



## FCC 47 CFR PART 15 SUBPART C

for

**Wireless-N USB Adapter**

**Model: WS-WN687N1,WS-WN699N,WS-WN688N**

**Brand: N/A**

**Test Report Number:**

**C130702Z02-RP1**

**Issued Date: July 18, 2013**

Issued for

**Winstars Technology Limited**

**Block 4,TaiSong Industrial Park, DaLang Street, LongHua  
Town, Bao'an district, Shenzhen, China.**

Issued by:

**Compliance Certification Services (Shenzhen) Inc.**

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TESTING CERT #2861.01

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Revision History

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	C130702Z02-RP1	Initial Issue	ALL	Sinphy Xie



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# 1 TEST CERTIFICATION

<b>Product</b>	Wireless-N USB Adapter
<b>Model</b>	WS-WN687N1,WS-WN699N,WS-WN688N
<b>Brand</b>	N/A
<b>Tested</b>	July 2~15, 2013
<b>Applicant</b>	<b>Winstars Technology Limited</b> Block 4,TaiSong Industrial Park, DaLang Street, LongHua Town, Bao'an district, Shenzhen, China.
<b>Manufacturer</b>	<b>Winstars Technology Limited</b> Block 4,TaiSong Industrial Park, DaLang Street, LongHua Town, Bao'an district, Shenzhen, China.

APPLICABLE STANDARDS			
Standard	Test Type	Standard	Test Type
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	<ul style="list-style-type: none"> <li>● Spurious Emissions</li> <li>● Conducted Measurement</li> <li>● Radiated Emissions</li> </ul>
15.247(a)(2)	6dB Bandwidth Measurement	15.247(b)(3) 15.247(b)(4)	Peak Power Measurement
15.247(d)	Band Edges Measurement	15.247(e)	Peak Power Spectral Density

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.4: 2009** 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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**Tom Gan**  
Supervisor of EMC Dept.  
Compliance Certification Service Inc.

**Reviewed by:**

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**Ruby Zhang**  
Supervisor of Report Dept.  
Compliance Certification Service Inc.



## 2 TEST RESULT SUMMARY

APPLICABLE STANDARDS			
Standard	Test Type	Result	Remark
15.247(a)(2)	6dB Bandwidth Measurement	Pass	Meet the requirement of limit.
15.247(b)(3) 15.247(b)(4)	Peak Power Measurement	Pass	Meet the requirement of limit.
15.247(d)	Band Edges Measurement	Pass	Meet the requirement of limit.
15.247(e)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	Pass	Meet the requirement of limit.

- Note:
1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
  2. The information of measurement uncertainty is available upon the customer's request.



### 3 EUT DESCRIPTION

<b>Product</b>	Wireless-N USB Adapter
<b>Model Number</b>	WS-WN687N1,WS-WN699N,WS-WN688N
<b>Brand</b>	N/A
<b>Model Discrepancy</b>	All models are identical to each other except for market designation for marketing purpose.
<b>Serial Number</b>	C130702Z02-RP1
<b>Received Date</b>	July 2, 2013
<b>Power Supply</b>	DC5V powered by the Notebook
<b>Transmit Power</b>	IEEE 802.11b mode: 18.40dBm IEEE 802.11g mode: 24.30dBm IEEE 802.11n HT20 MHz mode: 24.30dBm IEEE 802.11n HT40 MHz mode: 24.10dBm
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS(DQPSK, DBPSK, DSSS,CCK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM/OFDM) IEEE 802.11n HT20 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT40 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM)
<b>Transmit Data Rate</b>	IEEE 802.11b: 11Mbps(CCK) with fall back rates of 11/ 5.5/2/1Mbps IEEE 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9 /6Mbps IEEE 802.11n HT20: up to 150Mbps (downlink) and 150Mbps (uplink) IEEE 802.11n HT40: up to 150Mbps (downlink) and 150Mbps (uplink)
<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>	Dipole Antenna with 3.0dBi gain (Max)
<b>Channels Spacing</b>	IEEE 802.11b/g ,802.11n HT20/HT40 : 5MHz
<b>Temperature Range</b>	0°C ~ +40°C

**Note:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: NZ3WS-WN687N filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



## 4 TEST METHODOLOGY

### 4.1. 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.

Test Item	Test mode	Worse mode
Conducted Emission	<b>Mode 1:</b> Normal Link	<b>Mode 1</b>
Radiated Emission	<b>Mode 1:</b> Normal Link	<b>Mode 1</b>

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.

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.



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1	NOTEBOOK	B745	WE04591721	N/A	Lenovo	Unshielded 1.20m	N/A

**Note:**

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST

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





## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at **No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

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

<b>USA</b>	<b>A2LA</b>
<b>China</b>	<b>CNAS</b>

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(C-3478, R-3135, T-652, G-624)</b>
<b>Canada</b>	<b>INDUSTRY CANADA</b>
<b>Taiwan</b>	<b>BSMI</b>
<b>Norway</b>	<b>Nemko</b>

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

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Conducted Emissions		9kHz~30MHz	+/-3.6836dB
Radiated Emission (10m)	Test Site: 10m Chamber (Vertical)	30 MHz ~200 MHz	+/-3.6814dB
		200 MHz ~1000 MHz	+/-3.7023dB
	Test Site: 10m Chamber (Horizontal)	30 MHz ~200 MHz	+/-3.6916dB
		200 MHz ~1000 MHz	+/-3.7107dB
	Test Site: 966(2)	30 MHz ~200 MHz	+/-3.6880dB
		200 MHz ~1000 MHz	+/-3.6695dB
		1GHz ~8GHz	+/-5.1782dB
		8GHz~18GHz	+/-5.2173dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



## 7 FCC PART 15.247 REQUIREMENTS

### 7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

#### 7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

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

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 7.1.2. TEST INSTRUMENTS

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
ESCI EMI TEST RECEIVER.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	09/20/2012	09/20/2013
LISN	EMCO	3825/2	8901-1459	03/09/2013	03/08/2014
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	03/04/2013	03/03/2014
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R = No Calibration Request.

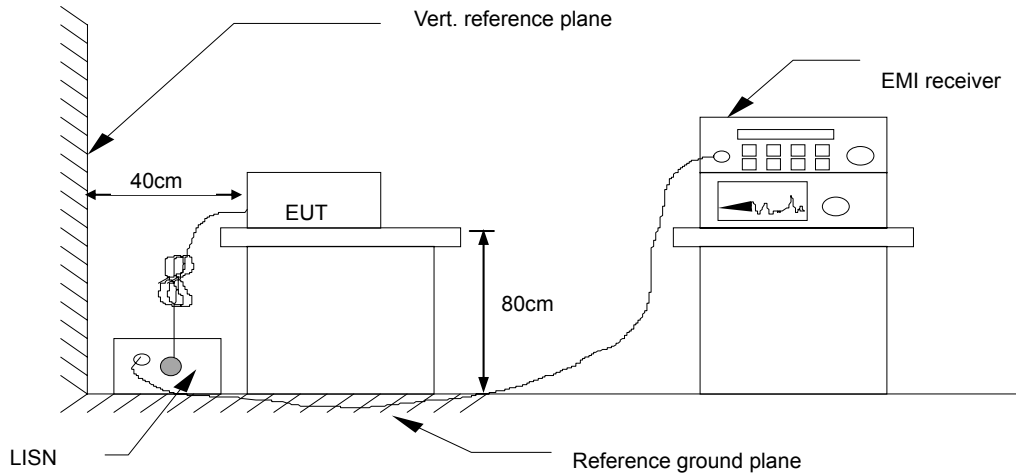


## 7.1.3. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT received DC5V from the Notebook and the Notebook installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.



7.1.4. TEST SETUP



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

7.1.5. DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

- Factor = Insertion loss of LISN + Cable Loss
- Result = Quasi-peak Reading/ Average Reading + Factor
- Limit = Limit stated in standard
- Margin = Result (dBuV) – Limit (dBuV)



7.1.6. TEST RESULTS

<b>Model No.</b>	WS-WN687N1	<b>RBW,VBW</b>	9 kHz
<b>Environmental Conditions</b>	26°C, 60% RH	<b>Test Mode</b>	Mode 1
<b>Tested by</b>	Sun Guo	<b>Line</b>	L1

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)	Line (L1/L2)
0.1500	40.72	17.90	9.58	50.30	27.48	65.99	56.00	-15.69	-28.52	Pass	L1
0.6980	25.71	13.18	9.79	35.50	22.97	56.00	46.00	-20.50	-23.03	Pass	L1
2.1340	30.04	15.43	9.73	39.77	25.16	56.00	46.00	-16.23	-20.84	Pass	L1
5.6860	24.15	10.66	9.71	33.86	20.37	60.00	50.00	-26.14	-29.63	Pass	L1
16.0900	31.15	18.96	9.89	41.04	28.85	60.00	50.00	-18.96	-21.15	Pass	L1
27.9420	28.51	21.39	9.96	38.47	31.35	60.00	50.00	-21.53	-18.65	Pass	L1
0.1500	38.52	20.35	9.78	48.30	30.13	65.99	56.00	-17.69	-25.87	Pass	L2
0.7019	25.87	14.17	9.69	35.56	23.86	56.00	46.00	-20.44	-22.14	Pass	L2
1.8900	29.28	16.38	9.74	39.02	26.12	56.00	46.00	-16.98	-19.88	Pass	L2
5.8340	24.35	9.59	9.78	34.13	19.37	60.00	50.00	-25.87	-30.63	Pass	L2
15.7020	30.74	16.65	9.71	40.45	26.36	60.00	50.00	-19.55	-23.64	Pass	L2
21.5220	28.66	13.86	9.75	38.41	23.61	60.00	50.00	-21.59	-26.39	Pass	L2

REMARKS: L1 = Line One (Live Line)

L2 = Line Two (Neutral Line)



## 7.2. SPURIOUS EMISSIONS MEASUREMENT

### 7.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

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)).

### 7.2.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

### 7.2.3. TEST PROCEDURE (please refer to measurement standard)

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 300 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

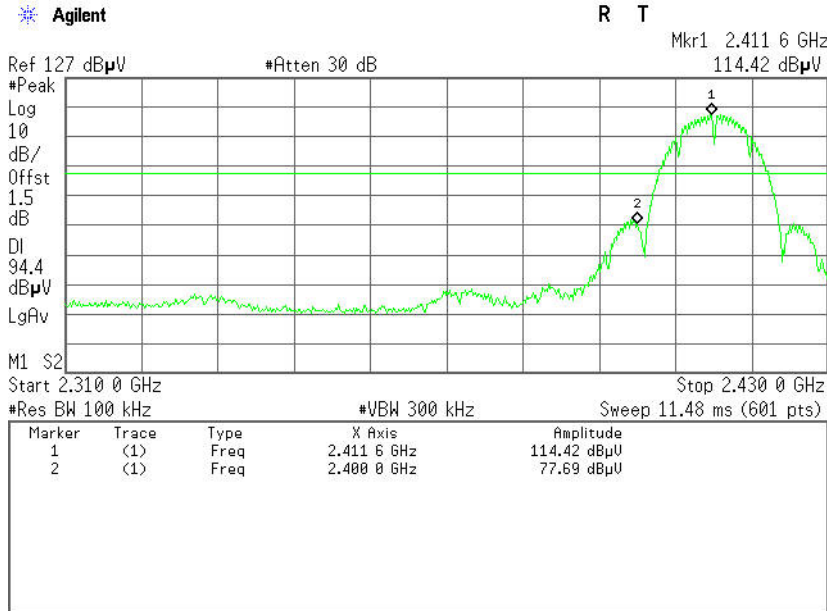


7.2.4. TEST RESULTS

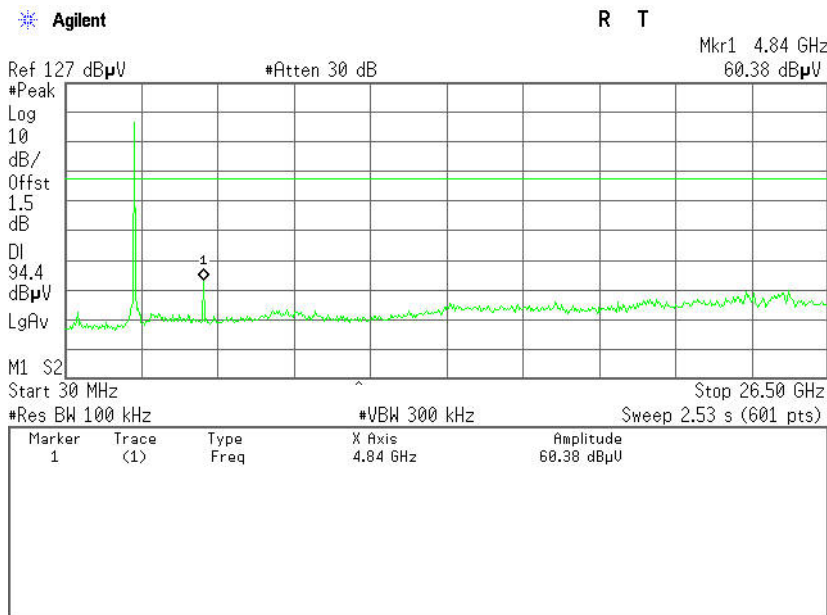
Test Plot

IEEE 802.11b mode

CH Low (2.31GHz ~2.43GHz)

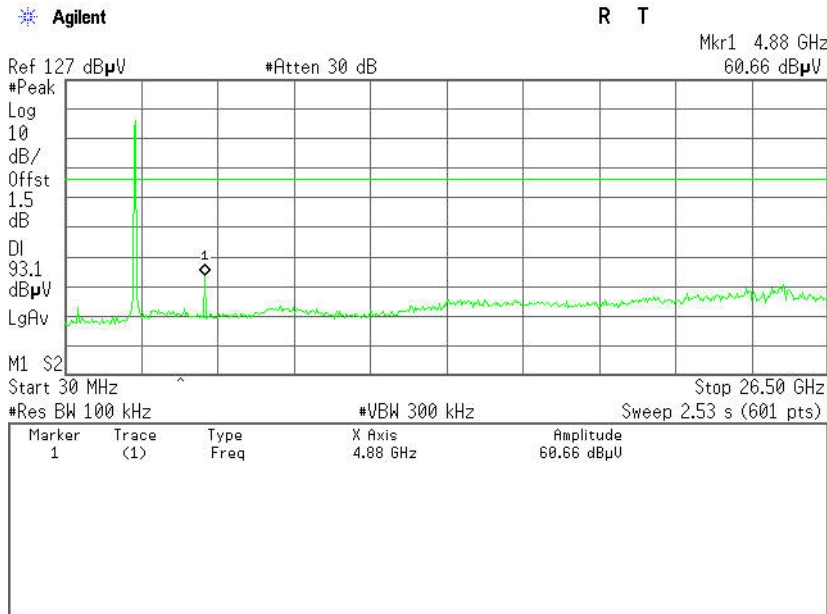


CH Low (30MHz ~26.5GHz)

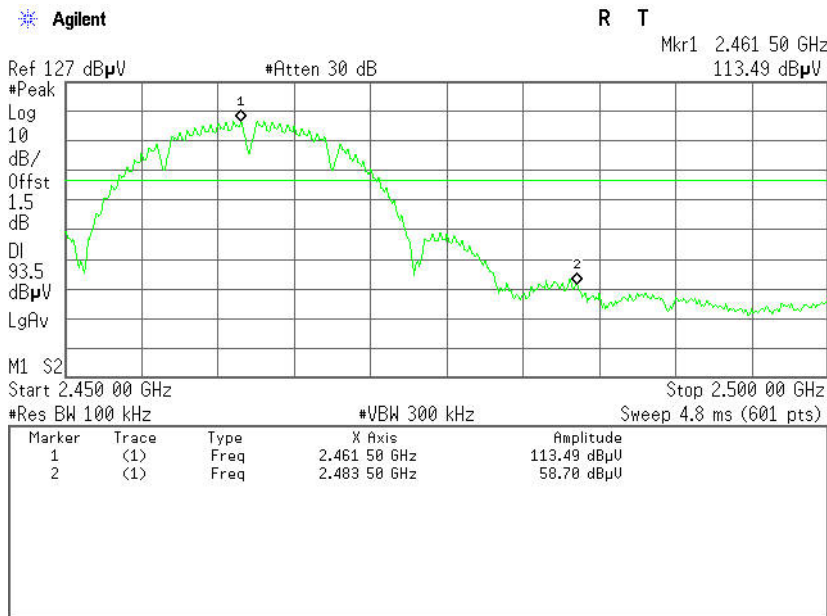




### CH Mid (30MHz ~26.5GHz)



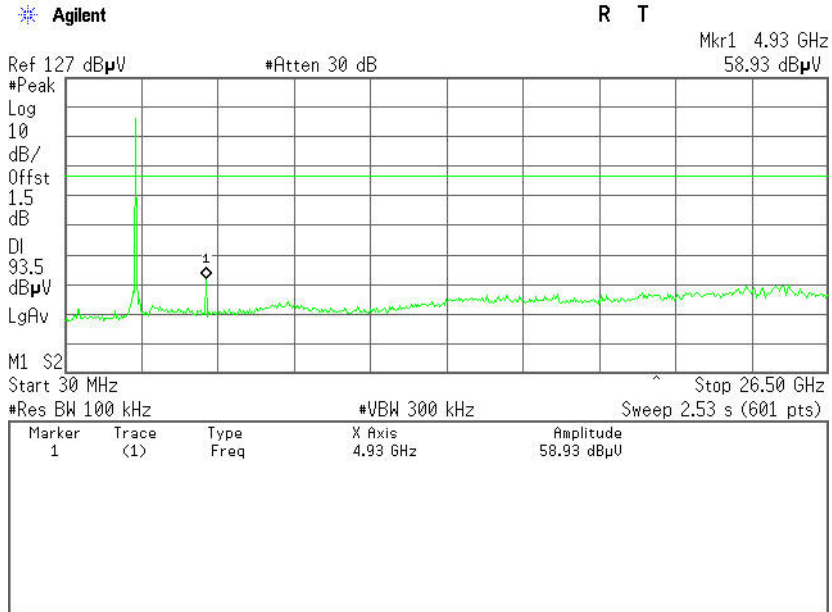
### CH High (2.45GHz ~2.5GHz)







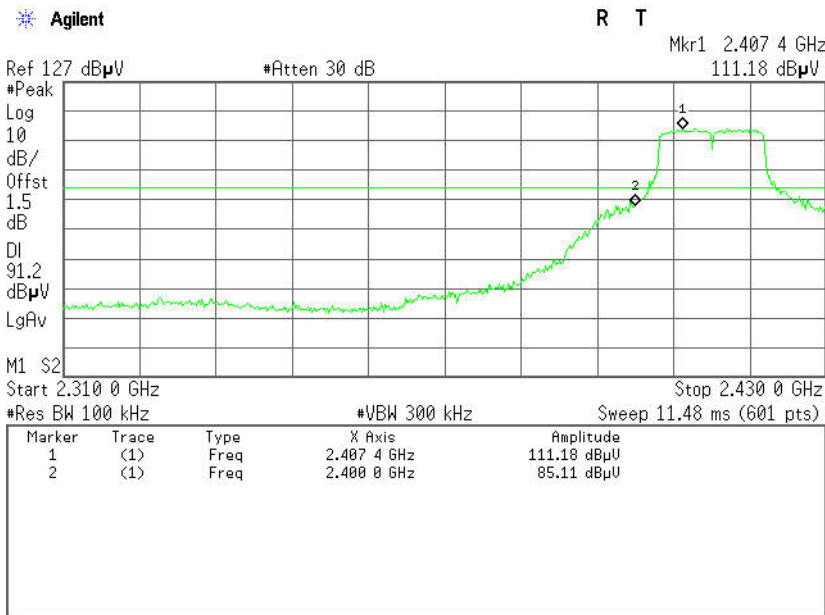
CH High (30MHz ~26.5GHz)



