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

FOR
PCMCIA MODEM CARD CDMA

MODEL NUMBER: AC595

FCC ID: N7NAC595

REPORT NUMBER: 06U10234-1E

ISSUE DATE: MAY 26, 2006

Prepared for
SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD, CA 92009, USA

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD
MORGAN HILL, CA 95037, USA
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* Details of specific model(s) tested and model differences are identified in the body of report.

LAB CODE:200065-0

Revision History

Rev.	Date	Revisions	Revised By
--	5/5/2006	Initial Issue	Thu
B	5/16/2006	Include 1xRTT RC3 Data	A. Ilarina
C	5/24/2006	Update PCS Low Channel Plot in Section 7.1 Clarify Calibration Due Dates in Section 6	A. Ilarina
D	5/25/2006	Add Section 7.6 MPE	A. Ilarina
E	5/26/2006	Revise Section 5.2	A. Ilarina

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SIERRA WIRELESS
2290 COSMOS CT.
CARLSBAD, CA 92009, USA

EUT DESCRIPTION: PCMCIA MODEM CARD CDMA

MODEL NUMBER: AC595

SERIAL NUMBER: P27006600040B

DATE TESTED: MAY 01-16, 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.

Approved & Released For CCS By:

ALVIN ILARINA
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with 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.

The module is manufactured by Sierra Wireless, Inc.

5.2. MAXIMUM OUTPUT POWER

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

NOTE: RBW=VBW=3MHz.

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	1xRTT RC3	24.8	302.00	28.3	676.08
Mid CH - 836.5		24.85	305.49	27.98	628.06
High CH - 848.3		24.81	302.69	27.28	534.56

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	1xRTT RC3	24.7	295.12	27.41	550.81
Mid CH - 1880		24.9	309.03	27.77	598.41
High CH - 1908.75		24.2	263.03	27.05	506.99

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an AC595 Planar Multi-band Dipole antenna with a 3 dBi gain for the Cellular band and a 4 dBi gain for the 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:

Cellular Band	Avg. Output Power (dBm) Mid CH	99% BW (MHz) Mid CH	26 dB BW (MHz) Mid CH	Band edge (dBm) Low CH	Band edge (dBm) High CH
1xRRT RC3, SO2	24.66	1.254	1.402	-16.691	-13.611
1xRRT RC3, SO32 (+F-SCH)	**24.85**	**1.2664**	**1.418**	**-16.185**	**-13.085**
1xRRT RC3, SO32 (+SCH)	24.77	1.2645	1.41	-16.222	-13.253
1xRRT RC3, SO55	24.74	1.2631	1.402	-16.464	-13.405
EVDO	**24.68**	1.2552	1.404	-15.821	-13.118

PCS Band	Avg. Output Power (dBm) Mid CH	99% BW (MHz) Mid CH	26 dB BW (MHz) Mid CH	Band edge (dBm) Low CH	Band edge (dBm) High CH
1xRRT RC3, SO2	24.58	1.253	1.403	-32.673	-34.265
1xRRT RC3, SO32 (+F-SCH)	**24.90**	**1.270**	**1.419**	**-31.896**	**-33.59**
1xRRT RC3, SO32 (+SCH)	24.61	1.261	1.41	-32.034	-34.461
1xRRT RC3, SO55	24.63	1.263	1.408	-32.396	-34.961
EVDO	24.65	1.273	1.396	-30.469	-33.824

Based on the above results from the different modulations, 1xRTT RC3, SO32 (+F-SCH) 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.

1xEVDO Rev. A can not be performed with Base Station simulator due to 1xEVDO Rev. A network is not widely supported in the U.S. at the time of tests.

3GPP2 C.S0024 refers to 3GPP2 C.S0033 for EV-DO Rev A maximum transmit power measurements. The channel configuration is the same for Rev 0 and Rev A. Sierra Wireless has provided an engineering evaluation data from the chip set manufacturer to show the differences in term of output power between Rev. 0 and Rev. A. As the result indicated, the difference is 0.08 dB thus 1xEVDO Rev. A configuration is not evaluated in this test report.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Compaq	Presario V2000	CNF6061MD9	DoC
AC Adapter	HP	DC359A	CT592C70AU457BV2	DoC

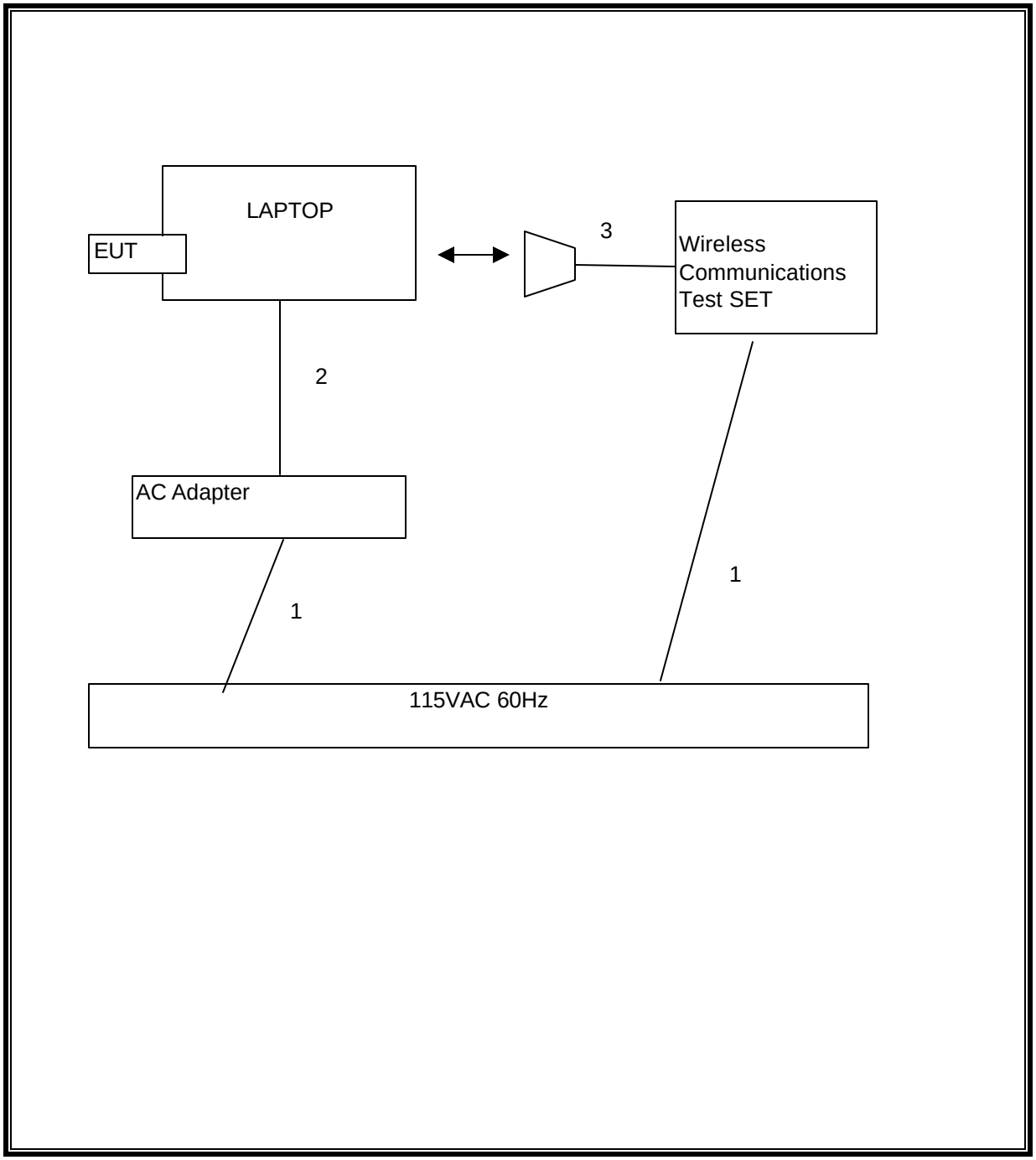
I/O CABLES

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

TEST SETUP

The EUT is installed in the Laptop during tests. The EUT is linked with Agilent Communication Test Set.

