ITS Intertek Testing Services
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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

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FCC Parts 22, 24 Certification, Ver 7/01

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* Separate Reports are issued

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	[X] Yes, [ ] 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 ? **Receiver L.O. frequency** **External input**	[X]Yes [ ] No 1052.61 - 1077.57 MHz (Cellular) 2113.6 - 2173.6 MHz (PCS) [X] Audio [ ] 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

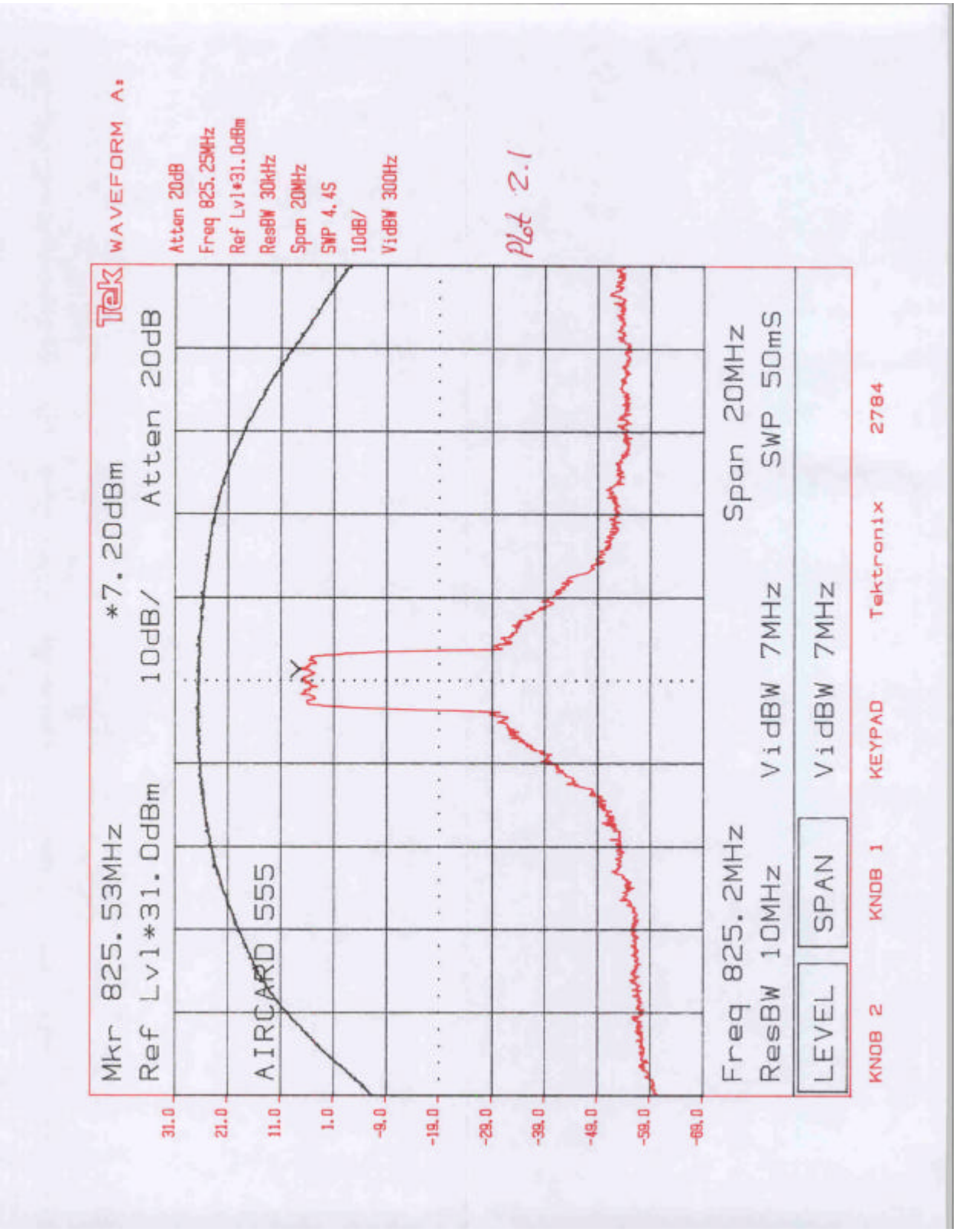
Gigatronics 8542 Power Meter
Tektronix 2784 Spectrum Analyzer, 100 Hz – 40 GHz
10 dB Attenuator

