



**FCC CFR47 PART 22 SUBPART H  
FCC CFR47 PART 24 SUBPART E  
CERTIFICATION TEST REPORT**

**FOR**

**CDMA+ WIMAX + WIFI MOBILE HOT SPOT**

**MODEL NUMBER: AirCard W802S**

**FCC ID: N7N-MHS802**

**REPORT NUMBER: 10U13412-2, Revision A**

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**NVLAP®**

NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Issue	Revisions	Revised By
---	10/12/10		Initial Issue	T. Chan
A	01/12/11		Changed model name	A. Zaffar

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## 1. ATTESTATION OF TEST RESULTS

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

**EUT DESCRIPTION:** CDMA+ WIMAX + WIFI MOBILE HOT SPOT

**MODEL:** AirCard W802S

**SERIAL NUMBER:** 3

**DATE TESTED:** SEPTEMBER 21 - 23, 2010

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 22 Subpart H	Pass
CFR 47 Part 24 Subpart E	Pass

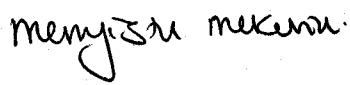
Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:



Tested By:




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THU CHAN  
ENGINEERING MANAGER  
UL CCS

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MENGISTU MEKURIA  
EMC ENGINEER  
UL CCS

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, FCC CFR 47 Part 22, and FCC CFR Part 24.

## 3. FACILITIES AND ACCREDITATION

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

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

### 4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a CDMA + WiMax + WiFi mobile Hot Spot router

The WiMax radio module is manufactured by Sierra Wireless.

#### GENERAL INFORMATION

Power Requirements	5.2 VDC/1.2A
List of frequencies generated or used by the EUT	Sleep clock: 32.768kHz (2 crystals) Application processor: 13MHzWiFi: 26MHz WiMAX: 40MHzUSB transceiver: 24MHzEVDO: 19.2MHz

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum ERP & EIRP peak output powers as follows:

#### Part 22 Cellular Band

Frequency range (MHz)	Modulation	Conducted		ERP	
		dBm	mW	dBm	mW
824.7 – 848.31	1xRTT	27.630	579.429	27.800	602.560
824.7 – 848.31	EVDO REV. A	28.270	671.429	26.300	426.580

#### Part 24 PCS Band

Frequency range (MHz)	Modulation	Conducted		EIRP	
		dBm	mW	dBm	mW
1851.25 – 1908.75	1xRTT	27.54	567.5	31.10	1288.2
1851.25 – 1908.76	EVDO REV. A	28.12	648.6	31.40	1380.4

### 5.3. DESCRIPTION OF AVAILABLE ANTENNS

The radio utilizes a PCB integrated antenna with a maximum gain of -0.5dBi for Cell band and 1.0dBi for PCS band.

## 5.4. SOFTWARE AND FIRMWARE

The EUT is linked with 8960 Agilent Wireless Communication Test Set.

## 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

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

Worst case modes:

- Cellular & PCS Bands:
  - CDMA 1xRTT
  - CDMA EVDO Rev A.

For the fundamental investigation, since the EUT is a portable device it was investigated for X and Y-Positions, and the worst position among X and Y with AC/DC adapter, after the investigations, the worst-position was turned out to be an X-position with AC/DC adapter for Cell band and X-position without AC/DC for PCS bands.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/DC Adapter	Sierra Wireless	SSW-2012	5/10/2450	N/A

### I/O CABLES (CONDUCTED TEST)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Un-shielded	1.2m	N/A
2	DC	1	DC	Un-shielded	1.0m	N/A
3	RF	1	RF	Shielded	0.2m	N/A

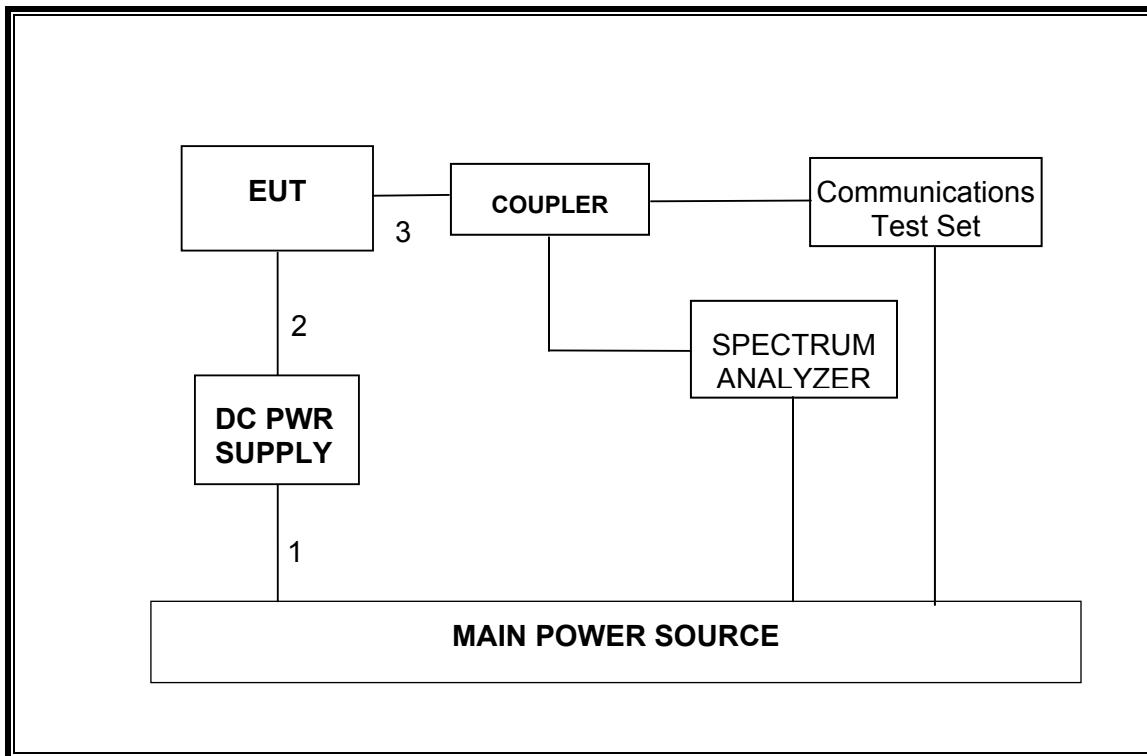
### I/O CABLES (RADIATED TEST)

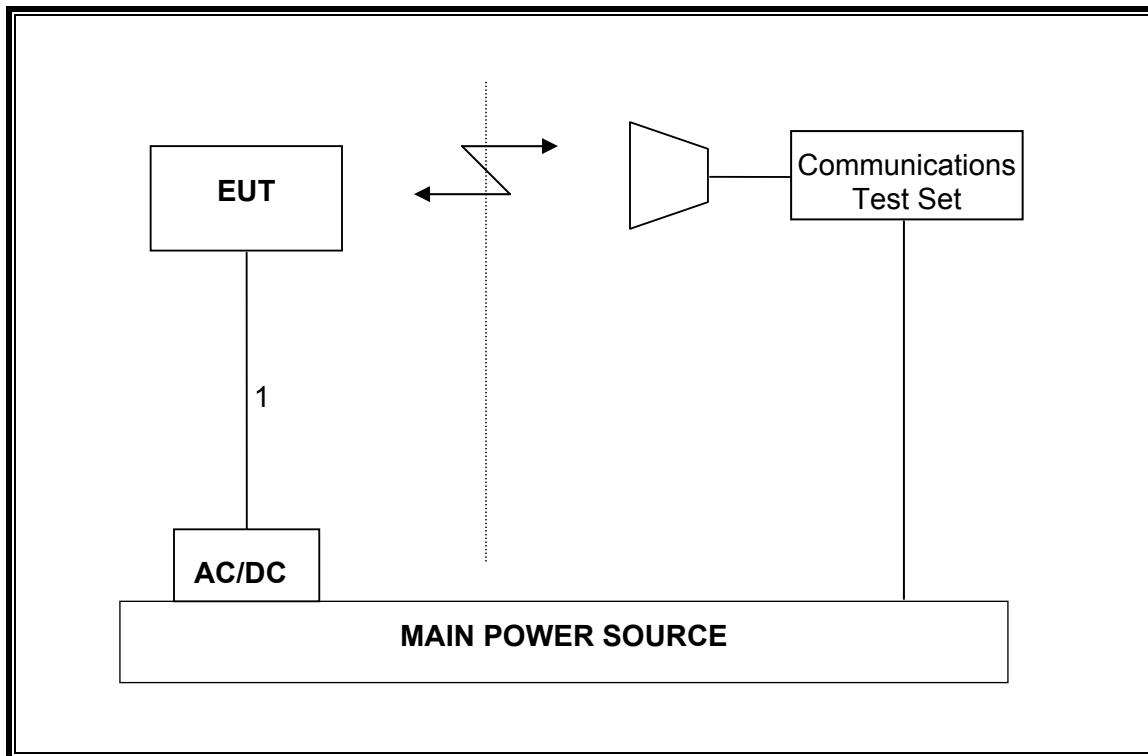
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	DC	Un-shielded	1.2m	NA

### TEST SETUP

The EUT is a stand-alone device during the test. A wireless link was established between the EUT and the communications test set.

**SETUP DIAGRAM FOR CONDUCTED TESTS**



**SETUP DIAGRAM FOR RADIATED TESTS**

## 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
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	05/08/11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	10/29/11
Communications Test Set	Agilent / HP	E5515C	C01086	06/17/11
Peak Power Meter	Boonton	4541	C01189	02/26/11
Peak Power Sensor	Boonton	57006	C01203	02/24/11
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	04/11/11
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
DC power supply, 60 V @ 18 A	Xantrex	XHR-60-18	C01064	CNR
Directional Coupler, 18 GHz	Krytar	1817	N02656	CNR
Signal Generator, 20 GHz	Agilent / HP	83732B	C00774	07/14/12
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	07/10/11

## 7. OUTPUT POWER 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. CDMA2000 1xRTT

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

<u>Application</u>	<u>Rev. License</u>
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CDMA2000 Mobile Test	B.13.08, L
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- Protocol Rev > 6 (IS-2000-0)
- System ID: 8; NID: 65535; Reg. Ch. #. 384 (Cell) & 600 (PCS)
- Radio Config (RC) > Please see following table for 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 > All Up bits (Maximum TxPout)

#### RF Output Power for Cellular Band

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		Ch. 1013 / 824.7 MHz	Ch. 384 / 836.52 MHz	Ch. 777 / 848.31 MHz
		Peak	Peak	Peak
RC1	2 (Loopback)	27.33	<b>27.61</b>	26.94
	55 (Loopback)	27.32	27.52	26.91
RC2	9 (Loopback)	27.29	27.47	26.90
	55 (Loopback)	27.25	27.53	26.82
RC3	2 (Loopback)	26.93	27.10	26.48
	55 (Loopback)	26.89	27.01	26.56
	32 (+ F-SCH)	26.95	27.07	26.56
	32 (+ SCH)	26.85	27.03	26.50
RC4	2 (Loopback)	26.91	27.00	26.51
	55 (Loopback)	26.93	27.02	26.51
	32 (+ F-SCH)	26.92	27.05	26.52
	32 (+ SCH)	26.91	27.07	26.62
RC5	9 (Loopback)	26.94	27.02	26.50
	55 (Loopback)	26.92	27.02	26.52

**RF Output Power for PCS Band**

Radio Configuration (RC)	Service Option (SO)	Conducted Output Power (dBm)		
		Ch. 25 / 1851.25 MHz	Ch. 600 / 1880 MHz	Ch. 1175 / 1908.75 MHz
		Peak	Peak	Peak
RC1	2 (Loopback)	27.22	27.51	26.59
	55 (Loopback)	27.26	27.55	26.49
RC2	9 (Loopback)	27.24	<b>27.56</b>	26.47
	55 (Loopback)	27.25	27.52	26.49
RC3	2 (Loopback)	26.86	27.17	26.17
	55 (Loopback)	26.90	27.23	26.14
	32 (+ F-SCH)	26.90	27.15	26.16
	32 (+ SCH)	26.88	27.14	26.09
RC4	2 (Loopback)	26.90	27.16	26.19
	55 (Loopback)	26.90	27.20	26.16
	32 (+ F-SCH)	26.95	27.20	26.21
	32 (+ SCH)	26.92	27.16	26.14
RC5	9 (Loopback)	26.90	27.20	26.18
	55 (Loopback)	26.89	27.15	26.17

## 7.2. CDMA200 1xEv-Do

### 7.2.1. Release 0 (Rel. 0)

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

#### EVDO Release 0 - RTAP

- Call Setup > Shift & Preset
- Call Control:
  - Access Network Info > Cell Parameters > Sector ID > 00000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- CallParms:
  - 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 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- CallParms:
  - 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

Band	FTAP Rate	RTAP Rate	Channel	f (MHz)	Conducted power (dBm)
					Peak
Cellular	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	27.552
			384	836.52	<b>27.944</b>
			777	848.31	27.109
PCS	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	27.072
			600	1880.00	<b>27.217</b>
			1175	1908.75	26.397

### 7.2.2. Revision A (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.09.13

#### EVDO Rev. 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: 00000000: 00000000: 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 Rev. 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: 00000000: 00000000: 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)

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	f (MHz)	Conducted power (dBm)
					Peak
Cellular	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	27.867
			384	836.52	<b>28.370</b>
			777	848.31	27.326
PCS	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	27.867
			600	1880.00	<b>28.264</b>
			1175	1908.75	27.394

## 8. CONDUCTED TEST RESULTS

### 8.1. OCCUPIED BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the -26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal -26 dB bandwidth function is utilized.

#### RESULTS

##### CELL, 1xRTT Modulation

Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	824.70	1.279	1.396
Middle	836.52	1.288	1.406
High	848.31	1.280	1.415

##### CELL, EVDO REV. A Modulation

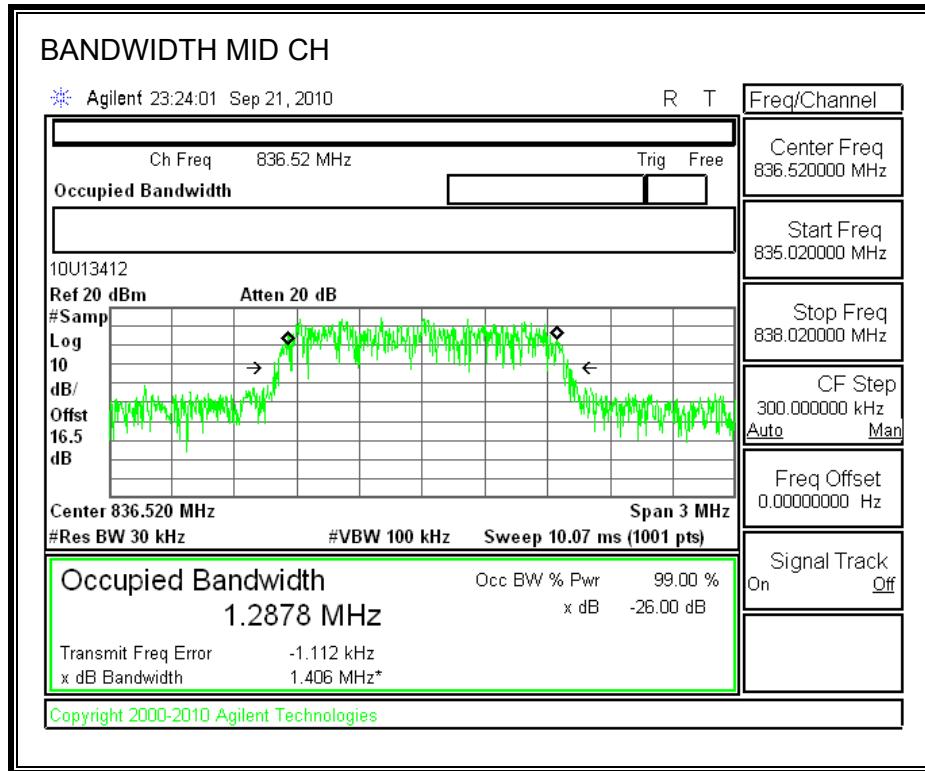
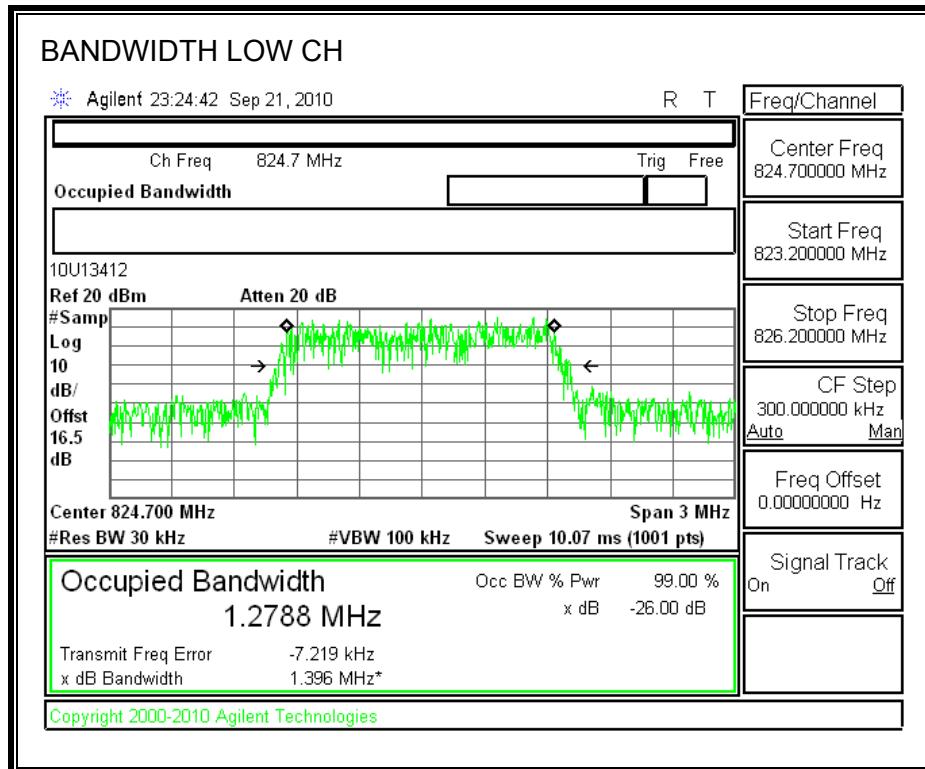
Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	824.70	1.275	1.395
Middle	836.52	1.280	1.394
High	848.31	1.272	1.375

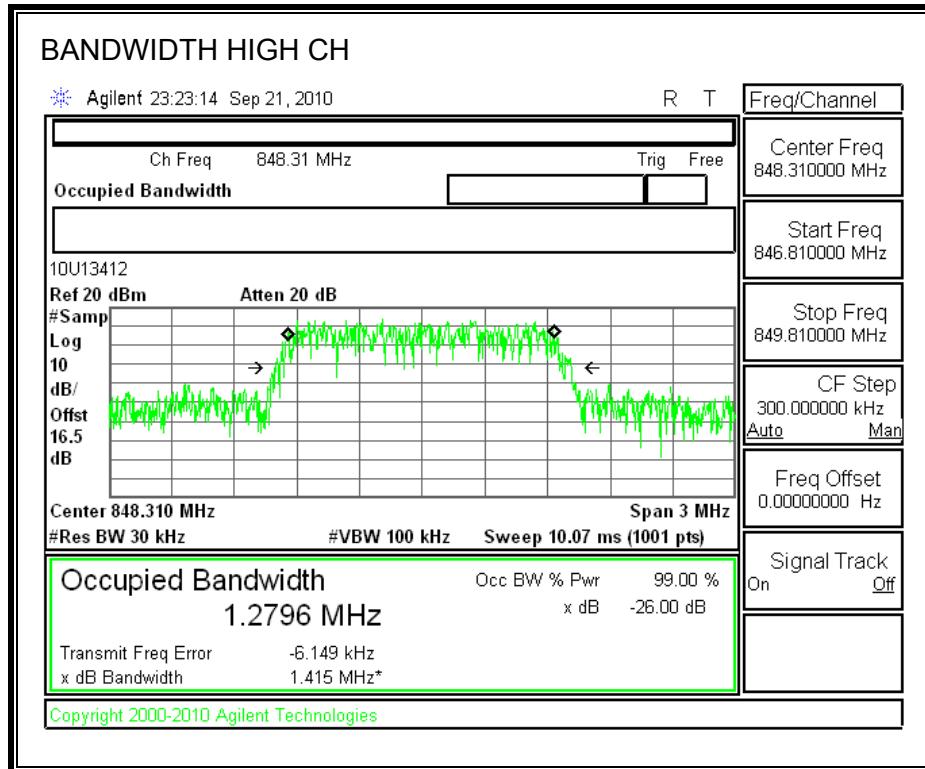
##### PCS, 1xRTT Modulation

Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	1851.25	1.292	1.403
Middle	1880.00	1.292	1.411
High	1908.75	1.297	1.412

