



**FCC 47 CFR PART 15 SUBPART C**

**TEST REPORT**

**For**

**802.11 b/g/n USB WLAN Adapter**

**Model: WLC311NR**

**Trade Name: N/A**

*Prepared for*

**CHUNG NAM ELECTRONICS CO., LTD  
12/F, Chung Nam Building, No. 1 Lockhart Road, Wanchai, Hong Kong**

**Issued by:**

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**Issued Date: December 09, 2008**



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# 1. TEST RESULT CERTIFICATION

**Applicant:** CHUNG NAM ELECTRONICS CO., LTD  
12/F, Chung Nam Building, No. 1 Lockhart Road, Wanchai, Hong Kong

**Manufacturer:** CHUNG NAM ELECTRONICS CO., LTD  
12/F, Chung Nam Building, No. 1 Lockhart Road, Wanchai, Hong Kong

**Equipment Under Test:** 802.11 b/g/n USB WLAN Adapter

**Trade Name:** N/A

**Model:** WLC311NR

**Date of Test:** October 30- December 25, 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 (Shenzhen) 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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Clinton Kao  
Manager  
Compliance Certification Service Inc.

Reviewed by:

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Vincent Yao  
Assistant manager  
Compliance Certification Service Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	802.11 b/g/n USB WLAN Adapter
<b>Trade Name</b>	N/A
<b>Model Number</b>	WLC311NR
<b>Model Difference</b>	N/A
<b>Power Supply</b>	Powered by the notebook
<b>Frequency Range</b>	IEEE 802.11b/g: 2412 ~ 2462 MHz IEEE 802.11n HT20 : 2412 ~ 2462 MHz IEEE 802.11n HT40 : 2422MHz~ 2452MHz
<b>Transmit Power</b>	IEEE 802.11b mode: 17.33dBm IEEE 802.11g mode: 15.18 dBm IEEE 802.11n HT20 MHz mode: 15.39 dBm IEEE 802.11n HT40 MHz mode: 14.17 dBm
<b>Modulation Technique</b>	IEEE 802.11b mode: CCK,QPSK, BPSK IEEE 802.11g mode: OFDM IEEE 802.11n HT20 MHz mode: PSK,QPSK,16-QAM,64-QAM IEEE 802.11n HT40 MHz mode: PSK,QPSK,16-QAM,64-QAM
<b>Transmit Data Rate</b>	802.11b: 11Mbps(CCK) with fall back rates of 5.5, 2, and 1Mbps 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9/6 Mbps IEEE 802.11n HT20 MHz mode: 65Mbps with fall back of 58.5/52/39/26/19.5/13Mbps IEEE 802.11n HT40 MHz mode: 135Mbps with fall back of 121.5/108/81/54/40.5/27Mbps
<b>Number of Channels</b>	IEEE 802.11b mode: 11 Channels IEEE 802.11g mode: 11 Channels IEEE 802.11n HT20 MHz mode: 11 Channels IEEE 802.11n HT40 MHz mode: 7 Channels
<b>Antenna Specification</b>	PCB Antenna with 1dBi gain (Max) PIFA Antenna with 2dBi gain (Max)

**Note:** This submittal(s) (test report) is intended for FCC ID: Q72WLC311NR 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: 2003 and FCC CFR 47 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 C63.4:2003 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 C63.4:2003.

### 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
2. 17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
2. 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 has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

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

The worst-case data rates:

IEEE802.11b mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE802.11g mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel



High (2462MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT20 MHz mode: Channel Low (2412MHz), Channel Mid

(2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT40 MHz mode: Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.

All emissions tests were made with the worst-case data rates.

Note: After the preliminary scan all data rates, we found the test above modes producing the highest emission level for this EUT.



#### **4. 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.





## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

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

No. 5, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4: 2003 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 LABORATORY ACCREDITATIONS AND LISTING

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

**Taiwan** TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>USA</b>	<b>FCC</b>
<b>Japan</b>	<b>VCCI</b>
<b>Canada</b>	<b>INDUSTRY CANADA</b>
<b>Taiwan</b>	<b>BSMI</b>

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsemc.com.tw>



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
Notebook	IBM	2672	DoC	992F2VG	N/A	Unshielded 1.8m
USB Connector	N/A	N/A	N/A	N/A	N/A	N/A

**Notes:**

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

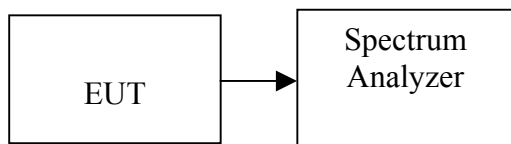
According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 -928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

#### 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  $\geq$  RBW, Span = 20MHz, 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****PIFA Antenna****IEEE 802.11b mode**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	12200	>500	PASS
Mid	2437	12200		PASS
High	2462	12100		PASS

**IEEE 802.11g mode**

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

**IEEE 802.11n HT20 MHz mode**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	17600	>500	PASS
Mid	2437	17400		PASS
High	2462	17400		PASS

**IEEE 802.11n HT40 MHz mode**

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2422	35830	>500	PASS
Mid	2437	36080		PASS
High	2452	35750		PASS



Test Plot

PIFA Antenna

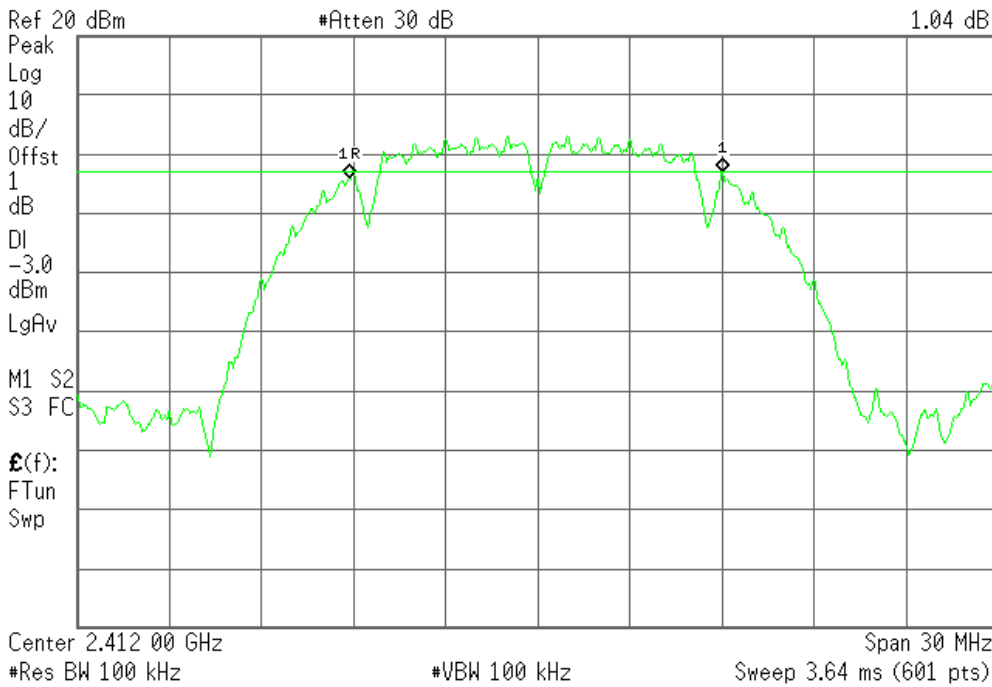
IEEE 802.11b mode

6dB Bandwidth (CH Low)

Agilent 15:49:29 Nov 26, 2008

R T

Mkr1 12.20 MHz  
1.04 dB

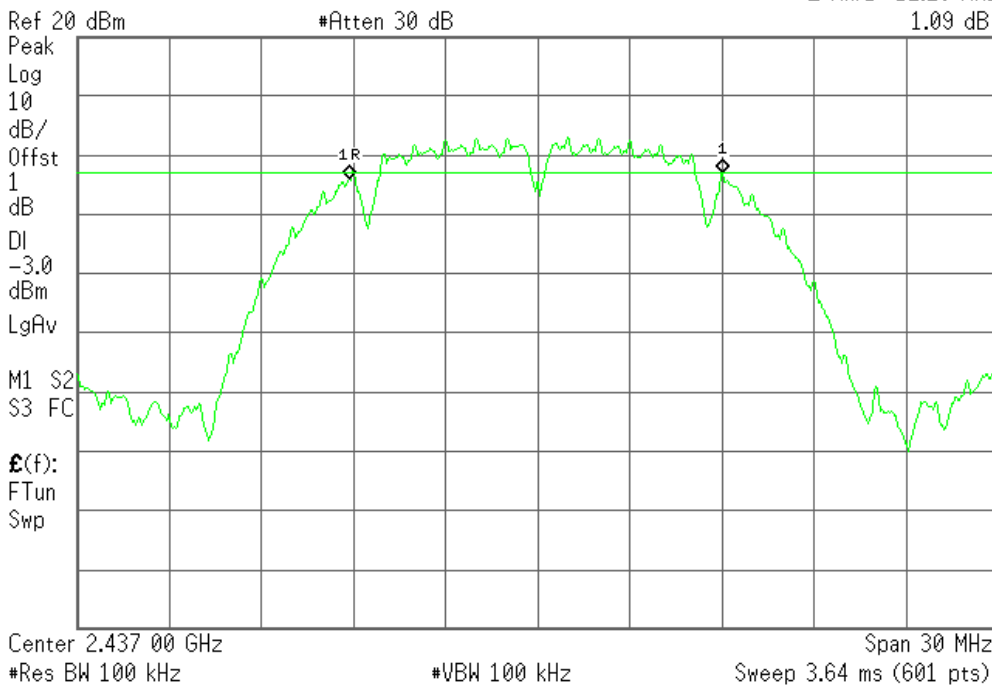


6dB Bandwidth (CH Mid)

Agilent 15:48:23 Nov 26, 2008

R T

Mkr1 12.20 MHz  
1.09 dB



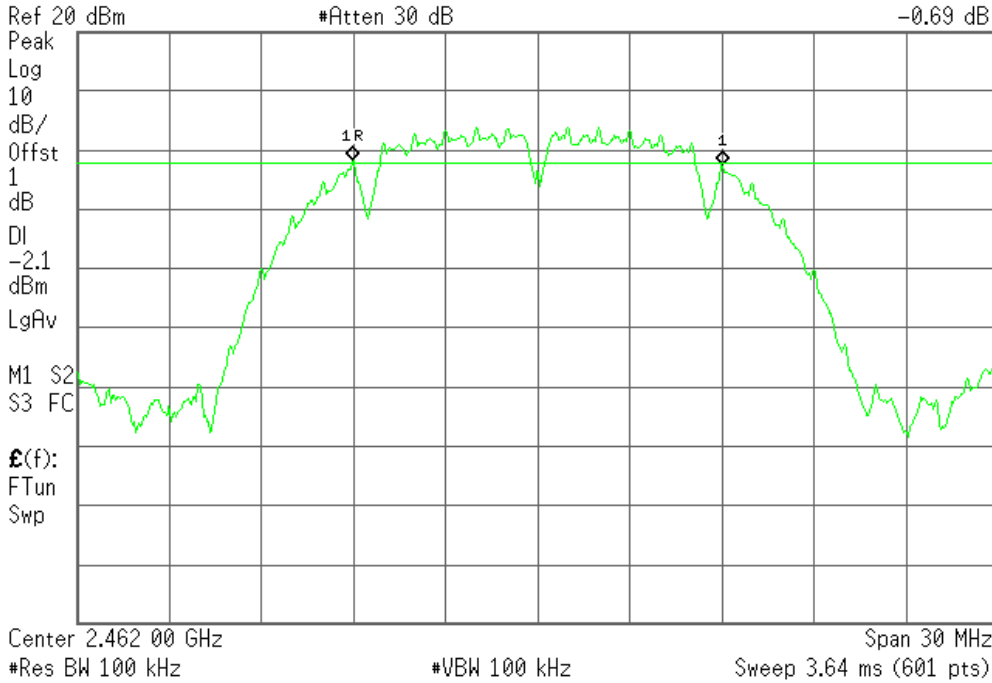


### 6dB Bandwidth (CH High)

Agilent 15:46:46 Nov 26, 2008

R T

Mkr1 12.10 MHz  
-0.69 dB



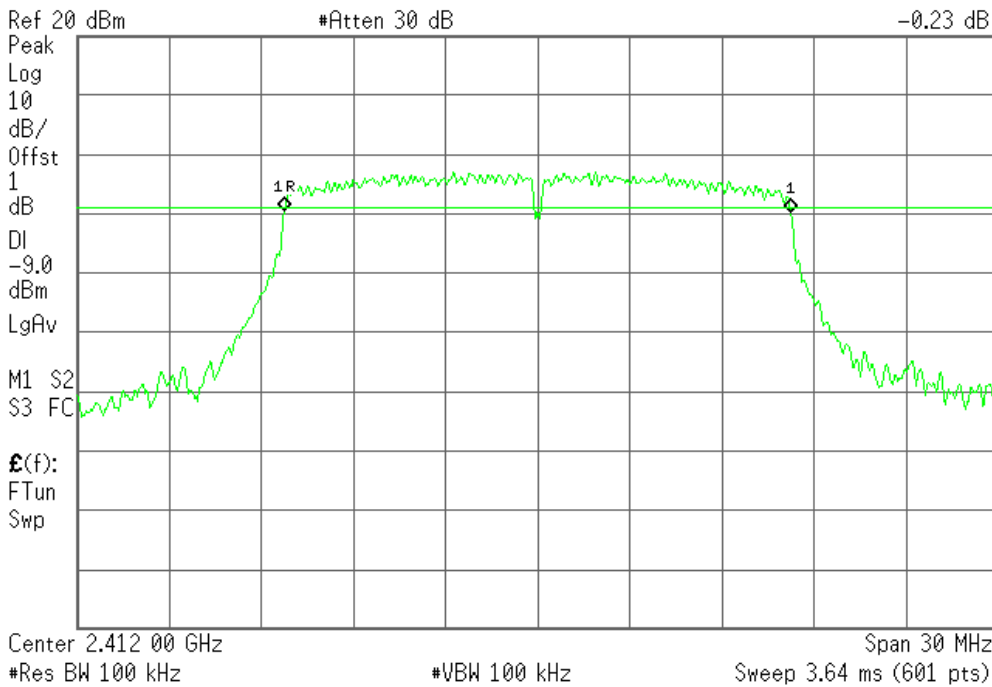
### IEEE 802.11g mode

### 6dB Bandwidth (CH Low)

Agilent 15:50:52 Nov 26, 2008

R T

Mkr1 16.50 MHz  
-0.23 dB



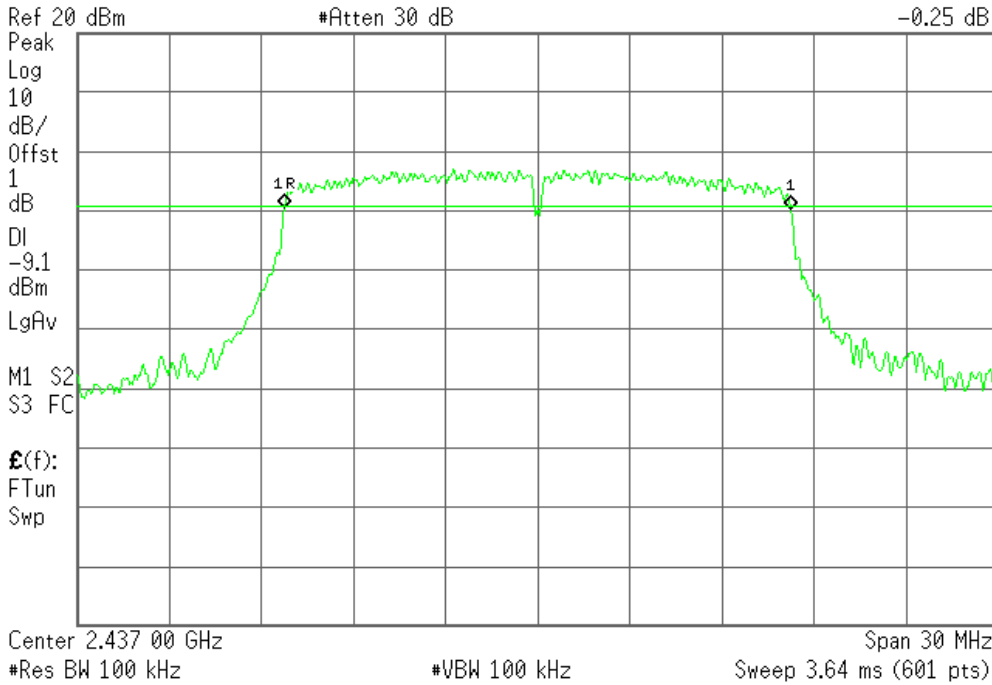


### 6dB Bandwidth (CH Mid)

Agilent 15:51:59 Nov 26, 2008

R T

Mkr1 16.50 MHz  
-0.25 dB

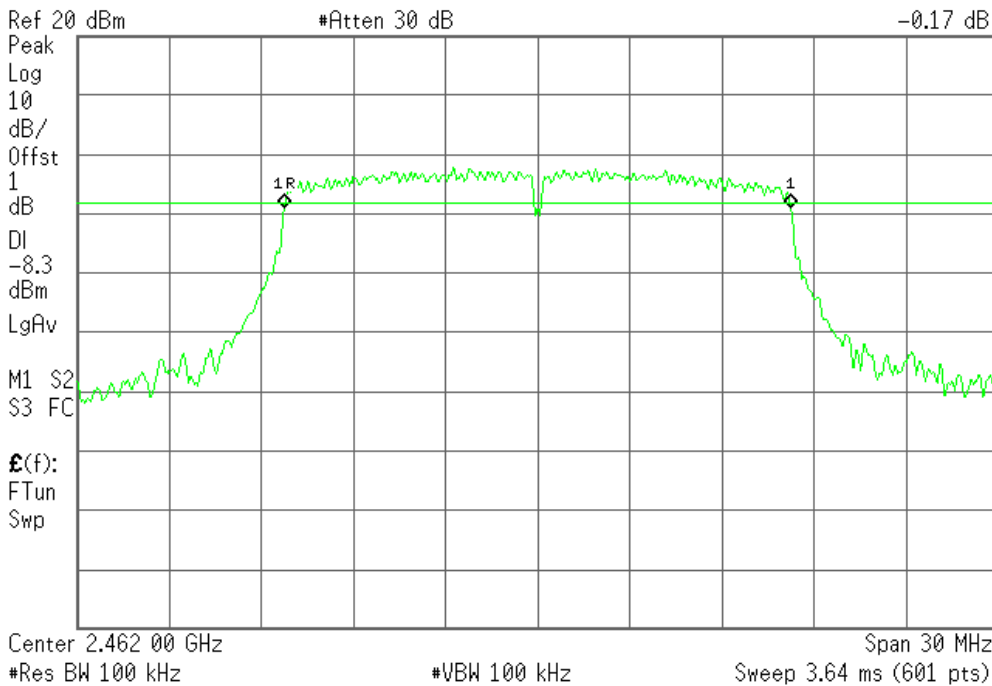


### 6dB Bandwidth (CH High)

Agilent 15:52:56 Nov 26, 2008

R T

Mkr1 16.50 MHz  
-0.17 dB





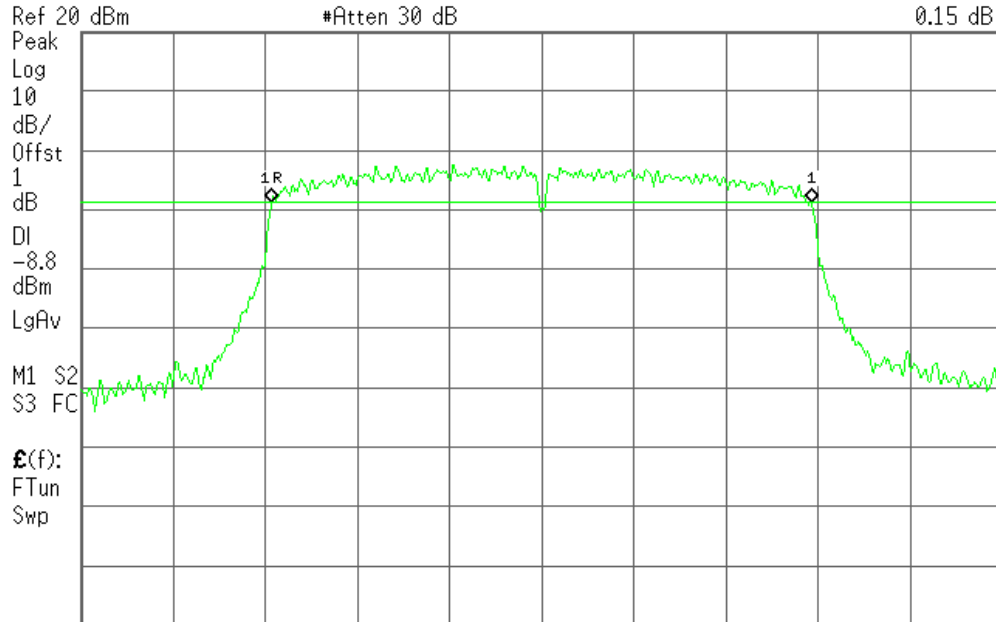
### IEEE 802.11n HT20 MHz mode

#### 6dB Bandwidth (CH Low)

Agilent 15:57:12 Nov 26, 2008

R T

Mkr1 17.60 MHz  
0.15 dB



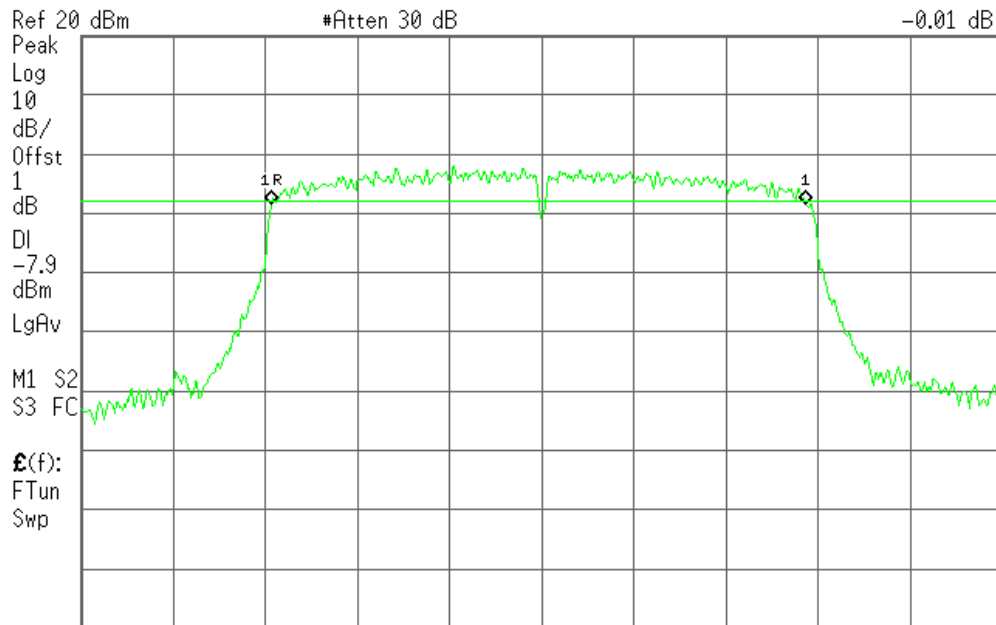
Center 2.412 00 GHz #Res BW 100 kHz #VBW 100 kHz Span 30 MHz Sweep 3.64 ms (601 pts)

#### 6dB Bandwidth (CH Mid)

Agilent 15:56:16 Nov 26, 2008

R T

Mkr1 17.40 MHz  
-0.01 dB



Center 2.437 00 GHz #Res BW 100 kHz #VBW 100 kHz Span 30 MHz Sweep 3.64 ms (601 pts)



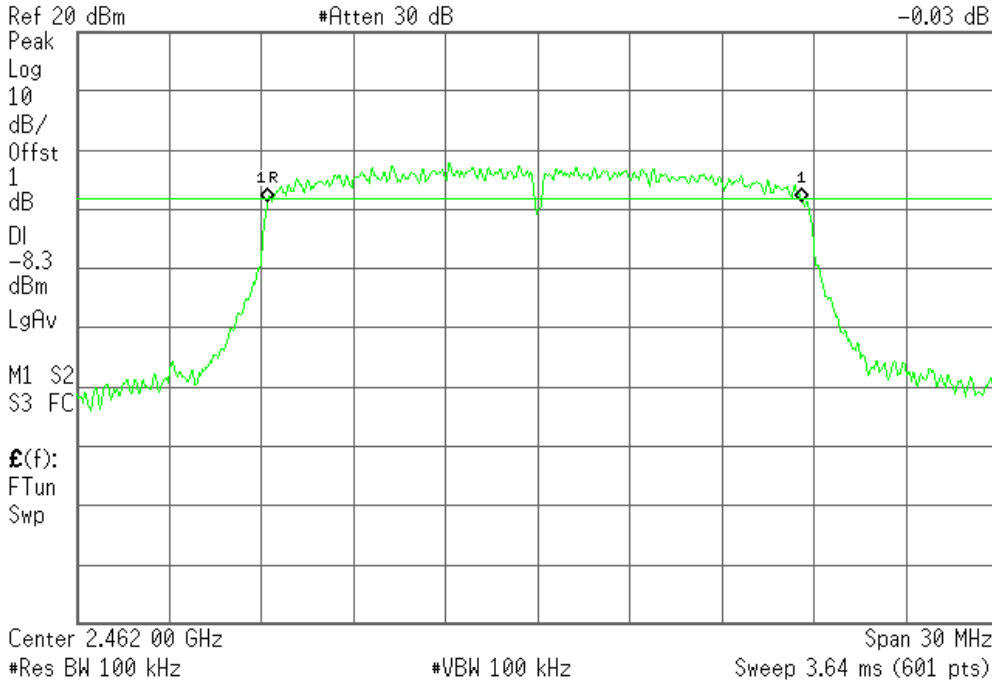


### 6dB Bandwidth (CH High)

Agilent 15:55:23 Nov 26, 2008

R T

Mkr1 17.40 MHz  
-0.03 dB



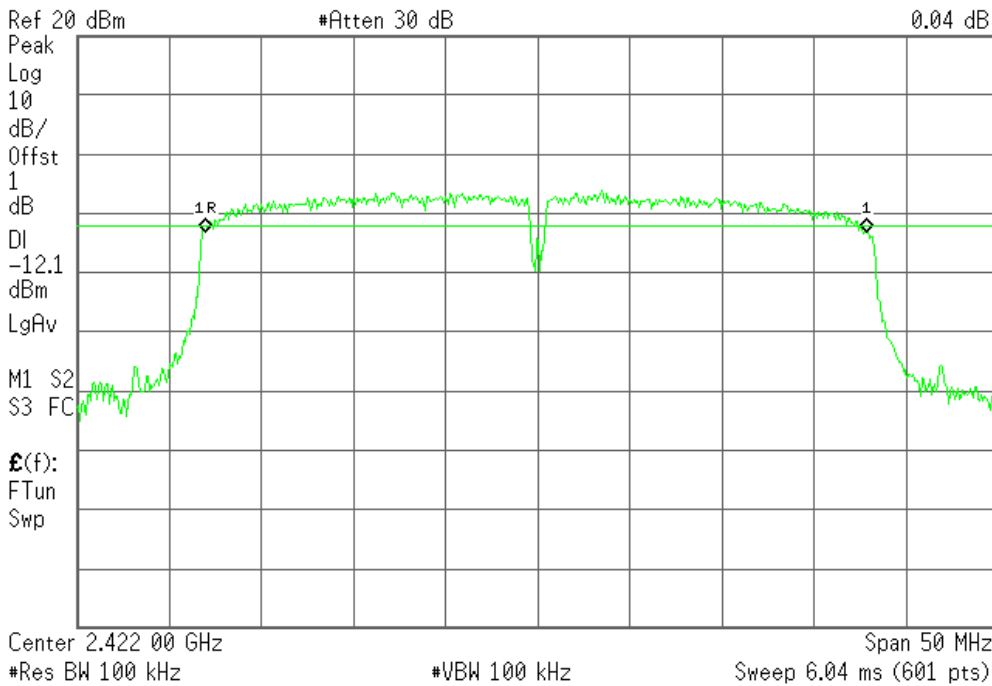
### IEEE 802.11n HT40 MHz mode

#### 6dB Bandwidth (CH Low)

Agilent 15:58:49 Nov 26, 2008

R T

Mkr1 35.83 MHz  
0.04 dB



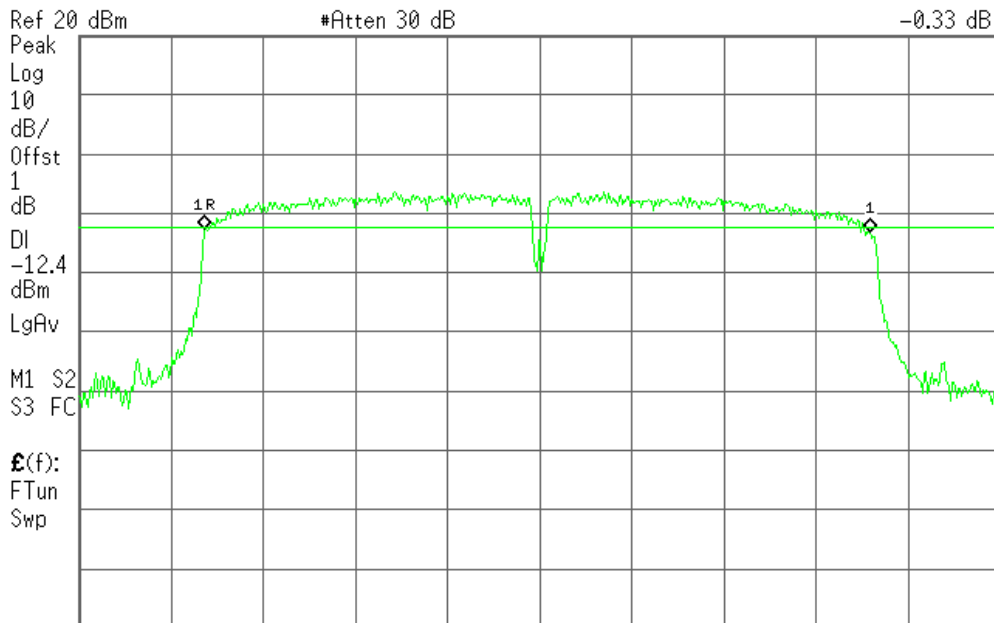


### 6dB Bandwidth (CH Mid)

Agilent 15:59:42 Nov 26, 2008

R T

Mkr1 36.08 MHz  
-0.33 dB



Center 2.437 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Span 50 MHz

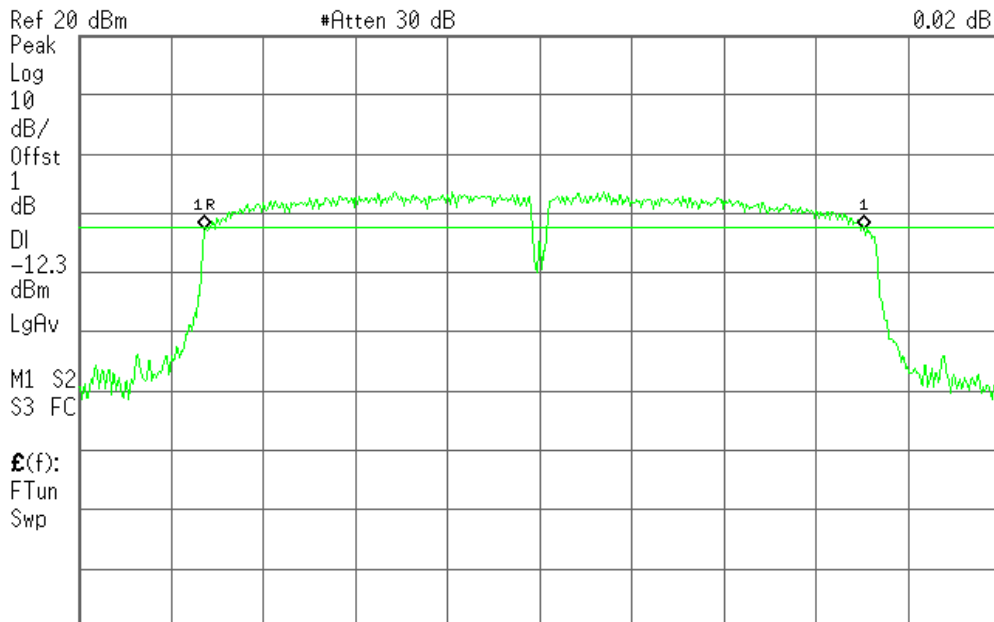
Sweep 6.04 ms (601 pts)

### 6dB Bandwidth (CH High)

Agilent 16:00:42 Nov 26, 2008

R T

Mkr1 35.75 MHz  
0.02 dB



Center 2.452 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Span 50 MHz

Sweep 6.04 ms (601 pts)

## 7.2 PEAK POWER

### LIMIT

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

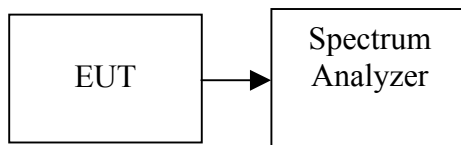
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional 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.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

### Test Configurations



### TEST PROCEDURE

- 1 Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2 Set RBW = 1 MHz.
- 3 Set VBW  $\geq$  3 MHz.
- 4 Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
- 5 Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.
- 6 Trace average 100 traces in power averaging mode.
- 7 Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

**TEST RESULTS***No non-compliance noted***Test Data****PIFA Antenna****IEEE 802.11b mode**

Channel	Frequency (MHz)	Output Power Total(dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.32	0.05395	1	PASS
Md	2437	17.33	0.05408		PASS
High	2462	17.26	0.05321		PASS

**IEEE 802.11g mode**

Channel	Frequency (MHz)	Output Power Total(dBm)	Output Power (W)	Limit (W)	Result
Low	2412	15.13	0.03258	1	PASS
Md	2437	15.10	0.03236		PASS
High	2462	15.18	0.03296		PASS

**IEEE 802.11n HT20 MHz mode**

Channel	Frequency (MHz)	Output Power Total(dBm)	Output Power (W)	Limit (W)	Result
Low	2412	15.39	0.03459	1	PASS
Md	2437	15.28	0.03373		PASS
High	2462	15.10	0.03236		PASS

**IEEE 802.11n HT40 MHz mode**

Channel	Frequency (MHz)	Output Power Total(dBm)	Output Power (W)	Limit (W)	Result
Low	2422	14.17	0.02612	1	PASS
Md	2437	14.13	0.02588		PASS
High	2452	13.99	0.02506		PASS



