Appendix B

Product Information Form(s)

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

General Equipment Description -- *NOTE: This information will be input into your test report as shown below.*

EUT Description: Point-to-multipoint Base Station with integrated antenna 18+/-1 dBi gain.

EUT Name: Spread Spectrum Radio FCC ID: HZB-US58-B60

Model No.: 40400-XX Serial No.: ENGR UNIT #1

Product Options: 20Mbps only

Configurations to be tested: 20 Mbps only

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 120 VAC (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: 1

Current (Amps/phase(max)): 2.5 Current (Amps/phase(nominal)): 1

Other: --

Other Special Requirements

--

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Small business

EUT Power Cable

☐ Permanent OR ■ Removable Length (in meters): 1 to 100m
☐ Shielded OR ■ Unshielded
☐ Not Applicable

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EUT Interface Ports and Cables												
Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (In meters)	Removable	Permanent
EXAMPLE:												
RS232	☐	■	*2*	■	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	■	☐
Cat5 UTP	■	■	1	☐	■	--	Crimp	RJ-45	Cat-5	0	■	☐

EUT Software.

Revision Level: 4.6

Description: Software can be manually configured by an external computer to use the desired frequency channel and modulation mode (QPSK, 8QAM, or 16QAM).

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing.
Consult with your TÜV Product Service Representative if additional assistance is required.

1. QPSK-1/2 modulation (20Mbps mode): frequency channels 0, 3, & 5 (lowest, mid, highest)

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
Base Station	40400-XX	1	HZB-US58-S60
Axiom 3V GPS Antenna with SMA Coax ~15 Ft.	--	--	--

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	*Model #*	*Serial #*	*FCC ID #*
HP Omnibook laptop	4150	TW01400612	--

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
--			

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
Skynet	WLH-A07T	001132458	■ Switched-mode: (Frequency) -- ☐ Linear ☐ Other: --

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*
--		

Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*
--				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

--

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Appendix C

Change History

Not Applicable

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Appendix D

Data supplied by Western Multiplex
Power Density, 6 dB Bandwidth, Out of Band Antenna Conducted Emission and Processing Gain

Note:

As the following testing was taken separately, the conducted output power measurements were taken to serve as a reference of the condition under which the power density, out of band antenna conducted emission measurements were taken. The data on page TD 3 will be the effective output power measurement data for this entire report. The output power measurements are slightly higher than that of ones on Page TD3, and yet the power density and conducted emission measurements are still within limits. This guarantees the compliance of the above items under a slightly lower output power.

TÜV PRODUCT SERVICE

ITS Intertek Testing Services
ETL SEMKO

February 7, 2002

To whom it may concern:

On February 4, 2002, testing as summarized in the following table was performed at Intertek Testing Services, 1365 Adams Court, Menlo Park, CA 94025, for the HZB-US58-60 product of Western Multiplex Corporation by Dr. David Chernomordik. Please refer to the following test data and results.

Sincerely,

Ollie Moyrong
EMC Manager
Intertek Testing Services

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

1.0 Summary of Tests

TEST	REFERENCE	RESULT
Output power	15.247(b)	Complies
6 dB Bandwidth	15.247(a)(2)	Complies
Power Density	15.247(d)	Complies
Out-of-band Antenna Conducted Emission	15.247(c)	Complies

2.0 Mode of Operation During Test

The transmitter was setup to transmit continuously at the low, middle, and high channels with QPSK R 1/2 modulation.

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3.0 Measurement Results

3.1 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) dBm.

Procedure

The Peak Power Meter was connected to the antenna port of the 40400-XX. Power was read directly and cable loss correction was included in the final reading to obtain the power at the 40400-XX antenna terminal.

Test Results

Frequency (MHz)	Output in mW
5740	50.5
5768	50.4
5810	50.8

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3.2 6 dB RF Bandwidth
FCC Rule 15.247(a)(2):

Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz

Procedure

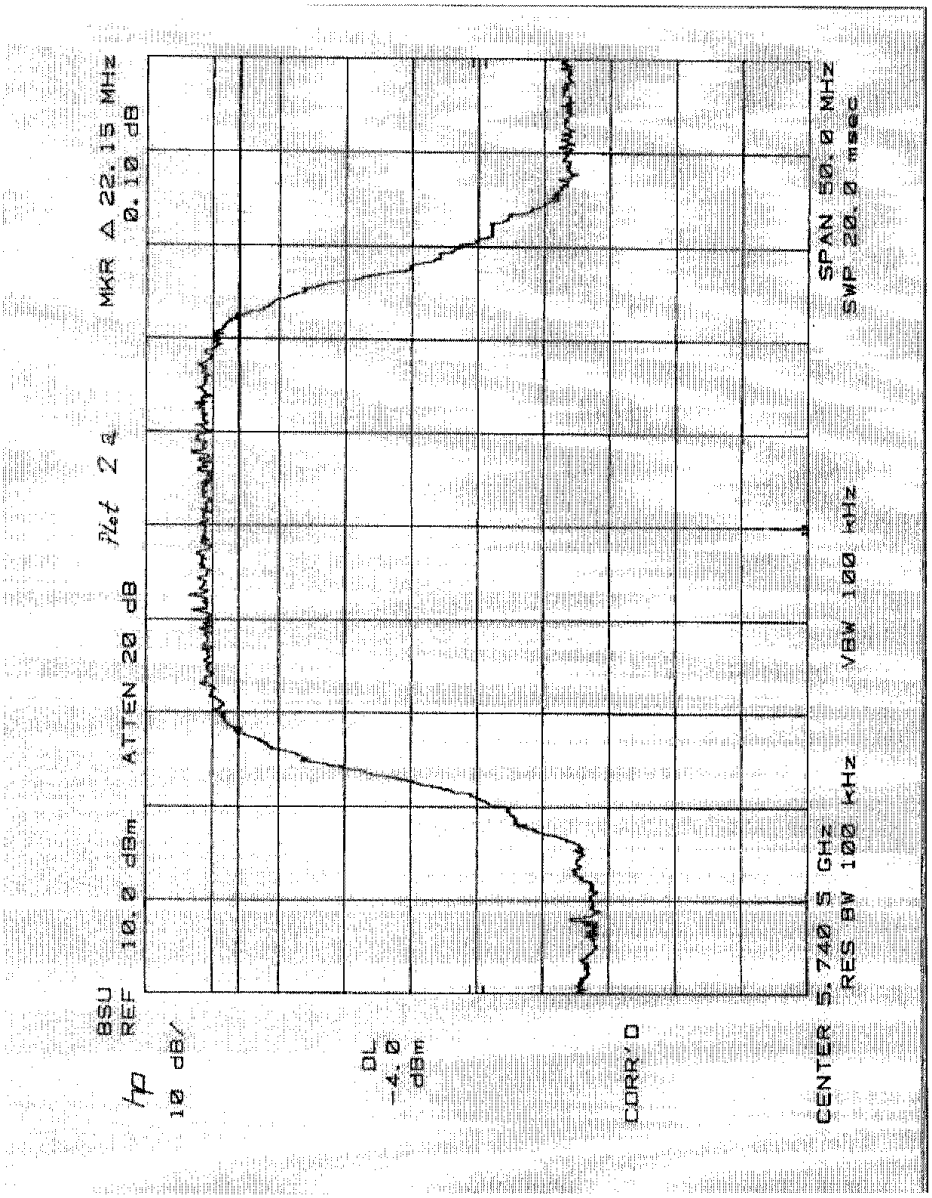
A spectrum analyzer was connected to the antenna port of the transmitter. Analyzer Resolution Bandwidth was set to 100 kHz. For each channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