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**
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	8/2/1981	6/10/2006
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/07
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	2/4/07
RF Filter Section	Agilent / HP	85420E	3705A00256	2/4/07
Peak Power Meter	Agilent / HP	E4416A	GB41291160	12/2/07
Peak / Average Power Sensor	Agilent	E9327A	US40440755	12/2/07
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/22/07
Signal Generator 2 -40 GHz	R & S	SMP04	DE 34210	6/2/06
Signal Generator 1024 MHz	R & S	SMY01	DE 12311	5/11/07
Dipole	EMCO	3121C-DB2	22435	5/7/2006*
2.7GHz HPF	MicroTronic	HPM13194	2	CNR
1.5GHz HPF	MicroTronic	HPM13195	1	CNR
Communication Test Set	Agilent	E5515C	91936	4/8/07
Power Splitter	HP	11667B	324	CNR

*The calibration of this equipment expires within the range of testing. Testing with this equipment was performed before the calibration due date.

7. LIMITS AND RESULTS

7.1. OCCUPIED BANDWIDTH

Worst case modulation, CDMA 1xRTT RC3

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:

800MHz CELL CDMA Modulation

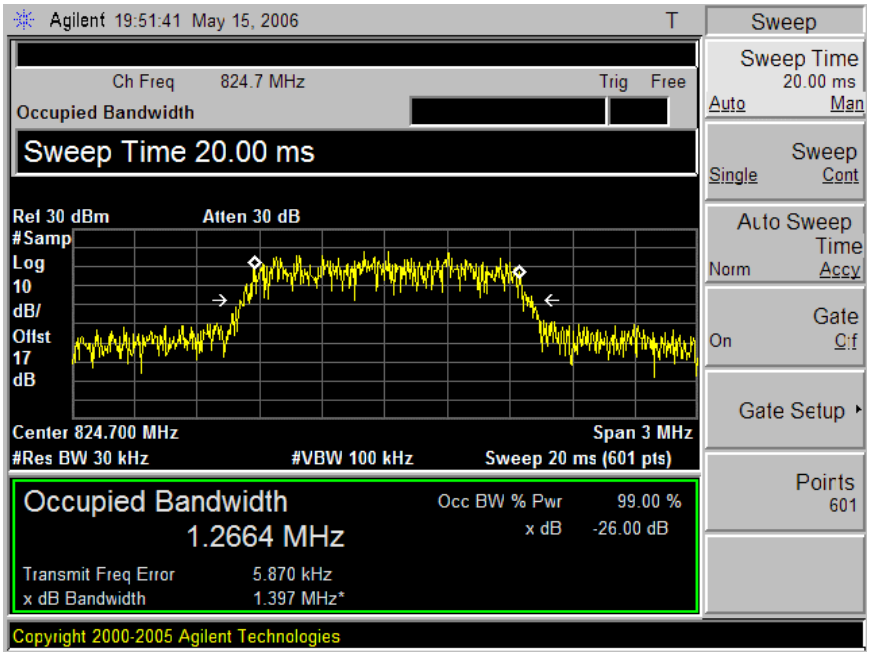
Channel	Frequency (MHz)	Bandwidth (MHz)
Low	824.70	1.397
Middle	836.52	1.418
High	848.31	1.406

1900MHz PCS Modulation

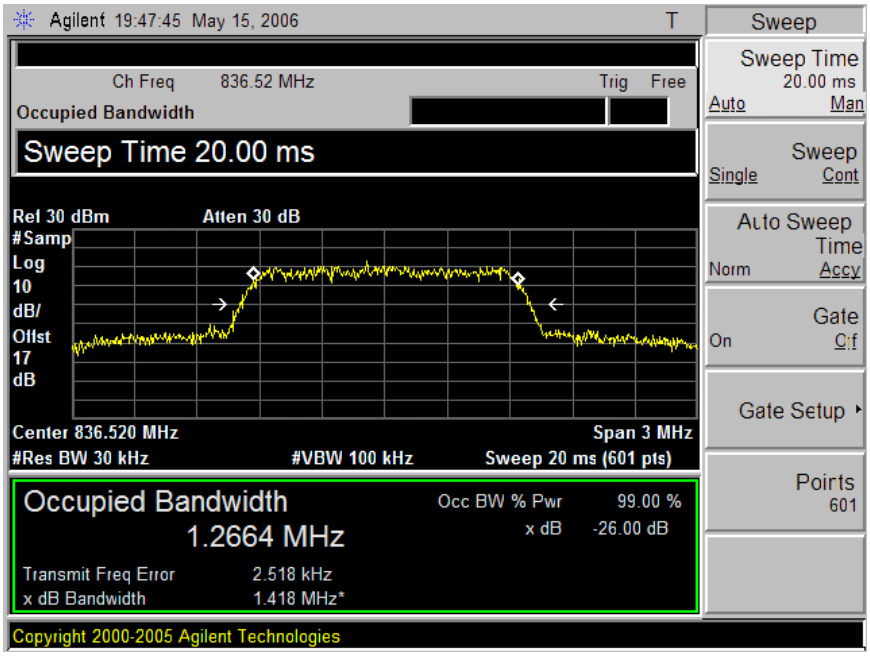
Channel	Frequency (MHz)	Bandwidth (MHz)
Low	1851.25	1.418
Middle	1880.00	1.422
High	1908.75	1.412

