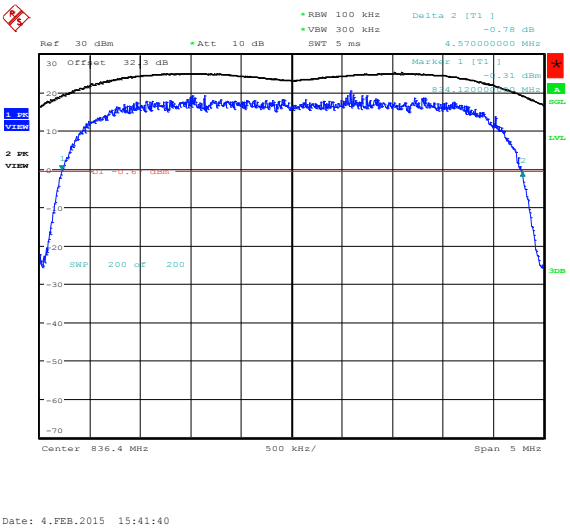


Figure 2-20a: -26 dBc Bandwidth, Band V Middle Channel



WCDMA Conducted RF Emission Test Data cont'd

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

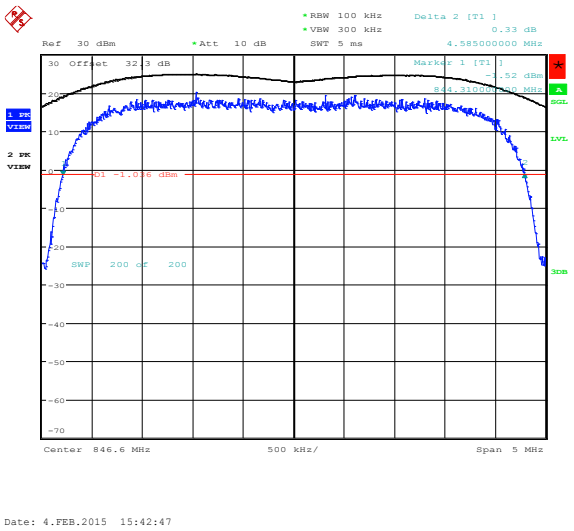


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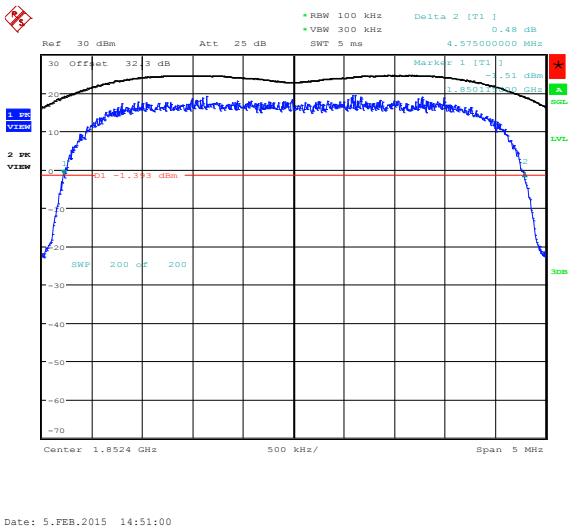
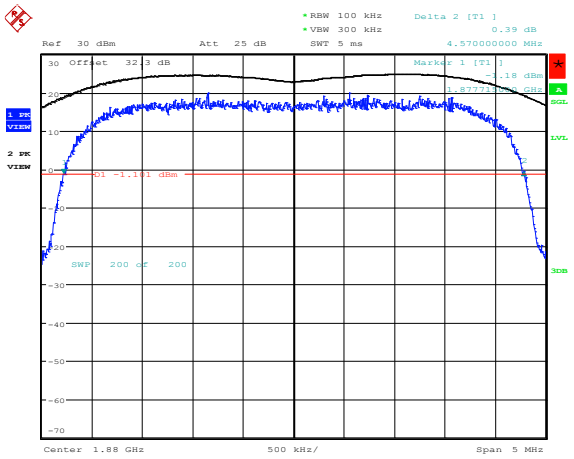
Figure 2-22a: -26 dBc Bandwidth, Band II Low Channel



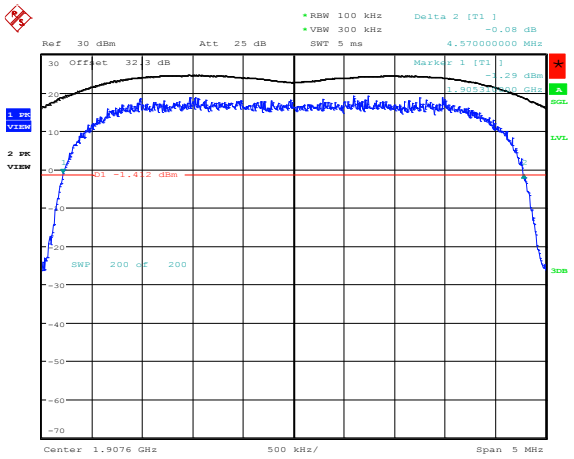
Date: 5.FEB.2015 14:51:00

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



Date: 5.FEB.2015 14:52:51

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



Date: 5.FEB.2015 14:54:02

WCDMA Conducted RF Emission Test Data cont'd

Figure 2-25a: Band V Low Channel Mask

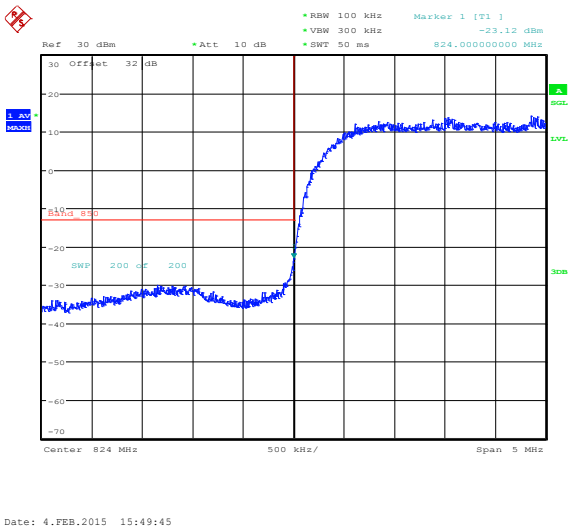


Figure 2-26a: Band V High Channel Mask

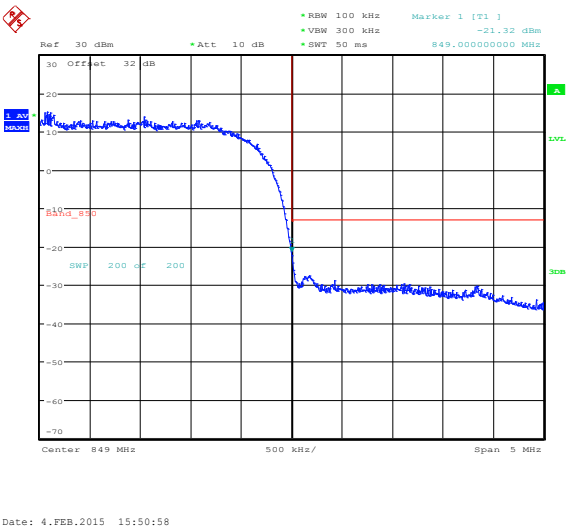


Figure 2-27a: Band II Low Channel Mask

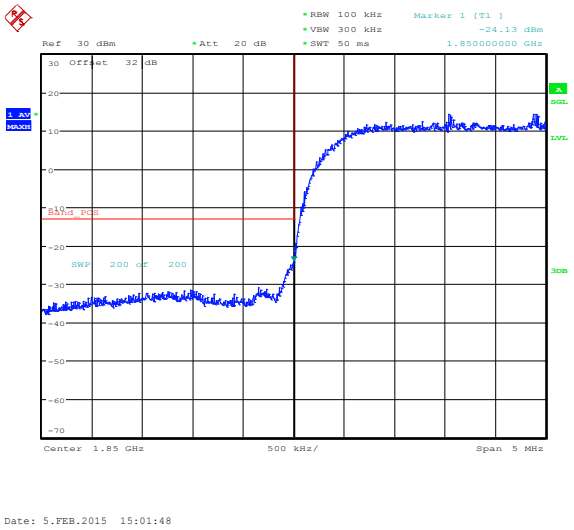
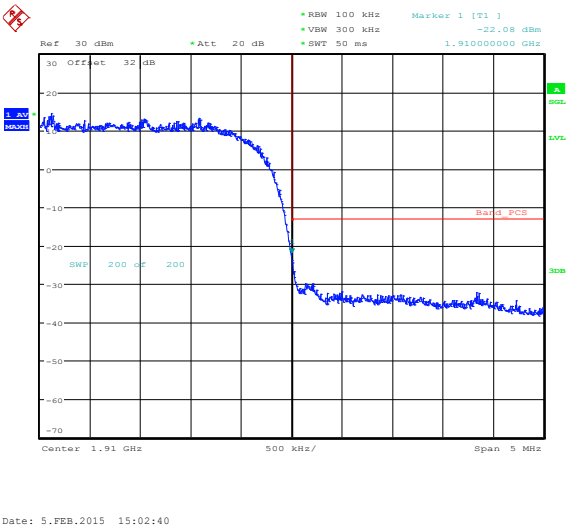


Figure 2-28a: Band II High Channel Mask



WCDMA Conducted RF Emission Test Data cont'd

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

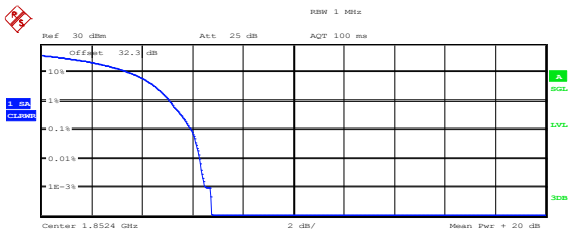


Figure 2-30a: Band II, PAR Mid Channel

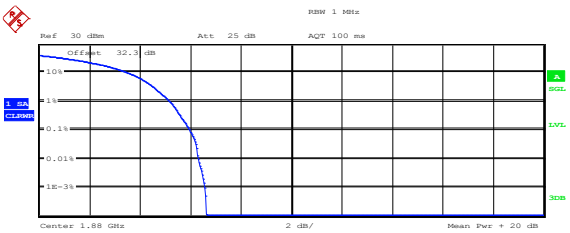
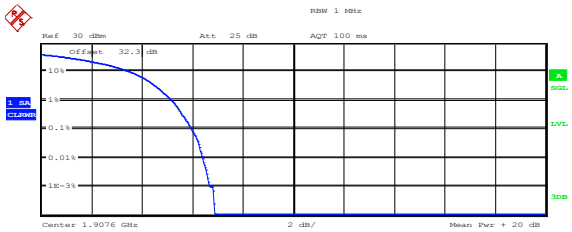


Figure 2-31a: Band II, PAR High Channel



WCDMA Conducted RF Emission Test Data cont'd

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

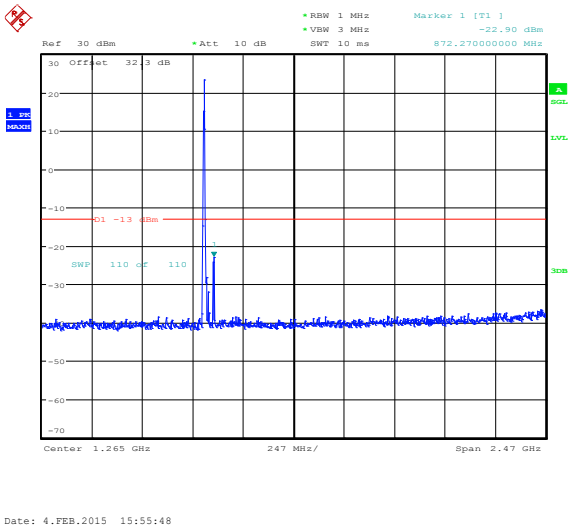


Figure 2-33a: Band V HSUPA, Spurious Conducted Emissions, Low channel

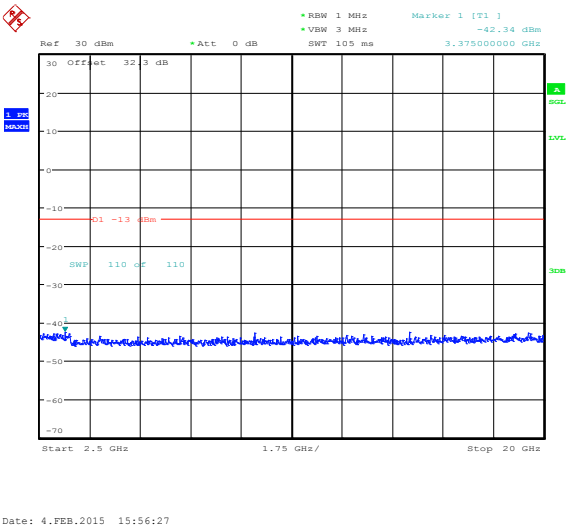


Figure 2-34a: Band V HSUPA, Spurious Conducted Emissions, Middle channel

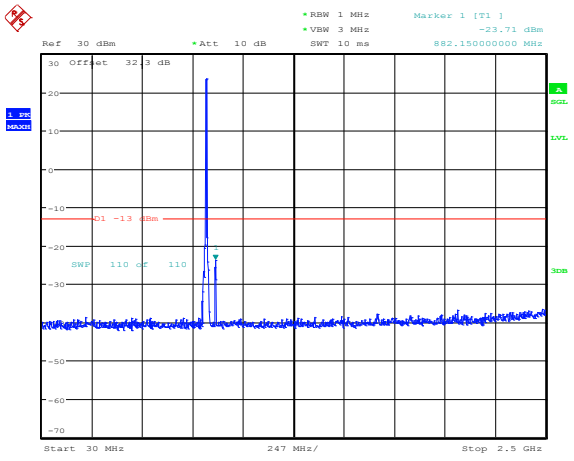
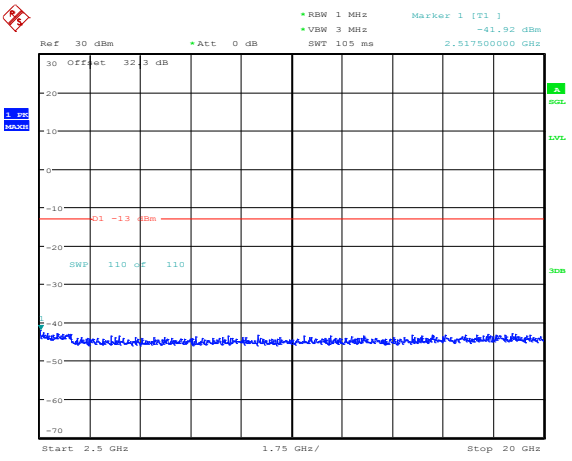