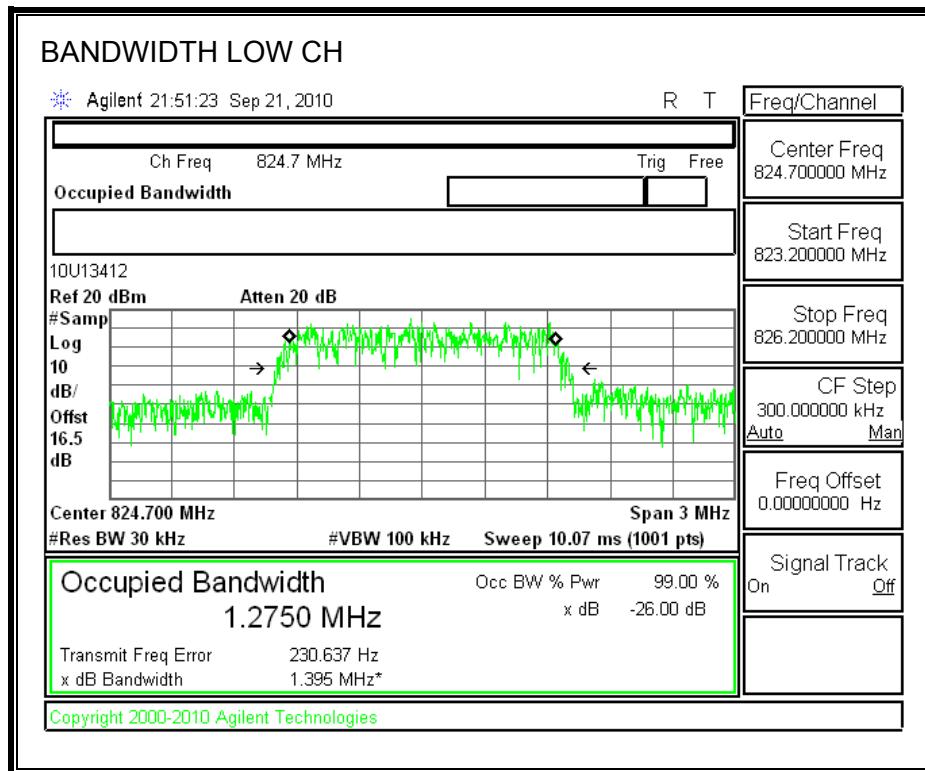
##### PCS, EVDO REV. A Modulation

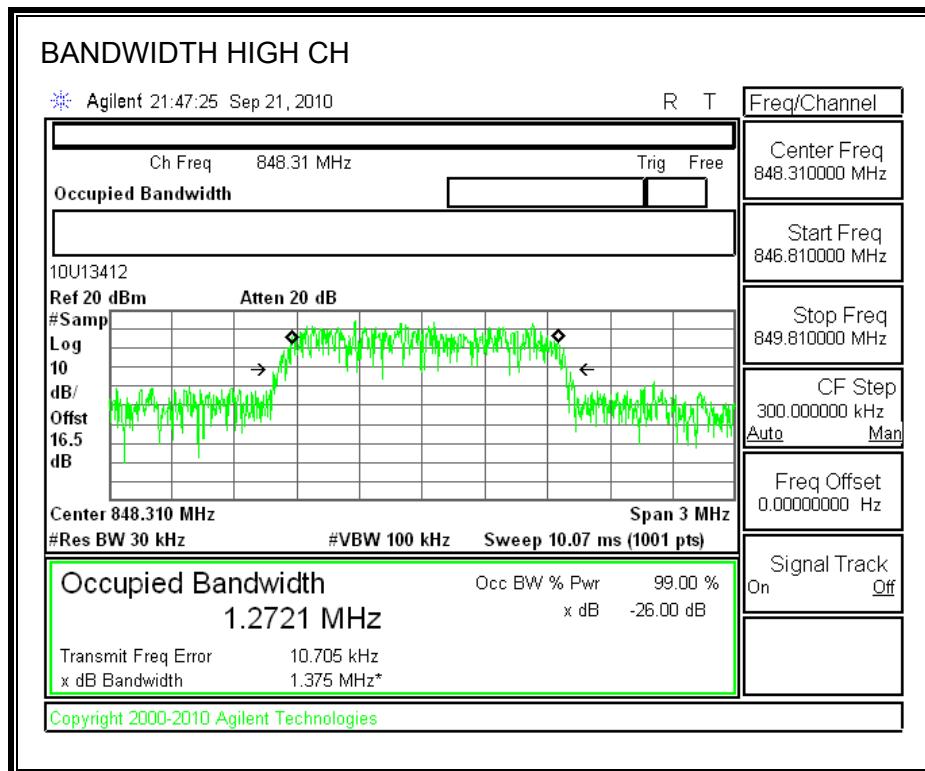
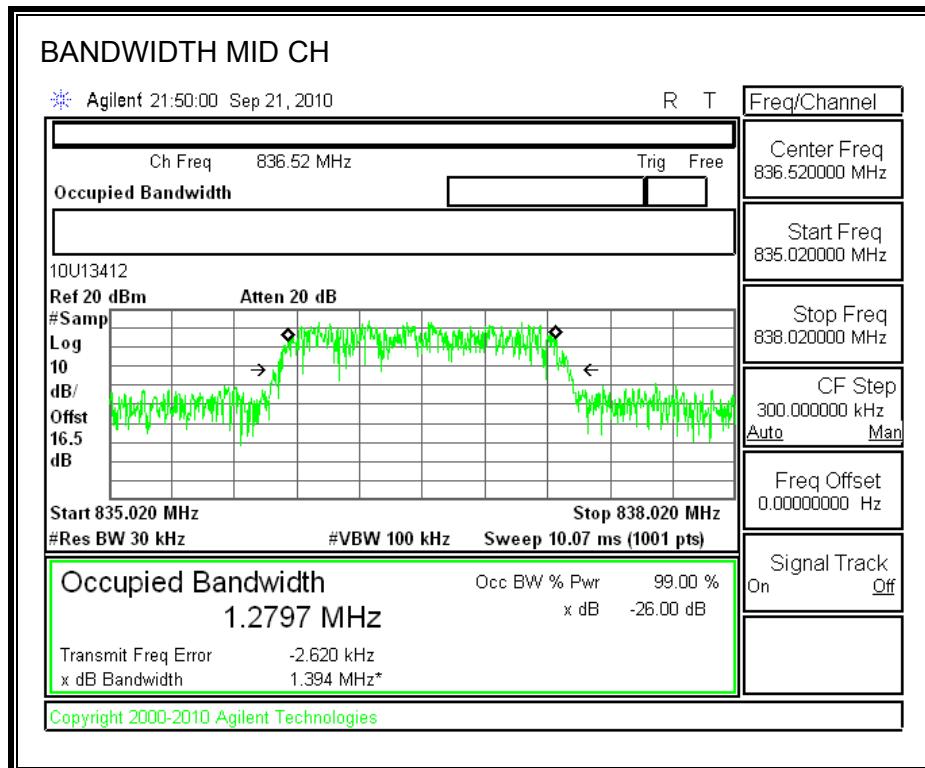
Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	1851.25	1.295	1.413
Middle	1880.00	1.298	1.449
High	1908.75	1.294	1.400

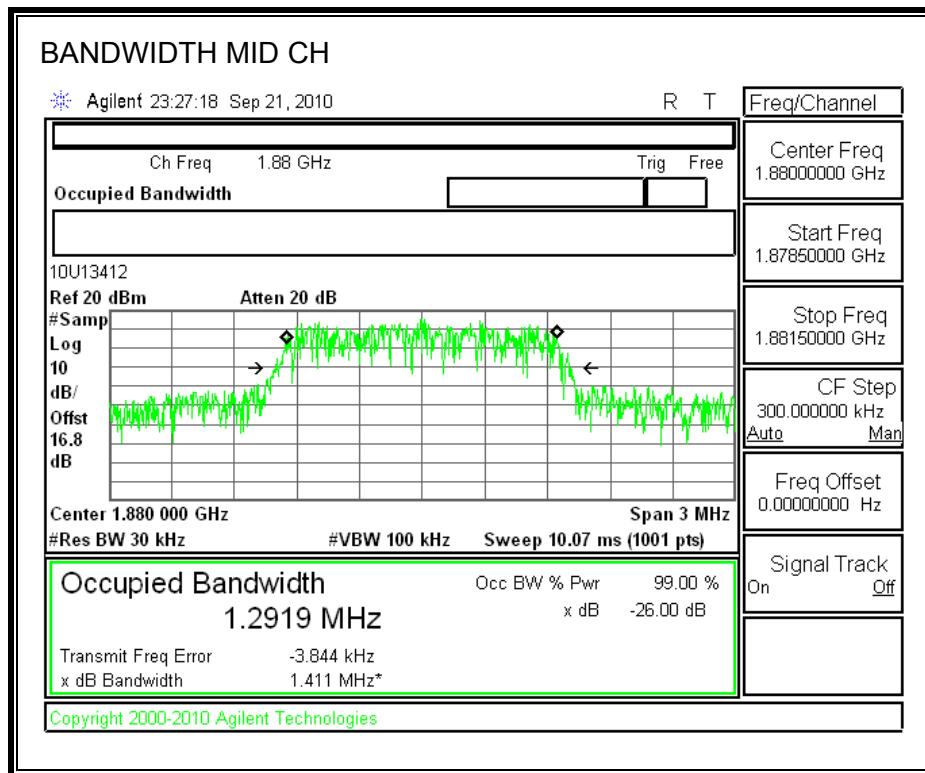
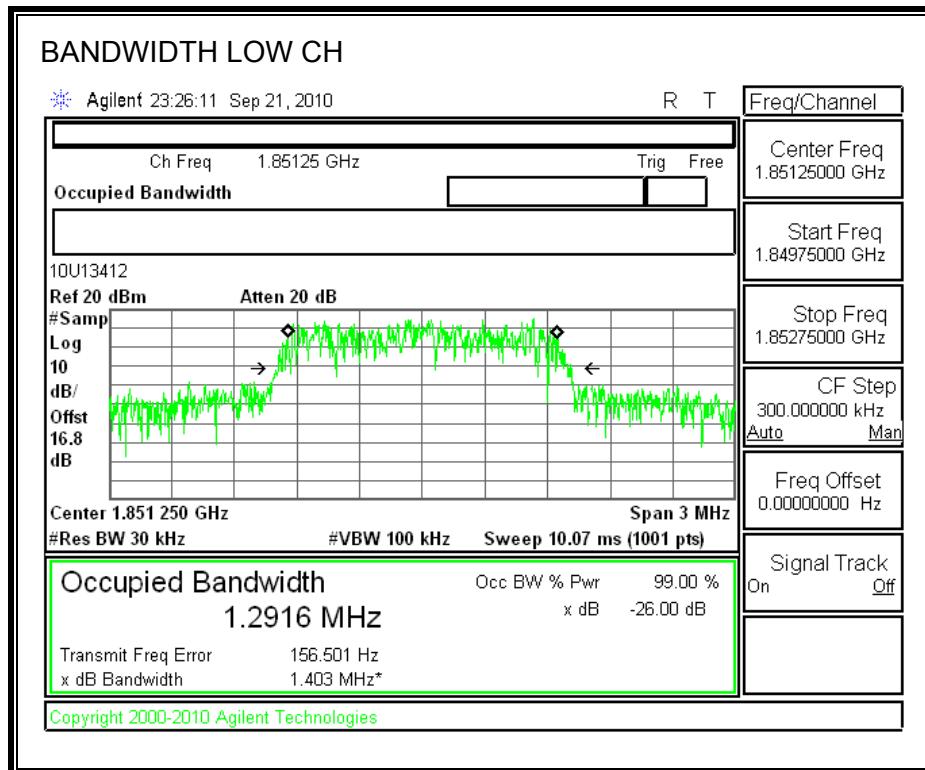
**CELL, 1xRTT MODULATION**

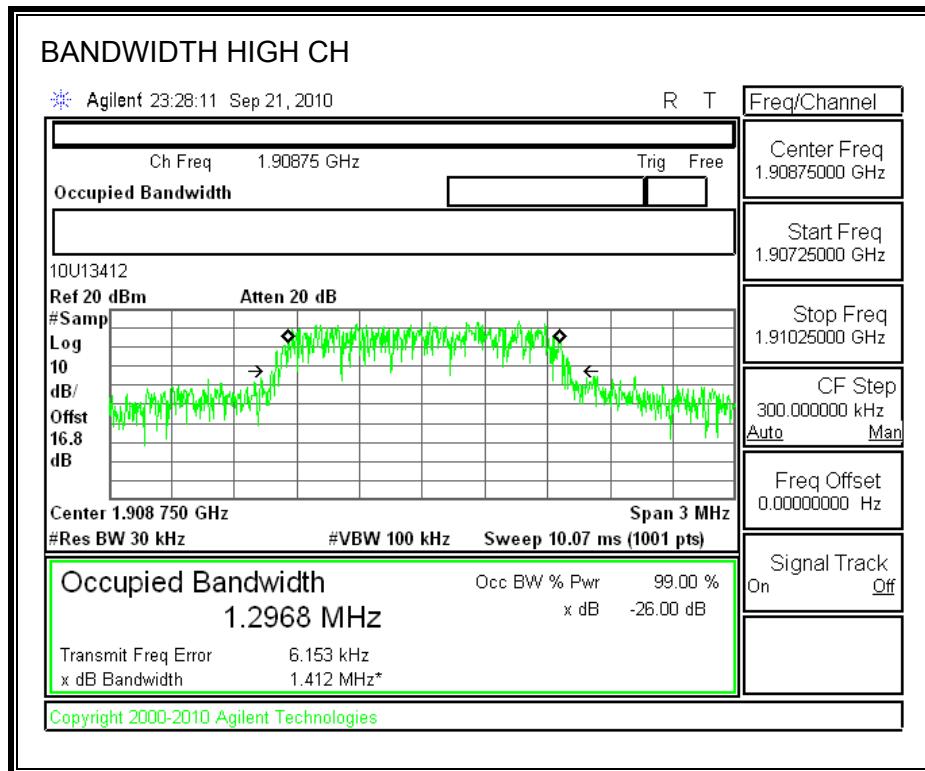


### CELL, EVDO REV A MODULATION

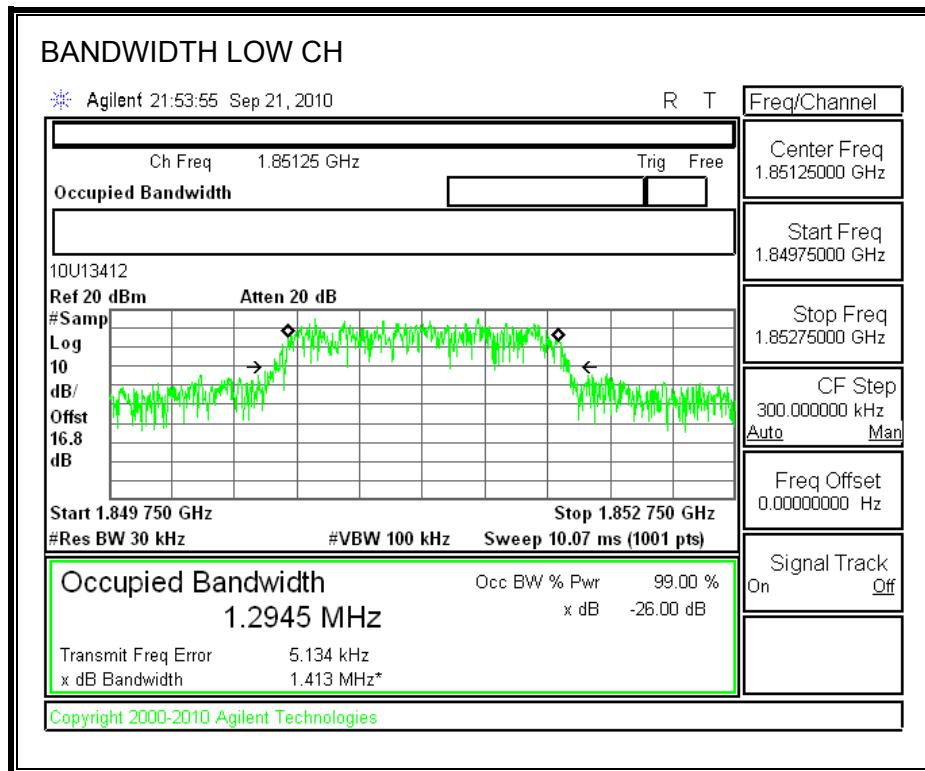


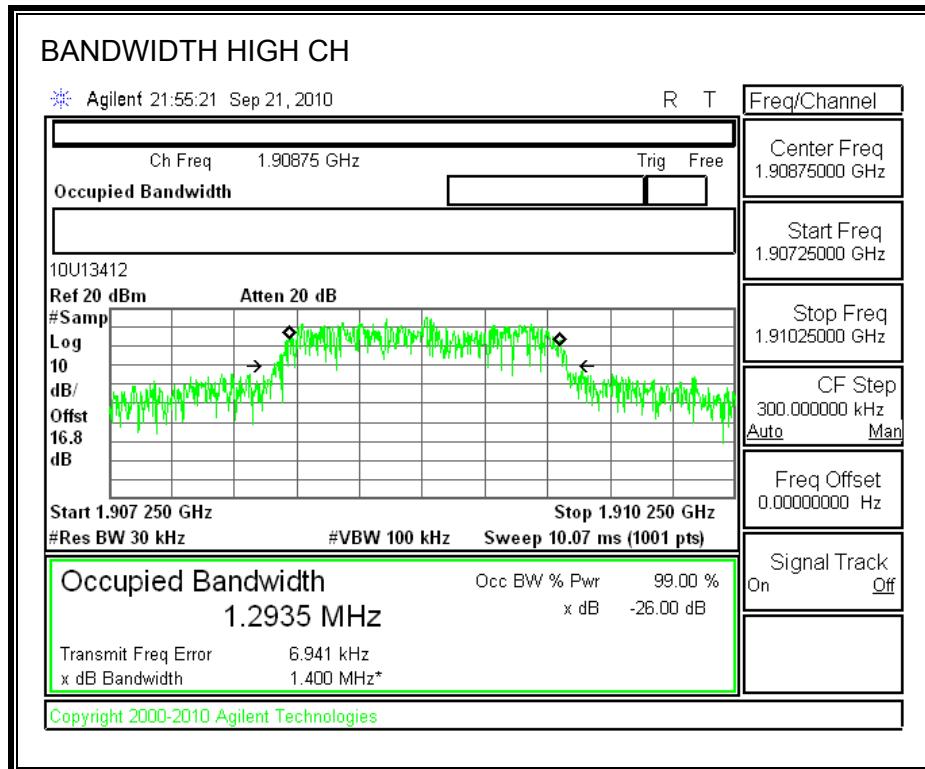
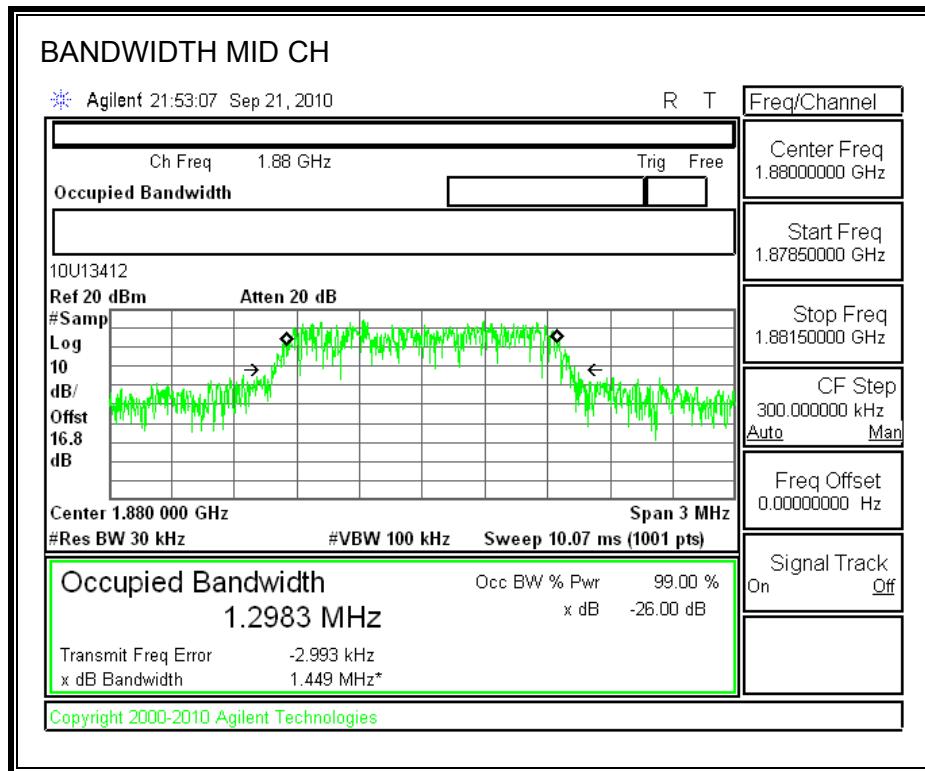


**PCS, 1xRTT MODULATION**



### PCS, EVDO REV.A MODULATION





## 8.2. RF POWER OUTPUT

### LIMIT

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

24.232(b) & RSS133 § 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 The maximum ERP shall be 6.3 Watts for mobile stations.

