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2001324 / PO 0070020947
December 4 – 7, 2001
FCC Part 22 and Part 24 Certification &
Industry Canada RSS-129

Exhibit 1

CERTIFICATE OF COMPLIANCE

FCC PART 22 & 24 CERTIFICATION & INDUSTRY CANADA CERTIFICATION

Test Lab:	Applicant Information
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170	Sony Ericsson Mobile Communications (USA, Inc.) 7001 Development Drive P.O. Box 13969 Research Triangle Park, NC 27709 USA Phone: 919-472-1697 (Pierre Chery)
Phone: 703-689-0368 Fax: 703-689-2056 Web Site: www.rheintech.com	

FCC Classification:	☒ PCB – Licensed Base Station for Part 24 ☐ PCE – Part 24 Licensed Portable Transmitter held to ear ☐ PCF – Part 24 Licensed Portable Transmitter held to face ☐ PCT – Part 24 Licensed Portable Transmitter held to body		
FCC Rule Part(s):	<table><tr><td>Part 22: Public Mobile Services ☐ Subpart E – Paging and Radiotelephone Services ☐ Subpart F – Rural Radiotelephone Services ☐ Subpart G – Air-Ground Radiotelephone Services ☒ Subpart H – Cellular Radiotelephone Services ☐ Subpart I – Offshore Radiotelephone Services</td><td>Part 24: Personal Communications Services ☐ Subpart D – Narrowband PCS ☒ Subpart E – Broadband PCS</td></tr></table>	Part 22: Public Mobile Services ☐ Subpart E – Paging and Radiotelephone Services ☐ Subpart F – Rural Radiotelephone Services ☐ Subpart G – Air-Ground Radiotelephone Services ☒ Subpart H – Cellular Radiotelephone Services ☐ Subpart I – Offshore Radiotelephone Services	Part 24: Personal Communications Services ☐ Subpart D – Narrowband PCS ☒ Subpart E – Broadband PCS
Part 22: Public Mobile Services ☐ Subpart E – Paging and Radiotelephone Services ☐ Subpart F – Rural Radiotelephone Services ☐ Subpart G – Air-Ground Radiotelephone Services ☒ Subpart H – Cellular Radiotelephone Services ☐ Subpart I – Offshore Radiotelephone Services	Part 24: Personal Communications Services ☐ Subpart D – Narrowband PCS ☒ Subpart E – Broadband PCS		
Industry Canada Standard:	☐ RSS-118: Land and Subscriber Stations: Voice, Data and Tone Modulated, Angle Modulation Radiotelephone Transmitters and Receivers Operating in the Cellular Mobile Bands 824-849 MHz and 869-894 MHz ☐ RSS-128: 800 MHz Dual-Mode TDMA Cellular Telephones ☒ RSS-129: 800 MHz Dual Mode CDMA Cellular Telephones		

FCC ID:	AXATR-423-A2	Max. RF Output Power:	2.773 W AMPS 0.296 W CDMA
Equipment Type:	AMPS, CDMA	Frequency Tolerance:	2.5 ppm
Tx Frequency Range:	824 - 849 MHz; 1850 -1910	Emission Designator:	1M23F9W; 40K0F1D, 40K0F8W
Rx Frequency Range:	869 - 894 MHz; 1930 -1990 MHz	Date of Test Report:	January 22, 2002
Model(s):	CM-42		

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15, FCC Part 22, FCC Part 24, Industry Canada RSS-129, ANSI C63.4, ANSI/TIA/EIA603 and ANSI/TIA/EIA 603-1.

Signature: 

Date: December 18, 2001

Typed/Printed Name: Bruno Clavier

Position: Vice President of Operations
(NVLAP Signatory)

 Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 22.901: The rules in this subpart govern the licensing and operation of cellular radiotelephone systems.

FCC Rules Part 24 (E): The rules in this subpart govern Personal Communications Services – Broadband PCS.

IC RSS-129: This Radio Standards Specification (RSS) and the TIA/EIA-627 Compatibility Standard referred to in section 3.10 set out the minimum requirements for the certification (type-approval) of transmitters and receivers for the dual-mode (analog and digital CDMA) cellular telephone system in the 824-849 MHz and 869-894 MHz paired bands.

All measurements contained in this application were conducted in accordance with the FCC Rules and Regulations CFR47, Industry Canada RSS-129 and ANSI/TIA/EIA603-1992/-1-1998 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.3 RELATED SUBMITAL(S)/GRANT(S)

This is an original application for Certification.



2 EQUIPMENT INFORMATION

2.1 APPLICANT AND EQUIPMENT INFORMATION

Sony Ericsson Mobile Communications (USA, Inc.)
7001 Development Drive
P.O. Box 13969
Research Triangle Park, NC 27709 USA
Phone: 919-472-1697 (Pierre Chery)

FCC Classification:	☒ PCB – Licensed Base Station for Part 24 ☐ PCE – Part 24 Licensed Portable Transmitter held to ear ☐ PCF – Part 24 Licensed Portable Transmitter held to face ☐ PCT – Part 24 Licensed Portable Transmitter held to body	
FCC Rule Part(s):	Part 22: Public Mobile Services ☐ Subpart E – Paging and Radiotelephone Services ☐ Subpart F – Rural Radiotelephone Services ☐ Subpart G – Air-Ground Radiotelephone Services ☒ Subpart H – Cellular Radiotelephone Services ☐ Subpart I – Offshore Radiotelephone Services	Part 24: Personal Communications Services ☐ Subpart D – Narrowband PCS ☒ Subpart E – Broadband PCS
Industry Canada Standard:	☐ RSS-118: Land and Subscriber Stations: Voice, Data and Tone Modulated, Angle Modulation Radiotelephone Transmitters and Receivers Operating in the Cellular Mobile Bands 824-849 MHz and 869-894 MHz ☐ RSS-128: 800 MHz Dual-Mode TDMA Cellular Telephones ☒ RSS-129: 800 MHz Dual Mode CDMA Cellular Telephones	

FCC ID:	AXATR-423-A2	Max. RF Output Power:	2.773 W AMPS 0.296 W CDMA
Equipment Type:	AMPS, CDMA	Frequency Tolerance:	2.5 ppm
Tx Frequency Range:	824 – 849 MHz; 1850-1910	Emission Designator:	1M23F9W; 40K0F1D, 40K0F8W
Rx Frequency Range:	869 – 894 MHz; 1930-1990 MHz	Date of Test Report:	January 22, 2002
Model(s):	CM-42		

2.2 JUSTIFICATION

To complete the test configuration required by the FCC, the receiver was connected to an external antenna, which receives a signal from a signal generator output. With the antenna installed, the receiver indicator was used to determine optional reception. The EUT's Intermediate frequencies (IF), Local Oscillators (LO), crystal oscillators and harmonics of each were investigated. All modes were investigated and tested including standby mode and receiving mode. The final radiated data was taken with the EUT locked to a set frequency in receive mode for Part 15 data.

The transmitter was tested at a high, mid, and low channel in the following frequency range (824 – 849 MHz and 1930 – 1990 MHz). The following frequencies were tested: 824.04, 836.49, 848.97, 1851.25, 1878.75, and 1908.75 MHz. Each transmitter frequency was measured independently in 3 orthogonal planes at 360° rotation.

The final radiated data was taken with the EUT locked to a set frequency.

2.3 EXERCISING THE EUT

The CM42 was tested using client based software to set all the parameters required for testing, such as power level, modulation type, frequency, and receive modes.



2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
CM-42 MODULE	SONY ERICSSON MOBILE COMMUNICATIONS	CM-42	TE60011MW2	SAMPLE	UNSHIELDED	013967
CM-42 MODULE	SONY ERICSSON MOBILE COMMUNICATIONS	CM-42	TE60011MW3	SAMPLE	UNSHIELDED	013966

TABLE 2-2: SUPPORT EQUIPMENT

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
POWER SUPPLY	HEWLETT PACKARD	E3610A	KR83020714	N/A	UNSHIELDED	013970
POWER SUPPLY	HEWLETT PACKARD	E3610A	KR83020678	N/A	UNSHIELDED	013969
DRADIO COMMUNICATIONS ANALYZER	INRITSU	MT8802A	MT17187	N/A	N/A	013965
JUNCTION BOX	SONY ERICSSON MOBILE COMMUNICATIONS	N/A	N/A	N/A	N/A	N/A

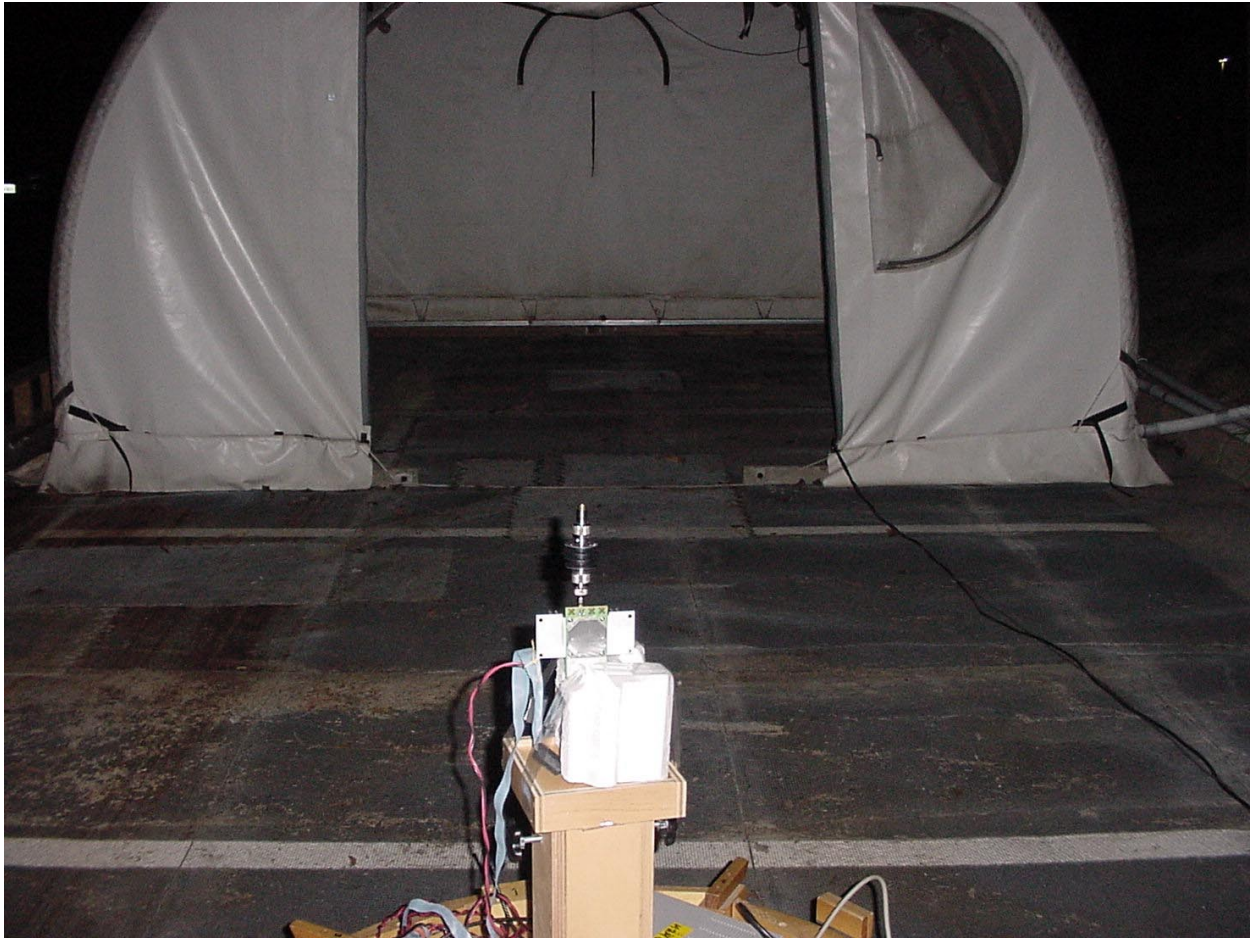


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Exhibit 1

2.5 CONFIGURATION OF TESTED SYSTEM



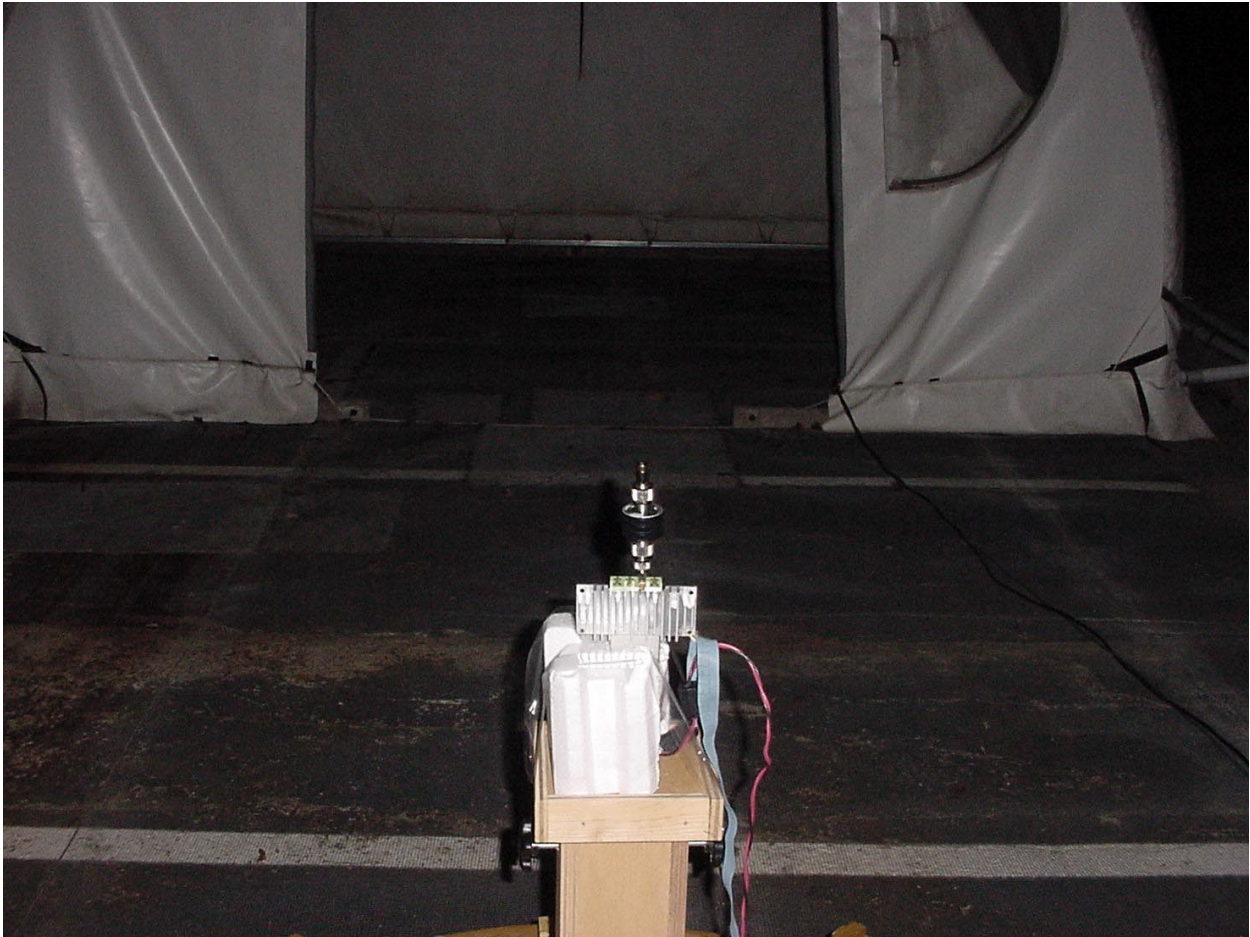
PHOTOGRAPH 1: CONFIGURATION OF TESTED SYSTEM (FRONT VIEW)



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Exhibit 1



PHOTOGRAPH 2: CONFIGURATION OF TESTED SYSTEM (REAR VIEW)



3 NECESSARY BANDWIDTH AND EMISSION BANDWIDTH - § 2.202

Type of Emission: F8W, F1D

Necessary Bandwidth and Emission Bandwidth:

40K0F1D

40K0F8W

Calculation for 40K0F8W

1/ Voice + SAT

Modulation: Voice is 2.5 kHz and SAT is 6 kHz, thus the maximum modulation is $M = 6$ kHz

Deviation: Voice is 12 kHz and SAT is 2 kHz, thus the maximum deviation is $D = 12 + 2 = 14$ kHz

$B_n = 2 \times M + 2 \times D \times K$ with $K = 1$

$B_n = 40$ kHz

2/ Signaling Tone (ST) + SAT

Modulation: ST is 10 kHz and SAT is 6 kHz, thus the maximum modulation is $M = 10$ kHz

Deviation: ST is 8 kHz and SAT is 2 kHz, thus the maximum deviation is $D = 8 + 2 = 10$ kHz

$B_n = 2 \times M + 2 \times D \times K$ with $K = 1$

$B_n = 40$ kHz

Calculation for 40K0F1D (wide Band Data)

1/ Voice + SAT

Modulation: Wideband Data is 10 kHz and SAT is 6 kHz, thus the maximum modulation is $M = 10$ kHz

Deviation: Wideband Data is 8 kHz and SAT is 2 kHz, thus the maximum deviation is $D = 8 + 2 = 10$ kHz

$B_n = 2 \times M + 2 \times D \times K$ with $K = 1$

$B_n = 40$ kHz



4 DC VOLTAGES AND CURRENTS - PART §2.1033(C)(8)

The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

LABEL	LEVEL (VOLTS)	TOLERANCE	MAX. CURRENT
VCC_5V	5	+/-10%	
VCC_12V	13.8	+/-20%	
VDIG	2.9	+/-2%	150 mA
VCODEC	2.6	+/-2%	100 mA
VCORE	2.6	+/-2%	100 mA
VPA	4	+/-3%	1000 mA
VBT	3.1	+/-2%	150 mA
VBATTIN	5		
VTX	2.9		164 mA
VRX	2.9		80 mA
VSYNTH	2.9		150 mA
VGPS	3.3		
VRTC			
VRXRF	2.9	+/-2%	
12V_PA	13.8	+/-20%	1A
12V_SW	13.8	+/-20%	1A
VCC_10V	10	+/-20%	5 mA
VGRF	3.3		
VRXRF_PCB	2.9		
VTCX0	2.8	+/-2%	150 mA
VGCORE	3.3		



5 RF POWER OUTPUT - §2.1046

5.1 POWER OUTPUT TEST PROCEDURES

5.1.1 ANSI/TIA/EIA-603-1992, SECTION 2.2.1 TEST PROCEDURE

Connect the equipment as illustrated below. Measure the transmitter output power during the defined duty cycle. The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

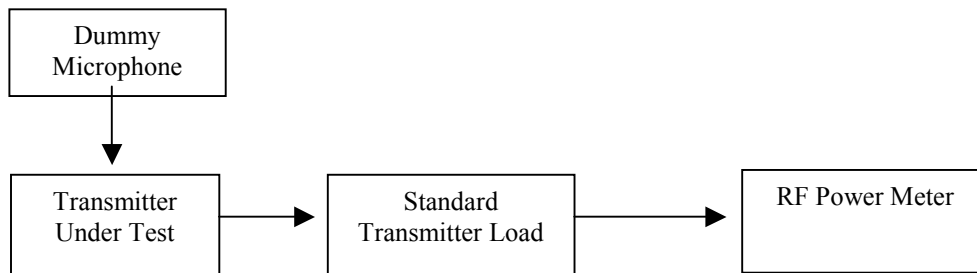


FIGURE 5-1: ILLUSTRATION OF HOW THE EQUIPMENT IS CONNECTED

5.1.2 MEASUREMENTS REQUIRED: RF POWER OUTPUT - §2.1046

Transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8) of the FCC rules and regulations. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

In addition, transmitters that are single sideband, independent sideband and controlled carrier radiotelephone the transmitter shall be modulated during the test as follows. In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

5.1.3 EFFECTIVE RADIATED POWER LIMITS - §22.913

Maximum ERP – The ERP of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.



