Application for Certification
For an RF Power Amplifier

Paradigm Wireless Systems Inc.
1672 McGaw Ave.
Irvine, CA 92614

RF Power Amplifier:

Part # MAP800-70S

FCC ID: OQ3MAP800-70S

REPORT # RA054914/10100

This report was prepared in accordance with the requirements of the FCC Rules and Regulations Part 2, Subpart J, 2.1031 through 2.1057, Part 22 and Part 90 and other applicable sections of the rules as indicated herein.

Prepared By:

Fred Gurule

DNB Engineering, Inc.
3535 W. Commonwealth Ave.
Fullerton, CA 92833

12 FEBRUARY 2001

TABLE OF CONTENTS

1.0 ADMINISTRATIVE DATA

1.1 Certifications and Qualifications

I certify that DNB Engineering, Inc conducted the tests performed in order to obtain the technical data presented in this application. Also, based on the results of the enclosed data, I have concluded that the equipment tested meets or exceeds the requirements of the Rules and Regulations governing this application.

1.2 Measurement Repeatability Information

The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2.1031 through 2.1057, Part 22 and Part 90. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include: The same test distance, EUT Height, Measurement Site Characteristics, and the same EUT System Components. The system must have the same Interconnecting Cables arranged in identical placement to that in the test set-up, with the system and/or EUT functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and the environment on the date of the test may result in measurement repeatability difficulties.
All changes made to the EUT during the course of testing as identified in this test report must be incorporated into the EUT or identical models to ensure compliance with the FCC regulations.

Bryan Broaddus (Para. 1.1)
Manager, Test Dept.
DNB Engineering, Inc.
Tel. (714) 870-7781 FAX (714) 870-5081

2.1033 (C) (1) Application for Certification

Name of Applicant:		Paradigm Wireless Systems Inc. 1672 McGaw Ave. Irvine, CA 92614
Applicant is:	X	Manufacturer Vendor Licensee Prospective Licensee Other
Name of Manufacturer		Paradigm Wireless Technology
Description:		RF Power Amplifier
Part Number:		MAP800-70S
Anticipated Production Quantity:		Multiple Units

2.1033 (C) (2) FCC Identifier

FCC ID: OQ3MAP800-70S

2.1033 (C) 3) Installation and Operating Instructions

Please refer to Appendix A

2.1033 (C) (4) Type of Emission

N/A (CDMA Modulation)

2.1033 (C) (10) Schematic Diagram and Circuit Description

Please refer to Appendix B

2.1033 (C) (11) Equipment Identification Plate

RF AMPLIFIER

MODEL NO. MAP800-70S

VOLTAGE: 27 VDC, 31A **PWR OUTPUT: 110W**

FCC ID: OQ3MAP800-70S **SERIAL NO._____**

PARADIGM WIRELESS TECHNOLOGY **MADE IN USA**

NOTES:
Label will be constructed of 0.02 inch aluminum as shown on the equipment with permanent adhesive.

All information on the label will be etched or stamped. Both methods will exceed the expected lifetime of the equipment.

The label will be large enough to allow all information to be legible.

2.1033 (C) (11) Equipment Photographs

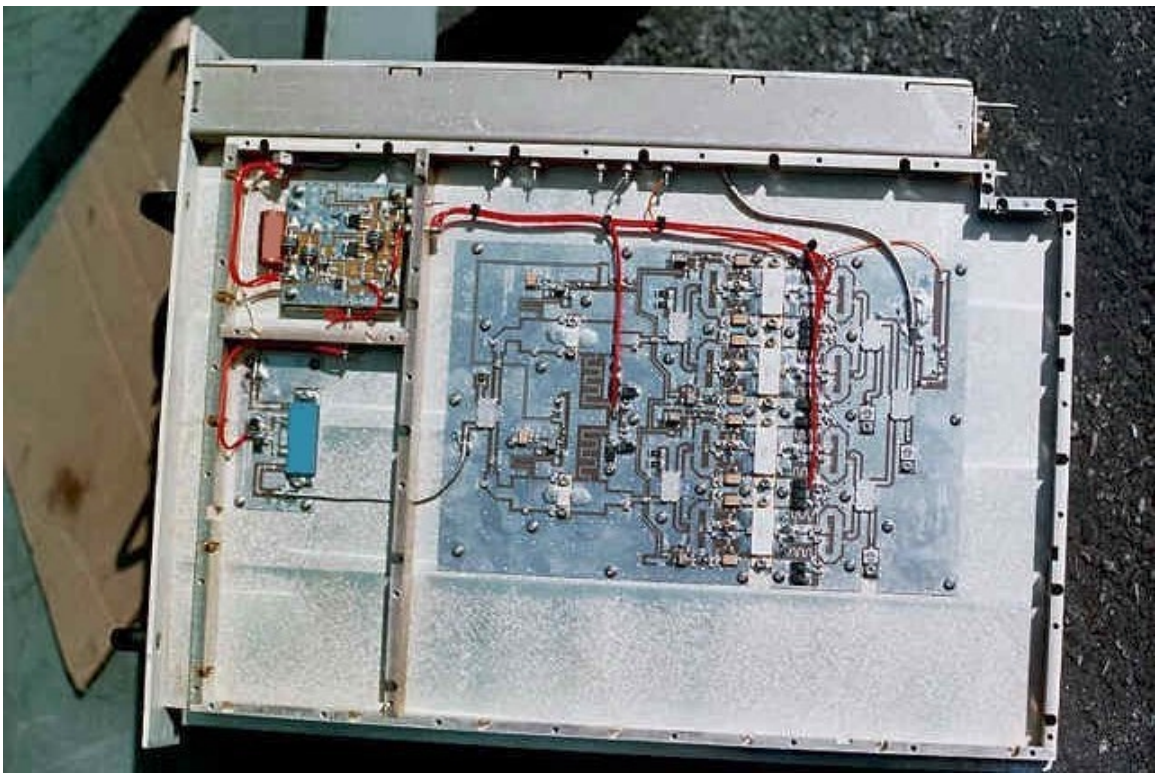
Note: The Main Circuit Board shown in these photos has no components on the reverse side.

Photo 1 Main Circuit Board (Overall View)

Photo 2 Main Circuit Board (Detail)

Photo 3 External Front, Back and Side Views

Photo 1 Main Circuit Board (Overall View)



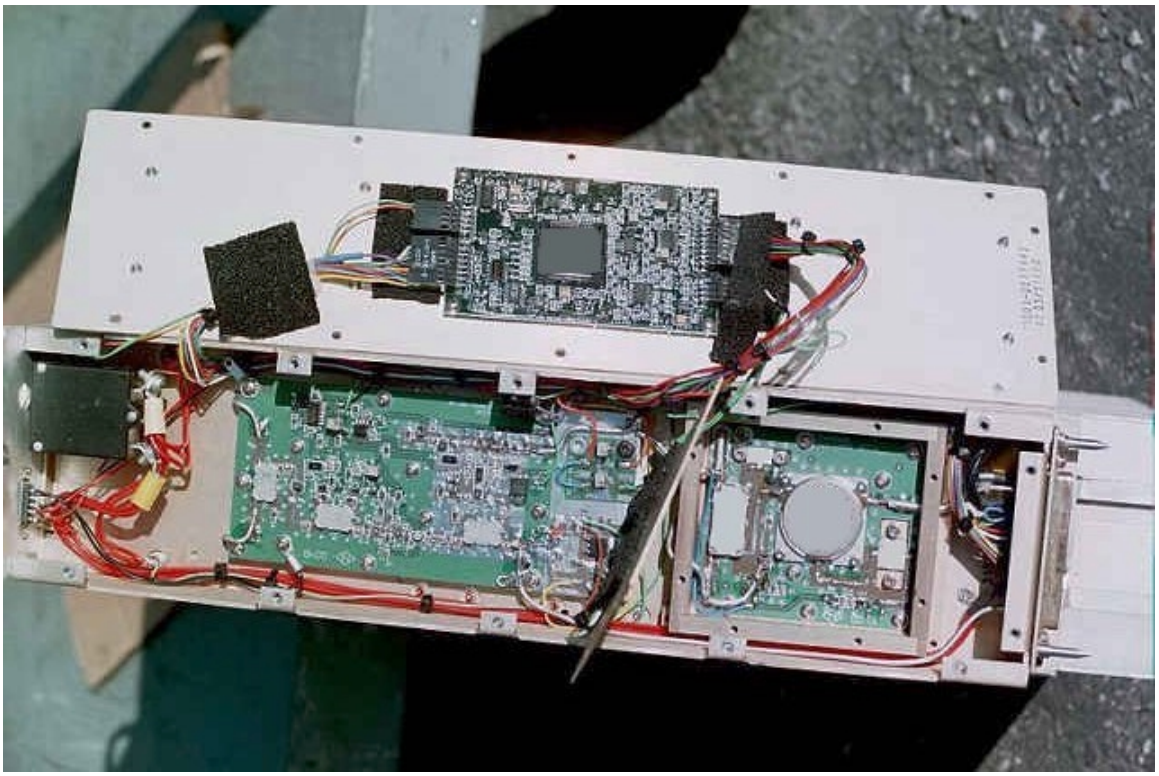
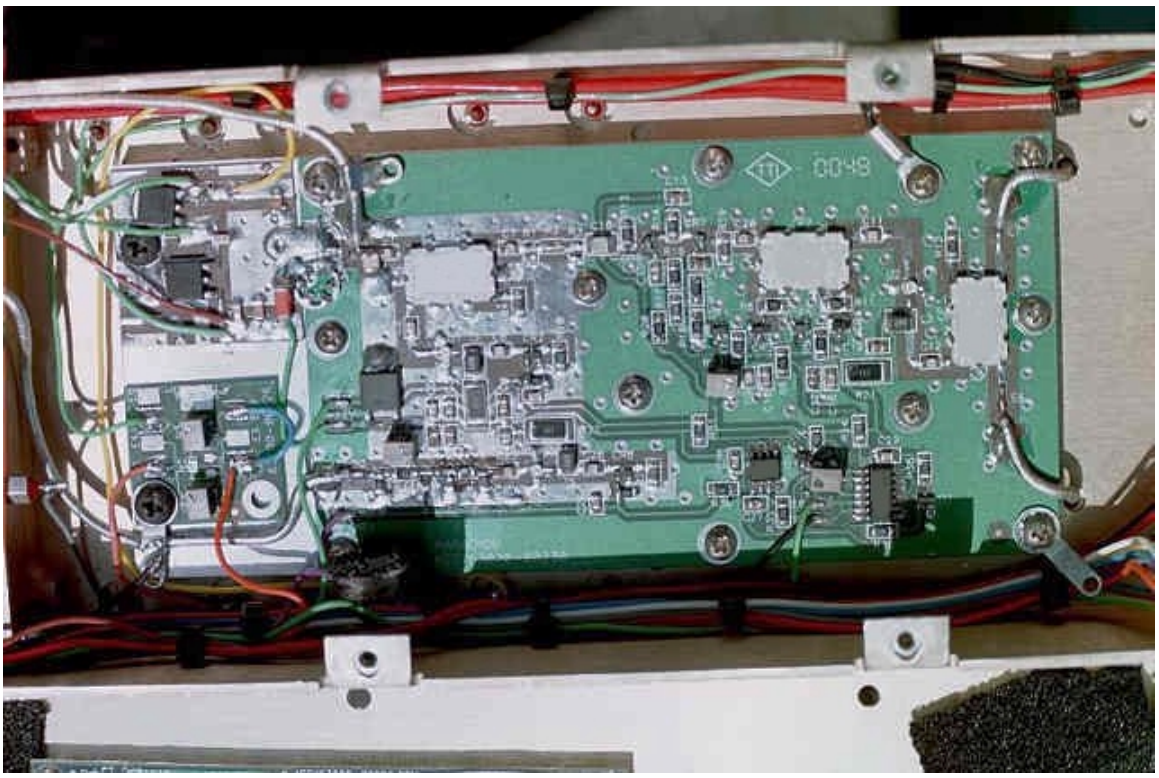
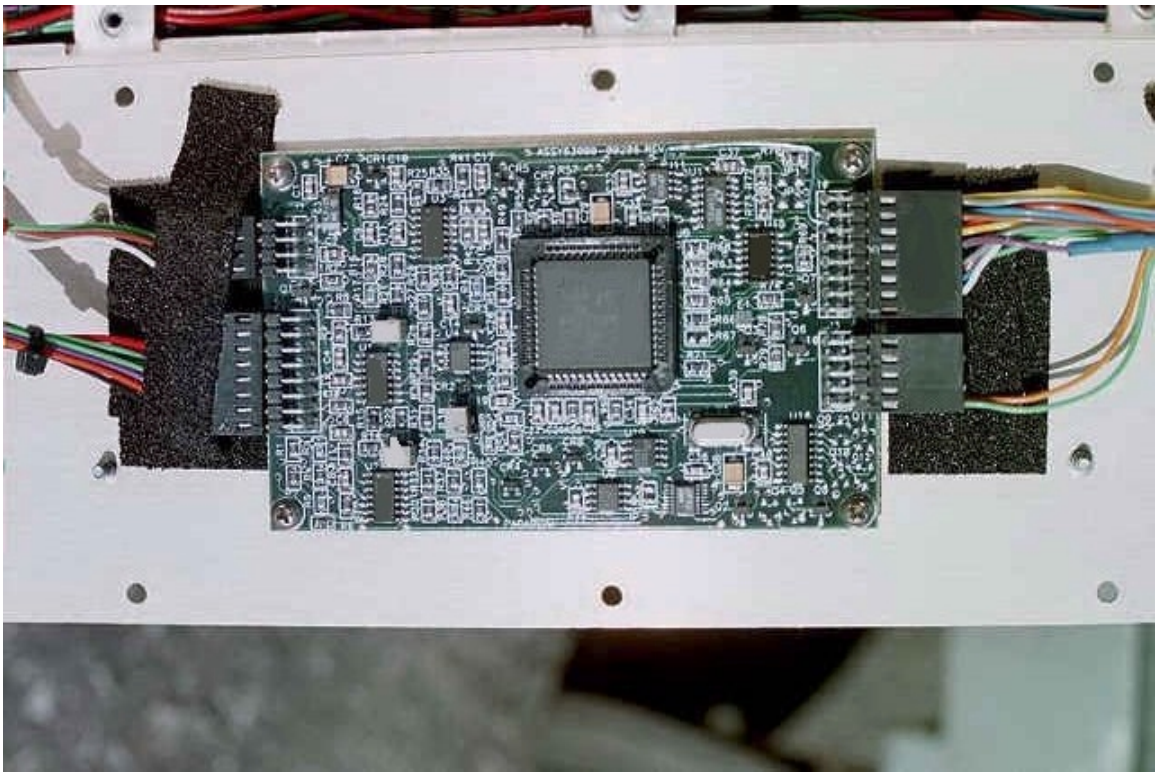
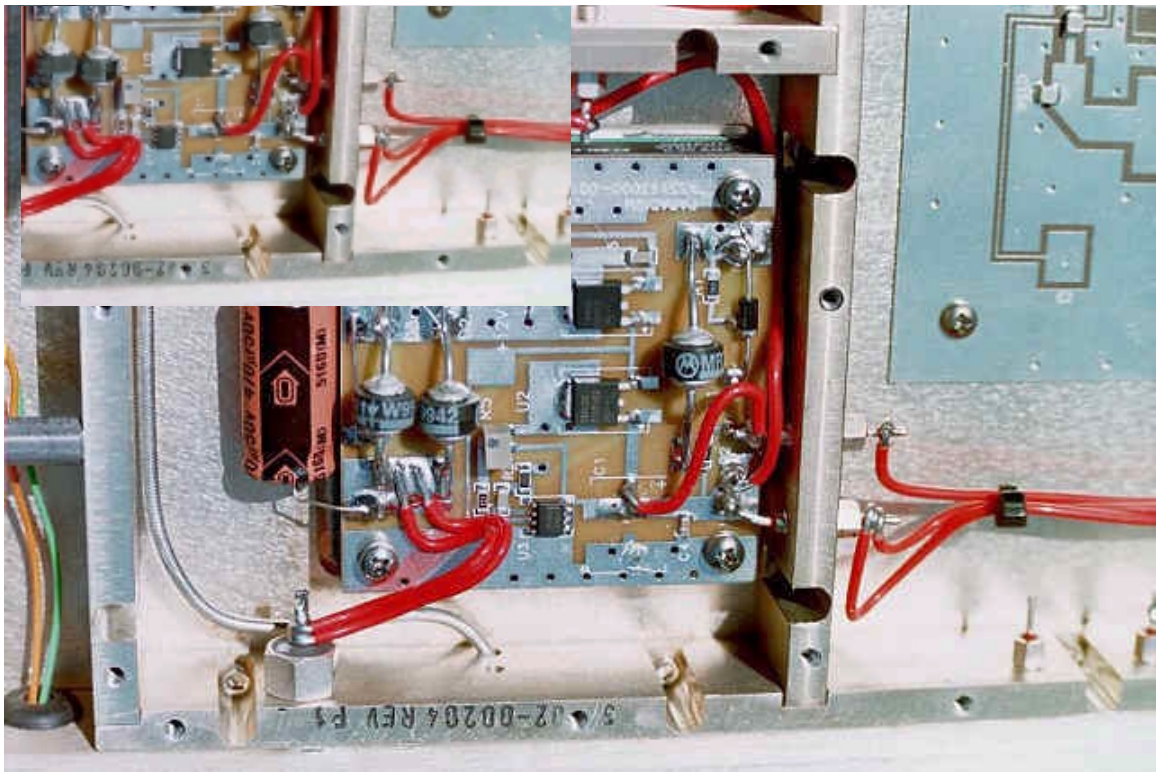
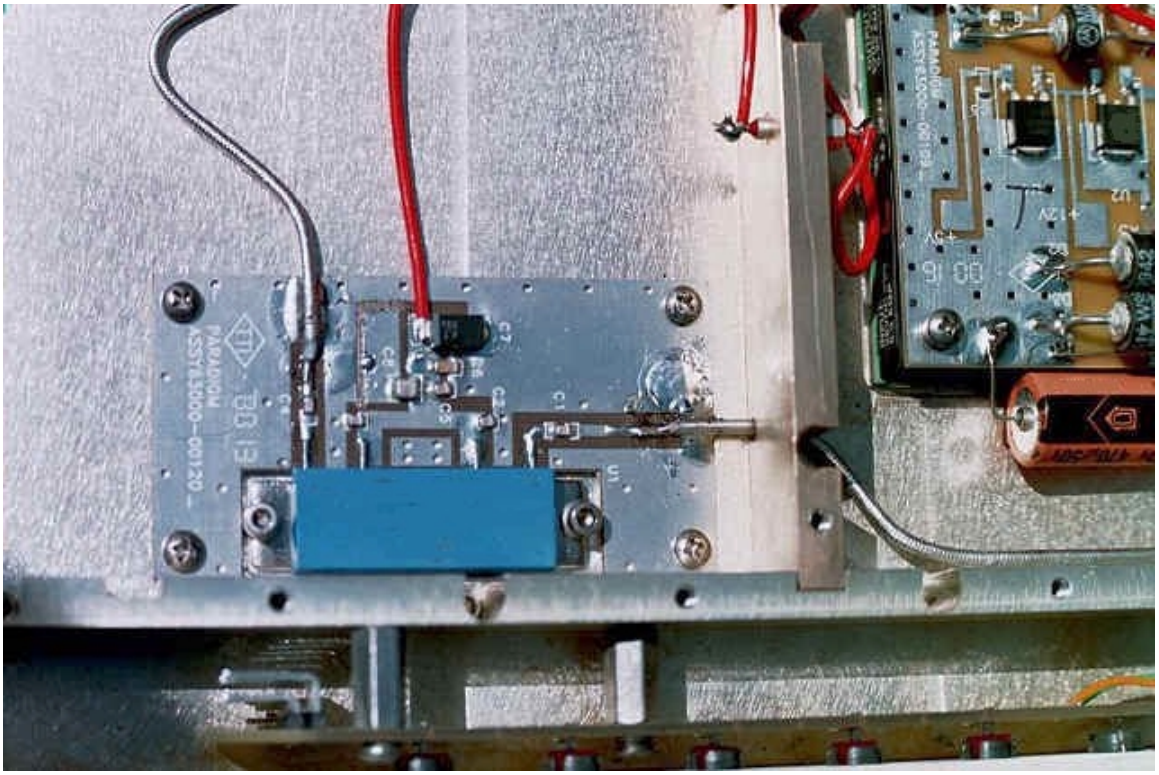


