# EMI Test Report

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

## A division of Research In Motion Limited

**REPORT NO: RTS-6011-1209-16**

| | |
|---|---|
| **PRODUCT MODEL NO**: | RFG81UW |
| **TYPE NAME**: | BlackBerry® smartphone |
| **FCC ID**: | L6ARFG80UW |
| **IC**: | 2503A-RFG80UW |
| **EMISSION DESIGNATOR (GSM)**: | 248KGXW |
| **EMISSION DESIGNATOR (EDGE)**: | 248KG7W |
| **EMISSION DESIGNATOR (WCDMA)**: | 4M18F9W |

**DATE**: September 19, 2012

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

**592**

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## Statement of Performance:

The BlackBerry® smartphone, model RFG81UW, part number CER-48928-001 Rev2 and accessories perform within the requirements of the test standards when configured and operated per RIM's instructions.

## Declaration:

We hereby certify that:
The test data reported herein is an accurate record of the performance of the sample(s) tested. The test results are valid for the tested unit (s) only. The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating parameters. The test methods were consistent with the methods described in the relevant standards.

Documented by:

Berkin Can
Regulatory Compliance Specialist
Date: September 19, 2012

Reviewed by:

Heng Lin
Regulatory Compliance Specialist
Date: September 20, 2012

Reviewed and Approved by:

Masud S. Attayi, P.Eng.
Manager, Regulatory Compliance
Date: September 21, 2012

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## A) Scope

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

- FCC CFR 47 Part 2, Oct, 2011
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct., 2011
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct., 2011
- Industry Canada, RSS-132 Issue 2, September 2005, Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz.
- Industry Canada, RSS-133 Issue 5, February 2009, 2 GHz Personal Communications Services.
- Industry Canada, RSS-GEN Issue 3, December 2010, General Requirements and Information for the Certification of Radio communication Equipment

## B) Associated Documents

1) Test report TR2-0037-12-1h

## C) Product Identification

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

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

RIM Testing Services EMI test facilities

| | |
|---|---|
| 305 Phillip Street | 440 Phillip Street |
| Waterloo, Ontario | Waterloo, Ontario, |
| Canada, N2L 3W8 | Canada , N2L 5R9 |
| Phone: 519 888 7465 | Phone: 519 888 7465 |
| Fax: 519 888 6906 | Fax: 519 888 6906 |

The testing was performed from July 19 – August 15, 2012.

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The sample EUT included:

| Sample | Model | CER NUMBER | PIN | Software Information |
|---|---|---|---|---|
| 1 | RFG81UW | CER-48928-001 Rev2 | 2A4A554A | OS Version: 10.0.6.420 Bundle 420 |
| 2 | RFG81UW | CER-48928-001 Rev2 | 2A4A5504 | OS Version: 10.0.6.420 Bundle 420 |

RF Conducted Emissions testing was performed on samples 1 and 2.

BlackBerry® smartphone Accessories Tested

1) Bat. LS1, part number BAT-47277-001.

## D) Support Equipment Used for the Testing of the EUT

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

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## E) Test Results Chart

| SPECIFICATION | | TEST TYPE | RESULT | TEST DATA APPENDIX |
|---|---|---|---|---|
| FCC CFR 47 | IC | | | |
| Part 2.1051<br>Part 22.917<br>Part 22.901 | RSS-GEN, 4.9 | GSM 850 Conducted Spurious Emissions | Pass | 1A |
| Part 2.1051<br>Part 24.238(a) | RSS-GEN, 4.9 | PCS 1900 Conducted Spurious Emissions | Pass | 1A |
| Part 2.202<br>Part 22.917 | RSS-GEN, 4.6 | GSM 850 Occupied Bandwidth and Channel Mask | Pass | 1A |
| Part 2.202<br>Part 24.238 | RSS-GEN, 4.6 | PCS 1900 Occupied Bandwidth and Channel Mask | Pass | 1A |
| Part 2.1046(a) | RSS-133, 6.4<br>RSS-132, 4.4 | GSM Conducted RF Output Power | Pass | 2A |
| Part 2.1055(a)(d)<br>Part 22.917 | RSS-132, 4.3 | GSM 850 Frequency Stability vs. Temperature and Voltage | Pass | 3A |
| Part 2.1055(a)(d)<br>Part 24.235 | RSS-132, 4.3 | PCS 1900 Frequency Stability vs. Temperature and Voltage | Pass | 3A |
| Part 22, Subpart H,<br>Part 24, Subpart E | RSS-GEN, 4.9 | GSM ERP, EIRP | Pass | See test report TR2-0037-12-1h |
| Part 22, Subpart H<br>Part 24, Subpart E | RSS-GEN, 4.9 | GSM Radiated Spurious/Harmonic Emissions | Pass | See test report TR2-0037-12-1h |
| Part 2.1051<br>Part 22.917<br>Part 22.901(d) | RSS-GEN, 4.9 | WCDMA Band V Conducted Spurious Emissions | Pass | 1B |
| Part 2.1051<br>Part 24.238(a) | RSS-GEN, 4.9 | WCDMA Band II Conducted Spurious Emissions | Pass | 1B |
| Part 2.202<br>Part 22.917 | RSS-GEN, 4.6 | WCDMA Band V Occupied Bandwidth and Channel Mask | Pass | 1B |
| Part 2.202<br>Part 24.238 | RSS-GEN, 4.6 | WCDMA Band II Occupied Bandwidth and Channel Mask | Pass | 1B |
| Part 2.1046(a) | RSS-133, 6.4<br>RSS-132, 4.4 | WCDMA Band II and V Conducted RF Output Power | Pass | 2B |
| Part 2.1055(a)(d)<br>Part 22.917 | RSS-132, 4.3 | WCDMA Band V Frequency Stability vs. Temperature and Voltage | Pass | 3B |

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| | | | | |
|---|---|---|---|---|
| Part 2.1055(a)(d) Part 24.235 | RSS-GEN, 4.7 | WCDMA Band II Frequency Stability vs. Temperature and Voltage | Pass | 3B |
| Part 22, Subpart H | RSS-GEN, 4.9 | WCDMA Band V Radiated Spurious/Harmonic Emissions, ERP | Pass | See test report TR2-0037-12-1h |
| Part 24, Subpart E | RSS-GEN, 4.9 | WCDMA Band II Radiated Spurious/Harmonic Emissions, EIRP | Pass | See test report TR2-0037-12-1h |

## F) Summary of Results

### 1) Conducted Emission Measurements

a) The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions requirements 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 10 MHz to 10 GHz.
See APPENDIX 1A for test data.

The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions requirements in the PCS1900 as per 47 CFR 2.1051, CFR 24.238(a) and RSS-GEN, 4.9. The EUT was on the low, middle and high channels. The frequency range investigated was from 10 MHz to 20 GHz.
See APPENDIX 1A for test data

b) The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask requirements in the GSM850 as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6. The EUT was measured in CALL and EDGE mode on the low, middle and high channels. The worst case occupied bandwidth was 247.0 kHz on the middle channel in CALL mode, and 245.0 kHz on middle channel in EDGE mode.
See APPENDIX 1A for test data.

The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask requirements in the PCS1900 as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6. The EUT was measured in CALL and EDGE mode on the low, middle and high channels. The worst case occupied bandwidth was 248.0 kHz on the high channel in CALL, and 248.0 kHz on the middle in EDGE mode.
See APPENDIX 1A for test data.

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c) The BlackBerry® smartphone met the requirements of the Tx Conducted RF output Power requirements in the GSM850 as per 47 CFR 2.1046, and RSS-GEN, 4.4. The EUT was measured on the low, middle and high channels.
See APPENDIX 2A for test data.

The BlackBerry® smartphone met the requirements of the Tx Conducted RF output Power requirements in the PCS1900 as per 47 CFR 2.1046, and RSS-GEN, 6.4. The EUT was on the low, middle and high channels.
See APPENDIX 2A for test data

d) The BlackBerry® smartphone met the requirements of the Frequency Stability requirements 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 3A for test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability requirements 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 APPENDIX 3A for test data.

e) The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions requirements 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 10 MHz to 10 GHz.
See APPENDIX 1B for test data.

The BlackBerry® smartphone met the requirements of the Tx Conducted Spurious Emissions requirements in the WCDMA Band II as per 47 CFR 2.1051, CFR 24.238(a) and RSS-GEN, 4.9. The EUT was on the low, middle and high channels. The frequency range investigated was from 10 MHz to 20 GHz.
See APPENDIX 1B for test data

f) The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask requirements in the WCDMA Band V as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6. The EUT was measured in Loopback and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.167 MHz on the low and middle channels in Loopback mode, and 4.167 MHz on all three channels in HSUPA mode.
See APPENDIX 1B for test data.

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The BlackBerry® smartphone met the requirements of the Occupied Bandwidth and channel mask requirements in the WCDMA Band II as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6. The EUT was measured in Loopback and HSUPA mode on the low, middle and high channels. The worst case occupied bandwidth was 4.175 MHz on the high channel in Loopback mode, and 4.175 MHz on the low and middle channels in HSUPA mode.
See APPENDIX 1B for test data.

g) The BlackBerry® smartphone met the requirements of the Tx Conducted RF output Power requirements in the WCDMA Band V as per 47 CFR 2.1046, and RSS-GEN, 4.4. The EUT was measured on the low, middle and high channels.
See APPENDIX 2B for test data.

The BlackBerry® smartphone met the requirements of the Tx Conducted RF output Power requirements in the WCDMA Band II as per 47 CFR 2.1046, and RSS-GEN, 6.4. The EUT was on the low, middle and high channels.
See APPENDIX 2B for test data

h) The BlackBerry® smartphone met the requirements of the Frequency Stability requirements in the WCDMA Band V as per 47 CFR 2.1055, CFR 22.917 and RSS-GEN, 4.3. The EUT was measured in WCDMA Band V mode on the low, middle and high channels.
See APPENDIX 3B for test data.

The BlackBerry® smartphone met the requirements of the Frequency Stability requirements in the WCDMA Band II as per 47 CFR 2.1055, CFR 24.235 and RSS-GEN, 4.7. The EUT was measured in WCDMA Band II mode on the low, middle and high channels.
See APPENDIX 3B for test data.

**Measurement Uncertainty ± 3.2 dB**

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## H) Compliance Test Equipment Used

| UNIT | MANUFACTURER | MODEL | SERIAL NUMBER | CAL DUE DATE (YY MM DD) | USE |
|---|---|---|---|---|---|
| Universal Radio Communication Tester | Rohde & Schwarz | CMU 200 | 109747 | 12-11-20 | RF Conducted Emissions |
| Spectrum Analyzer | HP | 8563E | 3745A08112 | 13-10-05 | RF Conducted Emissions |
| DC Power Supply | HP | 6632B | US37472178 | 12-09-27 | RF Conducted Emissions |
| Environment Monitor | Omega | iTHX-SD | 0340060 | 12-10-20 | RF Conducted Emissions |

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

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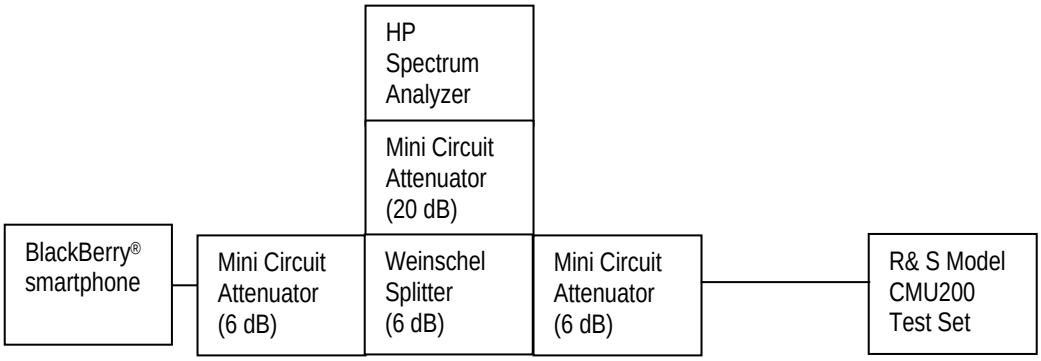
## GSM Conducted RF Emission Test Data

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




Date of Test: August 10, 2012

The environmental test conditions were:

Temperature: 25.2 ºC
Relative Humidity: 36.5 %

The following measurements were performed by Berkin Can.

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## GSM Conducted RF Emission Test Data cont'd

**The conducted spurious emissions** – As per 47 CFR 2.1051, CFR 24.238(a), RSS-GEN, 4.9, CFR 22 Subpart H and RSS-132 were measured from 10 MHz to 20 GHz. The EUT emissions were in the noise floor.
See figures 1-1a to 1-12a for the plots of the conducted spurious emissions.

### –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 270 kHz, and for the PCS1900 band was measured to be 273 kHz as shown below. Results were derived in a 3.0 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was applied.

**Test Data for 850 band and 1900 band in Call mode**

| 850 band Frequency (MHz) | -26dBc Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) |
|---|---|---|
| 824.2 | 268 | 243 |
| 837.6 | 270 | 247 |
| 848.8 | 270 | 243 |

| 1900 band Frequency (MHz) | -26dBc Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) |
|---|---|---|
| 1850.2 | 273 | 247 |
| 1880.0 | 270 | 247 |
| 1909.8 | 267 | 248 |

***Measurement Plots for 850 and 1900 bands in Call mode***
Refer to the following measurement plots for more detail.

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

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GSM Conducted RF Emission Test Data cont'd

**Test Data for 850 and 1900 bands in EDGE mode**

| 850 band Frequency (MHz) | 99% Occupied Bandwidth (kHz) |
|---|---|
| 824.2 | 240 |
| 837.6 | 245 |
| 848.8 | 240 |

| 1900 band Frequency (MHz) | 99% Occupied Bandwidth (kHz) |
|---|---|
| 1850.2 | 245 |
| 1880.0 | 243 |
| 1909.8 | 248 |

***Measurement Plots for 850 and 1900 bands in EDGE mode***
Refer to the following measurement plots for more detail:

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

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

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## GSM Conducted RF Emission Test Data cont'd

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

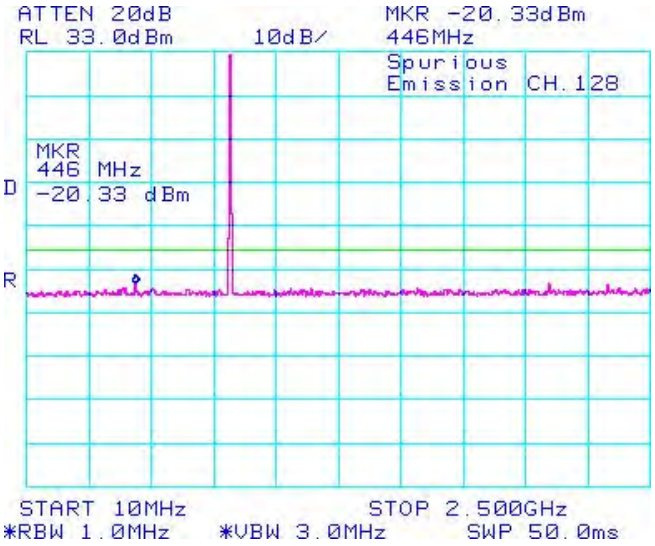



**Figure 1-2a: GSM850 band, Spurious Conducted Emissions, Low channel**

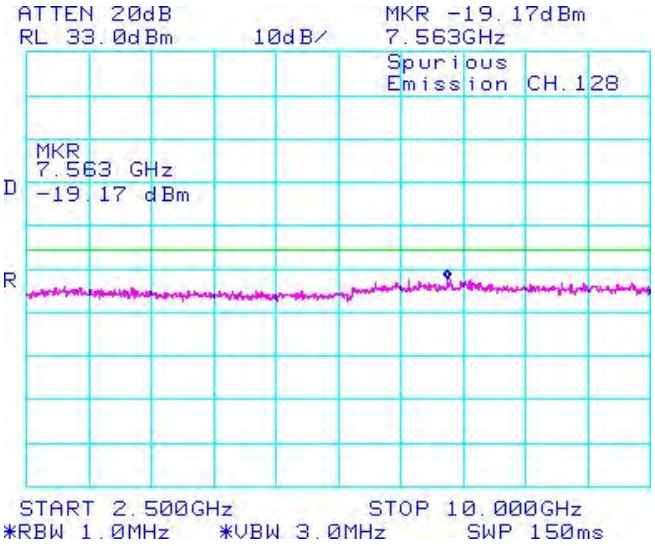



**Figure 1-3a: GSM850 band, Spurious Conducted Emissions, Middle Channel**

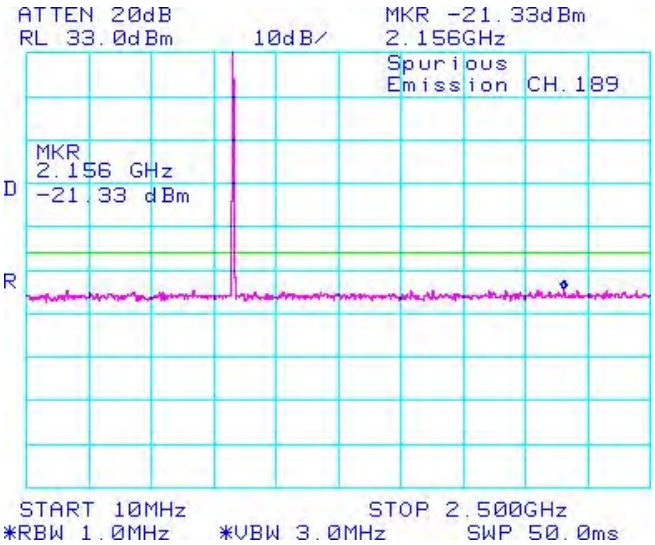
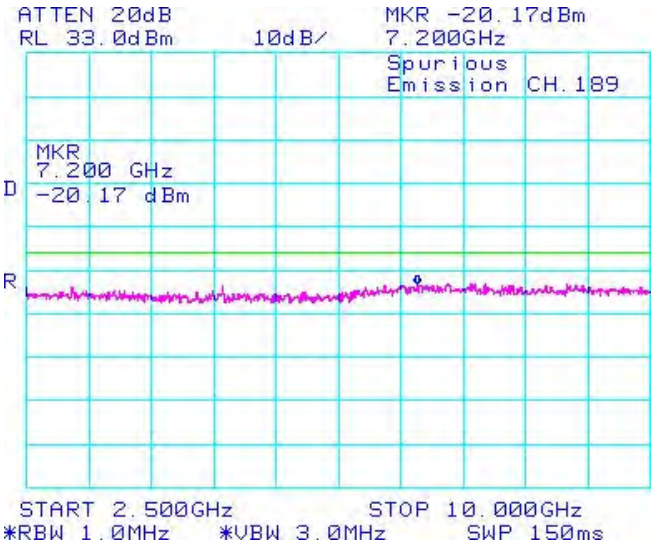



**Figure 1-4a: GSM850 band, Spurious Conducted Emissions, Middle Channel**

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## GSM Conducted RF Emission Test Data cont'd

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

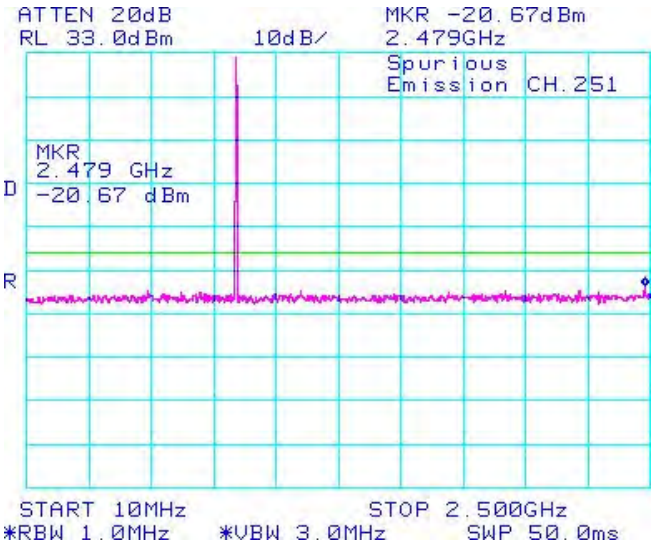



**Figure 1-6a: GSM850 band, Spurious Conducted Emissions, High Channel**

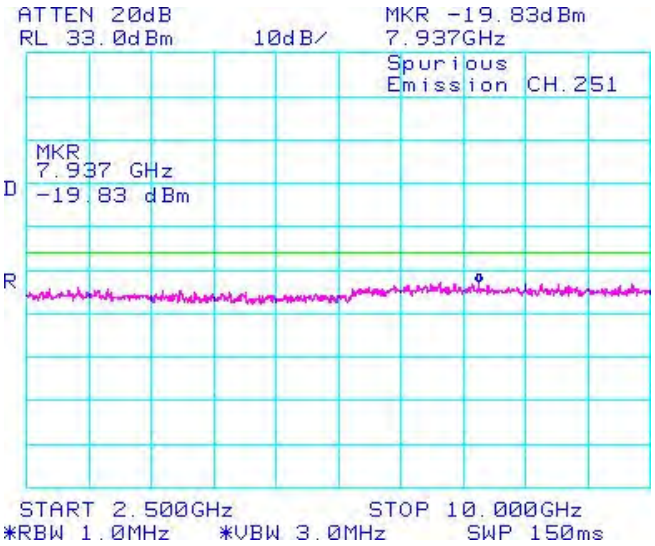



**Figure 1-7a: PCS1900 band, Spurious Conducted Emissions, Low Channel**

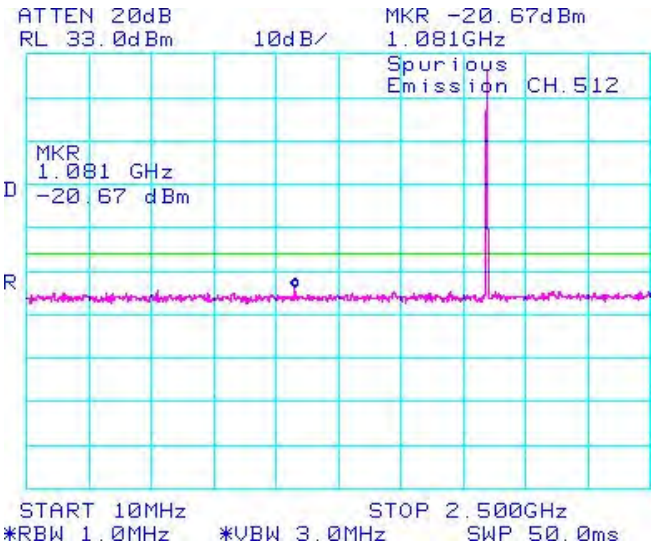
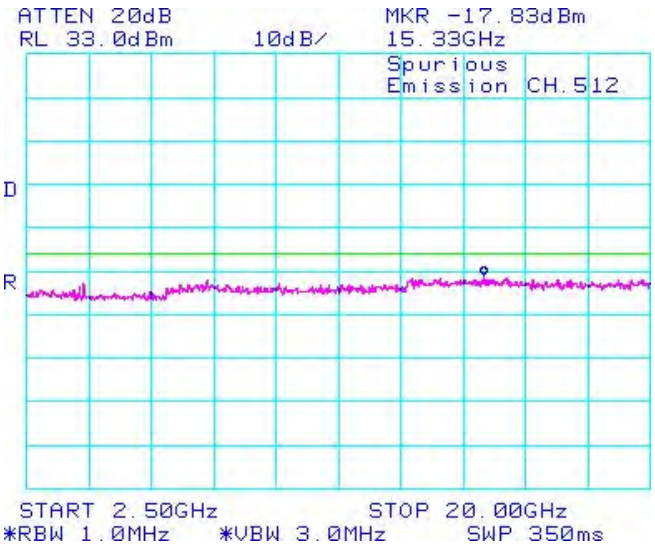



