U.S. TECH
A TRADITION IN TESTING SERVICES

FCC Part 25, Certification Application
of the
Axonn, Corporation LLC
Modular Satellite Transmitter Unit STX2

Issue Date: July 12, 2005
UST Project No: 05-0141

U.S. TECH
A TRADITION IN TESTING SERVICES

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: July 12, 2005

Axonn Corporation LLC
2021 Lakeshore Drive, Suite 533
New Orleans, LA 70122

By: _____

Name: _____

Title: _____

Date: _____

MEASUREMENT/TECHNICAL REPORT

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

Equipment type: **__Modular Transmitter___**

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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SECTION 1

GENERAL INFORMATION

GENERAL INFORMATION

1.1 Product Description

The Equipment Under Test (EUT) is the Axonn Corporation, L.L.C. Model STX2. The STX2 is a battery operated, modular telemetry device designed to communicate with the Globalstar satellite constellation and provide cost-efficient and reliable asset tracking and fleet management.

The STX2 can be installed in a compact rugged enclosure designed to attach easily, with either screws or auto-body grade adhesive, to the top of a cargo container, railcar or trailer. The Unit operates at the following 4 transmit frequencies: 1611.25, 1613.75, 1616.26 and 1618.25 MHz. Once service is established with Globalstar, STX2 sends information to Globalstar satellites which relay the information to ground stations. The processed information is then available to the user via the internet. The device is delivered complete and ready-to-go with no need for an external antenna or power source.

The EUT was configured to operate at 1611.25 and 1618.25 MHz, 255 Symbols, BPSK Demod on continuous transmit mode.

For the purpose of this test the EUT was placed into a (+20 dBm) constant TX mode of operation.

1.2 Related Submittal(s)/Grant(s)

The EUT is subject to the following authorizations:

a) Certification as a modular transmitter as specified by Part 25.

The information contained in this report is presented for the Part 25 Certification authorization(s) for the EUT.

SECTION 2

TEST AND MEASUREMENTS

TEST AND MEASUREMENTS

2.1 Configuration of Tested System

Prepared in accordance with the requirements of the FCC Rules and Regulations Part 2 & 25. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious emissions are shown in Figure 2.

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 registered by the FCC under Registration Number 91037. Additionally, this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file 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 25 limits for the transmitter portion of the EUT.

FIGURE 1

TEST CONFIGURATION

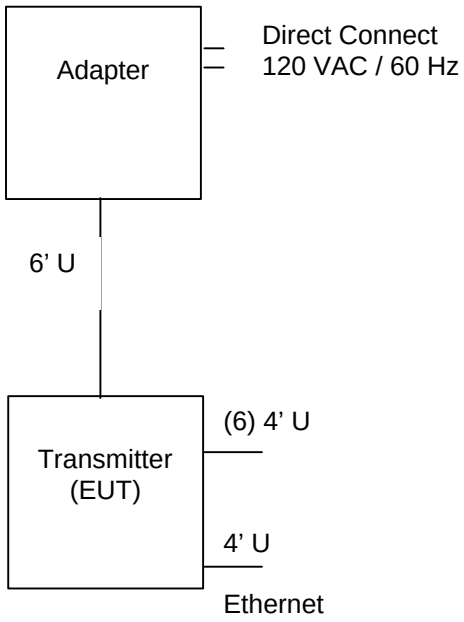


TABLE 1

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Transmitter Axonn Corporation (EUT)	STX2	50009	None	6' U Power Cable 4' U Ethernet (6) 4' U
Adapter	DSA-0151A-06	None	N/A	None

FIGURE 2a

Photograph(s) for Spurious Emissions

FIGURE 2b

Photograph(s) for Spurious Emissions (Cont.)

TABLE 2
TEST INSTRUMENTS

EQUIPMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	8558B	HEWLETT-PACKARD	2332A10055	02/19/04
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	3/1/05
RF PREAMP	8447D	HEWLETT-PACKARD	2944A07436	4/6/05
RF PREAMP	8449B	HEWLETT-PACKARD	3008A00480	6/23/04
LOG PERIODIC ANTENNA	3146	EMCO	3236	6/3/05
LISN (x 2) 8028-50-TS24-BNC	8028	SOLAR ELE.	910494 & 910495	1/27/05
HORN ANTENNA	3115	HEWLETT-PACKARD	9107-3723	
CALCULATION PROGRAM	N/A	N/A	EMCCALC	N/A

2.5 Antenna Description

The EUT will incorporate a Satellite transmit antenna: 25 mm ceramic patch, +4 dBi gain. GPS receive antenna: ceramic patch, passive.

2.6 RF Power Output (FCC Section 2.1046)

In bands shared coequally with terrestrial radio communications services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station operating in frequency bands between 1 and 15 GHz, shall not exceed the limits below.

For angles of elevation of the horizon greater than 5 degrees there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

FCC Minimum Standard (FCC Section 25.204 &)

EIRP < +40 dBW in any 4 kHz band for θ=0 degrees

The manufacturer has stated that the EUT has a maximum output power of +22 dBm.

TABLE 3
RF POWER OUTPUT

Frequency of Fundamental (MHz)	Measurement (dBm)	Cable Loss (dBm)	Adjusted Measurement (dBm)	Measurement (Watt)
1611.188	20.33	1.1	21.43	0.139
1618.713	19.12	1.1	20.22	0.105

Note: Given the output power and antenna gain of +4 dBi, even the direct lobe of radiation meets the FCC's EIRP Requirement for $\theta = 0$ (+40 dBW)

Test Date: March 30, 2004

Tester Signature:  **Name: David Blethen**

Figure 3a.
RF Power Output Low

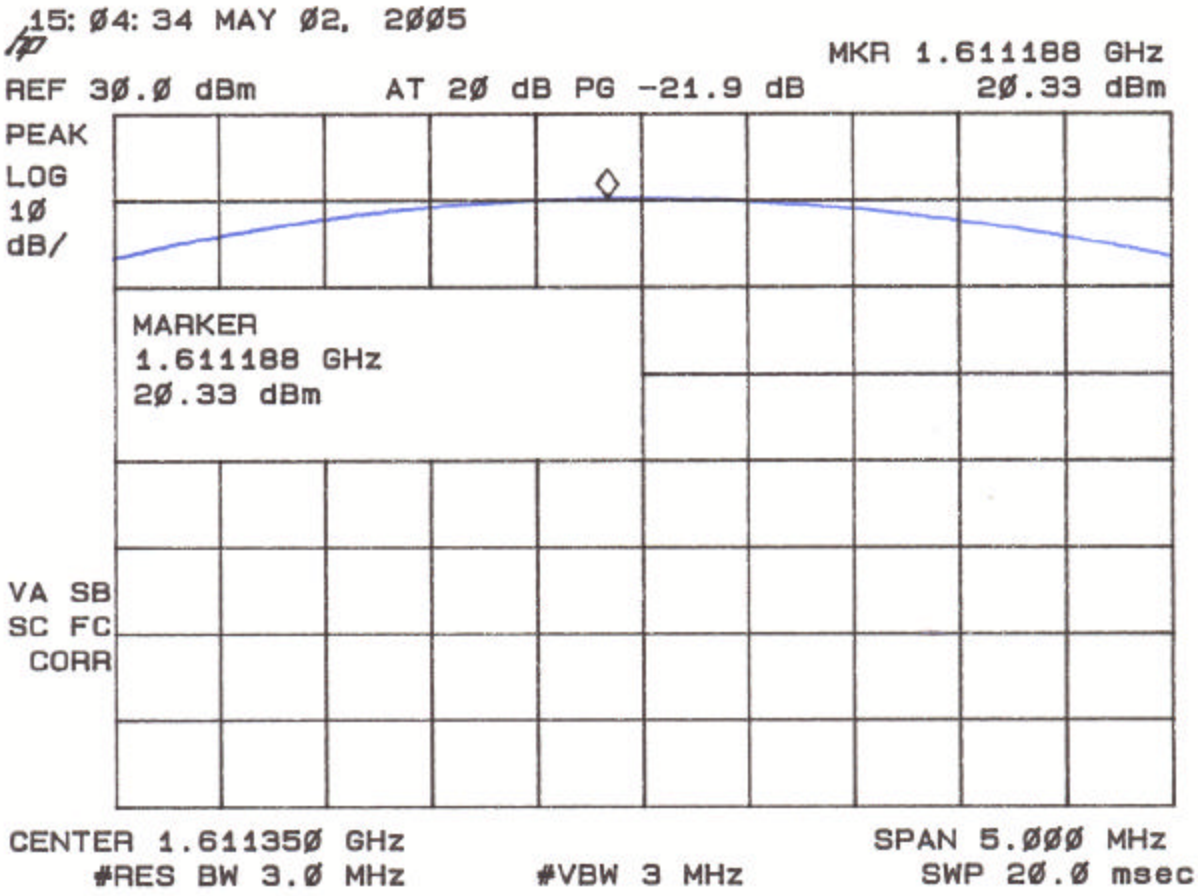
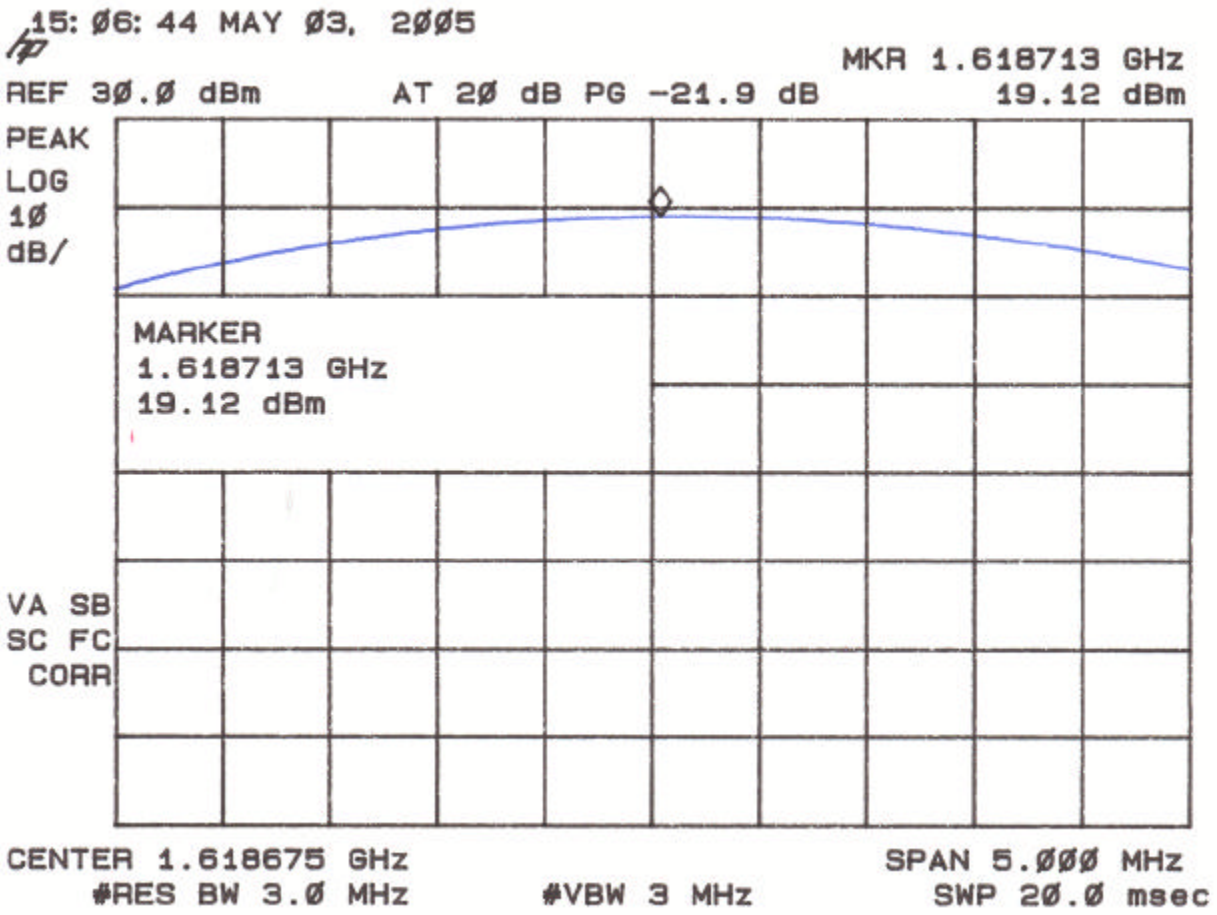


Figure 3b.
RF Power Output High



2.7 Modulation Characteristics (FCC Section 2.1047)

Since the device incorporates digital modulation techniques, this information is not necessary.

Figure 4.
Modulation Characteristics

The EUT uses digital modulation techniques only which were employed during the tests for occupied bandwidth.

2.8 Occupied Bandwidth (FCC Section 2.1049)

EUT was modulated by its own internal sources. Low and High Channels were tested. The bandwidth of the fundamental was measured using a spectrum. The results are shown in Figure 5a through Figure 5d. Long sweep times were applied near to the fundamental to ensure a good signal was obtained.

FCC Minimum Standard (FCC Section 25.202(f))

For out-of-band emissions for frequencies removed from the midpoint of the assigned frequency by more than 50% up to and including 100% of the authorized bandwidth (2.5 MHz), at least 25 dB.

For out-of-band emissions for frequencies removed from the midpoint of the assigned frequency by more than 100% up to and including 250% of the authorized bandwidth (2.5 MHz), at least 35 dB.

For out-of-band emissions for frequencies removed from the midpoint of the assigned frequency segment by more than 250% of the authorized bandwidth (2.5 MHz), at least

$43 + 10 \log (P_{Watts})$ attenuation below the mean power of the transmitter.

