Home Wireless Networks Inc.
FCC Part 15, Certification Application
95-0005-XXX

December 8, 1998

MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **Home Wireless Networks Inc.**

MODEL: **95-0005-XXX**

FCC ID: **NSK0005A**

DATE: **December 8, 1998**

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

Equipment type: __**Spread Spectrum 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 a Home Wireless Networks, Inc., Model 95-0005-XXX, FCC ID: NSK0005A. The Home Wireless Networks, Inc. Model 95-0005-XXX is a wireless controller that is the primary component of the Home Wireless Network. In connects to your incoming telephone lines and controls all communications between devices on the network. The Model 95-0005-XXX also contains internet gateway software that allows any PC's connected to the network via Data Jacks to simultaneously share the same internet account.

The following is a list of the channels designed into the EUT:

Channel	Channel Frequency (MHz)
0	905.728
1	906.240
2	906.752
3	907.264
4	907.776
5	908.288
6	908.800
7	909.312
8	909.824
9	910.336
10	910.848
11	911.360
12	911.872
13	912.384
14	912.896
15	913.408
16	913.920
17	914.432
18	914.944
19	915.456
20	915.968
21	916.480
22	916.992
23	917.504
24	918.016
25	918.528
26	919.040
27	919.552
28	920.064
29	920.576
30	921.088
31	921.600
32	922.112
33	922.624
34	923.136
35	923.648

1.2 Related Submittal(s)/Grant(s)

The EUT will be used with part of a system to send and receive voice and/or data. The transceiver presented in this report will be used with a variety of products which have been submitted under FCC ID's: NSK0001A, NSK0002A, & NSK0003A.

The EUT is subject to the following authorizations:

a) Certification as a transmitter
b) Verification as a receiver and digital device (Please refer to Note below)

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

NOTE: According the manufacturer, the serial port of this EUT will typically not be used. In certain applications it is possible for the serial port to be utilized, but in these cases it will be for certain devices such as a modem. Since the designed use of the serial port is <u>not</u> intended to be connected to a PC for normal use, a DoC authorization was deemed unnecessary and the device defaults to a verification authorization.

SECTION 2

TESTS AND MEASUREMENTS

TEST AND MEASUREMENTS

2.1 Configuration of Tested System and Test Procedure

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. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are shown in Figure 2. Since the EUT incorporates antenna diversity, the EUT was checked in each diversity for most tests.

The sample used for testing was received by U.S. Technologies on November 19, 1998 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

To bring the EUT (Revision 006 R2) into compliance to meet the class B limits of Part 15, the following modifications were made by Home Wireless Networks, Inc:

1) Compressed the AGND plane and extended DGND plane layer 1

The following changes had already been placed into the current revision. These changes could potentially affect the characteristics of the EUT for emissions testing.

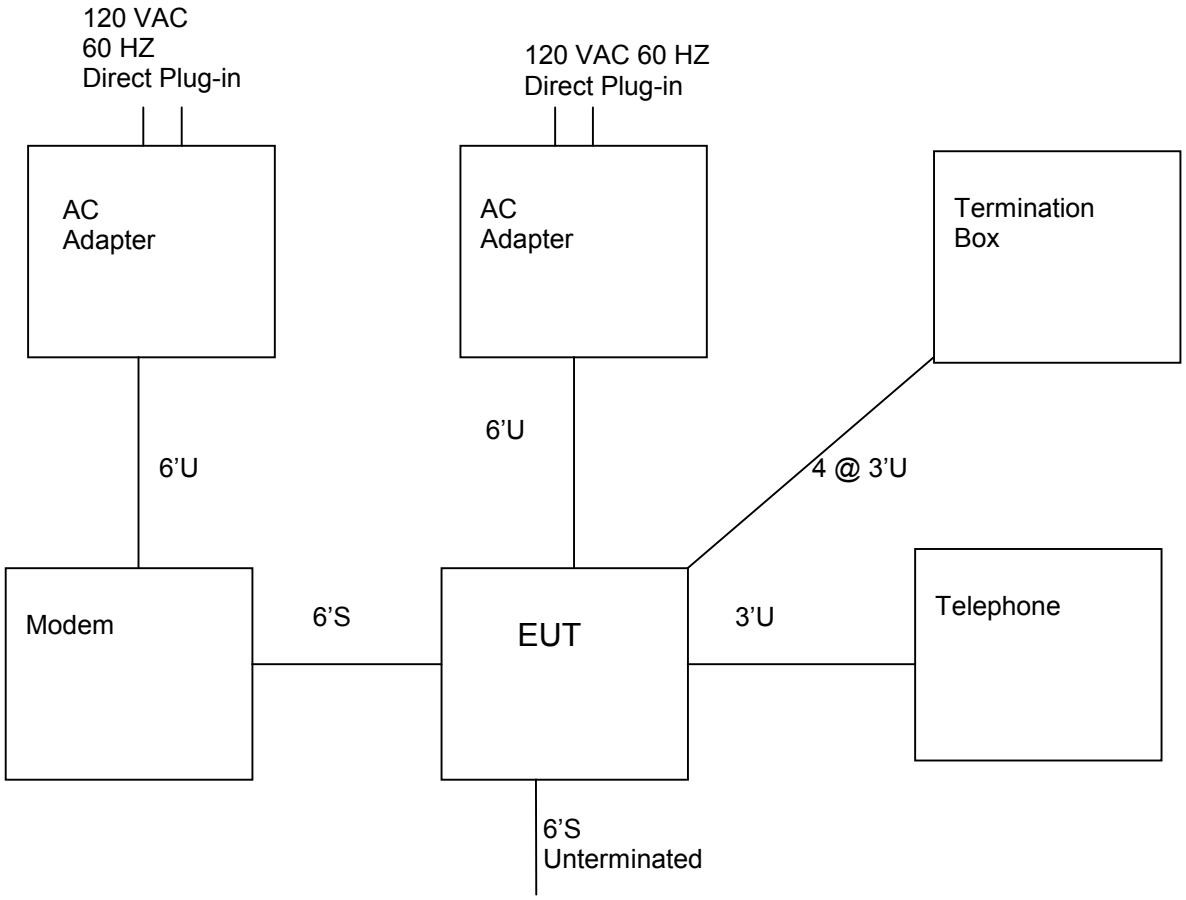
1) C84 in the transceiver section had been changed from 1 pF (10-000-007) to DNS.
2) The series resistors R428, R429, R430, & 502 on clock driver outputs had been changed from 18 Ohms (05-000-031) to 0 Ohm jumpers (05-0000-000)
3) Changed FB601-FB611 from 2700 Ohms (32-000-006) to 600 Ohms (32-0000-000).

Applicant: Home Wireless Networks, Inc. Dated: 12/8/98

Signed: Daniel [illegible] Title: Compliance Engineer

FIGURE 1

TEST CONFIGURATION



Test Date: November 24 & 30, 1998
UST Project: 98-559
Customer: Home Wireless Networks, Inc.
Model: 95-0005-XXX

FIGURE 2a

Photograph(s) for Spurious and Fundamental Emissions (Front)

Test Date: November 24 & 30, 1998
UST Project: 98-559
Customer: Home Wireless Networks, Inc.
Model: 95-0005-XXX

FIGURE 2b

Photograph(s) for Spurious and Fundamental Emissions (Back)

Test Date: November 24, 1998
UST Project: 98-559
Customer: Home Wireless Networks, Inc.
Model: 95-0005-XXX

FIGURE 2c

Photograph(s) for Digital Device Emissions (Front)

Test Date: November 24, 1998
UST Project: 98-559
Customer: Home Wireless Networks, Inc.
Model: 95-0005-XXX

FIGURE 2d

Photograph(s) for Digital Device Emissions (Rear)

Test Date: November 30, 1998
UST Project: 98-559
Customer: Home Wireless Networks, Inc.
Model: 95-0005-XXX

FIGURE 2e

Photograph(s) for Conducted Emissions

TABLE 1

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Transceiver (EUT) Home Wireless Networks, Inc.	95-0005-XXX (Rev 006 R2)	None	NSK0005A (Pending)	6'S Unterminated
AC Adapter US Robotics	1.015.1286	9725	None	6'U 120 VAC 60 Hz Direct Plug-in
AC Adapter Home Wireless Networks, Inc.	260001-000	None	None	6'U 120 VAC 60 Hz Direct Plug-in
Modem US Robotics	Sportster 2400 with MNP 1-50033-03074842	None	CJE-0104	6'S
Termination Box Home Wireless Networks, Inc.	None	None	None	4@ 3'U
Telephone Bell Phones	51451	731390	None	3'U

TABLE 2
TEST INSTRUMENTS

TYPE	MANUFACTURER	MODEL	SN.
SPECTRUM ANALYZER	HEWLETT-PACKARD	8593E	3205A00124
SPECTRUM ANALYZER	HEWLETT-PACKARD	8558B	2332A09900
S A DISPLAY	HEWLETT-PACKARD	853A	2404A02387
COMB GENERATOR	HEWLETT-PACKARD	8406A	1632A01519
RF PREAMP	HEWLETT-PACKARD	8447D	1937A03355
RF PREAMP	HEWLETT-PACKARD	8449B	3008A00480
HORN ANTENNA	EMCO	3115	3723
BICONICAL ANTENNA	EMCO	3110	9307-1431
LOG PERIODIC ANTENNA	EMCO	3146	9110-3600
BILOG	CHASE	CBL6112A	2238
LISN	SOLAR ELE.	8012	865577
LISN	SOLAR ELE.	8028	910494
LISN	SOLAR ELE.	8028	910495
THERMOMETER	FLUKE	52	5215250
MULTIMETER	FLUKE	85	53710469
FUNCTION GENERATOR	TEKTRONIX	CFG250	CFG250TW15059
PLOTTER	HEWLETT-PACKARD	7475A	2325A65394

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.

The Model Home Wireless Networks, Inc. 95-0005-XXX incorporates an internal antenna only.

Manufacturer:	Home Wireless Networks, Inc. 3145 Avalon Ridge Place Norcross, GA 30071
Type:	Part of PCB
Model Number:	None
Gain:	Unknown
Connector:	N/A

2.6 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 Ω impedance with the VBW ≥ RBW > 6 dB bandwidth. The results of the measurements are given in Table 3 and Figure 3a through Figure 3f. If the spectrum analyzer did not have a RBW greater than the 6 dB bandwidth for the largest fundamental bandwidth, then the data was taken using the channel power function of the spectrum analyzer.

The EUT did not incorporate any antennas of directional gain greater than 6 dBi, therefore the output power has not been reduced as required by 15.247(b)(3).

TABLE 3
PEAK POWER OUTPUT

Test Date: November 19-23, 1998
UST Project: 98-559
Customer: Home Wireless Networks, Inc.
Model: 95-0005-XXX

Horizontal Diversity

Frequency of Fundamental (MHz)	Measurement (dBm)*	Measurement (Watt)*	FCC Limit (Watt)
905.73	16.08	0.041	1.0
914.94	16.34	0.043	1.0
923.65	15.28	0.034	1.0

Vertical Diversity

Frequency of Fundamental (MHz)	Measurement (dBm)*	Measurement (Watt)*	FCC Limit (Watt)
905.73	16.12	0.041	1.0
914.94	16.47	0.044	1.0
923.65	16.37	0.044	1.0

*** Measurement Cable loss was equal to 0.1 dB**

Tester Signature: _____ **Name:** Tim R. Johnson

Figure 3a.

Peak Power per FCC Section 15.247(b) (Low-Horizontal Div.)

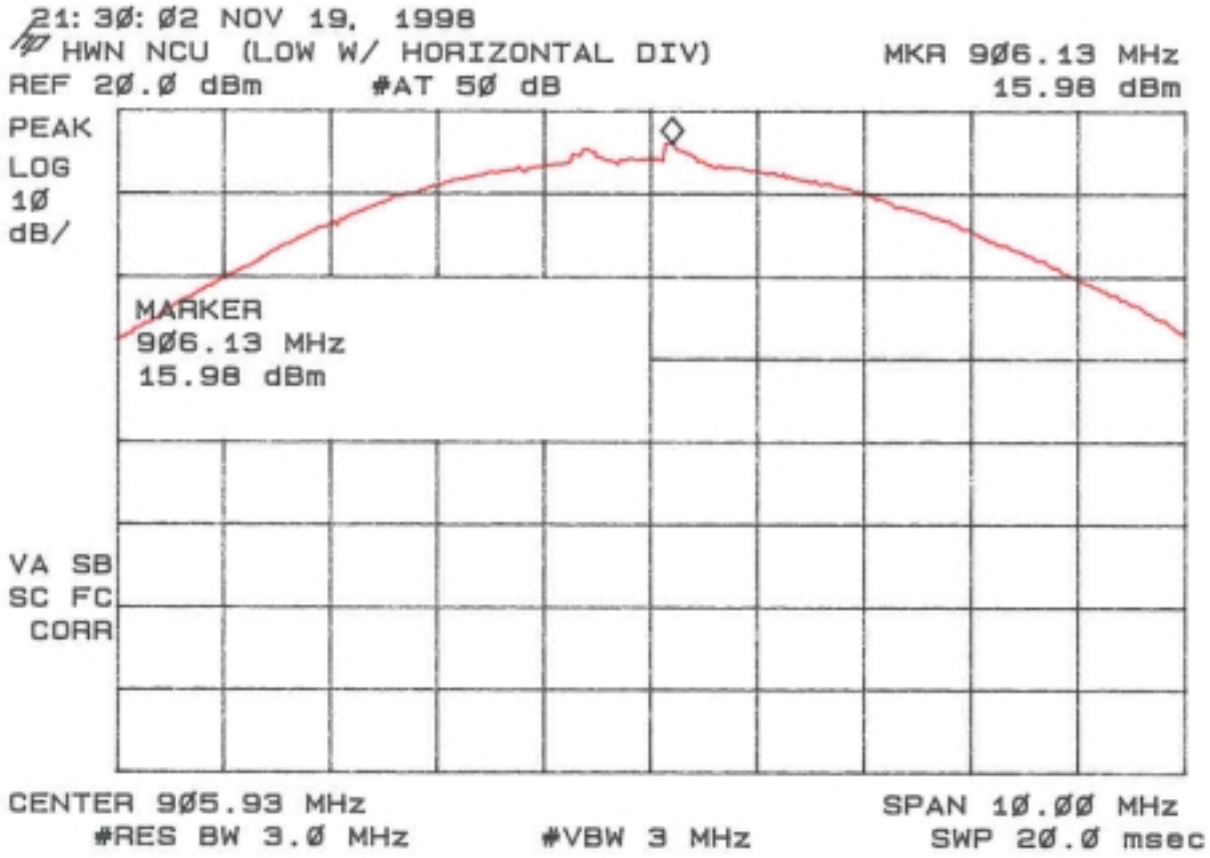


Figure 3b.
Peak Power per FCC Section 15.247(b) (Mid-Horizontal Div.)

