



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

FOR

PCMCIA ExpressCard MODEM CDMA

MODEL NUMBER: AC597E

FCC ID: N7NAC597E

REPORT NUMBER: 06U10740-1

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Prepared for
**SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD, CA 92011 USA**

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NVLAP LAB CODE 200065-0

Revision History

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--	01/09/07	Initial Issue	Thu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD, CA 92011, USA

EUT DESCRIPTION: PCMCIA ExpressCard MODEM CDMA

MODEL: AC597E

SERIAL NUMBER: 1827

DATE TESTED: DECEMBER 18-22, 2006

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22 SUBPART H	NO NON-COMPLIANCE NOTED
FCC PART 24 SUBPART E	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. 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 Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA/EIA 603C (2004), ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15 and FCC CFR 47 Part 22H and 24E.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a dual band 800 / 1900MHz PCMCIA CDMA wireless wide area network high-speed modem, and the module is manufactured by Sierra Wireless, Inc.

The module AC597E supports CDMA 1xRTT, and 1xEV-DO. REV A. Device capabilities are documented in the theory of operation.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power and ERP as follows:

824 to 849 MHz Authorized Band

Frequency Range (MHz)	Modulation	Conducted Average Power (dBm)	Conducted Average Power (mW)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low CH - 824.7	1 x EVDO, Rev A	24.51	282.49	28.05	638.26
Mid CH - 836.5		24.73	297.17	28.82	762.08
High CH - 848.3		24.69	294.44	28.16	654.64

1850 to 1910 MHz Authorized Band

Frequency Range (MHz)	Modulation	Conducted Average Power (dBm)	Conducted Average Power (mW)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low CH - 1851.25	1 x EVDO, Rev A	24.32	270.40	27.87	612.35
Mid CH - 1880		24.44	277.97	28.01	632.41
High CH - 1908.75		23.95	248.31	27.67	584.79

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes multi-band dipole antenna, with a maximum gain of 1.3dBi for Cell band and 2.7dBi for PCS band.

5.4. SOFTWARE AND FIRMWARE

The EUT is linked with Agilent Communication Test Set.

5.5. WORST-CASE CONFIGURATION AND MODE

Pre-scan was performed on RF conducted port to determine the worst-case scenario:

PROCEDURE USED TO ESTABLISH TEST SIGNAL

3G 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>
CDMA2000 Mobil Test	B.10.11, L

1xRTT

- Call Setup > Shift & Preset
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > RC3 (Fwd3, Rvs3)
- FCH Service Option (SO) Setup > 32 (+ F-SCH)
- 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
- Cell Info > Cell Parameters > System ID (SID) > 8
> Network ID (NID) > 65535

Once "Active Cell" show "Connected " then change "Rvs Power Ctrl" from "Active bits" to "**All Up bits**" to get the maximum power.

Worst-case Measurement Result @ Low, Middle and High Channel

Cellular Band

Radio Configuration (RC)	Service Option (SO)	Channel	Frequency	Output Power (dBm)	
				Average	Peak
RC3 (Fwd3, Rvs3)	SO32 (+F-SCH)	1013	824.70	24.38	27.88
		384	836.52	24.58	28.19
		777	848.31	24.54	28.10

PCS Band

Radio Configuration (RC)	Service Option (SO)	Channel	Frequency	Output Power (dBm)	
				Average	Peak
RC3 (Fwd3, Rvs3)	SO32 (+F-SCH)	25	1851.25	24.31	27.52
		600	1880.00	24.41	27.59
		1175	1908.75	23.90	26.76

3G-CDMA2000 1xRTT

Preliminary Measurement Results @ Middle channel

Radio Configuration (RC)	Service Option (SO)	Output Power (dBm)			
		Cellular Band @ M-ch		PCS Band @ M-ch	
		Average	Peak	Average	Peak
RC1 (Fwd1, Rvs1)	1 (Voice)				
	2 (Loopback)	24.58	28.18	24.41	27.58
	3 (Voice)				
	55 (Loopback)	24.58	28.18	24.41	27.58
RC2 (Fwd2, Rvs2)	9 (Loopback)	24.58	28.18	24.41	27.58
	17 (Voice)				
	55 (Loopback)	24.58	28.18	24.41	27.58
RC3 (Fwd3, Rvs3)	1 (Voice)				
	2 (Loopback)	24.58	28.18	24.41	27.58
	3 (Voice)				
	55 (Loopback)	24.58	28.18	24.41	27.58
	32 (+ F-SCH)	24.58	28.19	24.41	27.59
	32 (+ SCH)	23.90	28.00	23.77	27.43
RC43 (Fwd4, Rvs3)	1 (Voice)				
	2 (Loopback)	24.58	28.18	24.40	27.61
	3 (Voice)				
	55 (Loopback)	24.58	28.18	24.40	27.59
	32 (+ F-SCH)	24.58	28.18	24.40	27.59
	32 (+ SCH)	23.90	28.08	23.77	27.43
RC54 (Fwd5, Rvs4)	9 (Loopback)	24.58	28.18	24.40	27.60
	17 (Voice)				
	55 (Loopback)	24.58	28.18	24.40	27.66

3G-CDMA2000 1xEV-DO Release 0 (Rel 0)

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

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

FTAP

- Call Setup > Shift & Preset
- Protocol Rev > 0 (1xEV-DO)
- Application Config > Enhanced Test Application Protocol > FTAP
- FTAP Rate > 307.2 kbps (2 Slot, QPSK)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RTAP

- Call Setup > Shift & Preset
- Protocol Rev > 0 (1xEV-DO)
- Application Config > Enhanced Test Application Protocol > RTAP
- RTAP Rate > 153.6 kbps
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

Worst-case Measurement Result @ Low, Middle and High Channel

Cellular Band - RTAP					Cellular Band - FTAP				
Channel	f (MHz)	RTAP Rate	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
1013	824.70	153.6	24.27	28.20	1013	824.70	307.2 kbps (2 slot, QPSK)	24.04	27.80
384	836.52		24.57	28.28	384	836.52		24.33	28.22
777	848.31		24.61	28.30	777	848.31		24.26	27.95

PCS Band - RTAP					PCS Band - FTAP				
Channel	f (MHz)	RTAP Rate	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
25	1851.25	153.6	24.27	27.26	25	1851.25	307.2 kbps (2 slot, QPSK)	24.06	27.42
600	1880.00		24.40	27.80	600	1880.00		24.22	27.49
1175	1908.75		23.18	26.28	1175	1908.75		23.12	26.60

3G CDMA2000 1xEV DO Release 0 (Rel 0)

Preliminary Measurement Results @ Middle channel

Cellular Band - RTAP					Cellular Band - FTAP				
Channel	f (MHz)	RTAP Rate	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
384	836.52	9.6	24.22	28.20	384	836.52	307.2 kbps (2 slot, QPSK)	24.33	28.22
		19.2	24.40	28.23					
		38.4	24.47	28.25					
		76.8	24.56	28.27					
		153.6	24.57	28.28					

PCS Band - RTAP					PCS Band - FTAP				
Channel	f (MHz)	RTAP Rate	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
600	1880.00	9.6	24.10	27.42	600	1880.00	307.2 kbps (2 slot, QPSK)	24.22	27.49
		19.2	24.13	27.42					
		38.4	24.20	27.38					
		76.8	24.24	27.30					
		153.6	24.40	27.80					

3G CDMA2000 1xEV DO Revision A (Rev A)

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

<u>Application</u>	<u>Rev, License</u>
1xEV-DO Terminal Test	A.06.06, L

FETAP

- Call Setup > Shift & Preset
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
- FTAP Rate > 307.2 kbps (2 Slot, QPSK)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 0
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
- Rvs Power Ctrl > All Up bits (to get the maximum power)

RETAP

- Call Setup > Shift & Preset
- Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- F-Traffic Format > 4 (1024, 2,128) Canonical (307.2k, QPSK)
- R-Data Pkt Size > 4096 (for PCS band),12288 (for Cellular band)
- Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2
> PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0)
- Access Network Info > Cell Parameters > Sector ID > 00000000 > Subnet Mask > 0
- Generator Info > Termination Parameters > Max Forward Packet Duration >16 Slots
> ACK R-Data After > Subpacket 0 (All ACK)
- Rvs Power Ctrl > All Up bits (to get the maximum power)

Worst-case Measurement Result @ Low, Middle and High Channel

Cellular Band - RETAP					Cellular Band - FETAP				
Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
1013	824.70	12288	24.47	28.23	1013	824.70	307.2 (2 slot)	23.95	27.90
384	836.52		24.73	28.41	384	836.52		24.43	28.27
777	848.31		24.68	28.30	777	848.31		24.21	28.10

PCS Band - RETAP					PCS Band - FETAP				
Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
25	1851.25	4096	24.34	27.50	25	1851.25	307.2 (2 slot)	24.06	27.38
600	1880.00		24.44	27.53	600	1880.00		24.18	27.42
1175	1908.75		23.22	26.48	1175	1908.75		23.00	26.47

3G CDMA2000 1xEV-DO Revision A (Rev A)

Preliminary Measurement Results @ Middle channel

Cellular Band - RETAP					Cellular Band - FETAP				
Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
384	836.52	128	24.00	28.32	384	836.52	307.2 (2 slot)	24.43	28.27
		256	24.09	28.28			307.2 (4 slot)	24.20	28.19
		512	24.17	28.28					
		768	24.27	28.28					
		1024	24.30	28.25					
		1536	24.40	28.32					
		2048	24.45	28.19					
		3072	24.62	28.38					
		4096	24.64	28.32					
		6144	24.65	28.38					
		8192	24.68	28.39					
		12288	24.73	28.41					

PCS Band - RETAP					PCS Band - FETAP				
Channel	f (MHz)	R-Data Pkt Size	Conducted power (dBm)		Channel	f (MHz)	FTAP Rate	Conducted power (dBm)	
			Average	Peak				Average	Peak
600	1880.00	128	24.00	27.51	600	1880	307.2 (2 slot)	24.18	27.42
		256	24.01	27.51			307.2 (4 slot)	23.92	27.23
		512	24.10	27.42					
		768	24.14	27.42					
		1024	24.18	27.42					
		1536	24.23	27.42					
		2048	24.27	27.38					
		3072	24.43	27.53					
		4096	24.44	27.53					
		6144	24.40	27.56					
		8192	24.40	27.60					
		12288	24.42	27.56					

EV-DO REV A Worst Case Data

Cellular Band	Avg. Output Power (dBm)	99% BW (MHz)	26 dB BW (MHz)	Band edge (dBm)	
	Mid CH	Mid CH	Mid CH	Low CH	High CH
Protocol-FETAP	23.85	1.2651	1.386	-19.448	-14.572
Protocol-RETAP	24.73	1.2804	1.407	-16.771	-13.872

EV-DO, Rev A Protocol RETAP, PCS Band	Avg. Output Power (dBm)	99% BW (MHz)	26 dB BW (MHz)	Band edge (dBm)	
	Mid CH	Mid CH	Mid CH	Low CH	High CH
Protocol-FETAP	23.90	1.250	1.404	-31.093	-32.415
Protocol-RETAP	24.44	1.282	1.433	-25.046	-26.308

Based on the above results from the different modulations, EV-DO, REV A Protocol RETAP to be the worst-case scenario for all measurements.

