ITS Intertek Testing Services

FCC Part 15.247 Test Report
for
Symbol Technologies
on the
Spectrum Wireless LAN
Model: LA-4111
FCC ID: H9PLA4111

Test Report #: J99022686e
Date of Report: September 29, 1999

Job #: J99022686
Date of Test: September 24-27, 1999

Total No. of Pages Contained in this Report: 28 + data pages

NVLAP®

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Table of Contents

1.0 Summary of Tests

MODEL: LA-4111
FCC ID: H9PLA4111

TEST	REFERENCE	RESULTS
Max. Output power	15.247(b)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(d)	Pass
Out of Band Antenna Conducted Emission	15.247(c)	Pass
Out of Band Radiated Emission	15.247(c)	Not Applicable
Radiated Emission in Restricted Bands	15.35(b)(c)	Pass
AC Conducted Emission	15.207	Pass
Radiated Emission from Digital Part	15.109	Pass
Radiated Emission from Receiver L.O.	15.109	Not Applicable
Processing Gain Measurements	15.247(e)	Provided by applicant
Antenna Requirement	15.203	Pass

Test Engineer: Barry Smith / SK Date: 9/30/99
Barry Smith

EMC Site Manager: David Chernomordik Date: 9/30/99
David Chernomordik, Ph.D.
EMC Site Manager

2.0 General Description

2.1 Product Description

The Spectrum Wireless LAN is a radio in PCMCIA format that allows a laptop to remotely hook up to a LAN.

A pre-production version of the sample was received on September 24, 1999 in good condition.

Overview of Spectrum Wireless LAN

Applicant	Symbol Technologies
Trade Name & Model No.	Symbol Technologies / LA-4111
FCC Identifier	H9PLA4111
Use of Product	Wireless LAN
Manufacturer & Model of Spread Spectrum Module	Symbol Technologies
Type of Transmission	Direct Sequence
Rated RF Output (mW)	60
Frequency Range (MHz)	2412-2462
Number of Channel(s)	
Antenna(s) & Gain, dBi	9 dBi (worst case)
Processing Gain Measurements	[ ] Will be provided to ITS for submission with the application [X] Will be provided directly to the FCC reviewing engineer by the client or manufacturer of the spread spectrum module
Antenna Requirement	[ ] The EUT uses a permanently connected antenna. [X] 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	

2.2 Related Submittal(s) Grants

Not applicable.

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 part 2 of CFR 47.

2.4 Test Facility

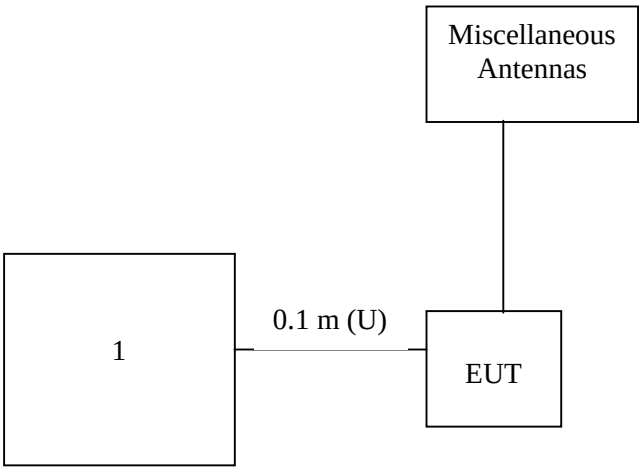
The open area test site and conducted measurement facility used to collect the radiated data is site 1. This test facility and site measurement data have been fully placed on file with the FCC and NVLAP accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

Item #	Description	Model No.	Serial No.	FCC ID
1	Dell Computer	POS3410-N500	F999999	DoC

3.2 Block Diagram of Test Setup



***** = EUT	**S** = Shielded;	**F** = With Ferrite
****** = No ferrites on video cable	**U** = Unshielded	

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

The EUT was set to continuously transmit.

3.6 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by Symbol Technologies prior to compliance testing):

No modificatins were installed by Intertek Testing Services.

3.7 Additions, deviations and exclusions from standards

No additions, exclusions, or deviations were made to the standard.

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals , FCC Rules 15.247(b):

Requirements

For antennas with gains of 6 dBi or less , maximum allowed transmitter output is 1 watt (+30 dBm).

For antennas with gains greater than 6 dBi, transmitter output level must be decreased by an amount equal to (GAIN - 6)/3 dBm.

[X] The antenna port of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

[ ] The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for maximun RES BW and power was read directly in dBm. External attenuation and cable loss were compensated for using the OFFSET function of the analyzer.

Test Results

Max. antenna gain = 9 dBi		
Frequency (MHz)	**Output in dBm**	**Output in mWatt**
2412	17.7	58.9
2437	16.4	43.7
2462	15.8	38.0

Cable loss: 0 dB External Attenuation: 0 dB

Cable loss, external attenuation: [X] included in OFFSET function
[ ]added to SA raw reading

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

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 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

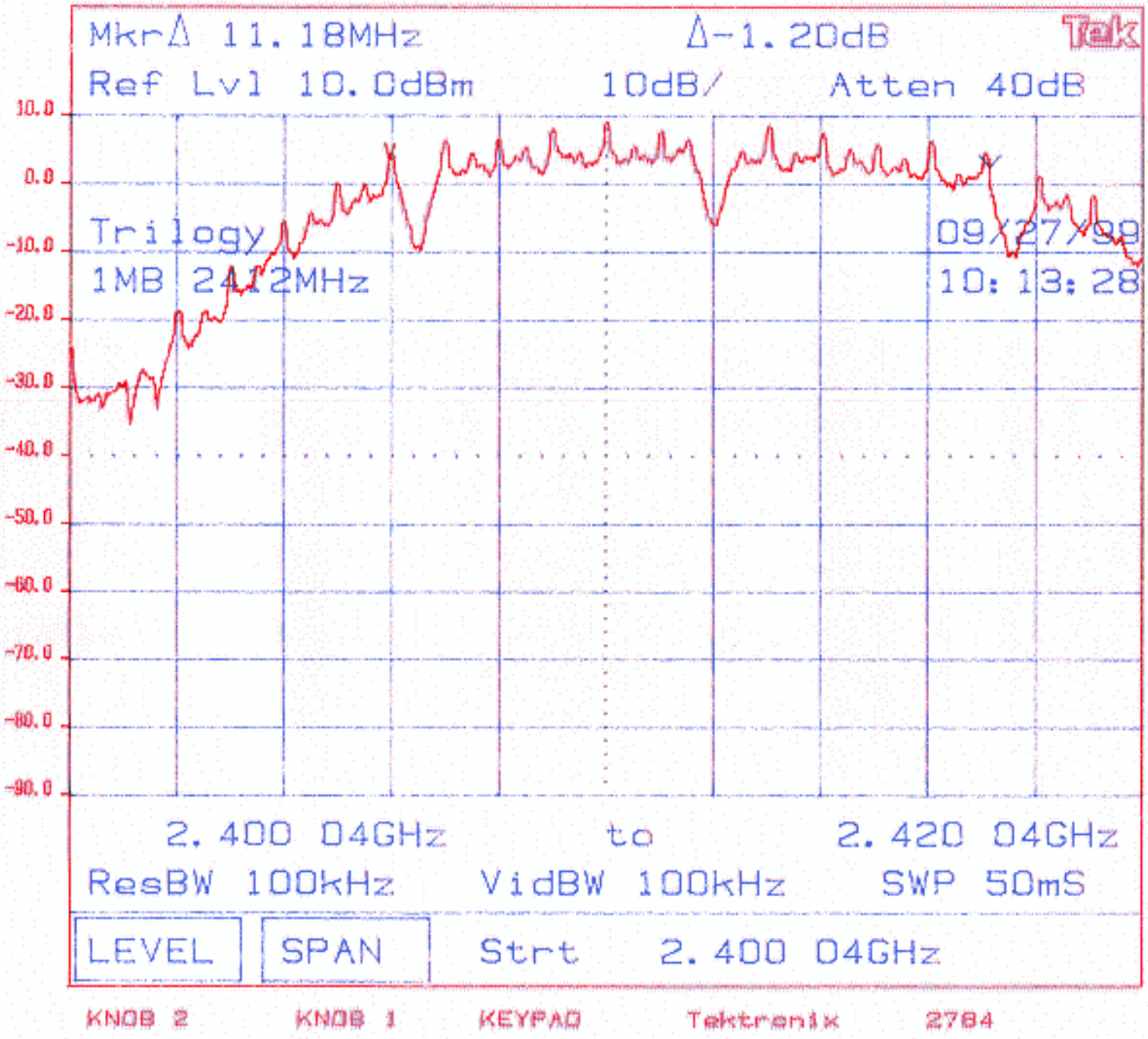
The test was performed at 3 channels at 4 bit rates (1 MB, 2 MB, 5.5 MB, 11 MB)

Frequency (MHz)	Min. 6 dB Bandwidth (MHz)
2412	11.2

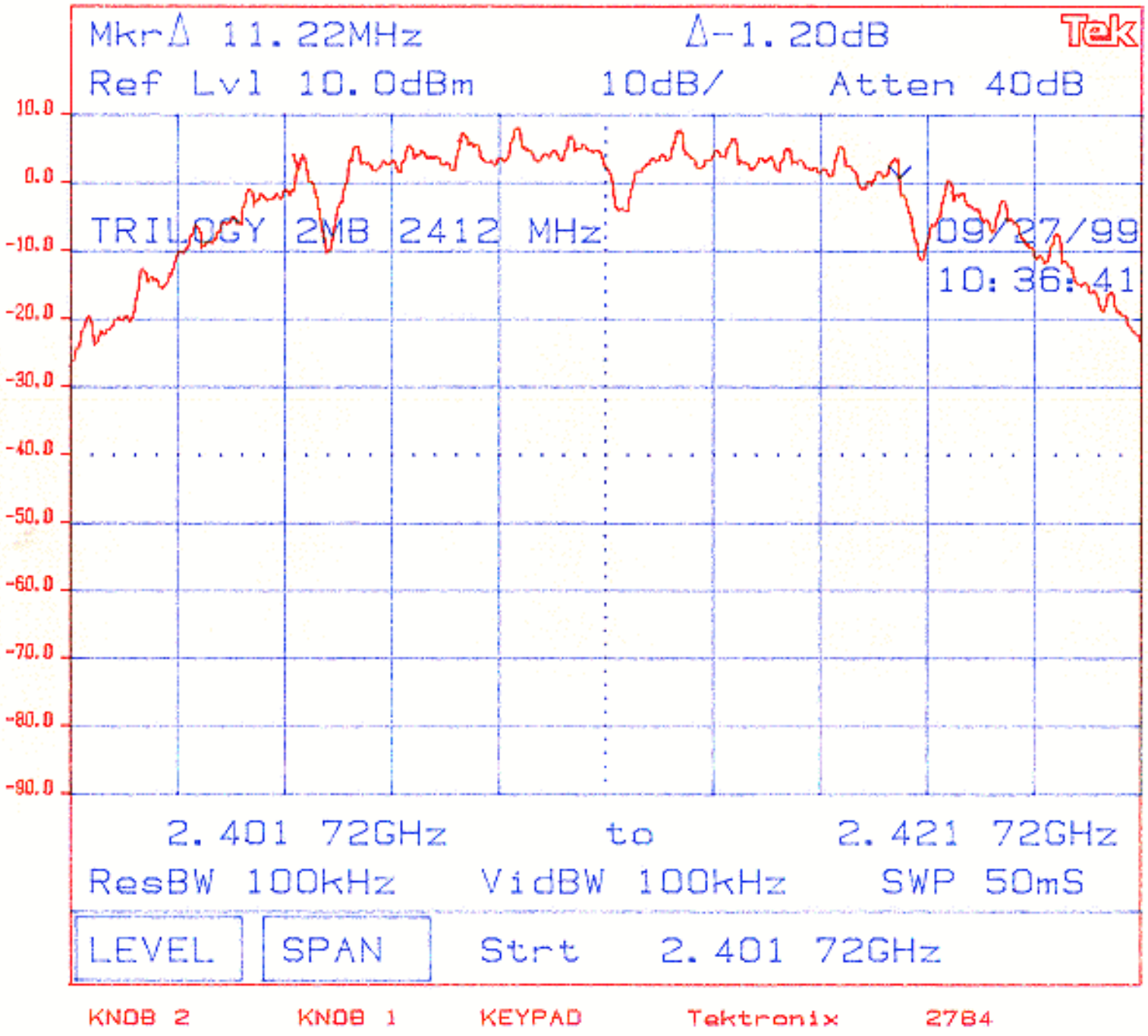
Refer to the following plots for 6 dB bandwidth sharp:

Plot 2a: Low Channel, 1 Mbps rate
Plot 2b: Low Channel, 2 Mbps rate
Plot 2c: Low Channel, 5.5 Mbps rate
Plot 2d: Low Channel, 11 Mbps rate
Plot 2e Middle Channel, 1 Mbps rate
Plot 2f Middle Channel, 2 Mbps rate
Plot 2g Middle Channel, 5.5 Mbps rate
Plot 2h Middle Channel, 11 Mbps rate
Plot 2i High Channel, 1 Mbps rate
Plot 2j High Channel, 2 Mbps rate
Plot 2k High Channel, 5.5 Mbps rate
Plot 2l High Channel, 11 Mbps rate

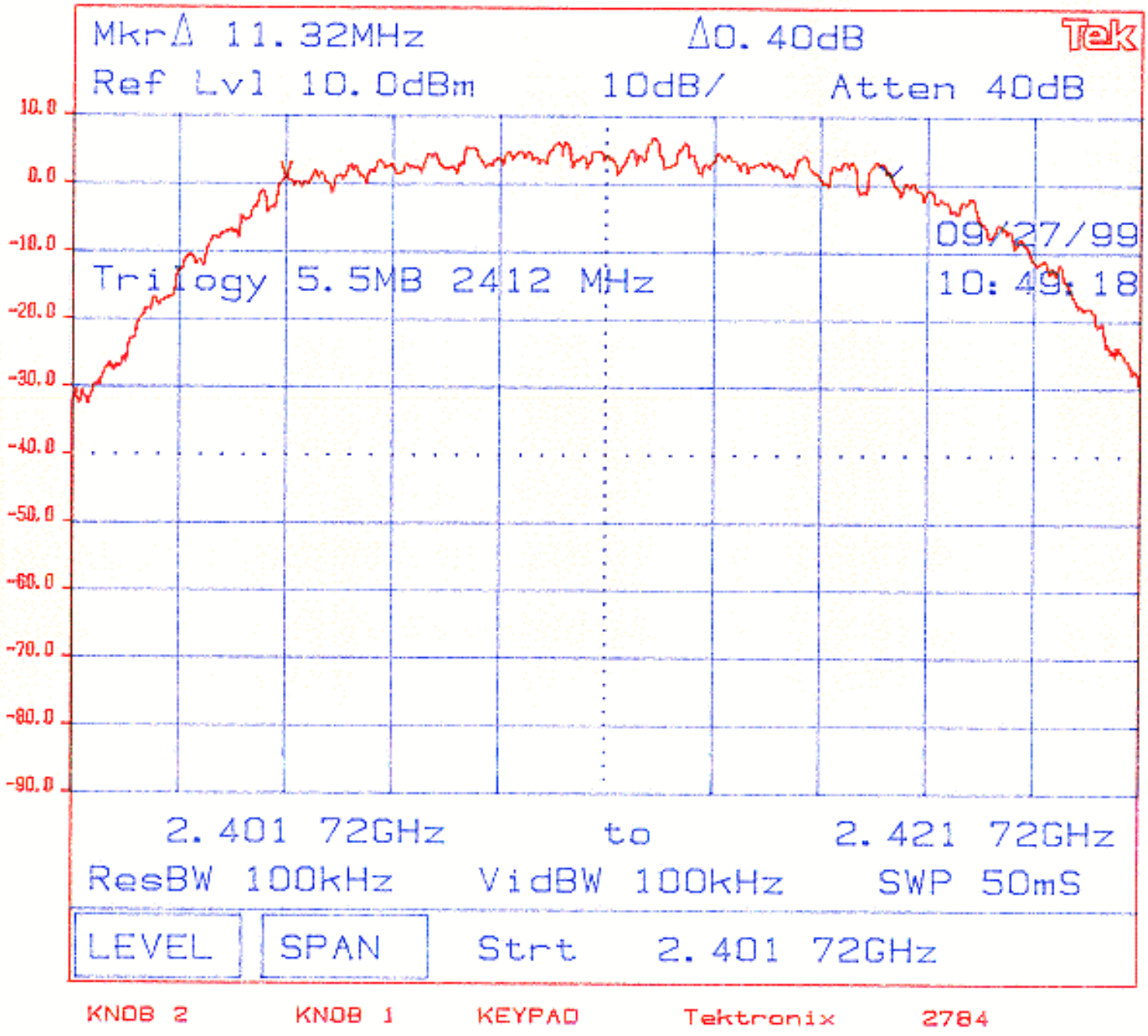
Plot 2a


MkrΔ 11.18MHz
Δ-1.20dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy
1MB 2412MHz
09/27/99
10:13:28
2.400 04GHz
to
2.420 04GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.400 04GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

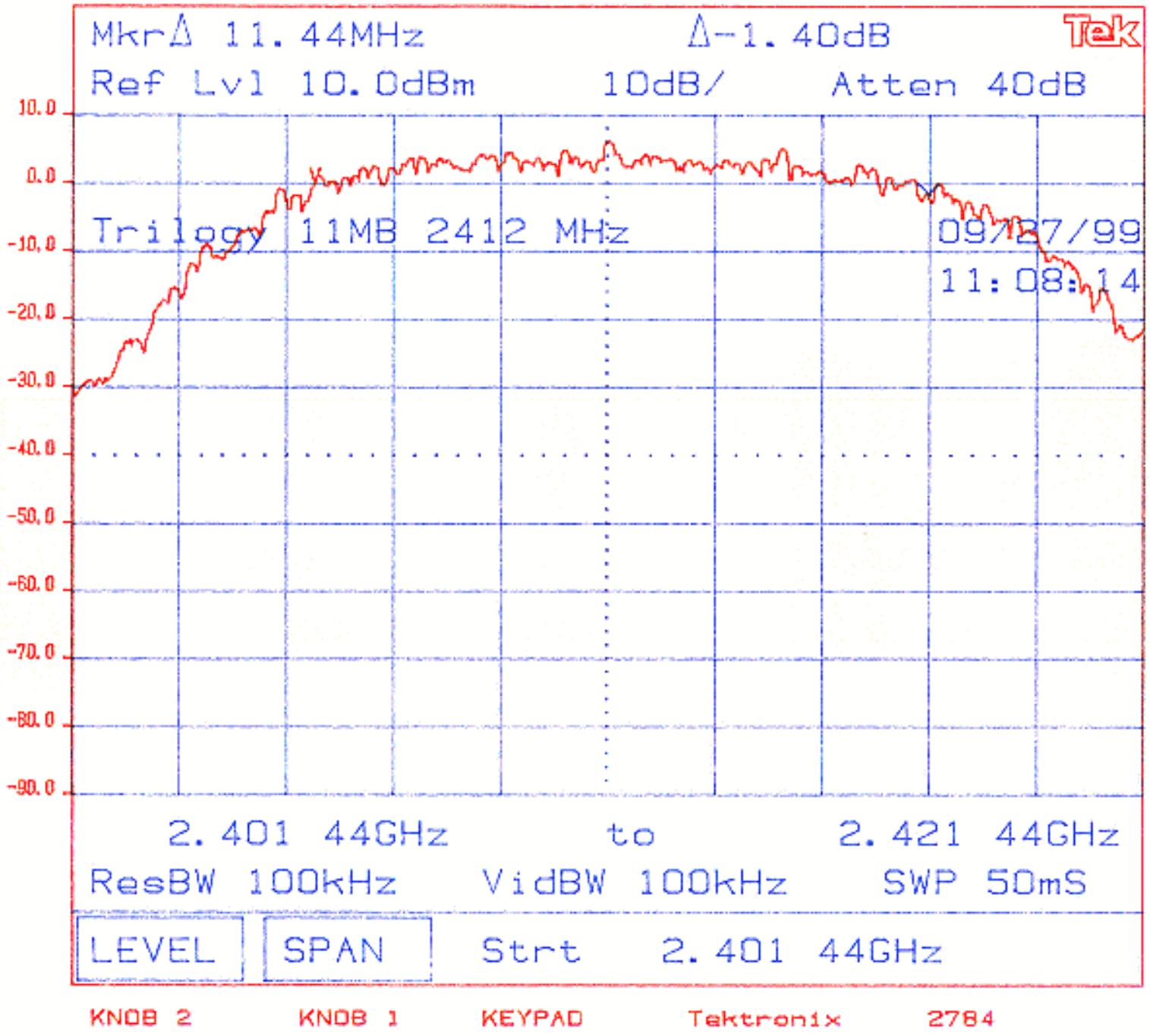
Plot 2b


MkrΔ 11.22MHz
Δ-1.20dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
TRILOGY 2MB 2412 MHz
09/27/99
10:36:41
2.401 72GHz
to
2.421 72GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.401 72GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

