

FCC Parts 22 and 24 Test Report

For
Sierra Wireless Inc.

Performed on the

CDMA Cellular and PCS PCMCIA Card
Model: AIRCARD 555
FCC ID: N7NACRD555

Report #: 2054479

Job #: J20054479
Date of Test: July 16-28, 2001

Total No of Pages Contained in this Report: 67.



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FCC Parts 22, 24 Certification, Ver 7/01



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1.0 Introduction

1.1 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
2.1046	RF Power Output	Complies 23 dBm - average 27.4 dBm - peak	6
22.913, 24.232	ERP, EIRP	Complies	7
2.1047	Modulation Requirements	Not Applicable	-
2.1049	Occupied Bandwidth, Emission Designator	1M25F9W	9
2.1051, 22.901(d) 22.917(f), 24.238(a)	Out of Band Emissions at Antenna Terminals Mobile Emissions In Base Frequency Range	Complies	10
2.1053	Field Strength of Spurious Radiation	Complies	11
15.107	Line Conducted Emissions	Complies	20
2.1055	Frequency Stability vs. Temperature	Complies	21
2.1055	Frequency Stability vs. Voltage	Complies	22
2.1093	Specific Absorption Rate	Complies	*

* Separate Reports are issued

Sierra Wireless Inc. AIRCARD 555
FCC ID: N7NACRD555

Date of Test: July 16-28, 2001

1.2 Product Description

The Sierra Wireless Inc. Model AIRCARD 555 is dual band CDMA PCMCIA Radio Card with removable antenna.

For more information, please refer to the attached product description.

Use of Product	Portable Cellular and PCS PCMCIA Card
Whether quantity (>1) production is planned	<input checked="" type="checkbox"/> Yes, <input type="checkbox"/> No
Cellular Phone standards	CDMA
Type(s) of Emission	1M25F9W
RF Output Power	824-849 MHz: 23 dBm (Average) 1850-1910 MHz: 23 dBm (Average)
Frequency Range	824 - 849 MHz, 1850 - 1910 MHz
Antenna(e) & Gain	~ 0 dBi
Detachable antenna ?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Receiver L.O. frequency	1052.61 - 1077.57 MHz (Cellular) 2113.6 - 2173.6 MHz (PCS)
External input	<input checked="" type="checkbox"/> Audio <input type="checkbox"/> Digital Data

1.3 Test Configuration

The Radio was tested in two configurations:

1. Radio Card installed into Laptop
2. Radio Card installed into hand-held computer (PDA)



Item #	Description	Model No.	Serial No.
1	EUT	AIRCARD 555	
2	Laptop	IBM 2609	AB-C8259
3	PDA	HP F1260A	SG84602056

1.4 Related Submittal(s) Grants

DOC for computer section. A separate DOC Report is prepared.

2.0 RF Power Output
FCC 2.1046

2.1 Test Procedure

The transmitter output was connected to the Average Power Meter. The output power was adjusted to 23 dBm. The transmitter output was connected a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. The resolution and video bandwidths of the spectrum analyzer were set up to 10 MHz and 7 MHz accordingly. The peak power at the transmitter output was determined by adding the value of the attenuator and cable loss to the spectrum analyzer reading.

Tests were performed at three frequencies (low, middle, and high channels) in Cellular in PCS bands.