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at mid channel for both bands.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	IBM	Thinkpad T60	ZZ9E242	DoC
Directional Coupler	KRYTAR	1817	2656	NA
Wireless Communications Test Set	Agilent	E5515C	10092	DoC
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	DoC
AC Adapter	IBM	92P1154	52569-11	DoC

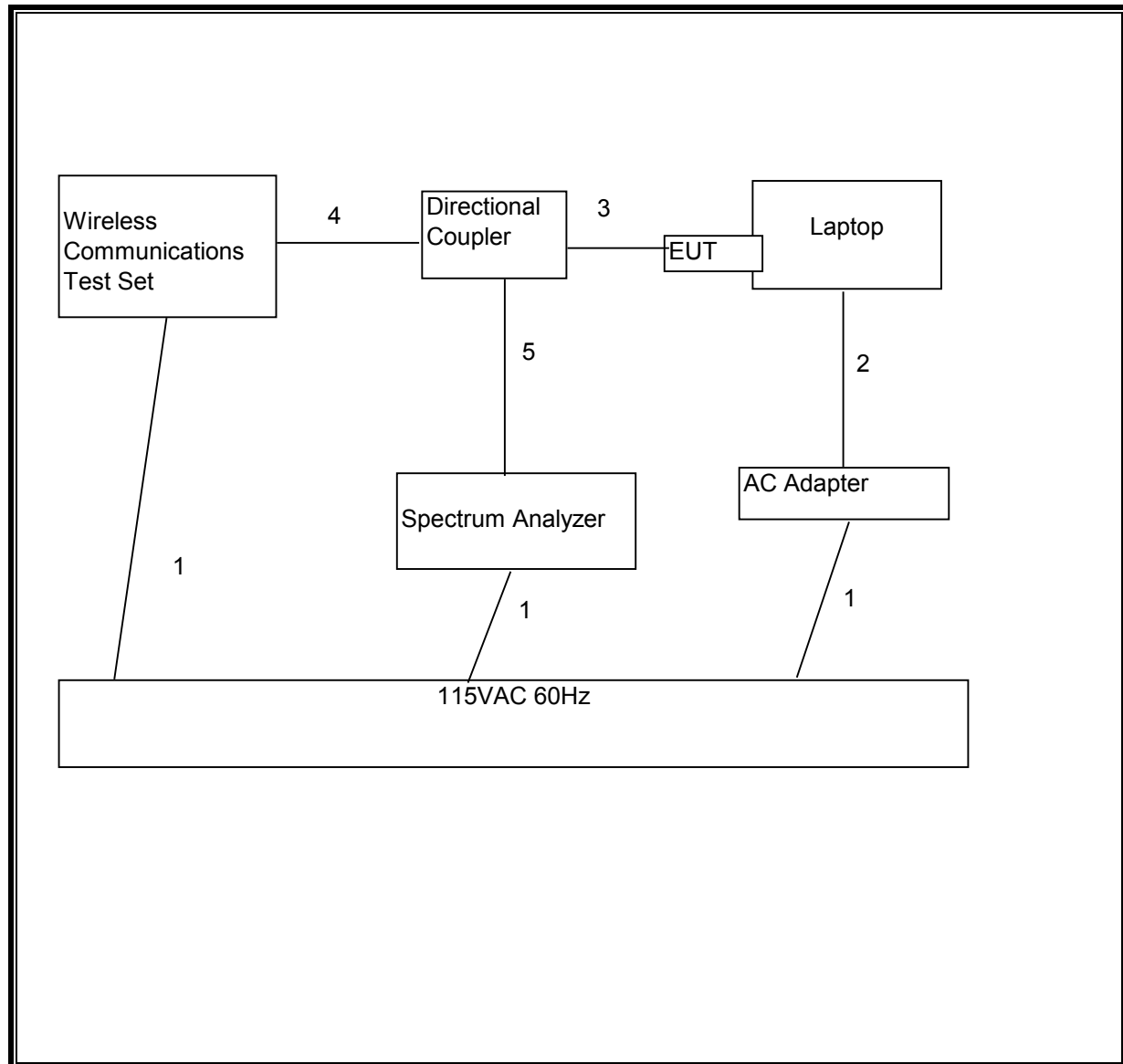
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	US115V	Un-shielded	2m	N/A
2	DC	1	Din	Un-shielded	1m	Ferrite on Laptop's end
3	Directional Coupler	1	N-Type	Shielded	1m	N/A
4	RF In	1	N-Type	Shielded	1m	N/A
5	RF Out	1	N-Type	Shielded	0.1m	N/A

TEST SETUP

The EUT card is inserted into the PCMCIA slot of ThinkPad T60 during the tests. The Wireless Communication test set exercised the EUT.

SETUP DIAGRAM FOR 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	Serial Number	Cal Due
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	07/29/07
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/02/07
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/02/07
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	9001-3245	04/22/07
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00561	10/03/07
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	09/03/07
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	02/04/07
RF Filter Section	Agilent / HP	85420E	3705A00256	02/04/07
Directional Coupler	KRYTAR	1817	2656	CNR
Wireless Communications Test Set	Agilent	E5515C	10092	10/19/07
2.7GHz HPF	MicroTronic	HPM13194	2	CNR
1.5GHz HPF	MicroTronic	HPM13195	1	CNR
Communication Test Set	Agilent	E5515C	91936	04/08/07
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	04/22/07
Signal Generator 2 -40 GHz	R & S	SMP04	DE 34210	06/02/07
Signal Generator 1024 MHz	R & S	SMY01	DE 12311	05/11/07
Dipole	EMCO	3121C-DB2	22435	03/25/07

7. LIMITS AND RESULTS

7.1. OCCUPIED BANDWIDTH

LIMIT

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

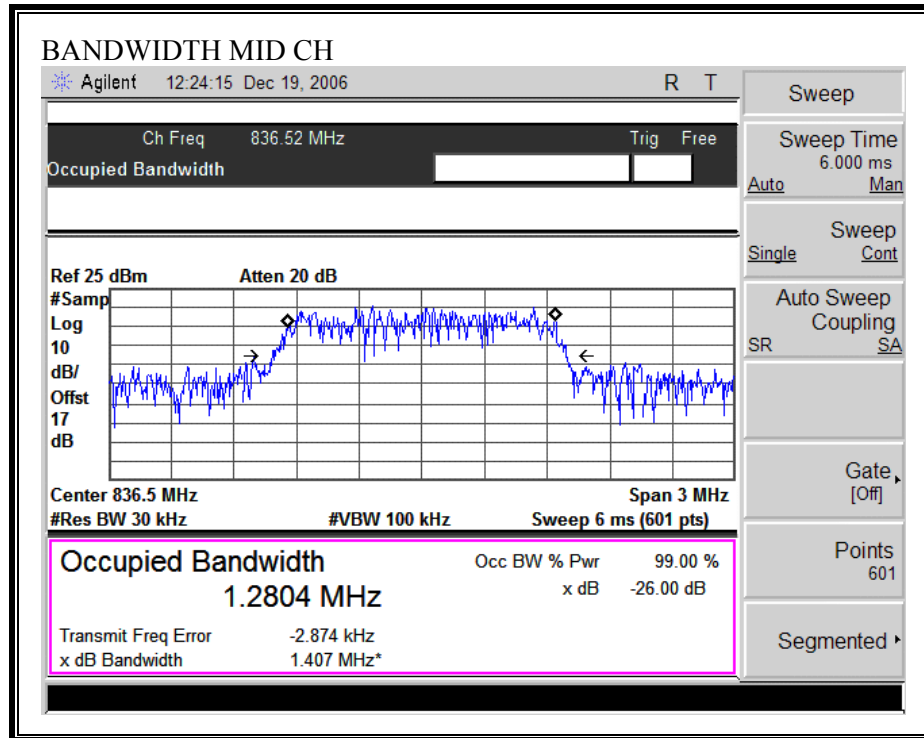
No non-compliance noted:

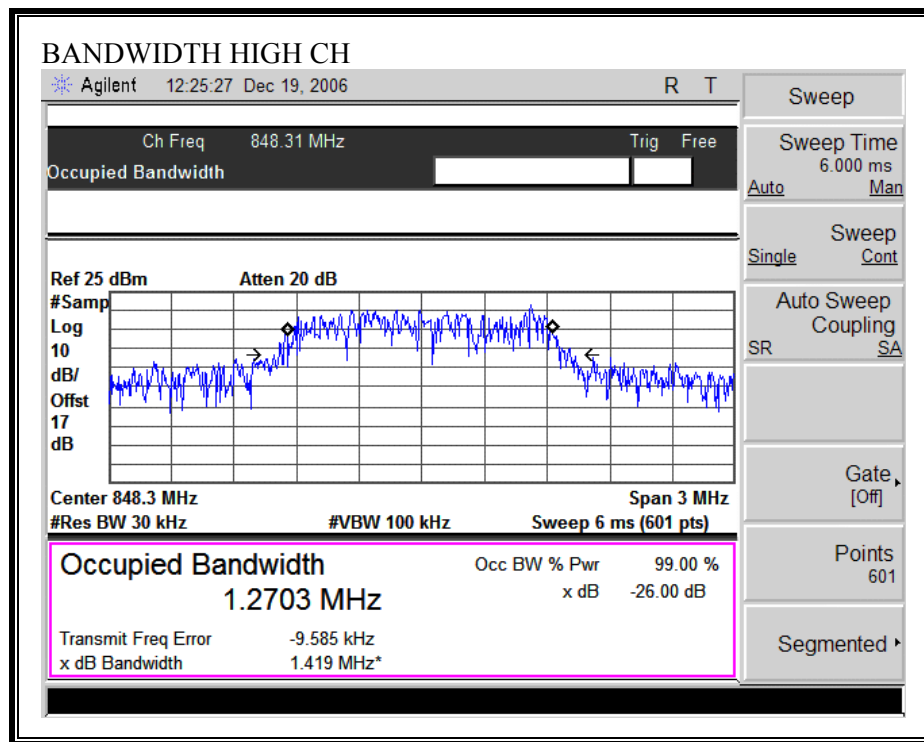
CDMA Modulation

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	824.7	1.408
Middle	836.52	1.407
High	848.31	1.419

