Intertek Testing Services
ETL SEMKO

Parts 22 Test Report

Test performed on the

UltraWAVE BTS
Model: AUAC85
FCC ID: OEWAUAC85

for

InterWave Communications Inc.

Test Report: 30368271
Date of Report: January 16, 2003
Revised Date: February 28, 2003

Job #: 3036827
Date of Test: January 7 to 16, 2003

A2LA Certificate Number: 1755-01

Test Performed by:
Intertek Testing Services
1365 Adams Court
Menlo Park, CA 94025

Test Authorized by:
InterWAVE Communications Inc.
312 Constitution Dr.
Menlo Park, CA 94025

Prepared by: _____ **Date:** 02/28/03
Suresh Kondapalli

Reviewed by: David Chernomordik **Date:** 02/28/03
David Chernomordik

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1.2 Product Description

UltraWAVE BTS Model: AUAC85 is complete GSM Base Station in 850MHz band. It provides full BSS Operation when connected with a BSC via E1/T1 Trunk line.

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

Use of Product	GSM Base Station
Whether quantity (>1) production is planned	Yes
Cellular Phone standards	GSM
Frequency Range	869 - 894 MHz
RF Output Power	50 W, except on lowest and highest channels where the power is 8 W.
Number of Transceivers	6
Number of channels	124
Type(s) of Modulation	GMSK, BT=0.3
Emission Designator	245KGXW
Data Rate	270.8 kbps
Antenna Gain	Typical antenna gain is 12 dBd with 2 dB loss of the antenna cable; if antenna with higher gain is used, the output power must be reduced accordingly.
Detachable antenna?	Yes
Receiver L.O. frequency	1070.2 – 1094.8 MHz
External input	Digital Data
Power Supply	90 to 264 VAC, -40 to –60 VDC
DC Power Supply to RF Amplifier	27 Volts, 7.5 Amps
Operating Temperature	-5^0C to $+55^0$C

There are 6 identical transmitters mounted in one rack. Only one transmitter was tested. All others were terminated with dummy loads.
Two cables were connected to the rack: power cable (unshielded, 2 m) and antenna cable (coax, 3 m) from the transmitter under test to the external antenna (during the Part 15 Subpart B test).

1.3 Related Submittal(s) Grants

None

2.0 RF Power Output,
FCC 2.1046

2.1 Test Procedure

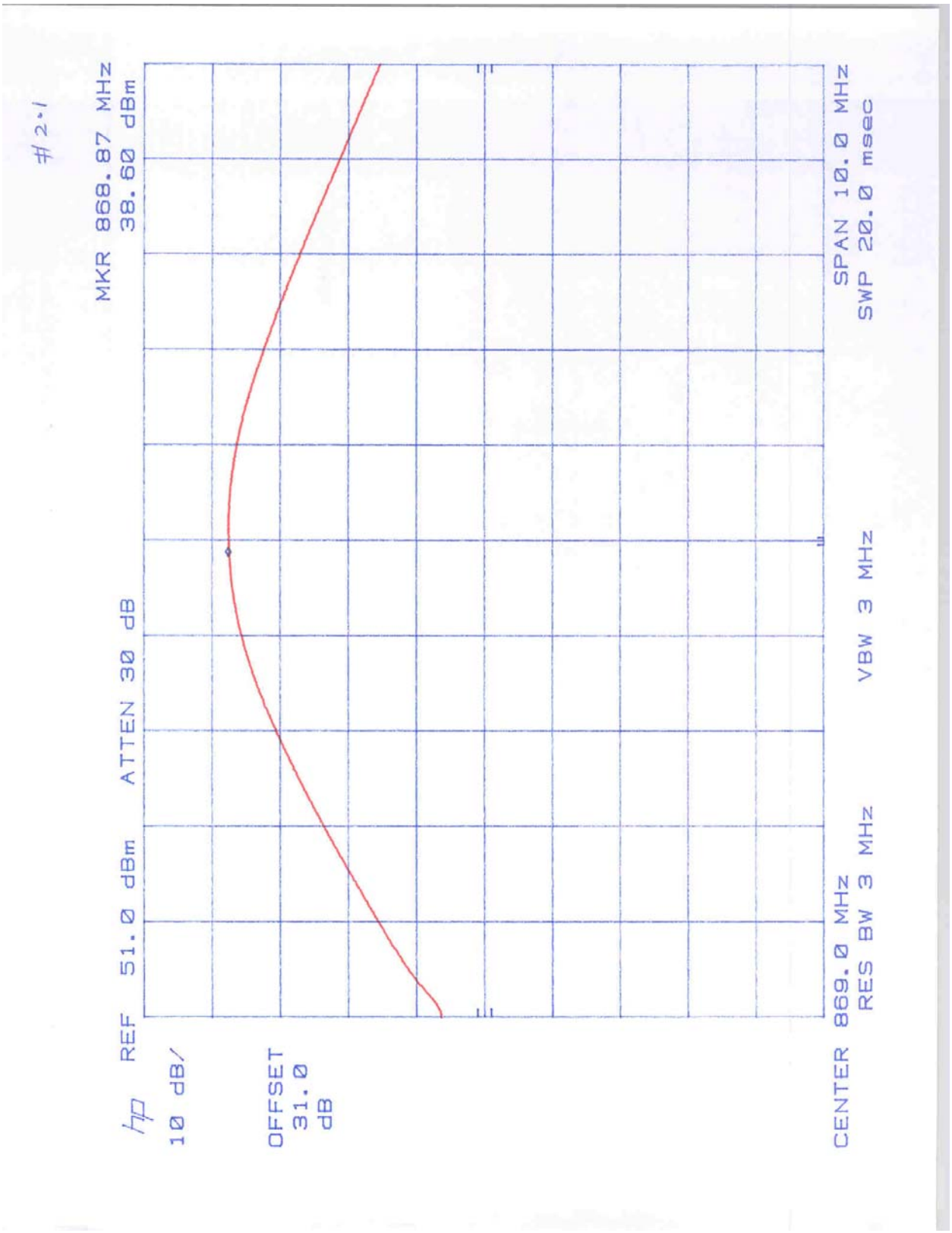
The transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the spectrum analyzer reading. An HP power meter was also used to measure the RF power.
Tests were performed at three frequencies (low, middle, and high channels) and on all power levels, which can be setup on the transmitters.

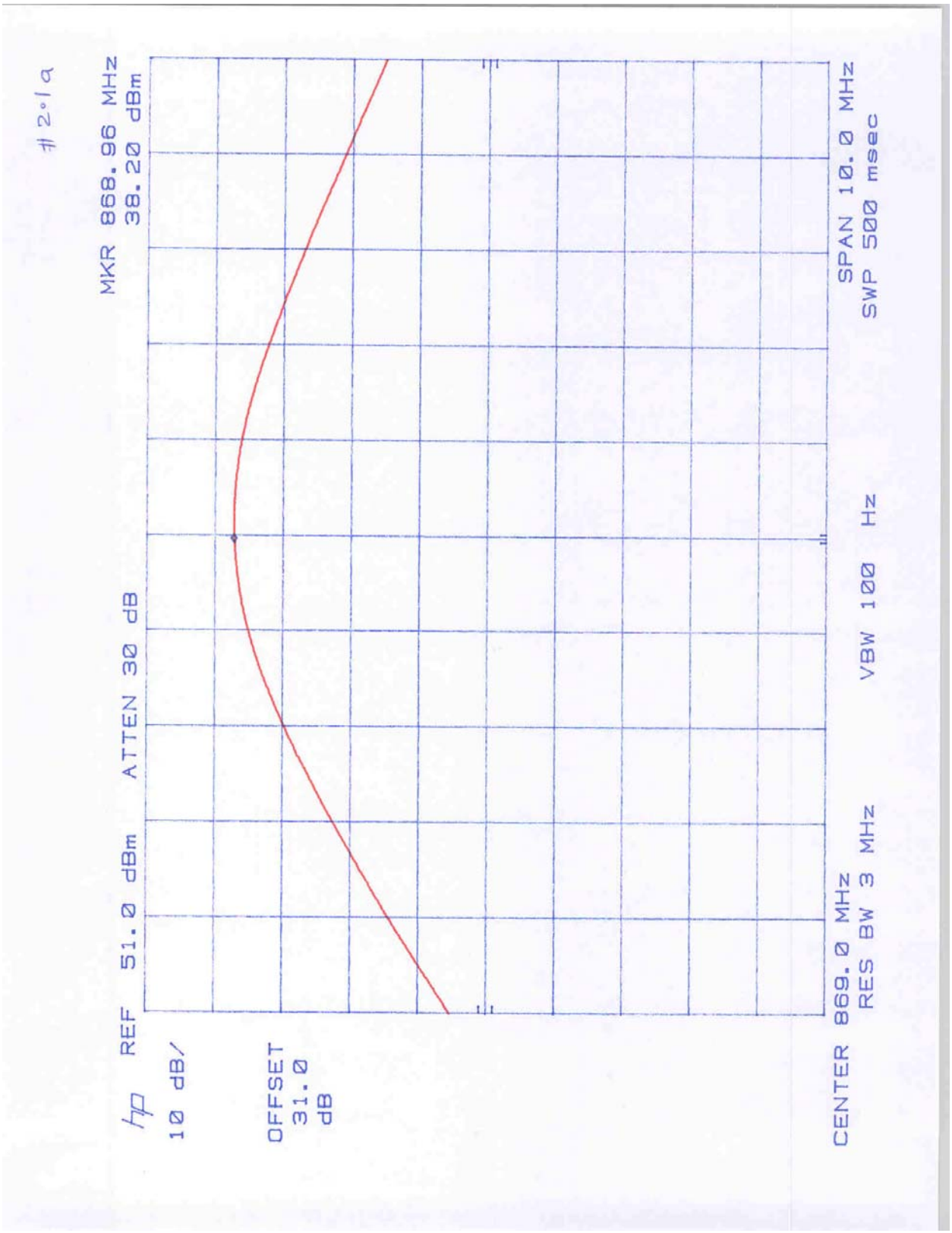
2.2 Test Equipment

Hewlett Packard 8481A Power Sensor, 435B Power Meter
Hewlett Packard HP8566B Spectrum Analyzer, 100 Hz - 22 GHz

2.3 Test Results

Frequency (MHz)	Mode	Channel	Measured maximum Conducted Peak Power (dBm)	Plot	Measured maximum Conducted Average Power (dBm)	Plot
868.93	GSM	128	38.60	2.1	38.20	2.1.a
869.40	GSM	129	46.90	2.2	46.50	2.2.a
836.55	GSM	192	47.00	2.3	46.90	2.3.a
848.97	GSM	250	46.70	2.4	46.60	2.4.a
848.97	GSM	251	38.20	2.5	37.90	2.5.a


