



# FCC TEST REPORT

for

**Wireless-N Router**

**MODEL: RT-N10E**

**Brand: ASUS**

**Test Report Number:**

**SZ110909B01-RP**

**Issued Date: September 19,2011**

Issued for

**ASUSTeK COMPUTER INC.**

**15, Li-Te Rd., Peitou, Taipei 112, Taiwan**

Issued by:

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

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Revision History

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	SZ110909B01-RP	Initial Issue	ALL	Anna Liu



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# 1 TEST CERTIFICATION

<b>Product</b>	Wireless-N Router
<b>Model</b>	RT-N10E
<b>Brand</b>	ASUS
<b>Tested</b>	September 9~19,2011
<b>Applicant</b>	<b>ASUSTeK COMPUTER INC.</b> 15, Li-Te Rd., Peitou, Taipei 112, Taiwan
<b>Manufacturer</b>	<b>Shenzhen Gongjin Electronics Co., Ltd</b> No 2&3 Buildings, Mingwei Factory Area, Songgang Road West, Songgang SUB-District, Shenzhen, Guangdong, 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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**Aven Zhou**  
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)	<ul style="list-style-type: none"><li>● Spurious Emissions</li><li>● Conducted Measurement</li><li>● Radiated Emissions</li></ul>	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 Router
<b>Model Number</b>	RT-N10E
<b>Trade Name</b>	ASUS
<b>Model Discrepancy</b>	N/A
<b>Identify Number</b>	SZ110909B01-RP
<b>Received Date</b>	September 9,2011
<b>Power Supply</b>	DC12V supplied by the adapter
<b>Adapter Manufacturer / Model No.</b>	1)Adapter 1: RUIDE RD1200500-C55-8MG I/P: 100-240Vac, 50/60Hz, 0.25A max O/P: 12Vdc, 0.5A DC Output Cable: Unshielded,1.50m 2)Adapter 2: ShenZhen Gongjin Electronics Co., Ltd. S06A22-120A050-PB I/P: 100-240Vac, 50/60Hz, 0.3A max O/P: 12Vdc, 0.5A, DC Output Cable: Unshielded,1.50m
<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: 17.62dBm IEEE 802.11g mode: 13.85dBm IEEE 802.11n HT20 MHz mode: 13.84dBm IEEE 802.11n HT40 MHz mode: 12.64dBm
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS(CCK,QPSK, BPSK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM) 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>	802.11b: 11Mbps(CCK) with fall back rates of 5.5/2/1Mbps 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/11 /6Mbps IEEE 802.11n HT20: 135.0Mbps with fall back rates of 121.5/ 108.0/81.0 /65.0/58.5/54.0/52.0/40.5/39.0/27.0/26.0/19.5/13.5/13.0/6.5 Mbps IEEE 802.11n HT40: 135.0Mbps with fall back rates of 121.5/ 108.0/81.0 /65.0/58.5/54.0/52.0/40.5/39.0/27.0/26.0/19.5/13.5 Mbps
<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 2.09dBi gain (Max)

**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: MSQRN10E 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: Normal Link</b>	☒
Radiated Emission	<b>Mode 1: Normal Link</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.

IEEE802.11n HT20 mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High(2462MHz) with 1Mbps data rate were chosen for full testing.

IEEE802.11n HT40mode: Channel Low (2422MHz), Channel Mid (2437MHz) and ChannelHigh (2462MHz) with 6Mbps 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	Trade Name	Data Cable	Power Cord
1	Notebook	2672	992F2VG	N/A	IBM	Shielded 1.80m	Shielded 1.80m
2	Notebook	Studio 1435	531544868 6549	N/A	DELL	Shielded 1.80m	Shielded 1.80m

**Note:**

- 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.

### 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 **No10-1, 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 170

<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-625)</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	+/- 3.18dB
Radiated emissions	30MHz ~ 200MHz	+/- 3.79dB
	200MHz ~1000MHz	+/- 3.62dB
	Above 1000MHz	+/- 5.04dB
Band Edges	+/-0.182 dB	

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 RECEIVE.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/19/2011	03/19/2012
LISN	SCHAFFNER	NNB42	2001/001	05/26/2011	05/26/2012
LISN	EMCO	3825/2	8901-1459	03/19/2011	03/19/2012
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/31/2011	03/31/2012
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.

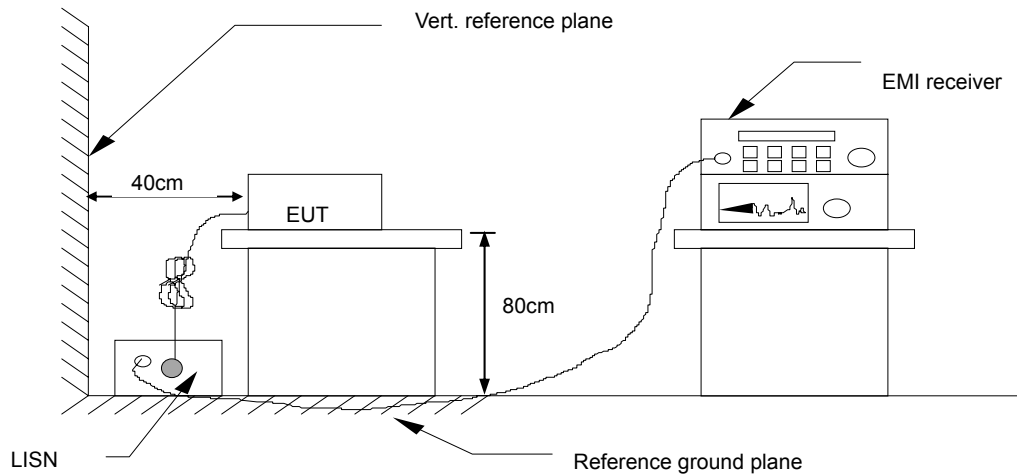


## 7.1.3. TEST PROCEDURES (please refer to measurement standard)

- 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 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>	RT-N10E	<b>RBW,VBW</b>	9 kHz
<b>Environmental Conditions</b>	26deg°C, 60% RH	<b>Test Mode</b>	Normal Link (Adapter1:RUIDE/RD1200500-C55-8MG)
<b>Tested by</b>	Sunday Hu	<b>Line</b>	L1

(The chart below shows the highest readings taken from the final data.)

No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.3540	30.64	21.79	11.51	42.15	33.30	58.87	48.87	-16.72	-15.57	Pass
2	0.6940	28.09	13.26	11.51	39.60	24.77	56.00	46.00	-16.40	-21.23	Pass
3*	1.7860	33.86	14.88	11.55	45.41	26.43	56.00	46.00	-10.59	-19.57	Pass
4	4.5980	25.68	12.59	11.66	37.34	24.25	56.00	46.00	-18.66	-21.75	Pass
5	5.8220	30.41	16.17	11.72	42.13	27.89	60.00	50.00	-17.87	-22.11	Pass
6	16.2300	22.22	13.15	12.39	34.61	25.54	60.00	50.00	-25.39	-24.46	Pass

<b>Model No.</b>	RT-N10E	<b>RBW,VBW</b>	9 kHz
<b>Environmental Conditions</b>	26deg°C, 60% RH	<b>Test Mode</b>	Normal Link (Adapter1:RUIDE/RD1200500-C55-8MG)
<b>Tested by</b>	Sunday Hu	<b>Line</b>	L2

(The chart below shows the highest readings taken from the final data.)

No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.3580	31.82	25.68	11.53	43.35	37.21	58.77	48.77	-15.42	-11.56	Pass
2	0.6980	26.92	15.18	11.53	38.45	26.71	56.00	46.00	-17.55	-19.29	Pass
3	1.2260	27.12	13.66	11.52	38.64	25.18	56.00	46.00	-17.36	-20.82	Pass
4	1.8260	29.09	16.84	11.55	40.64	28.39	56.00	46.00	-15.36	-17.61	Pass
5	5.6860	30.98	18.63	11.71	42.69	30.34	60.00	50.00	-17.31	-19.66	Pass
6	22.3940	21.01	5.59	12.56	33.57	18.15	60.00	50.00	-26.43	-31.85	Pass



## **7.2. SPURIOUS EMISSIONS MEASUREMENT**

### **7.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT**

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)).

### **7.2.2. TEST INSTRUMENTS**

<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Last Calibration</b>	<b>Due Calibration</b>
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2011	03/19/2012

### **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 100 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

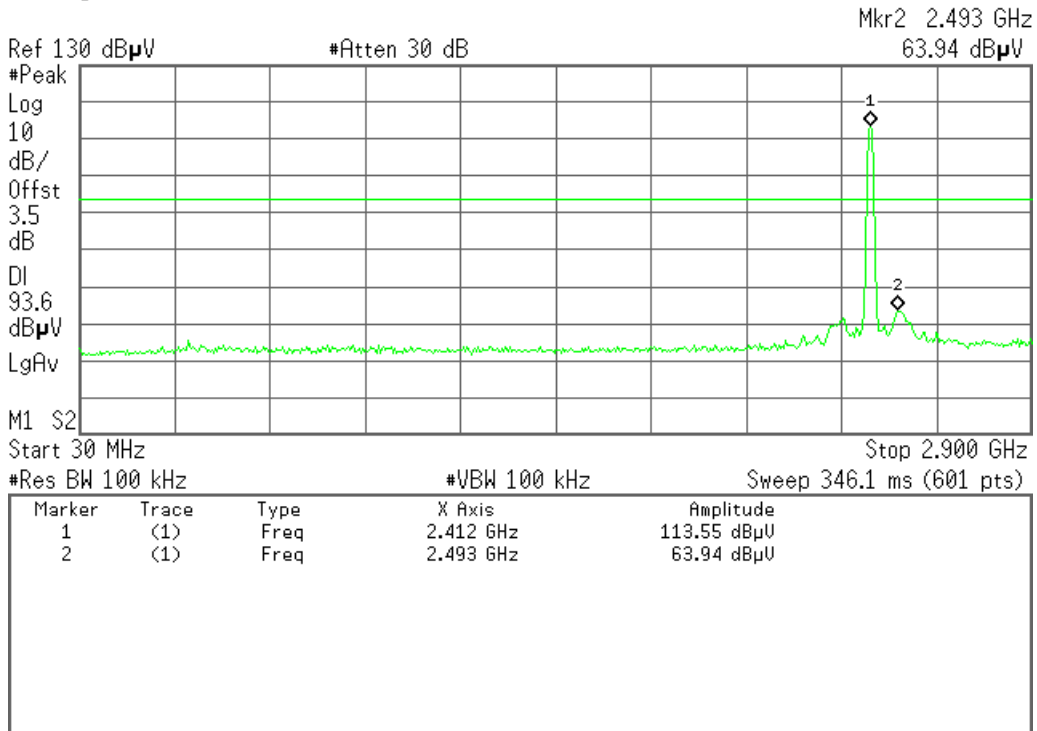
Test Plot

(IEEE 802.11b mode)

CH Low (30MHz ~2.9GHz)

Agilent 15:36:43 Sep 20, 2011

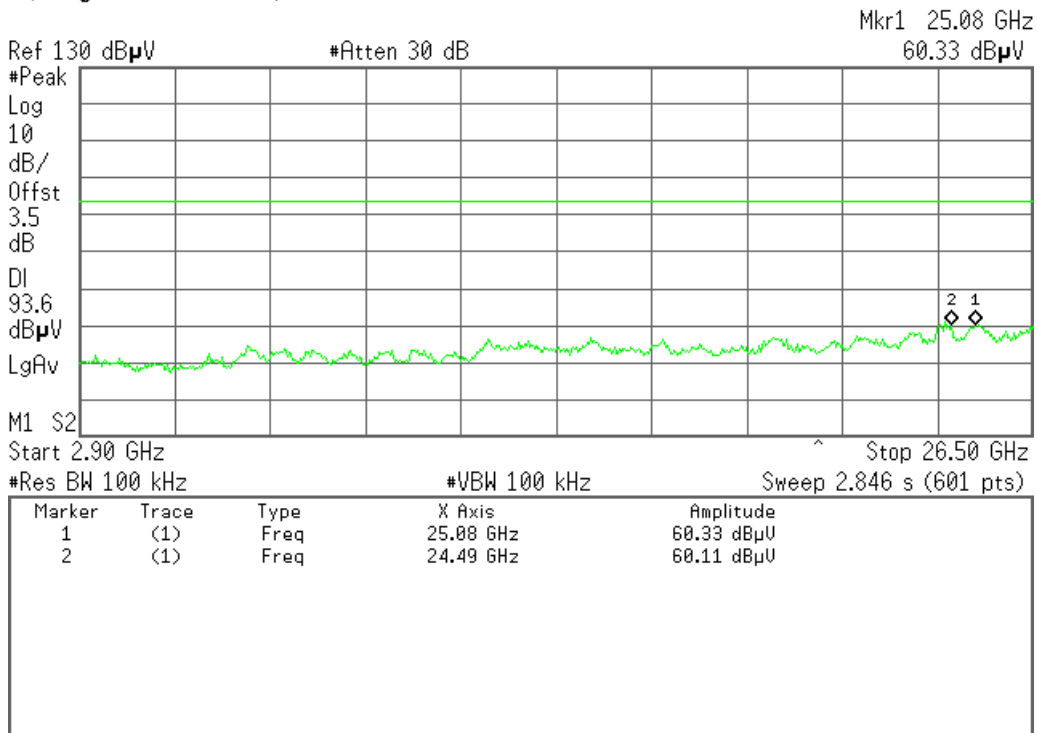
R T



CH Low (2.9GHz ~26.5GHz)

Agilent 15:38:21 Sep 20, 2011

R T

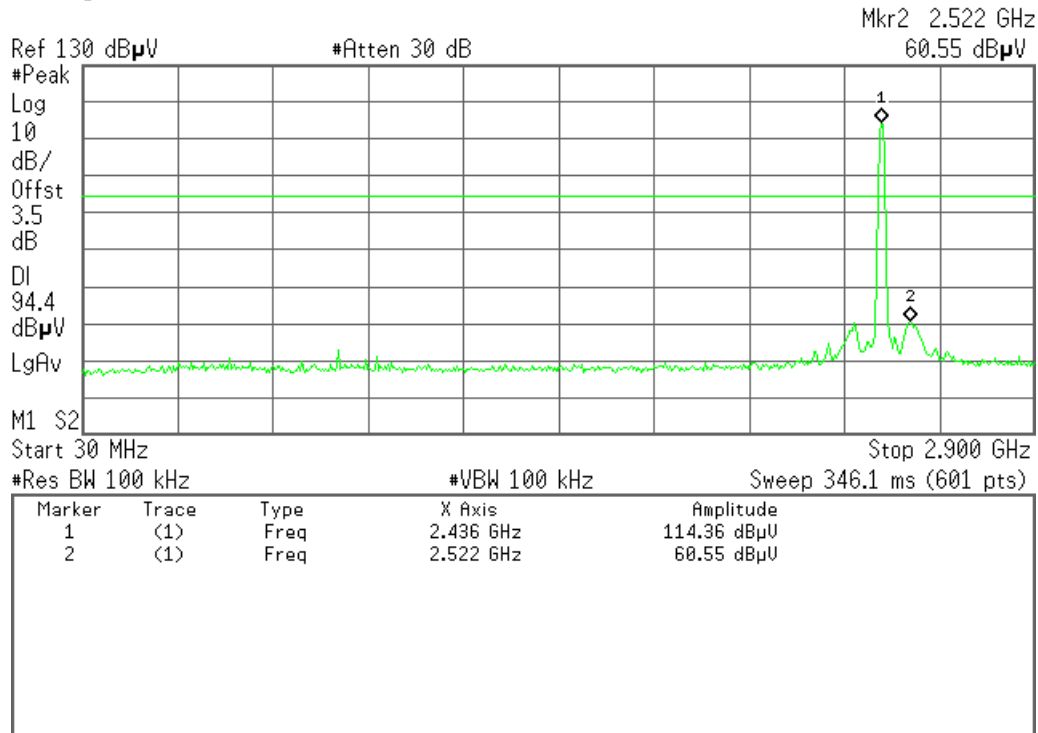




## CH Mid (30MHz ~2.9GHz)

Agilent 15:39:35 Sep 20, 2011

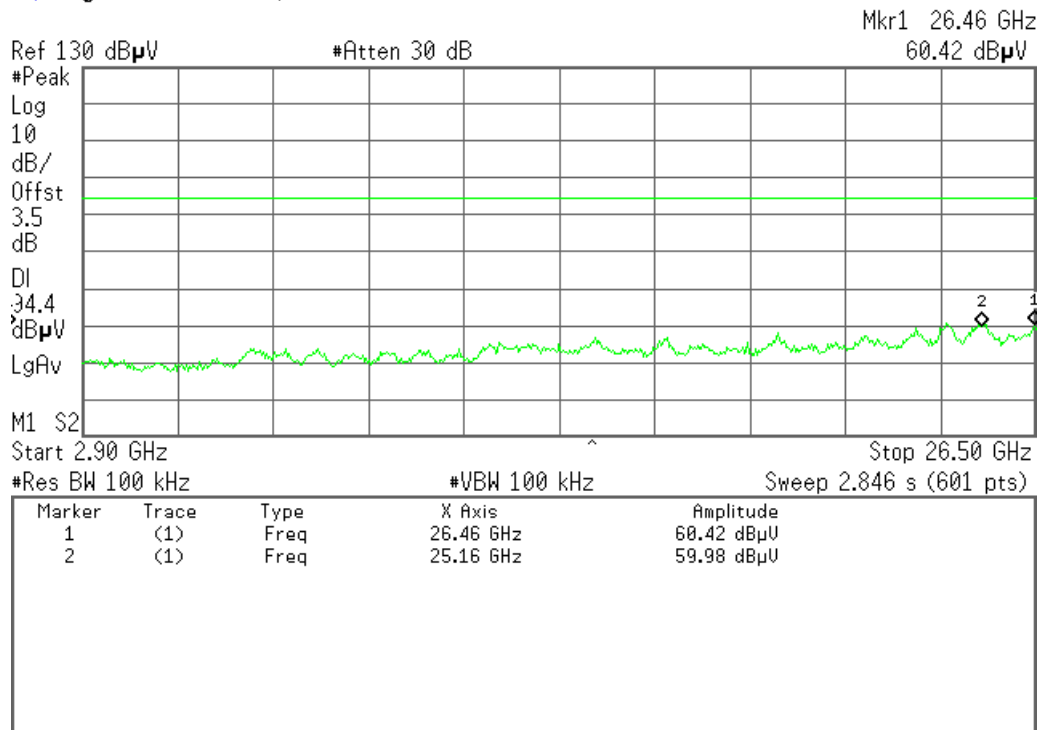
R T



## CH Mid (2.9GHz ~26.5GHz)

Agilent 15:40:23 Sep 20, 2011

R T



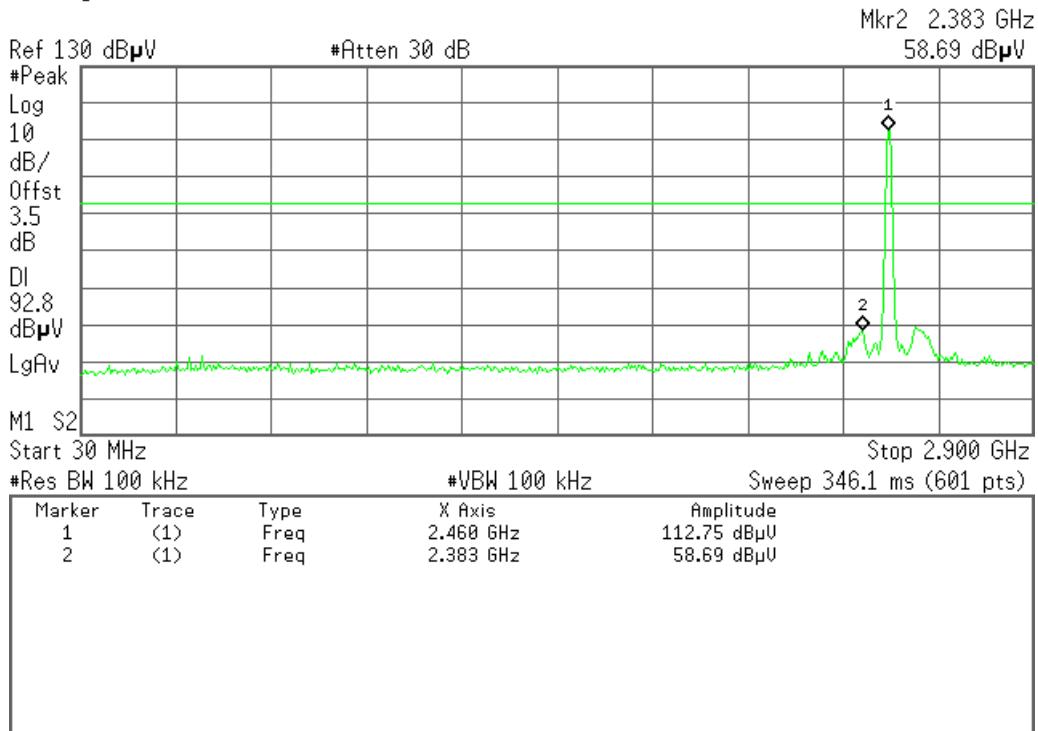




### CH High (30MHz ~2.9GHz)

Agilent 15:41:47 Sep 20, 2011

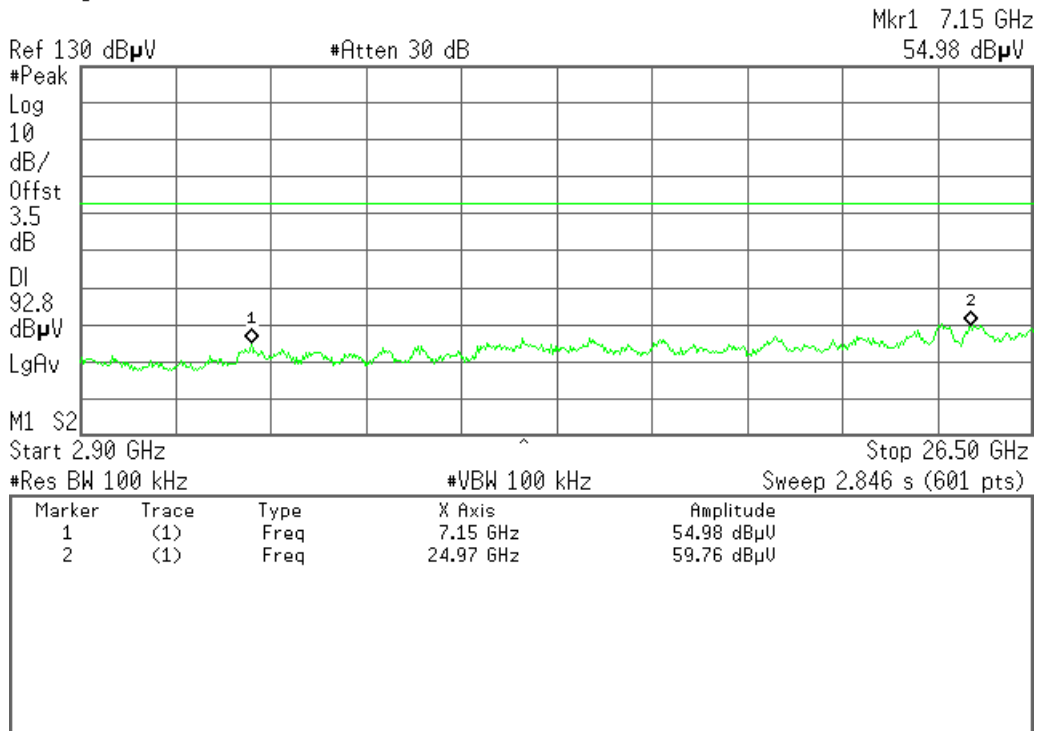
R T



### CH High( 2.9GHz ~26.5GHz)

Agilent 15:42:23 Sep 20, 2011

R T





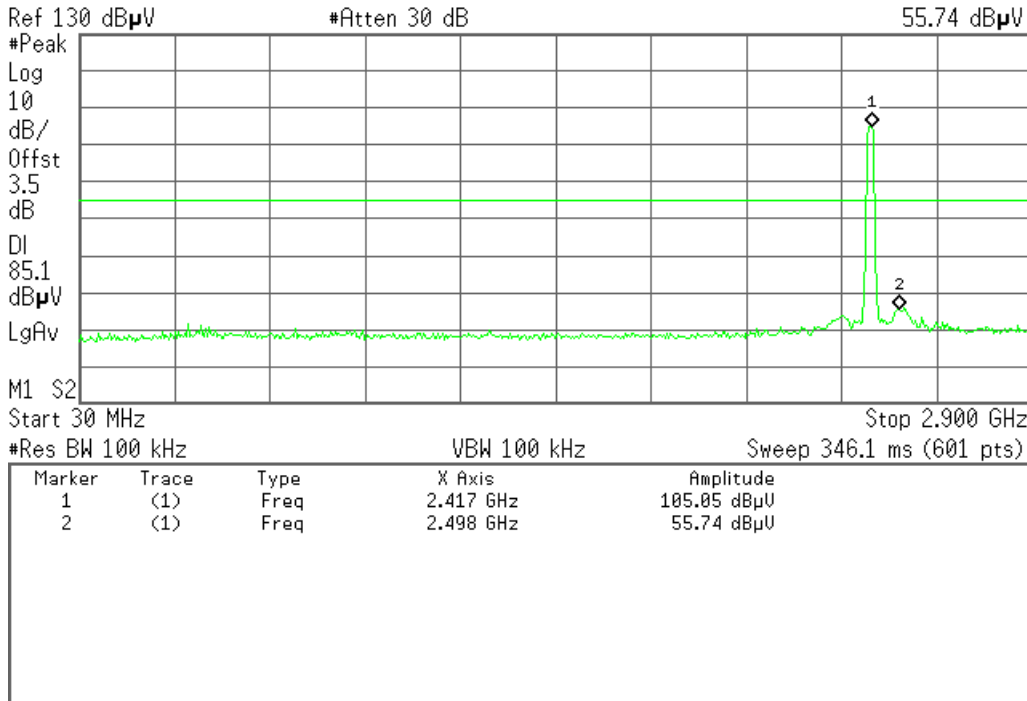
(IEEE 802.11g mode)

CH Low (30MHz ~2.9GHz)

Agilent 22:41:59 Sep 22, 2011

R T

Mkr2 2.498 GHz  
55.74 dBμV

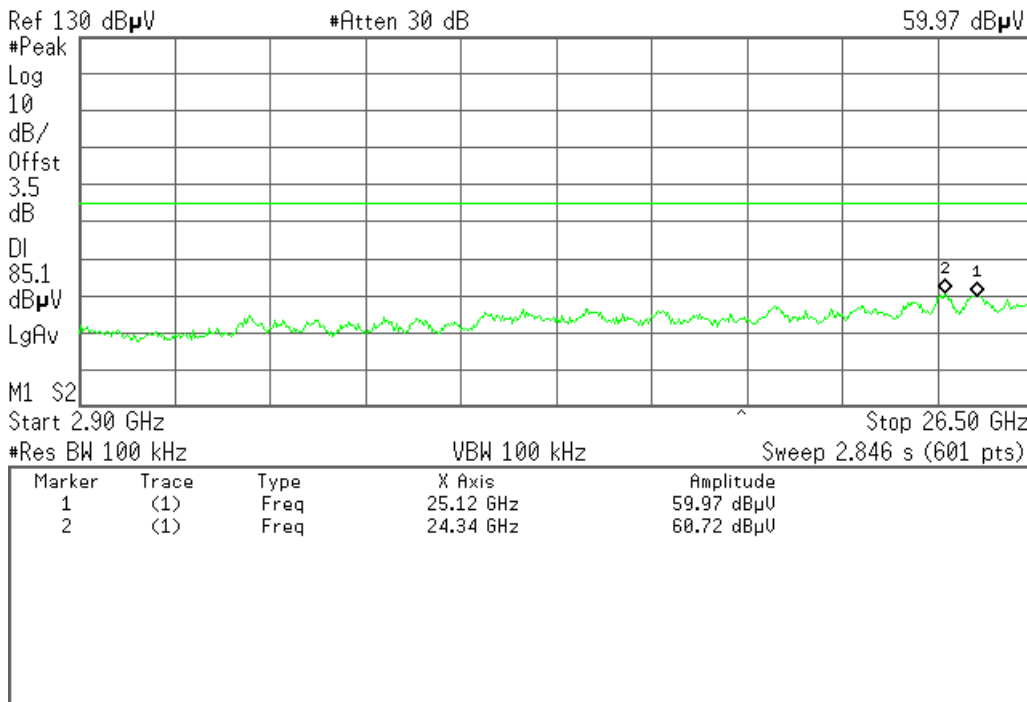


CH Low (2.9GHz ~26.5GHz)

