



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

### 802.11b/g Access Point

**Trade Name / Model:  
RUBYTECH / OW-1000 APP/CBP/RBP,  
Aphelion / Aphelion 300 series,  
YuFo / ZOE-AP1100**

*Issued to*

**RUBY TECH CORP.  
2F, No.7, Lane 50, Nan Kang Road,  
Sec.3, Taipei, Taiwan**

*Issued by*



**Compliance Certification Services Inc.  
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## 1. TEST RESULT CERTIFICATION

**Applicant:** RUBY TECH CORP.  
2F, No.7, Lane 50, Nan Kang Road,  
Sec.3, Taipei, Taiwan

**Equipment Under Test:** 802.11b/g Access Point

**Trade Name / Model:** RUBYTECH / OW-1000 APP/CBP/RBP,  
Aphelion / Aphelion 300 series,  
YuFo / ZOE-AP1100

**Date of Test:** January 5 ~ 17, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

*Approved by:*

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Rex Lai  
Section Manager  
Compliance Certification Services Inc.

*Reviewed by:*

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Amanda Wu  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	802.11b/g Access Point
<b>Trade Name / Model</b>	RUBYTECH / OW-1000 APP/CBP/RBP, Aphelion / Aphelion 300 series, YuFo / ZOE-AP1100
<b>Model Discrepancy</b>	All the specification and layout are identical except they come with different trade names and model numbers for marketing purposes.
<b>Power Adapter</b>	UNIFIVE Model: US318-48 I/P: 100-240V, 50-60Hz, 0.4A O/P: 48V, 0.4A
<b>Frequency Range</b>	2412 ~ 2462 MHz
<b>Transmit Power</b>	Panel Antenna: IEEE 802.11b: 17.65 dBm (58.21 mW) IEEE 802.11g: 14.57 dBm (28.64 mW)
<b>Modulation Technique</b>	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
<b>Transmit Data Rate</b>	IEEE 802.11b Mode: 11, 5.5, 2, 1 Mbps IEEE 802.11g Mode: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1Mbps
<b>Number of Channels</b>	11 Channels
<b>Antenna Specification</b>	Panel Antenna: Gain: 9 dBi Omni Antenna: Gain: 5 dBi

**Remark:**

1. *The sample selected for test was production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **KFWIOWXXARC** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

#### **3.1 EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



### **3.5 DESCRIPTION OF TEST MODES**

The EUT (model: OW-1000 APP/CBP/RBP) comes with two different antennas (internal Panel antenna and external Omni antenna) for sale.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

The worst case data rate is determined as the data rate with highest output power.

IEEE 802.11b mode:

Channel Low(2412MHz), Channel Mid(2437MHz) and Channel High(2462MHz) with 11Mbps data rate were chosen for full testing.

IEEE 802.11g mode:

Channel Low(2412MHz), Channel Mid(2437MHz) and Channel High(2462MHz) with 6Mbps data rate were chosen for full testing.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/29/2009

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/11/2008
Test Receiver	Rohde&Schwarz	ESCI	100064	11/12/2008
Switch Controller	TRC	Switch Controller	SC94050010	05/04/2008
4 Port Switch	TRC	4 Port Switch	SC94050020	05/04/2008
Horn-Antenna	TRC	HA-0502	06	06/05/2008
Horn-Antenna	TRC	HA-0801	04	06/20/2008
Horn-Antenna	TRC	HA-1201A	01	08/12/2008
Horn-Antenna	TRC	HA-1301A	01	08/12/2008
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/28/2009
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC: 965860 IC: IC 6106	09/25/2008
Test S/W	LABVIEW (V 6.1)			

*Remark: The measurement uncertainty is less than +/- 2.0dB (30MHz ~ 1GHz), +/- 3.1dB (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESHS30	828144/003	10/30/2008
Two-Line V-Network 9kHz-30MHz	Schaffner	NNB41	03/10013	06/12/2008
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	03/31/2009
ISN 9kHz-30MHz	FCC	FCC-TLISN-T4	20167	09/14/2008
Test S/W	LABVIEW (V 6.1)			

*Remark: The measurement uncertainty is less than +/- 2.8dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.*



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at

- No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.  
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan  
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan  
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### **5.2 EQUIPMENT**

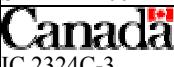
Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

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

### 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	EN 55011, EN 55014-1/2, CISPR 11, CISPR 14-1/2, EN 55022, EN 55015, CISPR 22, CISPR 15, AS/NZS 3548, VCCI V3 (2001), CFR 47, FCC Part 15/18, CNS 13783-1, CNS 13439, CNS 13438, CNS 13803, CNS 14115, EN 55024, IEC 801-2, IEC 801-3, IEC 801-4, IEC/EN 61000-3-2, IEC/EN 61000-3-3, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 50081-1/ EN 61000-6-3, EN 50081-2/EN 61000-6-4, EN 50081-2/EN 61000-6-1: 2001	 ACCREDITED TESTING CERT #0824.01
USA	FCC	3/10 meter Open Area Test Sites (93105, 90471) / 3M Semi Anechoic Chamber (965860) to perform FCC Part 15/18 measurements	 93105, 90471 965860
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 R-393/1066/725/879 C-402/747/912
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2	 ELA 124a ELA 124b ELA 124c
Taiwan	TAF	EN 300 328, EN 300 220-1, EN 300 220-2, EN 300 220-3, 47 CFR FCC Part 15 Subpart C, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 14115, CNS 13438, AS/NZS CISPR 22, CNS 13022-1, IEC 61000-4-2/3/4/5/6/8/11, CNS 13022-2/3	 Testing Laboratory 0363
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	 SL2-IS-E-0014 SL2-IN-E-0014 SL2-A1-E-0014 SL2-R1-E-0014 SL2-R2-E-0014 SL2-L1-E-0014
Canada	Industry Canada	3/10 meter Open Area Test Sites (IC 2324C-3, IC 2324C-5) / 3M Semi Anechoic Chamber (IC 6106)	 IC 2324C-3 IC 2324C-5 IC 6106

\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC (Remote)	DELL	PP05L	7T390 A03	E2K5HCKT	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

**Remark:**

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

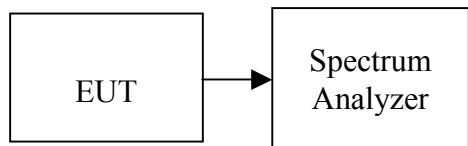
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6DB BANDWIDTH

#### LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### Test Configuration



#### TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = RBW, Span = 50MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.



## **TEST RESULTS**

*No non-compliance noted.*

### **Test Data**

#### **Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	11080	>500	PASS
Mid	2437	12080		PASS
High	2462	11080		PASS

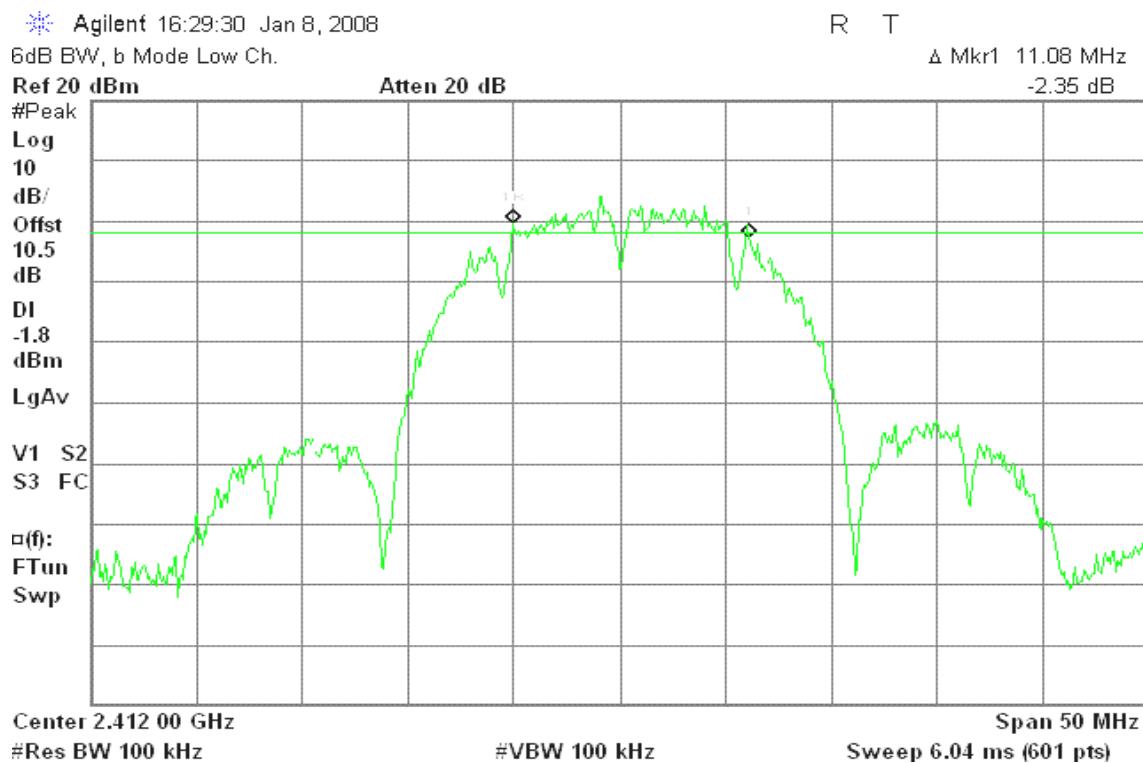
#### **Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	16500	>500	PASS
Mid	2437	16420		PASS
High	2462	16500		PASS

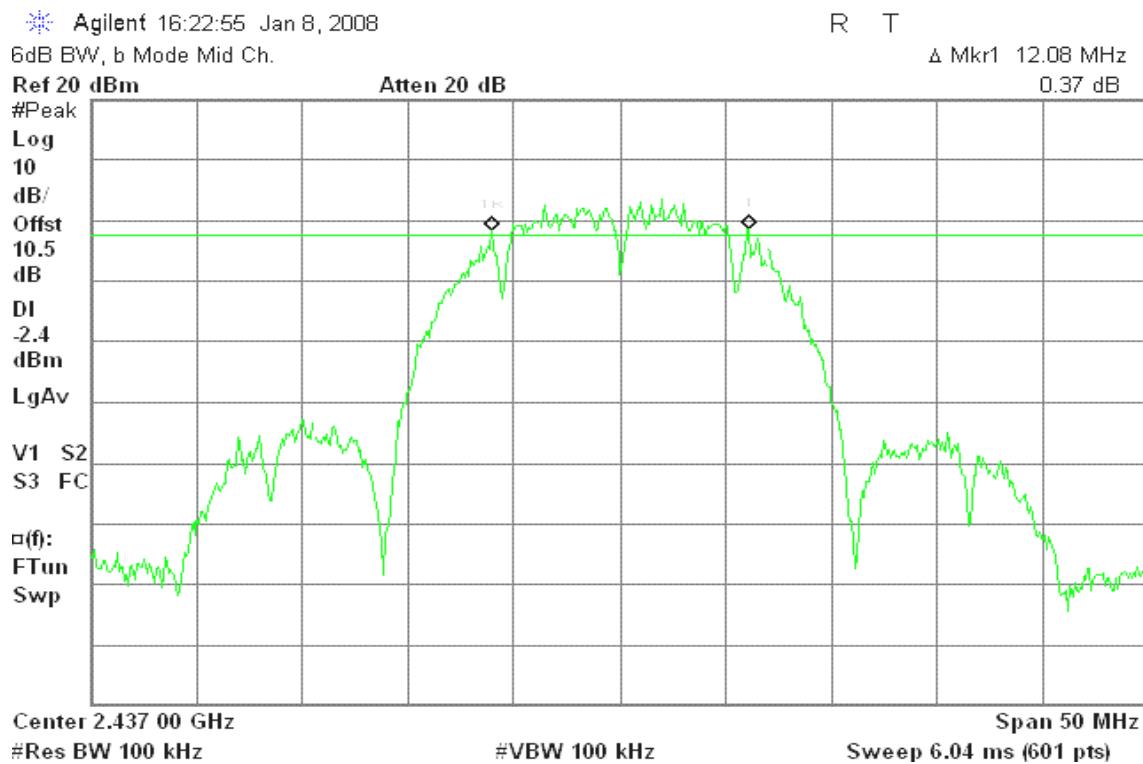
## Test Plot

### IEEE 802.11b

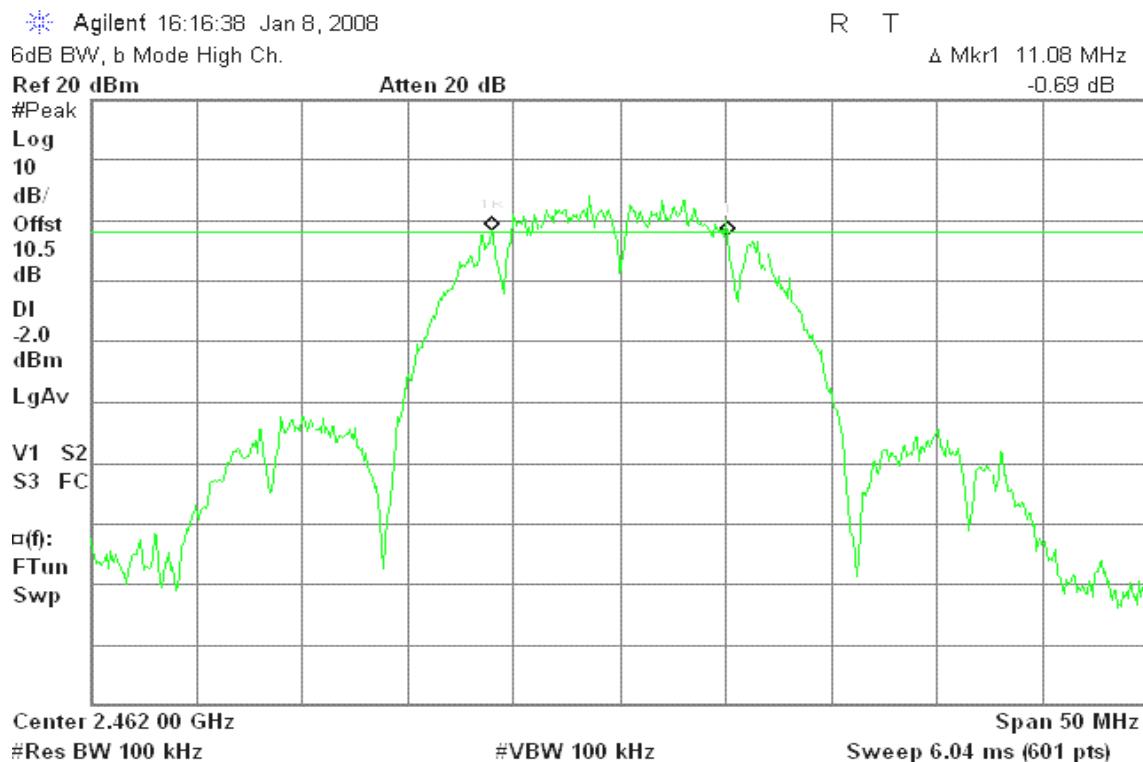
#### **6dB Bandwidth (CH Low)**



#### **6dB Bandwidth (CH Mid)**

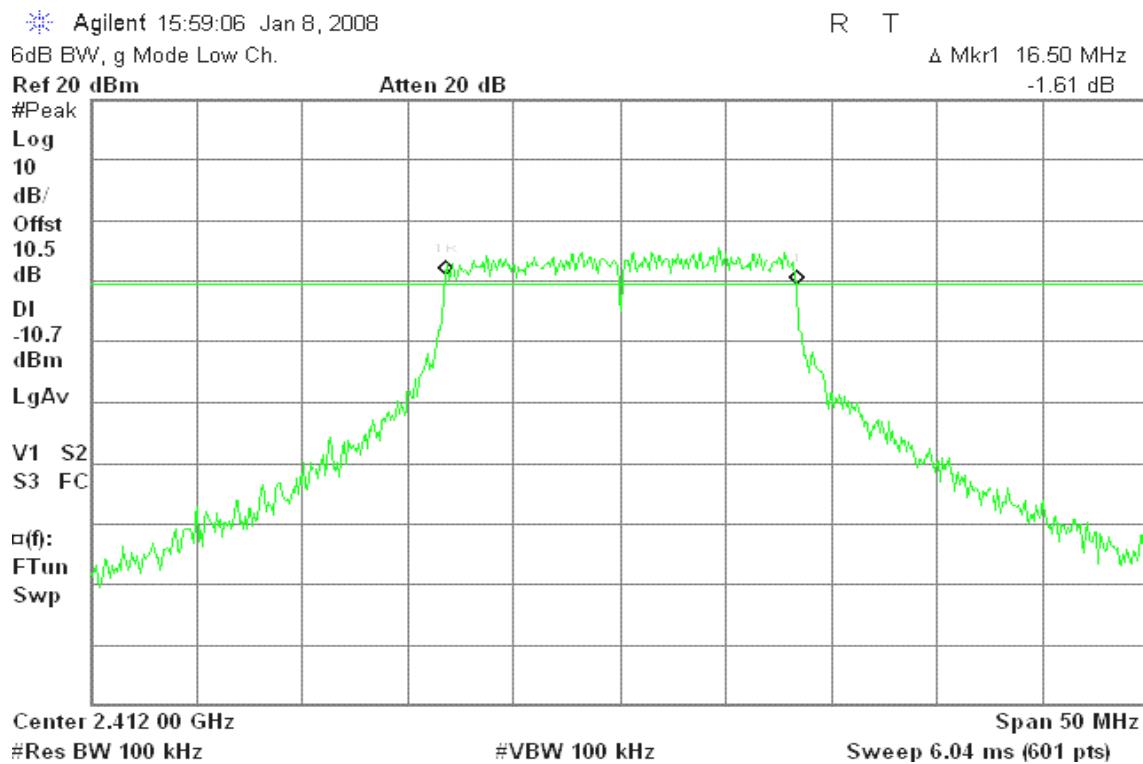


### 6dB Bandwidth (CH High)

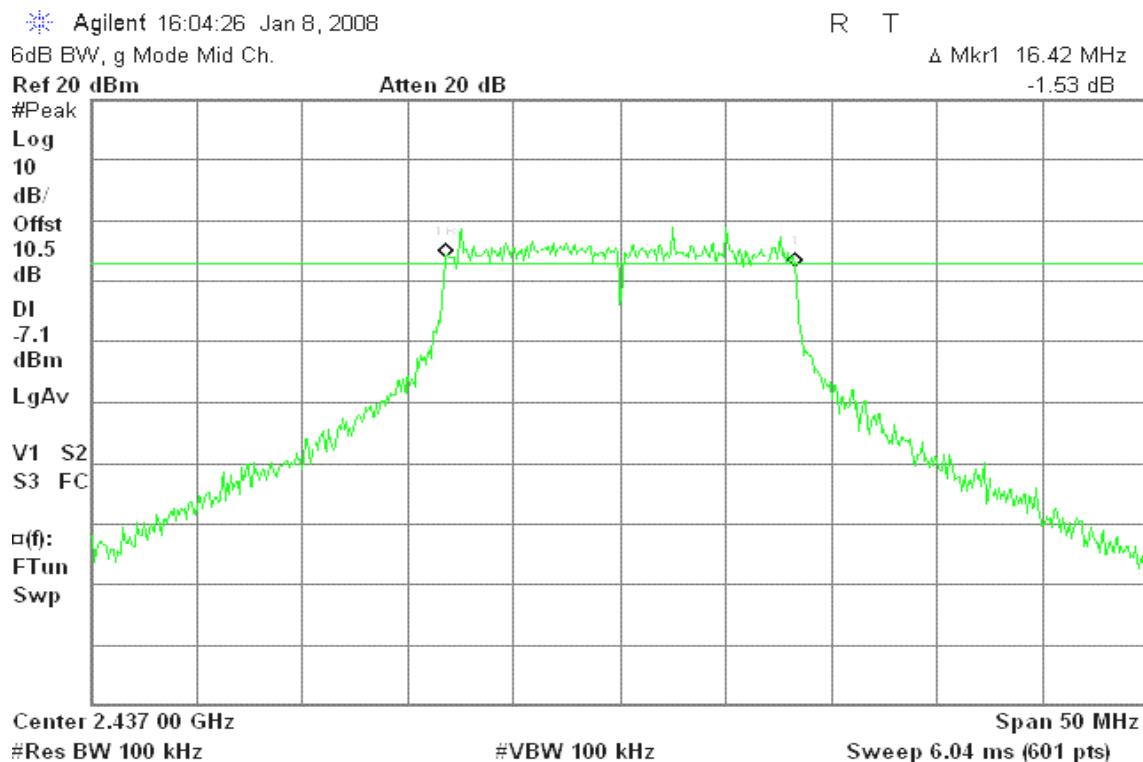


### IEEE 802.11g

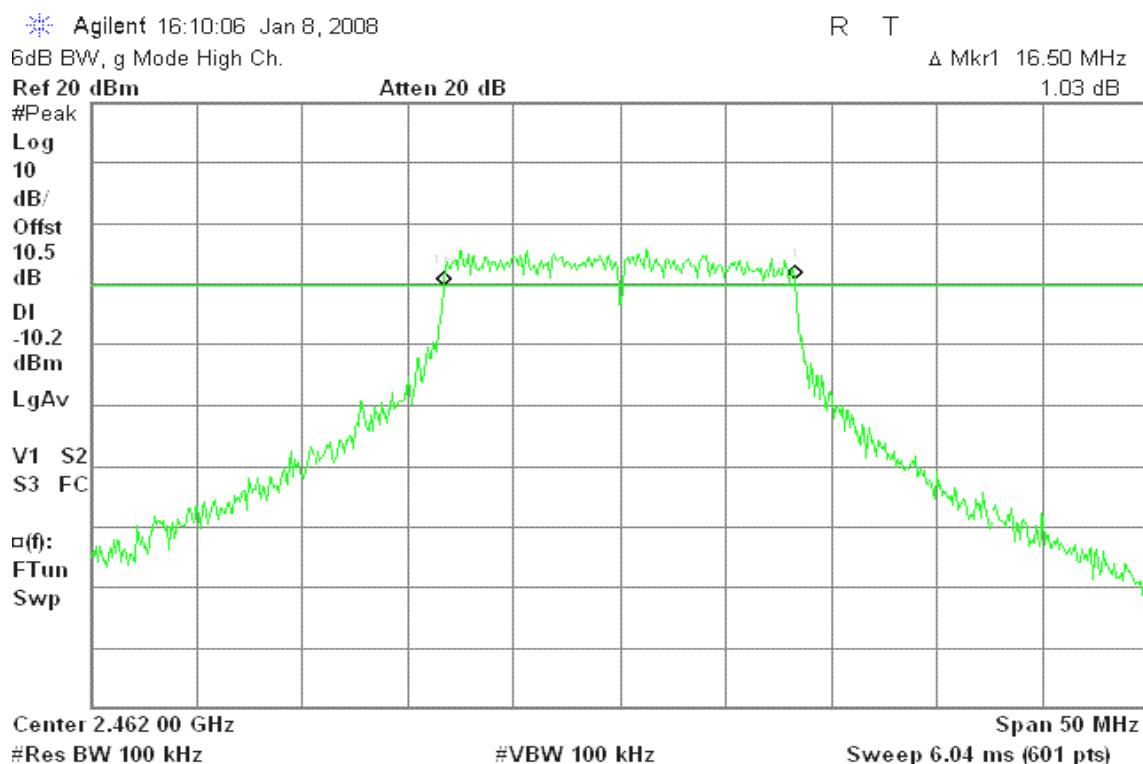
### 6dB Bandwidth (CH Low)



### 6dB Bandwidth (CH Mid)



### 6dB Bandwidth (CH High)



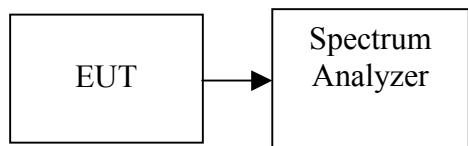
## 7.2 PEAK POWER

### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.