#2-1
MKR 868.87 MHz
38.60 dBm
SPAN 10.0 MHz
SWP 20.0 msec
REF 51.0 dBm
ATTEN 30 dB
VBW 3 MHz
10 dB/
OFFSET
31.0
dB
CENTER 869.0 MHz
RES BW 3 MHz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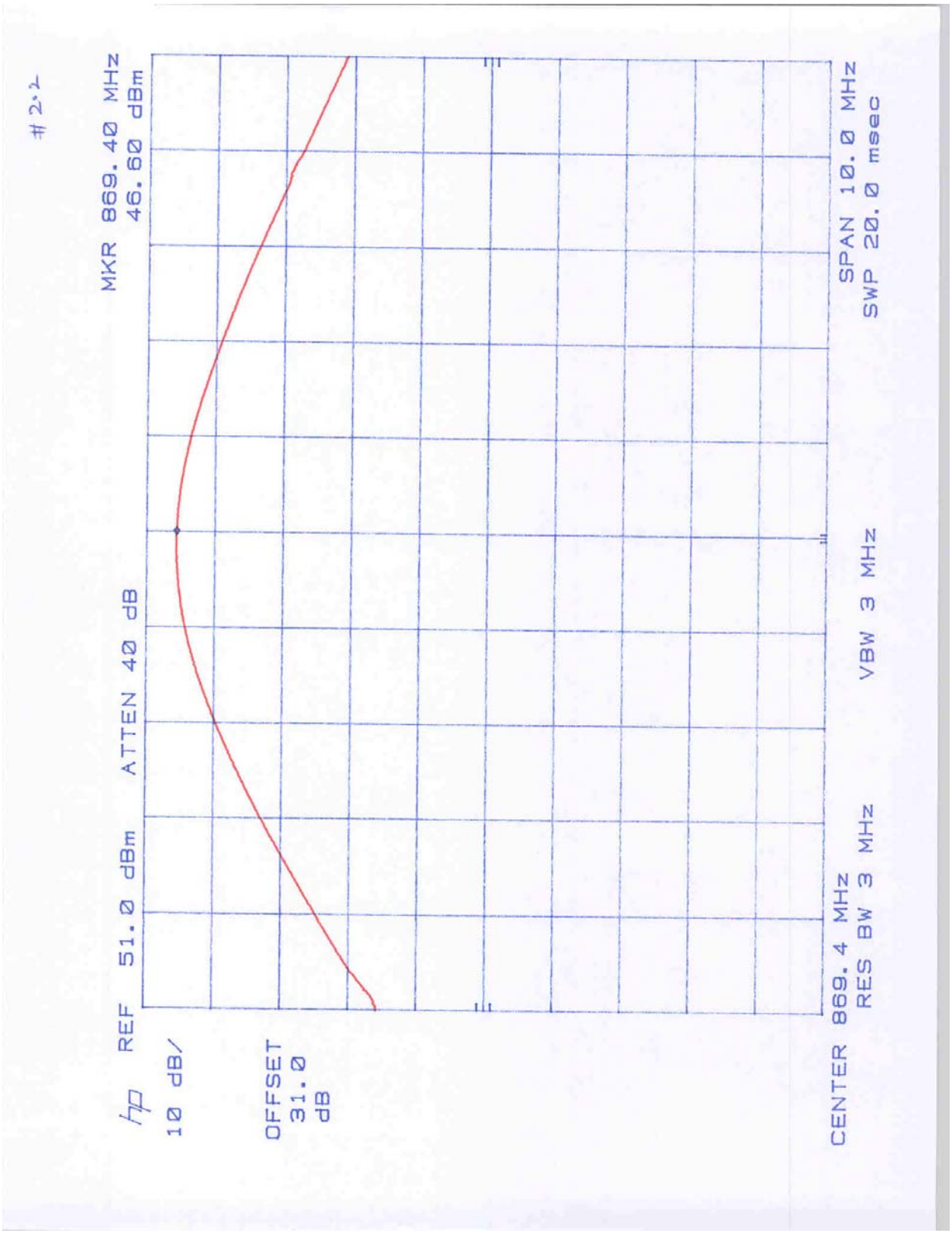
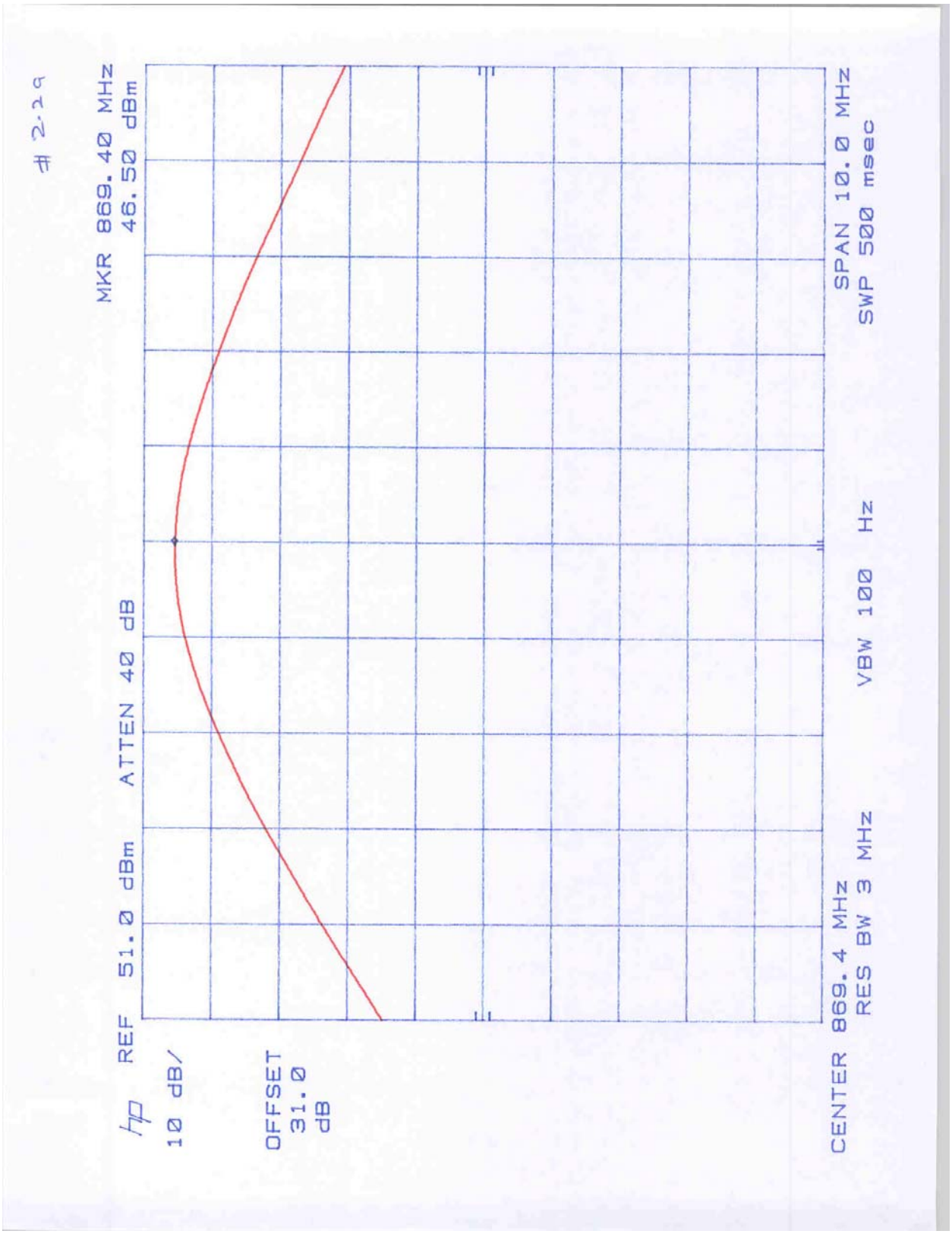
