

FCC CERTIFICATION TEST REPORT

for

Zeus Wireless, Inc.
8325 Guilford Road
Columbia, MD 21046

FCC ID: N4JLRT006

December 9, 1998

WLL PROJECT #: 4779X

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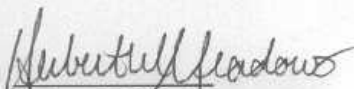
STATEMENT OF QUALIFICATIONS

for

Herbert W. Meadows

Washington Laboratories, Ltd.

I hold a Bachelor of Science in Electronics Engineering Technology. I have over two years of EMI testing experience and eight years of RF and microwave testing experience. I am qualified to perform EMC testing to the methods described in this test report. The measurements taken within this report are accurate within my ability to perform the tests and within the tolerance of the measuring instrumentation.

By: 
Herbert W. Meadows
Compliance Engineer

Date: December 9, 1998

NVLAP FC CE UL SF VE



Zeus Wireless, Inc.

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To: Federal Communication Commission
7435 Oakland Mills Road
Columbia, MD 21046

cc: M. Deegan, T. Newport, T. Fry, FILE

From: D. Soucy

Date: 28 October 98

FN: a102798.doc

Subject: Letter of Agency

☐ ACTION

☐ DECISION

☒ INFORMATION

This letter is to serve notice that Washington Laboratories, Ltd. is hereby authorized to act on our behalf in connection with the Application of Equipment Authorization attached herewith.

We certify that we are not subject to denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862. Further, no party, as defined in 47 CFR 1.2002(b) to the application is subject to denial of federal benefits, that includes FCC benefits.

As always, if you have any questions, comments and/or concerns, please do not hesitate to contact me for more information.

Regards,

Dean Soucy
Vice President of Engineering
Zeus Wireless, Inc.



Zeus Wireless, Inc.

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To: Federal Communication Commission
7435 Oakland Mills Road
Columbia, MD 21046

cc: M. Deegan, T. Newport, T. Fry, FILE

From: D. Soucy

Date: 28 October 98

FN: a102898.doc

Subject: Request for Confidentiality

☐ ACTION

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FCC ID: N4JLRT006

In accordance with 47 CFR Part 0.459, Zeus Wireless requests that the following information be held confidential:

- Schematics
- Technical Description
- Block Diagram

The application contains technical information, which Zeus Wireless deems to be trade secrets and proprietary. If made public, the information might be used to the disadvantage of the applicant in the market place.

Thank you for your attention to this matter.

Sincerely,

Dean Soucy
Vice President of Engineering
Zeus Wireless, Inc.

FCC CERTIFICATION TEST REPORT

for

Zeus Wireless, Inc.

FCC ID: N4JLRT006

1.0 Introduction

This report has been prepared on behalf of Zeus Wireless, Inc. to support the attached Application for Equipment Authorization. The test and application are submitted for an Intentional Radiator under Section 15.247 of the FCC Rules and Regulations. The Equipment Under Test was a Zeus Wireless, Inc. Frequency Hopping Spread Spectrum Transmitter Module, Model: ZLRT9600.

All measurements herein were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and field Strength Instrumentation. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

All measurements are performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

All results reported herein relate only to the equipment tested. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government.

1.1 Summary

The Zeus Wireless, Inc. Frequency Hopping Spread Spectrum Transmitter complies with the limits for an Intentional Radiator under Section 15.247.

2.0 Description of Equipment Under Test (EUT)

The Zeus Wireless, Inc. Frequency Hopping Spread Spectrum Transmitter, Model: ZLRT9600 is a 2.4 GHz low power transmitter module that is used for wireless data telemetry applications at 9.6kbps. The module interfaces with a digital section via a 20-pin header located on the underside of the module. Power to the module is provided via an external AC to DC wall mount transformer which connects to the digital board. Filtered DC power is then supplied to the transmitter module through pins on the 20-pin header connector. The transmitter module also contains a 6" RF cable with a reverse polarity "SMA" type RF connector for the transmit/receive antenna. The digital board contains a 9-pin D-sub connector for RS-232 interface.

Peak Power: 2401.3 = 22.2 dBm
 2441.3 = 21.7 dBm
 2477.3 = 21.0 dBm

The unit will be used with one of the following antennas:

Manufacturer	Model #	Gain	Dimension	Note
Yagi Antennas			(Length)	
Down East Microwave	1209LY	11.5 dBi	12 Inches	
Down East Microwave	1221LY	17.5 dBi	36 Inches	(1)
Astron	P-2406	6 dBi	4 Inches	
Astron	P-2409	9 dBi	8 Inches	
Astron	P-2412	12 dBi	16 Inches	
Astron	P-2415	15 dBi	32 Inches	(1)
Antenex	YB240015	15 dBi	30 Inches	(1)
Cushcraft	PC2415N	16.1 dBi	26 Inches	(1)
Maxrad	MYP-24008	8.8 dBi	7-1/4 Inches	
Maxrad	MYP-24013	13.5 dBi	18 Inches	(1)
Telex	2409AA	8.8 dBi	7-1/4 Inches	
Telex	2415AB	15 dBi	18 Inches	(1)
Telex	2417AA	10.7 dBi	4-1/2 Inches	
Telex	2418AA	5 dBi	4-1/2 Inches	
HyperGain	HG2414Y	14 dBi	Inches	(1)
Patch Antennas				
Cushcraft	S2406P12NF	6 dBi	6 Inches	
Cushcraft	S2307MP10SMF	7.5 dBi	6 Inches	
Cushcraft	S2401290P12NF	12 dBi	24 Inches	

Note: (1) May be used in Point-to-Point communication links only.

Manufacturer	Model #	Gain	Dimension
Omni. Antennas			(Length)
Zeus	2401	2 dBi	6 Inches
Zeus (Connector)	2501	2 dBi	6 Inches
M/A-COM	3380-8030-0127	6 dBi	12 Inches
Cushcraft	S2400BP12NF	Unity	8 Inches
Cushcraft	S2400BH12NF	Unity	9 Inches
Cushcraft	S2403BP12NF	5 dBi	11.5 Inches
Cushcraft	S2403BH12NF	5 dBi	11.5 Inches
Antenex	FMC24006	6 dBi	12 Inches
Telex	2426AA	5 dBi	14 Inches
Telex	2434AA	5 dBi	11 Inches
Telex	2427AA	5 dBi	12 Inches
Maxrad	MPA-2450	1 dBi	4.3 Inches
Maxrad	MQW-2400SM	1 dBi	2.5 Inches
Maxrad	MHW-2400C	2 dBi	7.0 Inches
Maxrad	2400SM	2 dBi	5.3 Inches
Maxrad	2400C	2 dBi	7.0 Inches
Maxrad	MHWS2400RPC	2 dBi	7.0 Inches
Maxrad	MHWS2400RPS	2 dBi	7.0 Inches

2.1 On-board Oscillators

The Zeus Wireless, Inc. Frequency Hopping Spread Spectrum Transmitter contains the following oscillators:

8 MHz Crystal, VCO of Fundamental, 1st IF 315 MHz VCO, 2nd IF 325.7 MHz fixed VCO,

3.0 Test Configuration

To complete the test configuration required by the FCC, the Frequency Hopping Spread Spectrum Transmitter Module was installed into the Zeus Digital Control Module (Class B device) which was connected to a certified computer via an RS-232 serial interface. The EUT was tested in three orthogonal planes as the unit may be mounted in various manners when incorporated into a final product and with the highest gain antenna for each type of antenna.

The antenna model tested is indicated on the data sheets. Testing for the EUT was performed on the low, high and middle operating channels (2401.3 MHz, 2477.3 MHz and 2441.3 MHz respectively). The computer was also configured with external peripherals that also have been certified to comply with the limits for Class B digital devices.

3.1 Testing Algorithm

The transmitter was powered on and setup to continuously transmit. Worst case emissions are recorded in the data tables.

