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: AIRCARD 402

FCC ID: N7NAC402

IC ID: 2417C-AC402

REPORT NUMBER: 08U12312-3

ISSUE DATE: FEBRUARY 09, 2009

Prepared for

SIERRA WIRELESS INC.
2290 COSMOS CT.
CRLSBAD, CA 92010, U.S.A.

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	02/09/09	Initial Issue	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC.
2290 COSMOS CT.
CARLSBAD, CA 92010, U.S.A.

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

MODEL: AIRCARD402

SERIAL NUMBER: P7631080284D1

DATE TESTED: FEBRUARY 05-07, 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:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

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

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 Flextronics Mfg. (H.K.) Ltd.

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB integrated and external blade antennas. For PCB integrated antenna, the maximum peak gain is 2 dBi for 850 MHz band and 1.3 dBi for 1900 MHz band. For blade antenna, the maximum peak gain is 2.01 dBi for 850MHz band and 2.94dBi for 1900MHz Band.

5.3. 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	Complies
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

5.4. MAXIMUM OUTPUT POWER

The transmitter has a maximum output power as follows:

Part 22 Cellular Band

Frequency range (MHz)	Modulation	Peak Conducted Power		ERP	
		dBm	mW	dBm	mW
824.7 – 848.31	EV-DO - REV A	29.21	833.7	29.0	794.3

Part 24 PCS Band

Frequency range (MHz)	Modulation	Peak Conducted Power		EIRP	
		dBm	mW	dBm	mW
1851.25 – 1908.8	EV-DO - REV A	29.23	837.5	29.2	831.8

6. 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

6.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Laptop	Toshiba	PSA8U-14N02K	96275878Q
Antenna, Horn, 18 GHz	EMCO	3115	C00945
Directional Coupler, 18 GHz	Krytar	1817	N02656
AC Adapter	Toshiba	PA3201U-ACA	035D7299

I/O CABLES (CONDUCTED TEST)

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	NA
2	DC	1	DC	Un-shielded	2m	NA
3	Directional	1	Spectrum Analyzer	Un-shielded	1m	NA
4	RF In/Out	1	Communications Test Set	Un-shielded	1m	NA
5	Directional	1	EUT	Un-shielded	NA	NA

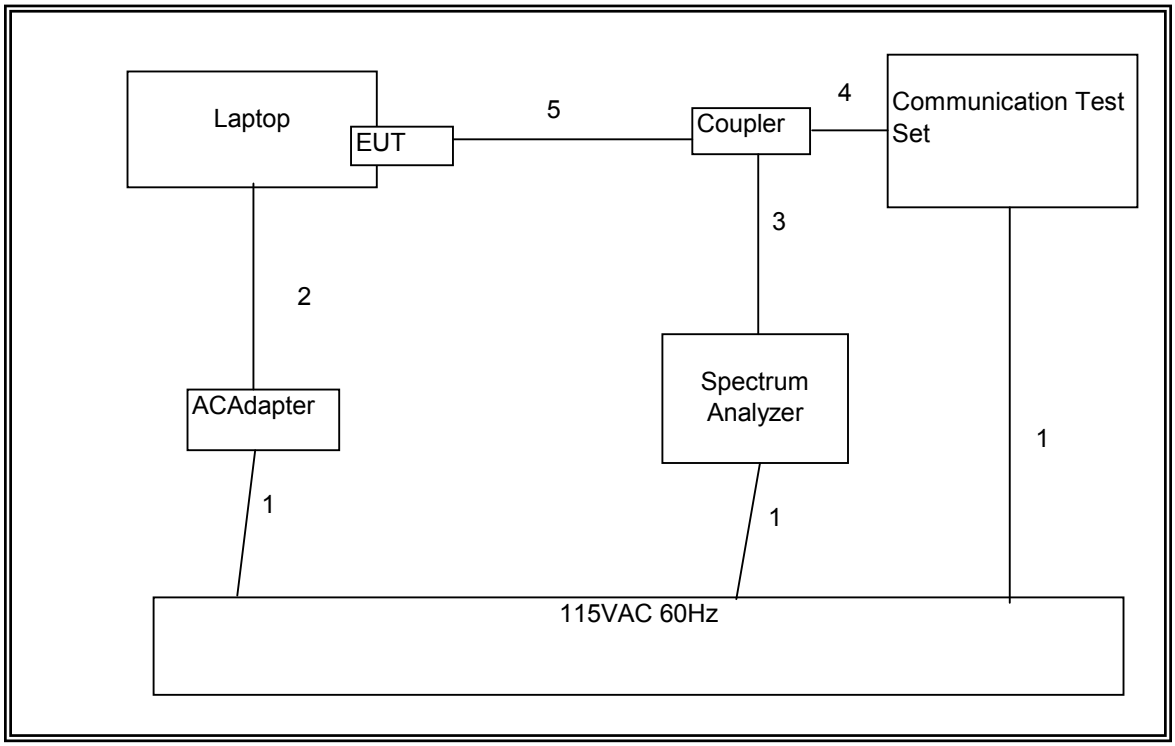
I/O CABLES (RADIATED TEST)

I/O CABLE LIST						
Cable No.	**Port**	**# of Identic Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	NA
2	DC	1	DC	Un-shielded	2m	NA
3	RF In/Out	1	Horn	Un-shielded	1m	NA

