ITS Intertek Testing Services
ETL SEMKO

FCC Part 15 Subpart E Test Report

for

Proxim Corporation

on the

Tsunami Subscriber Unit

Model: 40100-XXX

FCC ID: HZB-US58-S60

Job # 3008928

Date of Test: September 20 to 23, 2001

Total No of Pages contained in this Report: 51

Test Report #: 30089281

Date of Report: September 25, 2001

Revised: February 26, 2002

Revised: April 20, 2002

NVLAP Laboratory Code 200201-0

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1.0 Summary of Tests

Proxim Corporation,
Tsunami Subscriber Unit, Model: 40100-XXX
FCC ID: HZB-US58-S60

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26 dB Bandwidth	15.407(a)	For calculation only, see sec. 4.2 of this report
Power Density	15.407(a)(5)	Complies, see sec. 4.3 of this report
The ratio of the peak excursion of the modulation envelope to the peak transmit power	15.407(a)(6)	Complies, see sec. 4.4 of this report
Out-of-band Antenna Conducted Emission	15.407(b)	Complies, see sec. 4.5 of this report
Spurious Radiated Emission from transmitter	15.407(b)	Complies, see sec. 4.6 of this report
Radiated Emission in Restricted Bands	15.209, 15.205	Complies, see sec. 4.6 of this report
Radiated Emission from digital part and receiver	15.109	Complies, see sec. 4.6 of this report
AC Conducted Emission	15.207	Complies, see sec. 4.7 of this report
Requirement	15.407(c)	Complies, see file " Appendix D"
Requirement	15.407(g)	Complies, see file " Appendix D"
Radiation Exposure Requirement	1.1310	Complies, see file "RF Exposure Statement"
Antenna Requirement	15.203	Complies, the EUT uses a permanently connected antenna

2.0 General Description

2.1 Product Description

The Tsunami Subscriber Unit consists of two major components: an outdoor unit (ODU) and an indoor power adapter (IPA). The two components are connected with a single category-5 cable (4 unshielded twisted pairs) to transfer direct-current power to the ODU and to transport 10/100BaseT Ethernet data to and from the ODU. The IPA provides a RJ-45 jack to connect the Ethernet data to either a computer or hub/switch. The ODU is an integrated antenna, radio, modem, and Ethernet interface to provide fixed, broadband digital data services for individuals, businesses, and institutions.

As the device is used at a remote location to communicate with the Base Station unit at a central location, the transmission of the Subscriber unit is of fixed point-to-point.

A pre-production version of the EUT was received on September 18, 2001 in good operating condition.

Overview of the Tsunami Subscriber Unit

Applicant	Proxim Corporation
Trade Name & Model No.	Tsunami Subscriber Unit, Model 40100-XXX
FCC Identifier	HZB-US58-S60
Use of Product	**Fixed Wireless Ethernet Access**
Type of Transmission	TDD
Type of Modulation	**QAM16, QAM8, QPSK R $^{3}/_{4}$, QPSK R $^{1}/_{2}$**
Rated RF Output	18 dBm (peak)
Frequency Range	5740– 5810 MHz
Number of Channel(s)	6 channels maximum
Antenna(s) & Gain	Circle polarized internal permanently connected antenna, 21 dBi gain
Antenna Requirement	[X] The EUT uses a permanently connected antenna. [ ] The antenna is affixed to the EUT using a unique connector which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector. [ ] The EUT requires professional installation (attach supporting documentation if using this option).
Manufacturer name & address	Proxim Corporation 1196 Borregas Avenue, Sunnyvale, , CA 94089 USA

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application. All other measurements were made in accordance with the procedures in parts 2 and 15 of CFR 47.

2.4 Test Facility

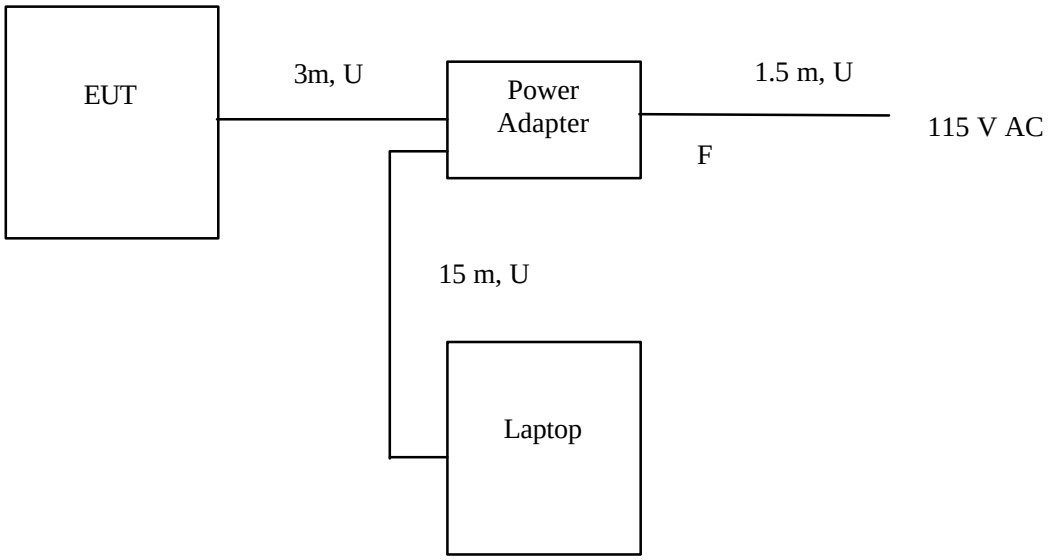
The open area test site and conducted measurement facility used to collect the radiated data is site 2. This test facility and site measurement data have been fully placed on file with the FCC and NVLAP accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

Laptop computer: Hewlett Packard Omnibook 4150

3.2 Block Diagram of Test Setup



***** = EUT	**S** = Shielded;	**F** = With Ferrite
****** = No Ferrite on video cable	**U** = Unshielded	**M** = Length in Meters

3.3 Justification

For emission testing, the Equipment Under Test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

The signal is maximized through rotation and placement in the three orthogonal axes. 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.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

3.5 Mode of operation during test

100% time transmitting signal on different channels.

3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by Proxim Cor. prior to compliance testing).

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results

4.1 Conducted Output Power at Antenna Terminal
FCC Rule 15.407(a)

Requirement:

For fixed point-to-point U-NII devices operating in 5.725-5.825 GHz band, the peak transmit power shall not exceed the lesser of 1 Watt (30 dBm) or 17 dBm+10Log(B), where B is the 26dB emission bandwidth in MHz (for antenna gain up to 23 dBi). For devices operating in 5.25-5.35 GHz band, the peak transmit power shall not exceed the lesser of 250 mW (24 dBm) or 11 dBm + 10Log(B), where B is the 26 dB emission bandwidth in MHz (for antenna gain up to 6 dBi).

Procedure:

The antenna port of the EUT was connected to the input of a peak power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal.

Result:

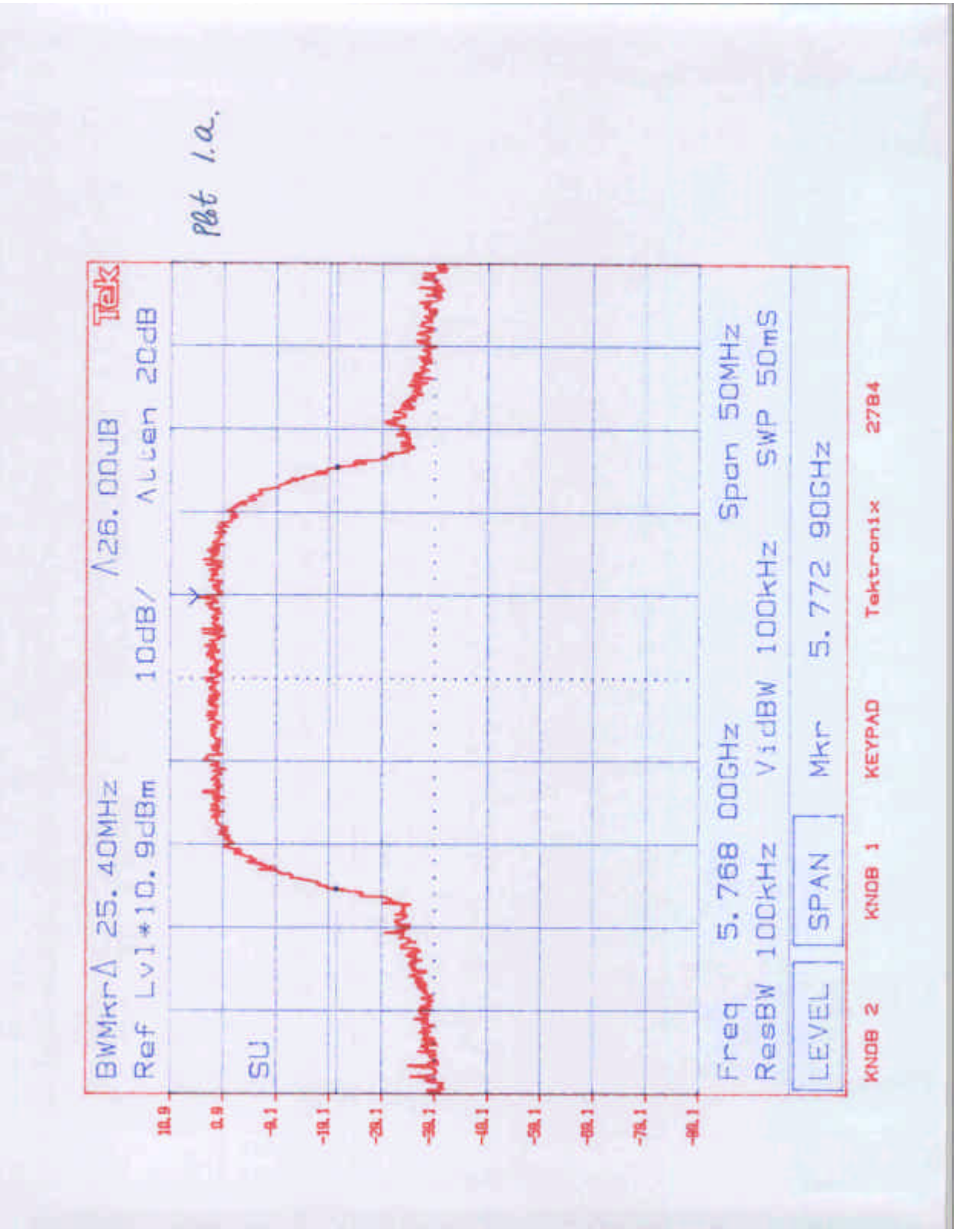
Frequency MHz	Peak Output Power for different type of modulation, dBm				Limit (dBm)
	QAM16	QAM8	QPSK R ¾	QPSK R ½	
5740	18.1	16.3	16.2	16.3	30
5754	18.1	16.2	16.2	16.3	30
5768	18.0	16.3	16.2	16.2	30
5782	18.1	16.2	16.1	16.3	30
5796	18.0	16.2	16.1	16.2	30
5810	18.1	16.2	16.1	16.2	30

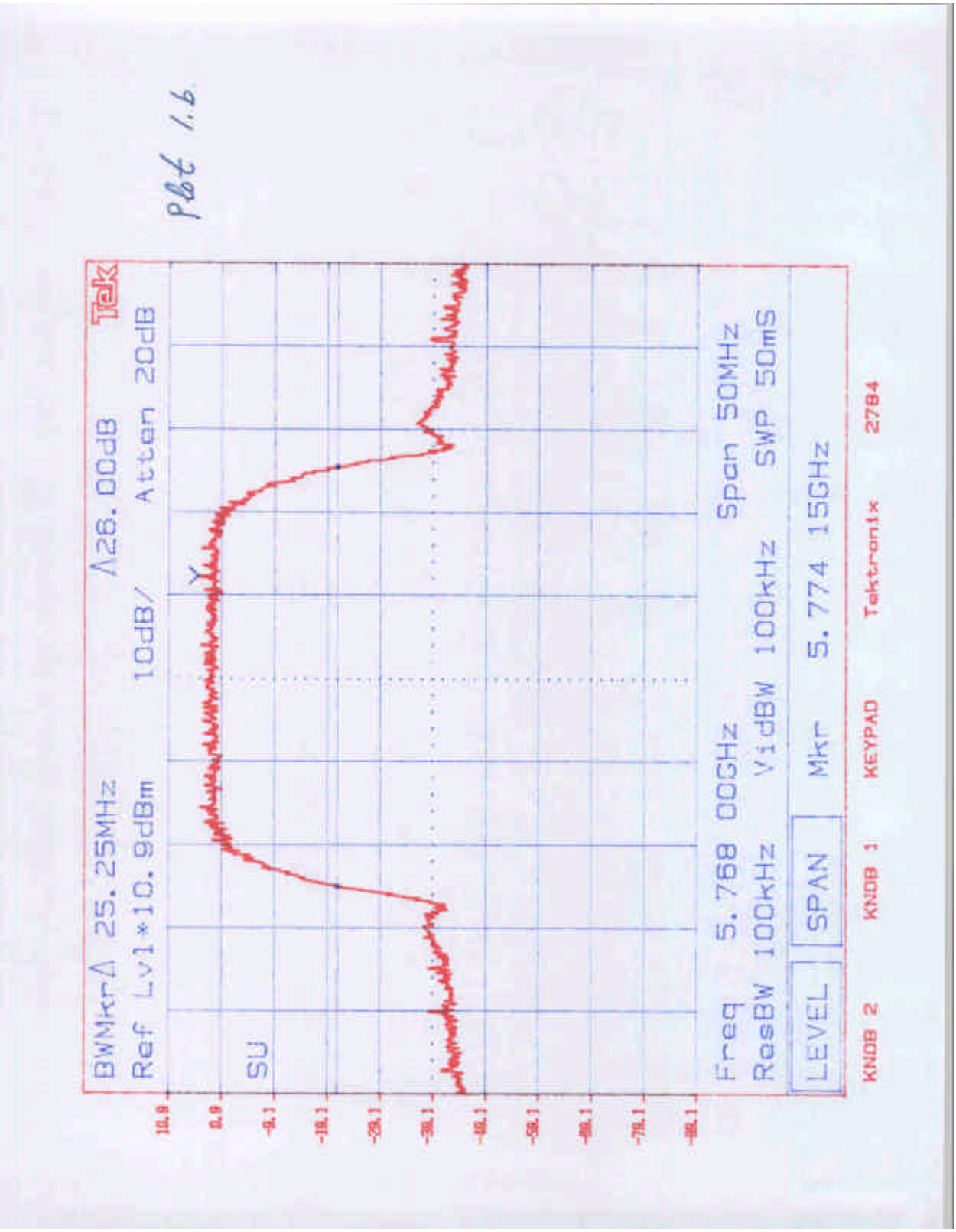
4.2 26 dB Bandwidth
FCC Rule 15.407(a) (for calculation only)

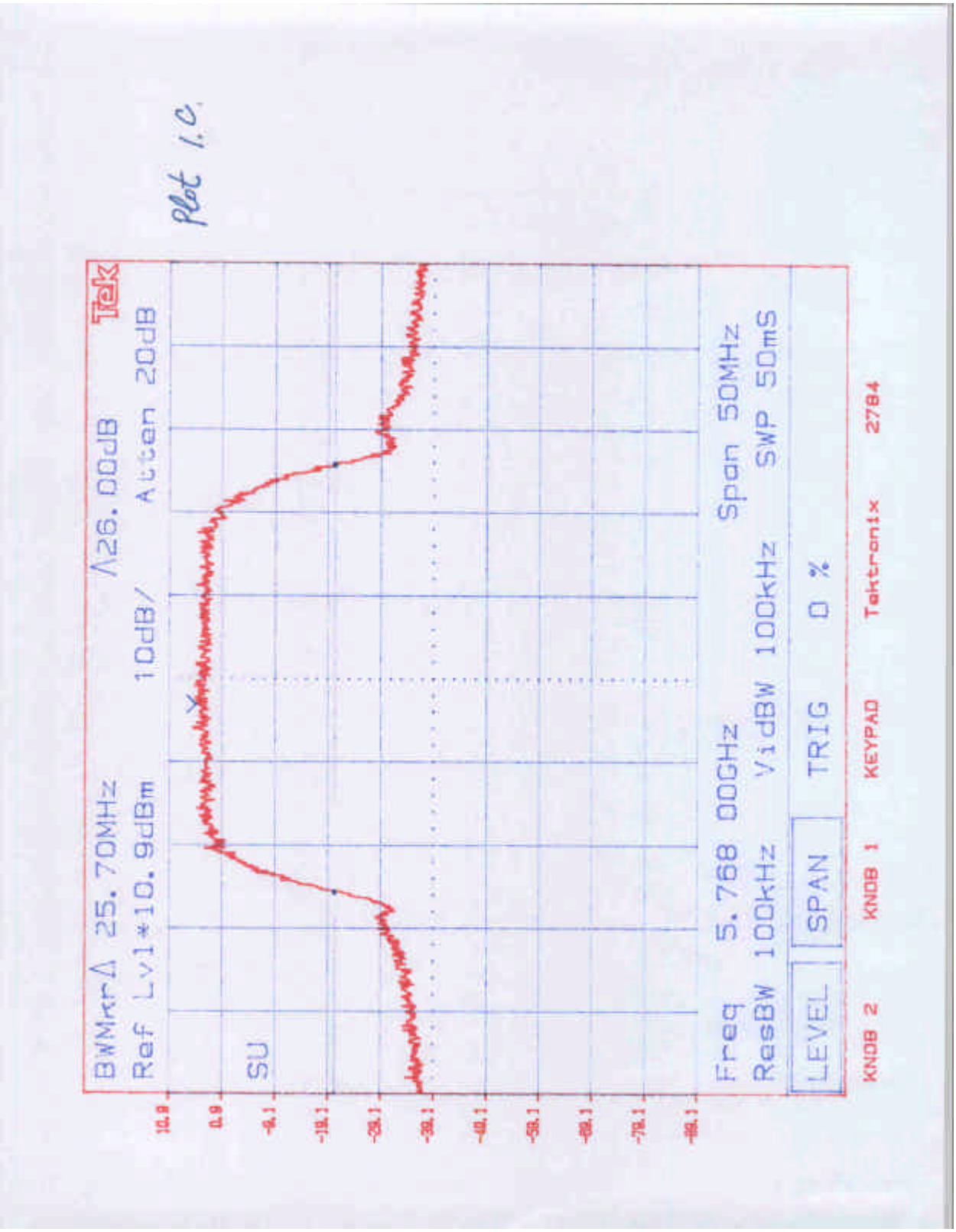
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer Res BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 26 dB lower than PEAK level. The 26-dB bandwidth was determined from where the channel output spectrum intersected the display line.