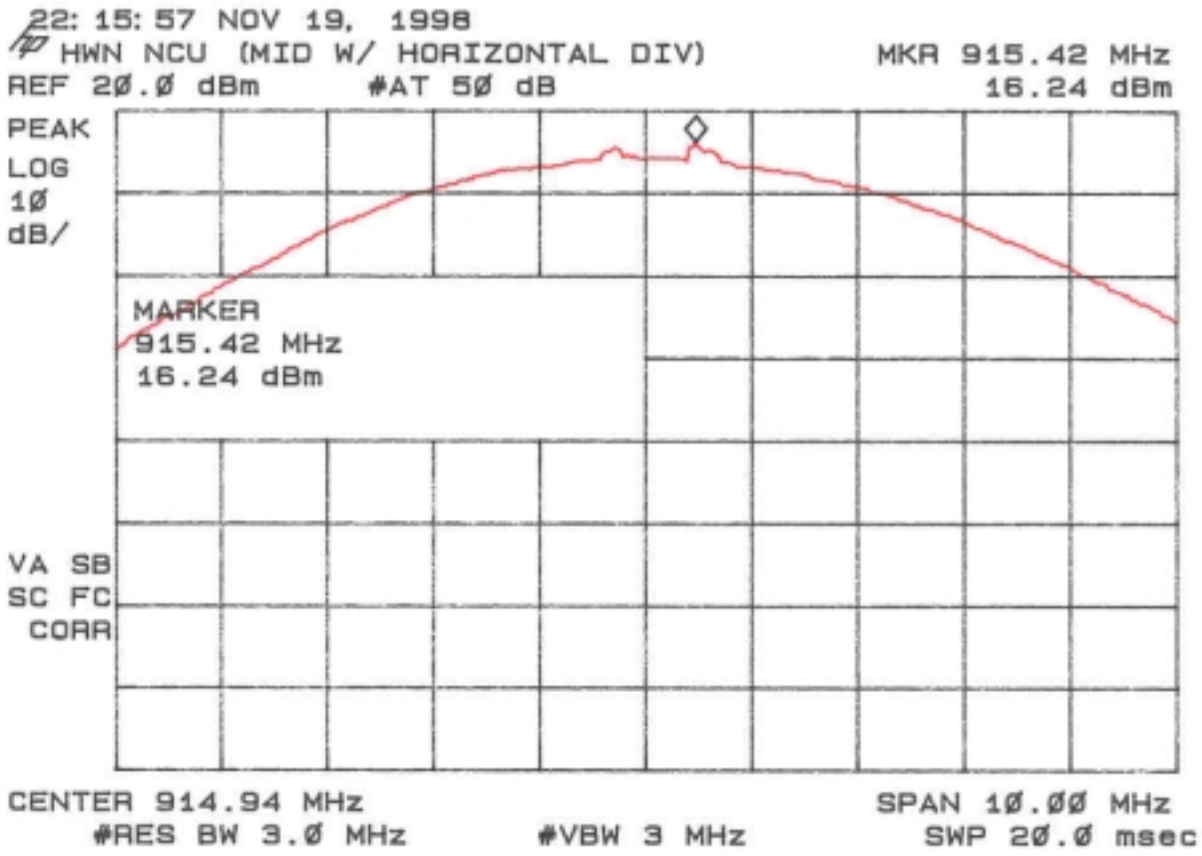


Figure 3c.
Peak Power per FCC Section 15.247(b) (High-Horizontal Div.)

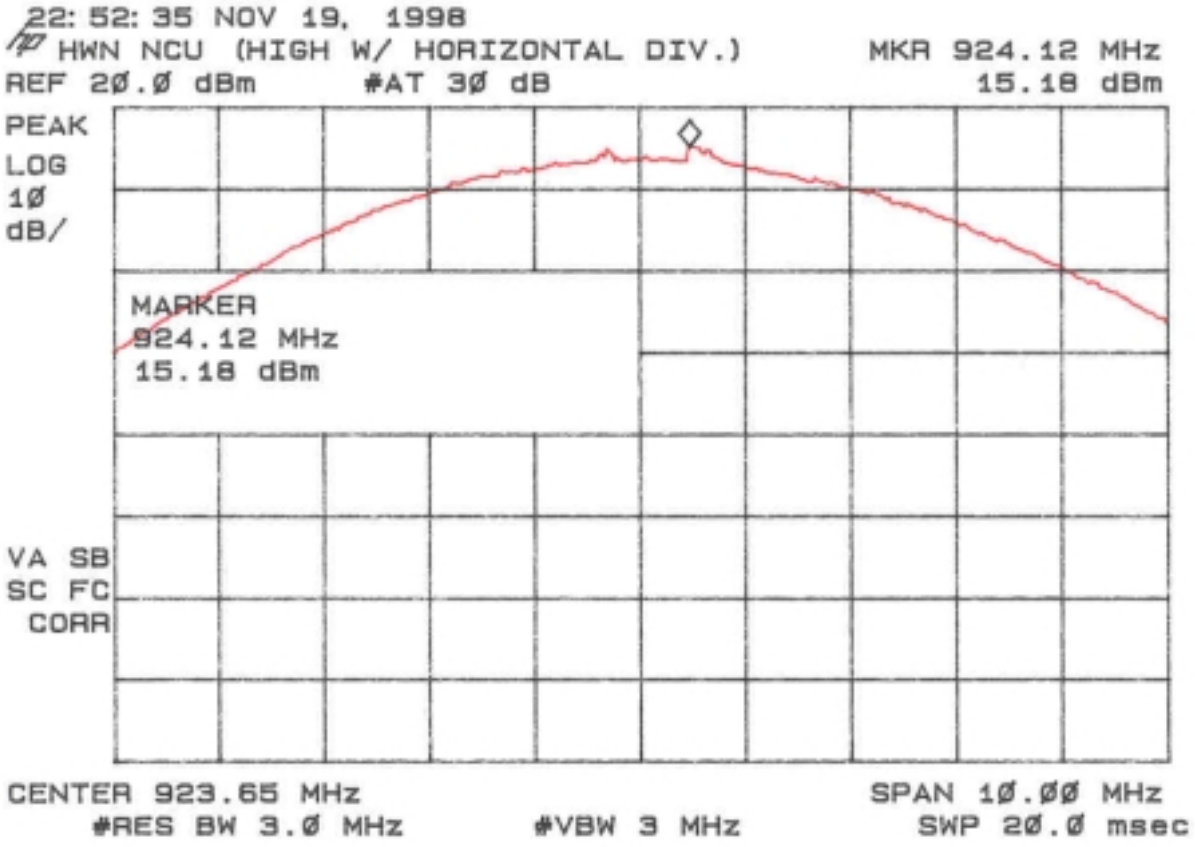


Figure 3d.
Peak Power per FCC Section 15.247(b) (Low-Vertical Div.)

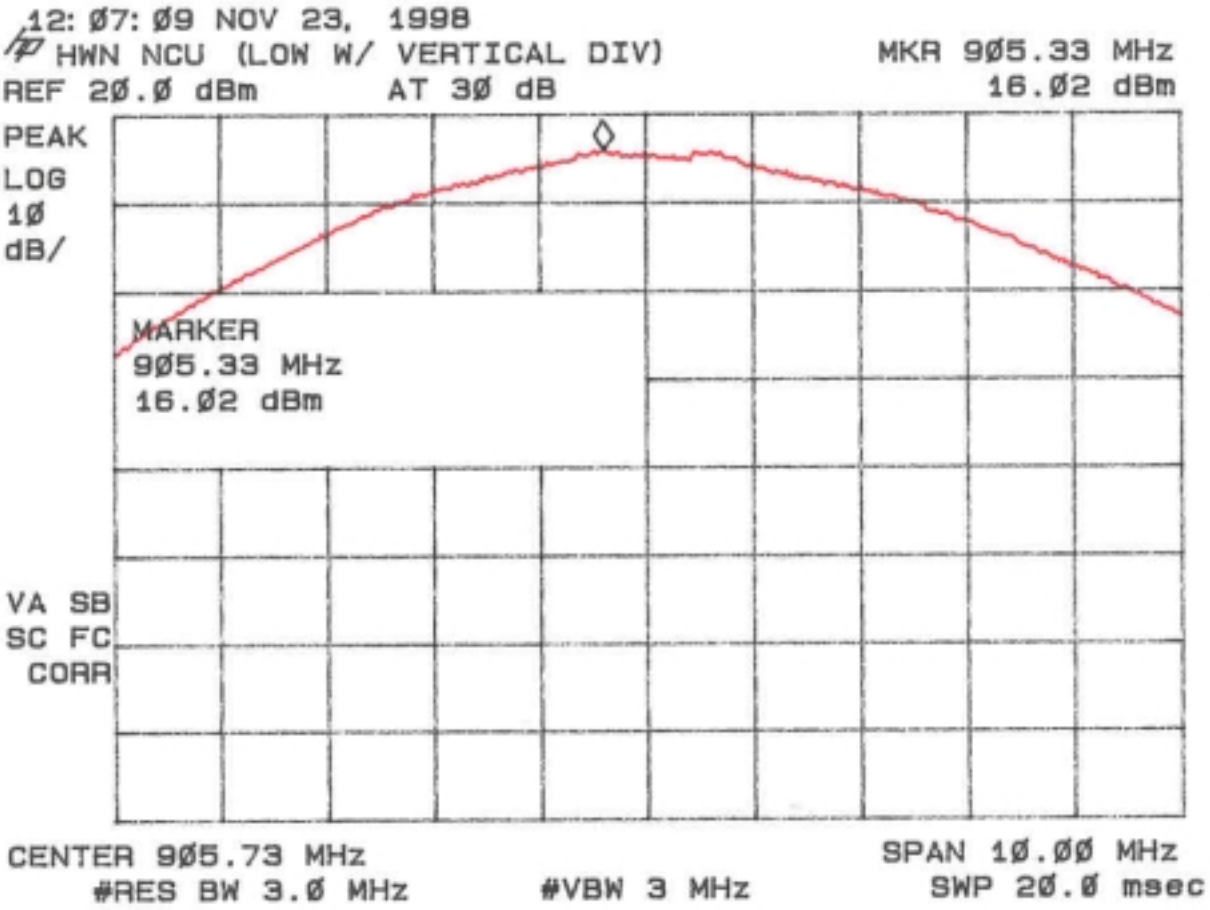


Figure 3e.
Peak Power per FCC Section 15.247(b) (Mid-Vertical Div.)