**Test Plot**

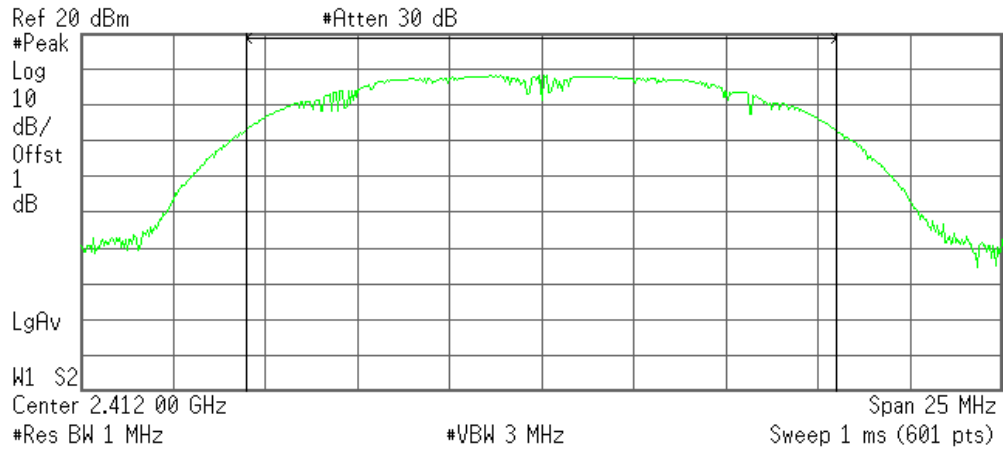
**PIFA Antenna**

**IEEE 802.11b mode**

**Peak power (CH Low)**

Agilent 09:30:42 Nov 26, 2008

R T



**Channel Power**

17.32 dBm /16.0000 MHz

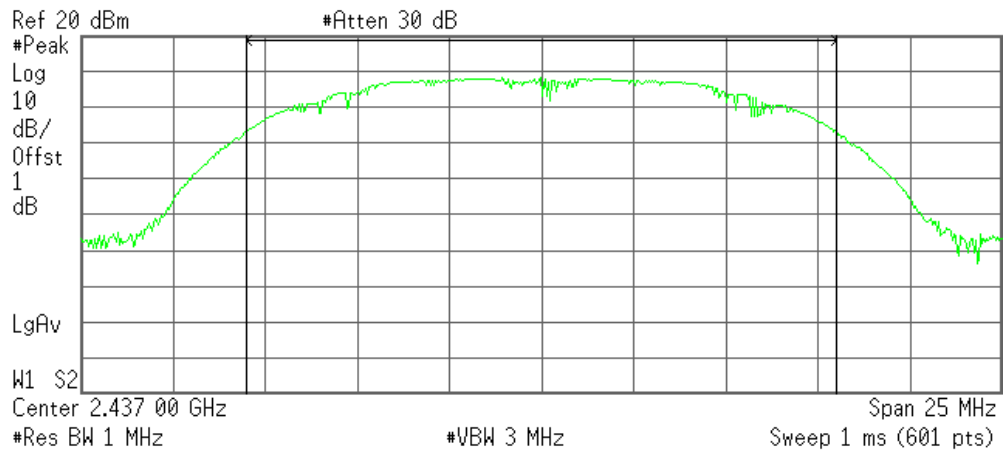
**Power Spectral Density**

-54.72 dBm/Hz

**Peak power (CH Mid)**

Agilent 09:34:34 Nov 26, 2008

R T



**Channel Power**

17.33 dBm /16.0000 MHz

**Power Spectral Density**

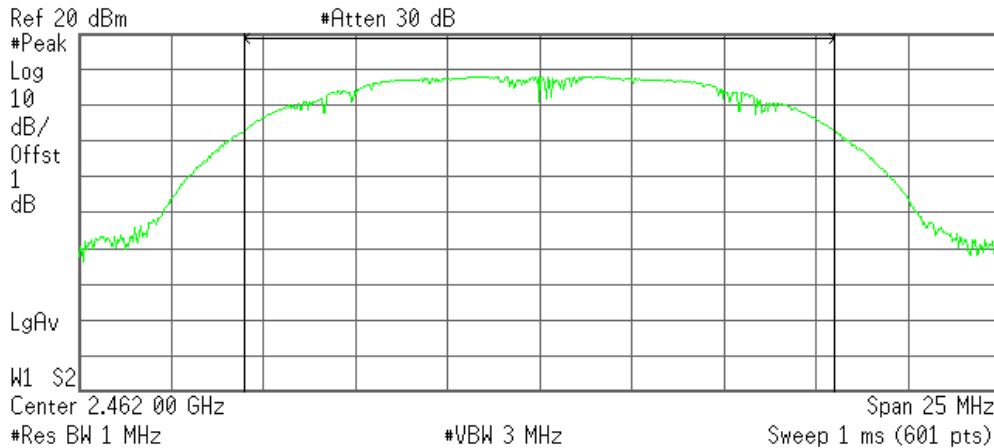
-54.71 dBm/Hz



### Peak power (CH High)

Agilent 09:38:02 Nov 26, 2008

R T



Channel Power

17.26 dBm /16.0000 MHz

Power Spectral Density

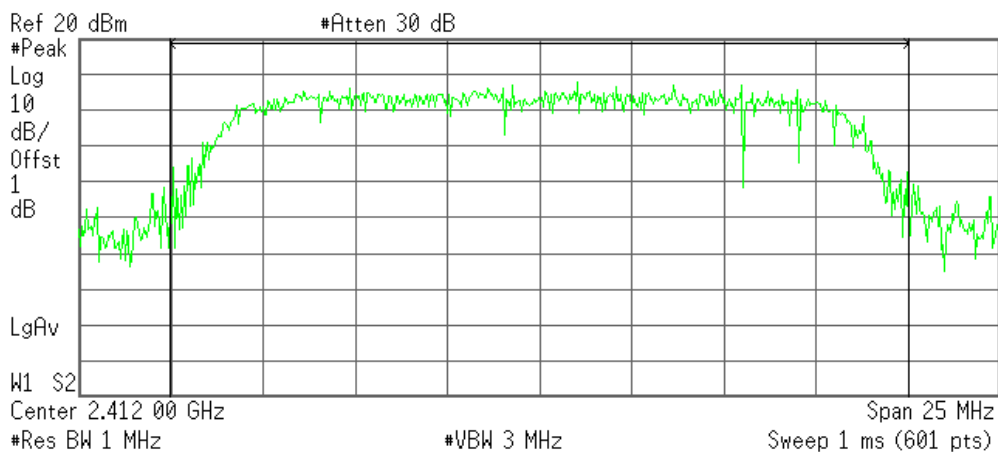
-54.78 dBm/Hz

### IEEE 802.11g mode

#### Peak power (CH Low)

Agilent 14:40:29 Nov 26, 2008

R T



Channel Power

15.13 dBm /20.0000 MHz

Power Spectral Density

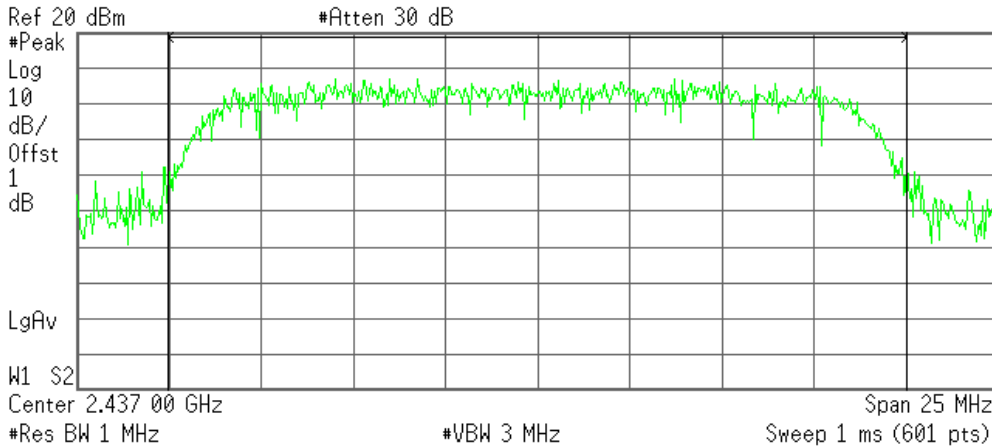
-57.88 dBm/Hz



### Peak power (CH Mid)

Agilent 09:50:23 Nov 26, 2008

R T



Channel Power

15.10 dBm /20.0000 MHz

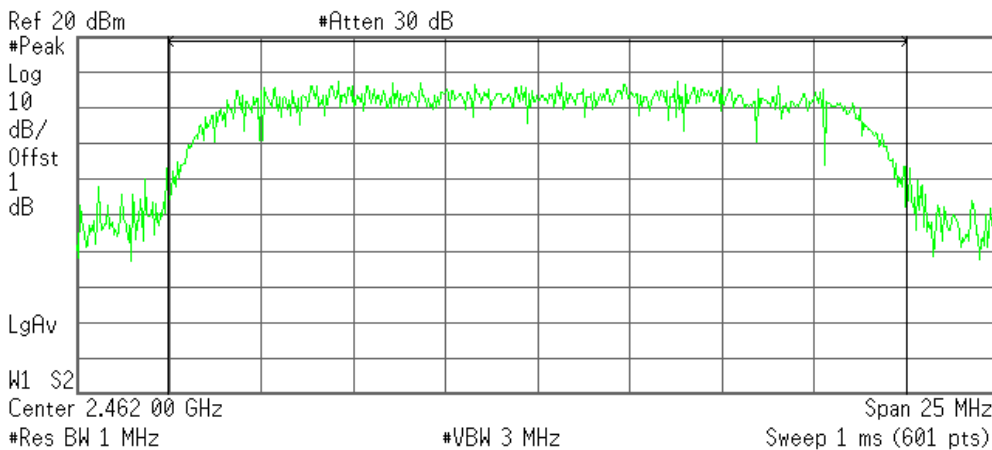
Power Spectral Density

-57.91 dBm/Hz

### Peak power (CH High)

Agilent 09:44:08 Nov 26, 2008

R T



Channel Power

15.18 dBm /20.0000 MHz

Power Spectral Density

-57.83 dBm/Hz

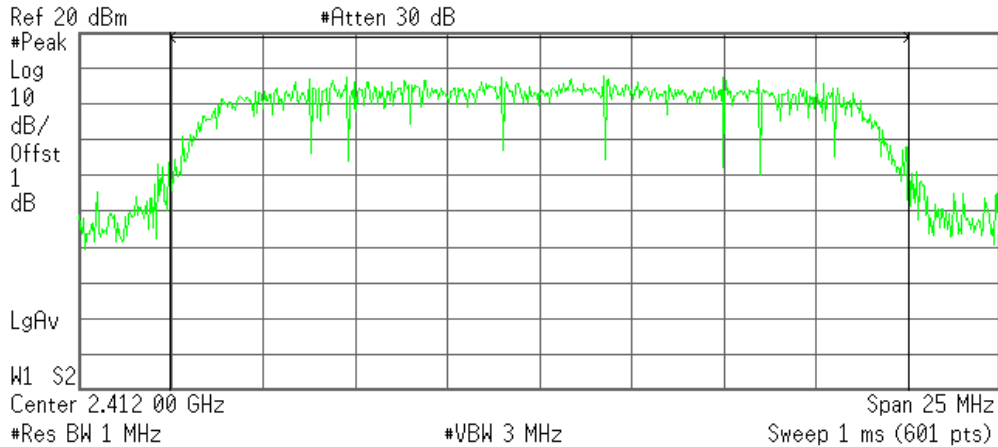


**IEEE 802.11n HT20 MHz mode**

**Peak power (CH Low)**

Agilent 14:43:26 Nov 26, 2008

R T



**Channel Power**

15.39 dBm /20.0000 MHz

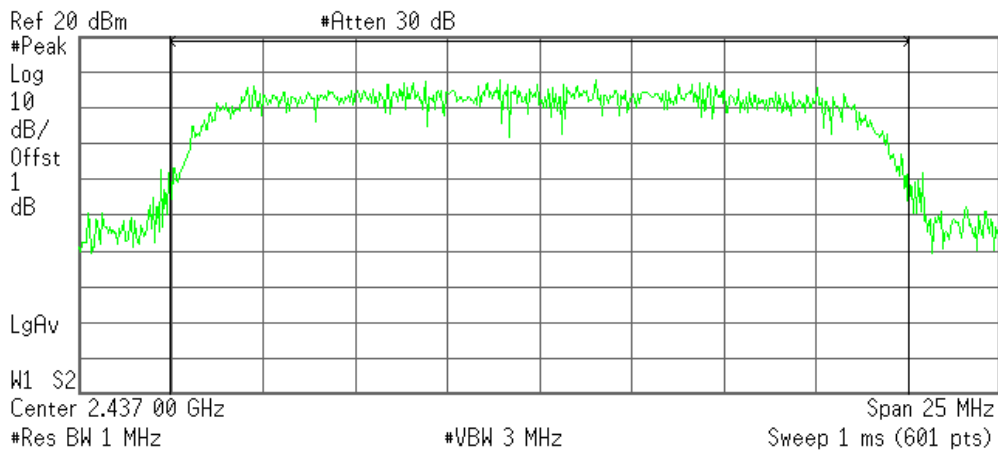
**Power Spectral Density**

-57.62 dBm/Hz

**Peak power (CH Mid)**

Agilent 14:45:42 Nov 26, 2008

R T



**Channel Power**

15.28 dBm /20.0000 MHz

**Power Spectral Density**

-57.73 dBm/Hz

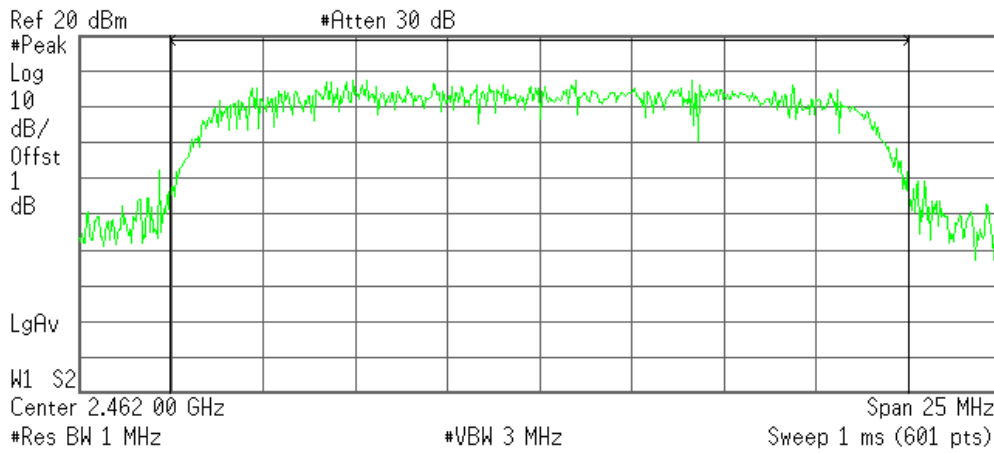




### Peak power (CH High)

Agilent 14:47:47 Nov 26, 2008

R T



Channel Power

15.10 dBm /20.0000 MHz

Power Spectral Density

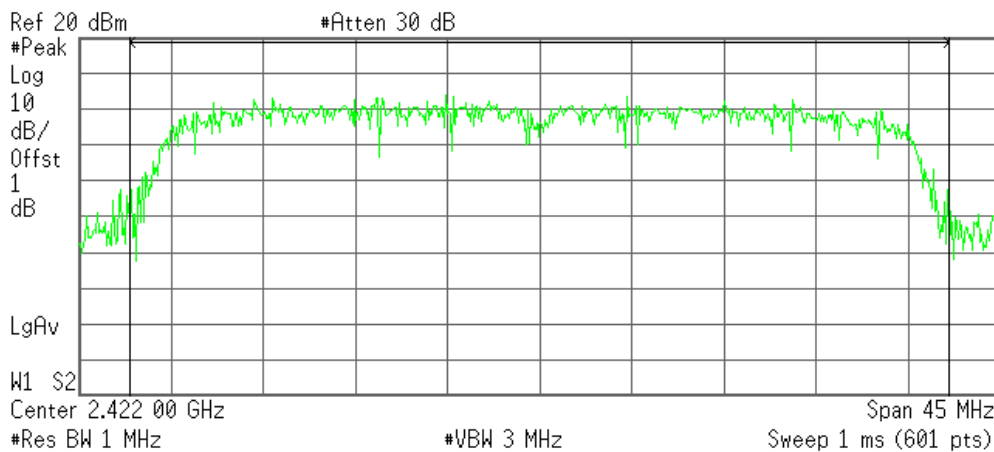
-57.91 dBm/Hz

### IEEE 802.11n HT40 MHz mode

#### Peak power (CH Low)

Agilent 14:59:32 Nov 26, 2008

R T



Channel Power

14.17 dBm /40.0000 MHz

Power Spectral Density

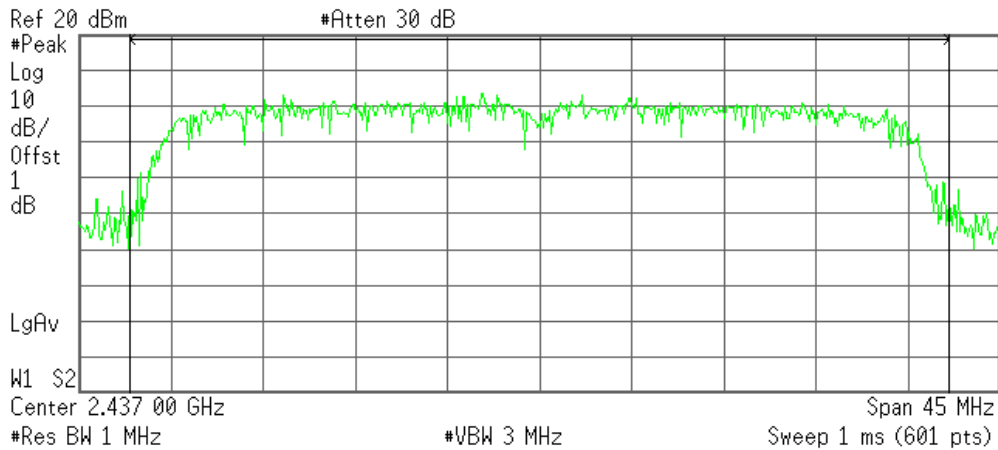
-61.85 dBm/Hz



### Peak power (CH Mid)

Agilent 14:57:02 Nov 26, 2008

R T



Channel Power

14.13 dBm /40.0000 MHz

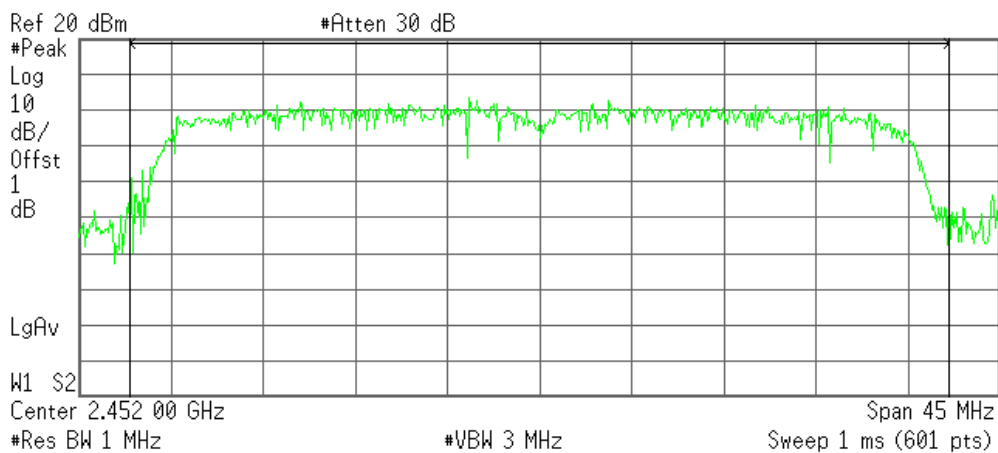
Power Spectral Density

-61.89 dBm/Hz

### Peak power (CH High)

Agilent 14:53:37 Nov 26, 2008

R T



Channel Power

13.99 dBm /40.0000 MHz

Power Spectral Density

-62.03 dBm/Hz

## 7.4 BAND EDGES MEASUREMENT

### LIMIT

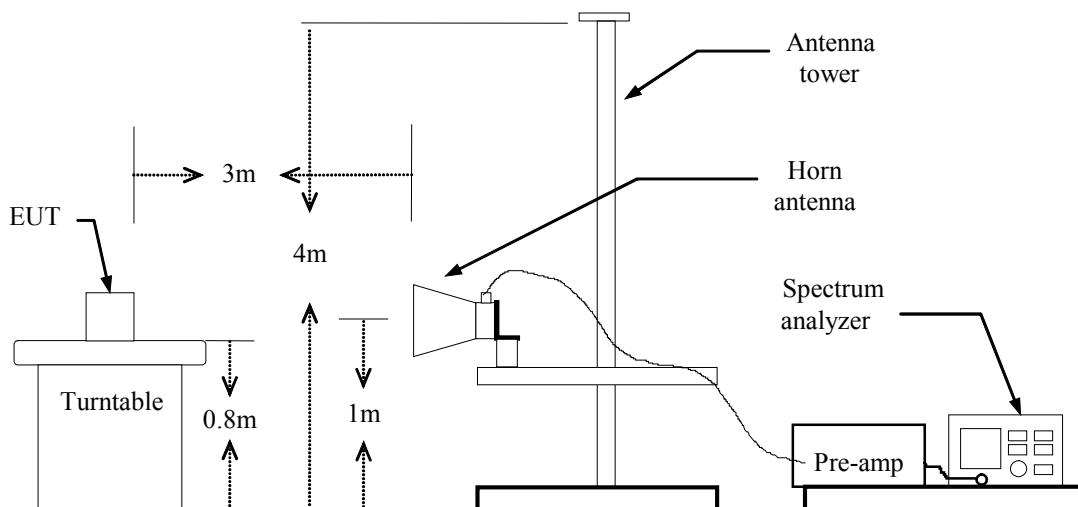
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. 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).

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due				
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009				
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2009				
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	02/14/2009				
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2009				
Turn Table	EMCO	2081-1.21	N/A	N.C.R				
Antenna Tower	CT	N/A	N/A	N.C.R				
Controller	CT	N/A	N/A	N.C.R				
High Noise Amplifier	Agilent	89842	N/A	06/09/2009				
Site NSA	C&C	N/A	N/A	06/09/2009				
Horn Antenna	TRC	N/A	N/A </tr <tr> <td>Signal Generator</td> <td>Anritsu</td> <td>MG3694A</td> <td>#050125</td> <td>02/24/2009</td> </tr>	Signal Generator	Anritsu	MG3694A	#050125	02/24/2009
Signal Generator	Anritsu	MG3694A	#050125	02/24/2009				

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

### 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.



**PIFA Antenna**

**Band Edges (IEEE 802.11b mode / CH Low)**

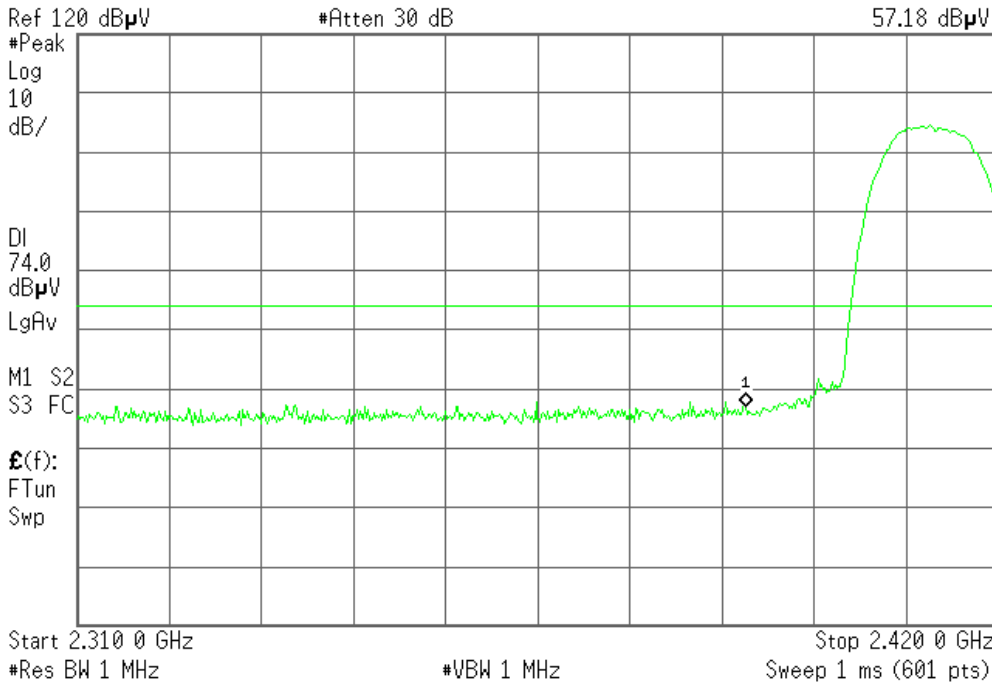
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 14:14:07 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
57.18 dB $\mu$ V



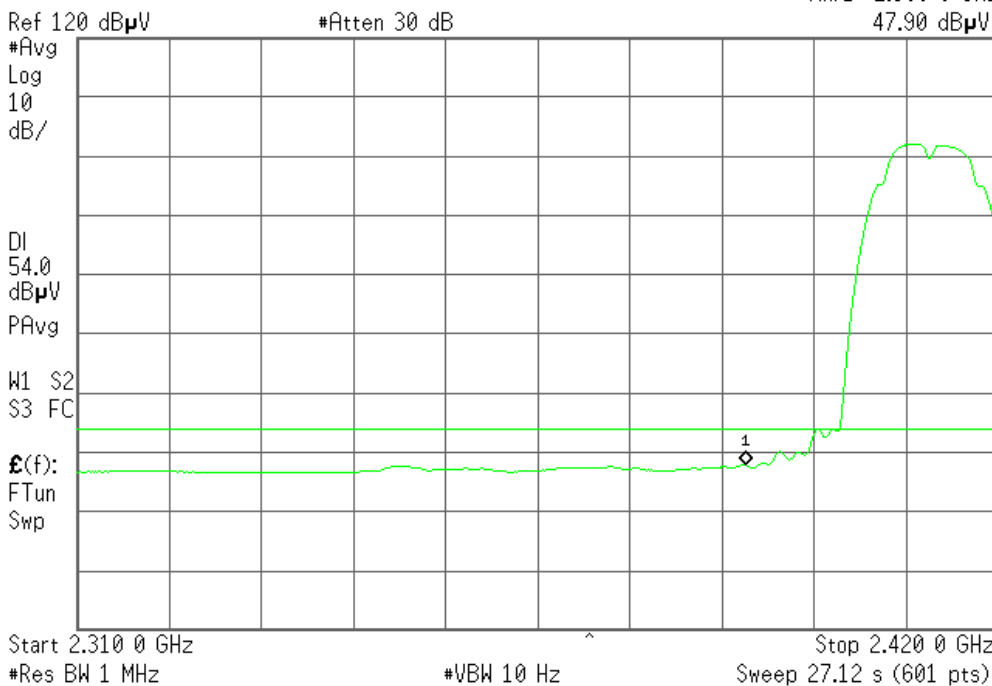
**Detector mode: Average**

**Polarity: Vertical**

Agilent 14:15:36 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
47.90 dB $\mu$ V





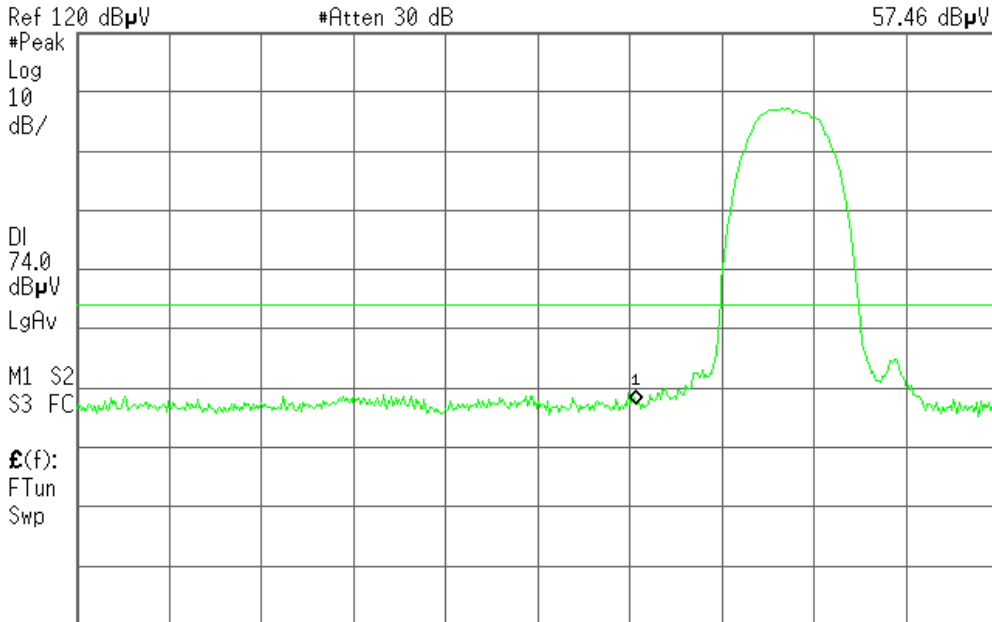
**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 15:01:57 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
57.46 dB $\mu$ V



Start 2.310 0 GHz Stop 2.442 0 GHz  
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

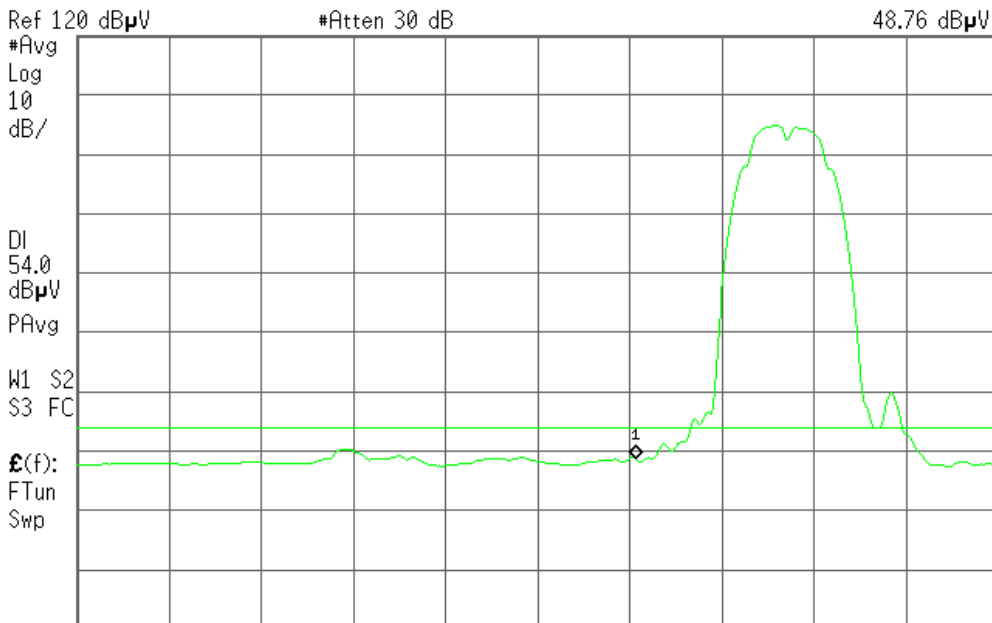
**Detector mode: Average**

**Polarity: Horizontal**

Agilent 15:03:48 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
48.76 dB $\mu$ V



Start 2.310 0 GHz Stop 2.442 0 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 32.55 s (601 pts)



### Band Edges (IEEE 802.11b mode/ CH High)

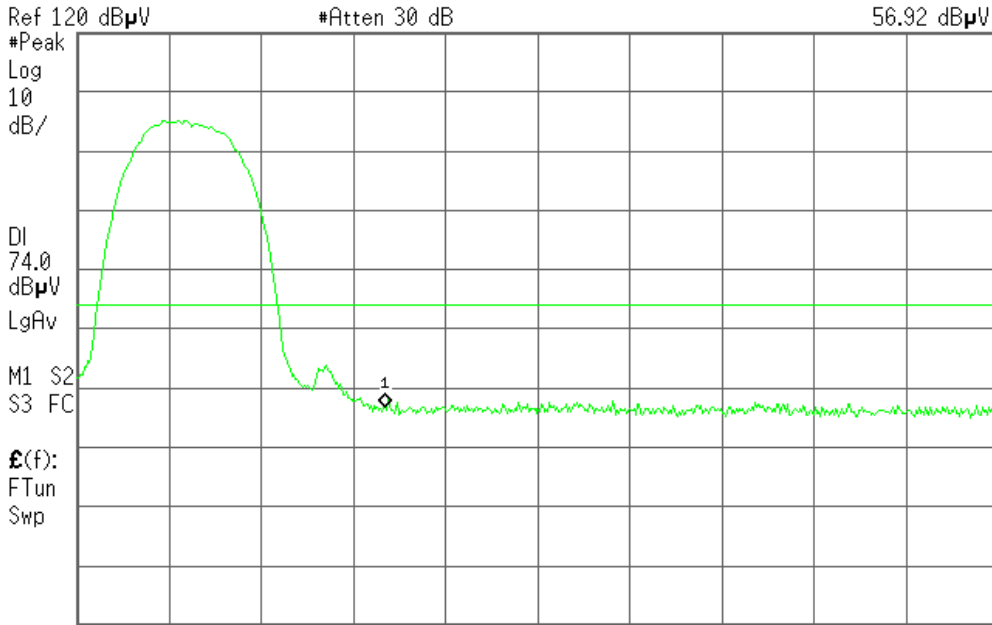
Detector mode: Peak

Polarity: Vertical

Agilent 14:48:17 Oct 30, 2008

R T

Mkr1 2.483 5 GHz  
56.92 dB $\mu$ V



Start 2.450 0 GHz Stop 2.550 0 GHz  
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

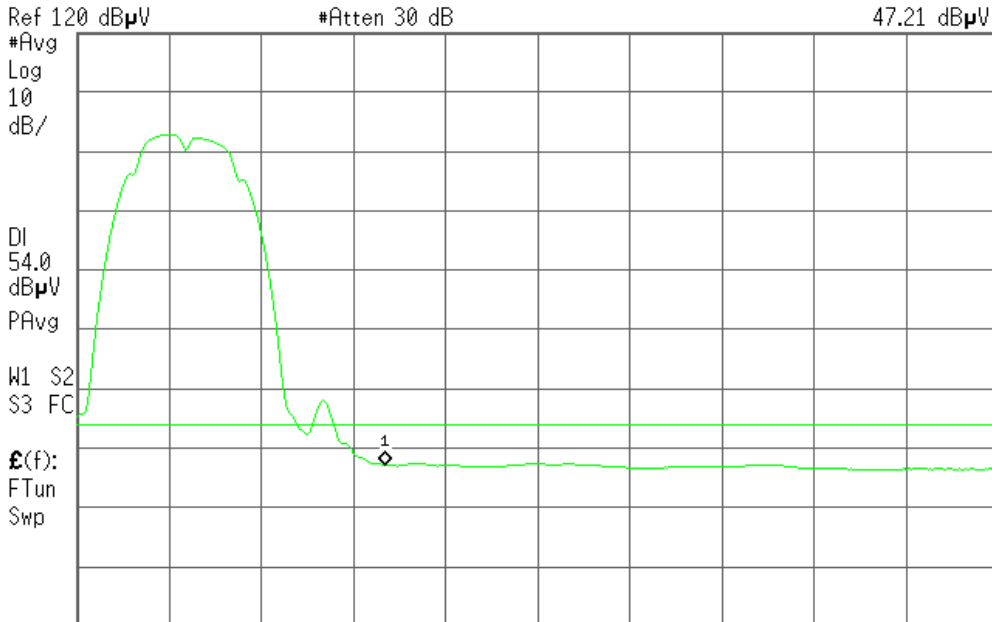
Detector mode: Average

Polarity: Vertical

Agilent 14:49:23 Oct 30, 2008

R T

Mkr1 2.483 5 GHz  
47.21 dB $\mu$ V



Start 2.450 0 GHz Stop 2.550 0 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 24.66 s (601 pts)



Detector mode: Peak

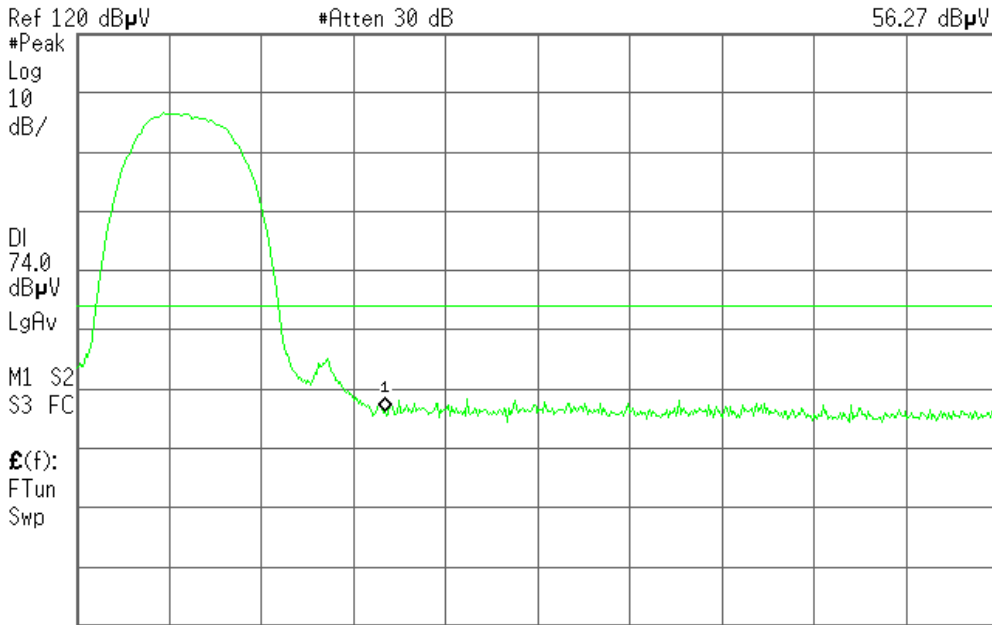
Polarity: Horizontal

Agilent 14:54:14 Oct 30, 2008

R T

Mkr1 2.483 5 GHz

56.27 dBμV



Start 2.450 0 GHz

Stop 2.550 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 1 ms (601 pts)

Detector mode: Average

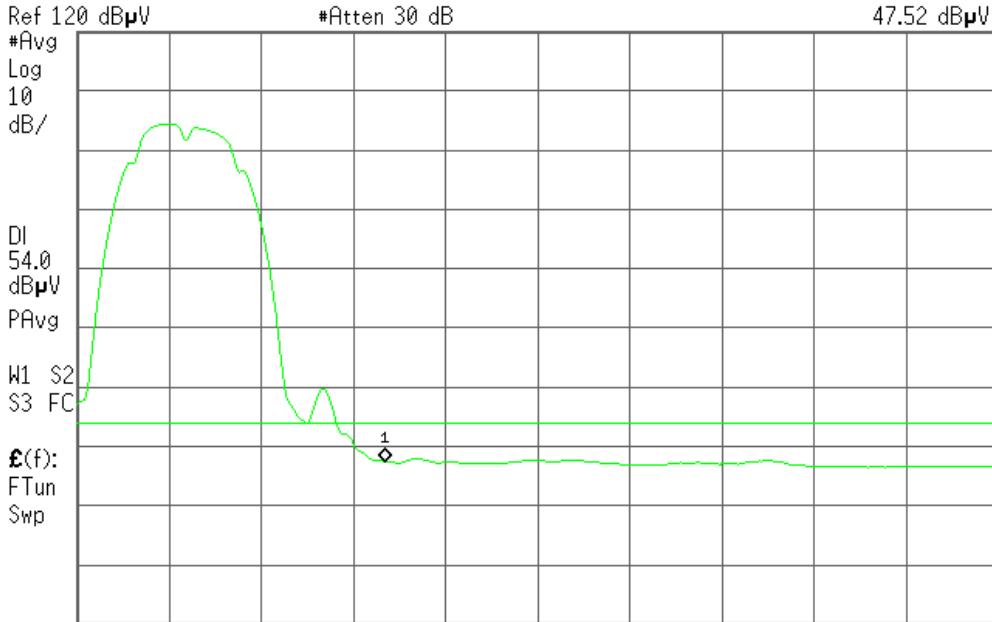
Polarity: Horizontal

Agilent 14:56:04 Oct 30, 2008

R T

Mkr1 2.483 5 GHz

47.52 dBμV



Start 2.450 0 GHz

Stop 2.550 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 24.66 s (601 pts)





### Band Edges (IEEE 802.11g mode / CH Low)

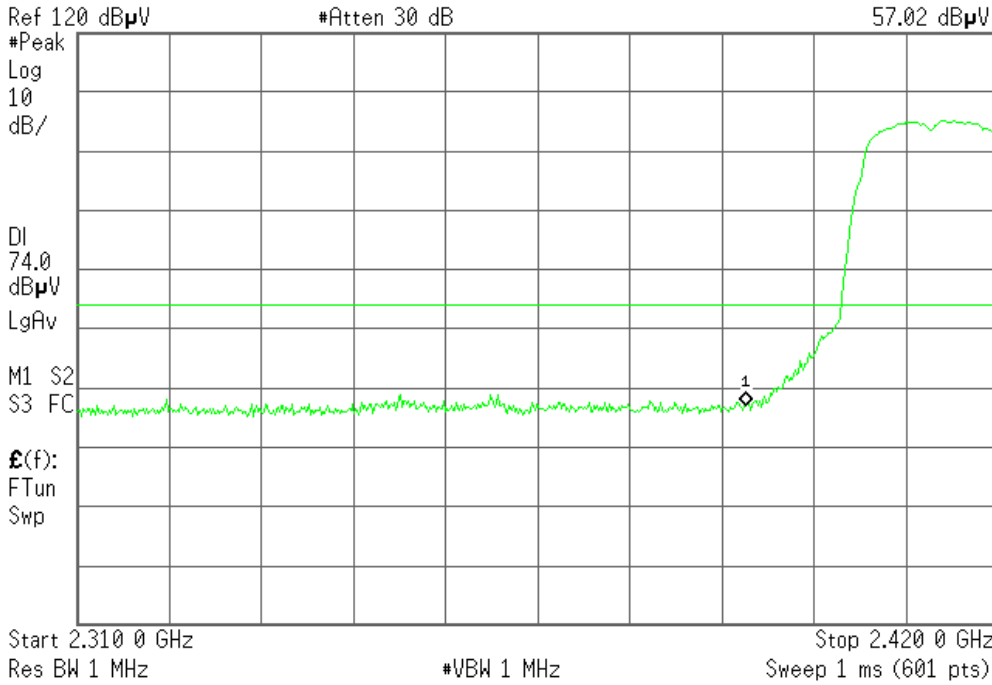
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 15:19:37 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
57.02 dBμV



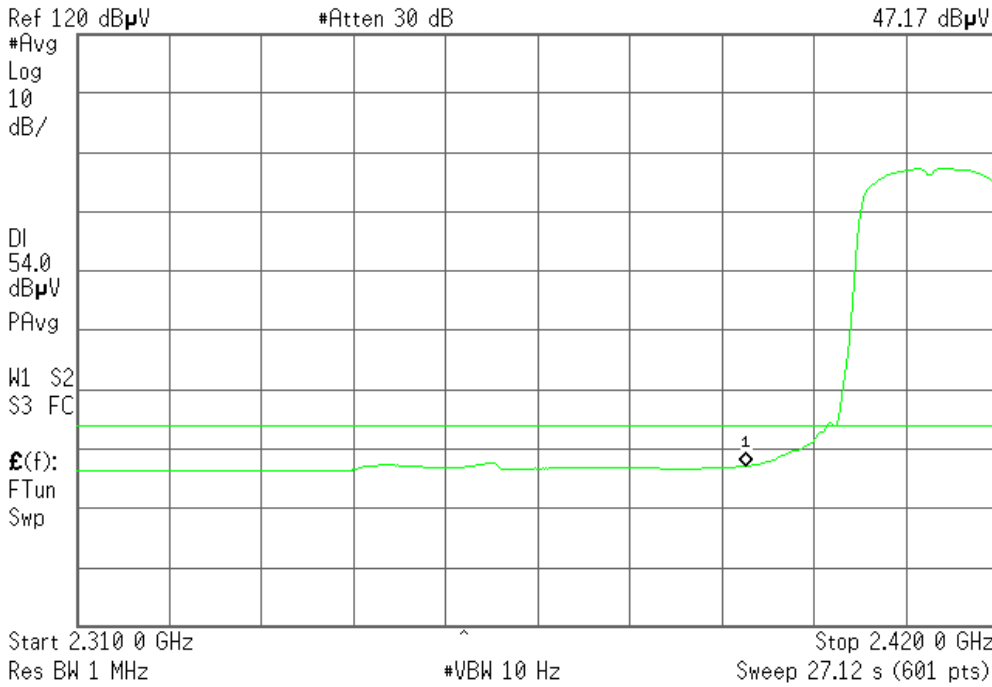
**Detector mode: Average**

**Polarity: Vertical**

Agilent 15:20:45 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
47.17 dBμV