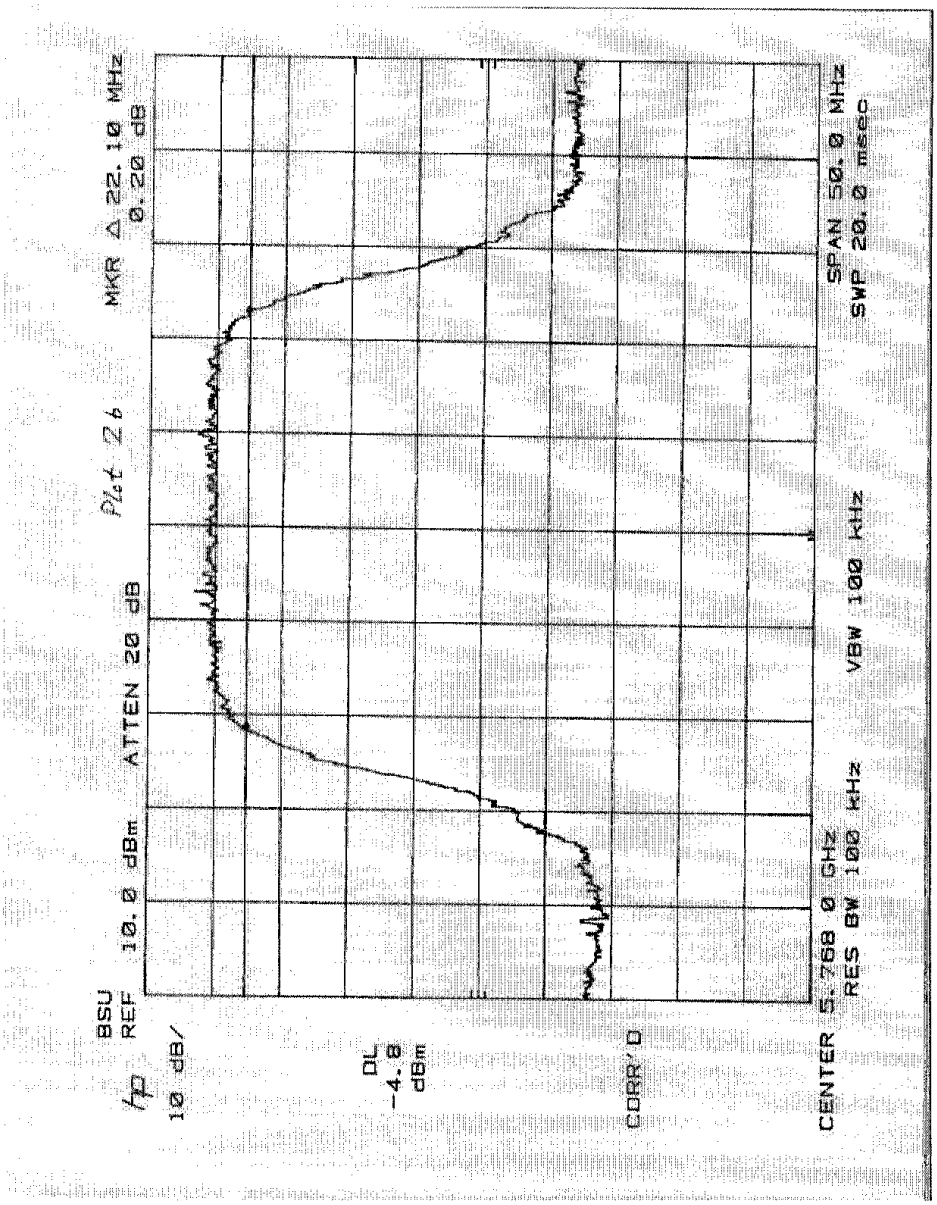
Test Result

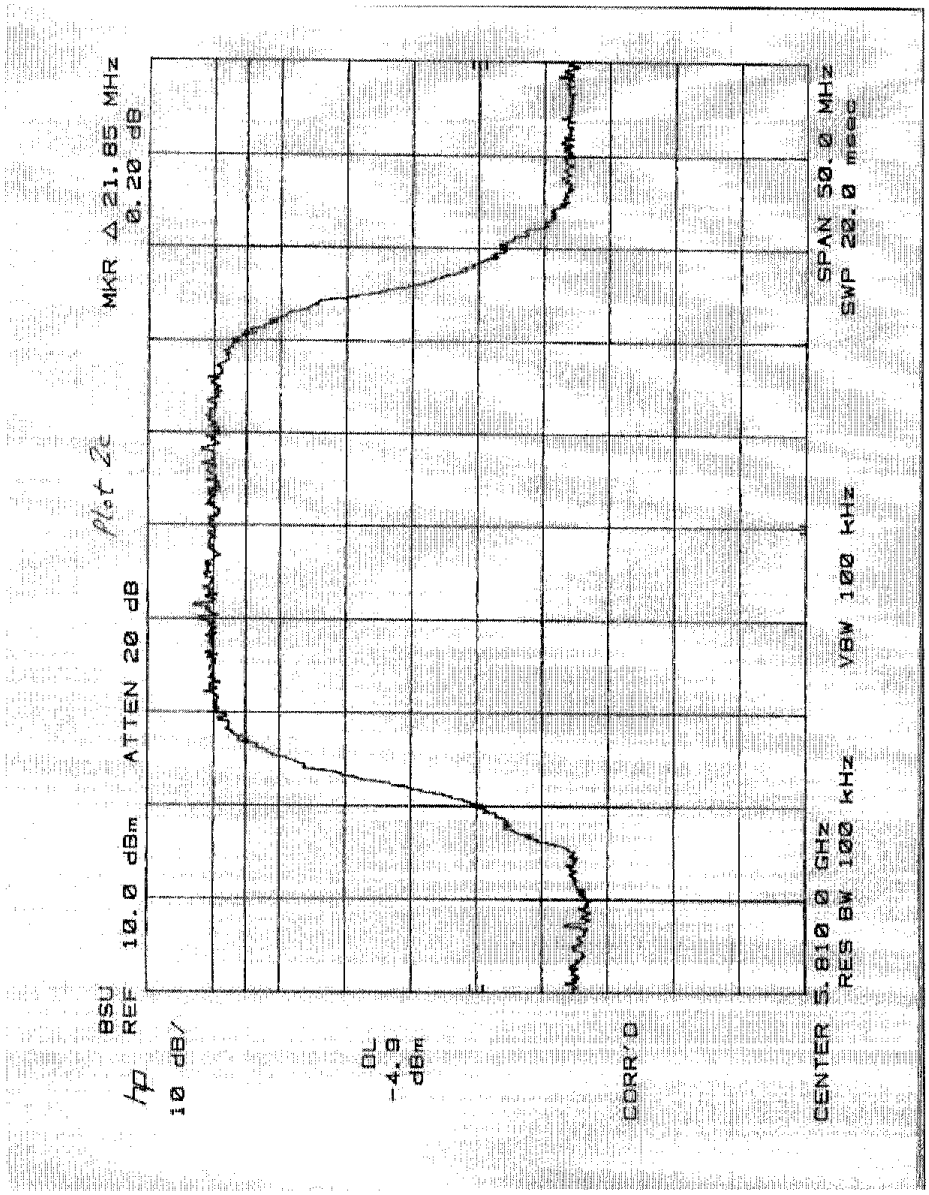
Frequency (MHz)	6 dB Bandwidth
5740	22.15 MHz
5768	22.10 MHz
5810	21.85 MHz

Refer to the following plots for 6 dB bandwidth:

Plot 2a: Low Channel, 6 dB RF Bandwidth
Plot 2b: Middle Channel, 6 dB RF Bandwidth
Plot 2c: High Channel, 6 dB RF Bandwidth


MKR Δ 22.15 MHz
0.10 dB
SPAN 50.0 MHz
SWP 20.0 msec
VBW 100 kHz
ATTEN 20 dB
10.0 dBm
BSU
REF
RES BW 100 kHz
5.740 5 GHz
CENTER
10 dB/
OL
-4.0
dBm
CORR'D


Plot 26
MKR Δ 22.10 MHz
0.20 dB
BSU
REF 10.0 dBm
ATTEN 20 dB
10 dB/
DL
-4.8 dBm
CORR
CENTER 5.768 0 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec


MKR Δ 21.85 MHz
0.20 dB
Plot 2E
BSU
REF 10.0 dBm
ATTEN 20 dB
10 dB/
DL
-4.9 dBm
CORR'D
CENTER 5.810 0 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

3.3 Power Density
FCC Rule 15.247(d):

Requirements

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Procedure

The spectrum analyzer Resolution Bandwidth 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. 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.

Test Result

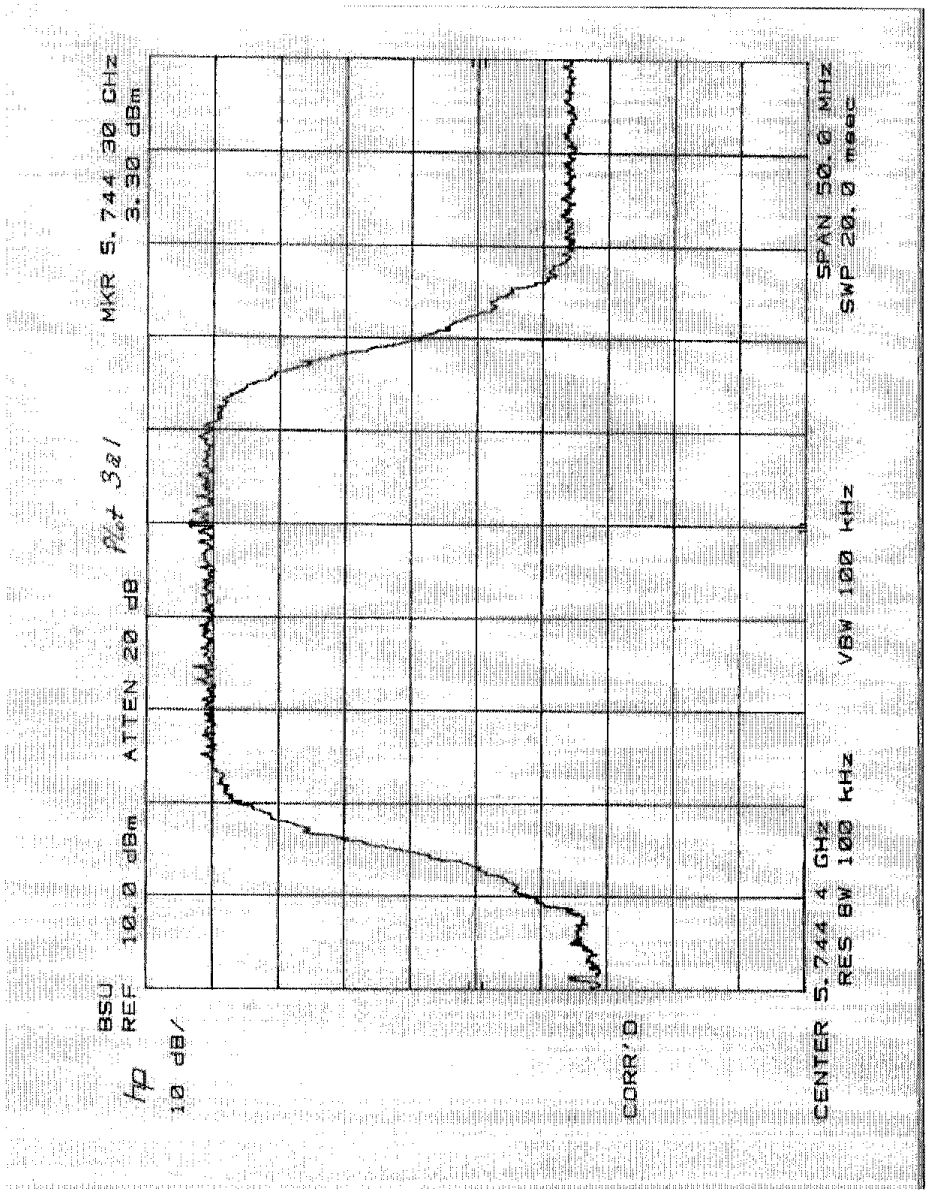
Frequency (MHz)	Power Density (dBm)
5740	-12.6
5768	-13.1
5810	-13.2