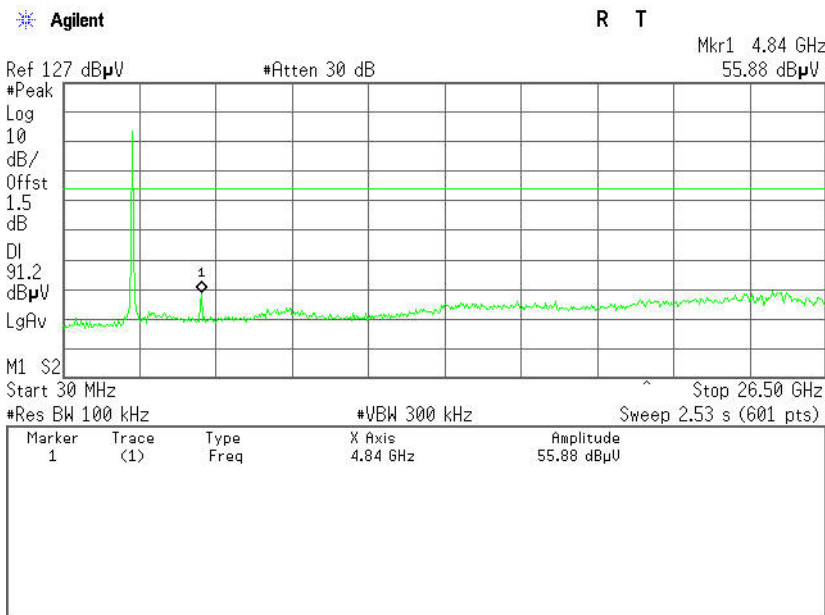


IEEE 802.11g mode

CH Low (2.31GHz ~2.43GHz)

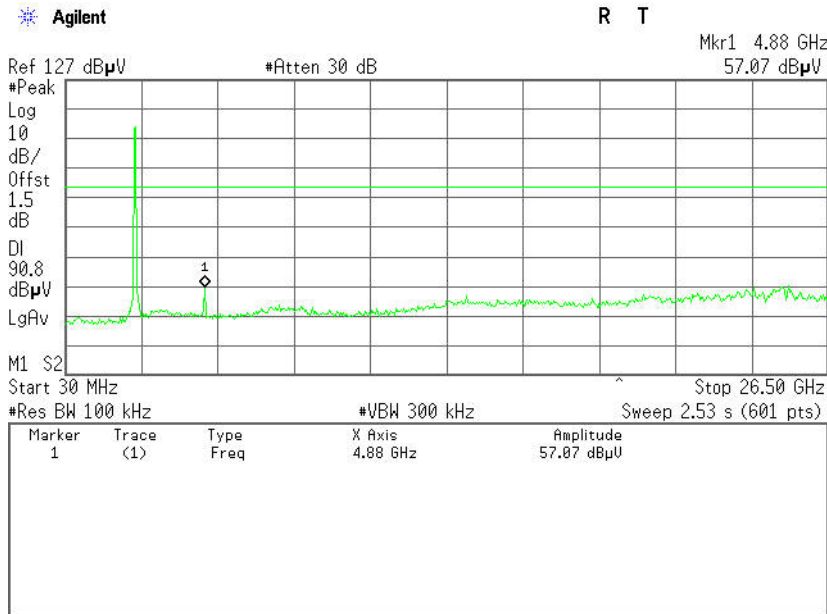


CH Low (30MHz ~26.5GHz)

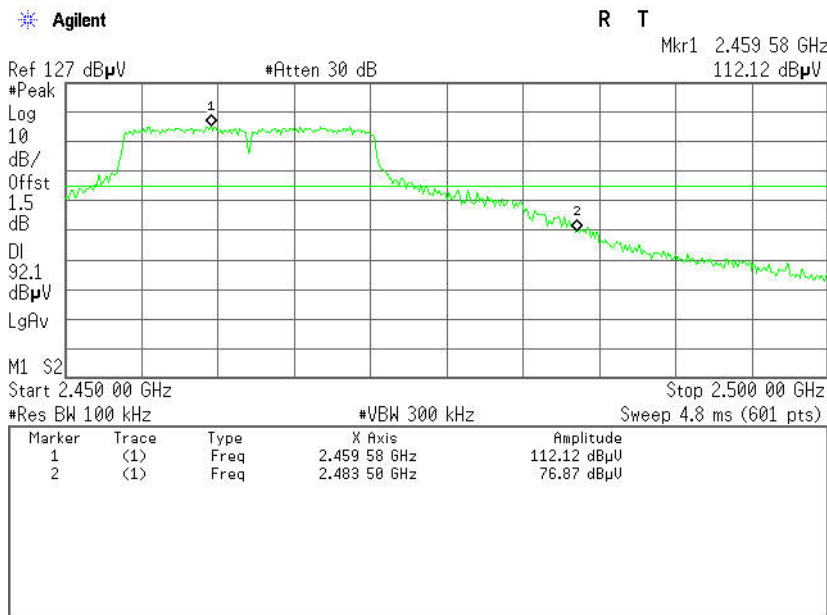




CH Mid (30MHz ~26.5GHz)

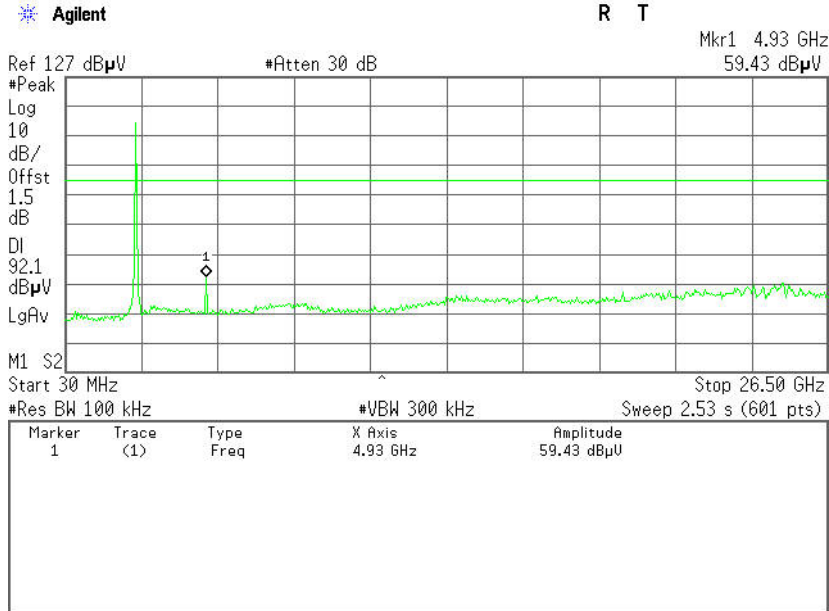


CH High (2.45GHz ~2.5GHz)





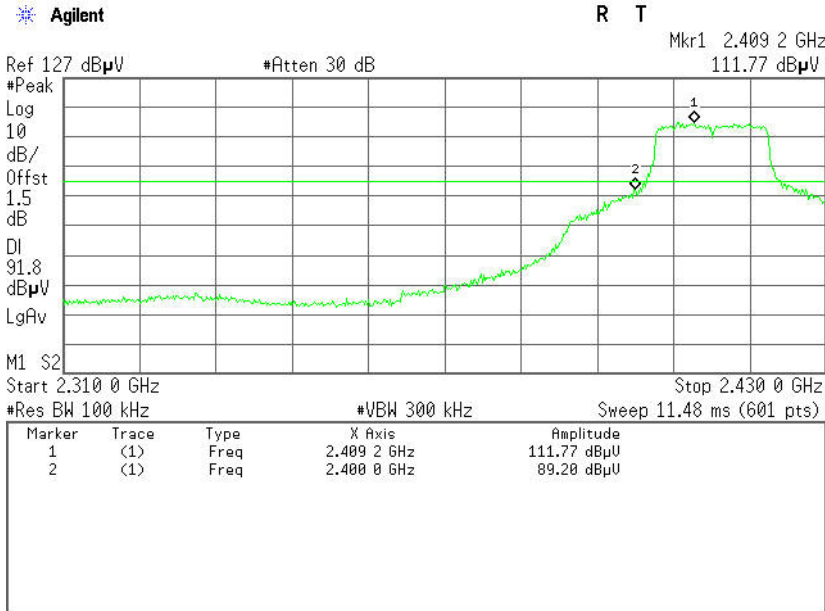
### CH High (30MHz ~26.5GHz)



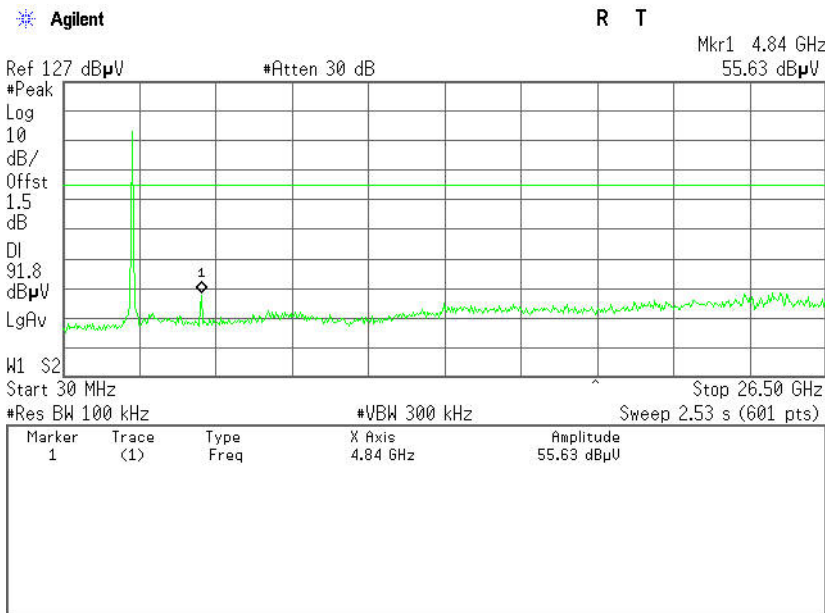


**IEEE 802.11n HT20 MHz mode**

**CH Low (2.31GHz ~2.43GHz)**

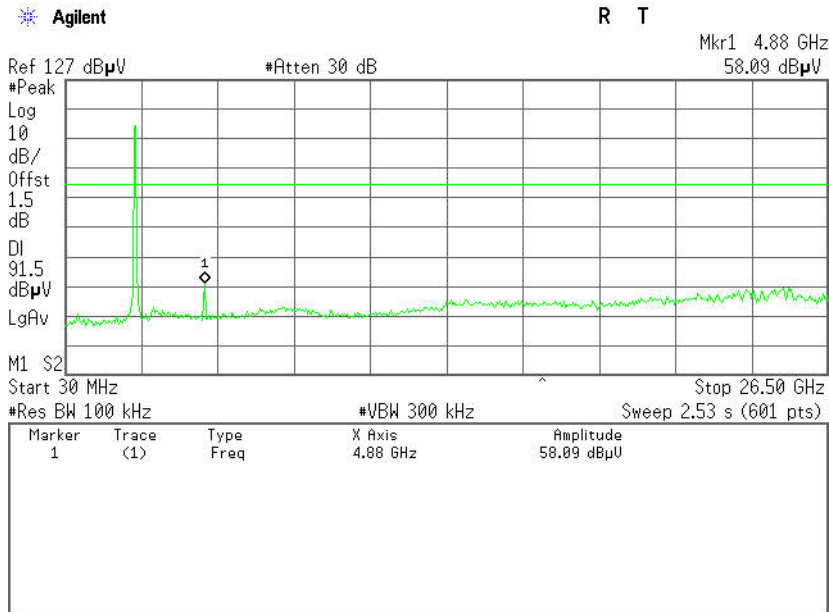


**CH Low (30MHz ~26.5GHz)**

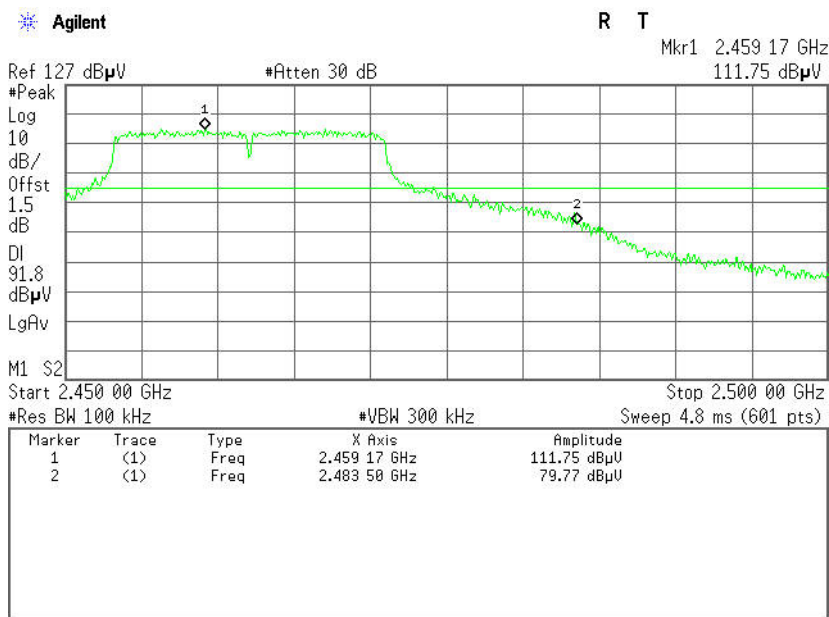




CH Mid (30MHz ~26.5GHz)

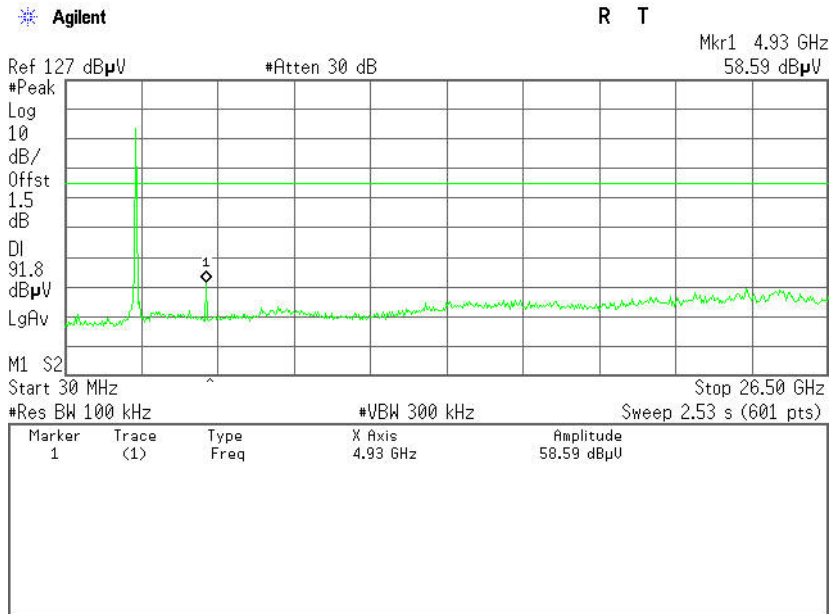


CH High (2.45GHz ~2.5GHz)





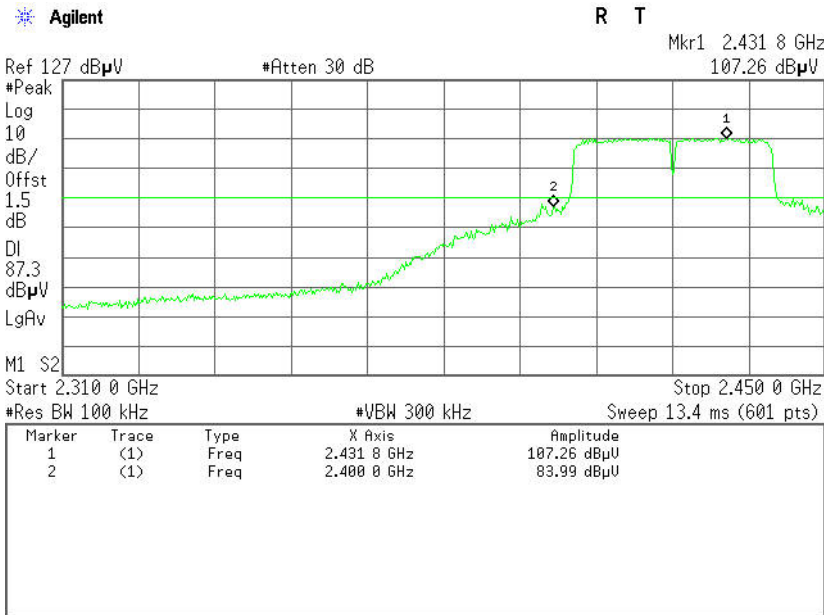
CH High (30MHz ~26.5GHz)



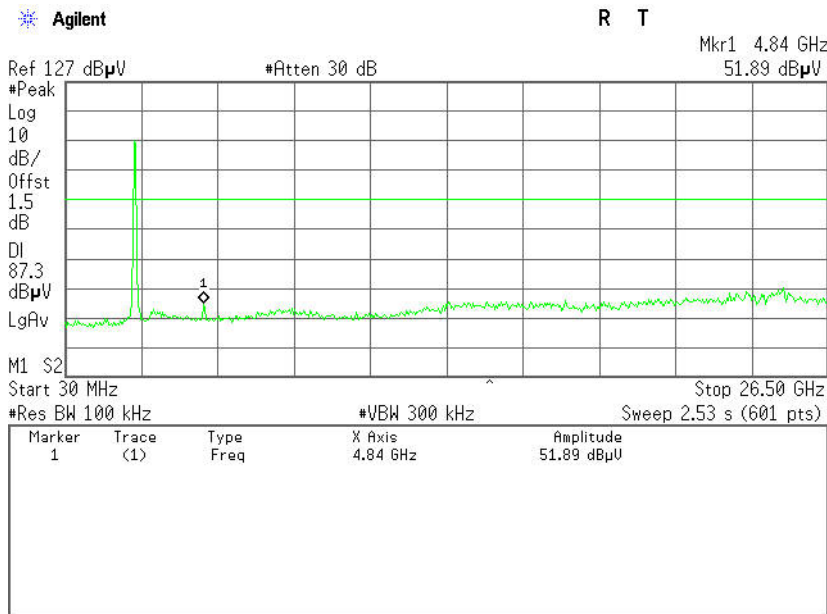


IEEE 802.11n HT40 MHz mode

CH Low (2.31GHz ~2.45GHz)



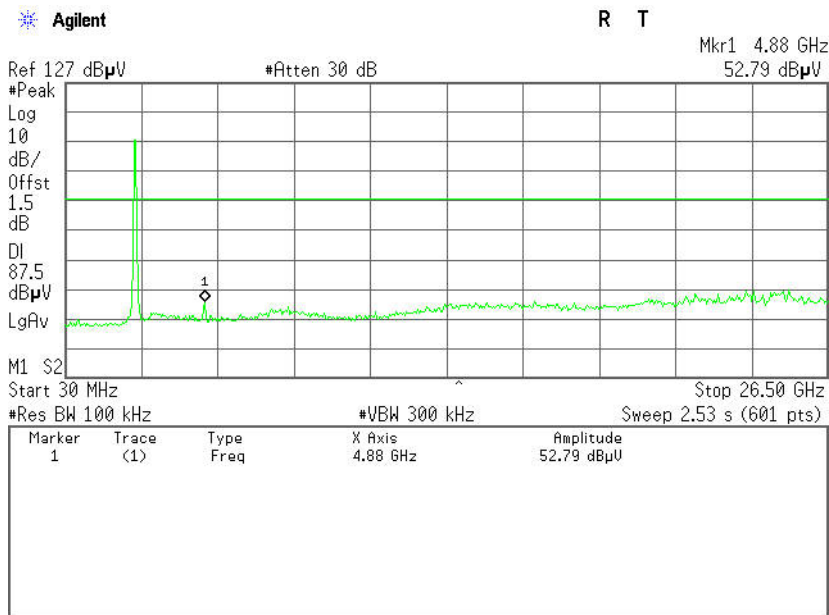
CH Low (30MHz ~26.5GHz)