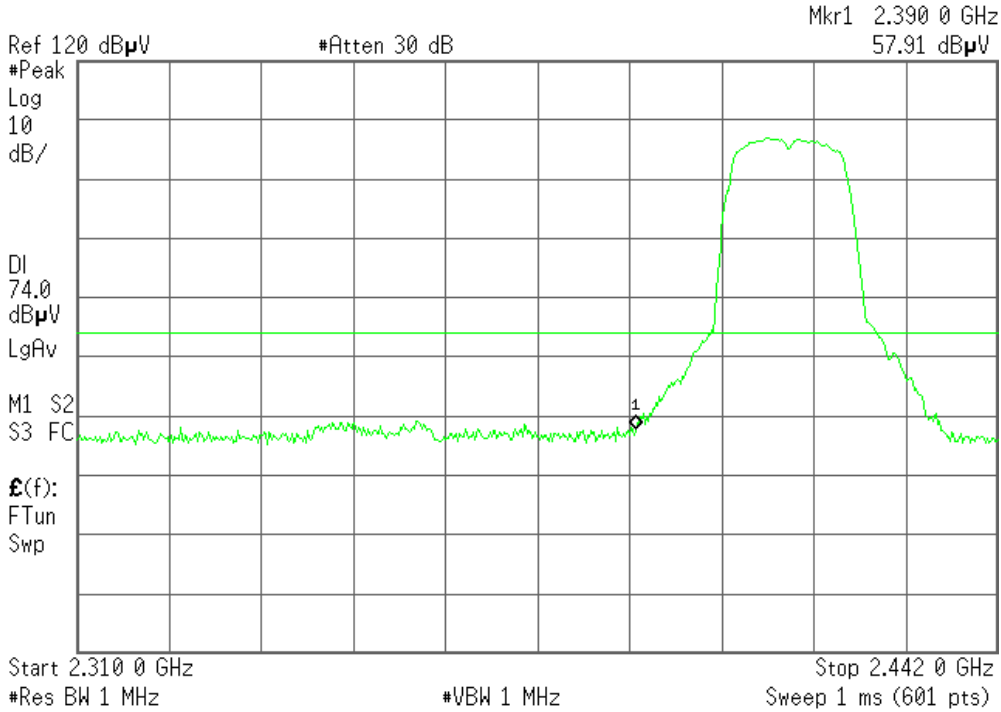


**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 15:12:17 Oct 30, 2008

R T

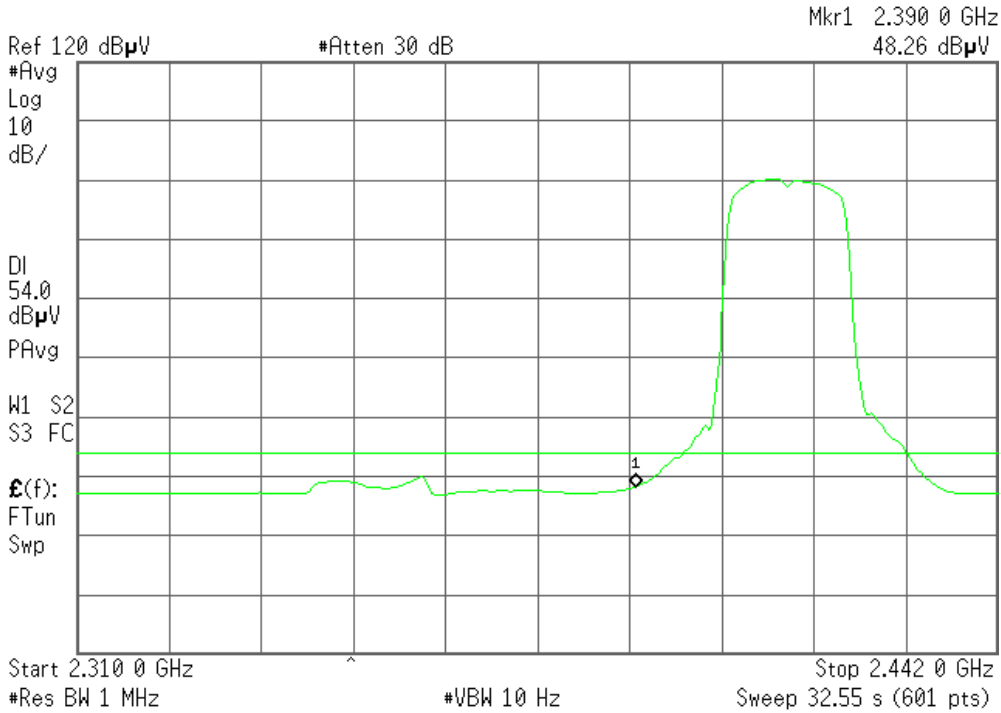


**Detector mode: Average**

**Polarity: Horizontal**

Agilent 15:13:14 Oct 30, 2008

R T





### Band Edges (IEEE 802.11g mode / CH High)

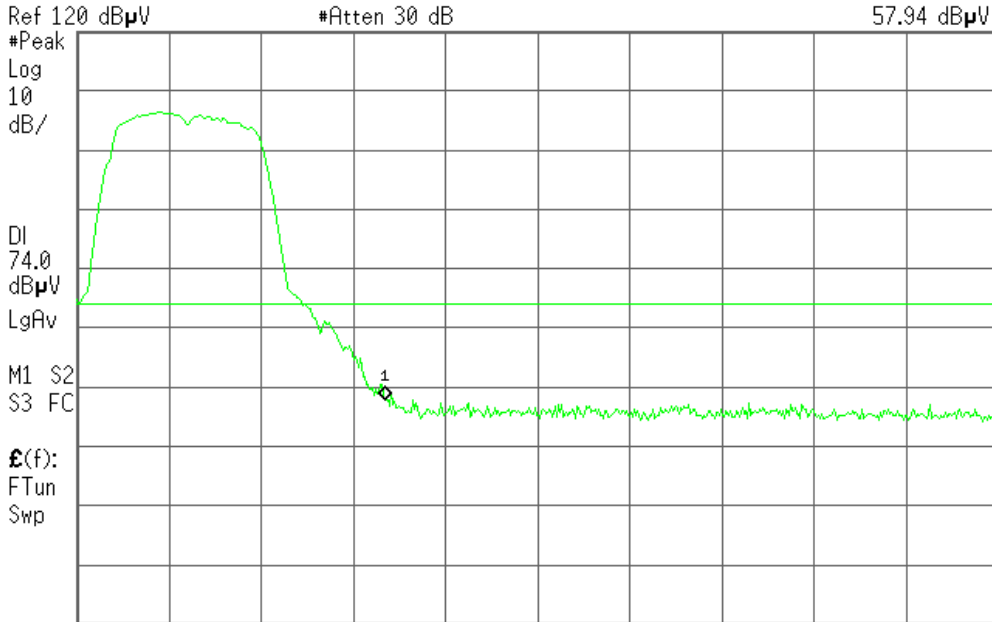
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 15:27:05 Oct 30, 2008

R T

Mkr1 2.483 5 GHz  
57.94 dB $\mu$ V



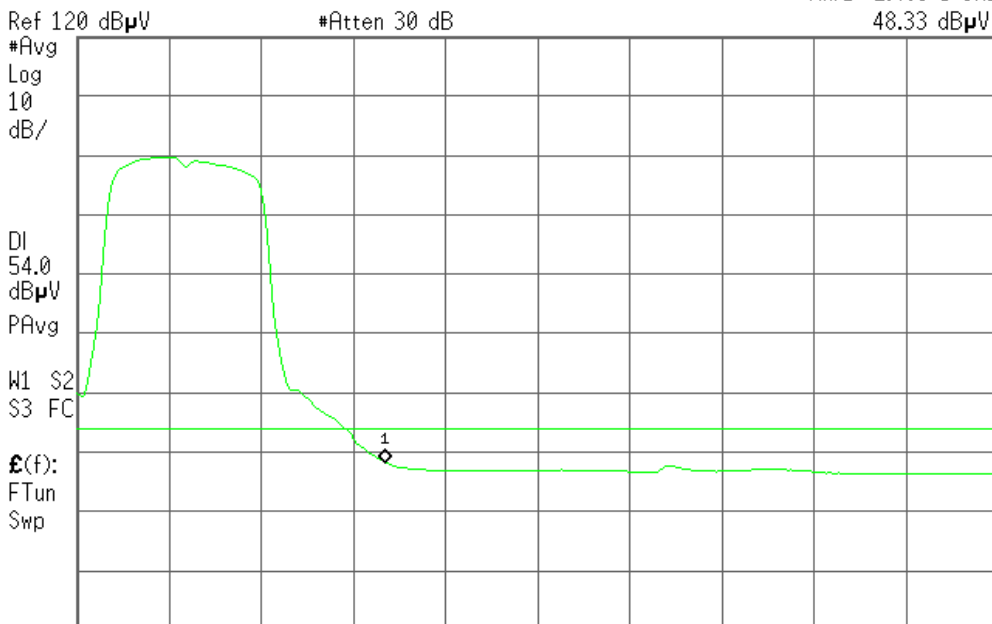
**Detector mode: Average**

**Polarity: Vertical**

Agilent 15:27:52 Oct 30, 2008

R T

Mkr1 2.483 5 GHz  
48.33 dB $\mu$ V





**Detector mode: Peak**

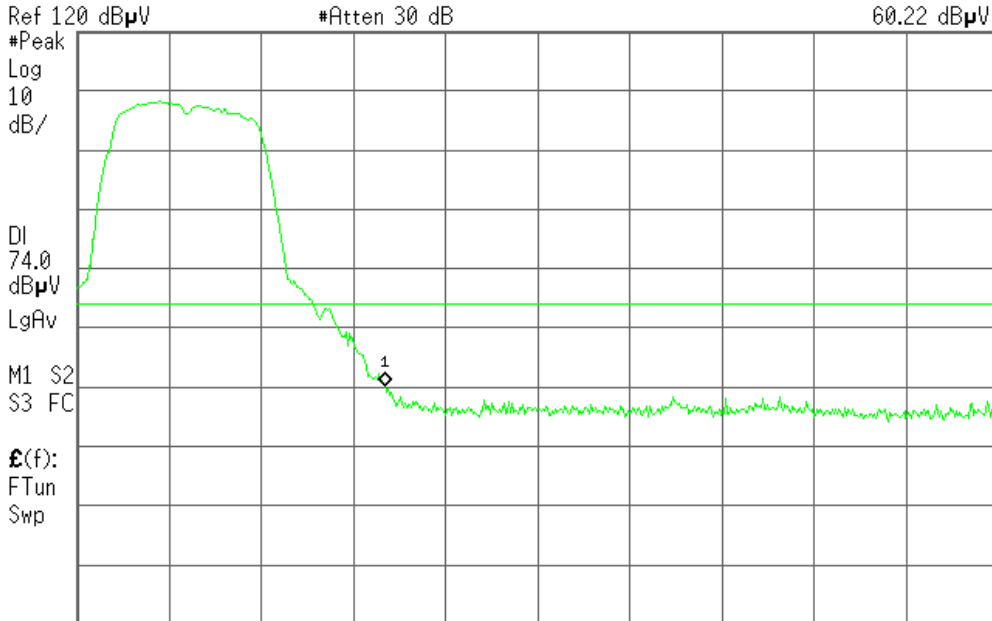
**Polarity: Horizontal**

Agilent 15:30:03 Oct 30, 2008

R T

Mkr1 2.483 5 GHz

60.22 dB $\mu$ V



Start 2.450 0 GHz

Stop 2.550 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**Detector mode: Average**

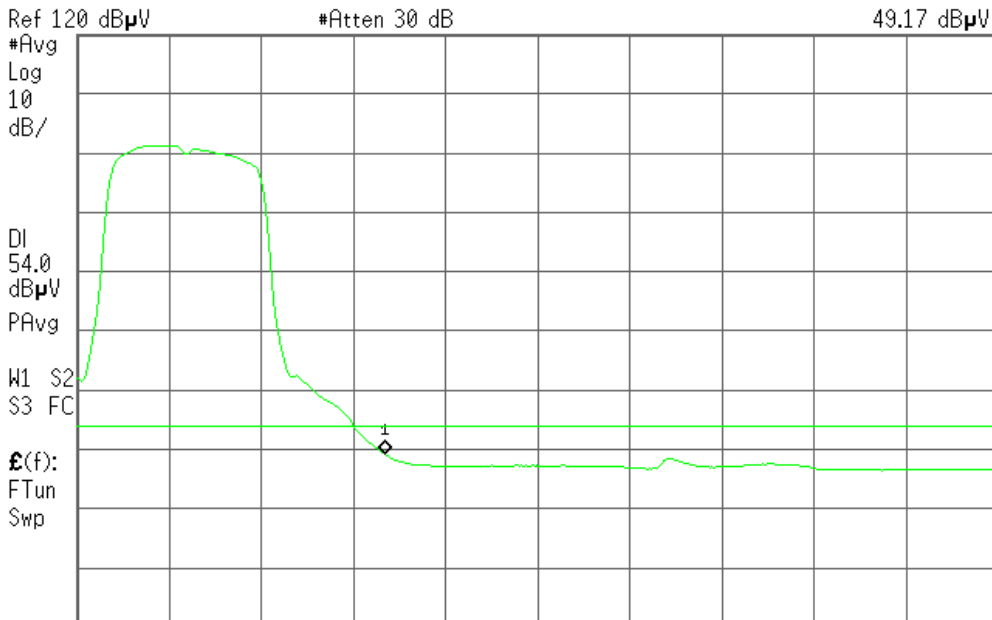
**Polarity: Horizontal**

Agilent 15:31:17 Oct 30, 2008

R T

Mkr1 2.483 5 GHz

49.17 dB $\mu$ V



Start 2.450 0 GHz

Stop 2.550 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 24.66 s (601 pts)



### Band Edges (IEEE 802.11n HT20 MHz mode / CH Low)

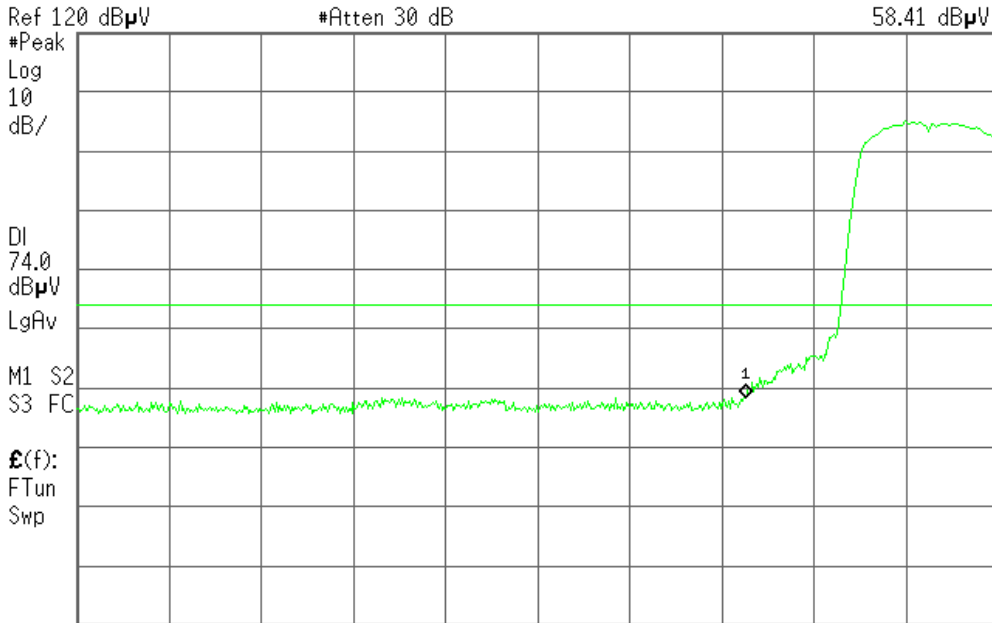
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 14:21:51 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
58.41 dB $\mu$ V



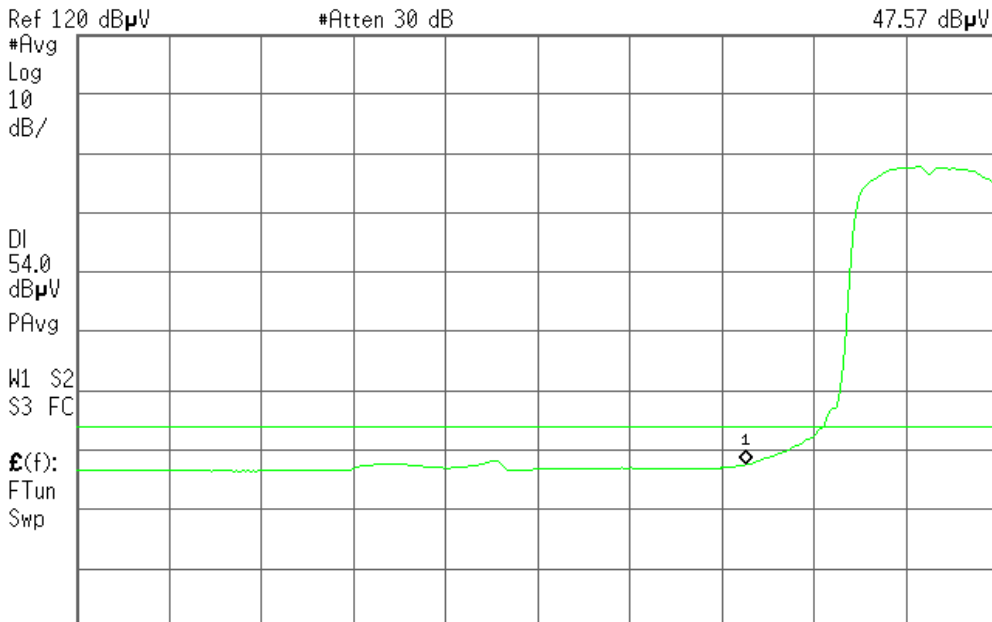
**Detector mode: Average**

**Polarity: Vertical**

Agilent 14:23:17 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
47.57 dB $\mu$ V





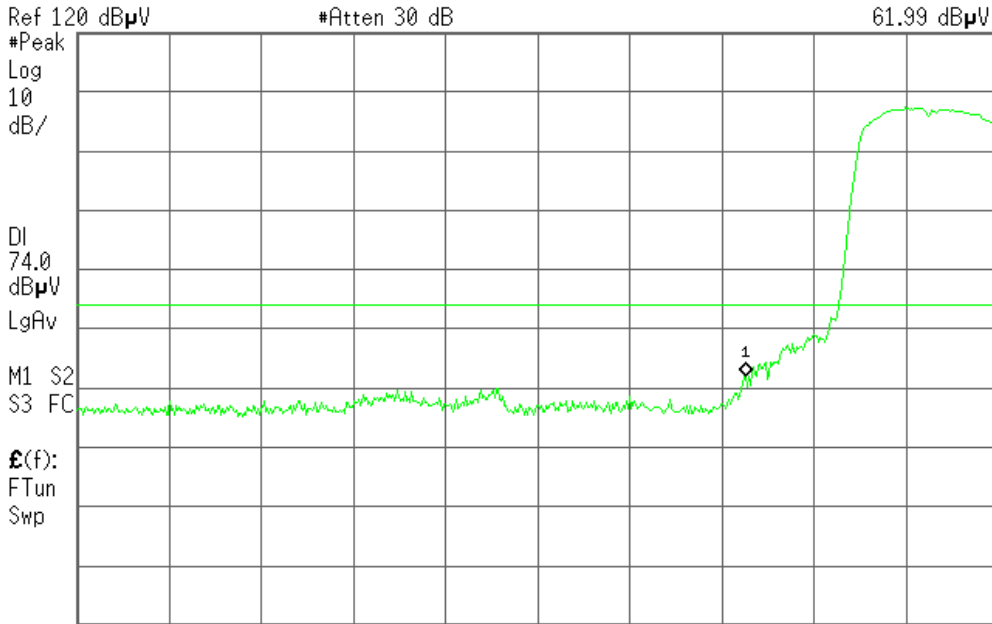
Detector mode: Peak

Polarity: Horizontal

Agilent 14:26:42 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
61.99 dBμV



Start 2.310 0 GHz Stop 2.420 0 GHz  
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

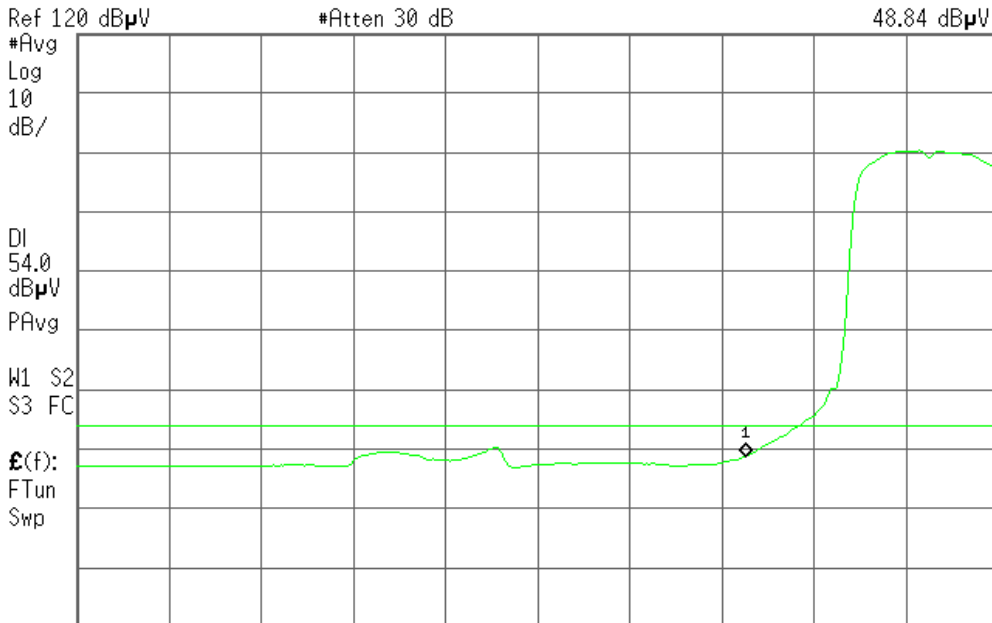
Detector mode: Average

Polarity: Horizontal

Agilent 14:27:50 Oct 30, 2008

R T

Mkr1 2.390 0 GHz  
48.84 dBμV



Start 2.310 0 GHz Stop 2.420 0 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 27.12 s (601 pts)



### Band Edges (IEEE 802.11n HT20 MHz mode/ CH High)

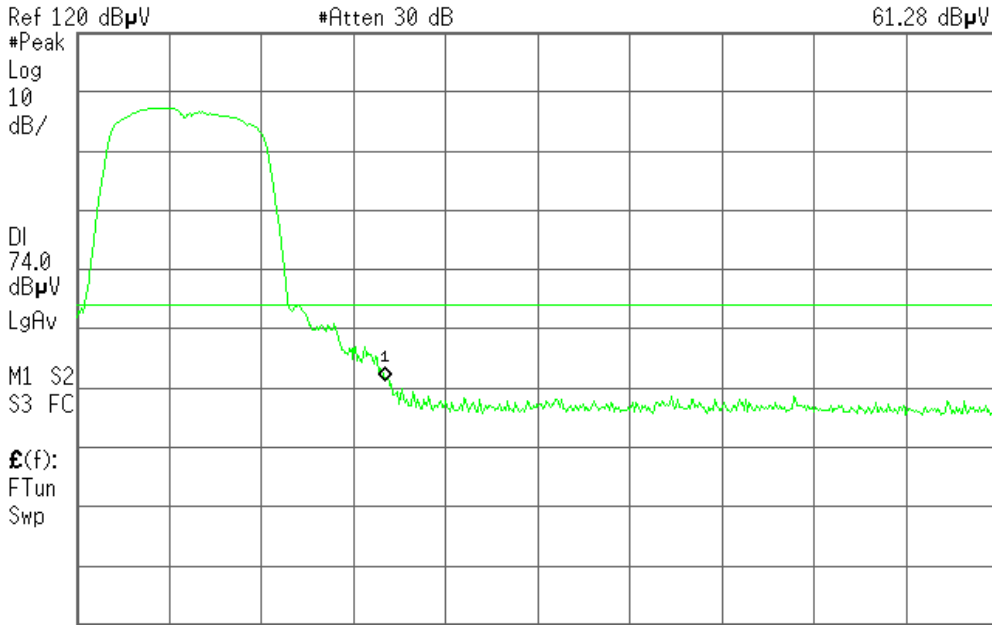
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 14:41:29 Oct 30, 2008

R T

Mkr1 2.483 5 GHz  
61.28 dB $\mu$ V



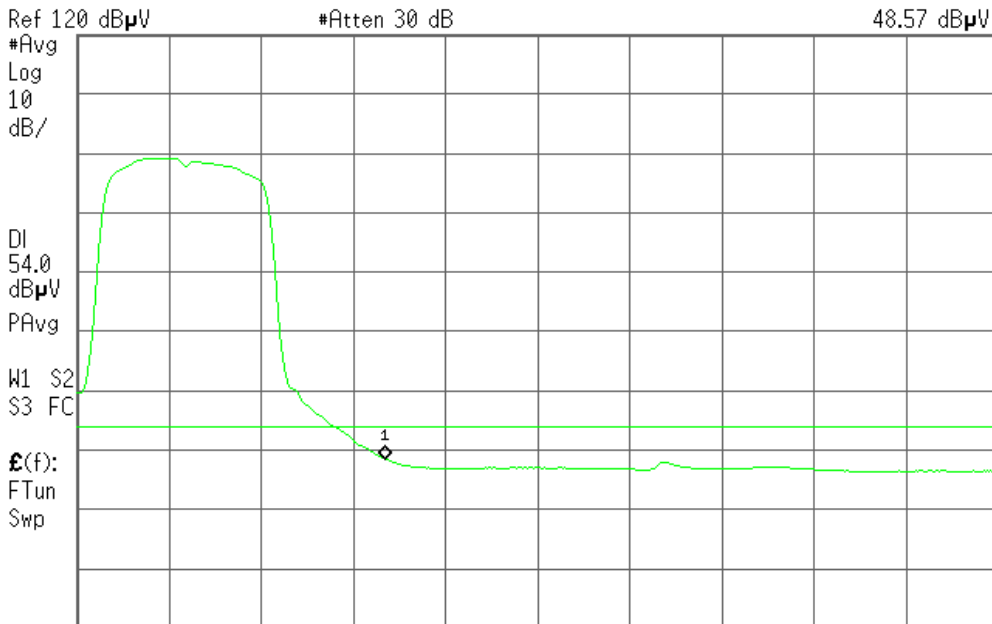
**Detector mode: Average**

**Polarity: Vertical**

Agilent 14:42:57 Oct 30, 2008

R T

Mkr1 2.483 5 GHz  
48.57 dB $\mu$ V





Detector mode: Peak

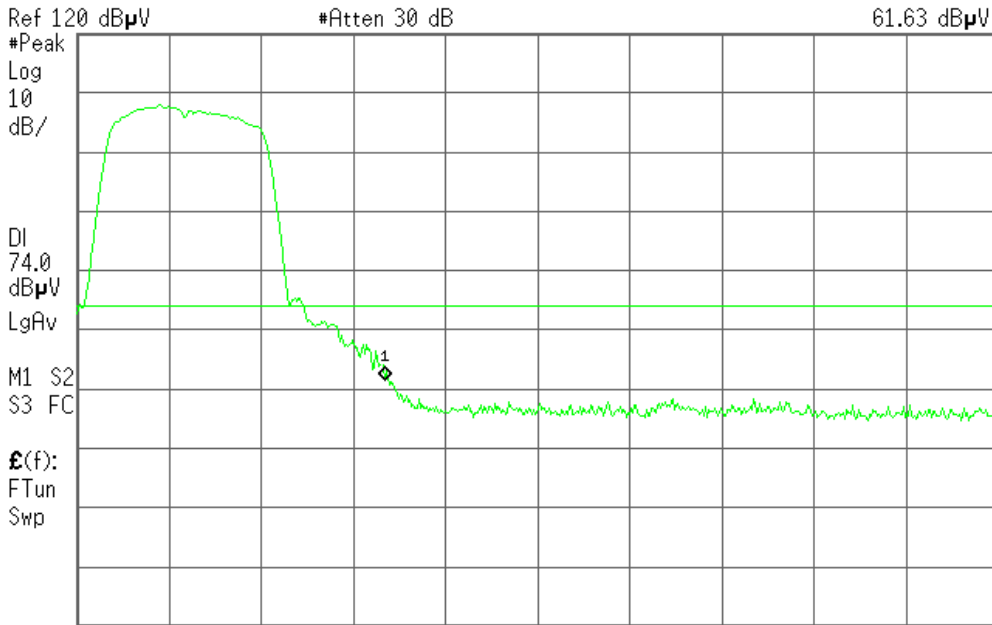
Polarity: Horizontal

Agilent 14:33:36 Oct 30, 2008

R T

Mkr1 2.483 5 GHz

61.63 dBμV



Start 2.450 0 GHz

Stop 2.550 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average

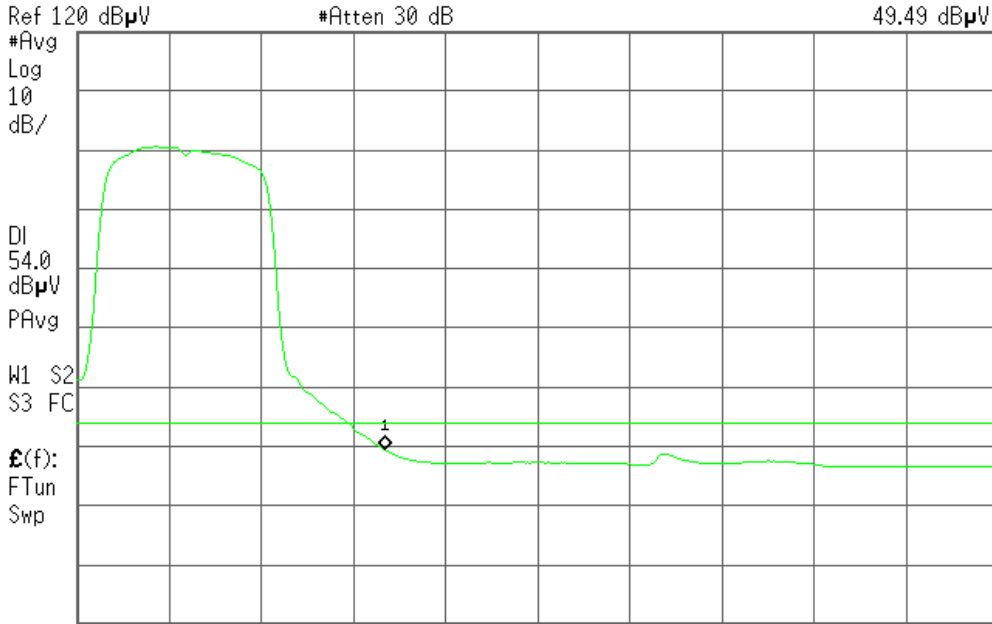
Polarity: Horizontal

Agilent 14:34:57 Oct 30, 2008

R T

Mkr1 2.483 5 GHz

49.49 dBμV



Start 2.450 0 GHz

Stop 2.550 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 24.66 s (601 pts)





### Band Edges (IEEE 802.11n HT40 MHz mode / CH Low)

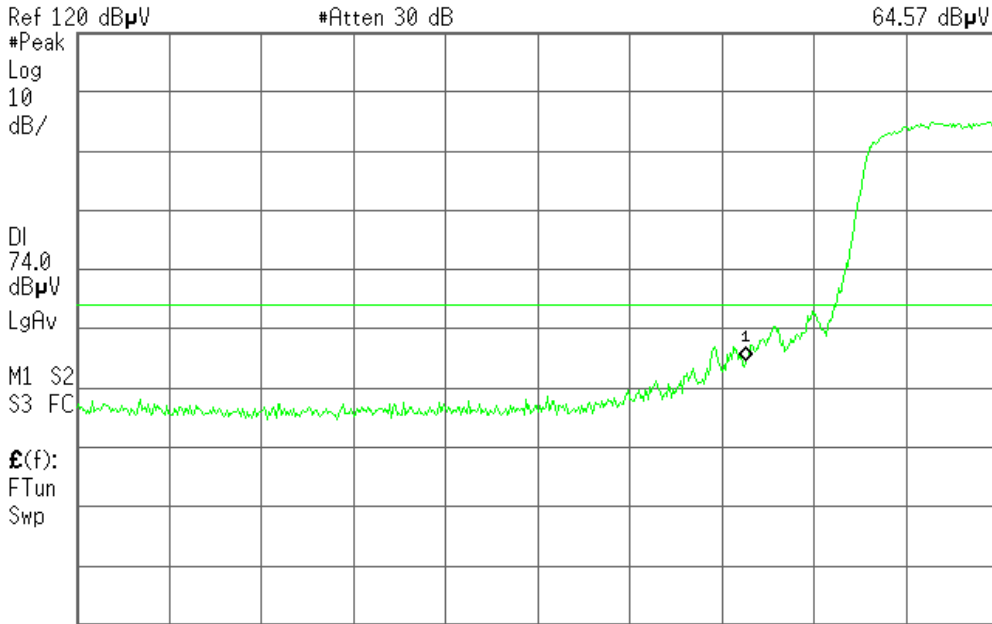
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 13:32:10 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
64.57 dBμV



Start 2.310 0 GHz Stop 2.420 0 GHz  
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

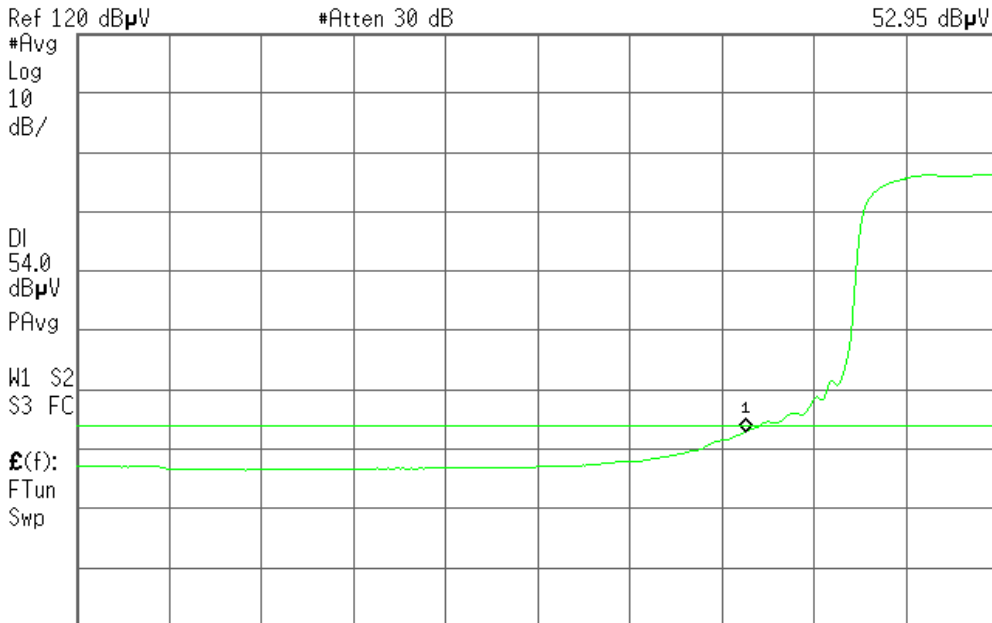
**Detector mode: Average**

**Polarity: Vertical**

Agilent 13:35:30 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
52.95 dBμV



Start 2.310 0 GHz Stop 2.420 0 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 27.12 s (601 pts)

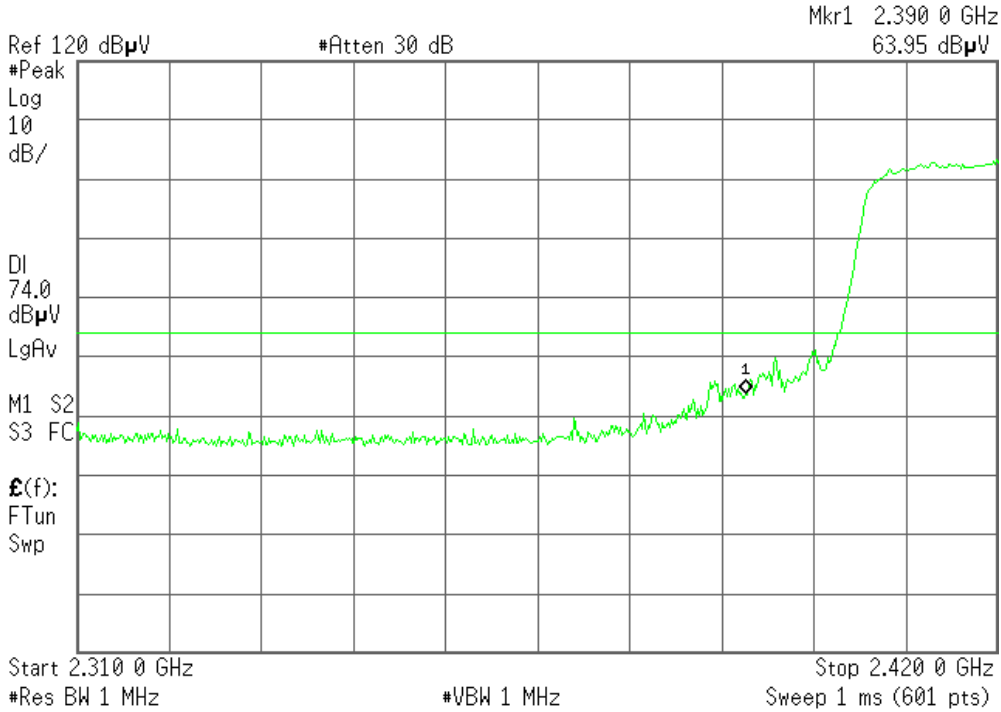


**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 13:37:47 Dec 2, 2008

R T

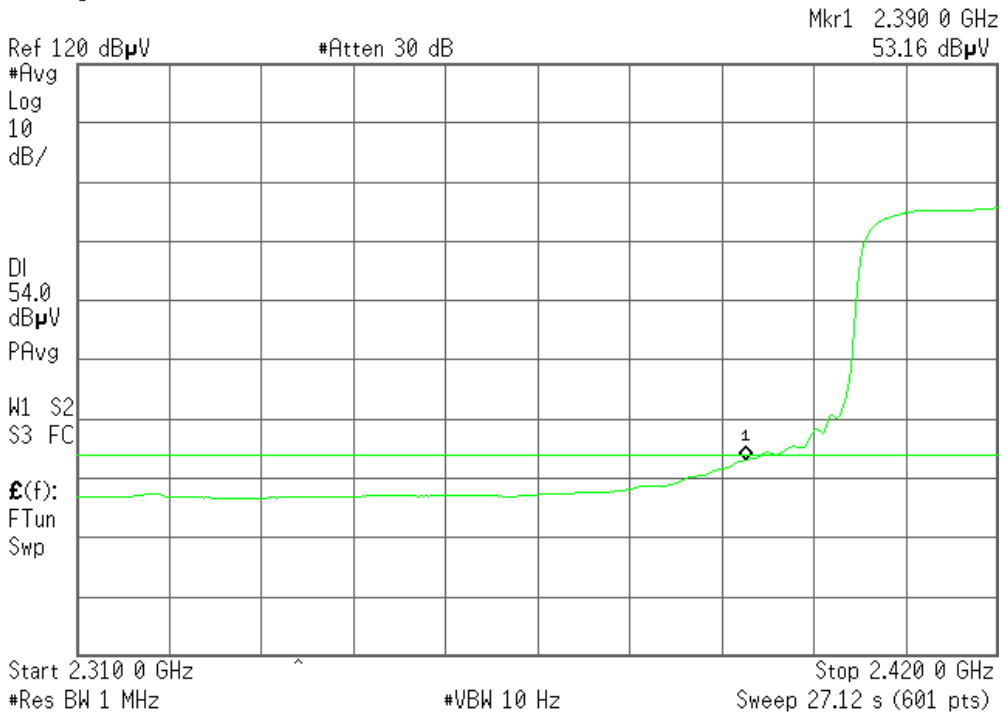


**Detector mode: Average**

**Polarity: Horizontal**

Agilent 13:42:59 Dec 2, 2008

R T





### Band Edges (IEEE 802.11n HT40 MHz mode / CH High)

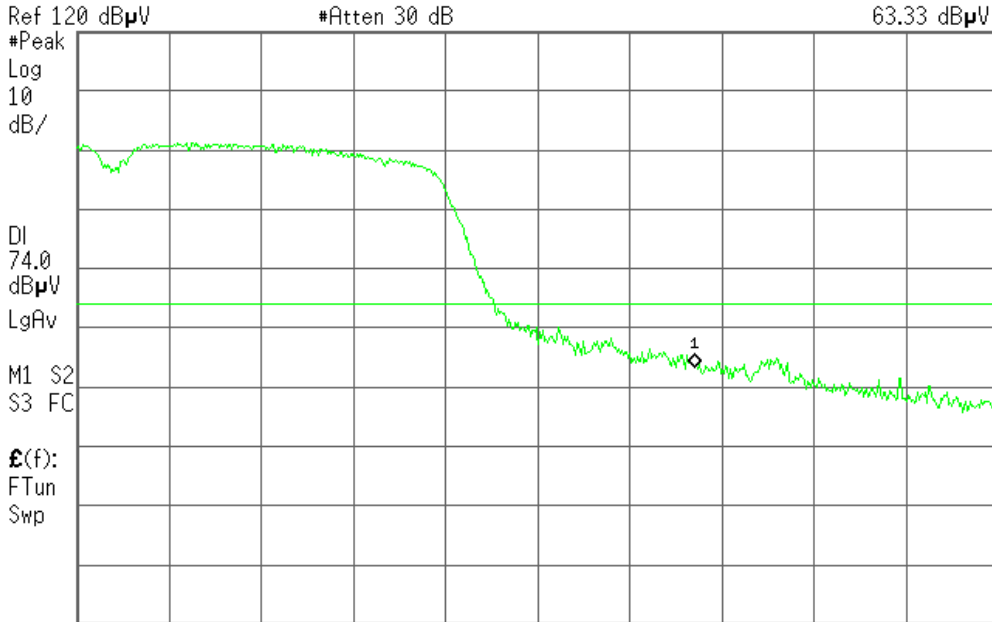
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 13:56:26 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
63.33 dB $\mu$ V



