

## **RADIATED AND LINE CONDUCTED EMISSIONS REPORT**

### **I. GENERAL INFORMATION**

Requirement:      Federal Communications Commission  
                            DTS Certification Application

Test Requirements:      15.205, 15.207, 15.209, 15.247

Applicant:      eXS Inc.  
                            1900 Alameda de las Pulgas  
                            Suite 110  
                            San Mateo, CA 94403-1222

Product ID:      FCC ID: **TTFN01A1206**  
Model No.              5001A

### **II. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)**

eXS model 5001A is a dual-band dual radio 802.11 AP.

#### **RF Specifications**

RF Frequency Band      2412-2462 MHz (DTS)  
                            5745-5805 MHz (DTS)  
                            5180-5320 MHz (U-NII)

Modulation Type      802.11 b: DQPSK, CCK (DTS)  
                            802.11 g: OFDM (DTS)  
                            802.11 a OFDM (U-NII, 5.8 GHz DTS)

Transmitter Output Power      2412-2462 MHz:      0.538 watts (27.3dBm)  
                            5745-5805 MHz:      0.086 watts (19.3dBm)

TX Antenna:      2.4/5 GHz Wenizen model W4E-WO-32

### **III. TEST LOCATION**

All emissions tests were performed at:

Compliance Certification Services  
571F Monterey Road  
Morgan Hill, CA 95037

FCC ID: **TTFN01A1206**

Testing performed 3-4 November 2005.

*T.N. Cokenias*

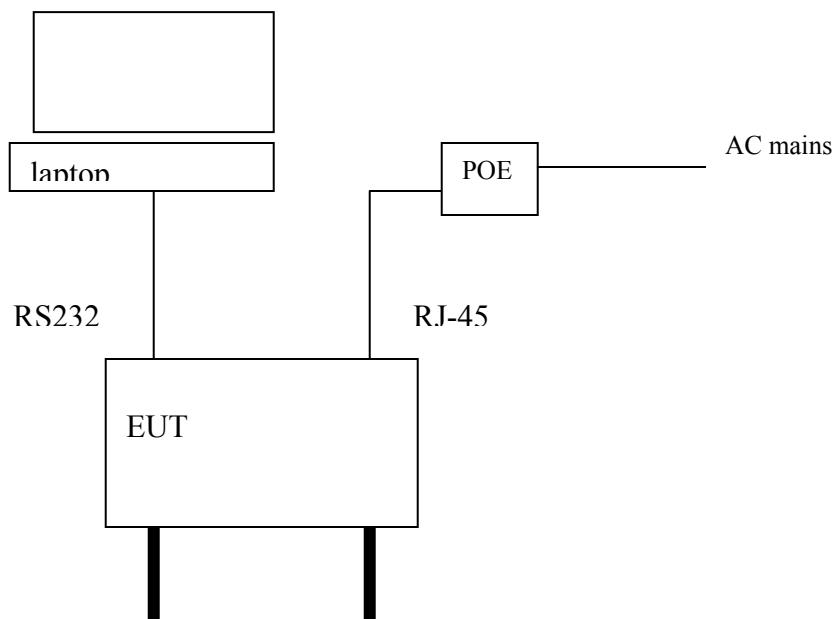
T.N. Cokenias  
Agent for eXS Inc.

12 December 2005

## Test Equipment List

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/06
RF Filter Section	HP	85420E	3705A00256	3/29/06
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	3/3/06
Antenna, Horn, 18-26 GHz	ARA	MWH-1826/B	1049	9/12/06
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	4/22/06
Pre-amplifier	MITEQ	NSP2600-SP	92342	8/15/06
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/06
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/06
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42070220	1/1/06
High Pass Filter 4 GHz	IFI	n/a	2682	3/15/06
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/06
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/06

## Test Configuration



## TEST PROCEDURES

Radiated emissions testing per the methods of ANSI C63.4.

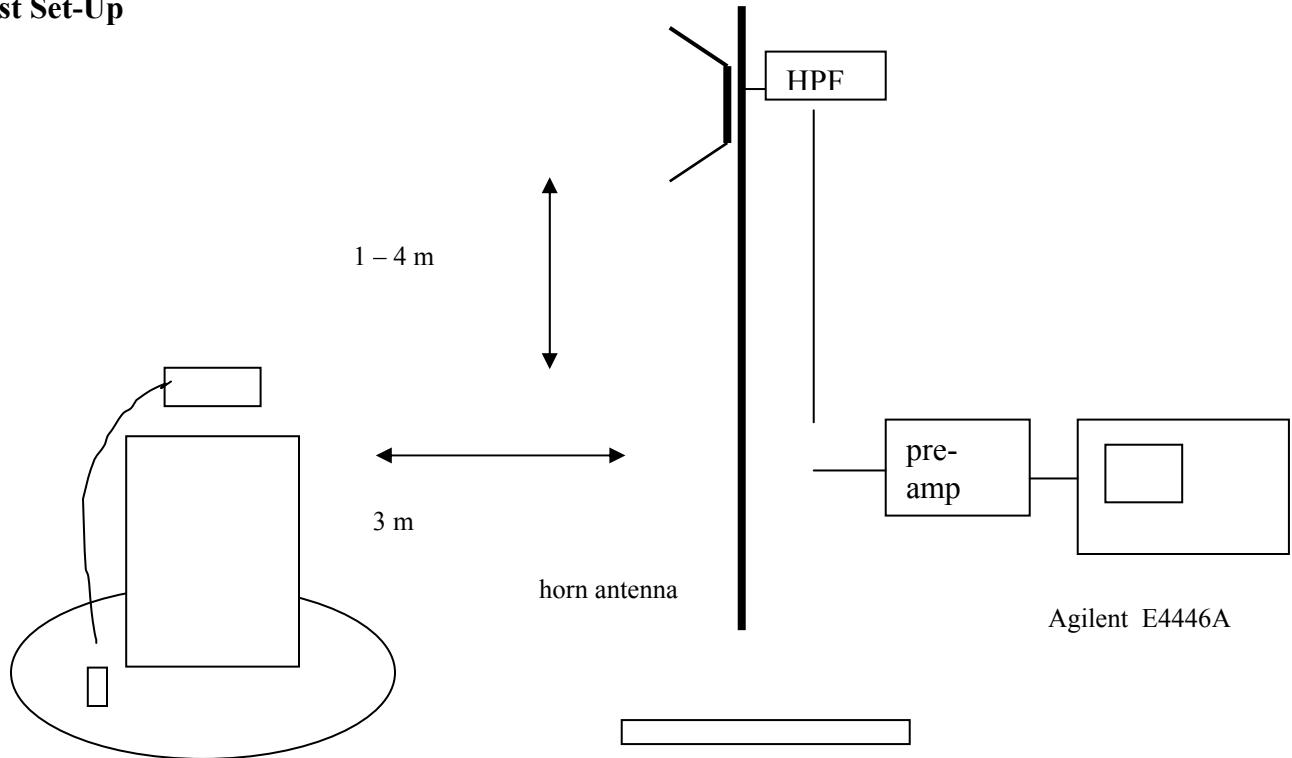
### Measurement Equipment Used:

Spectrum analyzer  
Hi pass filter, 7.6 GHz  
Pre-amplifier, 1 – 26.5 GHz  
Horn antenna, 1-18 GHz  
Horn 18-26 GHz

### Radiated Emissions Above 1 GHz

**Test Requirement: 15.205, 15.209, 15.247**

### Test Set-Up



### Test Procedures, 1- 26 GHz:

1. The EUT was placed on a wooden table resting on a turntable on the Site A 10m open area test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. Radiated emissions were investigated for a LOW channel, MID channel, and HIGH channel in the 5180-5320 MHz band.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

Radiated emissions were performed at each frequency for the following antenna:

<b>Antenna Type</b>	<b>Frequency range</b>	<b>Gain</b>	<b>Antenna Mfr.</b>	<b>Model</b>
Omni monopole	5.1-5.8 GHz 2.4 GHz	6dBi 3.5 dBi	Wenizen.	W4E-WO-32