For Lowest Channel = 43 + 10 log (0.139) = 34.4 dB
For Highest Channel = 43 + 10 log (0.105) = 33.2 dB

Note:
A 10 kHz RBW was used instead. This was deemed to meet the to 4 kHz RBW requirement.

Figure 5a.
99 % Occupied Bandwidth – Low

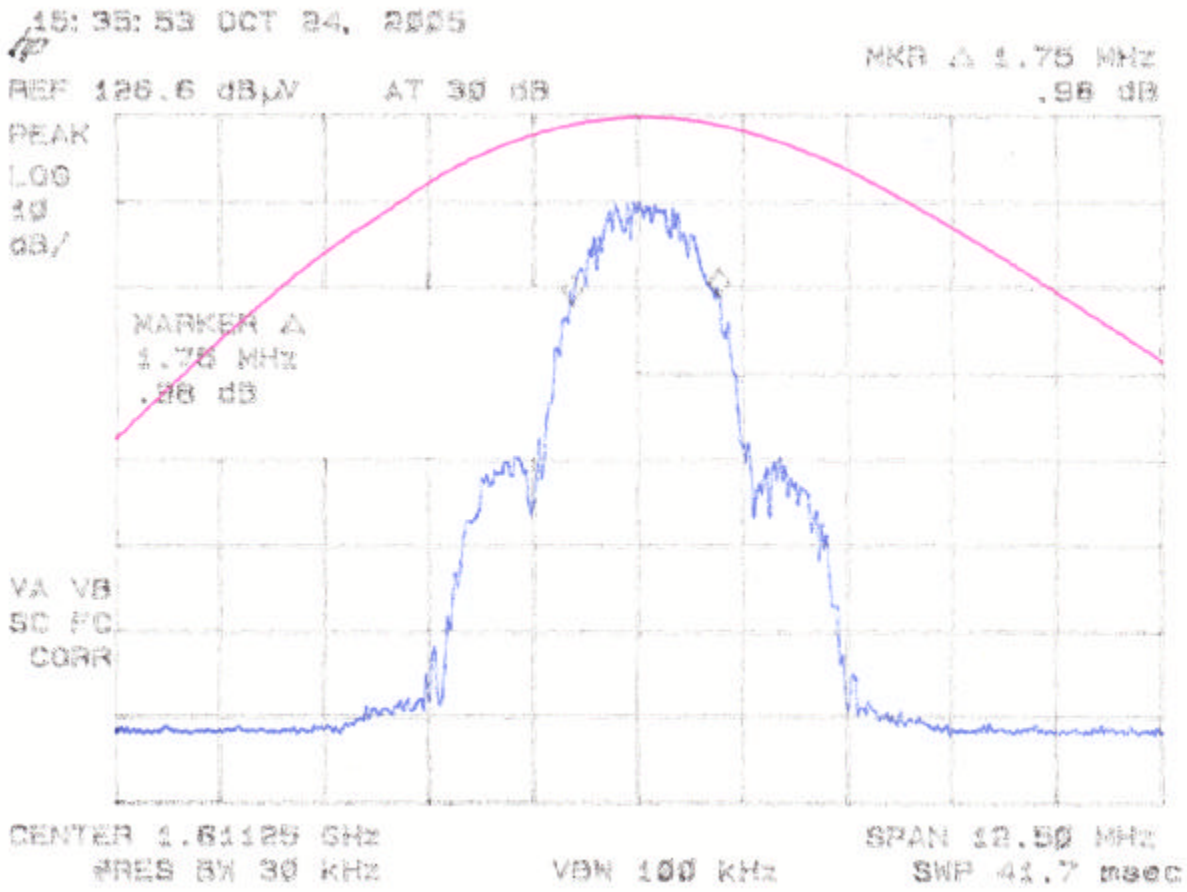


Figure 5b.
Occupied Bandwidth > 50% From Edge of Authorized Bandwidth – Low

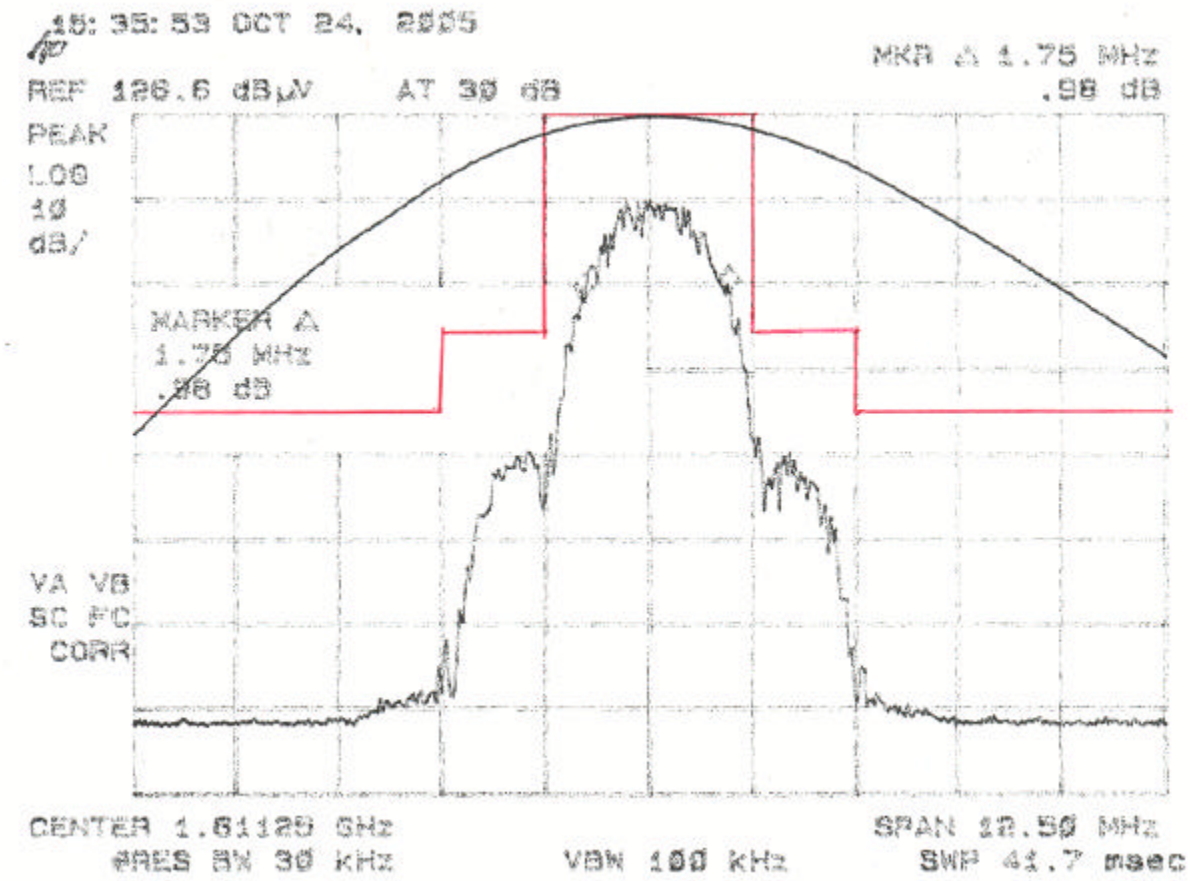


Figure 5c.
99% Occupied Bandwidth – High

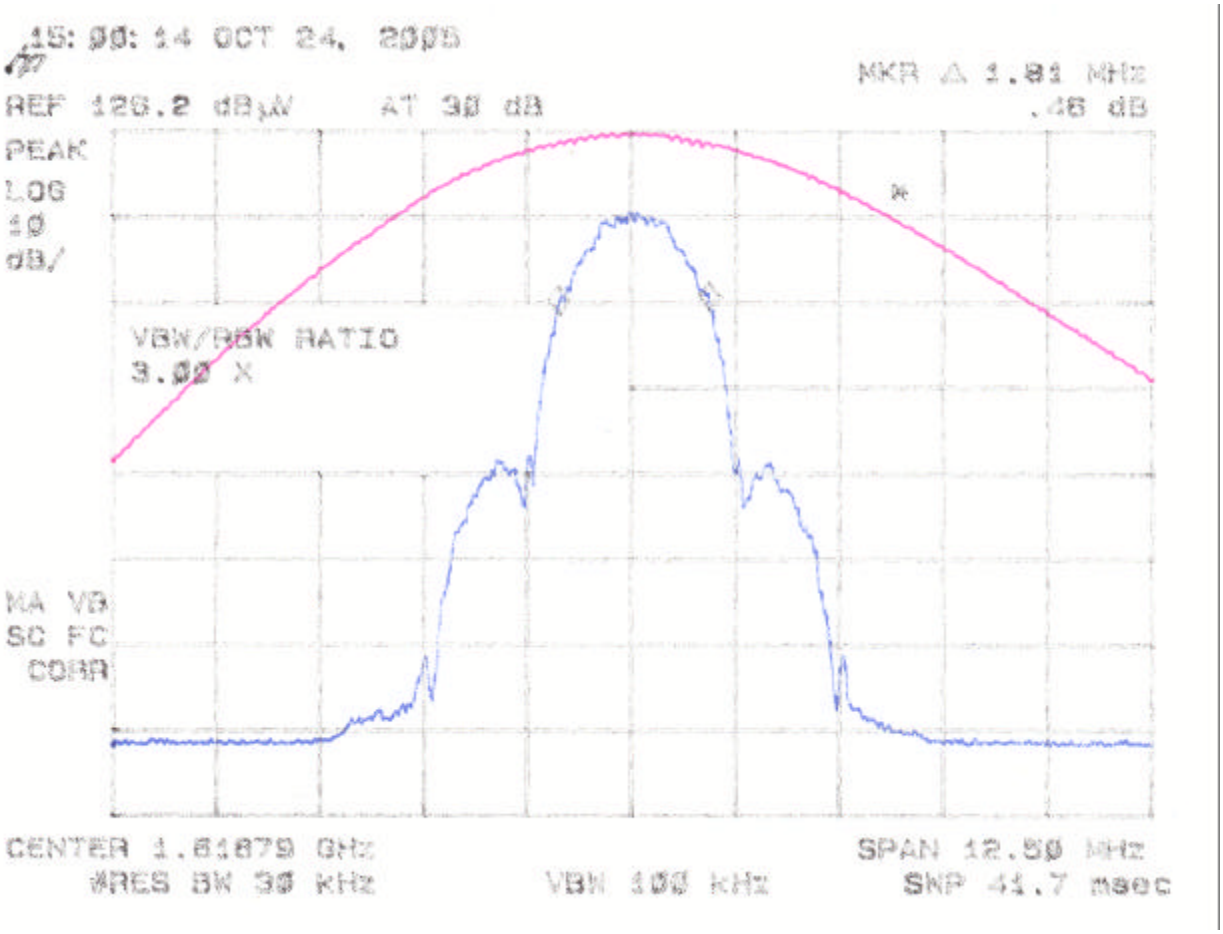
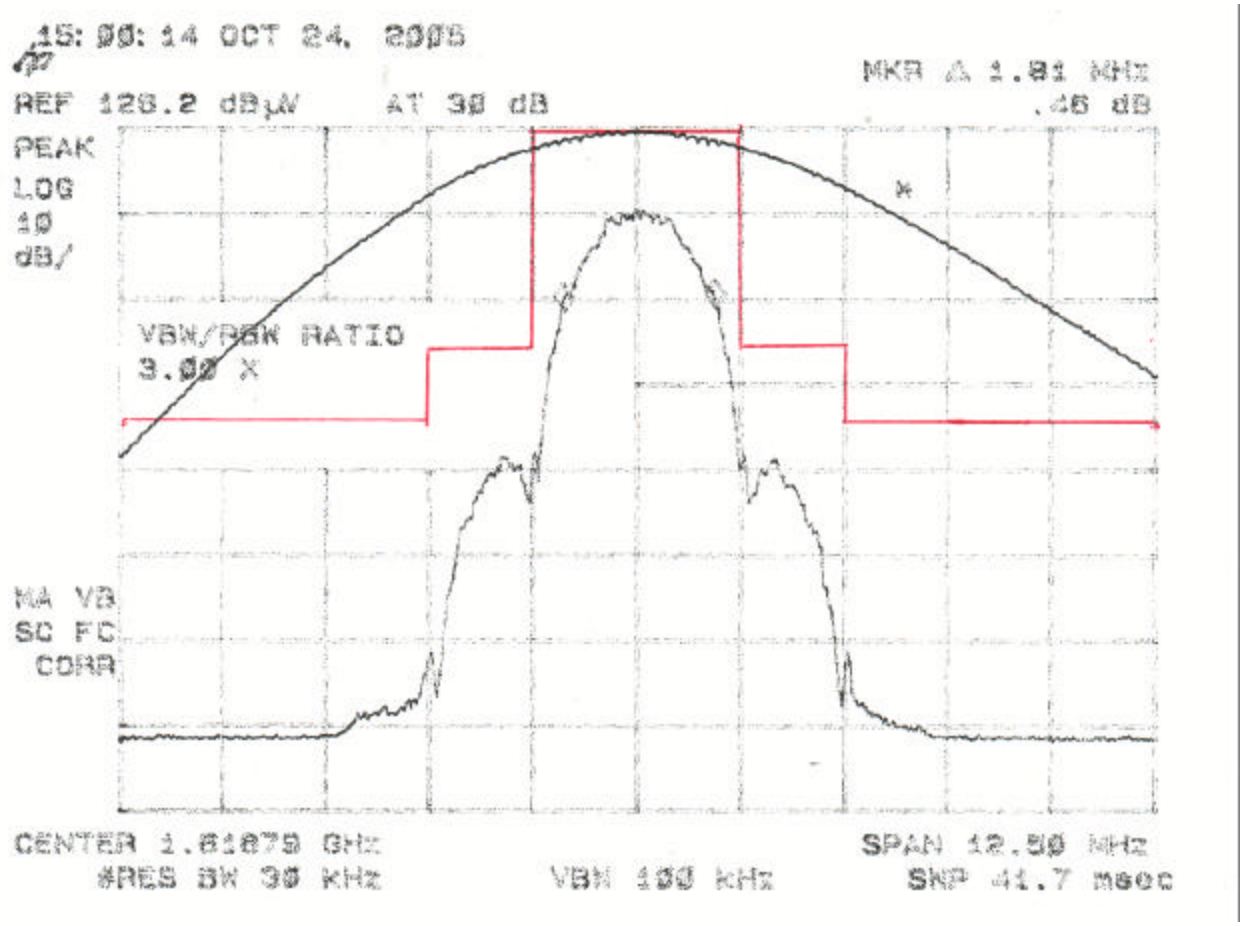


Figure 5d.
Occupied Bandwidth > 50% From Edge of Authorized Bandwidth – High



2.9 Spurious Emissions at Antenna Terminals (FCC Section 2.1051)

Spurious emissions appearing at the antenna terminals were 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. Results are shown in Figures 6a – 6n.