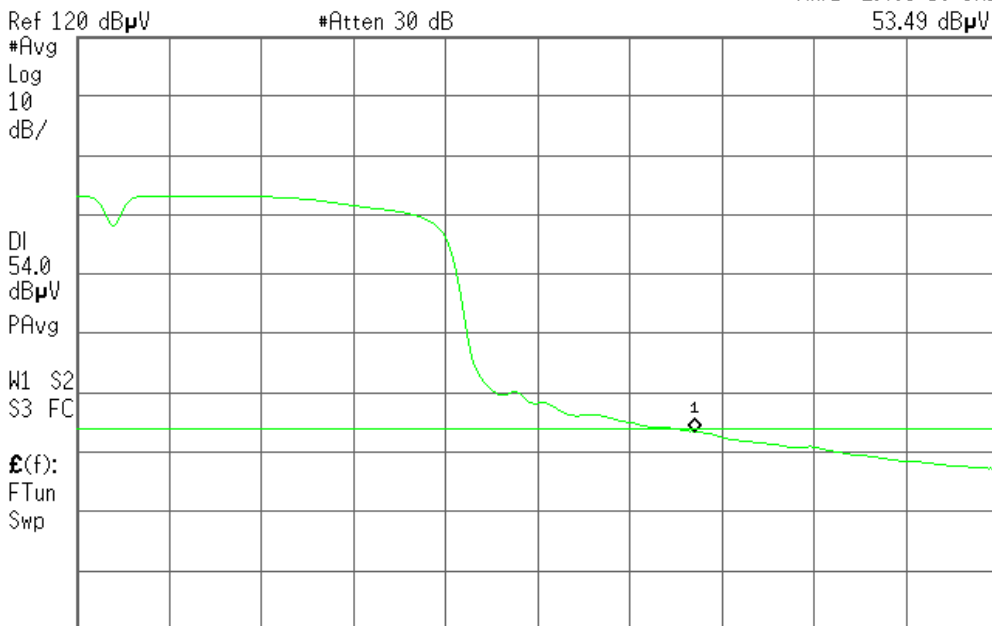
**Detector mode: Average**

**Polarity: Vertical**

Agilent 13:55:51 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
53.49 dB $\mu$ V





**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 13:51:52 Dec 2, 2008

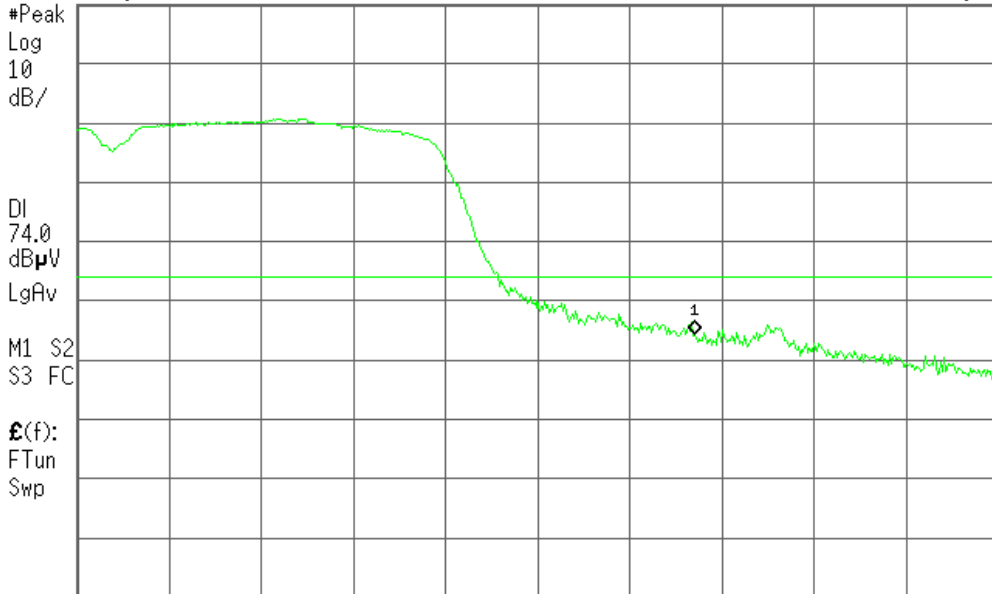
R T

Mkr1 2.483 50 GHz

64.48 dB $\mu$ V

Ref 120 dB $\mu$ V

#Atten 30 dB



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**Detector mode: Average**

**Polarity: Horizontal**

Agilent 13:51:13 Dec 2, 2008

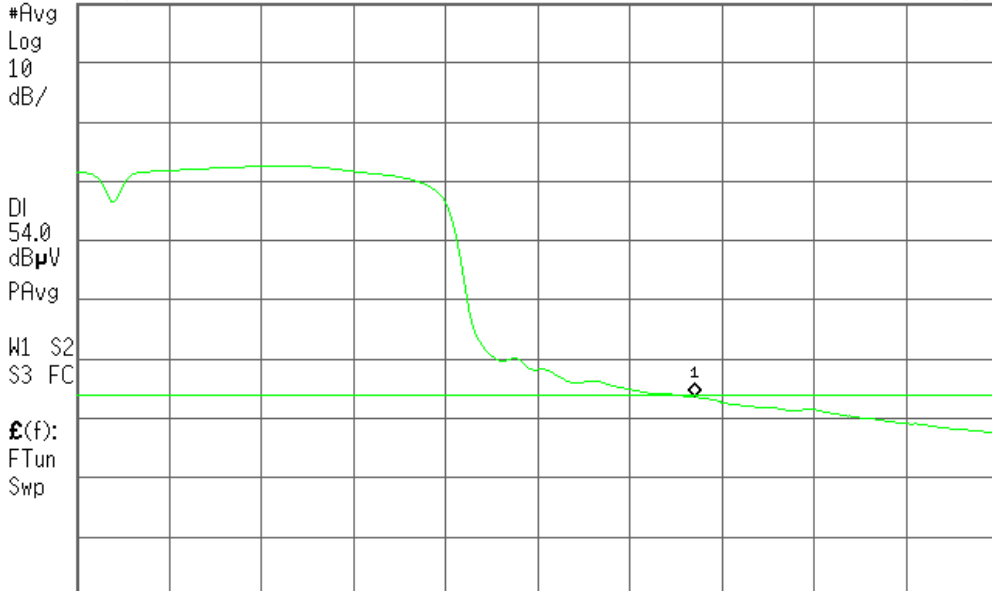
R T

Mkr1 2.483 50 GHz

53.64 dB $\mu$ V

Ref 120 dB $\mu$ V

#Atten 30 dB



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)



### PCB Antenna

### Band Edges (IEEE 802.11b mode / CH Low)

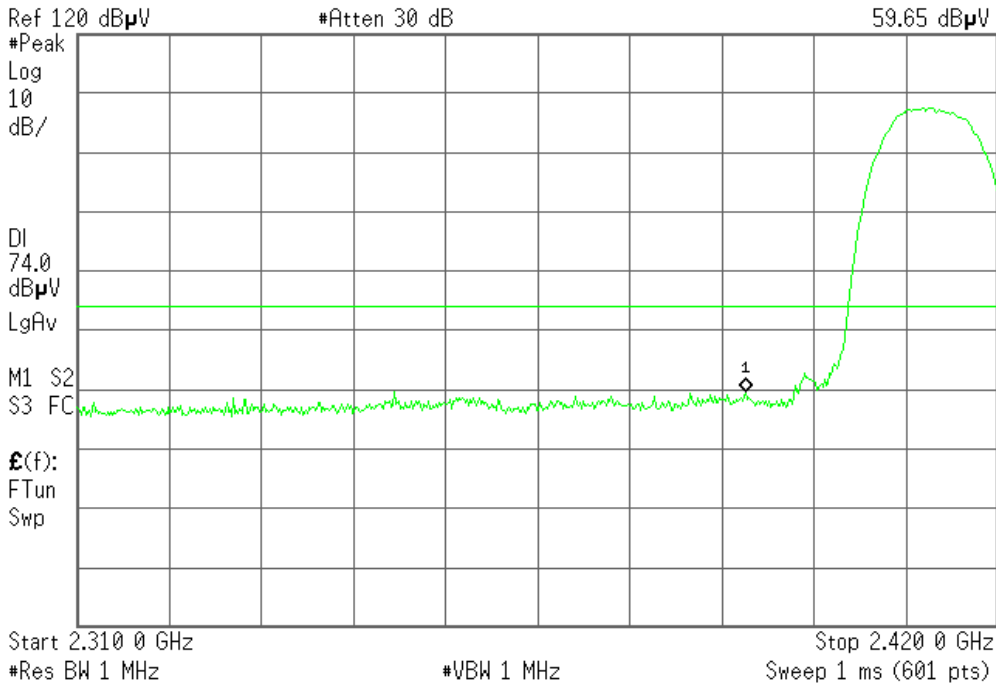
Detector mode: Peak

Polarity: Vertical

Agilent 13:14:03 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
59.65 dB $\mu$ V



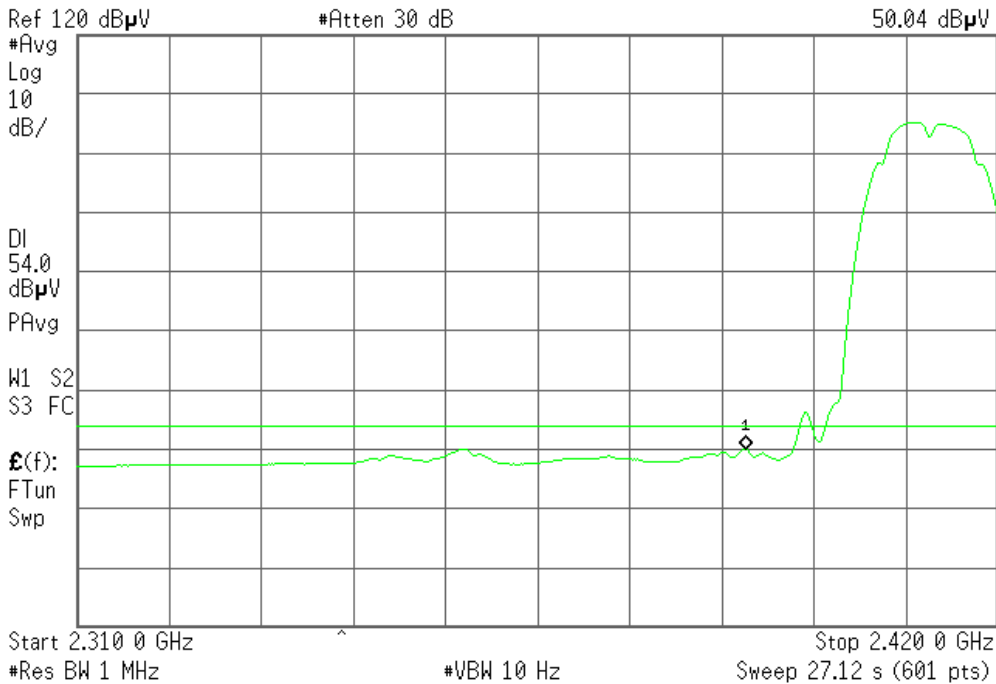
Detector mode: Average

Polarity: Vertical

Agilent 13:14:51 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
50.04 dB $\mu$ V



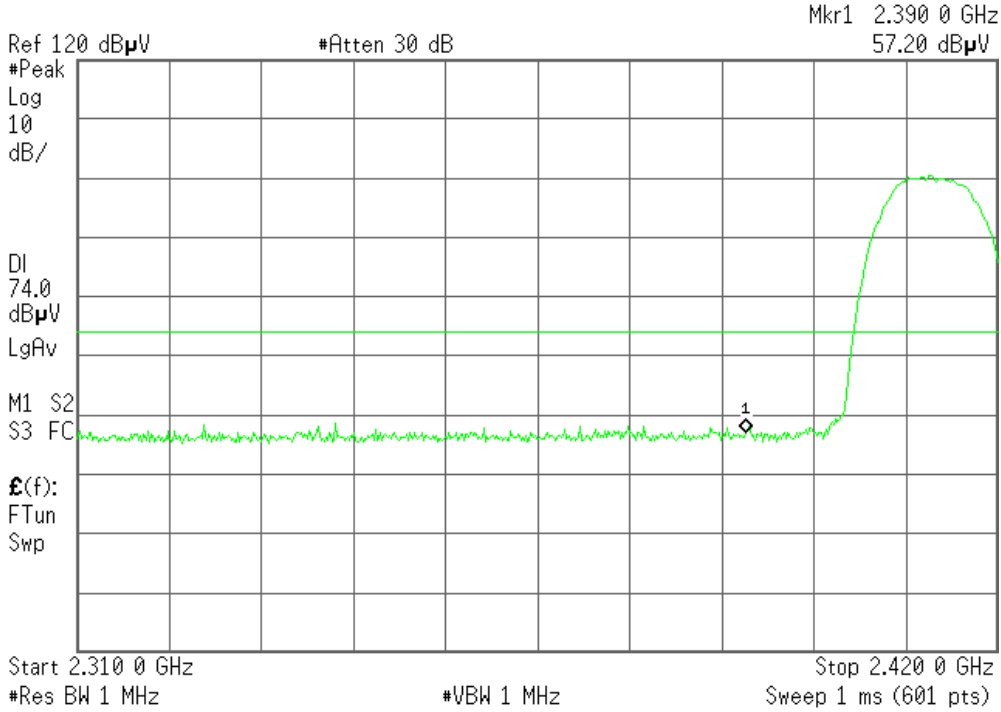


**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 13:10:51 Dec 2, 2008

R T

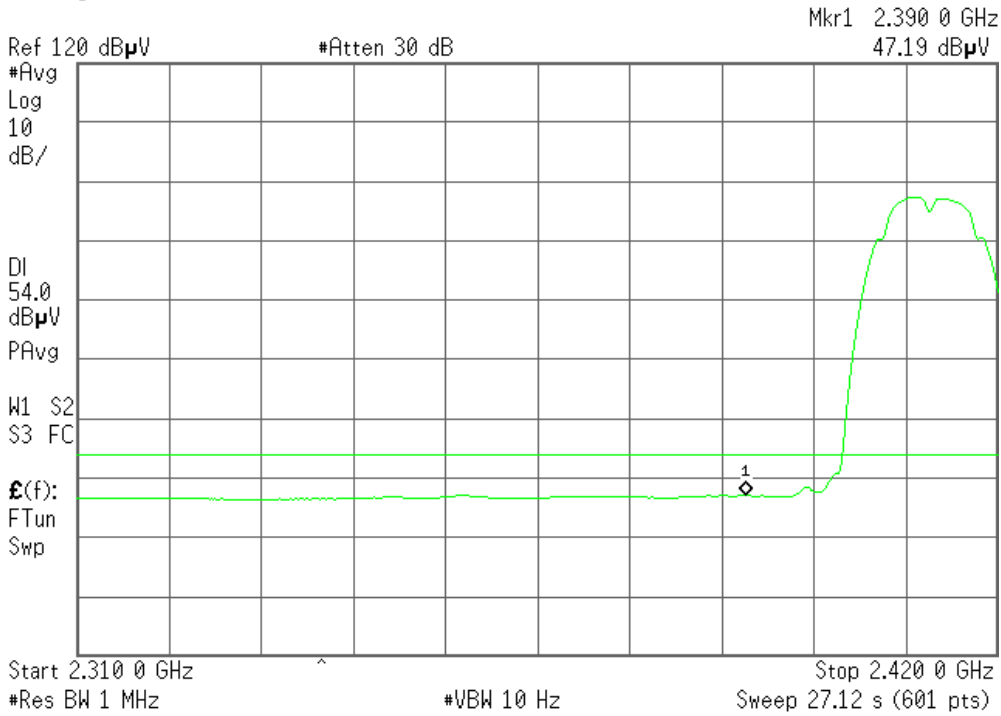


**Detector mode: Average**

**Polarity: Horizontal**

Agilent 13:11:39 Dec 2, 2008

R T





### Band Edges (IEEE 802.11b mode/ CH High)

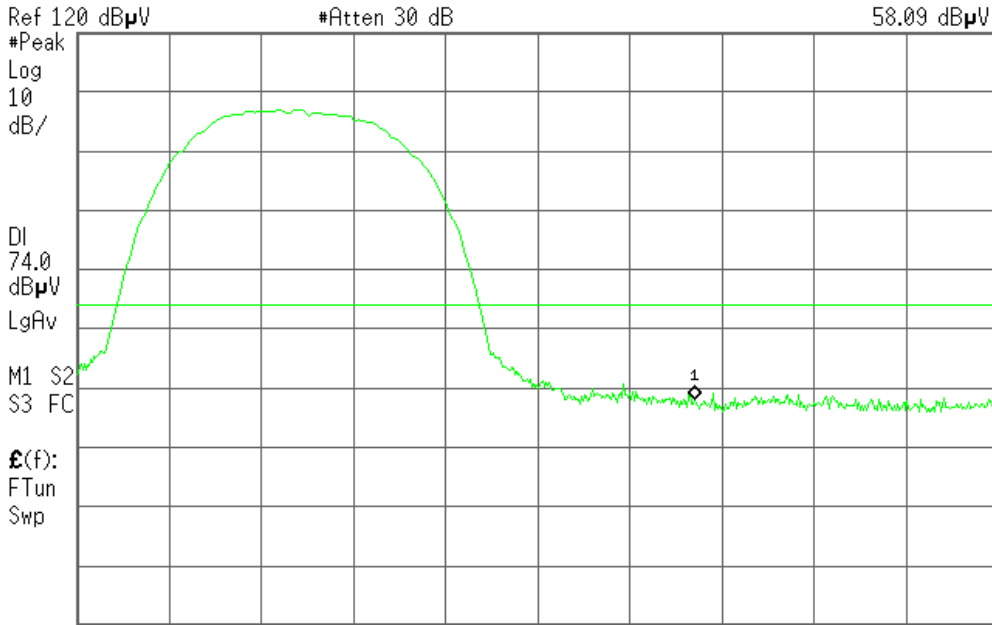
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 13:04:41 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
58.09 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

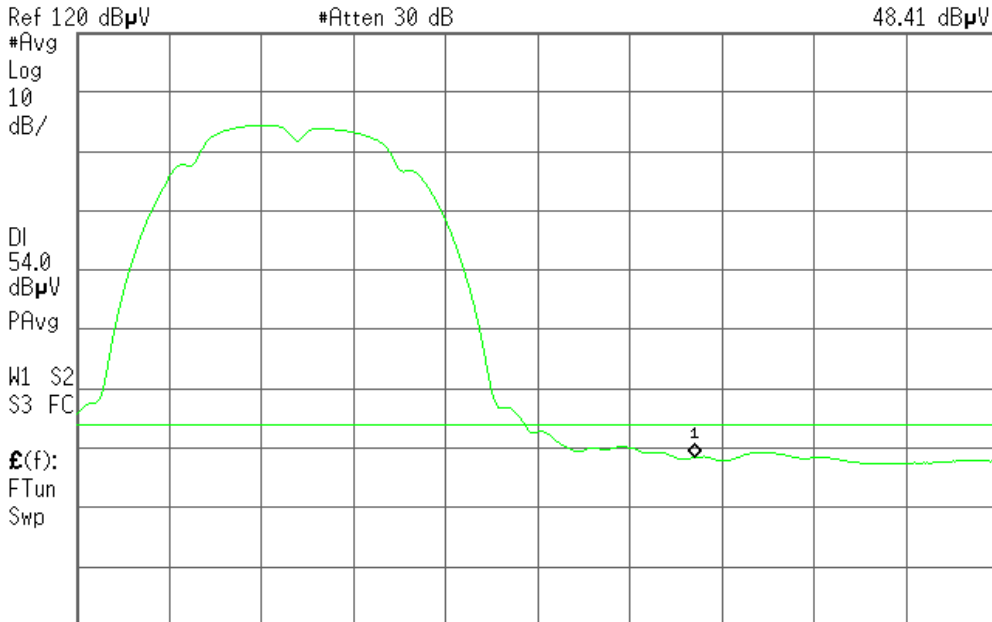
**Detector mode: Average**

**Polarity: Vertical**

Agilent 13:05:19 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
48.41 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)



Detector mode: Peak

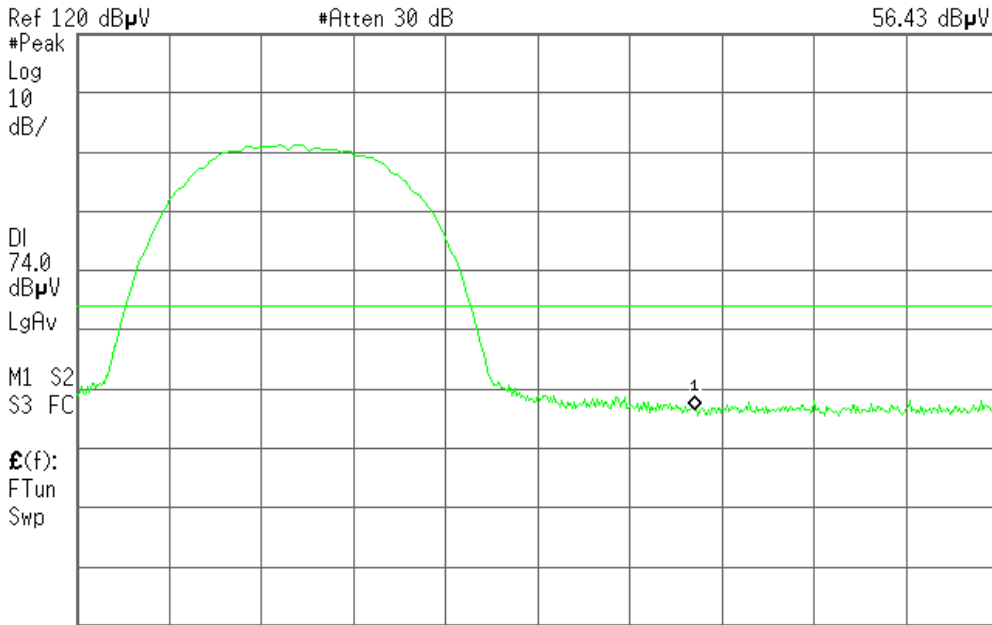
Polarity: Horizontal

Agilent 13:08:14 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

56.43 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average

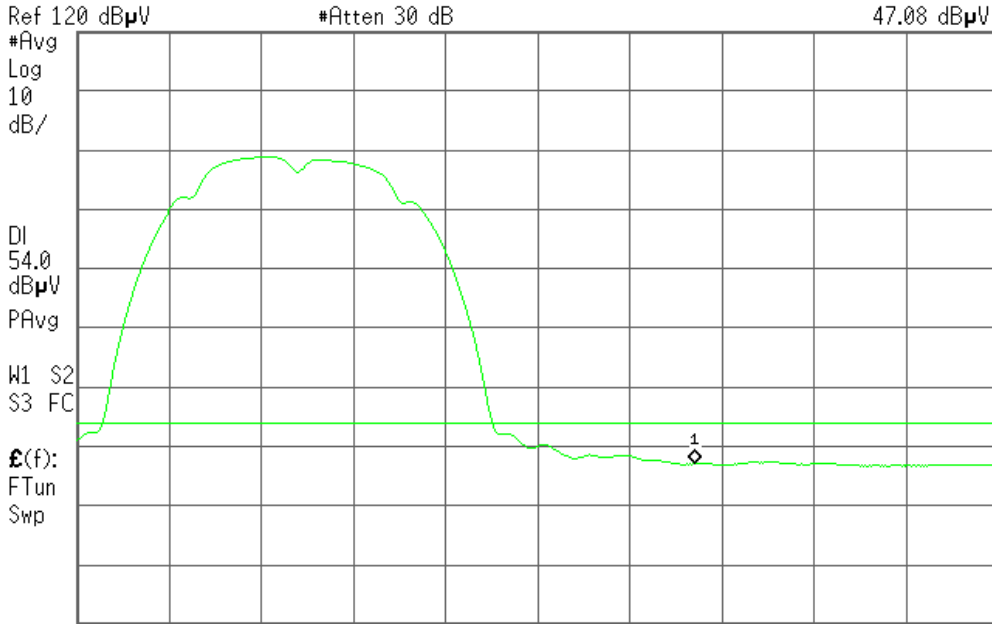
Polarity: Horizontal

Agilent 13:08:48 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

47.08 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)





### Band Edges (IEEE 802.11g mode / CH Low)

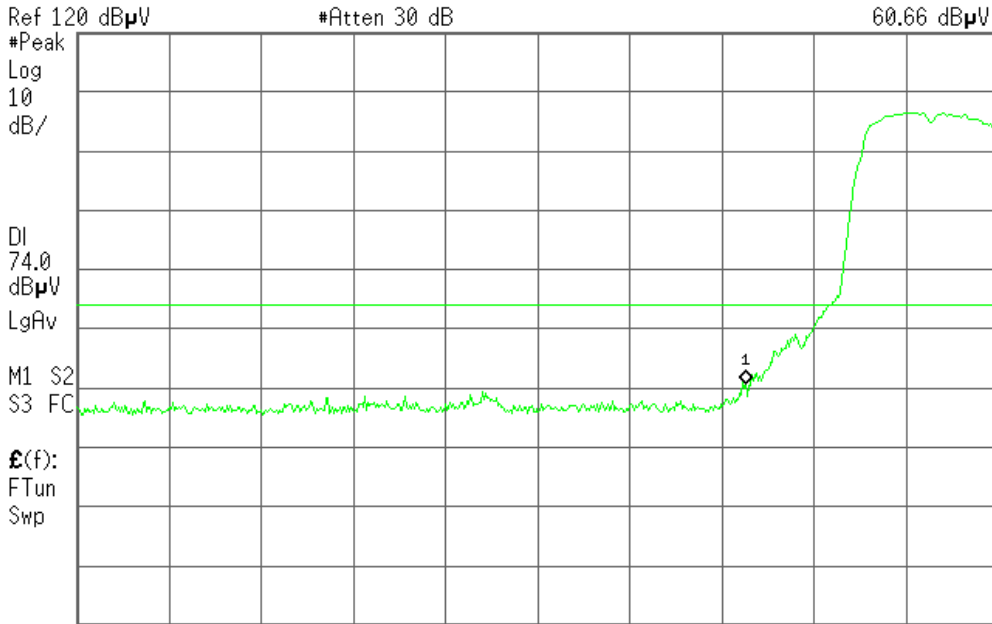
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 13:17:13 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
60.66 dBμV



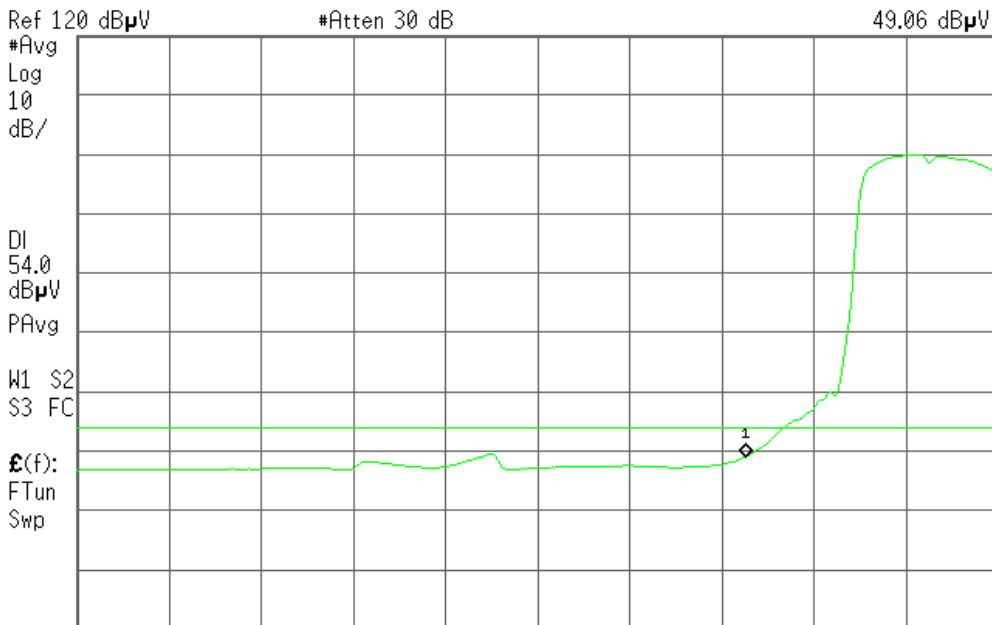
**Detector mode: Average**

**Polarity: Vertical**

Agilent 13:18:04 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
49.06 dBμV



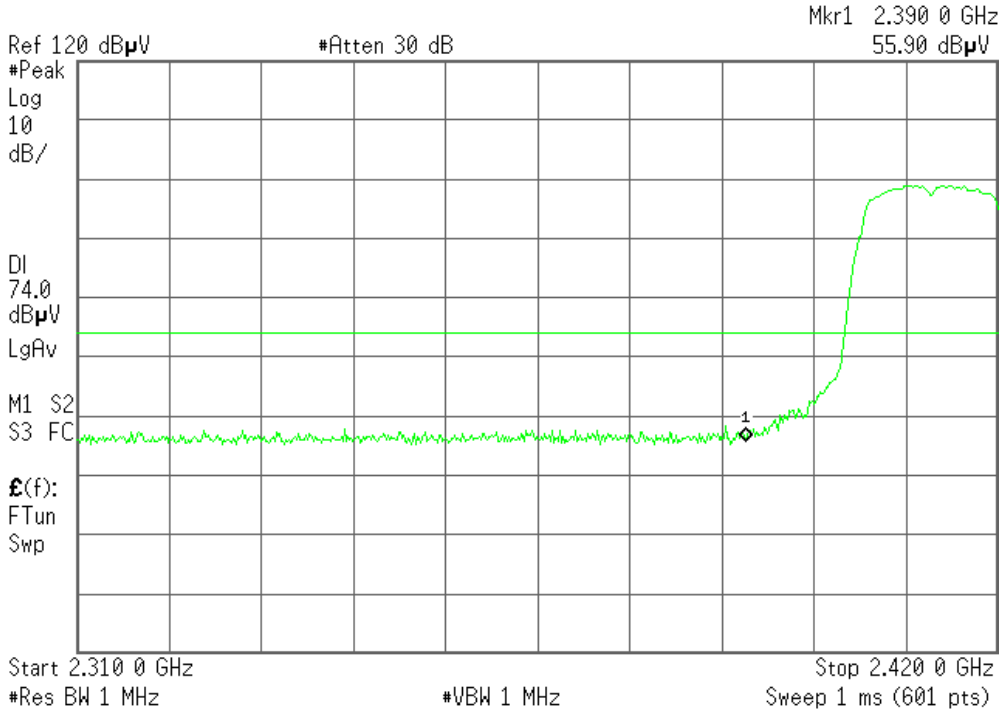


Detector mode: Peak

Polarity: Horizontal

Agilent 13:20:14 Dec 2, 2008

R T

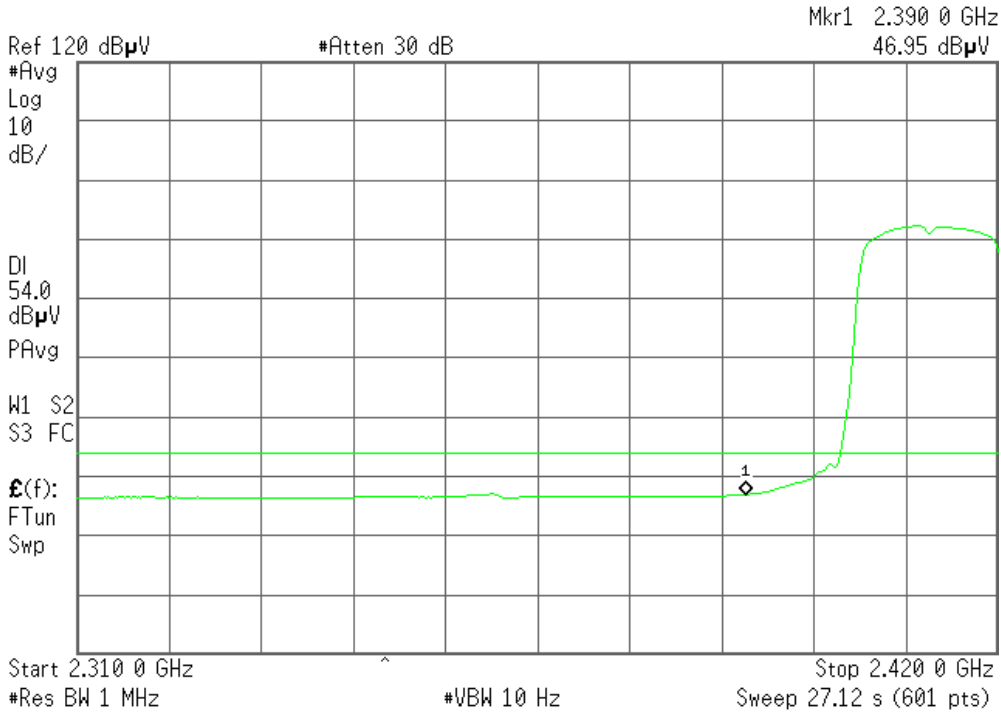


Detector mode: Average

Polarity: Horizontal

Agilent 13:21:02 Dec 2, 2008

R T





### Band Edges (IEEE 802.11g mode / CH High)

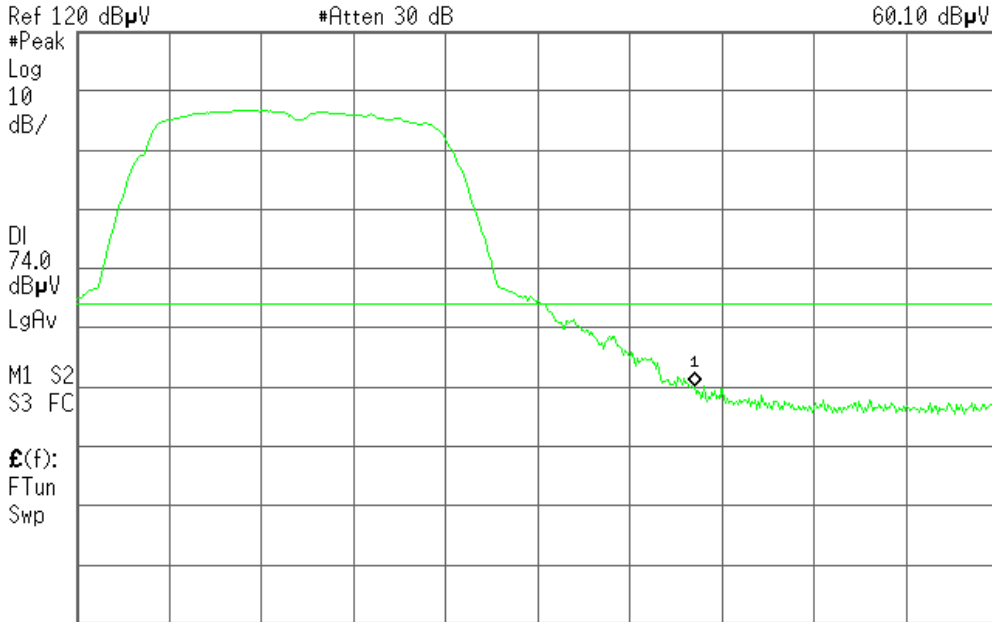
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 13:01:49 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
60.10 dB $\mu$ V



Start 2.450 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

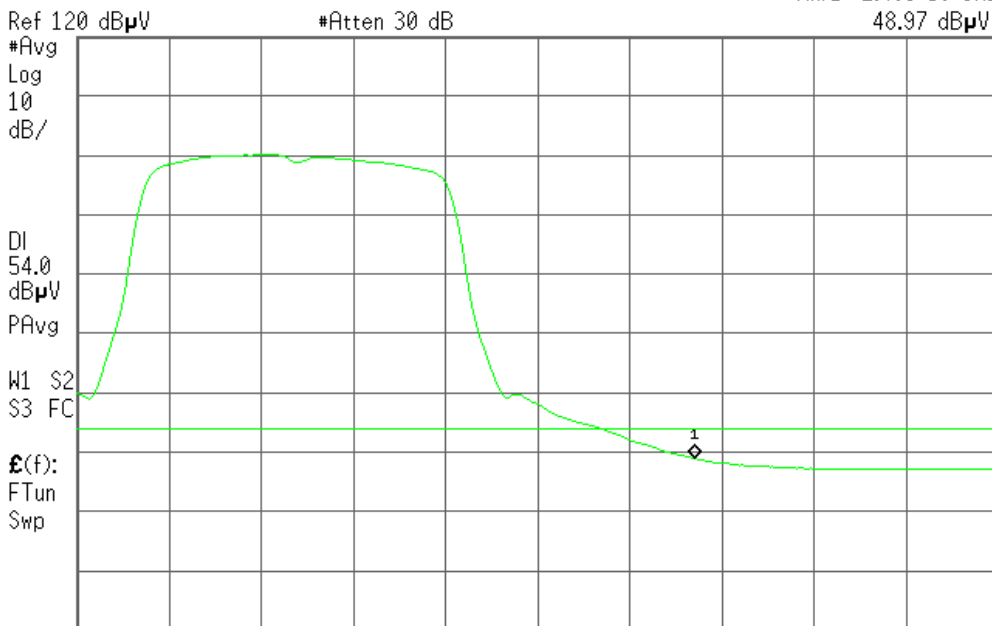
**Detector mode: Average**

**Polarity: Vertical**

Agilent 13:02:34 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
48.97 dB $\mu$ V