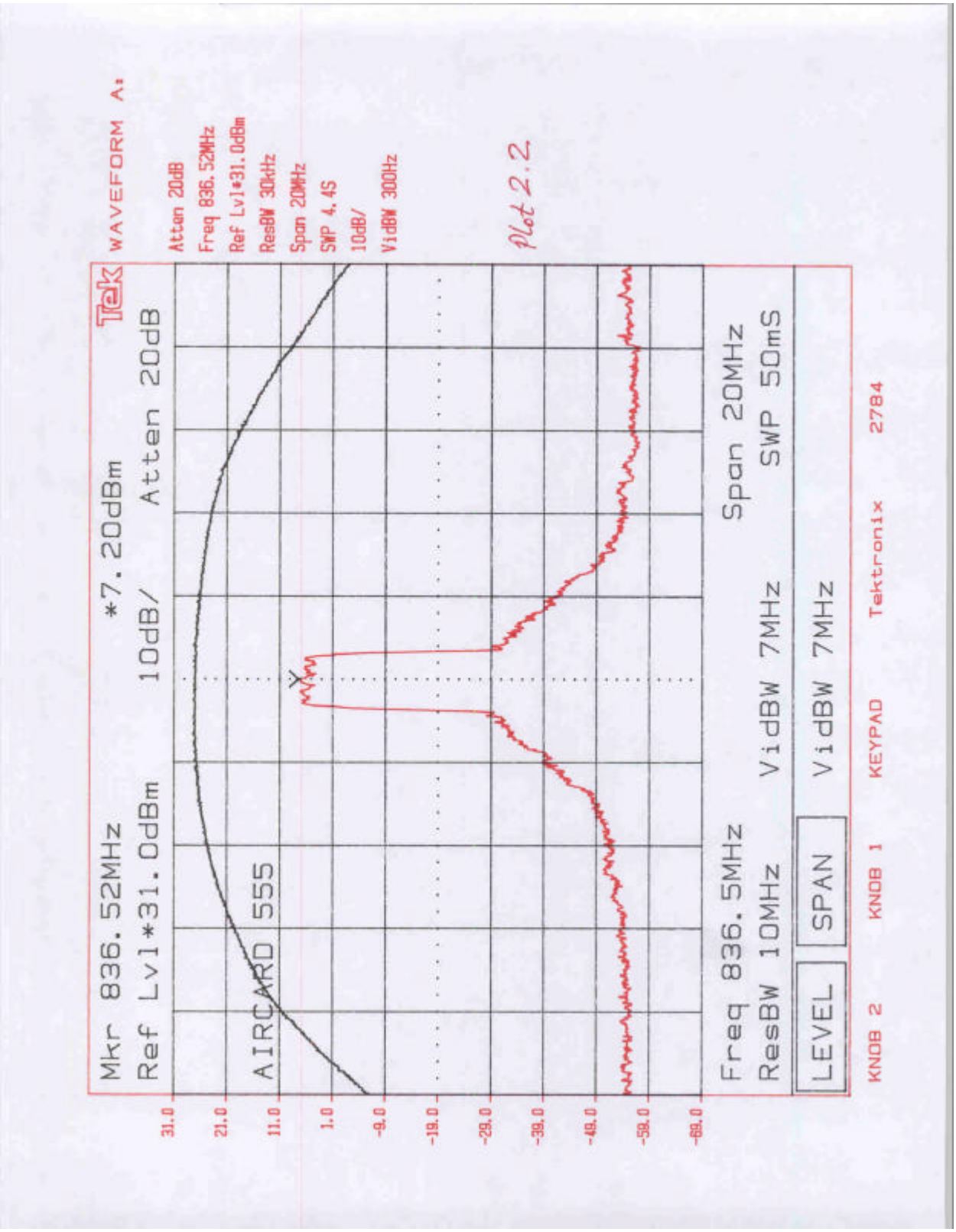
2.3 Test Results

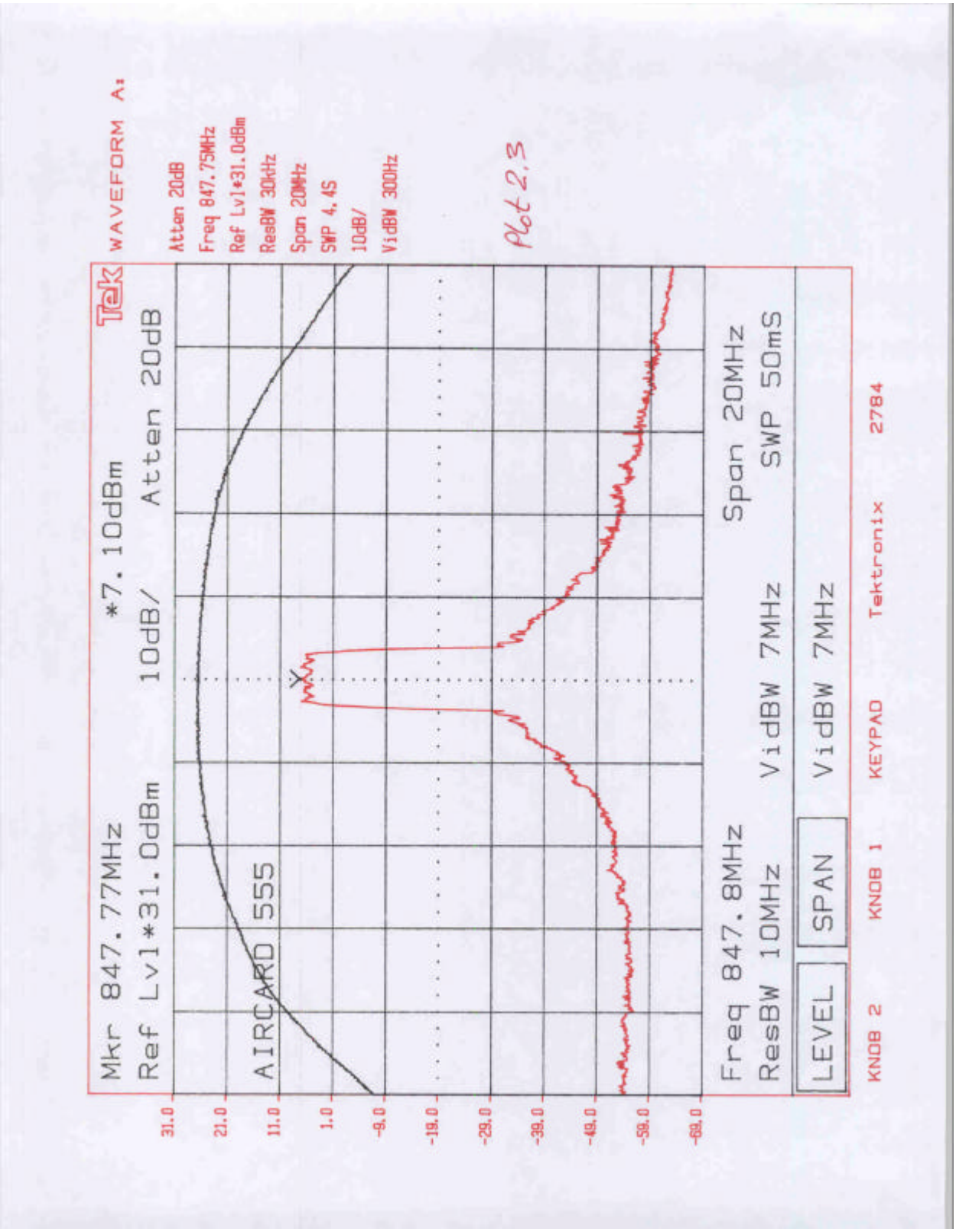
Frequency (MHz)	Average Power (dBm)	Measured Peak Power (dBm)
825.25	23.0	27.3
836.5	23.0	27.4
847.75	23.0	27.4
1851.25	23.0	27.4
1880.0	23.0	27.4
1908.75	23.0	27.3