Agilent 22:43:08 Sep 22, 2011

R T

Mkr1 25.12 GHz  
59.97 dBμV



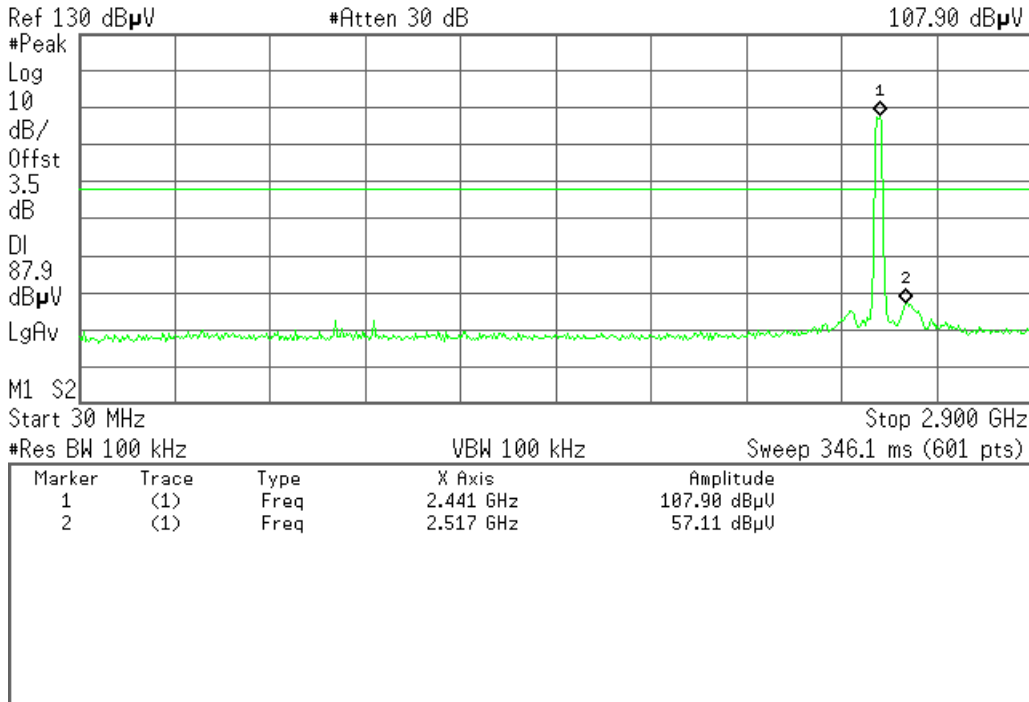


**CH Mid (30MHz ~2.9GHz)**

Agilent 22:44:54 Sep 22, 2011

R T

Mkr1 2.441 GHz  
107.90 dBμV

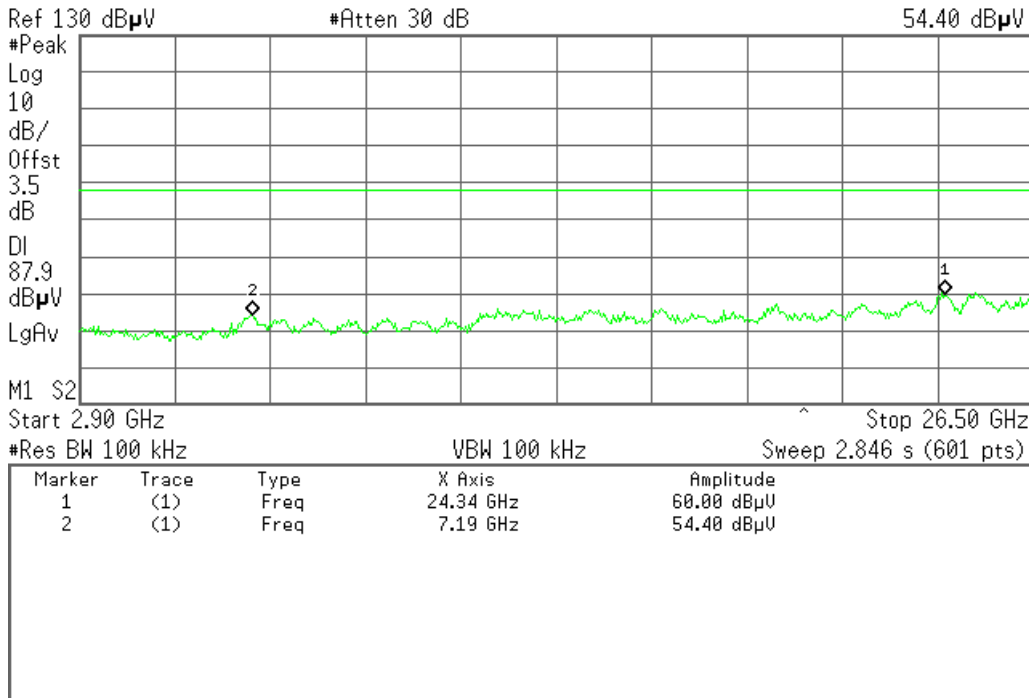


**CH Mid (2.9GHz ~26.5GHz)**

Agilent 22:45:42 Sep 22, 2011

R T

Mkr2 7.19 GHz  
54.40 dBμV



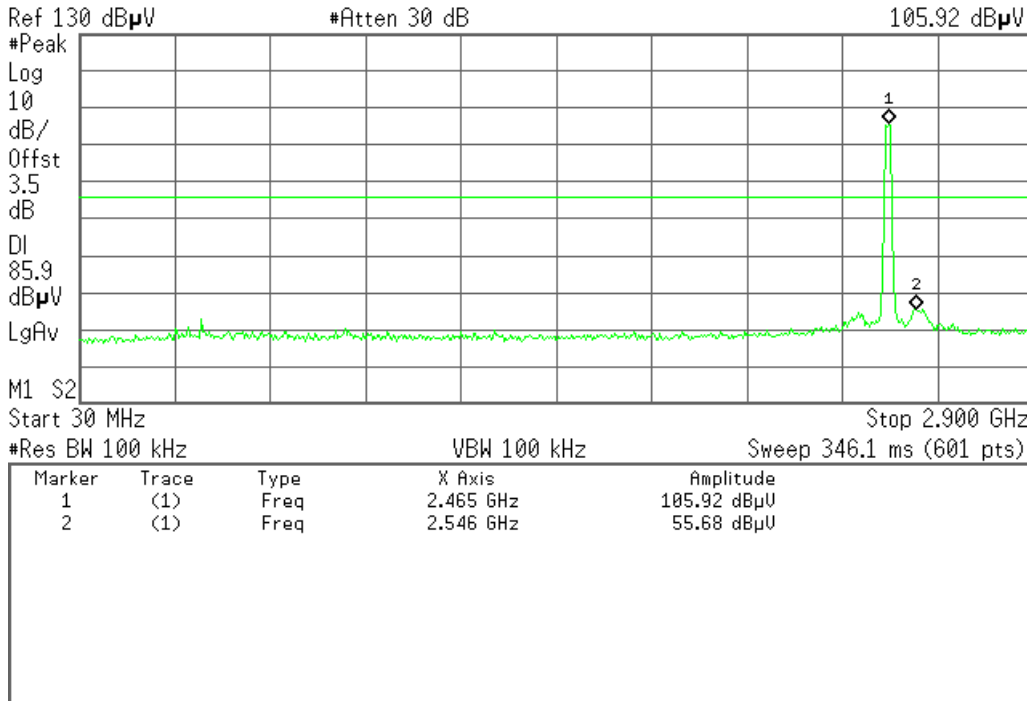


### CH High (30MHz ~2.9GHz)

Agilent 22:47:23 Sep 22, 2011

R T

Mkr1 2.465 GHz  
105.92 dB $\mu$ V

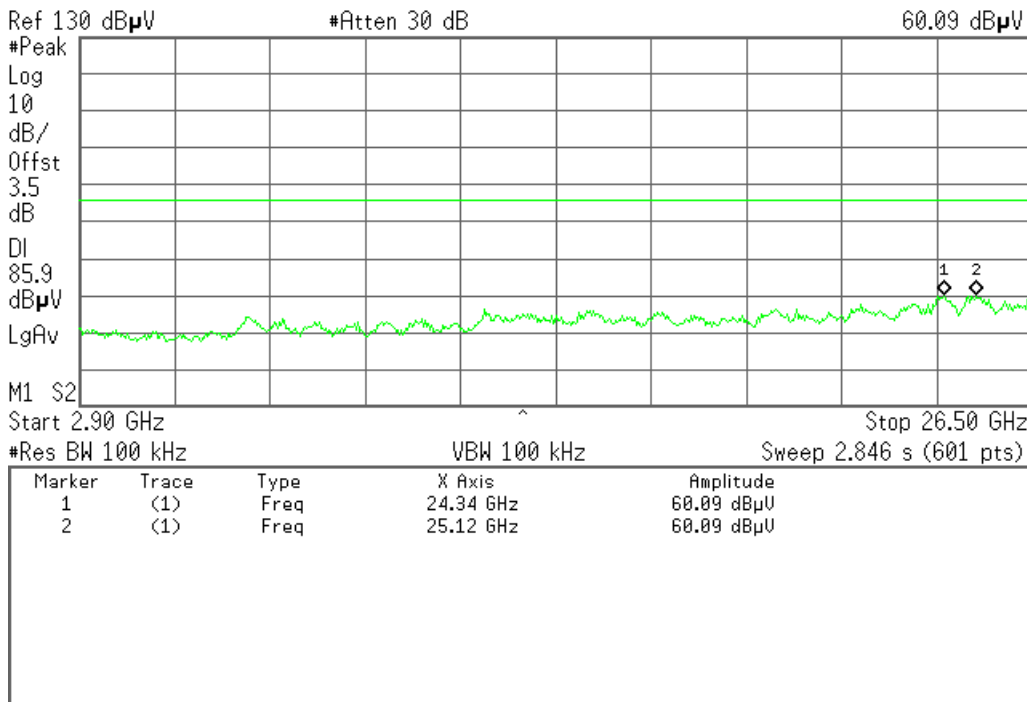


### CH High( 2.9GHz ~26.5GHz)

Agilent 22:48:05 Sep 22, 2011

R T

Mkr2 25.12 GHz  
60.09 dB $\mu$ V





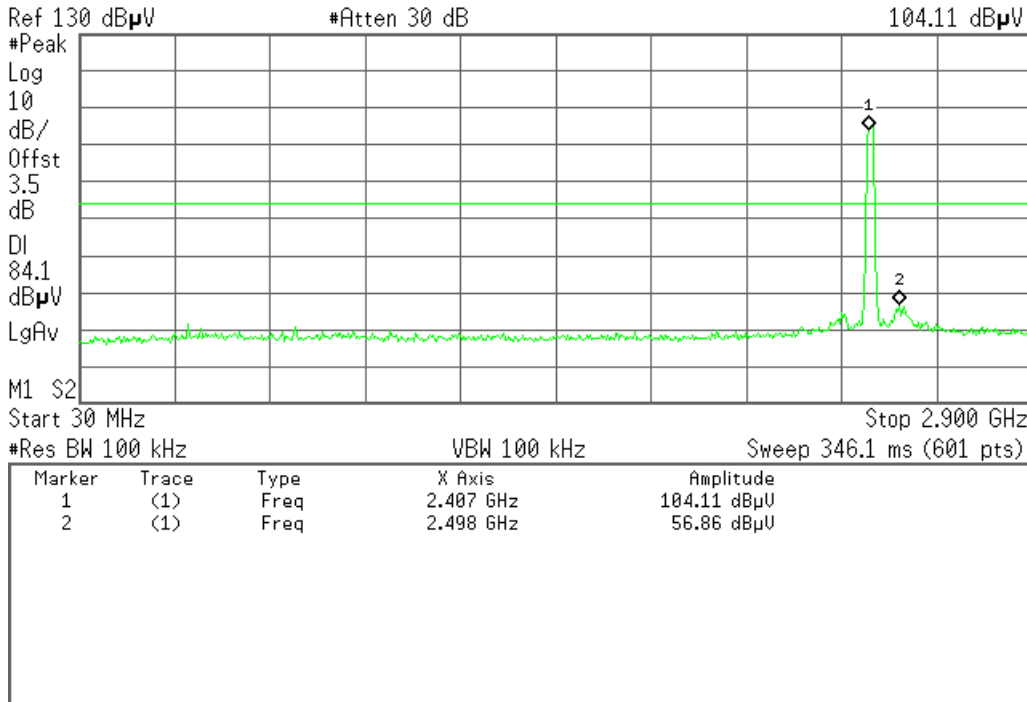
Test Plot (IEEE 802.11n HT20 MHz mode)

CH Low (30MHz ~2.9GHz)

Agilent 22:49:27 Sep 22, 2011

R T

Mkr1 2.407 GHz 104.11 dBµV

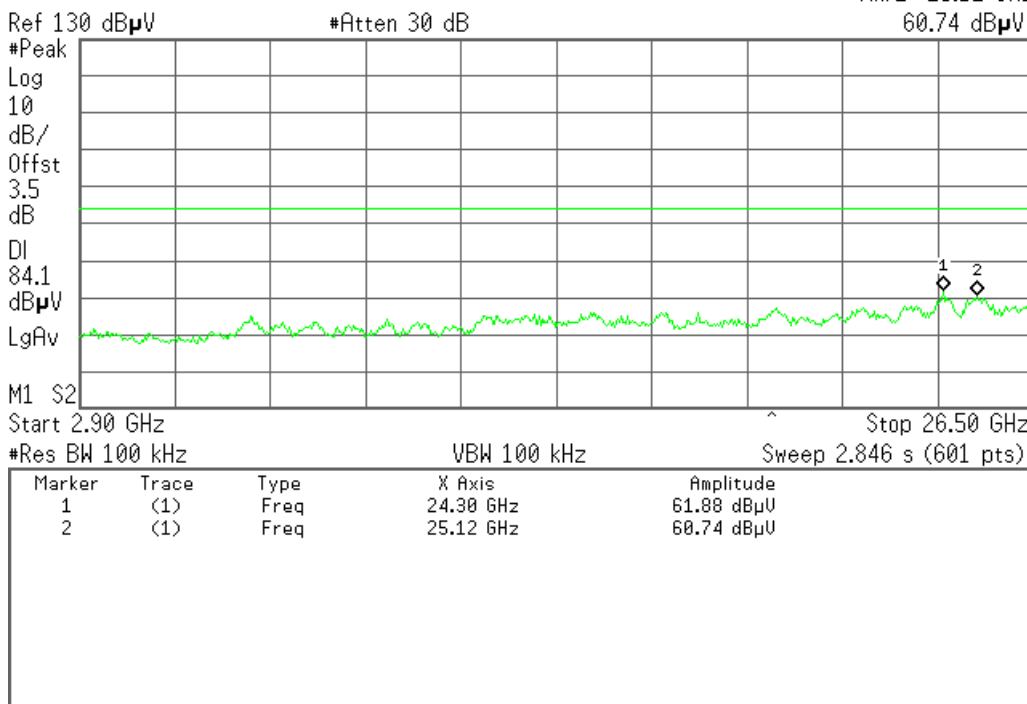


CH Low (2.9GHz ~26.5GHz)

Agilent 22:50:17 Sep 22, 2011

R T

Mkr2 25.12 GHz 60.74 dBµV



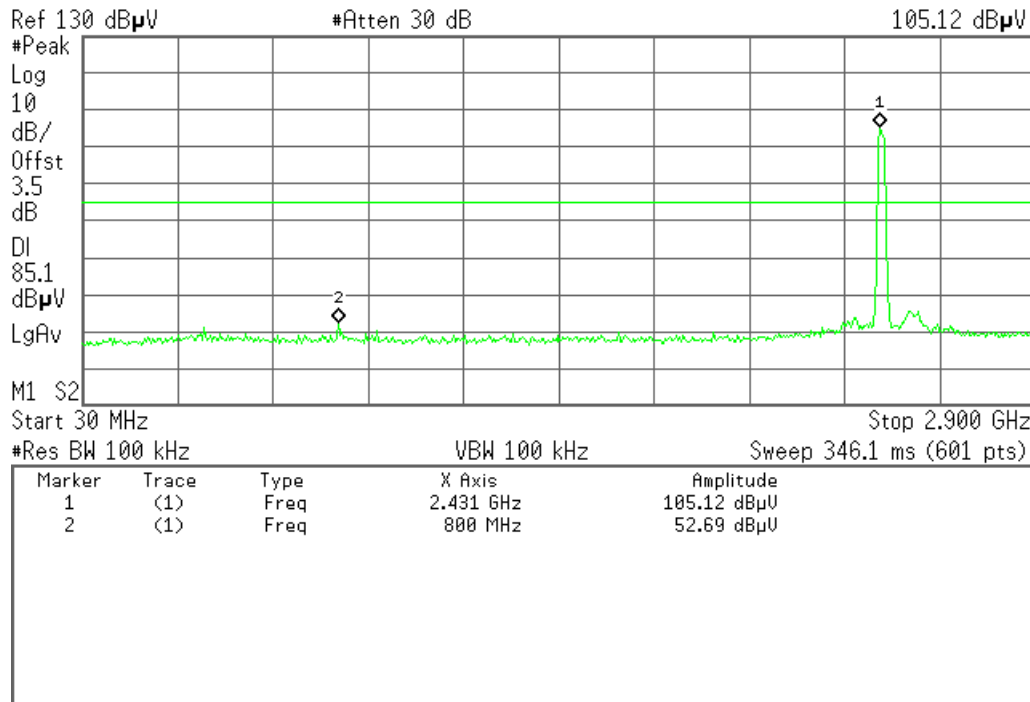


## CH Mid (30MHz ~2.9GHz)

Agilent 22:51:22 Sep 22, 2011

R T

Mkr1 2.431 GHz  
105.12 dB $\mu$ V

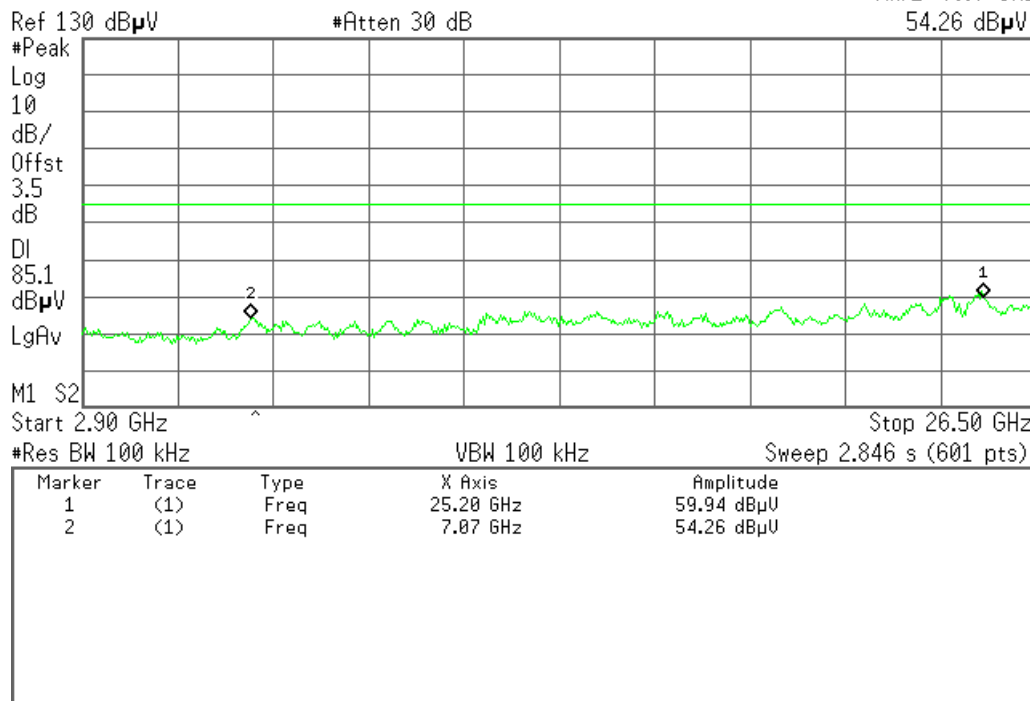


## CH Mid (2.9GHz ~26.5GHz)

Agilent 22:52:06 Sep 22, 2011

R T

Mkr2 7.07 GHz  
54.26 dB $\mu$ V



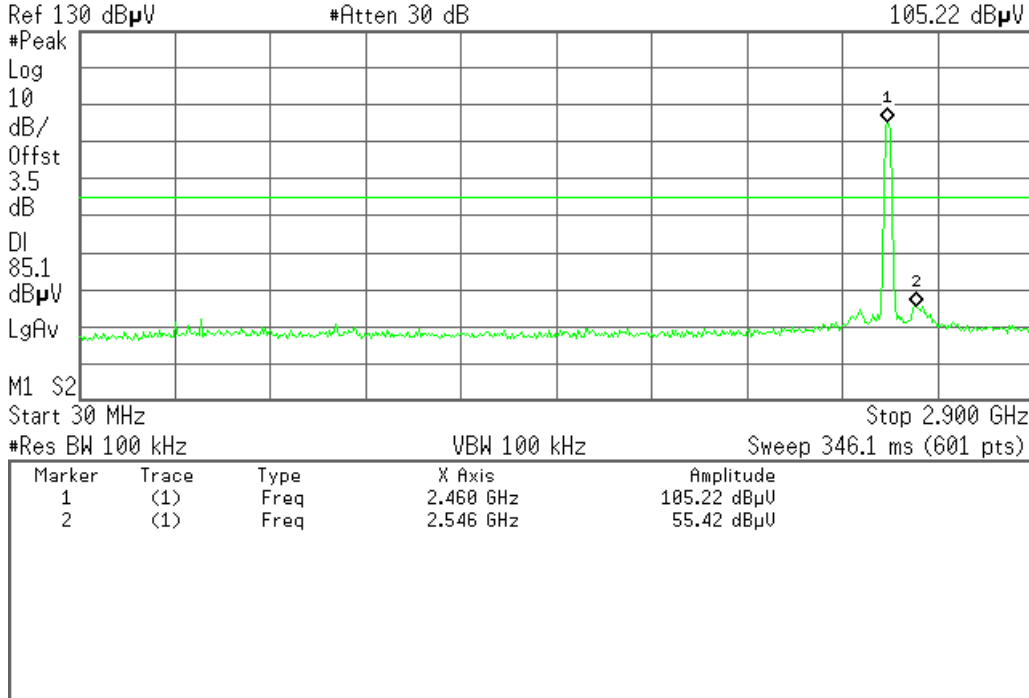


### CH High (30MHz ~2.9GHz)

Agilent 22:53:51 Sep 22, 2011

R T

Mkr1 2.460 GHz  
105.22 dBμV

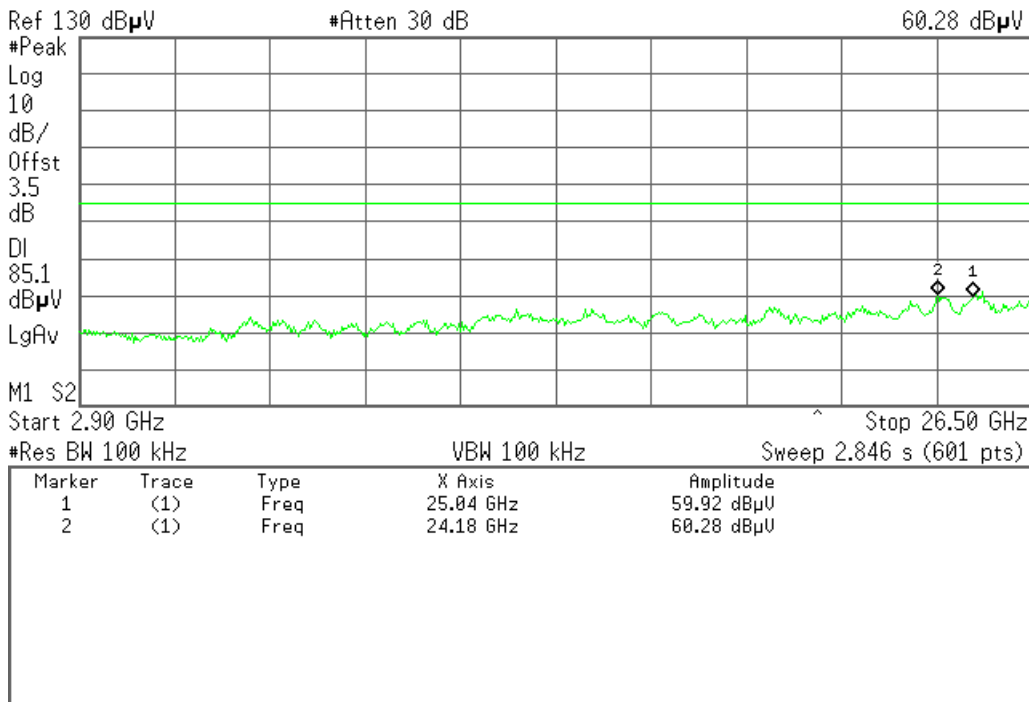


### CH High( 2.9GHz ~26.5GHz)

Agilent 22:54:27 Sep 22, 2011

R T

Mkr2 24.18 GHz  
60.28 dBμV





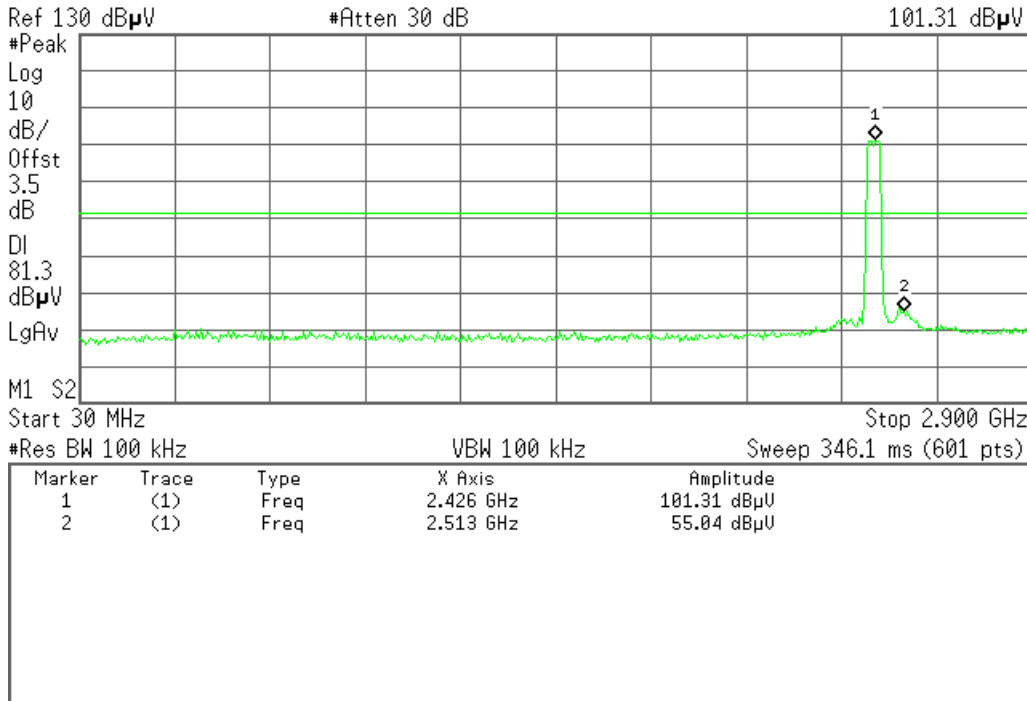
(IEEE 802.11n HT40 MHz mode

CH Low (30MHz ~2.9GHz)

Agilent 22:55:39 Sep 22, 2011

R T

Mkr1 2.426 GHz  
101.31 dBμV

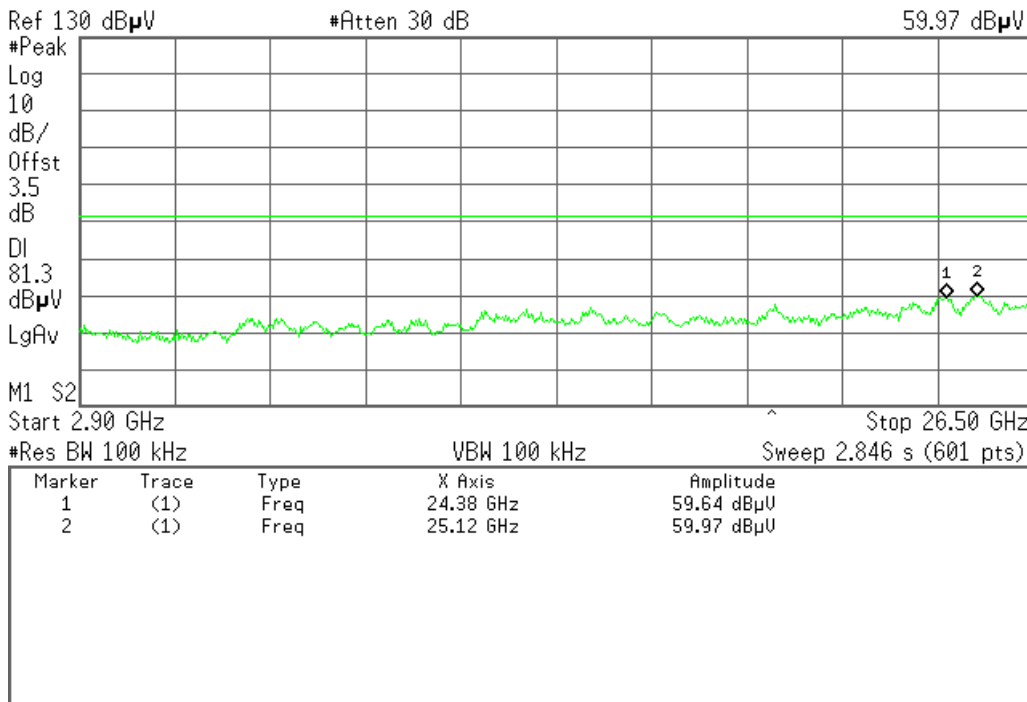


CH Low (2.9GHz ~26.5GHz)