Start 2.450 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 12.33 s (601 pts)



Detector mode: Peak

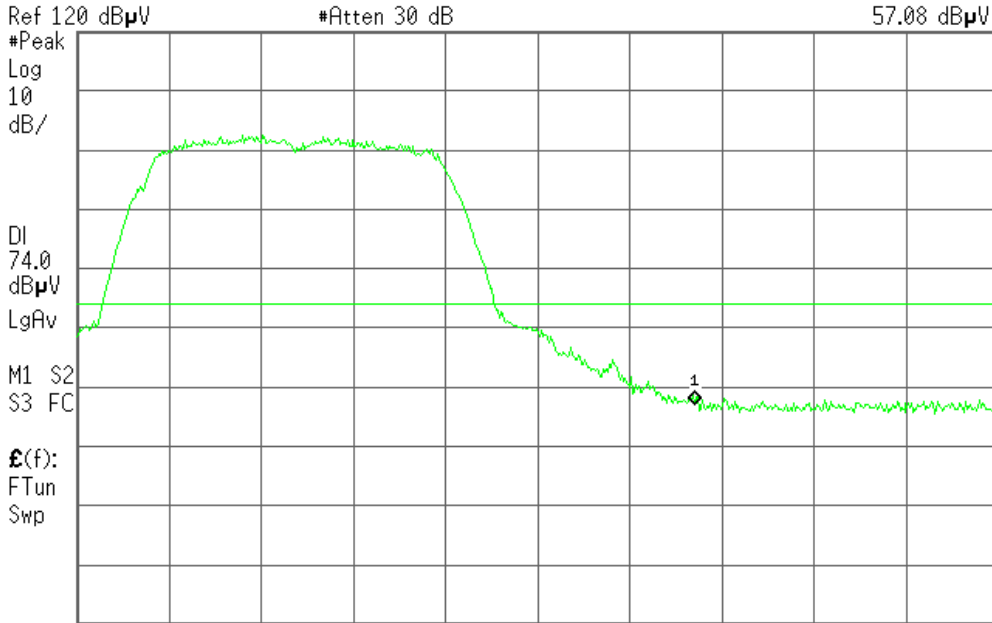
Polarity: Horizontal

Agilent 12:59:04 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

57.08 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average

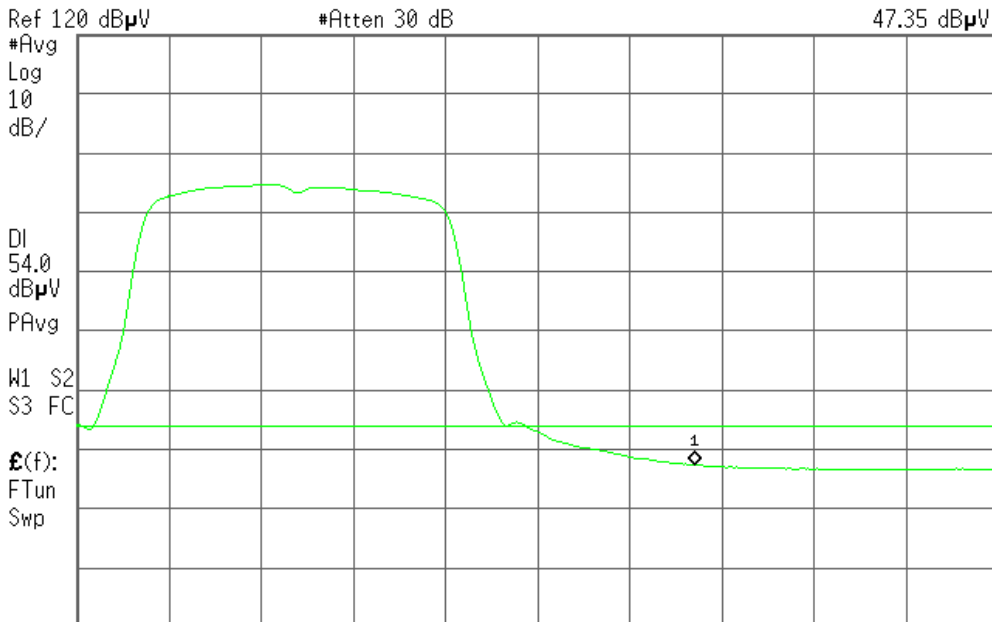
Polarity: Horizontal

Agilent 12:59:38 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

47.35 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)



### Band Edges (IEEE 802.11n HT20 MHz mode / CH Low)

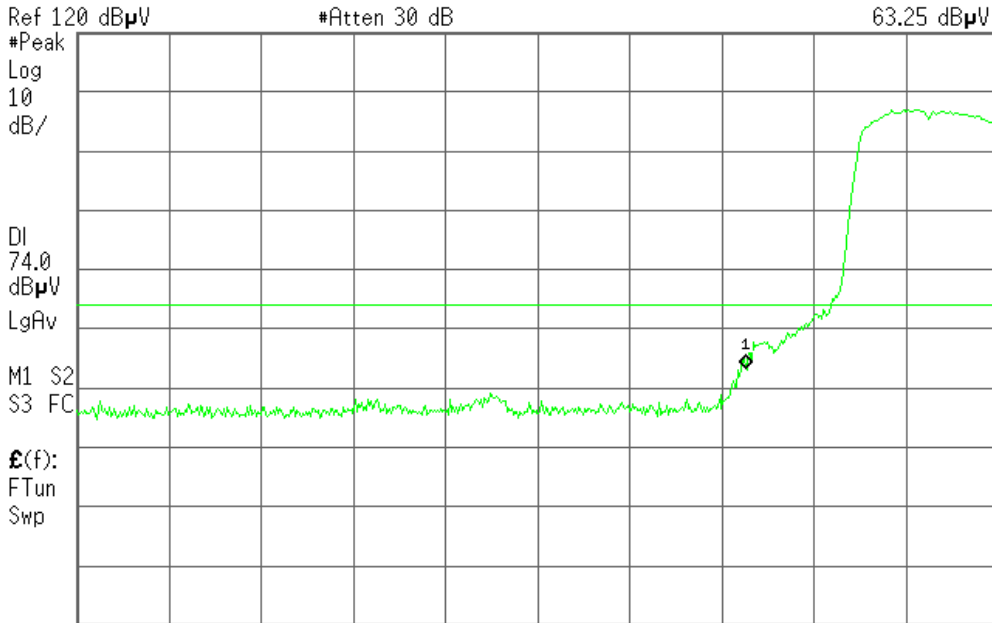
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 13:27:24 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
63.25 dB $\mu$ V



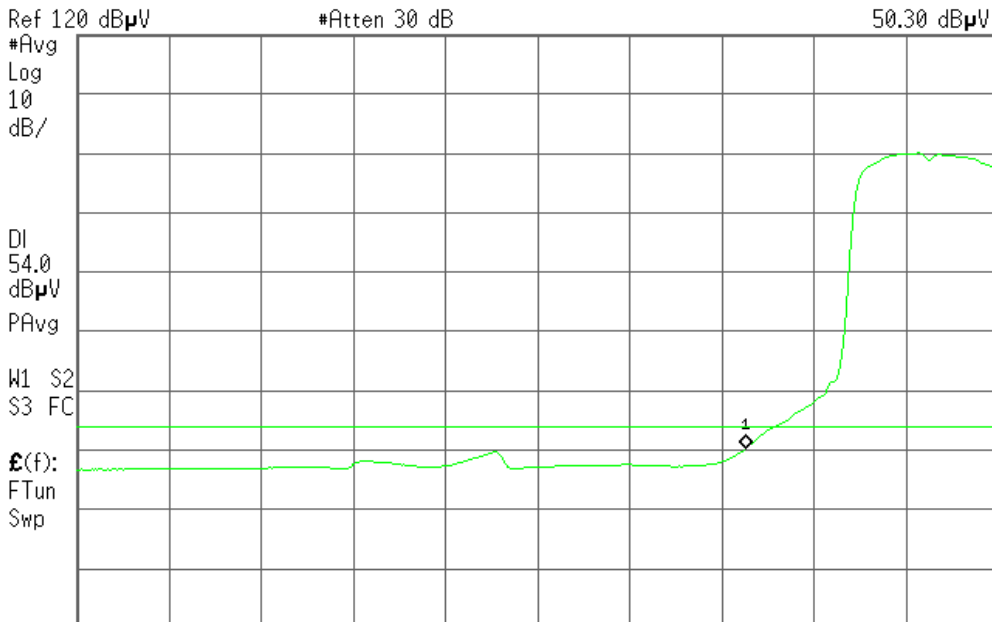
**Detector mode: Average**

**Polarity: Vertical**

Agilent 13:28:13 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
50.30 dB $\mu$ V





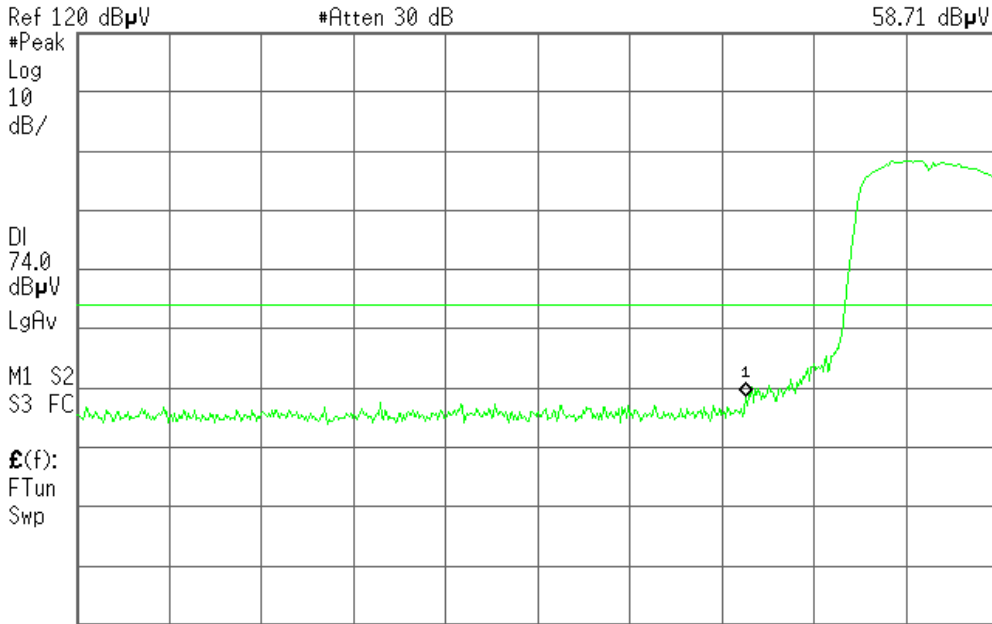
Detector mode: Peak

Polarity: Horizontal

Agilent 13:24:06 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
58.71 dBµV



Start 2.310 0 GHz #Res BW 1 MHz #VBW 1 MHz Stop 2.420 0 GHz Sweep 1 ms (601 pts)

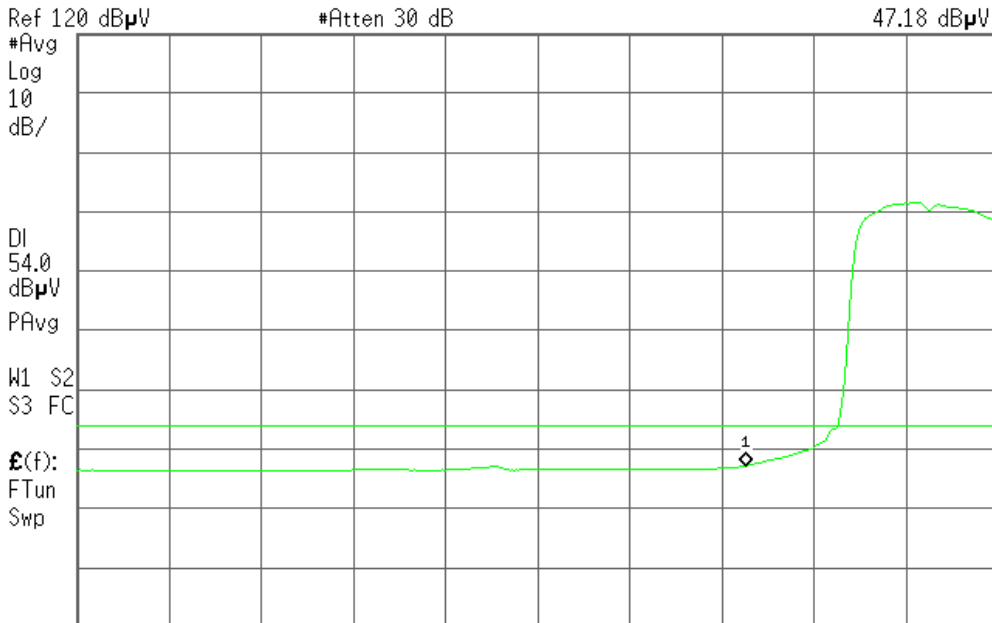
Detector mode: Average

Polarity: Horizontal

Agilent 13:24:53 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
47.18 dBµV



Start 2.310 0 GHz #Res BW 1 MHz #VBW 10 Hz Stop 2.420 0 GHz Sweep 27.12 s (601 pts)



### Band Edges (IEEE 802.11n HT20 MHz mode/ CH High)

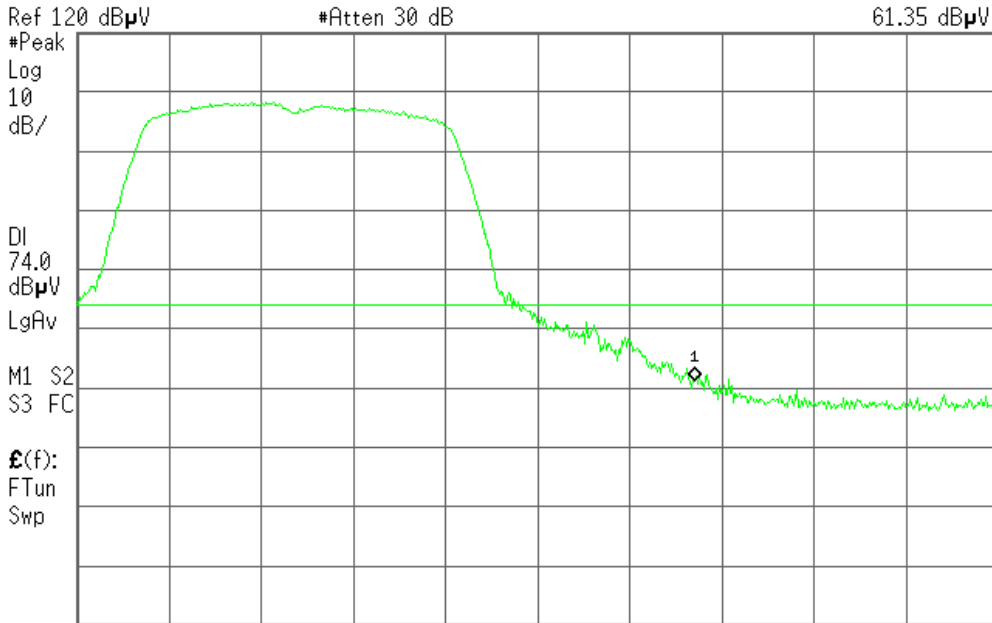
Detector mode: Peak

Polarity: Vertical

Agilent 12:51:25 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
61.35 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

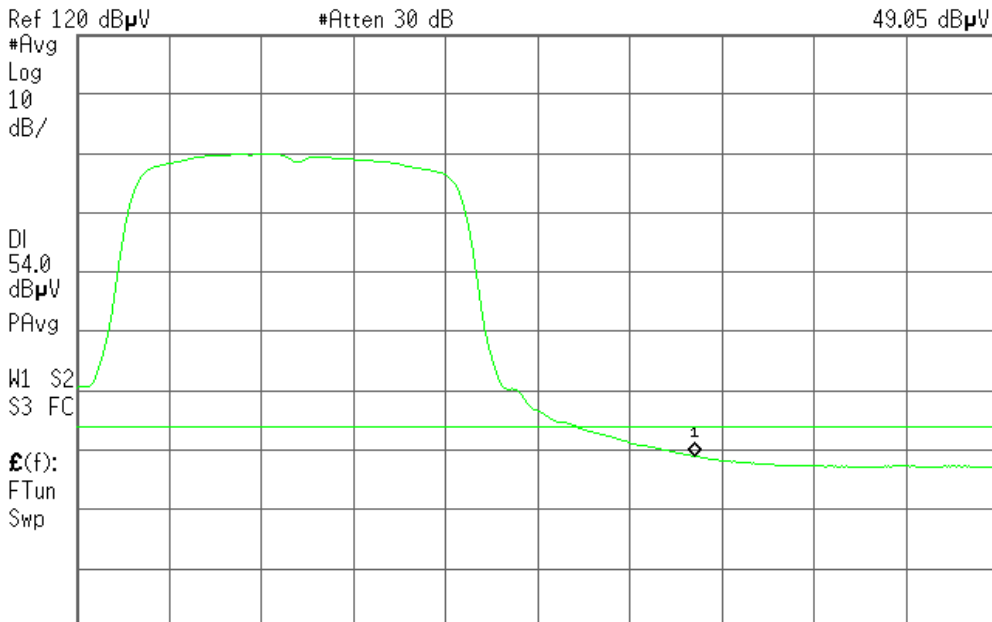
Detector mode: Average

Polarity: Vertical

Agilent 12:52:01 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
49.05 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)



Detector mode: Peak

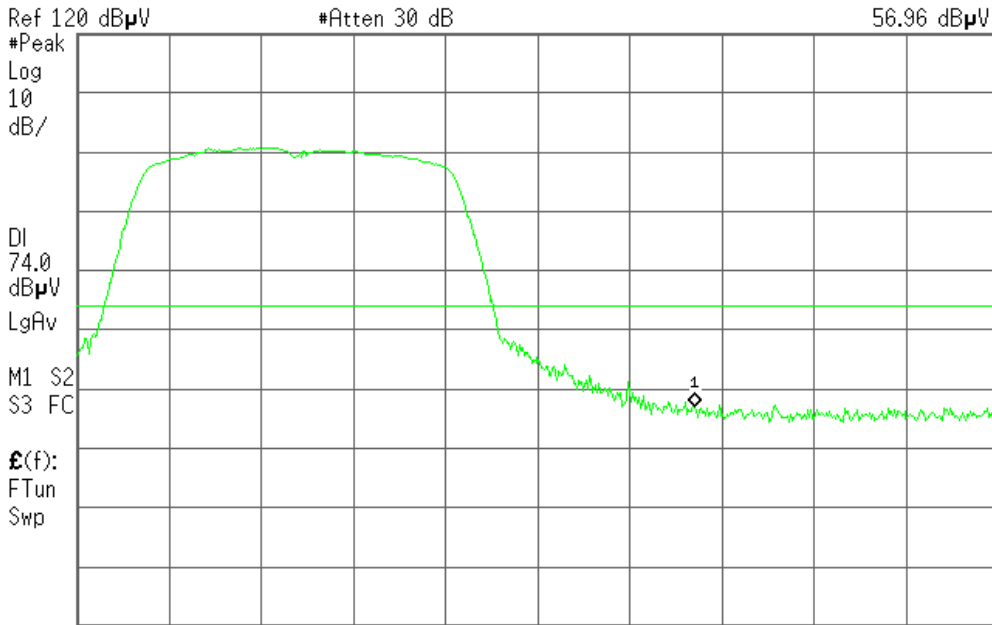
Polarity: Horizontal

Agilent 12:55:11 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

56.96 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average

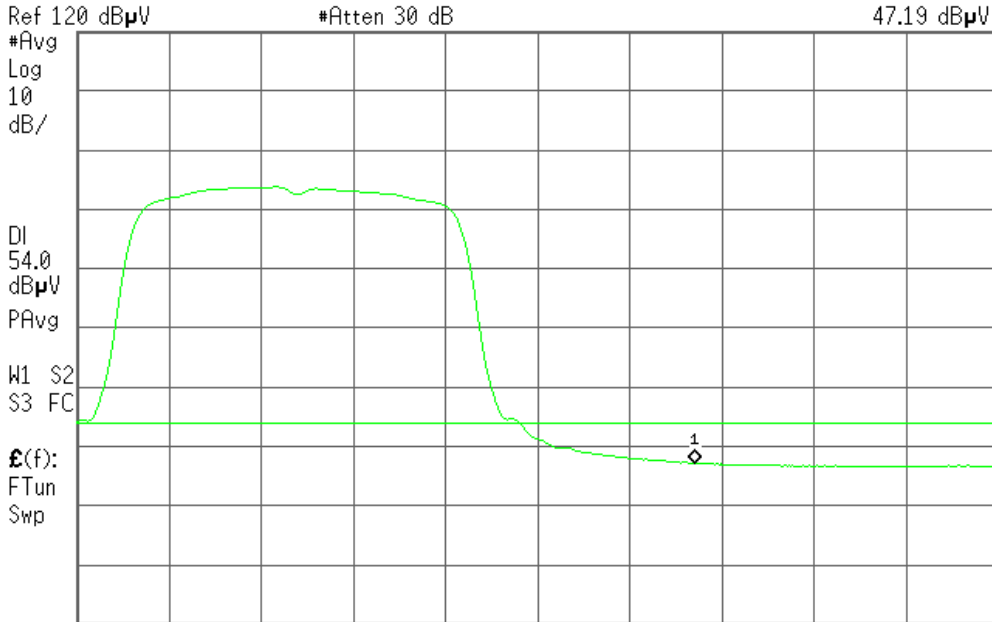
Polarity: Horizontal

Agilent 12:55:43 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

47.19 dBμV



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)





### Band Edges (IEEE 802.11n HT40 MHz mode / CH Low)

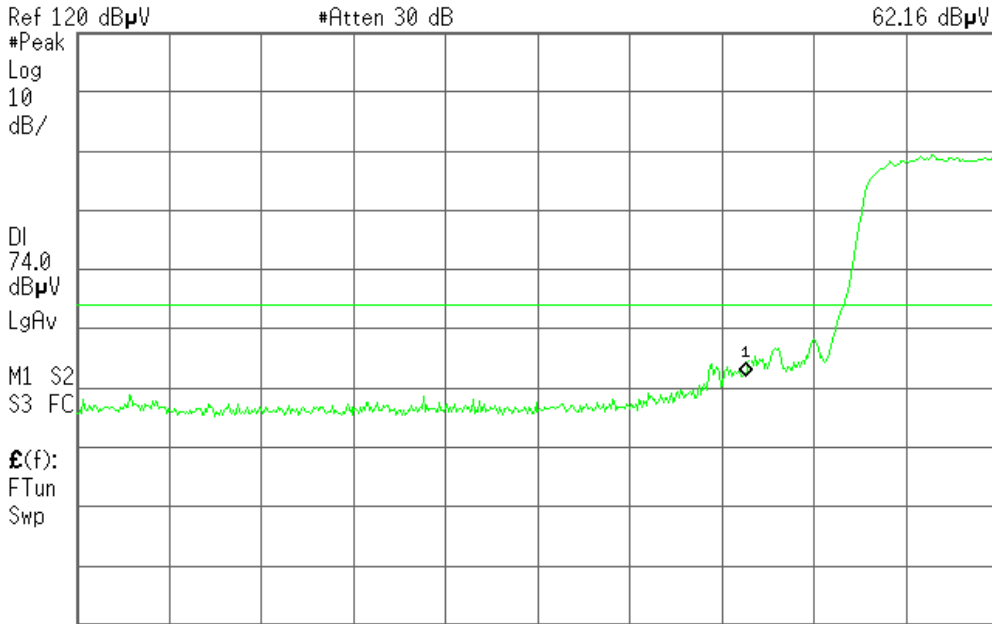
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 11:11:40 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
62.16 dB $\mu$ V



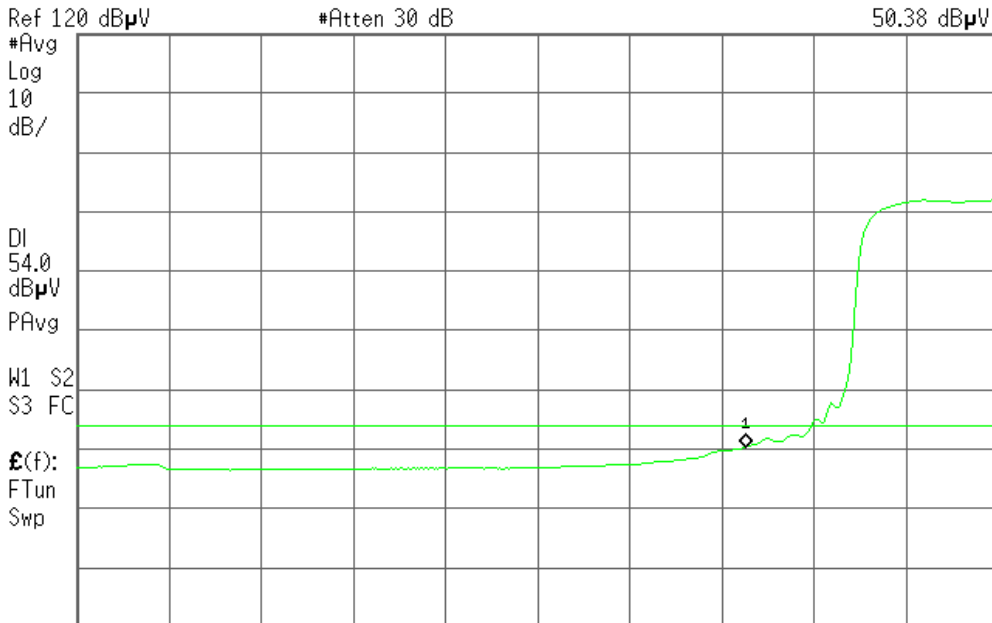
**Detector mode: Average**

**Polarity: Vertical**

Agilent 11:12:28 Dec 2, 2008

R T

Mkr1 2.390 0 GHz  
50.38 dB $\mu$ V



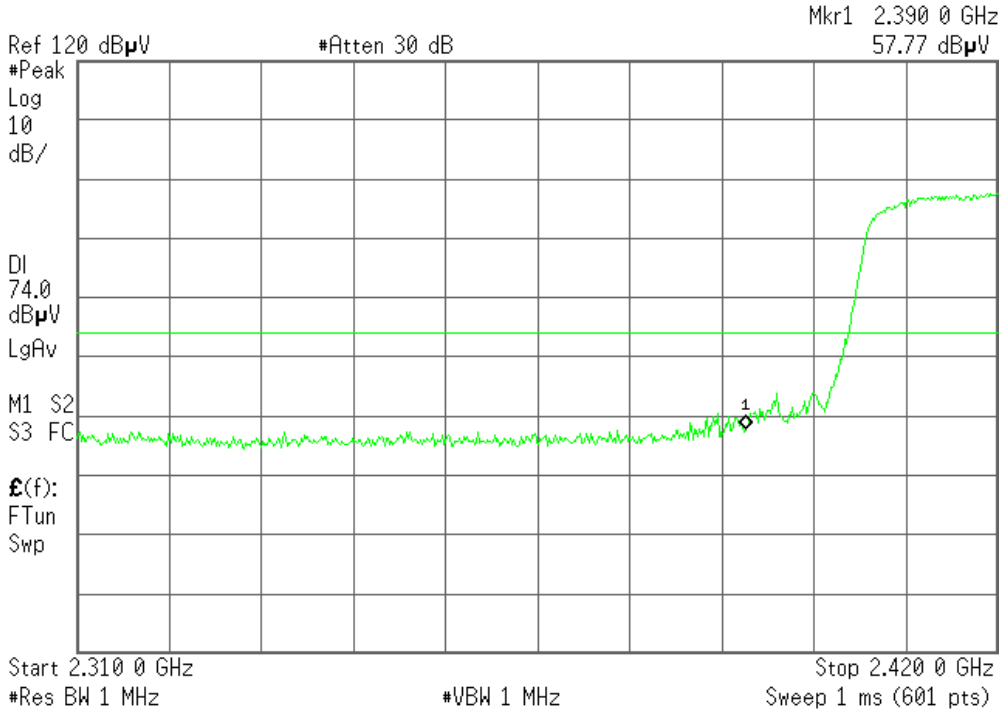


Detector mode: Peak

Polarity: Horizontal

Agilent 11:15:34 Dec 2, 2008

R T

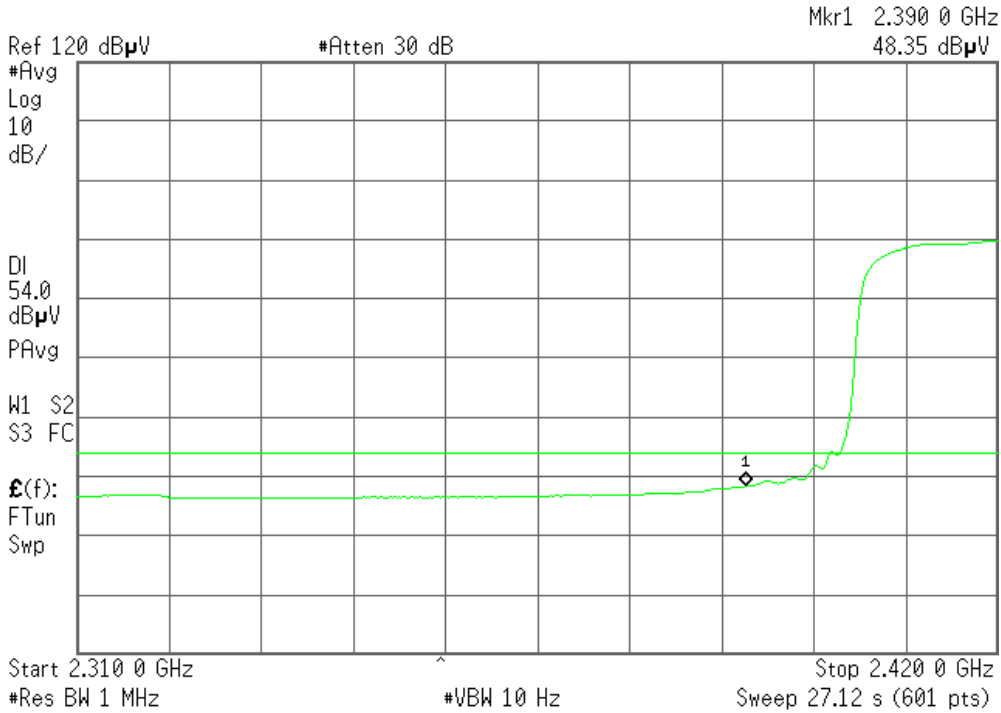


Detector mode: Average

Polarity: Horizontal

Agilent 11:16:30 Dec 2, 2008

R T





### Band Edges (IEEE 802.11n HT40 MHz mode / CH High)

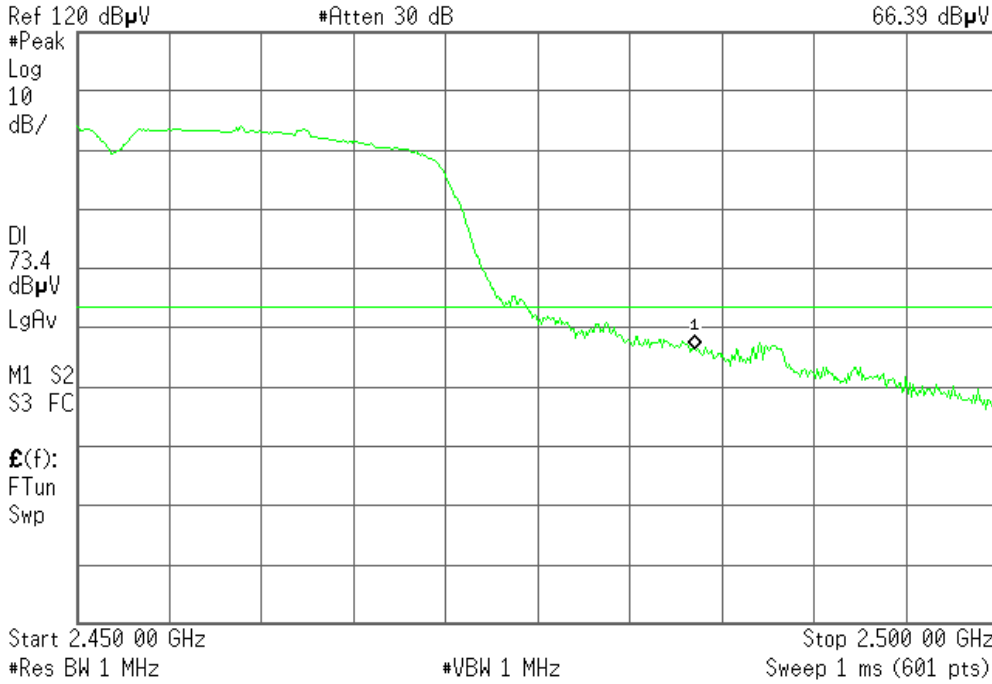
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 12:46:14 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
66.39 dBμV



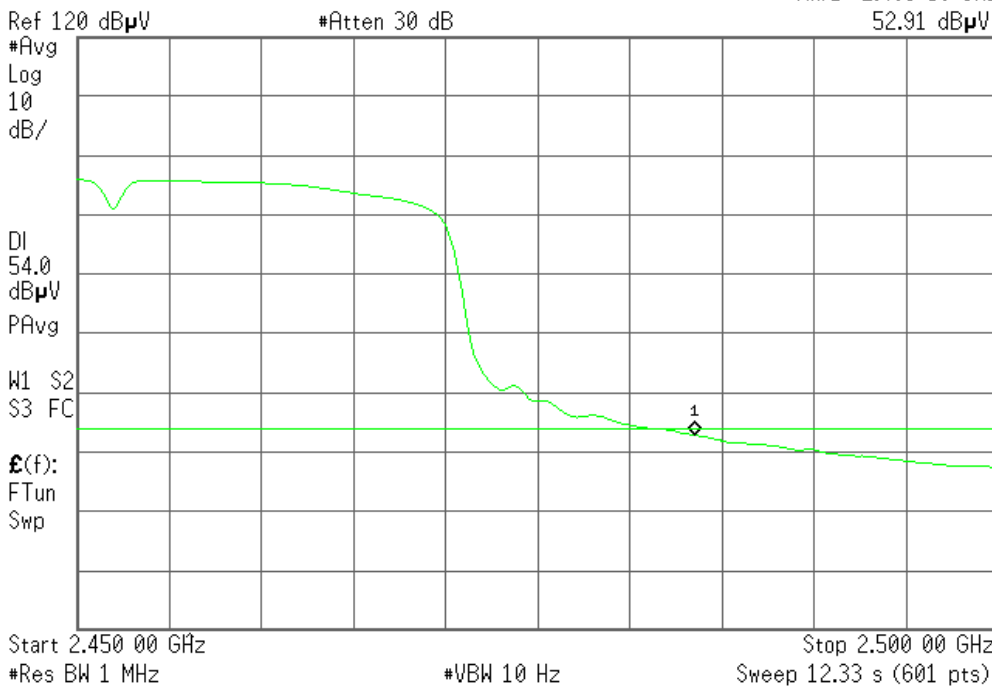
**Detector mode: Average**

**Polarity: Vertical**

Agilent 12:48:50 Dec 2, 2008

R T

Mkr1 2.483 50 GHz  
52.91 dBμV





Detector mode: Peak

Polarity: Horizontal

Agilent 11:21:30 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

62.09 dBμV

Ref 120 dBμV

#Atten 30 dB

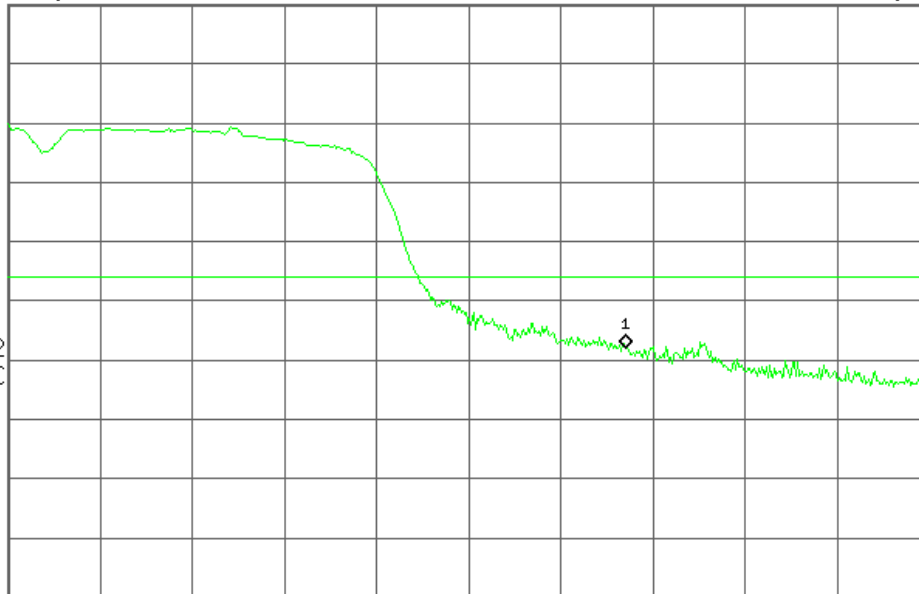
#Peak  
Log  
10  
dB/

DI  
74.0  
dBμV

LgAv

M1 S2  
S3 FC

£(f):  
FTun  
Swp



Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 11:22:28 Dec 2, 2008

R T

Mkr1 2.483 50 GHz

50.85 dBμV

Ref 120 dBμV

#Atten 30 dB

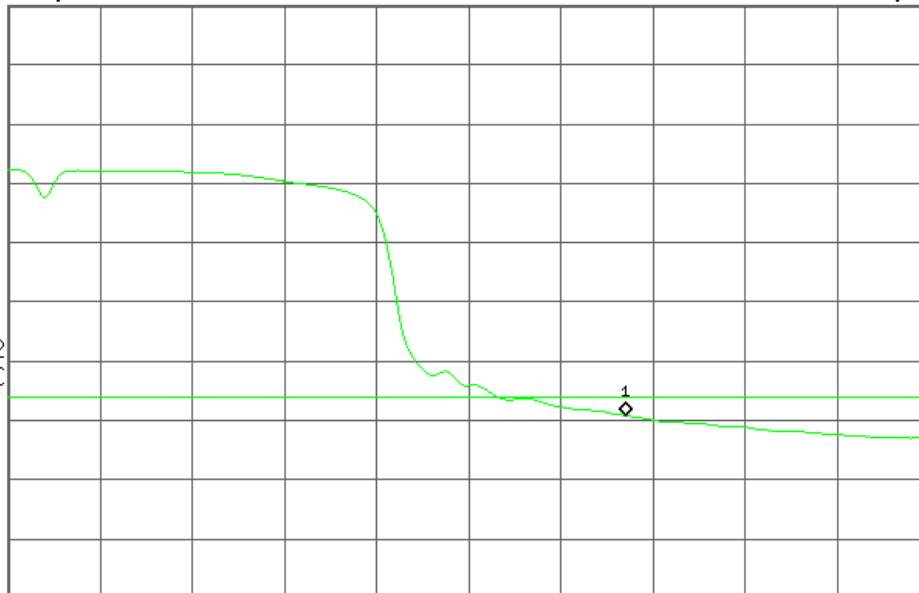
#Avg  
Log  
10  
dB/

DI  
54.0  
dBμV

PAvg

M1 S2  
S3 FC

£(f):  
FTun  
Swp



Start 2.450 00 GHz ^

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 12.33 s (601 pts)