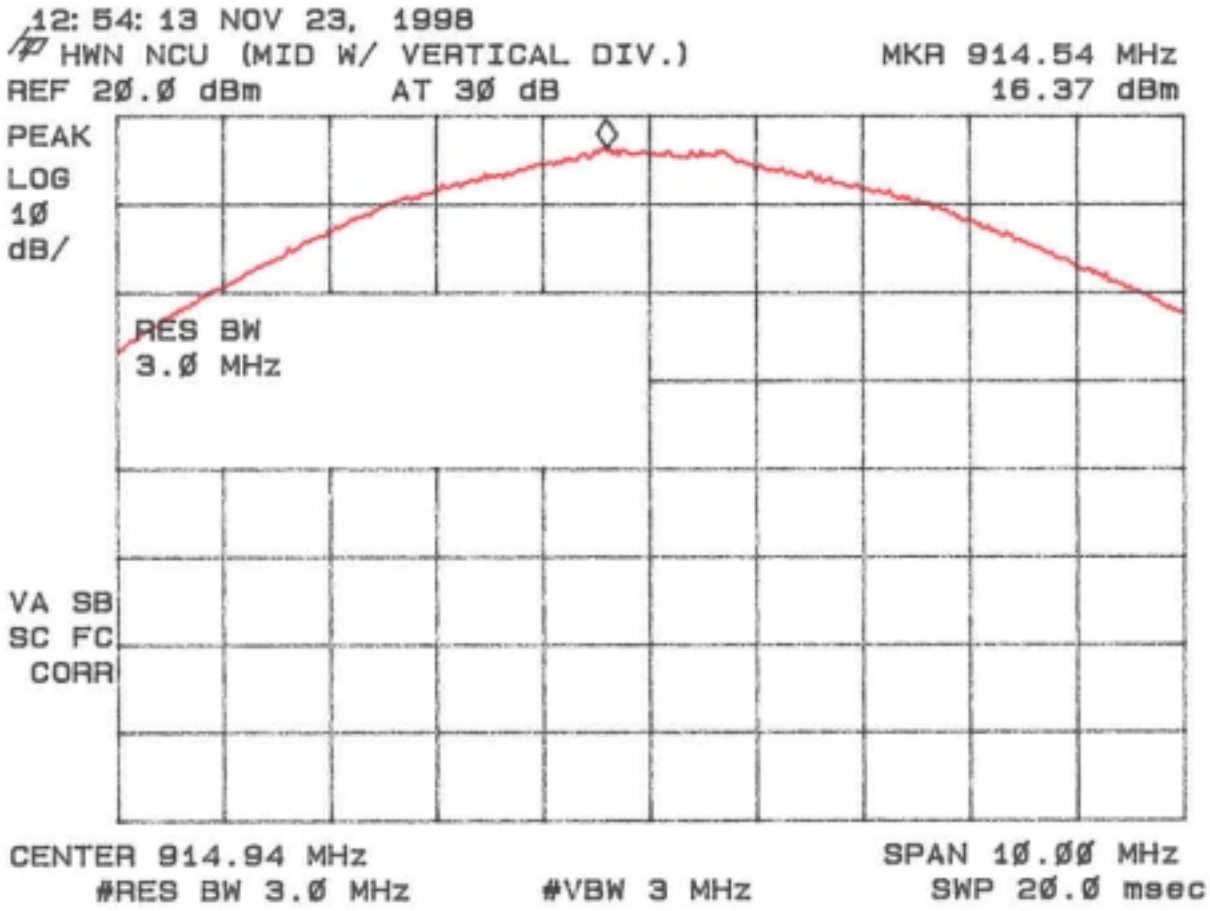
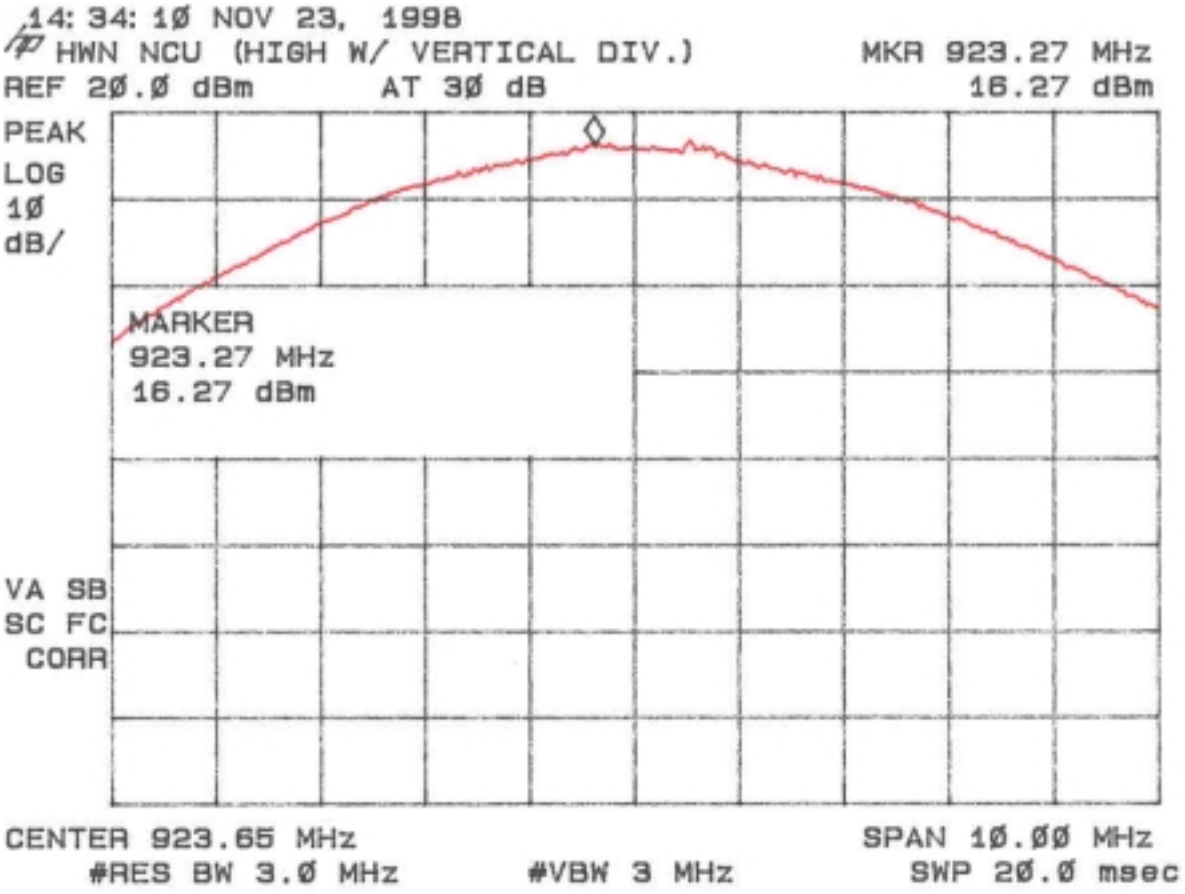


Figure 3f.
Peak Power per FCC Section 15.247(b) (High-Vertical Diversity)



2.7 Antenna Conducted Spurious Emissions in the Frequency Range 30 - 10000 MHz (FCC Section 15.247(c))

Spurious emissions in the frequency range 30 – 10000 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 measured were greater than 20 dB down from the fundamental. The results of conducted spurious emissions are given in Figure 4a through Figure 4x.

Figure 4a
Conducted Spurious Emissions 15.247(c) Low-Horizontal Div.

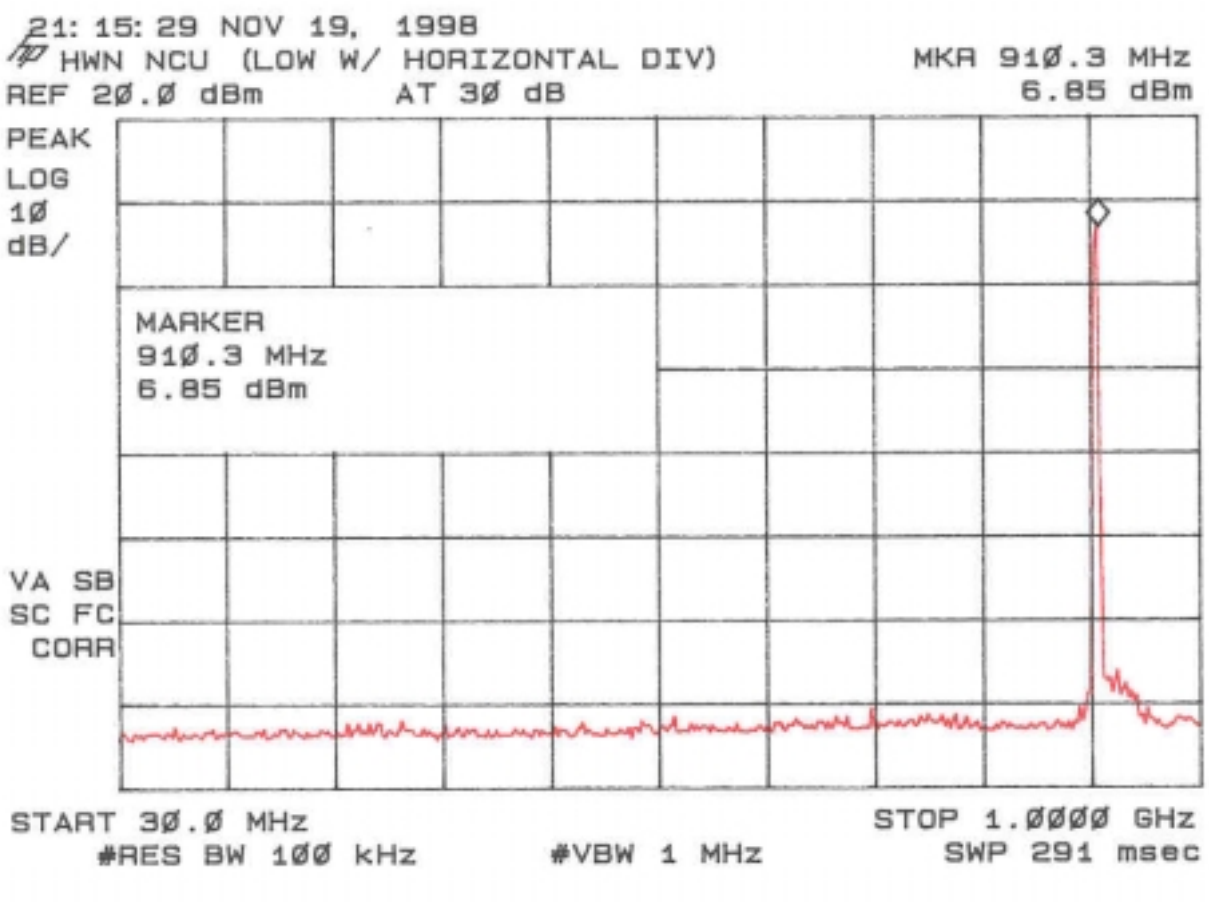


Figure 4b
Conducted Spurious Emissions 15.247(c) Low-Horizontal Div.

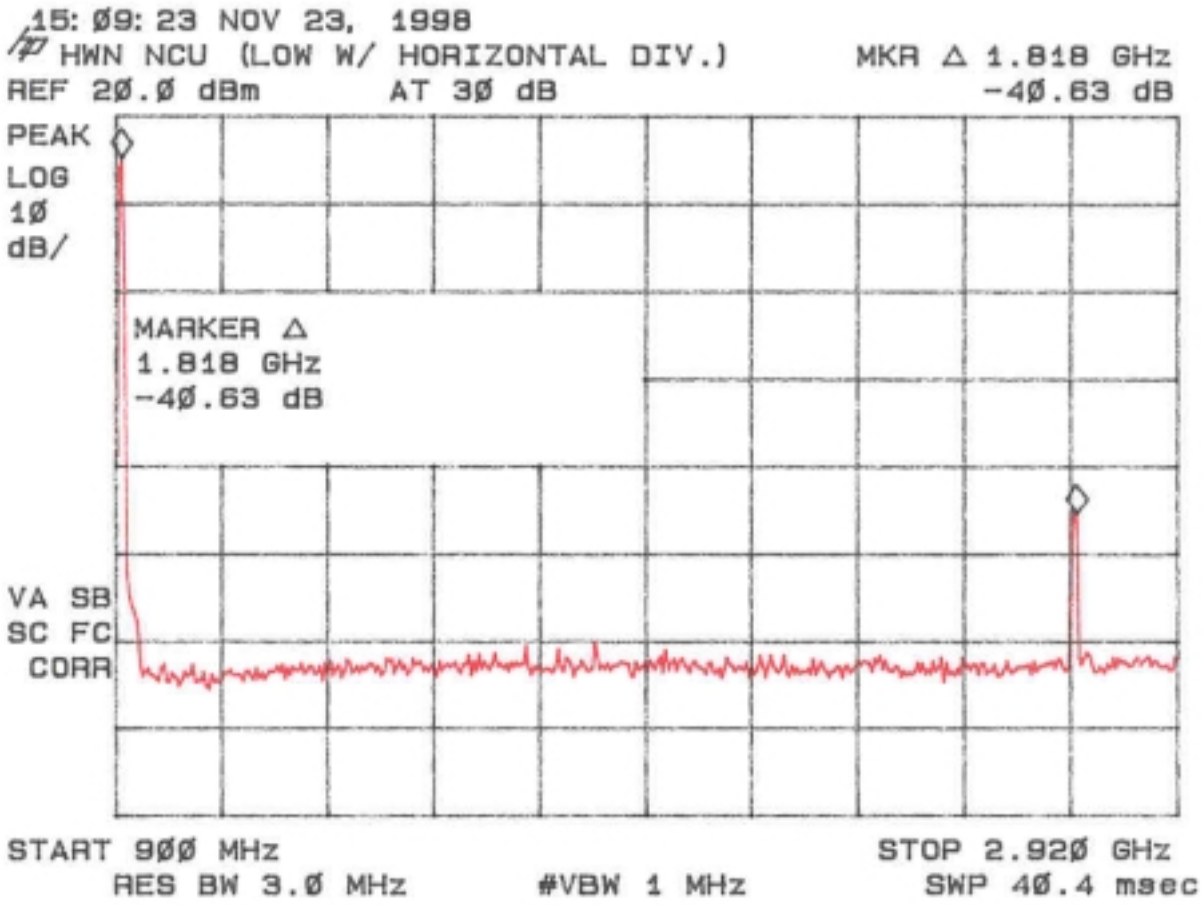


Figure 4c
Conducted Spurious Emissions 15.247(c) Low-Horizontal Div.

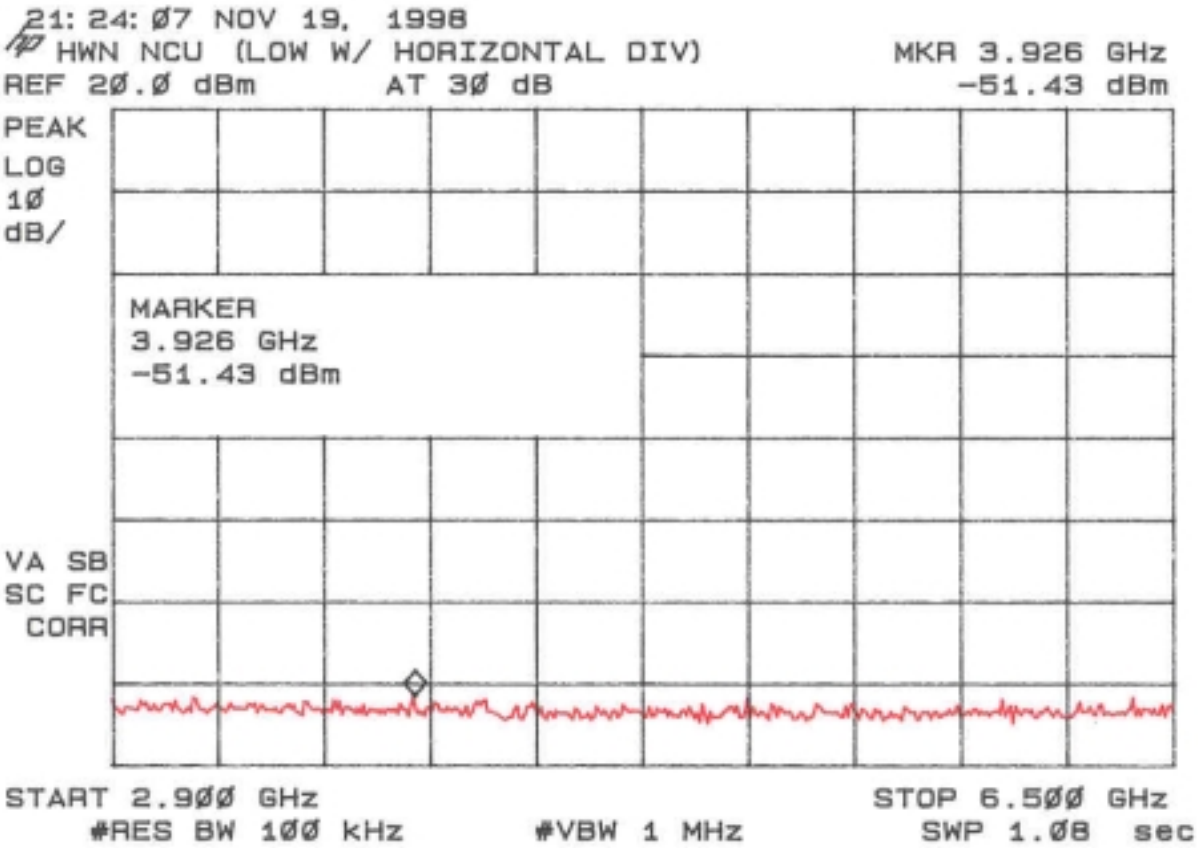


Figure 4d
Conducted Spurious Emissions 15.247(c) Low-Horizontal Div.