**Figure 1-8a: PCS1900 band, Spurious Conducted Emissions, Low Channel**

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## GSM Conducted RF Emission Test Data cont'd

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

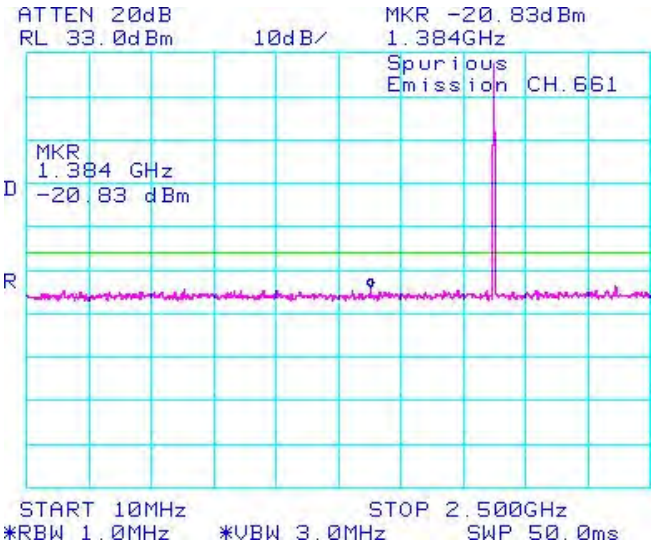



**Figure 1-10a: PCS1900 band, Spurious Conducted Emissions, Middle Channel**

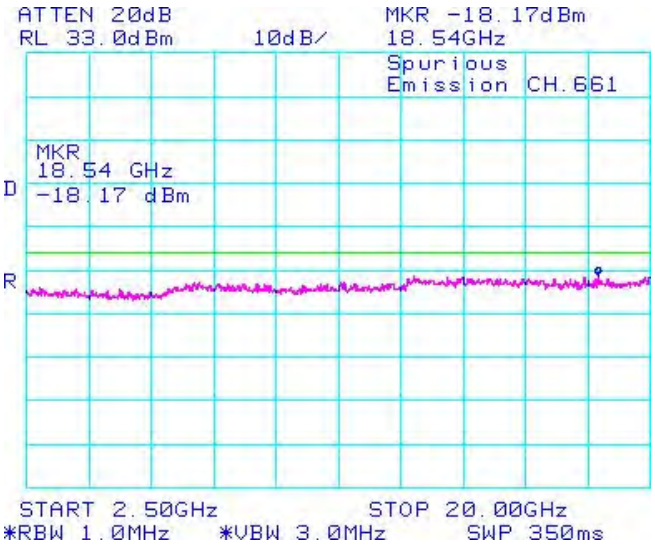



**Figure 1-11a: PCS1900 band, Spurious Conducted Emissions, High Channel**

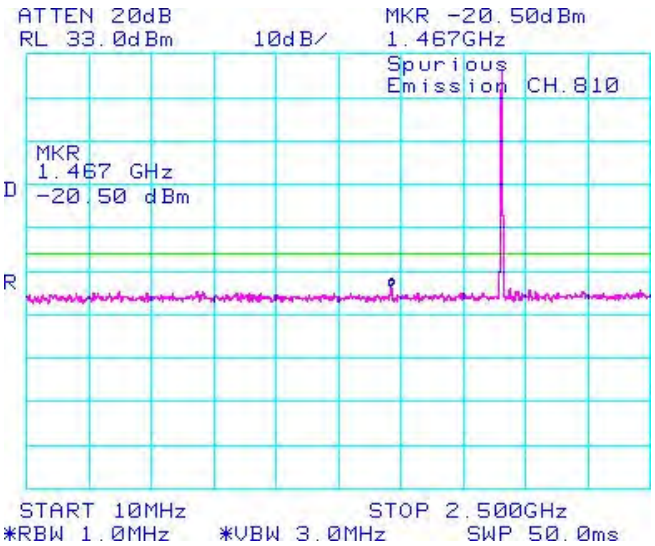
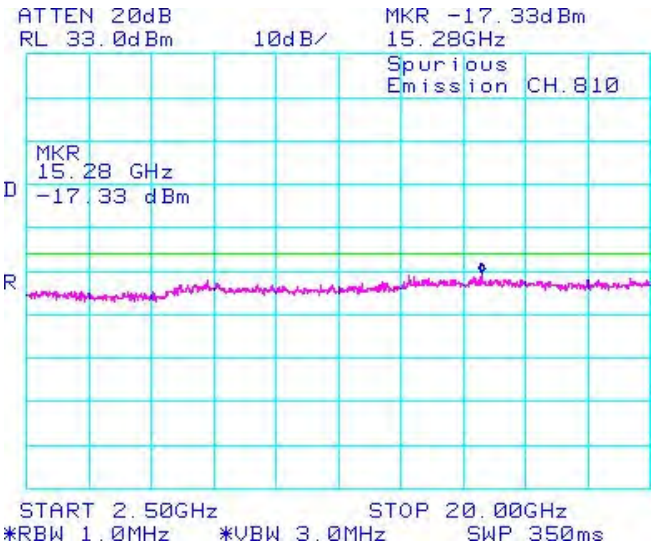



**Figure 1-12a: PCS1900 band, Spurious Conducted Emissions, High Channel**

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## GSM Conducted RF Emission Test Data cont'd

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

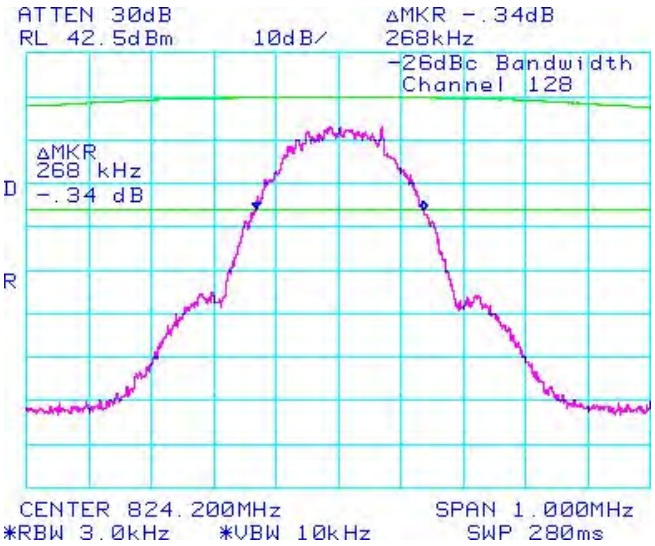



**Figure 1-14a: Occupied Bandwidth, GSM850 band Low Channel in GSM mode**

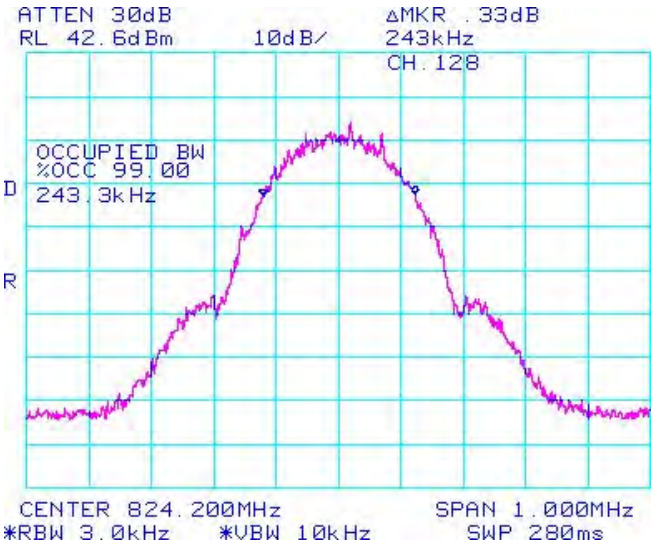



**Figure 1-15a: -26dBc bandwidth, GSM850 band Middle Channel in GSM mode**

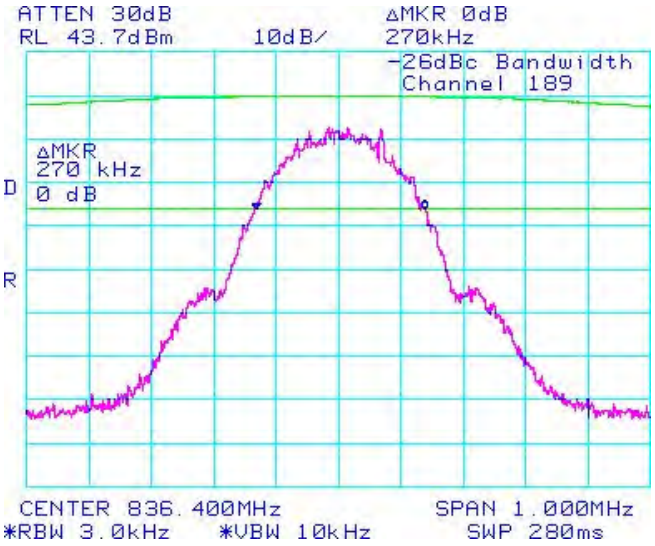
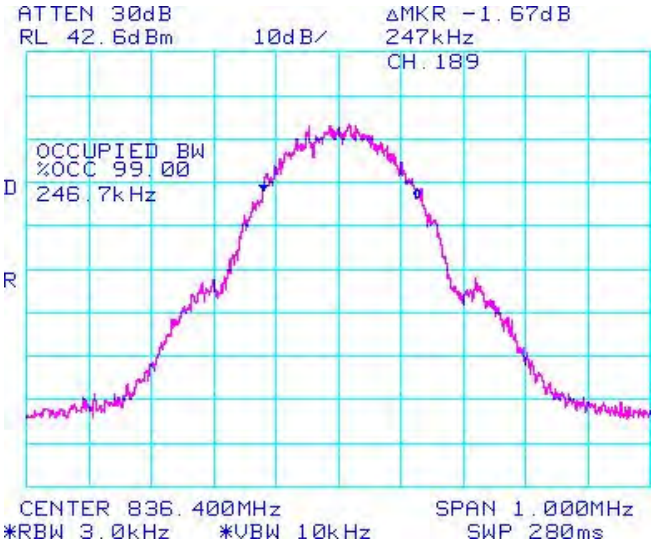



**Figure 1-16a: Occupied Bandwidth, GSM850 band Middle Channel in GSM mode**





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## GSM Conducted RF Emission Test Data cont'd

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

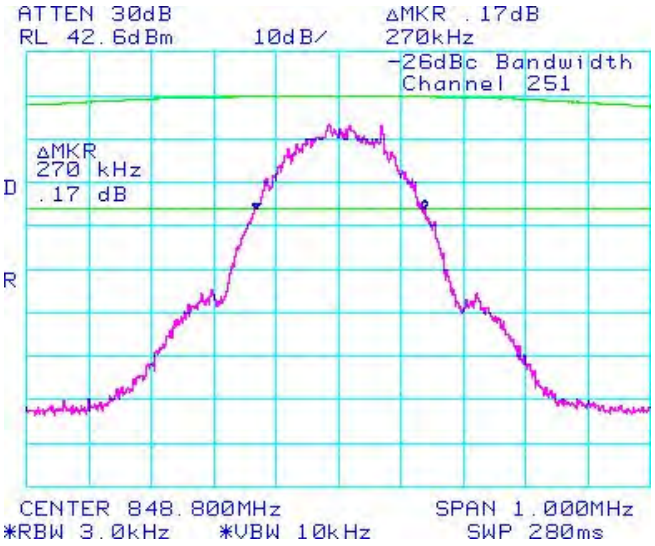



**Figure 1-18a: Occupied Bandwidth, GSM850 band High Channel in GSM mode**

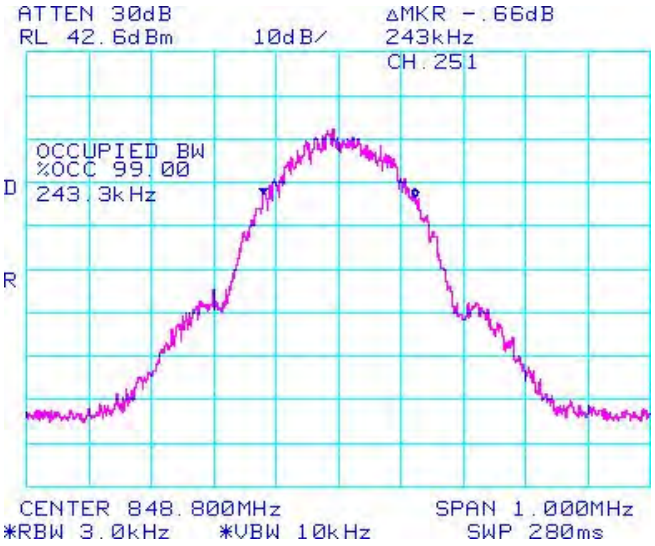



**Figure 1-19a: -26dBc bandwidth, PCS1900 Low Channel in GSM mode**

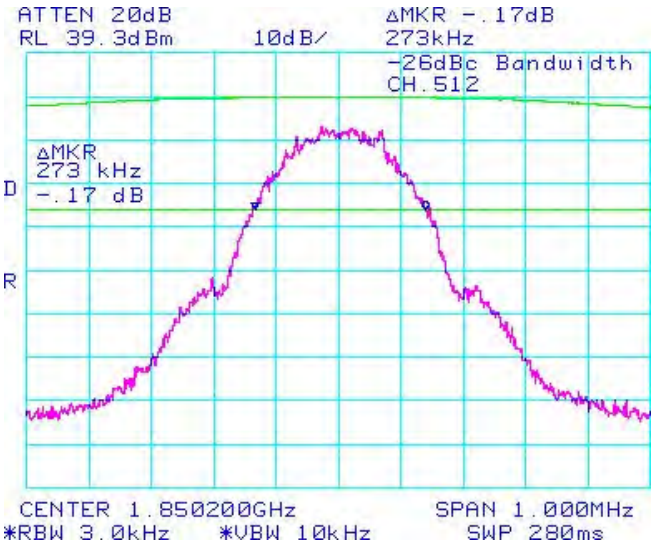
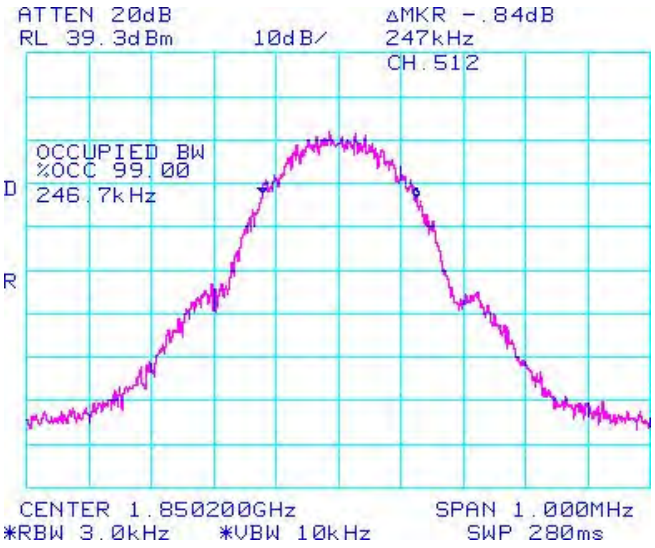



**Figure 1-20a: Occupied Bandwidth, PCS1900 Low Channel in GSM mode**





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## GSM Conducted RF Emission Test Data cont'd

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

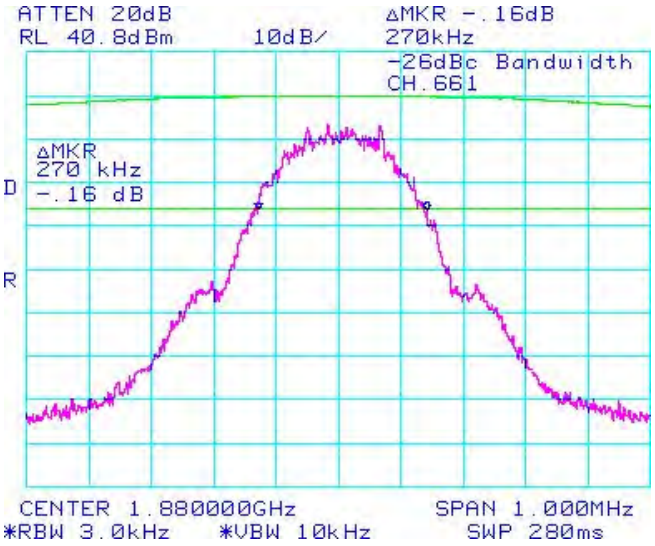



**Figure 1-22a: Occupied Bandwidth, PCS1900 Middle Channel in GSM mode**

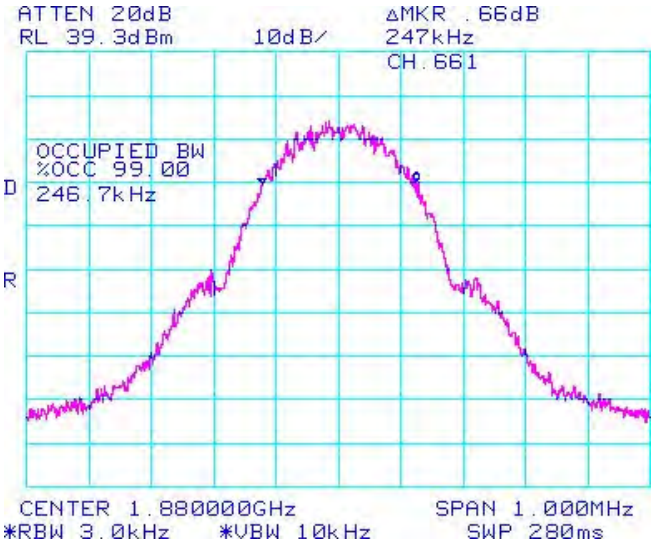



**Figure 1-23a: -26dBc bandwidth, PCS1900 High Channel in GSM mode**

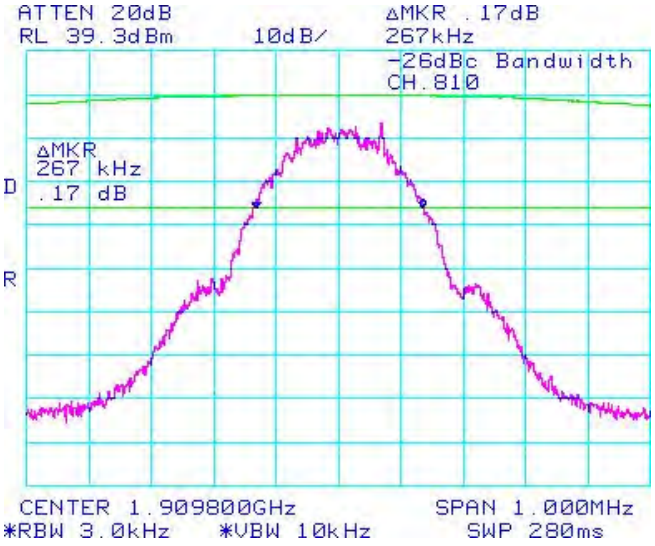
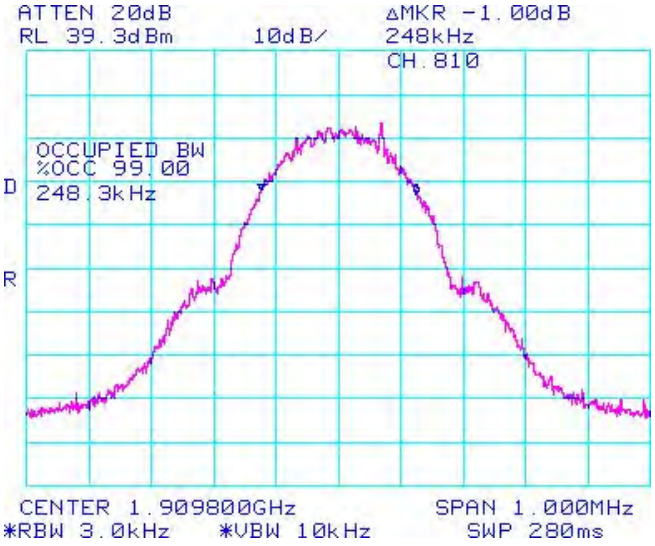



**Figure 1-24a: Occupied Bandwidth, PCS1900 High Channel in GSM mode**

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## GSM Conducted RF Emission Test Data cont'd