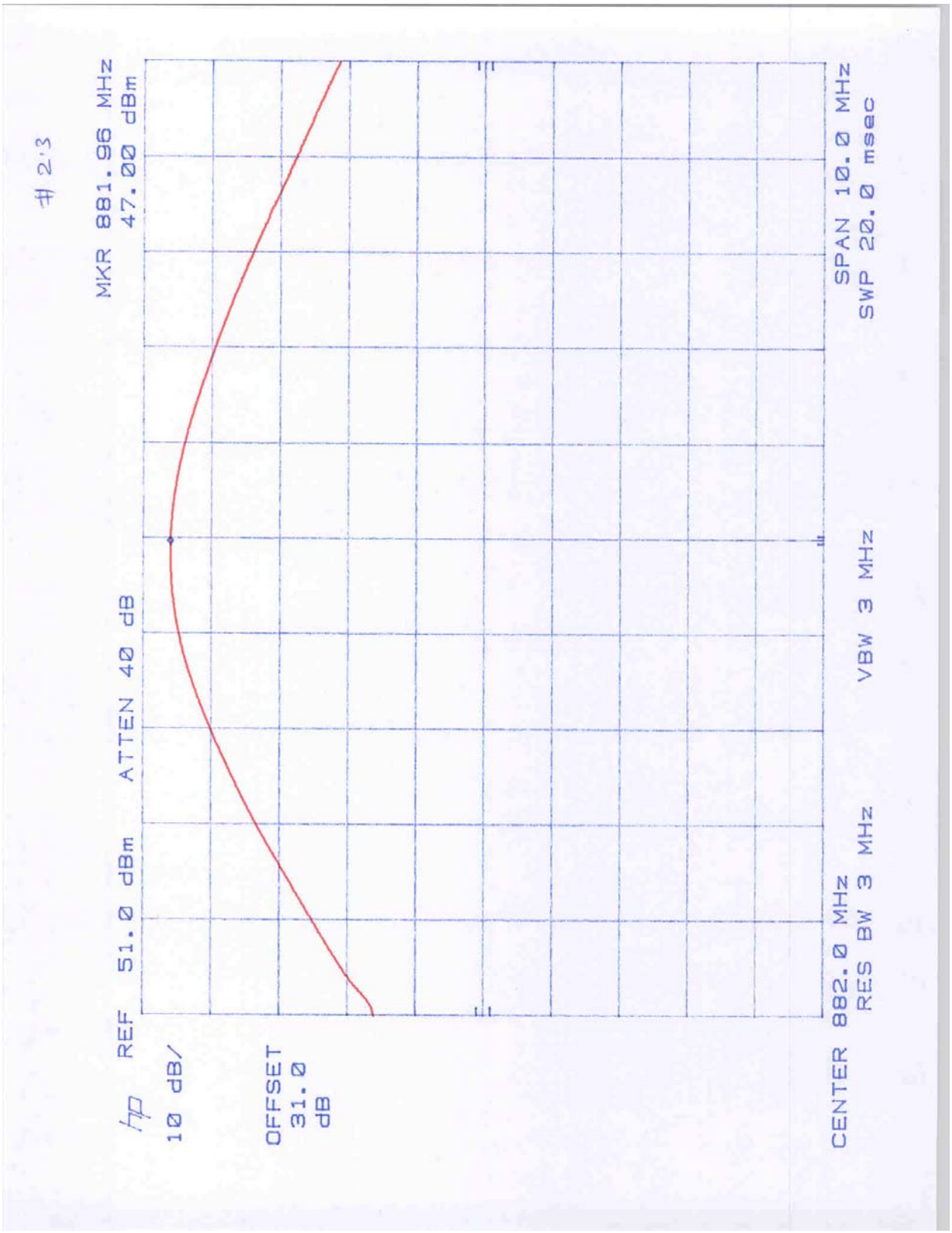
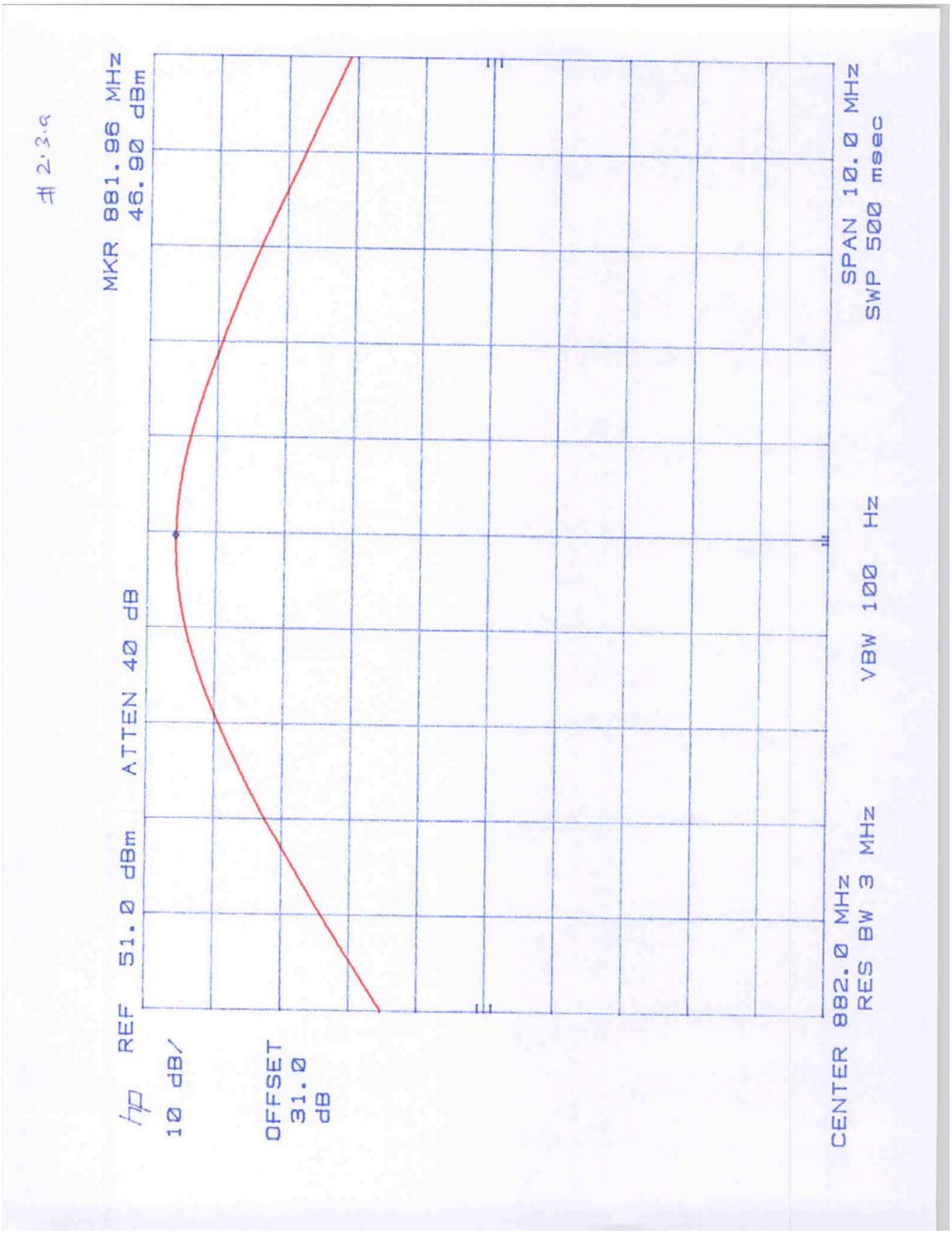
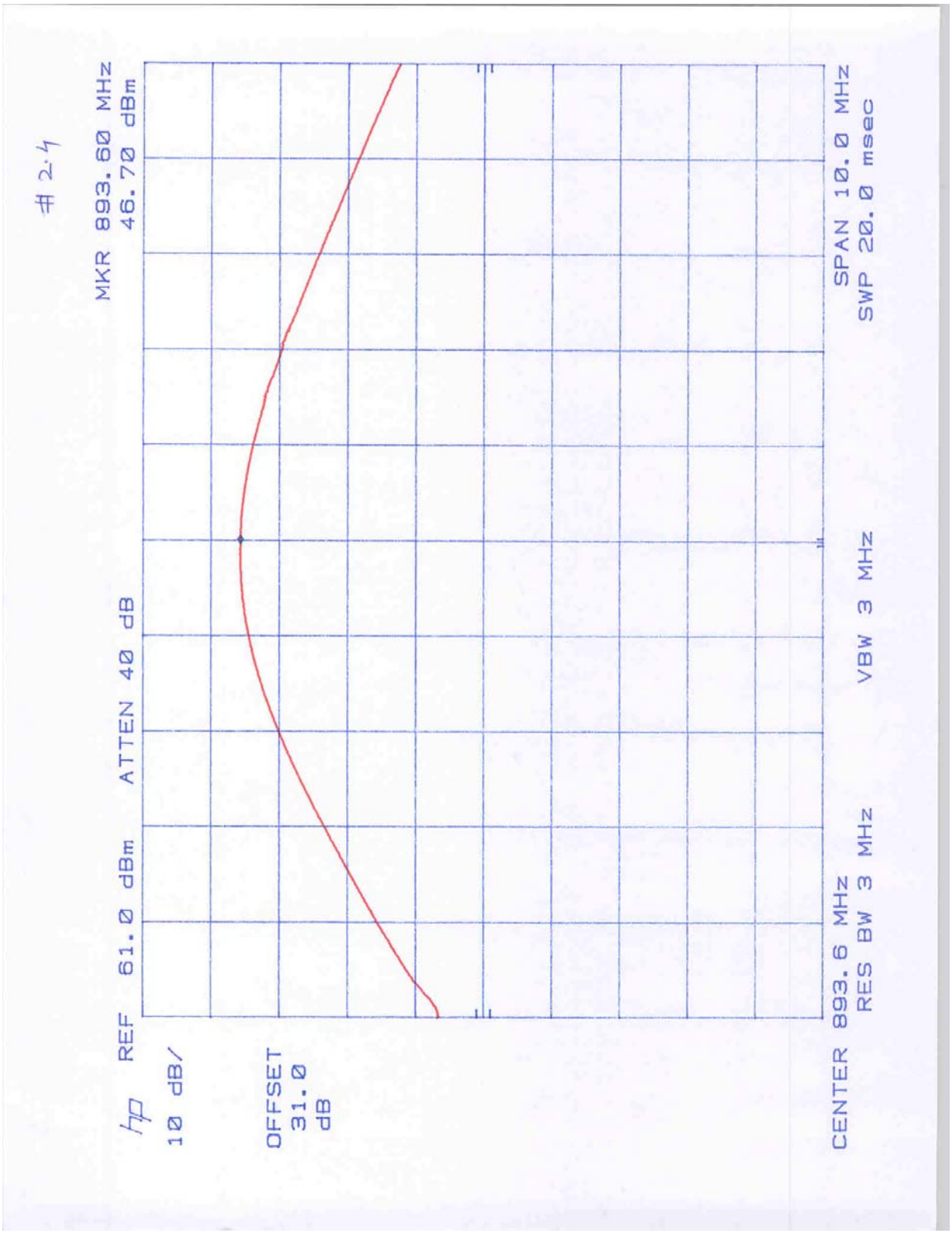
38.20 dBm
SPAN 10.0 MHz
SWP 500 msec
REF 51.0 dBm
ATTEN 30 dB
VBW 100 Hz
10 dB/
OFFSET
31.0
dB
CENTER 869.0 MHz
RES BW 3 MHz