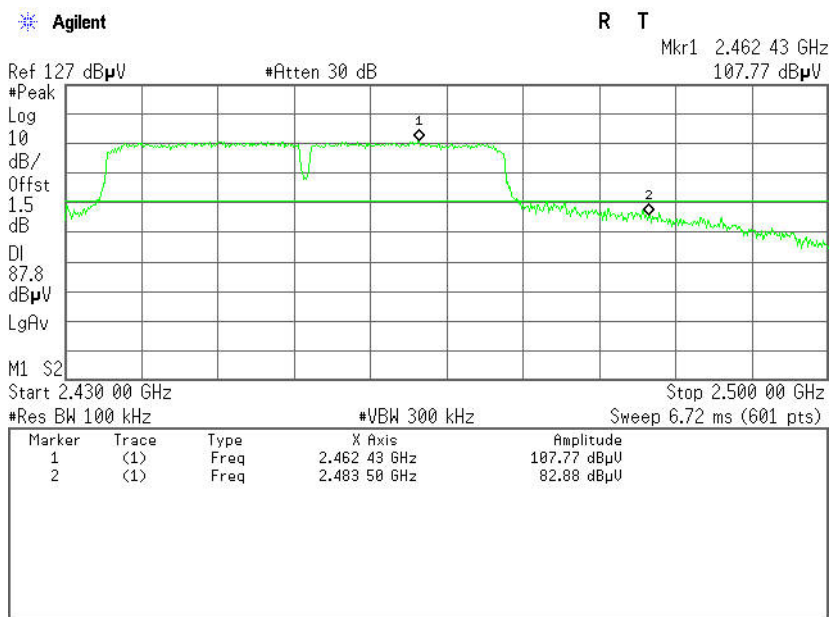




### CH Mid (30MHz ~26.5GHz)

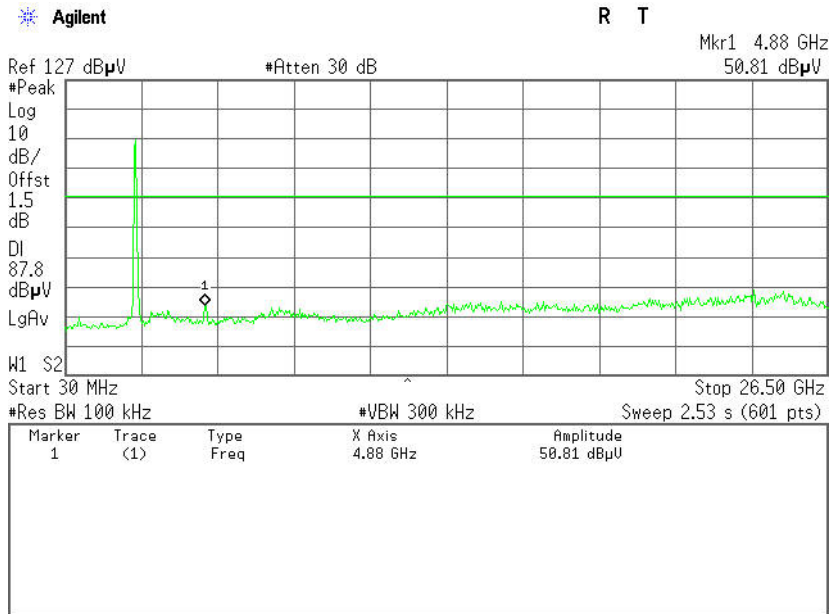


### CH High (2.43GHz ~2.5GHz)





CH High (30MHz ~26.5GHz)





7.2.4.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

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

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

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

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

Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

NOTE:(1) The lower limit shall apply at the transition frequencies.  
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

**7.2.4.2. TEST INSTRUMENTS**

<b>Radiated Emission Test Site 966 (2)</b>					
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Last Calibration</b>	<b>Due Calibration</b>
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
ESCI EMI TEST RECEIVER.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2013	03/18/2014
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2013	03/18/2014
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	06/21/2012	06/21/2014
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/02/2013	03/01/2014
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/02/2013	03/01/2014
Loop Antenna	A、R、A	PLA-1030/B	1029	03/23/2013	03/23/2014
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	03/04/2013	03/03/2014
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The FCC Site Registration number is 101879.  
3. N.C.R = No Calibration Required.



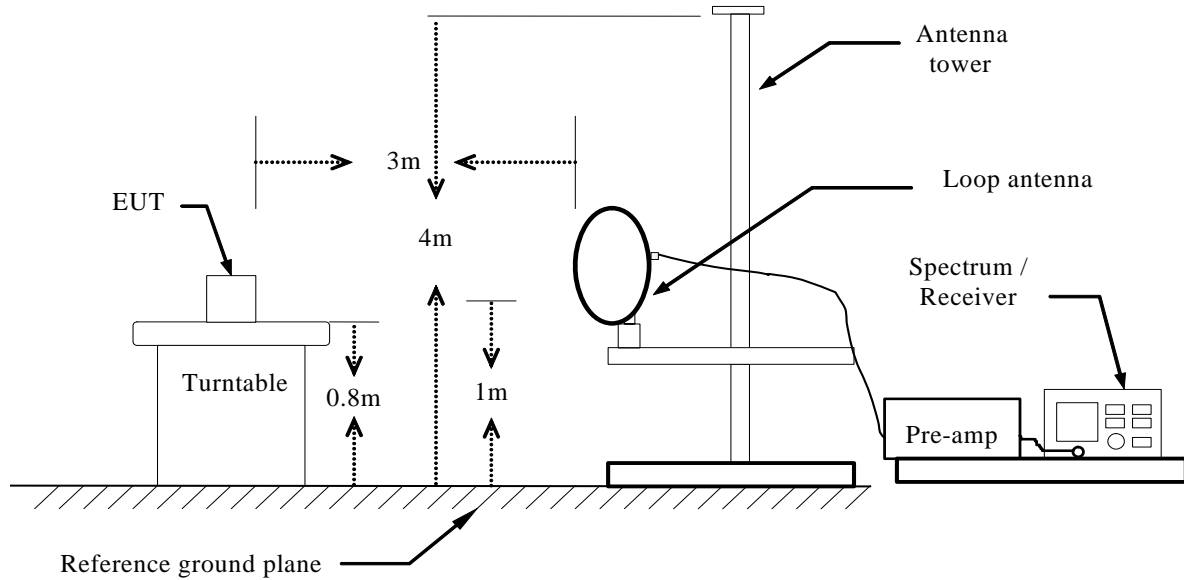
**7.2.4.3. TEST PROCEDURE** (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
  - Below 1GHz:
    - RBW=100kHz / VBW=300kHz / Sweep=AUTO
  - Above 1GHz:
    - (a) PEAK: RBW=1MHz,VBW=3MHz / Sweep=AUTO
    - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

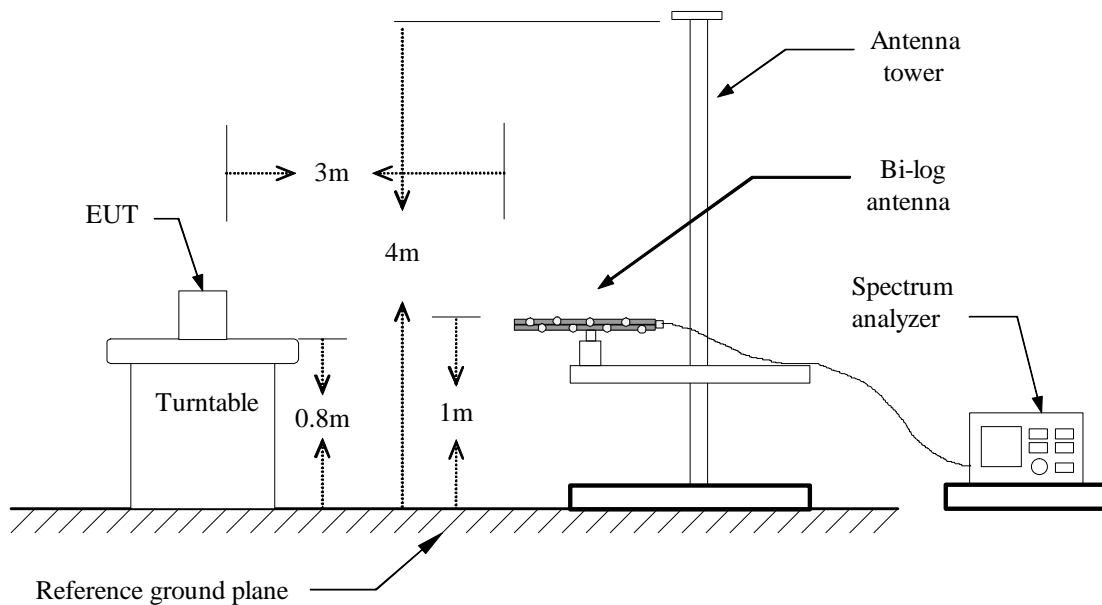


7.2.4.4. TEST SETUP

Below 30MHz

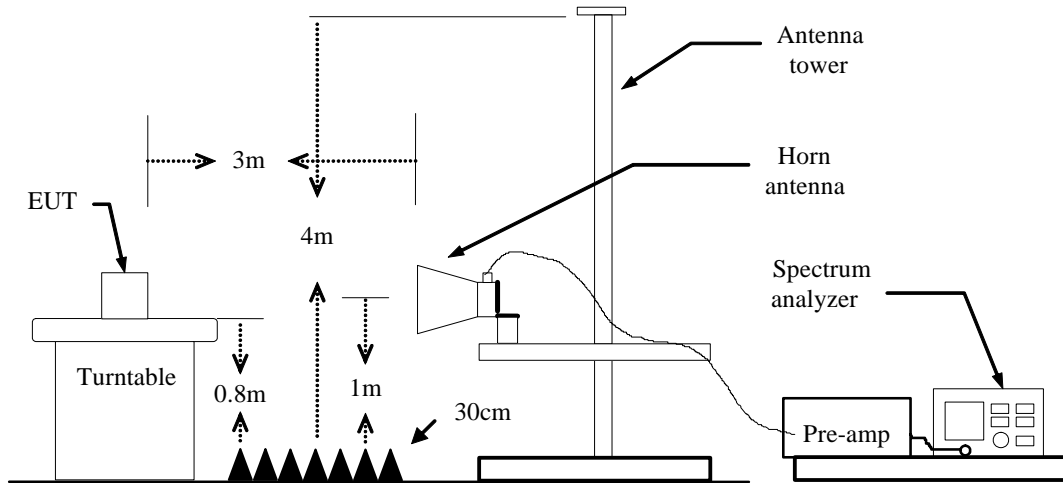


Below 1 GHz





**Above 1 GHz**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



7.2.4.5. DATA SAPLE

Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	36.37	-12.20	24.17	40.00	-15.83	V	QP

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading  
 Correct Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain  
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)  
 Limit (dBuV/m) = Limit stated in standard  
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)  
 Q.P. = Quasi-peak Reading

Above 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	62.09	-11.42	50.67	74.00	-23.33	V	Peak
XXXX.XXXX	49.78	-11.42	38.36	54.00	-15.64	V	AVG

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading  
 Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain  
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)  
 Limit (dBuV/m) = Limit stated in standard  
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)  
 Peak = Peak Reading  
 AVG = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV/m) – Limits (dBuV/m)  
 Result (dBuV/m) = Reading (dBuV) + Correction Factor





7.2.4.6. TEST RESULTS

Below 1 GHz

Test Mode: TX

Test Date: July 13, 2013

Temperature: 24°C

Tested by: Suo Guo

Humidity: 52% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
222.3831	52.35	-18.02	34.33	46.00	-11.67	V	QP
366.2667	48.74	-16.71	32.03	46.00	-13.97	V	QP
455.1831	48.80	-15.21	33.59	46.00	-12.41	V	QP
503.6831	46.65	-14.26	32.39	46.00	-13.61	V	QP
599.0665	45.76	-12.94	32.82	46.00	-13.18	V	QP
666.9664	44.13	-11.37	32.76	46.00	-13.24	V	QP
112.4500	56.50	-20.83	35.67	43.50	-7.83	H	QP
206.2167	54.00	-18.32	35.68	43.50	-7.82	H	QP
256.3333	54.69	-17.84	36.85	46.00	-9.15	H	QP
335.5500	52.57	-17.51	35.06	46.00	-10.94	H	QP
455.1831	52.22	-15.21	37.01	46.00	-8.99	H	QP
663.7332	43.12	-11.69	31.43	46.00	-14.57	H	QP

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

Notes:

1. Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using 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 Receiver between 30MHz to 1GHz was 120kHz.
4. Frequency (MHz). = Emission frequency in MHz  
Reading (dBuV/m) = Receiver reading  
Correction Factor (dB) = Antenna factor + Cable loss – Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Measured (dBuV/m) – Limits (dBuV/m)  
Antenna Pol e(H/V) = Current carrying line of reading



**Above 1 GHz**

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

**Test Date:** July 13, 2013

**Temperature:** 24°C

**Tested by:** Sun Guo

**Humidity:** 52% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	52.91	-8.55	44.36	74.00	-29.64	V	peak
1465.0000	53.35	-8.11	45.24	74.00	-28.76	V	peak
1570.0000	51.91	-8.55	43.36	74.00	-30.64	V	peak
3685.0000	45.65	-2.79	42.86	74.00	-31.14	V	peak
4825.0000	48.86	0.52	49.38	74.00	-24.62	V	peak
5350.0000	45.82	1.53	47.35	74.00	-26.65	V	peak
1270.0000	51.00	-8.42	42.58	74.00	-31.42	H	Peak
1495.0000	51.21	-8.23	42.98	74.00	-31.02	H	Peak
2995.0000	47.30	-4.26	43.04	74.00	-30.96	H	Peak
3760.0000	45.70	-2.59	43.11	74.00	-30.89	H	Peak
4285.0000	46.25	-1.26	44.99	74.00	-29.01	H	Peak
4825.0000	49.60	0.52	50.12	74.00	-23.88	H	Peak

**REMARKS:**

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



Operation Mode: TX / IEEE 802.11b/ CH Mid

Test Date: July 13, 2013

Temperature: 24°C

Tested by: Sun Guo

Humidity: 52% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	53.78	-8.55	45.23	74.00	-28.77	V	Peak
1465.0000	56.54	-8.11	48.43	74.00	-25.57	V	Peak
1570.0000	52.12	-8.55	43.57	74.00	-30.43	V	Peak
4195.0000	45.43	-1.60	43.83	74.00	-30.17	V	Peak
4870.0000	48.23	0.73	48.96	74.00	-25.04	V	Peak
6250.0000	45.72	3.83	49.55	74.00	-24.45	V	Peak
1240.0000	53.78	-8.55	45.23	74.00	-28.77	V	Peak
1435.0000	50.18	-7.98	42.20	74.00	-31.80	H	Peak
3385.0000	46.44	-4.01	42.43	74.00	-31.57	H	Peak
3640.0000	46.77	-2.91	43.86	74.00	-30.14	H	Peak
4300.0000	46.07	-1.20	44.87	74.00	-29.13	H	Peak
4870.0000	47.88	0.73	48.61	74.00	-25.39	H	Peak
6325.0000	45.54	4.05	49.59	74.00	-24.41	H	Peak

REMARKS:

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



Operation Mode: TX / IEEE 802.11b / CH High

Test Date: July 13, 2013

Temperature: 24°C

Tested by: Sun Guo

Humidity: 52% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	55.41	-8.55	46.86	74.00	-27.14	V	Peak
1465.0000	53.75	-8.11	45.64	74.00	-28.36	V	Peak
1570.0000	51.37	-8.55	42.82	74.00	-31.18	V	Peak
1915.0000	52.81	-10.51	42.30	74.00	-31.70	V	Peak
3910.0000	47.12	-2.51	44.61	74.00	-29.39	V	Peak
4930.0000	48.73	1.00	49.73	74.00	-24.27	V	Peak
1345.0000	48.22	-8.08	40.14	74.00	-33.86	H	Peak
3580.0000	46.50	-3.11	43.39	74.00	-30.61	H	Peak
4450.0000	45.23	-0.73	44.50	74.00	-29.50	H	Peak
4930.0000	47.79	1.00	48.79	74.00	-25.21	H	Peak
5995.0000	44.01	3.08	47.09	74.00	-26.91	H	Peak
6865.0000	44.51	5.72	50.23	74.00	-23.77	H	Peak

REMARKS:

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



Operation Mode: TX / IEEE 802.11g / CH Low
Temperature: 24°C
Humidity: 52% RH

Test Date: July 13, 2013
Tested by: Sun Guo
Polarity: Ver. / Hor.

Table with 8 columns: Frequency (MHz), Reading (dBuV), Correction Factor (dB/m), Result (dBuV/m), Limit (dBuV/m), Margin (dB), Antenna Pole (V/H), Remark. It contains 16 rows of measurement data.

REMARKS:

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



Operation Mode: TX / IEEE 802.11g / CH Mid

Test Date: July 13, 2013

Temperature: 24°C

Tested by: Sun Guo

Humidity: 52 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	52.52	-8.55	43.97	74.00	-30.03	V	Peak
1465.0000	54.89	-8.11	46.78	74.00	-27.22	V	Peak
3880.0000	45.62	-2.51	43.11	74.00	-30.89	V	Peak
4855.0000	46.66	0.66	47.32	74.00	-26.68	V	Peak
5125.0000	45.15	1.46	46.61	74.00	-27.39	V	Peak
5830.0000	44.84	2.83	47.67	74.00	-26.33	V	Peak
1330.0000	48.18	-8.14	40.04	74.00	-33.96	H	Peak
2845.0000	47.95	-4.86	43.09	74.00	-30.91	H	Peak
4270.0000	45.89	-1.31	44.58	74.00	-29.42	H	Peak
4945.0000	46.44	1.07	47.51	74.00	-26.49	H	Peak
5755.0000	44.61	2.59	47.20	74.00	-26.80	H	Peak
6430.0000	44.47	4.34	48.81	74.00	-25.19	H	Peak

**REMARKS:**

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



Operation Mode: TX / IEEE 802.11g / CH High

Test Date: July 13, 2013

Temperature: 24°C

Tested by: Sun Guo

Humidity: 52 % RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	50.37	-8.55	41.82	74.00	-32.18	V	Peak
1465.0000	55.18	-8.11	47.07	74.00	-26.93	V	Peak
1570.0000	52.48	-8.55	43.93	74.00	-30.07	V	Peak
3340.0000	46.75	-4.03	42.72	74.00	-31.28	V	Peak
4915.0000	45.77	0.93	46.70	74.00	-27.30	V	Peak
6250.0000	45.46	3.83	49.29	74.00	-24.71	V	Peak
1225.0000	51.66	-8.62	43.04	74.00	-30.96	H	Peak
2875.0000	47.71	-4.74	42.97	74.00	-31.03	H	Peak
3310.0000	47.16	-4.04	43.12	74.00	-30.88	H	Peak
4240.0000	47.04	-1.43	45.61	74.00	-28.39	H	Peak
4930.0000	47.01	1.00	48.01	74.00	-25.99	H	Peak
6145.0000	45.00	3.52	48.52	74.00	-25.48	H	Peak

REMARKS:

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





**Operation Mode:** TX / IEEE 802.11n HT20 MHz/ CH Low **Test Date:** July 13, 2013  
**Temperature:** 24°C **Tested by:** Sun Guo  
**Humidity:** 52% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	53.05	-8.55	44.50	74.00	-29.50	V	Peak
1465.0000	54.66	-8.11	46.55	74.00	-27.45	V	Peak
3040.0000	47.28	-4.21	43.07	74.00	-30.93	V	Peak
3790.0000	45.93	-2.52	43.41	74.00	-30.59	V	Peak
4825.0000	48.99	0.52	49.51	74.00	-24.49	V	Peak
5860.0000	44.91	2.87	47.78	74.00	-26.22	V	Peak
1510.0000	48.31	-8.30	40.01	74.00	-33.99	H	Peak
3295.0000	46.90	-4.05	42.85	74.00	-31.15	H	Peak
4315.0000	45.15	-1.14	44.01	74.00	-29.99	H	Peak
4825.0000	51.31	0.52	51.83	74.00	-22.17	H	Peak
5815.0000	44.61	2.80	47.41	74.00	-26.59	H	Peak
6535.0000	45.03	4.64	49.67	74.00	-24.33	H	Peak

**REMARKS:**

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





**Operation Mode:** TX / IEEE 802.11n HT20 MHz/ CH Mid    **Test Date:** July 13, 2013  
**Temperature:** 24°C    **Tested by:** Sun Guo  
**Humidity:** 52% RH    **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	52.46	-8.55	43.91	74.00	-30.09	V	Peak
1465.0000	55.48	-8.11	47.37	74.00	-26.63	V	Peak
3235.0000	46.71	-4.07	42.64	74.00	-31.36	V	Peak
3760.0000	45.75	-2.59	43.16	74.00	-30.84	V	Peak
4870.0000	48.01	0.73	48.74	74.00	-25.26	V	Peak
6370.0000	44.48	4.18	48.66	74.00	-25.34	V	Peak
1300.0000	48.94	-8.28	40.66	74.00	-33.34	H	Peak
3460.0000	47.33	-3.70	43.63	74.00	-30.37	H	Peak
4405.0000	44.58	-0.81	43.77	74.00	-30.23	H	Peak
4870.0000	47.68	0.73	48.41	74.00	-25.59	H	Peak
5875.0000	44.86	2.90	47.76	74.00	-26.24	H	Peak
6760.0000	45.37	5.36	50.73	74.00	-23.27	H	Peak