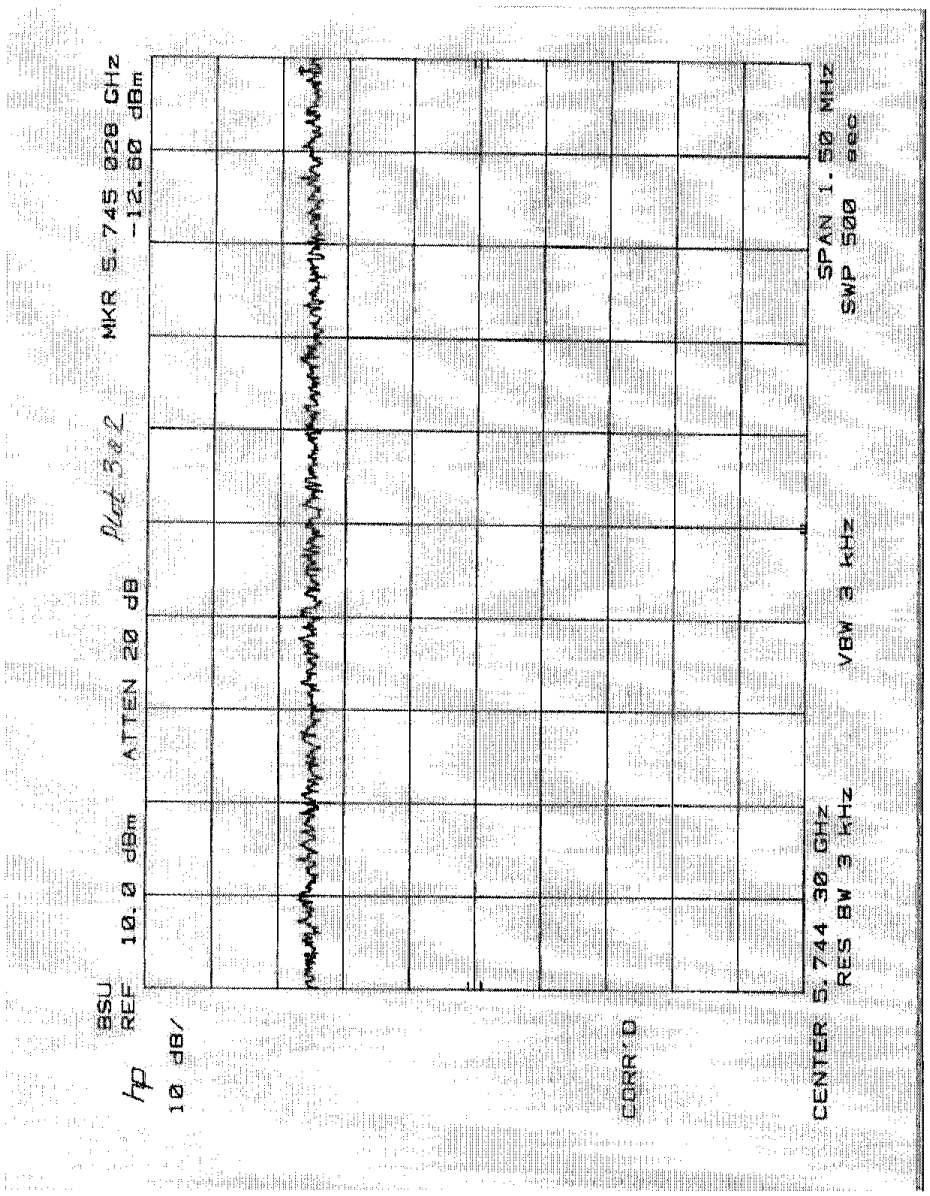
Frequency Span = 1500 kHz

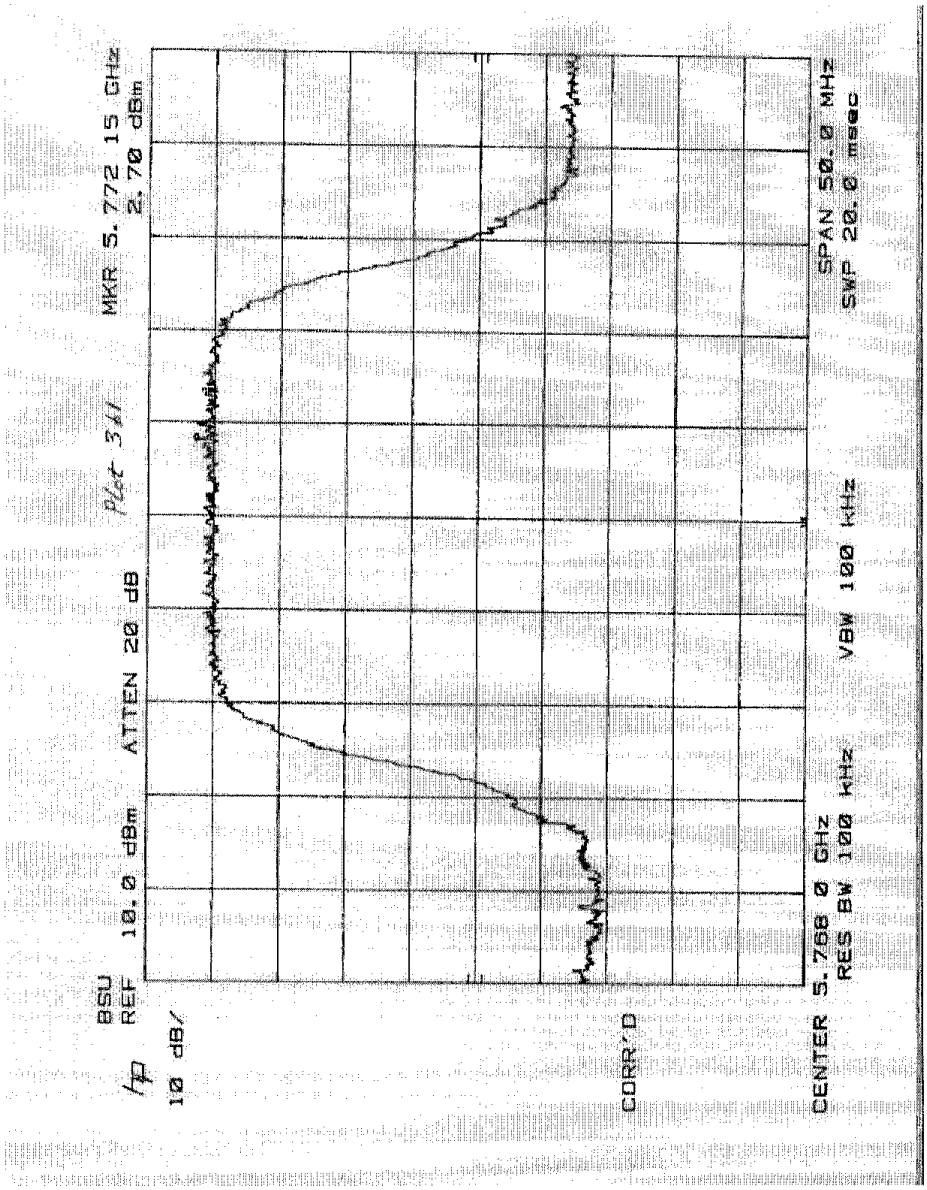
Sweep Time = Frequency Span/3 kHz = 500 Seconds

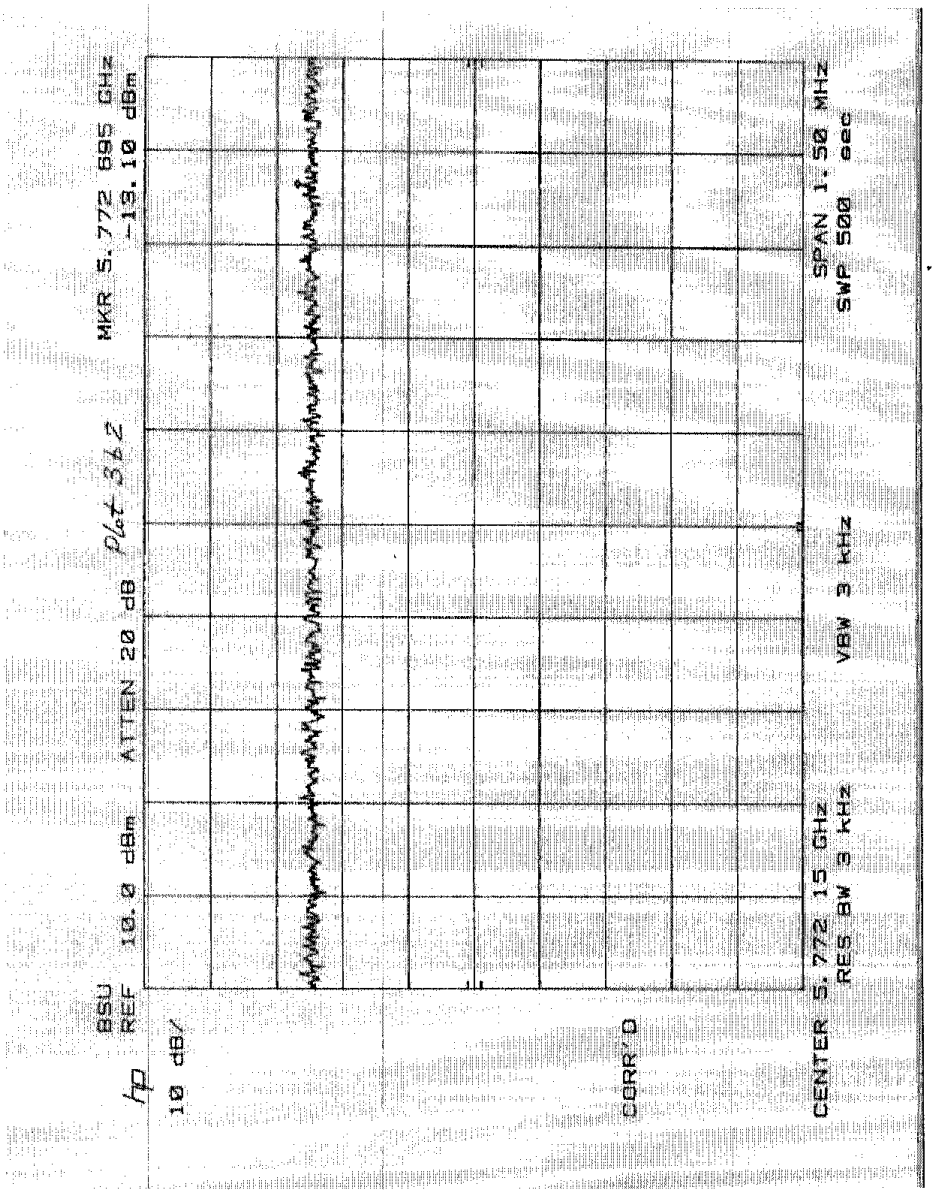
Refer to the following plots for power density data:

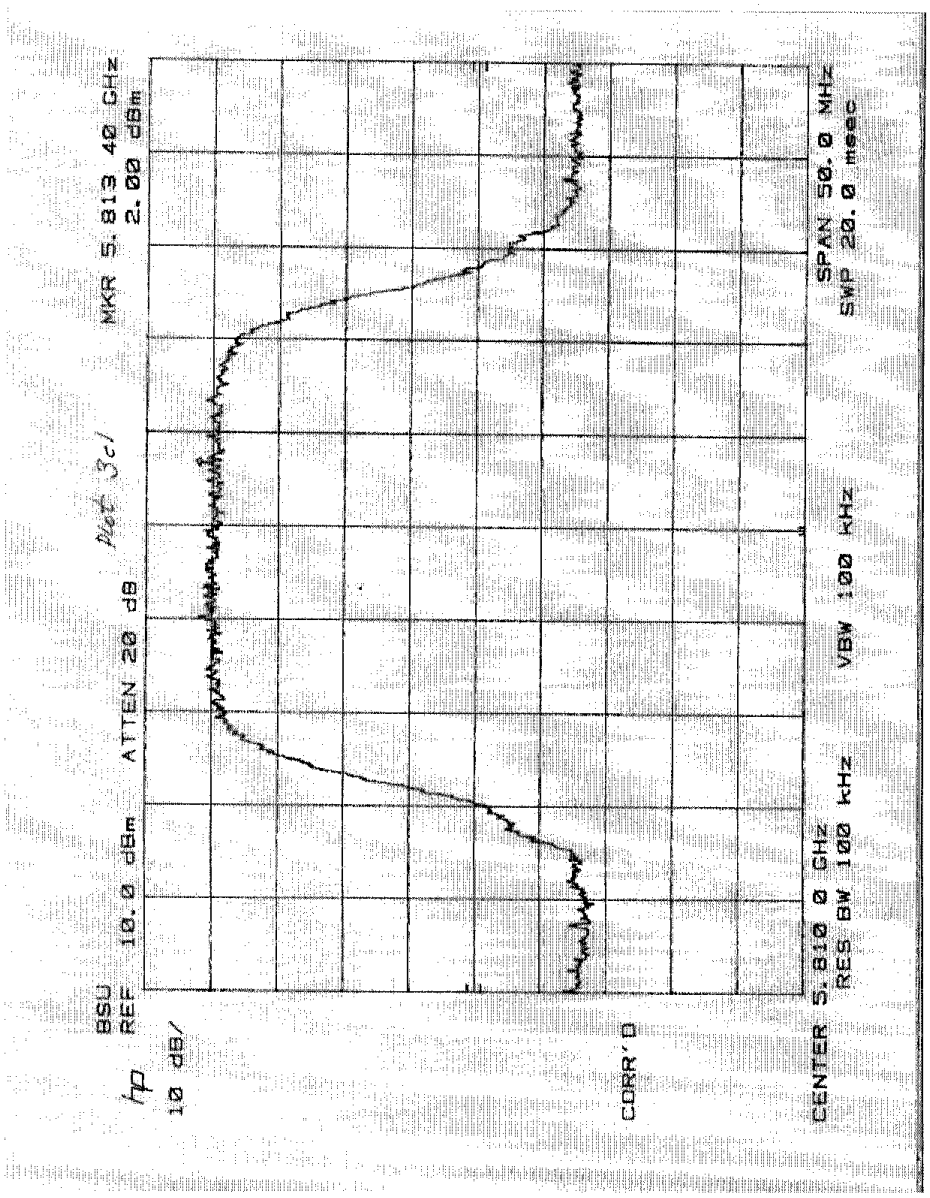
Plot 3a1 – 3a2: Low Channel Power Density
Plot 3b1 – 3b2: Middle Channel Power Density
Plot 3c1 – 3c2: High Channel Power Density

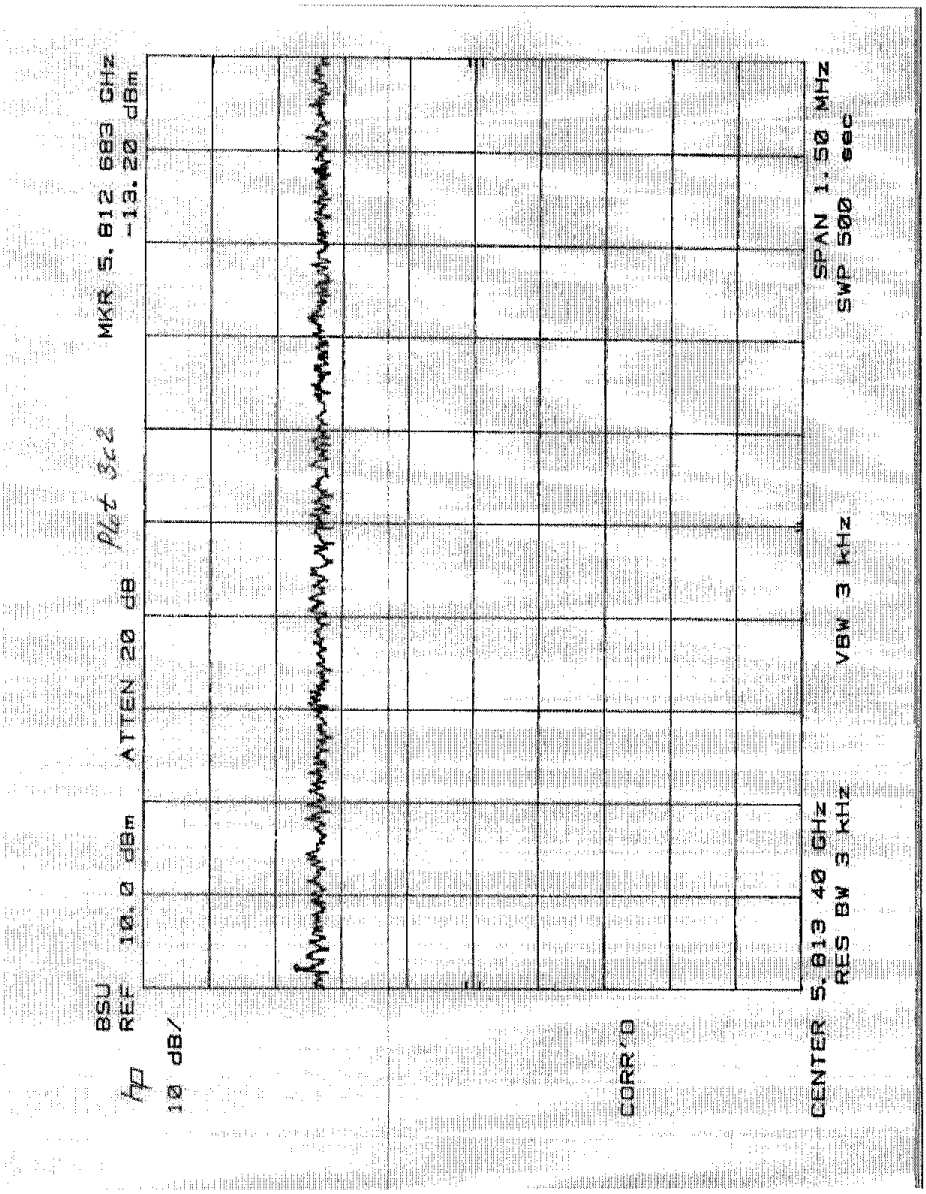

MKR 5.744 30 GHz
3.30 dBm
Ref 3.1
BSU
REF
10.0 dBm
ATTEN 20 dB
10 dB/
CORR'D
CENTER 5.744 4 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec


BSU
REF 10.0 dBm
10 dB/
ATTEN 20 dB
Ref 3d2
MKR 5.745 028 GHz
-12.60 dBm
CORR'D
CENTER 5.744 30 GHz
RES BW 3 kHz
VBW 3 kHz
SPAN 1.50 MHz
SWP 500 sec


BSU
REF 10.0 dBm
ATTEN 20 dB
Plot 3A
MKR 5.772 15 GHz
2.70 dBm
10 dB/
CORR'D
CENTER 5.760 0 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec


BSU
REF 10.0 dBm
10 dB/
ATTEN 20 dB
Plot 362
MKR 5.772 895 GHz
-13.10 dBm
CORR'D
CENTER 5.772 15 GHz
RES BW 3 kHz
VBW 3 kHz
SPAN 1.50 MHz
SWP 500 sec


hp
10 dB/
BSU
REF 10.0 dBm
ATTEN 20 dB
Ref 3c/
MKR 5.813 40 GHz
2.00 dBm
CORR'D
CENTER 5.810 0 GHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec


BSU
REF 10.0 dBm
10 dB/
ATTEN 20 dB
Plot 3c2
MKR 5.812 683 GHz
-13.20 dBm
CORR'D
CENTER 5.813 40 GHz
RES BW 3 kHz
VBW 3 kHz
SPAN 1.50 MHz
SWP 500 sec

3.4 Out-of-Band Conducted Emissions
FCC Rule 15.247(c):

Requirements

In any 100 kHz bandwidth outside the EUT pass-band, the RF power shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

Procedure

A spectrum analyzer was connected to the antenna port of the transmitter. Analyzer Resolution Bandwidth was set to 100 kHz. For each channel investigated, the in-band and out-of-band emission measurements were performed. The out-of-band emissions were measured from 10 MHz to 40 GHz.

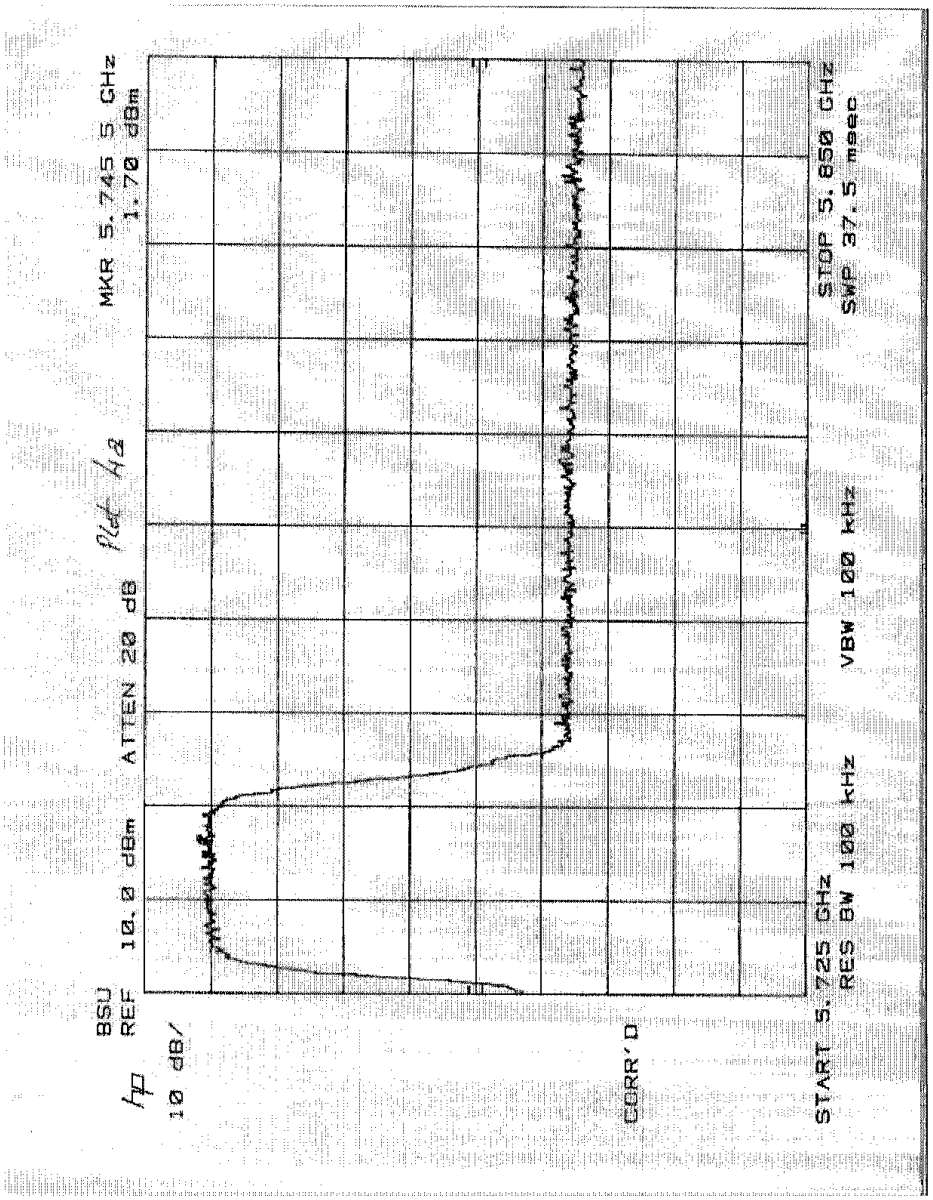
Test Result

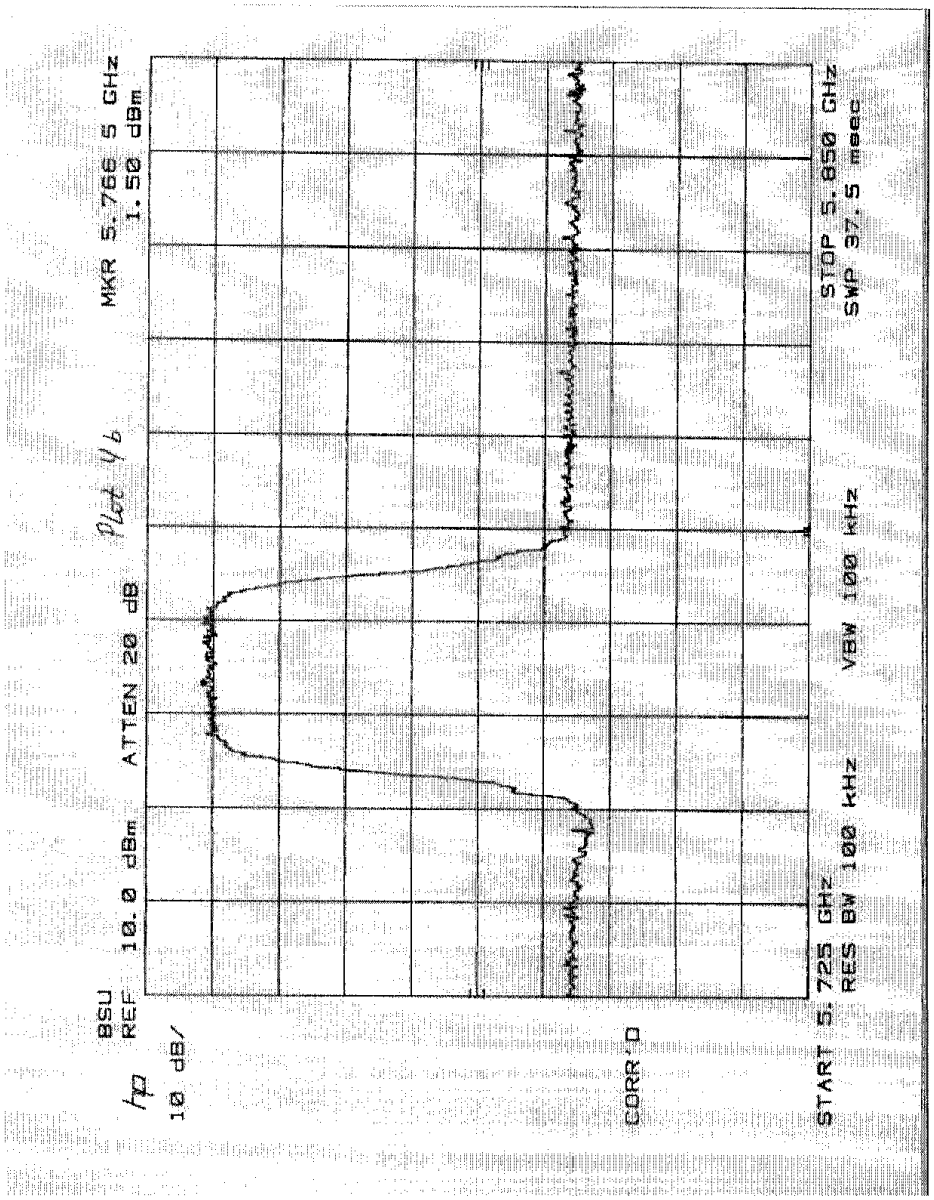
Refer to the following plots for in-band conducted emissions data:

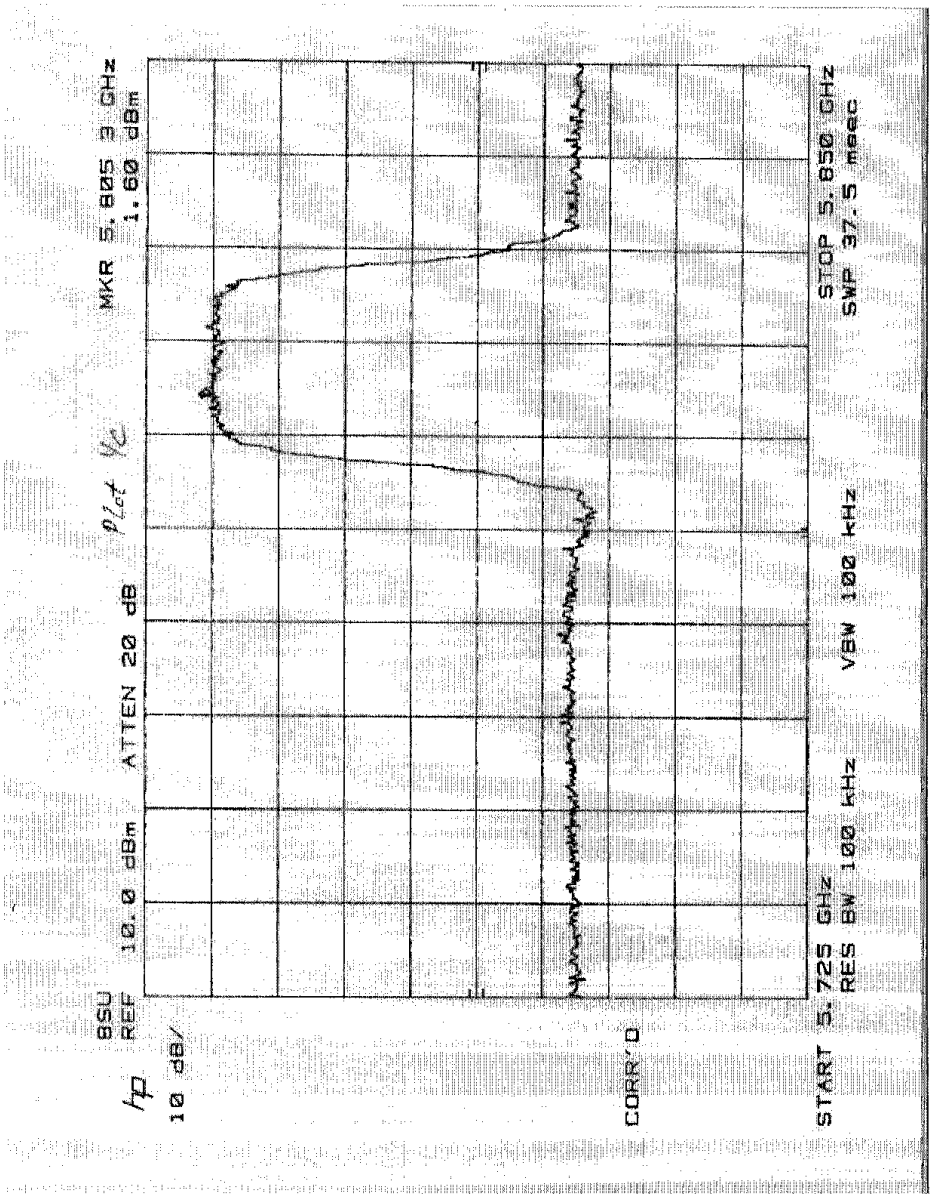
Plot 4a: Low Channel Emissions
Plot 4b: Middle Channel Emissions
Plot 4c: High Channel Emissions

