



**FCC CFR47 PART 22H AND 24E
&
INDUSTRY CANADA RSS-132 AND RSS-133**

CERTIFICATION TEST REPORT

**FOR
PCA, EVDO MINI-PCI EXPRESS CARD CDMA MODEM**

MODEL NUMBER: MC5728V

FCC ID: N7N-MC5728

IC ID: 2417C-MC5728

**REPORT NUMBER: 08U12326-1, Revision C
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Prepared for

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NVLAP LAB CODE 200065-0

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC
2290 COSMOS COURT
CARLSBAD, CA. 92009, UNITED STATES.

EUT DESCRIPTION: PCA, EVDO MINI-PCI EXPRESS CARD CDMA MODEM

MODEL: MC5728V

SERIAL NUMBER: P8929580124A2-10

DATE TESTED: JANUARY 14-21, 2009

| APPLICABLE STANDARDS | |
|--|--------------|
| STANDARD | TEST RESULTS |
| FCC PART 22 H and 24E | PASS |
| IC RSS-132 ISSUE 2 and RSS-133 ISSUE 4 | PASS |

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All expressions of Pass/Fail in this report are opinions expressed by CCS based on interpretations of the test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



THU CHAN
EMC MANAGER
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EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with RSS-GEN, RSS-132, RSS-133, ANSI/TIA 603C-2004, FCC CFR 47 Part 2, and FCC CFR 47 Part 22 and 24

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/Standards/scopes/2000650.htm>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER | UNCERTAINTY |
|-------------------------------------|----------------|
| Radiated Emission, 30 to 200 MHz | +/- 3.3 dB |
| Radiated Emission, 200 to 1000 MHz | +4.5 / -2.9 dB |
| Radiated Emission, 1000 to 2000 MHz | +4.5 / -2.9 dB |
| Power Line Conducted Emission | +/- 2.9 dB |

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a dual band, 800/1900MHz, PCA EVDO Mini-PCI Express Card CDMA Modem. The module manufactured by Sierra Wireless, Inc

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dipole antenna with a maximum gain of 0dBi for Cellular band PCS bands.

6. TEST SUMMARY

6.1. LIST OF TEST ITEMS

| Description of test | Rule part | | Results |
|--|---------------------------|-------------------------------------|----------|
| | FCC | IC | |
| 1. RF Power Output | §2.1046 | RSS-132, 4.4; RSS-133, 6.4; | Complies |
| 2. Occupied Bandwidth | §2.1049 | RSS-Gen, 4.6 | -- |
| 3. Block Edge (Band Edge) | §22.359, §24.238 | RSS-132, 4.5; RSS-133, 6.5 | Complies |
| 4. Out of Band Emissions | §2.1051, §22.917, §24.238 | RSS-132, 4.5; RSS-133, 6.5 | Complies |
| 5. Frequency Stability | §2.1055, §22.355, §24.235 | RSS-132, 4.3; RSS-133, 6.3 | Complies |
| 6. Radiated Power (ERP & EIRP) | §2.1046, §22.913, §24.232 | RSS-132; 4.4, RSS-133, 6.4 | Complies |
| 7. Field Strength of Spurious Radiation | §2.1053, §22.917, §24.238 | RSS-132, 4.5; RSS-233, 6.5 | Complies |
| 8. Receiver Spurious Emissions (IC only) | n/a | RSS-132, 4.6; RSS-133, 6.6, RSS-Gen | Complies |

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum output power as follows:

Part 22 Cellular Band

| Frequency range (MHz) | Modulation | Conducted | | ERP | |
|-----------------------|-------------------|-----------|-------|------|-------|
| | | dBm | mW | dBm | mW |
| 824.7 – 848.31 | 1xRTT (RC3, +SCH) | 29.15 | 822.2 | 27.6 | 575.4 |
| 824.7 – 848.31 | EV-DO - REV A | 29.82 | 959.4 | 27.7 | 588.8 |

Part 24 PCS Band

| Frequency range (MHz) | Modulation | Conducted | | EIRP | |
|-----------------------|-------------------|-----------|-------|------|-------|
| | | dBm | mW | dBm | mW |
| 1851.25 – 1908.8 | 1xRTT (RC3, +SCH) | 28.6 | 722.8 | 27.6 | 575.4 |
| 1851.25 – 1908.8 | EV-DO - REV A | 29.1 | 814.7 | 27.9 | 616.6 |

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST | | | | |
|---------------------------------------|----------------|------------------|--------|----------|
| Description | Manufacturer | Model | Asset | Cal Due |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01012 | 03/03/09 |
| Antenna, Bilog, 2 GHz | Sunol Sciences | JB1 | C01011 | 02/11/09 |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | C00885 | 03/31/09 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00945 | 04/22/09 |
| Preamplifier, 26.5 GHz | Agilent / HP | 8449B | C01063 | 08/05/09 |
| EMI Receiver, 2.9 GHz | Agilent / HP | 8542E | C00957 | 09/19/09 |
| RF Filter Section, 2.9 GHz | Agilent / HP | 85420E | C00958 | 09/19/09 |
| EMI Test Receiver, 30 MHz | R & S | ESHS 20 | N02396 | 08/06/09 |
| Communications Test Set | Agilent / HP | E5515C | C01086 | 06/16/09 |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 10/29/09 |
| Temperature / Humidity Chamber | Thermotron | SE 600-10-10 | C00930 | 05/13/09 |
| Highpass Filter, 1.5 GHz | Micro-Tronics | HPM13193 | N02689 | CNR |
| Highpass Filter, 2.7 GHz | Micro-Tronics | HPM13194 | N02687 | CNR |
| Directional Coupler, 18 GHz | Krytar | 1817 | N02656 | CNR |
| Signal Generator, 20 GHz | Agilent / HP | 83732B | C00774 | 07/03/09 |
| Antenna, Tuned Dipole 400~1000 MHz | ETS | 3121C DB4 | C00993 | 06/28/09 |

7.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | |
|-----------------------------------|-----------------|-------------------|---------------|
| Description | Manufacturer | Model | Serial Number |
| Communications Test set | Agilent | E5515C | 8/18/1927 |
| Directional Coupler | Krytar | 1817 | N02687 |
| EUT AC Adapter | ELPAC | FW1805 | 32692 |
| Test Fixture | Sierra Wireless | CCA-00000511-0001 | NA |

I/O CABLES (CONDUCTED TEST)

| I/O CABLE LIST | | | | | | |
|----------------|-----------|----------------------|-------------------------|-------------|--------------|---------|
| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
| 1 | AC | 2 | US 115V | Un-shielded | 2m | NA |
| 2 | DC | 1 | DC | Un-shielded | 2m | NA |
| 3 | RF In/Out | 1 | Directional Coupler | Un-shielded | 0.5m | NA |
| 4 | RF In/Out | 1 | Spectrum Analyser | Un-shielded | None | NA |
| 5 | RF In/Out | 1 | Communications Test Set | Un-shielded | 0.5m | NA |

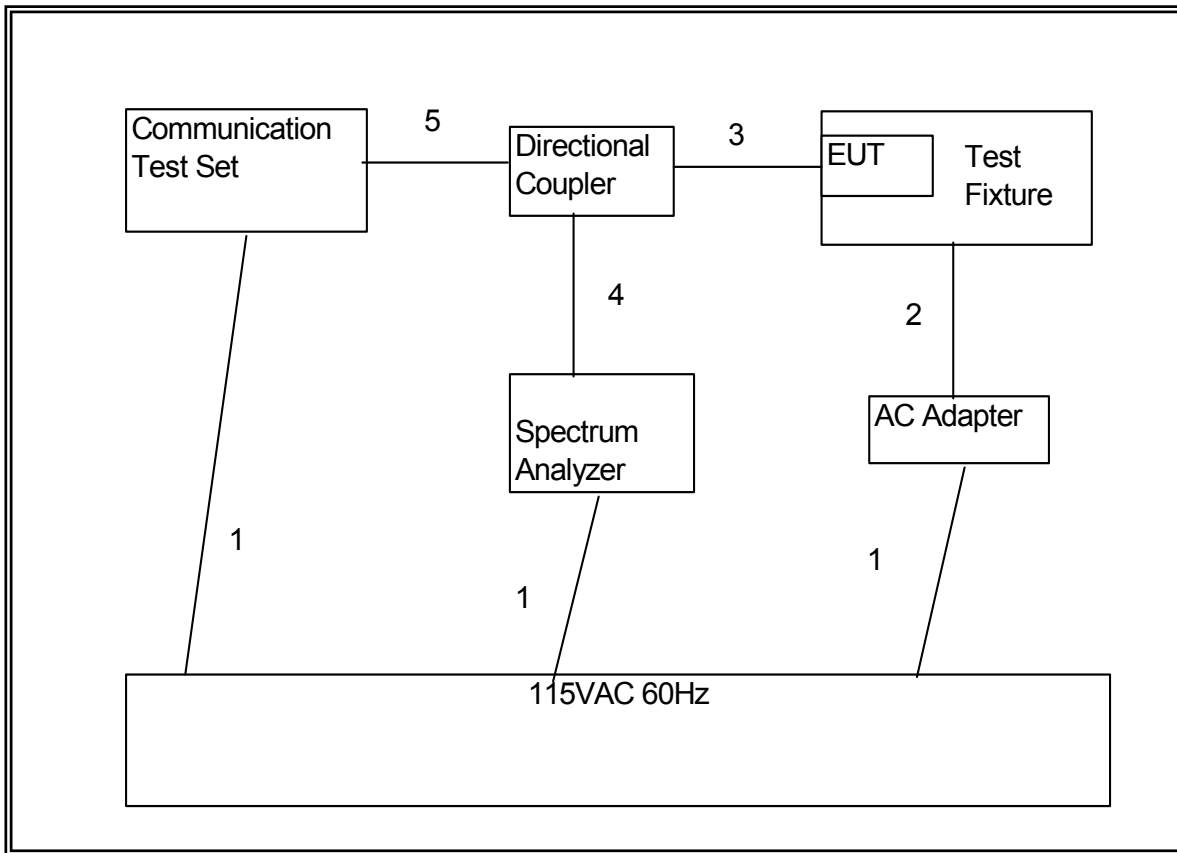
I/O CABLES (RADIATED TEST)

| I/O CABLE LIST | | | | | | |
|----------------|--------------|----------------------|-------------------------|-------------|--------------|---------|
| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
| 1 | AC | 2 | US 115V | Un-shielded | 2m | NA |
| 2 | DC | 1 | US 115V | Un-shielded | 2m | NA |
| 3 | Antenna Port | 1 | Dipole | Un-shielded | 2m | NA |
| 4 | RF In/Out | 1 | Communications Test Set | Un-shielded | 3m | NA |

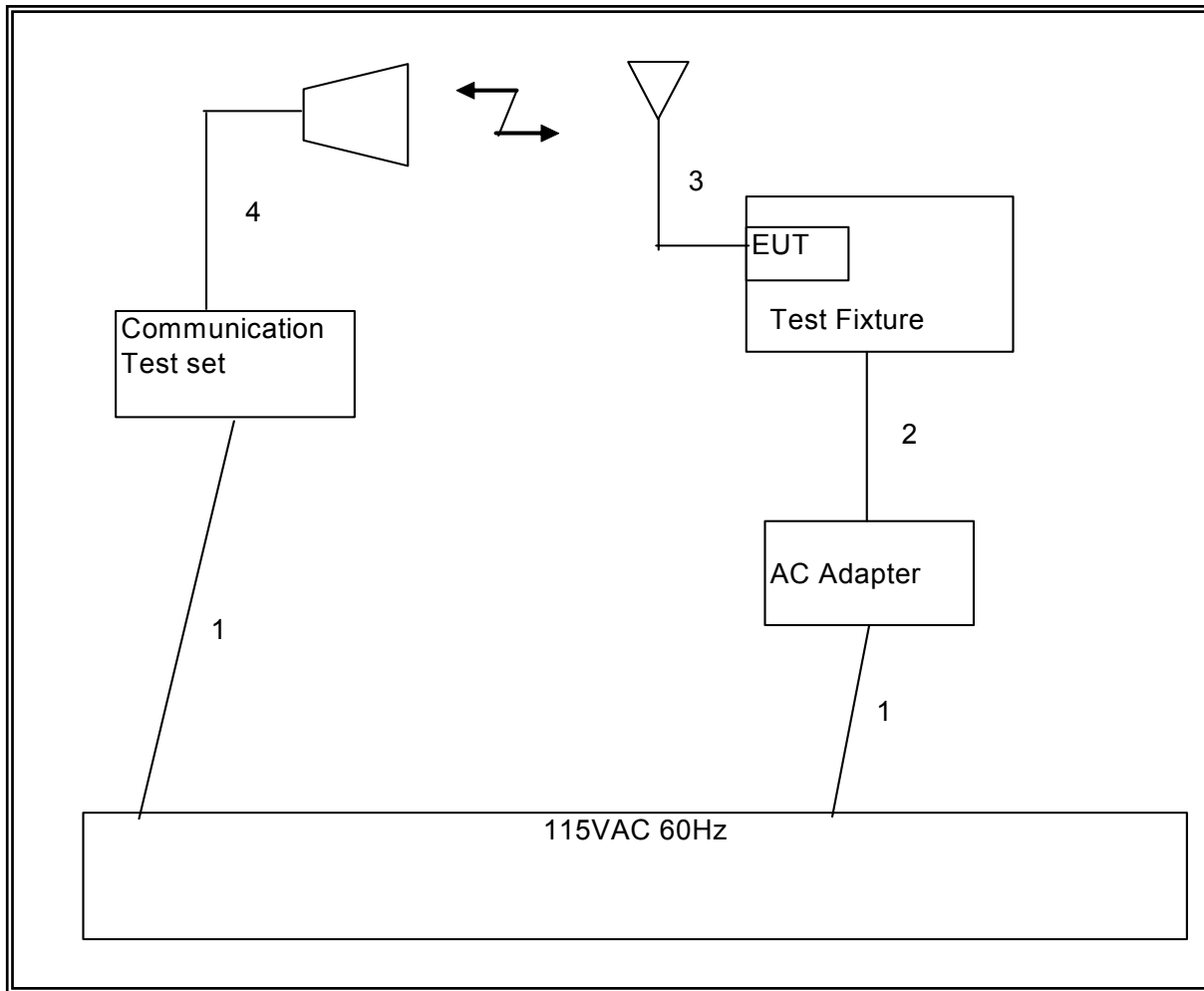
TEST SETUP

The EUT is a stand-alone device. The Wireless Communication test set exercised the EUT.

SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



RF Power Output Results for 1XRTT

| 1xRTT - Cell Band | | | | | | | |
|--------------------------|---------------------|------------------------------|-------|-------------------|-------|-------------------|-------|
| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) | | | | | |
| | | Ch. 1013/824.7MHz | | Ch. 384/836.52MHz | | Ch. 777/848.31MHz | |
| | | Average | Peak | Average | Peak | Average | Peak |
| RC1 (Fwd1, Rvs1) | 1 (Voice) | | | | | | |
| | 2 (Loopback) | 24.65 | 28.90 | 24.86 | 28.71 | 24.40 | 28.20 |
| | 3 (Voice) | | | | | | |
| | 55 (Loopback) | 24.75 | 29.10 | 24.86 | 28.99 | 24.50 | 28.60 |
| | 68 (Voice) | | | | | | |
| RC2 (Fwd2, Rvs2) | 9 (Loopback) | 24.65 | 28.92 | 24.85 | 29.02 | 24.45 | 28.66 |
| | 17 (Voice) | | | | | | |
| | 55 (Loopback) | 24.70 | 29.01 | 24.80 | 29.04 | 24.63 | 28.78 |
| | 32768 (Voice) | | | | | | |
| RC3 (Fwd3, Rvs3) | 1 (Voice) | | | | | | |
| | 2 (Loopback) | 24.70 | 28.67 | 24.80 | 28.76 | 24.45 | 28.29 |
| | 3 (Voice) | | | | | | |
| | 55 (Loopback) | 24.70 | 28.69 | 24.86 | 28.67 | 24.45 | 28.23 |
| | 32 (+ F-SCH) | 24.68 | 28.65 | 24.88 | 28.64 | 24.50 | 28.36 |
| | 32 (+ SCH) | 24.90 | 29.15 | 24.90 | 29.05 | 24.50 | 28.65 |
| RC4 (Fwd4, Rvs3) | 1 (Voice) | | | | | | |
| | 2 (Loopback) | 24.68 | 28.75 | 24.85 | 28.68 | 24.43 | 28.34 |
| | 3 (Voice) | | | | | | |
| | 55 (Loopback) | 24.70 | 28.61 | 24.82 | 28.75 | 24.43 | 28.18 |
| | 32 (+ F-SCH) | 24.70 | 28.71 | 24.85 | 28.69 | 24.50 | 28.28 |
| | 32 (+ SCH) | 24.85 | 28.84 | 24.87 | 28.75 | 24.45 | 28.18 |
| RC5 (Fwd5, Rvs4) | 9 (Loopback) | 24.65 | 28.70 | 24.75 | 28.73 | 24.51 | 28.32 |
| | 17 (Voice) | | | | | | |
| | 55 (Loopback) | 24.65 | 28.79 | 24.75 | 28.72 | 24.43 | 28.23 |
| | 32768 (Voice) | | | | | | |