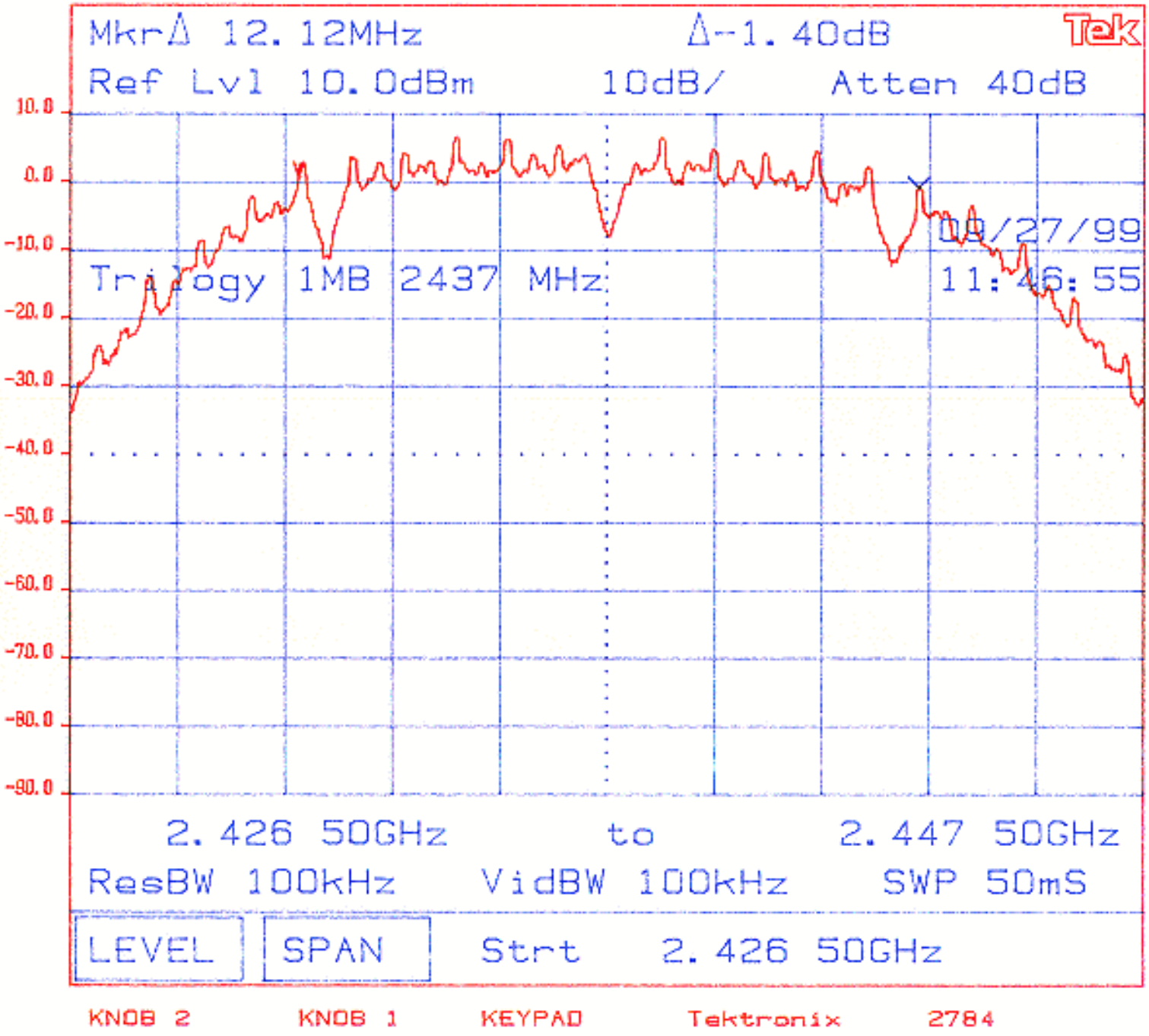
Plot 2c


MkrΔ 11.32MHz
Δ0.40dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
09/27/99
Trilogy 5.5MB 2412 MHz
10:49:18
2.401 72GHz
to
2.421 72GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.401 72GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

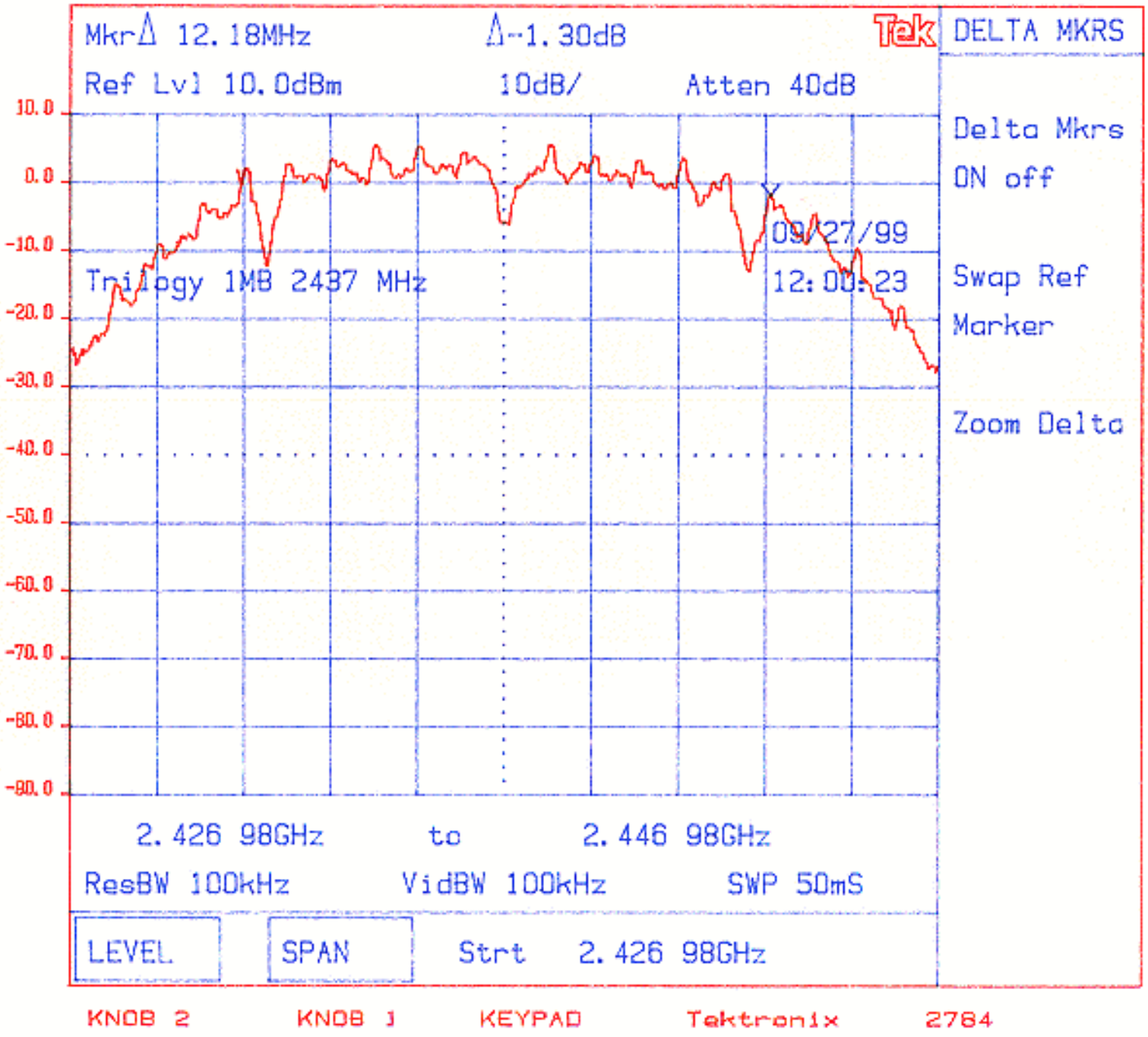
Plot 2d


MkrΔ 11.44MHz
Δ-1.40dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy 11MB 2412 MHz
09/27/99
11:08:14
2.401 44GHz
to
2.421 44GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.401 44GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

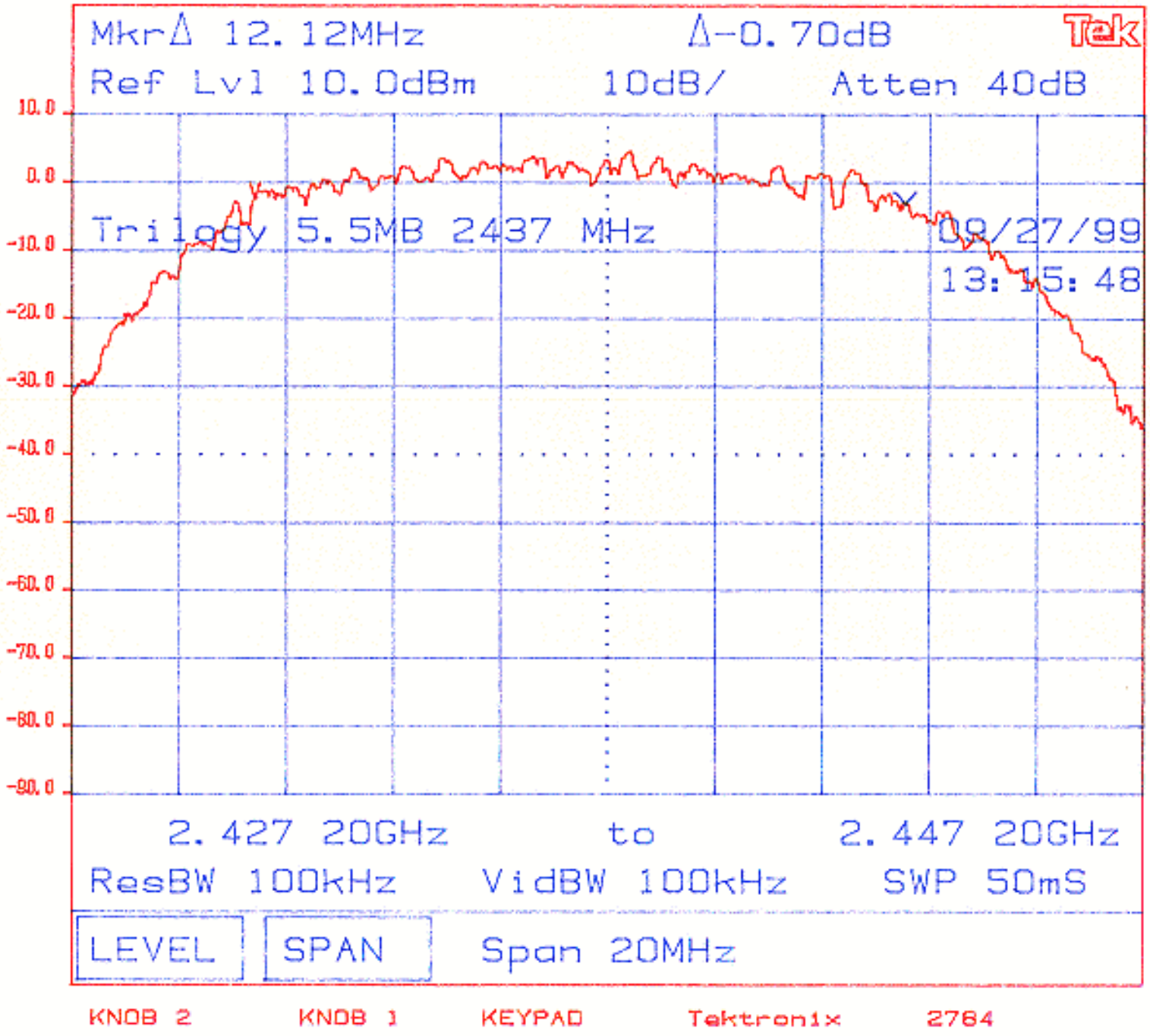
Plot 2e


MkrΔ 12.12MHz
Δ-1.40dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy 1MB 2437 MHz
08/27/99
11:46:55
2.426 50GHz
to
2.447 50GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.426 50GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

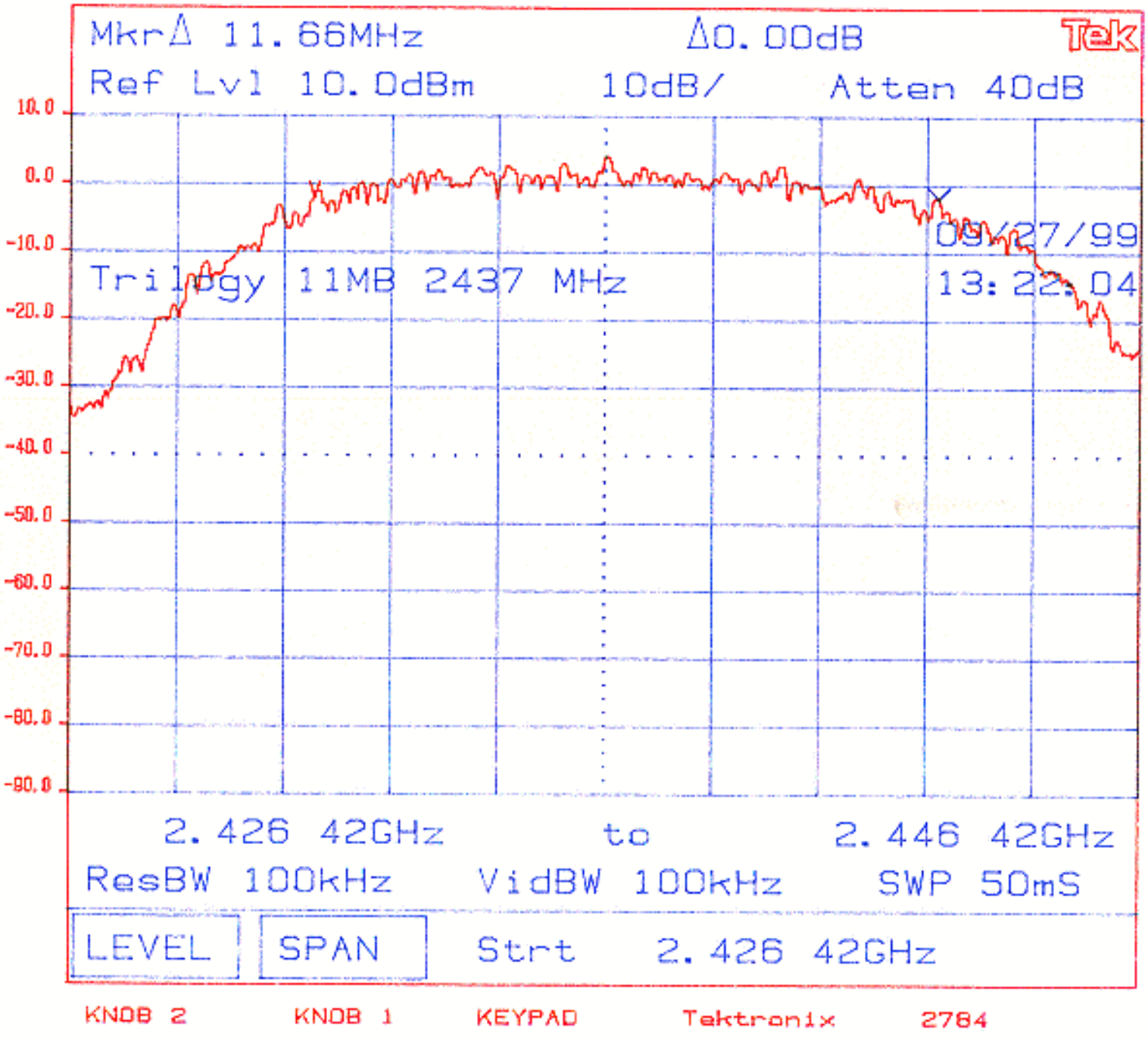
Plot 2f


MkrΔ 12.18MHz
Δ-1.30dB
Tek
DELTA MKRS
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Delta Mkrs
ON off
09/27/99
Trilogy 1MB 2437 MHz
12:00:23
Swap Ref
Marker
Zoom Delta
2.426 98GHz
to
2.446 98GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.426 98GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

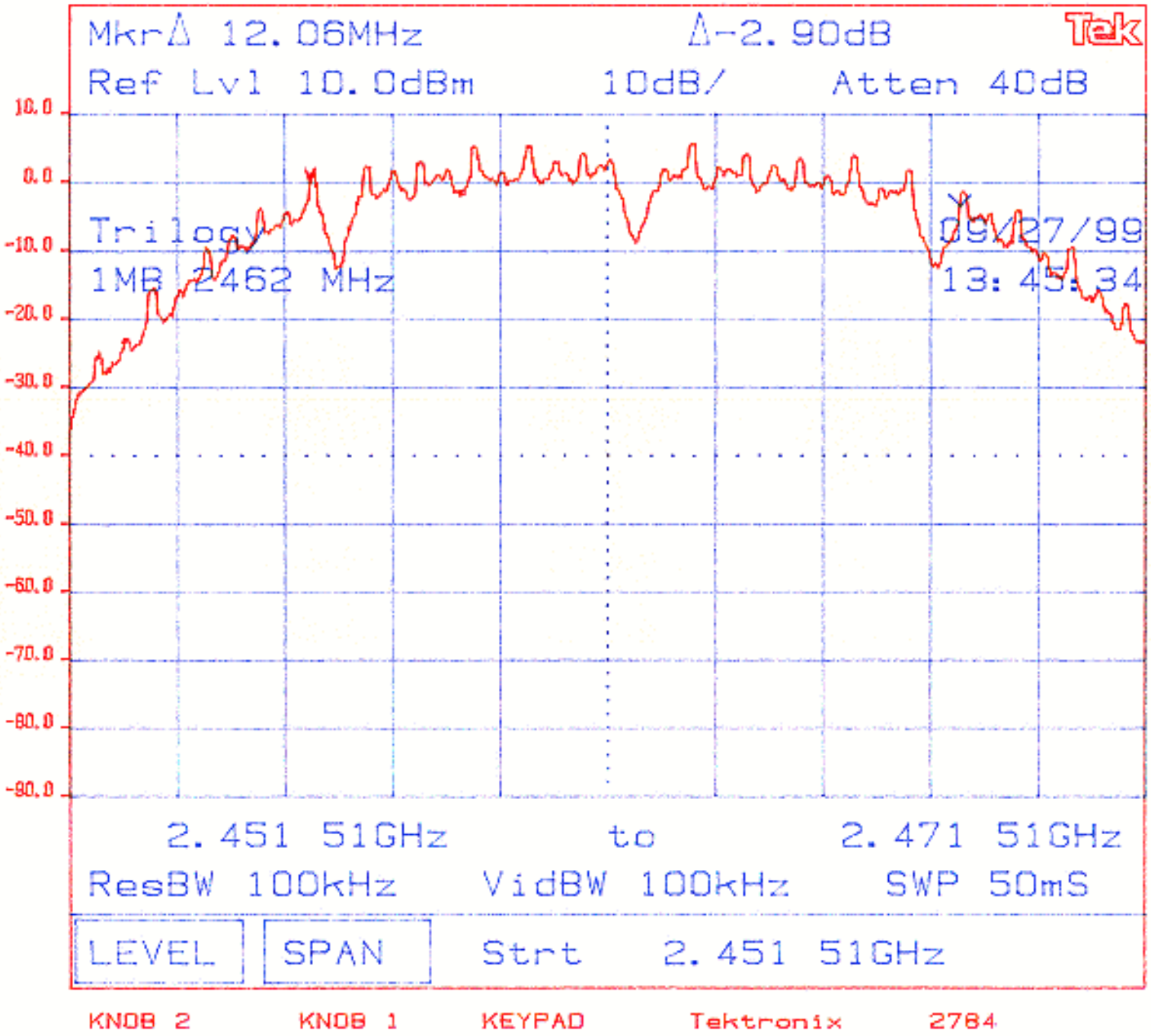
Plot 2g


MkrΔ 12.12MHz
Δ-0.70dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy 5.5MB 2437 MHz
08/27/99
13:15:48
2.427 20GHz
to
2.447 20GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Span 20MHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2764

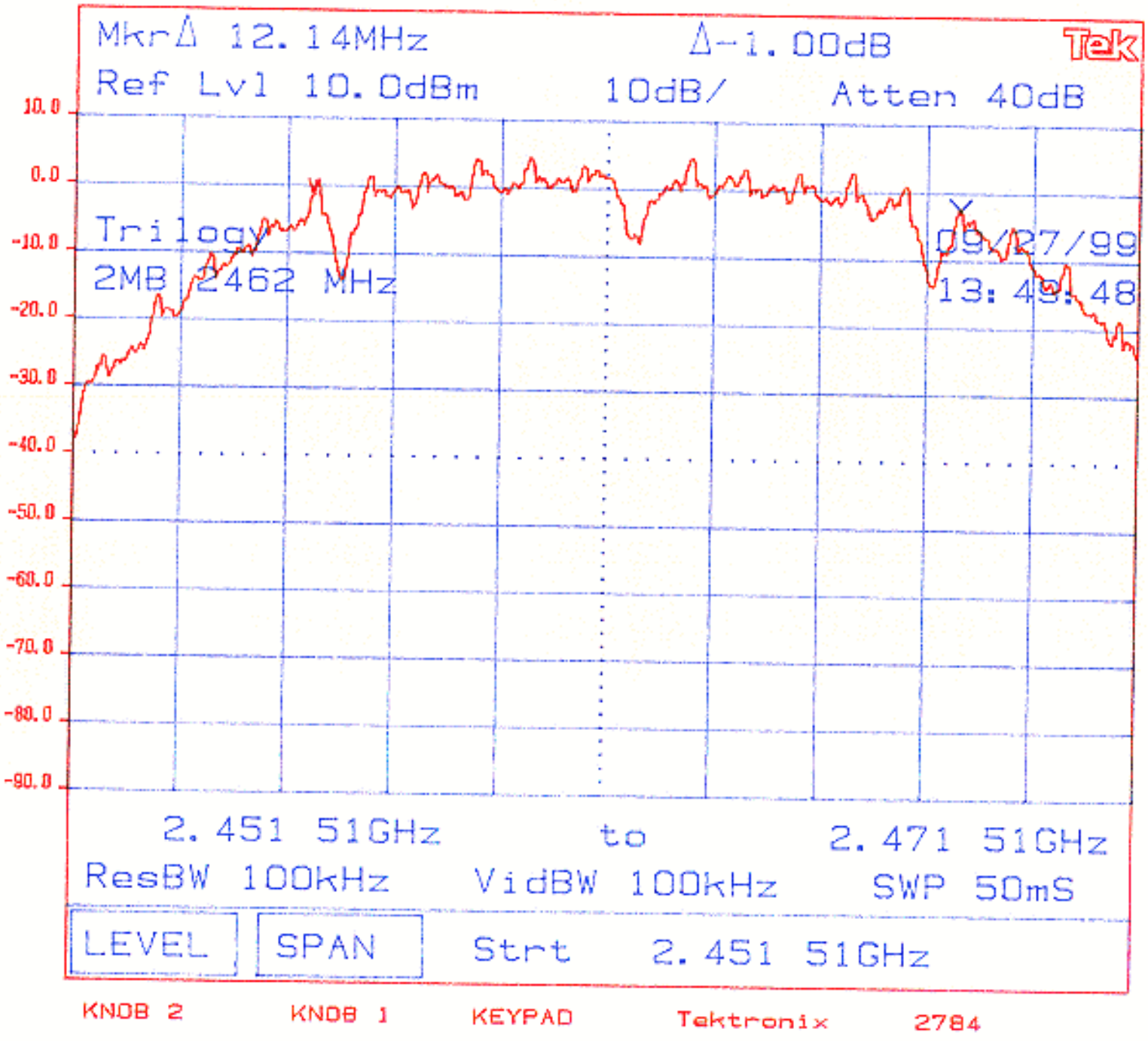
Plot 2h


MkrΔ 11.66MHz
Δ0.00dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy 11MB 2437 MHz
09/27/99
13:22:04
2.426 42GHz
to
2.446 42GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.426 42GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