5.2 POWER AND ANTENNA HEIGHT LIMITS - §24.232

HAAT is determined by subtracting average terrain elevation from antenna height above mean sea level.

Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT. Base station antenna heights may exceed 300 meters with a corresponding reduction in power.

TABLE 5-1: REDUCED POWER FOR BASE STATION ANTENNA HEIGHTS OVER 300 METERS

HAAT in meters	Maximum EIRP (Watts)
< 300	1640
≤ 500	1070
< 1000	490
< 1500	270
≤ 2000	160

Mobile/Portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

5.3 RF POWER OUTPUT TEST EQUIPMENT

TABLE 5-2: RF POWER OUTPUT TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	7/5/02
901186	Agilent Technologies	E9323A (50MHz–6GHz)	Peak & Avg. Power Sensor	US40410380	6/25/02



5.4 POWER OUTPUT TEST DATA- §2.1046

TABLE 5-3: POWER OUTPUT DATA - §2.1046

(800MHZ AMPS Mode)

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (High Power) (dBm)	EUT Conducted Power (Low Power) (dBm)
991	824.04	34.43	24.3
383	836.49	34.21	24.0
799	848.97	34.31	24.0

(800 MHz CDMA mode)

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)
1013	824.70	24.55
400	837.00	24.52
777	848.31	24.72

(1900 MHz PCS CDMA mode)

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)
25	1851.25	24.27
575	1878.75	24.08
1175	1908.75	24.56



6 MODULATION CHARACTERISTICS - §2.1047

6.1 MODULATION CHARACTERISTICS - §2.1047 TEST PROCEDURE

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

6.2 MODULATION REQUIREMENTS - §22.915 TEST PROCEDURE

Cellular systems must be capable of providing service using the types of modulation described in the cellular system compatibility specification.

6.3 MODULATION CHARACTERISTICS TEST EQUIPMENT

TABLE 6-1: MODULATION CHARACTERISTICS TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901055	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2545A04102	7/31/02
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	7/13/02
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	7/16/02

6.4 MODULATION CHARACTERISTICS TEST DATA

Type	Measured	Rated
Voice	11.96	12
Wideband	8.23	8
SAT	1.81	2
ST	7.61	8



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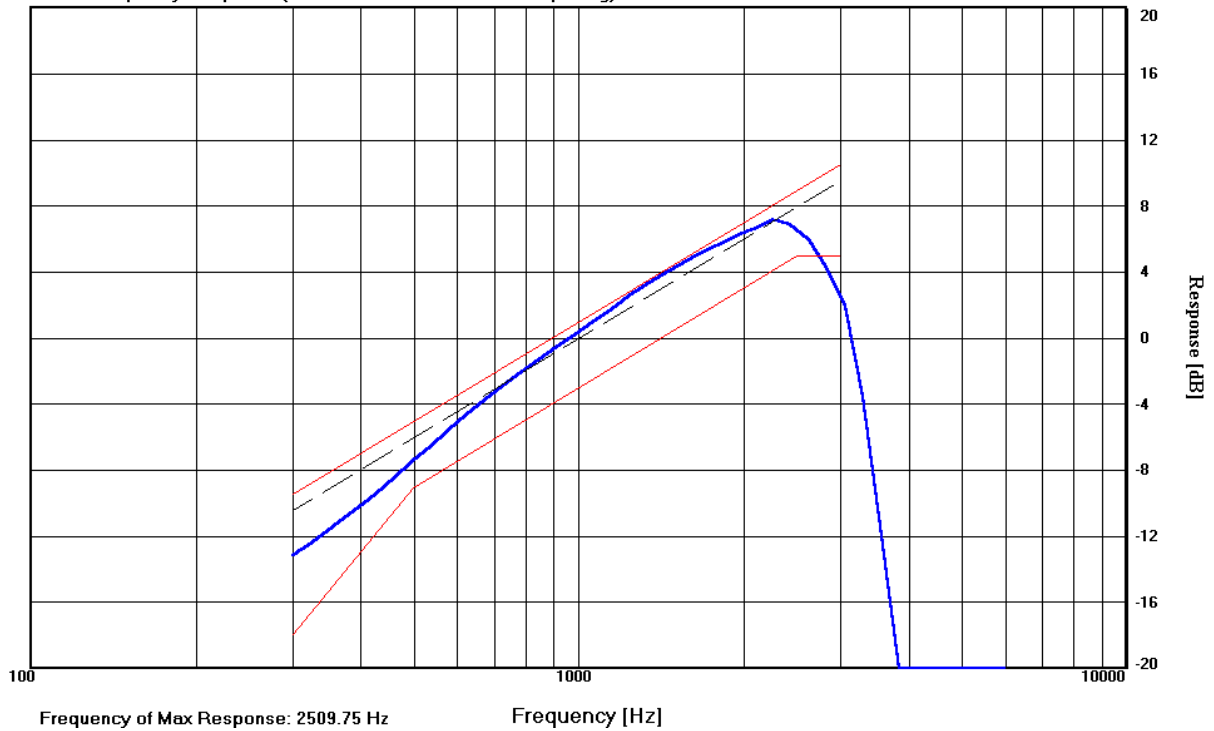
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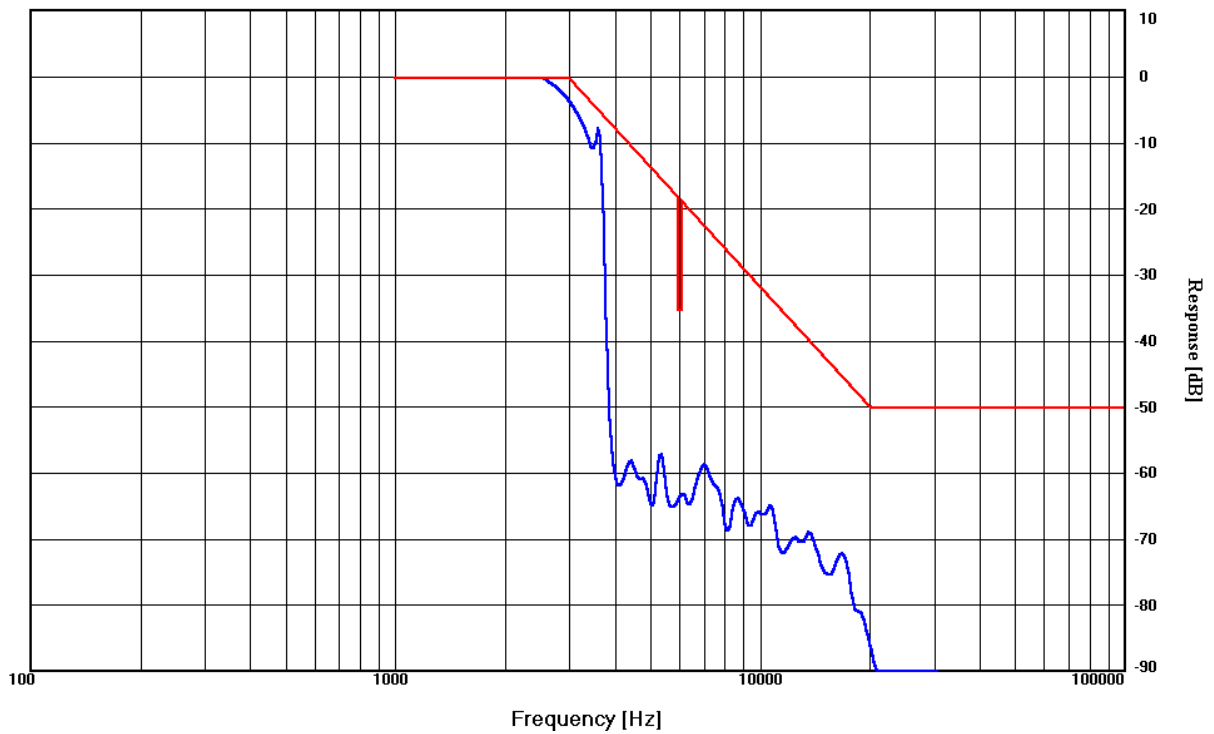
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Audio Frequency Response

Audio Frequency Response (836.49 MHz, 25 kHz Channel Spacing)

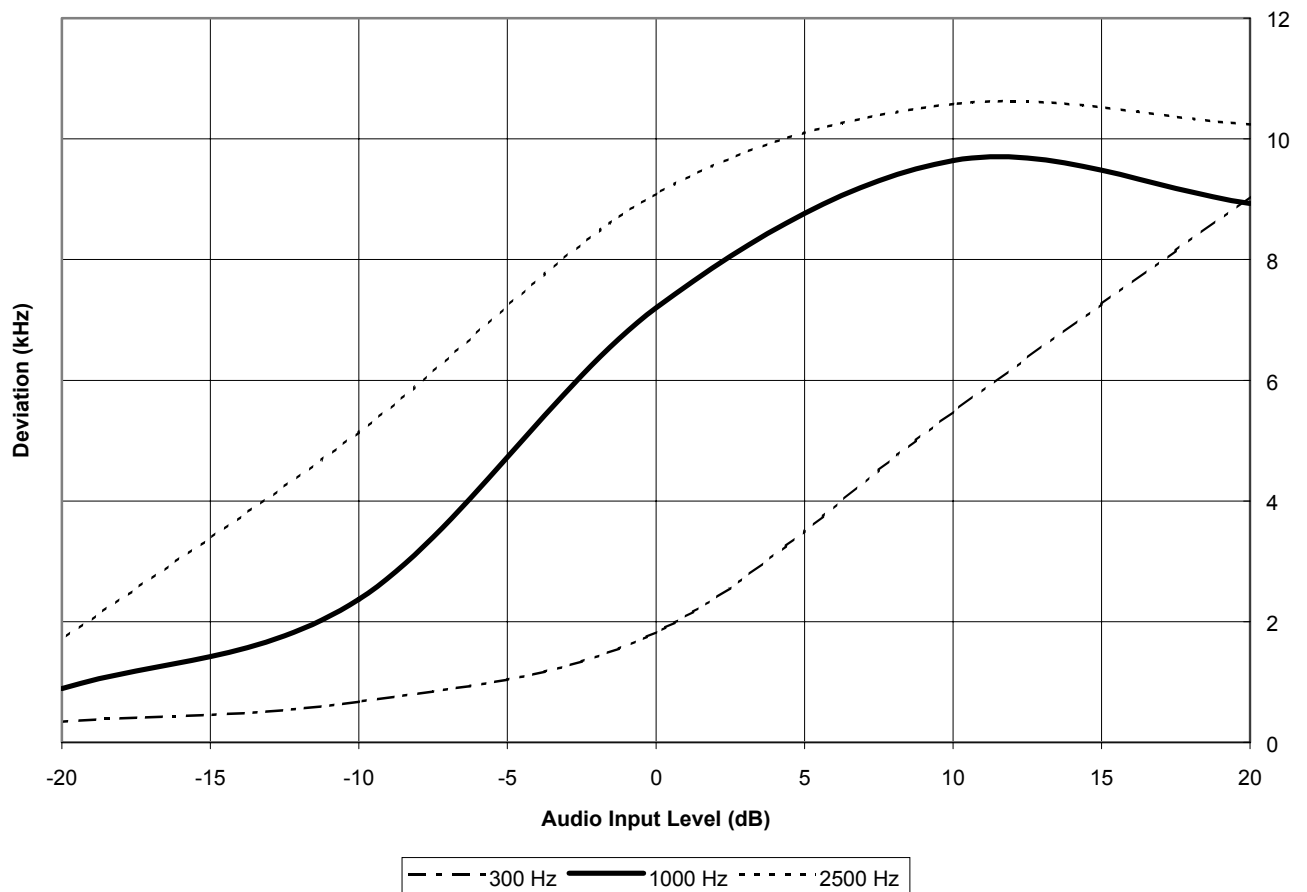


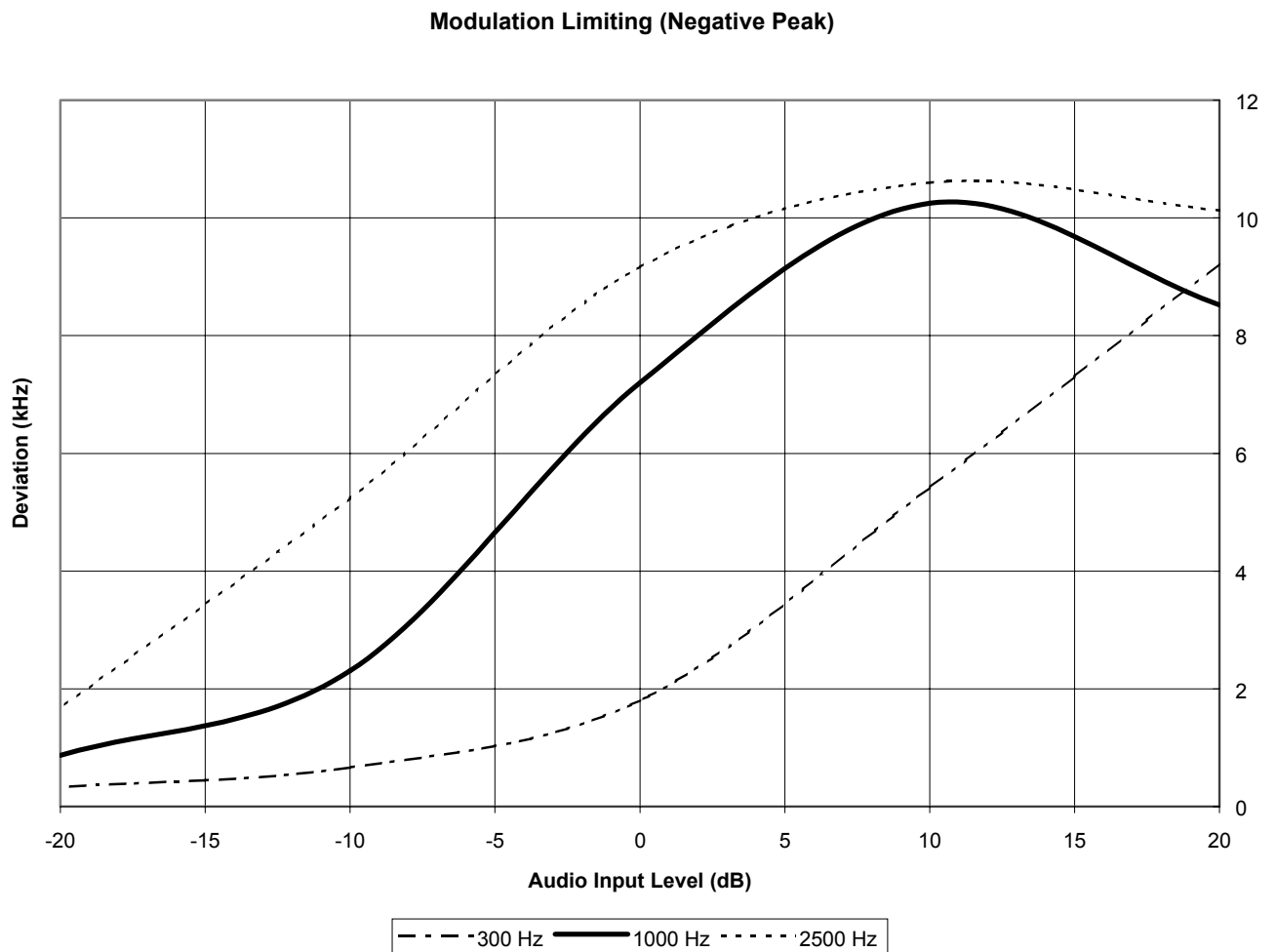
RTL





Modulation Limiting (Positive Peak)







7 OCCUPIED BANDWIDTH - §2.1049

7.1 OCCUPIED BANDWIDTH - §2.1049 TEST PROCEDURE

The antenna output terminal of the EUT was connected to the input of a 50W spectrum analyzer through a matched 30dB attenuator. The radio transmitter was operating at maximum output power with and without internal data modulation. 100% of the in-band modulation was below the specified mask per §22.917 (C). Specified Limits:

- A. On any frequency removed from the assigned carrier frequency by more than 20 kHz, up to and including 45 kHz, the sideband was at least 26dB below the carrier.
- B. On any frequency removed from the assigned carrier frequency by more than 45 kHz, up to and including 90 kHz, the sideband was at least 45 dB below the carrier.
- C. On any frequency removed from the assigned carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency, the sideband was at least 60dB below the carrier of $43 + \log_{10}$ (mean power output in Watts) dB, whichever was the smaller attenuation.

