FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
INDUSTRY CANADA RSS-132 ISSUE 2
INDUSTRY CANADA RSS-133 ISSUE 5

CERTIFICATION TEST REPORT

FOR

DUAL- BAND CDMA (1XRTT & EVDO) MODULE

MODEL NUMBER: AR5550

FCC ID: N7NAR5550
IC: 2417C-AR5550

REPORT NUMBER: 10U13438-1, Revision B

ISSUE DATE: DECEMBER 02, 2010

Prepared for

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13811 WIRELESS WAY
RICHMOND, BRITISH COLUMBIA V6V3A4, CANADA

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	10/21/10	Initial Issue	T. Chan
A	11/23/10	Replace EIRP peak data to EIRP Average data	M. Mekuria
B	12/02/10	Revised EUT description on page 7	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS INC. - YW
13811 WIRELESS WAY
RICHMOND, BRITISH COLUMBIA V6V3A4, CANADA

EUT DESCRIPTION: DUAL- BAND CDMA (1XRTT & EVDO) MODULE

MODEL: AR5550

SERIAL NUMBER: 1026060032

DATE TESTED: OCTOBER 07 TO 20, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H & 24E	Pass
IC RSS-132 ISSUE 2 & RSS-133 ISSUE 5	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:

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ENGINEERING MANAGER
UL CCS

Tested By:

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, FCC CFR Part 24, RSS-132 Issue 2 and RSS-133 Issue 5.

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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 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 Dual- Band CDMA (1XRTT & EVDO) Radio Module that is manufactured by Sierra Wireless.

GENERAL INFORMATION

Power Requirements	5.2 VDC/1.2A
List of frequencies generated or used by the EUT	32KHz & 19.2MHz

5.2. MAXIMUM OUTPUT POWER

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

Part 22 Cellular Band

Frequency range (MHz)	Modulation	Conducted		ERP	
		dBm	mW	dBm	mW
824.7 – 848.31	1xRTT	29.870	970.510	30.200	1047.129
824.7 – 848.31	EVDO REV. A	30.160	1037.528	30.300	1071.519

Part 24 PCS Band

Frequency range (MHz)	Modulation	Conducted		EIRP	
		dBm	mW	dBm	mW
1851.25 – 1908.75	1xRTT	25.85	384.6	27.60	575.4
1851.25 – 1908.75	EVDO REV. A	25.65	367.3	26.10	407.4

5.3. SOFTWARE AND FIRMWARE

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

5.4. 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.

Since the EUT is a read mobile device, the highest emissions also investigated for X and Y-antenna orientations. After the investigations, the worst-position was turned out to be an X-antenna orientation for both Cell and PCS bands.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Development Kit	Sierra Wireless	ARx550	1400476 Rev A	N/A
Interface Jig	Sierra Wireless	N/a	1400475 Rev A	N/A
AC/DC Adapter	CINCON ELEC.	TR45A12	45120-0054164	DoC
Laptop	Dell	D610	CN-0M7181-48643-66P-3523	DoC
AC/DC Adapter	Dell		CN-09T215-71615-55A-0614	DoC

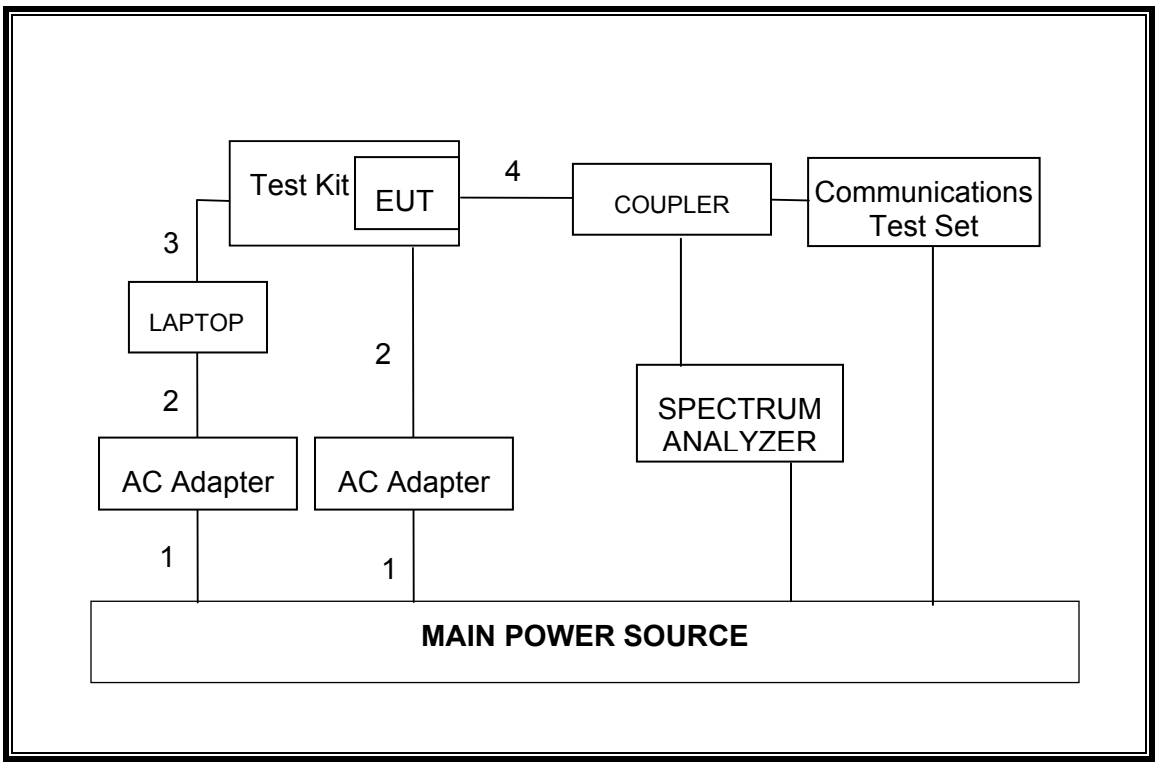
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	Un-shielded	2.0m	N/A
2	DC	2	DC	Un-shielded	2.0m	N/A
3	USB	1	USB	Un-shielded	2.0m	N/A
4	SMA	1	SMA	Shielded	0.8m	N/A

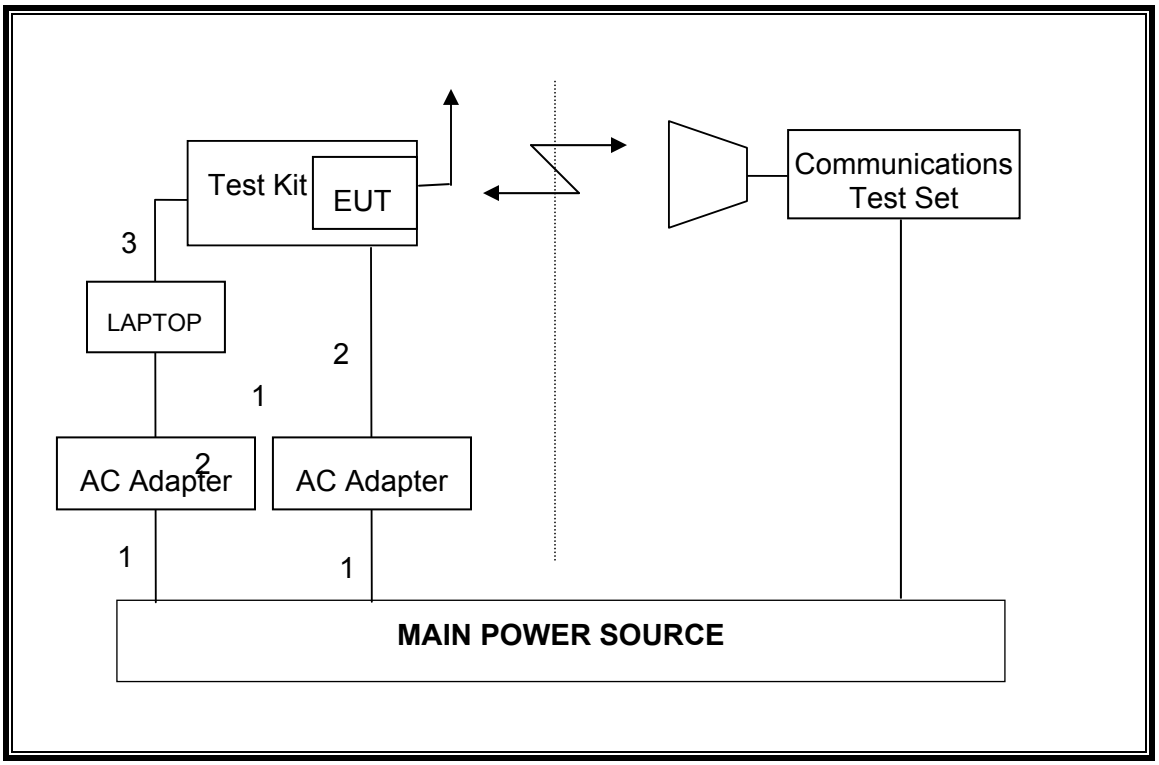
TEST SETUP

The EUT is attached to the test board that is connected to an AC Adapter and Laptop 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**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	08/18/11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	05/05/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	10/29/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	07/14/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/15/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/06/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/11
Antenna, Horn, 18 GHz	EMCO	3115	C00943	CNR
Antenna, Horn, 18 GHz	EMCO	3115	C00945	07/01/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	07/12/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/13/11
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	11/05/10
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10
Directional Coupler, 18 GHz	Krytar	1817	N02656	CNR
DC power supply, 60 V @ 18 A	Agilent / HP	6296A	N/A	CNR
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
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.

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

- 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)	29.68	29.53	29.81
	55 (Loopback)	29.71	29.64	**29.96**
RC2	9 (Loopback)	29.71	29.66	29.91
	55 (Loopback)	29.50	29.54	29.89
RC3	2 (Loopback)	29.26	29.03	29.62
	55 (Loopback)	29.21	29.14	29.63
	32 (+ F-SCH)	29.40	29.10	29.54
	32 (+ SCH)	29.43	29.15	29.52
RC4	2 (Loopback)	29.27	29.19	29.54
	55 (Loopback)	29.27	29.11	29.62
	32 (+ F-SCH)	29.31	29.11	29.52
	32 (+ SCH)	29.27	29.05	29.46
RC5	9 (Loopback)	29.23	29.10	29.51
	55 (Loopback)	29.29	29.21	29.60

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)	29.62	30.09	28.87
	55 (Loopback)	29.67	30.02	28.81
RC2	9 (Loopback)	29.72	30.26	29.21
	55 (Loopback)	29.70	**30.29**	29.20
RC3	2 (Loopback)	29.06	29.18	28.68
	55 (Loopback)	29.23	29.69	28.69
	32 (+ F-SCH)	29.09	29.81	28.70
	32 (+ SCH)	29.04	29.79	28.37
RC4	2 (Loopback)	29.46	29.91	28.67
	55 (Loopback)	29.41	29.91	28.39
	32 (+ F-SCH)	29.35	29.89	28.67
	32 (+ SCH)	29.32	29.90	28.65
RC5	9 (Loopback)	29.50	29.88	28.68
	55 (Loopback)	29.49	29.90	28.75

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
- 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 > 0000000 : 00000000 : 00000000 : 00000000 > Subnet Mask > 0
  - Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Parms:
  - Cell Power > -105.5 dBm/1.23 MHz
  - Cell Band > (Select US Cellular or US PCS)
  - Channel > (Enter channel number)
  - Application Config > Enhanced Test Application Protocol > FTAP (default)
  - FTAP Rate > 307.2 kbps (2 Slot, QPSK)
  - Rvs Power Ctrl > Active bits
  - Protocol Rel > 0 (1xEV-DO)
- Press “Start Data Connection” when “Session Open” appear in “Active Cell”
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

RF Power Output for EV-DO Rel 0

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	29.990
			384	836.52	**30.060**
			777	848.31	30.000
PCS	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	29.110
			600	1880.00	**30.154**
			1175	1908.75	29.720

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	30.010
			384	836.52	30.060
			777	848.31	**30.310**
PCS	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	30.030
			600	1880.00	**30.470**
			1175	1908.75	29.600

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	1.277	1.397
Middle	836.52	1.274	1.391
High	848.31	1.273	1.402

CELL, EVDO REV. A Modulation

Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	824.70	1.291	1.387
Middle	836.52	1.295	1.387
High	848.31	1.289	1.392

PCS,1xRTT Modulation

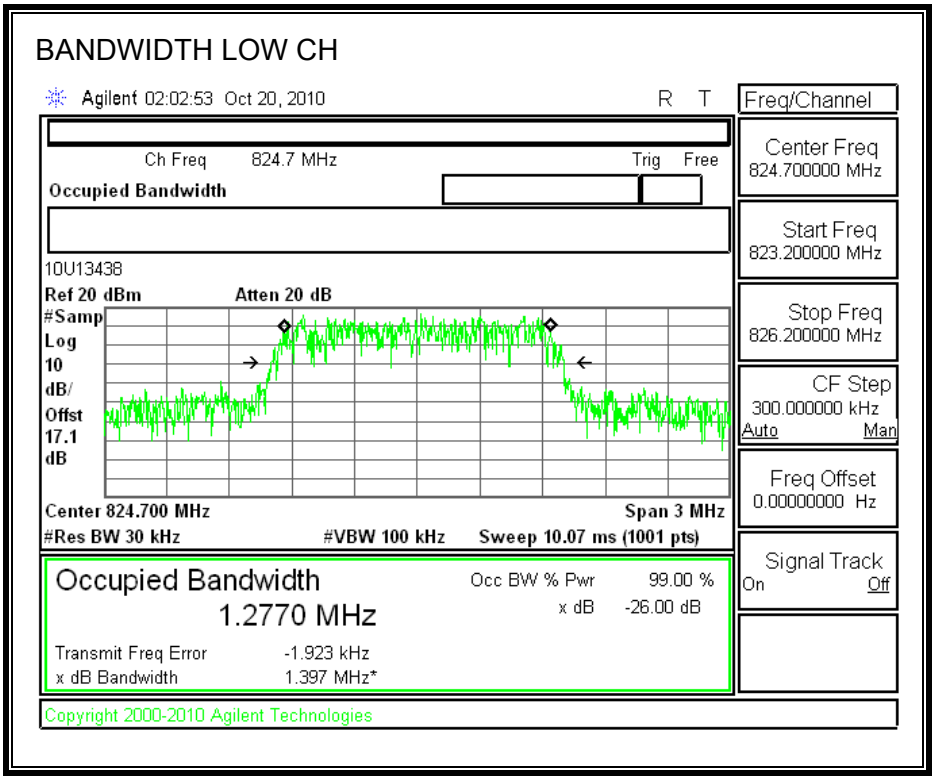
Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	1851.25	1.288	1.382
Middle	1880.00	1.293	1.394
High	1908.75	1.291	1.366

PCS,EVDO REV. A Modulation

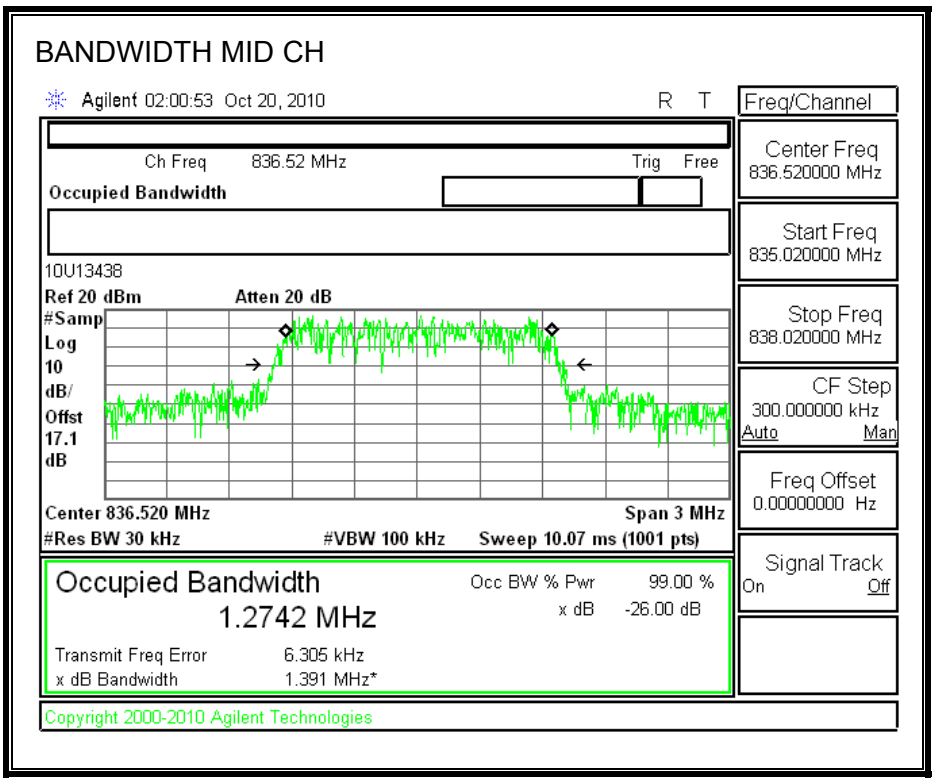
Channel	Frequency (MHz)	99% BW (MHz)	-26dB BW (MHz)
Low	1851.25	1.285	1.387
Middle	1880.00	1.292	1.409
High	1908.75	1.293	1.413

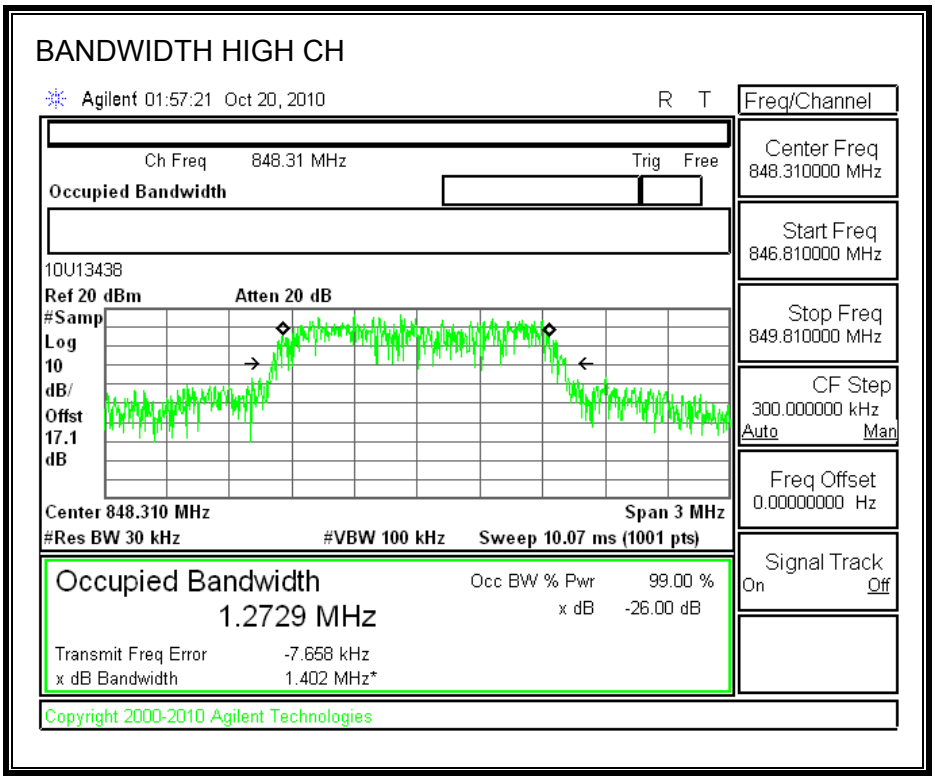
CELL, 1xRTT MODULATION

BANDWIDTH LOW CH

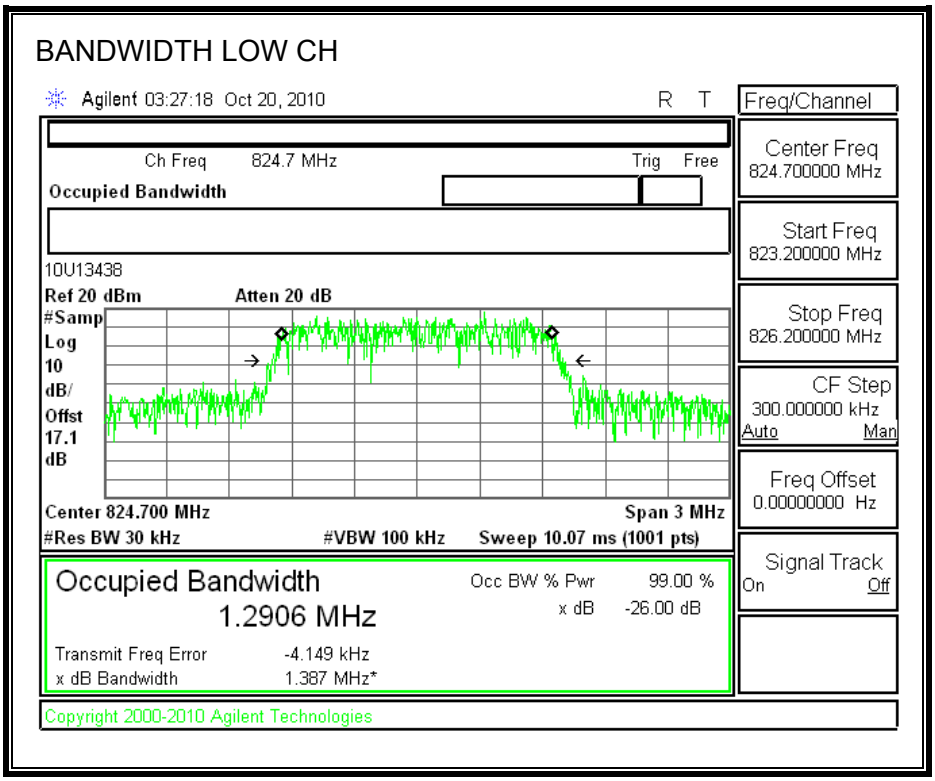


BANDWIDTH MID CH





CELL, EVDO REV A MODULATION



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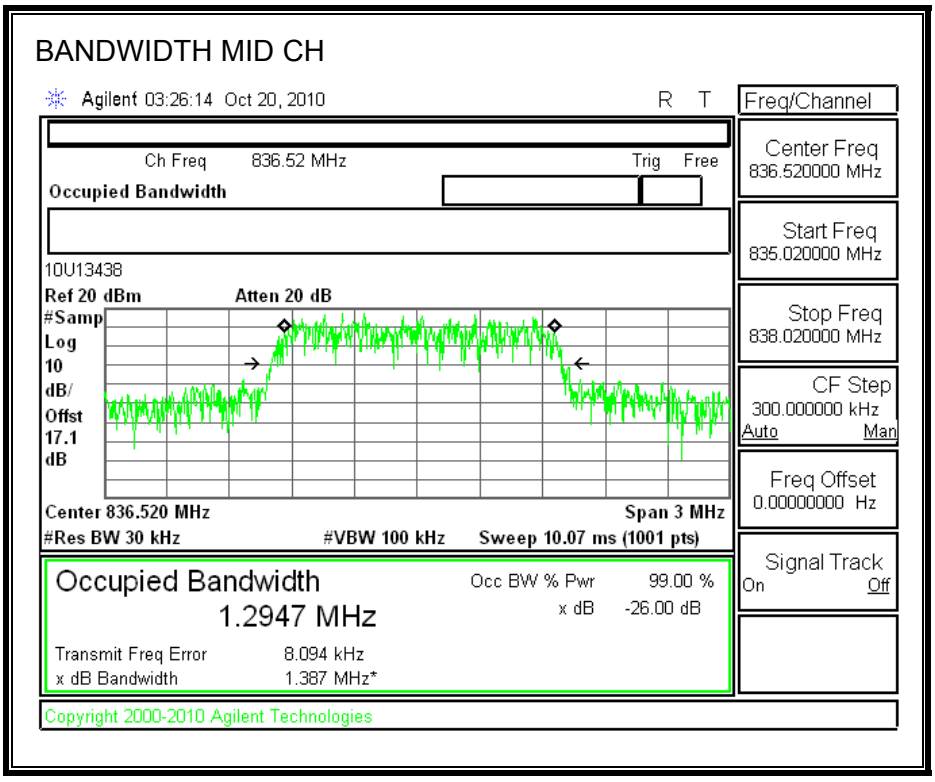

