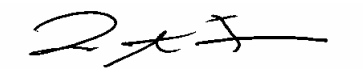
Cirronet
FCC Part 15, Certification Application
WIT2410G Spread Spectrum Transceiver

UST Project: 05-0311
Issue Date: March 16, 2006

3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
www.ustech-lab.com

I certify that I am authorized to sign for the manufacturer and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

UNITED STATES TECHNOLOGIES, INC. (AGENT RESPONSIBLE FOR TEST):

By: 

Name: Louis A. Feudi

Title: Operations Manager

Date: March 16, 2006

Cirronet Corporation
5375 Oakbrook Parkway
Norcross, GA 30093

By:

Name:

Title:

Date:

MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **Cirronet**

MODEL: **WIT2410G**

FCC ID: **HSW-2410G**

DATE: **March 16, 2006**

This report concerns (check one): Original grant X
Class II change_____

Equipment type: **2.4 GHz Spread Spectrum Transceiver**

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until:_____
date

N.A. agrees to notify the Commission by N.A.
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

United States Technologies, Inc.
3505 Francis Circle
Alpharetta, GA 30004

Phone Number: (770) 740-0717
Fax Number: (770) 740-1508

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GENERAL INFORMATION

GENERAL INFORMATION

1.1 Product Description

The Equipment Under Test (EUT) is a Cirronet, Model WIT2410G modular 2.4 GHz spread spectrum transceiver. The EUT will be used with one of 15 different antennas.

1.2 Related Submittal(s)/Grant(s)

The EUT will be used to send/receive data. The transceiver presented in this report will be used with other like transceivers:

The EUT is subject to the following authorizations:

a) Certification as a transceiver (modular approval)
b) Verification as a digital device

The information contained in this report is presented for the certification & verification authorization(s) for the EUT. The manufacturer desires to seek a modular approval on this device.

SECTION 2

TESTS AND MEASUREMENTS

TEST AND MEASUREMENTS

2.1 Configuration of Tested System

The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Bock diagrams of the tested systems are shown in Figures 1a and 16. Test configuration photographs for spurious and fundamental emissions are shown in Figure 2a -g.

The sample used for testing was received by U.S. Technologies on February 8, 2006 in good condition.

2.2 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and submitted to the FCC, and accepted in their letter marked 31040/SIT. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number IC2982.

2.3 Test Equipment

Table 2 describes test equipment used to evaluate this product.

2.4 Modifications

No modifications were made by US Tech, to bring the EUT into compliance with FCC Part 15, Class B Limits for the transmitter portion of the EUT or the Class B Digital Device Requirements.

FIGURE 1a
TEST CONFIGURATION
(Dipole Antenna)

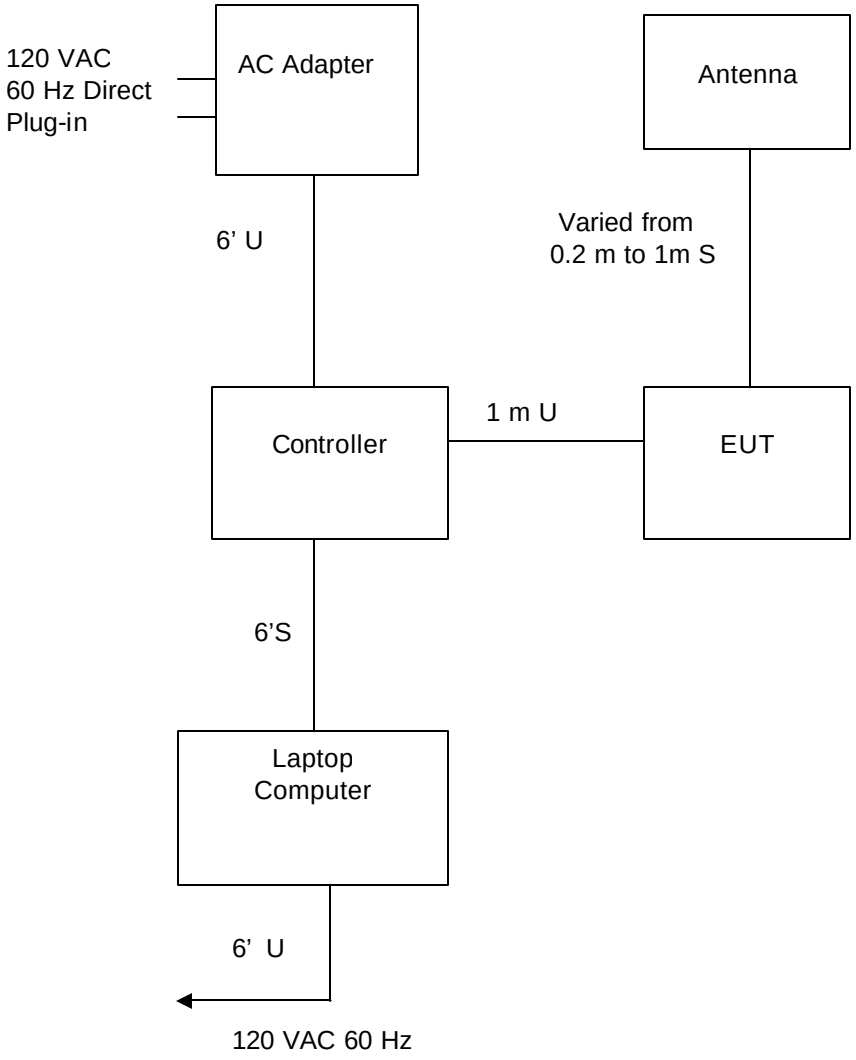


TABLE 1

Test Date: 12/21/05, 02/26/06, & March 6, 2006
UST Project: 05-0311
Customer: Cirronet
Model: WIT2410G

EUT and Peripherals

PERIPHERAL MANU.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
(EUT) Cirronet	WIT2410G	008517	HSW-2410G	1 m U
Antenna Various, see antenna descriptions			None	Varied from 0.2 to 1 m S
AC Adapter Volgen	SPU10R-1	None	None	6' U 120 VAC/ 60 Hz Direct Plug-in
Controller Cirronet	None	None	None	6' S
Laptop Computer Compaq	Armada 7400	7908BXL2036	Not Visable	6' U 120 VAC/ 60 Hz Power Cord

TABLE 2
TEST INSTRUMENTS

EQUIPMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	7/05/05
SIGNAL GENERATOR	8648B	HEWLETT-PACKARD	3642U01679	9/15/05
RF PREAMP	8447D	HEWLETT-PACKARD	2944A06291	4/6/05
BICONICAL ANTENNA	3110B	EMCO	9307-1431	5/31/05
LOG PERIODIC	3146	EMCO	3110-3236	6/3/05
LISN (x 2) 8028-50-TS24-BNC	8028	SOLAR ELE.	910494 & 910495	3/29/06
HORN ANTENNA	SAS-571	A. H. SYSTEMS	605	04/1/05
PREAMP	8449B	HEWLETT PACKARD	3008A00480	06/30/05
CALCULATION PROGRAM	N/A	N/A	Ver. 6.0	N/A

2.5 Antenna Description (Paragraph 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Cirronet Corporation will sell the WIT2410G with one of the following antennas.

MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB	TYPE OR CONNECTOR
Fixed Antennas				
Andrews	Parabolic Dish	26T-2400A	24 dBi	Reverse N to MMCX via adapter cable
Hyperlink Technologies, Inc.	Parabolic Dish	2424GC	24 dBi	Reverse N to MMCX via adapter cable
Andrews	Parabolic Dish	18T-2400 A	18 dBi	Reverse N to MMCX via adapter cable
Mobile Antennas				
ACE	Dipole	ACE-2400NF	2 dBi	Reverse SMA to MMCX via adapter cable
Cushcraft	Yagi	PC2415-RTNF	15 dBi	Reverse TNC to MMCX via adapter cable
Mobile Mark	Omni-Directional	OD6-2400-RNTC	6 dBi	Reverse TNC to MMCX via adapter cable
Mobile Mark	Corner Reflector	SCR14-2400PTA-RTNC	14 dBi	Reverse TNC to MMCX via adapter cable
Mobile Mark	Corner Reflector	SCR9-2400-RN	9 dBi	Reverse N to MMCX via adapter cable
Mobile Mark	Vehicle Mount Stub	RM3-2400-RTNC	2.5 dBi	Reverse TNC to MMCX via adapter cable
Mobile Mark	Omni	OD9-2400MUF24005	9 dBi	Reverse TNC to MMCX via adapter cable
MaxRad	Whip	MUF24005.RTNC	5 dBi	Reverse TNC to MMCX via adapter cable
MaxRad	Whip Magnetic Mount (Mobile Vehicle Whip)	MUF24005.RTNC	5 dBi	Reverse TNC to MMCX via adapter cable
Digital Wireless Corporation	Patch	PA2400	Appx. 3 dBi	Reverse TNC to MMCX via adapter cable
Cirronet Corporation	Patch	GA Tech	12 dBi	Non-standard MMCX
Cirronet Corporation	Patch	PA2410	6dBi	Non-standard MMCX

For the purposes of this application, the following antennas were tested as representative of the antennas listed above and tested to the requirements of FCC Part 15.

MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB	TYPE OR CONNECTOR
ACE	Dipole	ACE-2400NF	2 dBi	Reverse SMA to MMCX via adapter cable
Cushcraft	Yagi	PC2415-RTNF	15 dBi	Reverse TNC to MMCX via adapter cable
Mobile Mark	Corner Reflector	SCR14-2400PTA-RTNC	14 dBi	Reverse TNC to MMCX via adapter cable
Hyperlink Technologies, Inc.	Parabolic Dish	2424GC	24 dBi	Reverse N to MMCX via adapter cable
Mobile Mark	Omni	OD9-2400MUF24005	9 dBi	Reverse TNC to MMCX via adapter cable
Cirronet	Patch	GA Tech	12 dBi	Non-standard MMCX
MaxRad	Whip Magnetic Mount (Mobile Vehicle Whip)	MUF24005.RTNC	5 dBi	Reverse TNC to MMCX via adapter cable

To ensure compliance with 15.203, Cirronet Corporation attaches reverse-sex TNC or N connectors to all antennas except the 12 dBi and 6 dBi Patch antennas.

Cirronet Corporation. has arranged for the manufacturers of the antennas to provide reverse-sex TNC or N connectors for these antennas. OEM customers wanting to use one of these antennas in their product will first need to obtain a special part number from Cirronet Corporation to give to the antenna manufacturer. The manufacturer, upon receipt of this number, will know to attach the reverse-sex TNC or N connector (or SMA in the case of the dipole) to the end of the antenna cable before shipping.

The customer then purchases an adapter cable from Cirronet Corporation that will connect the MMCX port on the module to the reverse-sex connector on the antenna. No other type of commercially available antenna will attach to this reverse-sex TNC or N connector (or SMA for the case of the dipole). Given the nonstandard nature of the interconnect between module and antenna and the difficulty involved in circumventing that connection, Cirronet Corporation feel that this procedure meets the requirements called out in 15.203.

2.5 Antenna Description (Continued)

The sixth antenna included in their application, the DWC patch, already has a nonstandard MMCX mating connector attached to it. It cannot be connected to anything else but a MMCX connector. No adapter cable is needed when using this antenna – the antenna snaps directly to the module.

2.6 Peak power within the band 2400 – 2483.5 GHz per FCC Section 15.247(b)

Peak power within the band 2400-2483.5 GHz has been measured with a spectrum analyzer by connecting the spectrum analyzer directly via a short cable to the antenna output terminals or across the antenna leads on the PCB as specified by the manufacturer. The spectrum analyzer was set for a 50 Ω impedance with the VBW ≥ RBW 6 dB bandwidth. The results of the measurements are given in Table 3 and Figure 3a through Figure 3c.

Fundamental Frequencies were measured at Low Channel, Mid Channel, and High Channel.

TABLE 3
PEAK POWER OUTPUT

Test Date: **February 13, 2006**
UST Project: **05-0311**
Customer: **Cirronet**
Model: **WIT2410**

Frequency of Fundamental (MHz)	Measurement (dBm)*	Measurement (mW)*	FCC Limit (Watt)
2400.15	17.10	51.29	1.0
2435.63	17.83	60.67	1.0
2469.81	18.39	69.02	1.0