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

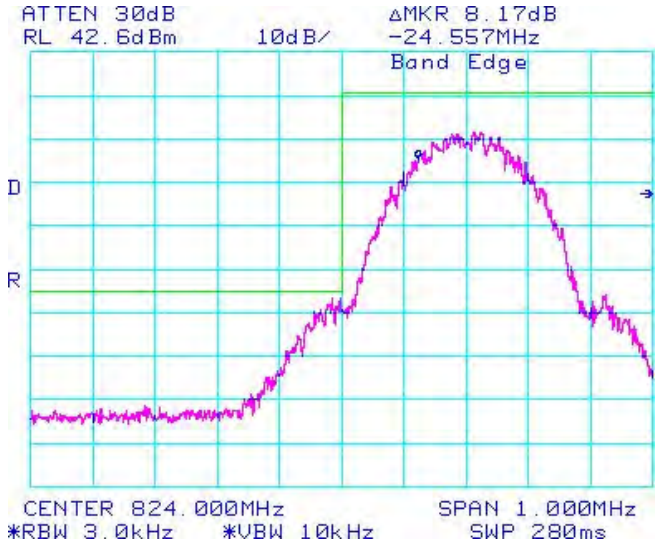



**Figure 1-26a: GSM850 band High Channel Mask in GSM mode**

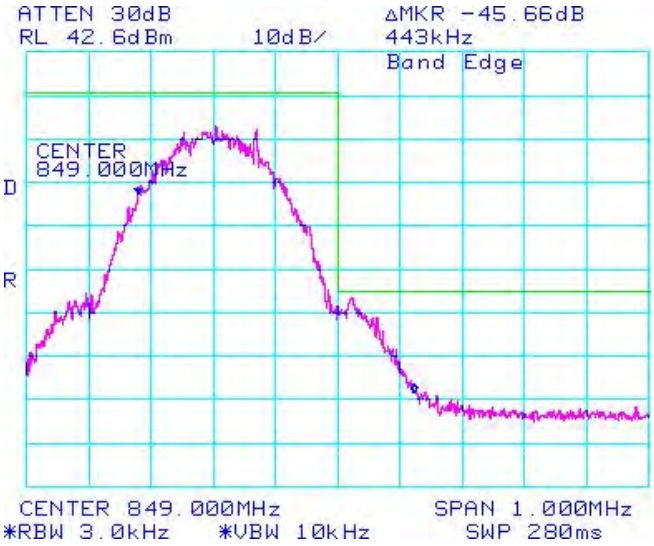



**Figure 1-27a: PCS1900, Low Channel Mask in GSM mode**

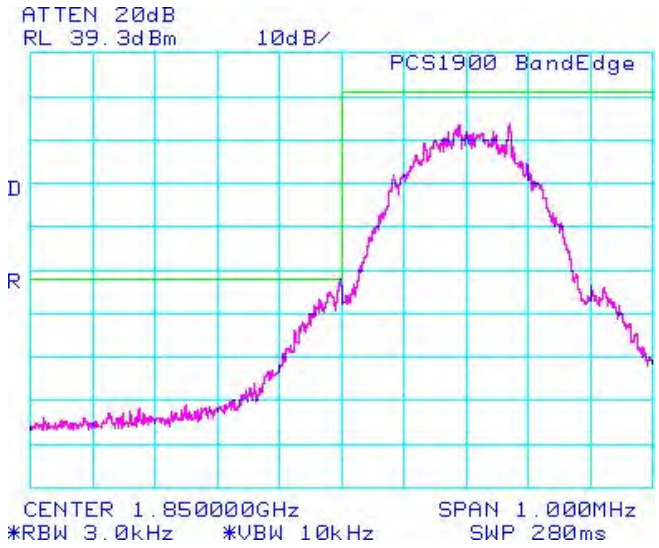
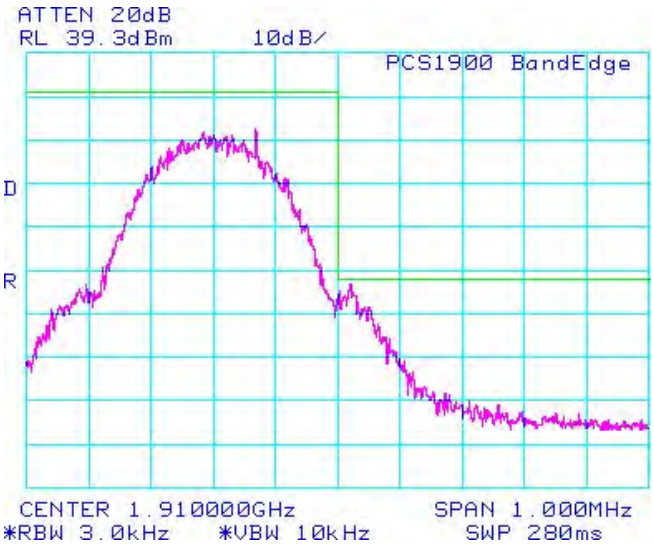



**Figure 1-28a: PCS1900, High Channel Mask in GSM mode**

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## GSM Conducted RF Emission Test Data cont'd

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

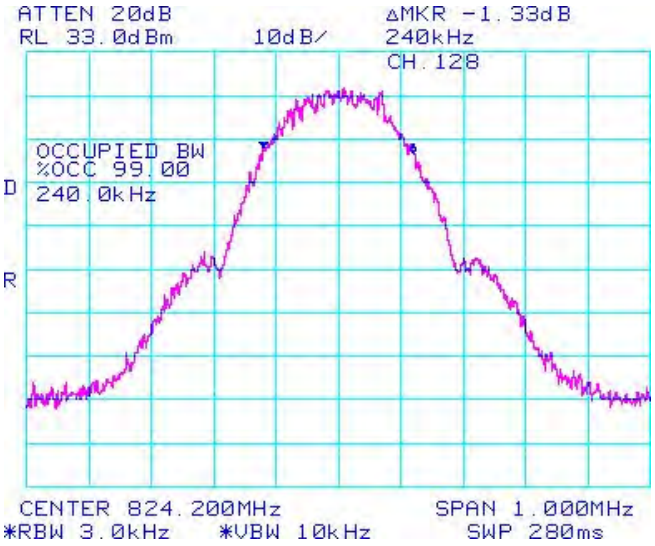



**Figure 1-30a: Occupied Bandwidth, GSM850 Band, Middle Channel in EDGE mode**

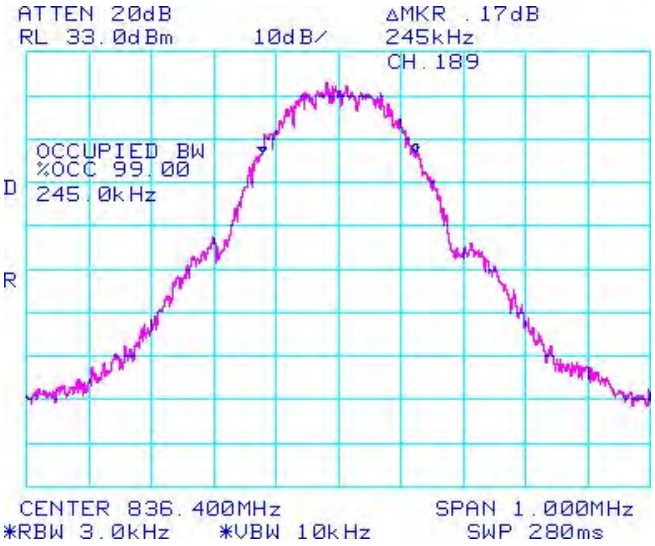



**Figure 1-31a: Occupied Bandwidth, GSM850 band, High Channel in EDGE mode**

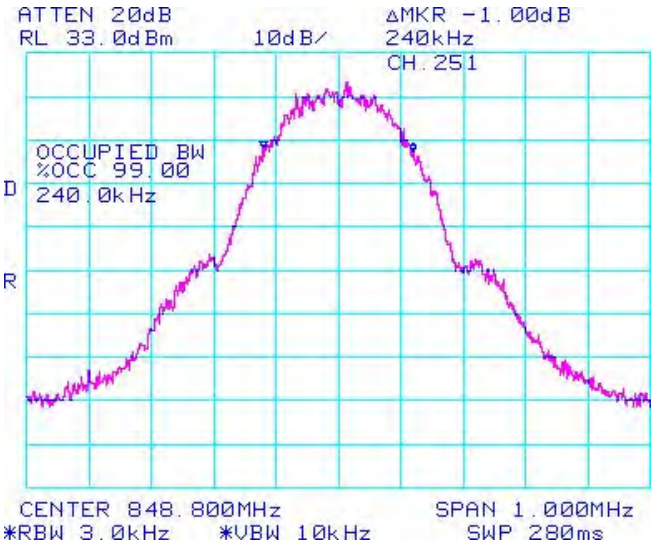
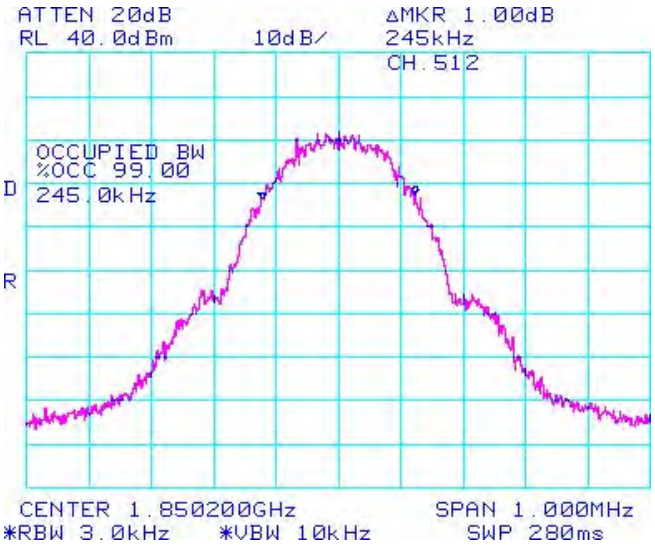



**Figure 1-32a: Occupied Bandwidth, PCS1900 Band, Low Channel in EDGE mode**

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## GSM Conducted RF Emission Test Data cont'd

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

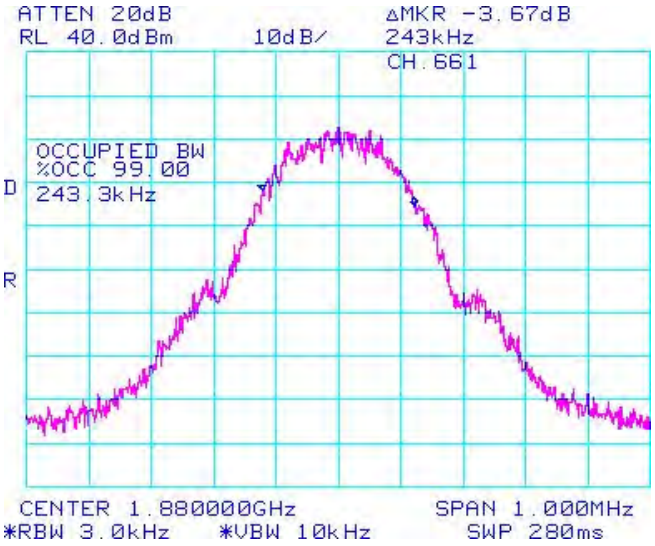



**Figure 1-34a: Occupied Bandwidth, PCS1900 Band, High Channel in EDGE mode**

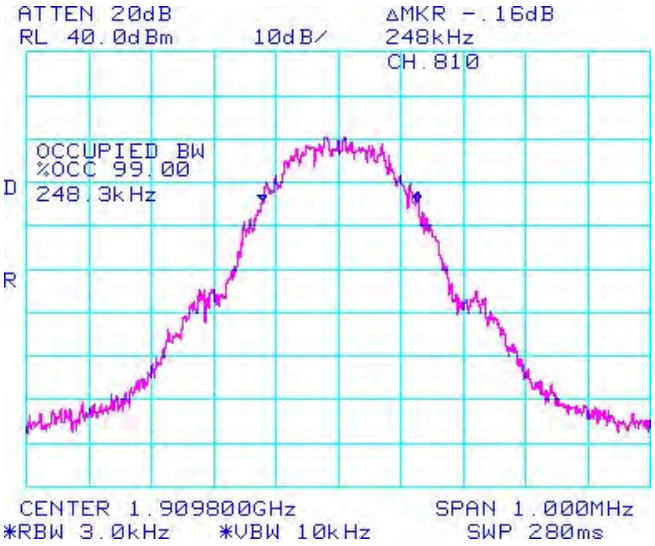



**Figure 1-35a: GSM850 Band, Low Channel Mask in EDGE mode**

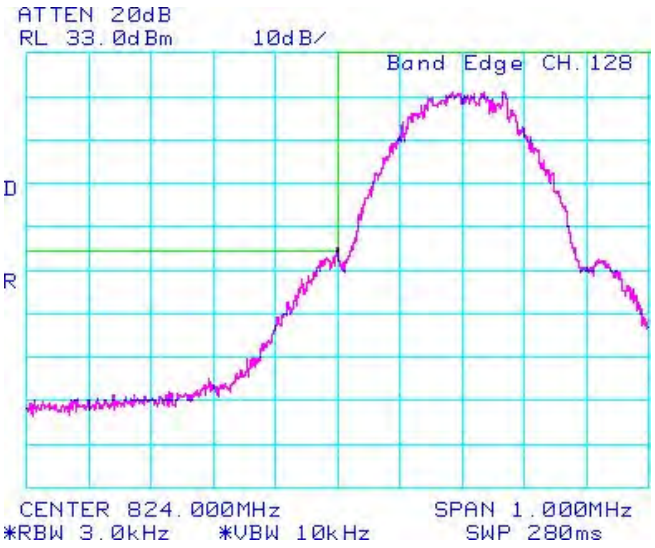
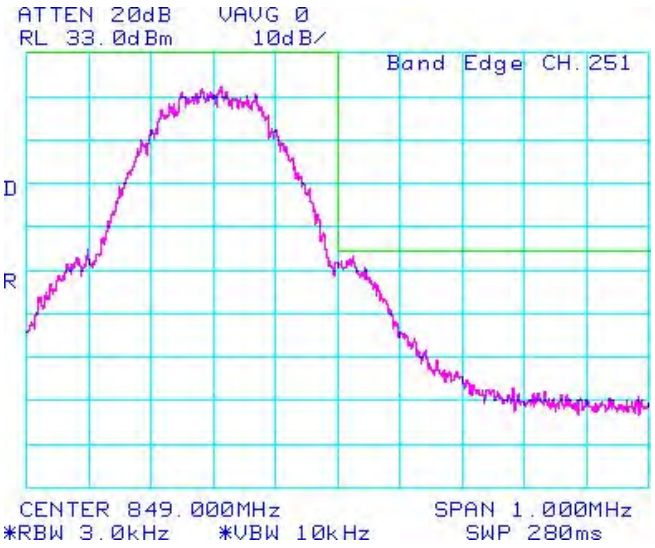



**Figure 1-36a: GSM850 Band, High Channel Mask in EDGE mode**

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## GSM Conducted RF Emission Test Data cont'd

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

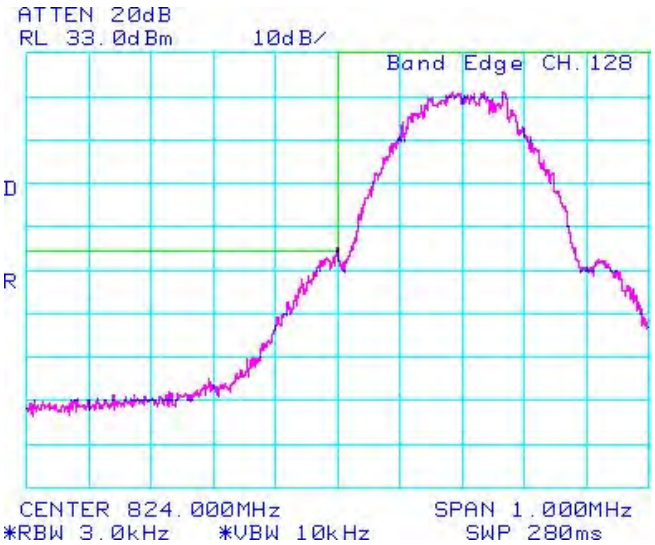
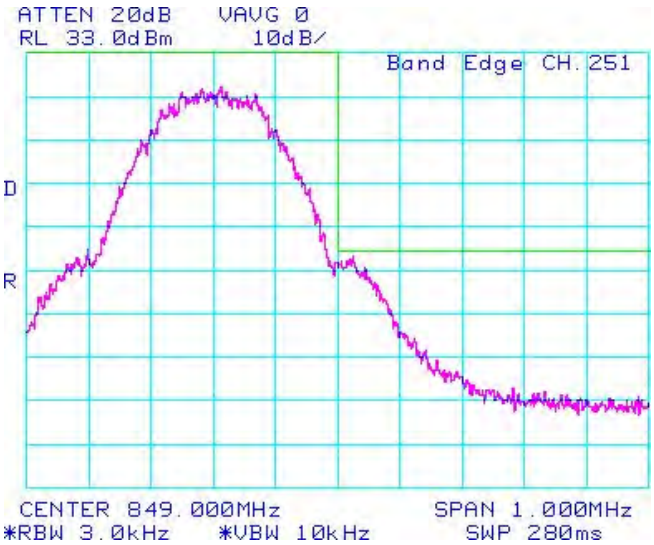



**Figure 1-38a: PCS1900 Band, High Channel Mask in EDGE mode**

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## GSM Conducted RF Emission Test Data cont'd

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

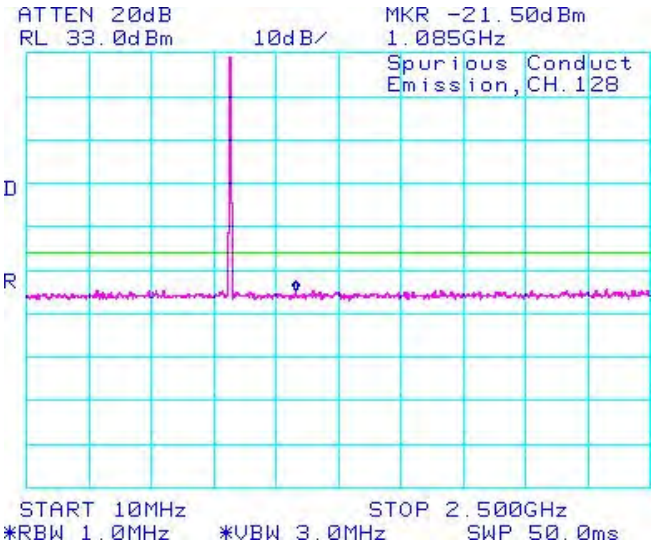



**Figure 1-40a: GSM850 band, Spurious Conducted Emissions, Low channel in Edge Mode**

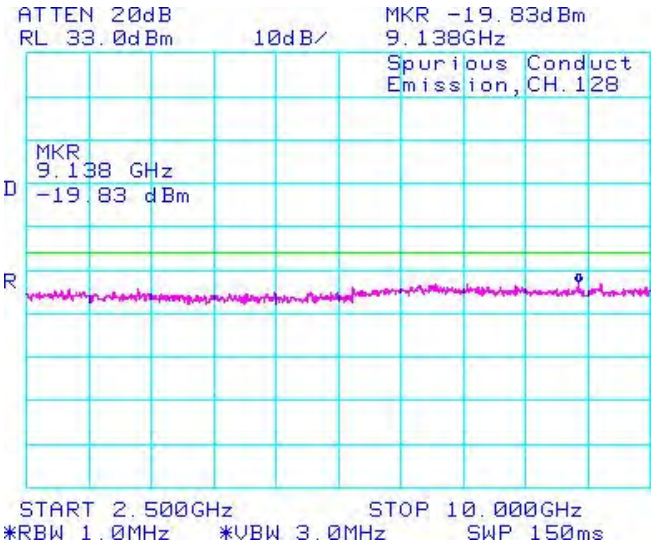



**Figure 1-41a: GSM850 band, Spurious Conducted Emissions, Middle channel in Edge Mode**

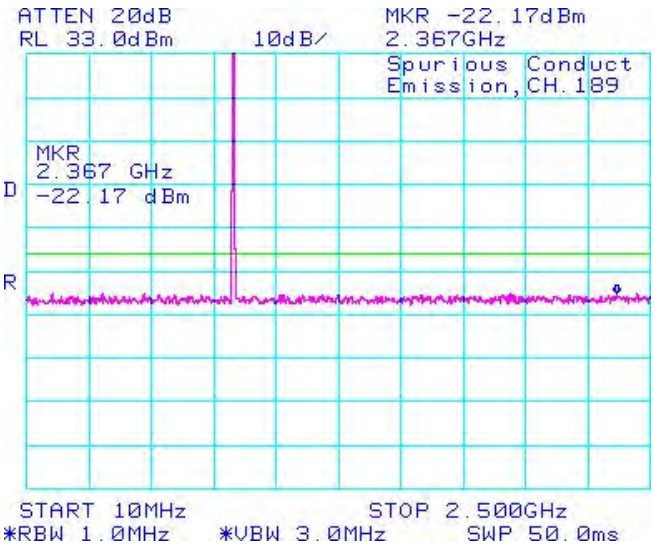
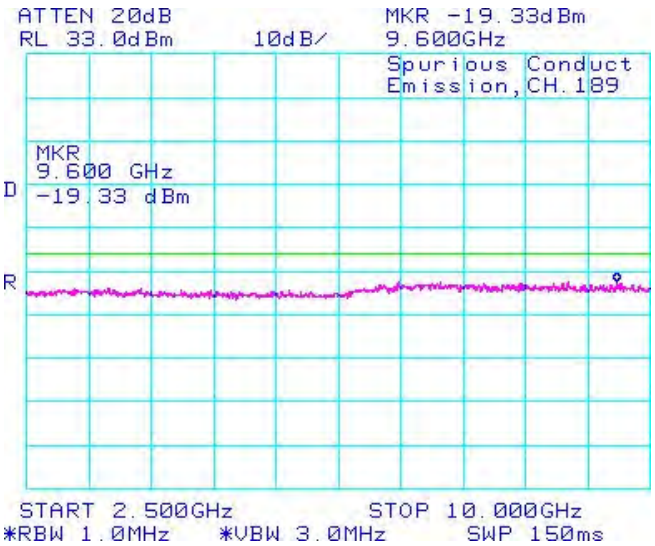



**Figure 1-42a: GSM850 band, Spurious Conducted Emissions, Middle channel in Edge Mode**





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## GSM Conducted RF Emission Test Data cont'd

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

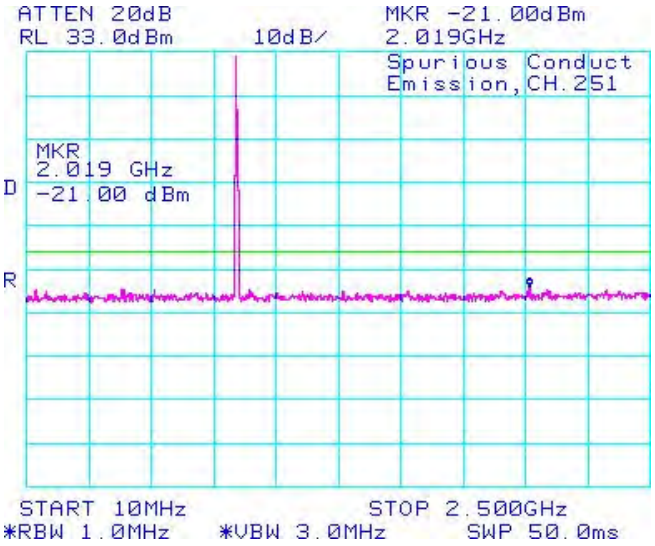



**Figure 1-44a: GSM850 band, Spurious Conducted Emissions, High channel in Edge Mode**

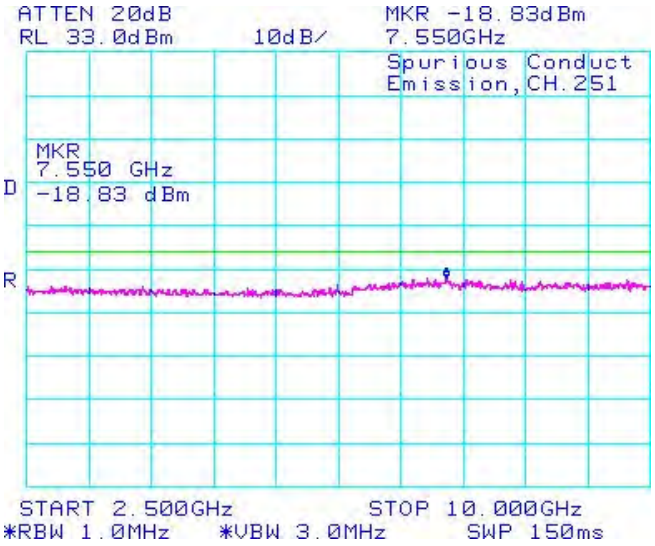



**Figure 1-45a: PCS1900 band, Spurious Conducted Emissions, Low channel in Edge Mode**

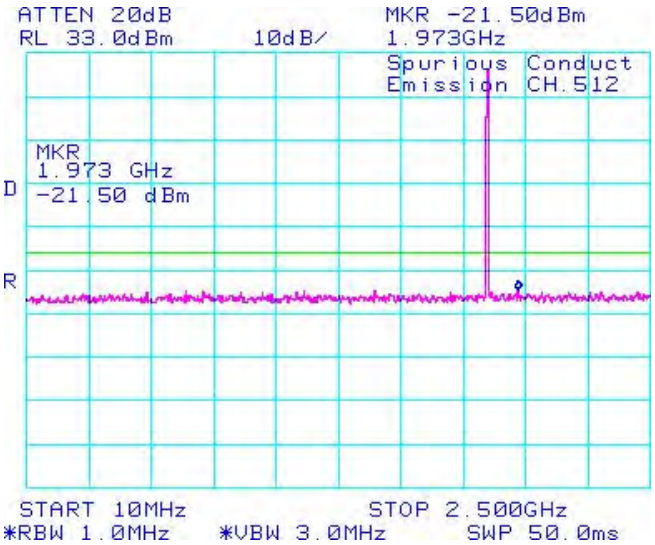
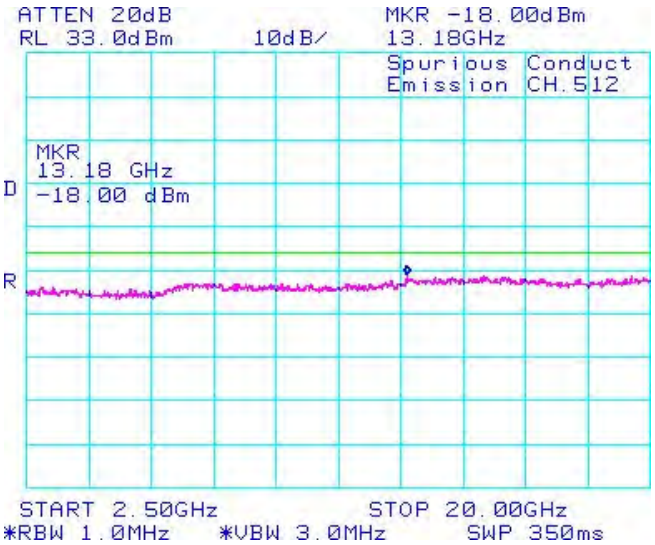