RF Power Output Results for 1XRTT

| 1xRTT – PCS Band | | | | | | | |
|--------------------------|---------------------|------------------------------|-------|-----------------|-------|----------------------|-------|
| Radio Configuration (RC) | Service Option (SO) | Conducted Output Power (dBm) | | | | | |
| | | Ch. 25/1851.25MHz | | Ch. 600/1880MHz | | Ch. 1175/1908.75 MHz | |
| | | Average | Peak | Average | Peak | Average | Peak |
| RC1 (Fwd1, Rvs1) | 1 (Voice) | | | | | | |
| | 2 (Loopback) | 24.20 | 27.80 | 24.55 | 28.18 | 24.65 | 28.35 |
| | 3 (Voice) | | | | | | |
| | 55 (Loopback) | 24.20 | 28.00 | 24.56 | 28.57 | 24.65 | 28.48 |
| | 68 (Voice) | | | | | | |
| RC2 (Fwd2, Rvs2) | 9 (Loopback) | 24.20 | 28.05 | 24.63 | 28.43 | 24.65 | 28.41 |
| | 17 (Voice) | | | | | | |
| | 55 (Loopback) | 24.20 | 28.02 | 24.53 | 28.48 | 24.70 | 28.35 |
| | 32768 (Voice) | | | | | | |
| RC3 (Fwd3, Rvs3) | 1 (Voice) | | | | | | |
| | 2 (Loopback) | 24.30 | 27.95 | 24.62 | 28.22 | 24.63 | 28.27 |
| | 3 (Voice) | | | | | | |
| | 55 (Loopback) | 24.20 | 27.85 | 24.60 | 28.26 | 24.64 | 28.25 |
| | 32 (+ F-SCH) | 24.40 | 27.98 | 24.65 | 28.17 | 24.72 | 28.23 |
| | 32 (+ SCH) | 24.40 | 28.10 | 24.67 | 28.59 | 24.74 | 28.49 |
| RC4 (Fwd4, Rvs3) | 1 (Voice) | | | | | | |
| | 2 (Loopback) | 24.30 | 27.92 | 24.4 | 28.07 | 24.65 | 28.20 |
| | 3 (Voice) | | | | | | |
| | 55 (Loopback) | 24.20 | 27.84 | 24.52 | 28.21 | 24.67 | 28.28 |
| | 32 (+ F-SCH) | 24.40 | 28.06 | 24.58 | 28.39 | 24.63 | 28.33 |
| | 32 (+ SCH) | 24.30 | 27.88 | 24.55 | 28.32 | 24.65 | 28.48 |
| RC5 (Fwd5, Rvs4) | 9 (Loopback) | 24.30 | 27.98 | 24.50 | 28.16 | 24.60 | 28.25 |
| | 17 (Voice) | | | | | | |
| | 55 (Loopback) | 24.20 | 27.83 | 24.62 | 28.13 | 24.63 | 28.22 |
| | 32768 (Voice) | | | | | | |

8.2. RF POWER OUTPUT FOR EVDO REV 0

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| <u>Application</u> | <u>Rev, License</u> |
|-----------------------|---------------------|
| 1xEV-DO Terminal Test | A.09.13 |

EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
 - Cell Power > -105.5 dBm/1.23 MHz
 - Cell Band > (Select US Cellular or US PCS)
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > RTAP
 - RTAP Rate > 153.6 kbps
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Release 0 - FTAP

- Call Setup > Shift & Preset
- Call Control:
 - Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
 - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
 - Cell Power > -105.5 dBm/1.23 MHz
 - Cell Band > (Select US Cellular or US PCS)
 - Channel > (Enter channel number)
 - Application Config > Enhanced Test Application Protocol > FTAP (default)
 - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
 - Rvs Power Ctrl > Active bits
 - Protocol Rel > 0 (1xEV-DO)
- Press "Start Data Connection" when "Session Open" appear in "Active Cell"
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RF Power Output for EV-DO Rel 0

Cell Band

| FTAP Rate | RTAP Rate | Channel | f (MHz) | Conducted power (dBm) | |
|------------------------------|------------|---------|---------|-----------------------|-------|
| | | | | Average | Peak |
| 307.2 kbps (2 slot, QPSK) | 153.6 kbps | 1013 | 824.70 | 24.76 | 28.03 |
| | | 384 | 836.52 | 24.80 | 29.01 |
| | | 777 | 848.31 | 24.42 | 28.54 |

PCS Band

| FTAP Rate | RTAP Rate | Channel | f (MHz) | Conducted power (dBm) | |
|------------------------------|------------|---------|---------|-----------------------|-------|
| | | | | Average | Peak |
| 307.2 kbps (2 slot, QPSK) | 153.6 kbps | 25 | 1851.25 | 24.20 | 28.00 |
| | | 600 | 1880.00 | 24.50 | 28.47 |
| | | 1175 | 1908.75 | 24.80 | 28.37 |

8.3. RF POWER OUTPUT FOR EVDO REV A

This procedure assumes the Agilent 8960 Test Set has the following applications installed and with valid license.

| <u>Application</u> | <u>Rev, License</u> |
|-----------------------|---------------------|
| 1xEV-DO Terminal Test | A.09.13 |

EVDO Release A – RETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- R-Data Pkt Size > 4096
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

EVDO Release A - FETAP

- Call Setup > Shift & Preset
- Cell Power > -60 dBm/1.23 MHz
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
- > PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots > ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RF Power Output Results for EV-DO Rev A

Cell Band

| FETAP-Traffic Format | RETAP-Data Payload Size | Channel | f (MHz) | Conducted power (dBm) | |
|---|-------------------------|---------|---------|-----------------------|-------|
| | | | | Average | Peak |
| 307.2k, QPSK/ ACK channel is transmitted at all the slots | 4096 | 1013 | 824.70 | 25.00 | 29.81 |
| | | 384 | 836.52 | 25.07 | 29.82 |
| | | 777 | 848.31 | 24.70 | 29.22 |

PCS Band

| FETAP-Traffic Format | RETAP-Data Payload Size | Channel | f (MHz) | Conducted power (dBm) | |
|---|-------------------------|---------|---------|-----------------------|-------|
| | | | | Average | Peak |
| 307.2k, QPSK/ ACK channel is transmitted at all the slots | 4096 | 25 | 1851.25 | 24.30 | 28.71 |
| | | 600 | 1880.00 | 24.77 | 29.11 |
| | | 1175 | 1908.75 | 24.90 | 28.98 |

9. WORST-CASE CONFIGURATION AND MODE

Based on the following investigation results, see Section 6. RF POWER OUTPUT VERIFICATION. The highest peak power and enhanced data rate is the worst-case scenario for all measurements.

Worst case modes:

- For Cellular and PCS band: 1xRTT RC3, 32(+SCH)
- For Cellular and PCS band: EVDO-Rev A

The worst-case configuration has been evaluated on EUT with antenna @ Y-position for both 850MHz and 1900MHz bands by comparing the fundamental ERP / EIRP output power.

10. CONDUCTED TEST RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
 IC: RSS-Gen, 4.6

LIMITS

For reporting purposes only

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

MODES TESTED

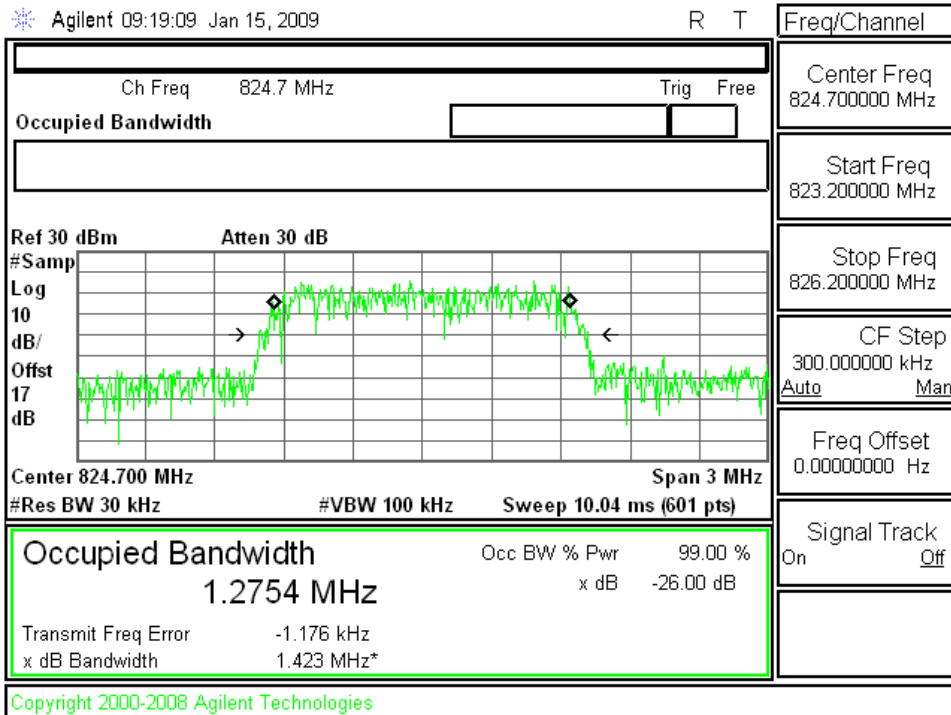
- 1xRTT – RC3, 32(+SCH)
- EV-DO - REV A

RESULTS

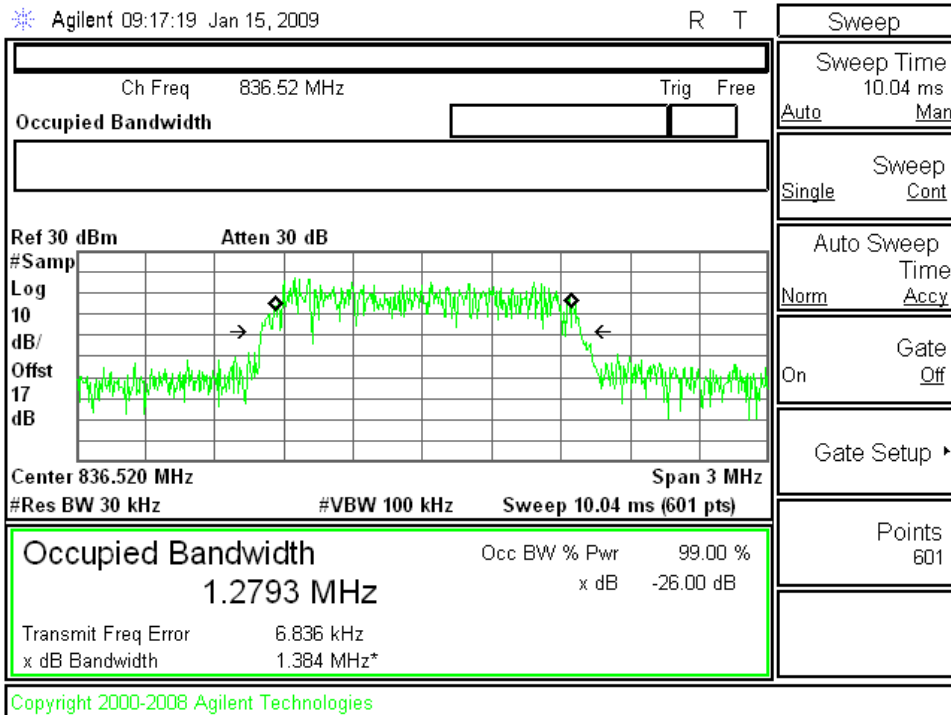
| Band | Mode | Channel | f (MHz) | 99% BW (MHz) | -26dB BW MHz) |
|----------|-------------|---------|---------|--------------|---------------|
| Cellular | 1xRTT | 1013 | 824.70 | 1.2754 | 1.423 |
| | | 384 | 836.52 | 1.2793 | 1.376 |
| | | 777 | 848.31 | 1.2816 | 1.405 |
| | EV-DO REV A | 1013 | 824.70 | 1.2884 | 1.405 |
| | | 384 | 836.52 | 1.2796 | 1.389 |
| | | 777 | 848.31 | 1.2836 | 1.400 |
| PCS | 1xRTT | 25 | 1851.25 | 1.2733 | 1.390 |
| | | 600 | 1880.0 | 1.2855 | 1.406 |
| | | 1175 | 1908.75 | 1.2745 | 1.411 |
| | EV-DO REV A | 25 | 1851.25 | 1.2834 | 1.474 |
| | | 600 | 1880.0 | 1.2939 | 1.438 |
| | | 1175 | 1908.75 | 1.2957 | 1.476 |

Plots for 1xRTT Mode (Cellular Band)

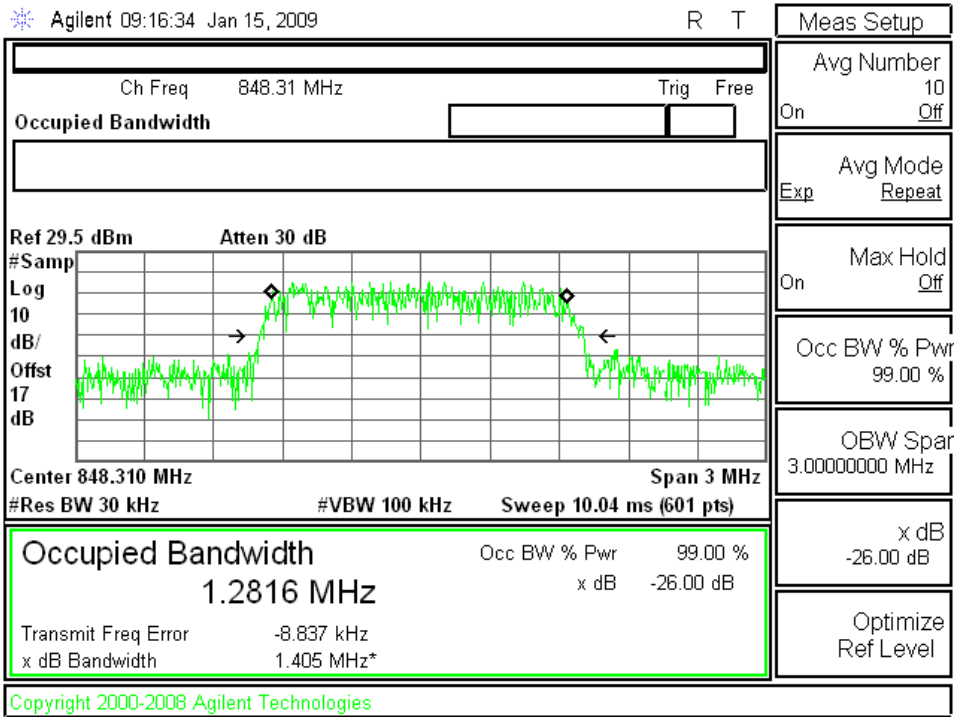
1xRTT Ch 1013



1xRTT, Ch 384

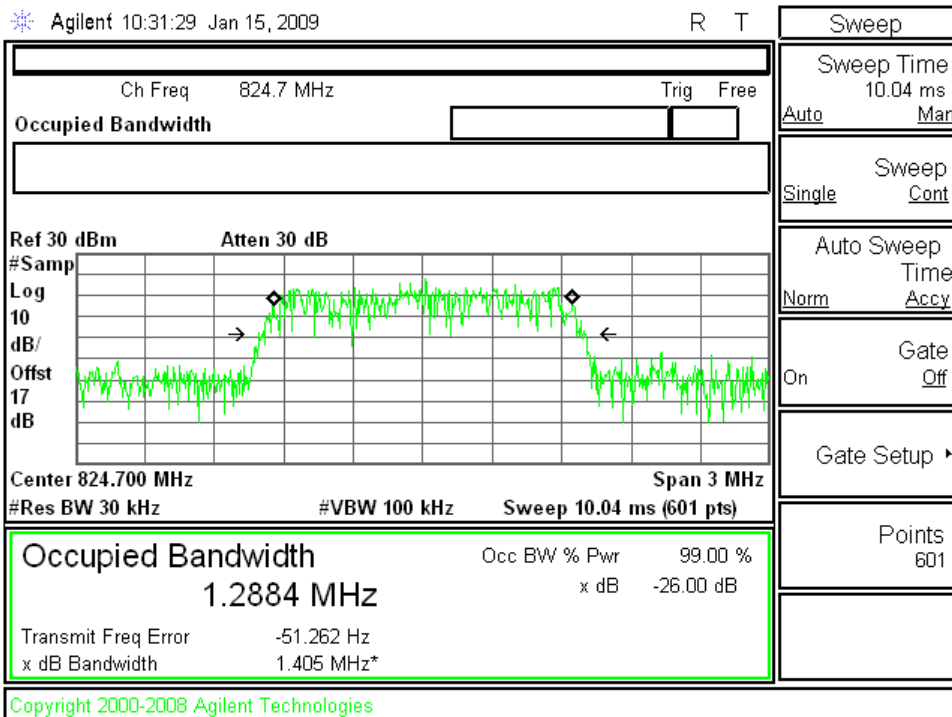


1xRTT Ch 777

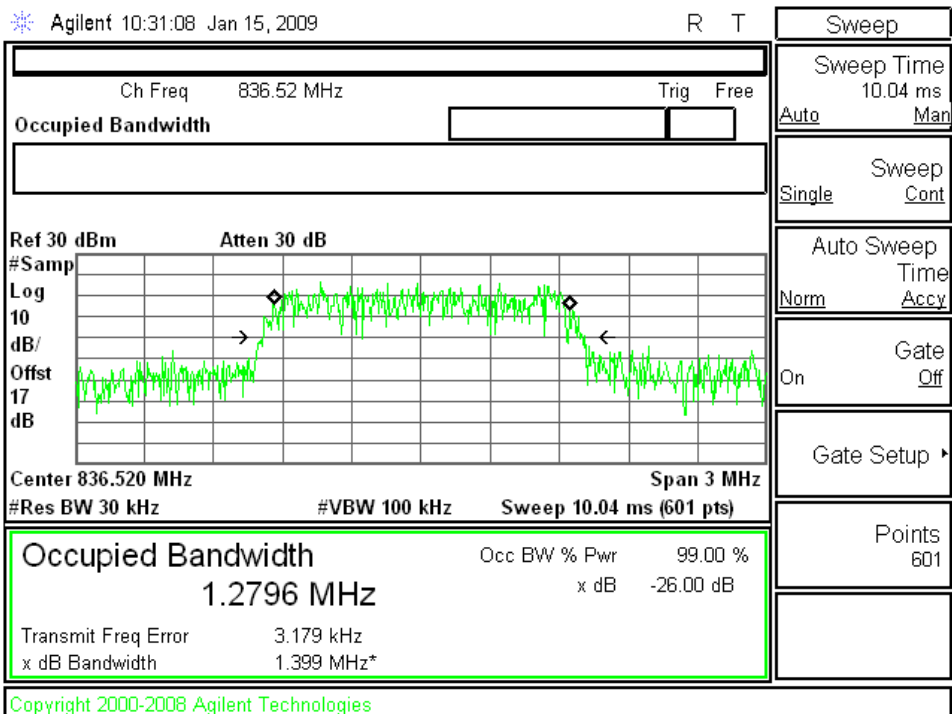


Plots for EVDO-REV A Mode (Cellular Band)