2.2 Test Equipment

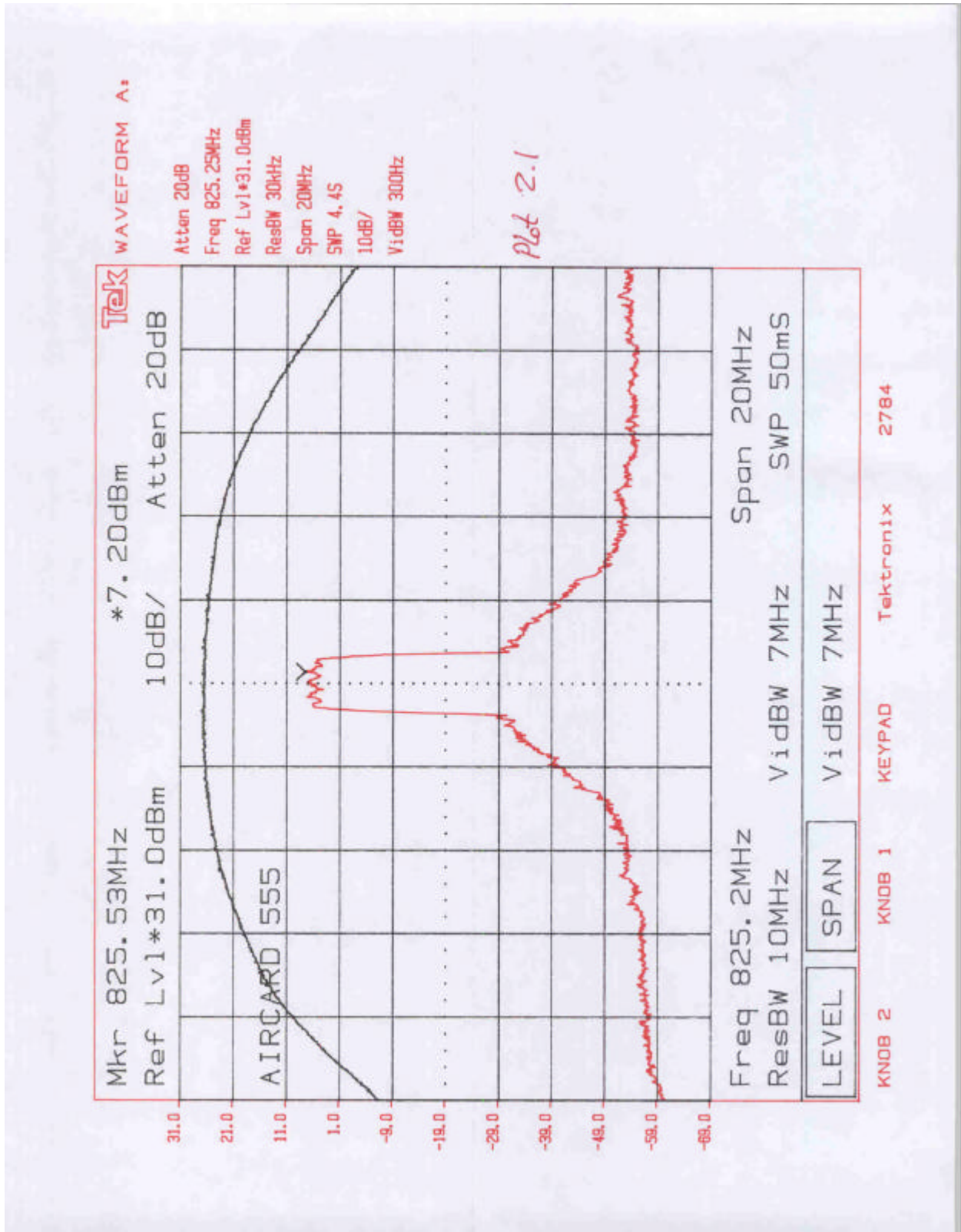
Gigatronics 8542 Power Meter
Tektronix 2784 Spectrum Analyzer, 100 Hz – 40 GHz
10 dB Attenuator