Figure 2-35a: Band V HSUPA, Spurious Conducted Emissions, Middle channel



WCDMA Conducted RF Emission Test Data cont'd

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

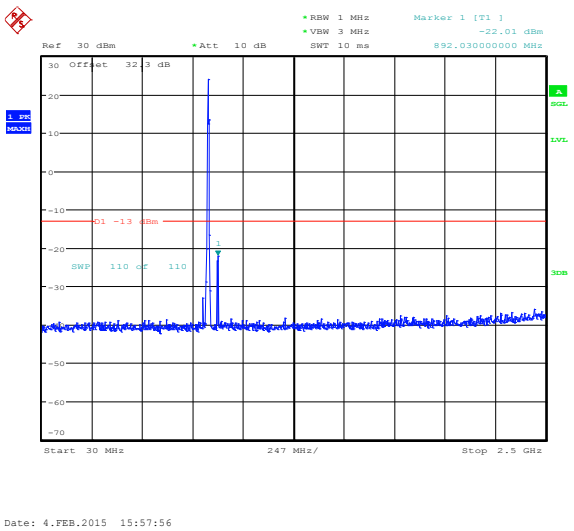


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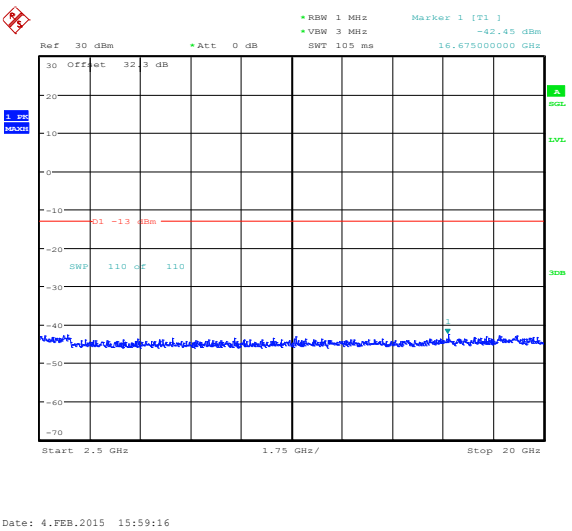
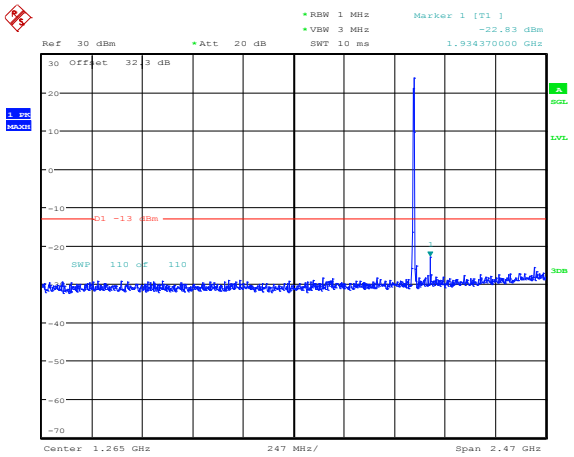
Figure 2-37a: Band V HSUPA, Spurious Conducted Emissions, High Channel



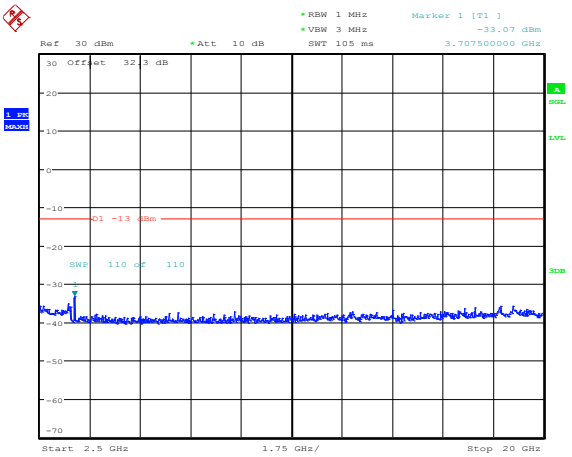
Date: 4.FEB.2015 15:59:16

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



Date: 4.FEB.2015 16:33:36

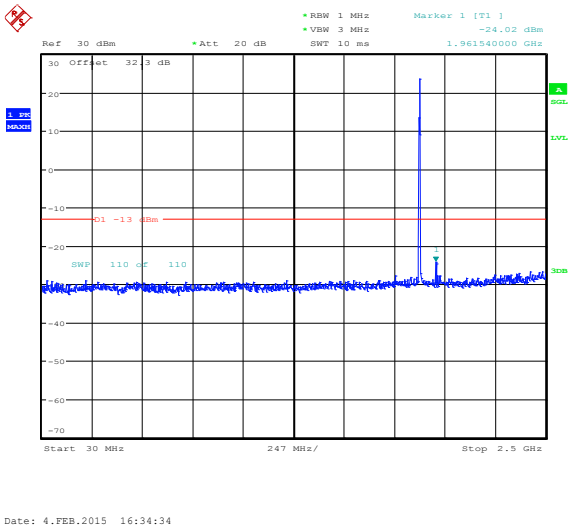
Figure 2-39a: Band II HSUPA, Spurious Conducted Emissions, Low Channel



Date: 4.FEB.2015 16:34:12

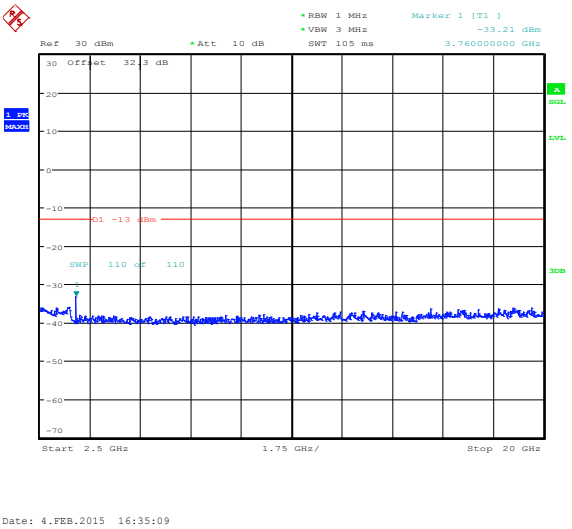
WCDMA Conducted RF Emission Test Data cont'd

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



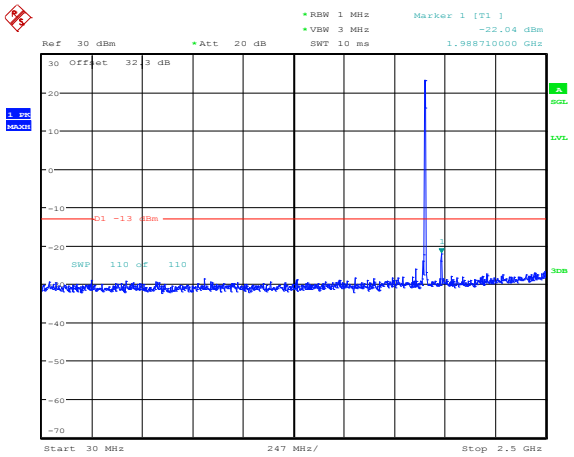
Date: 4.FEB.2015 16:34:34

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



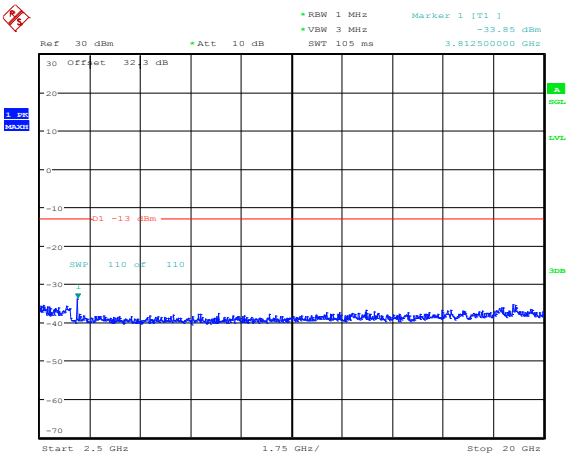
Date: 4.FEB.2015 16:35:09

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



Date: 4.FEB.2015 16:35:50

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



Date: 4.FEB.2015 16:36:52

WCDMA Conducted RF Emission Test Data cont'd

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

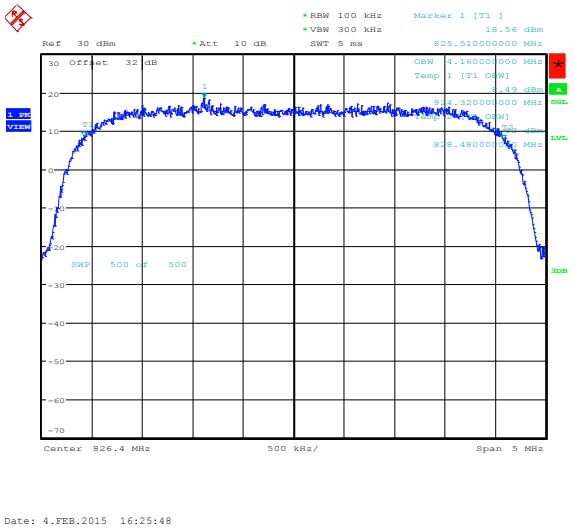


Figure 2-45a: Occupied Bandwidth, Band V HSUPA Middle Channel

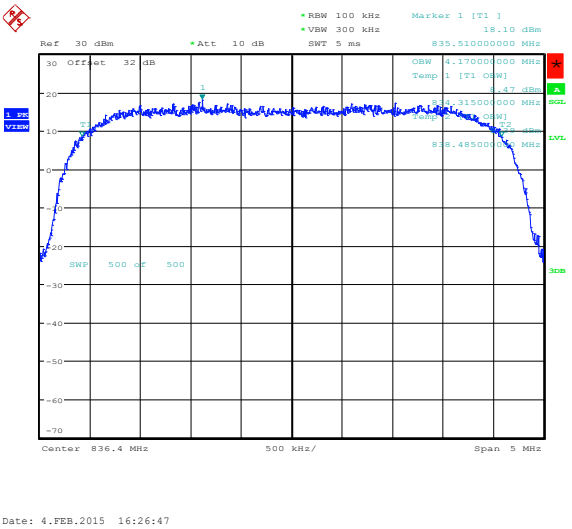


Figure 2-46a: Occupied Bandwidth, Band V HSUPA High Channel

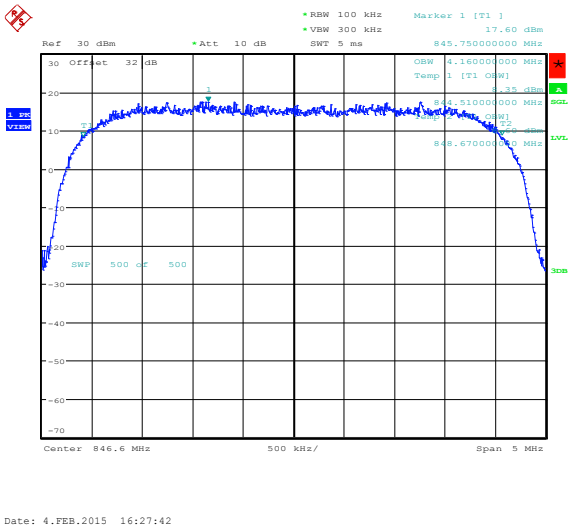
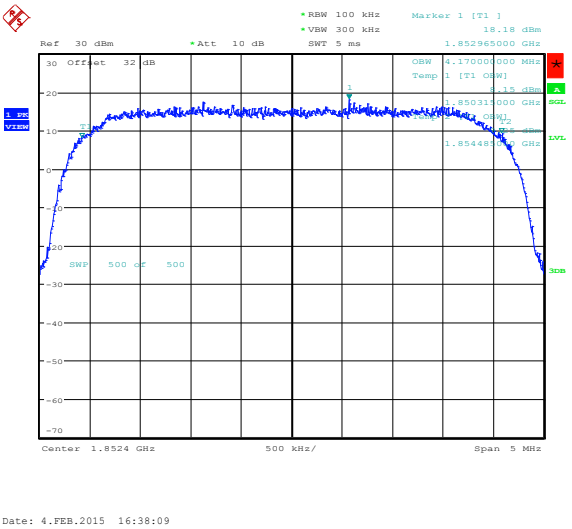


