



# FCC TEST REPORT

for

Home Gateway

MODEL: HG523

Test Report Number:

SZ100628B03-RP

Issued for

Huawei Technologies Co., Ltd.

Administration Building, Huawei Base, Bantian, Longgang

District, Shenzhen 518129 P.R.C.

Issued by:

COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.

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Issued Date: July 13, 2010



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 13, 2010	Initial Issue	ALL	Clinton Kao



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# 1 TEST CERTIFICATION

<b>Product:</b>	Home Gateway
<b>Model:</b>	HG523
<b>Brand:</b>	HUAWEI
<b>Tested:</b>	June 28-July 13, 2010
<b>Applicant:</b>	<b>Huawei Technologies Co., Ltd.</b> Administration Building, Huawei Base, Bantian, Longgang District, Shenzhen 518129 P.R.C.
<b>Manufacturer:</b>	<b>Huawei Technologies Co., Ltd.</b> Administration Building, Huawei Base, Bantian, Longgang District, Shenzhen 518129 P.R.C.

APPLICABLE STANDARDS			
Standard	Test Type	Standard	Test Type
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	● Spurious Emissions ● Conducted Measurement ● Radiated Emissions
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: 2003** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

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

**Approved by:**

**Reviewed by:**

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**Clinton Kao**  
Manager  
Compliance Certification Service Inc.

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**Vincent Yao**  
Assistant manager  
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>	Home Gateway
<b>Trade Name</b>	HUAWEI
<b>Model Number</b>	HG523
<b>Model Discrepancy</b>	N/A
<b>Serial Number</b>	SZ100628B03-RP
<b>Power Supply</b>	DC5V Powered by the adapter
<b>Adapter Manufacturer / Model No.</b>	(1)Adapter 1: FUHUA/UE05L1-050100SPAU AC input: AC100-240V, 50/60Hz,0.2 A Max DC output: DC5.0V, 1.0 A; Unshielded, 1.50m (2)Adapter 2: SHENZHEN FRECOM ELECTRONICS Co., LTD /FPS005US-050100 AC input: AC100-240V, 50/60Hz,0.3A DC output: DC5.0V, 1.0 A ;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: 15.73dBm IEEE 802.11g mode: 11.45 dBm IEEE 802.11n HT20 MHz mode: 11.27 dBm IEEE 802.11n HT40 MHz mode: 11.47 dBm
<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>	Printed Antenna with 2.0dBi 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: **QISHG523** 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.

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

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

IEEE802.11g mode: Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT20 MHz mode: Channel Low (2412MHz), Channel Mid(2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

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



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

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

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	NOTEBOOK 1	2672	992F2VG	N/A	IBM	N/A	Unshielded 1.80m
2	NOTEBOOK 2	Studio 1435	5315448686549	N/A	DELL	N/A	Unshielded 1.75m
3	ADSL CO-Router	N/A	N/A	N/A	N/A	Unshielded 1.50m	Unshielded 1.50m

**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 17025.

<b>USA</b>	<b>A2LA</b>
<b>Taiwan</b>	<b>TAF</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</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

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	1166.5950 03	100783	03/21/2010	03/21/2011
LISN	FCC	FCC-LISN-50-50-2-M	01068	03/21/2010	03/21/2011
LISN	EMCO	3825/2	8901-1459	03/21/2010	03/21/2011
CDN	FCC	FCC-TILISN-T4	20182	03/21/2010	03/21/2011
CDN	FCC	FCC-TLISN-T8-02	20183	03/21/2010	03/21/2011
CDN	FCC	FCC-TLISN-T4-02	20382	03/21/2010	03/21/2011
CDN	FCC	FCC-TLISN-T4-02	20383	03/21/2010	03/21/2011
CDN	FCC	FCC-801-T8-RJ45	04030	03/21/2010	03/21/2011
Current Probe	STODDART AIRCRAFT	91550-1	345-73	03/21/2010	03/21/2011
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/30/2010	03/30/2011

