



Wireless Detection  
**FCC Part 15, Certification Application**  
**Fire Warning System**  
**Model FWS-002 Rev 02 Smoke Detector**

**March 31, 2005**  
**UST Project Number: 05-0071**



3505 Francis Circle • Alpharetta, GA 30004  
Tel: (770) 740-0717 • Fax: (770) 740-1508 • [www.ustech-lab.com](http://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 31, 2005

**Wireless Detection**  
79 Tyee Drive  
Point Roberts, WA 98281

By:

Name:

Title:

Date:

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## MEASUREMENT/TECHNICAL REPORT

**COMPANY NAME:** **Wireless Detection**  
**MODEL:** **FWS-002 Rev 02 Smoke Detector**  
**FCC ID:** **SZX-FWS002**  
**DATE:** **March 31, 2005**

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

Equipment type: **Spread Spectrum Transceiver**

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

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

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## GENERAL INFORMATION

### 1.1 Product Description

The Equipment Under test (EUT) is the Wireless Detection's Fire Warning System, Model FWS-002 Rev 02 Smoke Detector. The Smoke Detector sends a status report every 30 minutes, it may be set as low as 15 minutes. During a status report, the transceiver sends the data message, then waits for an acknowledgement, if the Smoke Detector receives no acknowledgement after 7 transmissions, then the transceiver powers down until the next status report.

When the Smoke Detector detects an Alarm condition, which is either the detection of smoke, the temperature rate of rise condition has been met and or the maximum temperature has been exceeded, the unit is being tampered with, or the unit is in test mode via the user push to test button.

During these conditions the Smoke Detector ignores acknowledgement reception and continues to transmit until the alarm condition is no longer present.

When the unit is in FHSS mode, ten transmissions of alarm is sent followed by five transmissions of channel data. After this the transceiver increments to the next channel. The way this is controlled is by counting the transmissions, after 15 transmissions, the unit is incremented to the next channel. The format of the data transmissions is fixed. The transmit time will never increase or decrease.

When a data transmission is sent the transmit time is 2.84 ms. After a data transmission, the unit is put into the receive mode, the receive time before the next transmit time is 23.8 ms; if no acknowledgement has been received or the acknowledge transmission is inhibited. Each transmit and receive cycle is 26.24ms.

The channel occupancy is 15 transmissions @ 2.84 ms per transmission, which provides channel occupancy of 46.6 ms per channel. With a range of 62 separate channels; the total transmit and receive time is 0.3758 ms per channel. The cycle time of 62 channels is 23.2996 seconds.

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**1.2 Related Submittal(s)/Grant(s)**

The EUT will be used with part of a system to send/receive data. The transceiver presented in this report will be used with other like transmitters.

The EUT is subject to the following authorizations:

- a) Certification as a transceiver
- b) Verification as a receiver and digital device

The information contained in this report is presented for the certification & verification authorization(s) for the EUT.

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## SECTION 2

## TESTS AND MEASUREMENTS

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## 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 (1992). 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. Interconnecting cables were manipulated as necessary to maximize emissions. Block diagrams of the tested systems are shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are shown in Figure 2a-b. Test configuration photograph for conducted digital emissions is shown in Figure 2c.

The sample used for testing was received by U.S. Technologies on March 21, 2005 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

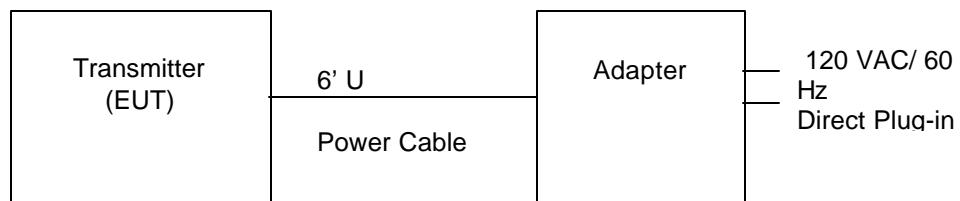
No modifications were made to bring the EUT into compliance with FCC Part 15, Class B Limits for the transmitter portion of the EUT or the Class B Digital Device Requirements:

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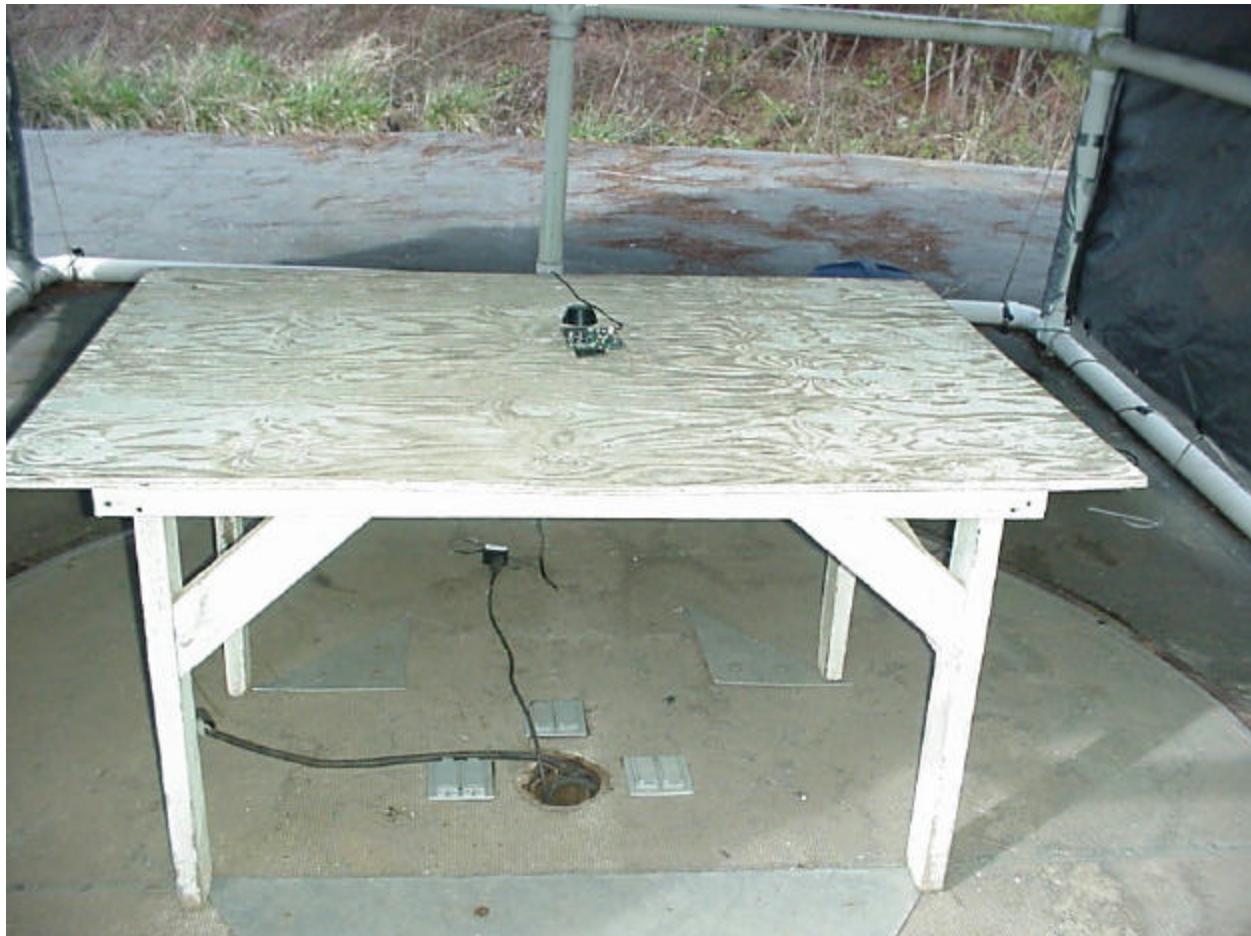
**FIGURE 1****TEST CONFIGURATION**