*** Measurement includes 0.1 dB for cable loss**

Tester Signature:  **Name: Austin Thonpson**

Figure 3a.
Peak Power per FCC Section 15.247(b) Low Channel

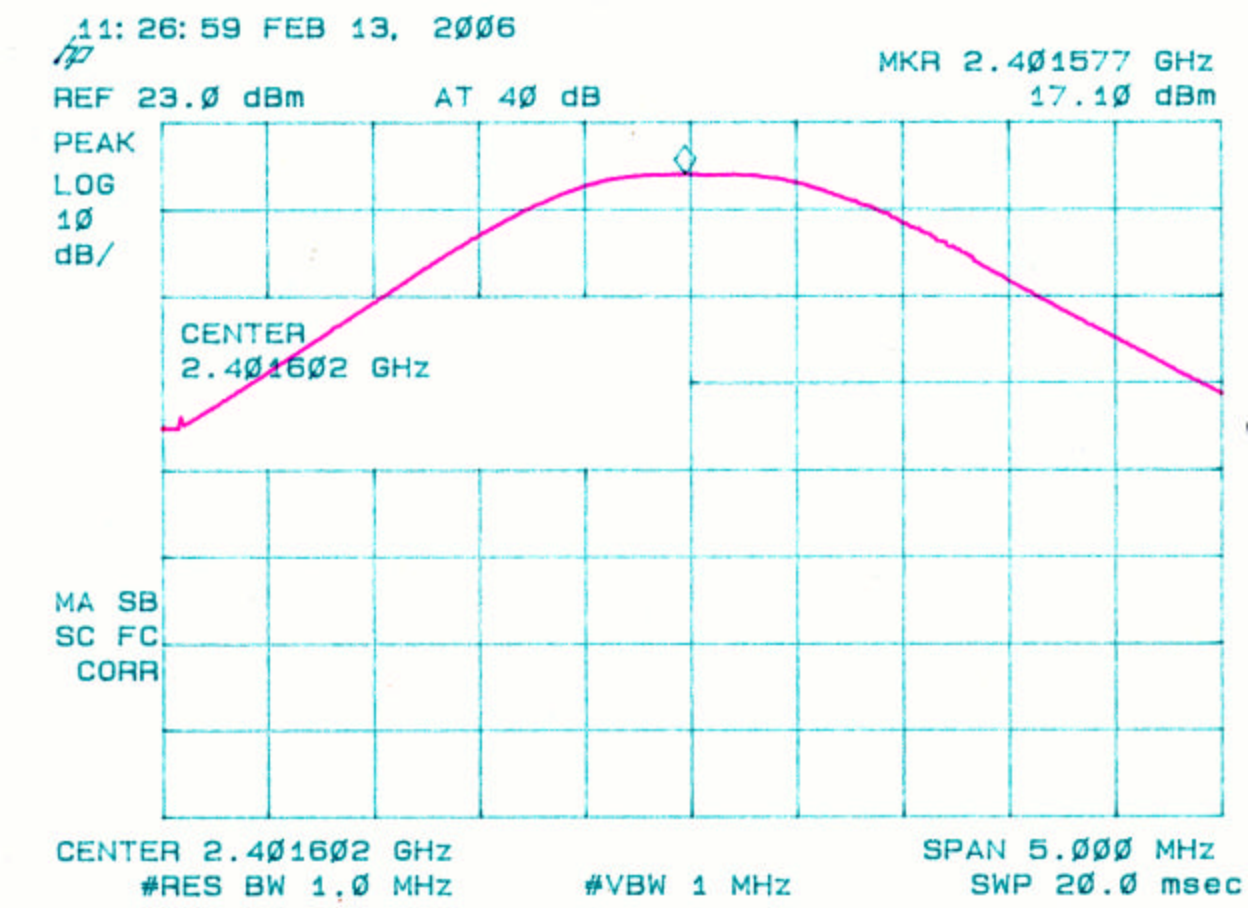


Figure 3b.
Peak Power per FCC Section 15.247(b) Mid Channel

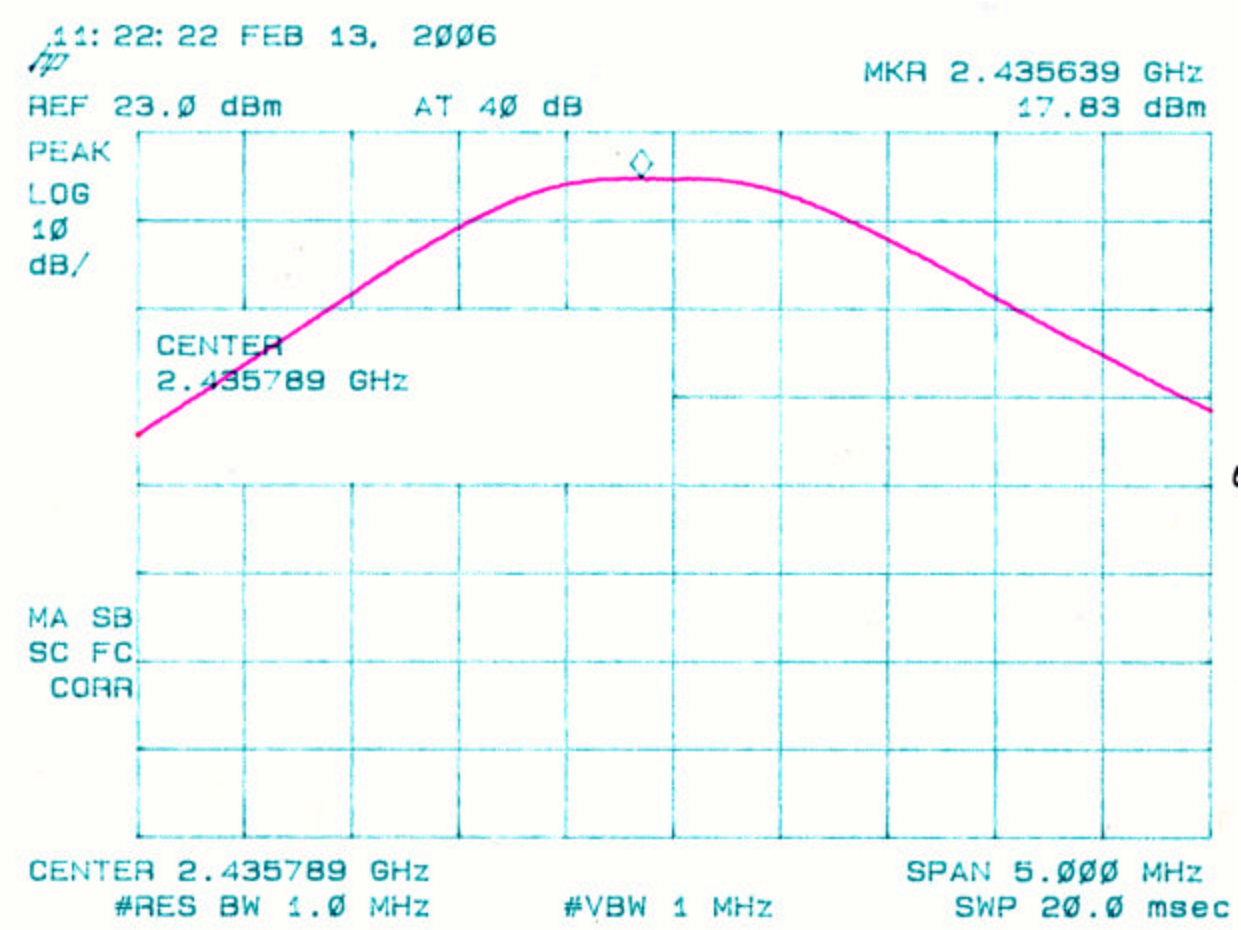
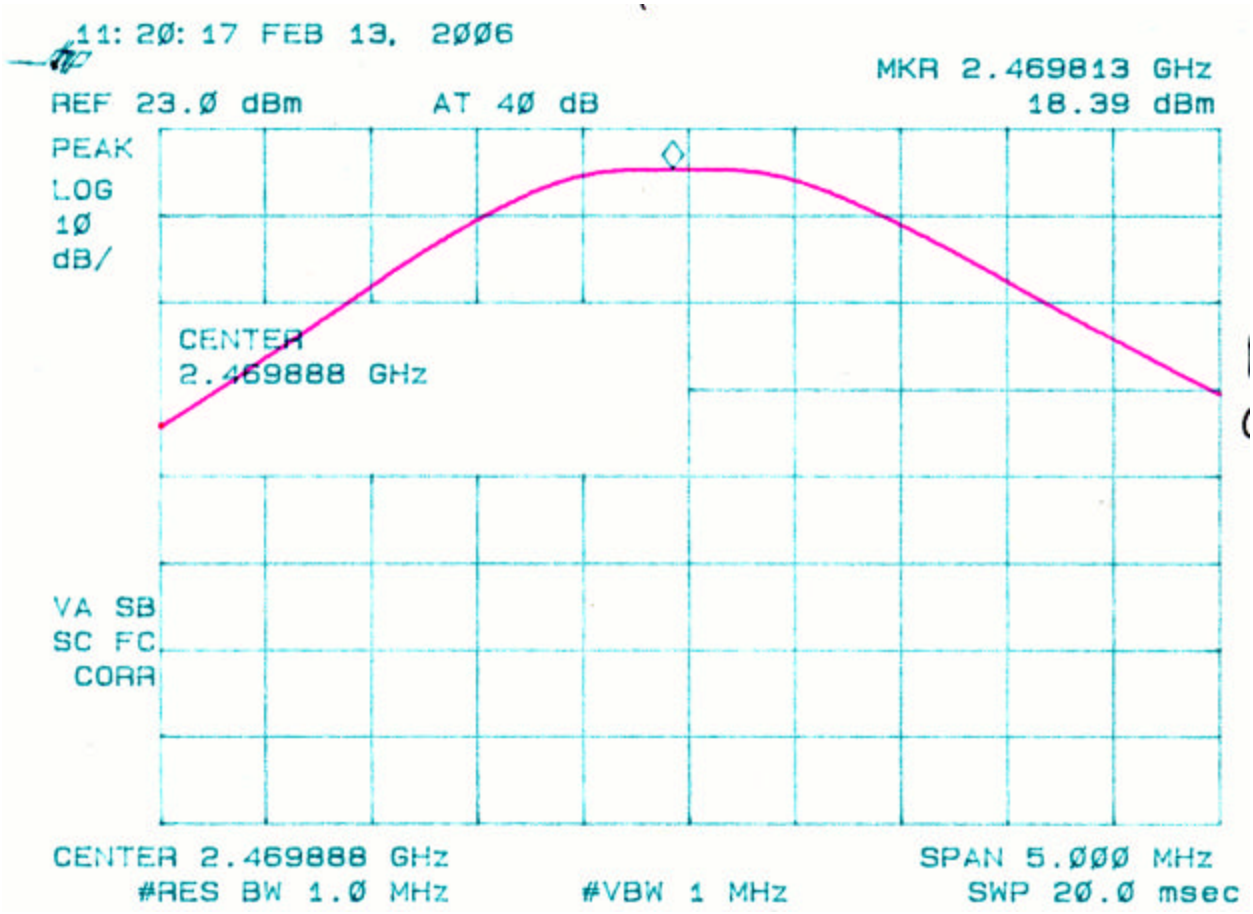


Figure 3c.
Peak Power per FCC Section 15.247(b) High Channel



2.7 Antenna Conducted Spurious Emission the Frequency Range 30 – 25000 MHz (FCC Section 15.247(c))

Spurious emissions in the frequency range 30 – 25000 MHz have been measured with a spectrum analyzer by connecting the spectrum analyzer directly via a short cable to the antenna output terminals or across the antenna leads on the PCB as specified by the manufacturer. The spectrum analyzer was set for a 50 Ω impedance with the RBW = 100 kHz & VBW> RBW. All spurious emissions were measured to be greater than 20 dB down from the fundamental. The results or conducted spurious emissions are given in Figure 4a through 4l.