### TEST PROCEDURE

RSS-132, RSS-133, & ANSI / TIA / EIA 603C Clause 2.2.17

### RESULTS

#### CELL, 1xRTT Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	824.70	27.39	548.28
Middle	836.52	27.63	579.43
High	848.31	26.89	488.65

#### CELL, EVDO REV A Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	824.70	27.97	626.61
Middle	836.52	28.27	671.43
High	848.31	27.58	572.80

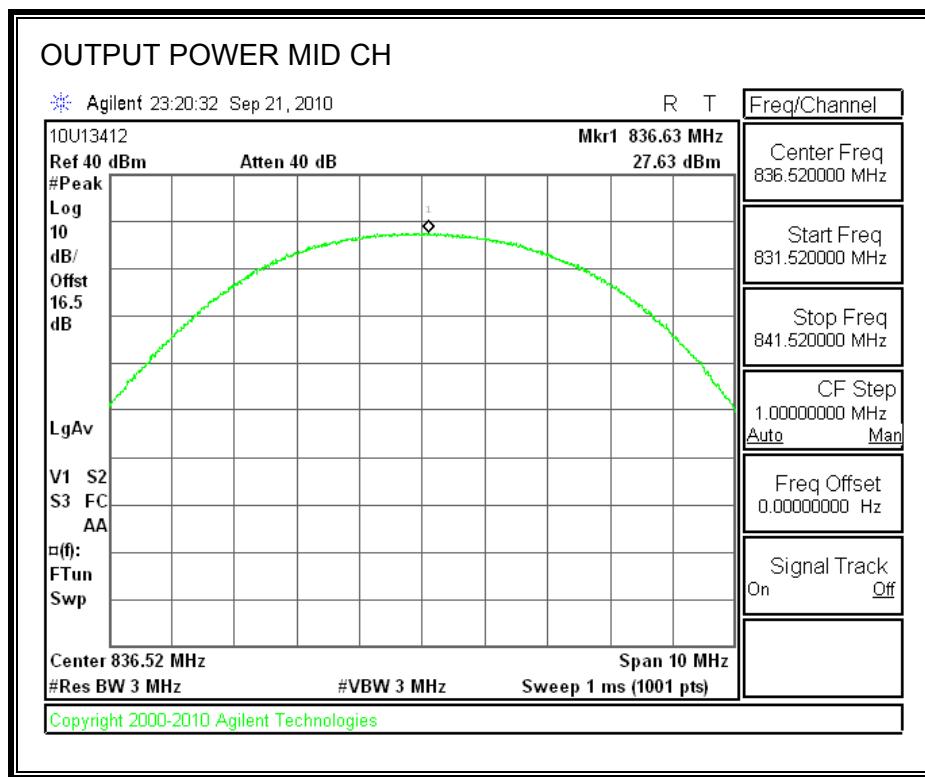
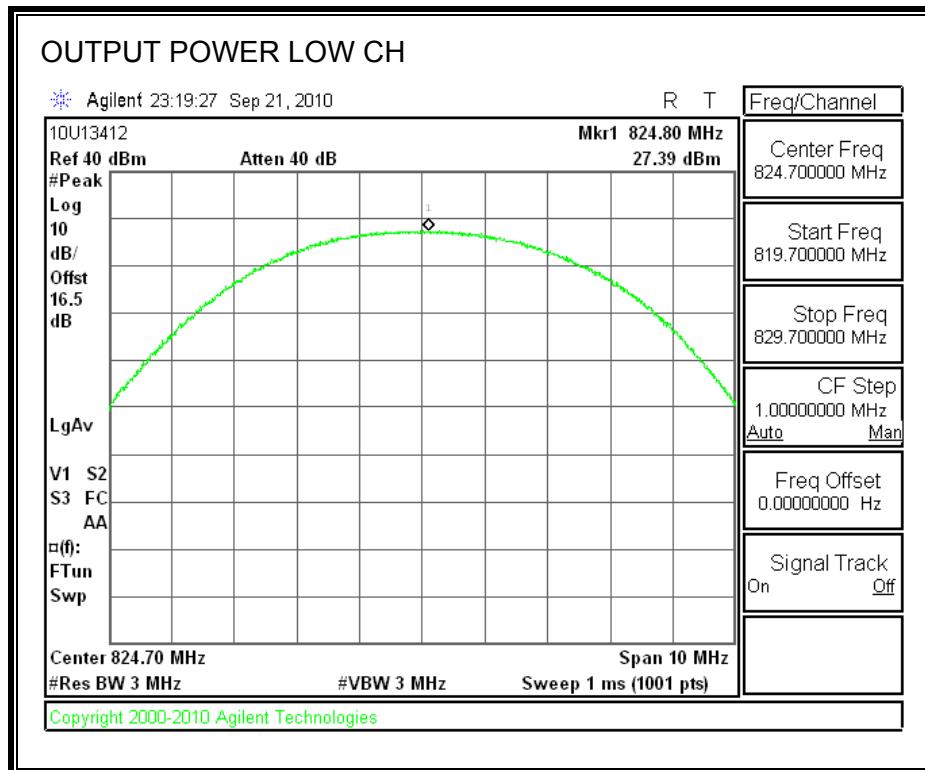
PCS, 1xRTT Modulation

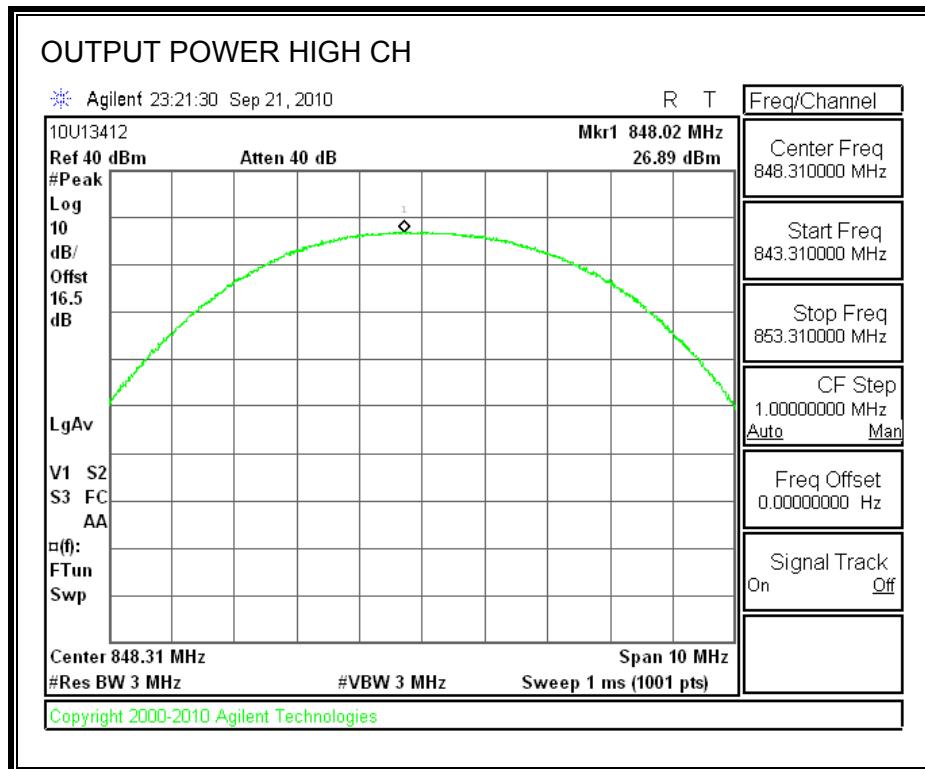
Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	1851.25	27.32	539.51
Middle	1880.00	27.54	567.54
High	1908.75	26.72	469.89

PCS, EVDO REV A Modulation

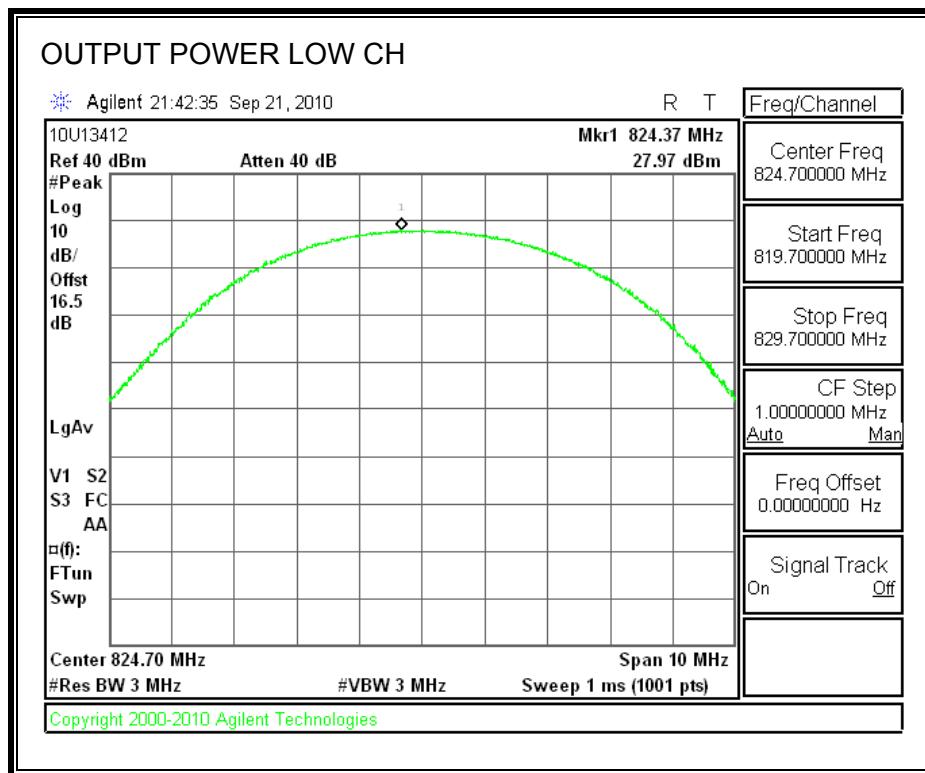
Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	1851.25	27.86	610.94
Middle	1880.00	28.12	648.63
High	1908.75	27.45	555.90

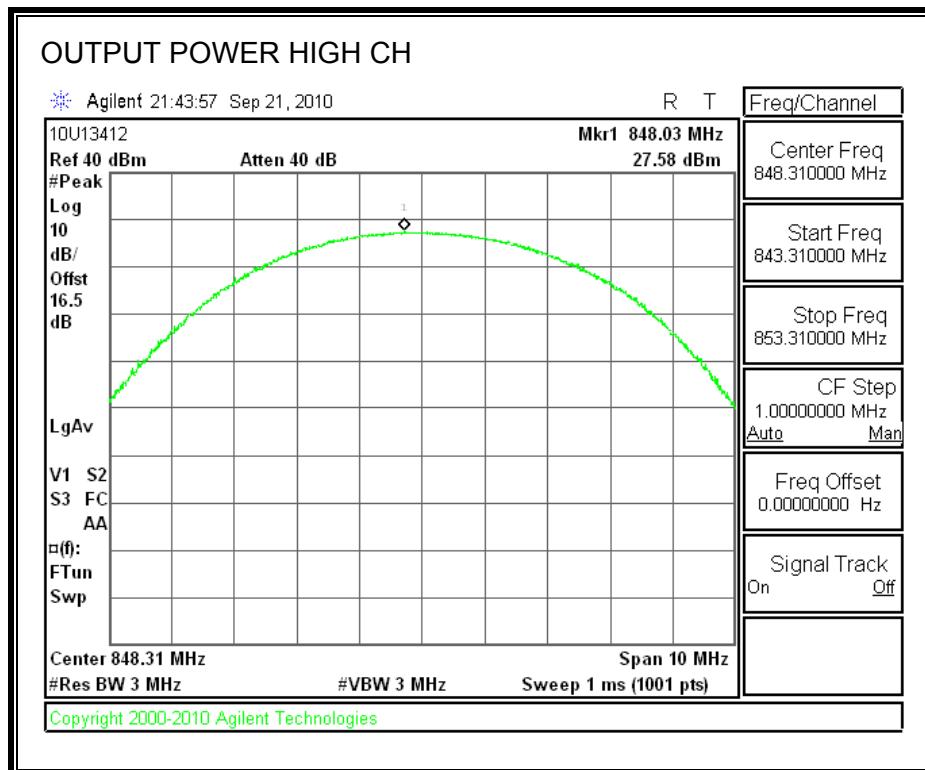
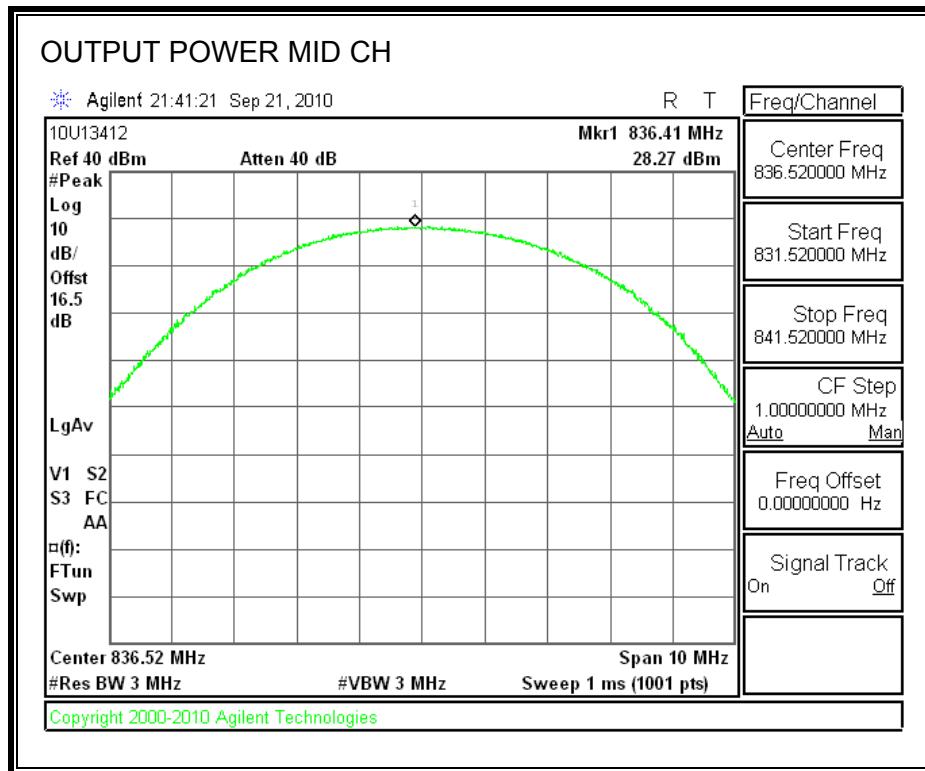
NOTE: RBW=VBW=3MHz

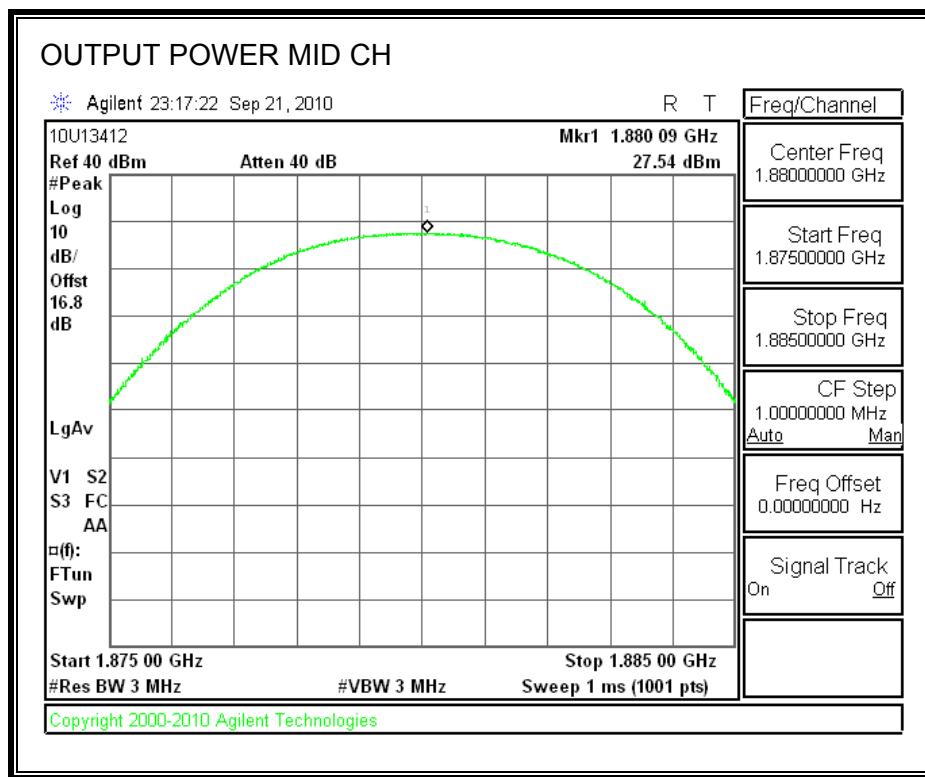
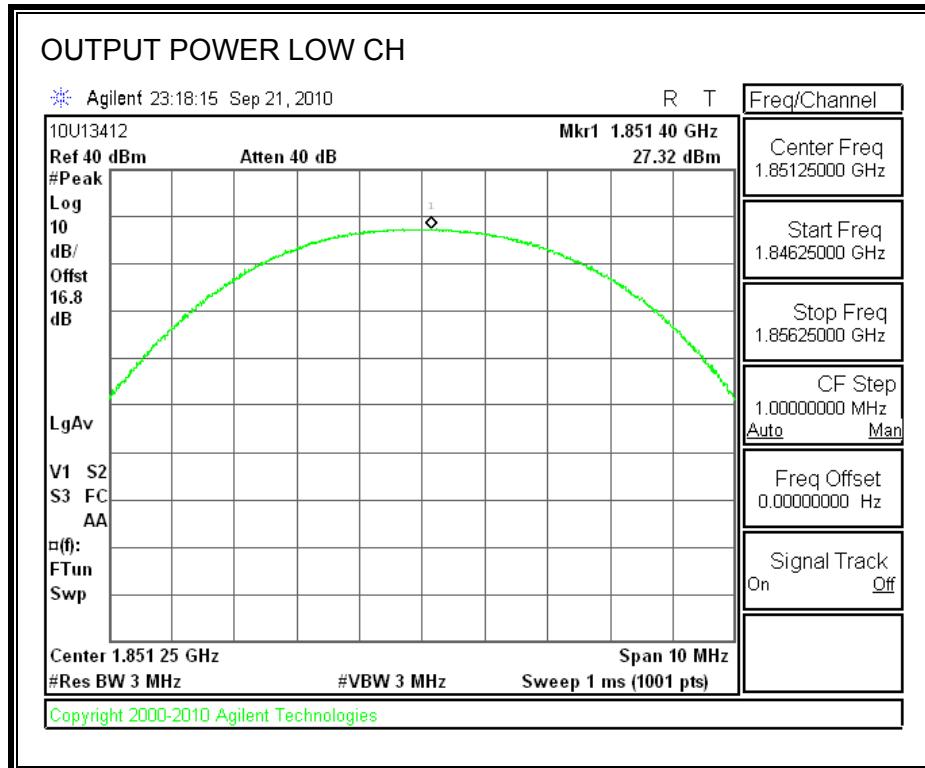
**CELL, 1xRTT MODULATION**