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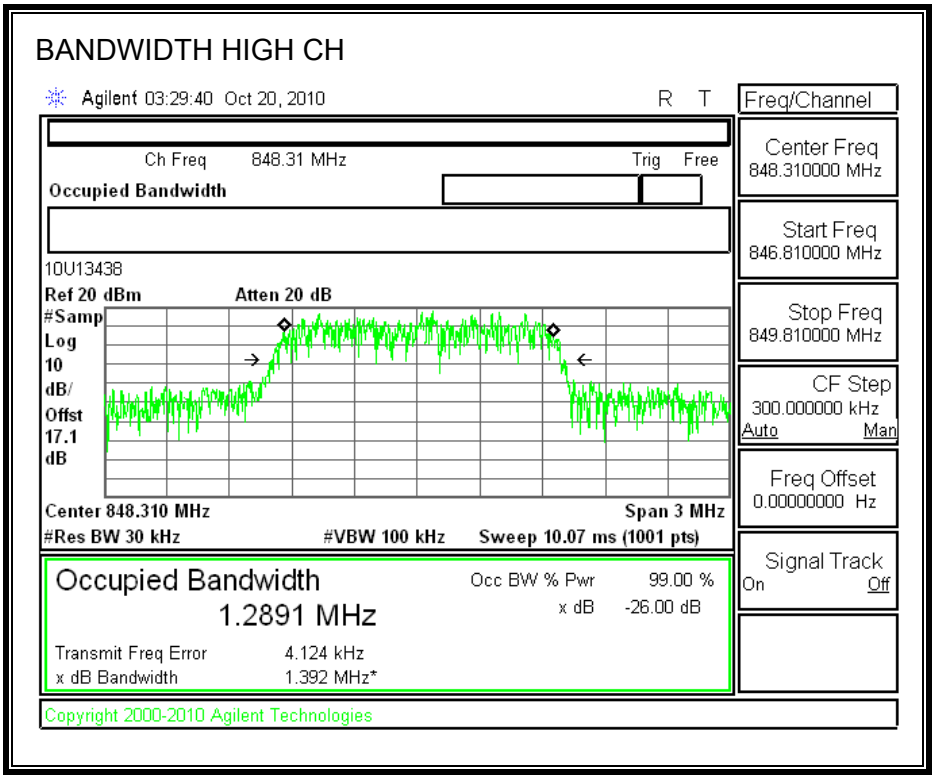
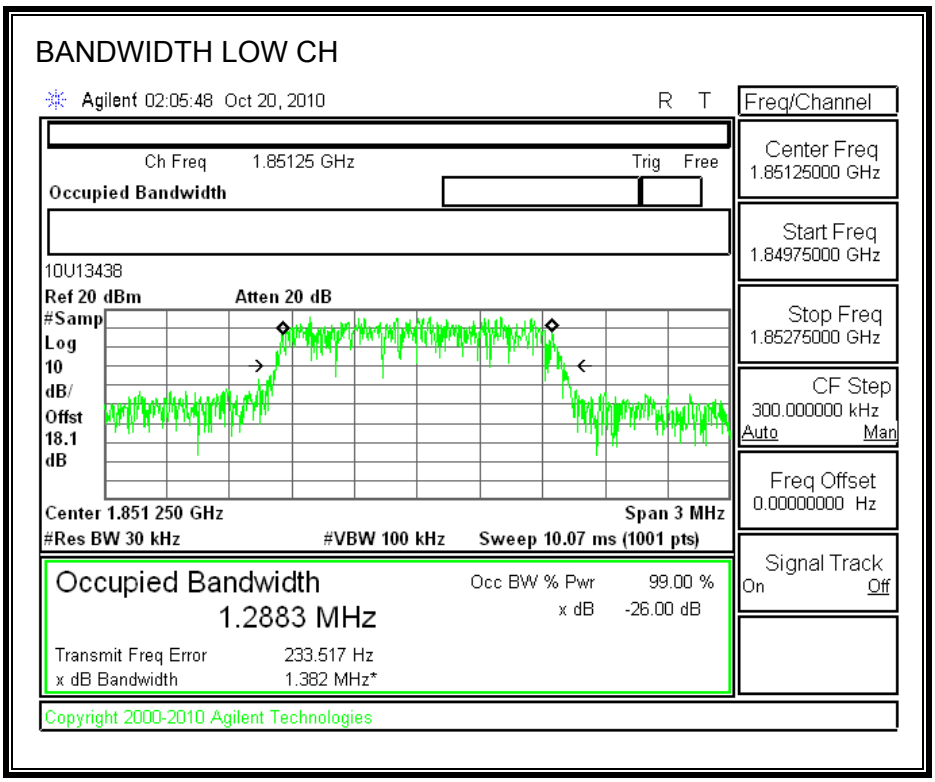


PCS, 1xRTT MODULATION

BANDWIDTH LOW CH



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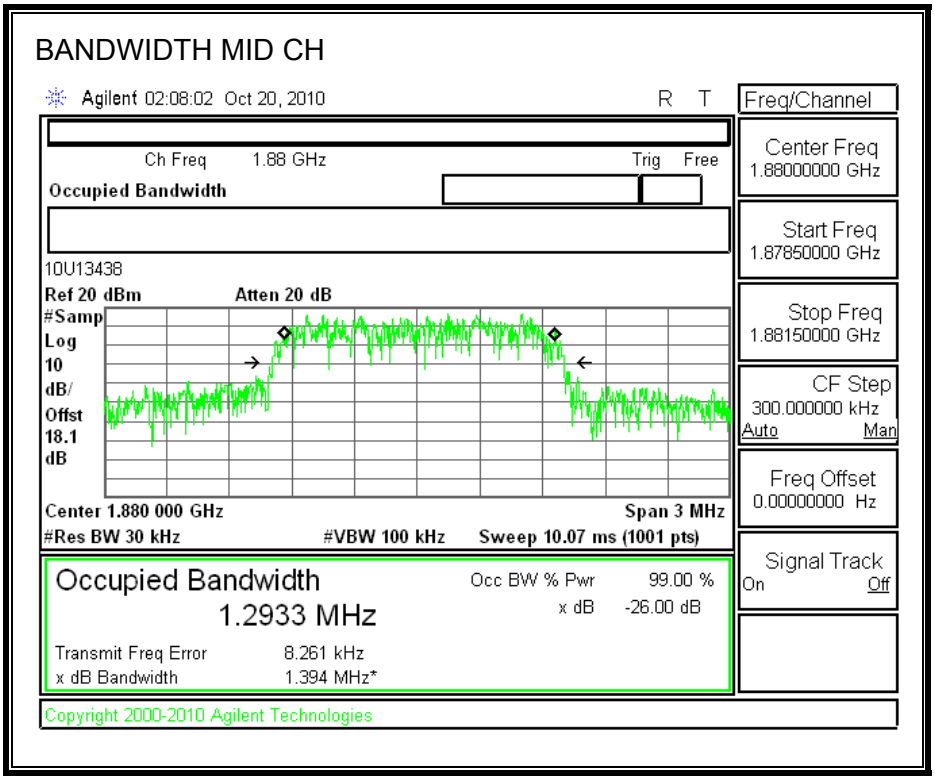
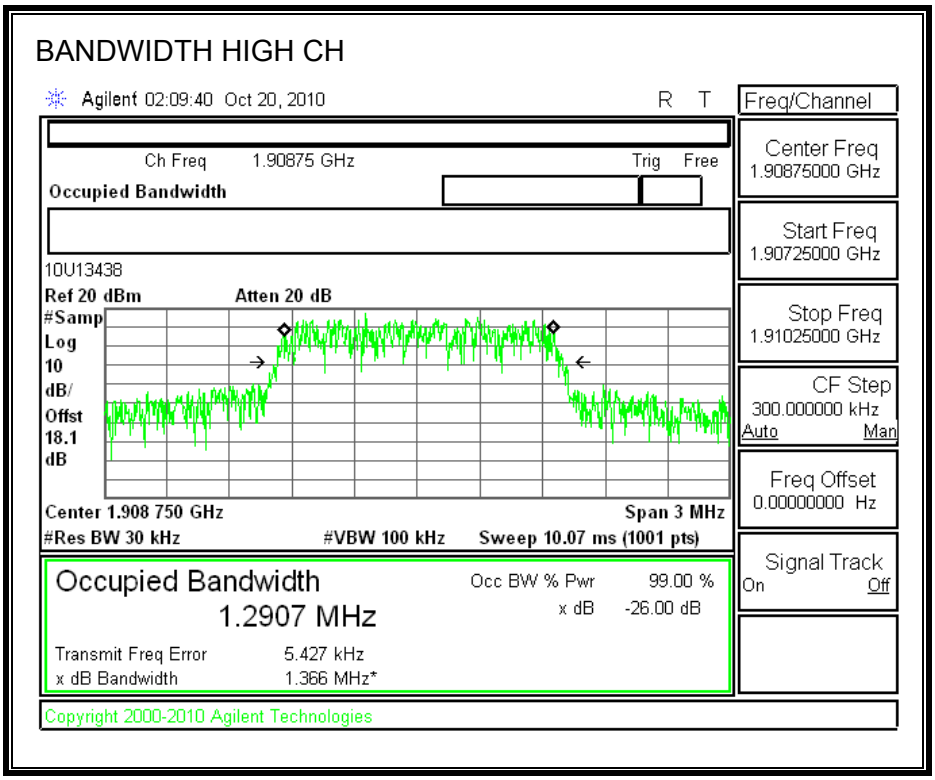
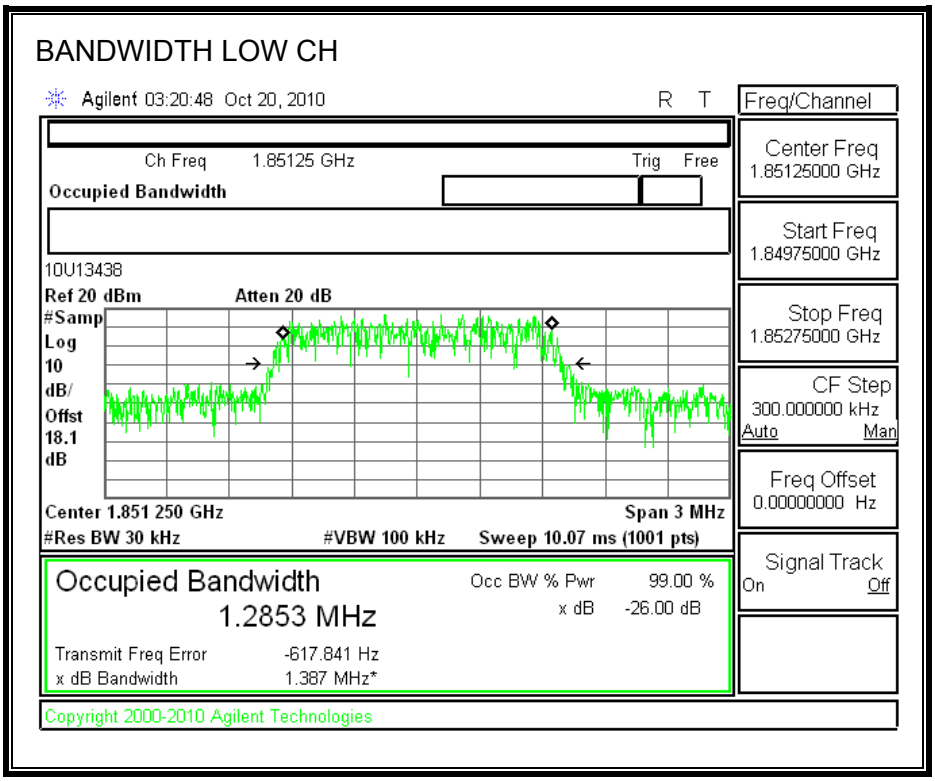




PCS, EVDO REV.A MODULATION



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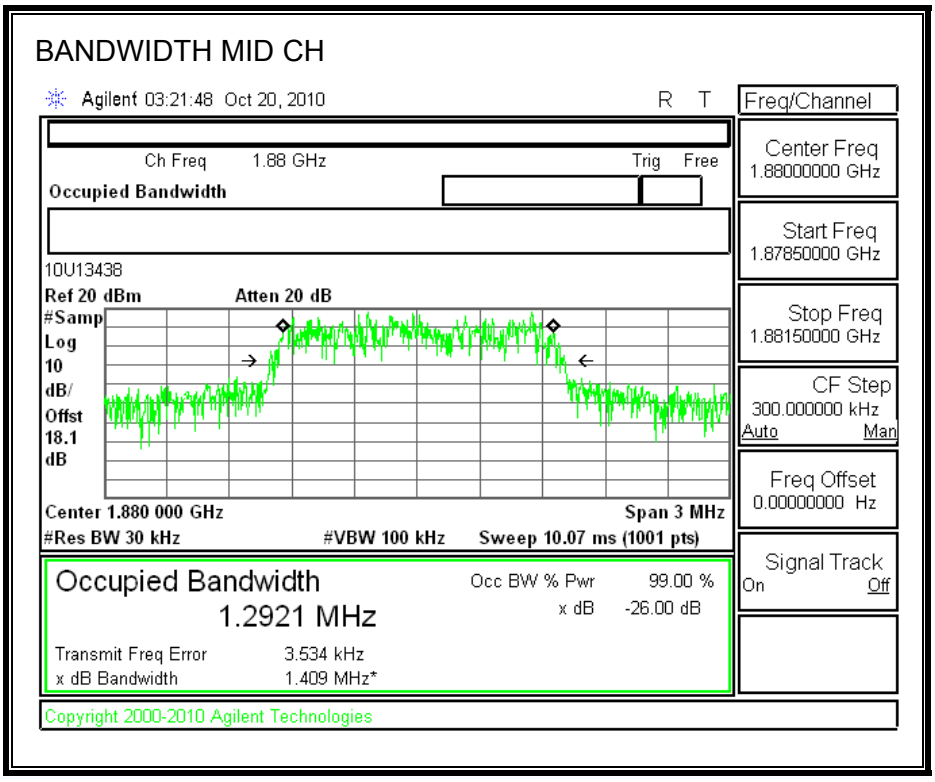

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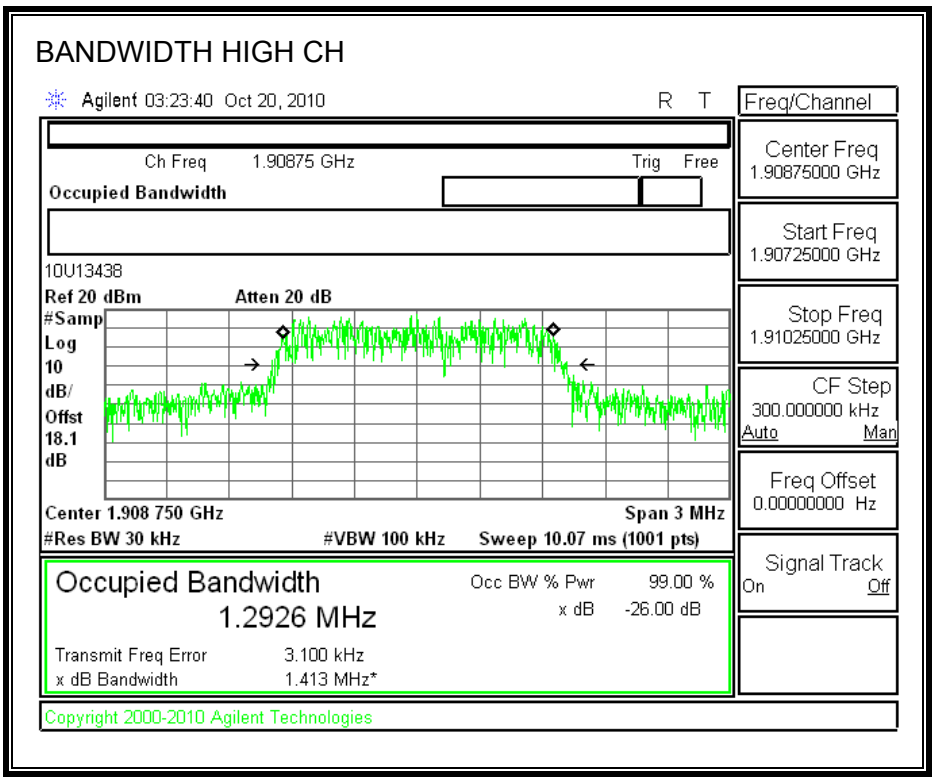


8.2. RF POWER OUTPUT

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	29.76	946.24
Middle	836.52	29.87	970.51
High	848.31	29.73	939.72

CELL, EVDO REV A Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	824.70	30.02	1004.62
Middle	836.52	30.16	1037.53
High	848.31	30.03	1006.93

PCS, 1xRTT Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	1851.25	29.58	907.82
Middle	1880.00	30.26	1061.70
High	1908.75	29.06	805.38

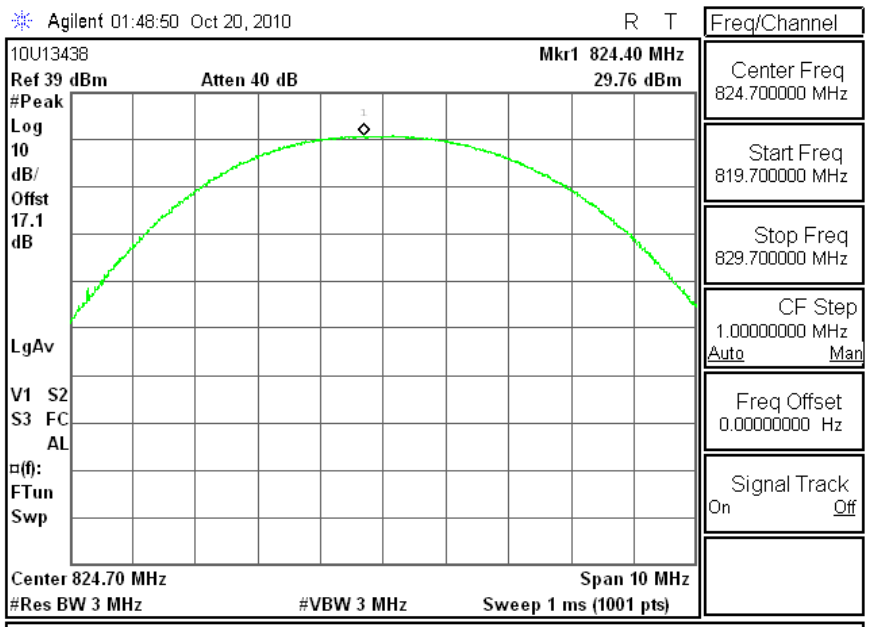
PCS, EVDO REV A Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	1851.25	29.92	981.75
Middle	1880.00	30.72	1180.32
High	1908.75	29.61	914.11