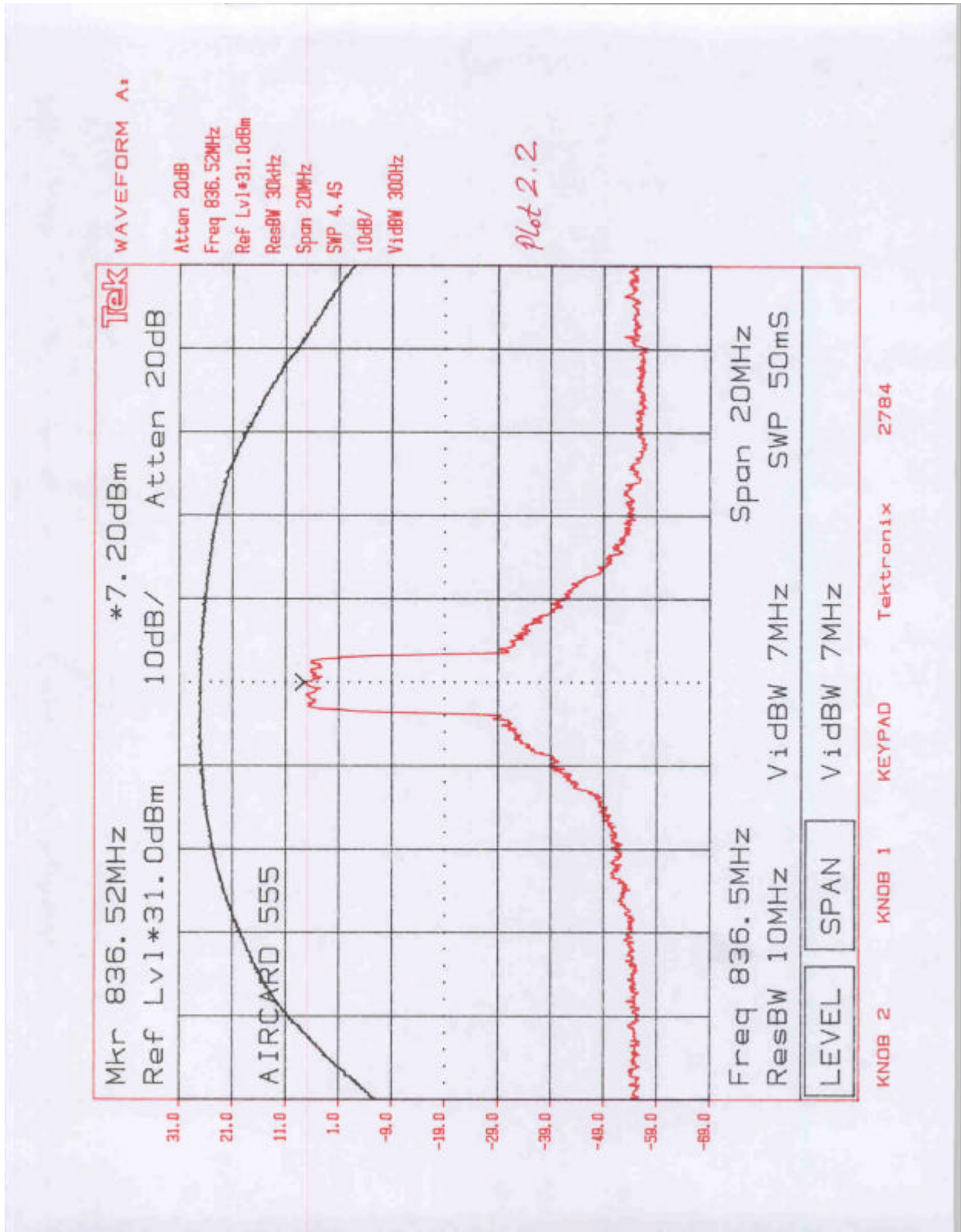
2.3 Test Results

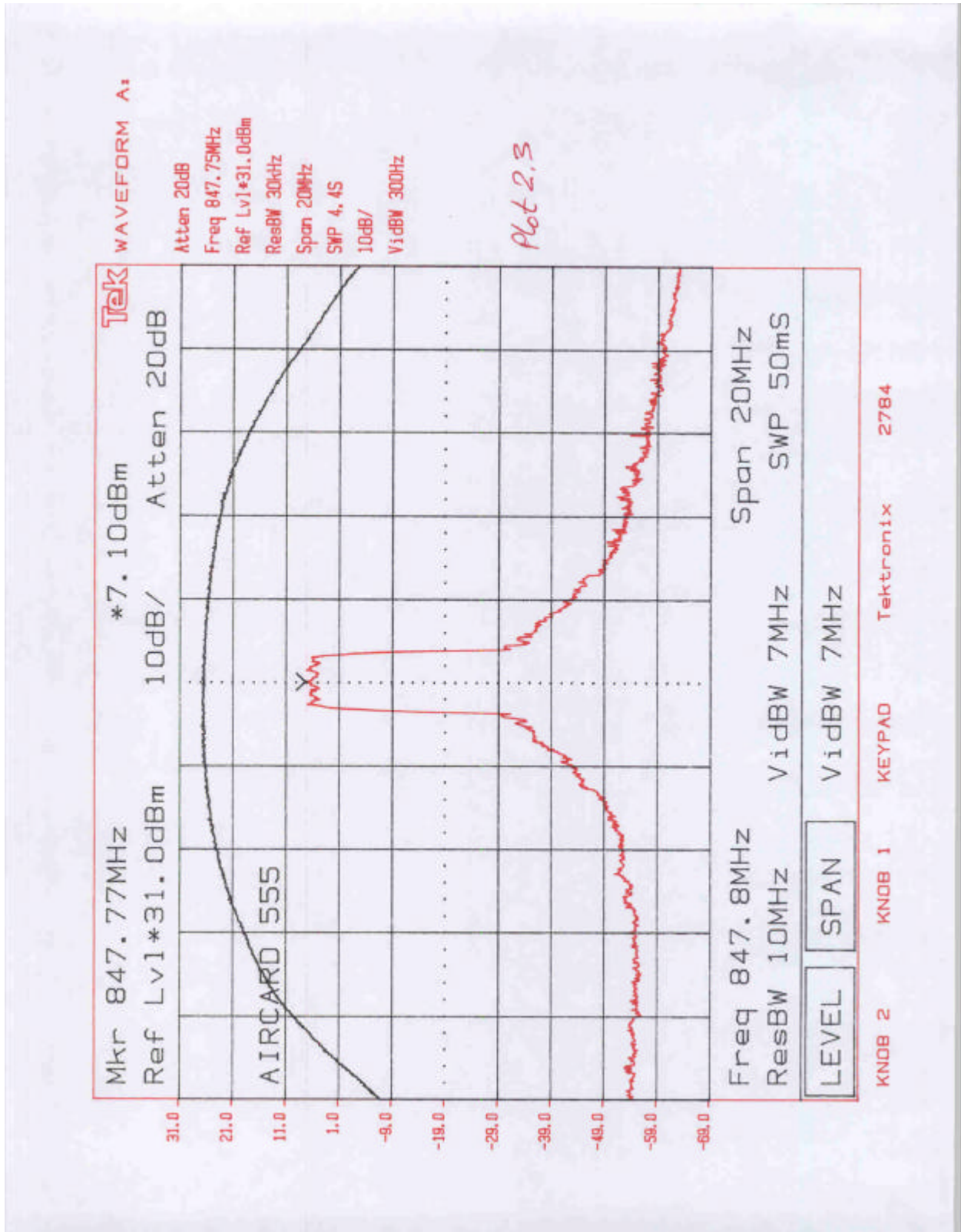
Frequency (MHz)	Average Power (dBm)	Measured Peak Power (dBm)
825.25	23.0	27.3
836.5	23.0	27.4
847.75	23.0	27.4
1851.25	23.0	27.4
1880.0	23.0	27.4
1908.75	23.0	27.3