Protection of the radio-navigation-satellite service. Mobile earth stations operating in the 1610-1626.5 MHz band shall limit out-of- band emissions in the 1574.397-1576.443 MHz band so as not to exceed an e.i.r.p. density level of -70 dB (W/MHz) averaged over any 20 ms period. The e.i.r.p. of any discrete spurious emission (i.e., bandwidth less than 600 Hz) in the 1574.397-1576.443 MHz band shall not exceed -80 dBW.

FCC Minimum Standard (FCC Section 25.202(f))

For out-of-band emissions for frequencies removed from the midpoint of the assigned frequency segment by more than 250% of the authorized bandwidth (2.5 MHz), at least

$$43 + 10 \log (P_{Watts})$$ attenuation below the mean power of the transmitter.

For Lowest Channel = 43 + 10 log (0.139) = 34.4 dB
For Highest Channel = 43 + 10 log (0.105) = 33.2 dB

Note:
A 10 kHz RBW was used instead. This was deemed to be comparable to 4 kHz RBW.

Additional requirement for 1574.397 - 157.443 MHz (**FCC Section 25.213(b))**
- 80 dBW (- 50 dBm)

Figure 6a.
Spurious Emissions at Antenna Terminals – Low Channel

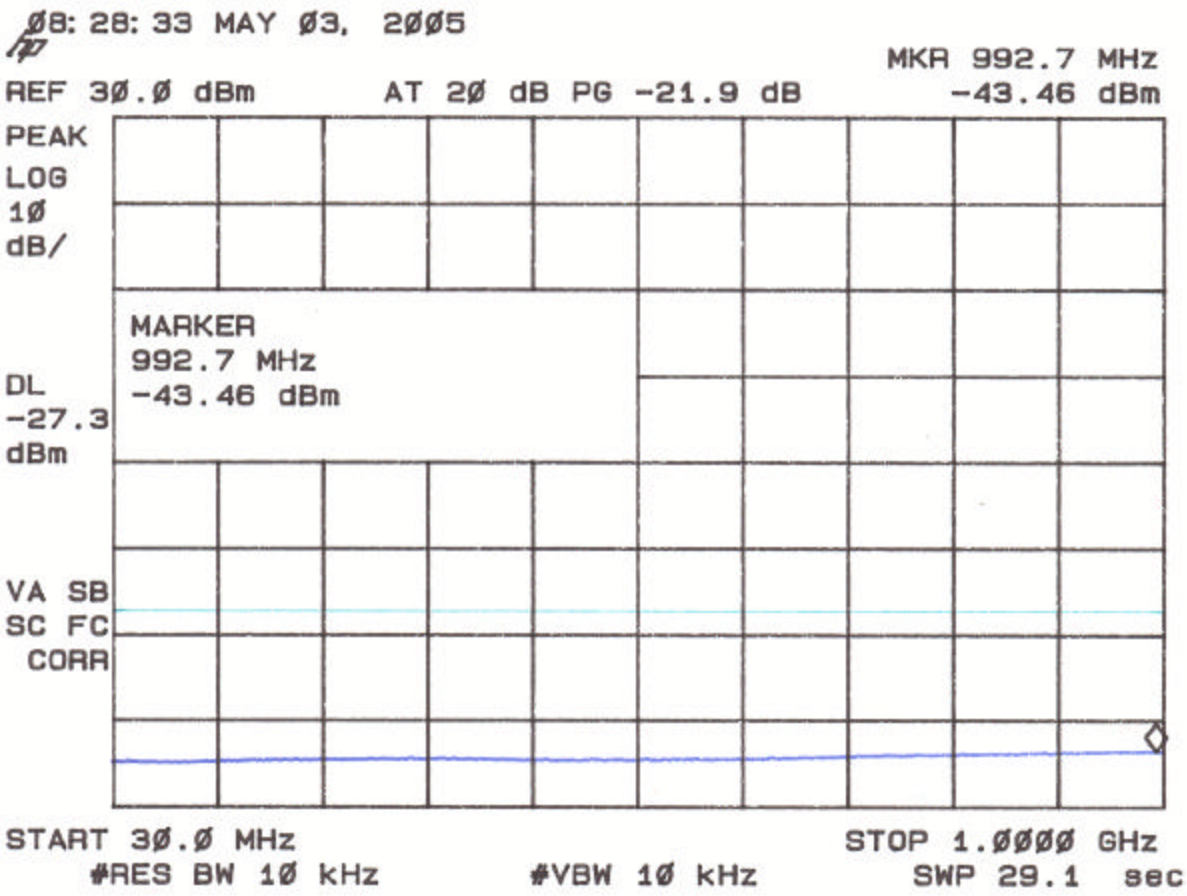


Figure 6b.
Spurious Emissions at Antenna Terminals – Low Channel

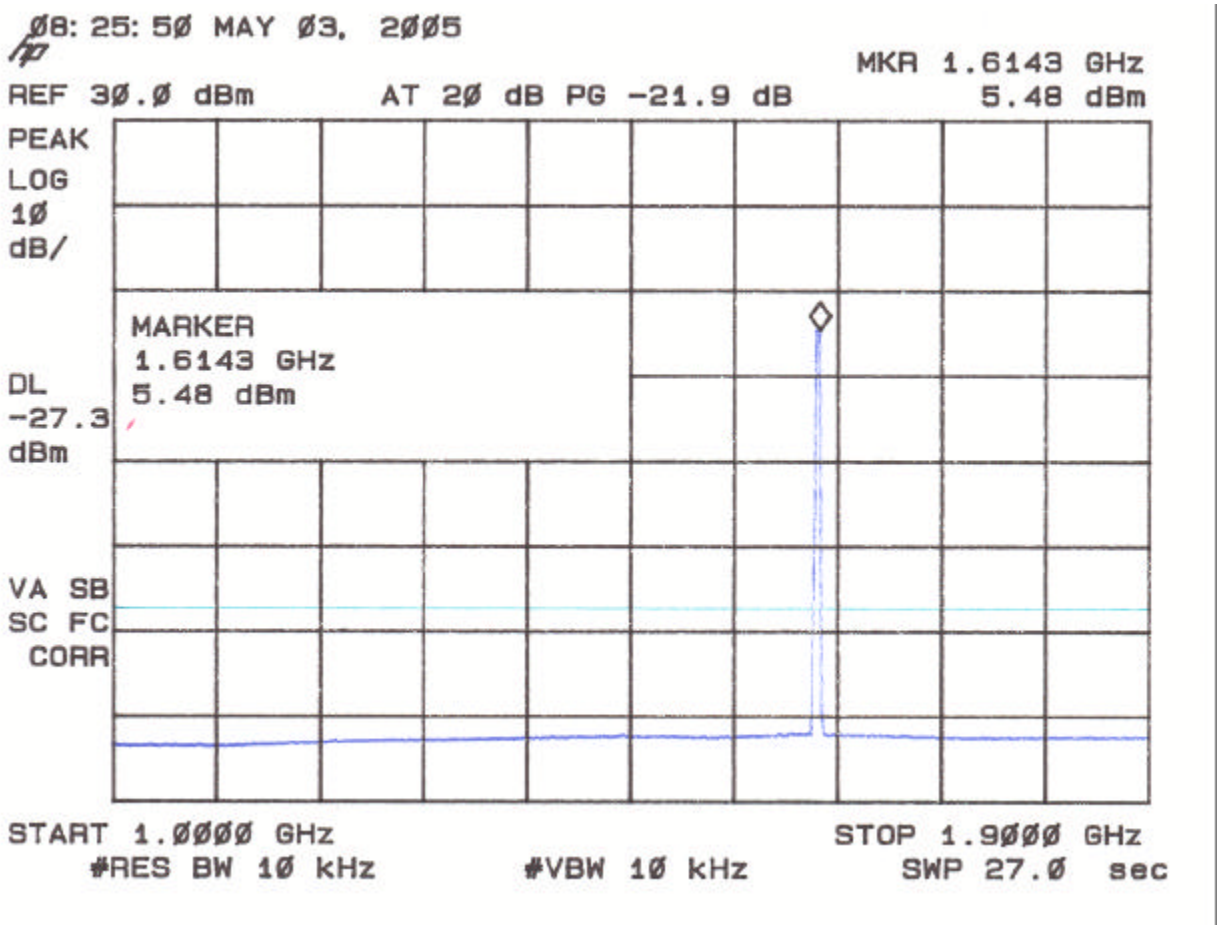


Figure 6c.
Spurious Emissions at Antenna Terminals – Low Channel

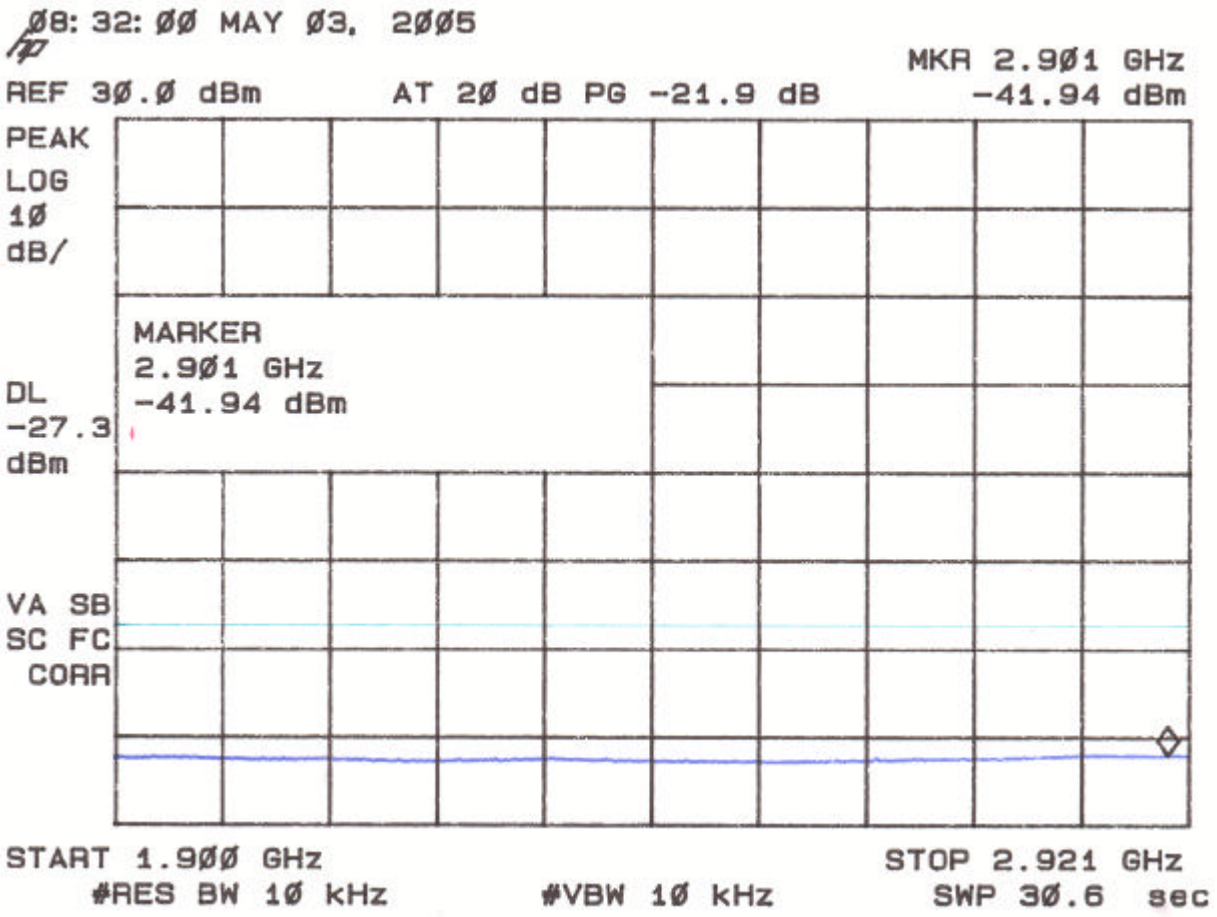


Figure 6d.