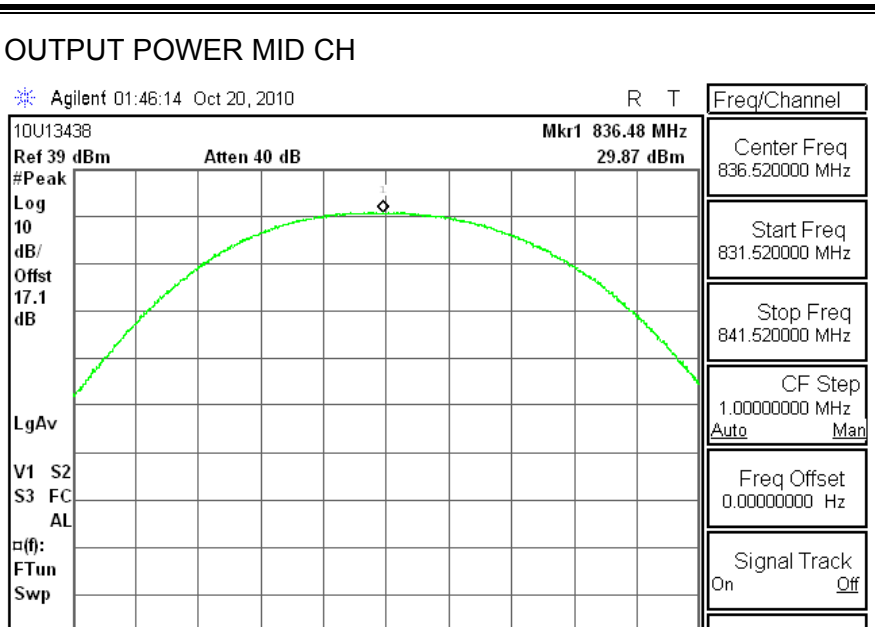
NOTE: RBW=VBW=3MHz

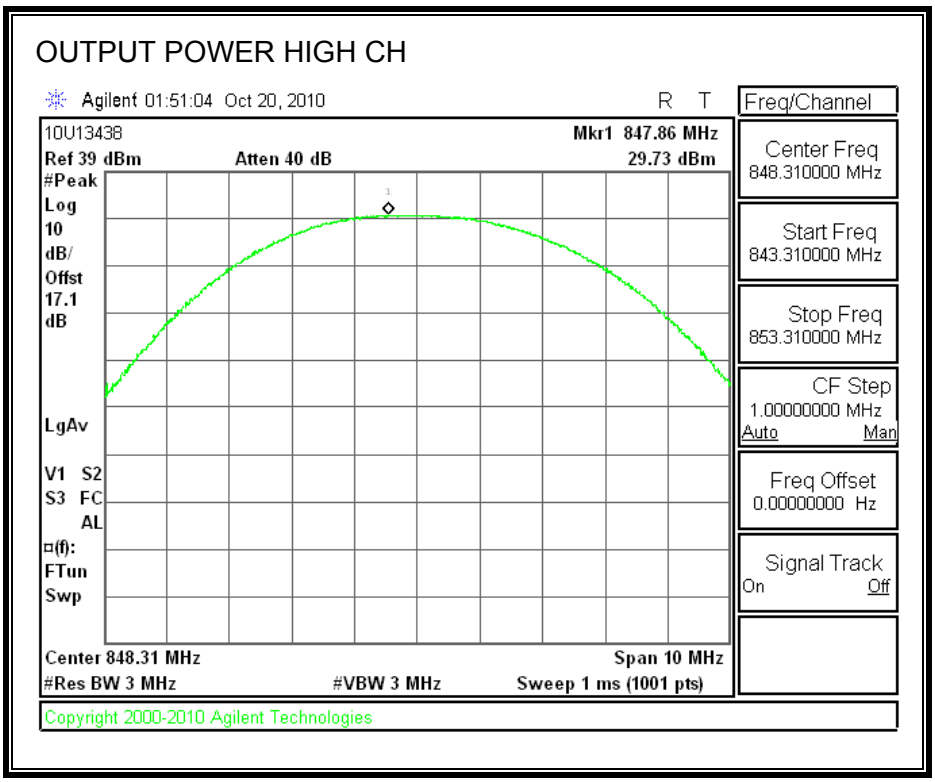
CELL, 1xRTT MODULATION

OUTPUT POWER LOW CH

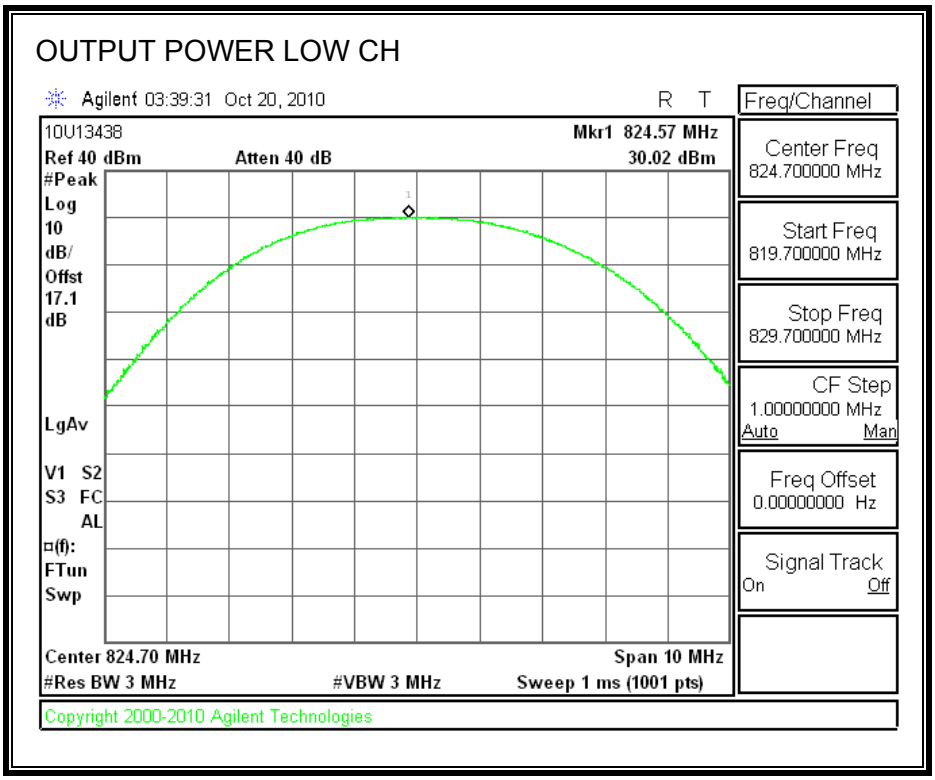


OUTPUT POWER MID CH

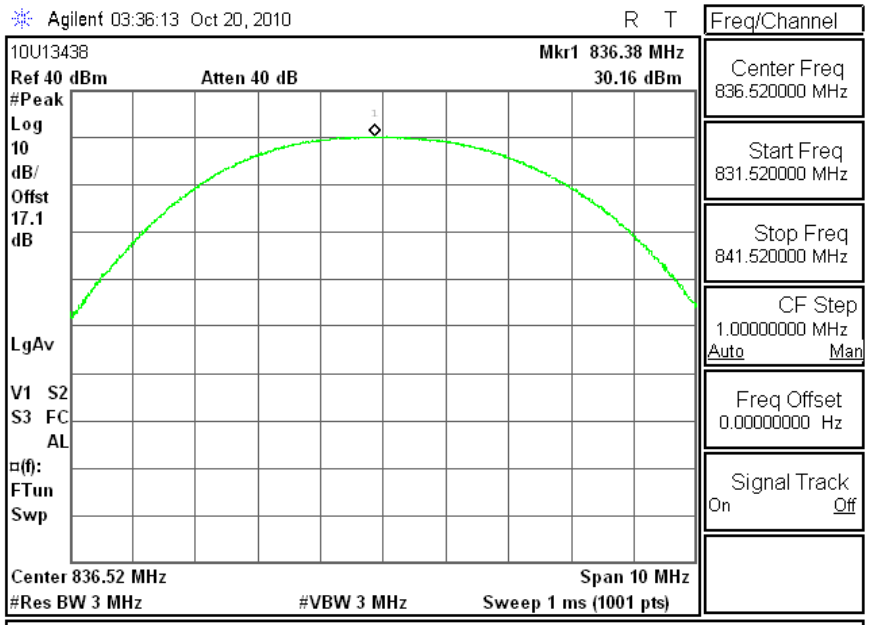




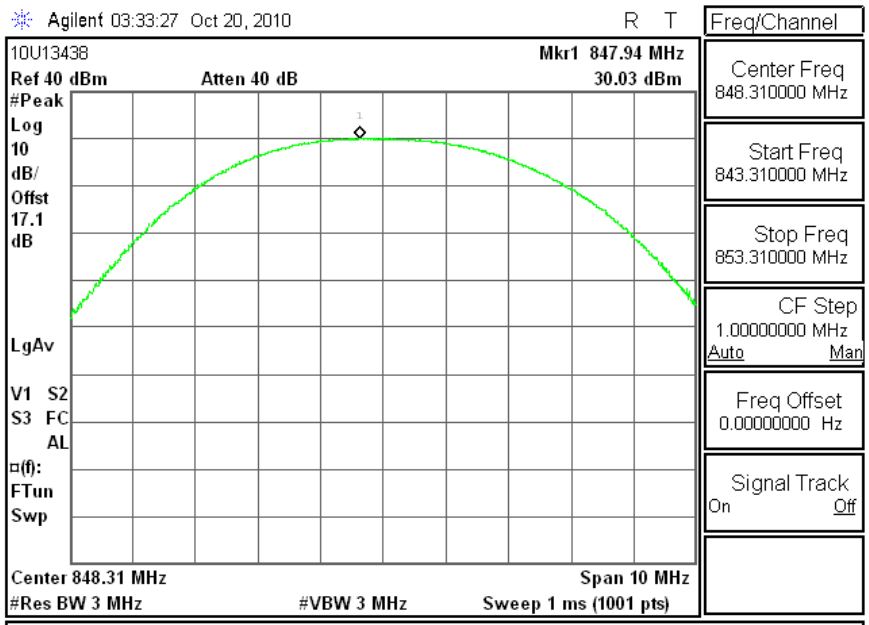
CELL, EVDO REV A MODULATION



OUTPUT POWER MID CH

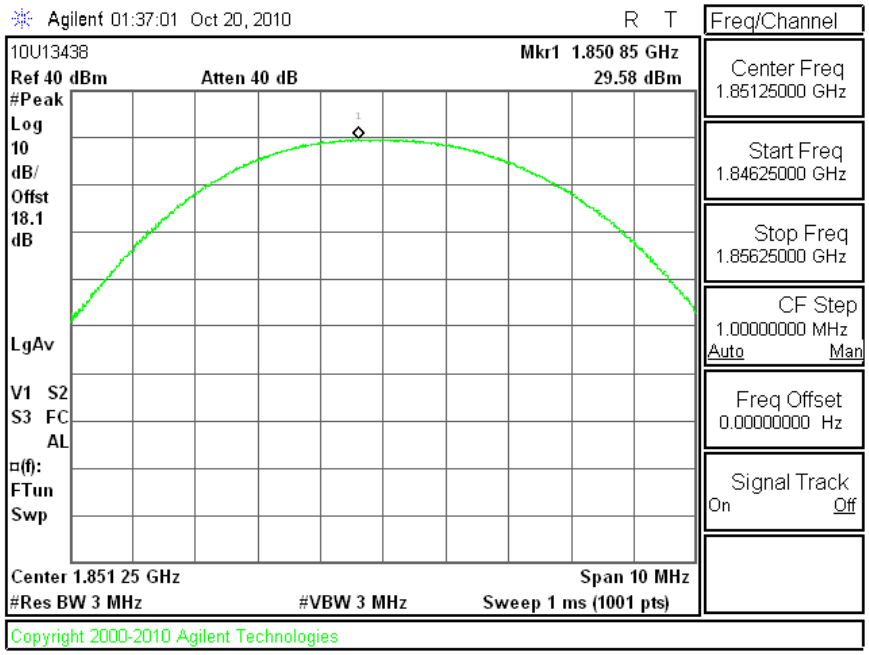


OUTPUT POWER HIGH CH

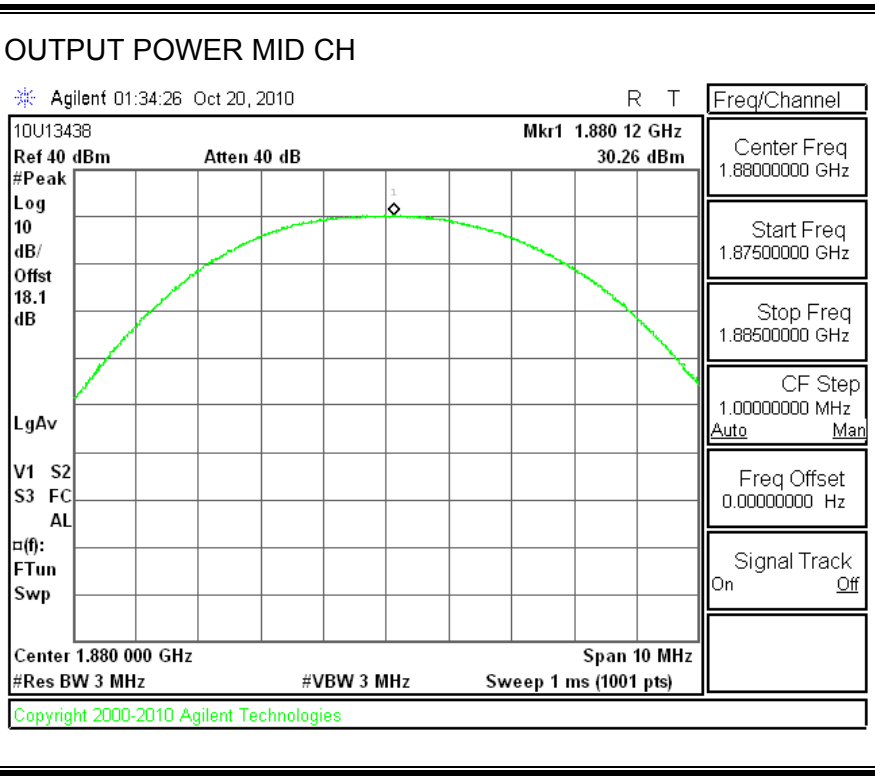


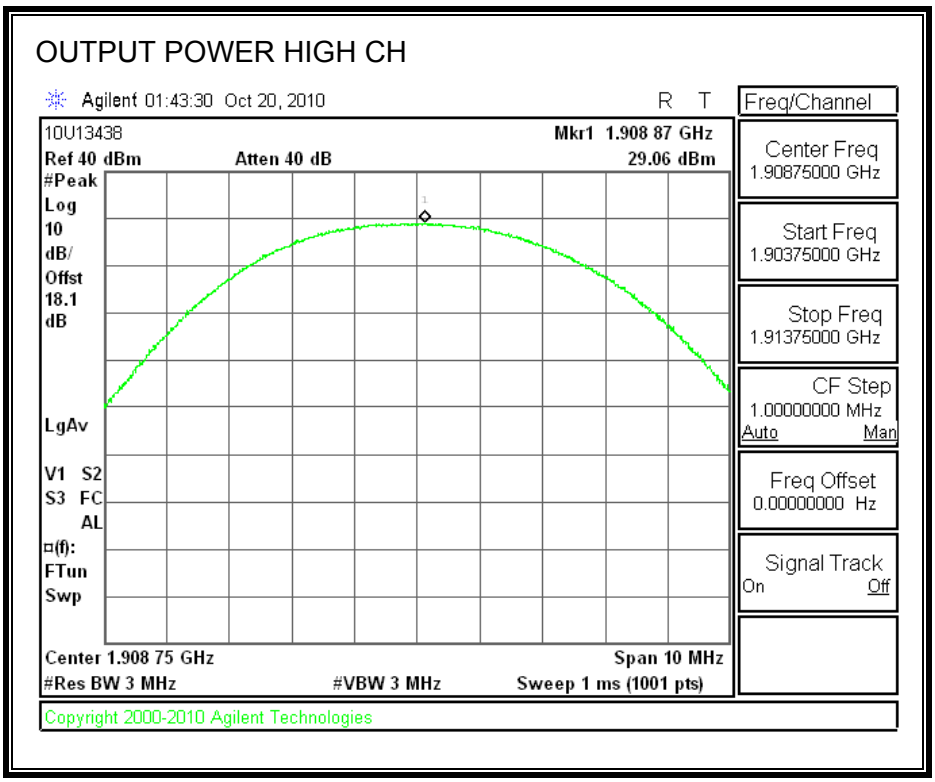
PCS, 1xRTT MODULATION

OUTPUT POWER LOW CH

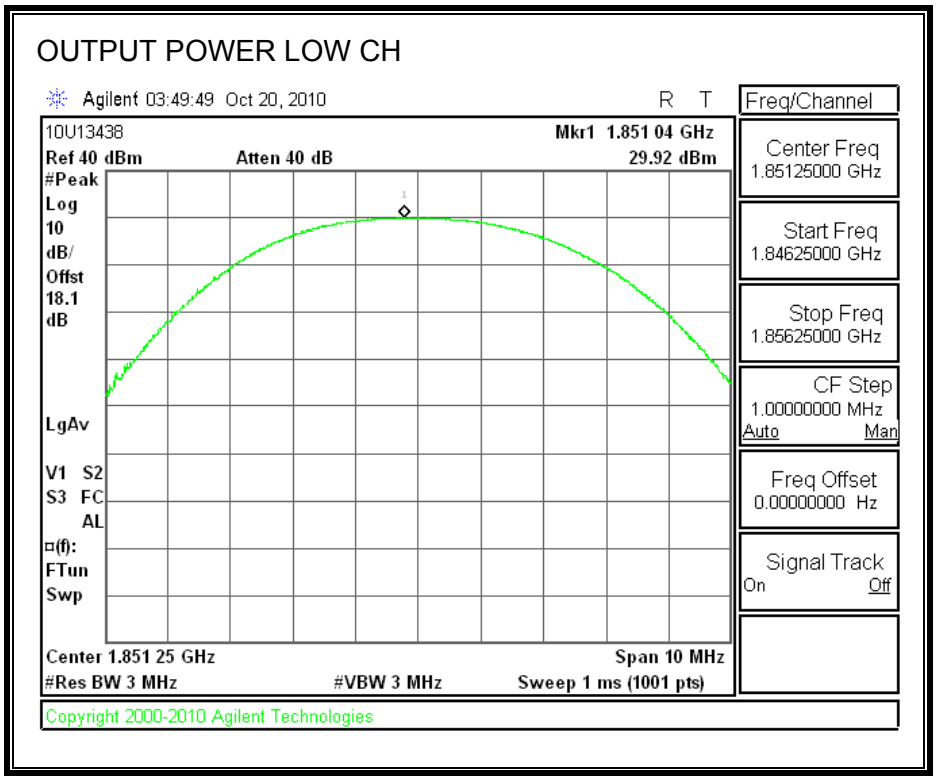


OUTPUT POWER MID CH

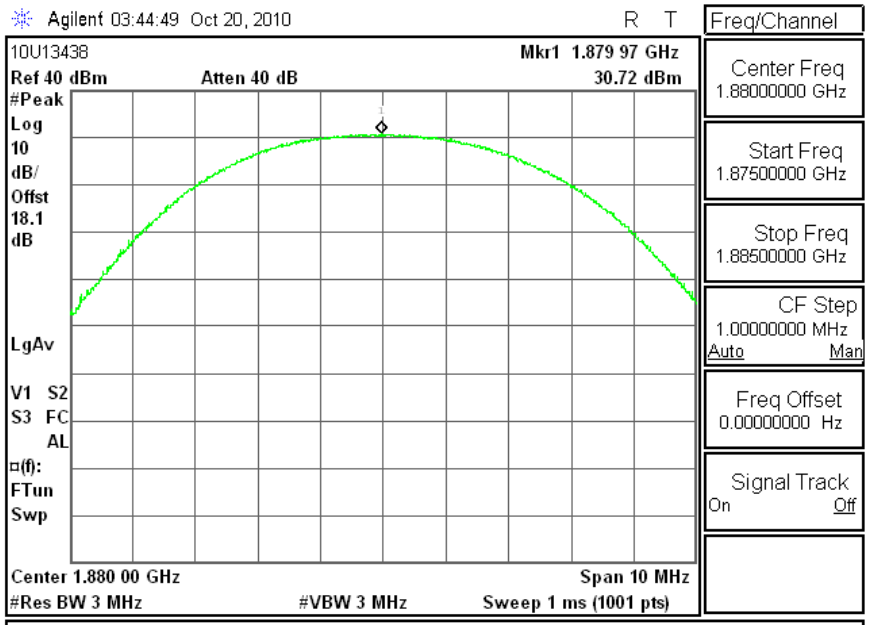




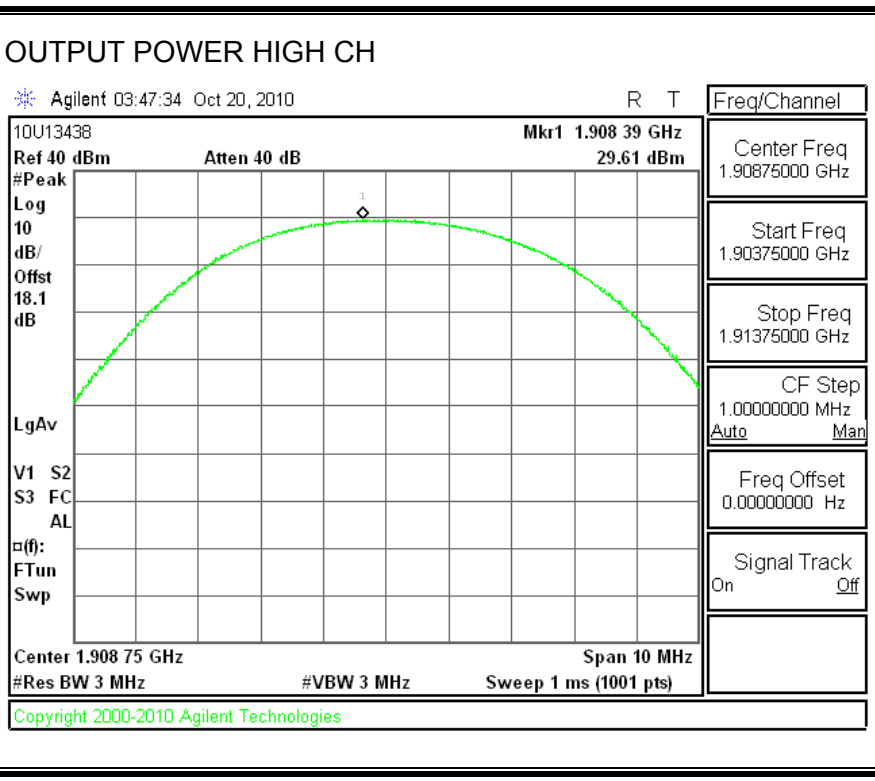
PCS, EVDO REV A MODULATION



OUTPUT POWER MID CH



OUTPUT POWER HIGH CH



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)