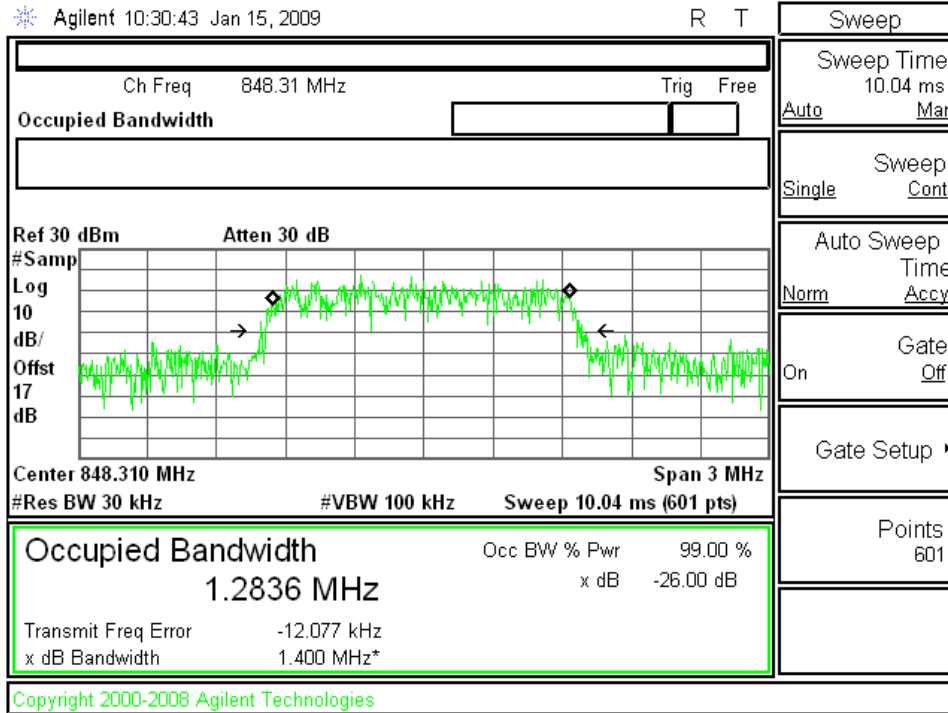
EVDO-REV A, Ch 1013



EVDO-REV A, Ch 384

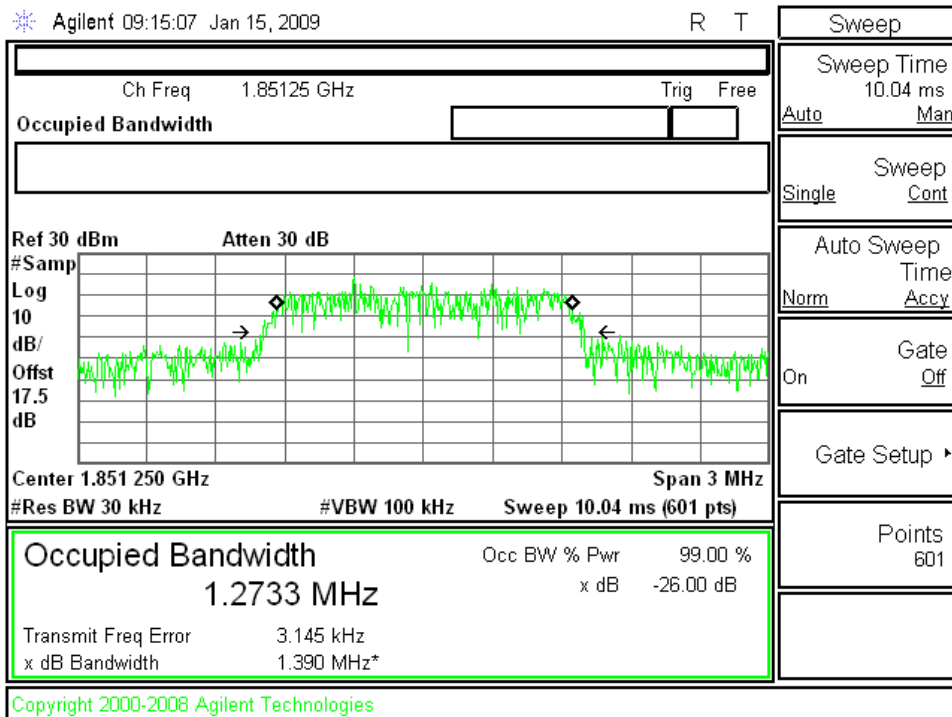


EVDO-REV A Ch 777

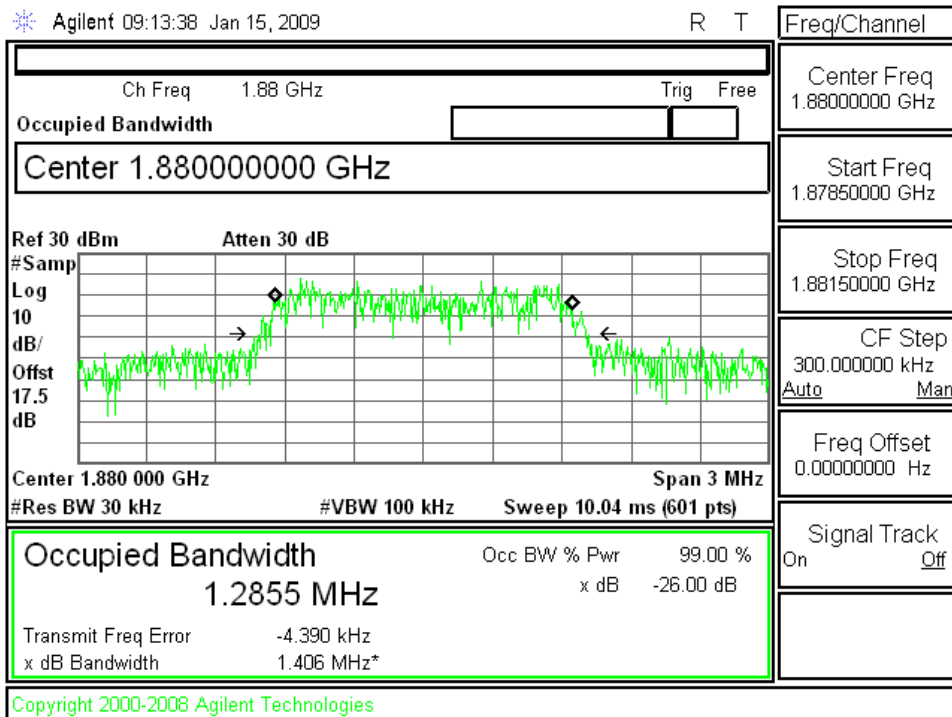


Plots for 1xRTT Mode (PCS Band)

1xRTT, Ch 25

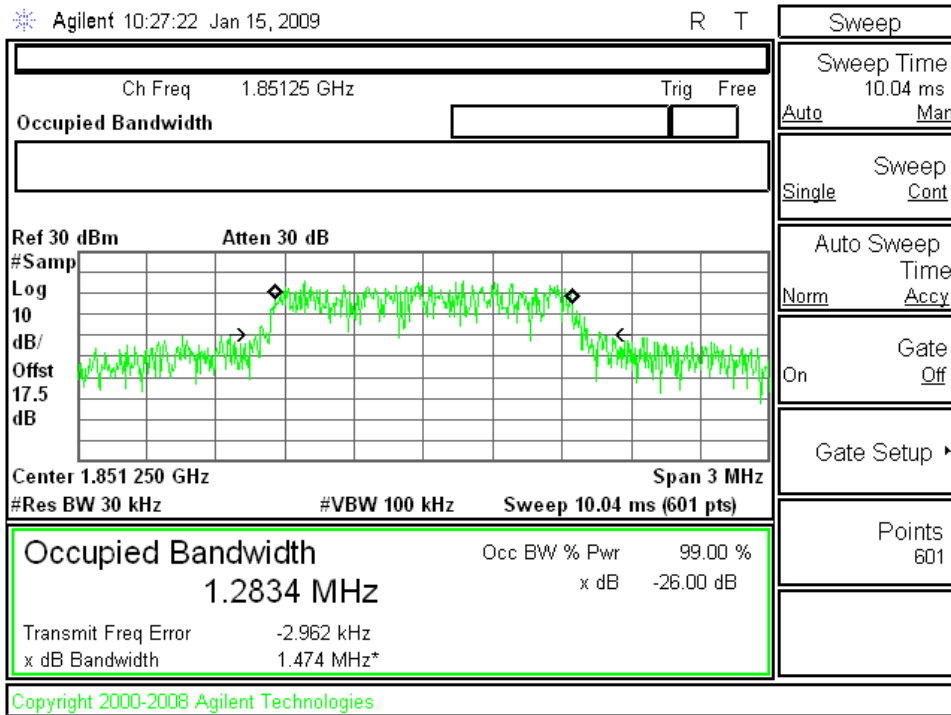


1xRTT, Ch 600

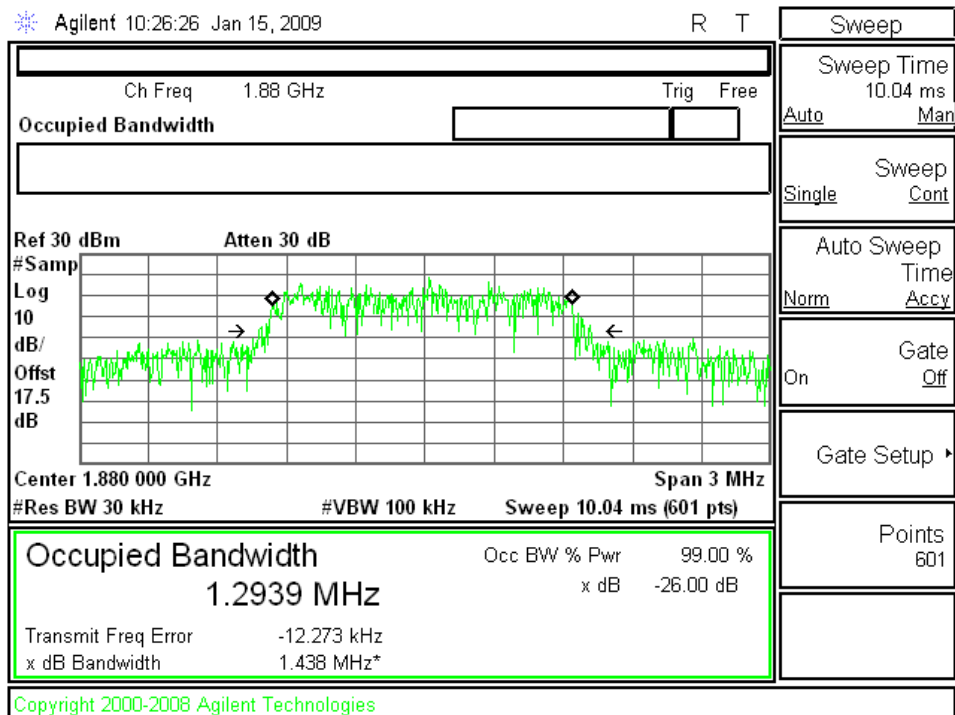


Plots for EVDO, REV A Mode (PCS Band)

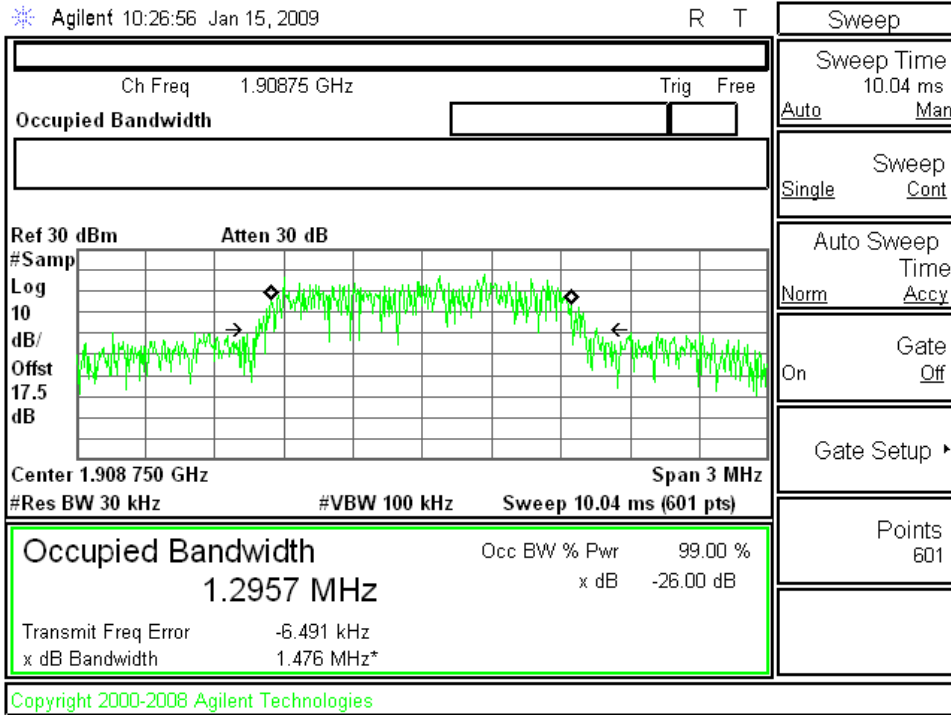
EVDO-REV A, Ch 25



EVDO-REV A, Ch 600



EVDO-REV A, Ch 1175



10.2. BAND EDGE

RULE PART(S)

FCC: §22.359, 24.238
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

The transmitter output was connected to a Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (824, 848, 1850, 1910MHz)
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

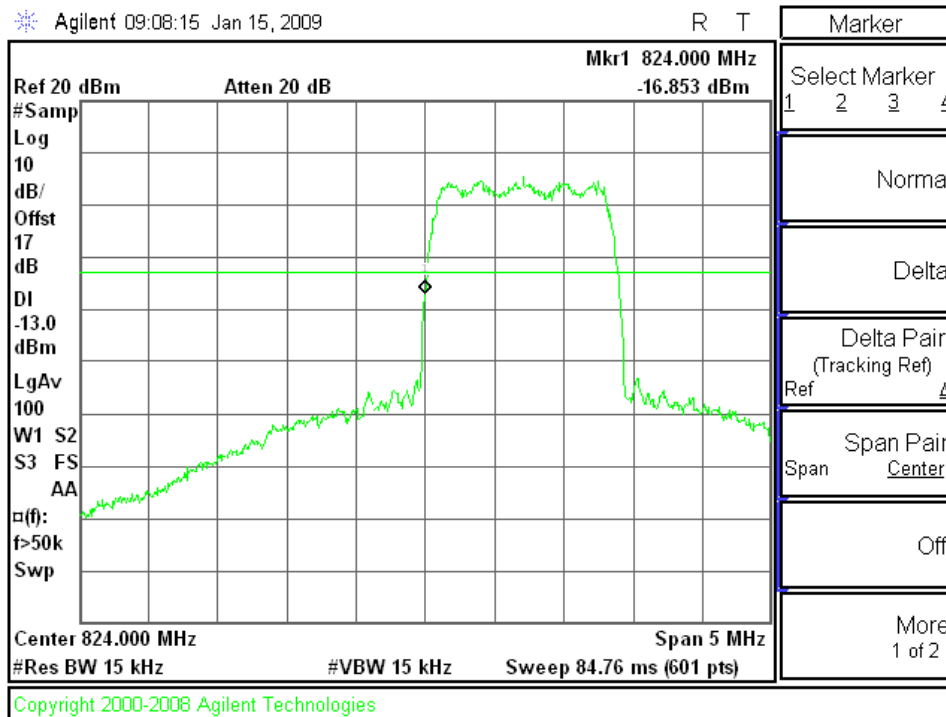
MODES TESTED

- 1xRTT - RC3, 32(+SCH)
- EV-DO - REV A

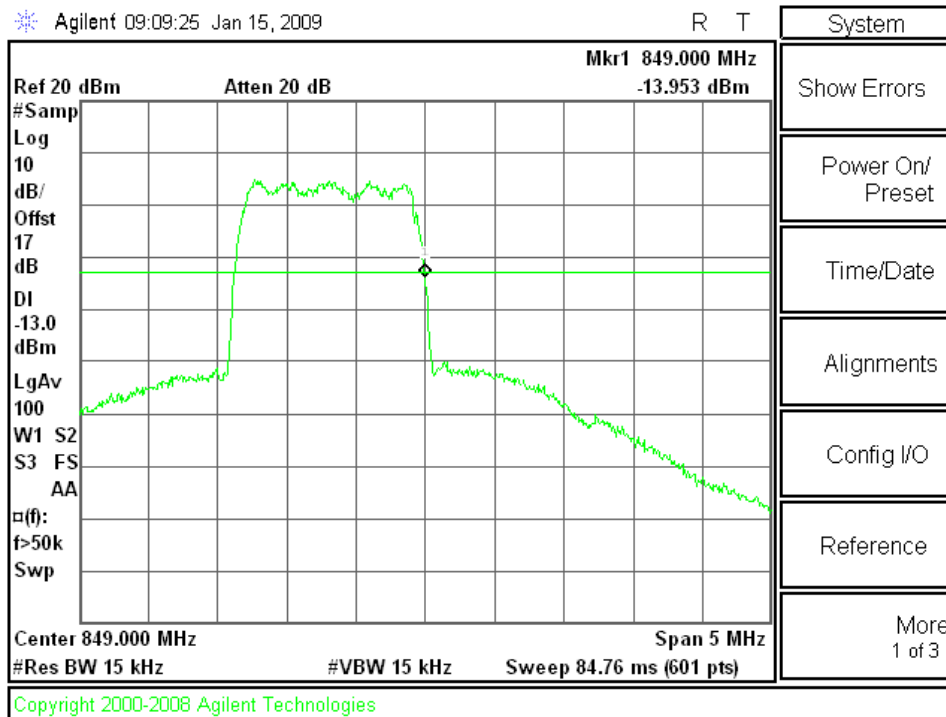
RESULTS

Plots for 1xRTT mode (Cellular Band)

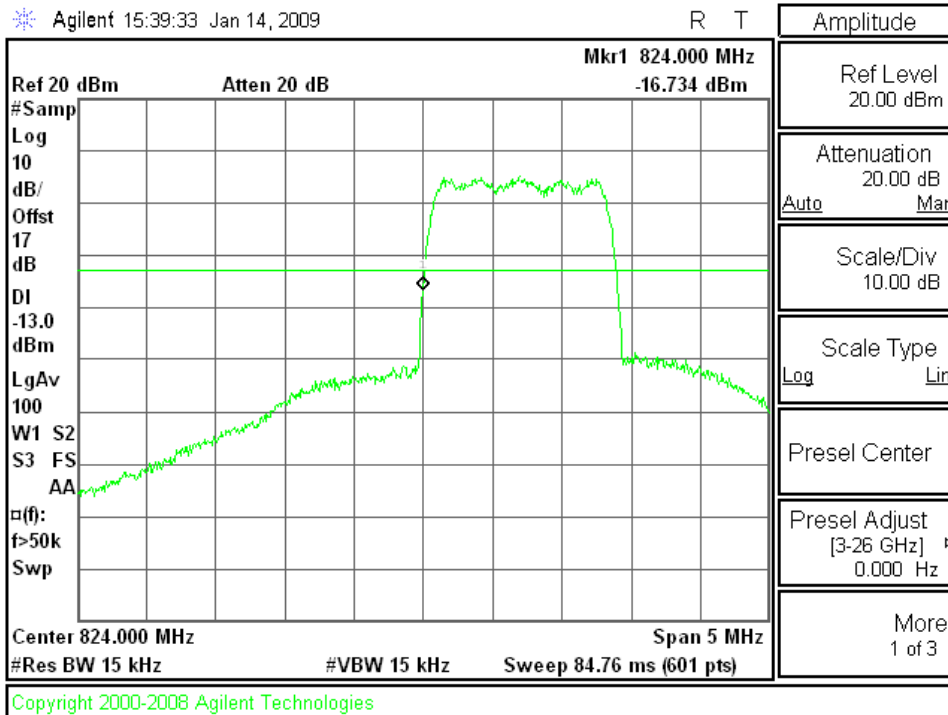
1xRTT, Ch 1013 (824.7 MHz)