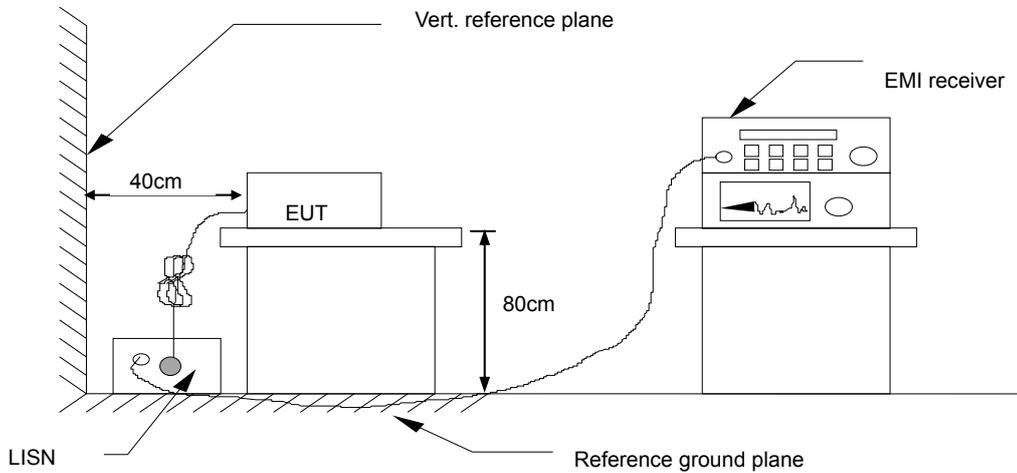
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.



**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:**

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	Note
x.xx	50.27	49.16	48.17	65.47	55.47	-16.31	-7.30	L

Freq. = Emission frequency in MHz  
 RAW dBuV = Uncorrected Analyzer/Received Reading +INSERTION LOSS of LISN+CABLE LOSS+pulse limiter loss  
 Q.P. Limit dBuV = Limit stated in standard  
 AVG Limit dBuV = Limit stated in standard  
 Q.P. Margin dB = Q.P. RAW (dBuV) –Q.P. Limit (dBuV)  
 AVG Margin dB = AVG RAW (dBuV) –AVG Limit (dBuV)  
 Note = Current carrying line of reading  
 Q.P.: =Quasi-Peak



7.1.6. TEST RESULTS

<b>Model No.</b>	HG523	<b>Test Mode</b>	Normal Link(Adapter 1: FUHUA/UE05L1-050100SPAU)
<b>Environmental Conditions</b>	24deg.C,54% RH, 1003 hPa	<b>RBW,VBW</b>	9 kHz
<b>Tested by</b>	Tom Gan		

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.183	52.24	---	---	65.05	55.05	---	-2.81	L1
0.257	47.89	---	---	62.93	52.93	---	-5.04	L1
0.313	47.55	---	---	61.34	51.34	---	-3.79	L1
0.617	43.33	---	---	56.00	46.00	---	-2.67	L1
0.961	43.79	---	---	56.00	46.00	---	-2.21	L1
4.717	42.22	---	---	56.00	46.00	---	-3.78	L1
0.198	50.23	---	---	64.62	54.62	---	-4.39	L2
0.264	47.58	---	---	62.72	52.72	---	-5.14	L2
0.327	45.24	---	---	60.92	50.92	---	-5.68	L2
0.479	43.84	---	---	56.57	46.57	---	-2.73	L2
4.412	44.29	38.61	24.64	56.00	46.00	-17.39	-21.36	L2
19.947	43.25	---	---	60.00	50.00	---	-6.75	L2

**NOTE:** 1. The measuring frequencies range between 0.15 MHz and 30 MHz.

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



<b>Model No.</b>	HG523	<b>Test Mode</b>	Normal Link(Adapter 2: SHENZHEN FRECOM ELECTRONICS Co., LTD /FPS005US-050100)
<b>Environmental Conditions</b>	24deg.C,54% RH, 1003 hPa	<b>RBW,VBW</b>	9 kHz
<b>Tested by</b>	Tom Gan		