7.2 OCCUPIED BANDWIDTH TEST EQUIPMENT

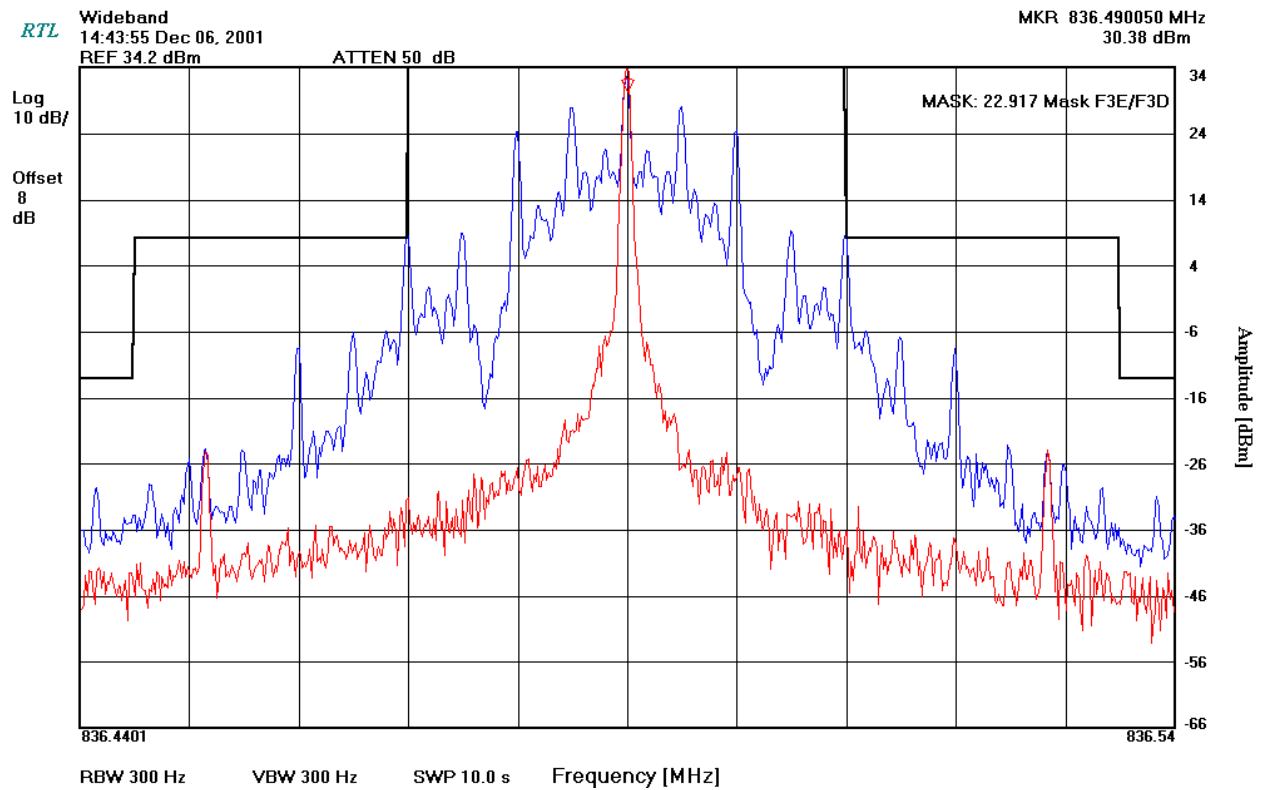
TABLE 7-1: OCCUPIED BANDWIDTH TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz – 40 GHz)	3943A01719	6/7/02
013965	Inritsu	MT8802A	Radio Communications Test Set	MT17187	10/04/02