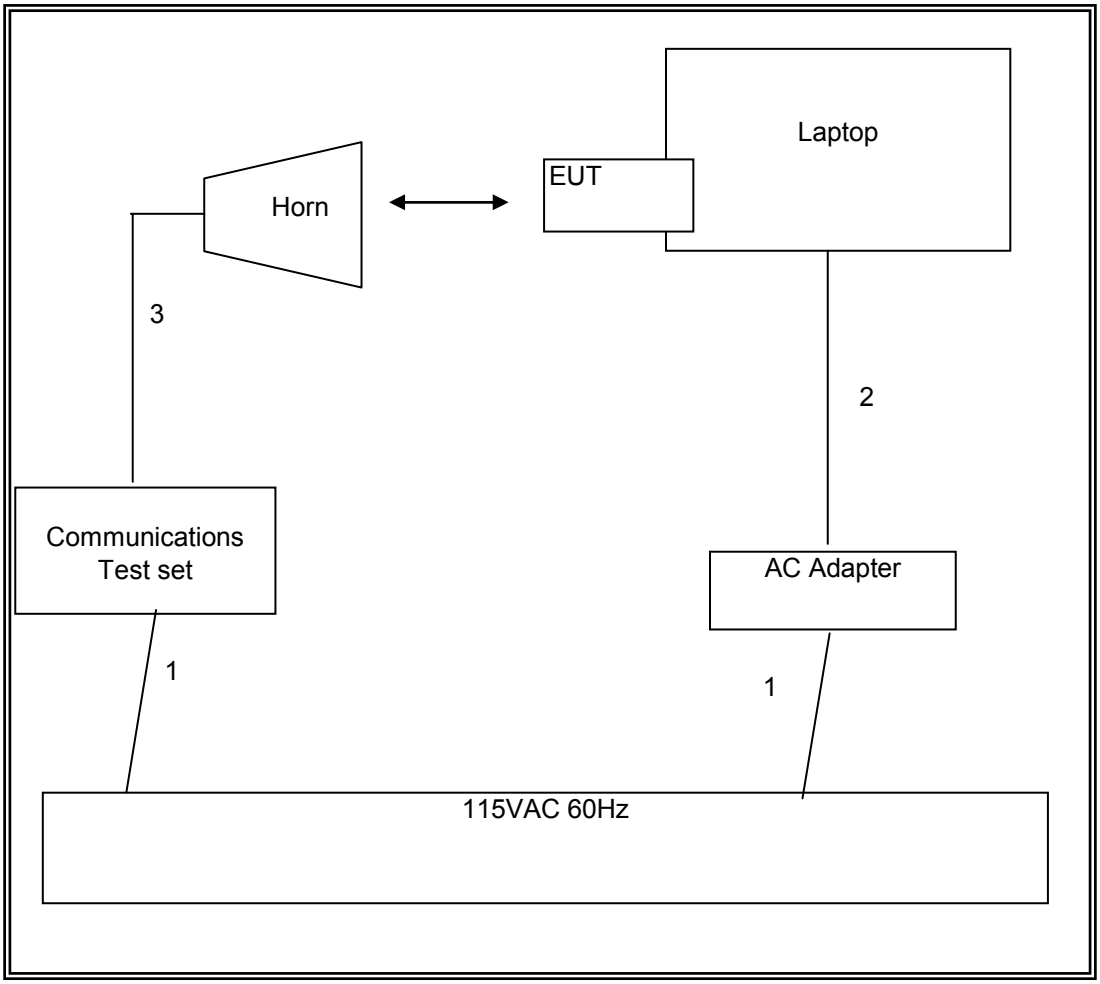
TEST SETUP

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

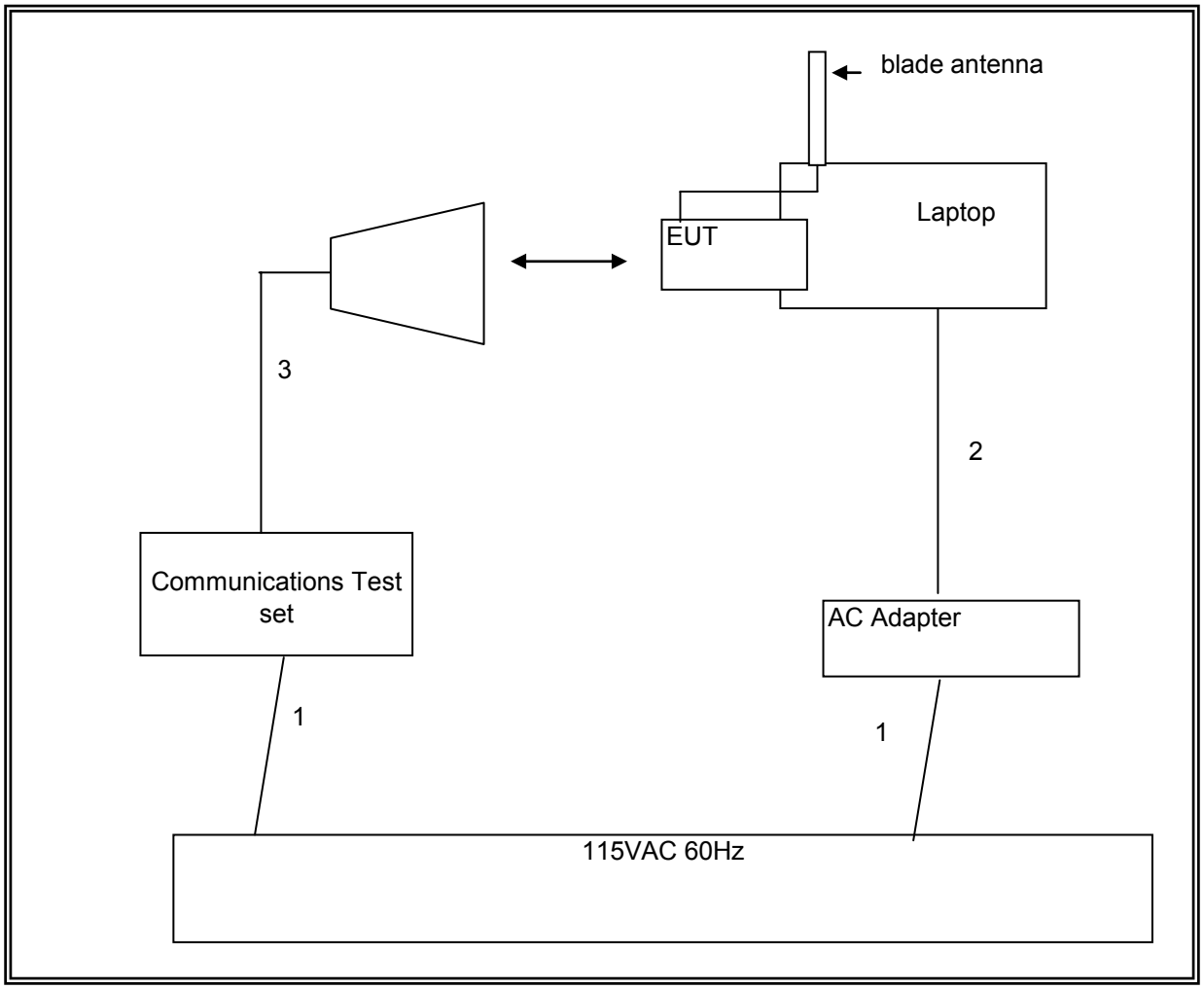
SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR RADIATED TESTS WITH EXTERNAL ANTENNA



7. RF POWER OUTPUT VERIFICATION

Maximum output power is verified on the Low, Middle and High channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E for 1xRTT, section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866 for Rel. 0 and section 4.3.4 of 3GPP2 C.S0033-A for Rev. A

7.1. RF POWER OUTPUT FOR CDMA2000 1xRTT

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

Application	Rev, License
CDMA2000 Mobile Test	B.13.08, L

1xRTT

- Call Setup > Shift & Preset
- Cell Info > Cell Parameters > System ID (SID) > 8
  > Network ID (NID) > 65535
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > Please see following table or details
- FCH Service Option (SO) Setup > Please see following table or details
- Traffic Data Rate > Full
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
  > R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits
  - Rvs Power Ctrl > All Up bits (Maximum TxPout)

RESULTS

1xRTT - Cell Band (Sample #: 608EBD6D)							
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)	23.75	28.41	23.6	28.36	23.6	28.3
	3 (Voice)						
	55 (Loopback)	23.80	28.57	23.6	28.42	23.65	28.25
	68 (Voice)						
RC2 (Fwd2, Rvs2)	9 (Loopback)	23.65	28.43	23.5	28.28	23.50	28.20
	17 (Voice)						
	55 (Loopback)	23.70	28.53	23.5	28.3	23.5	28.09
	32768 (Voice)						
RC3 (Fwd3, Rvs3)	1 (Voice)						
	2 (Loopback)	23.6	27.96	23.40	27.84	23.50	27.68
	3 (Voice)						
	55 (Loopback)	23.60	28.07	23.6	27.81	23,60	27.67
	32 (+ F-SCH)	23.80	27.98	23.50	27.71	23.6	27.65
	32 (+ SCH)	23.6	27.89	23.50	28.07	23.75	28.00
RC4 (Fwd4, Rvs3)	1 (Voice)						
	2 (Loopback)	23,6	27.96	23.50	27.82	23.6	27.78
	3 (Voice)						
	55 (Loopback)	23.60	27.84	23.5	27.87	23.5	27.88
	32 (+ F-SCH)	23.70	28.05	23.5	27.86	23.60	27.78
	32 (+ SCH)	23.60	28.06	23.40	27.71	23.6	27.76
RC5 (Fwd5, Rvs4)	9 (Loopback)	23.80	28.05	23.5	27.73	23.50	27.72
	17 (Voice)						
	55 (Loopback)	23.6	28.02	23.4	27.77	23.50	27.71
	32768 (Voice)						

RESULTS

1xRTT – PCS Band (Sample #: 608EBD6D)							
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)	23.2	28.22	23.4	28.25	23.3	27.97
	3 (Voice)						
	55 (Loopback)	23.4	28.27	23.5	28.33	23.4	27.96
	68 (Voice)						
RC2 (Fwd2, Rvs2)	9 (Loopback)	23.5	28.28	23.6	28.50	23.5	28
	17 (Voice)						
	55 (Loopback)	23.3	28.22	23.5	28.44	23.4	28.11
	32768 (Voice)						
RC3 (Fwd3, Rvs3)	1 (Voice)						
	2 (Loopback)	23.5	27.90	23.6	28.01	23.4	27.76
	3 (Voice)						
	55 (Loopback)	23.5	27.87	23.60	28.1	23.4	27.62
	32 (+ F-SCH)	23.4	28	23.40	28.21	23.50	27.77
	32 (+ SCH)	23.50	27.96	23.60	28.02	23.50	28.07
RC4 (Fwd4, Rvs3)	1 (Voice)						
	2 (Loopback)	23.5	27.94	23.5	28.05	23.4	27.66
	3 (Voice)						
	55 (Loopback)	23.5	27.97	23.50	28.12	23.5	27.79
	32 (+ F-SCH)	23.5	27.98	23.50	27.91	23.60	27.93
	32 (+ SCH)	23.50	27.97	23.50	28.11	23.5	27.83
RC5 (Fwd5, Rvs4)	9 (Loopback)	23.4	28.07	23.50	27.88	23.4	27.7
	17 (Voice)						
	55 (Loopback)	235	27.99	23.60	28.06	23..4	27.65
	32768 (Voice)						

7.2. RF POWER OUTPUT FOR 1xEV-DO Rel 0

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

Application	Rev, License
1xEV-DO Terminal Test	A.06.06

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)

Maximum Output Power Measurement Results for EV-DO Rel 0

Cell Band (Sample #: 608EBD6D)

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted power (dBm)	
				Average	Peak
307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	23.55	28.17
		384	836.52	**23.50**	**28.12**
		777	848.31	23.50	28.10

PCS Band (Sample #: 608EBD6D)

FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted power (dBm)	
				Average	Peak
307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	23.5	28.64
		600	1880.00	**23.50**	**28.63**
		1175	1908.75	23.50	28.04

7.3. RF POWER OUTPUT FOR 1xEV-DO Rev A

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

Application	Rev, License
1xEV-DO Terminal Test	A.06.06

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)

Maximum Output Power Measurement Results for EV-DO Rev A

Cell Band (Sample #: 608EBD6D)

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	23.70	29.19
		384	836.52	**23.60**	**29.21**
		777	848.31	23.60	28.94

PCS Band (Sample #: 608EBD6D)

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	23.70	29.11
		600	1880.00	**23.75**	**29.23**
		1175	1908.75	23.70	28.93

7.4. WORST-CASE CONFIGURATION AND MODE

Based on the investigation results above, the highest peak power is the worst-case scenario for all measurements.