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.153	43.71	34.69	30.00	65.89	55.89	-31.20	-25.89	L1
0.168	51.65	---	---	65.47	55.47	---	-3.82	L1
0.409	45.80	34.89	23.76	58.59	48.59	-23.70	-24.83	L1
0.687	42.54	32.22	16.47	56.00	46.00	-23.78	-29.53	L1
1.929	41.89	---	---	56.00	46.00	---	-4.11	L1
7.234	45.21	---	---	60.00	50.00	---	-4.79	L1
0.164	54.25	44.32	35.62	65.58	55.58	-21.26	-1.33	L2
0.379	49.84	39.55	24.78	59.43	49.43	-19.88	0.41	L2
0.424	49.76	39.47	23.68	58.16	48.16	-18.69	1.60	L2
0.672	47.25	36.95	20.77	56.00	46.00	-19.05	1.25	L2
1.885	45.52	41.58	28.36	56.00	46.00	-14.42	-17.64	L2
7.76	47.77	41.08	32.31	60.00	50.00	-18.92	-2.23	L2

**NOTE:** 1. The measuring frequencies range between 0.15 MHz and 30 MHz.

2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.

3. “---” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.

4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of test Receiver between 0.15MHz and 30MHz was 9kHz.

5. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).



## 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

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011

### 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

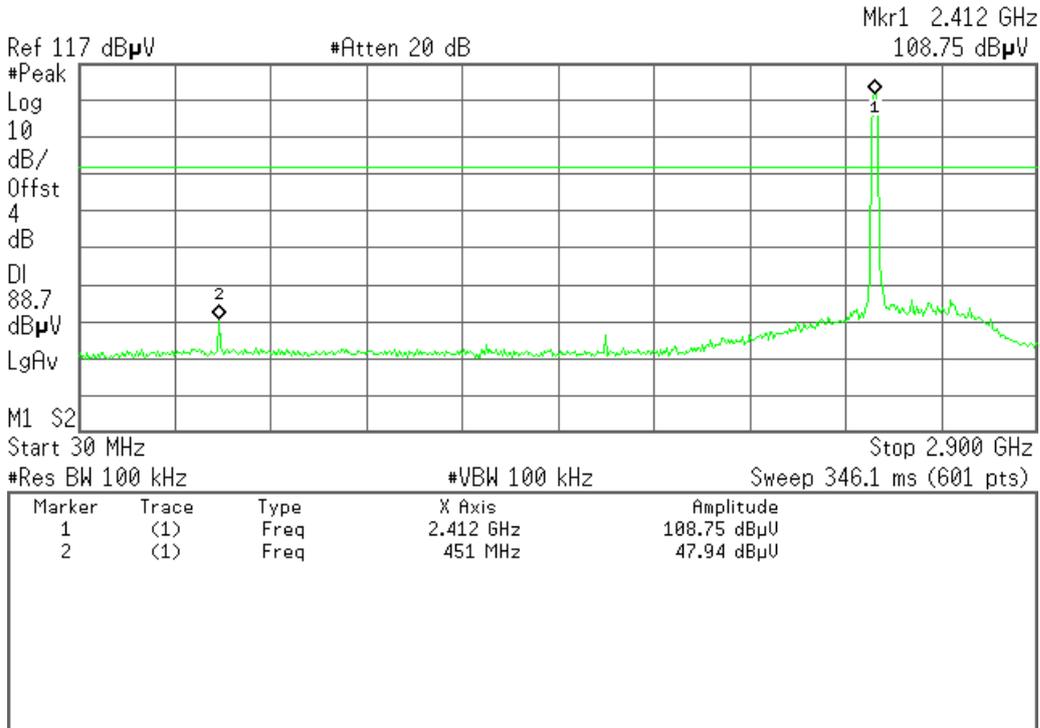
#### Test Plot

(IEEE 802.11b mode)

CH Low (30MHz ~2.9GHz)

