



**FCC CFR47 PART 15 SUBPART C  
CERTIFICATION  
TEST REPORT**

**FOR**

**DUAL MODE 2.4GHz / 5GHz MODULE FOR ACCESS POINT**

**MODEL NUMBER: 100 RADIO CARD  
FOR MOBILITY POINT 100/101/122**

**BRAND NAME: TRAPEZE NETWORKS, INC.**

**FCC ID: QZE100**

**REPORT NUMBER: 03U1984-1**

**ISSUE DATE: JUNE 11<sup>TH</sup>, 2003**

*Prepared for*  
**TRAPEZE NETWORKS, INC.  
5753 W. LAS POSITAS BLVD.  
PLEASANTON, CALIFORNIA 94588  
U.S.A**

*Prepared by*  
**COMPLIANCE CERTIFICATION SERVICES  
561F MONTEREY ROAD,  
MORGAN HILL, CA 95037, USA  
TEL: (408) 463-0885  
FAX: (408) 463-0888**

## TABLE OF CONTENTS

<b>1. TEST RESULT CERTIFICATION .....</b>	<b>3</b>
<b>2. EUT DESCRIPTION .....</b>	<b>4</b>
<b>3. TEST METHODOLOGY .....</b>	<b>5</b>
<b>4. FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
4.1. <i>FACILITIES AND EQUIPMENT .....</i>	<i>5</i>
4.2. <i>TABLE OF ACCREDITATIONS AND LISTINGS .....</i>	<i>6</i>
<b>5. CALIBRATION AND UNCERTAINTY .....</b>	<b>7</b>
5.1. <i>MEASURING INSTRUMENT CALIBRATION .....</i>	<i>7</i>
5.2. <i>MEASUREMENT UNCERTAINTY .....</i>	<i>7</i>
5.3. <i>TEST AND MEASUREMENT EQUIPMENT .....</i>	<i>8</i>
<b>6. SETUP OF EQUIPMENT UNDER TEST .....</b>	<b>9</b>
<b>7. APPLICABLE LIMITS AND TEST RESULTS .....</b>	<b>13</b>
7.1. <i>6 dB BANDWIDTH .....</i>	<i>13</i>
7.2. <i>OUTPUT POWER .....</i>	<i>21</i>
7.3. <i>MAXIMUM PERMISSIBLE EXPOSURE .....</i>	<i>24</i>
7.4. <i>PEAK POWER SPECTRAL DENSITY .....</i>	<i>26</i>
7.5. <i>CONDUCTED SPURIOUS EMISSIONS .....</i>	<i>34</i>
7.6. <i>RADIATED EMISSIONS .....</i>	<i>47</i>
7.7. <i>POWERLINE CONDUCTED EMISSIONS .....</i>	<i>70</i>
7.8. <i>SETUP PHOTOS .....</i>	<i>73</i>

# 1. TEST RESULT CERTIFICATION

**COMPANY NAME:** TRAPEZE NETWORKS, INC.  
5753 W. LAS POSITAS BLVD.  
PLEASANTON, CA 94588, U.S.A

**EUT DESCRIPTION:** DUAL MODE 2.4GHz / 5GHz MODULE FOR ACCESS POINT

**MODEL:** 100 RADIO CARD FOR MOBILITY POINT 100/101/102

**DATE TESTED:** MAY 7 – JUNE 2, 2003

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

**Note:** The 2.4 and 5.8 GHz bands are applicable to this report; another band of operation (5.2 GHz) is documented in a separate report

Approved & Released For CCS By:

Tested By:



---

MIKE HECKROTTE  
CHIEF ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

---

NEELESH RAJ  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. EUT DESCRIPTION

Model 100 radio card for Mobility Point 100/101/122 (model 122 has two band radios) operates in the 2.4-2.4835GHz and 5.725-5.850 GHz band. It has a peak output power of 19.35 dBm (86.1 mW) in the 2.4-2.4835GHz band and a peak output power of 23.07 dBm (203 mW) in the 5.725-5.850GHz band. The EUT has a peak antenna gain of 2dBi.

### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.







### **4. FACILITIES AND ACCREDITATION**

#### **4.1. FACILITIES AND EQUIPMENT**

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 4.2. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	 R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	 ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	 ELA-171
Taiwan	BSMI	CNS 13438	 SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	 IC2324 A,B,C, and F

## 5. CALIBRATION AND UNCERTAINTY

### 5.1. MEASURING INSTRUMENT CALIBRATION

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations, and are traceable to national standards.

### 5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

### 5.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2004
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924341	4/25/2004
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	4/25/2004
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	9/6/2003
Line Filter	Lindgren	LMF-3489	497	CNR
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2003
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/2004
PSA	AGILENT	E4446A	US42070220	1/13/2004
Peak Power Meter	AGILENT	E4416A	6B41291160	8/9/2003
Power Sensor	AGILENT	E9327A	US40440755	8/9/2003
EMI Test Receiver	HP	8542E	3942A00286	11/20/2003
RF Filter Section	HP	85420E	3705A00256	11/20/2003
Bilog Antenna	ARA	LPB-25201A	1185	3/6/2004
10dB Pad	WEINSCHEL	56-10	K16148	N/A
2.4-2.5 GHz Reject Filter	MICROTRONICS	BRM50702	1	N/A
5.725-5.875 GHz Reject Filter	MICROTRONICS	BRC13192	1	N/A



## 6. SETUP OF EQUIPMENT UNDER TEST

### SETUP INFORMATION FOR TRANSMITTER TESTS

#### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
LAPTOP	IBM	THINKPAD	N/A	ANOC126P8056
POE	LUXUL	N/A	N/A	N/A
AC ADAPTER	CISCO SYSTEMS	PSA18U-480C	PH107010912B	N/A

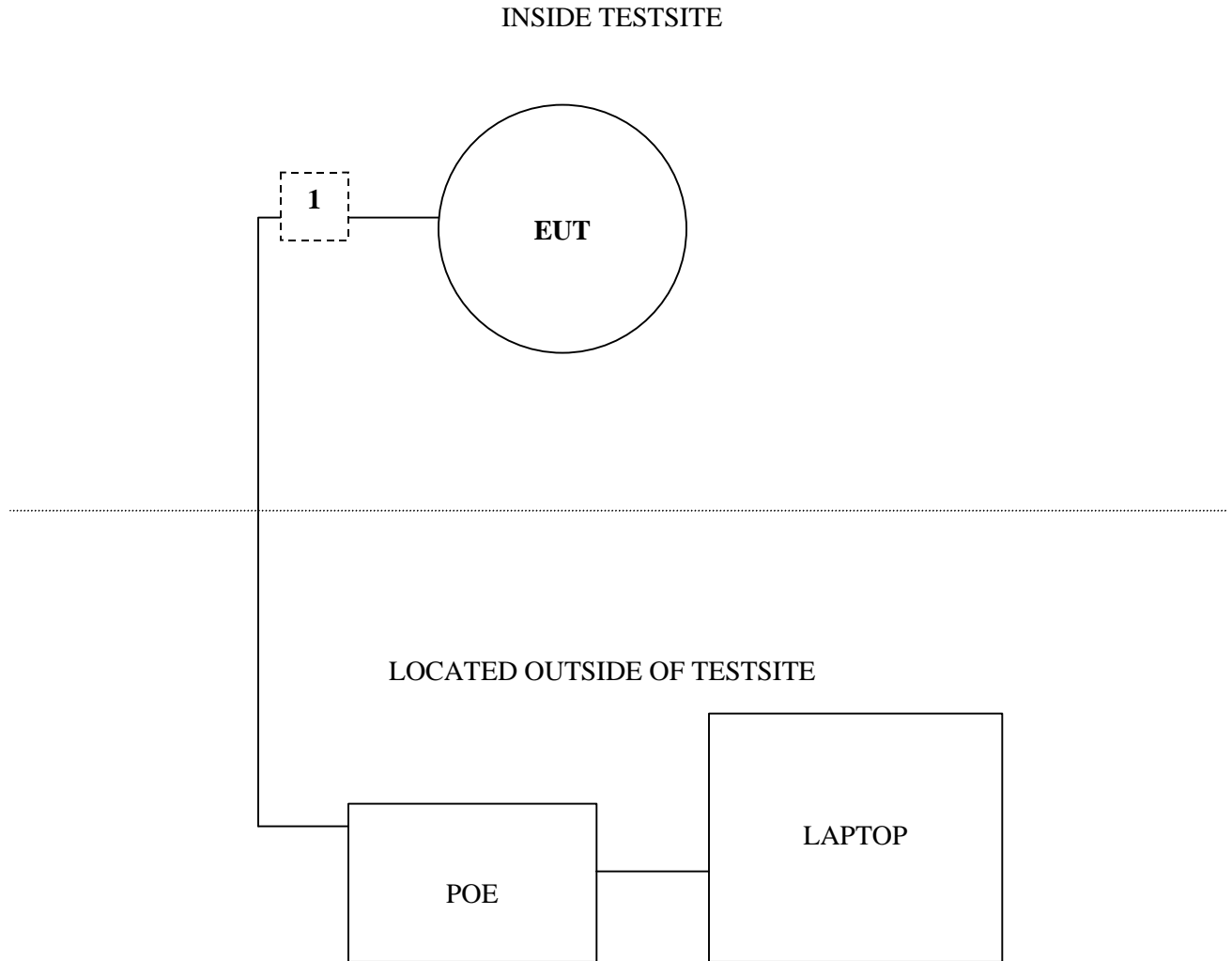
#### I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	ETHERNET	2	RJ-45	UNSHIELDED	12M	N/A