3.2 Conducted Emissions Testing

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table. Power to the digital control module to which the transmitter was installed was provided through a Solar Corporation 50 Ω /50 μ H Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 450 kHz to 30 MHz was measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

Table 1**Conducted Emissions Test Per 15.247(c)**

CLIENT: Zeus Comm. Systems
 MODEL NO: Freq Hopping 2.4 GHz Tx
 DATE: 10/19/98
 BY: H. Meadows
 JOB #: 4779RFFCC

LINE 1 - NEUTRAL

Frequency MHz	Voltage (PEAK) dBuV	Voltage uV	FCC Limit uV	Margin dB
0.45	46.4	208.9	250	-1.6
0.73	43.1	142.9	250	-4.9
1.00	33.4	46.8	250	-14.6
13.30	30.5	33.5	250	-17.5
18.05	32.1	40.3	250	-15.9
27.10	31.3	36.7	250	-16.7

LINE 2 - PHASE

FREQ MHz	VOLTAGE (PEAK) dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
0.45	41.1	113.5	250	-6.9
0.69	36.7	68.4	250	-11.3
1.09	31.3	36.7	250	-16.7
11.10	30.0	31.6	250	-18.0
20.30	30.2	32.4	250	-17.8
24.80	29.1	28.5	250	-18.9

3.3 Radiated Emissions Testing

The EUT was placed on an 80 cm high 1 x 1.5 meters non-conductive motorized turntable for radiated testing on a 3 meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Biconical, log periodic, and horn broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak, peak or average as appropriate. The measurement bandwidth on the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

3.3.1 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Table 2. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dBμV to obtain the Radiated Electric Field in dBμV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Voltage:	VdBμV
Composite Antenna Factor:	AFcdB/m
Electric Field:	$EdB\mu V/m = VdB\mu V + AFcdB/m$
To convert to linear units:	$E\mu V/m = \text{antilog}(EdB\mu V/m/20)$

Data is recorded in Table 2.

Table 2**Radiated Emissions Test Per 15.247(c)**

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Low Channel: 2401.3 MHz**
 ANTENNA: Down East Microwave Model 1221LY; 17.5 dBi Yagi Antenna

Frequency	Polarity	Azimuth	Antenna Height	SA Level QP< 1GHz Avg. > 1 GHz	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	m	dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
117.00	H	0	1.0	9.0	12.9	21.9	12.5	150.0	-21.6
120.00	H	0	1.0	14.0	13.1	27.1	22.6	150.0	-16.4
127.80	H	0	1.0	9.0	12.1	21.1	11.4	150.0	-22.4
240.00	H	0	1.0	12.5	14.3	26.8	21.9	200.0	-19.2
264.00	H	0	1.0	8.0	14.9	22.9	14.0	200.0	-23.1
288.00	H	0	1.0	8.0	15.7	23.7	15.3	200.0	-22.3
400.10	H	0	1.0	12.0	18.6	30.6	34.1	200.0	-15.4
2390.00	H	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
2390.00	V	0	1.0	14.9	29.5	44.4	166.0	500.0	-9.6
4172.00	H	0	1.0	31.5	7.5	39.0	89.1	500.0	-15.0
4172.00	H	0	1.0	32.5	7.5	40.0	100.0	500.0	-14.0
4802.00	H	0	1.0	31.0	8.0	39.0	89.1	500.0	-15.0
4802.00	V	0	1.0	30.5	8.0	38.5	84.1	500.0	-15.5
7204.00	H	0	1.0	34.7	12.0	46.7	216.3	500.0	-7.3
7204.00	V	0	1.0	35.1	12.0	47.1	226.5	500.0	-6.9
9605.00	V	0	1.0	32.3	14.4	46.7	216.3	500.0	-7.3
9605.00	H	0	1.0	30.1	14.4	44.5	167.9	500.0	-9.5
12065.00	H	0	1.0	31.0	16.5	47.5	237.1	500.0	-6.5
12065.00	V	0	1.0	32.0	16.5	48.5	266.1	500.0	-5.5

Table 2 Continued

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Low Channel: 2401.3 MHz**
 ANTENNA: Down East Microwave Model 1221LY; 17.5 dBi Yagi Antenna

Frequency	Polarity	Azimuth	Antenna Height	SA Level (Peak)	AFC	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	m	dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	24.5	29.5	54.0	501.2	5000.0	-20.0
2390.00	V	0	1.0	22.8	29.5	52.3	412.1	5000.0	-21.7
4172.00	H	0	1.0	40.4	7.5	47.9	248.3	5000.0	-26.1
4172.00	V	0	1.0	37.4	7.5	44.9	175.8	5000.0	-29.1
4802.00	H	0	1.0	38.7	8.0	46.7	216.3	5000.0	-27.3
4802.00	V	0	1.0	37.8	8.0	45.8	195.0	5000.0	-28.2
7204.00	H	0	1.0	42.5	12.0	54.5	530.9	5000.0	-19.5
7204.00	V	0	1.0	43.6	12.0	55.6	602.6	5000.0	-18.4
9605.00	H	0	1.0	38.9	14.4	53.3	462.4	5000.0	-20.7
9605.00	V	0	1.0	39.7	14.4	54.1	507.0	5000.0	-19.9
12065.00	V	0	1.0	40.2	16.5	56.7	683.9	5000.0	-17.3
12065.00	H	0	1.0	38.0	16.5	54.5	530.9	5000.0	-19.5

Table 2 Continued

Radiated Emissions Test Per 15.247(c)

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Mid Channel: 2441.3 MHz**
 ANTENNA: Down East Microwave Model 1221LY; 17.5 dBi Yagi Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	(Avg) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
2390.00	V	0	1.0	15.1	29.5	44.6	169.8	500.0	-9.4
4252.00	H	0	1.0	31.0	7.5	38.5	84.1	500.0	-15.5
4252.00	V	0	1.0	31.1	7.5	38.6	85.1	500.0	-15.4
4882.60	H	0	1.0	31.1	8.0	39.1	90.2	500.0	-14.9
4882.60	V	0	1.0	31.1	8.0	39.1	90.2	500.0	-14.9
7324.00	V	0	1.0	31.1	12.0	43.1	142.9	500.0	-10.9
7324.00	H	0	1.0	29.7	12.0	41.7	121.6	500.0	-12.3
9765.00	H	0	1.0	31.3	15.1	46.4	208.9	500.0	-7.6
9765.00	V	0	1.0	31.3	15.1	46.4	208.9	500.0	-7.6
12206.00	H	0	1.0	31.3	16.5	47.8	245.5	500.0	-6.2
12206.00	V	0	1.0	31.3	16.5	47.8	245.5	500.0	-6.2

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	(Peak) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	23.9	29.5	53.4	467.7	5000.0	-20.6
2390.00	V	0	1.0	23.0	29.5	52.5	421.7	5000.0	-21.5
4252.00	H	0	1.0	39.5	7.5	47.0	223.9	5000.0	-27.0
4252.00	V	0	1.0	38.0	7.5	45.5	188.4	5000.0	-28.5
4882.60	H	0	1.0	39.6	8.0	47.6	239.9	5000.0	-26.4
4882.60	V	0	1.0	37.8	8.0	45.8	195.0	5000.0	-28.2
7324.00	H	0	1.0	37.0	12.0	49.0	281.8	5000.0	-25.0
7324.00	V	0	1.0	37.5	12.0	49.5	298.5	5000.0	-24.5
9765.00	H	0	1.0	38.4	15.1	53.5	473.2	5000.0	-20.5
9765.00	V	0	1.0	38.1	15.1	53.2	457.1	5000.0	-20.8
12206.00	H	0	1.0	39.5	16.5	56.0	631.0	5000.0	-18.0
12206.00	V	0	1.0	39.2	16.5	55.7	609.5	5000.0	-18.3

Table 2 Continued

Radiated Emissions Test Per 15.247(c)