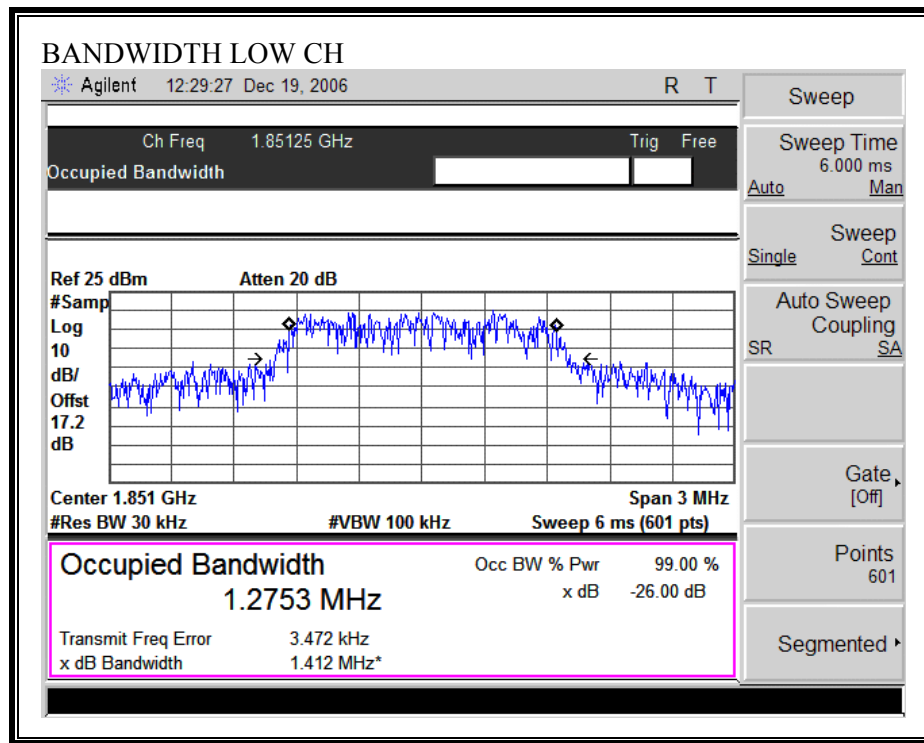
PCS Modulation

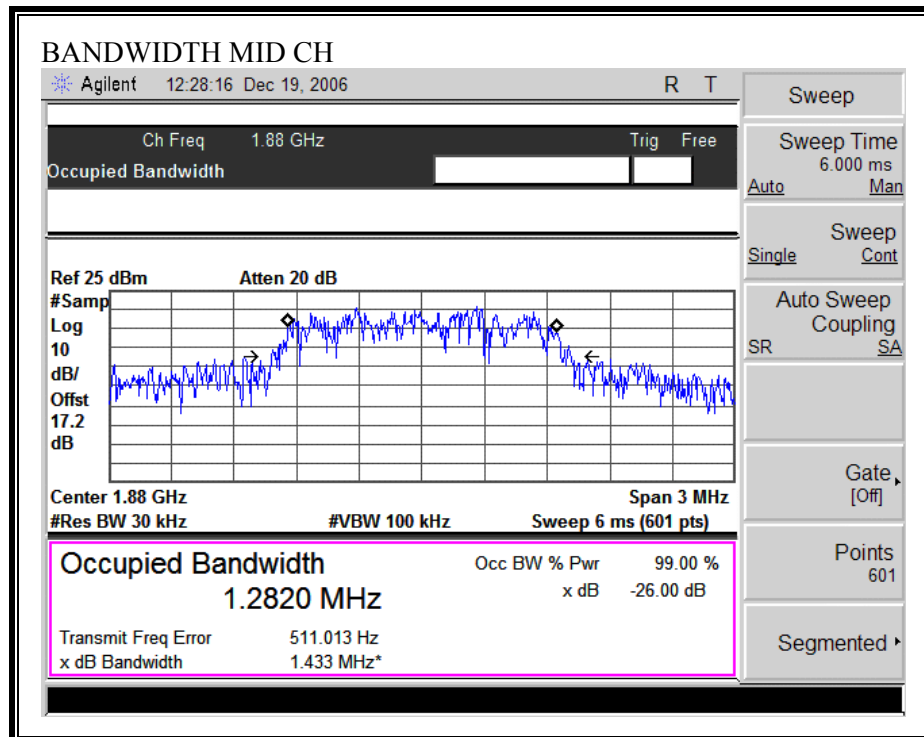
Channel	Frequency (MHz)	Bandwidth (MHz)
Low	1851.25	1.412
Middle	1880	1.433
High	1908.75	1.42

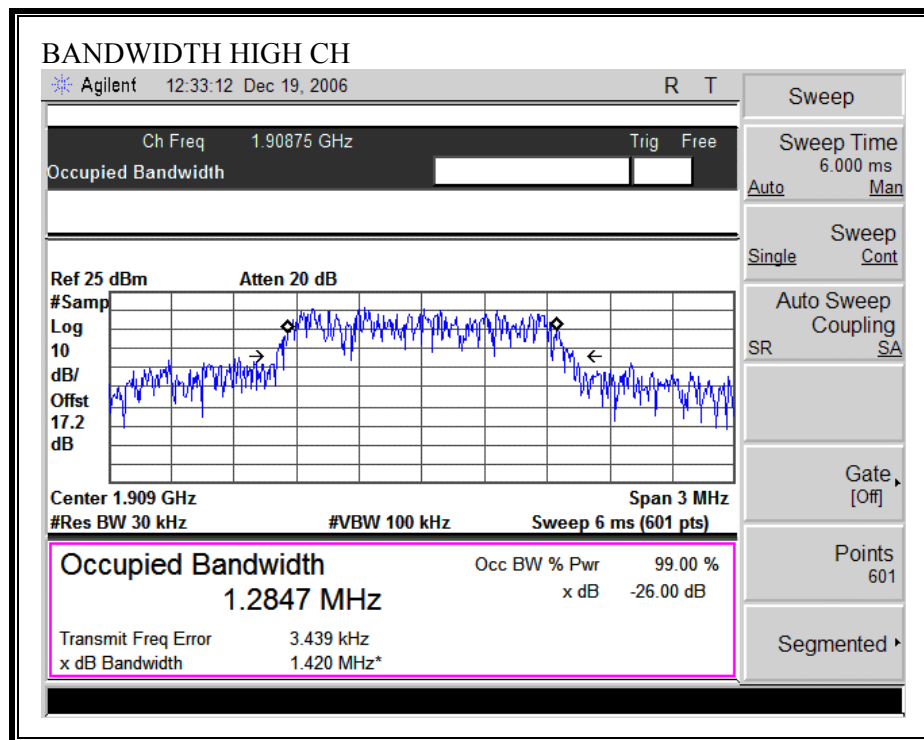




PCS, CDMA 26 dB BANDWIDTH







7.2. RF POWER OUTPUT

LIMIT

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

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.2.17

RESULTS

No non-compliance noted.

800MHz CELL CDMA Modulation

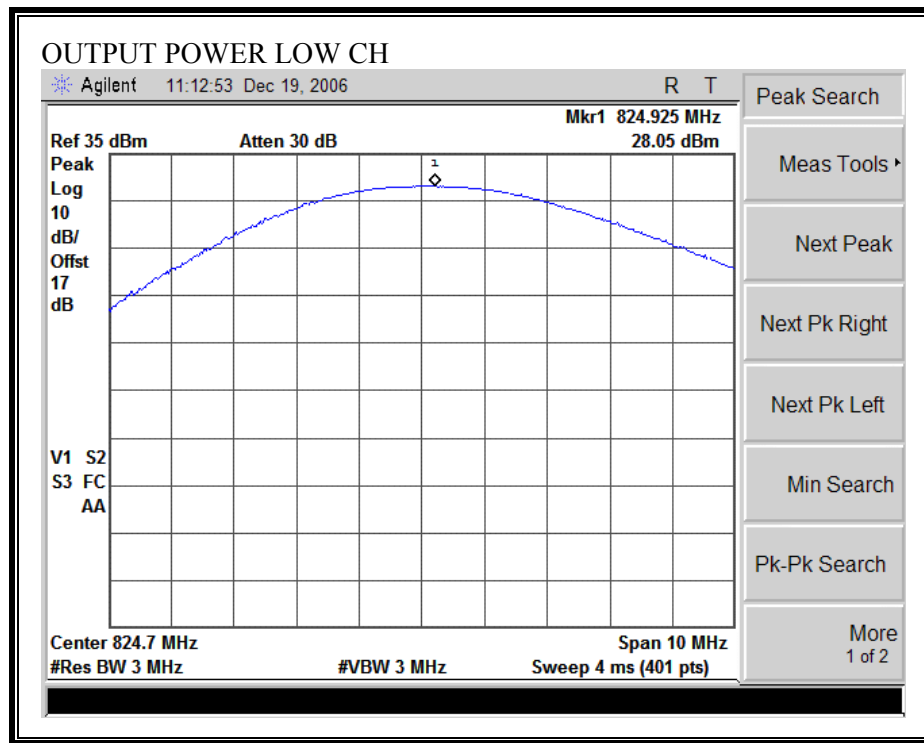
Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)	ERP Peak Power (dBm)	ERP Peak Power (mW)
Low	824.7	28.05	638.26	26.00	398.11
Middle	836.5	28.82	762.08	26.80	478.63
High	848.3	28.16	654.64	26.40	436.52

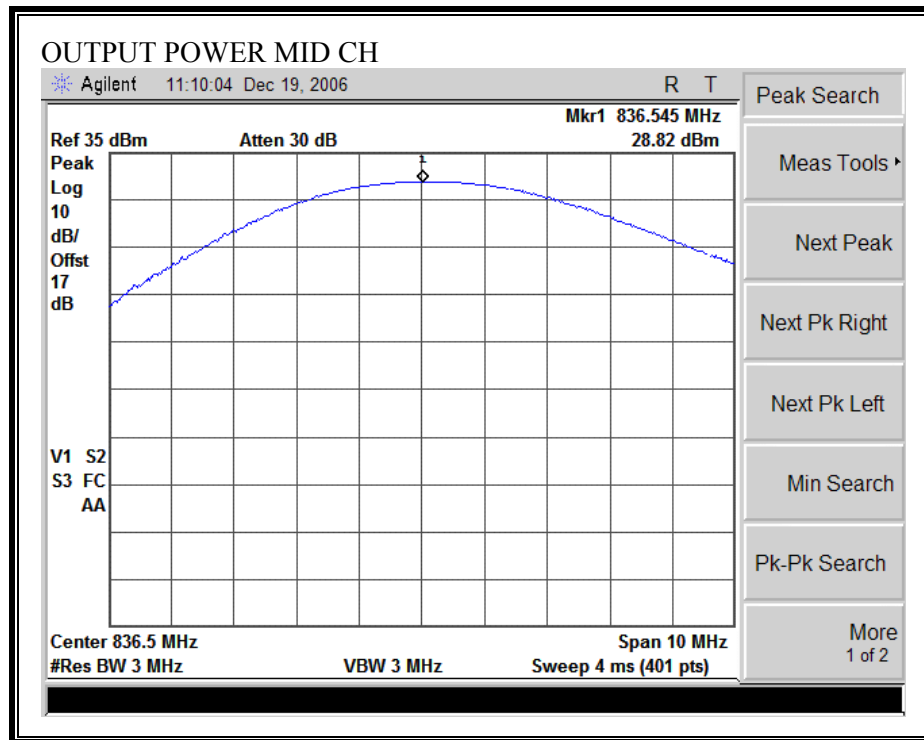
1900MHz PCS Modulation

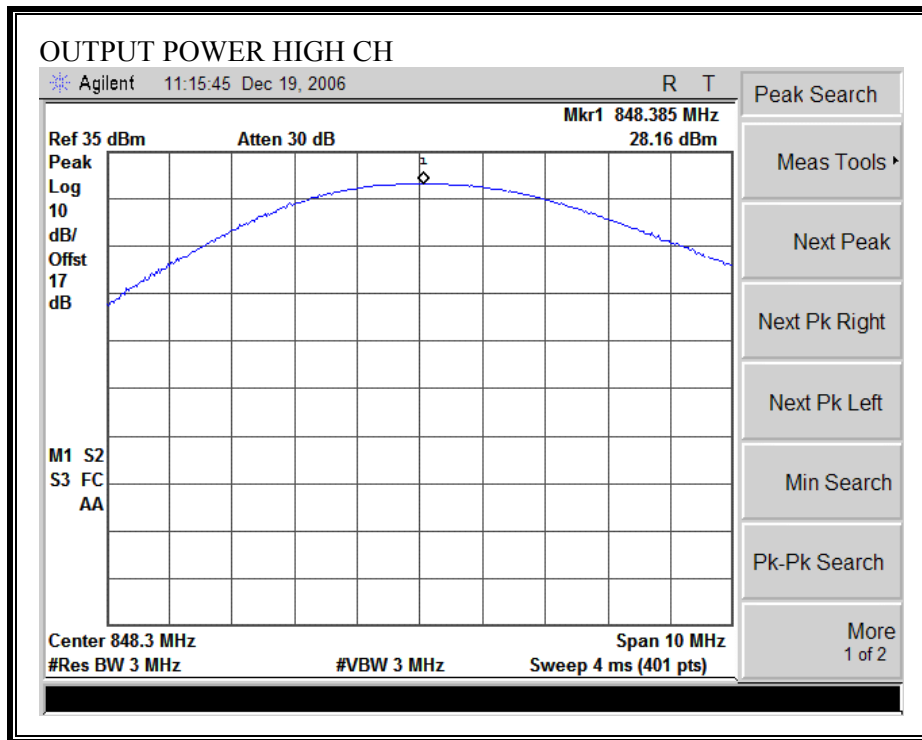
Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)	EIRP Peak Power (dBm)	EIRP Peak Power (mW)
Low	1851.25	27.87	612.35	24.70	295.12
Middle	1880.00	28.01	632.41	24.10	257.04
High	1908.75	27.67	584.79	23.90	245.47