7.3 OCCUPIED BANDWIDTH TEST DATA

40 kHz Channel Bandwidth: Wideband data; 836.49 MHz



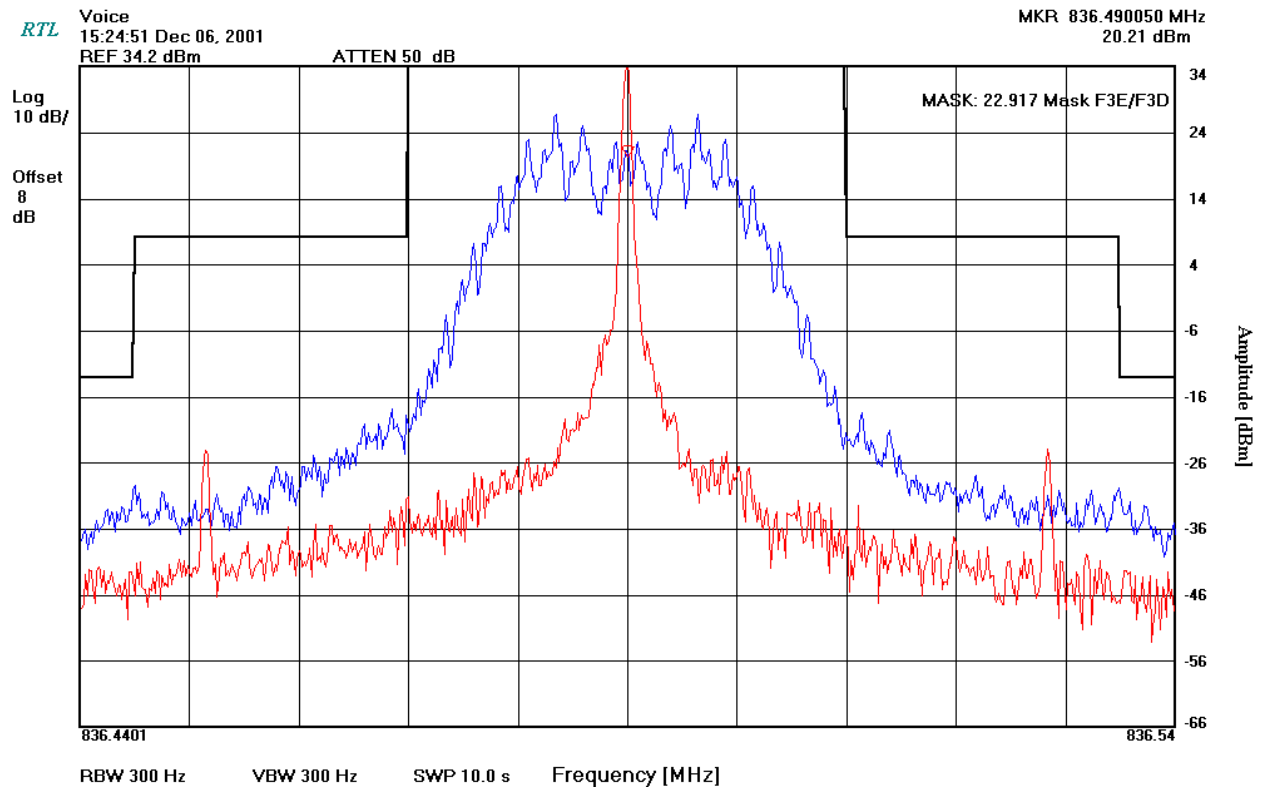


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Exhibit 1

40 kHz Channel Bandwidth: Voice; 836.49 MHz



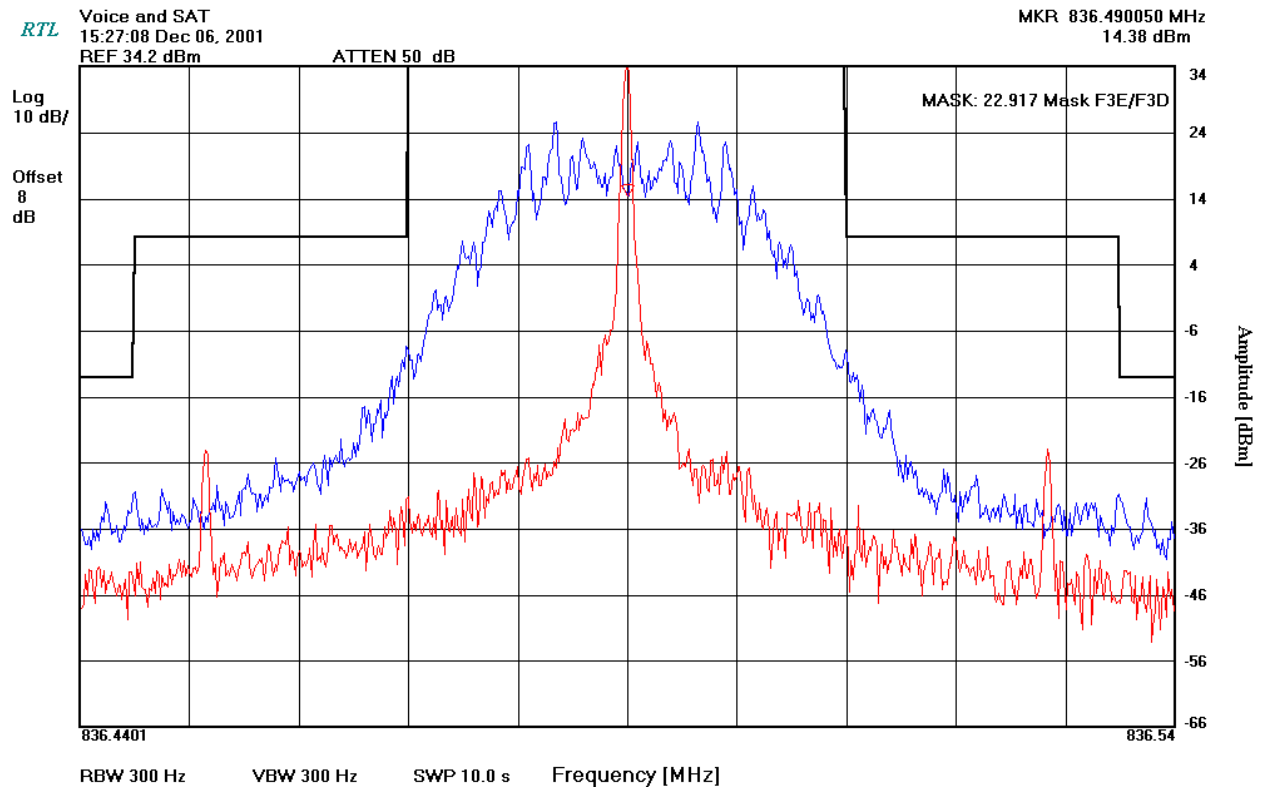


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Exhibit 1

40 kHz Channel Bandwidth: Voice and SAT; 836.49 MHz



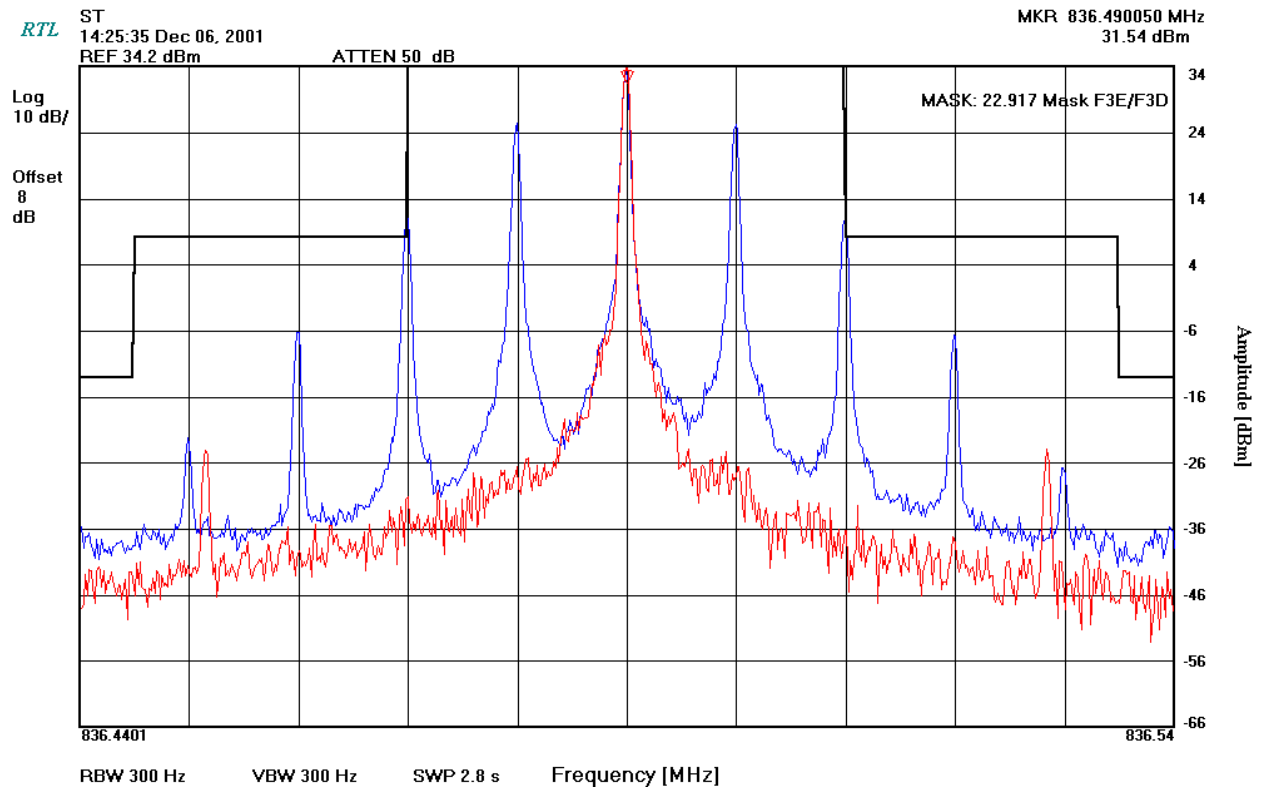


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Exhibit 1

40 kHz Channel Bandwidth: ST; 836.49 MHz



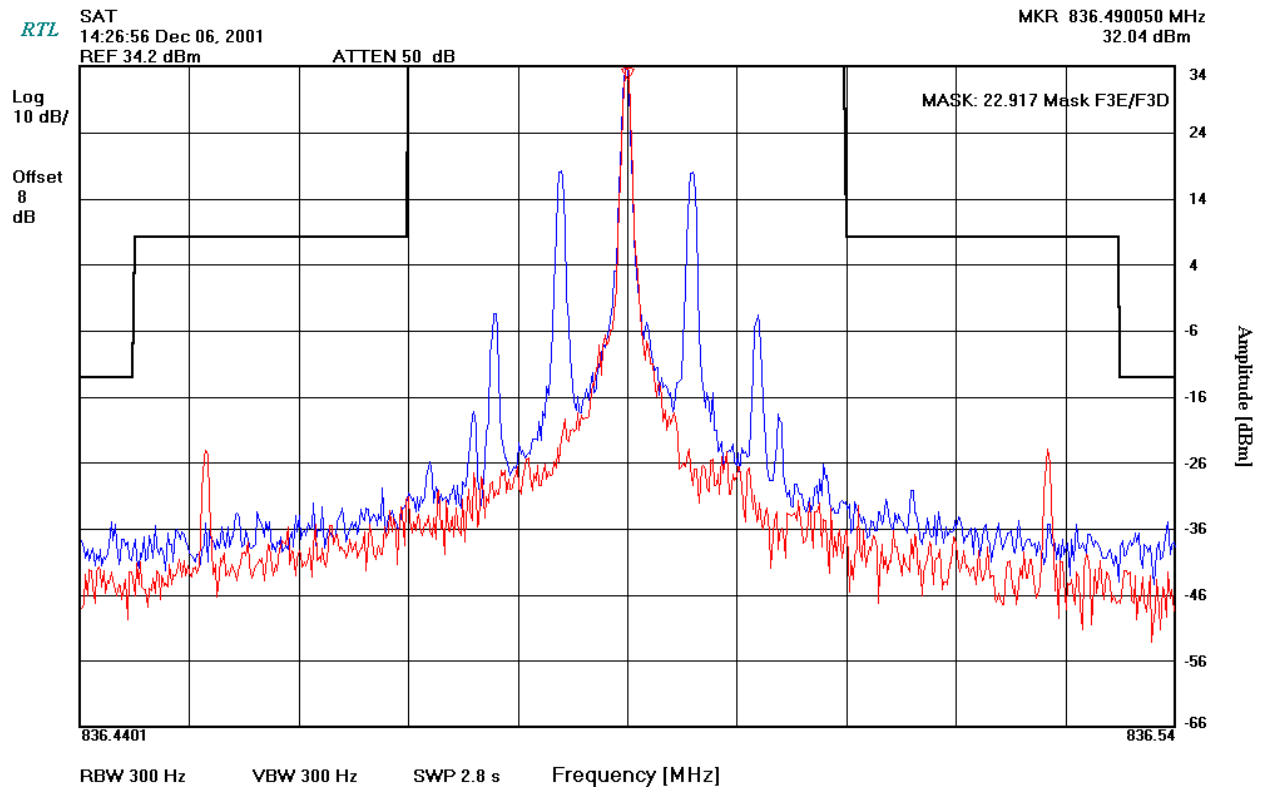


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Exhibit 1

40 kHz Channel Bandwidth: SAT; 836.49 MHz



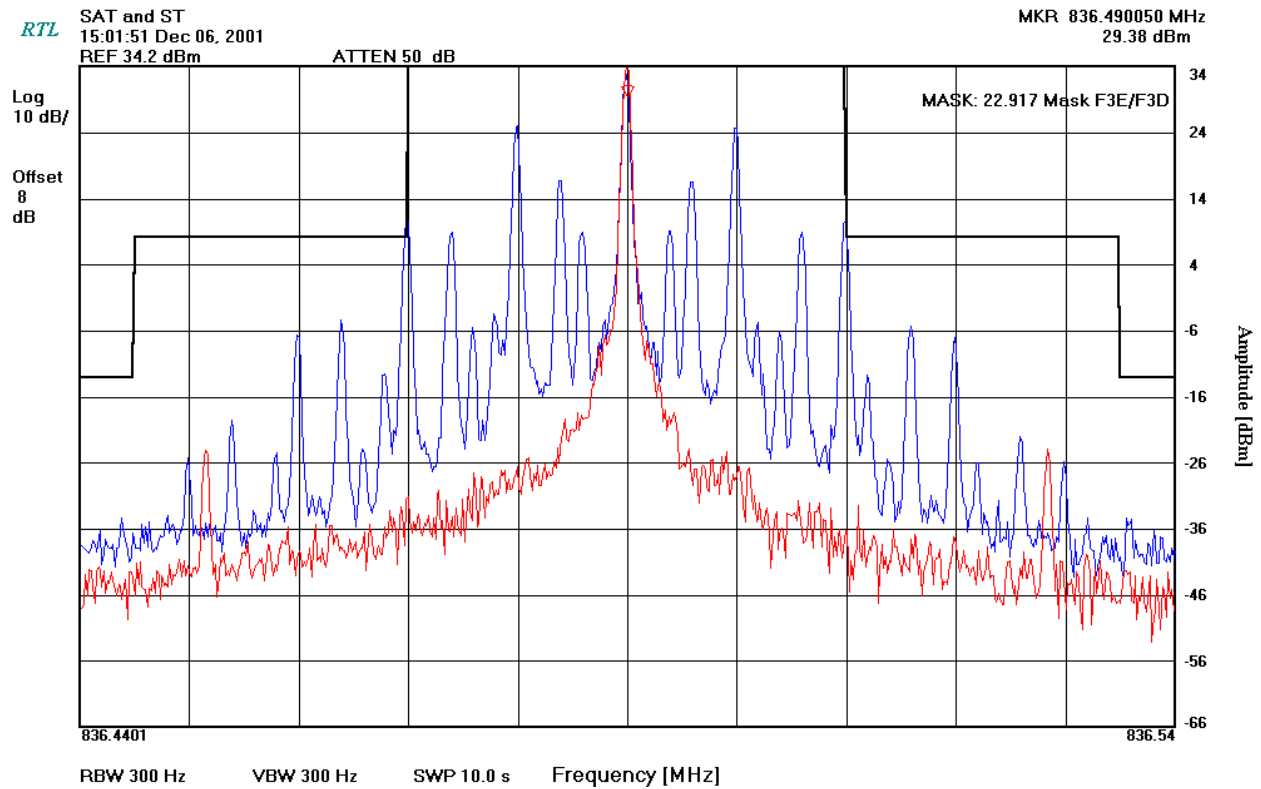


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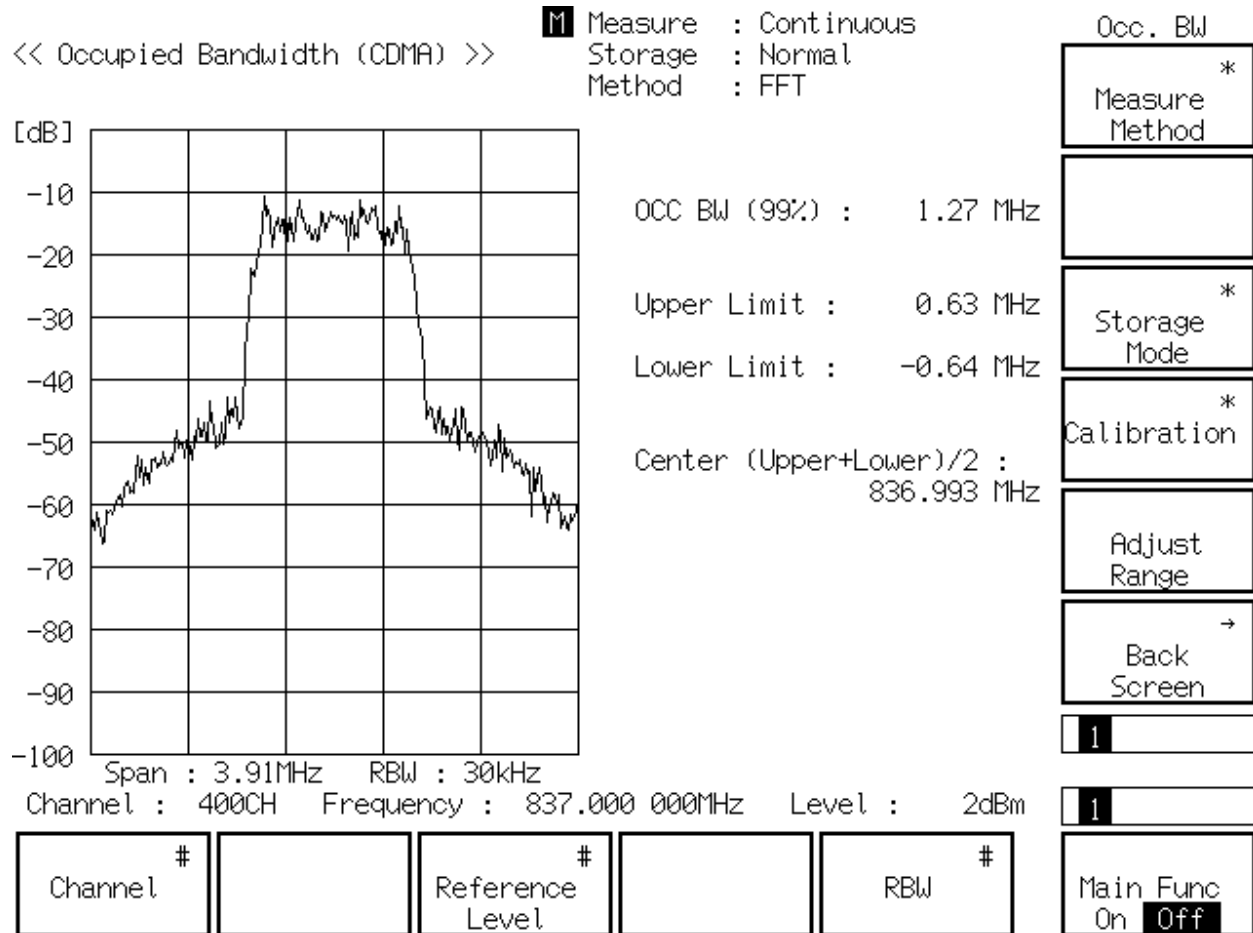
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Exhibit 1

40 kHz Channel Bandwidth: SAT and ST; 836.49 MHz



CDMA Occupied Bandwidth (1.27 MHz): 837.00 MHz



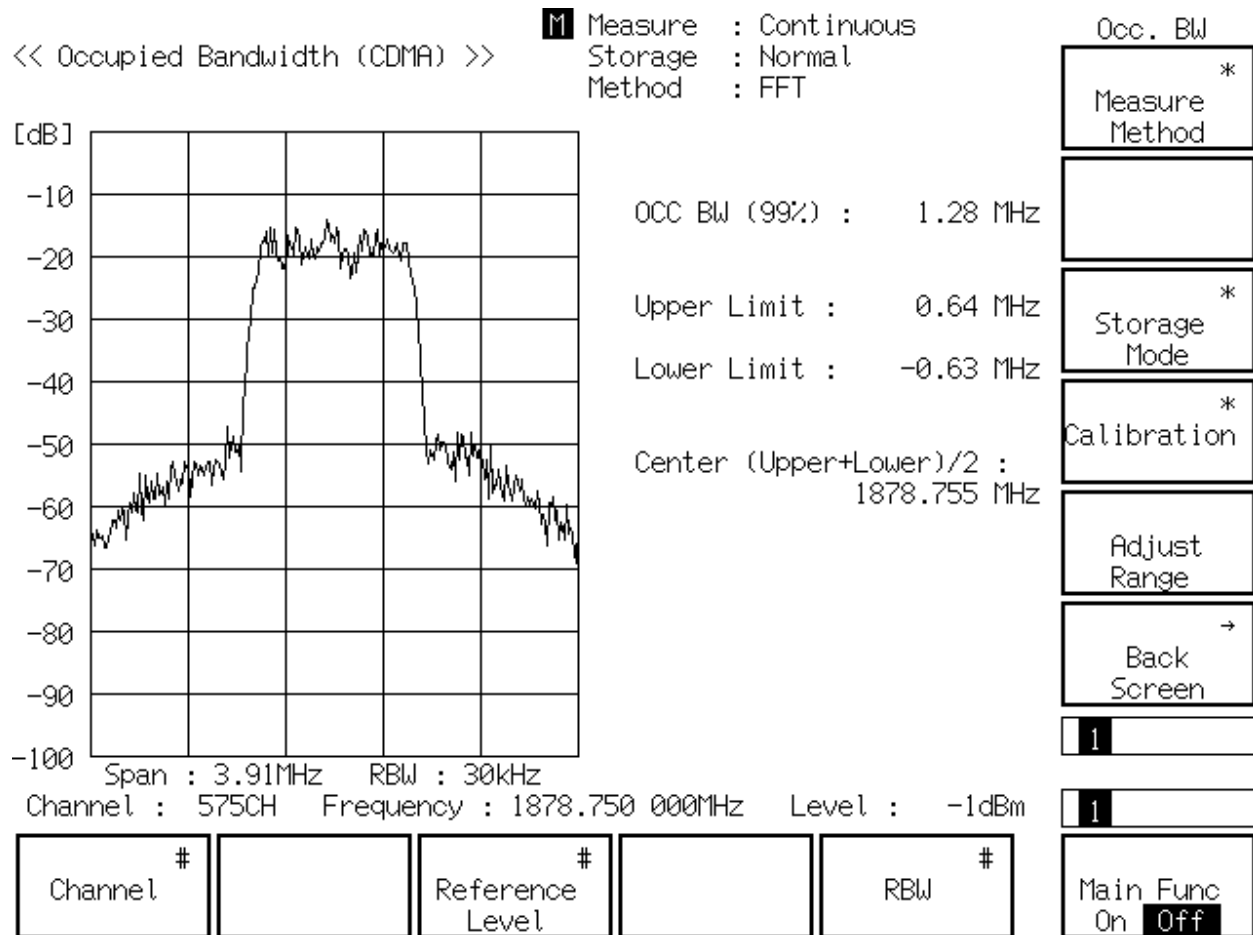


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Exhibit 1

PCS CDMA Occupied Bandwidth (1.28 MHz): 1878.75 MHz





8 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051

8.1 SPURIOUS EMISSIONS TEST PROCEDURES

8.1.1 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051

The level of the carrier and the various conducted spurious frequencies was measured by means of a calibrated spectrum analyzer. The antenna output terminal of the EUT was connected to the input of a 50 Ω spectrum analyzer through a matched 30dB attenuator and coaxial cable. The transmitter was operating at maximum power with internal data modulation.

8.1.2 EMISSION LIMITATIONS FOR CELLULAR - §22.917

(d) *F1D emission mask*. For F1D emissions, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB;
- (2) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency: at least 60 dB or $43 + 10 \log P$ dB, whichever is the lesser attenuation.

8.1.3 MEASUREMENT PROCEDURE

The following spectrum analyzer bandwidth settings should be used for measurement of spurious emissions. When operating in the radiotelephony mode or the supervisory audio tone mode: (1) Any emission not more than 45 kHz removed from the carrier frequency, 300 Hz. (2) Any emission more than 45 kHz removed from the carrier frequency, 30 kHz. When operating in the wideband data mode or the signaling tone mode: (1) Any emission not more than 60 kHz removed from the carrier frequency, 300 Hz. (2) Any emission more than 60 kHz removed from the carrier frequency, 30 kHz.

8.1.4 EMISSION LIMITS - §24.133

The power of any emission shall be attenuated below the transmitter power, as measure in accordance with FCC §24.132.



8.2 SPURIOUS EMISSIONS AT ANTENNA TERMINAL TEST EQUIPMENT

TABLE 8-1: SPURIOUS EMISSIONS AT ANTENNA TERMINAL TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	6/7/02
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	7/13/02
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz – 6.5 GHz)	3325A00159	12/5/02

8.3 SPURIOUS EMISSIONS TEST DATA

Cellular AMPS
836.49 MHz
Channel 383
Conducted power = 34.21 dBm
Limit = 47.21 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
1672.98	-43.17	-9.67	67.71	-20.50
2509.47	-41.83	-12.33	63.71	-16.50
3345.96	-44.67	-10.17	68.71	-21.50
4182.45	-44.33	-11.00	67.54	-20.33
5018.94	-54.67	-9.50	79.38	-32.17
5855.43	-65.33	-13.33	86.21	-39.00
6691.92	-87.50	-30.83	90.88	-43.67
7528.41	-68.83	-10.17	92.87	-45.66
8364.9	-68.17	-12.83	89.55	-42.34



Cellular CDMA
824.7 MHz
Channel 1013
Conducted power = 24.55 dBm
Limit = 37.55 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
1649.400	-63.9	1.7	86.8	-49.2
2474.100	-68.0	6.1	86.5	-48.9
3298.800	-69.7	1.8	92.5	-54.9
4123.500	-95.3	1.9	118.0	-80.4
4948.200	<-100			
5772.900	<-100			
6597.600	<-100			
7422.300	<-100			
8247.000	<-100			

Cellular CDMA
837.00 MHz
Channel 400
Conducted power = 24.52 dBm
Limit = 37.52 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
1674.00	-65.4	2.0	87.9	-50.4
2511.00	-65.1	6.0	83.6	-46.1
3348.00	-65.2	2.1	87.6	-50.1
4185.00	-68.4	4.1	88.8	-51.3
5022.00	-90.6	1.6	113.5	-76.0
5859.00	<-100			
6696.00	<-100			
7533.00	<-100			
8370.00	<-100			



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Cellular CDMA
848.31 MHz
Channel 700
Conducted power = 24.72 dBm
Limit = 37.72 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
1696.620	-71.3	1.5	94.5	-56.8
2544.930	-62.9	5.1	82.5	-44.8
3393.240	-61.8	1.2	85.3	-47.6
4241.550	-99.4	2.8	121.3	-83.6
5089.860	-93.3	1.3	116.7	-79.0
5938.170	<-100			
6786.480	<-100			
7634.790	<-100			
8483.100	<-100			

PCS CDMA
1851.25 MHz
Channel 25
Conducted power = 24.27 dBm
Limit = 37.3 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
3702.500	-51.4	2.5	73.2	-35.9
5553.750	-63.3	2.3	85.3	-48.0
7405.000	<-100			
9256.250	<-100			
11107.500	<-100			
12958.750	<-100			
14810.000	<-100			
16661.250	<-100			
18512.500	<-100			



PCS CDMA
1878.75 MHz
Channel 575
Conducted power = 24.1 dBm
Limit = 37.1 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
3757.50	-61.5	2.0	83.6	-46.5
5636.25	-81.6	1.5	104.2	-67.1
7515.00	-80.9	16.0	89.0	-51.9
9393.75	-99.5	11.0	112.6	-75.5
11272.50	<-100			
13151.25	<-100			
15030.00	<-100			
16908.75	<-100			
18787.50	<-100			

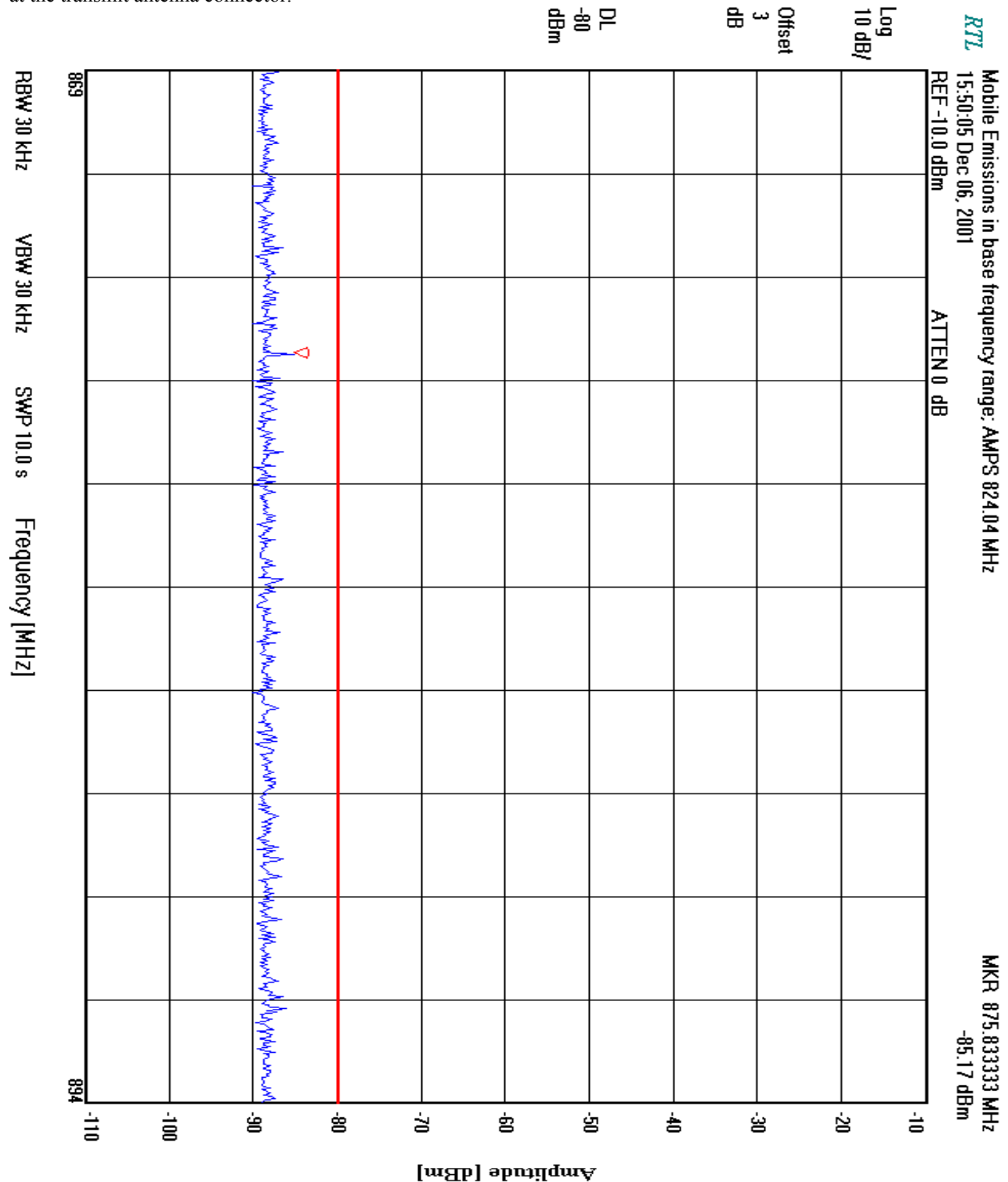
PCS CDMA
1908.75 MHz
Channel 1175
Conducted power = 24.56 dBm
Limit = 37.6 dBc