Worst case modes:

- For Cellular and PCS band: EVDO-Rev A

8. CONDUCTED TEST RESULTS

8.1. 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

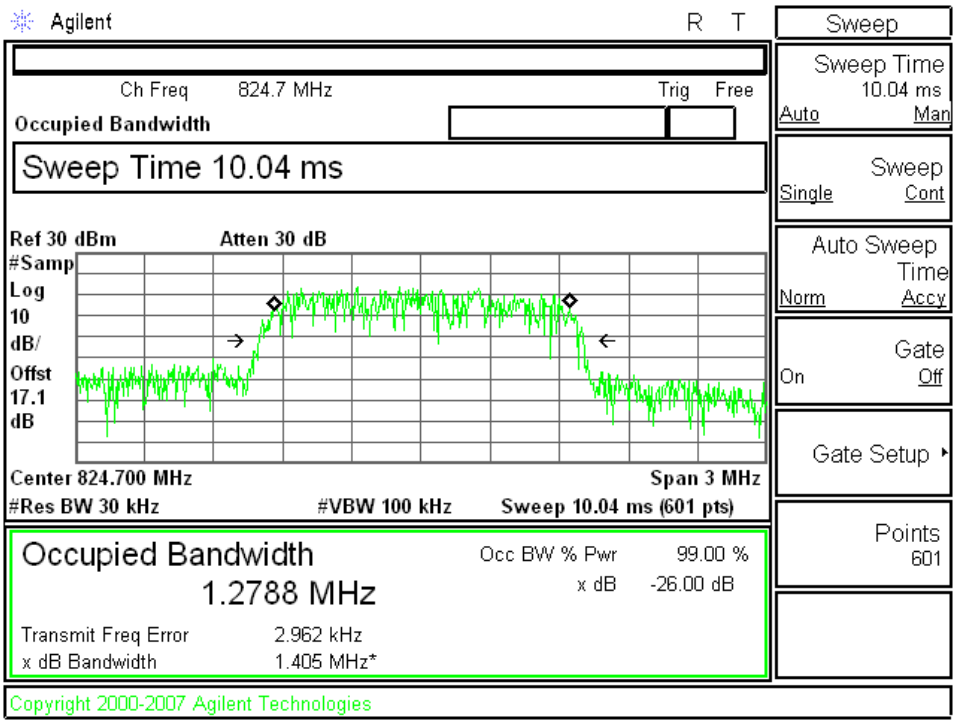
- EV-DO - REV A

RESULTS

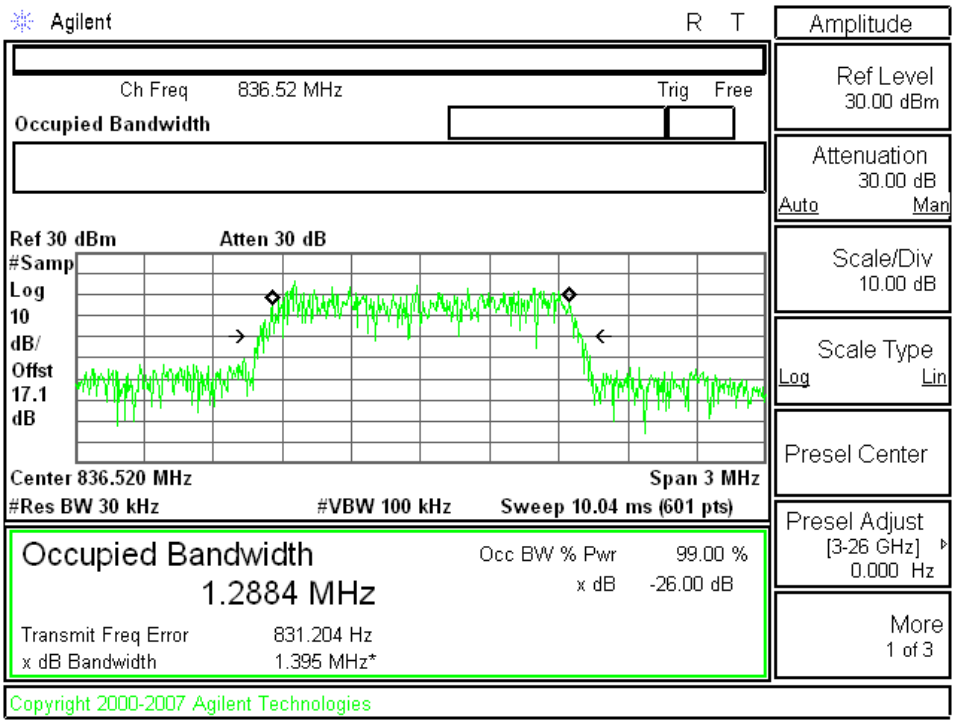
Band	Mode	Channel	f (MHz)	99% BW (MHz)	26dBc BW MHz)
Cell	EV-DO, REV A	1013	824.70	1.2788	1.395
		384	836.52	1.2884	1.405
		777	848.31	1.2805	1.419
PCS	EV-DO, REV A	25	1851.25	1.2873	1.400
		600	1880.0	1.2622	1.399
		1175	1908.75	1.2875	1.435

Plots for EVDO-REV A Mode (Cellular Band)

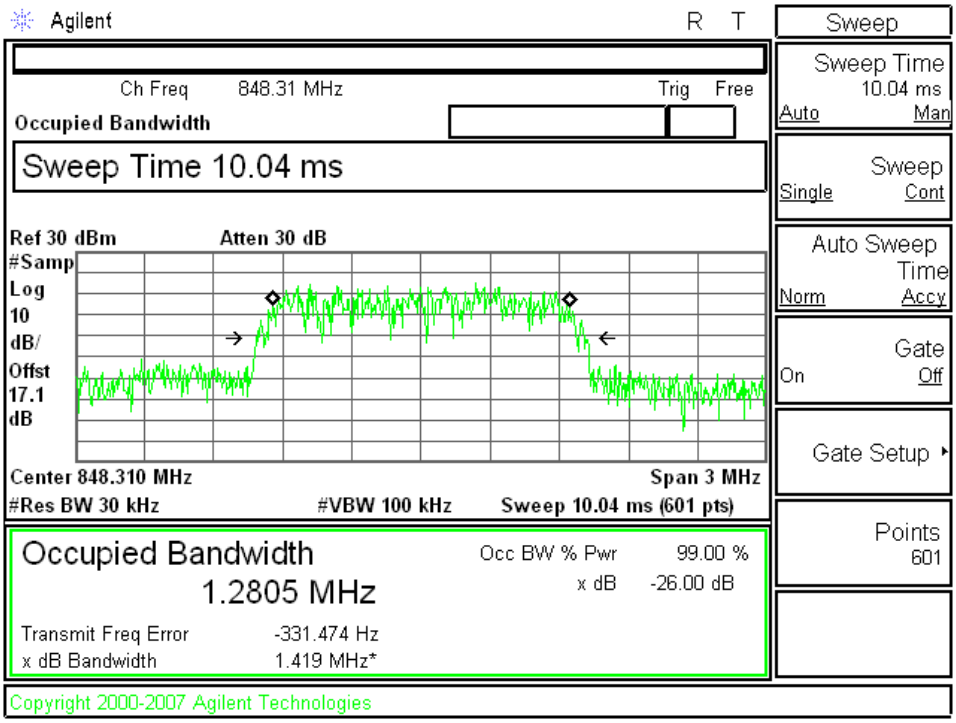
EVDO-REV A, Ch 1013



EVDO-REV A, Ch 384

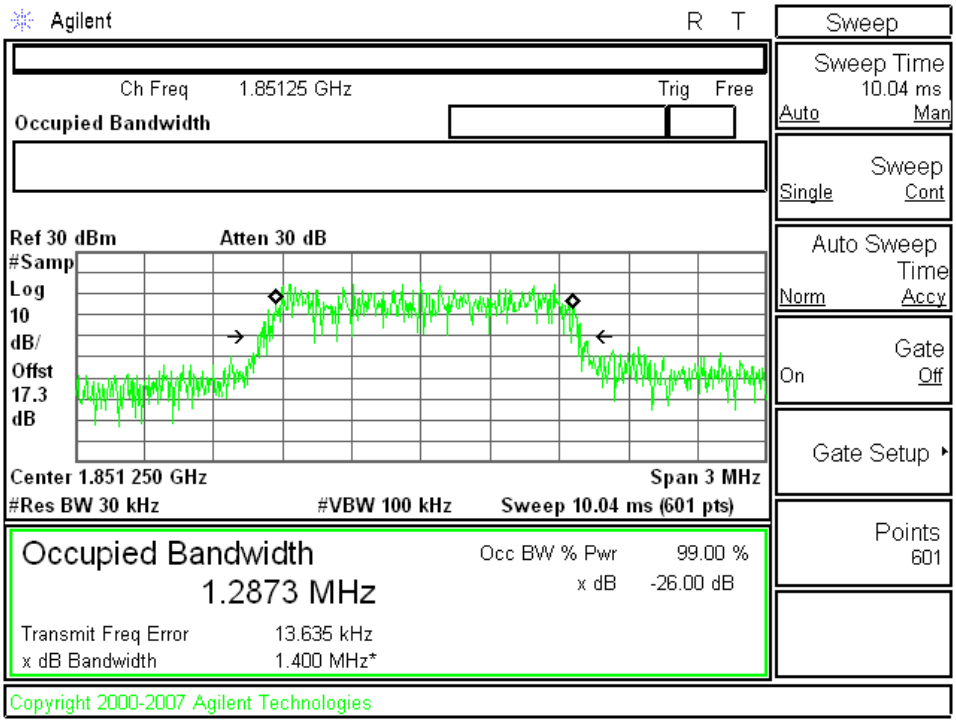


EVDO-REV A Ch 777

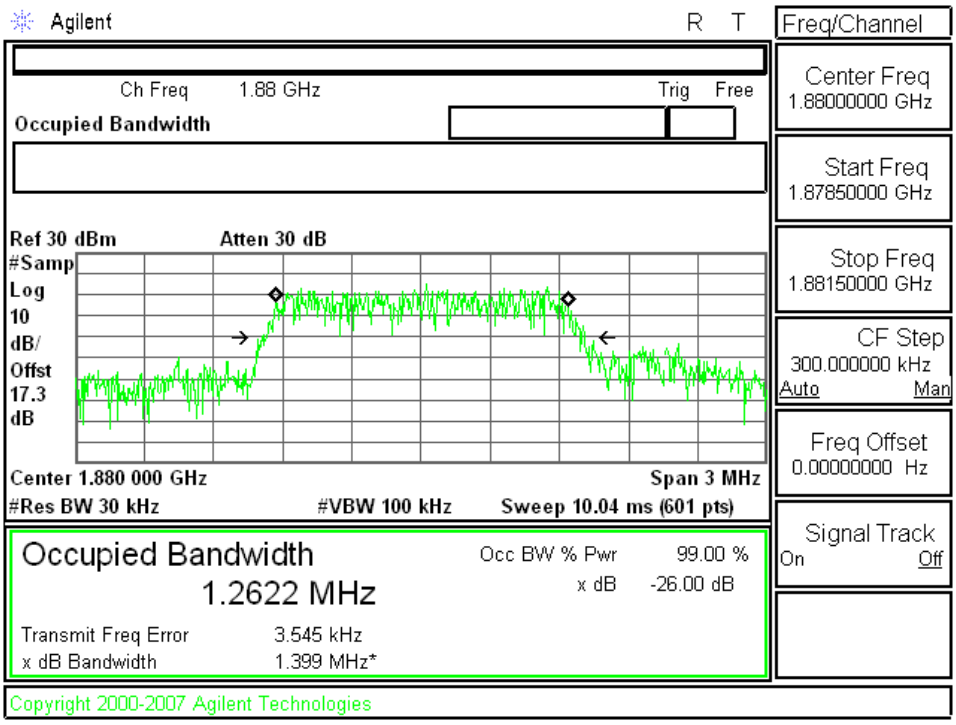


Plots for EVDO, REV A Mode (PCS Band)