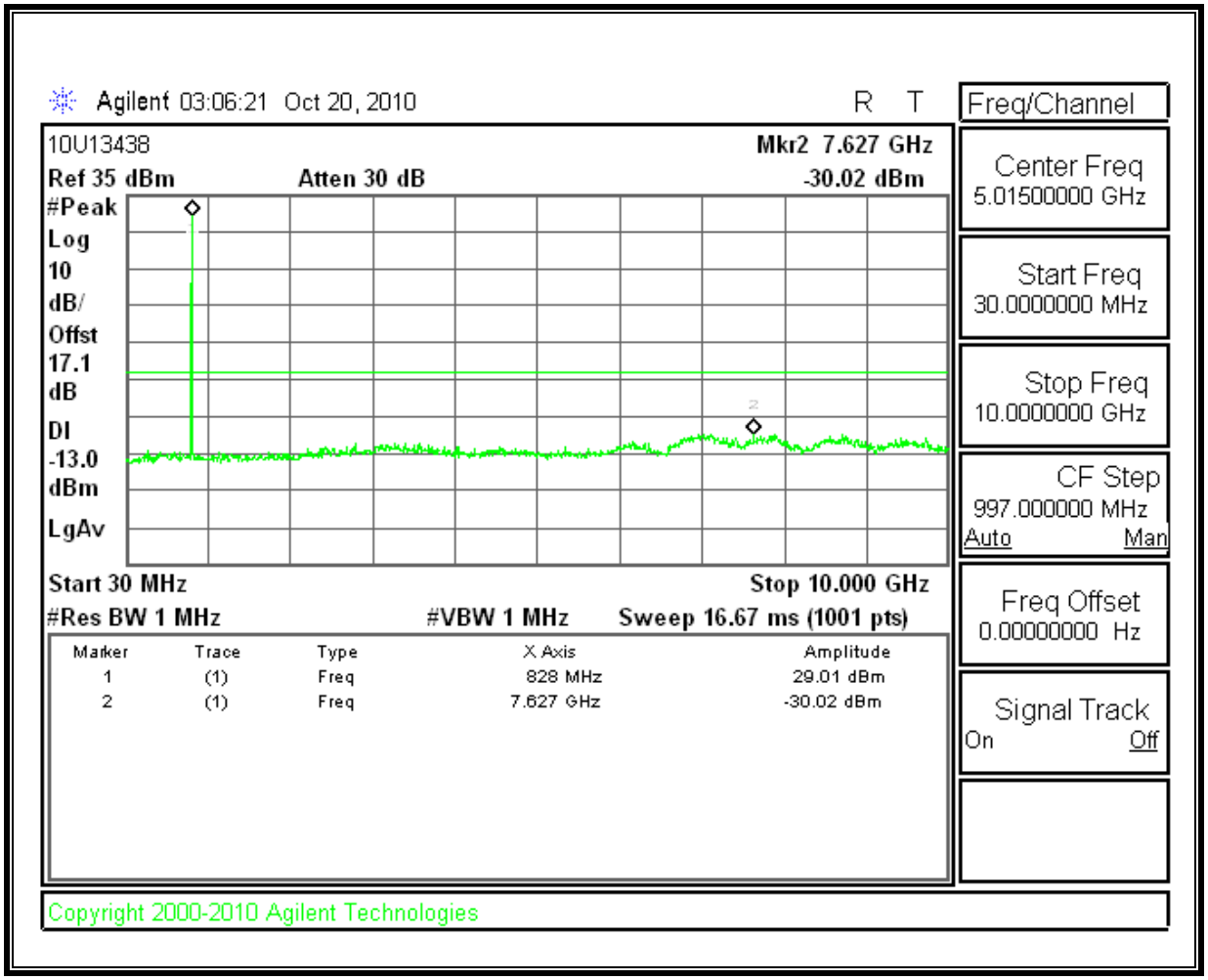
MODES TESTED

- CDMA – 1xRTT & EVDO REV A

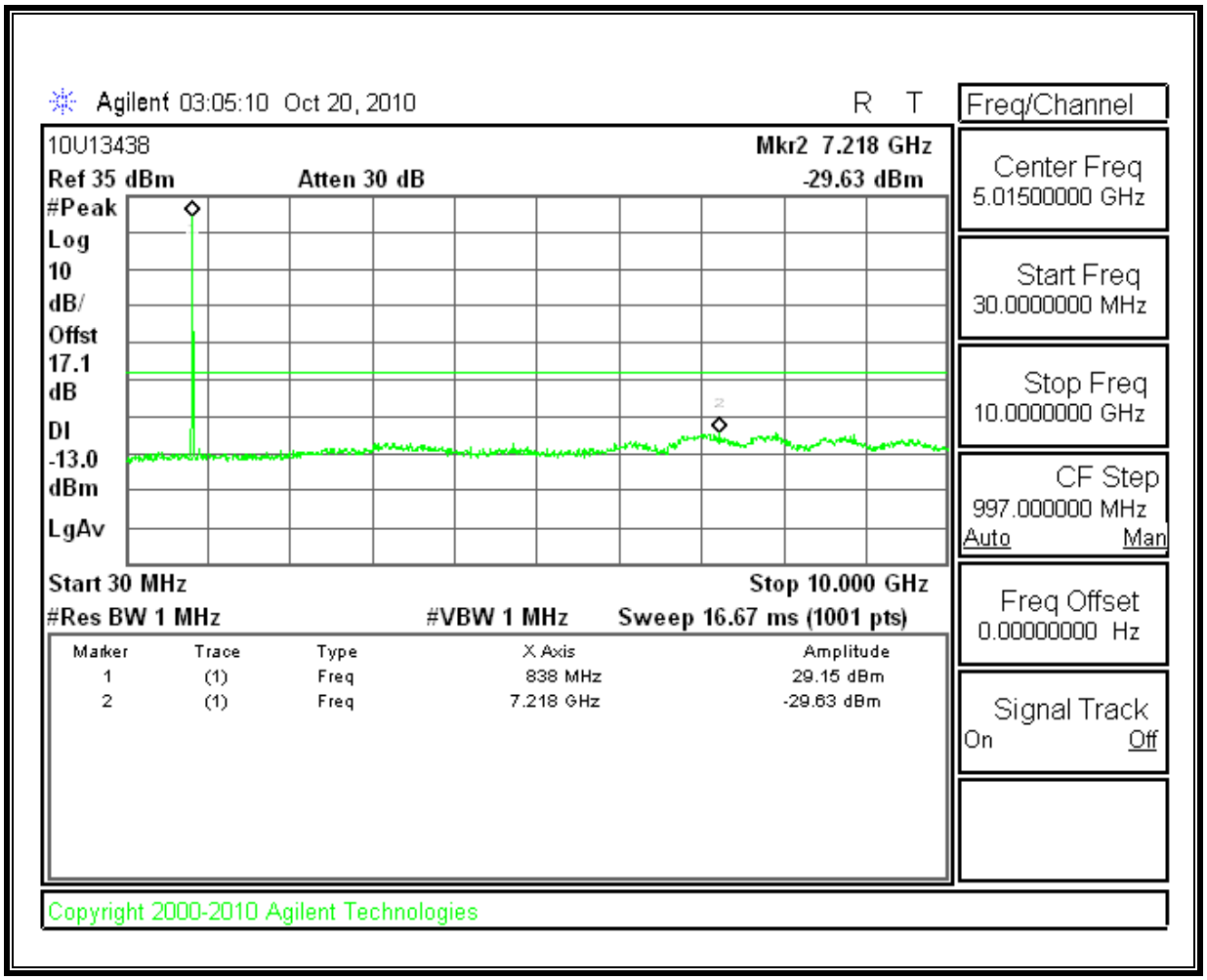
RESULTS

CELL, 1xRTT MODULATION:

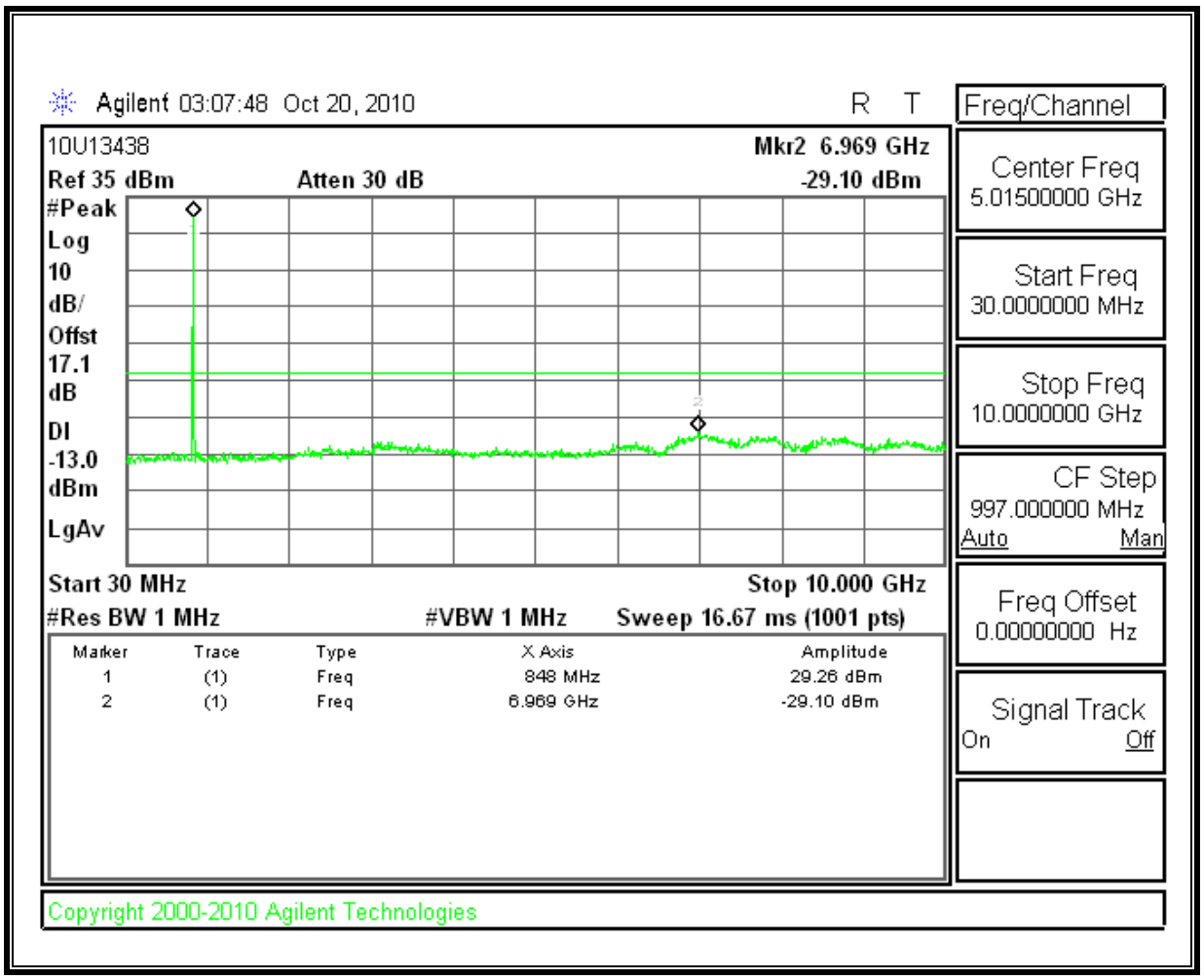
Low Channel, Out-Of-Band Emissions



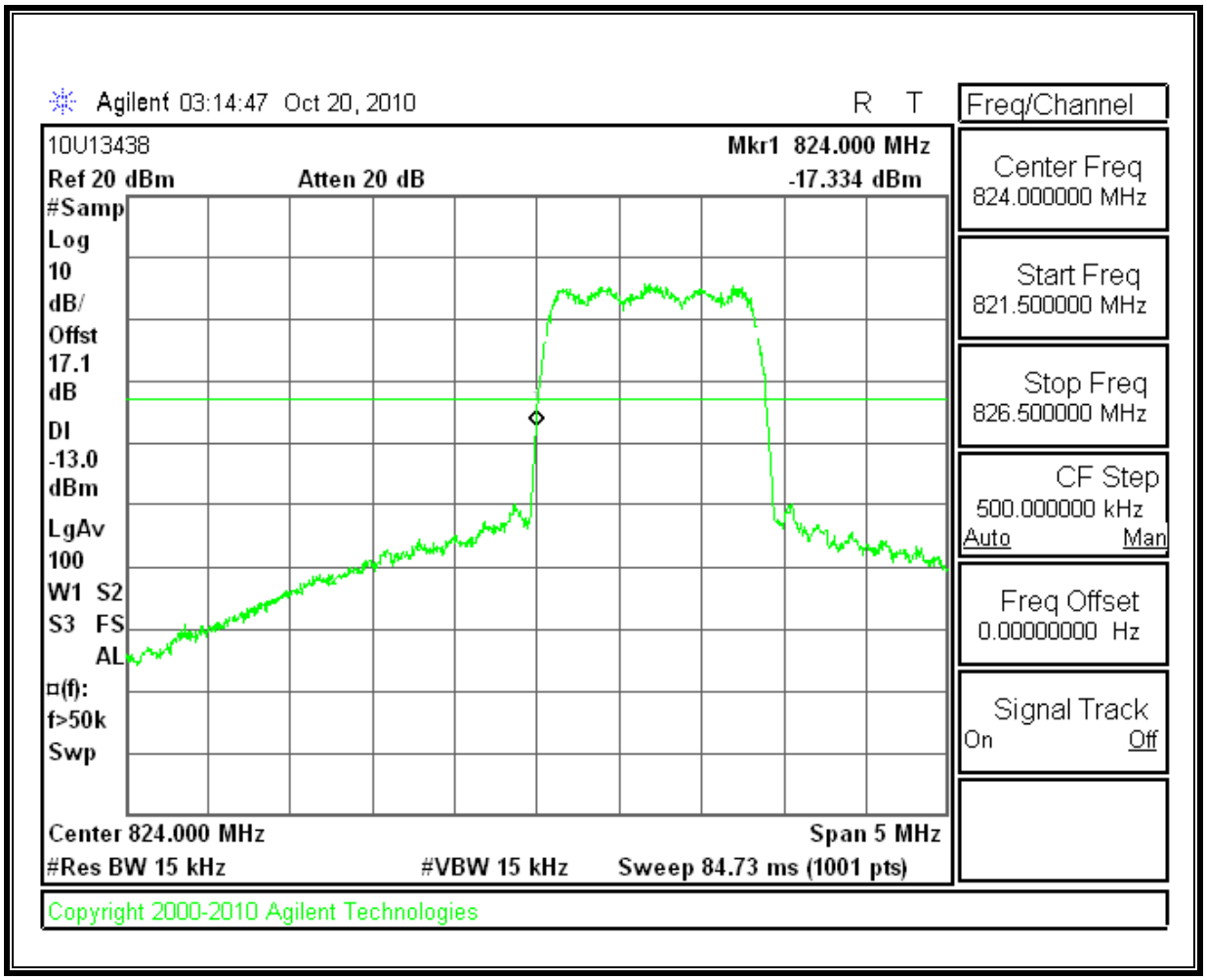
Mid Channel, Out-Of-Band Emissions



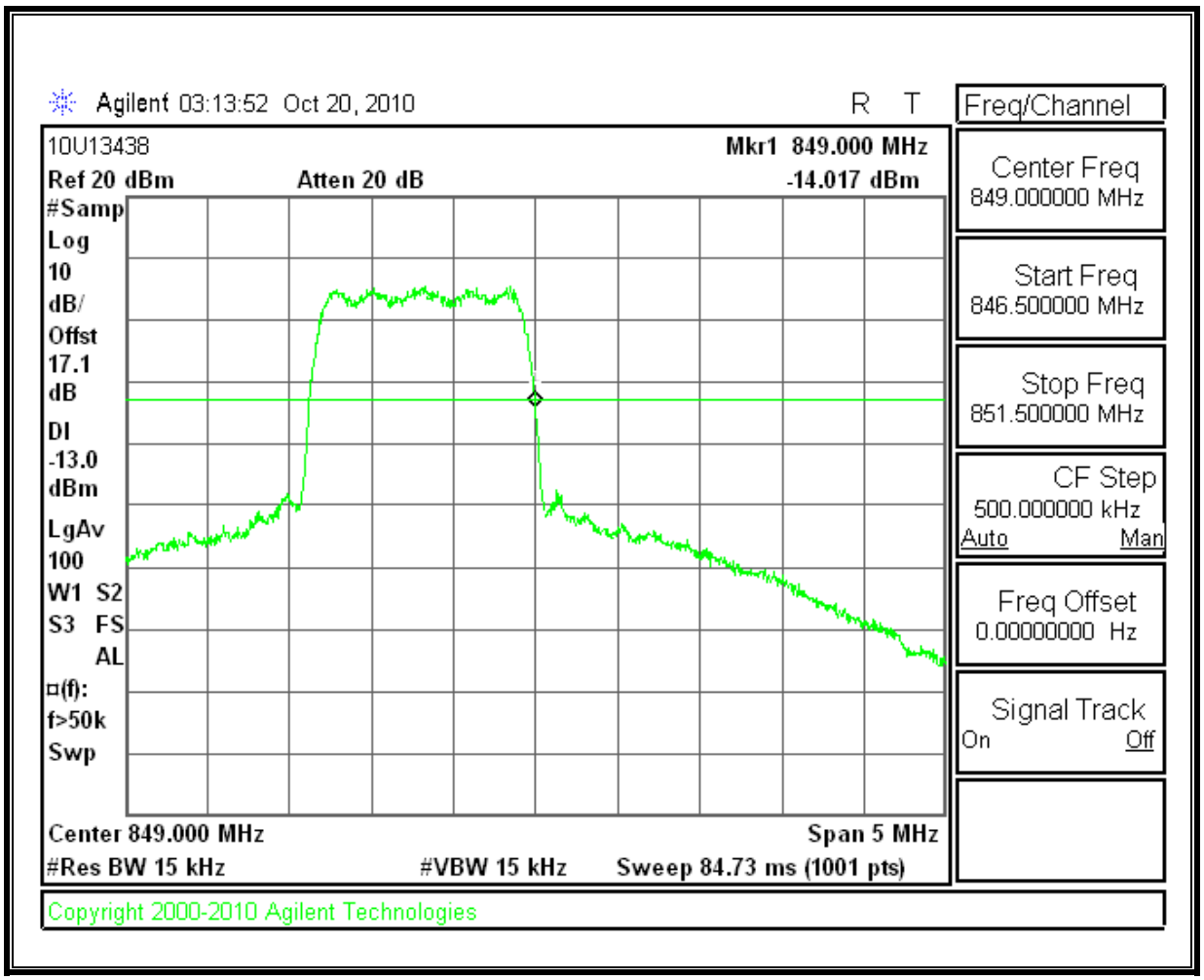
High Channel, Out-Of-Band Emissions



Low Channel Band Edge

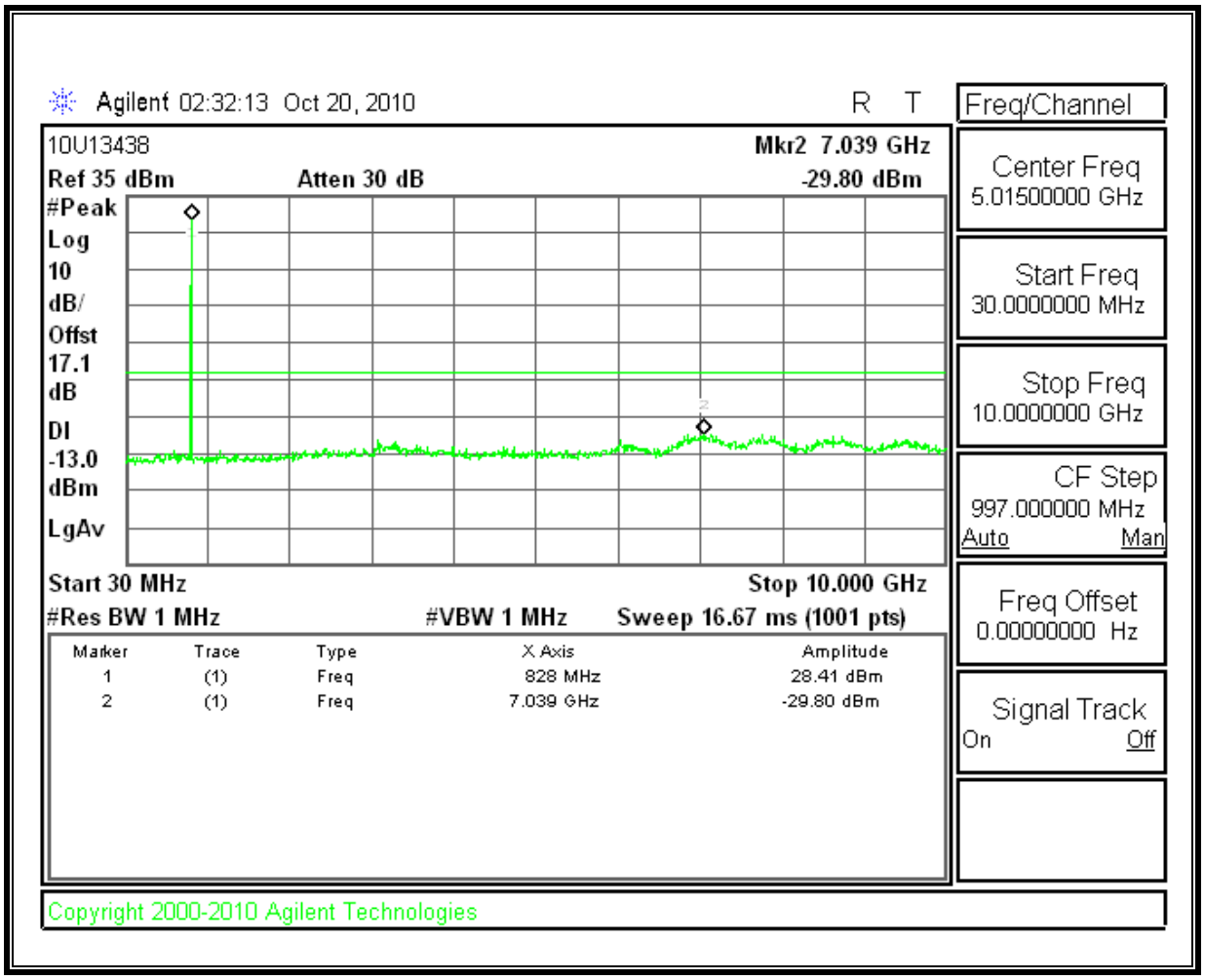


High Channel Band Edge

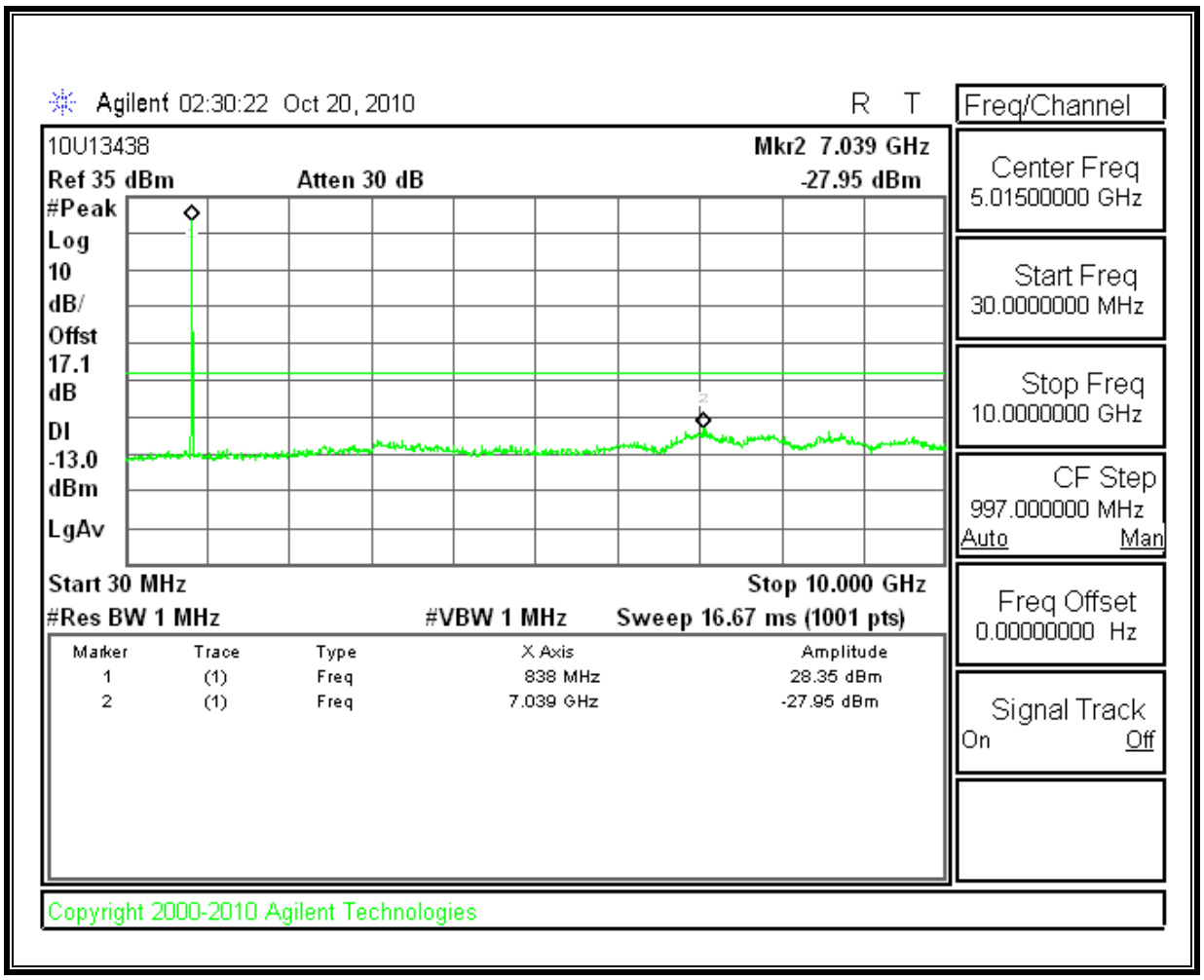


CELL, EVDO REV A MODULATION:

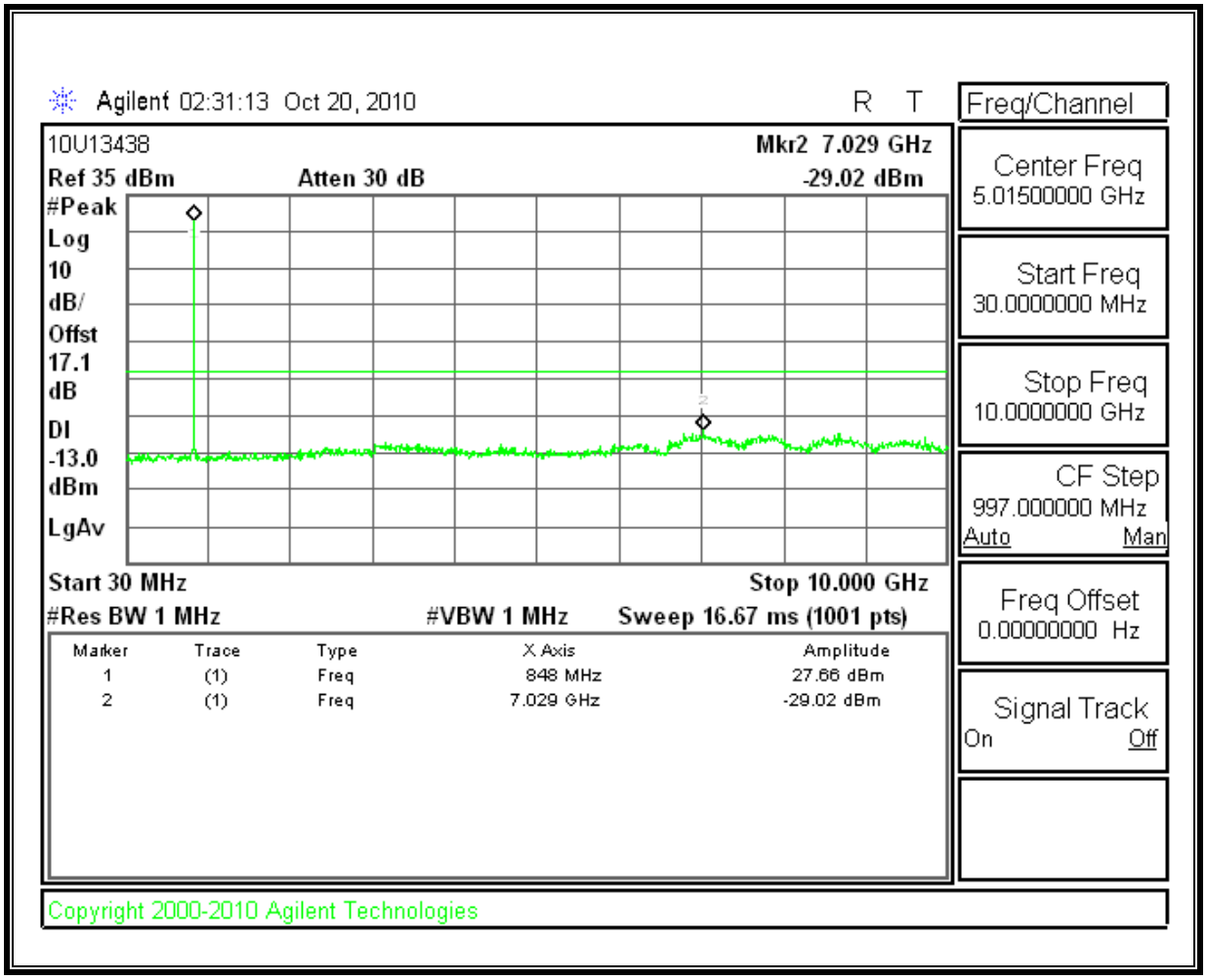
Low Channel, Out-Of-Band Emissions



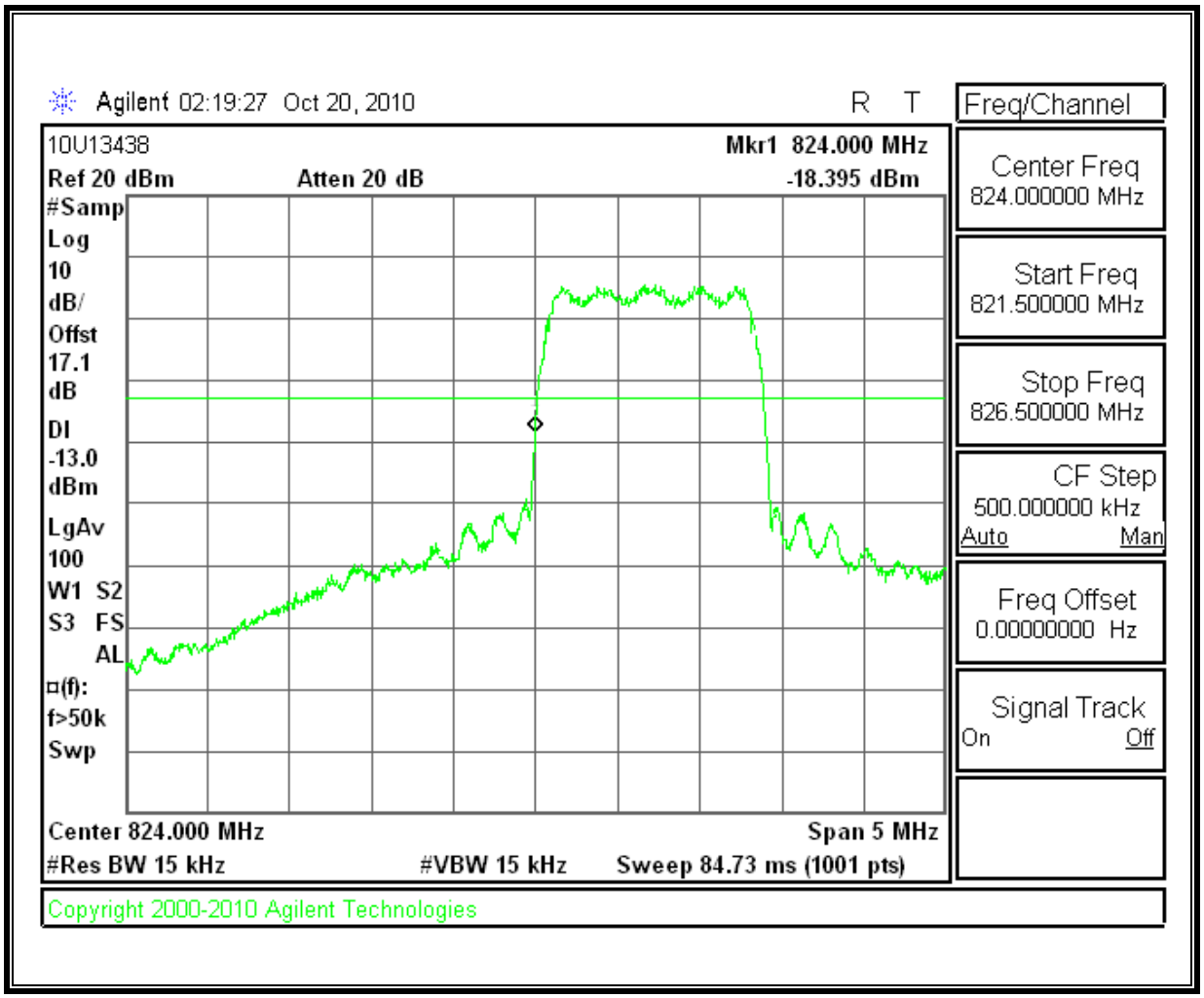
Mid Channel, Out-Of-Band Emissions



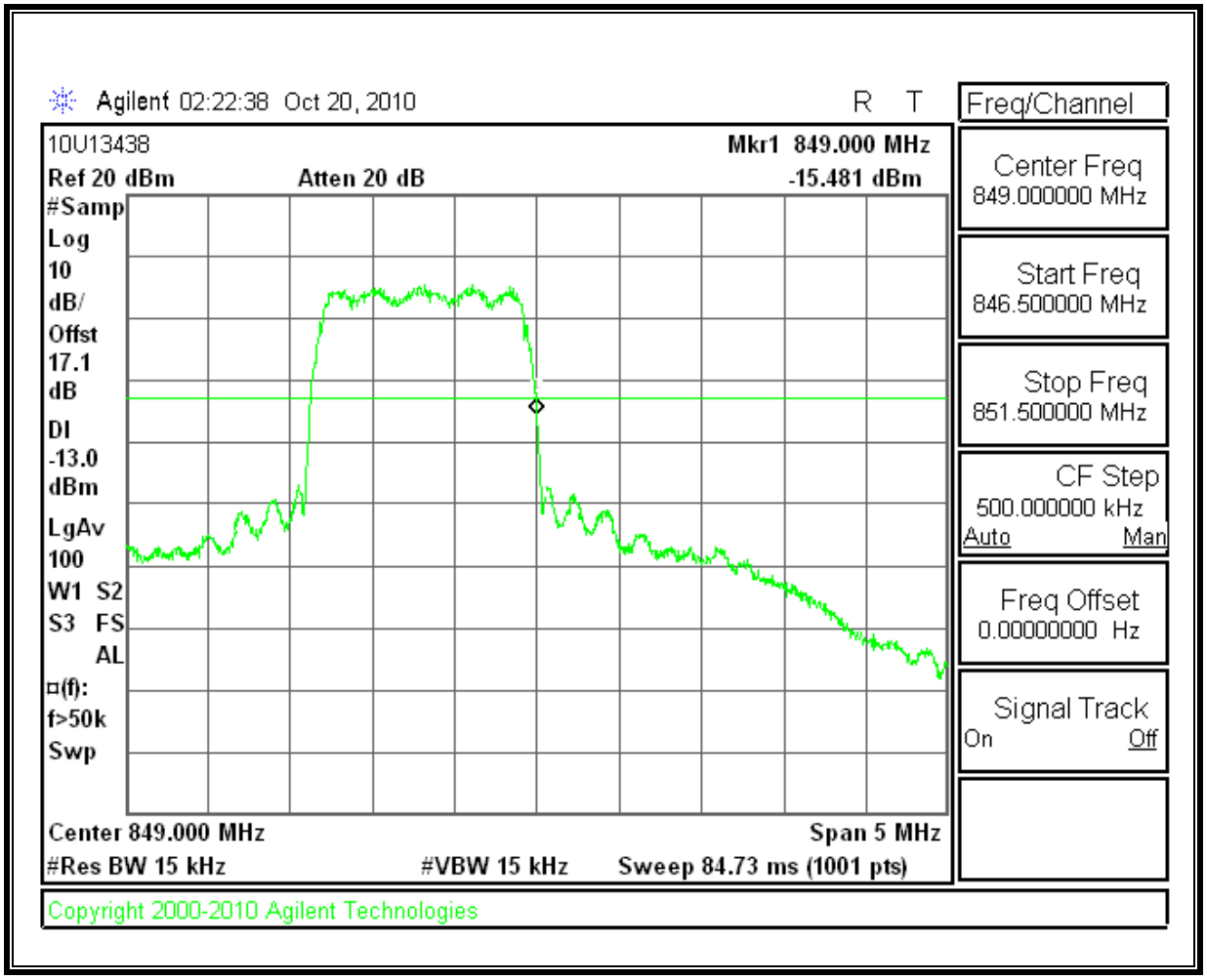
High Channel, Out-Of-Band Emissions



Low Channel Band Edge

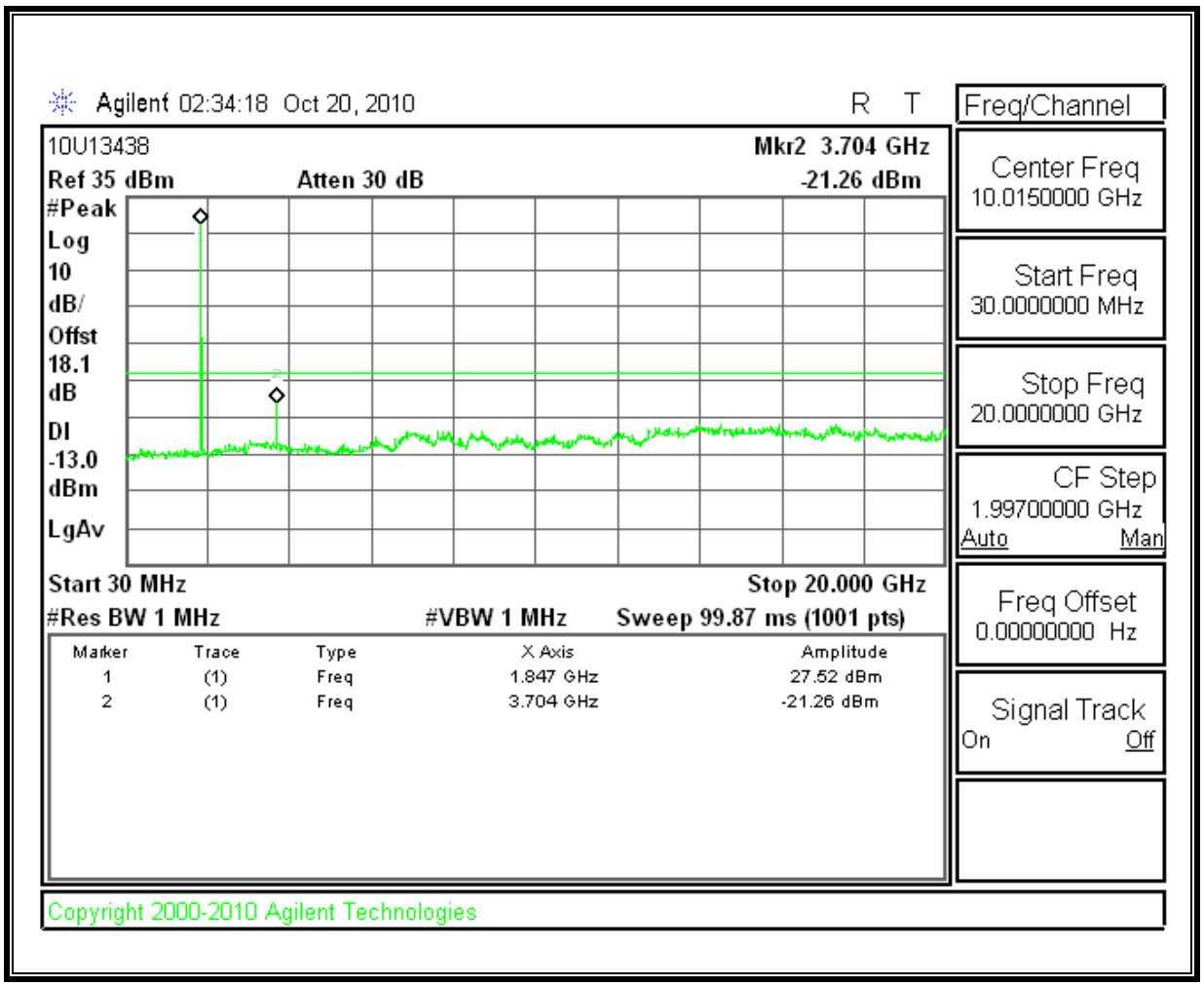


High Channel Band Edge

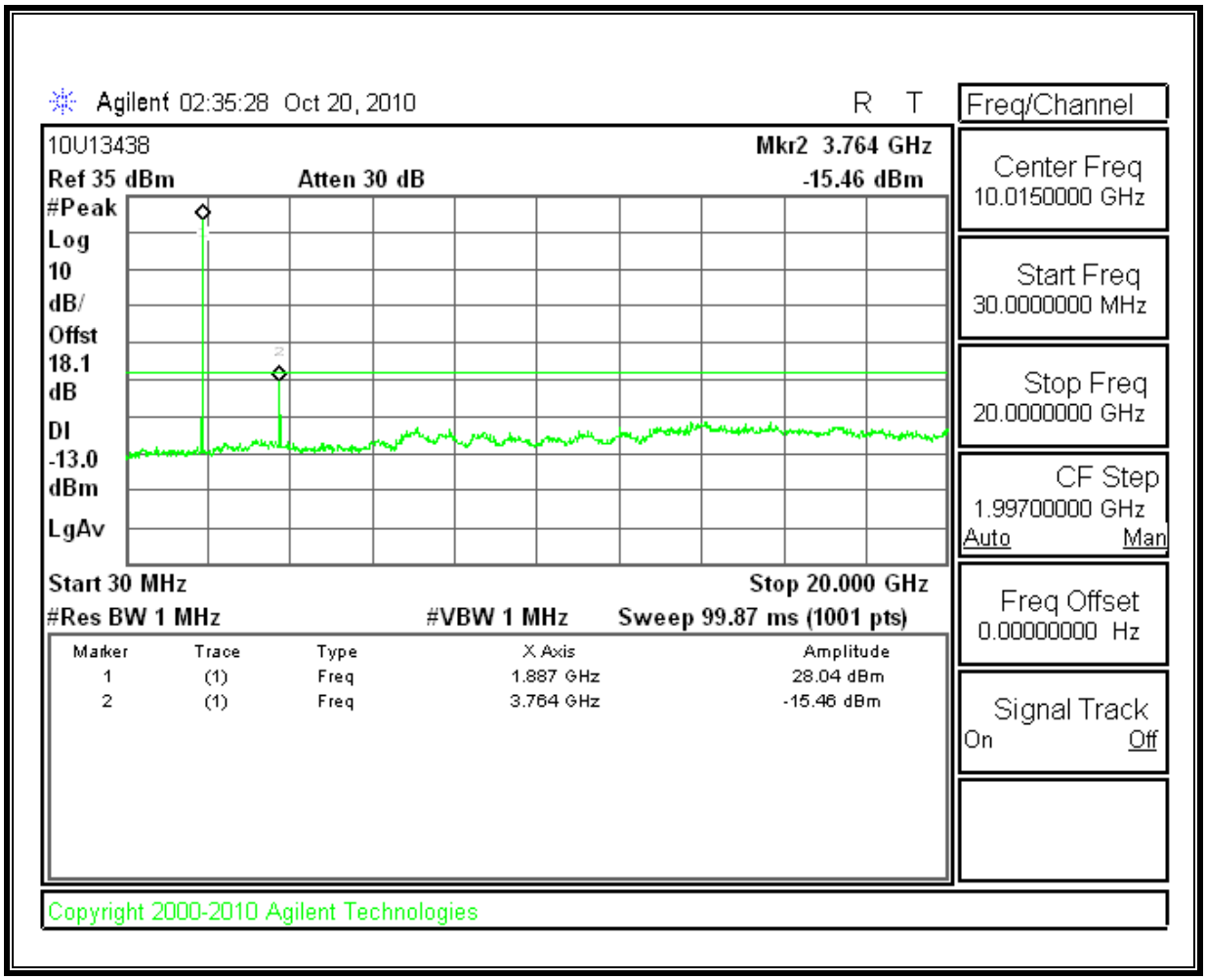


PCS 1xRTT MODULATION RESULTS

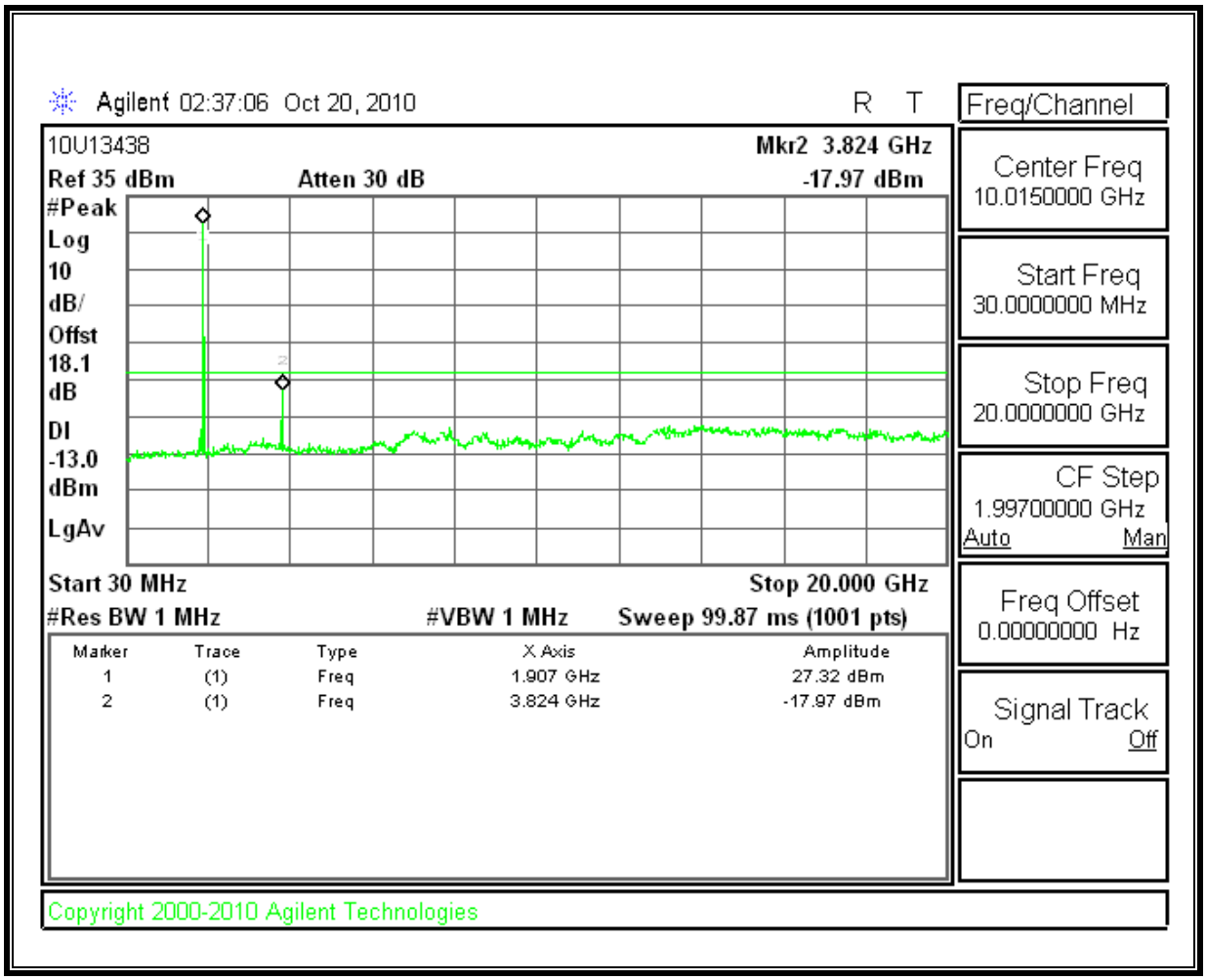
Low Channel, Out-Of-Band Emissions



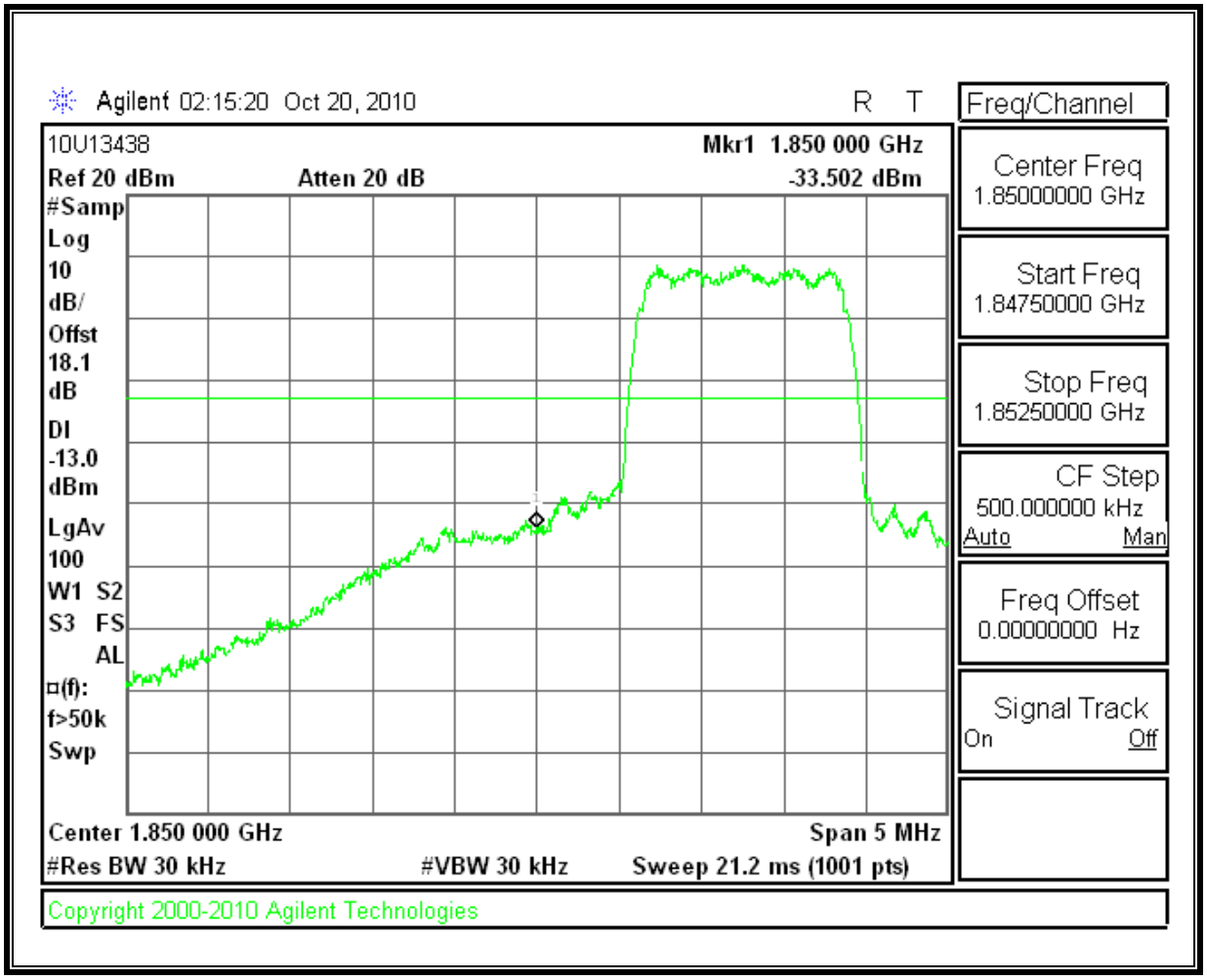
Mid Channel, Out-Of-Band Emissions



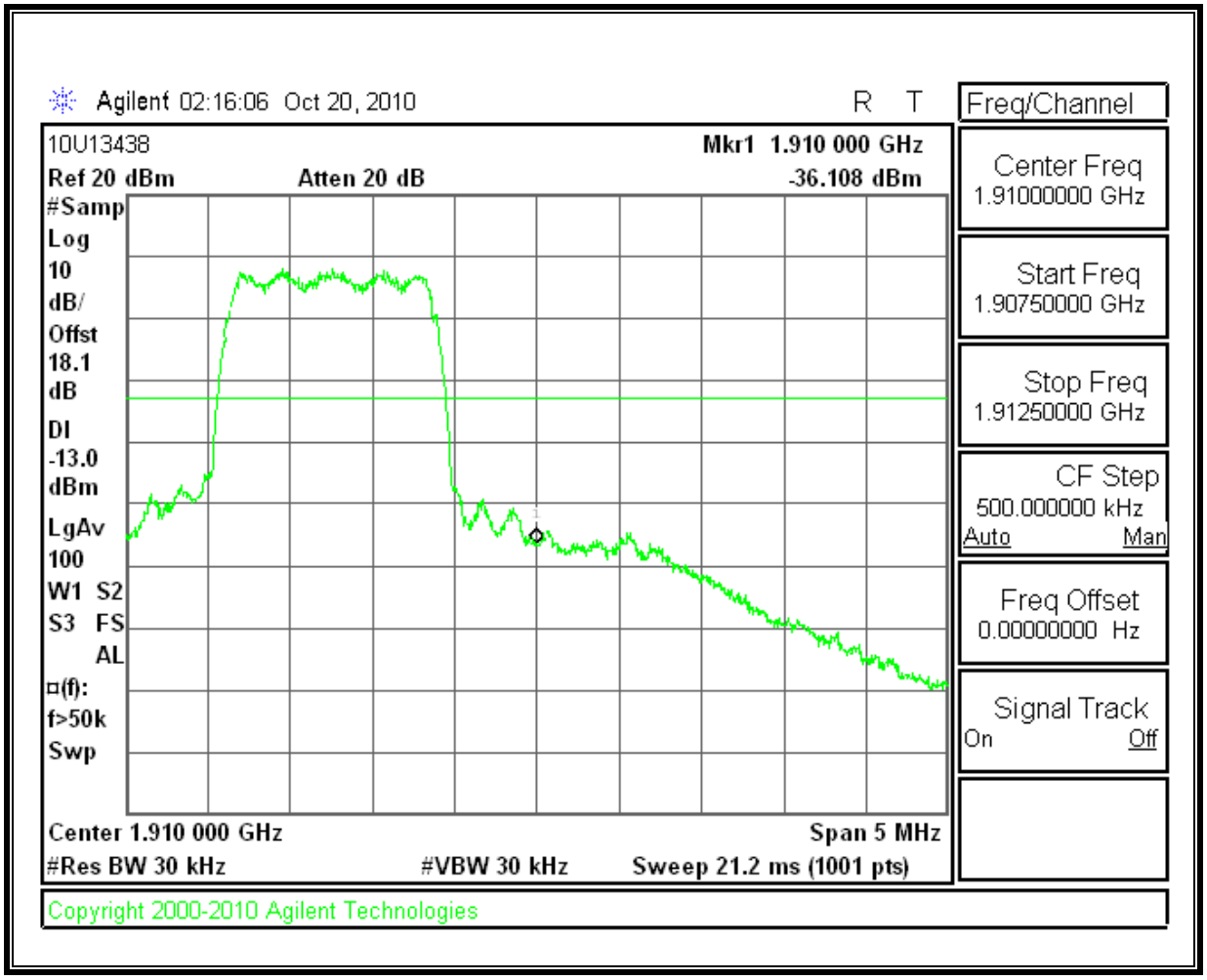
High Channel, Out-Of-Band Emissions



Low Channel Band Edge

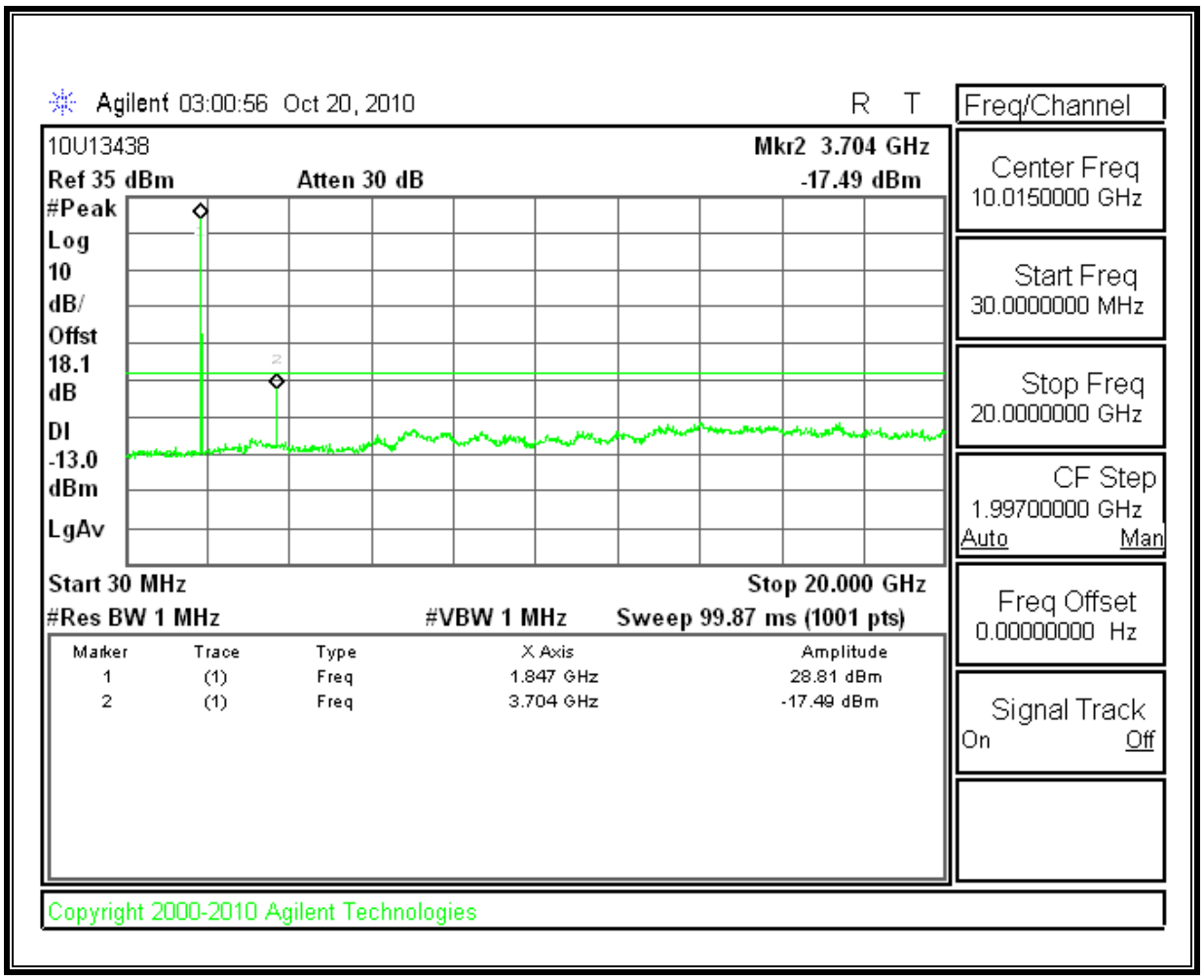


High Channel Band Edge

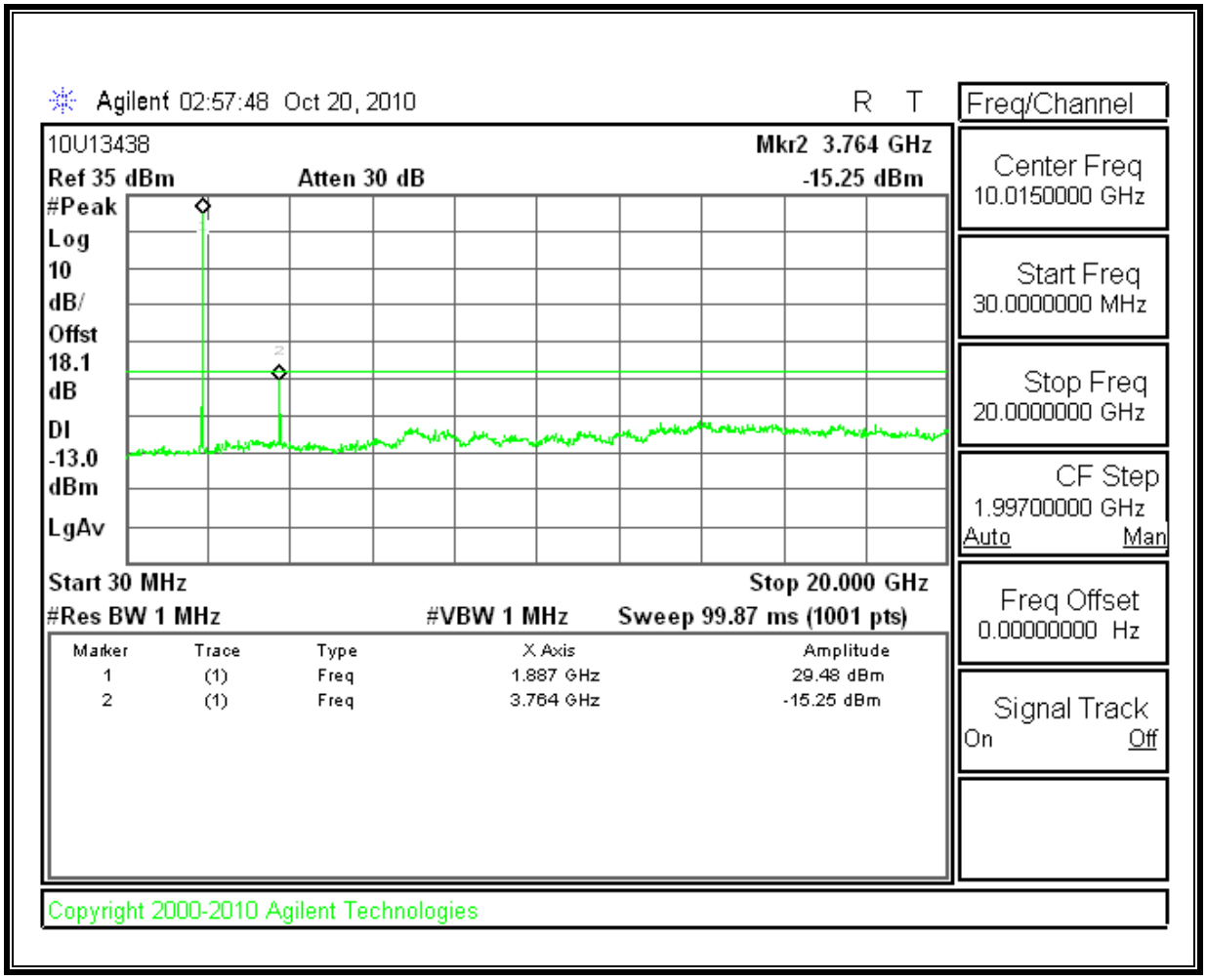


PCS EVDO REV A MODULATION RESULTS

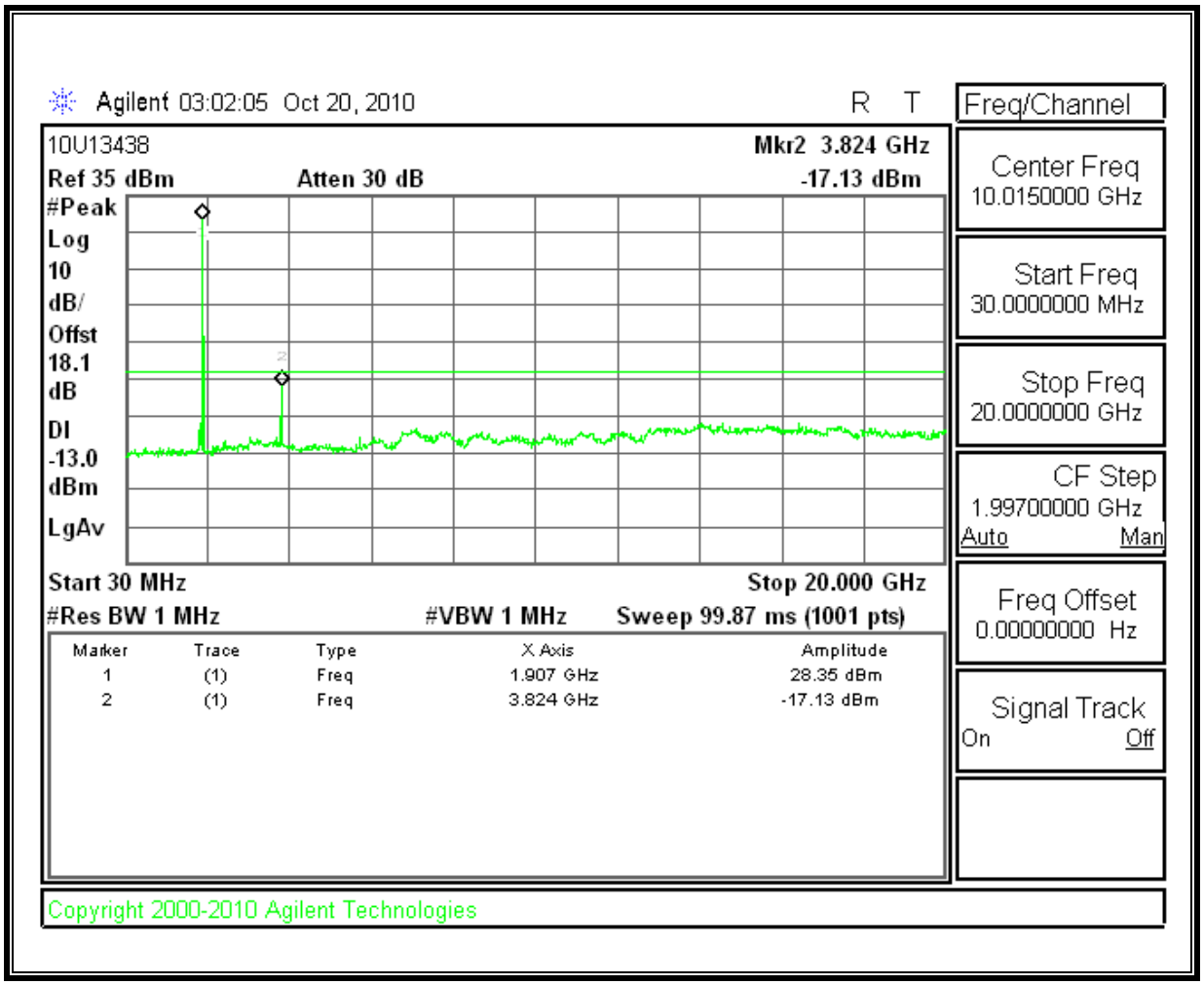
Low Channel, Out-Of-Band Emissions



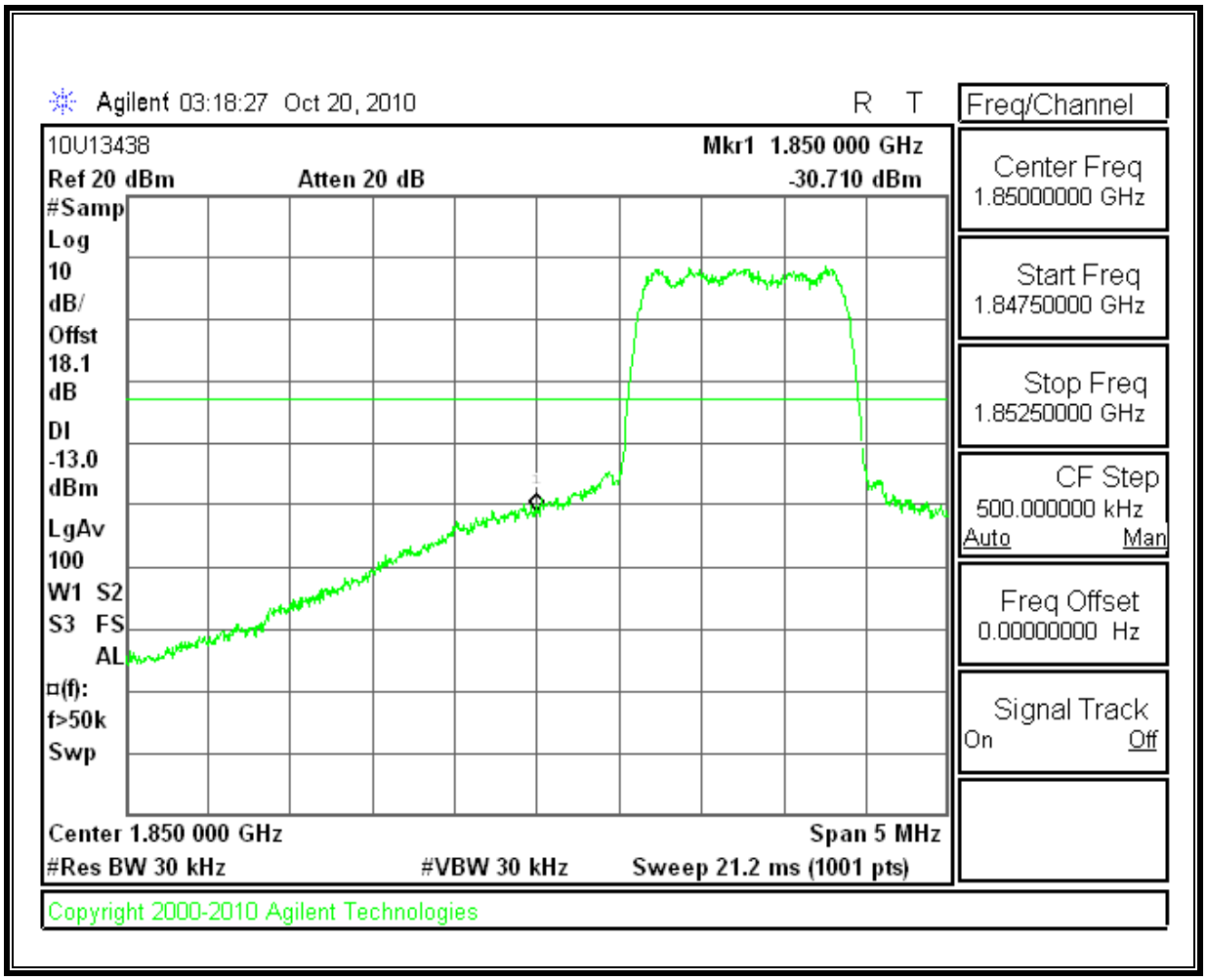
Mid Channel, Out-Of-Band Emissions



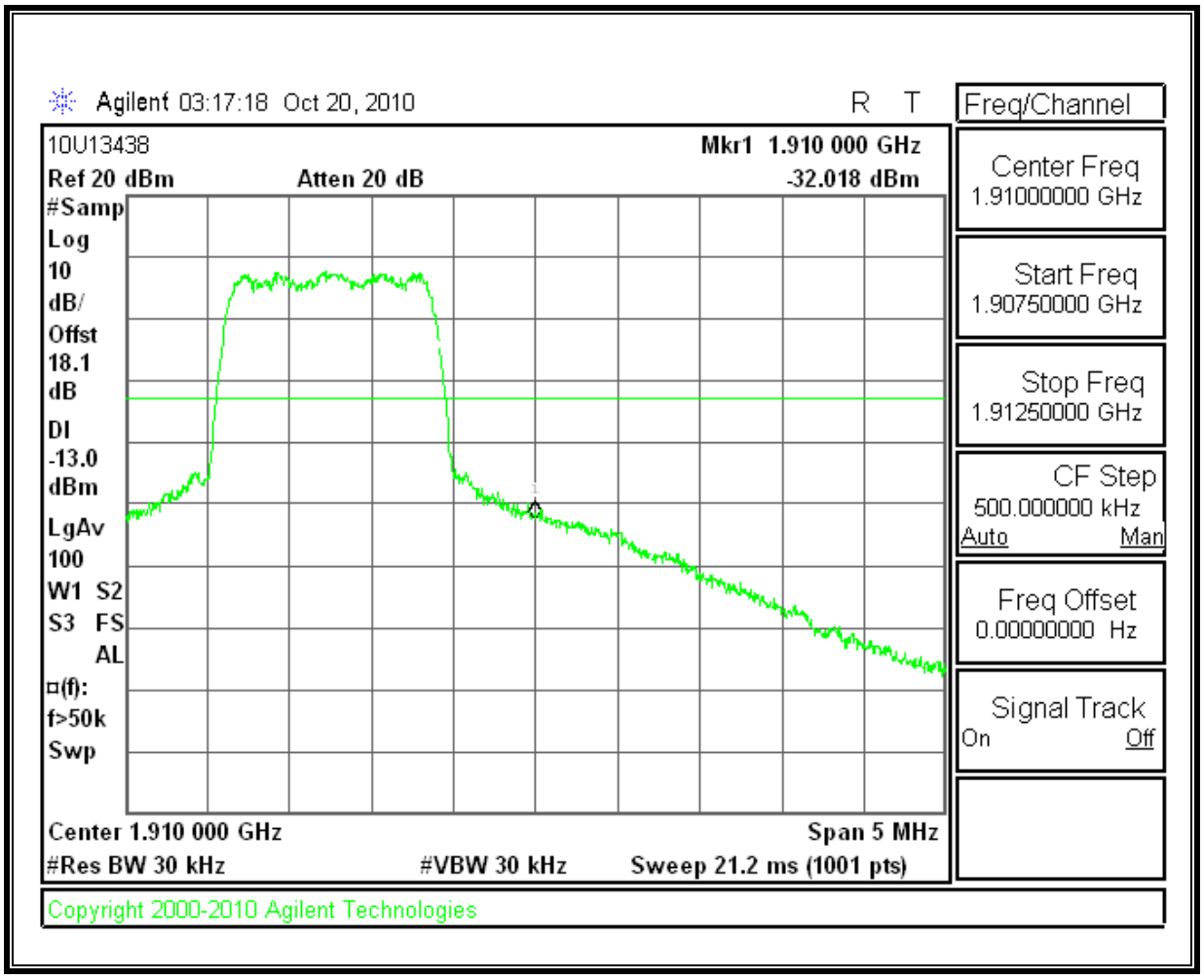
High Channel, Out-Of-Band Emissions



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 ±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° to +50°C
- Voltage = 115 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

- CDMA – 1xRTT & EVDO REV A

RESULTS

See the following pages.

CELL – MID CHANNEL

Reference Frequency: Cellular Mid Channel 836.520056MHz @ 20°C Limit: to stay +- 2.5 ppm = 2091.300 Hz				
DC Power Supply (Vac)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
115.00	50	836.520120	-0.077	2.5
115.00	40	836.520086	-0.036	2.5
115.00	30	836.519677	0.453	2.5
115.00	***20***	***836.520056***	***0***	2.5
115.00	10	836.520093	-0.044	2.5
115.00	0	836.520106	-0.060	2.5
115.00	-10	836.520110	-0.065	2.5
115.00	-20	836.520136	-0.096	2.5
97.75	20	836.520026	0.036	2.5
132.25	20	836.52002	*0.043*	2.5

PCS – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000098 @ 20°C Limit: within the authorized block or +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vac)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
115.00	50	1880.000153	-0.029	2.5
115.00	40	1880.000028	0.037	2.5
115.00	30	1880.000076	0.012	2.5
115.00	***20***	***1880.000098***	***0***	***2.5***
115.00	10	1880.000216	-0.063	2.5
115.00	0	1880.000334	-0.126	2.5
115.00	-10	1880.000088	0.005	2.5
115.00	-20	1880.000227	-0.069	2.5
97.75	20	1880.000094	0.002	2.5
132.25	20	1880.000015	0.044	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	
			dBm	mW
1xRTT	1013	824.70	28.80	758.58
	384	836.52	28.70	741.31
	777	848.31	**30.20**	1047.13
EVDO REV A	1013	824.70	29.50	891.25
	384	836.52	**30.30**	1071.52
	777	848.31	29.80	954.99

RESULTS for PCS Band (EIRP)

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
1xRTT	512	1850.20	**27.60**	575.44
	661	1880.00	26.80	478.63
	810	1909.80	25.00	316.23
EVDO REV A	512	1850.20	**26.10**	407.38
	661	1880.00	25.10	323.59
	810	1909.80	22.60	181.97

CELL 1xRTT MODULATION

High Frequency Substitution Measurement
Compliance Certification Services Chamber A

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/11/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT, FEXTURE JIG, AC ADAPTER , AND LAPTOP
Mode: TX, 1xRTT CELL BAND

Test Equipment:
Receiving: Sunol T122, 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	-8.9	V	34.8	25.9	38.5	-12.6	
824.70	-1.7	H	30.5	28.8	38.5	-9.6	
836.52	-7.3	V	33.1	25.8	38.5	-12.7	
836.52	-2.5	H	31.2	28.7	38.5	-9.7	
848.31	-7.1	V	32.1	25.0	38.5	-13.4	