**Test Results:** PASS. Worst case results are presented. Refer to data below.

## Radiated Harmonics, 802.11b /g, LOW and HIGH Channels

12/17/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																														
Test Engr: Ninous Davoudi		Project #:05U3800		Company:Tom		EUT Descrip.: wi fi access point		EUT M/N:		Test Target:		Mode Oper:																		
f	Measurement Frequency	Dist	Distance to Antenna	Read	Analyzer Reading	AF	Antenna Factor	CL	Cable Loss	Amp	Preamp Gain	D Corr	Distance Correct to 3 meters	Avg	Average Field Strength @ 3 m	Peak	Calculated Peak Field Strength	HPF	High Pass Filter	Avg Lim	Average Field Strength Limit	Pk Lim	Peak Field Strength Limit	Avg Mar	Margin vs. Average Limit	Pk Mar	Margin vs. Peak Limit			
4.824	3.0	46.0	32.9	33.7	3.1	-33.6	0.0	0.6	49.9	36.7	74.0	54.0	-24.1	-17.3																
4.824	3.0	43.1	32.9	33.7	3.1	-33.6	0.0	0.6	46.9	36.8	74.0	54.0	-27.1	-17.2																
7.236	3.0	41.3	29.4	35.4	3.5	-33.3	0.0	0.6	47.6	35.7	74.0	54.0	-26.4	-18.3																
7.236	3.0	41.8	29.4	35.4	3.5	-33.3	0.0	0.6	48.1	35.7	74.0	54.0	-25.9	-18.3																
9.648	3.0	46.2	40.9	37.5	3.9	-33.9	0.0	0.8	54.4	49.1	74.0	54.0	-19.6	-4.9																
9.648	3.0	42.2	33.2	37.5	3.9	-33.9	0.0	0.8	50.4	41.4	74.0	54.0	-23.6	-12.6																
12.060	3.0	42.2	29.7	38.5	4.3	-33.5	0.0	0.9	52.4	40.0	74.0	54.0	-21.6	-14.0																
12.060	3.0	42.4	29.7	38.5	4.3	-33.5	0.0	0.9	52.7	39.9	74.0	54.0	-21.3	-14.1																
14.472	3.0	41.4	29.0	40.1	5.0	-32.8	0.0	0.9	54.6	42.2	74.0	54.0	-19.4	-11.8																
14.472	3.0	40.4	29.0	40.1	5.0	-32.8	0.0	0.9	53.6	42.2	74.0	54.0	-20.4	-11.8																
16.884	3.0	42.1	29.8	40.7	5.6	-32.7	0.0	1.4	57.1	44.8	74.0	54.0	-16.9	-9.2																
16.884	3.0	41.4	29.8	40.7	5.6	-32.7	0.0	1.4	56.4	44.8	74.0	54.0	-17.6	-9.2																
19.296	3.0	41.4	30.0	44.0	6.1	-32.0	0.0	0.9	60.5	49.0	74.0	54.0	-13.5	-5.0																
19.296	3.0	41.6	30.4	44.0	6.1	-32.0	0.0	0.9	60.7	49.4	74.0	54.0	-13.3	-4.6																
<b>b mode L ch</b>																														
4.824	3.0	41.4	29.4	33.7	3.1	-33.6	0.0	0.6	45.3	33.2	74.0	54.0	-28.7	-20.8																
4.824	3.0	42.1	29.5	33.7	3.1	-33.6	0.0	0.6	45.9	33.4	74.0	54.0	-28.1	-20.6																
7.236	3.0	41.5	29.3	35.4	3.5	-33.3	0.0	0.6	47.8	35.5	74.0	54.0	-26.2	-18.5																
7.236	3.0	40.6	29.2	35.4	3.5	-33.3	0.0	0.6	46.9	35.5	74.0	54.0	-27.1	-18.5																
9.648	3.0	41.5	31.0	37.5	3.9	-33.9	0.0	0.8	49.7	39.2	74.0	54.0	-24.4	-14.8																
9.648	3.0	42.9	35.9	37.5	3.9	-33.9	0.0	0.8	51.1	44.1	74.0	54.0	-22.9	-9.9																
12.060	3.0	41.6	29.6	38.5	4.3	-33.5	0.0	0.9	51.9	39.9	74.0	54.0	-22.1	-14.1																
12.060	3.0	42.5	29.6	38.5	4.3	-33.5	0.0	0.9	52.8	39.9	74.0	54.0	-21.2	-14.1																
14.472	3.0	42.6	29.0	40.1	5.0	-32.8	0.0	0.9	55.8	42.2	74.0	54.0	-18.2	-11.8																
14.472	3.0	40.2	29.0	40.1	5.0	-32.8	0.0	0.9	53.4	42.2	74.0	54.0	-20.6	-11.8																
16.884	3.0	41.6	29.8	40.7	5.6	-32.7	0.0	1.4	56.6	44.8	74.0	54.0	-17.4	-9.2																
16.884	3.0	41.9	29.7	40.7	5.6	-32.7	0.0	1.4	56.9	44.7	74.0	54.0	-17.1	-9.3																
<b>b mode h ch</b>																														
4.924	3.0	43.5	37.3	33.8	3.1	-33.5	0.0	0.6	47.6	41.3	74.0	54.0	-26.4	-12.7																
4.924	3.0	41.5	30.3	33.8	3.1	-33.5	0.0	0.6	45.5	34.3	74.0	54.0	-28.5	-19.7																
7.386	3.0	41.6	29.1	35.6	3.5	-33.3	0.0	0.6	48.2	35.6	74.0	54.0	-25.8	-18.4																
7.386	3.0	41.2	29.1	35.6	3.5	-33.3	0.0	0.6	47.7	35.6	74.0	54.0	-26.3	-18.4																
9.848	3.0	46.0	40.9	37.6	3.9	-34.0	0.0	0.8	54.3	49.3	74.0	54.0	-19.7	-4.7																
9.848	3.0	42.3	33.3	37.6	3.9	-34.0	0.0	0.8	50.6	41.7	74.0	54.0	-23.4	-12.3																
12.310	3.0	42.4	29.4	38.5	4.4	-33.4	0.0	0.9	52.8	39.8	74.0	54.0	-21.2	-14.2																
12.310	3.0	40.6	29.4	38.5	4.4	-33.4	0.0	0.9	51.0	39.8	74.0	54.0	-23.0	-14.2																
14.772	3.0	41.2	29.2	40.3	5.1	-32.7	0.0	0.9	54.8	42.8	74.0	54.0	-19.2	-11.2																
14.772	3.0	41.0	29.2	40.3	5.1	-32.7	0.0	0.9	54.6	42.7	74.0	54.0	-19.4	-11.3																
17.234	3.0	41.3	29.5	42.3	5.6	-32.6	0.0	1.5	58.2	46.4	74.0	54.0	-15.8	-7.6																
17.234	3.0	41.5	29.5	42.3	5.6	-32.6	0.0	1.5	58.4	46.4	74.0	54.0	-15.6	-7.6																
<b>g mode h ch</b>																														
4.924	3.0	41.3	29.5	33.8	3.1	-33.5	0.0	0.6	45.4	33.5	74.0	54.0	-28.6	-20.5																
4.924	3.0	41.3	29.5	33.8	3.1	-33.5	0.0	0.6	45.4	33.5	74.0	54.0	-28.6	-20.5																
7.386	3.0	40.7	29.1	35.6	3.5	-33.3	0.0	0.6	47.2	35.6	74.0	54.0	-26.8	-18.4																
7.386	3.0	42.8	29.1	35.6	3.5	-33.3	0.0	0.6	49.3	35.6	74.0	54.0	-24.7	-18.4																
9.848	3.0	42.5	32.4	37.6	3.9	-34.0	0.0	0.8	50.9	40.8	74.0	54.0	-23.1	-13.2																
9.848	3.0	42.8	30.5	37.6	3.9	-34.0	0.0	0.8	51.2	38.8	74.0	54.0	-22.8	-15.2																
12.310	3.0	41.0	29.4	38.5	4.4	-33.4	0.0	0.9	51.4	39.8	74.0	54.0	-22.6	-14.2																
12.310	3.0	41.4	29.4	38.5	4.4	-33.4	0.0	0.9	51.9	39.8	74.0	54.0	-22.1	-14.2																
14.772	3.0	40.5	29.2	40.3	5.1	-32.7	0.0	0.9	54.0	42.7	74.0	54.0	-20.0	-11.3																
14.772	3.0	40.8	29.1	40.3	5.1	-32.7	0.0	0.9	54.4	42.7	74.0	54.0	-19.6	-11.3																
17.234	3.0	41.1	29.5	42.3	5.6	-32.6	0																							