Agilent 22:56:16 Sep 22, 2011

R T

Mkr2 25.12 GHz  
59.97 dBμV





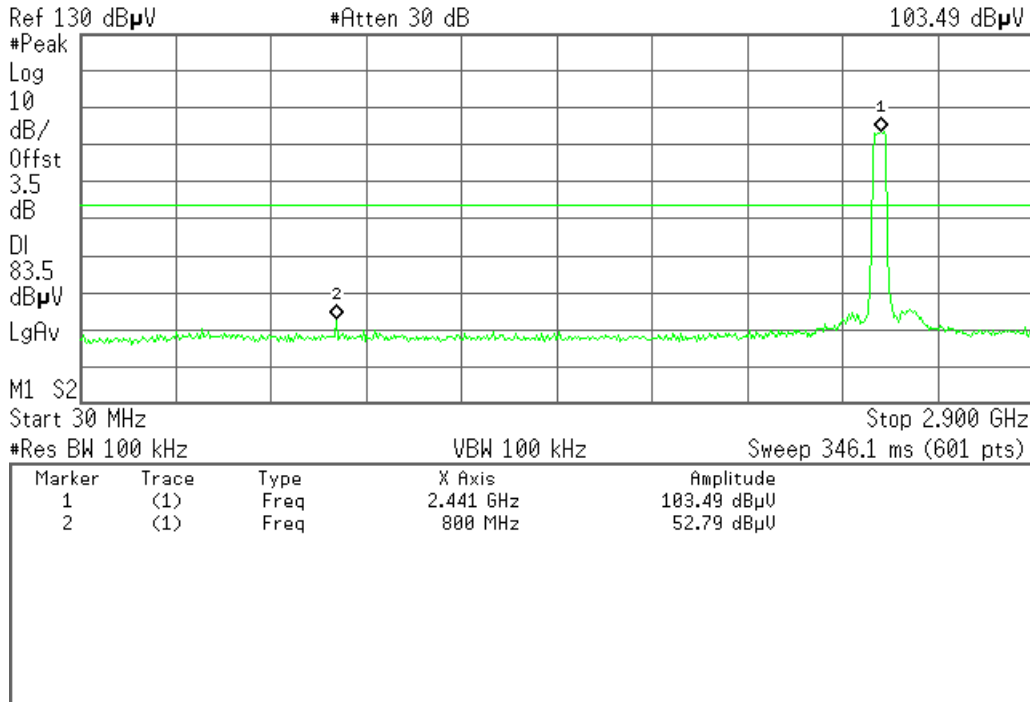


**CH Mid (30MHz ~2.9GHz)**

Agilent 22:57:09 Sep 22, 2011

R T

Mkr1 2.441 GHz  
103.49 dBμV

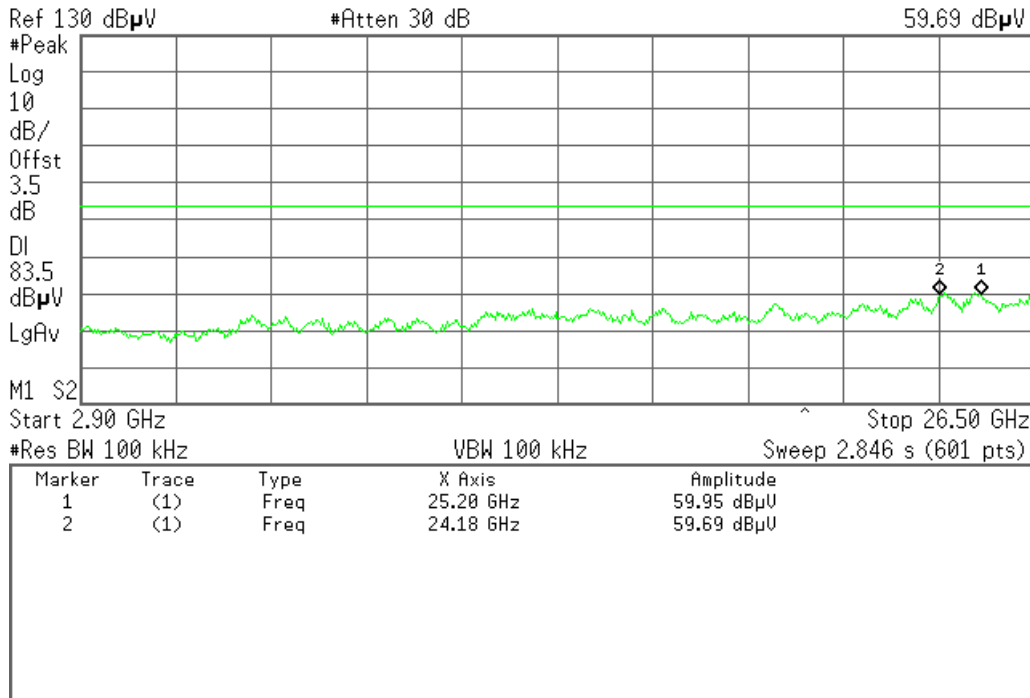


**CH Mid (2.9GHz ~26.5GHz)**

Agilent 22:57:50 Sep 22, 2011

R T

Mkr2 24.18 GHz  
59.69 dBμV



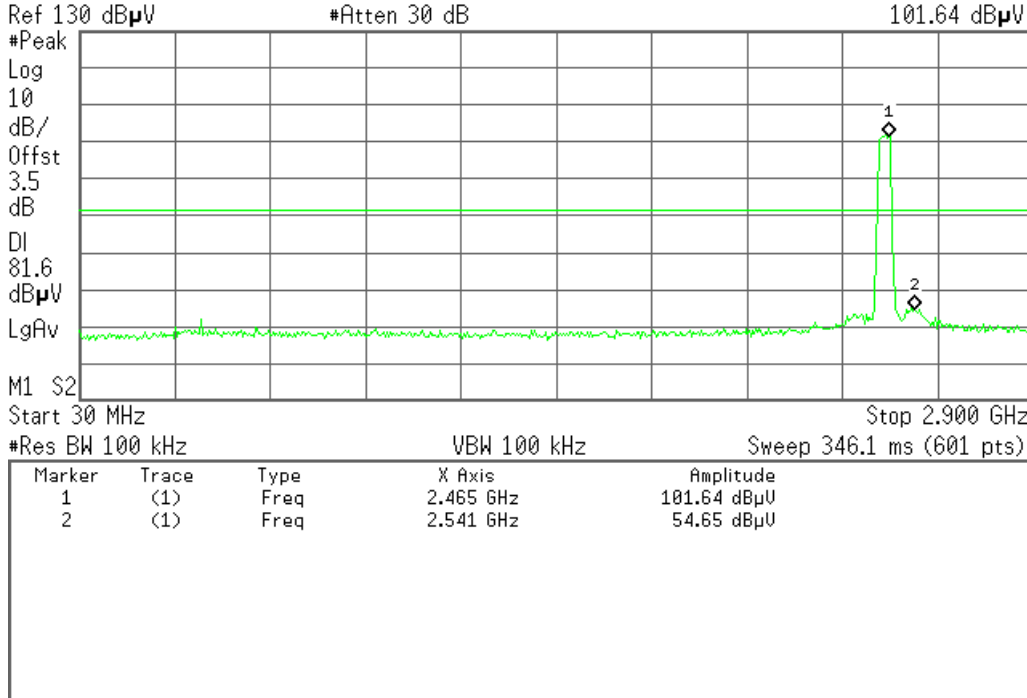


CH High (30MHz ~2.9GHz)

Agilent 22:59:03 Sep 22, 2011

R T

Mkr1 2.465 GHz  
101.64 dBμV

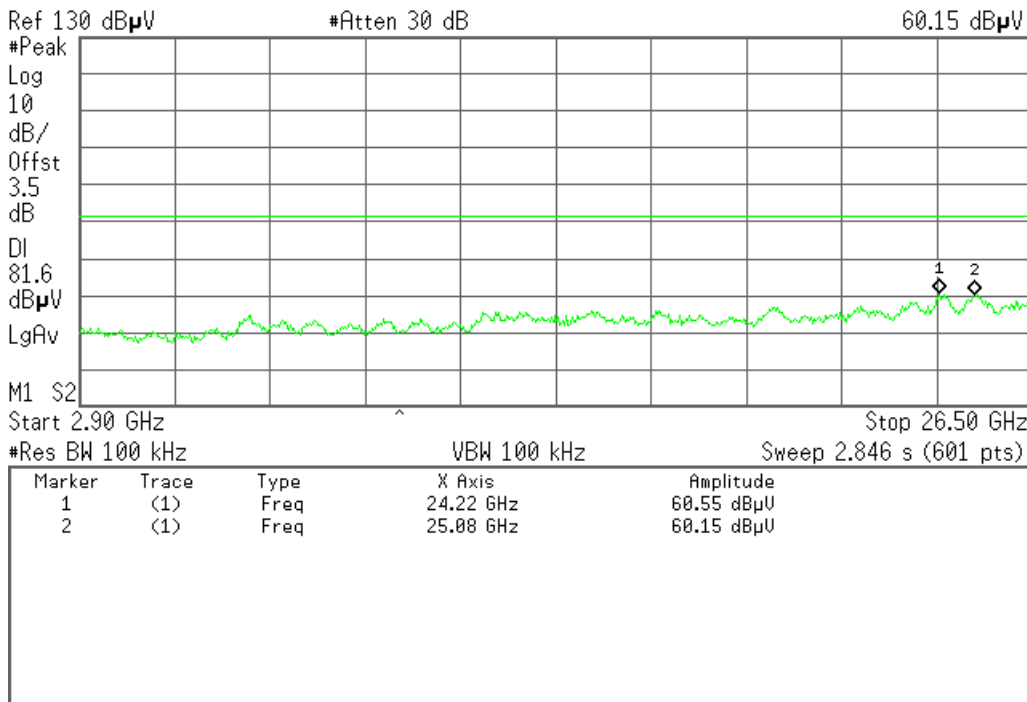


CH High( 2.9GHz ~26.5GHz)

Agilent 22:59:48 Sep 22, 2011

R T

Mkr2 25.08 GHz  
60.15 dBμV





**7.2.4.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT**

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

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

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

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

Frequency (MHz)	Field Strength (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

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	03/19/2011	03/19/2012
Amplifier	MITEQ	AM-1604-3000	1411843	03/18/2011	03/18/2012
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2011	03/18/2012
Bilog Antenna	SCHAFFNER	CBL6143	5082	06/03/2011	06/03/2012
Horn Antenna	SCHWARZBECK	BBHA9120D	D286	03/19/2011	03/19/2012
Loop Antenna	A、R、A	PLA-1030/B	1029	03/19/2011	03/19/2012
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/31/2011	03/31/2012
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.

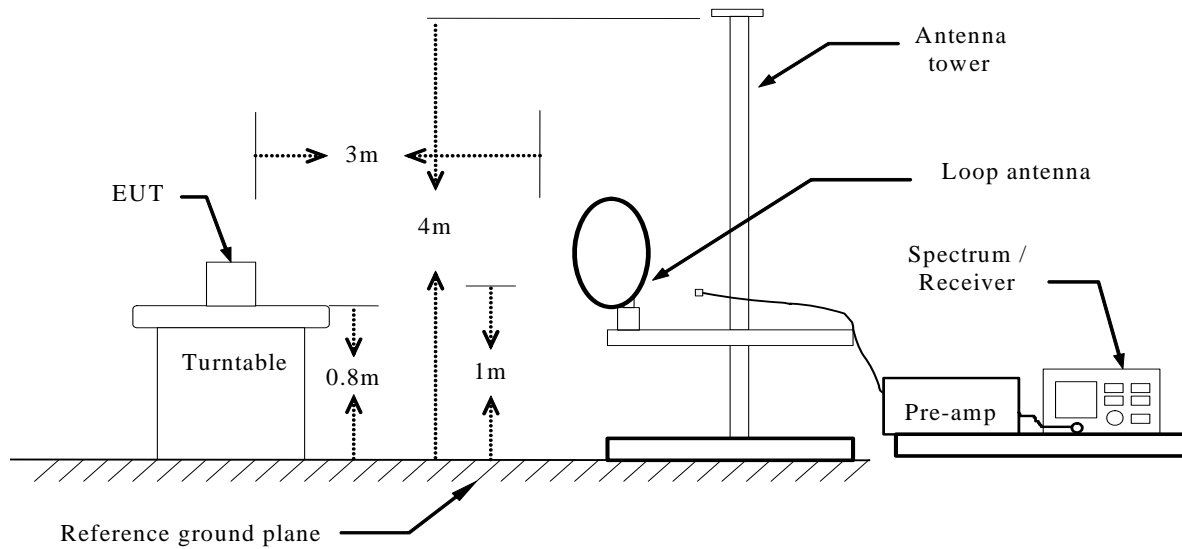
7.2.4.3. TEST PROCEDURE (please refer to measurement standard)

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

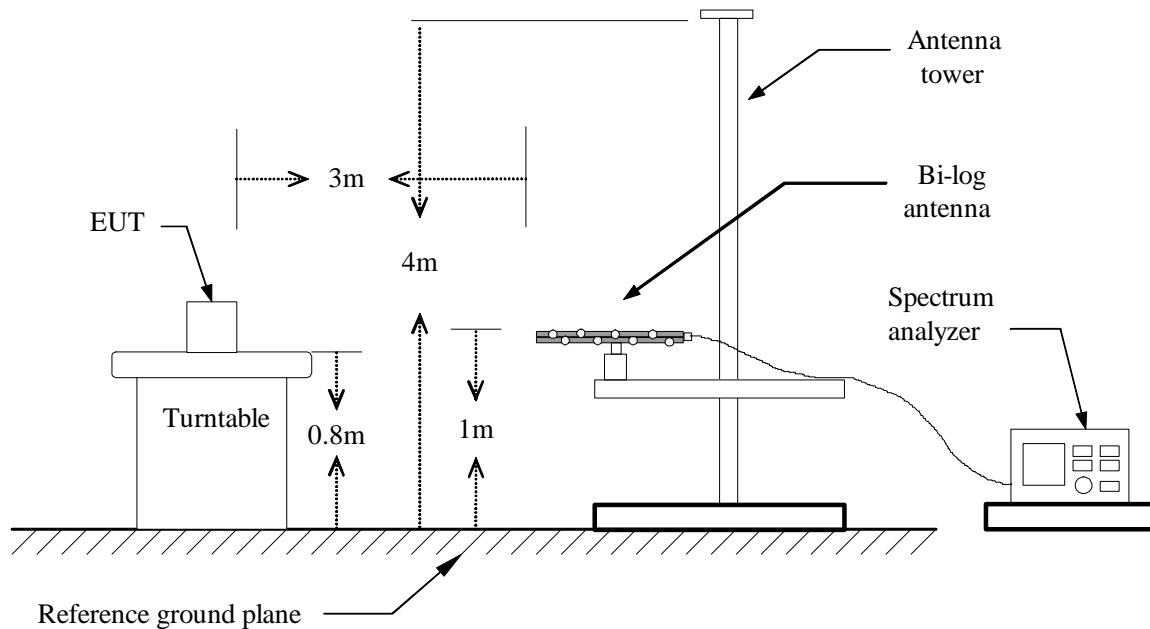


### 7.2.4.4. TEST SETUP

#### Below 30MHz

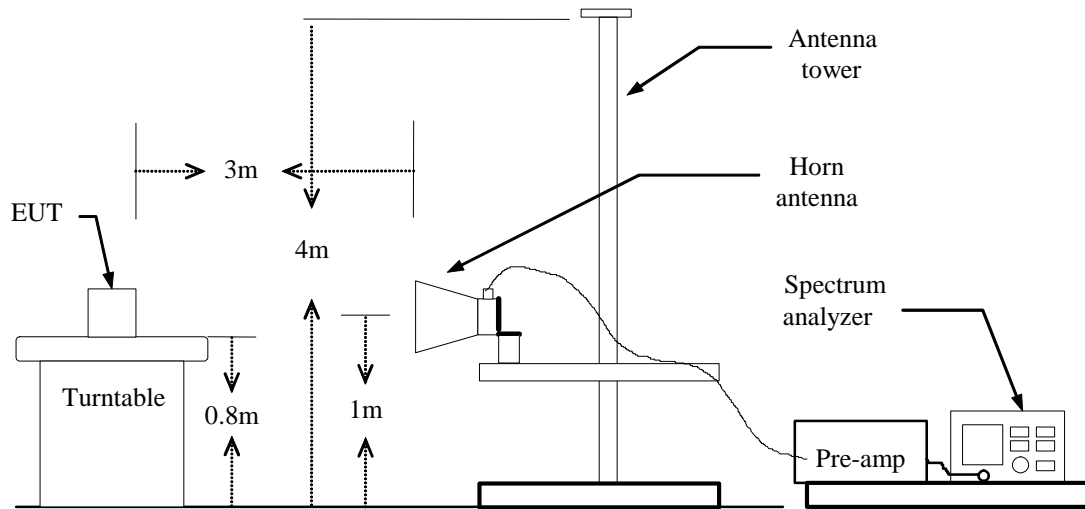


#### Below 1 GHz





Above 1 GHz



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



7.2.4.5. Data Sample:

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

Operation Mode: TX

Test Date: September 19,2011

Temperature: 24°C

Tested by: Sunday Hu

Humidity: 52% RH

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg)	Detector
1	312.9167	56.48	-18.26	38.22	46.00	-7.78	---	---	peak
2	364.6500	59.87	-16.60	43.27	46.00	-2.73	---	---	peak
3	416.3833	60.08	-15.36	44.72	46.00	-1.28	---	---	peak
4	521.4667	54.71	-13.14	41.57	46.00	-4.43	---	---	peak
5	573.2000	54.71	-12.51	42.20	46.00	-3.80	---	---	peak
6*	885.2167	53.74	-9.40	44.34	46.00	-1.66	---	---	peak

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

Notes:

- Measuring frequencies from 9kHz to the 1GHz.
- Radiated emissions measured in frequency range from 30MHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.
- 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.
- The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
- |                    |  |
|--------------------|--|
| Freq(MHz).         | = Emission frequency in MHz                    |
| Reading (dBuV/m)   | = Receiver reading                             |
| Corr. Factor (dB)  | = Antenna factor + Cable loss – Amplifier gain |
| Actual FS (dBuV/m) | = Reading (dBuV) + Corr. Factor (dB/m)         |
| Limit (dBuV/m)     | = Limit stated in standard                     |
| Safe Margin(dB)    | = Measured (dBuV/m) – Limits (dBuV/m)          |
| Ant. H/V           | = Current carrying line of reading             |
| Detector           | = Mark Peak Reading or Quasi-peak Reading      |





**Operation Mode:** TX  
**Temperature:** 24°C  
**Humidity:** 52% RH

**Test Date:** September 19,2011

**Tested by:**Sunday Hu

No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg)	Detector
1	156.1000	62.65	-21.82	40.83	43.50	-2.67	---	---	peak
2	312.9166	63.10	-18.26	44.84	46.00	-1.16	---	---	peak
3	416.3833	58.76	-15.36	43.40	46.00	-2.60	---	---	peak
4	728.4000	50.65	-11.22	39.43	46.00	-6.57	---	---	peak
5	885.2167	51.76	-9.40	42.36	46.00	-3.64	---	---	peak
6*	988.6833	49.29	-8.12	41.17	54.00	-12.83	---	---	peak

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

**Notes:**

- Measuring frequencies from 9kHz to the 1GHz.
- Radiated emissions measured in frequency range from 30MHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.
- 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.
- The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
- |                    |  |
|--------------------|--|
| Freq(MHz).         | = Emission frequency in MHz                    |
| Reading (dBuV/m)   | = Receiver reading                             |
| Corr. Factor (dB)  | = Antenna factor + Cable loss – Amplifier gain |
| Actual FS (dBuV/m) | = Reading (dBuV) + Corr. Factor (dB/m)         |
| Limit (dBuV/m)     | = Limit stated in standard                     |
| Safe Margin(dB)    | = Measured (dBuV/m) – Limits (dBuV/m)          |
| Ant. H/V           | = Current carrying line of reading             |
| Detector           | = Mark Peak Reading or Quasi-peak Reading      |



## Above 1 GHz

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

**Test Date:** September 19, 2011

**Temperature:** 24°C

**Tested by:** Sunday Hu

**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1151.6667	53.79	-11.55	42.24	74.00	-31.76	V	Peak
1455.0000	50.44	-10.28	40.16	74.00	-33.84	V	Peak
1560.0000	50.38	-10.31	40.07	74.00	-33.93	V	Peak
2855.0000	48.13	-6.95	41.18	74.00	-32.82	V	Peak
3240.0000	46.75	-5.41	41.34	74.00	-32.66	V	Peak
4126.6667	46.54	-3.16	43.38	74.00	-30.62	V	Peak
1046.6667	56.10	-11.82	44.28	74.00	-29.72	H	Peak
1116.6667	54.96	-11.64	43.32	74.00	-30.68	H	Peak
2120.0000	48.83	-9.29	39.54	74.00	-34.46	H	Peak
2820.0000	47.55	-7.18	40.37	74.00	-33.63	H	Peak
4803.3333	46.07	-0.64	45.43	74.00	-28.57	H	Peak
5620.0000	45.50	1.61	47.11	74.00	-26.89	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.  $\text{Margin (dB)} = \text{Remark result (dBuV/m)} - \text{Average limit (dBuV/m)}$ .



Operation Mode: TX / IEEE 802.11b / CH Mid

Test Date: September 19,2011

Temperature: 24°C

Tested by: Sunday Hu

Humidity: 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2843.3333	48.19	-7.03	41.16	74.00	-32.84	V	Peak
3613.3333	45.68	-3.81	41.87	74.00	-32.13	V	Peak
4535.0000	45.95	-1.92	44.03	74.00	-29.97	V	Peak
4861.6667	47.48	-0.45	47.03	74.00	-26.97	V	Peak
5795.0000	44.88	2.56	47.44	74.00	-26.56	V	Peak
6145.0000	45.13	3.58	48.71	74.00	-25.29	V	Peak
1046.6667	54.90	-11.82	43.08	74.00	-30.92	H	Peak
1198.3333	56.79	-11.42	45.37	74.00	-28.63	H	Peak
1513.3333	54.05	-10.31	43.74	74.00	-30.26	H	Peak
3240.0000	47.35	-5.41	41.94	74.00	-32.06	H	Peak
4861.6667	46.50	-0.45	46.05	74.00	-27.95	H	Peak
6285.0000	44.92	3.76	48.68	74.00	-25.32	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:** September 19, 2011**Temperature:** 24°C**Tested by:** Sunday Hu**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1303.3333	51.20	-10.87	40.33	74.00	-33.67	V	Peak
1408.3333	52.15	-10.25	41.90	74.00	-32.10	V	Peak
1455.0000	52.74	-10.28	42.46	74.00	-31.54	V	Peak
2563.3333	48.57	-9.05	39.52	74.00	-34.48	V	Peak
4418.3333	45.86	-2.21	43.65	74.00	-30.35	V	Peak
4920.0000	48.52	-0.27	48.25	74.00	-25.75	V	Peak
1046.6667	53.38	-11.82	41.56	74.00	-32.44	H	Peak
1560.0000	50.24	-10.31	39.93	74.00	-34.07	H	Peak
1735.0000	48.70	-10.20	38.50	74.00	-35.50	H	Peak
2155.0000	49.99	-9.35	40.64	74.00	-33.36	H	Peak
3310.0000	47.08	-5.26	41.82	74.00	-32.18	H	Peak
4920.0000	47.49	-0.27	47.22	74.00	-26.78	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

Test Date: September 19,2011

Temperature: 24°C

Tested by: Sunday Hu

Humidity: 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1046.6667	57.18	-11.82	45.36	74.00	-28.64	V	Peak
1140.0000	59.18	-11.58	47.60	74.00	-26.40	V	Peak
1350.0000	53.10	-10.57	42.53	74.00	-31.47	V	Peak
1583.3333	52.01	-10.31	41.70	74.00	-32.30	V	Peak
4803.3333	44.92	-0.64	44.28	74.00	-29.72	V	Peak
6215.0000	45.42	3.81	49.23	74.00	-24.77	V	Peak
1046.6667	58.63	-11.82	46.81	74.00	-27.19	H	Peak
1198.3333	57.91	-11.42	46.49	74.00	-27.51	H	Peak
1303.3333	58.47	-10.87	47.60	74.00	-26.40	H	Peak
2855.0000	47.20	-6.95	40.25	74.00	-33.75	H	Peak
3811.6667	46.51	-3.86	42.65	74.00	-31.35	H	Peak
6576.6667	44.95	4.13	49.08	74.00	-24.92	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 Mid**Test Date:** September 19,2011**Temperature:** 24°C**Tested by:** Sunday Hu**Humidity:** 52 % RH

Frequency (MHz)	Reading (dBUV)	Correction Factor (dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1245.0000	51.76	-11.18	40.58	74.00	-33.42	V	Peak
1618.3333	52.97	-10.29	42.68	74.00	-31.32	V	Peak
4931.6667	45.45	-0.23	45.22	74.00	-28.78	V	Peak
5760.0000	44.82	2.37	47.19	74.00	-26.81	V	Peak
6250.0000	44.88	3.79	48.67	74.00	-25.33	V	Peak
7218.3333	44.66	5.02	49.68	74.00	-24.32	V	Peak
1198.3333	55.72	-11.42	44.30	74.00	-29.70	H	Peak
1303.3333	52.82	-10.87	41.95	74.00	-32.05	H	Peak
3228.3333	46.74	-5.43	41.31	74.00	-32.69	H	Peak
5036.6667	46.32	0.10	46.42	74.00	-27.58	H	Peak
5760.0000	45.48	2.37	47.85	74.00	-26.15	H	Peak
6541.6667	45.05	4.04	49.09	74.00	-24.91	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:** September 19,2011

**Temperature:** 24°C

**Tested by:** Sunday Hu

**Humidity:** 52 % RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1151.6667	56.41	-11.55	44.86	74.00	-29.14	V	Peak
1350.0000	53.22	-10.57	42.65	74.00	-31.35	V	Peak
2995.0000	47.37	-5.99	41.38	74.00	-32.62	V	Peak
5445.0000	46.29	1.12	47.41	74.00	-26.59	V	Peak
6145.0000	44.82	3.58	48.40	74.00	-25.60	V	Peak
6926.6667	45.42	4.36	49.78	74.00	-24.22	V	Peak
1046.6667	59.51	-11.82	47.69	74.00	-26.31	H	Peak
1198.3333	60.43	-11.42	49.01	74.00	-24.99	H	Peak
1303.3333	55.81	-10.87	44.94	74.00	-29.06	H	Peak
6250.0000	45.48	3.79	49.27	74.00	-24.73	H	Peak
6670.0000	45.53	4.23	49.76	74.00	-24.24	H	Peak
7766.6667	45.50	6.01	51.51	74.00	-22.49	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:** September 19,2011  
**Temperature:** 24°C    **Tested by:** Sunday Hu  
**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1046.6667	56.42	-11.82	44.60	74.00	-29.40	V	Peak
1140.0000	58.85	-11.58	47.27	74.00	-26.73	V	Peak
1560.0000	52.02	-10.31	41.71	74.00	-32.29	V	Peak
4196.6667	46.25	-2.94	43.31	74.00	-30.69	V	Peak
5118.3333	44.91	0.34	45.25	74.00	-28.75	V	Peak
5900.0000	45.07	2.76	47.83	74.00	-26.17	V	Peak
1046.6667	54.11	-11.82	42.29	74.00	-31.71	H	Peak
1175.0000	54.71	-11.49	43.22	74.00	-30.78	H	Peak
1221.6667	54.36	-11.31	43.05	74.00	-30.95	H	Peak
2820.0000	47.99	-7.18	40.81	74.00	-33.19	H	Peak
4931.6667	45.16	-0.23	44.93	74.00	-29.07	H	Peak
6821.6667	45.91	4.31	50.22	74.00	-23.78	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:** September 19,2011  
**Temperature:** 24°C    **Tested by:** Sunday Hu  
**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1116.6667	53.90	-11.64	42.26	74.00	-31.74	V	Peak
1350.0000	53.10	-10.57	42.53	74.00	-31.47	V	Peak
1513.3333	53.29	-10.31	42.98	74.00	-31.02	V	Peak
1793.3333	50.33	-10.17	40.16	74.00	-33.84	V	Peak
3625.0000	46.10	-3.81	42.29	74.00	-31.71	V	Peak
6285.0000	46.10	3.76	49.86	74.00	-24.14	V	Peak
1198.3333	55.46	-11.42	44.04	74.00	-29.96	H	Peak
1350.0000	54.49	-10.57	43.92	74.00	-30.08	H	Peak
1455.0000	49.97	-10.28	39.69	74.00	-34.31	H	Peak
2120.0000	48.41	-9.29	39.12	74.00	-34.88	H	Peak
2586.6667	48.29	-8.77	39.52	74.00	-34.48	H	Peak
6378.3333	44.64	3.70	48.34	74.00	-25.66	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:** September 19,2011