**Figure 1-46a: PCS1900 band, Spurious Conducted Emissions, Low channel in Edge Mode**

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## GSM Conducted RF Emission Test Data cont'd

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

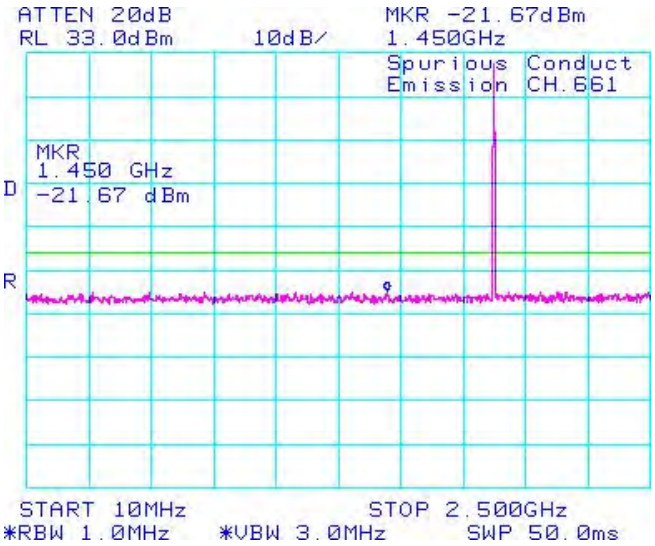



**Figure 1-48a: PCS1900 band, Spurious Conducted Emissions, middle channel in Edge Mode**

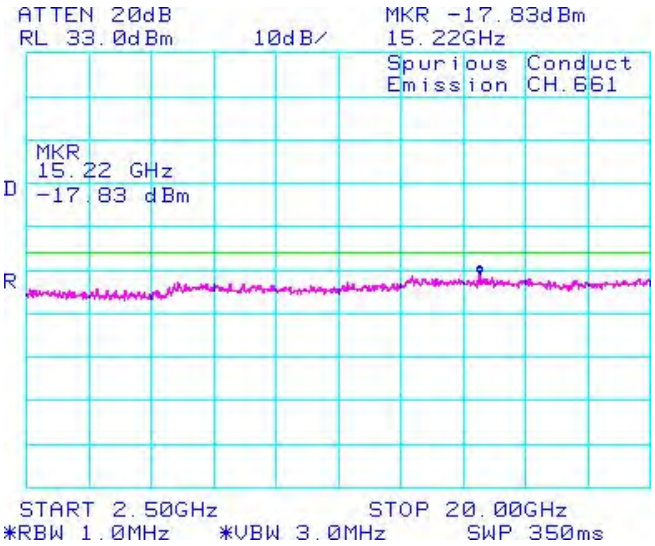



**Figure 1-49a: PCS1900 band, Spurious Conducted Emissions, High channel in Edge Mode**

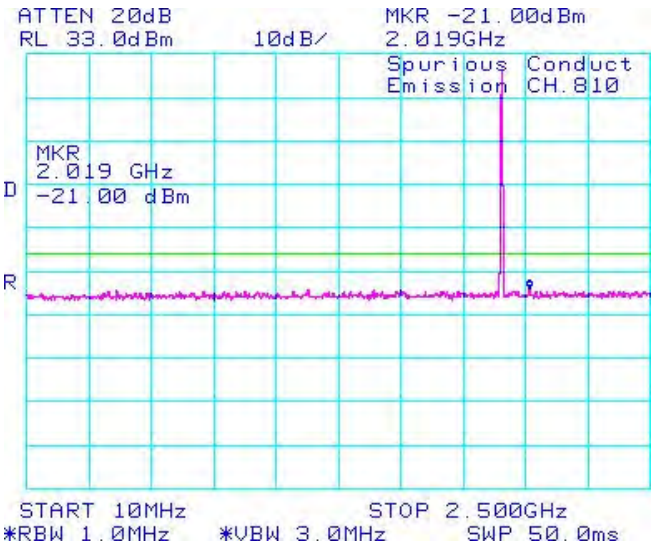
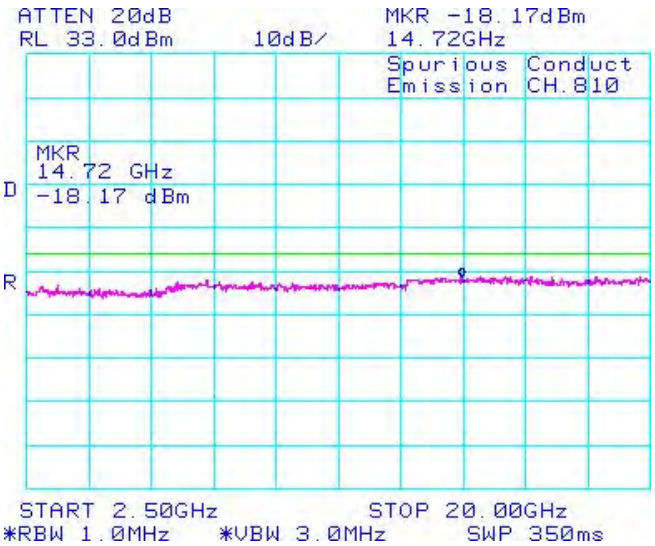



**Figure 1-50a: PCS1900 band, Spurious Conducted Emissions, High channel in Edge Mode**





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APPENDIX 1B– WCDMA Band II/V CONDUCTED RF EMISSIONS TEST DATA/PLOTS

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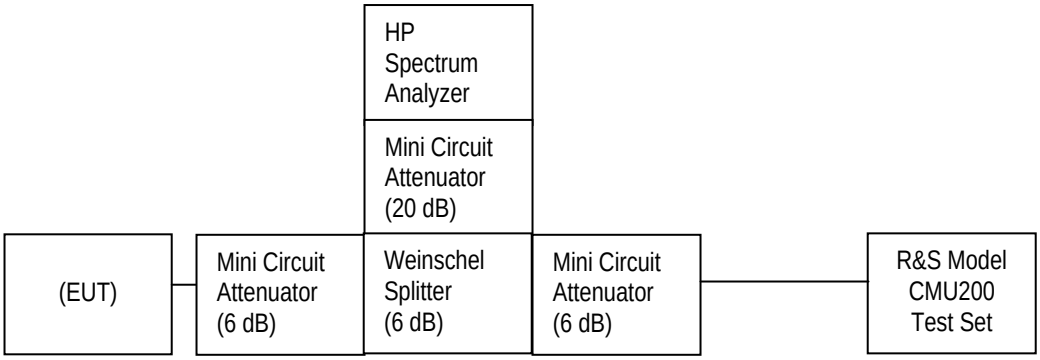
## WCDMA BAND II/V Conducted RF Emission Test Data

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

### Test Setup Diagram




Date of Test: August 15, 2012

The environmental test conditions were: Temperature: 25.0ºC
Relative Humidity: 37.0 %

The following measurements were performed by Berkin Can.

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## WCDMA Conducted RF Emission Test Data cont'd

**The conducted spurious emissions** – As per 47 CFR 2.1051, CFR 24.238(a), CFR 4.202, CFR 22 Subpart H, RSS-132 and RSS - 133 were measured from 10 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 4.683 MHz, and for the PCS1900 band was measured to be 4.700 MHz 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 WCDMA Band V/II selected Frequencies in Loopback mode**

| WCDMA Band V Frequency (MHz) | 26dBc Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|
| 826.400 | 4.683 | 4.167 |
| 836.400 | 4.675 | 4.167 |
| 846.600 | 4.675 | 4.158 |

| WCDMA Band II Frequency (MHz) | 26dBc Occupied Bandwidth (MHz | 99% Occupied Bandwidth (MHz) |
|---|---|---|
| 1852.400 | 4.700 | 4.167 |
| 1880.000 | 4.683 | 4.117 |
| 1907.600 | 4.692 | 4.175 |

***Measurement Plots for WCDMA Band V and WCDMA BAND II in Loopback mode***
Refer to the following measurement plots for more detail:

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

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

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-1b: Band V, Spurious Conducted Emissions, Low channel**

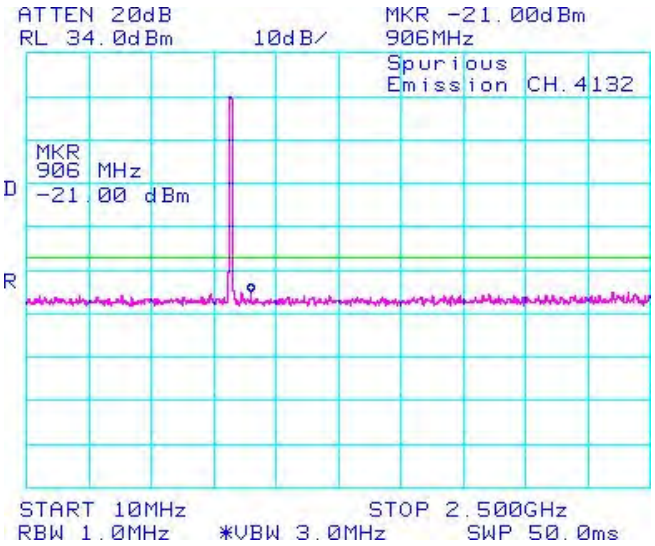



**Figure 1-2b: Band V, Spurious Conducted Emissions, Low channel**

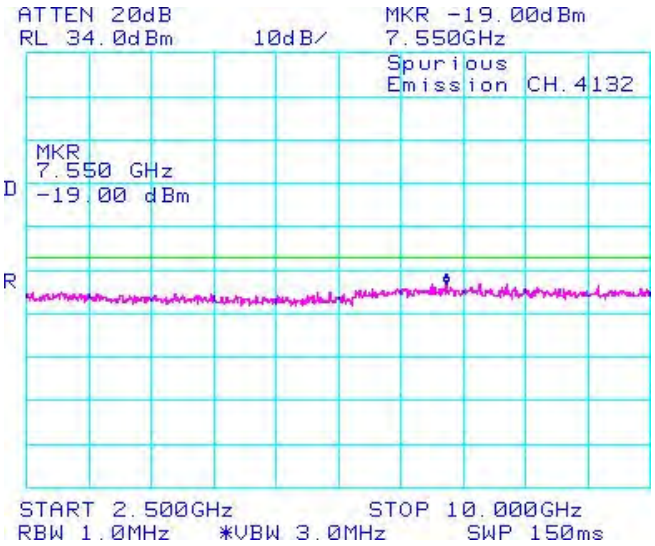



**Figure 1-3b: Band V, Spurious Conducted Emissions, Middle channel**

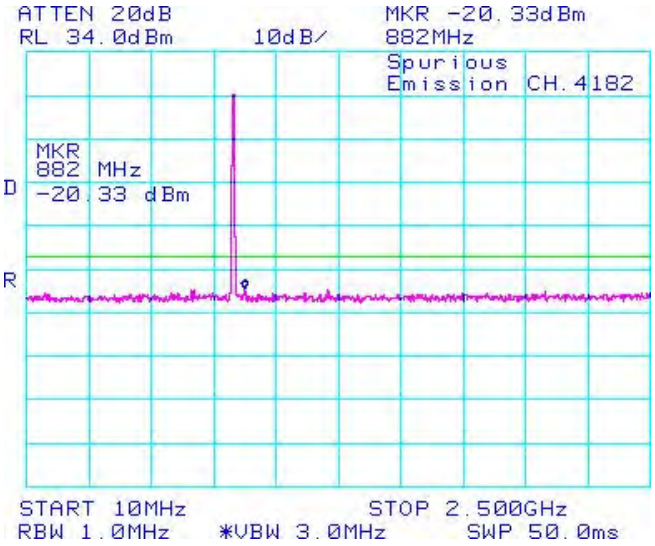
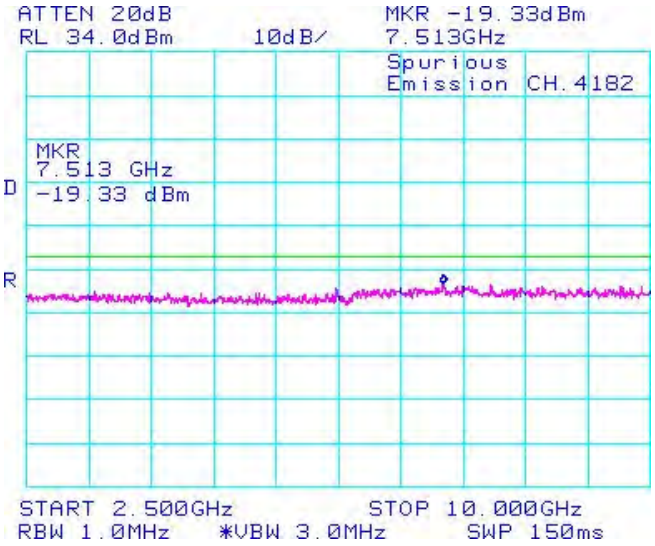



**Figure 1-4b: Band V, Spurious Conducted Emissions, Middle channel**

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-5b: Band V, Spurious Conducted Emissions, High Channel**

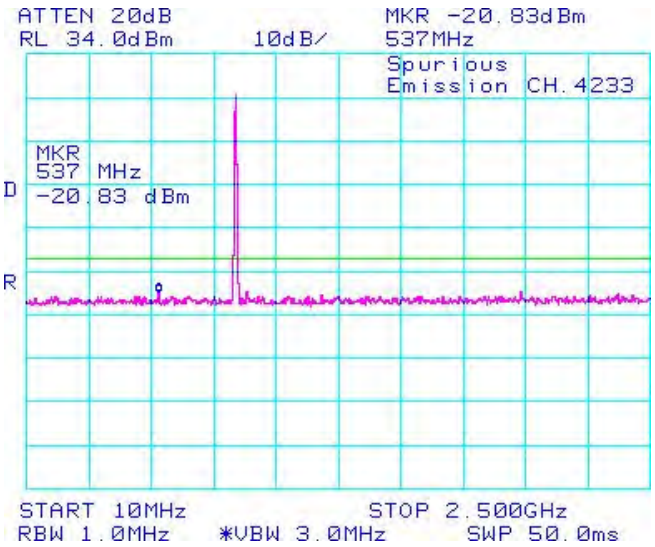



**Figure 1-6b: Band V, Spurious Conducted Emissions, High Channel**

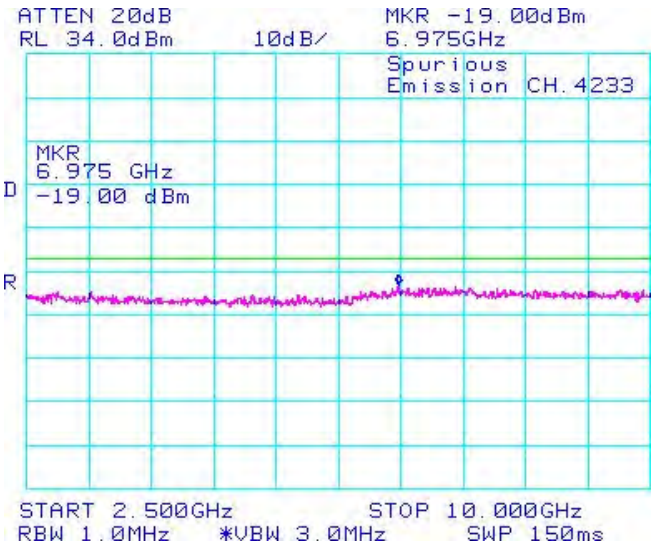



**Figure 1-7b:, BAND II Spurious Conducted Emissions, Low Channel**

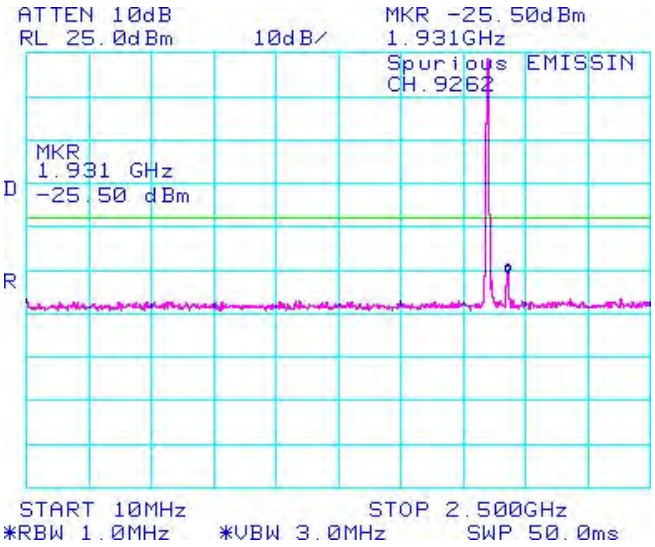
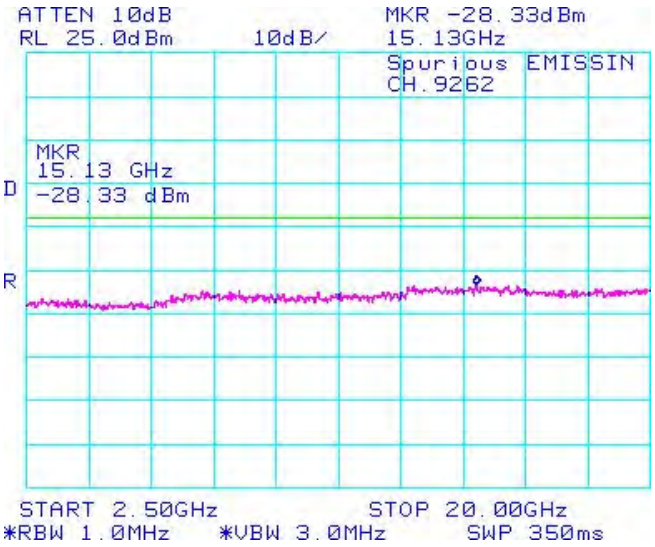



**Figure 1-8b: BAND II, Spurious Conducted Emissions, Low Channel**

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-9b: BAND II, Spurious Conducted Emissions, Middle Channel**

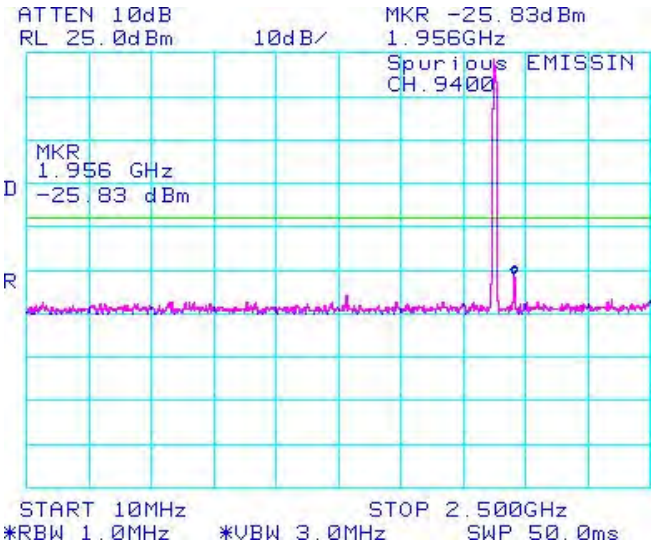



**Figure 1-10b: BAND II, Spurious Conducted Emissions, Middle Channel**

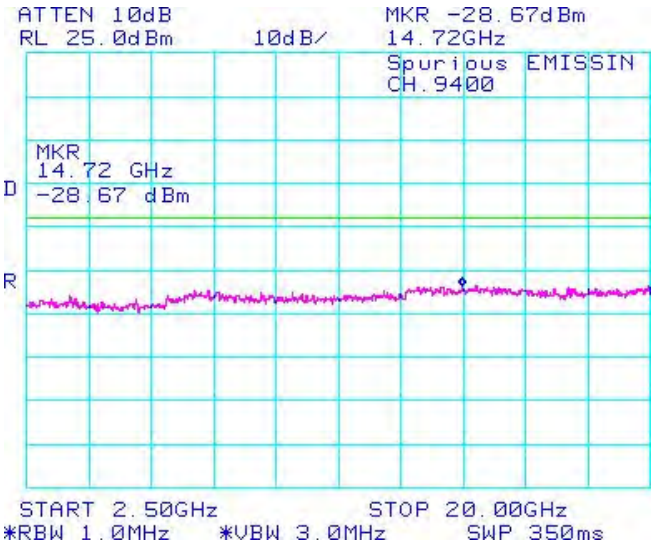



**Figure 1-11b: BAND II, Spurious Conducted Emissions, High Channel**

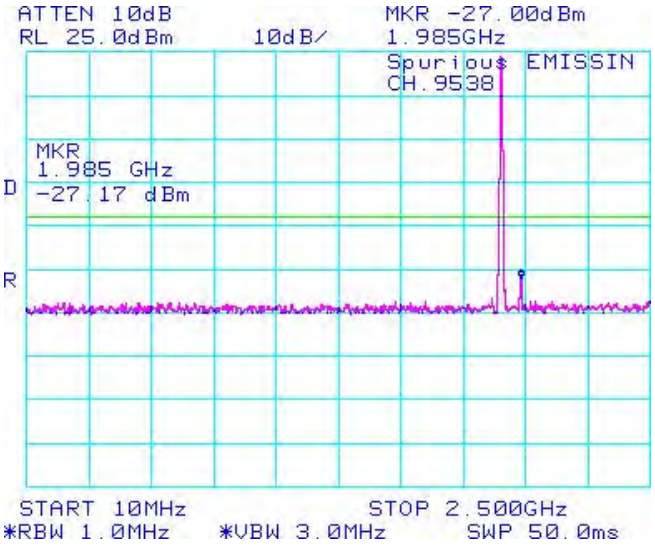
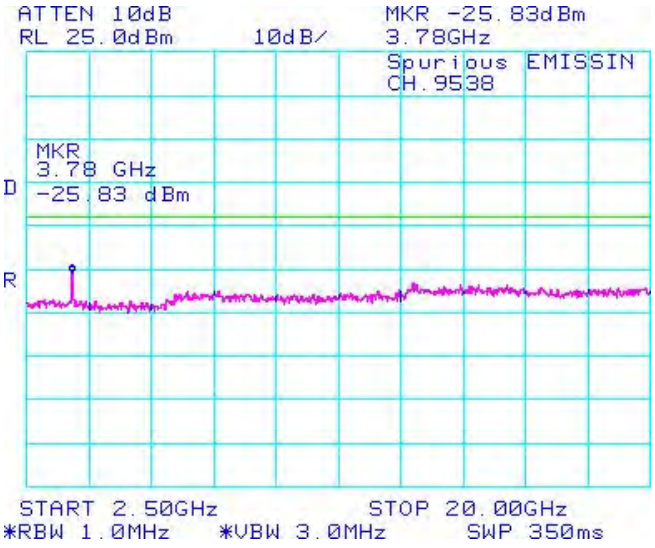