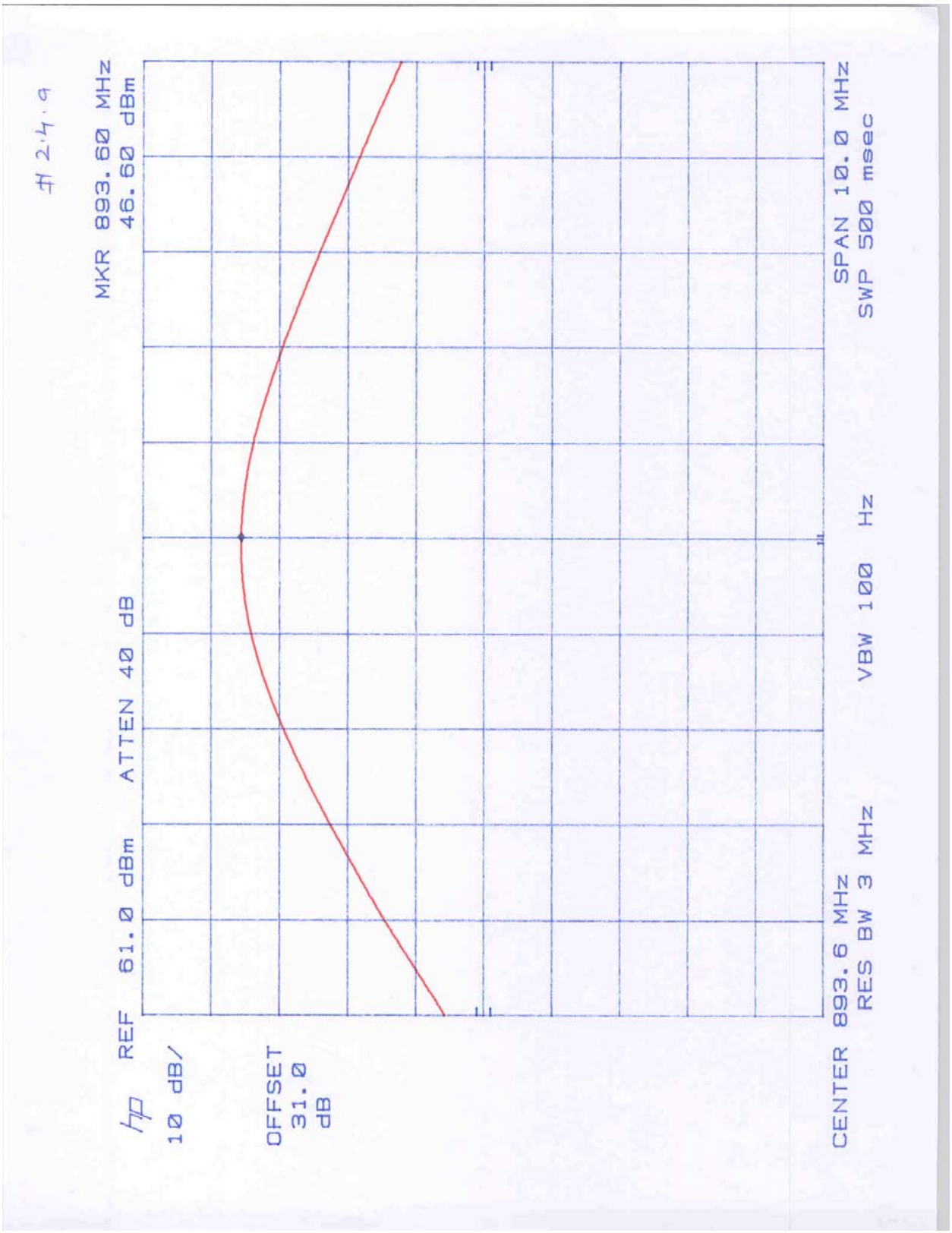

#2.2
MKR 869.40 MHz
46.60 dBm
SPAN 10.0 MHz
SWP 20.0 msec
REF 51.0 dBm
ATTEN 40 dB
VBW 3 MHz
10 dB/
OFFSET
31.0
dB
CENTER 869.4 MHz
RES BW 3 MHz

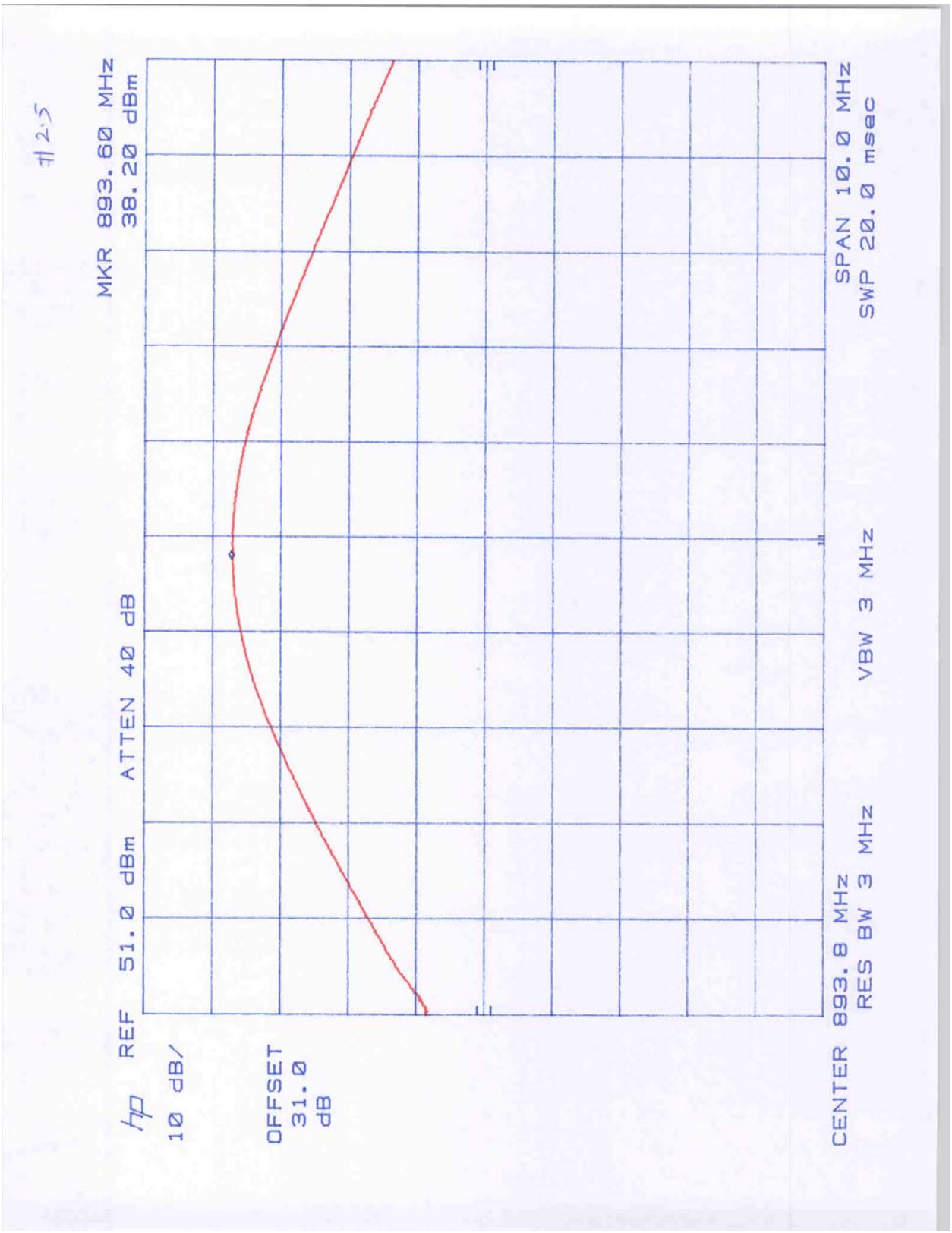

#2-29
MKR 869.40 MHz
46.50 dBm
SPAN 10.0 MHz
SWP 500 msec
VBW 100 Hz
REF 51.0 dBm
ATTEN 40 dB
10 dB/
OFFSET
31.0
dB
CENTER 869.4 MHz
RES BW 3 MHz

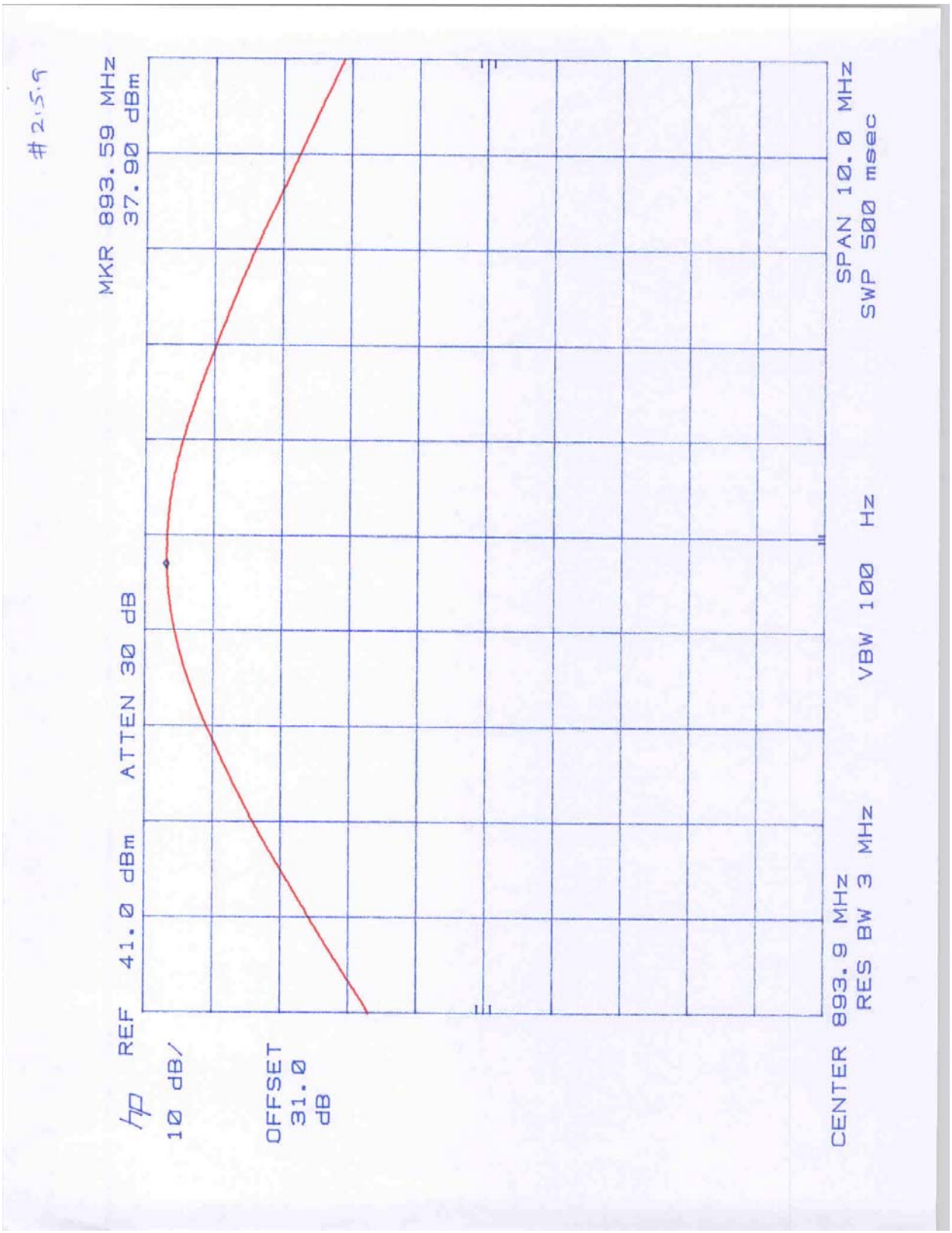

#2:3
MKR 881.96 MHz
47.00 dBm
SPAN 10.0 MHz
SWP 20.0 msec
REF 51.0 dBm
ATTEN 40 dB
VBW 3 MHz
10 dB/
OFFSET
31.0
dB
CENTER 882.0 MHz
RES BW 3 MHz


#2.3.6
MKR 881.96 MHz
46.90 dBm
SPAN 10.0 MHz
SWP 500 msec
REF 51.0 dBm
ATTEN 40 dB
VBW 100 Hz
10 dB/
OFFSET
31.0
dB
CENTER 882.0 MHz
RES BW 3 MHz


#2.4
MKR 893.60 MHz
46.70 dBm
SPAN 10.0 MHz
SWP 20.0 msec
REF 61.0 dBm
ATTEN 40 dB
VBW 3 MHz
10 dB/
OFFSET
31.0
dB
CENTER 893.6 MHz
RES BW 3 MHz


#2.4.9
MKR 893.60 MHz
46.60 dBm
SPAN 10.0 MHz
SWP 500 msec
REF 61.0 dBm
ATTEN 40 dB
VBW 100 Hz
10 dB/
OFFSET
31.0
dB
CENTER 893.6 MHz
RES BW 3 MHz


#1 2-5
MKR 893.60 MHz
38.20 dBm
SPAN 10.0 MHz
SWP 20.0 msec
REF 51.0 dBm
ATTEN 40 dB
VBW 3 MHz
10 dB/
OFFSET
31.0
dB
CENTER 893.8 MHz
RES BW 3 MHz


#2.5.9
MKR 893.59 MHz
37.90 dBm
SPAN 10.0 MHz
SWP 500 msec
REF 41.0 dBm
ATTEN 30 dB
VBW 100 Hz
10 dB/
OFFSET
31.0
dB
CENTER 893.9 MHz
RES BW 3 MHz

3.0 Radiated Power
FCC 22.913

The Effective Radiated Power (ERP) of base transmitters must not exceed 500 Watts.