## Radiated Harmonics, 802.11b /g, MID Channels

## Radiated Harmonics, 802.11a, LOW , MID and HIGH Channels

11/03/05 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr: Ninous Davoudi		Project #: 05U3800		Company: EXS		EUT Descrip.: AP dual band 2.4 & 5 GHz		EUT M/N:5001A		Test Target:FCC15.209		Mode Oper: Testing mode			
f	Measurement Frequency	Dist	Distance to Antenna	Amp	Preamp Gain	D Corr	Distance Correct to 3 meters	Avg	Average Field Strength @ 3 m	Peak	Calculated Peak Field Strength	HPF	High Pass Filter	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	Read	Analyzer Reading	Avg	Avg	Peak	Calculated Peak Field Strength	Pk Lim	Peak Field Strength Limit	Pk Mar	Margin vs. Average Limit	Pk Mar	Margin vs. Peak Limit	Avg Mar	Avg Mar
Read Pk	dBuV	Read Avg.	dBuV	AF	dB/m	CL	Peak	dBuV/m	dBuV/m	dBuV/m	Margin vs. Average Limit	dBuV/m	Margin vs. Peak Limit	dB	dB
<b>a mode low ch</b>															
11.490	3.0	49.7	37.2	38.3	4.2	-33.6	0.0	0.7	59.3	46.8	74.0	54.0	-14.7	-7.2	V
11.490	3.0	44.5	33.8	38.3	4.2	-33.6	0.0	0.7	54.1	43.4	74.0	54.0	-19.9	-10.6	H
17.235	3.0	41.4	29.6	42.4	5.6	-32.6	0.0	0.6	57.5	45.6	74.0	54.0	-16.5	-8.4	H
17.235	3.0	41.1	29.6	42.4	5.6	-32.6	0.0	0.6	57.1	45.6	74.0	54.0	-16.9	-8.4	V
<b>a mode m ch</b>															
11.530	3.0	44.2	32.9	38.3	4.2	-33.6	0.0	0.7	53.8	42.5	74.0	54.0	-20.2	-11.5	H
11.530	3.0	47.5	36.0	38.3	4.2	-33.6	0.0	0.7	57.1	45.6	74.0	54.0	-16.9	-8.4	V
17.295	3.0	41.8	29.7	42.7	5.6	-32.6	0.0	0.6	58.2	46.1	74.0	54.0	-15.8	-7.9	V
17.295	3.0	41.8	30.0	42.7	5.6	-32.6	0.0	0.6	58.2	46.4	74.0	54.0	-15.8	-7.6	H
<b>a mode h ch</b>															
11.610	3.0	48.1	36.7	38.3	4.2	-33.6	0.0	0.7	57.7	46.4	74.0	54.0	-16.3	-7.6	V
11.610	3.0	43.5	32.2	38.3	4.2	-33.6	0.0	0.7	53.2	41.9	74.0	54.0	-20.8	-12.1	H
17.415	3.0	41.6	29.7	43.4	5.7	-32.5	0.0	0.6	58.7	46.8	74.0	54.0	-15.3	-7.2	H
17.415	3.0	41.8	29.6	43.4	5.7	-32.5	0.0	0.6	59.0	46.8	74.0	54.0	-15.0	-7.2	V

## TEST PROCEDURES

Radiated emissions testing per the methods of ANSI C63.4.  
Band-edge Restricted Band Emissions

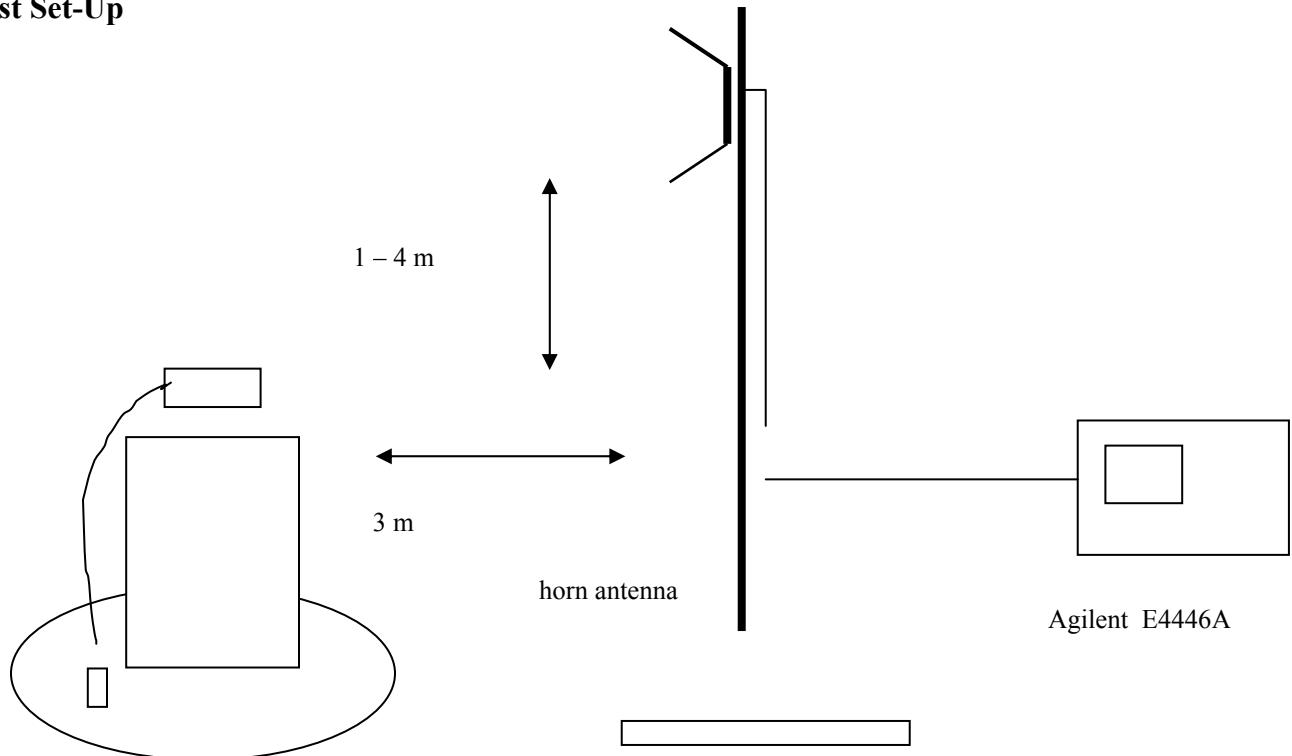
### Measurement Equipment Used:

Spectrum analyzer  
Horn antenna, 1-18 GHz

### Radiated Emissions Above 1 GHz

Test Requirement: 15.205, 15.209, 15.247

### Test Set-Up



### Test Procedures, 1- 26 GHz:

1. The EUT was placed on a wooden table resting on a turntable on the Site A 10m open area test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. Radiated emissions were investigated for a LOW channel, in the 2310-2390 MHz restricted band, and for the HIGH channel in the 2483.5 – 2500 MHz restricted band.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

**Channel      Frequency, MHz**

1 (Low)	2412
11 (High)	2462

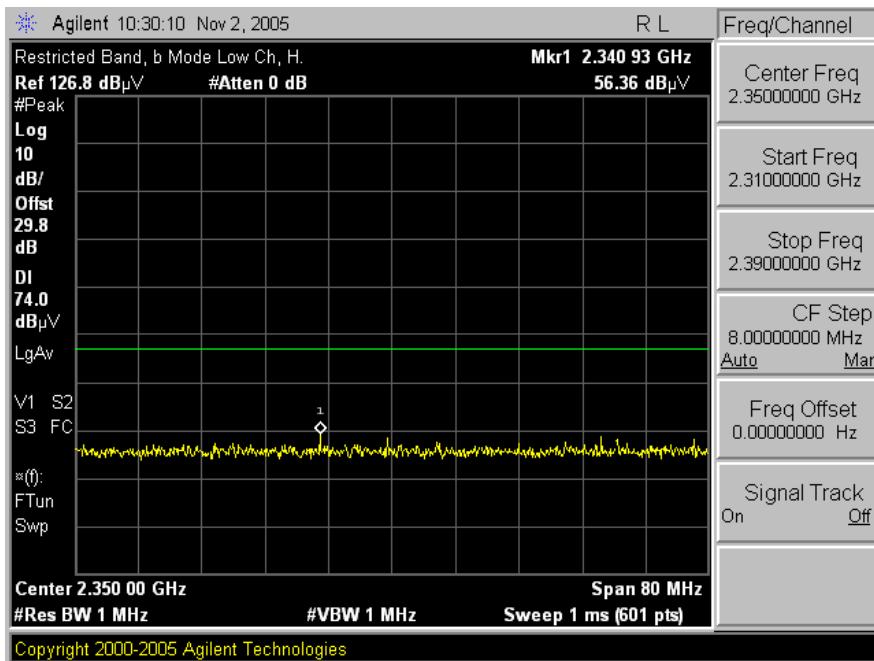
**Test Results:** PASS. Worst case results are presented. Maximum output power was reduced at lowest and highest channels to meet restricted band limits:

<b>Frequency</b>	<b>Mode</b>	<b>Maximum output power</b>
2412	b	21 dBm
2462	b	21 dBm
2412	g	18 dBm
2462	g	18 dBm

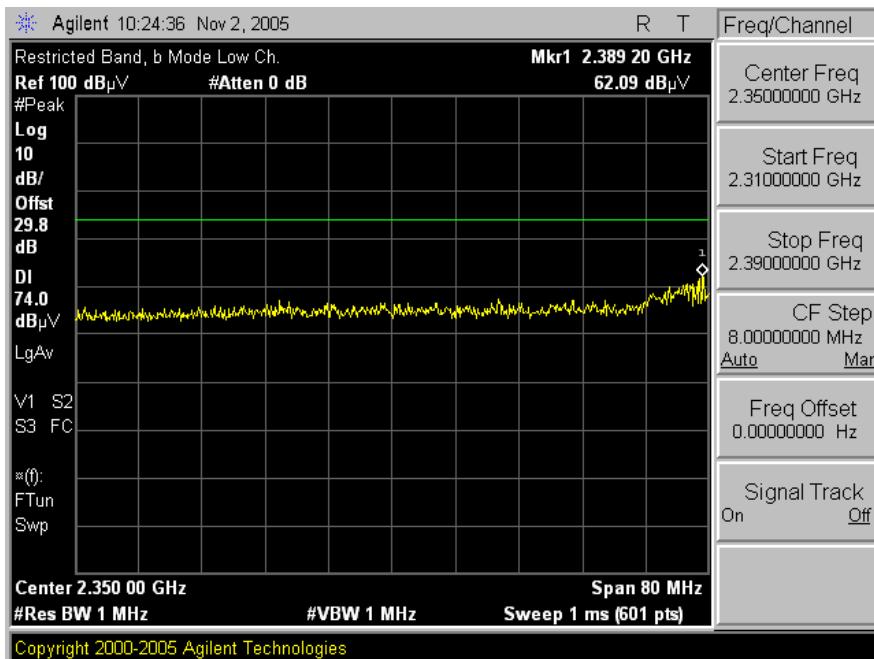
Refer to spectrum analyzer plots below.