Figure 2-47a: Occupied Bandwidth, Band II HSUPA Low Channel



WCDMA Conducted RF Emission Test Data cont'd

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

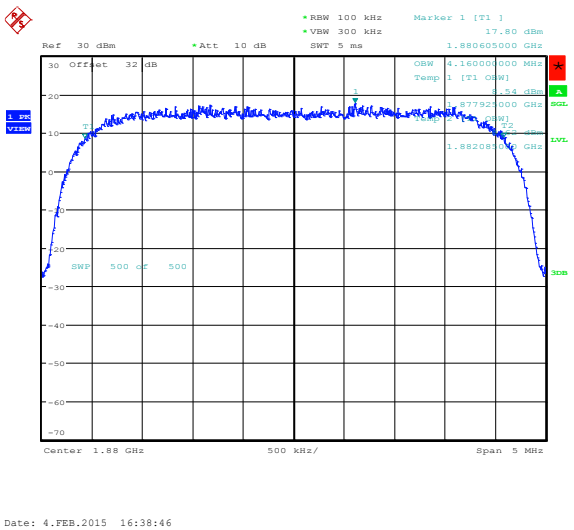


Figure 2-49a: Occupied Bandwidth, Band II HSUPA High Channel

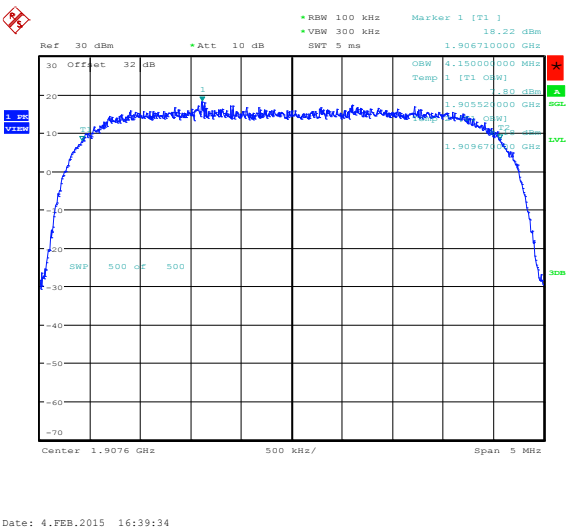


Figure 2-50a: Band V , HSUPA Low Channel Mask

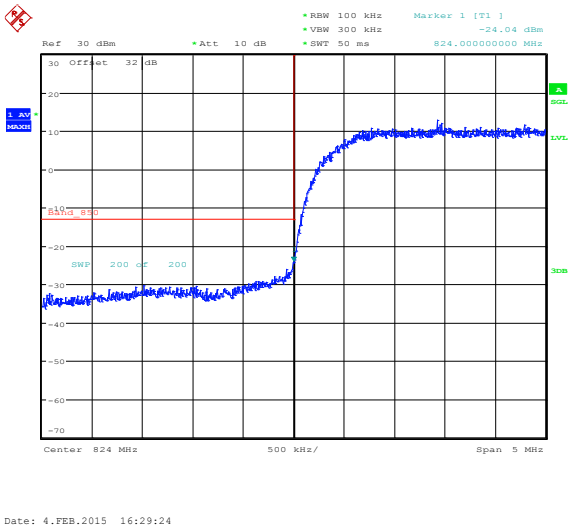
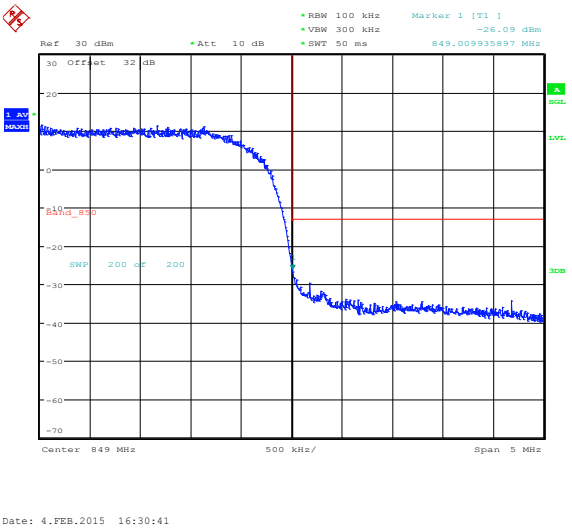


Figure 2-51a: Band V , HSUPA High Channel Mask



WCDMA Conducted RF Emission Test Data cont'd

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

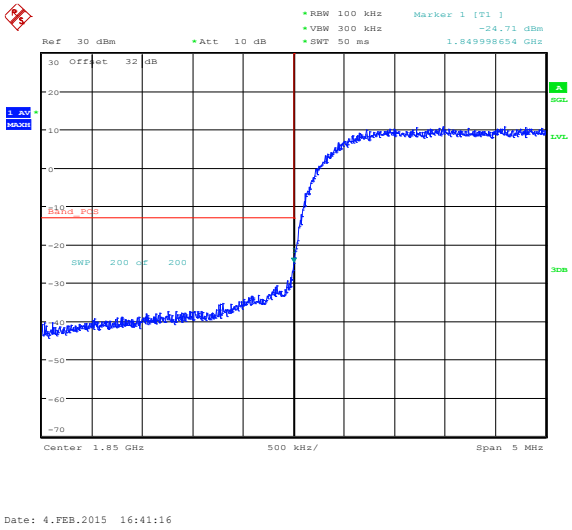
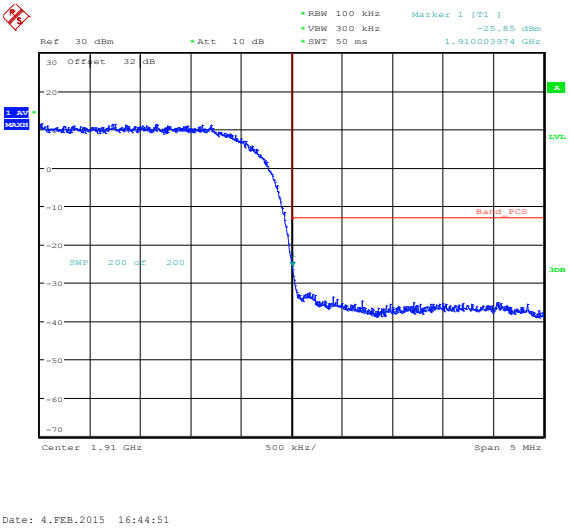
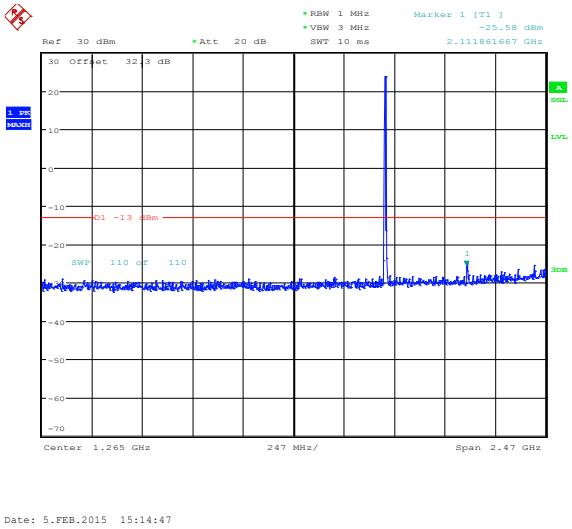


Figure 2-53a: Band II, HSUPA High Channel Mask



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-1b: Band IV, Spurious Conducted Emissions, Low channel



Date: 5.FEB.2015 15:14:47

Figure 2-2b: Band IV, Spurious Conducted Emissions, Low channel

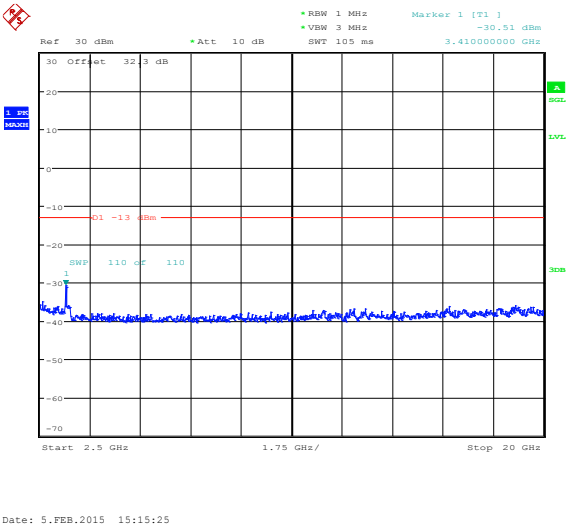


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Figure 2-3b: Band IV, Spurious Conducted Emissions, Middle channel

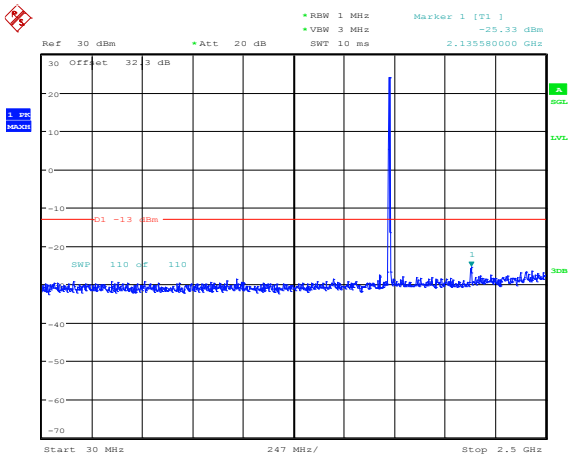

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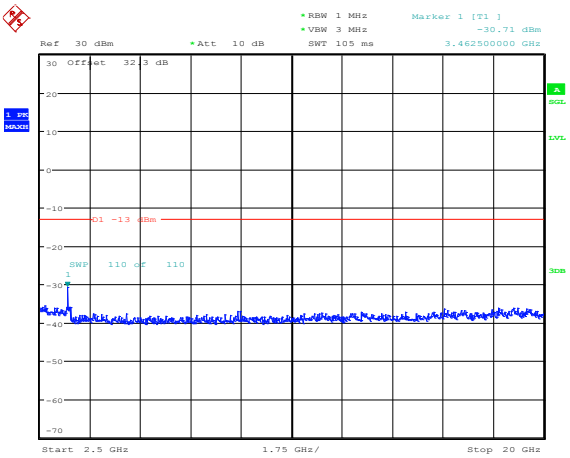
Figure 2-4b: Band IV, Spurious Conducted Emissions, Middle channel



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WCDMA Conducted RF Emission Test Data cont'd

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

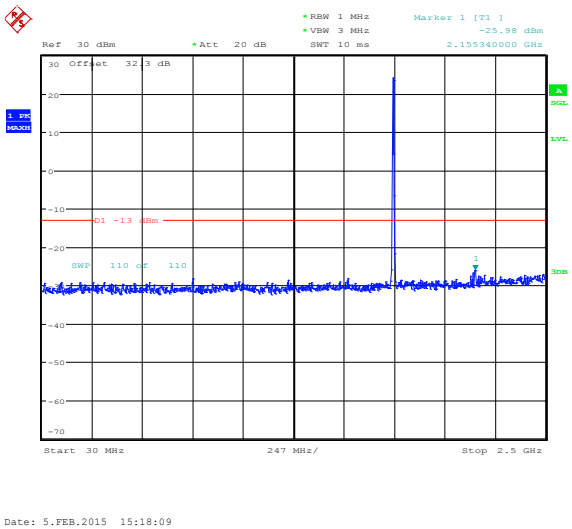
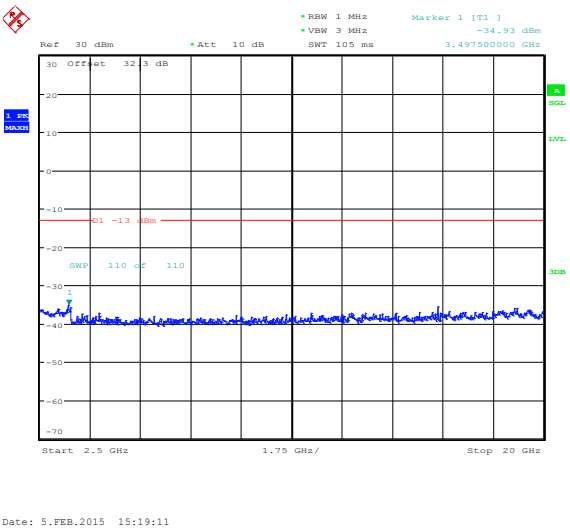


Figure 2-6b: Band IV, Spurious Conducted Emissions, High Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-7b: Occupied Bandwidth, Band IV Low Channel