Frequency (MHz)	Level Measured (dBm)	Notch Insertion Loss (dB)	Corrected Level (dBc)	Margin (dB)
3817.500	-68.3	1.9	91.0	-53.4
5726.250	-90.8	3.2	112.2	-74.6
7635.000	<-100			
9543.750	<-100			
11452.500	<-100			
13361.250	<-100			
15270.000	<-100			
17178.750	<-100			
19087.500	<-100			



8.4 FCC PART 22.917 (F) MOBILE EMISSIONS IN BASE FREQUENCY RANGE

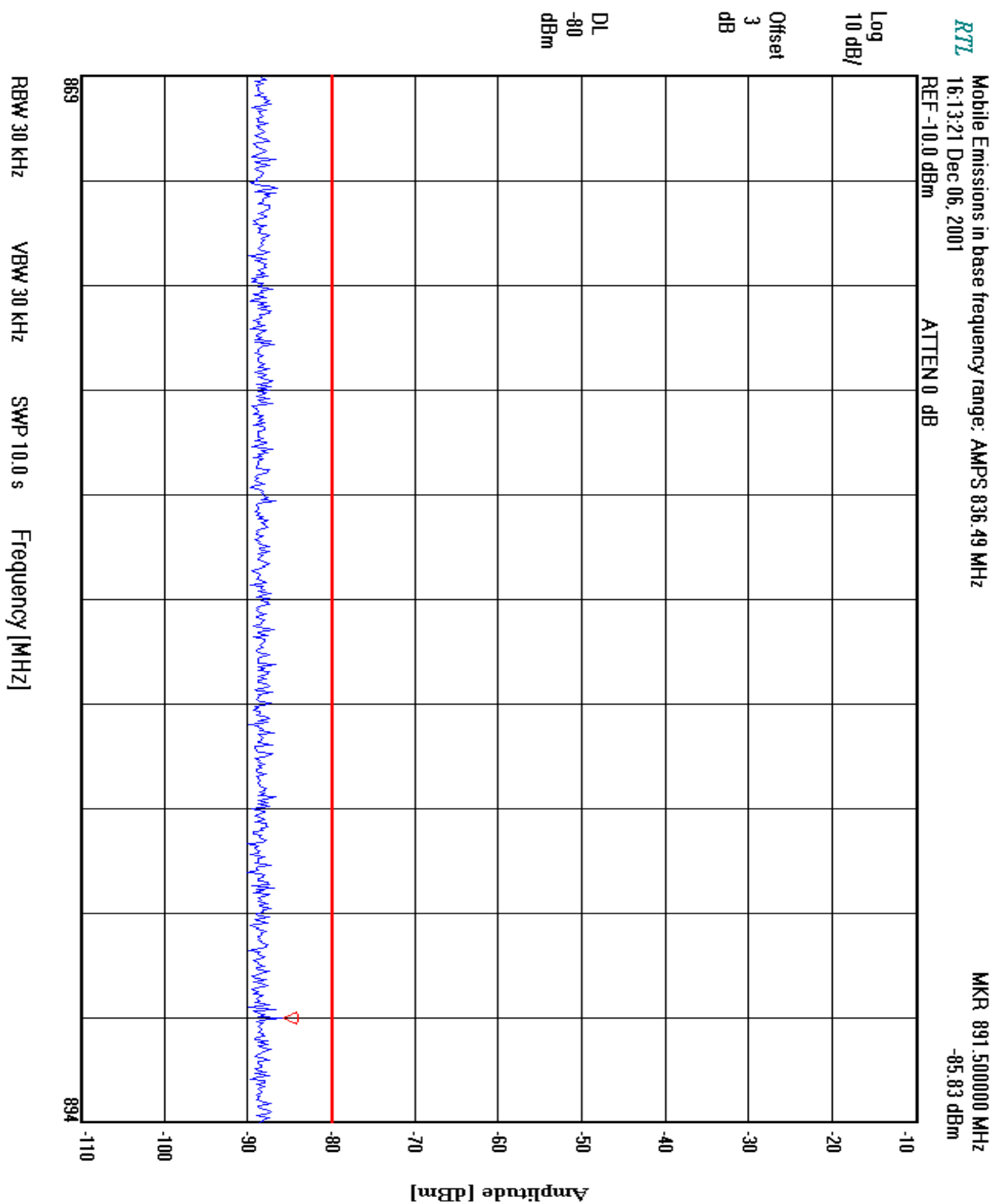
Mobile emissions in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed 80 dBm at the transmit antenna connector.





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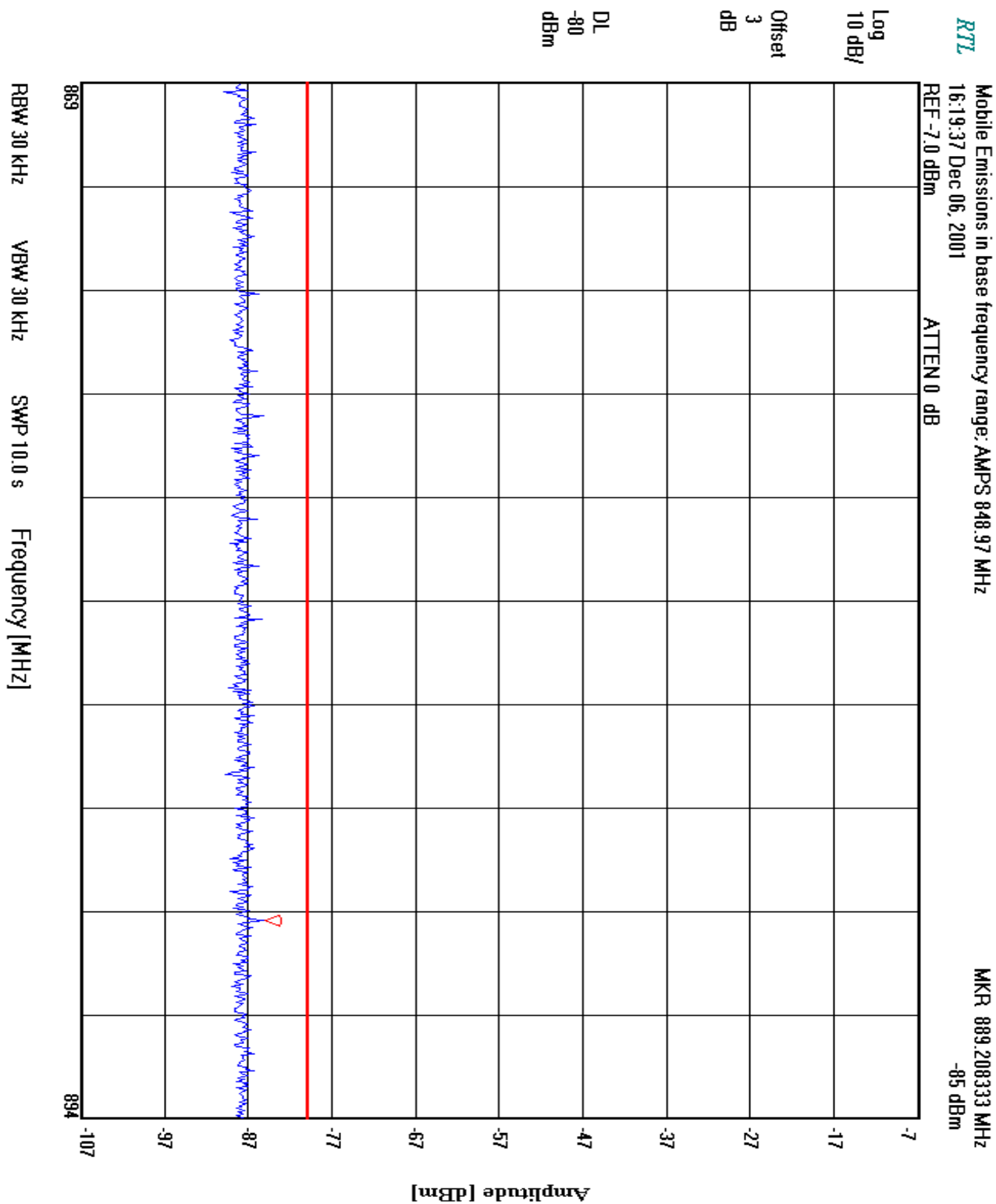
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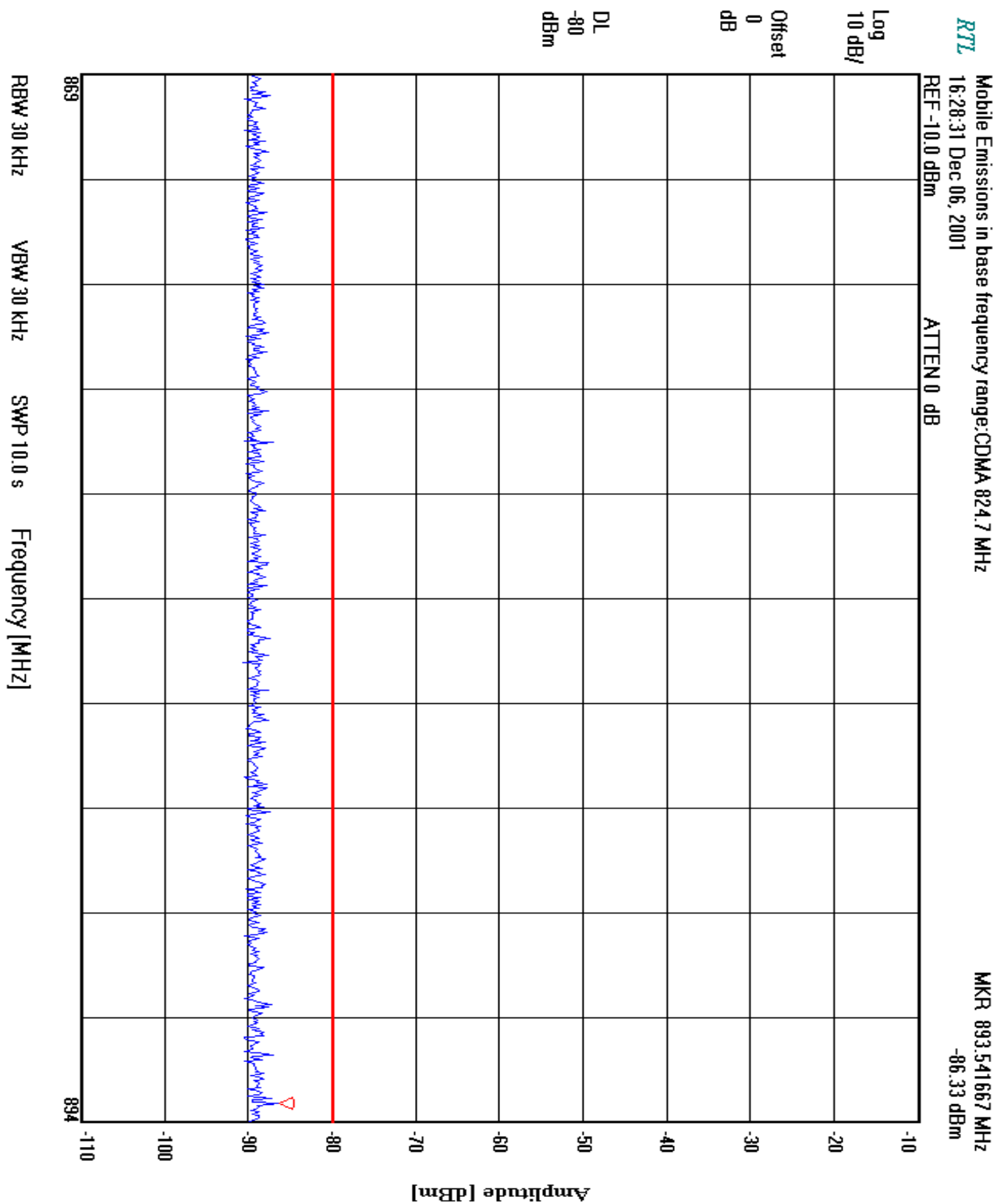
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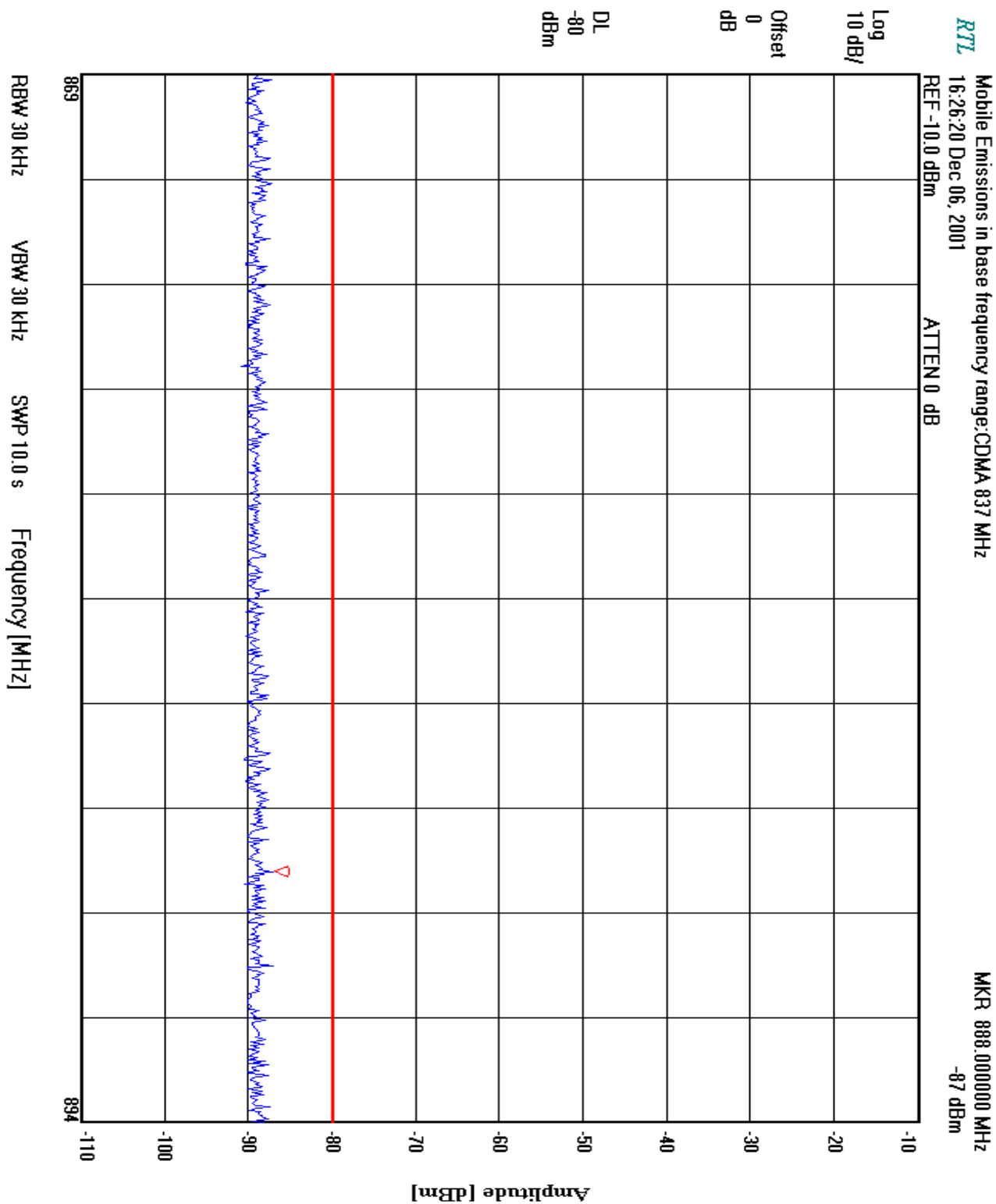
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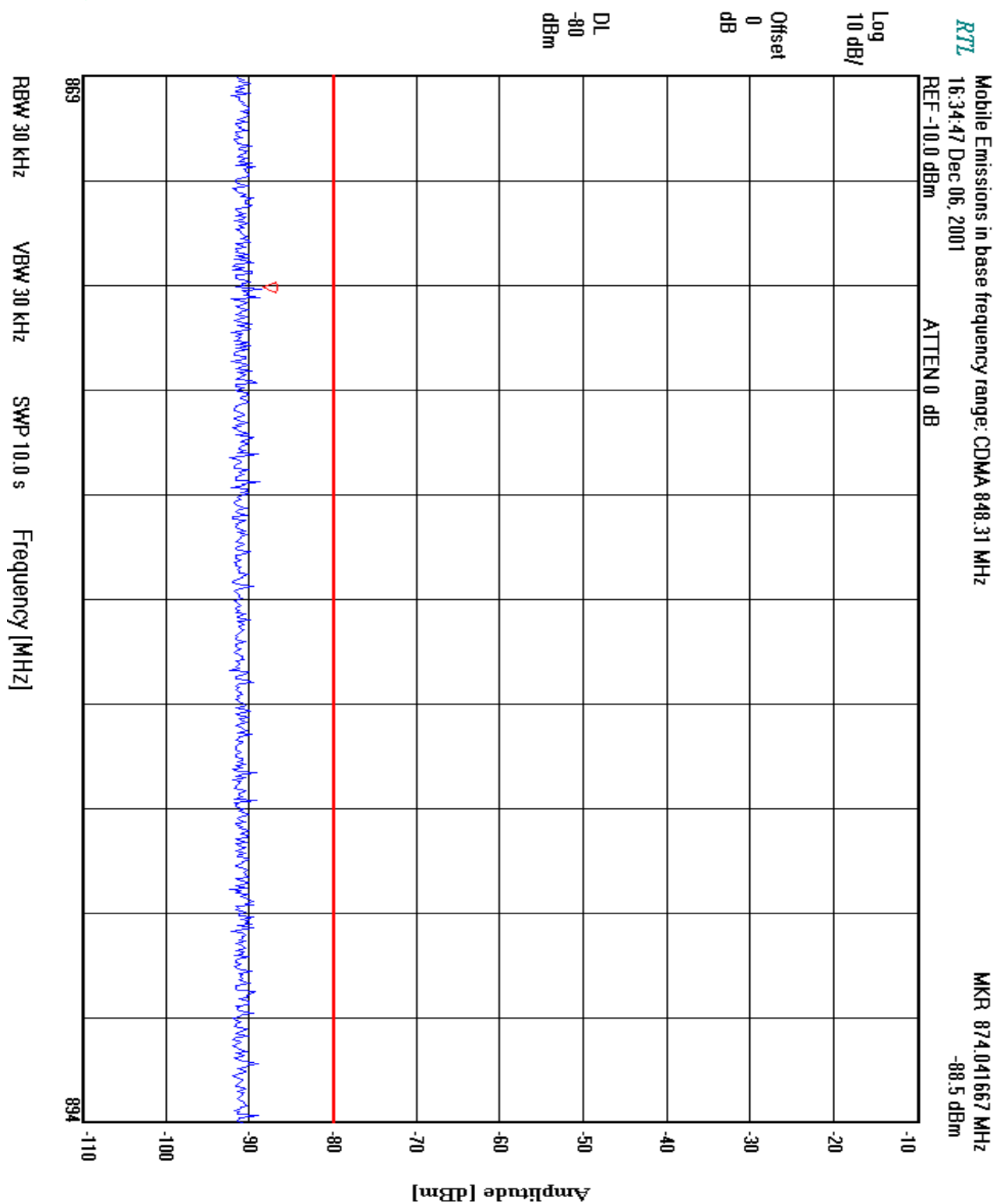
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9 RADIATED SPURIOUS AND HARMONIC EMISSIONS - §2.1053