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**FIGURE 2a****Photograph(s) for Spurious Emissions****Photograph represents worst case configuration**

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**FIGURE 2b****Photograph(s) for Spurious Emissions****Photograph represents worst case configuration**

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**FIGURE 2c****Photograph(s) for Conducted Emissions****Photograph represents worst case configuration**

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**TABLE 1**  
**EUT and Peripherals**

PERIPHERAL MANU.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Transmitter (EUT) Wireless Detection	FWS-002 Rev 02 Smoke Detector	None	None	6' U Power Cable
Adapter Cui, Inc.	DR-4530	None	None	120 VAC/ 60 Hz Direct Connect

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**Detail of I/O Cables Attached to EUT**

DESCRIPTION OF CABLE	DETAILS OF CABLE			CABLE LENGTH
Power Cable	<u>Manufacturer and Part Number</u>			6'
	Shield Type	Shield Termination	Type of Backshell	
	N/A	N/A	N/A	

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**TABLE 2**  
**TEST INSTRUMENTS**

EQUIPMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	8558B	HEWLETT-PACKARD	2332A10055	2/25/05
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	3/1/05
SIGNAL GENERATOR	8648B	HEWLETT-PACKARD	3642U01679	4/29/04
RF PREAMP	8447D	HEWLETT-PACKARD	2944A06291	3/1/05
BICONICAL ANTENNA	3110B	EMCO	9307-1431	5/18/04
LOG PERIODIC	3146	EMCO	3110-3236	6/30/04
LISN (x 2) 8028-50-TS24-BNC	8028	SOLAR ELE.	910494 & 910495	1/27/05
HORN ANTENNA	SAS-571	A. H. SYSTEMS	605	04/26/04
PREAMP	8449B	HEWLETT PACKARD	3008A00480	6/23/04
CALCULATION PROGRAM	N/A	N/A	EMCCALC	N/A

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**2.6 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.

The Model Wireless Detection FWS-002 Rev 02 Smoke Detector uses the following antenna:

Linx Technologies  
1/4 Wave Whip Antenna  
Model ANT-916-JJB-ST  
Gain = 3.0 dBi

The antenna mounts on a unique reverse SMA connector.

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**2.7 Peak power within the band 902 – 928 MHz per FCC Section 15.247(b)**

Peak power within the band 902 – 928 MHz 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  $50 \Omega$  impedance with the  $VBW \geq RBW$  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, High Channel.

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**TABLE 3**  
**PEAK POWER OUTPUT**

Frequency of Fundamental (MHz)	Measurement (dBm)*	Measurement (mW)*	FCC Limit (Watt)
902.264	18.78	75.5	1.0
914.955	18.98	79.07	1.0
927.304	16.19	41.59	1.0

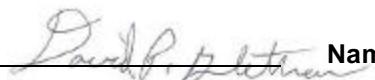
Power = Antilog (dBm/10) = Antilog (18.78/10) = Antilog 1.878 = 75.5

\* Measurement includes 0.1 dB for cable loss

**Test Date:** February 15, 2005

**Tester**

**Signature:**



**Name:** David Blethen

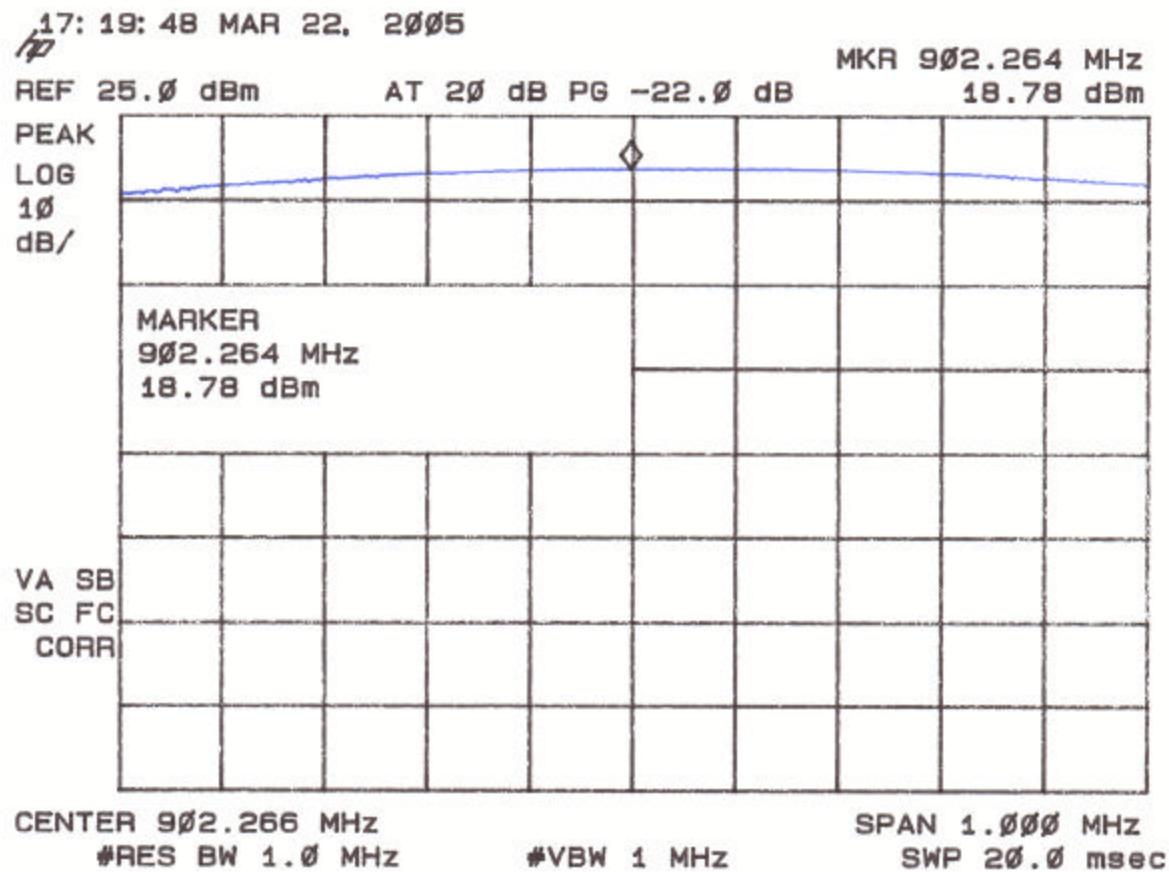
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Figure 3a.  
Peak Power per FCC Section 15.247(b) (Low Channel)