## **TEST RESULTS**

*No non-compliance noted.*

### **Test Data**

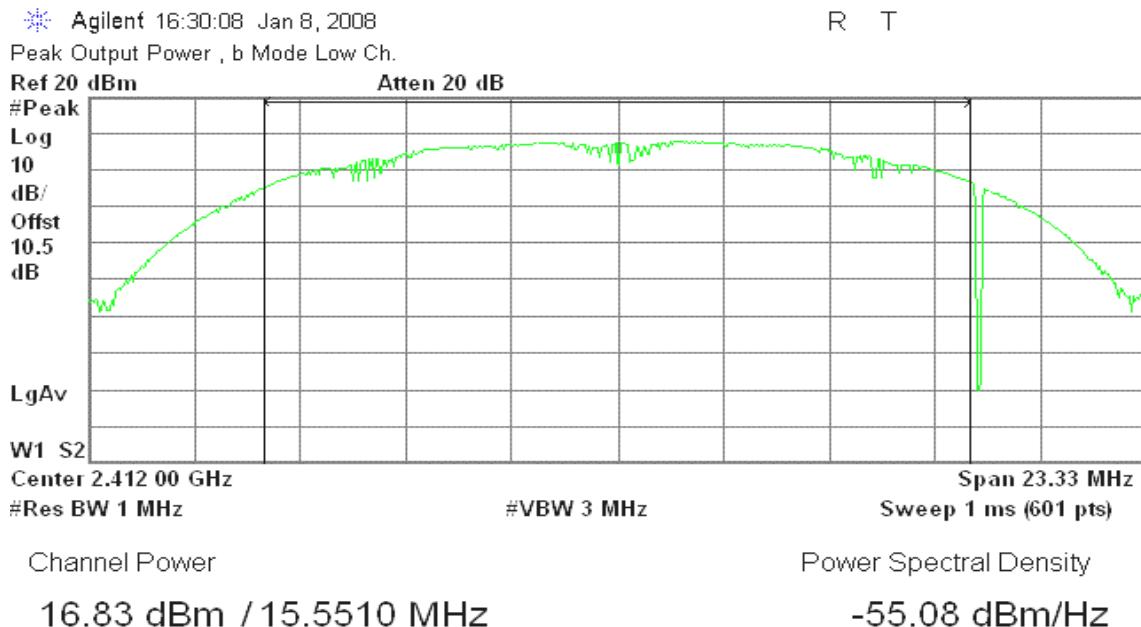
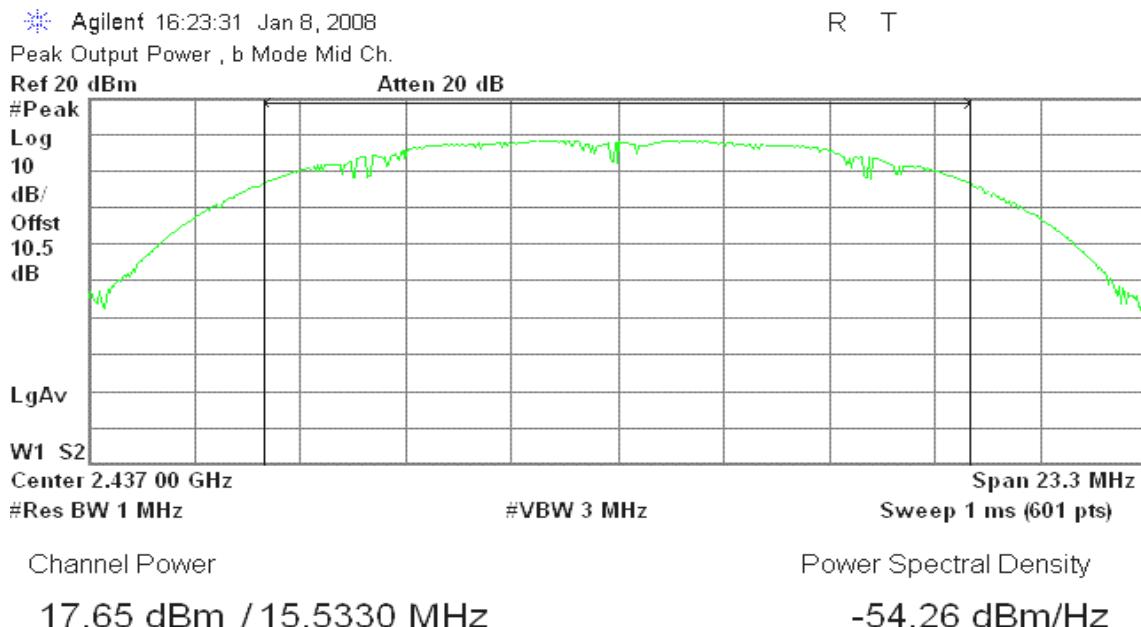
#### **Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.83	0.04819	0.501	PASS
Mid	2437	17.65	0.05821		PASS
High	2462	17.28	0.05346		PASS

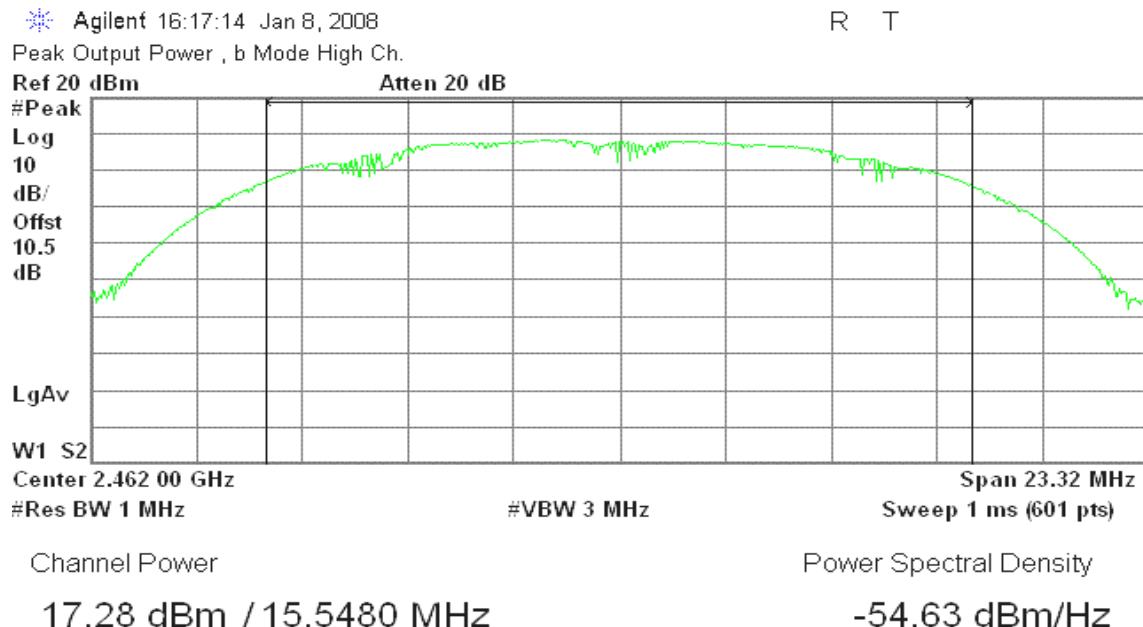
#### **Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	13.12	0.02051	0.501	PASS
Mid	2437	14.57	0.02864		PASS
High	2462	13.18	0.02080		PASS

*Remark: The maximum antenna gain is 9 dBi; therefore the reduction due to antenna gain is 3 dB, so the limit is 27 dBm.*

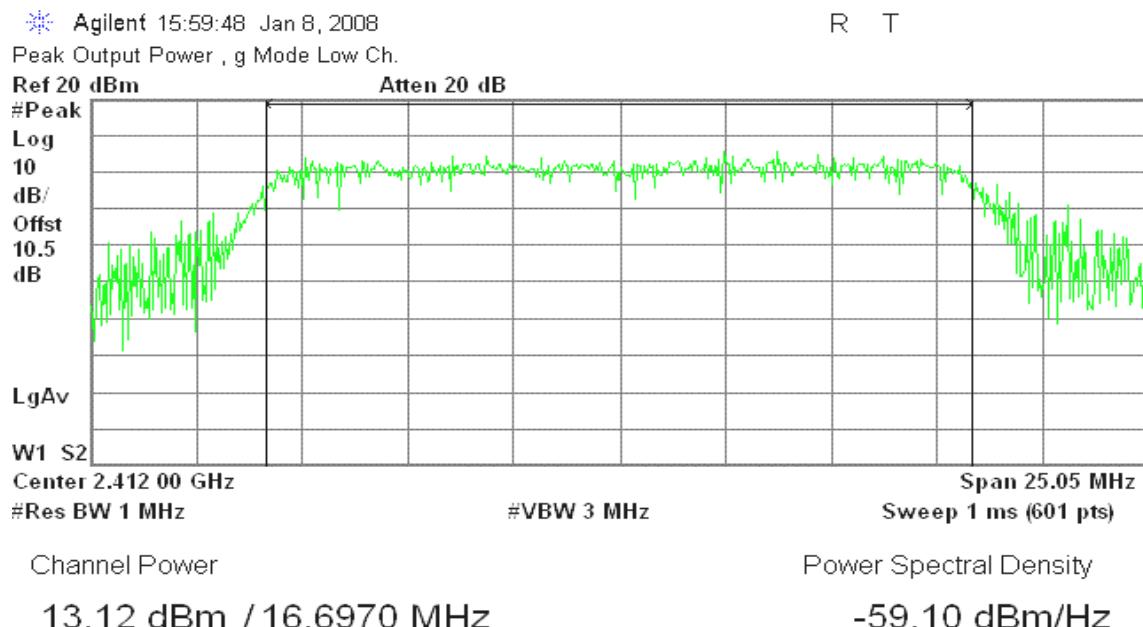
**Test Plot****IEEE 802.11b****Peak Power (CH Low)****Peak Power (CH Mid)**

### Peak Power (CH High)

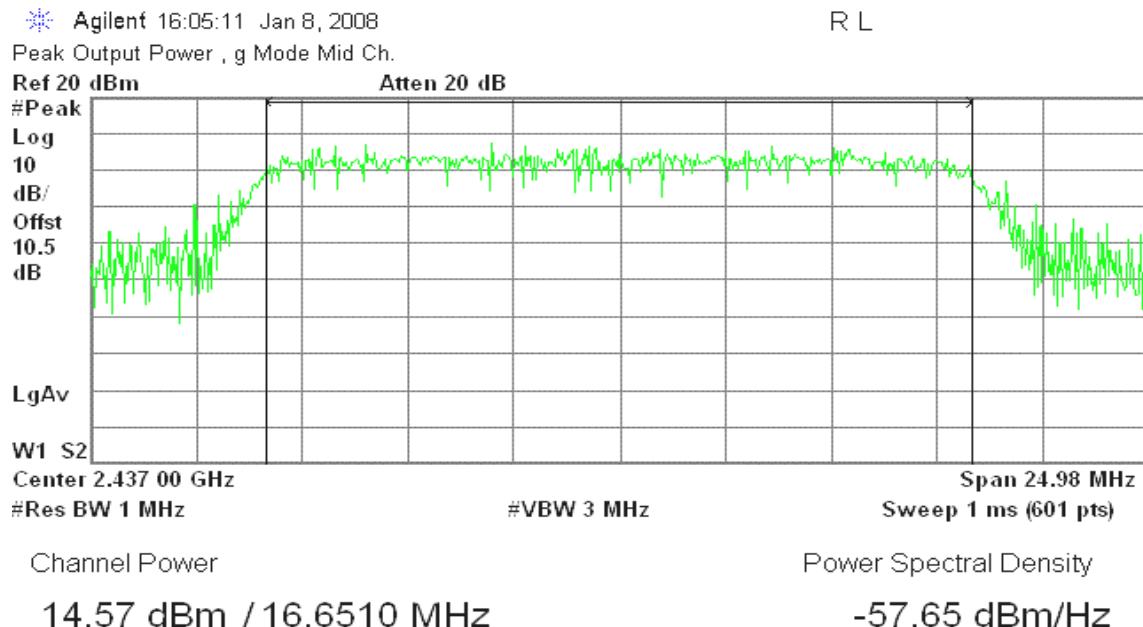


### IEEE 802.11g

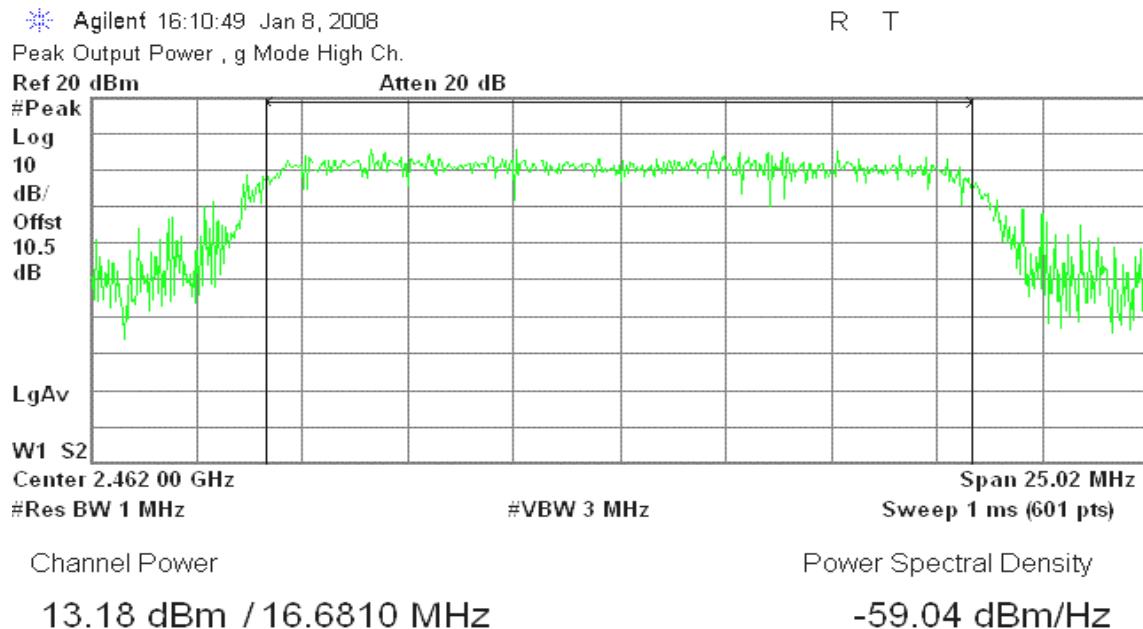
#### Peak Power (CH Low)



### Peak Power (CH Mid)



### Peak Power (CH High)

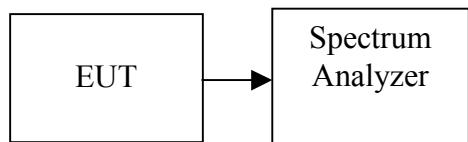


## 7.3 AVERAGE POWER

### LIMIT

None; for reporting purposes only.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the average power detection.



## **TEST RESULTS**

*No non-compliance noted.*

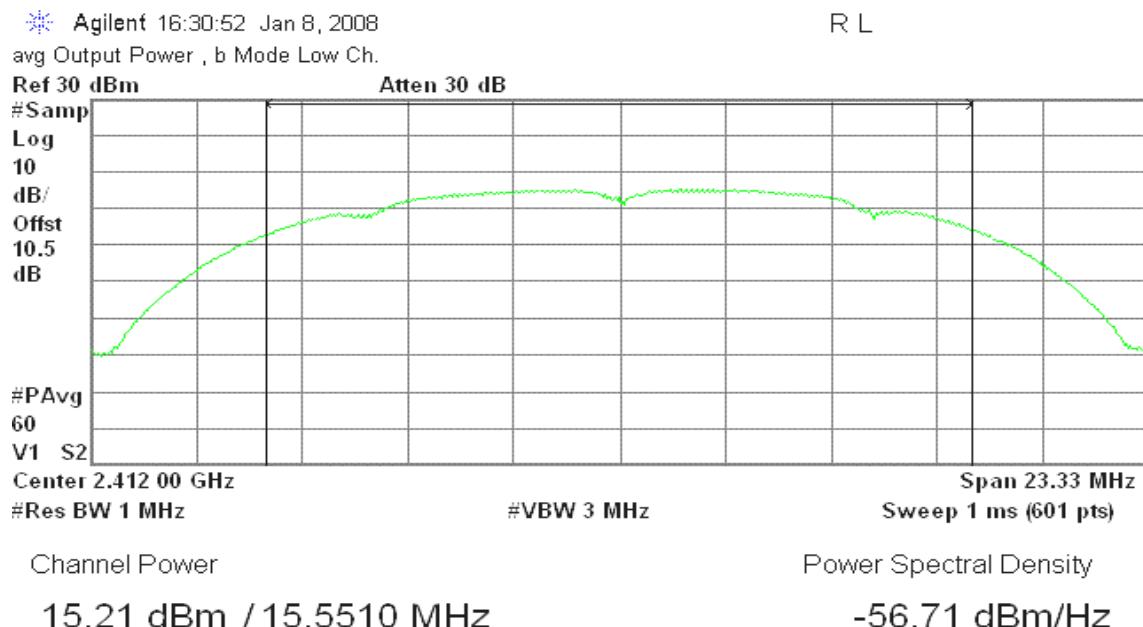
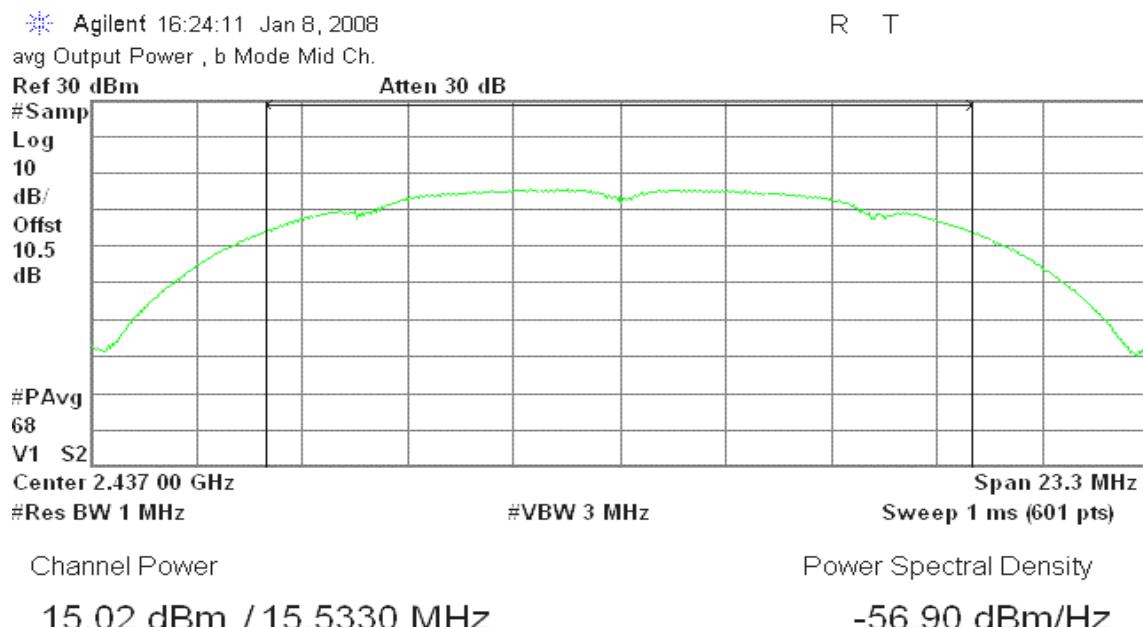
### **Test Data**

#### **Test mode: IEEE 802.11b mode**

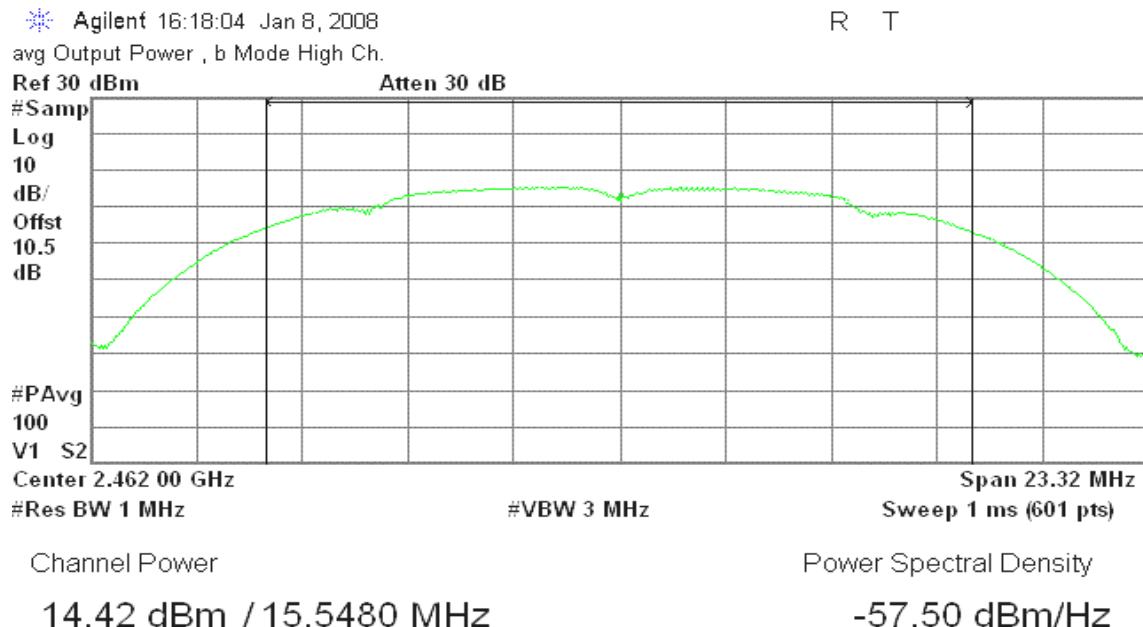
Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	15.21
Mid	2437	15.02
High	2462	14.42

#### **Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	Output Power (dBm)
Low	2412	9.56
Mid	2437	11.22
High	2462	9.92

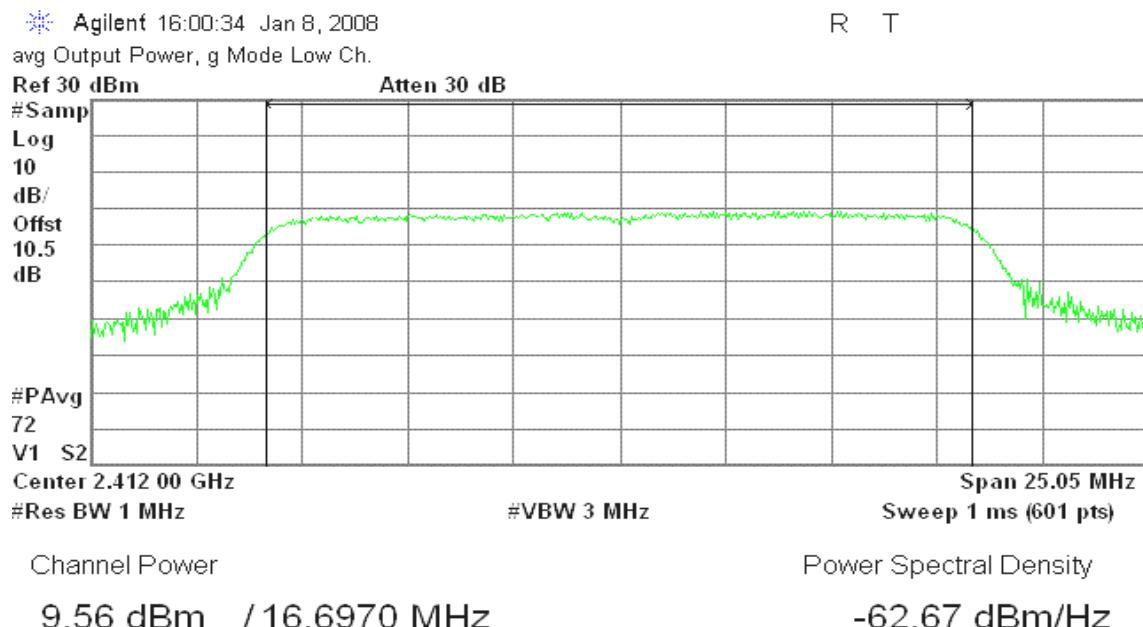
**Test Plot****IEEE 802.11b****Average Power (CH Low)****Average Power (CH Mid)**