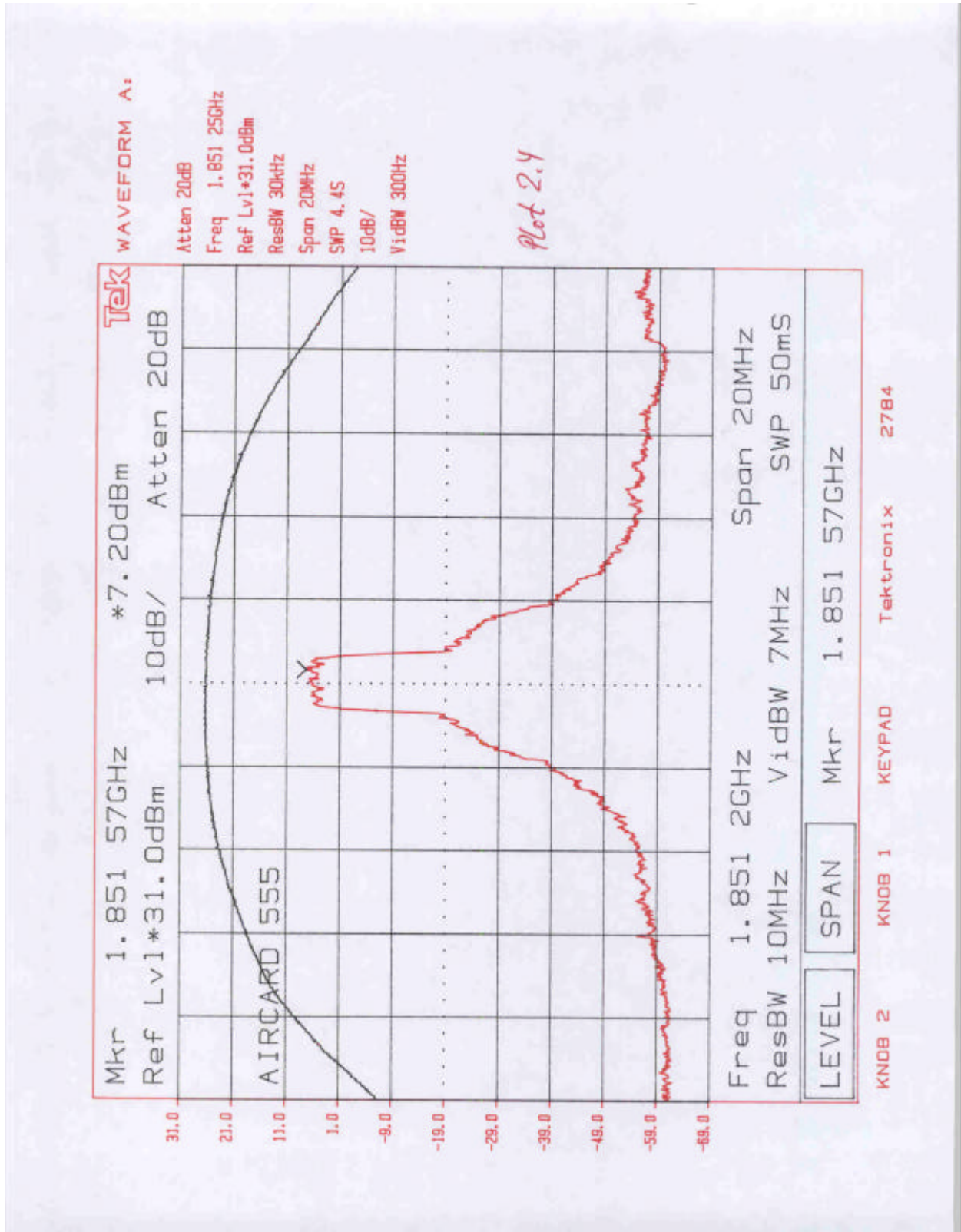
For more details refer to the attached plots:

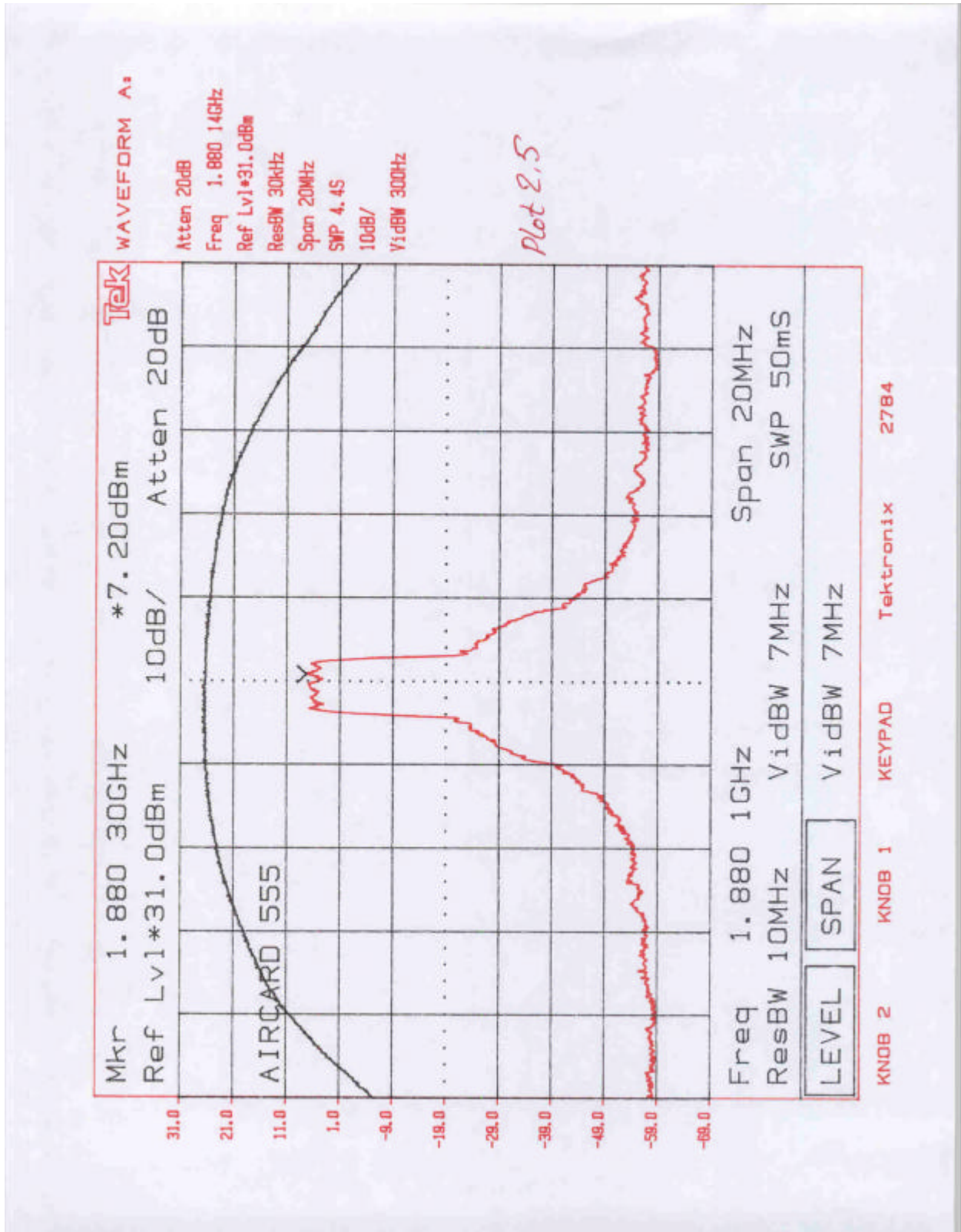
Cellular Band (CDMA Mode)	
Plot Number	Description
2.1	Low Channel
2.2	Middle Channel
2.3	High Channel
PCS Band (CDMA Mode)	
Plot Number	Description
2.4	Low Channel
2.5	Middle Channel
2.6	High Channel