## 7.5 PEAK POWER SPECTRAL DENSITY

### LIMIT

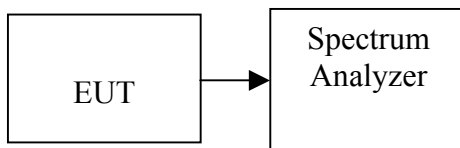
1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

### 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**

**PIFA Antenna**

**IEEE 802.11b mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-13.20	8.00	PASS
Mid	2437	-13.93		PASS
High	2462	-13.77		PASS

**IEEE 802.11g mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-17.94	8.00	PASS
Mid	2437	-18.56		PASS
High	2462	-17.42		PASS

**IEEE 802.11n HT20 MHz mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-17.76	8.00	PASS
Mid	2437	-17.61		PASS
High	2462	-17.65		PASS

**IEEE 802.11n HT40 MHz mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422	-18.87	8.00	PASS
Mid	2437	-19.32		PASS
High	2452	-19.56		PASS



**Test Plot**

**PIFA Antenna**

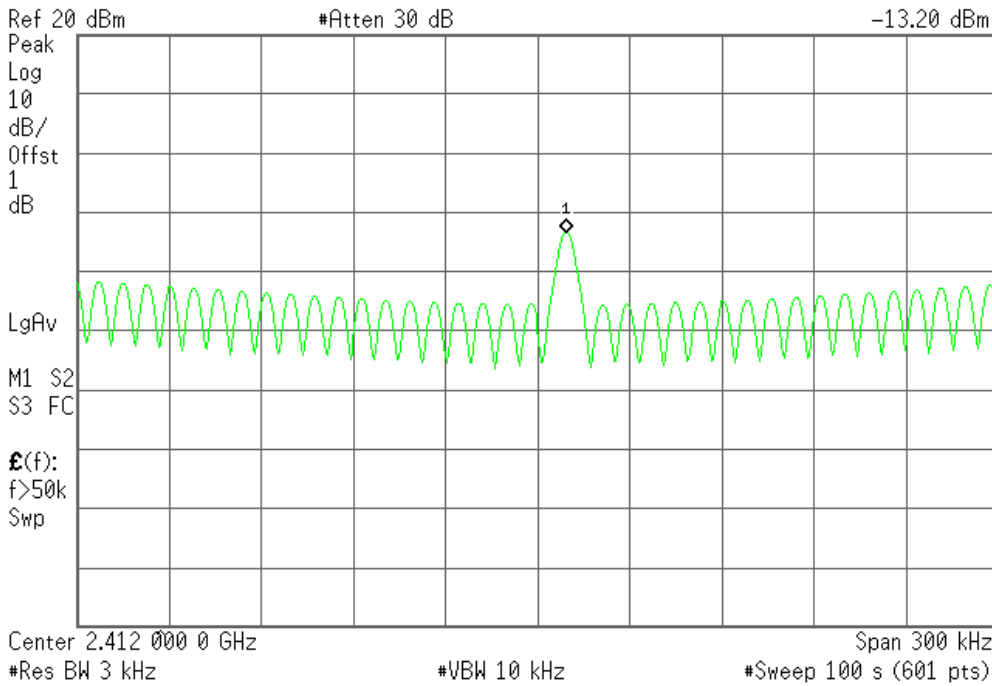
**IEEE 802.11b mode**

**PPSD (CH Low)**

Agilent 16:04:50 Dec 25, 2008

R T

Mkr1 2.412 010 0 GHz  
-13.20 dBm

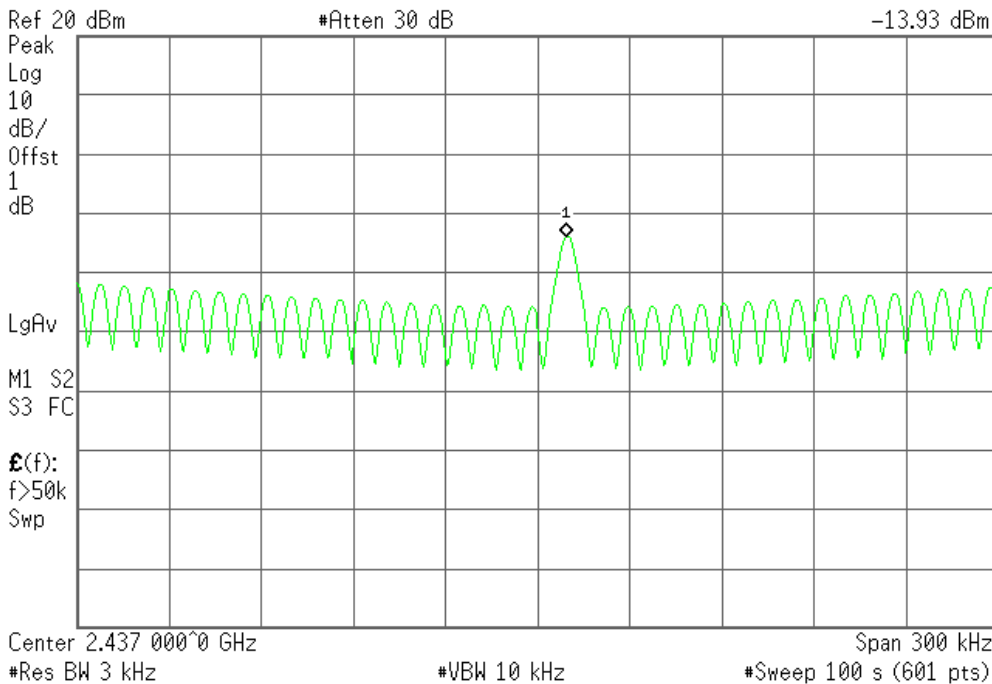


**PPSD (CH Mid)**

Agilent 16:07:12 Dec 25, 2008

R T

Mkr1 2.437 010 0 GHz  
-13.93 dBm





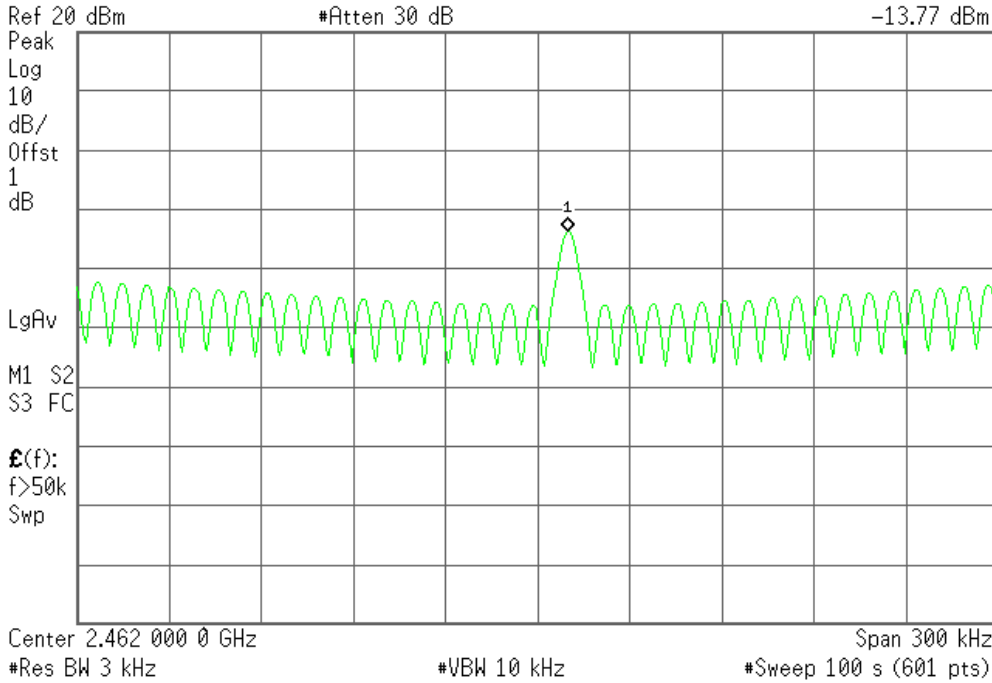
### PPSD (CH High)

Agilent 16:10:39 Dec 25, 2008

R T

Mkr1 2.462 010 0 GHz

-13.77 dBm



### IEEE 802.11g mode

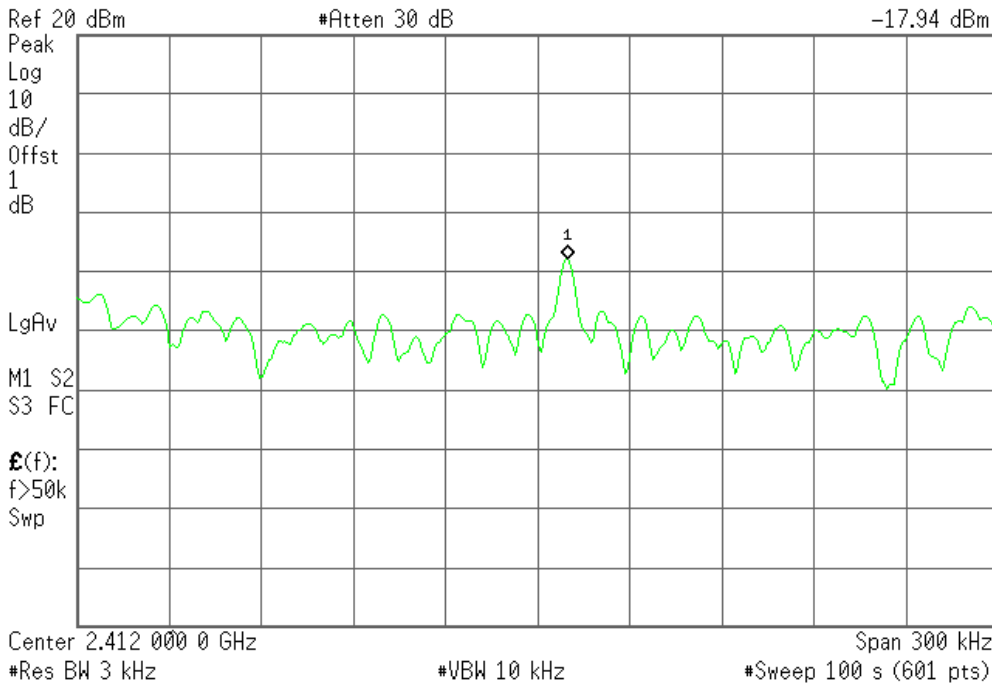
### PPSD (CH Low)

Agilent 16:17:17 Dec 25, 2008

R T

Mkr1 2.412 010 0 GHz

-17.94 dBm





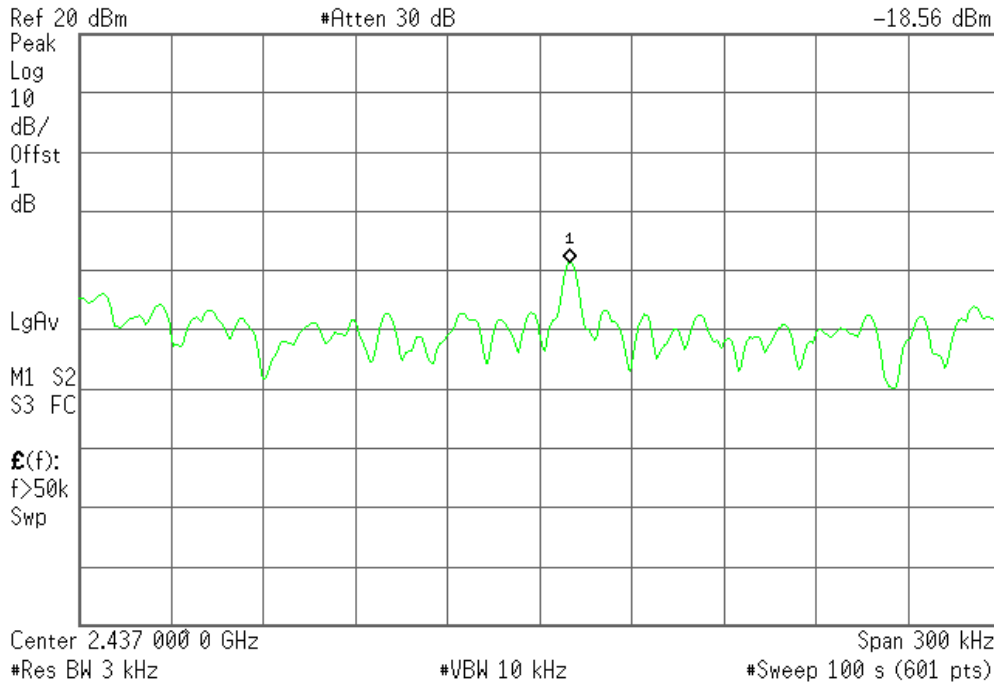


### PPSD (CH Mid)

Agilent 16:22:57 Dec 25, 2008

R T

Mkr1 2.437 010 0 GHz  
-18.56 dBm

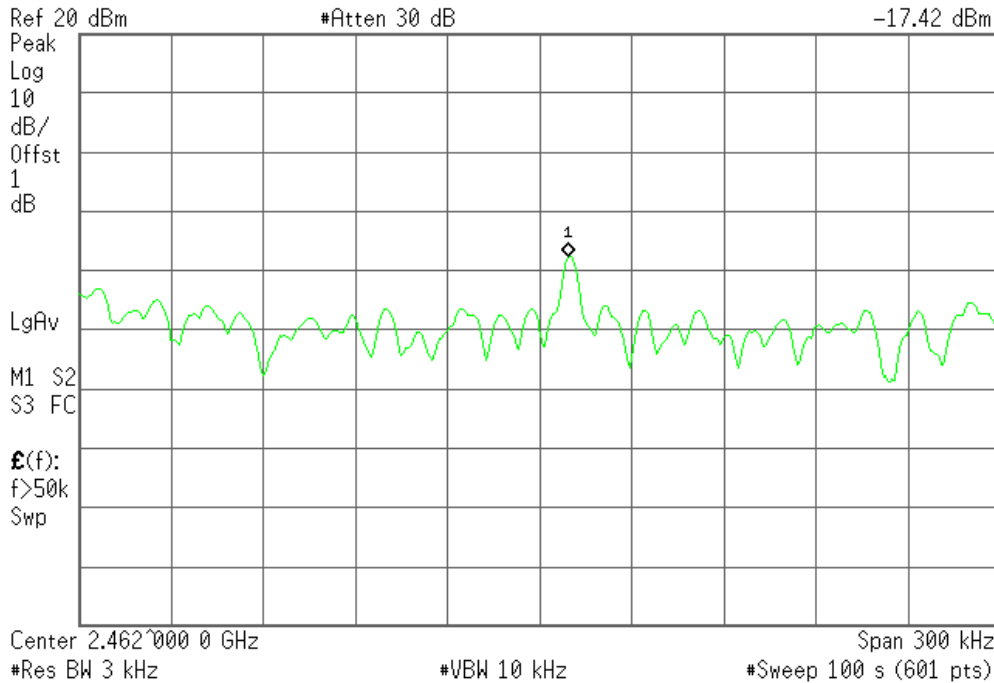


### PPSD (CH High)

Agilent 16:27:56 Dec 25, 2008

R T

Mkr1 2.462 010 0 GHz  
-17.42 dBm





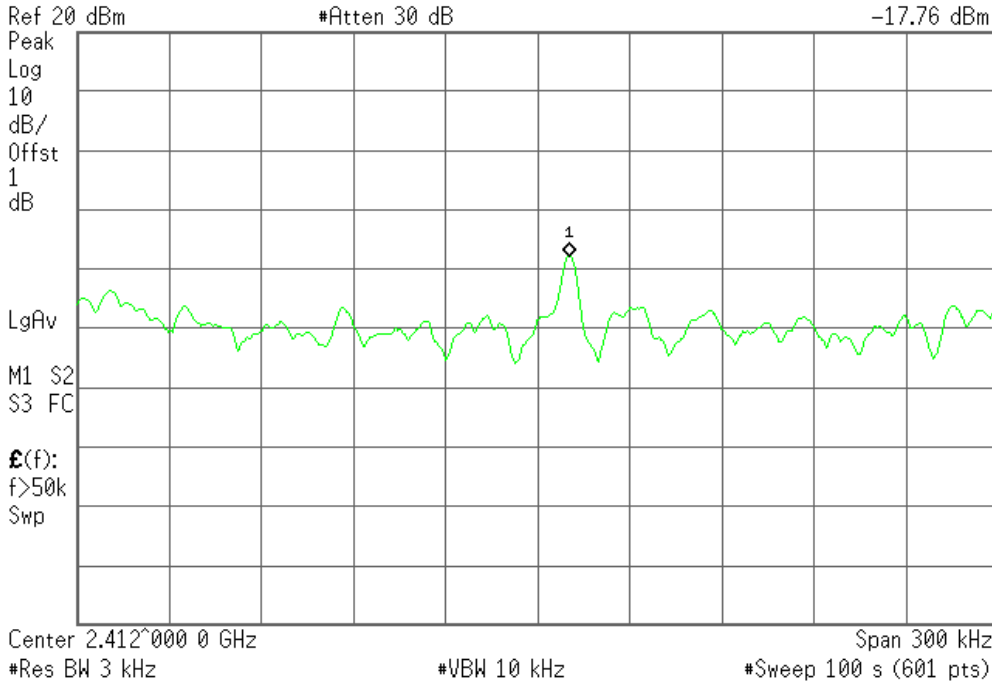
**IEEE 802.11n HT20 MHz mode**

**PPSD (CH Low)**

Agilent 16:36:06 Dec 25, 2008

R L

Mkr1 2.412 010 5 GHz  
-17.76 dBm

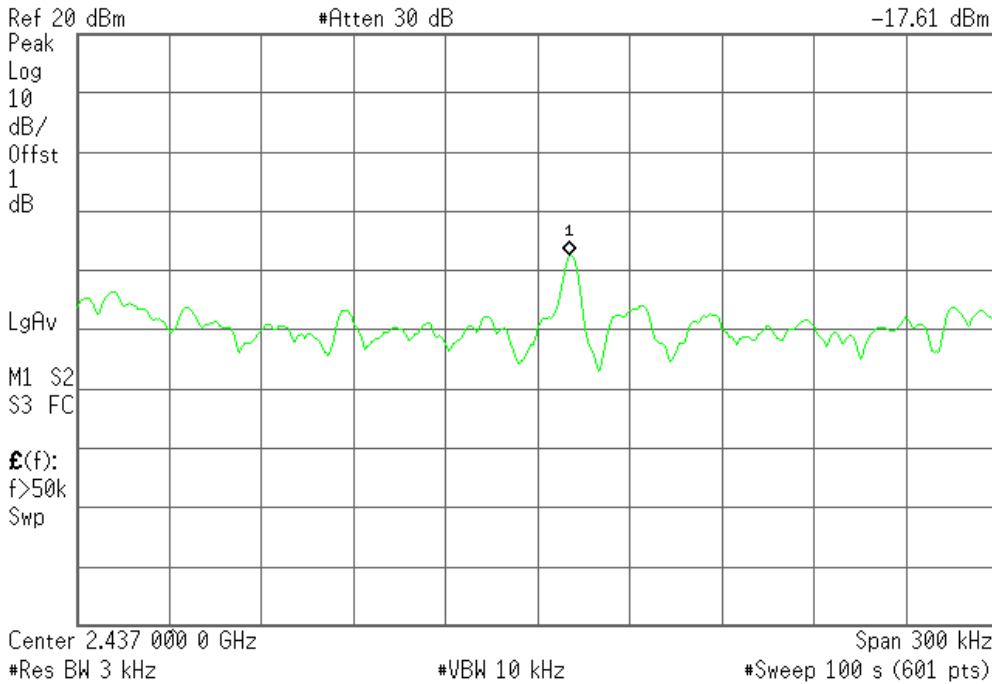


**PPSD (CH Mid)**

Agilent 16:51:53 Dec 25, 2008

R T

Mkr1 2.437 010 5 GHz  
-17.61 dBm





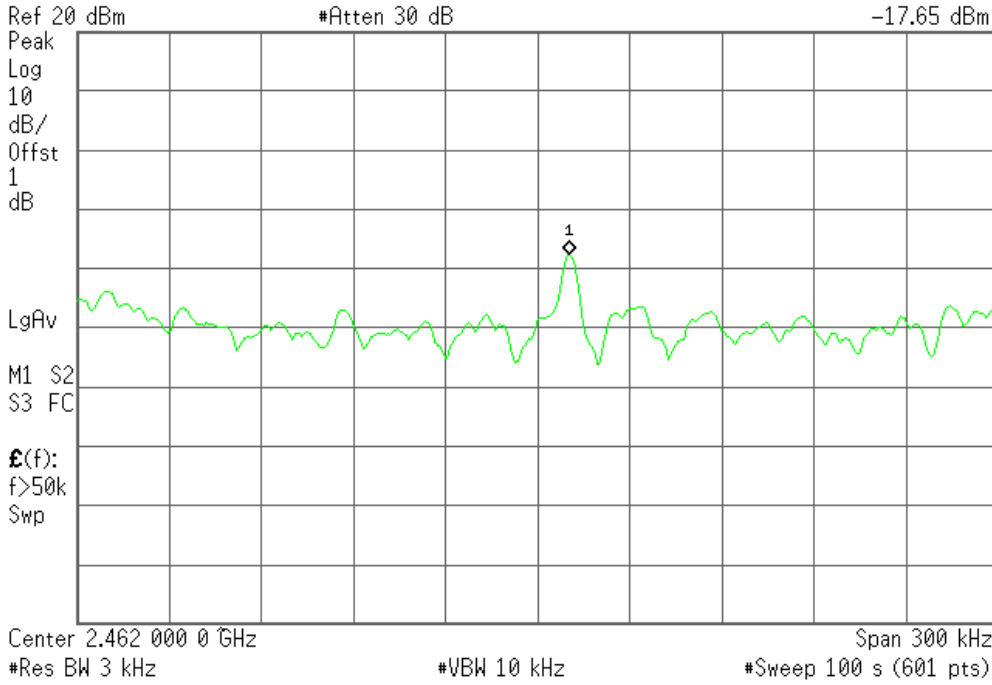
### PPSD (CH High)

Agilent 16:56:29 Dec 25, 2008

R T

Mkr1 2.462 010 5 GHz

-17.65 dBm



### IEEE 802.11n HT40 MHz mode

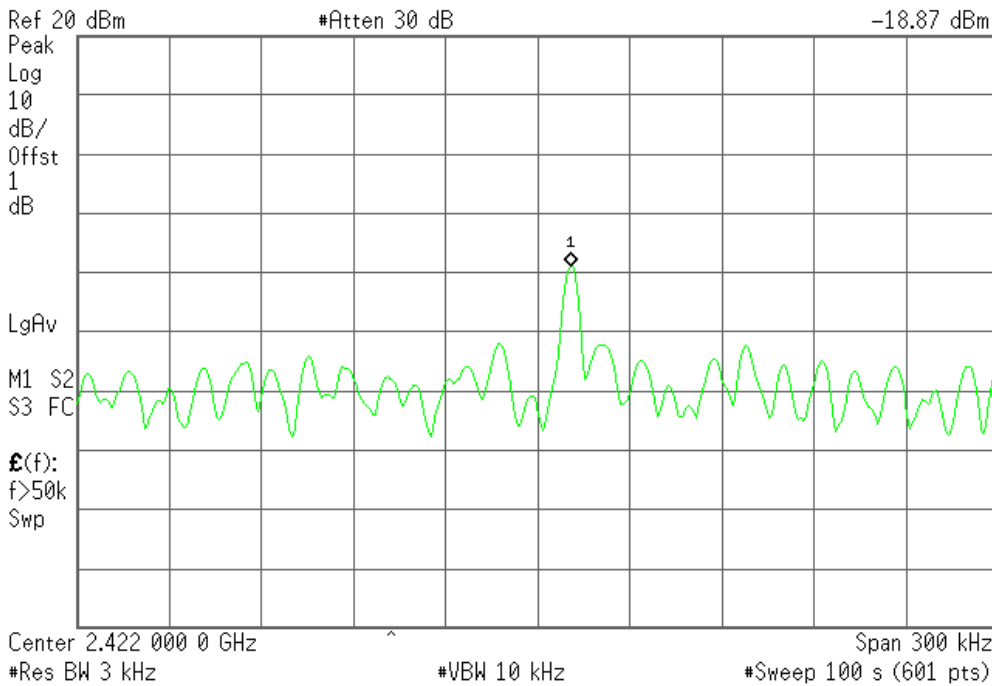
#### PPSD (CH Low)

Agilent 15:23:49 Nov 26, 2008

R T

Mkr1 2.422 011 0 GHz

-18.87 dBm



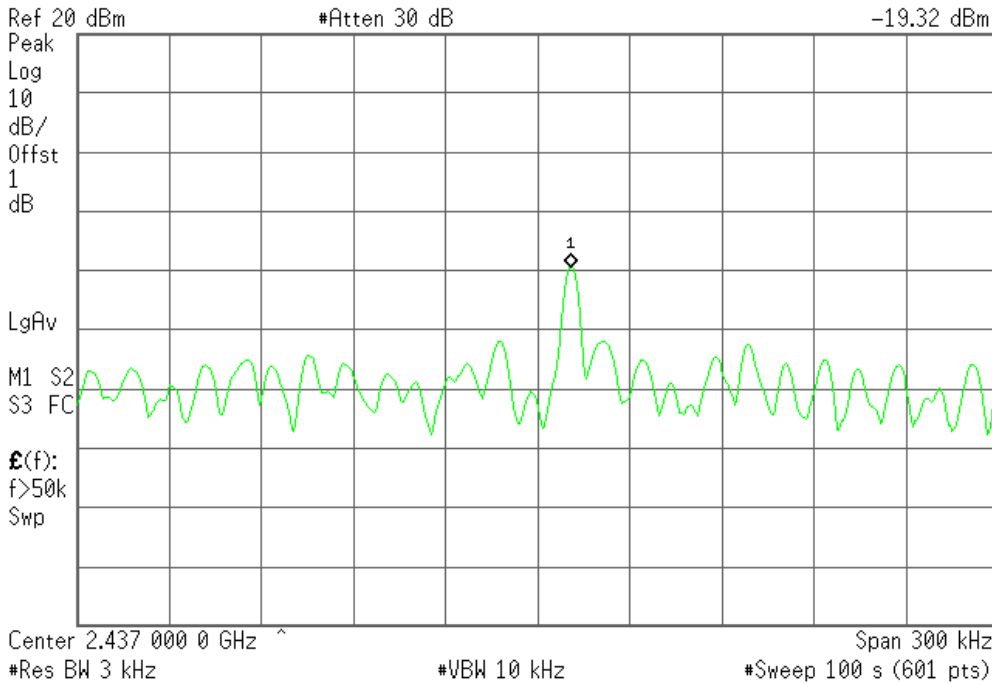


### PPSD (CH Mid)

Agilent 15:26:24 Nov 26, 2008

R T

Mkr1 2.437 011 0 GHz  
-19.32 dBm

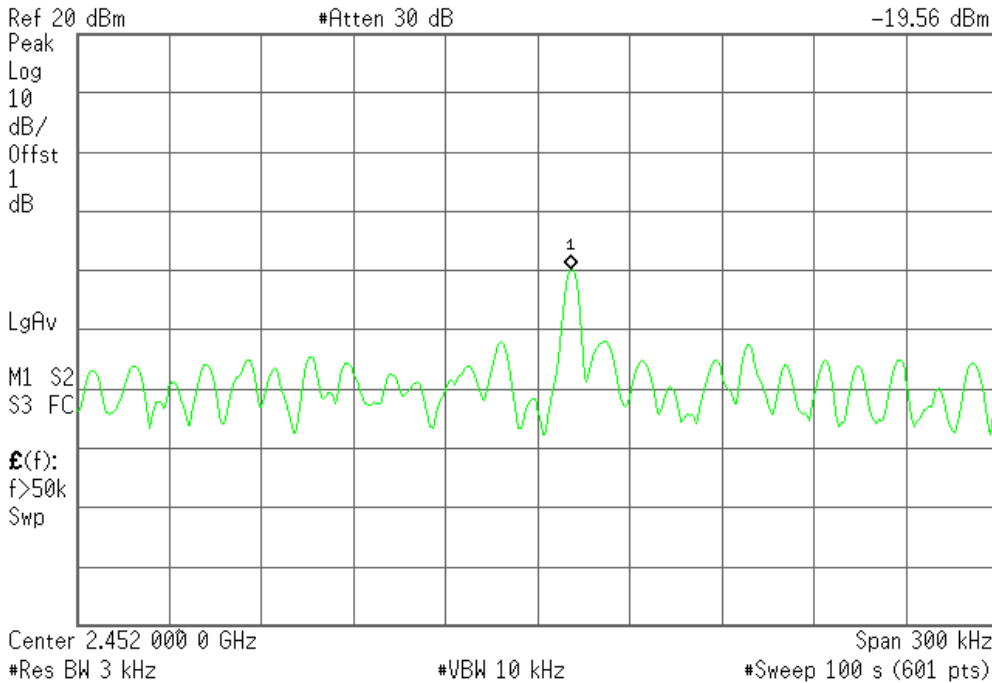


### PPSD (CH High)

Agilent 15:29:59 Nov 26, 2008

R L

Mkr1 2.452 011 0 GHz  
-19.56 dBm



## 7.6 SPURIOUS EMISSIONS

### 7.6.1 Conducted Measurement

#### LIMIT

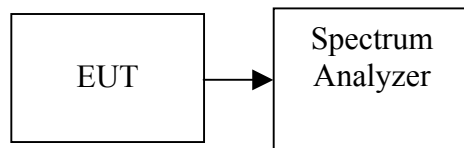
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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)).

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

#### 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 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

#### TEST RESULTS

*No non-compliance noted*



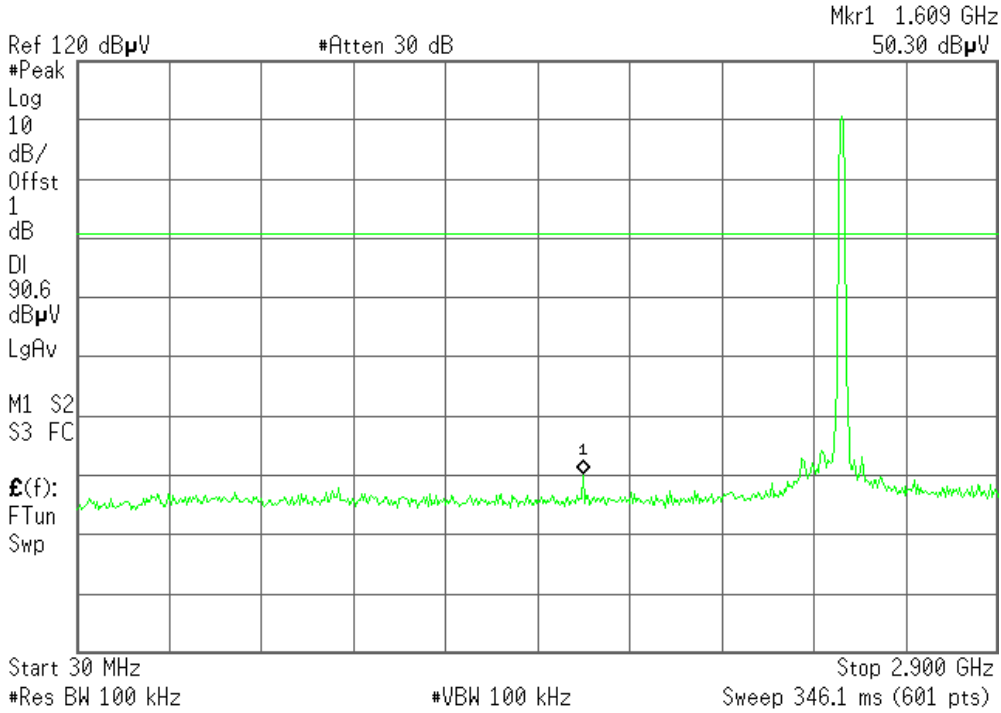
**Test Plot**

**IEEE 802.11b mode / CH Low**

**30MHz ~ 2.9GHz**

Agilent 16:42:34 Nov 26, 2008

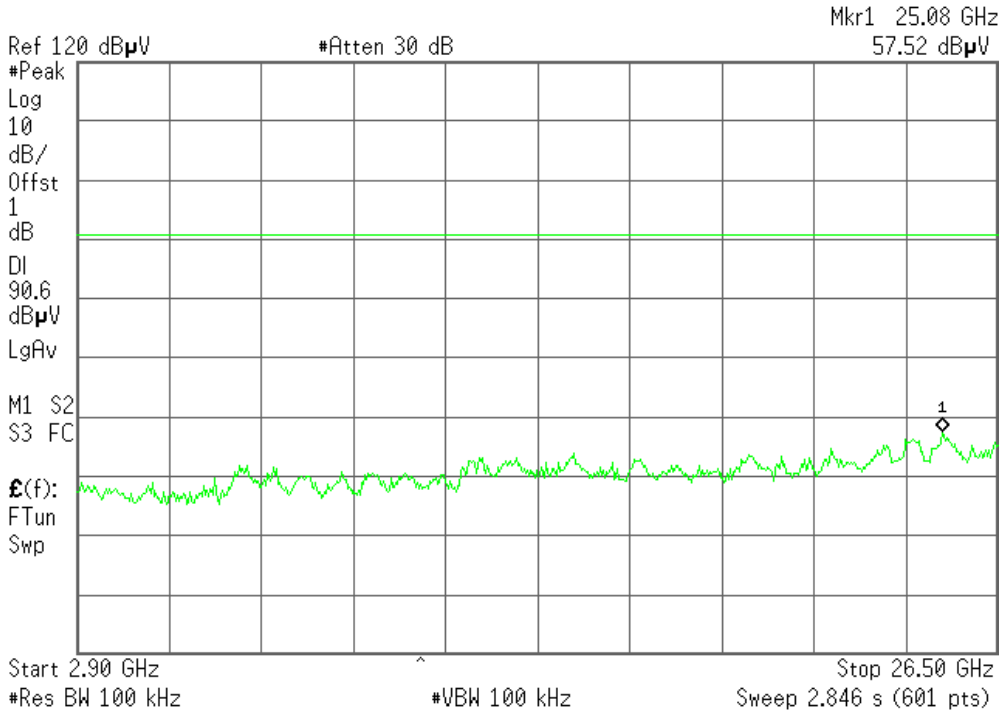
R L



**2.9GHz ~ 26.5GHz**

Agilent 16:43:04 Nov 26, 2008

R L



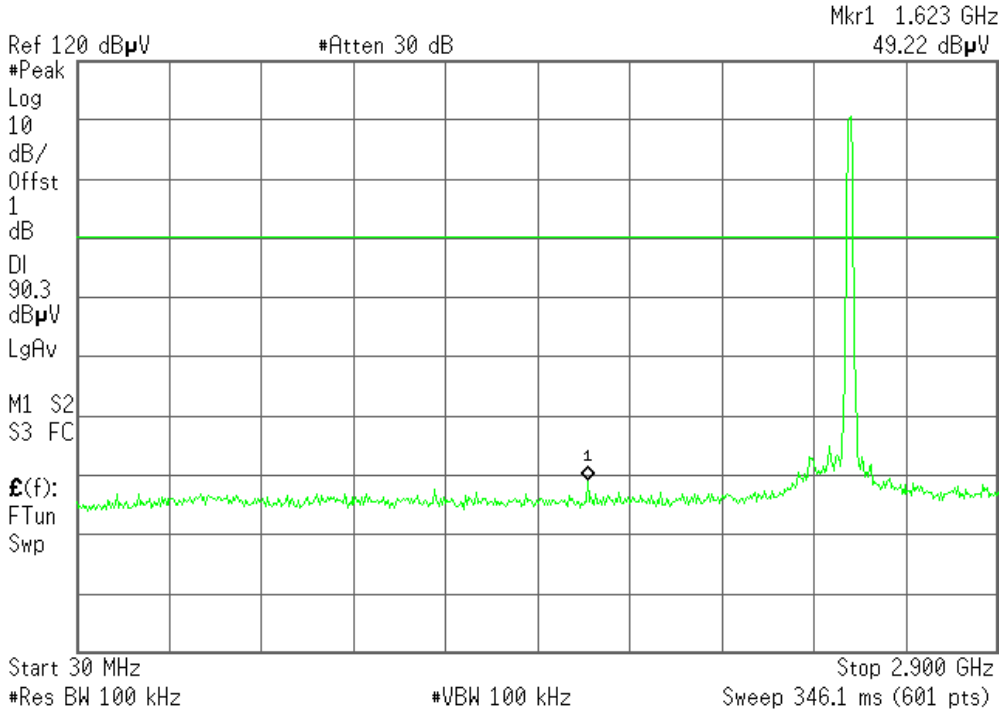


**IEEE 802.11b mode / CH Mid**

**30MHz ~ 2.9GHz**

Agilent 16:43:59 Nov 26, 2008

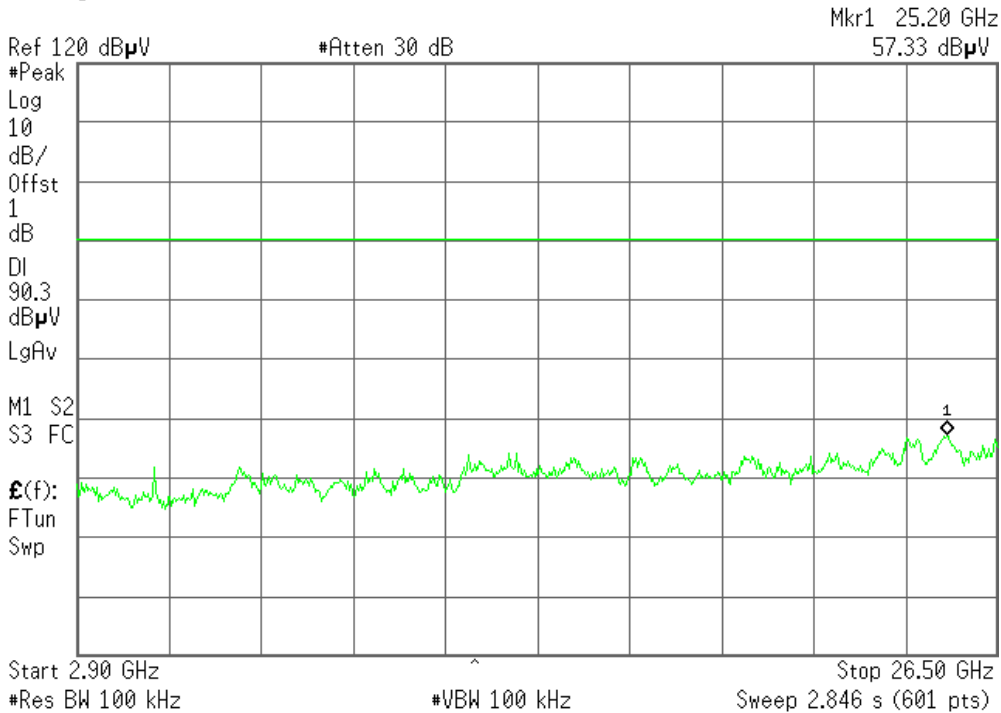
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:44:37 Nov 26, 2008