### Average Power (CH High)

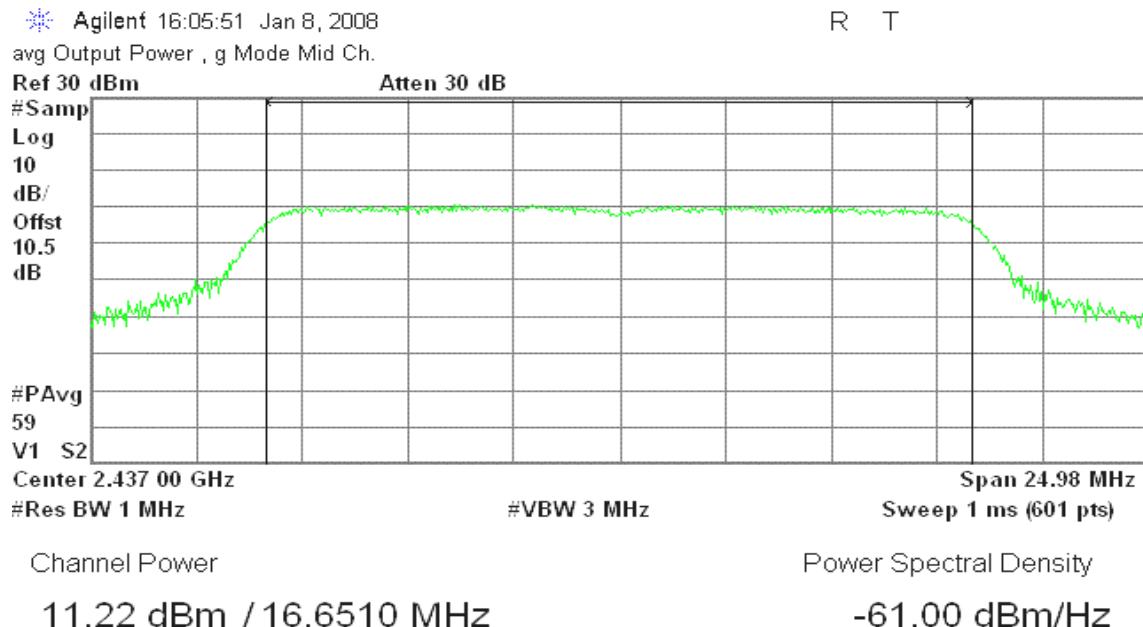


### IEEE 802.11g

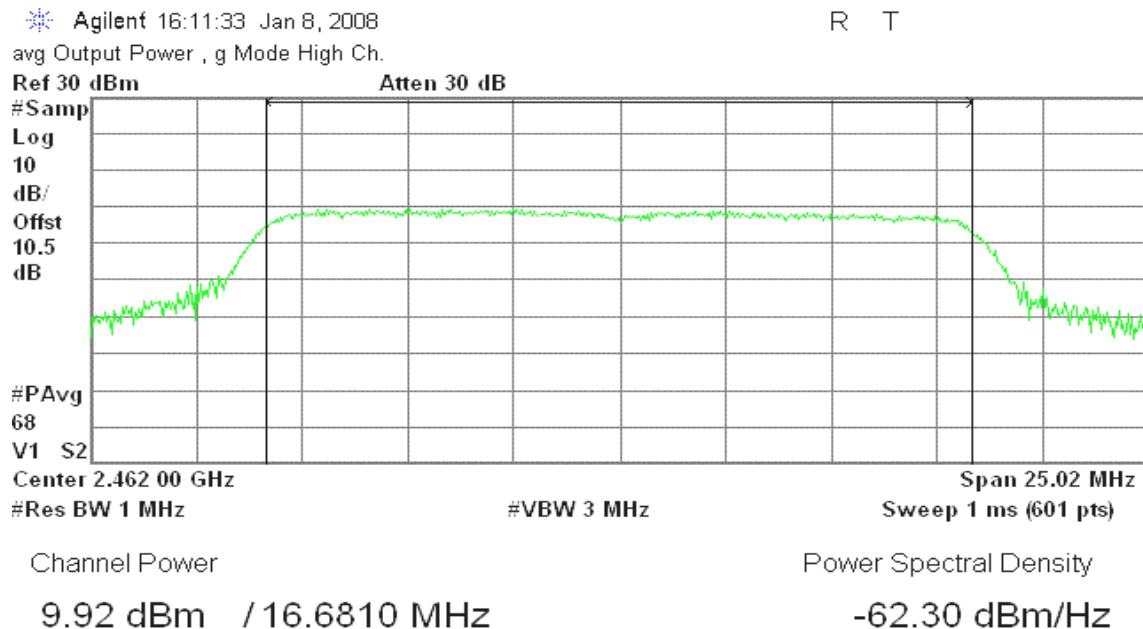
#### Average Power (CH Low)



### Average Power (CH Mid)



### Average Power (CH High)

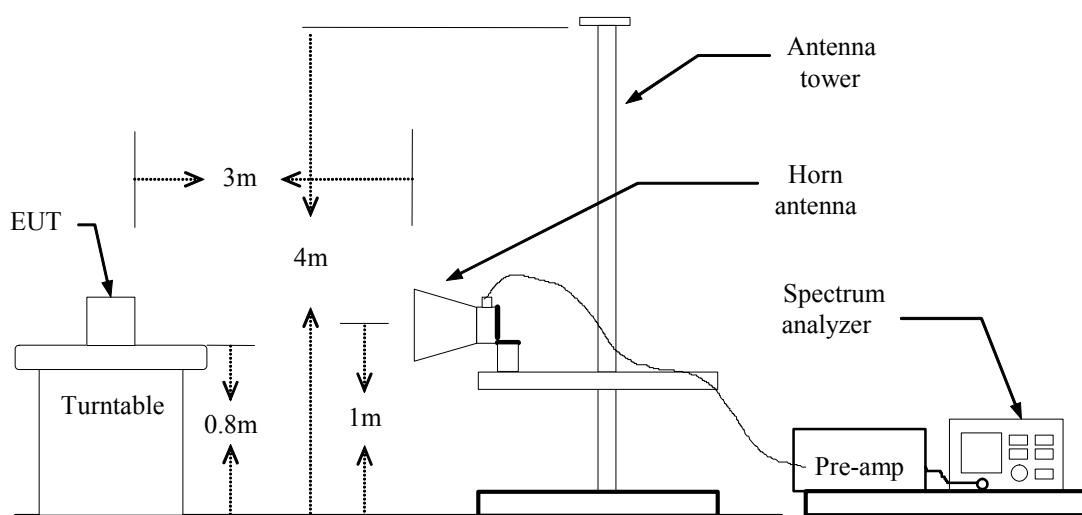


## 7.4 BAND EDGES MEASUREMENT

### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands 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, provided the transmitter demonstrates compliance with the peak conducted power limits. 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 Section 15.205(c)).

### Test Configuration

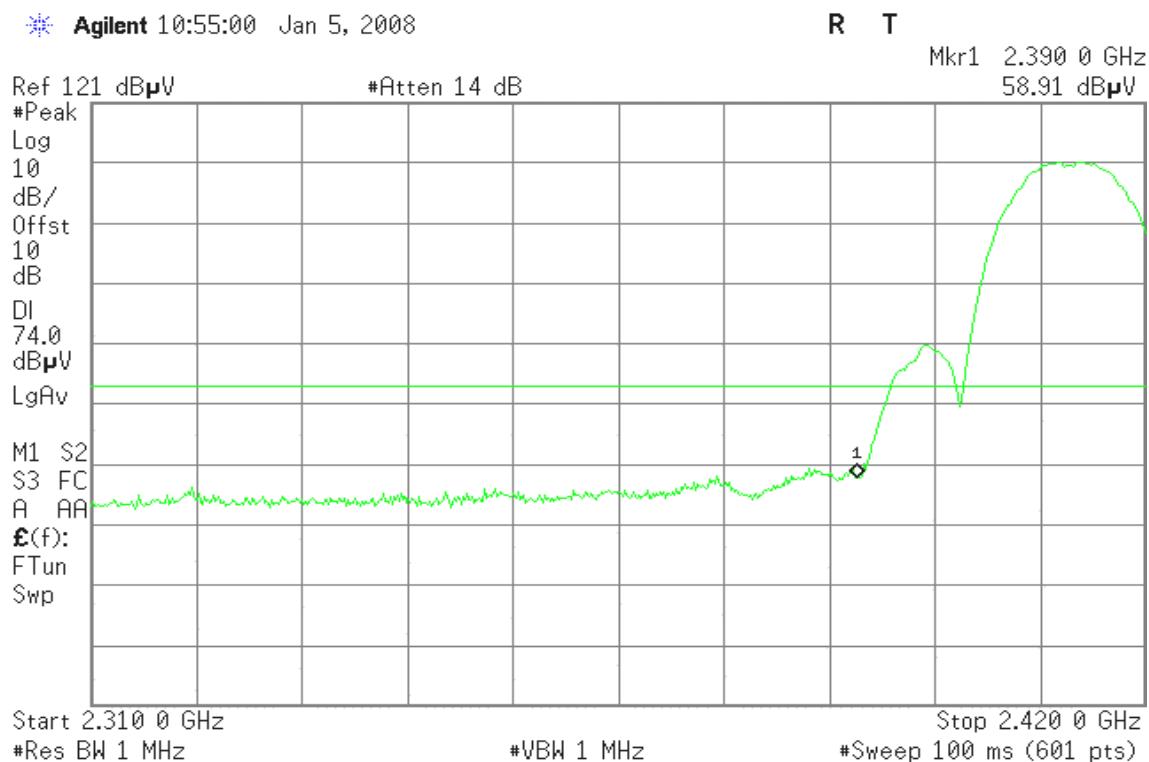
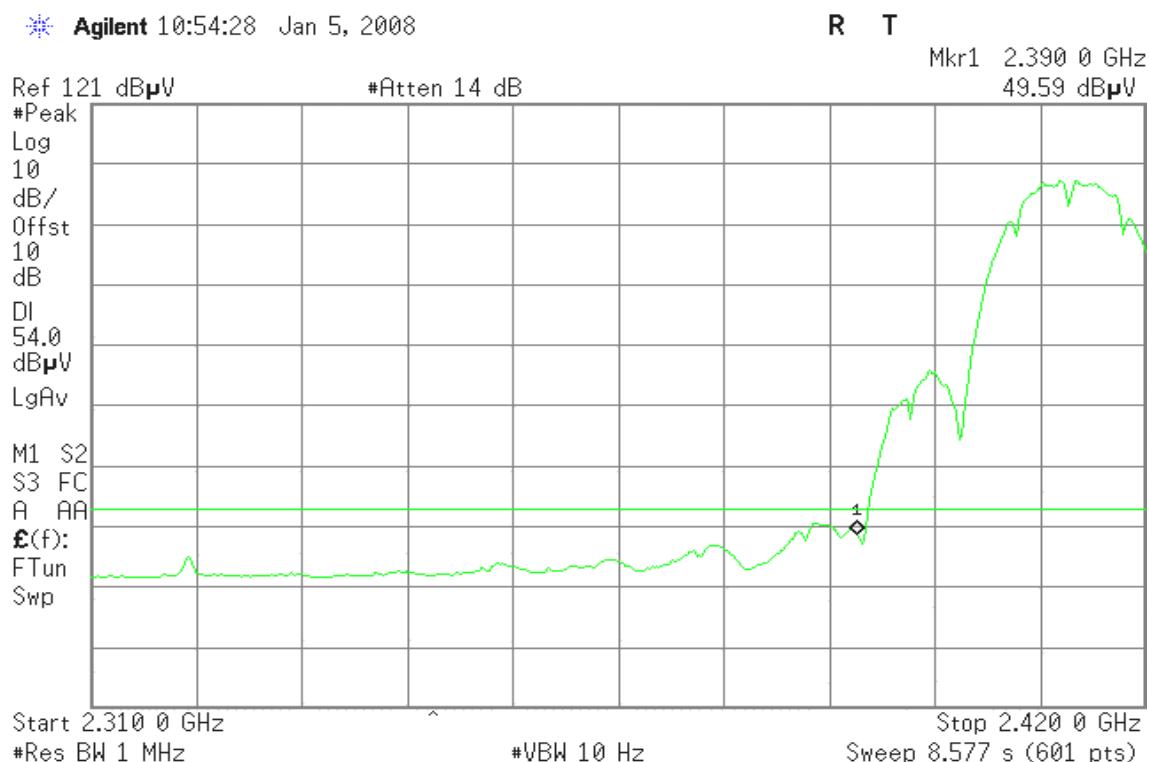


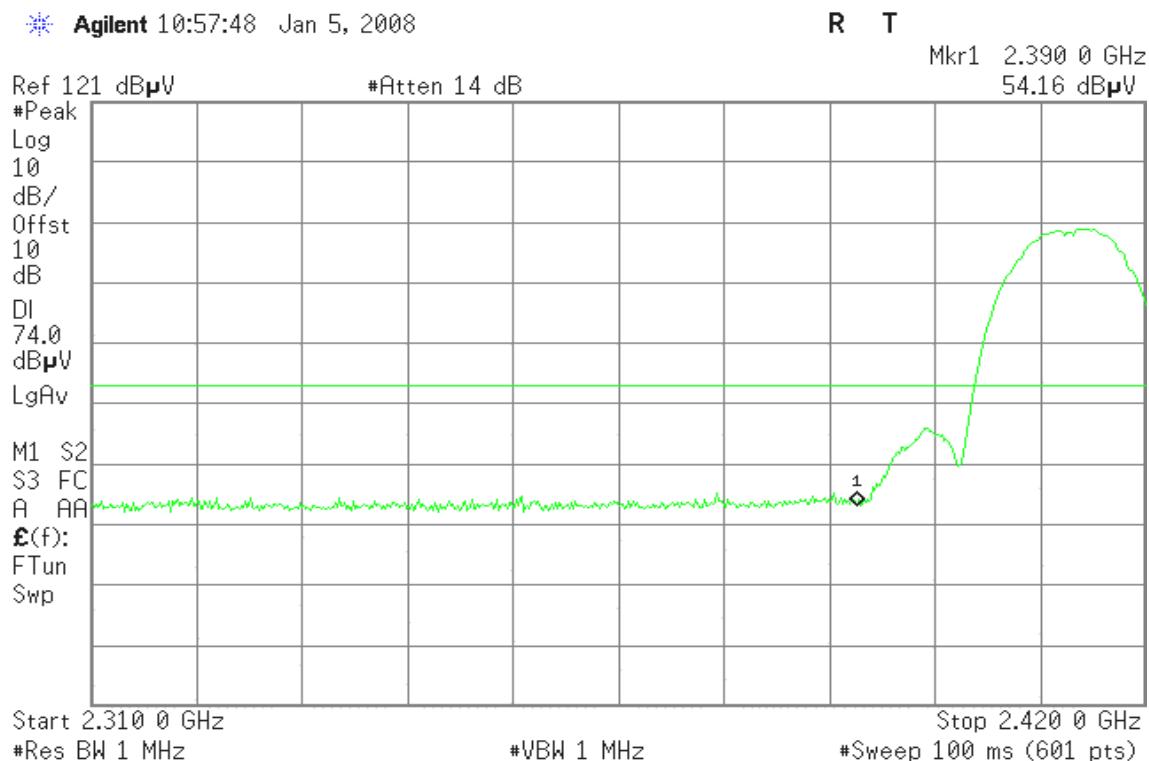
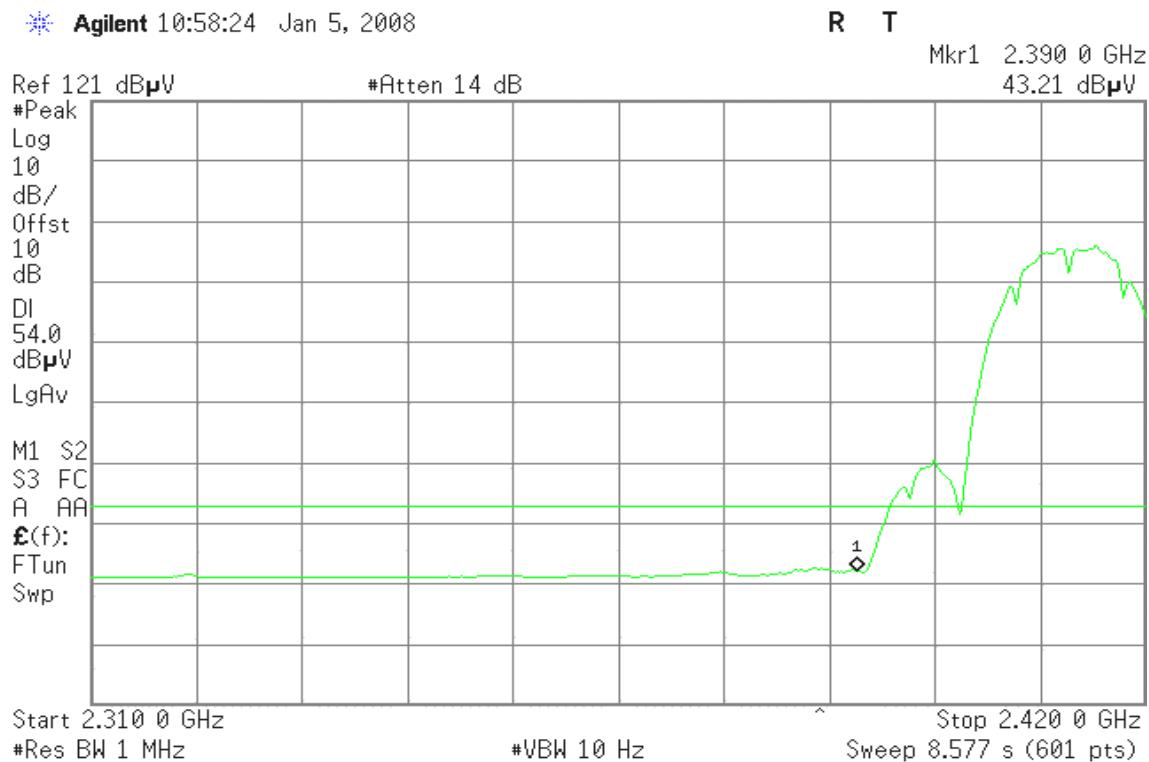
### TEST PROCEDURE

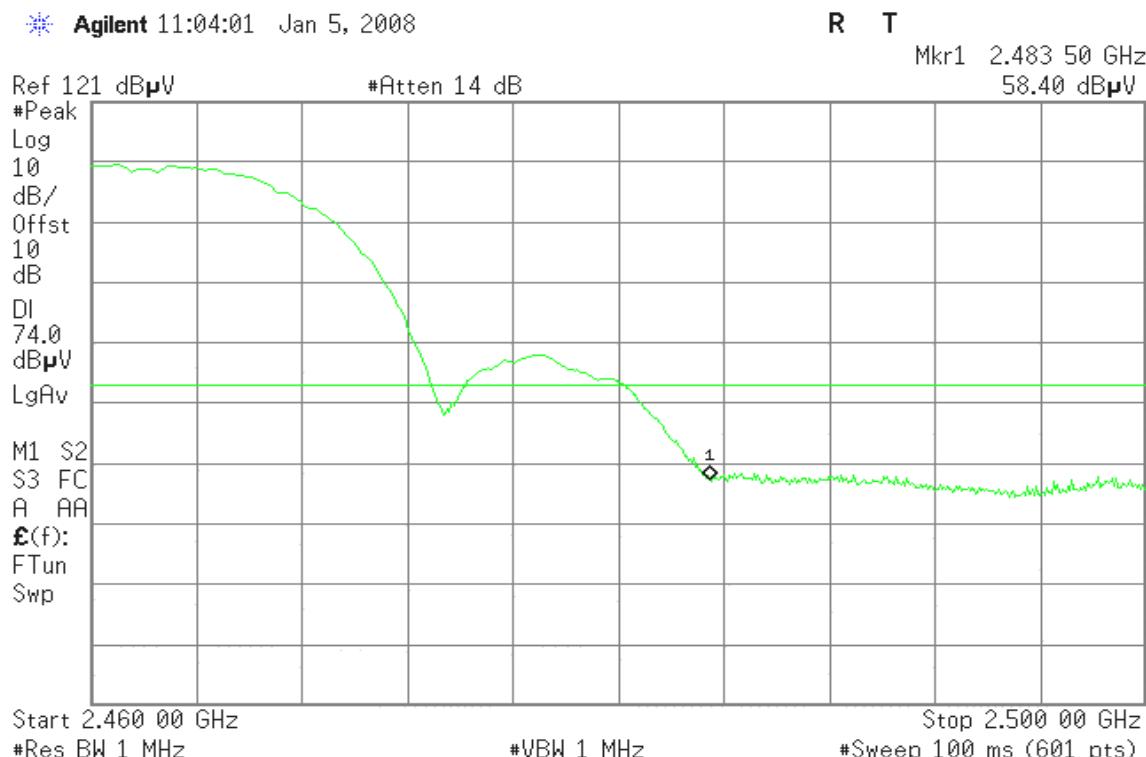
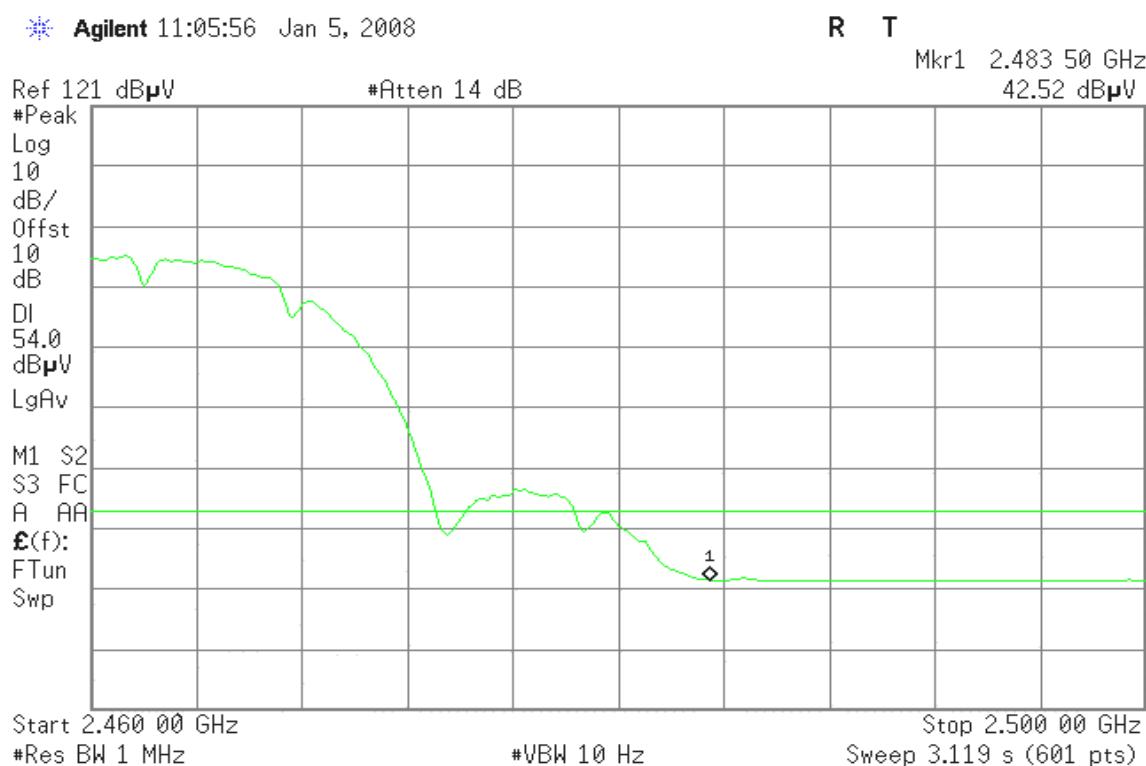
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