**Figure 1-12b: BAND II, Spurious Conducted Emissions, High Channel**





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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-13b: Occupied Bandwidth, Band V Low Channel**

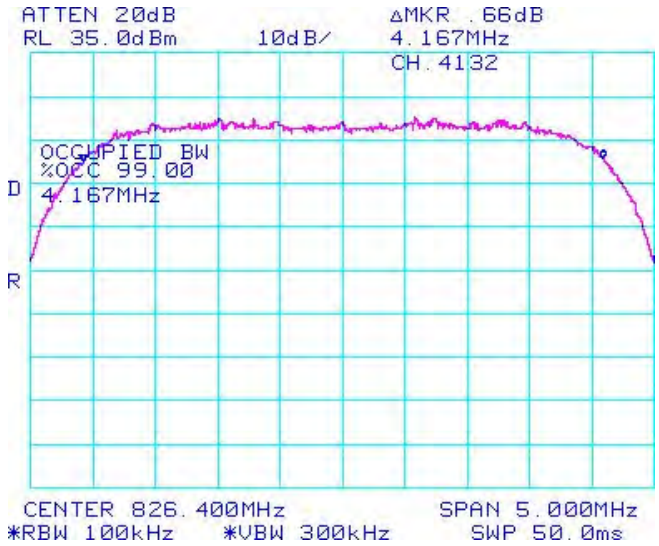



**Figure 1-14b: Occupied Bandwidth, Band V Middle Channel**

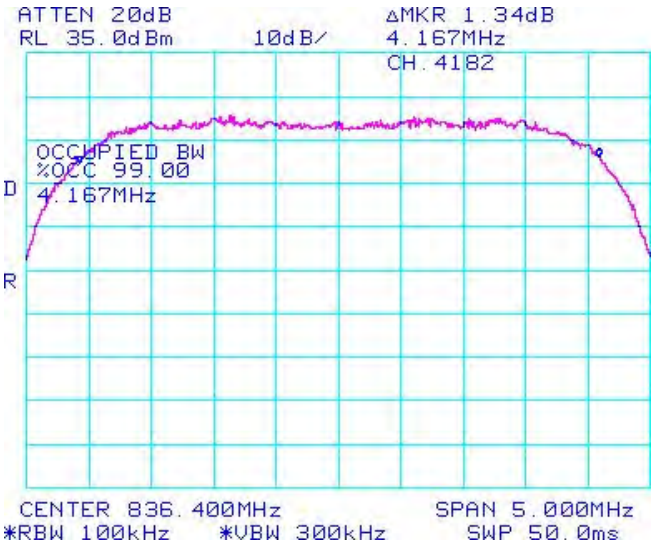



**Figure 1-15b: Occupied Bandwidth, Band V High Channel**

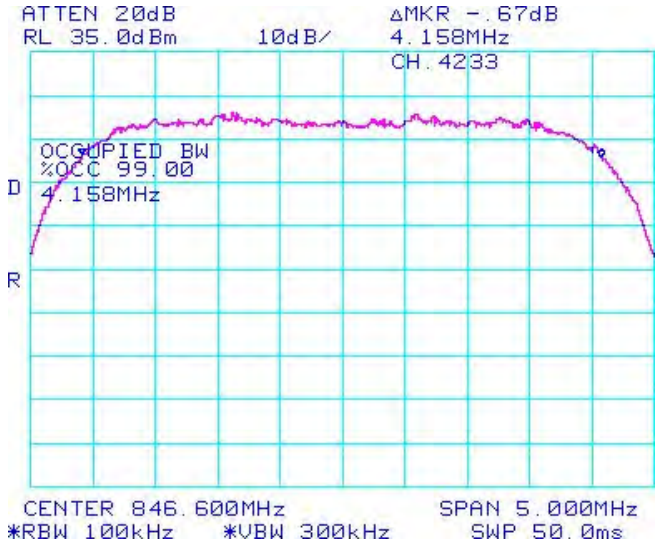
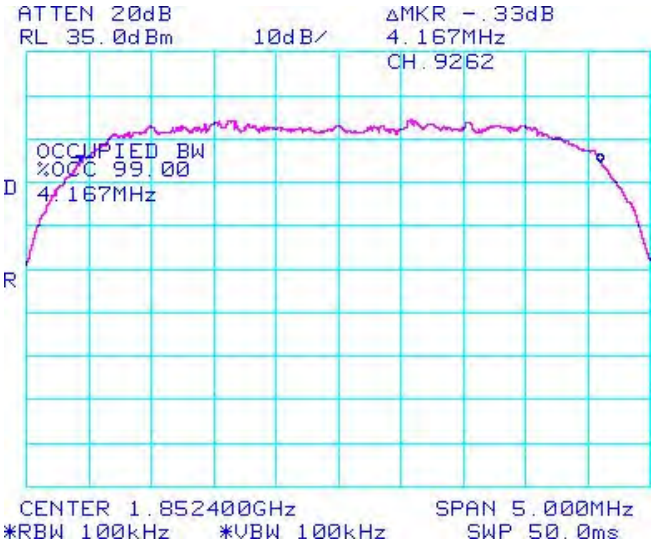



**Figure 1-16b: Occupied Bandwidth, BAND II Low Channel**





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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-17b: Occupied Bandwidth, BAND II Middle Channel**

**Figure 1-18b: Occupied Bandwidth, BAND II High Channel**

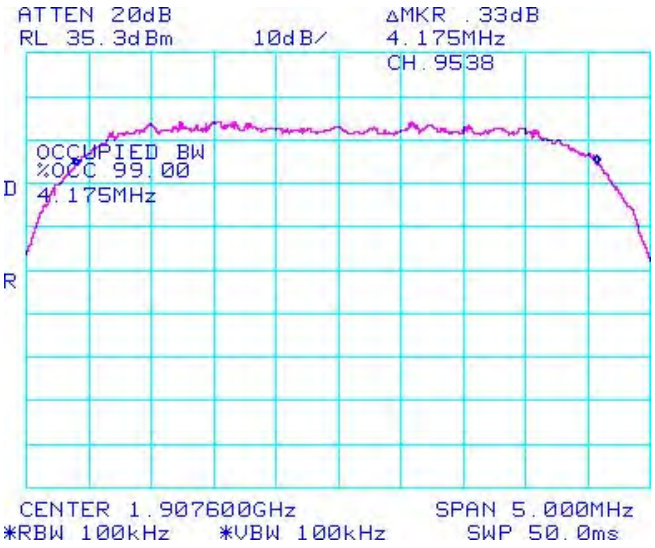



**Figure 1-19b: -26 dBc Bandwidth, Band V Low Channel**

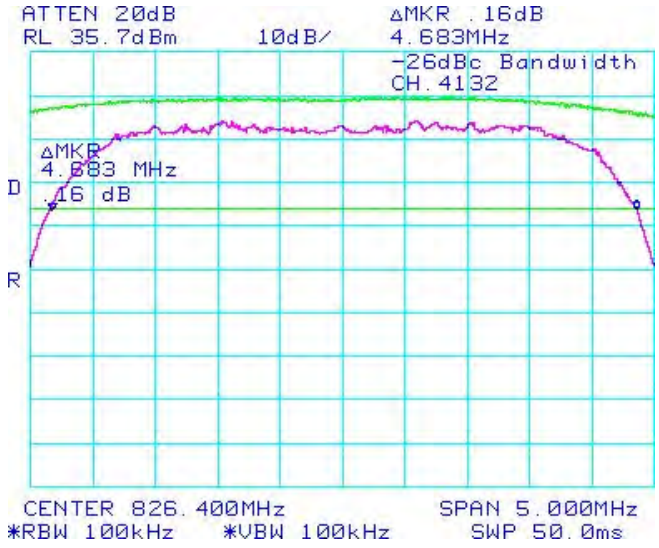
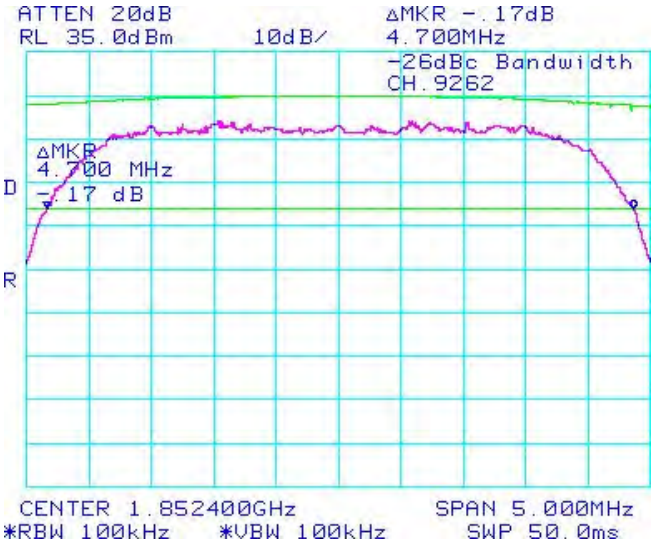



**Figure 1-20b: -26 dBc Bandwidth, Band II Low Channel**

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-21b: -26 dBc Bandwidth, Band V Middle Channel**

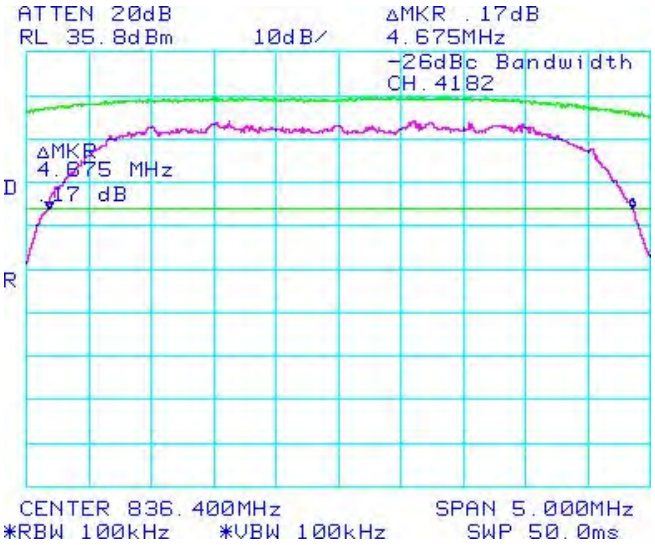



**Figure 1-22b: -26 dBc Bandwidth, Band II Middle Channel**

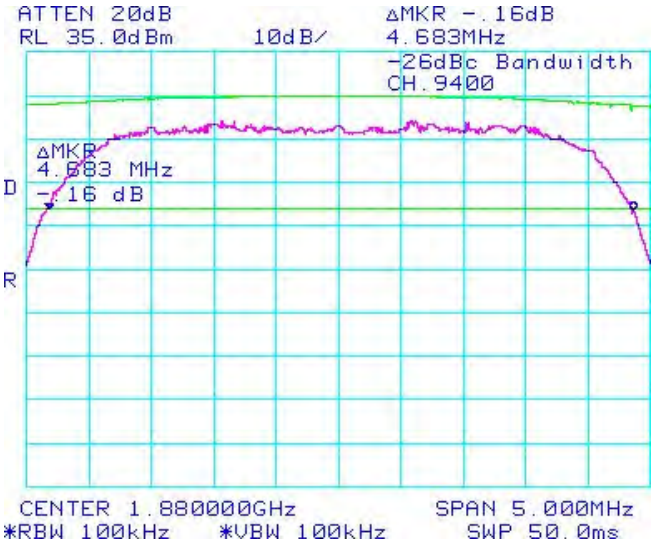



**Figure 1-23b: -26 dBc Bandwidth, Band V High Channel**

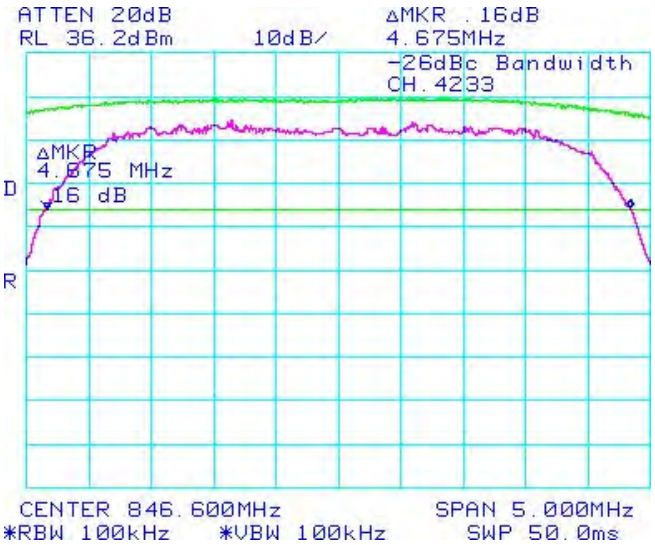
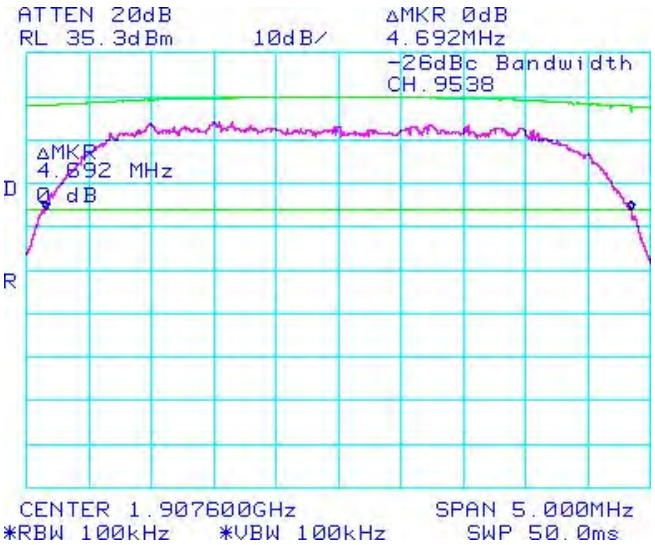



**Figure 1-24b: -26 dBc Bandwidth, Band II High Channel**

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-25b: Band II Low Channel Mask**

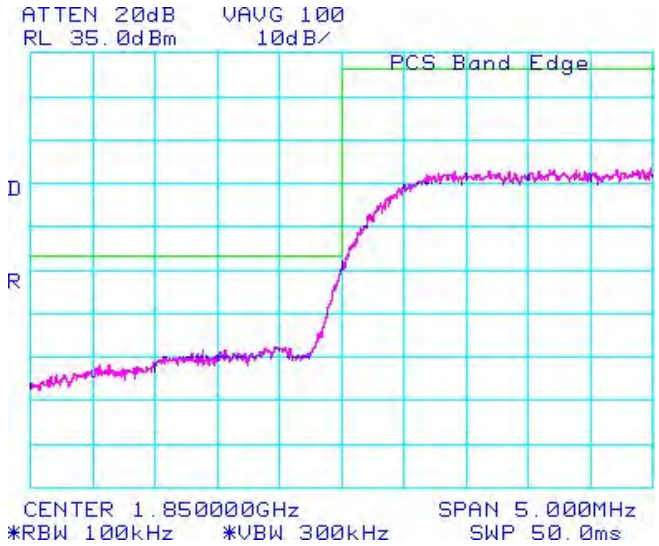



**Figure 1-26b: Band II High Channel Mask**

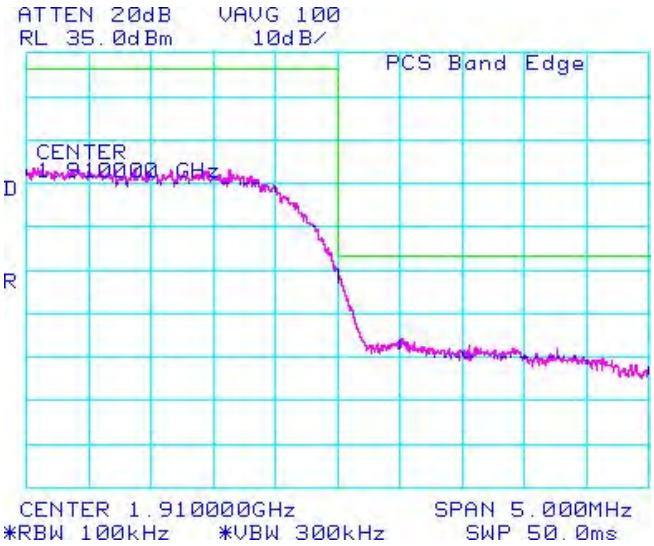



**Figure 1-27b: Band V Low Channel Mask**

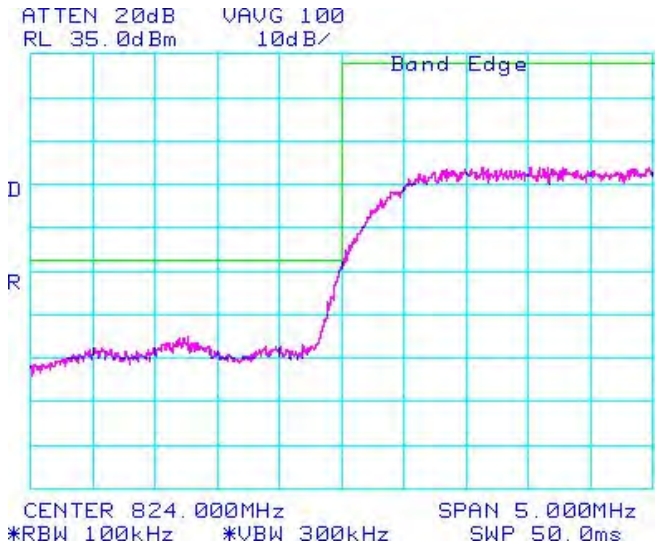
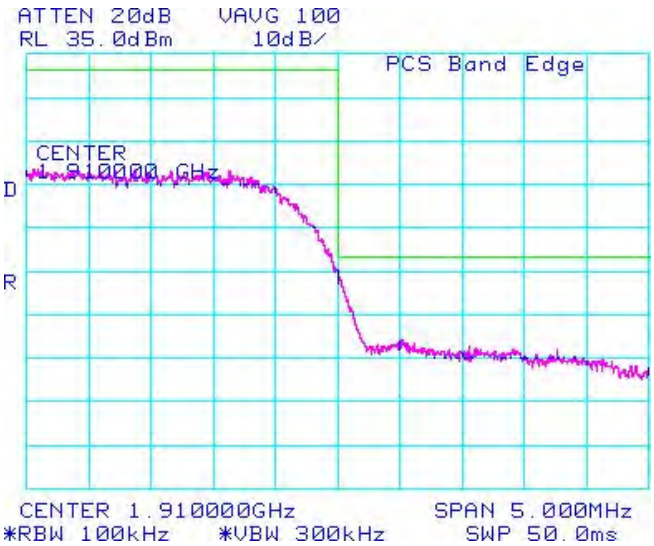



**Figure 1-28b: Band V High Channel Mask**

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## WCDMA Conducted RF Emission Test Data cont'd

**The conducted spurious emissions** – As per 47 CFR 2.1051, CFR 24.238(a), CFR 22 Subpart H, RSS-132 and RSS - 133 were measured from 10 MHz to 20 GHz.

Date of Test: August 15, 2012

The environmental test conditions were: Temperature: 25.0 ºC
Relative Humidity: 37.0 %

**Test Data for WCDMA Band V and WCDMA Band II selected Frequencies in HSUPA mode**

| Band V Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|
| 826.400 | 4.167 |
| 836.400 | 4.167 |
| 846.600 | 4.167 |

| BAND II Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|
| 1852.400 | 4.175 |
| 1880.000 | 4.175 |
| 1907.600 | 4.158 |

***Measurement Plots for WCDMA Band V and WCDMA BAND II in HSUPA mode***
Refer to the following measurement plots for more detail:

See Figures 1-29b to 1-40b for the plots of the conducted spurious emissions.
See Figures 1-41b to 1-46b for the plots of 99% Occupied Bandwidth.
See Figures 1-47b to 1-50b for the plots of the Channel mask.