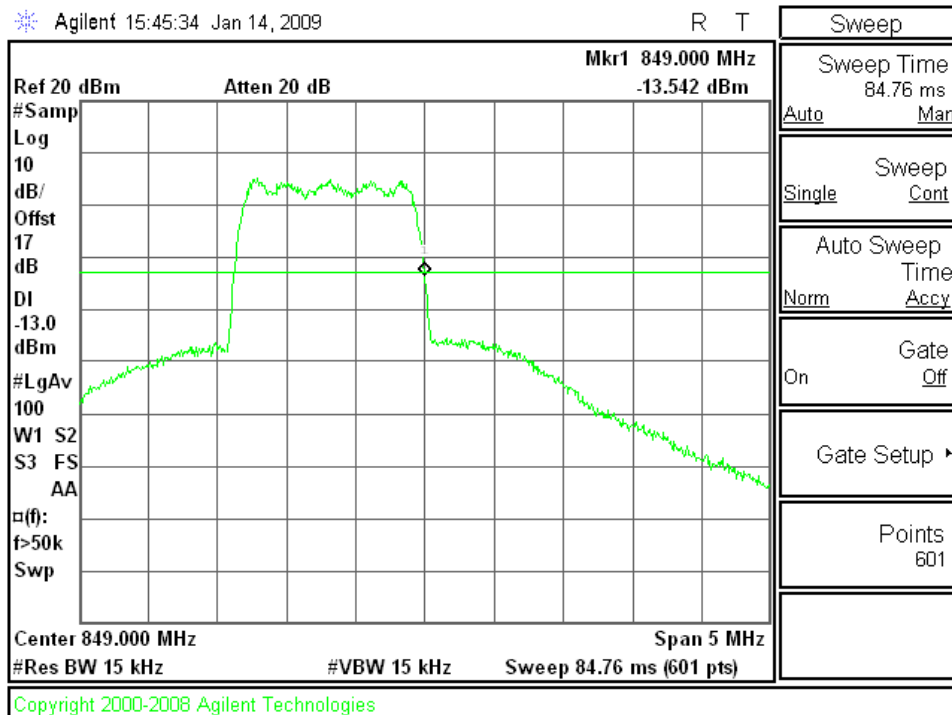
1xRTT, Ch 777 (848.31 MHz)



Plots for EVDO-REV A mode (Cellular Band)
EVDO-REV A Ch 1013 (824.7 MHz)

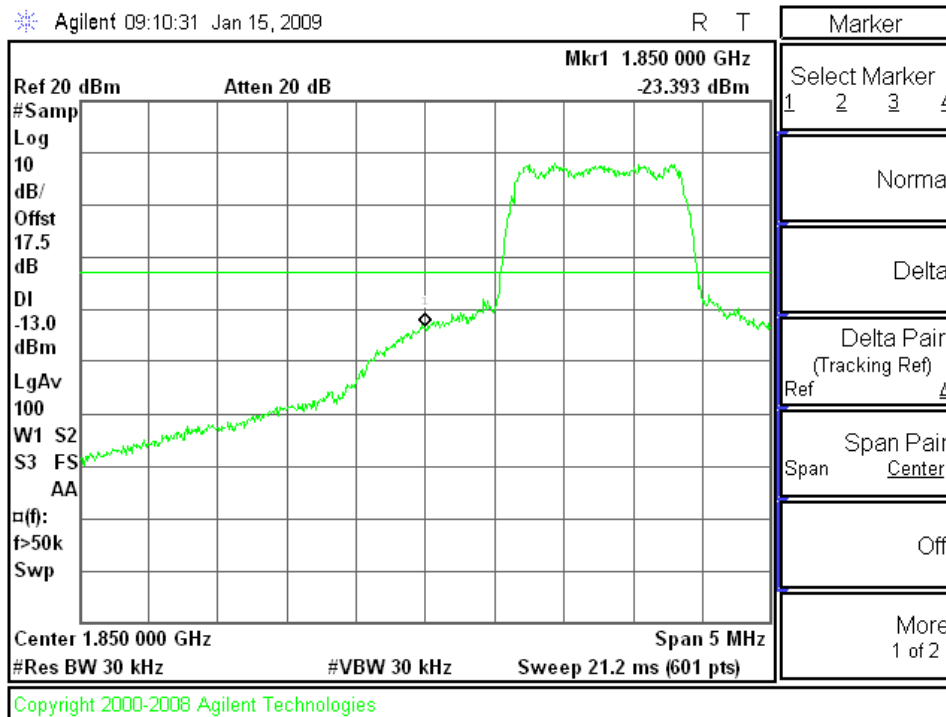


EVDO-REV A, Ch 777 (848.31 MHz)

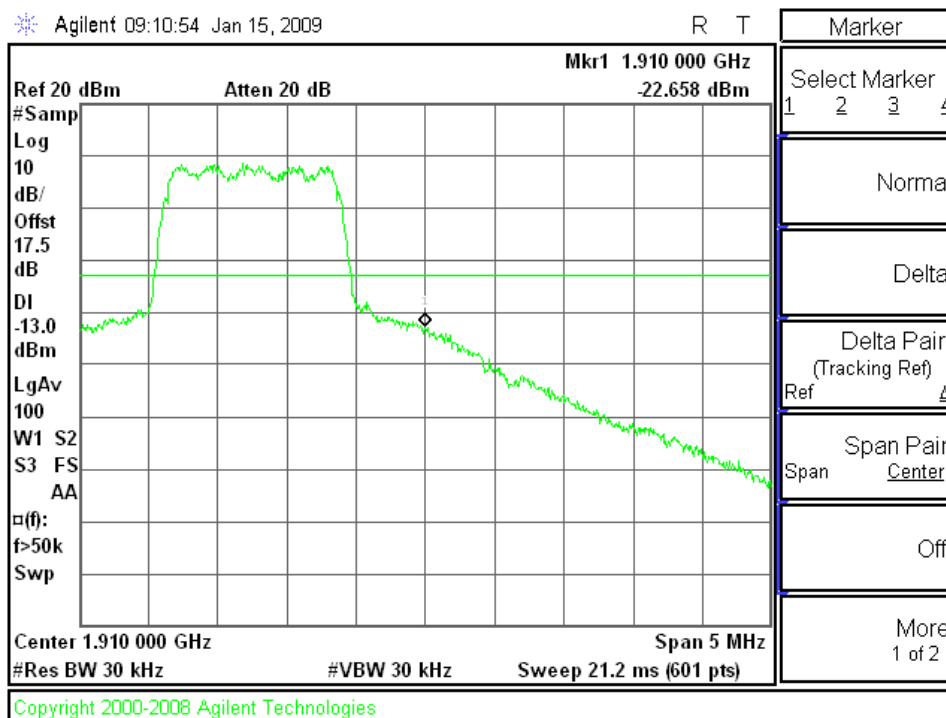


Plots for 1xRTT mode (PCS Band)

1xRTT, Ch 25 (1851.25 MHz)

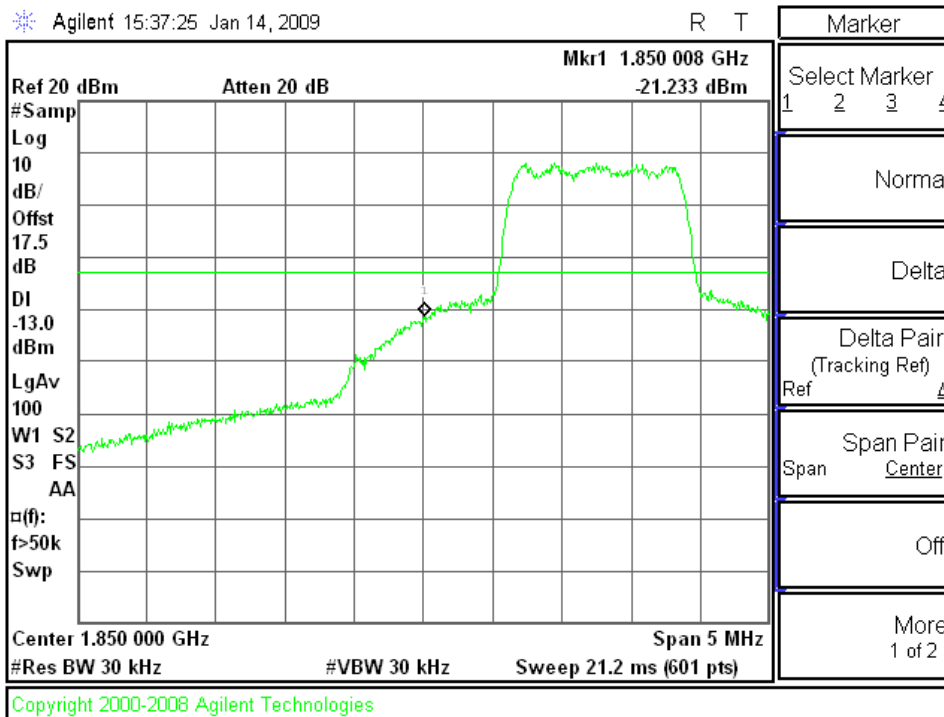


1xRTT Ch 1175 (1908.75 MHz)

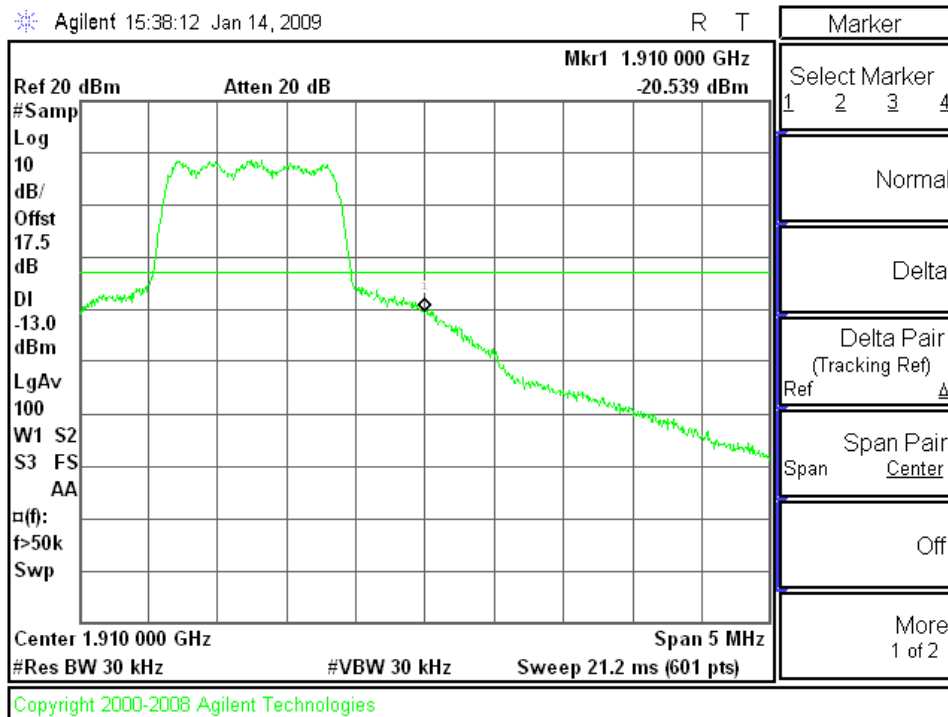


Plots for EVDO-REV A mode (PCS Band)

EVDO-REV A Ch 25(1851.25 MHz)



EVDO-REV A Ch 1175(1908.75 MHz)



10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

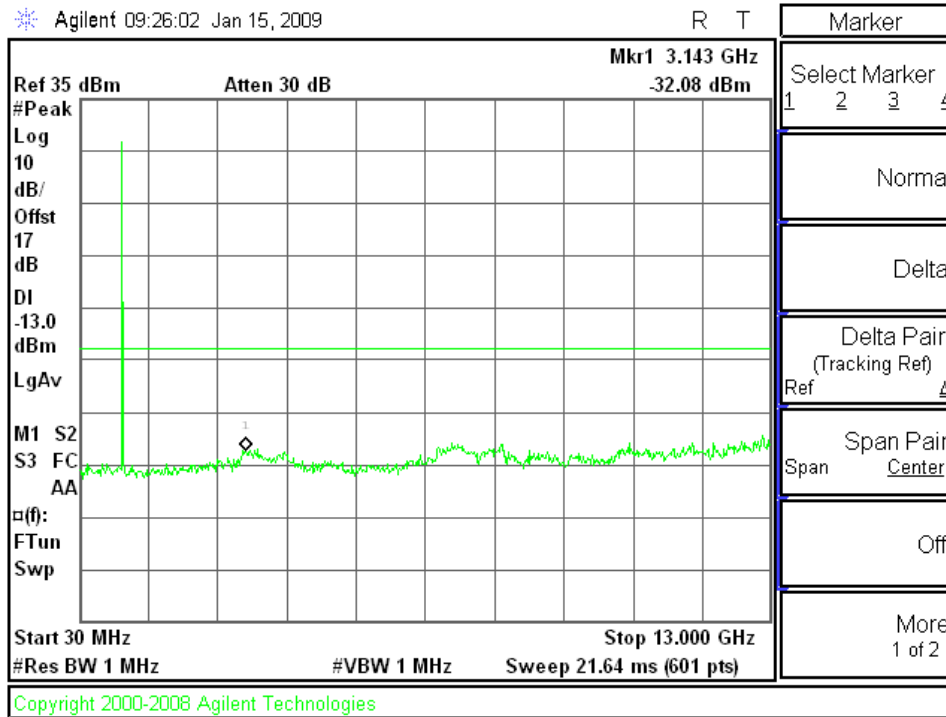
MODES TESTED

- 1xRTT – RC3, 32(+SCH)
- Ev-DO – Rev A

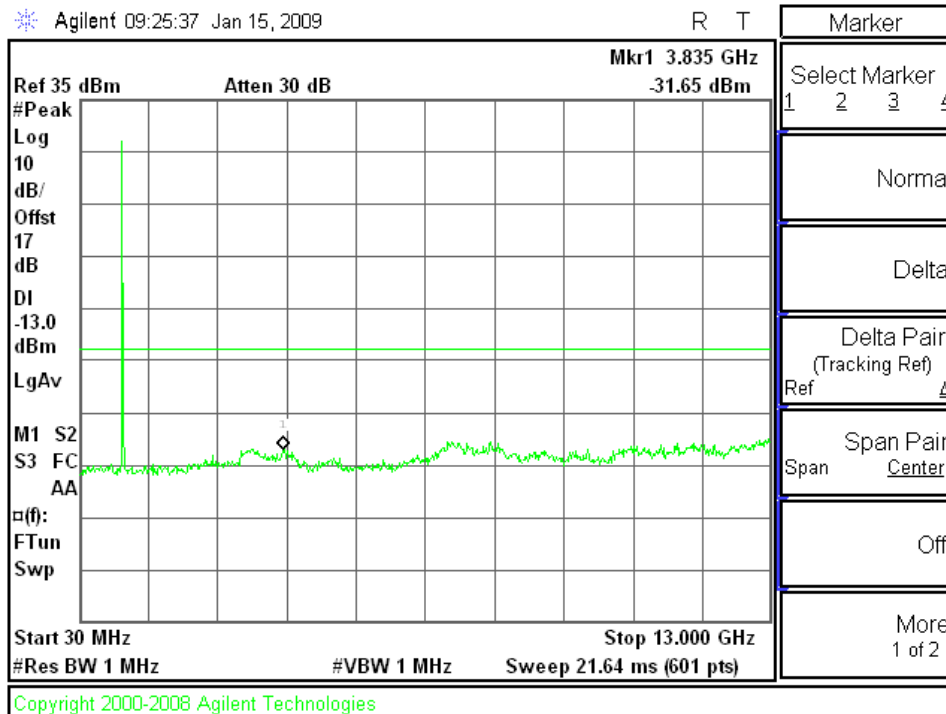
RESULTS

Plots for 1xRTT Mode (Cellular Band)