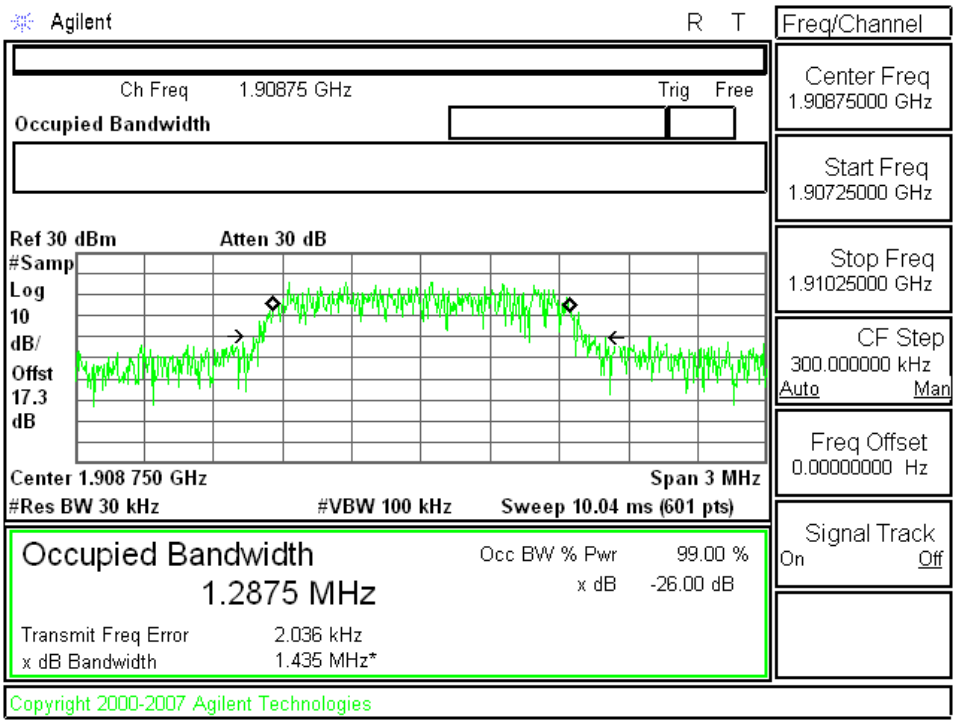
EVDO-REV A, Ch 25



EVDO-REV A, Ch 600



EVDO-REV A, Ch 1175



8.2. 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.

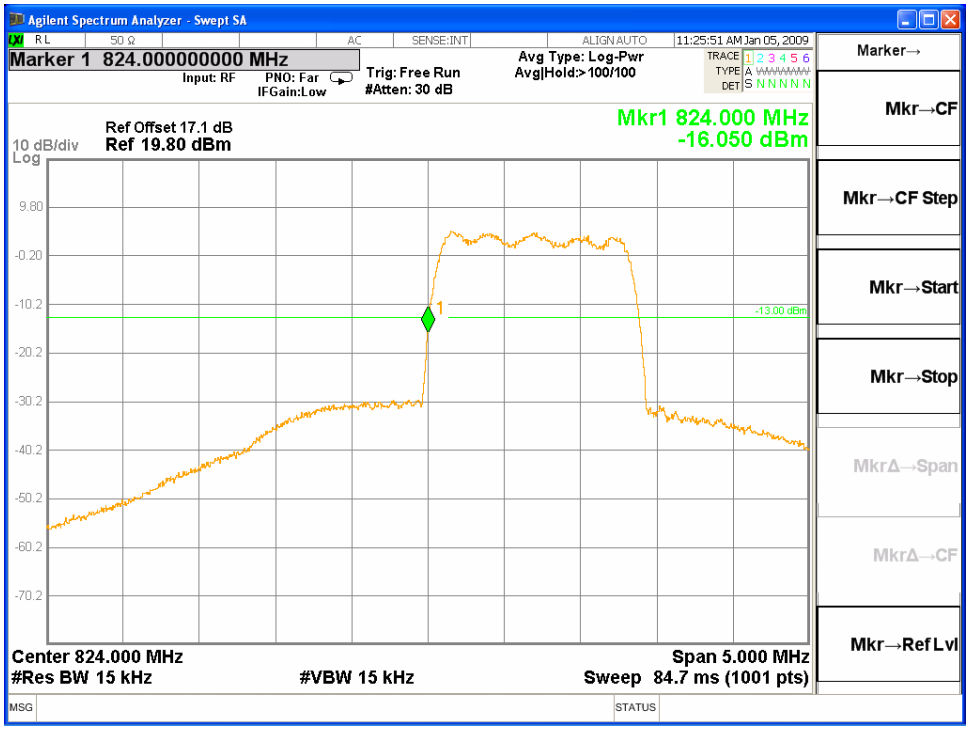
MODES TESTED

- EV-DO - REV A

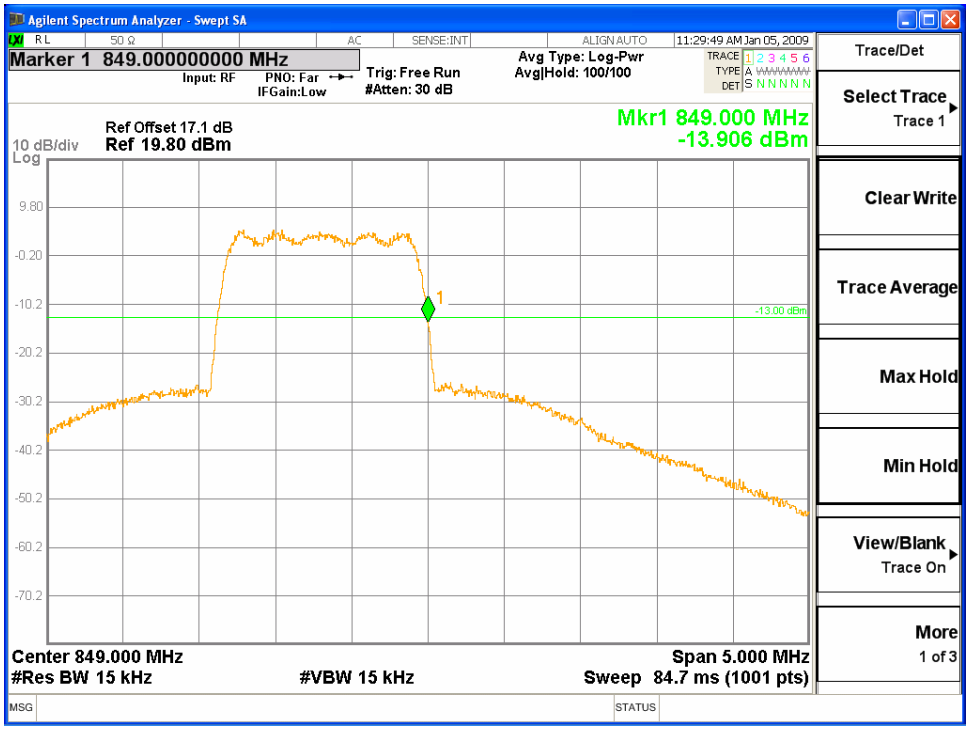
RESULTS

Plots for EVDO-REV A mode (Cellular Band)

EVDO-REV A Ch 1013 (824.7 MHz)

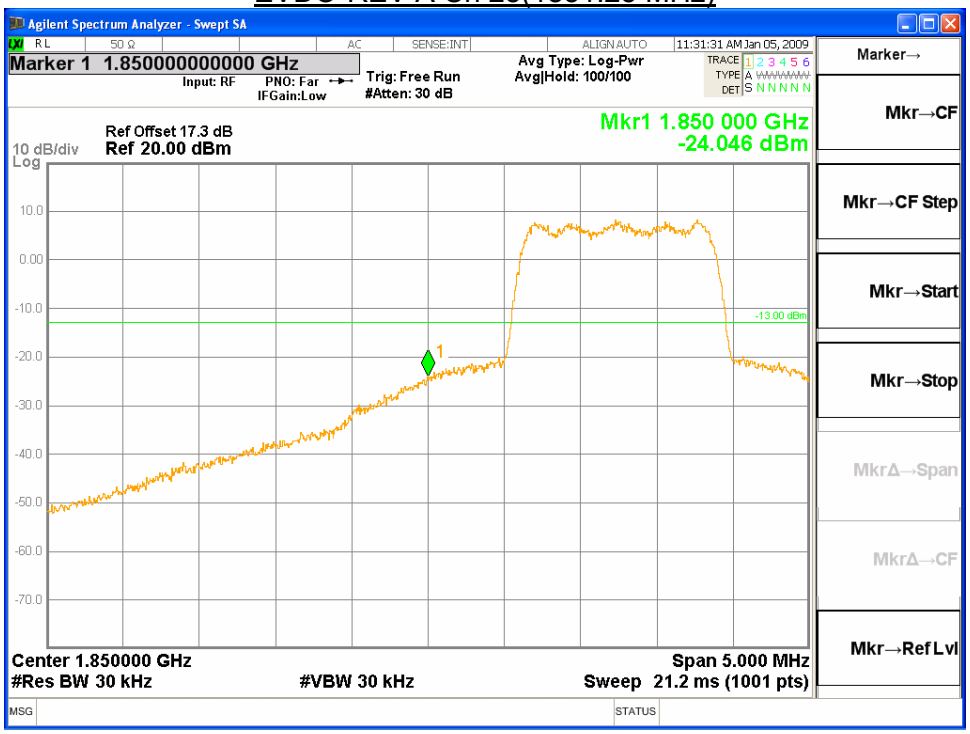


EVDO-REV A, Ch 777 (848.75 MHz)