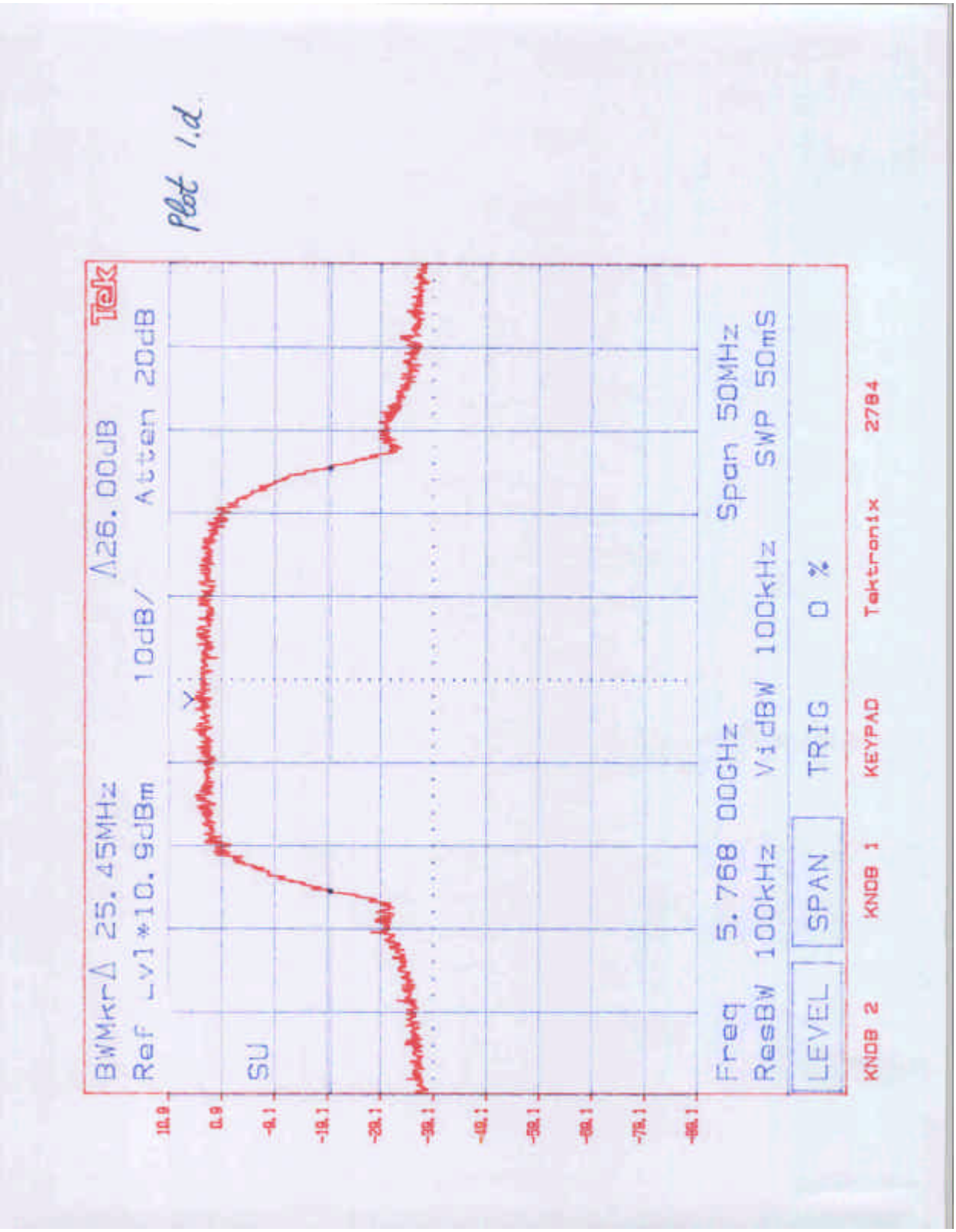
Refer to the following plots for 26-dB bandwidth:

Frequency, MHz	Mode	26 dB Bandwidth, MHz	Plot
5768	QAM16	25.40	1.a
5768	QAM8	25.25	1.b
5768	QPSK R ¾	25.70	1.c
5768	QPSK R ½	25.45	1.d


Plot 1.a.
Tek
BWMkrΔ 25.40MHz
Ref Lvl*10.9dBm
SU
Δ26.00dB
10dB/
Atten 20dB
Freq 5.768 00GHz
ResBW 100kHz
Span 50MHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Mkr 5.772 90GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix 2784


Plot 1.6
Tek
BWMkrΔ 25.25MHz
Ref Lvl*10.9dBm
SU
Δ26.00dB
10dB/
Atten 20dB
Freq 5.768 00GHz
ResBW 100kHz
Span 50MHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Mkr 5.774 15GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix 2784


Plot 1.c.
Tek
BWMkr Δ 25.70MHz
Ref Lvl*10.9dBm
SU
Δ26.00dB
10dB/
Atten 20dB
Freq 5.768 000GHz
ResBW 100kHz
VidBW 100kHz
Span 50MHz
SWP 50mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Plot 1.d
Tek
BWMkr Δ 25.45MHz
Ref -v1*10.9dBm
Δ26.00dB
10dB/
Atten 20dB
SU
Freq 5.768 000GHz
ResBW 100kHz
VidBW 100kHz
Span 50MHz
SWP 50mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

4.3 Power Density
FCC Rule 15.407(a)(3)

Requirement:

For fixed point-to-point U-NII devices operating in 5.725-5.825 GHz band the peak power spectral density shall not exceed 17 dBm in any 1 MHz band (for antenna gain up to 23 dBi).
For devices operating in 5.25-5.35 GHz band peak power spectral density shall not exceed 11 dBm in any 1 MHz band (for antenna gain up to 6 dBi).

Procedure:

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

The spectrum analyzer Resolution Bandwidth was set to 1 MHz and Video Bandwidth was set to 7 MHz. The START and STOP frequencies were set to the band edges of the maximum output passband. Maximum peak-power spectral density reading was recorded.

Result:

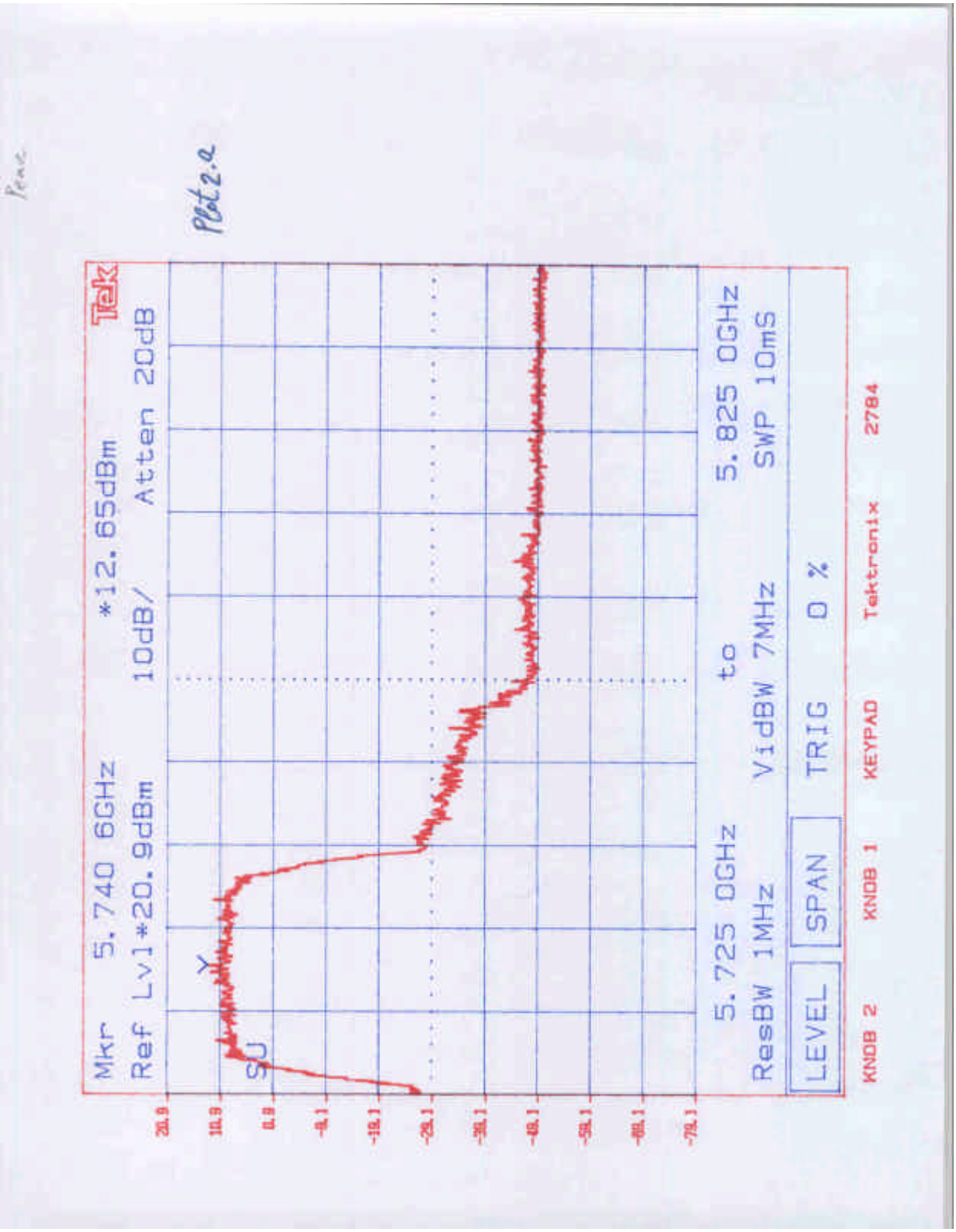
Frequency MHz	Peak Power Density for different type of modulation, dBm			
	QAM16	QAM8	QPSK R ¾	QPSK R ½
5740	12.65	11.65	11.45	12.85
5768	13.65	10.25	11.45	11.95
5810	12.85	11.45	10.65	12.25

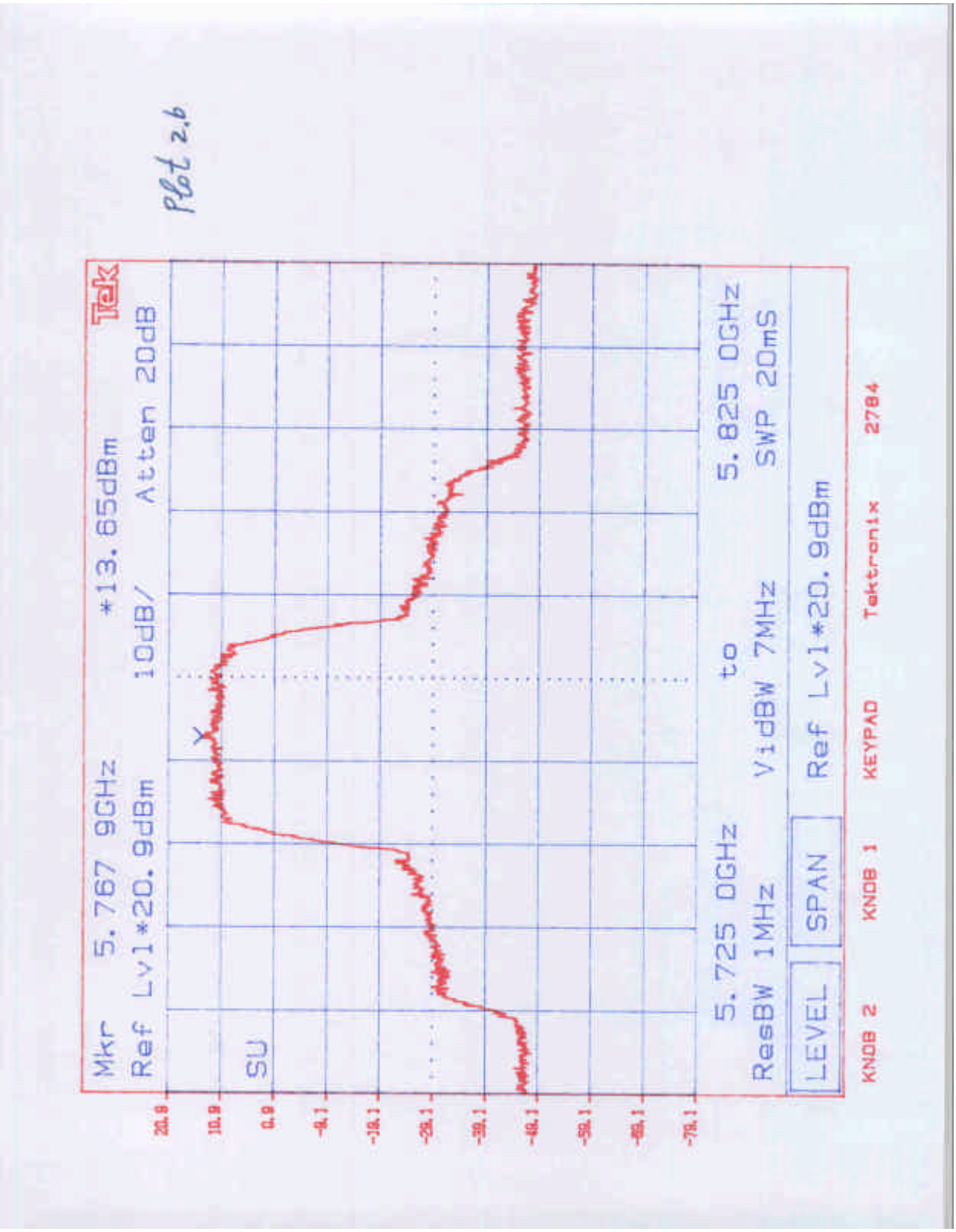
Frequency MHz	EIRP Density for different type of modulation, dBm				EIRP Density Limit (dBm)
	QAM16	QAM8	QPSK R ¾	QPSK R ½	
5740	33.65	32.65	32.45	33.85	40
5768	34.65	31.25	32.45	32.95	40
5810	33.85	32.45	31.65	33.25	40