**Temperature:** 24°C **Tested by:** Sunday Hu

**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1140.0000	59.03	-11.58	47.45	74.00	-26.55	V	Peak
1350.0000	52.43	-10.57	41.86	74.00	-32.14	V	Peak
3228.3333	48.07	-5.43	42.64	74.00	-31.36	V	Peak
5060.0000	44.95	0.17	45.12	74.00	-28.88	V	Peak
5375.0000	45.65	0.96	46.61	74.00	-27.39	V	Peak
6553.3333	44.84	4.07	48.91	74.00	-25.09	V	Peak
1093.3333	55.16	-11.71	43.45	74.00	-30.55	H	Peak
1198.3333	56.02	-11.42	44.60	74.00	-29.40	H	Peak
1455.0000	52.30	-10.28	42.02	74.00	-31.98	H	Peak
4255.0000	46.19	-2.75	43.44	74.00	-30.56	H	Peak
5830.0000	45.53	2.64	48.17	74.00	-25.83	H	Peak
7055.0000	44.95	4.56	49.51	74.00	-24.49	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:** September 19,2011  
**Temperature:** 24°C    **Tested by:** Sunday Hu  
**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1291.6667	50.05	-10.93	39.12	74.00	-34.88	V	Peak
2236.6667	48.14	-9.50	38.64	74.00	-35.36	V	Peak
2855.0000	47.28	-6.95	40.33	74.00	-33.67	V	Peak
4966.6667	46.40	-0.12	46.28	74.00	-27.72	V	Peak
5223.3333	45.17	0.64	45.81	74.00	-28.19	V	Peak
7731.6667	46.05	5.96	52.01	74.00	-21.99	V	Peak
1875.0000	48.77	-9.81	38.96	74.00	-35.04	H	Peak
2085.0000	47.90	-9.25	38.65	74.00	-35.35	H	Peak
3228.3333	46.56	-5.43	41.13	74.00	-32.87	H	Peak
4266.6667	46.40	-2.71	43.69	74.00	-30.31	H	Peak
5048.3333	45.73	0.13	45.86	74.00	-28.14	H	Peak
6250.0000	44.98	3.79	48.77	74.00	-25.23	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: September 19,2011

Temperature: 24°C

Tested by: Sunday Hu

Humidity: 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
2120.0000	48.32	-9.29	39.03	74.00	-34.97	V	Peak
2551.6667	48.93	-9.19	39.74	74.00	-34.26	V	Peak
3228.3333	46.67	-5.43	41.24	74.00	-32.76	V	Peak
4231.6667	45.13	-2.82	42.31	74.00	-31.69	V	Peak
5585.0000	45.20	1.46	46.66	74.00	-27.34	V	Peak
6215.0000	44.40	3.81	48.21	74.00	-25.79	V	Peak
1560.0000	48.66	-10.31	38.35	74.00	-35.65	H	Peak
1991.6667	47.79	-9.31	38.48	74.00	-35.52	H	Peak
2586.6667	48.19	-8.77	39.42	74.00	-34.58	H	Peak
2831.6667	47.92	-7.10	40.82	74.00	-33.18	H	Peak
3683.3333	46.29	-3.83	42.46	74.00	-31.54	H	Peak
6261.6667	45.13	3.78	48.91	74.00	-25.09	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:** September 19,2011

**Temperature:** 24°C

**Tested by:** Sunday Hu

**Humidity:** 52% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1875.0000	48.22	-9.81	38.41	74.00	-35.59	V	Peak
2551.6667	49.06	-9.19	39.87	74.00	-34.13	V	Peak
2808.3333	47.72	-7.26	40.46	74.00	-33.54	V	Peak
3776.6667	46.11	-3.87	42.24	74.00	-31.76	V	Peak
4698.3333	44.67	-1.21	43.46	74.00	-30.54	V	Peak
5701.6667	45.22	2.05	47.27	74.00	-26.73	V	Peak
1140.0000	55.46	-11.58	43.88	74.00	-30.12	H	Peak
2131.6667	48.50	-9.31	39.19	74.00	-34.81	H	Peak
4955.0000	45.40	-0.15	45.25	74.00	-28.75	H	Peak
5911.6667	44.00	2.78	46.78	74.00	-27.22	H	Peak
6133.3333	45.19	3.52	48.71	74.00	-25.29	H	Peak
7545.0000	44.71	5.71	50.42	74.00	-23.58	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).



### 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.

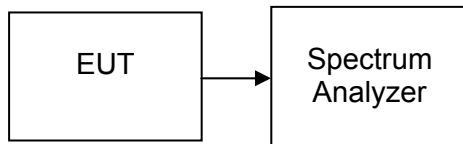
#### 7.3.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2011	03/19/2012

#### 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 = 100kHz, VBW = 100kHz, Span = 25MHz, 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	10007	>500	PASS
Mid	2437	10065		PASS
High	2462	10073		PASS

**Test Data**

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16372	>500	PASS
Mid	2437	16376		PASS
High	2462	16371		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	17568	>500	PASS
Mid	2437	17601		PASS
High	2462	17592		PASS

**Test Data**

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35527	>500	PASS
Mid	2437	35519		PASS
High	2452	35530		PASS



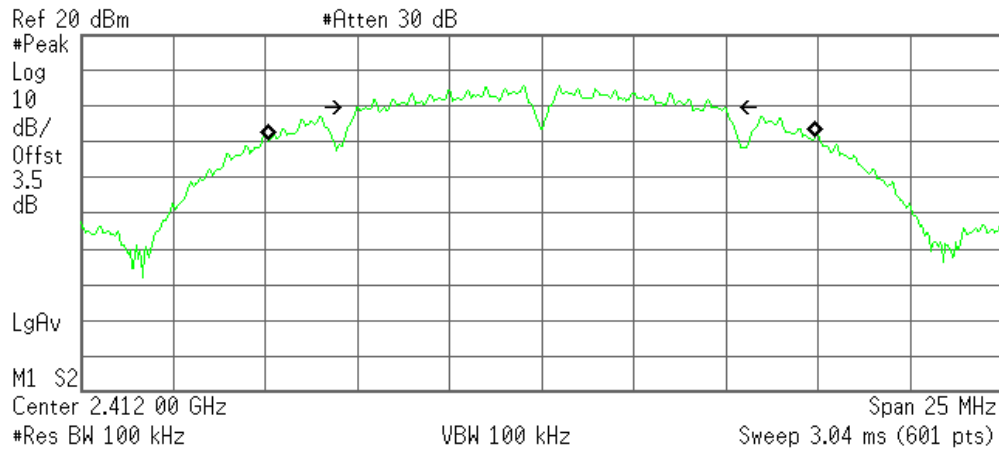
**Test Plot**

(IEEE 802.11b mode)

**6dB Bandwidth (CH Low)**

Agilent 15:26:22 Sep 20, 2011

R T



**Occupied Bandwidth**  
14.8696 MHz

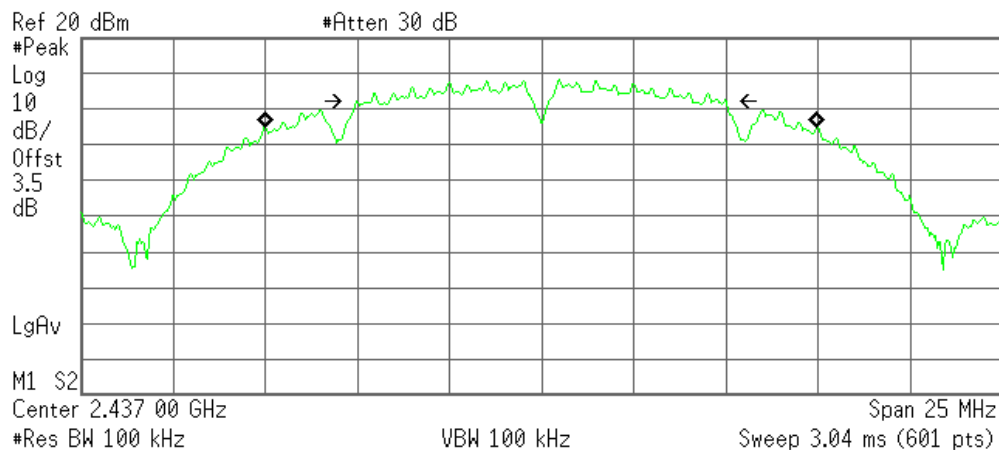
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -1.709 kHz  
**x dB Bandwidth** 10.007 MHz

**6dB Bandwidth (CH Mid)**

Agilent 15:25:06 Sep 20, 2011

R T



**Occupied Bandwidth**  
14.9362 MHz

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -14.382 kHz  
**x dB Bandwidth** 10.065 MHz

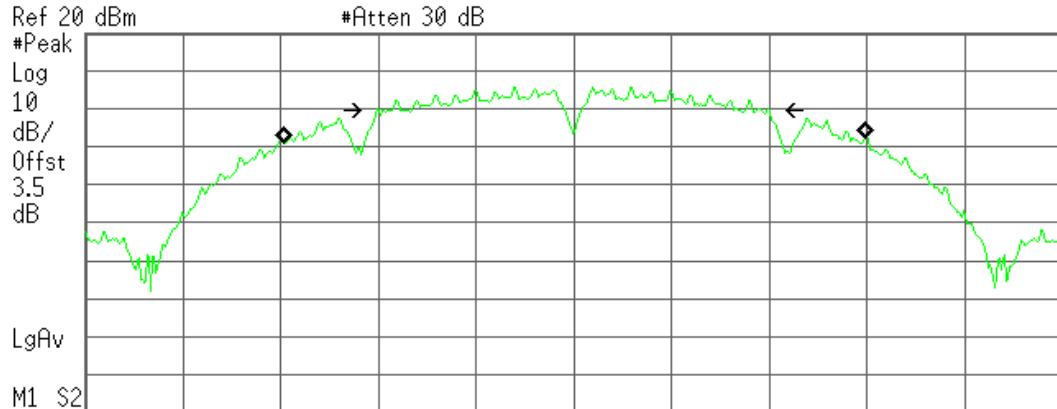




### 6dB Bandwidth (CH High)

Agilent 15:26:00 Sep 20, 2011

R T



Ref 20 dBm #Atten 30 dB  
Center 2.462 00 GHz Span 25 MHz  
#Res BW 100 kHz VBW 100 kHz Sweep 3.04 ms (601 pts)

Occupied Bandwidth  
14.8814 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

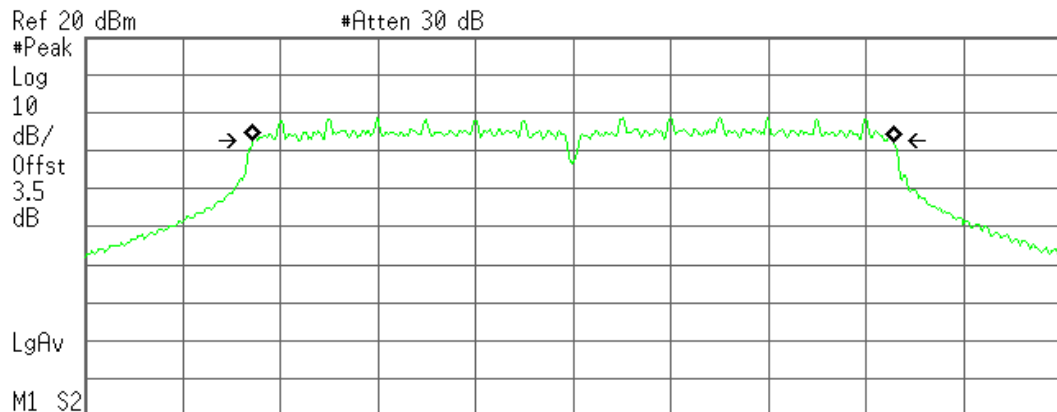
Transmit Freq Error 6.703 kHz  
x dB Bandwidth 10.073 MHz

### (IEEE 802.11g mode)

### 6dB Bandwidth (CH Low)

Agilent 15:27:25 Sep 20, 2011

R T



Ref 20 dBm #Atten 30 dB  
Center 2.412 00 GHz Span 25 MHz  
#Res BW 100 kHz VBW 100 kHz Sweep 3.04 ms (601 pts)

Occupied Bandwidth  
16.3883 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

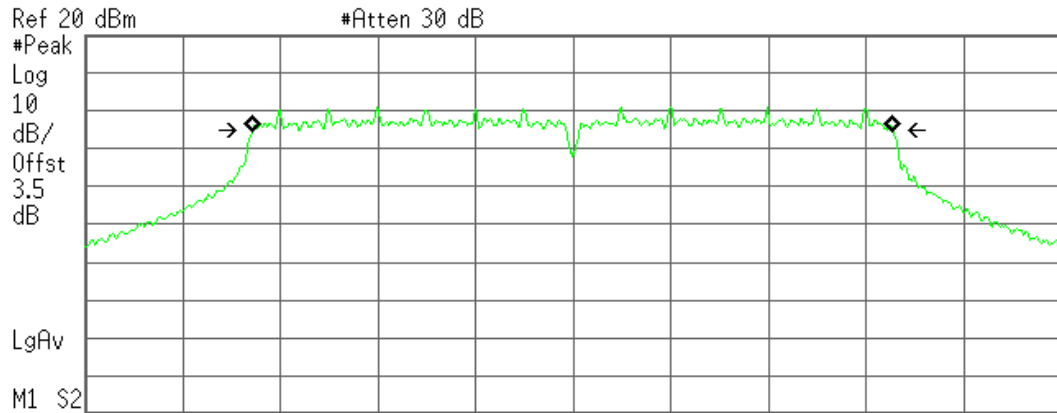
Transmit Freq Error -5.071 kHz  
x dB Bandwidth 16.372 MHz



### 6dB Bandwidth (CH Mid)

Agilent 15:28:32 Sep 20, 2011

R T



Ref 20 dBm #Atten 30 dB  
Center 2.437 00 GHz Span 25 MHz  
#Res BW 100 kHz VBW 100 kHz Sweep 3.04 ms (601 pts)

Occupied Bandwidth  
16.3977 MHz

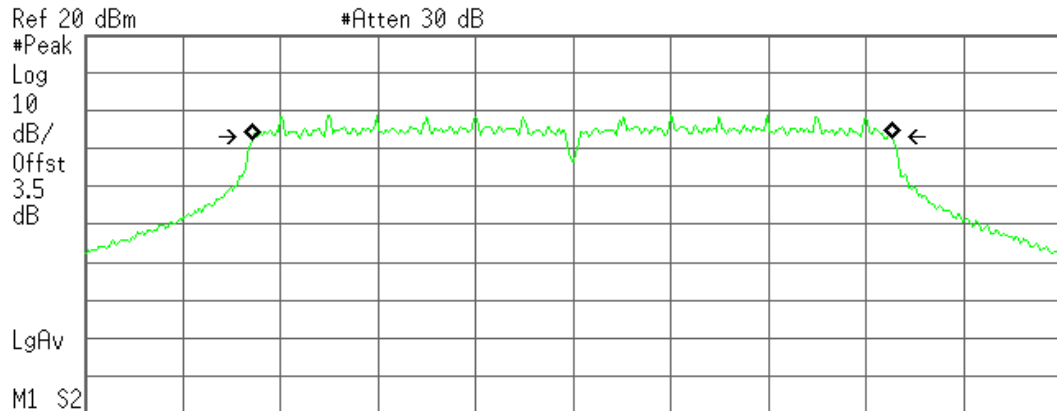
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error -11.854 kHz  
x dB Bandwidth 16.376 MHz

### 6dB Bandwidth (CH High)

Agilent 15:27:57 Sep 20, 2011

R T



Ref 20 dBm #Atten 30 dB  
Center 2.462 00 GHz Span 25 MHz  
#Res BW 100 kHz VBW 100 kHz Sweep 3.04 ms (601 pts)

Occupied Bandwidth  
16.3873 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error -14.252 kHz  
x dB Bandwidth 16.371 MHz

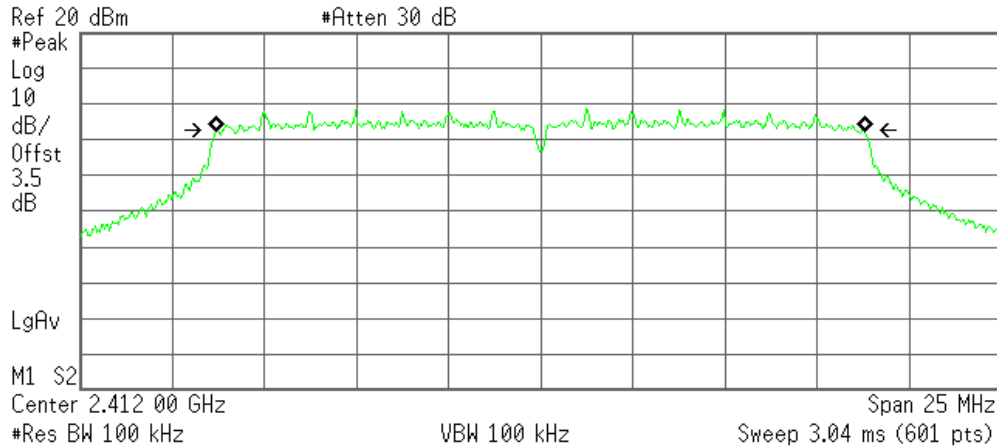


(IEEE 802.11n HT20 MHz mode)

6dB Bandwidth (CH Low)

Agilent 15:30:31 Sep 20, 2011

R T



Occupied Bandwidth  
17.5947 MHz

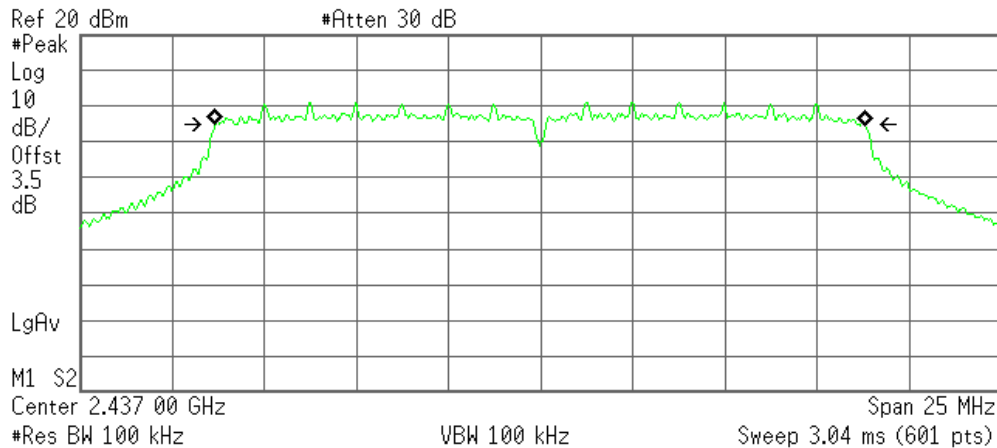
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error -2.194 kHz  
x dB Bandwidth 17.568 MHz

6dB Bandwidth (CH Mid)

Agilent 15:30:03 Sep 20, 2011

R T



Occupied Bandwidth  
17.6192 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

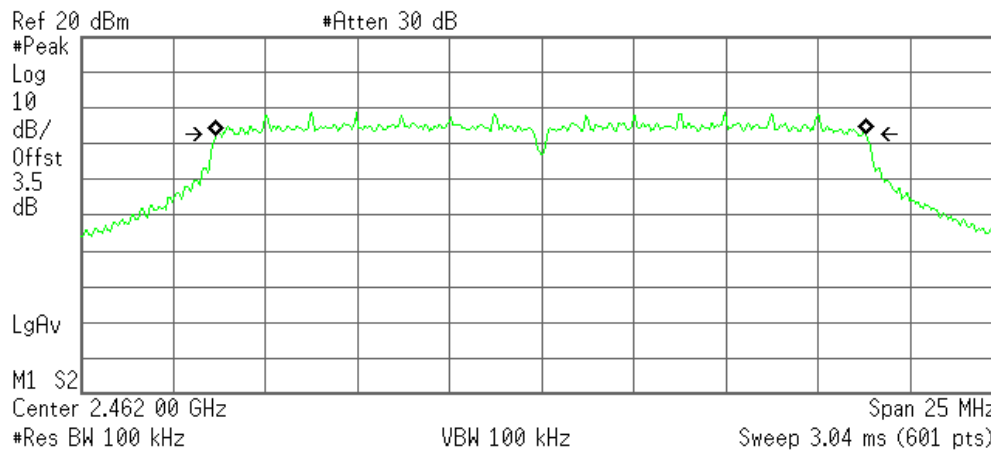
Transmit Freq Error -5.893 kHz  
x dB Bandwidth 17.601 MHz



### 6dB Bandwidth (CH High)

Agilent 15:30:55 Sep 20, 2011

R T



Occupied Bandwidth  
17.6154 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

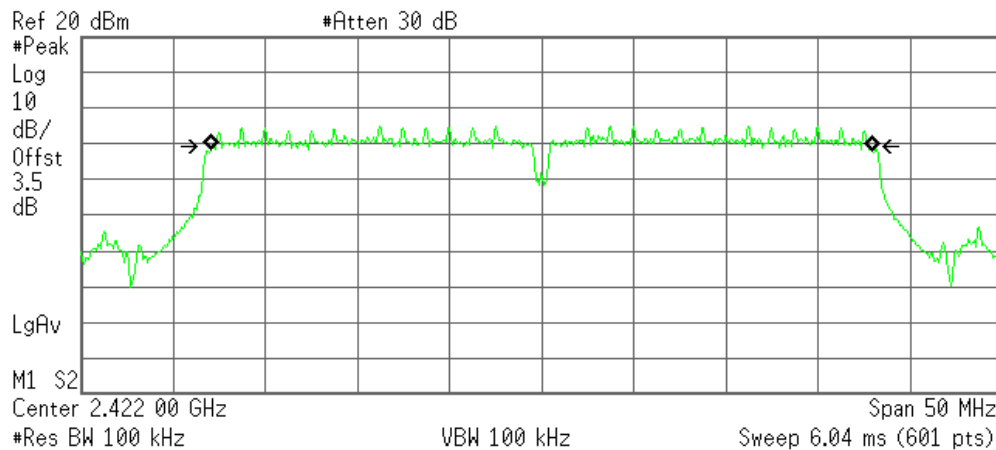
Transmit Freq Error -10.047 kHz  
x dB Bandwidth 17.592 MHz

### (IEEE 802.11n HT40 MHz mode)

### 6dB Bandwidth (CH Low)

Agilent 15:32:04 Sep 20, 2011

R T



Occupied Bandwidth  
35.8707 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

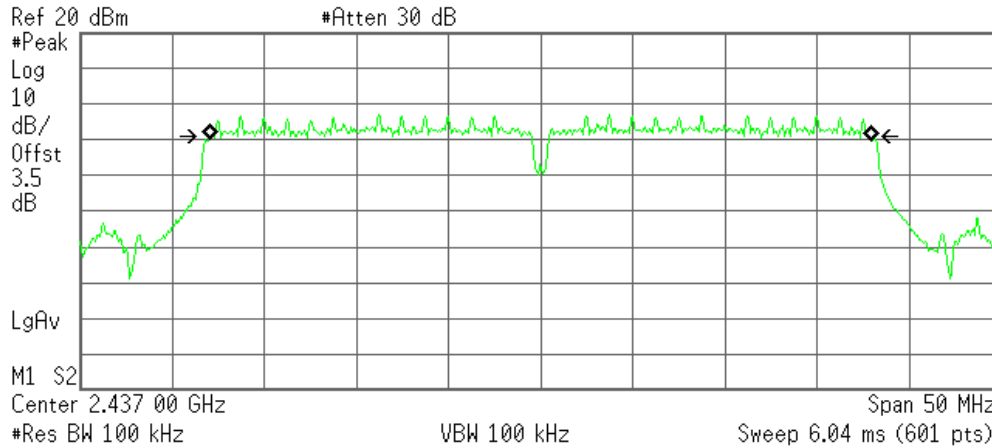
Transmit Freq Error 16.809 kHz  
x dB Bandwidth 35.527 MHz



### 6dB Bandwidth (CH Mid)

Agilent 15:33:07 Sep 20, 2011

R T



Occupied Bandwidth  
35.8660 MHz

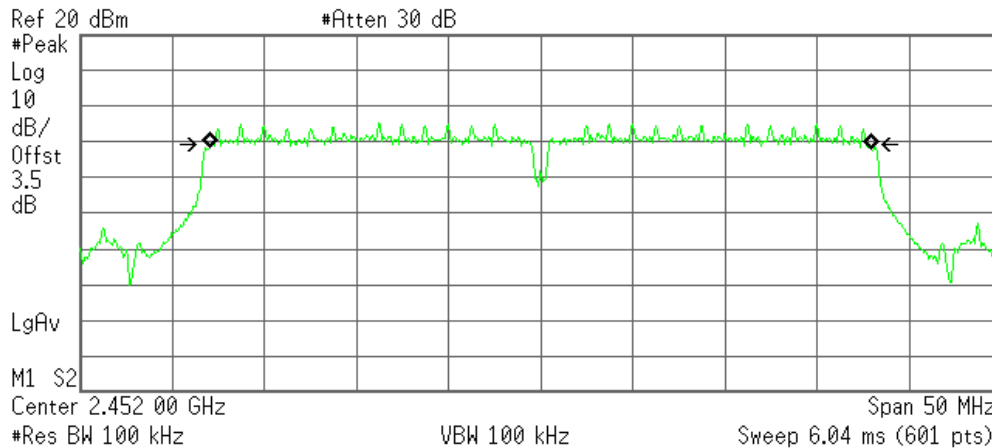
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 12.951 kHz  
x dB Bandwidth 35.519 MHz

### 6dB Bandwidth (CH High)

Agilent 15:32:41 Sep 20, 2011

R T



Occupied Bandwidth  
35.8802 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 6.045 kHz  
x dB Bandwidth 35.530 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

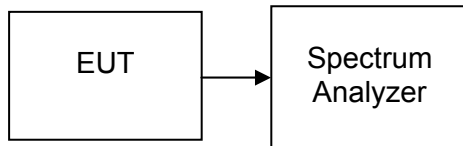
Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2011	03/19/2012

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

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.