3.1 Test Procedure

The ERP/EIRP was calculated by adding the antenna gain (in dBd) to the output power in dBm.

3.2 Test Result

The antenna supplied with the device has a gain of 6 dBd. However, according to the information provided by the Applicant, the typical antenna gain used with this base station is 12 dBd with a typical cable loss of 2 dB. Therefore:

ERP = 56.9 dBm (490 W) for all frequencies except the lowest and the highest channels,
ERP = 48.0 dBm (63 W) for the lowest and the highest channels.

If an antenna with higher gain is used, the output power must be reduced accordingly.

Complies

4.0 Occupied Bandwidth

FCC 2.1049

4.1 Test Procedure

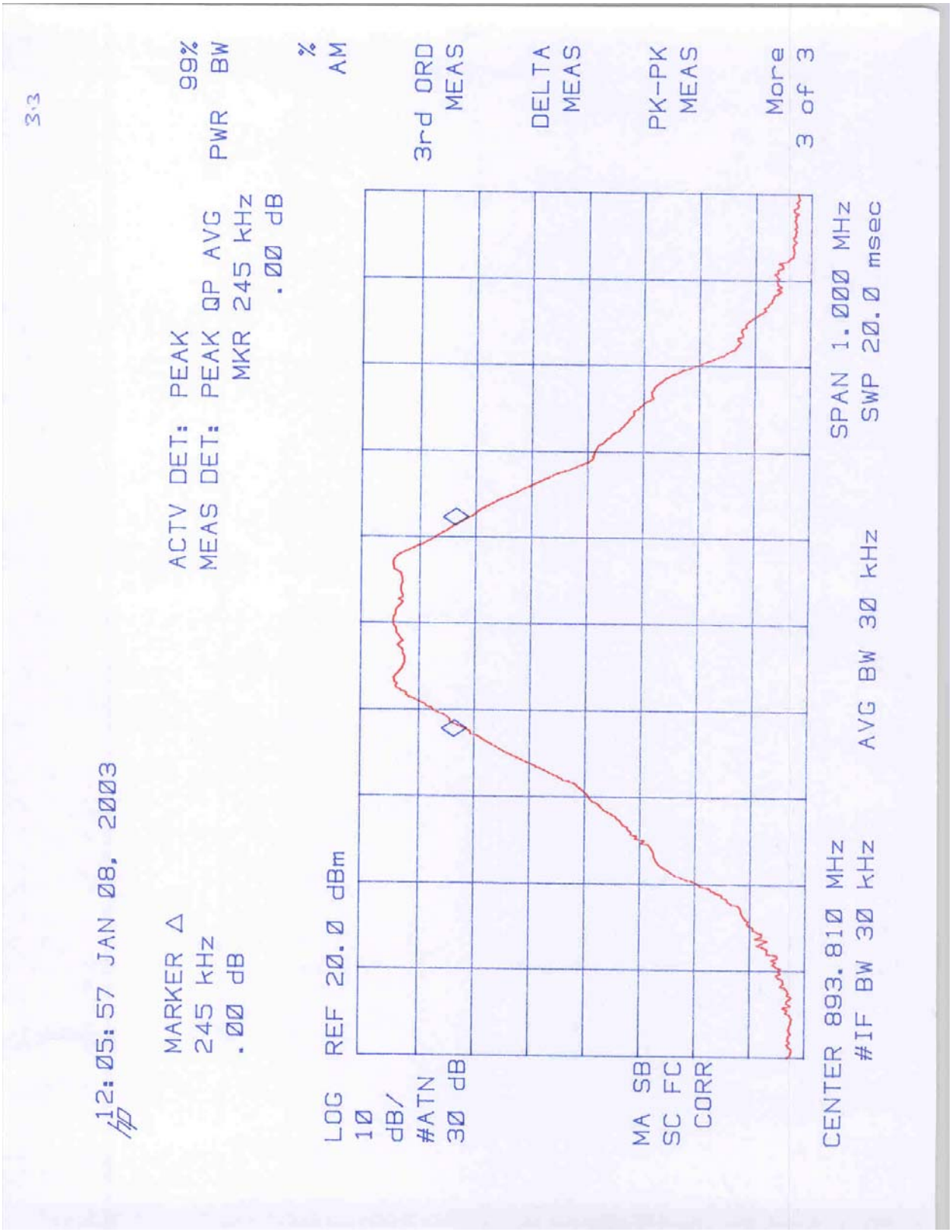
The transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. The Occupied Bandwidth (defined as the 99% Power Bandwidth) was measured with HP8546A Spectrum Analyzer.

4.2 Test Equipment

Hewlett Packard HP8546A Spectrum Analyzer

4.3 Test Results

See attached plots 4.1. The test result shows that the bandwidth is 245 kHz, Therefore the Emission Designator is determined as 245KGXW


12:05:57 JAN 08, 2003
MARKER Δ
245 kHz
.00 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 245 kHz
.00 dB
99%
PWR BW
%
AM
3rd ORD
MEAS
DELTA
MEAS
PK-PK
MEAS
More
3 of 3
LOG REF 20.0 dBm
10
dB/
#ATN
30 dB
MA SB
SC FC
CORR
CENTER 893.810 MHz
#IF BW 30 kHz
AVG BW 30 kHz
SPAN 1.000 MHz
SWP 20.0 msec

5.0 Out of Band Emissions at Antenna Terminals

FCC 22.901(d), 24.238(a)

Out of Band Emissions:

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) on by at least (43 + 10 log P) dB.

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

Hewlett Packard HP8566B Spectrum Analyzer

5.3 Test Results

Complies	Refer to the attached plots in APPENDIX A

Plot Number	Description
5.1.a - 5.1.e	Channel # 128, high Power (reduced), 38.2dBm
5.2.a - 5.2.e	Channel #129, high Power, 46.5 dBm
5.3.a - 5.3.e	Channel #192, high Power, 46.9 dBm
5.4.a - 5.5.e	Channel #250, high Power, 46.6 dBm
5.5.a - 5.5.e	Channel #251, high Power (reduced), 37.9 dBm
5.6.a – 5.6.d	Channel # 192, lower Power, 20.7dBm

6.0 Field Strength of Spurious Radiation

FCC 2.1053

6.1 Test Procedure

The dummy load was connected to the output of the transmitter. The transmitter was placed on the turntable in a 10-m semi-anechoic chamber.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The frequency range up to tenth harmonic of each of the three fundamental frequency (low, middle, and high channels) was investigated. The worst case of emissions was reported.

For spurious emissions attenuation measurement, the substitution method was used. On each frequency where the Field Strength was found above 63.4 dB(uV/m) (which corresponds to ERP = -33 dBm), the EUT was substituted by a reference antenna (half-wave dipole - below 1 GHz, or Horn antenna - above 1GHz), connected to a signal generator.

The signal generator output was adjusted to obtain the same reading as from EUT. The ERP at the spurious emissions frequency was calculated by adding the gain of the substitution antenna (in dBd) to the output power of the generator ($\mathbf{V_g}$ dBm). The spurious emissions attenuation was calculated as the difference between ERP at the fundamental frequency (see section 3) and at the spurious emissions frequency.

6.2 Test Equipment

EMCO 3115 Horn Antennas
HP 8566B Spectrum Analyzer
Low Pass Filter
Preamplifiers
Signal Generator HP83732A

6.3 Test Results

Test Result:	Complies, refer to the attached

Effective Radiated Power
(Measured by Substitution Method)

Frequency	Antenna Polariz.	SA Reading (EUT)	Signal Generator Output required to have the same SA Reading as from EUT	ERP *	Spurious Attenuat.
MHz		**dB(µV)**	**V_g (dBm)**	**dBm**	**dB**
Channel 128; Frequency : 869.8 MHz; Output power: 38.2 dBm					
1738.4	V	30.0	-41.8	-36.8	84.8
2607.6	V	62.1	-41.6	-37.1	85.1
3476.8	V	43.0	-57.5	-51.5	99.5
Channel 192; Frequency : 882.0 MHz; Output power: 46.9 dBm					
1764.0	V	22.4	-47.4	-42.4	99.3
2646.0	V	59.8	-43.1	-38.6	95.5
3528.0	V	37.2	-62.8	-58.8	115.7
Channel 251; Frequency : 893.8 MHz; Output power: 37.9 dBm					
1787.6	V	28.3	-43.5	-38.5	83.8
2681.4	V	60.1	-43.5	-37.5	85.5
3557.2	V	30.4	-69.0	-66.0	114.0

* ERP is calculated as: $ERP_{(dBm)} = V_{g(dBm)} + G_{(dBd)}$
The Limit for Spurious Attenuation is 52 dB for the lowest and highest channels and 63 dB for the middle channel.
Attenuation for all other frequencies not reported is more then 20 dB above the limit.

Test Result:	Complies by more than 30 dB

7.0 Spurious Emissions from digital part

FCC 15.109

7.1 Procedure

Radiated emission measurements were performed from 30 MHz to 1000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater.