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **High Channel: 2477.3 MHz**
 ANTENNA: Down East Microwave Model 1221LY; 17.5 dBi Yagi Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height M	(Avg) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
2390.00	V	0	1.0	14.9	29.5	44.4	166.0	500.0	-9.6
4252.00	H	0	1.0	31.0	7.5	38.5	84.1	500.0	-15.5
4252.00	V	0	1.0	30.1	7.5	37.6	75.9	500.0	-16.4
4639.00	H	0	1.0	31.7	8.0	39.7	96.6	500.0	-14.3
4639.00	V	0	1.0	31.8	8.0	39.8	97.7	500.0	-14.2
4954.60	H	0	1.0	35.0	8.0	43.0	141.3	500.0	-11.0
4954.60	V	0	1.0	35.3	8.0	43.3	146.2	500.0	-10.7
7431.90	H	0	1.0	29.0	12.0	41.0	112.2	500.0	-13.0
7431.90	V	0	1.0	39.0	12.0	51.0	354.8	500.0	-3.0
9909.20	H	0	1.0	27.4	15.1	42.5	133.4	500.0	-11.5
9909.20	V	0	1.0	34.2	15.1	49.3	291.7	500.0	-4.7
12386.00	H	0	1.0	25.7	16.5	42.2	128.8	500.0	-11.8
12386.00	V	0	1.0	30.6	16.5	47.1	226.5	500.0	-6.9

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	(Peak) dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	23.4	29.5	52.9	443.1	5000.0	-21.0
2390.00	V	0	1.0	21.8	29.5	51.3	367.3	5000.0	-22.7
4252.00	H	0	1.0	39.0	7.5	46.5	211.3	5000.0	-27.5
4252.00	V	0	1.0	37.4	7.5	44.9	175.8	5000.0	-29.1
4639.00	H	0	1.0	39.4	8.0	47.4	234.4	5000.0	-26.6
4639.00	V	0	1.0	36.9	8.0	44.9	175.8	5000.0	-29.1
4954.60	H	0	1.0	43.8	8.0	51.8	389.0	5000.0	-22.2
4954.60	V	0	1.0	41.2	8.0	49.2	288.4	5000.0	-24.8
7431.90	H	0	1.0	37.8	12.0	49.8	309.0	5000.0	-24.2
7431.90	V	0	1.0	46.8	12.0	58.8	871.0	5000.0	-15.2
9909.20	H	0	1.0	35.3	15.1	50.4	331.1	5000.0	-23.6
9909.20	V	0	1.0	43.0	15.1	58.1	803.5	5000.0	-15.9
12386.00	H	0	1.0	33.6	16.5	50.1	319.9	5000.0	-23.9
12386.00	V	0	1.0	37.6	16.5	54.1	507.0	5000.0	-19.9

Table 3**Radiated Emissions Test Per 15.247(c)**

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Low Channel: 2401.3 MHz**
 ANTENNA: Cushcraft Model: S2401290P12NF; 12 dBi Patch Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Avg. dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
2390.00	V	0	1.0	14.9	29.5	44.4	166.0	500.0	-9.6
4172.00	H	0	1.0	32.0	7.5	39.5	94.4	500.0	-14.5
4172.00	V	0	1.0	31.7	7.5	39.2	91.2	500.0	-14.8
4802.00	H	0	1.0	30.3	8.0	38.3	82.2	500.0	-15.7
4802.00	V	0	1.0	30.3	8.0	38.3	82.2	500.0	-15.7
7204.00	H	0	1.0	33.0	12.0	45.0	177.8	500.0	-9.0
7204.00	V	0	1.0	36.6	12.0	48.6	269.2	500.0	-5.4
9605.00	H	0	1.0	30.8	14.4	45.2	182.0	500.0	-8.8
9605.00	V	0	1.0	30.0	14.4	44.4	166.0	500.0	-9.6
12065.00	H	0	1.0	31.0	16.5	47.5	237.1	500.0	-6.5
12065.00	V	0	1.0	30.6	16.5	47.1	226.5	500.0	-6.9

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Peak dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	25.6	29.5	55.1	568.9	5000.0	-18.9
2390.00	V	0	1.0	23.8	29.5	53.3	462.4	5000.0	-20.7
4172.00	H	0	1.0	40.7	7.5	48.2	257.0	5000.0	-25.8
4172.00	V	0	1.0	38.4	7.5	45.9	197.2	5000.0	-28.1
4802.00	H	0	1.0	37.9	8.0	45.9	197.2	5000.0	-28.1
4802.00	V	0	1.0	37.6	8.0	45.6	190.5	5000.0	-28.4
7204.00	H	0	1.0	41.1	12.0	53.1	451.9	5000.0	-20.9
7204.00	V	0	1.0	42.5	12.0	54.5	530.9	5000.0	-19.5
9605.00	V	0	1.0	37.7	14.4	52.1	402.7	5000.0	-21.9
9605.00	H	0	1.0	38.0	14.4	52.4	416.9	5000.0	-21.6
12065.00	V	0	1.0	39.8	16.5	56.3	653.1	5000.0	-17.7
12065.00	H	0	1.0	37.0	16.5	53.5	473.2	5000.0	-20.5

Table 3 Continued

Radiated Emissions Test Per 15.247(c)

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Mid Channel: 2441.3 MHz**
 ANTENNA: Cushcraft Model: S2401290P12NF; 12 dBi Patch Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Avg. dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
2390.00	V	0	1.0	14.9	29.5	44.4	166.0	500.0	-9.6
4252.00	H	0	1.0	31.5	7.5	39.0	89.1	500.0	-15.0
4252.00	V	0	1.0	31.0	7.5	38.5	84.1	500.0	-15.5
4882.60	H	0	1.0	31.0	8.0	39.0	89.1	500.0	-15.0
4882.60	V	0	1.0	31.4	8.0	39.4	93.3	500.0	-14.6
7324.00	H	0	1.0	29.9	12.0	41.9	124.5	500.0	-12.1
7324.00	V	0	1.0	31.7	12.0	43.7	153.1	500.0	-10.3
9765.00	H	0	1.0	31.0	15.1	46.1	201.8	500.0	-7.9
9765.00	V	0	1.0	32.0	15.1	47.1	226.5	500.0	-6.9
12206.00	H	0	1.0	30.5	16.5	47.0	223.9	500.0	-7.0
12206.00	V	0	1.0	31.3	16.5	47.8	245.5	500.0	-6.2

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Peak dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	25.4	29.5	54.9	555.9	5000.0	-19.1
2390.00	V	0	1.0	22.9	29.5	52.4	416.9	5000.0	-21.6
4252.00	H	0	1.0	40.3	7.5	47.8	245.5	5000.0	-26.2
4252.00	V	0	1.0	37.0	7.5	44.5	167.9	5000.0	-29.5
4882.60	H	0	1.0	38.8	8.0	46.8	218.8	5000.0	-27.2
4882.60	V	0	1.0	40.0	8.0	48.0	251.2	5000.0	-26.0
7324.00	H	0	1.0	39.4	12.0	51.4	371.5	5000.0	-22.6
7324.00	V	0	1.0	37.1	12.0	49.1	285.1	5000.0	-24.9
9765.00	H	0	1.0	37.5	15.1	52.6	426.6	5000.0	-21.4
9765.00	V	0	1.0	38.5	15.1	53.6	478.6	5000.0	-20.4
12206.00	H	0	1.0	38.4	16.5	54.9	555.9	5000.0	-19.1
12206.00	V	0	1.0	37.5	16.5	54.0	501.2	5000.0	-20.0

Table 3 Continued

Radiated Emissions Test Per 15.247(c)

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **High Channel: 2477.3 MHz**
 ANTENNA: Cushcraft Model: S2401290P12NF; 12 dBi Patch Antenna