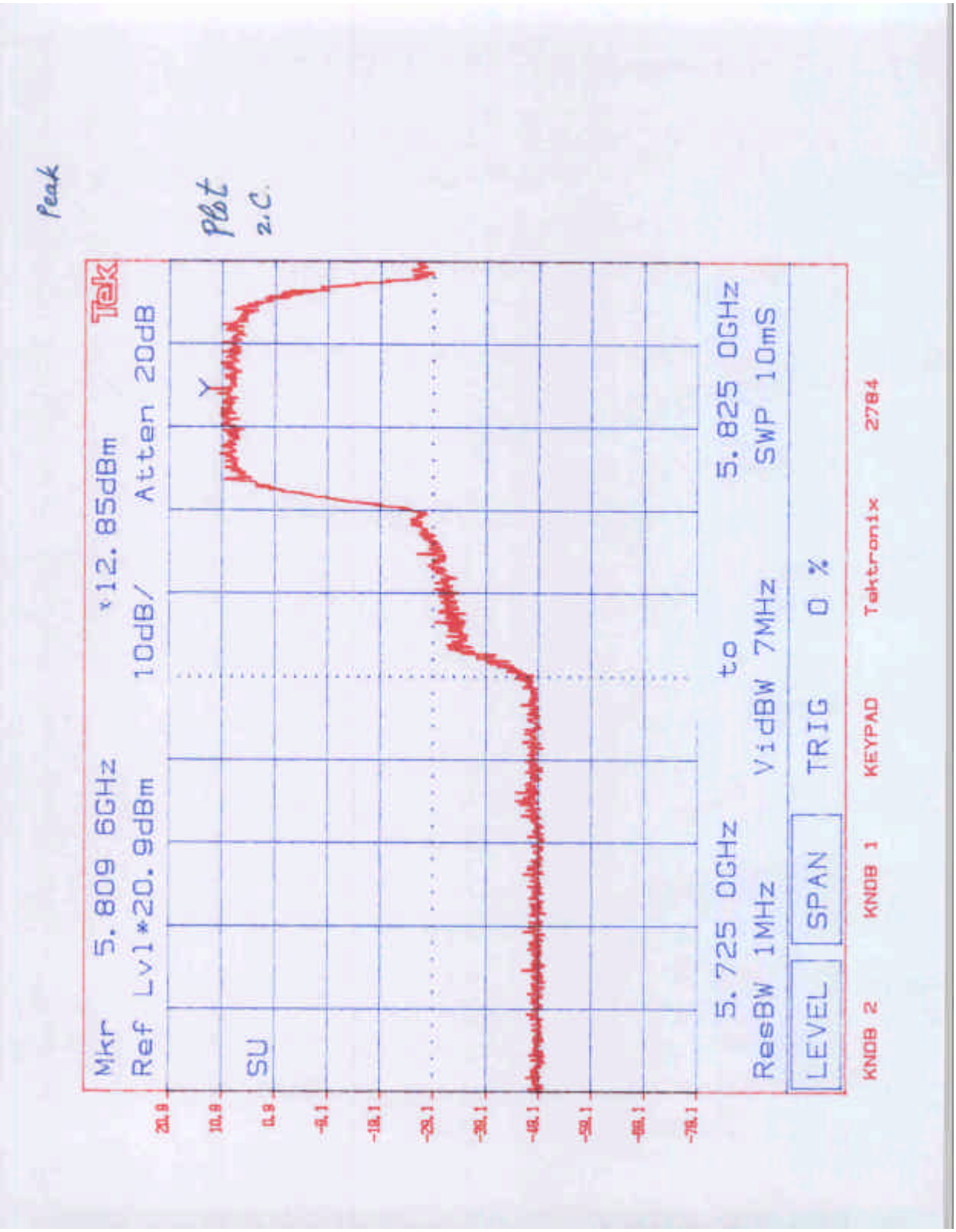
Note: antenna gain equals 21 dBi

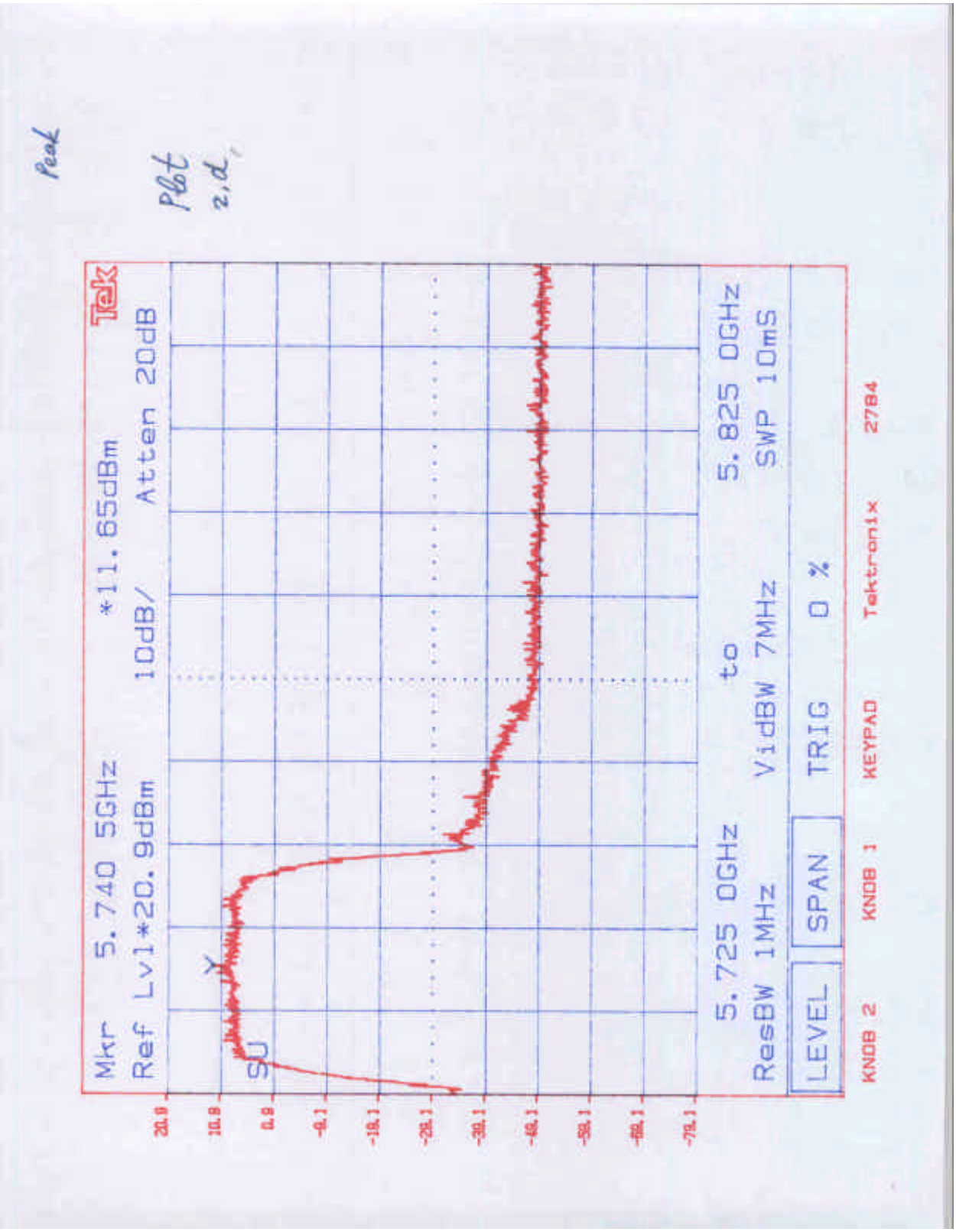
Refer to the following plots for Power Density:

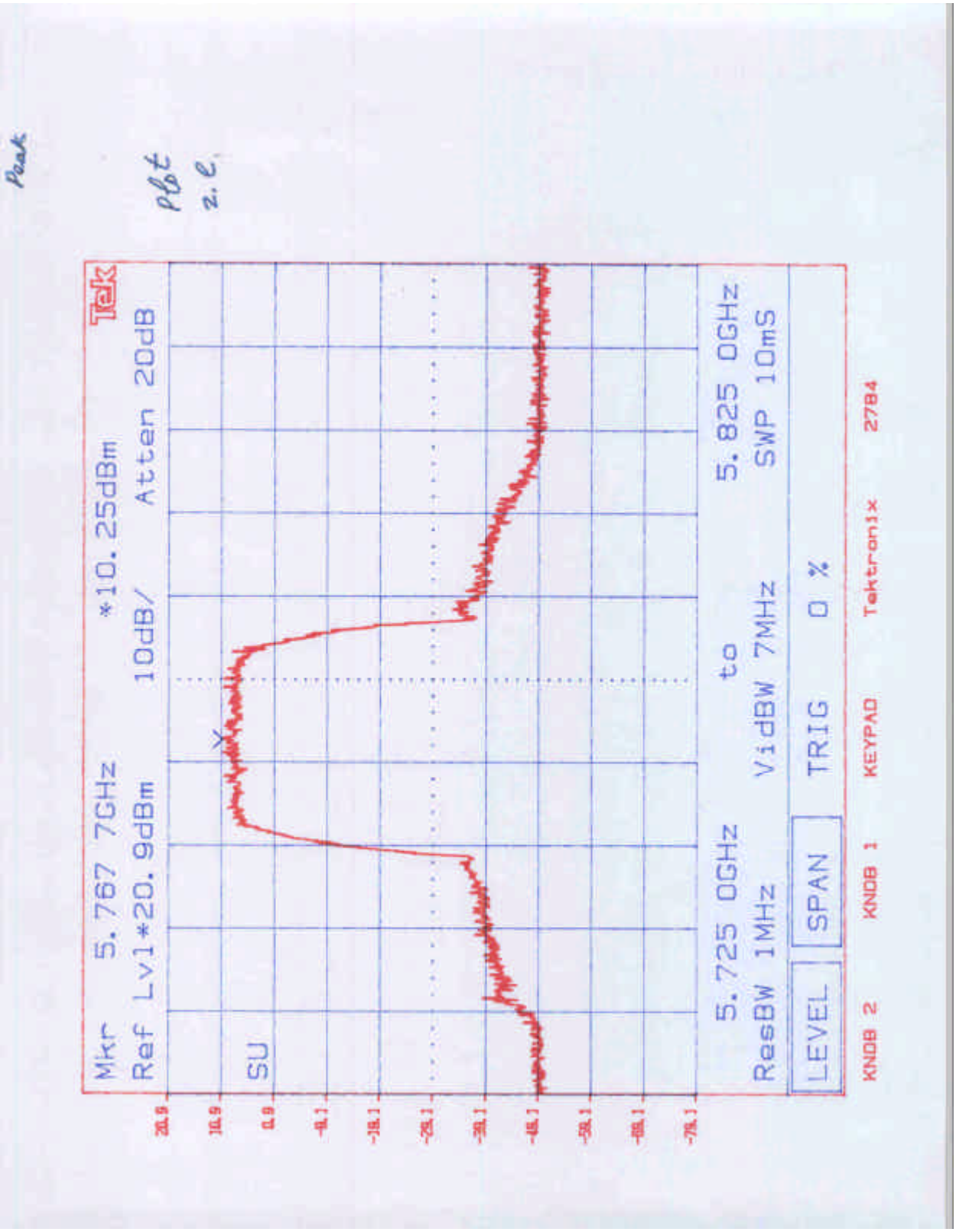
Plot		Mode	Channel
2.a	Power Density	QAM16	Ch 0
2.b	Power Density	QAM16	Ch 2
2.c	Power Density	QAM16	Ch 5
2.d	Power Density	QAM8	Ch 0
2.e	Power Density	QAM8	Ch 2
2.f	Power Density	QAM8	Ch 5
2.g	Power Density	QPSK R ¾	Ch 0
2.h	Power Density	QPSK R ¾	Ch 2
2.i	Power Density	QPSK R ¾	Ch 5
2.j	Power Density	QPSK R ½	Ch 0
2.k	Power Density	QPSK R ¾	Ch 2
2.l	Power Density	QPSK R ¾	Ch 5

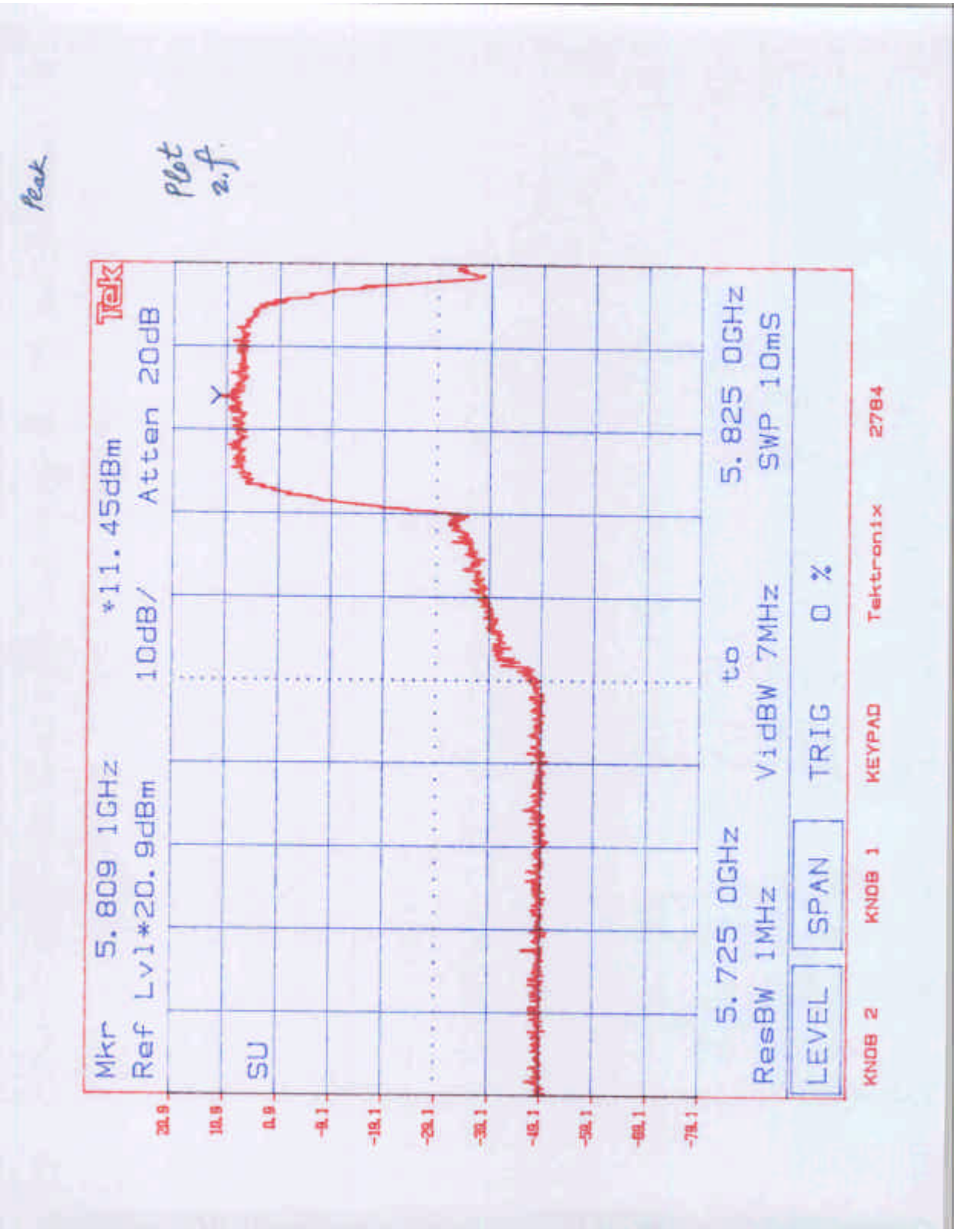

Plot 2.a
Tek
Mkr 5.740 6GHz *12.65dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
5.725 0GHz to 5.825 0GHz
ResBW 1MHz VidBW 7MHz SWP 10mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

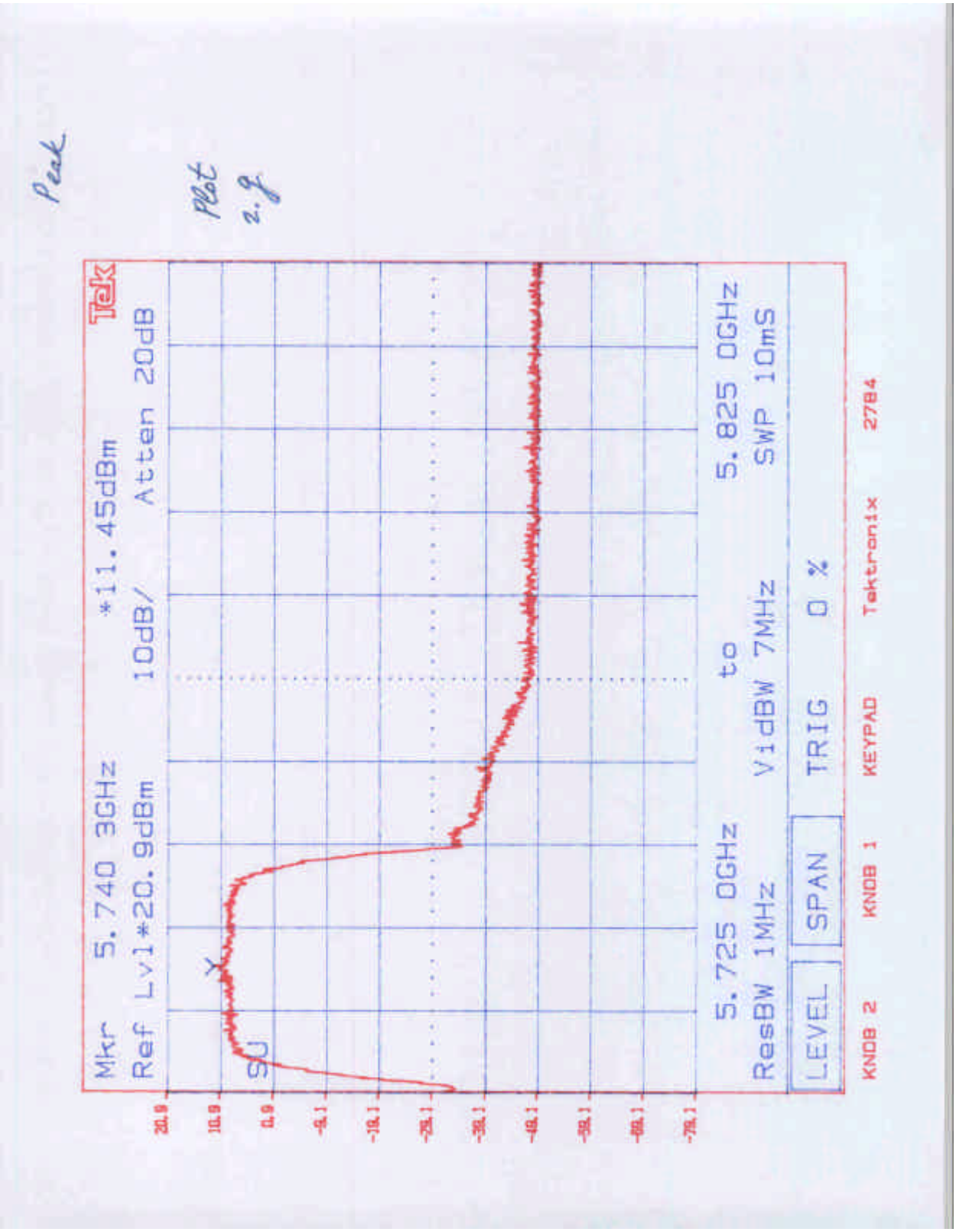

Plot 2.b
Tek
Mkr 5.767 9GHz
Ref Lvl*20.9dBm
*13.85dBm
10dB/ Atten 20dB
SU
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 20mS
LEVEL
SPAN
Ref Lvl*20.9dBm
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