#### TEST SETUP

The EUT was operated remotely by the laptop.

**SETUP DIAGRAM FOR TRANSMITTER TESTS**



**SETUP INFORMATION FOR DIGITAL DEVICE TESTS**

**SUPPORT EQUIPMENT**

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
LAPTOP	IBM	THINKPAD	N/A	AN0CH126P8056
POE	LUXUL	N/A	N/A	N/A
AC ADAPTER	CISCO SYSTEMS	PSA18U-480C	PH107010912B	N/A

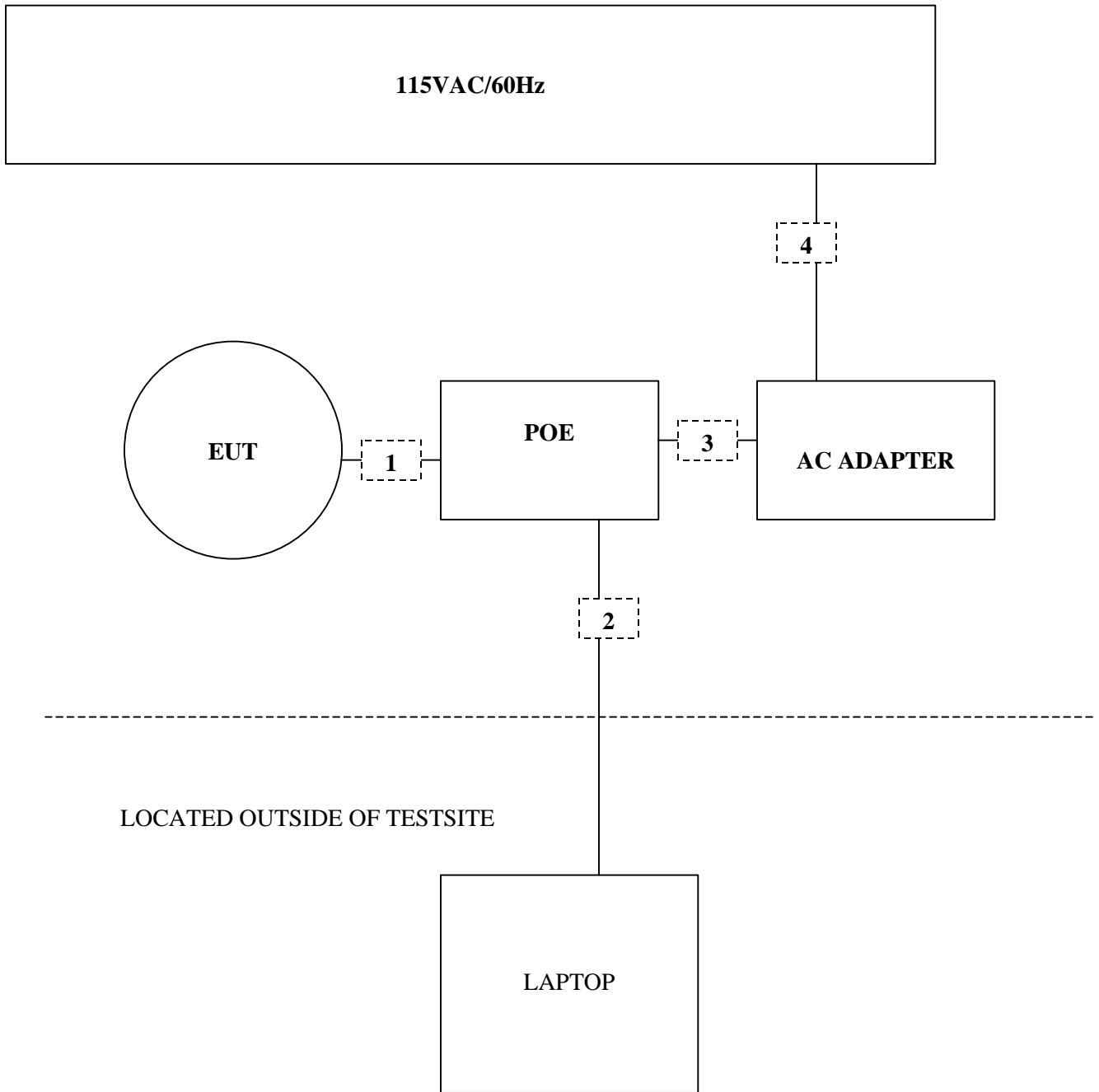
**I/O CABLES**

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	ETHERNET	2	RJ-45	UNSHIELDED	3M	N/A
2	ETHERNET	1	RJ-45	UNSHIELDED	12M	N/A
3	DC PWR	1	DC PWR	UNSHIELDED	2M	N/A
4	AC PWR	1	US115	UNSHIELDED	2M	N/A

**TEST SETUP**

The EUT was operated remotely by the laptop.

**SETUP DIAGRAM FOR DIGITAL DEVICE TESTS**



## 7. APPLICABLE LIMITS AND TEST RESULTS

### 7.1. 6 dB BANDWIDTH

#### LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

#### 2.4 GHz BAND RESULTS

No non-compliance noted:

##### 802.11b Mode

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)
Low	2412	12570	500
Middle	2437	12570	500
High	2462	12570	500