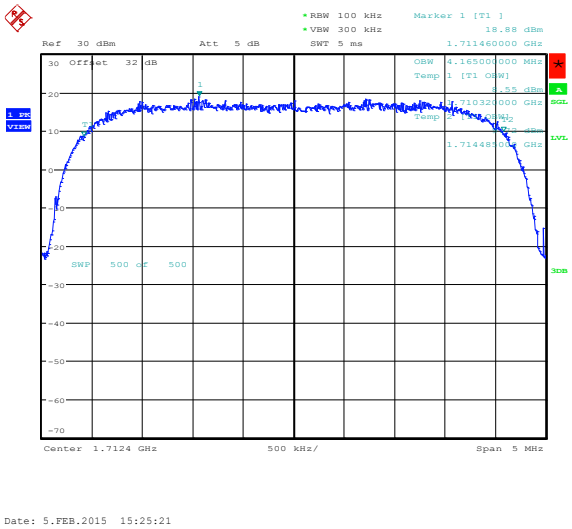


Figure 2-8b: Occupied Bandwidth, Band IV Middle Channel

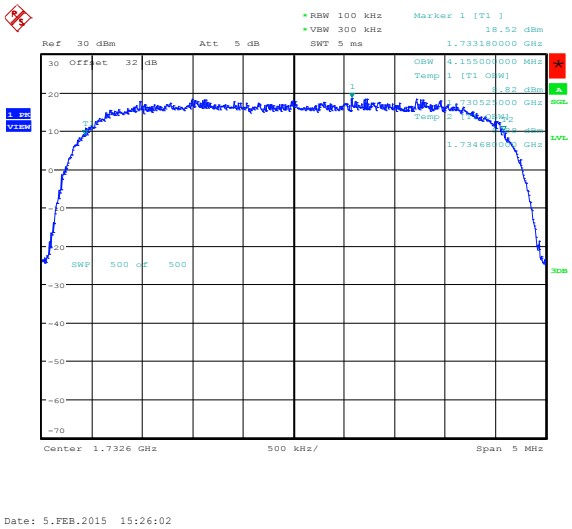


Figure 2-9b: Occupied Bandwidth, Band IV High Channel

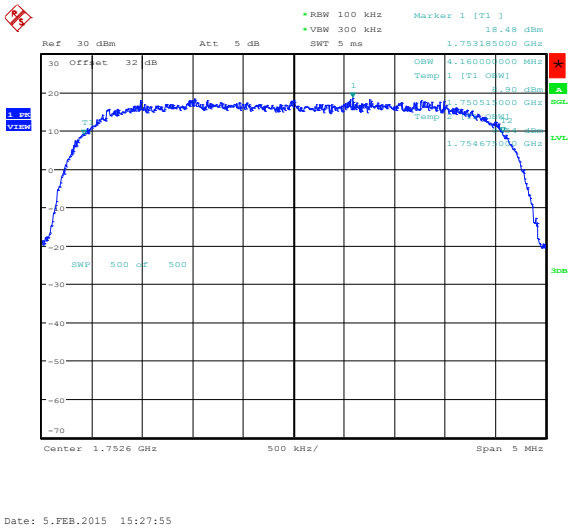


Figure 2-10b: -26 dBc Bandwidth, Band IV Low Channel

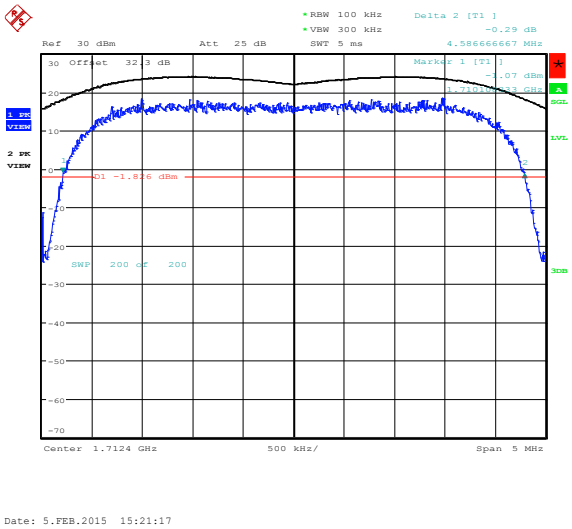


Figure 2-11b: -26 dBc Bandwidth, Band IV Middle Channel

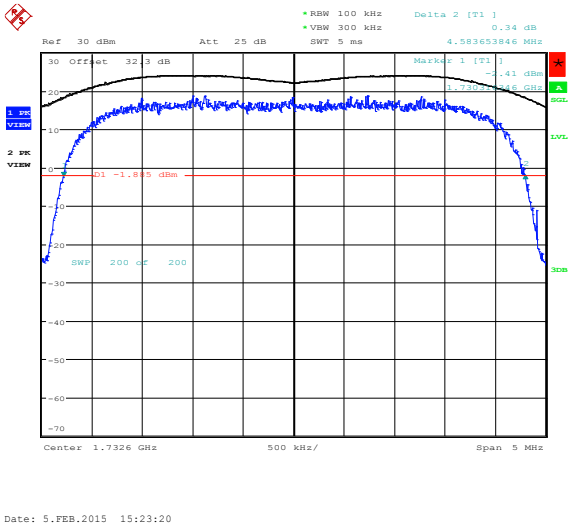


Figure 2-12b: -26 dBc Bandwidth, Band IV High Channel

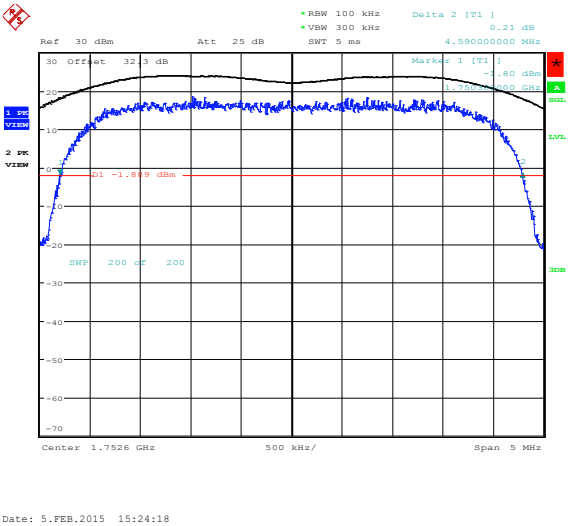


Figure 2-13b: Band IV Low Channel Mask

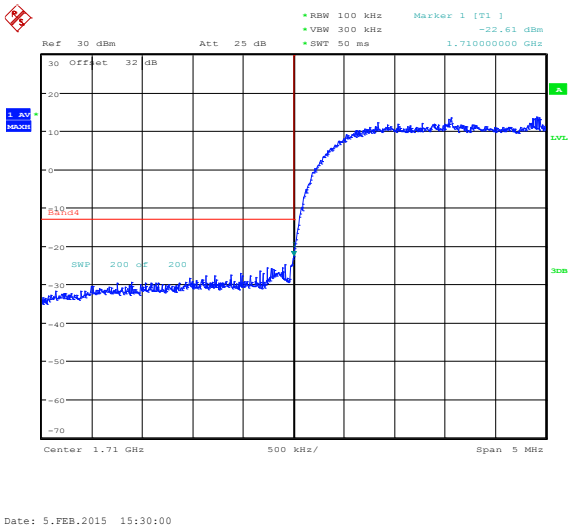
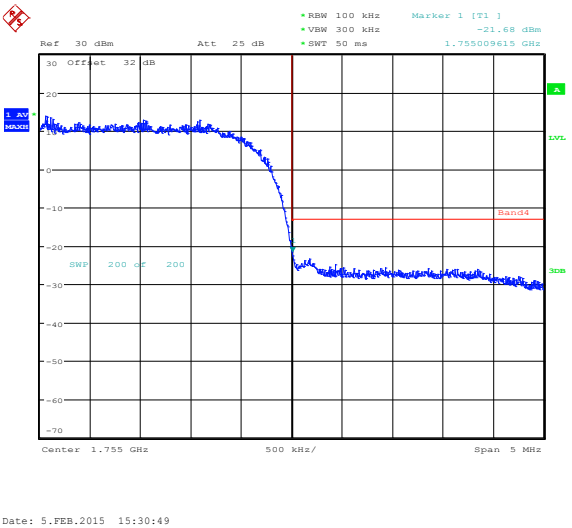


Figure 2-14b: Band IV High Channel Mask



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-15b: Band IV, PAR Low Channel

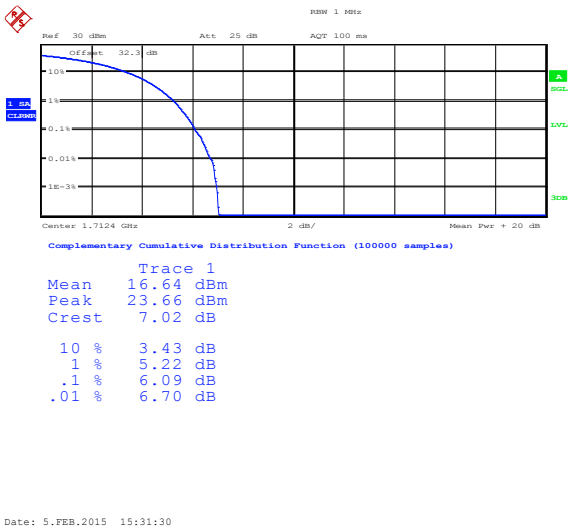


Figure 2-16b: Band IV, PAR Mid Channel

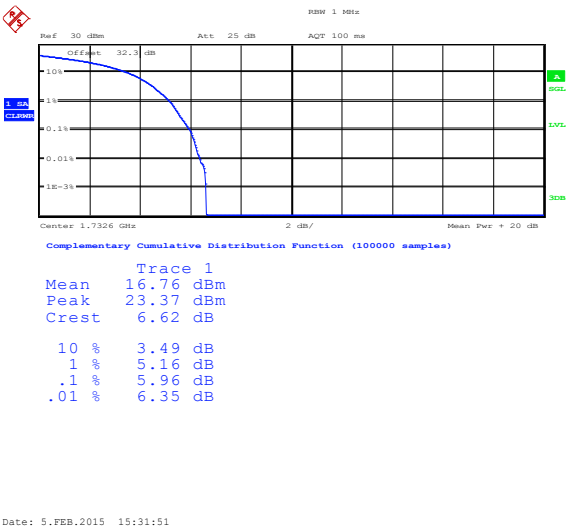
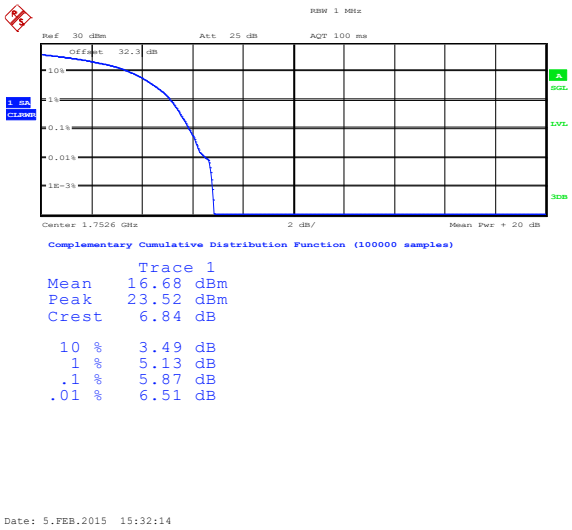


Figure 2-17b: Band IV, PAR High Channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-18b: Band IV HSUPA, Spurious Conducted Emissions, Low channel

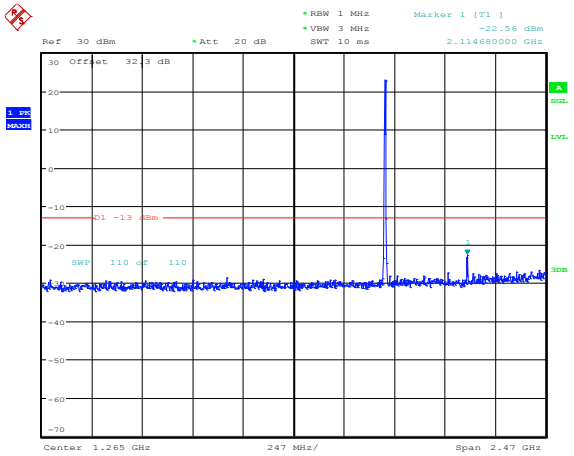


Figure 2-19b: Band IV HSUPA, Spurious Conducted Emissions, Low channel

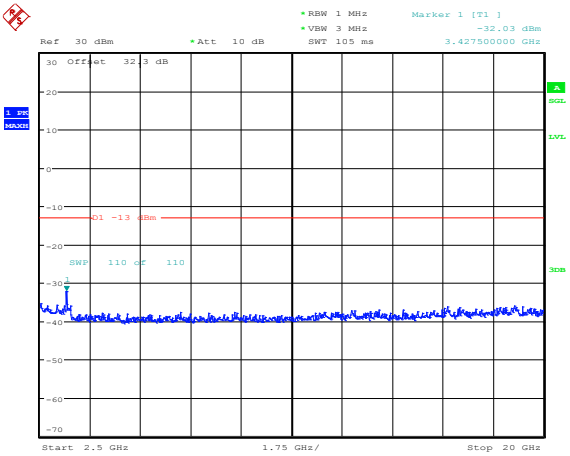


Figure 2-20b: Band IV HSUPA, Spurious Conducted Emissions, Middle channel

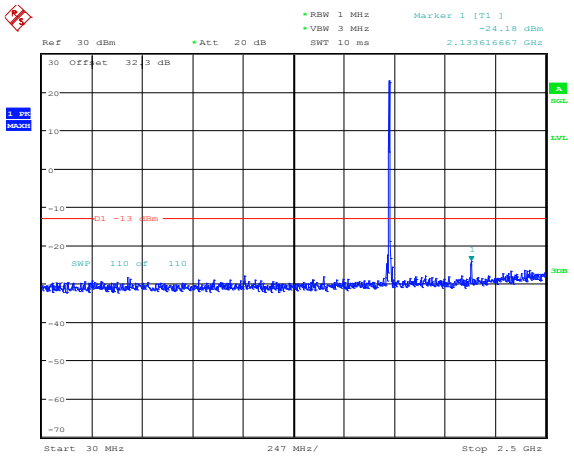
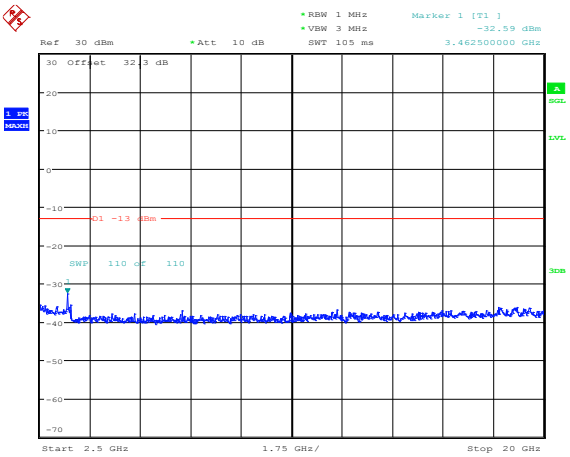


Figure 2-21b: Band IV HSUPA, Spurious Conducted Emissions, Middle channel



WCDMA Conducted RF Emission Test Data cont'd

Figure 2-22b: Band IV HSUPA, Spurious Conducted Emissions, High Channel

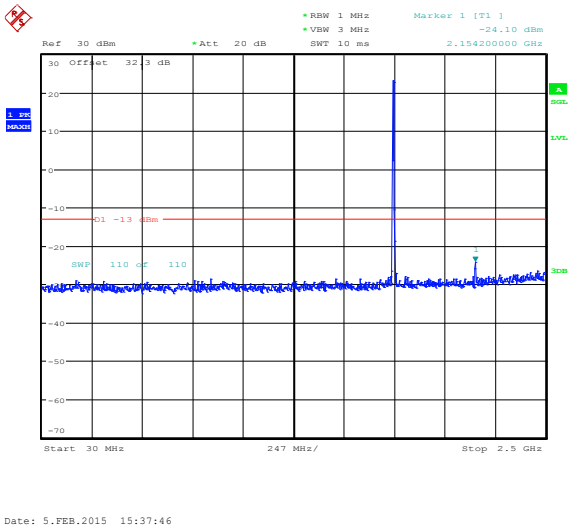


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Figure 2-23b: Band IV HSUPA, Spurious Conducted Emissions, High Channel