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	15.47	0.03524	1	PASS
Mid	2437	17.62	0.05781		PASS
High	2462	15.26	0.03357		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	11.62	0.01452	1	PASS
Mid	2437	13.85	0.02427		PASS
High	2462	11.92	0.01556		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	11.61	0.01449	1	PASS
Mid	2437	13.84	0.02421		PASS
High	2462	11.85	0.01531		PASS

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	10.72	0.01180	1	PASS
Mid	2437	12.64	0.01837		PASS
High	2452	10.89	0.01227		PASS



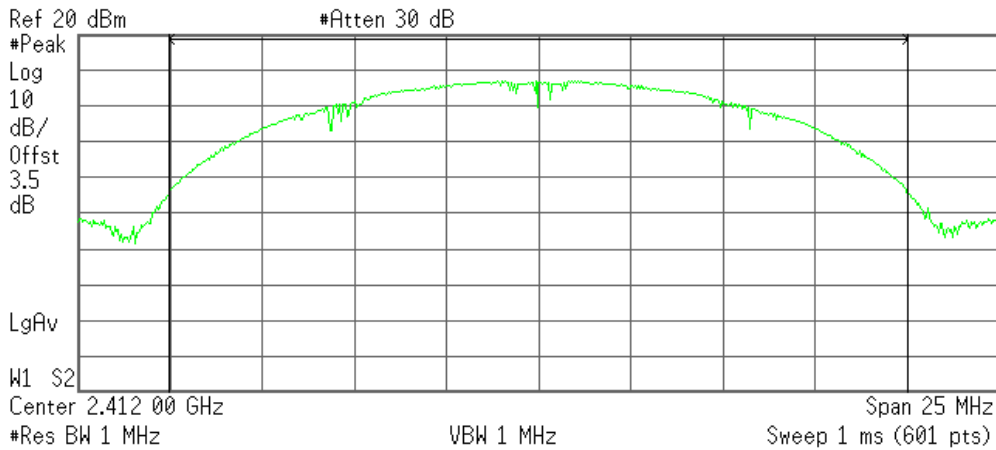
**Test Plot**

(IEEE 802.11b mode)

**Peak power (CH Low)**

\* Agilent 06:17:55 Sep 11, 2011

R T



**Channel Power**

15.47 dBm /20.0000 MHz

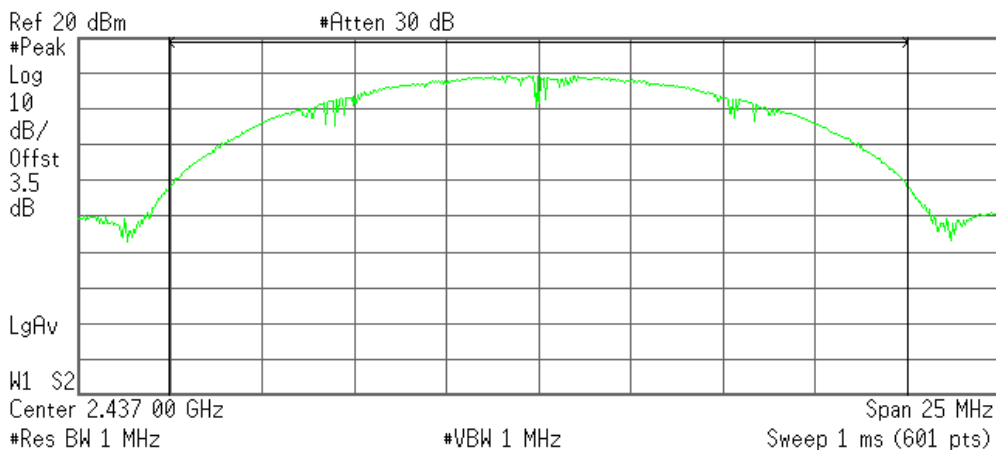
**Power Spectral Density**

-57.54 dBm/Hz

**Peak power (CH Mid)**

\* Agilent 06:19:44 Sep 11, 2011

R T



**Channel Power**

17.62 dBm /20.0000 MHz

**Power Spectral Density**

-55.39 dBm/Hz

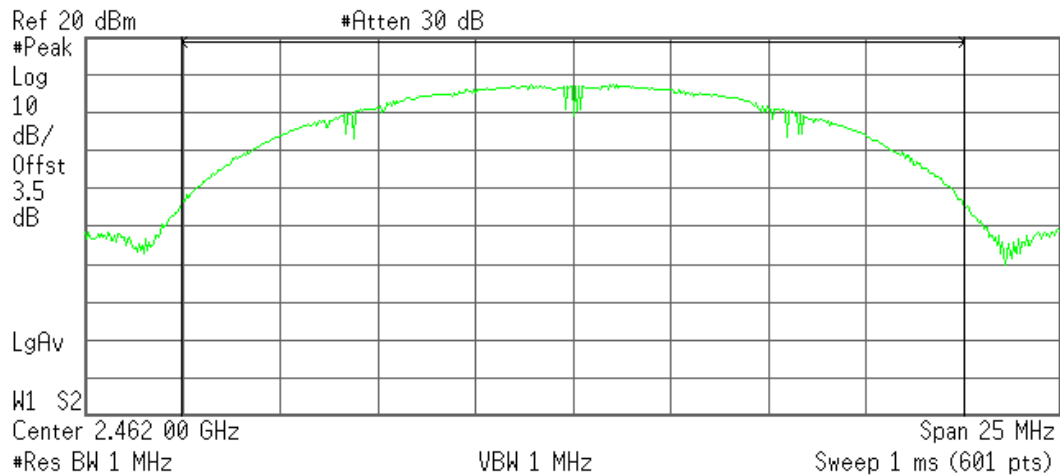




**Peak power (CH High)**

Agilent 06:21:12 Sep 11, 2011

R T



**Channel Power**

15.76 dBm /20.0000 MHz

**Power Spectral Density**

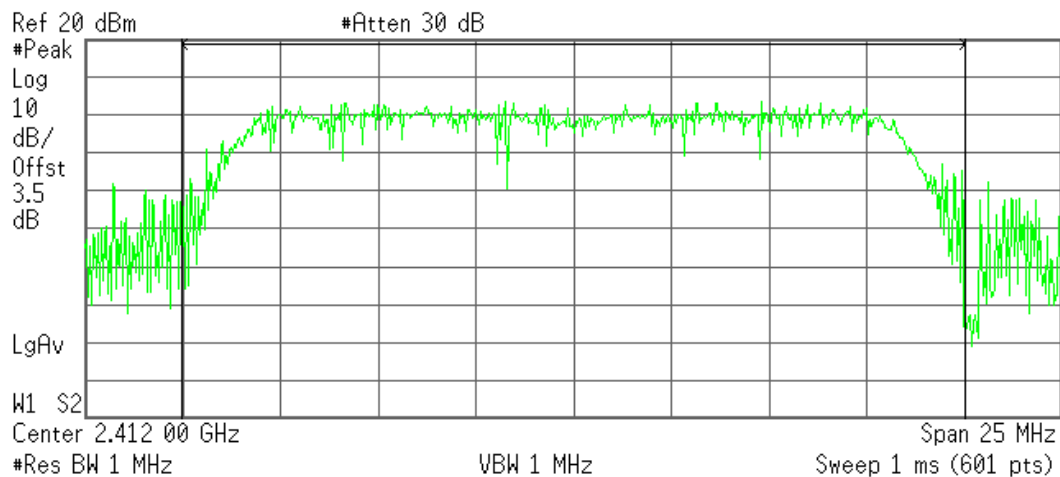
-57.25 dBm/Hz

**(IEEE 802.11g mode)**

**Peak power (CH Low)**

Agilent 06:29:14 Sep 11, 2011

R T



**Channel Power**

11.62 dBm /20.0000 MHz

**Power Spectral Density**

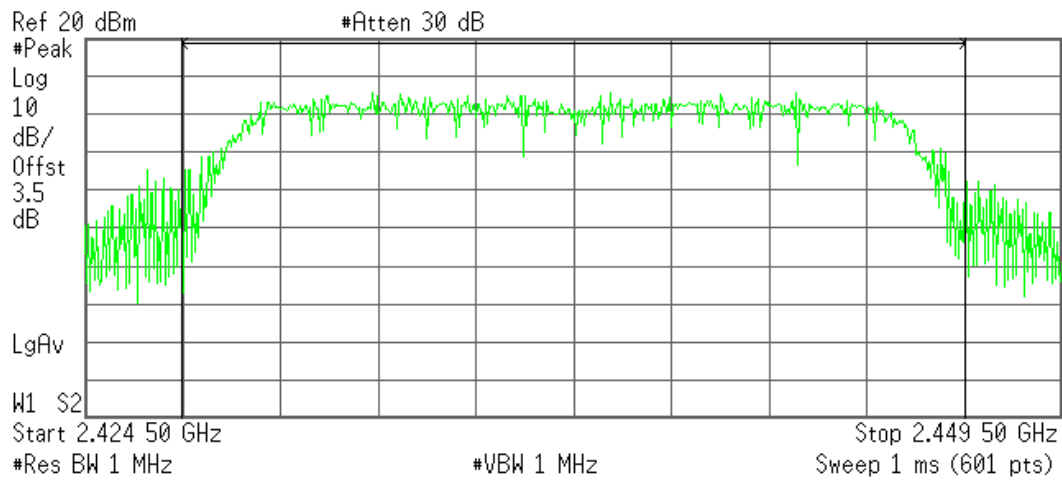
-61.39 dBm/Hz



**Peak power (CH Mid)**

\* Agilent 06:29:54 Sep 11, 2011

R T



**Channel Power**

13.85 dBm /20.0000 MHz

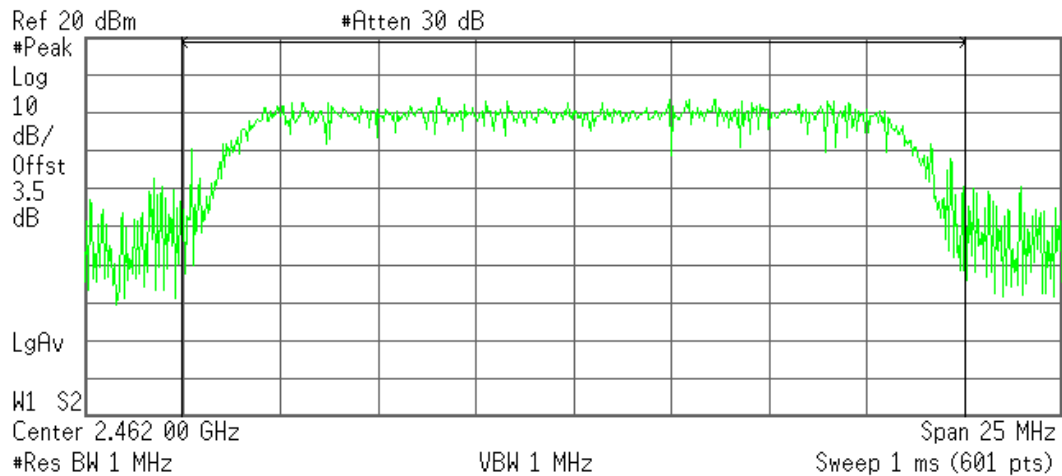
**Power Spectral Density**

-59.16 dBm/Hz

**Peak power (CH High)**

\* Agilent 06:31:33 Sep 11, 2011

R T



**Channel Power**

11.92 dBm /20.0000 MHz

**Power Spectral Density**

-61.09 dBm/Hz

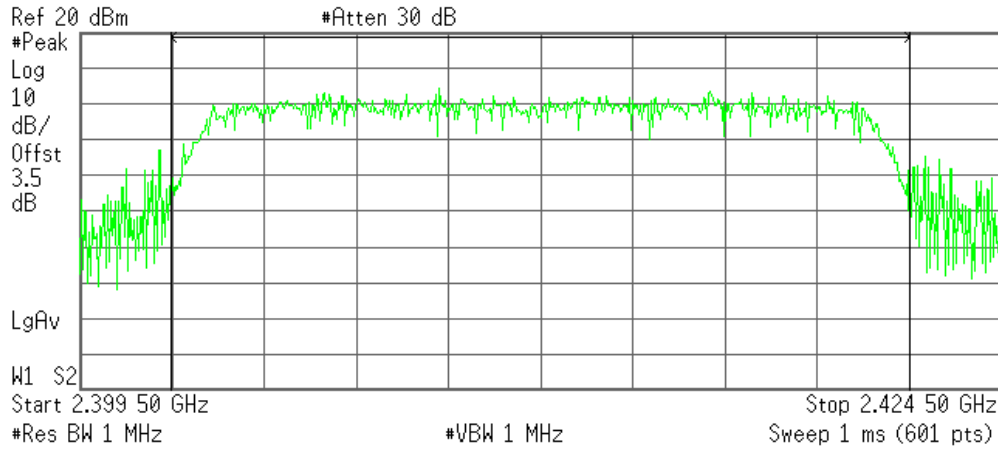


(IEEE 802.11n HT20 MHz mode)

Peak power (CH Low)

Agilent 06:36:41 Sep 11, 2011

R T



Channel Power

11.61 dBm /20.0000 MHz

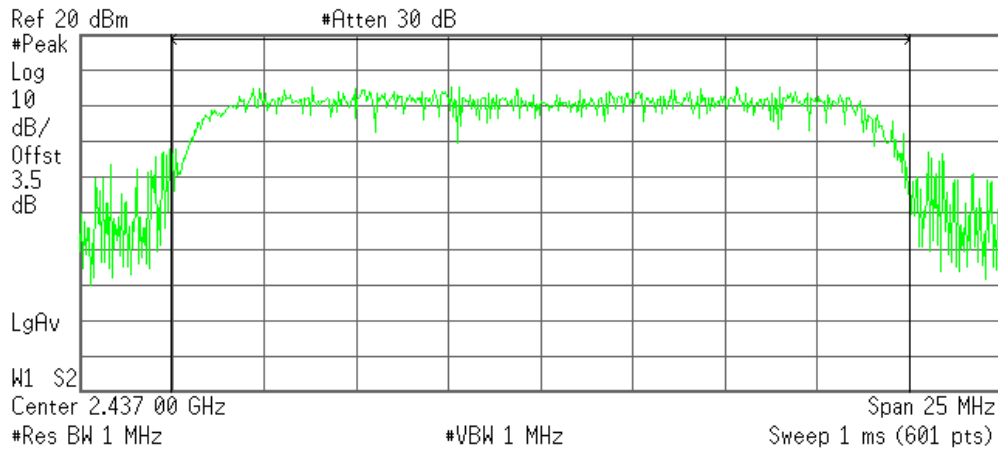
Power Spectral Density

-61.40 dBm/Hz

Peak power (CH Mid)

Agilent 06:35:52 Sep 11, 2011

R T



Channel Power

13.84 dBm /20.0000 MHz

Power Spectral Density

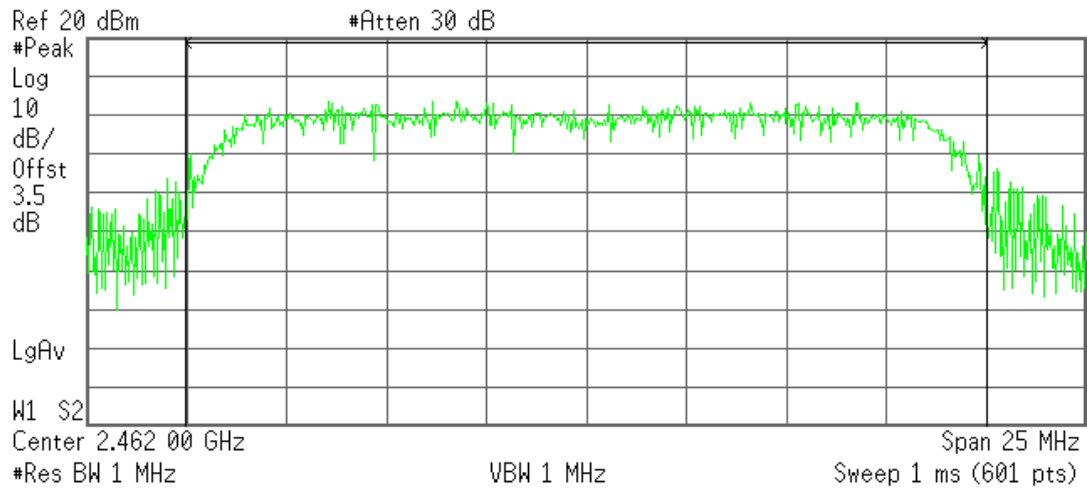
-59.17 dBm/Hz



**Peak power (CH High)**

\* Agilent 06:34:49 Sep 11, 2011

R T



**Channel Power**

11.85 dBm /20.0000 MHz

**Power Spectral Density**

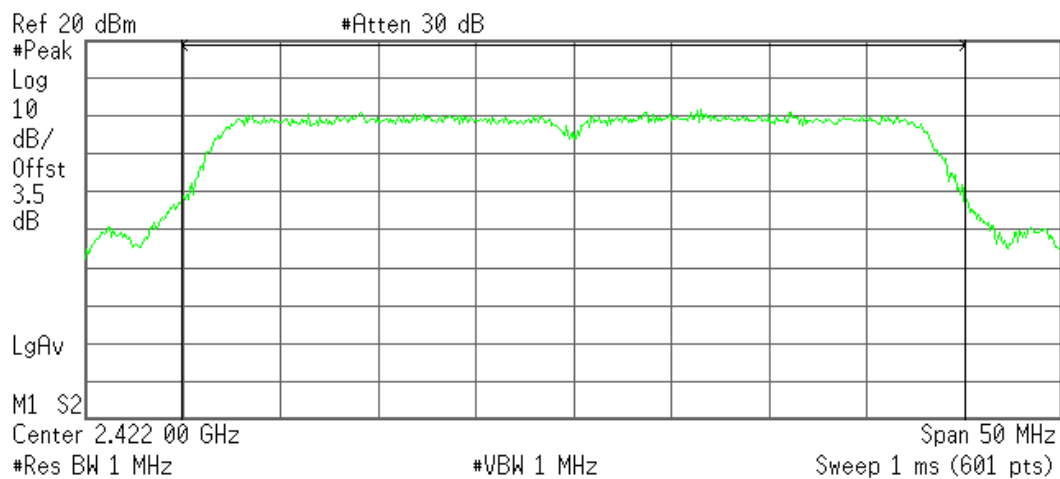
-61.16 dBm/Hz

**(IEEE 802.11n HT40 MHz mode)**

**Peak power (CH Low)**

\* Agilent 06:40:44 Sep 11, 2011

R T



**Channel Power**

10.72 dBm /40.0000 MHz

**Power Spectral Density**

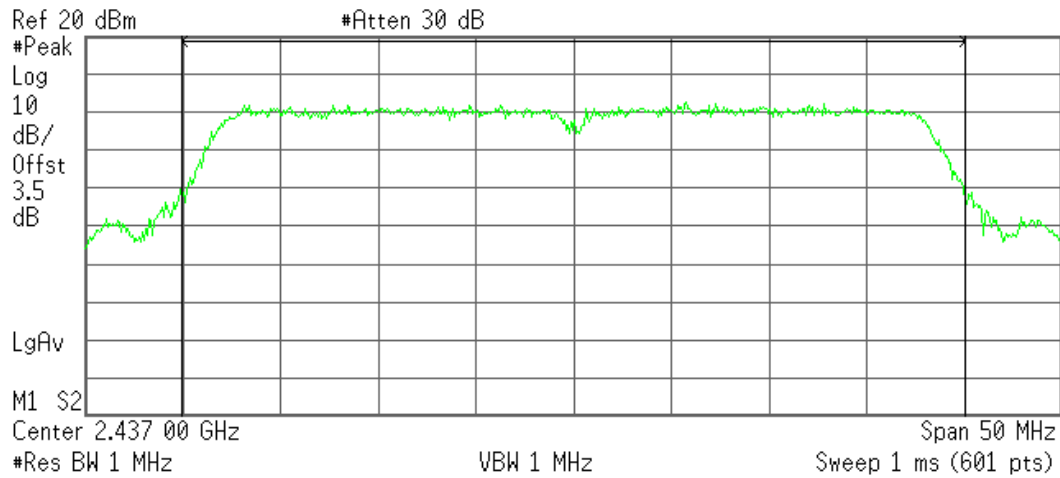
-65.30 dBm/Hz



### Peak power (CH Mid)

Agilent 06:41:53 Sep 11, 2011

R T



Channel Power

12.64 dBm /40.0000 MHz

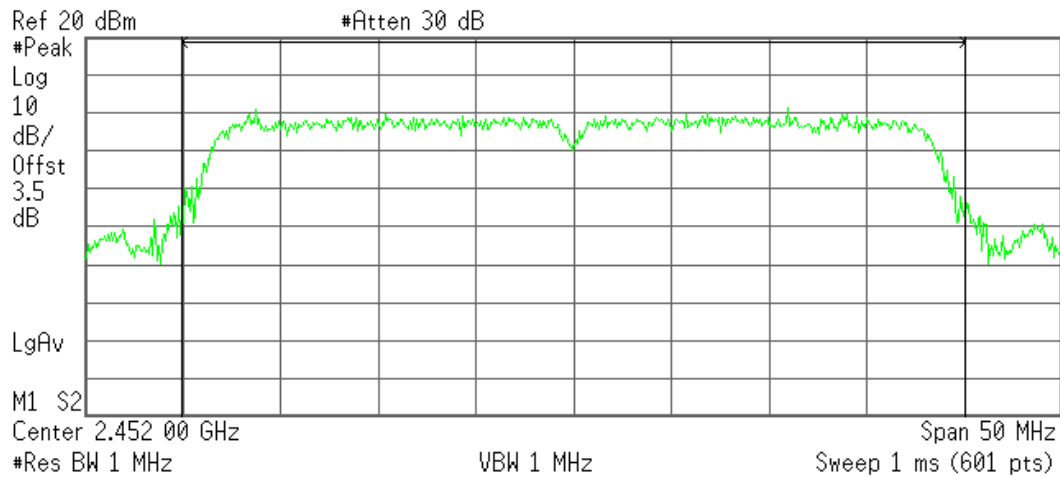
Power Spectral Density

-63.38 dBm/Hz

### Peak power (CH High)

Agilent 06:43:16 Sep 11, 2011

R T



Channel Power

10.89 dBm /40.0000 MHz

Power Spectral Density

-65.13 dBm/Hz



### 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	03/19/2011	03/19/2012	
Amplifier	MITEQ	AM-1604-3000	1411843	03/18/2011	03/18/2012	
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R	
Controller	CT	N/A	N/A	N.C.R	N.C.R	
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2011	03/18/2012	
Bilog Antenna	SCHAFFNER	CBL6143	5082	06/03/2011	06/03/2012	
Horn Antenna	SCHWARZBECK	BBHA9120D	D286	03/19/2011	03/19/2012	
Loop Antenna	A. R. A	PLA-1030/B	1029	03/19/2011	03/19/2012	
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/31/2011	03/31/2012	
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R	
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2				

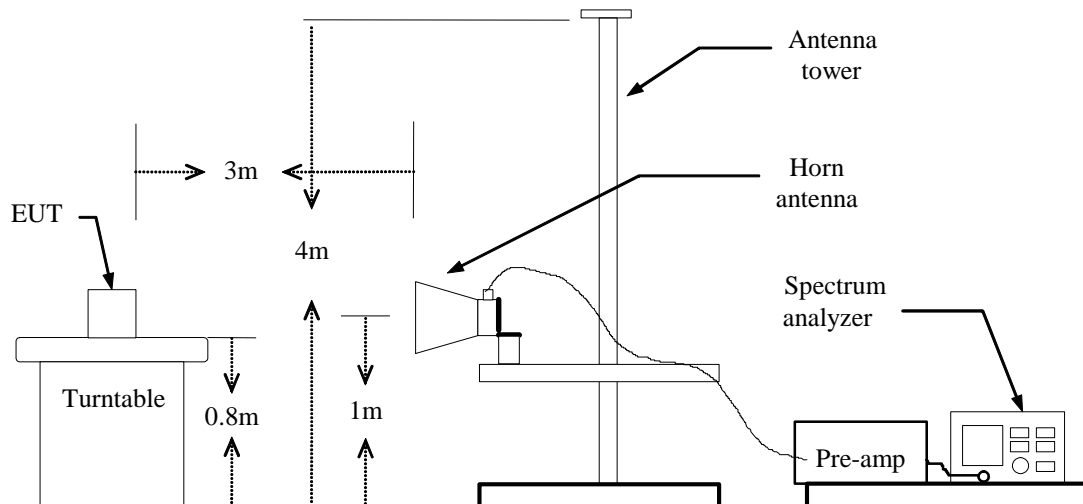
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The FCC Site Registration number is 101879.  
 3. N.C.R = No Calibration Required.



**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

IEEE 802.11b mode / CH Low

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	56.59	45.88	-9.75	46.84	36.13	74	54	-27.16	-17.87
N/A										
2390.00	H	50.07	39.07	-9.75	40.32	29.32	74	54	-33.68	-24.68
N/A										

IEEE 802.11b mode / CH High

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	62.04	53.41	-9.75	52.29	43.66	74	54	-21.71	-10.34
N/A										
2483.50	H	51.29	43.86	-9.75	41.54	34.11	74	54	-32.46	-19.89
N/A										





IEEE 802.11g mode / CH Low

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	60.33	46.41	-9.75	50.58	36.66	74	54	-23.42	-17.34
N/A										
2390.00	H	50.44	39.32	-9.75	40.69	29.57	74	54	-33.31	-24.43
N/A										

IEEE 802.11g mode / CH High

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	63.32	47.05	-9.75	53.57	37.30	74	54	-20.43	-16.70
N/A										
2483.50	H	55.40	40.01	-9.75	45.65	30.26	74	54	-28.35	-23.74
N/A										



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

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	62.08	45.27	-9.75	52.33	35.52	74	54	-21.67	-18.48
N/A										
2390.00	H	50.76	39.26	-9.75	41.01	29.51	74	54	-32.99	-24.49
N/A										

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

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	74.69	51.18	-9.75	64.94	41.43	74	54	-9.06	-12.57
N/A										
2483.50	H	60.15	39.47	-9.75	50.40	29.72	74	54	-23.60	-24.28
N/A										



IEEE 802.11n HT40 MHz mode / CH Low

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	61.17	45.37	-9.75	51.42	35.62	74	54	-22.58	-18.38
N/A										
2390.00	H	50.84	38.81	-9.75	41.09	29.06	74	54	-32.91	-24.94
N/A										

IEEE 802.11n HT40 MHz mode / CH High

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)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	64.73	49.16	-9.75	54.98	39.41	74	54	-19.02	-14.59
N/A										
2483.50	H	52.09	39.11	-9.75	42.34	29.36	74	54	-31.66	-24.64
N/A										



## Test Plot (IEEE 802.11b mode)

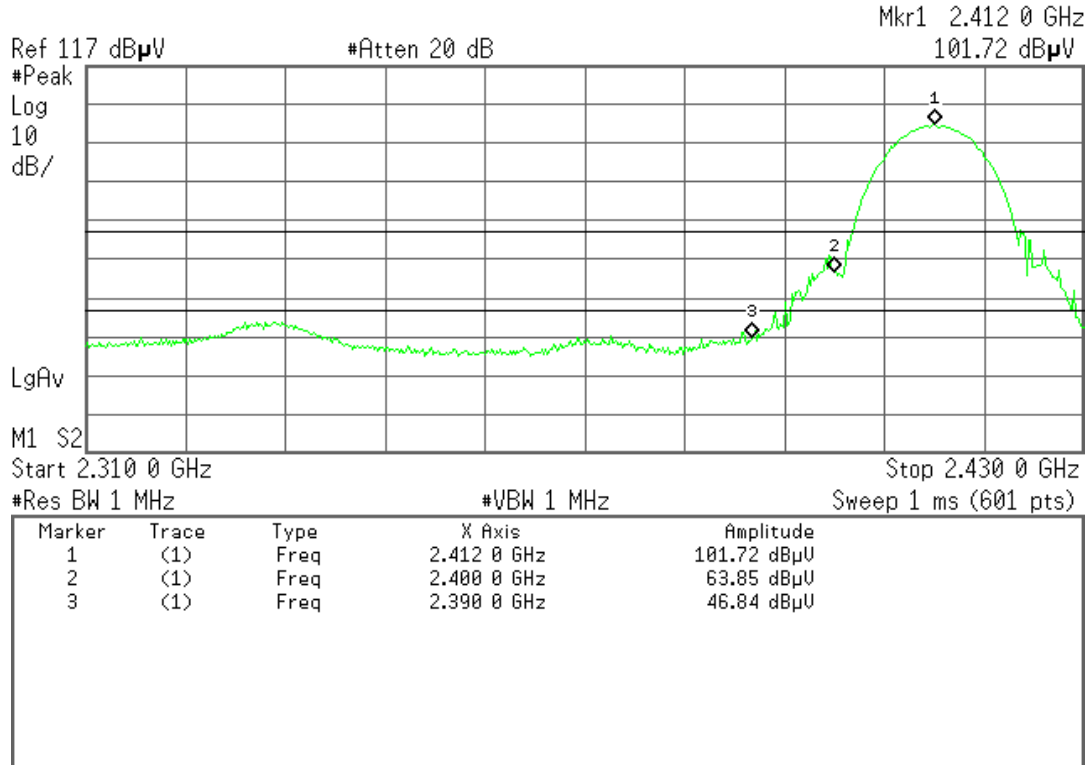
### Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 19:24:09 Sep 19, 2011