800MHz CELLULAR 26 dB BANDWIDTH

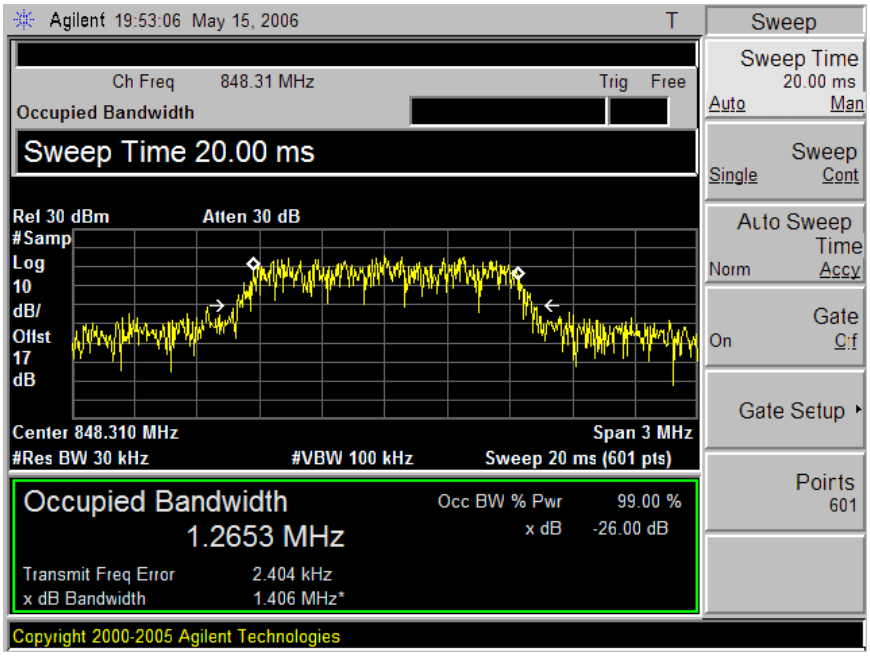
BANDWIDTH LOW CH



BANDWIDTH MID CH

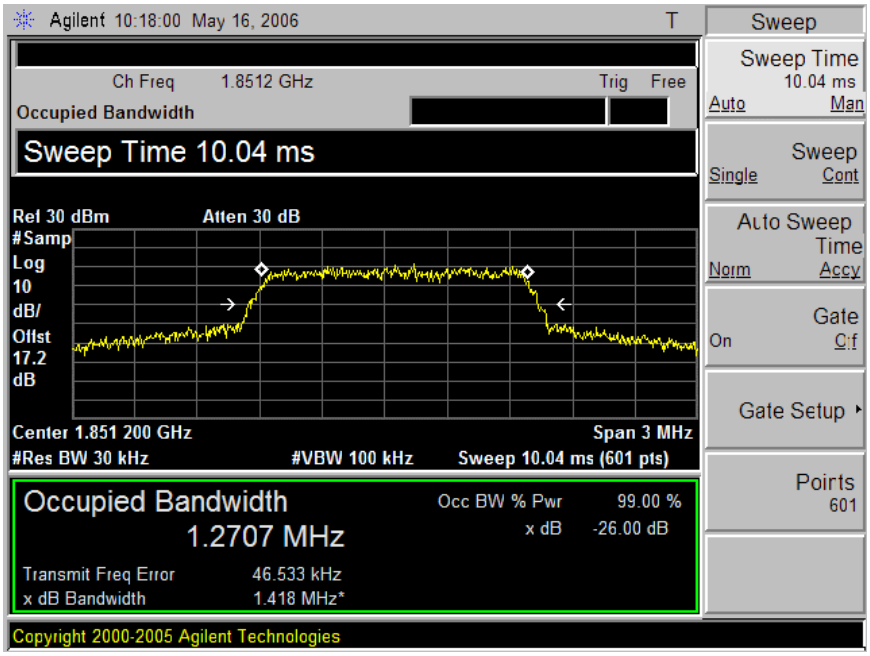


BANDWIDTH HIGH CH

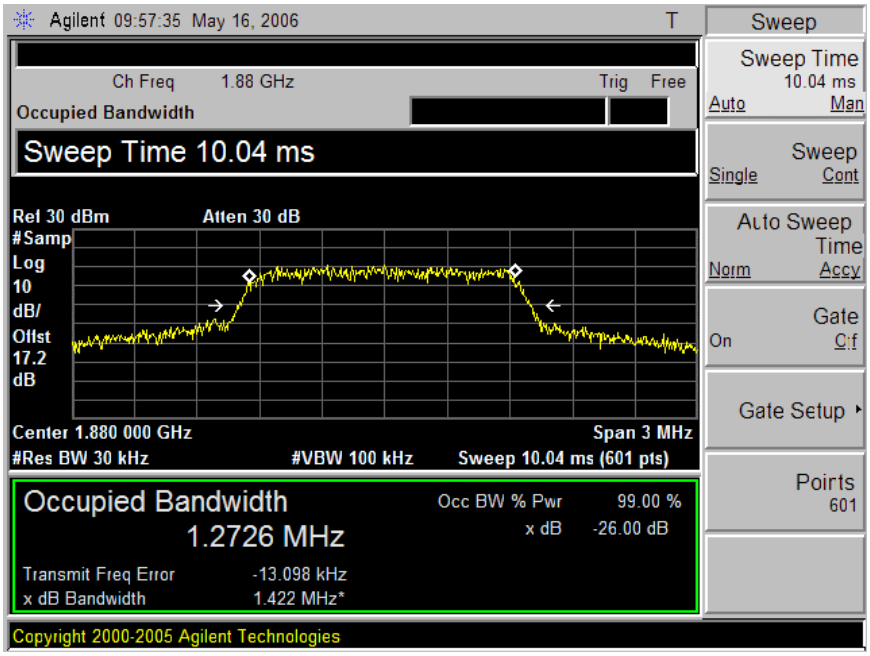


1900MHz PCS 26 dB BANDWIDTH

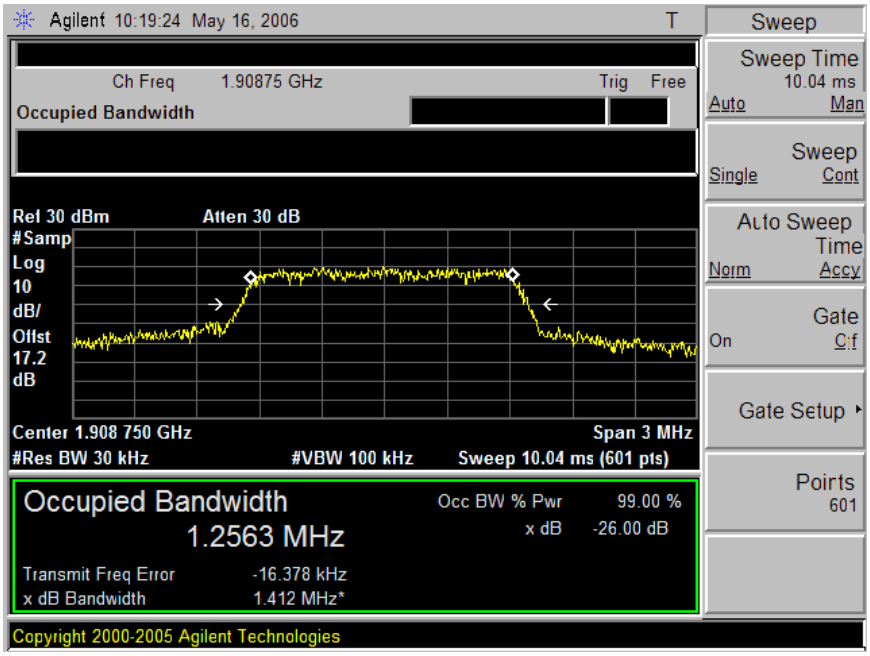
BANDWIDTH LOW CH



BANDWIDTH MID CH



BANDWIDTH HIGH CH



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 603C Clause 2.2.17

RESULTS

No non-compliance noted.

800MHz CELL CDMA Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	824.7	28.30	676.08
Middle	836.5	27.98	628.06
High	848.3	27.28	534.56

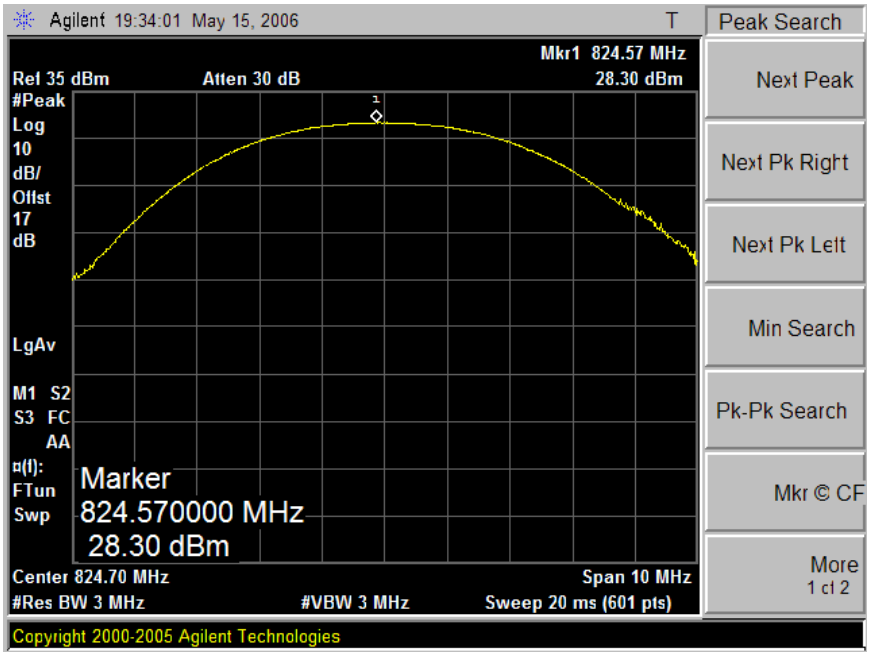
1900MHz PCS Modulation

Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Peak Power (mW)
Low	1851.25	27.41	550.81
Middle	1880.00	27.77	598.41
High	1908.75	27.05	506.99