Figure 4a
Antenna Conducted Spurious Emissions 15.247(c) Low

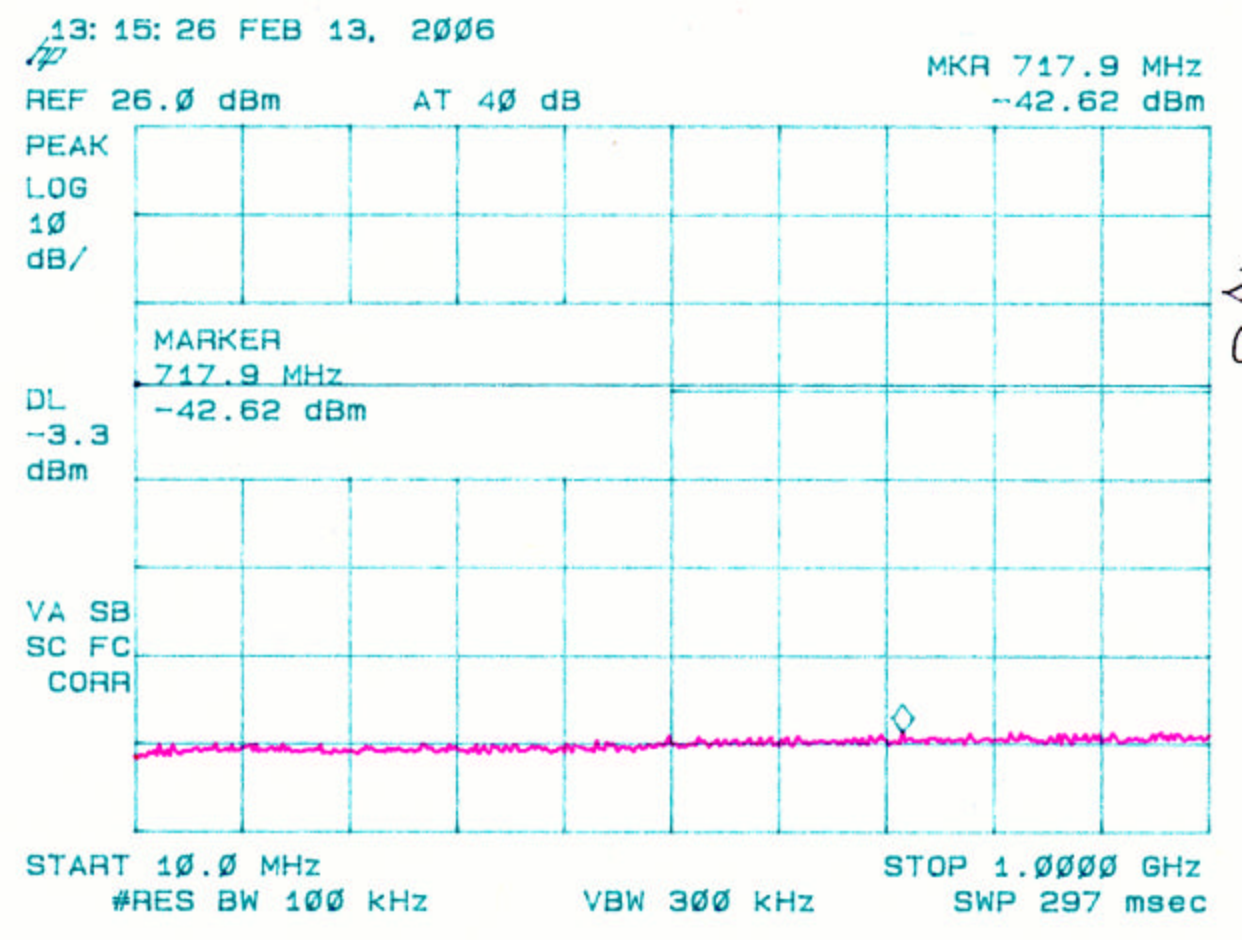
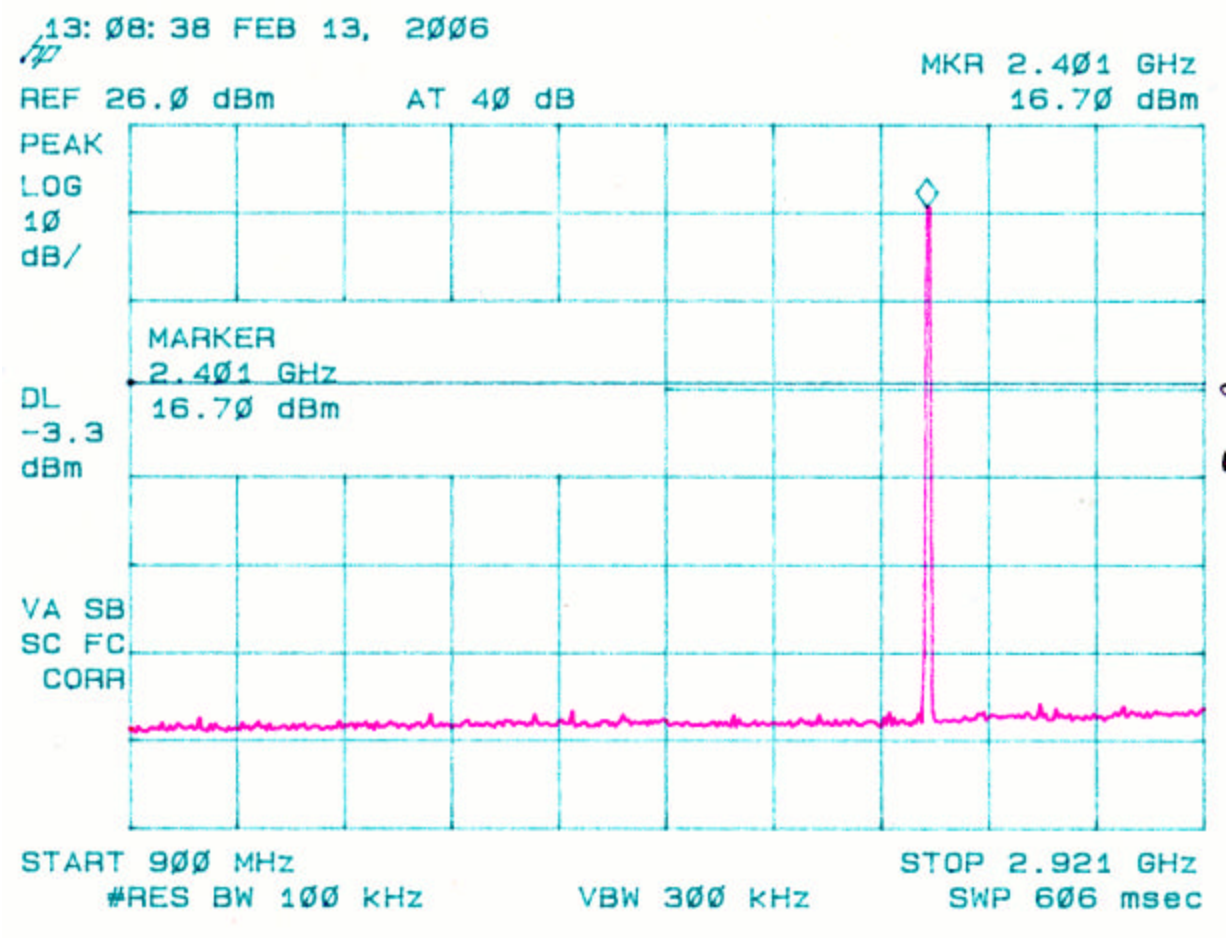


Figure 4b
Antenna Conducted Spurious Emissions 5.247(c) Low



Note: Signal shown represents Fundamental Frequency.