R T

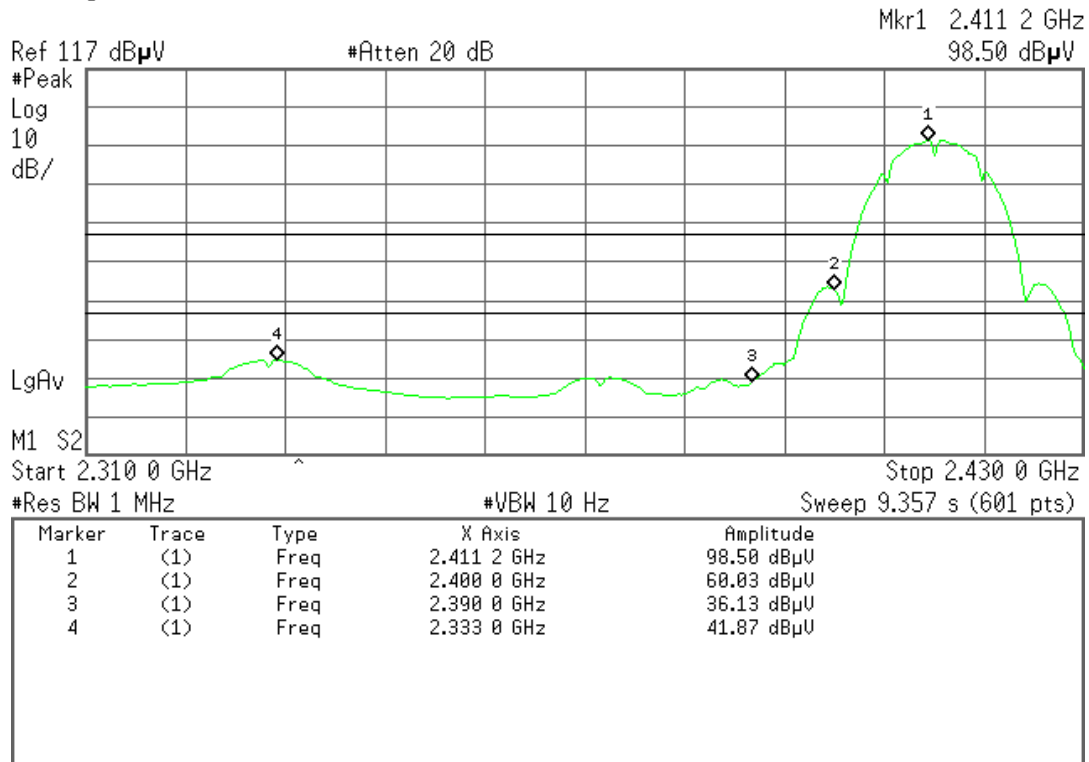


Detector mode: Average

Polarity: Vertical

Agilent 19:26:18 Sep 19, 2011

R T





Detector mode: Peak

Polarity: Horizontal

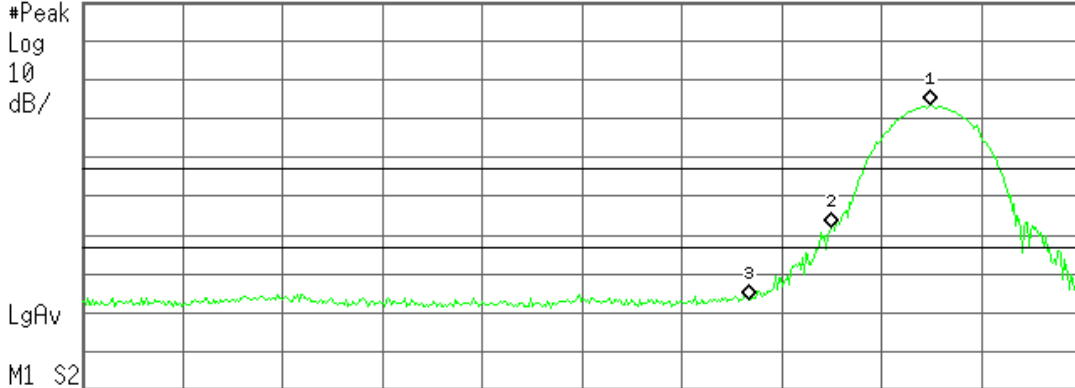
Agilent 19:20:49 Sep 19, 2011

R T

Mkr1 2.411 8 GHz  
90.49 dBμV

Ref 117 dBμV

#Atten 20 dB



M1 S2  
Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 8 GHz	90.49 dBμV
2	(1)	Freq	2.400 0 GHz	58.80 dBμV
3	(1)	Freq	2.390 0 GHz	40.32 dBμV

Detector mode: Average

Polarity: Horizontal

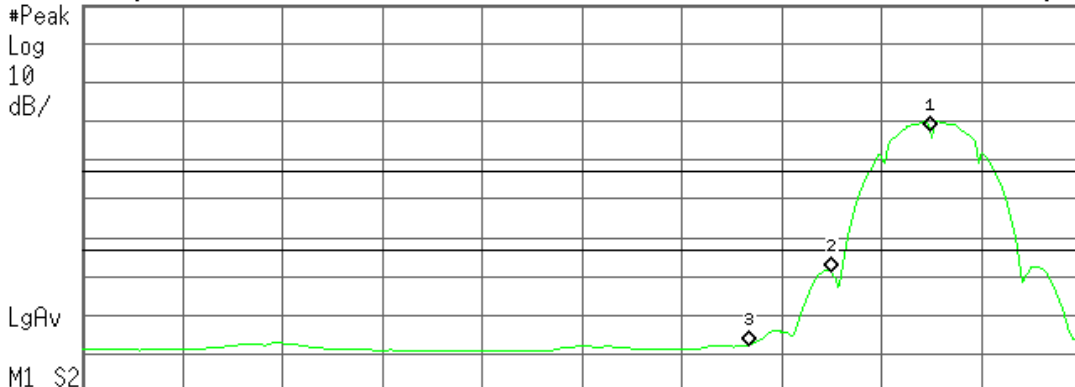
Agilent 19:22:18 Sep 19, 2011

R T

Mkr1 2.411 8 GHz  
84.52 dBμV

Ref 117 dBμV

#Atten 20 dB



M1 S2  
Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 9.357 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 8 GHz	84.52 dBμV
2	(1)	Freq	2.400 0 GHz	48.09 dBμV
3	(1)	Freq	2.390 0 GHz	29.32 dBμV



Band Edges (CH High)

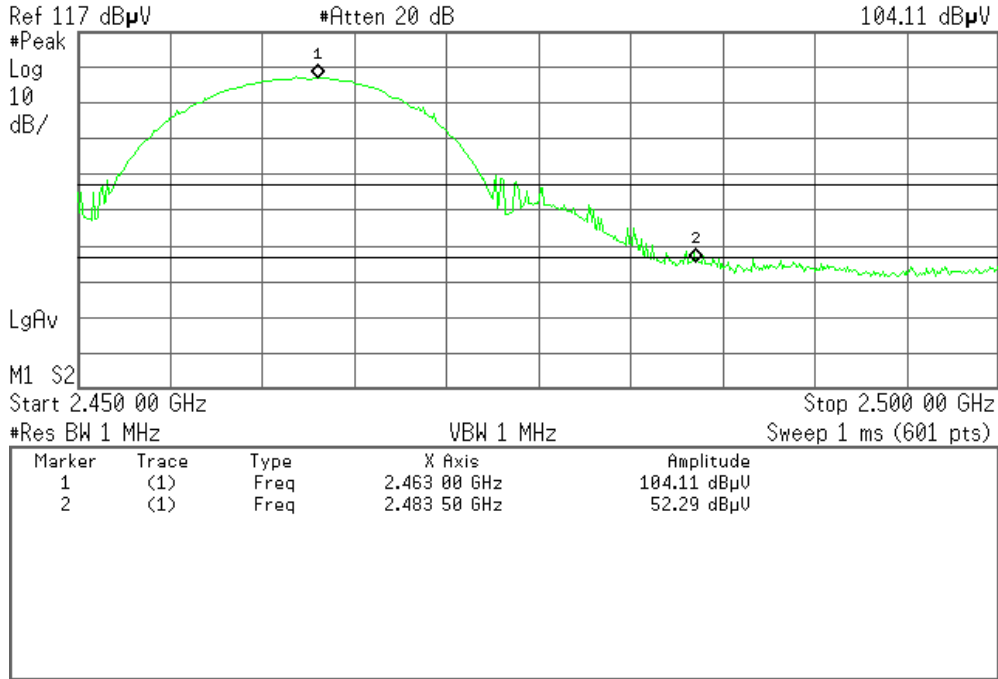
Detector mode: Peak

Polarity: Vertical

Agilent 19:31:34 Sep 19, 2011

R T

Mkr1 2.463 00 GHz  
104.11 dBμV



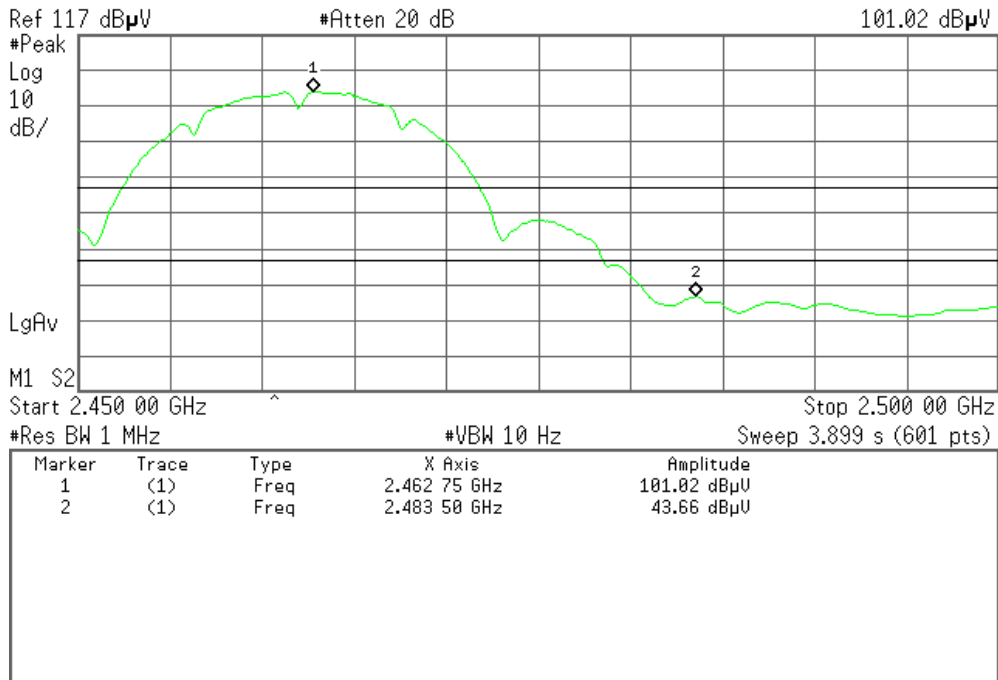
Detector mode: Average

Polarity: Vertical

Agilent 19:32:13 Sep 19, 2011

R T

Mkr1 2.462 75 GHz  
101.02 dBμV





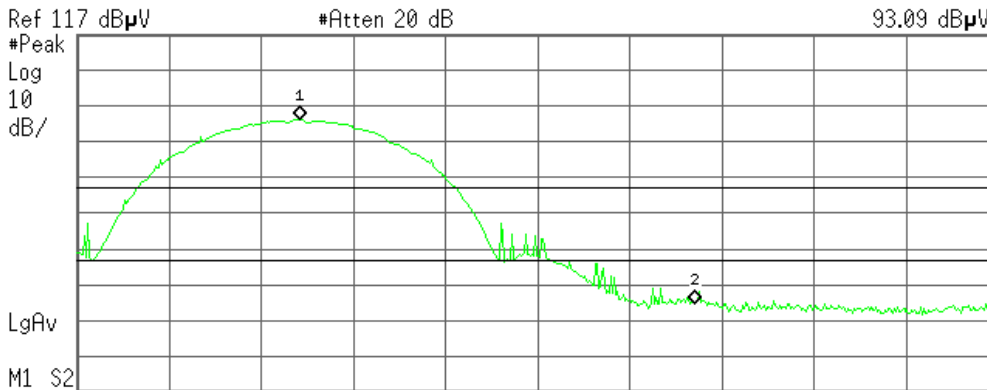
**Detector mode: Peak**

**Polarity: Horizontal**

Agilent 19:34:24 Sep 19, 2011

R T

Mkr1 2.462 08 GHz  
93.09 dBμV



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 08 GHz	93.09 dBμV
2	(1)	Freq	2.483 50 GHz	41.54 dBμV

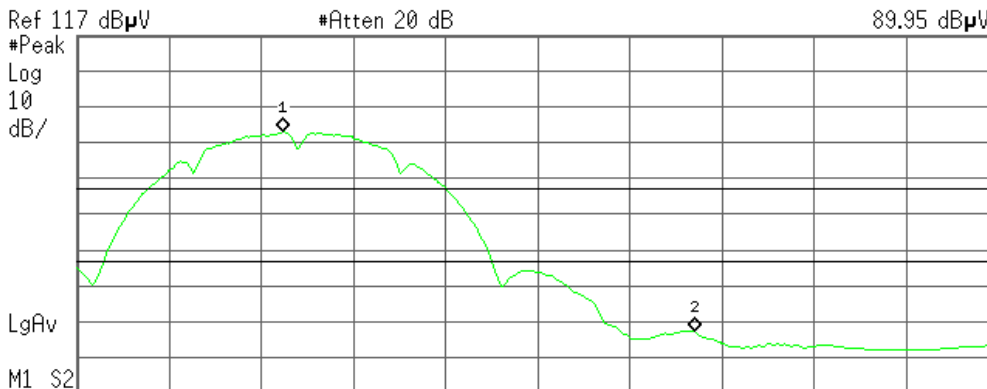
**Detector mode: Average**

**Polarity: Horizontal**

Agilent 19:35:15 Sep 19, 2011

R T

Mkr1 2.461 17 GHz  
89.95 dBμV



Start 2.450 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 3.899 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 17 GHz	89.95 dBμV
2	(1)	Freq	2.483 50 GHz	34.11 dBμV



(IEEE 802.11g mode)

Band Edges (CH Low)

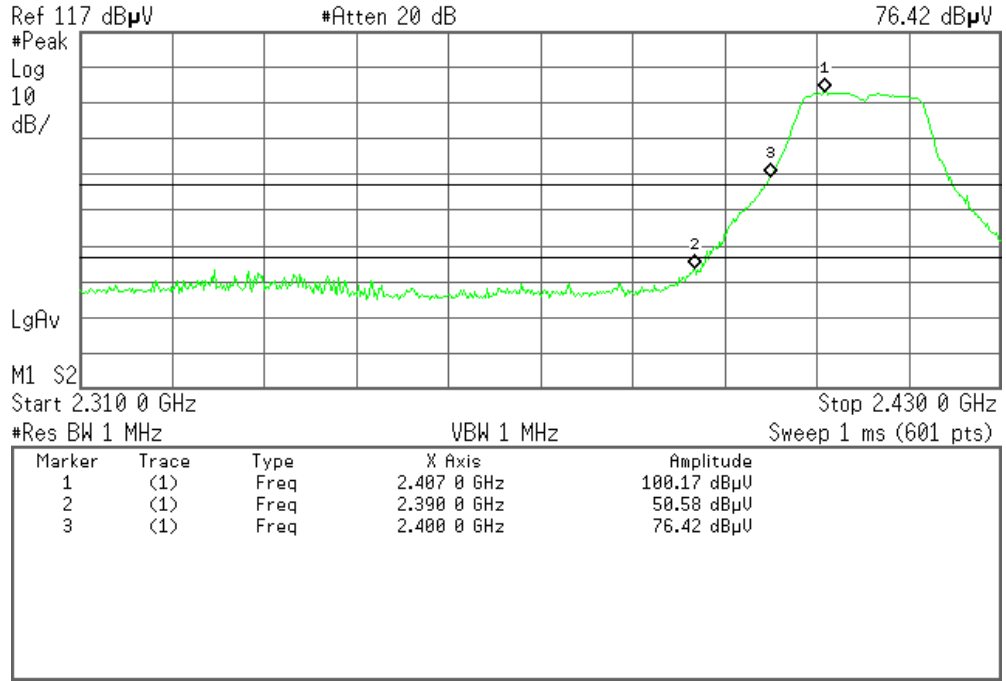
Detector mode: Peak

Polarity: Vertical

Agilent 19:46:58 Sep 19, 2011

R T

Mkr3 2.400 0 GHz  
76.42 dBμV



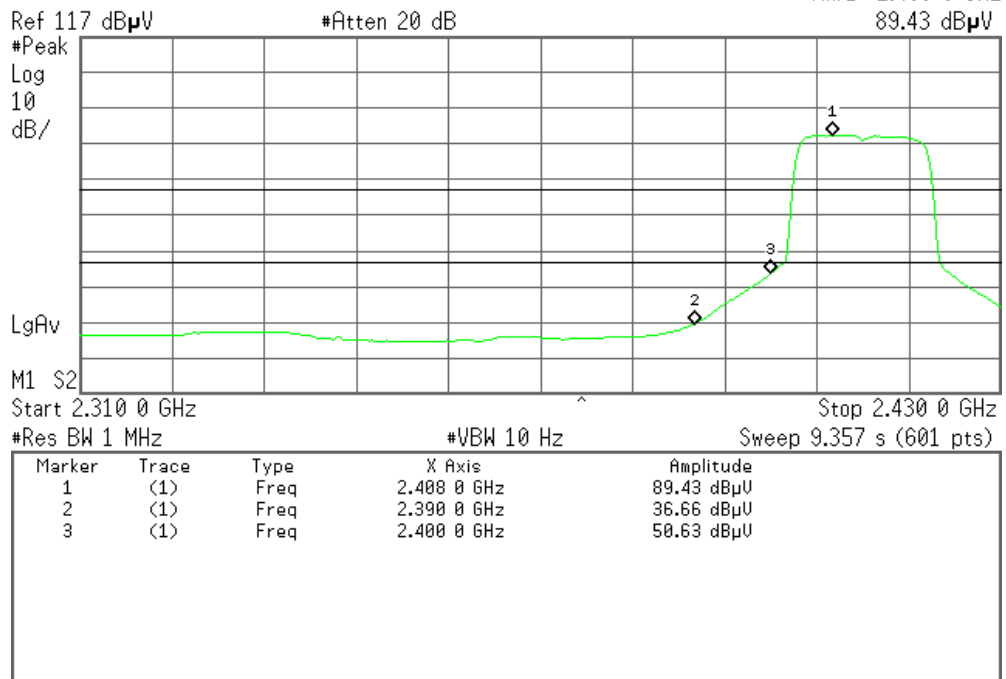
Detector mode: Average

Polarity: Vertical

Agilent 19:47:51 Sep 19, 2011

R T

Mkr1 2.400 0 GHz  
89.43 dBμV







Detector mode: Peak

Polarity: Horizontal

Agilent 19:50:01 Sep 19, 2011

R T

Mkr1 2.409 4 GHz  
89.94 dBμV

Ref 117 dBμV

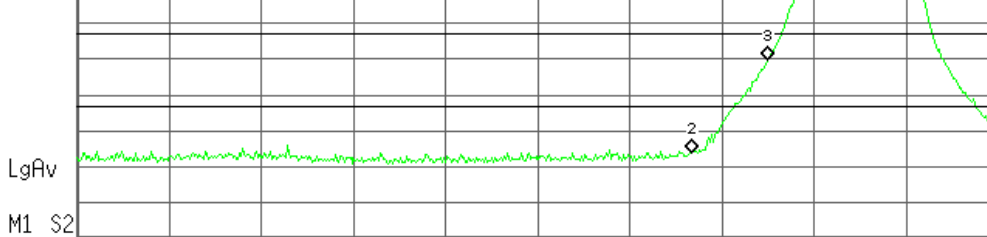
#Atten 20 dB

#Peak

Log

10

dB/



M1 S2

Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.409 4 GHz	89.94 dBμV
2	(1)	Freq	2.390 0 GHz	40.69 dBμV
3	(1)	Freq	2.400 0 GHz	66.80 dBμV

Detector mode: Average

Polarity: Horizontal

Agilent 19:50:39 Sep 19, 2011

R T

Mkr1 2.407 4 GHz  
79.77 dBμV

Ref 117 dBμV

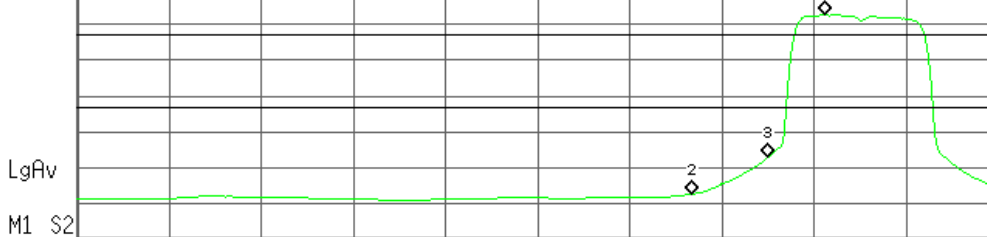
#Atten 20 dB

#Peak

Log

10

dB/



M1 S2

Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 9.357 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.407 4 GHz	79.77 dBμV
2	(1)	Freq	2.390 0 GHz	29.57 dBμV
3	(1)	Freq	2.400 0 GHz	39.78 dBμV



**Band Edges (CH High)**

**Detector mode: Peak**

**Polarity: Vertical**

Agilent 19:43:13 Sep 19, 2011

R T

Mkr1 2.457 00 GHz

99.95 dBμV

Ref 117 dBμV

#Atten 20 dB

#Peak

Log

10

dB/

LgAv

M1 S2

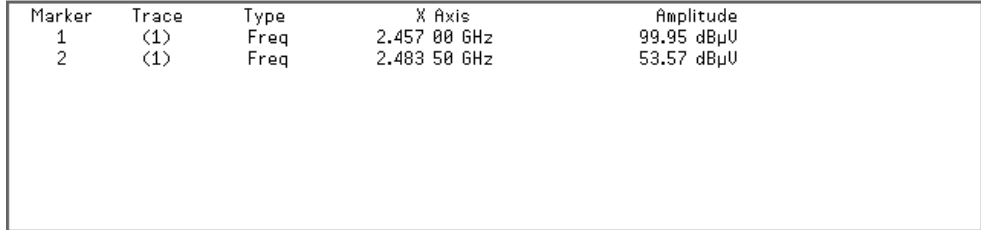
Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

VBW 1 MHz

Sweep 1 ms (601 pts)



**Detector mode: Average**

**Polarity: Vertical**

Agilent 19:43:55 Sep 19, 2011

R T

Mkr1 2.458 75 GHz

89.42 dBμV

Ref 117 dBμV

#Atten 20 dB

#Peak

Log

10

dB/

LgAv

M1 S2

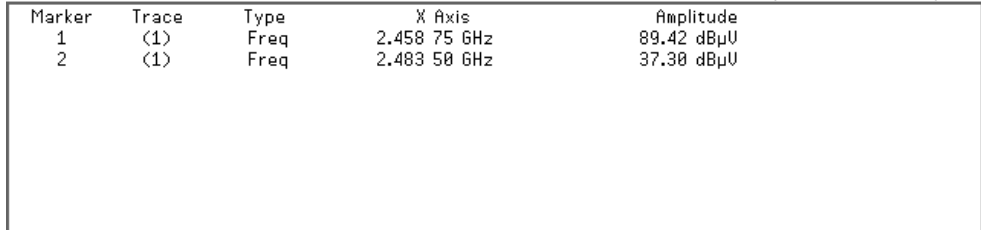
Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 3.899 s (601 pts)





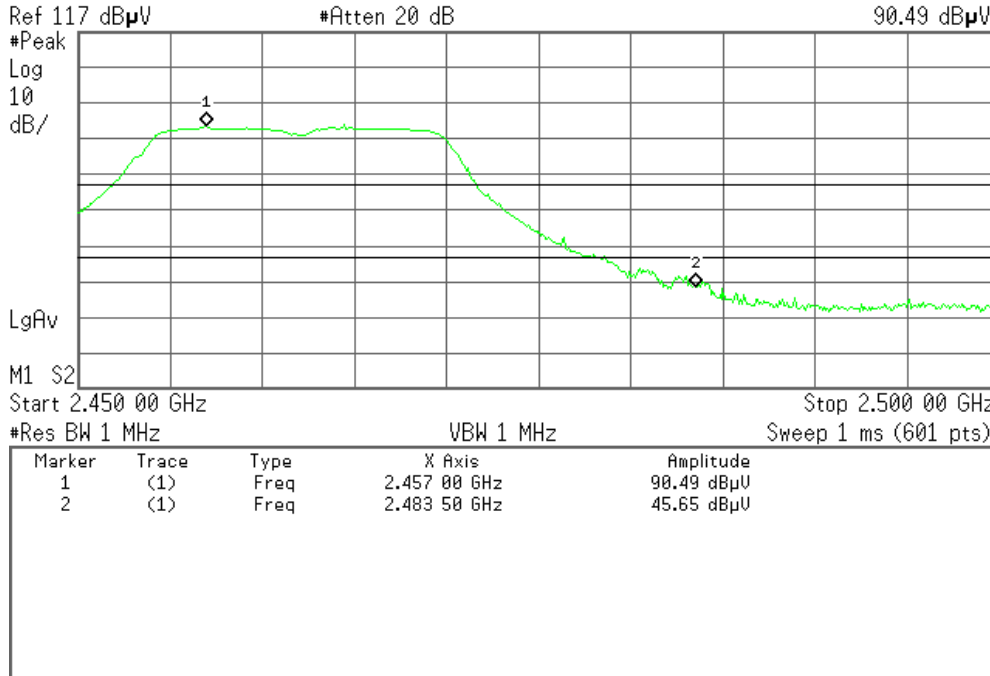
Detector mode: Peak

Polarity: Horizontal

Agilent 19:39:44 Sep 19, 2011

R T

Mkr1 2.457 00 GHz



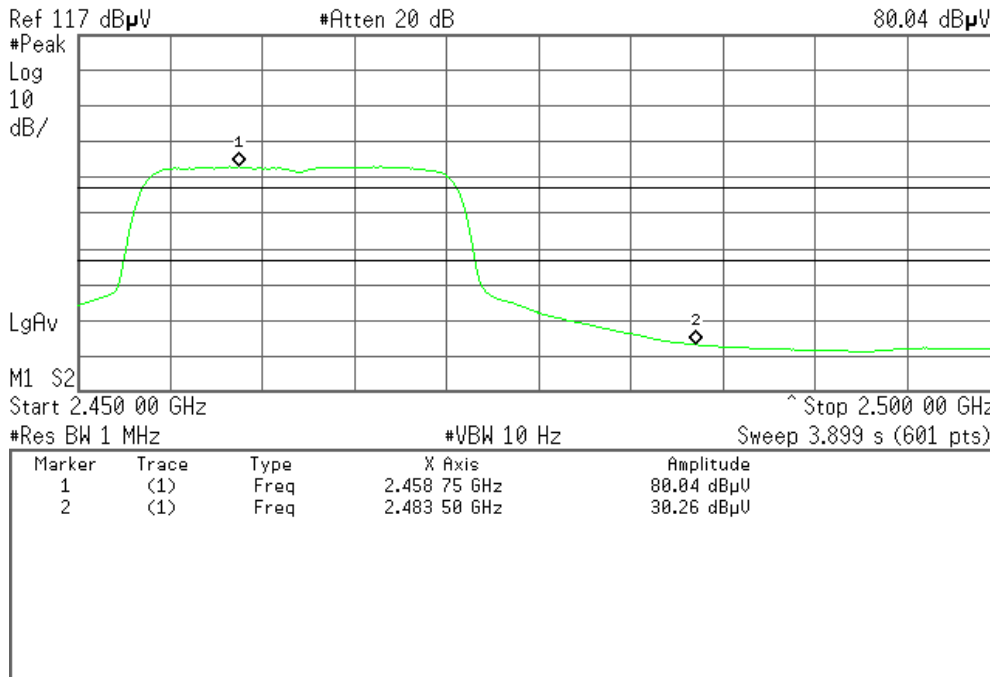
Detector mode: Average

Polarity: Horizontal

Agilent 19:40:30 Sep 19, 2011

R T

Mkr1 2.458 75 GHz





(IEEE 802.11n HT20 MHz mode)

Band Edges (CH Low)

Detector mode: Peak

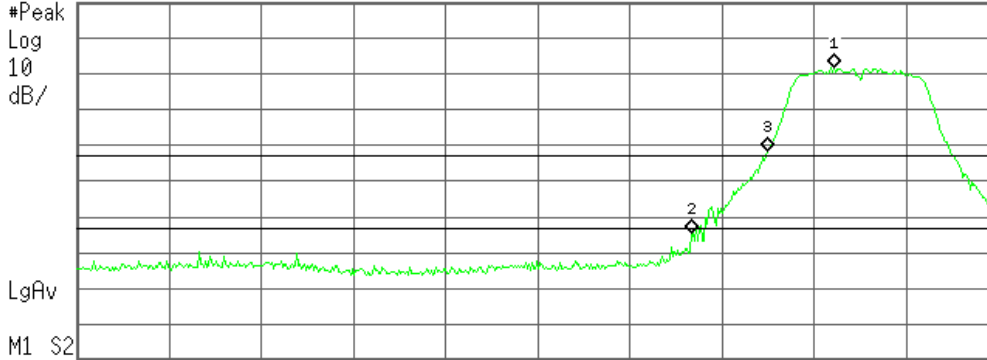
Polarity: Vertical

Agilent 19:57:05 Sep 19, 2011

R T

Mkr1 2.408 6 GHz  
98.77 dBµV

Ref 117 dBµV #Atten 20 dB



Start 2.310 0 GHz Stop 2.430 0 GHz  
#Res BW 1 MHz VBW 1 MHz Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.408 6 GHz	98.77 dBµU
2	(1)	Freq	2.390 0 GHz	52.33 dBµU
3	(1)	Freq	2.400 0 GHz	75.45 dBµU