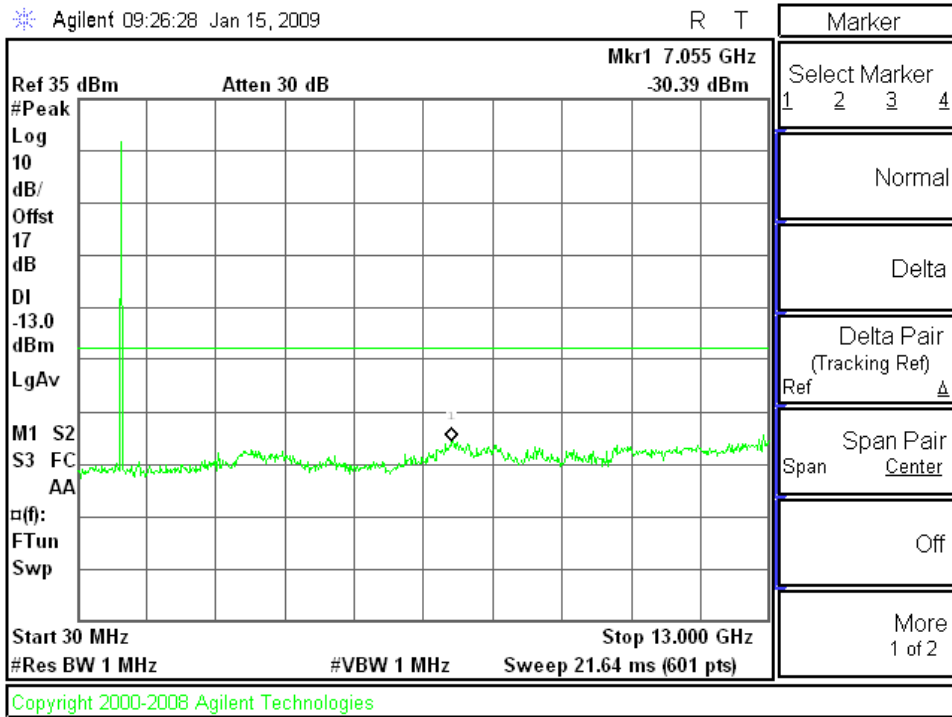
1xRTT, Ch 1013



1xRTT, Ch 384

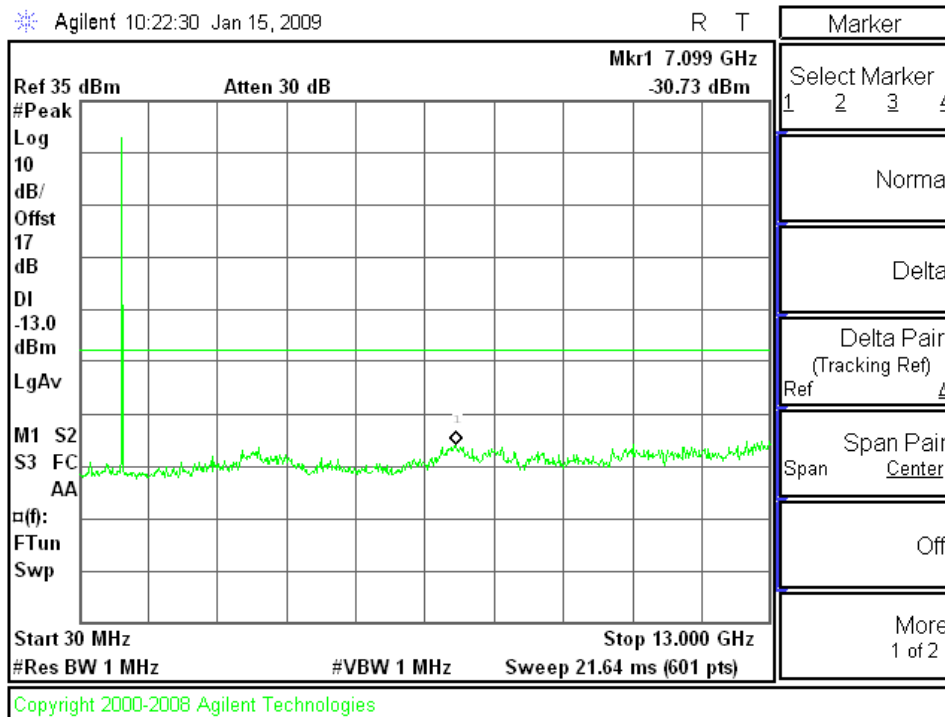


1xRTT, Ch 777

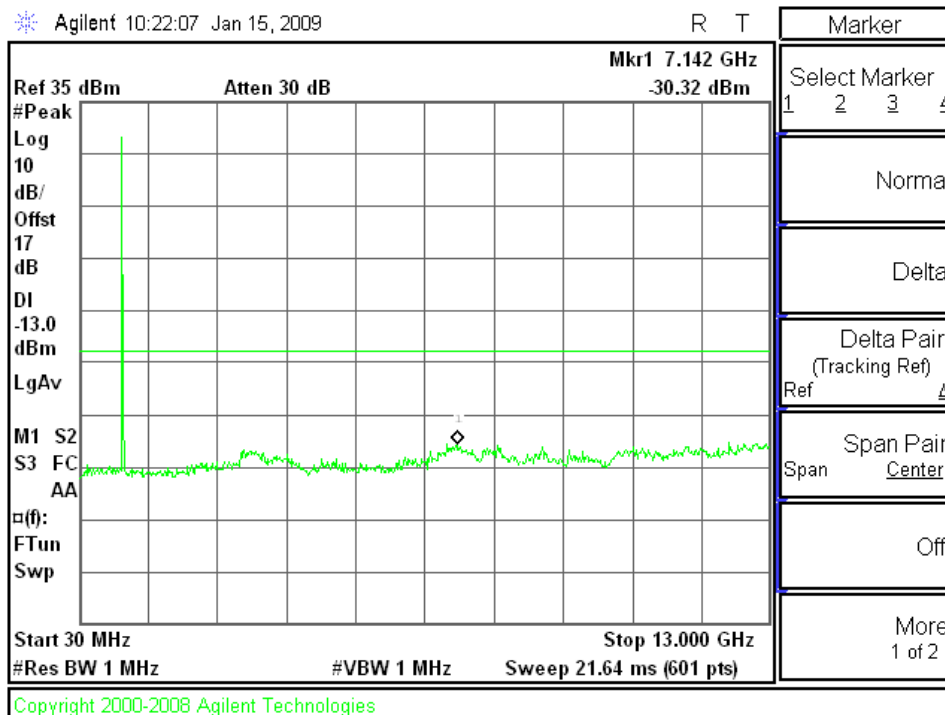


Plots for EVDO-REV A Mode (Cellular Band)

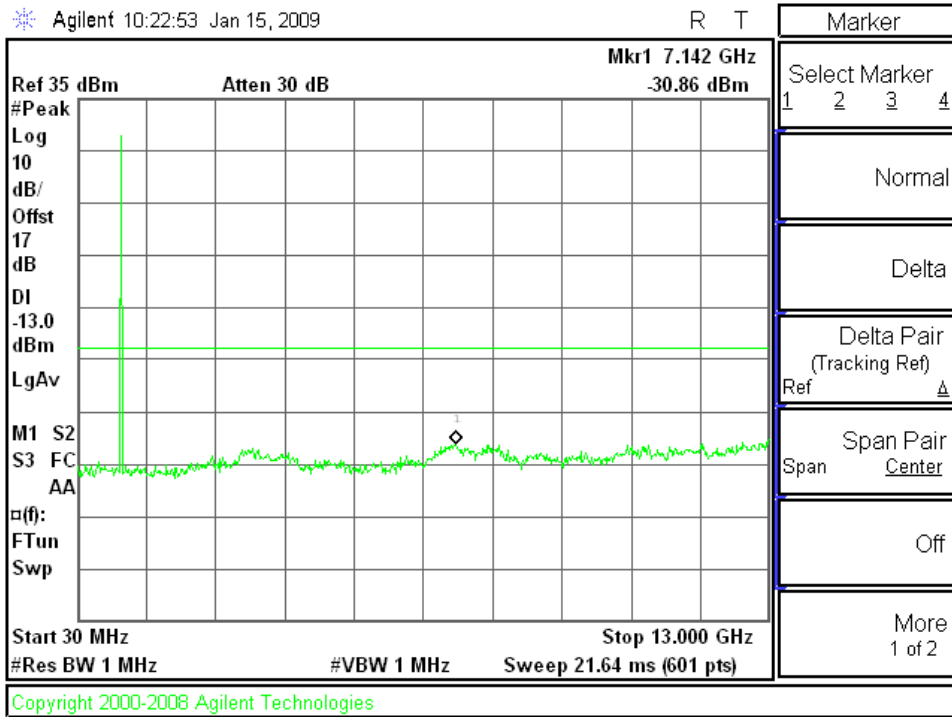
EVDO-REV A, Ch 1013



EVDO-REV A, Ch 384

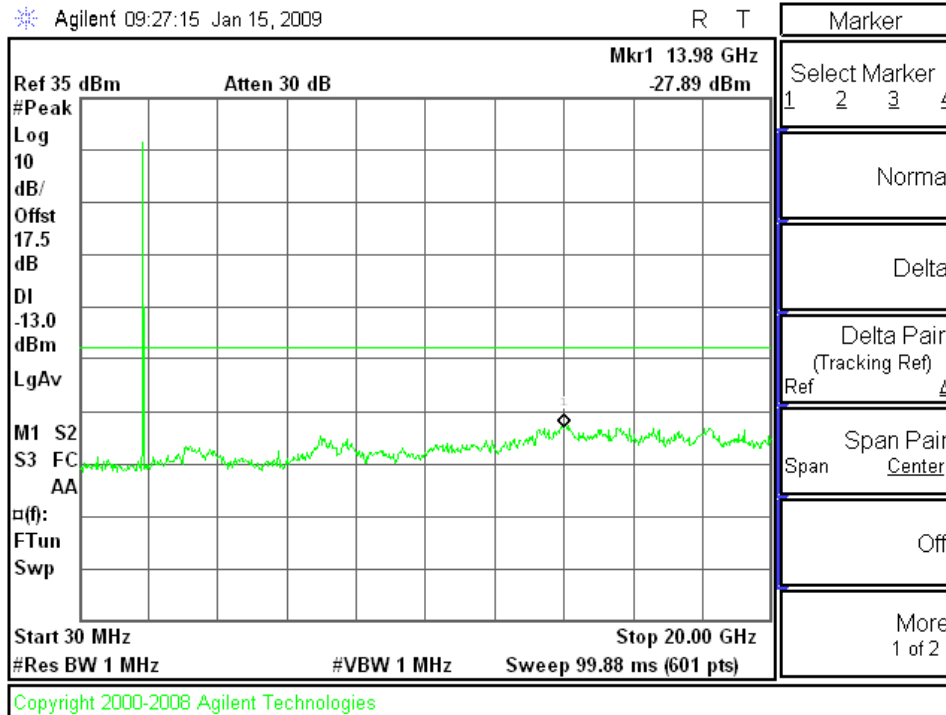


EVDO-REV A, Ch 777

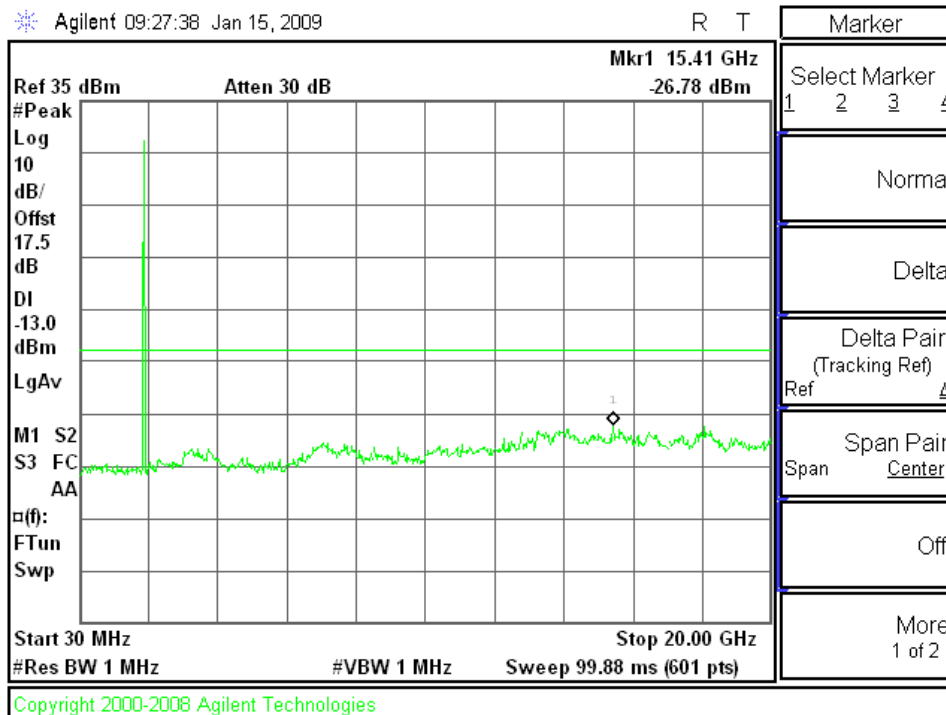


Plots for 1xRTT Mode (PCS Band)

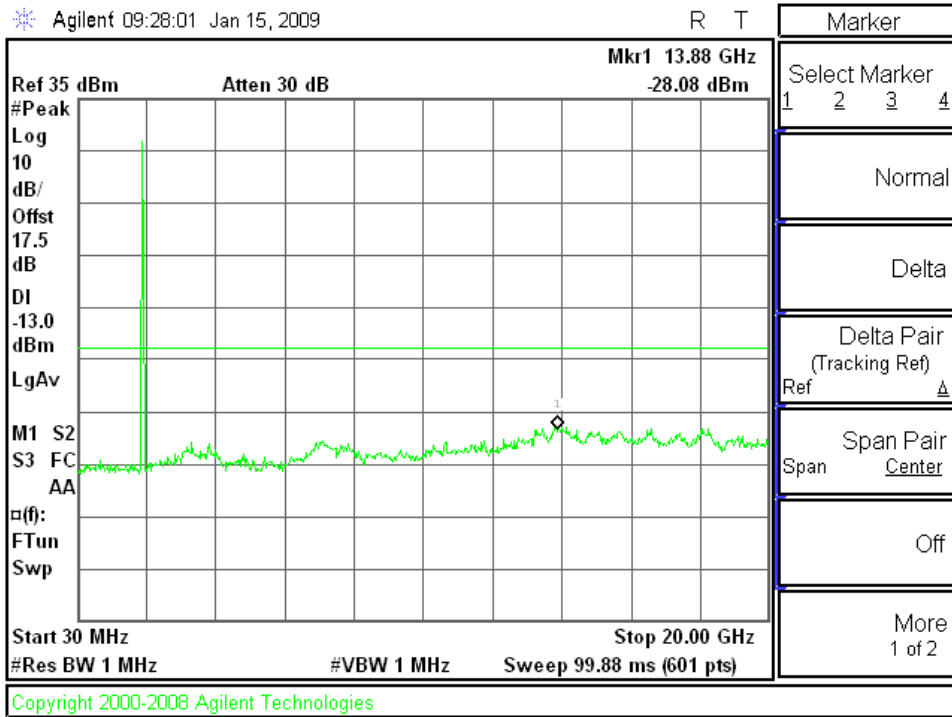
1xRTT Ch 25



1xRTT Ch 600

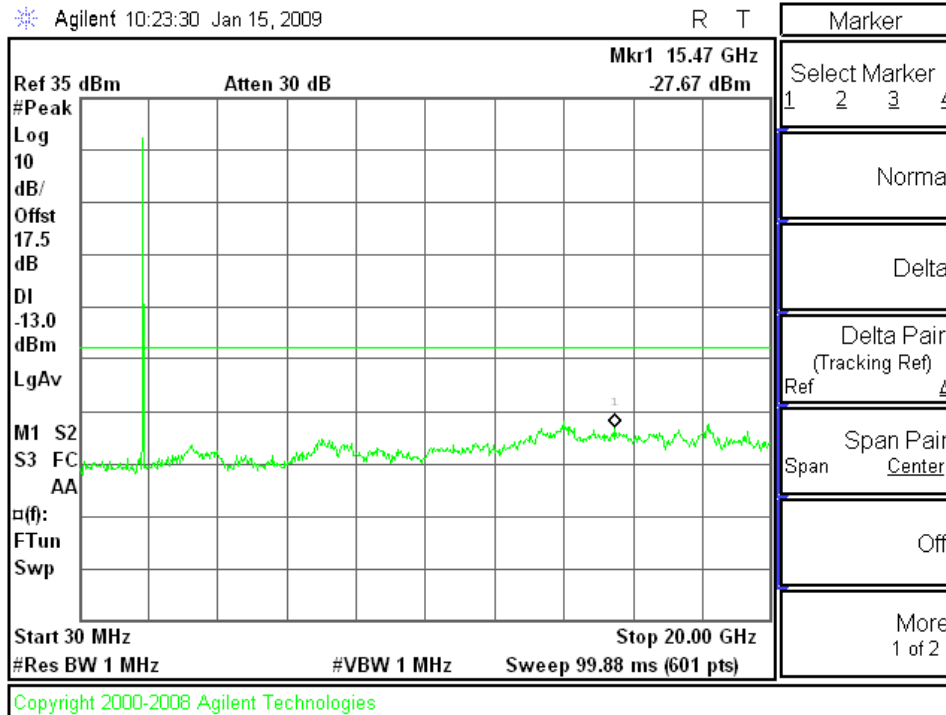


1xRTT Ch 1175

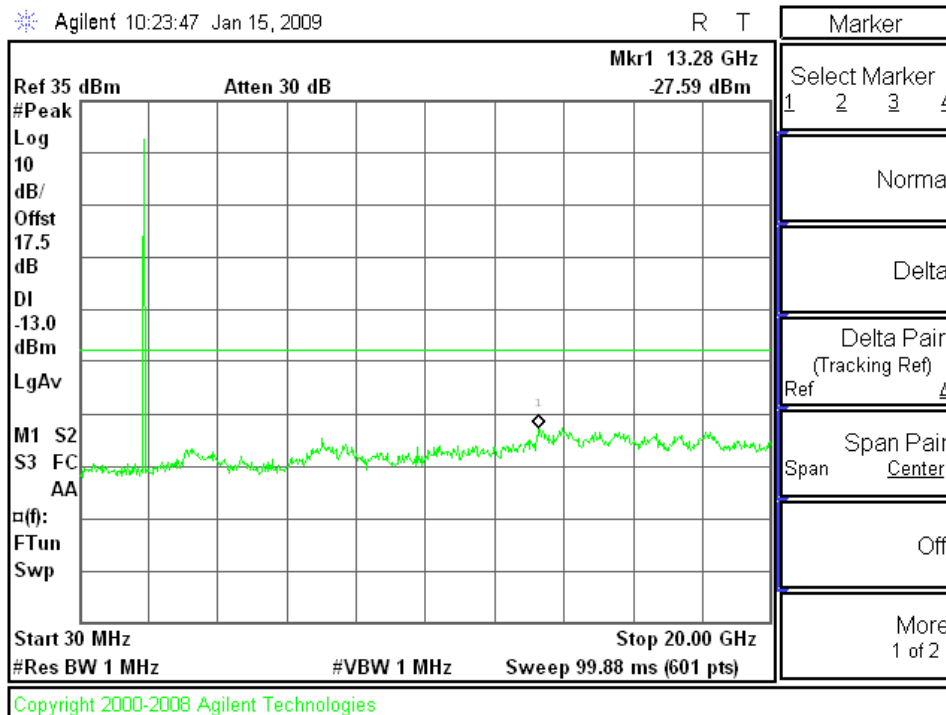


Plots for EVDO-REV A Mode (PCS Band)

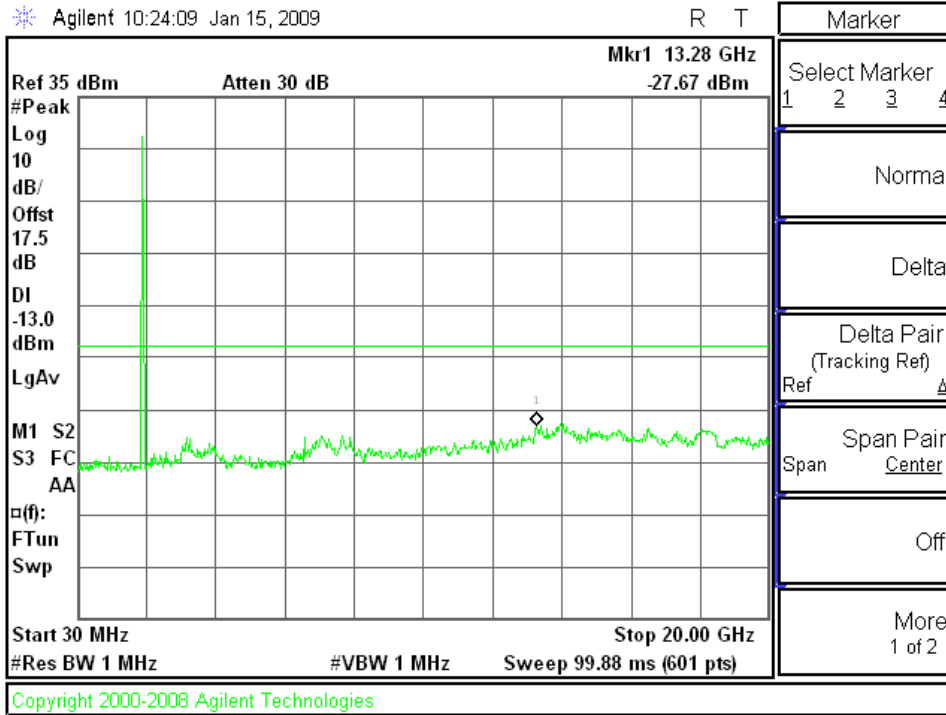
EVDO-REV A, Ch 25



EVDO-REV A, Ch 600



EVDO-REV A, Ch 1175



10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235
IC: RSS-132, 4.3; RSS-133, 6.3

LIMITS

- §22.355 & RSS-132 4.3 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.
- RSS-133 6.3 - The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.
- §24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Use Agilent 8960 with Frequency Error measurement capability.