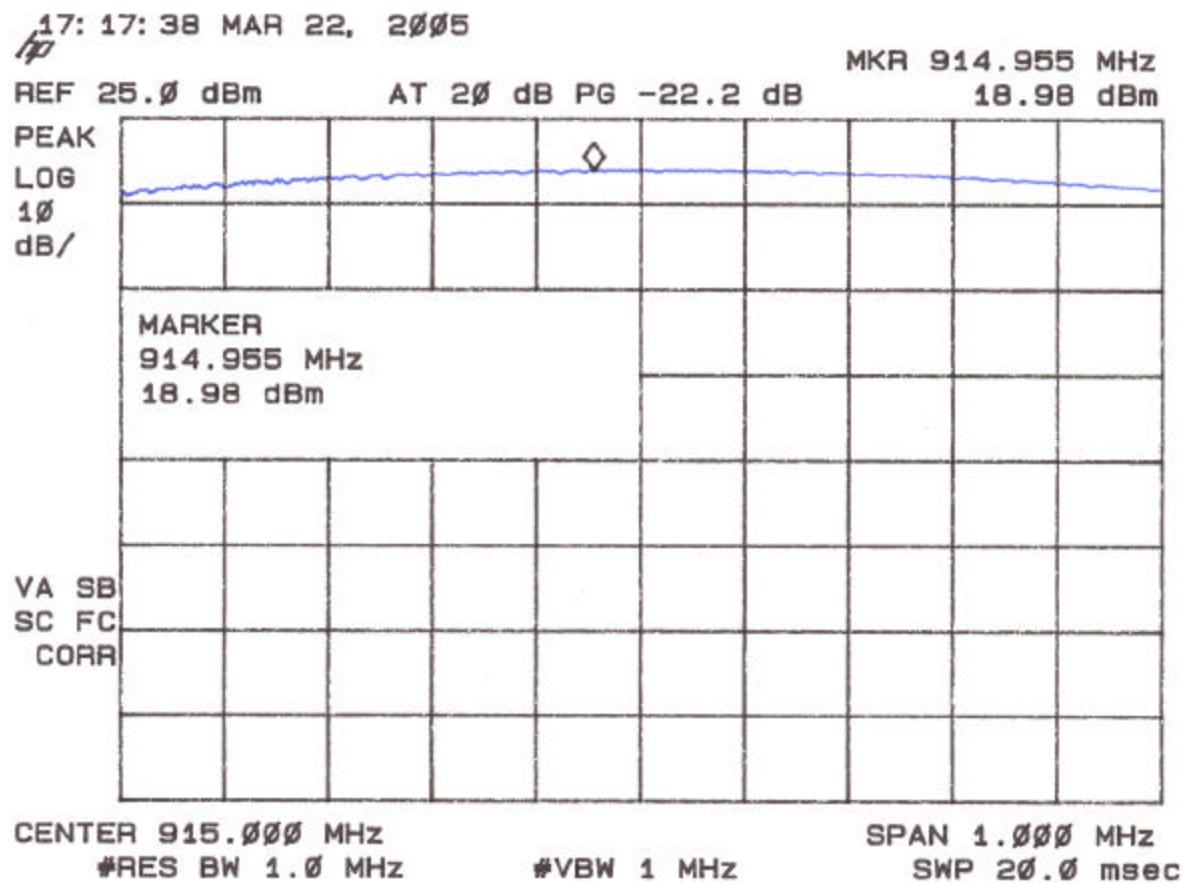
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**Figure 3b.**  
**Peak Power per FCC Section 15.247( b) (Mid Channel)**



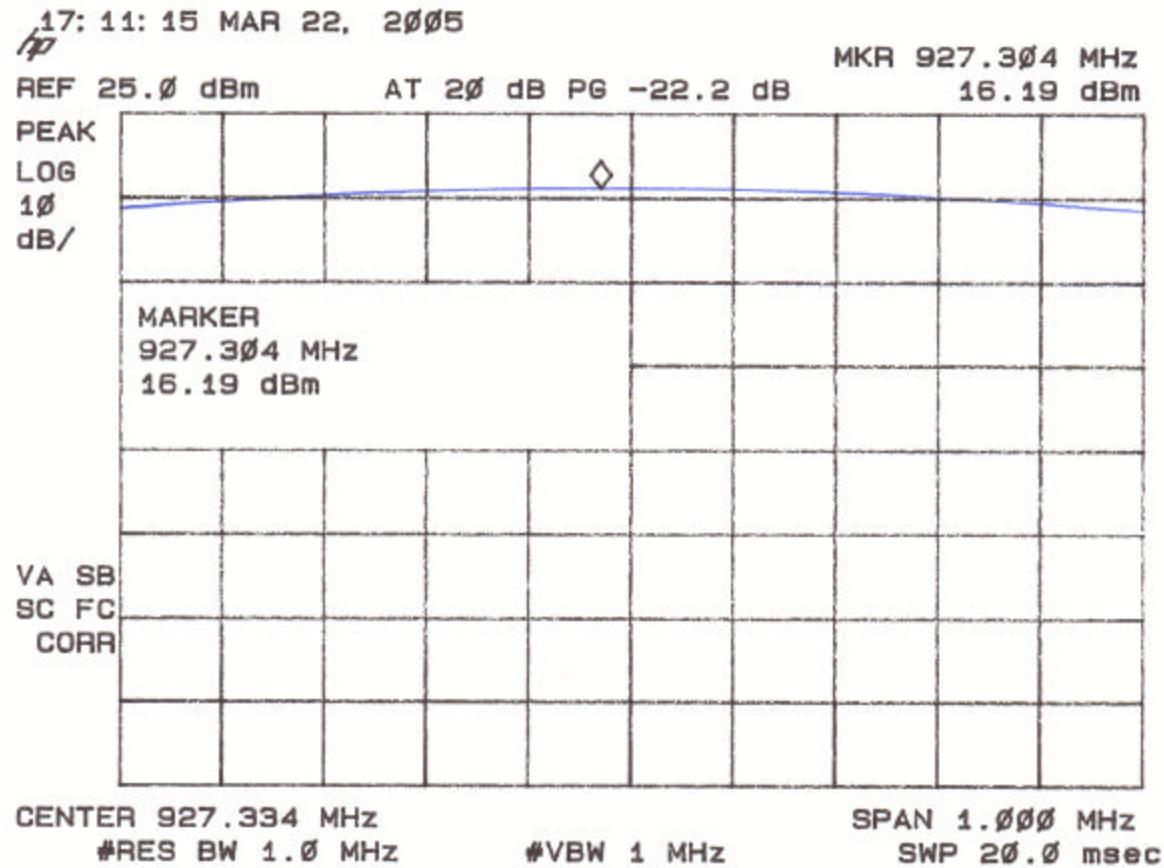
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**Figure 3c.**  
**Peak Power per FCC Section 15.247( b) (High Channel)**



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**2.8 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  $50 \Omega$  impedance with the  $RBW = 100 \text{ kHz}$  &  $VBW > RBW$ . All spurious emissions were measured to be greater than 20 dB down from the fundamental. The results of conducted spurious emissions are given in Figure 4a through 4l.

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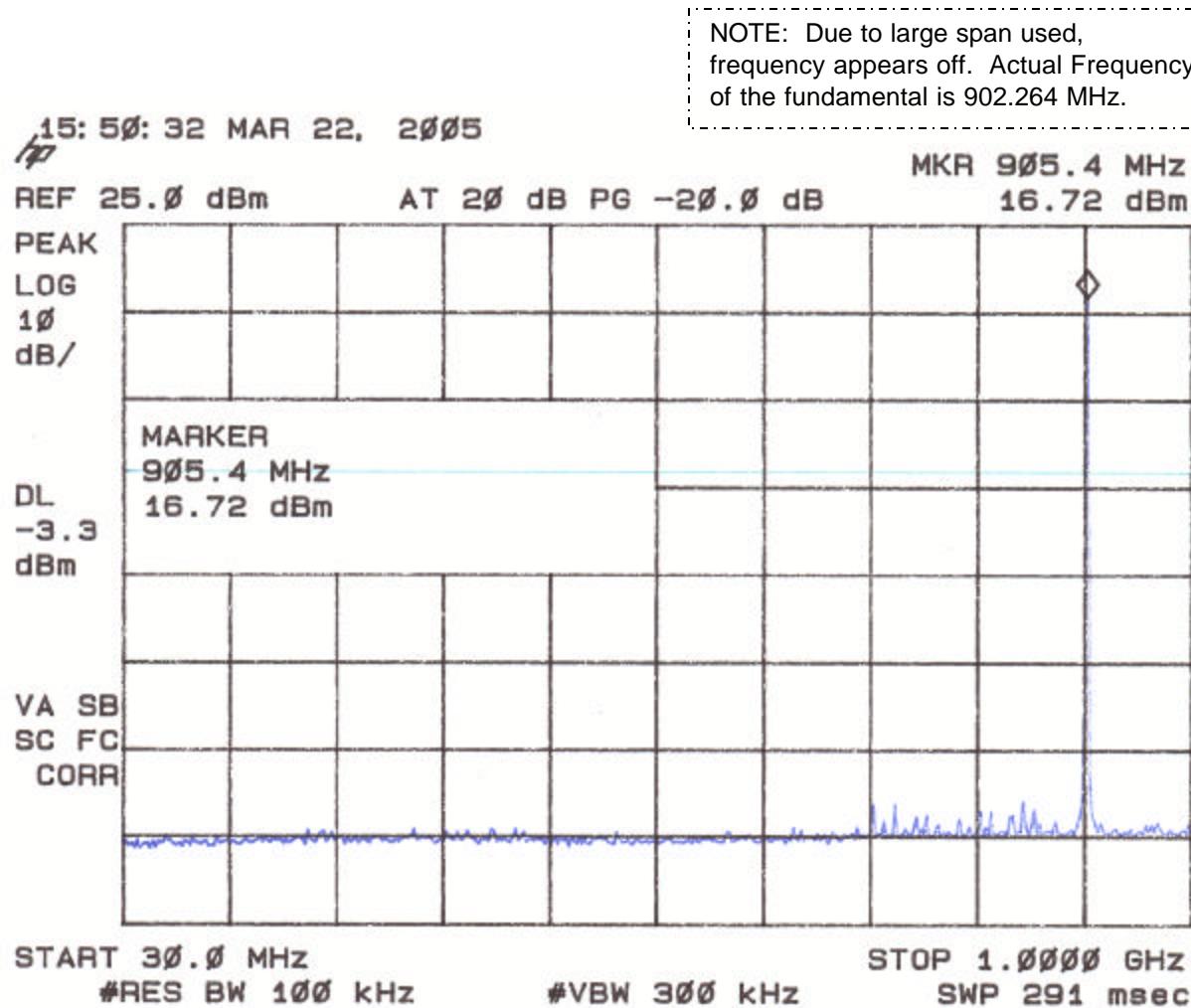
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**Figure 4a**