Figure 4c
Antenna Conducted Spurious Emissions 15.247(c) Low

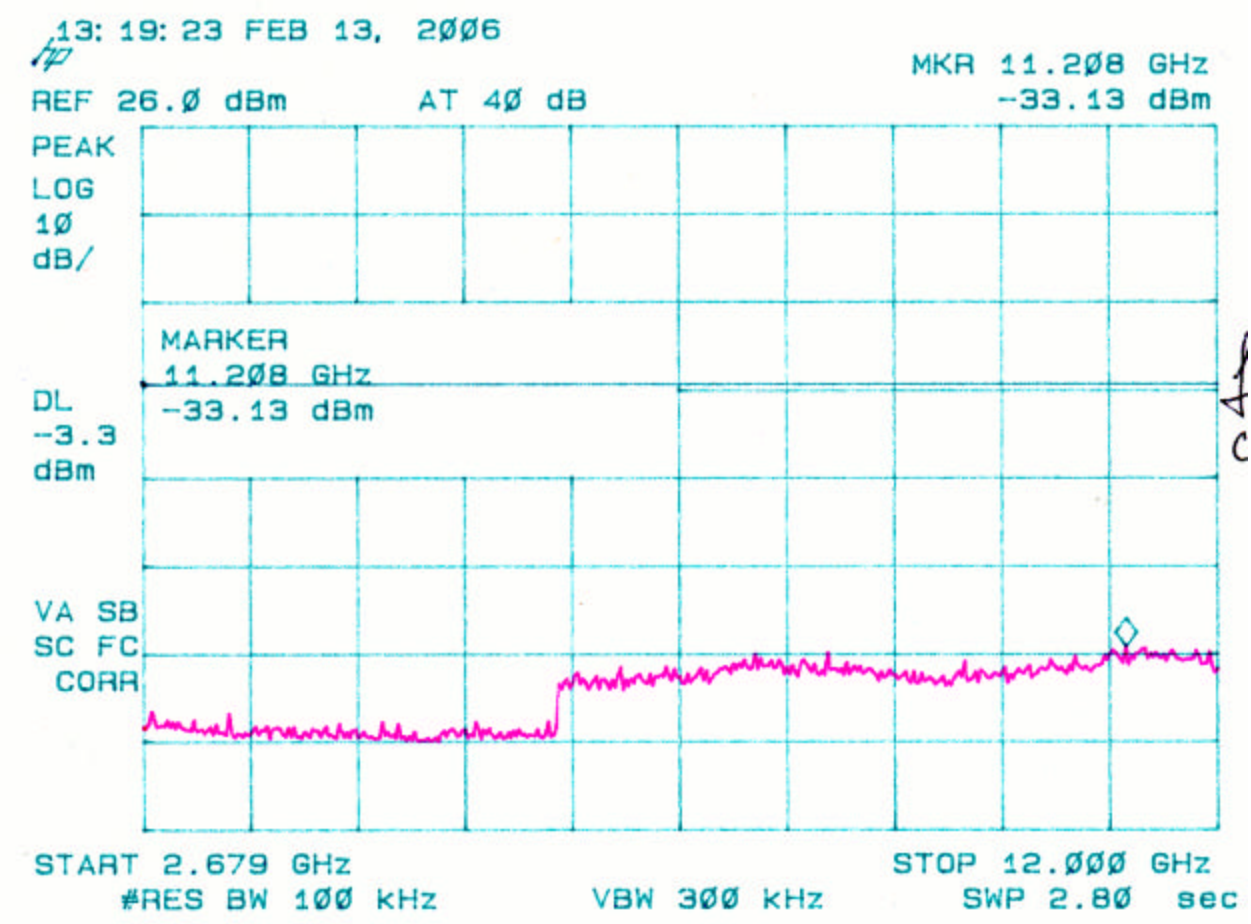


Figure 4d
Antenna Conducted Spurious Emissions 15.247(c) Low

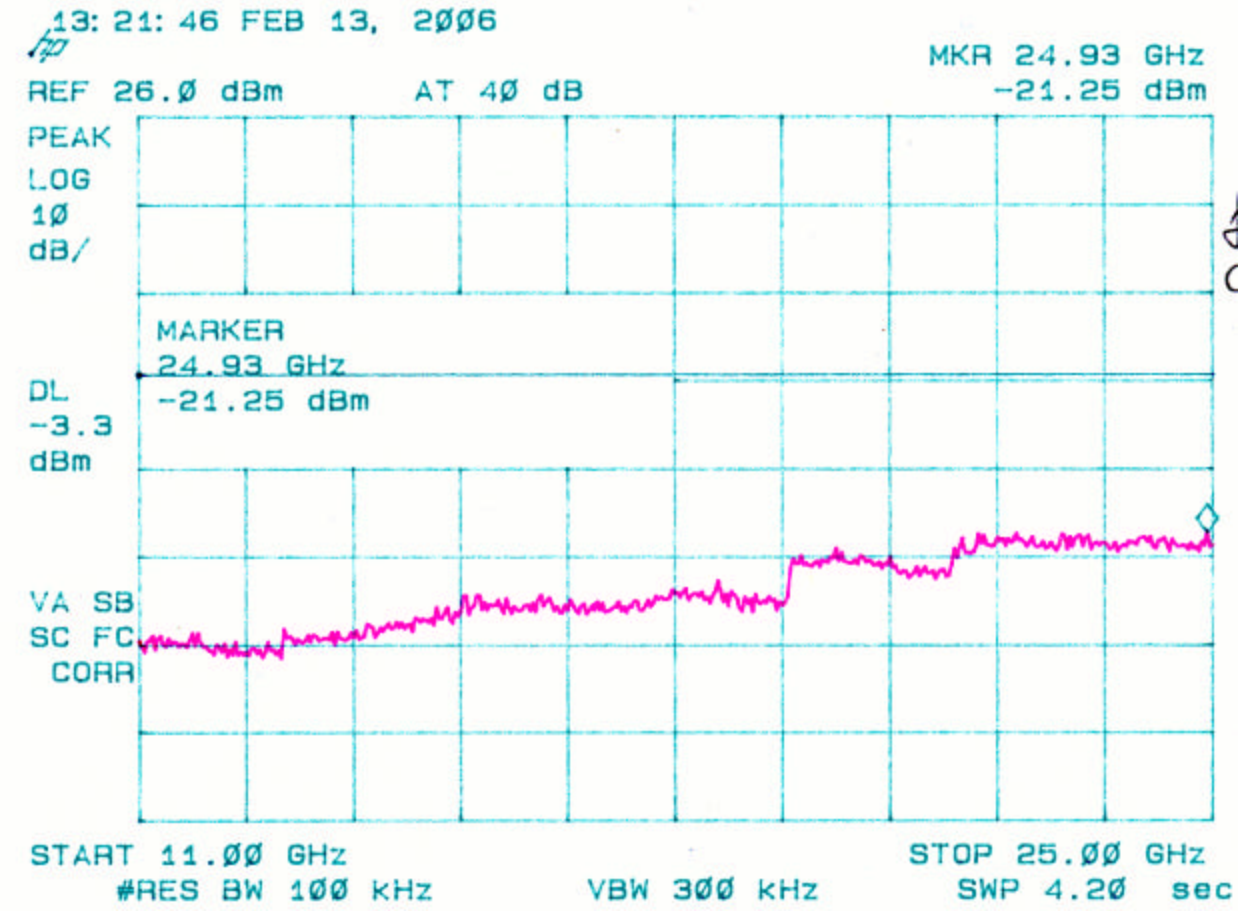


Figure 4e
Antenna Conducted Spurious Emissions 15.247(c) Mid

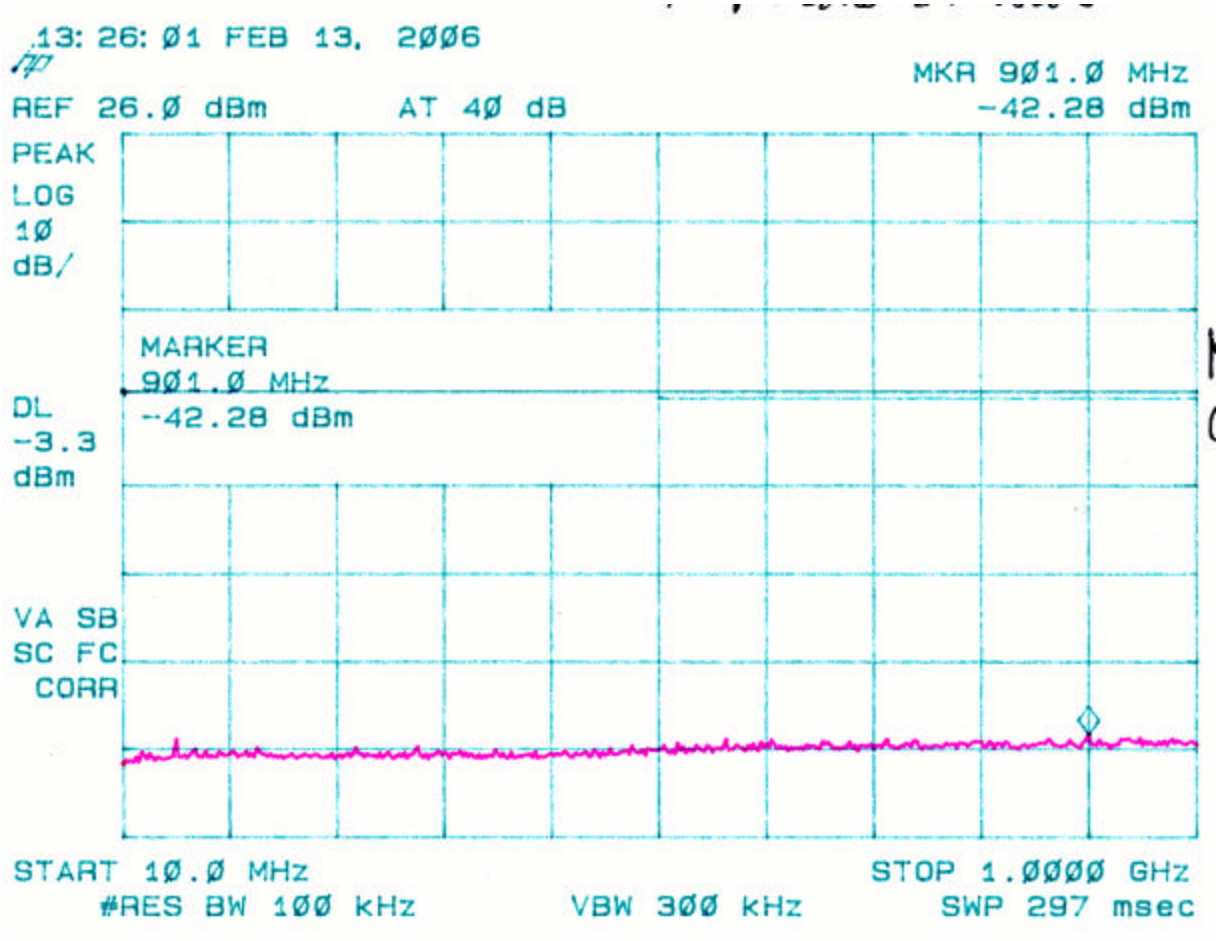
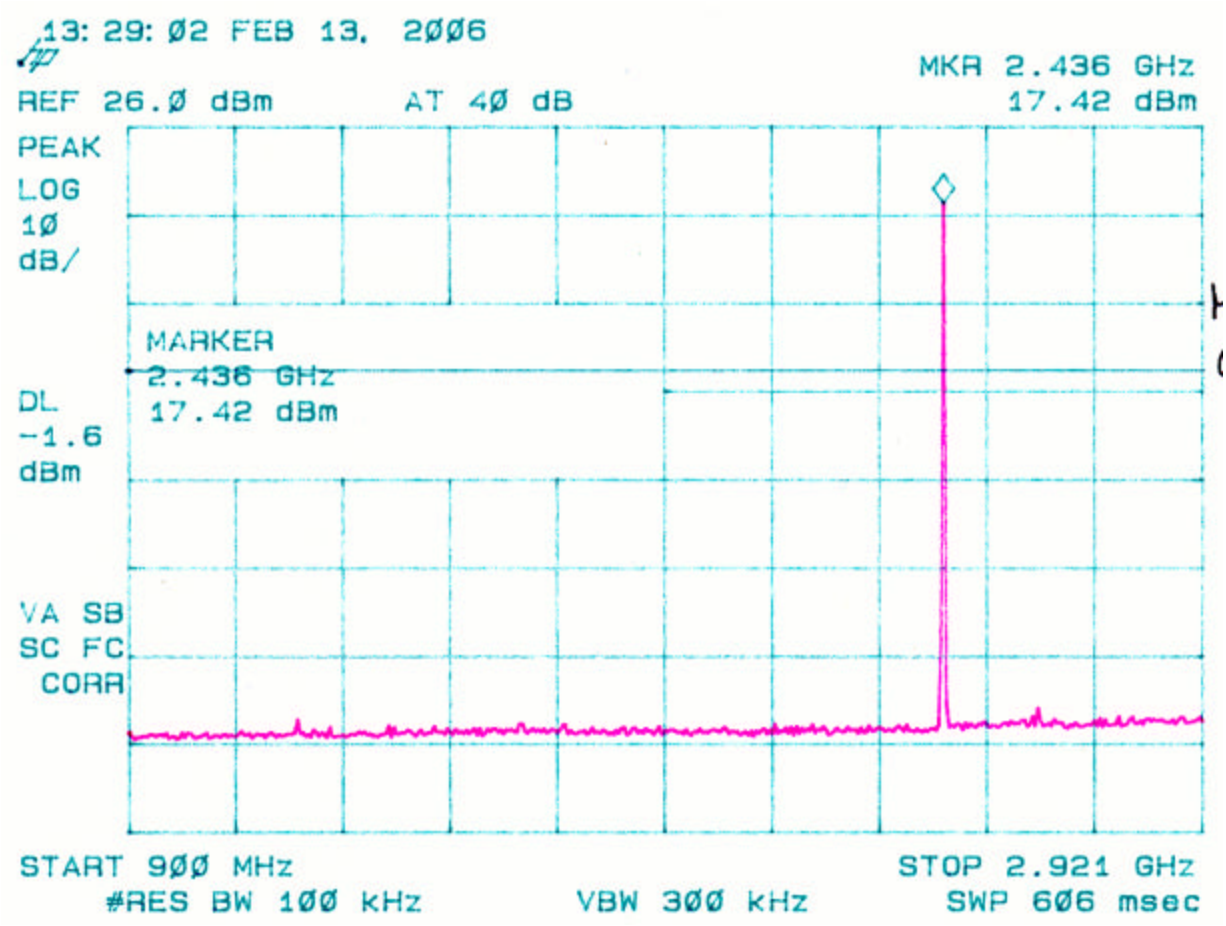


Figure 4f
Antenna Conducted Spurious Emissions 15.247(c) Mid



Note: Signal shown represents Fundamental Frequency.

Figure 4g
Antenna Conducted Spurious Emissions 15.247(c) Mid

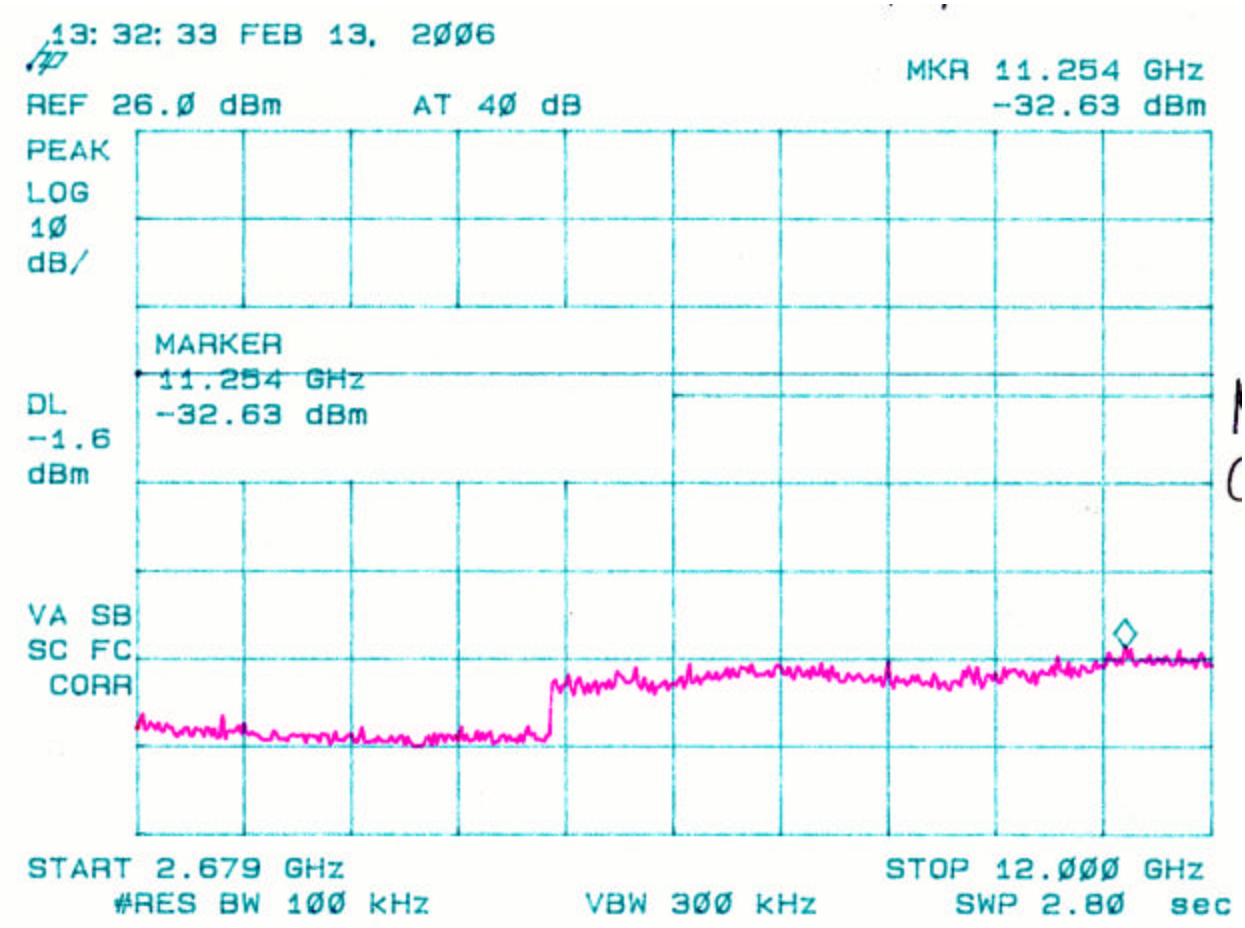
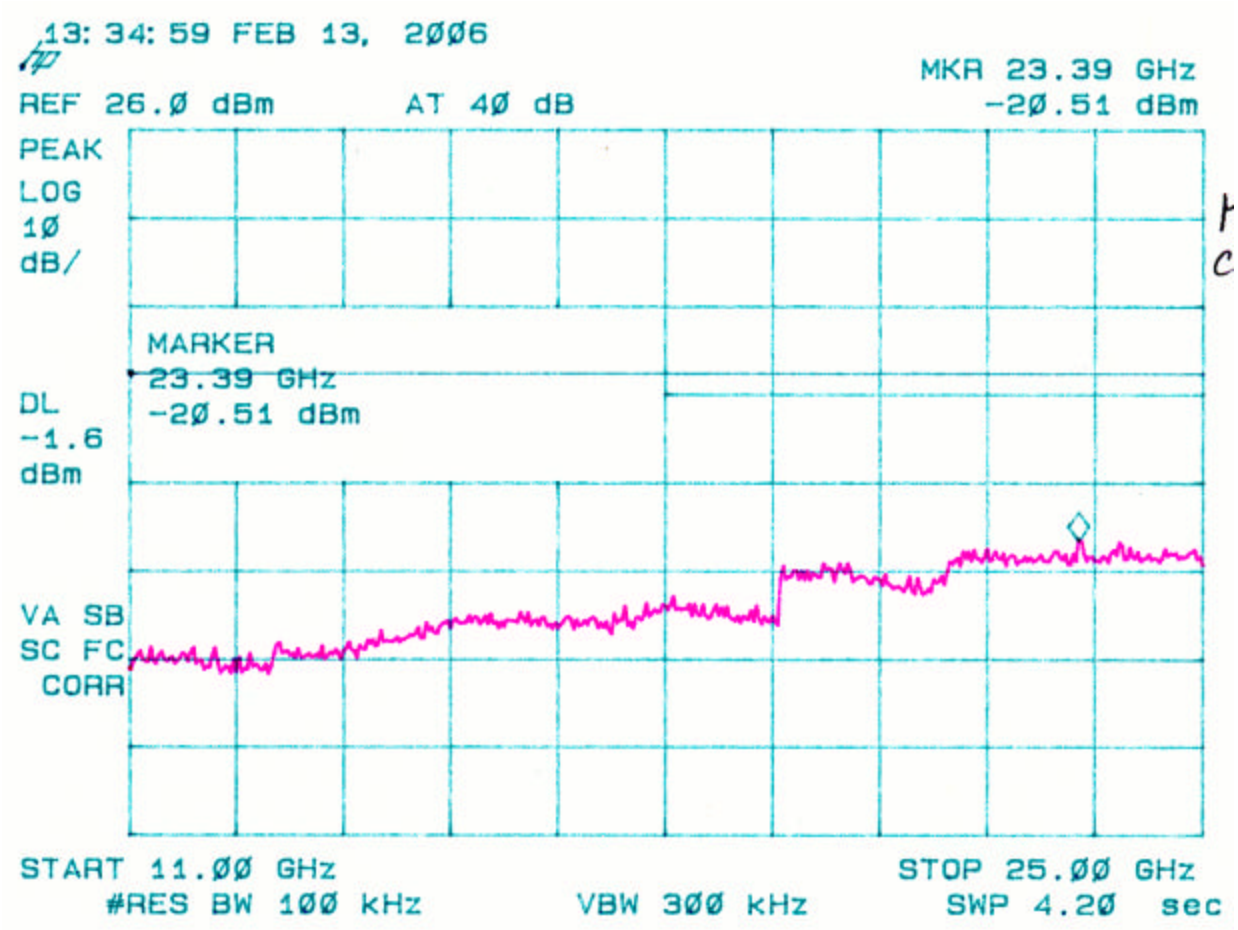