NOTE: RBW=VBW=3MHz

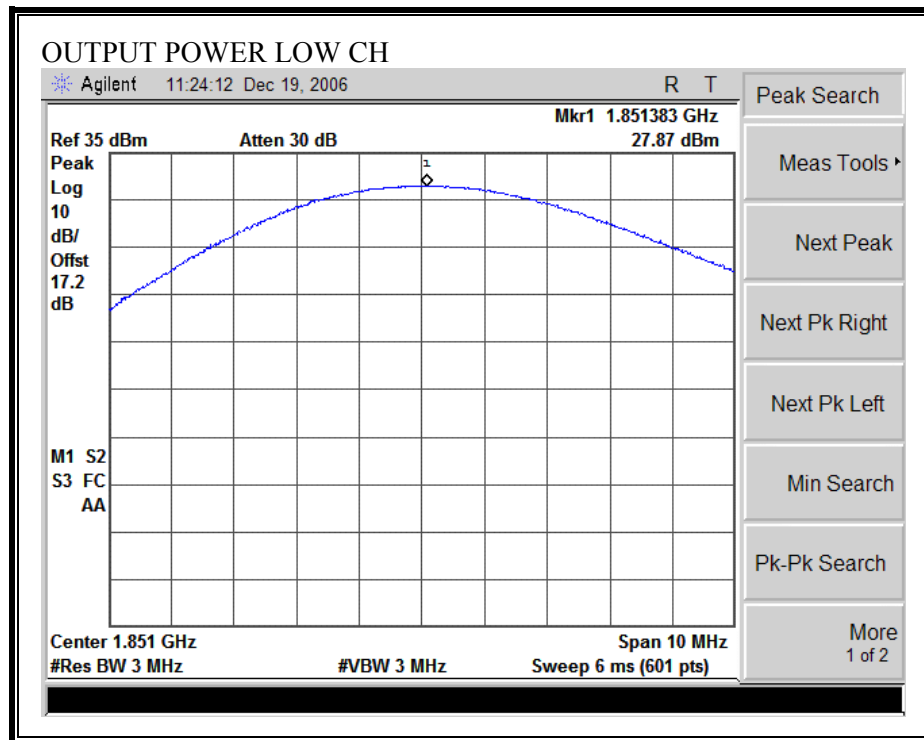
800MHz CELLULAR (RF CONDUCTED OUTPUT POWER)

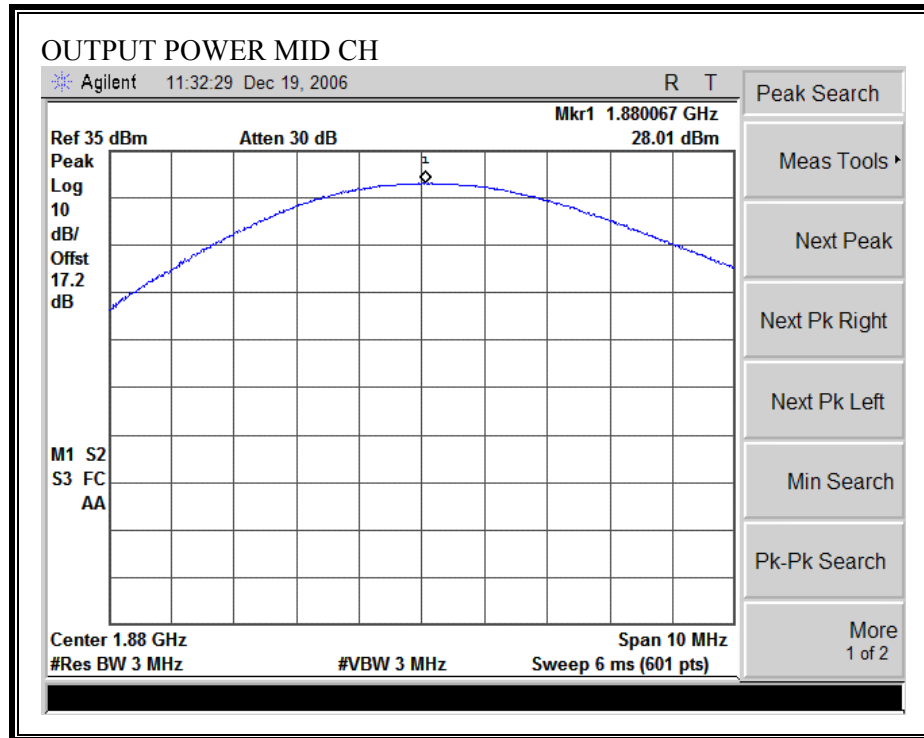


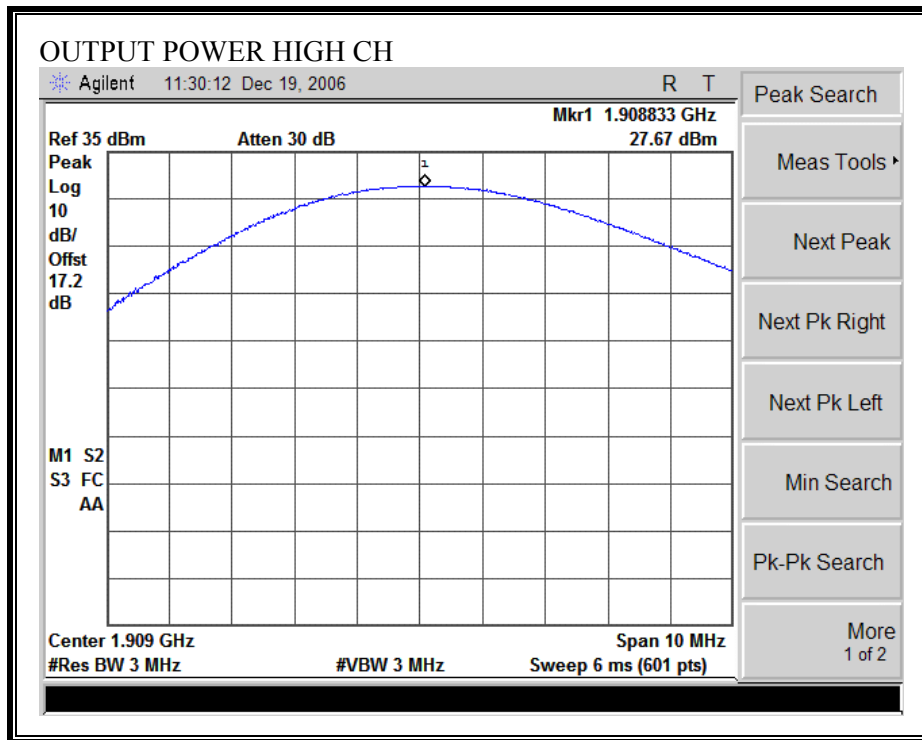




1900MHz PCS (RF CONDUCTED OUTPUT POWER)







Cellular Output Power (ERP)

High Frequency Substitution Measurement Compliance Certification Services, Morgan Hill 5m Chamber Site									
Company:Sierra Wireless Inc. Project #:06U10740 Date:12/20/2006 Test Engineer:Chien Ho Configuration:EUT only Mode:Cell TX									
<u>Test Equipment:</u> Receiving: Sunol T122, and 5m Chamber N-type Cable (Setup this one for testing EUT) Substitution: Dipole S/N: 00022117, and 4ft SMA Cable Warehouse S/N: 177081002									
f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.20	103.2	V	26.3	0.5	0.0	25.8	38.5	-12.7	
824.20	104.8	H	26.5	0.5	0.0	26.0	38.5	-12.5	
836.50	103.4	V	27.4	0.6	0.0	26.8	38.5	-11.6	
836.50	105.0	H	26.8	0.6	0.0	26.2	38.5	-12.2	
848.80	102.5	V	27.1	0.7	0.0	26.4	38.5	-12.0	
848.80	104.8	H	26.7	0.7	0.0	26.0	38.5	-12.4	
Rev. 5.1.6									

PCS Output Power (EIRP)

High Frequency Fundamental Measurement Compliance Certification Services, Morgan Hill 5m Chamber Site Company: Sierra Wireless, Inc. Project #: 06U10740 Date: 12/20/2006 Test Engineer: Chien Ho Configuration: EUT Only Mode: EV-DO Rev A, RETAP, PCS, TX Test Equipment: Receiving: Horn T73, and 12ft S/N: 197209005 (Setup this one for testing EUT) Substitution: Horn T60 Substitution, 4ft SMA Cable Warehouse S/N: 177081002									
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
1.850	94.5	V	17.3	0.9	8.3	24.7	33.0	-8.3	
1.850	93.3	H	15.9	0.9	8.3	23.3	33.0	-9.7	
1.880	93.5	V	16.6	0.9	8.3	24.1	33.0	-9.0	
1.880	92.7	H	15.0	0.9	8.3	22.5	33.0	-10.6	
1.910	93.0	V	16.4	0.9	8.4	23.9	33.0	-9.1	
1.910	92.5	H	15.5	0.9	8.4	23.0	33.0	-10.0	
Rev. 5.1.6									

7.3. SPURIOUS EMISSION AT ANTENNA TERMINAL

LIMIT

§22.917 (e) & §24.238 (a) Out of band emissions. 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