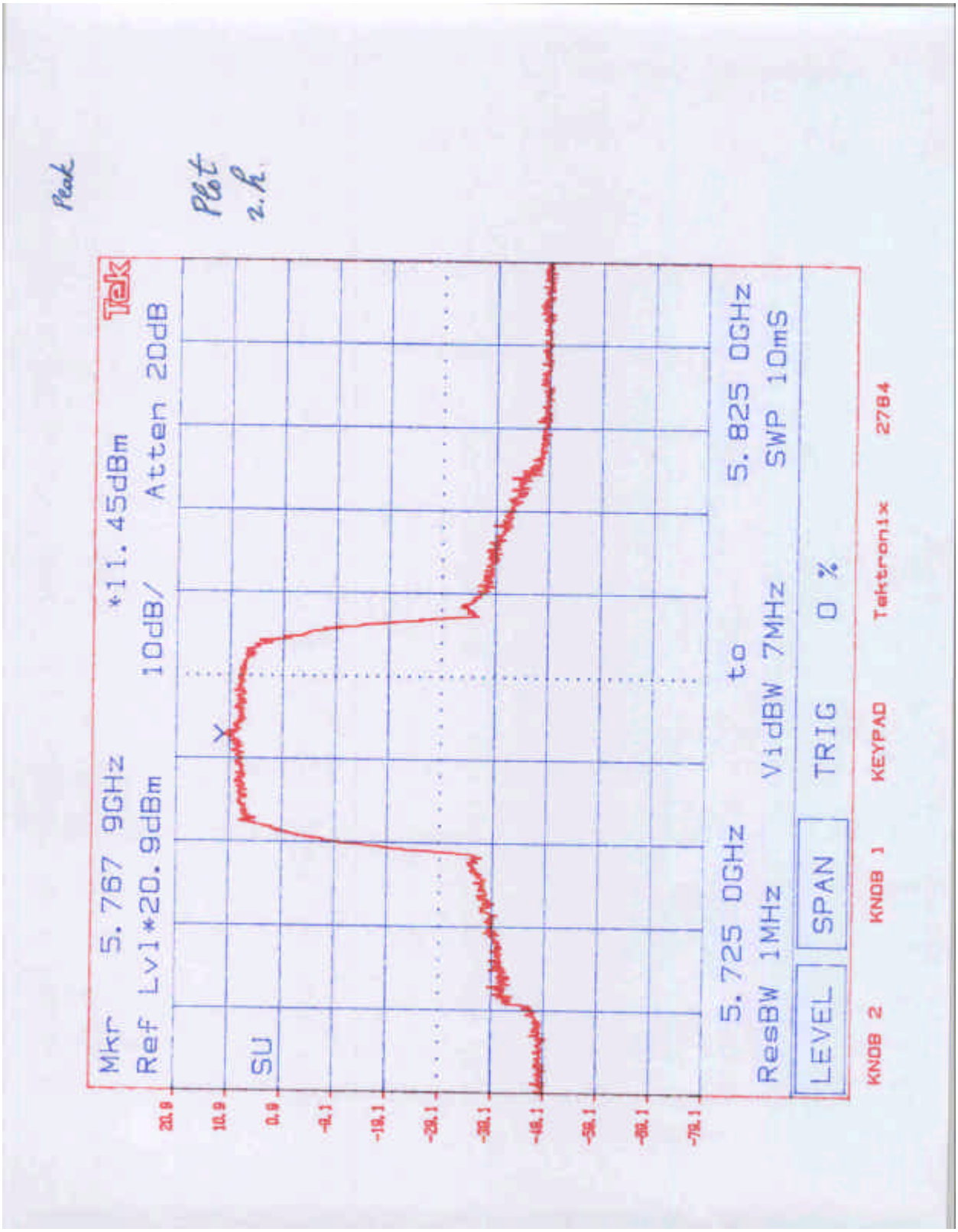

Peak
Plot
2.C.
Tek
Mkr 5.809 6GHz
Ref Lvl *20.9dBm
*12.85dBm
10dB/ Atten 20dB
SU
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 10mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

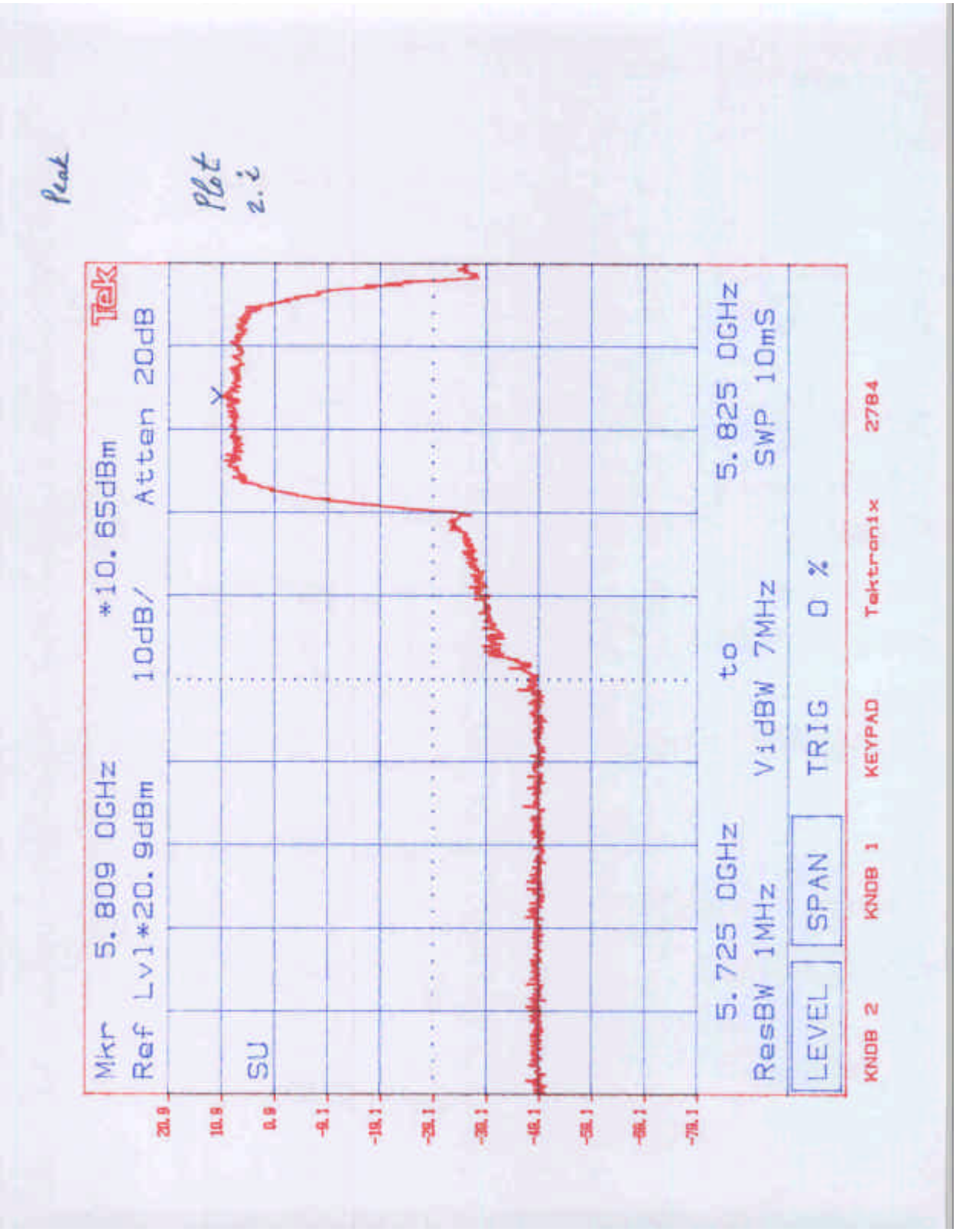

Peak
Plot 2, d
Tek
Mkr 5.740 5GHz *11.65dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
5.725 0GHz to 5.825 0GHz
ResBW 1MHz VidBW 7MHz SWP 10mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

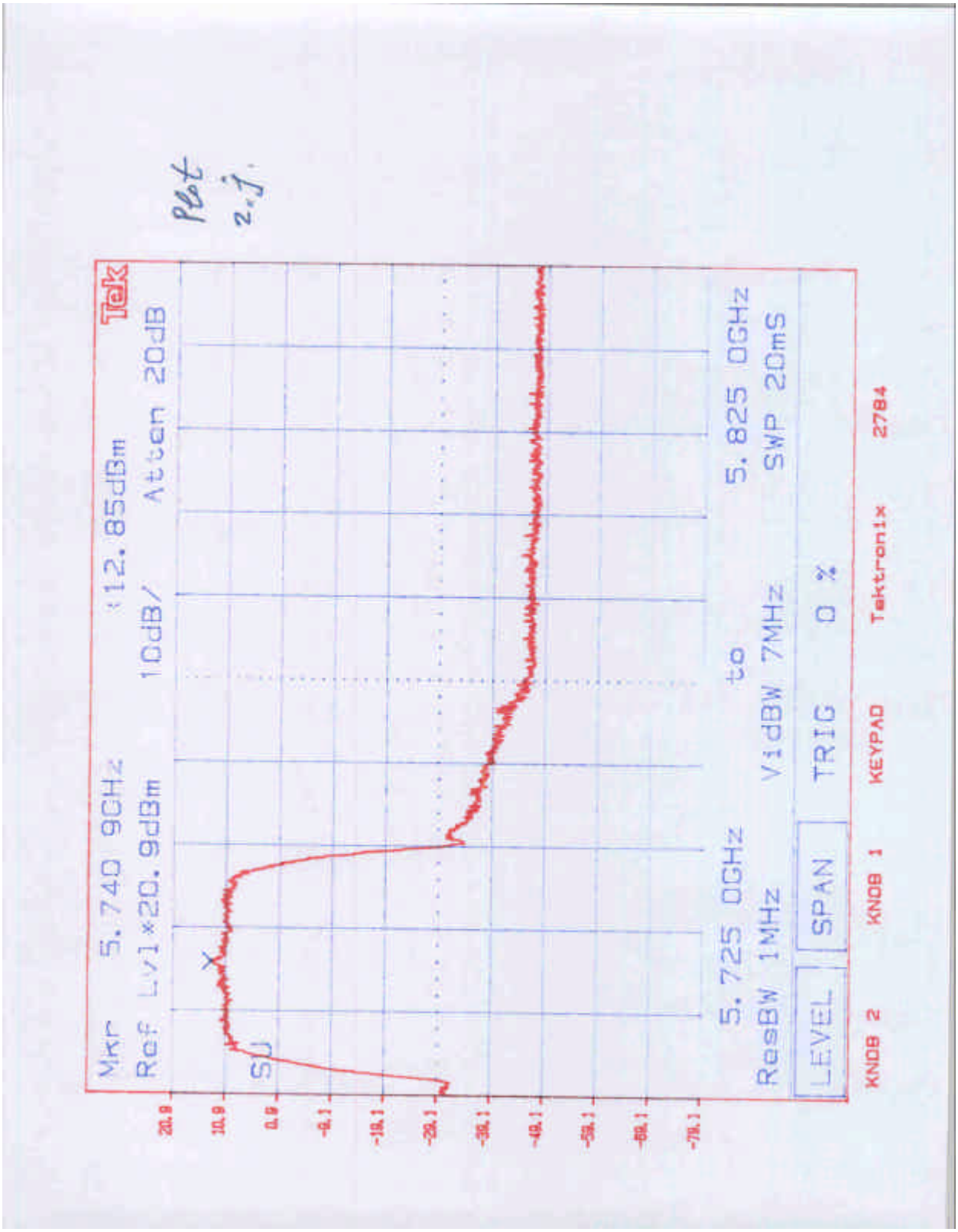

Peak
plot
2. e.
Tek
Mkr 5.767 7GHz
Ref Lvl*20.9dBm
*10.25dBm
10dB/ Atten 20dB
SU
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 10mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

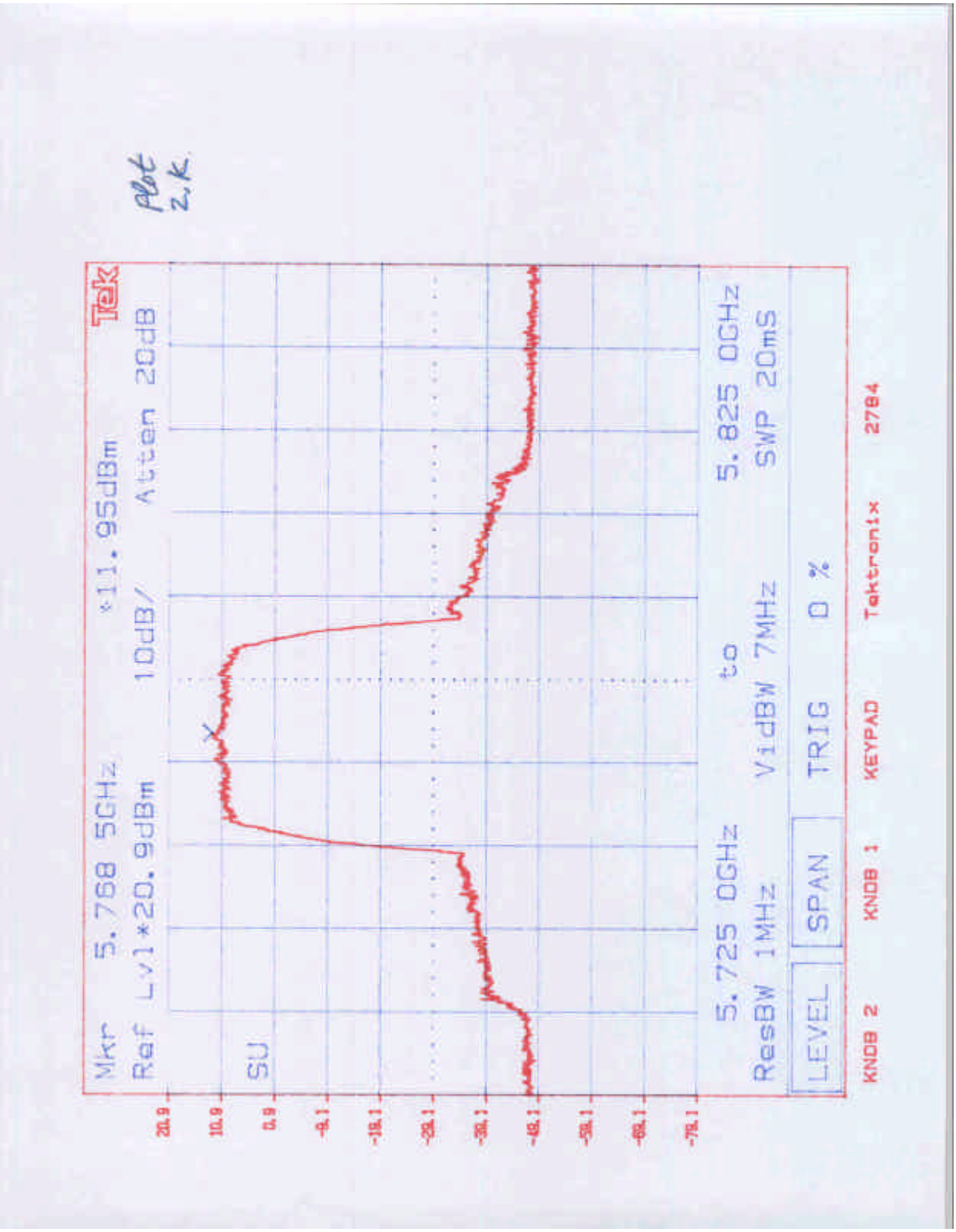

Peak
Plot 2.f
Tek
Mkr 5.809 1GHz
Ref Lvl*20.9dBm
*11.45dBm
10dB/ Atten 20dB
SU
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 10mS
LEVEL
SPAN
TRIG 0 %
KNOB 2 KNOB 1 KEYPAD
Tektronix 2784