Antenna Conducted Spurious Emissions 15.247(c) (Low Channel)



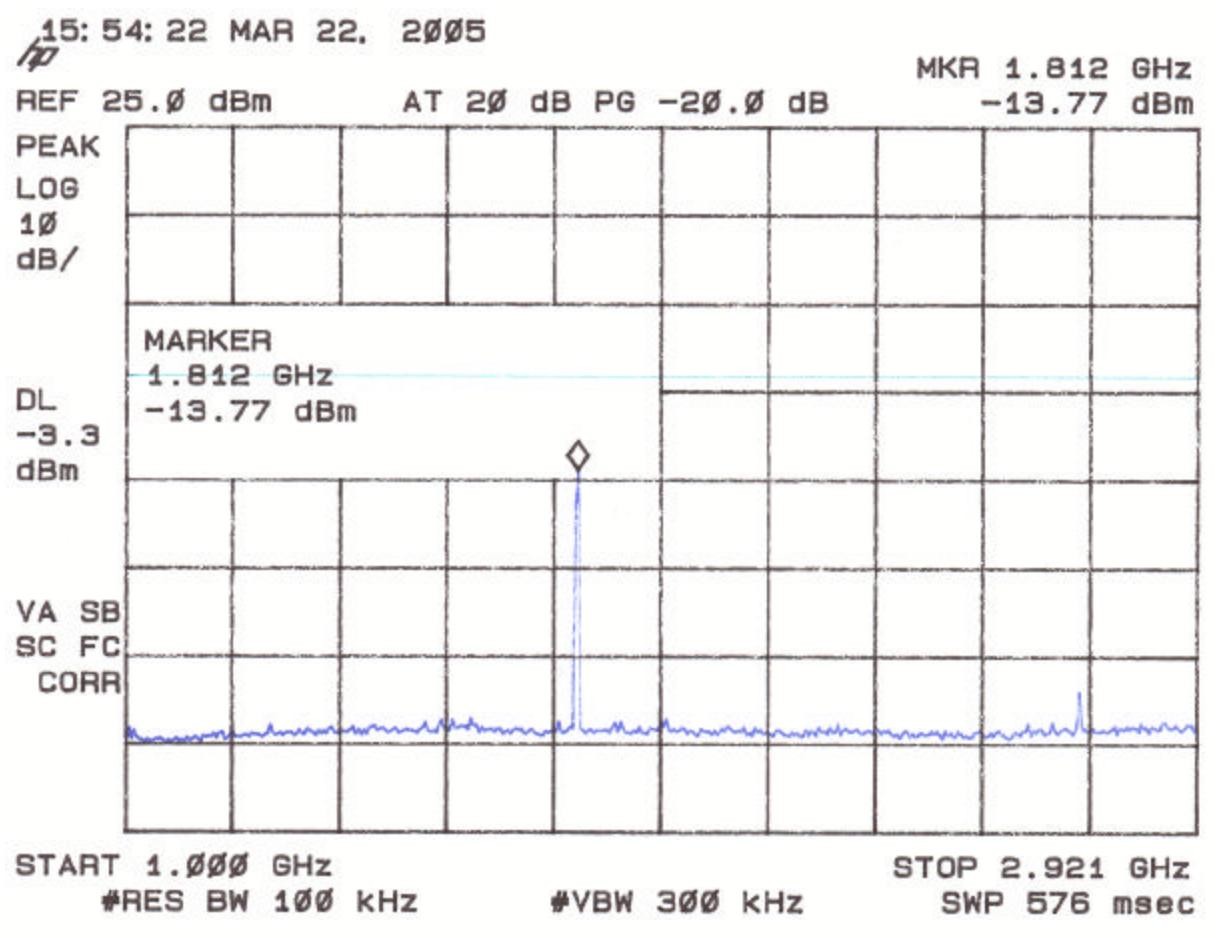
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**Figure 4b**  
Antenna Conducted Spurious Emissions 5.247(c) (Low Channel)



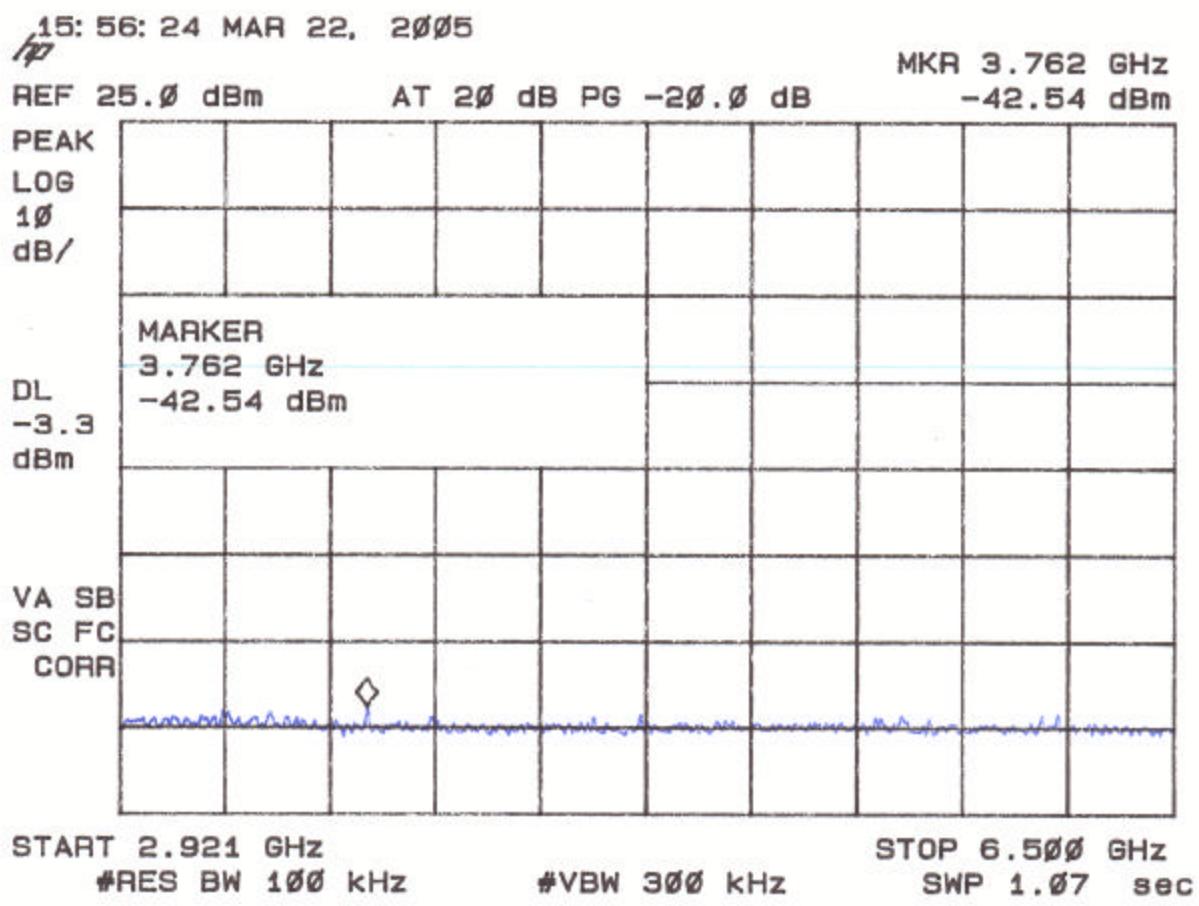
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**Figure 4c**  
**Antenna Conducted Spurious Emissions 15.247(c) (Low Channel)**