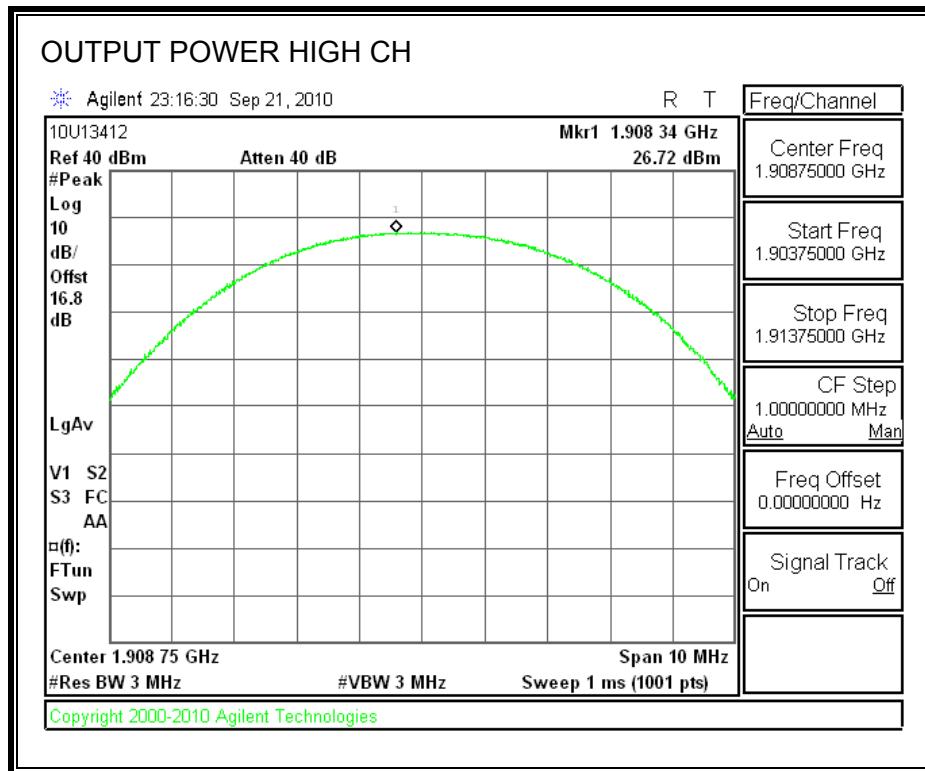


## CELL, EVDO REV A MODULATION

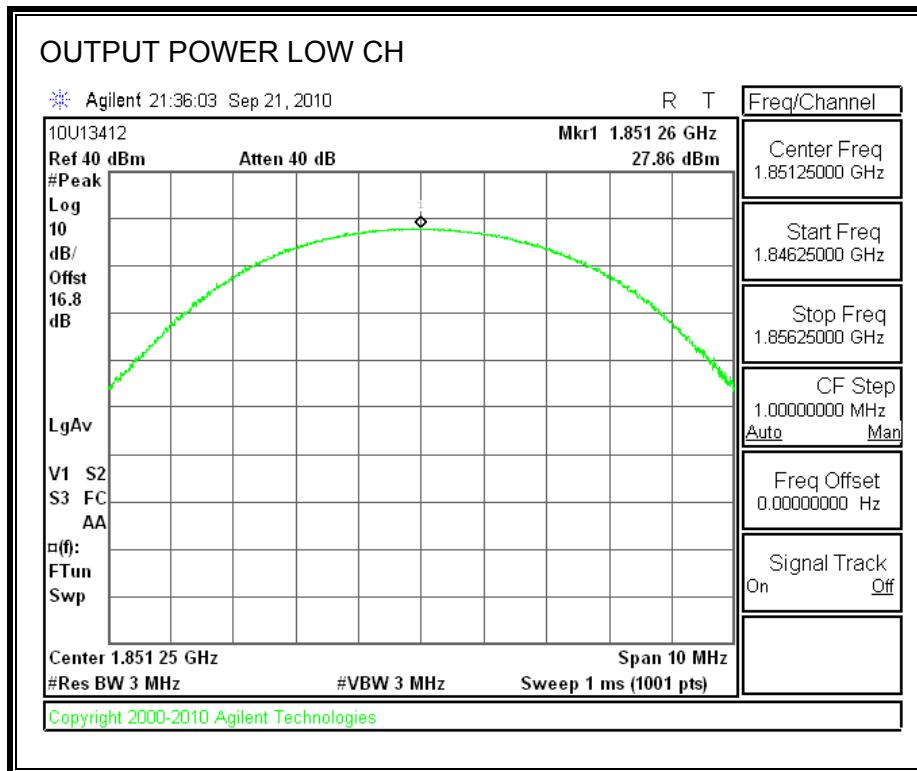


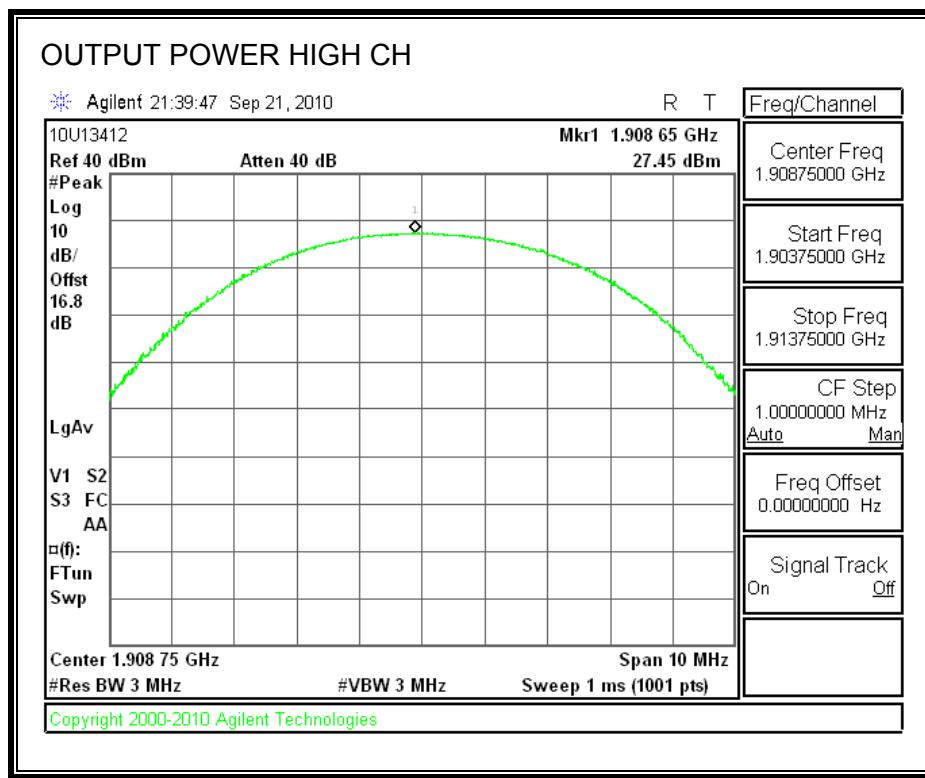
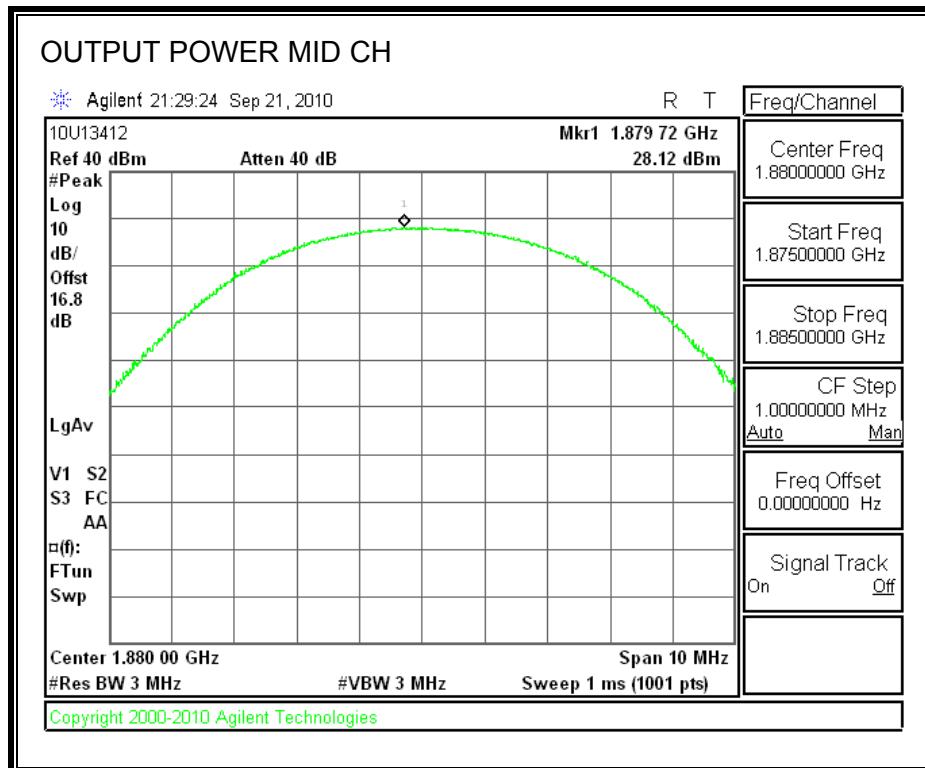


**PCS, 1xRTT MODULATION**



## PCS, EVDO REV A MODULATION





### 8.3. SPURIOUS EMISSION AT ANTENNA TERMINAL

#### LIMIT

§22.917 (e) and §24.238 (a), 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

ANSI / TIA / EIA 603 Clause 3.2.13 & FCC 22.917 (h)