Spurious Emissions at Antenna Terminals – Low Channel

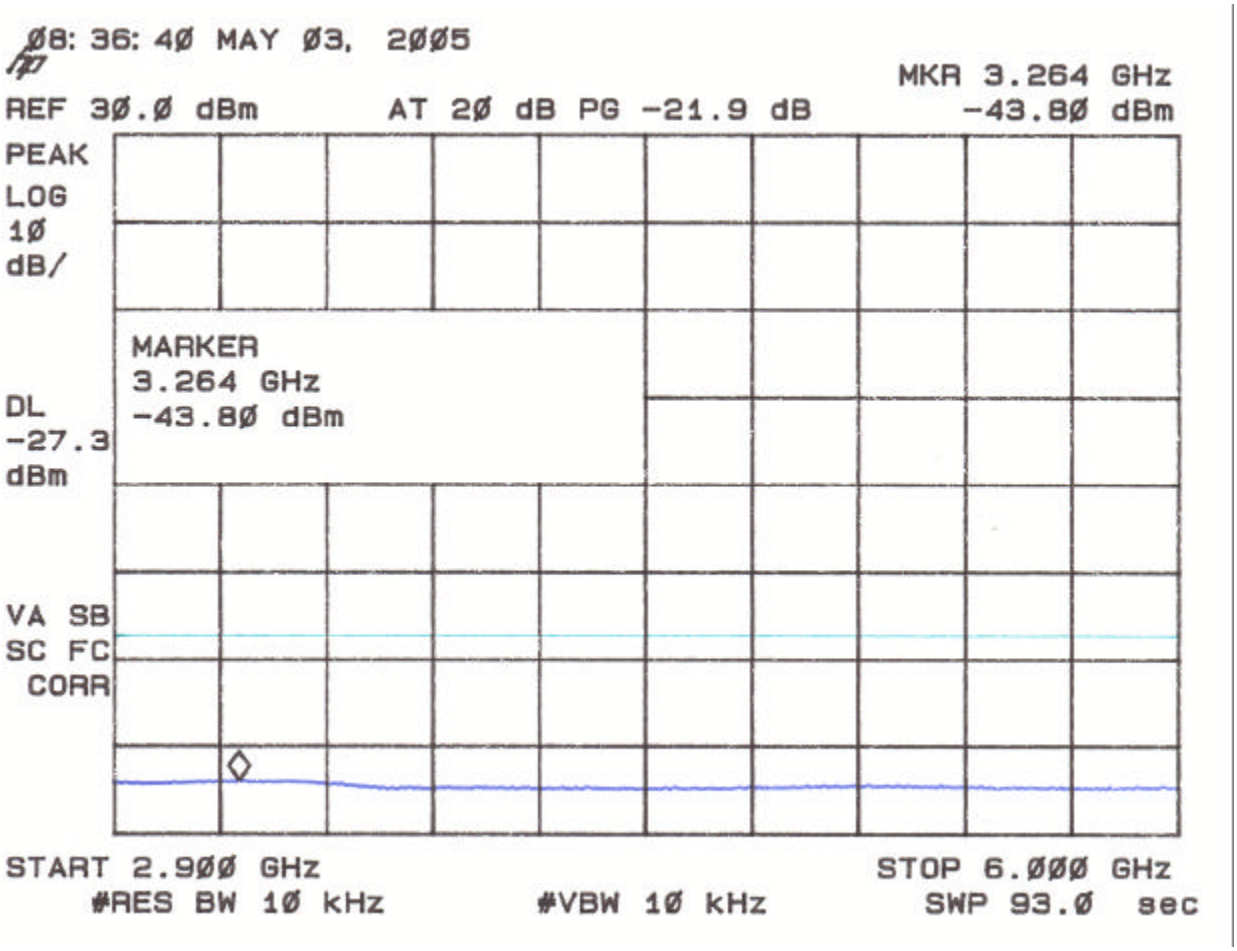


Figure 6e.
Spurious Emissions at Antenna Terminals – Low Channel

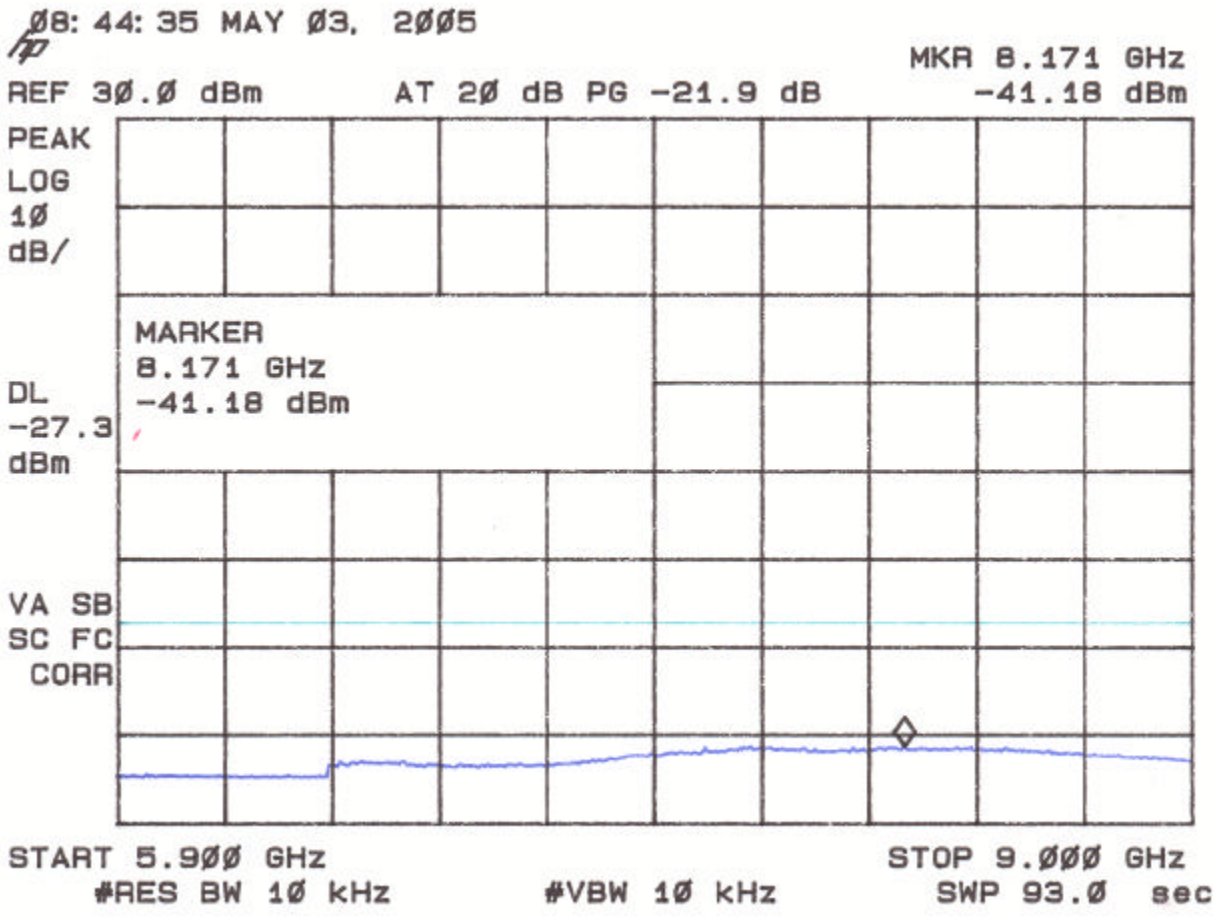


Figure 6f
Spurious Emissions at Antenna Terminals – Low Channel

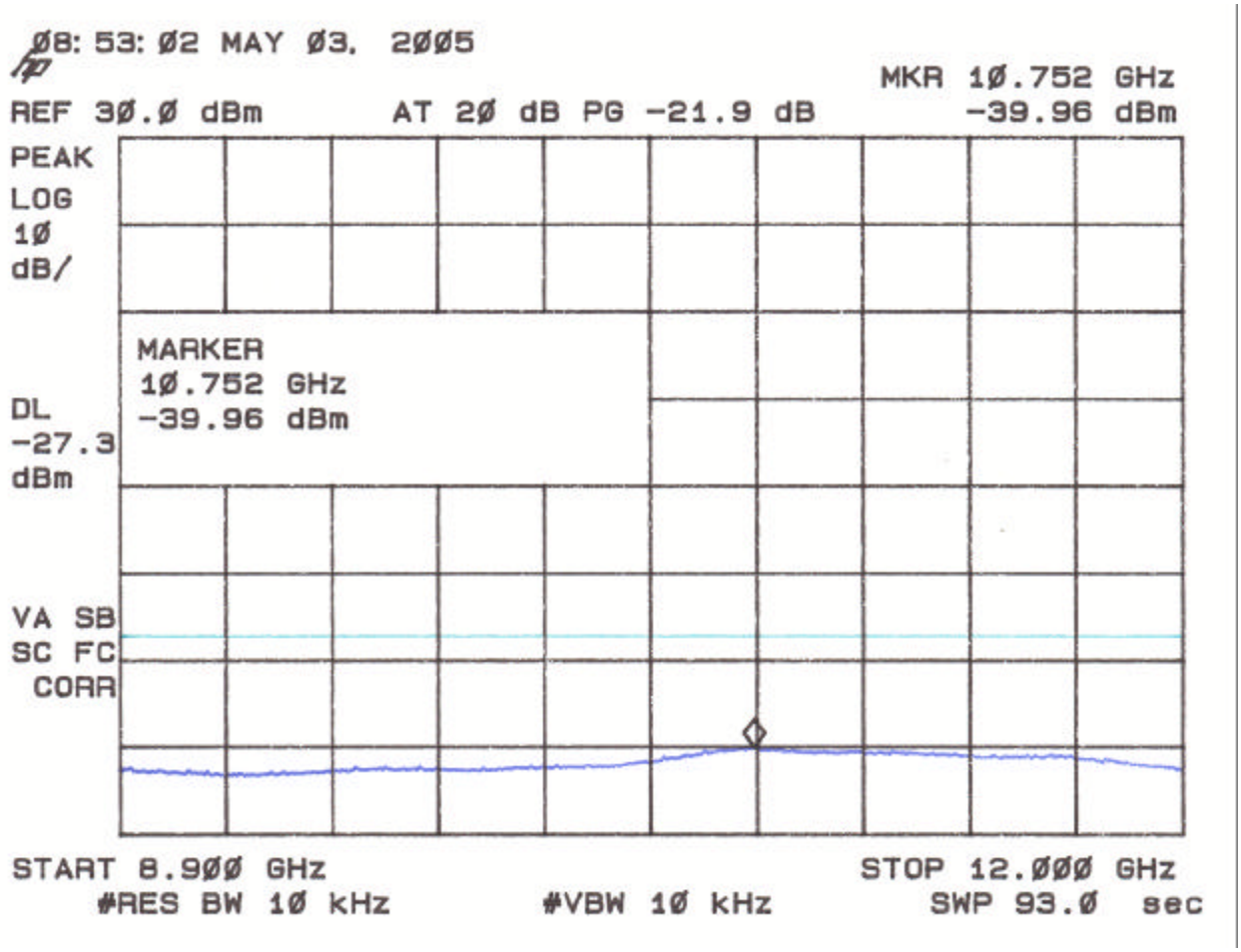


Figure 6g
Spurious Emissions at Antenna Terminals – Low Channel

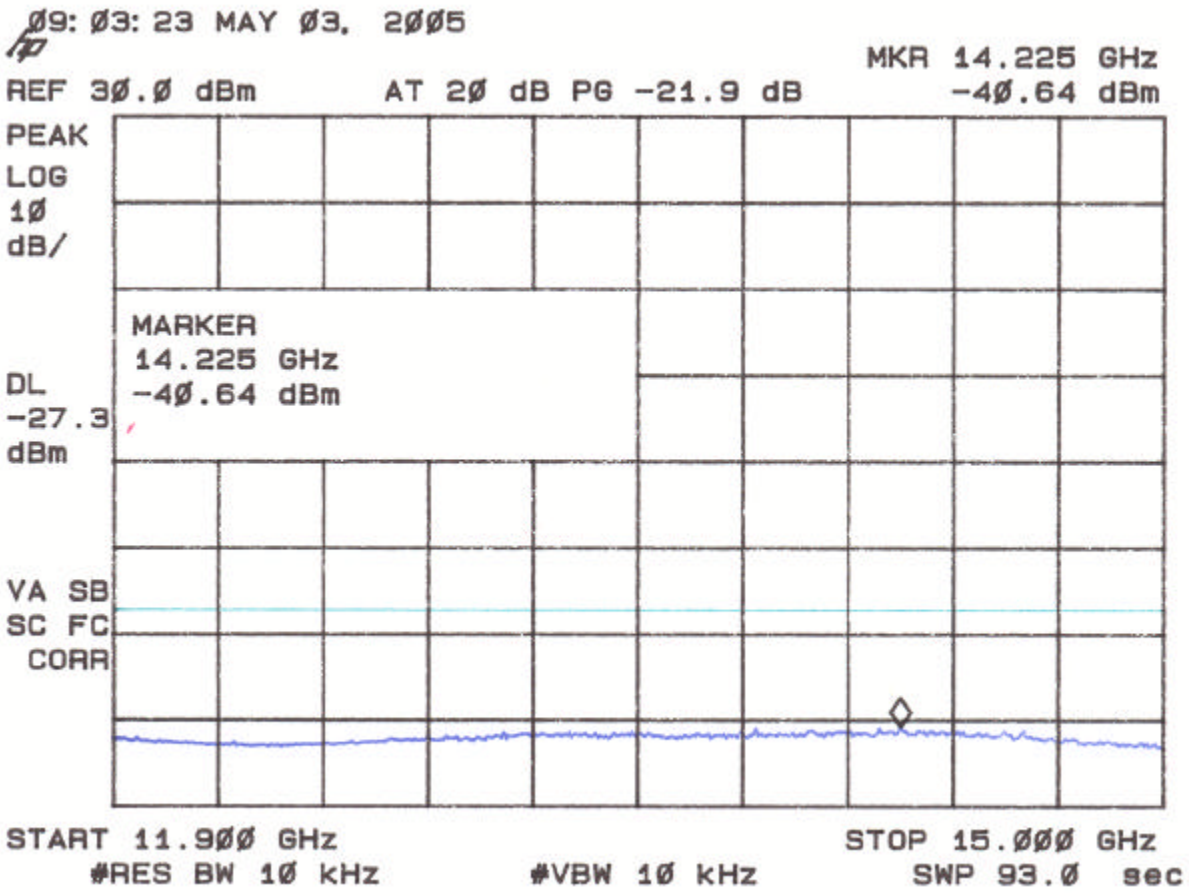


Figure 6h
Spurious Emissions at Antenna Terminals – Low Channel

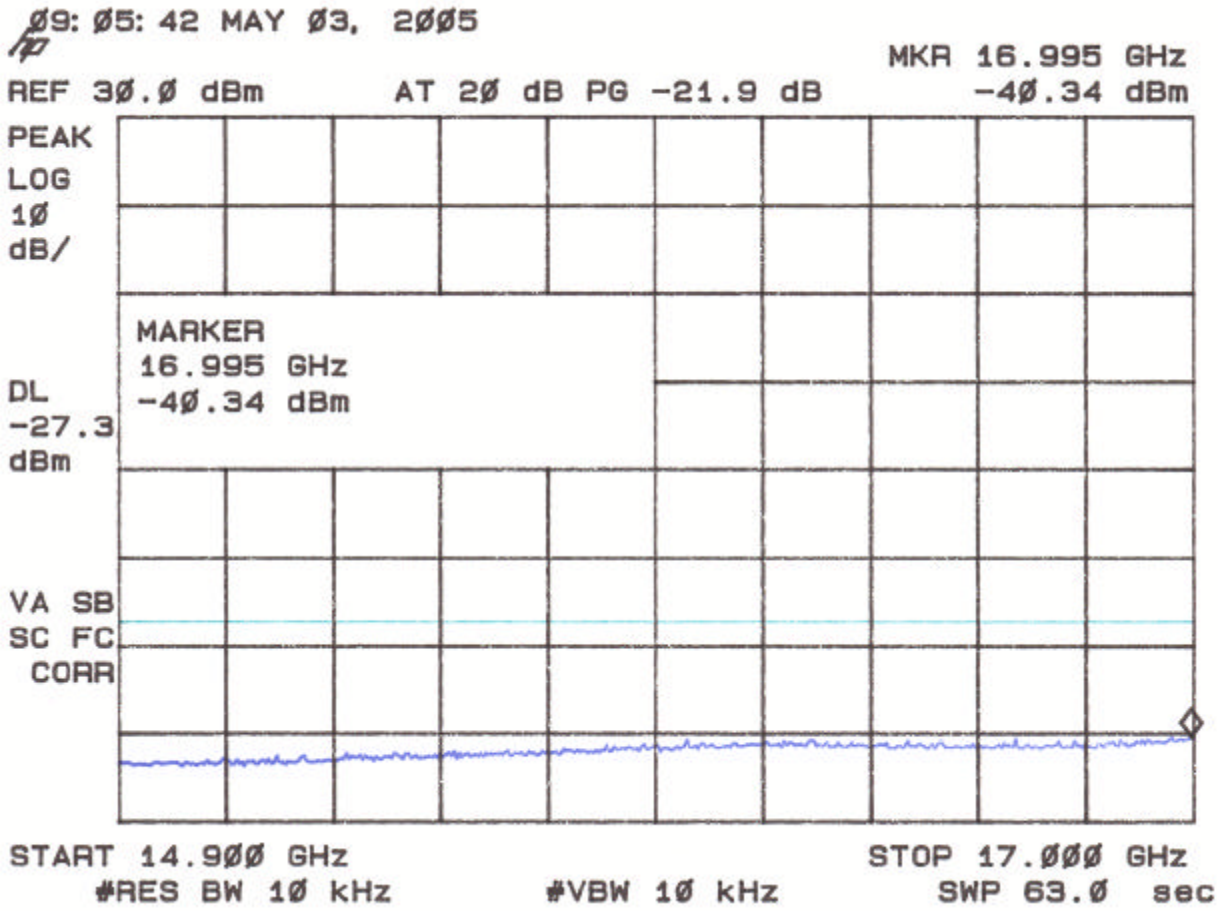


Figure 6i
Spurious Emissions at Antenna Terminals - High Channel

Limit = -80 dBW = -50 dBm

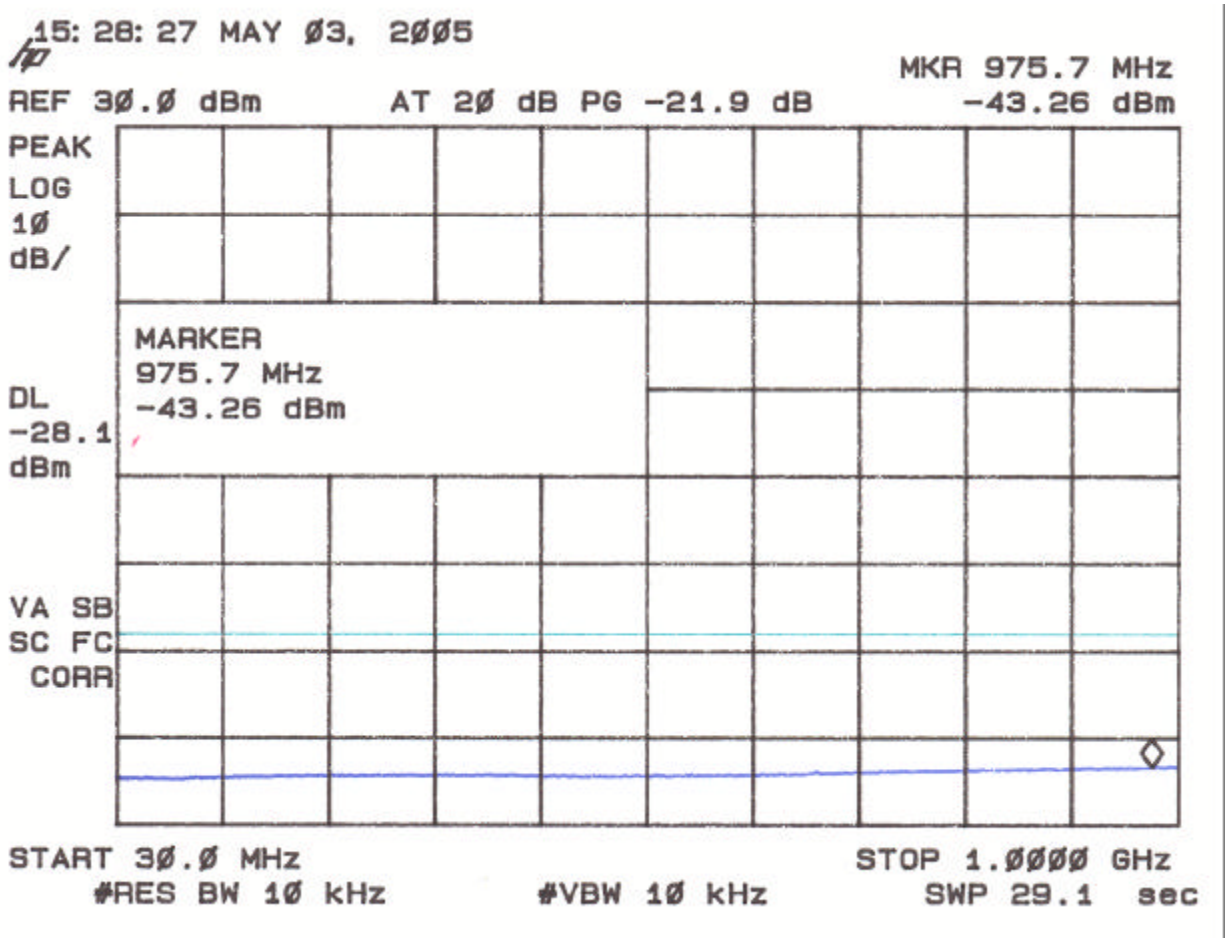
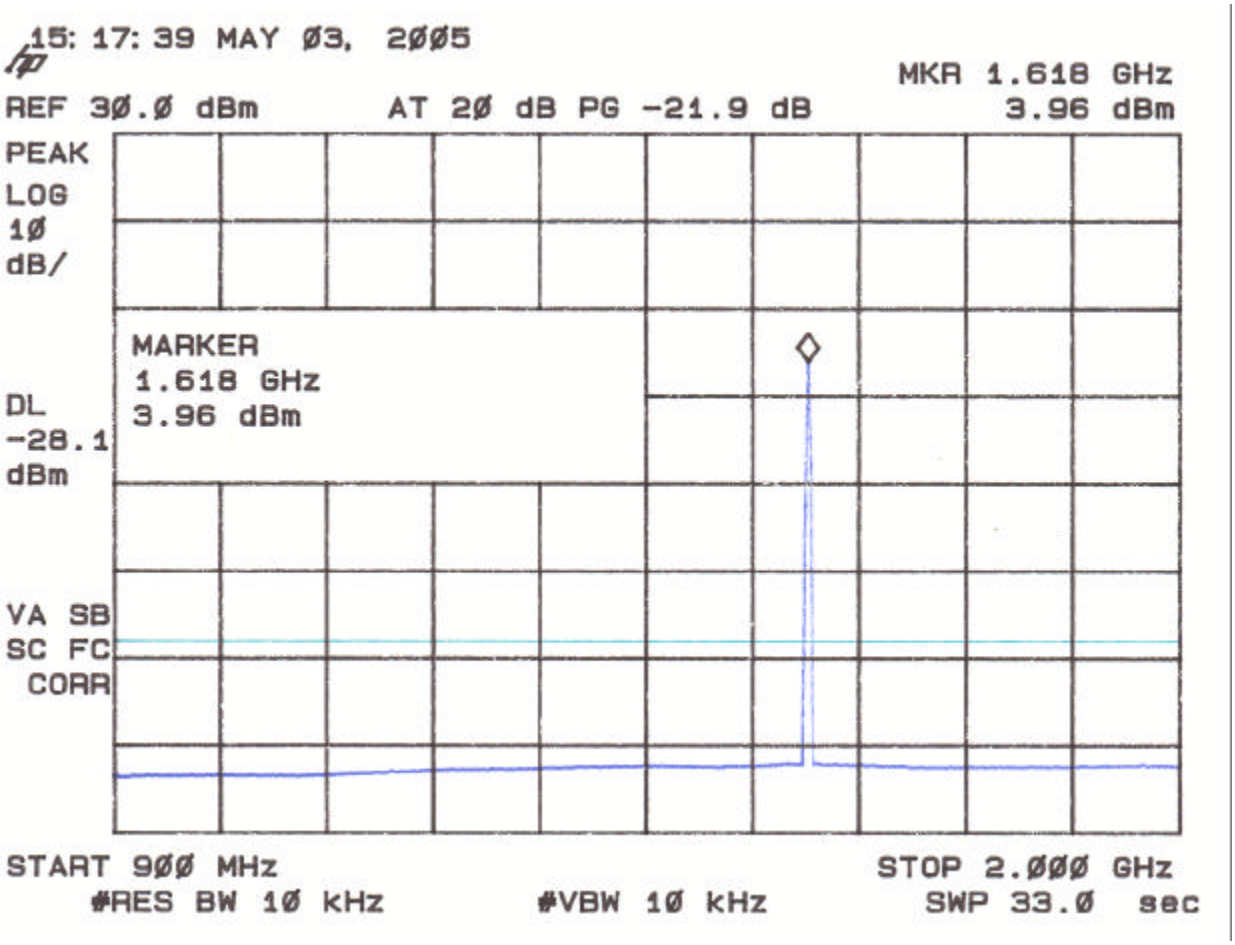