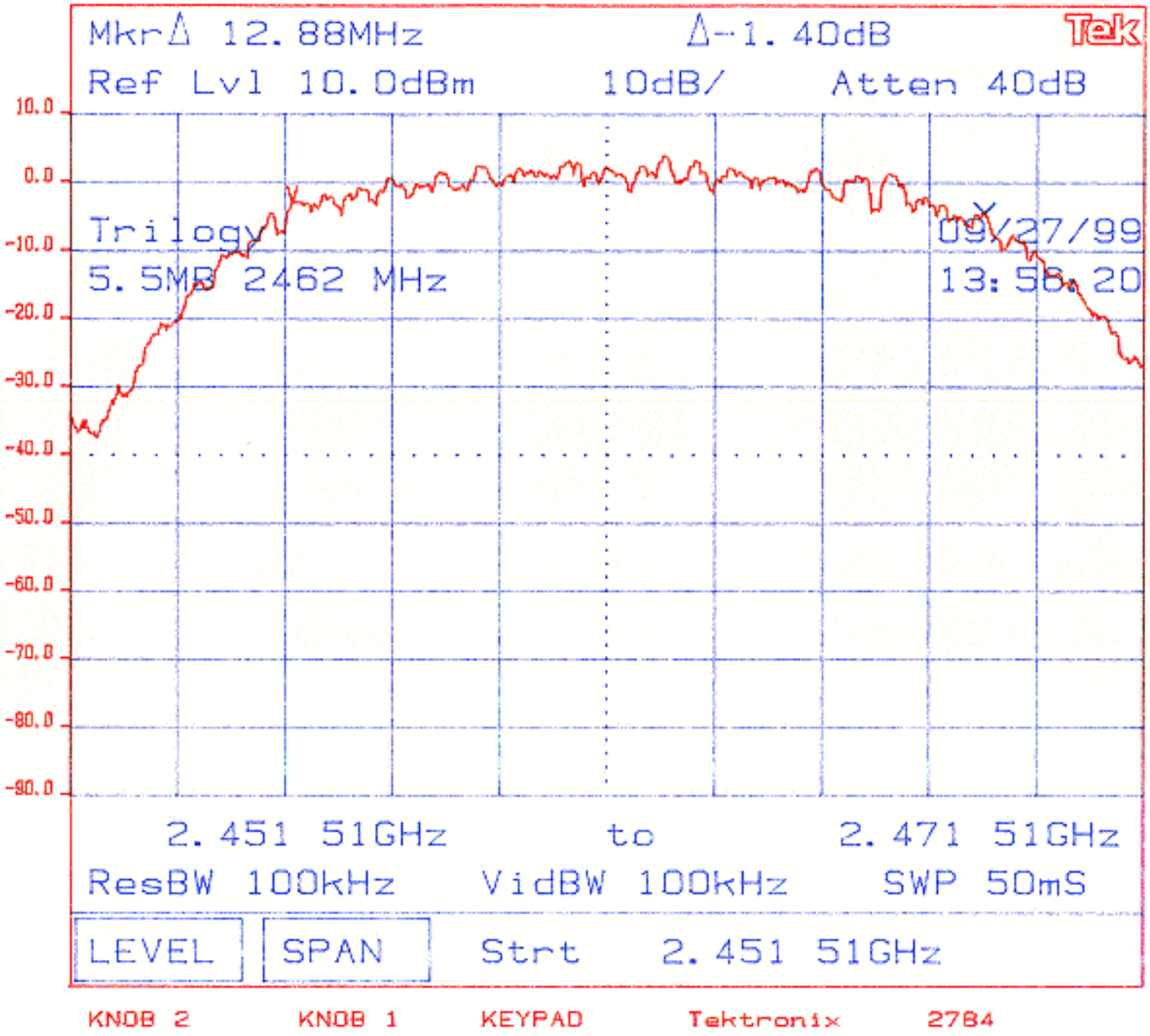
Plot 2i


MkrΔ 12.06MHz
Δ-2.90dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy
1MB 2462 MHz
09/27/99
13:45:34
2.451 51GHz
to
2.471 51GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.451 51GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 2j


MkrΔ 12.14MHz
Δ-1.00dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy
2MB 2462 MHz
09/27/99
13:49:48
2.451 51GHz
to
2.471 51GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.451 51GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 2k


MkrΔ 12.88MHz
Δ-1.40dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy
5.5MB 2462 MHz
09/27/99
13:58:20
2.451 51GHz
to
2.471 51GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.451 51GHz
KNOB 2
KNOB 1
KEYPAD
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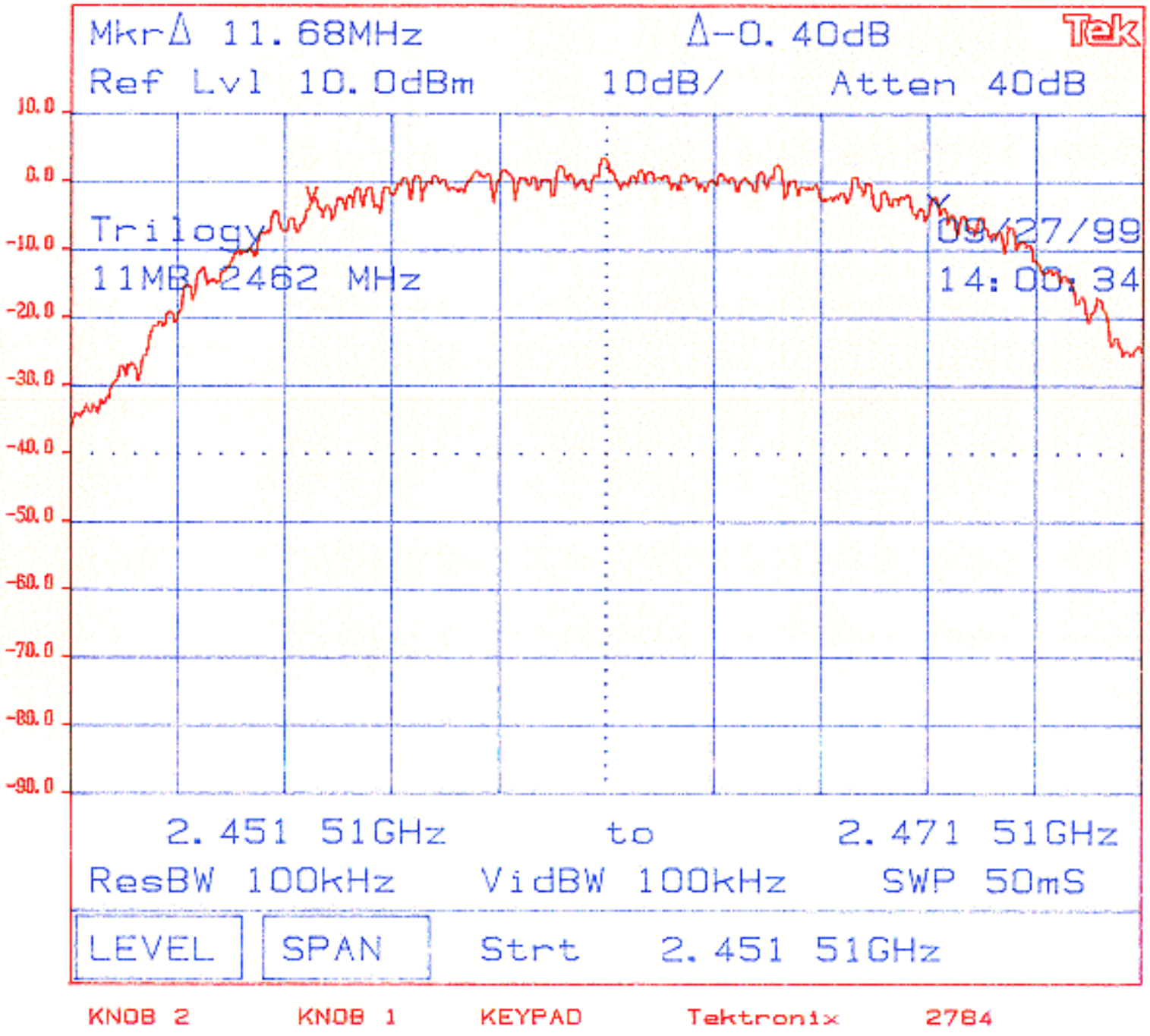
Plot 21


MkrΔ 11.68MHz
Δ-0.40dB
Tek
Ref Lvl 10.0dBm
10dB/
Atten 40dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
Trilogy
11MB 2462 MHz
09/27/99
14:00:34
2.451 51GHz
to
2.471 51GHz
ResBW 100kHz
VidBW 100kHz
SWP 50mS
LEVEL
SPAN
Strt 2.451 51GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

4.3 Maximum Power Density Reading, FCC Rule 15.247(d):

The spectrum analyzer RES BW was set to 3 kHz. The START and STOP frequencies were set to the band edges of the maximum output passband. If there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs. The specification calls for a 1 second interval at each 3 kHz bandwidth; total SWEEP TIME is calculated as follows:

SWEEP TIME (SEC) = (Fstop, kHz - Fstart, kHz)/3 kHz

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.

Frequency (MHz)	Power Density (dBm)
2462	-13.1

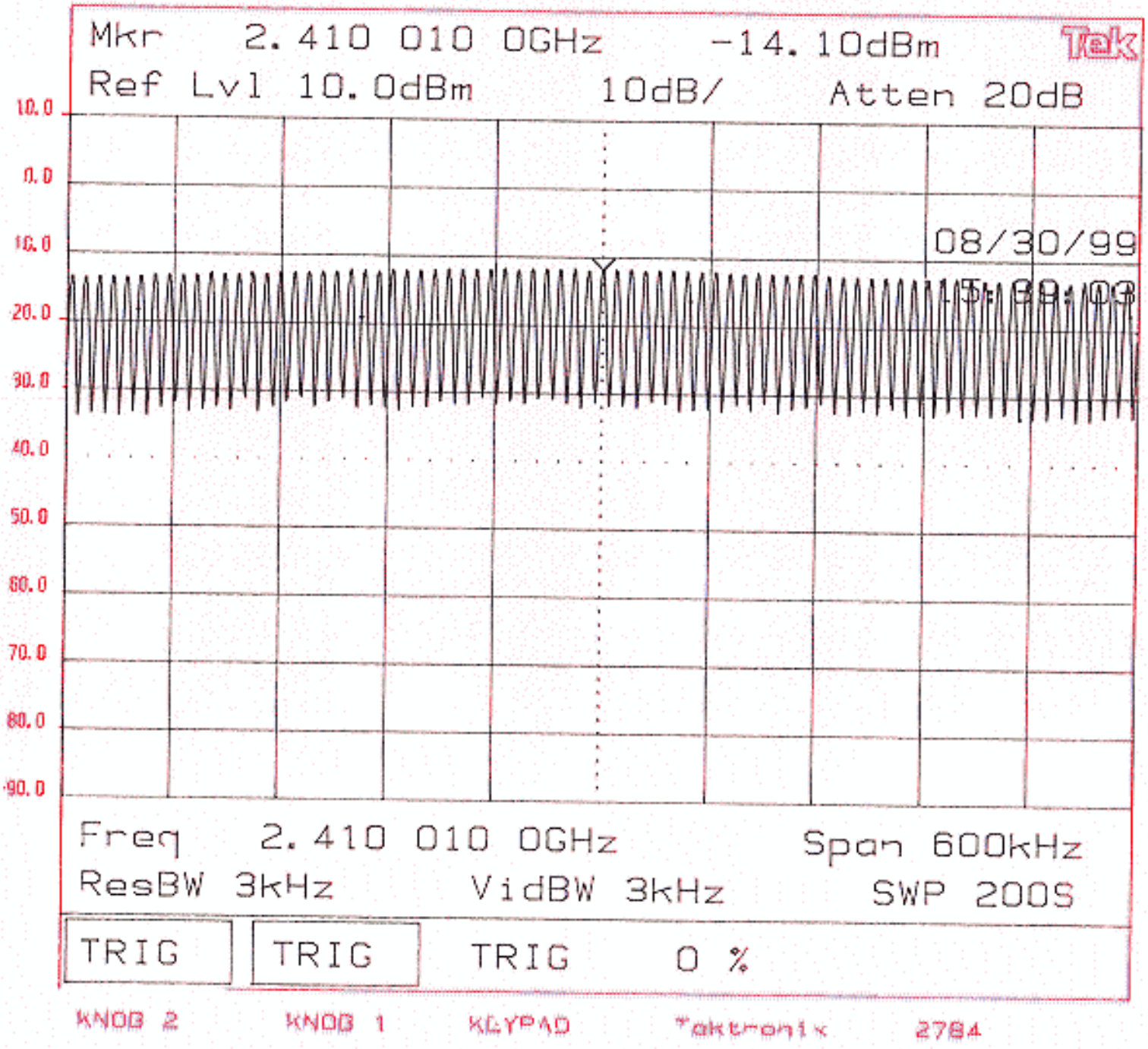
Frequency Span = 600 kHz

Sweep Time = Frequency Span/3 kHz
= 200 seconds

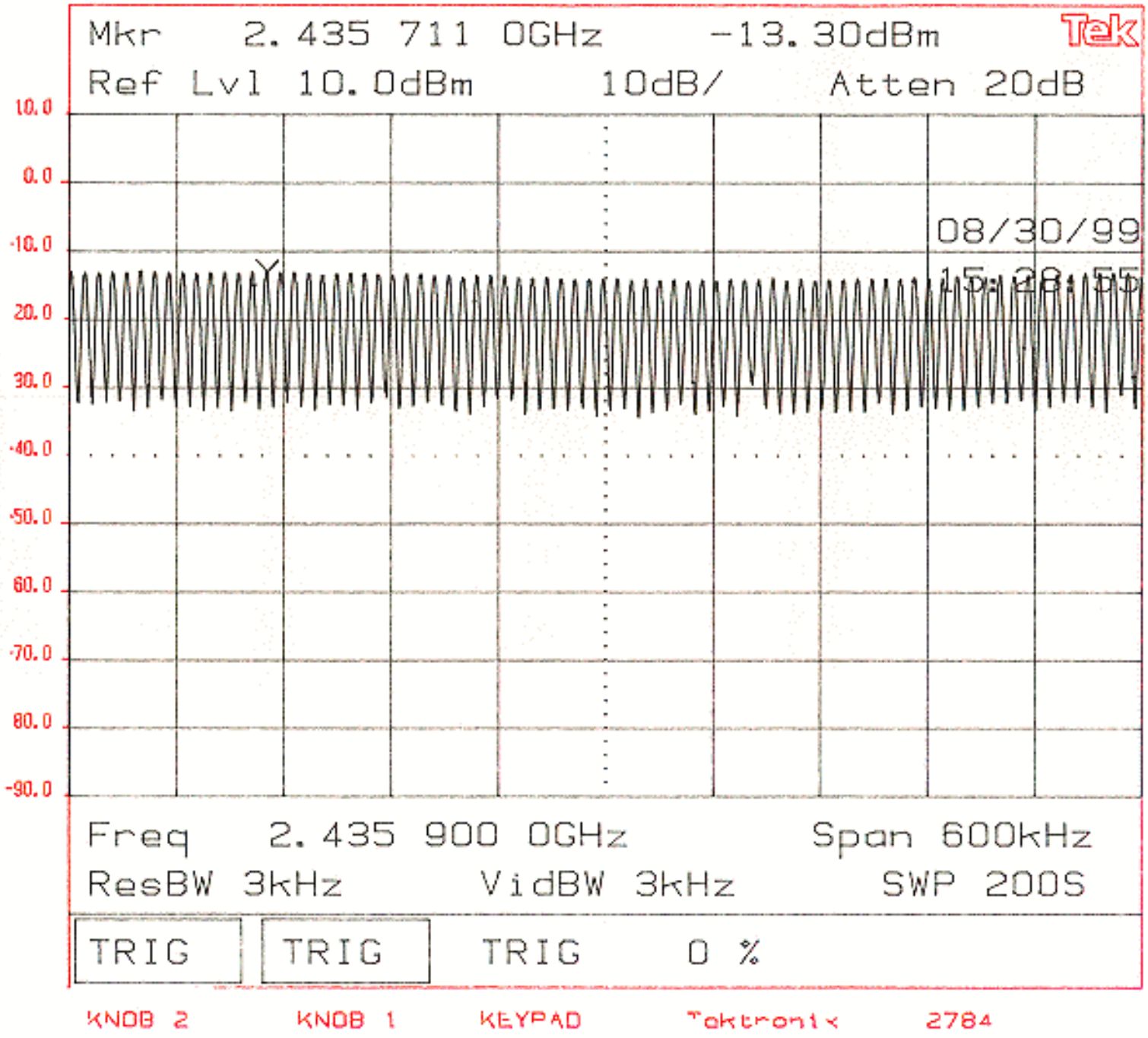
Refer to the following plots for power density data:

Plot 3a: Low Channel Power Density
Plot 3b: Middle Channel Power Density
Plot 3c: High Channel Power Density

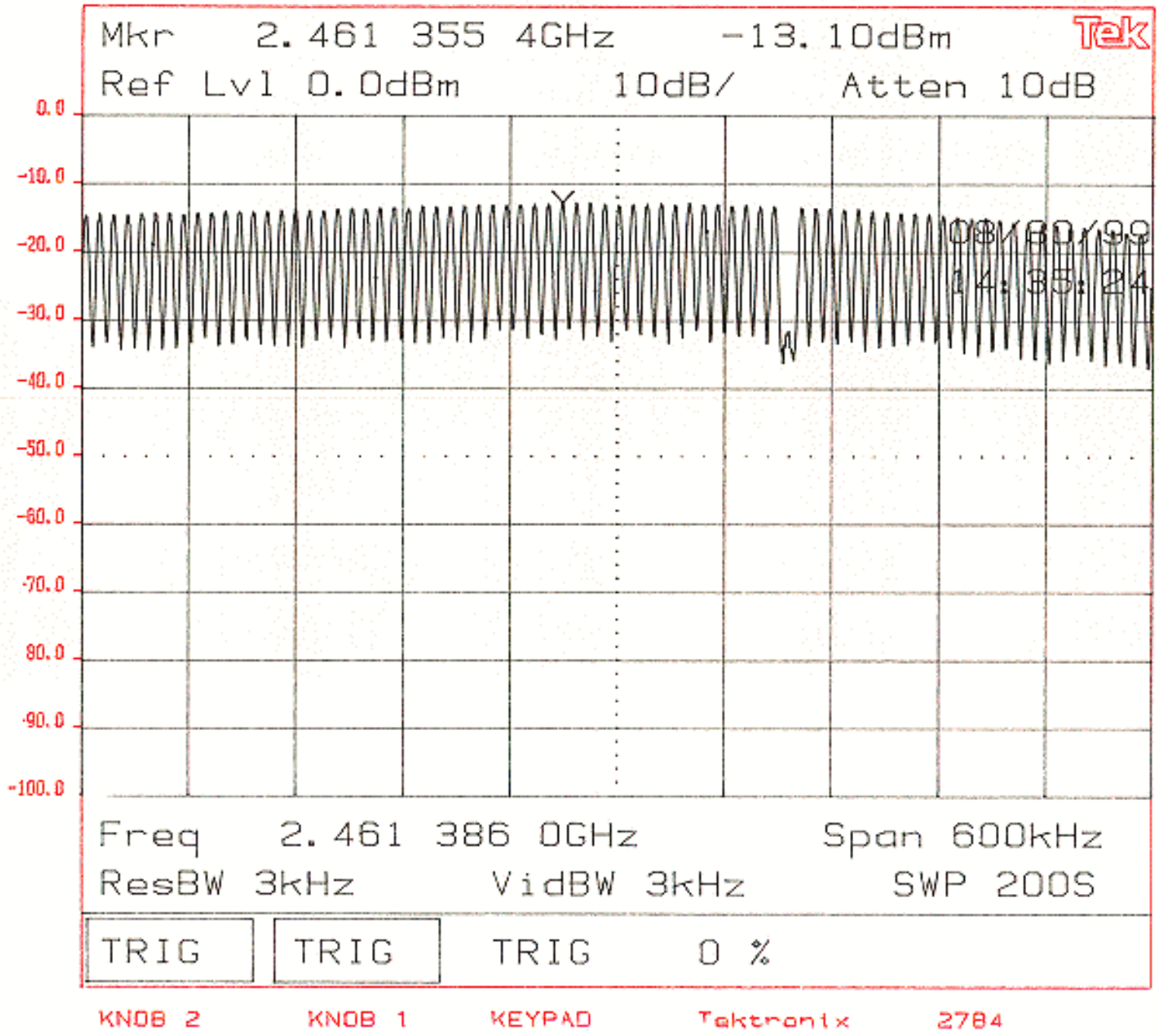
Plot 3a


Mkr 2.410 010 0GHz -14.10dBm
Tek
Ref Lvl 10.0dBm 10dB/ Atten 20dB
10.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
08/30/99
Freq 2.410 010 0GHz Span 600kHz
ResBW 3kHz VidBW 3kHz SWP 200S
TRIG
TRIG
TRIG 0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 3b


Mkr 2.435 711 0GHz -13.30dBm
Tek
Ref Lvl 10.0dBm 10dB/ Atten 20dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
15:28:55
Freq 2.435 900 0GHz Span 600kHz
ResBW 3kHz VidBW 3kHz SWP 200S
TRIG
TRIG
TRIG 0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 3c


Mkr 2.461 355 4GHz -13.10dBm
Tek
Ref Lvl 0.0dBm 10dB/ Atten 10dB
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
Freq 2.461 386 0GHz Span 600kHz
ResBW 3kHz VidBW 3kHz SWP 200S
TRIG
TRIG
TRIG 0 %
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(c):

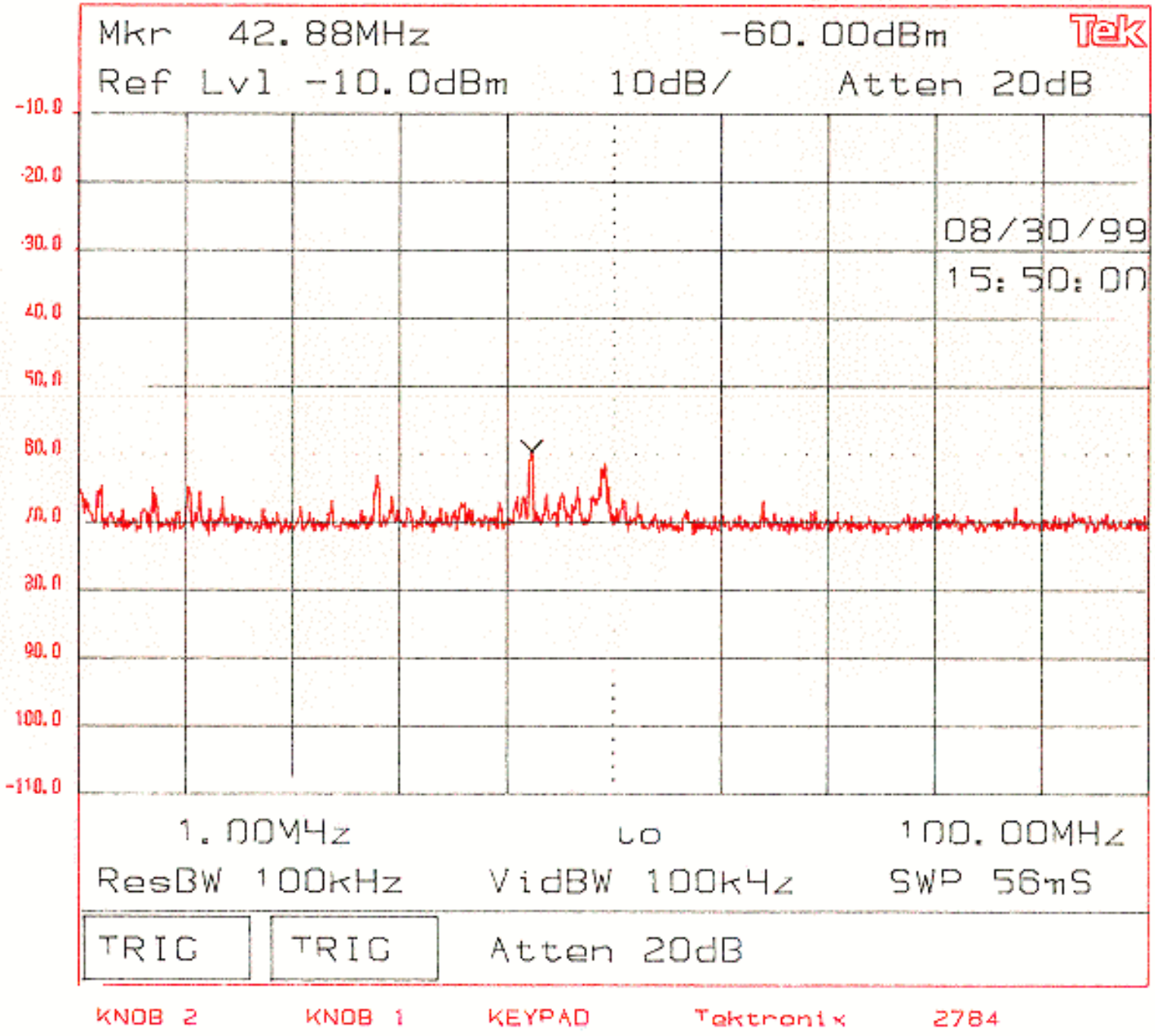
In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