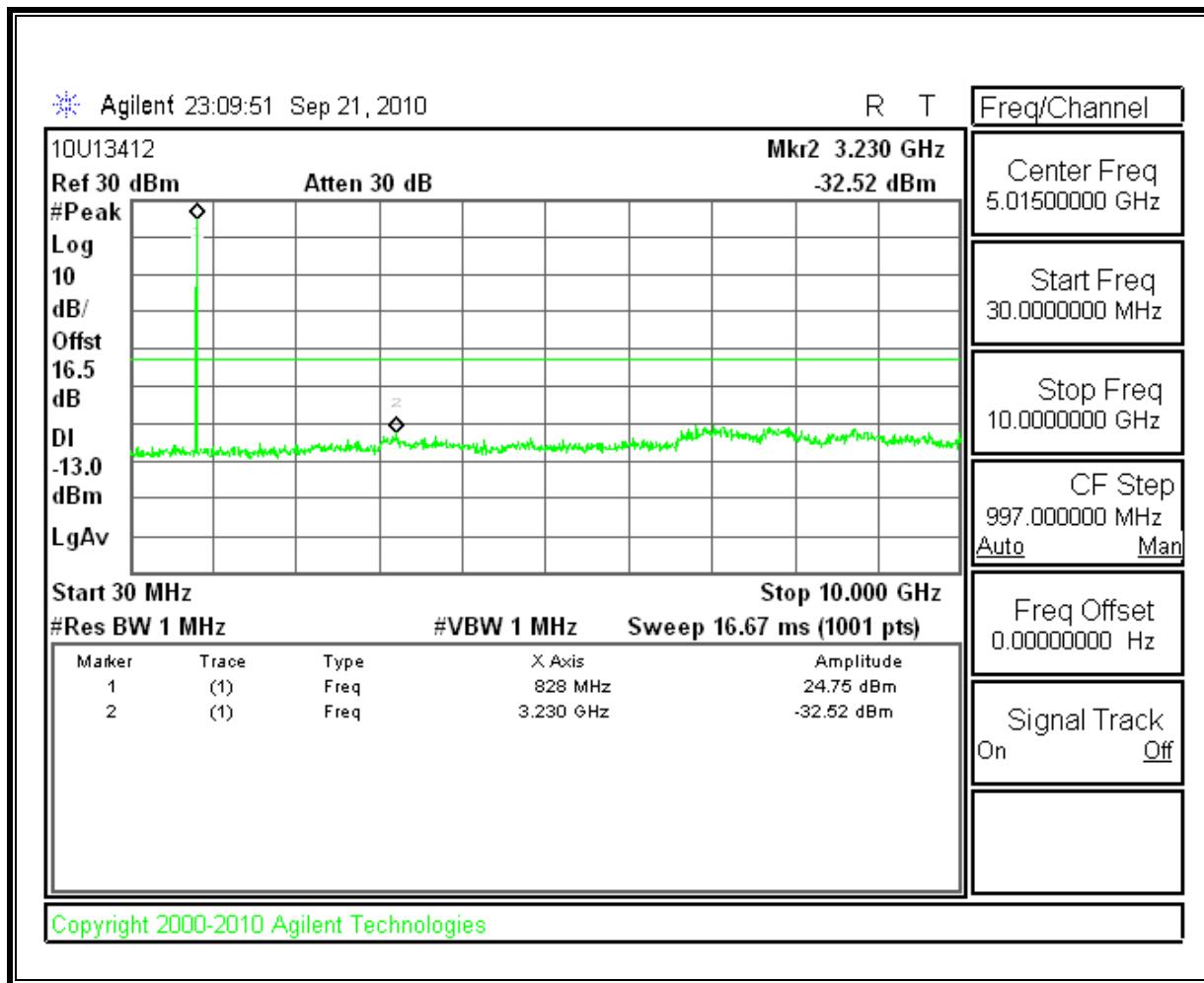
#### MODES TESTED

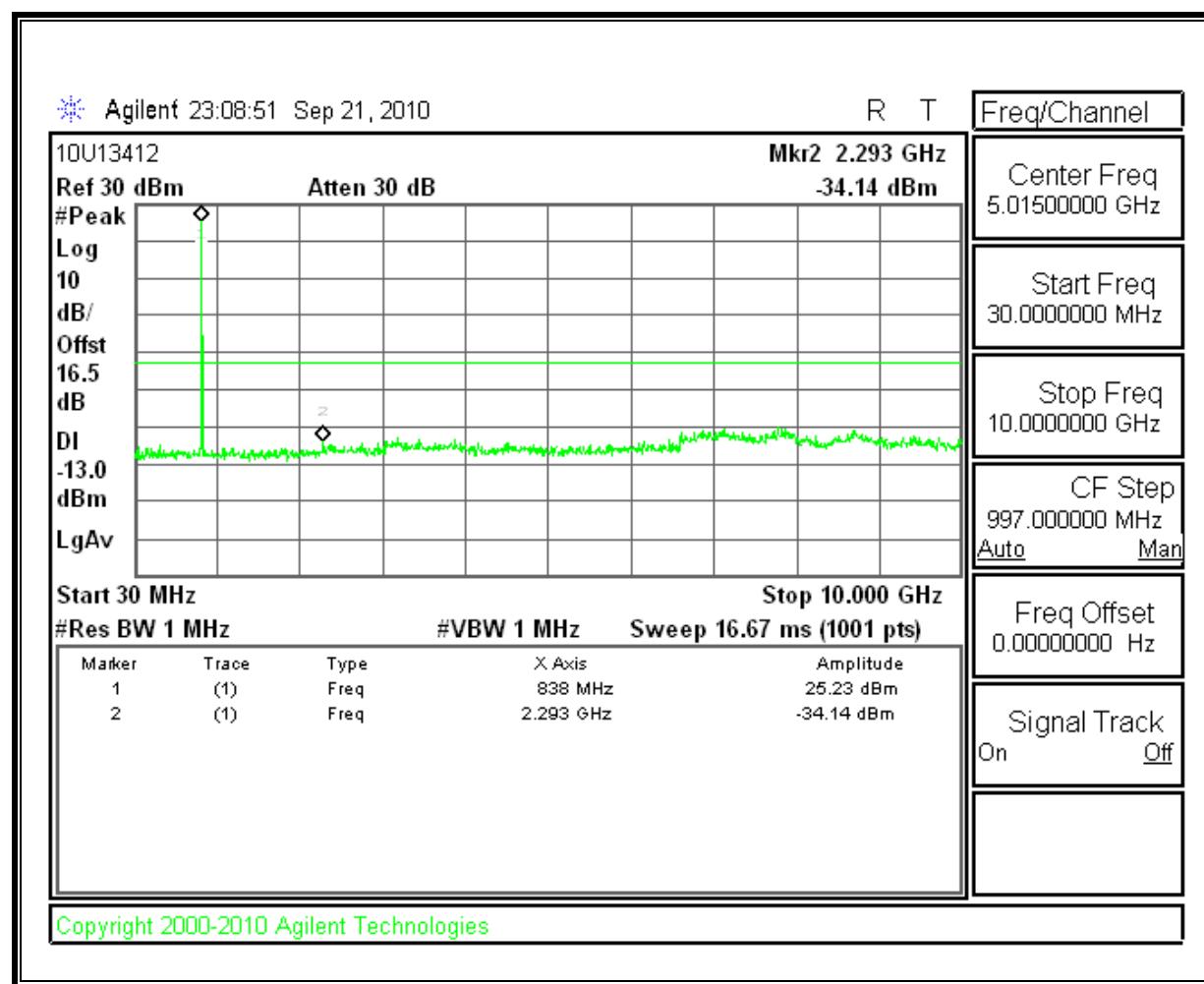
- CDMA – 1xRTT & EVDO REV A

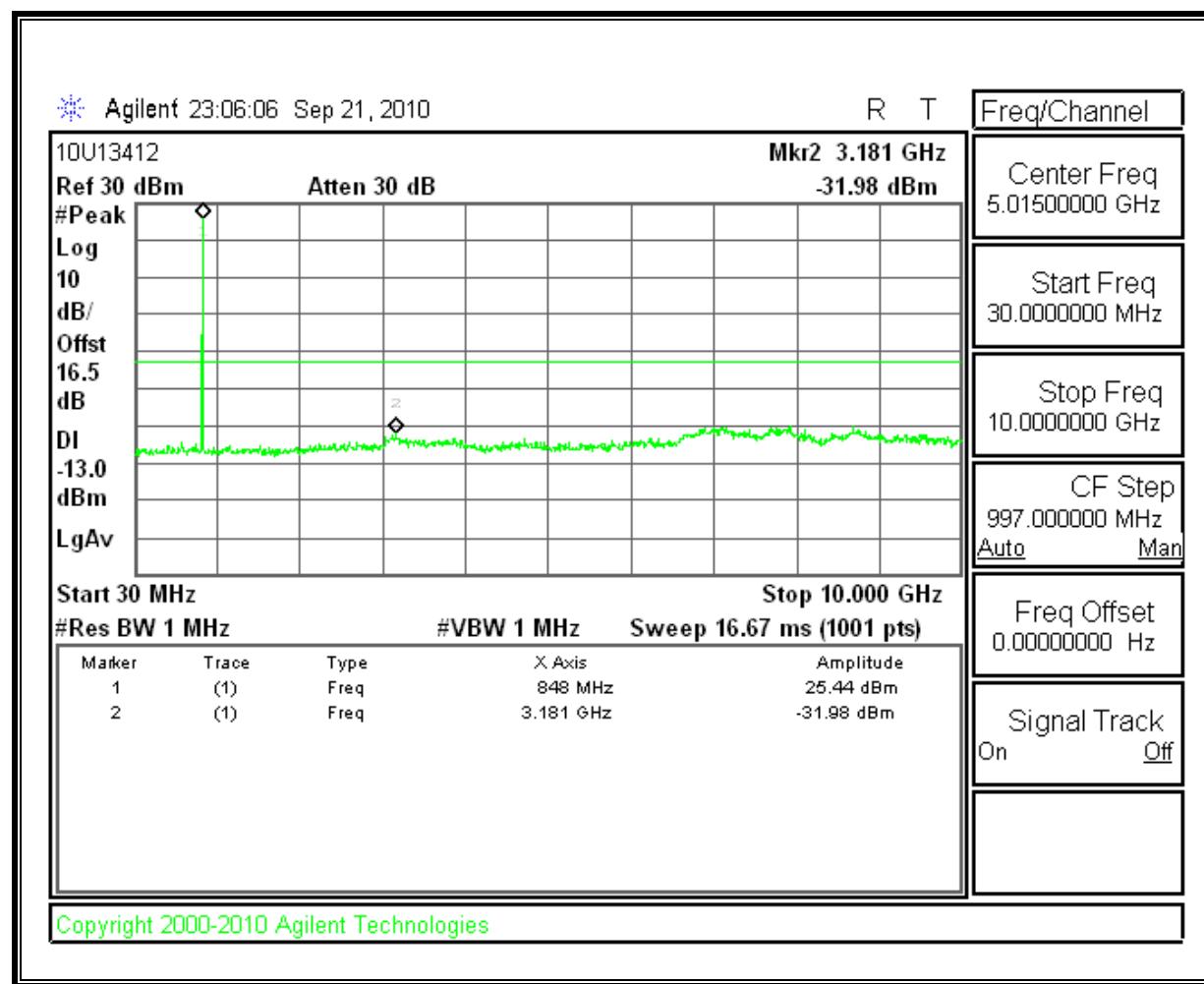
#### RESULTS

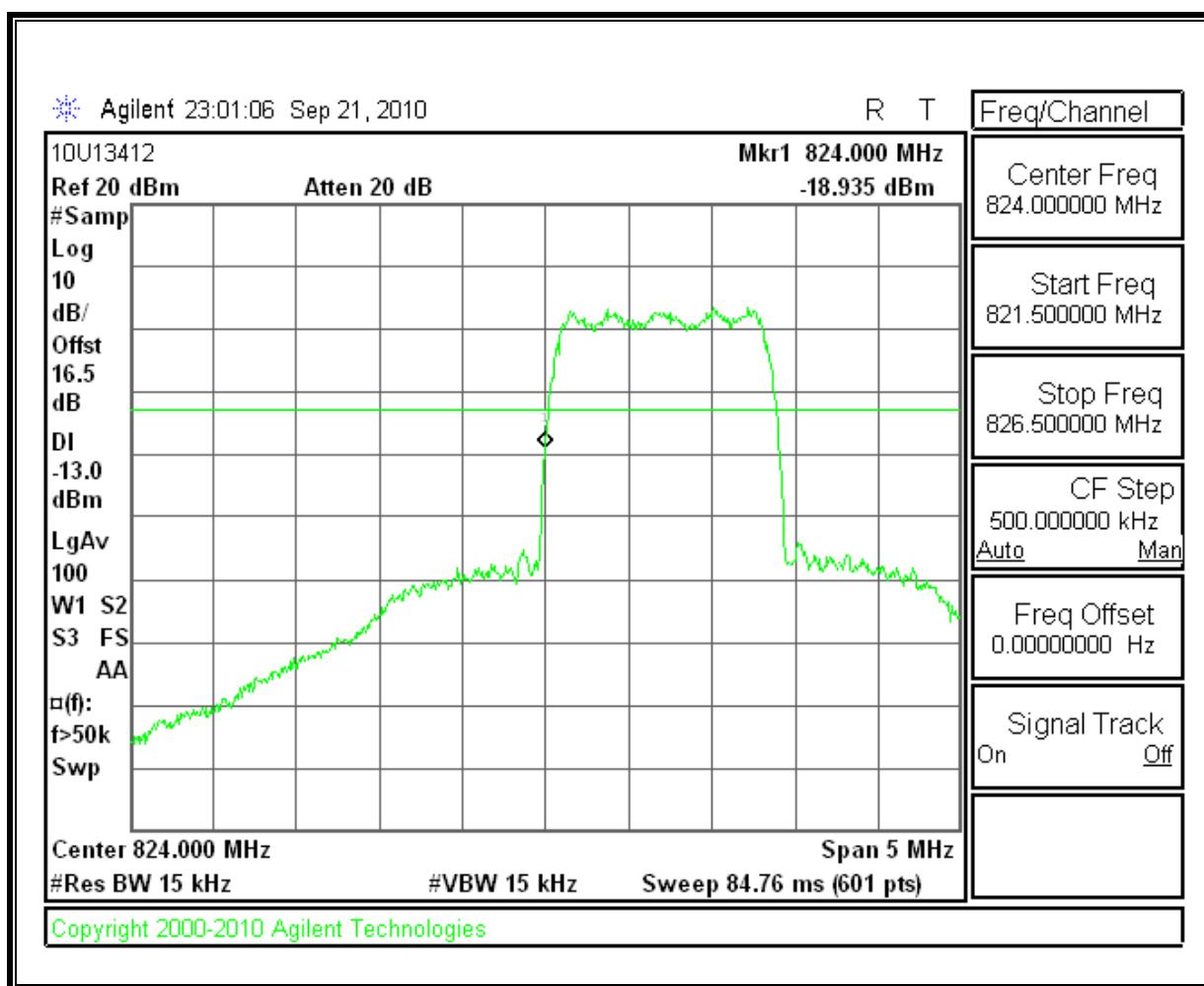
**CELL, 1xRTT MODULATION:**

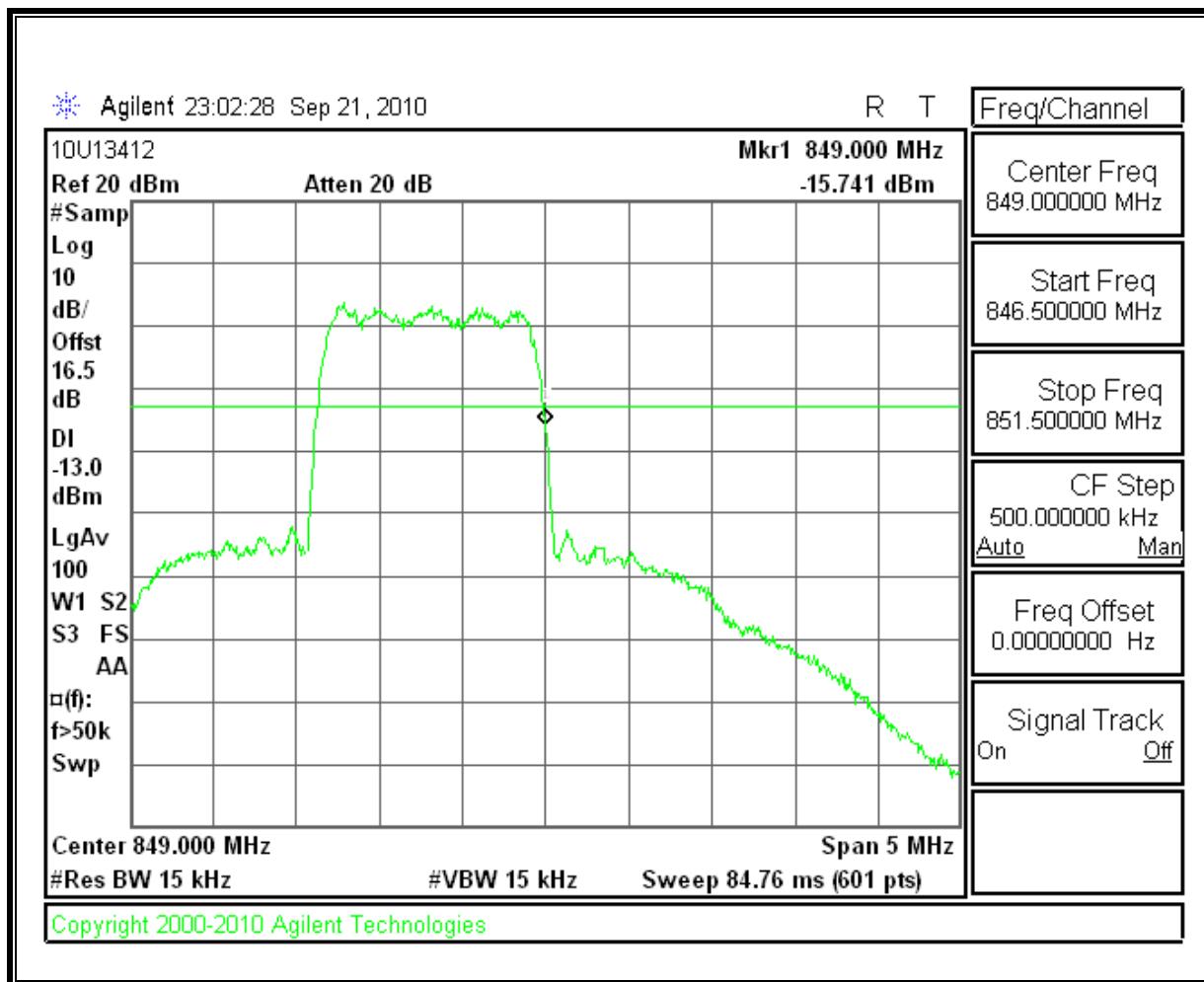
**Low Channel, Out-Of-Band Emissions**

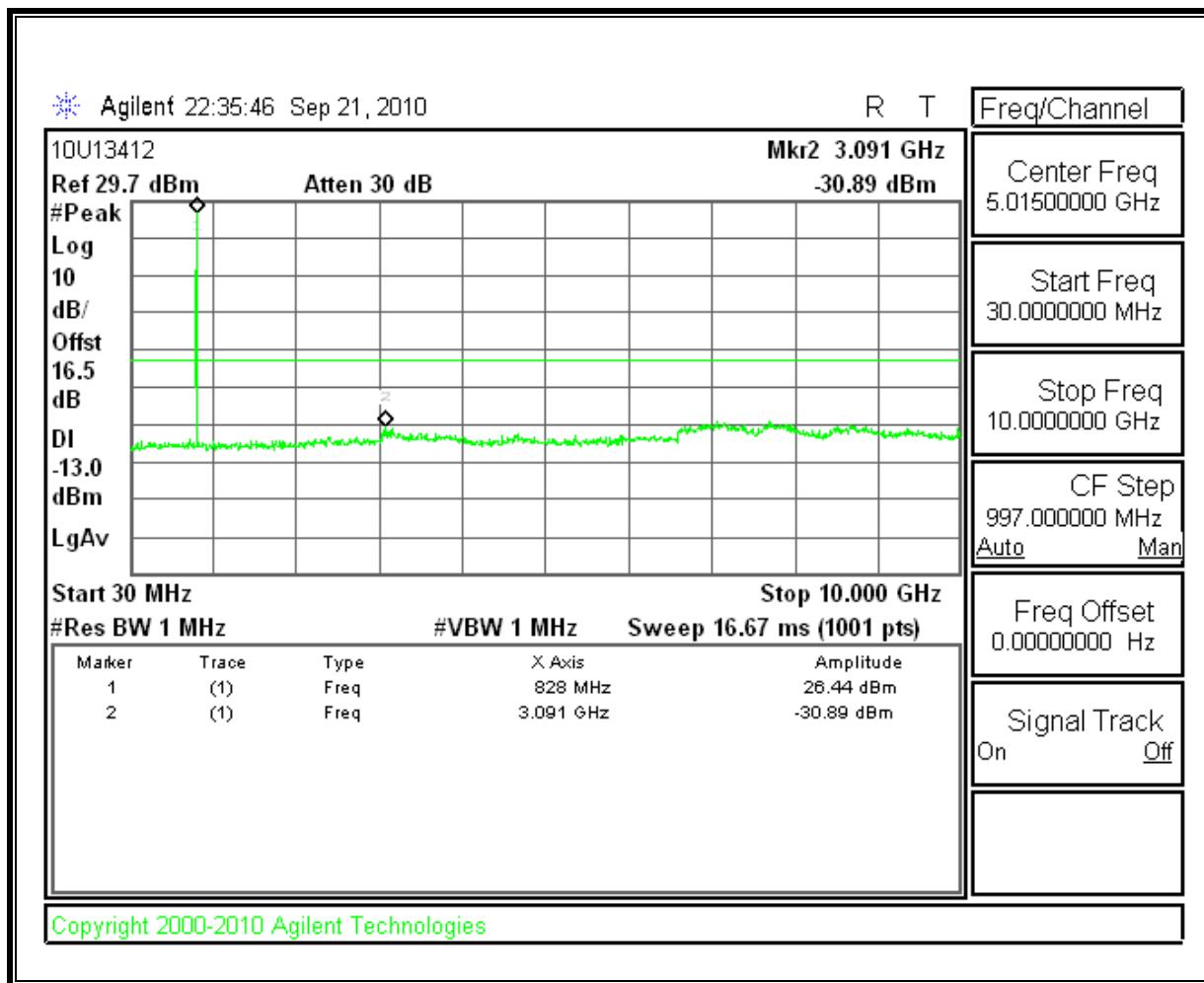