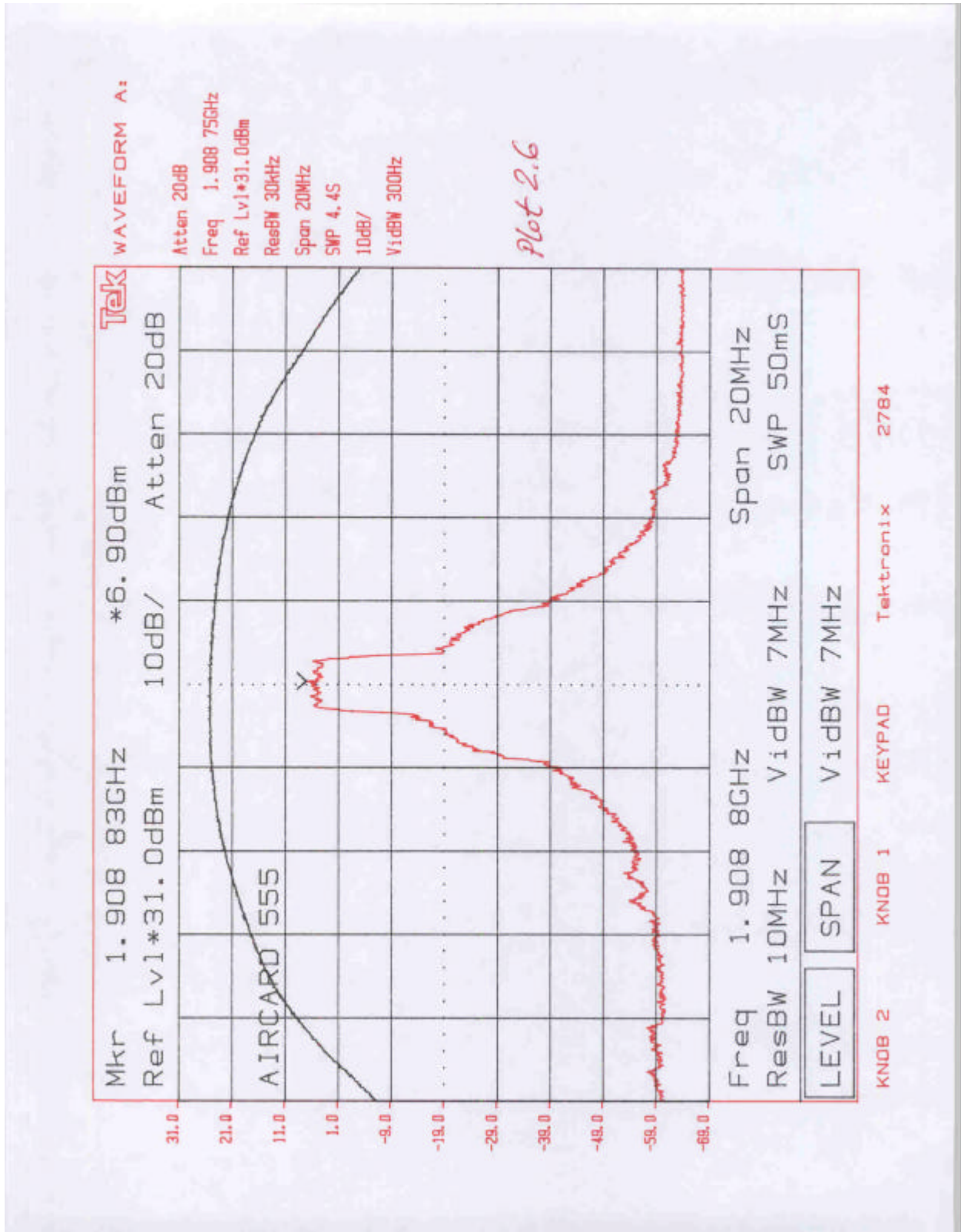












3.0 Radiated Power

FCC 22.913

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 24.232

The Equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

3.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 10 MHz and 7 MHz.

The highest emission level was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading was recorded

ERP in frequency band 824-849 MHz, and EIRP in frequency band 1851.25-1910 MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849 MHz) or horn antenna (1851.25-1908.75 MHz) connected to a signal generator. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

$$\text{ERP} = U_1 - U_2 + V_g, ; \text{EIRP} = U_1 - U_2 + V_g + G$$

where U_1 & U_2 are spectrum analyzer readings in dBuV when measured field strength from EUT & generator accordingly; V_g is the generator output in dBm; G is the transmitting antenna gain.

3.2 Test Equipment

Tektronix 2784 Spectrum Analyzer, 100 Hz – 40 GHz
EMCO 3148 Log Periodic Antenna
EMCO 3115 Horn Antenna
CDI Robert's Antenna
Hewlett Packard 8656A signal generator

3.3 Test Results

Complies	Refer to the data sheet below
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	Frequency MHz	Antenna Polarization H/V	SA Reading (EUT) dB(uV)	SA Reading (Signal Gen & Tuned Dipole) dB(uV)	Signal Generator Power dBm	Effective Radiated Power (EUT) dBm
Laptop	825.25	H	103.0	85.7	9.6	26.9
	836.50	H	103.0	85.6	9.5	26.9
	847.75	H	102.1	84.7	9.4	26.8
PDA	825.25	H	102.7	85.7	9.6	26.6
	836.50	H	102.6	85.6	9.5	26.5
	847.75	H	101.8	84.7	9.4	26.5
	Frequency MHz	Antenna Polarization H/V	SA Reading (EUT) dB(uV)	SA Reading (Signal Gen & Horn Antenna) dB(uV)	Signal Generator Power + Horn Antenna Gain dBm	Equivalent Isotropic Radiated Power (EUT) dBm
Laptop	1851.25	H	97.1	85.0	16.2	28.3
	1880.00	H	96.5	84.5	16.0	28.0
	1908.75	H	94.9	84.4	15.9	26.4
PDA	1851.25	H	97.0	85.0	16.2	28.2
	1880.00	H	96.6	84.5	16.0	28.1
	1908.75	H	95.4	84.4	15.9	26.9