Frequency MHz	Polarity H/V	Azimuth Degree	Antenna Height m	SA Level Avg. dBuV	AFc dB/m	E-Field dBuV/m	E-Field uV/m	Limit uV/m	Margin dB
2390.00	H	0	1.0	15.1	29.5	44.6	169.8	500.0	-9.4
2390.00	V	0	1.0	14.9	29.5	44.4	166.0	500.0	-9.6
4252.00	H	0	1.0	31.0	7.5	38.5	84.1	500.0	-15.5
4252.00	V	0	1.0	30.1	7.5	37.6	75.9	500.0	-16.4
4639.00	H	0	1.0	30.4	8.0	38.4	83.2	500.0	-15.6
4639.00	V	0	1.0	30.0	8.0	38.0	79.4	500.0	-16.0
4954.60	H	0	1.0	34.3	8.0	42.3	130.3	500.0	-11.7
4954.60	V	0	1.0	36.3	8.0	44.3	164.1	500.0	-9.7
7431.90	H	0	1.0	30.7	12.0	42.7	136.5	500.0	-11.3
7431.90	V	0	1.0	34.7	12.0	46.7	216.3	500.0	-7.3
9909.20	H	0	1.0	31.4	15.1	46.5	211.3	500.0	-7.5
9909.20	V	0	1.0	36.0	15.1	51.1	358.9	500.0	-2.9
12386.00	H	0	1.0	30.6	16.5	47.1	226.5	500.0	-6.9
12386.00	V	0	1.0	30.4	16.5	46.9	221.3	500.0	-7.1

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency MHz	Polarity H/V	Azimuth Degree	Antenna Height m	SA Level Peak dBuV	AFc dB/m	E-Field dBuV/m	E-Field uV/m	Limit uV/m	Margin dB
2390.00	H	0	1.0	24.4	29.5	53.9	495.5	5000.0	-20.1
2390.00	V	0	1.0	21.6	29.5	51.1	358.9	5000.0	-22.9
4252.00	H	0	1.0	38.9	7.5	46.4	208.9	5000.0	-27.6
4252.00	V	0	1.0	37.4	7.5	44.9	175.8	5000.0	-29.1
4639.00	H	0	1.0	38.7	8.0	46.7	216.3	5000.0	-27.3
4639.00	V	0	1.0	36.9	8.0	44.9	175.8	5000.0	-29.1
4954.60	H	0	1.0	39.2	8.0	47.2	229.1	5000.0	-26.8
4954.60	V	0	1.0	42.7	8.0	50.7	342.8	5000.0	-23.3
7431.90	H	0	1.0	40.1	12.0	52.1	402.7	5000.0	-21.9
7431.90	V	0	1.0	41.9	12.0	53.9	495.5	5000.0	-20.1
9909.20	H	0	1.0	38.6	15.1	53.7	484.2	5000.0	-20.3
9909.20	V	0	1.0	44.3	15.1	59.4	933.3	5000.0	-14.6
12386.00	H	0	1.0	38.2	16.5	54.7	543.3	5000.0	-19.3
12386.00	V	0	1.0	38.3	16.5	54.8	549.5	5000.0	-19.2

Table 4**Radiated Emissions Test Per 15.247(c)**

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Low Channel: 2401.3 MHz**
 ANTENNA: M/A-COM Model: 3380-8030-0127; 6 dBi Omni Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFC	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Avg. dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	14.9	29.5	44.4	166.0	500.0	-9.6
2390.00	V	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
4172.00	H	0	1.0	32.0	7.5	39.5	94.4	500.0	-14.5
4172.00	V	0	1.0	31.2	7.5	38.7	86.1	500.0	-15.3
4802.00	H	0	1.0	30.5	7.5	38.0	79.4	500.0	-16.0
4802.00	V	0	1.0	31.6	7.5	39.1	90.2	500.0	-14.9
7204.00	H	0	1.0	33.0	12.0	45.0	177.8	500.0	-9.0
7204.00	V	0	1.0	38.5	12.0	50.5	335.0	500.0	-3.5
9605.00	H	0	1.0	31.0	14.4	45.4	186.2	500.0	-8.6
9605.00	V	0	1.0	32.5	14.4	46.9	221.3	500.0	-7.1
12065.00	H	0	1.0	30.1	16.5	46.6	213.8	500.0	-7.4
12065.00	V	0	1.0	34.0	16.5	50.5	335.0	500.0	-3.5

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFC	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Peak dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
4802.00	H	0	1.0	38.5	7.5	46.0	198.4	5000.0	-28.0
4802.00	V	0	1.0	40.3	7.5	47.8	245.5	5000.0	-26.2
7204.00	H	0	1.0	42.2	12.0	54.2	512.9	5000.0	-19.8
7204.00	V	0	1.0	33.0	12.0	45.0	177.8	5000.0	-29.0
9605.00	H	0	1.0	37.9	14.4	52.3	412.1	5000.0	-21.7
9605.00	V	0	1.0	36.5	14.4	50.9	350.8	5000.0	-23.1
12065.00	H	0	1.0	37.8	16.5	54.3	518.8	5000.0	-19.7
12065.00	V	0	1.0	40.6	16.5	57.1	716.1	5000.0	-16.9

Table 4 Continued

Radiated Emissions Test Per 15.247(c)

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **Mid Channel: 2441.3 MHz**
 ANTENNA: M/A-COM Model: 3380-8030-0127; 6 dBi Omni Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Avg. dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	15.1	29.5	44.6	169.8	500.0	-9.4
2390.00	V	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
4252.00	H	0	1.0	31.6	4.0	35.6	60.3	500.0	-18.4
4252.00	V	0	1.0	31.0	4.0	35.0	56.2	500.0	-19.0
4882.60	H	0	1.0	31.1	7.5	38.6	85.1	500.0	-15.4
4882.60	V	0	1.0	36.0	7.5	43.5	149.6	500.0	-10.5
7324.00	H	0	1.0	31.0	12.0	43.0	141.3	500.0	-11.0
7324.00	V	0	1.0	35.5	12.0	47.5	237.1	500.0	-6.5
9765.00	H	0	1.0	31.0	15.1	46.1	201.8	500.0	-7.9
9765.00	V	0	1.0	32.4	15.1	47.5	237.1	500.0	-6.5
12206.00	H	0	1.0	31.2	16.5	47.7	242.7	500.0	-6.3
12206.00	V	0	1.0	30.7	16.5	47.2	229.1	500.0	-6.8

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Peak dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	24.4	29.5	53.9	495.5	5000.0	-20.1
2390.00	V	0	1.0	23.5	29.5	53.0	446.7	5000.0	-21.0
4252.00	H	0	1.0	38.7	7.5	46.2	204.2	5000.0	-27.8
4252.00	V	0	1.0	37.1	7.5	44.6	169.8	5000.0	-29.4
4882.60	H	0	1.0	36.5	7.5	44.0	158.5	5000.0	-30.0
4882.60	V	0	1.0	42.5	7.5	50.0	316.2	5000.0	-24.0
7324.00	H	0	1.0	38.2	12.0	50.2	323.6	5000.0	-23.8
7324.00	V	0	1.0	41.8	12.0	53.8	489.8	5000.0	-20.2
9765.00	H	0	1.0	39.0	15.1	54.1	507.0	5000.0	-19.9
9765.00	V	0	1.0	40.8	15.1	55.9	623.7	5000.0	-18.1
12206.00	H	0	1.0	36.9	16.5	53.4	467.7	5000.0	-20.6
12206.00	V	0	1.0	37.2	16.5	53.7	484.2	5000.0	-20.3

Table 4 Continued

Radiated Emissions Test Per 15.247(c)

CLIENT: ZEUS WIRELESS
 MODEL NO: Spread Spectrum Frequency Hopping Radio
 DATE: December 5, 1998
 BY: Mike Violette
 JOB #: 4779
 CONFIGURATION: **High Channel: 2477.3 MHz**
 ANTENNA: M/A-COM Model: 3380-8030-0127; 6 dBi Omni Antenna

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Avg. dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	15.0	29.5	44.5	167.9	500.0	-9.5
2390.00	V	0	1.0	15.1	29.5	44.6	169.8	500.0	-9.4
4639.00	H	0	1.0	30.5	8.0	38.5	84.1	500.0	-15.5
4639.00	V	0	1.0	30.4	8.0	38.4	83.2	500.0	-15.6
4954.60	H	0	1.0	34.4	8.0	42.4	131.8	500.0	-11.6
4954.60	V	0	1.0	42.4	8.0	50.4	331.1	500.0	-3.6
7431.90	H	0	1.0	35.2	12.0	47.2	229.1	500.0	-6.8
7431.90	V	0	1.0	39.0	12.0	51.0	354.8	500.0	-3.0
9909.20	H	0	1.0	34.0	15.1	49.1	285.1	500.0	-4.9
9909.20	V	0	1.0	31.1	15.1	46.2	204.2	500.0	-7.8
12386.00	H	0	1.0	31.4	16.5	47.9	248.3	500.0	-6.1
12386.00	V	0	1.0	30.4	16.5	46.9	221.3	500.0	-7.1