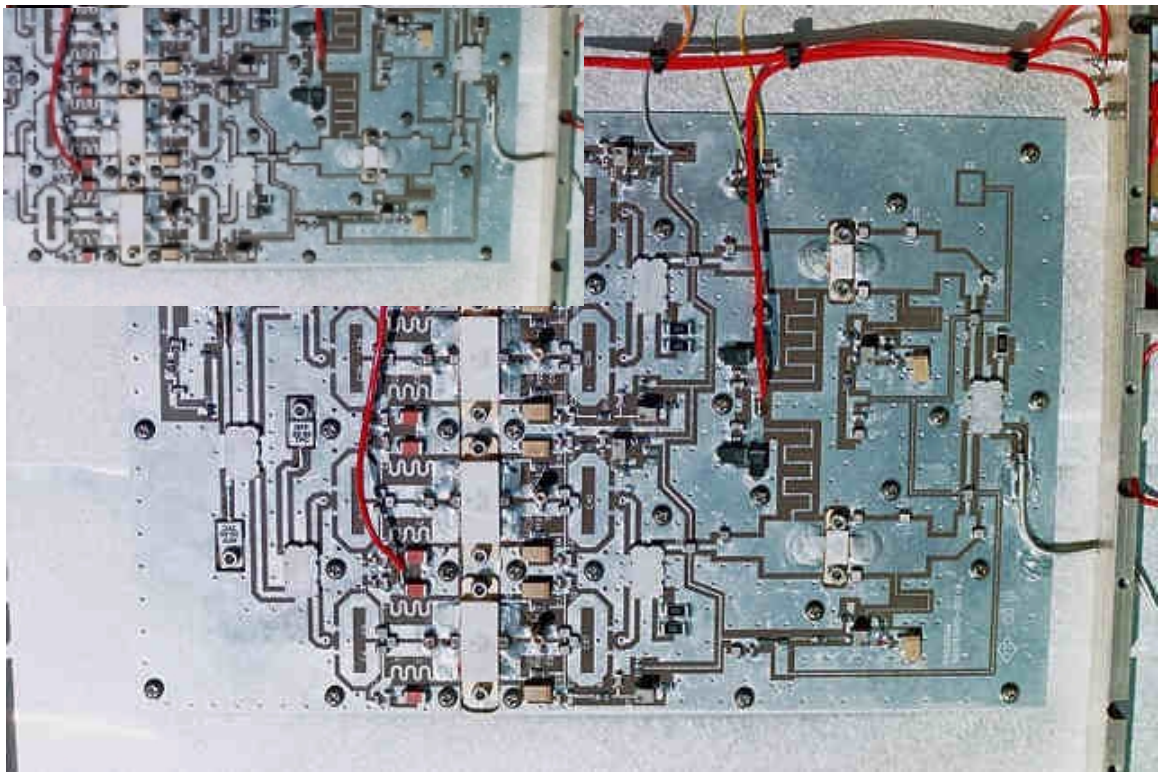
Photo 2 Main Circuit Board (Detail)











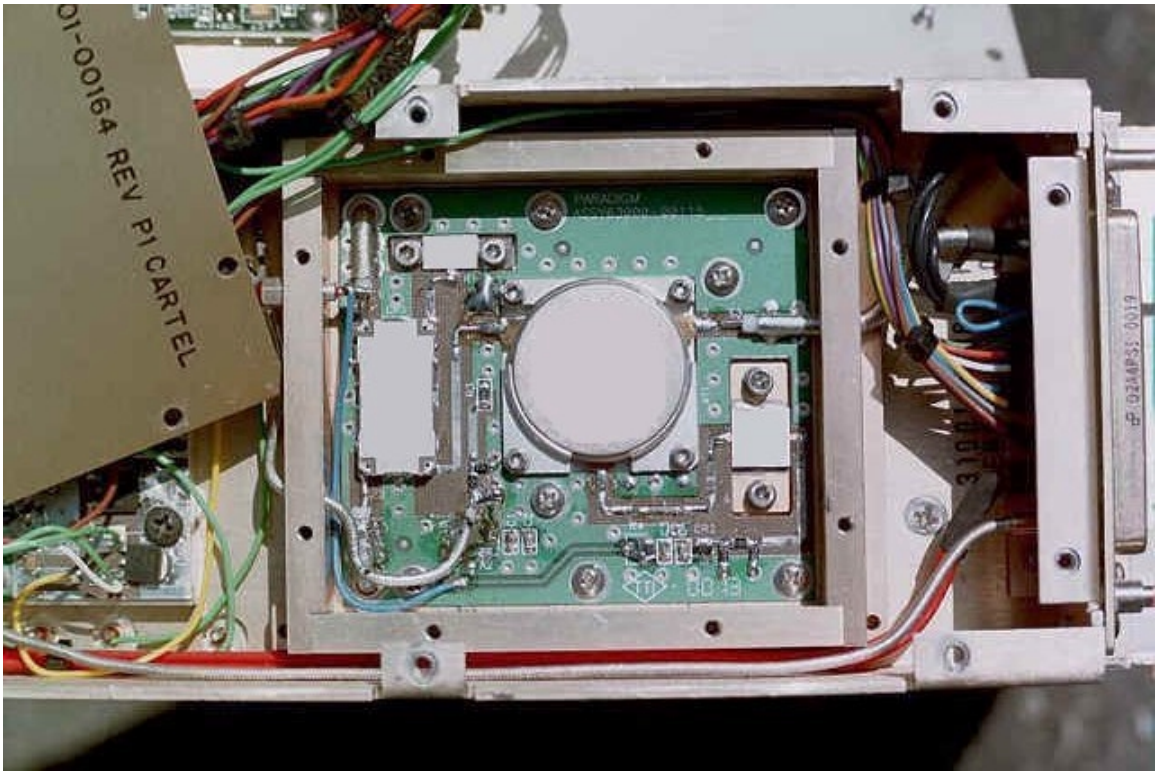
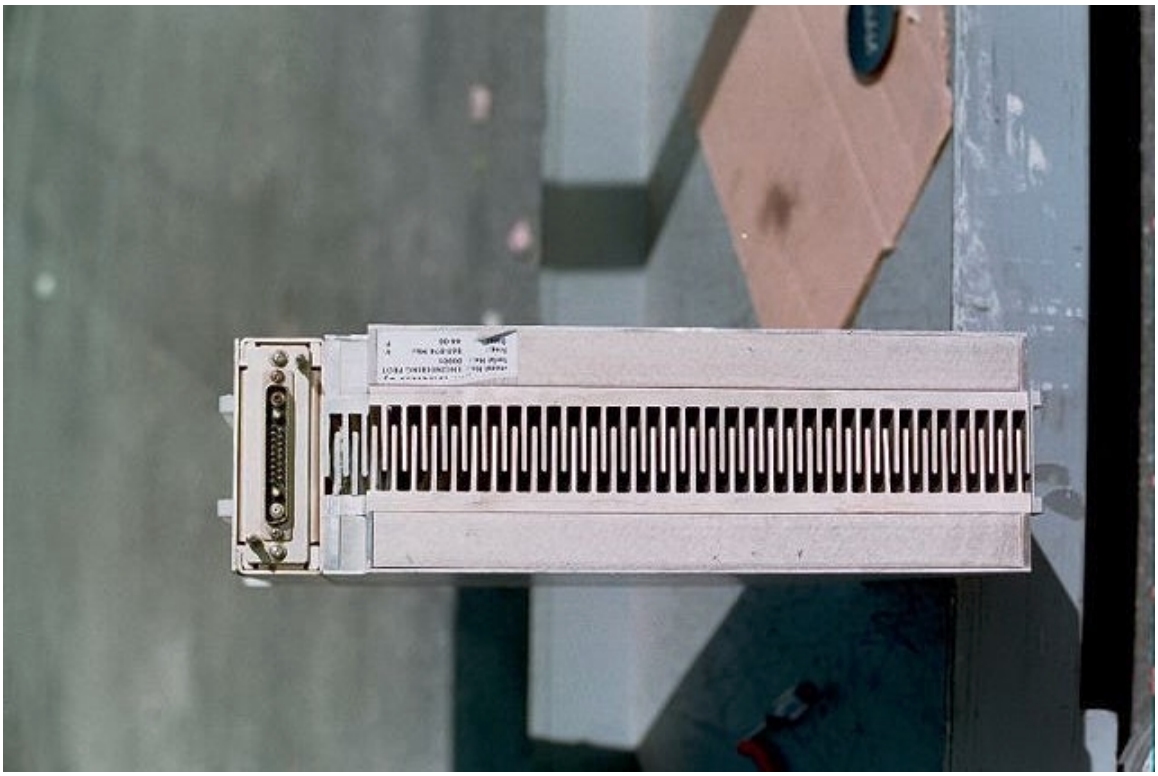

01-00164 REV P1 CARTEL

Photo 3 External Front, Back and Side Views



2.1033 (C) (13) Digital Modulation Techniques

Not Applicable

2.1033 (c) (14) Test Data

Refer to 2.1046 through 2.1057

2.1046 Measurement of RF Power Output

Definition: For RF Amplifiers.

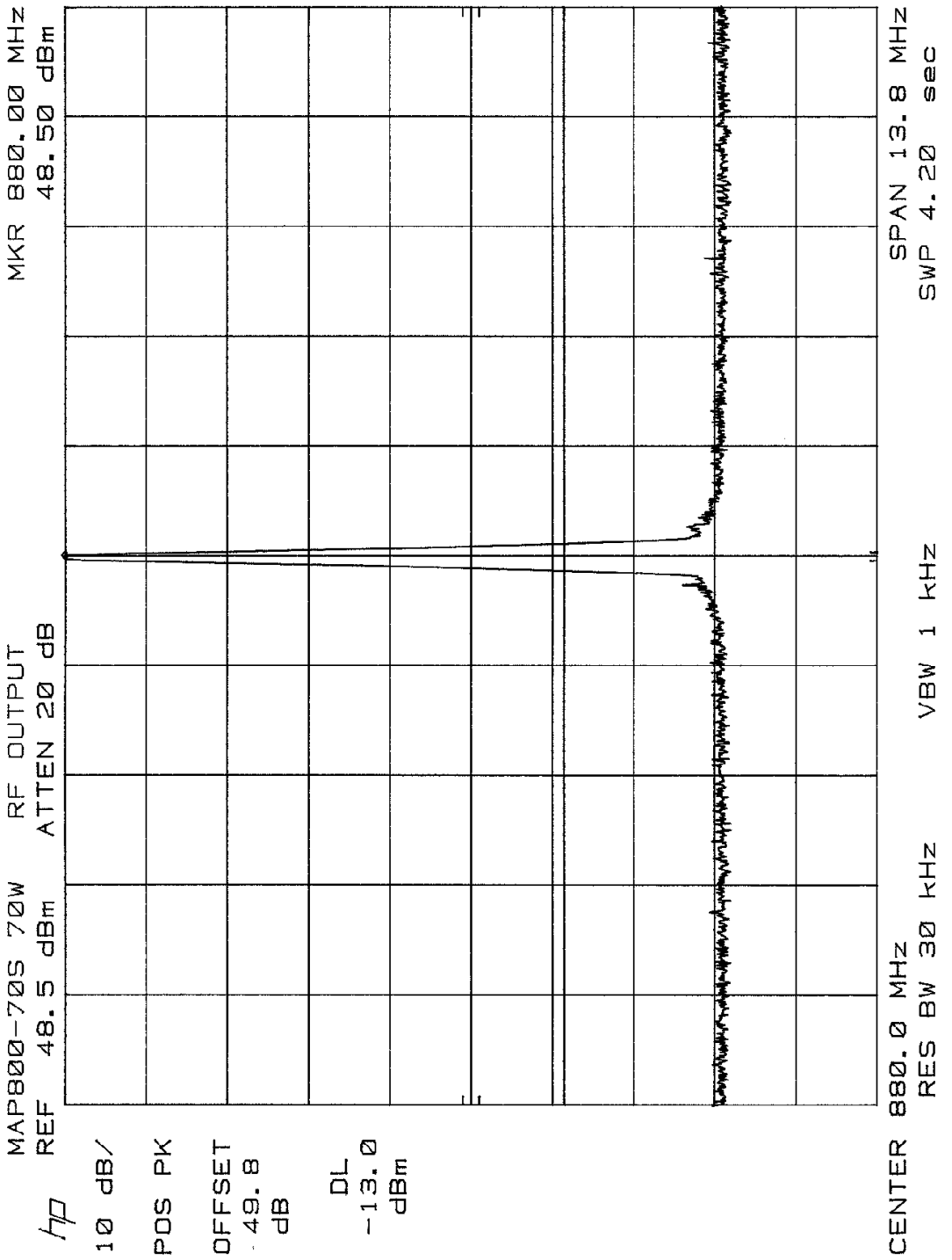
Test Method: See FIGURE 1.

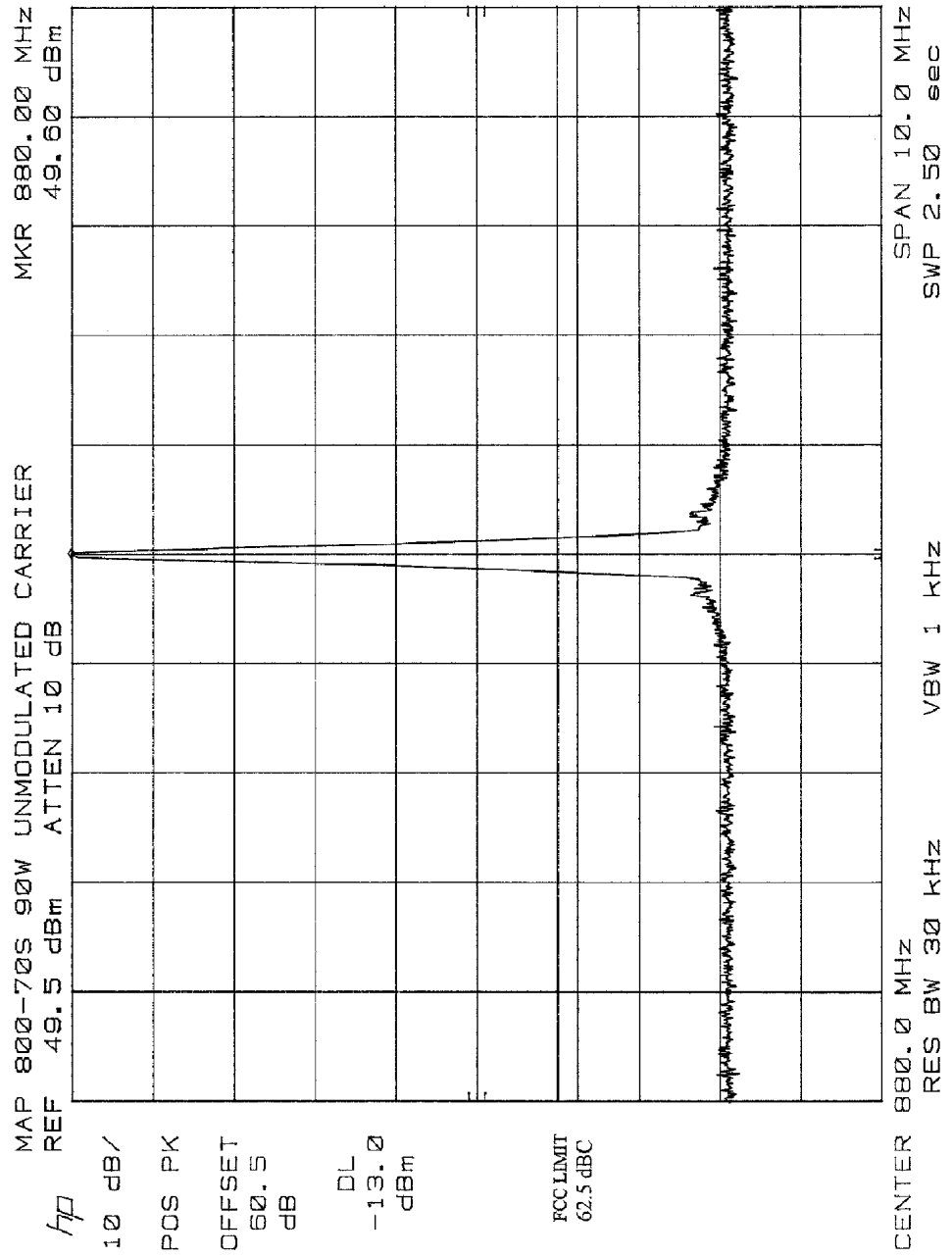
Output Power is measured across a precision 50 ohm load with a Spectrum Analyzer. For the power measurement, CW (no modulation) is used.

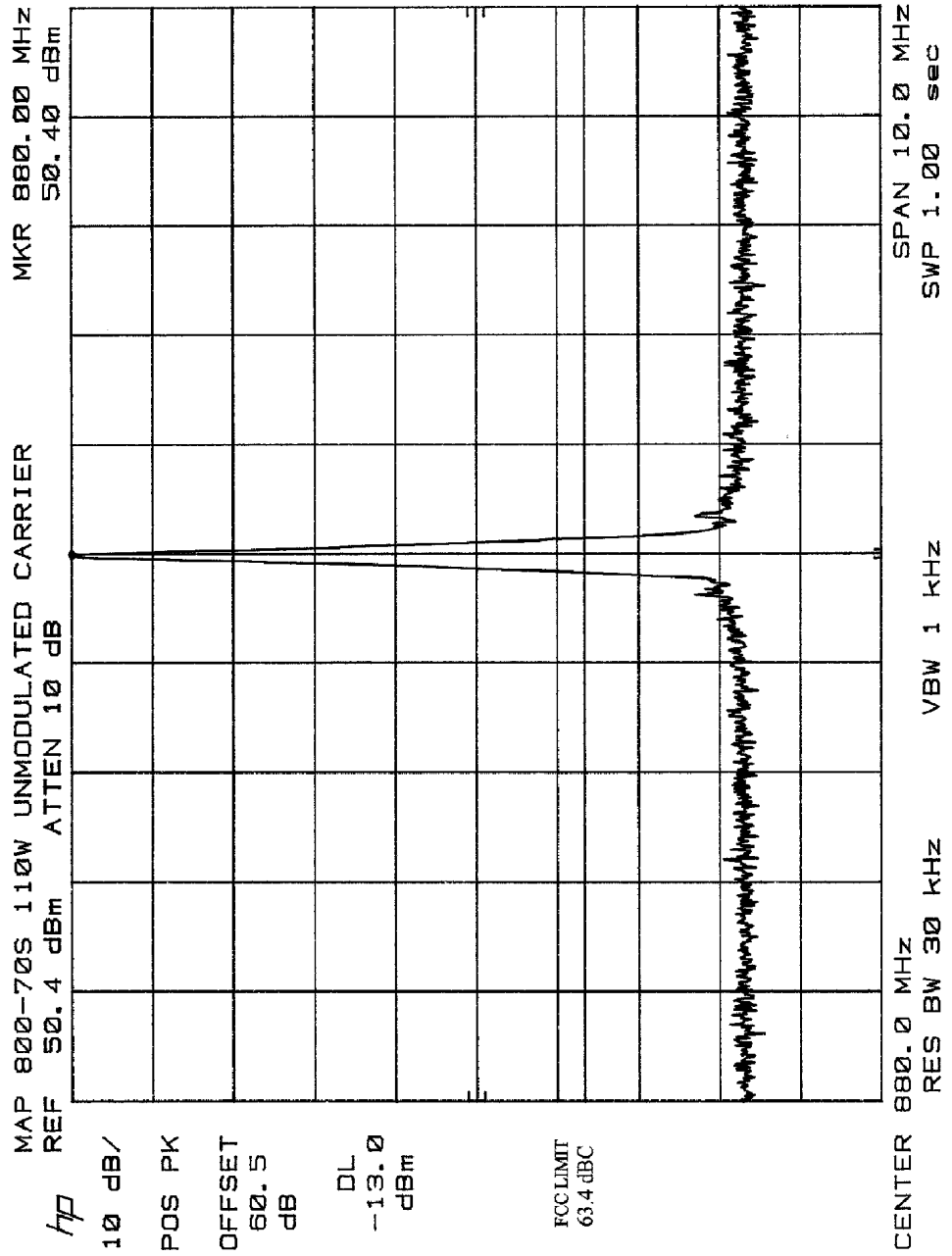
Test Results:

POWER OUTPUT MEASURED AT NOMINAL VOLTAGE WAS:

	Frequency (MHz)	Power (dBm)	Power (W)
4 carriers	880	48.5	71
2 carriers	880	49.6	91
1 carrier	880	50.4	110


MAP800-70S 70W
RF OUTPUT
REF 48.5 dBm
ATTEN 20 dB
MKR 880.00 MHz
48.50 dBm
10 dB/
POS PK
OFFSET
49.8
dB
DL
-13.0
dBm
CENTER 880.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 13.8 MHz
SWP 4.20 sec


MAP 800-70S 90W UNMODULATED CARRIER
MKR 880.00 MHz
REF 49.5 dBm
ATTEN 10 dB
49.60 dBm
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
CENTER 880.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 10.0 MHz
SWP 2.50 sec


MAP 800-70S 110W UNMODULATED CARRIER
MKR 880.00 MHz
50.40 dBm
REF 50.4 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
CENTER 880.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 10.0 MHz
SWP 1.00 sec

2.1049 Measurement of Occupied Bandwidth

Definition:
Occupied Bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are equal to 0.5 percent of the total mean power radiated by a given emission.

Test Method: Connect the Equipment per FIGURE 1.
Measurements were made while modulation the driving source with a CDMA signal.