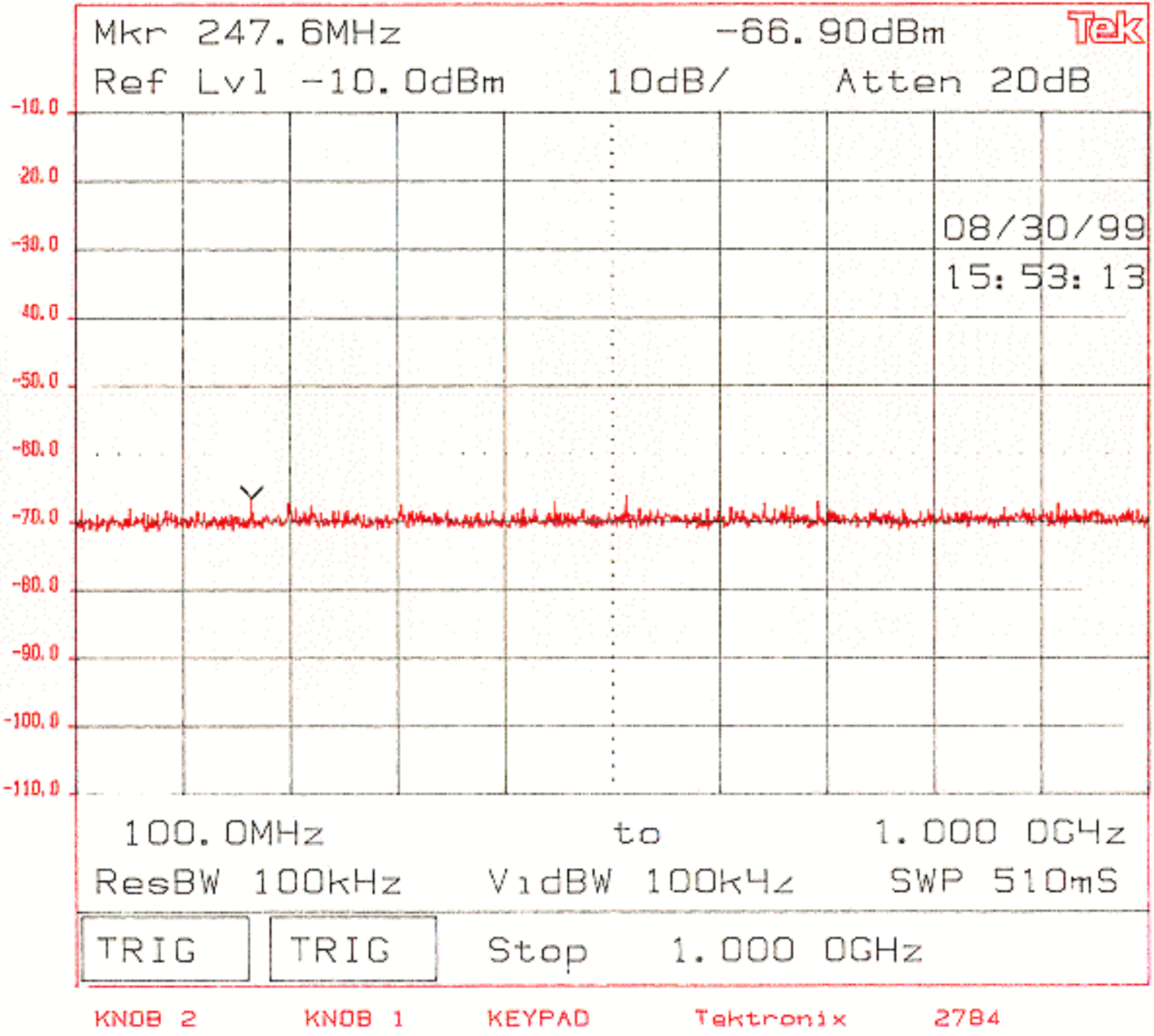
Refer to the following plots for out of band conducted emissions data:

Plot 4a.1 - 4a.6: Low Channel Emissions
Plot 4b.1 - 4b.4: Middle Channel Emissions
Plot 4c.1 - 4c.6: High Channel Emissions

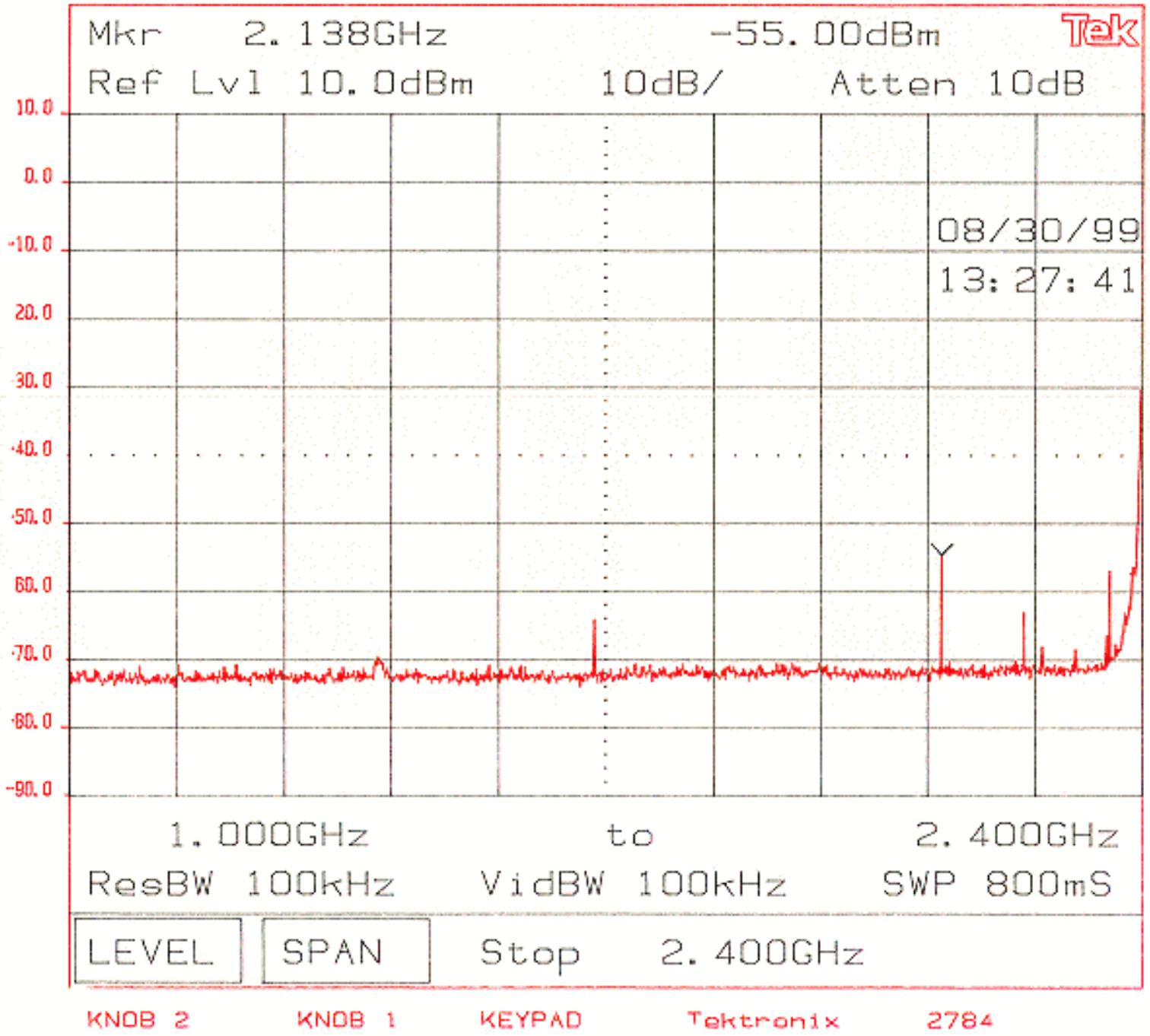
Plot 4.a.1


Mkr 42.88MHz
-60.00dBm
Tek
Ref Lvl -10.0dBm
10dB/
Atten 20dB
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
08/30/99
15:50:00
1.00MHz
Lo
100.00MHz
ResBW 100kHz
VidBW 100kHz
SWP 56mS
TRIG
TRIG
Atten 20dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

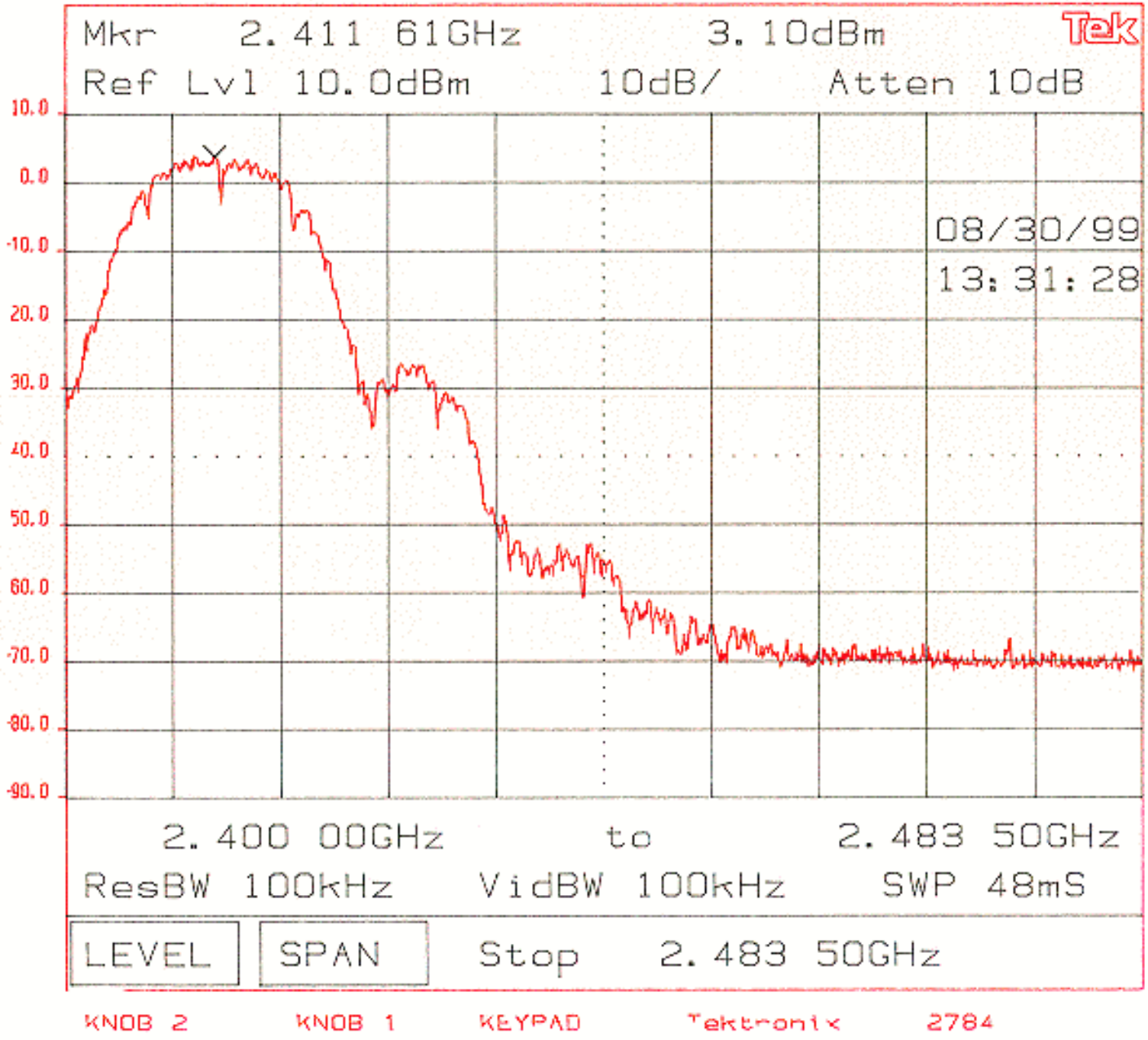
Plot 4.a.2


Mkr 247.6MHz
-66.90dBm
Tek
Ref Lvl -10.0dBm
10dB/
Atten 20dB
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
08/30/99
15:53:13
100.0MHz
to
1.000 0GHz
ResBW 100kHz
VidBW 100kHz
SWP 510mS
TRIG
TRIG
Stop 1.000 0GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

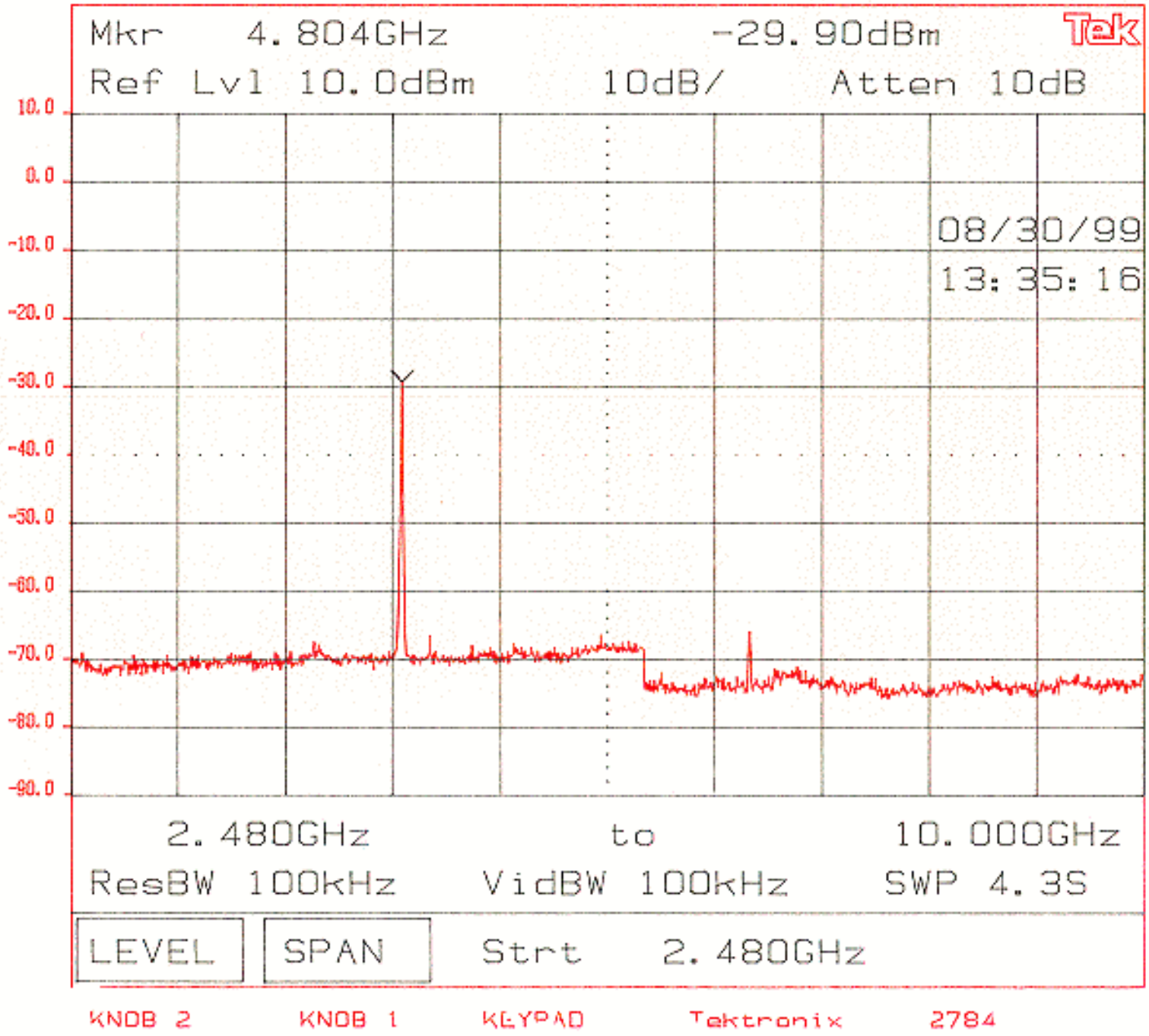
Plot 4.a.3


Mkr 2.138GHz
-55.00dBm
Tek
Ref Lvl 10.0dBm
10dB/
Atten 10dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
13:27:41
1.000GHz
to
2.400GHz
ResBW 100kHz
VidBW 100kHz
SWP 800mS
LEVEL
SPAN
Stop 2.400GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

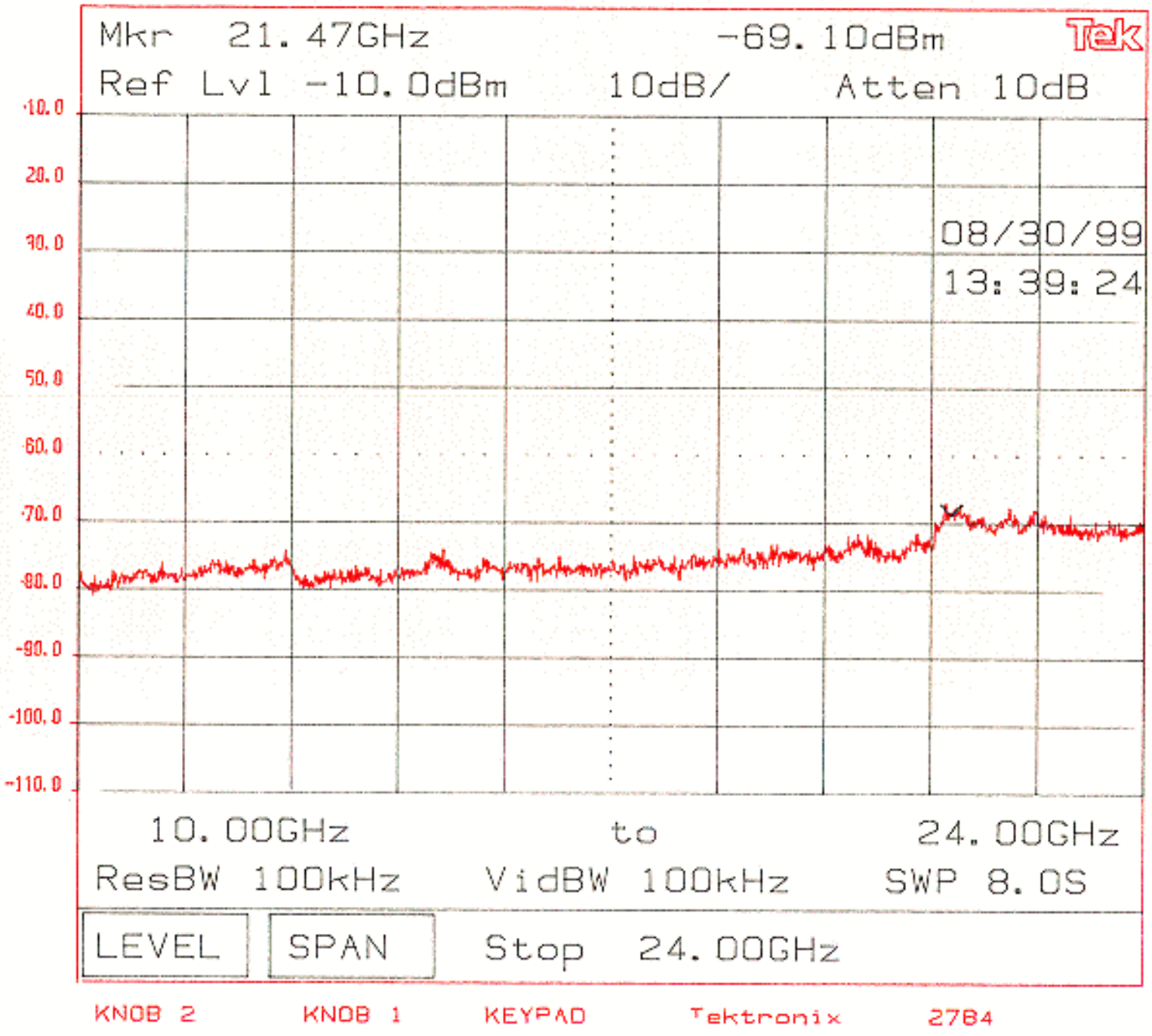
Plot 4.a.4


Mkr 2.411 61GHz
3.10dBm
Tek
Ref Lvl 10.0dBm
10dB/
Atten 10dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
13:31:28
2.400 00GHz
to
2.483 50GHz
ResBW 100kHz
VidBW 100kHz
SWP 48mS
LEVEL
SPAN
Stop 2.483 50GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