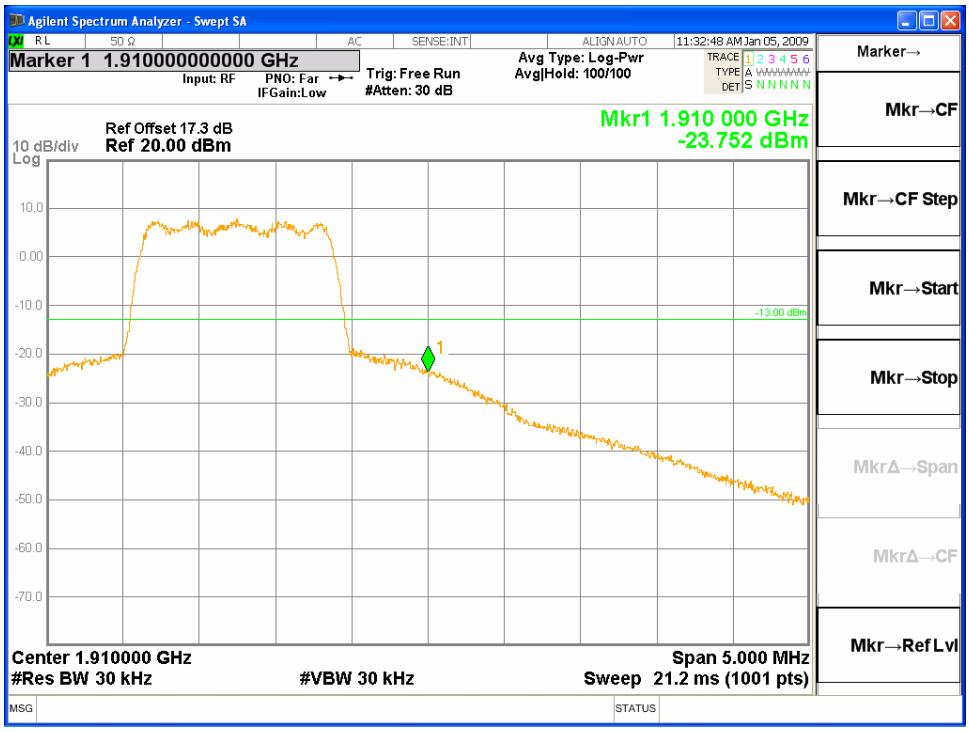


Plots for EVDO-REV A mode (PCS Band)

EVDO-REV A Ch 25(1851.25 MHz)



EVDO-REV A Ch 1175(1908.75 MHz)



8.3. 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.

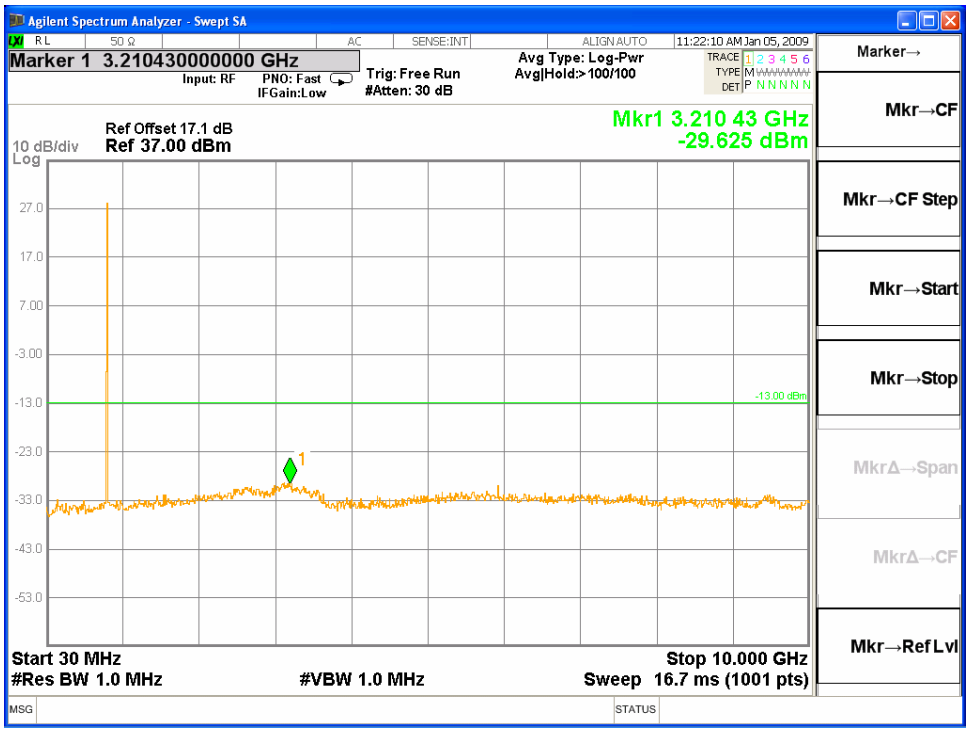
MODES TESTED

- 1xRTT – RC1, SO55
- Ev-DO – Rev A

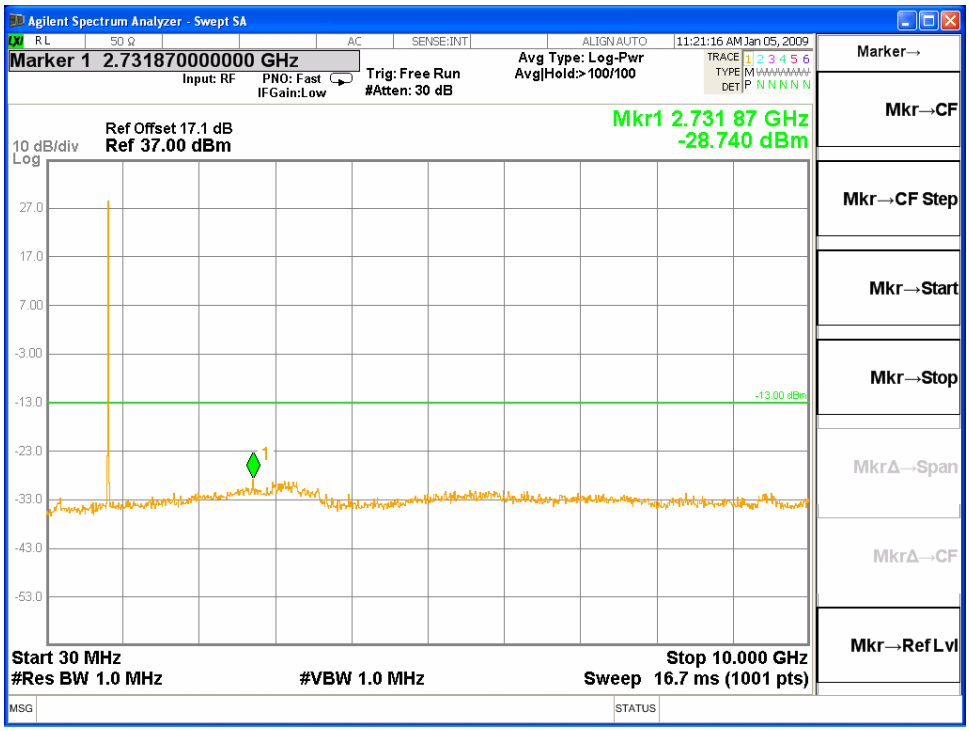
RESULTS

Plots for EVDO-REV A Mode (Cellular Band)