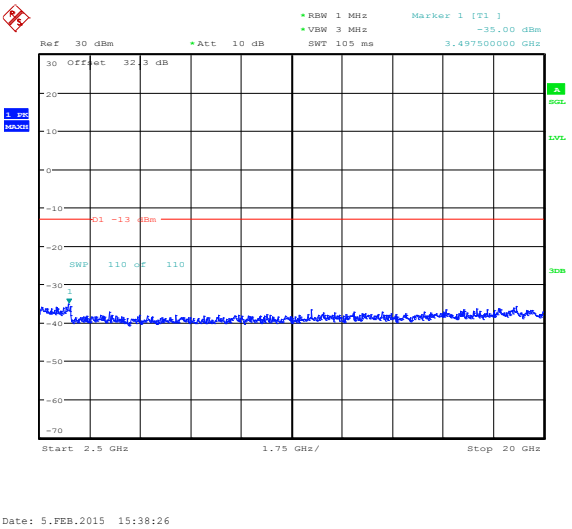

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Figure 2-24b: Occupied Bandwidth, Band IV HSUPA Low Channel

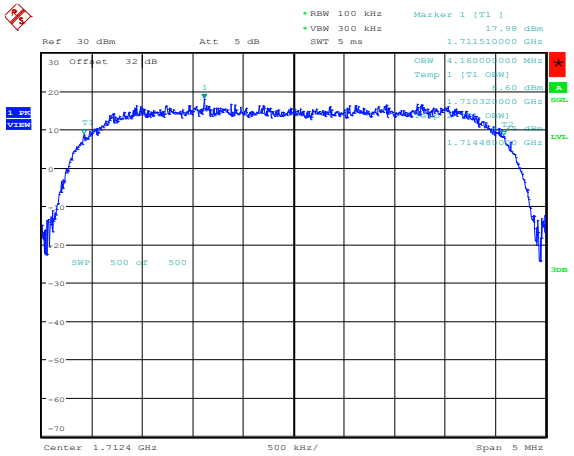

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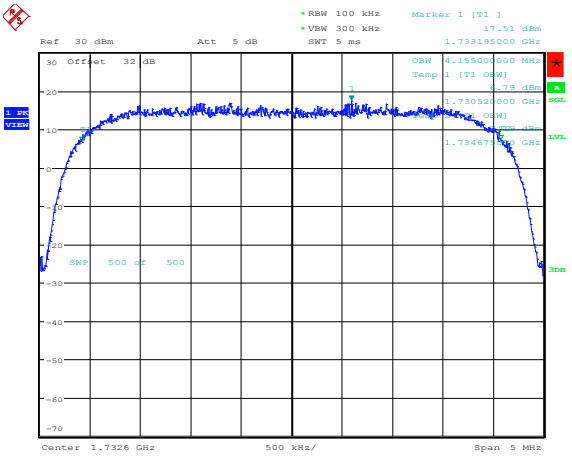
Figure 2-25b: Occupied Bandwidth, Band IV HSUPA Middle Channel



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WCDMA Conducted RF Emission Test Data cont'd

Figure 2-26b: Occupied Bandwidth, Band IV
HSUPA High Channel

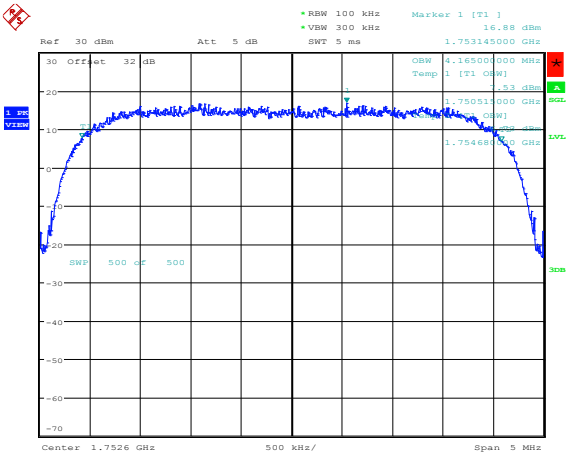


Figure 2-27b: Band IV , HSUPA Low Channel Mask

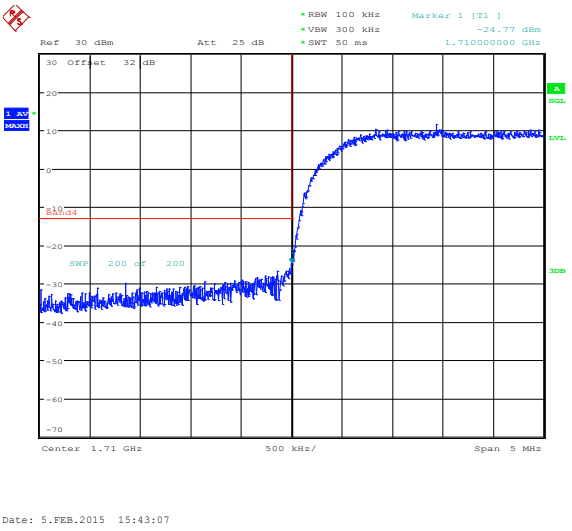
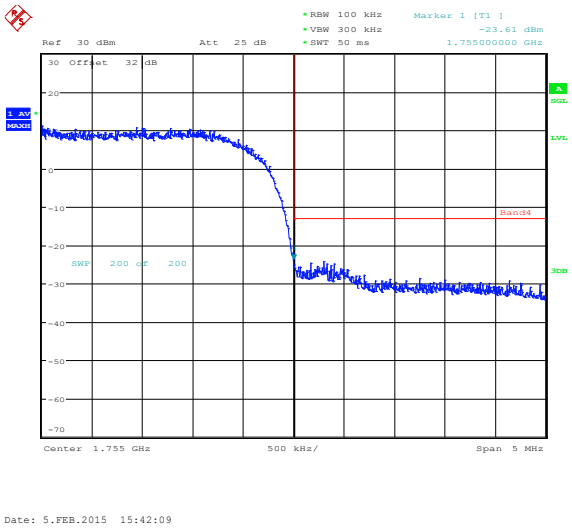
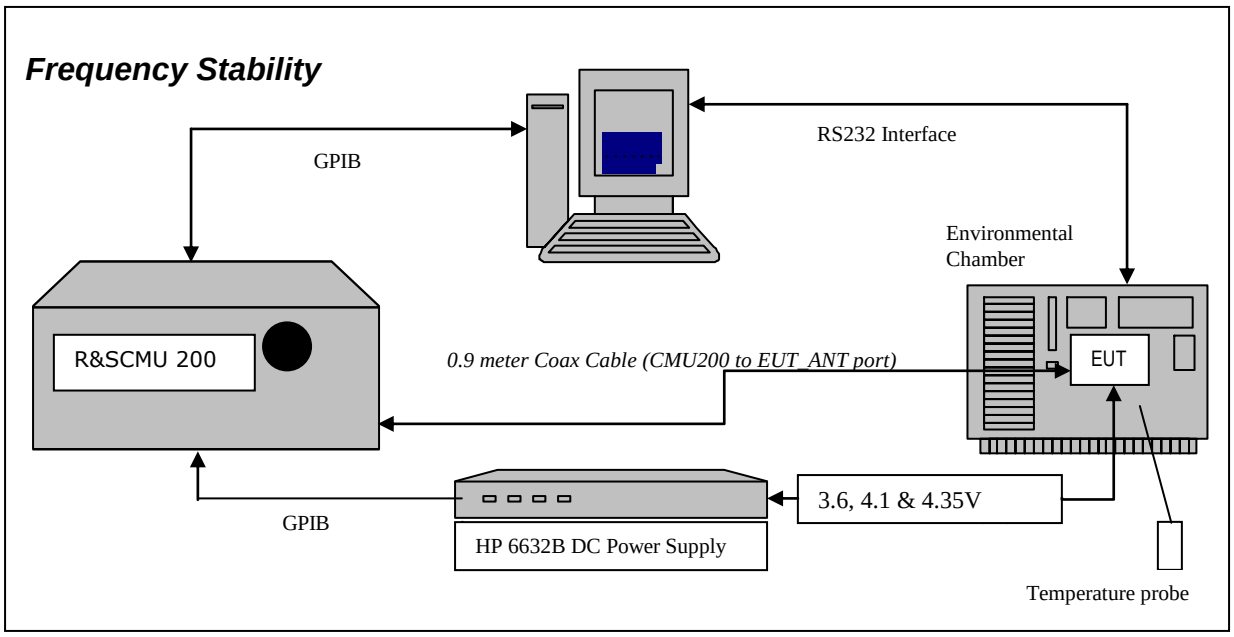


Figure 2-28b: Band IV , HSUPA High Channel Mask



APPENDIX 2B – WCDMA Band V/II/IV FREQUENCY STABILITY TEST DATA

WCDMA Frequency Stability Test Data



The following measurements were performed by Sijia.

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements
2.1055 Frequency Stability - Procedures
(a,b) Frequency Stability - Temperature Variation
(d) Frequency Stability - Voltage Variation

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

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, CFR 47 chapter 1, Section 22.917 RSS-132, 5.3 Frequency Stability, and RSS-133, 6.3 Frequency Stability.

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

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 826.4, 836.4 and 846.6 MHz for the WCDMA band V. 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.

Procedure:

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

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

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

The maximum frequency error in the WCDMA band V measured was 0.0124 PPM.
The maximum frequency error in the WCDMA band II measured was 0.0088 PPM.
The maximum frequency error in the WCDMA Band IV measured was -0.0217 PPM.

Date of Test: Feb 17, 2015

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

Traffic Channel Number	WCDMA Band V Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	3.6	20	-5.31	-0.0064
4182	836.4	3.6	20	-4.88	-0.0058
4233	846.6	3.6	20	8.36	0.0099

Traffic Channel Number	WCDMA Band V Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.1	20	5.91	0.0071
4182	836.4	4.1	20	5.49	0.0066
4233	846.6	4.1	20	6.56	0.0078

Traffic Channel Number	WCDMA Band V Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
4132	826.4	4.35	20	-6.61	-0.0080
4182	836.4	4.35	20	6.21	0.0074
4233	846.6	4.35	20	5.20	0.0061

WCDMA Band V 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	-4.91	-0.0059
4132	826.4	3.6	-20	-4.67	-0.0057
4132	826.4	3.6	-10	-6.21	-0.0075
4132	826.4	3.6	0	-7.19	-0.0087
4132	826.4	3.6	10	-6.65	-0.0081
4132	826.4	3.6	20	-5.31	-0.0064
4132	826.4	3.6	30	5.89	0.0071
4132	826.4	3.6	40	8.71	0.0105
4132	826.4	3.6	50	7.25	0.0088
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4132	826.4	4.1	-30	5.91	0.0071
4132	826.4	4.1	-20	-7.10	-0.0086
4132	826.4	4.1	-10	-5.68	-0.0069
4132	826.4	4.1	0	-6.64	-0.0080
4132	826.4	4.1	10	-6.81	-0.0082
4132	826.4	4.1	20	5.91	0.0071
4132	826.4	4.1	30	-6.04	-0.0073
4132	826.4	4.1	40	8.56	0.0104
4132	826.4	4.1	50	8.07	0.0098
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4132	826.4	4.35	-30	6.33	0.0077
4132	826.4	4.35	-20	6.13	0.0074
4132	826.4	4.35	-10	-7.80	-0.0094
4132	826.4	4.35	0	-6.33	-0.0077
4132	826.4	4.35	10	-7.16	-0.0087
4132	826.4	4.35	20	-6.61	-0.0080
4132	826.4	4.35	30	6.76	0.0082
4132	826.4	4.35	40	8.16	0.0099
4132	826.4	4.35	50	6.39	0.0077

WCDMA Band V 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	5.87	0.0070
4182	836.4	3.6	-20	-6.26	-0.0075
4182	836.4	3.6	-10	5.51	0.0066
4182	836.4	3.6	0	7.05	0.0084
4182	836.4	3.6	10	-6.27	-0.0075
4182	836.4	3.6	20	-4.88	-0.0058
4182	836.4	3.6	30	8.70	0.0104
4182	836.4	3.6	40	-5.77	-0.0069
4182	836.4	3.6	50	9.98	0.0119
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4182	836.4	4.1	-30	-6.12	-0.0073
4182	836.4	4.1	-20	7.69	0.0092
4182	836.4	4.1	-10	7.25	0.0087
4182	836.4	4.1	0	-5.16	-0.0062
4182	836.4	4.1	10	-3.94	-0.0047
4182	836.4	4.1	20	5.49	0.0066
4182	836.4	4.1	30	8.16	0.0098
4182	836.4	4.1	40	6.87	0.0082
4182	836.4	4.1	50	6.55	0.0078
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4182	836.4	4.35	-30	4.10	0.0049
4182	836.4	4.35	-20	5.17	0.0062
4182	836.4	4.35	-10	-5.17	-0.0062
4182	836.4	4.35	0	5.04	0.0060
4182	836.4	4.35	10	6.93	0.0083
4182	836.4	4.35	20	6.21	0.0074
4182	836.4	4.35	30	-6.61	-0.0079
4182	836.4	4.35	40	8.45	0.0101
4182	836.4	4.35	50	8.91	0.0107

WCDMA Band V 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	-5.94	-0.0070
4233	846.6	3.6	-20	6.45	0.0076
4233	846.6	3.6	-10	5.63	0.0067
4233	846.6	3.6	0	9.06	0.0107
4233	846.6	3.6	10	10.53	**0.0124**
4233	846.6	3.6	20	8.36	0.0099
4233	846.6	3.6	30	6.93	0.0082
4233	846.6	3.6	40	7.03	0.0083
4233	846.6	3.6	50	-8.15	-0.0096
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4233	846.6	4.1	-30	-6.29	-0.0074
4233	846.6	4.1	-20	-5.72	-0.0068
4233	846.6	4.1	-10	8.91	0.0105
4233	846.6	4.1	0	9.96	0.0118
4233	846.6	4.1	10	9.67	0.0114
4233	846.6	4.1	20	6.56	0.0078
4233	846.6	4.1	30	6.76	0.0080
4233	846.6	4.1	40	-6.77	-0.0080
4233	846.6	4.1	50	6.85	0.0081
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
4233	846.6	4.35	-30	-6.15	-0.0073
4233	846.6	4.35	-20	5.40	0.0064
4233	846.6	4.35	-10	7.61	0.0090
4233	846.6	4.35	0	7.64	0.0090
4233	846.6	4.35	10	7.34	0.0087
4233	846.6	4.35	20	5.20	0.0061
4233	846.6	4.35	30	7.03	0.0083
4233	846.6	4.35	40	7.03	0.0083
4233	846.6	4.35	50	6.48	0.0077