4.0 Occupied Bandwidth
FCC 2.1049

4.1 Test Procedure

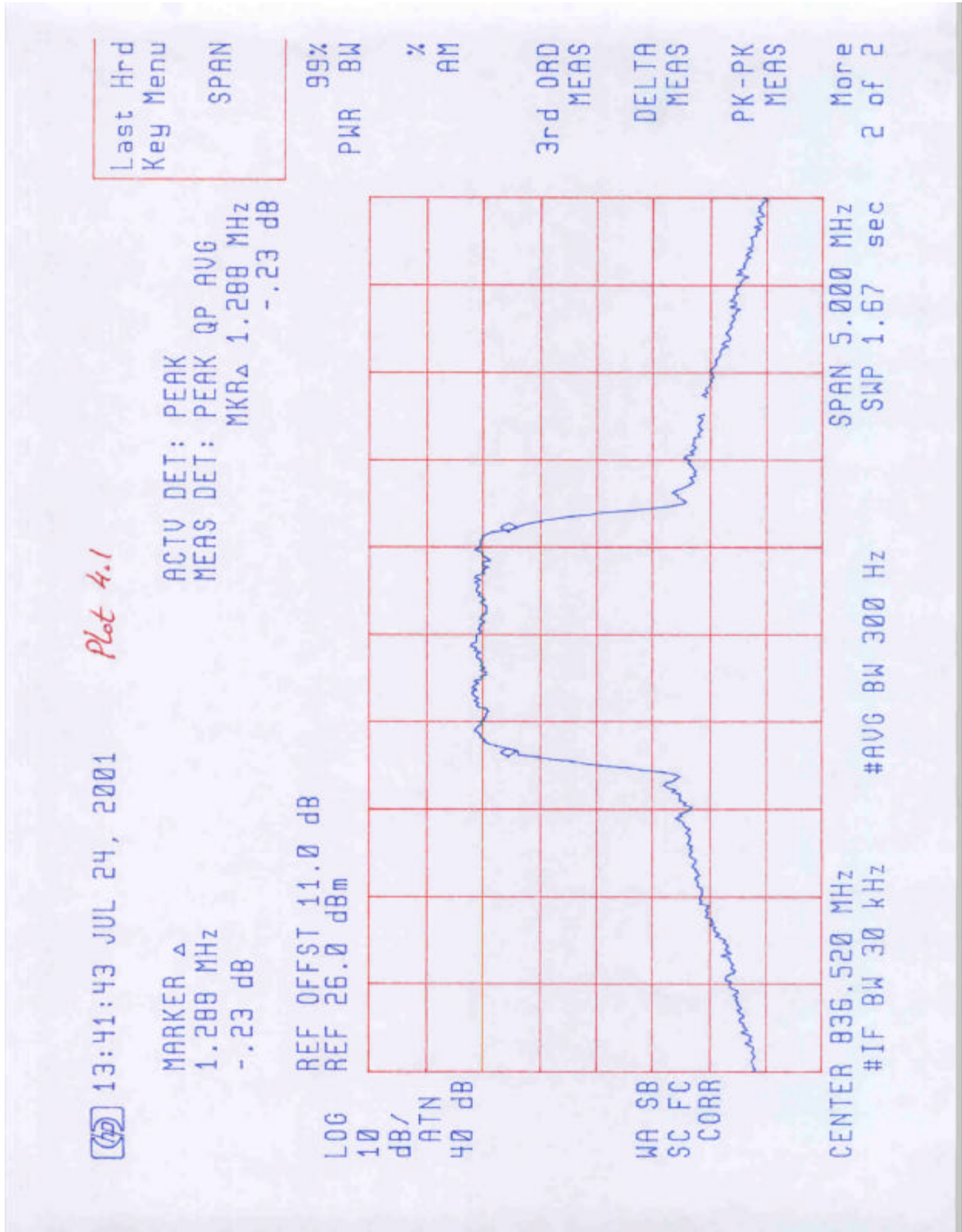
The transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. The Occupied Bandwidth (defined as the 99% Power Bandwidth) was measured with HP8546A Spectrum Analyzer.