The EUT is placed on the turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

Field Strength Calculation

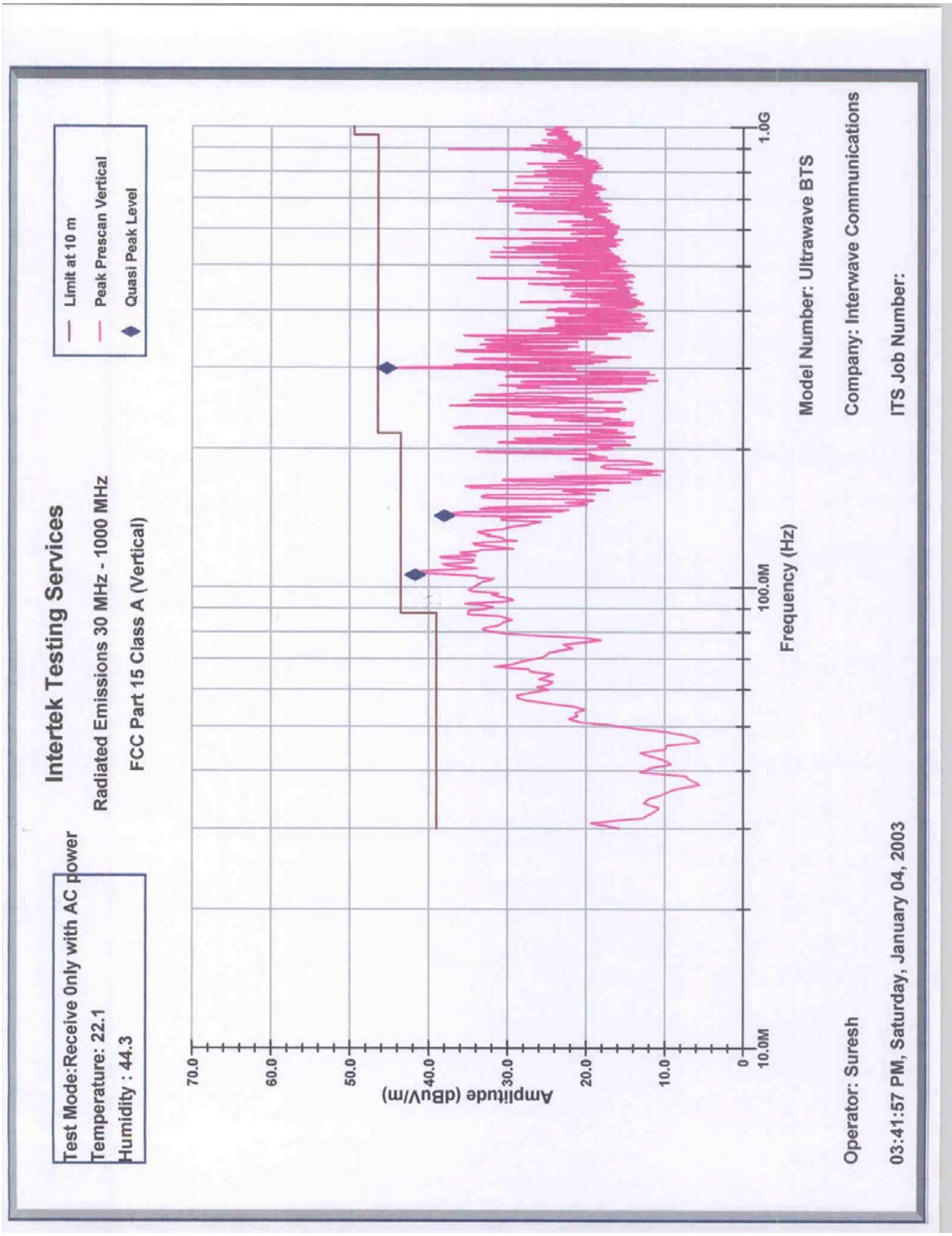
The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG + Att
Where FS = Field Strength in dB(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(1/m)
AG = Amplifier Gain in dB
Att = External attenuator (if used)

Assume a receiver reading of 52.0 dB(μV) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted, giving field strength of 32.0 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.
RA = 52.0 dB(μV)
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
Att = 0 dB
FS = 52+7.4+1.6-29.0+0 = 32.0 dB(μV/m)
Level in μV/m = Common Antilogarithm [(32.0 dBμV/m)/20] = 39.8 μV/m

7.2 Test Results

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.
The EUT passed Class A Limit by 1.1 dB. According to the applicant, the EUT is not used in residential area.


Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class A (Vertical)
Test Mode:Receive Only with AC power
Temperature: 22.1
Humidity : 44.3
Limit at 10 m
Peak Prescan Vertical
Quasi Peak Level
Amplitude (dBuV/m)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: Ultrawave BTS
Company: Interwave Communications
ITS Job Number:
Operator: Suresh
03:41:57 PM, Saturday, January 04, 2003

Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class A (QP-Vertical)

Operator: Suresh

Model Number: Ultrawave BTS
ITS Job Number:

03:41:54 PM, Saturday, January 04, 2003

Company: Interwave Communications

	1	2	3	4	5	6	7
Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	AF
MHz	dB(uV/m)	dB(uV/m)	dB	dB	dB	dB	dB(1/m)
106.4938 MHz	41.7	43.5	-1.8	63.6	4.3	32.3	6.2
143.0003 MHz	38.0	43.5	-5.5	56.1	4.5	32.3	9.7
298.9985 MHz	45.3	46.4	-1.1	59.6	5.1	32.2	12.9

Test Mode:Receive Only with AC power
Temperature: 22.1
Humidity : 44.3

Page 1

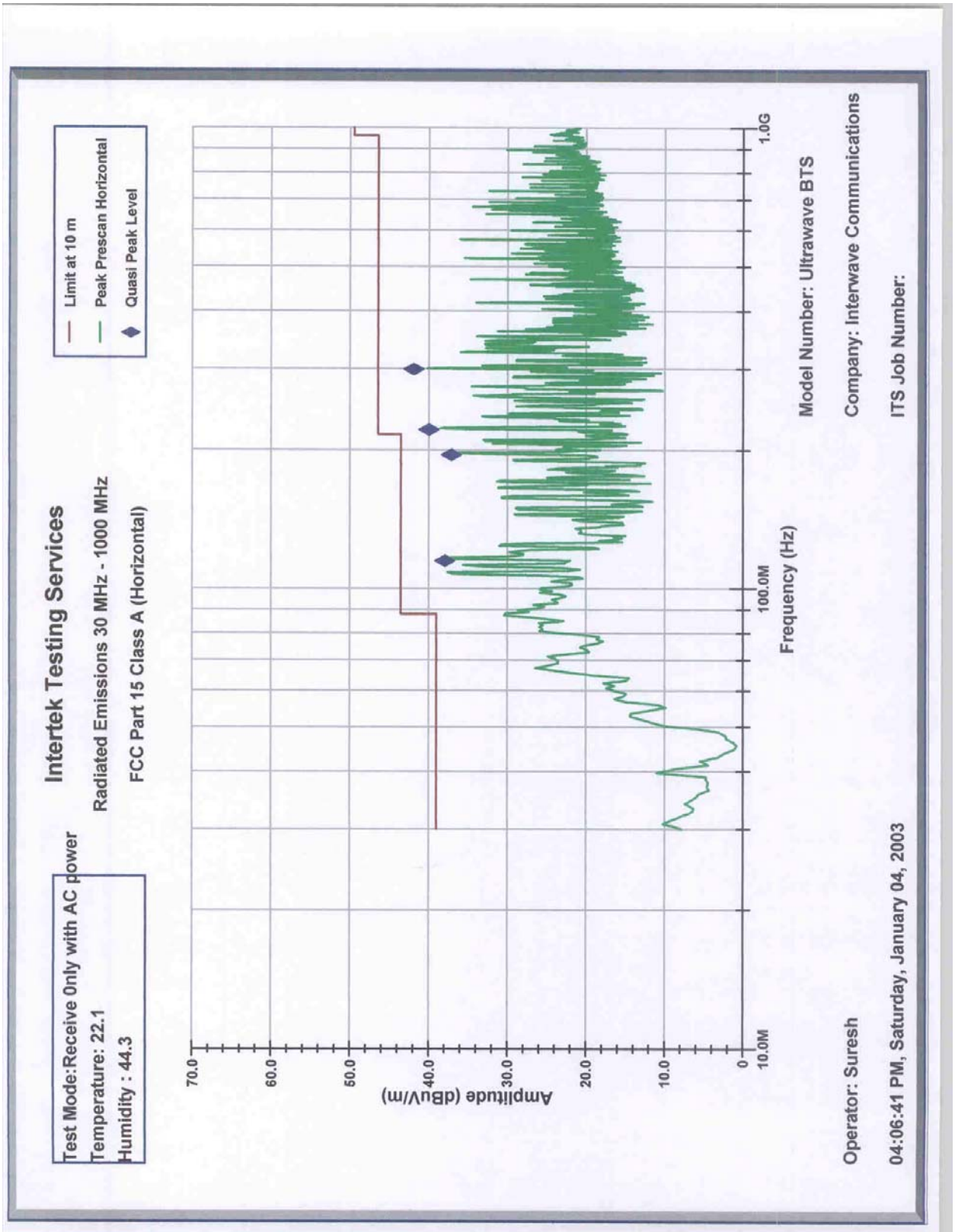
Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class A (QP-Horizontal)

Operator: Suresh
Model Number: Ultrawave BTS
ITS Job Number:
04:06:38 PM, Saturday, January 04, 2003
Company: Interwave Communications

	1	2	3	4	5	6	7
Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	AF
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
114.687 MHz	37.9	43.5	-5.6	60.2	4.3	32.3	5.7
195.0003 MHz	37.1	43.5	-6.4	55.0	4.7	32.3	9.7
220.9988 MHz	40.0	46.4	-6.4	57.0	4.8	32.2	10.4
298.998 MHz	41.9	46.4	-4.5	56.0	5.1	32.2	13.1

Test Mode:Receive Only with AC power
Temperature: 22.1
Humidity : 44.3

Page 1


Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class A (Horizontal)
Test Mode:Receive Only with AC power
Temperature: 22.1
Humidity : 44.3
Limit at 10 m
Peak Prescan Horizontal
Quasi Peak Level
Amplitude (dBuV/m)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: Ultrawave BTS
Company: Interwave Communications
ITS Job Number:
Operator: Suresh
04:06:41 PM, Saturday, January 04, 2003

Intertek Testing Services
Radiated Emissions 30 MHz - 1000 MHz
FCC Part 15 Class A (QP-Vertical)