R T



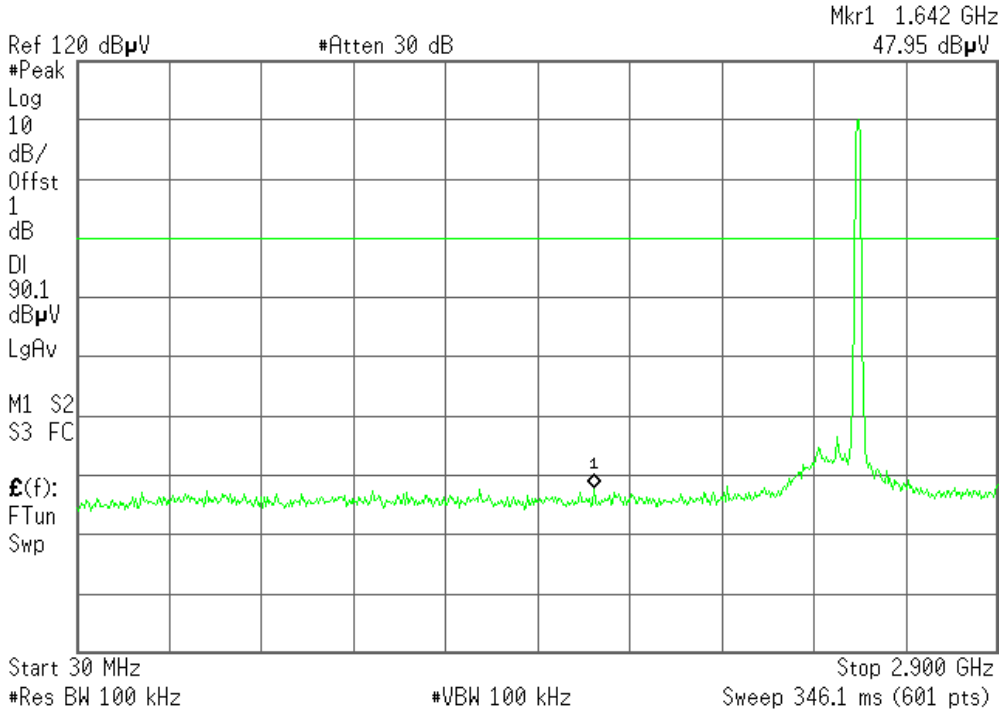


**IEEE 802.11b mode / CH High**

**30MHz ~ 2.9GHz**

Agilent 16:45:55 Nov 26, 2008

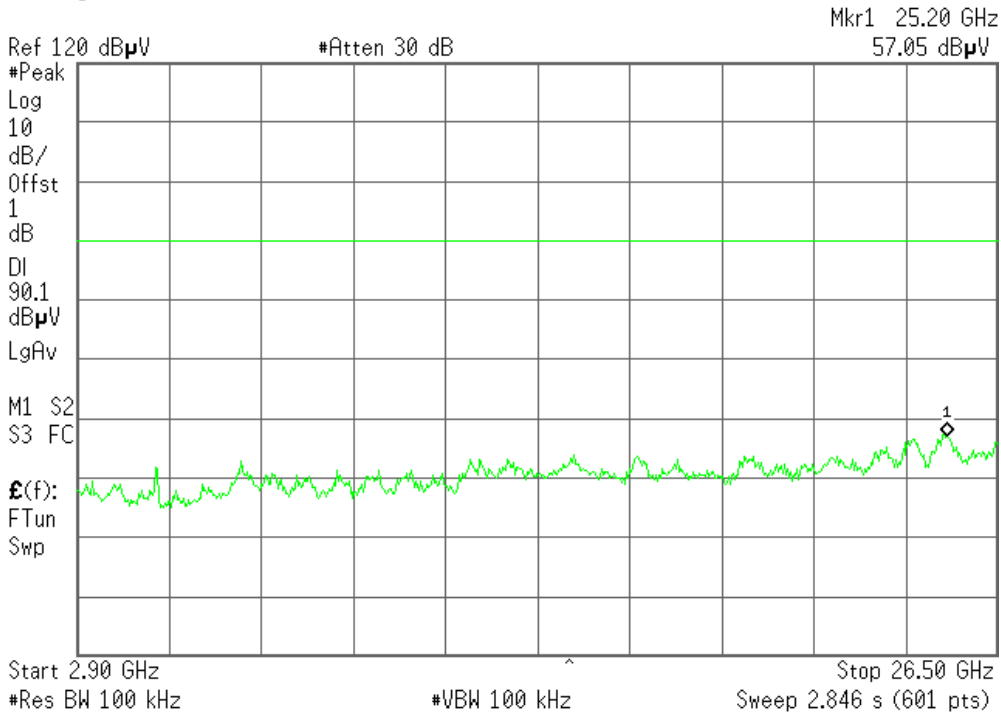
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:46:25 Nov 26, 2008

R T





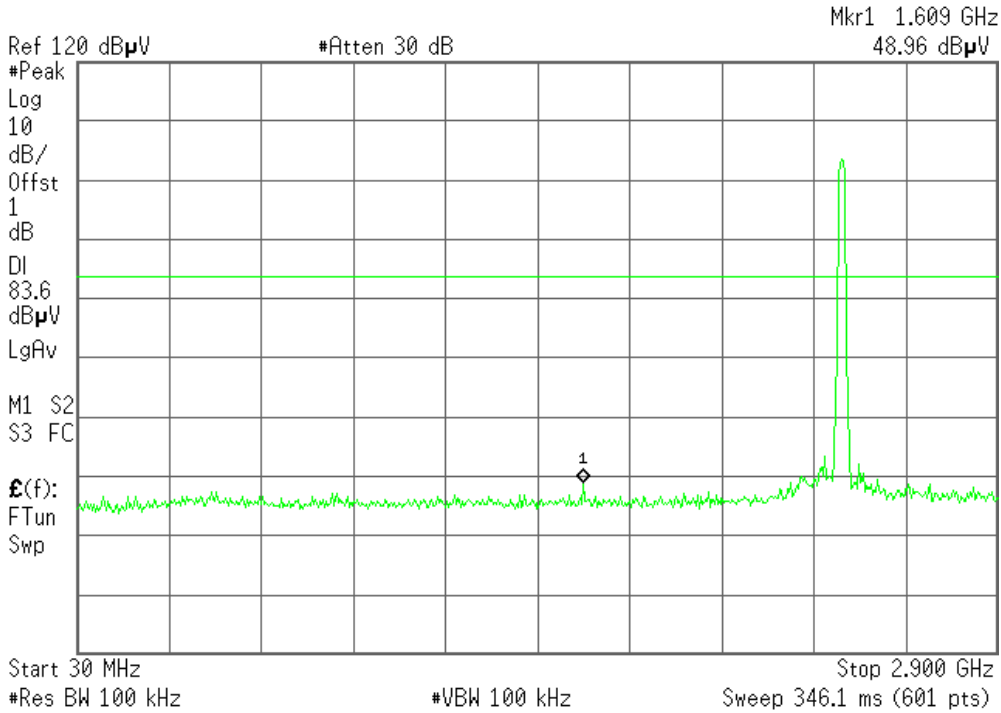


**IEEE 802.11g mode/ CH Low**

**30MHz ~ 2.9GHz**

Agilent 16:40:53 Nov 26, 2008

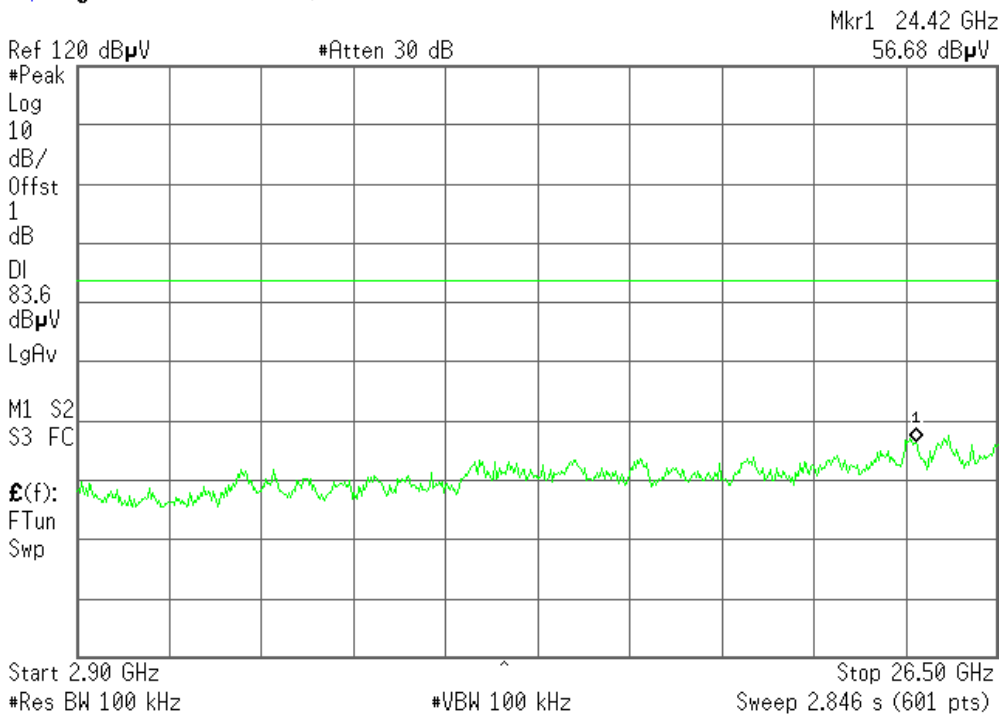
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:41:27 Nov 26, 2008

R T



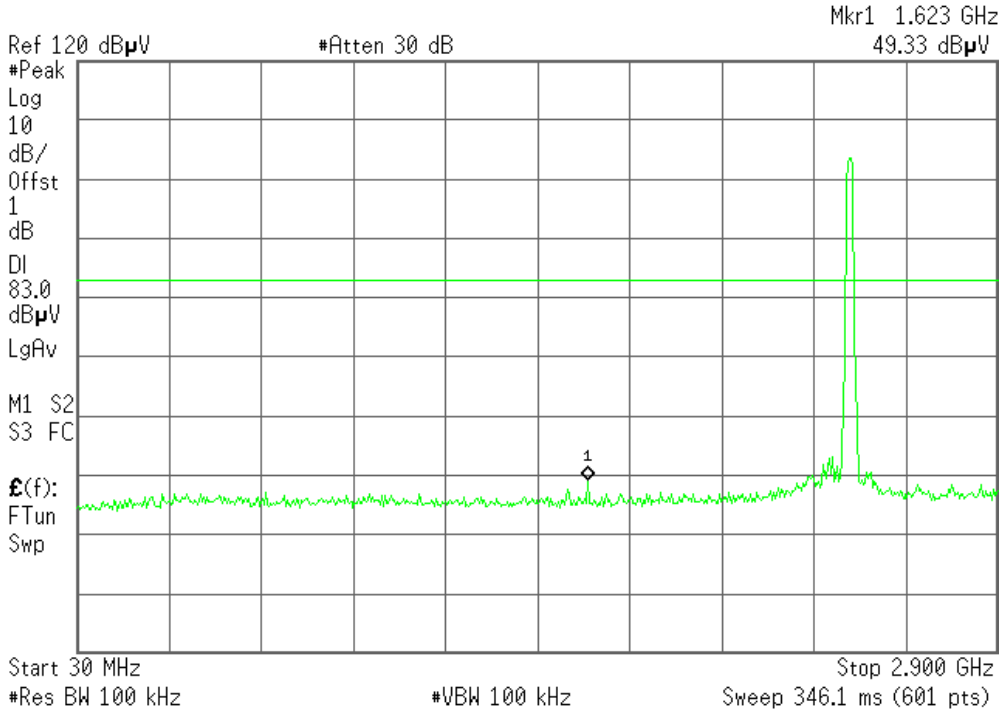


IEEE 802.11g / CH Mid

30MHz ~ 2.9GHz

Agilent 16:39:34 Nov 26, 2008

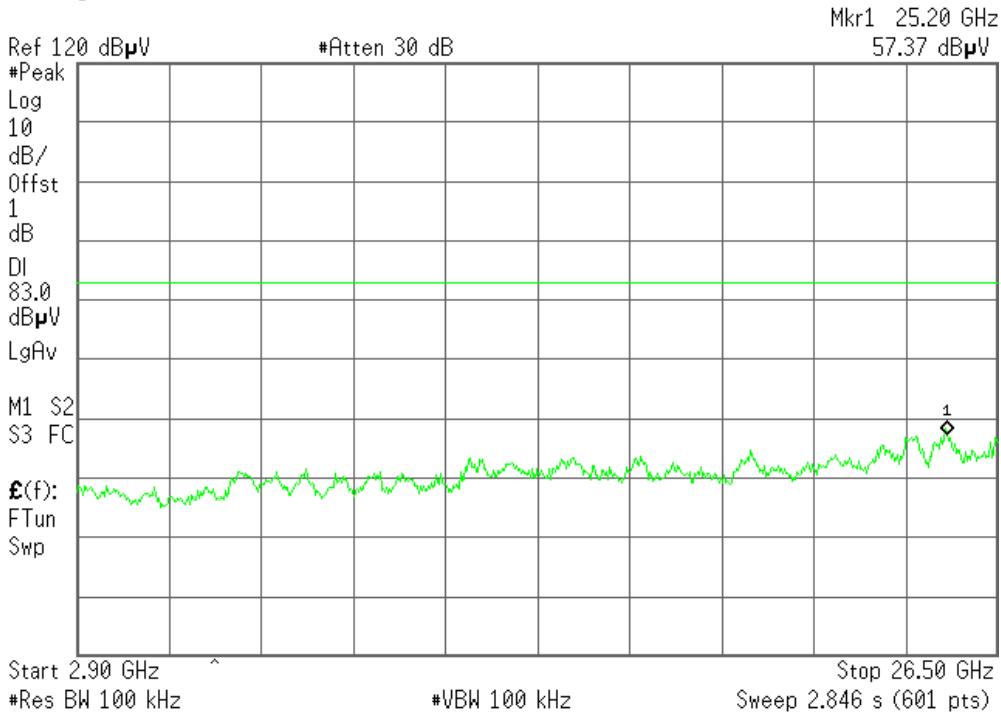
R T



2.9GHz ~ 26.5GHz

Agilent 16:40:07 Nov 26, 2008

R T



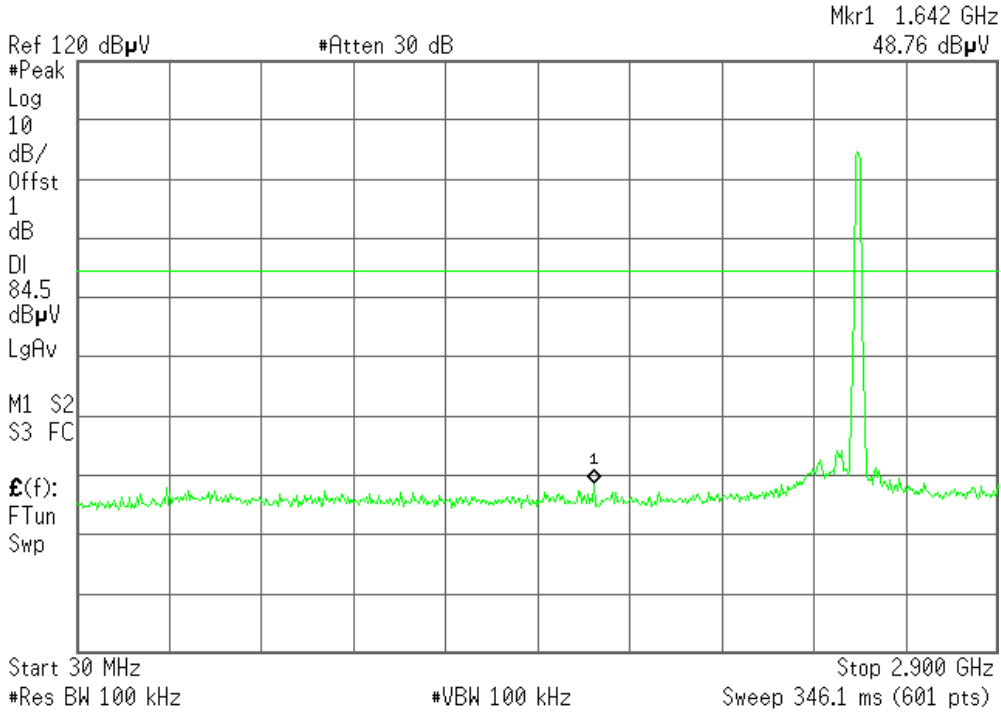


**IEEE 802.11g / CH High**

**30MHz ~ 2.9GHz**

Agilent 16:37:24 Nov 26, 2008

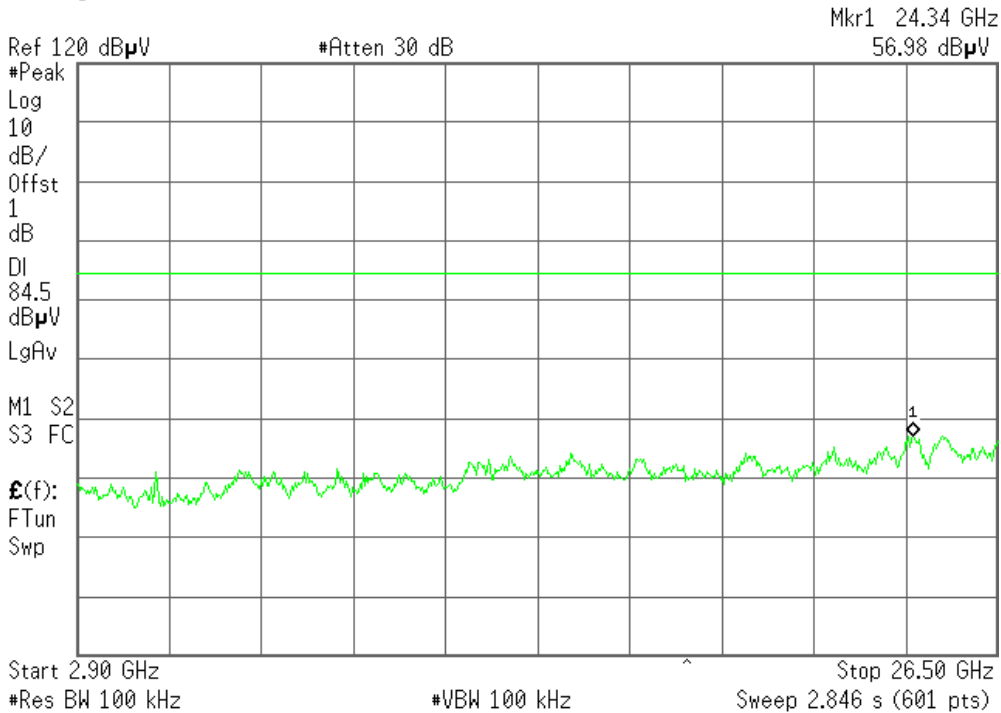
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:37:58 Nov 26, 2008

R T



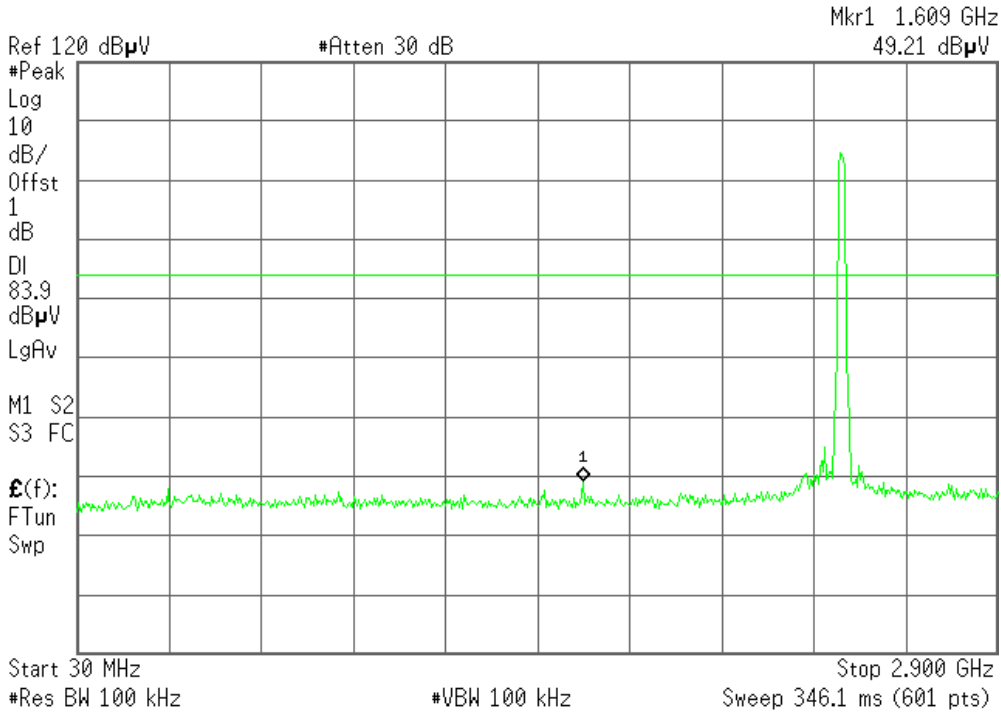


IEEE 802.11n HT20 MHz mode / CH Low

30MHz ~ 2.9GHz

Agilent 16:32:19 Nov 26, 2008

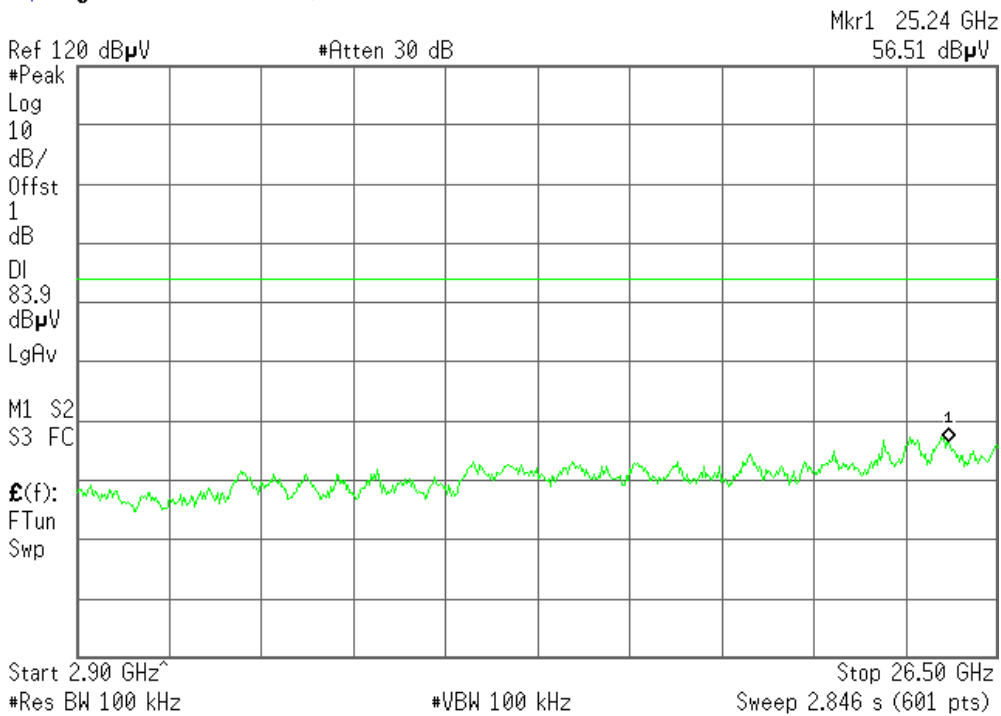
R T



2.9GHz ~ 26.5GHz

Agilent 16:32:57 Nov 26, 2008

R L



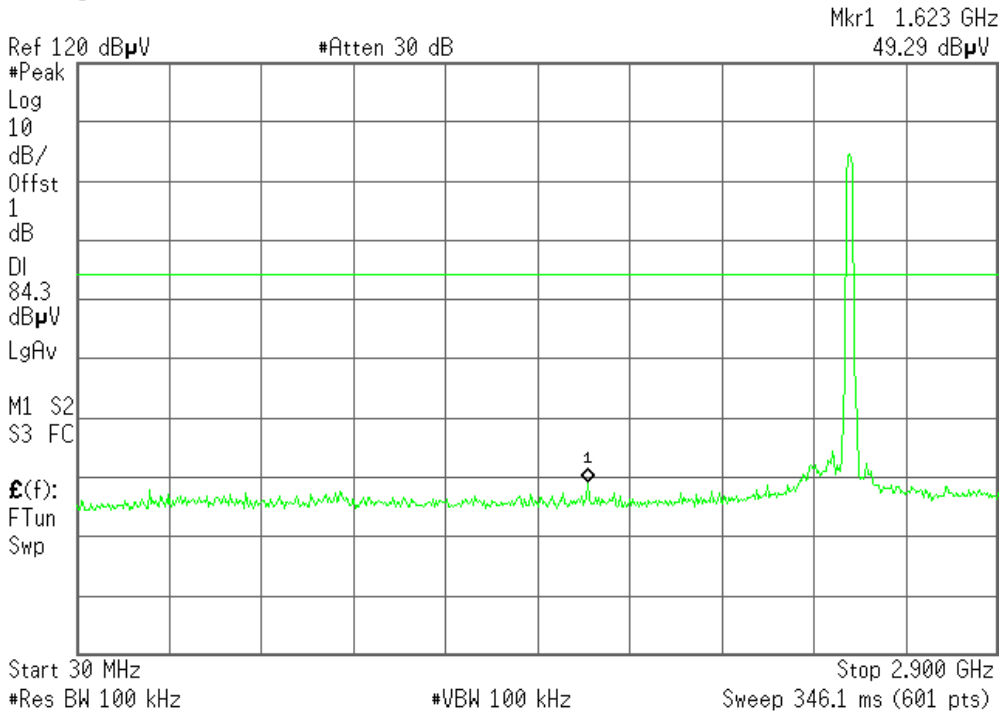


**IEEE 802.11n HT20 MHz mode / CH Mid**

**30MHz ~ 2.9GHz**

Agilent 16:34:16 Nov 26, 2008

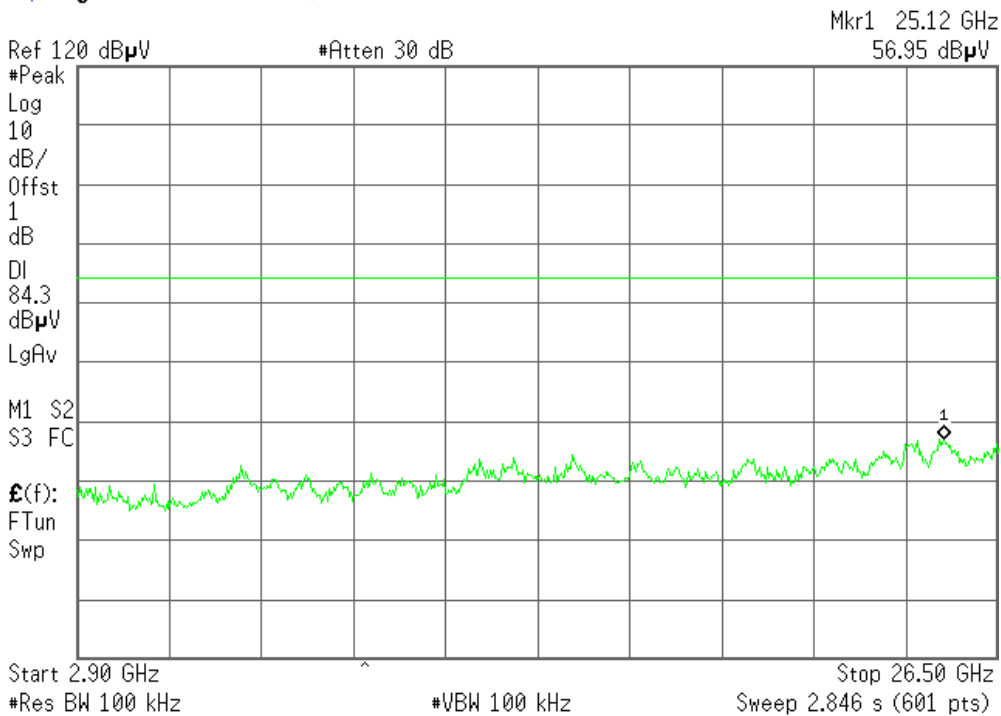
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:34:46 Nov 26, 2008

R T



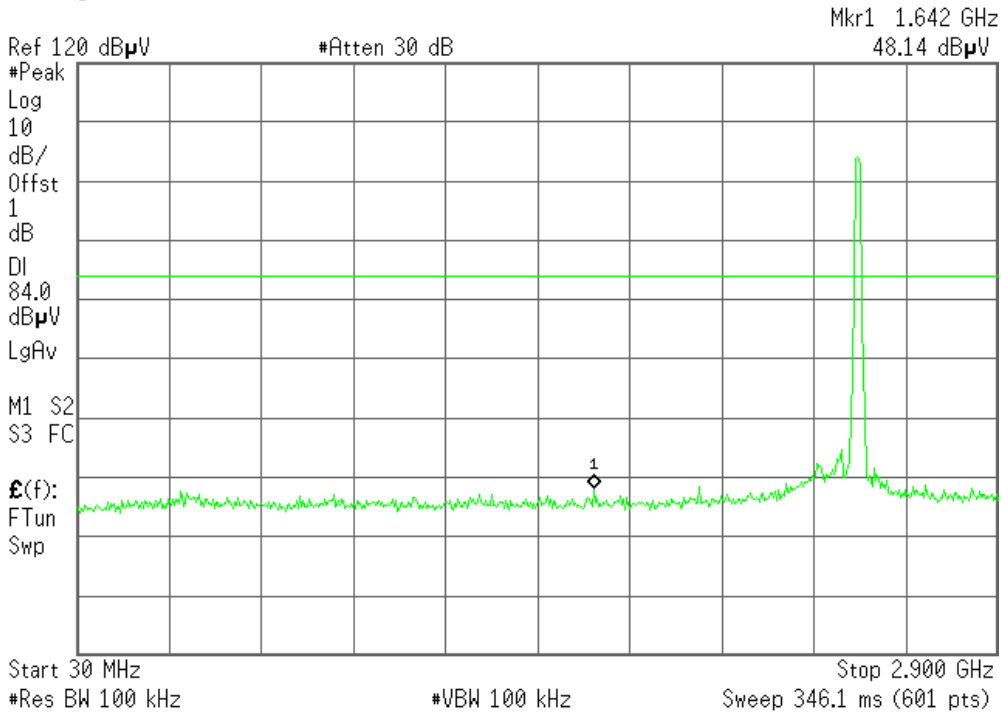


**IEEE 802.11n HT20 MHz mode / CH High**

**30MHz ~ 2.9GHz**

Agilent 16:35:41 Nov 26, 2008

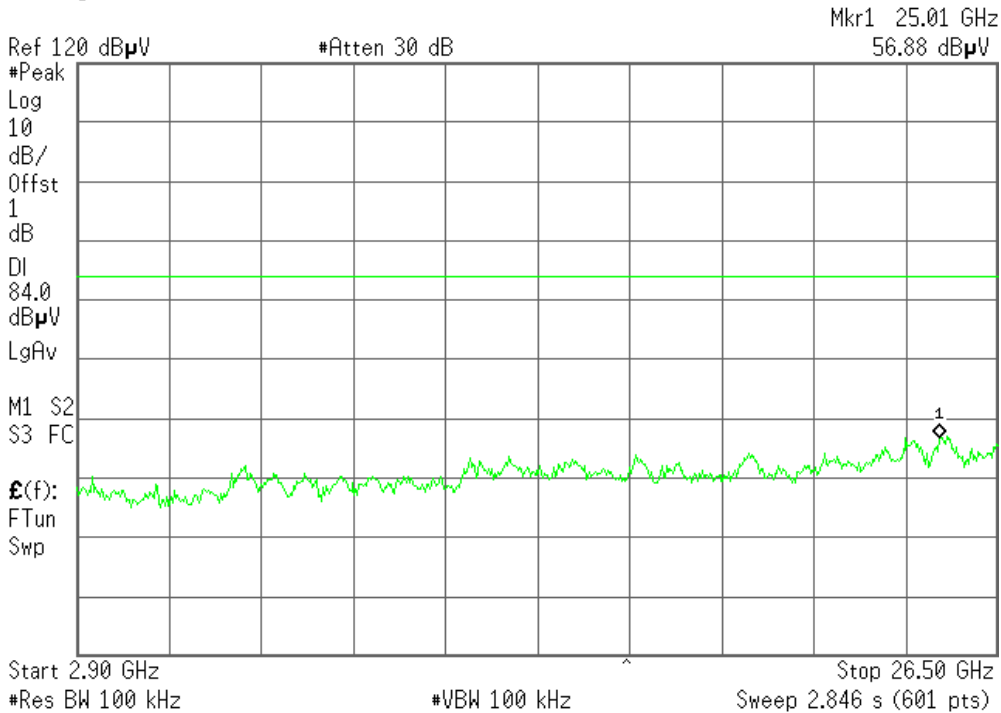
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:36:11 Nov 26, 2008