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

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-29b: Band V, Spurious Conducted Emissions, Low channel**

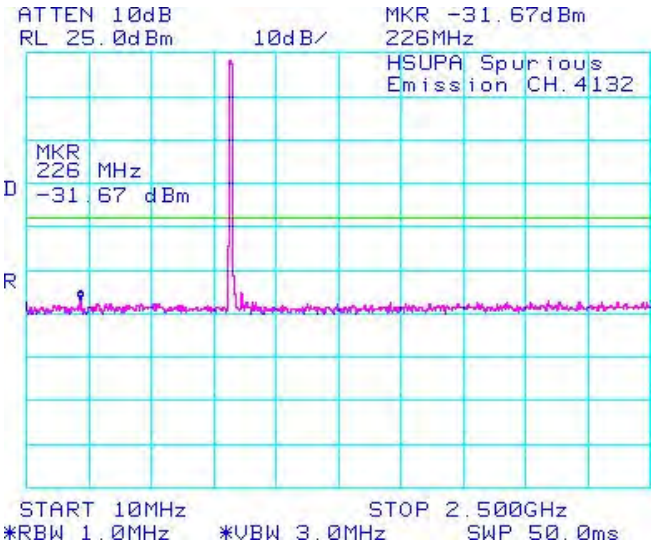



**Figure 1-30b: Band V, Spurious Conducted Emissions, Low channel**

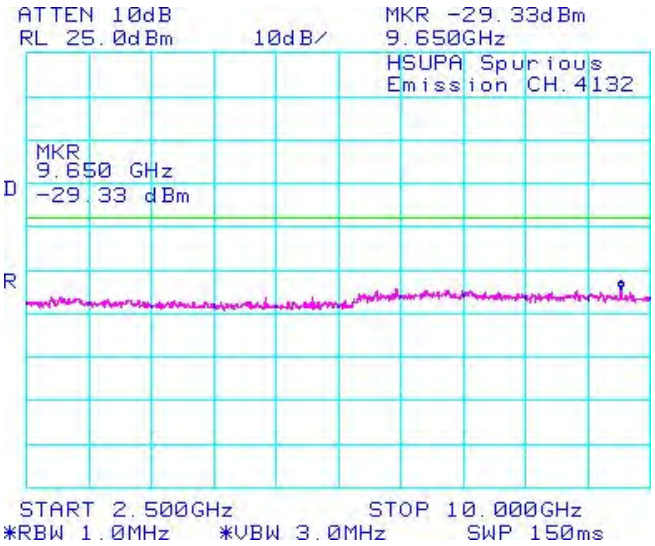



**Figure 1-31b: Band V , Spurious Conducted Emissions, Middle channel**

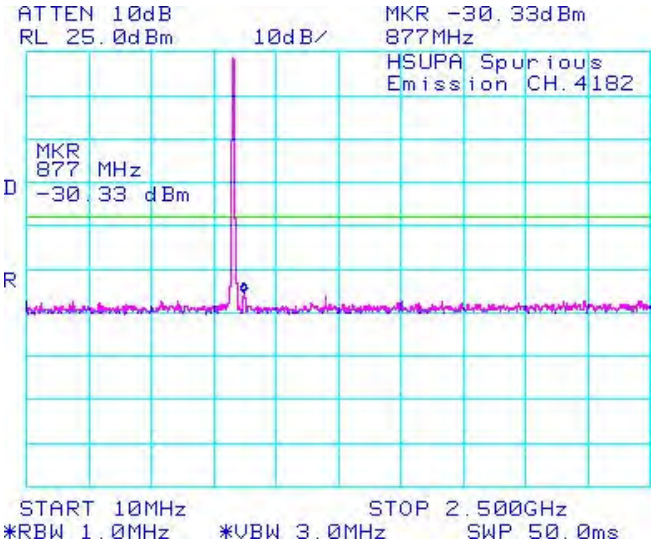
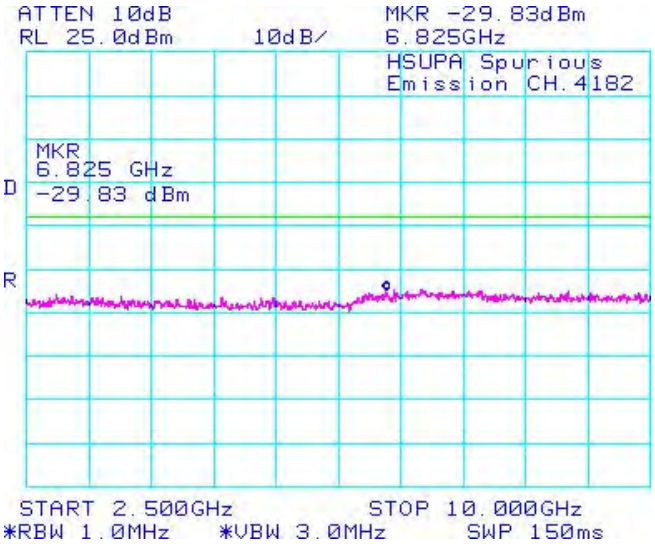



**Figure 1-32b: Band V , Spurious Conducted Emissions, Middle channel**





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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-33b: Band V , Spurious Conducted Emissions, High Channel**

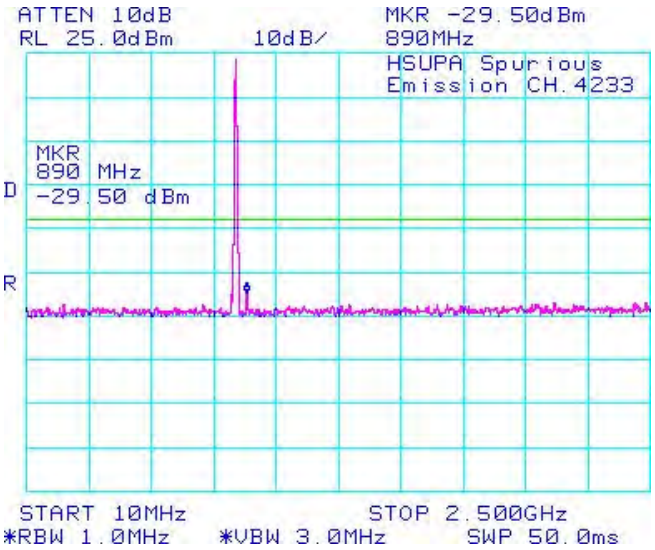



**Figure 1-34b: Band V , Spurious Conducted Emissions, High Channel**

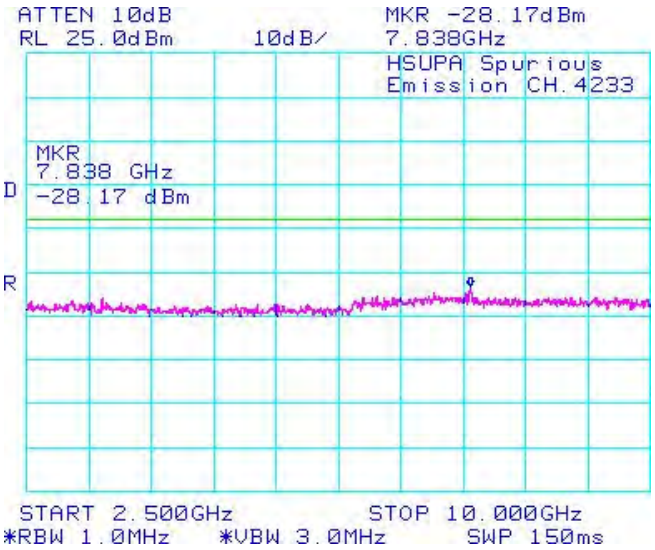



**Figure 1-35b: Band II, Spurious Conducted Emissions, Low Channel**

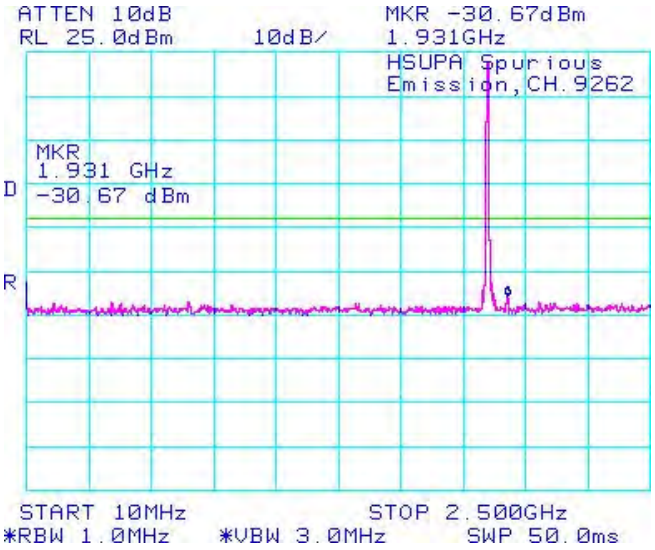
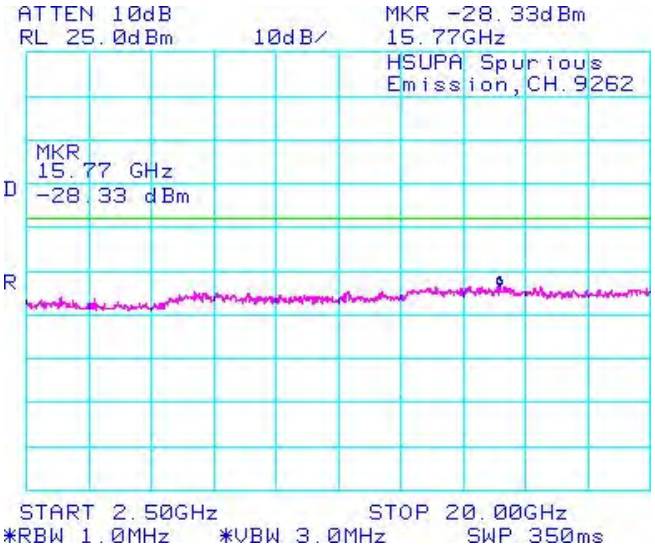



**Figure 1-36b: Band II, Spurious Conducted Emissions, Low Channel**





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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-37b: Band II, Spurious Conducted Emissions, Middle Channel**

**Figure 1-38b: Band II, Spurious Conducted Emissions, Middle Channel**

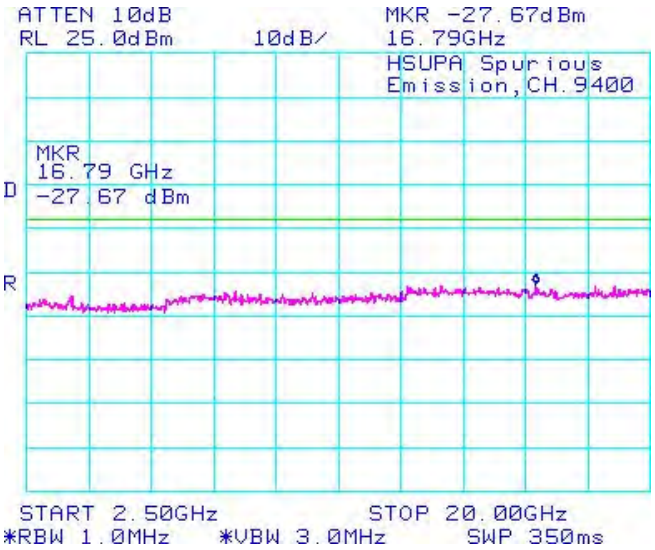



**Figure 1-39b: Band II, Spurious Conducted Emissions, High Channel**

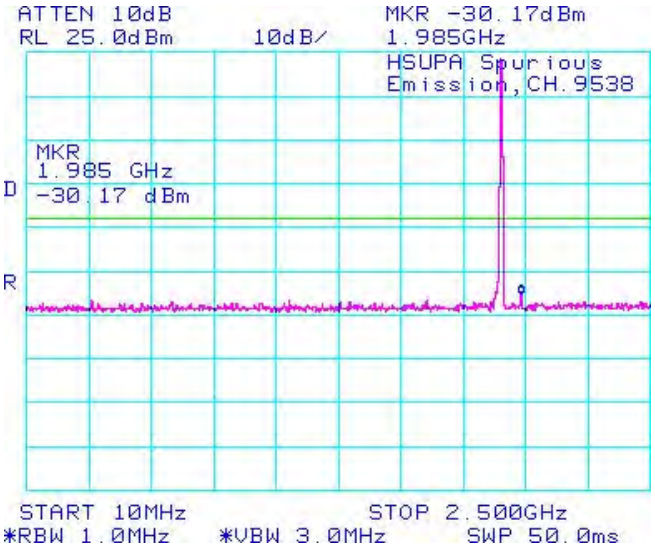
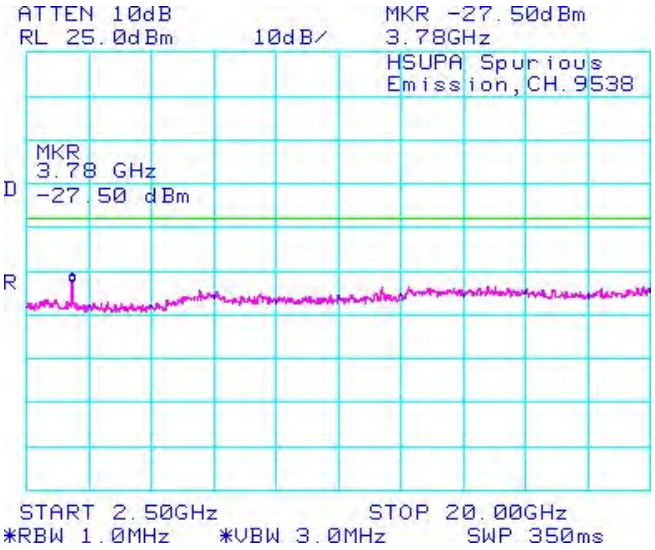



**Figure 1-40b: Band II, Spurious Conducted Emissions, High Channel**





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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-41b: Occupied Bandwidth, Band V Low Channel**

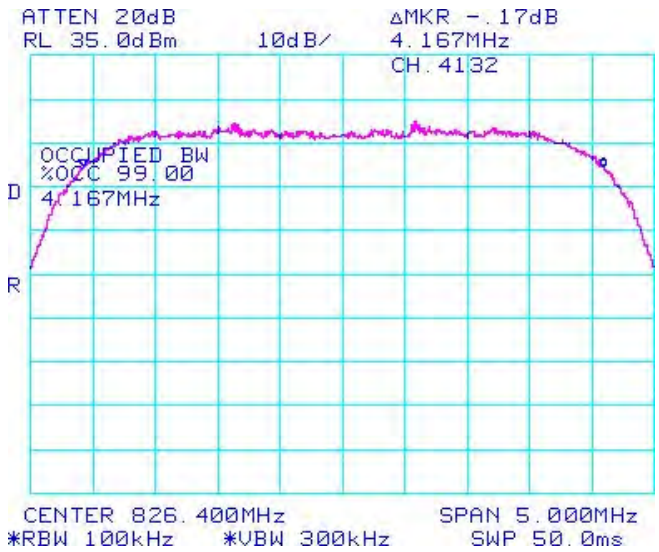



**Figure 1-42b: Occupied Bandwidth, Band V Middle Channel**

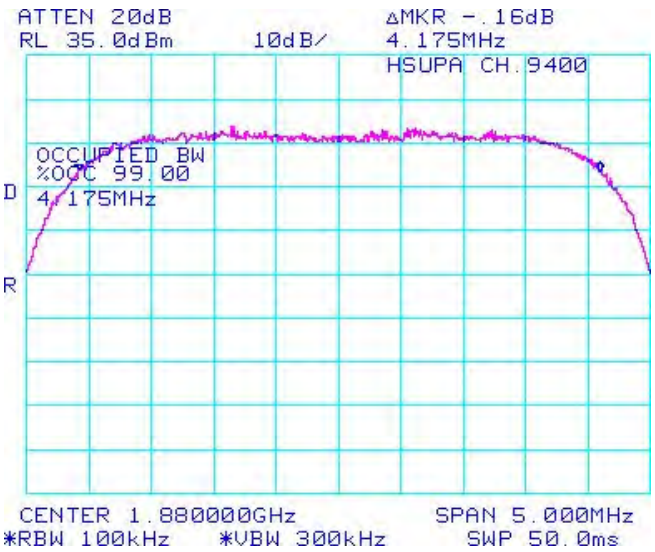



**Figure 1-43b: Occupied Bandwidth, Band V High Channel**

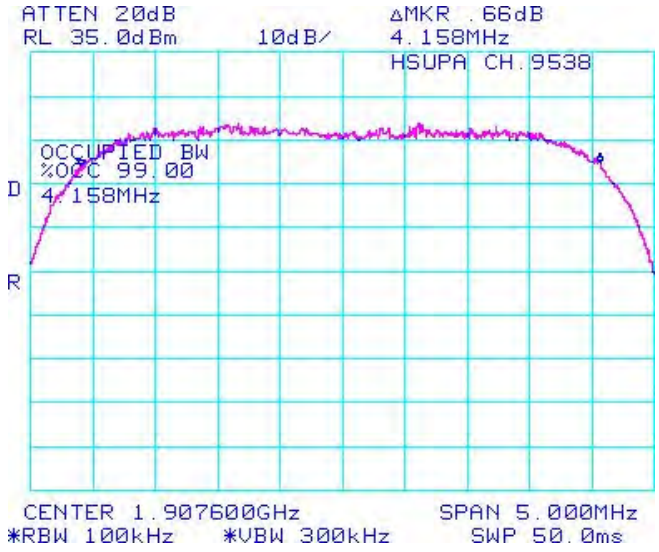
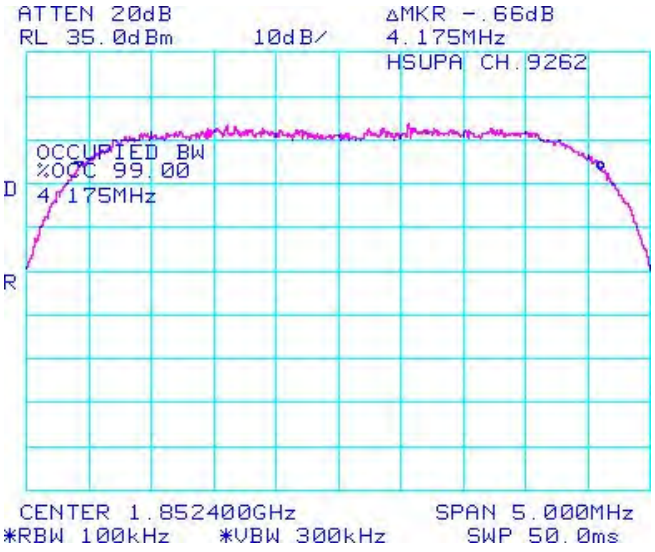



**Figure 1-44b: Occupied Bandwidth, BAND II Low Channel**





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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-45b: Occupied Bandwidth, BAND II Middle Channel**

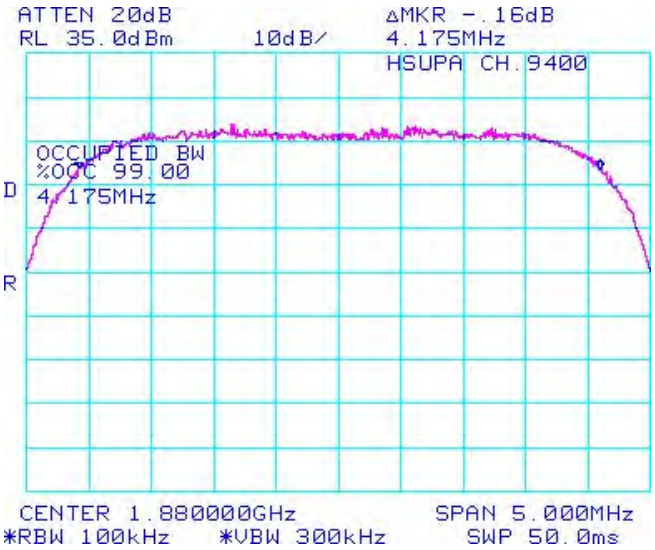



**Figure 1-46b: Occupied Bandwidth, BAND II High Channel**

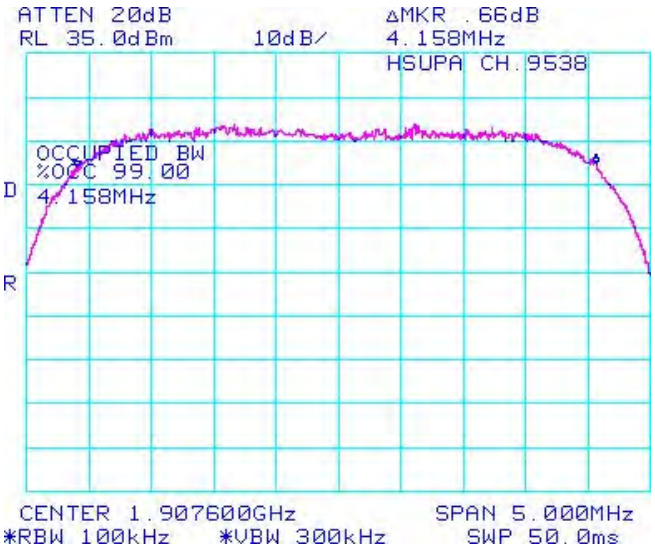



**Figure 1-47b: Band V , Low Channel Mask**

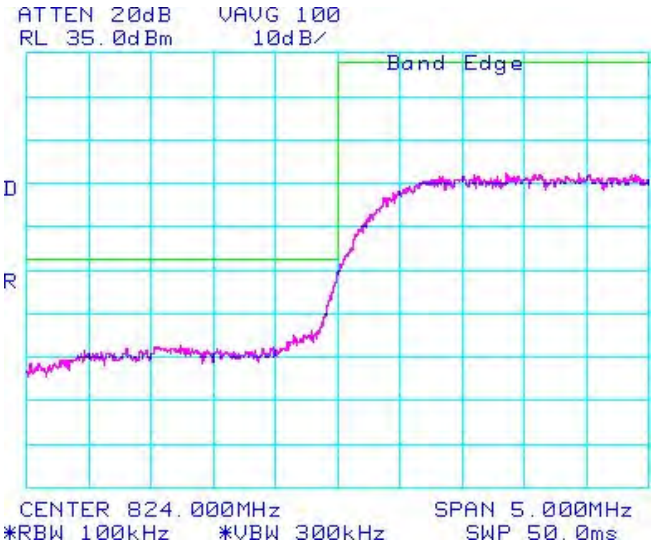
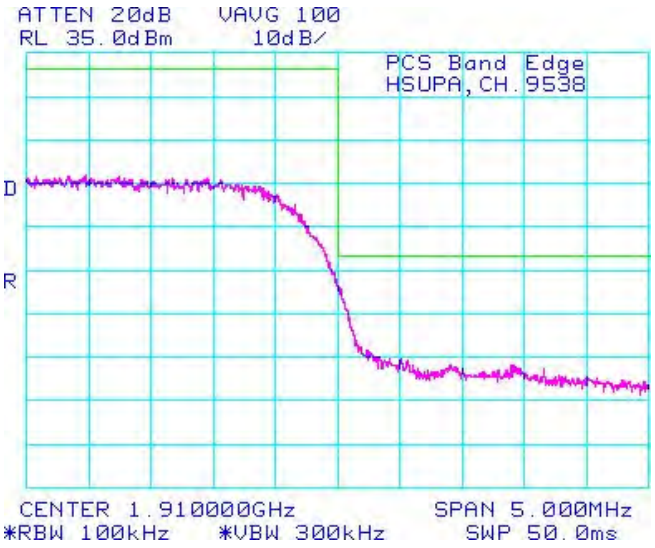



**Figure 1-48b: Band V , High Channel Mask**

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## WCDMA Conducted RF Emission Test Data cont'd

**Figure 1-49b: Band II, Low Channel Mask**

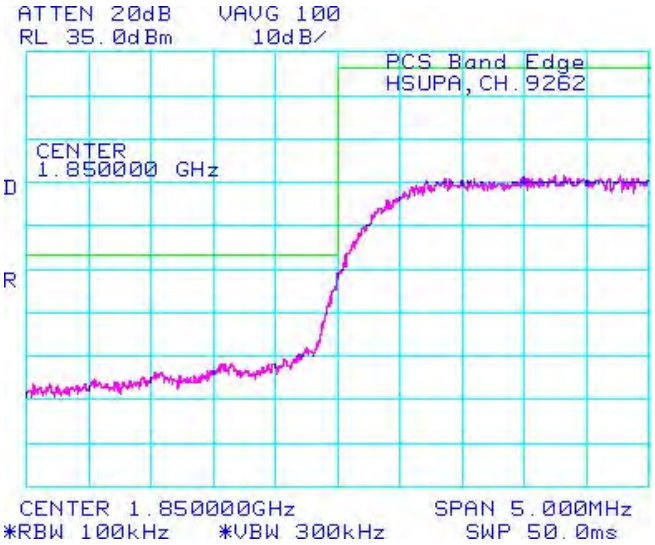
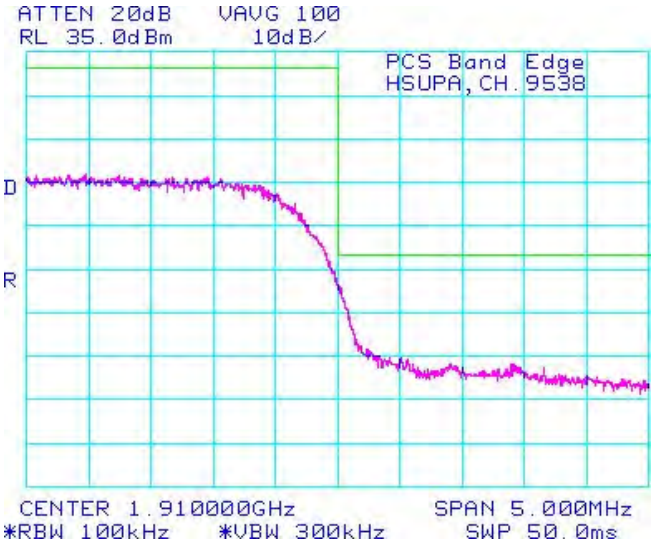



**Figure 1-50b: Band II, High Channel Mask**

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# APPENDIX 2A – GSM CONDUCTED RF OUTPUT POWER TEST DATA

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## GSM Conducted RF Output Power Test Data

The conducted RF output power was measured on the BlackBerry® smartphone using the Communication Tester, Rohde & Schwarz, model CMU 200. The low, middle and high channels were measured at maximum output power. The insertion loss of the coaxial cable from the CMU 200 to the BlackBerry® smartphone was compensated for in the measurements.