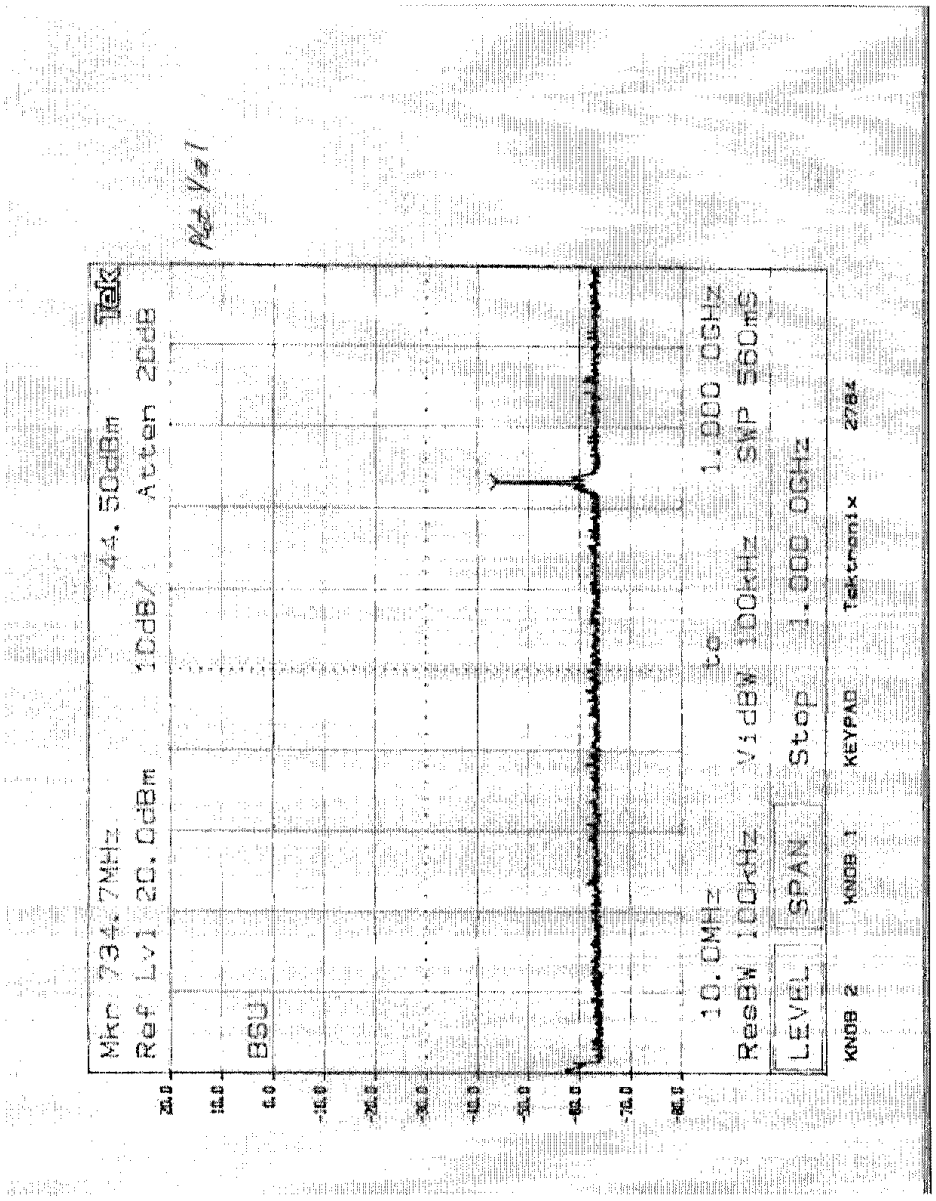
Refer to the following plots for out-of-band conducted emissions data:

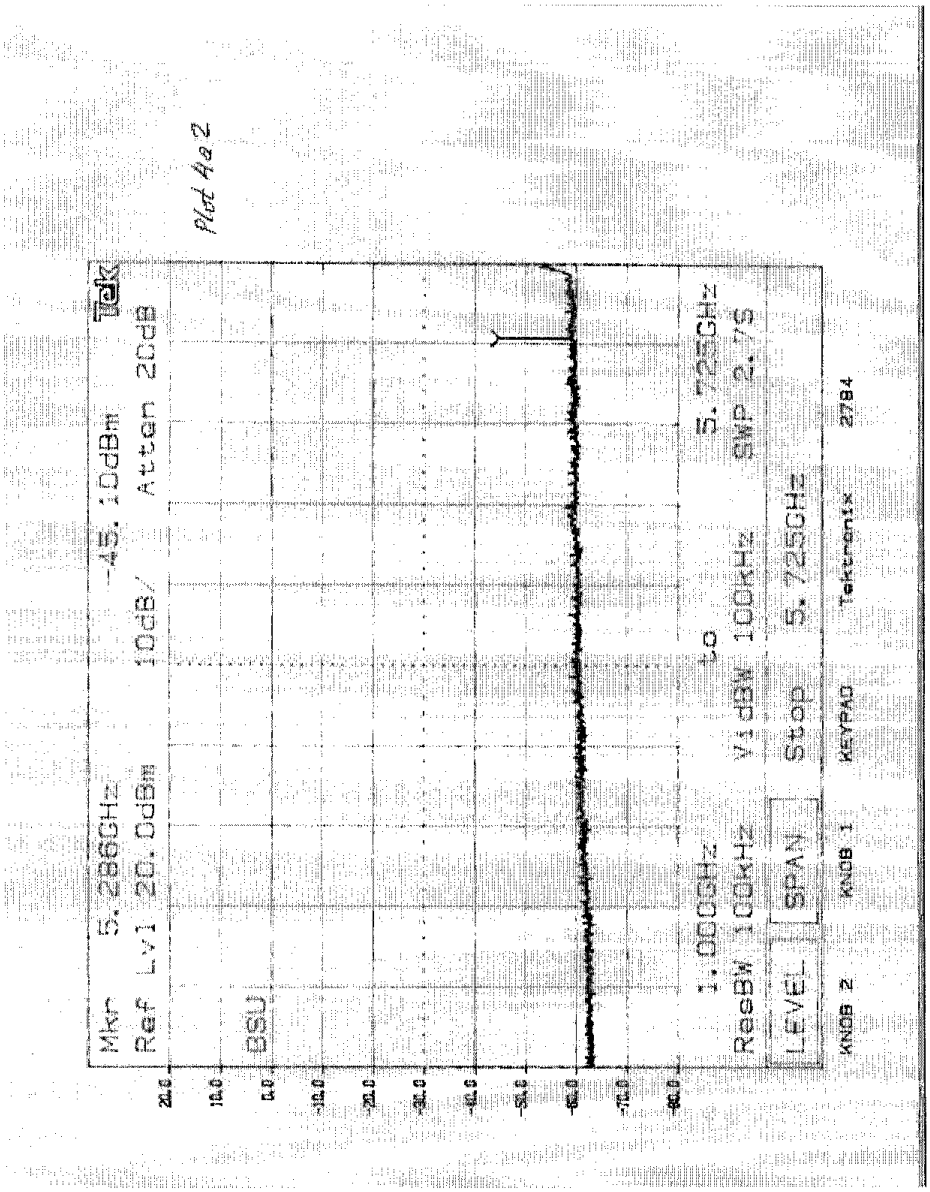
Plot 4a1 – 4a4: Low Channel Emissions
Plot 4b1 – 4b4: Middle Channel Emissions
Plot 4c1 – 4c4: High Channel Emissions

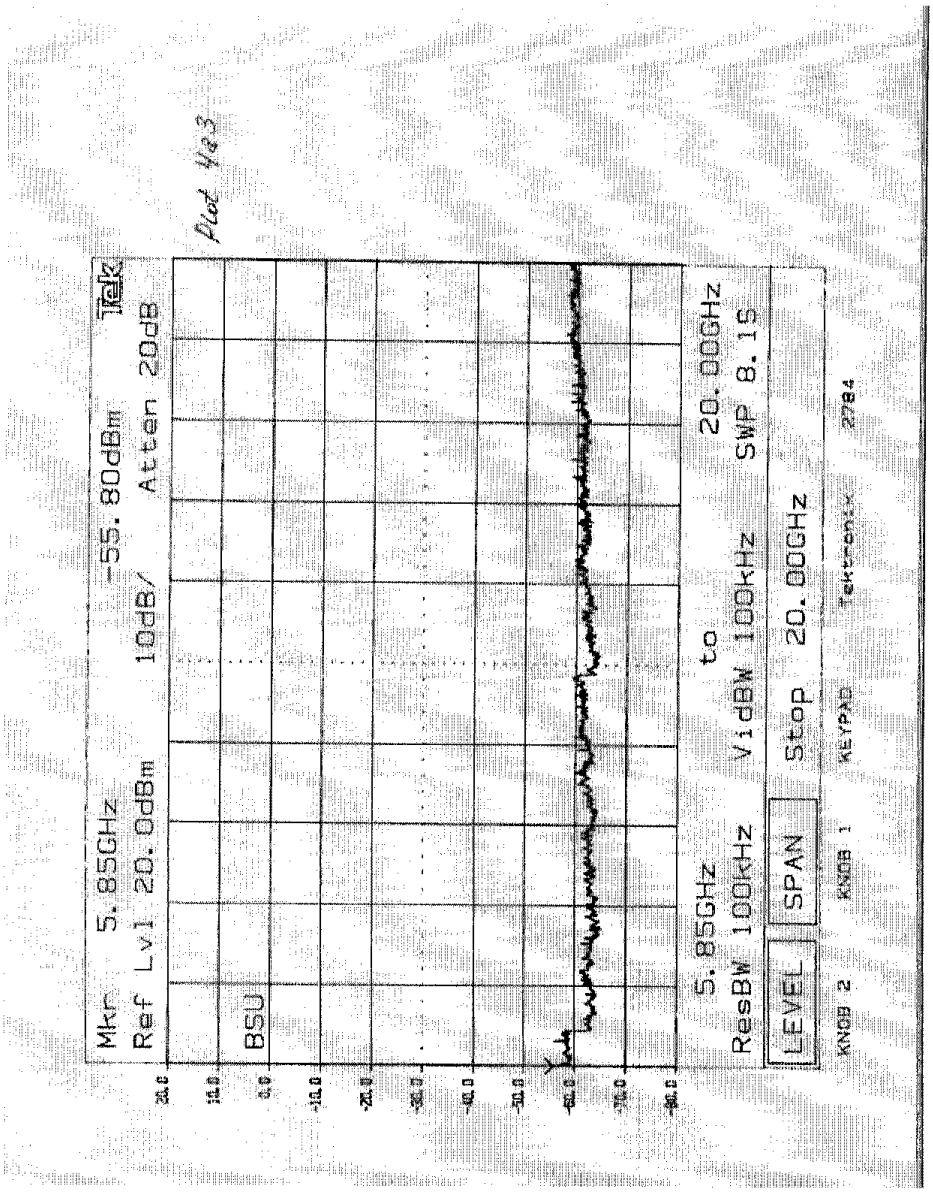

MKR 5.745 5 GHz
1.70 dBm
STOP 5.850 GHz
SWP 37.5 msec
BSU
REF 10.0 dBm
ATTEN 20 dB
VBW 100 kHz
10 dB/
CORR'D
START 5.725 GHz
RES BW 100 kHz