Detector mode: Average

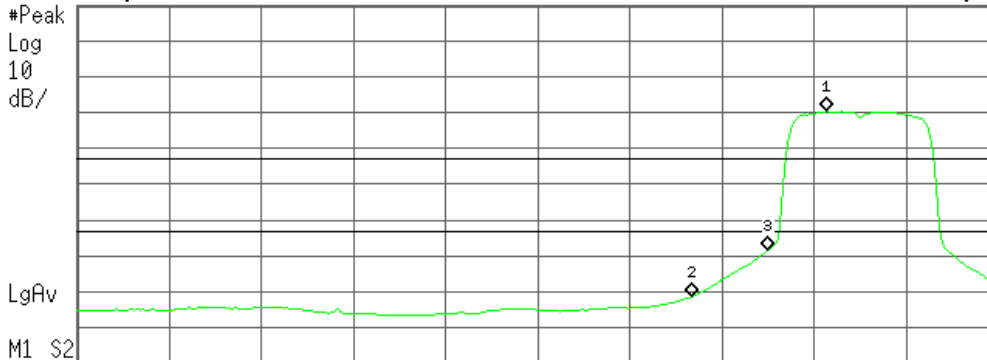
Polarity: Vertical

Agilent 19:57:41 Sep 19, 2011

R T

Mkr1 2.407 6 GHz  
87.54 dBµV

Ref 117 dBµV #Atten 20 dB



Start 2.310 0 GHz Stop 2.430 0 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 9.357 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.407 6 GHz	87.54 dBµU
2	(1)	Freq	2.390 0 GHz	35.52 dBµU
3	(1)	Freq	2.400 0 GHz	48.48 dBµU



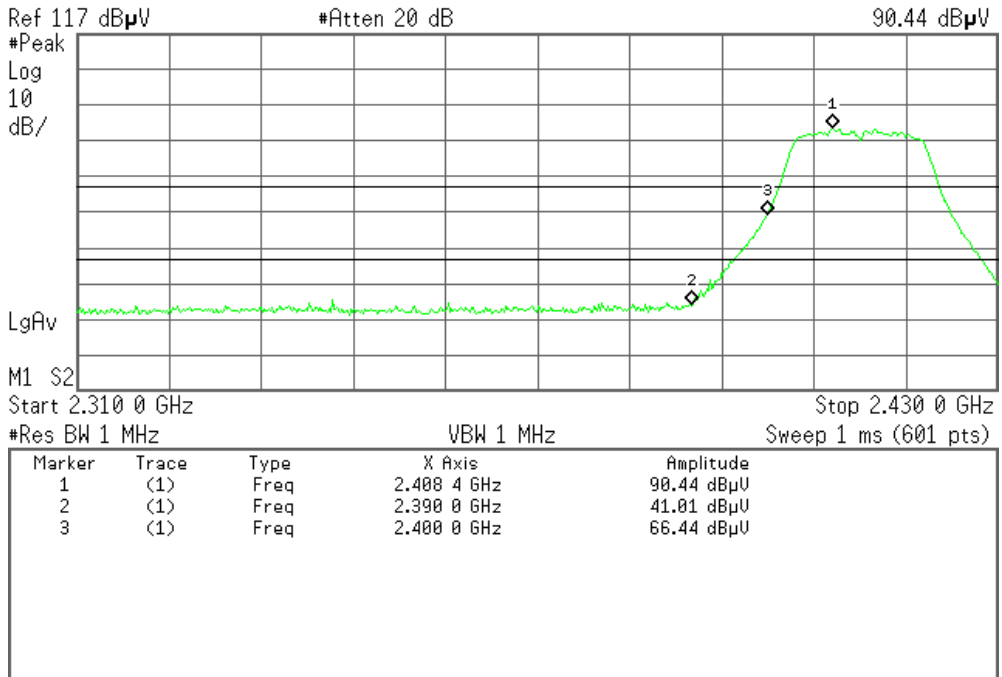
Detector mode: Peak

Polarity: Horizontal

Agilent 19:54:08 Sep 19, 2011

R T

Mkr1 2.408 4 GHz  
90.44 dBμV



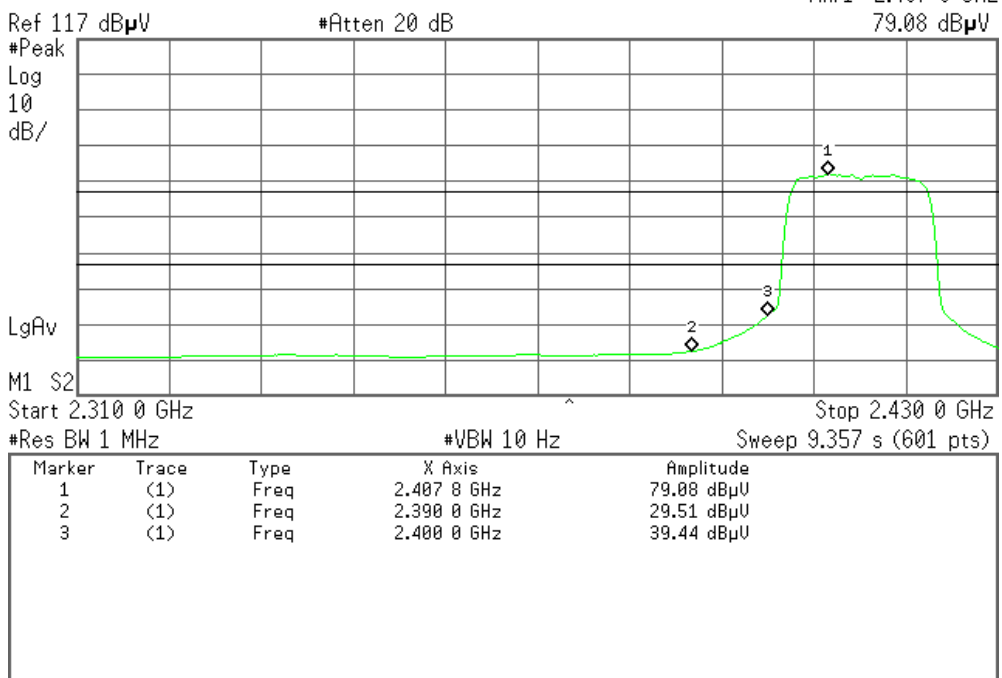
Detector mode: Average

Polarity: Horizontal

Agilent 19:54:44 Sep 19, 2011

R T

Mkr1 2.407 8 GHz  
79.08 dBμV





**Band Edges (CH High)**

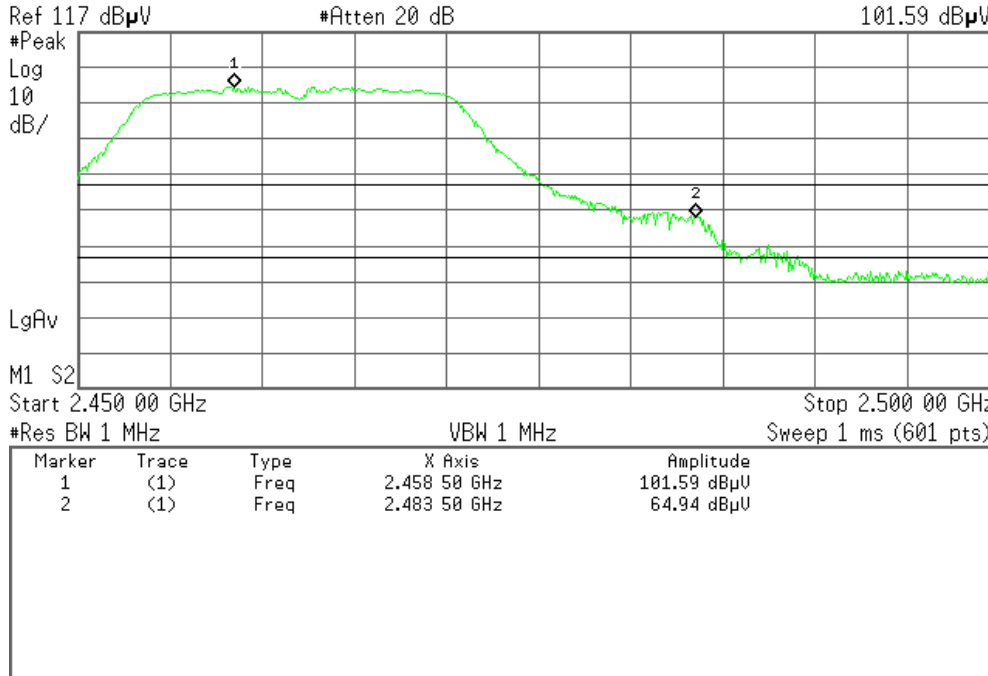
**Detector mode: Peak**

**Polarity: Vertical**

Agilent 20:00:22 Sep 19, 2011

R T

Mkr1 2.458 50 GHz  
101.59 dBμV



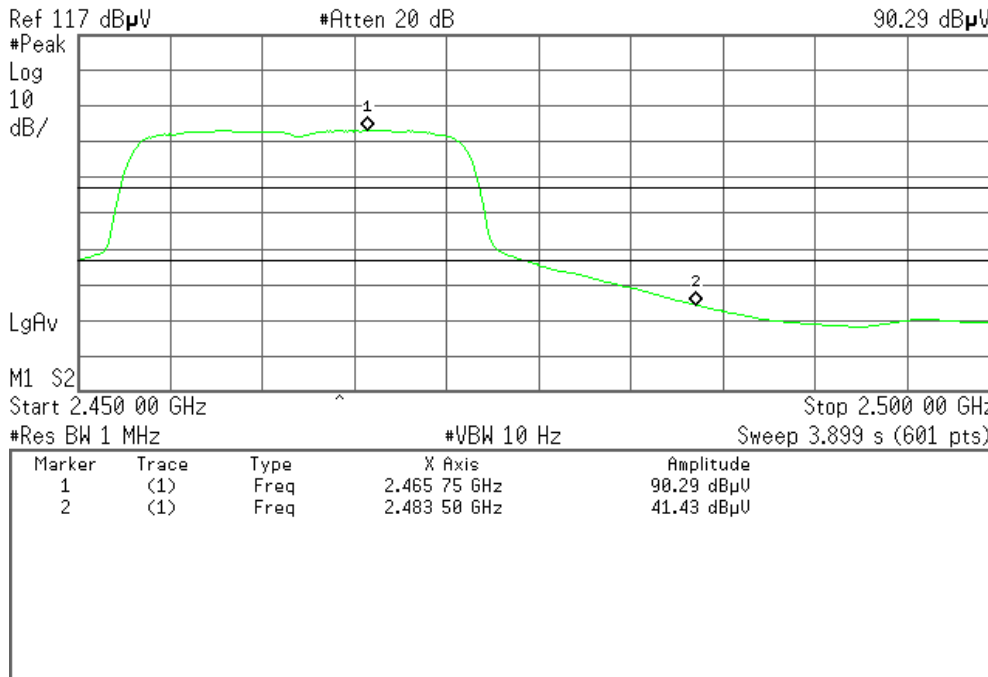
**Detector mode: Average**

**Polarity: Vertical**

Agilent 20:00:59 Sep 19, 2011

R T

Mkr1 2.465 75 GHz  
90.29 dBμV





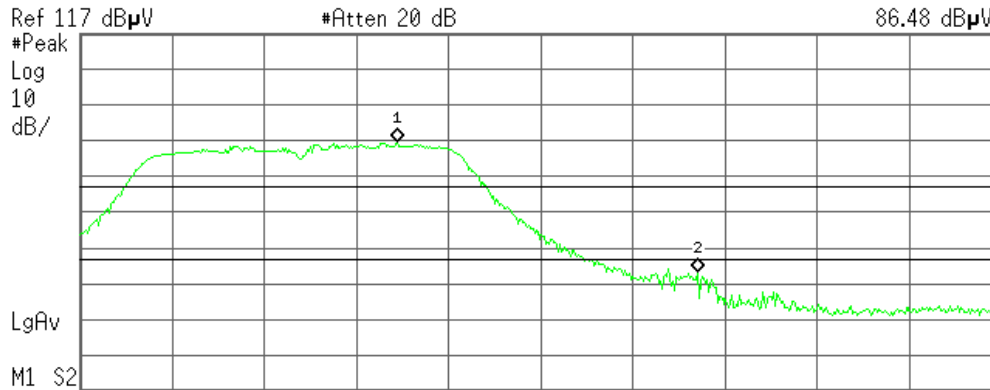
Detector mode: Peak

Polarity: Horizontal

Agilent 20:03:45 Sep 19, 2011

R T

Mkr1 2.467 25 GHz  
86.48 dBμV



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 25 GHz	86.48 dBμV
2	(1)	Freq	2.483 50 GHz	50.40 dBμV

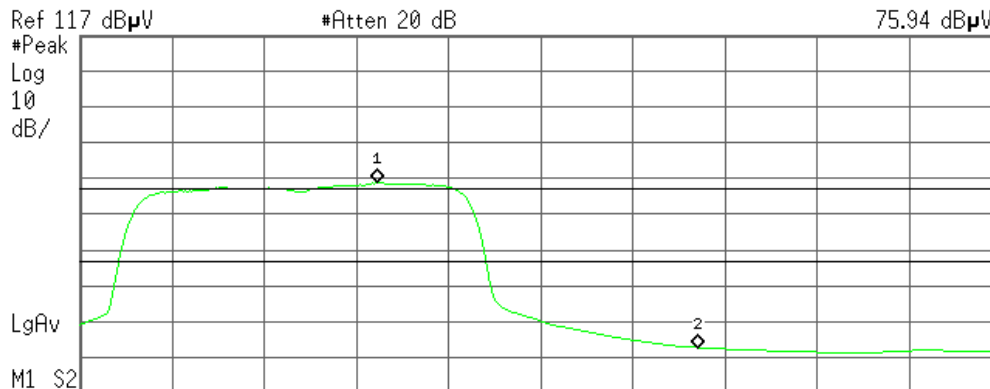
Detector mode: Average

Polarity: Horizontal

Agilent 20:04:12 Sep 19, 2011

R T

Mkr1 2.466 17 GHz  
75.94 dBμV



Start 2.450 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 3.899 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.466 17 GHz	75.94 dBμV
2	(1)	Freq	2.483 50 GHz	29.72 dBμV



(IEEE 802.11n HT40 MHz mode)

Band Edges (CH Low)

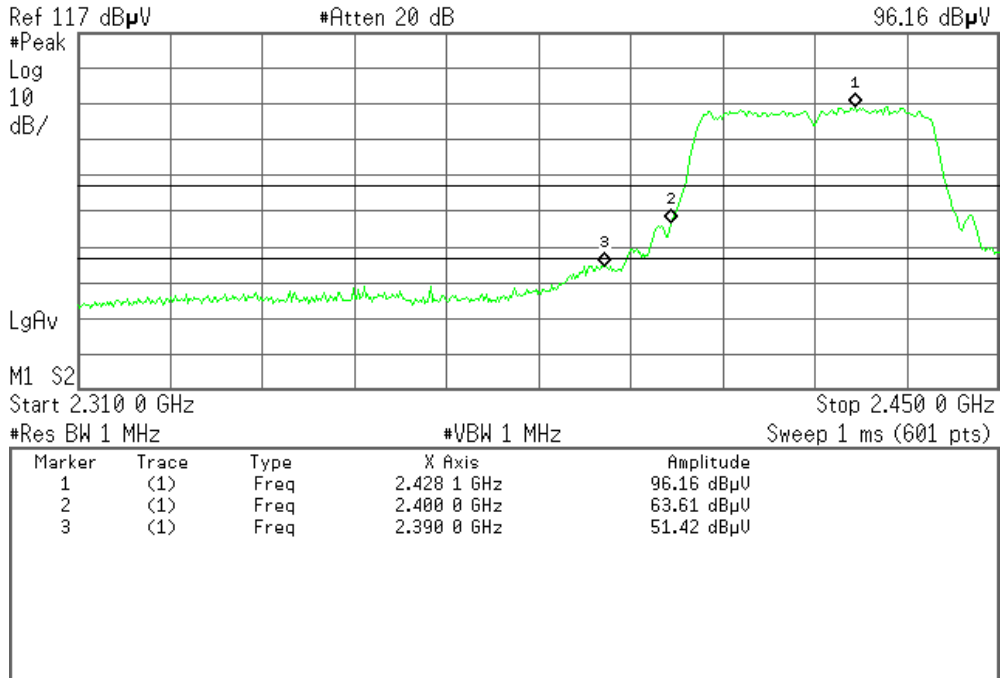
Detector mode: Peak

Polarity: Vertical

Agilent 20:36:22 Sep 19, 2011

R T

Mkr1 2.428 1 GHz  
96.16 dBµV



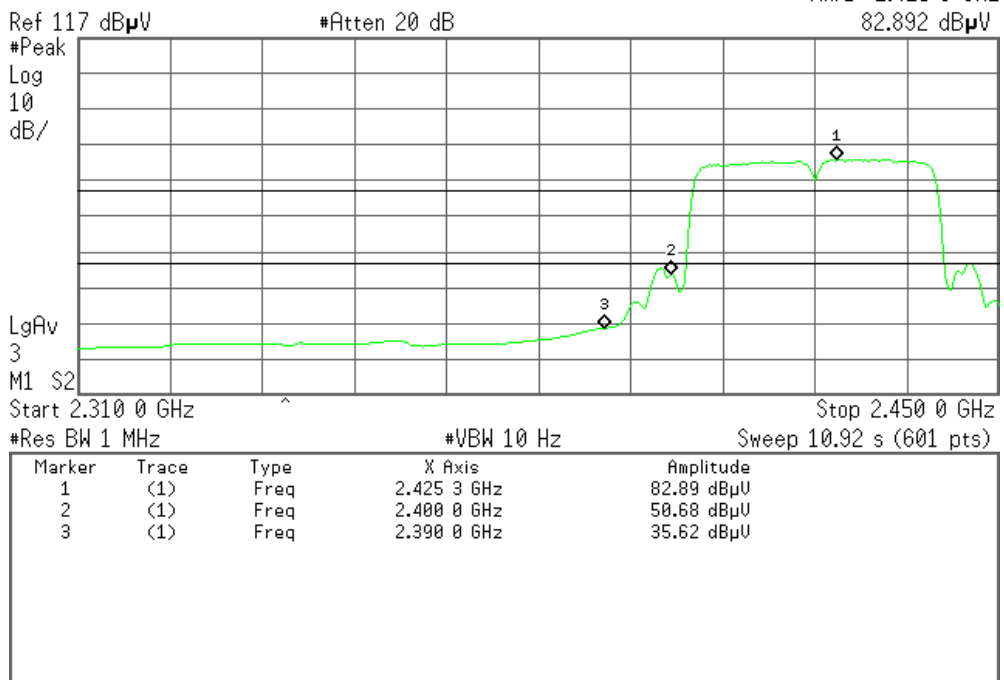
Detector mode: Average

Polarity: Vertical

Agilent 20:36:55 Sep 19, 2011

R T

Mkr1 2.425 3 GHz  
82.89 dBµV







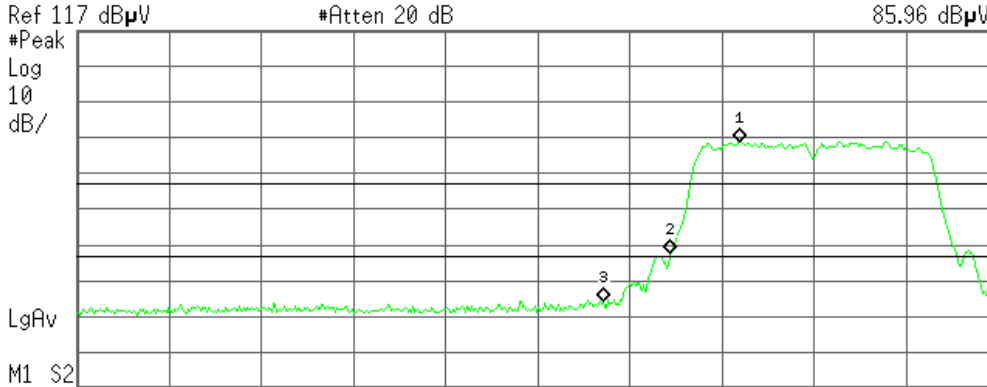
Detector mode: Peak

Polarity: Horizontal

Agilent 20:33:26 Sep 19, 2011

R T

Mkr1 2.410 8 GHz  
85.96 dBμV



Start 2.310 0 GHz Stop 2.450 0 GHz  
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.410 8 GHz	85.96 dBμV
2	(1)	Freq	2.400 0 GHz	54.43 dBμV
3	(1)	Freq	2.390 0 GHz	41.09 dBμV

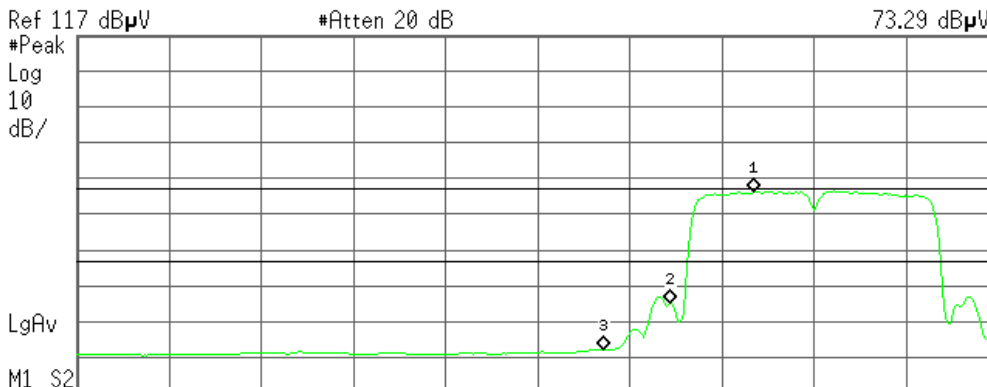
Detector mode: Average

Polarity: Horizontal

Agilent 20:34:06 Sep 19, 2011

R T

Mkr1 2.412 9 GHz  
73.29 dBμV



Start 2.310 0 GHz Stop 2.450 0 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 10.92 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 9 GHz	73.29 dBμV
2	(1)	Freq	2.400 0 GHz	42.14 dBμV
3	(1)	Freq	2.390 0 GHz	29.06 dBμV



**Band Edges (CH High)**

**Detector mode: Peak**

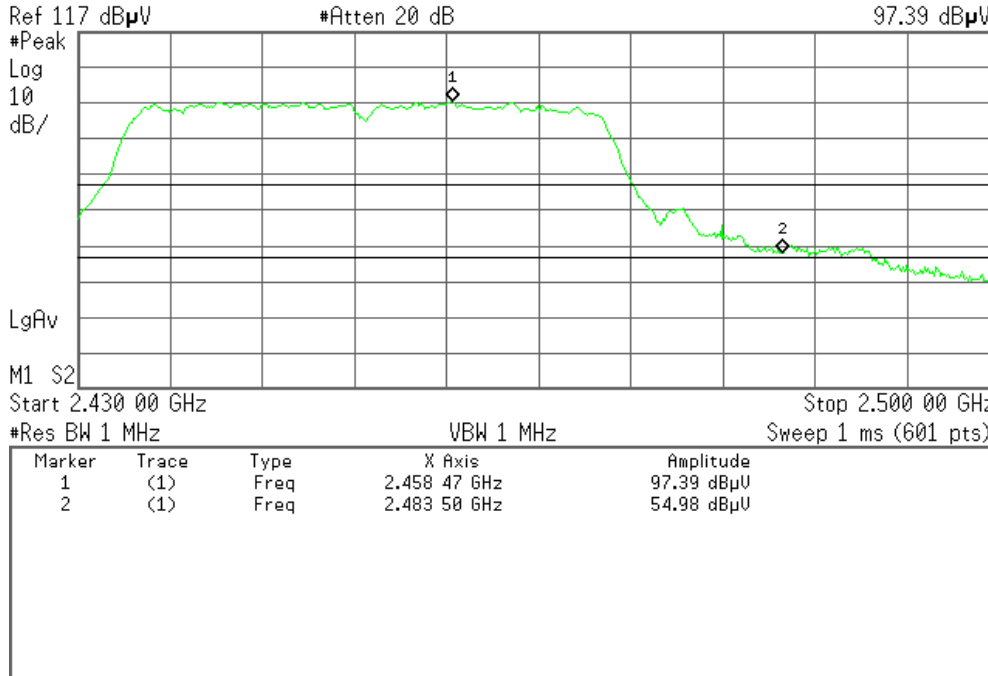
**Polarity: Vertical**

Agilent 20:25:51 Sep 19, 2011

R T

Mkr1 2.458 47 GHz

97.39 dBμV



**Detector mode: Average**

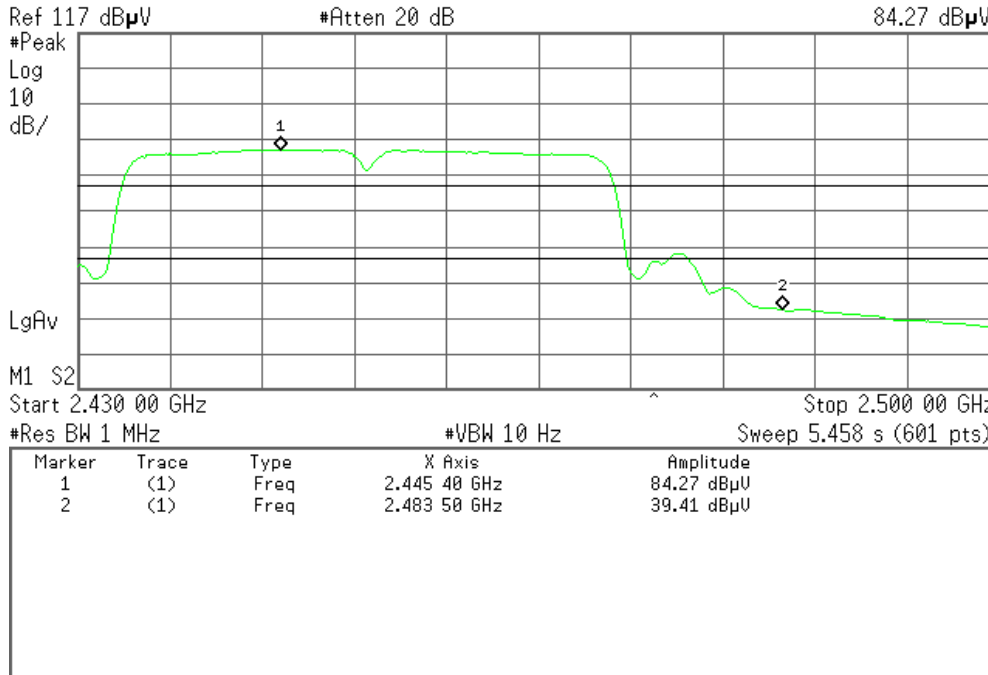
**Polarity: Vertical**

Agilent 20:26:31 Sep 19, 2011

R T

Mkr1 2.445 40 GHz

84.27 dBμV





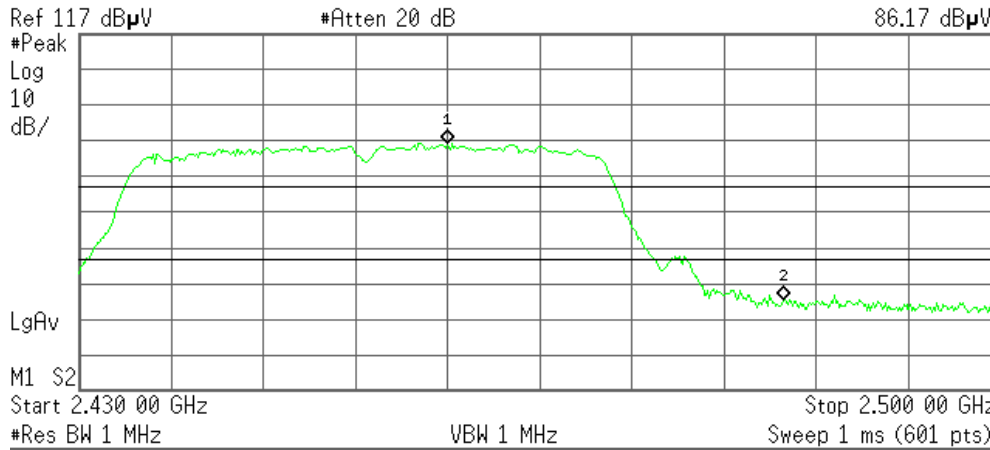
Detector mode: Peak

Polarity: Horizontal

Agilent 20:28:48 Sep 19, 2011

R T

Mkr1 2.458 00 GHz  
86.17 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.458 00 GHz	86.17 dBμV
2	(1)	Freq	2.483 50 GHz	42.34 dBμV