Figure 4h



Antenna Conducted Spurious Emissions 15.247(c) Mid

Figure 4i
Antenna Conducted Spurious Emissions 15.247(c) High

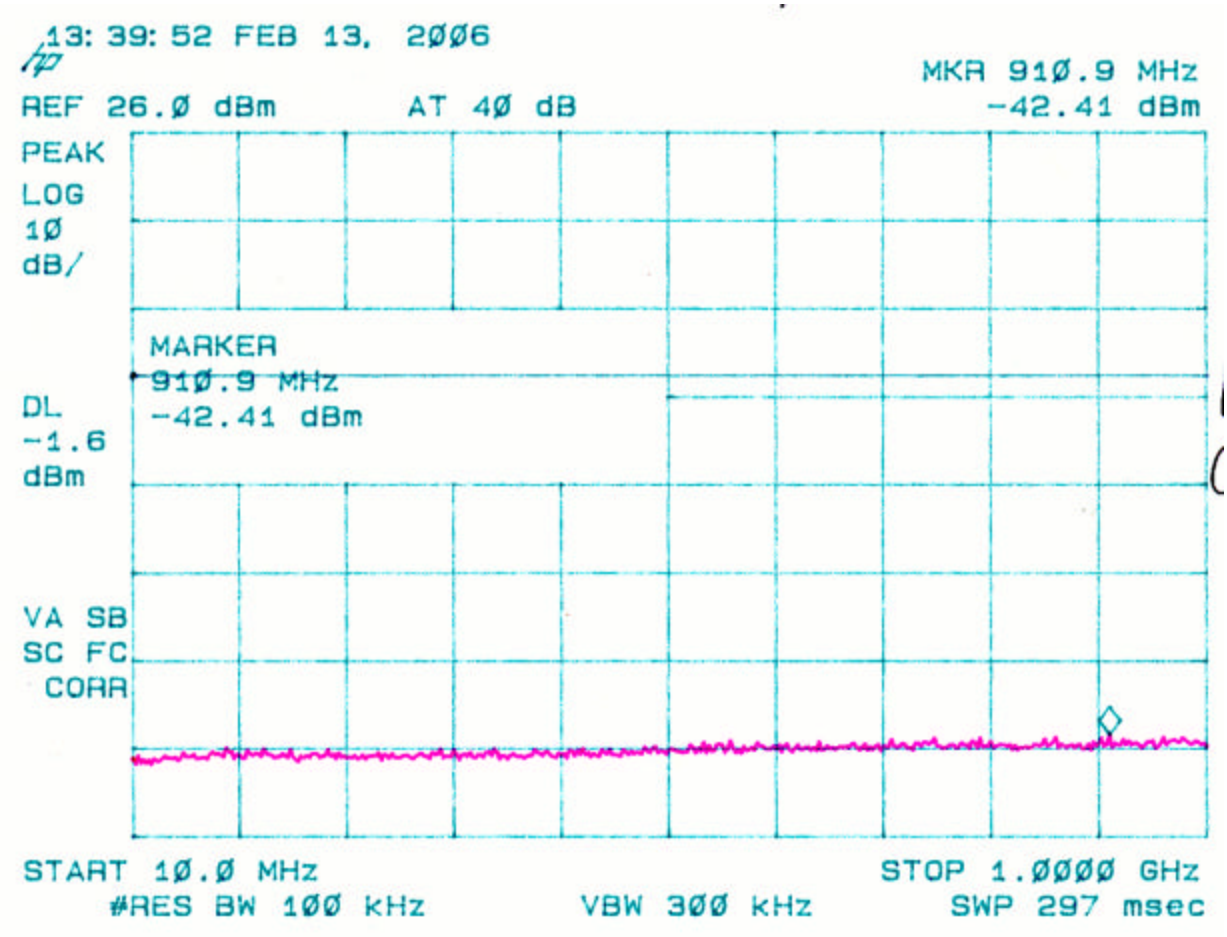
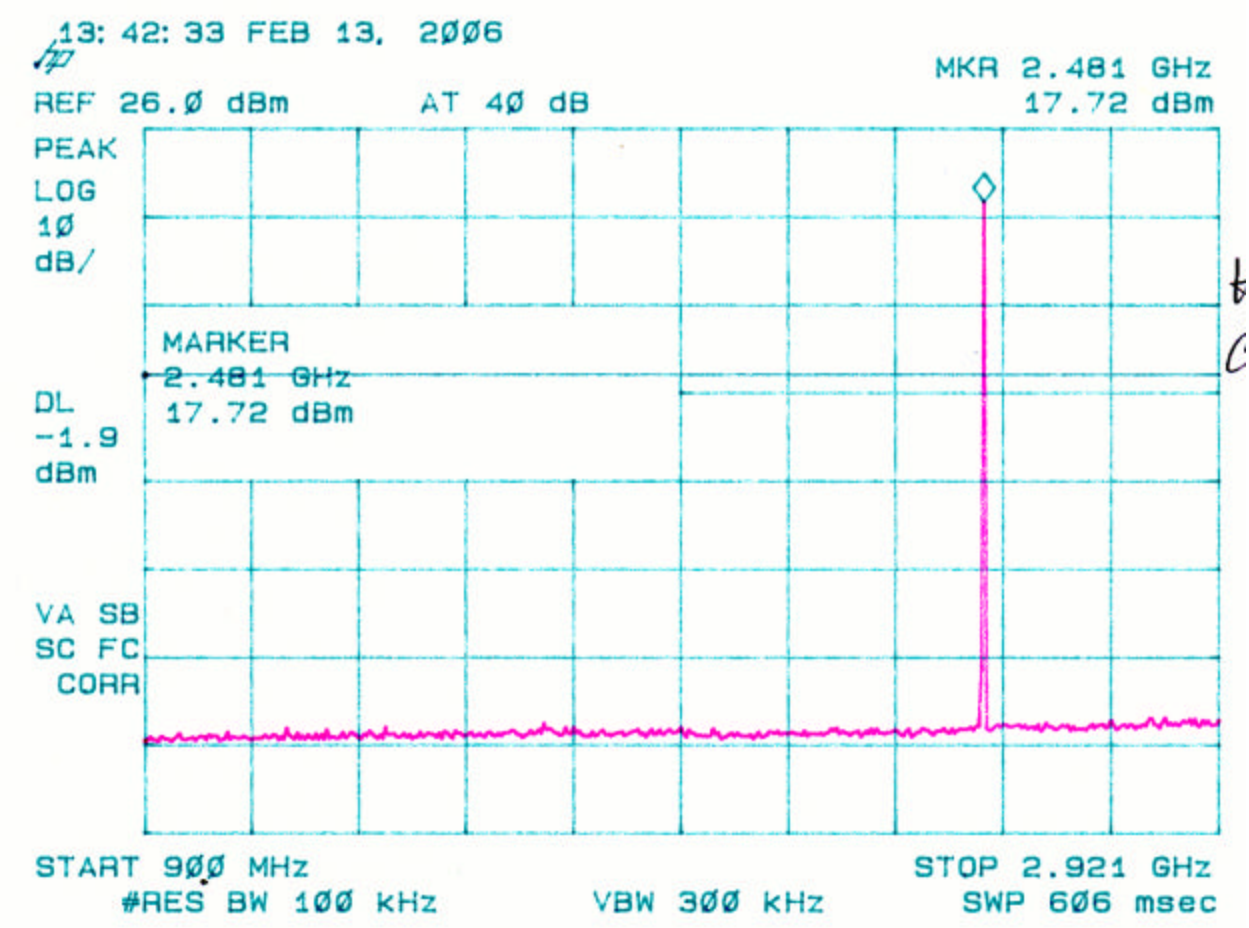


Figure 4j
Antenna Conducted Spurious Emissions 15.247(c) High



Note: Signal shown represents Fundamental Frequency.

Figure 4k
Antenna Conducted Spurious Emissions 15.247(c) High

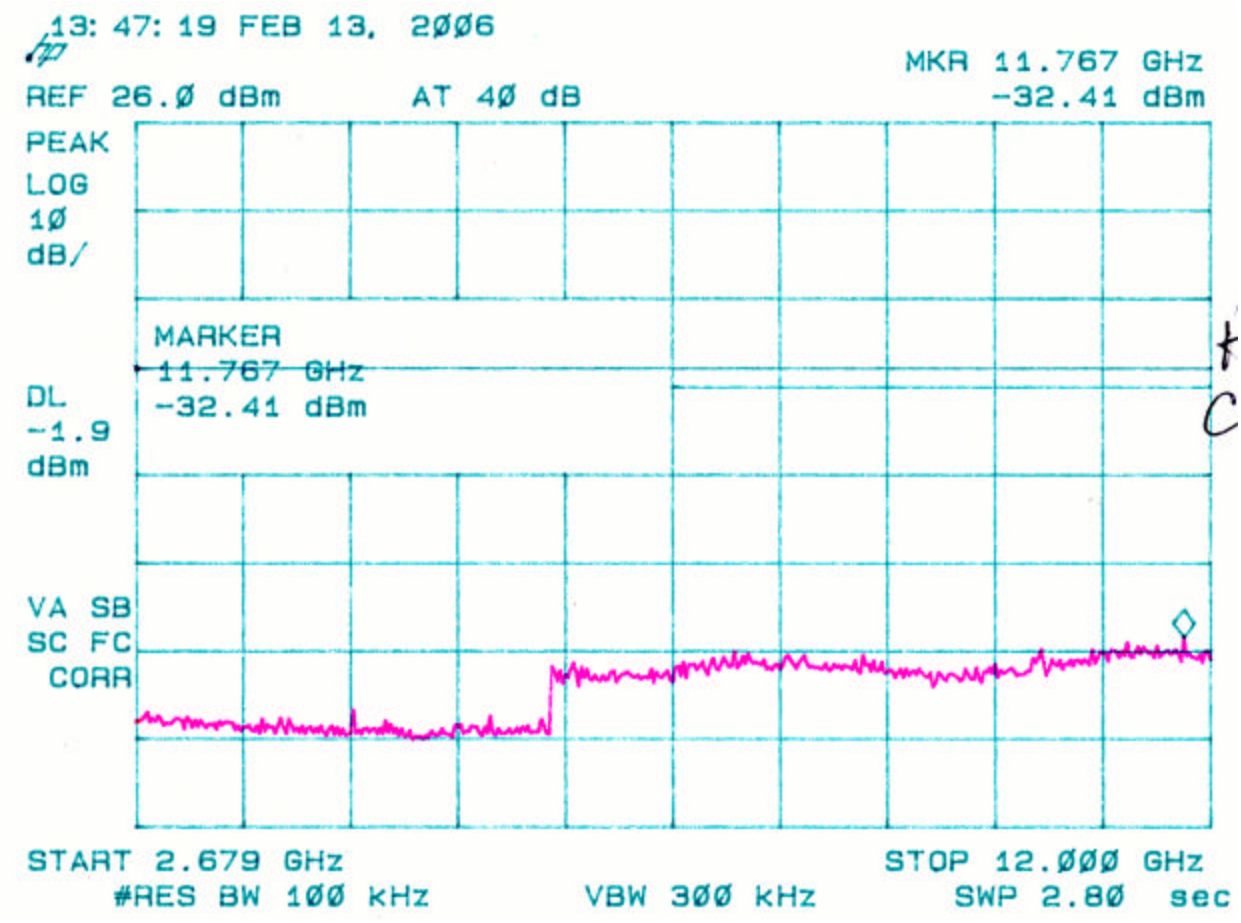
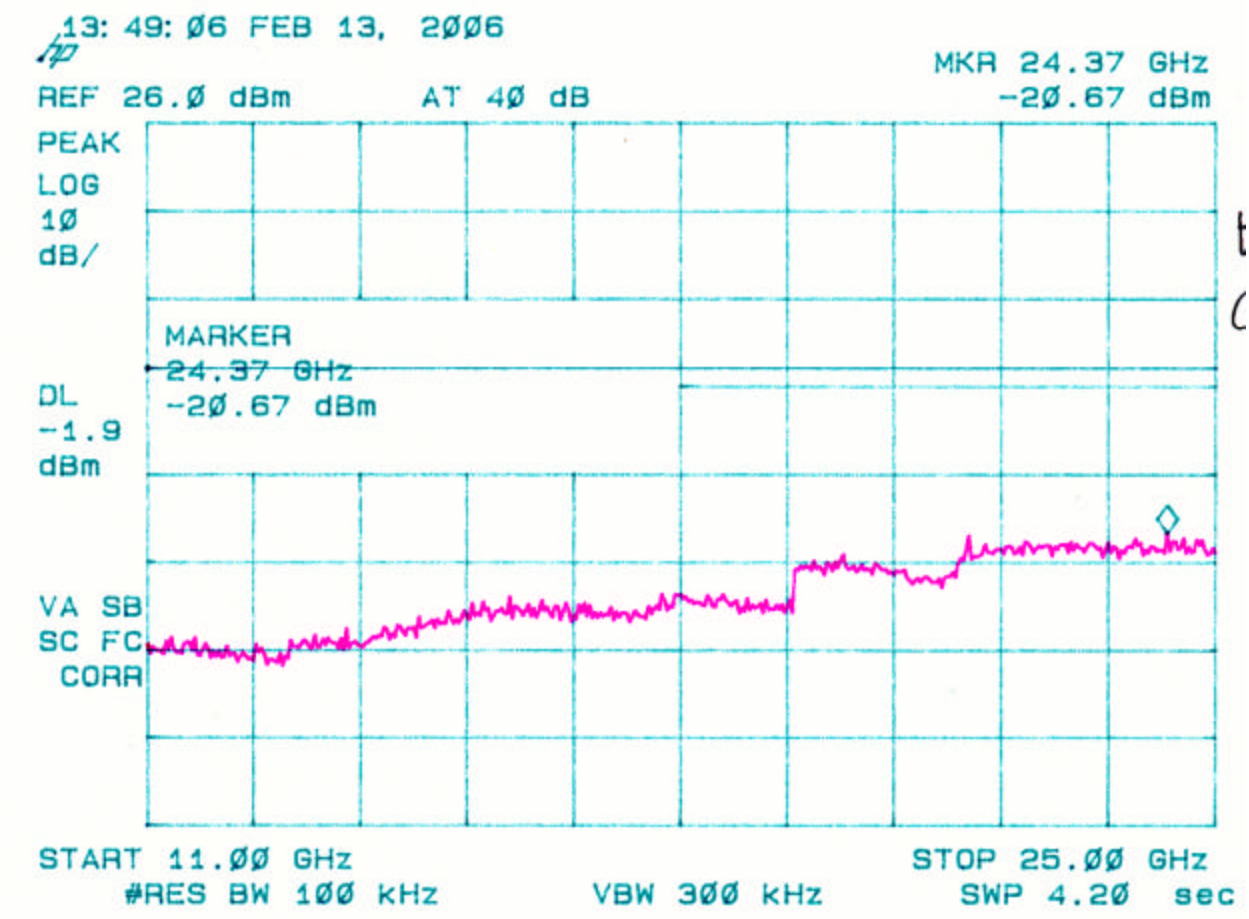


Figure 4l
Antenna Conducted Spurious Emissions 15.247(c) High



2.8 Peak Radiated Spurious Emission in the Frequency Range 30 -25000 MHz (FCC Section 15.247(c))

The EUT was hop-stopped and when possible, placed into a continuous transmit mode of operation. A preliminary scan was performed on the EUT to determine frequencies that were caused by the transmitter portion of the product. Significant emissions that fell within restricted bands were then measured on an OAT's site. Radiated measurements below 1 GHz were tested with a RBW = 120 kHz. Radiated measurements above 1 GHz were measured using a RBW = VBW = 1 MHz. The results of peak radiated spurious emissions falling within restricted bands are given in Table 4a –4u and Figure 4a – Figure 4u.