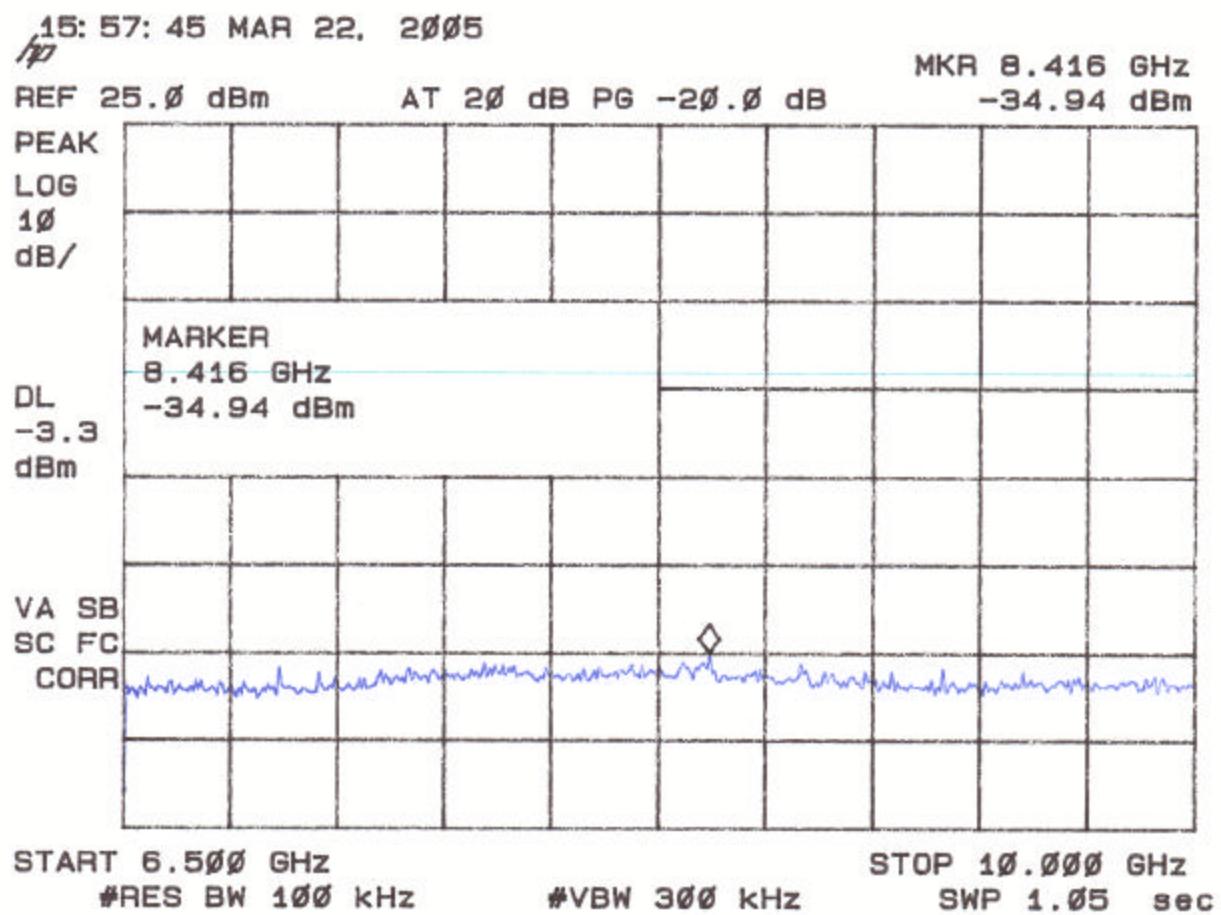
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**Figure 4d**  
**Antenna Conducted Spurious Emissions 15.247(c) (Low Channel)**



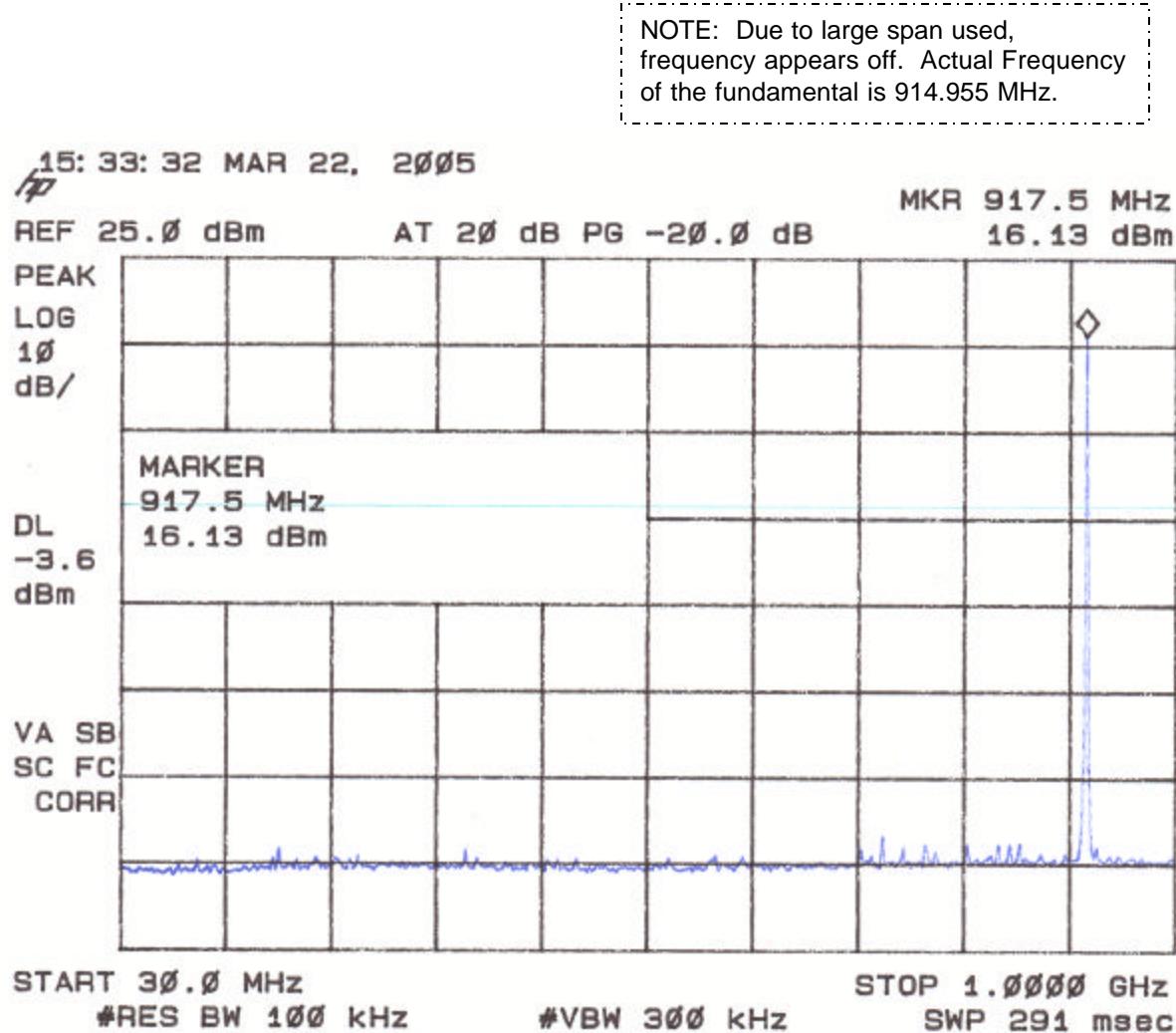
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**Figure 4e**  
**Antenna Conducted Spurious Emissions 15.247(c) (Mid Channel)**