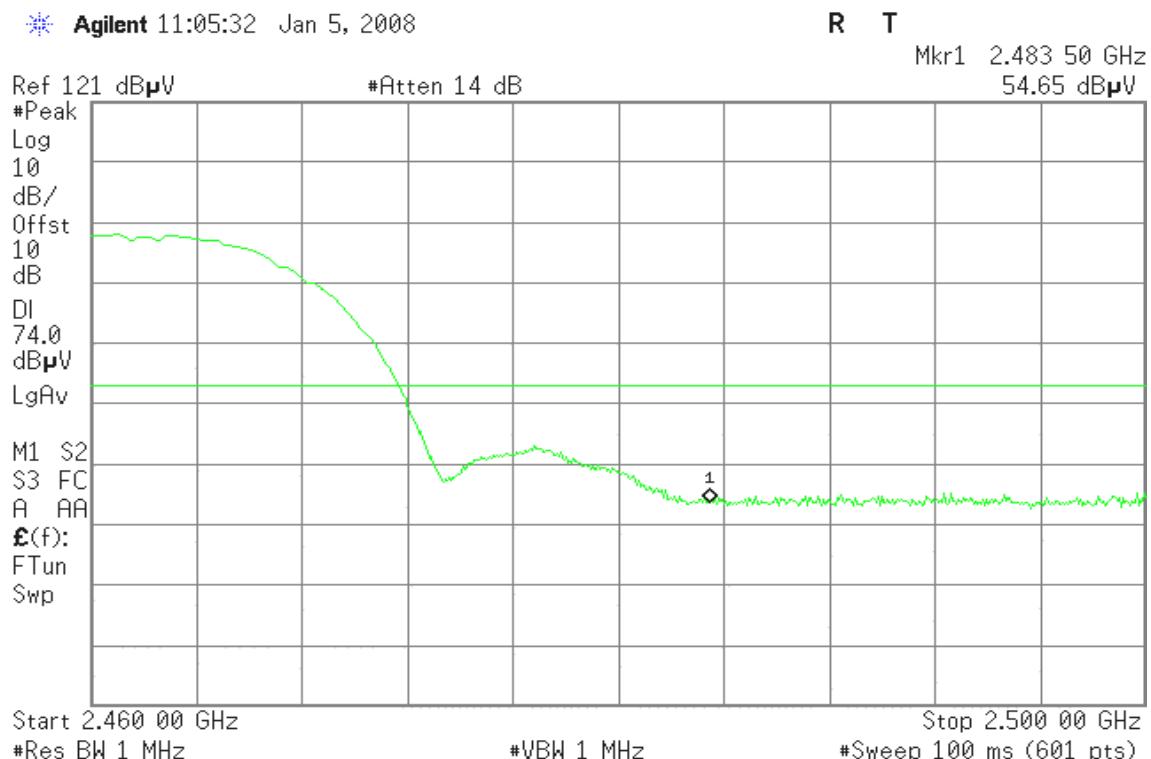
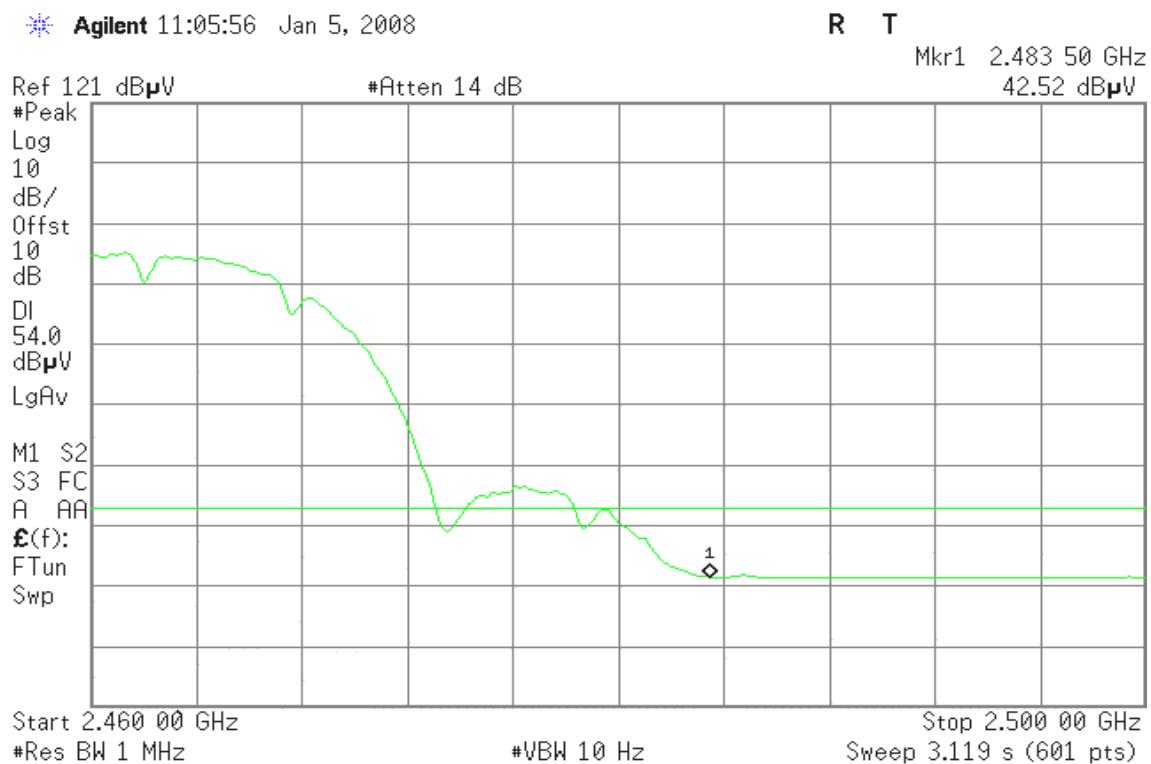
### TEST RESULTS

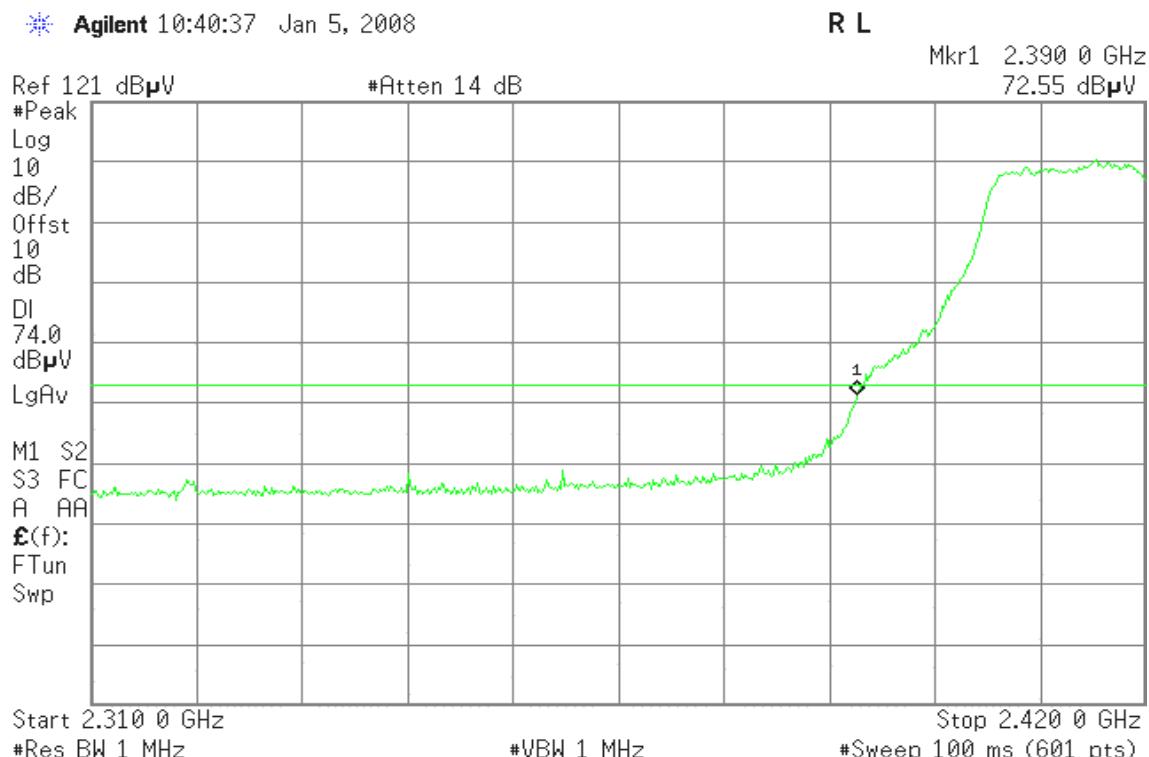
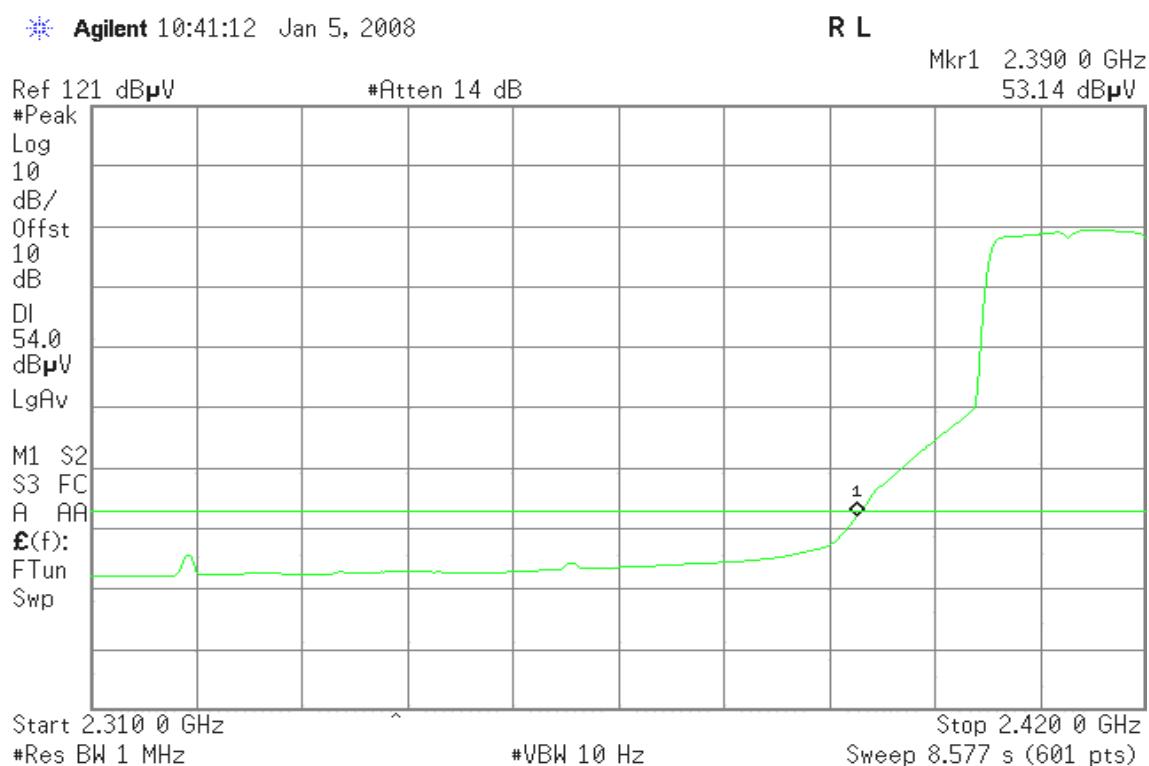
Refer to attach spectrum analyzer data chart.

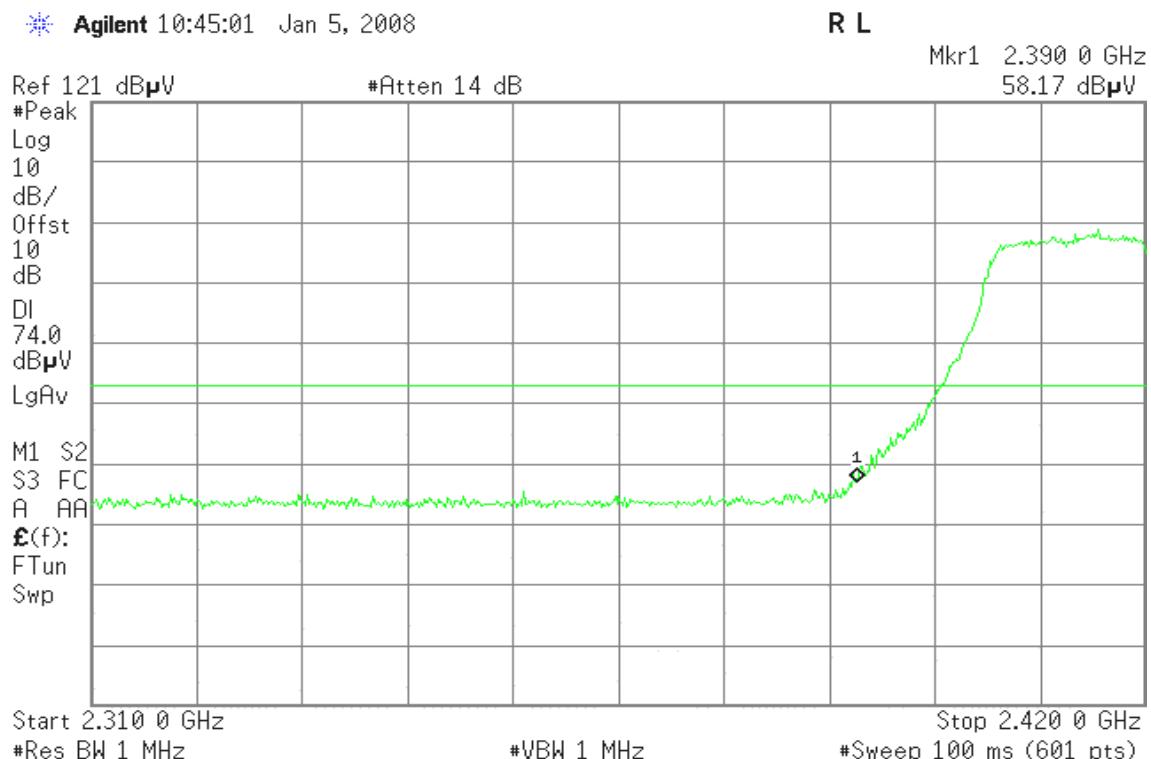
**Panel Antenna:****Band Edges (IEEE 802.11b / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

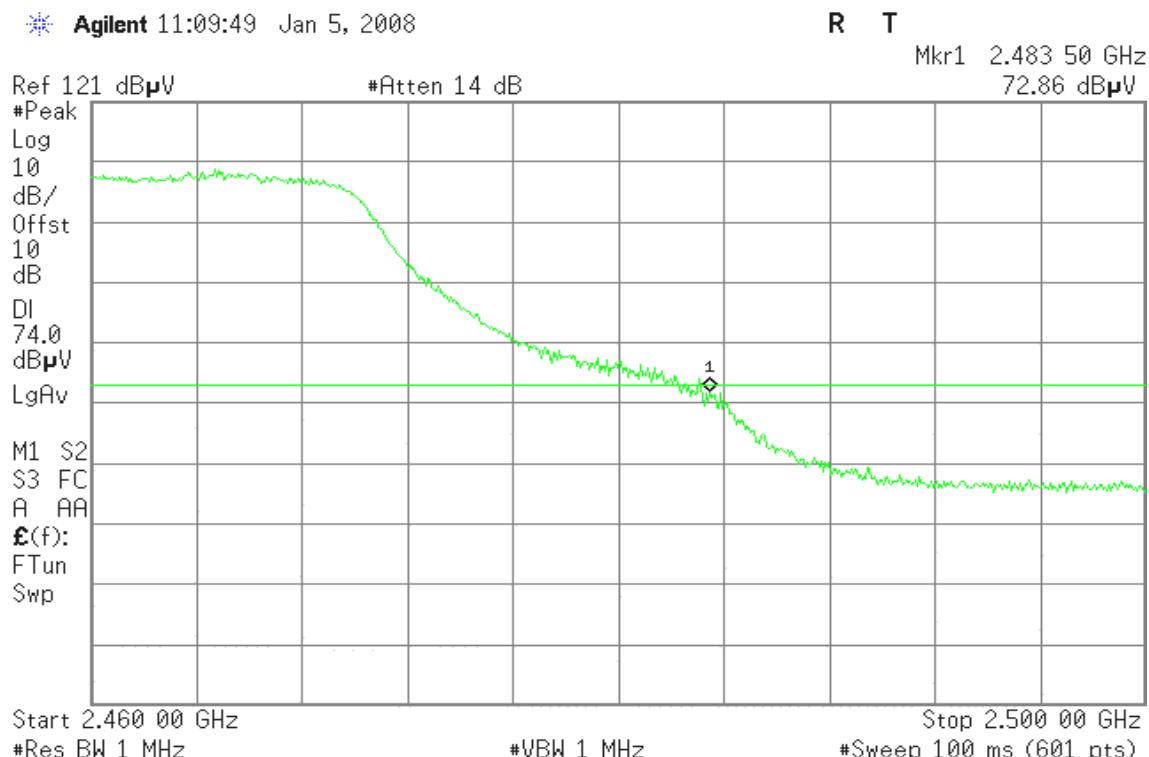
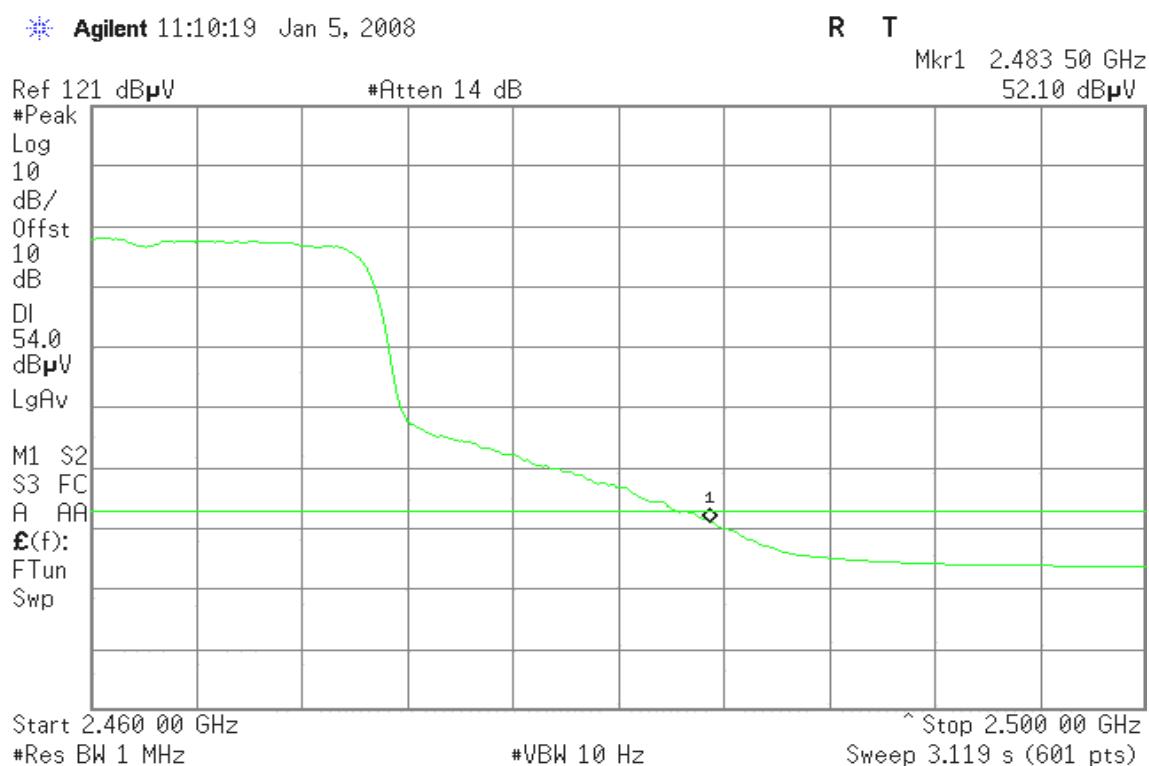
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

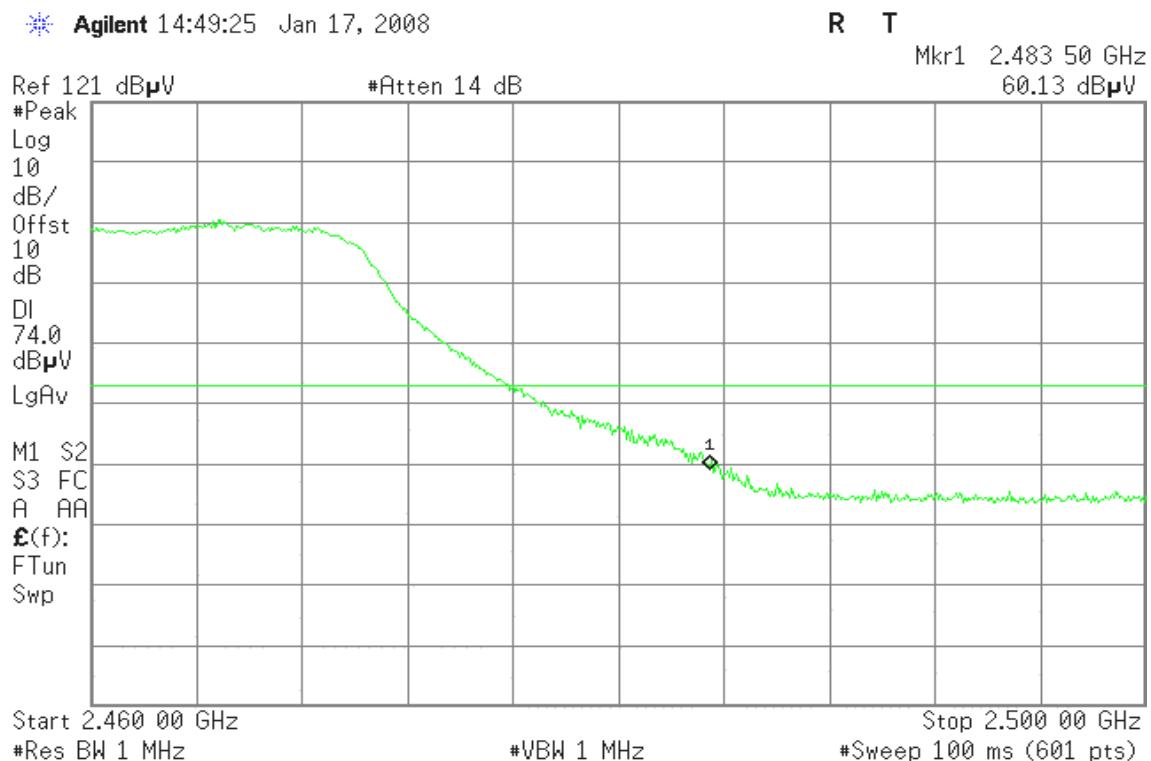
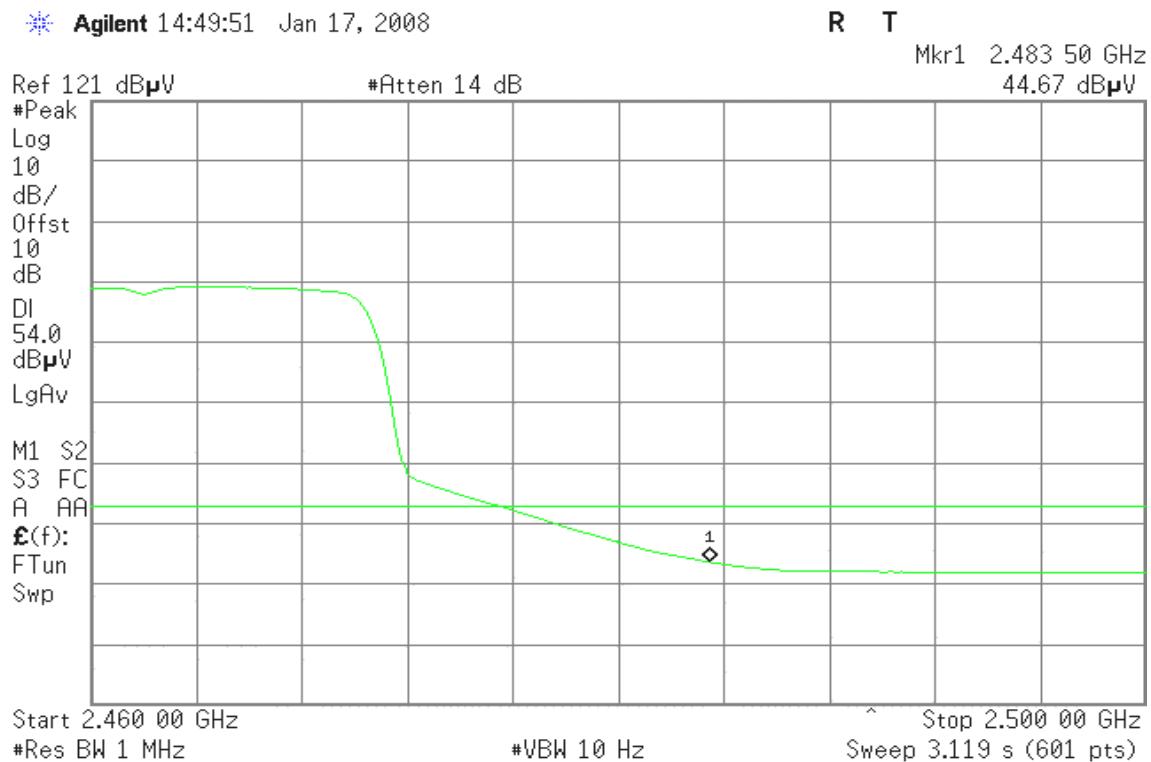
**Band Edges (IEEE 802.11b / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