9.1 RADIATED SPURIOUS AND HARMONIC EMISSIONS - §2.1053

Radiated and harmonic emissions were measured at our 3-meter outdoor site. The EUT was placed on the turntable with the transmitter transmitting into a non-radiating load. A receiving antenna located 3 meters from the turntable received any signal radiated from the transmitter and its operating accessories. The receiving antenna was varied from 1 to 4 meters and the polarization was varied to determine the worst-case emission level, the EUT was tested in 3 orthogonal planes.

9.2 RADIATED SPURIOUS TEST EQUIPMENT

TABLE 9-1: RADIATED SPURIOUS TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz – 2 GHz)	2648	5/22/02
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	7/5/02
901186	Agilent Technologies	E9323A (50MHz-6GHz)	Peak & Avg. Power Sensor	US40410380	6/25/02
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz – 22 GHz)	3138A07771	5/16/02
900917	Hewlett Packard	8648C	Signal Generator (100 kHz – 3200 MHz)	3537A01741	4/10/02
900928	Hewlett Packard	83752A	Syntesized Sweeper (0.01 GHz – 20 GHz)	3610A00866	5/11/02



9.3 FIELD STRENGTH OF SPURIOUS RADIATION TEST DATA - §2.1053

Operating Frequency (MHz): 836.49
Channel: 383
Measured Cond. Pwr. (dBm): 34.21
Measured ERP (dBm): N/A
Modulation: Analog
Distance: 3
Limit: 47.21 dBc

TABLE 9-2: FIELD STRENGTH DATA §2.1053 (CELLULAR AMPS)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBd)	POL (H/V)	ERP (dBc)	Margin (dB)
1672.98	41.60	-48.46	1.3	4.72	H	79.25	-32.04
2509.47	53.48	-41.45	1.6	5.16	H	72.11	-24.90
3345.96	46.74	-48.19	2.1	7.01	H	77.49	-30.28
4182.45	18.56	-69.75	1.3	6.29	H	98.97	-51.76
5018.94	13.93	-76.67	1.7	8.95	H	103.63	-56.42
5855.43	24.38	-65.85	1.5	6.55	H	95.01	-47.80
6691.92	19.43	-69.69	3.1	7.65	H	99.35	-52.14
7528.41	18.48	-71.45	4.2	7.55	H	102.31	-55.10
8364.9	17.59	-70.88	3	8.35	H	99.74	-52.53

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters in three orthogonal planes. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed from a signal generator, and the level was adjusted to the same field strength level as the EUT. The conducted power from the signal generator was recorded. The final ERP level was determined by subtracting the cable loss and adding the dipole gain in dBd.



Operating Frequency (MHz): 824.7
Channel: 1013
Measured Cond. Pwr. (dBm): 24.55
Measured ERP (dBm): N/A
Modulation: CDMA
Distance: 3
Limit: 37.55 dBc

TABLE 9-3: FIELD STRENGTH DATA §2.1053 (CELLULAR CDMA)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBd)	POL (H/V)	ERP (dBc)	Margin (dB)
1649.40	45.8	-56.2	0.9	4.7	H	76.9	-39.4
2474.10	23.9	-60.6	1.4	5.1	H	81.4	-43.9
3298.80	29.7	-47.8	1.5	6.1	H	67.8	-30.2
4123.50							
4948.20							
5772.90							
6597.60							
7422.30							
8247.00							

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters in three orthogonal planes. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed from a signal generator, and the level was adjusted to the same field strength level as the EUT. The conducted power from the signal generator was recorded. The final ERP level was determined by subtracting the cable loss and adding the dipole gain in dBd.



Operating Frequency (MHz): 837.00
Channel: 400
Measured Cond. Pwr. (dBm): 24.52
Measured ERP (dBm): N/A
Modulation: CDMA
Distance: 3
Limit: 37.52 dBc

TABLE 9-4: FIELD STRENGTH DATA §2.1053 (CELLULAR CDMA)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBd)	POL (H/V)	ERP (dBc)	Margin (dB)
1674.00	46.3	-55.0	0.9	4.7	H	75.7	-38.2
2511.00	20.7	-61.8	1.6	5.2	H	82.8	-45.2
3348.00	37.5	-43.6	1.7	6.0	H	63.8	-26.3
4185.00							
5022.00							
5859.00							
6696.00							
7533.00							
8370.00							

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters in three orthogonal planes. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed from a signal generator, and the level was adjusted to the same field strength level as the EUT. The conducted power from the signal generator was recorded. The final ERP level was determined by subtracting the cable loss and adding the dipole gain in dBd.



Operating Frequency (MHz): 848.31
Channel: 777
Measured Cond. Pwr. (dBm): 24.72
Measured ERP (dBm): N/A
Modulation: CDMA
Distance: 3
Limit: 37.72 dBc

TABLE 9-5: FIELD STRENGTH DATA §2.1053 (CELLULAR CDMA)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBd)	POL (H/V)	ERP (dBc)	Margin (dB)
1696.62	45.0	-56.8	0.9	4.7	H	77.7	-40.0
2544.93	23.1	-58.5	1.7	5.3	H	79.7	-42.0
3393.24	35.7	-44.2	1.6	6.0	H	64.5	-26.8
4241.55							
5089.86							
5938.17							
6786.48							
7634.79							
8483.10							

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters in three orthogonal planes. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed from a signal generator, and the level was adjusted to the same field strength level as the EUT. The conducted power from the signal generator was recorded. The final ERP level was determined by subtracting the cable loss and adding the dipole gain in dBd.



Operating Frequency (MHz): 1851.25
Channel: 25
Measured Cond. Pwr. (dBm): 24.27
Measured ERP (dBm): N/A
Modulation: CDMA
Distance: 3
Limit: 37.27

TABLE 9-6: FIELD STRENGTH DATA §2.1053 (PCS CDMA)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBc)	Margin (dB)
3702.50						<60	
5553.75						<60	
7405.00						<60	
9256.25						<60	
11107.50						<60	
12958.75						<60	
14810.00						<60	
16661.25						<60	
18512.50						<60	

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees through 3 orthogonal planes, and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed through a cable from a signal generator and the power at the signal generator was monitored. The level of the signal generator was adjusted to the same field strength level as the EUT. The conducted power of the signal generator was recorded. The horn gain was then determined and the EIRP level was determined by subtracting the cable loss and adding the horn gain in dBi.



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Operating Frequency (MHz): 1878.75
Channel: 575
Measured Cond. Pwr. (dBm): 24.08
Measured ERP (dBm): N/A
Modulation: CDMA
Distance: 3
Limit: 37.08

TABLE 9-7: FIELD STRENGTH DATA §2.1053 (PCS CDMA)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBc)	Margin (dB)
3757.500						<60	
5636.250						<60	
7515.000						<60	
9393.750						<60	
11272.500						<60	
13151.250						<60	
15030.000						<60	
16908.750						<60	
18787.500						<60	

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees through 3 orthogonal planes, and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed through a cable from a signal generator and the power at the signal generator was monitored. The level of the signal generator was adjusted to the same field strength level as the EUT. The conducted power of the signal generator was recorded. The horn gain was then determined and the EIRP level was determined by subtracting the cable loss and adding the horn gain in dBi.



9.4

Operating Frequency (MHz): 1908.75
Channel: 1175
Measured Cond. Pwr. (dBm): 24.56
Measured ERP (dBm): N/A
Modulation: CDMA
Distance: 3
Limit: 37.56

TABLE 9-8: FIELD STRENGTH DATA §2.1053 (PCS CDMA)

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)	Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBc)	Margin (dB)
3817.500						<60	
5726.250						<60	
7635.000						<60	
9543.750						<60	
11452.500						<60	
13361.250						<60	
15270.000						<60	
17178.750						<60	
19087.500						<60	

The spectrum analyzer was set to the following settings:

1. Resolution Bandwidth ≤ 1 MHz
2. Video Bandwidth 10 Hz
3. Sweep Speed 5 Second
4. Detector Mode = Positive Peak

Notes:

ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees through 3 orthogonal planes, and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. The horn was fed through a cable from a signal generator and the power at the signal generator was monitored. The level of the signal generator was adjusted to the same field strength level as the EUT. The conducted power of the signal generator was recorded. The horn gain was then determined and the EIRP level was determined by subtracting the cable loss and adding the horn gain in dBi.

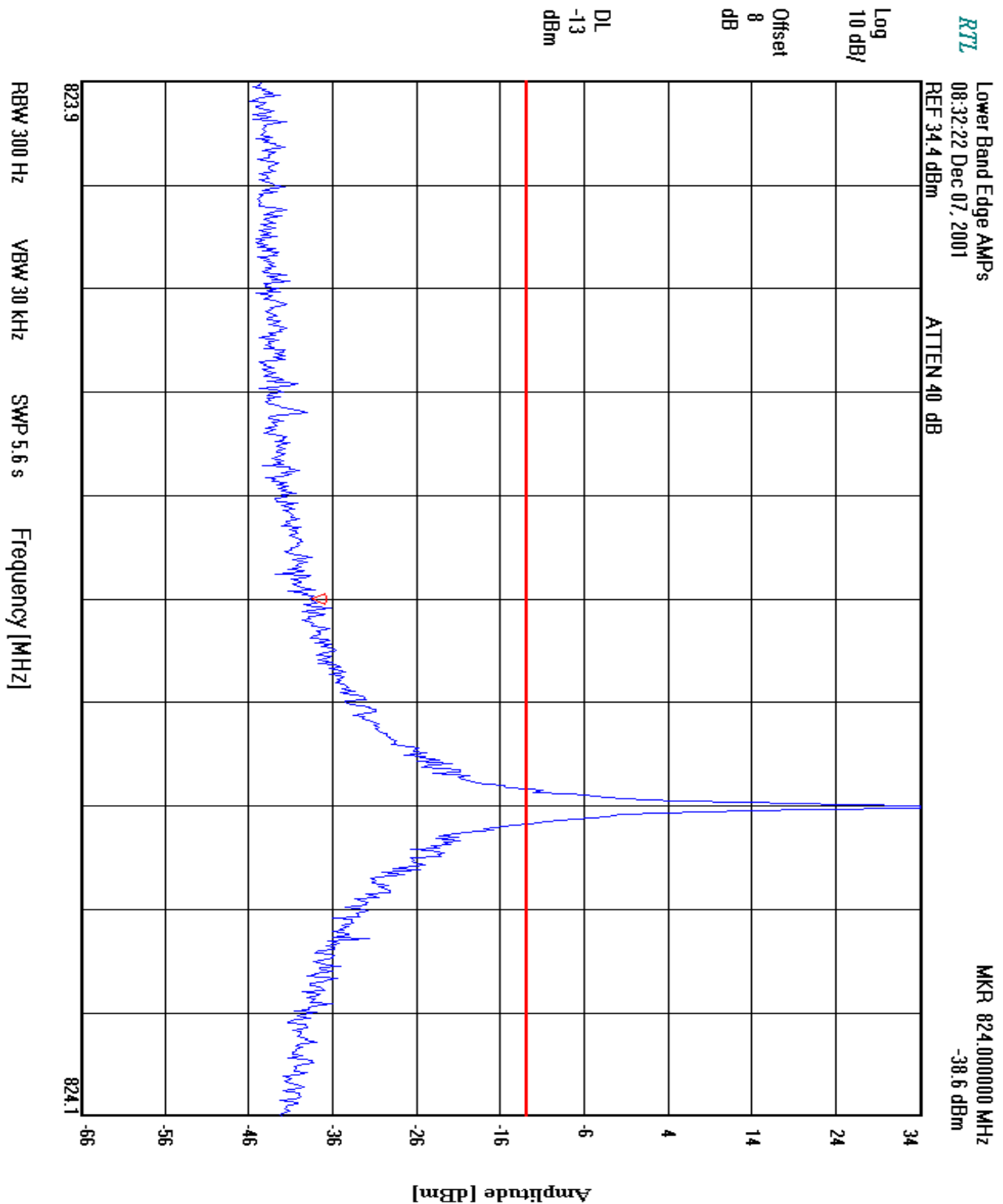


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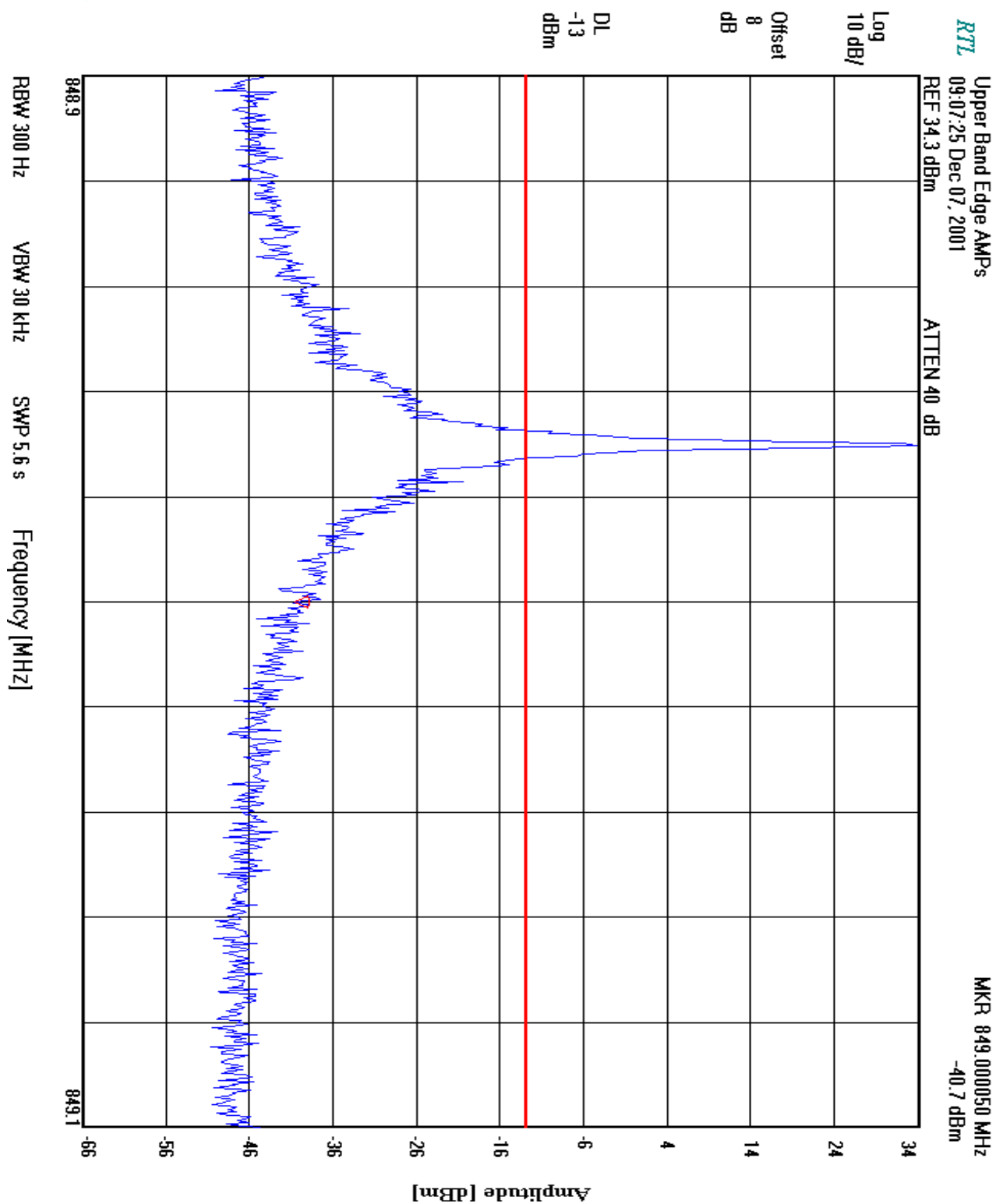
9.5 FCC PART 22.901(D); PART 24.229 AND PART 24.238 - BAND-EDGE COMPLIANCE