- Temp. = -20° to $+50^{\circ}\text{C}$
- Voltage = 3.7 Vdc (85% - 115%)

Frequency Stability vs Temperature:

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until $+50^{\circ}\text{C}$ is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

- Ev-DO – Rev A

RESULTS

See the following pages.

CELL, EVDO Rev A – MID CHANNEL

| Reference Frequency: Cellular Mid Channel 835.82784MHz @ 20°C | | | | |
|---|------------------------------|---|-------------|-------------|
| Limit: to stay +/- 2.5 ppm = 2089.570 Hz | | | | |
| DC Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measured with Time Elapse | | |
| | | (MHz) | Delta (ppm) | Limit (ppm) |
| 3.60 | 50 | 835.827834 | 0.007 | 2.5 |
| 3.60 | 40 | 835.827835 | 0.006 | 2.5 |
| 3.60 | 30 | 835.827838 | 0.002 | 2.5 |
| 3.60 | 20 | 835.827840 | 0 | 2.5 |
| 3.60 | 10 | 835.827837 | 0.004 | 2.5 |
| 3.60 | 0 | 835.827836 | 0.005 | 2.5 |
| 3.60 | -10 | 835.827845 | -0.006 | 2.5 |
| 3.60 | -20 | 835.827846 | -0.007 | 2.5 |
| 3.60 | -30 | 835.827850 | -0.012 | 2.5 |

| Reference Frequency: Cellular Mid Channel 835.837000MHz @ 20°C | | | | |
|--|------------------------------|---|-------------|-------------|
| Limit: to stay +/- 2.5 ppm = 2089.570 Hz | | | | |
| DC Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measured with Time Elapse | | |
| | | (MHz) | Delta (ppm) | Limit (ppm) |
| 100% | 20 | 835.827840 | 0 | 2.5 |
| 85% | 20 | 835.827837 | 0.004 | 2.5 |
| 115% | 20 | 835.827835 | 0.006 | 2.5 |

PCS, EVDO-REV A – MID CHANNEL

| Reference Frequency: PCS Mid Channel 1879.306760MHz @ 20°C | | | | |
|---|------------------------------|---|-------------|-------------|
| Limit: within the authorized block or +/- 2.5 ppm = 4698.267 Hz | | | | |
| Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measured with Time Elapse | | |
| | | (MHz) | Delta (ppm) | Limit (ppm) |
| 3.60 | 50 | 1879.306751 | 0.005 | 2.5 |
| 3.60 | 40 | 1879.306751 | 0.005 | 2.5 |
| 3.60 | 30 | 1879.306752 | 0.004 | 2.5 |
| 3.60 | 20 | 1879.30676 | 0 | 2.5 |
| 3.60 | 10 | 1879.306753 | 0.004 | 2.5 |
| 3.60 | 0 | 1879.306765 | -0.003 | 2.5 |
| 3.60 | -10 | 1879.306768 | -0.004 | 2.5 |
| 3.60 | -20 | 1879.306770 | -0.005 | 2.5 |
| 3.60 | -30 | 1879.306772 | -0.006 | 2.5 |

| Reference Frequency: PCS Mid Channel 1880.0000MHz @ 20°C | | | | |
|---|------------------------------|---|-------------|-------------|
| Limit: within the authorized block or +/- 2.5 ppm = 4698.267 Hz | | | | |
| Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measured with Time Elapse | | |
| | | (MHz) | Delta (ppm) | Limit (ppm) |
| 100% | 20 | 1879.306760 | 0 | 2.5 |
| 85% | 20 | 1879.306754 | 0.003 | 2.5 |
| 115% | 20 | 1879.306752 | 0.004 | 2.5 |

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232
 IC: RSS-132; 4.4, RSS-133, 6.4

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) & RSS-133 § 6.4 - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

RSS-132 4.4, SRSP503 5.1.3 - The maximum ERP shall be 6.3 Watts for mobile stations.

TEST PROCEDURE

ANSI / TIA / EIA 603C
 RSS-132; RSS-133

MODES TESTED

- 1xRTT – RC3, 32(+SCH)
- EV-DO – Rev A

RESULTS for Cellular Band (ERP)

| Mode | Channel | f (MHz) | ERP | |
|-----------------------------|---------|---------|-------|--------|
| | | | dBm | mW |
| 1xRTT (RC3, 32(+SCH)) | 1013 | 824.70 | 27.00 | 501.19 |
| | 384 | 836.52 | 27.60 | 575.44 |
| | 777 | 848.31 | 27.20 | 524.81 |
| EVDO-REV A | 1013 | 824.70 | 27.20 | 524.81 |
| | 384 | 836.52 | 27.70 | 588.84 |
| | 777 | 848.31 | 27.60 | 575.44 |

RESULTS for PCS Band (EIRP)

| Mode | Channel | f (MHz) | EIRP | |
|-----------------------------|---------|---------|-------|--------|
| | | | dBm | mW |
| 1xRTT (RC3, 32(+SCH)) | 25 | 1851.25 | 27.40 | 549.54 |
| | 600 | 1880.00 | 27.60 | 575.44 |
| | 1175 | 1908.75 | 27.60 | 575.44 |
| EVDO-REV A | 25 | 1851.25 | 27.70 | 588.84 |
| | 600 | 1880.00 | 27.90 | 616.60 |
| | 1175 | 1908.75 | 27.80 | 602.56 |

ERP for 1xRTT Mode (Cellular Band)

| Cellular Fundamental Substitution Measurement | | | | | | | | | |
|---|------------------------|--------------------|---------------------|------------|---------------|--------------|----------------|----------------|-------|
| Compliance Certification Services, Fremont 5m Chamber | | | | | | | | | |
| Company: Sierra Wireless | | | | | | | | | |
| Project #: 08U12326 | | | | | | | | | |
| Date: 1-19-2009 | | | | | | | | | |
| Test Engineer: Chin Pang | | | | | | | | | |
| Configuration: EUT/Dipole Antenna | | | | | | | | | |
| Mode: Cell, 1xRTT | | | | | | | | | |
| Test Equipment: | | | | | | | | | |
| Receiving: Sunol T122, and 5m Chamber N-type Cable (Setup this one for testing EUT) | | | | | | | | | |
| Substitution: Dipole S/N: 00022117, and 4ft SMA Cable Warehouse S/N: 177081002, Thanh cable | | | | | | | | | |
| f MHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
| Low Ch | | | | | | | | | |
| 824.70 | 102.5 | V | 27.5 | 0.5 | 0.0 | 27.0 | 38.5 | -11.4 | |
| 824.70 | 99.4 | H | 23.1 | 0.5 | 0.0 | 22.6 | 38.5 | -15.8 | |
| Mid Ch | | | | | | | | | |
| 836.52 | 103.2 | V | 28.1 | 0.5 | 0.0 | 27.6 | 38.5 | -10.9 | |
| 836.52 | 98.4 | H | 21.8 | 0.5 | 0.0 | 21.3 | 38.5 | -17.1 | |
| High Ch | | | | | | | | | |
| 848.31 | 103.0 | V | 27.7 | 0.5 | 0.0 | 27.2 | 38.5 | -11.2 | |
| 848.31 | 98.2 | H | 22.7 | 0.5 | 0.0 | 22.2 | 38.5 | -16.3 | |
| Rev. 1.24.7 | | | | | | | | | |

ERP for EVDO-REV A Mode (Cellular Band)

| Cellular Fundamental Substitution Measurement | | | | | | | | | |
|---|------------------------|--------------------|---------------------|------------|---------------|--------------|----------------|----------------|-------|
| Compliance Certification Services, Fremont 5m Chamber | | | | | | | | | |
| Company: Sierra Wireless | | | | | | | | | |
| Project #: 08U12326 | | | | | | | | | |
| Date: 1-15-2009 | | | | | | | | | |
| Test Engineer: Chin Pang | | | | | | | | | |
| Configuration: EUT/Dipole Antenna | | | | | | | | | |
| Mode: Cell, EV-DO Rev A | | | | | | | | | |
| Test Equipment: | | | | | | | | | |
| Receiving: Sunol T122, and 5m Chamber N-type Cable (Setup this one for testing EUT) | | | | | | | | | |
| Substitution: Dipole S/N: 00022117, and 4ft SMA Cable Warehouse S/N: 177081002, Thanh cable | | | | | | | | | |
| f MHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
| Low Ch | | | | | | | | | |
| 824.70 | 102.7 | V | 27.7 | 0.5 | 0.0 | 27.2 | 38.5 | -11.2 | |
| 824.70 | 99.5 | H | 23.2 | 0.5 | 0.0 | 22.7 | 38.5 | -15.7 | |
| Mid Ch | | | | | | | | | |
| 836.52 | 103.3 | V | 28.2 | 0.5 | 0.0 | 27.7 | 38.5 | -10.8 | |
| 836.52 | 98.3 | H | 21.7 | 0.5 | 0.0 | 21.2 | 38.5 | -17.2 | |
| High Ch | | | | | | | | | |
| 848.31 | 103.4 | V | 28.1 | 0.5 | 0.0 | 27.6 | 38.5 | -10.8 | |
| 848.31 | 98.6 | H | 23.1 | 0.5 | 0.0 | 22.6 | 38.5 | -15.9 | |
| Rev. 1.24.7 | | | | | | | | | |

EIRP for 1xRTT Mode (PCS Band)

| High Frequency Fundamental Measurement | | | | | | | | | |
|--|------------------------|--------------------|---------------------|------------|---------------|---------------|----------------|----------------|-------|
| Compliance Certification Services, Fremont 5m Chamber Site | | | | | | | | | |
| Company: Sierra Wireless | | | | | | | | | |
| Project #: 08U12326 | | | | | | | | | |
| Date: 1-19-2009 | | | | | | | | | |
| Test Engineer: Chin Pang | | | | | | | | | |
| Configuration: EUT/Dipole Antenna | | | | | | | | | |
| Mode: PCS, 1xRTT | | | | | | | | | |
| <u>Test Equipment:</u> | | | | | | | | | |
| Receiving: Horn T73, and 20ft S/N: 228076 003 | | | | | | | | | |
| Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse S/N: 187215 001 | | | | | | | | | |
| f GHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
| Low Ch | | | | | | | | | |
| 1.851 | 95.0 | V | 19.7 | 0.6 | 8.3 | 27.4 | 33.0 | -5.6 | |
| 1.851 | 91.6 | H | 15.5 | 0.6 | 8.3 | 23.2 | 33.0 | -9.8 | |
| Mid Ch | | | | | | | | | |
| 1.880 | 95.4 | V | 19.9 | 0.6 | 8.3 | 27.6 | 33.0 | -5.4 | |
| 1.880 | 92.6 | H | 16.7 | 0.6 | 8.3 | 24.4 | 33.0 | -8.6 | |
| High Ch | | | | | | | | | |
| 1.909 | 95.1 | V | 20.0 | 0.7 | 8.4 | 27.6 | 33.0 | -5.4 | |
| 1.909 | 93.9 | H | 17.6 | 0.7 | 8.4 | 25.3 | 33.0 | -7.7 | |

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EIRP for EVDO-REV A Mode (PCS Band)

| High Frequency Fundamental Measurement | | | | | | | | | |
|--|------------------------|--------------------|---------------------|------------|---------------|---------------|----------------|----------------|-------|
| Compliance Certification Services, Fremont 5m Chamber Site | | | | | | | | | |
| Company: Sierra Wireless | | | | | | | | | |
| Project #: 08U12326 | | | | | | | | | |
| Date: 1-15-2009 | | | | | | | | | |
| Test Engineer: Chin Pang | | | | | | | | | |
| Configuration: EUT/Dipole Antenna | | | | | | | | | |
| Mode: PCS, EV-DO Rev A | | | | | | | | | |
| <u>Test Equipment:</u> | | | | | | | | | |
| Receiving: Horn T73, and 20ft S/N: 228076 003 | | | | | | | | | |
| Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse S/N: 187215 001 | | | | | | | | | |
| f GHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
| Low Ch | | | | | | | | | |
| 1.851 | 95.3 | V | 20.0 | 0.6 | 8.3 | 27.7 | 33.0 | -5.3 | |
| 1.851 | 92.0 | H | 15.9 | 0.6 | 8.3 | 23.6 | 33.0 | -9.4 | |
| Mid Ch | | | | | | | | | |
| 1.880 | 95.7 | V | 20.2 | 0.6 | 8.3 | 27.9 | 33.0 | -5.1 | |
| 1.880 | 92.5 | H | 16.6 | 0.6 | 8.3 | 24.3 | 33.0 | -8.7 | |
| High Ch | | | | | | | | | |
| 1.909 | 95.3 | V | 20.2 | 0.7 | 8.4 | 27.8 | 33.0 | -5.2 | |
| 1.909 | 93.2 | H | 16.9 | 0.7 | 8.4 | 24.6 | 33.0 | -8.4 | |

Rev. 1.24.7

11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238
IC: RSS-132, 4.5; RSS-233, 6.5

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

- 1xRTT – RC3, 32(+SCH)
- Ev-DO – Rev A

RESULTS

1xRTT Mode (Cellular Band)

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Sierra Wireless
 Project #: 08U12326
 Date: 1/19/2009
 Test Engineer: Chin Pang
 Configuration: EUT/Dipole Antenna
 Mode: TX, Cell, 1xRTT

Test Equipment:

EMCO Horn 1-18GHz

T73; S/N: 6717 @3m

Horn > 18GHz

Limit

FCC 22

High Pass Filter

Hi Frequency Cables

3' cable
22807700

12' cable
22807600

20' cable
22897500

Pre-amplifier 1-26GHz

T145 Agilent 3008A1

Pre-amplifier 26-40GHz

| f GHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBi) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---------------------------|------------------------|--------------------|---------------------|------------|---------------|---------------|--------------|----------------|----------------|-------|
| Low Ch, 824.7MHz | | | | | | | | | | |
| 1.649 | 60.0 | H | -46.8 | 3.1 | 8.0 | 5.8 | -44.0 | -13.0 | -31.0 | |
| 2.474 | 44.5 | H | -59.7 | 3.9 | 9.5 | 7.4 | -56.2 | -13.0 | -43.2 | |
| 3.299 | 43.0 | H | -57.9 | 4.6 | 9.8 | 7.6 | -54.9 | -13.0 | -41.9 | |
| 1.649 | 62.7 | V | -44.8 | 3.1 | 8.0 | 5.8 | -42.1 | -13.0 | -29.1 | |
| 2.474 | 47.5 | V | -56.9 | 3.9 | 9.5 | 7.4 | -53.4 | -13.0 | -40.4 | |
| 3.299 | 44.3 | V | -56.7 | 4.6 | 9.8 | 7.6 | -53.7 | -13.0 | -40.7 | |
| Mid Ch, 836.52MHz | | | | | | | | | | |
| 1.673 | 58.9 | H | -47.8 | 3.1 | 8.0 | 5.9 | -45.0 | -13.0 | -32.0 | |
| 2.510 | 44.9 | H | -59.2 | 3.9 | 9.6 | 7.4 | -55.7 | -13.0 | -42.7 | |
| 3.346 | 43.1 | H | -57.6 | 4.6 | 9.8 | 7.6 | -54.6 | -13.0 | -41.6 | |
| 1.673 | 60.8 | V | -46.6 | 3.1 | 8.0 | 5.9 | -43.8 | -13.0 | -30.8 | |
| 2.510 | 51.5 | V | -52.8 | 3.9 | 9.6 | 7.4 | -49.3 | -13.0 | -36.3 | |
| 3.346 | 44.5 | V | -56.3 | 4.6 | 9.8 | 7.6 | -53.3 | -13.0 | -40.3 | |
| High Ch, 848.31MHz | | | | | | | | | | |
| 1.697 | 60.0 | H | -46.6 | 3.1 | 8.1 | 5.9 | -43.8 | -13.0 | -30.8 | |
| 2.545 | 45.0 | H | -58.9 | 4.0 | 9.6 | 7.4 | -55.5 | -13.0 | -42.5 | |
| 3.393 | 43.0 | H | -57.4 | 4.7 | 9.7 | 7.6 | -54.5 | -13.0 | -41.5 | |
| 1.697 | 63.0 | V | -44.3 | 3.1 | 8.1 | 5.9 | -41.5 | -13.0 | -28.5 | |
| 2.545 | 49.0 | V | -55.1 | 4.0 | 9.6 | 7.4 | -51.7 | -13.0 | -38.7 | |
| 3.393 | 45.0 | V | -55.5 | 4.7 | 9.7 | 7.6 | -52.6 | -13.0 | -39.6 | |

Rev. 12.02.08
 Note: No other emissions were detected above the system noise floor.