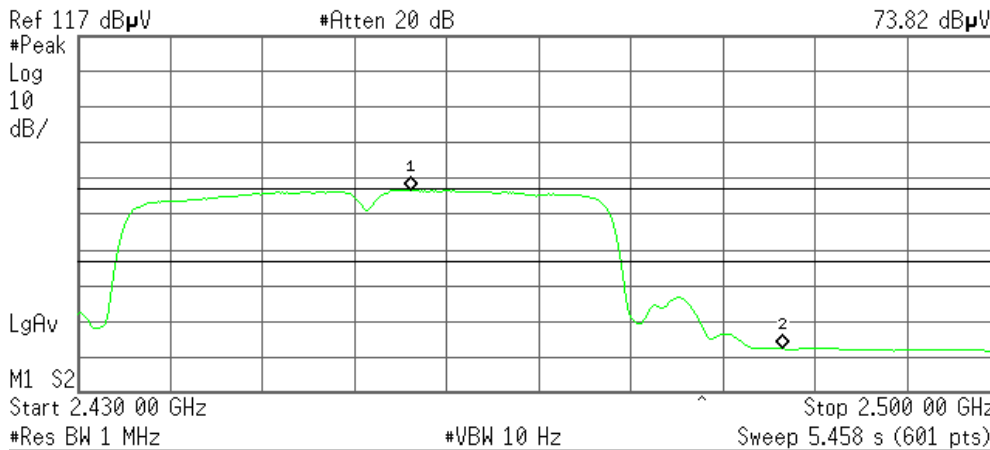
Detector mode: Average

Polarity: Horizontal

Agilent 20:29:30 Sep 19, 2011

R T

Mkr1 2.455 32 GHz  
73.82 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.455 32 GHz	73.82 dBμV
2	(1)	Freq	2.483 50 GHz	29.36 dBμV



## 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.

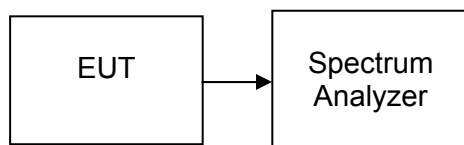
### 7.6.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2011	03/19/2012

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

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 = 1500kHz, Sweep=100s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

### 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	-5.02	8.00	PASS
Mid	2437	-4.52		PASS
High	2462	-6.08		PASS

**Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-17.30	8.00	PASS
Mid	2437	-14.81		PASS
High	2462	-17.05		PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-12.28	8.00	PASS
Mid	2437	-10.31		PASS
High	2462	-12.78		PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422	-17.73	8.00	PASS
Mid	2437	-14.61		PASS
High	2452	-17.02		PASS



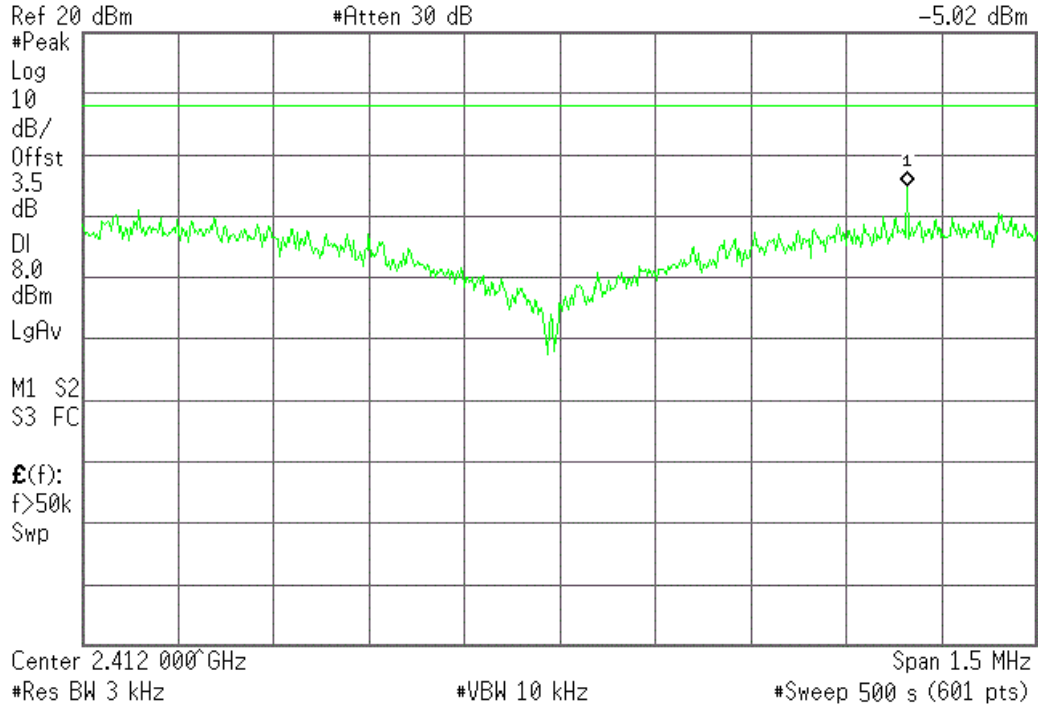
**Test Plot (IEEE 802.11b mode)**

**PPSD (CH Low)**

Agilent 02:33:47 Sep 21, 2011

R T

Mkr1 2.412 548 GHz  
-5.02 dBm

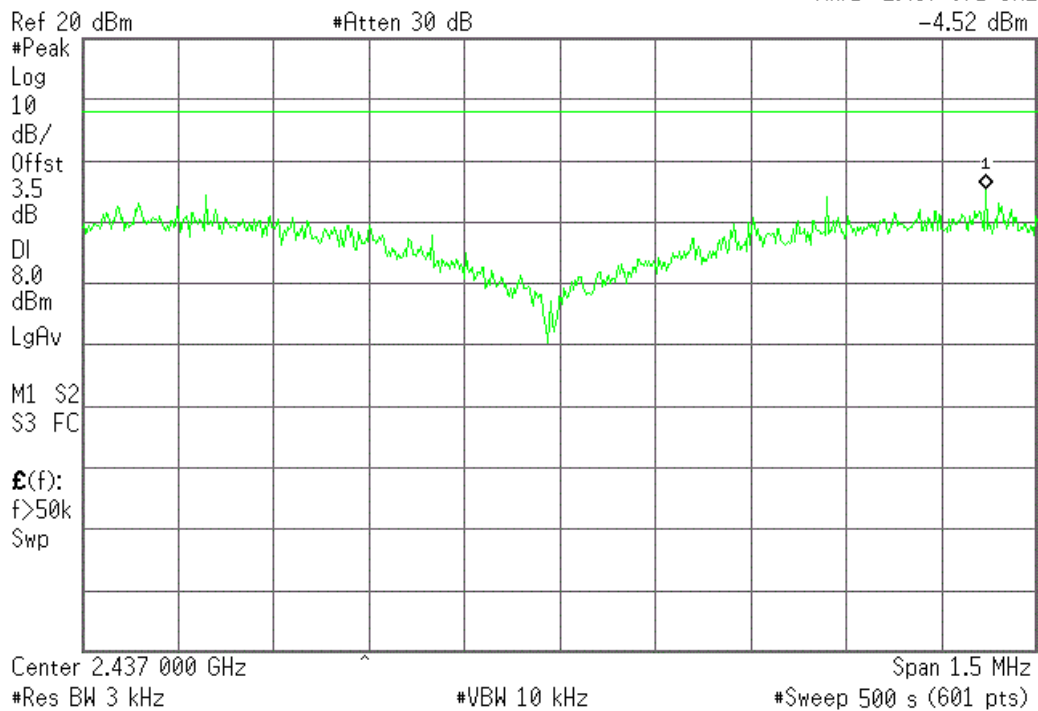


**PPSD (CH Mid)**

Agilent 02:46:22 Sep 21, 2011

R T

Mkr1 2.437 671 GHz  
-4.52 dBm



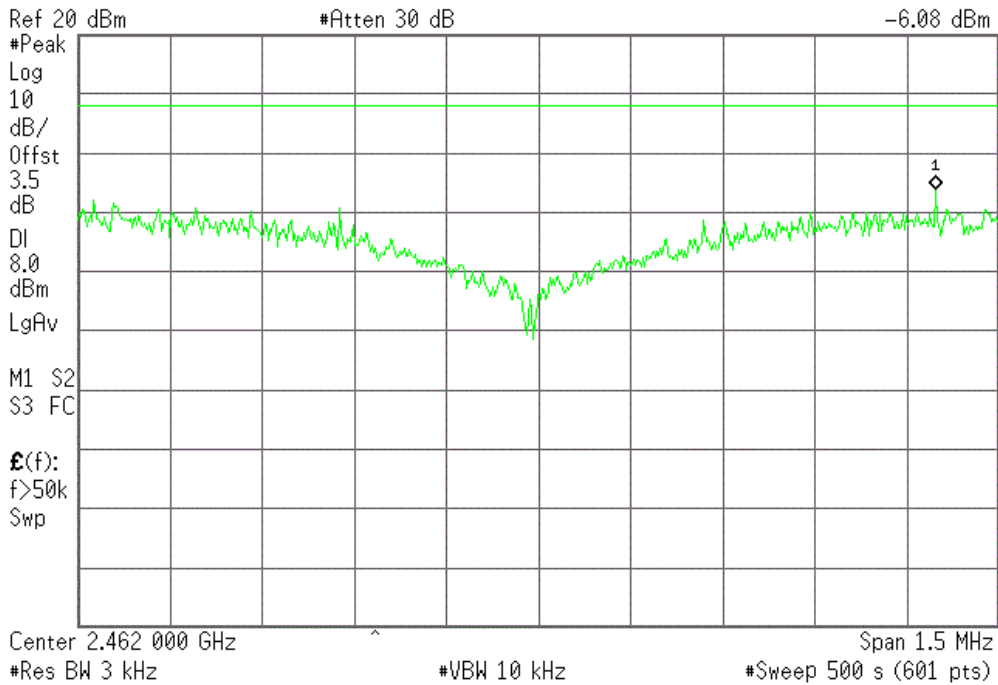


### PPSD (CH High)

Agilent 03:01:37 Sep 21, 2011

R T

Mkr1 2.462 672 GHz  
-6.08 dBm



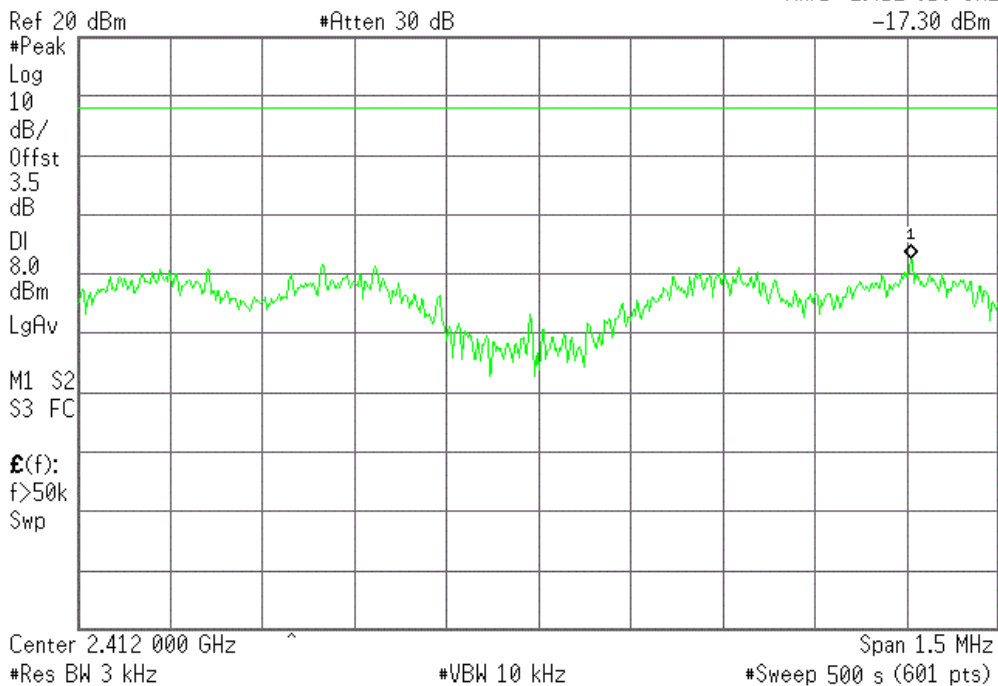
(IEEE 802.11g mode)

### PPSD (CH Low)

Agilent 03:26:17 Sep 21, 2011

R T

Mkr1 2.412 610 GHz  
-17.30 dBm



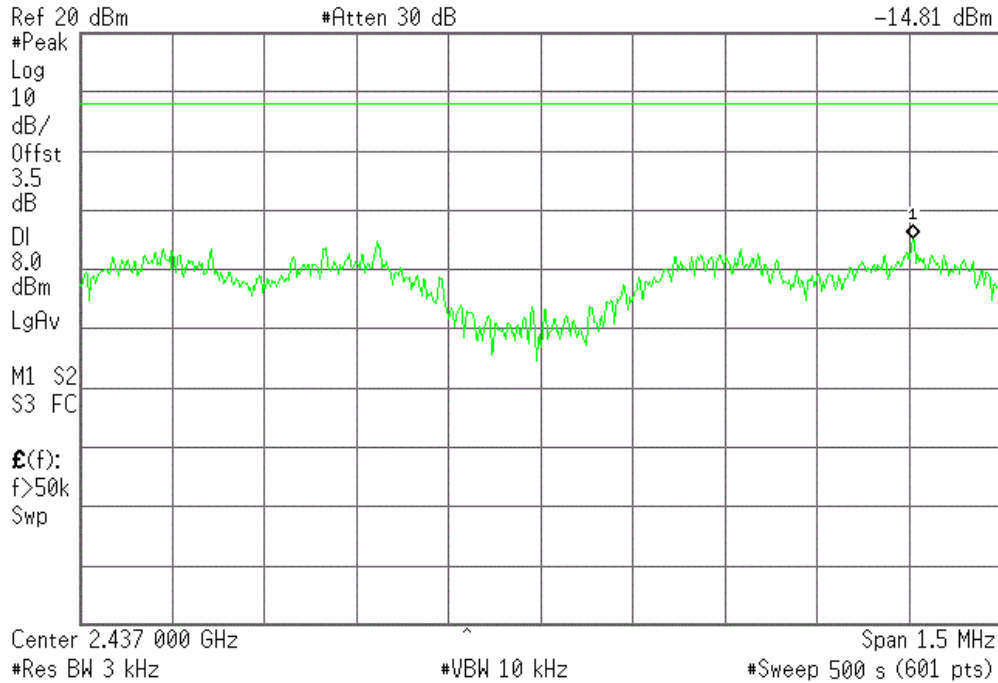


### PPSD (CH Mid)

Agilent 03:43:44 Sep 21, 2011

R T

Mkr1 2.437 610 GHz  
-14.81 dBm

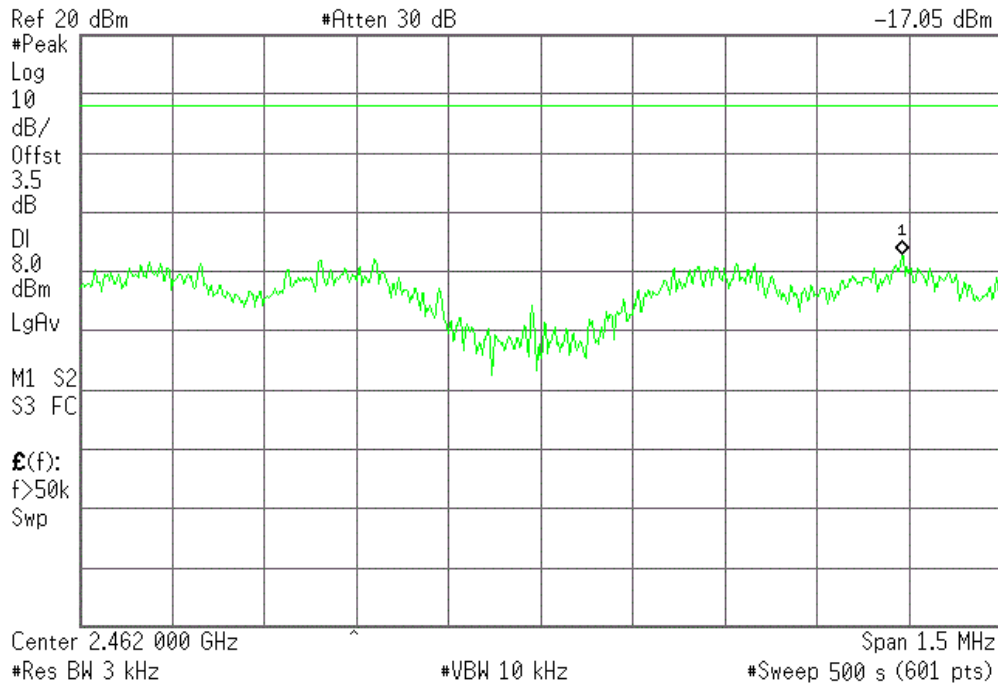


### PPSD (CH High)

Agilent 03:58:46 Sep 21, 2011

R T

Mkr1 2.462 609 GHz  
-17.05 dBm







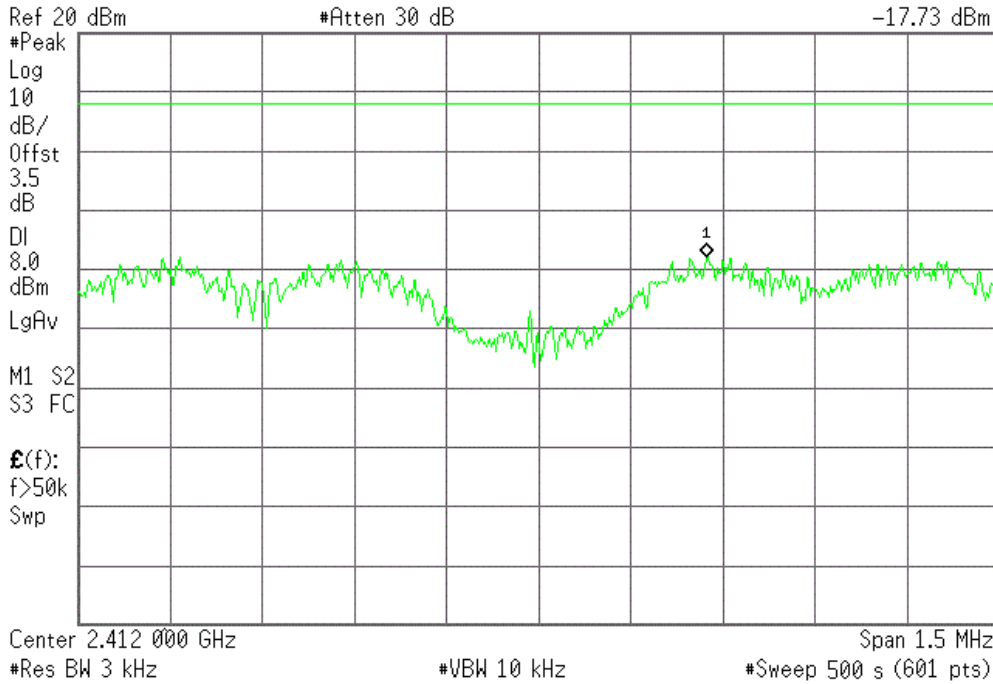
(IEEE 802.11n HT20 MHz mode)

PPSD (CH Low)

Agilent 04:23:18 Sep 21, 2011

R T

Mkr1 2.412 276 GHz  
-17.73 dBm

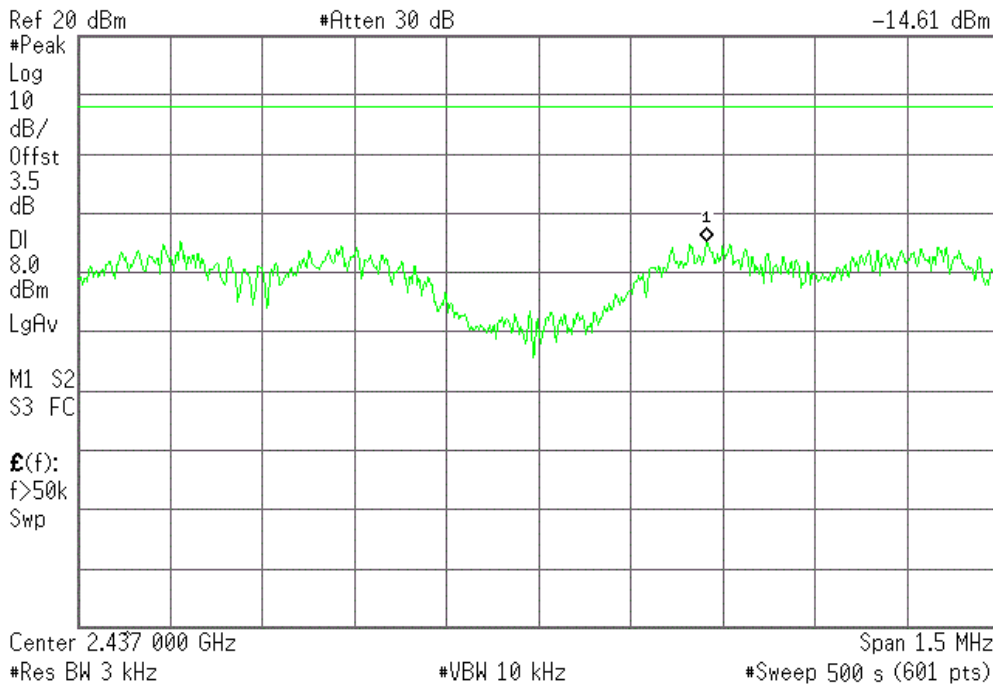


PPSD (CH Mid)

Agilent 04:41:06 Sep 21, 2011

R T

Mkr1 2.437 276 GHz  
-14.61 dBm



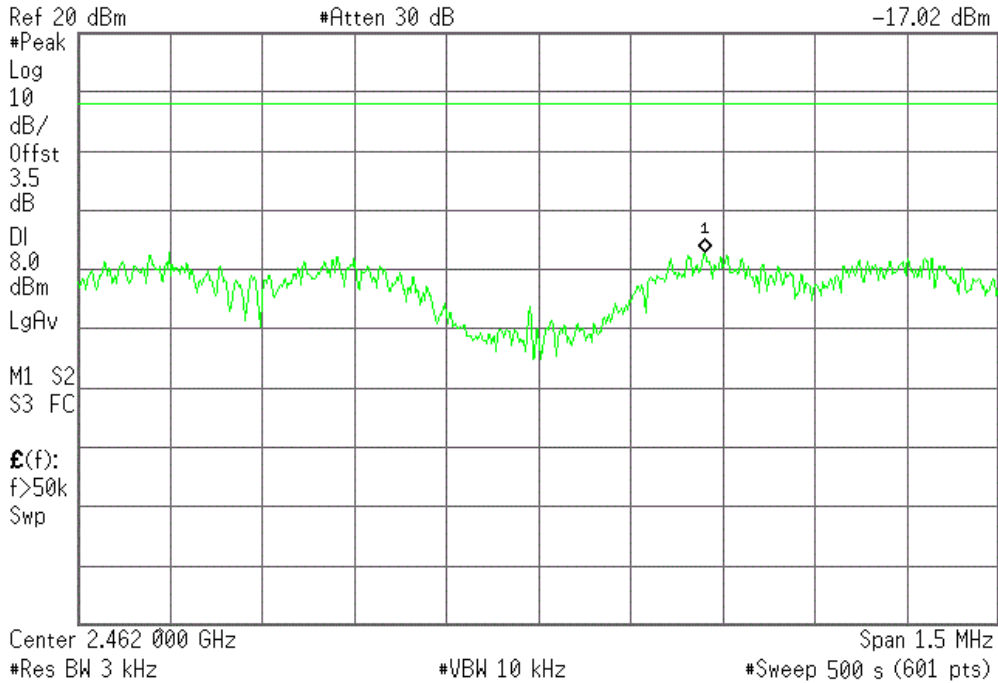


### PPSD (CH High)

Agilent 04:55:30 Sep 21, 2011

R T

Mkr1 2.462 278 GHz  
-17.02 dBm



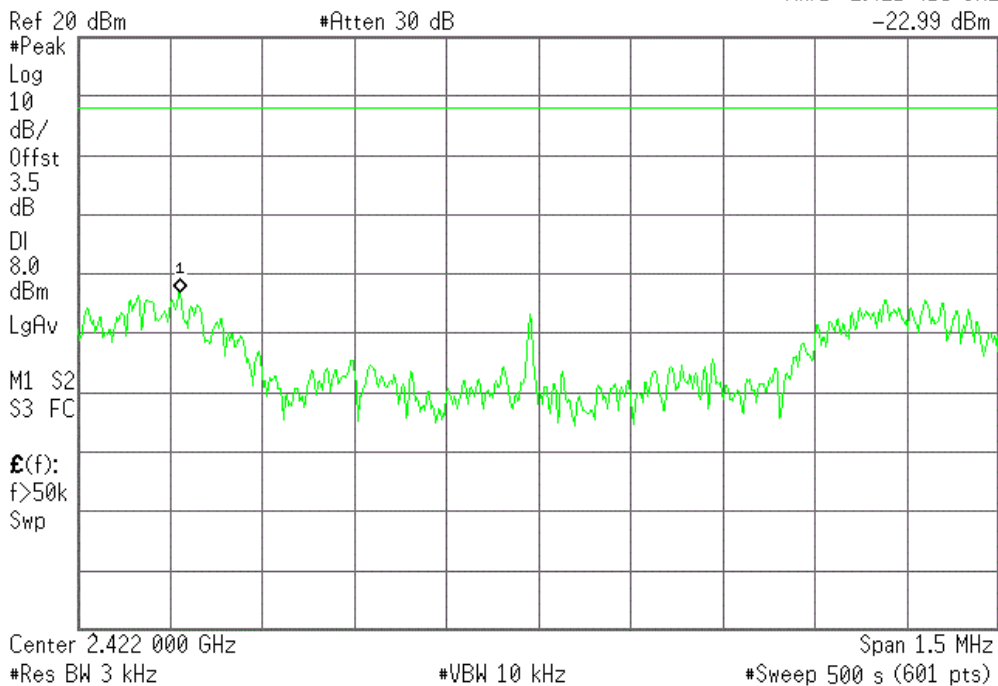
### (IEEE 802.11n HT40 MHz mode)

### PPSD (CH Low)

Agilent 05:11:08 Sep 21, 2011

R T

Mkr1 2.421 415 GHz  
-22.99 dBm



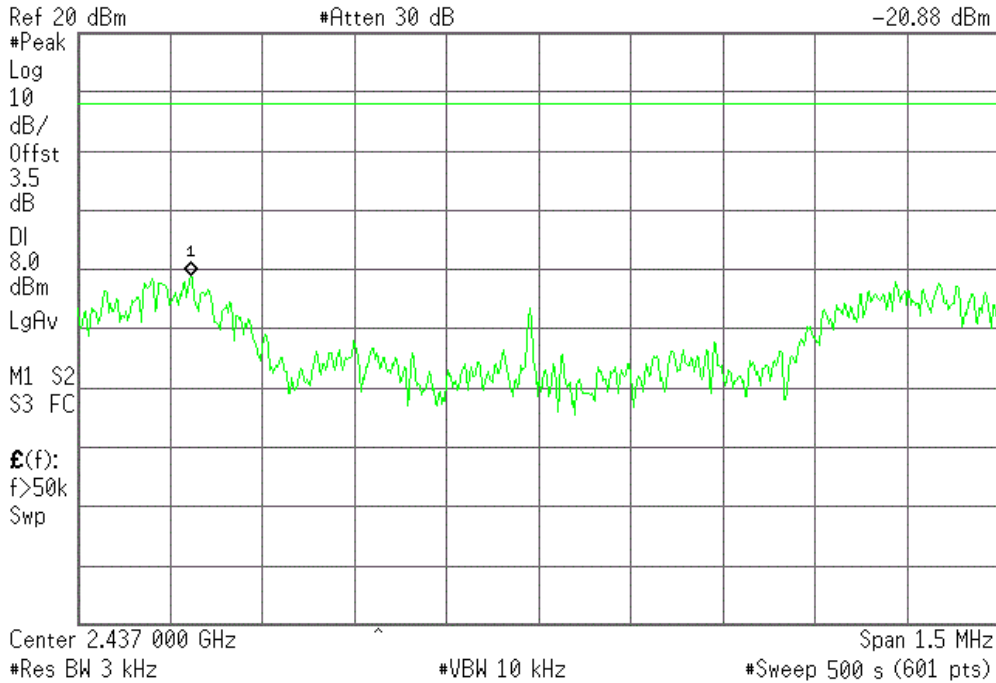


### PPSD (CH Mid)

Agilent 05:27:34 Sep 21, 2011

R T

Mkr1 2.436 414 GHz  
-20.88 dBm



### PPSD (CH High)

Agilent 05:44:55 Sep 21, 2011

R T

Mkr1 2.451 414 GHz  
-22.53 dBm