Figure 6j.
Spurious Emissions at Antenna Terminals



NOTE: Marker shows Fundamental Frequency

Figure 6k.
Spurious Emissions at Antenna Terminals – High Channel

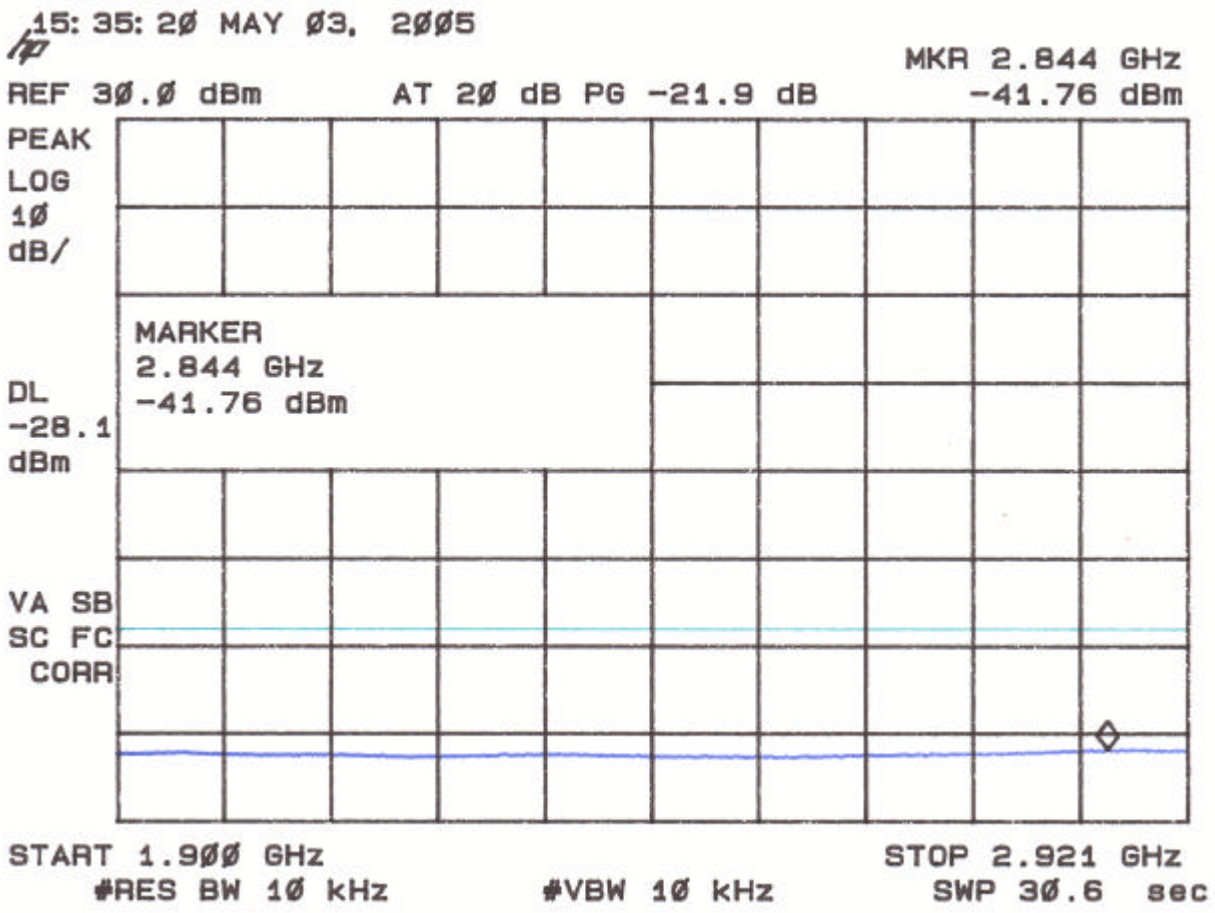


Figure 6l
Spurious Emissions at Antenna Terminals – High Channel

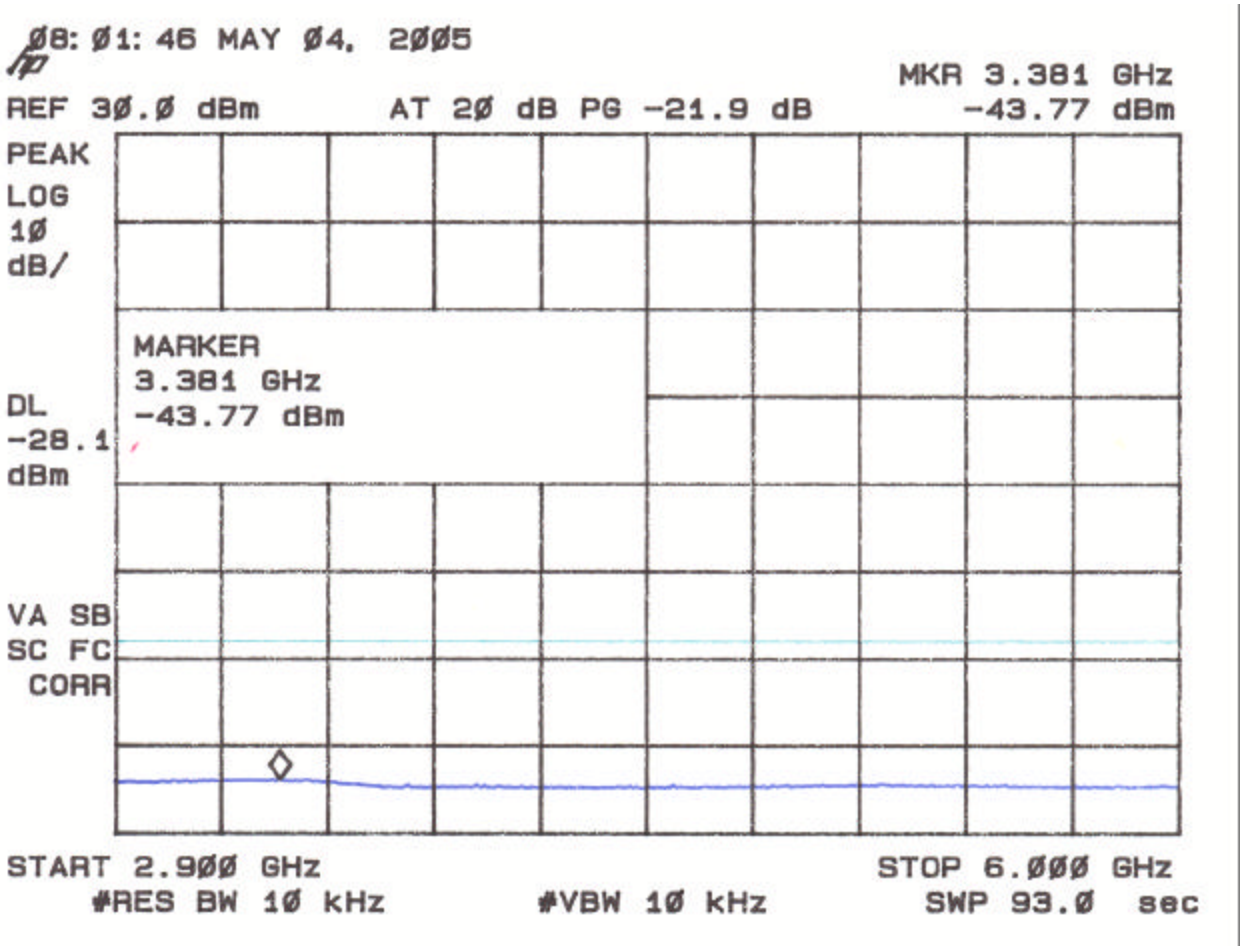


Figure 6m.
Spurious Emissions at Antenna Terminals – High Channel

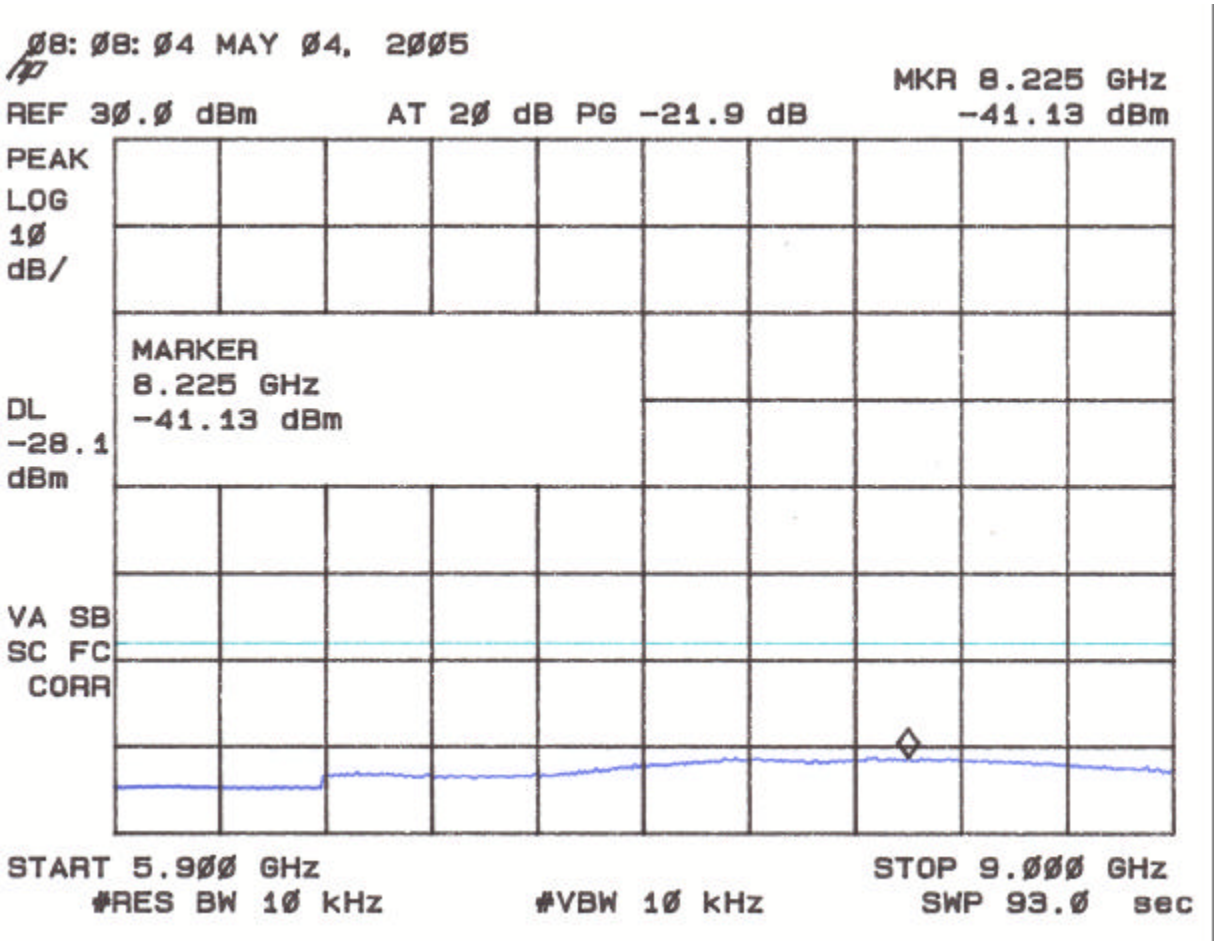


Figure 6n.
Spurious Emissions at Antenna Terminals – High Channel

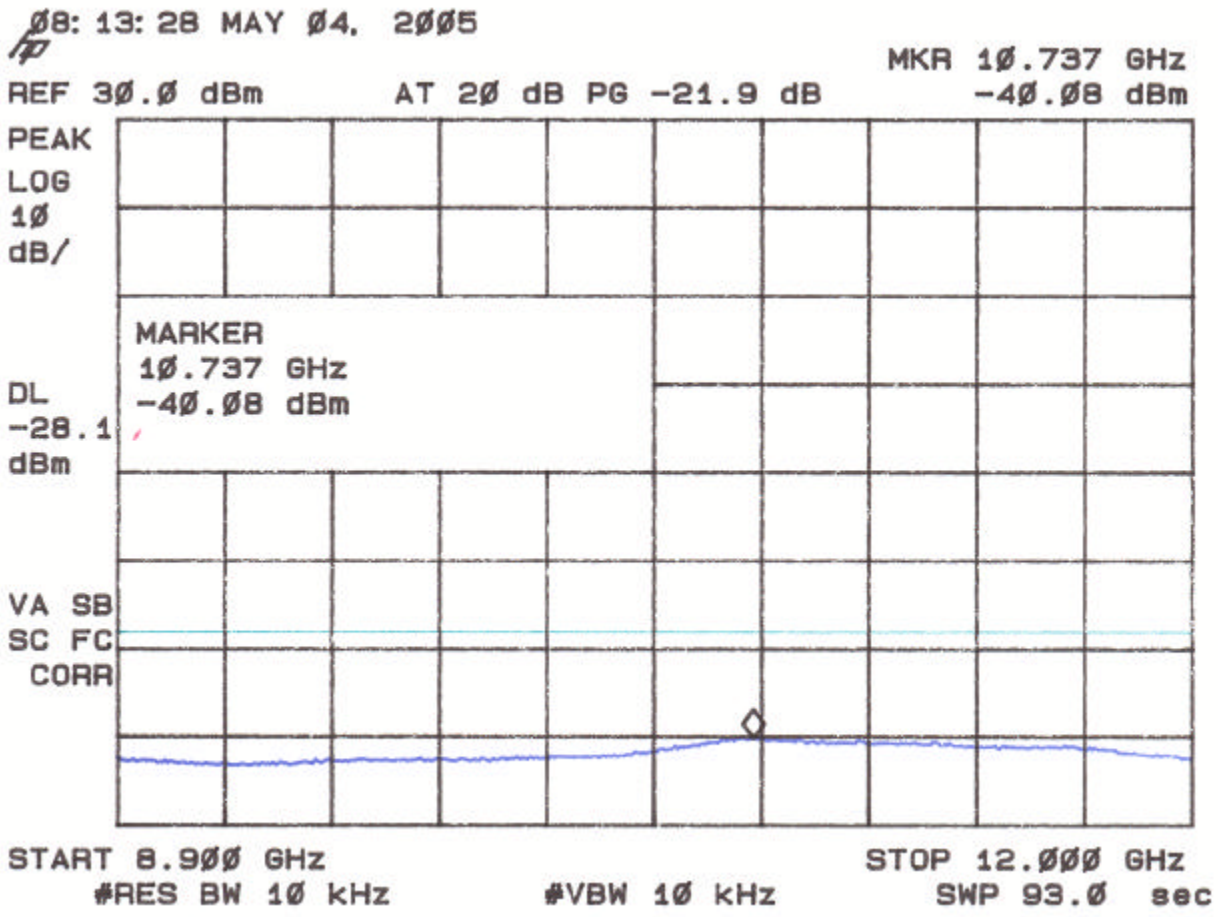


Figure 6o
Spurious Emissions at Antenna Terminals – High Channel

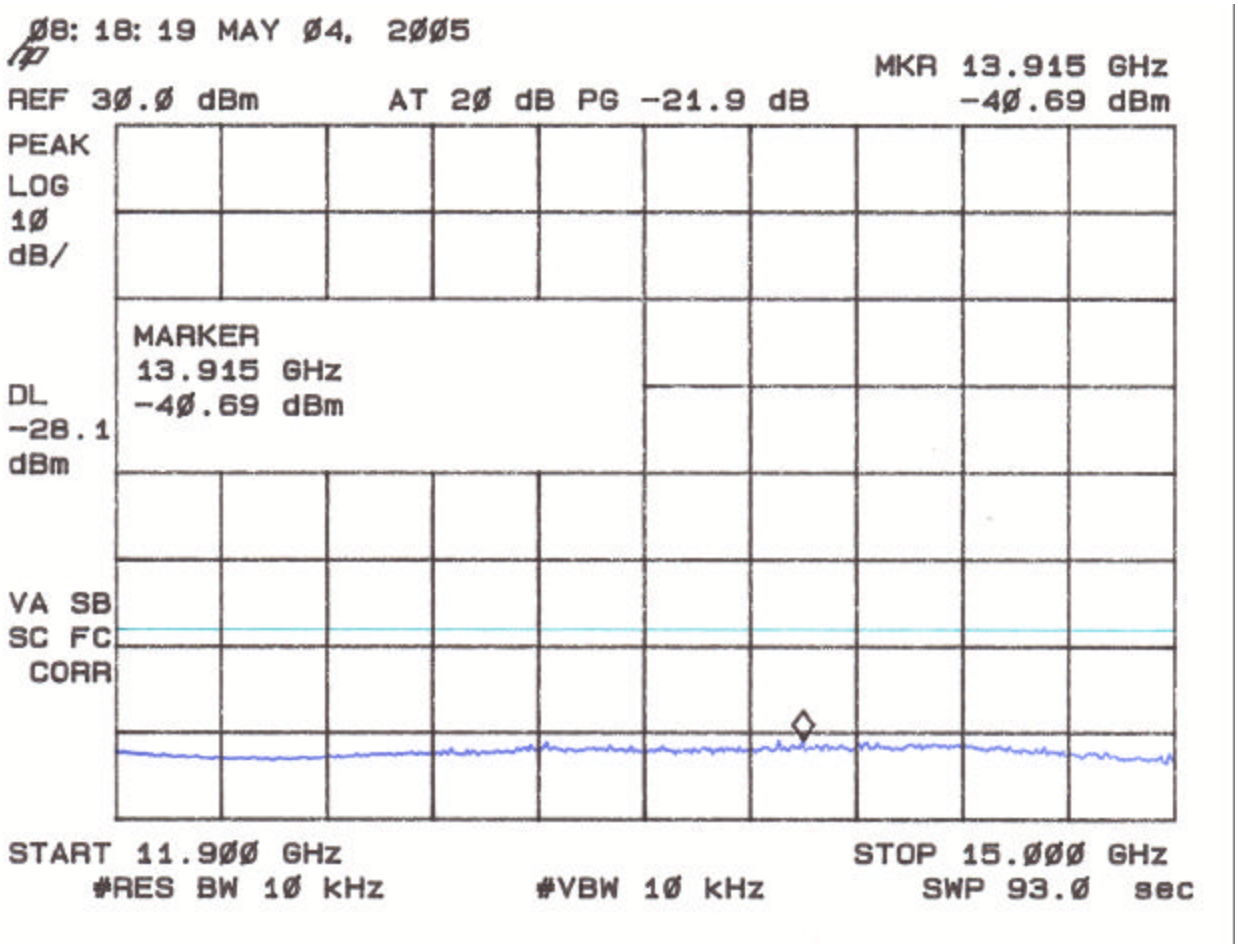
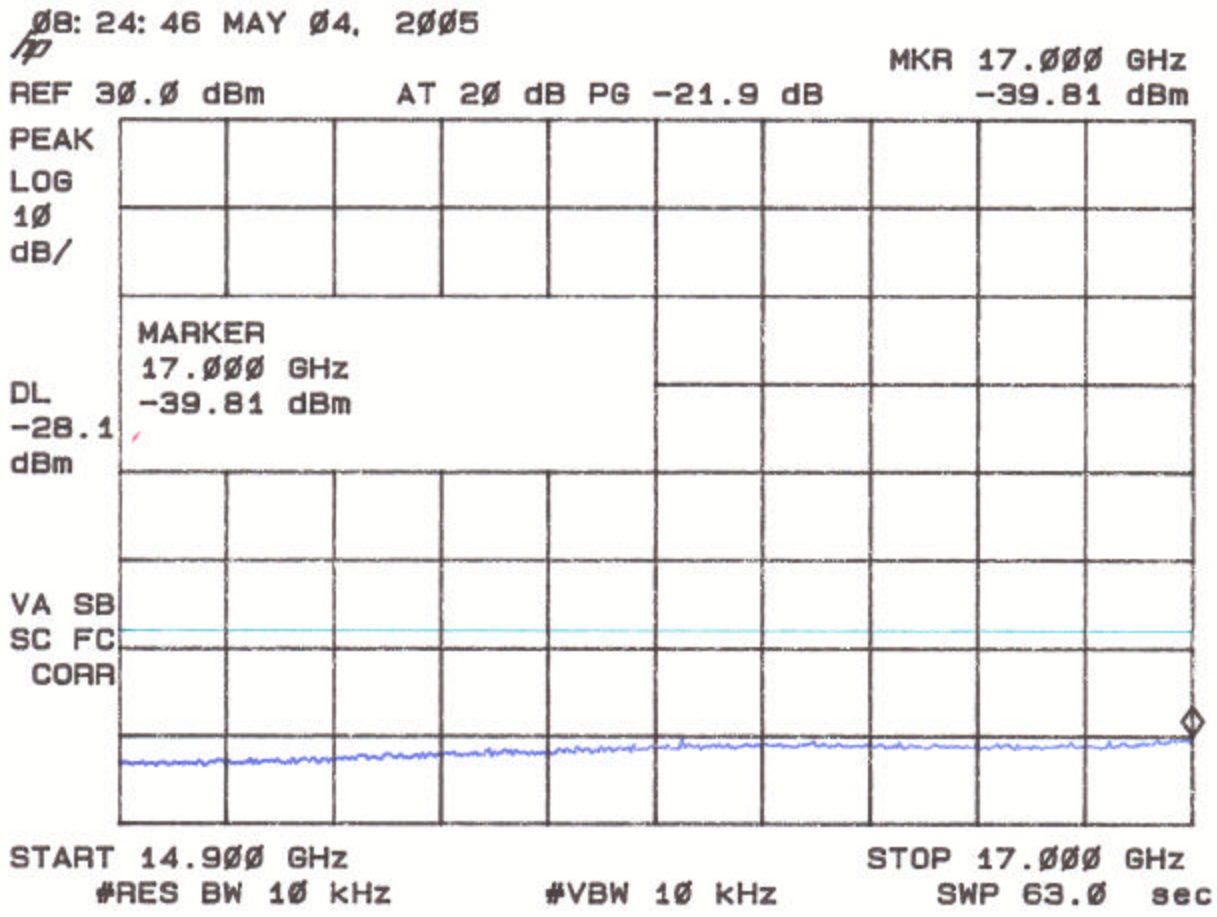


Figure 6p
Spurious Emissions at Antenna Terminals – High Channel



2.10 Field Strength of Spurious Radiation (FCC Section 2.1053)

Spurious emissions were evaluated from 30 MHz to 16.2 GHz at an EUT to antenna distance of 1 or 3 meters. The EUT was tested with an external power source and modulated by its own internal sources. Both a low and high channel were tested. The EUT was placed on an open area test site and the spurious emissions tested with the Substitution Method as stipulated by EIT/TIA-603: 1992 section 2.2.12. Measurements for 30 to 1000 MHz were made with the analyzer's bandwidth set to 120 kHz. Measurements above 1 GHz were made with the analyzer's bandwidth set to 1 MHz. The worse case results are shown in Table 4.

FCC Minimum Standard (FCC Section 25.202(f))

For out-of-band emissions for frequencies removed from the midpoint of the assigned frequency segment by more than 250% of the authorized bandwidth (2.5 MHz), at least

$$43 + 10 \log (P_{Watts})$$ attenuation below the mean power of the transmitter.