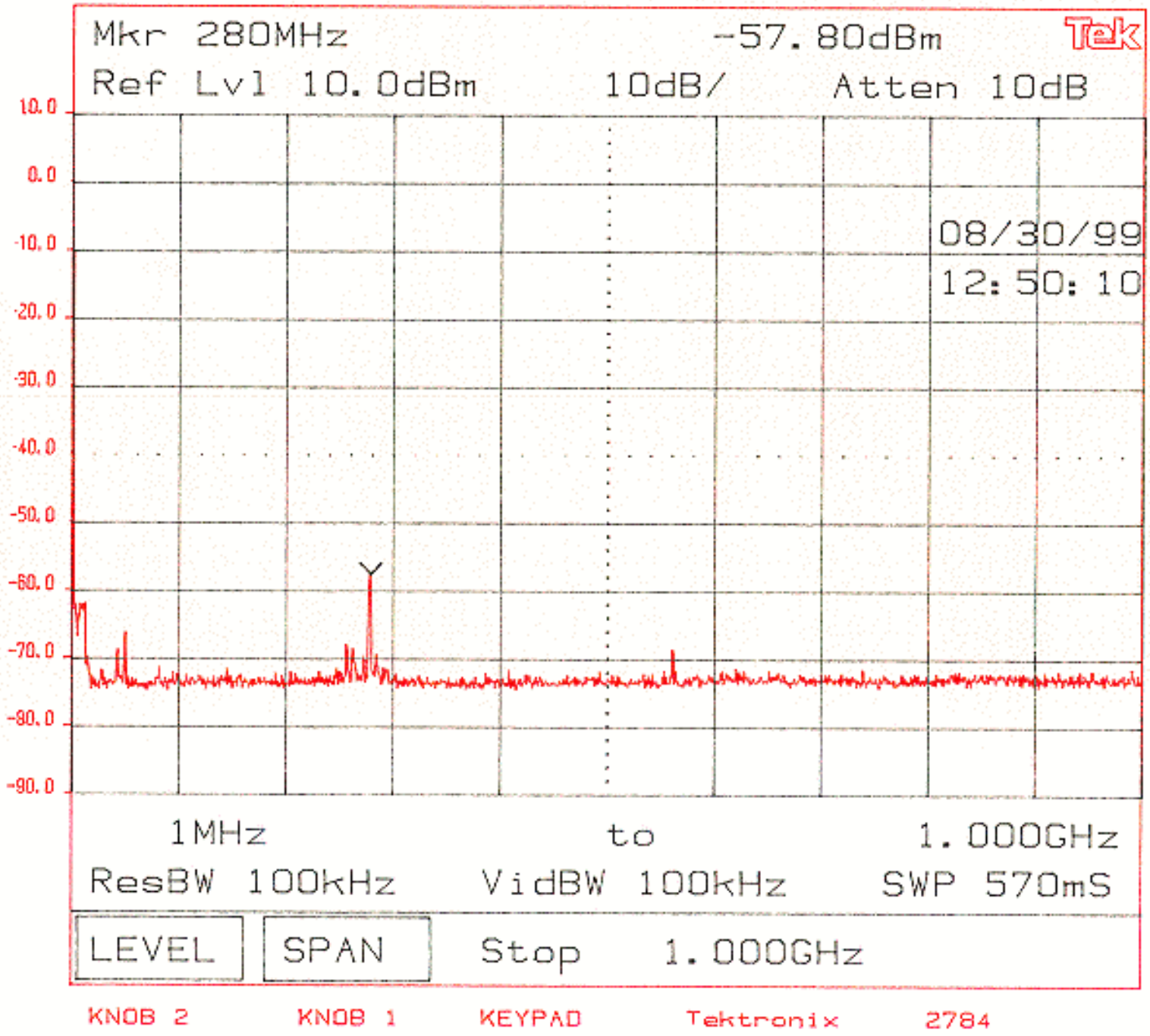
Plot 4.a.5


Mkr 4.804GHz
-29.90dBm
Tek
Ref Lvl 10.0dBm
10dB/
Atten 10dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
13:35:16
2.480GHz
to
10.000GHz
ResBW 100kHz
VidBW 100kHz
SWP 4.3S
LEVEL
SPAN
Strt 2.480GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

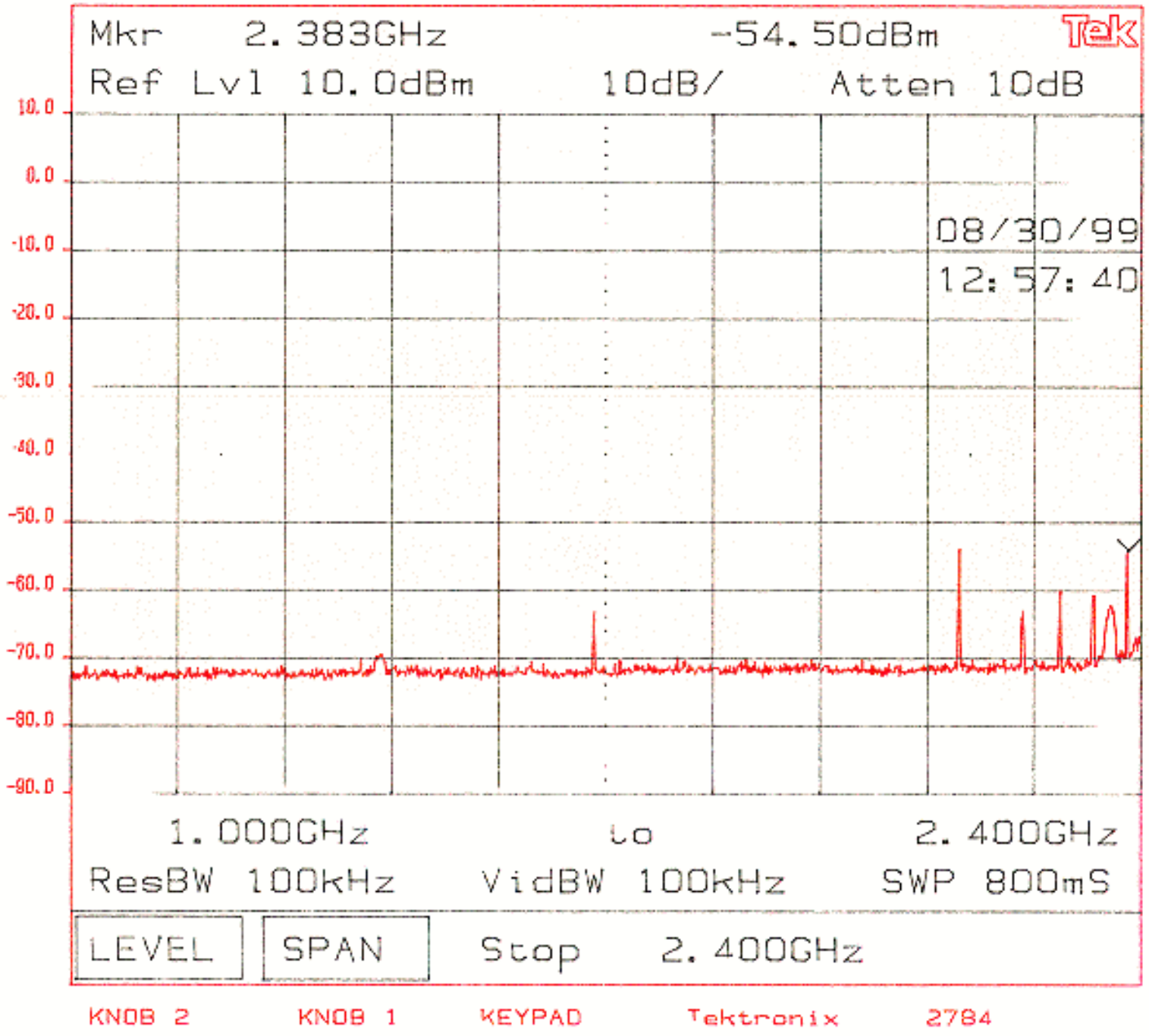
Plot 4.a.6


Mkr 21.47GHz
-69.10dBm
Tek
Ref Lvl -10.0dBm
10dB/
Atten 10dB
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
-110.0
08/30/99
13:39:24
10.00GHz
to
24.00GHz
ResBW 100kHz
VidBW 100kHz
SWP 8.0S
LEVEL
SPAN
Stop 24.00GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

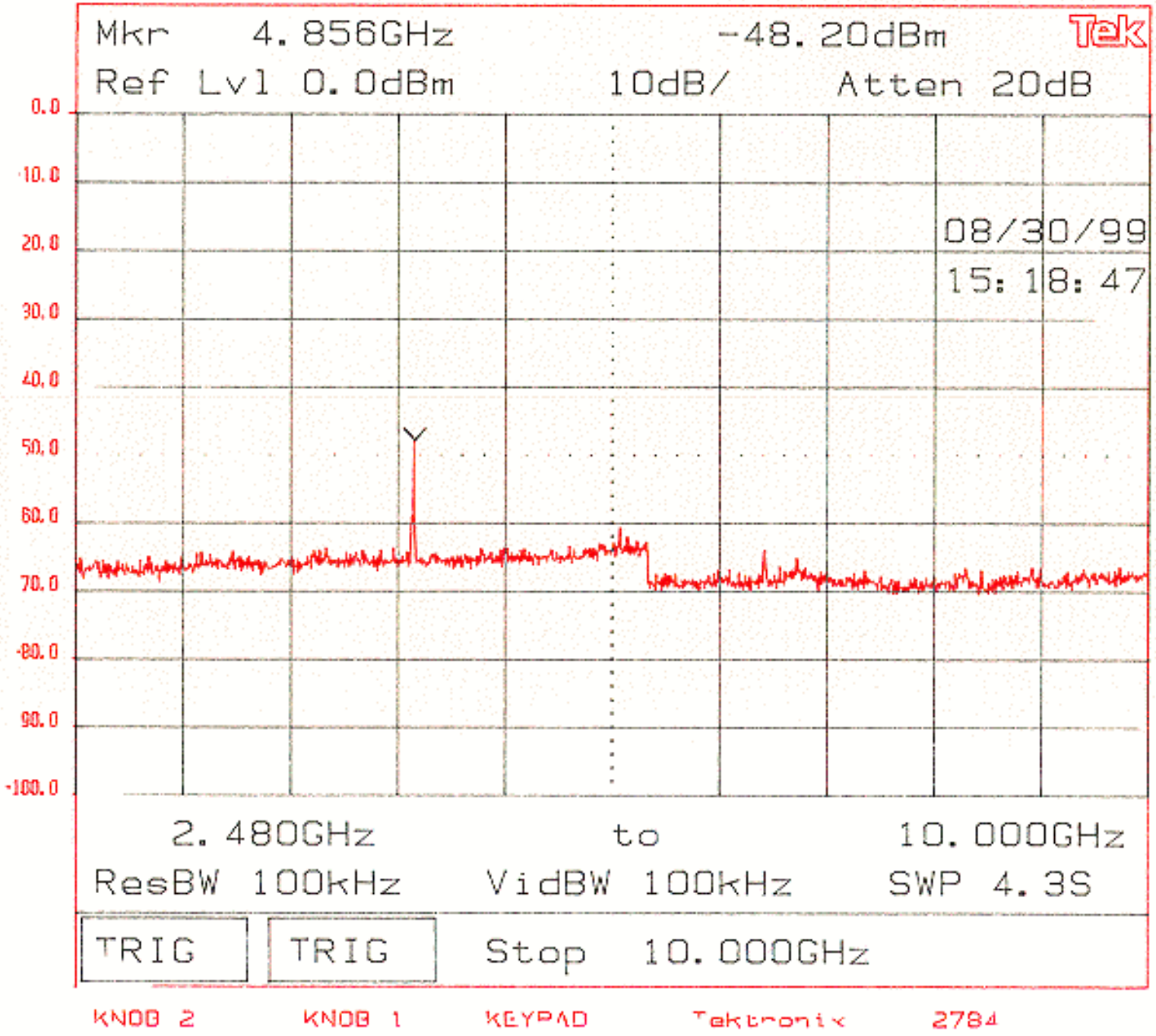
Plot 4.b.1


Mkr 280MHz
-57.80dBm
Tek
Ref Lvl 10.0dBm
10dB/
Atten 10dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
12:50:10
1MHz
to
1.000GHz
ResBW 100kHz
VidBW 100kHz
SWP 570mS
LEVEL
SPAN
Stop 1.000GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

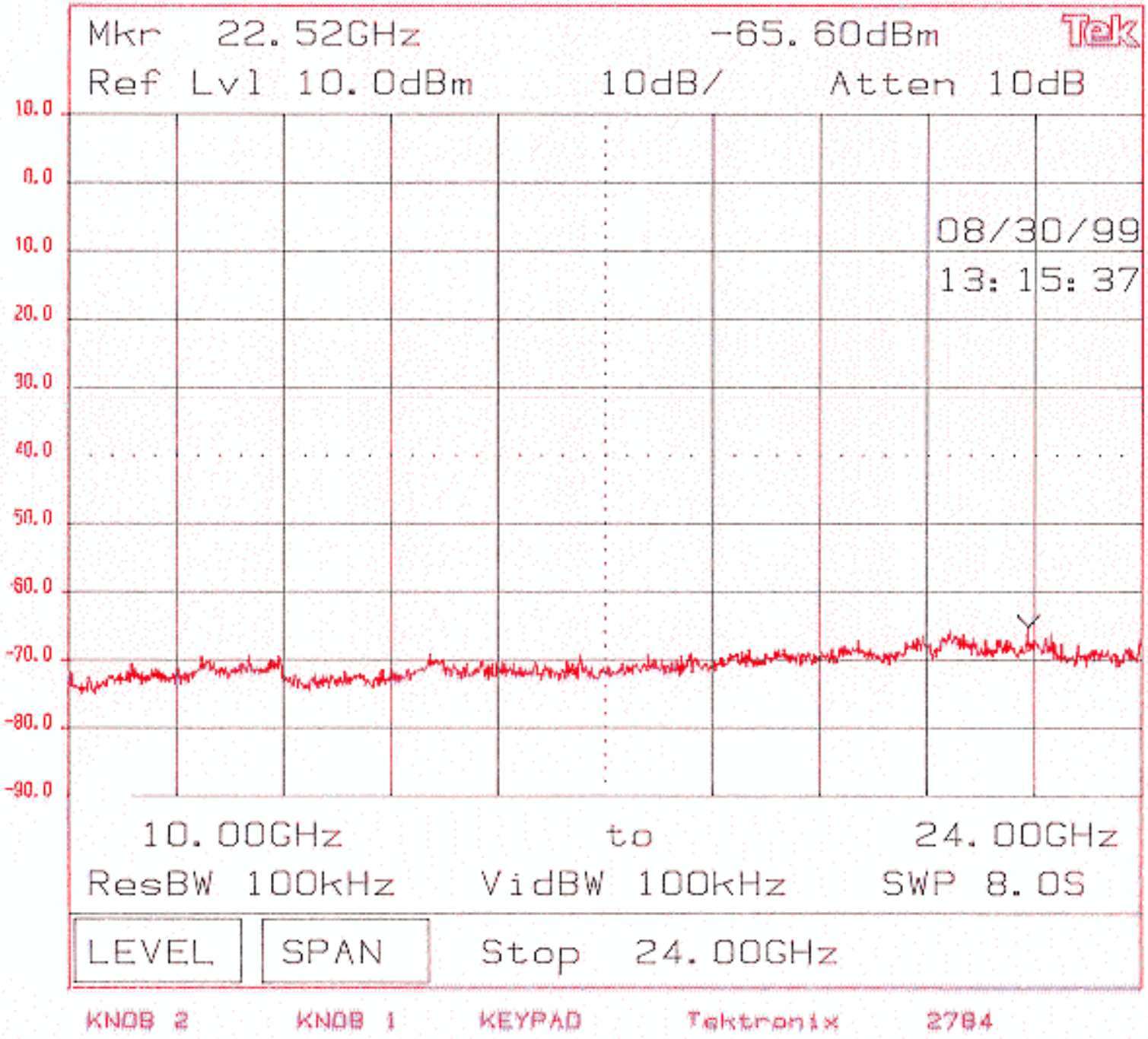
Plot 4.b.2


Mkr 2.383GHz
-54.50dBm
Tek
Ref Lvl 10.0dBm
10dB/
Atten 10dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
12:57:40
1.000GHz
Lo
2.400GHz
ResBW 100kHz
VidBW 100kHz
SWP 800mS
LEVEL
SPAN
Stop 2.400GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

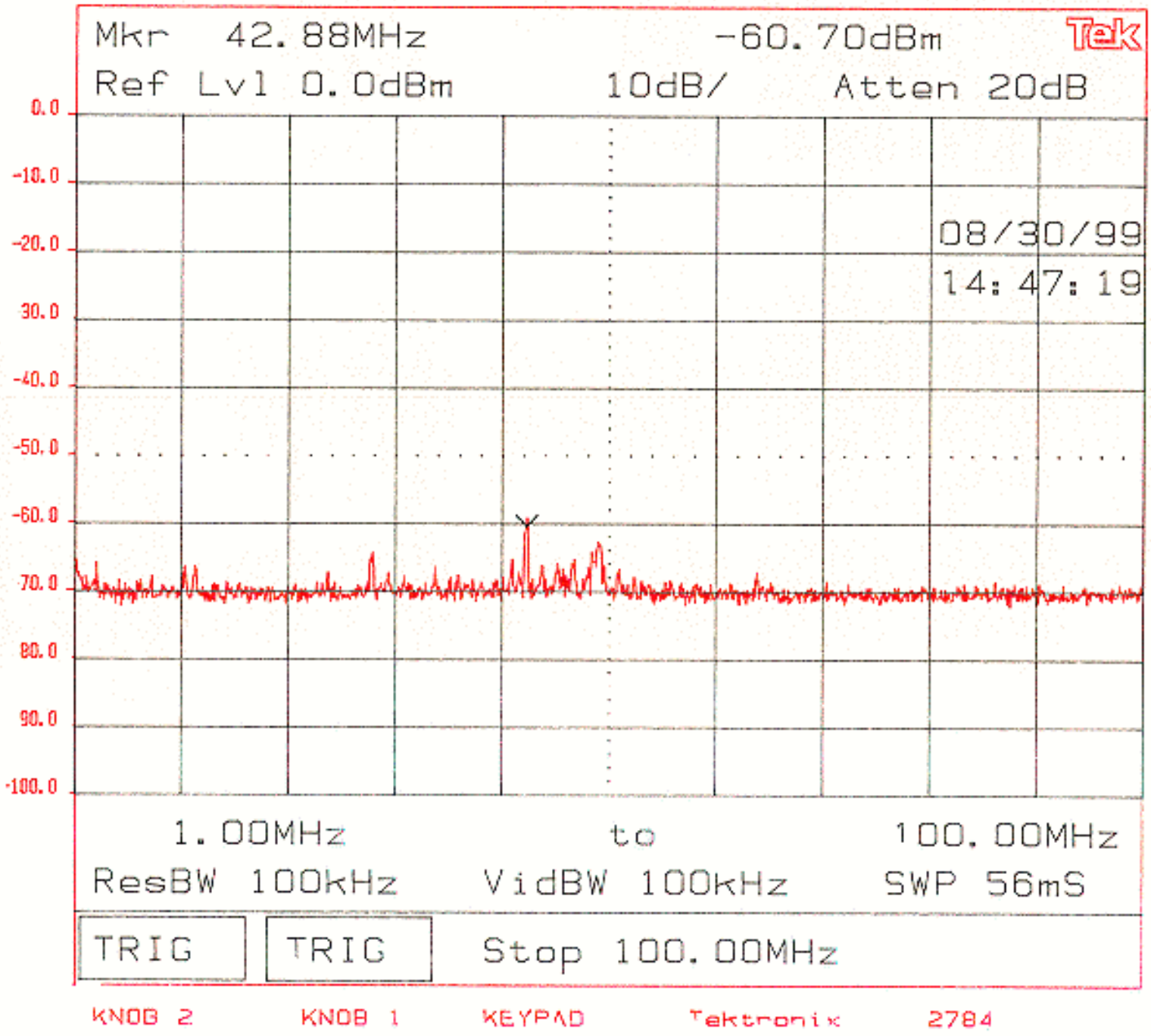
Plot 4.b.3


Mkr 4.856GHz
-48.20dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
-80.0
90.0
-100.0
08/30/99
15:18:47
2.480GHz
to
10.000GHz
ResBW 100kHz
VidBW 100kHz
SWP 4.3S
TRIG
TRIG
Stop 10.000GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

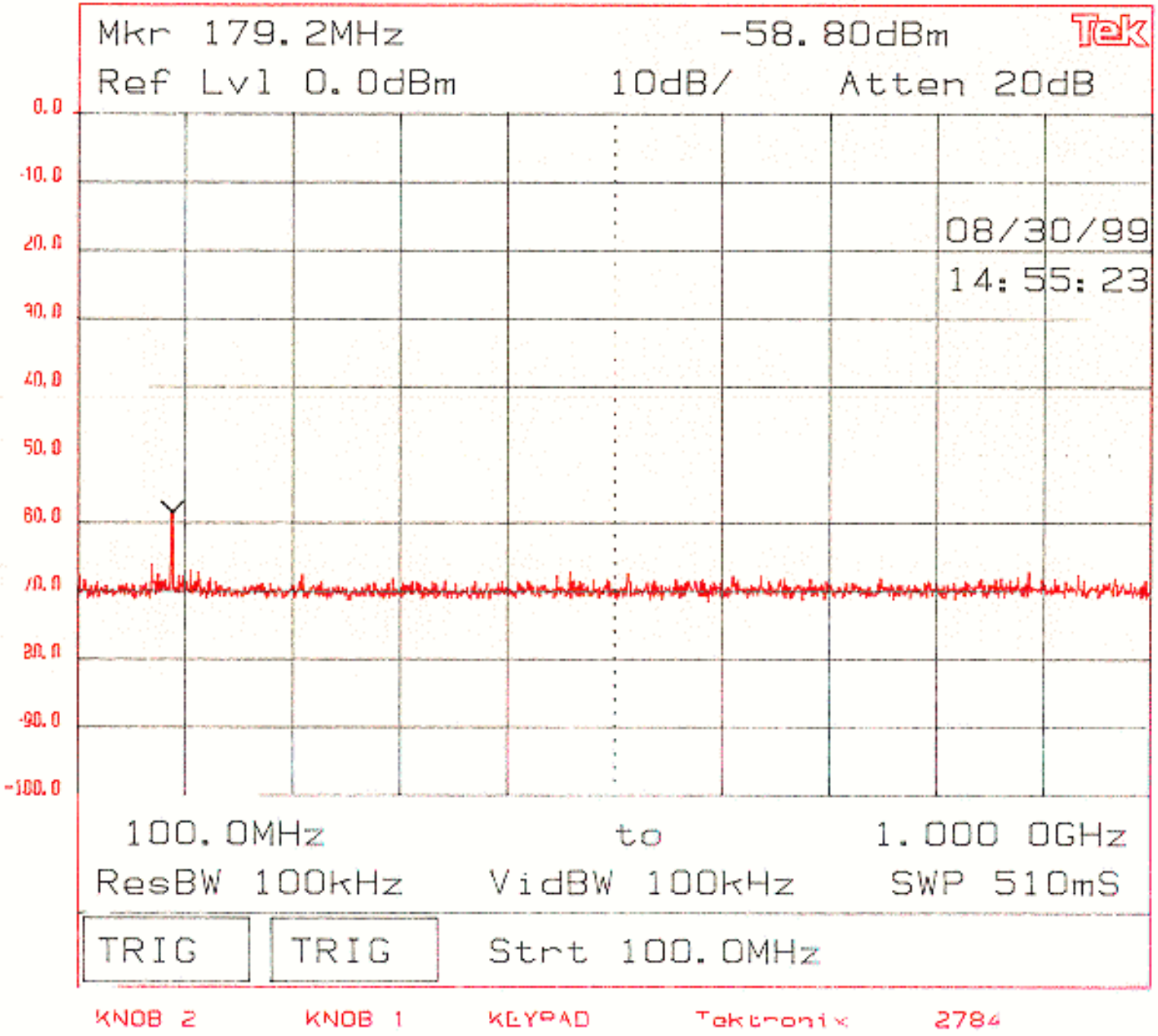
Plot 4.b.4


Mkr 22.52GHz
-65.60dBm
Tek
Ref Lvl 10.0dBm
10dB/
Atten 10dB
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
08/30/99
13:15:37
10.00GHz
to
24.00GHz
ResBW 100kHz
VidBW 100kHz
SWP 8.0S
LEVEL
SPAN
Stop 24.00GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