**5.8 GHz BAND RESULTS**

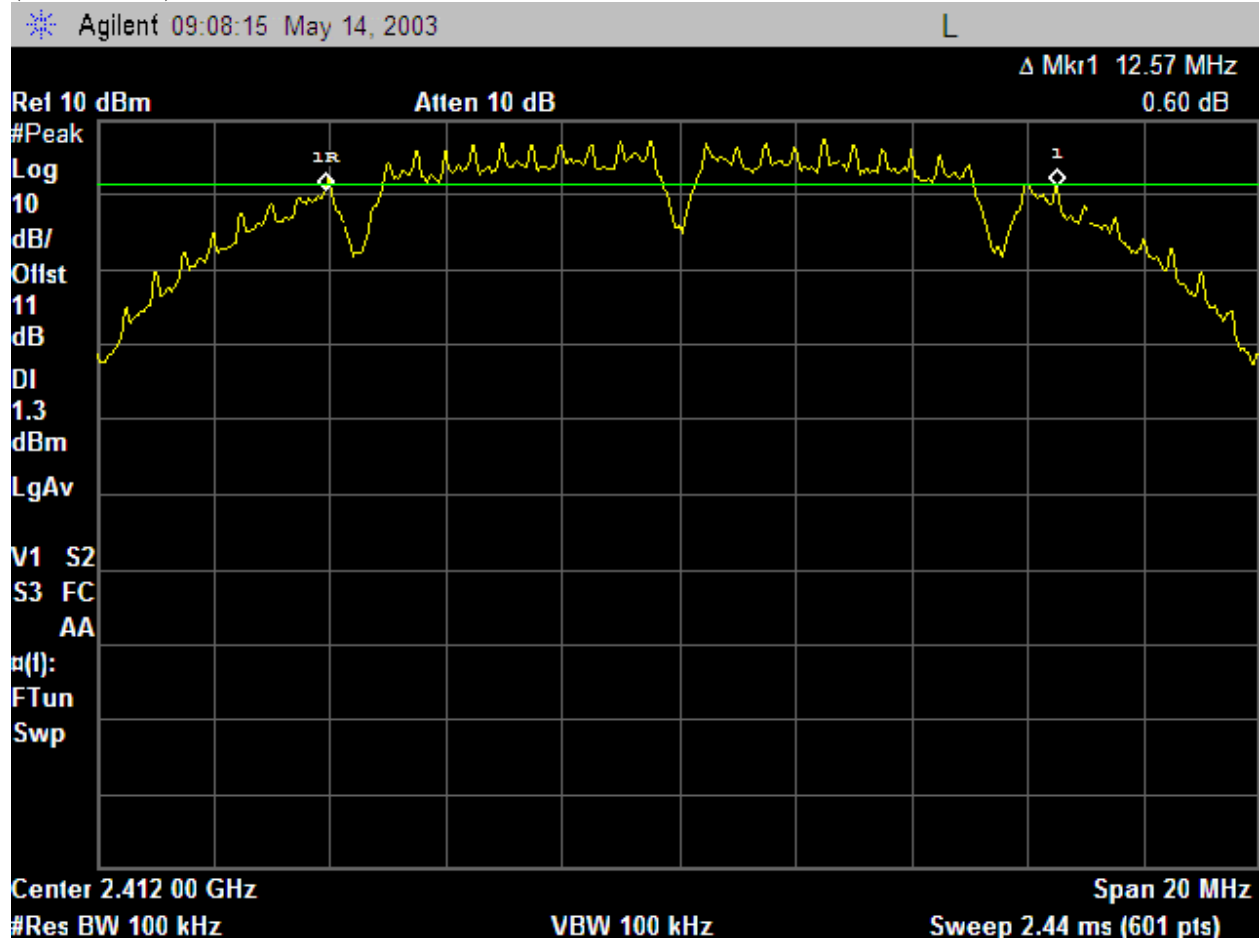
No non-compliance noted:

802.11a Mode

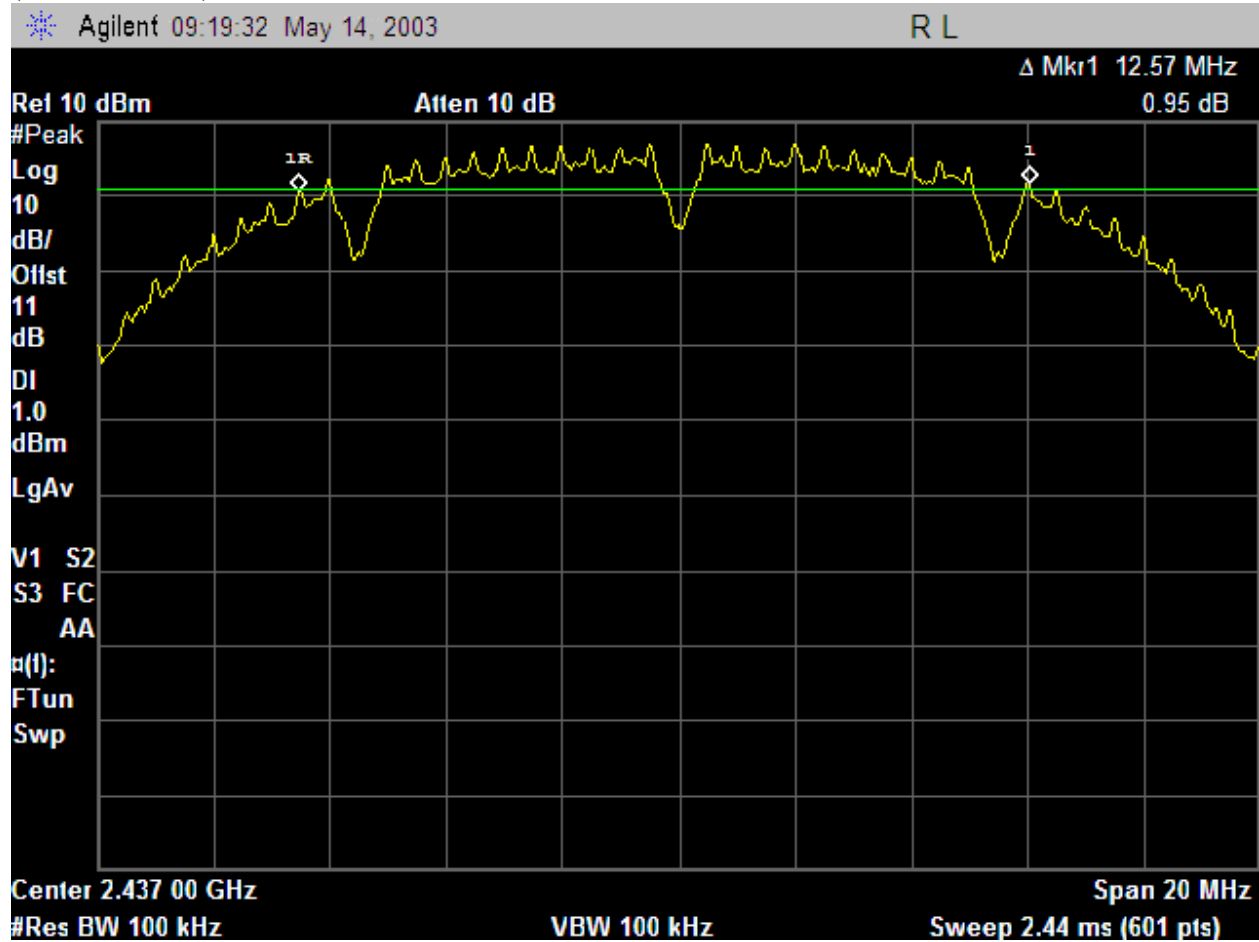
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)
Low	5745	16450	500
Middle	5785	16430	500
High	5825	16450	500

**6 DB BANDWIDTH (2.4 GHZ b MODE)**

(low channel)