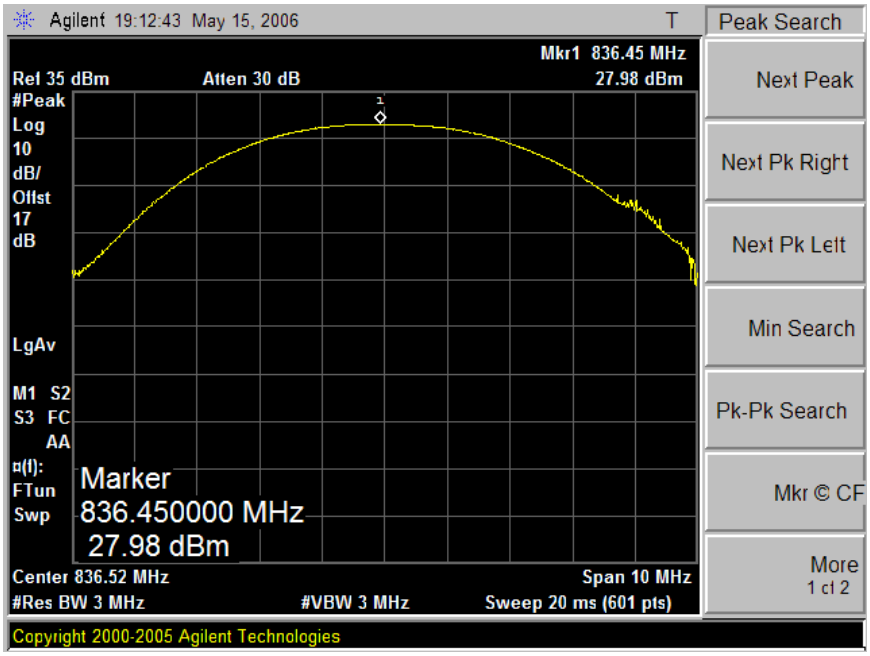
NOTE: RBW=VBW=3MHz

800MHz CELLULLAR (RF CONDUCTED OUTPUT POWER)

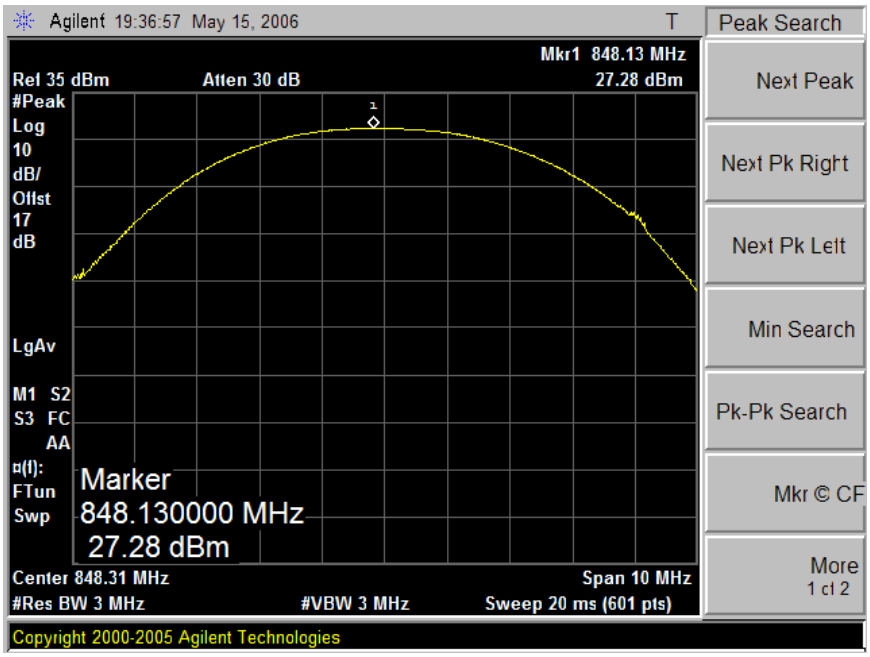
OUTPUT POWER LOW CH



OUTPUT POWER MID CH

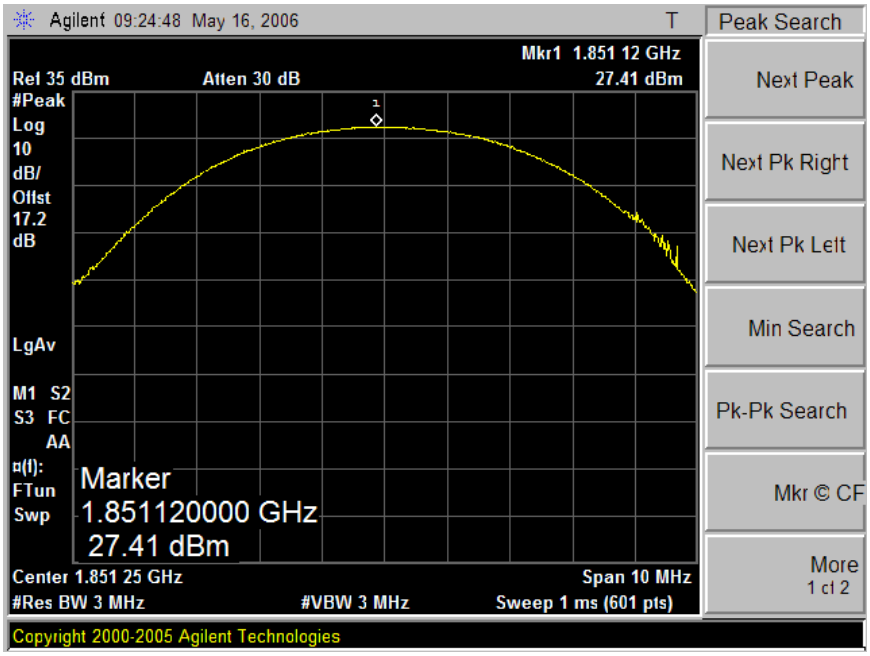


OUTPUT POWER HIGH CH

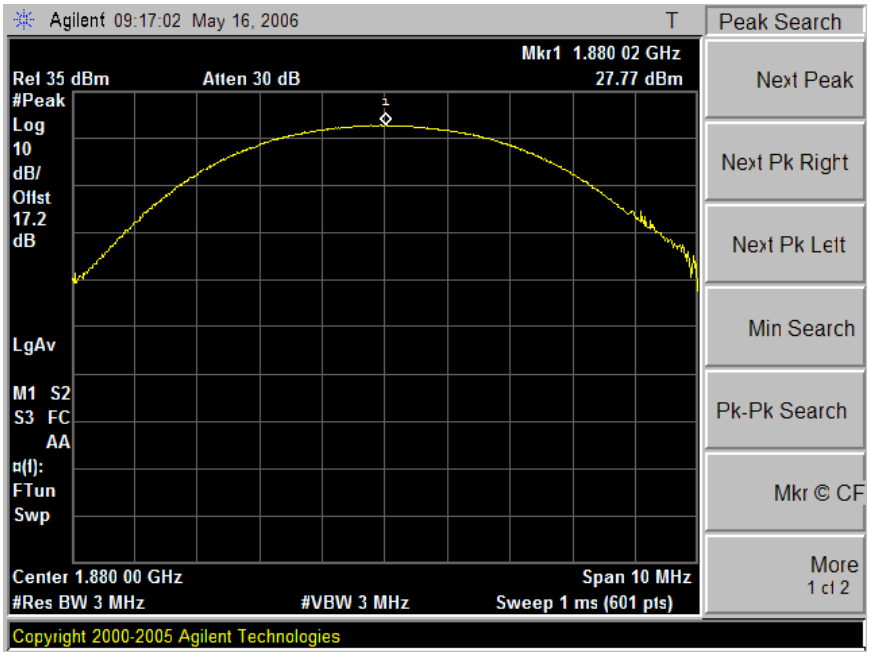


1900MHz PCS (RF CONDUCTED OUTPUT POWER)