848.31	-1.0	H	31.2	30.2	38.5	-8.2	

Rev. 1.24.7

CELL EVDO REV A MODULATION

High Frequency Substitution Measurement
Compliance Certification Services Chamber A

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/11/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT, FEXTURE JIG, AC ADAPTER , AND LAPTOP
Mode: TX, EVDO REV. A CELL BAND

Test Equipment:
Receiving: Sunol T122, 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	34.8	28.5	38.5	-10.0	
824.70	-1.1	H	30.5	29.5	38.5	-9.0	
836.52	-5.9	V	33.1	27.3	38.5	-11.2	
836.52	-0.8	H	31.2	30.3	38.5	-8.1	
848.31	-6.8	V	32.1	25.3	38.5	-13.1	
848.31	-1.4	H	31.2	29.8	38.5	-8.6	

Rev. 1.24.7

PCS 1xRTT MODULATION

High Frequency Fundamental Measurement
Compliance Certification Services Chamber A

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/11/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT, FEXTURE JIG, AC ADAPTER , AND LAPTOP
Mode: TX, 1xRTT PCS BAND

Test Equipment:
Receiving: Horn T73, 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
1.850	-19.3	V	40.4	21.1	33.0	-11.9	
1.850	-12.2	H	39.7	27.6	33.0	-5.5	
1.880	-19.1	V	39.9	20.8	33.0	-12.2	
1.880	-13.4	H	40.1	26.8	33.0	-6.3	
1.910	-20.2	V	39.8	19.6	33.0	-13.4	
1.910	-15.2	H	40.2	25.0	33.0	-8.0	

Rev. 1.24.7

PCS EVDO REV A MODULATION

High Frequency Fundamental Measurement
Compliance Certification Services Chamber A

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/11/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT, FEXTURE JIG, AC ADAPTER , AND LAPTOP
Mode: TX, EVDO REV. A PCS BAND

Test Equipment:
Receiving: Horn T73, 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
1.850	-21.3	V	40.4	19.1	33.0	-13.9	
1.850	-13.7	H	39.7	26.1	33.0	-6.9	
1.880	-21.5	V	39.9	18.4	33.0	-14.6	
1.880	-15.0	H	40.1	25.1	33.0	-7.9	
1.910	-23.4	V	39.8	16.5	33.0	-16.5	
1.910	-17.5	H	40.2	22.6	33.0	-10.4	

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 WIRELESS
Project #: 10U13438
Date: 10/18/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT STAND ALONE
Mode: TX, CELL BND , 1xRTT MODE

Chamber	Pre-amplifer	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
LOW CH. (824.7 MHz)										
1.649	-40.0	H	3.0	37.2	35.5	1.0	-37.3	-13.0	-24.3	
2.474	-68.9	H	3.0	39.8	35.4	1.0	-63.5	-13.0	-50.5	
3.299	-69.1	H	3.0	44.0	35.5	1.0	-59.7	-13.0	-46.7	
1.649	-45.3	V	3.0	36.8	35.5	1.0	-43.0	-13.0	-30.0	
2.474	-70.6	V	3.0	41.7	35.4	1.0	-63.4	-13.0	-50.4	
3.299	-69.0	V	3.0	44.1	35.5	1.0	-59.3	-13.0	-46.3	
MID CH. (836.52 MHz)										
1.673	-35.1	H	3.0	37.5	35.5	1.0	-32.2	-13.0	-19.2	
2.510	-64.6	H	3.0	39.9	35.4	1.0	-59.1	-13.0	-46.1	
3.346	-66.3	H	3.0	44.1	35.5	1.0	-56.7	-13.0	-43.7	
1.673	-38.8	V	3.0	37.1	35.5	1.0	-36.2	-13.0	-23.2	
2.510	-65.9	V	3.0	41.8	35.4	1.0	-58.5	-13.0	-45.5	
3.346	-66.8	V	3.0	44.3	35.5	1.0	-57.0	-13.0	-44.0	
HI CH. (848.31 MHz)										
1.697	-37.0	H	3.0	37.7	35.5	1.0	-33.8	-13.0	-20.8	
2.545	-66.8	H	3.0	40.1	35.4	1.0	-61.1	-13.0	-48.1	
3.393	-68.2	H	3.0	44.3	35.5	1.0	-58.4	-13.0	-45.4	
1.697	-40.6	V	3.0	37.4	35.5	1.0	-37.7	-13.0	-24.7	
2.545	-68.9	V	3.0	42.0	35.4	1.0	-61.3	-13.0	-48.3	
3.393	-67.3	V	3.0	44.4	35.5	1.0	-57.4	-13.0	-44.4	

Rev. 03.03.09

CELL EVDO REV A MODULATION

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/18/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT STAND ALONE
Mode: TX, CELL BAND , EVDO REV A. MODE

Chamber	Pre-amplifer	Filter	Limit
5m Chamber A	T144 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
LOW CH. (824.7 MHz)										