FCC ID: TTFN01A1206

802.11b LOW channel, PEAK readings, Horizontal

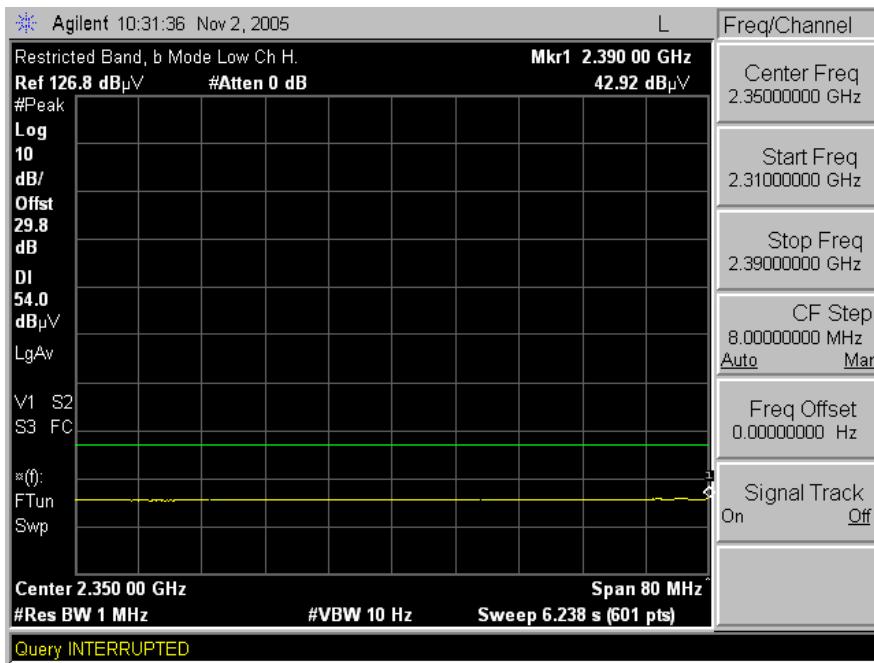


802.11b LOW channel, PEAK readings, Vertical

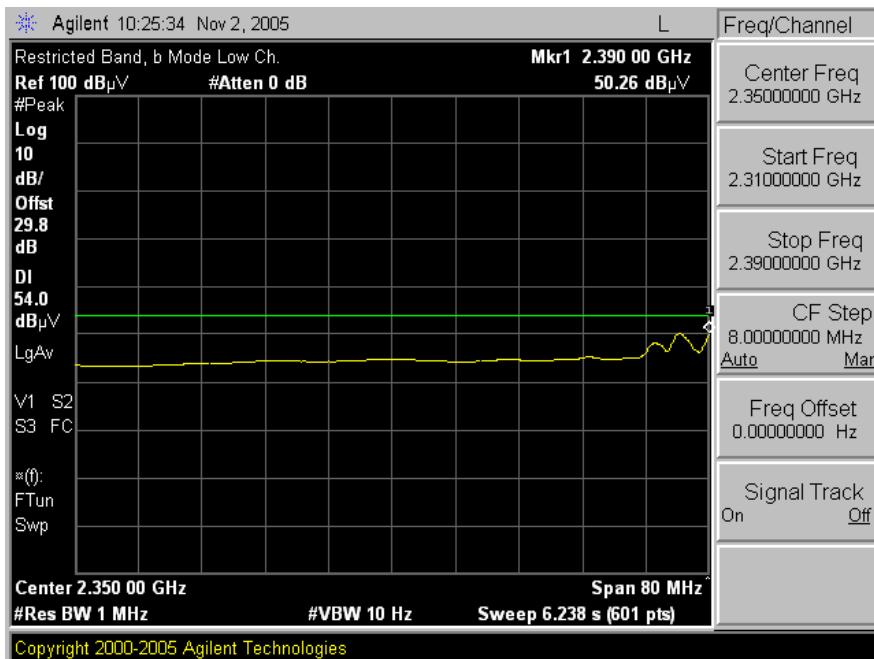


FCC ID: TTFN01A1206

802.11b LOW channel, AVERAGE readings, Horizontal

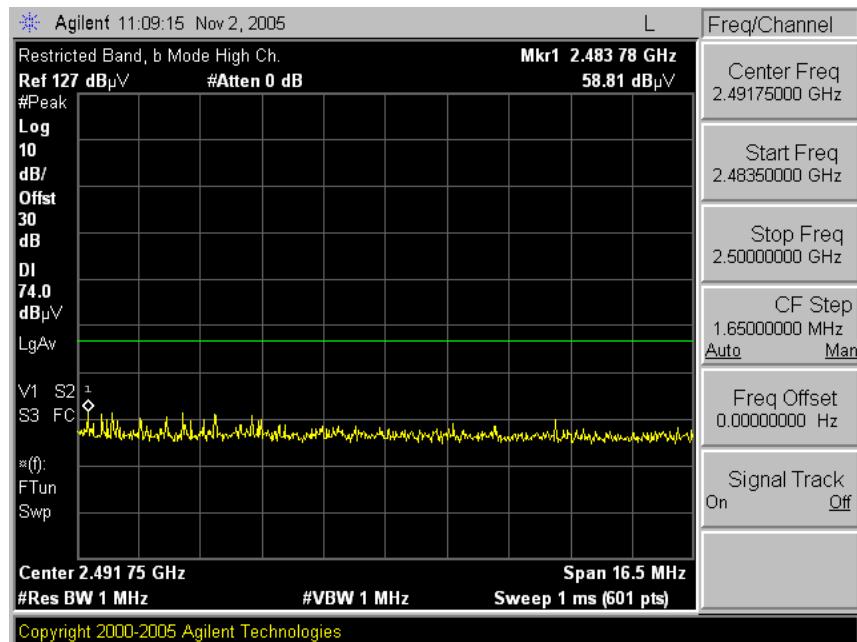


802.11b LOW channel, AVERAGE readings, Vertical

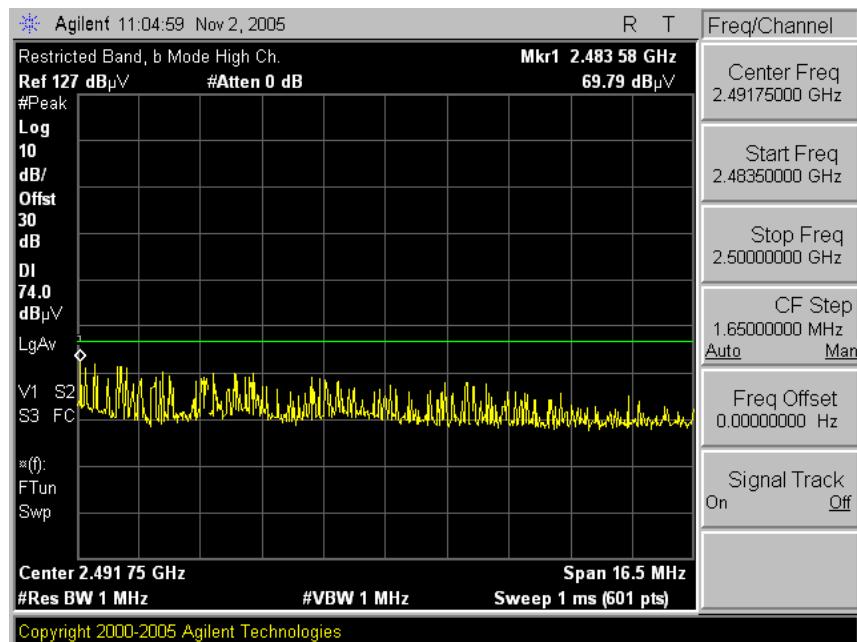