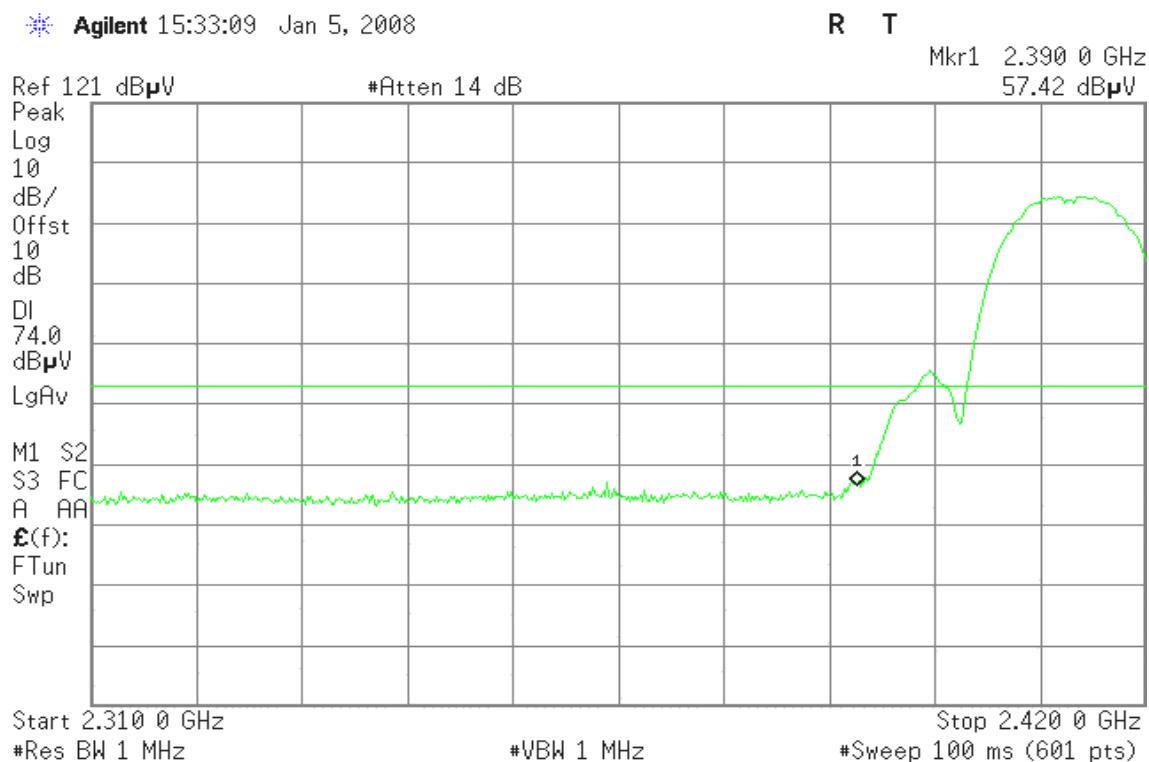
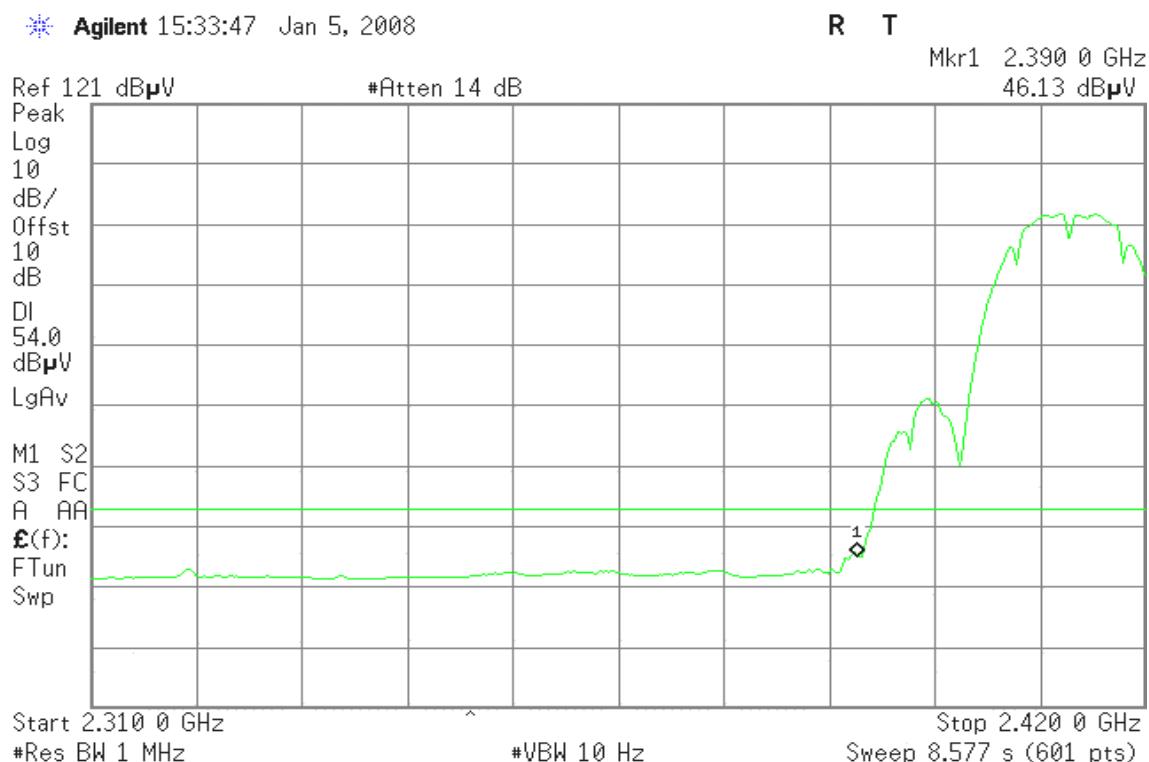
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

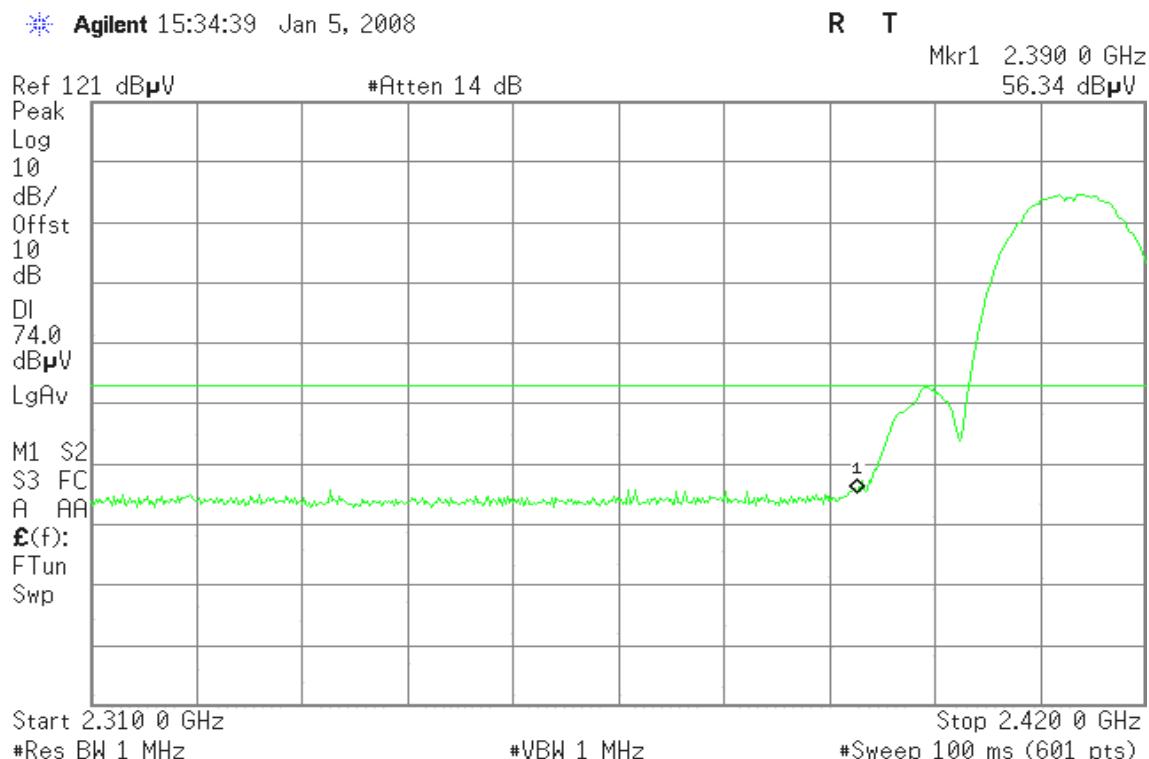
**Band Edges (IEEE 802.11g / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

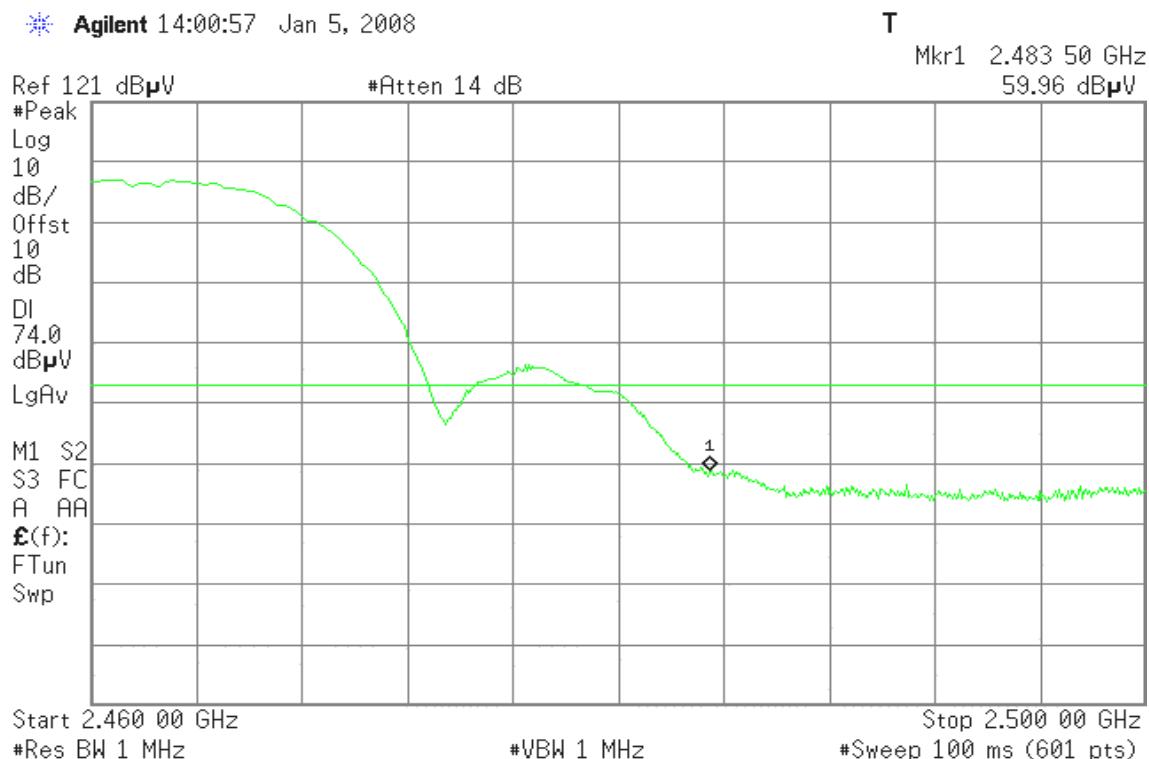
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

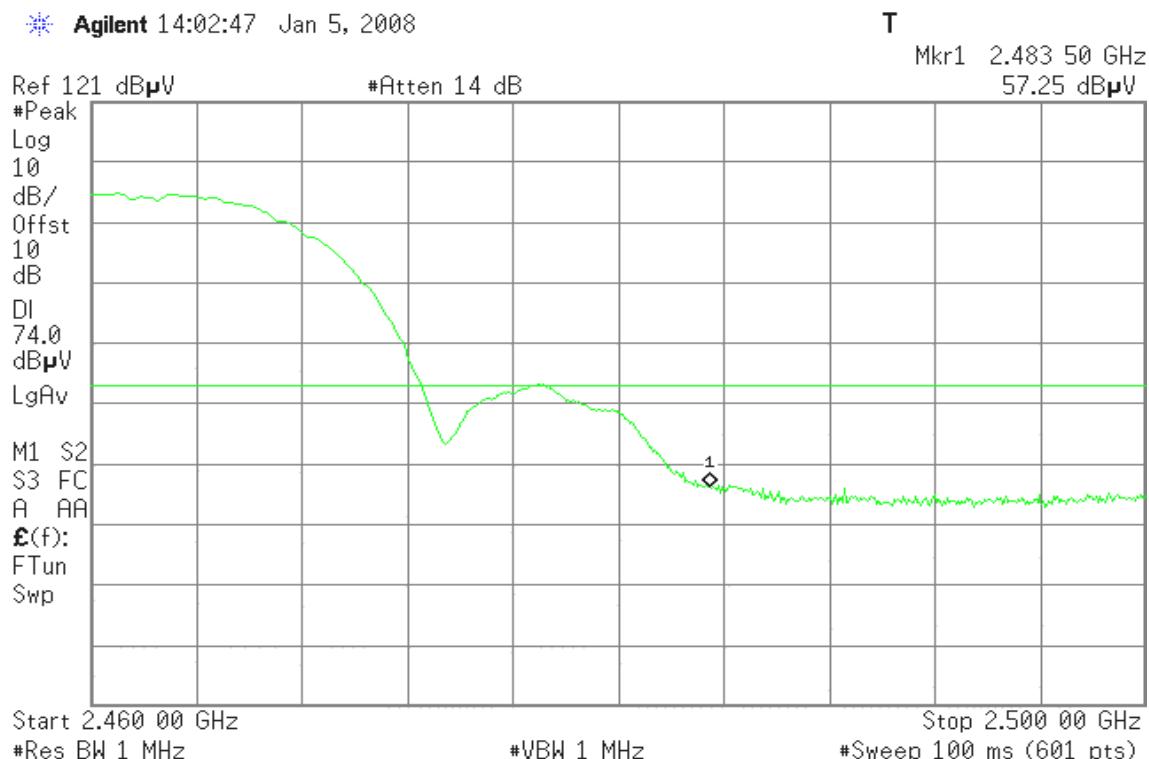
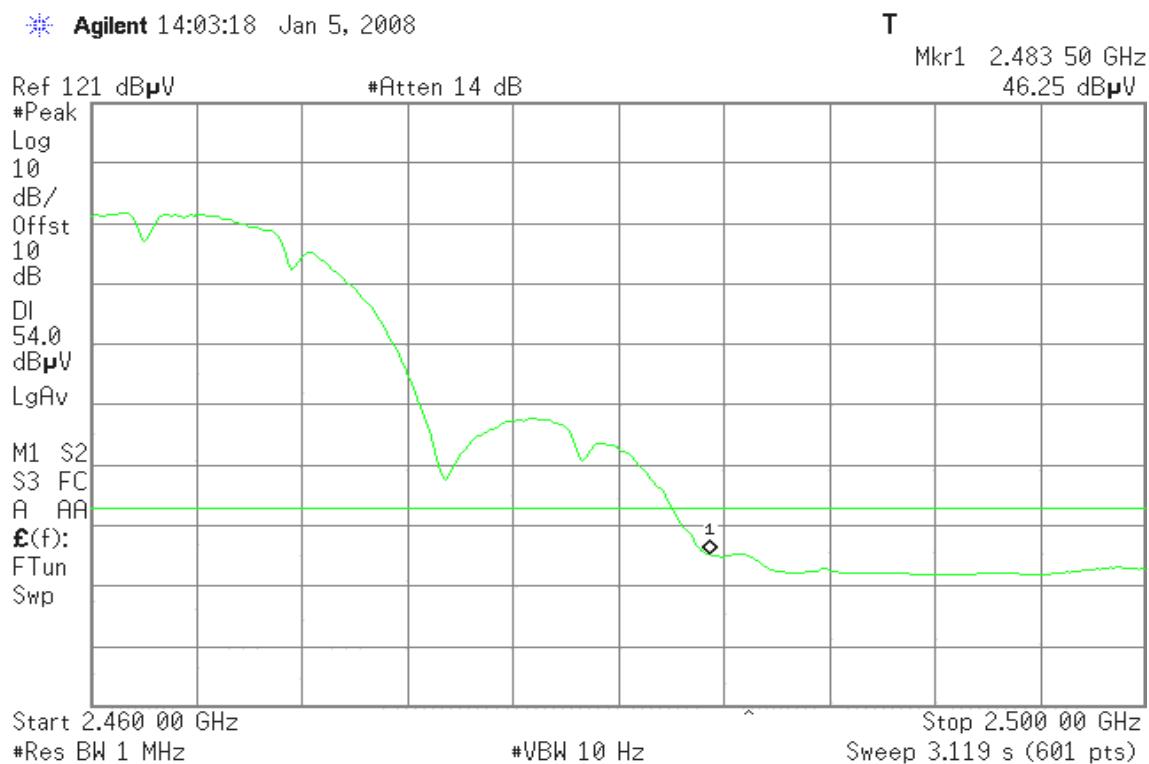
**Band Edges (IEEE 802.11g / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

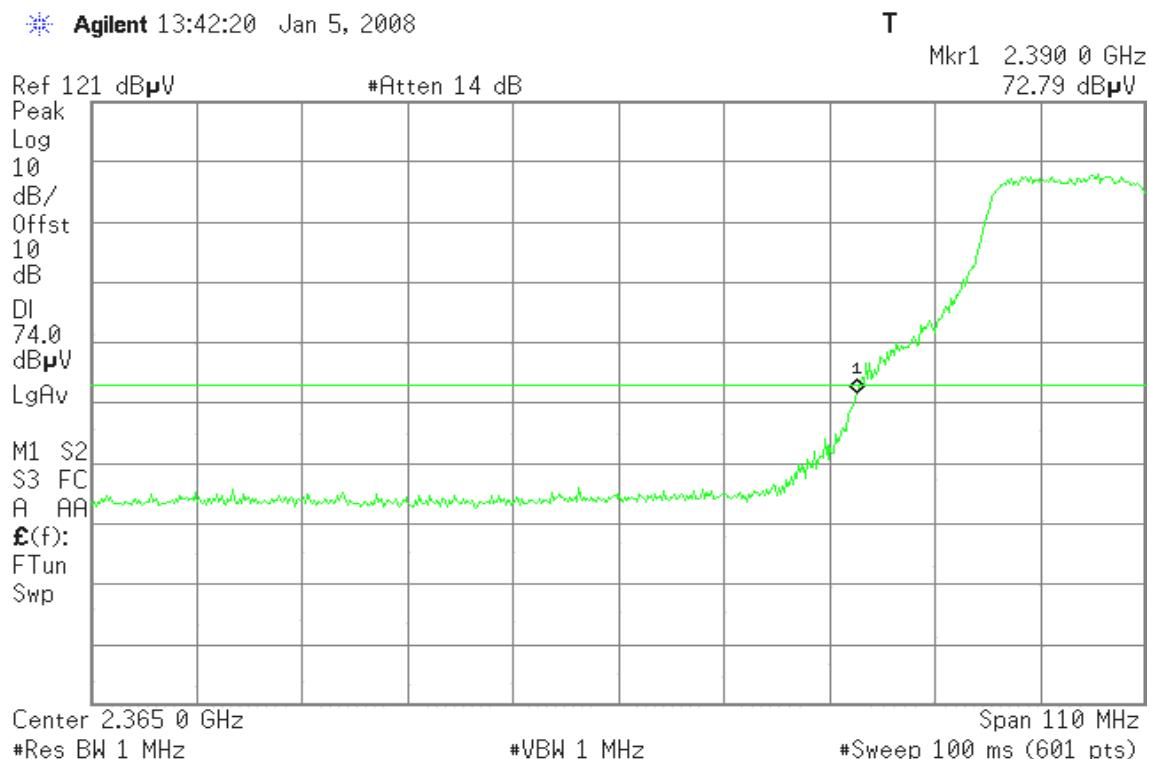
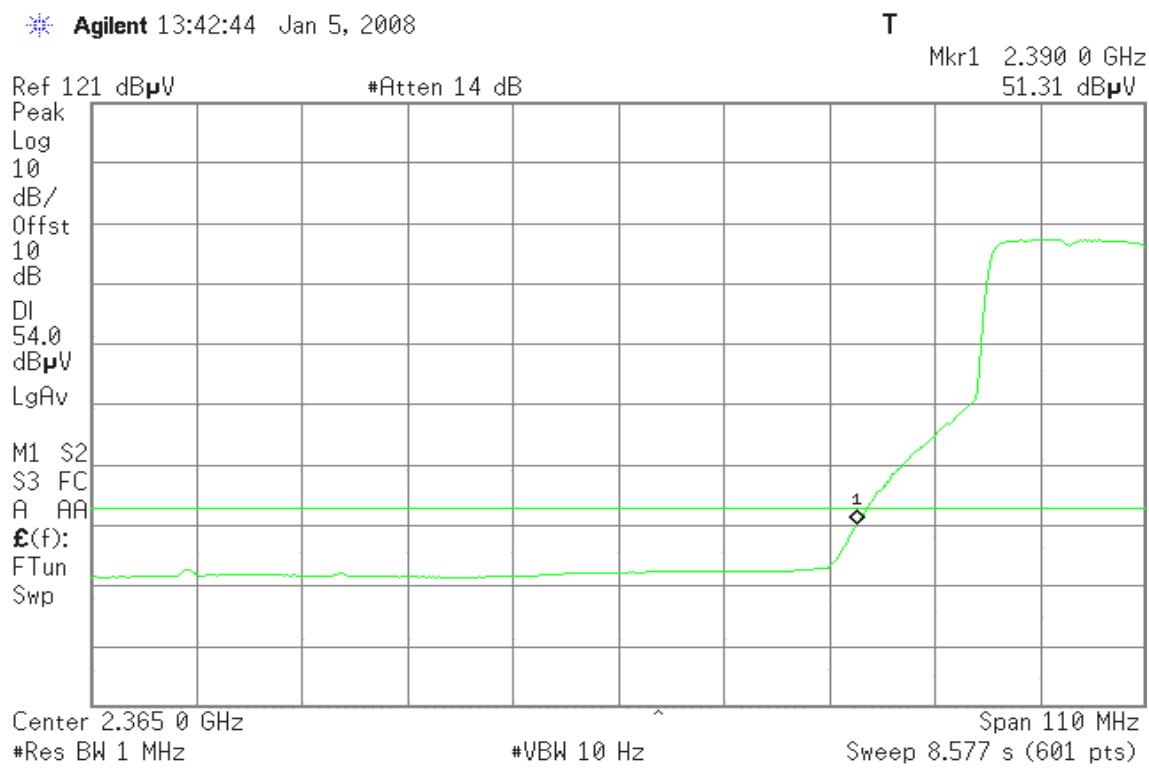
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