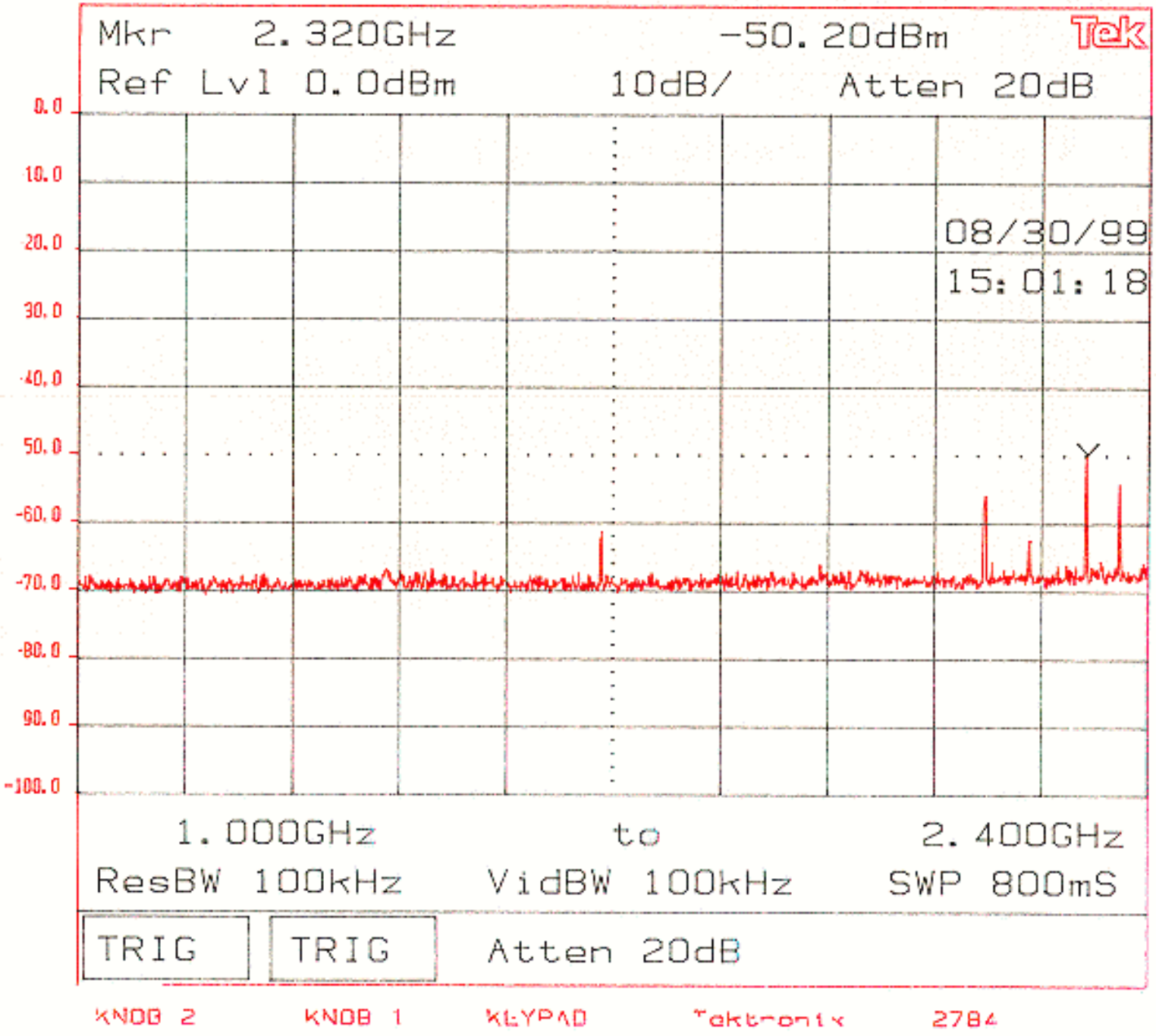
Plot 4.c.1


Mkr 42.88MHz
-60.70dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
-10.0
-20.0
30.0
-40.0
-50.0
-60.0
70.0
80.0
90.0
-100.0
08/30/99
14:47:19
1.00MHz
to
100.00MHz
ResBW 100kHz
VidBW 100kHz
SWP 56mS
TRIG
TRIG
Stop 100.00MHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

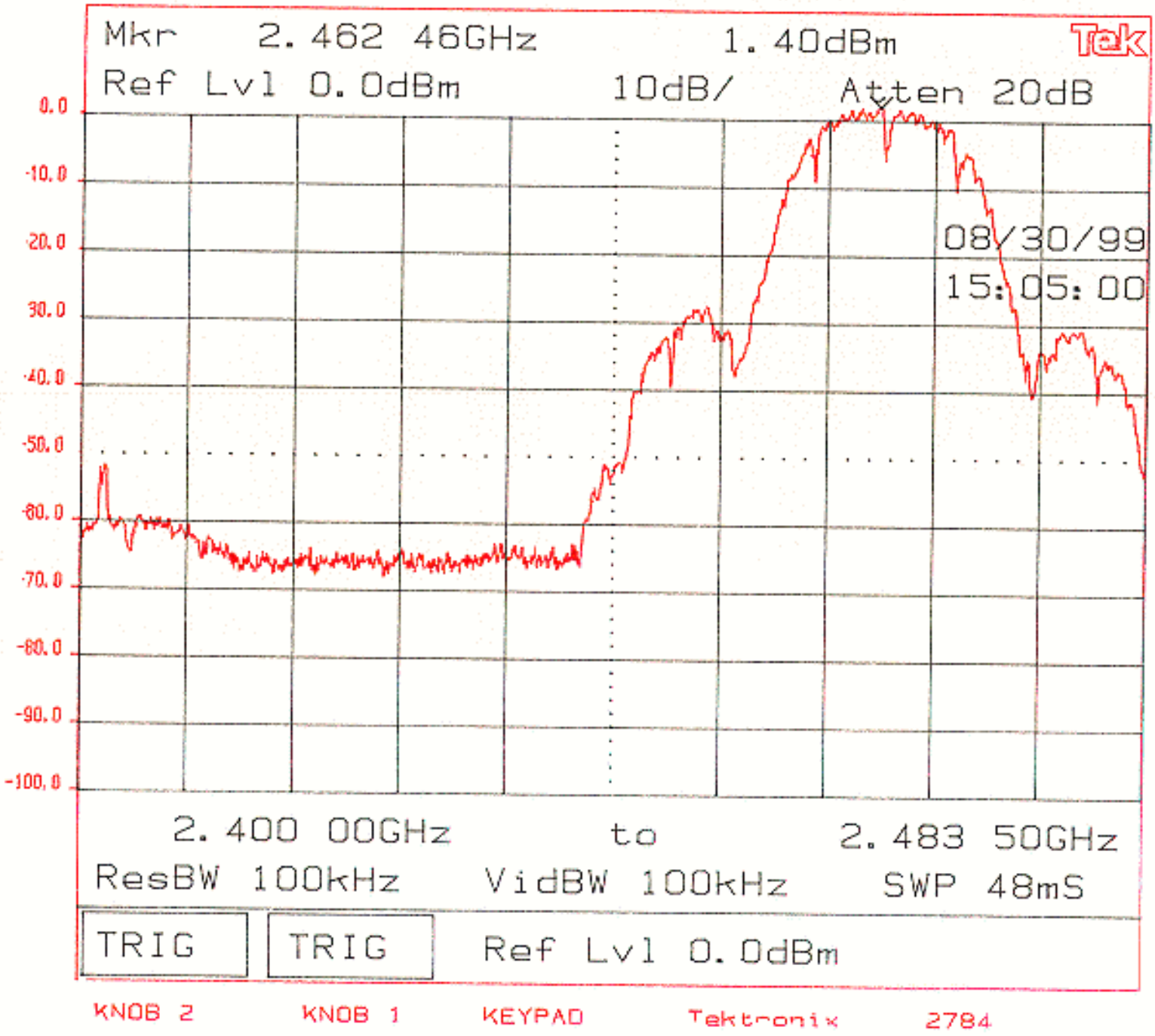
Plot 4.c.2


Mkr 179.2MHz
-58.80dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
08/30/99
14:55:23
100.0MHz
to
1.0000GHz
ResBW 100kHz
VidBW 100kHz
SWP 510mS
TRIG
TRIG
Strt 100.0MHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

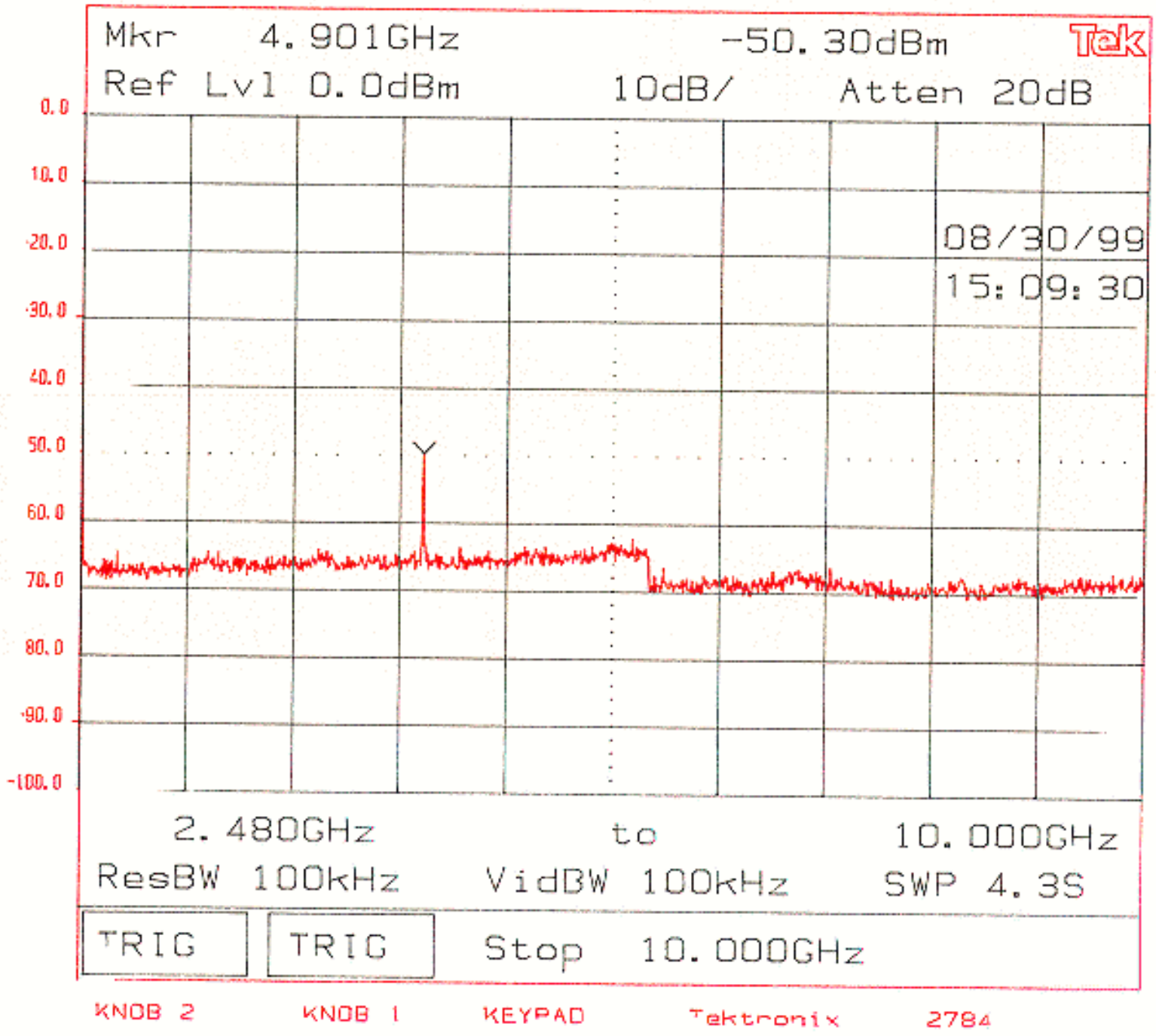
Plot 4.c.3


Mkr 2.320GHz
-50.20dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
10.0
20.0
30.0
40.0
50.0
-60.0
-70.0
-80.0
90.0
-100.0
08/30/99
15:01:18
1.000GHz
to
2.400GHz
ResBW 100kHz
VidBW 100kHz
SWP 800mS
TRIG
TRIG
Atten 20dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

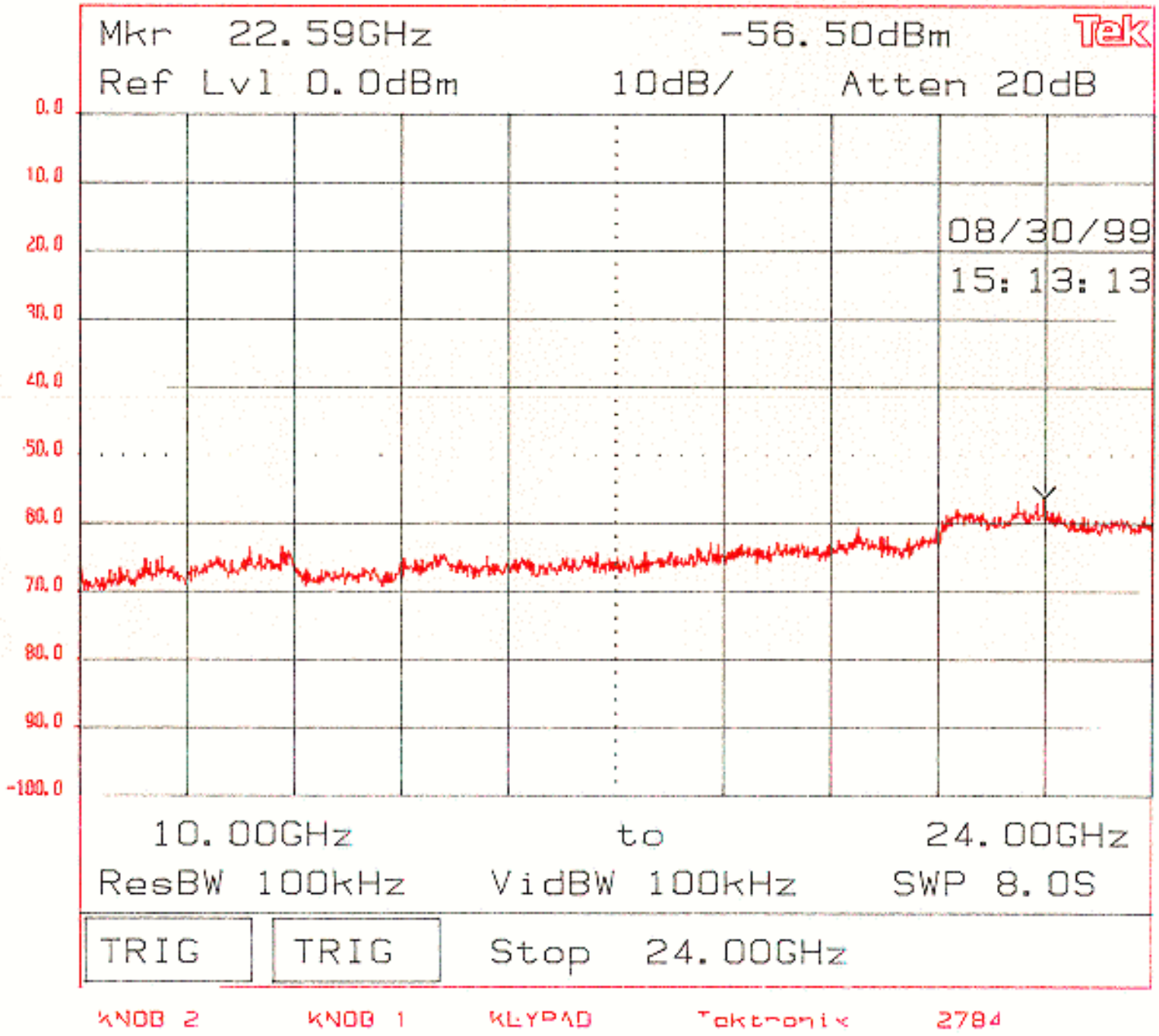
Plot 4.c.4


Mkr 2.462 46GHz
1.40dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-100.0
08/30/99
15:05:00
2.400 00GHz
to
2.483 50GHz
ResBW 100kHz
VidBW 100kHz
SWP 48mS
TRIG
TRIG
Ref Lvl 0.0dBm
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 4.c.5


Mkr 4.901GHz
-50.30dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
08/30/99
15:09:30
2.480GHz
to
10.000GHz
ResBW 100kHz
VidBW 100kHz
SWP 4.3S
TRIG
TRIG
Stop 10.000GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

Plot 4.c.6


Mkr 22.59GHz
-56.50dBm
Tek
Ref Lvl 0.0dBm
10dB/
Atten 20dB
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
-100.0
08/30/99
15:13:13
10.00GHz
to
24.00GHz
ResBW 100kHz
VidBW 100kHz
SWP 8.0S
TRIG
TRIG
Stop 24.00GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 26 dB below carrier), FCC Rule 15.247(c):

For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[X] Not required. All out-of-band conducted emissions are more than 26 dB below the level at fundamental frequency.
[ ] See attached data sheet

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

Radiated emission measurements were performed from 30 MHz to 25 GHz. Analyzer resolution is 100 kHz or greater for frequencies from 30 MHz to 1000 MHz and 1 MHz for frequencies above 1000 MHz.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). All measurements were performed with peak detection and average detection (above 1 GHz) unless otherwise specified.

On the following pages, the emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter was in full radiated power. The additional test was performed to show compliance with the requirement at the band-edge frequency 2483.5 MHz and up to 2500 MHz and at 2390.0 MHz.

The transmitter was configured with the worst case antenna and setup to transmit at the highest channel. Then the field strength was measured at 2483.5 MHz.

The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel. Then the field strength was measured at 2390.0 MHz. These tests were performed at 4 different bit rates.

To show compliance with FCC rules, the 6 dB duty cycle correction was used for field strength measurements at band-edge frequencies.

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

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 1					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	38.1	Peak	14	8	V	33.9	28.1	6.4	0.0	50.3	74.0	-23.7
4824	35.0	Ave.	14	8	V	33.9	28.1	6.4	0.0	47.2	54.0	-6.8
7236	33.8	Peak	14	8	V	38.0	28.0	8.2	0.0	52.0	74.0	-22.0
7236	26.7	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.9	54.0	-9.1
12060	37.2	Peak	8	10	V	42.5	39.1	8.8	0.0	49.4	74.0	-24.6
12060	29.7	Ave.	8	10	V	42.5	39.1	8.8	0.0	41.9	54.0	-12.1
14472	38.5	Peak	8	10	V	41.5	37.8	10.3	0.0	52.5	74.0	-21.5
14472	30.9	Ave.	8	10	V	41.5	37.8	10.3	0.0	44.9	54.0	-9.1
19296	26.2	Peak	21	13	V	40.2	23.3	2.4	-9.5	36.0	74.0	-38.0
19296	17.5	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.3	54.0	-26.7
21708	30.2	Peak	21	13	V	40.3	24.0	2.5	-9.5	39.5	74.0	-34.5
21708	20.2	Ave.	21	13	V	40.3	24.0	2.5	-9.5	29.5	54.0	-24.5
2437												
4874	29.0	Peak	14	8	V	33.9	28.1	6.4	0.0	41.2	74.0	-32.8
4874	23.0	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.2	54.0	-18.8
7311	34.3	Peak	14	8	V	38.0	28.0	8.2	0.0	52.5	74.0	-21.5
7311	27.3	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.5	54.0	-8.5
12185	37.2	Peak	8	10	V	42.5	39.1	8.8	0.0	49.4	74.0	-24.6
12185	29.5	Ave.	8	10	V	42.5	39.1	8.8	0.0	41.7	54.0	-12.3
19496	31.2	Peak	21	13	V	40.2	23.3	2.4	-9.5	41.0	74.0	-33.0
19496	18.8	Ave.	21	13	V	40.2	23.3	2.4	-9.5	28.6	54.0	-25.4
2462												
4924	29.4	Peak	14	8	V	33.9	28.1	6.4	0.0	41.6	74.0	-32.4
4924	23.0	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.2	54.0	-18.8
7386	33.3	Peak	14	8	V	38.0	28.0	8.2	0.0	51.5	74.0	-22.5
7386	26.7	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.9	54.0	-9.1
12310	37.7	Peak	8	10	V	42.5	39.1	8.8	0.0	49.9	74.0	-24.1
12310	30.1	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.3	54.0	-11.7
22158	35.3	Peak	21	13	V	40.3	23.3	2.5	-9.5	45.3	74.0	-28.7
22158	21.3	Ave.	21	13	V	40.3	23.3	2.5	-9.5	31.3	54.0	-22.7

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 2					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB

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
2412												
4824	39.7	Peak	14	8	V	33.9	28.1	6.4	0.0	51.9	74.0	-22.1
4824	37.3	Ave.	14	8	V	33.9	28.1	6.4	0.0	49.5	54.0	-4.5
7236	34.6	Peak	14	8	V	38.0	28.0	8.2	0.0	52.8	74.0	-21.2
7236	26.4	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.6	54.0	-9.4
14472	37.6	Peak	8	10	V	42.5	39.1	8.8	0.0	49.8	74.0	-24.2
14472	30.3	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.5	54.0	-11.5
14472	38.9	Peak	8	10	V	41.5	37.8	10.3	0.0	52.9	74.0	-21.1
14472	31.1	Ave.	8	10	V	41.5	37.8	10.3	0.0	45.1	54.0	-8.9
19296	27.7	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.5	74.0	-36.5
19296	17.3	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.1	54.0	-26.9
21708	30.4	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.4	74.0	-33.6
21708	20.1	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.1	54.0	-23.9
2437												
4874	30.5	Peak	14	8	V	33.9	28.1	6.4	0.0	42.7	74.0	-31.4
4874	23.5	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.7	54.0	-18.3
7311	33.4	Peak	14	8	V	38.0	28.0	8.2	0.0	51.6	74.0	-22.4
7311	26.7	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.9	54.0	-9.1
12185	37.1	Peak	8	10	V	42.5	39.1	8.8	0.0	49.3	74.0	-24.7
12185	29.8	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.0	54.0	-12.0
19496	31.7	Peak	21	13	V	40.2	23.3	2.4	-9.5	41.5	74.0	-32.5
19496	18.7	Ave.	21	13	V	40.2	23.3	2.4	-9.5	28.5	54.0	-25.5
2462												
4924	31.3	Peak	14	8	V	33.9	28.1	6.4	0.0	43.5	74.0	-30.5
4924	23.3	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.5	54.0	-18.5
7386	35.3	Peak	14	8	V	38.0	28.0	8.2	0.0	53.5	74.0	-20.5
7386	27.1	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.3	54.0	-8.7
12310	38.0	Peak	8	10	V	42.5	39.1	8.8	0.0	50.2	74.0	-23.8
12310	30.3	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.5	54.0	-11.5
22158	31.4	Peak	21	13	V	40.3	23.3	2.5	-9.5	41.4	74.0	-32.6
22158	21.0	Ave.	21	13	V	40.3	23.3	2.5	-9.5	31.0	54.0	-23.0

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 3					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB

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
2412												
4824	37.1	Peak	14	8	V	33.9	28.1	6.4	0.0	49.3	74.0	-24.7
4824	34.8	Ave.	14	8	V	33.9	28.1	6.4	0.0	47.0	54.0	-7.0
7236	34.0	Peak	14	8	V	38.0	28.0	8.2	0.0	52.2	74.0	-21.8
7236	27.5	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.7	54.0	-8.3
12060	37.3	Peak	8	10	V	42.5	39.1	8.8	0.0	49.5	74.0	-24.5
12060	29.9	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.1	54.0	-11.9
14472	39.0	Peak	8	10	V	41.5	37.8	10.3	0.0	53.0	74.0	-21.0
14472	31.0	Ave.	8	10	V	41.5	37.8	10.3	0.0	45.0	54.0	-9.0
19296	28.5	Peak	21	13	V	40.2	23.3	2.4	-9.5	38.3	74.0	-35.7
19296	18.3	Ave.	21	13	V	40.2	23.3	2.4	-9.5	28.1	54.0	-25.9
21708	31.4	Peak	21	13	V	40.3	23.3	2.5	-9.5	41.4	74.0	-32.6
21708	20.0	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.0	54.0	-24.0
2437												
4874	28.5	Peak	14	8	V	33.9	28.1	6.4	0.0	40.7	74.0	-33.3
4874	22.9	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.1	54.0	-18.9
7311	33.4	Peak	14	8	V	38.0	28.0	8.2	0.0	51.6	74.0	-22.4
7311	27.5	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.7	54.0	-8.3
12185	37.6	Peak	8	10	V	42.5	39.1	8.8	0.0	49.8	74.0	-24.2
12185	30.0	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.2	54.0	-11.8
19496	28.1	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.9	74.0	-36.1
19496	17.4	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.2	54.0	-26.8
2462												
4924	29.9	Peak	14	8	V	33.9	28.1	6.4	0.0	42.1	74.0	-31.9
4924	23.2	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.4	54.0	-18.6
7386	33.8	Peak	14	8	V	38.0	28.0	8.2	0.0	52.0	74.0	-22.0
7386	27.9	Ave.	14	8	V	38.0	28.0	8.2	0.0	46.1	54.0	-7.9
12310	38.0	Peak	8	10	V	42.5	39.1	8.8	0.0	50.2	74.0	-23.8
12310	30.3	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.5	54.0	-11.5
22158	30.1	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.1	74.0	-33.9
22158	20.3	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.3	54.0	-23.7

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 4					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	30.7	Peak	8	8	V	33.5	28.1	4.9	0.0	41.0	74.0	-33.0
4824	23.4	Ave.	8	8	V	33.5	28.1	4.9	0.0	33.7	54.0	-20.3
7236	34.0	Peak	8	8	V	38.0	28.0	6.3	0.0	50.3	74.0	-23.7
7236	26.1	Ave.	8	8	V	38.0	28.0	6.3	0.0	42.4	54.0	-11.6
12060	36.9	Peak	8	10	V	42.5	39.1	8.8	0.0	49.1	74.0	-24.9
12060	29.3	Ave.	8	10	V	42.5	39.1	8.8	0.0	41.5	54.0	-12.5
14472	38.9	Peak	8	10	V	41.5	37.8	10.3	0.0	52.9	74.0	-21.1
14472	31.2	Ave.	8	10	V	41.5	37.8	10.3	0.0	45.2	54.0	-8.8
19296	27.6	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.4	74.0	-36.6
19296	17.7	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.5	54.0	-26.5
21708	29.6	Peak	21	13	V	40.3	23.3	2.5	-9.5	39.6	74.0	-34.4
21708	20.0	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.0	54.0	-24.0
2437												
4874	28.6	Peak	8	8	V	33.5	28.1	4.9	0.0	38.9	74.0	-35.1
4874	21.0	Ave.	8	8	V	33.5	28.1	4.9	0.0	31.3	54.0	-22.7
7311	33.4	Peak	8	8	V	38.0	28.0	6.3	0.0	49.7	74.0	-24.3
7311	26.0	Ave.	8	8	V	38.0	28.0	6.3	0.0	42.3	54.0	-11.7
12185	36.0	Peak	8	10	V	42.5	39.1	8.8	0.0	48.2	74.0	-25.8
12185	29.2	Ave.	8	10	V	42.5	39.1	8.8	0.0	41.4	54.0	-12.6
19496	29.3	Peak	21	13	V	40.2	23.3	2.4	-9.5	39.1	74.0	-34.9
19496	17.6	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.4	54.0	-26.6
2462												
4924	29.9	Peak	14	8	V	33.9	28.1	6.4	0.0	42.1	74.0	-31.9
4924	23.2	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.4	54.0	-18.6
7386	33.8	Peak	14	8	V	38.0	28.0	8.2	0.0	52.0	74.0	-22.0
7386	27.9	Ave.	14	8	V	38.0	28.0	8.2	0.0	46.1	54.0	-7.9
12310	37.1	Peak	8	10	V	42.5	39.1	8.8	0.0	49.3	74.0	-24.7
12310	30.0	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.2	54.0	-11.8
22158	31.3	Peak	21	13	V	40.3	23.3	2.5	-9.5	41.3	74.0	-32.7
22158	21.3	Ave.	21	13	V	40.3	23.3	2.5	-9.5	31.3	54.0	-22.7

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 5					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	38.3	Peak	14	8	V	33.9	28.1	6.4	0.0	50.5	74.0	-23.5
4824	36.4	Ave.	14	8	V	33.9	28.1	6.4	0.0	48.6	54.0	-5.4
7236	32.5	Peak	14	8	V	38.0	28.0	8.2	0.0	50.7	74.0	-23.3
7236	26.9	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.1	54.0	-8.9
12060	36.7	Peak	8	10	V	42.5	39.1	8.8	0.0	48.9	74.0	-25.1
12060	29.6	Ave.	8	10	V	42.5	39.1	8.8	0.0	41.8	54.0	-12.2
14472	38.2	Peak	8	10	V	41.5	37.8	10.3	0.0	52.2	74.0	-21.8
14472	31.6	Ave.	8	10	V	41.5	37.8	10.3	0.0	45.6	54.0	-8.4
19296	27.5	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.3	74.0	-36.7
19296	17.5	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.3	54.0	-26.7
21708	29.7	Peak	21	13	V	40.3	23.3	2.5	-9.5	39.7	74.0	-34.3
21708	20.2	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8
2437												
4874	29.3	Peak	14	8	V	33.9	28.1	6.4	0.0	41.5	74.0	-32.5
4874	23.0	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.2	54.0	-18.8
7311	33.4	Peak	14	8	V	38.0	28.0	8.2	0.0	51.6	74.0	-22.4
7311	27.1	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.3	54.0	-8.7
12185	38.5	Peak	8	10	V	42.5	39.1	8.8	0.0	50.7	74.0	-23.3
12185	31.0	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.2	54.0	-10.8
19496	27.8	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.6	74.0	-36.4
19496	17.6	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.4	54.0	-26.6
2462												
4924	29.7	Peak	14	8	V	33.9	28.1	6.4	0.0	41.9	74.0	-32.1
4924	23.4	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.6	54.0	-18.4
7386	33.2	Peak	14	8	V	38.0	28.0	8.2	0.0	51.4	74.0	-22.6
7386	27.2	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.4	54.0	-8.6
12310	38.2	Peak	8	10	V	42.5	39.1	8.8	0.0	50.4	74.0	-23.6
12310	30.2	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.4	54.0	-11.6
22158	24.9	Peak	21	13	V	40.3	23.3	2.5	-9.5	34.9	74.0	-39.1
22158	20.5	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.5	54.0	-23.5

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/hi channel ant 6					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	30.6	Peak	14	8	V	33.9	28.1	6.4	0.0	42.8	74.0	-31.2
4824	22.9	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.1	54.0	-18.9
7236	33.0	Peak	14	8	V	38.0	28.0	8.2	0.0	51.2	74.0	-22.8
7236	27.3	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.5	54.0	-8.5
12060	38.6	Peak	8	10	V	42.5	39.1	8.8	0.0	50.8	74.0	-23.2
12060	31.1	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.3	54.0	-10.7
14472	40.4	Peak	8	10	V	41.5	37.8	10.3	0.0	54.4	74.0	-19.6
14472	32.8	Ave.	8	10	V	41.5	37.8	10.3	0.0	46.8	54.0	-7.2
19296	27.5	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.3	74.0	-36.7
19296	17.6	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.4	54.0	-26.6
21708	29.7	Peak	21	13	V	40.3	23.3	2.5	-9.5	39.7	74.0	-34.3
21708	20.2	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8
2437												
4874	29.2	Peak	14	8	V	33.9	28.1	6.4	0.0	41.4	74.0	-32.6
4874	23.1	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.3	54.0	-18.7
7311	33.5	Peak	14	8	V	38.0	28.0	8.2	0.0	51.7	74.0	-22.3
7311	27.0	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.2	54.0	-8.8
12185	38.4	Peak	8	10	V	42.5	39.1	8.8	0.0	50.6	74.0	-23.4
12185	30.4	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.6	54.0	-11.4
19496	27.4	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.2	74.0	-36.8
19496	17.5	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.3	54.0	-26.7
2462												
4924	30.0	Peak	14	8	V	33.9	28.1	6.4	0.0	42.2	74.0	-31.8
4924	23.6	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.8	54.0	-18.2
7386	33.2	Peak	14	8	V	38.0	28.0	8.2	0.0	51.4	74.0	-22.6
7386	27.1	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.3	54.0	-8.7
12310	39.0	Peak	8	10	V	42.5	39.1	8.8	0.0	51.2	74.0	-22.8
12310	31.4	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.6	54.0	-10.4
22158	30.2	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.2	74.0	-33.8
22158	20.2	Ave.	21	10	V	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 9					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	37.8	Peak	14	8	V	33.9	28.1	6.4	0.0	50.0	74.0	-24.0
4824	35.5	Ave.	14	8	V	33.9	28.1	6.4	0.0	47.7	54.0	-6.3
7236	33.8	Peak	14	8	V	38.0	28.0	8.2	0.0	52.0	74.0	-22.0
7236	27.0	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.2	54.0	-8.8
12060	38.4	Peak	8	10	V	42.5	39.1	8.8	0.0	50.6	74.0	-23.4
12060	31.1	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.3	54.0	-10.7
14472	40.1	Peak	8	10	V	41.5	37.8	10.3	0.0	54.1	74.0	-19.9
14472	32.5	Ave.	8	10	V	41.5	37.8	10.3	0.0	46.5	54.0	-7.5
19296	27.5	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.3	74.0	-36.7
19296	17.3	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.1	54.0	-26.9
21708	29.4	Peak	21	13	V	40.3	23.3	2.5	-9.5	39.4	74.0	-34.6
21708	20.0	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.0	54.0	-24.0
2437												
4874	29.4	Peak	14	8	V	33.9	28.1	6.4	0.0	41.6	74.0	-32.4
4874	23.1	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.3	54.0	-18.7
7311	32.5	Peak	14	8	V	38.0	28.0	8.2	0.0	50.7	74.0	-23.3
7311	26.8	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.0	54.0	-9.0
12185	38.1	Peak	8	10	V	42.5	39.1	8.8	0.0	50.3	74.0	-23.7
12185	30.8	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.0	54.0	-11.0
19496	27.7	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.5	74.0	-36.5
19496	17.6	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.4	54.0	-26.6
2462												
4924	29.5	Peak	14	8	V	33.9	28.1	6.4	0.0	41.7	74.0	-32.3
4924	23.8	Ave.	14	8	V	33.9	28.1	6.4	0.0	36.0	54.0	-18.0
7386	32.2	Peak	14	8	V	38.0	28.0	8.2	0.0	50.4	74.0	-23.6
7386	27.5	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.7	54.0	-8.3
12310	38.2	Peak	8	10	V	42.5	39.1	8.8	0.0	50.4	74.0	-23.6
12310	31.0	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.2	54.0	-10.8
22158	27.9	Peak	21	13	V	40.3	23.3	2.5	-9.5	37.9	74.0	-36.1
22158	20.3	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.3	54.0	-23.7

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 10					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412		Ave.	14		V	30.1	0.0	4.5	0.0		54.0	-54.0
4824	38.2	Peak	14	8	V	33.9	28.1	6.4	0.0	50.4	74.0	-23.6
4824	35.6	Ave.	14	8	V	33.9	28.1	6.4	0.0	47.8	54.0	-6.2
7236	32.6	Peak	14	8	V	38.0	28.0	8.2	0.0	50.8	74.0	-23.3
7236	26.4	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.6	54.0	-9.4
12060	38.4	Peak	8	10	V	42.5	39.1	8.8	0.0	50.6	74.0	-23.4
12060	30.0	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.2	54.0	-11.8
14472	36.8	Peak	8	10	V	41.5	37.8	10.3	0.0	50.8	74.0	-23.2
14472	30.9	Ave.	8	10	V	41.5	37.8	10.3	0.0	44.9	54.0	-9.1
19296	28.0	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.8	74.0	-36.2
19296	17.3	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.1	54.0	-26.9
21708	30.0	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.0	74.0	-34.0
21708	20.0	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.0	54.0	-24.0
2437												
4874	28.3	Peak	14	8	V	33.9	28.1	6.4	0.0	40.5	74.0	-33.5
4874	22.8	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.0	54.0	-19.0
7311	32.5	Peak	14	8	V	38.0	28.0	8.2	0.0	50.7	74.0	-23.3
7311	26.8	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.0	54.0	-9.0
12185	36.2	Peak	8	10	V	42.5	39.1	8.8	0.0	48.4	74.0	-25.6
12185	29.9	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.1	54.0	-11.9
19496	28.0	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.8	74.0	-36.2
19496	17.8	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.6	54.0	-26.4
2462												
4924	30.9	Peak	14	8	V	33.9	28.1	6.4	0.0	43.1	74.0	-30.9
4924	23.1	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.3	54.0	-18.7
7386	32.6	Peak	14	8	V	38.0	28.0	8.2	0.0	50.8	74.0	-23.2
7386	26.9	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.1	54.0	-8.9
12310	38.0	Peak	8	10	V	42.5	39.1	8.8	0.0	50.2	74.0	-23.8
12310	30.1	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.3	54.0	-11.7
22158	30.2	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.2	74.0	-33.8
22158	20.3	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.3	54.0	-23.7

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 15					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	40.2	Peak	14	8	V	33.9	28.1	6.4	0.0	52.4	74.0	-21.6
4824	36.9	Ave.	14	8	V	33.9	28.1	6.4	0.0	49.1	54.0	-4.9
7236	41.2	Peak	14	8	V	38.0	28.0	8.2	0.0	59.4	74.0	-14.6
7236	26.4	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.6	54.0	-9.4
12060	38.8	Peak	8	10	V	42.5	39.1	8.8	0.0	51.0	74.0	-23.0
12060	30.7	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.9	54.0	-11.1
14472	40.2	Peak	8	10	V	41.5	37.8	10.3	0.0	54.2	74.0	-19.8
14472	32.5	Ave.	8	10	V	41.5	37.8	10.3	0.0	46.5	54.0	-7.5
19296	23.1	Peak	21	13	V	40.2	23.3	2.4	-9.5	32.9	74.0	-41.1
19296	17.7	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.5	54.0	-26.5
21708	25.2	Peak	21	13	V	40.3	23.3	2.5	-9.5	35.2	74.0	-38.8
21708	20.2	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8
2437												
4874	29.3	Peak	14	8	V	33.9	28.1	6.4	0.0	41.5	74.0	-32.5
4874	22.5	Ave.	14	8	V	33.9	28.1	6.4	0.0	34.7	54.0	-19.3
7311	35.5	Ave.	14	8	V	38.0	28.0	8.2	0.0	53.7	54.0	-0.3
7311	31.5	Peak	14	8	V	38.0	28.0	8.2	0.0	49.7	74.0	-24.3
12185	37.5	Peak	8	10	V	42.5	39.1	8.8	0.0	49.7	74.0	-24.3
12185	30.7	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.9	54.0	-11.1
19496	35.6	Peak	21	13	V	40.2	23.3	2.4	-9.5	45.4	74.0	-28.6
19496	18.0	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.8	54.0	-26.2
2462												
4924	30.2	Peak	14	8	V	33.9	28.1	6.4	0.0	42.4	74.0	-31.6
4924	22.9	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.1	54.0	-18.9
7386	32.6	Peak	14	8	V	38.0	28.0	8.2	0.0	50.8	74.0	-23.2
7386	26.7	Ave.	14	8	V	38.0	28.0	8.2	0.0	44.9	54.0	-9.1
12310	39.3	Peak	8	10	V	42.5	39.1	8.8	0.0	51.5	74.0	-22.5
12310	31.0	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.2	54.0	-10.8
22158	30.6	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.6	74.0	-33.4
22158	20.5	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.5	54.0	-23.5

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 2 - 6, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant 18					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB

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
2412												
4824	38.8	Peak	14	8	V	33.9	28.1	6.4	0.0	51.0	74.0	-23.0
4824	36.6	Ave.	14	8	V	33.9	28.1	6.4	0.0	48.8	54.0	-5.2
7236	33.7	Peak	14	8	V	38.0	28.0	8.2	0.0	51.9	74.0	-22.1
7236	26.9	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.1	54.0	-8.9
12060	38.4	Peak	8	10	V	42.5	39.1	8.8	0.0	50.6	74.0	-23.4
12060	30.6	Ave.	8	10	V	42.5	39.1	8.8	0.0	42.8	54.0	-11.2
14472	40.2	Peak	8	10	V	41.5	37.8	10.3	0.0	54.2	74.0	-19.8
14472	32.5	Ave.	8	10	V	41.5	37.8	10.3	0.0	46.5	54.0	-7.5
19296	28.7	Peak	21	13	V	40.2	23.3	2.4	-9.5	38.5	74.0	-35.5
19296	17.5	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.3	54.0	-26.7
21708	30.2	Peak	21	13	V	40.3	23.3	2.5	-9.5	40.2	74.0	-33.8
21708	20.4	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.4	54.0	-23.6
2437												
4874	29.3	Peak	14	8	V	33.9	28.1	4.9	-9.5	30.5	74.0	-43.5
4874	23.0	Ave.	14	8	V	33.9	28.1	4.9	-9.5	24.2	54.0	-29.8
7311	33.4	Peak	14	8	V	38.0	28.0	6.3	-9.5	40.2	74.0	-33.8
7311	27.1	Ave.	14	8	V	38.0	28.0	6.3	-9.5	33.8	54.0	-20.2
12185	38.1	Peak	8	10	V	42.5	39.1	8.8	0.0	50.3	74.0	-23.7
12185	30.9	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.1	54.0	-10.9
19496	27.5	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.3	74.0	-36.7
19496	18.7	Ave.	21	13	V	40.2	23.3	2.4	-9.5	28.5	54.0	-25.5
2462												
4924	29.3	Peak	14	8	V	33.9	28.1	6.4	0.0	41.5	74.0	-32.6
4924	23.0	Ave.	14	8	V	33.9	28.1	6.4	0.0	35.2	54.0	-18.8
7386	33.1	Peak	14	8	V	38.0	28.0	8.2	0.0	51.3	74.0	-22.7
7386	27.3	Ave.	14	8	V	38.0	28.0	8.2	0.0	45.5	54.0	-8.5
12310	38.6	Peak	8	10	V	42.5	39.1	8.8	0.0	50.8	74.0	-23.2
12310	31.1	Ave.	8	10	V	42.5	39.1	8.8	0.0	43.3	54.0	-10.7
22158	31.2	Peak	21	13	V	40.3	23.3	2.5	-9.5	41.2	74.0	-32.8
22158	20.2	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 9, 1999		**Test Distance_**		3	meters
Test Mode:	Lo/Mid/Hi channel ant X					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB
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
2412												
4824	29.9	Peak	8	8	H	34.0	28.1	4.9	0.0	40.7	74.0	-33.3
4824	20.9	Ave.	8	8	H	34.0	28.1	4.9	0.0	31.7	54.0	-22.3
7236	32.5	Peak	8	8	H	36.8	28.0	6.3	0.0	47.6	74.0	-26.4
7236	26.9	Ave.	8	8	H	36.8	28.0	6.3	0.0	42.0	54.0	-12.0
12060	38.5	Peak	8	10	H	44.1	39.1	8.8	0.0	52.3	74.0	-21.7
12060	32.9	Ave.	8	10	H	44.1	39.1	8.8	0.0	46.7	54.0	-7.3
14472	40.0	Peak	8	10	H	40.9	37.8	10.3	0.0	53.4	74.0	-20.6
14472	33.0	Ave.	8	10	H	40.9	37.8	10.3	0.0	46.4	54.0	-7.6
19296	27.6	Peak	21	13	H	40.2	23.3	2.4	-9.5	37.4	74.0	-36.6
19296	17.9	Ave.	21	13	H	40.2	23.3	2.4	-9.5	27.7	54.0	-26.3
21708	30.0	Peak	21	13	H	40.3	23.3	2.5	-9.5	35.0	74.0	-39.0
21708	17.7	Ave.	21	13	H	40.3	23.3	2.5	-9.5	27.7	54.0	-26.3
2437												
4874	27.8	Peak	8	8	H	34.0	28.1	4.9	0.0	38.6	74.0	-35.4
4874	21.7	Ave.	8	8	H	34.0	28.1	4.9	0.0	32.5	54.0	-21.5
7311	34.2	Peak	8	8	H	36.8	28.0	6.3	0.0	49.3	74.0	-24.7
7311	26.5	Ave.	8	8	H	36.8	28.0	6.3	0.0	41.6	54.0	-12.4
12185	40.1	Peak	8	10	H	44.1	39.1	8.8	-9.5	44.4	74.0	-29.6
12185	32.4	Ave.	8	10	H	44.1	39.1	8.8	-9.5	36.7	54.0	-17.3
19496	25.9	Peak	21	13	H	40.2	23.3	2.4	-9.5	35.7	74.0	-38.3
19496	17.2	Ave.	21	13	H	40.2	23.3	2.4	-9.5	27.0	54.0	-27.0
2462												
4924	30.1	Peak	8	8	H	34.0	28.1	4.9	0.0	40.9	74.0	-33.1
4924	22.3	Ave.	8	8	H	34.0	28.1	4.9	0.0	33.1	54.0	-20.9
7386	33.8	Peak	8	8	H	36.8	28.0	6.3	0.0	48.9	74.0	-25.1
7386	26.4	Ave.	8	8	H	36.8	28.0	6.3	0.0	41.5	54.0	-12.5
12310	39.8	Peak	8	10	H	44.1	39.1	8.8	0.0	53.6	74.0	-20.4
12310	32.7	Ave.	8	10	H	44.1	39.1	8.8	0.0	46.5	54.0	-7.5
22158	34.7	Peak	21	13	H	40.3	23.3	2.5	-9.5	44.7	74.0	-29.3
22158	22.5	Ave.	21	13	H	40.3	23.3	2.5	-9.5	32.4	54.0	-21.6

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. - Transducer 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 20 dB below the limits.