FCC ID: TTFN01A1206

802.11g LOW channel, PEAK readings, Horizontal

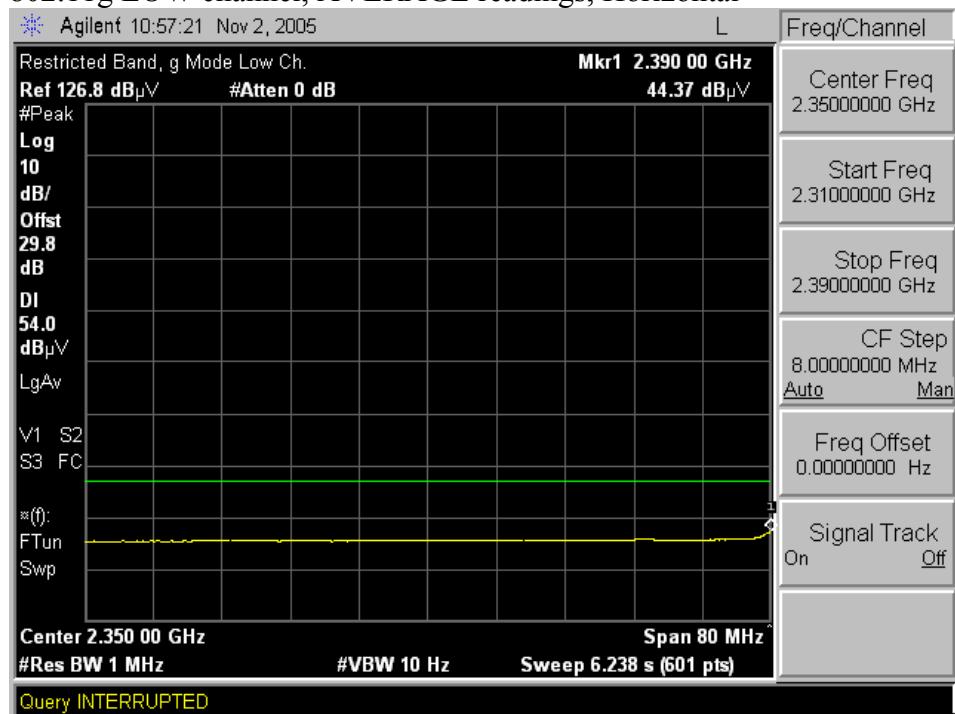


802.11g LOW channel, PEAK readings, Vertical

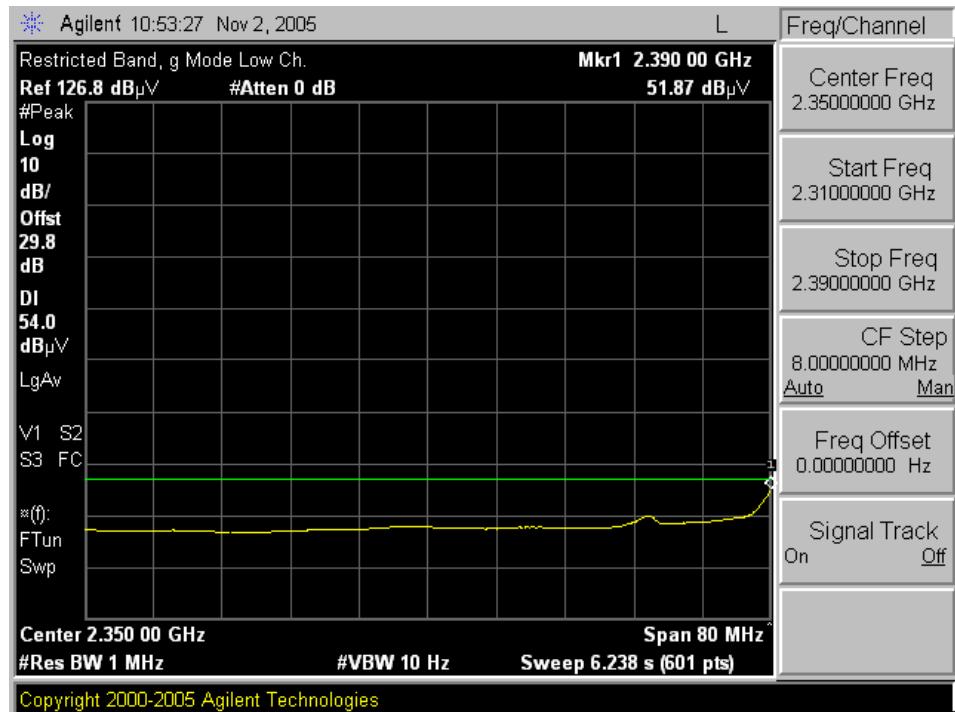


FCC ID: TTFN01A1206

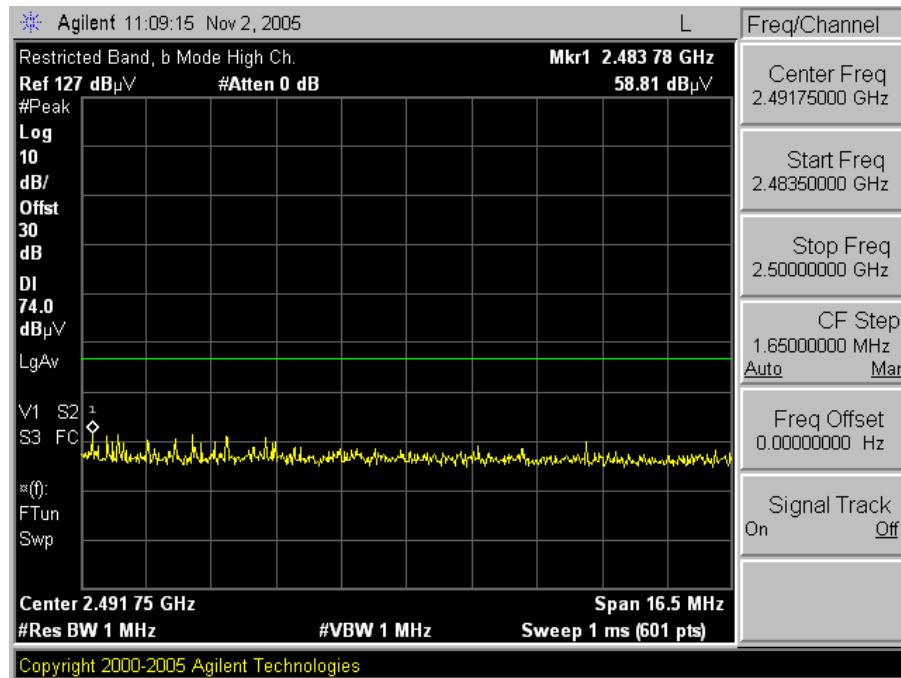
802.11g LOW channel, AVERAGE readings, Horizontal



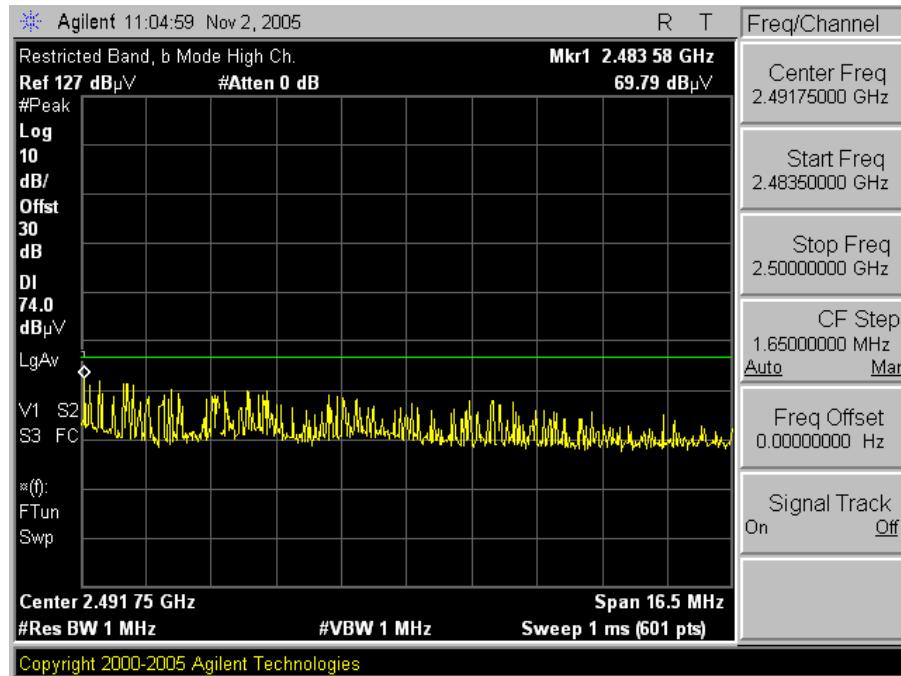
802.11g LOW channel, AVERAGE readings, Vertical