For more details refer to the attached plots:

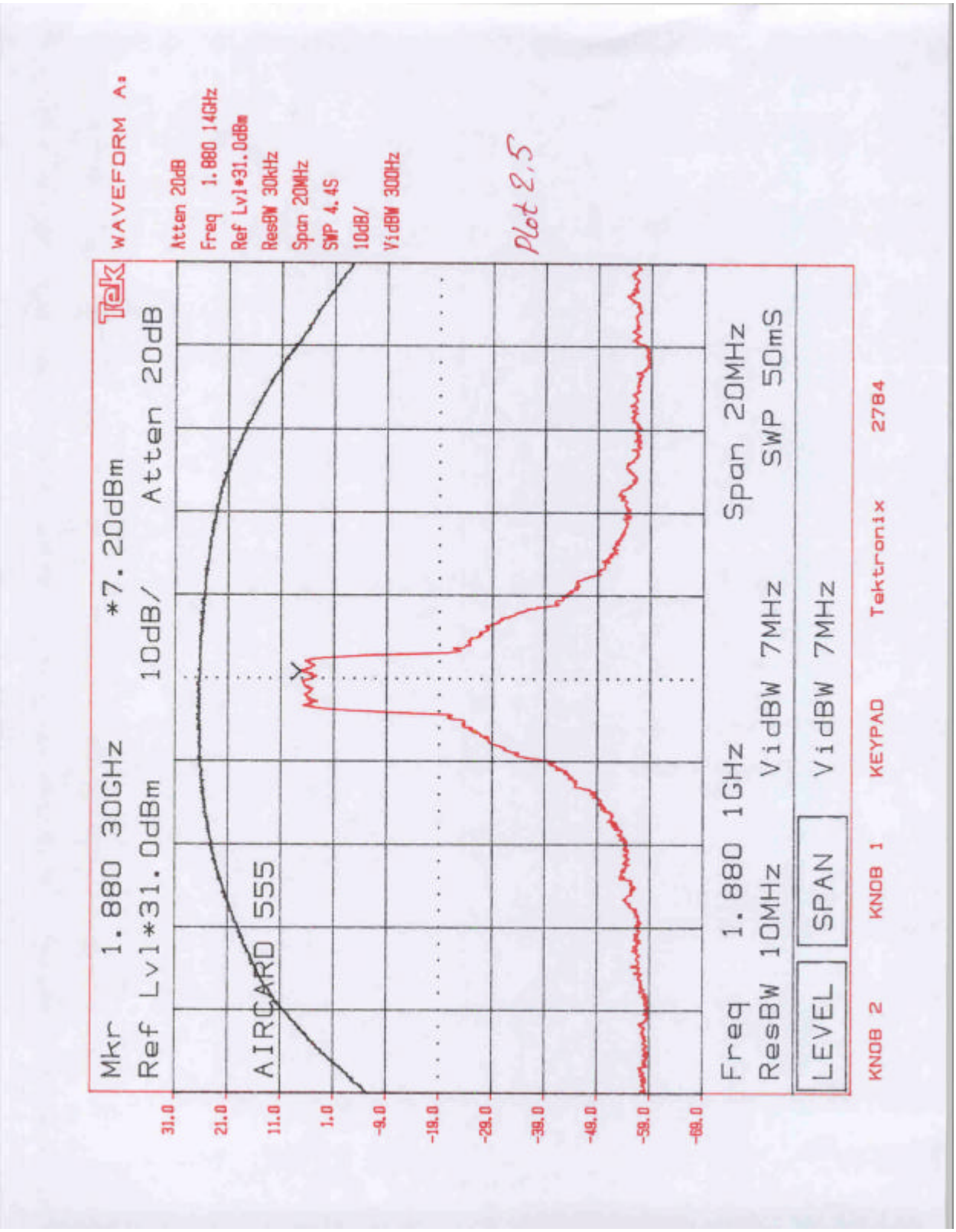
Cellular Band (CDMA Mode)	
Plot Number	**Description**
2.1	Low Channel
2.2	Middle Channel
2.3	High Channel
PCS Band (CDMA Mode)	
Plot Number	**Description**
2.4	Low Channel
2.5	Middle Channel
2.6	High Channel