**REMARKS:**

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



Operation Mode: TX / IEEE 802.11n HT20 MHz/ CH High Test Date: July 13, 2013

Temperature: 24°C

Tested by: Sun Guo

Humidity: 52% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	54.46	-8.55	45.91	74.00	-28.09	V	Peak
1465.0000	54.35	-8.11	46.24	74.00	-27.76	V	Peak
3265.0000	47.78	-4.06	43.72	74.00	-30.28	V	Peak
4420.0000	45.05	-0.78	44.27	74.00	-29.73	V	Peak
4930.0000	46.67	1.00	47.67	74.00	-26.33	V	Peak
5860.0000	44.83	2.87	47.70	74.00	-26.30	V	Peak
1270.0000	49.71	-8.42	41.29	74.00	-32.71	H	Peak
4135.0000	45.93	-1.89	44.04	74.00	-29.96	H	Peak
4780.0000	46.09	0.32	46.41	74.00	-27.59	H	Peak
4930.0000	45.45	1.00	46.45	74.00	-27.55	H	Peak
5860.0000	44.51	2.87	47.38	74.00	-26.62	H	Peak
7045.0000	45.06	6.58	51.64	74.00	-22.36	H	Peak

REMARKS:

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



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH Low **Test Date:** July 13, 2013

**Temperature:** 24°C

**Tested by:** Sun Guo

**Humidity:** 52% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	55.57	-8.55	47.02	74.00	-26.98	V	Peak
1465.0000	55.63	-8.11	47.52	74.00	-26.48	V	Peak
3775.0000	46.46	-2.55	43.91	74.00	-30.09	V	Peak
4405.0000	44.70	-0.81	43.89	74.00	-30.11	V	Peak
4825.0000	45.35	0.52	45.87	74.00	-28.13	V	Peak
5995.0000	44.66	3.08	47.74	74.00	-26.26	V	Peak
1330.0000	50.64	-8.14	42.50	74.00	-31.50	H	Peak
3670.0000	45.94	-2.83	43.11	74.00	-30.89	H	Peak
4420.0000	45.33	-0.78	44.55	74.00	-29.45	H	Peak
4855.0000	45.57	0.66	46.23	74.00	-27.77	H	Peak
5755.0000	44.78	2.59	47.37	74.00	-26.63	H	Peak
6550.0000	44.74	4.68	49.42	74.00	-24.58	H	Peak

**REMARKS:**

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



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH Mid    **Test Date:** July 13, 2013  
**Temperature:** 24°C    **Tested by:** Sun Guo  
**Humidity:** 52% RH    **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	54.00	-8.55	45.45	74.00	-28.55	V	Peak
1465.0000	53.41	-8.11	45.30	74.00	-28.70	V	Peak
3235.0000	47.21	-4.07	43.14	74.00	-30.86	V	Peak
3925.0000	46.39	-2.51	43.88	74.00	-30.12	V	Peak
5440.0000	45.84	1.60	47.44	74.00	-26.56	V	Peak
5890.0000	45.37	2.92	48.29	74.00	-25.71	V	Peak
1435.0000	47.96	-7.98	39.98	74.00	-34.02	H	Peak
3235.0000	48.59	-4.07	44.52	74.00	-29.48	H	Peak
4315.0000	45.03	-1.14	43.89	74.00	-30.11	H	Peak
4795.0000	45.00	0.39	45.39	74.00	-28.61	H	Peak
5230.0000	45.64	1.55	47.19	74.00	-26.81	H	Peak
6535.0000	44.80	4.64	49.44	74.00	-24.56	H	Peak

**REMARKS:**

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



Operation Mode: TX / IEEE 802.11n HT40 MHz / CH High Test Date: July 13, 2013  
 Temperature: 24°C Tested by: Sun Guo  
 Humidity: 52% RH Polarity: Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1240.0000	53.61	-8.55	45.06	74.00	-28.94	V	Peak
1465.0000	55.94	-8.11	47.83	74.00	-26.17	V	Peak
3715.0000	45.22	-2.71	42.51	74.00	-31.49	V	Peak
4285.0000	45.11	-1.26	43.85	74.00	-30.15	V	Peak
4960.0000	45.34	1.14	46.48	74.00	-27.52	V	Peak
6145.0000	45.68	3.52	49.20	74.00	-24.80	V	Peak
1300.0000	49.11	-8.28	40.83	74.00	-33.17	H	Peak
3205.0000	47.93	-4.09	43.84	74.00	-30.16	H	Peak
4435.0000	44.95	-0.76	44.19	74.00	-29.81	H	Peak
4900.0000	45.82	0.86	46.68	74.00	-27.32	H	Peak
5110.0000	45.26	1.45	46.71	74.00	-27.29	H	Peak
6895.0000	44.87	5.82	50.69	74.00	-23.31	H	Peak

REMARKS:

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



### 7.3. 6dB BANDWIDTH MEASUREMENT

#### 7.3.1. LIMITS

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

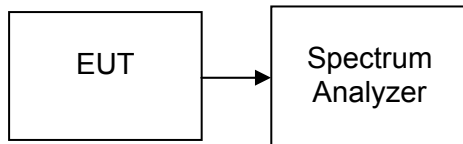
#### 7.3.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

#### 7.3.3. TEST PROCEDURES (please refer to measurement standard)

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 = 1-5 % of the emission bandwidth (EBW), VBW =  $\geq 3 \times$  RBW, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

#### 7.3.4. TEST SETUP





7.3.5. TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	10120	>500	PASS
Mid	2437	10088		PASS
High	2462	10120		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16544	>500	PASS
Mid	2437	16566		PASS
High	2462	16568		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	17763	>500	PASS
Mid	2437	17800		PASS
High	2462	16568		PASS

Test mode: IEEE 802.11n HT40 MHz

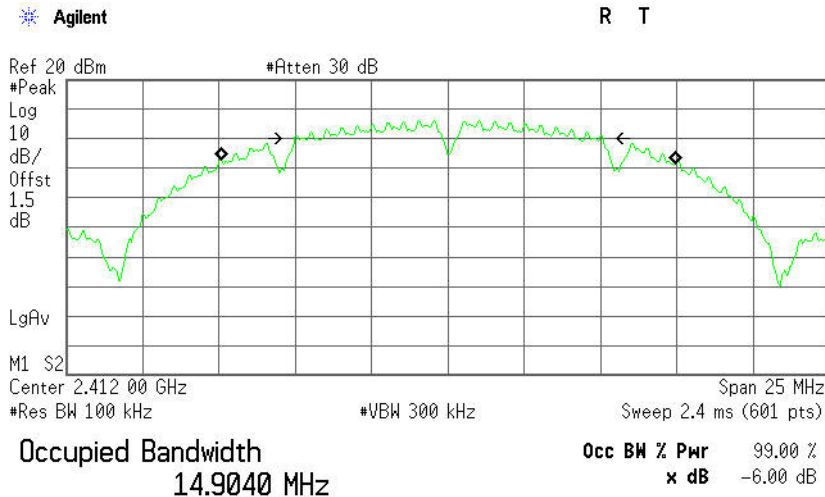
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	36477	>500	PASS
Mid	2437	36493		PASS
High	2452	36487		PASS



Test Plot

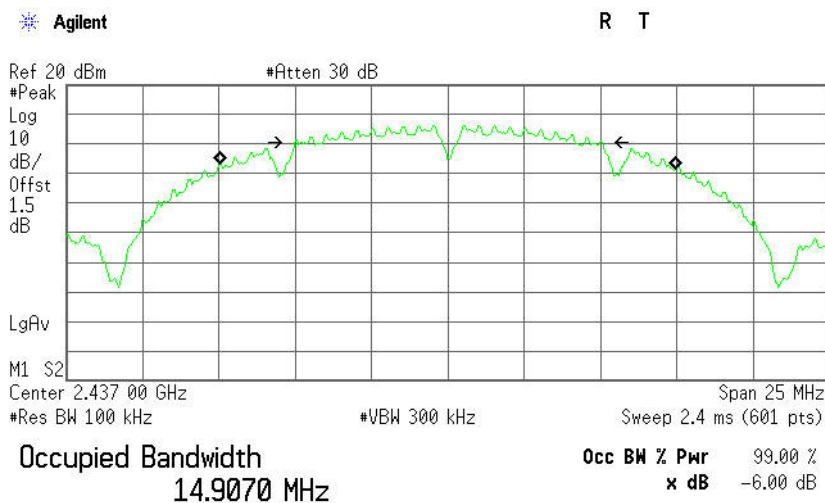
IEEE 802.11b mode

6dB Bandwidth (CH Low)



Transmit Freq Error 18.536 kHz  
x dB Bandwidth 10.120 MHz

6dB Bandwidth (CH Mid)



Transmit Freq Error -5.420 kHz  
x dB Bandwidth 10.088 MHz

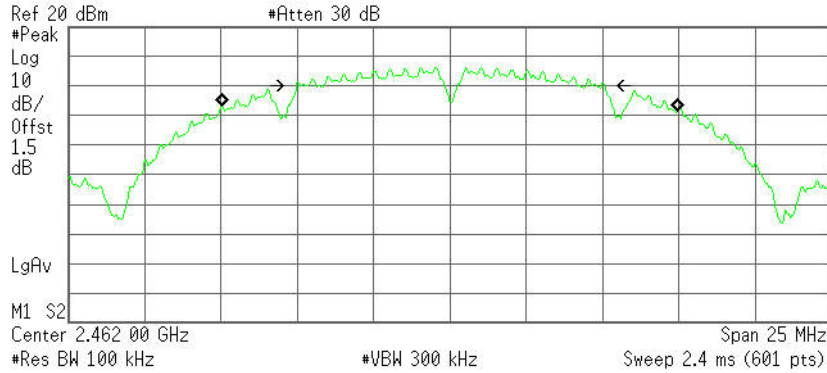




### 6dB Bandwidth (CH High)

Agilent

R T



Occupied Bandwidth  
14.9110 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

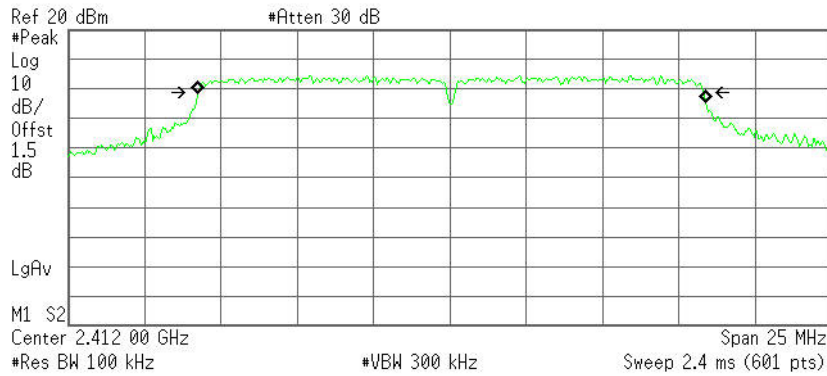
Transmit Freq Error 7.515 kHz  
x dB Bandwidth 10.120 MHz

### IEEE 802.11g mode

### 6dB Bandwidth (CH Low)

Agilent

R T



Occupied Bandwidth  
16.6250 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

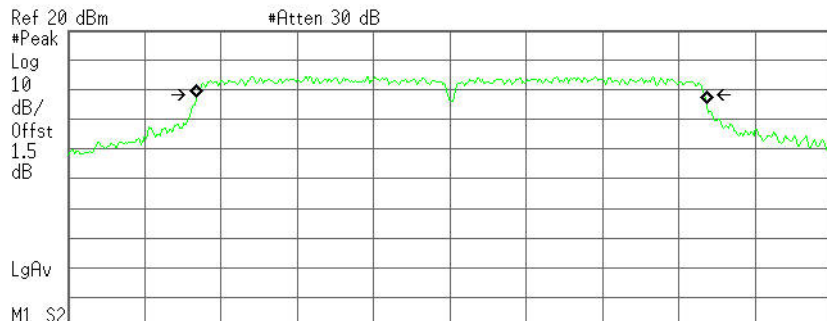
Transmit Freq Error 71.380 kHz  
x dB Bandwidth 16.544 MHz



### 6dB Bandwidth (CH Mid)

Agilent

R T



Ref 20 dBm #Atten 30 dB  
Center 2.437 00 GHz Span 25 MHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 2.4 ms (601 pts)

Occupied Bandwidth  
16.6775 MHz

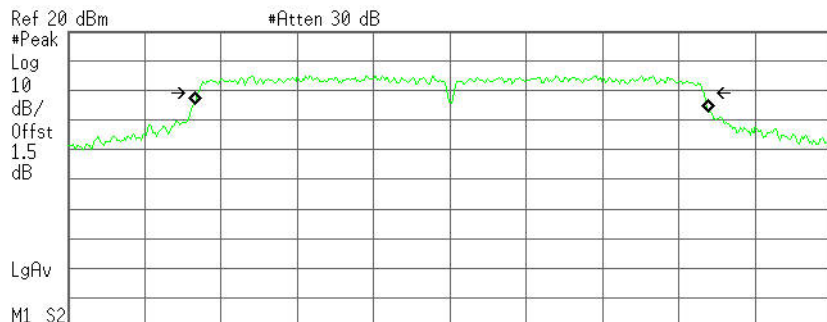
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 58.653 kHz  
x dB Bandwidth 16.566 MHz

### 6dB Bandwidth (CH High)

Agilent

R T



Ref 20 dBm #Atten 30 dB  
Center 2.462 00 GHz Span 25 MHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 2.4 ms (601 pts)

Occupied Bandwidth  
16.8049 MHz

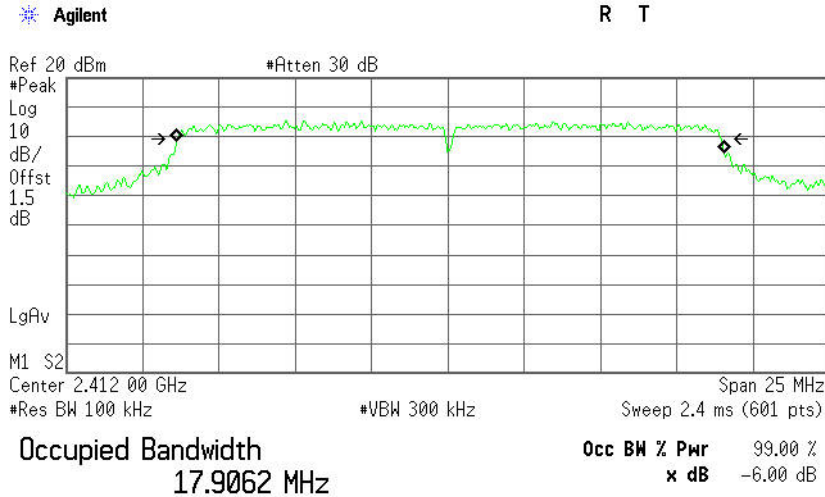
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 72.863 kHz  
x dB Bandwidth 16.568 MHz



IEEE802.11n HT20 MHz mode

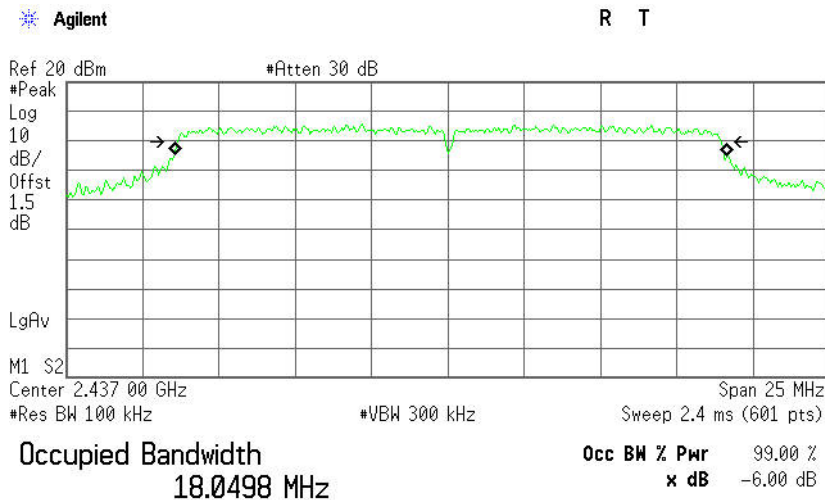
6dB Bandwidth (CH Low)



Transmit Freq Error 81.053 kHz

x dB Bandwidth 17.763 MHz

6dB Bandwidth (CH Mid)



Transmit Freq Error 97.369 kHz

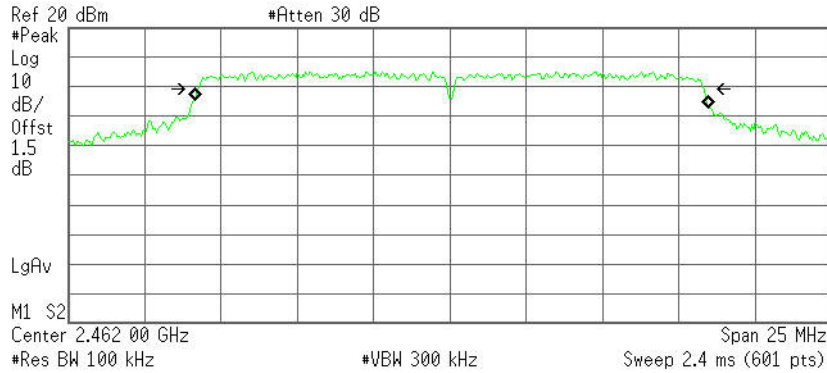
x dB Bandwidth 17.800 MHz



### 6dB Bandwidth (CH High)

Agilent

R T



Occupied Bandwidth  
16.8049 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

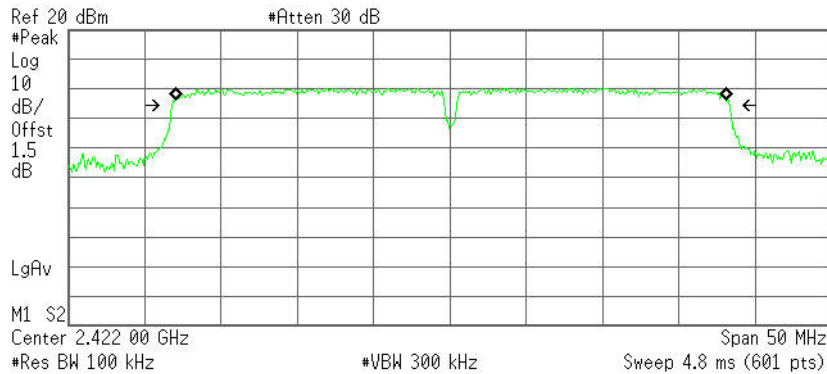
Transmit Freq Error 72.863 kHz  
x dB Bandwidth 16.568 MHz

### IEEE 802.11n HT40 MHz mode

#### 6dB Bandwidth (CH Low)

Agilent

R T



Occupied Bandwidth  
36.0436 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

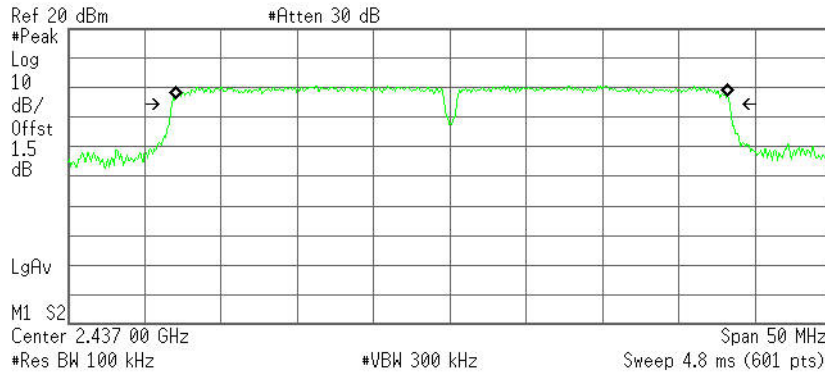
Transmit Freq Error 97.458 kHz  
x dB Bandwidth 36.477 MHz



### 6dB Bandwidth (CH Mid)

Agilent

R T



Occupied Bandwidth  
36.0795 MHz

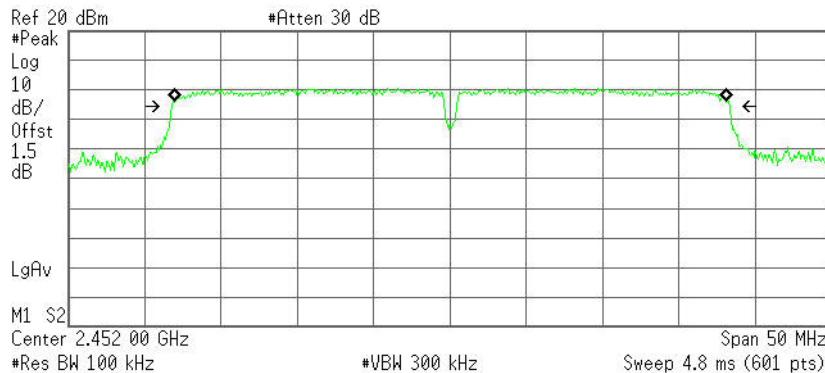
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 90.071 kHz  
x dB Bandwidth 36.493 MHz

### 6dB Bandwidth (CH High)

Agilent

R T



Occupied Bandwidth  
36.0702 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 73.477 kHz  
x dB Bandwidth 36.487 MHz



## 7.4. PEAK OUTPUT POWER

### 7.4.1. LIMITS

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

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

### 7.4.2. TEST INSTRUMENTS

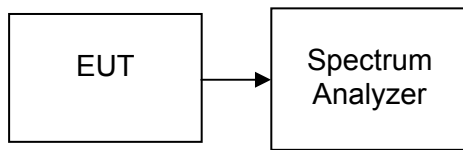
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

### 7.4.3. TEST PROCEDURES (please refer to measurement standard)

1. This procedure provides an integrated measurement alternative when the maximum available RBW < EBW.
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Set the span to a value that is 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at 1 MHz intervals extending across the EBW of the spectrum.