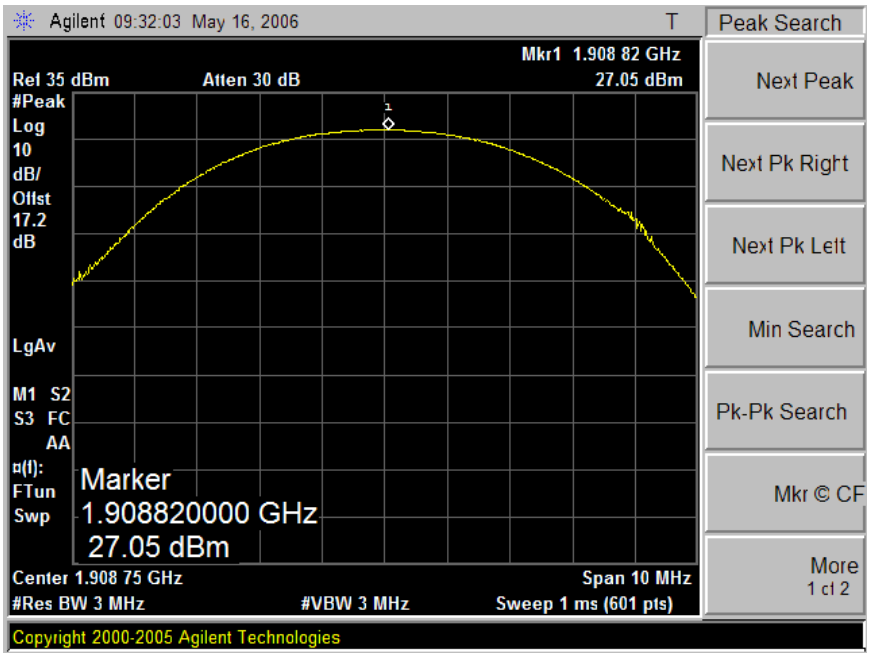
OUTPUT POWER LOW CH



OUTPUT POWER MID CH



OUTPUT POWER HIGH CH



Cellular Output Power (ERP)

f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.70	99.4	V	22.5	0.5	0.0	22.0	38.5	-16.5	
824.70	104.0	H	25.7	0.5	0.0	25.2	38.5	-13.3	
836.52	99.4	V	23.4	0.6	0.0	22.8	38.5	-15.6	
836.52	104.2	H	26.0	0.6	0.0	25.4	38.5	-13.0	
848.31	99.1	V	23.7	0.7	0.0	23.0	38.5	-15.4	
848.31	104.0	H	25.9	0.7	0.0	25.2	38.5	-13.2	

PCS Output Power (EIRP)

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	93.7	H	16.5	0.9	8.3	23.9	33.0	-9.1	
1.850	89.6	V	12.2	0.9	8.3	19.6	33.0	-13.4	
1.880	94.8	H	17.9	0.9	8.3	25.4	33.0	-7.7	
1.880	91.0	V	13.3	0.9	8.3	20.8	33.0	-12.3	
1.910	94.0	H	17.4	0.9	8.4	24.9	33.0	-8.1	
1.910	90.5	V	13.5	0.9	8.4	21.0	33.0	-12.0	

7.3. SPURIOUS EMISSION AT ANTENNA TERMINAL

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

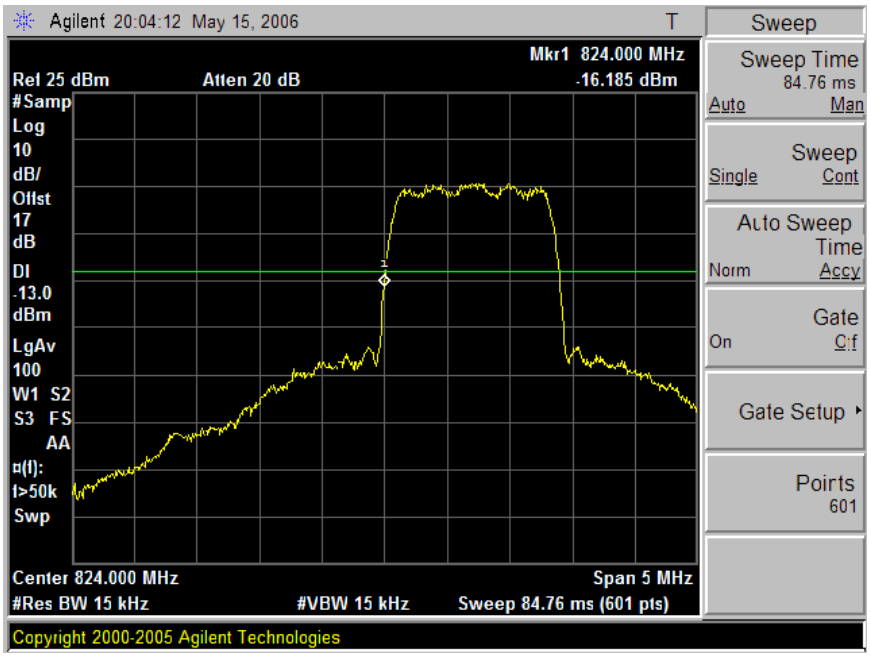
ANSI / TIA / EIA 603C Clause 2.2.12, FCC 22.917 (h), & FCC 24.238 (b)

RESULTS

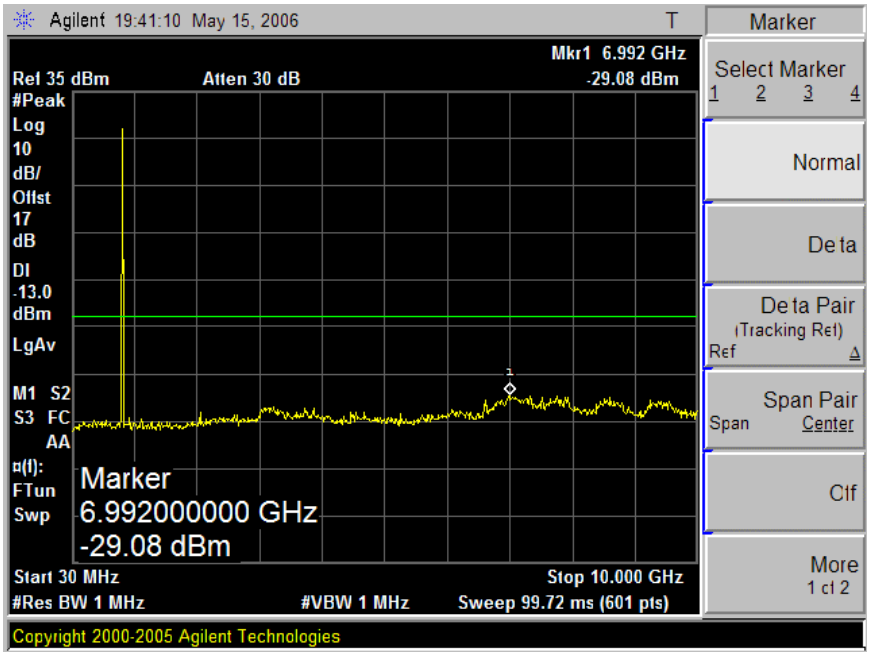
No non-compliance noted.