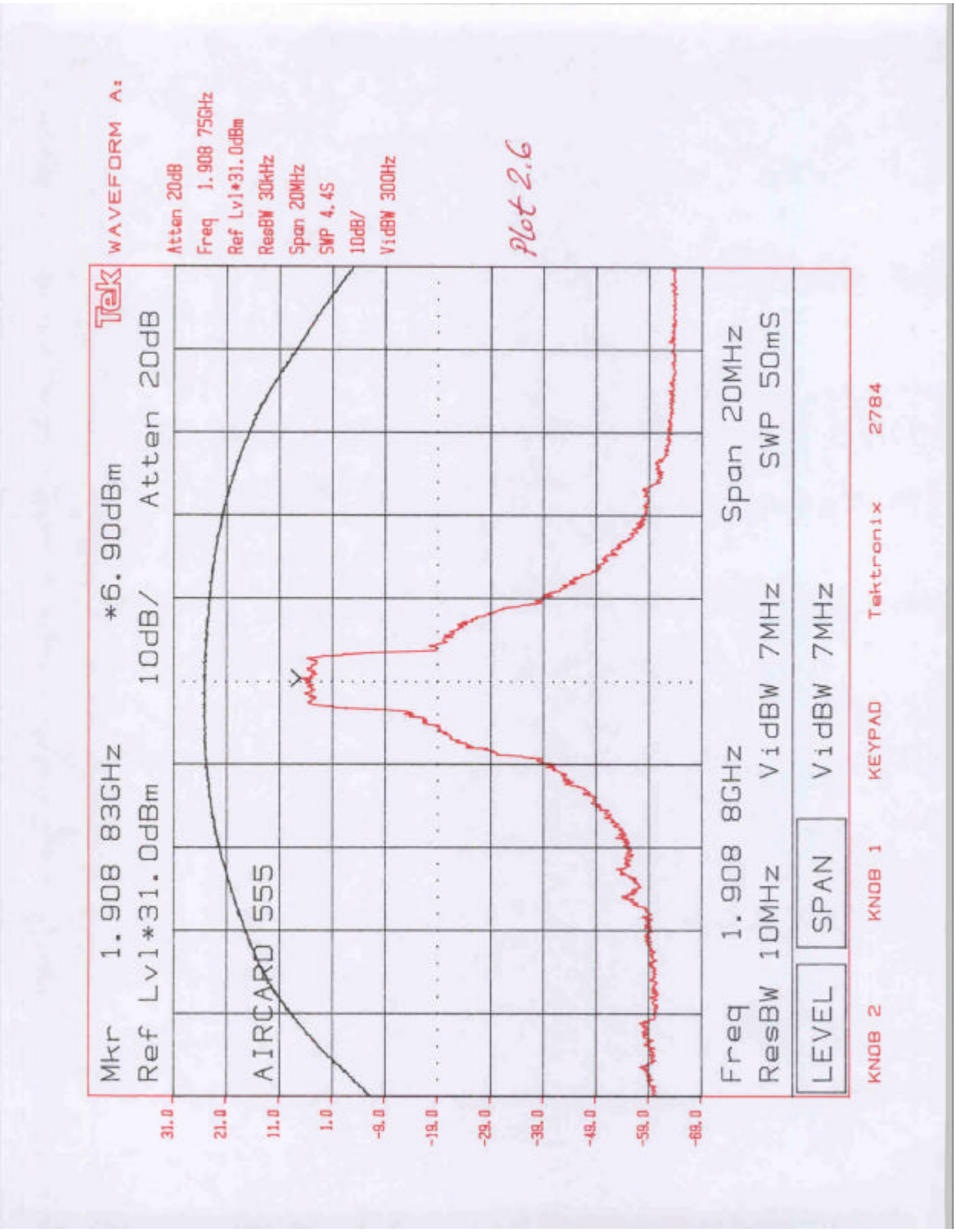

WAVEFORM A
Atten 20dB
Freq 825.25MHz
Ref Lvl*31.0dBm
ResBW 30kHz
Span 20MHz
SWP 4.4S
10dB/
VidBW 300Hz
Plot 2.1
Tek
Mkr 825.53MHz
Ref Lvl*31.0dBm
*7.20dBm
10dB/ Atten 20dB
AIRCARD 555
Freq 825.2MHz
ResBW 10MHz
Span 20MHz
VidBW 7MHz
SWP 50mS
VidBW 7MHz
LEVEL
SPAN
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784
31.0
21.0
11.0
1.0
-9.0
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0


WAVEFORM A:
Atten 20dB
Freq 836.52MHz
Ref Lvl*31.0dBm
ResBW 30kHz
Span 20MHz
SWP 4.4S
10dB/
VidBW 300Hz
Plot 2.2
Tek
*7.20dBm
Mkr 836.52MHz
Ref Lvl*31.0dBm
10dB/ Atten 20dB
AIRCARD 555
Span 20MHz
SWP 50mS
Freq 836.5MHz
ResBW 10MHz
VidBW 7MHz
VidBW 7MHz
LEVEL
SPAN
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784
31.0
21.0
11.0
1.0
-9.0
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0


WAVEFORM A:
Atten 20dB
Freq 847.75MHz
Ref Lvl*31.0dBm
ResBW 30kHz
Span 20MHz
SWP 4.4S
10dB/
VidBW 300Hz
Plot 2.3
Tek
Mkr 847.77MHz
Ref Lvl*31.0dBm
*7.10dBm
10dB/ Atten 20dB
AIRCARD 555
31.0
21.0
11.0
1.0
-9.0
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Freq 847.8MHz
ResBW 10MHz
Span 20MHz
SWP 50mS
VidBW 7MHz
VidBW 7MHz
LEVEL
SPAN
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


WAVEFORM A:
Atten 20dB
Freq 1.851 25GHz
Ref Lvl*31.0dBm
ResBW 30kHz
Span 20MHz
SWP 4.4S