Table 4a. PEAK RADIATED SPURIOUS EMISSIONS (Low)
Parabolic Dish Antenna

Radiated Spurious Emissions								
Test By:	**Test:**	Spurious Emissions-Parabolic Antenna-Low Channel				**Client:**	Cirronet	
AT	**Project:**	05-0311		**Class:**	**Peak**	**Model:**	WIT2410G	
Frequency Range		**Table**	**Model**		**S/N**	**Valid**	**Calibrated:**	
		2hn3mh	Model : SAS-571		S/N 605	Yes	01 APR 05	
		preamp			S/N	Yes	June/30/2005	
		flex2ft			S/N	Yes	05/Dec/2005	
		flex17ft			S/N	Yes	05/Dec/2005	
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Margin**	**PK = n**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**	**(dB)**	**/ QP**
2401.55	-8.3	2hn3mh	98.7	31.6	3283436.7			**PK**
4803.351	-48.0	2hn3mh	59.0	5.4	1673.8	5000.0	**9.5**	**PK**
7205.45	-46.2	2hn3mh	60.8	10.7	3774.9	328343.7	**38.8**	**PK****
9607.287	-66.2	2hn3mh	40.9	13.3	510.3	328343.7	**56.2**	**PK****
12008.96	-66.9	2hn3mh	40.1	18.9	891.0	5000.0	**15.0**	**PK****

Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:
RESULTS (uV/m @ 3m) = Antilog ((-48.0 + 5.4 + 107)/20) = 1673.8
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature:  **Name: Austin Thompson**

Figure 4a - 1
Peak Radiated Spurious Emission 15.247(c) Fundamental Low – Parabolic Dish