Date of Test: July 19, 2012

The environmental conditions were: Temperature: 23.0 °C
Humidity: 40.7 %

The measurements were performed by Daoud Attayi

| Channel | Frequency (MHz) | Maximum Output Power (dBm) | Maximum Output Power (Watts) | Channel | Frequency (MHz) | Maximum Output Power (dBm) | Maximum Output Power (Watts) |
|---|---|---|---|---|---|---|---|
| GSM850 | | | | GSM850 EDGE | | | |
| 128 | 824.20 | 32.1 | 1.62 | 128 | 824.20 | 30.2 | 1.05 |
| 189 | 837.60 | 33.3 | 2.14 | 189 | 837.60 | 30.1 | 1.02 |
| 251 | 848.80 | 32.0 | 1.58 | 251 | 848.80 | 30.2 | 1.05 |
| PCS | | | | PCS EDGE | | | |
| 512 | 1850.2 | 28.8 | 0.76 | 512 | 1850.2 | 26.9 | 0.49 |
| 661 | 1880.0 | 30.2 | 1.05 | 661 | 1880.0 | 26.8 | 0.48 |
| 810 | 1909.8 | 28.6 | 0.72 | 810 | 1909.8 | 26.8 | 0.48 |

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APPENDIX 2B – WCDMA Band II/V CONDUCTED RF OUTPUT POWER TEST DATA

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## WCDMA Band II/V Conducted RF Output Power Test Data

The conducted RF output power was measured using the CMU200 base station simulator. Low, middle and high channels were measured at maximum radio output power at different service options and modes.

Date of Test: July 19, 2012

The environmental conditions were: Temperature: 23.0 °C
Humidity: 40.7 %

The measurements were performed by Daoud Attayi.

| | **Band** | **FDD V (850)** | | | **FDD II (1900)** | | |
|---|---|---|---|---|---|---|---|
| | **Channel** | 4132 | 4182 | 4233 | 9262 | 9400 | 9538 |
| | **Freq (MHz)** | 826.4 | 836.4 | 846.6 | 1852.4 | 1880.0 | 1907.6 |
| **Mode** | **Subtest** | **Max burst averaged conducted power (dBm)** | | | **Max burst averaged conducted power (dBm)** | | |
| Rel99 | 12.2 kbps RMC | 24.3 | 24.5 | 24.4 | 24.0 | 24.0 | 24.0 |
| Rel99 | 12.2 kbps, Voice, AMR, SRB 3.4 kbps | 24.3 | 24.5 | 24.5 | 23.8 | 23.8 | 23.9 |
| Rel7 HSDPA | 1 | 23.5 | 23.3 | 23.1 | 22.9 | 23.1 | 23.1 |
| Rel7 HSDPA | 2 | 22.6 | 22.8 | 23.0 | 22.5 | 22.5 | 22.8 |
| Rel7 HSDPA | 3 | 23.0 | 23.2 | 23.2 | 22.6 | 22.4 | 22.3 |
| Rel7 HSDPA | 4 | 21.8 | 21.9 | 22.1 | 21.3 | 21.5 | 21.4 |
| Rel6 HSUPA | 1 | 22.9 | 23.0 | 22.9 | 22.5 | 22.5 | 22.6 |
| Rel6 HSUPA | 2 | 23.5 | 23.6 | 23.5 | 22.8 | 22.8 | 23.0 |
| Rel6 HSUPA | 3 | 22.5 | 22.7 | 22.5 | 21.9 | 21.9 | 21.9 |
| Rel6 HSUPA | 4 | 21.5 | 21.6 | 21.6 | 20.8 | 20.9 | 20.9 |
| Rel6 HSUPA | 5 | 22.6 | 22.7 | 22.6 | 21.9 | 21.9 | 22.0 |

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# APPENDIX 3A – GSM FREQUENCY STABILITY TEST DATA

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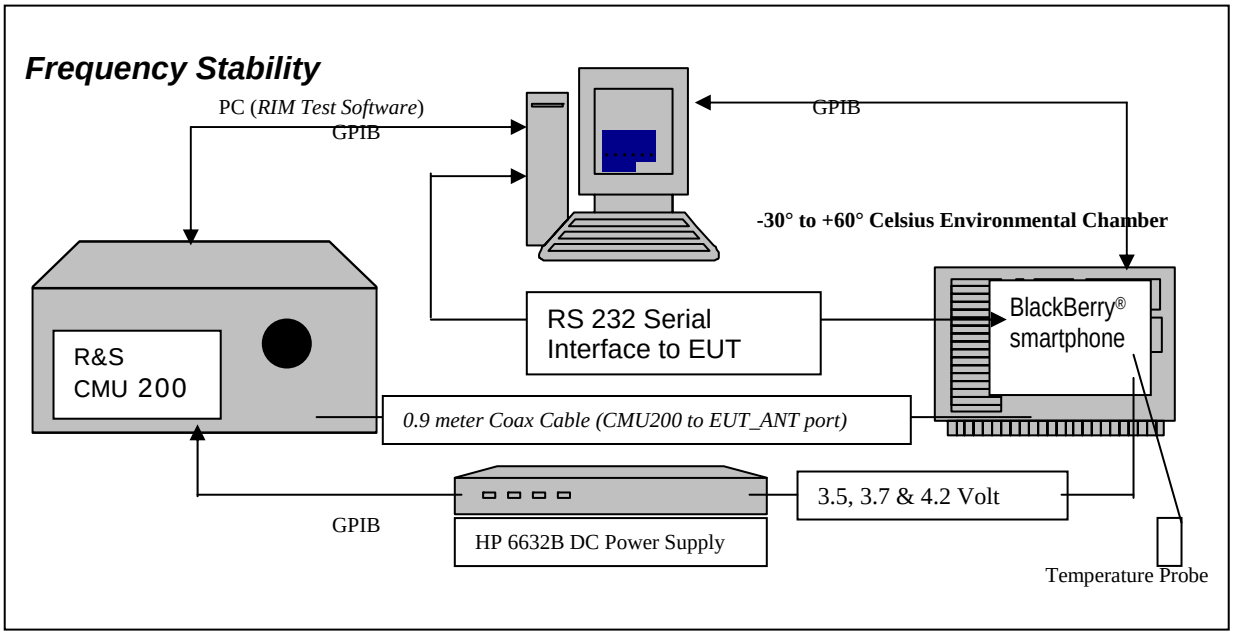
## GSM Frequency Stability Test Data




The measurements were performed by Kevin Guo.

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

***24.235/22.917*** *Frequency Stability*.
*The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.*
*The EUT meets the requirements as stated in CFR 47 chapter 1, Section 24.235, CFR 47 chapter 1, Section 22.917 RSS-132, 4.3 Frequency Stability, and RSS-133, 6.3 Frequency Stability.*
Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-metre coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMU 200 and the EUT antenna port.
Calibration for the Cable Loss was performed in the RF Laboratory using the Agilent power meter and Agilent Signal Generator.

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Test setup:

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

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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 3.8 volts 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, 3.8 volts and 4.35 volts. The transmit frequency was varied in 3 steps consisting of 824.2, 836.4, and 848.8 MHz for the GSM850 band, 1850.2, 1880.0 and 1909.8 MHz for the PCS1900 band. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.
After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

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Procedure:

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

1. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.6 volts.
5. Set up CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
10. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 3.8 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, 3.8 and 4.35 volts.

The maximum frequency error in the GSM850 band measured was -**0.0556 PPM**.
The maximum frequency error in the PCS1900 band measured was **0.0500 PPM**.

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Date of Test: August 13, 2012

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 | 42 | 0.0510 |
| 189 | 836.40 | 3.6 | 20 | -42 | -0.0510 |
| 251 | 848.60 | 3.6 | 20 | -39 | -0.0473 |

| Traffic Channel Number | GSM850 Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 128 | 824.20 | 3.8 | 20 | 46 | 0.0550 |
| 189 | 836.40 | 3.8 | 20 | 42 | 0.0502 |
| 251 | 848.60 | 3.8 | 20 | 35 | 0.0418 |

| Traffic Channel Number | GSM850 Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 128 | 824.20 | 4.35 | 20 | 20 | 0.0236 |
| 189 | 836.40 | 4.35 | 20 | -32 | -0.0377 |
| 251 | 848.60 | 4.35 | 20 | -39 | -0.0459 |

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GSM850 Results: channel 128 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 128 | 824.20 | 3.6 | -30 | -19 | -0.0231 |
| 128 | 824.20 | 3.6 | -20 | -21 | -0.0255 |
| 128 | 824.20 | 3.6 | -10 | 25 | 0.0303 |
| 128 | 824.20 | 3.6 | 0 | 27 | 0.0328 |
| 128 | 824.20 | 3.6 | 10 | 38 | 0.0461 |
| 128 | 824.20 | 3.6 | 20 | 42 | 0.0510 |
| 128 | 824.20 | 3.6 | 30 | 25 | 0.0303 |
| 128 | 824.20 | 3.6 | 40 | 32 | 0.0388 |
| 128 | 824.20 | 3.6 | 50 | -35 | -0.0425 |
| 128 | 824.20 | 3.6 | 60 | -38 | -0.0461 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 128 | 824.20 | 3.8 | -30 | -32 | -0.0388 |
| 128 | 824.20 | 3.8 | -20 | -28 | -0.0340 |
| 128 | 824.20 | 3.8 | -10 | 19 | 0.0231 |
| 128 | 824.20 | 3.8 | 0 | 21 | 0.0255 |
| 128 | 824.20 | 3.8 | 10 | -35 | -0.0425 |
| 128 | 824.20 | 3.8 | 20 | -42 | -0.0510 |
| 128 | 824.20 | 3.8 | 30 | 19 | 0.0231 |
| 128 | 824.20 | 3.8 | 40 | 25 | 0.0303 |
| 128 | 824.20 | 3.8 | 50 | -28 | -0.0340 |
| 128 | 824.20 | 3.8 | 60 | -30 | -0.0364 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 128 | 824.20 | 4.35 | -30 | 42 | 0.0510 |
| 128 | 824.20 | 4.35 | -20 | 32 | 0.0388 |
| 128 | 824.20 | 4.35 | -10 | -23 | -0.0279 |
| 128 | 824.20 | 4.35 | 0 | -20 | -0.0243 |
| 128 | 824.20 | 4.35 | 10 | -38 | -0.0461 |
| 128 | 824.20 | 4.35 | 20 | -39 | -0.0473 |
| 128 | 824.20 | 4.35 | 30 | 24 | 0.0291 |
| 128 | 824.20 | 4.35 | 40 | 28 | 0.0340 |
| 128 | 824.20 | 4.35 | 50 | 33 | 0.0400 |
| 128 | 824.20 | 4.35 | 60 | 32 | 0.0388 |

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GSM850 Results: channel 189 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 189 | 836.40 | 3.6 | -30 | 31 | 0.0371 |
| 189 | 836.40 | 3.6 | -20 | -28 | -0.0335 |
| 189 | 836.40 | 3.6 | -10 | -22 | -0.0263 |
| 189 | 836.40 | 3.6 | 0 | -25 | -0.0299 |
| 189 | 836.40 | 3.6 | 10 | 35 | 0.0418 |
| 189 | 836.40 | 3.6 | 20 | 46 | 0.0550 |
| 189 | 836.40 | 3.6 | 30 | 31 | 0.0371 |
| 189 | 836.40 | 3.6 | 40 | 31 | 0.0371 |
| 189 | 836.40 | 3.6 | 50 | -22 | -0.0263 |
| 189 | 836.40 | 3.6 | 60 | -25 | -0.0299 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 189 | 836.40 | 3.8 | -30 | 26 | 0.0311 |
| 189 | 836.40 | 3.8 | -20 | 31 | 0.0371 |
| 189 | 836.40 | 3.8 | -10 | 18 | 0.0215 |
| 189 | 836.40 | 3.8 | 0 | 18 | 0.0215 |
| 189 | 836.40 | 3.8 | 10 | 41 | 0.0490 |
| 189 | 836.40 | 3.8 | 20 | 42 | 0.0502 |
| 189 | 836.40 | 3.8 | 30 | 25 | 0.0299 |
| 189 | 836.40 | 3.8 | 40 | 21 | 0.0251 |
| 189 | 836.40 | 3.8 | 50 | -26 | -0.0311 |
| 189 | 836.40 | 3.8 | 60 | -27 | -0.0323 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 189 | 836.40 | 4.35 | -30 | 36 | 0.0430 |
| 189 | 836.40 | 4.35 | -20 | -25 | -0.0299 |
| 189 | 836.40 | 4.35 | -10 | -23 | -0.0275 |
| 189 | 836.40 | 4.35 | 0 | -24 | -0.0287 |
| 189 | 836.40 | 4.35 | 10 | 38 | 0.0454 |
| 189 | 836.40 | 4.35 | 20 | 35 | 0.0418 |
| 189 | 836.40 | 4.35 | 30 | -30 | -0.0359 |
| 189 | 836.40 | 4.35 | 40 | -33 | -0.0395 |
| 189 | 836.40 | 4.35 | 50 | 24 | 0.0287 |
| 189 | 836.40 | 4.35 | 60 | 25 | 0.0299 |

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GSM850 Results: channel 251 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 251 | 848.8 | 3.6 | -30 | 32 | 0.0377 |
| 251 | 848.8 | 3.6 | -20 | 21 | 0.0247 |
| 251 | 848.8 | 3.6 | -10 | 19 | 0.0224 |
| 251 | 848.8 | 3.6 | 0 | 22 | 0.0259 |
| 251 | 848.8 | 3.6 | 10 | 22 | 0.0259 |
| 251 | 848.8 | 3.6 | 20 | 20 | 0.0236 |
| 251 | 848.8 | 3.6 | 30 | 25 | 0.0295 |
| 251 | 848.8 | 3.6 | 40 | 26 | 0.0306 |
| 251 | 848.8 | 3.6 | 50 | -25 | -0.0295 |
| 251 | 848.8 | 3.6 | 60 | -25 | -0.0295 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 251 | 848.8 | 3.8 | -30 | -48 | **-0.0566** |
| 251 | 848.8 | 3.8 | -20 | 27 | 0.0318 |
| 251 | 848.8 | 3.8 | -10 | 22 | 0.0259 |
| 251 | 848.8 | 3.8 | 0 | 25 | 0.0295 |
| 251 | 848.8 | 3.8 | 10 | -31 | -0.0365 |
| 251 | 848.8 | 3.8 | 20 | -32 | -0.0377 |
| 251 | 848.8 | 3.8 | 30 | -10 | -0.0118 |
| 251 | 848.8 | 3.8 | 40 | -11 | -0.0130 |
| 251 | 848.8 | 3.8 | 50 | -30 | -0.0353 |
| 251 | 848.8 | 3.8 | 60 | -27 | -0.0318 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 251 | 848.8 | 4.35 | -30 | 37 | 0.0436 |
| 251 | 848.8 | 4.35 | -20 | -25 | -0.0295 |
| 251 | 848.8 | 4.35 | -10 | -33 | -0.0389 |
| 251 | 848.8 | 4.35 | 0 | -38 | -0.0448 |
| 251 | 848.8 | 4.35 | 10 | -28 | -0.0330 |
| 251 | 848.8 | 4.35 | 20 | -39 | -0.0459 |
| 251 | 848.8 | 4.35 | 30 | -18 | -0.0212 |
| 251 | 848.8 | 4.35 | 40 | -22 | -0.0259 |
| 251 | 848.8 | 4.35 | 50 | -27 | -0.0318 |
| 251 | 848.8 | 4.35 | 60 | -22 | -0.0259 |

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PCS Channel 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 | -46.00 | -0.0249 |
| 661 | 1880.00 | 3.6 | 20 | -53.00 | -0.0282 |
| 810 | 1909.80 | 3.6 | 20 | -66.00 | -0.0346 |

| Traffic Channel Number | PCS Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 512 | 1850.20 | 3.8 | 20 | -77.00 | -0.0416 |
| 661 | 1880.00 | 3.8 | 20 | -53.00 | -0.0282 |
| 810 | 1909.80 | 3.8 | 20 | -75.00 | -0.0393 |

| Traffic Channel Number | PCS Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 512 | 1850.20 | 4.35 | 20 | -71.00 | -0.0384 |
| 661 | 1880.00 | 4.35 | 20 | -79.00 | -0.0420 |
| 810 | 1909.80 | 4.35 | 20 | -71.00 | -0.0372 |

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PCS1900 Results: channel 512 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 512 | 1850.20 | 3.6 | -30 | 83.00 | 0.0449 |
| 512 | 1850.20 | 3.6 | -20 | -69.00 | -0.0373 |
| 512 | 1850.20 | 3.6 | -10 | -58.00 | -0.0313 |
| 512 | 1850.20 | 3.6 | 0 | -48.00 | -0.0259 |
| 512 | 1850.20 | 3.6 | 10 | -29.00 | -0.0157 |
| 512 | 1850.20 | 3.6 | 20 | -46.00 | -0.0249 |
| 512 | 1850.20 | 3.6 | 30 | -56.00 | -0.0303 |
| 512 | 1850.20 | 3.6 | 40 | -42.00 | -0.0227 |
| 512 | 1850.20 | 3.6 | 50 | -52.00 | -0.0281 |
| 512 | 1850.20 | 3.6 | 60 | -75.00 | -0.0405 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 512 | 1850.20 | 3.8 | -30 | -80.00 | -0.0432 |
| 512 | 1850.20 | 3.8 | -20 | -65.00 | -0.0351 |
| 512 | 1850.20 | 3.8 | -10 | -51.00 | -0.0276 |
| 512 | 1850.20 | 3.8 | 0 | -44.00 | -0.0238 |
| 512 | 1850.20 | 3.8 | 10 | -23.00 | -0.0124 |
| 512 | 1850.20 | 3.8 | 20 | -77.00 | -0.0416 |
| 512 | 1850.20 | 3.8 | 30 | -68.00 | -0.0368 |
| 512 | 1850.20 | 3.8 | 40 | -52.00 | -0.0281 |
| 512 | 1850.20 | 3.8 | 50 | -64.00 | -0.0346 |
| 512 | 1850.20 | 3.8 | 60 | 27.00 | 0.0146 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 512 | 1850.20 | 4.35 | -30 | 46.00 | 0.0249 |
| 512 | 1850.20 | 4.35 | -20 | 56.00 | 0.0303 |
| 512 | 1850.20 | 4.35 | -10 | 46.00 | 0.0249 |
| 512 | 1850.20 | 4.35 | 0 | -29.00 | -0.0157 |
| 512 | 1850.20 | 4.35 | 10 | -37.00 | -0.0200 |
| 512 | 1850.20 | 4.35 | 20 | -71.00 | -0.0384 |
| 512 | 1850.20 | 4.35 | 30 | -68.00 | -0.0368 |
| 512 | 1850.20 | 4.35 | 40 | -73.00 | -0.0395 |
| 512 | 1850.20 | 4.35 | 50 | -77.00 | -0.0416 |
| 512 | 1850.20 | 4.35 | 60 | 43.00 | 0.0232 |

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PCS1900 Results: channel 661 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 661 | 1880.00 | 3.6 | -30 | 29.00 | 0.0154 |
| 661 | 1880.00 | 3.6 | -20 | -43.00 | -0.0229 |
| 661 | 1880.00 | 3.6 | -10 | -38.00 | -0.0202 |
| 661 | 1880.00 | 3.6 | 0 | -43.00 | -0.0229 |
| 661 | 1880.00 | 3.6 | 10 | 54.00 | 0.0287 |
| 661 | 1880.00 | 3.6 | 20 | -53.00 | -0.0282 |
| 661 | 1880.00 | 3.6 | 30 | -51.00 | -0.0271 |
| 661 | 1880.00 | 3.6 | 40 | -65.00 | -0.0346 |
| 661 | 1880.00 | 3.6 | 50 | -71.00 | -0.0378 |
| 661 | 1880.00 | 3.6 | 60 | -67.00 | -0.0356 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 661 | 1880.00 | 3.7 | -30 | 67.00 | 0.0356 |
| 661 | 1880.00 | 3.7 | -20 | -32.00 | -0.0170 |
| 661 | 1880.00 | 3.7 | -10 | -48.00 | -0.0255 |
| 661 | 1880.00 | 3.7 | 0 | -28.00 | -0.0149 |
| 661 | 1880.00 | 3.7 | 10 | 26.00 | 0.0138 |
| 661 | 1880.00 | 3.7 | 20 | -53.00 | -0.0282 |
| 661 | 1880.00 | 3.7 | 30 | -49.00 | -0.0261 |
| 661 | 1880.00 | 3.7 | 40 | -78.00 | -0.0415 |
| 661 | 1880.00 | 3.7 | 50 | -77.00 | -0.0410 |
| 661 | 1880.00 | 3.7 | 60 | 31.00 | 0.0165 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 661 | 1880.00 | 4.2 | -30 | -94.00 | **-0.0500** |
| 661 | 1880.00 | 4.2 | -20 | 61.00 | 0.0324 |
| 661 | 1880.00 | 4.2 | -10 | 51.00 | 0.0271 |
| 661 | 1880.00 | 4.2 | 0 | 32.00 | 0.0170 |
| 661 | 1880.00 | 4.2 | 10 | -43.00 | -0.0229 |
| 661 | 1880.00 | 4.2 | 20 | -79.00 | -0.0420 |
| 661 | 1880.00 | 4.2 | 30 | -72.00 | -0.0383 |
| 661 | 1880.00 | 4.2 | 40 | -71.00 | -0.0378 |
| 661 | 1880.00 | 4.2 | 50 | -78.00 | -0.0415 |
| 661 | 1880.00 | 4.2 | 60 | -27.00 | -0.0144 |