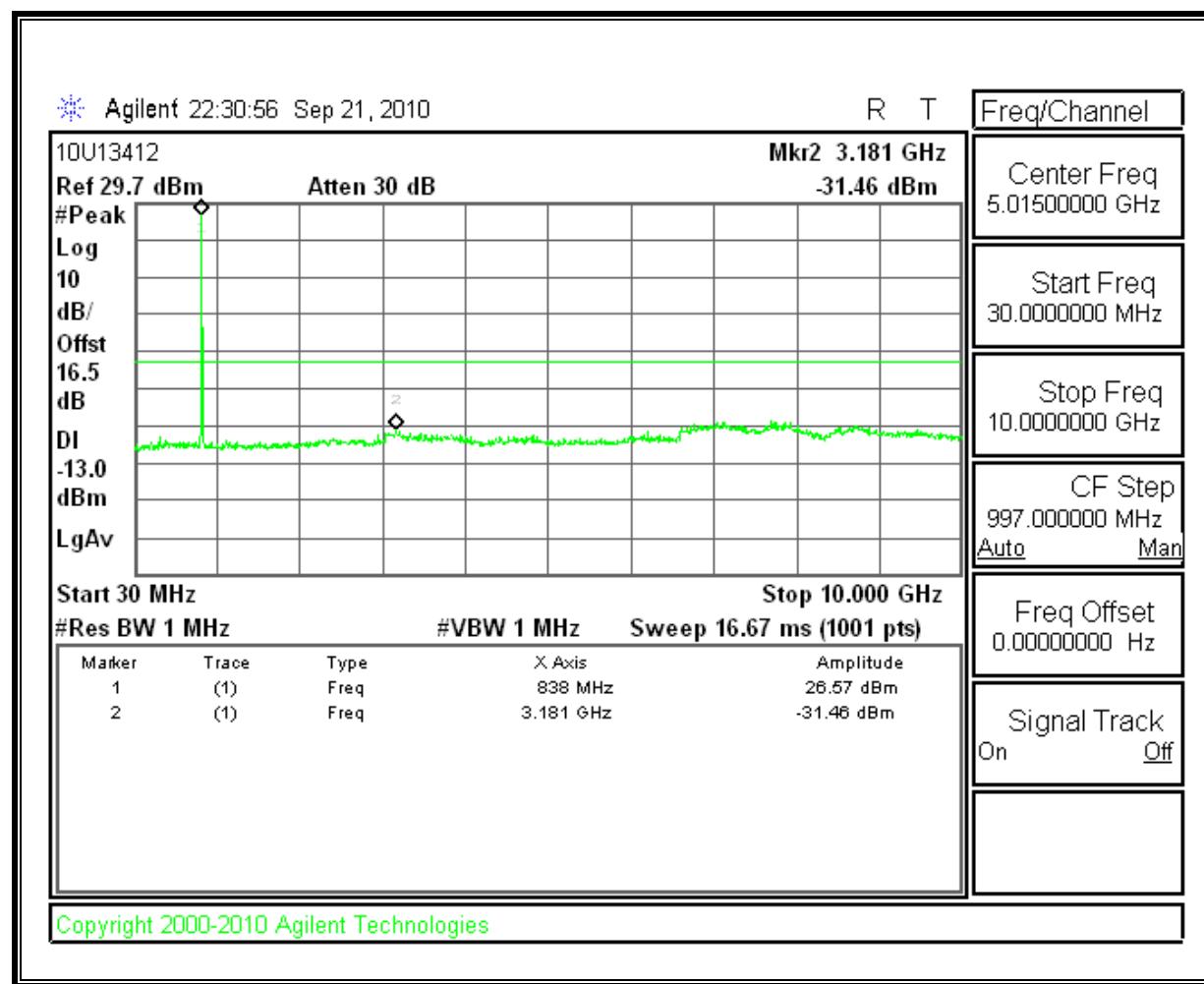
Mid Channel, Out-Of-Band Emissions

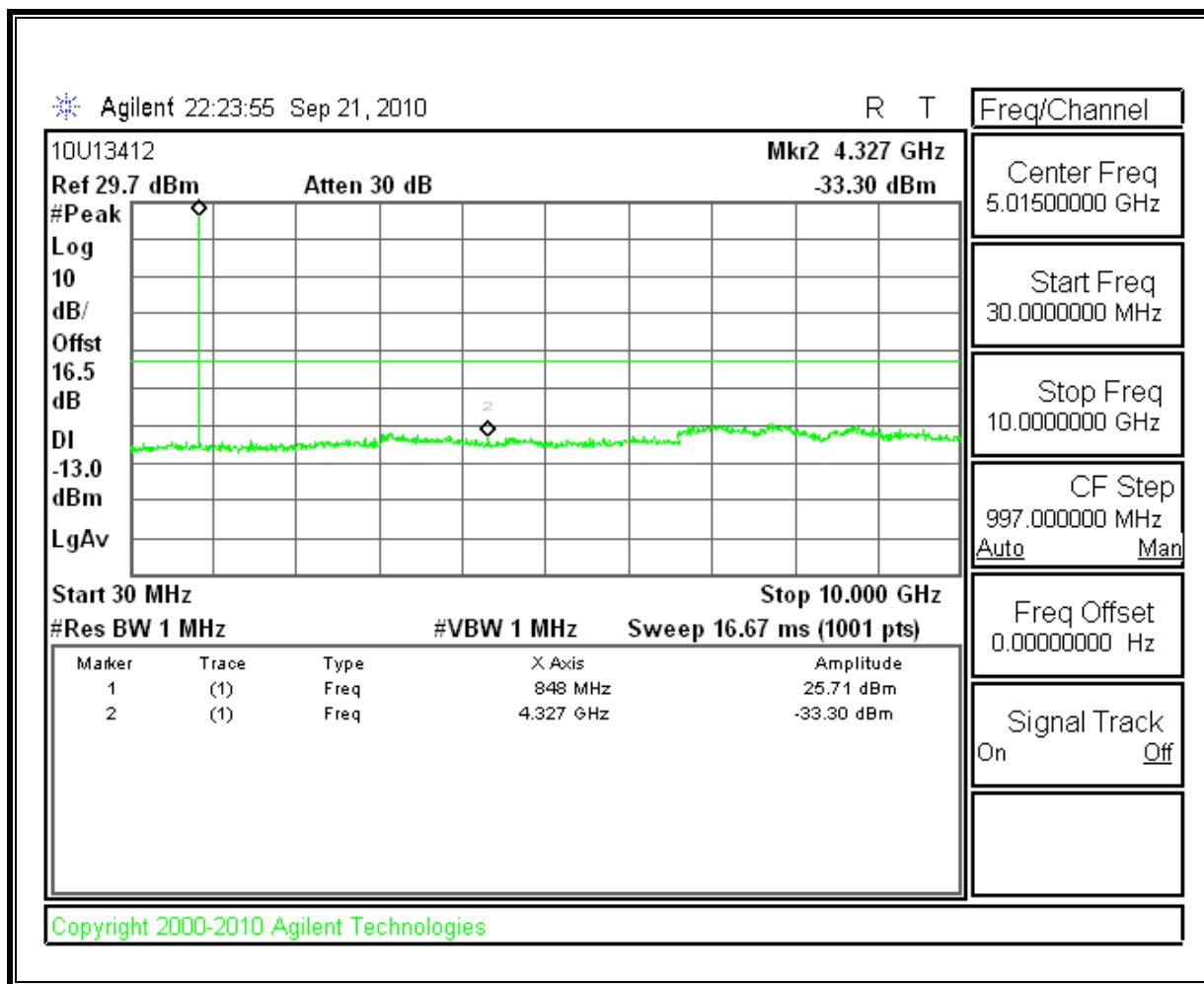
High Channel, Out-Of-Band Emissions

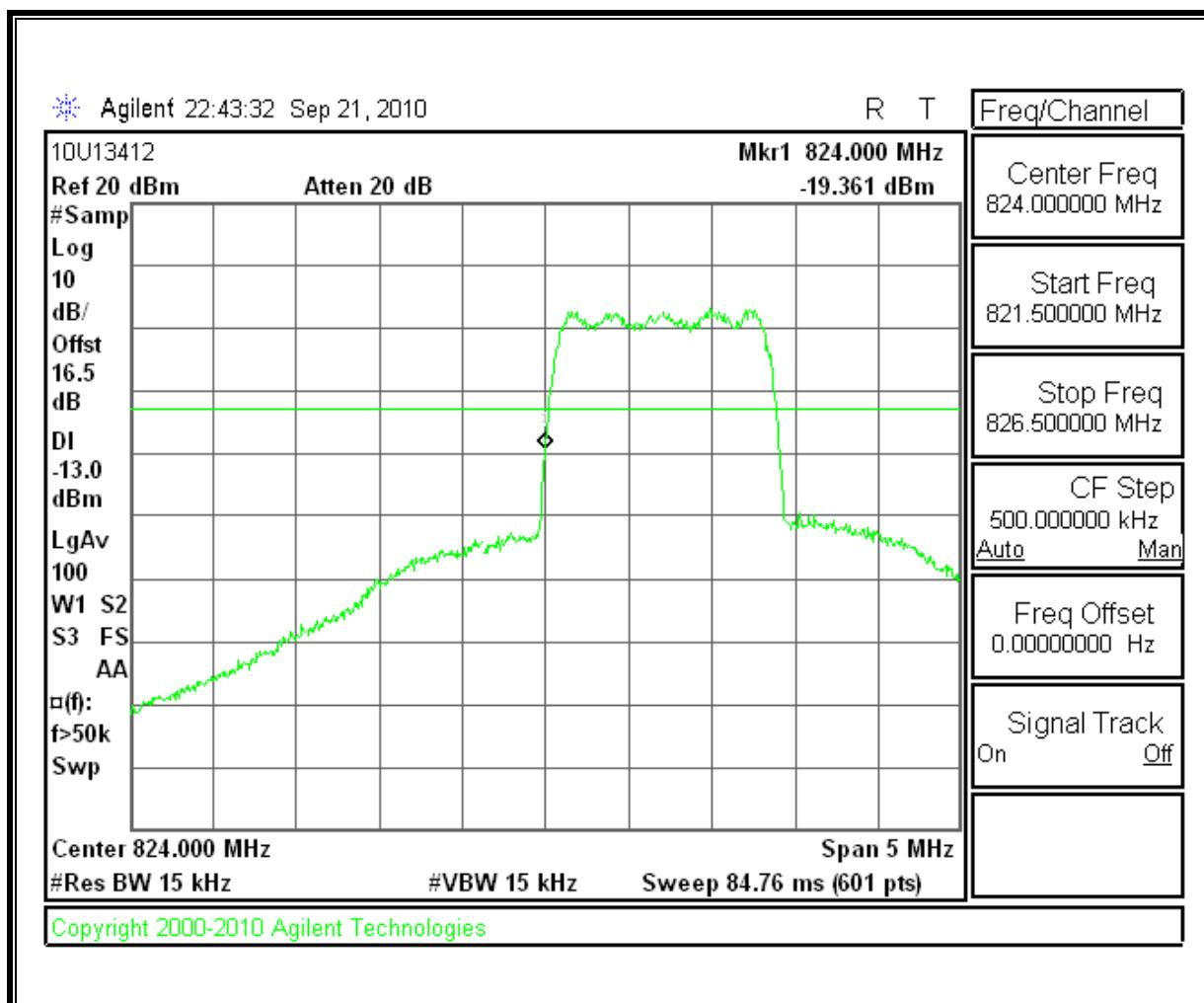
Low Channel Band Edge

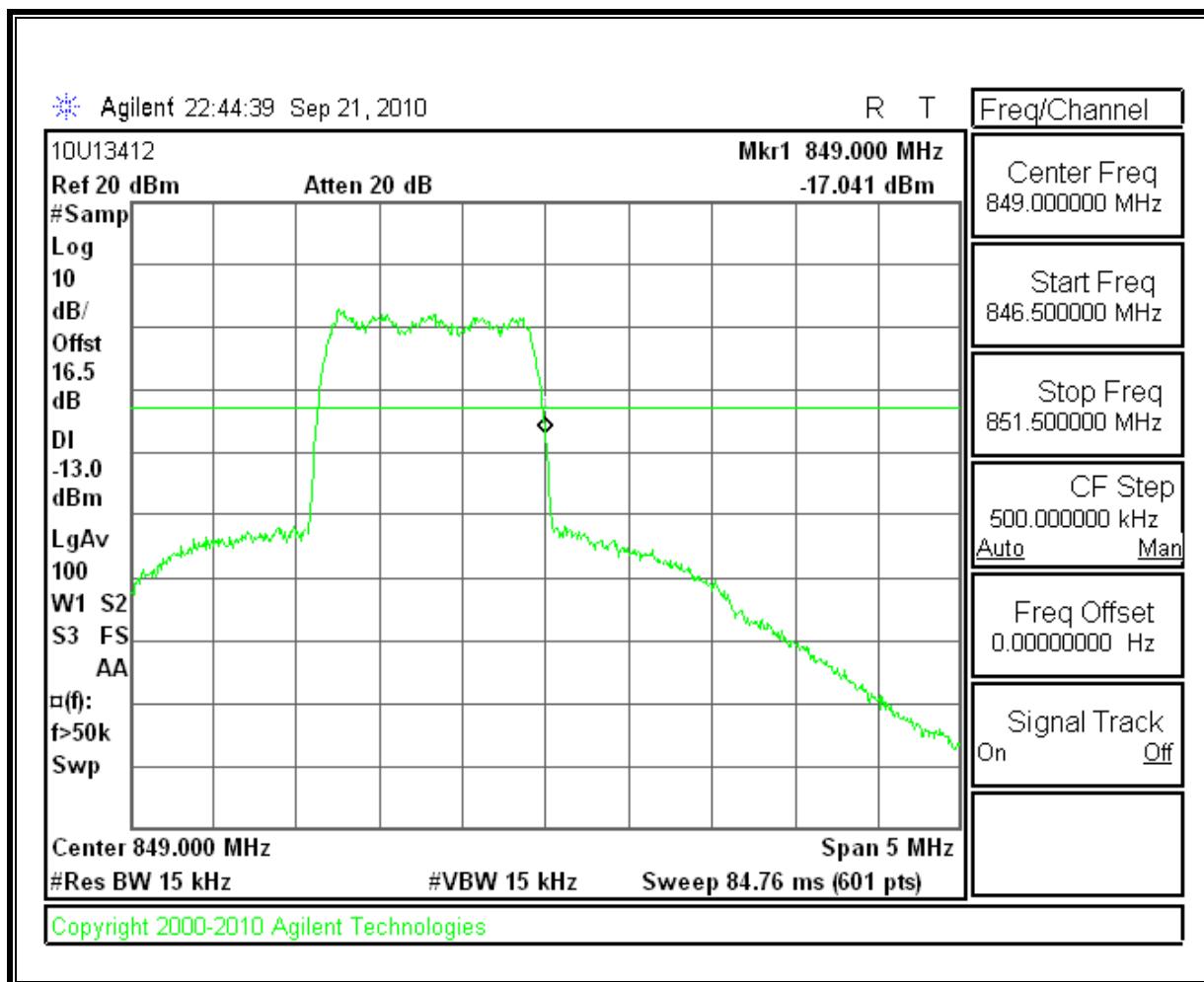
High Channel Band Edge

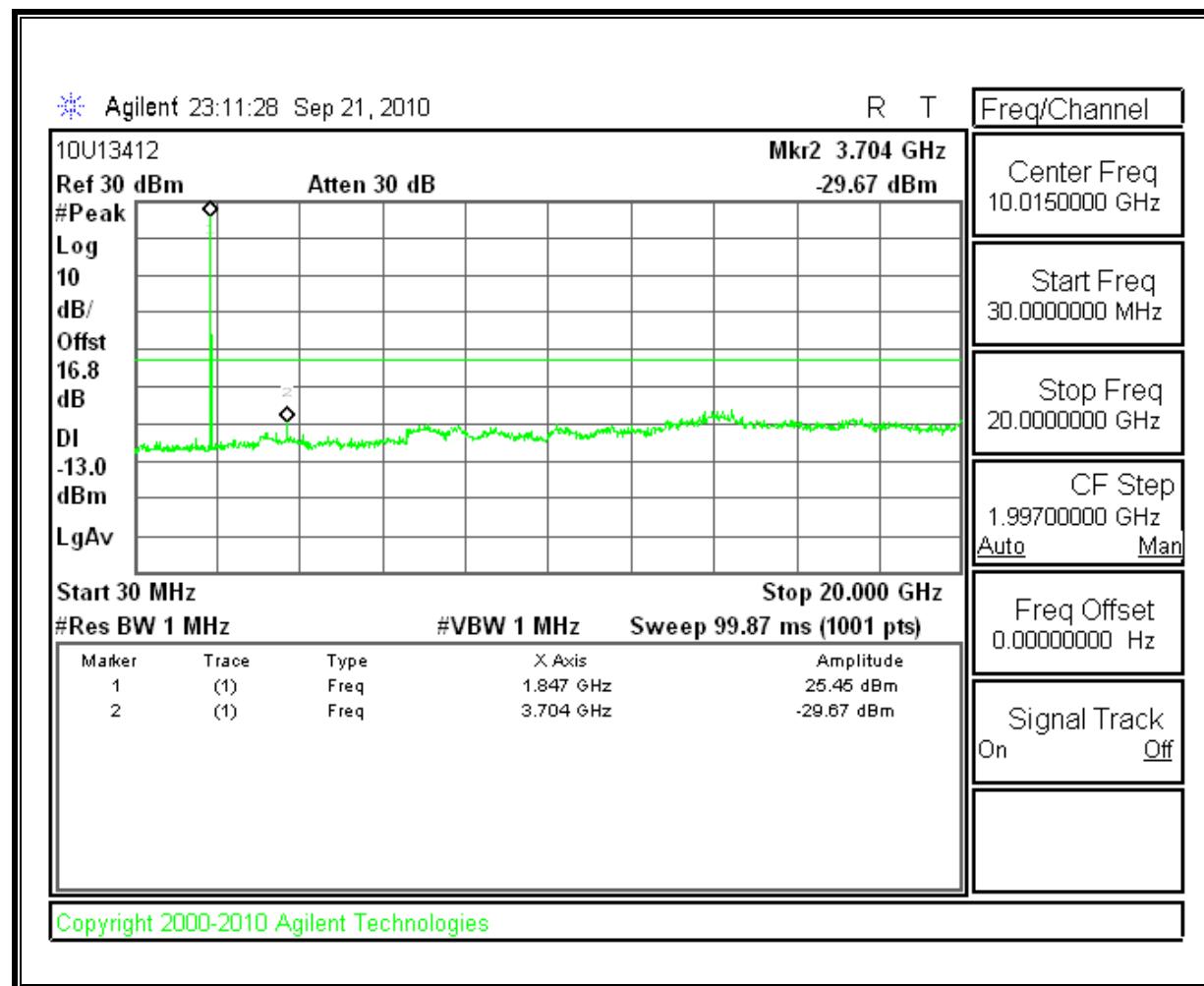
**CELL, EVDO REV A MODULATION:****Low Channel, Out-Of-Band Emissions**