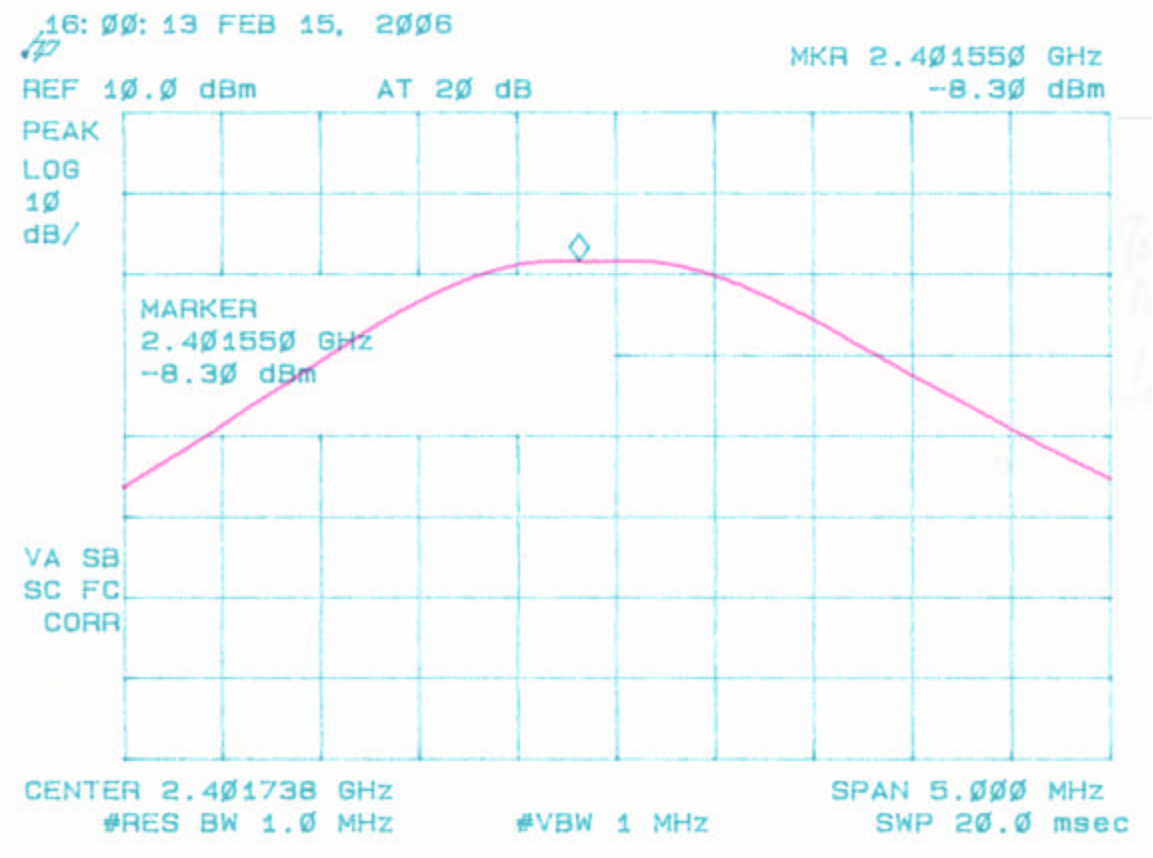


Figure 4a - 2
Peak Radiated Spurious Emission 15.247(c) Low – Parabolic Dish

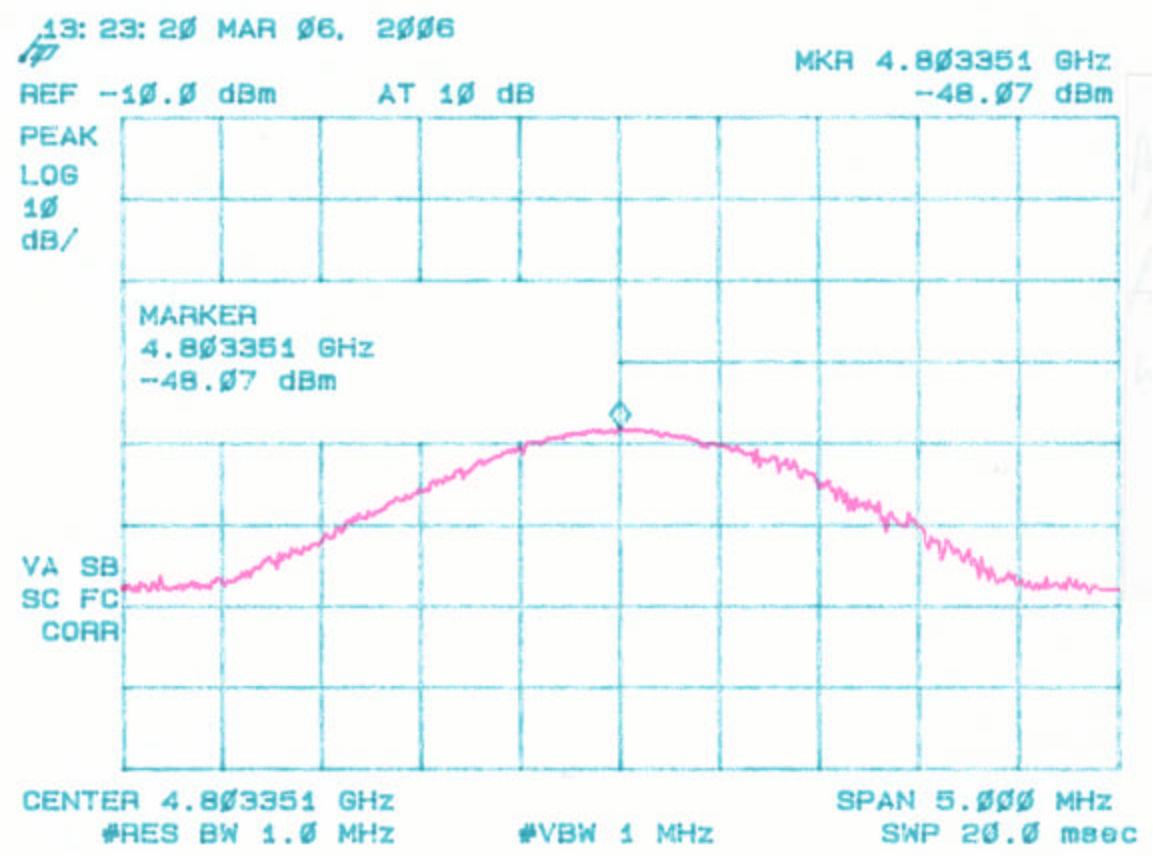


Figure 4a - 3
Peak Radiated Spurious Emission 15.247(c) Low – Parabolic Dish

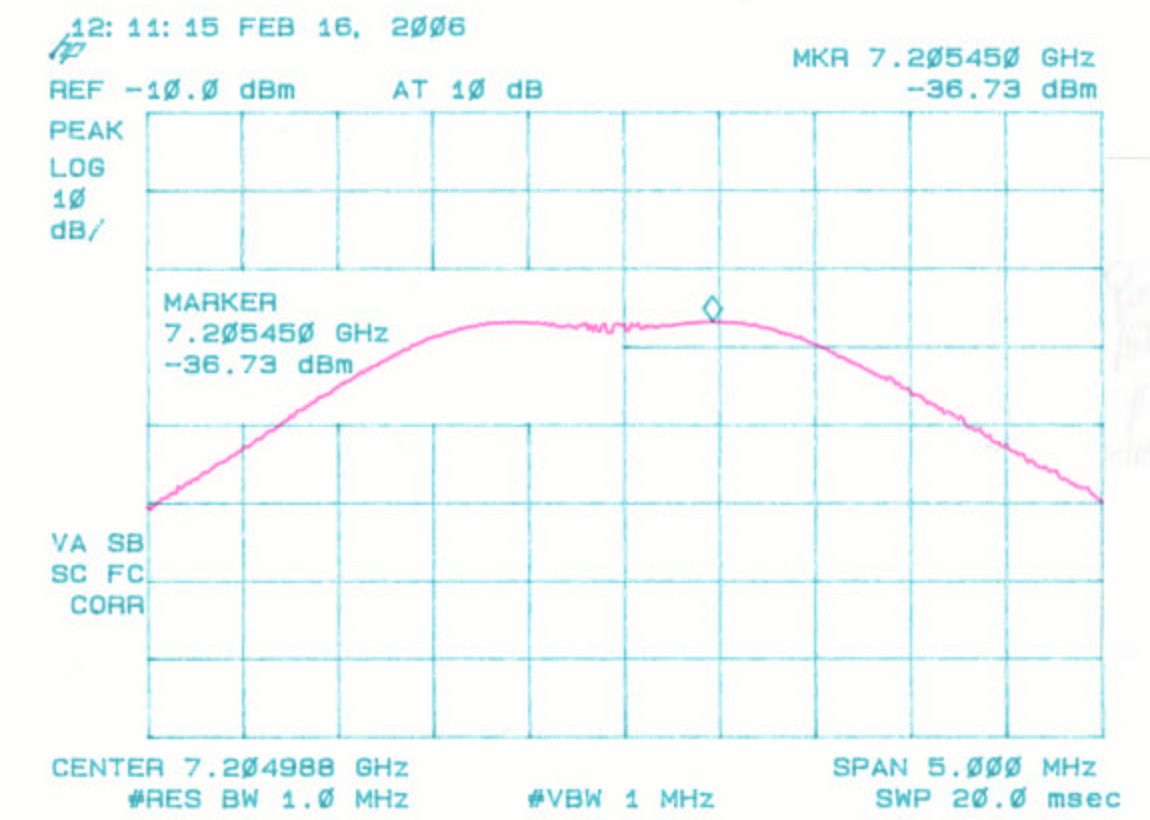


Figure 4a - 4
Peak Radiated Spurious Emission 15.247(c) Low – Parabolic Dish

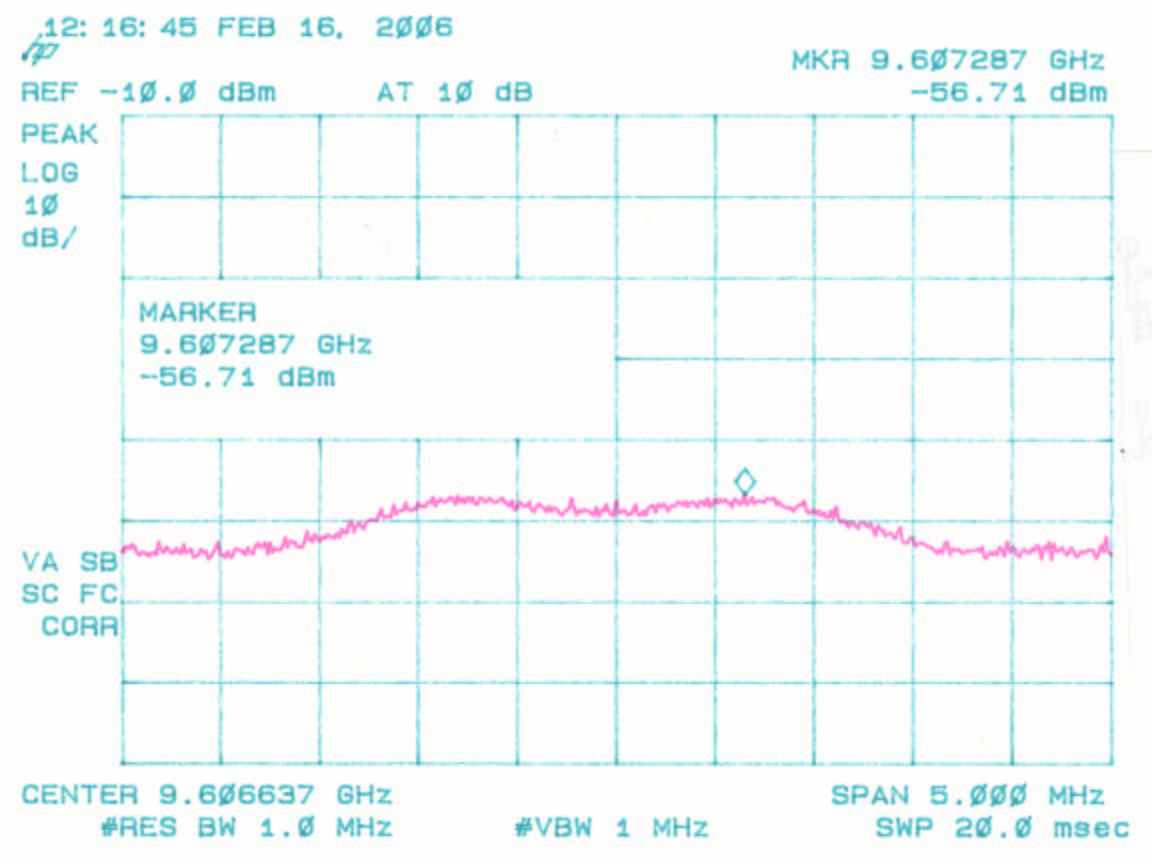


Figure 4a - 5
Peak Radiated Spurious Emission 15.247(c) Low – Parabolic Dish

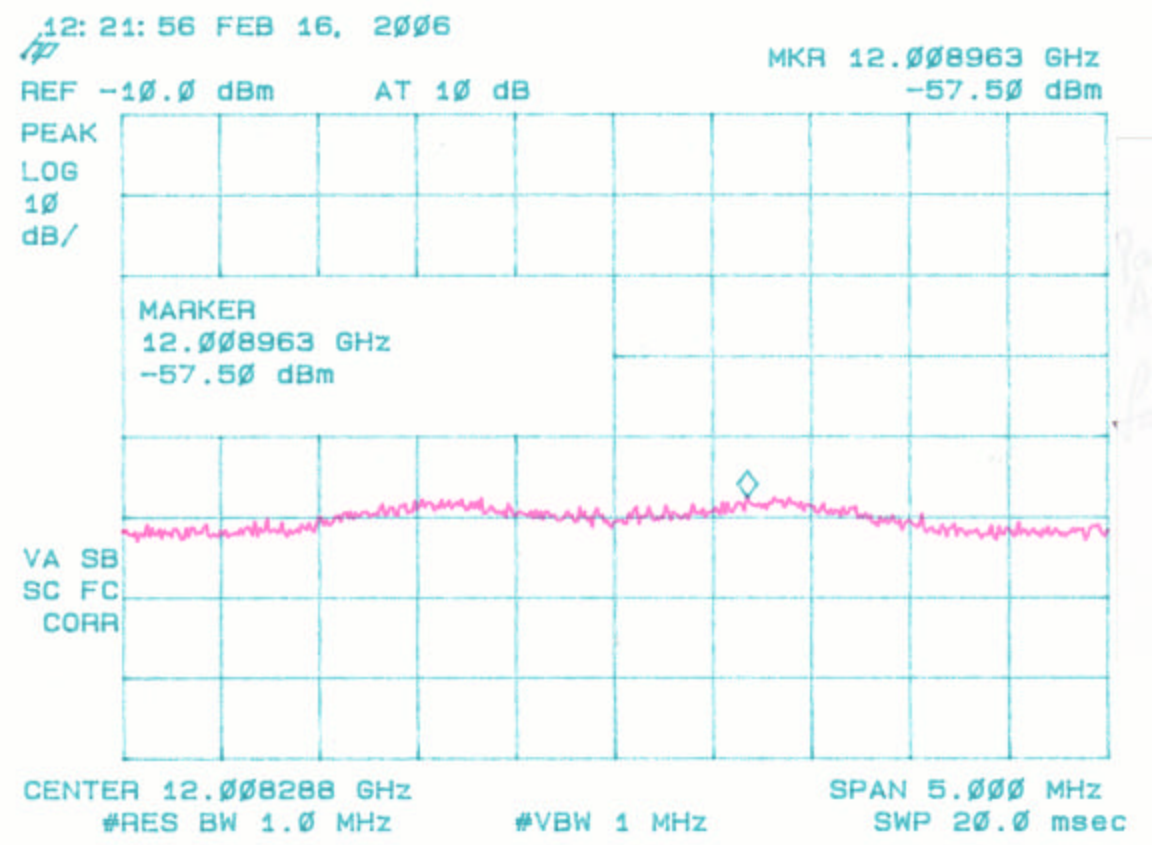


Table 4b. PEAK RADIATED SPURIOUS EMISSIONS (Mid)
Parabolic Dish Antenna

Radiated Spurious Emissions								
Test By:	**Test:**	Spurious Emissions-Parabolic Antenna-Mid Channel				**Client:**	Cirronet	
AT	**Project:**	05-0311		**Class:**	**Pea**	**Model:**	WIT2410G	
Frequency Range		**Table**	**Model**		**S/N**	**Valid**	**Calibrated:**	
		2hn3mh	Model : SAS-571		S/N 605	Yes	01 APR 05	
		preamp			S/N	Yes	June/30/2005	
		flex2ft			S/N	Yes	05/Dec/2005	
		flex17ft			S/N	Yes	05/Dec/2005	
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Margin**	**PK = n**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**	**(dB)**	**/ QP**
2435.63	-8.3	2hn3mh	98.7	31.7	3308695.9			**PK**
4871.838	-45.6	2hn3mh	61.4	5.7	2263.7	5000.0	**6.9**	**PK**
7306.638	-48.0	2hn3mh	59.0	10.9	3118.9	5000.0	**4.1**	**PK****
9743.687	-63.9	2hn3mh	43.2	13.5	677.5	330869.6	**53.8**	**PK****
12179.43	-68.4	2hn3mh	38.6	19.3	786.8	5000.0	**16.1**	**PK****

Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:
RESULTS (uV/m @ 3m) = Antilog ((-45.6 + 5.7 + 107)/20) = 2263.7
CONVERSION FROM dBm TO dBuV = 107 dB

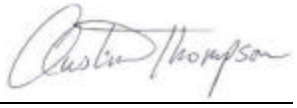
Tester Signature:  **Name: Austin Thompson**

Figure 4b - 1
Peak Radiated Spurious Emission 15.247(c) Fundamental Mid – Parabolic Dish