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 23, 1999		**Test Distance_**		3	meters
Test Mode:	Xmit 2412, 2437 and 2462 Antenna Y					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Ant. Factor**	**Pre-Amp**	**Insert. Loss**	**D. C. F.**	**Net**	**Limit @3m**	**Margin**
MVz	dB(µV)	P/A/Q	#	#	V/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
2412	68.9	Peak	14		V	30.1	0.0	3.1	0.0	102.1		
2412	67.7	Ave.	14		V	30.1	0.0	3.1	0.0	100.9		
4824	39.3	Peak	14	8	V	33.9	28.1	4.9	0.0	50.0	74.0	-24.0
4824	34.2	Ave.	14	8	V	33.9	28.1	4.9	0.0	44.9	54.0	-9.1
7236	41.6	Peak	14	8	V	38.0	28.0	6.3	0.0	57.9	74.0	-16.1
7236	34.8	Ave.	14	8	V	38.0	28.0	6.3	0.0	51.1	54.0	-2.9
12060	39.4	Peak	14	10	V	42.3	39.1	8.8	0.0	51.4	74.0	-22.6
12060	32.2	Ave.	14	10	V	42.3	39.1	8.8	0.0	44.2	54.0	-9.8
14472	39.6	Peak	14	10	V	40.7	37.8	10.3	0.0	52.8	74.0	-21.2
14472	32.2	Ave.	14	10	V	40.7	37.8	10.3	0.0	45.4	54.0	-8.6
19296	27.5	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.3	74.0	-36.7
19296	17.5	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.3	54.0	-26.7
21708	29.7	Peak	21	13	V	40.3	23.3	2.5	-9.5	39.7	74.0	-34.3
21708	20.2	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8
4874	38.1	Peak	14	8	V	33.9	28.1	4.9	0.0	48.8	74.0	-25.2
4874	32.0	Ave.	14	8	V	33.9	28.1	4.9	0.0	42.7	54.0	-11.3
7311	42.0	Peak	14	8	V	38.0	28.0	6.3	0.0	58.3	74.0	-15.7
7311	34.6	Ave.	14	8	V	38.0	28.0	6.3	0.0	50.9	54.0	-3.1
12185	39.5	Peak	14	10	V	42.3	39.1	8.8	0.0	51.5	74.0	-22.5
12185	32.0	Ave.	14	10	V	42.3	39.1	8.8	0.0	44.0	54.0	-10.0
19496	27.8	Peak	21	13	V	40.2	23.3	2.4	-9.5	37.6	74.0	-36.4
19496	17.6	Ave.	21	13	V	40.2	23.3	2.4	-9.5	27.4	54.0	-26.6
2462	69.1	Peak	8		V	29.6	0.0	3.1	0.0	101.8		
2462	67.7	Ave.	8		V	29.6	0.0	3.1	0.0	100.4		
4924	35.5	Peak	8	8	V	33.5	28.1	4.9	0.0	45.8	74.0	-28.2
4924	32.6	Ave.	8	8	V	33.5	28.1	4.9	0.0	42.9	54.0	-11.1
7386	34.9	Peak	8	8	V	38.0	28.0	6.3	0.0	51.2	74.0	-22.8
7386	28.7	Ave.	8	8	V	38.0	28.0	6.3	0.0	45.0	54.0	-9.0
12310	40.3	Peak	8	10	V	42.5	39.1	8.8	0.0	52.5	74.0	-21.5
12310	32.6	Ave.	8	10	V	42.5	39.1	8.8	0.0	44.8	54.0	-9.2
22158	24.9	Peak	21	13	V	40.3	23.3	2.5	-9.5	34.9	74.0	-39.1
22158	20.5	Ave.	21	13	V	40.3	23.3	2.5	-9.5	30.5	54.0	-23.5

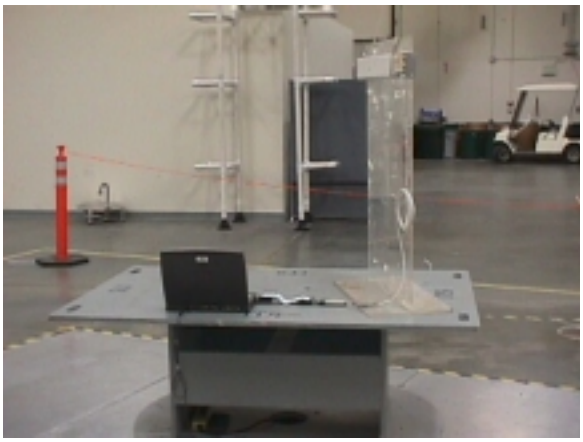
A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111		**Standard_**		**FCC § 15.247 (R.B.)**	
EUT:	Trilogy Direct Sequence Radio					**S/N #:**			**Limits**		11	
Project #:	J99020337					**Test Date:**	Sep 24, 1999		**Test Distance_**		3	meters
Test Mode:	Xmit 2412, 2437 and 2462 Antenna Z					**Engineer:**	Barry Smith		**Duty Relaxation**		0	dB

Frequency	**Reading**	**Detector**	**Ant.**	**Amp.**	**Ant. Pol.**	**Ant. Factor**	**Pre-Amp**	**Insert. Loss**	**D. C. F.**	**Net**	**Limit @3m**	**Margin**
MHz	dB(µH)	P/A/Q	#	#	H/H	dB(1/m)	dB	dB	dB	dB(µH/m)	dB(µH/m)	dB
2412	71.9	Peak	14		H	28.8	0.0	3.1	0.0	103.8		
2412	68.4	Ave.	14		H	28.8	0.0	3.1	0.0	100.3		
4824	28.9	Peak	14	8	H	35.4	28.1	4.9	0.0	41.1	74.0	-33.0
4824	22.3	Ave.	14	8	H	35.4	28.1	4.9	0.0	34.5	54.0	-19.5
7236	31.9	Peak	14	8	H	37.8	28.0	6.3	0.0	48.0	74.0	-26.0
7236	20.6	Ave.	14	8	H	37.8	28.0	6.3	0.0	36.7	54.0	-17.3
12060	39.8	Peak	14	10	H	42.0	39.1	8.8	0.0	51.5	74.0	-22.6
12060	31.9	Ave.	14	10	H	42.0	39.1	8.8	0.0	43.6	54.0	-10.4
14472	40.2	Peak	14	10	H	39.5	37.8	10.3	0.0	52.2	74.0	-21.8
14472	32.7	Ave.	14	10	H	39.5	37.8	10.3	0.0	44.7	54.0	-9.3
19296	27.5	Peak	21	13	H	40.2	23.3	2.4	-9.5	37.3	74.0	-36.7
19296	17.5	Ave.	21	13	H	40.2	23.3	2.4	-9.5	27.3	54.0	-26.7
21708	29.7	Peak	21	13	H	40.3	23.3	2.5	-9.5	39.7	74.0	-34.3
21708	20.2	Ave.	21	13	H	40.3	23.3	2.5	-9.5	30.2	54.0	-23.8
4874	28.0	Peak	14	8	H	35.4	28.1	4.9	0.0	40.2	74.0	-33.8
4874	21.3	Ave.	14	8	H	35.4	28.1	4.9	0.0	33.5	54.0	-20.5
7311	33.5	Peak	14	8	H	37.8	28.0	6.3	0.0	49.6	74.0	-24.4
7311	25.6	Ave.	14	8	H	37.8	28.0	6.3	0.0	41.7	54.0	-12.3
12185	39.6	Peak	14	10	H	42.0	39.1	8.8	0.0	51.3	74.0	-22.7
12185	32.1	Ave.	14	10	H	42.0	39.1	8.8	0.0	43.8	54.0	-10.2
19496	27.8	Peak	21	13	H	40.2	23.3	2.4	-9.5	37.6	74.0	-36.4
19496	17.6	Ave.	21	13	H	40.2	23.3	2.4	-9.5	27.4	54.0	-26.6
2462	70.6	Peak	14		H	28.8	0.0	3.1	0.0	102.5		
2462	67.0	Ave.	14		H	28.8	0.0	3.1	0.0	98.9		
4924	29.3	Peak	14	8	H	35.4	28.1	4.9	0.0	41.5	74.0	-32.5
4924	21.6	Ave.	14	8	H	35.4	28.1	4.9	0.0	33.8	54.0	-20.2
7386	34.0	Peak	14	8	H	37.8	28.0	6.3	0.0	50.1	74.0	-23.9
7386	26.0	Ave.	14	8	H	37.8	28.0	6.3	0.0	42.1	54.0	-11.9
12310	39.8	Peak	14	10	H	42.0	39.1	8.8	0.0	51.5	74.0	-22.5
12310	32.0	Ave.	14	10	H	42.0	39.1	8.8	0.0	43.7	54.0	-10.3
22158	24.9	Peak	21	13	H	40.3	23.3	2.5	-9.5	34.9	74.0	-39.1
22158	20.5	Ave.	21	13	H	40.3	23.3	2.5	-9.5	30.5	54.0	-23.5

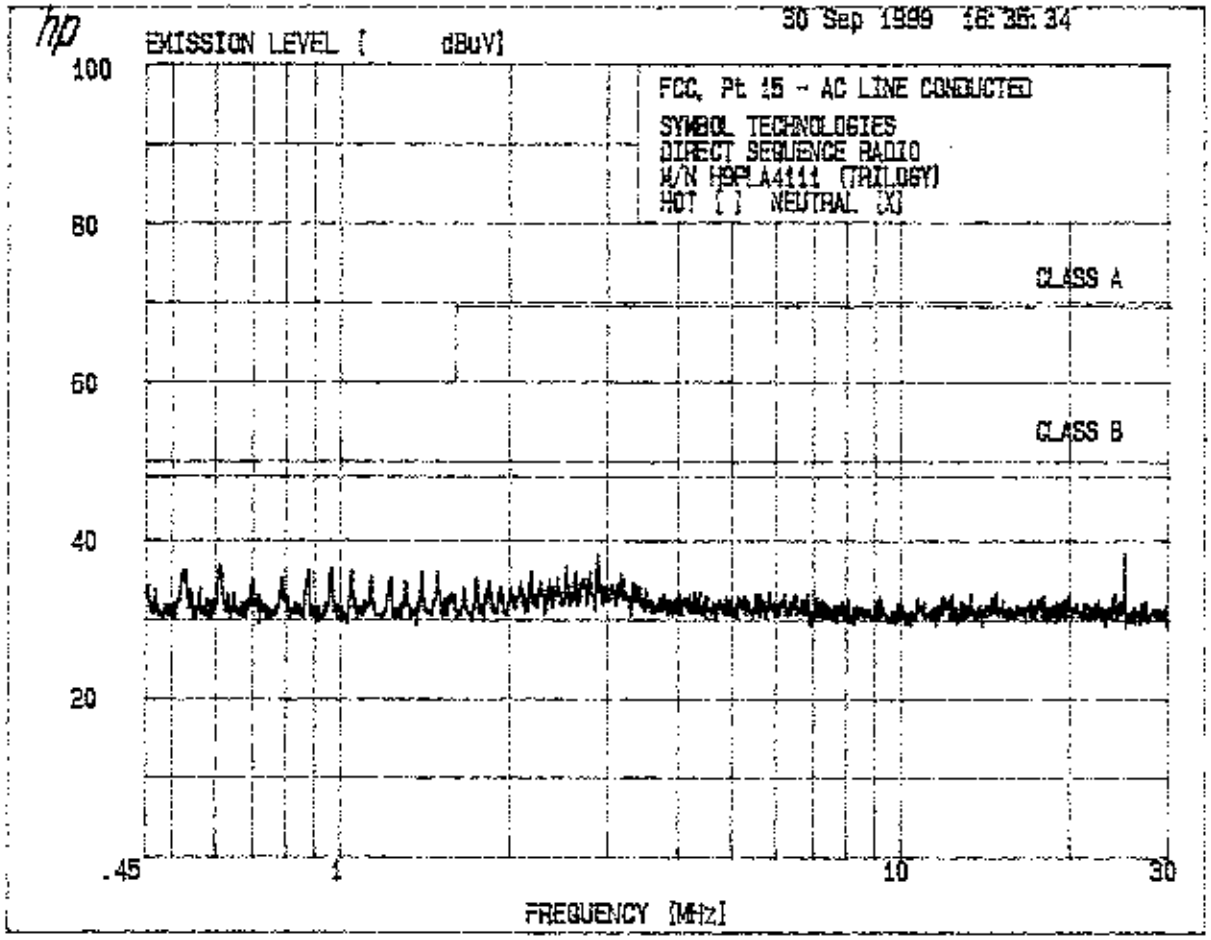
4.7 Configuration Photographs – Radiated Emissions

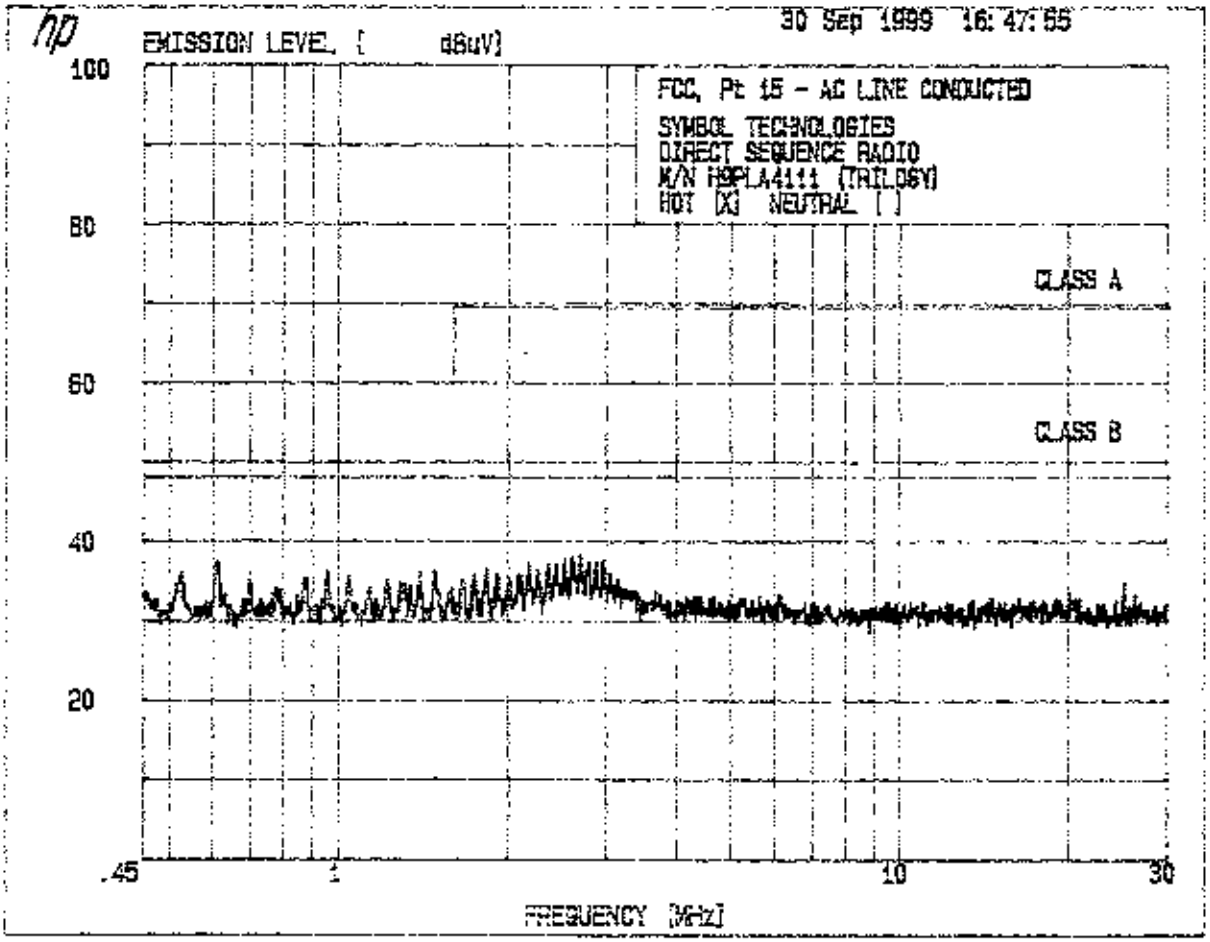


4.8 AC Line Conducted Emission, FCC Rule 15.207:

[ ] Not required; battery operation only

[X] Test data attached (copy from DoC report)


30 Sep 1999 16:35:34
EMISSION LEVEL [dBuV]
FCC, Pt 15 - AC LINE CONDUCTED
SYMBOL TECHNOLOGIES
DIRECT SEQUENCE RADIO
M/N HSPLA4111 (TRILOGY)
HOT [ ] NEUTRAL [X]
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]


30 Sep 1999 16:47:55
EMISSION LEVEL [dBuV]
FCC, Pt 15 - AC LINE CONDUCTED
SYMBOL TECHNOLOGIES
DIRECT SEQUENCE RADIO
M/N HSPLA4111 (TRILOGY)
HOT [X] NEUTRAL [ ]
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

30 Sep 1999 16:35:34

3. FCC CFR 47, Pt 15
   3.1 FCC, Pt 15 - AC LINE CONDUCTED

SYMBOL TECHNOLOGIES
DIRECT SEQUENCE RADIO
M/N HSPLA4111 (TRILOGY)
HOT [ ] NEUTRAL [X]

PEAKS FOUND ABOVE 36 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	.5300	36.2
2	.6138	36.8
3	.8842	36.0
4	.9697	36.4
5	1.055	36.2
6	1.403	36.1
7	1.494	36.1
8	2.198	36.0
9	2.545	36.9
10	2.643	36.0
11	2.803	36.0
12	2.887	38.2
13	25.15	38.5

30 Sep 1999 16:47:55

3. FCC CFR 47, Pt 15
   3.1 FCC, Pt 15 - AC LINE CONDUCTED

SYMBOL TECHNOLOGIES
DIRECT SEQUENCE RADIO
M/N HSPLA4111 (TRILOGY)
HOT [X] NEUTRAL [ ]

PEAKS FOUND ABOVE 36 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	.6138	37.3
2	.9616	36.1
3	1.403	36.0
4	1.488	36.1
5	1.843	36.4
6	2.188	37.2
7	2.273	36.2
8	2.370	37.0
9	2.451	37.0
10	2.535	37.7
11	2.621	38.0
12	2.711	38.1
13	2.803	37.2
14	2.887	37.2

4.9 Configuration Photographs – AC Line Conducted Emissions

4.10 Radiated Emissions from Digital Section of Transceiver (Transmitter), FCC Ref: 15.109

[ ] Not required - No digital part
[X] Test results are attached (copy from DoC report)

A

Radiated Emissions Test Data

Company:	Symbol					**Model #:**	H9PLA4111	**Standard_**	**FCC § 15B**		
EUT:	Trilogy Direct Sequence Radio					**S/N #:**		**Limits**	2		
Project #:	J99020337					**Test Date:**	Sept 14, 1999	**Test Distance_**	3	meters	
Test Mode:	TX/RX					**Engineer:**	Barry Smith	**Duty Relaxation**	0	dB	

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	1	2	22	1	2	5	1	0	0	0
Model:	EMCO 3143	EMCO 3143	3160-10	HP 8447D	HP 8447D	CDI_P950	Site 1	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
88	50.2	Peak	1	1	H	8.1	26.0	0.8	0.0	33.1	43.5	-10.4
110	57.7	Peak	1	1	H	6.9	25.6	0.9	0.0	39.9	43.5	-3.6
132	52.9	Peak	1	1	H	7.9	24.8	1.0	0.0	37.0	43.5	-6.5
176	49.8	QP	2	2	H	9.1	21.8	1.2	0.0	38.3	43.5	-5.2
220	48.3	Peak	2	2	H	11.4	22.3	1.3	0.0	38.7	46.0	-7.3
264	43.6	Peak	2	2	H	12.7	22.0	1.6	0.0	35.9	46.0	-10.1
286	49.1	Peak	2	2	H	13.0	22.5	1.6	0.0	41.2	46.0	-4.8
308	45.4	Peak	2	2	H	13.7	22.6	1.7	0.0	38.2	46.0	-7.8
440	41.5	Peak	2	2	H	17.3	22.6	2.1	0.0	38.3	46.0	-7.7

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. - Transducer 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 20 dB below the limits.

4.11 Radiated Emissions from Receiver Section of Transceiver (L.O. Radiation), FCC Ref: 15.109, 15.111

[X] Not required - EUT operation above 960 MHz only

[ ] Not required - EUT is transmitter only

[ ] Not performed; exempt until June 1999

[ ] Test results are attached

4.12 Processing Gain Measurements, FCC Rule 15.247(e)

The processing gain shall be determined from the ratio in dB of the signal to noise ratio with the system spreading code turned OFF, to the signal to noise ratio with the system spreading code turned ON, as measured at the demodulated output of the receiver. The processing gain shall be at least 10 dB for a direct sequence spread spectrum system.

	Refer to attached test procedure and data sheets.
X	Refer to circuit analysis and processing gain calculations provided by manufacturer.

4.13 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The duty cycle was declared by the manufacturer as 6 dB.

	See attached spectrum analyzer chart(s) for transmitter timing
X	See transmitter timing diagram provided by manufacturer

Exhibit 1
ID Label Format

Exhibit 2
ID Label Location

Exhibit 3
Equipment Photographs

Exhibit 4
Block Diagram

Exhibit 5
Circuit Diagram

Exhibit 6
Test Setup Photos

See pages 14 and 16 of this report

Exhibit 7
Instruction Manual

Exhibit 8
Antenna Information