800MHz CELLULAR

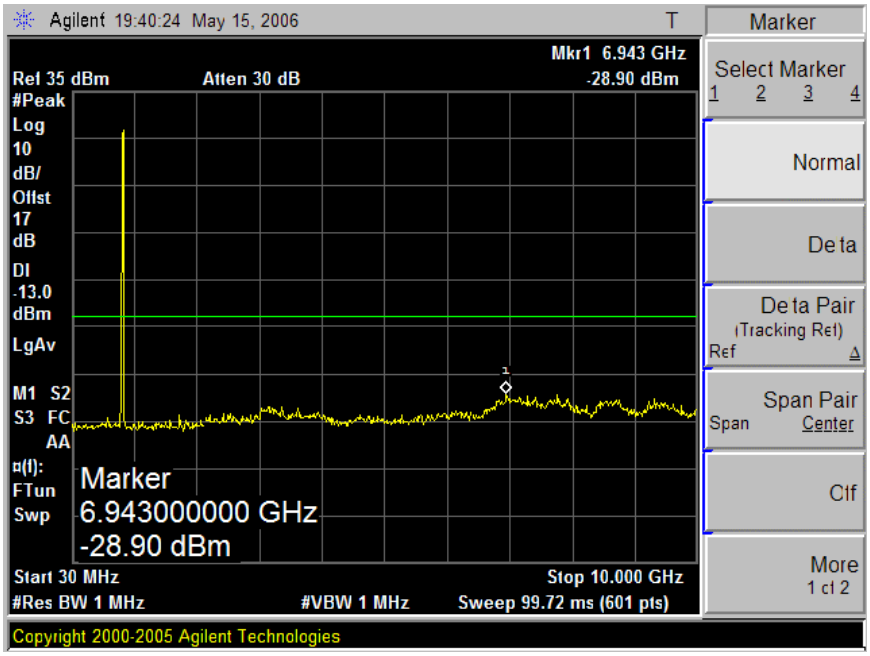
CELLULAR LOW CH BANDEDGE



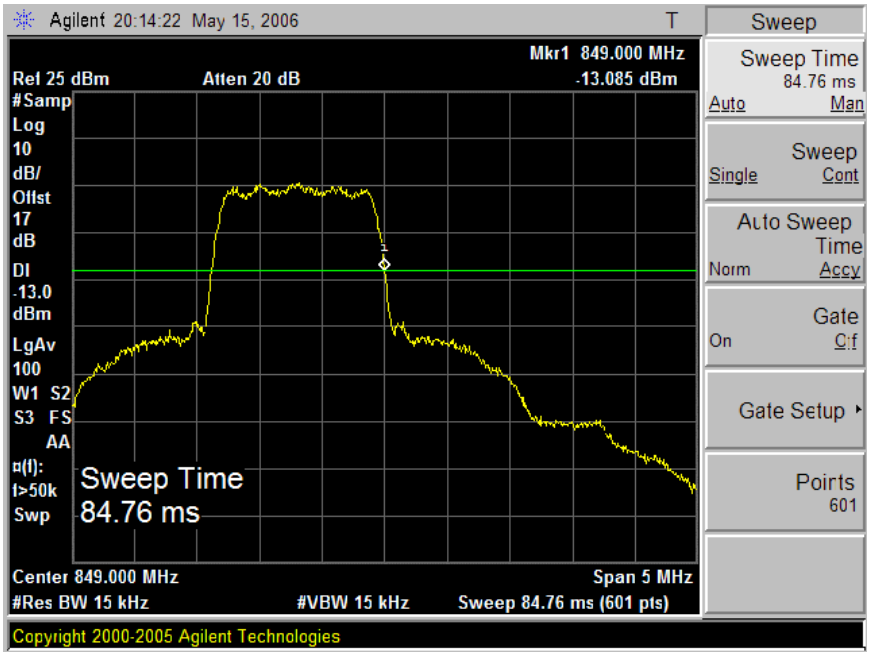
CELLULAR LOW CH SPURIOUS



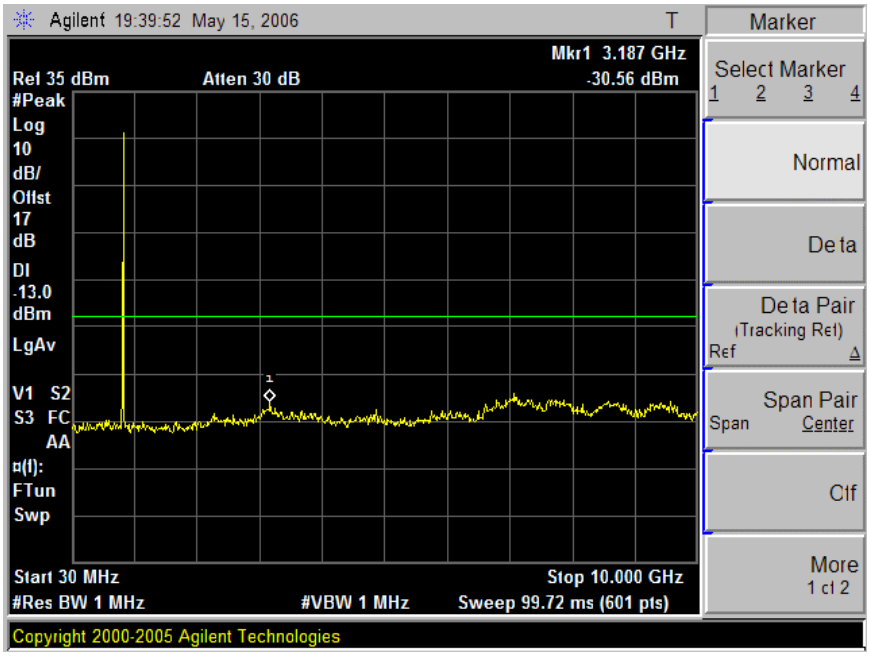
CELLULAR MID CH SPURIOUS



CELLULAR HIGH CH BANDEDGE

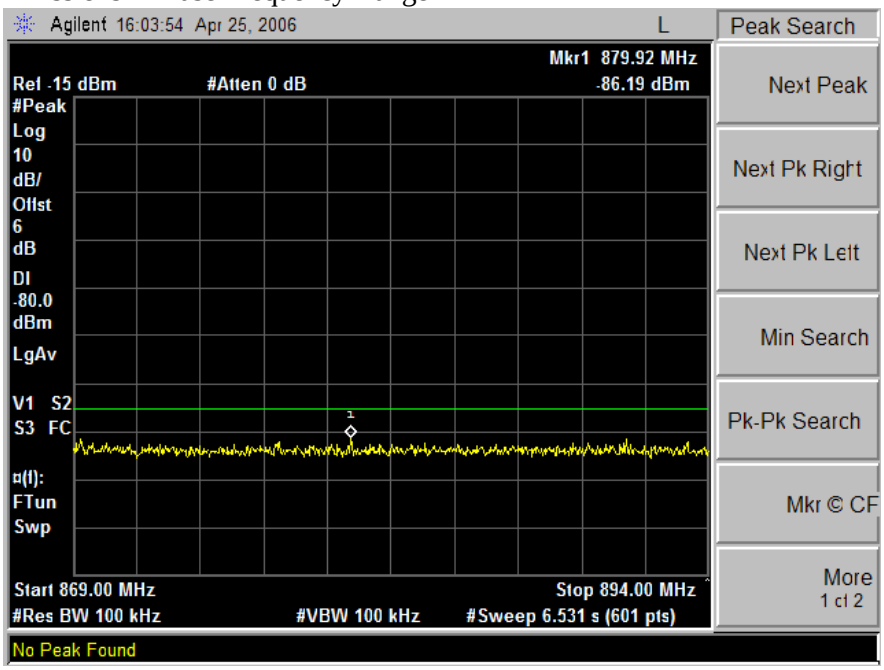


CELLULAR HIGH CH SPURIOUS



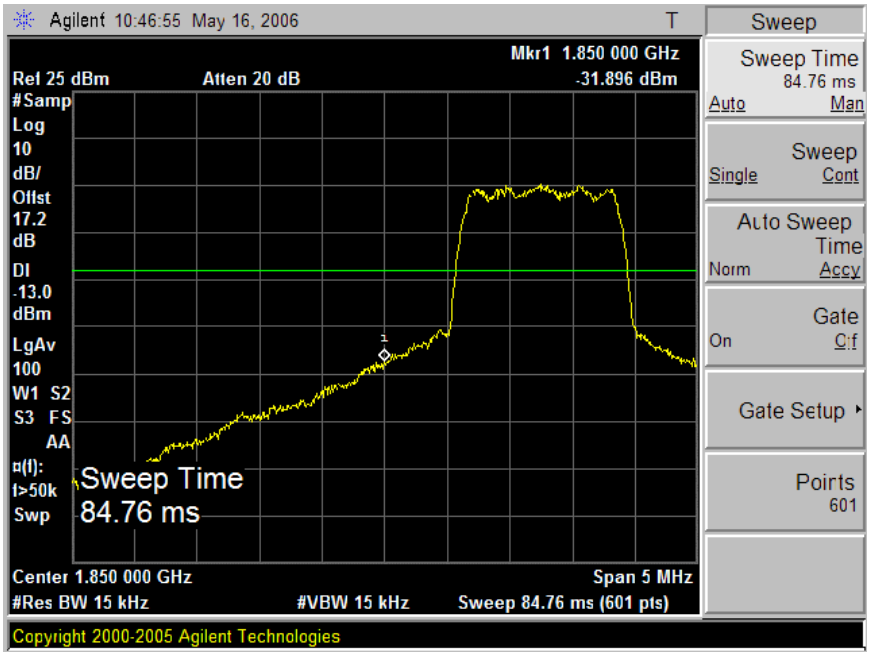
800MHz Cellular Mobile Emissions in Base Frequency Range