7.4.4. TEST SETUP



7.4.5. TEST RESULTS

No non-compliance noted

**Test Data**

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	18.40	0.06918	1	PASS
Mid	2437	18.10	0.06457		PASS
High	2462	17.90	0.06166		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	24.30	0.26915	1	PASS
Mid	2437	24.00	0.25119		PASS
High	2462	23.80	0.23988		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	24.30	0.26915	1	PASS
Mid	2437	24.00	0.25119		PASS
High	2462	23.70	0.23442		PASS

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	24.10	0.25704	1	PASS
Mid	2437	23.90	0.24547		PASS
High	2452	23.80	0.23988		PASS



7.5. BAND EDGES MEASUREMENT

7.5.1. LIMITS

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)).

7.5.2. TEST INSTRUMENTS

Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014
ESCI EMI TEST RECEIVER.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/09/2013	03/08/2014
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2013	03/18/2014
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2013	03/18/2014
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	06/21/2012	06/21/2014
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/02/2013	03/01/2014
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/02/2013	03/01/2014
Loop Antenna	A, R, A	PLA-1030/B	1029	03/23/2013	03/23/2014
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	03/04/2013	03/03/2014
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The FCC Site Registration number is 101879.  
 3. N.C.R = No Calibration Required.

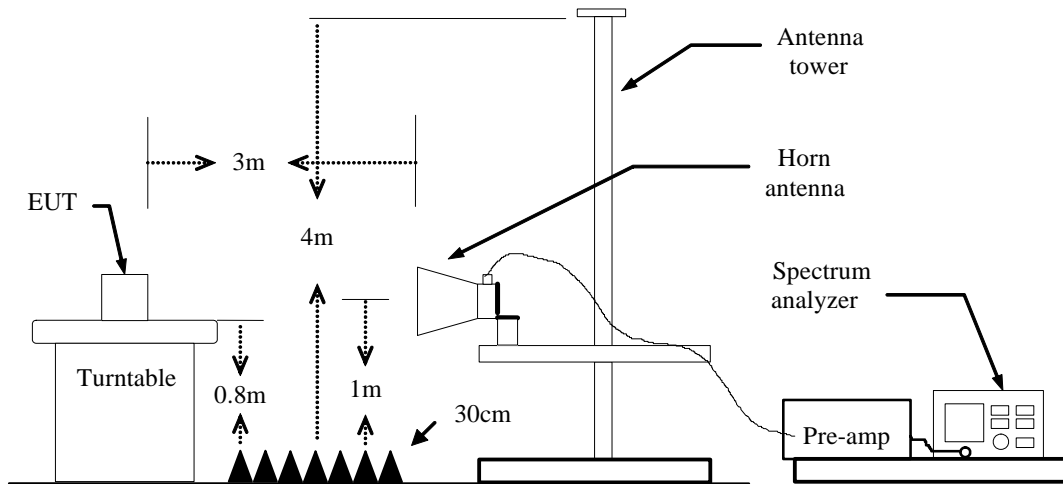




**7.5.3. TEST PROCEDURES** (please refer to measurement standard)

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

**7.5.4. TEST SETUP**





7.5.5. TEST RESULTS

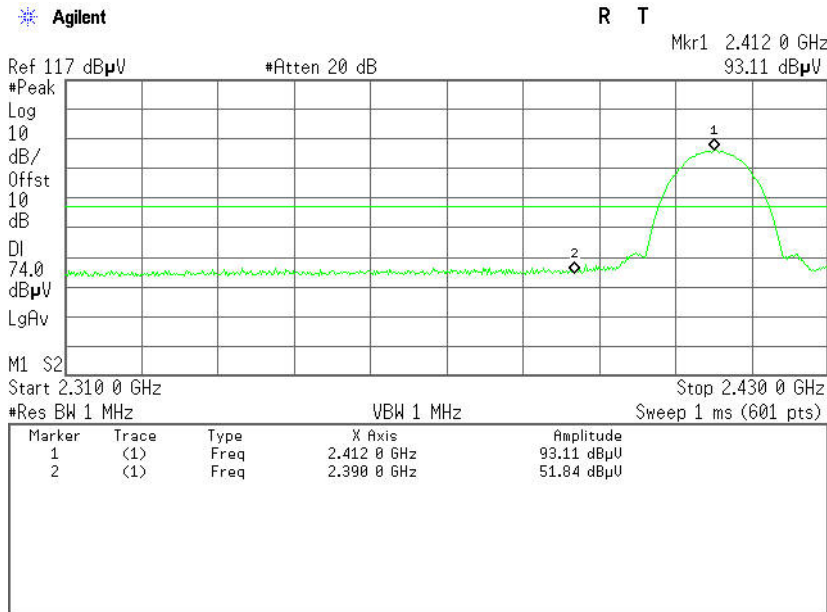
Test Plot

IEEE 802.11b mode

Band Edges (CH Low)

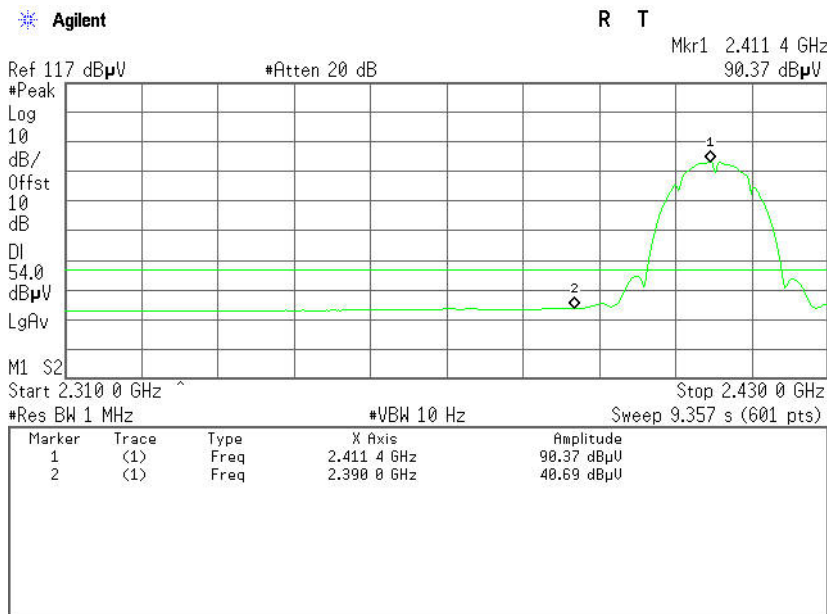
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

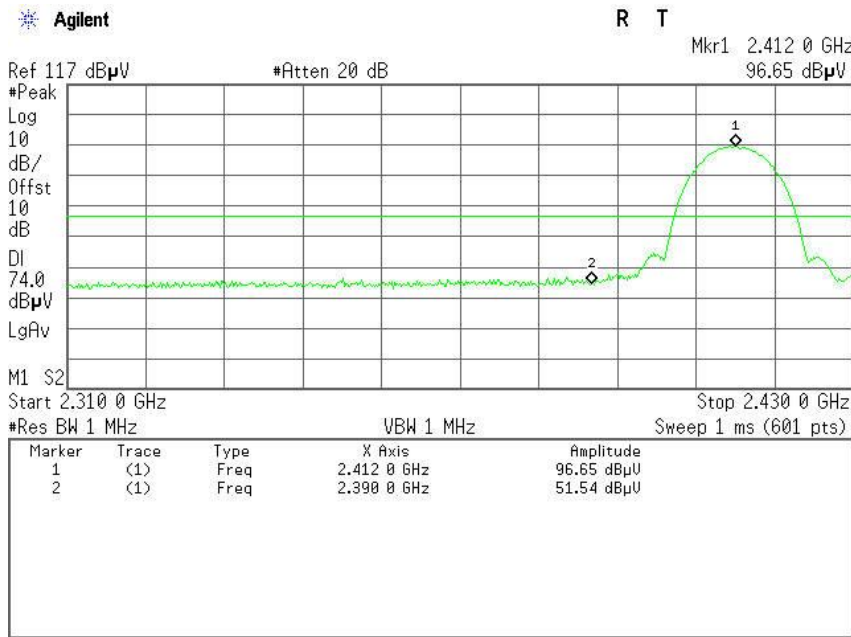


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	45.24	-6.60	51.84	74.00	-22.16	Peak	Vertical
2	2390.0000	34.09	-6.60	40.69	54.00	-13.31	Average	Vertical



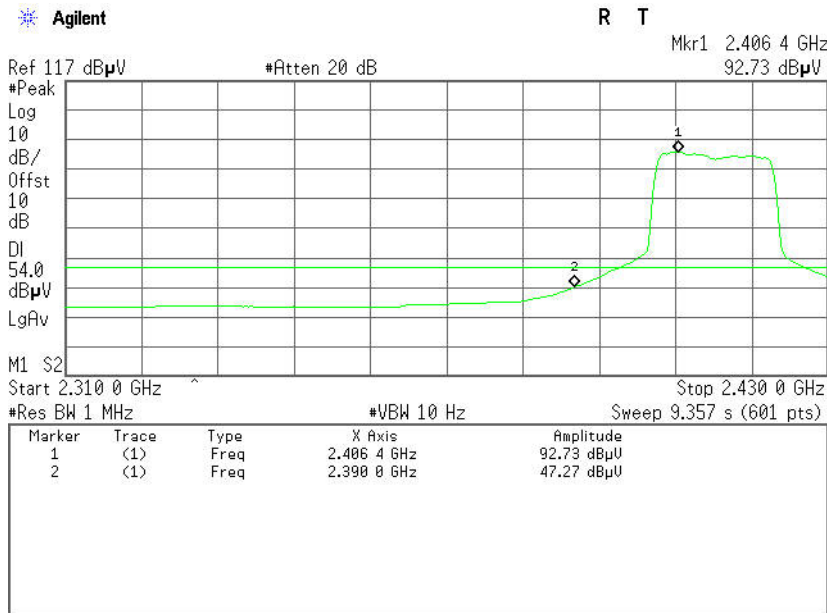
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



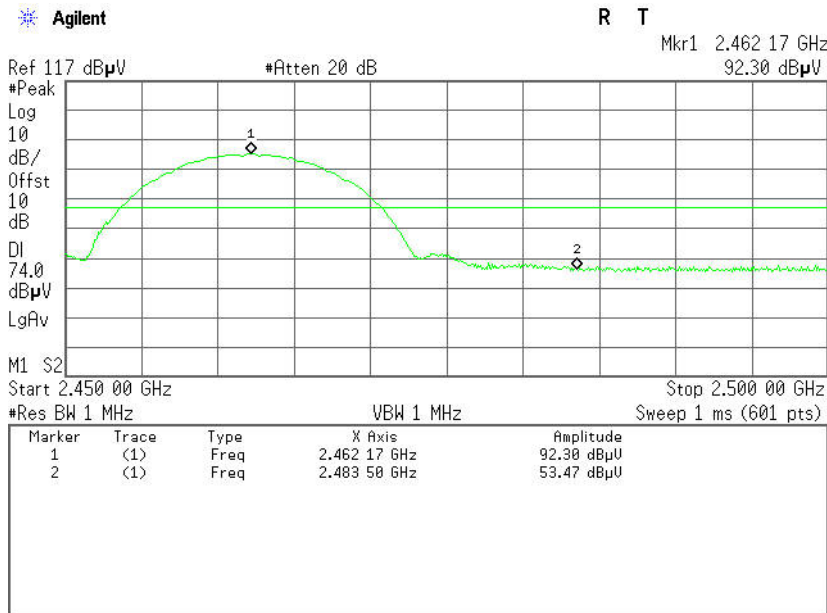
No.	Frequency (MHz)	Reading (dBμV)	Corrected (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	44.94	-6.60	51.54	74.00	-22.46	Peak	Horizontal
2	2390.0000	40.67	-6.60	47.27	54.00	-6.73	Average	Horizontal



**Band Edges (CH High)**

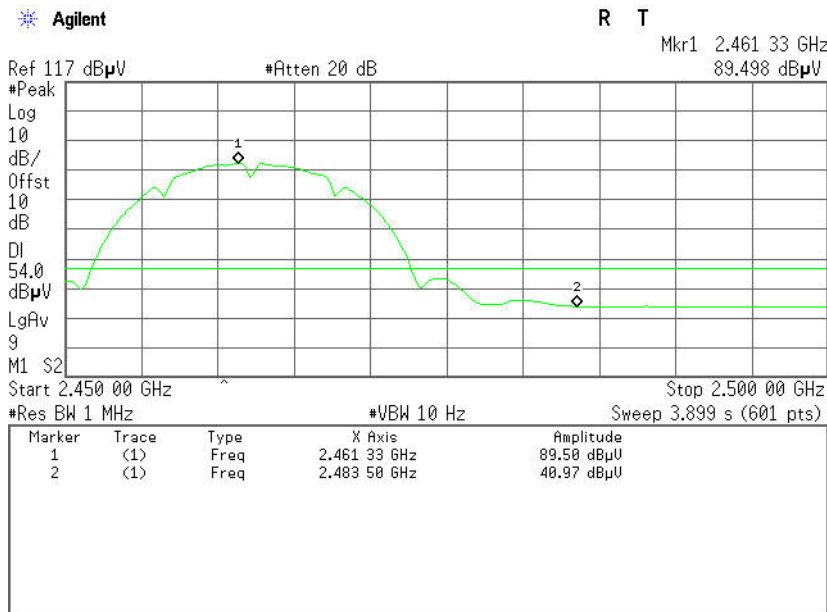
**Detector mode: Peak**

**Polarity: Vertical**



**Detector mode: Average**

**Polarity: Vertical**

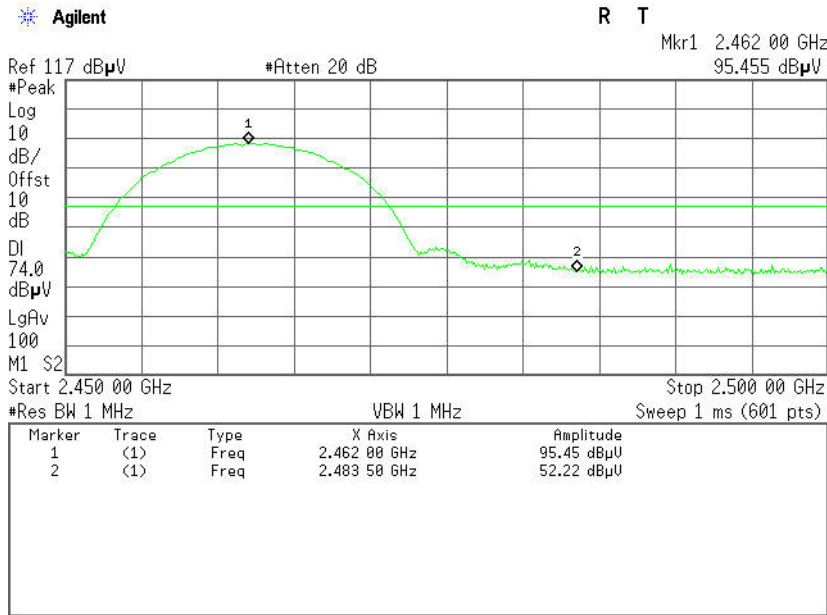


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	47.23	-6.24	53.47	74.00	-20.53	Peak	Vertical
2	2483.5000	34.73	-6.24	40.97	54.00	-13.03	Average	Vertical



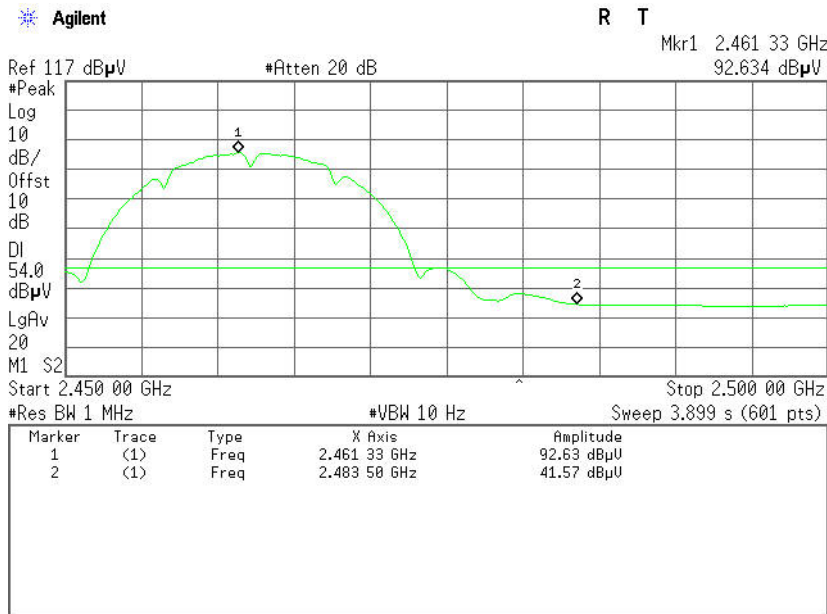
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Corrected (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	45.98	-6.24	52.22	74.00	-21.78	Peak	Horizontal
2	2483.5000	35.33	-6.24	41.57	54.00	-12.43	Average	Horizontal

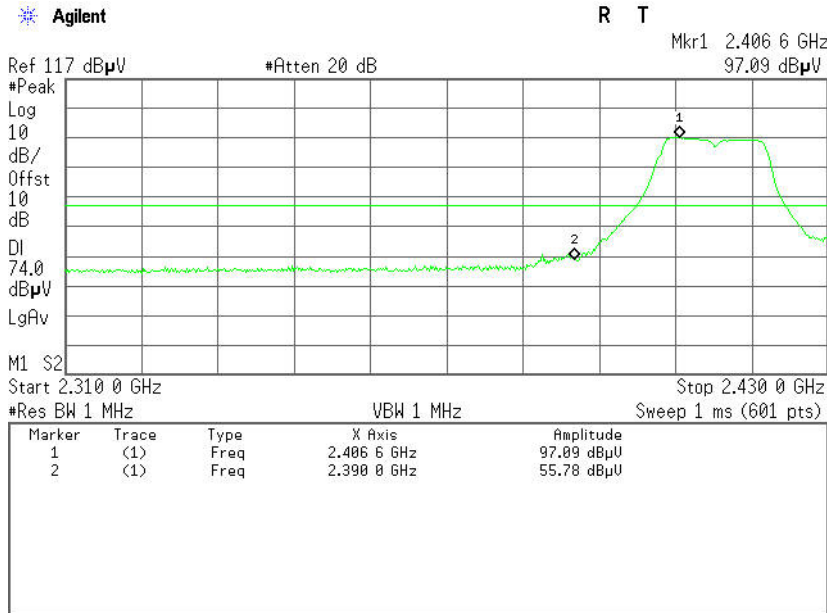


IEEE 802.11g mode

Band Edges (CH Low)