EVDO-REV A Mode (Cellular Band)

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Sierra Wireless
 Project #: 08U12326
 Date: 1/16/2009
 Test Engineer: Chin Pang
 Configuration: EUT/Dipole Antenna
 Mode: TX, Cell, EV-DO Rev A

Test Equipment:

EMCO Horn 1-18GHz
T60; S/N: 2238 @3m

Horn > 18GHz

Limit
FCC 22

High Pass Filter

Hi Frequency Cables
 3' cable 22807700
 12' cable 22807600
 20' cable 22897500

Pre-amplifier 1-26GHz
T145 Agilent 3008A1

Pre-amplifier 26-40GHz

| f GHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBi) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---------------------------|---------------------|-----------------|------------------|---------|------------|------------|-----------|-------------|-------------|-------|
| Low Ch, 824.7MHz | | | | | | | | | | |
| 1.649 | 63.5 | H | -41.5 | 3.1 | 7.1 | 4.9 | -39.6 | -13.0 | -26.6 | |
| 2.474 | 46.0 | H | -57.6 | 3.9 | 9.3 | 7.1 | -54.4 | -13.0 | -41.4 | |
| 3.299 | 42.7 | H | -57.6 | 4.6 | 9.4 | 7.3 | -54.9 | -13.0 | -41.9 | |
| 1.649 | 62.0 | V | -43.7 | 3.1 | 7.1 | 4.9 | -41.8 | -13.0 | -28.8 | |
| 2.474 | 48.6 | V | -55.2 | 3.9 | 9.3 | 7.1 | -52.0 | -13.0 | -39.0 | |
| 3.299 | 45.0 | V | -55.4 | 4.6 | 9.4 | 7.3 | -52.7 | -13.0 | -39.7 | |
| Mid Ch, 836.52MHz | | | | | | | | | | |
| 1.673 | 59.0 | H | -45.9 | 3.1 | 7.2 | 5.0 | -44.0 | -13.0 | -31.0 | |
| 2.510 | 45.0 | H | -58.5 | 3.9 | 9.3 | 7.1 | -55.3 | -13.0 | -42.3 | |
| 3.346 | 43.5 | H | -56.6 | 4.6 | 9.5 | 7.3 | -53.9 | -13.0 | -40.9 | |
| 1.673 | 60.0 | V | -45.6 | 3.1 | 7.2 | 5.0 | -43.7 | -13.0 | -30.7 | |
| 2.510 | 48.0 | V | -55.7 | 3.9 | 9.3 | 7.1 | -52.5 | -13.0 | -39.5 | |
| 3.346 | 45.0 | V | -55.2 | 4.6 | 9.5 | 7.3 | -52.5 | -13.0 | -39.5 | |
| High Ch, 848.31MHz | | | | | | | | | | |
| 1.697 | 65.8 | H | -39.1 | 3.1 | 7.2 | 5.1 | -37.1 | -13.0 | -24.1 | |
| 2.545 | 46.0 | H | -57.3 | 4.0 | 9.3 | 7.1 | -54.2 | -13.0 | -41.2 | |
| 3.393 | 43.0 | H | -56.9 | 4.7 | 9.5 | 7.3 | -54.3 | -13.0 | -41.3 | |
| 1.697 | 62.0 | V | -43.6 | 3.1 | 7.2 | 5.1 | -41.6 | -13.0 | -28.6 | |
| 2.545 | 50.5 | V | -53.0 | 4.0 | 9.3 | 7.1 | -49.9 | -13.0 | -36.9 | |
| 3.393 | 45.3 | V | -54.7 | 4.7 | 9.5 | 7.3 | -52.1 | -13.0 | -39.1 | |

Rev. 12.02.08
 Note: No other emissions were detected above the system noise floor.

1xRTT Mode (PCS Band)

| High Frequency Substitution Measurement | | | | | | | | | | | |
|--|---------------------|-----------------|---|---------|---|------------|-----------------------|-------------|--|-------|--|
| Compliance Certification Services, Fremont 5m Chamber | | | | | | | | | | | |
| Company: Sierra Wireless | | | | | | | | | | | |
| Project #: 08U12326 | | | | | | | | | | | |
| Date: 1/19/2009 | | | | | | | | | | | |
| Test Engineer: Chin Pang | | | | | | | | | | | |
| Configuration: EUT/Dipole Antenna | | | | | | | | | | | |
| Mode: TX, PCS, 1xRTT | | | | | | | | | | | |
| Test Equipment: | | | | | | | | | | | |
| EMCO Horn 1-18GHz | | | Horn > 18GHz | | | | Limit | | <input checked="" type="checkbox"/> High Pass Filter | | |
| T60; S/N: 2238 @3m | | | | | | | FCC 24 | | | | |
| Hi Frequency Cables | | | | | | | | | | | |
| <input checked="" type="checkbox"/> 3' cable 22807700 | | | <input checked="" type="checkbox"/> 12' cable 22807600 | | <input checked="" type="checkbox"/> 20' cable 22897500 | | Pre-amplifier 1-26GHz | | Pre-amplifier 26-40GHz | | |
| | | | | | | | T145 Agilent 3008A1 | | | | |
| f GHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBi) | Gain (dBd) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes | |
| Low Ch, 1851.25MHz | | | | | | | | | | | |
| 3.703 | 47.1 | H | -51.8 | 4.9 | 9.7 | 7.5 | -47.0 | -13.0 | -34.0 | | |
| 5.554 | 40.5 | H | -52.7 | 6.3 | 11.0 | 8.9 | -47.9 | -13.0 | -34.9 | | |
| 7.405 | 40.0 | H | -50.3 | 7.3 | 12.0 | 9.8 | -45.6 | -13.0 | -32.6 | | |
| 3.703 | 47.0 | V | -52.0 | 4.9 | 9.7 | 7.5 | -47.2 | -13.0 | -34.2 | | |
| 5.554 | 42.0 | V | -52.2 | 6.3 | 11.0 | 8.9 | -47.4 | -13.0 | -34.4 | | |
| 7.405 | 41.0 | V | -50.1 | 7.3 | 12.0 | 9.8 | -45.4 | -13.0 | -32.4 | | |
| Mid Ch, 1880MHz | | | | | | | | | | | |
| 3.760 | 48.0 | H | -50.7 | 5.0 | 9.7 | 7.5 | -45.9 | -13.0 | -32.9 | | |
| 5.640 | 40.6 | H | -52.7 | 6.3 | 11.2 | 9.0 | -47.9 | -13.0 | -34.9 | | |
| 7.520 | 40.0 | H | -50.0 | 7.4 | 12.0 | 9.8 | -45.4 | -13.0 | -32.4 | | |
| 3.760 | 49.0 | V | -49.8 | 5.0 | 9.7 | 7.5 | -45.0 | -13.0 | -32.0 | | |
| 5.640 | 41.0 | V | -53.3 | 6.3 | 11.2 | 9.0 | -48.5 | -13.0 | -35.5 | | |
| 7.520 | 42.0 | V | -48.8 | 7.4 | 12.0 | 9.8 | -44.2 | -13.0 | -31.2 | | |
| High Ch, 1908.75MHz | | | | | | | | | | | |
| 3.818 | 49.5 | H | -49.0 | 5.0 | 9.7 | 7.6 | -44.3 | -13.0 | -31.3 | | |
| 5.726 | 42.0 | H | -51.4 | 6.4 | 11.3 | 9.2 | -46.5 | -13.0 | -33.5 | | |
| 7.635 | 41.0 | H | -48.7 | 7.4 | 12.0 | 9.8 | -44.2 | -13.0 | -31.2 | | |
| 3.818 | 49.7 | V | -48.9 | 5.0 | 9.7 | 7.6 | -44.2 | -13.0 | -31.2 | | |
| 5.726 | 45.0 | V | -49.4 | 6.4 | 11.3 | 9.2 | -44.5 | -13.0 | -31.5 | | |
| 7.635 | 42.0 | V | -48.5 | 7.4 | 12.0 | 9.8 | -44.0 | -13.0 | -31.0 | | |
| Rev. 12.02.08 | | | | | | | | | | | |
| Note: No other emissions were detected above the system noise floor. | | | | | | | | | | | |

EVDO-REV A Mode (PCS Band)

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m Chamber

Company: Sierra Wireless
 Project #: 08U12326
 Date: 1/16/2009
 Test Engineer: Chin Pang
 Configuration: EUT/Dipole Antenna
 Mode: TX, PCS, EV-DO Rev A

Test Equipment:

EMCO Horn 1-18GHz

T60; S/N: 2238 @3m

Horn > 18GHz

Limit

FCC 24

High Pass Filter

Hi Frequency Cables

3' cable
22807700

12' cable
22807600

20' cable
22897500

Pre-amplifier 1-26GHz

T145 Agilent 3008A1

Pre-amplifier 26-40GHz

| f GHz | SA reading (dBuV/m) | Ant. Pol. (H/V) | SG reading (dBm) | CL (dB) | Gain (dBi) | Gain (dBd) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|----------------------------|------------------------|--------------------|---------------------|------------|---------------|---------------|---------------|----------------|----------------|-------|
| Low Ch, 1851.25MHz | | | | | | | | | | |
| 3.703 | 47.5 | H | -51.4 | 4.9 | 9.7 | 7.5 | -46.6 | -13.0 | -33.6 | |
| 5.554 | 41.3 | H | -51.9 | 6.3 | 11.0 | 8.9 | -47.1 | -13.0 | -34.1 | |
| 7.405 | 40.8 | H | -49.5 | 7.3 | 12.0 | 9.8 | -44.8 | -13.0 | -31.8 | |
| 3.703 | 48.0 | V | -51.0 | 4.9 | 9.7 | 7.5 | -46.2 | -13.0 | -33.2 | |
| 5.554 | 43.2 | V | -51.0 | 6.3 | 11.0 | 8.9 | -46.2 | -13.0 | -33.2 | |
| 7.405 | 41.6 | V | -49.5 | 7.3 | 12.0 | 9.8 | -44.8 | -13.0 | -31.8 | |
| Mid Ch, 1880MHz | | | | | | | | | | |
| 3.760 | 50.0 | H | -48.7 | 5.0 | 9.7 | 7.5 | -43.9 | -13.0 | -30.9 | |
| 5.640 | 41.0 | H | -52.3 | 6.3 | 11.2 | 9.0 | -47.5 | -13.0 | -34.5 | |
| 7.520 | 40.5 | H | -49.5 | 7.4 | 12.0 | 9.8 | -44.9 | -13.0 | -31.9 | |
| 3.760 | 52.0 | V | -46.8 | 5.0 | 9.7 | 7.5 | -42.0 | -13.0 | -29.0 | |
| 5.640 | 42.0 | V | -52.3 | 6.3 | 11.2 | 9.0 | -47.5 | -13.0 | -34.5 | |
| 7.520 | 42.8 | V | -48.0 | 7.4 | 12.0 | 9.8 | -43.4 | -13.0 | -30.4 | |
| High Ch, 1908.75MHz | | | | | | | | | | |
| 3.818 | 49.4 | H | -49.1 | 5.0 | 9.7 | 7.6 | -44.4 | -13.0 | -31.4 | |
| 5.726 | 43.5 | H | -49.9 | 6.4 | 11.3 | 9.2 | -45.0 | -13.0 | -32.0 | |
| 7.635 | 41.8 | H | -47.9 | 7.4 | 12.0 | 9.8 | -43.4 | -13.0 | -30.4 | |
| 3.818 | 50.0 | V | -48.6 | 5.0 | 9.7 | 7.6 | -43.9 | -13.0 | -30.9 | |
| 5.726 | 44.6 | V | -49.8 | 6.4 | 11.3 | 9.2 | -44.9 | -13.0 | -31.9 | |
| 7.635 | 42.3 | V | -48.2 | 7.4 | 12.0 | 9.8 | -43.7 | -13.0 | -30.7 | |

Rev. 12.02.08
 Note: No other emissions were detected above the system noise floor.

11.3. RECEIVER SPURIOUS EMISSIONS

RULE PART(S)

FCC: N/A
IC: RSS-132, 4.6; RSS-133, 6.6, RSS-Gen

LIMIT

RSS-Gen 6 (a) - If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers:

| Spurious Frequency (MHz) | Field Strength(microvolt/m at 3 meters) |
|--------------------------|---|
| 30 - 88 | 100 |
| 88 - 216 | 150 |
| 216 - 960 | 200 |
| Above 960 | 500 |

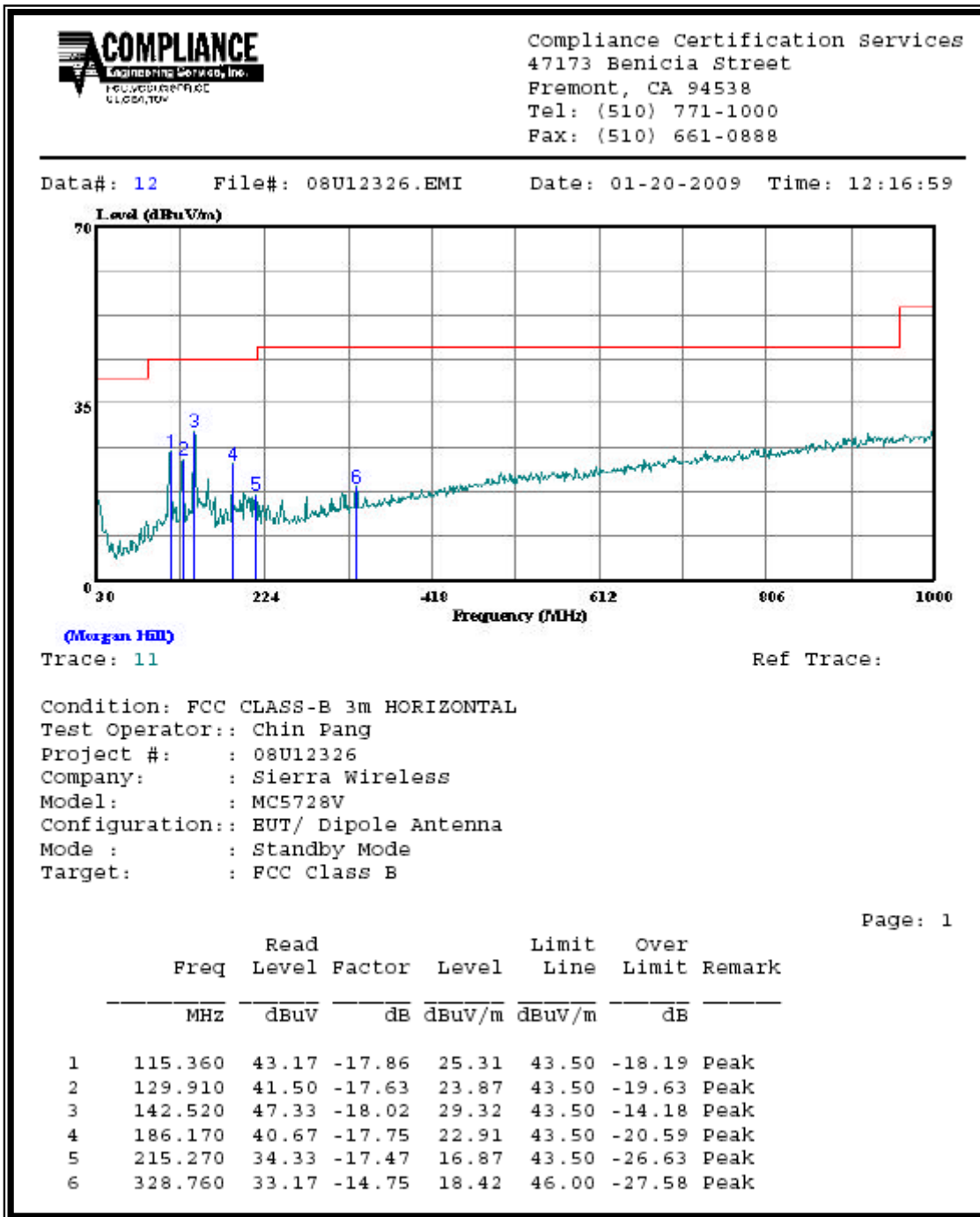
TEST PROCEDURE

RSS-Gen 4.10 - The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

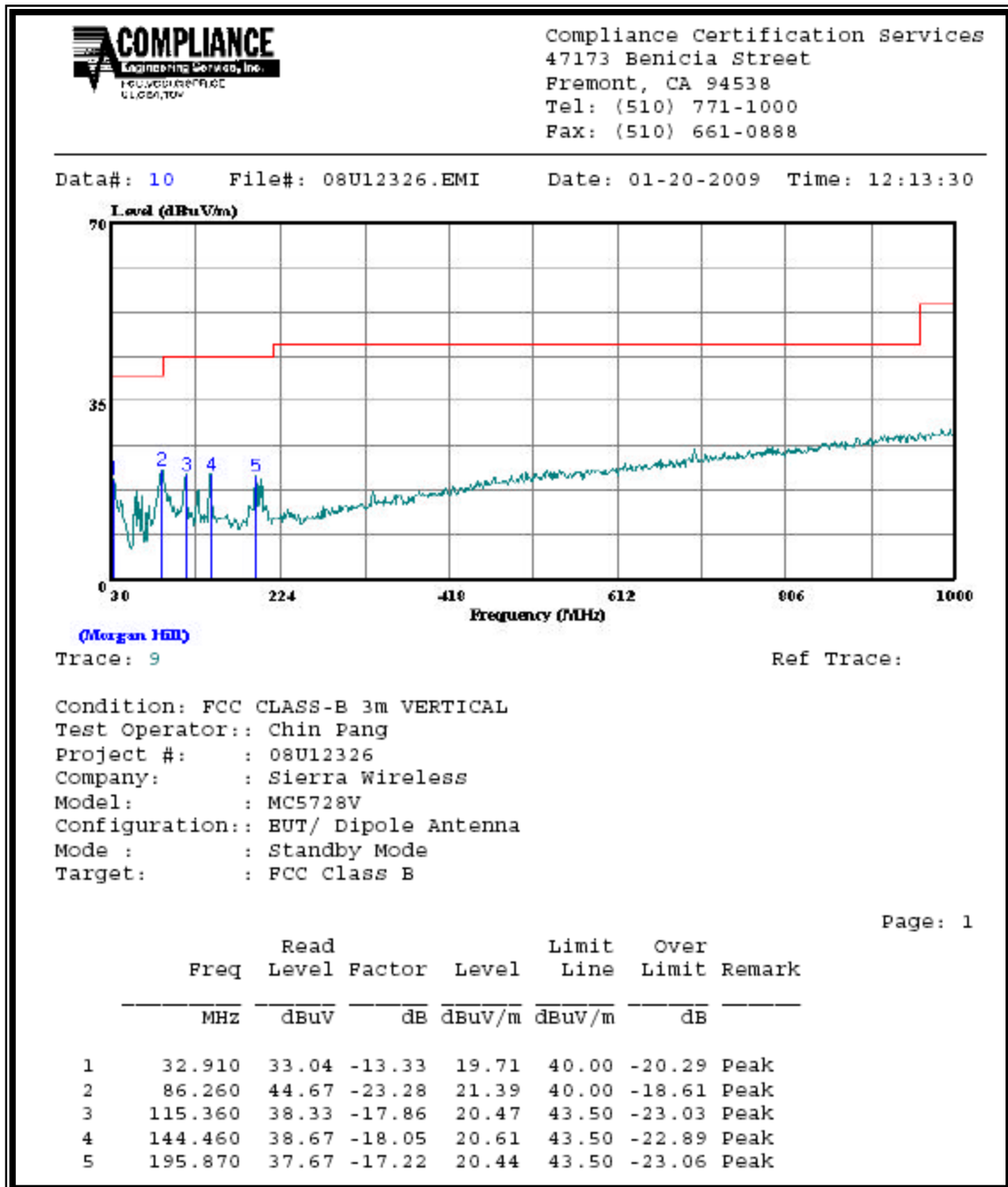
RESULTS

See the following pages.