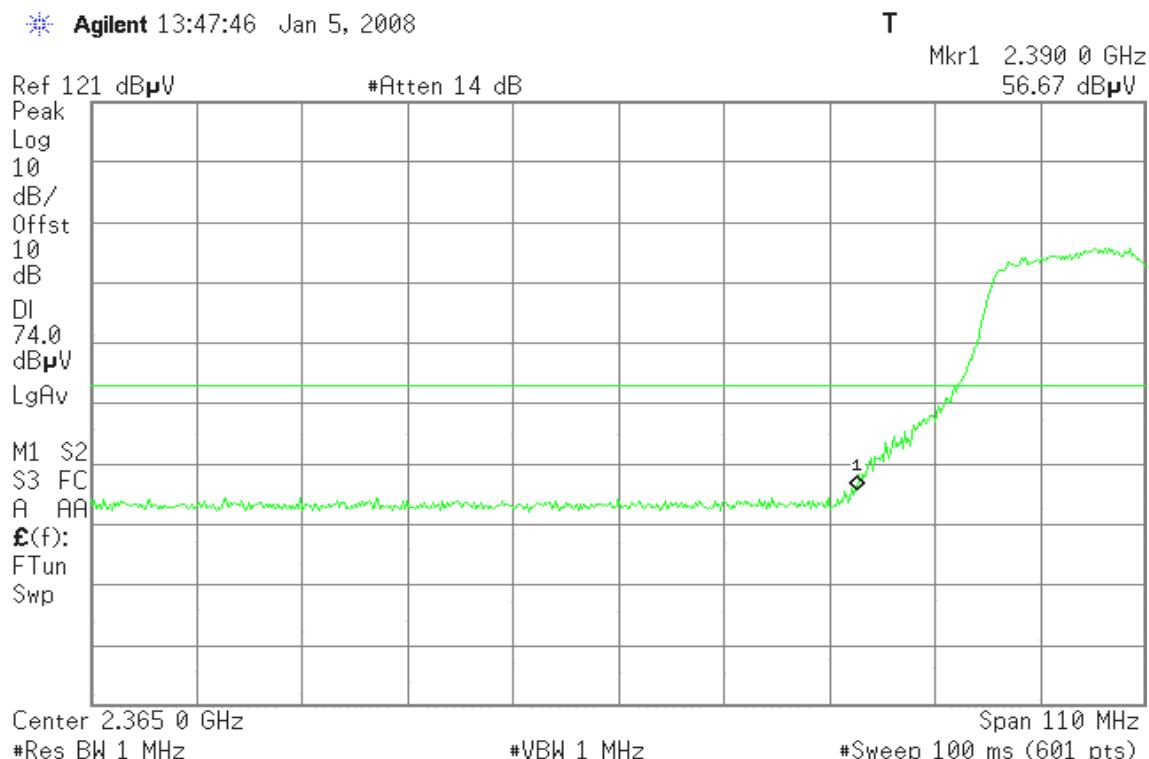
**Omni Antenna:****Band Edges (IEEE 802.11b / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

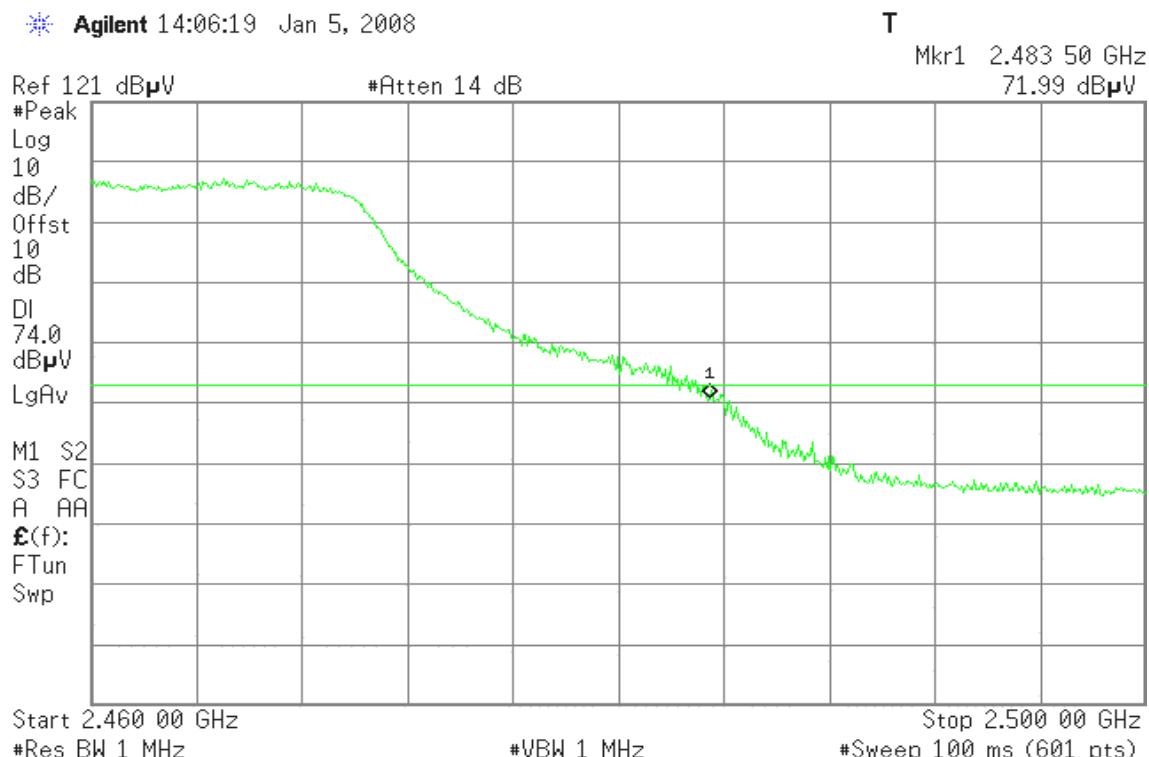
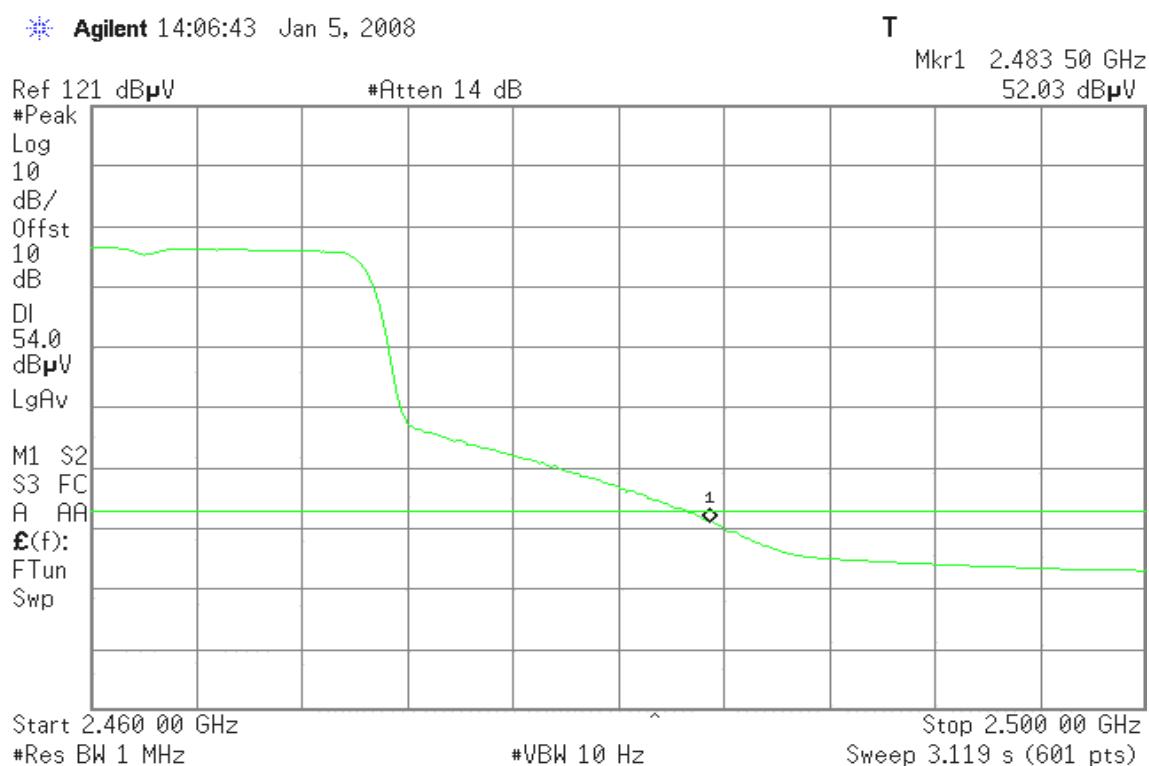
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

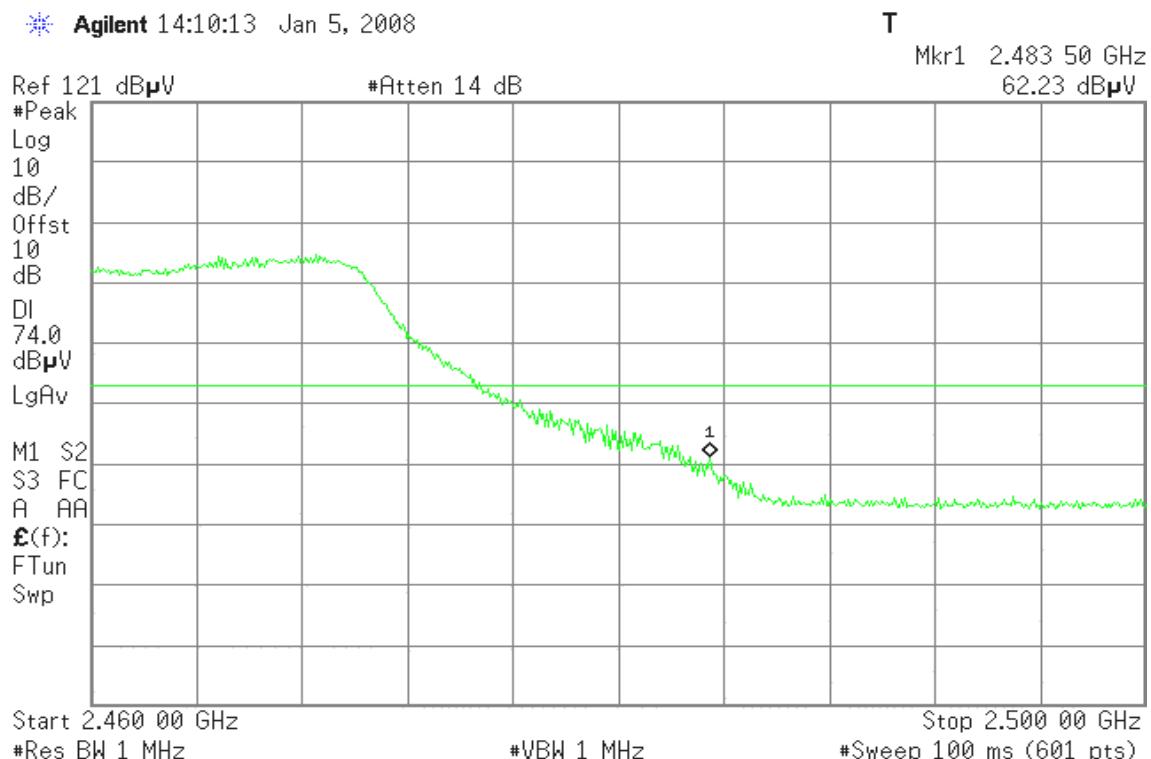
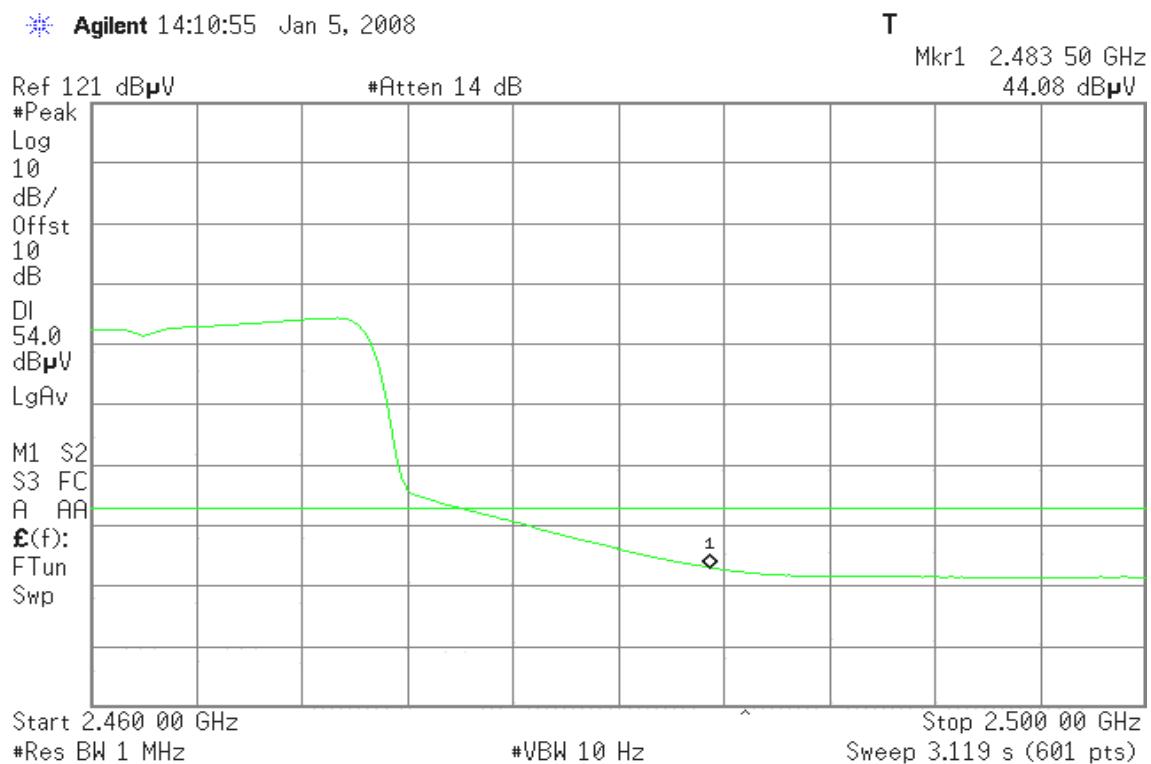
**Band Edges (IEEE 802.11b / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11g / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (IEEE 802.11g / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

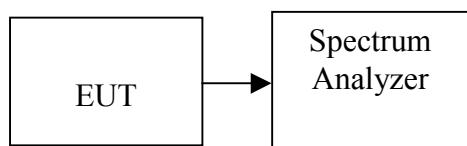
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

## 7.5 PEAK POWER SPECTRAL DENSITY

### LIMIT

1. According to §15.247(e), for digitally modulated systems, the 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.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.



## **TEST RESULTS**

*No non-compliance noted.*

### **Test Data**

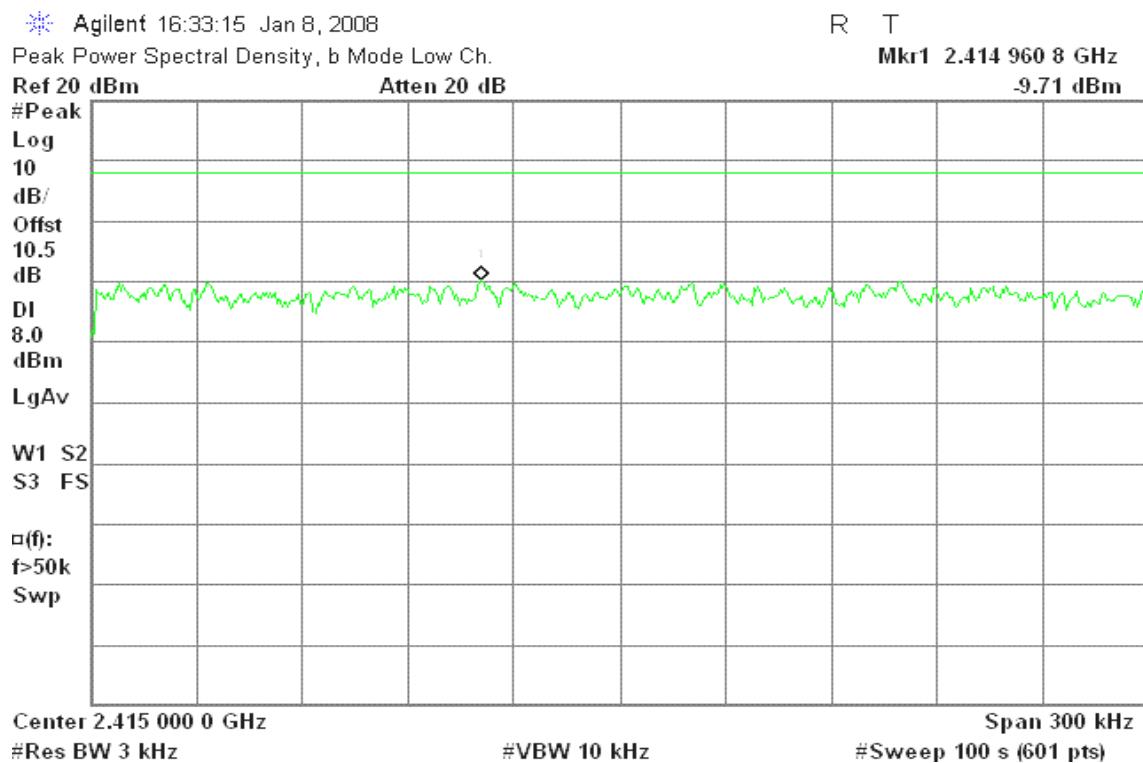
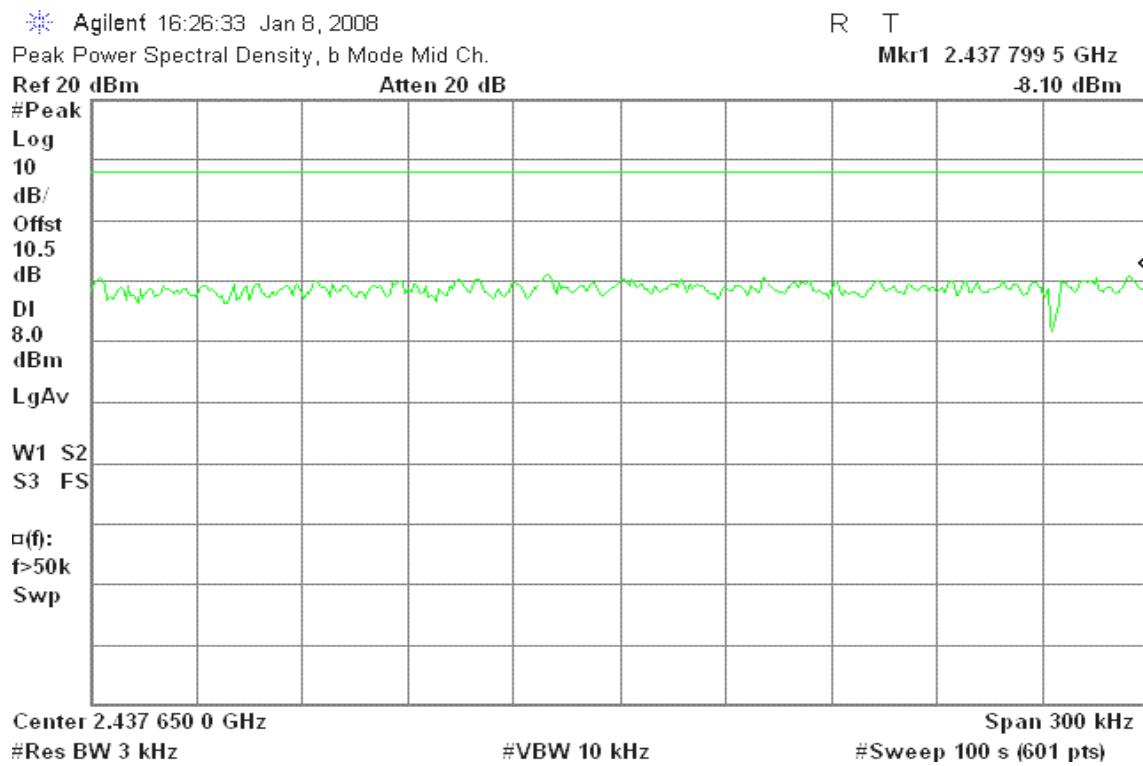
#### **Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-9.71	5.00	PASS
Mid	2437	-8.10		PASS
High	2462	-10.39		PASS