Radiated Emissions Test Per 15.247(c) Peak Emissions Above 1 GHz

Frequency	Polarity	Azimuth	Antenna	SA Level	AFc	E-Field	E-Field	Limit	Margin
MHz	H/V	Degree	Height m	Peak dBuV	dB/m	dBuV/m	uV/m	uV/m	dB
2390.00	H	0	1.0	23.3	29.5	52.8	436.5	5000.0	-21.2
2390.00	V	0	1.0	25.4	29.5	54.9	555.9	5000.0	-19.1
4954.60	H	0	1.0	43.8	8.0	51.8	389.0	5000.0	-22.2
4954.60	V	0	1.0	52.2	8.0	60.2	1023.3	5000.0	-13.8
7431.90	H	0	1.0	43.2	12.0	55.2	575.4	5000.0	-18.8
7431.90	V	0	1.0	43.5	12.0	55.5	595.7	5000.0	-18.5
7431.90	V	0	1.0	47.2	12.0	59.2	912.0	5000.0	-14.8
9909.20	H	0	1.0	42.8	15.1	57.9	785.2	5000.0	-16.1
9909.20	V	0	1.0	35.4	15.1	50.5	335.0	5000.0	-23.5
12386.00	H	0	1.0	39.3	16.5	55.8	616.6	5000.0	-18.2
12386.00	V	0	1.0	34.0	16.5	50.5	335.0	5000.0	-23.5

3.4 Spurious Emissions Testing At The Antenna Terminal

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 1 MHz. The amplitude of the EUT carrier frequency was measured to determine the emissions limit (20 dB below the carrier frequency amplitude). Then all of the emissions outside of the allocated frequency band were scanned up to the tenth harmonic of the carrier.

Spectrum analyzer plots of the spurious emissions for the low, middle and high channels are in Exhibit 1.

3.5 Carrier Bandwidth Testing

The EUT antenna was removed and connected directly into the spectrum analyzer input with a short length of coaxial cable. The analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 1 MHz. The highest peak of the carrier was centered on the analyzer display. An external attenuator or filter was used to confirm that the transmitter input was not overloading the spectrum analyzer input. The 20dB bandwidth of the modulated carrier was measured and compared to the FCC limit of 1MHz.

Spectrum analyzer plots of the bandwidths are located in Exhibit 2. The measured 20dB bandwidth was 975 kHz for the Low Channel, 550 kHz for the Mid Channel, and 875 kHz for the High Channel.

3.6 Power Output Testing

The EUT antenna was removed and connected directly into the spectrum analyzer input with a short length of coaxial cable. The analyzer resolution and video bandwidths were set to 2 MHz and 3 MHz respectively (greater than the 20dB bandwidth). The highest peak of the carrier was centered on the analyzer display. An external attenuator or filter was used to confirm that the transmitter input was not overloading the spectrum analyzer input. The peak power in dBm was measured and compared to the FCC limit.

The measured peak power was 22.2 dBm, or 166 mW, for the Low Channel, 21.7 dBm, or 148 mW, for the Mid Channel, and 21 dBm, or 126 mW, for the High Channel.

3.7 Radio Frequency Radiation Exposure

Based on the above data, the worst case RF output power of the unit occurs at the Low Channel, 2401.3 MHz. According to Section 1.1310 of the FCC rules, the uncontrolled RF exposure limit for this frequency range is $1\text{mW}/\text{cm}^2$. This unit will be used with several different antennas. The gain of the antennas will range from unity up to 17.5 dBi. To comply with the exposure limits for this section, humans must not be too close to the transmit antenna. The following formula was used to calculate the minimum distances:

$$S = (PG)/(4\pi R^2)$$

Where,

S = Power Density

P = Output Power at the Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

For this device, the calculation is as follows:

$$S = \text{FCC Limit} = 1\text{mW}/\text{cm}^2$$

$$P = \text{Output Power} = 166 \text{ mW}$$

$$G = \text{Worst Case Gain} = 17.5 \text{ dBi} = \text{INVLOG}(17.5/10) = 56.23$$

The following table is a list of the minimum distances to which humans can be to the radiating antenna for the antennas listed in Section 2.0 of this report.

Table 5
Radiation Exposure
Minimum Distance Requirements

Antenna Model	Antenna Gain (dBi)	Linear Gain	Max Power (mW)	Limit mW/cm ²	Minimum Distance cm
Yagi					
1221LY	17.5	56.23	166	1	27.26
1209LY	11.5	14.13	166	1	13.66
P-2406	6	3.98	166	1	7.25
P-2409	9	7.94	166	1	10.24
P-2412	12	15.85	166	1	14.47
P-2415	15	31.62	166	1	20.44
YB240015	15	31.62	166	1	20.44
PC2415N	16.1	40.74	166	1	23.20
MYP-24008	8.8	7.59	166	1	10.01
MYP-24013	13.5	22.39	166	1	17.20
2409AA	8.8	7.59	166	1	10.01
2415AB	15	31.62	166	1	20.44
2417AA	10.7	11.75	166	1	12.46
2418AA	5	3.16	166	1	6.46
HG2414Y	14	25.12	166	1	18.22
Patch					
S2406P12NF	6	3.98	166	1	7.25
S2307MP10SMF	7.5	5.62	166	1	8.62
S2401290P12NF	12	15.85	166	1	14.47
Omni					
2401	2	1.58	166	1	4.58
2501	2	1.58	166	1	4.58
3380-8030-0127	6	3.98	166	1	7.25
S2400BP12NF	0	1.00	166	1	3.63
S2400BH12NF	0	1.00	166	1	3.63
S2403BP12NF	5	3.16	166	1	6.46
S2403BH12NF	5	3.16	166	1	6.46
FMC24006	6	3.98	166	1	7.25
2426AA	5	3.16	166	1	6.46
2434AA	5	3.16	166	1	6.46
2427AA	5	3.16	166	1	6.46
MPA-2450	1	1.26	166	1	4.08
MQW-2400SM	1	1.26	166	1	4.08
MHW-2400C	2	1.58	166	1	4.58
2400SM	2	1.58	166	1	4.58
2400C	2	1.58	166	1	4.58
MHWS2400RPC	2	1.58	166	1	4.58
MHWS2400RPS	2	1.58	166	1	4.58

Table 6

System Under Test

FCC ID: N4JLRT006

EUT:	Zeus Wireless, Inc. 2.4 GHz Wireless FHSS Radio Module; M/N: ZLRT9600; S/N: N/A; FCC ID: N4JLRT006
Personal Computer:	Compaq Armada M/N: 1560DM; FCC DOC
Monitor:	NEC/Multisync 2A; M/N: JC-1403HMA; S/N: 35M62642C; FCC ID: A3D5YRJC-1403HMA
Printer:	Hewlett Packard; M/N: 2225C+; S/N: 2750S18711; FCC ID: DSI6XU2225
Keyboard:	Gateway 2000; M/N: 219600X-XX-XXX; S/N: 01330529; FCC ID: P7J2196001-XX
Power Supply:	CUI STACK; M/N: DV-1280; S/N: N/A; FCC ID: N/A

Table 7

Interface Cables Used

One meter bundled/shielded interface cables were used for connection of EUT digital board to the Host PC and for connection of the other peripherals to the Host PC.

All devices used during testing of the Zeus Wireless Frequency Hopping Spread Spectrum Transmitter Module were powered via non-shielded power cords.