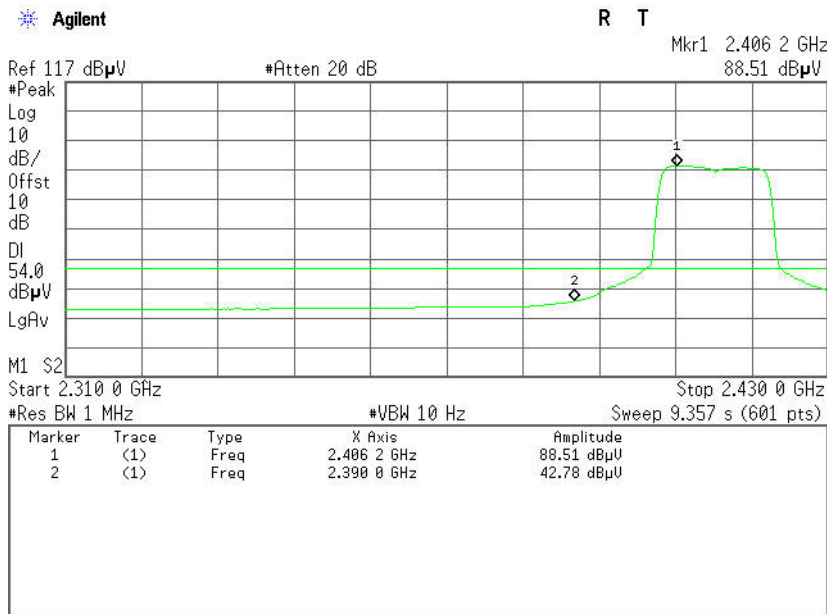
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

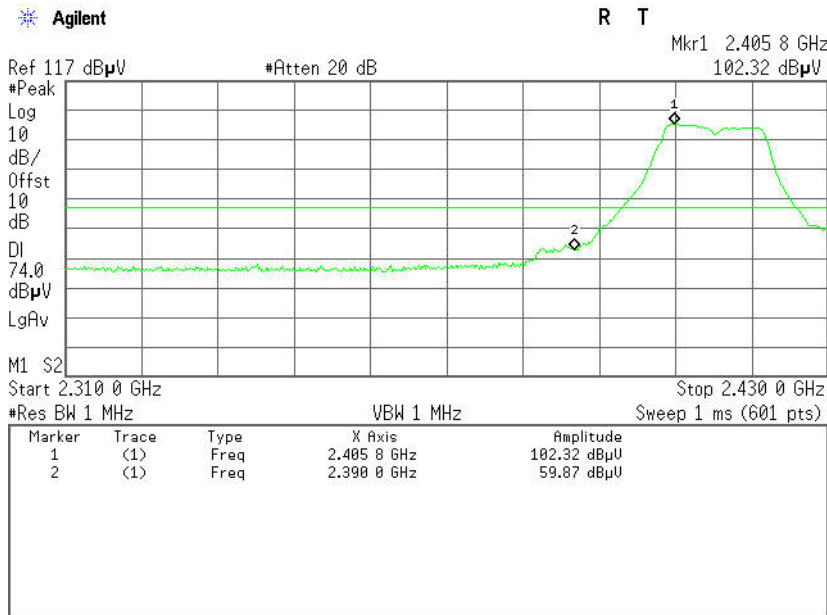


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	49.18	-6.60	55.78	74.00	-18.22	Peak	Vertical
2	2390.0000	36.18	-6.60	42.78	54.00	-11.22	Average	Vertical



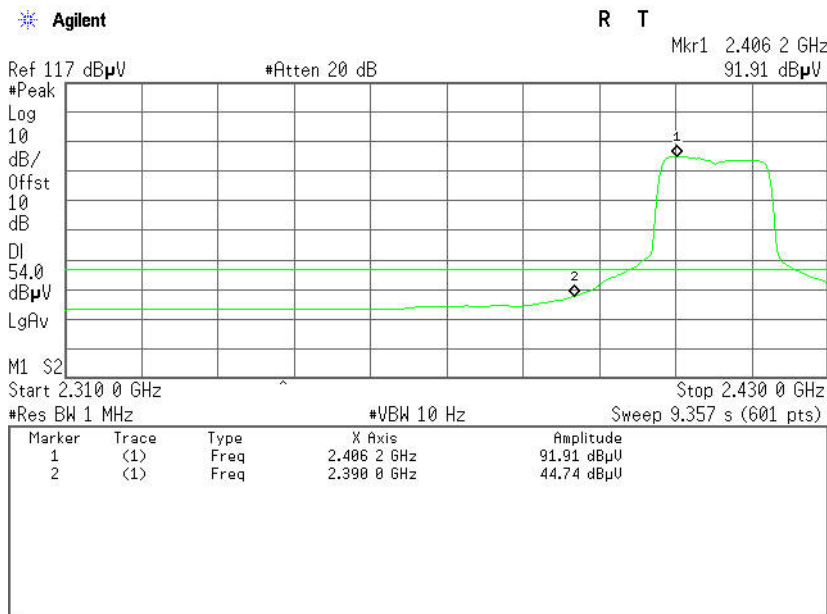
**Detector mode: Peak**

**Polarity: Horizontal**



**Detector mode: Average**

**Polarity: Horizontal**



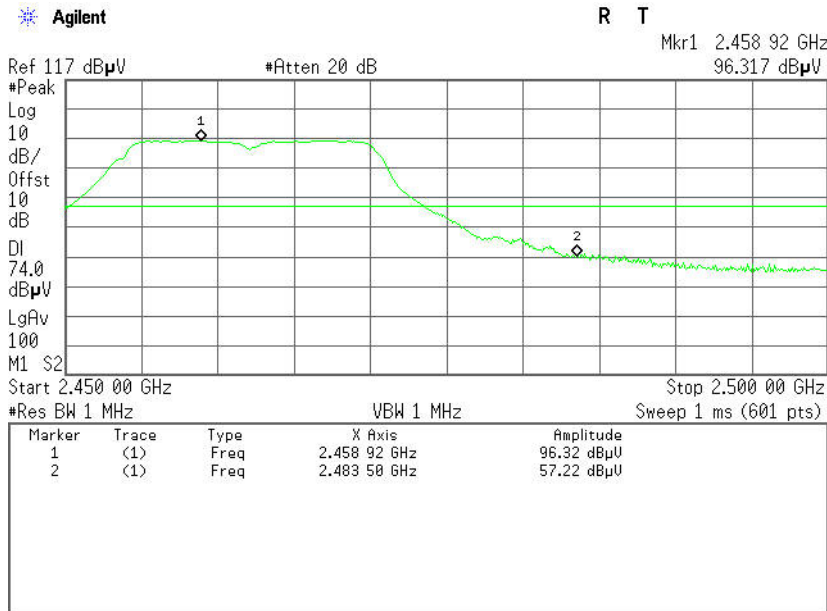
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	53.27	-6.60	59.87	74.00	-14.13	Peak	Horizontal
2	2390.0000	38.14	-6.60	44.74	54.00	-9.26	Average	Horizontal



**Band Edges (CH High)**

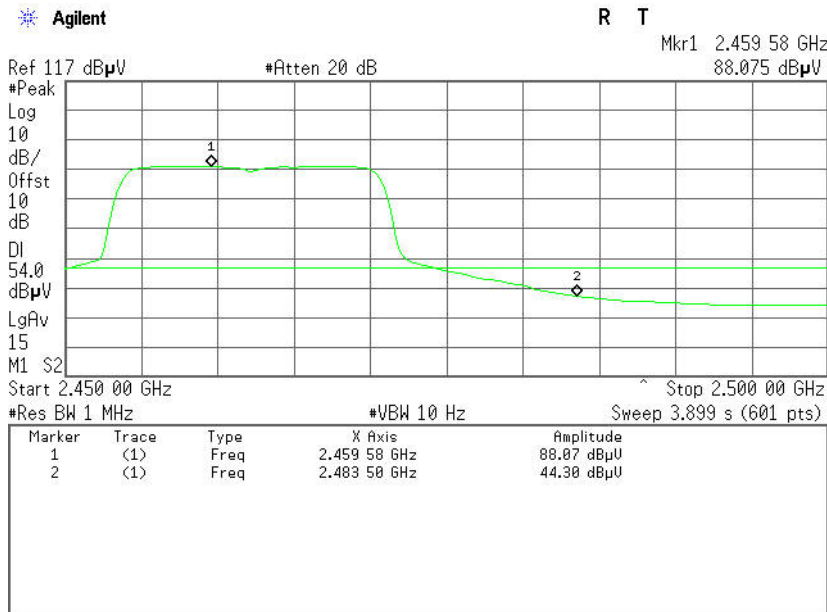
**Detector mode: Peak**

**Polarity: Vertical**



**Detector mode: Average**

**Polarity: Vertical**



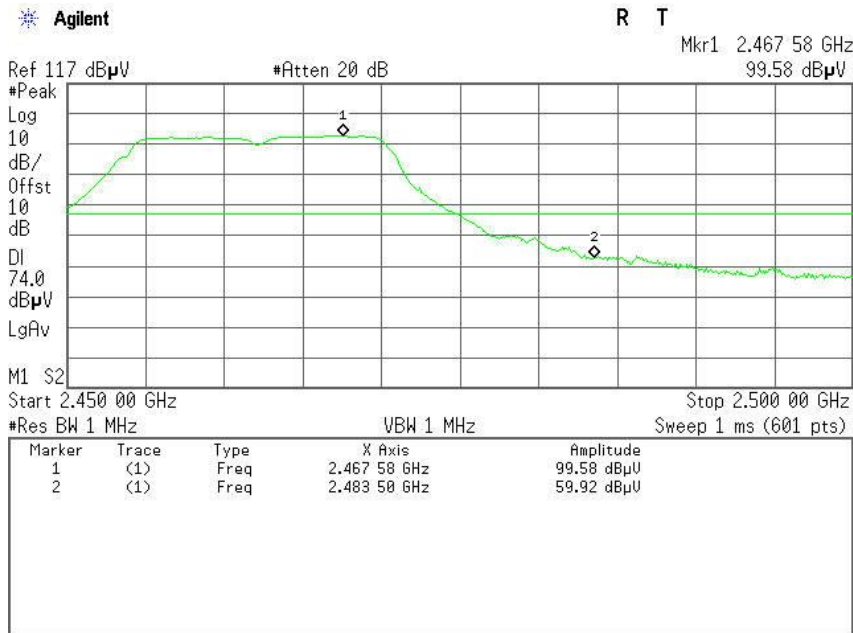
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	50.98	-6.24	57.22	74.00	-16.78	Peak	Vertical
2	2483.5000	38.06	-6.24	44.30	54.00	-9.70	Average	Vertical





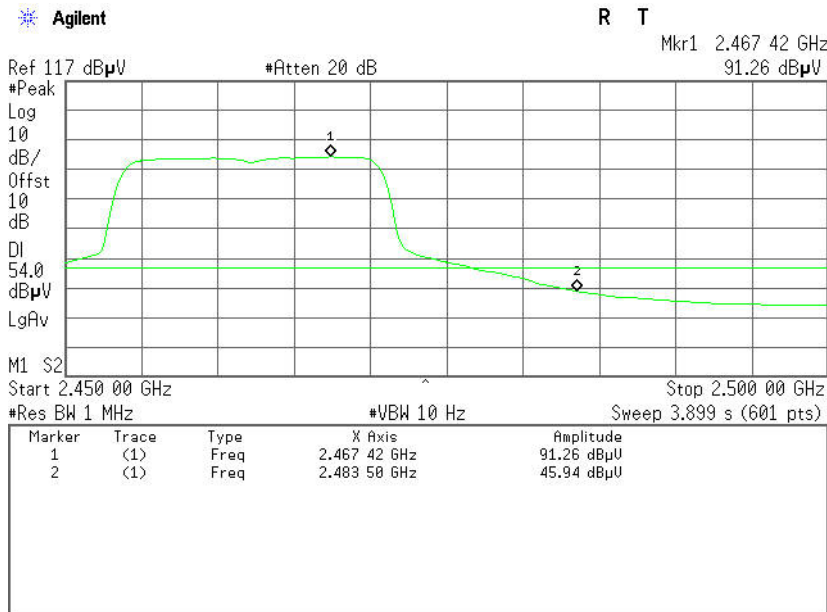
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Corrected (dB)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	53.68	-6.24	59.92	74.00	-14.08	Peak	Horizontal
2	2483.5000	39.70	-6.24	45.94	54.00	-8.06	Average	Horizontal

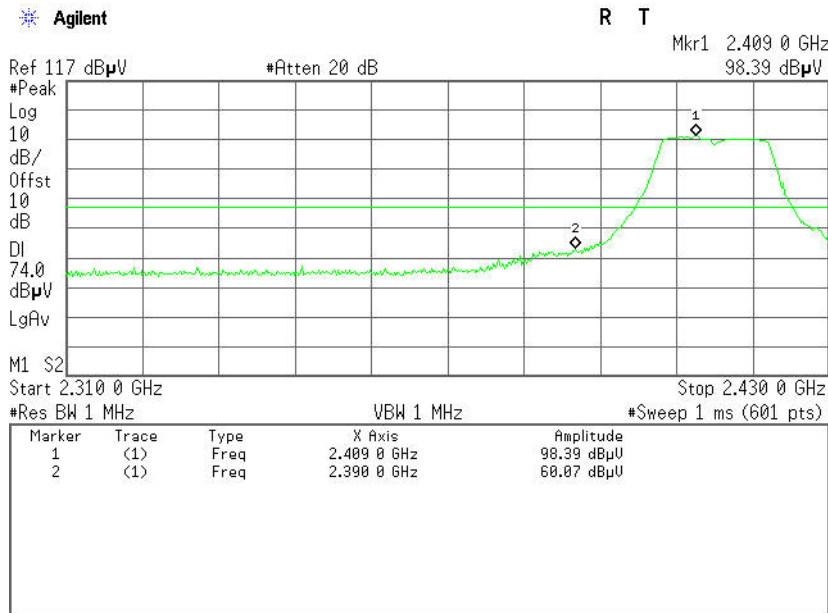


IEEE 802.11n HT20 MHz mode

Band Edges (CH Low)

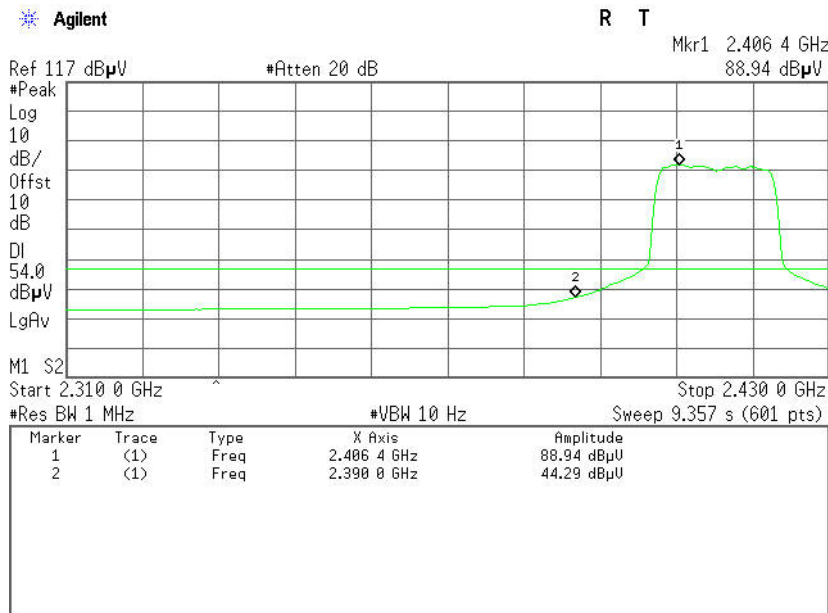
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

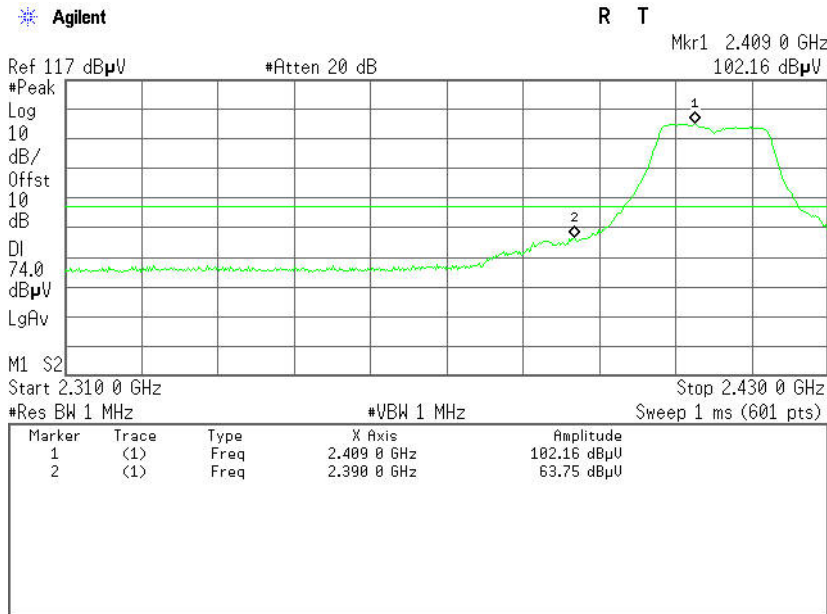


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	53.47	-6.60	60.07	74.00	-13.93	Peak	Vertical
2	2390.0000	37.69	-6.60	44.29	54.00	-9.71	Average	Vertical



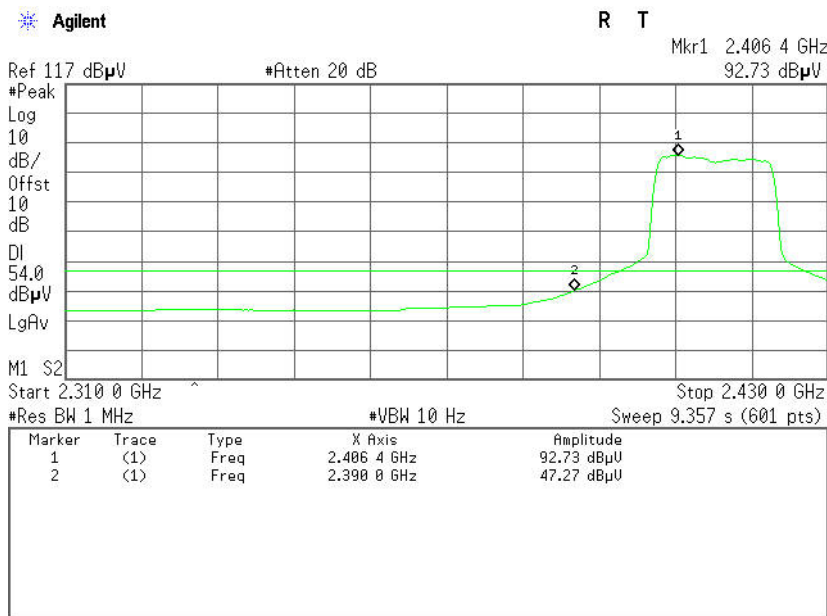
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