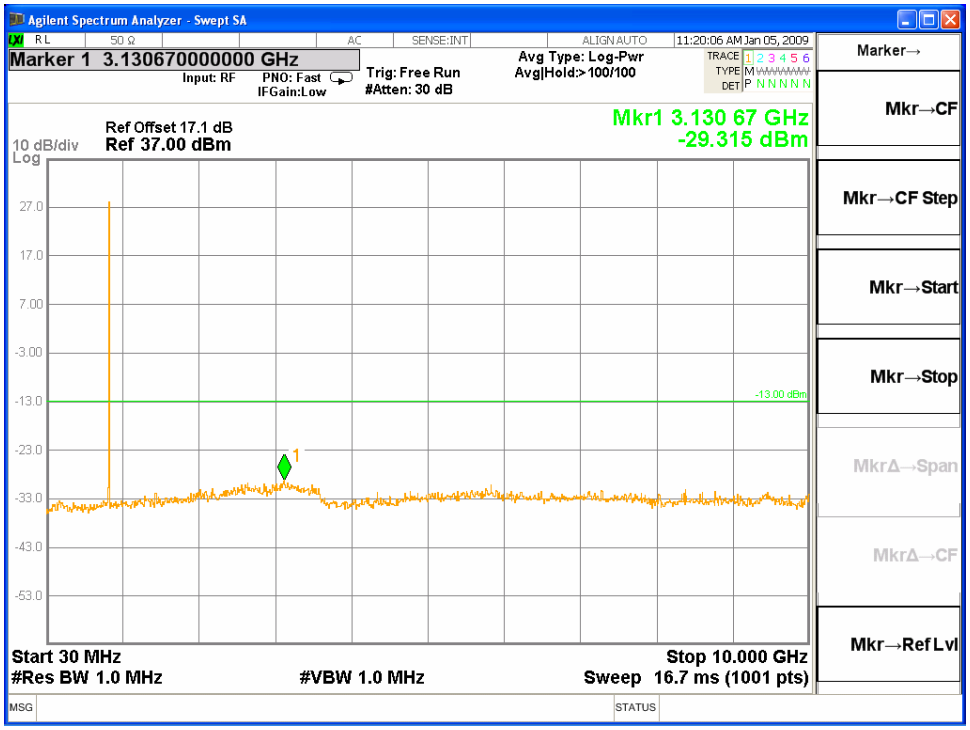
EVDO-REV A, Ch 1013



EVDO-REV A, Ch 384

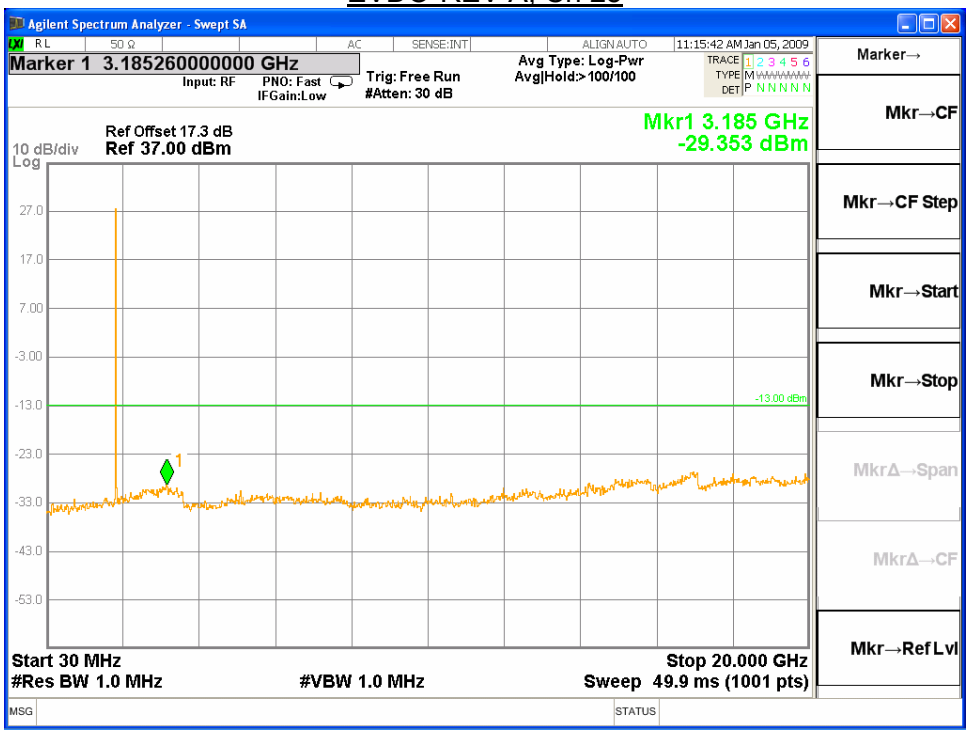


EVDO-REV A, Ch 777

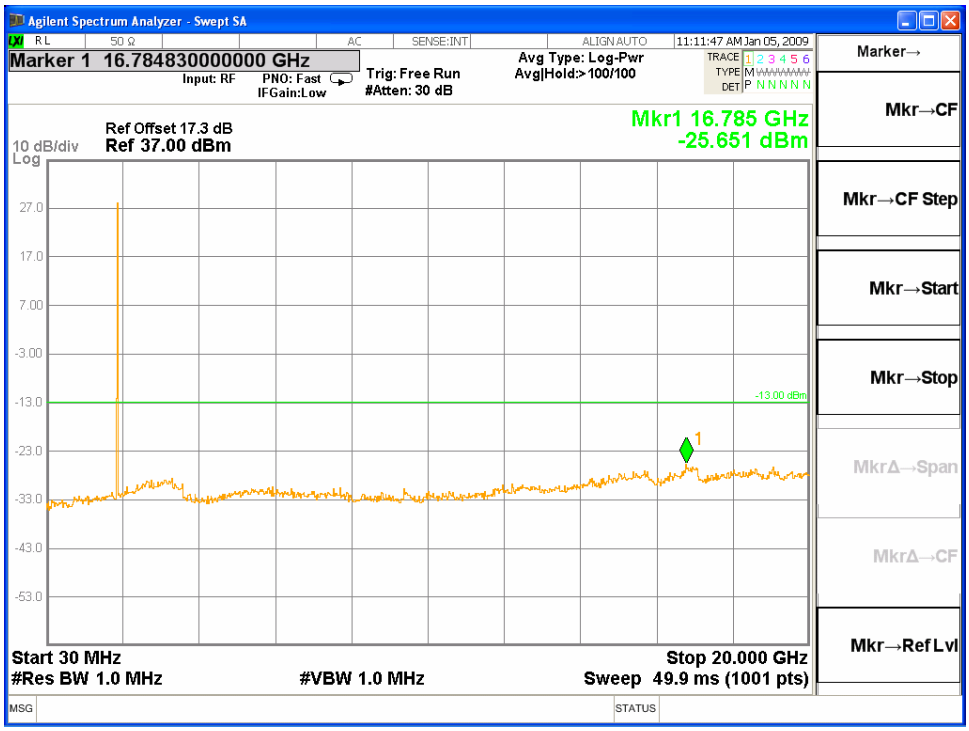


Plots for EVDO-REV A Mode (PCS Band)

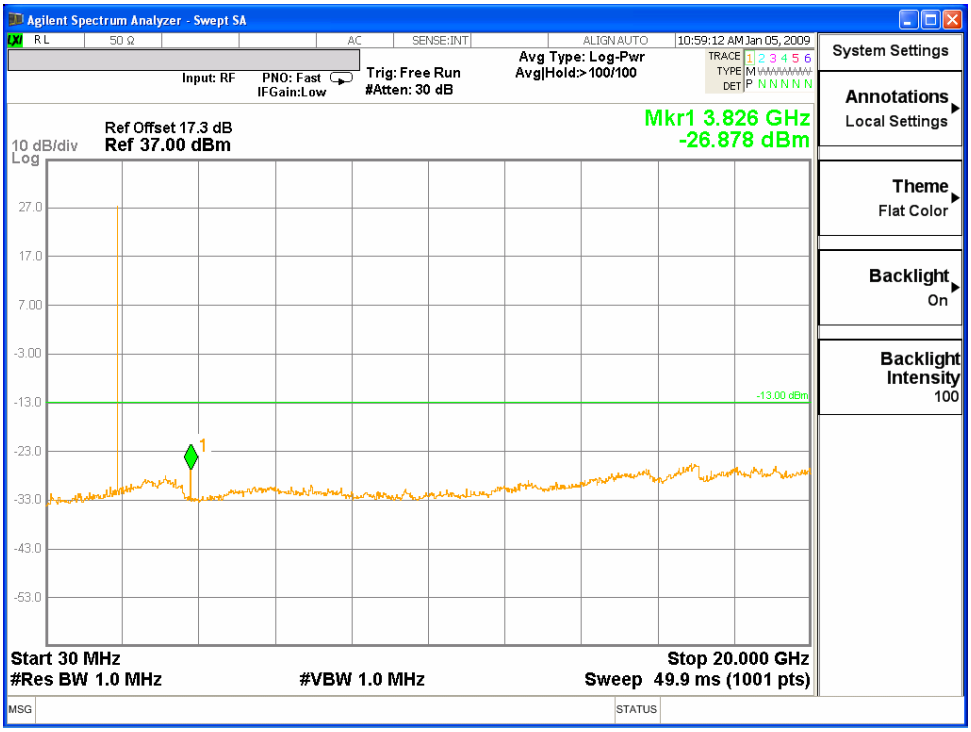
EVDO-REV A, Ch 25



EVDO-REV A, Ch 600



EVDO-REV A, Ch 1175



8.4. 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°C
- Voltage = 3.7 Vdc (85% - 115%)

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC 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 +50ºC 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 835.83248MHz @ 20ºC Limit: to stay +- 2.5 ppm = 2089.581 Hz				
DC Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (ºC)	(MHz)	Delta (ppm)	Limit (ppm)
3.60	50	835.832492	-0.014	2.5
3.60	40	835.832488	-0.010	2.5
3.60	30	835.832486	-0.007	2.5
3.60	***20***	***835.832480***	***0***	2.5
3.60	10	835.832476	0.005	2.5
3.60	0	835.832474	0.007	2.5
3.60	-10	835.832477	0.004	2.5
3.60	-20	835.832478	0.002	2.5
3.60	-30	835.832472	0.010	2.5

Reference Frequency: Cellular Mid Channel 835.831694MHz @ 20ºC Limit: to stay +- 2.5 ppm = 2089.581 Hz				
DC Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (ºC)	(MHz)	Delta (ppm)	Limit (ppm)
100%	***20***	***835.832480***	***0***	***2.5***
85%	20	835.832485	*-0.006*	2.5
115%	20	835.832488	*-0.010*	2.5

PCS, EVDO-REV A – MID CHANNEL

Reference Frequency: PCS Mid Channel 1879.322540MHz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4698.306 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (ºC)	(MHz)	Delta (ppm)	Limit (ppm)
3.60	50	1879.322552	-0.006	2.5
3.60	40	1879.322548	-0.004	2.5
3.60	30	1879.322547	-0.004	2.5
3.60	***20***	***1879.32254***	***0***	***2.5***
3.60	10	1879.322537	0.002	2.5
3.60	0	1879.322550	-0.005	2.5
3.60	-10	1879.322549	-0.005	2.5
3.60	-20	1879.322547	-0.004	2.5
3.60	-30	1879.322549	-0.005	2.5

Reference Frequency: PCS Mid Channel 1879.322540Hz @ 20ºC Limit: within the authorized block or +- 2.5 ppm = 4698.306 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (ºC)	(MHz)	Delta (ppm)	Limit (ppm)
100%	***20***	***1879.322540***	***0***	***2.5***
85%	20	1879.322546	*-0.003*	2.5
115%	20	1879.322553	*-0.007*	2.5

9. RADIATED TEST RESULTS

9.1. 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 11.5 Watts for mobile stations.