Table 8

Measurement Equipment Used

The following equipment is used to perform measurements:

Hewlett-Packard Spectrum Analyzer: HP 8568B

Hewlett-Packard Quasi-Peak Adapter: HP 85650A

Hewlett-Packard Preselector: HP 85685A

Hewlett-Packard Spectrum Analyzer: HP 8564E

Hewlett-Packard Pre-Amplifier: HP 8449A

Antenna Research Associates, Inc. Biconical Log Periodic Antenna: LPB-2520A (Site 2)

Antenna Research Associates, Inc. Horn Antenna: DRG-118/A

Solar 50 Ω /50 μ H Line Impedance Stabilization Network: 8012-50-R-24-BNC

Solar 50 Ω /50 μ H Line Impedance Stabilization Network: 8028-50-TS-24-BNC

AH Systems, Inc. Portable Antenna Mast: AMS-4 (Site 2)

AH Systems, Inc. Motorized Turntable (Site 2)

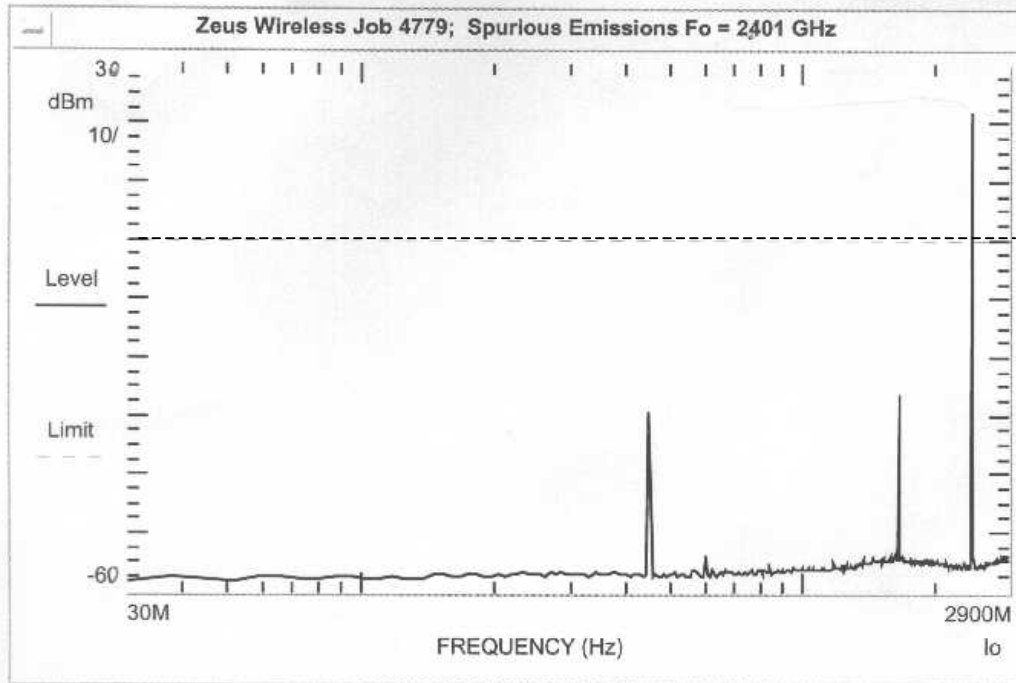
RG-214 semi-rigid coaxial cable

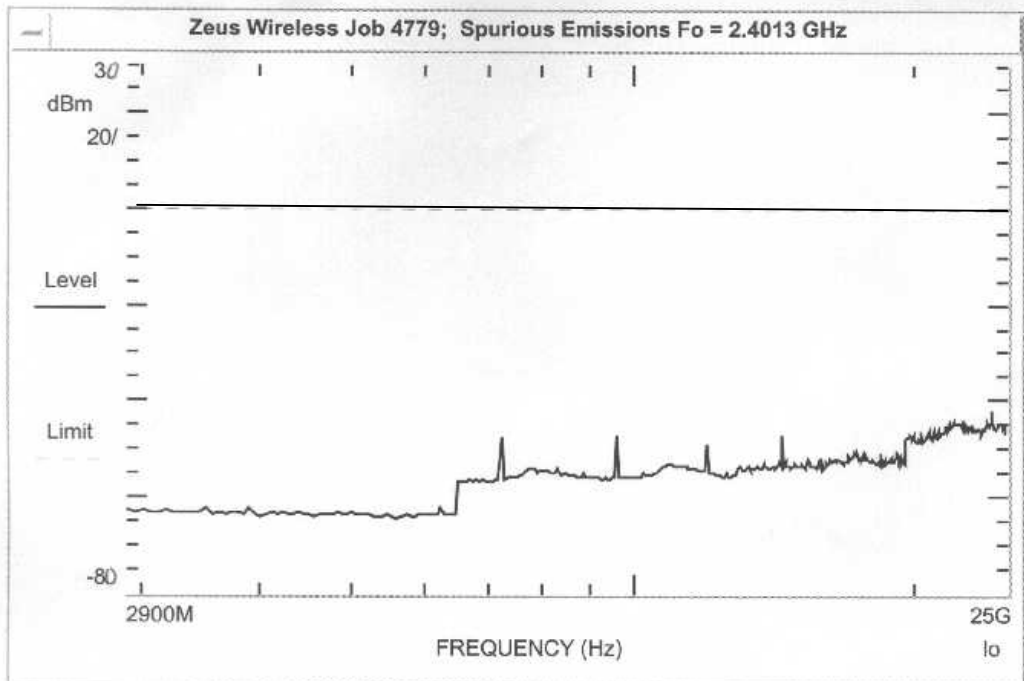
RG-223 double-shielded coaxial cable

EXHIBIT 1

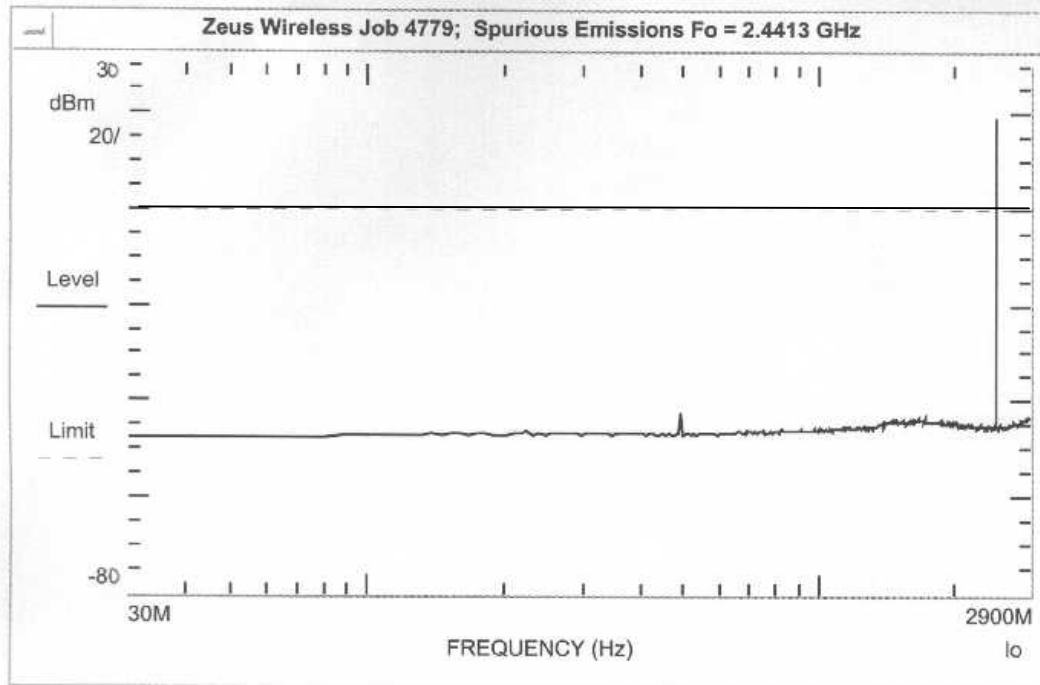
SPURIOUS EMISSIONS AT THE ANTENNA TERMINAL PLOTS