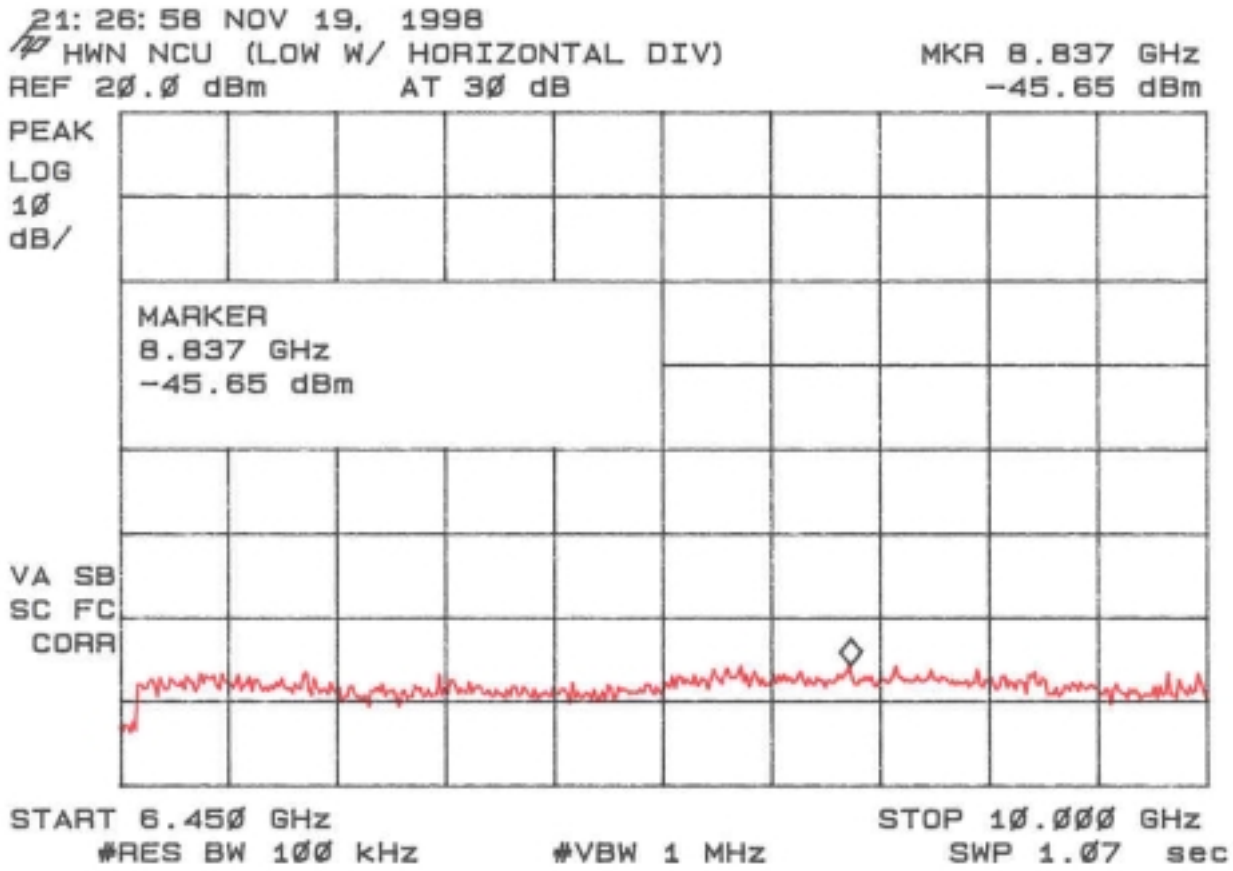


Figure 4e
Conducted Spurious Emissions 15.247(c) Mid-Horizontal Div.

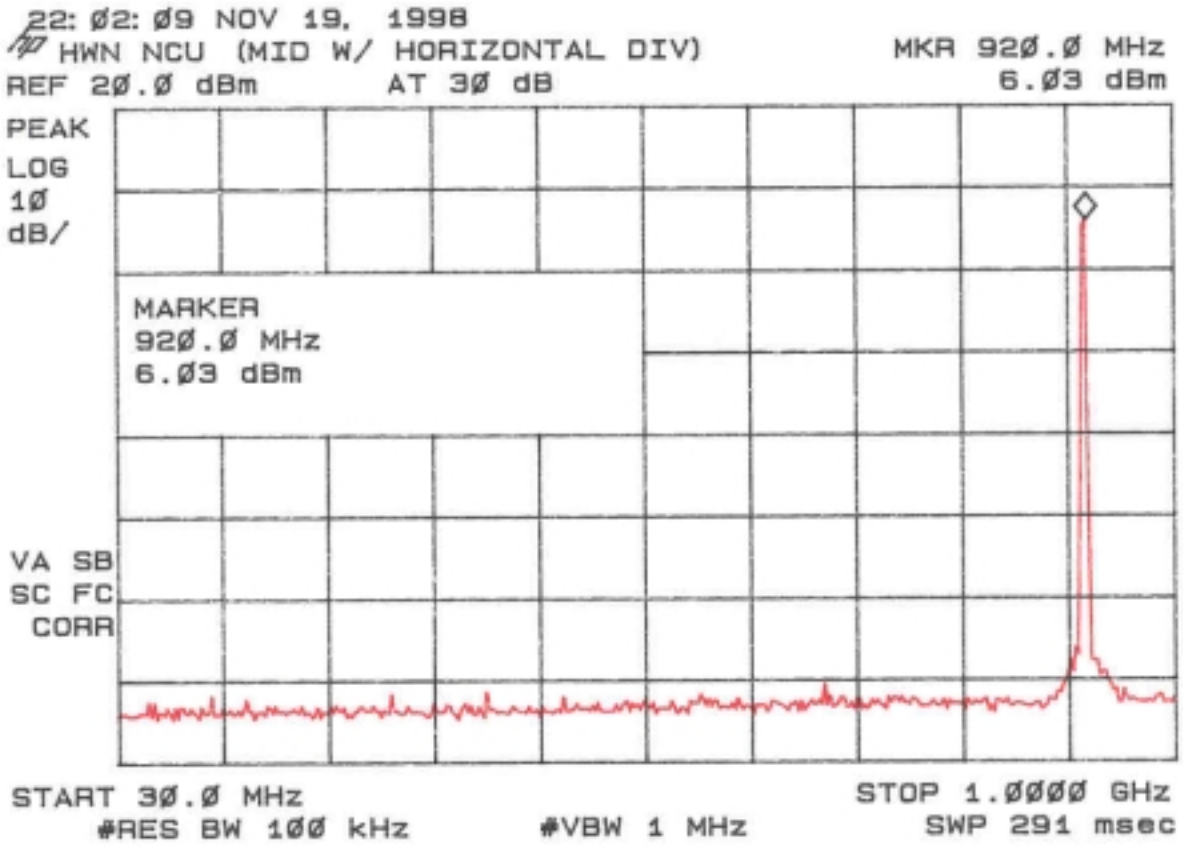


Figure 4f
Conducted Spurious Emissions 15.247(c) Mid-Horizontal Div.

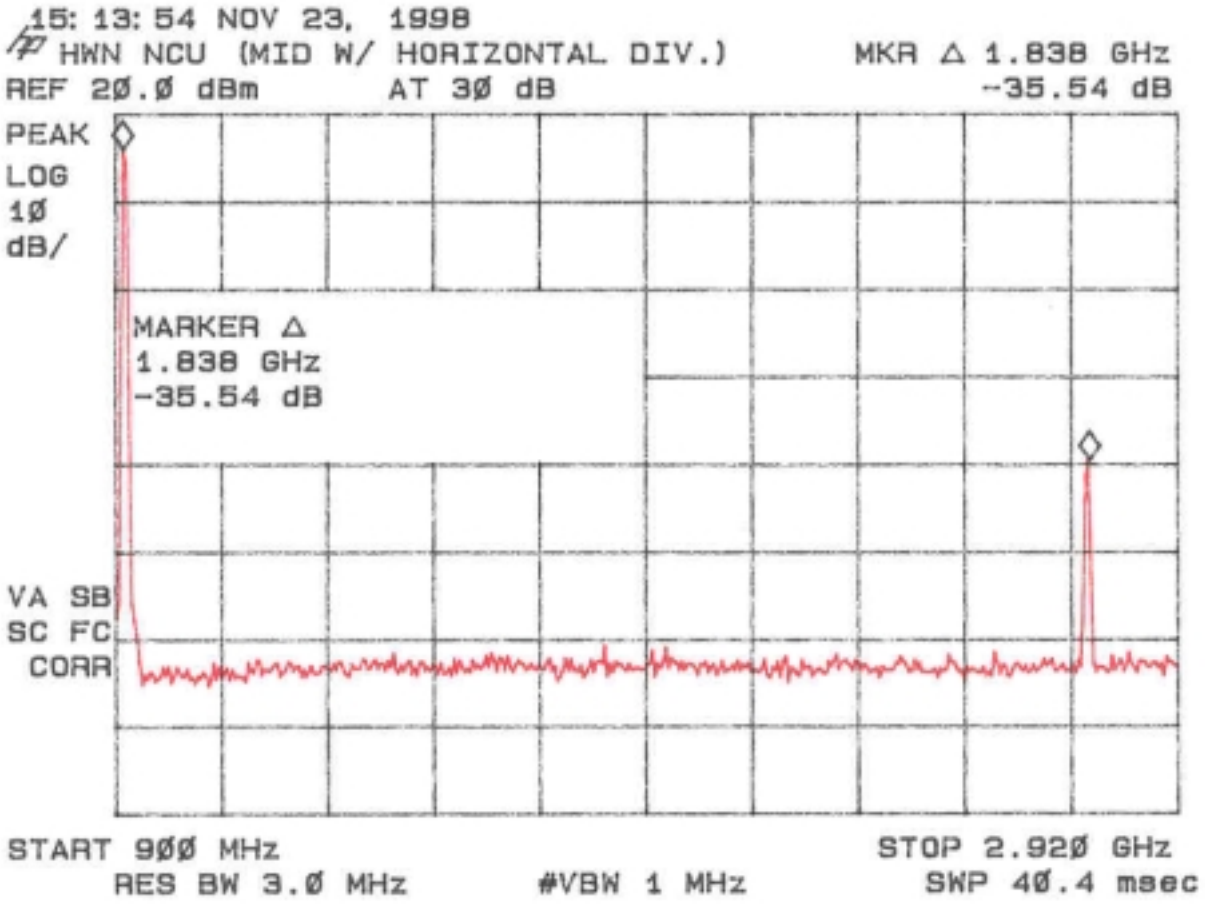


Figure 4g
Conducted Spurious Emissions 15.247(c) Mid-Horizontal Div.

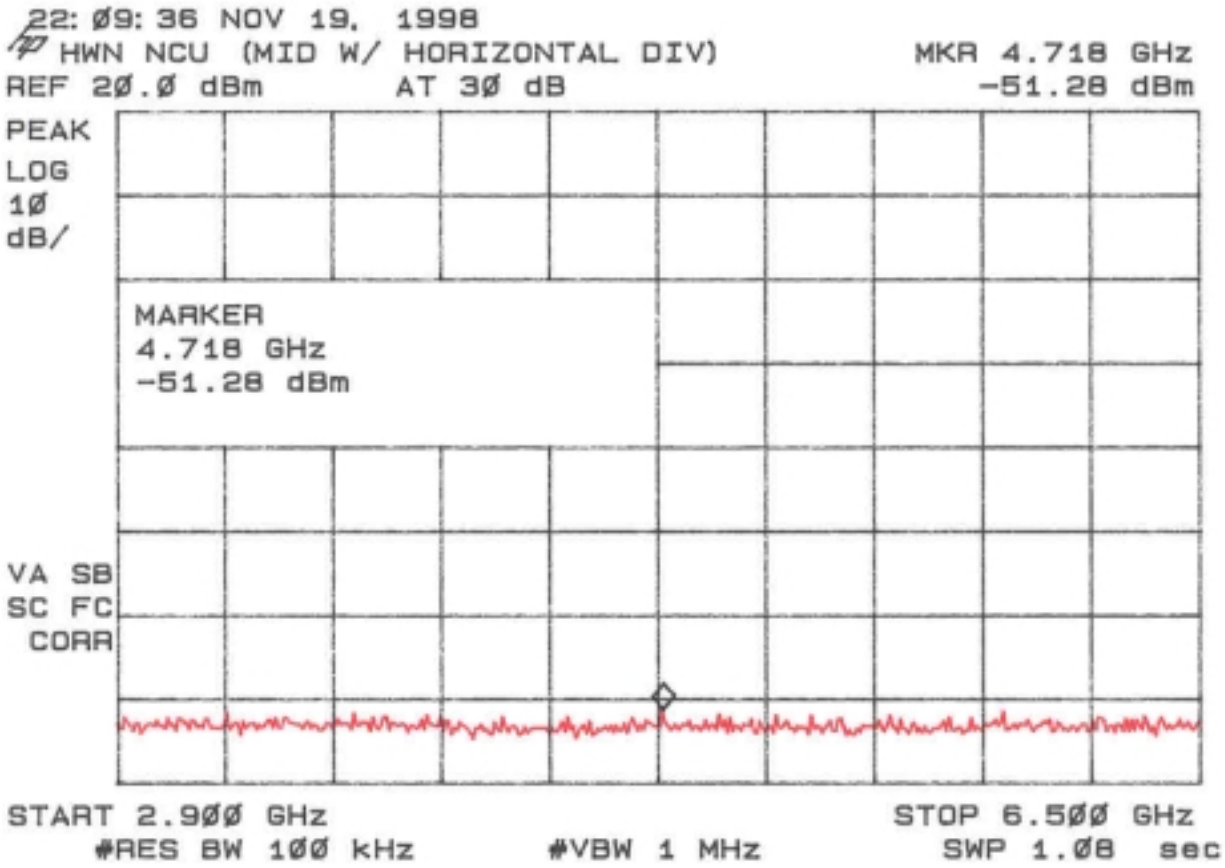


Figure 4h
Conducted Spurious Emissions 15.247(c) Mid-Horizontal Div.