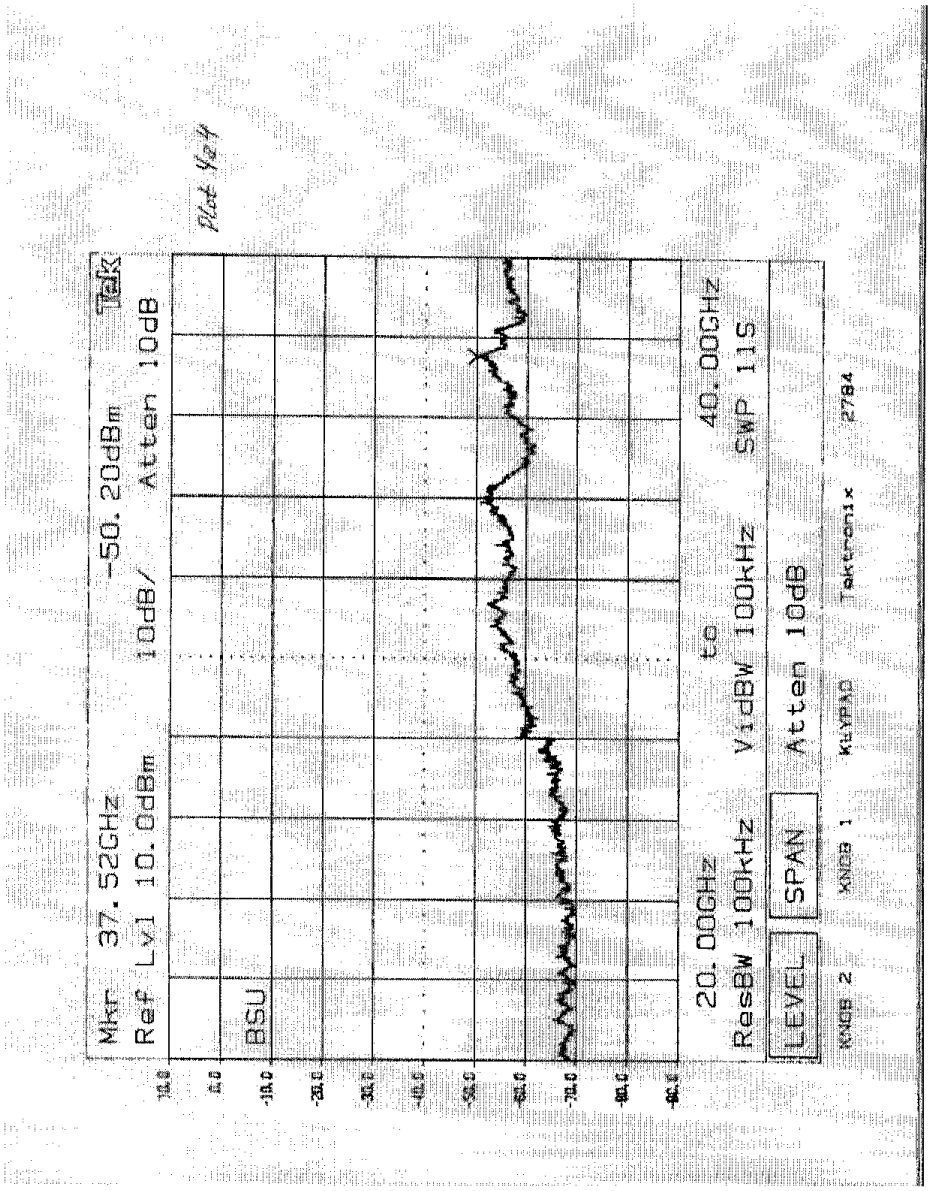

MKR 5.766 5 GHz
1.50 dBm
BSU
REF 10.0 dBm
ATTEN 20 dB
10 dB/
CORR
START 5.725 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 5.850 GHz
SWP 37.5 msec

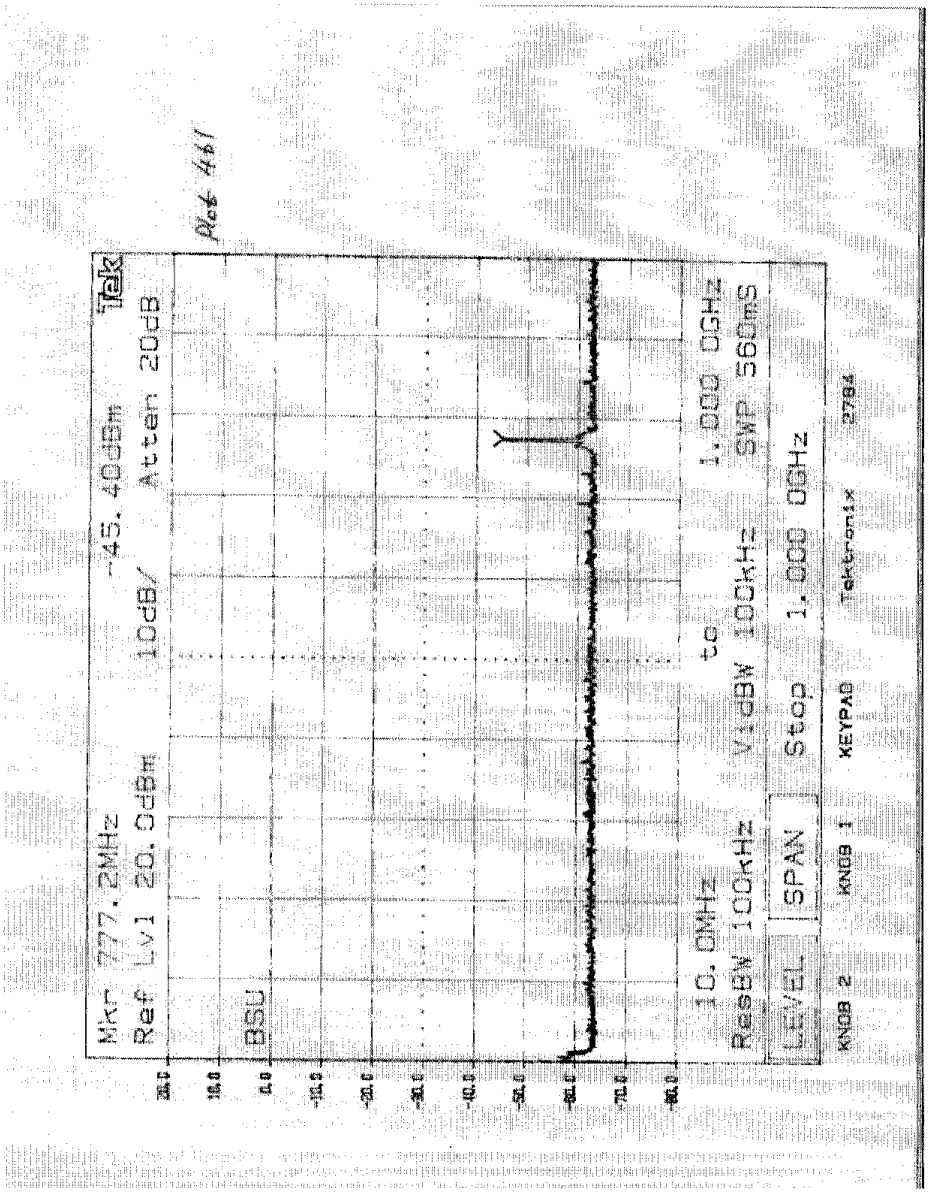

MKR 5.805 3 GHz
1.60 dBm
STOP 5.850 GHz
SWP 37.5 msec
BSU
REF 10.0 dBm
ATTEN 20 dB
10 dB/
CORR'D
START 5.725 GHz
RES BW 100 kHz
VBW 100 kHz

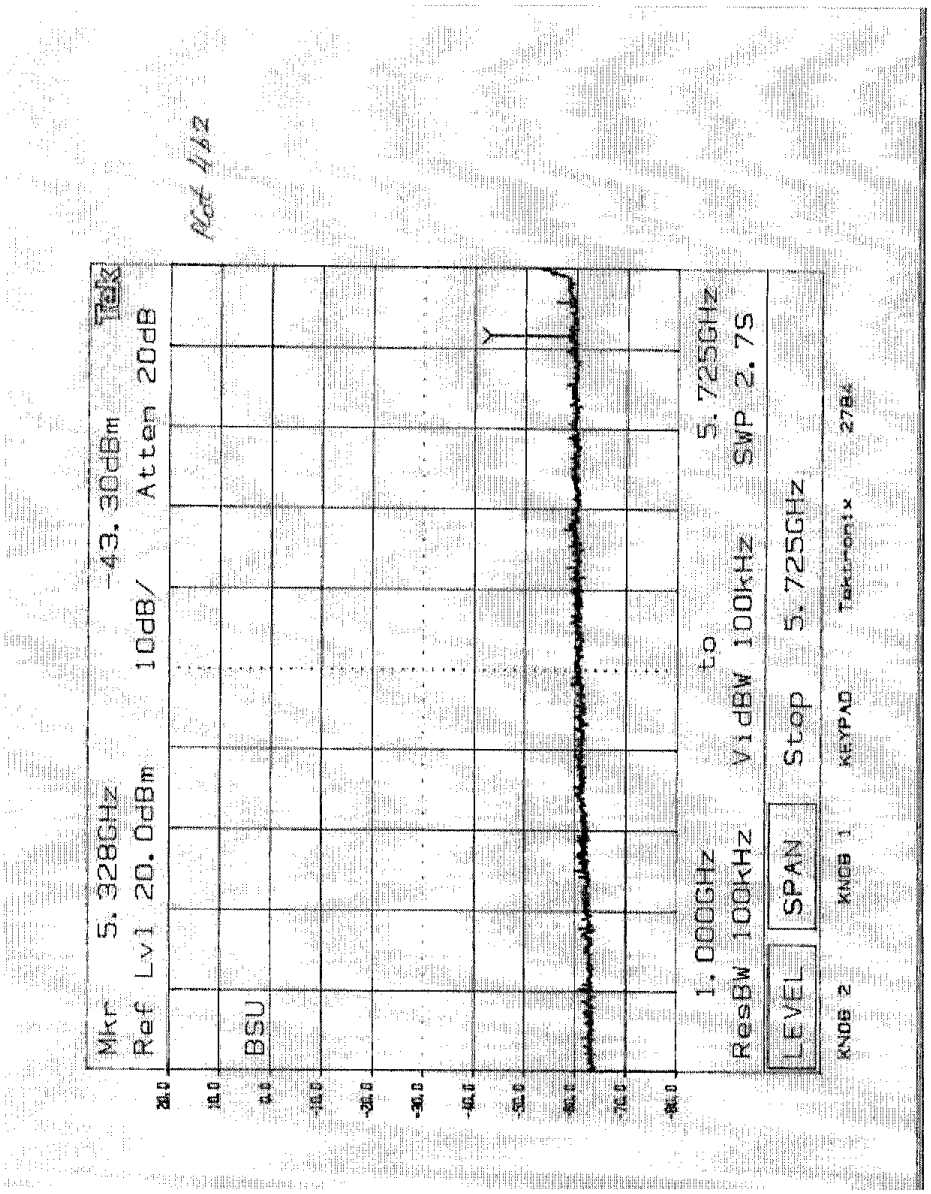

Tek
Mkr 734.7MHz
-44.50dBm
Ref Lvl 20.0dBm
10dB/
Atten 20dB
BSU
10.0MHz
ResBW 100kHz
VidBW 100kHz
SWP 560mS
LEVEL
SPAN
Stop
1.000 0GHz
1.000 0GHz
KNOB 1
KEYPAD
Tektronix
2784
KNOB 2