Agilent 11:56:27 Jul 8, 2010

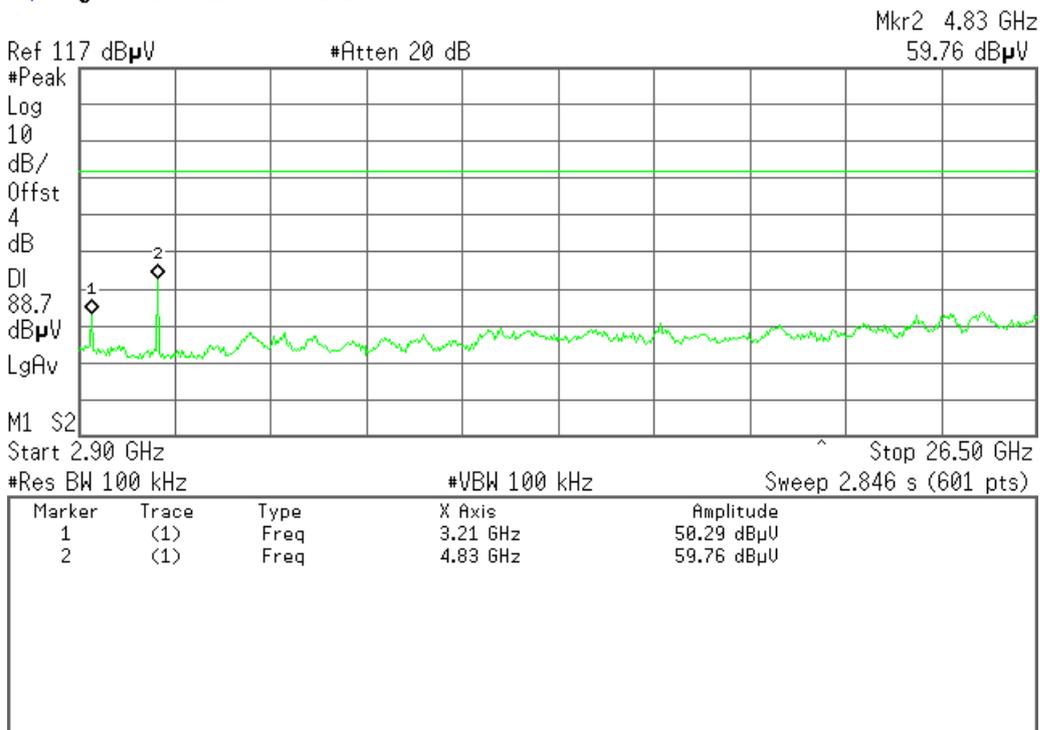
R T



(2.9MHz ~26.5GHz)