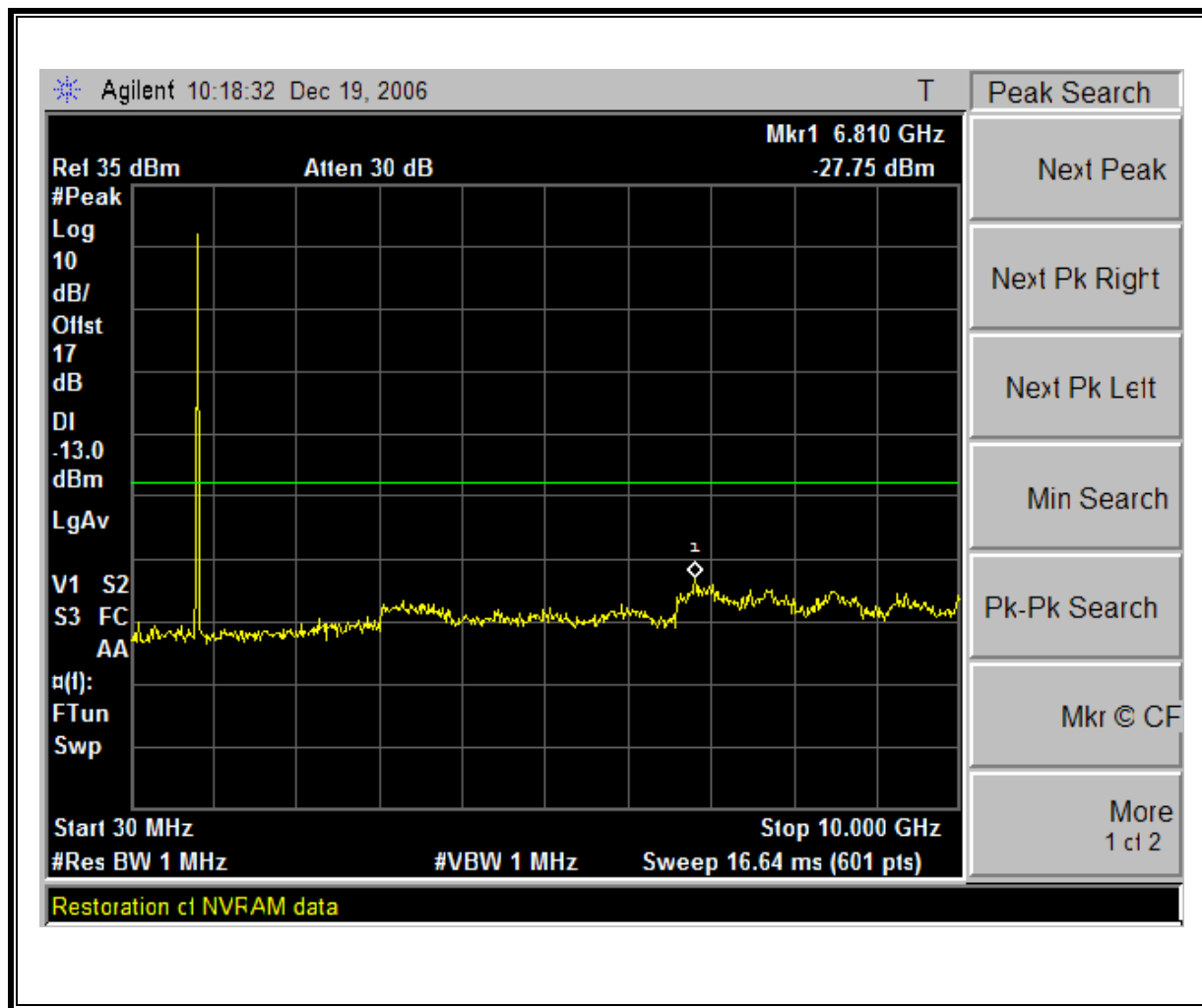
ANSI / TIA / EIA 603C Clause 2.2.12, FCC 22.917 (h), & FCC 24.238 (b)

RESULTS

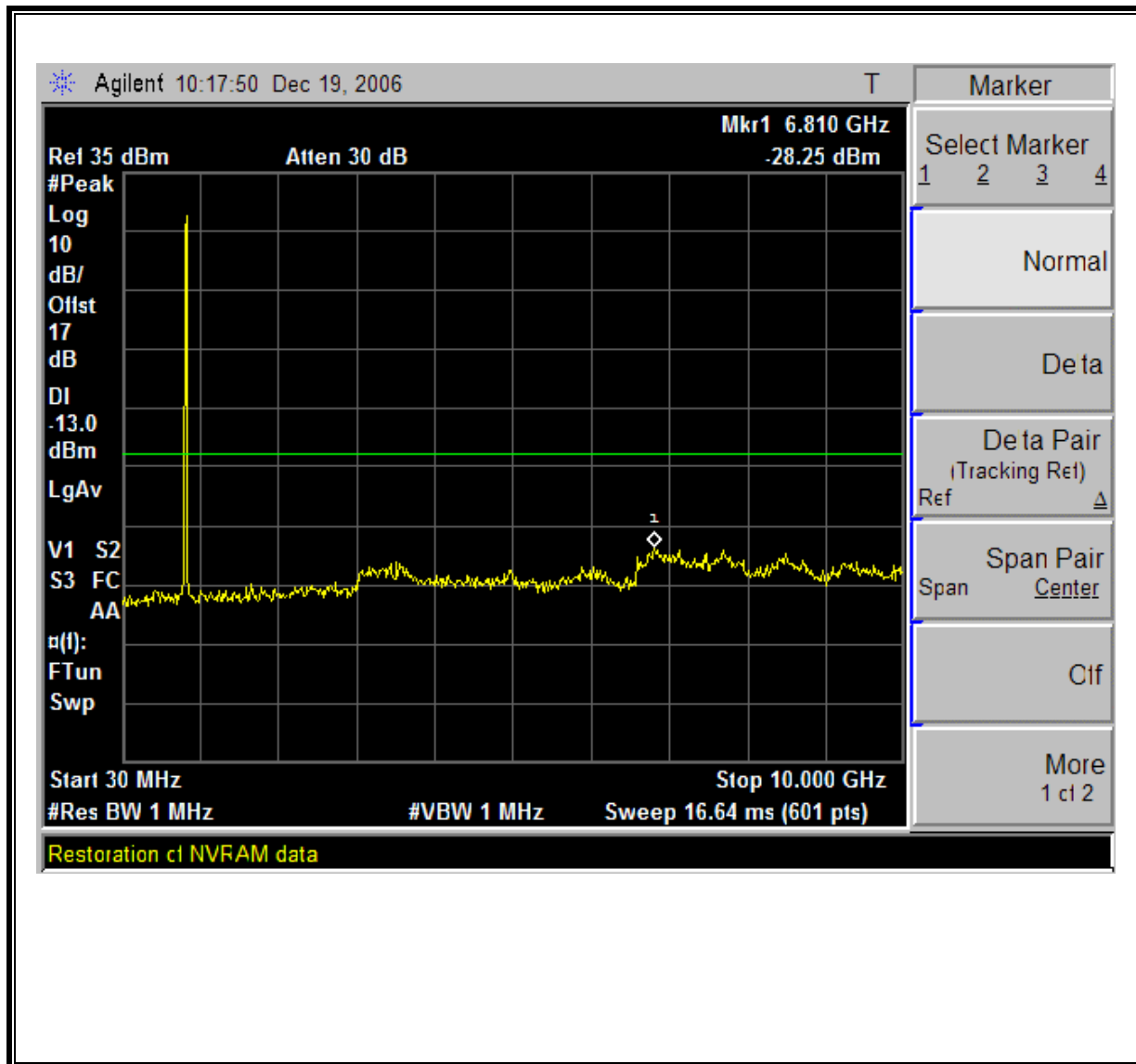
No non-compliance noted.

CDMA MODULATION RESULTS

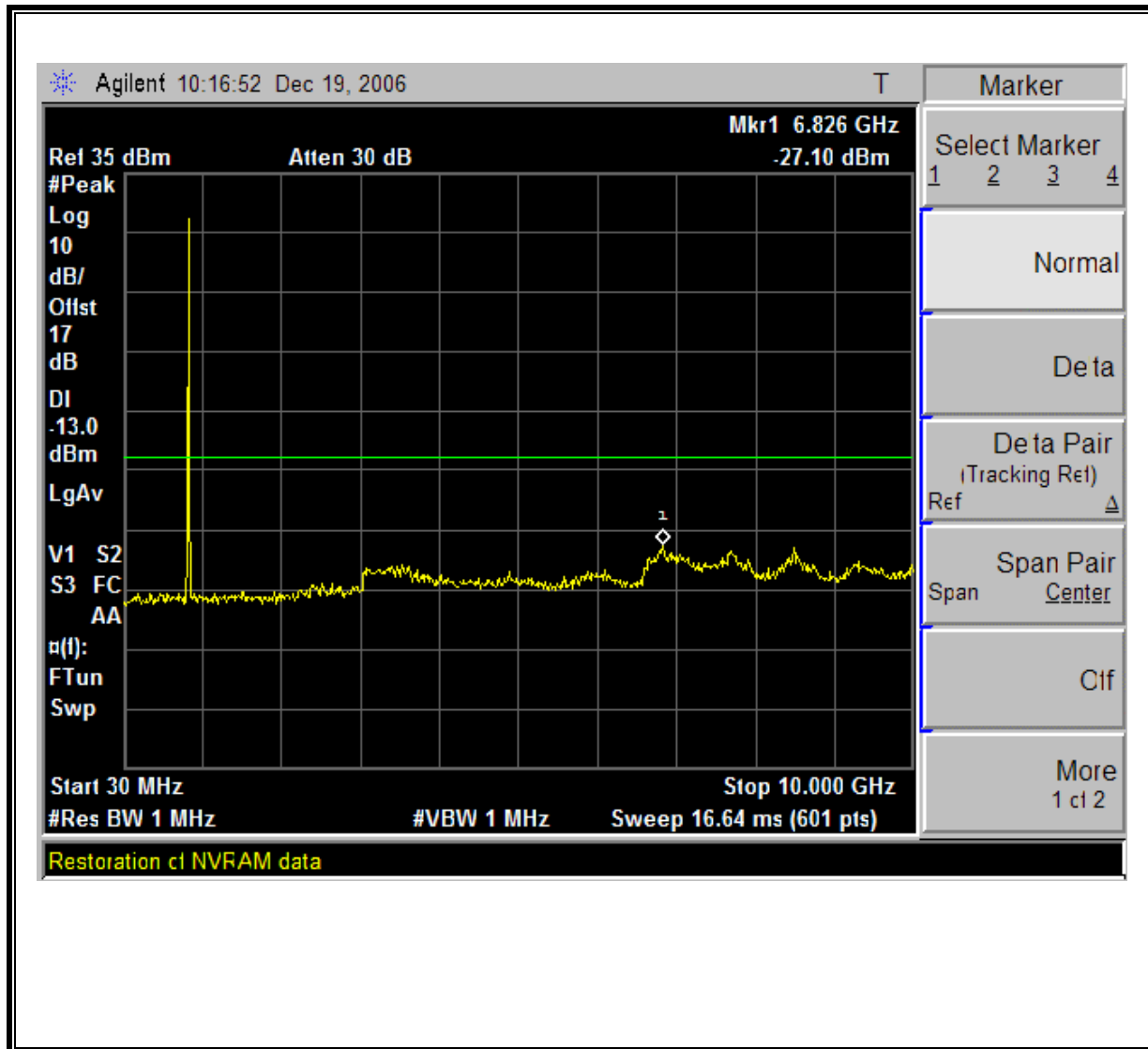
CDMA Modulation: Low Channel, Out-Of-Band Emissions