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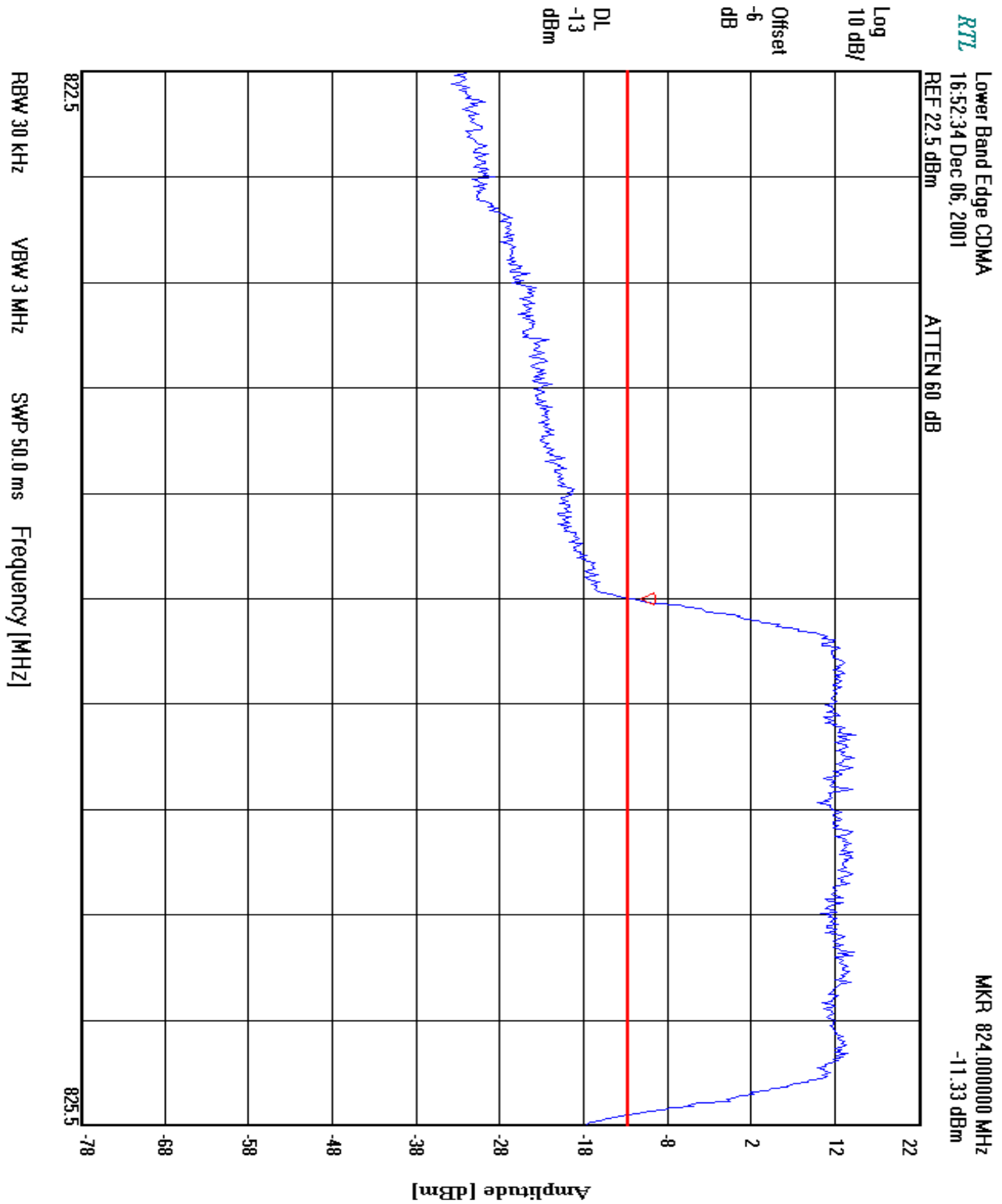




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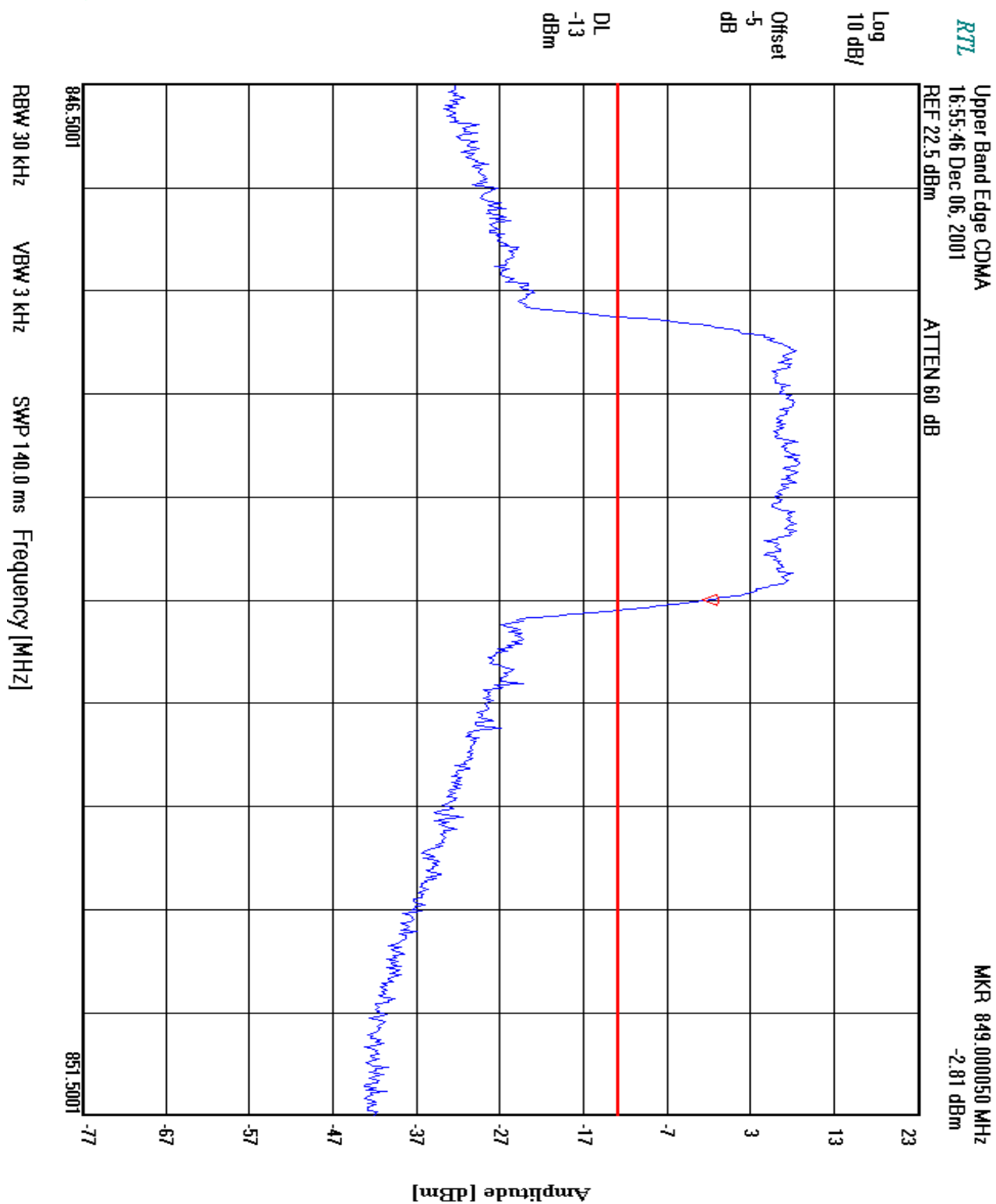
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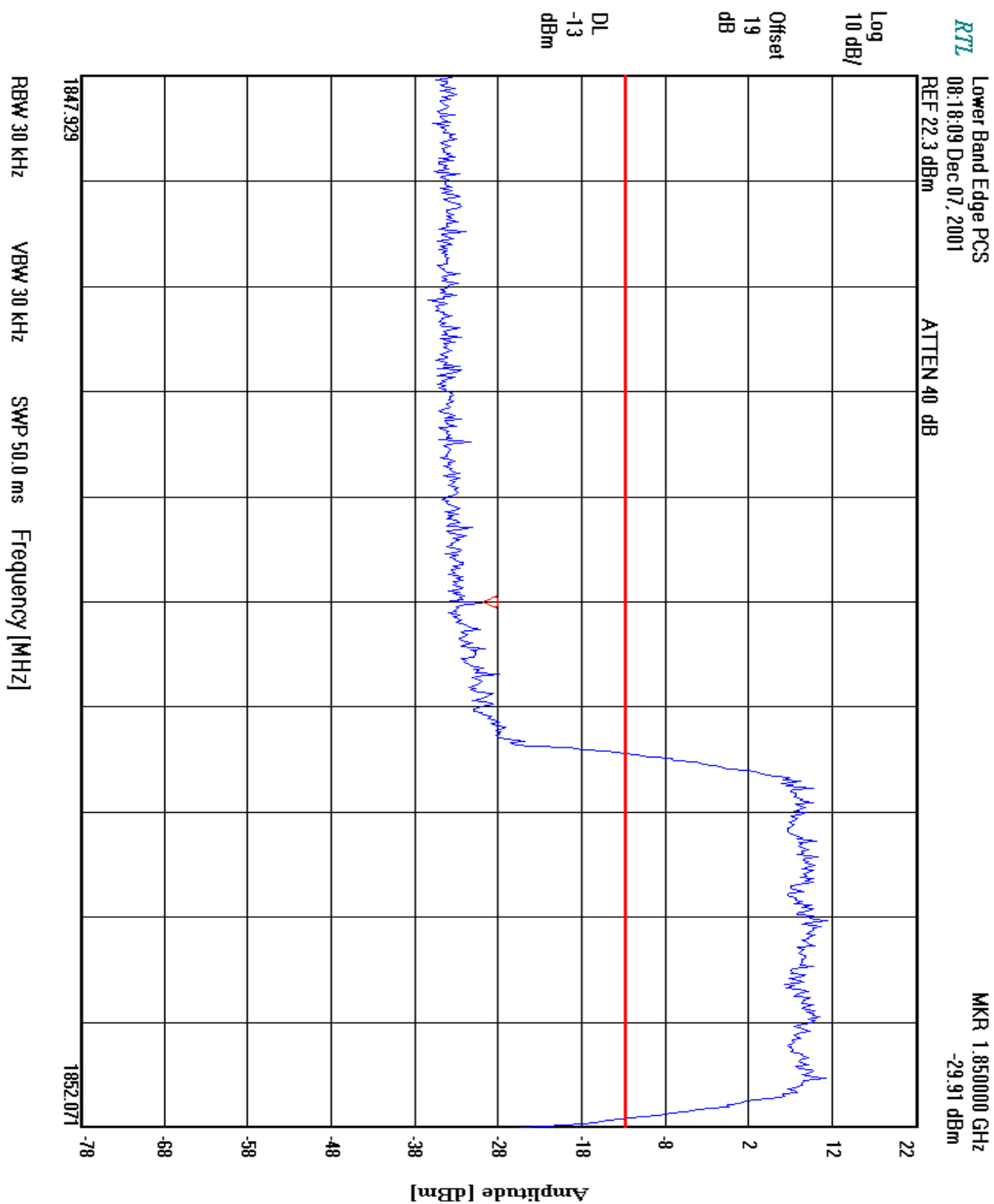
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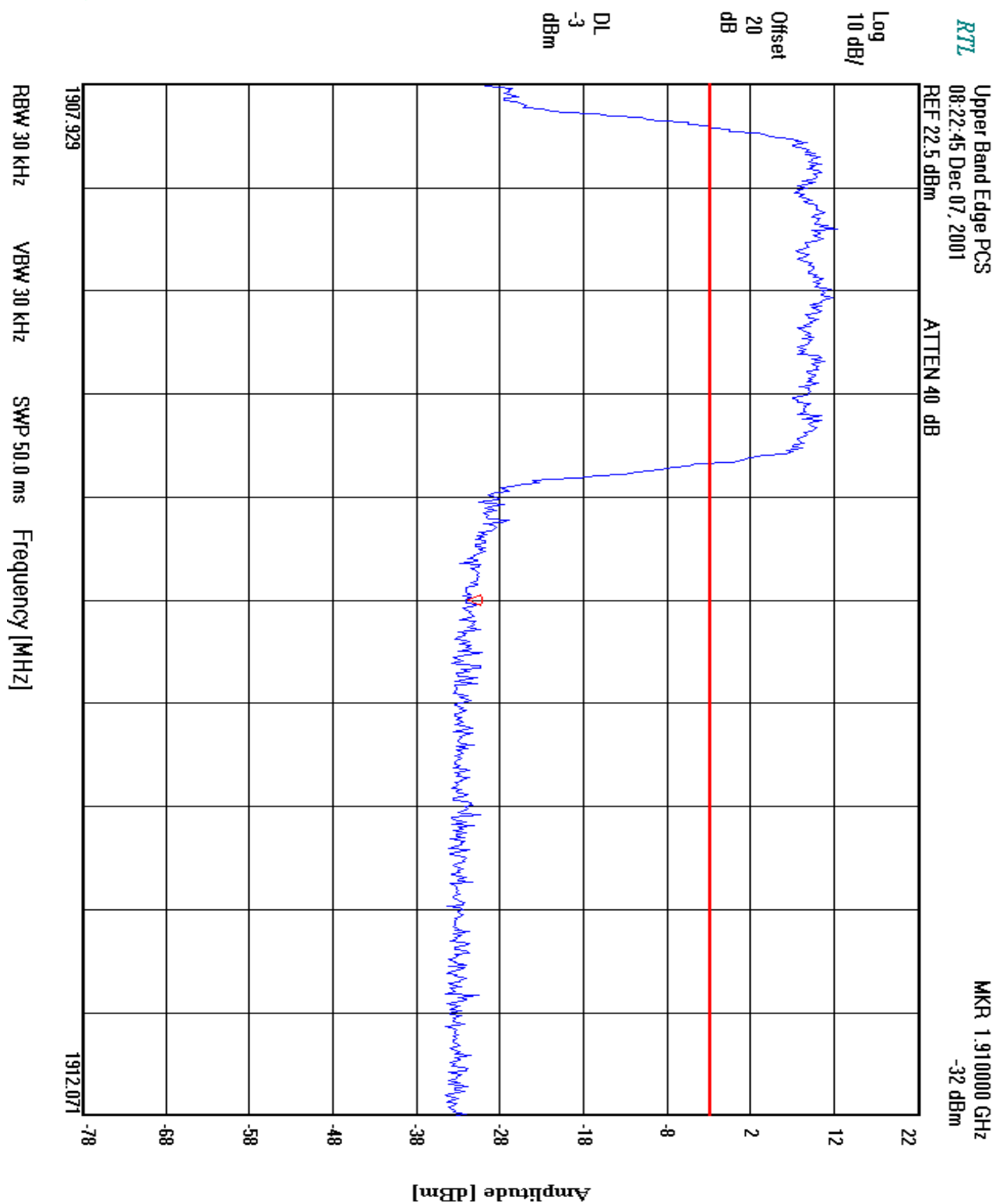
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10 FREQUENCY STABILITY / TEMPERATURE VARIATION - §2.1055

The frequency stability and RF power, measured at the antenna connector using a communications test set as the specified load, are plotted against supply voltage variations and temperature variations at the highest power levels for each modulation type. All measurements are made at the center of the frequency band.

10.1 MEASUREMENT METHOD:

The frequency stability of the transmitter was measured by:

1. Temperature: The temperature was varied from -30°C to +60°C at intervals no more than 10°C throughout the temperature range using an environmental chamber. A period of time sufficient to stabilize all of the components in the equipment shall be allowed prior to each frequency measurement.
2. Primary Supply Voltage: The primary supply voltage was varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied. The EUT was tested down to the battery endpoint.

10.2 FREQUENCY STABILITY TEST EQUIPMENT

TABLE 10-1: FREQUENCY STABILITY TEST EQUIPMENT

Manufacturer	Model	Part Type
Anritsu	MT8802A	Radio Communications Test Set
Hewlett Packard	E3631A	Power Supply
Hewlett Packard	E3610A	Power Supply
Hewlett Packard	E4418B	Power Meter
ESPEC	SH-240	Temperature Chamber

10.3 TIME PERIOD AND PROCEDURE:

1. The carrier frequency of the transmitter was measured at room temperature (25°C to provide a reference).
2. The equipment was subjected to a “soak” at -30°C without any power applied.
3. After the “soak” at -30°C, the measurement of the carrier frequency of the transmitter was made within a three-minute interval after applying power to the transmitter.
4. Frequency measurements were made at 10°C intervals up to +60°C, then back to room temperature. A minimum period of one hour was provided to allow stabilization of the equipment at each temperature level.