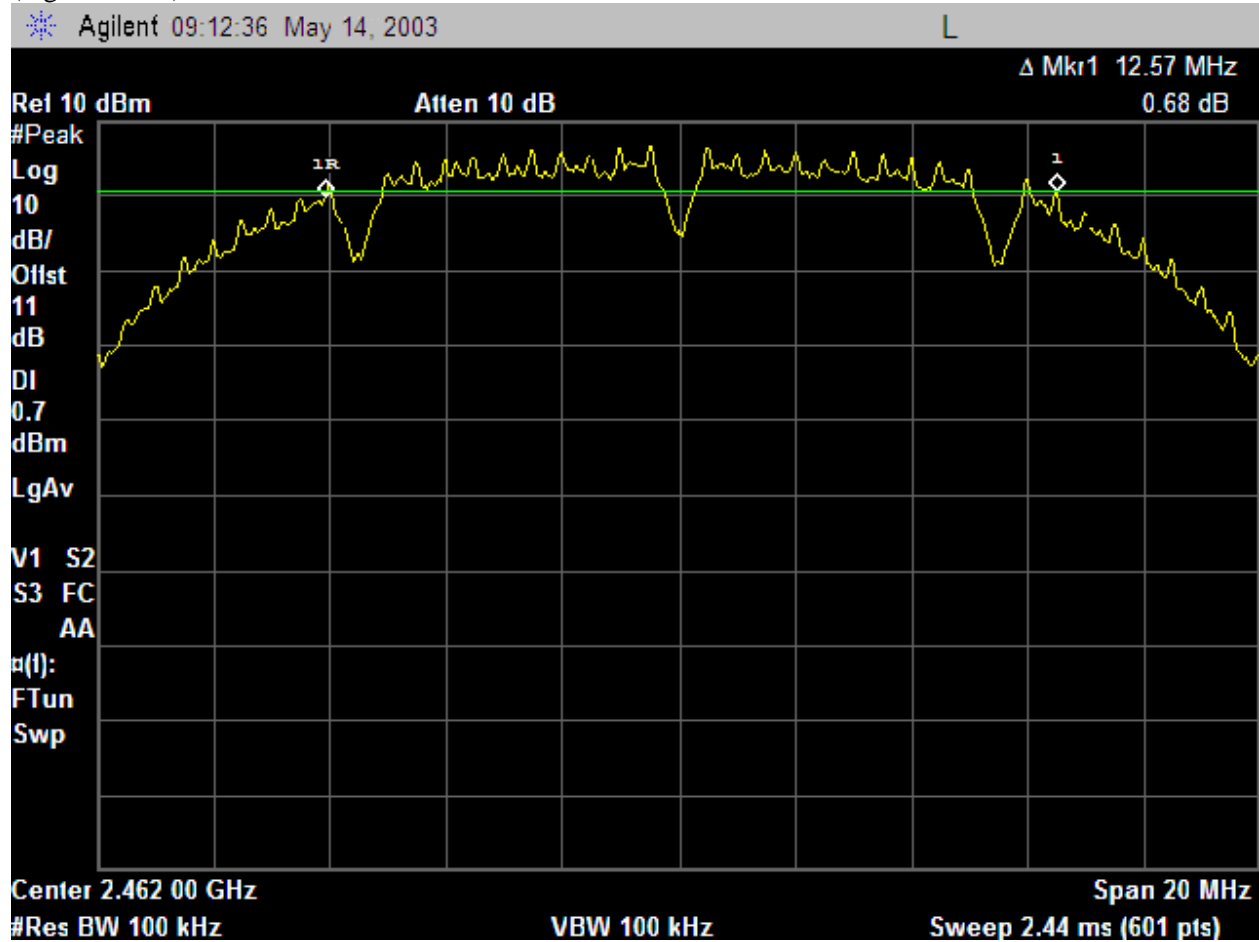


(middle channel)



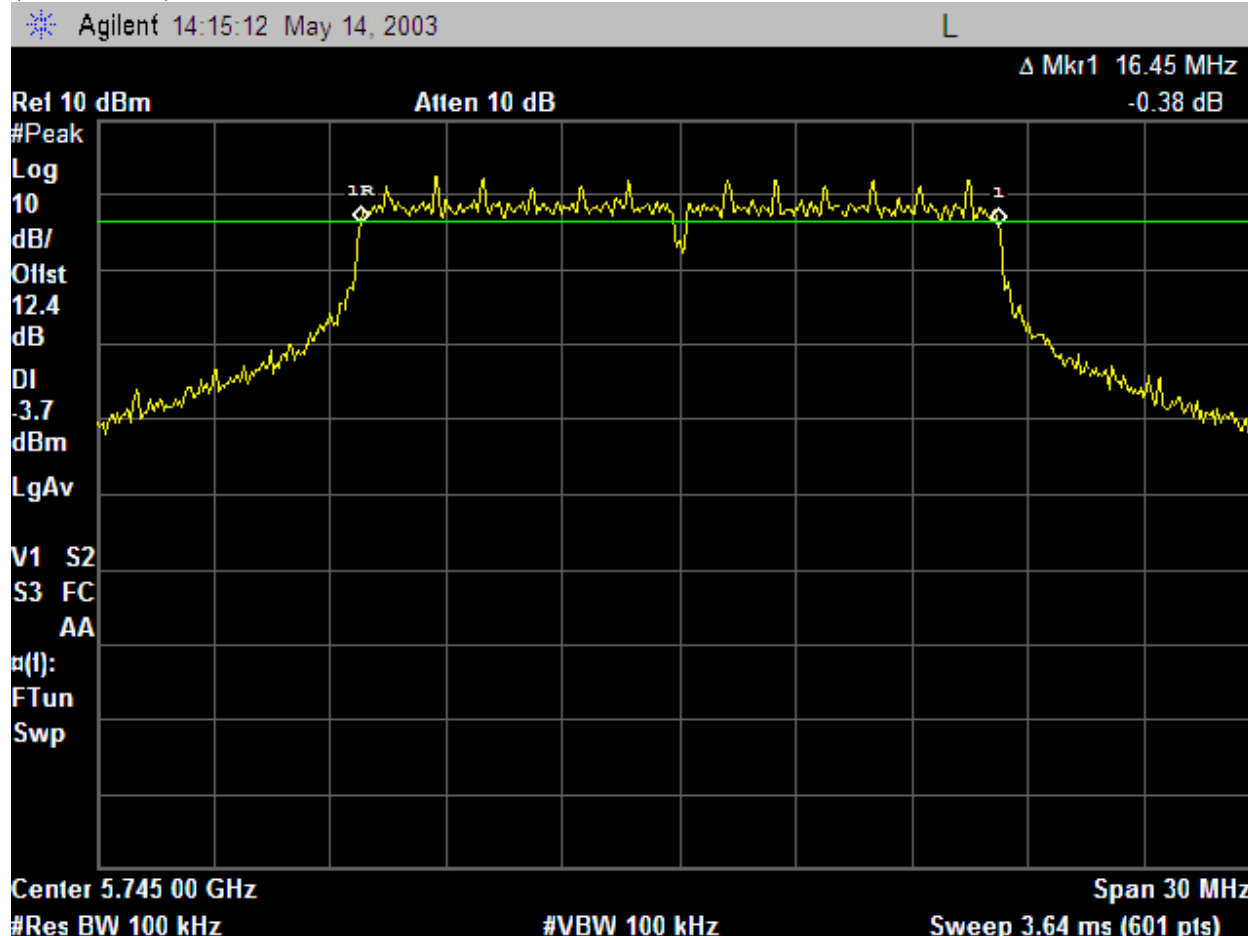


(high channel)