WCDMA Band II 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	9.41	0.0051
9400	1880.00	3.6	20	9.98	0.0053
9538	1907.60	3.6	20	10.03	0.0053

Traffic Channel Number	WCDMA1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.1	20	7.42	0.0040
9400	1880.00	4.1	20	8.27	0.0044
9538	1907.60	4.1	20	9.40	0.0049

Traffic Channel Number	WCDMA1900 Frequency (MHz	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9262	1852.40	4.35	20	7.32	0.0040
9400	1880.00	4.35	20	9.08	0.0048
9538	1907.60	4.35	20	10.85	0.0057

WCDMA Band II 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	8.19	0.0044
9262	1852.40	3.6	-20	-4.82	-0.0026
9262	1852.40	3.6	-10	-7.42	-0.0040
9262	1852.40	3.6	0	-8.21	-0.0044
9262	1852.40	3.6	10	5.78	0.0031
9262	1852.40	3.6	20	9.41	0.0051
9262	1852.40	3.6	30	11.78	0.0064
9262	1852.40	3.6	40	13.37	0.0072
9262	1852.40	3.6	50	16.33	**0.0088**
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9262	1852.40	4.1	-30	8.73	0.0047
9262	1852.40	4.1	-20	5.29	0.0029
9262	1852.40	4.1	-10	-10.25	-0.0055
9262	1852.40	4.1	0	-10.39	-0.0056
9262	1852.40	4.1	10	8.36	0.0045
9262	1852.40	4.1	20	7.42	0.0040
9262	1852.40	4.1	30	11.43	0.0062
9262	1852.40	4.1	40	12.97	0.0070
9262	1852.40	4.1	50	14.60	0.0079
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9262	1852.40	4.35	-30	10.86	0.0059
9262	1852.40	4.35	-20	-5.77	-0.0031
9262	1852.40	4.35	-10	-11.14	-0.0060
9262	1852.40	4.35	0	-8.90	-0.0048
9262	1852.40	4.35	10	-7.63	-0.0041
9262	1852.40	4.35	20	7.32	0.0040
9262	1852.40	4.35	30	11.35	0.0061
9262	1852.40	4.35	40	14.56	0.0079
9262	1852.40	4.35	50	14.66	0.0079

WCDMA Band II 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	7.68	0.0041
9400	1880.00	3.6	-20	8.07	0.0043
9400	1880.00	3.6	-10	6.81	0.0036
9400	1880.00	3.6	0	8.82	0.0047
9400	1880.00	3.6	10	9.28	0.0049
9400	1880.00	3.6	20	9.98	0.0053
9400	1880.00	3.6	30	9.11	0.0048
9400	1880.00	3.6	40	9.05	0.0048
9400	1880.00	3.6	50	7.42	0.0039
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9400	1880.00	4.1	-30	6.26	0.0033
9400	1880.00	4.1	-20	7.75	0.0041
9400	1880.00	4.1	-10	8.36	0.0044
9400	1880.00	4.1	0	8.00	0.0043
9400	1880.00	4.1	10	7.57	0.0040
9400	1880.00	4.1	20	8.27	0.0044
9400	1880.00	4.1	30	10.76	0.0057
9400	1880.00	4.1	40	8.76	0.0047
9400	1880.00	4.1	50	8.73	0.0046
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9400	1880.00	4.35	-30	7.60	0.0040
9400	1880.00	4.35	-20	8.73	0.0046
9400	1880.00	4.35	-10	6.82	0.0036
9400	1880.00	4.35	0	8.04	0.0043
9400	1880.00	4.35	10	9.38	0.0050
9400	1880.00	4.35	20	9.08	0.0048
9400	1880.00	4.35	30	9.31	0.0050
9400	1880.00	4.35	40	7.93	0.0042
9400	1880.00	4.35	50	8.19	0.0044

WCDMA Band II Results: channel 9538 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
9538	1907.60	3.6	-30	-8.48	-0.0044
9538	1907.60	3.6	-20	8.80	0.0046
9538	1907.60	3.6	-10	13.18	0.0069
9538	1907.60	3.6	0	13.95	0.0073
9538	1907.60	3.6	10	10.54	0.0055
9538	1907.60	3.6	20	10.03	0.0053
9538	1907.60	3.6	30	-9.40	-0.0049
9538	1907.60	3.6	40	-7.29	-0.0038
9538	1907.60	3.6	50	-9.96	-0.0052
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
9538	1907.60	4.1	-30	-5.63	-0.0030
9538	1907.60	4.1	-20	10.97	0.0058
9538	1907.60	4.1	-10	12.68	0.0066
9538	1907.60	4.1	0	13.12	0.0069
9538	1907.60	4.1	10	13.17	0.0069
9538	1907.60	4.1	20	9.40	0.0049
9538	1907.60	4.1	30	8.10	0.0042
9538	1907.60	4.1	40	-6.15	-0.0032
9538	1907.60	4.1	50	-8.06	-0.0042
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**21BPPM**
9538	1907.60	4.35	-30	-7.40	-0.0039
9538	1907.60	4.35	-20	10.54	0.0055
9538	1907.60	4.35	-10	12.54	0.0066
9538	1907.60	4.35	0	13.26	0.0070
9538	1907.60	4.35	10	13.03	0.0068
9538	1907.60	4.35	20	10.85	0.0057
9538	1907.60	4.35	30	7.98	0.0042
9538	1907.60	4.35	40	-8.73	-0.0046
9538	1907.60	4.35	50	-10.35	-0.0054

WCDMA Band IV results: channels 1312, 1413 and 1513 @ 20°C maximum transmitted power

Traffic Channel Number	WCDMA Band IV Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1312	1712.4	3.6	20	-5.43	-0.0032
1413	1732.6	3.6	20	-10.45	-0.0060
1513	1752.6	3.6	20	9.28	0.0061

Traffic Channel Number	WCDMA Band IV Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1312	1712.4	4.1	20	-6.53	-0.0038
1413	1732.6	4.1	20	-9.51	-0.0055
1513	1752.6	4.1	20	8.67	0.0057

Traffic Channel Number	WCDMA Band IV Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1312	1712.4	4.35	20	-8.76	-0.0051
1413	1732.6	4.35	20	-8.87	-0.0051
1513	1752.6	4.35	20	9.67	0.0064

WCDMA Band IV Results: channel 1312 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1312.00	1712.40	3.6	-30	12.62	0.0074
1312.00	1712.40	3.6	-20	-14.68	-0.0086
1312.00	1712.40	3.6	-10	-19.96	-0.0117
1312.00	1712.40	3.6	0	-22.46	-0.0131
1312.00	1712.40	3.6	10	-15.40	-0.0090
1312.00	1712.40	3.6	20	-5.43	-0.0032
1312.00	1712.40	3.6	30	14.22	0.0083
1312.00	1712.40	3.6	40	21.94	0.0128
1312.00	1712.40	3.6	50	25.13	0.0147
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1312.00	1712.40	4.1	-30	13.67	0.0080
1312.00	1712.40	4.1	-20	-17.01	-0.0099
1312.00	1712.40	4.1	-10	-19.49	-0.0114
1312.00	1712.40	4.1	0	-23.27	-0.0136
1312.00	1712.40	4.1	10	-14.59	-0.0085
1312.00	1712.40	4.1	20	-6.53	-0.0038
1312.00	1712.40	4.1	30	12.53	0.0073
1312.00	1712.40	4.1	40	21.62	0.0126
1312.00	1712.40	4.1	50	24.40	0.0142
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1312.00	1712.40	4.35	-30	14.02	0.0082
1312.00	1712.40	4.35	-20	-14.36	-0.0084
1312.00	1712.40	4.35	-10	-19.58	-0.0114
1312.00	1712.40	4.35	0	-20.36	-0.0119
1312.00	1712.40	4.35	10	-14.91	-0.0087
1312.00	1712.40	4.35	20	-8.76	-0.0051
1312.00	1712.40	4.35	30	13.87	0.0081
1312.00	1712.40	4.35	40	21.24	0.0124
1312.00	1712.40	4.35	50	25.45	0.0149

WCDMA Band IV Results: channel 1413 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1413.00	1732.60	3.6	-30	-11.20	-0.0065
1413.00	1732.60	3.6	-20	-12.08	-0.0070
1413.00	1732.60	3.6	-10	-8.82	-0.0051
1413.00	1732.60	3.6	0	-12.18	-0.0070
1413.00	1732.60	3.6	10	-8.19	-0.0047
1413.00	1732.60	3.6	20	-10.45	-0.0060
1413.00	1732.60	3.6	30	-8.24	-0.0048
1413.00	1732.60	3.6	40	-7.28	-0.0042
1413.00	1732.60	3.6	50	-10.44	-0.0060
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1413.00	1732.60	4.1	-30	-11.86	-0.0068
1413.00	1732.60	4.1	-20	-12.94	-0.0075
1413.00	1732.60	4.1	-10	-11.35	-0.0066
1413.00	1732.60	4.1	0	-9.31	-0.0054
1413.00	1732.60	4.1	10	-10.30	-0.0059
1413.00	1732.60	4.1	20	-9.51	-0.0055
1413.00	1732.60	4.1	30	-10.04	-0.0058
1413.00	1732.60	4.1	40	-6.76	-0.0039
1413.00	1732.60	4.1	50	-9.80	-0.0057
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1413.00	1732.60	4.35	-30	-8.12	-0.0047
1413.00	1732.60	4.35	-20	-11.96	-0.0069
1413.00	1732.60	4.35	-10	-8.35	-0.0048
1413.00	1732.60	4.35	0	-9.06	-0.0052
1413.00	1732.60	4.35	10	-10.35	-0.0060
1413.00	1732.60	4.35	20	-8.87	-0.0051
1413.00	1732.60	4.35	30	-9.70	-0.0056
1413.00	1732.60	4.35	40	-9.31	-0.0054
1413.00	1732.60	4.35	50	-8.16	-0.0047

WCDMA Band IV Results: channel 1513 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
1513.00	1752.6	3.6	-30	-13.55	-0.0090
1513.00	1752.6	3.6	-20	14.19	0.0094
1513.00	1752.6	3.6	-10	21.65	0.0143
1513.00	1752.6	3.6	0	23.67	0.0156
1513.00	1752.6	3.6	10	17.04	0.0113
1513.00	1752.6	3.6	20	9.28	0.0061
1513.00	1752.6	3.6	30	-11.73	-0.0078
1513.00	1752.6	3.6	40	-19.15	-0.0127
1513.00	1752.6	3.6	50	-23.91	-0.0158
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1513.00	1752.6	4.1	-30	-18.05	-0.0119
1513.00	1752.6	4.1	-20	12.91	0.0085
1513.00	1752.6	4.1	-10	21.36	0.0141
1513.00	1752.6	4.1	0	22.86	0.0151
1513.00	1752.6	4.1	10	17.12	0.0113
1513.00	1752.6	4.1	20	8.67	0.0057
1513.00	1752.6	4.1	30	-12.70	-0.0084
1513.00	1752.6	4.1	40	-19.81	-0.0131
1513.00	1752.6	4.1	50	-23.64	-0.0156
Traffic Channel Number	**Frequency (MHz)**	**Voltage (Volts)**	**Temperature (Celsius)**	**Frequency Error (Hz)**	**PPM**
1513.00	1752.6	4.35	-30	-12.77	-0.0084
1513.00	1752.6	4.35	-20	14.98	0.0099
1513.00	1752.6	4.35	-10	20.92	0.0138
1513.00	1752.6	4.35	0	21.93	0.0145
1513.00	1752.6	4.35	10	17.06	0.0113
1513.00	1752.6	4.35	20	9.67	0.0064
1513.00	1752.6	4.35	30	-11.25	-0.0074
1513.00	1752.6	4.35	40	-20.52	-0.0136
1513.00	1752.6	4.35	50	-24.84	-0.0164

APPENDIX 2C – WCDMA Band V/II/IV RADIATED EMISSIONS TEST DATA

Radiated Power Test Data Results

The following measurements were performed by Shiva Kumbham.

Date of Test: February 11, 2015

The environmental tests conditions were: Temperature: 27.0 °C
Relative Humidity: 9.9 %

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.