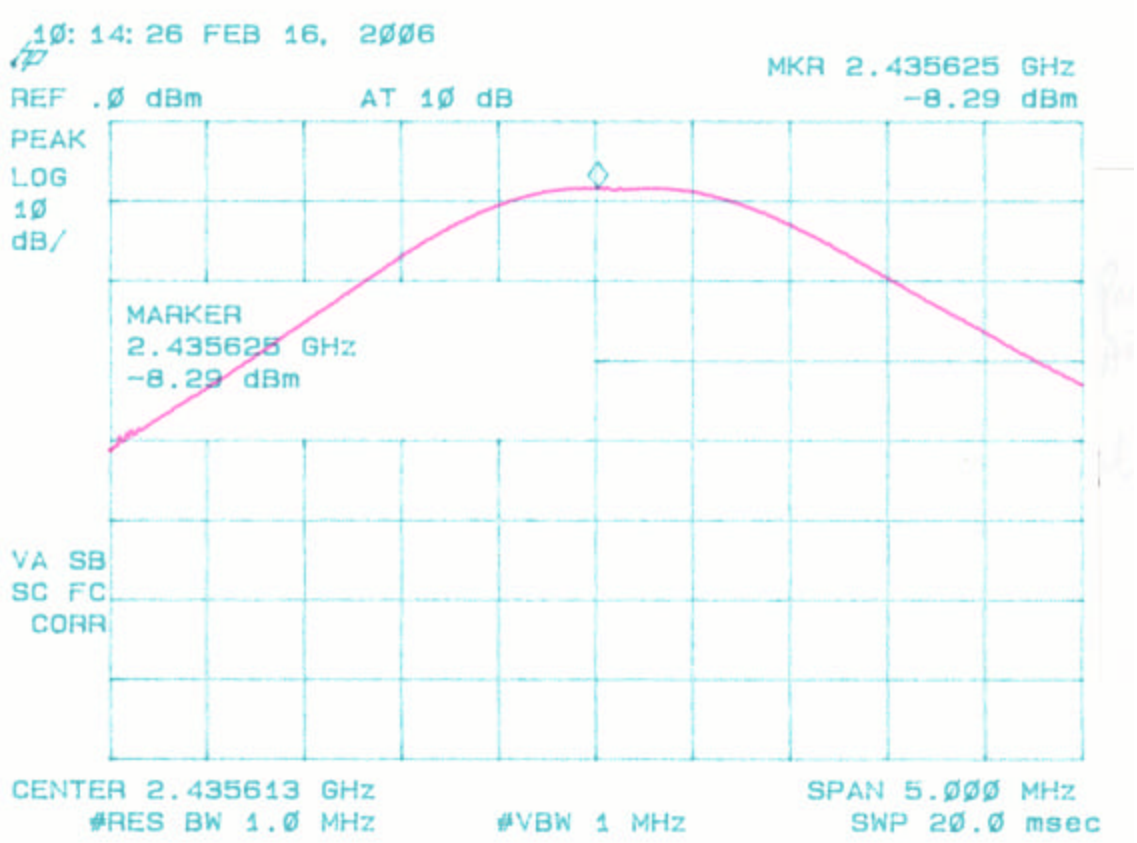


Figure 4b - 2
Peak Radiated Spurious Emission 15.247(c) Mid – Parabolic Dish

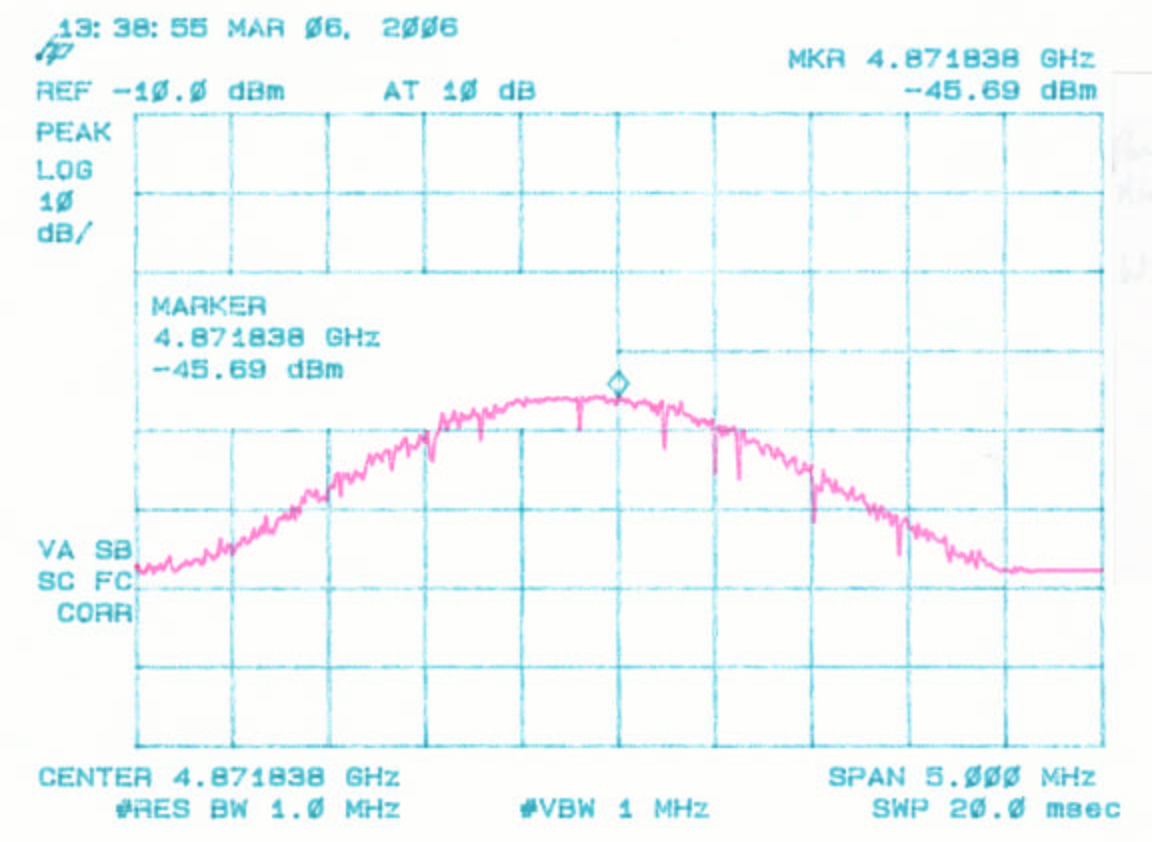


Figure 4b - 3
Peak Radiated Spurious Emission 15.247(c) Mid – Parabolic Dish

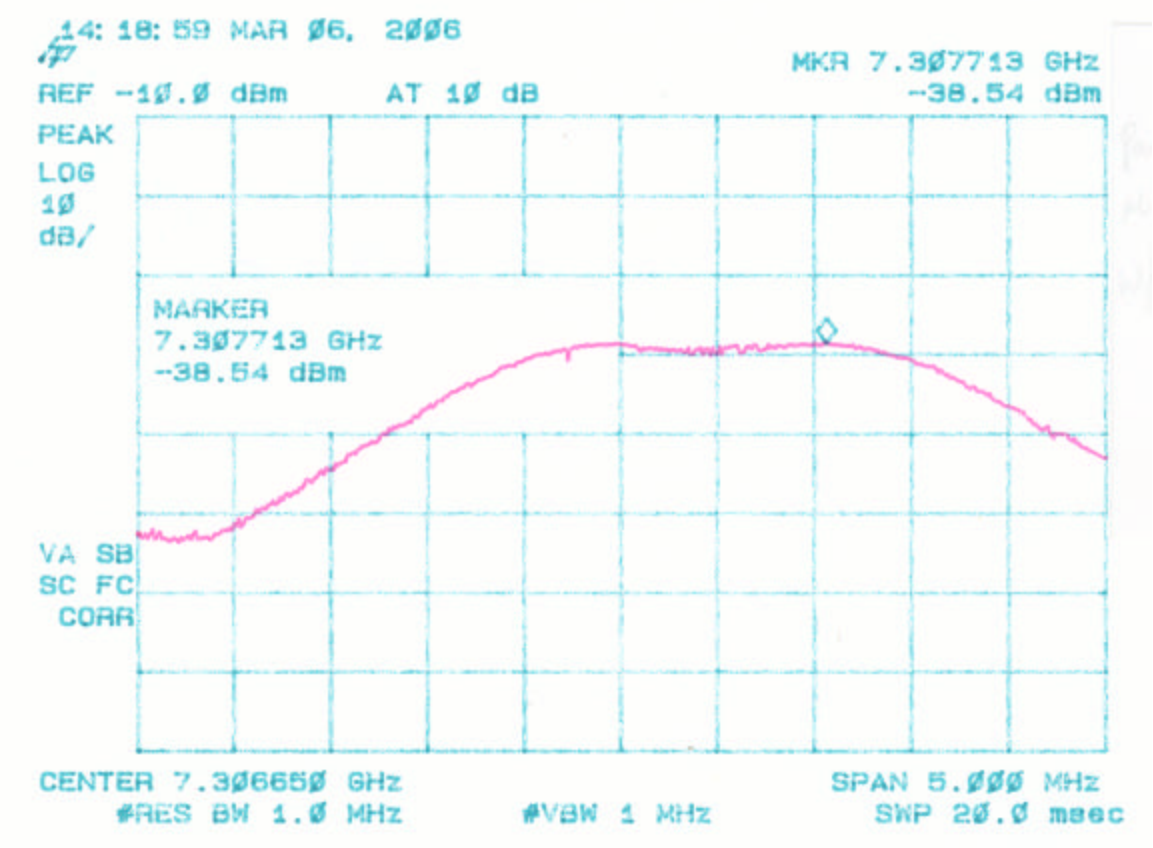


Figure 4b - 4
Peak Radiated Spurious Emission 15.247(c) Mid – Parabolic Dish

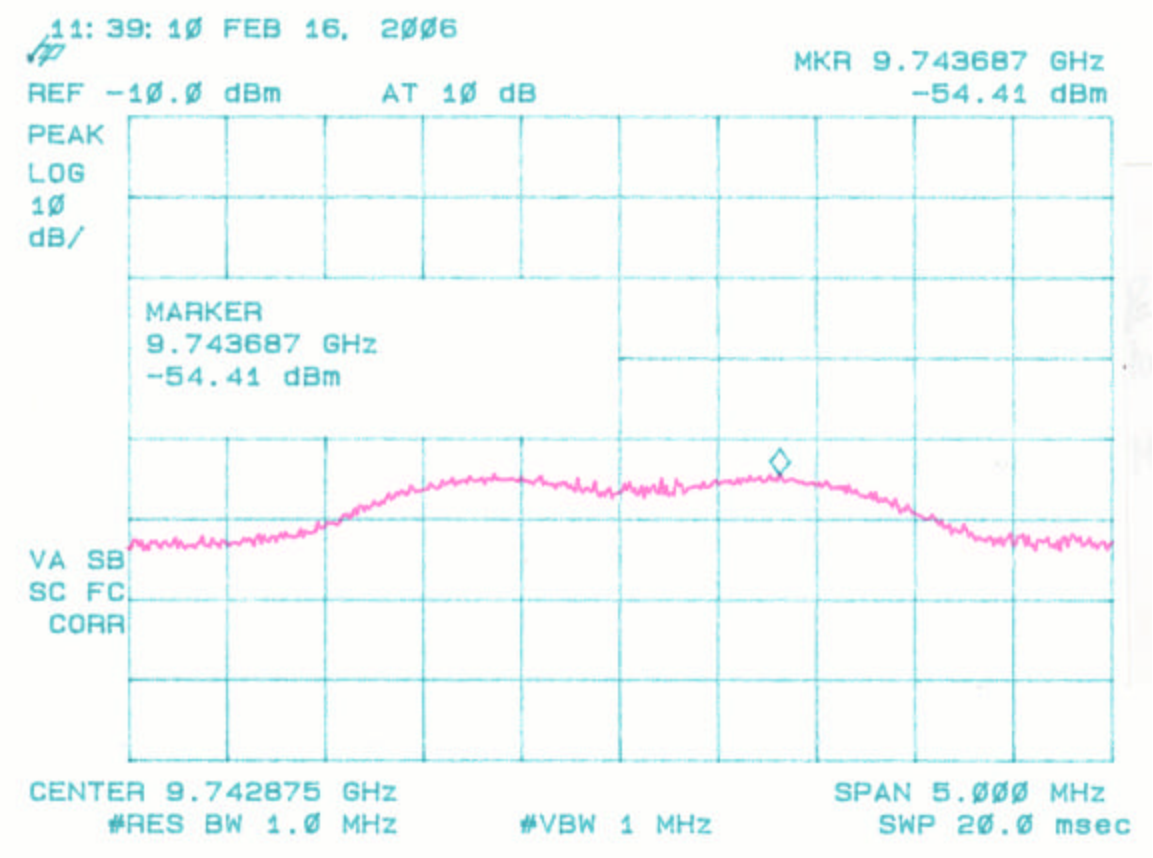


Figure 4b – 5
Peak Radiated Spurious Emission 15.247(c) Mid – Parabolic Dish

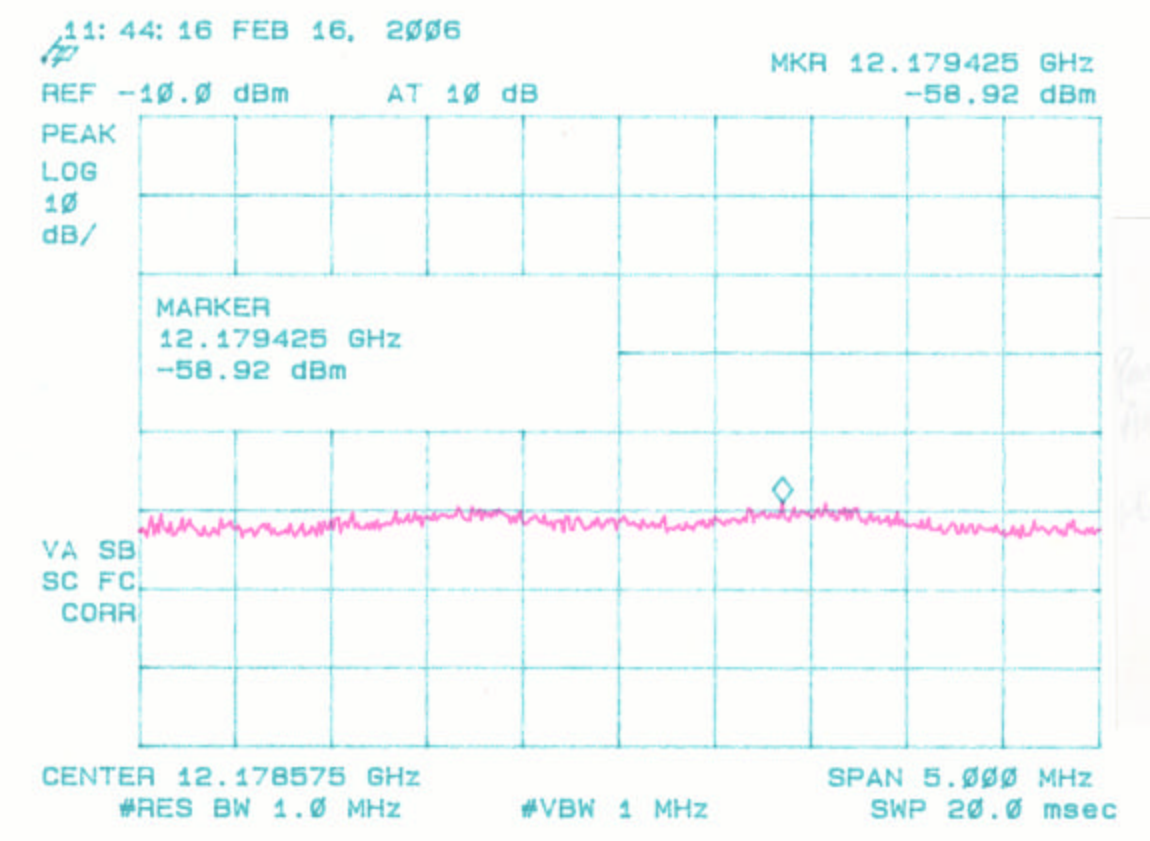


Table 4c. PEAK RADIATED SPURIOUS EMISSIONS (High)
Parabolic Dish Antenna

Radiated Spurious Emissions								
Test By:	**Test:**	Spurious Emissions-Parabolic Antenna-High Channel				**Client:**	Cirronet	
AT	**Project:**	05-0311		**Class:**	**Peak**	**Model:**	WIT2410G	
Frequency Range		**Table**	**Model**		**S/N**	**Valid**	**Calibrated:**	
		2hn3mh	Model : SAS-571		S/N 605	Yes	01 APR 05	
		preamp			S/N	Yes	June/30/2005	
		flex2ft			S/N	Yes	05/Dec/2005	
		Flex17ft			S/N	Yes	05/Dec/2005	
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA -AMP**	**Results**	**Limits**	**Margin**	**PK = n**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**	**(dB)**	**/ QP**
2469.66	-8.8	2hn3mh	98.2	31.7	3147618.4			**PK**
4940.1	-45.1	2hn3mh	61.9	5.9	2468.3	5000.0	**6.1**	**PK**
7410.163	-49.5	2hn3mh	57.5	11.0	2656.2	5000.0	**5.5**	**PK****
9878.75	-65.0	2hn3mh	42.1	13.6	607.9	314761.8	**54.3**	**PK****
12350.29	-69.2	2hn3mh	37.8	19.6	742.8	5000.0	**16.6**	**PK****

Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:
RESULTS (uV/m @ 3m) = Antilog ((-45.1 + 5.9 + 107)/20) = 2468.3
CONVERSION FROM dBm TO dBuV = 107 dB

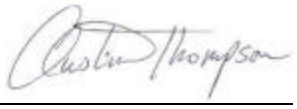
Tester Signature:  **Name: Austin Thompson**

Figure 4c – 1
Peak Radiated Spurious Emission 15.247(c) Fundamental High – Parabolic Dish

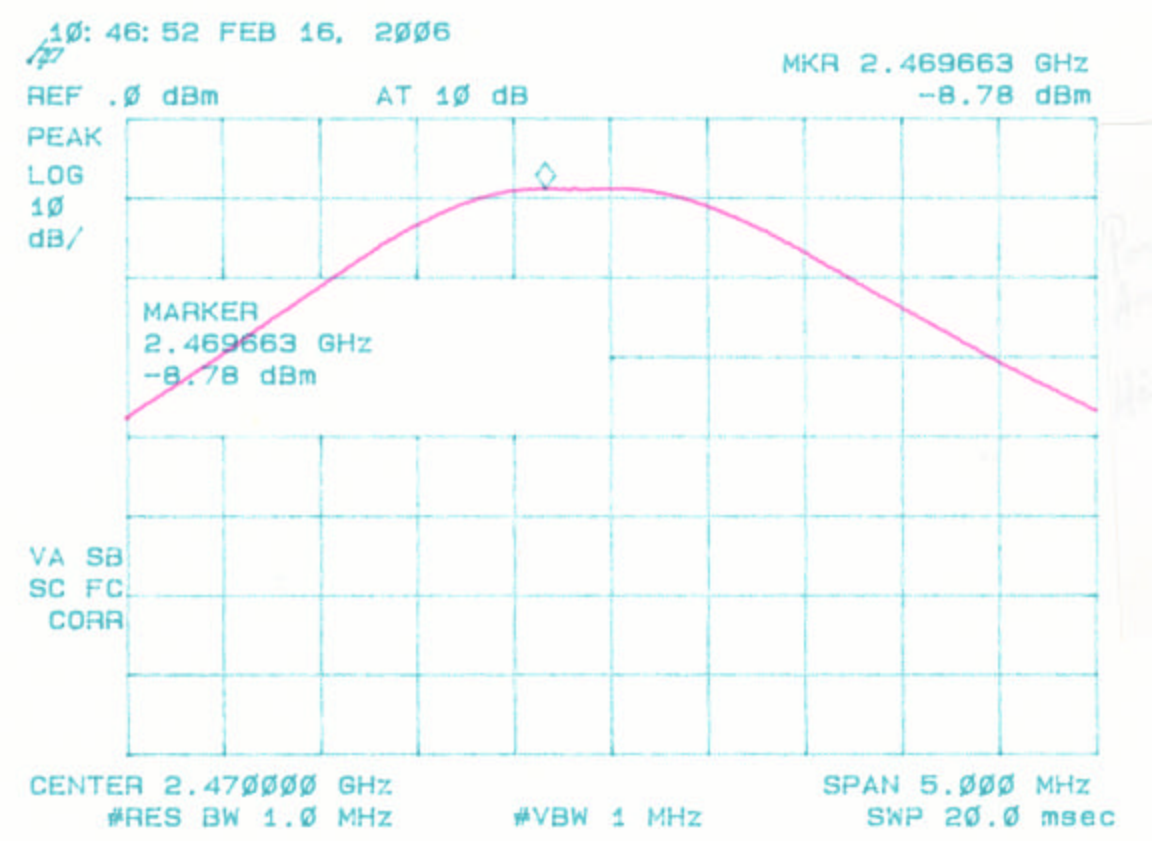


Figure 4c – 2

Peak Radiated Spurious Emission 15.247(c) High – Parabolic Dish