TEST PROCEDURE

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

MODES TESTED

- Ev-DO – Rev A

RESULTS for Cellular Band (ERP)

Mode	Channel	f (MHz)	ERP (PCB Antenna)		ERP(With Blade Antenna)	
			dBm	mW	dBm	mW
EVDO REV A	1013	824.70	29.00	794.33	26.70	467.74
	384	836.52	28.50	707.95	26.70	467.74
	777	848.75	29.00	794.33	26.90	489.78

RESULTS for PCS Band (EIRP)

Mode	Channel	f (MHz)	EIRP (PCB Antenna)		EIRP(With Blade Antenna)	
			dBm	mW	dBm	mW
EVDO REV A	25	1851.25	27.10	512.86	28.20	660.69
	600	1880.00	26.80	478.63	29.20	831.76
	1175	1908.75	25.90	389.05	27.00	501.19

ERP for EVDO-REV A Mode (Cellular Band), WITH INTERNAL ANTENNA

Cellular Fundamental Substitution Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration: EUT Only
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	101.5	V	26.0	0.5	0.0	25.5	38.5	-12.9	
824.70	105.8	H	29.5	0.5	0.0	29.0	38.5	-9.4	
Mid Ch									
836.52	102.0	V	26.9	0.5	0.0	26.4	38.5	-12.1	
836.52	105.6	H	29.0	0.5	0.0	28.5	38.5	-9.9	
High Ch									
848.31	100.2	V	25.6	0.5	0.0	25.1	38.5	-13.3	
848.31	105.0	H	29.5	0.5	0.0	29.0	38.5	-9.5	

Rev. 1.24.7

ERP for EVDO-REV A Mode (CELL Band) WITH BLADE ANTENNA

Cellular Fundamental Substitution Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration: EUT / Blade 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	27.2	0.5	0.0	26.7	38.5	-11.7	
824.70	99.0	H	22.7	0.5	0.0	22.2	38.5	-16.2	
Mid Ch									
836.52	102.3	V	27.2	0.5	0.0	26.7	38.5	-11.8	
836.52	100.1	H	23.5	0.5	0.0	23.0	38.5	-15.4	
High Ch									
848.31	102.0	V	27.4	0.5	0.0	26.9	38.5	-11.5	
848.31	99.6	H	24.1	0.5	0.0	23.6	38.5	-14.9	

Rev. 1.24.7

EIRP for EVDO-REV A Mode (PCS Band), WITH INTERNAL ANTENNA

High Frequency Fundamental Measurement
Compliance Certification Services, Fremont 5m Chamber Site

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration:EUT only
Mode:PCS, EV-DO, REV A

Test Equipment:
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	94.7	V	19.4	0.6	8.3	27.1	33.0	-5.9	
1.851	94.5	H	18.4	0.6	8.3	26.1	33.0	-6.9	
Mid Ch									
1.880	94.1	V	18.6	0.6	8.3	26.3	33.0	-6.7	
1.880	95.0	H	19.1	0.6	8.3	26.8	33.0	-6.2	
High Ch									
1.909	92.4	V	17.3	0.7	8.4	24.9	33.0	-8.1	
1.909	94.5	H	18.2	0.7	8.4	25.9	33.0	-7.1	

Rev. 1.24.7

EIRP for EVDO-REV A Mode (PCS Band) WITH BLADE ANTENNA

High Frequency Fundamental Measurement
Compliance Certification Services, Fremont 5m Chamber Site

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration:EUT / Blade Antenna
Mode:PCS, EV-DO, REV A

Test Equipment:
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	95.8	V	20.5	0.6	8.3	28.2	33.0	-4.8	
1.851	93.8	H	17.7	0.6	8.3	25.4	33.0	-7.6	
Mid Ch									
1.880	97.0	V	21.5	0.6	8.3	29.2	33.0	-3.8	
1.880	95.1	H	19.2	0.6	8.3	26.9	33.0	-6.1	
High Ch									
1.909	94.5	V	19.4	0.7	8.4	27.0	33.0	-6.0	
1.909	93.1	H	16.8	0.7	8.4	24.5	33.0	-8.5	

Rev. 1.24.7

9.2. 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

- Ev-DO – Rev A

RESULTS

EVDO-REV A Mode (Cellular Band) , No External Antenna

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

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration: EUT only
Mode: Cell, EV-DO REV A

Test Equipment:

EMCO Horn 1-18 GHz: 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-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 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	58.0	H	-48.7	3.1	7.1	4.9	-46.8	-13.0	-33.8	
2.474	48.0	H	-56.8	3.9	9.3	7.1	-53.6	-13.0	-40.6	
3.299	44.0	H	-56.8	4.6	9.4	7.3	-54.1	-13.0	-41.1	
1.649	55.0	V	-52.4	3.1	7.1	4.9	-50.5	-13.0	-37.5	
2.474	54.2	V	-50.8	3.9	9.3	7.1	-47.6	-13.0	-34.6	
3.299	43.5	V	-57.4	4.6	9.4	7.3	-54.7	-13.0	-41.7	
Mid Ch, 836.52MHz										
1.673	54.0	H	-52.6	3.1	7.2	5.0	-50.7	-13.0	-37.7	
2.510	54.2	H	-50.4	3.9	9.3	7.1	-47.2	-13.0	-34.2	
3.346	43.5	H	-57.1	4.6	9.5	7.3	-54.4	-13.0	-41.4	
1.673	55.0	V	-52.3	3.1	7.2	5.0	-50.4	-13.0	-37.4	
2.510	50.1	V	-54.7	3.9	9.3	7.1	-51.5	-13.0	-38.5	
3.346	43.0	V	-57.7	4.6	9.5	7.3	-55.0	-13.0	-42.0	
High Ch 848.31MHz										
1.697	57.6	H	-48.9	3.1	7.2	5.1	-47.0	-13.0	-34.0	
2.545	57.4	H	-47.0	4.0	9.3	7.1	-43.8	-13.0	-30.8	
3.393	42.0	H	-58.4	4.7	9.5	7.3	-55.8	-13.0	-42.8	
1.697	55.0	V	-52.2	3.1	7.2	5.1	-50.3	-13.0	-37.3	
2.545	56.8	V	-47.8	4.0	9.3	7.1	-44.6	-13.0	-31.6	
3.393	42.5	V	-58.0	4.7	9.5	7.3	-55.4	-13.0	-42.4	

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

EVDO-REV A Mode (Cellular Band) , With Blade Antenna

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

Company: Sierra Wireless
Project #: 08U12312
Date: 2/06/2009
Test Engineer: Chin Pang
Configuration: EUT with Blade Antenna
Mode: Cell, EV-DO REV A

Test Equipment:

EMCO Horn 1-18 GHz: 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-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 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	60.8	H	-45.9	3.1	7.1	4.9	-44.0	-13.0	-31.0	
2.473	49.5	H	-55.3	3.9	9.3	7.1	-52.1	-13.0	-39.1	
3.297	43.6	H	-57.2	4.6	9.4	7.3	-54.5	-13.0	-41.5	
1.649	58.8	V	-48.6	3.1	7.1	4.9	-46.7	-13.0	-33.7	
2.473	50.0	V	-55.0	3.9	9.3	7.1	-51.8	-13.0	-38.8	
3.297	43.4	V	-57.5	4.6	9.4	7.3	-54.8	-13.0	-41.8	
Mid Ch, 836.52MHz										
1.673	60.8	H	-45.8	3.1	7.2	5.0	-43.9	-13.0	-30.9	
2.510	56.0	H	-48.6	3.9	9.3	7.1	-45.4	-13.0	-32.4	
3.356	42.7	H	-57.9	4.6	9.5	7.3	-55.2	-13.0	-42.2	
1.673	60.5	V	-46.8	3.1	7.2	5.0	-44.9	-13.0	-31.9	
2.510	59.2	V	-45.6	3.9	9.3	7.1	-42.4	-13.0	-29.4	
3.356	43.2	V	-57.5	4.6	9.5	7.3	-54.8	-13.0	-41.8	
High Ch 848.31MHz										
1.697	61.6	H	-44.9	3.1	7.2	5.1	-43.0	-13.0	-30.0	
2.545	48.6	H	-55.8	4.0	9.3	7.1	-52.6	-13.0	-39.6	
3.393	42.2	H	-58.2	4.7	9.5	7.3	-55.6	-13.0	-42.6	
1.697	63.0	V	-44.2	3.1	7.2	5.1	-42.3	-13.0	-29.3	
2.545	49.5	V	-55.1	4.0	9.3	7.1	-51.9	-13.0	-38.9	
3.393	43.2	V	-57.3	4.7	9.5	7.3	-54.7	-13.0	-41.7	

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

EVDO-REV A Mode (PCS Band) No External Antenna

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

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration: EUT only
Mode: PCS, EV-DO REV A

Test Equipment:

EMCO Horn 1-18 GHz: 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-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 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	57.0	H	-42.2	4.9	9.7	7.5	-37.5	-13.0	-24.5	
5.554	46.5	H	-46.5	6.3	11.0	8.9	-41.8	-13.0	-28.8	
7.405	42.0	H	-47.7	7.3	12.0	9.8	-43.0	-13.0	-30.0	
3.703	60.0	V	-39.3	4.9	9.7	7.5	-34.6	-13.0	-21.6	
5.554	48.5	V	-45.5	6.3	11.0	8.9	-40.8	-13.0	-27.8	
7.405	42.6	V	-47.9	7.3	12.0	9.8	-43.2	-13.0	-30.2	
Mid Ch, 1880MHz										
3.760	58.0	H	-41.0	5.0	9.7	7.5	-36.3	-13.0	-23.3	
5.640	45.0	H	-48.2	6.3	11.2	9.0	-43.3	-13.0	-30.3	
7.520	43.0	H	-46.4	7.4	12.0	9.8	-41.8	-13.0	-28.8	
3.760	62.3	V	-36.8	5.0	9.7	7.5	-32.1	-13.0	-19.1	
5.640	46.2	V	-48.0	6.3	11.2	9.0	-43.1	-13.0	-30.1	
7.520	42.0	V	-48.2	7.4	12.0	9.8	-43.6	-13.0	-30.6	
High Ch 1908.75MHz										
3.818	65.5	H	-33.3	5.0	9.7	7.6	-28.6	-13.0	-15.6	
5.726	44.2	H	-49.1	6.4	11.3	9.2	-44.2	-13.0	-31.2	
7.635	43.6	H	-45.5	7.4	12.0	9.8	-40.9	-13.0	-27.9	
3.818	71.5	V	-27.4	5.0	9.7	7.6	-22.7	-13.0	-9.7	
5.726	45.0	V	-49.3	6.4	11.3	9.2	-44.4	-13.0	-31.4	
7.635	43.3	V	-46.6	7.4	12.0	9.8	-42.0	-13.0	-29.0	

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

EVDO-REV A Mode (PCS Band) With Blade Antenna

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

Company: Sierra Wireless
Project #: 08U12312
Date: 2/05/2009
Test Engineer: Chin Pang
Configuration: EUT with Blade Antenna
Mode: PCS, EV-DO REV A

Test Equipment:

EMCO Horn 1-18 GHz: 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-amplifer 1-26GHz: T34 HP 8449B
Pre-amplifer 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	62.0	H	-37.2	4.9	9.7	7.5	-32.5	-13.0	-19.5	
5.554	43.5	H	-49.5	6.3	11.0	8.9	-44.8	-13.0	-31.8	
7.405	41.5	H	-48.2	7.3	12.0	9.8	-43.5	-13.0	-30.5	
3.703	65.5	V	-33.8	4.9	9.7	7.5	-29.1	-13.0	-16.1	
5.554	45.0	V	-49.0	6.3	11.0	8.9	-44.3	-13.0	-31.3	
7.405	42.6	V	-47.9	7.3	12.0	9.8	-43.2	-13.0	-30.2	
Mid Ch, 1880MHz										
3.760	67.5	H	-31.5	5.0	9.7	7.5	-26.8	-13.0	-13.8	
5.640	42.6	H	-50.6	6.3	11.2	9.0	-45.7	-13.0	-32.7	
7.520	43.6	H	-45.8	7.4	12.0	9.8	-41.2	-13.0	-28.2	
3.760	70.4	V	-28.7	5.0	9.7	7.5	-24.0	-13.0	-11.0	
5.640	45.2	V	-49.0	6.3	11.2	9.0	-44.1	-13.0	-31.1	
7.520	42.3	V	-47.9	7.4	12.0	9.8	-43.3	-13.0	-30.3	
High Ch 1908.75MHz										
3.818	62.0	H	-36.8	5.0	9.7	7.6	-32.1	-13.0	-19.1	
5.726	43.6	H	-49.7	6.4	11.3	9.2	-44.8	-13.0	-31.8	
7.635	42.3	H	-46.8	7.4	12.0	9.8	-42.2	-13.0	-29.2	
3.818	67.1	V	-31.8	5.0	9.7	7.6	-27.1	-13.0	-14.1	
5.726	43.5	V	-50.8	6.4	11.3	9.2	-45.9	-13.0	-32.9	
7.635	42.0	V	-47.9	7.4	12.0	9.8	-43.3	-13.0	-30.3	

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

9.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§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.

CALCULATIONS

Given

E = √ (30 * P * G) / d

and

S = E ^ 2 / 3770

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

d = √ ((30 * P * G) / (3770 * S))

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

d = 100 * √ ((30 * (P / 1000) * G) / (3770 * S))
d = 0.282 * √ (P * G / S)

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

d = 0.282 * 10 ^ ((P + G) / 20) / √ S Equation (1)

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

RESULTS

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
800MHz Celllar	20.0	29.21	2.01	0.263
1900 MHz PCS	20.0	29.23	2.94	0.328

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

9.4. 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.

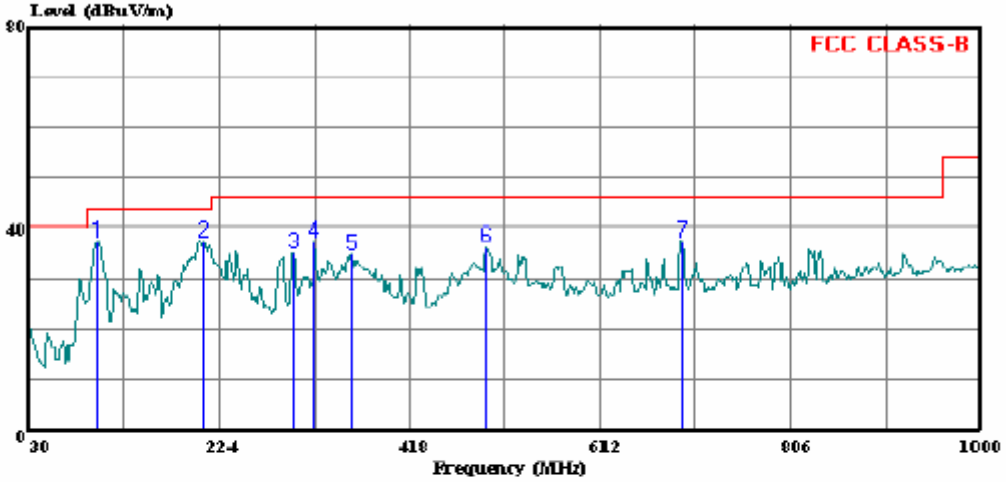
RESULTS

See the following pages.

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, HORIZONTAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 4 File#: 08U12312.EMI Date: 02-07-2009 Time: 14:42:47



Trace: 3 Ref Trace:

Condition: FCC CLASS-B 3m HORIZONTAL
Test Operator:: Chin Pangn
Project #: : 08U12312
Company: : Sierra Wireless
Model: : AC402
Configuration:: EUT with blade Antenna and Support
: Equipment
Mode : : Normal
Target: : FCC Class B

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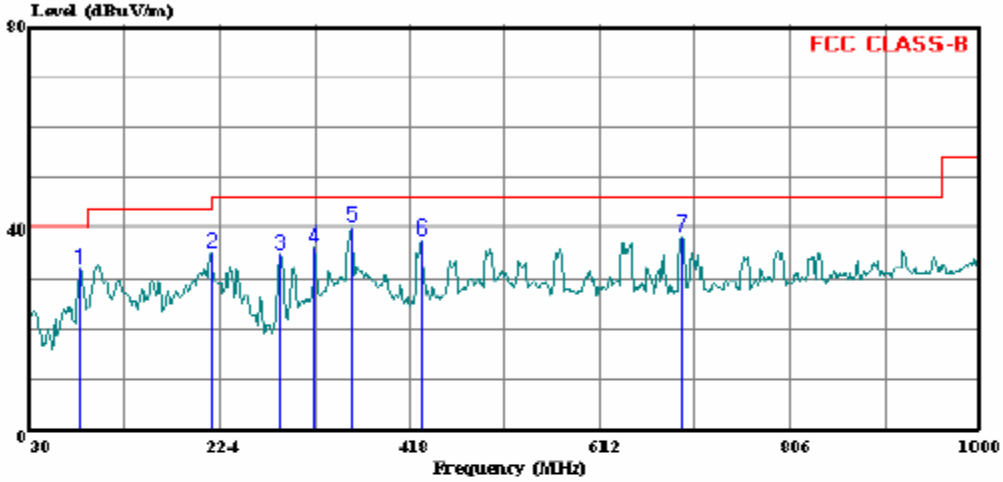
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	99.840	53.89	-16.45	37.44	43.50	-6.06	Peak
2	208.480	50.18	-12.85	37.33	43.50	-6.17	Peak
3	299.660	46.46	-11.09	35.37	46.00	-10.64	Peak
4	320.030	47.76	-10.50	37.26	46.00	-8.74	Peak
5	358.830	44.41	-9.38	35.03	46.00	-10.97	Peak
6	494.630	41.34	-4.92	36.42	46.00	-9.58	Peak
7	696.390	37.93	-0.58	37.35	46.00	-8.65	Peak

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, VERTICAL

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 6 File#: 08U12312.EMI Date: 02-07-2009 Time: 14:50:56



(Fremont)

Trace: 5 Ref Trace:

Condition: FCC CLASS-B 3m VERTICAL
Test Operator:: Chin Pangn
Project #: : 08U12312
Company: : Sierra Wireless
Model: : AC402
Configuration:: EUT with blade Antenna and Support
: Equipment
Mode : : Normal
Target: : FCC Class B

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	80.440	51.03	-18.86	32.17	40.00	-7.83	Peak
2	216.240	48.19	-12.96	35.23	46.00	-10.77	Peak
3	286.080	46.53	-11.69	34.84	46.00	-11.16	Peak
4	320.030	46.85	-10.50	36.35	46.00	-9.65	Peak
5	358.830	49.49	-9.38	40.11	46.00	-5.89	Peak
6	429.640	44.88	-7.20	37.68	46.00	-8.32	Peak
7	696.390	38.96	-0.58	38.38	46.00	-7.62	Peak

RECEIVER SPURIOUS EMISSIONS FOR ABOVE 1GHz

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