WCDMA Band V 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	V	Dipole	V	-40.66	-30.43	V-V	5.23	21.22	0.13	38.50	17.28
F0	4132	826.40	V	Dipole	H	-30.43		H-H	4.62				
F0	4182	836.40	V	Dipole	V	-39.59	-29.36	V-V	5.07	22.73	0.19	38.50	15.77
F0	4182	836.40	V	Dipole	H	-29.36		H-H	4.45				
F0	4233	846.60	V	Dipole	V	-40.24	-30.96	V-V	3.69	**23.33**	0.22	38.50	15.17
F0	4233	846.60	V	Dipole	H	-30.96		H-H	5.41				

WCDMA Band V HSUPA Mode

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator					
Type	Ch	Frequency (MHz)	Band	Type	ol.	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	V	Dipole	V	-42.17	-31.83	V-V	1.79	19.81	0.10	38.50	18.69
F0	4132	826.40	V	Dipole	H	-31.83		H-H	1.12				
F0	4182	836.40	V	Dipole	V	-41.04	-30.75	V-V	3.70	21.33	0.14	38.50	17.17
F0	4182	836.40	V	Dipole	H	-30.75		H-H	3.08				
F0	4233	846.60	V	Dipole	V	-41.95	-32.58	V-V	4.04	**21.71**	0.15	38.50	16.79
F0	4233	846.60	V	Dipole	H	-32.58		H-H	0.87				

Radiated Power Test Data Results cont'd

Date of Test: February 11, 2015

The environmental test conditions were: Temperature: 27.0 ºC
Relative Humidity: 9.9 %

The BlackBerry® smartphone was standalone, horizontally down with the top of device 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 II 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	II	Horn	V	-26.51	-23.40	V-V	-11.75	29.28	0.85	33.00	3.72
F0	9262	1852.40	II	Horn	H	-23.40		H-H	-10.34				
F0	9400	1880.00	II	Horn	V	-26.65	-22.76	V-V	-10.73	**29.41**	0.87	33.00	3.59
F0	9400	1880.00	II	Horn	H	-22.76		H-H	-9.99				
F0	9538	1907.60	II	Horn	V	-28.08	-23.59	V-V	-11.16	28.99	0.79	33.00	4.01
F0	9538	1907.60	II	Horn	H	-23.59		H-H	-10.41				

WCDMA Band II 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	II	Horn	V	-27.97	-24.94	V-V	-12.32	27.71	0.59	33.00	5.29
F0	9262	1852.40	II	Horn	H	-24.94		H-H	-11.91				
F0	9400	1880.00	II	Horn	V	-28.18	-24.19	V-V	-12.23	**28.43**	0.70	33.00	4.57
F0	9400	1880.00	II	Horn	H	-24.19		H-H	-10.97				
F0	9538	1907.60	II	Horn	V	-29.48	-25.03	V-V	-12.65	27.46	0.56	33.00	5.54
F0	9538	1907.60	II	Horn	H	-25.03		H-H	-11.94				

Radiated Power Test Data Results

Date of Test: Feb 21, 2015

The environmental tests conditions were: Temperature: 25.8 °C
Relative Humidity: 17.1 %

The BlackBerry® smartphone was standalone, side button 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 IV 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	1312	1712.4	IV	Dipole	V	-20.78	-20.78	V-V	-10.47	**28.63**	0.73	30.00	1.37
F0	1312	1712.4	IV	Dipole	H	-24.04		H-H	-10.07				
F0	1413	1732.6	IV	Dipole	V	-22.18	-22.18	V-V	-11.73	27.43	0.55	30.00	2.57
F0	1413	1732.6	IV	Dipole	H	-26.26		H-H	-11.36				
F0	1513	1752.6	IV	Dipole	V	-21.21	-21.21	V-V	-10.61	28.58	0.72	30.00	1.42
F0	1513	1752.6	IV	Dipole	H	-24.85		H-H	-10.09				

WCDMA Band IV 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	1312	1712.4	IV	Dipole	V	-22.23	-22.23	V-V	-11.95	**27.14**	0.52	30.00	2.86
F0	1312	1712.4	IV	Dipole	H	-25.44		H-H	-11.56				
F0	1413	1732.6	IV	Dipole	V	-23.71	-23.71	V-V	-13.26	25.86	0.39	30.00	4.14
F0	1413	1732.6	IV	Dipole	H	-27.67		H-H	-12.93				
F0	1513	1752.6	IV	Dipole	V	-22.70	-22.70	V-V	-12.08	27.08	0.51	30.00	2.92
F0	1513	1752.6	IV	Dipole	H	-26.37		H-H	-11.59				

Radiated Emissions Test Data Results cont'd

WCDMA Band V Call Service Mode

The following measurements were performed by Shiva Kumbham.

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 27.2 ºC
Relative Humidity: 6.5 %

The BlackBerry® smartphone was standalone, with horizontal 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 V Call mode on channels 4132, 4182, and 4233.

All emissions were at least 25.0 dB below the limit.

The following measurements were performed by Kevin Guo

Date of Test: February 11 and 20, 2015

The environmental test conditions were: Temperature: 24.4 - 24.7 ºC
Relative Humidity: 14.6 - 15.7 %

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 up and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band V Call mode on channels 4132, 4182, and 4233.

All emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

WCDMA V HSUPA Mode

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 27.2 ºC
Relative Humidity: 6.5 %

The BlackBerry® smartphone was standalone, with horizontal 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 V HSUPA mode on channels 4132, 4182, and 4233.

All emissions were at least 25.0 dB below the limit.

Date of Test: February 11 and 20, 2015

The environmental test conditions were: Temperature: 24.4 - 24.7 ºC
Relative Humidity: 14.6 - 15.7 %

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 up and top pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band V HSUPA mode on channels 4132, 4182, and 4233.

All emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

WCDMA Band II Call Service mode

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 26.9 ºC
Relative Humidity: 5.7 %

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, with horizontally down and top of the device pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band II Call mode on channels 9262, 9400 and 9538.

All emissions were at least 25.0 dB below the limit.

Date of Test: February 10, 20, and March 2, 2015

The environmental test conditions were: Temperature: 24.5 - 24.7 ºC
Relative Humidity: 14.4 - 15.7 %

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 horizontally down and top of the device pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band II Call mode on channels 9262, 9400, 9538.

All emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

WCDMA Band II HSUPA Mode

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 26.9 ºC
Relative Humidity: 5.7 %

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, with horizontally down and top of the device pointing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band II HSUPA mode on channels 9262, 9400, and 9538.

All emissions were at least 25.0 dB below the limit.

Date of Test: February 10, 20, and March 2, 2015

The environmental test conditions were: Temperature: 24.5 - 24.7 ºC
Relative Humidity: 14.4 - 15.7 %

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 horizontally down and top of the device pointing to the RX antenna when the turntable is at 0 degree position

Measurements were performed in WCDMA Band II HSUPA mode on channels 9262, 9400, 9538.

All emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

WCDMA Band IV Call Service mode

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 27.2 ºC
Relative Humidity: 6.5 %

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

Measurements were performed in WCDMA Band IV Call mode on channels 1312, 1413 and 1513.

All emissions were at least 25.0 dB below the limit.

Date of Test: February 10, 11, 20, 2015.

The environmental test conditions were: Temperature: 23.2 - 25.6 ºC
Relative Humidity: 17.7 - 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 18 GHz.

The BlackBerry® smartphone was standalone, volume key down with LCD facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band IV Call mode on channels 1312, 1413 and 1513.

All emissions were at least 25.0 dB below the limit.

Radiated Emissions Test Data Results cont'd

WCDMA Band IV HSUPA Mode

Date of Test: February 10, 2015

The environmental test conditions were: Temperature: 27.2 ºC
Relative Humidity: 6.5 %

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

Measurements were performed in WCDMA Band IV HSUPA mode on channels 1312, 1413 and 1513.

All emissions were at least 25.0 dB below the limit.

Date of Test: February 10, 11, 20, 2015.

The environmental test conditions were: Temperature: 23.2 - 25.6 ºC
Relative Humidity: 17.7 - 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 18 GHz.

The BlackBerry® smartphone was standalone, volume key down with LCD facing to the RX antenna when the turntable is at 0 degree position.

Measurements were performed in WCDMA Band IV HSUPA mode on channels 1312, 1413 and 1513.

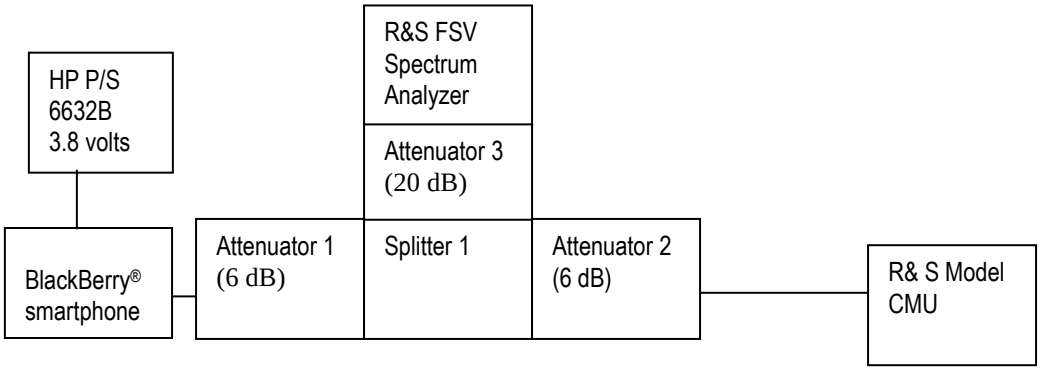
All emissions were at least 25.0 dB below the limit.

APPENDIX 3A– LTE Band 2 CONDUCTED RF EMISSIONS TEST DATA/PLOTS

LTE Band 2 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: February 2, 2015

The environmental test conditions were: Temperature: 22.6ºC
Relative Humidity: 16.5 %

The following measurements were performed by Sijia Li.

LTE Band 2 Conducted RF Emission Test Data cont'd

Emission Designator Table

Frequency Range (MHz)	Conducted Output Power (dBm)	Emission Designator	Band	Bandwidth (MHz)	Modulation
1850.7-1909.3	21.87	1M07G7D	LTE B2	1.4	QPSK
1850.7-1909.3	20.82	1M07D7W	LTE B2	1.4	16QAM
1851.5-1908.5	21.80	2M69G7D	LTE B2	3	QPSK
1851.5-1908.5	21.08	2M69D7W	LTE B2	3	16QAM
1852.5-1907.5	21.89	4M47G7D	LTE B2	5	QPSK
1852.5-1907.5	20.68	4M49D7W	LTE B2	5	16QAM
1855-1905	21.94	8M95G7D	LTE B2	10	QPSK
1855-1905	21.37	8M93D7W	LTE B2	10	16QAM
1857.5-1902.5	22.00	13M4G7D	LTE B2	15	QPSK
1857.5-1902.5	21.42	13M4D7W	LTE B2	15	16QAM
1860-1900	21.93	17M8G7D	LTE B2	20	QPSK
1860-1900	21.55	17M9D7W	LTE B2	20	16QAM

The conducted spurious emissions – As per 47 CFR 2.1051, CFR 24.232(d), CFR 2.202, RSS - 133 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 RBs as per scalable bandwidths for LTE Band 2, 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 RB 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 2 was measured to be 18.60 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.

Test Data for LTE Band 2 selected Frequencies in 20MHz bandwidth (RB = 100)

LTE Band 2 Frequency (MHz)	26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	
	QPSK	QPSK	16QAM
1852.400	18.42	17.84	17.88
1880.000	18.58	**17.93**	17.88
1907.600	18.60	17.88	**17.98**

Peak to Average Ratio (PAR)

For each 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz and 20 MHz with different number of RBs as per scalable bandwidths for LTE Band 2, 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 9.10 dB on middle channel in 20MHz bandwidth with 100 RBs.

Measurement Plots for LTE Band 2

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 3-24a and 3-43a to 3-45a for the plots of 99% Occupied Bandwidth and -26 dBc Bandwidth.
See Figures 3-25a to 3-36a for the plots of the Channel mask.
See Figures 3-37a to 3-42a for the plots of the Peak to Average Ratio.

LTE Band 2 Conducted RF Emission Test Data (cont'd)

Figure 3-1a: Band 2, Spurious Conducted Emissions, Low channel, 20MHz BW (RB= 100)

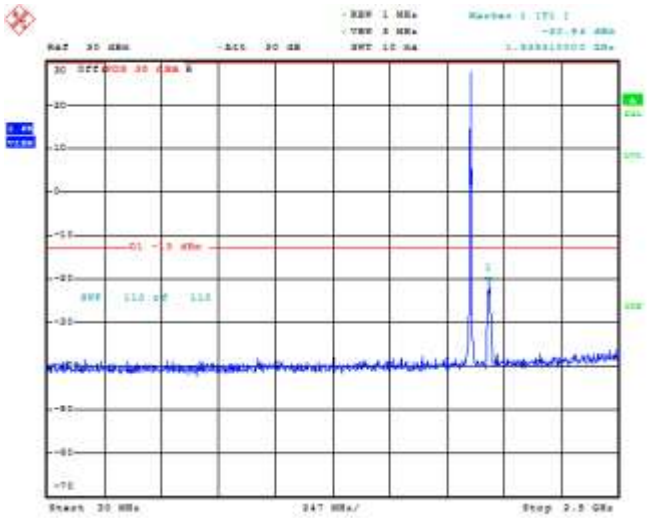


Figure 3-2a: Band 2, Spurious Conducted Emissions, Low channel, 20MHz BW (RB= 100)

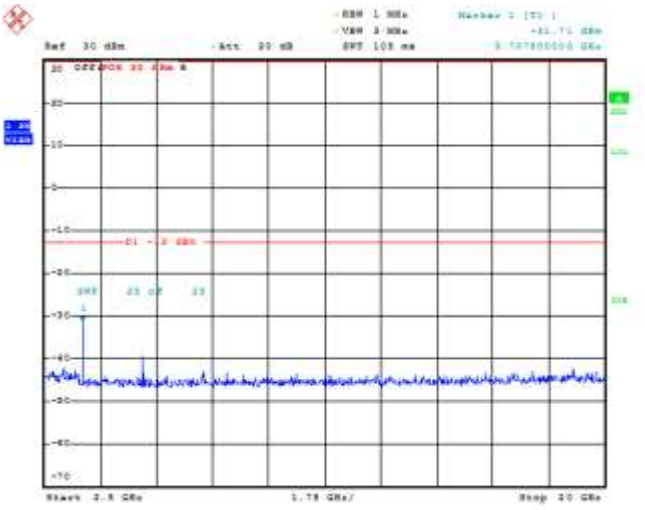


Figure 3-3a: Band 2, Spurious Conducted Emissions, Middle channel, 20MHz BW (RB= 100)