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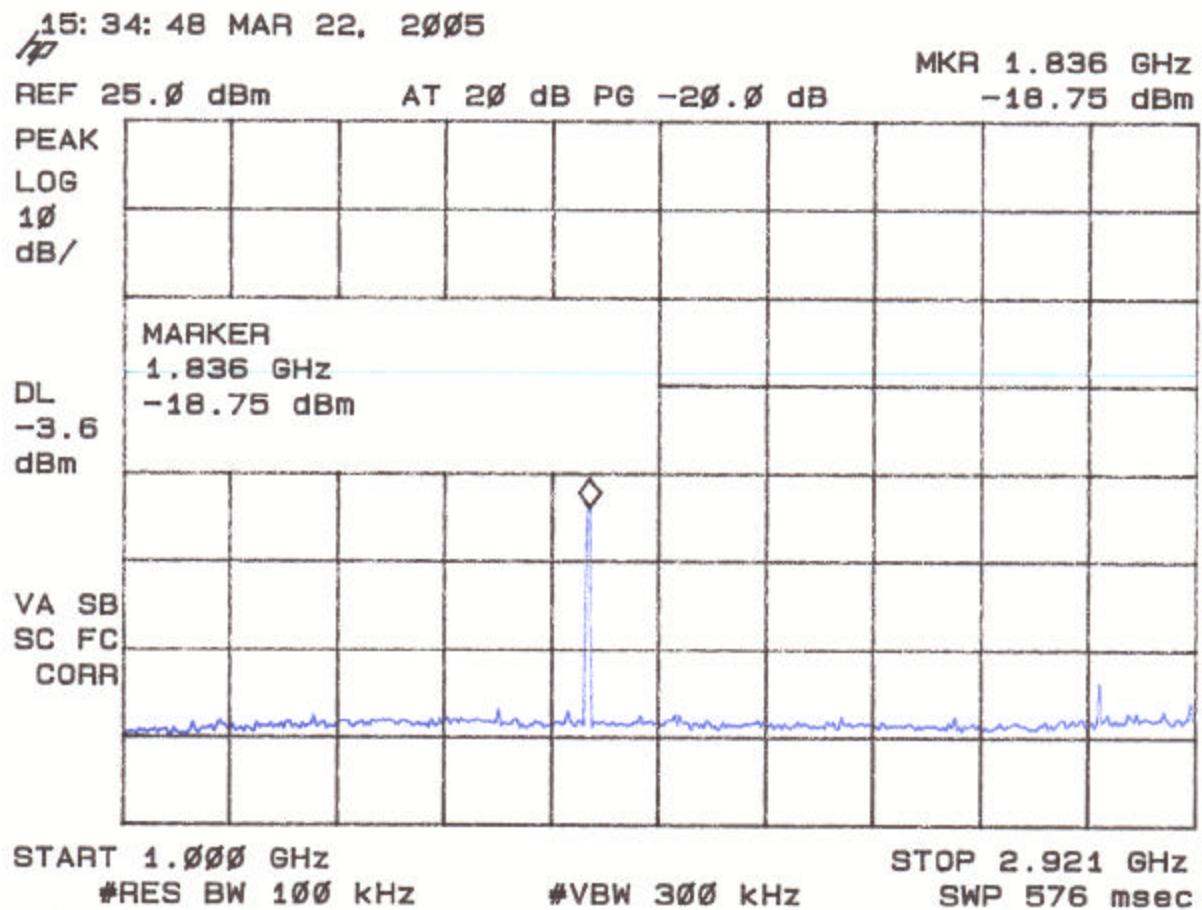
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**Figure 4f**

**Antenna Conducted Spurious Emissions 15.247(c) (Mid Channel)**



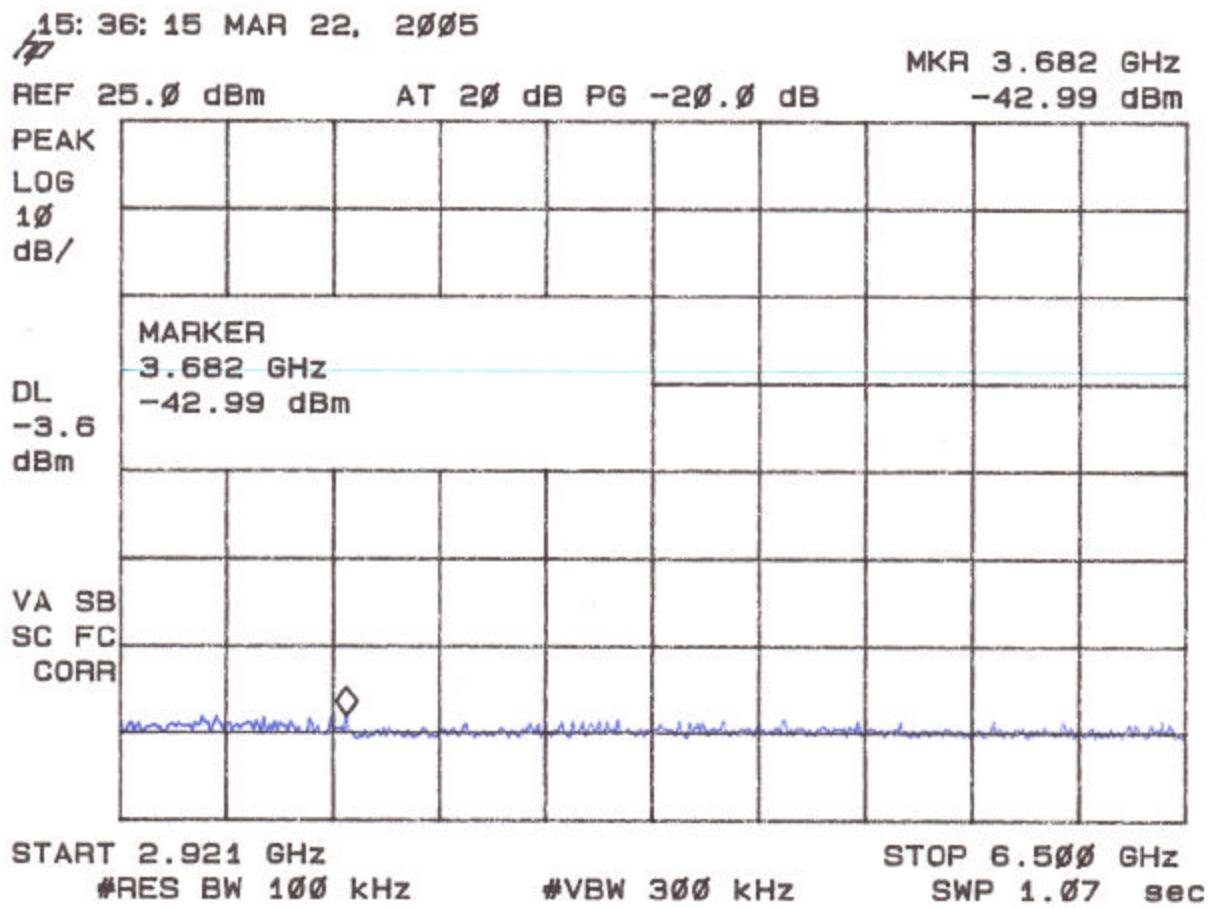
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**Figure 4g**  
**Antenna Conducted Spurious Emissions 15.247(c) (Mid Channel)**