Emissions in Base Frequency Range

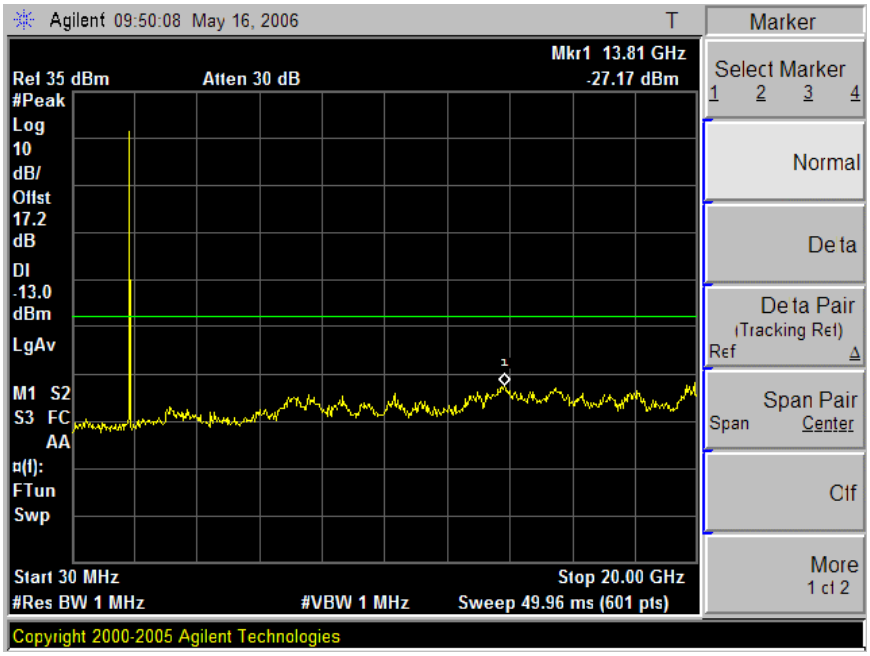


1900MHZ PCS

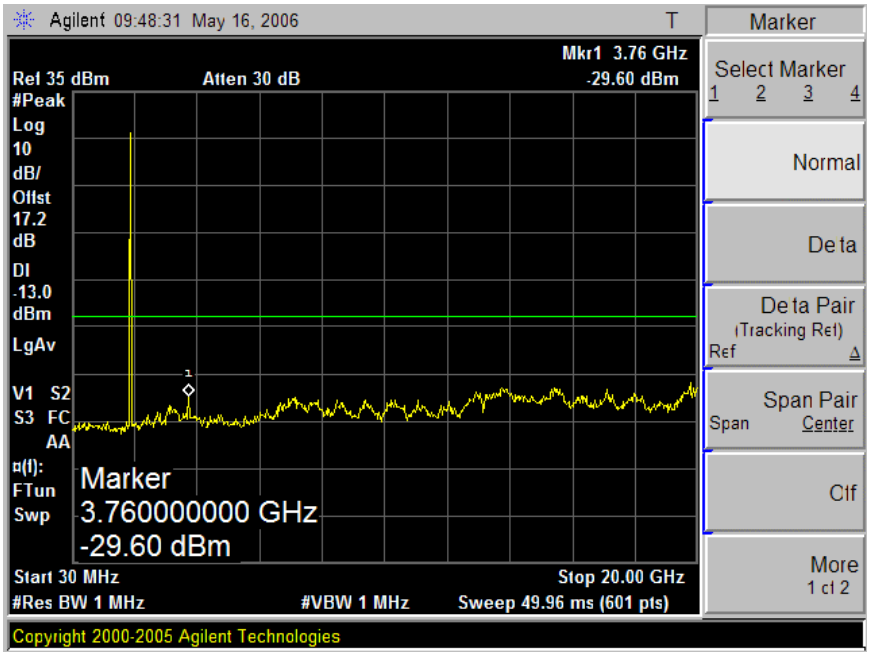
PCS LOW CH BANDEDGE



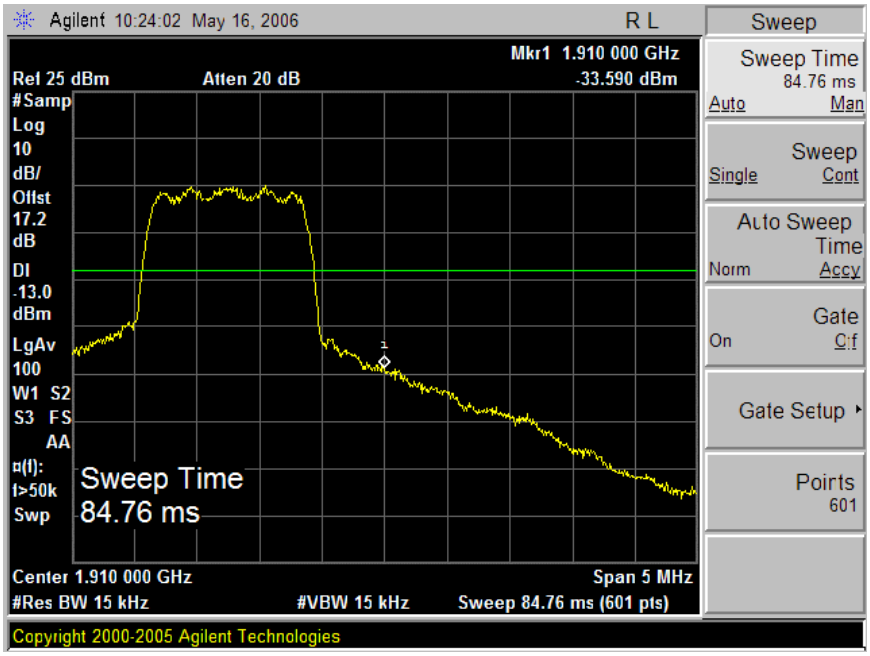
PCS LOW CH SPURIOUS



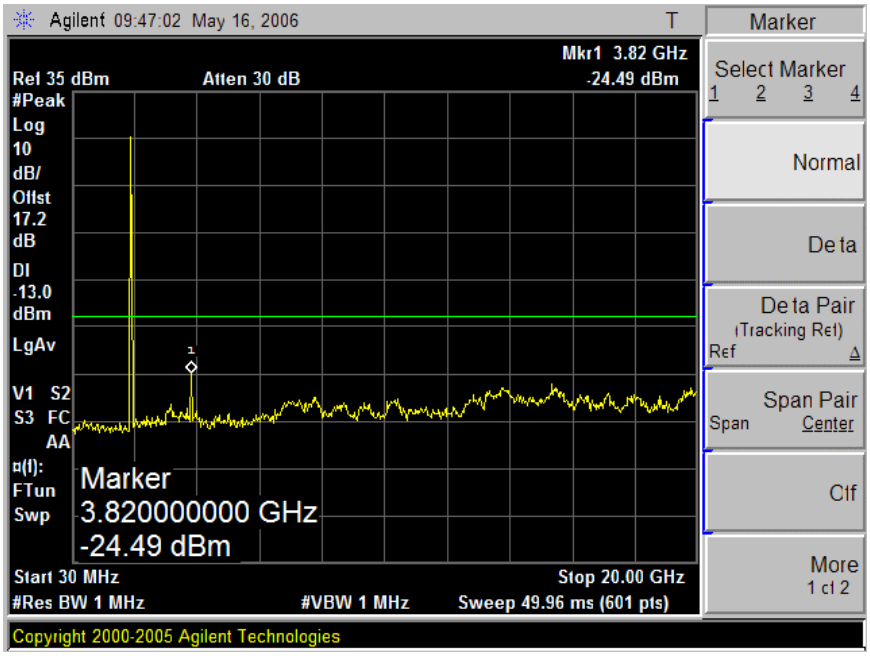
PCS MID CH SPURIOUS



PCS HIGH CH BANDEDGE



PCS HIGH CH SPURIOUS



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.

800MHz Band CDMA Spurious & Harmonic (ERP)

05/14/06 **High Frequency Fundamental Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Frank Ibrahim
Project #: 06U10234
Company: Sierra Wireless
EUT Mode.: CDMA cell
EUT M/N: AC595

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: FCC 22
☑ High Pass Filter
Hi Frequency Cables: ☐ (2 ft) ☑ (2 – 3 ft) ☐ (4 – 6 ft) ☑ (12 ft)
Pre-amplifer 1-26GHz: T145 Agilent 3008A
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
1.649	56.4	V	-54.2	1.6	8.1	5.9	-49.9	-13.0	-36.9	
1.649	55.9	H	-54.0	1.6	8.1	5.9	-49.7	-13.0	-36.7	
Mid Ch										
1.673	57.8	V	-52.8	1.6	8.1	6.0	-48.4	-13.0	-35.4	
2.509	50.0	V	-58.2	1.9	9.6	7.4	-52.8	-13.0	-39.8	
1.673	57.4	H	-52.5	1.6	8.1	6.0	-48.2	-13.0	-35.2	
2.509	49.0	H	-59.0	1.9	9.6	7.4	-53.5	-13.0	-40.5	
High Ch										
1.697	56.1	V	-54.4	1.6	8.2	6.0	-50.0	-13.0	-37.0	
1.697	55.7	H	-54.1	1.6	8.2	6.0	-49.7	-13.0	-36.7	
Note: No other emissions were detected above the system noise floor.										

PCS Spurious & Harmonic (EIRP):

05/14/06 **High Frequency Fundamental Measurement**
Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Frank Ibrahim
Project #: 06U10234
Company: Sierra Wireless
EUT Mode.: CDMA 1xRTT RC3
EUT M/N: AC595

Test Equipment:

EMCO Horn 1-18GHz: T73; S/N: 6717 @3m
Horn > 18GHz:
Limit: FCC 24
☑ High Pass Filter
Hi Frequency Cables: ☐ (2 ft) ☑ (2 – 3 ft) ☐ (4 – 6 ft) ☑ (12 ft)
Pre-amplifer 1-26GHz: T144 Miteq 3008A0(
Pre-amplifer 26-40GHz:

f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch										
3.702	60.1	V	-45.4	2.4	9.5	7.3	-38.4	-13.0	-25.4	
5.554	58.7	V	-42.4	3.2	10.7	8.6	-34.9	-13.0	-21.9	
7.405	59.8	V	-40.0	3.7	12.0	9.8	-31.7	-13.0	-18.7	
9.256	52.3	V	-47.0	4.2	12.4	10.2	-38.8	-13.0	-25.8	
3.702	60.3	H	-45.1	2.4	9.5	7.3	-38.1	-13.0	-25.1	
5.554	55.7	H	-44.4	3.2	10.7	8.6	-36.9	-13.0	-23.9	
7.405	54.2	H	-44.8	3.7	12.0	9.8	-36.5	-13.0	-23.5	
9.256	50.2	H	-49.1	4.2	12.4	10.2	-40.9	-13.0	-27.9	
Mid Ch										
3.760	61.5	V	-43.9	2.5	9.5	7.3	-36.8	-13.0	-23.8	
5.640	60.8	V	-40.5	3.3	10.9	8.7	-32.8	-13.0	-19.8	
7.520	59.6	V	-40.0	3.7	11.9	9.8	-31.8	-13.0	-18.8	
9.400	51.2	V	-48.0	4.2	12.4	10.2	-39.8	-13.0	-26.8	
3.760	61.7	H	-43.5	2.5	9.5	7.3	-36.5	-13.0	-23.5	
5.640	56.6	H	-43.7	3.3	10.9	8.7	-36.1	-13.0	-23.1	
7.520	55.6	H	-43.2	3.7	11.9	9.8	-35.0	-13.0	-22.0	
9.400	50.3	H	-48.9	4.2	12.4	10.2	-40.7	-13.0	-27.7	