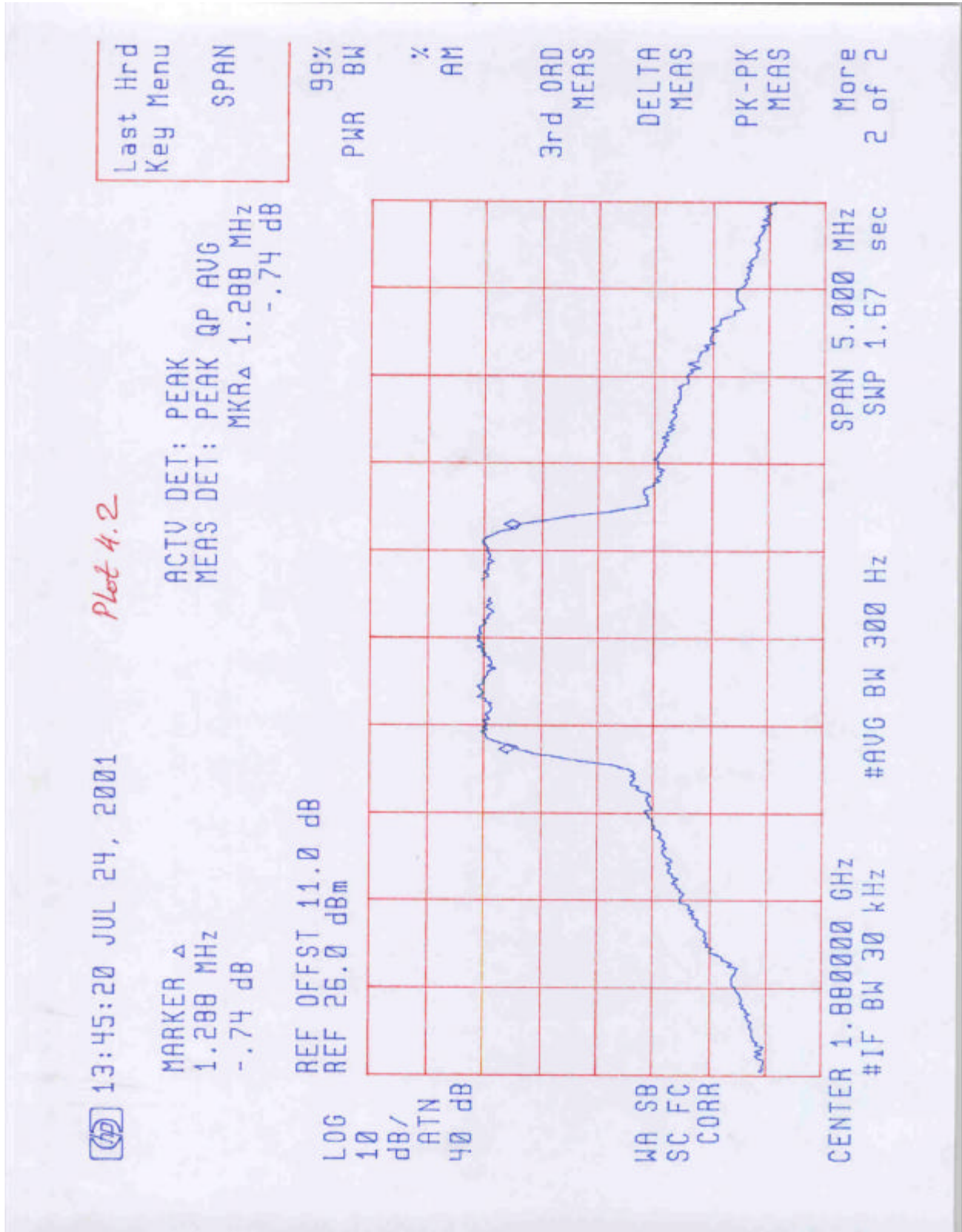
4.2 Test Equipment

Hewlett Packard HP8546A Spectrum Analyzer

4.3 Test Results

See attached plots 4.1 and 4.2. The test result shows that the bandwidth is 1.288 MHz, which is 3% higher than the theoretical bandwidth for CDMA - 1.25 MHz. The Emission Designator was determined as 1M25F9W





5.0 Out of Band Emissions at Antenna Terminals

FCC 22.901(d), 22.901(d), 22.917(f), 24.238(a)

Out of Band Emissions:

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least $(43 + 10 \log P)$ dB.

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.

5.1 Test Procedure

The RF output of the transmitter was connected to a spectrum analyzer through appropriate attenuation. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic.

5.2 Test Equipment

Tektronix 2784 Spectrum Analyzer

5.3 Test Results

Complies	Refer to the attached plots.
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Cellular Band	
Plot Number	Description
5.1a - 5.1e	Low Channel, 825.25 MHz
5.2a - 5.2e	Middle Channel, 836.5 MHz
5.3a - 5.3e	High Channel, 847.75 MHz

PCS Band	
Plot Number	Description
5.4a - 5.4f	Low Channel, 1851.25 MHz
5.5a - 5.5e	Middle Channel, 1880 MHz
5.6a - 5.6f	High Channel, 1908.75 MHz

Emission in Base Frequency Range	
Plot Number	Description
5.7a	Low Channel, 825.25 MHz
5.7b	Middle Channel, 836.5 MHz
5.7c	High Channel, 847.75 MHz