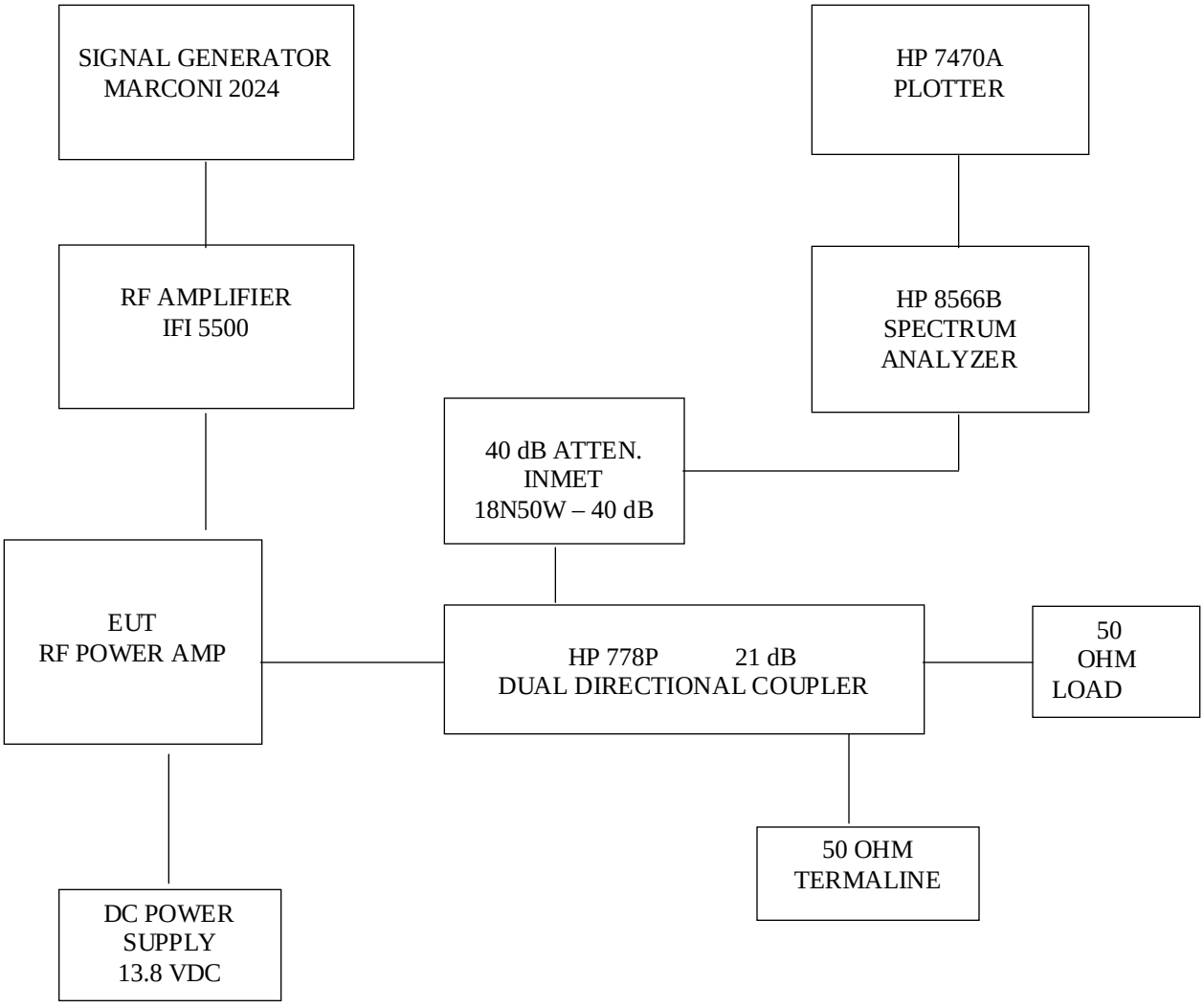
Test Results: See Plots following FIGURE 1.

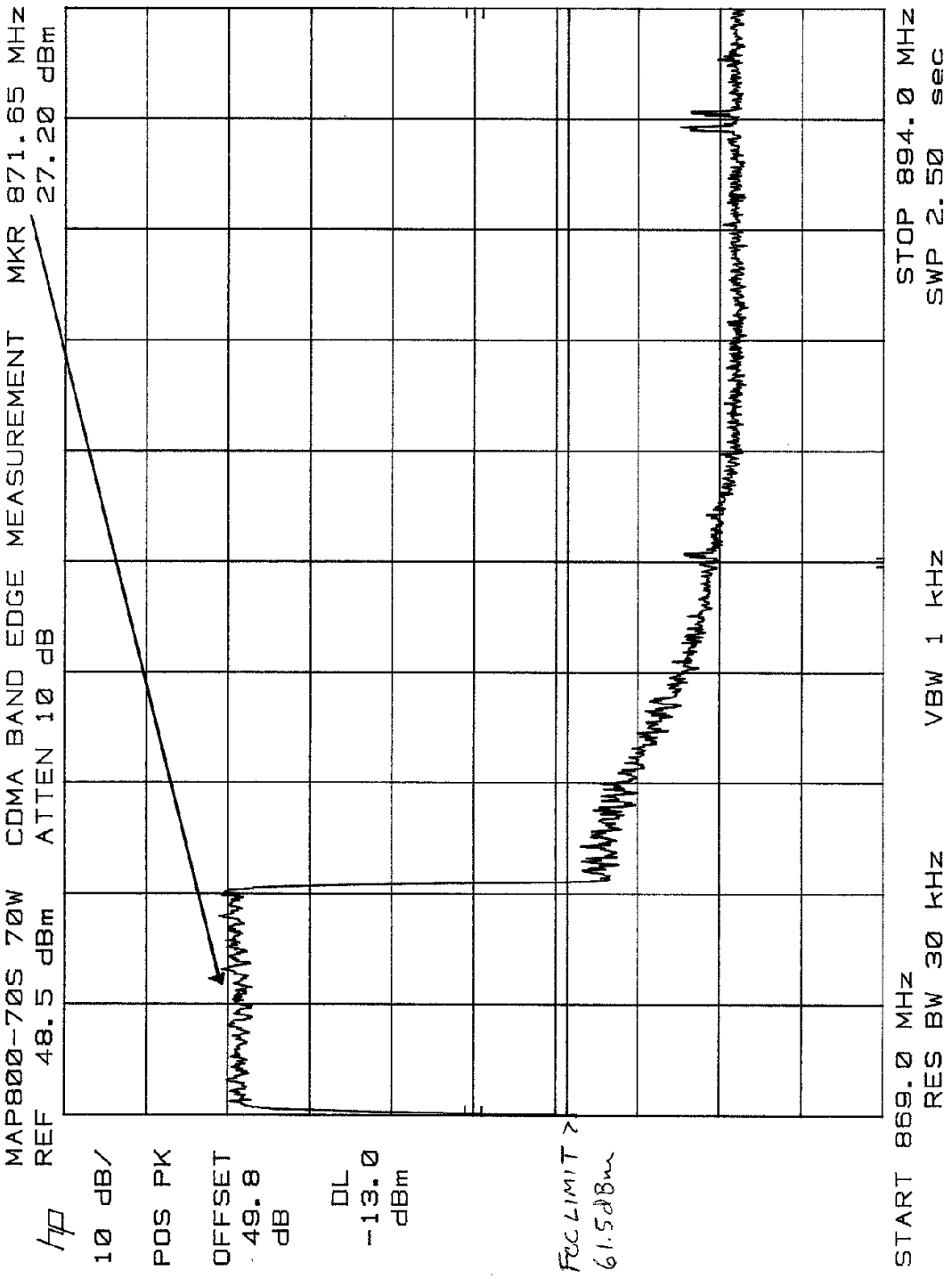
The center frequency of the signal did not shift with modulation. The Spectrum Bandwidth was well within the limits specified in the FCC Regulations.

Note:

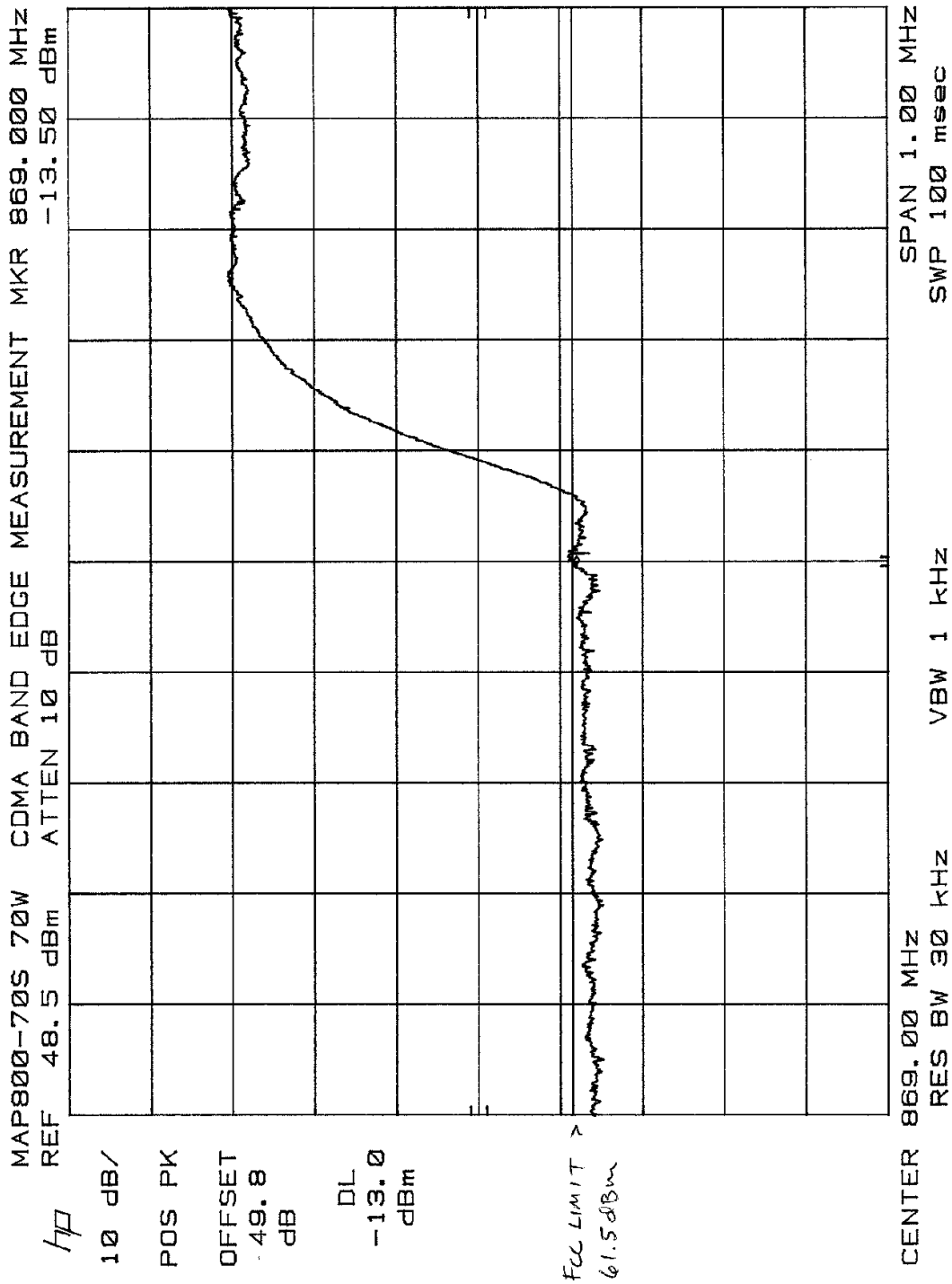
This amplifier has the ability to transmit multiple carriers within the 869-894 MHz band. Therefore the emissions shall be contained within this band as stated in Part 22.901 (d) (2). Plots have been provided that show the lowest and highest useable frequencies with CDMA modulation. Operation between 871.65 MHz and 891.30 MHz will ensure emissions will be at or below 43+ 10 log (Po) at the band edges.

FIGURE 1: Block Diagram
(Occupied Bandwidth tests)

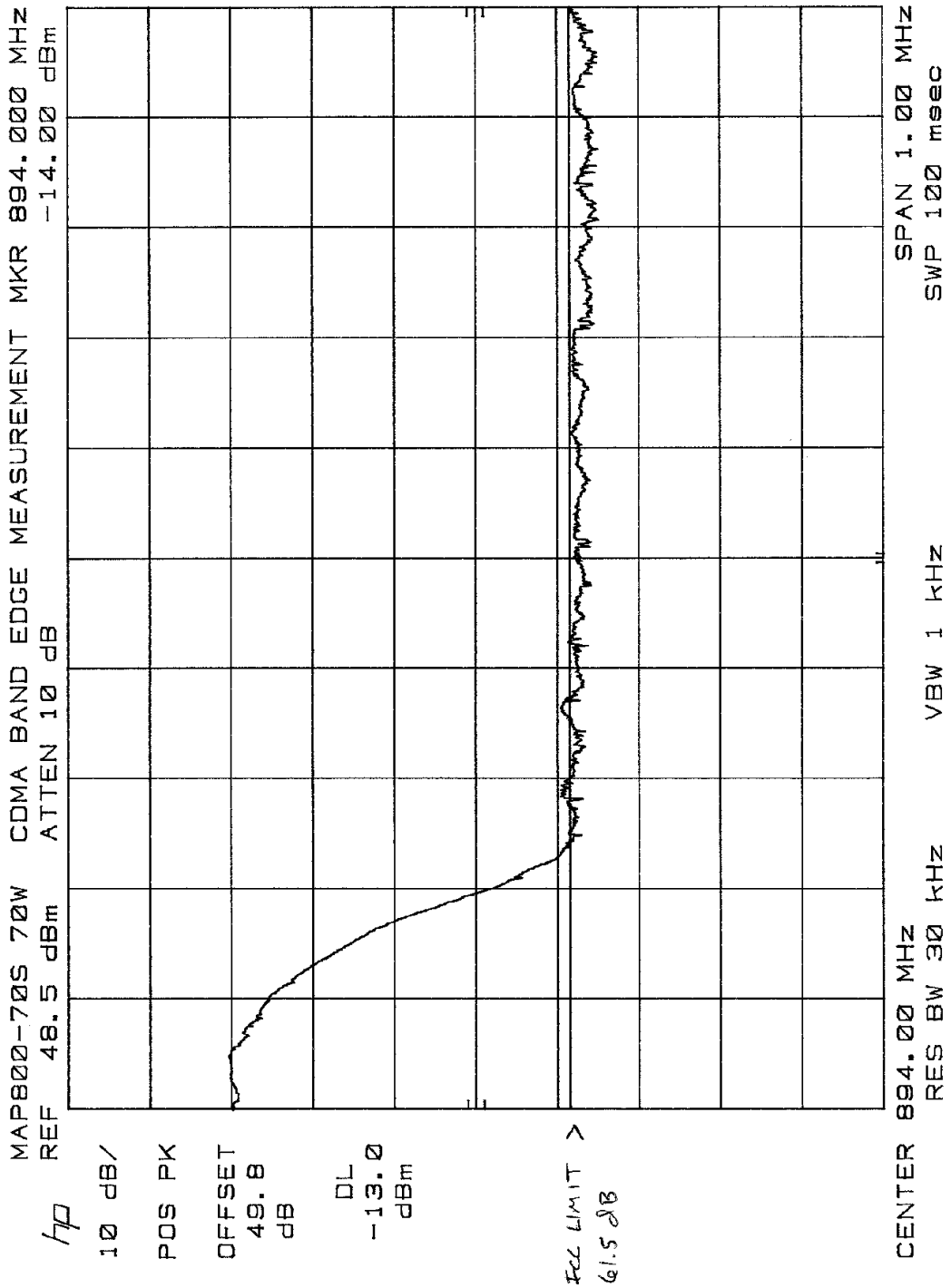


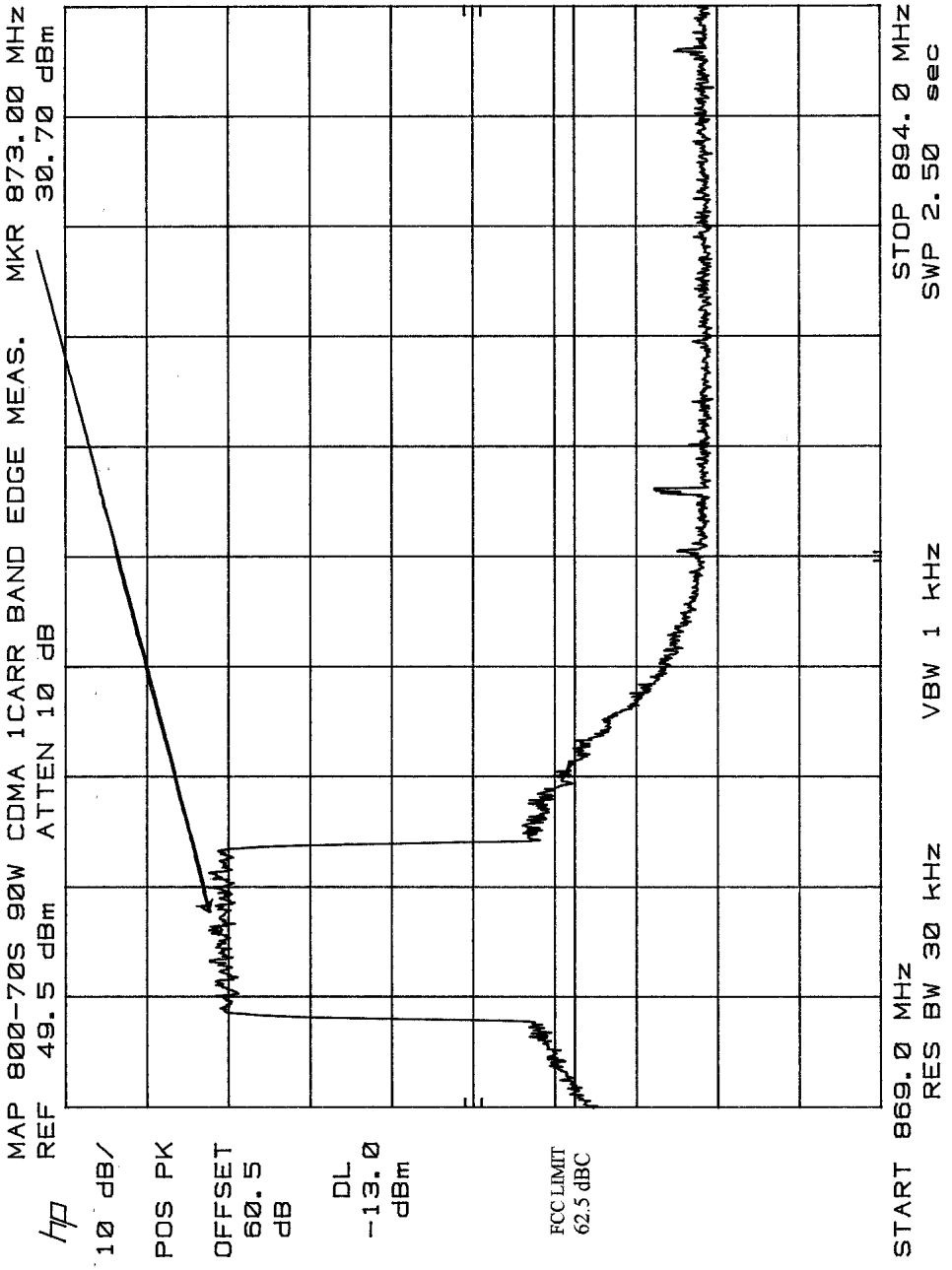

MAP800-70S 70W CDMA BAND EDGE MEASUREMENT MKR 871.65 MHz
REF 48.5 dBm ATTEN 10 dB 27.20 dBm
10 dB/
POS PK
OFFSET 49.8 dB
DL -13.0 dBm
FCC LIMIT > 61.5dBm
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec

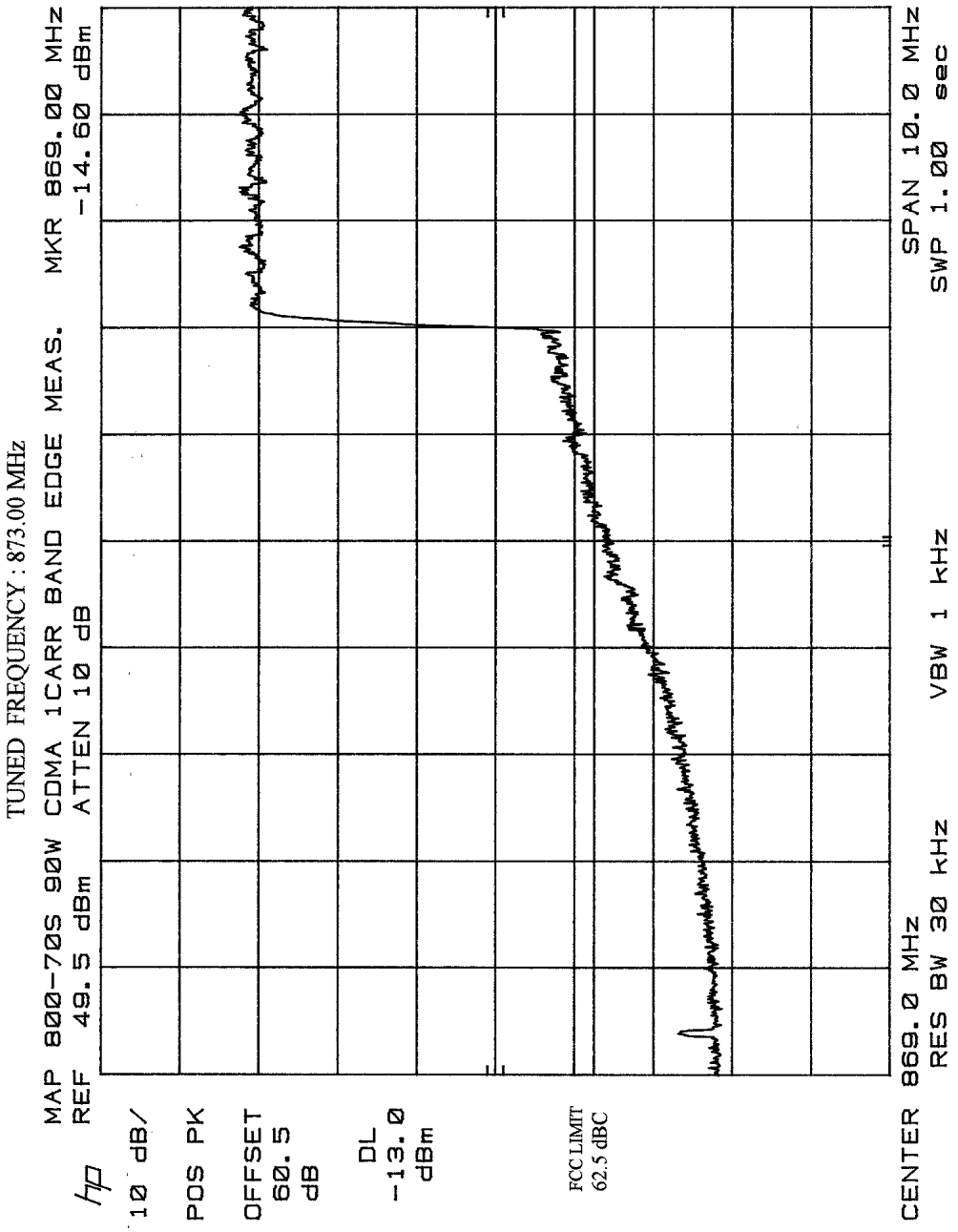
TUNED FREQUENCY : 871.65 MHz

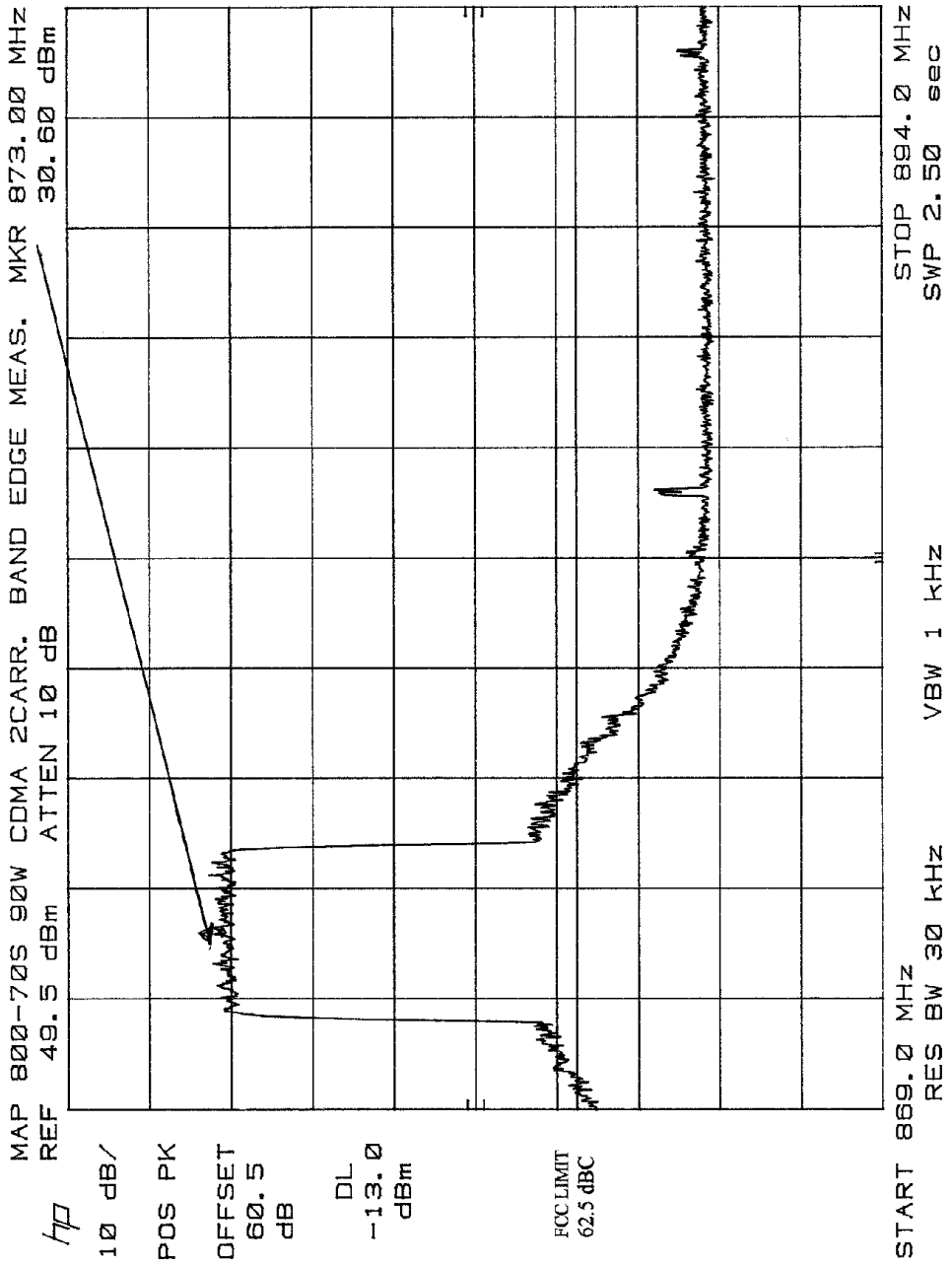


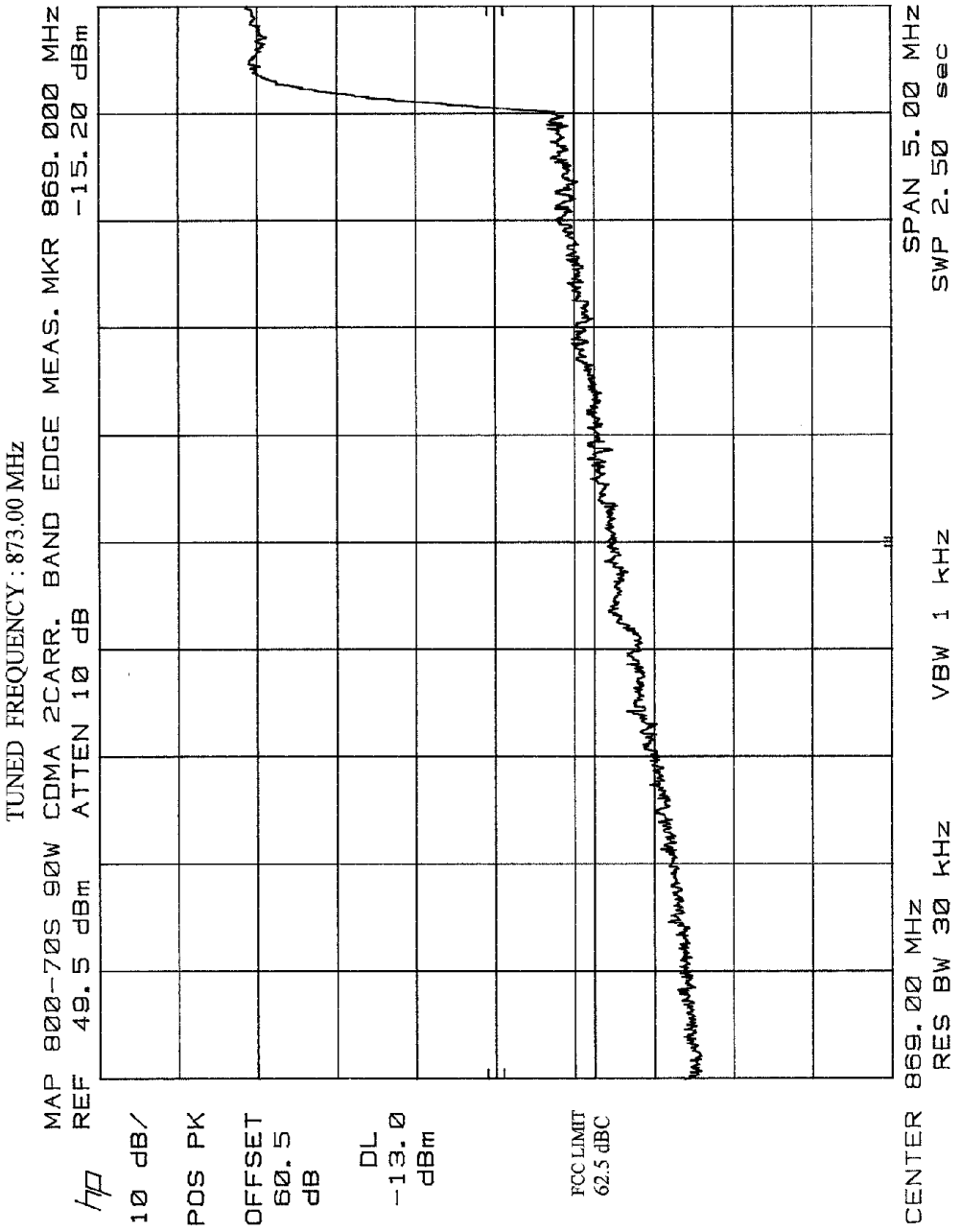
TUNED FREQUENCY : 891.30 MHz

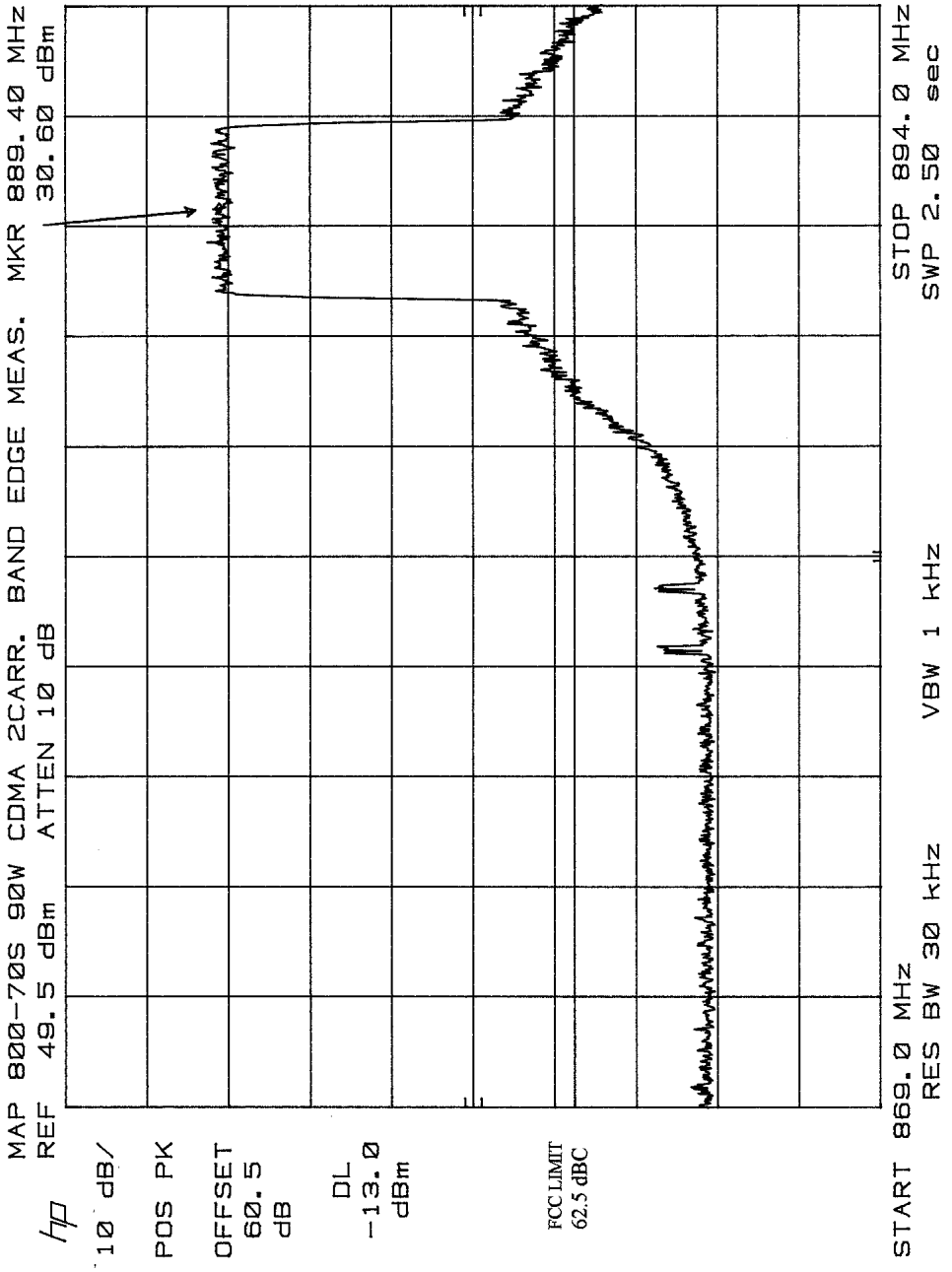


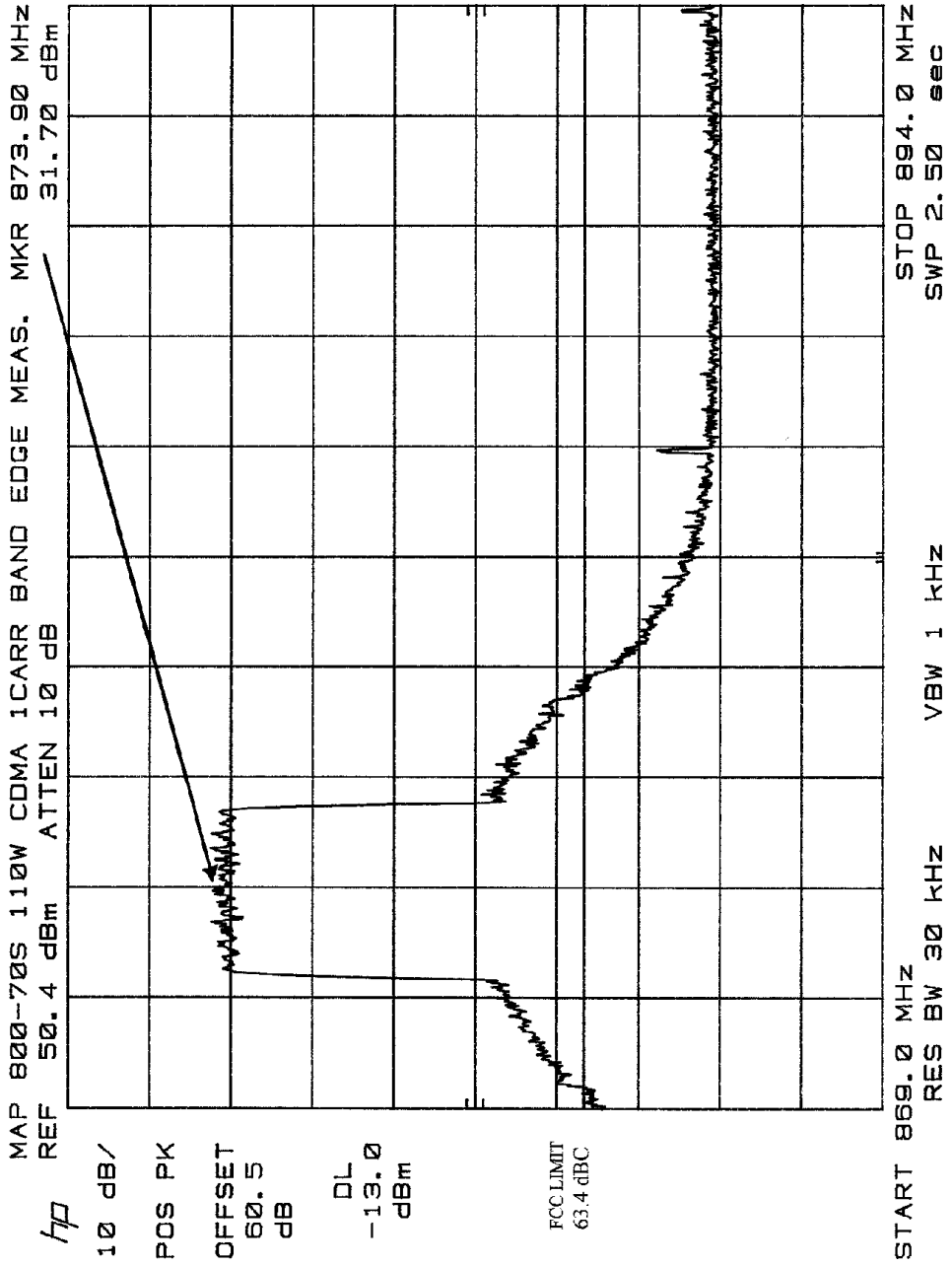

MAP 800-70S 90W CDMA 1CARR BAND EDGE MEAS.
MKR 873.00 MHz
30.70 dBm
REF 49.5 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec

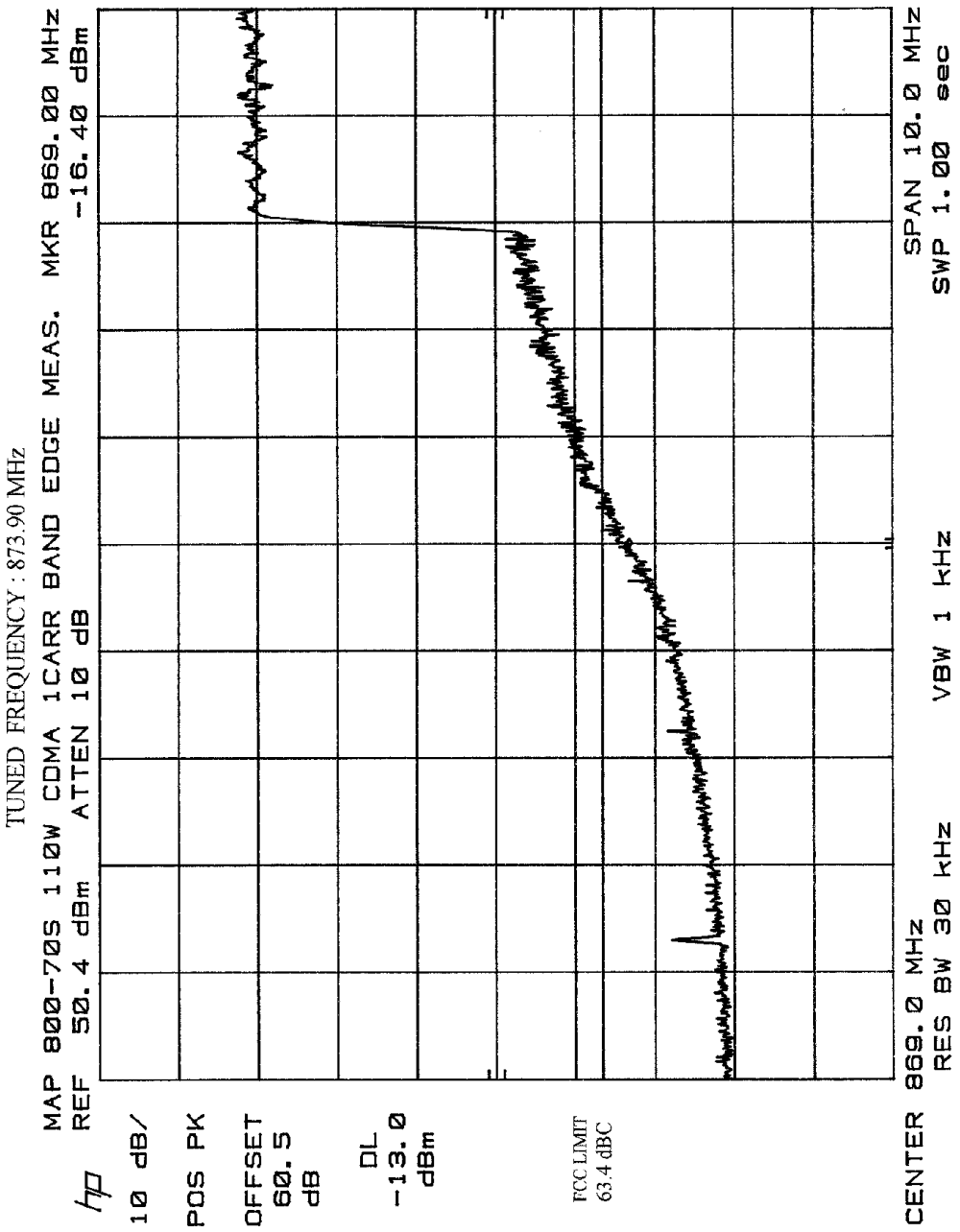

TUNED FREQUENCY : 873.00 MHz
MAP 800-70S 90W CDMA 1CARR BAND EDGE MEAS.
MKR 869.00 MHz
-14.60 dBm
REF 49.5 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
CENTER 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 10.0 MHz
SWP 1.00 sec