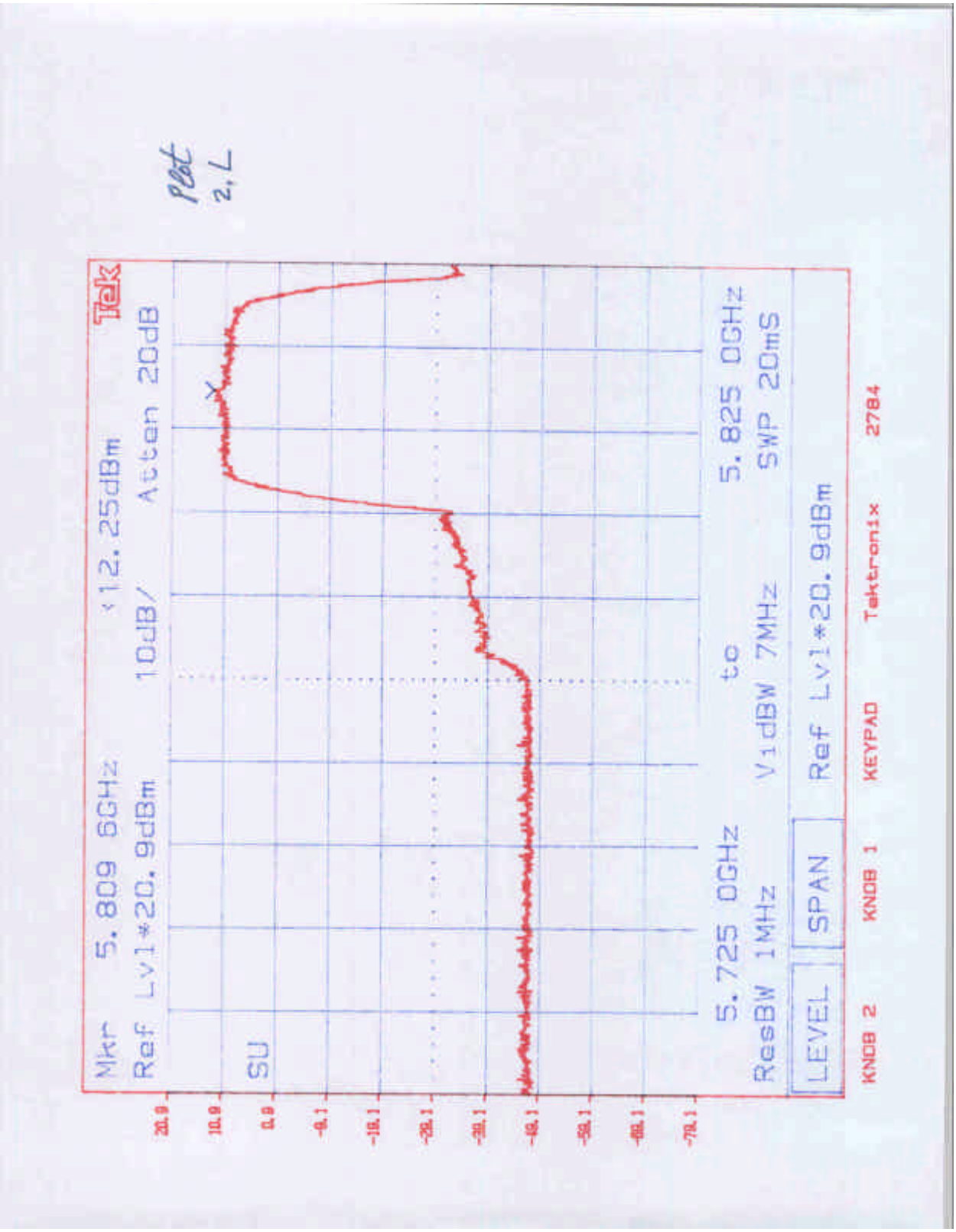

Peak
Plot 2.g
Tek
Mkr 5.740 3GHz
Ref Lvl*20.9dBm
*11.45dBm
10dB/ Atten 20dB
SU
X
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 10mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Peak
Plot 2.h
Tek
Mkr 5.767 9GHz
Ref Lvl *20.9dBm
*11.45dBm
10dB/ Atten 20dB
SU
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 10mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Peak
Plot 2.i
Tek
Mkr 5.809 0GHz *10.65dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
5.725 0GHz to 5.825 0GHz
ResBW 1MHz VidBW 7MHz SWP 10mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1


Plot 2.j
Tek
Mkr 5.740 9GHz 12.85dBm
Ref Lvl 20.9dBm 10dB/ Atten 20dB
SJ
5.725 0GHz to 5.825 0GHz
ResBW 1MHz VidBW 7MHz SWP 20mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1


Plot 2, K.
Tek
Mkr 5.768 5GHz
*11.95dBm
Ref Lvl*20.9dBm
10dB/
Atten 20dB
SU
5.825 0GHz
to
5.725 0GHz
ResBW 1MHz
VidBW 7MHz
SWP 20mS
LEVEL
SPAN
TRIG
0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Plot 2.L
Tek
Mkr 5.809 6GHz
Ref Lvl*20.9dBm
12.25dBm
10dB/
Atten 20dB
SU
5.725 0GHz
ResBW 1MHz
to
5.825 0GHz
VidBW 7MHz
SWP 20mS
LEVEL
SPAN
Ref Lvl*20.9dBm
KNOB 2
KNOB 1
KEYPAD
Tektronix
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4.4 The ratio of the peak excursion of the modulation envelope to the peak power
FCC Rule 15.407(a)(6)

Requirement:

The ratio of the peak excursion of the modulation envelope to the peak transmit power shall not exceed 13 dB.

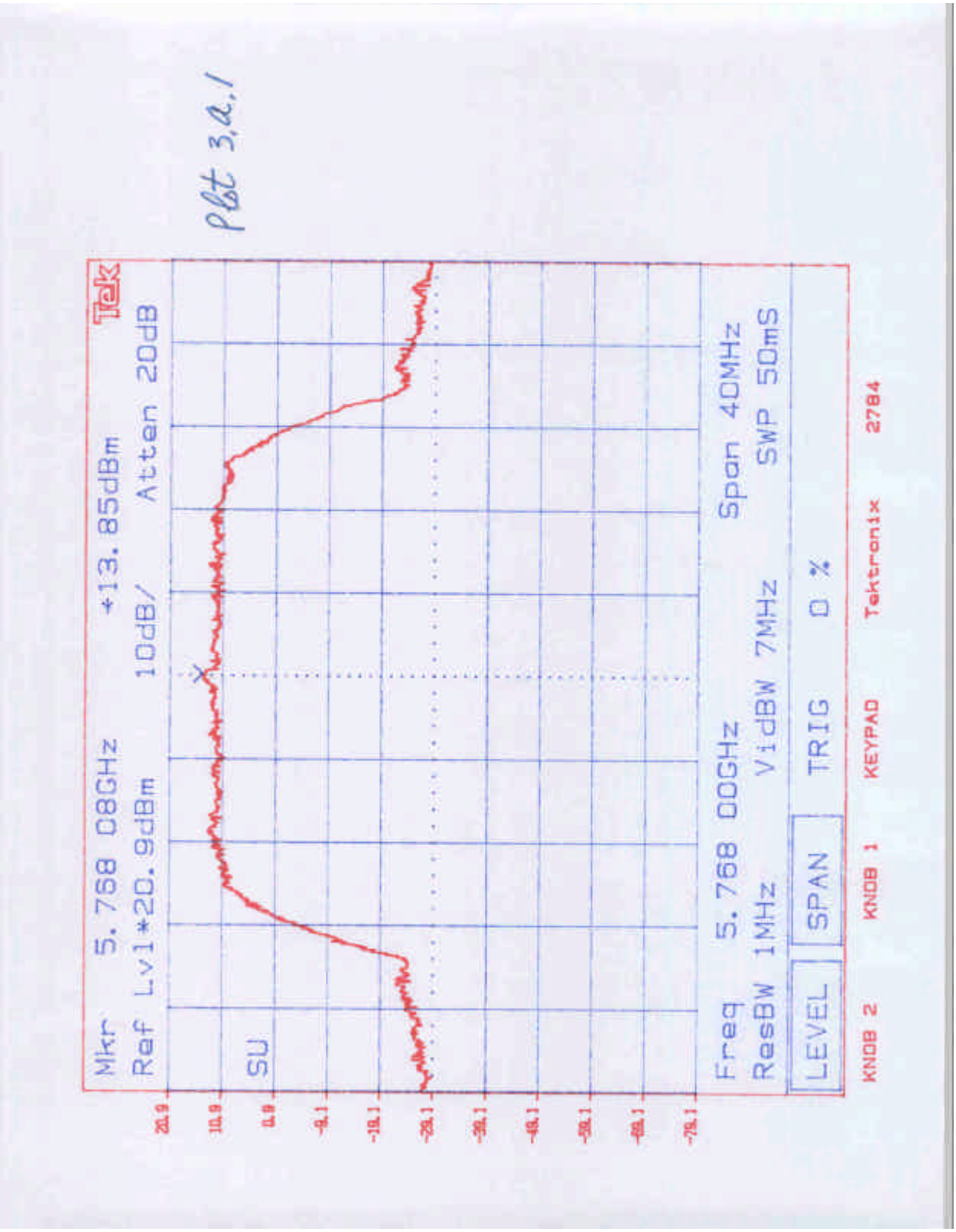
Procedure:

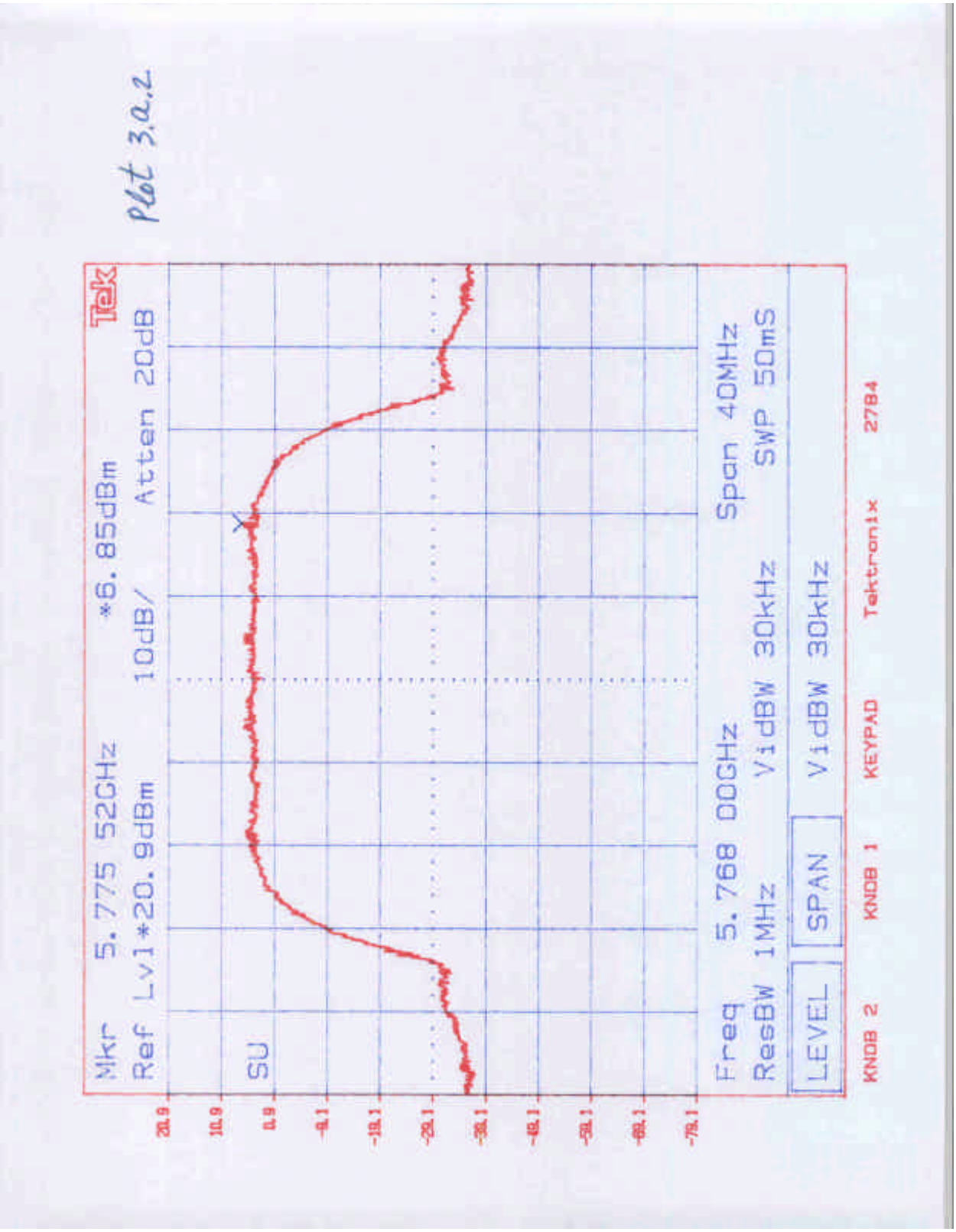
Spectrum Analyzer was connected to the output of the EUT. The Resolution Bandwidth was set to 1 MHz. Two plots were made in each band: with the Video Bandwidth set to 7 MHz and with the Video Bandwidth set to 30 kHz. The difference between spectrum analyzer readings indicates the ratio of the peak excursion of the modulation envelope to the peak transmit power.

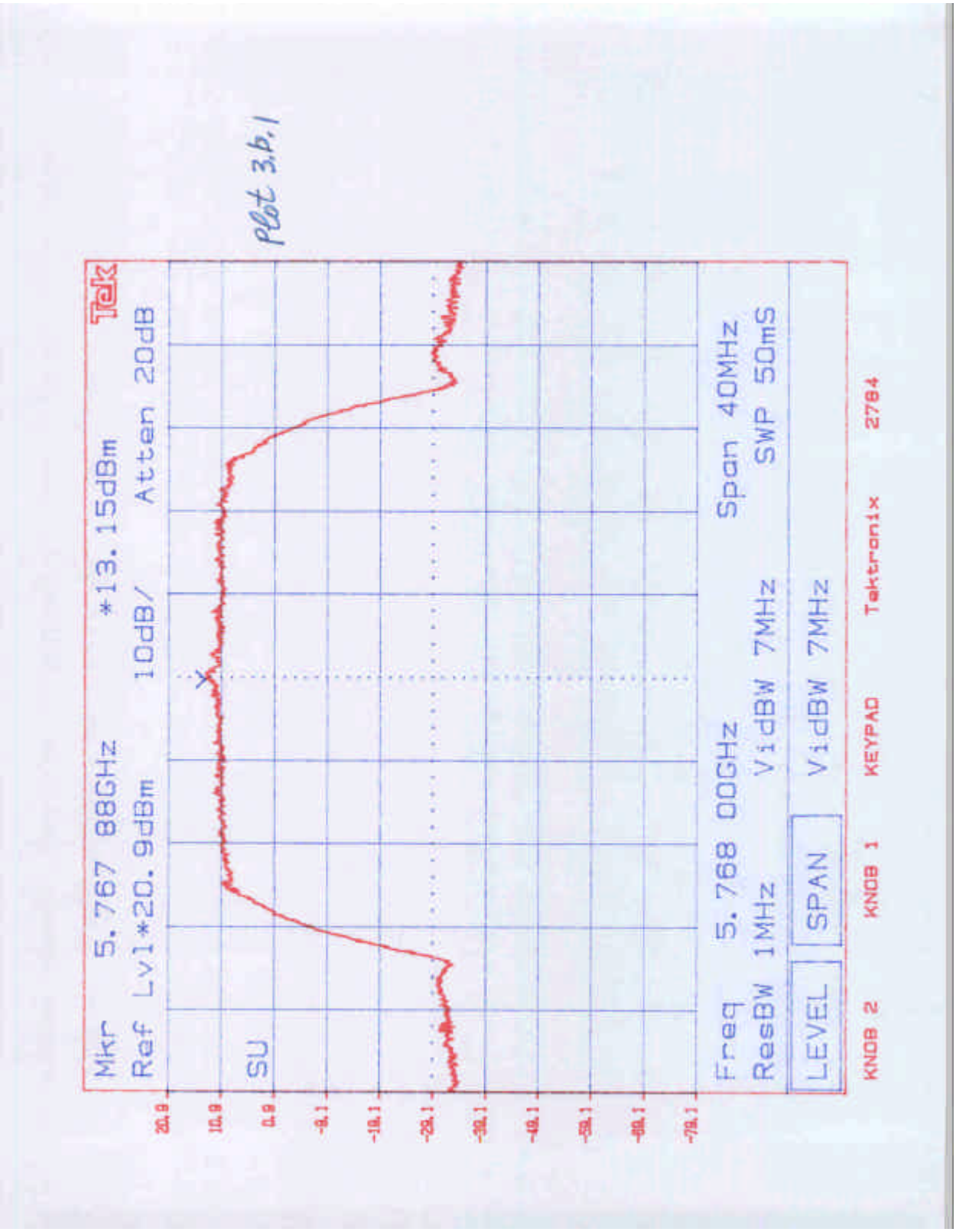
Test Result:

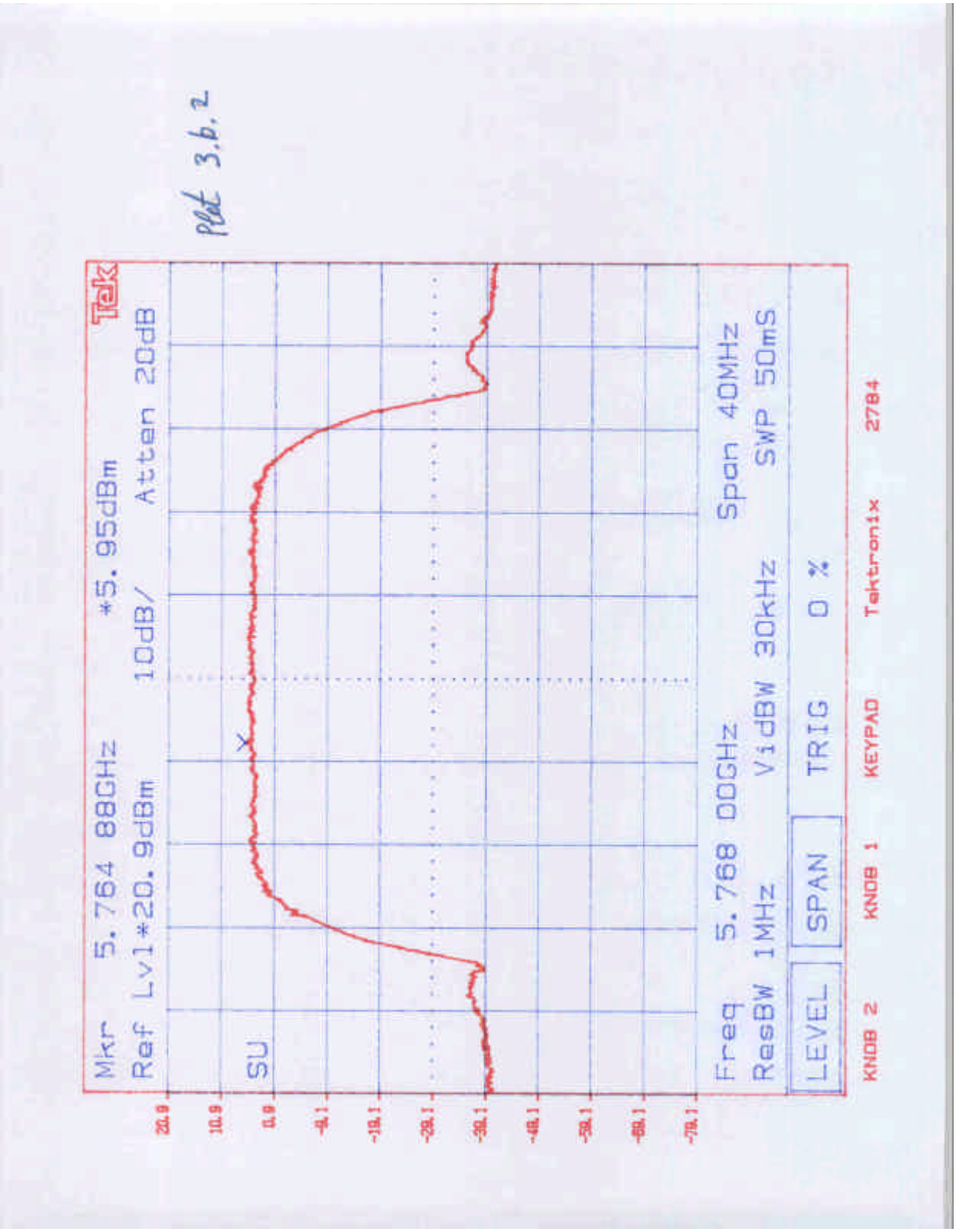
See attached plots for the ratio of the peak excursion of the modulation envelope to the peak power. The maximum Ratio is 7.3 dB.

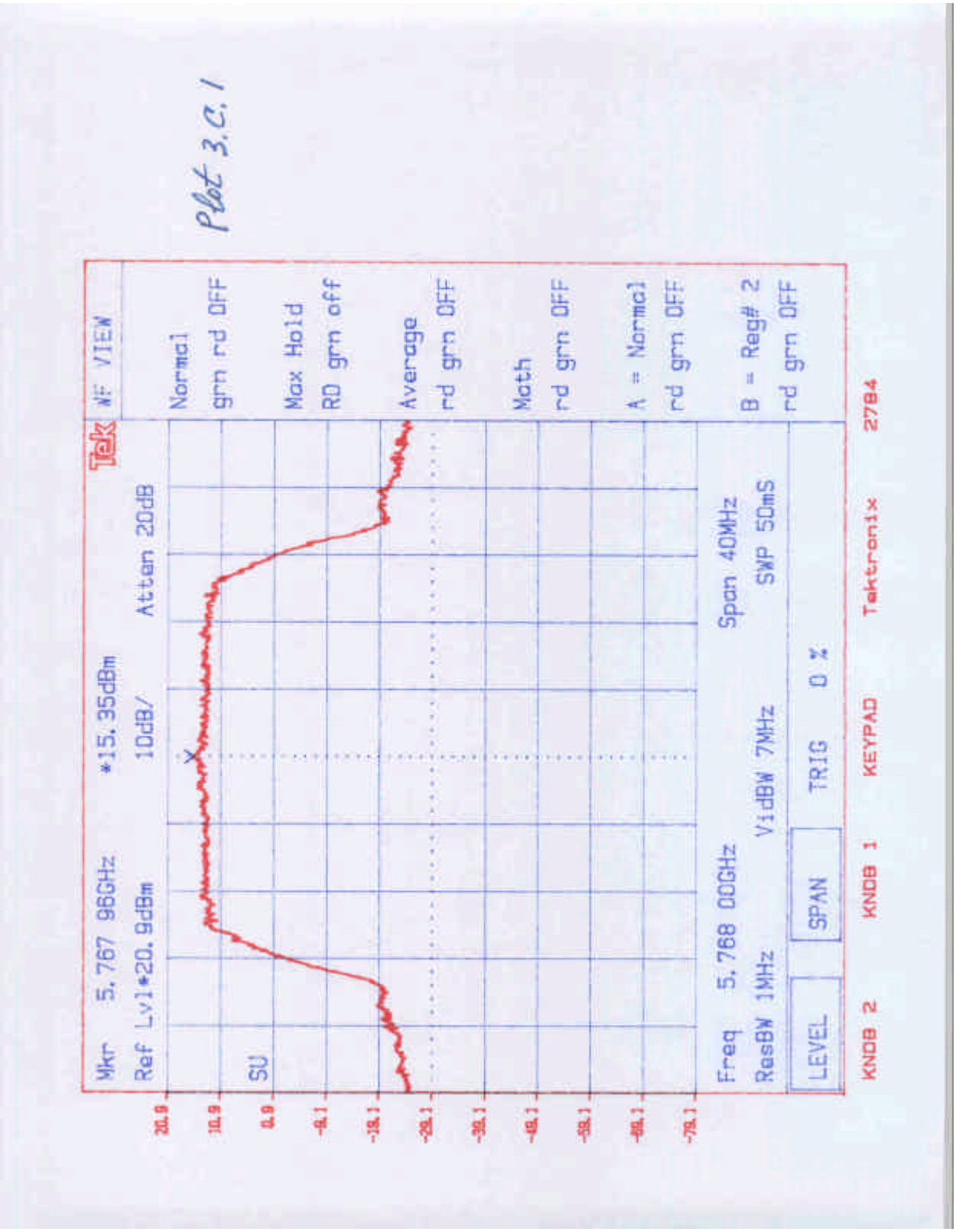
15.407(a)(6)		
3.a.1 – 3.a.2	Ch 2	QAM16
3.b.1 – 3.b.2	Ch 2	QAM8
3.c.1 – 3.c.2	Ch 2	QPSK R ¾
3.d.1 – 3.d.2	Ch 2	QPSK R 1/2

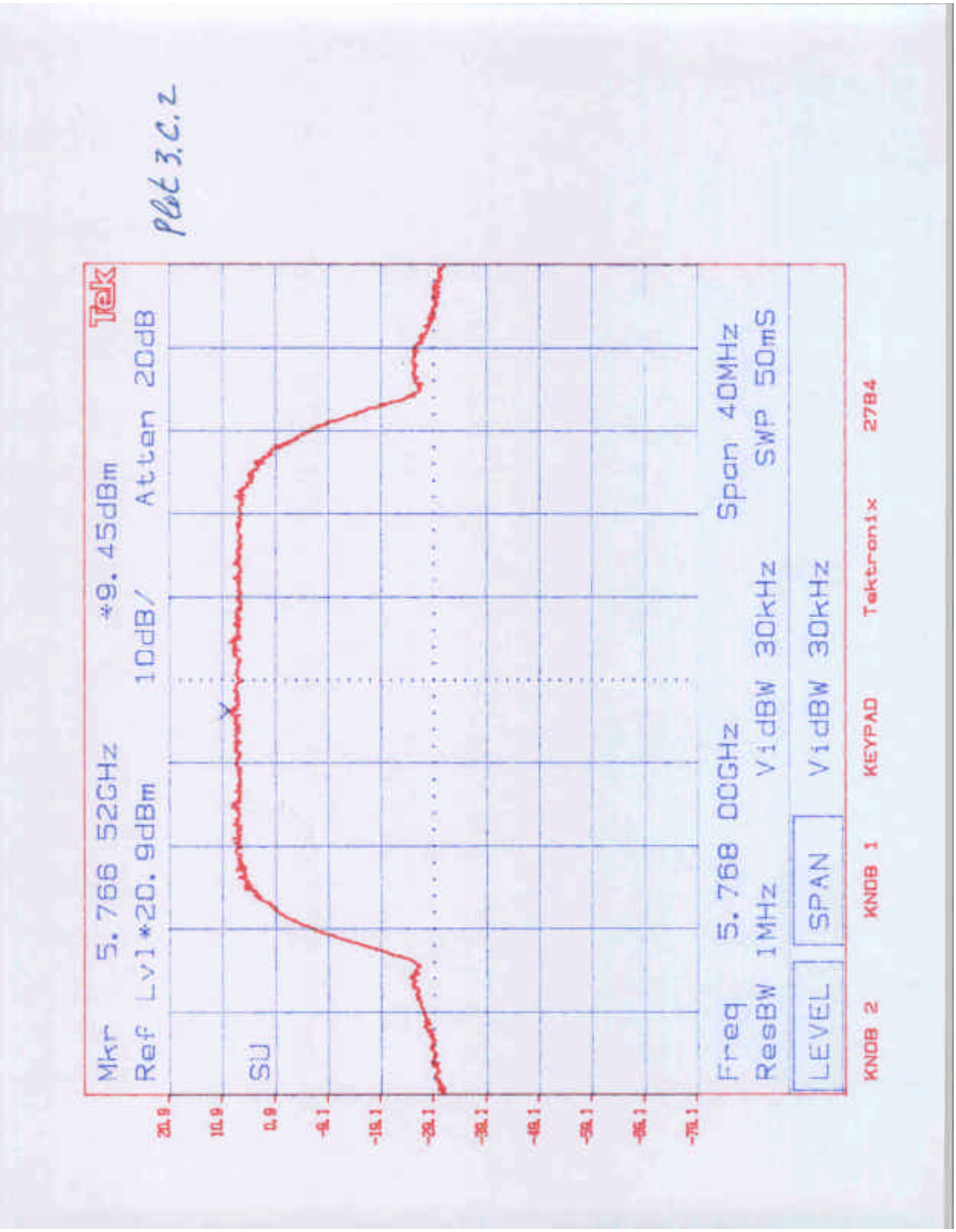

Plot 3.a.1
Tek
Mkr 5.768 08GHz +13.85dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 00GHz Span 40MHz
ResBW 1MHz VidBW 7MHz SWP 50mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1


Plot 3.a.2
Tek
Mkr 5.775 52GHz *6.85dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 00GHz Span 40MHz
ResBW 1MHz VidBW 30kHz SWP 50mS
LEVEL SPAN VidBW 30kHz
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1

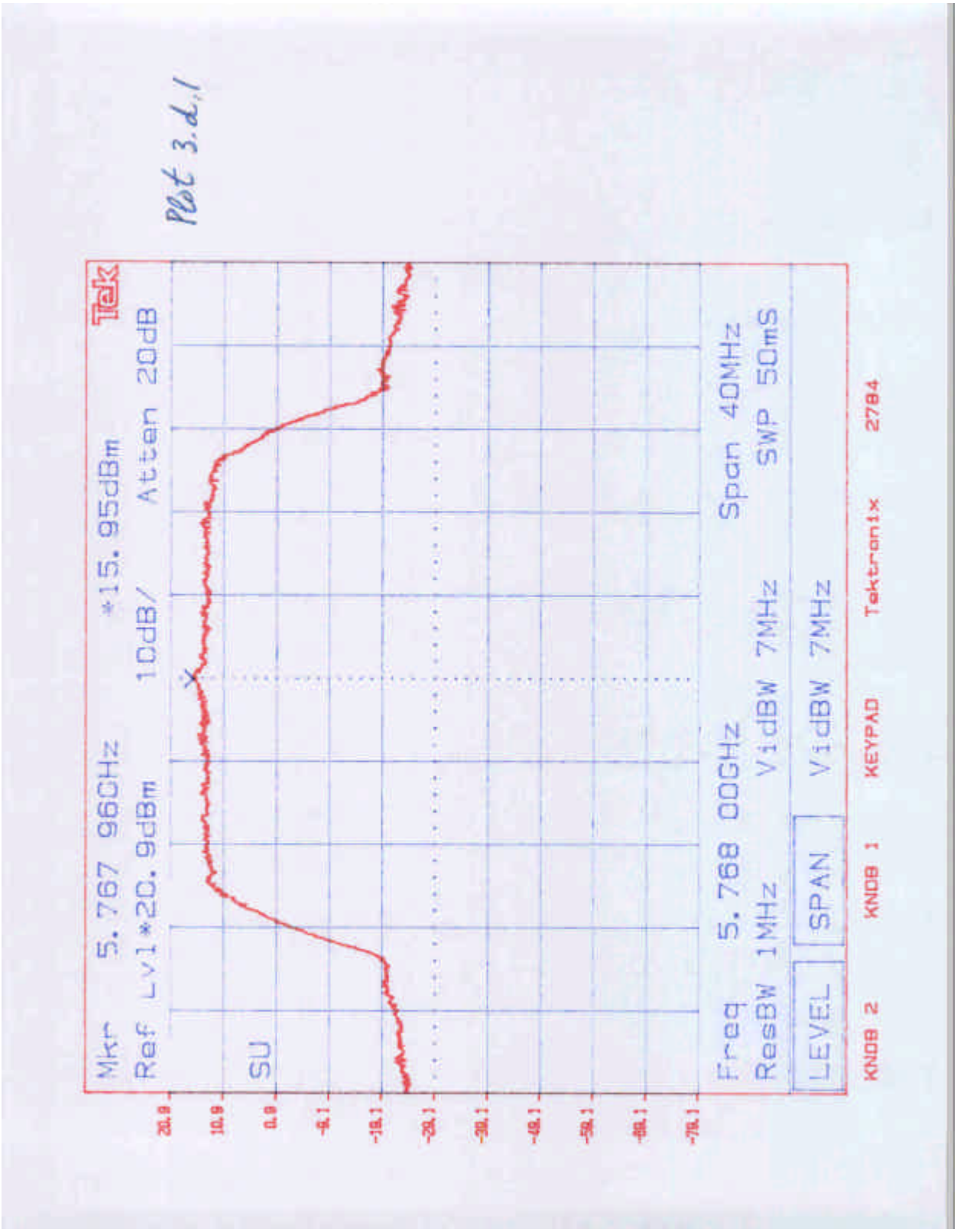

Plot 3.b.1
Tek
Mkr 5.767 88GHz *13.15dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 00GHz Span 40MHz
ResBW 1MHz VidBW 7MHz SWP 50mS
LEVEL SPAN VidBW 7MHz
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1