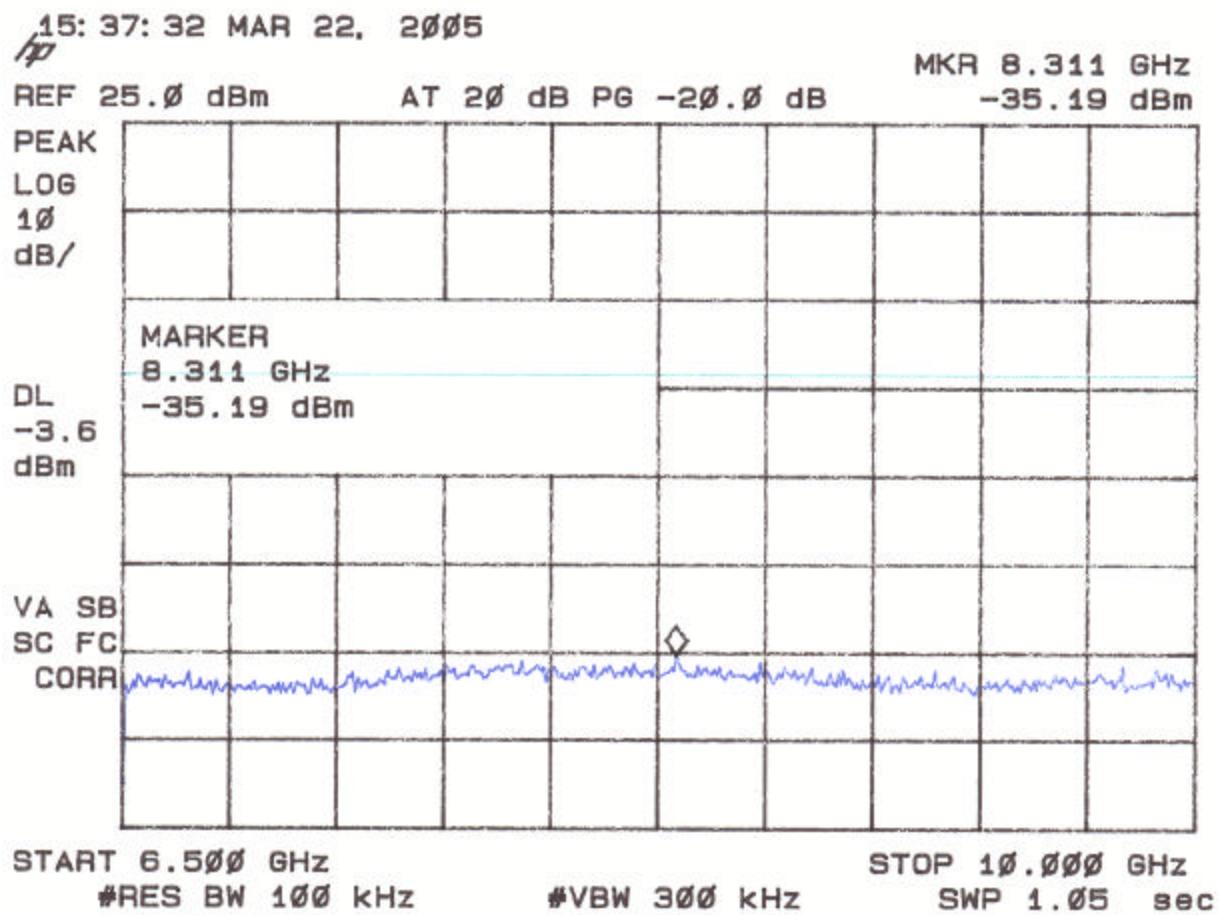
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**Figure 4h**  
**Antenna Conducted Spurious Emissions 15.247(c) (Mid Channel)**



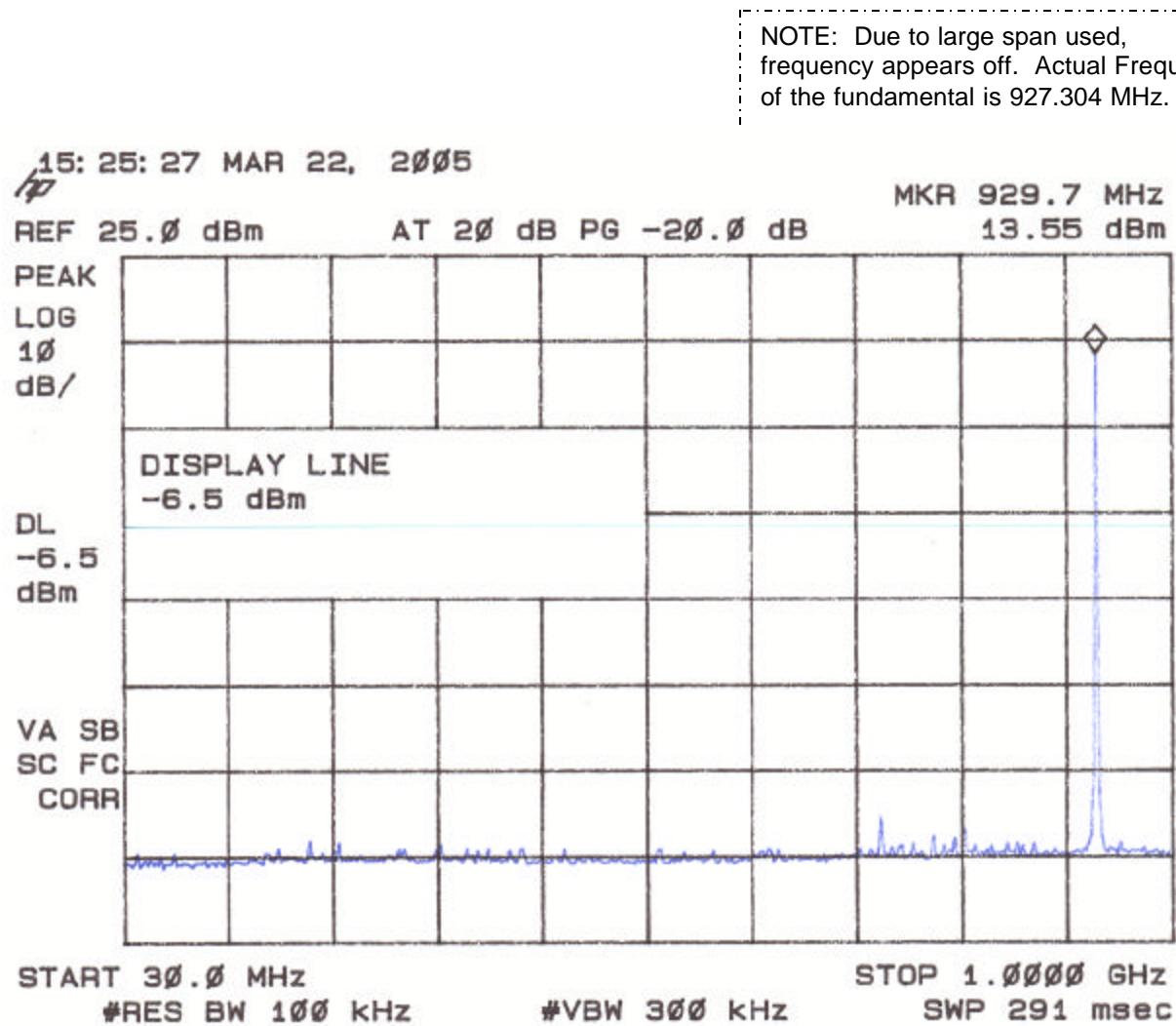
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**Figure 4i**  
**Antenna Conducted Spurious Emissions 15.247(c) (High Channel)**