## 802.11b HIGH channel, PEAK readings, Horizontal

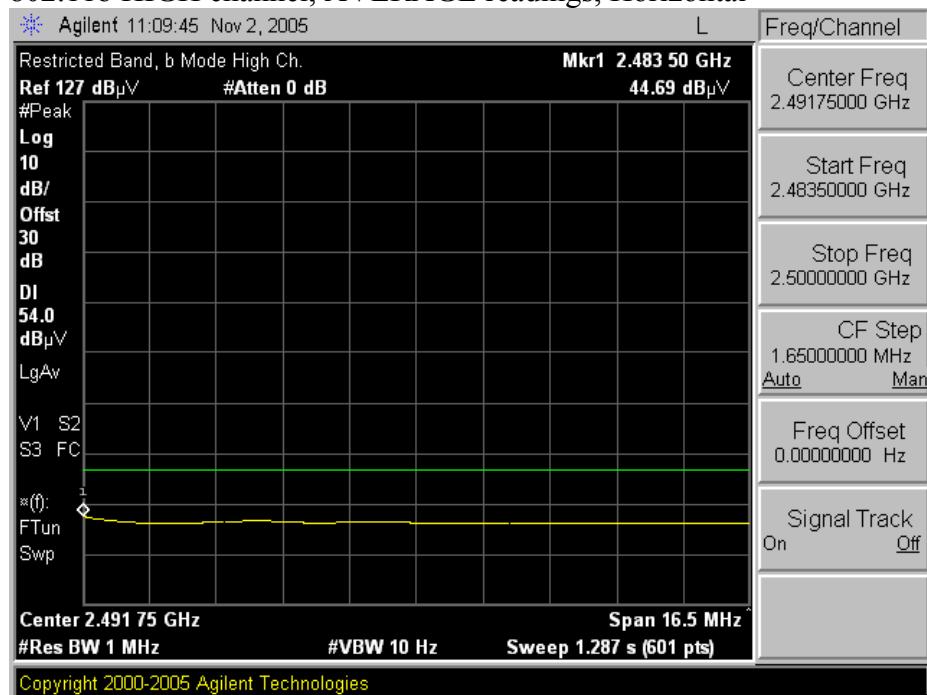


## 802.11b HIGH channel, PEAK readings, Vertical

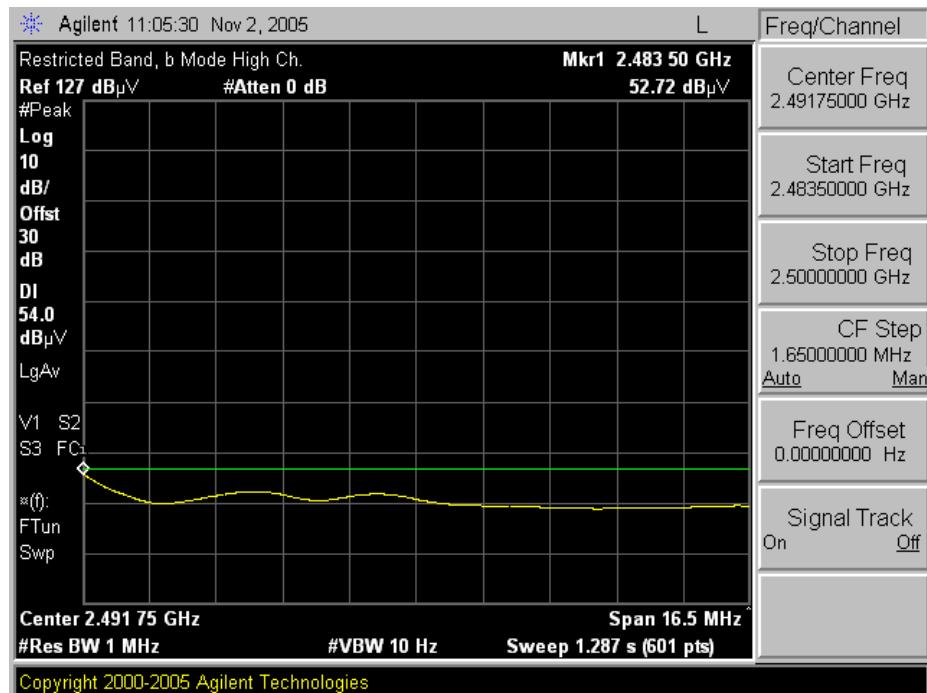


FCC ID: TTFN01A1206

802.11b HIGH channel, AVERAGE readings, Horizontal

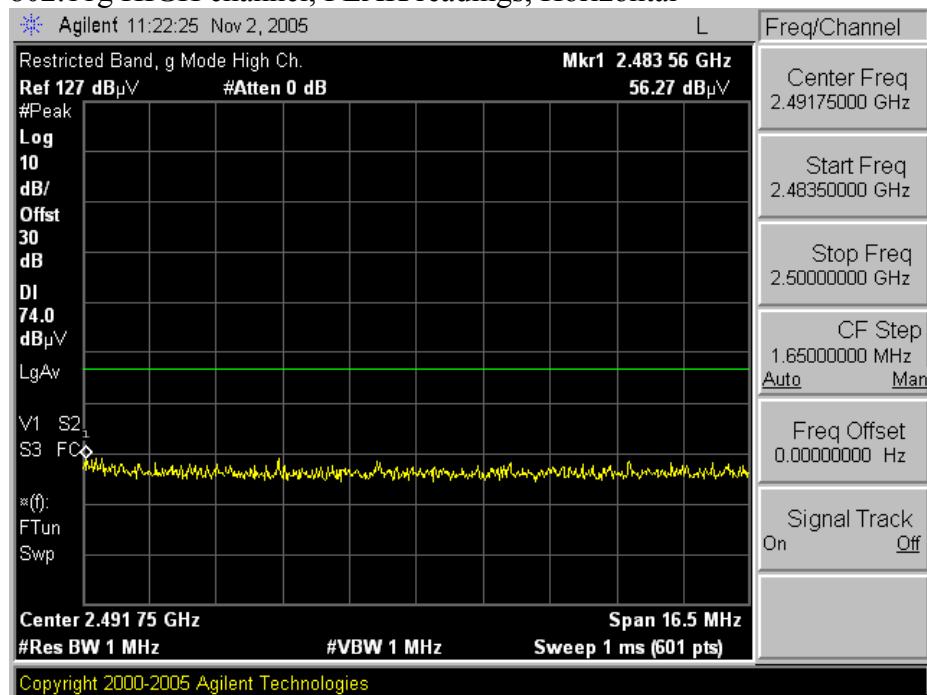


802.11b HIGH channel, AVERAGE readings, Vertical

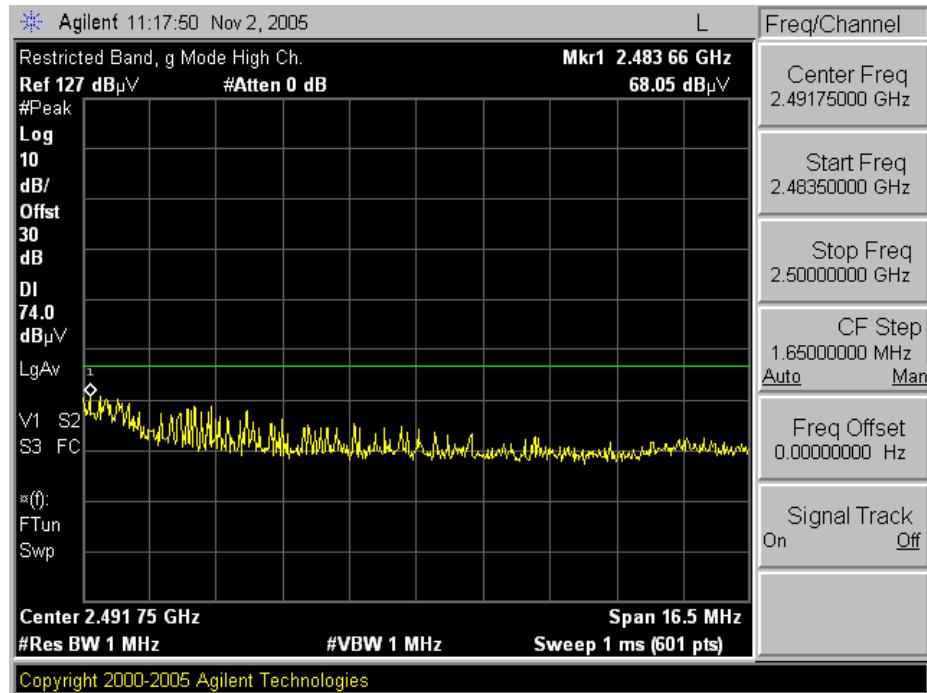


FCC ID: TTFN01A1206

802.11g HIGH channel, PEAK readings, Horizontal

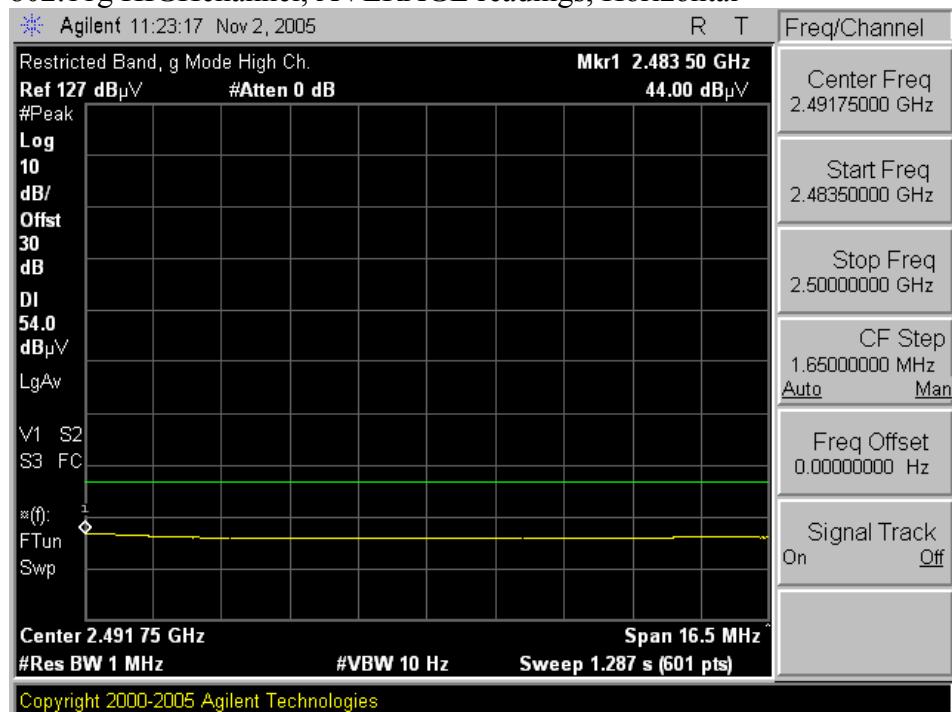


802.11g HIGH channel, PEAK readings, Vertical

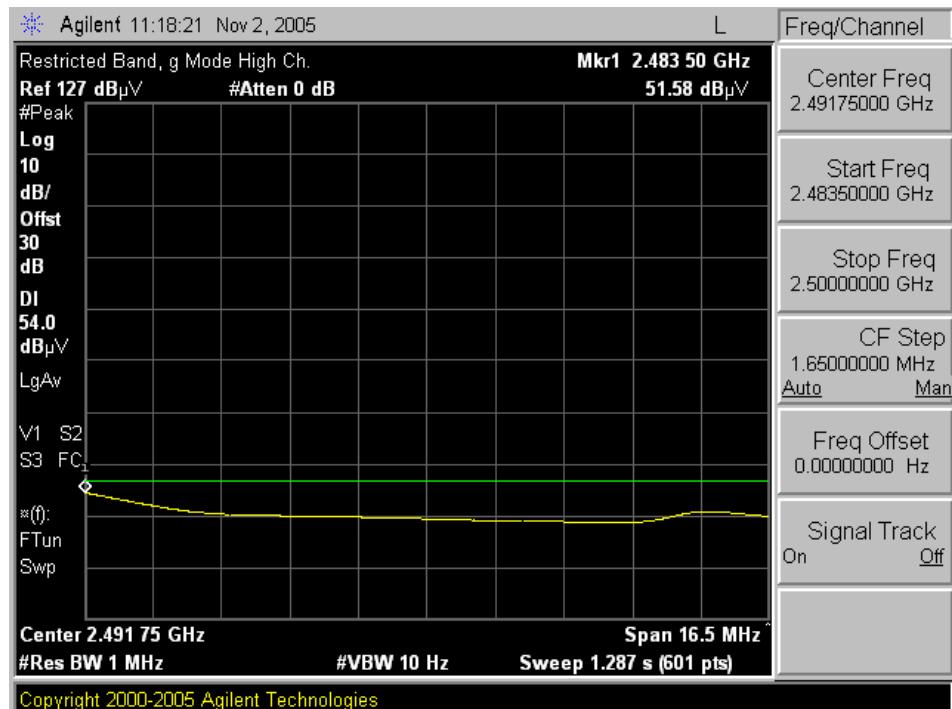


FCC ID: TTFN01A1206

802.11g HIGHchannel, AVERAGE readings, Horizontal



802.11g HIGHchannel, AVERAGE readings, Vertical



FCC ID: **TTFN01A1206**

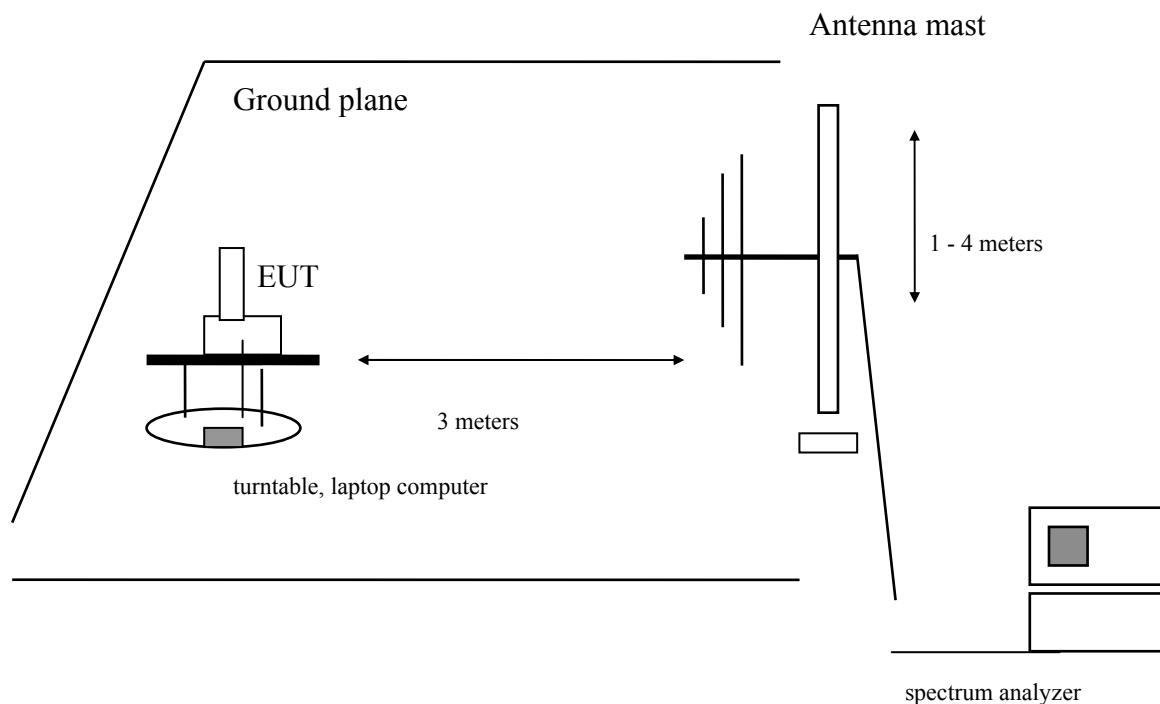
**Radiated Emissions**

**Test Requirement: 15.109**

**Measurement Equipment Used:**

Receiver, 9 kHz - 2.9 GHz  
Biconolog Antenna