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, HORIZONTAL



RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, VERTICAL



RECEIVER SPURIOUS EMISSIONS FOR ABOVE 1GHz

Note: No emissions were found within above 1GHz of 20dB below the system noise floor.

11.4. POWER LINE CONDUCTED EMISSION

LIMIT

RSS-Gen 7.2.2

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radio communication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

Table 2 – AC Power Lines Conducted Emission Limits

| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|-----------------------------|------------------------|-----------------------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 [*] | 56 to 46 [*] |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

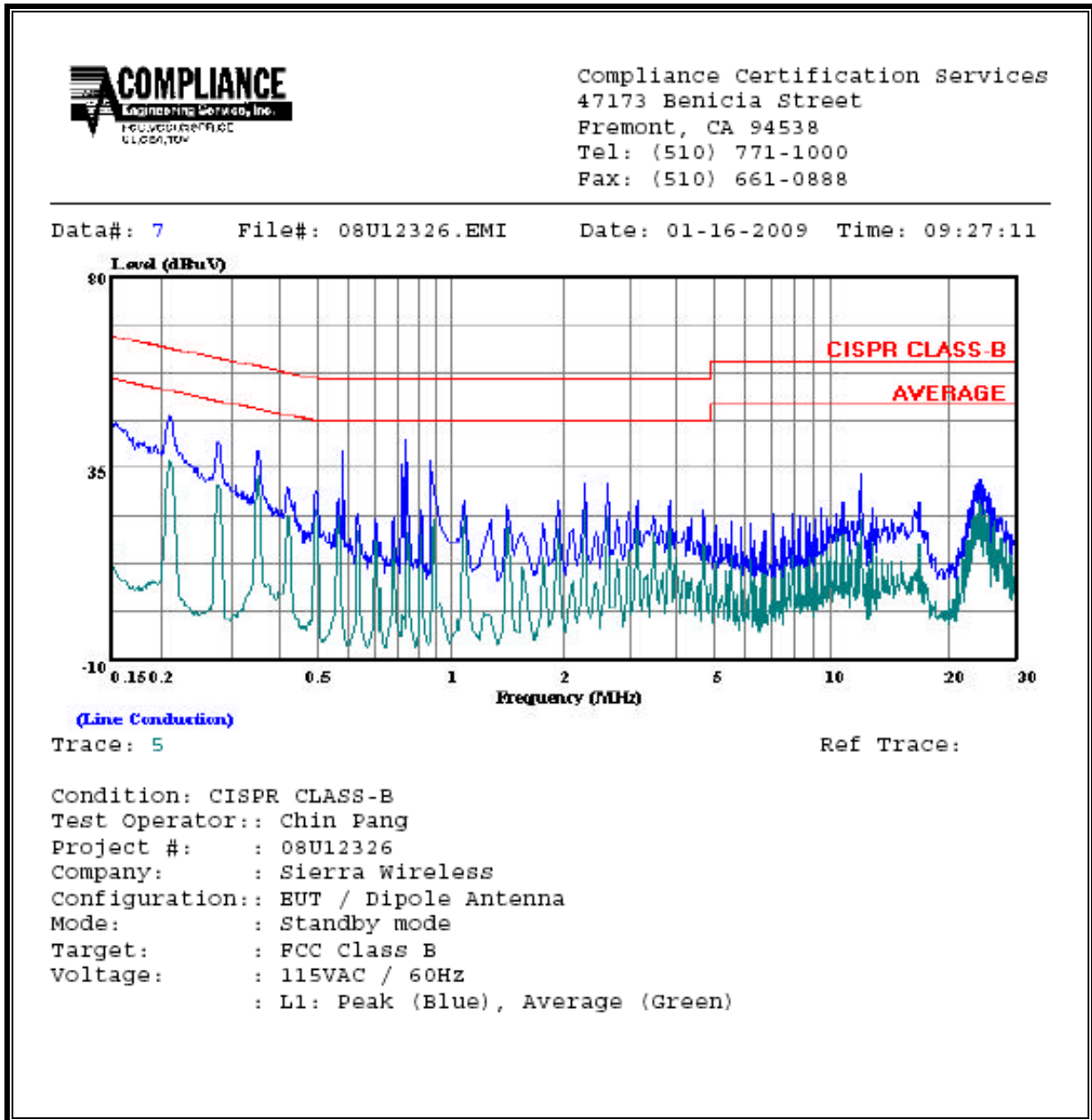
^{*}Decreases with the logarithm of the frequency.

RESULTS

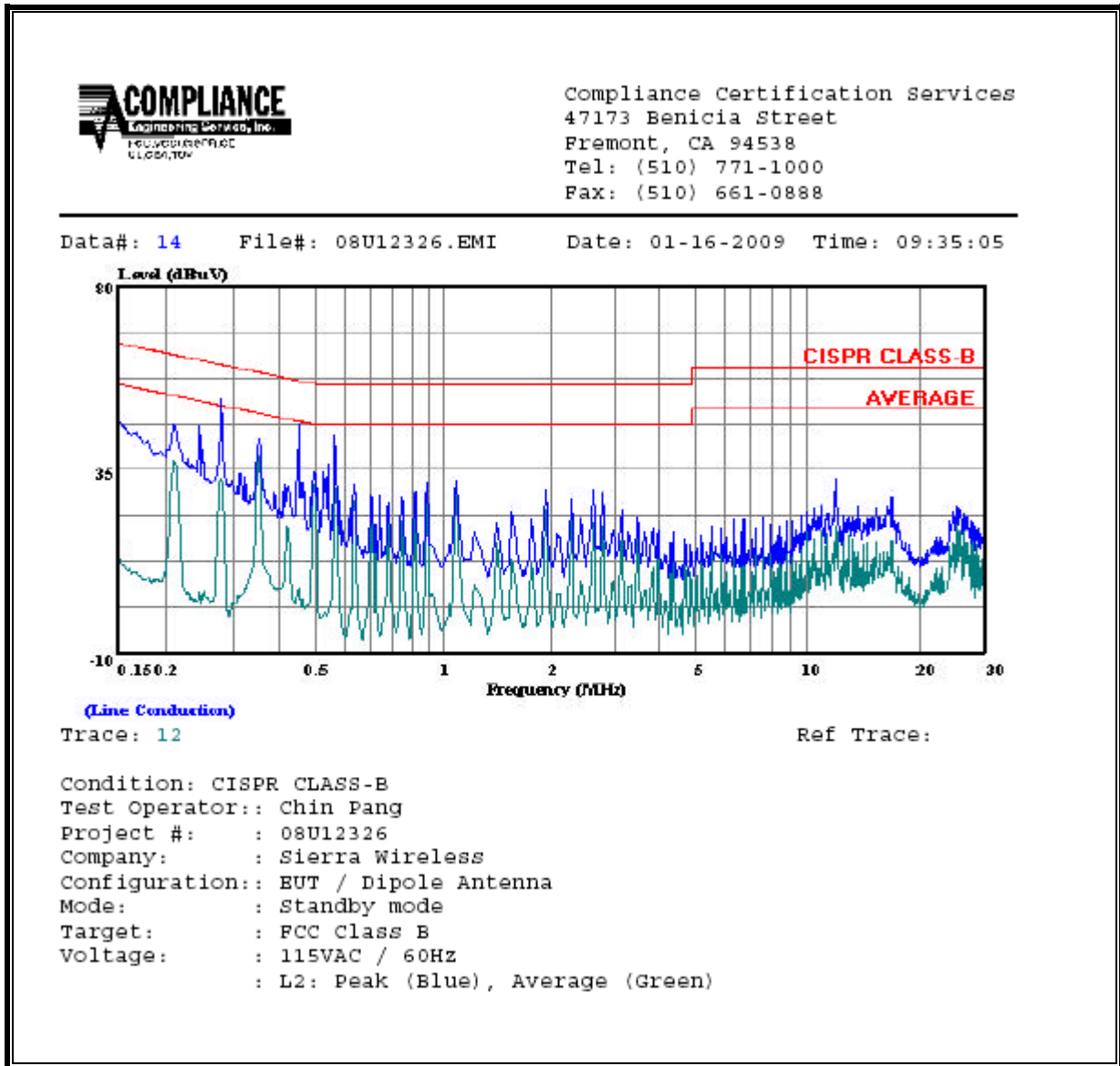
No non-compliance noted:

| CONDUCTED EMISSIONS DATA (115VAC 60Hz) | | | | | | | | | |
|--|-----------|-----------|-----------|---------------|-------------|------------|---------|---------|-------------------|
| Freq. (MHz) | Reading | | | Class (dB) | Limit QP | EN B AV | Margin | | Remark L1 / L2 |
| | PK (dBuV) | QP (dBuV) | AV (dBuV) | | | | QP (dB) | AV (dB) | |
| 0.21 | 46.62 | -- | 36.57 | 0.00 | 63.13 | 53.13 | -16.51 | -16.56 | L1 |
| 0.84 | 41.75 | -- | 22.81 | 0.00 | 56.00 | 46.00 | -14.25 | -23.19 | L1 |
| 24.14 | 32.48 | -- | 28.91 | 0.00 | 60.00 | 50.00 | -27.52 | -21.09 | L1 |
| 0.21 | 45.36 | -- | 37.00 | 0.00 | 63.13 | 53.13 | -17.77 | -16.13 | L2 |
| 0.28 | 52.51 | -- | 38.28 | 0.00 | 60.76 | 50.76 | -8.25 | -12.48 | L2 |
| 12.00 | 32.79 | -- | 21.38 | 0.00 | 60.00 | 50.00 | -27.21 | -28.62 | L2 |
| 6 Worst Data | | | | | | | | | |

LINE 1 RESULTS



LINE 2 RESULTS



12. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm ²) | Averaging time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposures | | | | |
| 0.3–3.0 | 614 | 1.63 | *(100) | 6 |
| 3.0–30 | 1842/f | 4.89/f | *(900/f ²) | 6 |
| 30–300 | 61.4 | 0.163 | 1.0 | 6 |
| 300–1500 | | | f/300 | 6 |
| 1500–100,000 | | | 5 | 6 |
| (B) Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3–1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34–30 | 824/f | 2.19/f | *(180/f ²) | 30 |

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm ²) | Averaging time (minutes) |
|-----------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| 30–300 | 27.5 | 0.073 | 0.2 | 30 |
| 300–1500 | | | f/1500 | 30 |
| 1500–100,000 | | | 1.0 | 30 |

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

**Table 5
 Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)**

| 1 Frequency (MHz) | 2 Electric Field Strength; rms (V/m) | 3 Magnetic Field Strength; rms (A/m) | 4 Power Density (W/m ²) | 5 Averaging Time (min) |
|-------------------------|---|---|--|-----------------------------------|
| 0.003–1 | 280 | 2.19 | | 6 |
| 1–10 | 280/ <i>f</i> | 2.19/ <i>f</i> | | 6 |
| 10–30 | 28 | 2.19/ <i>f</i> | | 6 |
| 30–300 | 28 | 0.073 | 2* | 6 |
| 300–1 500 | 1.585 <i>f</i> ^{0.5} | 0.0042 <i>f</i> ^{0.5} | <i>f</i> /150 | 6 |
| 1 500–15 000 | 61.4 | 0.163 | 10 | 6 |
| 15 000–150 000 | 61.4 | 0.163 | 10 | 616 000 / <i>f</i> ^{1.2} |
| 150 000–300 000 | 0.158 <i>f</i> ^{0.5} | 4.21 x 10 ⁻⁴ <i>f</i> ^{0.5} | 6.67 x 10 ⁻⁵ <i>f</i> | 616 000 / <i>f</i> ^{1.2} |

* Power density limit is applicable at frequencies greater than 100 MHz.

- Notes:**
1. Frequency, *f*, is in MHz.
 2. A power density of 10 W/m² is equivalent to 1 mW/cm².
 3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * D^2)$$

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

For mobile radio equipment operating in the cellular phone band, the lowest power density limit is calculated using the lowest frequency, as 824 MHz / 1500 = 0.55 mW/cm² (FCC) and 824 MHz / 150 = 5.5 W/m² (IC).

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm²

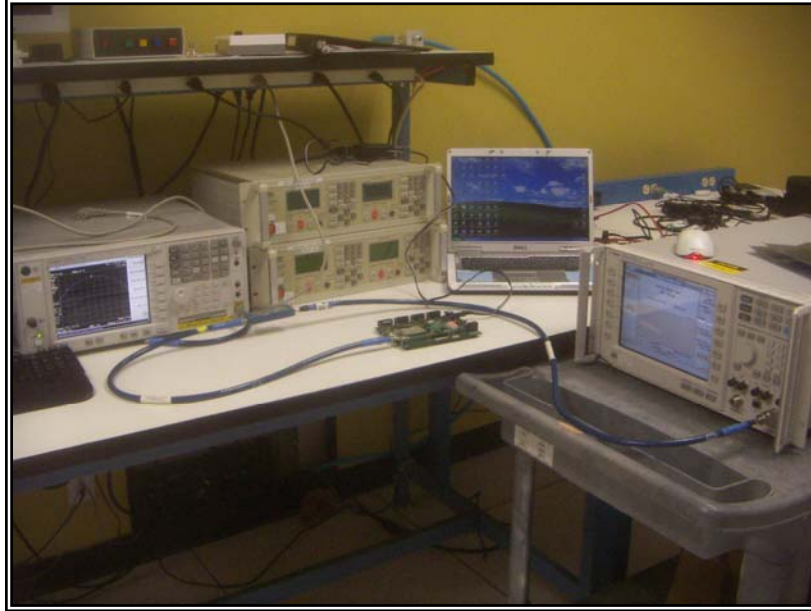
From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

RESULTS

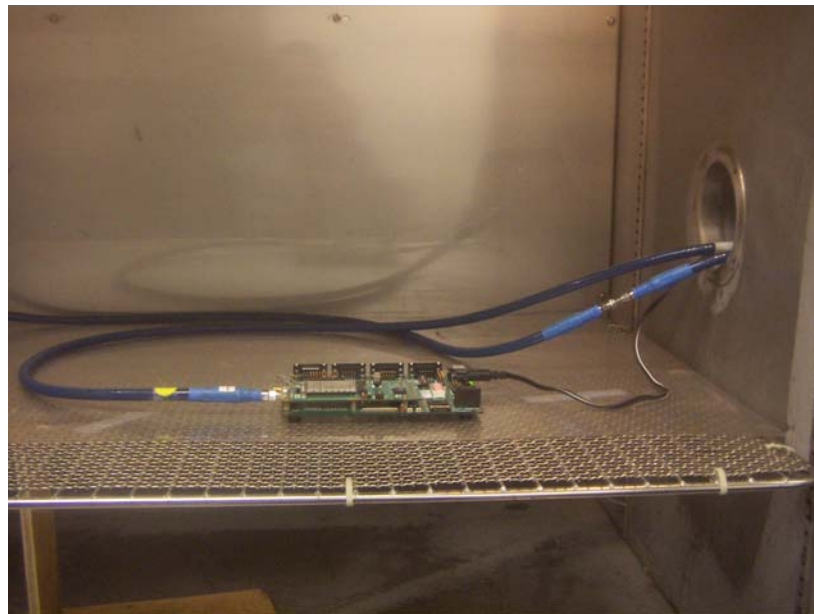
| Band | Separation Distance (m) | Output Power (dBm) | Antenna Gain (dBi) | IC Power Density (W/m ²) | FCC Power Density (mW/cm ²) |
|----------|-------------------------|--------------------|--------------------|--------------------------------------|---|
| 800 MHz | 0.20 | 25.07 | 9.30 | 5.44 | 0.544 |
| 1900 MHz | 0.20 | 24.90 | 8.00 | 3.88 | 0.388 |

13. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

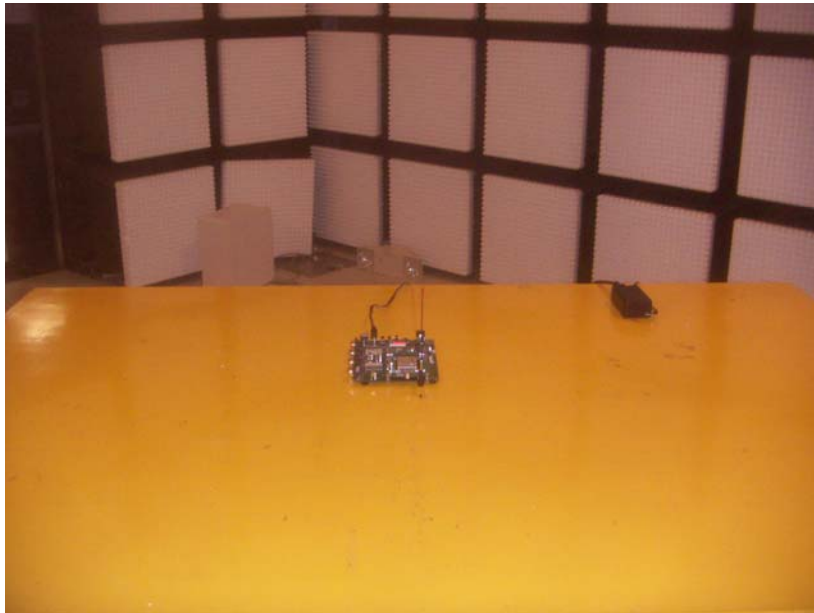


ENVIRONMENTAL



RADIATED MEASUREMENT SETUP

FRONT PHOTO



BACK PHOTO



END OF REPORT