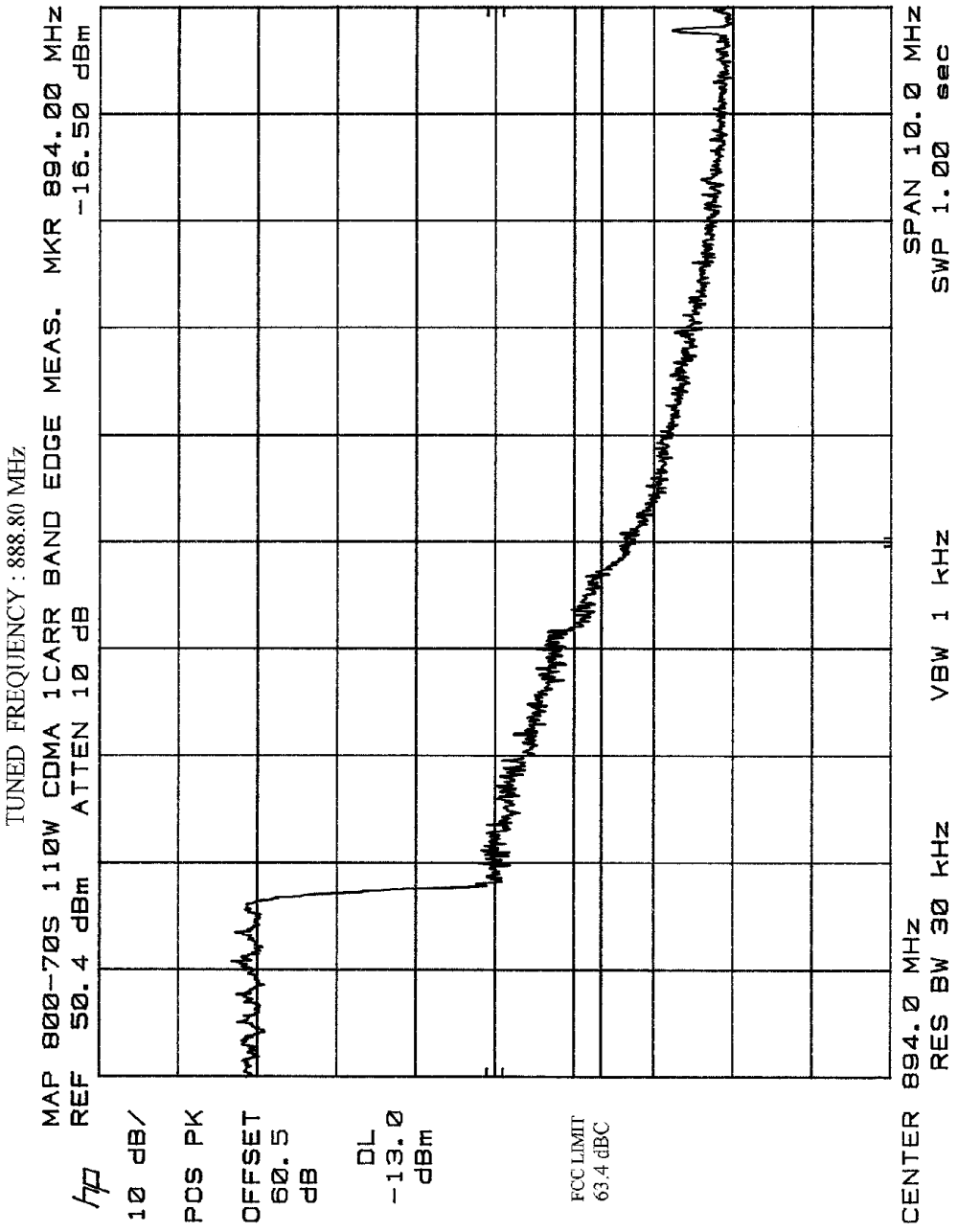

MAP 800-70S 90W CDMA 2CARR. BAND EDGE MEAS. MKR 873.00 MHz
30.60 dBm
REF 49.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec

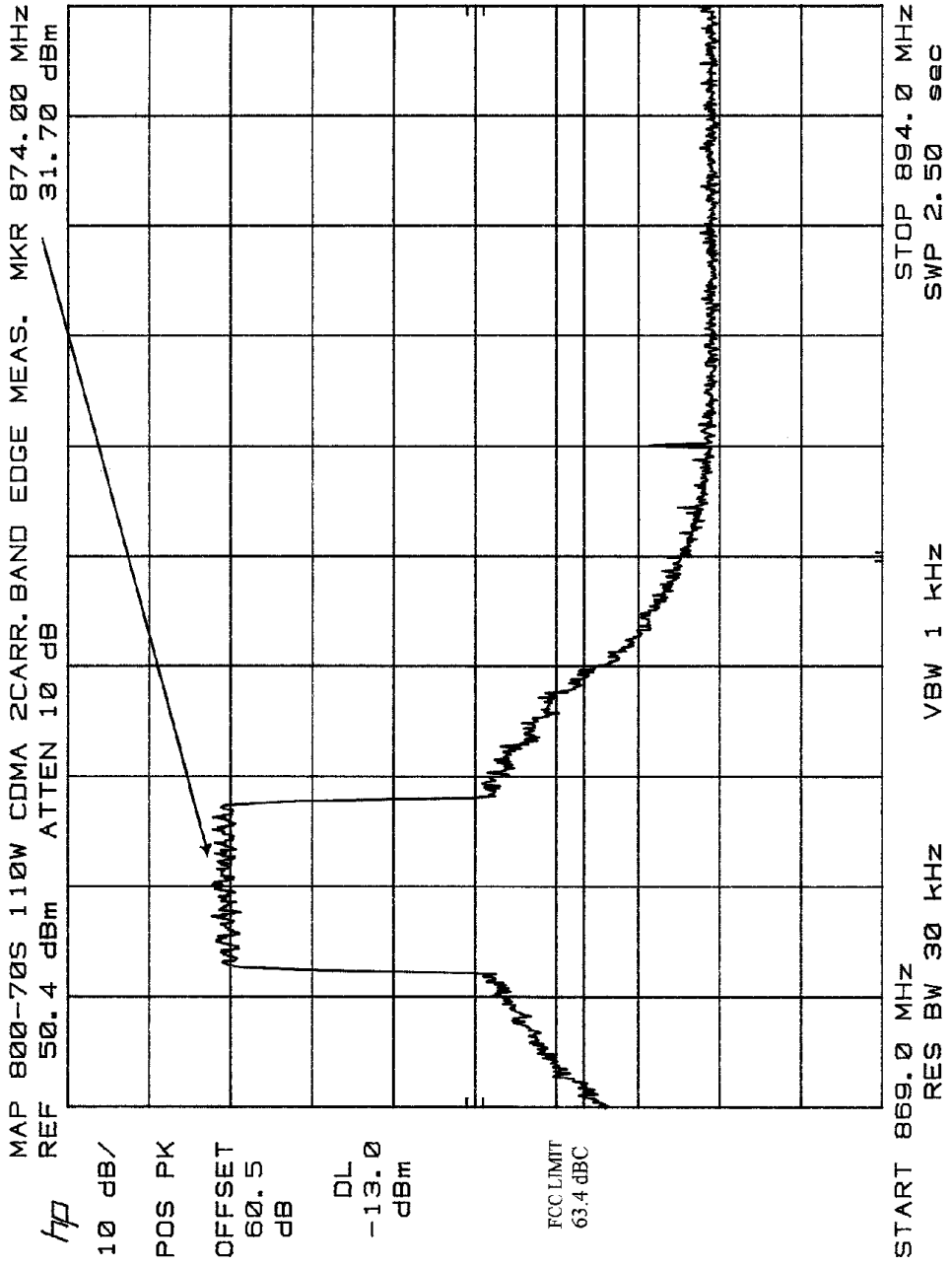

TUNED FREQUENCY: 873.00 MHz
MAP 800-70S 90W CDMA 2CARR. BAND EDGE MEAS. MKR 869.000 MHz
REF 49.5 dBm ATTEN 10 dB -15.20 dBm
10 dB/
POS PK
OFFSET 60.5 dB
DL -13.0 dBm
FCC LIMIT 62.5 dBC
CENTER 869.00 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 5.00 MHz
SWP 2.50 sec

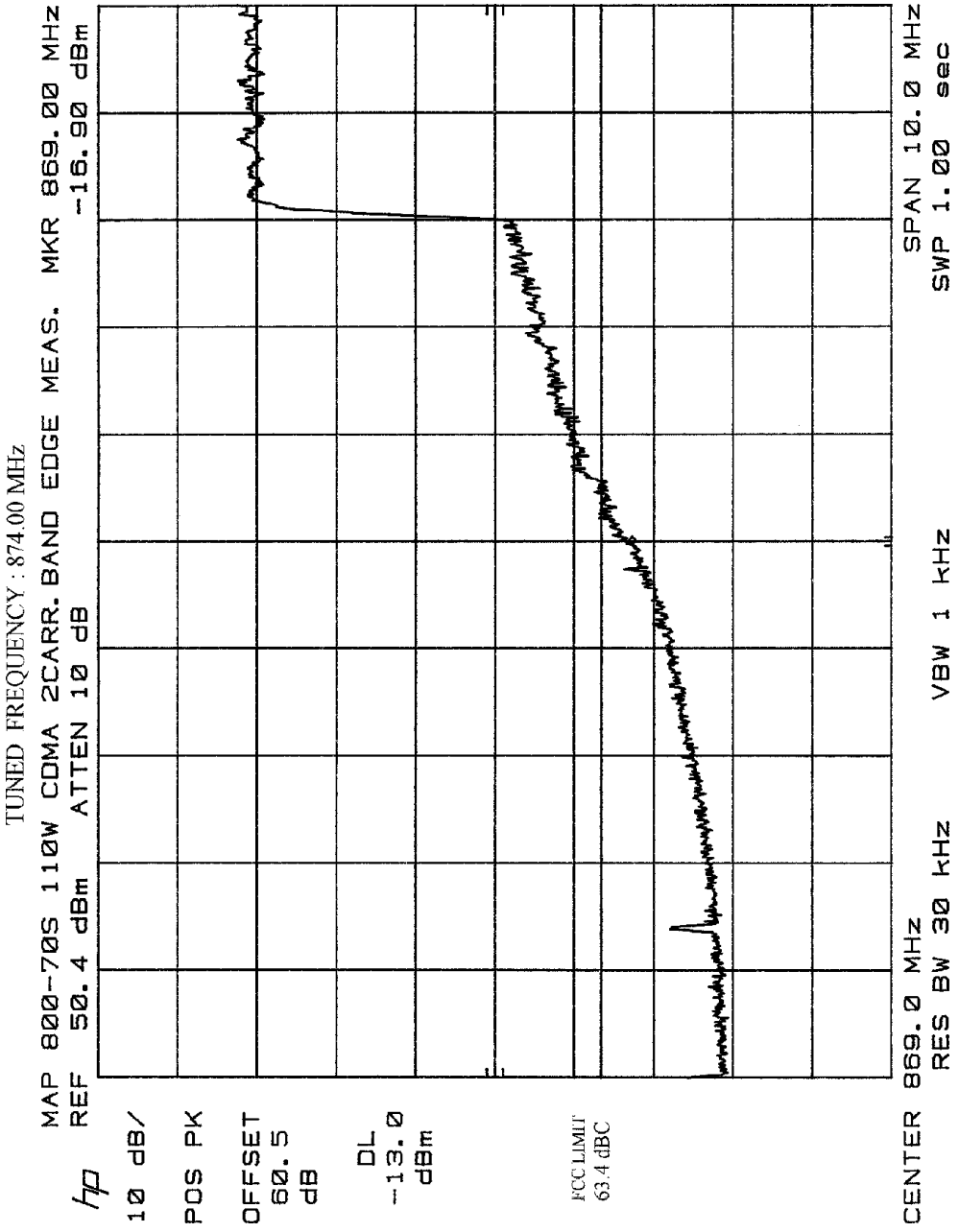

MAP 800-70S 90W CDMA 2CARR. BAND EDGE MEAS. MKR 889.40 MHz
REF 49.5 dBm ATTEN 10 dB 30.60 dBm
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec

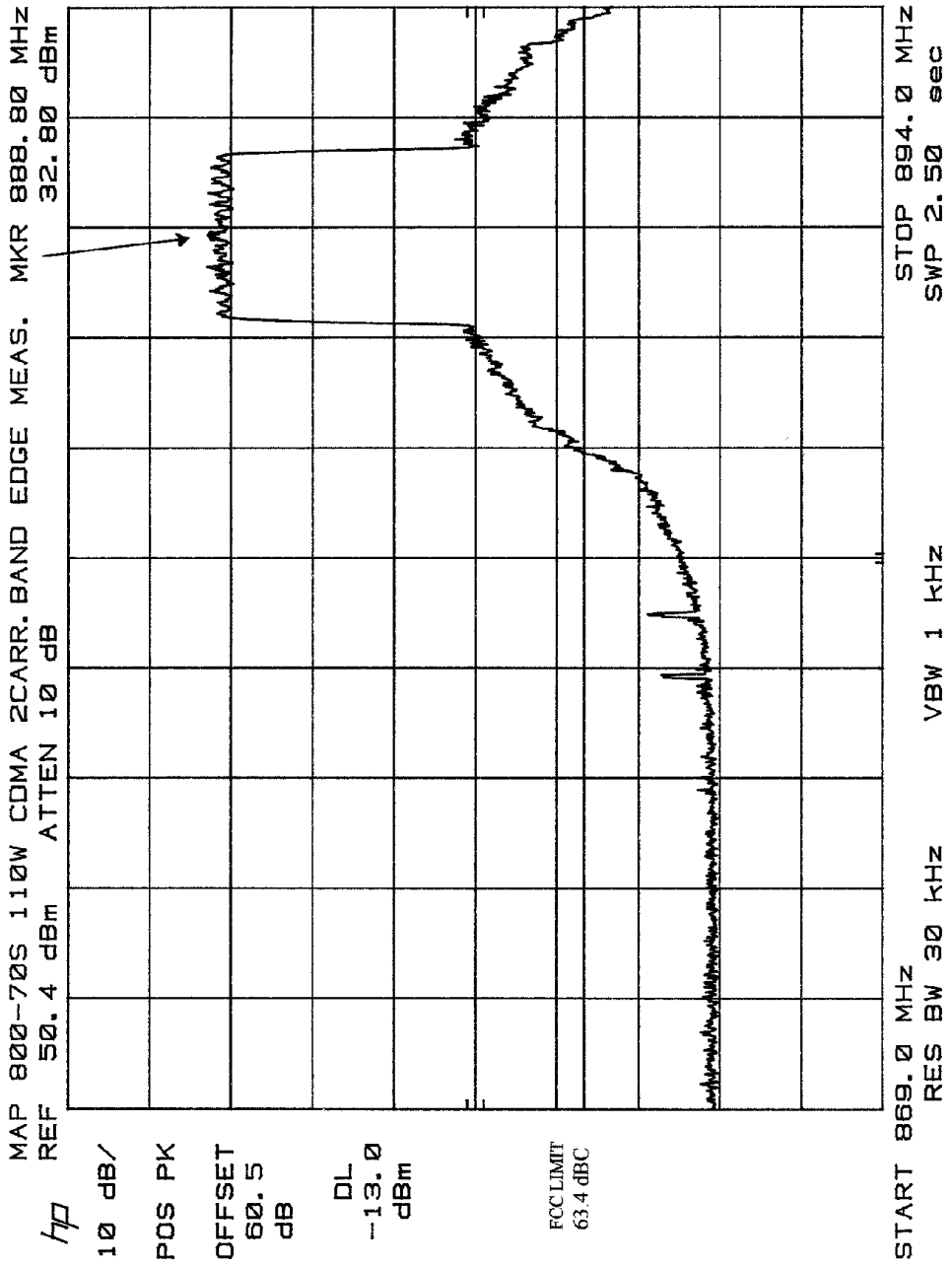

MAP 800-70S 110W CDMA 1CARR BAND EDGE MEAS. MKR 873.90 MHz
REF 50.4 dBm ATTEN 10 dB 31.70 dBm
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec

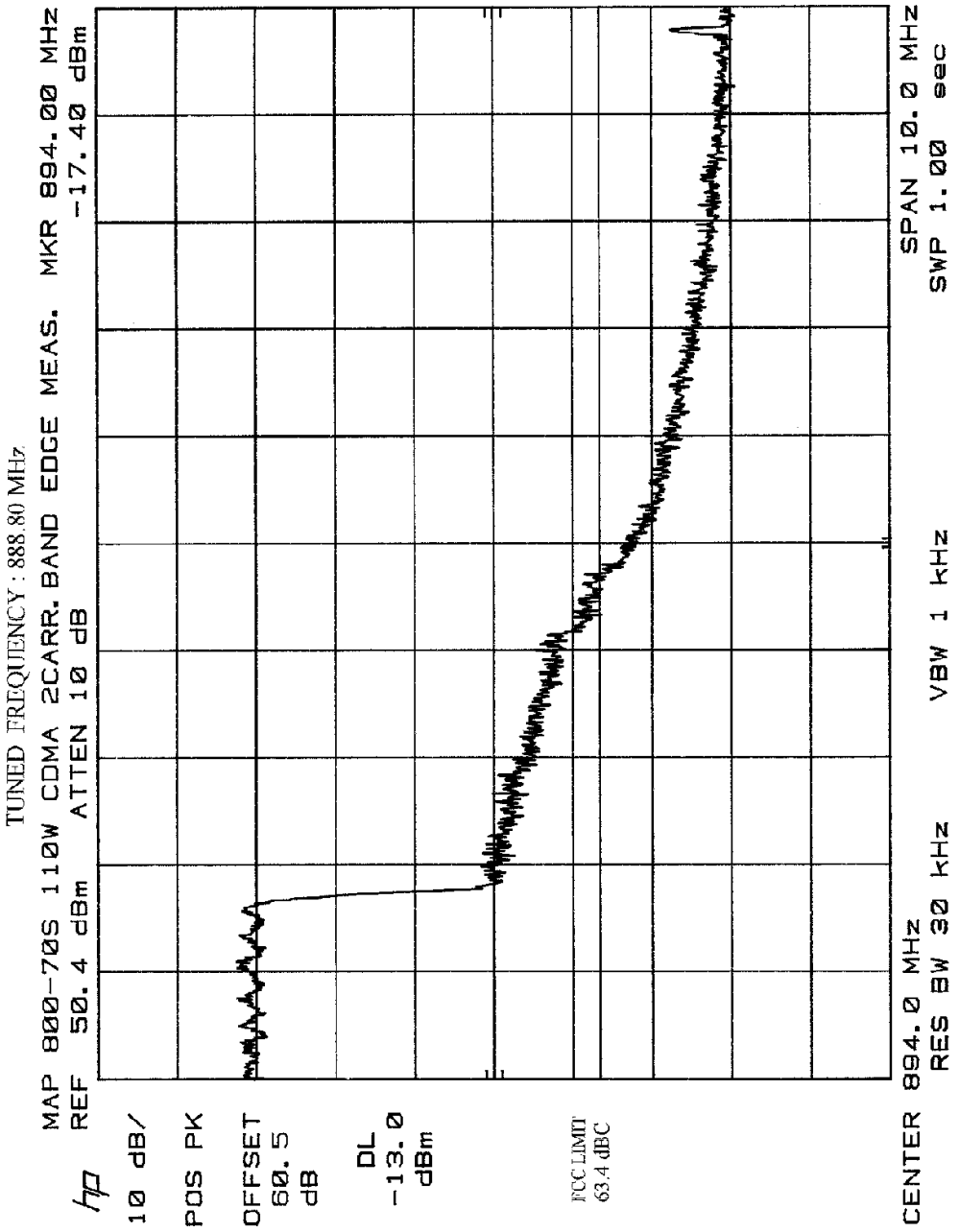

TUNED FREQUENCY : 873.90 MHz
MAP 800-70S 110W CDMA 1CARR BAND EDGE MEAS. MKR 869.00 MHz
REF 50.4 dBm ATTEN 10 dB -16.40 dBm
10 dB/
POS PK
OFFSET 60.5 dB
DL -13.0 dBm
FCC LIMIT 63.4 dBC
CENTER 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 10.0 MHz
SWP 1.00 sec


TUNED FREQUENCY : 888.80 MHz
MAP 800-70S 110W CDMA 1CARR BAND EDGE MEAS. MKR 894.00 MHz
REF 50.4 dBm ATTEN 10 dB -16.50 dBm
10 dB/
POS PK
OFFSET 60.5 dB
DL -13.0 dBm
FCC LIMIT 63.4 dBC
CENTER 894.0 MHz
RES BW 30 kHz VBW 1 kHz
SPAN 10.0 MHz
SWP 1.00 sec


MAP 800-70S 110W CDMA 2CARR. BAND EDGE MEAS. MKR 874.00 MHz
REF 50.4 dBm ATTEN 10 dB 31.70 dBm
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec


TUNED FREQUENCY : 874.00 MHz
MAP 800-70S 110W CDMA 2CARR. BAND EDGE MEAS.
MKR 869.00 MHz
-16.90 dBm
REF 50.4 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
CENTER 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 10.0 MHz
SWP 1.00 sec


MAP 800-70S 110W CDMA 2CARR. BAND EDGE MEAS. MKR 888.80 MHz
REF 50.4 dBm ATTEN 10 dB 32.80 dBm
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 869.0 MHz
RES BW 30 kHz
VBW 1 kHz
STOP 894.0 MHz
SWP 2.50 sec


TUNED FREQUENCY : 888.80 MHz
MAP 800-70S 110W CDMA 2CARR. BAND EDGE MEAS.
MKR 894.00 MHz
-17.40 dBm
REF 50.4 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
CENTER 894.0 MHz
RES BW 30 kHz
VBW 1 kHz
SPAN 10.0 MHz
SWP 1.00 sec

2.1033 (C) (5) Frequency Range

869 - 894 MHz

2.1033 (C) (6) Operating Power

110 Watts

2.1033 (C) (7) Maximum Power Allowed in Applicable Part(s) of the Rules

RULES PART	MAXIMUM POWER (WATTS)
Part 90.213	110

2.1033 (C) (8) Final RF Amplifier Input Power Characteristics

Please refer to Appendix A

2.1033 (C) (9) Tune Up Procedure

Please refer to Appendix A

2.1051 Spurious Emissions at Antenna Terminals

Definition:
Conducted Spurious Emissions are emissions at the antenna terminals on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Conducted Spurious Emissions shall be attenuated below the maximum level of the carrier frequency in accordance with the following formula:

Spurious attenuation in dB = $43 + 10 \log_{10}$ Po

Where Po = Output in Watts (CW)

= $43 + 10 \log_{10} (70)$

= 61.5 dB

Test Method: Per EIA RS 152-B, Paragraph 4 as modified below.

Connect the equipment as shown in FIGURE 2.