Figure 4i
Conducted Spurious Emissions 15.247(c) High-Horizontal Div.

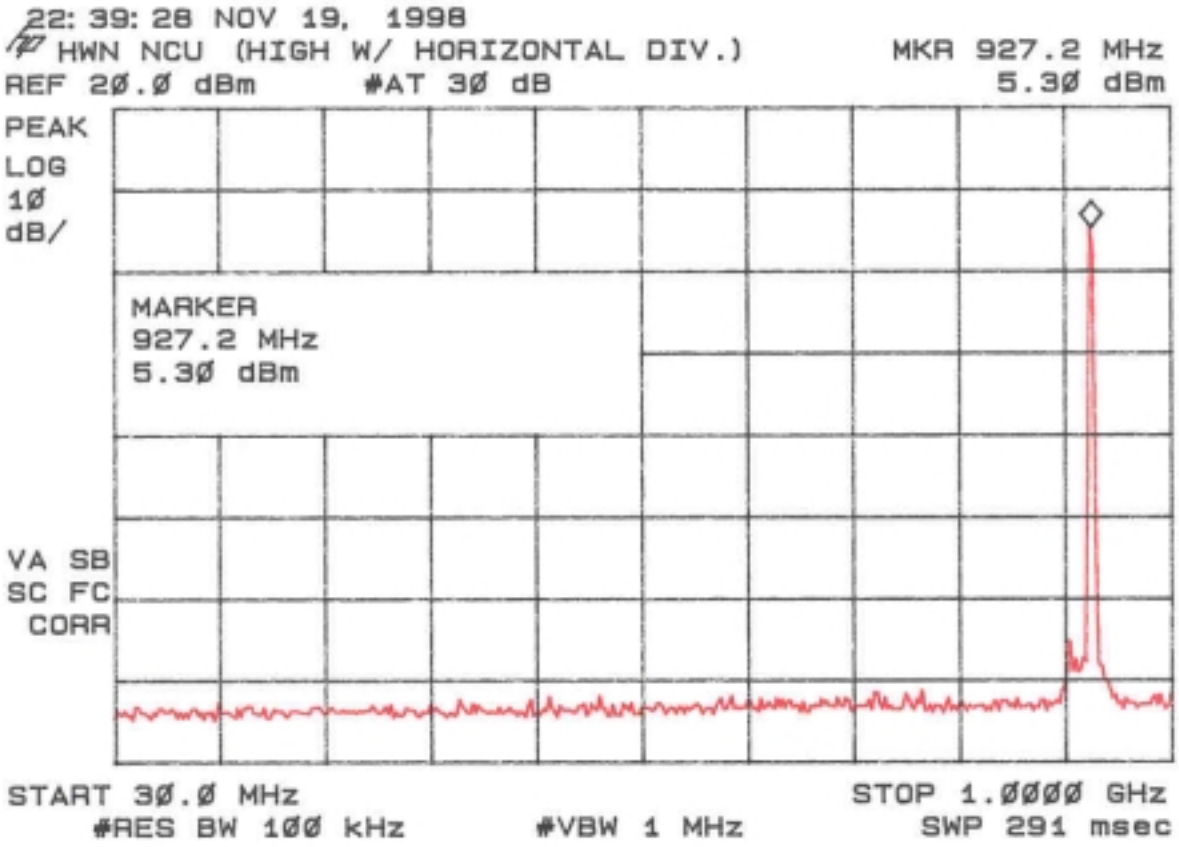


Figure 4j
Conducted Spurious Emissions 15.247(c) High-Horizontal Div.

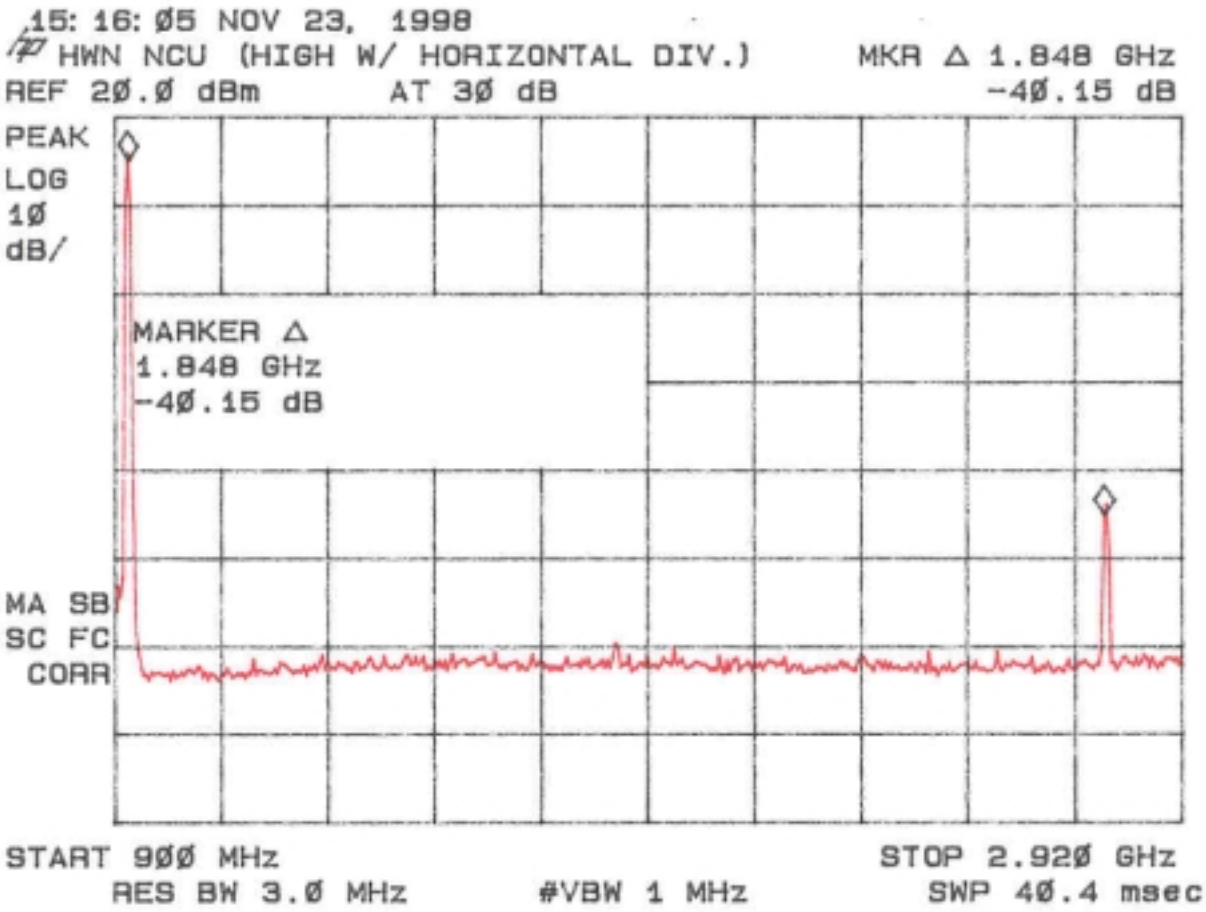


Figure 4k
Conducted Spurious Emissions 15.247(c) High-Horizontal Div.

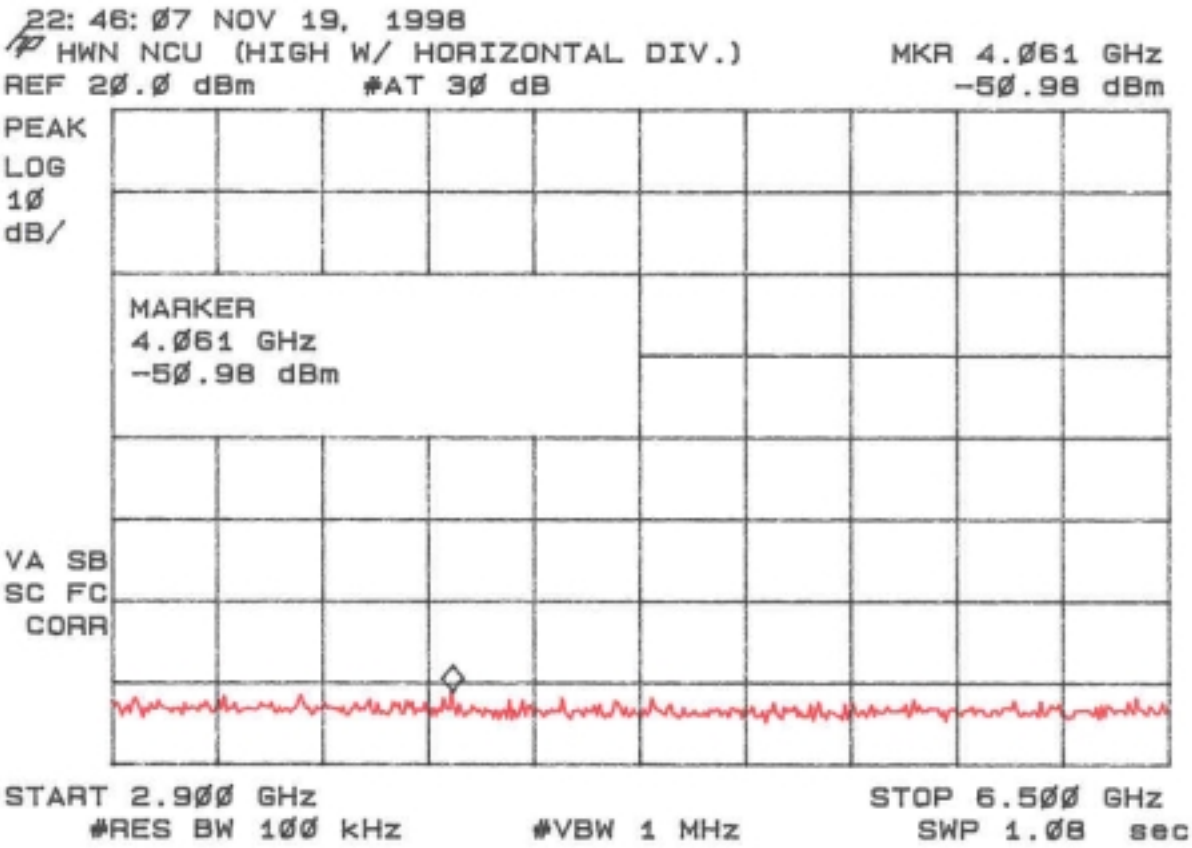


Figure 4l
Conducted Spurious Emissions 15.247(c) High-Horizontal Div.

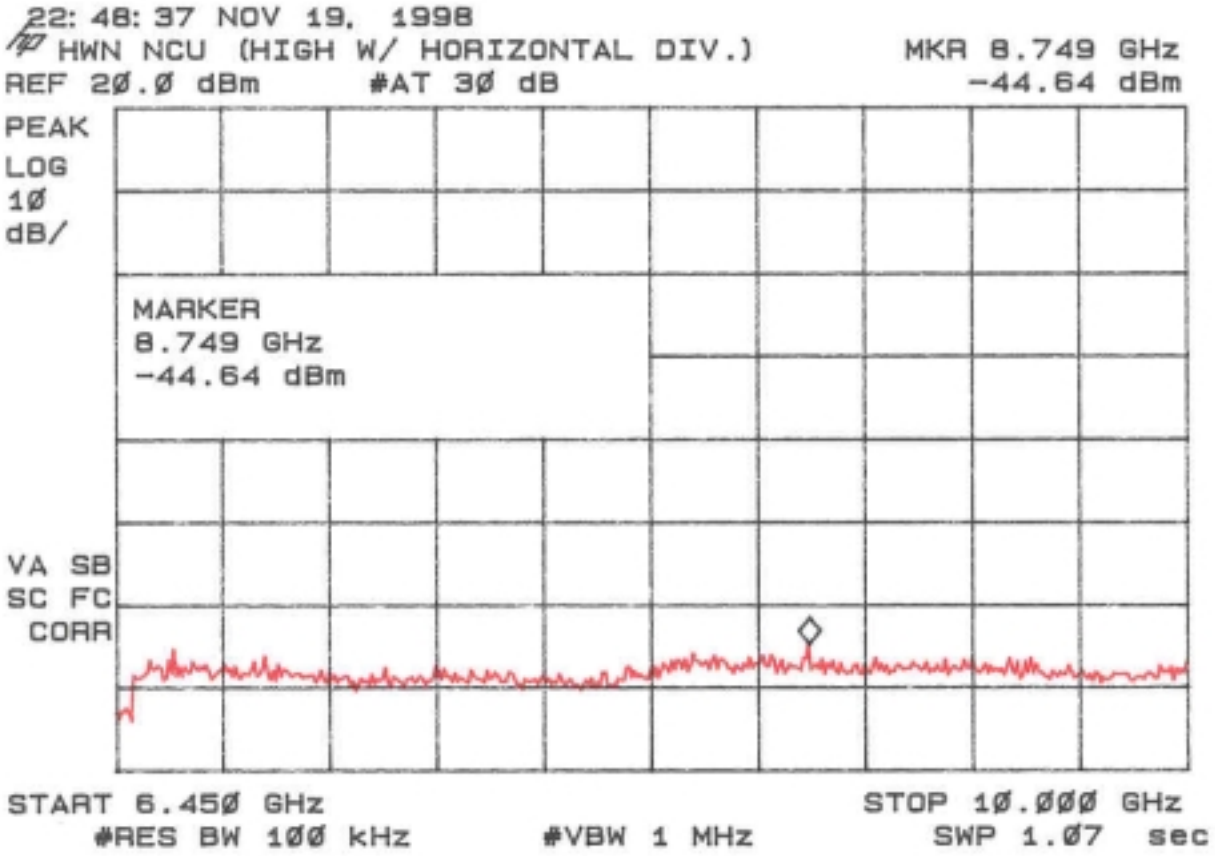


Figure 4m
Conducted Spurious Emissions 15.247(c) Low-Vertical Div.