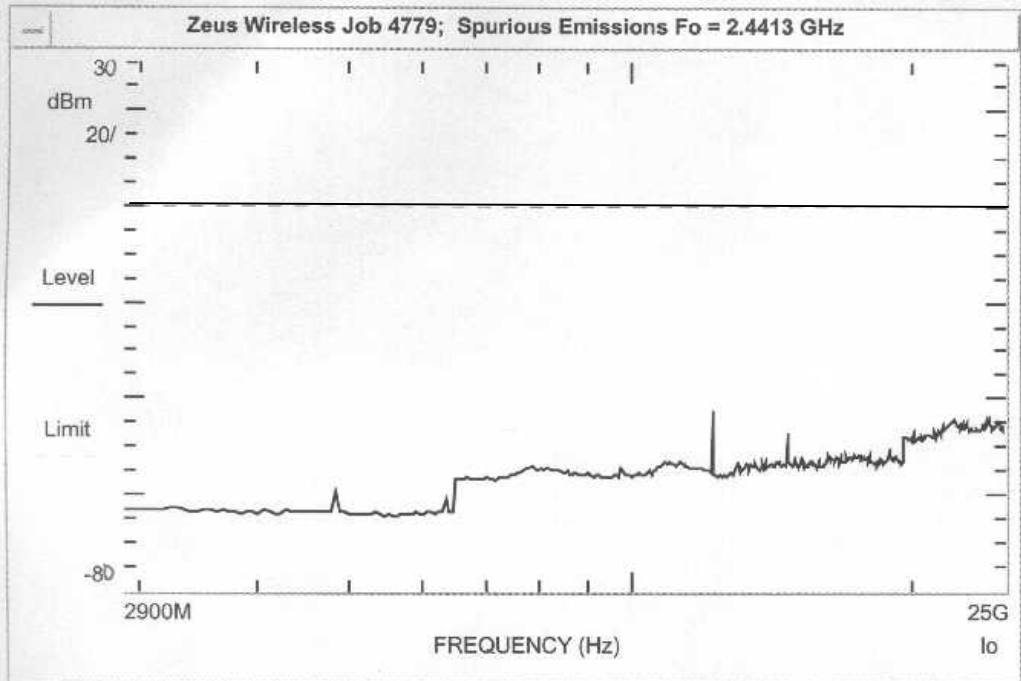
Low Channel: 2.4013 GHz



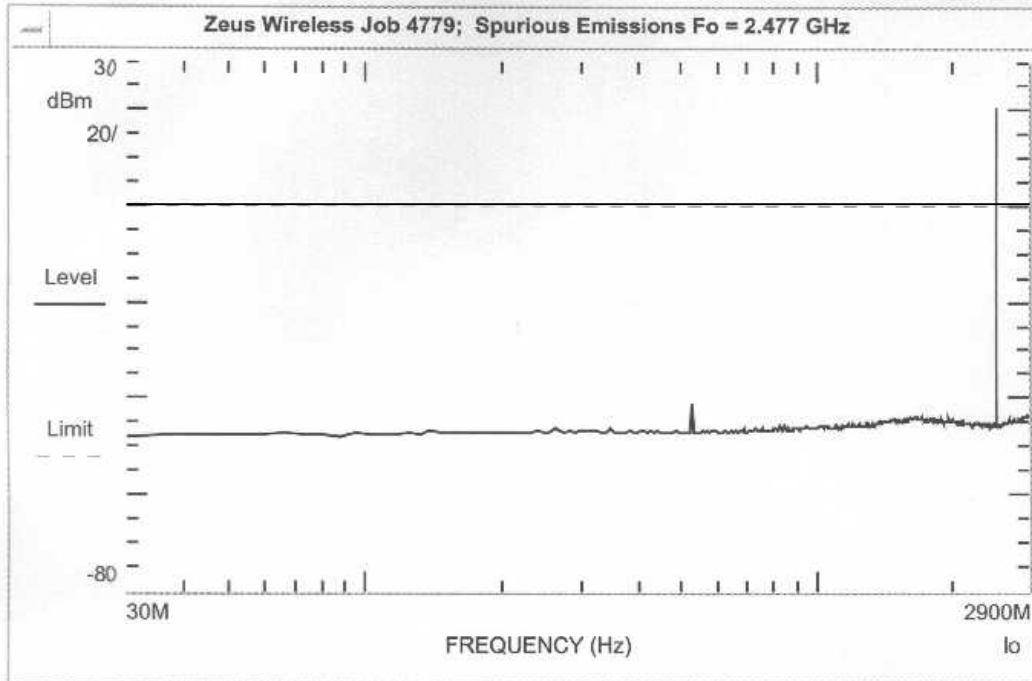


Mid Channel: 2.4413 GHz





High Channel: 2.4773 GHz



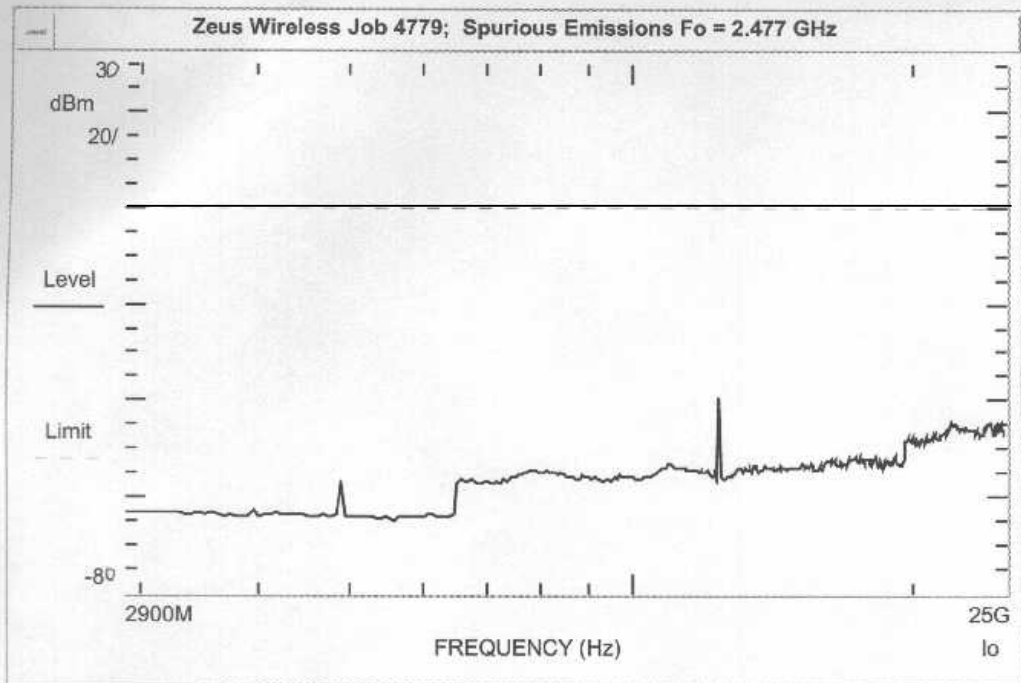
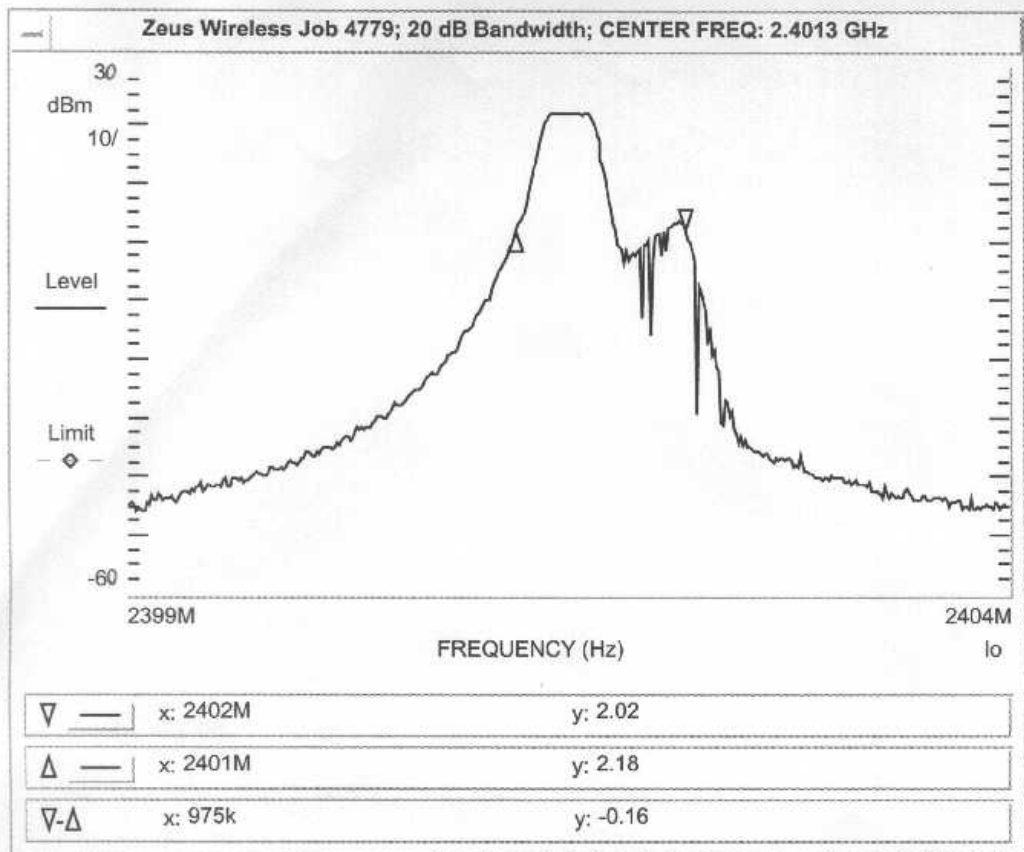