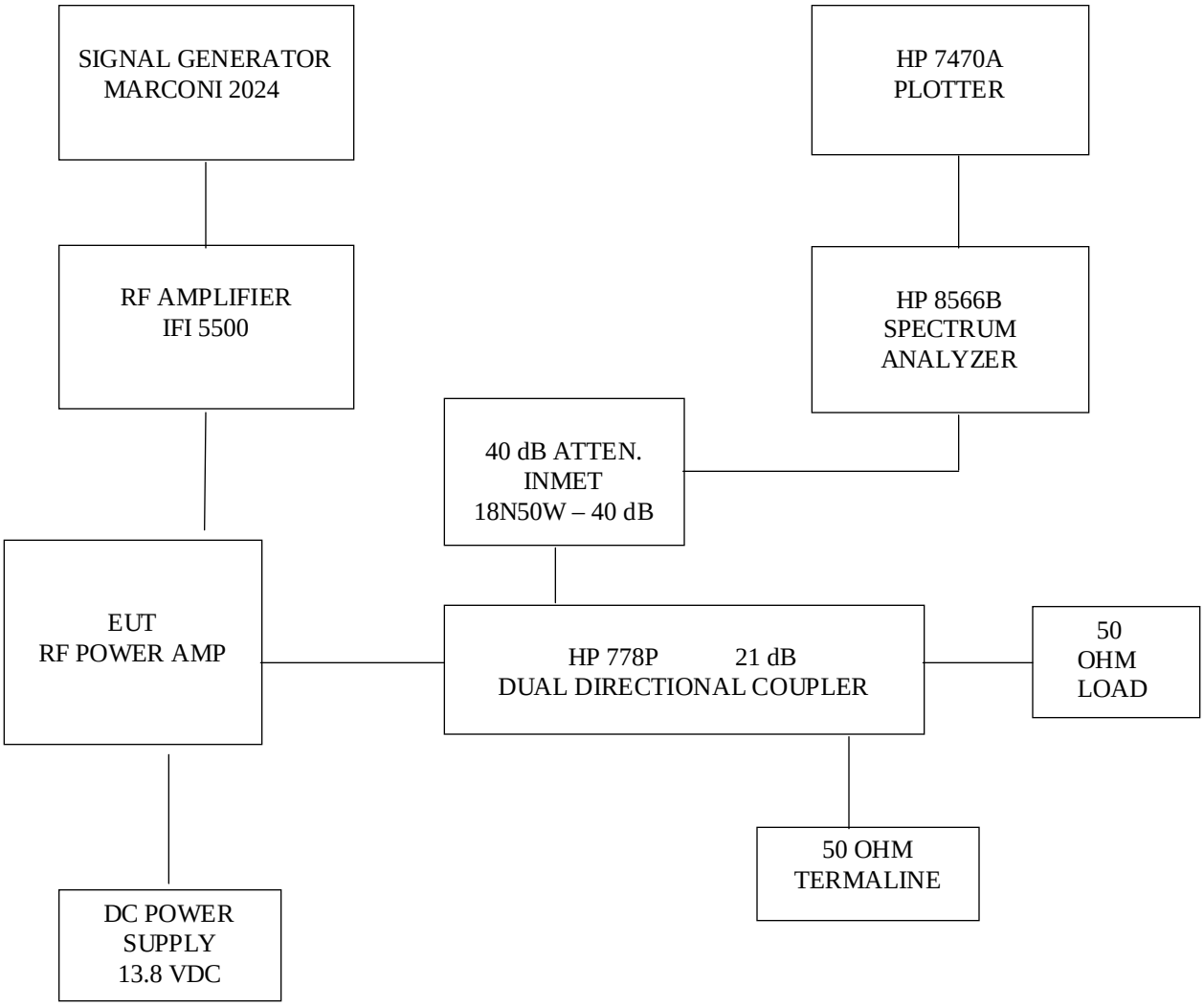
Adjust the drive source to produce CDMA modulation. Adjust the Spectrum Analyzer to display the Modulated Carrier.

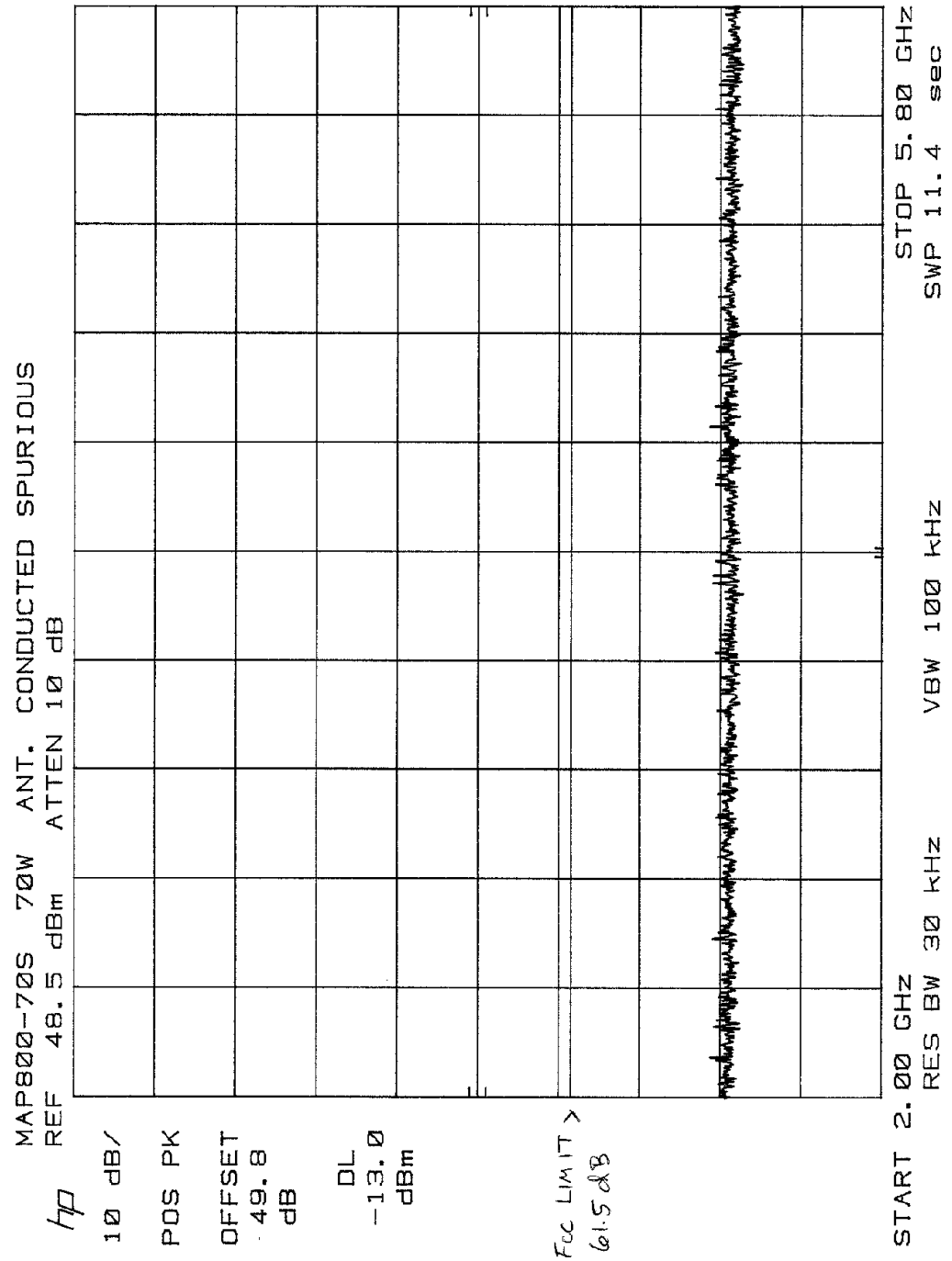
Scan the frequency spectrum from the lowest radio frequency generated in the equipment through the 10^{th} harmonic of the carrier frequency.

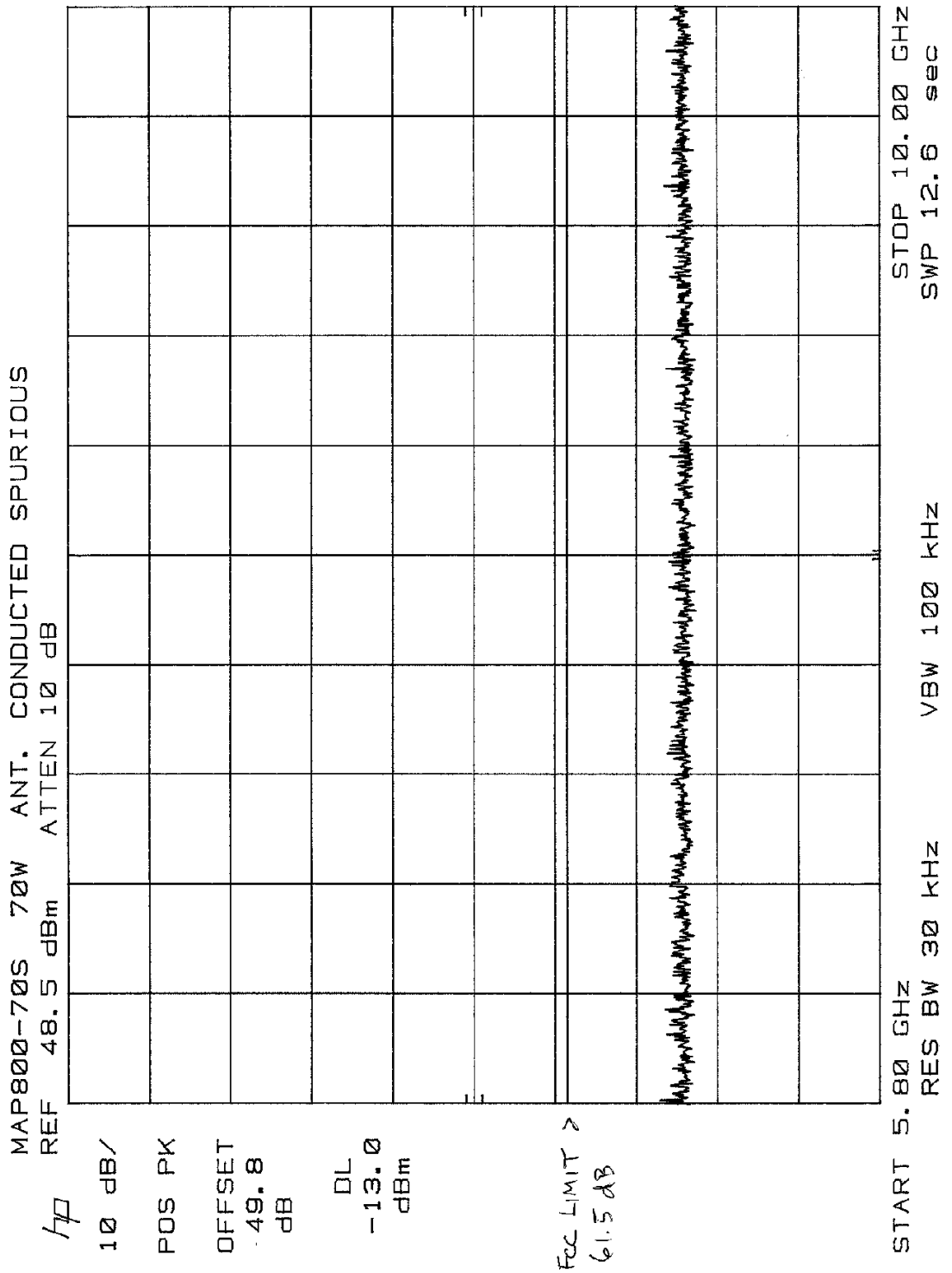
Test Results: See Plots following FIGURE 2.

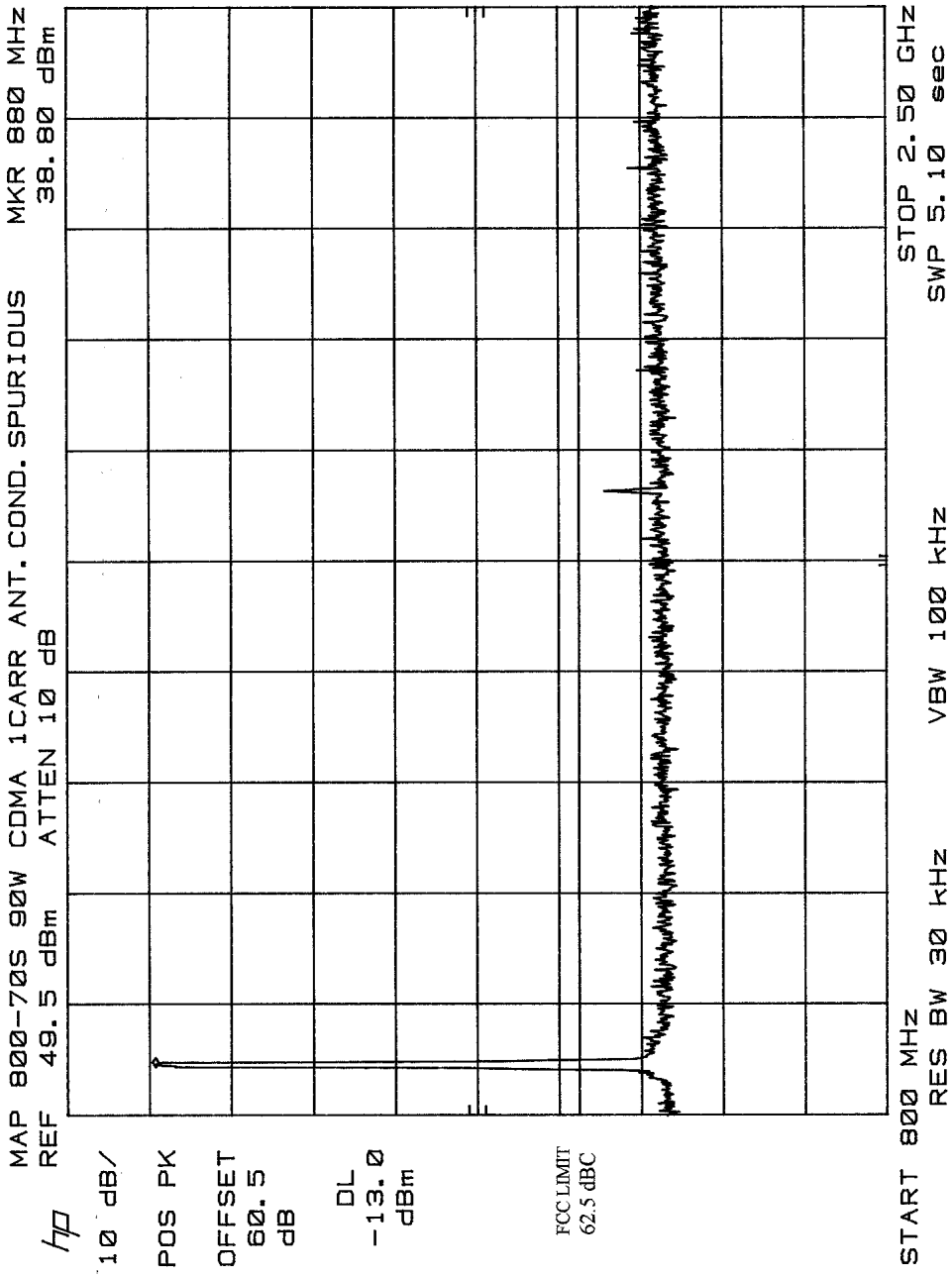
All spurious emissions at the antenna terminals are below the FCC specifications

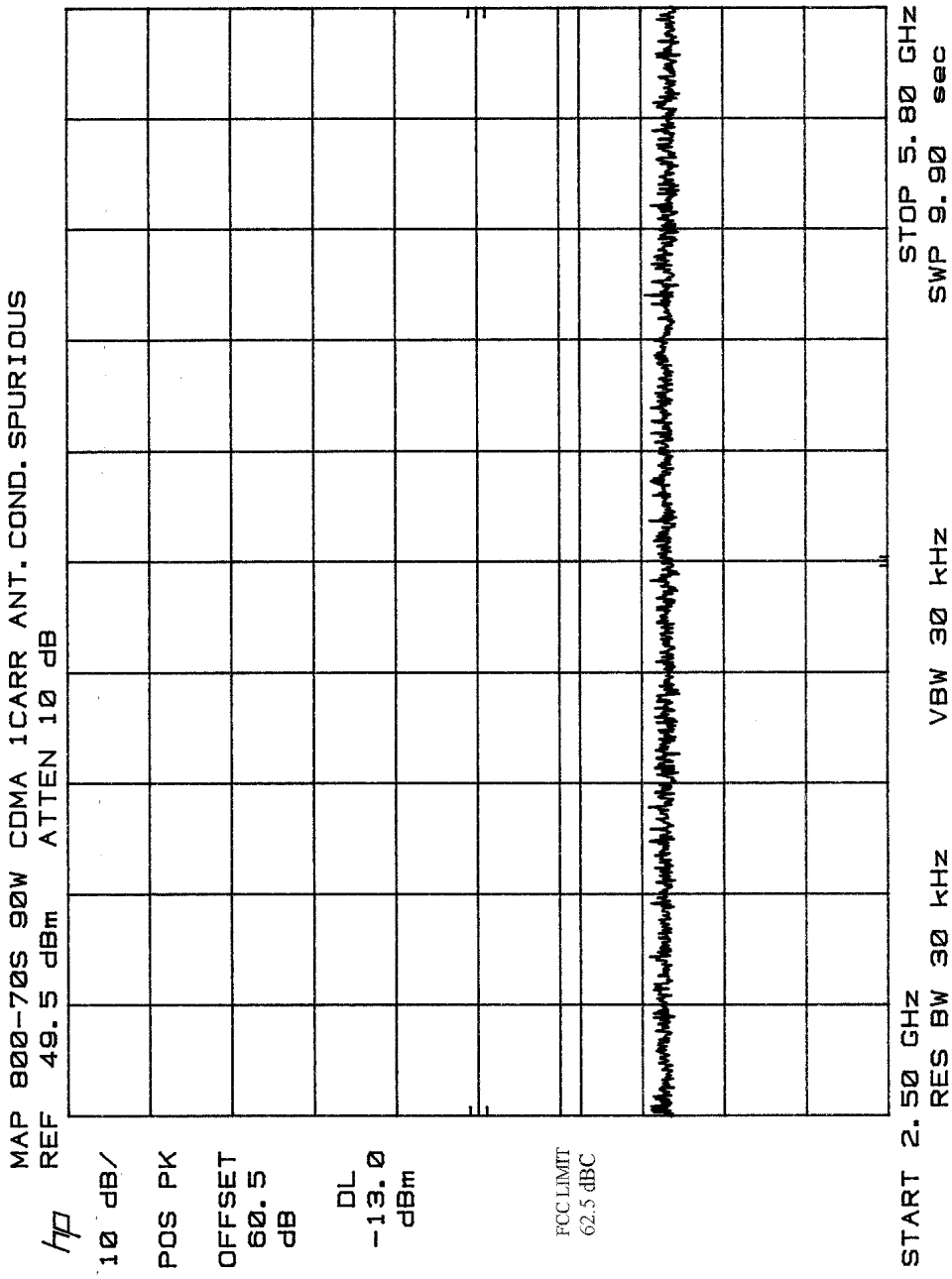
FIGURE 2: Block Diagram
(Spurious Emissions tests)