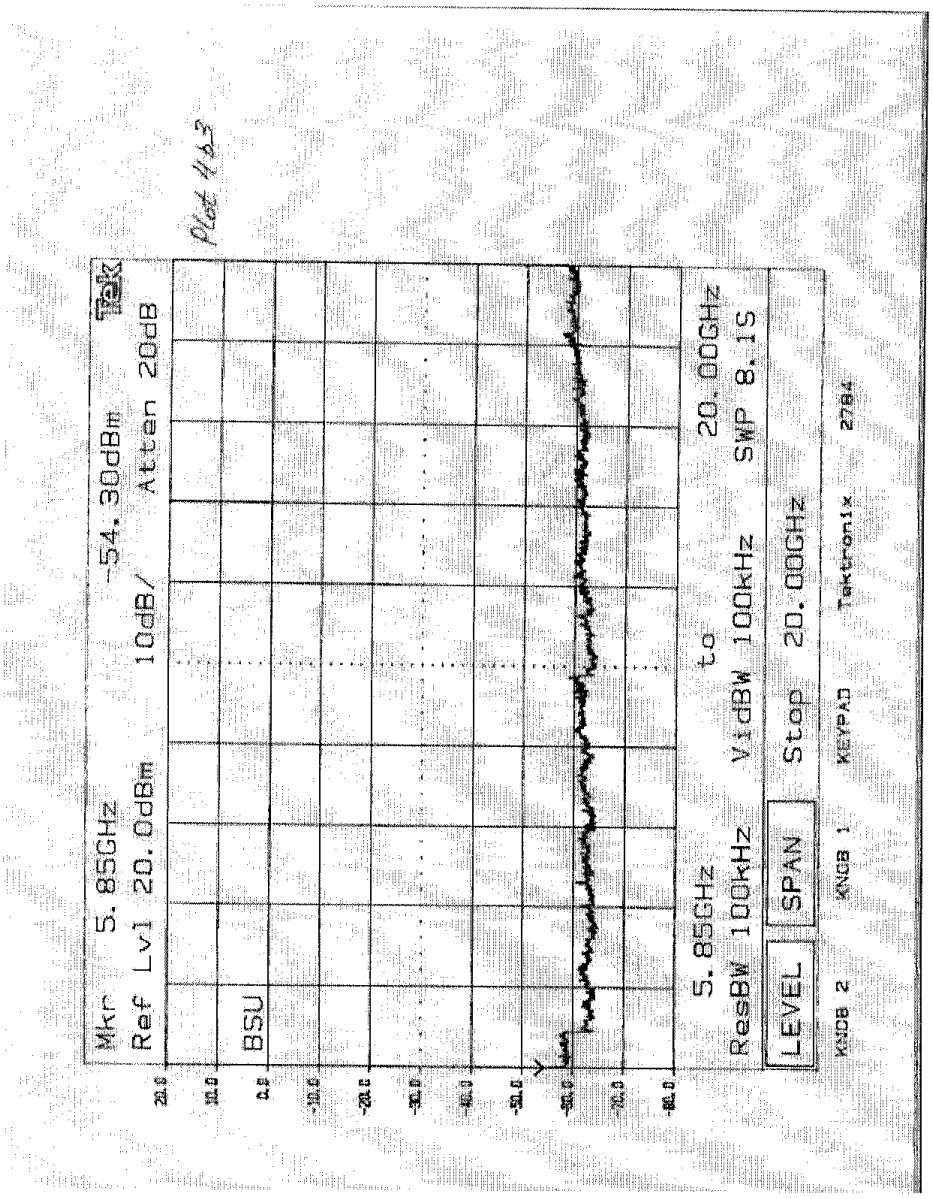

Plot 4a 2
Tek
Mkr 5.286GHz -45.10dBm
Ref Lvl 20.00dBm 10dB/ Atten 20dB
BSU
ResBW 100kHz VidBW 100kHz SWP 2.7S
1.000GHz to 5.725GHz
LEVEL SPAN Stop 5.725GHz
KNOB 2 KNOB 1 KEYPAD Tektronix 2784

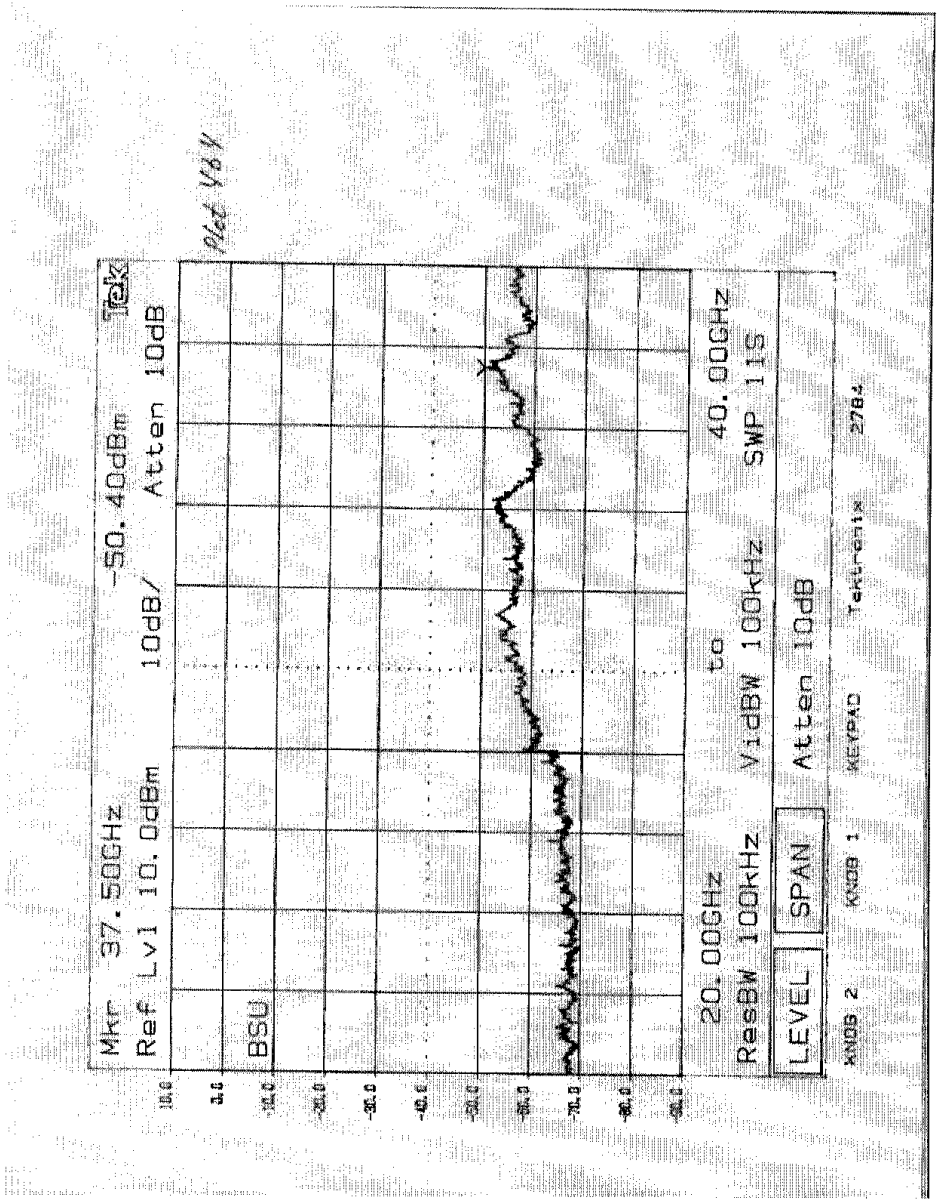

Plot #3
Mkr 5.85GHz -55.80dBm
Ref Lvl 20.0dBm 10dB/ Atten 20dB
BSU
5.85GHz to 20.00GHz
ResBW 100kHz VidBW 100kHz SWP 8.1S
LEVEL SPAN Stop 20.00GHz
KNOB 2 KNOB 1 KEYPAD
2784

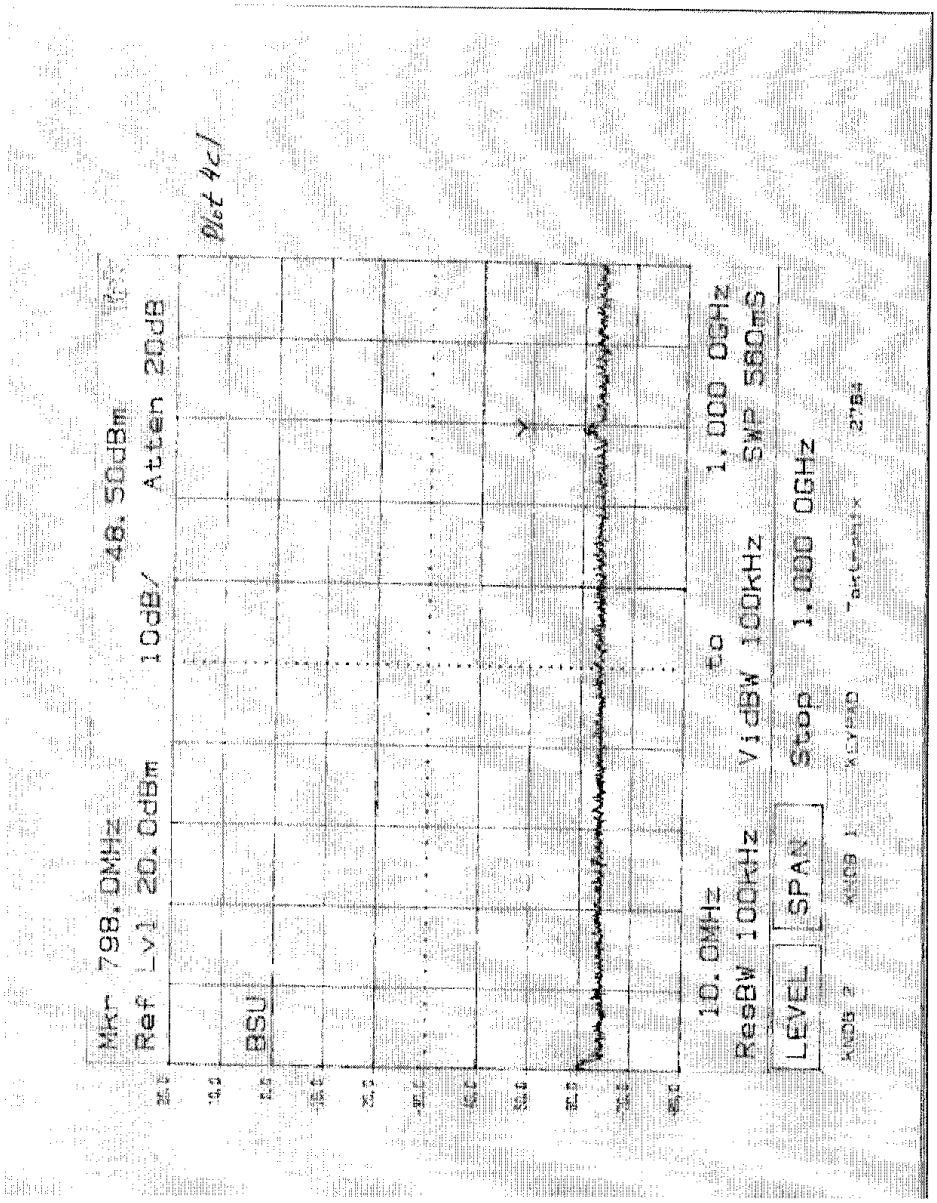

Plot 4 of 4
Mkr 37.52GHz
-50.20dBm
Ref Lvl 10.0dBm
10dB/
Atten 10dB
Tek
BSU
20.00GHz
to
40.00GHz
ResBW 100kHz
VidBW 100kHz
SWP 11S
LEVEL
SPAN
Atten 10dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