Agilent 11:57:22 Jul 8, 2010

R T

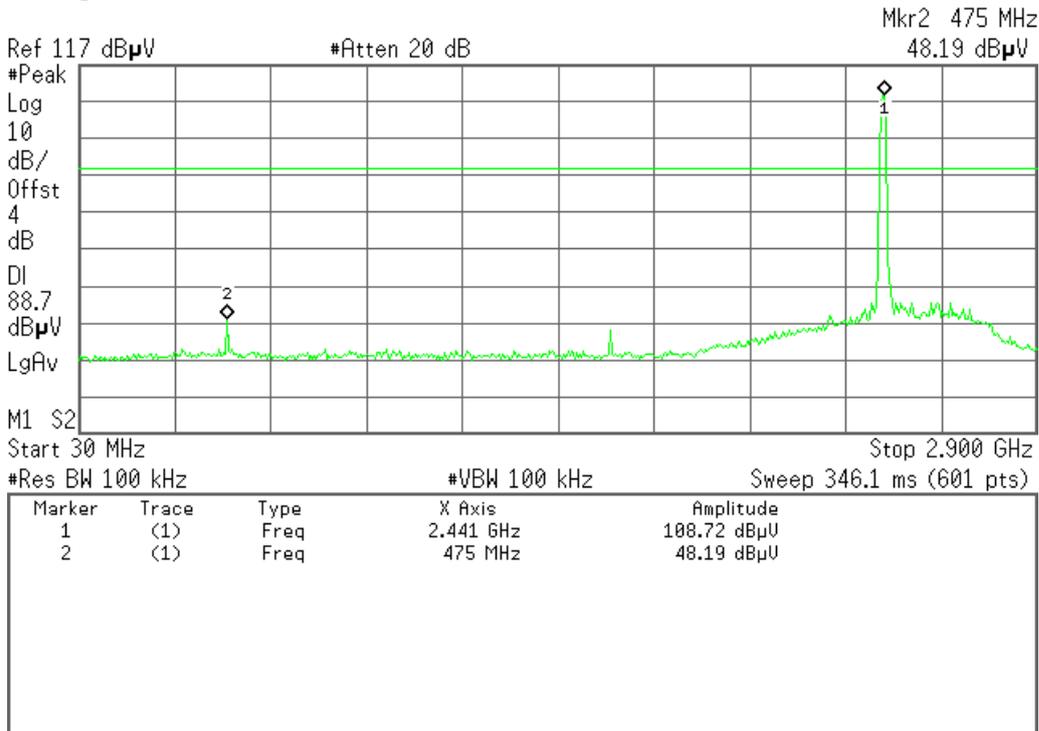




CH Mid(30MHz ~ 2.9GHz)