1.649	-37.5	H	3.0	36.6	38.2	1.0	-38.1	-13.0	-25.1	
2.474	-59.0	H	3.0	40.0	37.5	1.0	-55.5	-13.0	-42.5	
3.299	-64.4	H	3.0	43.9	37.1	1.0	-56.6	-13.0	-43.6	
1.649	-40.0	V	3.0	36.8	38.2	1.0	-40.3	-13.0	-27.3	
2.474	-57.2	V	3.0	41.7	37.5	1.0	-52.0	-13.0	-39.0	
3.299	-62.7	V	3.0	44.0	37.1	1.0	-54.8	-13.0	-41.8	
MID CH. (836.52 MHz)										
1.673	-32.6	H	3.0	36.8	38.1	1.0	-32.9	-13.0	-19.9	
2.510	-54.7	H	3.0	40.1	37.5	1.0	-51.0	-13.0	-38.0	
3.346	-61.6	H	3.0	44.0	37.1	1.0	-53.7	-13.0	-40.7	
1.673	-33.5	V	3.0	37.1	38.1	1.0	-33.5	-13.0	-20.5	
2.510	-52.5	V	3.0	41.8	37.5	1.0	-47.1	-13.0	-34.1	
3.346	-60.5	V	3.0	44.1	37.1	1.0	-52.5	-13.0	-39.5	
HI CH. (848.31 MHz)										
1.697	-34.5	H	3.0	37.0	38.1	1.0	-34.6	-13.0	-21.6	
2.545	-56.8	H	3.0	40.3	37.5	1.0	-53.0	-13.0	-40.0	
3.393	-63.4	H	3.0	44.1	37.1	1.0	-55.4	-13.0	-42.4	
1.697	-35.3	V	3.0	37.4	38.1	1.0	-35.0	-13.0	-22.0	
2.545	-55.4	V	3.0	42.0	37.5	1.0	-49.9	-13.0	-36.9	
3.393	-61.0	V	3.0	44.2	37.1	1.0	-52.8	-13.0	-39.8	

Rev. 03.03.09

PCS 1xRTT MODULATION

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/12/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT STAND ALONE
Mode: TX, PCS BND , 1xRTT MODE

Chamber	Pre-amplifer	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
LOW CH. (1851.25 MHz)										
3.703	-53.5	H	3.0	45.3	35.4	1.0	-42.5	-13.0	-29.5	
5.554	-66.2	H	3.0	50.0	35.4	1.0	-50.5	-13.0	-37.5	
3.703	-50.3	V	3.0	45.1	35.4	1.0	-39.5	-13.0	-26.5	
5.554	-66.5	V	3.0	49.2	35.4	1.0	-51.7	-13.0	-38.7	
MID CH. (1880.00 MHz)										
3.760	-52.2	H	3.0	45.5	35.3	1.0	-41.0	-13.0	-28.0	
5.640	-65.8	H	3.0	50.2	35.4	1.0	-50.0	-13.0	-37.0	
3.760	-49.9	V	3.0	45.3	35.3	1.0	-38.9	-13.0	-25.9	
5.640	-66.3	V	3.0	49.3	35.4	1.0	-51.5	-13.0	-38.5	
HI CH. (1908.75 MHz)										
3.818	-50.3	H	3.0	45.7	35.3	1.0	-38.9	-13.0	-25.9	
5.726	-64.3	H	3.0	50.3	35.4	1.0	-48.4	-13.0	-35.4	
3.818	-47.5	V	3.0	45.4	35.3	1.0	-36.4	-13.0	-23.4	
5.726	-65.4	V	3.0	49.4	35.4	1.0	-50.4	-13.0	-37.4	

Rev. 03.03.09

PCS EVDO REV A MODULATION

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: SIERRA WIRELESS
Project #: 10U13438
Date: 10/12/2010
Test Engineer: MENGISTU MEKURIA
Configuration: EUT STAND ALONE
Mode: TX, PCS BND , EVDO REV A. MODE

Chamber	Pre-amplifer	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
LOW CH. (1851.25 MHz)										
3.703	-51.5	H	3.0	45.3	35.4	1.0	-40.5	-13.0	-27.5	
5.554	-64.3	H	3.0	50.0	35.4	1.0	-48.7	-13.0	-35.7	
3.703	-49.4	V	3.0	45.1	35.4	1.0	-38.6	-13.0	-25.6	
5.554	-65.2	V	3.0	49.2	35.4	1.0	-50.5	-13.0	-37.5	
MID CH. (1880.00 MHz)										
3.760	-51.3	H	3.0	45.5	35.3	1.0	-40.1	-13.0	-27.1	
5.640	-65.0	H	3.0	50.2	35.4	1.0	-49.3	-13.0	-36.3	
3.760	-46.7	V	3.0	45.3	35.3	1.0	-35.8	-13.0	-22.8	
5.640	-65.7	V	3.0	49.3	35.4	1.0	-50.8	-13.0	-37.8	
HI CH. (1908.75 MHz)										
3.818	-48.4	H	3.0	45.7	35.3	1.0	-37.0	-13.0	-24.0	
5.726	-64.3	H	3.0	50.3	35.4	1.0	-48.5	-13.0	-35.5	
3.818	-46.2	V	3.0	45.4	35.3	1.0	-35.1	-13.0	-22.1	
5.726	-65.3	V	3.0	49.4	35.4	1.0	-50.4	-13.0	-37.4	

Rev. 03.03.09

9.3. RECEIVER SPURIOUS EMISSIONS

LIMIT

RSS-Gen 7.2.2

Spurious Emission Limits for Receivers:

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

TEST PROCEDURE

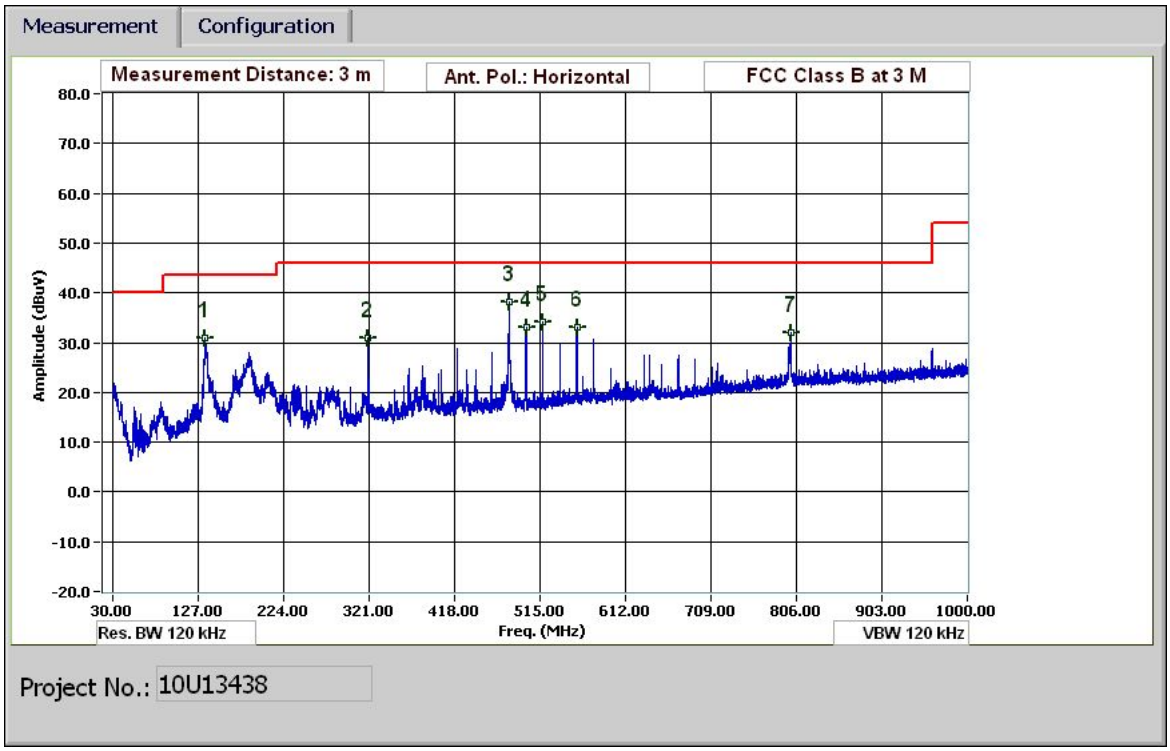
The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (local oscillator frequency, intermediate frequency or carrier frequency),

or 30 MHz, whichever is the higher, to at least 3 times the highest tunable and local oscillator frequencies.