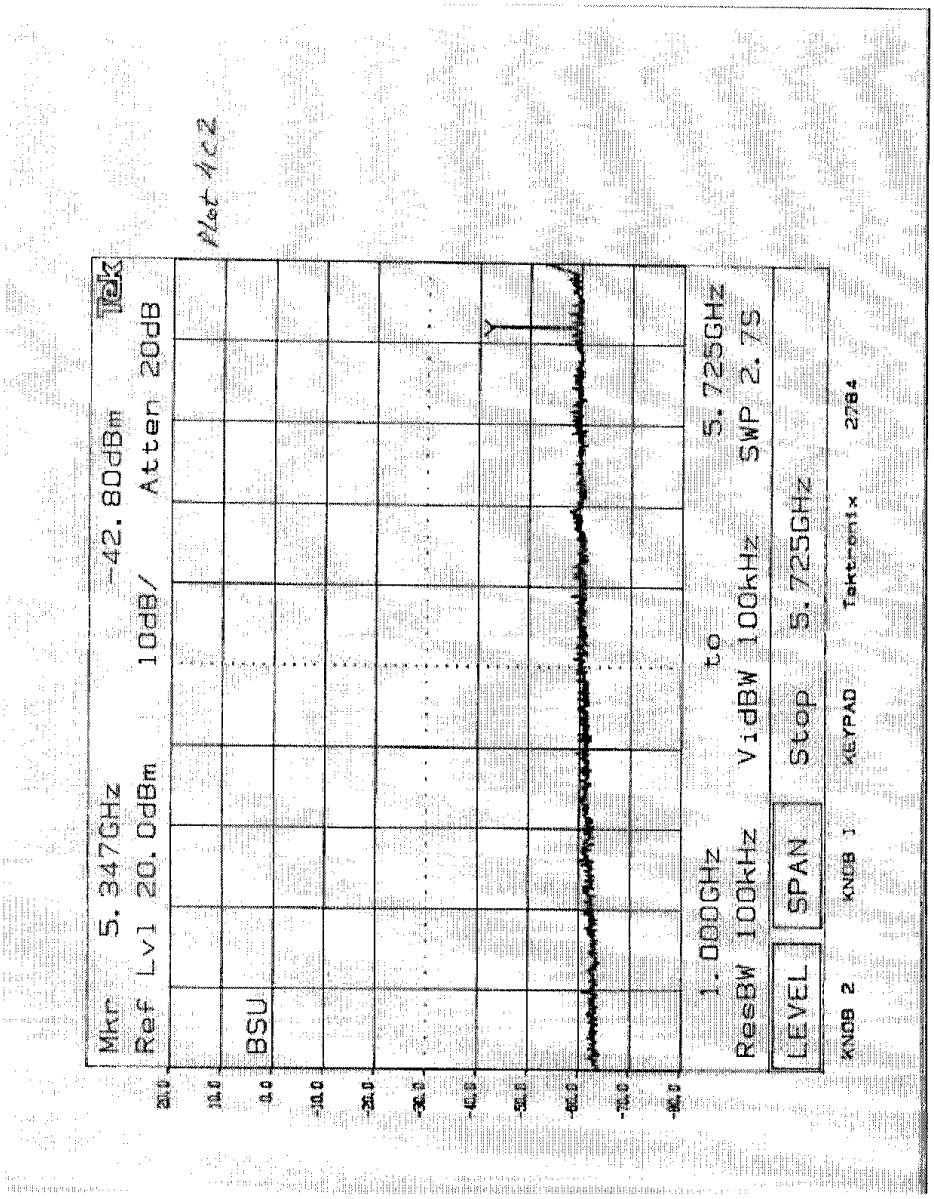

Ref 4dB
Tek
Mkr 777.2MHz
Ref Lvl 20.0dBm
-45.40dBm
10dB/
Atten 20dB
BSU
10.0MHz
ResBW 100kHz
to
VidBW 100kHz
1.000 0GHz
SWP 560mS
LEVEL
SPAN
Stop 1.000 0GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

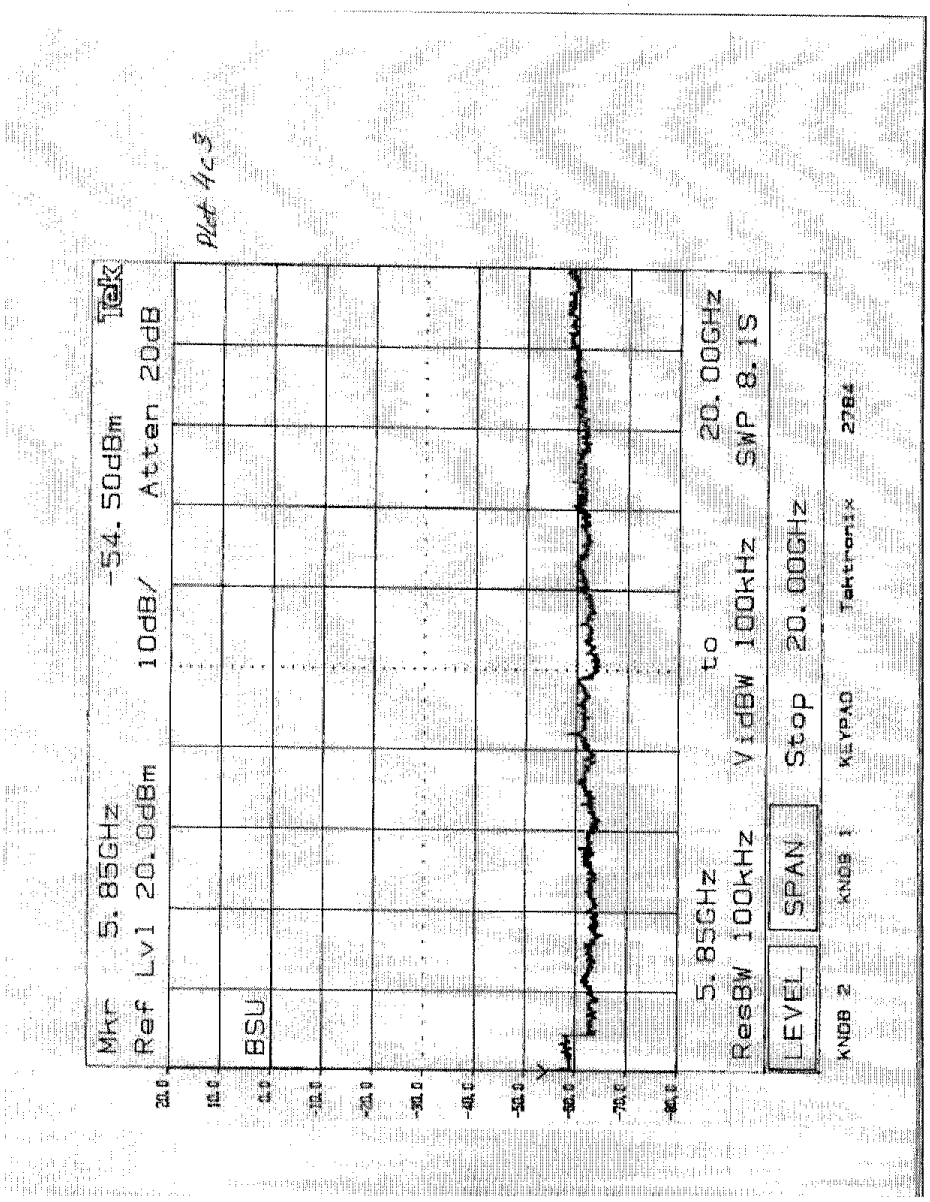

Ref 4/2
Mkr 5.328GHz -43.30dBm
Ref Lvl 20.0dBm 10dB/ Atten 20dB
BSU
1.000GHz to 5.725GHz
ResBW 100kHz VidBW 100kHz SWP 2.7S
LEVEL SPAN Stop 5.725GHz
KNOB 2 KNOB 1 KEYPAD
Tektronix 2784

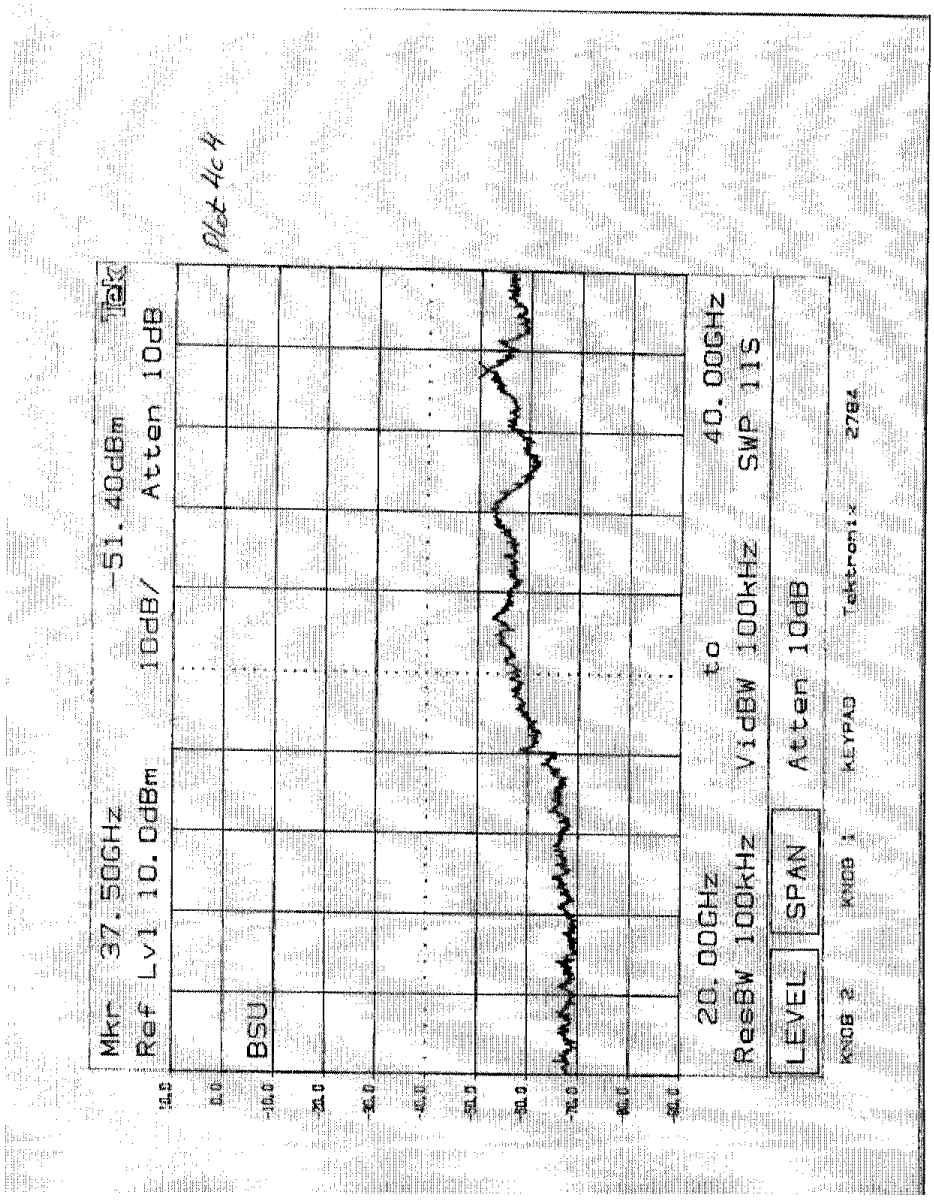

Plot #53
Mkr 5.85GHz
-54.30dBm
Ref Lvl 20.0dBm
10dB/
Atten 20dB
BSU
5.85GHz
ResBW 100kHz
to
VidBW 100kHz
20.00GHz
SWP 8.1S
LEVEL
SPAN
Stop 20.00GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Mkr 37.500GHz
Ref Lvl 10.0dBm
10dB/
-50.40dBm
Atten 10dB
Tek
Plot V&H
BSU
20.000GHz
ResBW 100kHz
to
40.000GHz
VidBW 100kHz
SWP 11S
LEVEL
SPAN
Atten 10dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Mkr 798.0MHz
-48.50dBm
Ref Lvl 20.0dBm
10dB/
Atten 20dB
Plot #2
BSU
10.0MHz
ResBW 100kHz
to
VidBW 100kHz
1.000 0GHz
SWP 580mS
LEVEL
SPAN
Stop
1.000 0GHz


Plot 4c2
Mkr 5.347GHz
-42.80dBm
Ref Lvl 20.0dBm
10dB/
Atten 20dB
BSU
1.000GHz
to
5.725GHz
ResBW 100kHz
VidBW 100kHz
SWP 2.7S
LEVEL
SPAN
Stop
5.725GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Plot 4c-3
Mkr 5.85GHz
Ref Lvl 20.0dBm
-54.50dBm
10dB/
Atten 20dB
Tek
BSU
5.85GHz
ResBW 100kHz
to
20.00GHz
VidBW 100kHz
SWP 8.1S
LEVEL
SPAN
Stop 20.00GHz
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784


Plot 4c 4
Mkr 37.50GHz
-51.40dBm
Ref Lvl 10.0dBm
10dB/
Atten 10dB
BSU
20.00GHz
to
40.00GHz
ResBW 100kHz
VidBW 100kHz
SWP 11S
LEVEL
SPAN
Atten 10dB
KNOB 2
KNOB 1
KEYPAD
Tektronix
2784

4.0 List of Test Equipment

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. INTERVAL	CAL. DUE
Spectrum Analyzer	Hewlett Packard	8566B	2416A00317 2043A00251	12	2/23/02
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/08/02
Peak Power Meter	Hewlett Packard	8900D	3607U00673	12	8/08/02

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