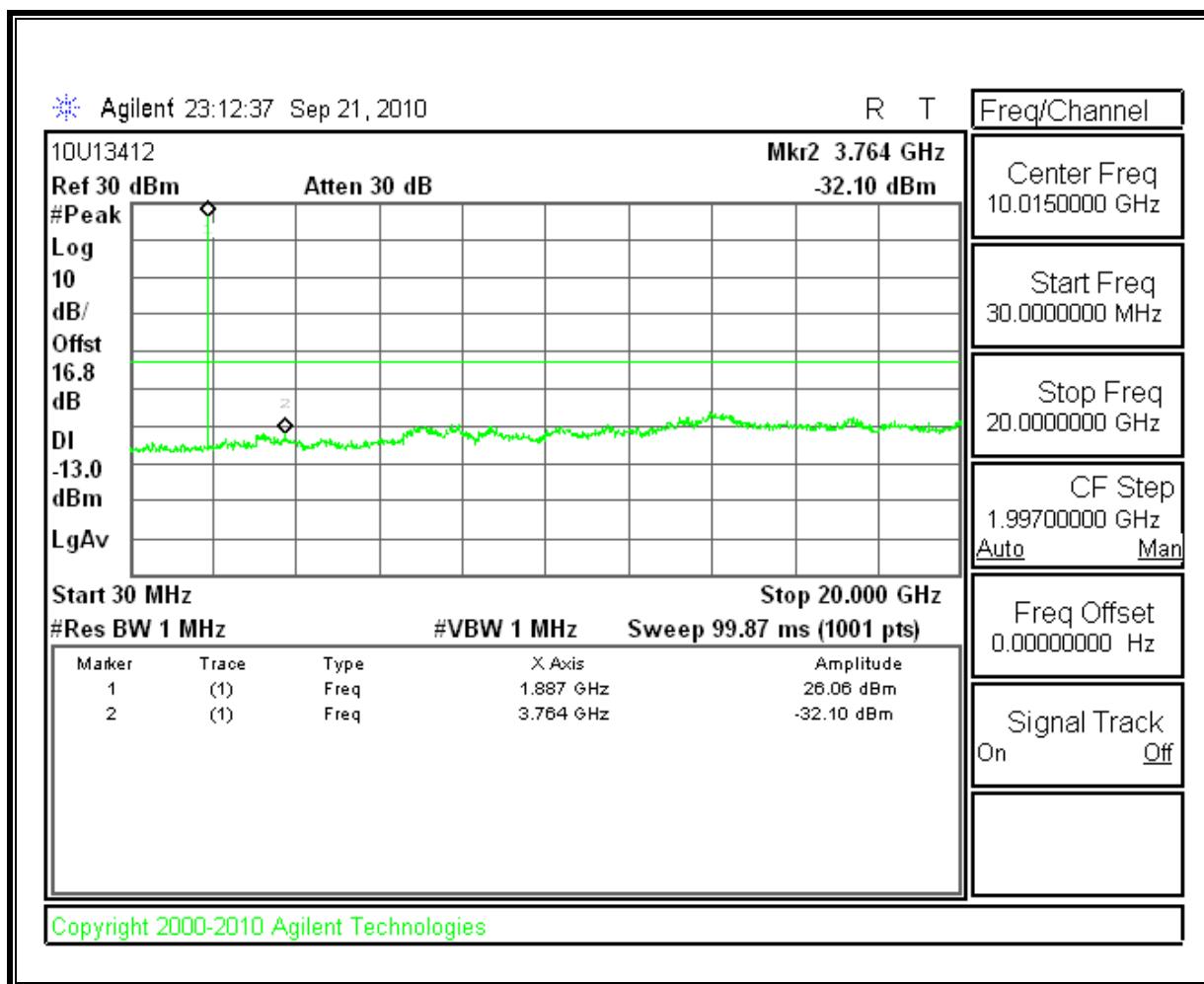
Mid Channel, Out-Of-Band Emissions

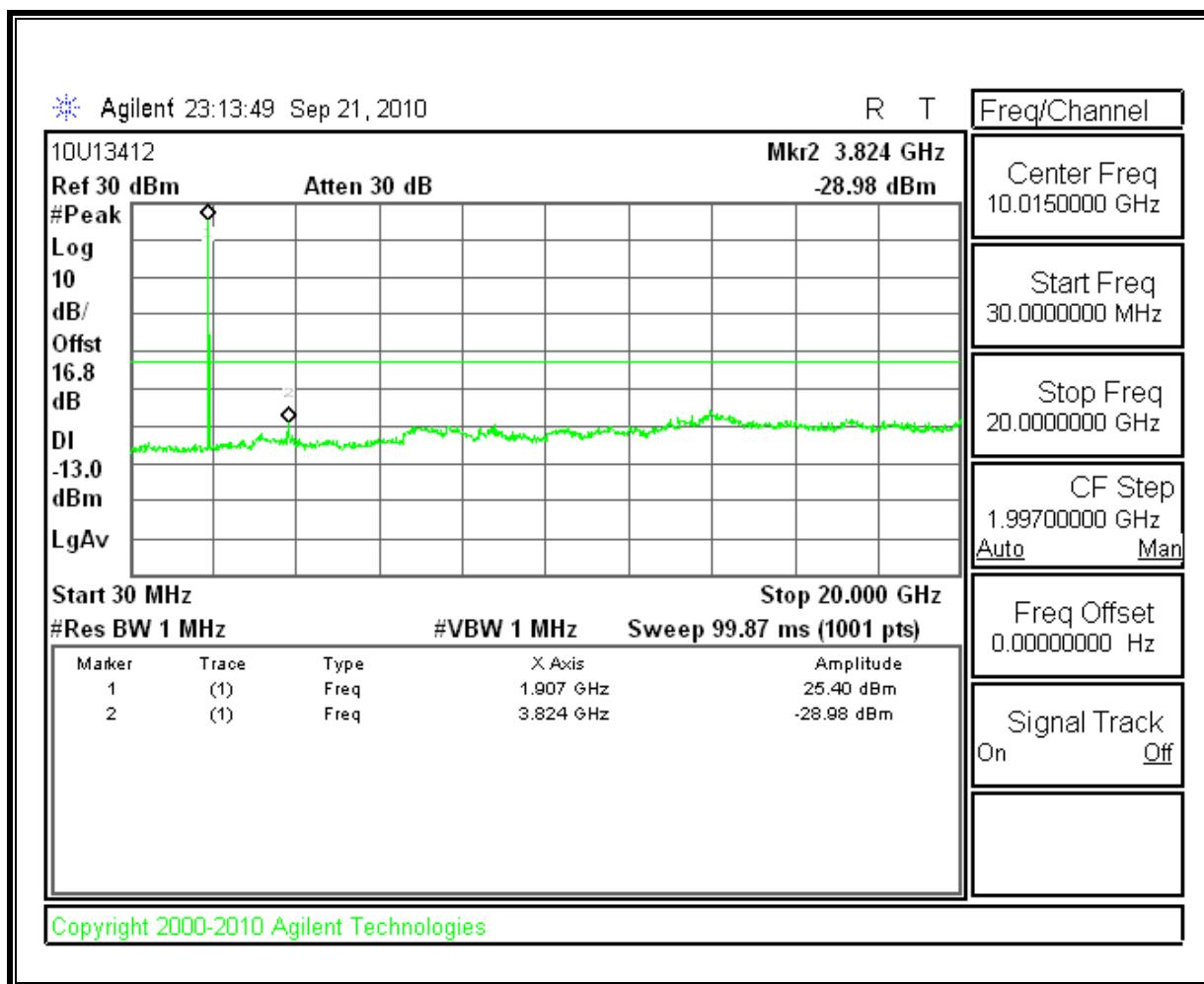
High Channel, Out-Of-Band Emissions

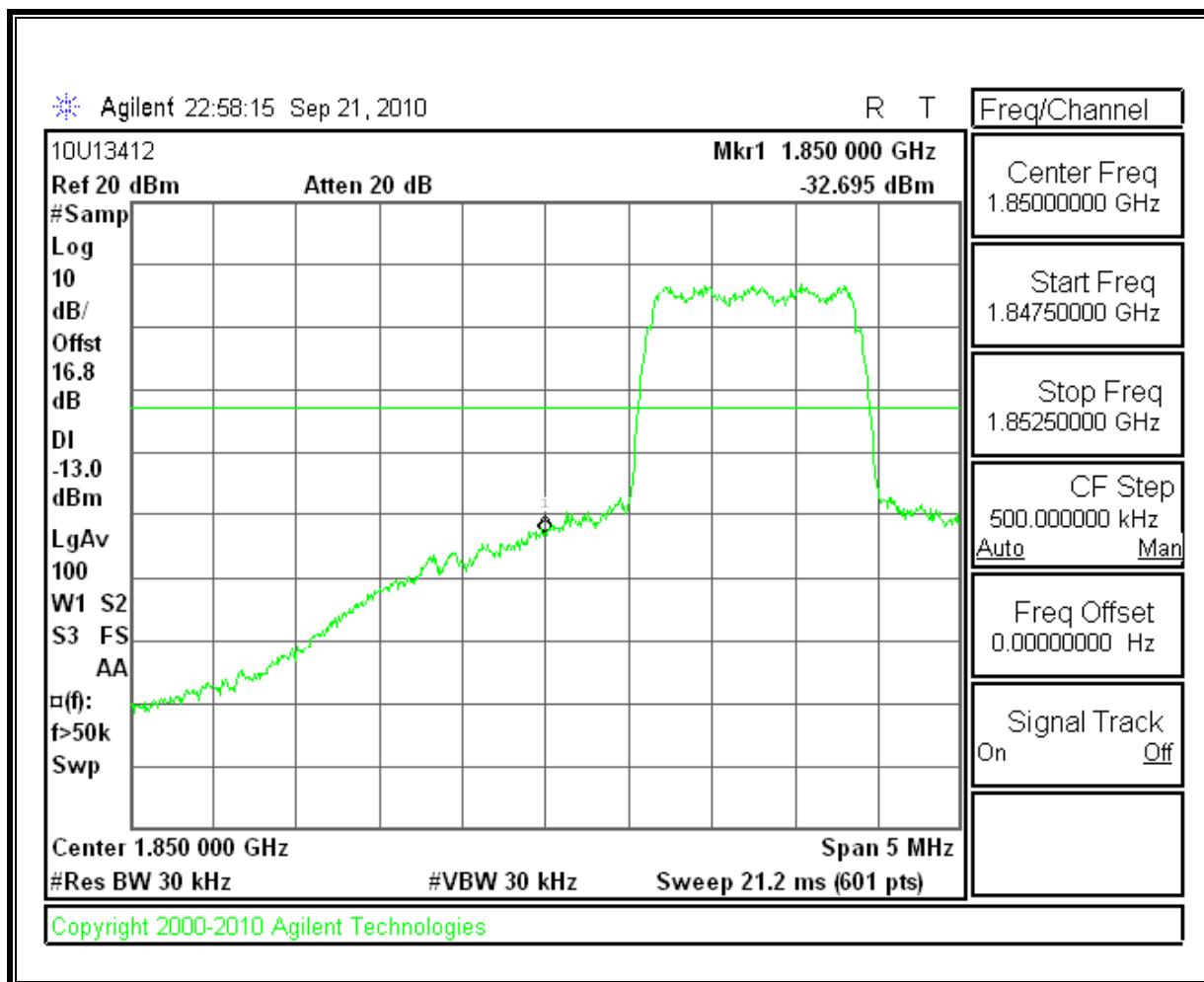
Low Channel Band Edge

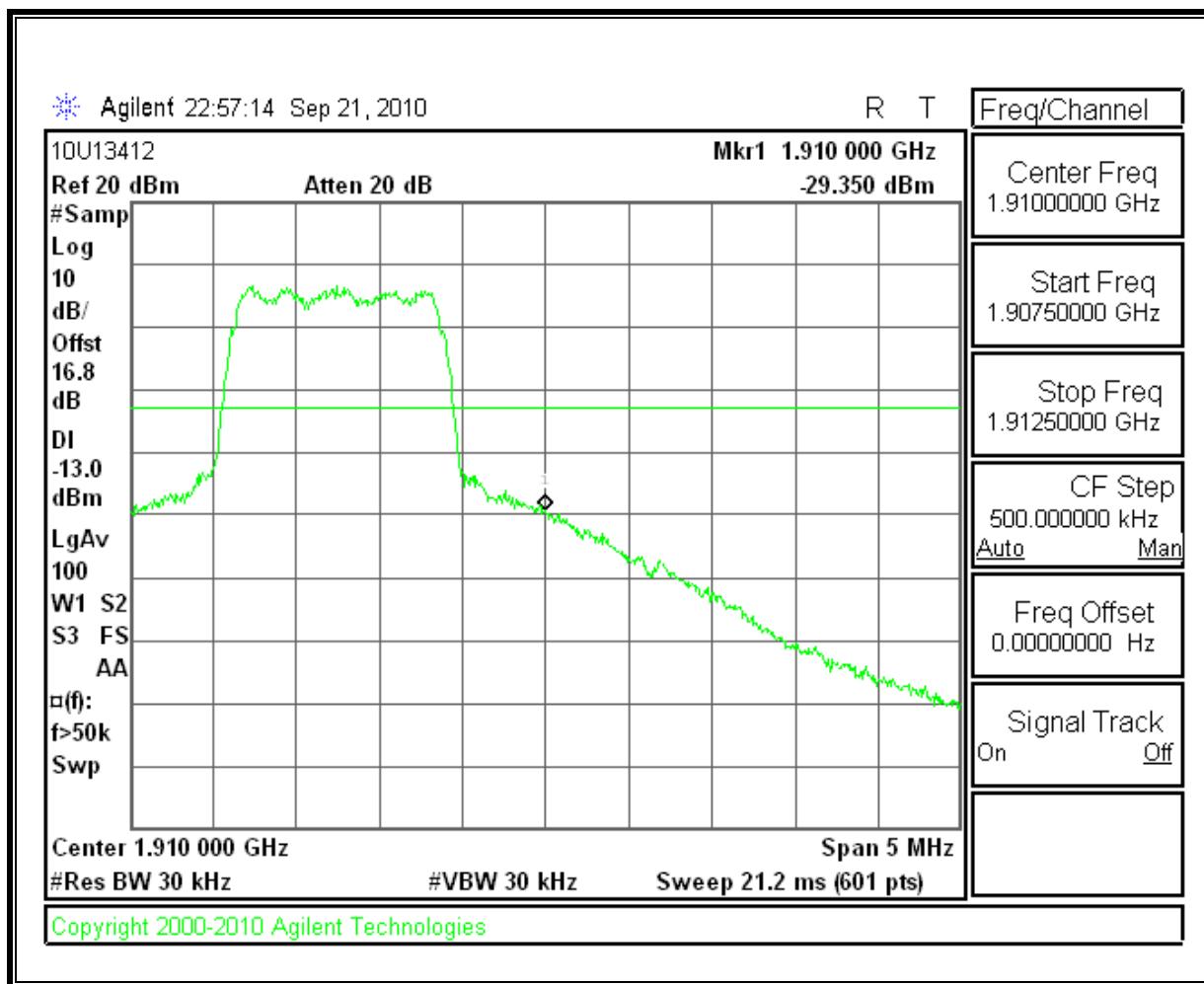
High Channel Band Edge

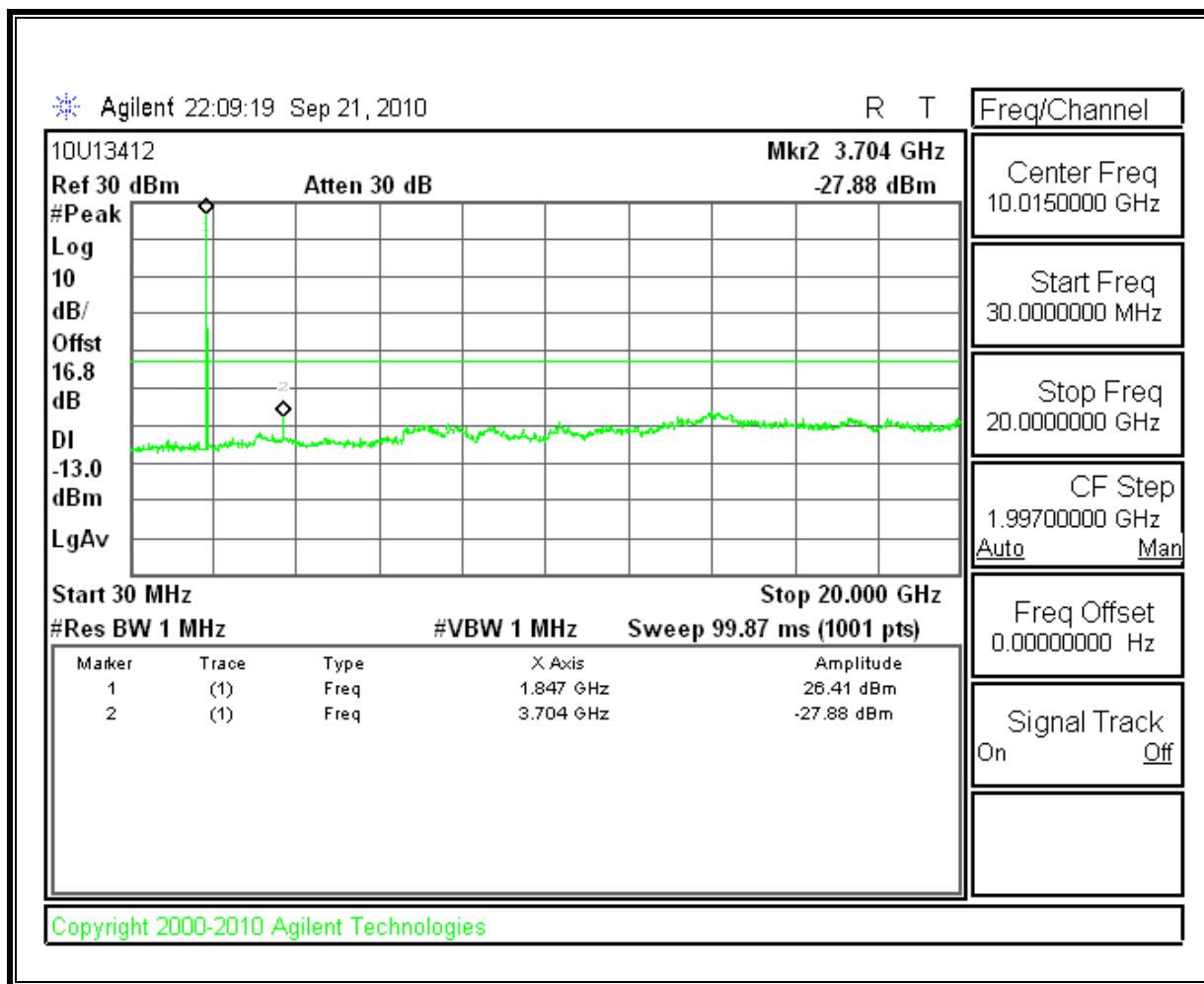
**PCS 1xRTT MODULATION RESULTS****Low Channel, Out-Of-Band Emissions**

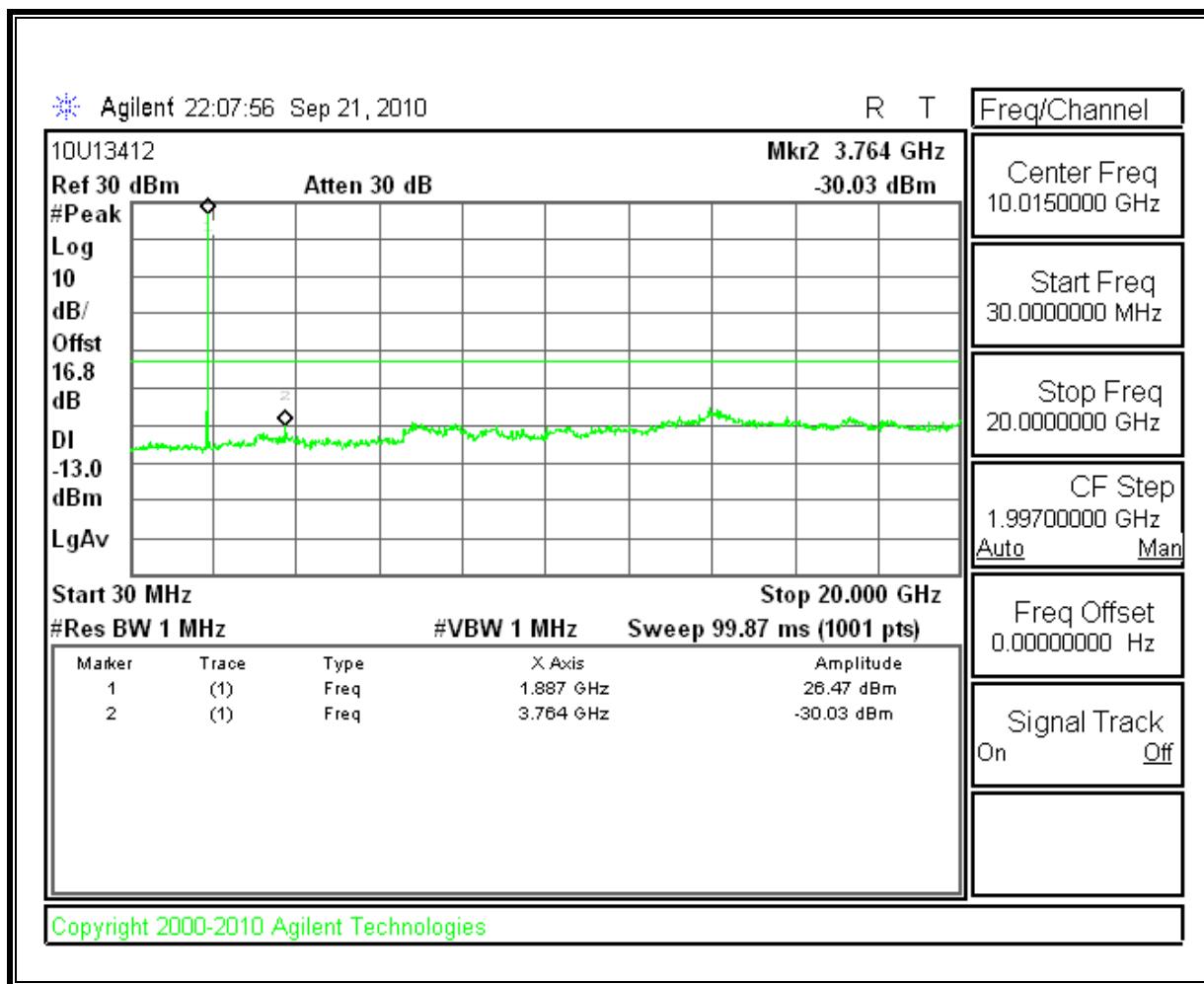
Mid Channel, Out-Of-Band Emissions

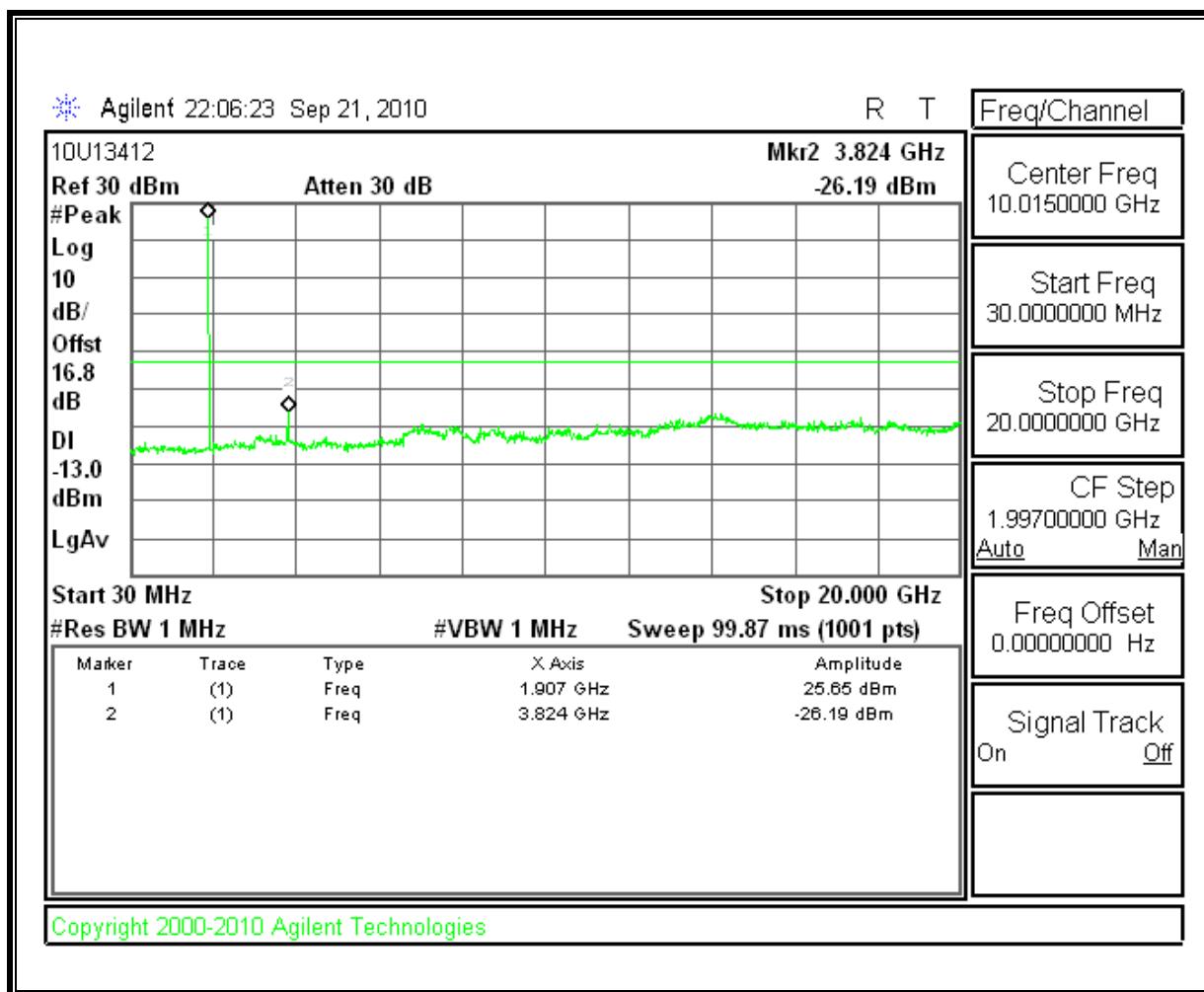
High Channel, Out-Of-Band Emissions

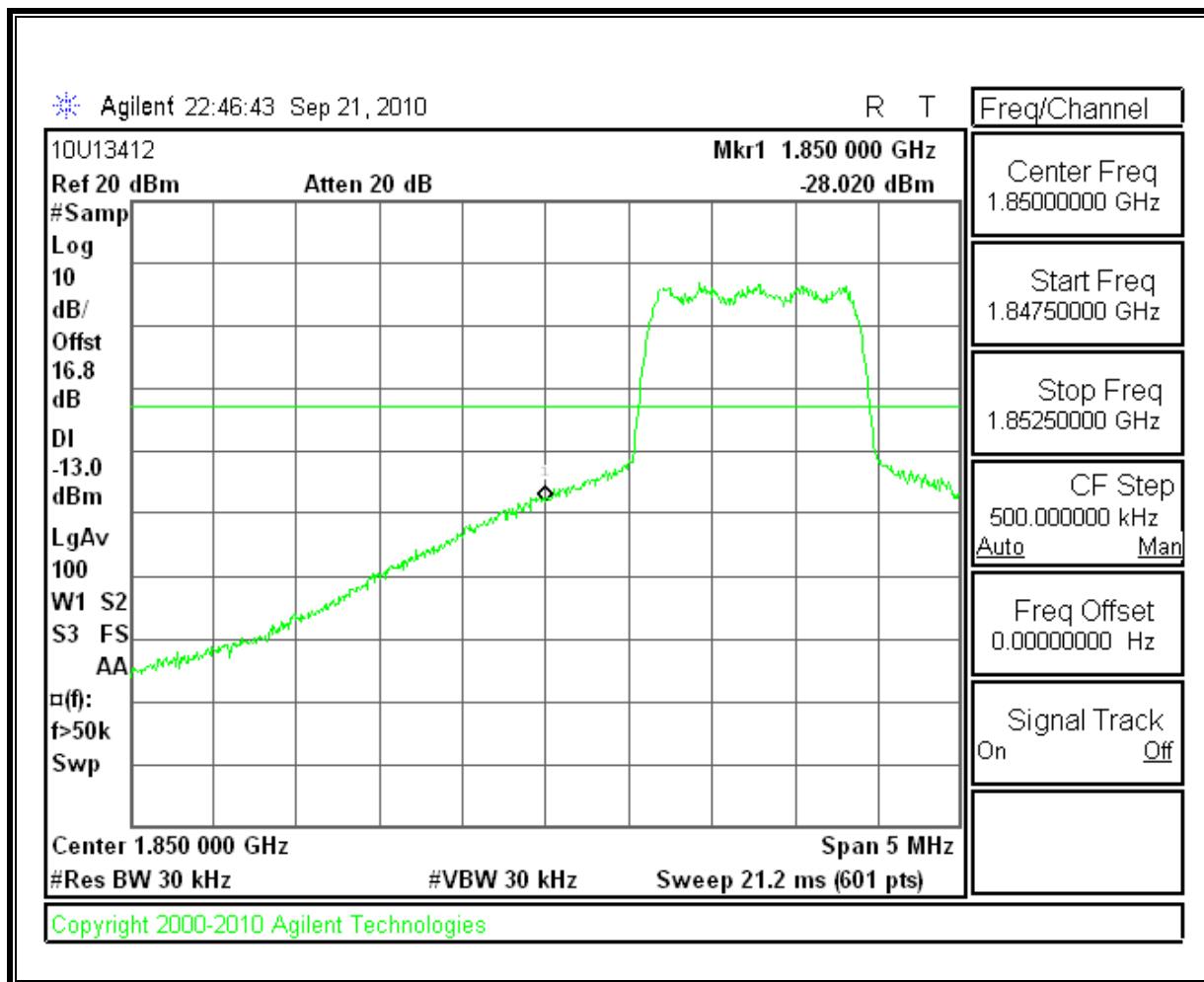
Low Channel Band Edge

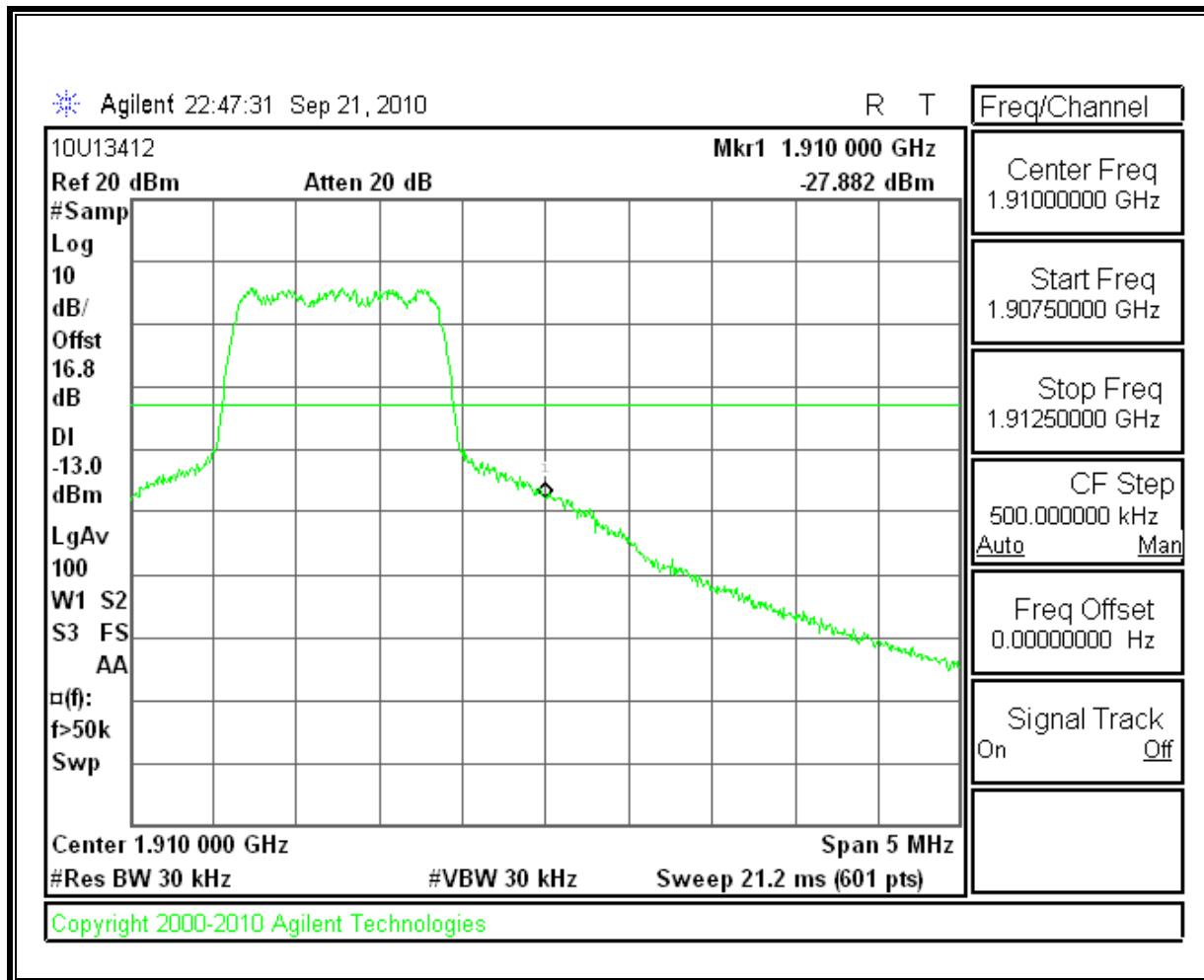
High Channel Band Edge

**PCS EVDO REV A MODULATION RESULTS****Low Channel, Out-Of-Band Emissions**

Mid Channel, Out-Of-Band Emissions

High Channel, Out-Of-Band Emissions

Low Channel Band Edge

High Channel Band Edge

## 8.4. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235

### LIMITS

- §22.355 & RSS-132 4.3 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  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

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

#### **Frequency Stability vs Temperature:**

The EUT is place inside a temperature chamber. The temperature is set to  $20^{\circ}\text{C}$  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

- CDMA – 1xRTT & EVDO REV A

### RESULTS

See the following pages.