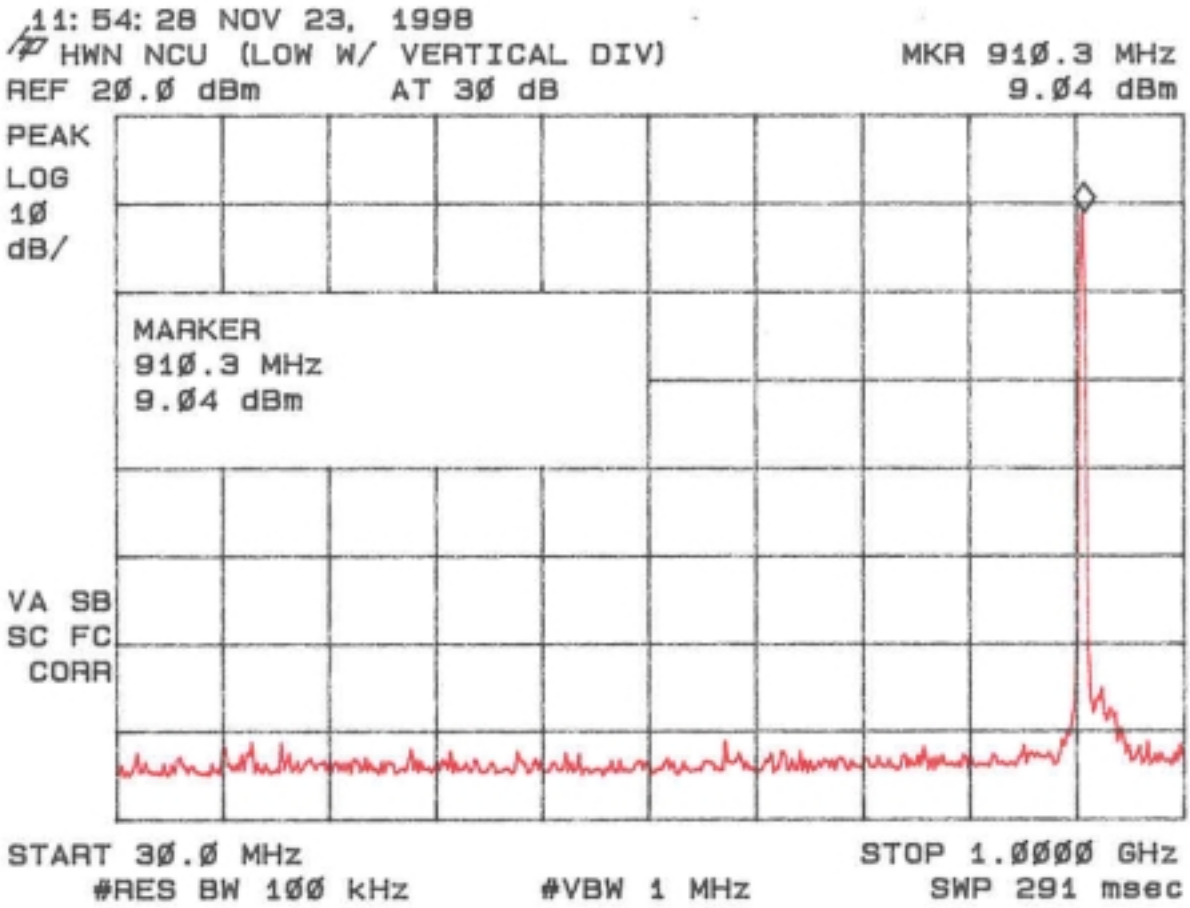


Figure 4n
Conducted Spurious Emissions 15.247(c) Low-Vertical Div.

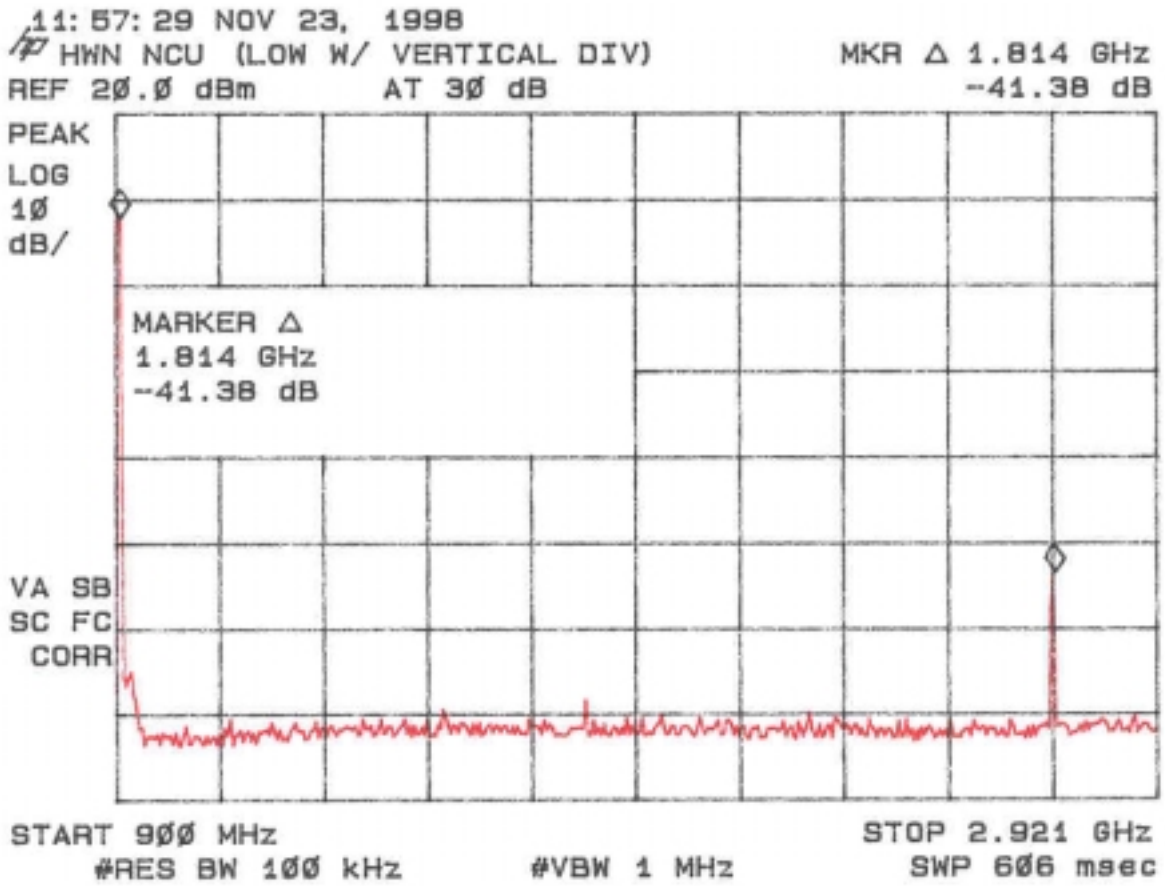


Figure 4o
Conducted Spurious Emissions 15.247(c) Low-Vertical Div.

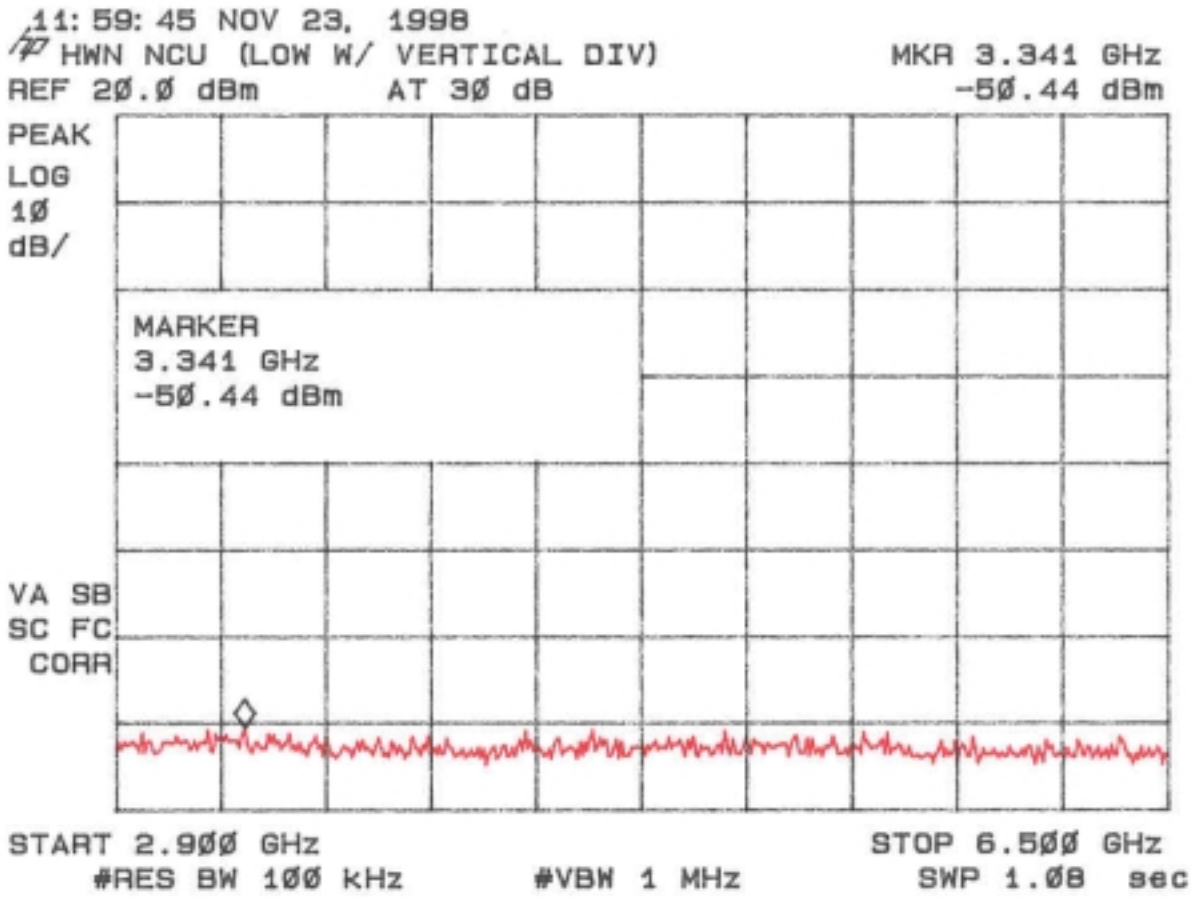


Figure 4p
Conducted Spurious Emissions 15.247(c) Low-Vertical Div.

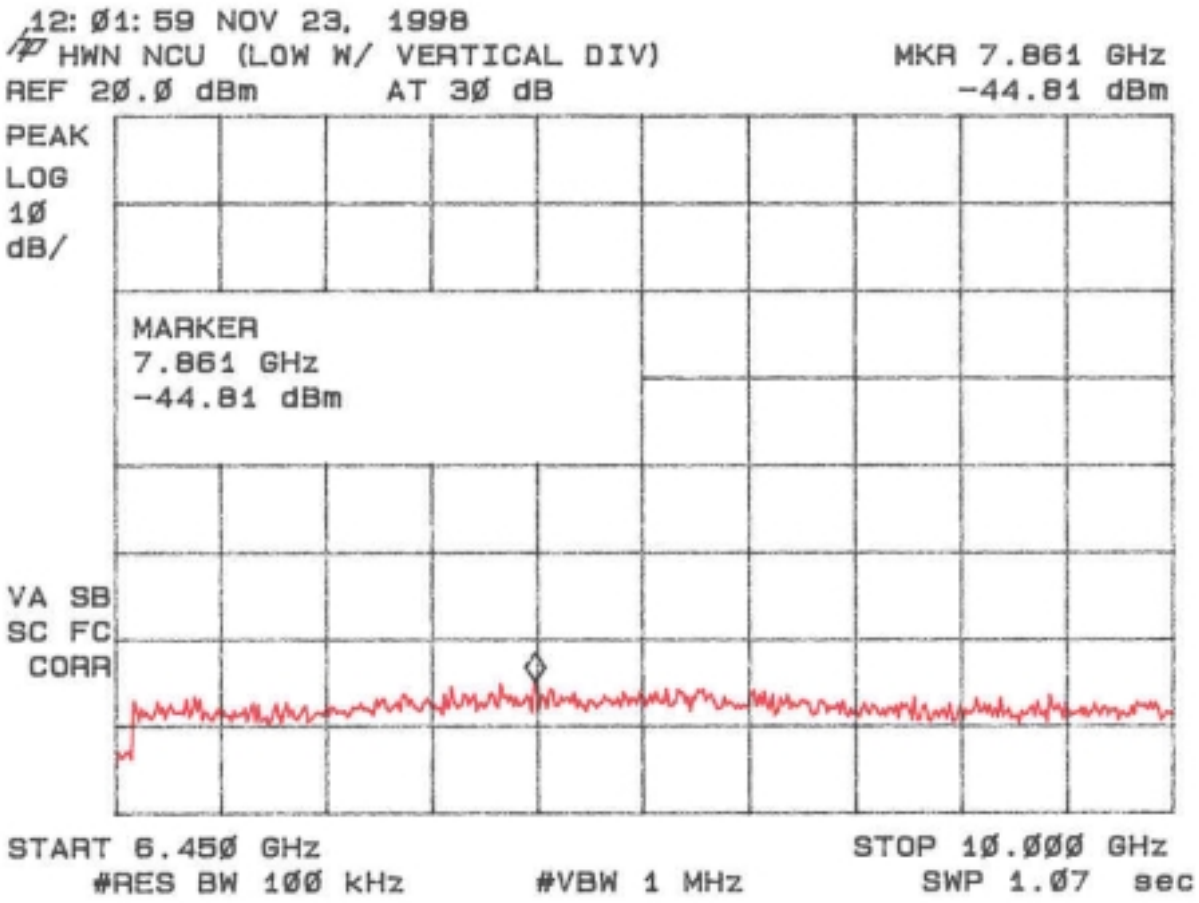


Figure 4q
Conducted Spurious Emissions 15.247(c) Mid-Vertical Div.