Agilent 11:59:09 Jul 8, 2010

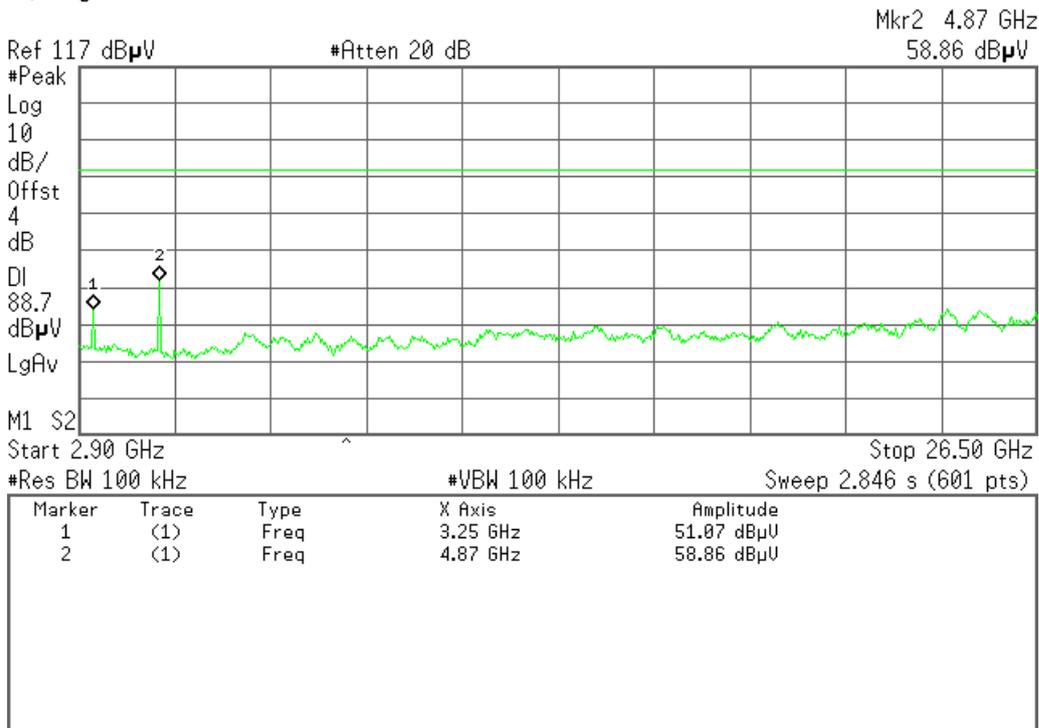
R T



2.9GHz ~ 26.5GHz

Agilent 12:00:02 Jul 8, 2010

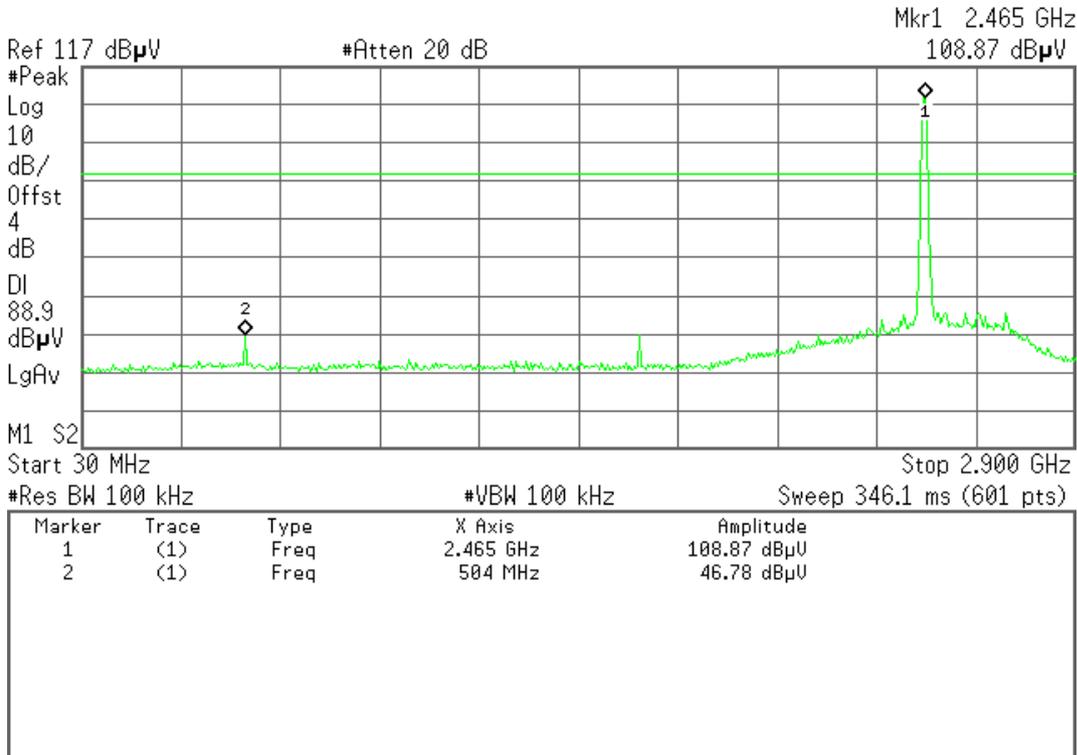
R T



## CH High (30MHz ~ 2.9GHz)

Agilent 12:02:15 Jul 8, 2010