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PCS1900 Results: channel 810 @ maximum transmitted power

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 810 | 1909.80 | 3.6 | -30 | -29.00 | -0.0152 |
| 810 | 1909.80 | 3.6 | -20 | -79.00 | -0.0414 |
| 810 | 1909.80 | 3.6 | -10 | -26.00 | -0.0136 |
| 810 | 1909.80 | 3.6 | 0 | -35.00 | -0.0183 |
| 810 | 1909.80 | 3.6 | 10 | 32.00 | 0.0168 |
| 810 | 1909.80 | 3.6 | 20 | -66.00 | -0.0346 |
| 810 | 1909.80 | 3.6 | 30 | -48.00 | -0.0251 |
| 810 | 1909.80 | 3.6 | 40 | -68.00 | -0.0356 |
| 810 | 1909.80 | 3.6 | 50 | -69.00 | -0.0361 |
| 810 | 1909.80 | 3.6 | 60 | -77.00 | -0.0403 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 810 | 1909.80 | 3.7 | -30 | -74.00 | -0.0387 |
| 810 | 1909.80 | 3.7 | -20 | -30.00 | -0.0157 |
| 810 | 1909.80 | 3.7 | -10 | -33.00 | -0.0173 |
| 810 | 1909.80 | 3.7 | 0 | -35.00 | -0.0183 |
| 810 | 1909.80 | 3.7 | 10 | 35.00 | 0.0183 |
| 810 | 1909.80 | 3.7 | 20 | -75.00 | -0.0393 |
| 810 | 1909.80 | 3.7 | 30 | -65.00 | -0.0340 |
| 810 | 1909.80 | 3.7 | 40 | -78.00 | -0.0408 |
| 810 | 1909.80 | 3.7 | 50 | -69.00 | -0.0361 |
| 810 | 1909.80 | 3.7 | 60 | 36.00 | 0.0189 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 810 | 1909.80 | 4.2 | -30 | -27.00 | -0.0141 |
| 810 | 1909.80 | 4.2 | -20 | -41.00 | -0.0215 |
| 810 | 1909.80 | 4.2 | -10 | -43.00 | -0.0225 |
| 810 | 1909.80 | 4.2 | 0 | -43.00 | -0.0225 |
| 810 | 1909.80 | 4.2 | 10 | -69.00 | -0.0361 |
| 810 | 1909.80 | 4.2 | 20 | -71.00 | -0.0372 |
| 810 | 1909.80 | 4.2 | 30 | -75.00 | -0.0393 |
| 810 | 1909.80 | 4.2 | 40 | -56.00 | -0.0293 |
| 810 | 1909.80 | 4.2 | 50 | -68.00 | -0.0356 |
| 810 | 1909.80 | 4.2 | 60 | 28.00 | 0.0147 |

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APPENDIX 3B – WCDMA Band II/V FREQUENCY STABILITY TEST DATA

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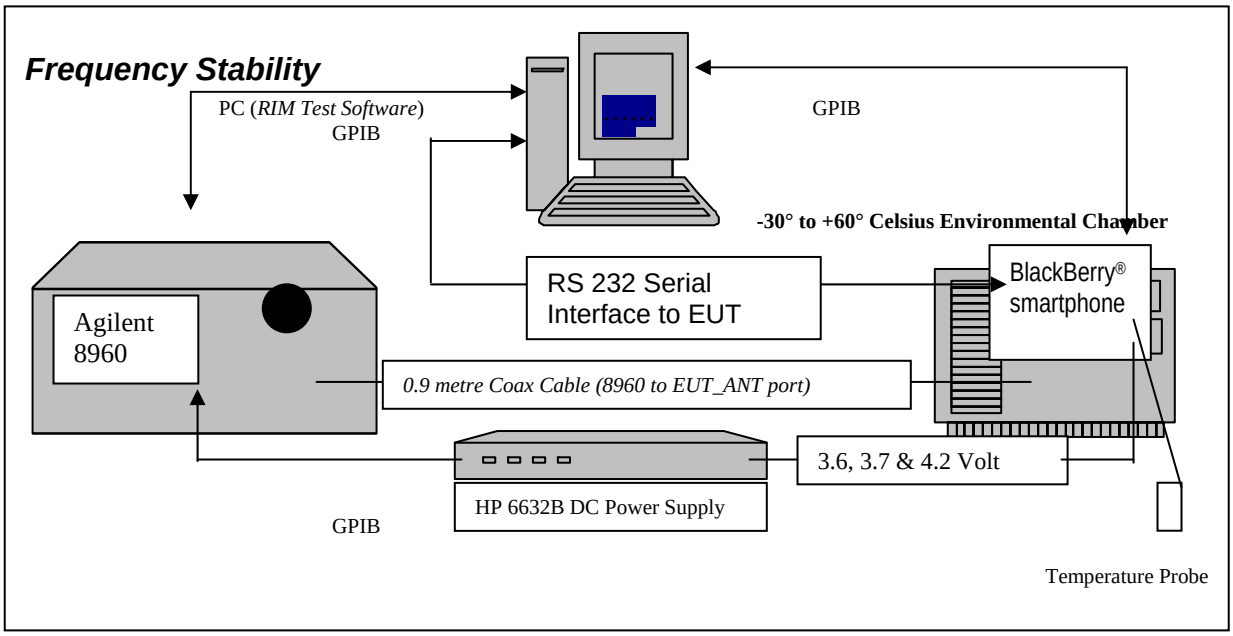
## WCDMA Frequency Stability Test Data




The following measurements were performed by Berkin Can.

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements

**2.1055** Frequency Stability - Procedures

(a,b) Frequency Stability - Temperature Variation

(d) Frequency Stability - Voltage Variation

**24.235** *Frequency Stability*.

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

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

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

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Test Setup:

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

---

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

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

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.6 volts, to 3.8 volts 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, 3.8 volts and 4.35 volts. The transmit frequency was varied in 3 steps consisting of 1852.4, 1880.0 and 1907.6 MHz for the WCDMA Band II. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.
After the initial one-hour soak at the beginning of the tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

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Procedure:

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

1. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30°C and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.6 volts.
5. Set up CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power and Frequency Error.
10. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 3.8 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, 3.7 and 4.2 volts

The maximum frequency error in the WCDMA Band V measured was **0.0203 PPM**.
The maximum frequency error in the WCDMA Band II measured was **0.0133 PPM.**

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Date of Test: August 10, 2012

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 | 6 | 0.0073 |
| 4182 | 836.4 | 3.6 | 20 | 9 | 0.0108 |
| 4233 | 846.6 | 3.6 | 20 | 11 | 0.0130 |

| Traffic Channel Number | WCDMA Band V Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4132 | 826.4 | 3.8 | 20 | 10 | 0.0121 |
| 4182 | 836.4 | 3.8 | 20 | 13 | 0.0155 |
| 4233 | 846.6 | 3.8 | 20 | -12 | -0.0142 |

| Traffic Channel Number | WCDMA Band V Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4132 | 826.4 | 4.35 | 20 | -10 | -0.0121 |
| 4182 | 836.4 | 4.35 | 20 | 13 | 0.0155 |
| 4233 | 846.6 | 4.35 | 20 | 9 | 0.0106 |

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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 | 9 | 0.0109 |
| 4132 | 826.4 | 3.6 | -20 | 13 | 0.0157 |
| 4132 | 826.4 | 3.6 | -10 | -12 | -0.0145 |
| 4132 | 826.4 | 3.6 | 0 | -12 | -0.0145 |
| 4132 | 826.4 | 3.6 | 10 | 11 | 0.0133 |
| 4132 | 826.4 | 3.6 | 20 | 6 | 0.0073 |
| 4132 | 826.4 | 3.6 | 30 | 9 | 0.0109 |
| 4132 | 826.4 | 3.6 | 40 | 9 | 0.0109 |
| 4132 | 826.4 | 3.6 | 50 | -8 | -0.0097 |
| 4132 | 826.4 | 3.6 | 60 | -10 | -0.0121 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4132 | 826.4 | 3.8 | -30 | 11 | 0.0133 |
| 4132 | 826.4 | 3.8 | -20 | 13 | 0.0157 |
| 4132 | 826.4 | 3.8 | -10 | 13 | 0.0157 |
| 4132 | 826.4 | 3.8 | 0 | 12 | 0.0145 |
| 4132 | 826.4 | 3.8 | 10 | 13 | 0.0157 |
| 4132 | 826.4 | 3.8 | 20 | 10 | 0.0121 |
| 4132 | 826.4 | 3.8 | 30 | 8 | 0.0097 |
| 4132 | 826.4 | 3.8 | 40 | 12 | 0.0145 |
| 4132 | 826.4 | 3.8 | 50 | 13 | 0.0157 |
| 4132 | 826.4 | 3.8 | 60 | 11 | 0.0133 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4132 | 826.4 | 4.35 | -30 | -14 | -0.0169 |
| 4132 | 826.4 | 4.35 | -20 | 13 | 0.0157 |
| 4132 | 826.4 | 4.35 | -10 | -15 | -0.0182 |
| 4132 | 826.4 | 4.35 | 0 | -15 | -0.0182 |
| 4132 | 826.4 | 4.35 | 10 | -11 | -0.0133 |
| 4132 | 826.4 | 4.35 | 20 | -10 | -0.0121 |
| 4132 | 826.4 | 4.35 | 30 | 7 | 0.0085 |
| 4132 | 826.4 | 4.35 | 40 | 12 | 0.0145 |
| 4132 | 826.4 | 4.35 | 50 | -10 | -0.0121 |
| 4132 | 826.4 | 4.35 | 60 | 11 | 0.0133 |

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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 | 16 | 0.0191 |
| 4182 | 836.4 | 3.6 | -20 | 11 | 0.0132 |
| 4182 | 836.4 | 3.6 | -10 | 11 | 0.0132 |
| 4182 | 836.4 | 3.6 | 0 | 13 | 0.0155 |
| 4182 | 836.4 | 3.6 | 10 | 9 | 0.0108 |
| 4182 | 836.4 | 3.6 | 20 | 9 | 0.0108 |
| 4182 | 836.4 | 3.6 | 30 | -11 | -0.0132 |
| 4182 | 836.4 | 3.6 | 40 | 10 | 0.0120 |
| 4182 | 836.4 | 3.6 | 50 | 11 | 0.0132 |
| 4182 | 836.4 | 3.6 | 60 | 16 | 0.0191 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4182 | 836.4 | 3.8 | -30 | 14 | 0.0167 |
| 4182 | 836.4 | 3.8 | -20 | 11 | 0.0132 |
| 4182 | 836.4 | 3.8 | -10 | 9 | 0.0108 |
| 4182 | 836.4 | 3.8 | 0 | 11 | 0.0132 |
| 4182 | 836.4 | 3.8 | 10 | 9 | 0.0108 |
| 4182 | 836.4 | 3.8 | 20 | 13 | 0.0155 |
| 4182 | 836.4 | 3.8 | 30 | 11 | 0.0132 |
| 4182 | 836.4 | 3.8 | 40 | 11 | 0.0132 |
| 4182 | 836.4 | 3.8 | 50 | 11 | 0.0132 |
| 4182 | 836.4 | 3.8 | 60 | 15 | 0.0179 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4182 | 836.4 | 4.35 | -30 | 11 | 0.0132 |
| 4182 | 836.4 | 4.35 | -20 | 12 | 0.0143 |
| 4182 | 836.4 | 4.35 | -10 | 15 | 0.0179 |
| 4182 | 836.4 | 4.35 | 0 | 12 | 0.0143 |
| 4182 | 836.4 | 4.35 | 10 | 14 | 0.0167 |
| 4182 | 836.4 | 4.35 | 20 | 13 | 0.0155 |
| 4182 | 836.4 | 4.35 | 30 | 11 | 0.0132 |
| 4182 | 836.4 | 4.35 | 40 | 14 | 0.0167 |
| 4182 | 836.4 | 4.35 | 50 | 16 | 0.0191 |
| 4182 | 836.4 | 4.35 | 60 | 17 | **0.0203** |

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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 | 12 | 0.0142 |
| 4233 | 846.6 | 3.6 | -20 | -13 | -0.0154 |
| 4233 | 846.6 | 3.6 | -10 | -14 | -0.0165 |
| 4233 | 846.6 | 3.6 | 0 | -17 | -0.0201 |
| 4233 | 846.6 | 3.6 | 10 | 12 | 0.0142 |
| 4233 | 846.6 | 3.6 | 20 | 11 | 0.0130 |
| 4233 | 846.6 | 3.6 | 30 | 13 | 0.0154 |
| 4233 | 846.6 | 3.6 | 40 | 11 | 0.0130 |
| 4233 | 846.6 | 3.6 | 50 | -9 | -0.0106 |
| 4233 | 846.6 | 3.6 | 60 | -8 | -0.0094 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4233 | 846.6 | 3.8 | -30 | 13 | 0.0154 |
| 4233 | 846.6 | 3.8 | -20 | -8 | -0.0094 |
| 4233 | 846.6 | 3.8 | -10 | 12 | 0.0142 |
| 4233 | 846.6 | 3.8 | 0 | 9 | 0.0106 |
| 4233 | 846.6 | 3.8 | 10 | -12 | -0.0142 |
| 4233 | 846.6 | 3.8 | 20 | -12 | -0.0142 |
| 4233 | 846.6 | 3.8 | 30 | -14 | -0.0165 |
| 4233 | 846.6 | 3.8 | 40 | 10 | 0.0118 |
| 4233 | 846.6 | 3.8 | 50 | 12 | 0.0142 |
| 4233 | 846.6 | 3.8 | 60 | 16 | 0.0189 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 4233 | 846.6 | 4.35 | -30 | 16 | 0.0189 |
| 4233 | 846.6 | 4.35 | -20 | -9 | -0.0106 |
| 4233 | 846.6 | 4.35 | -10 | -11 | -0.0130 |
| 4233 | 846.6 | 4.35 | 0 | -14 | -0.0165 |
| 4233 | 846.6 | 4.35 | 10 | -7 | -0.0083 |
| 4233 | 846.6 | 4.35 | 20 | 9 | 0.0106 |
| 4233 | 846.6 | 4.35 | 30 | 9 | 0.0106 |
| 4233 | 846.6 | 4.35 | 40 | 12 | 0.0142 |
| 4233 | 846.6 | 4.35 | 50 | 11 | 0.0130 |
| 4233 | 846.6 | 4.35 | 60 | 8 | 0.0094 |

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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 | 14 | 0.0076 |
| 9400 | 1880.00 | 3.6 | 20 | -12 | -0.0064 |
| 9538 | 1907.60 | 3.6 | 20 | -15 | -0.0079 |

| Traffic Channel Number | WCDMA1900 Frequency (MHz | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9262 | 1852.40 | 3.8 | 20 | -11 | -0.0059 |
| 9400 | 1880.00 | 3.8 | 20 | 14 | 0.0074 |
| 9538 | 1907.60 | 3.8 | 20 | -17 | -0.0089 |

| Traffic Channel Number | WCDMA1900 Frequency (MHz | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9262 | 1852.40 | 4.35 | 20 | -13 | -0.0070 |
| 9400 | 1880.00 | 4.35 | 20 | -15 | -0.0080 |
| 9538 | 1907.60 | 4.35 | 20 | -14 | -0.0073 |

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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 | -13 | -0.0070 |
| 9262 | 1852.40 | 3.6 | -20 | -7 | -0.0038 |
| 9262 | 1852.40 | 3.6 | -10 | 12 | 0.0065 |
| 9262 | 1852.40 | 3.6 | 0 | -12 | -0.0065 |
| 9262 | 1852.40 | 3.6 | 10 | -13 | -0.0070 |
| 9262 | 1852.40 | 3.6 | 20 | 14 | 0.0076 |
| 9262 | 1852.40 | 3.6 | 30 | -17 | -0.0092 |
| 9262 | 1852.40 | 3.6 | 40 | 11 | 0.0059 |
| 9262 | 1852.40 | 3.6 | 50 | 10 | 0.0054 |
| 9262 | 1852.40 | 3.6 | 60 | -10 | -0.0054 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9262 | 1852.40 | 3.8 | -30 | 13 | 0.0070 |
| 9262 | 1852.40 | 3.8 | -20 | -10 | -0.0054 |
| 9262 | 1852.40 | 3.8 | -10 | -12 | -0.0065 |
| 9262 | 1852.40 | 3.8 | 0 | -12 | -0.0065 |
| 9262 | 1852.40 | 3.8 | 10 | 12 | 0.0065 |
| 9262 | 1852.40 | 3.8 | 20 | -11 | -0.0059 |
| 9262 | 1852.40 | 3.8 | 30 | -7 | -0.0038 |
| 9262 | 1852.40 | 3.8 | 40 | -10 | -0.0054 |
| 9262 | 1852.40 | 3.8 | 50 | -11 | -0.0059 |
| 9262 | 1852.40 | 3.8 | 60 | 22 | 0.0119 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9262 | 1852.40 | 4.35 | -30 | -17 | -0.0092 |
| 9262 | 1852.40 | 4.35 | -20 | -9 | -0.0049 |
| 9262 | 1852.40 | 4.35 | -10 | -14 | -0.0076 |
| 9262 | 1852.40 | 4.35 | 0 | -12 | -0.0065 |
| 9262 | 1852.40 | 4.35 | 10 | 15 | 0.0081 |
| 9262 | 1852.40 | 4.35 | 20 | -13 | -0.0070 |
| 9262 | 1852.40 | 4.35 | 30 | -9 | -0.0049 |
| 9262 | 1852.40 | 4.35 | 40 | 14 | 0.0076 |
| 9262 | 1852.40 | 4.35 | 50 | 14 | 0.0076 |
| 9262 | 1852.40 | 4.35 | 60 | -12 | -0.0065 |

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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 | 9 | 0.0048 |
| 9400 | 1880.00 | 3.6 | -20 | 12 | 0.0064 |
| 9400 | 1880.00 | 3.6 | -10 | -14 | -0.0074 |
| 9400 | 1880.00 | 3.6 | 0 | 16 | 0.0085 |
| 9400 | 1880.00 | 3.6 | 10 | 11 | 0.0059 |
| 9400 | 1880.00 | 3.6 | 20 | -12 | -0.0064 |
| 9400 | 1880.00 | 3.6 | 30 | 12 | 0.0064 |
| 9400 | 1880.00 | 3.6 | 40 | -6 | -0.0032 |
| 9400 | 1880.00 | 3.6 | 50 | -9 | -0.0048 |
| 9400 | 1880.00 | 3.6 | 60 | 25 | **0.0133** |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9400 | 1880.00 | 3.8 | -30 | 8 | 0.0043 |
| 9400 | 1880.00 | 3.8 | -20 | -11 | -0.0059 |
| 9400 | 1880.00 | 3.8 | -10 | -13 | -0.0069 |
| 9400 | 1880.00 | 3.8 | 0 | 12 | 0.0064 |
| 9400 | 1880.00 | 3.8 | 10 | -10 | -0.0053 |
| 9400 | 1880.00 | 3.8 | 20 | 14 | 0.0074 |
| 9400 | 1880.00 | 3.8 | 30 | 12 | 0.0064 |
| 9400 | 1880.00 | 3.8 | 40 | 16 | 0.0085 |
| 9400 | 1880.00 | 3.8 | 50 | 13 | 0.0069 |
| 9400 | 1880.00 | 3.8 | 60 | -12 | -0.0064 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9400 | 1880.00 | 4.35 | -30 | 9 | 0.0048 |
| 9400 | 1880.00 | 4.35 | -20 | 10 | 0.0053 |
| 9400 | 1880.00 | 4.35 | -10 | 9 | 0.0048 |
| 9400 | 1880.00 | 4.35 | 0 | 9 | 0.0048 |
| 9400 | 1880.00 | 4.35 | 10 | -12 | -0.0064 |
| 9400 | 1880.00 | 4.35 | 20 | -15 | -0.0080 |
| 9400 | 1880.00 | 4.35 | 30 | 11 | 0.0059 |
| 9400 | 1880.00 | 4.35 | 40 | -9 | -0.0048 |
| 9400 | 1880.00 | 4.35 | 50 | -11 | -0.0059 |
| 9400 | 1880.00 | 4.35 | 60 | 25 | **0.0133** |

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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 | 11 | 0.0058 |
| 9538 | 1907.60 | 3.6 | -20 | -11 | -0.0058 |
| 9538 | 1907.60 | 3.6 | -10 | -13 | -0.0068 |
| 9538 | 1907.60 | 3.6 | 0 | 12 | 0.0063 |
| 9538 | 1907.60 | 3.6 | 10 | -12 | -0.0063 |
| 9538 | 1907.60 | 3.6 | 20 | -15 | -0.0079 |
| 9538 | 1907.60 | 3.6 | 30 | 10 | 0.0052 |
| 9538 | 1907.60 | 3.6 | 40 | 13 | 0.0068 |
| 9538 | 1907.60 | 3.6 | 50 | 12 | 0.0063 |
| 9538 | 1907.60 | 3.6 | 60 | -13 | -0.0068 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9538 | 1907.60 | 3.8 | -30 | 12 | 0.0063 |
| 9538 | 1907.60 | 3.8 | -20 | 9 | 0.0047 |
| 9538 | 1907.60 | 3.8 | -10 | 14 | 0.0073 |
| 9538 | 1907.60 | 3.8 | 0 | 13 | 0.0068 |
| 9538 | 1907.60 | 3.8 | 10 | 11 | 0.0058 |
| 9538 | 1907.60 | 3.8 | 20 | -17 | -0.0089 |
| 9538 | 1907.60 | 3.8 | 30 | -12 | -0.0063 |
| 9538 | 1907.60 | 3.8 | 40 | -8 | -0.0042 |
| 9538 | 1907.60 | 3.8 | 50 | -7 | -0.0037 |
| 9538 | 1907.60 | 3.8 | 60 | -14 | -0.0073 |

| Traffic Channel Number | Frequency (MHz) | Voltage (Volts) | Temperature (Celsius) | Frequency Error (Hz) | PPM |
|---|---|---|---|---|---|
| 9538 | 1907.60 | 4.35 | -30 | -13 | -0.0068 |
| 9538 | 1907.60 | 4.35 | -20 | -12 | -0.0063 |
| 9538 | 1907.60 | 4.35 | -10 | 11 | 0.0058 |
| 9538 | 1907.60 | 4.35 | 0 | 12 | 0.0063 |
| 9538 | 1907.60 | 4.35 | 10 | 13 | 0.0068 |
| 9538 | 1907.60 | 4.35 | 20 | -14 | -0.0073 |
| 9538 | 1907.60 | 4.35 | 30 | 9 | 0.0047 |
| 9538 | 1907.60 | 4.35 | 40 | -13 | -0.0068 |
| 9538 | 1907.60 | 4.35 | 50 | -13 | -0.0068 |
| 9538 | 1907.60 | 4.35 | 60 | -13 | -0.0068 |

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