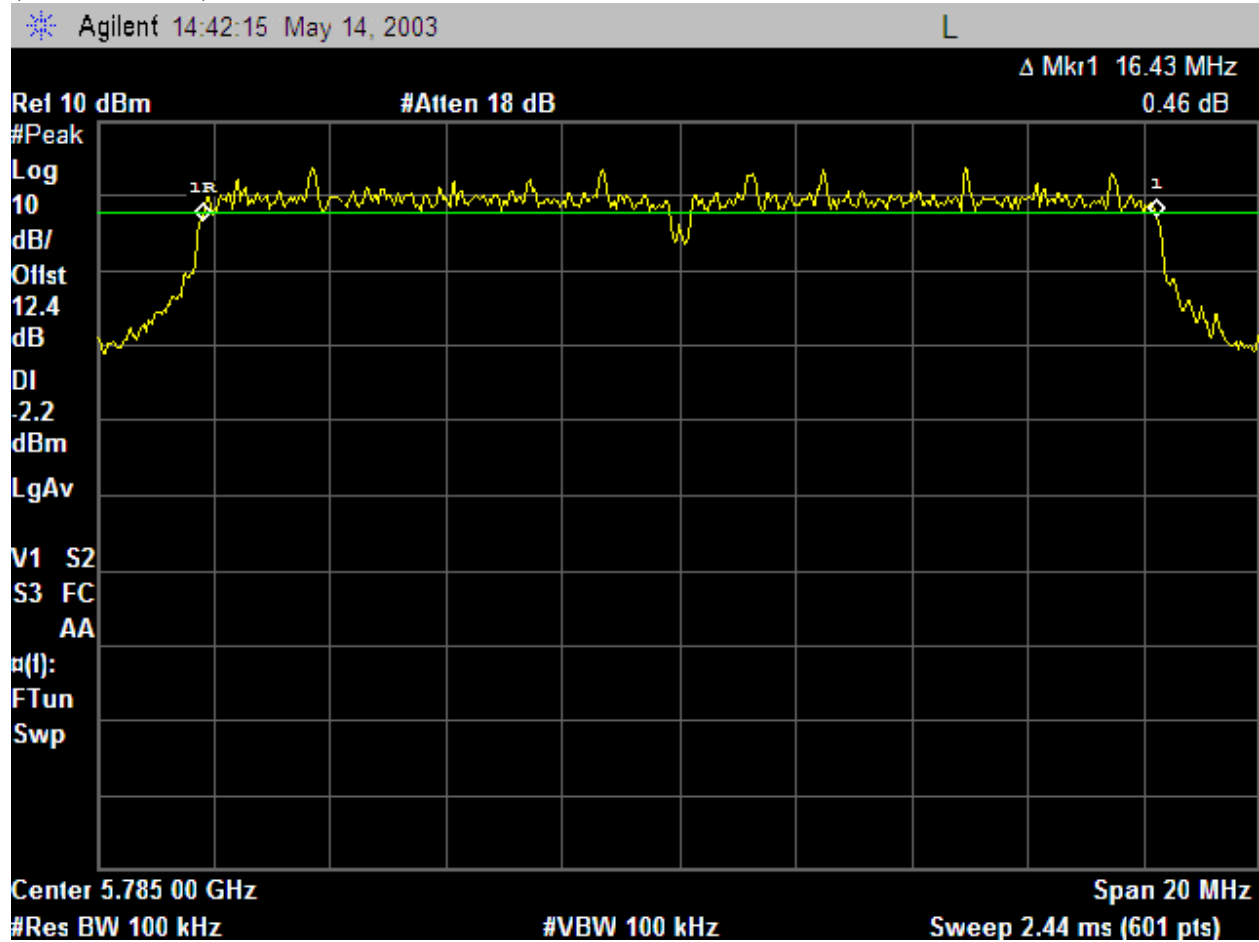


**6 DB BANDWIDTH (5.8 GHZ a MODE)**

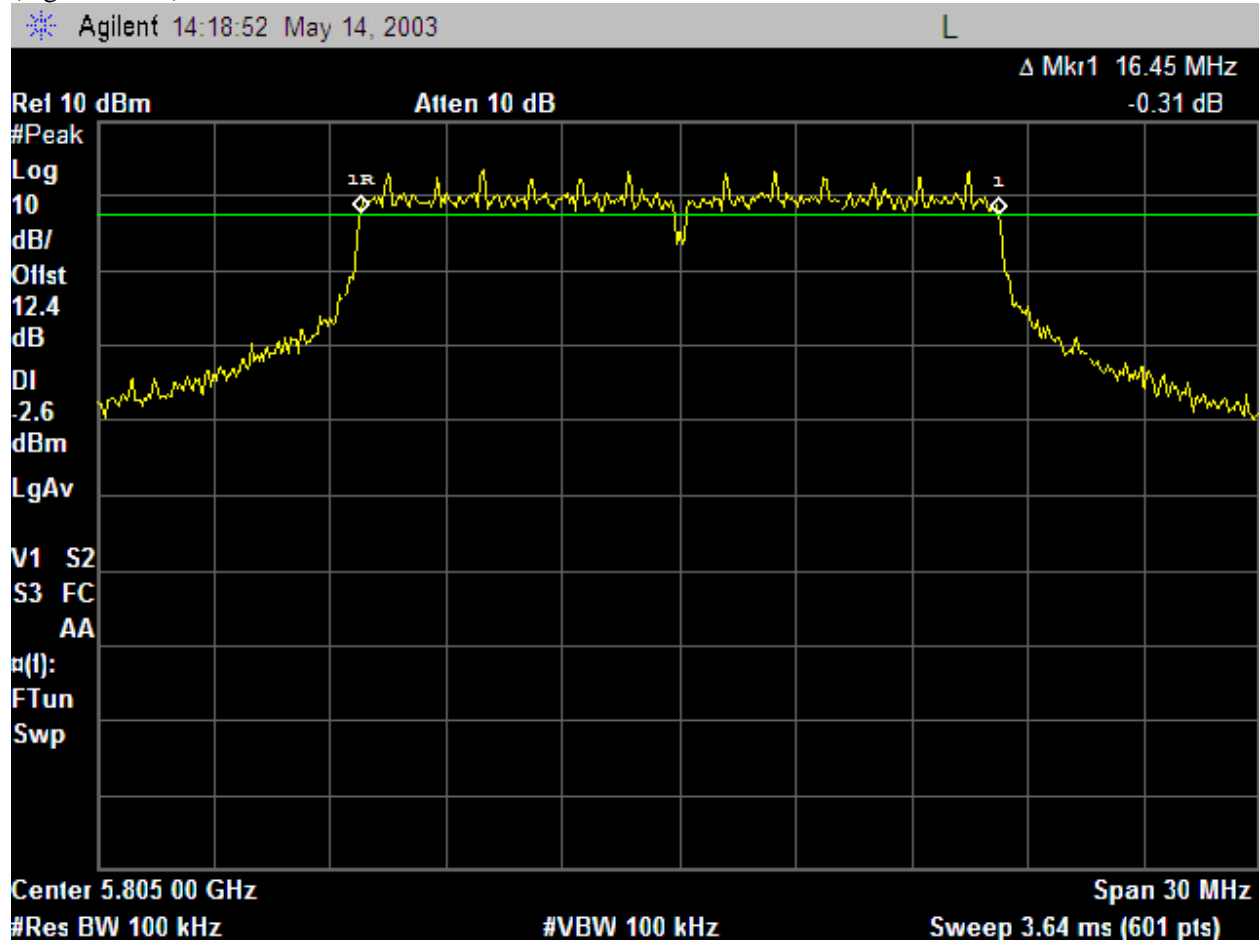
(low channel)



(middle channel)



(high channel)



## 7.2. OUTPUT POWER

### **PEAK POWER LIMIT**

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is 2 dBi, therefore the limit is 30 dBm.

### **AVERAGE POWER LIMIT**

None; for reporting purposes only.

### **TEST PROCEDURE**

The transmitter output is connected to a power meter. The power meter is set to simultaneously read peak power and average power.

**2.4 GHz BAND RESULTS**

The cable assembly insertion loss of 11.22 dB (including 10 dB pad and 1.22 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

No non-compliance noted:

802.11b Mode

Channel	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	17.67	19.35	30	-10.65
Middle	2437	17	19.1	30	-10.90
High	2462	16.57	18.58	30	-11.42

**5.8 GHz BAND RESULTS**

The cable assembly insertion loss of 12.6 dB (including 10 dB pad and 2.6 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

No non-compliance noted:

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	13.47	21.67	30	-8.33
Middle	5785	15.16	23.07	30	-6.93
High	5825	15.17	23.04	30	-6.96

### 7.3. MAXIMUM PERMISSIBLE EXPOSURE

#### LIMITS

§15.247 (b) (5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

#### CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = distance in meters

S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW / cm<sup>2</sup>



Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$
$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20) / \sqrt{S}} \quad \text{Equation (1)}$$

where

- d = MPE distance in cm
- P = Power in dBm
- G = Antenna Gain in dBi
- S = Power Density Limit in mW / cm<sup>2</sup>

Equation (1) and the measured peak power is used to calculate the MPE distance.