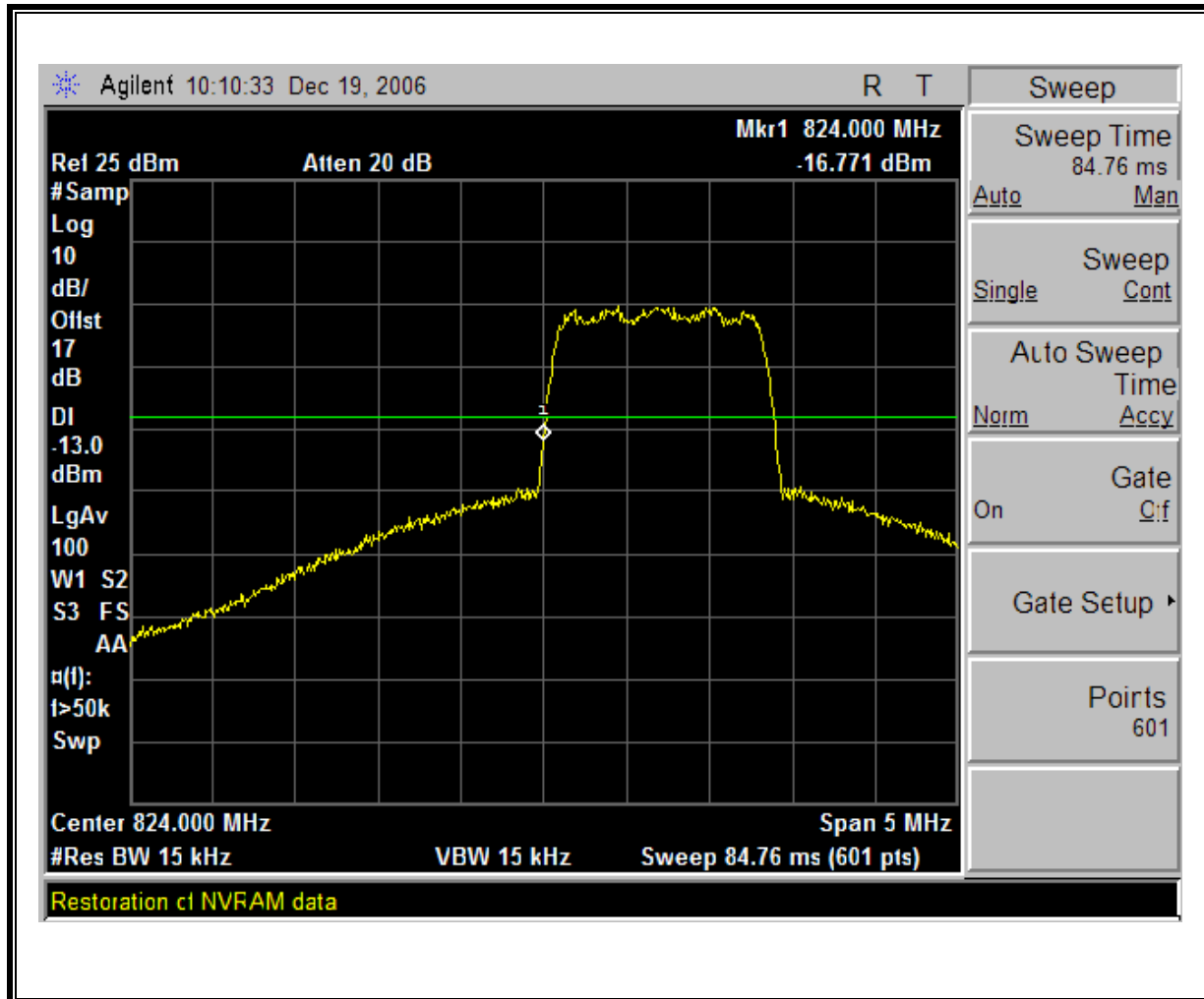
CDMA Modulation: Mid Channel, Out-Of-Band Emissions



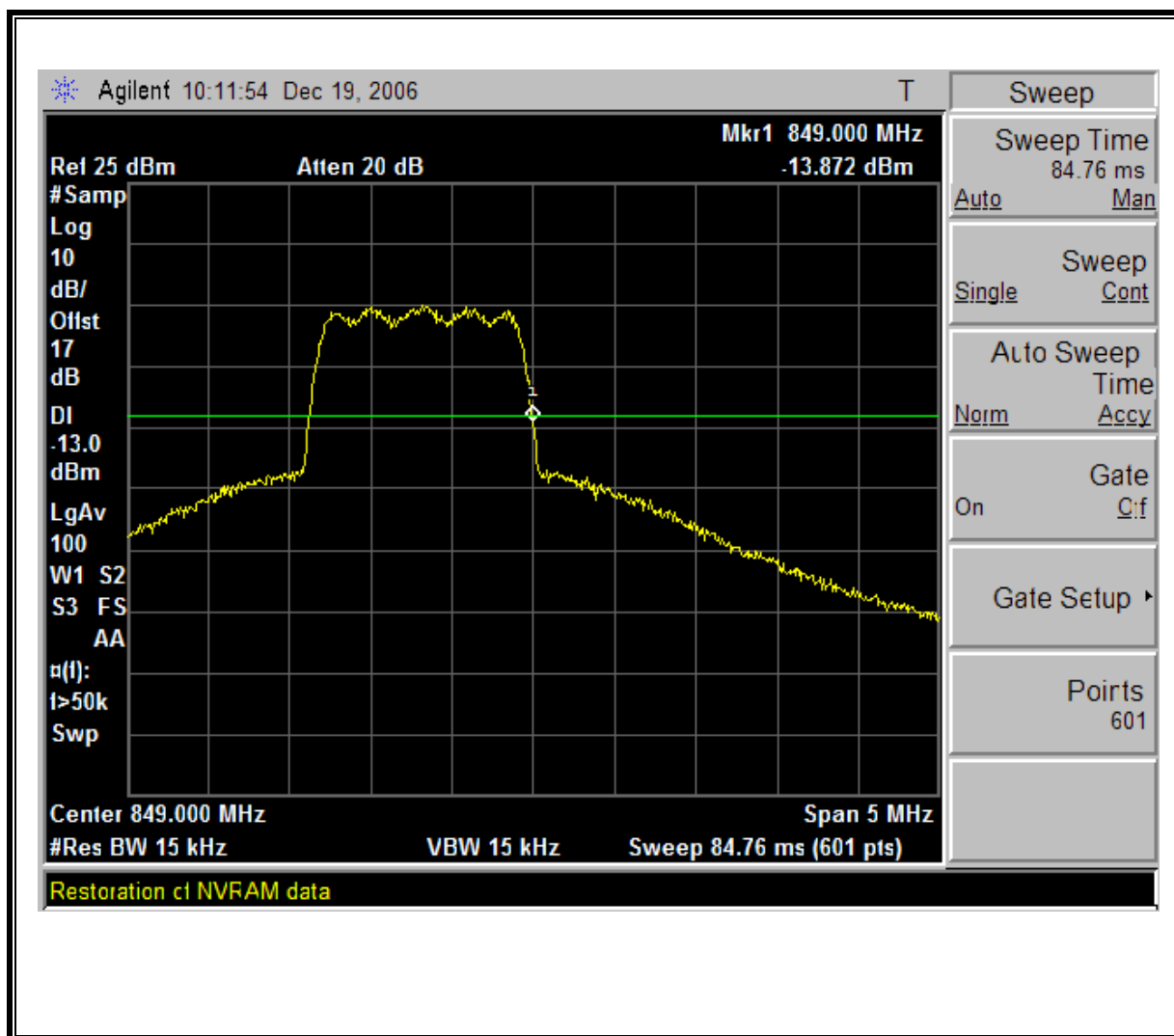
CDMA Modulation: High Channel, Out-Of-Band Emissions