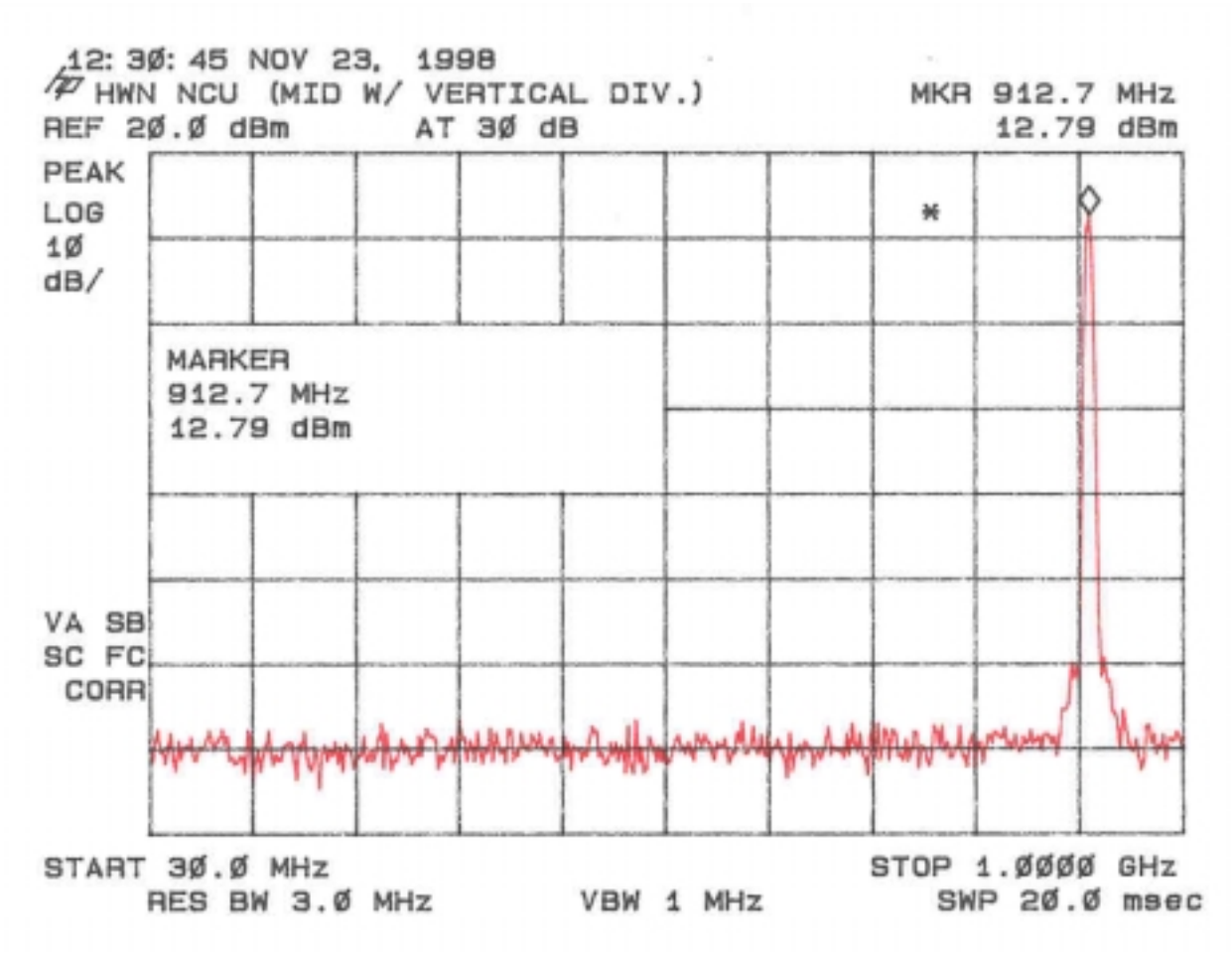


Figure 4r
Conducted Spurious Emissions 15.247(c) Mid-Vertical Div.

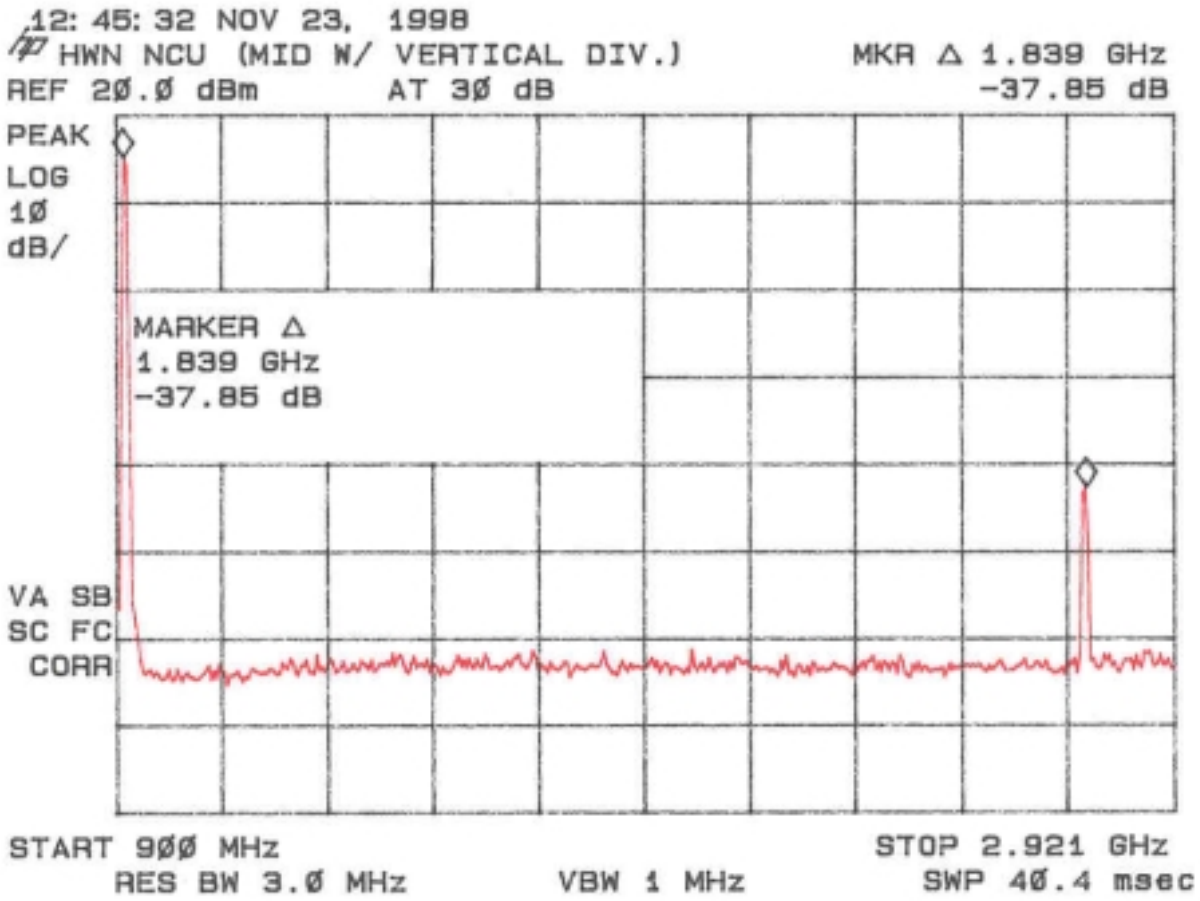


Figure 4s
Conducted Spurious Emissions 15.247(c) Mid-Vertical Div.

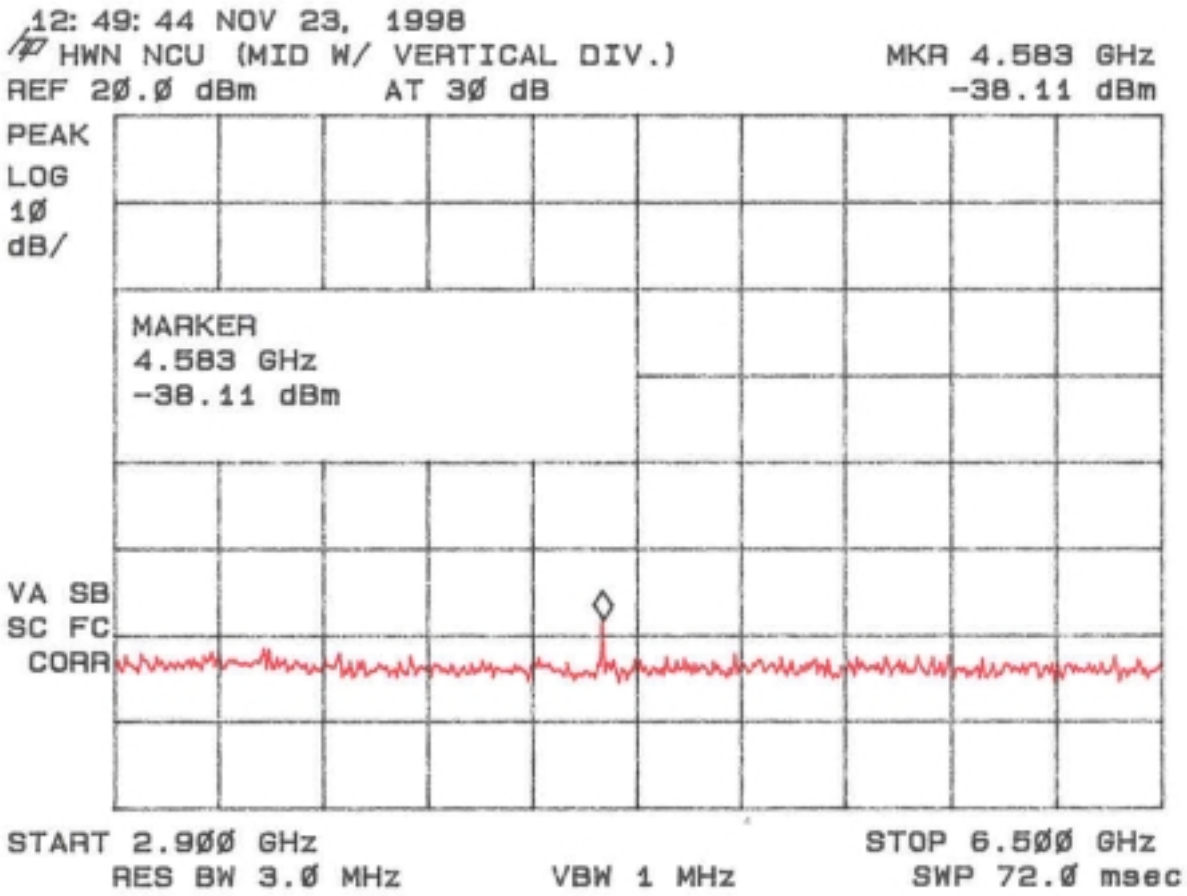


Figure 4t
Conducted Spurious Emissions 15.247(c) Mid-Vertical Div.

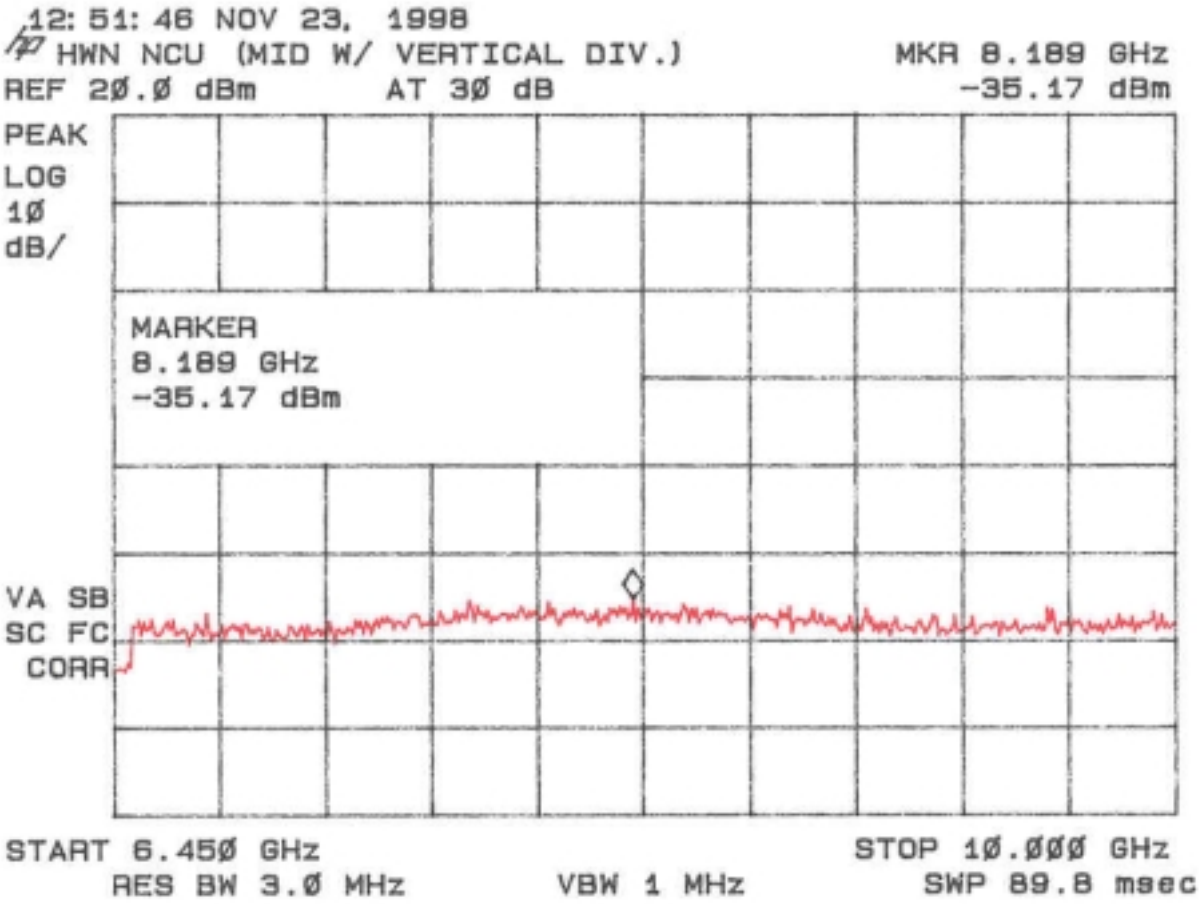


Figure 4u
Conducted Spurious Emissions 15.247(c) High-Vertical Div.