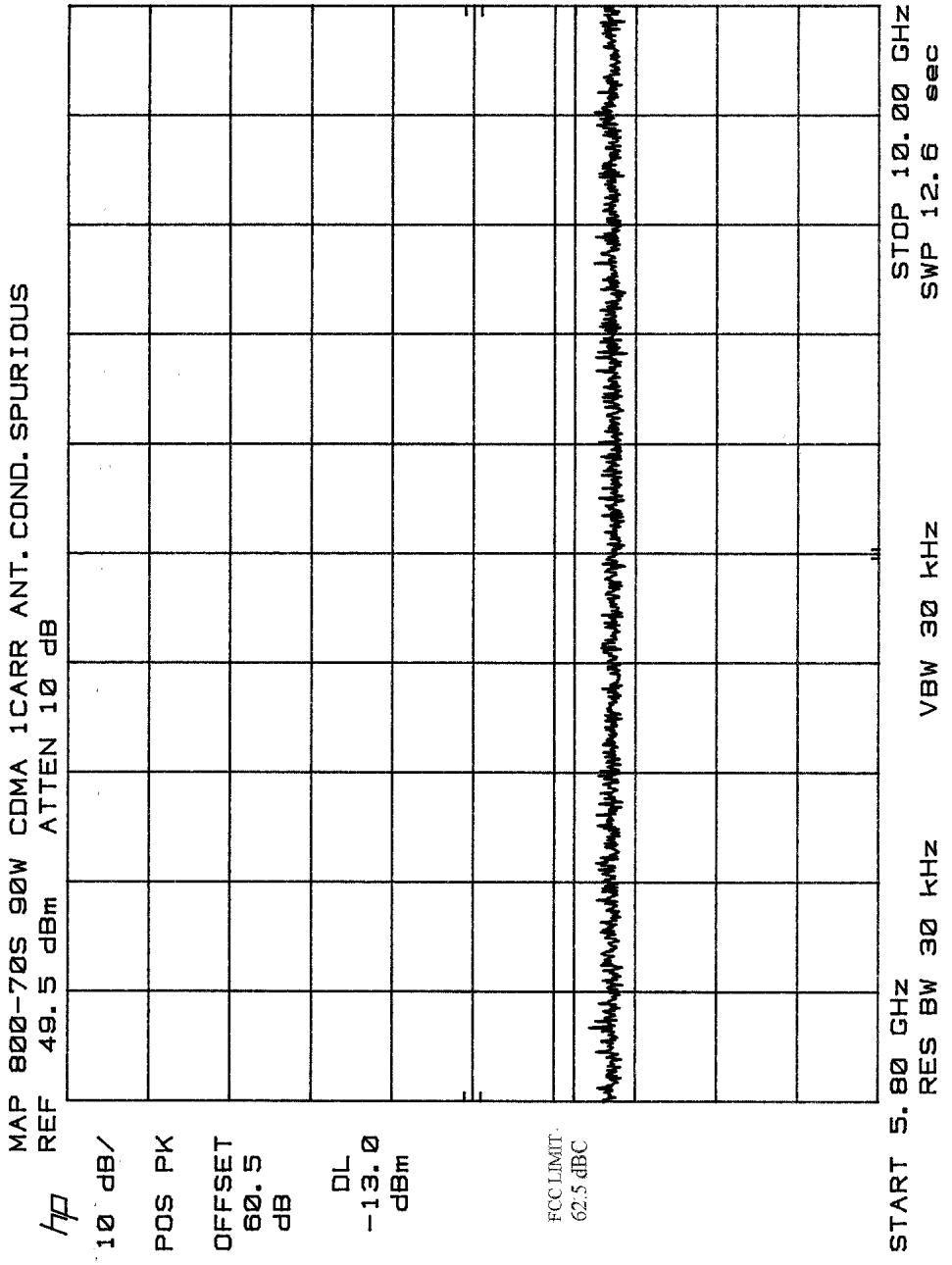


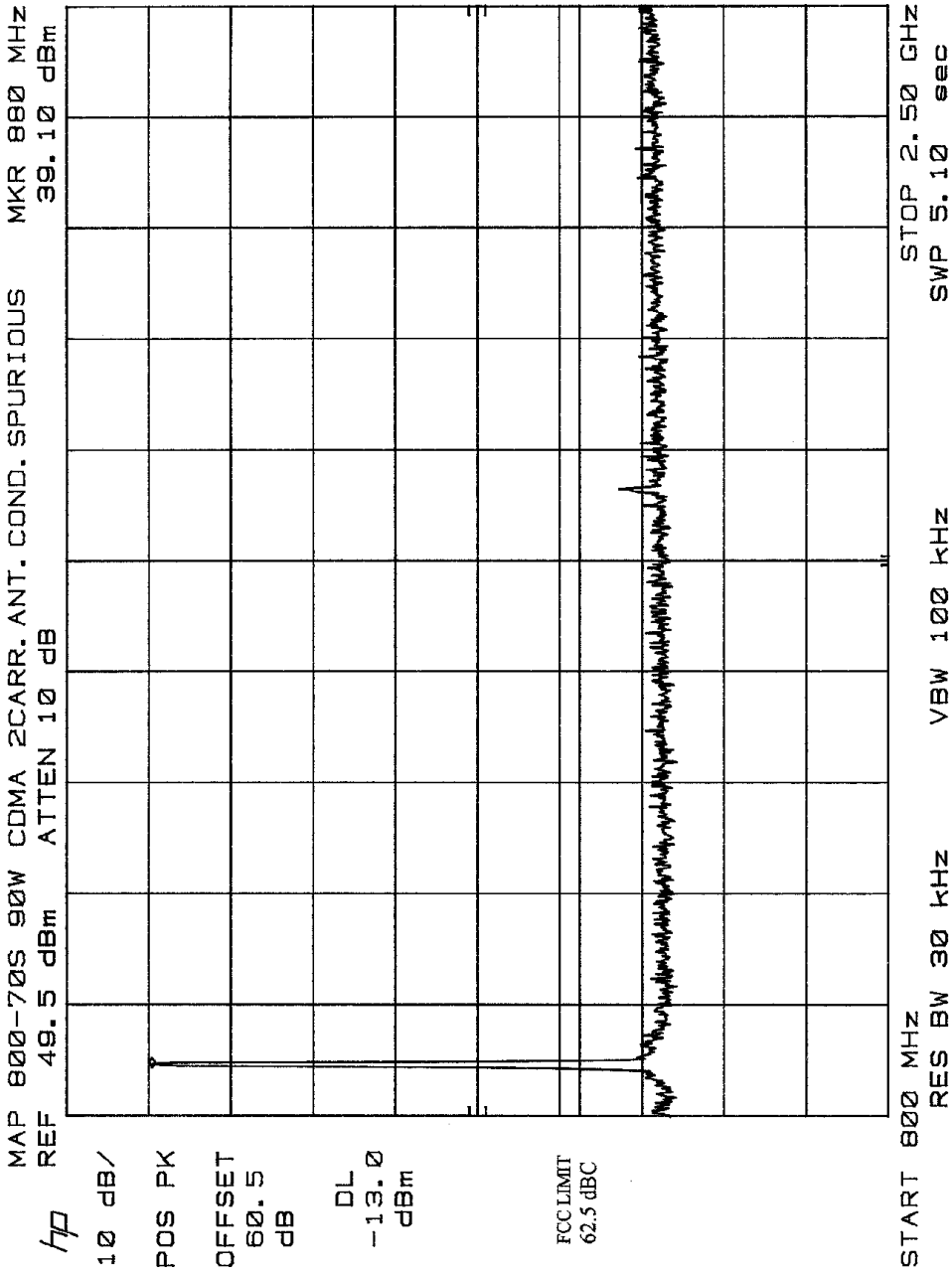

MAP800-70S 70W ANT. CONDUCTED SPURIOUS
REF 48.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET 49.8 dB
DL -13.0 dBm
FCC LIMIT > 61.5 dB
START 2.00 GHz
RES BW 30 kHz
VBW 100 kHz
STOP 5.80 GHz
SWP 11.4 sec

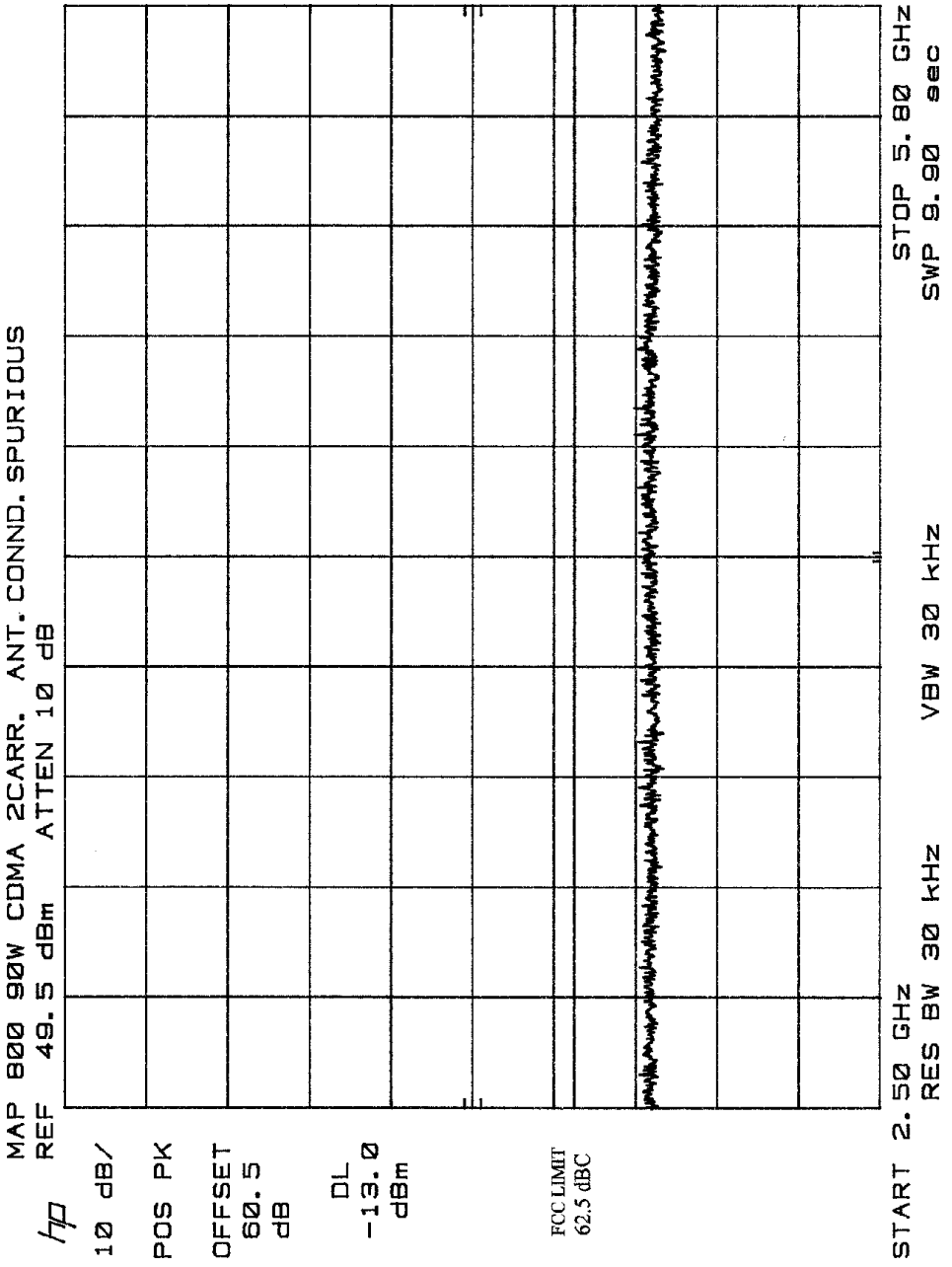

MAP800-70S 70W ANT. CONDUCTED SPURIOUS
REF 48.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
49.8
dB
DL
-13.0
dBm
FCC LIMIT >
61.5 dB
START 5.80 GHz
RES BW 30 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 12.6 sec

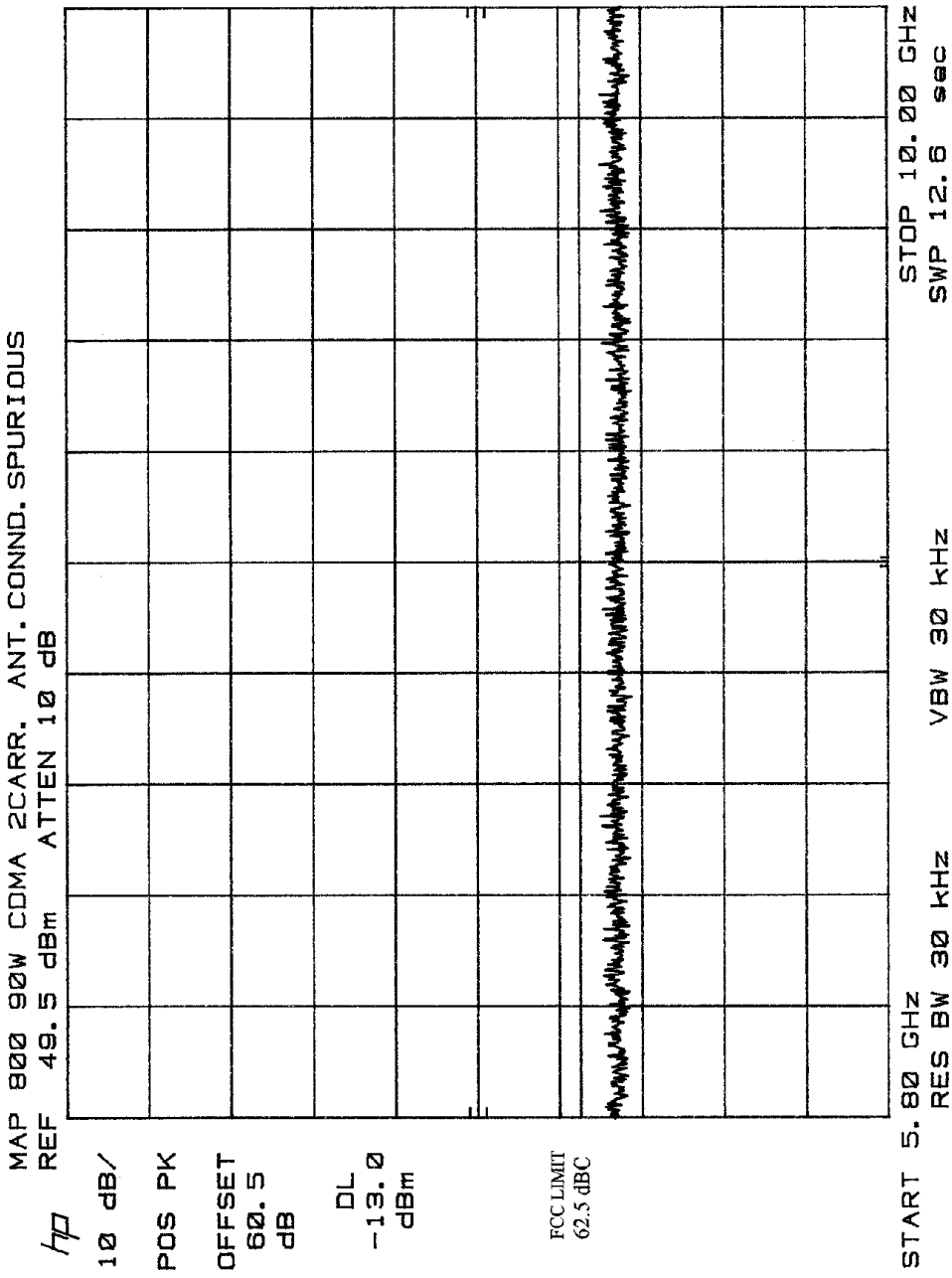

MAP 800-70S 90W CDMA 1CARR ANT. COND. SPURIOUS
MKR 880 MHz
38.80 dBm
REF 49.5 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 800 MHz
RES BW 30 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 5.10 sec

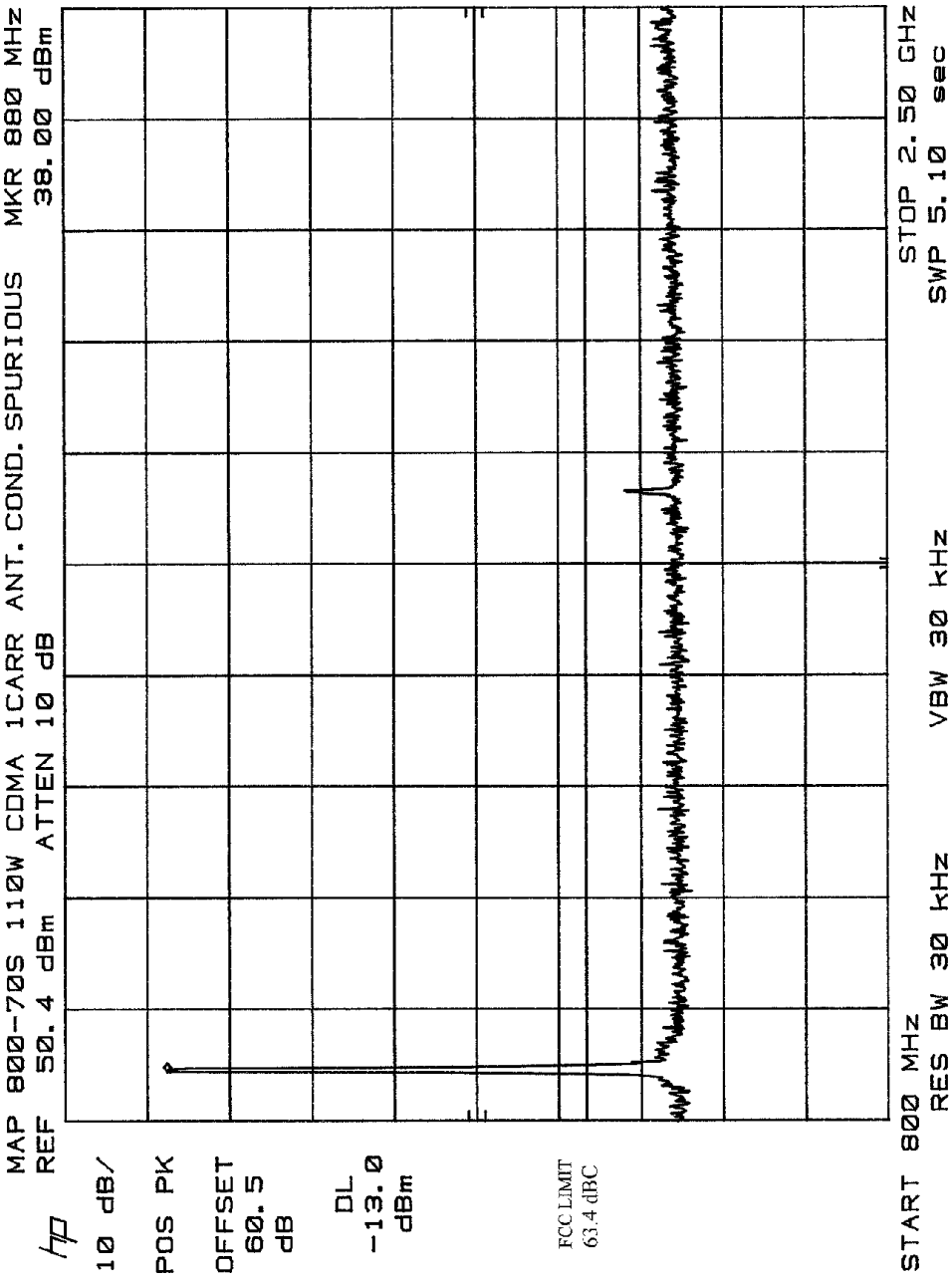

MAP 800-70S 90W CDMA 1CARR ANT. COND. SPURIOUS
REF 49.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 2.50 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 5.80 GHz
SWP 9.90 sec

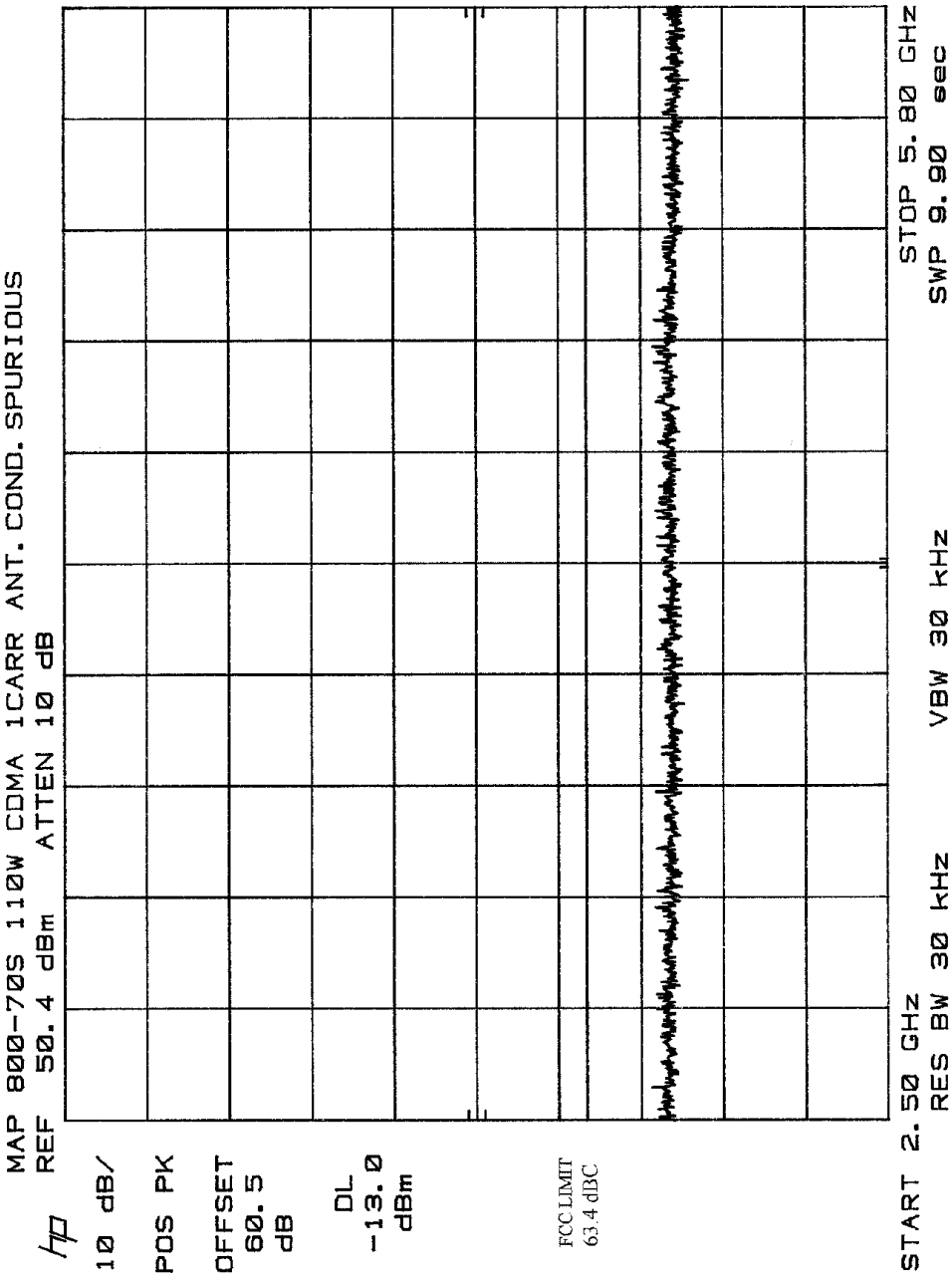

MAP 800-70S 90W CDMA 1CARR ANT. COND. SPURIOUS
REF 49.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 5.80 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 10.00 GHz
SWP 12.6 sec