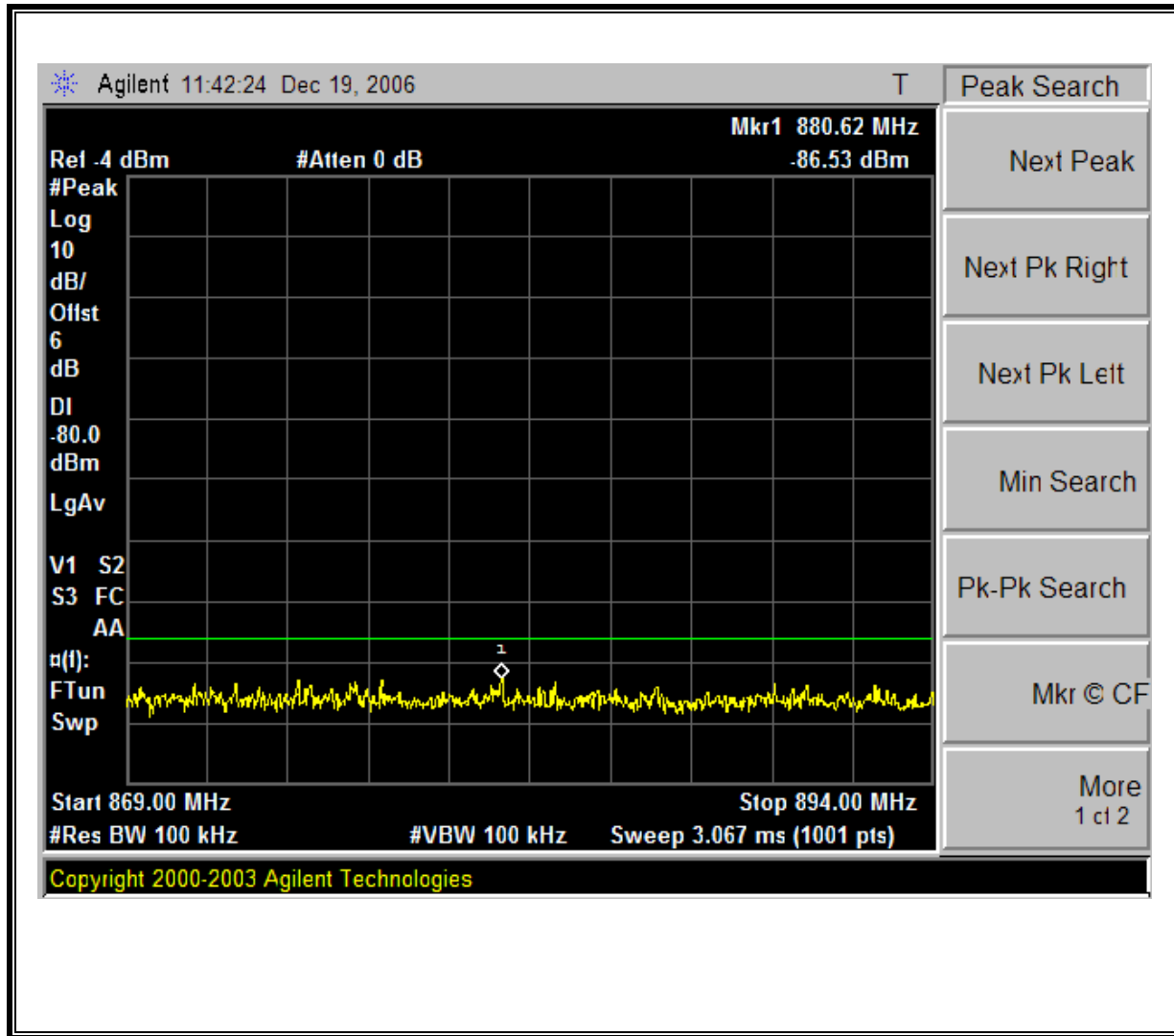
CDMA Modulation: Low Channel Band Edge



CDMA Modulation: High Channel Band Edge

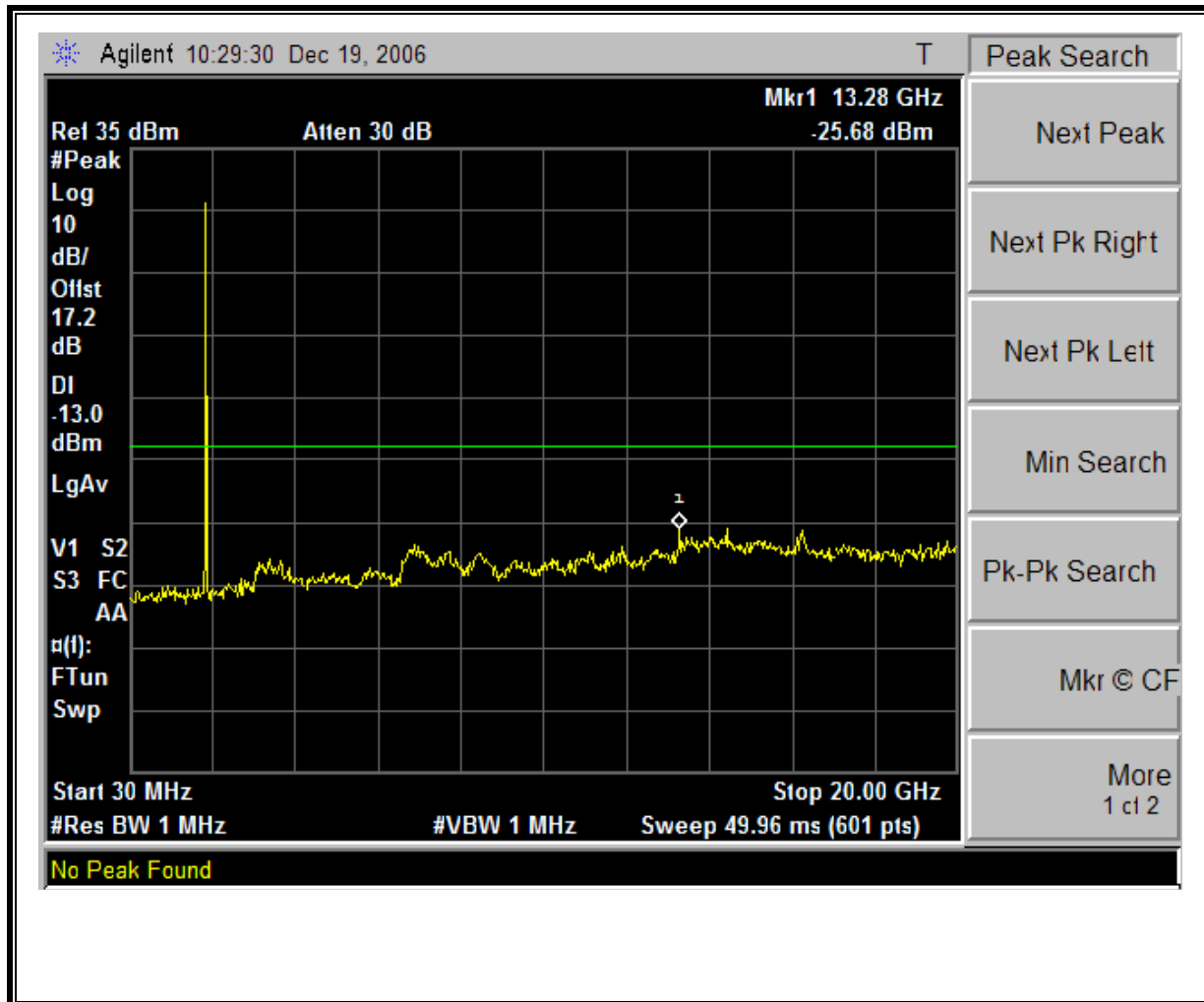


CDMA Mobile Emissions in Base Frequency Range



PCS MODULATION RESULTS

Low Channel, Out-Of-Band Emissions



Agilent 10:24:33 Dec 19, 2006 T

Rel 35 dBm Atten 30 dB Mkr1 3.76 GHz -25.03 dBm

#Peak Log 10 dB/ Offst 17.2 dB DI -13.0 dBm LgAv

M1 S2 S3 FC AA

q(t): FTun Swp

Start 30 MHz Stop 20.00 GHz

#Res BW 1 MHz #VBW 1 MHz Sweep 49.96 ms (601 pts)