### **LIMITS**

S = 1.0 mW / cm<sup>2</sup> from 1.1310 Table 1

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

### **2.4 GHz BAND RESULTS**

No non-compliance noted:

Mode	Power Density Limit (mW/cm <sup>2</sup> )	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	19.35	2.00	3.29

### **5.8 GHz BAND RESULTS**

No non-compliance noted:

Mode	Power Density Limit (mW/cm <sup>2</sup> )	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11a Base	1.0	23.07	2.00	5.06

## 7.4. PEAK POWER SPECTRAL DENSITY

### LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW  $\geq$  3KHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

### 2.4 GHz BAND RESULTS

No non-compliance noted:

2.4 GHz Band, 802.11b Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.35	8	-13.35
Middle	2437	-6.41	8	-14.41
High	2462	-6.34	8	-14.34

**5.8 GHz BAND RESULTS**

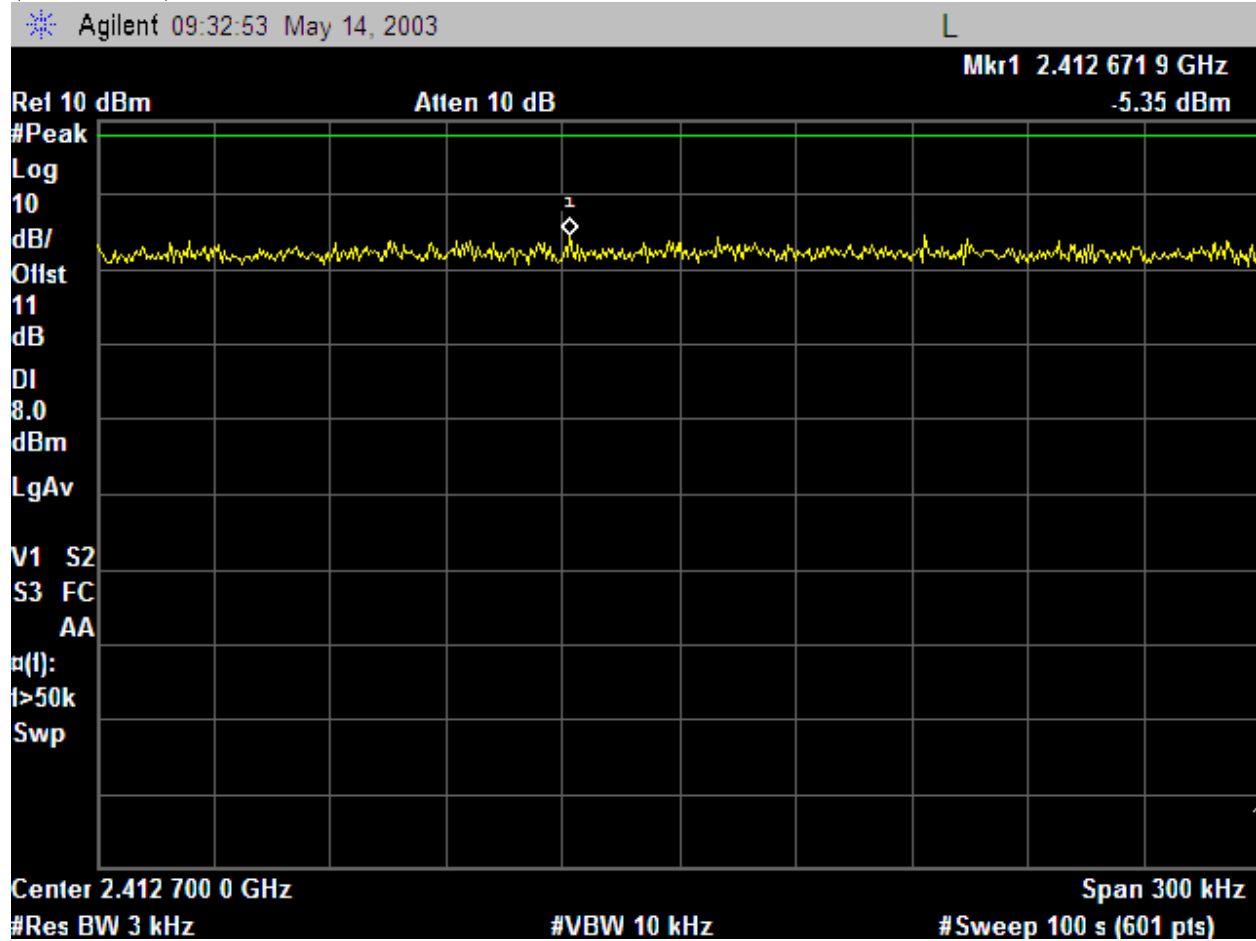
No non-compliance noted:

802.11a Mode

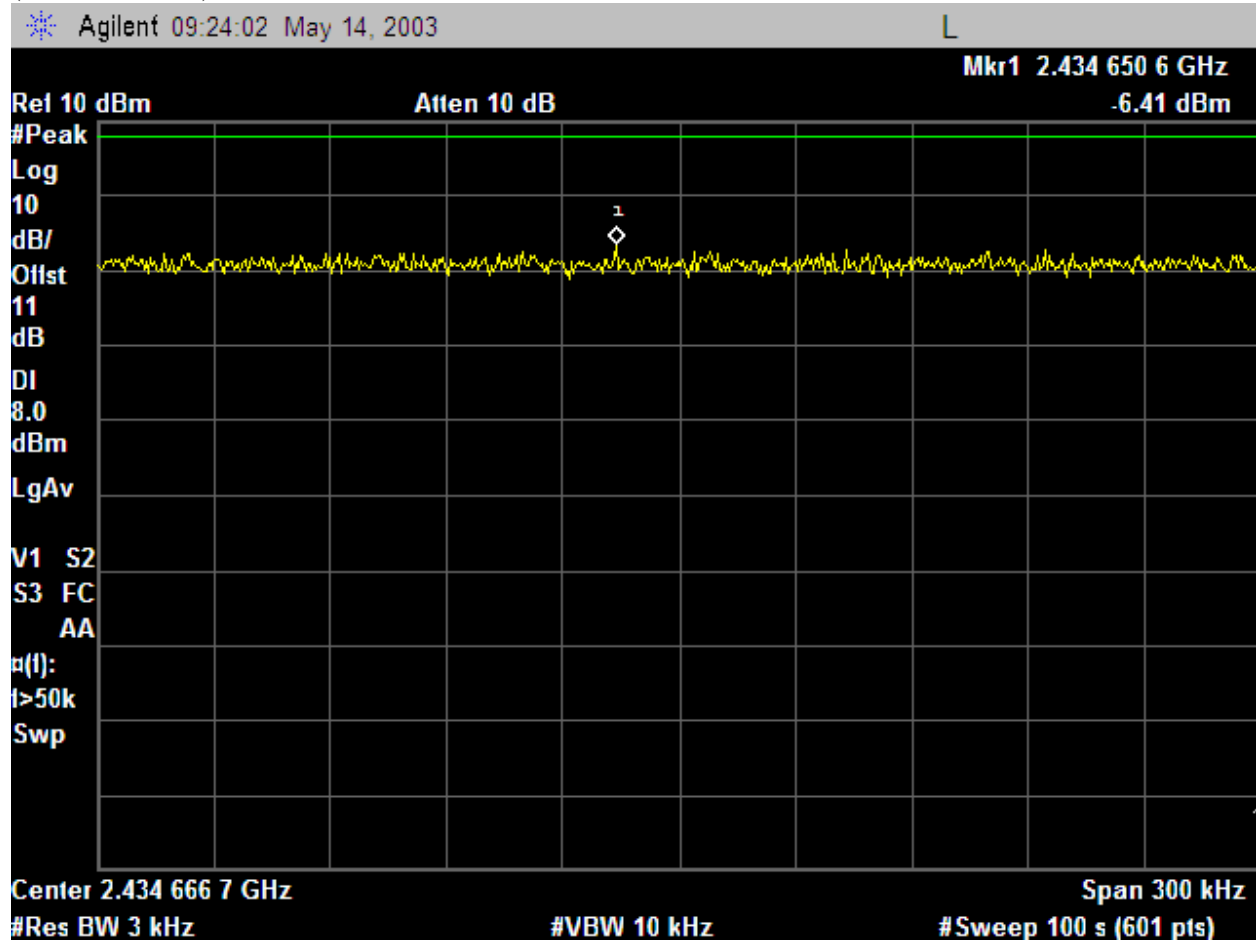
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-10.29	8	-18.29
Middle	5785	-8.48	8	-16.48
High	5825	-9.19	8	-17.19