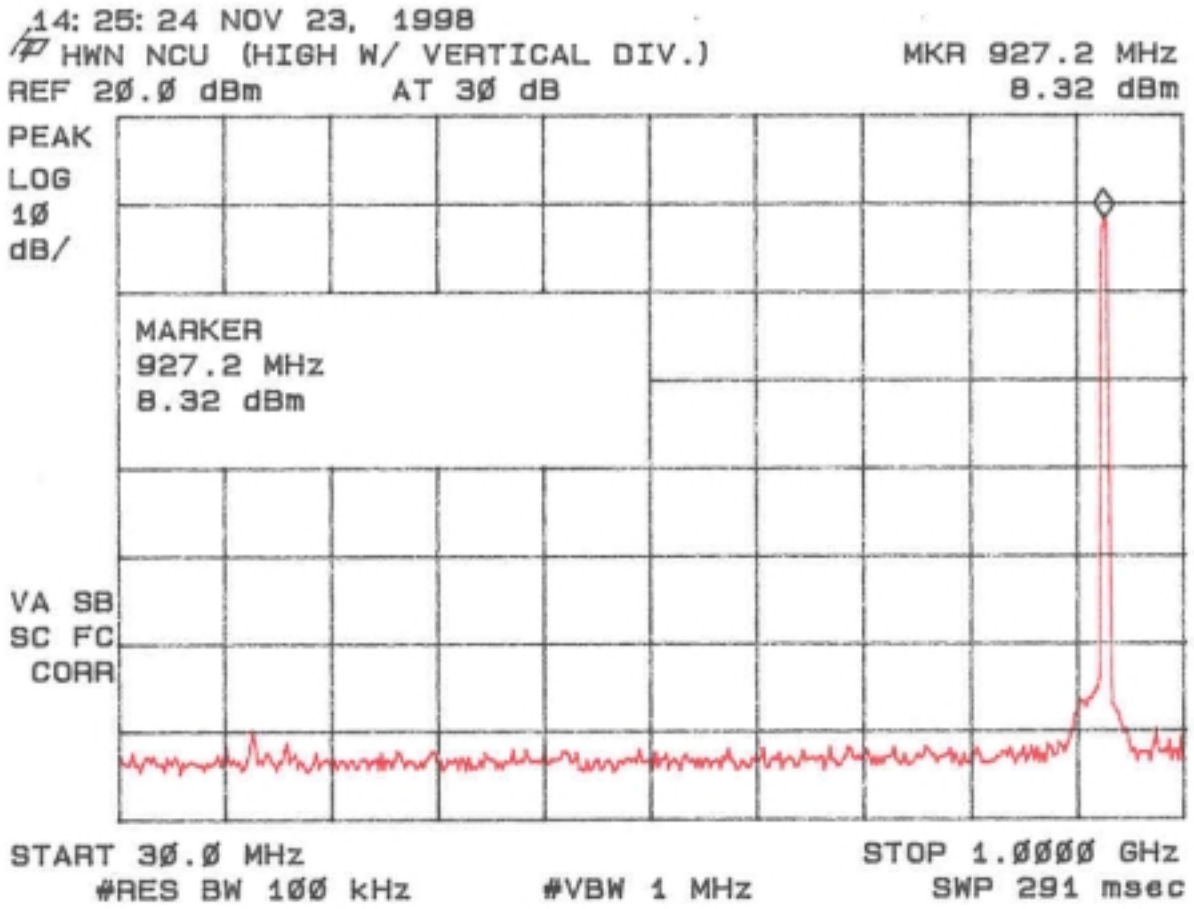


Figure 4v
Conducted Spurious Emissions 15.247(c) High-Vertical Div.

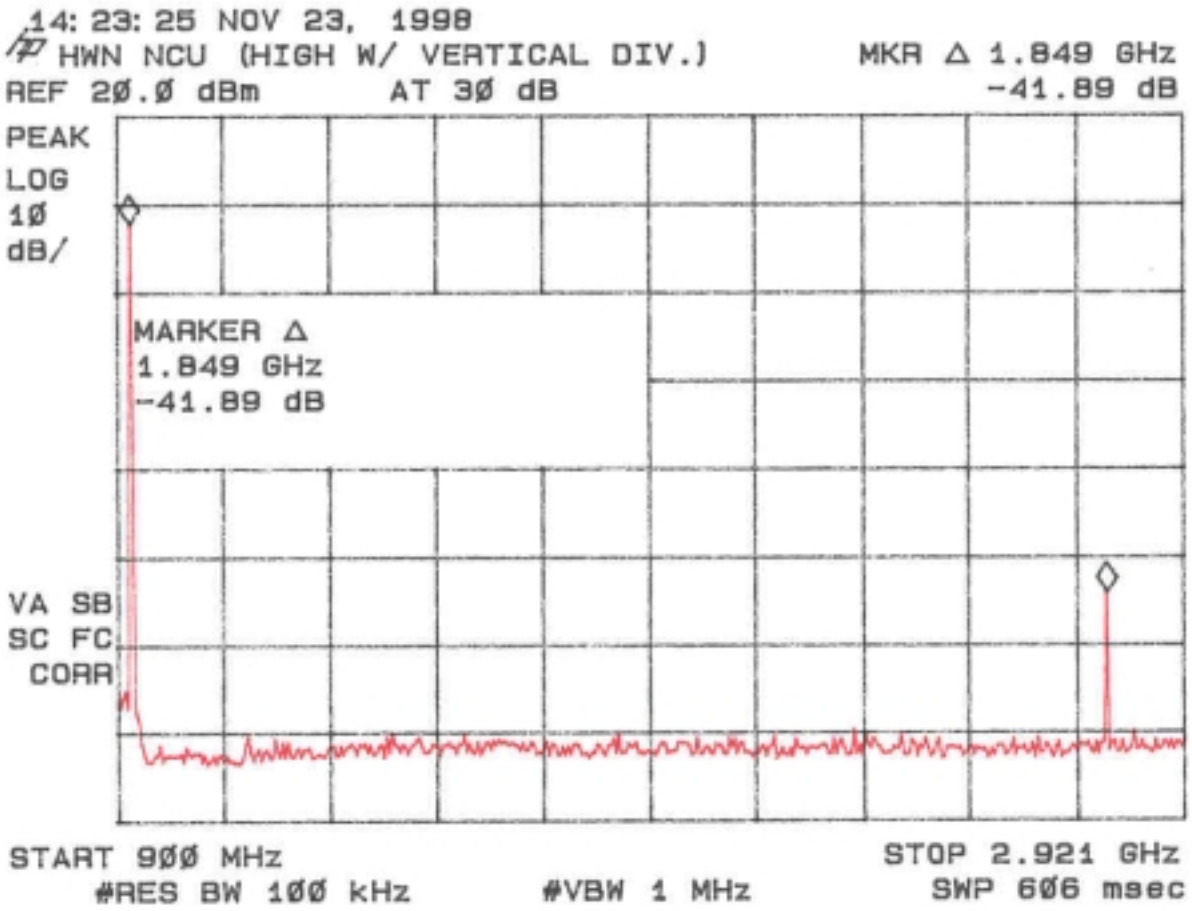


Figure 4w
Conducted Spurious Emissions 15.247(c) High-Vertical Div.

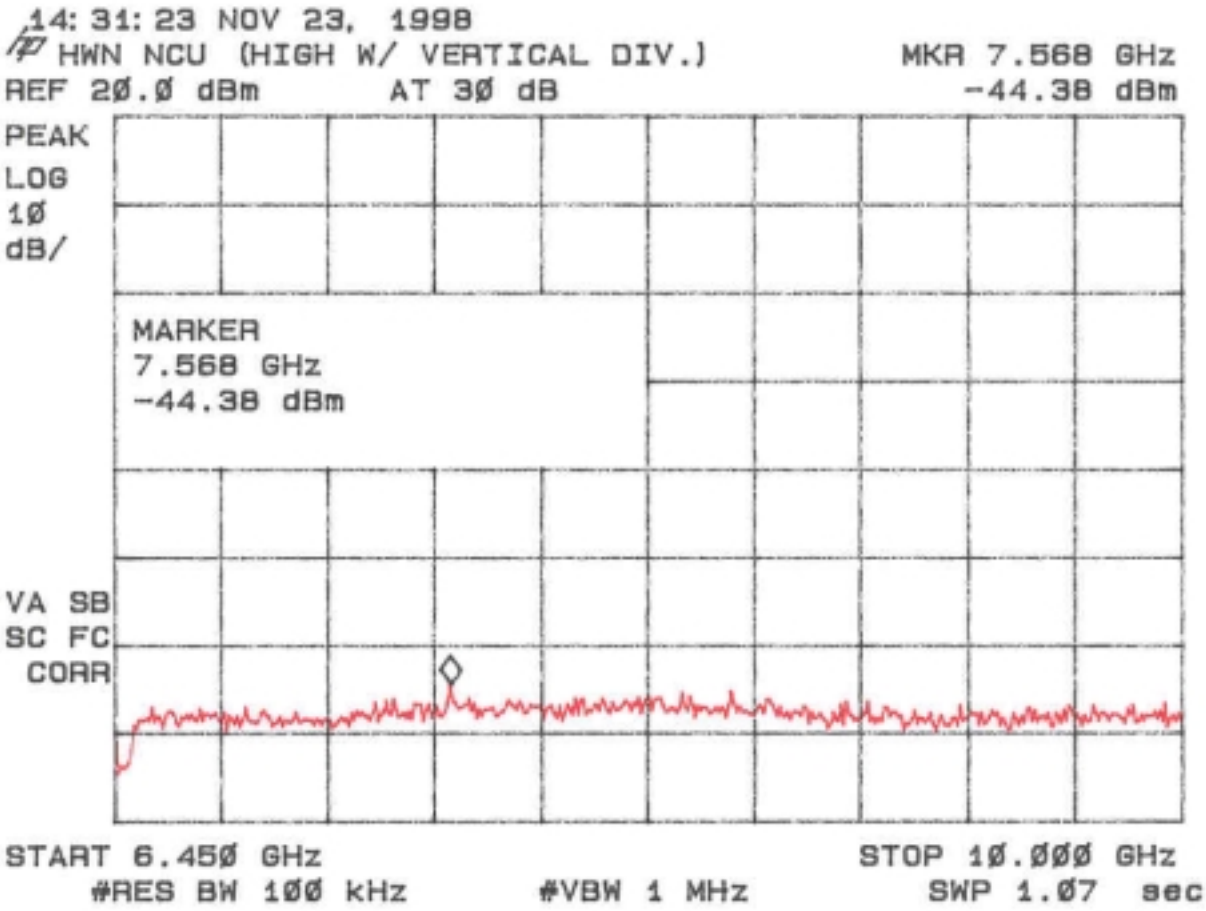
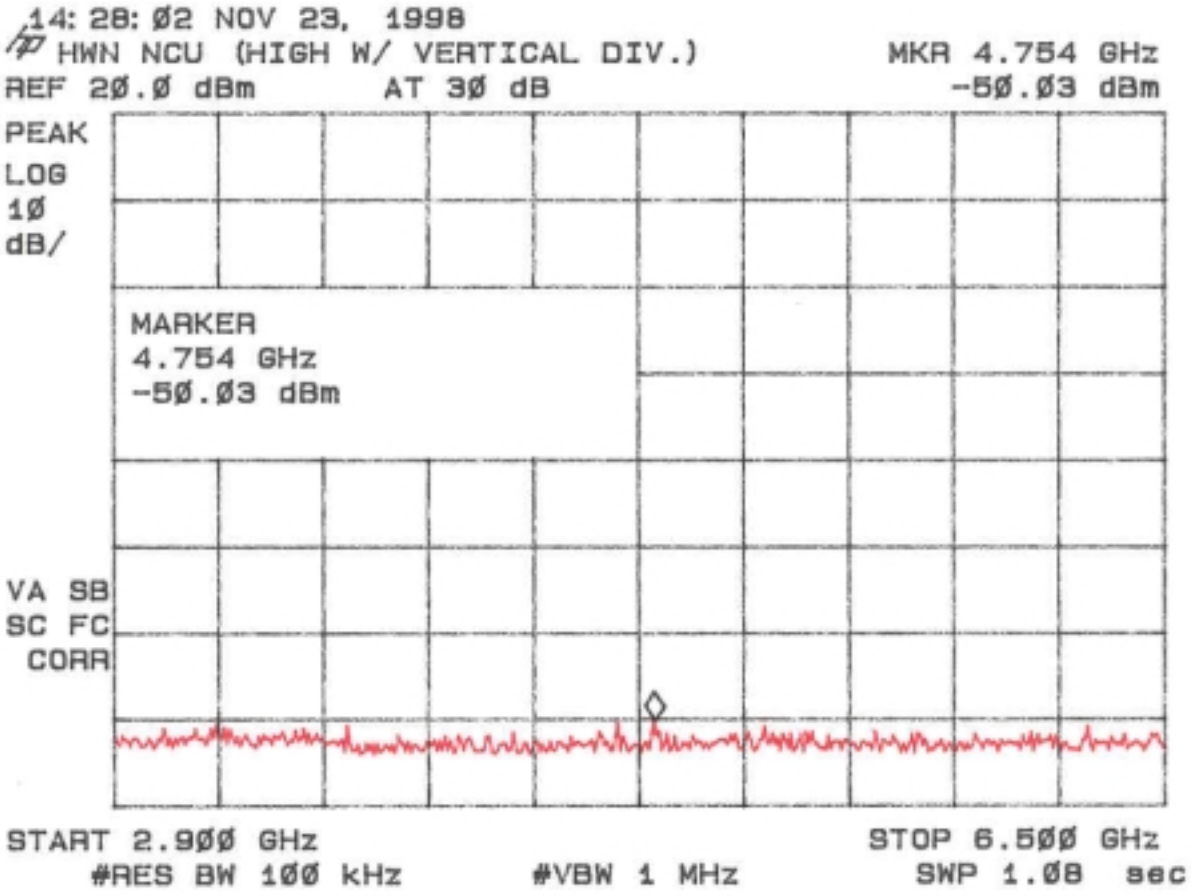



Figure 4x
Conducted Spurious Emissions 15.247(c) High-Vertical Div.