No Peak Found

Peak Search

Next Peak

Next Pk Right

Next Pk Left

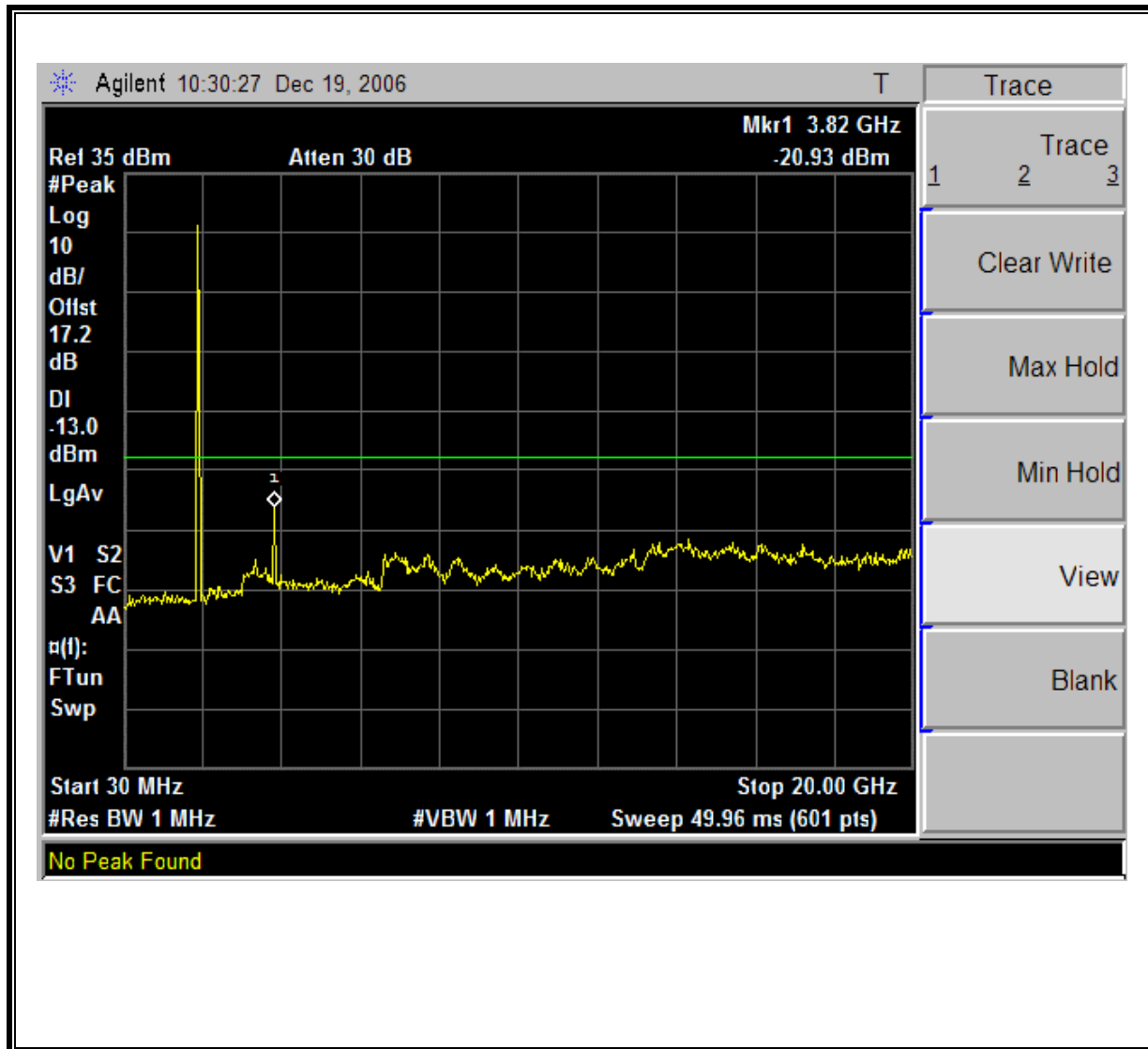
Min Search

Pk-Pk Search

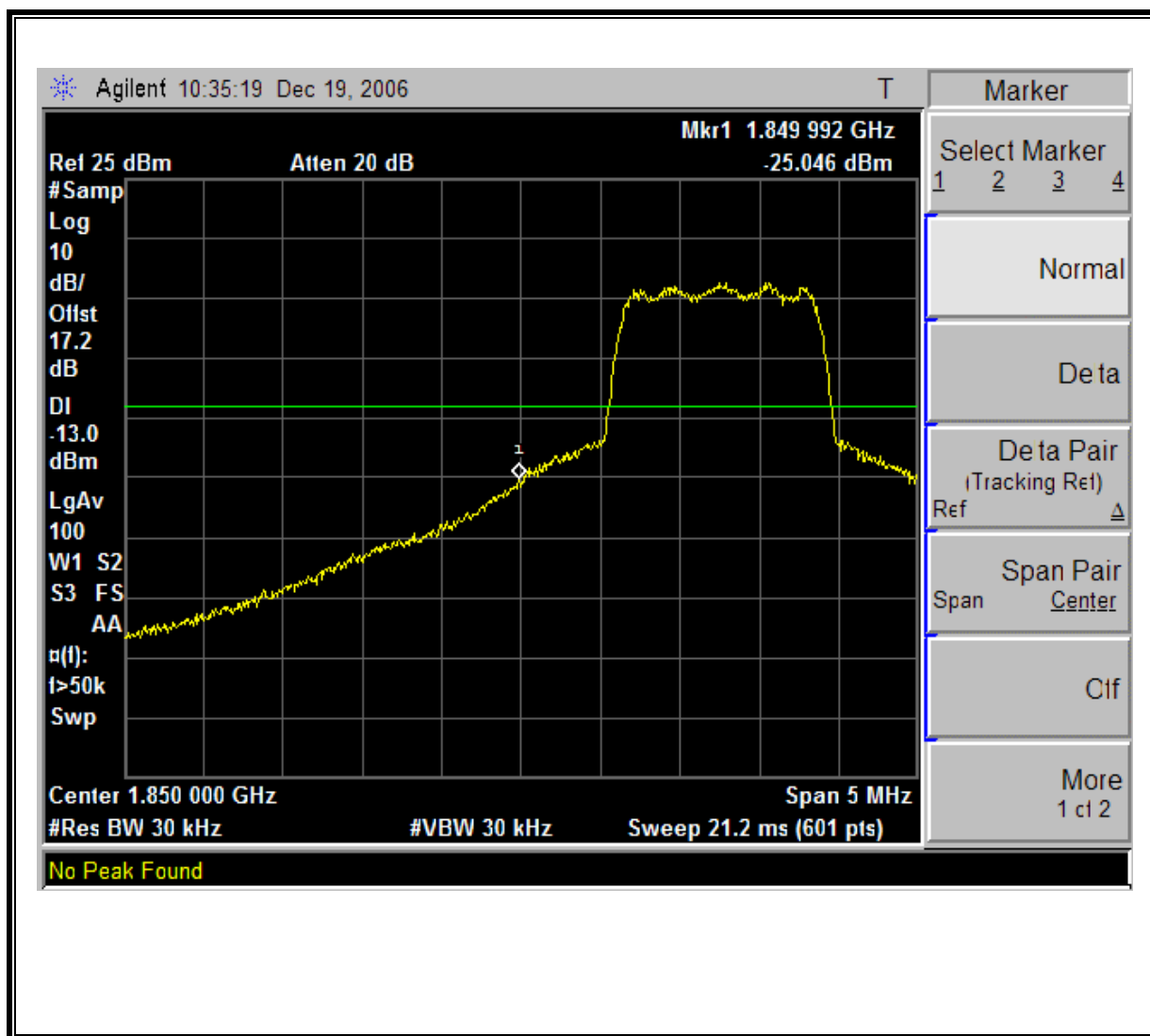
Mkr © CF

More 1 of 2

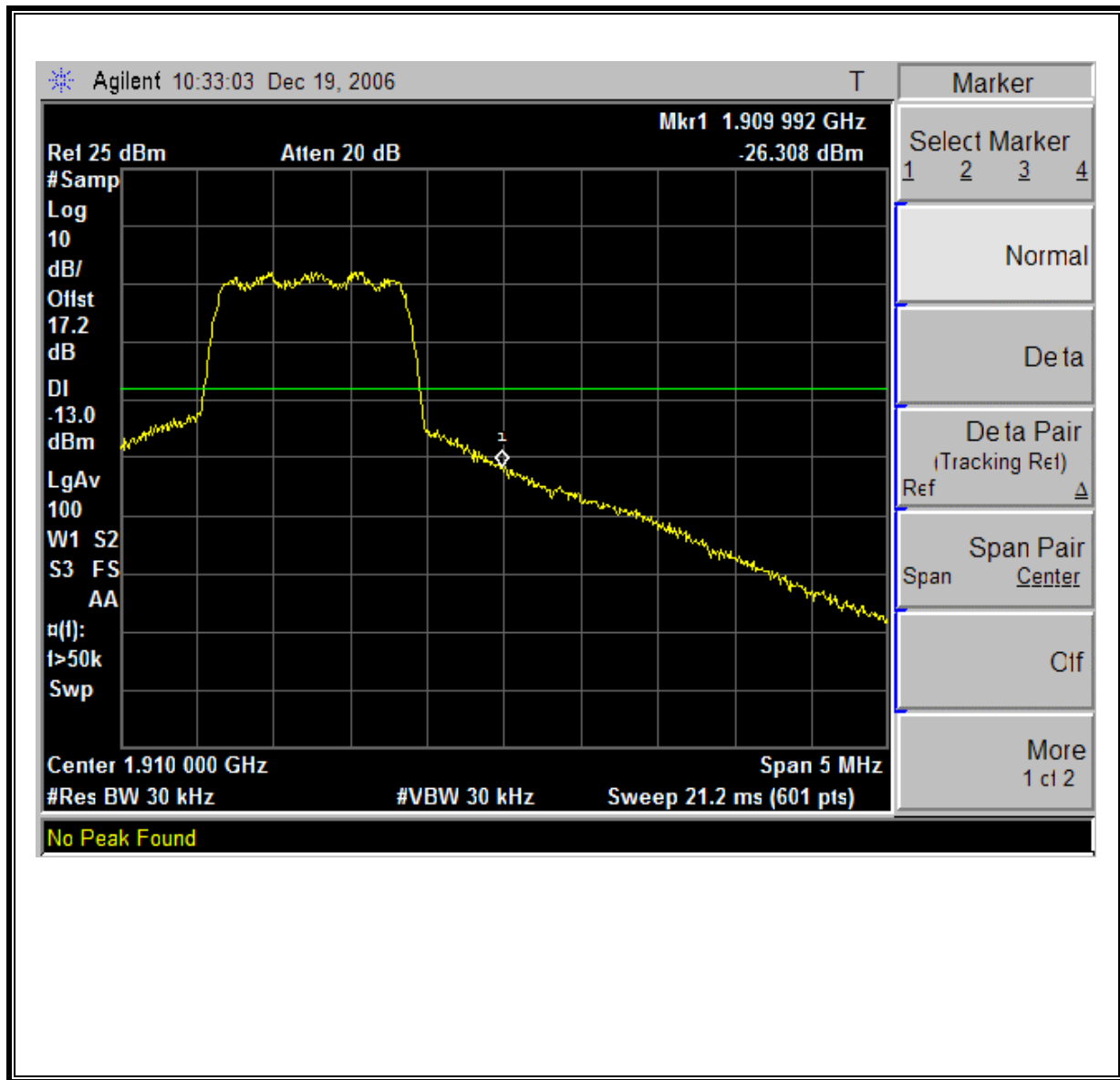
High Channel, Out-Of-Band Emissions



Low Channel Band Edge



High Channel Band Edge



7.4. FIELD STRENGTH OF SPURIOUS RADIATION

LIMIT

§22.917 (e) and §24.238 (a) Out of band emissions. 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 603C Clause 2.2.12, FCC 22.917 (h), & FCC 24.238 (b)

RESULTS

No non-compliance noted.

Note: No emissions were found within 30-1000MHz of 20dB below the system noise.

CELL Spurious & Harmonic (ERP)

High Frequency Substitution Measurement										
Compliance Certification Services, Morgan Hill 5m Chamber Site										
Company: Sierra Wireless, Inc. Project #: 06U10740 Date: 12/20/2006 Test Engineer: Chien Ho Configuration: EUT Only Mode: CELL, TX, EV-DO Rev A RETAP										
Test Equipment:										
EMCO Horn 1-18GHz		Horn > 18GHz			Limit		☒ High Pass Filter			
T 60; S/N: 2238 @3m					FCC 22					
Hi Frequency Cables ☐ (2 ft) ☒ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☒ (12 ft)					Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz			
					T144 Miteq 3008A00					
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
1.649	65.0	V	-46.6	1.6	7.1	4.9	-43.2	-13.0	-30.2	
2.474	52.0	V	-58.2	1.9	9.3	7.1	-53.0	-13.0	-40.0	
3.299	47.0	V	-60.1	2.3	9.4	7.3	-55.0	-13.0	-42.0	
1.649	66.1	H	-44.8	1.6	7.1	4.9	-41.4	-13.0	-28.4	
2.474	51.0	H	-59.0	1.9	9.3	7.1	-53.8	-13.0	-40.8	
3.299	46.0	H	-61.0	2.3	9.4	7.3	-55.9	-13.0	-42.9	
Mid Ch										
1.673	61.0	V	-50.5	1.6	7.2	5.0	-47.1	-13.0	-34.1	
2.510	51.9	V	-58.1	1.9	9.3	7.1	-52.9	-13.0	-39.9	
3.346	46.0	V	-60.9	2.3	9.5	7.3	-55.9	-13.0	-42.9	
1.673	64.3	H	-46.5	1.6	7.2	5.0	-43.1	-13.0	-30.1	
2.510	51.0	H	-58.8	1.9	9.3	7.1	-53.6	-13.0	-40.6	
3.346	44.6	H	-62.2	2.3	9.5	7.3	-57.2	-13.0	-44.2	
High Ch										
1.696	59.0	V	-52.5	1.6	7.2	5.1	-49.0	-13.0	-36.0	
2.544	51.7	V	-58.2	2.0	9.3	7.1	-53.0	-13.0	-40.0	
3.393	44.8	V	-62.0	2.3	9.5	7.3	-56.9	-13.0	-43.9	
1.696	59.0	H	-51.8	1.6	7.2	5.1	-48.3	-13.0	-35.3	
2.544	51.4	H	-58.3	2.0	9.3	7.1	-53.1	-13.0	-40.1	
3.393	44.4	H	-62.3	2.3	9.5	7.3	-57.2	-13.0	-44.2	
Rev. 5.1.6										

PCS Spurious & Harmonic (ERP)

High Frequency Substitution Measurement										
Compliance Certification Services, Morgan Hill 5m Chamber Site										
Company: Sierra Wireless, Inc. Project #: 06U10740 Date: 12/20/2006 Test Engineer: Chien Ho Configuration: EUT Only Mode: PCS, TX, EV-DO Rev A RETAP										
Test Equipment:										
EMCO Horn 1-18GHz		Horn > 18GHz		Limit		☒ High Pass Filter				
T60; S/N: 2238 @3m				FCC 24						
Hi Frequency Cables										
☐ (2 ft)		☒ (2 ~ 3 ft)		☐ (4 ~ 6 ft)		☒ (12 ft)		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz
						T144 Miteq 3008A00				
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
3.703	52.6	V	-53.3	2.4	9.7	7.5	-46.1	-13.0	-33.1	
5.553	44.0	V	-57.7	3.2	11.0	8.9	-49.9	-13.0	-36.9	
7.405	42.5	V	-57.4	3.7	12.0	9.8	-49.1	-13.0	-36.1	
3.703	59.5	H	-46.3	2.4	9.7	7.5	-39.1	-13.0	-26.1	
5.553	42.4	H	-58.3	3.2	11.0	8.9	-50.5	-13.0	-37.5	
7.405	43.0	H	-56.1	3.7	12.0	9.8	-47.8	-13.0	-34.8	
Mid Ch										
3.760	59.1	V	-46.6	2.5	9.7	7.5	-39.4	-13.0	-26.4	
5.640	47.0	V	-54.8	3.3	11.2	9.0	-46.9	-13.0	-33.9	
7.520	52.5	V	-47.2	3.7	12.0	9.8	-38.9	-13.0	-25.9	
3.760	66.0	H	-39.6	2.5	9.7	7.5	-32.4	-13.0	-19.4	
5.640	45.0	H	-55.8	3.3	11.2	9.0	-47.9	-13.0	-34.9	
7.520	50.0	H	-48.9	3.7	12.0	9.8	-40.6	-13.0	-27.6	
High Ch										
3.818	64.0	V	-41.5	2.5	9.7	7.6	-34.3	-13.0	-21.3	
5.726	51.0	V	-51.0	3.3	11.3	9.2	-42.9	-13.0	-29.9	
7.635	52.0	V	-47.5	3.8	12.0	9.8	-39.2	-13.0	-26.2	
3.818	72.4	H	-33.0	2.5	9.7	7.6	-25.8	-13.0	-12.8	
5.726	43.0	H	-58.0	3.3	11.3	9.2	-49.9	-13.0	-36.9	
7.635	48.0	H	-50.7	3.8	12.0	9.8	-42.4	-13.0	-29.4	
Rev. 5.1.6										

7.5. FREQUENCY STABILITY

LIMIT

§22.355 Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

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

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

800MHz CELLULAR – MID CHANNEL

Reference Frequency: Cellular Mid Channel 835.830005MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2089.575 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.60	50	835.830000	0.006	2.5
3.60	40	835.830009	-0.005	2.5
3.60	30	835.830007	-0.002	2.5
3.60	20	835.830005	0	2.5
3.60	10	835.830000	0.006	2.5
3.60	0	835.830009	-0.005	2.5
3.60	-10	835.830010	-0.006	2.5
3.60	-20	835.830001	0.005	2.5
3.60	-30	835.830009	-0.005	2.5

Reference Frequency: Cellular Mid Channel 835.830005MHz @ 20°C Limit: to stay +/- 2.5 ppm = 2089.575 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
100%	20	835.830005	0	2.5
85%	20	835.830092	-0.104	2.5
115%	20	835.830035	-0.036	2.5

1900MHz PCS – MID CHANNEL

Reference Frequency: PCS Mid Channel 1879.309077MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 4698.273 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.60	50	1879.309303	-0.120	2.5
3.60	40	1879.308929	0.079	2.5
3.60	30	1879.309022	0.029	2.5
3.60	20	1879.309077	0	2.5
3.60	10	1879.309913	-0.445	2.5
3.60	0	1879.309036	0.022	2.5
3.60	-10	1879.309152	-0.040	2.5
3.60	-20	1879.309199	-0.065	2.5
3.60	-30	1879.309214	-0.073	2.5

Reference Frequency: PCS Mid Channel 1879.309077MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 4698.273 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
100%	20	1879.309077	0	2.5
85%	20	1879.309123	-0.024	2.5
115%	20	1879.309737	-0.351	2.5

7.6. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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

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

f = frequency in MHz

* = Plane-wave equivalent power density

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

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

CALCULATIONS

Given

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

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

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

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

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S} \quad \text{Equation (1)}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

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

LIMITS

From §1.1310 Table 1 (B), $S = 1.0 \text{ mW/cm}^2$

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm²)
800MHz Cellar	20.0	28.82	5.55	0.54
1900 MHz PCS	20.0	28.01	4.95	0.39

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