**Radiated Test Set-up, 30 - 1000 MHz**



**Test Procedures**

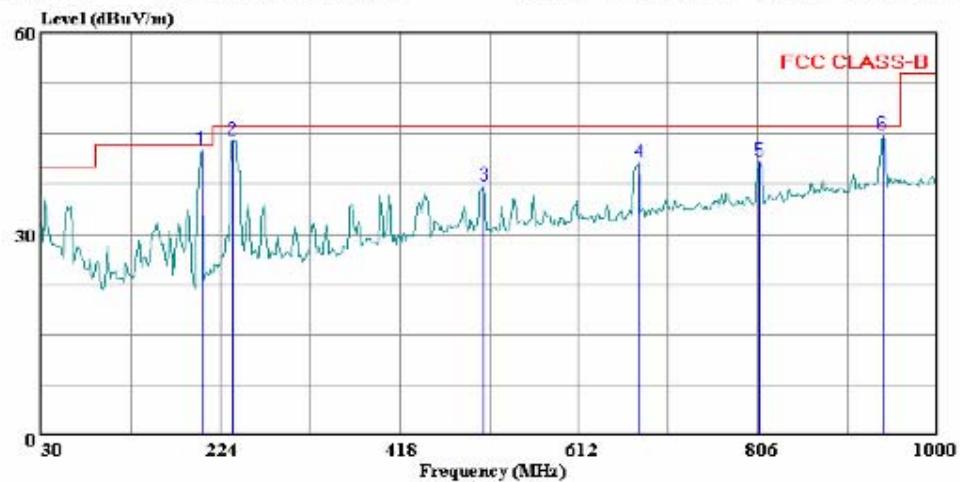
1. The EUT was placed on a wooden table resting on a turntable on the open air test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation. The EUT was set to transmit continuously on the MID channel.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

**Test Results:** EUT meets requirements. All transmitter emissions in the 30-1000 MHz band are at least 20 below the carrier:



561F Monterey Road  
Morgan Hill, CA 95037  
Tel: (408) 463-0888  
Fax: (408) 463-0885

Data#: 8 File#: sprious.EMI Date: 11-03-2005 Time: 14:58:53



(Audit ATC)

Trace: 7

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL  
Test Operator: : Ninous Davoudi  
Project #: : 05U3800  
Company: : EXS  
EUT: : AP eXS  
Model No. : 5001A  
Configuration : EUT connected to laptop  
Target of Test : FCC Class B  
Mode of Operation: Normal Power on.