**PPSD (2.4 GHZ b MODE)**

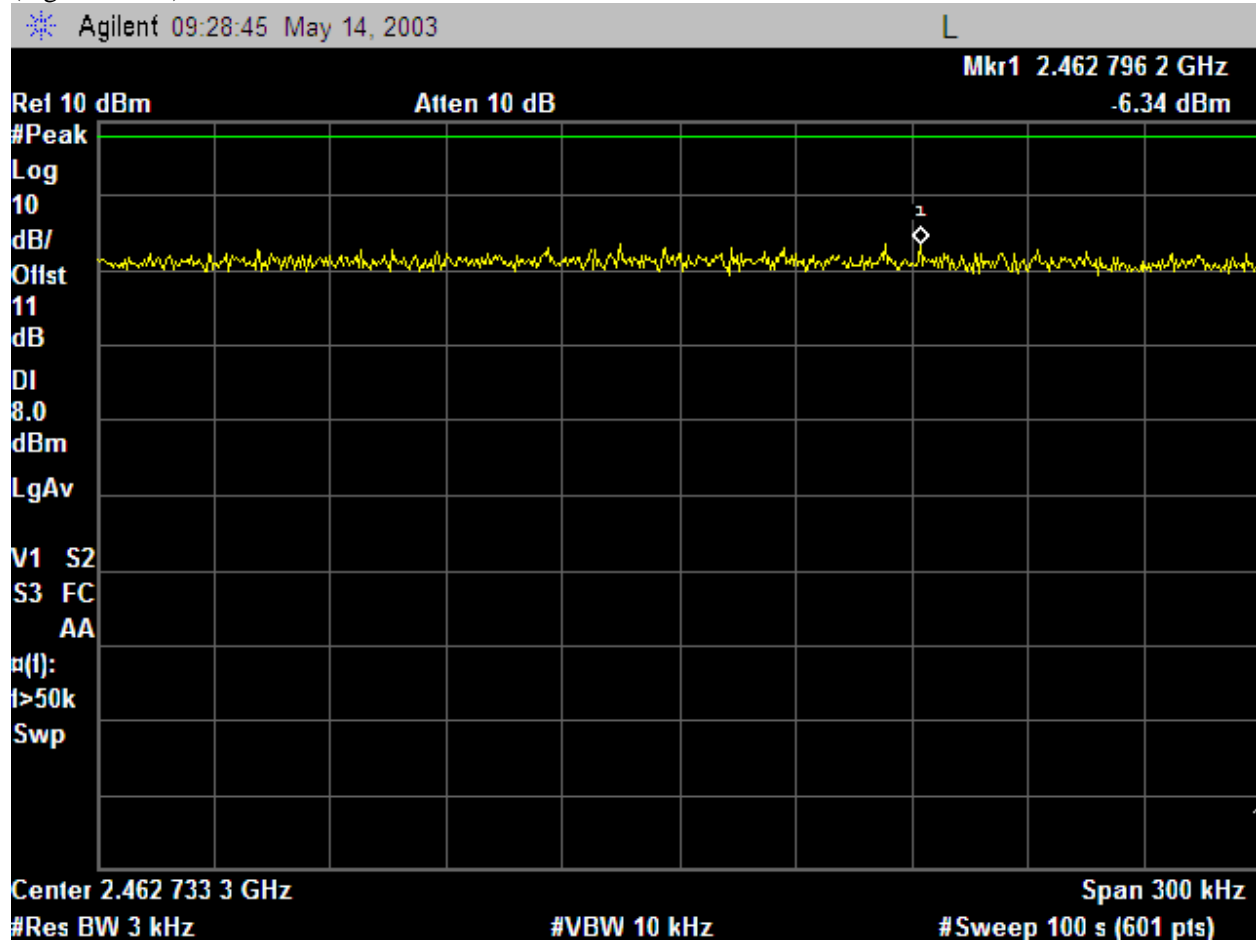
(low channel)



(middle channel)

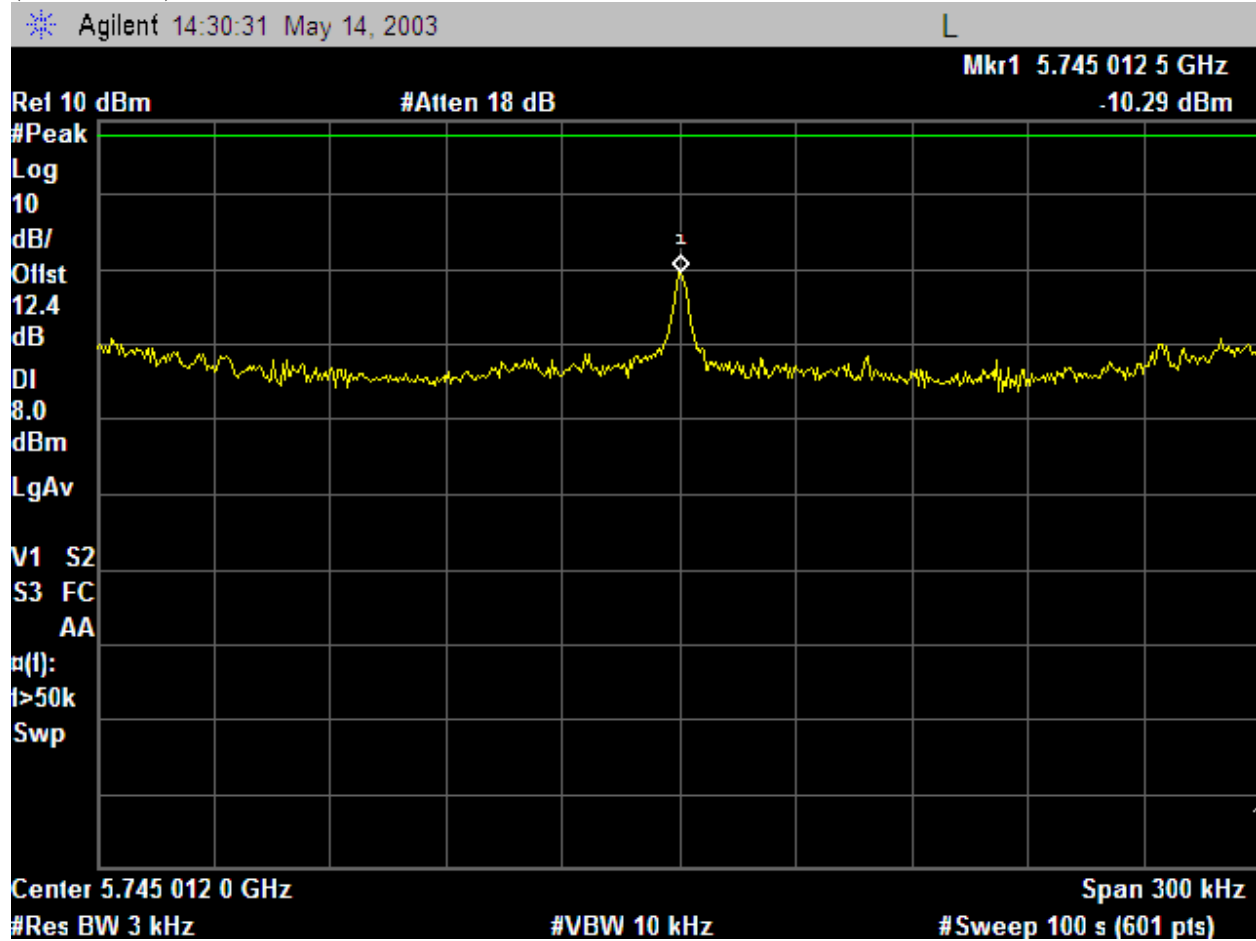


(high channel)