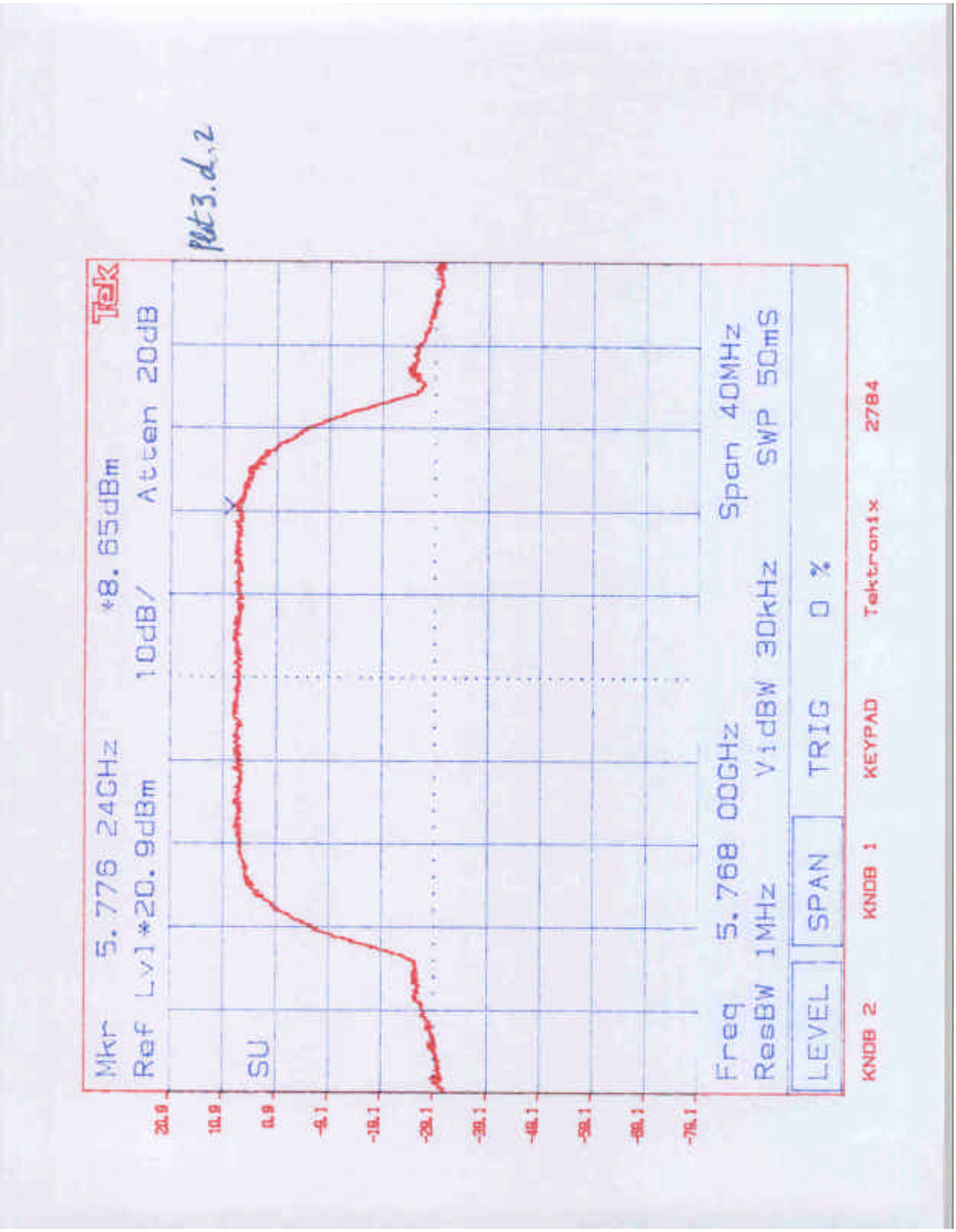

Plot 3.b.2
Tek
Mkr 5.764 88GHz *5.95dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 00GHz Span 40MHz
ResBW 1MHz VidBW 30kHz SWP 50mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784


Plot 3.C.1
Tek
NF VIEW
Normal
grn rd OFF
Max Hold
RD grn off
Average
rd grn OFF
Math
rd grn OFF
A = Normal
rd grn OFF
B = Reg# 2
rd grn OFF
Mkr 5.767 96GHz
*15.35dBm
Ref Lvl*20.9dBm
10dB/
Atten 20dB
SU
Freq 5.768 00GHz
Span 40MHz
ResBW 1MHz
VidBW 7MHz
SWP 50mS
LEVEL
SPAN
TRIG 0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix 2784


Plot 3.c.2
Tek
Mkr 5.766 52GHz *9.45dBm
Ref Lvl*20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 00GHz Span 40MHz
ResBW 1MHz VidBW 30kHz SWP 50mS
LEVEL SPAN VidBW 30kHz
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1

Plot 3.d.1


Tek
Mkr 5.767 960GHz *15.95dBm
Ref Lvl *20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 000GHz Span 40MHz
ResBW 1MHz VidBW 7MHz SWP 50mS
VidBW 7MHz
LEVEL SPAN
KNOB 2 KNOB 1 KEYPAD Tektronix 2784
20.9
10.9
0.9
-9.1
-19.1
-29.1
-39.1
-49.1
-59.1
-69.1
-79.1


Plot 3.d.2
Tek
Mkr 5.776 24GHz *8.65dBm
Ref Lvl *20.9dBm 10dB/ Atten 20dB
SU
Freq 5.768 000GHz Span 40MHz
ResBW 1MHz VidBW 30kHz SWP 50mS
LEVEL SPAN TRIG 0 %
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

4.5 Out-of-Band Conducted Emissions
FCC Rule 15.407(b)

Requirement:

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15-5.25 GHz band.

For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed and EIRP of –27 dBm/MHz.

The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

Procedure:

Spectrum Analyzer was connected to the output of the EUT. For measurements above 1 GHz, the Resolution Bandwidth was set to 1 MHz and the Video Bandwidth was set to 7 MHz; the Spectrum Analyzer was set to perform average by sampling, 100 sweeps was used. For measurements below 1 GHz, the Resolution Bandwidth and the Video Bandwidth were set 100 kHz. Several plots were made in the frequency range from 30 MHz to 40 GHz.

The tests were performed for three modulation: QAM16, QAM8, QPSK R $^{3}/_{4}$.
Note: QPSK R $^{3}/_{4}$ is the worst case for QPSK R $^{3}/_{4}$ and QPSK R $^{1}/_{2}$.

Result:

Refer to the following plots (on the next pages) for out-of-band conducted emissions data.
The EUT complies with out-of-band conducted emissions limits, calculated as EIRP Limit minus Antenna Gain (21 dBi):

-48 dBm/MHz, for frequencies 30 - 5715 MHz,
-48 dBm/MHz, for frequencies 5835 - 40 GHz,
-38 dBm/MHz, for frequencies 5715 - 5725 MHz,
-38 dBm/MHz, for frequencies 5825 - 5835 MHz,

except for frequencies 731.3 MHz, 759.4 MHz, 801.2 MHz (see plots: 4.c1, 4.d1, 4.e1, 4.f1, 4.g1, 4.h1, 4.i1). On those frequencies the antenna gain is unknown, therefore radiated emission tests were performed (see test data in section 4.6).

15.407((b), Out-of-Band emissions		
4.a.1 – 4.a.8 *	Ch 0	QAM16
4.b.1 – 4.b.8 *	Ch 2	QAM16
4.c.1 – 4.c.9 *	Ch 5	QAM16
4.d.1 – 4.d.8 **	CH 0	QAM8
4.e.1 – 4.e.7 **	CH 2	QAM8
4.f.1 – 4.f.10 **	Ch 5	QAM8
4.g.1 – 4.g.10 ***	Ch 0	QPSK R ¾
4.h.1 – 4.h.7 ***	Ch 2	QPSK R ¾
4.i.1 – 4.i.11 ***	Ch 5	QPSK R ¾

* See Appendix A for plots
** See Appendix B for plots
*** See Appendix C for plots

4.6 Radiated Emissions
FCC Rules 15.109, 15.209, 15.205

Procedure

Radiated emission measurements were performed from 30 MHz to 40,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz - for frequencies above 1000 MHz.

The EUT is placed on the wooden 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
Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF
Where FS = Field Strength in dBµV/m
RR = RA - AG in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antennas factor of 7.4-dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV
AF = 7.4 dB RR = 23.0 dBµV
CF = 1.6 dB LF = 9.0 dB
AG = 29.0 dB
FS = RR + LF

FS = 23 + 9 = 32 dBμV/m
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

Result

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Radiated Emissions Test Data

Company:	Proxim Cor.	**Model #:**	40100-XXX	**Standard**	FCC § 15.407
EUT:	PMP Subscriber unit	**S/N #:**		**Limits**	11
Project #:	3008928	**Test Date:**	Sep 19,2001	**Test Distance**	3 meters
Test Mode:	Tx @5740.40MHz	**Engineer:**	Suresh K	**Duty Relaxation**	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	21	22	0	13	10	21	0	0	0
Model:	EMCO 3115	3160-9	3160-10	None	ACO/400	AFT18855	Grn	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
5740.40E+0	81.7	Peak	8	0	H	36.6	0.0	3.7	0.0	122.0	-	-
5740.40E+0	66.2	Ave.	8	0	H	36.6	0.0	3.7	0.0	106.5	-	-
1.15E+4	38.0	Peak	8	10	H	40.4	39.9	5.6	0.0	44.1	74.0	-29.9
1.15E+4	27.9	Ave.	8	10	H	40.4	39.9	5.6	0.0	34.0	54.0	-20.0
1.72E+4	38.5	Peak	8	10	H	42.2	38.8	7.5	0.0	49.4	74.0	-24.6
1.72E+4	28.5	Ave.	8	10	H	42.2	38.8	7.5	0.0	39.4	54.0	-14.6
2.30E+4	39.9 *	Peak	21	13	H	40.4	23.3	8.5	-9.5	56.0	74.0	-18.0
2.30E+4	28.2 *	Ave.	21	13	H	40.4	23.3	8.5	-9.5	44.3	54.0	-9.7
2.87E+4	37.3 *	Peak	22	13	H	43.4	24.2	9.2	-9.5	56.2	74.0	-17.8
2.87E+4	27.5 *	Ave.	22	13	H	43.4	24.2	9.2	-9.5	46.4	54.0	-7.6
3.44E+4	43.6 *	Peak	22	13	H	43.6	25.9	10.0	-9.5	64.5	74.0	-9.5
3.44E+4	33.1 *	Ave.	22	13	H	43.6	25.9	10.0	-9.5	51.3	54.0	-2.7

Notes:

a) D.C.F.:Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 3 dB below the limits.
f) Measurements above 20 GHz were made at 1 m distance
g) * noise floor

Proxim Corporation, Model No: 40100-XXX
FCC ID: HZB-US58-S60 **Date of Test: September 20 to 23, 2001**

Radiated Emissions Test Data

Company:	Proxim Cor.	**Model #:**	40100-XXX	**Standard**	**FCC § 15.407**
EUT:	PMP Subscriber unit	**S/N #:**		**Limits**	11
Project #:	3008928	**Test Date:**	Sep 19, 2001	**Test Distance**	3 meters
Test Mode:	Transmitter@5768.0MHz	**Engineer:**	Suresh K	**Duty Relaxation**	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	22	8	21	8	10	13	21	0	0	0
Model:	3160-10	EMCO 3115	3160-9	CDI_P1000	AFT18855	ACO/400	Grn	None	None	None

Frequency	Reading	Detector	Ant	Amp	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
5768.06E+0	82.9	Peak	8	0	H	36.6	0.0	3.7	0.0	123.2	-	-
5768.06E+0	69.8	Ave.	8	0	H	36.6	0.0	3.7	0.0	110.1	-	-
1.15E+4	44.2	Peak	8	10	H	40.4	39.7	5.8	0.0	50.7	74.0	-23.3
1.15E+4	32.5	Ave.	8	10	H	40.4	39.7	5.8	0.0	39.0	54.0	-15.0
1.73E+4	39.4	Peak	8	10	H	42.2	38.8	7.5	0.0	50.3	74.0	-23.7
1.73E+4	28.0	Ave.	8	10	H	42.2	38.8	7.5	0.0	38.9	54.0	-15.1
2.31E+4	39.1 *	Peak	21	13	H	40.4	23.3	8.5	-9.5	55.2	74.0	-18.8
2.31E+4	28.3 *	Ave.	21	13	H	40.4	23.3	8.5	-9.5	44.4	54.0	-9.6
2.88E+4	36.5 *	Peak	22	13	H	43.4	24.2	9.2	-9.5	55.4	74.0	-18.6
2.88E+4	26.7 *	Ave.	22	13	H	43.4	24.2	9.2	-9.5	45.6	54.0	-8.4
3.46E+4	42.0 *	Peak	22	13	H	43.6	23.8	10.0	-9.5	62.3	74.0	-11.7
3.46E+4	31.7 *	Ave.	22	13	H	43.6	23.8	10.0	-9.5	52.0	54.0	-2.0

Notes:

a) D.C.F.:Distance Correction Factor
b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Duty Relaxation (transmitter only).
d) Negative signs (-) in Margin column signify levels below the limits.
e) All other emissions not reported are below the equipment noise floor which is at least 3 dB below the limits.
f) Measurements above 20 GHz were made at 1 m distance
g) * noise floor

Radiated Emissions Test Data

Company:	Proxim Cor.	**Model #:**	40100-XXX	**Standard**	**FCC § 15.407**
EUT:	PMP Subscriber unit	**S/N #:**		**Limits**	11
Project #:	3008928	**Test Date:**	Sep 19, 2001	**Test Distance**	3 meters
Test Mode:	Transmitter@5809.56MHz	**Engineer:**	Suresh K	**Duty Relaxation**	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	22	8	21	8	10	13	21	0	0	0
Model:	3160-10	EMCO 3115	3160-9	CDI_P1000	AFT18855	ACO/400	Grn	None	None	None

Frequency	Reading	Detector	Ant	Amp	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
5809.56E+0	78.9	Peak	8	0	H	36.6	0.0	3.7	0.0	119.2	-	-
5809.56E+0	65.4	Ave.	8	0	H	36.6	0.0	3.7	0.0	105.7	-	-
1.16E+4	42.9	Peak	8	10	H	40.4	39.7	5.8	0.0	49.4	74.0	-24.6
1.16E+4	32.1	Ave.	8	10	H	40.4	39.7	5.8	0.0	38.6	54.0	-15.4
1.74E+4	38.9	Peak	8	10	H	42.2	38.8	7.5	0.0	49.8	74.0	-24.2
1.74E+4	28.2	Ave.	8	10	H	42.2	38.8	7.5	0.0	39.1	54.0	-14.9
2.32E+4	39.1 *	Peak	21	13	H	40.4	23.3	8.5	-9.5	55.2	74.0	-18.8
2.32E+4	27.2 *	Ave.	21	13	H	40.4	23.3	8.5	-9.5	43.3	54.0	-10.7
2.90E+4	36.5 *	Peak	22	13	H	43.5	25.9	9.2	-9.5	53.8	74.0	-20.2
2.90E+4	26.4 *	Ave.	22	13	H	43.5	25.9	9.2	-9.5	43.7	54.0	-10.3
3.49E+4	42.0 *	Peak	22	13	H	43.6	23.8	10.0	-9.5	62.3	74.0	-11.7
3.49E+4	31.4 *	Ave.	22	13	H	43.6	23.8	10.0	-9.5	51.7	54.0	-2.3

Notes:	
	a) D.C.F.:Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss - Duty Relaxation (transmitter only).
	d) Negative signs (-) in Margin column signify levels below the limits.
	e) All other emissions not reported are below the equipment noise floor which is at least 3 dB below the limits.
	f) Measurements above 20 GHz were made at 1 m distance
	g) * noise floor

Job No.: 3008928
Company: Proxim Corporation
Model: PMP Subscriber Unit
Test Mode: Tx/Rx
Engineer: Ollie Moyrong
Date: September_18_2001

FCC Part 15.109 Class B Radiated Emissions

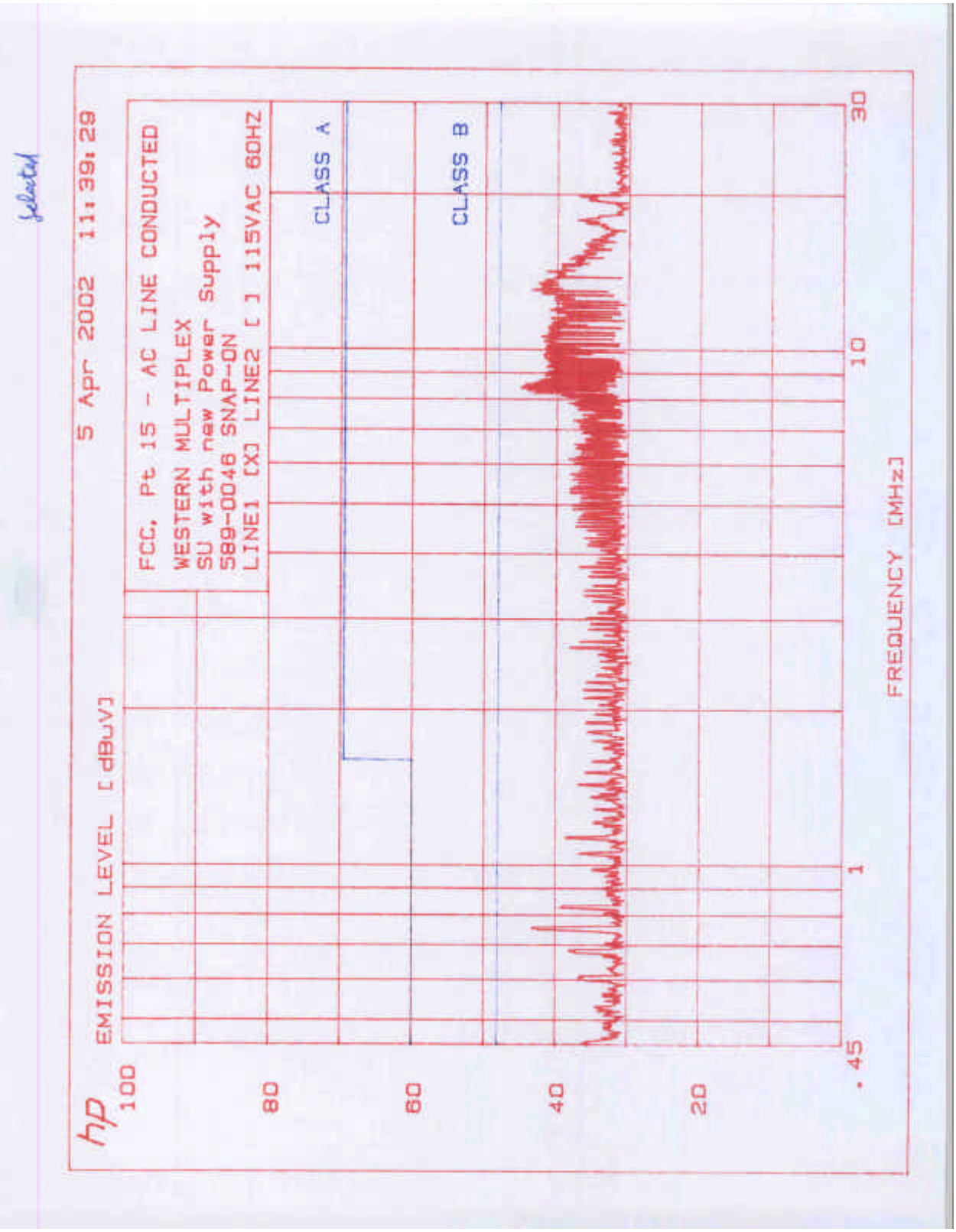
Frequency (MHz)	Antenna Location (m)	Antenna Polariz. (H/V)	Reading (dBuV)	Antenna Factor (dB/m)	Preamp gain (dB)	Dist. Corr. Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit at 3 m (dBuV/m)	Margin (dB)
35.0	3.0	V	35.1	8.2	18.4	0.0	1.5	26.4	40.0	-13.6
35.4	3.0	V	38.6	8.2	18.4	0.0	1.5	29.9	40.0	-10.1
51.0	3.0	V	37.1	5.0	18.5	0.0	2.1	25.7	40.0	-14.3
56.8	3.0	V	34.3	5.7	18.5	0.0	2.1	23.6	40.0	-16.4
64.2	3.0	V	38.4	5.8	18.7	0.0	2.3	27.8	40.0	-12.2
64.8	3.0	V	39.7	5.8	18.7	0.0	2.3	29.1	40.0	-10.9
80.0	3.0	V	36.7	6.7	18.8	0.0	2.4	27.0	40.0	-13.0
103.4	3.0	V	27.0	7.2	19.0	0.0	2.7	17.9	43.5	-25.6
112.8	3.0	V	32.3	7.1	19.0	0.0	2.7	23.1	43.5	-20.4
731.3	3.0	V	31.9	20.7	32.0	0.0	3.5	24.1	46.0	-21.9
759.4	3.0	V	30.0	20.7	32.0	0.0	3.5	22.2	46.0	-23.8
801.2	3.0	V	32.0	20.7	32.0	0.0	3.5	24.2	46.0	-21.8