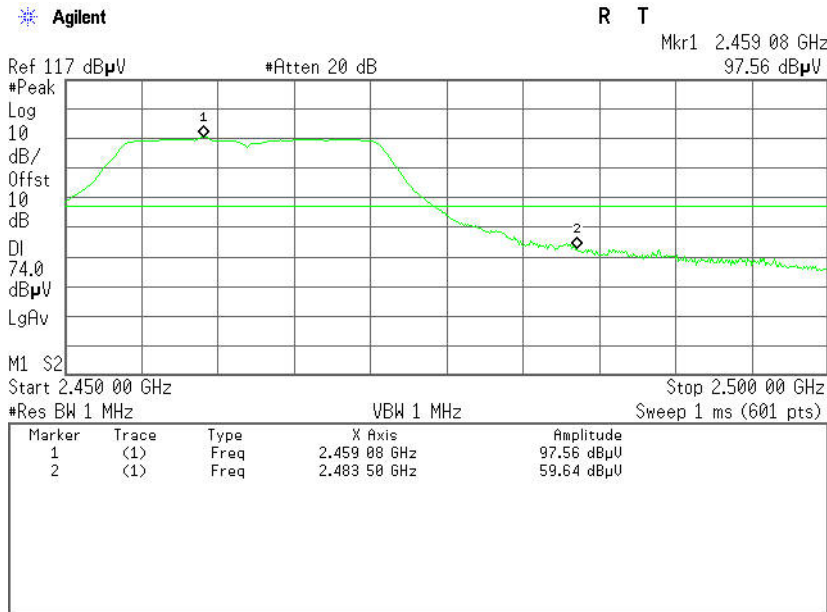
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	57.15	-6.60	63.75	74.00	-10.25	Peak	Horizontal
2	2390.0000	40.67	-6.60	47.27	54.00	-6.73	Average	Horizontal



**Band Edges (CH High)**

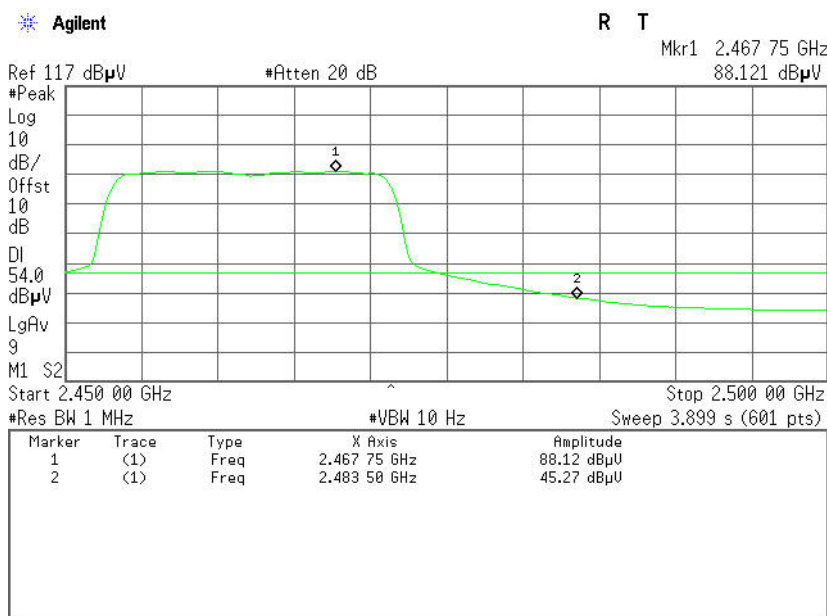
**Detector mode: Peak**

**Polarity: Vertical**



**Detector mode: Average**

**Polarity: Vertical**

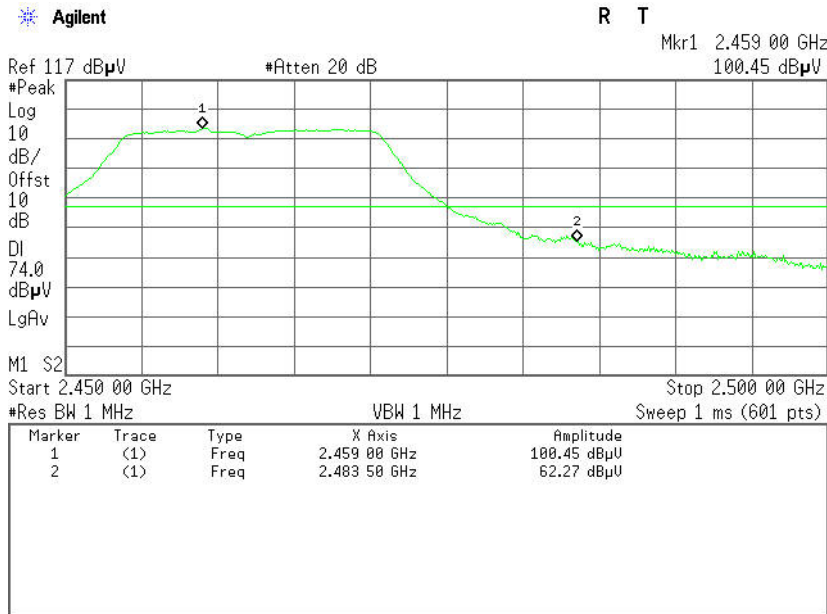


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	53.40	-6.24	59.64	74.00	-14.36	Peak	Vertical
2	2483.5000	39.03	-6.24	45.27	54.00	-8.73	Average	Vertical



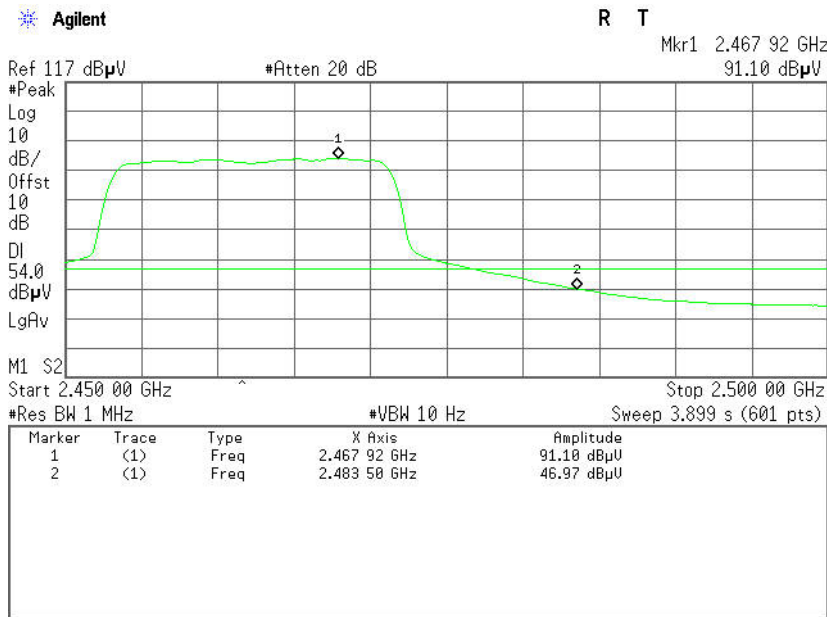
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	56.03	-6.24	62.27	74.00	-11.73	Peak	Horizontal
2	2483.5000	40.73	-6.24	46.97	54.00	-7.03	Average	Horizontal

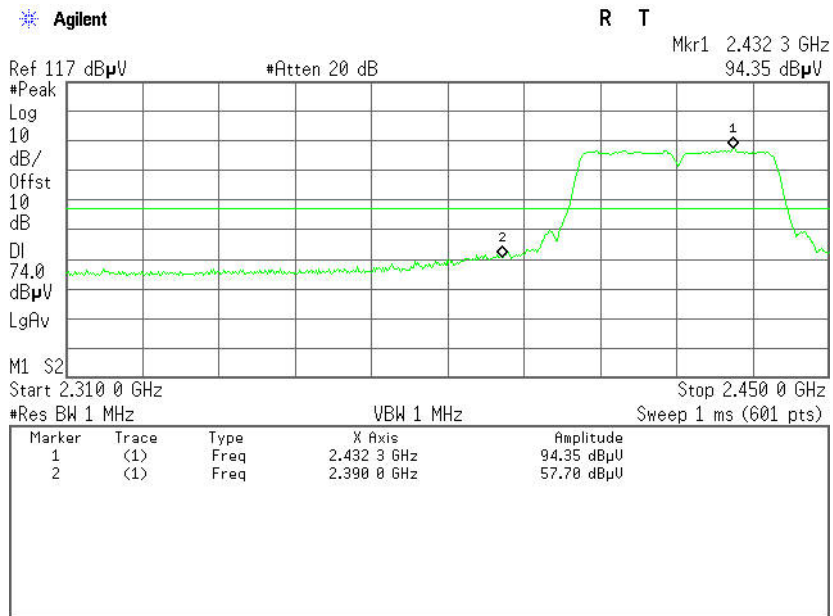


IEEE 802.11n HT40 MHz mode

Band Edges (CH Low)

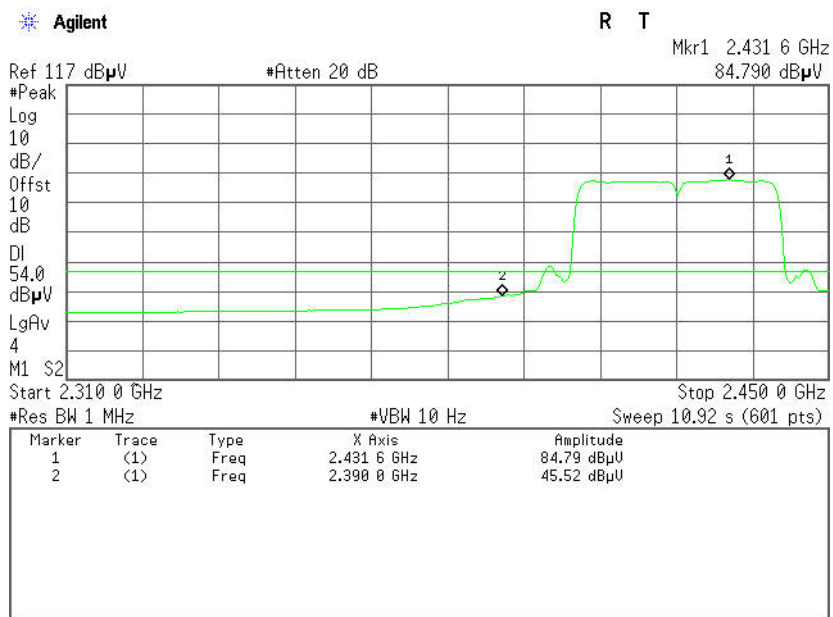
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

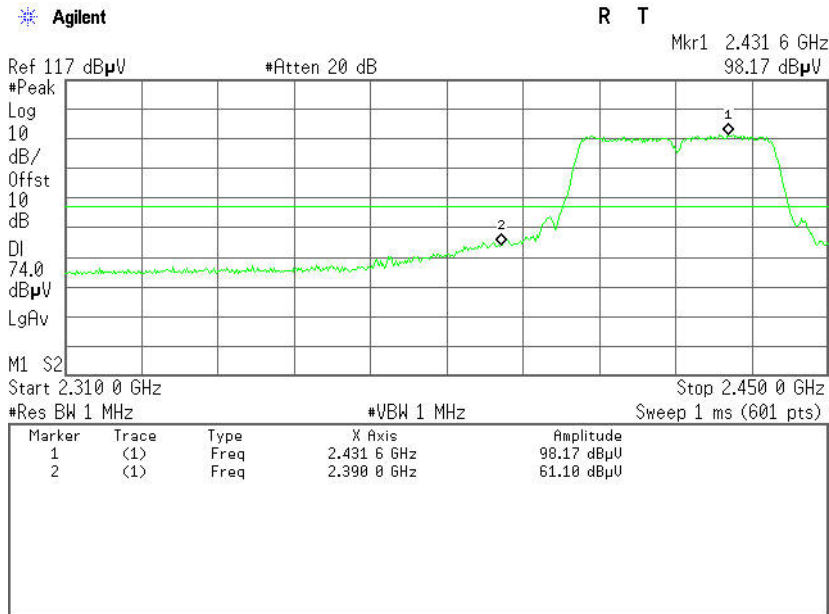


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	51.18	-6.60	57.78	74.00	-16.22	Peak	Vertical
2	2390.0000	38.92	-6.60	45.52	54.00	-8.48	Average	Vertical



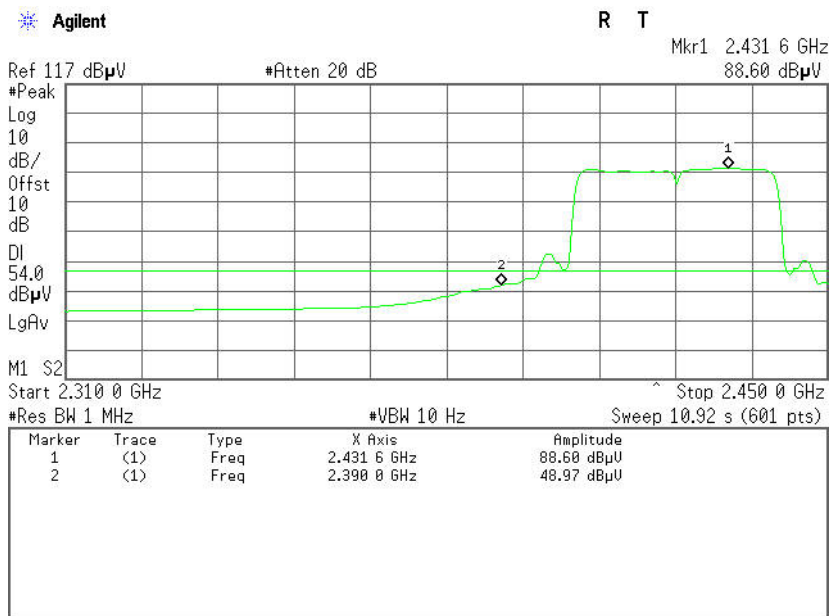
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



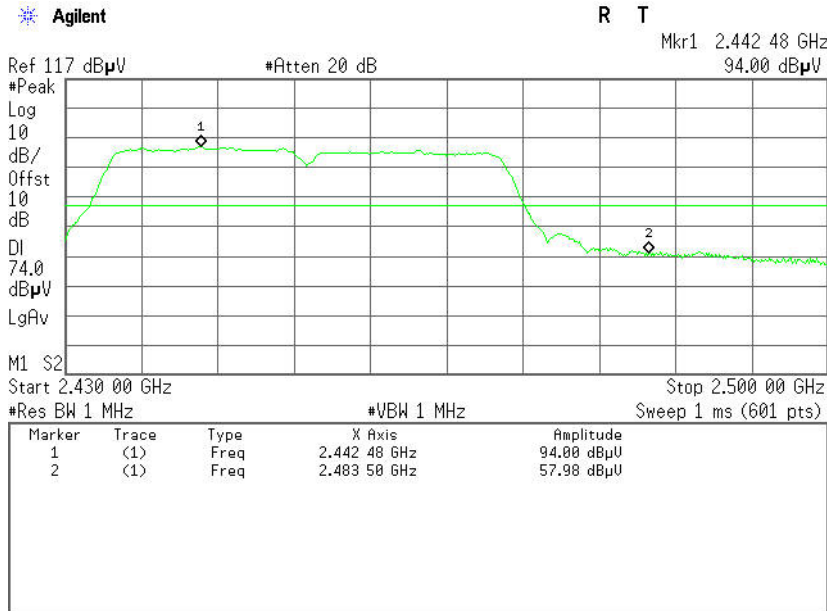
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2390.0000	54.50	-6.60	61.10	74.00	-12.90	Peak	Horizontal
2	2390.0000	42.37	-6.60	48.97	54.00	-5.03	Average	Horizontal



**Band Edges (CH High)**

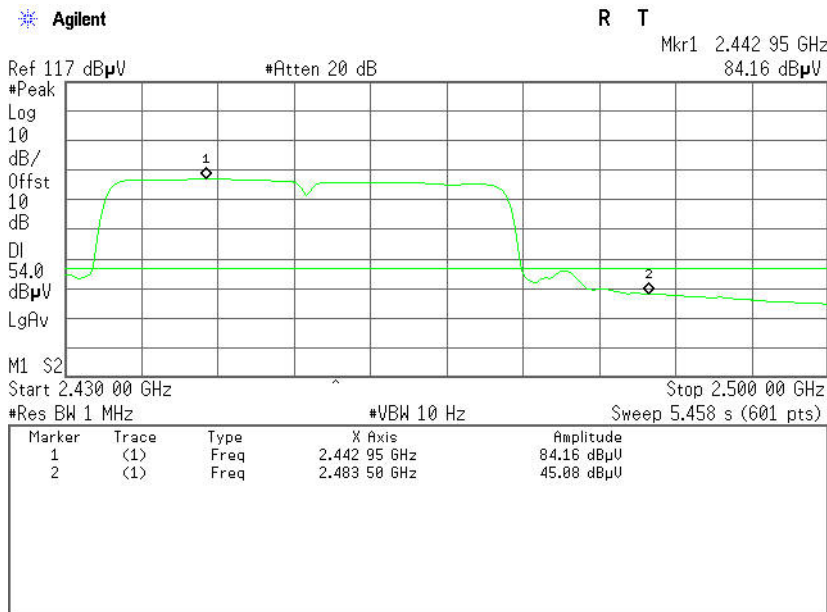
**Detector mode: Peak**

**Polarity: Vertical**



**Detector mode: Average**

**Polarity: Vertical**



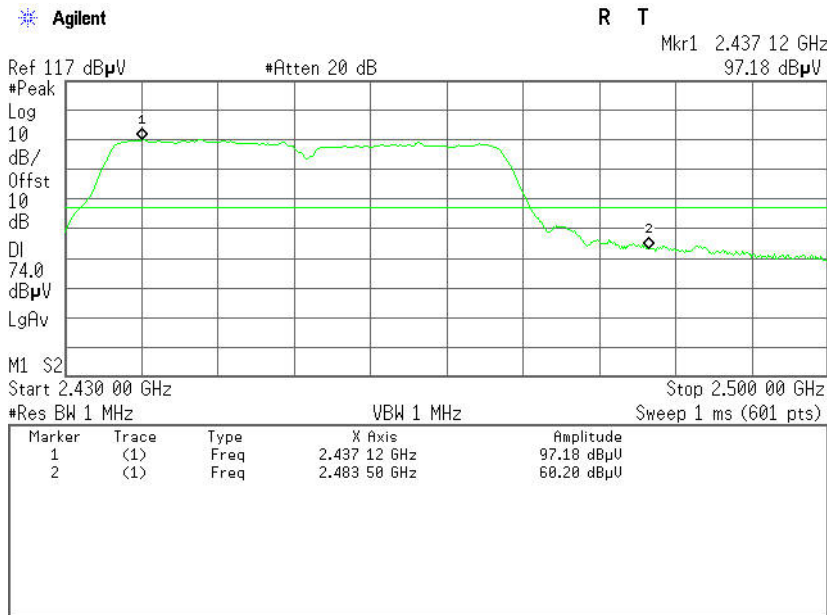
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	51.74	-6.24	57.98	74.00	-16.02	Peak	Vertical
2	2483.5000	38.84	-6.24	45.08	54.00	-8.92	Average	Vertical





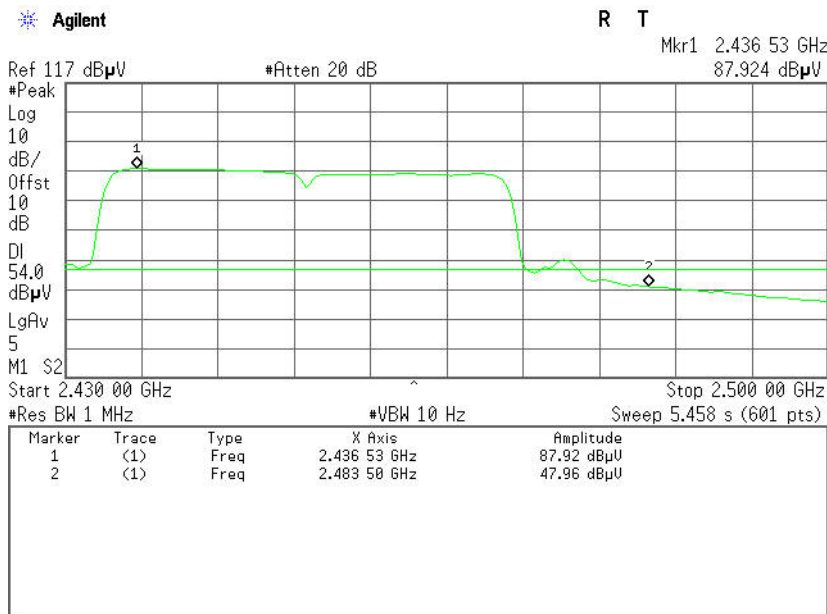
**Detector mode: Peak**

**Polarity: Horizontal**



**Detector mode: Average**

**Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Antenna Pole
1	2483.5000	53.96	-6.24	60.20	74.00	-13.80	Peak	Horizontal
2	2483.5000	41.72	-6.24	47.96	54.00	-6.04	Average	Horizontal



## 7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 7.6.1. LIMITS

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.