EXHIBIT 2

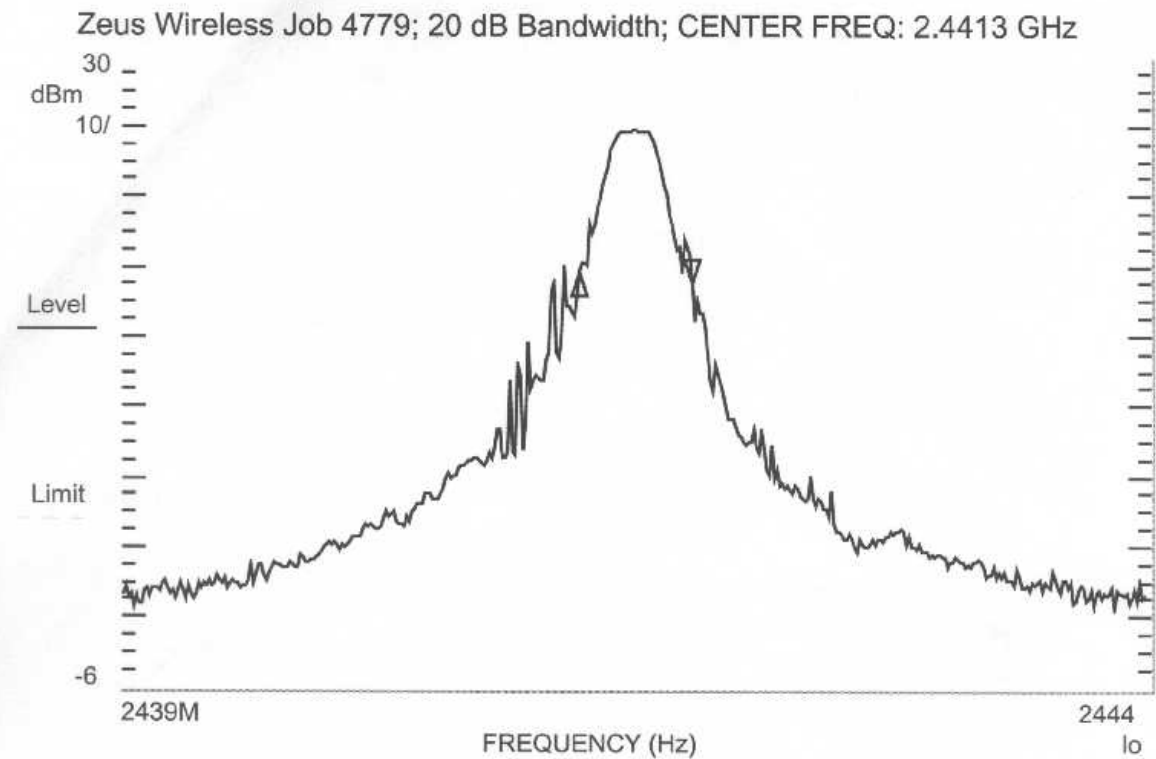
20dB BANDWIDTH PLOTS

Low Channel

001 00/00/00 1000 00:00:00

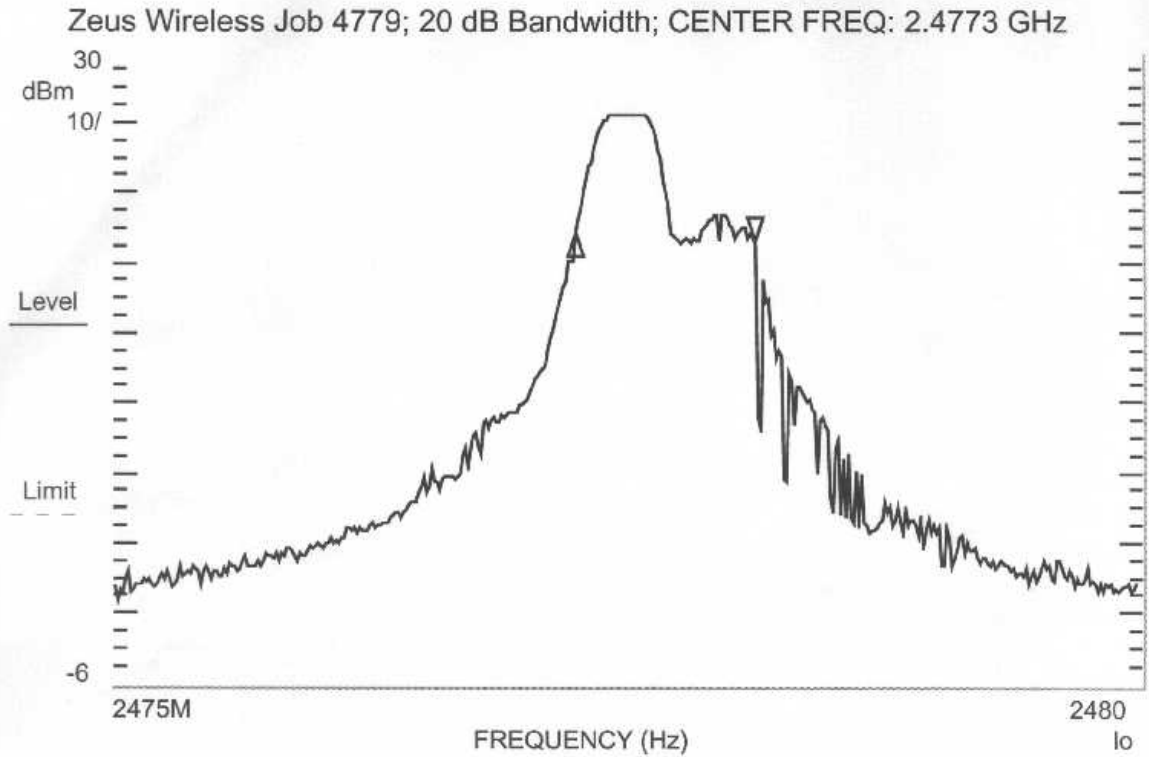


Mid Channel



▽ —	x: 2442M	y: -2.52
Δ —	x: 2441M	y: -0.32
▽-Δ	x: 550k	y: -2.2

High Channel



▽ —	x: 2478M	y: 3.1
Δ —	x: 2477M	y: 4.76
▽-Δ	x: 875k	y: -1.66