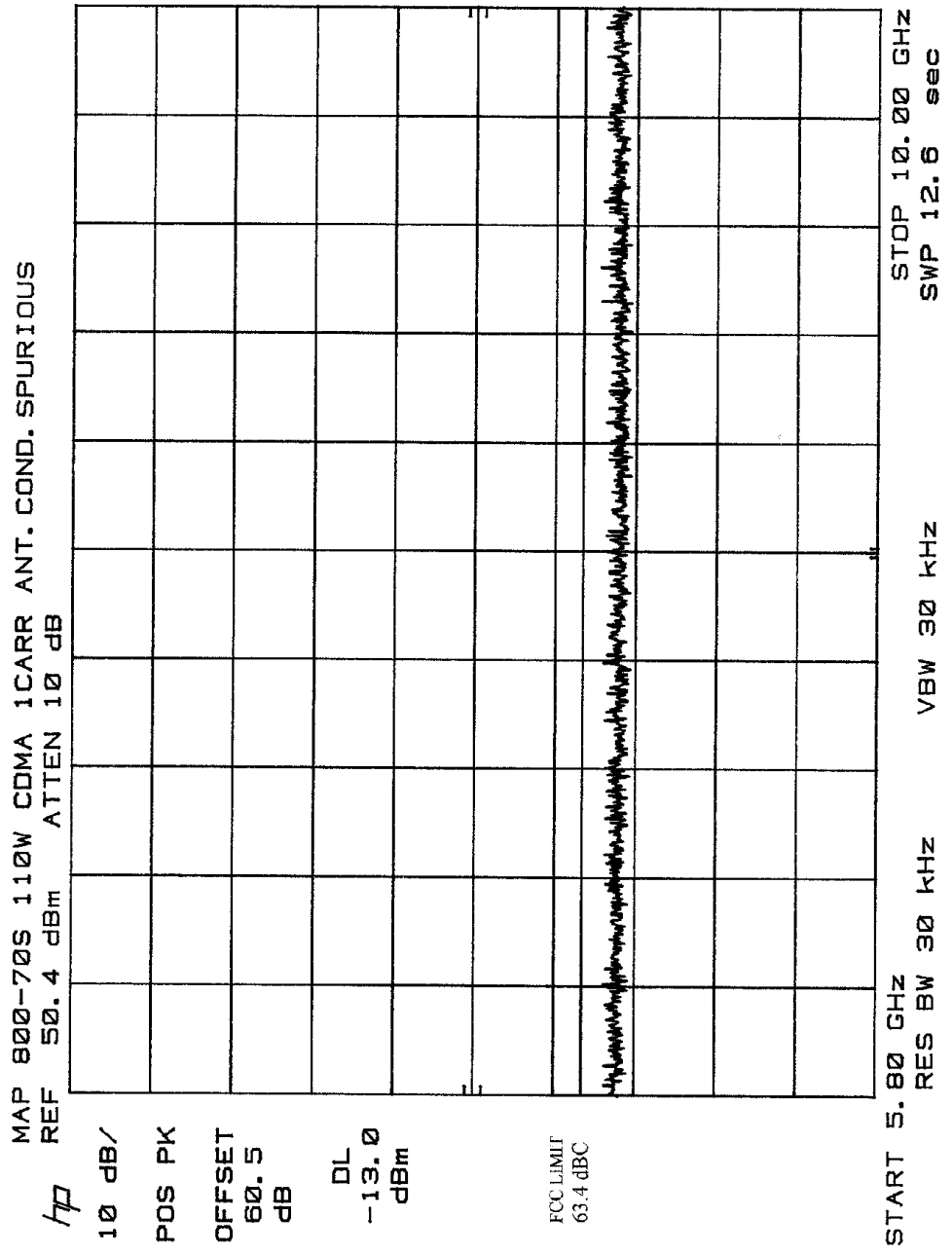

MAP 800-70S 90W CDMA 2CARR. ANT. COND. SPURIOUS
MKR 880 MHz
39.10 dBm
REF 49.5 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 800 MHz
RES BW 30 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 5.10 sec

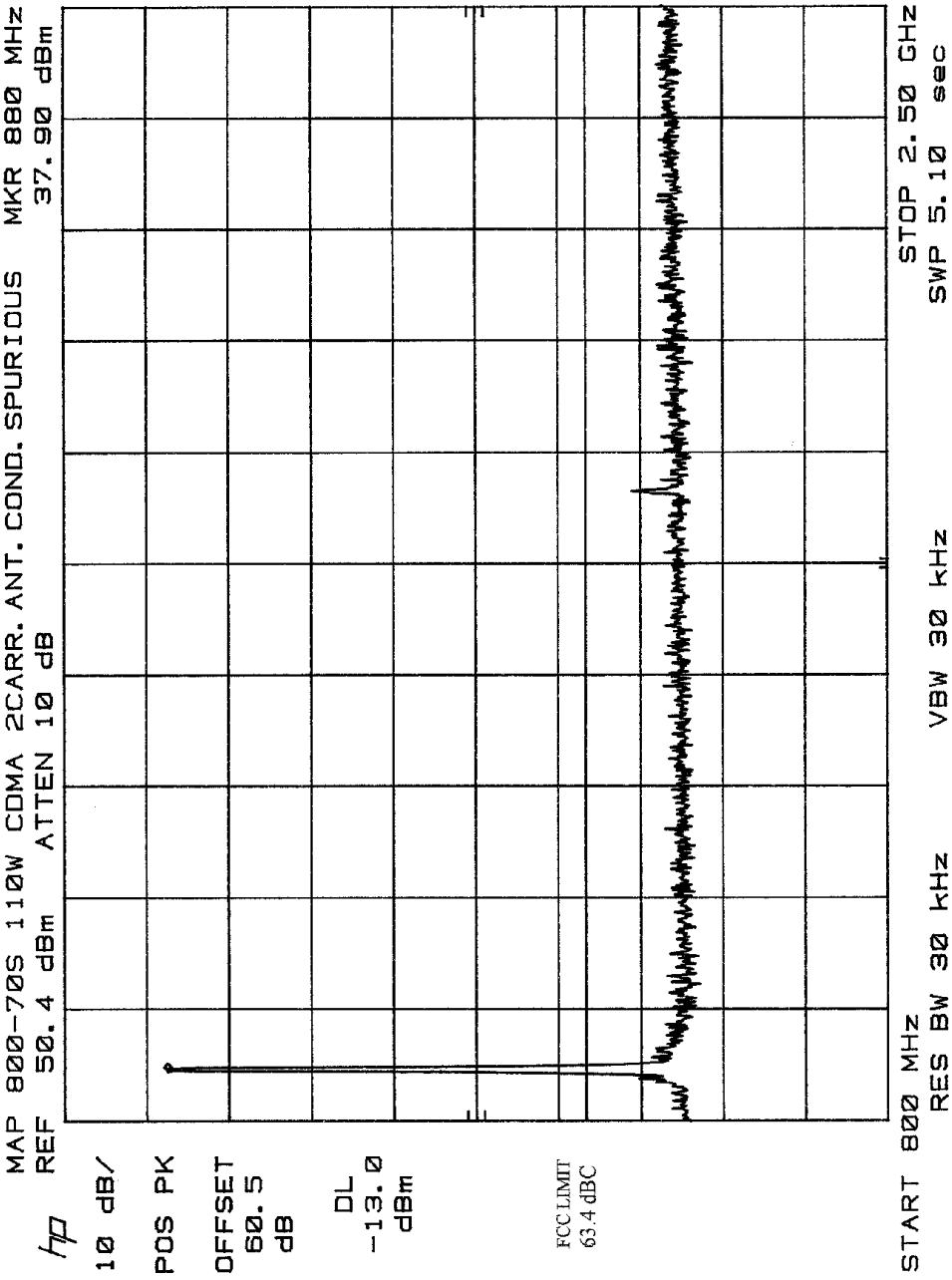

MAP 800 90W CDMA 2CARR. ANT. CONND. SPURIOUS
REF 49.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 2.50 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 5.80 GHz
SWP 9.90 sec

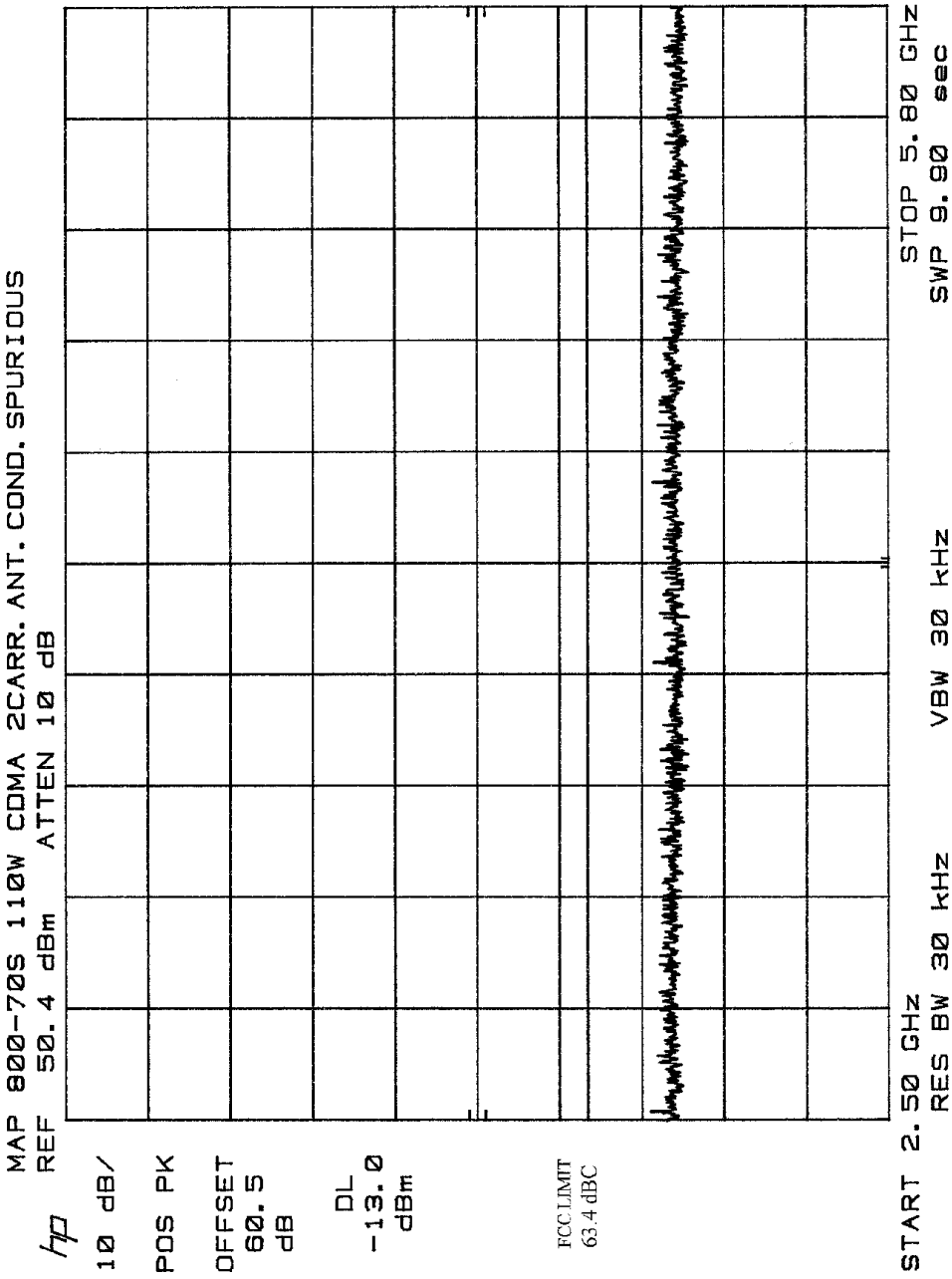

MAP 800 90W CDMA 2CARR. ANT. CONND. SPURIOUS
REF 49.5 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
62.5 dBC
START 5.80 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 10.00 GHz
SWP 12.6 sec

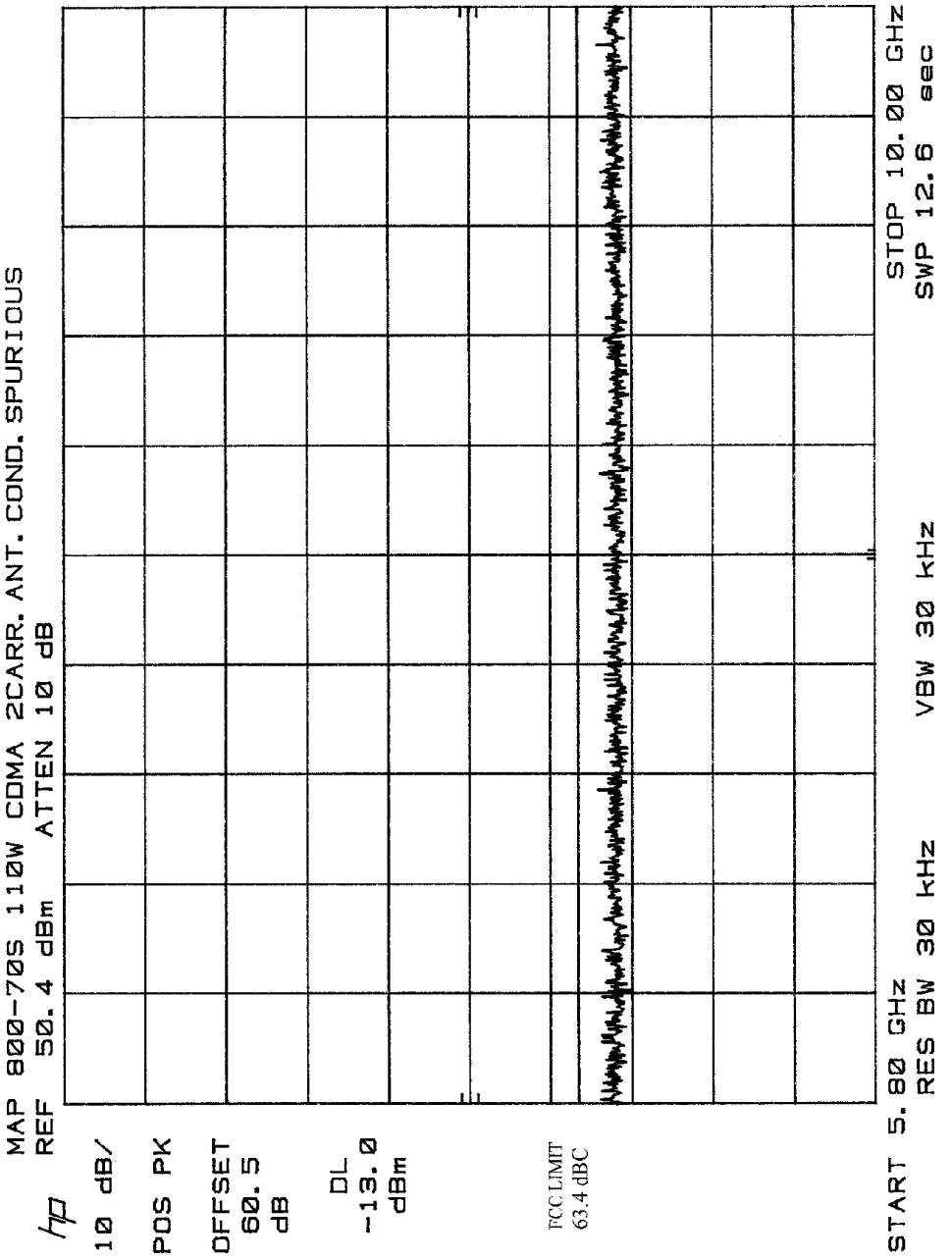

MAP 800-70S 110W CDMA 1CARR ANT. COND. SPURIOUS
MKR 880 MHz
38.00 dBm
REF 50.4 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 800 MHz
RES BW 30 kHz
VBW 30 kHz
STOP 2.50 GHz
SWP 5.10 sec


MAP 800-70S 110W CDMA 1CARR ANT. COND. SPURIOUS
REF 50.4 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET 60.5 dB
DL -13.0 dBm
FCC LIMIT 63.4 dBC
START 2.50 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 5.80 GHz
SWP 9.90 sec


MAP 800-70S 110W CDMA 1CARR ANT. COND. SPURIOUS
REF 50.4 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 5.80 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 10.00 GHz
SWP 12.6 sec


MAP 800-70S 110W CDMA 2CARR. ANT. COND. SPURIOUS
MKR 880 MHz
37.90 dBm
REF 50.4 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 800 MHz
RES BW 30 kHz
VBW 30 kHz
STOP 2.50 GHz
SWP 5.10 sec


MAP 800-70S 110W CDMA 2CARR. ANT. COND. SPURIOUS
REF 50.4 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 2.50 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 5.80 GHz
SWP 9.90 sec


MAP 800-70S 110W CDMA 2CARR. ANT. COND. SPURIOUS
REF 50.4 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
DL
-13.0
dBm
FCC LIMIT
63.4 dBC
START 5.80 GHz
RES BW 30 kHz
VBW 30 kHz
STOP 10.00 GHz
SWP 12.6 sec

2.1053 Field Strength of Spurious Radiation

Definition:
Emissions from the equipment when connected into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Test Method: Per EIA RS 152-B.

Connect the equipment and follow the procedure described in paragraph 2.2.1.1 and paragraph 5.0. Measure the amplitude of each spurious radiated signal through the 10^{th} harmonic. The level in dBuV/m is calculated on the following page. The spurious signals are then measured on the 3 meter range.

$$\text{Spurious attenuation dB} = 10 \log \frac{\text{Po Watts}}{\text{Calc. Spurious power}}$$

Test Results: See TABLE on following Page.

All radiated spurious emissions are below the FCC Specifications.

RF Exposure

The information contained in "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65; August 1997 is applicable when a radiating antenna is connected to this amplifier. Paging stations that utilize this amplifier authorized under Part 22 (Subpart E) and Part 90 are subject to routine environmental evaluation for RF exposure if an antenna is located on a rooftop and if its ERP exceeds 1000 watts.

This product is certified to meet the RF exposure guidelines of OET-65 as a stand-alone RF power amplifier. The RF spurious emissions recorded when the antenna output connector is terminated into a non-radiating 50 ohm load do not exceed the 27.5 V/m limit specified for General Population/Uncontrolled Exposure in OET Bulletin 65.

TEST EQUIPMENT LOG

Customer: Paradigm Wireless Technology **Test Procedure:** FCC, Parts 22, 90

EUT: UHF Amplifier, 869-894 MHz **Test Specification:** Radiated Spurious

Model / Part #: MAP800-70S **Test Engineer:** John Stanford

Serial #: N/A **Customer Rep:** Charlie Lipsey

February 5, 2001

DESCRIPTION	MANUFACTURER	MODEL # / SERIAL #	CAL. DUE
Spectrum Analyzer	Hewlett-Packard	8566B/2407A13212	03/08/01
Signal Generator (*)	Agilent	E4436B/US89260471	Reference
Amplifier	Mini-Circuits	ZHL-42/122884	03/23/01
Amplifier	Miteq	AFD3-040080-40/121391	01/30/02
Antenna, DRG Horn	Electrometrics	RGA60/6103	01/12/01
50 ohm load (1500W)	Dielectric	5750/0910861	Reference
Power Supply (*) (0-40 Vdc, 0-75A)	Sorensen	DCS 40-75	Reference
Coaxial Cables (3)	Malik Cable Devices	CA-NP5096NPS-H260	Cal prior to test

• - Customer furnished

FORM 0010

DNB Engineering, Inc.
SPURIOUS RADIATED SIGNAL MEASUREMENTS
(Ref: Part 2, Subpart J, 2.1053 and 2.1057)

	Input Fields
	Calculated Fields

Date	5-Feb-01	
Customer	Paradigm	
EUT	RF Power Amplifier	
P/N	MAP800-70S	
S/N	N/A	
Pass/Fail	PASS	
Operating Mode	CDMA	
Test Engineer	John Stanford	
Fund. Freq.	880	MHz
Output Power	110	W
Output Impedance	50	ohms
Fund. Field Strength	24.7	V/m
Fund. Field Strength	147.9	dBuV/m
FCC Limit	63.4	dBc

Antenna Polarization	Freq (MHz)	Measured Signal (dBuV)	AF (dB/m)	Cable Loss (dB)	Amp Gain (dB)	Corrected Measurement (dBuV)	Fundamental Field Strength (dBuV/m)	Spurious Below Carrier (dBc)	FCC Limit (dBc)
V	1760	61.4	27.4	2.2	29.8	61.2	147.9	86.7	63.4
H	2640	42.4	28.7	2.5	32.2	41.4	147.9	106.5	63.4
H	3520	31.5	31.0	2.8	30.2	35.1	147.9	112.8	63.4
H	4400	38.0	32.9	3.6	28.4	46.1	147.9	101.8	63.4
H	5280	25.3	34.6	4.3	28.6	35.6	147.9	112.3	63.4
V	6160	18.3	35.3	4.6	29.3	28.9	147.9	119.0	63.4
H	7040	18.2	37.0	5.0	28.5	31.7	147.9	116.2	63.4
V	7920	18.1	37.0	5.4	28.5	32.0	147.9	115.9	63.4
H	8800	18.0	37.8	5.5	26.0	35.3	147.9	112.6	63.4

2.1055 Measurement of Frequency Stability

The EUT is a power amplifier and contains no circuitry for generating or stabilizing the RF signal. The driver will be responsible for this task.

2.1057 Frequency Spectrum to be Investigated

The Frequency was searched from the lowest radio frequency generated in the equipment through the 10^{th} harmonic of the carrier frequency.