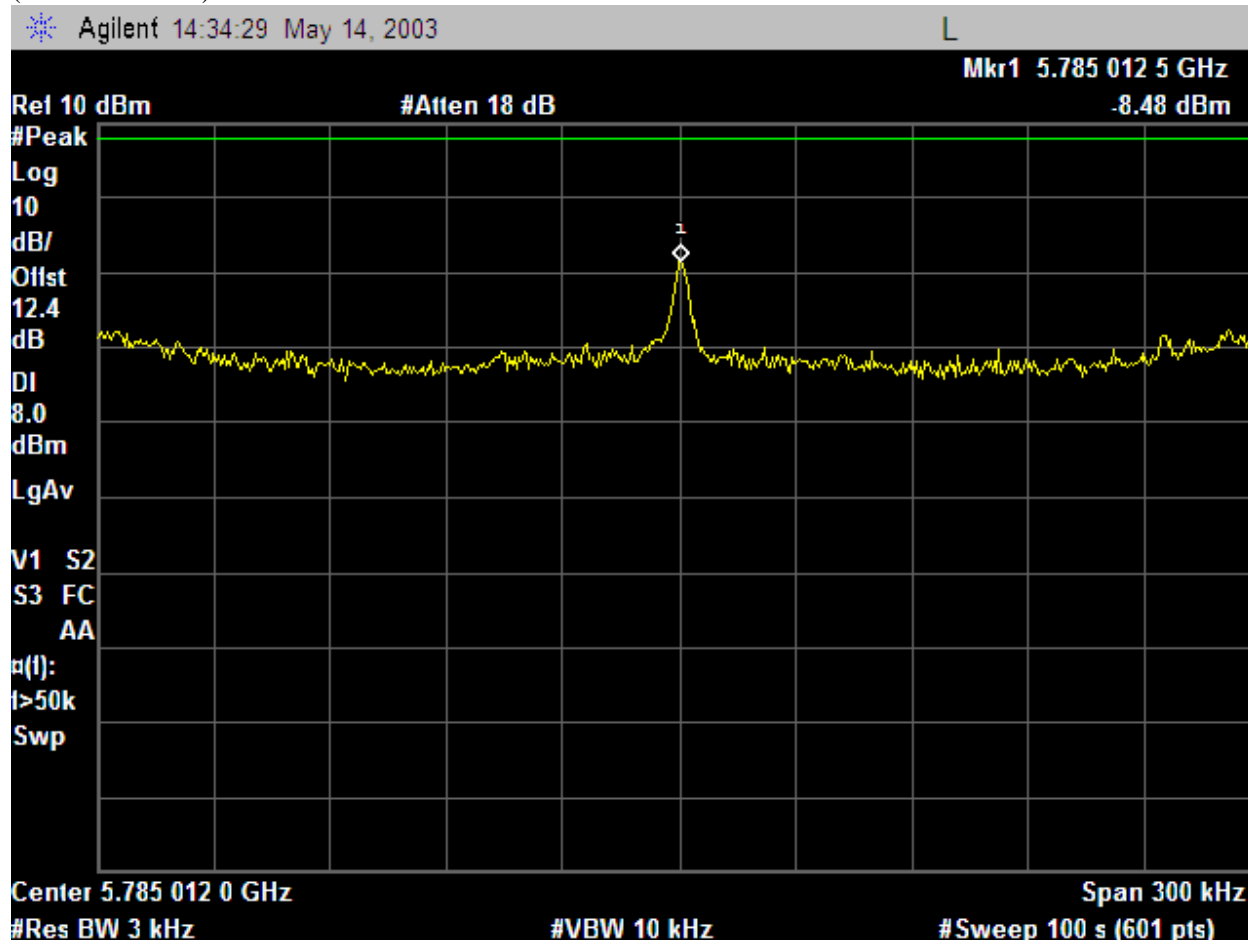


**PPSD (5.8 GHZ a MODE)**

(low channel)

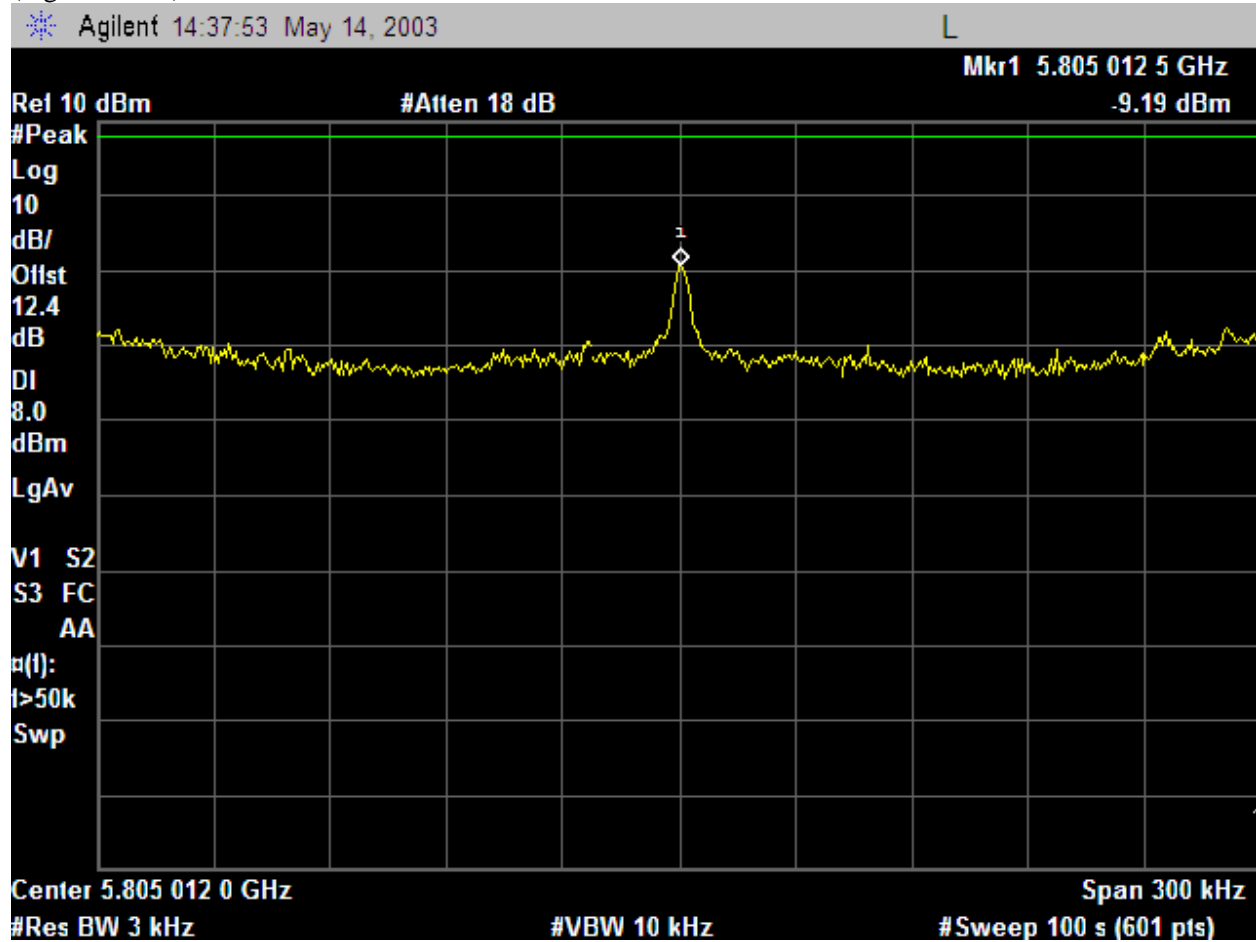


(middle channel)





(high channel)



## 7.5. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30 MHz to 26.5 GHz range with the transmitter set to the lowest, middle, and highest channels within the 2.4 GHz band.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels within the 5.8 GHz band.

### RESULTS

No non-compliance noted:

**CONDUCTED SPURIOUS EMISSIONS (2.4 GHZ b MODE)**

(low channel bandedge)