Page: 1

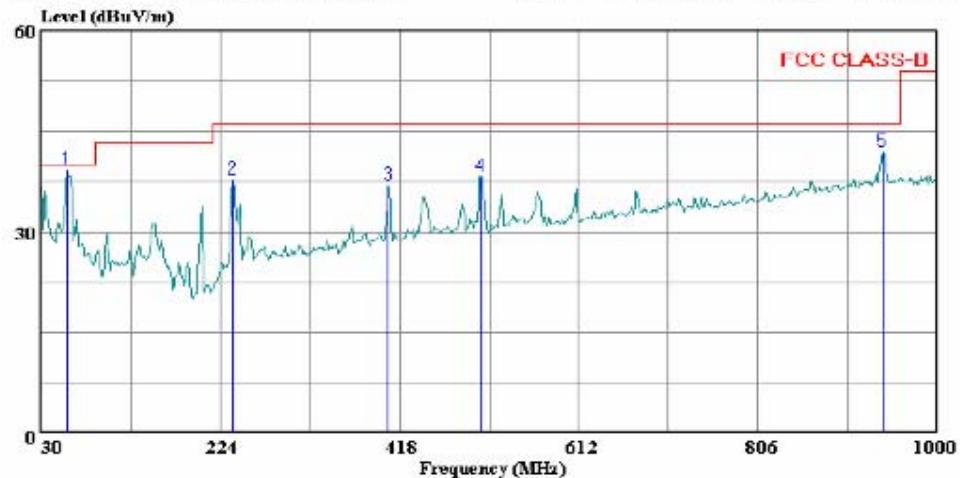
Freq	Read		Limit	Over	Remark	
	MHz	dBuV				
		dB	dBuV/m	dBuV/m	dB	
1	203.630	30.89	11.61	42.50	43.50	-1.00 Peak
2	237.580	30.15	13.78	43.93	46.00	-2.07 Peak
3	509.180	17.64	19.57	37.21	46.00	-8.79 Peak
4	676.990	18.72	21.93	40.65	46.00	-5.35 Peak
5	807.940	17.21	23.77	40.98	46.00	-5.02 Peak
6	940.830	19.54	25.29	44.83	46.00	-1.17 Peak

FCC ID: **TTFN01A1206**



561F Monterey Road  
Morgan Hill, CA 95037  
Tel: (408) 463-0888  
Fax: (408) 463-0885

Data#: 10 File#: sprious.EMI Date: 11-03-2005 Time: 15:04:58



(Audit ATC)

Trace: 9

Ref Trace:

Condition: FCC CLASS-B VERTICAL  
Test Operator: : Ninous Davoudi  
Project #: : 05U3800  
Company: : EXS  
EUT: : AP eXS  
Model No. : 5001A  
Configuration : EUT connected to laptop  
Target of Test : FCC Class B  
Mode of Operation: Normal Power on.

Page: 1

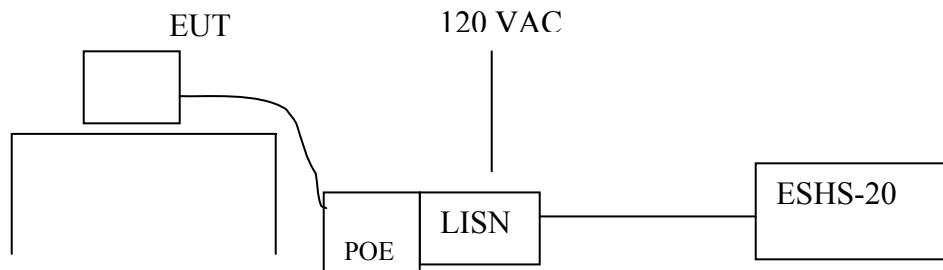
Freq	Read		Limit	Over	Remark	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1	58.130	27.11	12.18	39.29	40.00	-0.71 Peak
2	237.580	23.91	13.78	37.69	46.00	-8.31 Peak
3	405.390	19.38	17.49	36.87	46.00	-9.13 Peak
4	505.300	18.77	19.48	38.25	46.00	-7.75 Peak
5	940.830	16.75	25.29	42.04	46.00	-3.96 Peak

**AC Line Conducted Emissions**  
**Test Requirement: 15.107, 15.207**

**Measurement Equipment Used:**

Rhode & Schwarz EMI Receiver ESHS-20  
Fischer Custom Communication LISN, FCC-LISN-50/250-25-2

**AC Conducted Set-up**



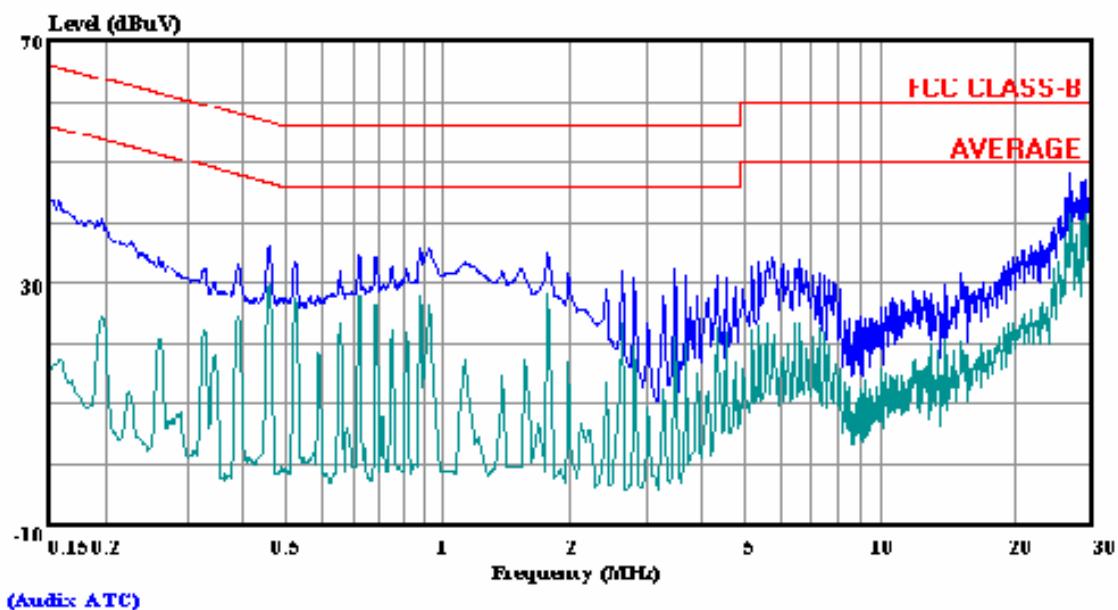
**Test Procedure**

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in normally.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

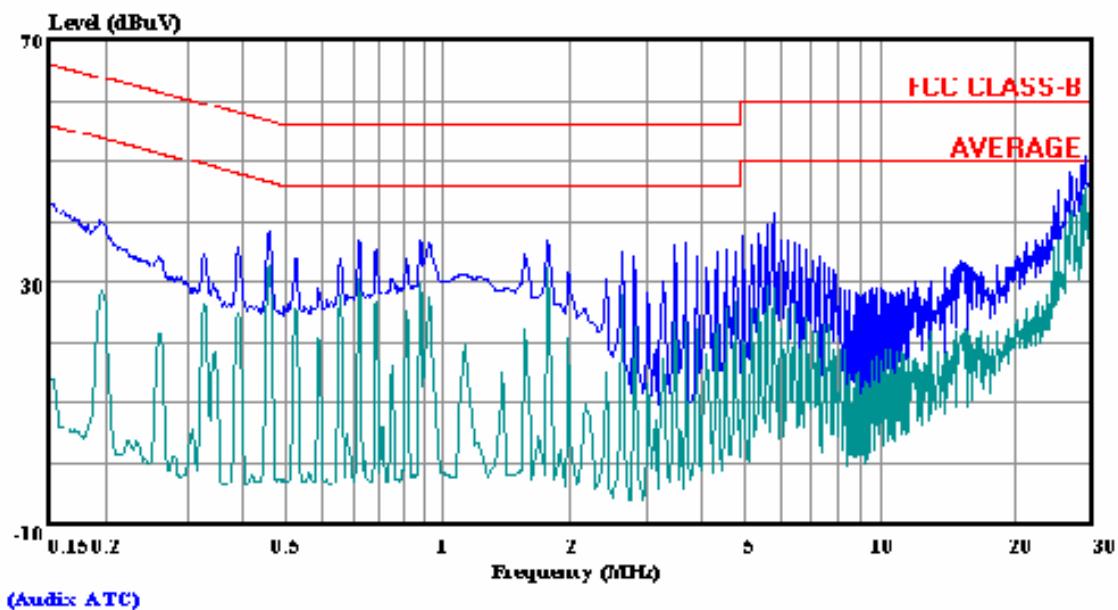
**Test Results**

PASS. Refer to attached plots and tabulated data.

Line 1



Line 2



Blue trace: PEAK detector

Green trace: AVERAGE detector