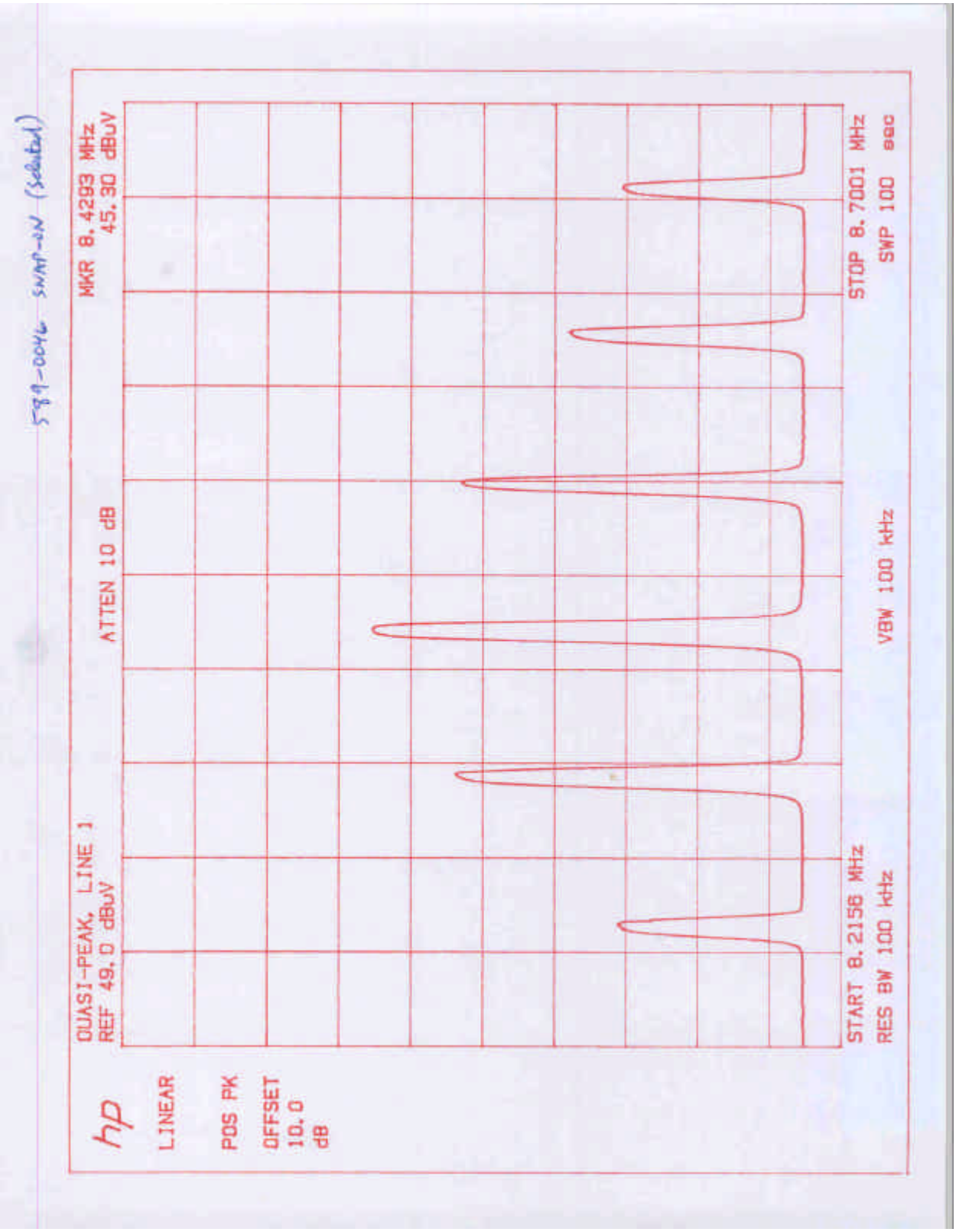
Notes: Negative signs (-) in the Margin column signify levels below the limit.
All readings are peak measurements.
All other emissions not reported are at least 10 dB below the applicable limits.
Frequency range of investigation is 30 MHz - 1 GHz.

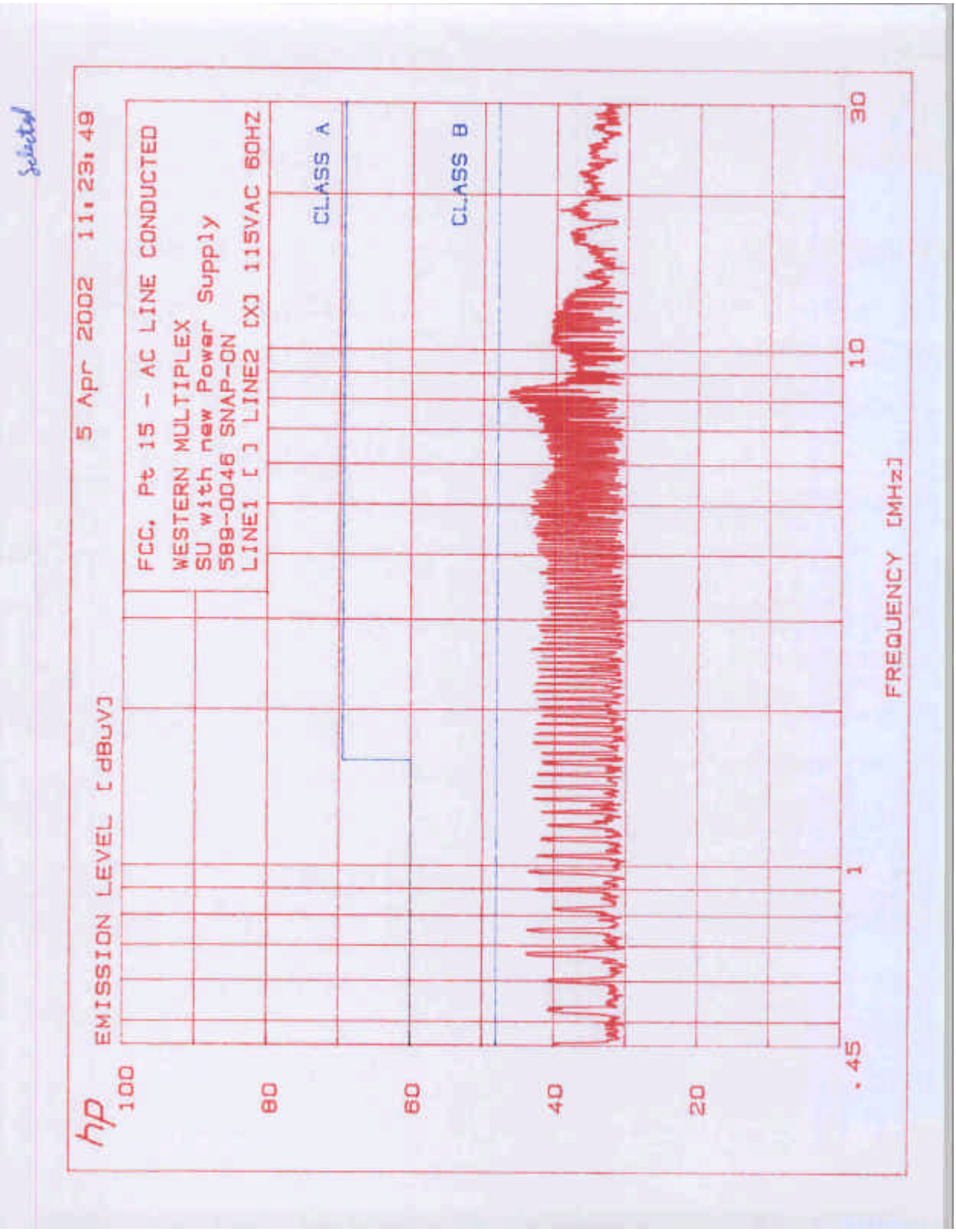
4.7 AC Line Conducted Emission
FCC Rule 15.207

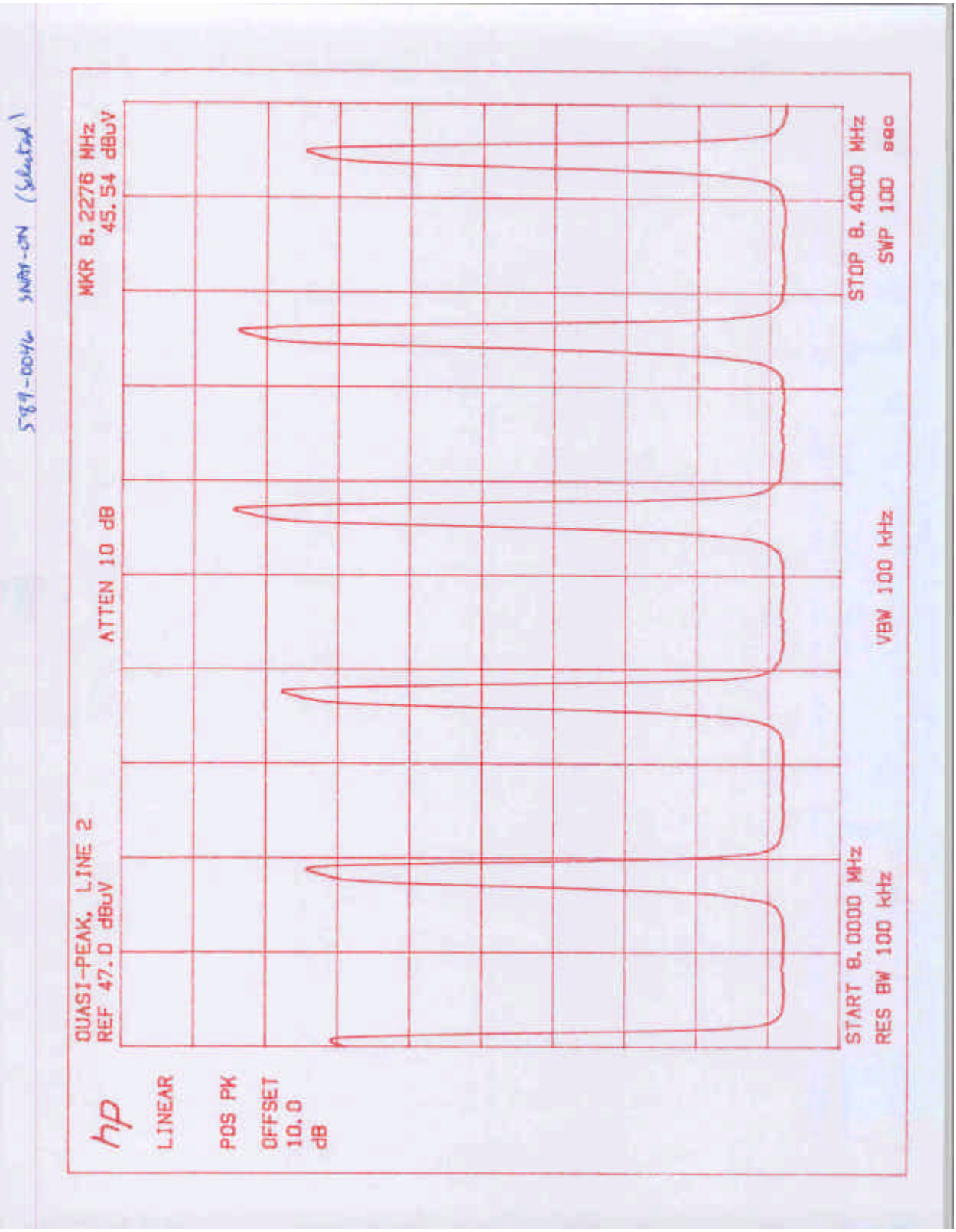
AC line conducted emission test was performed according the ANSI C63.4 standard. The EUT was connected to DC Power Supply which was connected to AC Line through the LISNs.

For the test result, see attached plots.
The EUT passed by 2.5 dB


hp
EMISSION LEVEL [dBuV]
100
80
60
40
20
5 Apr 2002 11:39:29
FCC, Pt 15 - AC LINE CONDUCTED
WESTERN MULTIPLEX
SU with new Power Supply
589-0046 SNAP-ON
LINE1 [X] LINE2 [ ] 115VAC 60HZ
CLASS A
CLASS B
.45
1
10
30
FREQUENCY [MHz]


5849-0046 SWAP-AV (Selected)
MKR 8.4293 MHz
45.30 dBuV
ATTEN 10 dB
QUASI-PEAK, LINE 1
REF 49.0 dBuV
hp
LINEAR
POS PK
OFFSET
10.0
dB
STOP 8.7001 MHz
SWP 100 sec
VBW 100 kHz
START 8.2156 MHz
RES BW 100 kHz


5 Apr 2002 11:23:49
FCC. Pt 15 - AC LINE CONDUCTED
WESTERN MULTIPLEX
SU with new Power Supply
588-0046 SNAP-ON
LINE1 [ ] LINE2 [X] 115VAC 60HZ
CLASS A
CLASS B
EMISSION LEVEL [dBuV]
FREQUENCY [MHz]
100
80
60
40
20
.45
1
10
30


MKR 8.2276 MHz
45.54 dBuV
ATTEN 10 dB
QUASI-PEAK, LINE 2
REF 47.0 dBuV
hp
LINEAR
POS PK
OFFSET
10.0
dB
START 8.0000 MHz
RES BW 100 kHz
VBW 100 kHz
STOP 8.4000 MHz
SWP 100 sec

5.0 List of Test Equipment

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. INTERVAL	CAL. DUE
Spectrum Analyzer w/85650 QP Adapter	Hewlett Packard	8566B	2416A00317 2043A00251	12	4/6/02
Spectrum Analyzer w/8650 QP Adapter	Hewlett Packard	8568B	1912A0053 2521A01021	12	2/23/02
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/8/02
BI-Log Antenna	EMCO	3143	9509-1164	12	3/4/03
Double-ridged Horn Antenna	EMCO	3115	9107-3712	12	3/17/02
Horn Antenna	EMCO	3160-09	Not Labeled	#	#
Horn Antenna	EMCO	3160-10	Not Labeled	#	#
Pre-Amplifier	CDI	P950	ITS009	12	7/2/02
Pre-Amplifier	Sonoma Inst.	310	185634	12	4/25/02
Pre-Amplifier	CDI	P1000	N/A	12	10/06/01
Pre-Amplifier	Avantek	AFT-18855	8723H705	12	10/5/01
Pre-amplifier	CTT	ACO/400	47526	12	10/5/01
Power Meter	Hewlett Packard	8900D	3607U00673	12	8/8/02
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	1/02/03

No Calibration Required

6.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3008928	SS	September 20, 2001	Original document
2.0 / 3018893	DC	February 26, 2002	New FCC ID
	DC	April 20, 2002	Company Name

7.0 Appendix A

See file "Appendix A"

8.0 Appendix B

See file "Appendix B"

9.0 Appendix C

See file "Appendix C"

10.0 Appendix D

See file " Appendix D"