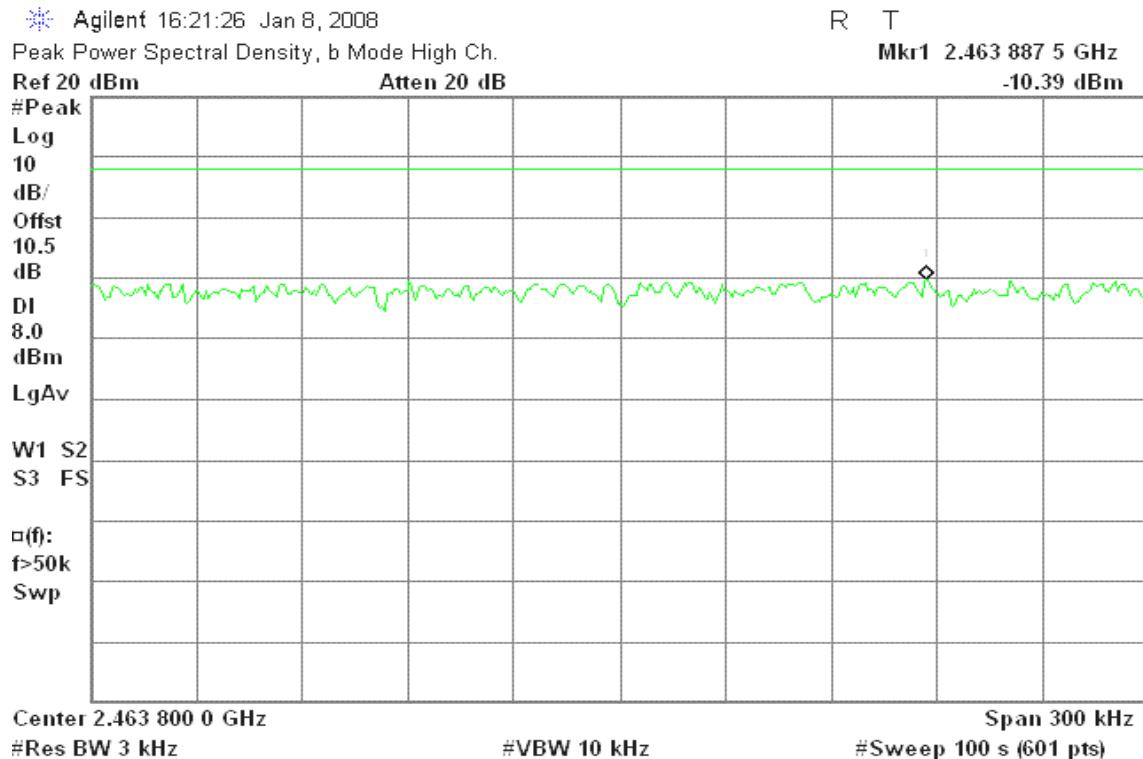
#### **Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-13.72	5.00	PASS
Mid	2437	-12.99		PASS
High	2462	-15.16		PASS

*Remark: The maximum antenna gain is 9 dBi; therefore the reduction due to antenna gain is 3 dB, so the limit is 5 dBm.*

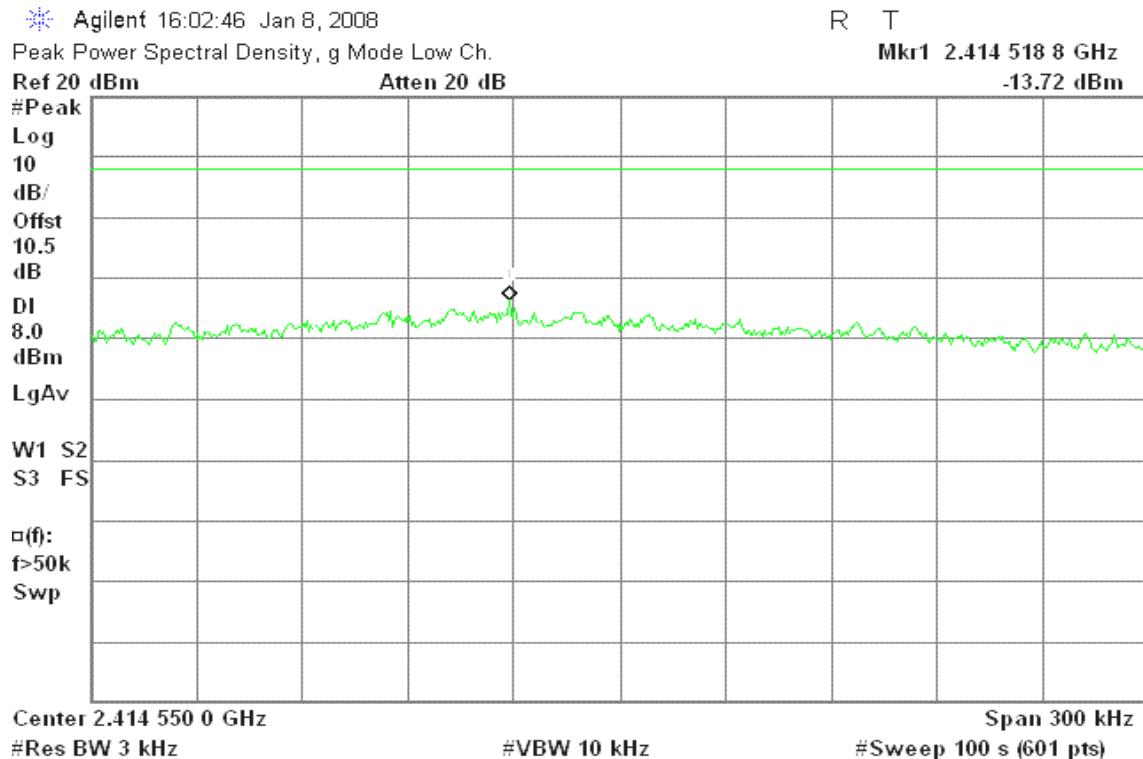
**Test Plot****IEEE 802.11b****PPSD (CH Low)****PPSD (CH Mid)**

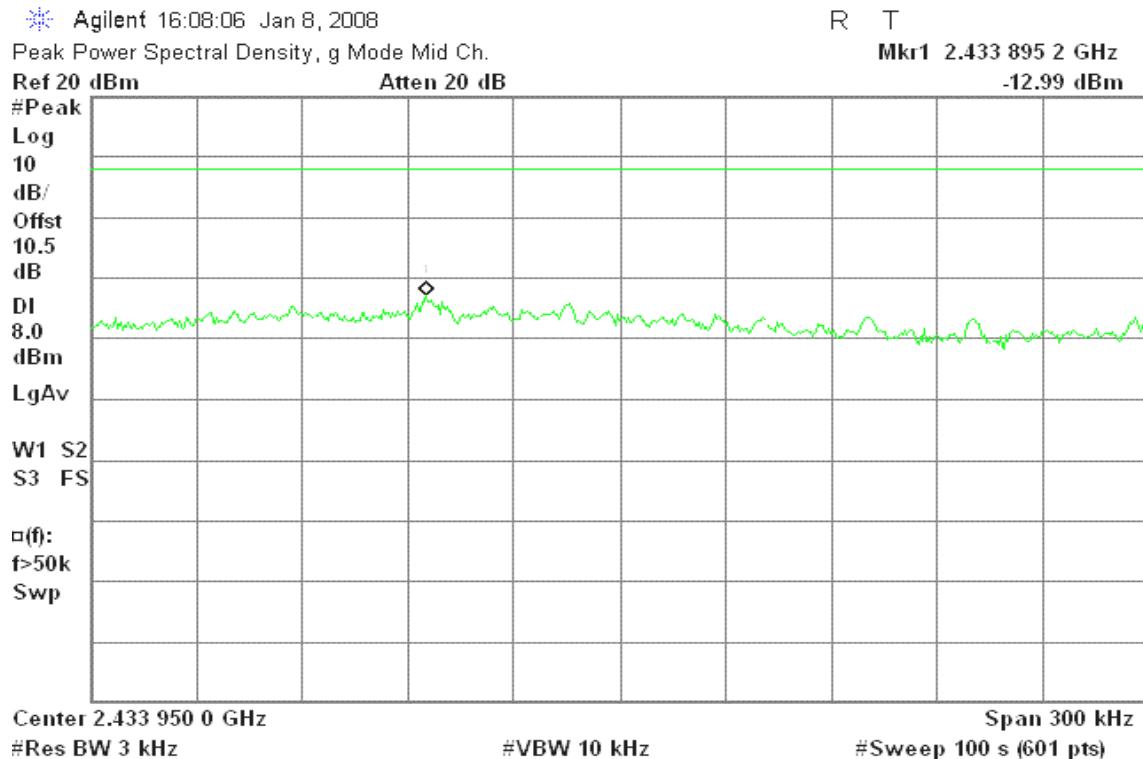
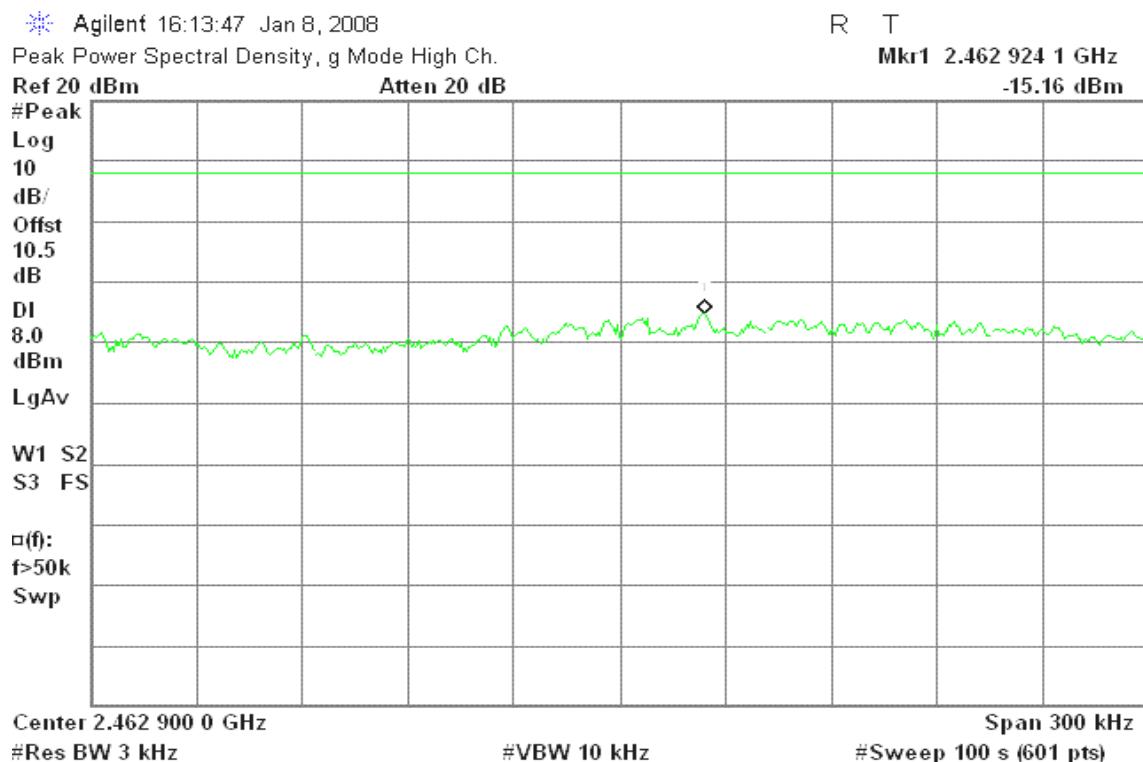
### PPSD (CH High)



### IEEE 802.11g

### PPSD (CH Low)



**PPSD (CH Mid)****PPSD (CH High)**

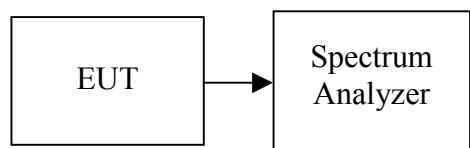
## 7.6 SPURIOUS EMISSIONS

### 7.6.1 Conducted Measurement

#### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands 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, provided the transmitter demonstrates compliance with the peak conducted power limits. 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 Section 15.205(c)).

#### Test Configuration



#### TEST PROCEDURE

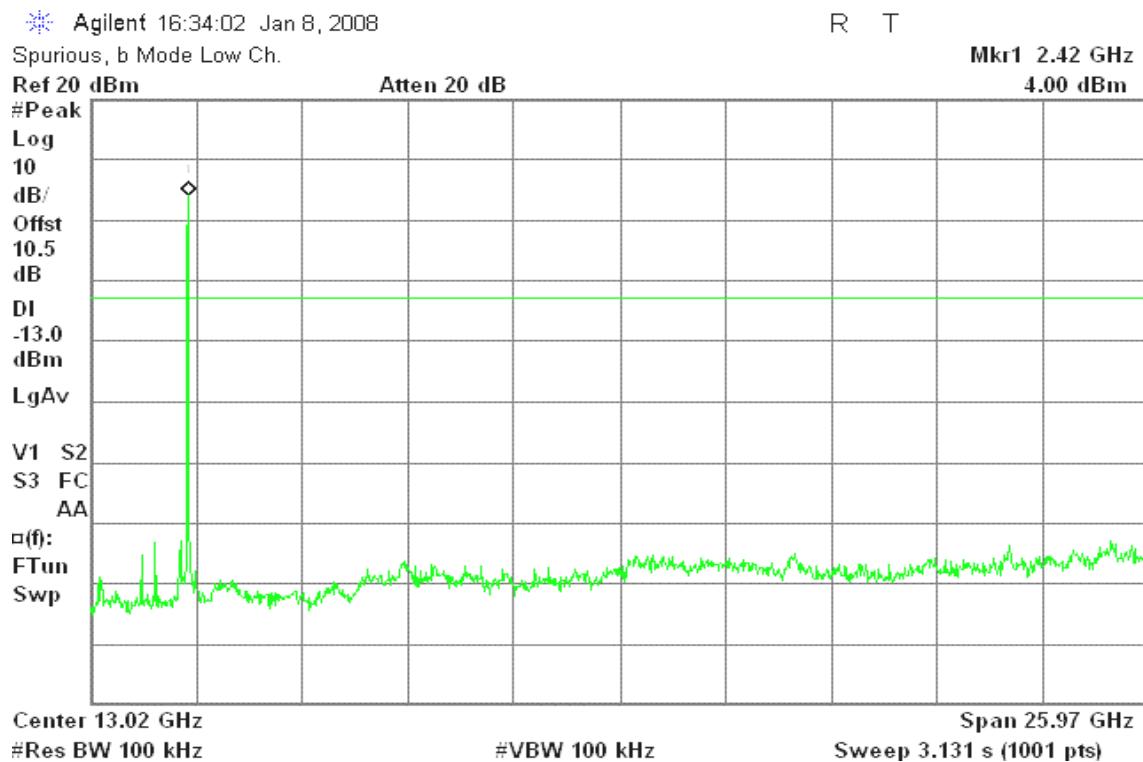
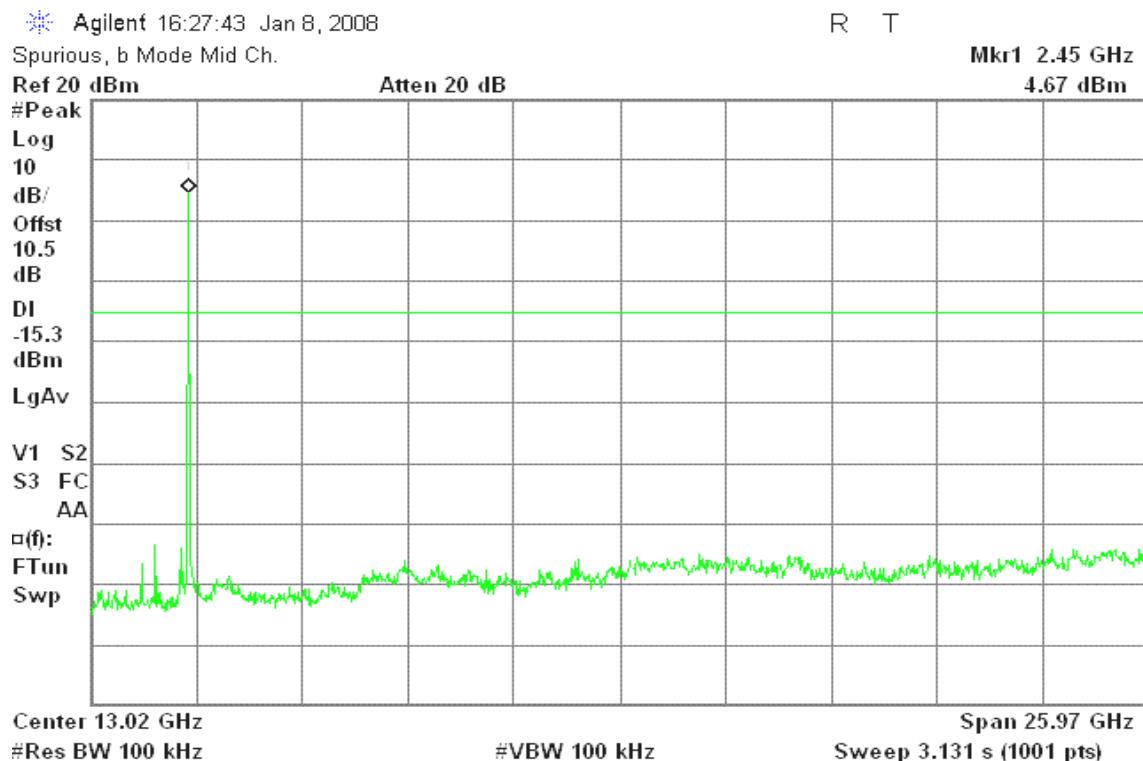
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

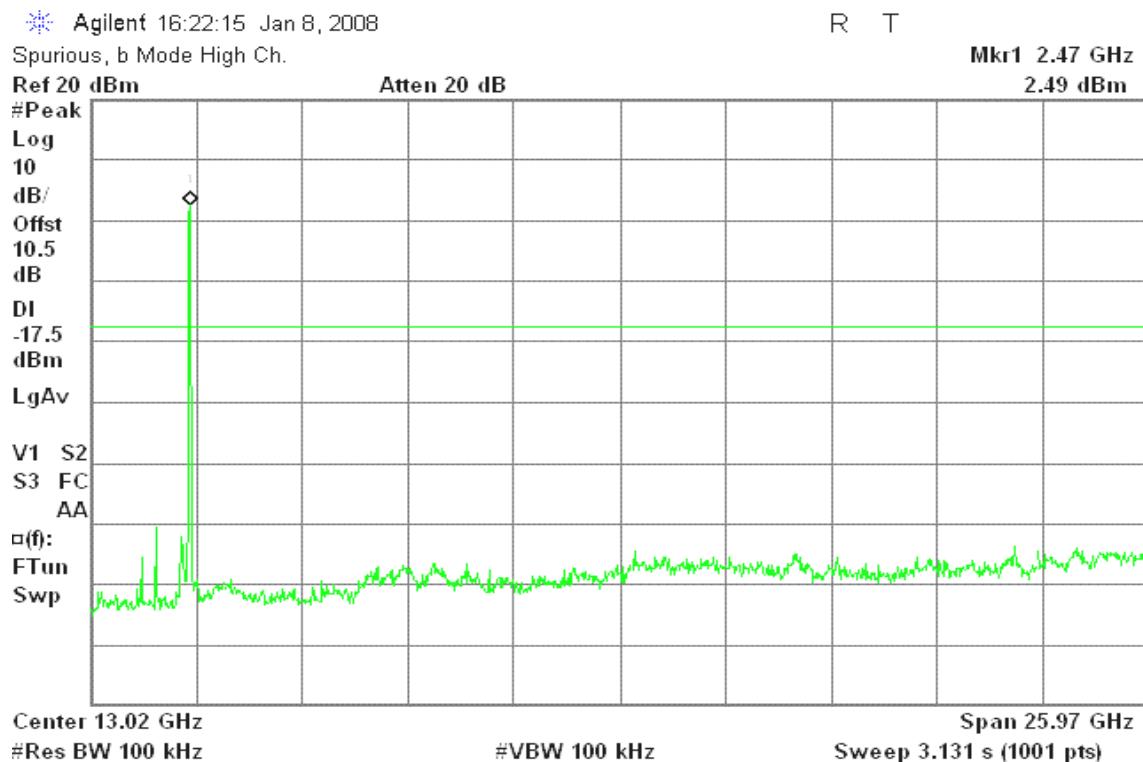
Measurements are made over the 13GHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

#### TEST RESULTS

*No non-compliance noted.*

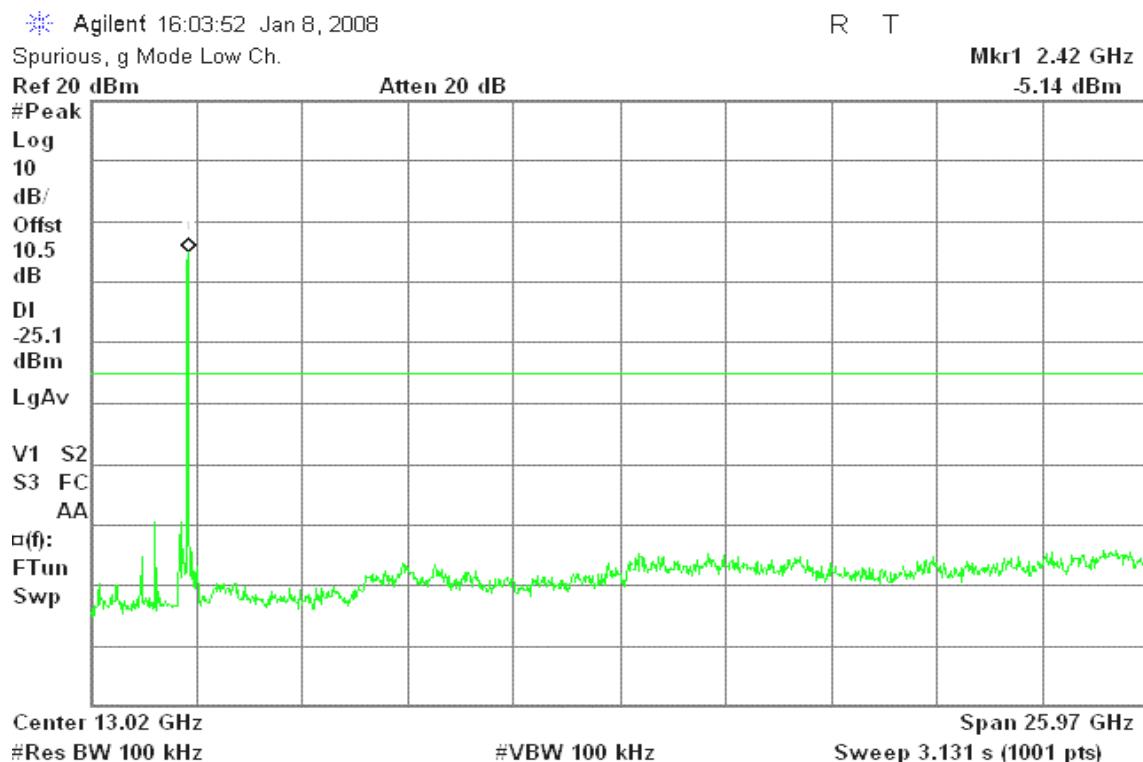
**Test Plot****IEEE 802.11b****CH Low****CH Mid**