For Lowest Channel = 43 + 10 log (0.139) = 34.4 dB
For Highest Channel = 43 + 10 log (0.105) = 33.2 dB

FIELD STRENGTH OF SPURIOUS RADIATION

Limit: 43 + 10 log (P_{Watts}) = 43 + 10 log (0.195) = 35.9 dB
43 + 10 log (Pwatts)= 43 + 10 log (0.139) = 34.4

TABLE 4

Worse Case Mode = Low Channel

Frequency (MHz)	Polarity (H or V)	Corrected Substitution Level Relative to Dipole (dBm)	Attenuated Level Below Carrier Power (dB)
3236.2	V	-63.2	83.4
4854.2	V	-68.2	88.4
6471.1	V	-63.2	89.4
8089.1	V	-63.0	83.2
9707.1	V	-59.1	75.3

SAMPLE CALCULATION:

Attenuated Level Below Carrier Power =
10 log (TX Power in mW) – Corrected Substitution Level (dBm)
10 log (195.0) - -63.2 = 83.4

Test Date: March 30, 2004

Tester Signature:  **Name: David Blethen**

2.11 Frequency Stability (FCC Section 2.1055 and 25.202(d))

The frequency tolerance of the carrier signal was measured by while ambient temperature was varied from -30 to 50 degrees centigrade. The frequency tolerance was verified at 10 degree increments. Additionally, the supply voltage was varied from 85% to 115% of the nominal value (except for hand carried, battery powered equipment which was additionally measured at battery endpoint).

FCC Minimum Standard

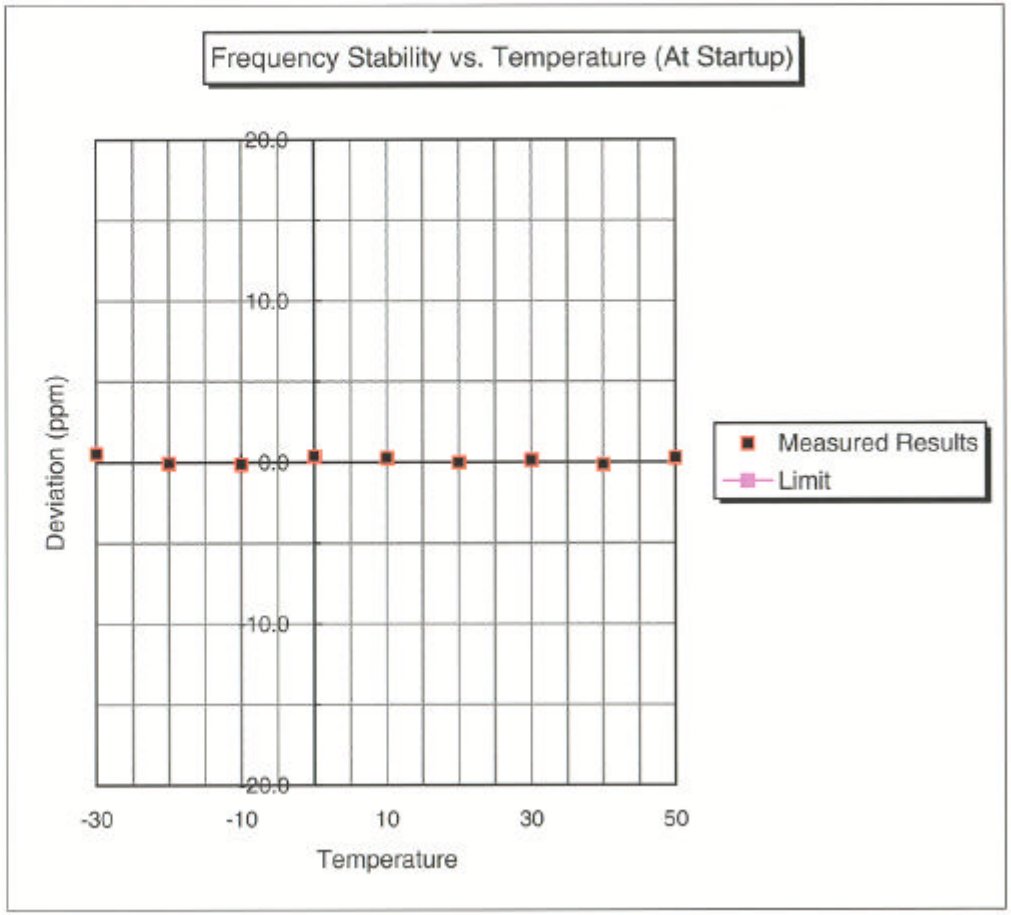
None

FCC Certification
Axonn L.L.C Model GEN STX
Frequency Stability vs. Temperature (At Startup)

Test Results Reviewed By:

Louis A. Feudi

Temperature (degrees C)	Measured Frequency (MHz)	Deviation (ppm)
-30	1611.249227	0.5
-20	1611.248262	-0.1
-10	1611.248162	-0.1
0	1611.248969	0.4
10	1611.248804	0.3
20	1611.248362	0.0
30	1611.248585	0.1
40	1611.248140	-0.1
50	1611.248815	0.3