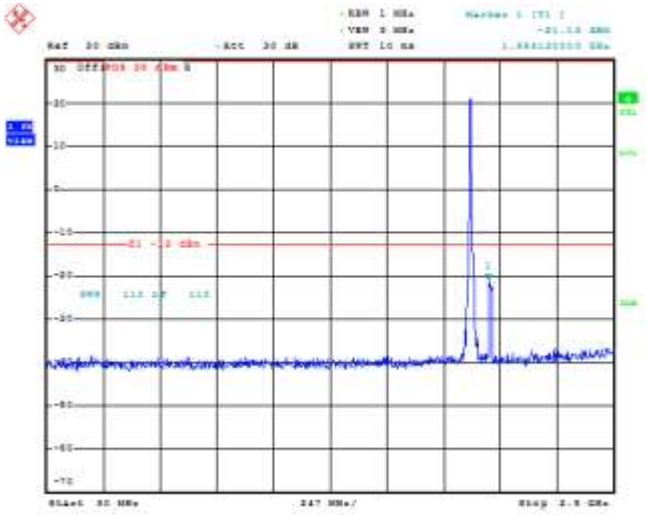
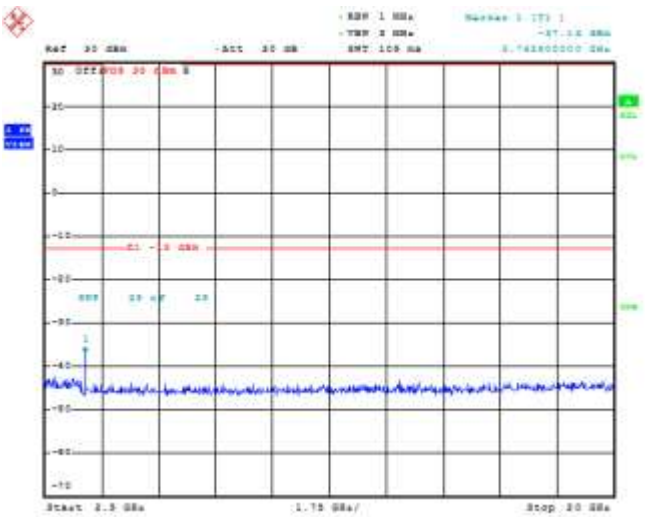


Figure 3-4a: Band 2, Spurious Conducted Emissions, Middle channel, 20MHz BW (RB= 100)



LTE Band 2 Conducted RF Emission Test Data cont'd

Figure 3-5a: Band 2, Spurious Conducted Emissions, High Channel, 20MHz BW (RB= 100)

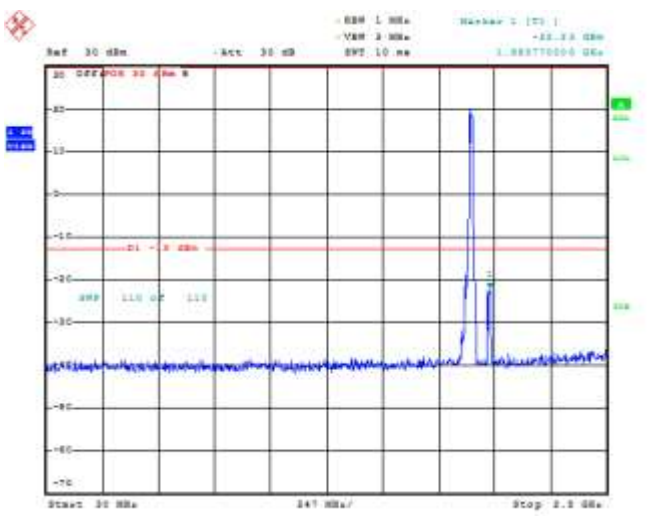


Figure 3-6a: Band 2, Spurious Conducted Emissions, High Channel, 20MHz BW (RB= 100)

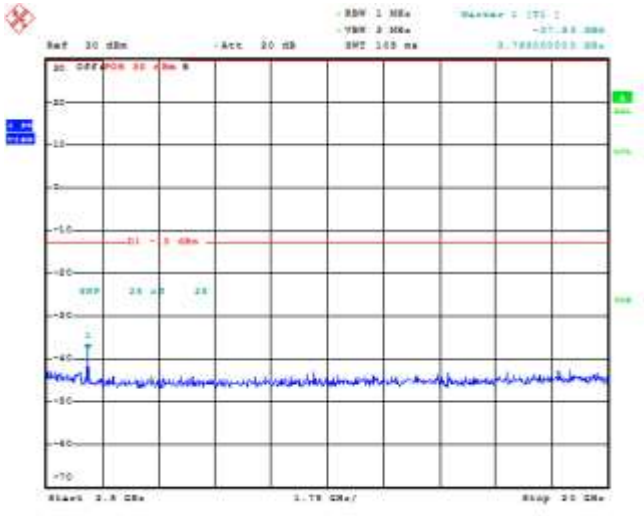


Figure 3-7a: Band 2, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 50)

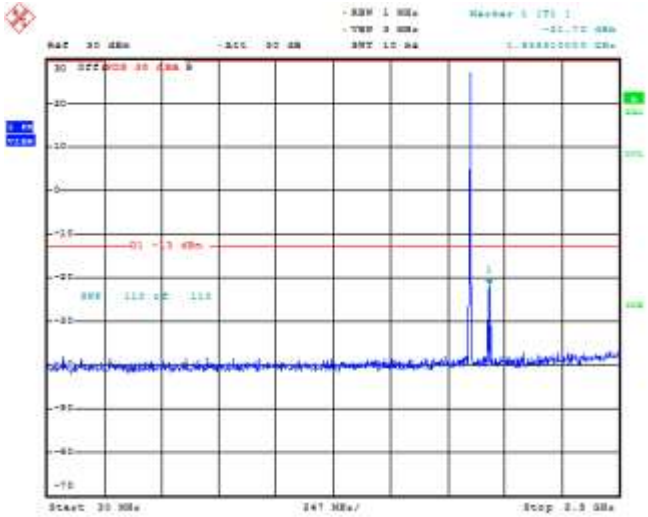
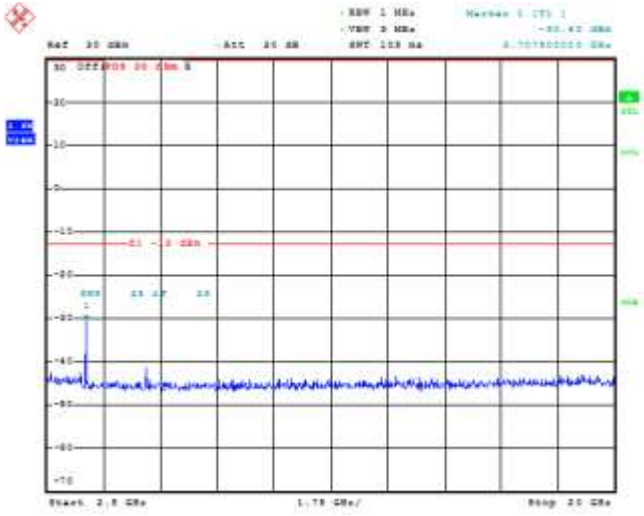


Figure 3-8a: Band 2, Spurious Conducted Emissions, Low channel, 10MHz BW (RB= 50)



LTE Band 2 Conducted RF Emission Test Data cont'd

Figure 3-9a: Band 2, Spurious Conducted Emissions, Middle channel, 10MHz BW (RB= 50)

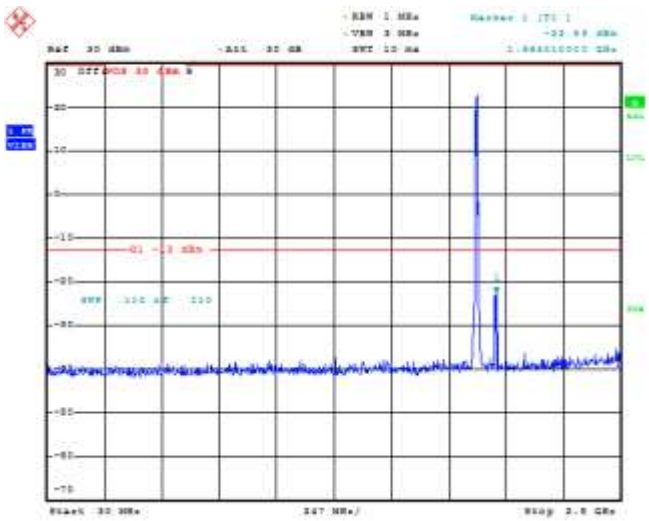


Figure 3-10a: Band 2, Spurious Conducted Emissions, Middle channel, 10MHz BW (RB= 50)

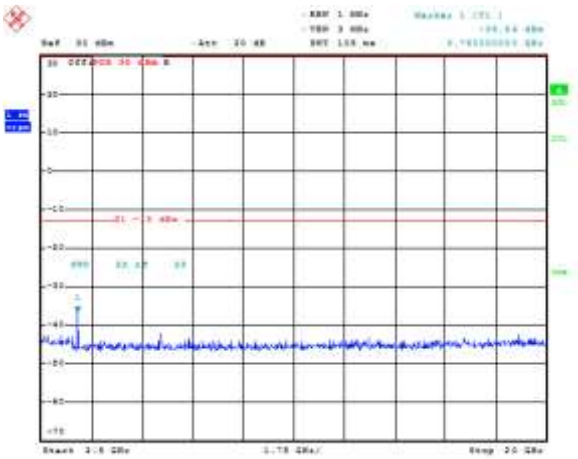


Figure 3-11a: Band 2, Spurious Conducted Emissions, High Channel, 10MHz BW (RB= 50)

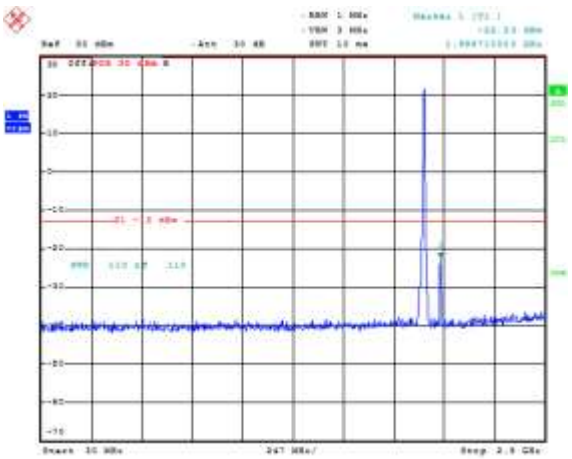
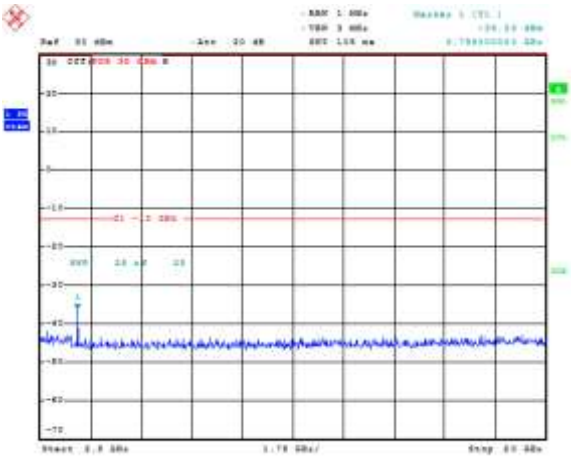


Figure 3-12a: Band 2, Spurious Conducted Emissions, High Channel, 10MHz BW (RB= 50)



LTE Band 2 Conducted RF Emission Test Data cont'd

Figure 3-13a: Band 2, Spurious Conducted Emissions, Low channel, 1.4MHz BW (RB= 6)

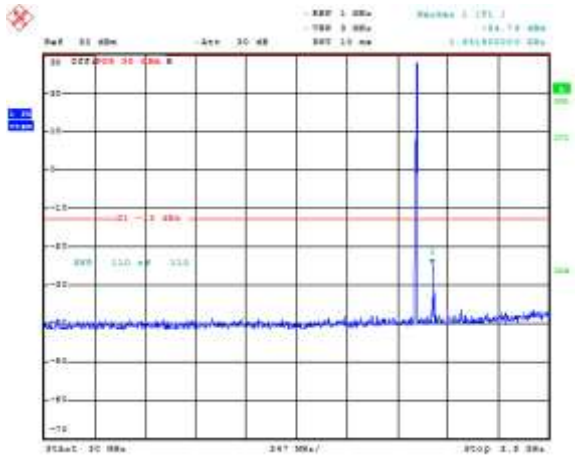


Figure 3-14a: Band 2, Spurious Conducted Emissions, Low channel, 1.4MHz BW (RB= 6)

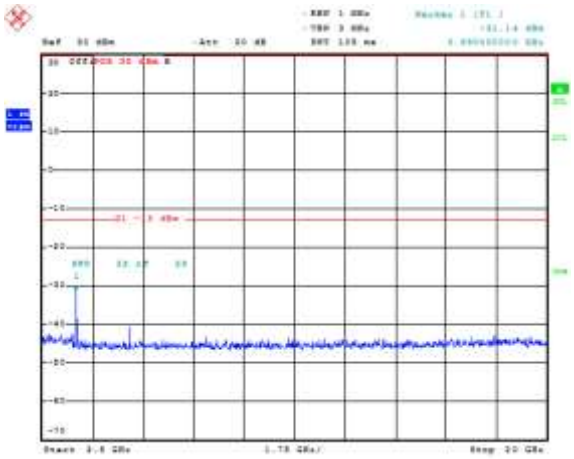


Figure 3-15a: Band 2, Spurious Conducted Emissions, Middle channel, 1.4MHz BW (RB= 6)

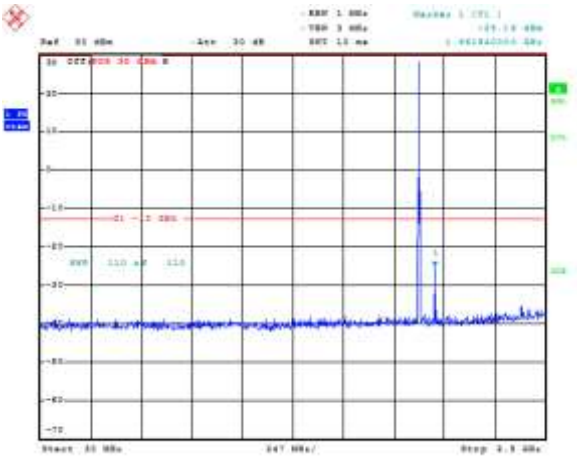


Figure 3-16a: Band 2, Spurious Conducted Emissions, Middle channel, 1.4MHz BW (RB= 6)