R T



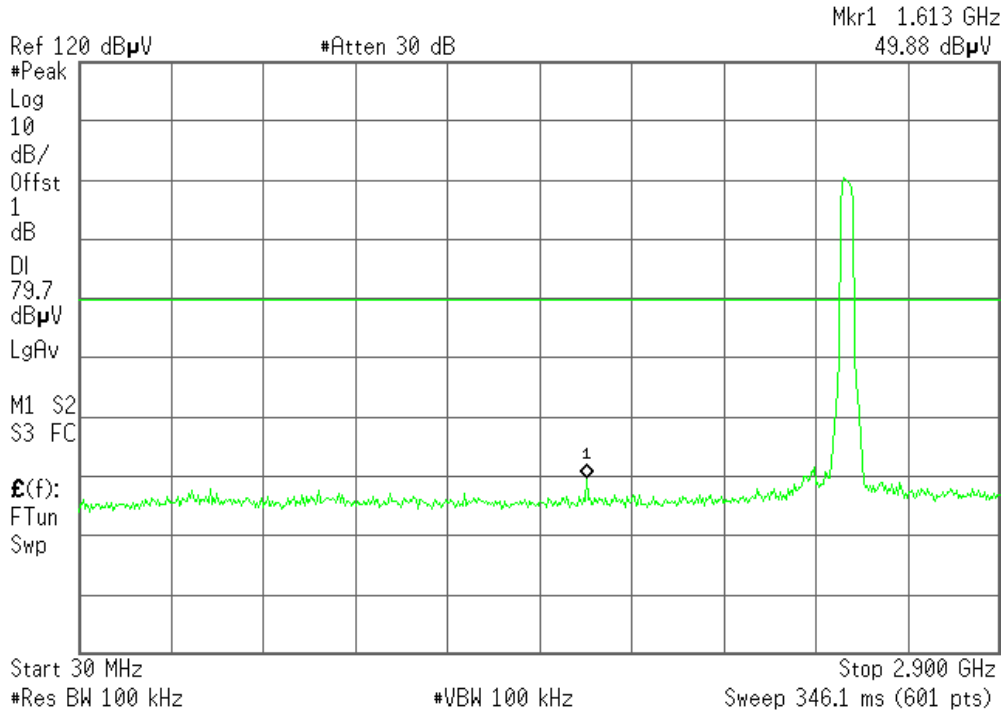


### IEEE 802.11n HT40 MHz mode/ CH Low

#### 30MHz ~ 2.9GHz

Agilent 16:30:43 Nov 26, 2008

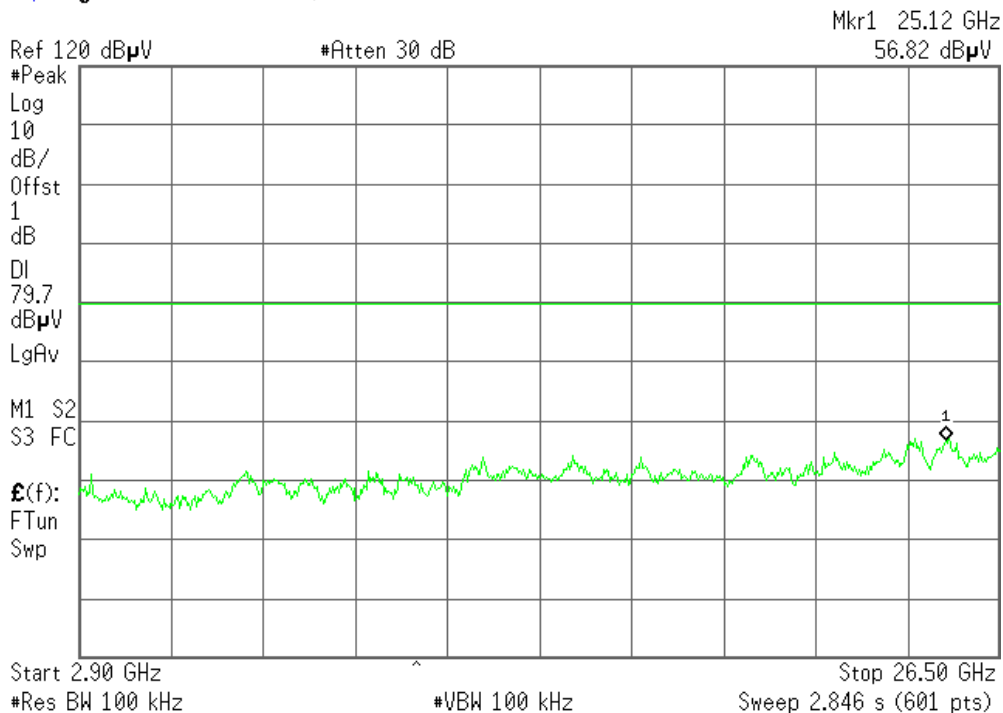
R T



#### 2.9GHz ~ 26.5GHz

Agilent 16:31:14 Nov 26, 2008

R T



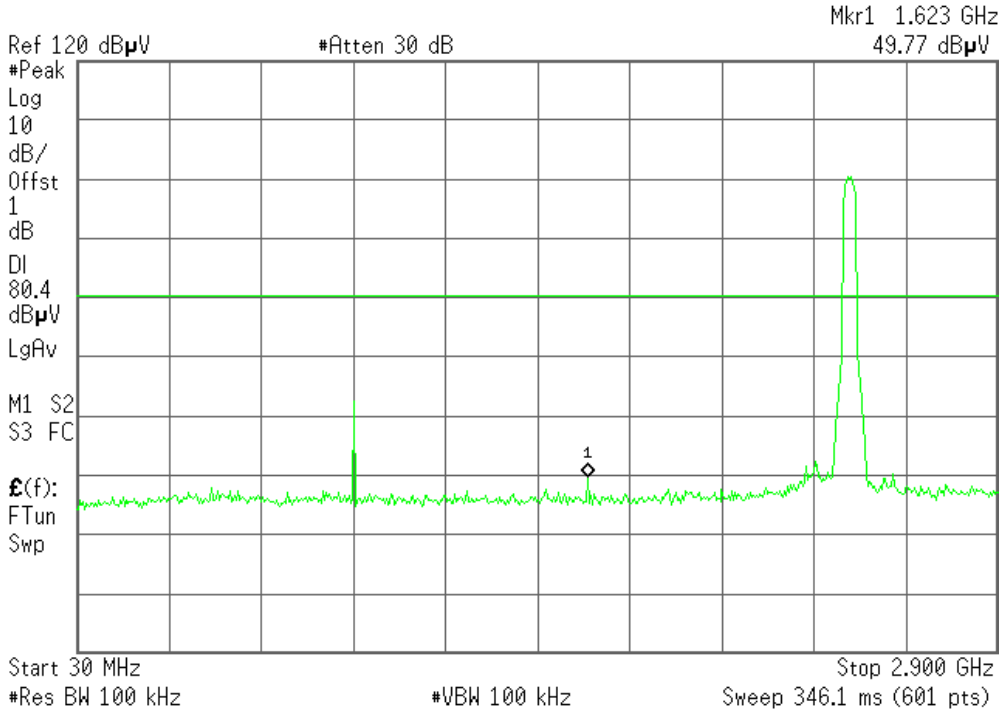


**IEEE 802.11n HT40 MHz mode/ CH Mid**

**30MHz ~ 2.9GHz**

Agilent 16:28:45 Nov 26, 2008

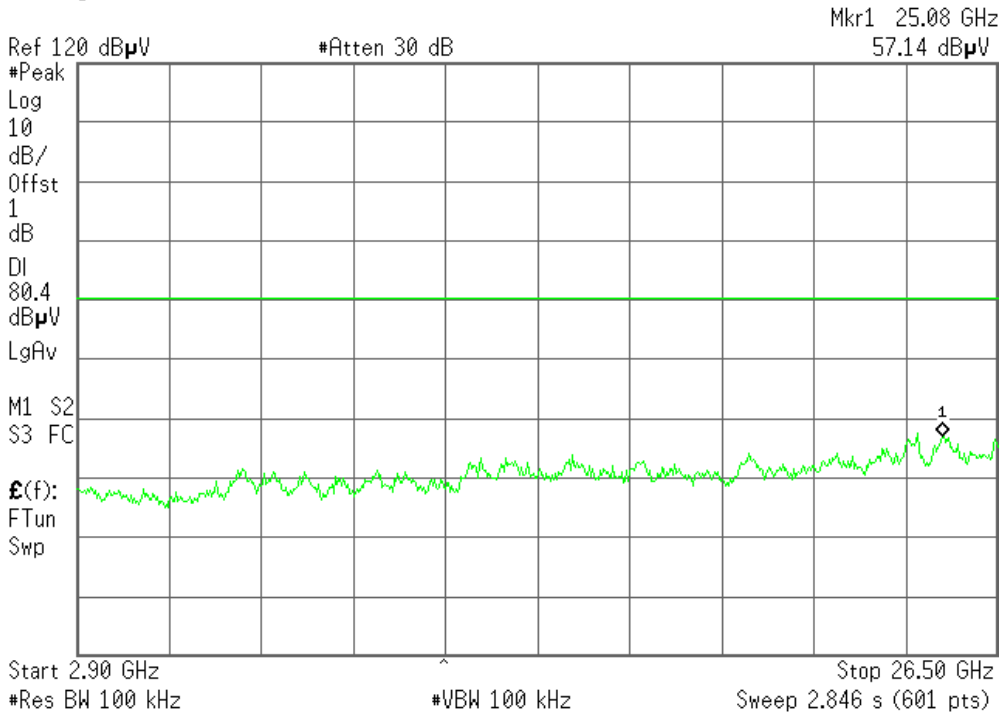
R T



**2.9GHz ~ 26.5GHz**

Agilent 16:29:25 Nov 26, 2008

R T







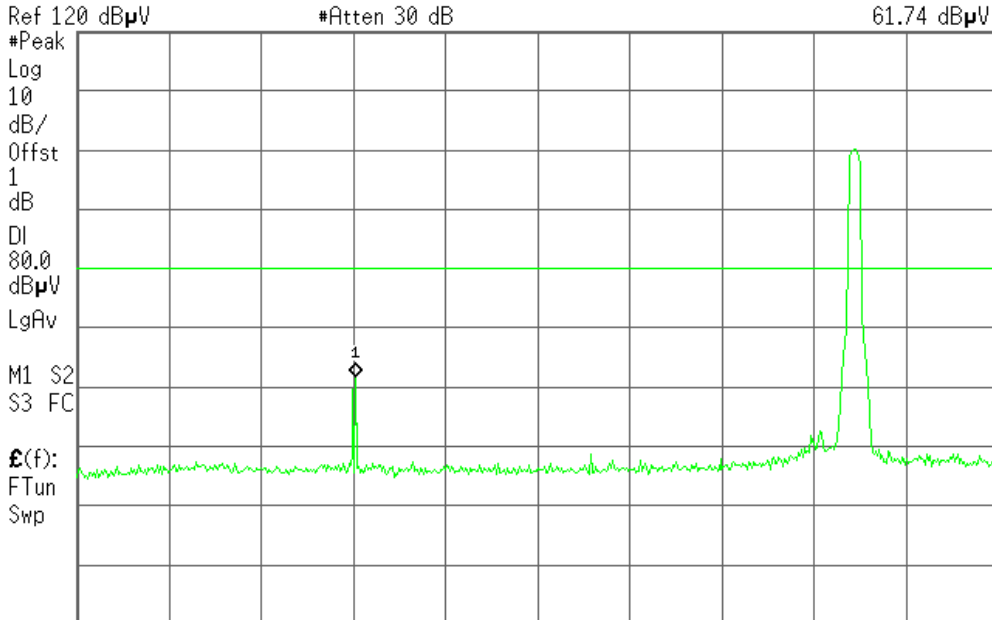
**IEEE 802.11n HT40 MHz mode/ CH High**

**30MHz ~ 2.9GHz**

Agilent 16:26:31 Nov 26, 2008

R T

Mkr1 901 MHz  
61.74 dBμV



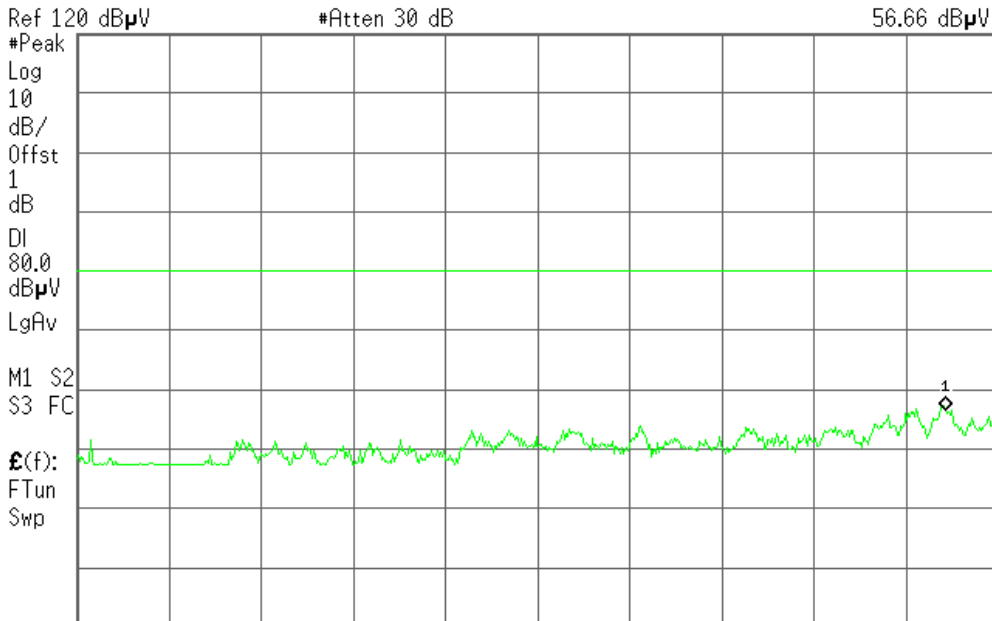
Start 30 MHz #Res BW 100 kHz #VBW 100 kHz Stop 2.900 GHz Sweep 346.1 ms (601 pts)

**2.9GHz ~ 26.5GHz**

Agilent 16:27:09 Nov 26, 2008

R T

Mkr1 25.16 GHz  
56.66 dBμV



Start 2.90 GHz #Res BW 100 kHz #VBW 100 kHz Stop 26.50 GHz Sweep 2.846 s (601 pts)



### 7.6.2 Radiated Emissions

#### LIMIT

1. 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 (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

*Note: 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 above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	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

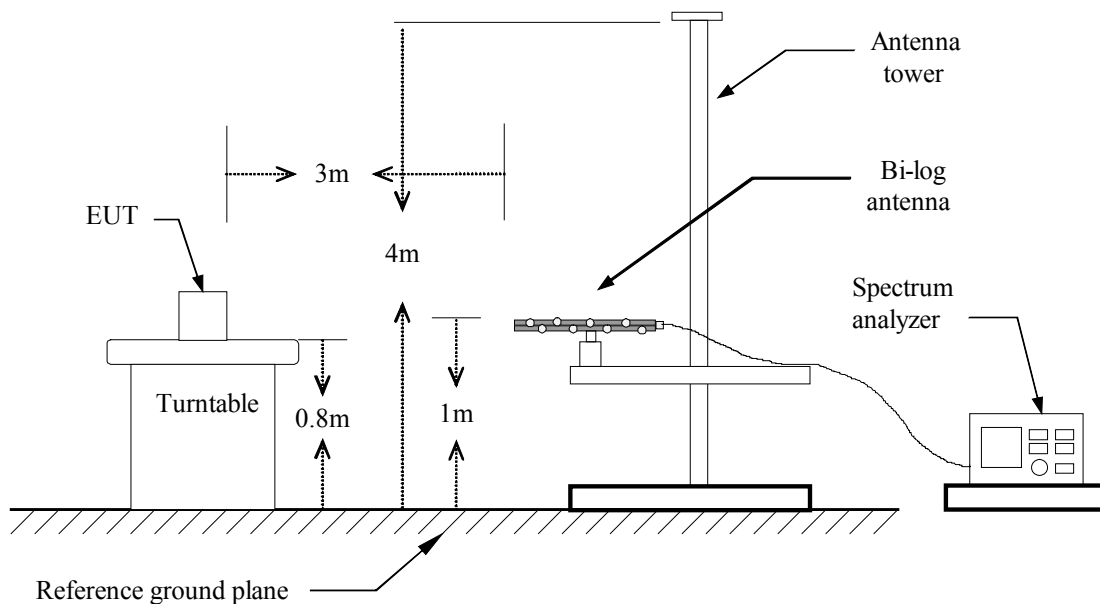
**MEASUREMENT EQUIPMENT USED**

966 RF CHAMBER 2				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2009
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	02/14/2009
Bi-log Antenna	SCHWAZBECK	CBL6143	5082	06/09/2009
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
High Noise Amplifier	Agilent	89842	N/A	06/09/2009
Site NSA	C&C	N/A	N/A	06/09/2009
Horn Antenna	TRC	N/A	N/A	03/04/2009
Signal Generator	Anritsu	MG3694A	#050125	02/24/2009

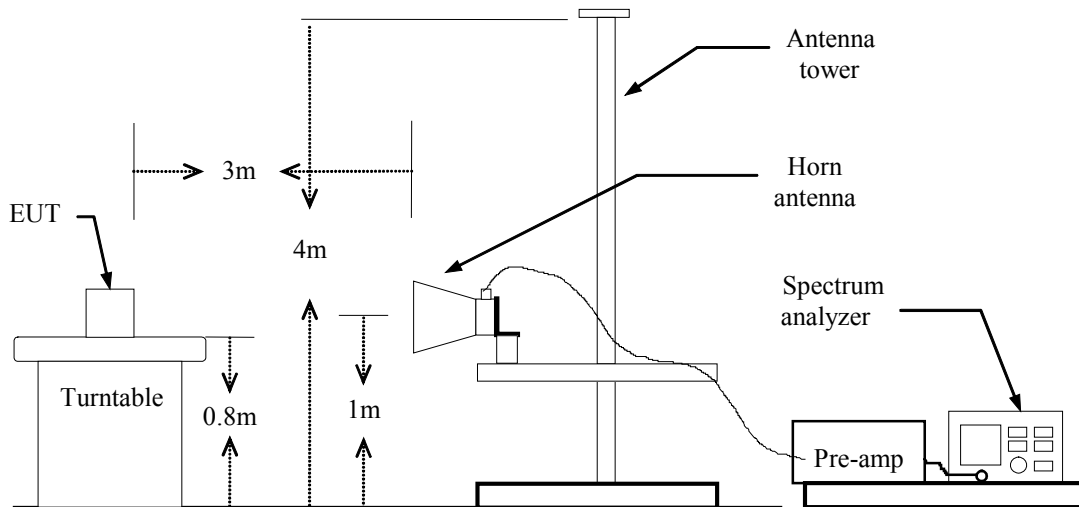
*Remark: Each piece of equipment is scheduled for calibration once a year.*

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

**TEST RESULTS****Below 1 GHz****PIFA Antenna****Operation Mode:** Normal link**Test Date:** November 13, 2008**Temperature:** 27°C**Tested by:** Simple Guan**Humidity:** 56 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
123.600	V	Peak	36.79	-19.63	17.16	43.50	-26.34
187.500	V	Peak	44.72	-18.14	26.58	43.50	-16.92
307.000	V	Peak	41.23	-14.29	26.94	46.00	-19.06
403.833	V	Peak	31.18	-11.39	19.79	46.00	-26.21
491.333	V	Peak	31.17	-9.40	21.77	46.00	-24.23
665.166	V	Peak	31.23	-5.03	26.20	46.00	-19.80
78.150	H	Peak	40.82	-19.99	20.83	40.00	-19.17
94.800	H	Peak	41.91	-20.30	21.61	43.50	-21.89
143.400	H	Peak	45.40	-19.18	26.22	43.50	-17.28
186.600	H	Peak	42.31	-18.24	24.07	43.50	-19.43
576.500	H	Peak	31.06	-7.17	23.89	46.00	-22.11
669.833	H	Peak	30.84	-4.98	25.86	46.00	-20.14

**\*\*Remark:** No emission found between lowest internal used/generated frequency to 30 MHz.**Notes:**

1. Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.
2. 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.
3. The IF bandwidth of SPA between 9kHz to 1GHz was 100kHz.



**PCB Antenna**

**Operation Mode:** Normal link

**Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
38.100	V	Peak	35.36	-17.63	17.73	40.00	-22.27
94.800	V	Peak	41.73	-20.30	21.43	43.50	-22.07
110.550	V	Peak	44.12	-19.95	24.17	43.50	-19.33
151.950	V	Peak	44.94	-19.22	25.72	43.50	-17.78
563.666	V	Peak	31.85	-8.07	23.78	46.00	-22.22
757.333	V	Peak	30.92	-4.69	26.23	46.00	-19.77
69.600	H	Peak	40.49	-20.00	20.49	40.00	-19.51
100.650	H	Peak	42.67	-20.33	22.34	43.50	-21.16
177.150	H	Peak	40.09	-18.63	21.46	43.50	-22.04
557.833	H	Peak	30.82	-8.40	22.42	46.00	-23.58
662.833	H	Peak	30.54	-5.06	25.48	46.00	-20.52
779.500	H	Peak	30.17	-4.30	25.87	46.00	-20.13

**\*\*Remark:** No emission found between lowest internal used/generated frequency to 30 MHz.

**Notes:**

1. Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.
2. 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.
3. The IF bandwidth of SPA between 9kHz to 1GHz was 100kHz.



**Above 1 GHz**

**PIFA Antenna**

**Operation Mode:** TX / IEEE 802.11b / CH Low

**Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1430.00	V	54.90	---	-9.80	45.10	---	74.00	54.00	-8.90	Peak
1630.00	V	54.92	---	-8.39	46.53	---	74.00	54.00	-7.47	Peak
3358.33	V	55.72	52.66	-1.29	54.43	51.37	74.00	54.00	-2.63	AVG
4825.00	V	71.26	49.71	2.68	73.94	52.39	74.00	54.00	-1.61	AVG
N/A										
1336.66	H	56.14	---	-10.32	45.82	---	74.00	54.00	-8.18	Peak
1626.66	H	54.86	---	-8.42	46.44	---	74.00	54.00	-7.56	Peak
3416.66	H	55.31	52.96	-2.82	52.49	50.14	74.00	54.00	-3.86	AVG
4825.00	H	72.75	50.16	2.68	75.43	52.84	74.00	54.00	-1.16	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11b/ CH Mid

Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1313.33	V	56.60	---	-10.45	46.15	---	74.00	54.00	-7.85	Peak
1466.66	V	55.47	---	-9.60	45.87	---	74.00	54.00	-8.13	Peak
3475.00	V	55.58	53.64	-1.03	54.55	52.61	74.00	54.00	-1.39	AVG
4875.00	V	69.62	50.13	2.77	72.39	52.90	74.00	54.00	-1.10	AVG
N/A										
1250.00	H	55.26	---	-10.79	44.47	---	74.00	54.00	-9.53	Peak
1426.66	H	55.02	---	-9.82	45.20	---	74.00	54.00	-8.80	Peak
3400.00	H	55.49	54.69	-2.79	52.70	51.90	74.00	54.00	-2.10	AVG
4875.00	H	69.47	49.21	2.77	72.24	51.98	74.00	54.00	-2.02	AVG
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.





Operation Mode: TX / IEEE 802.11b/ CH High

Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1296.66	V	57.22	---	-10.54	46.68	---	74.00	54.00	-7.32	Peak
1446.66	V	55.56	---	-9.71	45.85	---	74.00	54.00	-8.15	Peak
3375.00	V	56.34	52.67	-1.25	55.09	51.42	74.00	54.00	-2.58	AVG
4925.00	V	72.10	49.71	2.85	74.95	52.56	74.00	54.00	-1.44	AVG
N/A										
1323.33	H	55.94	---	-10.39	45.55	---	74.00	54.00	-8.45	Peak
1466.66	H	55.70	---	-9.60	46.10	---	74.00	54.00	-7.90	Peak
3525.00	H	55.30	54.66	-2.74	52.56	51.92	74.00	54.00	-2.08	AVG
4625.00	H	72.23	49.88	2.85	75.08	52.73	74.00	54.00	-1.27	AVG
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11g/ CH Low

Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1296.66	V	55.75	---	-10.54	45.21	---	74.00	54.00	-8.79	Peak
1456.66	V	55.44	---	-9.66	45.78	---	74.00	54.00	-8.22	Peak
3416.66	V	56.01	52.85	-1.16	54.85	51.69	74.00	54.00	-2.31	AVG
4825.00	V	60.64	50.19	2.68	63.32	52.87	74.00	54.00	-1.13	AVG
N/A										
1246.66	H	55.98	---	-10.81	45.17	---	74.00	54.00	-8.83	Peak
1423.33	H	55.54	---	-9.84	45.70	---	74.00	54.00	-8.30	Peak
3508.33	H	55.41	54.13	-2.89	52.52	51.24	74.00	54.00	-2.76	AVG
4816.66	H	62.18	50.28	2.66	64.84	52.94	74.00	54.00	-1.06	AVG
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** November 13, 2008**Temperature:** 27°C**Tested by:** Simple Guan**Humidity:** 56 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1233.33	V	56.10	---	-10.89	45.21	--	74.00	54.00	-8.79	Peak
1420.00	V	55.78	---	-9.86	45.92	--	74.00	54.00	-8.08	Peak
3441.66	V	55.93	52.82	-1.10	54.83	51.72	74.00	54.00	-2.28	AVG
4875.00	V	62.06	50.14	2.77	64.83	52.91	74.00	54.00	-1.09	AVG
N/A										
1370.00	H	55.91	---	-10.13	45.78	--	74.00	54.00	-8.22	Peak
1590.00	H	55.72	---	-8.71	47.01	--	74.00	54.00	-6.99	Peak
3508.33	H	55.44	53.88	-2.89	52.55	50.99	74.00	54.00	-3.01	AVG
4875.00	H	61.01	50.21	2.77	63.78	52.98	74.00	54.00	-1.02	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11g / CH High

Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1250.00	V	55.89	---	-10.79	45.10	---	74.00	54.00	-8.90	Peak
1396.66	V	55.49	---	-9.99	45.50	---	74.00	54.00	-8.50	Peak
3400.00	V	56.74	54.13	-1.19	55.55	52.94	74.00	54.00	-1.06	AVG
4916.66	V	64.26	49.11	2.84	67.10	51.95	74.00	54.00	-2.05	AVG
N/A										
1420.00	H	55.61	---	-9.86	45.75	---	74.00	54.00	-8.25	Peak
1686.66	H	55.72	---	-7.94	47.78	---	74.00	54.00	-6.22	Peak
3441.66	H	55.71	53.10	-2.87	52.84	50.23	74.00	54.00	-3.77	AVG
4925.00	H	67.13	49.34	2.85	69.98	52.19	74.00	54.00	-1.81	AVG
N/A						---				

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11n HT20 MHz / CH Low Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1333.33	V	56.05	---	-10.34	45.71	---	74.00	54.00	-8.29	Peak
1530.00	V	55.27	---	-9.18	46.09	---	74.00	54.00	-7.91	Peak
3466.66	V	55.90	51.81	-1.04	54.86	50.77	74.00	54.00	-3.23	AVG
4825.00	V	63.80	49.16	2.68	66.48	51.84	74.00	54.00	-2.16	AVG
N/A										
1210.00	H	56.04	---	-11.02	45.02	---	74.00	54.00	-8.98	Peak
1600.00	H	56.09	---	-8.63	47.46	---	74.00	54.00	-6.54	Peak
3508.33	H	55.76	53.41	-2.89	52.87	50.52	74.00	54.00	-3.48	AVG
4816.66	H	65.20	48.62	2.66	67.86	51.28	74.00	54.00	-2.72	AVG
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11n HT20 MHz / CH Mid Test Date: November 13, 2008

Temperature: 27°C Tested by: Simple Guan

Humidity: 56% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1310.00	V	55.89	---	-10.46	45.43	---	74.00	54.00	-8.57	Peak
1560.00	V	55.05	---	-8.94	46.11	---	74.00	54.00	-7.89	Peak
3450.00	V	55.91	52.57	-1.08	54.83	51.49	74.00	54.00	-2.51	AVG
4875.00	V	62.12	49.36	2.77	64.89	52.13	74.00	54.00	-1.87	AVG
N/A										
1480.00	H	55.29	---	-9.53	45.76	---	74.00	54.00	-8.24	Peak
1760.00	H	55.57	---	-7.36	48.21	---	74.00	54.00	-5.79	Peak
3450.00	H	55.59	53.12	-2.88	52.71	50.24	74.00	54.00	-3.76	AVG
4866.66	H	63.79	50.21	2.75	66.54	52.96	74.00	54.00	-1.04	AVG
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT20 MHz / CH High **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1433.33	V	54.96	---	-9.79	45.17	---	74.00	54.00	-8.83	Peak
1540.00	V	55.11	---	-9.10	46.01	---	74.00	54.00	-7.99	Peak
3475.00	V	55.89	51.99	-1.03	54.86	50.96	74.00	54.00	-3.04	AVG
4925.00	V	65.37	48.64	2.85	68.22	51.49	74.00	54.00	-2.51	AVG
N/A										
1286.66	H	56.43	---	-10.59	45.84	---	74.00	54.00	-8.16	Peak
1426.66	H	55.66	---	-9.82	45.84	---	74.00	54.00	-8.16	Peak
3366.66	H	55.92	52.85	-2.74	53.18	50.11	74.00	54.00	-3.89	AVG
4925.00	H	66.07	49.16	2.85	68.92	52.01	74.00	54.00	-1.99	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11n HT40 MHz / CH Low Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1126.66	V	55.90	---	-11.47	44.43	---	74.00	54.00	-9.57	Peak
1506.66	V	55.18	---	-9.37	45.81	---	74.00	54.00	-8.19	Peak
3416.66	V	55.59	53.47	-1.16	54.43	52.31	74.00	54.00	-1.69	AVG.
4850.00	V	60.97	50.15	2.72	63.69	52.87	74.00	54.00	-1.13	AVG.
N/A										
1430.00	H	55.58	---	-9.80	45.78	---	74.00	54.00	-8.22	Peak
1586.66	H	56.18	---	-8.73	47.45	---	74.00	54.00	-6.55	Peak
3500.00	H	55.46	52.86	-2.97	52.49	49.89	74.00	54.00	-4.11	AVG.
4841.66	H	61.66	50.09	2.71	64.37	52.80	74.00	54.00	-1.20	AVG.
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.





**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH Mid **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1066.66	V	61.81	---	-11.80	50.01	---	74.00	54.00	-3.99	Peak
1513.33	V	55.79	---	-9.31	46.48	---	74.00	54.00	-7.52	Peak
3333.33	V	56.62	53.02	-1.34	55.28	51.68	74.00	54.00	-2.32	AVG.
4875.00	V	61.67	49.40	2.77	64.44	52.17	74.00	54.00	-1.83	AVG.
N/A										
1323.33	H	55.76	---	-10.39	45.37	---	74.00	54.00	-8.63	Peak
1510.00	H	55.32	---	-9.34	45.98	---	74.00	54.00	-8.02	Peak
3533.33	H	55.84	53.64	-2.66	53.18	50.98	74.00	54.00	-3.02	AVG.
4866.66	H	61.93	48.66	2.75	64.68	51.41	74.00	54.00	-2.59	AVG.
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH High **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1370.00	V	55.57	---	-10.13	45.44	---	74.00	54.00	-8.56	Peak
1720.00	V	55.46	---	-7.68	47.78	---	74.00	54.00	-6.22	Peak
3391.66	V	56.68	53.28	-1.21	55.47	52.07	74.00	54.00	-1.93	AVG.
4900.00	V	59.27	49.83	2.81	62.08	52.64	74.00	54.00	-1.36	AVG.
N/A										
1353.33	H	55.48	---	-10.23	45.25	---	74.00	54.00	-8.75	Peak
1523.33	H	55.12	---	-9.24	45.88	---	74.00	54.00	-8.12	Peak
3466.66	H	55.46	52.20	-2.91	52.55	49.29	74.00	54.00	-4.71	AVG.
4908.33	H	60.23	49.71	2.82	63.05	52.53	74.00	54.00	-1.47	AVG.
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**PCB Antenna**

**Operation Mode:** TX / IEEE 802.11b / CH Low

**Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1313.33	V	55.33	---	-10.45	44.88	---	74.00	54.00	-9.12	Peak
1600.00	V	56.19	---	-8.63	47.56	---	74.00	54.00	-6.44	Peak
3358.33	V	56.58	52.36	-1.28	55.30	51.08	74.00	54.00	-2.92	AVG
4825.00	V	72.56	49.77	2.68	75.24	52.45	74.00	54.00	-1.55	AVG
N/A										
1220.00	H	56.14	---	-10.96	45.18	---	74.00	54.00	-8.82	Peak
1370.00	H	55.07	---	-10.13	44.94	---	74.00	54.00	-9.06	Peak
3475.00	H	55.41	51.05	-2.93	52.48	48.12	74.00	54.00	-5.88	AVG
4875.00	H	58.14	48.40	2.77	60.91	51.17	74.00	54.00	-2.83	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11b/ CH Mid

**Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56% RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1066.66	V	58.13	---	-11.80	46.33	---	74.00	54.00	-7.67	Peak
1556.66	V	55.78	---	-8.97	46.81	---	74.00	54.00	-7.19	Peak
3516.66	V	56.14	53.05	-0.88	55.26	52.17	74.00	54.00	-1.83	AVG
4875.00	V	71.37	49.97	2.77	74.14	52.74	74.00	54.00	-1.26	AVG
N/A										
1233.33	H	55.43	---	-10.89	44.54	---	74.00	54.00	-9.46	Peak
1543.33	H	55.15	---	-9.08	46.07	---	74.00	54.00	-7.93	Peak
3483.33	H	55.47	53.06	-2.94	52.53	50.12	74.00	54.00	-3.88	AVG
4650.00	H	55.82	49.71	2.38	58.20	52.09	74.00	54.00	-1.91	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11b/ CH High

**Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1303.33	V	56.40	---	-10.50	45.90	---	74.00	54.00	-8.10	Peak
1513.33	V	55.76	---	-9.31	46.45	---	74.00	54.00	-7.55	Peak
3316.66	V	56.28	53.24	-1.38	54.90	51.86	74.00	54.00	-2.14	AVG
4925.00	V	72.08	49.42	2.85	74.93	52.27	74.00	54.00	-1.73	AVG
N/A										
13700.00	H	56.74	---	-10.13	46.61	---	74.00	54.00	-7.39	Peak
1516.66	H	56.70	---	-9.29	47.41	---	74.00	54.00	-6.59	Peak
3408.33	H	55.82	54.26	-2.81	53.01	51.45	74.00	54.00	-2.55	AVG
4925.00	H	63.50	49.57	2.85	66.35	52.42	74.00	54.00	-1.58	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



Operation Mode: TX / IEEE 802.11g/ CH Low

Test Date: November 13, 2008

Temperature: 27°C

Tested by: Simple Guan

Humidity: 56% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1496.66	V	56.20	---	-9.44	46.76	---	74.00	54.00	-7.24	Peak
1686.66	V	56.52	---	-7.94	48.58	---	74.00	54.00	-5.42	Peak
3433.33	V	55.68	52.50	-1.12	54.56	51.38	74.00	54.00	-2.62	AVG
4825.00	V	64.79	49.78	2.68	67.47	52.46	74.00	54.00	-1.54	AVG
N/A										
1293.33	H	57.13	---	-10.56	46.57	---	74.00	54.00	-7.43	Peak
1553.33	H	57.08	---	-9.00	48.08	---	74.00	54.00	-5.92	Peak
3483.33	H	55.82	53.92	-2.94	52.88	50.98	74.00	54.00	-3.02	AVG
4825.00	H	57.45	48.49	2.68	60.13	51.17	74.00	54.00	-2.83	AVG
N/A										

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** November 13, 2008**Temperature:** 27°C**Tested by:** Simple Guan**Humidity:** 56 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1150.00	V	56.63	---	-11.35	45.28	---	74.00	54.00	-8.72	Peak
1400.00	V	55.42	---	-9.97	45.45	---	74.00	54.00	-8.55	Peak
3308.33	V	56.90	52.29	-1.40	55.50	50.89	74.00	54.00	-3.11	AVG
4875.00	V	61.09	48.97	2.77	63.86	51.74	74.00	54.00	-2.26	AVG
N/A										
1470.00	H	56.44	---	-9.58	46.86	---	74.00	54.00	-7.14	Peak
1686.66	H	55.05	---	-7.94	47.11	---	74.00	54.00	-6.89	Peak
3500.00	H	55.51	52.79	-2.97	52.54	49.82	74.00	54.00	-4.18	AVG
4866.66	H	58.21	50.07	2.75	60.96	52.82	74.00	54.00	-1.18	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11g / CH High

**Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56% RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1220.00	V	56.02	---	-10.96	45.06	---	74.00	54.00	-8.94	Peak
1360.00	V	55.97	---	-10.19	45.78	---	74.00	54.00	-8.22	Peak
3441.66	V	56.65	52.76	-1.10	55.55	51.66	74.00	54.00	-2.34	AVG
4925.00	V	64.42	49.49	2.85	67.27	52.34	74.00	54.00	-1.66	AVG
N/A										
1286.66	H	55.51	---	-10.59	44.92	---	74.00	54.00	-9.08	Peak
1453.33	H	55.32	---	-9.68	45.64	---	74.00	54.00	-8.36	Peak
3491.66	H	55.84	51.91	-2.96	52.88	48.95	74.00	54.00	-5.05	AVG
4925.00	H	58.08	49.99	2.85	60.93	52.84	74.00	54.00	-1.16	AVG
N/A						---				

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.





**Operation Mode:** TX / IEEE 802.11n HT20 MHz / CH Low **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1390.00	V	55.49	---	-10.03	45.46	---	74.00	54.00	-8.54	Peak
1480.00	V	55.71	---	-9.53	46.18	---	74.00	54.00	-7.82	Peak
3466.66	V	55.87	52.80	-1.04	54.83	51.76	74.00	54.00	-2.24	AVG
4825.00	V	64.77	49.77	2.68	67.45	52.45	74.00	54.00	-1.55	AVG
N/A										
1286.66	H	55.55	---	-10.59	44.96	---	74.00	54.00	-9.04	Peak
1486.66	H	55.51	---	-9.49	46.02	---	74.00	54.00	-7.98	Peak
3491.66	H	56.03	52.77	-2.96	53.07	49.81	74.00	54.00	-4.19	AVG
4825.00	H	57.24	49.70	2.68	59.92	52.38	74.00	54.00	-1.62	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT20 MHz / CH Mid **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56% RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1203.33	V	57.10	---	-11.05	46.05	---	74.00	54.00	-7.95	Peak
1386.66	V	55.87	---	-10.04	45.83	---	74.00	54.00	-8.17	Peak
3425.00	V	56.36	52.21	-1.14	55.22	51.07	74.00	54.00	-2.93	AVG
4875.00	V	64.80	49.87	2.77	67.57	52.64	74.00	54.00	-1.36	AVG
N/A										
1323.33	H	55.69	---	-10.39	45.30	---	74.00	54.00	-8.70	Peak
1563.33	H	55.17	---	-8.92	46.25	---	74.00	54.00	-7.75	Peak
3458.33	H	55.87	50.89	-2.90	52.97	47.99	74.00	54.00	-6.01	AVG
4875.00	H	57.05	48.29	2.77	59.82	51.06	74.00	54.00	-2.94	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT20 MHz / CH High **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1063.33	V	58.77	---	-11.82	46.95	---	74.00	54.00	-7.05	Peak
1490.00	V	56.23	---	-9.47	46.76	---	74.00	54.00	-7.24	Peak
3483.33	V	56.15	51.83	-1.01	55.14	50.82	74.00	54.00	-3.18	AVG
4916.66	V	64.62	48.92	2.84	67.46	51.76	74.00	54.00	-2.24	AVG
N/A										
1440.00	H	55.49	---	-9.75	45.74	---	74.00	54.00	-8.26	Peak
1566.66	H	56.53	---	-8.89	47.64	---	74.00	54.00	-6.36	Peak
3416.66	H	56.29	52.64	-2.82	53.47	49.82	74.00	54.00	-4.18	AVG
4925.00	H	56.32	49.87	2.85	59.17	52.72	74.00	54.00	-1.28	AVG
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH Low **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1370.00	V	55.92	---	-10.13	45.79	---	74.00	54.00	-8.21	Peak
1570.00	V	55.51	---	-8.87	46.64	---	74.00	54.00	-7.36	Peak
3483.33	V	57.43	52.34	-1.01	56.42	51.33	74.00	54.00	-2.67	AVG.
4833.33	V	59.31	50.17	2.69	62.00	52.86	74.00	54.00	-1.14	AVG.
N/A										
1336.66	H	55.62	---	-10.32	45.30	---	74.00	54.00	-8.70	Peak
1720.00	H	55.00	---	-7.68	47.32	---	74.00	54.00	-6.68	Peak
3325.00	H	56.19	54.23	-2.66	53.53	51.57	74.00	54.00	-2.43	AVG.
3466.66	H	55.55	55.70	-2.91	52.64	52.79	74.00	54.00	-1.21	AVG.
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH Mid **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1423.33	V	56.39	---	-9.84	46.55	---	74.00	54.00	-7.45	Peak
1586.66	V	55.45	---	-8.73	46.72	---	74.00	54.00	-7.28	Peak
3191.66	V	57.75	52.09	-1.66	56.09	50.43	74.00	54.00	-3.57	AVG.
3675.00	V	58.10	51.64	-0.05	58.05	51.59	74.00	54.00	-2.41	AVG.
N/A										
1206.66	H	55.76	---	-11.03	44.73	---	74.00	54.00	-9.27	Peak
1460.00	H	55.59	---	-9.64	45.95	---	74.00	54.00	-8.05	Peak
3408.33	H	56.29	54.43	-2.81	53.48	51.62	74.00	54.00	-2.38	AVG.
3508.33	H	55.76	55.18	-2.89	52.87	52.29	74.00	54.00	-1.71	AVG.
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH High **Test Date:** November 13, 2008

**Temperature:** 27°C

**Tested by:** Simple Guan

**Humidity:** 56 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1300.00	V	55.60	---	-10.52	45.08	---	74.00	54.00	-8.92	Peak
1453.33	V	55.65	---	-9.68	45.97	---	74.00	54.00	-8.03	Peak
3175.00	V	58.09	53.06	-1.70	56.39	51.36	74.00	54.00	-2.64	AVG.
4558.33	V	58.52	50.51	2.22	60.74	52.73	74.00	54.00	-1.27	AVG.
N/A										
1350.00	H	55.21	---	-10.24	44.97	---	74.00	54.00	-9.03	Peak
1526.66	H	55.37	---	-9.21	46.16	---	74.00	54.00	-7.84	Peak
3475.00	H	56.02	52.74	-2.93	53.09	49.81	74.00	54.00	-4.19	AVG.
4841.66	H	58.25	48.97	2.71	60.96	51.68	74.00	54.00	-2.32	AVG.
N/A										

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.



### 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 μH/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 (dBμV)	
	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

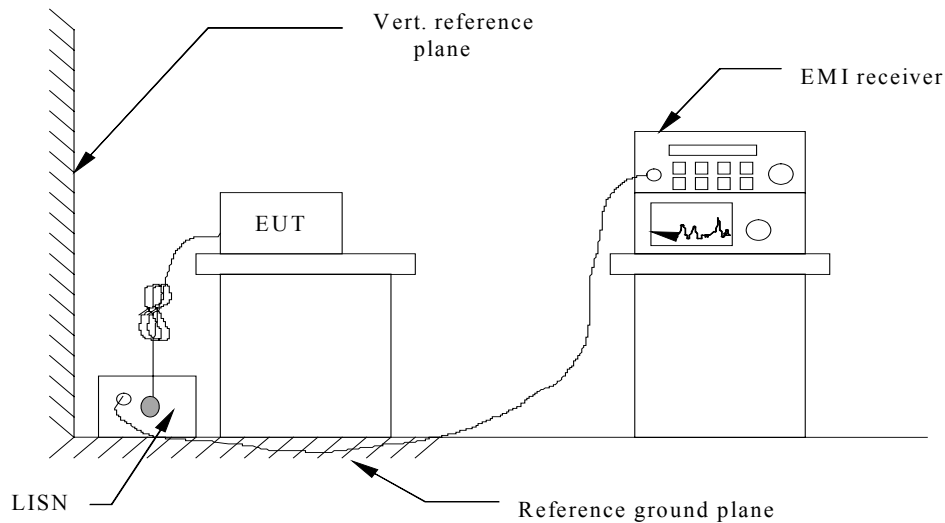
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power Line (LINE and NEUTRAL) and ground at the power terminals.

#### MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site G				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESCI EMI TEST RECEIV.ESCI	ROHDE&SCHWARZ	1166.5950 03	100088	02/24/2009
LISN	EMCO	3825/2	1371	02/24/2009
LISN	EMCO	3825/2	8901-1459	02/24/2009

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

## Test Configuration



See test photographs attached in Appendix 1 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**

<b>Test Mode:</b> Normal Link	<b>Location:</b> Site G
<b>Model Name:</b> WLC311NR	<b>Test Date:</b> November 13, 2008
<b>Tested by:</b> Simple Guan	<b>Test Results:</b> Passed

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.153	53.13	---	---	65.89	55.89	---	-2.76	L1
0.242	45.58	---	---	63.35	53.35	---	-7.77	L1
0.379	39.58	---	---	59.43	49.43	---	-9.85	L1
0.446	41.84	---	---	57.53	47.53	---	-5.69	L1
0.531	45.26	41.56	32.40	56.00	46.00	-14.44	-13.60	L1
0.846	37.11	---	---	56.00	46.00	---	-8.89	L1
0.198	49.60	---	---	64.62	54.62	---	-5.02	L2
0.268	50.83	46.84	33.54	62.61	52.61	-15.77	-19.07	L2
0.353	43.74	---	---	60.17	50.17	---	-6.43	L2
0.442	46.63	42.03	34.39	57.63	47.63	-15.60	-13.24	L2
0.531	48.52	45.12	37.86	56.00	46.00	-10.88	-8.14	L2
0.935	40.45	---	---	56.00	46.00	---	-5.55	L2

Note: The chart above shows the highest readings taken from the final data.

**Remark:**

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz, were made with an instrument using Quasi-peak detector and Average detector.
3. “---” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
4. The IF bandwidth of SPA between 0.15MHz and 30MHz, was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz, was 9kHz.
5. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

**Note:**

Freq. = Emission frequency in KHz

Factor (dB) = cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER (The TRANSIENT LIMITER included 10 dB ATTENUATION)

Amptd dBuV = Uncorrected Analyzer/Receiver reading + cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER,

if it > 0.5 dB

Limit dBuV = Limit stated in standard ; Margin dB= Reading in reference to limit

**Calculation Formula**

Margin (dB) = Amptd (dBuV) – Limit (dBuV)

**Common Mode Conducted Emission**

Not applicable