Actual TX Frequency was: 1611.248362 MHz

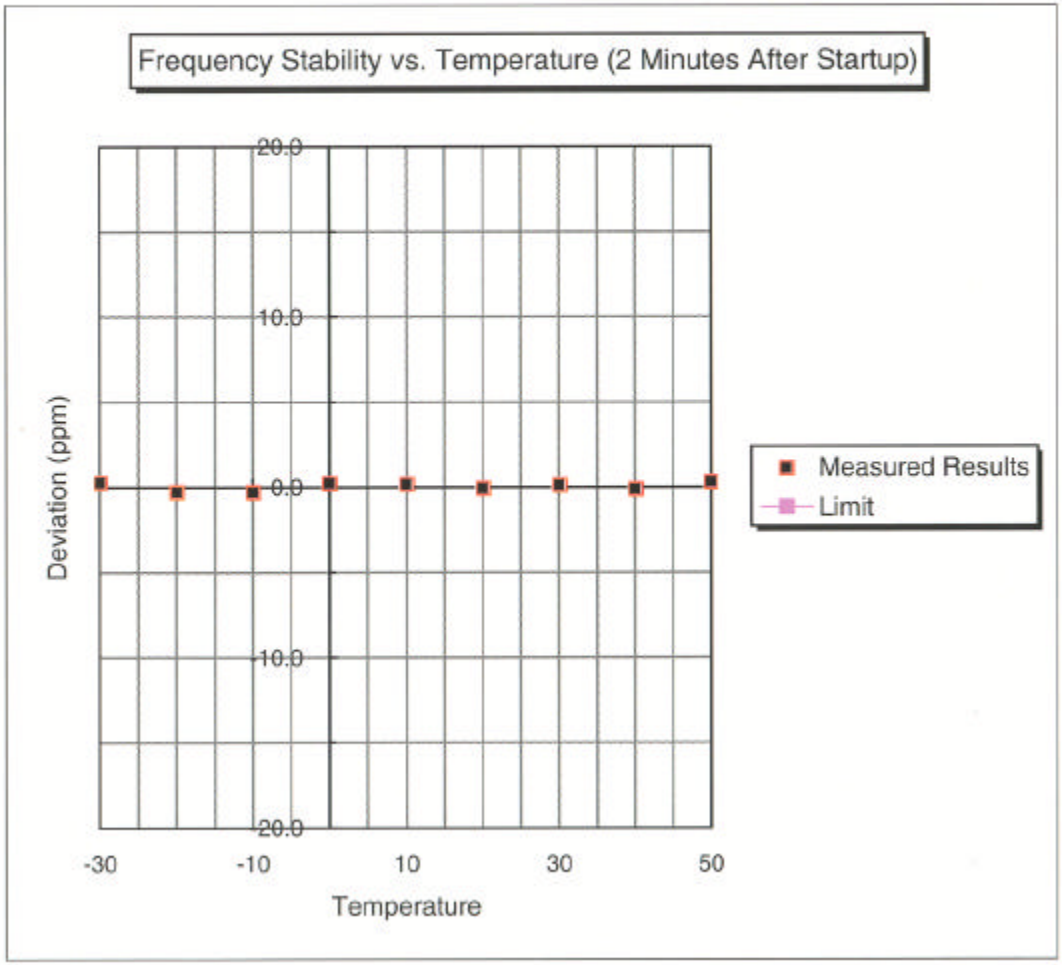
Maximum Deviation = .0001% or 10ppm
Reference Point from 20 degrees C: 1611.248 MHz

FCC Certification
Axonn L.L.C. Model GEN STX
Frequency Stability vs. Temperature (2 Minutes After Startup)

Test Results Reviewed By:

Louis A. Feudi

Temperature (degrees C)	Measured Frequency (MHz)	Deviation (ppm)
-30	1611.248808	0.3
-20	1611.247907	-0.3
-10	1611.247889	-0.3
0	1611.248727	0.2
10	1611.248634	0.2
20	1611.248257	-0.1
30	1611.248557	0.1
40	1611.248170	-0.1
50	1611.248875	0.3



Actual TX Frequency was: 1611.248362 MHz

Maximum Deviation = .001% or 10ppm
Reference Point from 20 degrees C: 1611.248 MHz

-

FCC Certification
Axonn L.L.C. Model GEN STX
Frequency Stability vs. Temperature (5 Minutes After Startup)

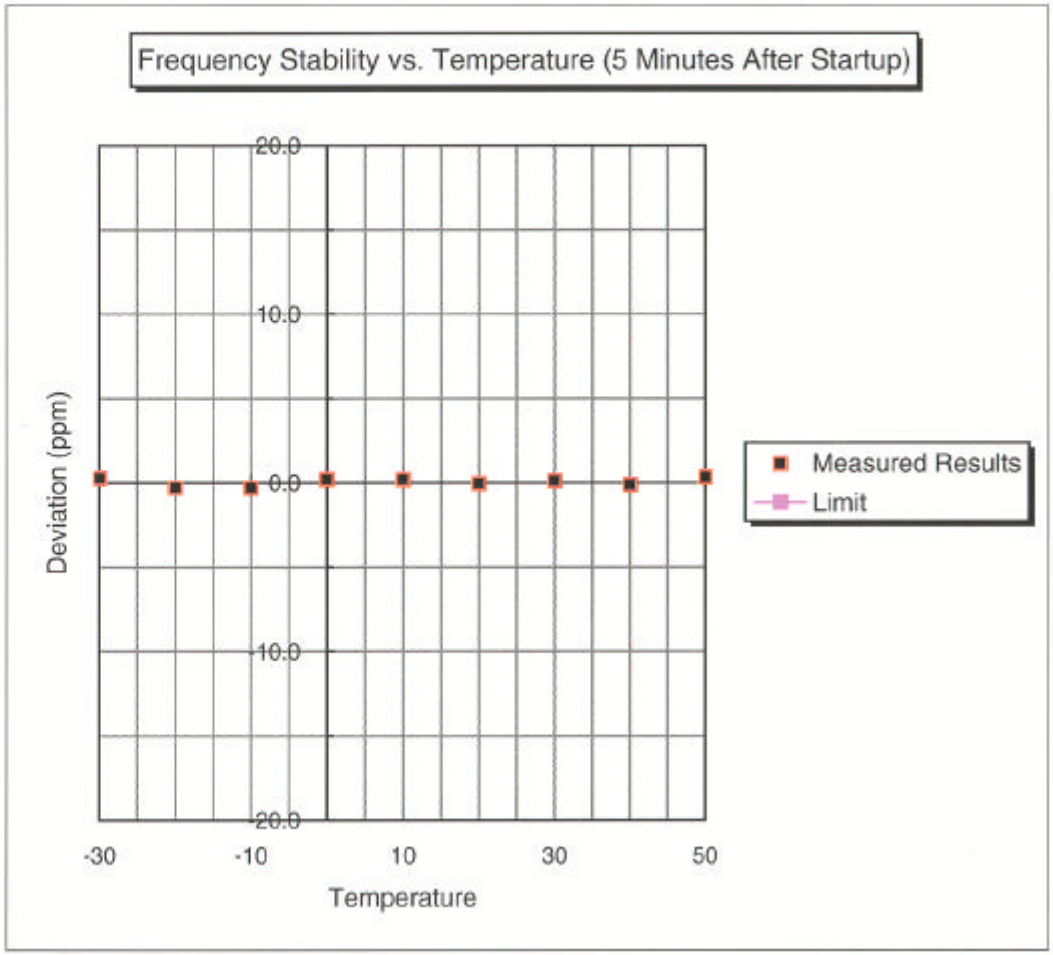
Test Results Reviewed By:

Louis A. Feudi

Temperature (degrees C)	Measured Frequency (MHz)	Deviation (ppm)
-30	1611.248788	0.3
-20	1611.247894	-0.3
-10	1611.247874	-0.3
0	1611.248689	0.2
10	1611.248672	0.2
20	1611.248305	0.0
30	1611.248560	0.1
40	1611.248195	-0.1
50	1611.248885	0.3

Actual TX Frequency was: 1611.248362 MHz

Maximum Deviation = .0001% or 10ppm
Reference Point from 20 degrees C: 1611.248 MHz

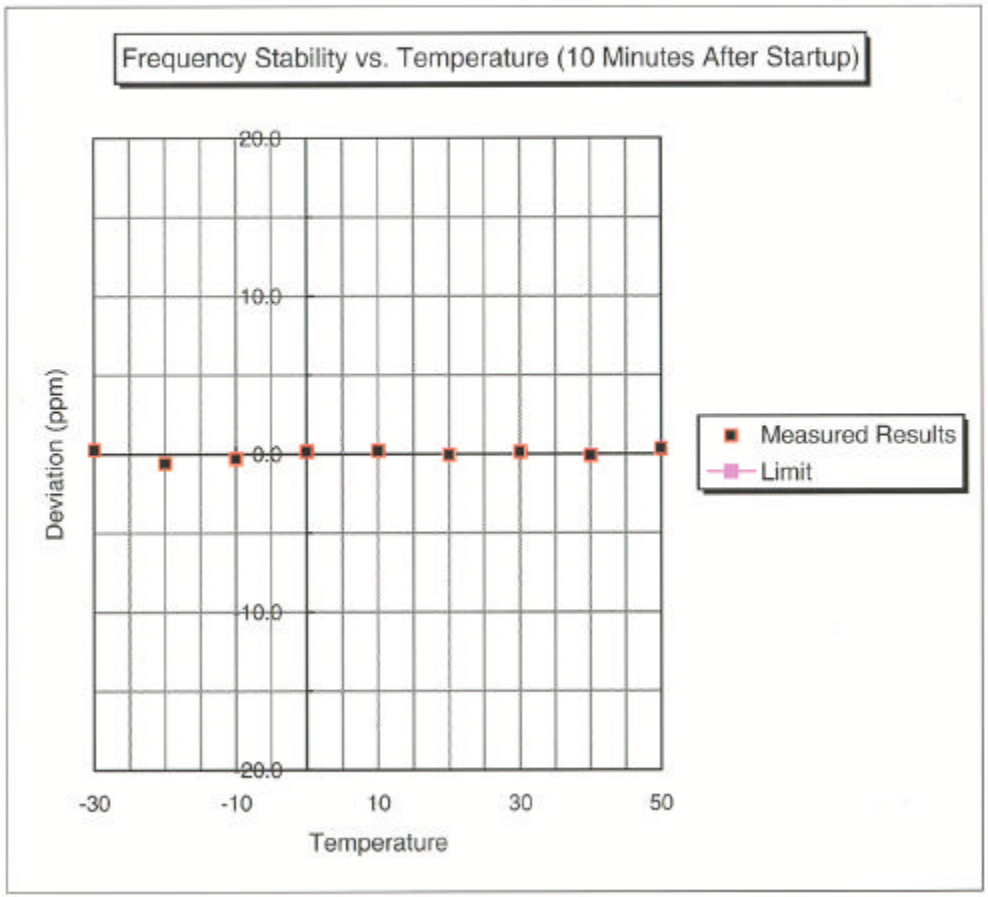


FCC Certification
Axonn L.L.C. Model GEN STX
Frequency Stability vs. Temperature (10 Minutes After Startup)

Test Results Reviewed By:

Louis A. Feudi

Temperature (degrees C)	Measured Frequency (MHz)	Deviation (ppm)
-30	1611.248788	0.3
-20	1611.247407	-0.6
-10	1611.247874	-0.3
0	1611.248617	0.2
10	1611.248682	0.2
20	1611.248297	0.0
30	1611.248582	0.1
40	1611.248215	-0.1
50	1611.248912	0.3



Actual TX Frequency was: 1611.248362 MHz

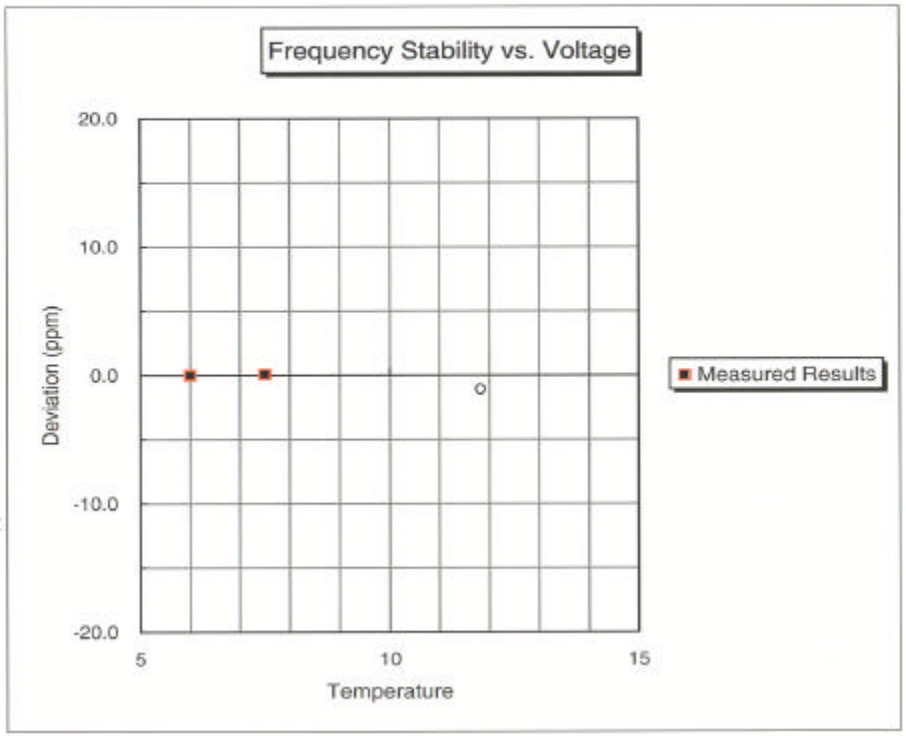
Maximum Deviation = .001% or 10ppm
Reference Point from 20 degrees C: 1611.248 MHz

FCC Certification
Axonn L.L.C. Model GEN STX
Frequency Stability vs. Voltage

Test Results Reviewed By:

Louis A. Feudi

Voltage (V DC)	Measured Frequency (MHz)	Deviation (ppm)
7.5	1611.2485	0.1
6	1611.2484	0.0
4.5	1611.2485	0.1



Actual TX Frequency was: 1611.248362 MHz

Maximum Deviation = 0.001% or 10ppm
Reference Point From 20 degrees C: 1611.248 MHz