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.

### 7.6.2. TEST INSTRUMENTS

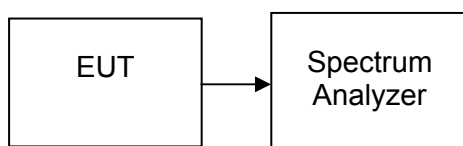
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/09/2013	03/08/2014

### 7.6.3. TEST PROCEDURES (please refer to measurement standard)

§15.247(e) specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission. The same method as used to determine the conducted output power shall be used to determine the power spectral density (i.e., if peak-detected fundamental power was measured then use the peak PSD procedure and if average fundamental power was measured then use the average PSD procedure).

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{ kHz} = -15.2\text{ dB})$ .
11. The resulting peak PSD level must be ≤ 8 dBm.

### 7.6.4. TEST SETUP





7.6.5. TEST RESULTS

No non-compliance noted

**Test Data**

**Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-13.79	8	PASS
Mid	2437	-13.74		PASS
High	2462	-13.71		PASS

**Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-9.70	8	PASS
Mid	2437	-9.58		PASS
High	2462	-8.35		PASS

**Test mode: IEEE 802.11n HT20 MHz**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-9.26	8	PASS
Mid	2437	-8.72		PASS
High	2462	-9.27		PASS

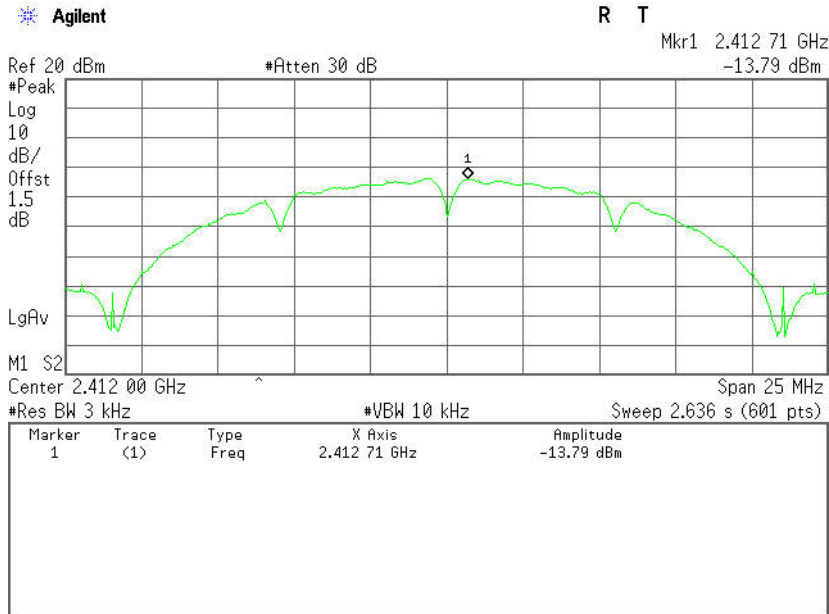
**Test mode: IEEE 802.11n HT40 MHz**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422	-12.48	8	PASS
Mid	2437	-11.72		PASS
High	2452	-12.45		PASS

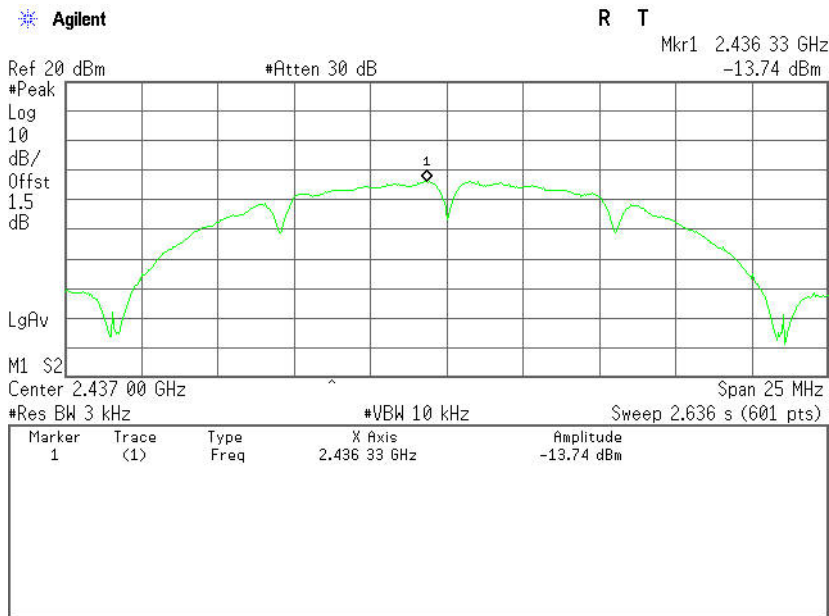


**Test Plot IEEE 802.11b mode**

**PPSD (CH Low)**

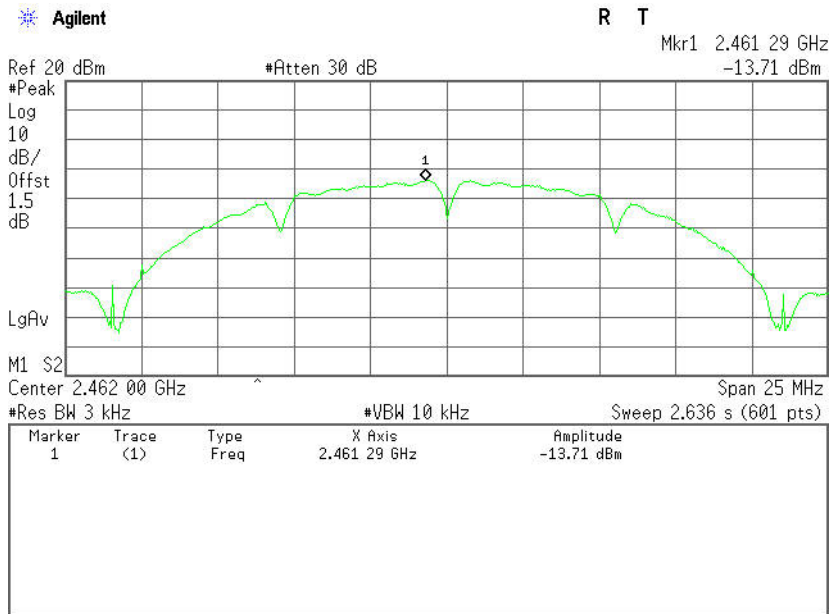


**PPSD (CH Mid)**



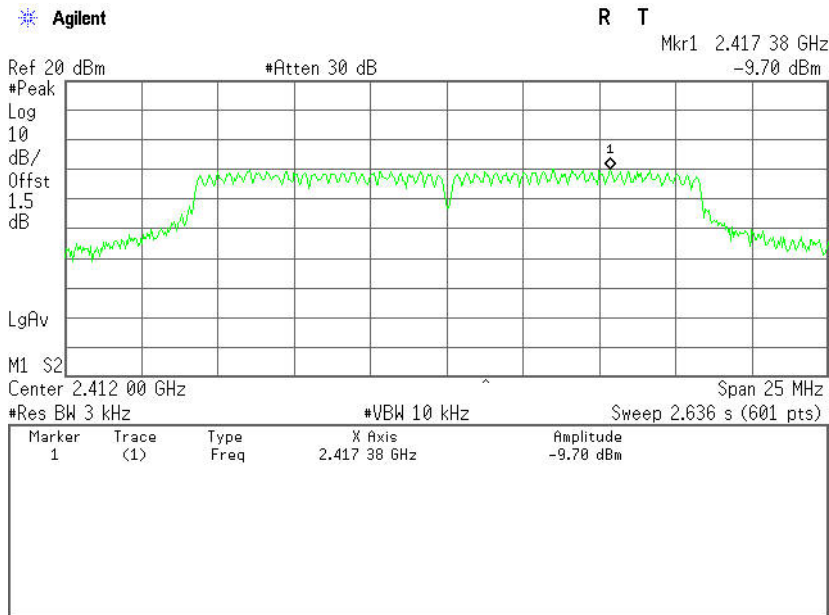


### PPSD (CH High)



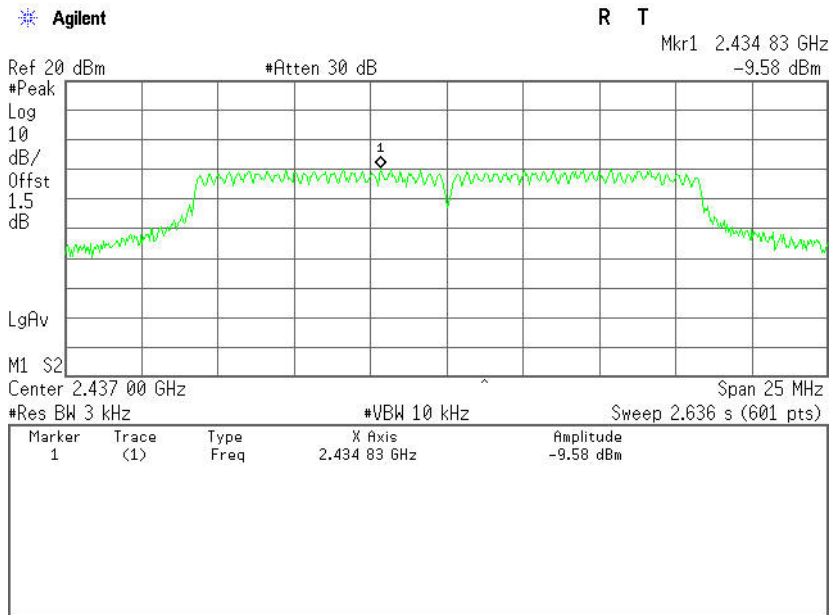
### IEEE 802.11g mode

### PPSD (CH Low)

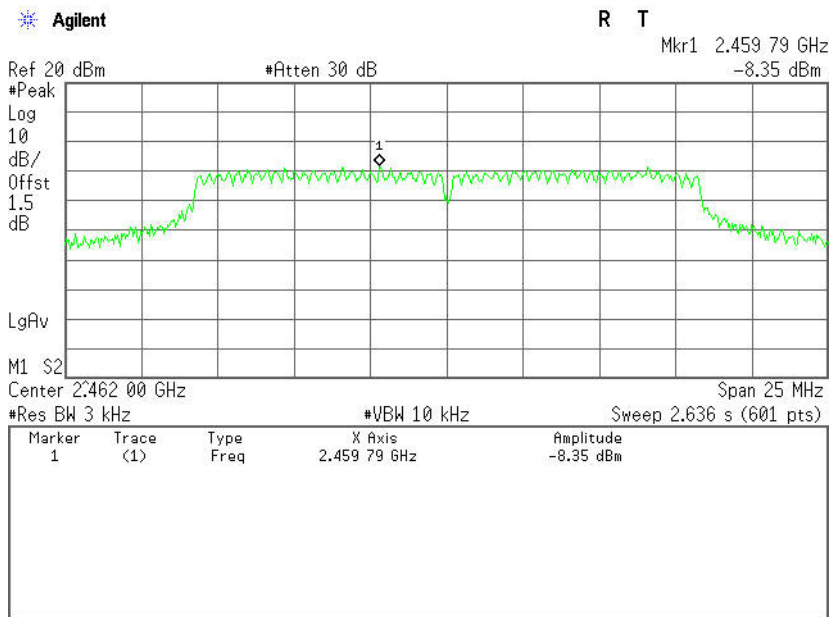




### PPSD (CH Mid)



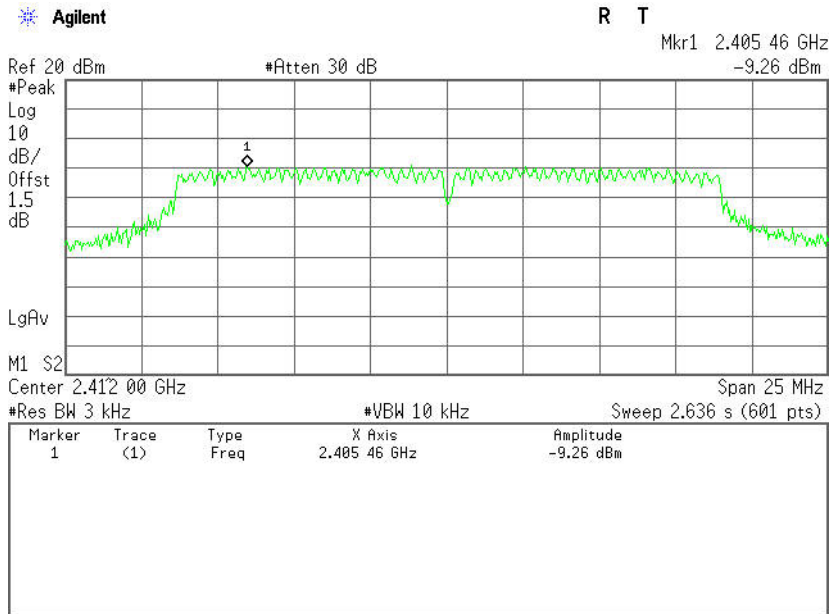
### PPSD (CH High)



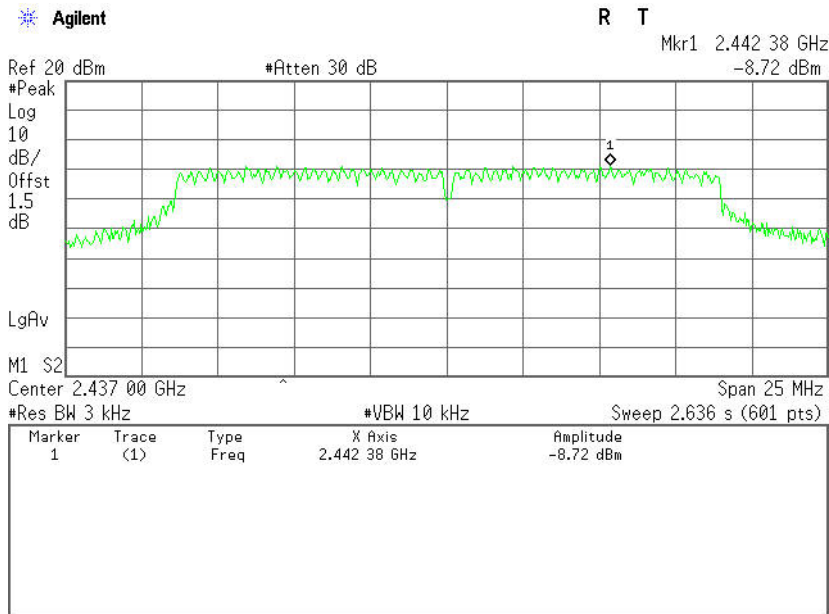


IEEE 802.11n HT20 MHz mode

PPSD (CH Low)

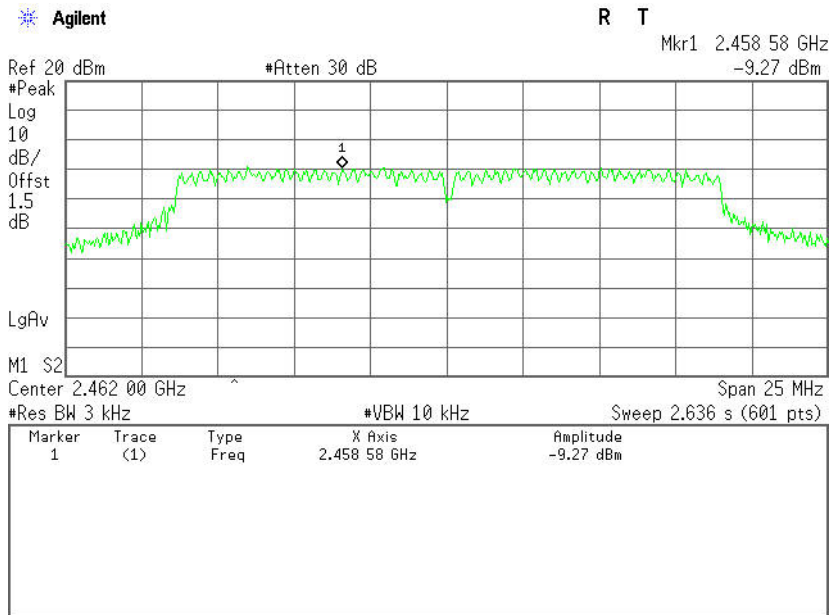


PPSD (CH Mid)



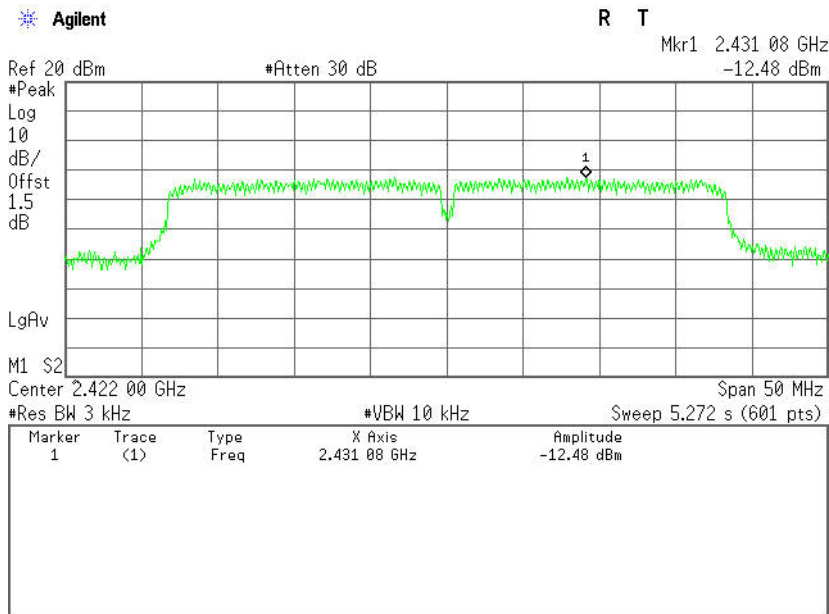


### PPSD (CH High)



### IEEE 802.11n HT40 MHz mode

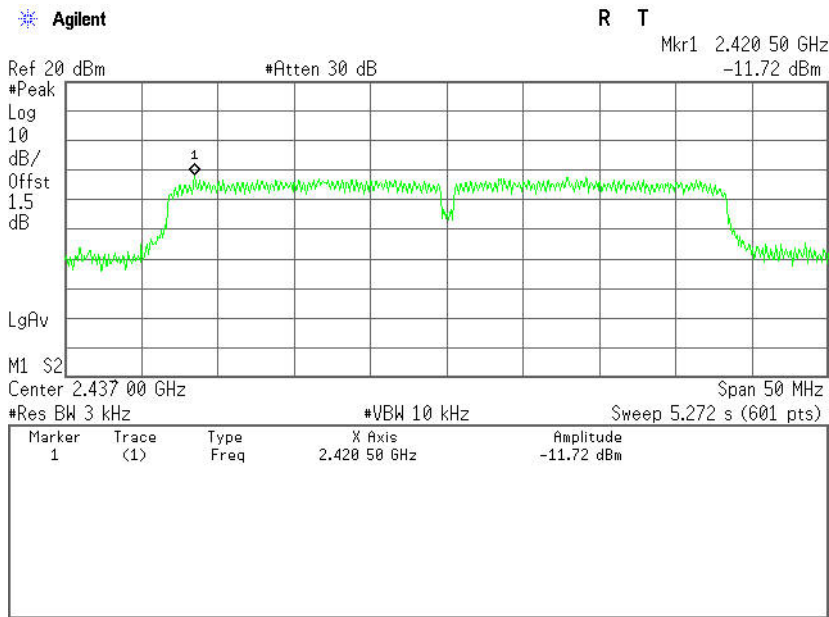
### PPSD (CH Low)







### PPSD (CH Mid)



### PPSD (CH High)