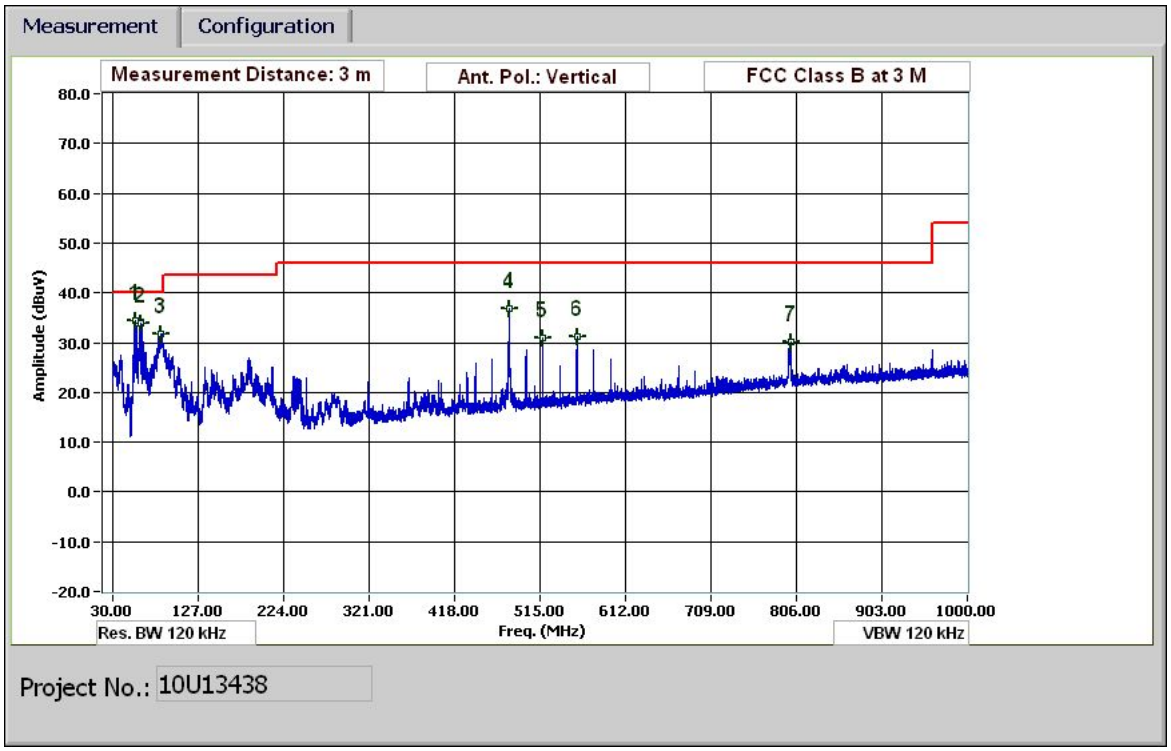
RESULTS

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Mengistu Mekuria
Date: 10/11/10
Project #: 10U13438
Company: Sierra Wireless Inc.
Test Target: FCC Class B
Mode Oper: TX_AR5550 (Worst-Case)

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
55.561	3.0	55.6	7.9	0.6	29.6	0.0	0.0	34.5	40.0	-5.5	V	P	
62.521	3.0	54.8	8.0	0.7	29.6	0.0	0.0	33.8	40.0	-6.2	V	P	
84.722	3.0	52.9	7.5	0.8	29.6	0.0	0.0	31.6	40.0	-8.4	V	P	
480.019	3.0	48.0	16.4	2.1	29.6	0.0	0.0	36.9	46.0	-9.1	V	P	
518.42	3.0	41.3	17.1	2.2	29.7	0.0	0.0	30.9	46.0	-15.1	V	P	
556.822	3.0	40.9	17.6	2.3	29.7	0.0	0.0	31.1	46.0	-14.9	V	P	
799.952	3.0	35.5	21.0	2.8	29.2	0.0	0.0	30.1	46.0	-15.9	V	P	
134.404	3.0	46.0	13.5	1.0	29.4	0.0	0.0	31.1	43.5	-12.4	H	P	
320.052	3.0	44.5	13.6	1.7	28.9	0.0	0.0	30.9	46.0	-15.1	H	P	
480.019	3.0	49.3	16.4	2.1	29.6	0.0	0.0	38.2	46.0	-7.8	H	P	
499.219	3.0	44.0	16.8	2.1	29.7	0.0	0.0	33.2	46.0	-12.8	H	P	
518.42	3.0	44.5	17.1	2.2	29.7	0.0	0.0	34.1	46.0	-11.9	H	P	
556.822	3.0	42.9	17.6	2.3	29.7	0.0	0.0	33.2	46.0	-12.8	H	P	
799.952	3.0	37.4	21.0	2.8	29.2	0.0	0.0	32.0	46.0	-14.0	H	P	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

SPURIOUS EMISSIONS ABOVE 1000 MHz (WORST-CASE CONFIGURATION)

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

9.4. POWER LINE CONDUCTED EMISSION

LIMIT

RSS-Gen 7.2.2

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

Table 2 – AC Power Lines Conducted Emission Limits

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

* Decreases with the logarithm of the frequency.

RESULTS

6 WORST EMISSIONS

AC ADAPTER

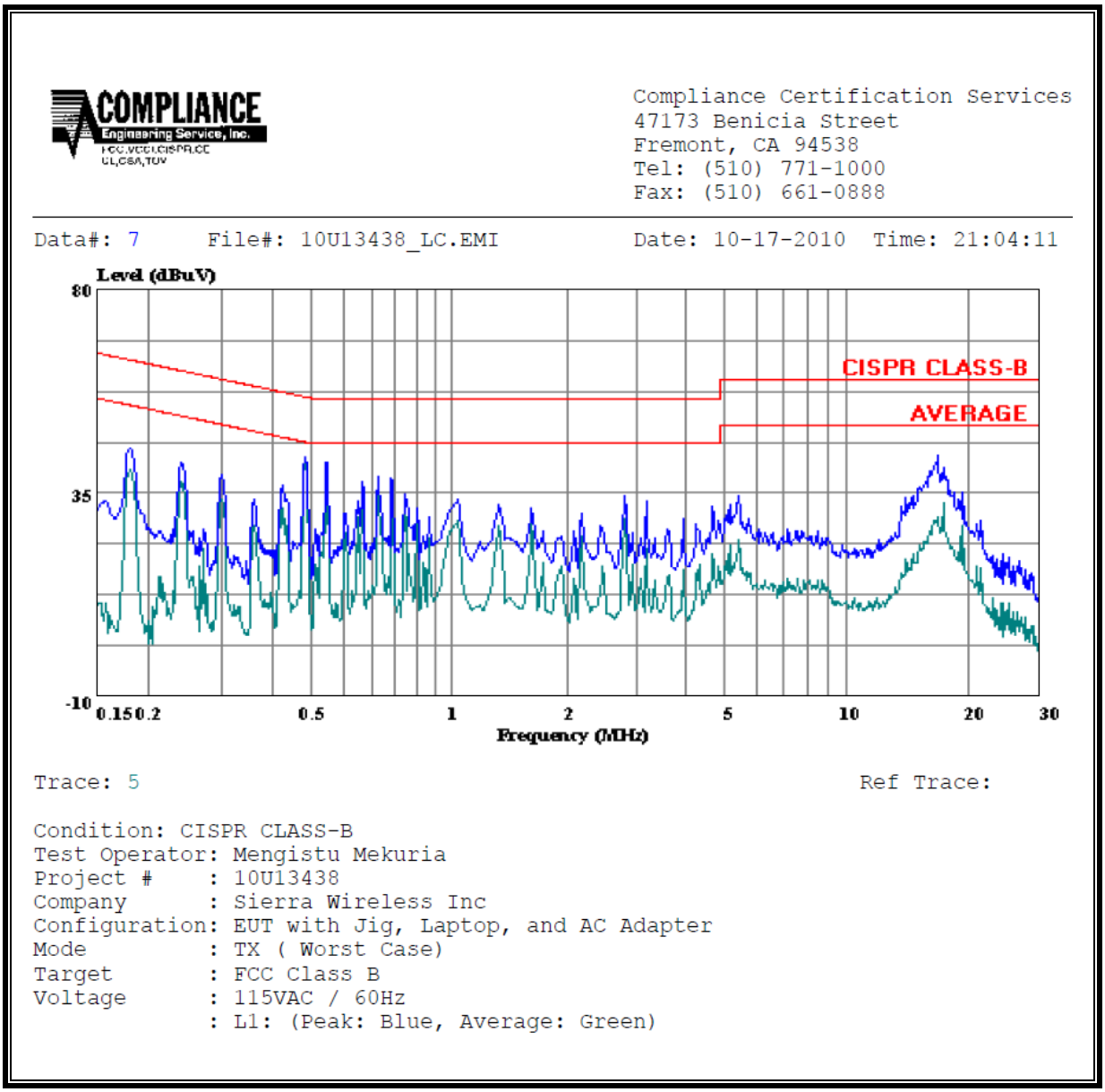
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.18	45.10	--	40.15	0.00	64.49	54.49	-19.39	-14.34	L1
0.48	42.93	--	41.90	0.00	56.32	46.32	-13.39	-4.42	L1
0.54	41.89	--	39.73	0.00	56.00	46.00	-14.11	-6.27	L1
0.18	46.05	--	40.16	0.00	64.49	54.49	-18.44	-14.33	L2
0.48	42.17	--	40.35	0.00	56.27	46.27	-14.10	-5.92	L2
0.54	41.61	--	39.36	0.00	56.00	46.00	-14.39	-6.64	L2
6 Worst Data									

SUPPORT LAPTOP

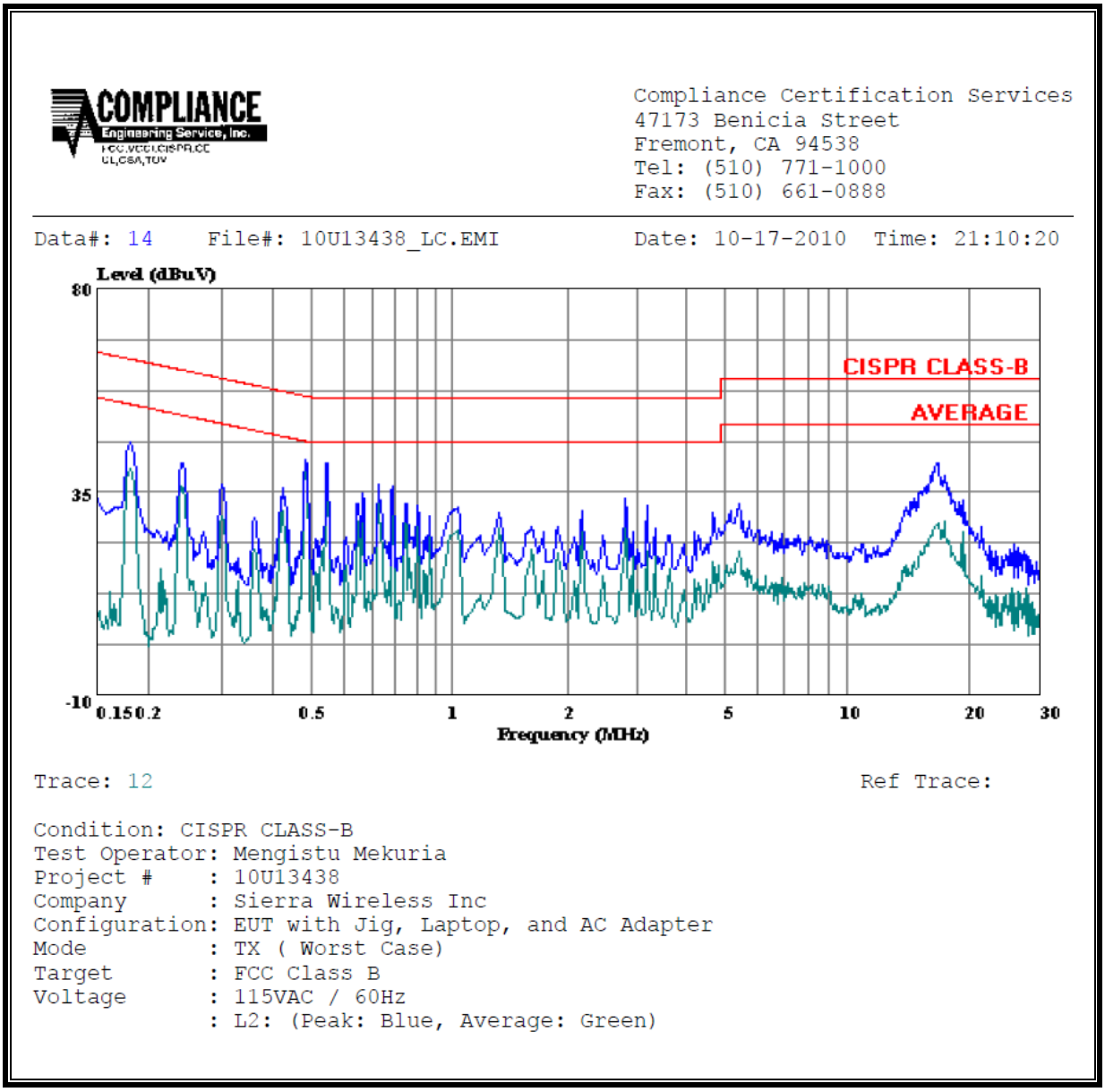
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	55.74	--	47.70	0.00	65.21	55.21	-9.47	-7.51	L1
0.22	52.44	--	42.67	0.00	63.01	53.01	-10.57	-10.34	L1
0.55	47.18	--	34.74	0.00	56.00	46.00	-8.82	-11.26	L1
0.16	57.32	--	48.55	0.00	65.62	55.62	-8.30	-7.07	L2
0.61	47.88	--	37.44	0.00	56.00	46.00	-8.12	-8.56	L2
0.69	47.02	--	37.57	0.00	56.00	46.00	-8.98	-8.43	L2
6 Worst Data									

AC ADAPTER

LINE 1 RESULTS

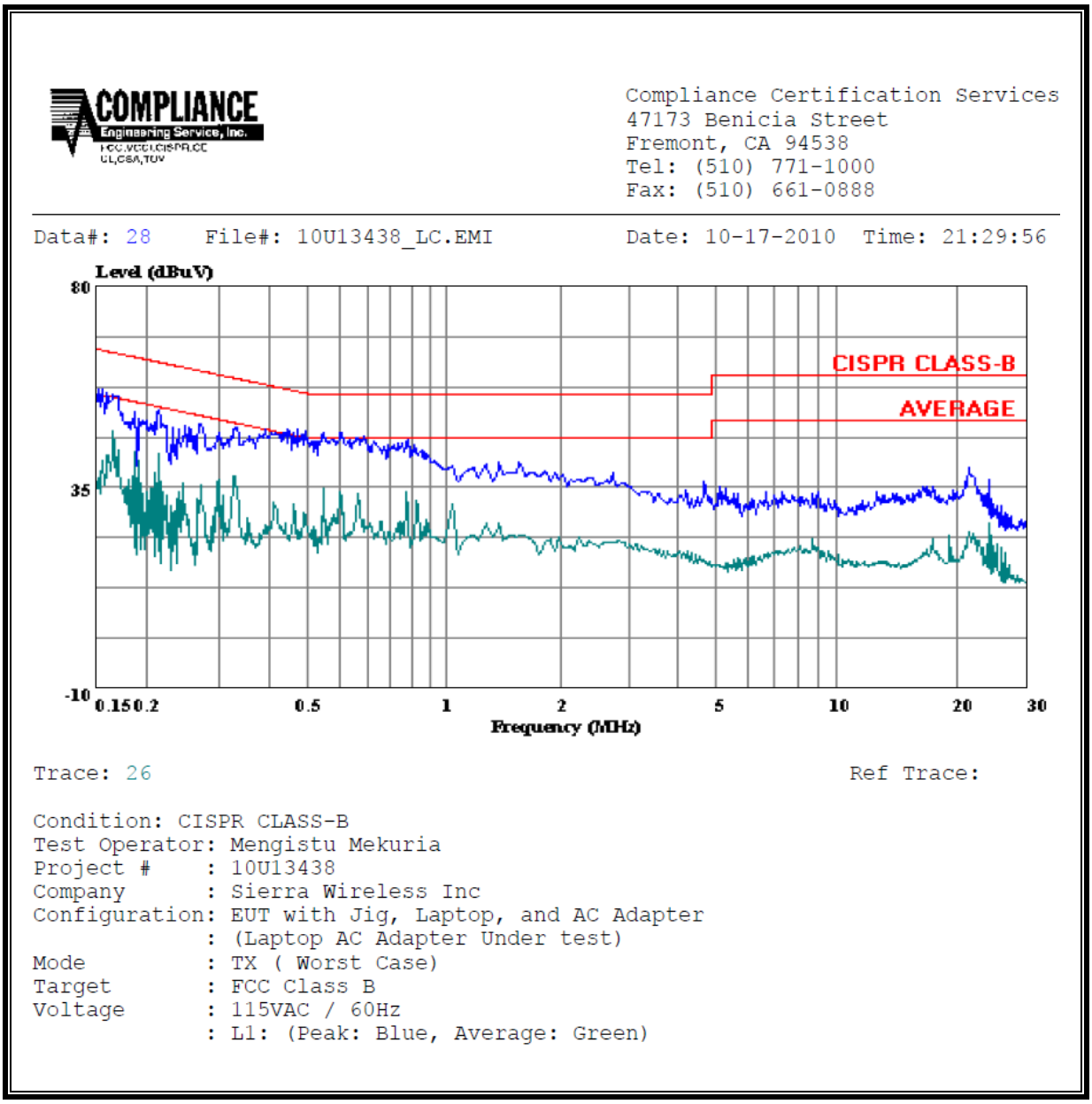


LINE 2 RESULTS

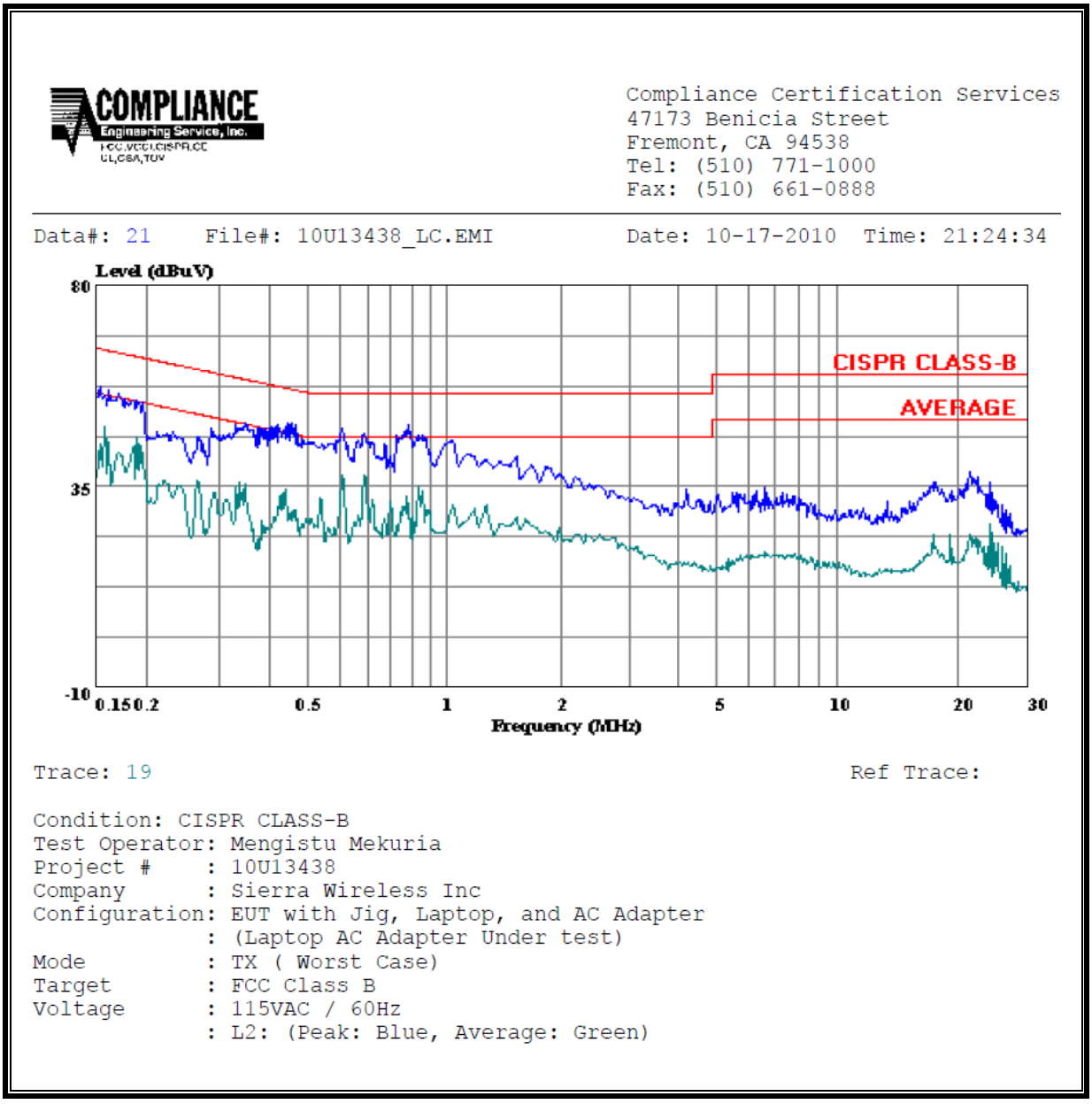


SUPPORT LAPTOP

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz
* = Plane-wave equivalent power density

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

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

IC RULES

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

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

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

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

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

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

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, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 0.5498 mW/cm^2 (Cell) and S = 1.0 mW/cm^2 (PCS)

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 5.498 mW/cm^2 (Cell) and S = 10 mW/cm^2 (PCS)

RESULTS

Band	MPE Distance (cm)	Output Power (dBm)	Max Antenna Gain (dBi)	FCC Power Density (mW/cm^2)	IC Power Density (W/m^2)
Cell	20.0	30.16	4.25	0.549	5.487
PCS	20.0	25.85	6.10	0.311	3.114