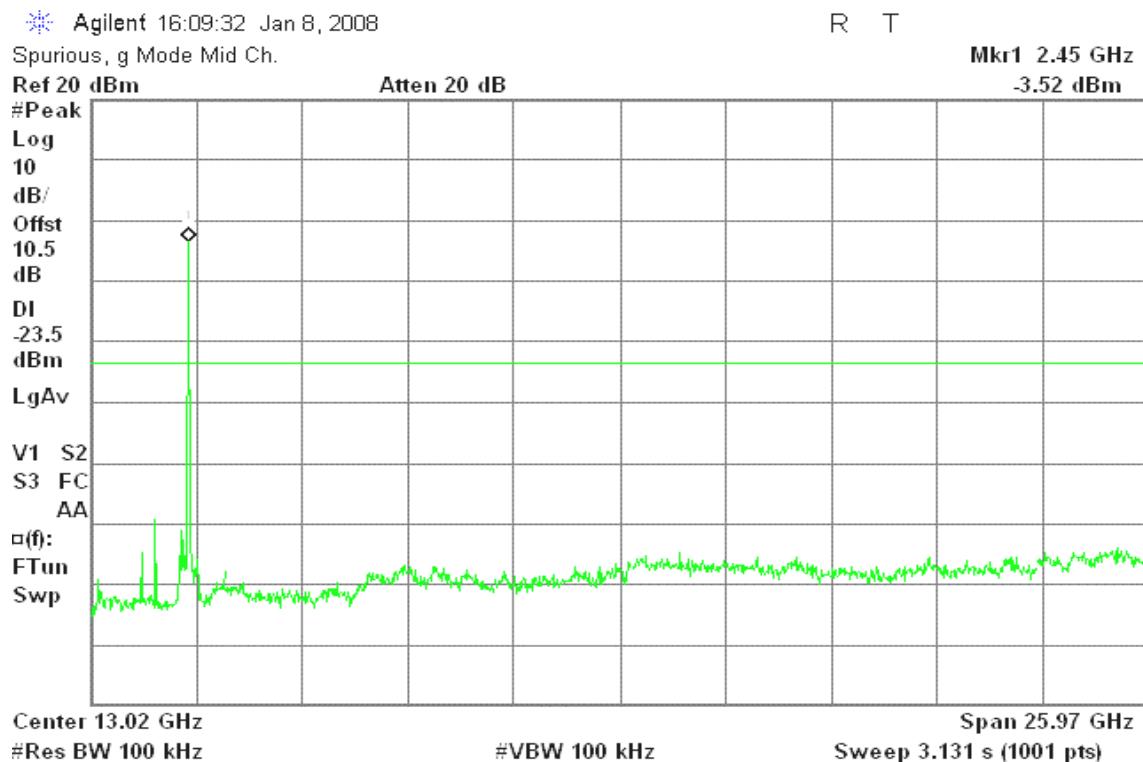
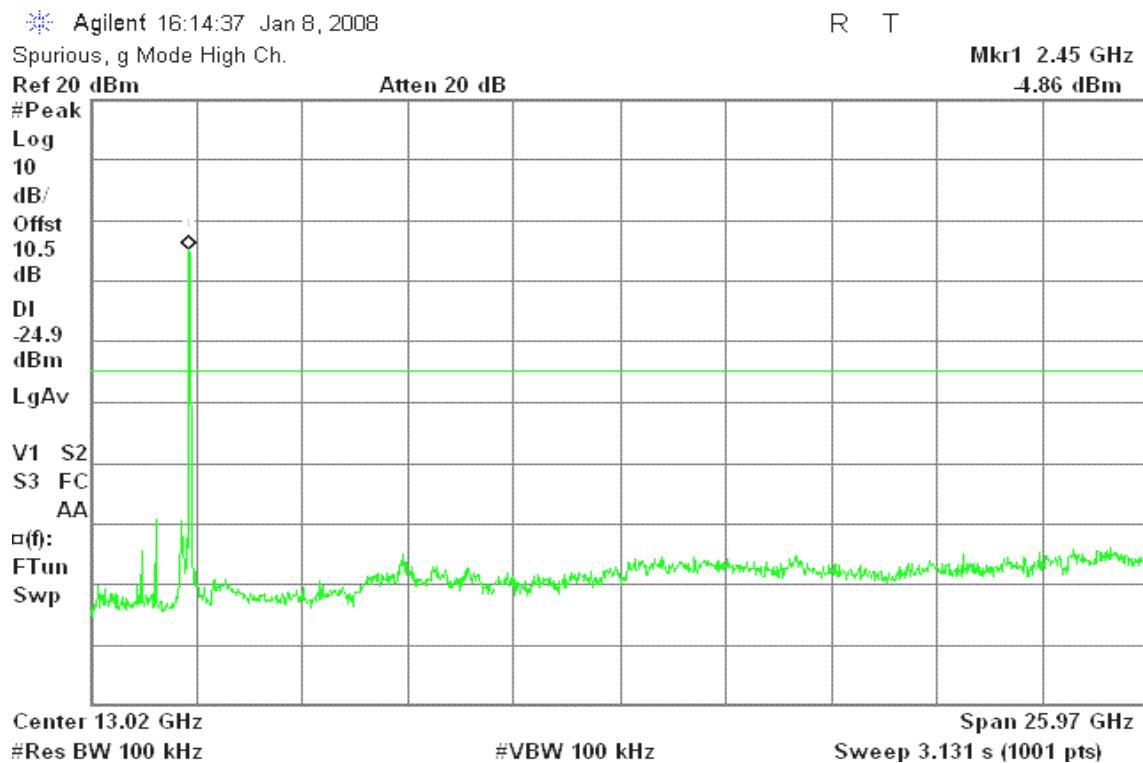
## CH High



## IEEE 802.11g

### CH Low



**CH Mid****CH High**



## 7.6.2 Radiated Emissions

### LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

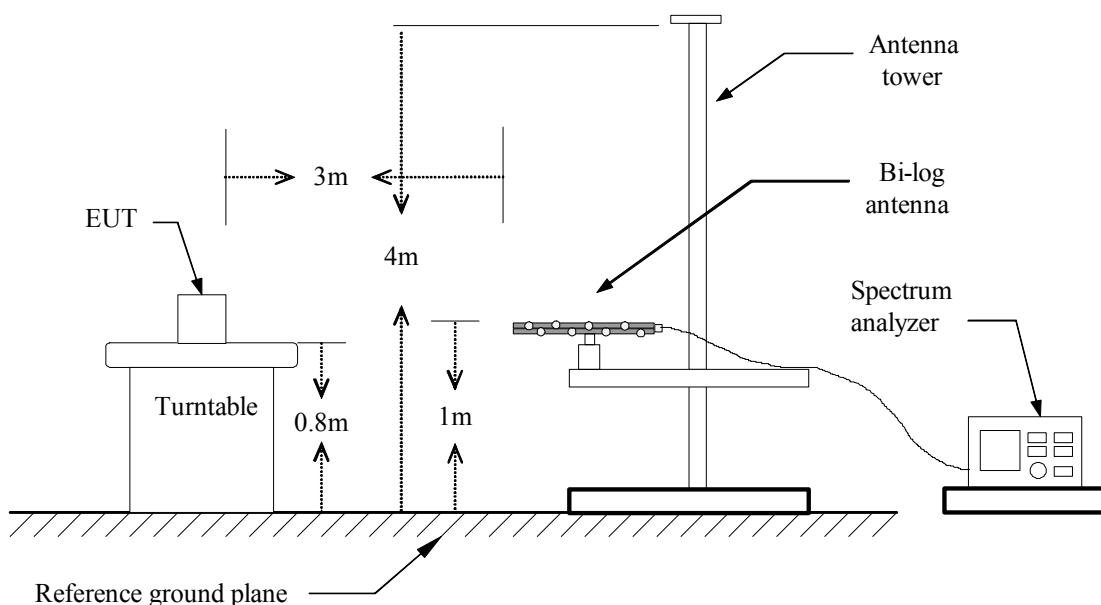
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

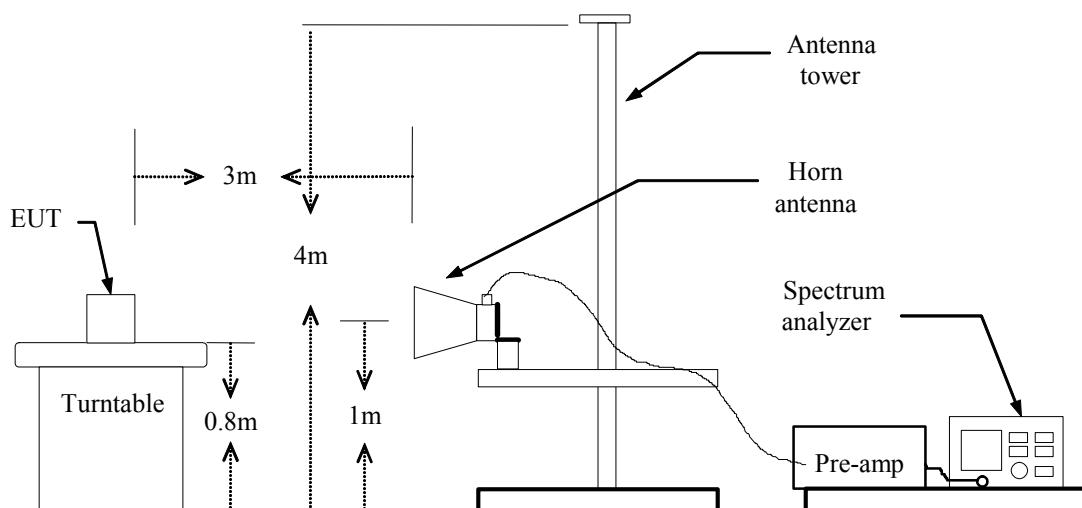
Frequency (MHz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

## Test Configuration

### Below 1 GHz



### Above 1 GHz





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.



## TEST RESULTS

*No non-compliance noted.*

### Below 1 GHz

**Operation Mode:** Normal Link / Panel Antenna

**Test Date:** January 5, 2008

**Temperature:** 25°C

**Tested by:** Ivan Tsai

**Humidity:** 55 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
30.00	V	39.96	-4.65	35.31	40.00	-4.69	QP
97.90	V	57.11	-17.35	39.76	43.50	-3.74	Peak
199.75	V	53.55	-13.37	40.18	43.50	-3.32	Peak
275.73	V	48.90	-12.73	36.17	46.00	-9.83	Peak
374.35	V	47.54	-10.20	37.34	46.00	-8.66	Peak
500.45	V	49.74	-7.86	41.88	46.00	-4.12	Peak
30.00	H	38.89	-4.65	34.24	40.00	-5.76	Peak
199.75	H	48.23	-13.37	34.86	43.50	-8.64	Peak
275.73	H	51.31	-12.73	38.58	46.00	-7.42	Peak
367.88	H	46.53	-10.30	36.23	46.00	-9.77	Peak
500.45	H	46.76	-7.86	38.91	46.00	-7.09	Peak
624.93	H	41.46	-5.38	36.08	46.00	-9.92	Peak

**Remark:**

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

**Operation Mode:** Normal Link / Omni Antenna**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
30.00	V	41.20	-4.65	36.55	40.00	-3.45	QP
97.90	V	58.25	-17.35	40.90	43.50	-2.60	Peak
199.75	V	54.13	-13.37	40.76	43.50	-2.74	Peak
249.87	V	51.17	-14.56	36.61	46.00	-9.39	Peak
374.35	V	46.37	-10.20	36.16	46.00	-9.84	Peak
500.45	V	49.61	-7.86	41.75	46.00	-4.25	Peak
30.00	H	39.85	-4.65	35.20	40.00	-4.80	Peak
199.75	H	50.07	-13.37	36.70	43.50	-6.80	Peak
374.35	H	44.96	-10.20	34.75	46.00	-11.25	Peak
500.45	H	47.64	-7.86	39.78	46.00	-6.22	Peak
624.93	H	41.58	-5.38	36.20	46.00	-9.80	Peak
875.52	H	33.63	-2.31	31.31	46.00	-14.69	Peak

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).

**Above 1 GHz****Panel Antenna:****Operation Mode:** IEEE 802.11b / TX / CH Low**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1870.00	V	45.57	---	-6.30	39.27	---	74.00	54.00	-14.73	Peak
4825.00	V	51.62	---	0.55	52.18	---	74.00	54.00	-1.82	Peak
N/A										
1290.00	H	52.72	---	-10.32	42.40	---	74.00	54.00	-11.60	Peak
3216.67	H	47.35	---	-2.17	45.17	---	74.00	54.00	-8.83	Peak
4825.00	H	52.99	---	0.55	53.55	---	74.00	54.00	-0.45	Peak
7241.67	H	46.96	---	3.54	50.49	---	74.00	54.00	-3.51	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11b / TX / CH Mid**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1846.67	V	52.44	---	-6.53	45.91	---	74.00	54.00	-8.09	Peak
4875.00	V	54.74	52.82	0.60	55.34	53.42	74.00	54.00	-0.58	AVG
7308.33	V	44.20	---	3.41	47.61	---	74.00	54.00	-6.39	Peak
N/A										
1806.67	H	56.09	---	-6.93	49.16	---	74.00	54.00	-4.84	Peak
3250.00	H	49.95	---	-2.13	47.82	---	74.00	54.00	-6.18	Peak
4875.00	H	54.06	52.31	0.60	54.66	52.91	74.00	54.00	-1.09	AVG
7308.33	H	49.02	---	3.41	52.43	---	74.00	54.00	-1.57	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11b / TX / CH High**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1846.67	V	55.73	---	-6.53	49.21	---	74.00	54.00	-4.79	Peak
3283.33	V	45.64	---	-2.09	43.55	---	74.00	54.00	-10.45	Peak
4925.00	V	53.68	52.10	0.65	54.33	52.75	74.00	54.00	-1.25	AVG
7383.33	V	46.36	---	3.27	49.63	---	74.00	54.00	-4.37	Peak
N/A										
1830.00	H	61.33	55.64	-6.69	54.64	48.95	74.00	54.00	-5.05	AVG
3283.33	H	50.55	---	-2.09	48.47	---	74.00	54.00	-5.53	Peak
4925.00	H	52.26	---	0.65	52.91	---	74.00	54.00	-1.09	Peak
7391.67	H	50.18	---	3.25	53.43	---	74.00	54.00	-0.57	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11g / TX / CH Low**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1836.67	V	51.91	---	-6.63	45.28	---	74.00	54.00	-8.72	Peak
4825.00	V	42.43	---	0.55	42.99	---	74.00	54.00	-11.01	Peak
N/A										
1846.67	H	55.48	---	-6.53	48.95	---	74.00	54.00	-5.05	Peak
3216.67	H	45.86	---	-2.17	43.68	---	74.00	54.00	-10.32	Peak
4825.00	H	43.42	---	0.55	43.98	---	74.00	54.00	-10.02	Peak
6433.33	H	46.71	---	2.87	49.57	---	74.00	54.00	-4.43	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11g / TX / CH Mid**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1846.67	V	50.90	---	-6.53	44.37	---	74.00	54.00	-9.63	Peak
3466.67	V	44.58	---	-1.86	42.72	---	74.00	54.00	-11.28	Peak
4875.00	V	44.06	---	0.60	44.66	---	74.00	54.00	-9.34	Peak
N/A										
1806.67	H	55.68	---	-6.93	48.76	---	74.00	54.00	-5.24	Peak
3250.00	H	47.69	---	-2.13	45.56	---	74.00	54.00	-8.44	Peak
4875.00	H	44.22	---	0.60	44.83	---	74.00	54.00	-9.17	Peak
6500.00	H	47.43	---	2.99	50.41	---	74.00	54.00	-3.59	Peak
7308.33	H	44.85	---	3.41	48.26	---	74.00	54.00	-5.74	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11g / TX / CH High**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2240.00	V	56.52	---	-4.40	52.11	---	74.00	54.00	-1.89	Peak
4916.67	V	44.49	---	0.64	45.14	---	74.00	54.00	-8.86	Peak
N/A										
1846.67	H	56.55	---	-6.53	50.02	---	74.00	54.00	-3.98	Peak
3283.33	H	45.46	---	-2.09	43.37	---	74.00	54.00	-10.63	Peak
4925.00	H	43.43	---	0.65	44.08	---	74.00	54.00	-9.92	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Omni Antenna:****Operation Mode:** IEEE 802.11b / TX / CH Low**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1830.00	V	55.99	---	-6.69	49.29	---	74.00	54.00	-4.71	Peak
4825.00	V	53.56	52.23	0.55	54.11	52.78	74.00	54.00	-1.22	AVG
7241.67	V	46.99	---	3.54	50.53	---	74.00	54.00	-3.47	Peak
N/A										
1846.67	H	59.99	49.20	-6.53	53.46	42.67	74.00	54.00	-11.33	AVG
4825.00	H	54.57	52.54	0.55	55.12	53.09	74.00	54.00	-0.91	AVG
6433.33	H	46.48	---	2.87	49.35	---	74.00	54.00	-4.65	Peak
7241.67	H	47.12	---	3.54	50.66	---	74.00	54.00	-3.34	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11b / TX / CH Mid**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1623.33	V	53.75	---	-8.75	45.00	---	74.00	54.00	-9.00	Peak
1753.33	V	58.80	---	-7.46	51.35	---	74.00	54.00	-2.65	Peak
4875.00	V	54.39	52.87	0.60	55.00	53.47	74.00	54.00	-0.53	AVG
7316.67	V	48.53	---	3.39	51.92	---	74.00	54.00	-2.08	Peak
N/A										
1846.67	H	60.67	56.52	-6.53	54.15	49.99	74.00	54.00	-4.01	AVG
4875.00	H	52.95	51.40	0.60	53.55	52.00	74.00	54.00	-0.45	AVG
7316.67	H	47.87	---	3.39	51.26	---	74.00	54.00	-2.74	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11b / TX / CH High**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1640.00	V	55.60	---	-8.58	47.02	---	74.00	54.00	-6.98	Peak
1830.00	V	56.14	---	-6.69	49.45	---	74.00	54.00	-4.55	Peak
4925.00	V	52.58	---	0.65	53.24	---	74.00	54.00	-0.76	Peak
7391.67	V	49.09	---	3.25	52.35	---	74.00	54.00	-1.65	Peak
N/A										
1830.00	H	61.42	57.20	-6.69	54.73	50.51	74.00	54.00	-3.49	AVG
3283.33	H	47.79	---	-2.09	45.70	---	74.00	54.00	-8.30	Peak
4925.00	H	50.23	---	0.65	50.88	---	74.00	54.00	-3.12	Peak
7391.67	H	45.43	---	3.25	48.68	---	74.00	54.00	-5.32	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11g / TX / CH Low**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1830.00	V	56.54	---	-6.69	49.84	---	74.00	54.00	-4.16	Peak
4825.00	V	47.04	---	0.55	47.60	---	74.00	54.00	-6.40	Peak
7241.67	V	46.21	---	3.54	49.74	---	74.00	54.00	-4.26	Peak
N/A										
1846.67	H	60.93	55.65	-6.53	54.41	49.12	74.00	54.00	-4.88	AVG
4825.00	H	46.14	---	0.55	46.70	---	74.00	54.00	-7.30	Peak
6433.33	H	46.00	---	2.87	48.87	---	74.00	54.00	-5.13	Peak
7233.33	H	45.77	---	3.55	49.32	---	74.00	54.00	-4.68	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**peration Mode:** IEEE 802.11g / TX / CH Mid**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1623.33	V	55.25	---	-8.75	46.50	---	74.00	54.00	-7.50	Peak
1830.00	V	56.90	---	-6.69	50.21	---	74.00	54.00	-3.79	Peak
4875.00	V	46.42	---	0.60	47.02	---	74.00	54.00	-6.98	Peak
7316.67	V	47.40	---	3.39	50.79	---	74.00	54.00	-3.21	Peak
N/A										
1840.00	H	61.21	56.41	-6.60	54.62	49.81	74.00	54.00	-4.19	AVG
3250.00	H	47.80	---	-2.13	45.67	---	74.00	54.00	-8.33	Peak
4875.00	H	44.72	---	0.60	45.32	---	74.00	54.00	-8.68	Peak
7316.67	H	45.63	---	3.39	49.03	---	74.00	54.00	-4.97	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** IEEE 802.11g / TX / CH High**Test Date:** January 5, 2008**Temperature:** 25°C**Tested by:** Ivan Tsai**Humidity:** 55 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1640.00	V	59.60	---	-8.58	51.02	---	74.00	54.00	-2.98	Peak
1830.00	V	56.68	---	-6.69	49.99	---	74.00	54.00	-4.01	Peak
4925.00	V	43.37	---	0.65	44.02	---	74.00	54.00	-9.98	Peak
5916.67	V	45.32	---	1.98	47.30	---	74.00	54.00	-6.70	Peak
7391.67	V	44.70	---	3.25	47.95	---	74.00	54.00	-6.05	Peak
N/A										
1840.00	H	61.06	57.45	-6.60	54.47	50.85	74.00	54.00	-3.15	AVG
3283.33	H	47.48	---	-2.09	45.39	---	74.00	54.00	-8.61	Peak
4925.00	H	42.89	---	0.65	43.54	---	74.00	54.00	-10.46	Peak
6566.67	H	45.84	---	3.12	48.96	---	74.00	54.00	-5.04	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



## 7.7 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

### Test Configuration

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



## **TEST RESULTS**

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

### **Test Data**

#### **Omni Antenna**

**Operation Mode:** Normal Link      **Test Date:** January 11, 2008  
**Temperature:** 26°C      **Tested by:** Wolf Huang  
**Humidity:** 45% RH

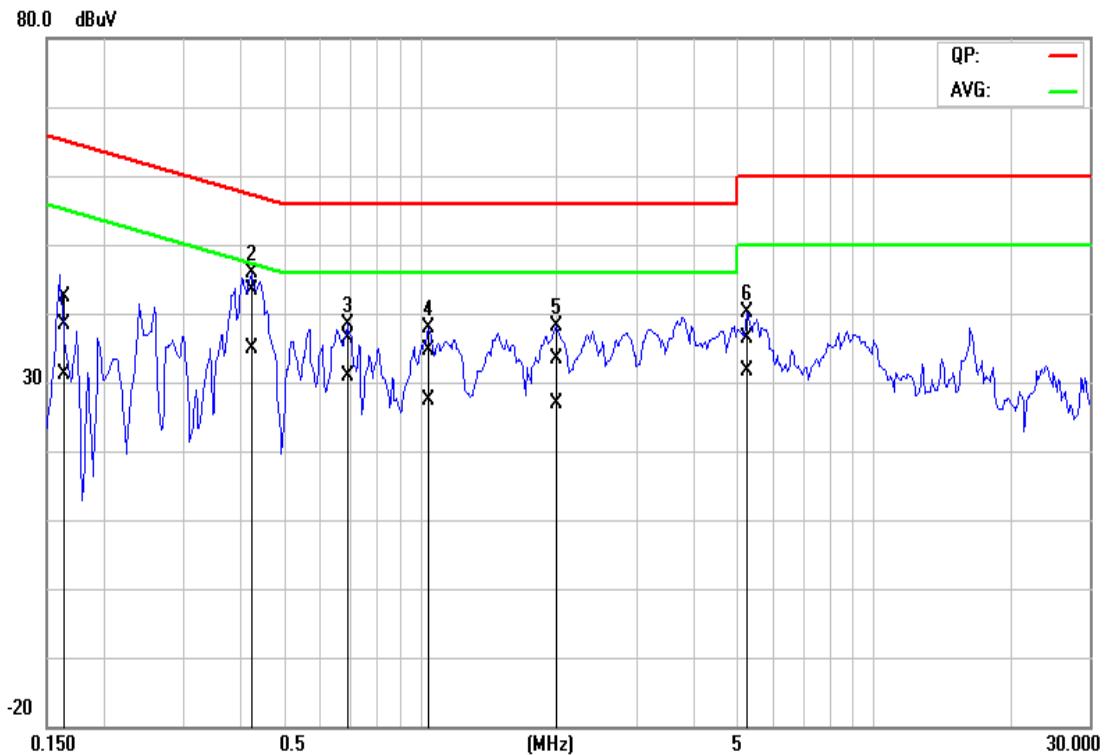
Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1649	42.36	31.06	0.14	42.50	31.20	65.21	55.21	-22.71	-24.01	L1
0.4250	43.27	34.87	0.03	43.30	34.90	57.35	47.35	-14.05	-12.45	L1
0.6900	36.40	30.80	0.00	36.40	30.80	56.00	46.00	-19.60	-15.20	L1
1.0450	34.70	27.40	0.00	34.70	27.40	56.00	46.00	-21.30	-18.60	L1
2.0000	33.29	26.99	0.01	33.30	27.00	56.00	46.00	-22.70	-19.00	L1
5.2750	36.39	31.59	0.11	36.50	31.70	60.00	50.00	-23.50	-18.30	L1
0.1650	44.16	33.06	0.14	44.30	33.20	65.21	55.21	-20.91	-22.01	L2
0.4250	43.87	35.57	0.03	43.90	35.60	57.35	47.35	-13.45	-11.75	L2
0.6866	37.30	32.70	0.00	37.30	32.70	56.00	46.00	-18.70	-13.30	L2
1.1850	33.60	25.70	0.00	33.60	25.70	56.00	46.00	-22.40	-20.30	L2
3.8300	35.64	28.74	0.06	35.70	28.80	56.00	46.00	-20.30	-17.20	L2
8.7150	32.25	27.15	0.25	32.50	27.40	60.00	50.00	-27.50	-22.60	L2

#### **Remark:**

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

## Test Plots

### *Conducted emissions (Line 1)*



### *Conducted emissions (Line 2)*