Operator: Suresh K

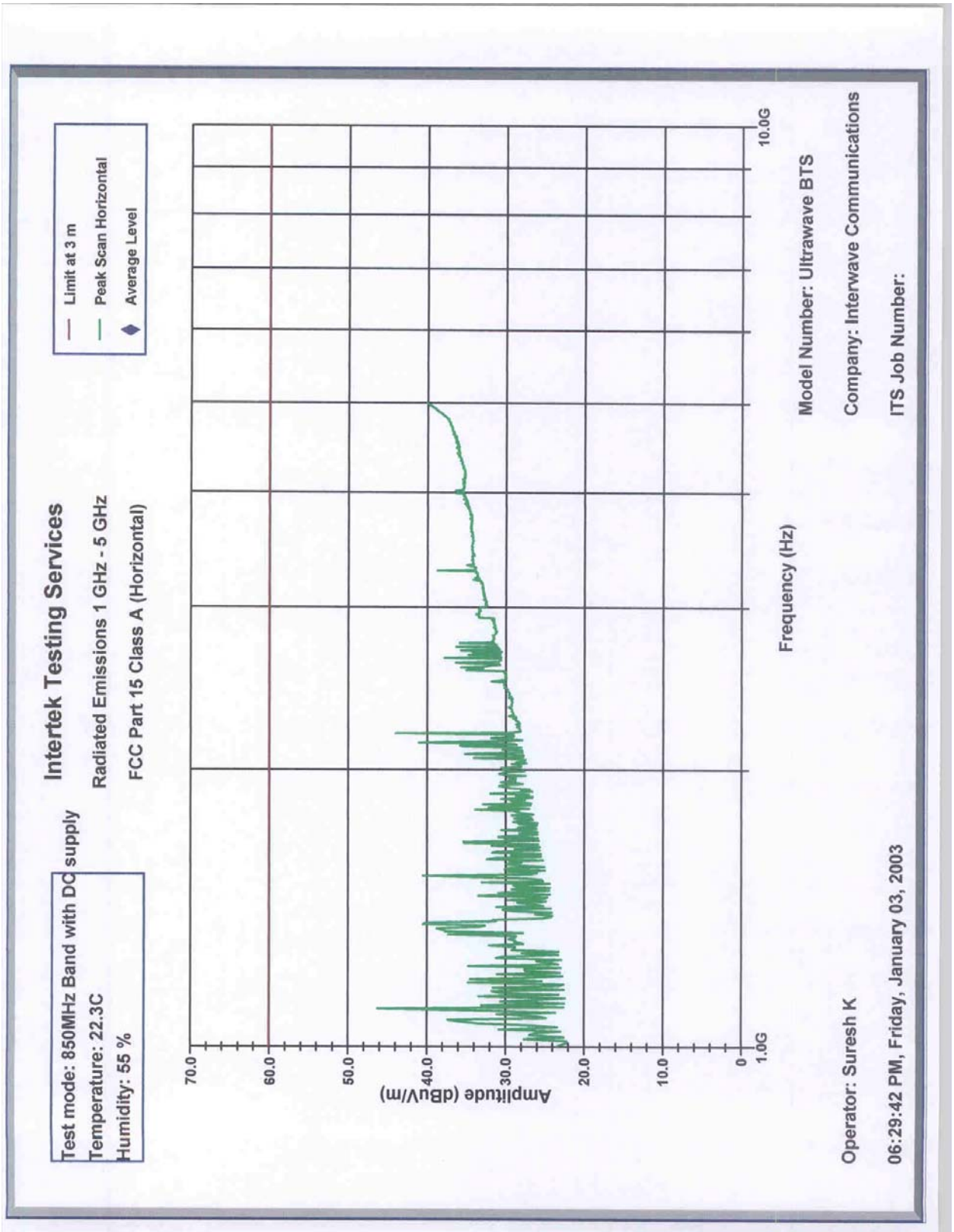
Model Number: Utrawave BTS
ITS Job Number:
Company: Interwave Comuunications

05:22:45 PM, Friday, January 03, 2003

	1	2	3	4	5	6	7
Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	AF
MHz	dB(uV/m)	dB(uV/m)	dB	dB	dB	dB	dB(1/m)
51.9988 MHz	33.8	39.0	-5.2	58.3	3.6	32.4	4.3
129.9978 MHz	35.1	43.5	-8.4	55.7	4.5	32.3	7.3
142.9988 MHz	38.0	43.5	-5.5	56.1	4.5	32.3	9.7
303.1038 MHz	41.8	46.4	-4.6	55.7	5.1	32.2	13.2

Test Mode:850MHz Band Receive only; -48VDC supply
Temperature: 22.3
Humidity : 45.6

Page 1


Intertek Testing Services
Radiated Emissions 1 GHz - 5 GHz
FCC Part 15 Class A (Horizontal)
Test mode: 850MHz Band with DC supply
Temperature: 22.3C
Humidity: 55 %
Limit at 3 m
Peak Scan Horizontal
Average Level
Amplitude (dBuV/m)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
1.0G
10.0G
Frequency (Hz)
Model Number: Ultrawave BTS
Company: Interwave Communications
ITS Job Number:
Operator: Suresh K
06:29:42 PM, Friday, January 03, 2003

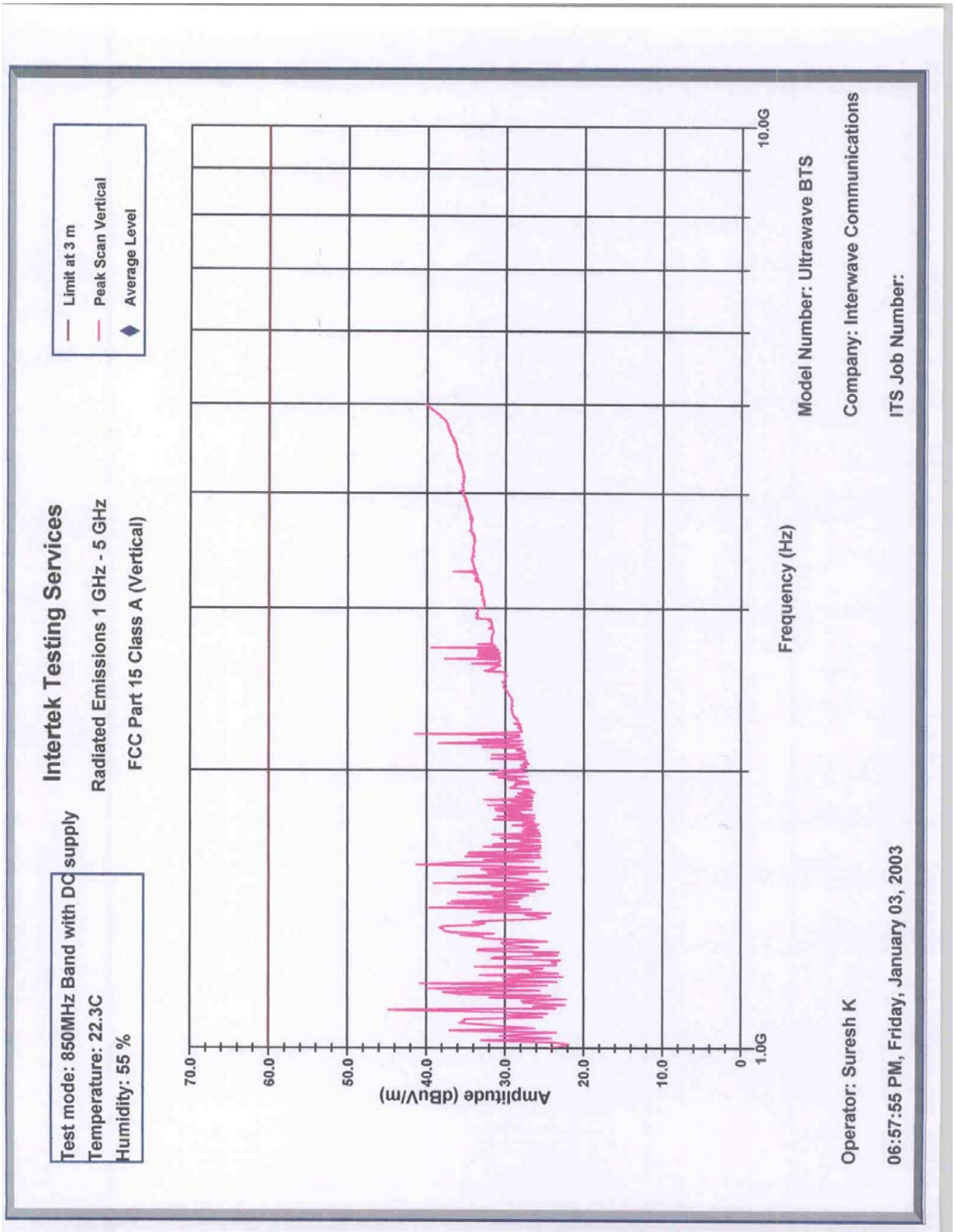
Intertek Testing Services
Radiated Emissions 1 GHz - 5 GHz
FCC Part 15 Class A (Pk-Horizontal)

Operator: Suresh K
Model Number: Ultrawave BTS
ITS Job Number:
06:29:40 PM, Friday, January 03, 2003
Company: Interwave Communications

	1	2	3	4	5	6	7
Frequency	Pk Level	Limit@3m	Pk Margin	Raw	Cable	Preamp	AF
MHz	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(dB)	(dB)	dB(1/m)
1.07 GHz	37.3	60.0	-22.7	42.3	3.1	36.5	25.4
1.1 GHz	46.3	60.0	-13.7	51.1	3.1	36.5	25.5
1.11 GHz	33.1	60.0	-26.9	37.9	3.1	36.5	25.6
1.135 GHz	33.4	60.0	-26.6	38.0	3.2	36.5	25.7
1.175 GHz	34.8	60.0	-25.2	39.2	3.3	36.5	25.8
1.185 GHz	34.5	60.0	-25.5	38.8	3.4	36.5	25.8
1.225 GHz	34.7	60.0	-25.3	38.9	3.4	36.5	26.0
1.345 GHz	38.7	60.0	-21.3	42.4	3.5	36.5	26.4
1.36 GHz	40.5	60.0	-19.5	44.1	3.5	36.5	26.4
1.46 GHz	33.5	60.0	-26.5	36.5	3.7	36.5	26.8
1.535 GHz	40.5	60.0	-19.5	43.1	3.9	36.5	27.1
1.67 GHz	35.4	60.0	-24.6	37.1	4.1	36.5	27.7
1.81 GHz	33.9	60.0	-26.1	34.7	4.3	36.5	28.4
1.835 GHz	32.9	60.0	-27.1	33.6	4.3	36.5	28.5
2.06 GHz	34.1	60.0	-25.9	33.6	4.5	36.5	29.5
2.08 GHz	35.2	60.0	-24.8	34.7	4.5	36.5	29.5
2.125 GHz	35.8	60.0	-24.2	35.1	4.5	36.5	29.6
2.14 GHz	41.0	60.0	-19.0	40.3	4.5	36.5	29.7
2.19 GHz	44.0	60.0	-16.0	43.1	4.6	36.5	29.8
2.645 GHz	37.8	60.0	-22.2	35.0	5.4	36.5	30.9