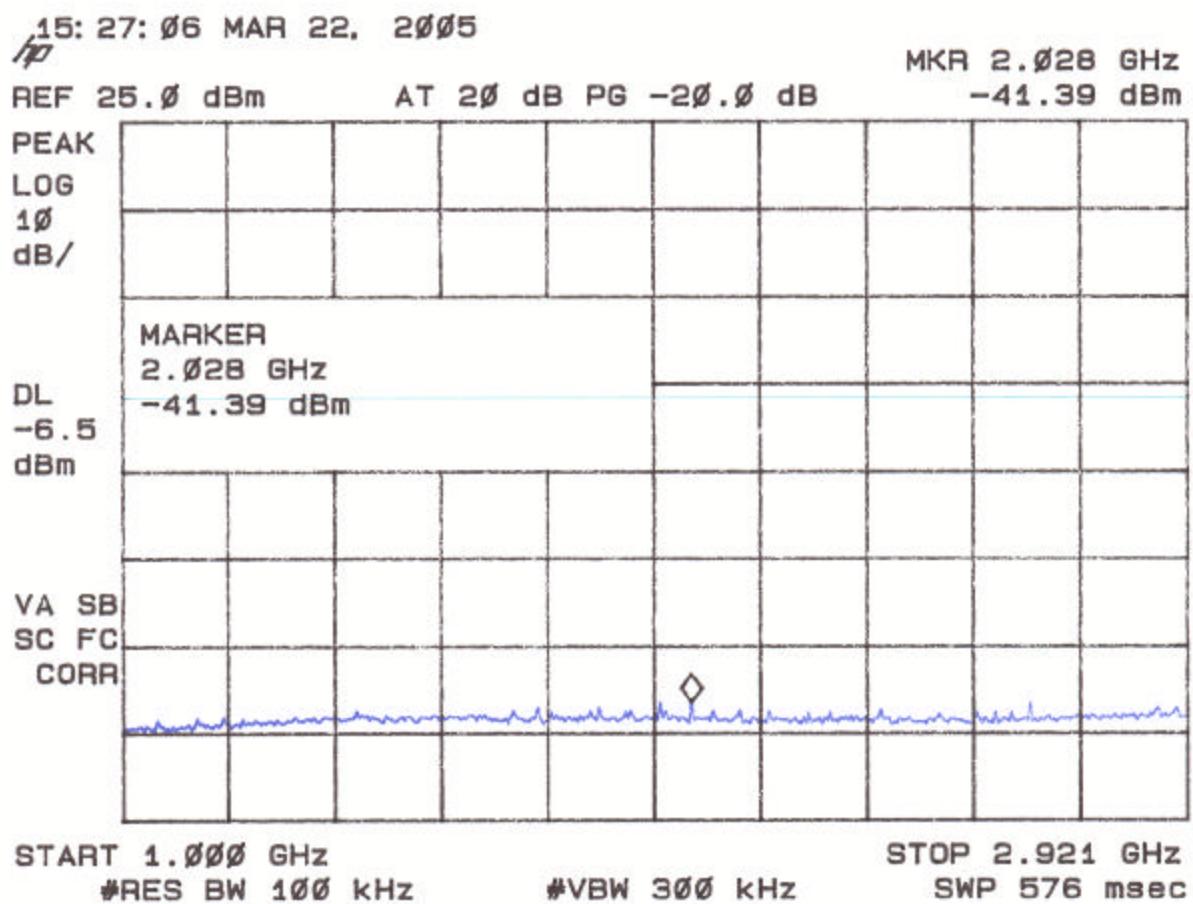
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**Figure 4j**  
Antenna Conducted Spurious Emissions 15.247(c) (High Channel)



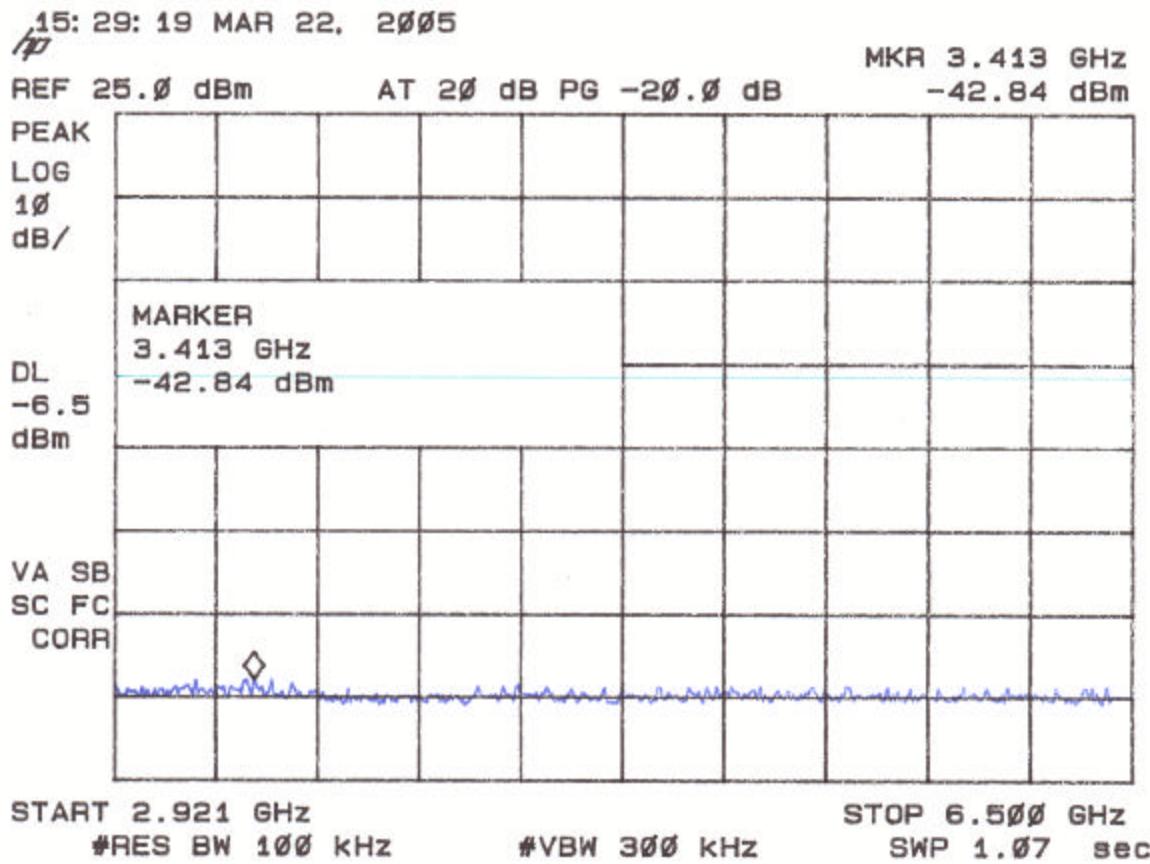
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**Figure 4k**  
**Antenna Conducted Spurious Emissions 15.247(c) (High Channel)**



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**Figure 4I**  
**Antenna Conducted Spurious Emissions 15.247(c) (High Channel)**