CELL – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.519396MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.298 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
4.20	50	836.519257	0.166	2.5
	40	836.519491	-0.114	2.5
	30	836.519677	-0.336	2.5
	20	<b>836.519396</b>	<b>0</b>	2.5
	10	836.519349	0.056	2.5
	0	836.519207	0.226	2.5
	-10	836.519139	0.307	2.5
	-20	836.518956	0.526	2.5
3.57	20	836.519115	0.336	2.5
4.83	20	836.519125	0.324	2.5

**PCS – MID CHANNEL**

Reference Frequency: PCS Mid Channel 1880.000411 @ 20°C Limit: within the authorized block or +/- 2.5 ppm = 4700.001 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
4.20	50	1880.000624	-0.113	2.5
4.20	40	1880.000510	-0.053	2.5
4.20	30	1880.000238	0.092	2.5
<b>4.20</b>	<b>20</b>	<b>1880.000411</b>	<b>0</b>	<b>2.5</b>
4.20	10	1880.000496	-0.045	2.5
4.20	0	1880.000585	-0.093	2.5
4.20	-10	1880.000007	0.215	2.5
4.20	-20	1879.999933	0.254	2.5
<hr/>				
3.57	20	1880.000499	-0.047	2.5
4.83	20	1880.000206	0.109	2.5

## 9. RADIATED TEST RESULTS

### 9.1. RADIATED POWER (ERP & EIRP)

#### LIMIT

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

24.232(b) & RSS133 § 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 The maximum ERP shall be 6.3 Watts for mobile stations.

#### TEST PROCEDURE

RSS-132, RSS-133, & ANSI / TIA / EIA 603C Clause 2.2.17

#### MODES TESTED

- CDMA – 1xRTT & EVDO REV A

#### RESULTS for Cellular Band (ERP)

Mode	Channel	f (MHz)	ERP( Standard Cover)	
			dBm	mW
1xRTT	1013	824.70	26.30	426.58
	384	836.52	<b>27.80</b>	602.56
	777	848.31	25.30	338.84
EVDO REV A	1013	824.70	24.50	281.84
	384	836.52	<b>26.30</b>	426.58
	777	848.31	23.80	239.88

#### RESULTS for PCS Band (EIRP)

Mode	Channel	f (MHz)	EIRP( Standard Cover)	
			dBm	mW
1xRTT	512	1850.20	27.60	575.44
	661	1880.00	<b>31.10</b>	1288.25
	810	1909.80	28.90	776.25
EVDO REV A	512	1850.20	27.90	616.60
	661	1880.00	<b>31.40</b>	1380.38
	810	1909.80	29.40	870.96

**CELL 1xRTT MODULATION**

High Frequency Substitution Measurement Compliance Certification Services Chamber B														
Company:	SIERRA WORELESS													
Project #:	10U13412													
Date:	9/20/2010													
Test Engineer:	MENGISTU MEKURIA													
Configuration:	EUT ALONE													
Mode:	TX, 1xRTT, CELL BAND													
<u>Test Equipment:</u>														
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)														
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.														
f MHz	SA reading (dBm)	Ant. Pol. (H/V)	Path Loss (dBm)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes							
824.70	-6.3	V	32.6	26.3	38.5	-12.1								
824.70	-10.4	H	30.4	20.0	38.5	-18.5								
836.52	-4.8	V	32.7	27.8	38.5	-10.6								
836.52	-10.3	H	30.7	20.4	38.5	-18.0								
848.31	-6.6	V	32.0	25.3	38.5	-13.1								
848.31	-11.8	H	30.8	18.9	38.5	-19.5								

Rev. 1.24.7

**CELL EVDO REV A MODULATION**

<b>High Frequency Substitution Measurement Compliance Certification Services Chamber B</b>														
<b>Company:</b>	SIERRA WORELESS													
<b>Project #:</b>	10U13412													
<b>Date:</b>	9/20/2010													
<b>Test Engineer:</b>	MENGISTU MEKURIA													
<b>Configuration:</b>	EUT ALONE													
<b>Mode:</b>	TX, EVDO REV A, CELL BAND													
<b>Test Equipment:</b>														
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)														
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.														
f MHz	SA reading (dBm)	Ant. Pol. (H/V)	Path Loss (dBm)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes							
824.70	-8.1	V	32.6	24.5	38.5	-14.0								
824.70	-18.5	H	30.4	11.9	38.5	-26.6								
836.52	-6.3	V	32.7	26.3	38.5	-12.1								
836.52	-15.6	H	30.7	15.1	38.5	-23.3								
848.31	-8.2	V	32.0	23.8	38.5	-14.7								
848.31	-16.6	H	30.8	14.2	38.5	-24.2								

Rev. 1.24.7

**PCS 1xRTT MODULATION**

High Frequency Fundamental Measurement Compliance Certification Services Chamber B														
Company:	SIERRA WIRELESS													
Project #:	10U13412													
Date:	9/20/2010													
Test Engineer:	MENGISTU MEKURIA													
Configuration:	EUT ALONE													
Mode:	TX, 1xRTT, PCS BAND													
<u>Test Equipment:</u>														
Receiving: Horn T59, and Camber B SMA Cables														
Substitution: Horn T72 Substitution, 6ft SMA Cable (208947003) Warehouse														
f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Path Loss (dBm)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes							
1.851	-20.7	V	40.2	19.4	33.0	-13.6								
1.851	-11.9	H	39.5	27.6	33.0	-5.4								
1.880	-19.2	V	40.3	21.0	33.0	-12.0								
1.880	-9.1	H	40.1	31.1	33.0	-1.9								
1.909	-21.9	V	40.2	18.3	33.0	-14.7								
1.909	-11.3	H	40.1	28.9	33.0	-4.2								
Rev. 1.24.7														

**PCS EVDO REV A MODULATION****High Frequency Fundamental Measurement  
Compliance Certification Services Chamber B**

**Company:** SIERRA WORELESS  
**Project #:** 10U13412  
**Date:** 9/15/2010  
**Test Engineer:** MENGISTU MEKURIA  
**Configuration:** EUT ALONE  
**Mode:** TX, EVDO REV A, PCS BAND

**Test Equipment:****Receiving: Horn T59, and Camber B SMA Cables****Substitution: Horn T72 Substitution, 6ft SMA Cable (208947003) Warehouse**

f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Path Loss (dBm)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.851	-22.3	V	40.2	17.8	33.0	-15.2	
1.851	-11.6	H	39.5	27.9	33.0	-5.1	
1.880	-20.7	V	40.3	19.5	33.0	-13.5	
1.880	-8.7	H	40.1	31.4	33.0	-1.6	
1.909	-19.9	V	40.2	20.3	33.0	-12.7	
1.909	-10.7	H	40.1	29.4	33.0	-3.6	

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**

- CDMA – 1xRTT & EVDO REV A

### **RESULTS**

**CELL 1xRTT MODULATION**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement										
Company:	SIERRA WORELESS									
Project #:	10U13412									
Date:	9/20/2010									
Test Engineer:	MENGISTU MEKURIA									
Configuration:	EUT ALONE									
Mode:	TX, 1xRTT, CELL BAND									
Chamber	Pre-amplifier	Filter	Limit							
5m Chamber B	T145 8449B	Filter 1	ETSI 300 328 Tx							
f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch. (824.70 MHz)</b>										
1.649	-48.5	V	3.0	36.8	35.5	1.0	-46.2	-13.0	-33.2	
2.474	-45.5	V	3.0	41.7	35.4	1.0	-38.3	-13.0	-25.3	
3.299	-52.2	V	3.0	44.1	35.5	1.0	-42.6	-13.0	-29.6	
4.124	-53.0	V	3.0	46.2	35.2	1.0	-41.0	-13.0	-28.0	
4.948	-57.5	V	3.0	48.2	35.3	1.0	-43.7	-13.0	-30.7	
1.649	-43.3	H	3.0	37.2	35.5	1.0	-40.6	-13.0	-27.6	
2.474	-42.9	H	3.0	39.8	35.4	1.0	-37.5	-13.0	-24.5	
3.299	-55.2	H	3.0	44.0	35.5	1.0	-45.8	-13.0	-32.8	
4.124	-53.7	H	3.0	46.7	35.2	1.0	-41.3	-13.0	-28.3	
4.948	-54.4	H	3.0	48.8	35.3	1.0	-39.9	-13.0	-26.9	
<b>Mid Ch. (836.52 MHz)</b>										
1.673	-45.7	V	3.0	37.1	35.5	1.0	-43.1	-13.0	-30.1	
2.510	-56.4	V	3.0	41.8	35.4	1.0	-49.0	-13.0	-36.0	
3.346	-53.9	V	3.0	44.3	35.5	1.0	-44.2	-13.0	-31.2	
4.183	-53.9	V	3.0	46.3	35.2	1.0	-41.8	-13.0	-28.8	
5.019	-57.6	V	3.0	48.3	35.3	1.0	-43.5	-13.0	-30.5	
1.673	-39.5	H	3.0	37.5	35.5	1.0	-36.5	-13.0	-23.5	
2.510	-52.7	H	3.0	39.9	35.4	1.0	-47.2	-13.0	-34.2	
3.346	-55.7	H	3.0	44.1	35.5	1.0	-46.1	-13.0	-33.1	
4.183	-55.3	H	3.0	46.8	35.2	1.0	-42.7	-13.0	-29.7	
5.019	-55.4	H	3.0	48.9	35.3	1.0	-40.8	-13.0	-27.8	
<b>Hi Ch. (848.31 MHz)</b>										
1.697	-50.0	V	3.0	37.4	35.5	1.0	-47.1	-13.0	-34.1	
2.545	-55.9	V	3.0	42.0	35.4	1.0	-48.4	-13.0	-35.4	
3.393	-56.2	V	3.0	44.4	35.5	1.0	-46.3	-13.0	-33.3	
4.242	-54.2	V	3.0	46.4	35.2	1.0	-42.0	-13.0	-29.0	
5.090	-58.1	V	3.0	48.5	35.3	1.0	-43.9	-13.0	-30.9	
1.697	-40.9	H	3.0	37.7	35.5	1.0	-37.8	-13.0	-24.8	
2.545	-53.4	H	3.0	40.1	35.4	1.0	-47.7	-13.0	-34.7	
3.393	-56.7	H	3.0	44.3	35.5	1.0	-46.9	-13.0	-33.9	
4.242	-58.0	H	3.0	47.0	35.2	1.0	-45.3	-13.0	-32.3	
5.090	-54.1	H	3.0	49.1	35.3	1.0	-39.3	-13.0	-26.3	

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**CELL EVDO REV A MODULATION**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement											
<b>Company:</b>	SIERRA WORELESS										
<b>Project #:</b>	10U13412										
<b>Date:</b>	9/21/2010										
<b>Test Engineer:</b>	MENGISTU MEKURIA										
<b>Configuration:</b>	EUT ALONE										
<b>Mode:</b>	TX, EVDO REV A, CELL BAND										
Chamber			Pre-amplifier			Filter			Limit		
5m Chamber B			T145 8449B			Filter 1			FCC PART 22		
f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	
<b>Low Ch.</b>											
1.649	-47.3	V	3.0	36.8	35.5	1.0	45.0	-13.0	32.0		
2.474	-43.4	V	3.0	41.7	35.4	1.0	-36.1	-13.0	-23.1		
3.299	-52.9	V	3.0	44.1	35.5	1.0	-43.3	-13.0	-30.3		
4.124	-57.7	V	3.0	46.2	35.2	1.0	-45.8	-13.0	-32.8		
4.948	-61.9	V	3.0	48.2	35.3	1.0	-48.0	-13.0	-35.0		
1.649	-53.0	H	3.0	37.2	35.5	1.0	-50.3	-13.0	-37.3		
2.474	-43.9	H	3.0	39.8	35.4	1.0	-38.5	-13.0	-25.5		
3.299	-55.0	H	3.0	44.0	35.5	1.0	-45.6	-13.0	-32.6		
4.124	-51.7	H	3.0	46.7	35.2	1.0	-39.3	-13.0	-26.3		
4.948	-60.1	H	3.0	48.8	35.3	1.0	-45.6	-13.0	-32.6		
<b>Mid Ch.</b>											
1.673	-53.9	V	3.0	37.1	35.5	1.0	-51.3	-13.0	-38.3		
2.510	-59.4	V	3.0	41.8	35.4	1.0	-52.0	-13.0	-39.0		
3.346	-53.2	V	3.0	44.3	35.5	1.0	-43.4	-13.0	-30.4		
4.183	-55.4	V	3.0	46.3	35.2	1.0	-43.4	-13.0	-30.4		
5.019	-62.6	V	3.0	48.3	35.3	1.0	-48.6	-13.0	-35.6		
1.673	-50.0	H	3.0	37.5	35.5	1.0	-47.1	-13.0	-34.1		
2.510	-59.1	H	3.0	39.9	35.4	1.0	-53.6	-13.0	-40.6		
3.346	-57.1	H	3.0	44.1	35.5	1.0	-47.5	-13.0	-34.5		
4.183	-52.8	H	3.0	46.8	35.2	1.0	-40.2	-13.0	-27.2		
5.019	-59.4	H	3.0	48.9	35.3	1.0	-44.7	-13.0	-31.7		
<b>Hi Ch.</b>											
1.697	-55.2	V	3.0	37.4	35.5	1.0	-52.3	-13.0	-39.3		
2.545	-56.8	V	3.0	42.0	35.4	1.0	-49.3	-13.0	-36.3		
3.393	-60.9	V	3.0	44.4	35.5	1.0	-51.0	-13.0	-38.0		
4.242	-62.7	V	3.0	46.4	35.2	1.0	-50.5	-13.0	-37.5		
5.090	-65.3	V	3.0	48.5	35.3	1.0	-51.1	-13.0	-38.1		
1.697	-53.1	H	3.0	37.7	35.5	1.0	-50.0	-13.0	-37.0		
2.545	-60.0	H	3.0	40.1	35.4	1.0	-54.3	-13.0	-41.3		
3.393	-60.8	H	3.0	44.3	35.5	1.0	-51.1	-13.0	-38.1		
4.242	-58.6	H	3.0	47.0	35.2	1.0	-45.9	-13.0	-32.9		
5.090	-64.6	H	3.0	49.1	35.3	1.0	-49.8	-13.0	-36.8		
Rev. 03.03.09											

**PCS 1xRTT MODULATION**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement											
Company:	SIERRA WORELESS										
Project #:	10U13412										
Date:	9/20/2010										
Test Engineer:	MENGISTU MEKURIA										
Configuration:	EUT ALONE										
Mode:	TX, 1xRTT, PCS BAND										
Chamber			Pre-amplifier			Filter			Limit		
5m Chamber B			T145 8449B			Filter 1			FCC PART 24		
f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
<b>Low Ch. (1851.25 MHz)</b>											
3.703	-48.3	H	3.0	45.3	35.4	1.0	-37.4	-13.0	-24.4		
5.554	-65.0	H	3.0	50.0	35.4	1.0	-49.4	-13.0	-36.4		
7.405	-62.4	H	3.0	53.0	35.7	1.0	-44.1	-13.0	-31.1		
9.256	-66.9	H	3.0	55.1	35.6	1.0	-46.4	-13.0	-33.4		
3.703	-48.4	V	3.0	45.1	35.4	1.0	-37.7	-13.0	-24.7		
5.554	-67.7	V	3.0	49.2	35.4	1.0	-52.9	-13.0	-39.9		
7.405	-59.1	V	3.0	51.3	35.7	1.0	-42.5	-13.0	-29.5		
9.256	-66.4	V	3.0	53.6	35.6	1.0	-47.4	-13.0	-34.4		
<b>Mid Ch. (1880 MHz)</b>											
3.760	-48.2	H	3.0	45.5	35.3	1.0	-37.0	-13.0	-24.0		
5.640	-65.3	H	3.0	50.2	35.4	1.0	-49.5	-13.0	-36.5		
7.520	-62.0	H	3.0	53.1	35.7	1.0	-43.6	-13.0	-30.6		
9.400	-65.7	H	3.0	55.2	35.6	1.0	-45.0	-13.0	-32.0		
3.760	-51.0	V	3.0	45.3	35.3	1.0	-40.1	-13.0	-27.1		
5.640	-66.8	V	3.0	49.3	35.4	1.0	-52.0	-13.0	-39.0		
7.520	-61.3	V	3.0	51.4	35.7	1.0	-44.5	-13.0	-31.5		
9.400	-65.7	V	3.0	53.7	35.6	1.0	-46.6	-13.0	-33.6		
<b>Hi Ch. (1908.75 MHz)</b>											
3.818	-46.6	H	3.0	45.7	35.3	1.0	-35.2	-13.0	-22.2		
5.726	-66.6	H	3.0	50.3	35.4	1.0	-50.8	-13.0	-37.8		
7.635	-62.8	H	3.0	53.2	35.7	1.0	-44.3	-13.0	-31.3		
9.544	-65.0	H	3.0	55.4	35.6	1.0	-44.2	-13.0	-31.2		
3.818	-49.9	V	3.0	45.4	35.3	1.0	-38.8	-13.0	-25.8		
5.726	-64.7	V	3.0	49.4	35.4	1.0	-49.8	-13.0	-36.8		
7.635	-63.5	V	3.0	51.6	35.7	1.0	-46.6	-13.0	-33.6		
9.544	-64.7	V	3.0	53.9	35.6	1.0	-45.3	-13.0	-32.3		
Rev. 03.03.09											

**PCS EVDO REV A MODULATION**

Compliance Certification Services Above 1GHz High Frequency Substitution Measurement										
<b>Company:</b>	SIERRA WORELESS									
<b>Project #:</b>	10U13412									
<b>Date:</b>	9/20/2010									
<b>Test Engineer:</b>	MENGISTU MEKURIA									
<b>Configuration:</b>	EUT ALONE									
<b>Mode:</b>	TX, EVDO REV A, PCS BAND									
<b>Chamber</b>			<b>Pre-amplifier</b>		<b>Filter</b>		<b>Limit</b>			
5m Chamber B			T145 8449B		Filter 1		FCC PART 24			
f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch. (1851.25 MHz)</b>										
3.703	-48.9	H	3.0	45.3	35.4	1.0	-37.9	-13.0	-24.9	
5.554	-65.0	H	3.0	50.0	35.4	1.0	-49.4	-13.0	-36.4	
7.405	-64.8	H	3.0	53.0	35.7	1.0	-46.5	-13.0	-33.5	
9.256	-63.1	H	3.0	55.1	35.6	1.0	-42.6	-13.0	-29.6	
3.703	-49.5	V	3.0	45.1	35.4	1.0	-38.7	-13.0	-25.7	
5.554	-63.6	V	3.0	49.2	35.4	1.0	-48.8	-13.0	-35.8	
7.405	-59.9	V	3.0	51.3	35.7	1.0	-43.3	-13.0	-30.3	
9.256	-58.7	V	3.0	53.6	35.6	1.0	-39.7	-13.0	-26.7	
<b>Mid Ch. (1880 MHz)</b>										
3.760	-53.2	H	3.0	45.5	35.3	1.0	-42.0	-13.0	-29.0	
5.640	-65.3	H	3.0	50.2	35.4	1.0	-49.5	-13.0	-36.5	
7.520	-62.2	H	3.0	53.1	35.7	1.0	-43.8	-13.0	-30.8	
9.400	-65.3	H	3.0	55.2	35.6	1.0	-44.7	-13.0	-31.7	
3.760	-53.8	V	3.0	45.3	35.3	1.0	-42.9	-13.0	-29.9	
5.640	-62.0	V	3.0	49.3	35.4	1.0	-47.1	-13.0	-34.1	
7.520	-57.8	V	3.0	51.4	35.7	1.0	-41.1	-13.0	-28.1	
9.400	-59.3	V	3.0	53.7	35.6	1.0	-40.1	-13.0	-27.1	
<b>Hi Ch. (1908.75 MHz)</b>										
3.818	-47.9	H	3.0	45.7	35.3	1.0	-36.5	-13.0	-23.5	
5.726	-66.8	H	3.0	50.3	35.4	1.0	-51.0	-13.0	-38.0	
7.635	-61.2	H	3.0	53.2	35.7	1.0	-42.7	-13.0	-29.7	
9.544	-58.1	H	3.0	55.4	35.6	1.0	-37.3	-13.0	-24.3	
3.818	-47.0	V	3.0	45.4	35.3	1.0	-35.9	-13.0	-22.9	
5.726	-66.6	V	3.0	49.4	35.4	1.0	-51.6	-13.0	-38.6	
7.635	-58.2	V	3.0	51.6	35.7	1.0	-41.3	-13.0	-28.3	
9.544	-57.8	V	3.0	53.9	35.6	1.0	-38.4	-13.0	-25.4	

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