10dB/
VidBW 300Hz
Plot 2.4
Tek
Mkr 1.851 57GHz *7.20dBm
Ref Lvl*31.0dBm 10dB/ Atten 20dB
AIRCARD 555
31.0
21.0
11.0
1.0
-9.0
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Freq 1.851 2GHz Span 20MHz
ResBW 10MHz VidBW 7MHz SWP 50mS
LEVEL SPAN Mkr 1.851 57GHz
KNOB 2 KNOB 1 KEYPAD Tektronix 2784


Mkr 1.880 30GHz
Ref Lvl*31.0dBm
*7.20dBm
10dB/ Atten 20dB
AIRCARD 555
Tek
WAVEFORM A:
Atten 20dB
Freq 1.880 14GHz
Ref Lvl*31.0dBm
ResBW 30kHz
Span 20MHz
SWP 4.4S
10dB/
VidBW 300Hz
Plot 2.5
Freq 1.880 1GHz
ResBW 10MHz
Span 20MHz
VidBW 7MHz
SWP 50mS
VidBW 7MHz
LEVEL
SPAN
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784
31.0
21.0
11.0
1.0
-9.0
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0


Plot 2.6
WAVEFORM A:
Atten 20dB
Freq 1.908 75GHz
Ref Lvl*31.0dBm
ResBW 30kHz
Span 20MHz
SWP 4.4S
10dB/
VidBW 300Hz
Tek
Mkr 1.908 83GHz *6.90dBm
Ref Lvl*31.0dBm 10dB/ Atten 20dB
AIRCARD 555
31.0
21.0
11.0
1.0
-9.0
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Freq 1.908 8GHz Span 20MHz
ResBW 10MHz VidBW 7MHz SWP 50mS
LEVEL SPAN VidBW 7MHz
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

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:

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

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

	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