10.4 FREQUENCY TOLERANCE §22.355:

The minimum frequency stability shall 2.5 ppm for this device

TABLE 10-2: FREQUENCY TOLERANCE §22.355

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile ≤ 3 Watts (ppm)	Mobile ≤ 3 Watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

10.5 FREQUENCY STABILITY § 24.235

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

10.6 FREQUENCY STABILITY TEST DATA - §2.1055

Operating Frequency: 836.49; 837; and 1878.75 MHz
Channel: 383; 400; and 575
Reference Voltage: 5 and 13.8 VDC
Deviation Limit: 0.00025 % or 2.5 ppm

TABLE 10-3: FREQUENCY STABILITY DATA - §2.1055

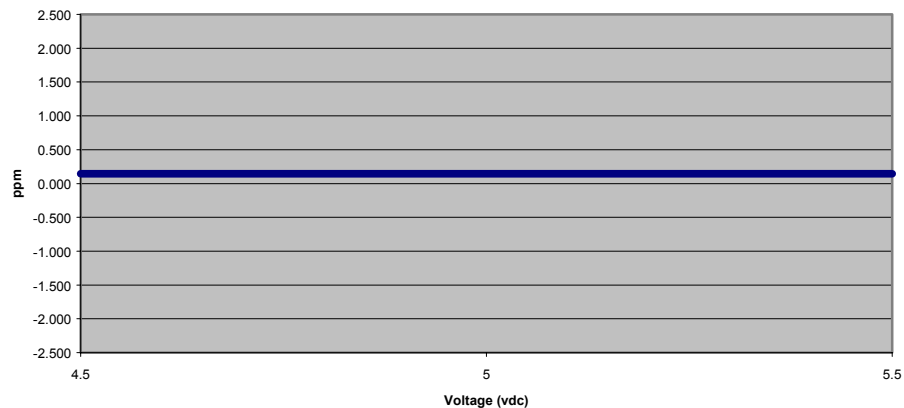
Exhibit	Input Voltage	Temperature (°C)	Modulation (Freq)
1	5.0 $\pm$ 10%, 13.8 $\pm$ 20%	25	AMPS (800)
2	5.0, 13.8	-30 to +50	AMPS (800)
3	5.0 $\pm$ 10%, 13.8 $\pm$ 20%	25	CDMA (800)
4	5.0, 13.8	-30 to +50	CDMA (800)
5	5.0 $\pm$ 10%, 13.8 $\pm$ 20%	25	CDMA (1900)
6	5.0, 13.8	-30 to +50	CDMA (1900)



EXHIBIT 10-1: VOLTAGE FREQUENCY STABILITY - §2.1055; AMPS (800)

Voltage (5V nom./13.8V nom.)	Temperature (°C)	Freq. Error (Hz)
4.5/11.0	25	119.2
4.6/11.6	25	120.2
4.7/12.1	25	120.3
4.8/12.7	25	118.8
4.9/13.2	25	120.4
5.0/13.8	25	119.3
5.1/14.3	25	119.6
5.2/14.9	25	120.4
5.3/15.5	25	120.1
5.4/16.0	25	119.2
5.5/16.6	25	120.3

Voltage Frequency Stability



Voltage Frequency Stability

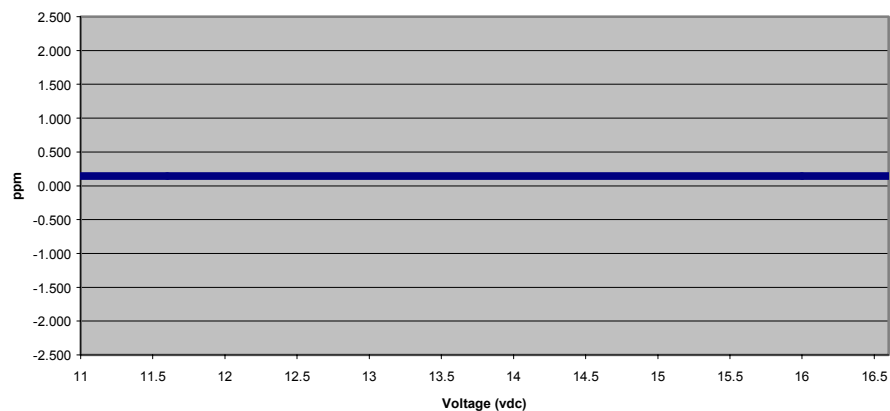




EXHIBIT 10-2: TEMPERATURE FREQUENCY STABILITY - §2.1055; AMPS (800)

(°C)	(5V nom./13.8V nom.)	(Hz)
-30	5.0/13.8	119.7
-20	5.0/13.8	119.7
-10	5.0/13.8	118.9
0	5.0/13.8	120.7
10	5.0/13.8	120.4
20	5.0/13.8	120.0
30	5.0/13.8	121.6
40	5.0/13.8	120.3
50	5.0/13.8	119.1

Temperature Frequency Stability

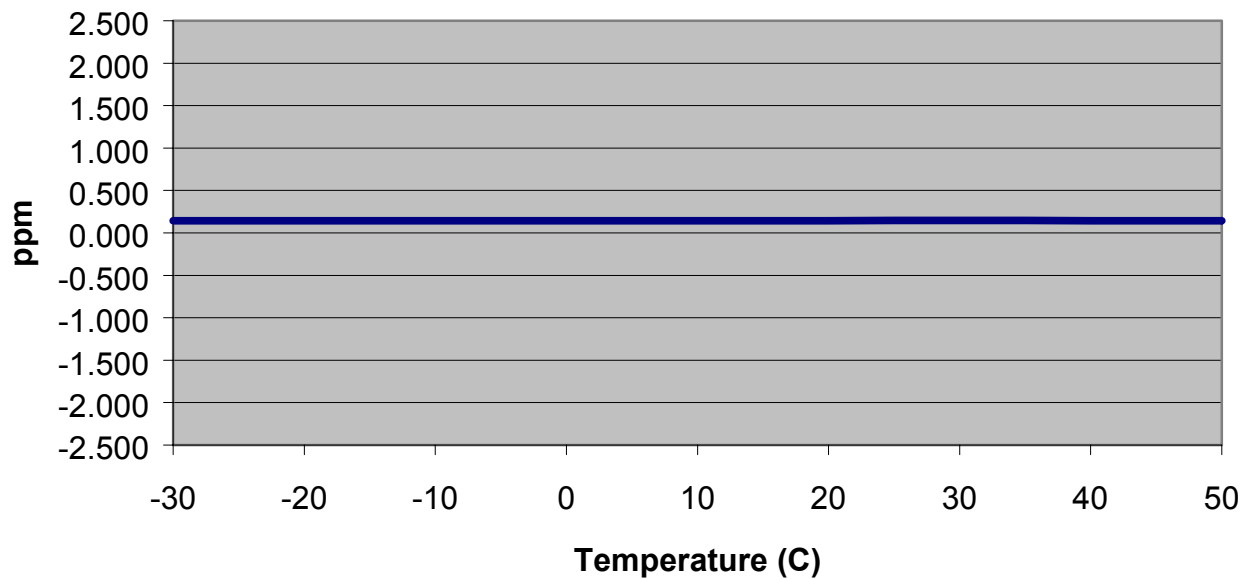
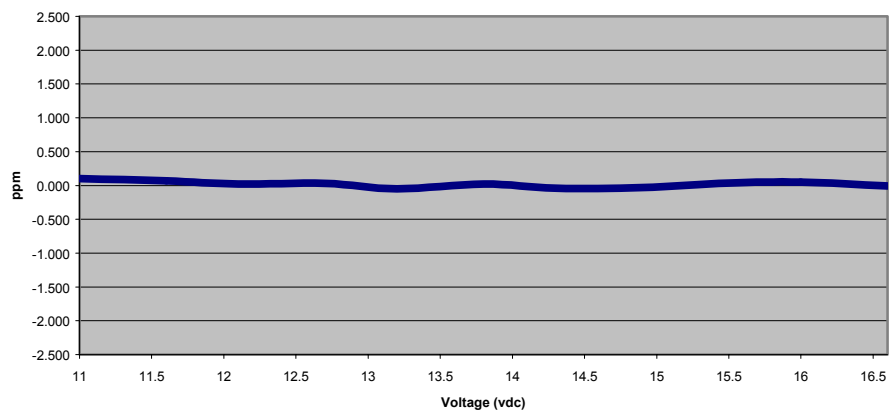




EXHIBIT 10-3: VOLTAGE FREQUENCY STABILITY - §2.1055; CDMA (800)

Voltage (5V nom./13.8V nom.)	Temperature (°C)	Freq. Error (Hz)
4.5/11.0	25	85.8
4.6/11.6	25	57.0
4.7/12.1	25	18.6
4.8/12.7	25	27.4
4.9/13.2	25	-42.0
5.0/13.8	25	17.3
5.1/14.3	25	-32.7
5.2/14.9	25	-26.7
5.3/15.5	25	30.8
5.4/16.0	25	41.6
5.5/16.6	25	-4.7

Voltage Frequency Stability



Voltage Frequency Stability

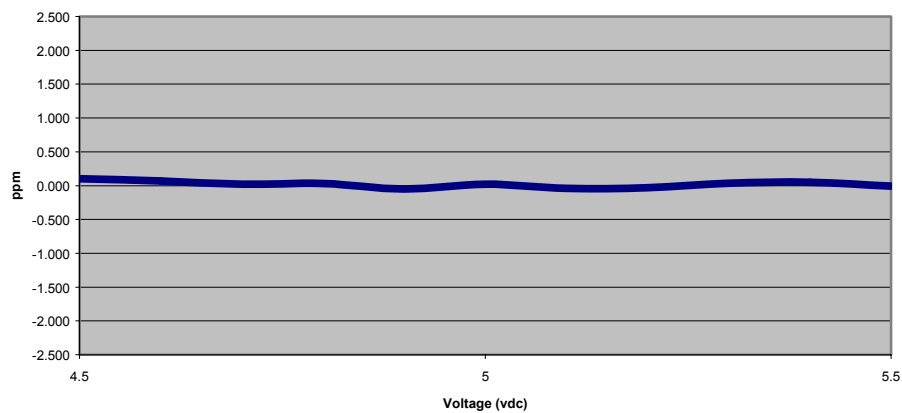




EXHIBIT 10-4: TEMPERATURE FREQUENCY STABILITY - §2.1055; CDMA (800)

(°C)	(5V nom./13.8V nom.)	(Hz)
-30	5.0/13.8	15.2
-20	5.0/13.8	27.5
-10	5.0/13.8	37.8
0	5.0/13.8	-53.7
10	5.0/13.8	6.4
20	5.0/13.8	17.2
30	5.0/13.8	28.0
40	5.0/13.8	26.0
50	5.0/13.8	-50.1

Temperature Frequency Stability

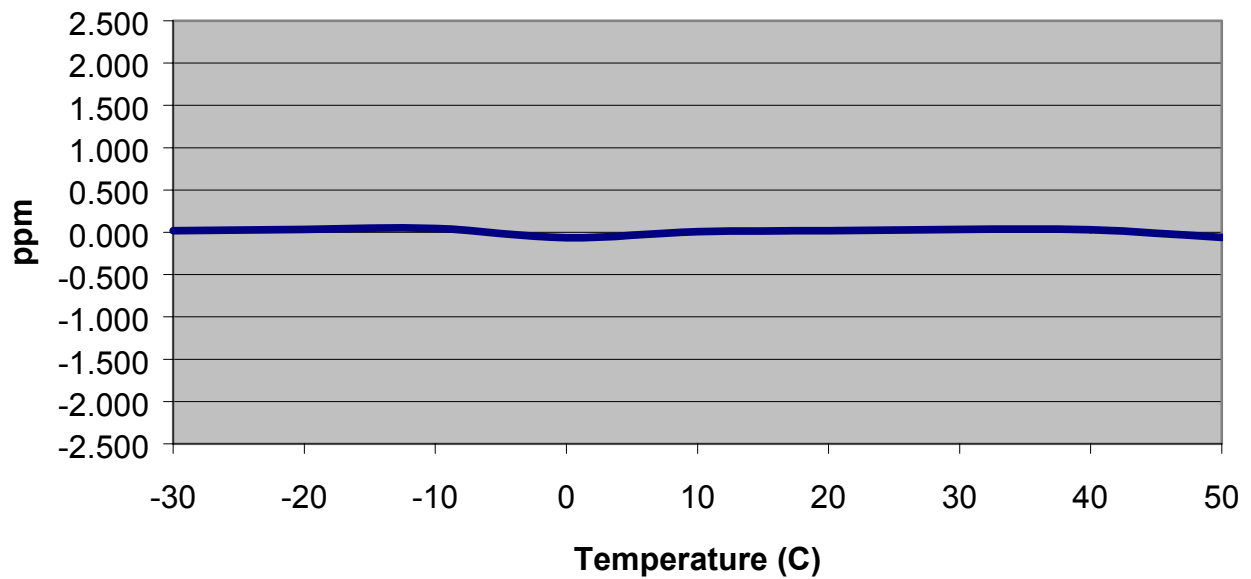
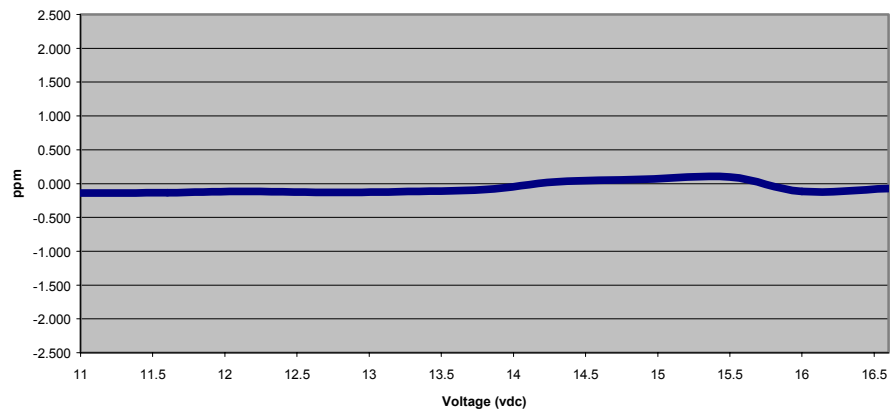




EXHIBIT 10-5: VOLTAGE FREQUENCY STABILITY - §2.1055; CDMA (1900)

Voltage (5V nom./13.8V nom.)	Temperature (°C)	Freq. Error (Hz)
4.5/11.0	25	-117.7
4.6/11.6	25	-112.7
4.7/12.1	25	-95.0
4.8/12.7	25	-109.4
4.9/13.2	25	-100.1
5.0/13.8	25	-71.3
5.1/14.3	25	21.7
5.2/14.9	25	54.3
5.3/15.5	25	80.0
5.4/16.0	25	-97.0
5.5/16.6	25	-61.8

Voltage Frequency Stability



Voltage Frequency Stability

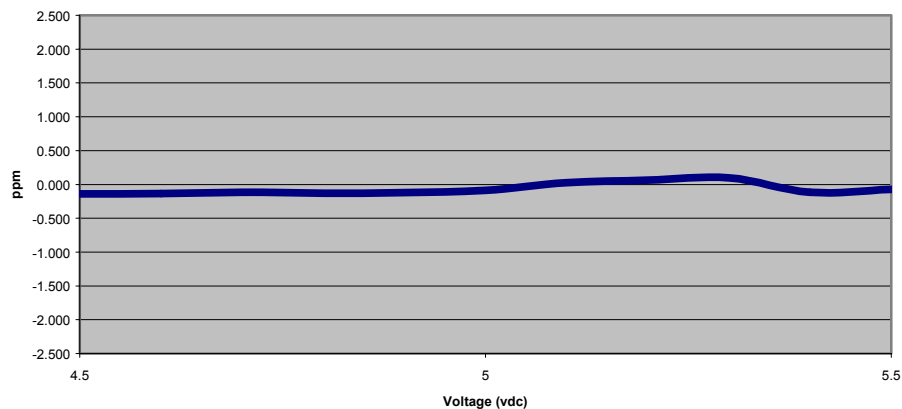
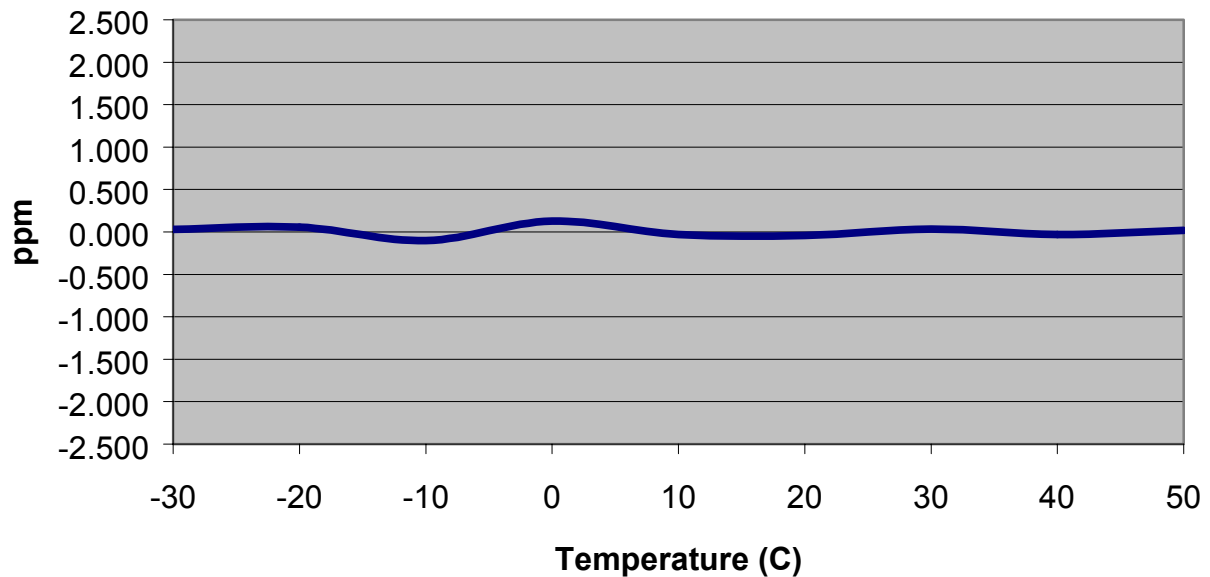




EXHIBIT 10-6: TEMPERATURE FREQUENCY STABILITY - §2.1055; CDMA (1900)

(°C)	(5V nom./13.8V nom.)	(Hz)
-30	5.0/13.8	26.6
-20	5.0/13.8	48.5
-10	5.0/13.8	-85.1
0	5.0/13.8	107.2
10	5.0/13.8	-25.4
20	5.0/13.8	-35.3
30	5.0/13.8	28.4
40	5.0/13.8	-23.8
50	5.0/13.8	16.5

Temperature Frequency Stability





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11 CONCLUSION

The data in this measurement report shows that the Sony Ericsson Mobile Communications (USA, Inc.), CM-42 FCC ID: AXATR-423-A2 complies with all the requirements of Parts 2 and 22.901 of the FCC Rules and Industry Canada RSS-129.