Test mode: 850MHz Band with DC supply
Temperature: 22.3C
Humidity: 55 %

Page 1


Intertek Testing Services
Radiated Emissions 1 GHz - 5 GHz
FCC Part 15 Class A (Vertical)
Test mode: 850MHz Band with DC supply
Temperature: 22.3C
Humidity: 55 %
Limit at 3 m
Peak Scan Vertical
Average Level
Amplitude (dBuV/m)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
1.0G
10.0G
Frequency (Hz)
Model Number: Ultrawave BTS
Company: Interwave Communications
ITS Job Number:
Operator: Suresh K
06:57:55 PM, Friday, January 03, 2003

Intertek Testing Services
Radiated Emissions 1 GHz - 5 GHz
FCC Part 15 Class A (Pk-Vertical)

Operator: Suresh K

Model Number: Ultrawave BTS
ITS Job Number:
Company: Interwave Communications

06:57:54 PM, Friday, January 03, 2003

	1	2	3	4	5	6	7
Frequency	Pk Level	Limit@3m	Pk Margin	Raw	Cable	Preamp	AF
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(dB)	(dB)	dB(1/m)
1.045 GHz	37.0	60.0	-23.0	42.1	3.0	36.5	25.3
1.1 GHz	44.8	60.0	-15.2	49.7	3.1	36.5	25.5
1.15 GHz	37.8	60.0	-22.2	42.4	3.3	36.5	25.7
1.16 GHz	39.9	60.0	-20.1	44.5	3.3	36.5	25.7
1.175 GHz	40.8	60.0	-19.2	45.3	3.3	36.5	25.7
1.35 GHz	38.4	60.0	-21.6	42.1	3.5	36.5	26.3
1.42 GHz	39.6	60.0	-20.4	43.0	3.6	36.5	26.5
1.435 GHz	37.3	60.0	-22.7	40.6	3.6	36.5	26.5
1.445 GHz	36.7	60.0	-23.3	40.0	3.6	36.5	26.5
1.475 GHz	36.0	60.0	-24.0	39.2	3.7	36.5	26.6
1.51 GHz	39.1	60.0	-20.9	42.1	3.8	36.5	26.7
1.535 GHz	36.0	60.0	-24.0	38.7	3.9	36.5	26.9
1.58 GHz	41.2	60.0	-18.8	43.6	4.1	36.5	27.1
1.615 GHz	35.0	60.0	-25.0	37.1	4.2	36.5	27.3
1.625 GHz	34.7	60.0	-25.3	36.7	4.2	36.5	27.3
2.14 GHz	38.5	60.0	-21.5	37.9	4.5	36.5	29.5
2.19 GHz	41.5	60.0	-18.5	40.7	4.6	36.5	29.7
2.645 GHz	37.7	60.0	-22.3	34.8	5.4	36.5	30.9
2.72 GHz	39.4	60.0	-20.6	36.2	5.6	36.5	31.1
5.0 GHz	40.3	60.0	-19.8	27.1	10.6	35.8	35.3

Test mode: 850MHz Band with DC supply
Temperature: 22.3C
Humidity: 55 %

Page 1

8.0 Line Conducted Emissions, FCC 15.207

8.1 Test Procedure

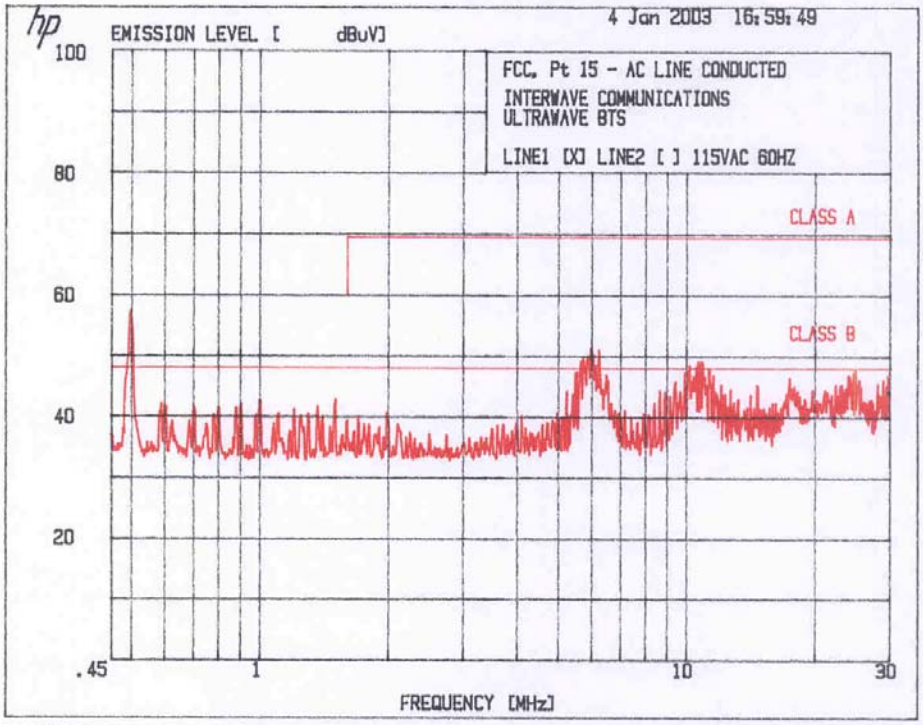
Test procedure described in the ANSI C63.4 Standard was employed.

The EUT was connected to the AC Power supply through the LISNs.

Both HOT and NEUTRAL leads were tested.

8.2 Test Results

See the attached plots.
The EUT passed by 3 dB at 500 kHz.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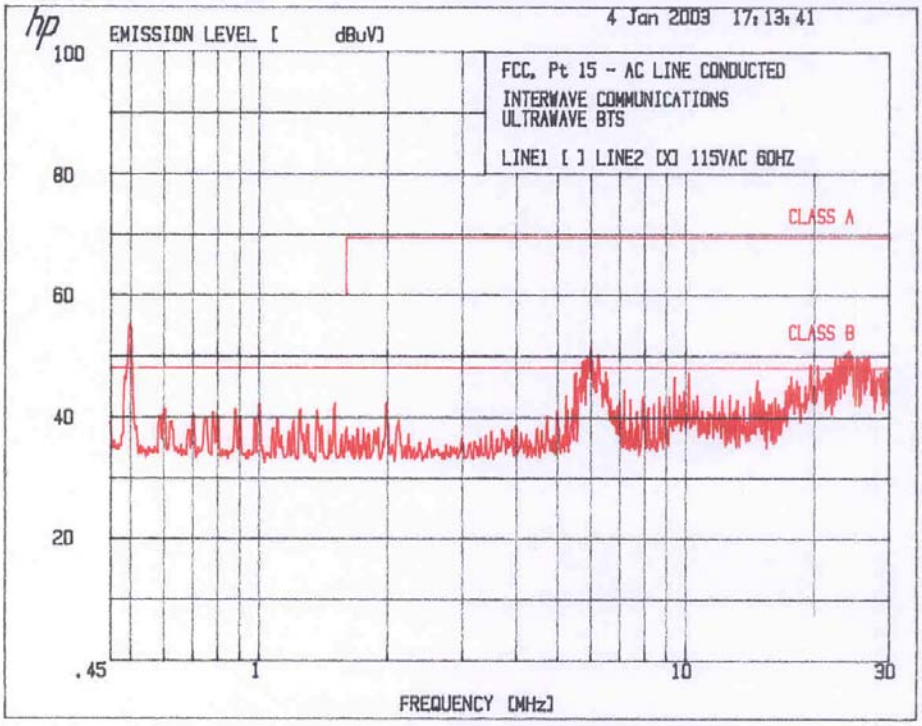
EMISSION LEVEL [dBuV]
4 Jan 2003 16:59:49
FCC, Pt 15 - AC LINE CONDUCTED
INTERWAVE COMMUNICATIONS
ULTRAWAVE BTS
LINE1 [X] LINE2 [ ] 115VAC 60HZ
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]


hp
EMISSION LEVEL [dBuV]
4 Jan 2003 17:13:41
FCC, Pt 15 - AC LINE CONDUCTED
INTERWAVE COMMUNICATIONS
ULTRAWAVE BTS
LINE1 [ ] LINE2 [X] 115VAC 60HZ
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

9.0 Frequency Stability vs Temperature

FCC 2.1055, 22.355

Frequency Tolerance: 1.5 ppm

9.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. The RF output cable, and the control cable exited the chamber through an opening made for that purpose.

After the temperature stabilized for approximately 20 minutes, the external PTT switch was activated, and the frequency was recorded from the spectrum analyzer.

9.2 Test Equipment

Temperature Chamber, -30^0C to $+70^0$C
Hewlett Packard HP8591E

9.3 Test Results

Test Result:	Complies

Tx Frequency: 882.000000 MHz
Tolerance: +/- 1323 Hz

Temperature (°C)	Frequency (MHz)	Difference (Hz)
50	882.000040	+40
40	882.000040	+40
30	882.000040	+40
20	882.000040	+40
10	882.000040	+40
0	882.000040	+40
-10	882.000040	+40
-20	882.000040	+40
-30	882.000040	+40

Maximum deviation is 0.05 ppm

10.0 Frequency Stability vs Voltage
FCC 2.1055, 22.355

Frequency Tolerance: 1.5 ppm

10.1 Test Procedure

An external variable DC power supply was connected to the equipment under test. The voltage was set to 115% of the nominal value and was then decreased to 85% of the nominal value. The output frequency was recorded from the spectrum analyzer.

10.2 Test Equipment

Hewlett Packard HP8591E
DC Power Supply

10.3 Test Results.

Test Result:	Complies

Tx Frequency: 882.000000 MHz
Tolerance: +/- 1323 Hz

Supply	Frequency (MHz)	Difference (Hz)
112VAC, 60Hz	882.000040	+40
120VAC, 60Hz	882.000040	+40
132VAC, 60Hz	882.000040	+40
-40.8V DC	882.000040	+40
-48.0V DC	882.000040	+40
-55.2V DC	882.000040	+40

Maximum deviation 0.05 ppm

11.0 Test Equipment

Measurement equipment used for compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
Bi-Log Antenna	EMCO	3143	9509-1160	12	9/19/03
Pre-Amplifier	Sonoma Inst.	310	185634	12	4/30/03
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	7/16/03
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	7/16/03
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/08/03
Signal Generator	Hewlett Packard	83732A	322A00119	12	03/04/03
Double-ridged Horn Antenna	EMCO	3115	9170-3712	12	6/02/03
Double-ridged Horn Antenna	EMCO	3115	8812-3049	12	4/03/03
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	4/05/03
Power Meter	Hewlett Packard	8900D	3607U00673	12	7/8/03
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	2/02/03

12.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 /3036827	SS	January 16, 2003	Original document
2.0/3036827	SS	February 28, 2003	Additional plots & info added.