High Ch										
3.818	59.8	V	-45.3	2.5	9.5	7.3	-38.3	-13.0	-25.3	
5.726	57.8	V	-43.7	3.3	11.1	8.9	-35.9	-13.0	-22.9	
7.635	58.4	V	-40.9	3.8	11.9	9.8	-32.8	-13.0	-19.8	
9.544	51.5	V	-47.6	4.3	12.4	10.3	-39.4	-13.0	-26.4	
3.818	58.7	H	-46.3	2.5	9.5	7.3	-39.3	-13.0	-26.3	
5.726	54.8	H	-45.7	3.3	11.1	8.9	-37.9	-13.0	-24.9	
7.635	53.7	H	-44.8	3.8	11.9	9.8	-36.7	-13.0	-23.7	
9.544	51.2	H	-47.9	4.3	12.4	10.3	-39.7	-13.0	-26.7	

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 835.843716MHz @ 20*C Limit: to stay +- 2.5 ppm = 2089.563 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (*C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.60	50	835.825028	0.266	2.5
3.60	40	835.825215	0.042	2.5
3.60	30	835.825092	0.189	2.5
3.60	***20***	***835.825250***	***0***	2.5
3.60	10	835.825005	0.293	2.5
3.60	0	835.824988	0.313	2.5
3.60	-10	835.825202	0.057	2.5
3.60	-20	835.825239	0.013	2.5
3.60	-30	835.825322	-0.086	2.5

Reference Frequency: Cellular Mid Channel 835.839966MHz @ 20*C Limit: to stay +- 2.5 ppm = 2089.563 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (*C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.60	***20***	***835.825250***	***0***	***2.5***
3.4 (end point)	20	835.825056	*0.232*	2.5
3.5	20	835.825226	*0.029*	2.5
4.14	20	835.825330	*-0.096*	2.5

1900MHz PCS – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.000030MHz @ 20*C Limit: within the authorized block or +- 2.5 ppm = 4698.273 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (*C)**	**(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 1880.000030MHz @ 20*C Limit: within the authorized block or +- 2.5 ppm = 4698.273 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vdc)	**Temperature (*C)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.60	***20***	***1879.309077***	***0***	***2.5***
3.4 (end point)	20	1879.308066	*0.538*	2.5
3.5	20	1879.309123	*-0.024*	2.5
4.14	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

$S = E \wedge 2 / 3770$

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 (mW) = P (W) / 1000 and
d (cm) =100 * d (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/cm^2

Substituting the logarithmic form of power and gain using:

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

yields

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

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

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

LIMITS

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

RESULTS

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

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.

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
800MHz Celllar	20.0	28.72	5.65	0.54
1900 MHz PCS	20.0	28.62	4.35	0.39