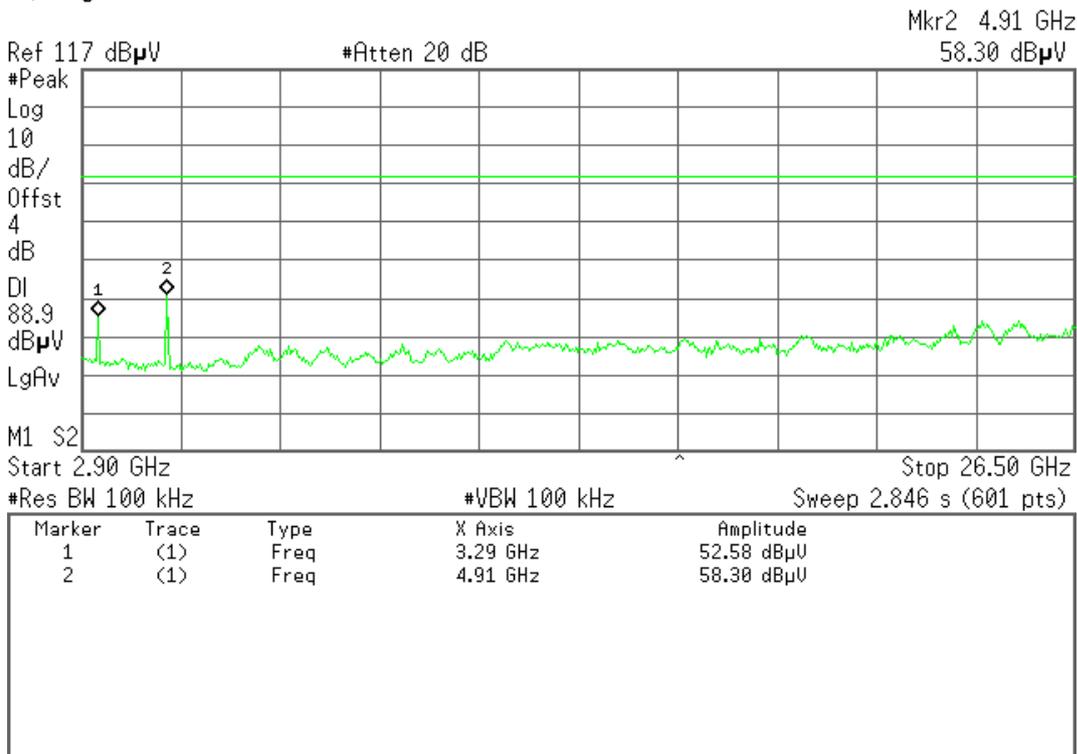
R T



## 2.9GHz ~ 26.5GHz

Agilent 12:03:04 Jul 8, 2010

R T

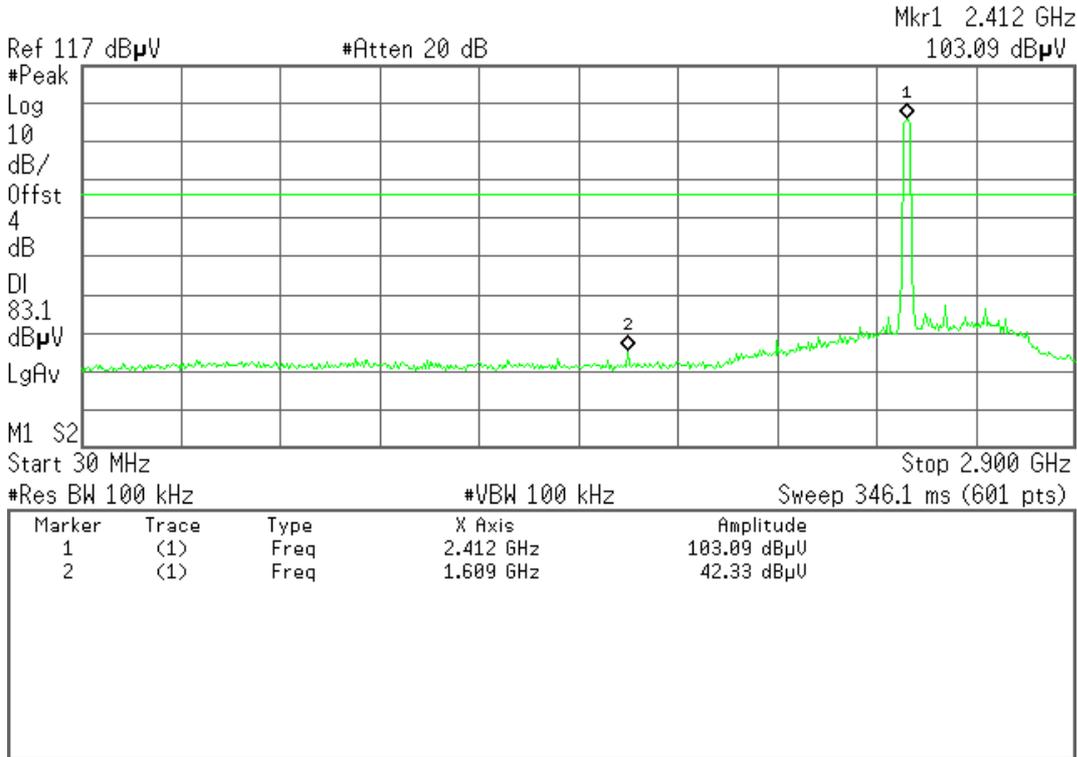




(IEEE 802.11g mode)  
CH Low (30MHz ~2.9GHz)

Agilent 12:10:20 Jul 8, 2010

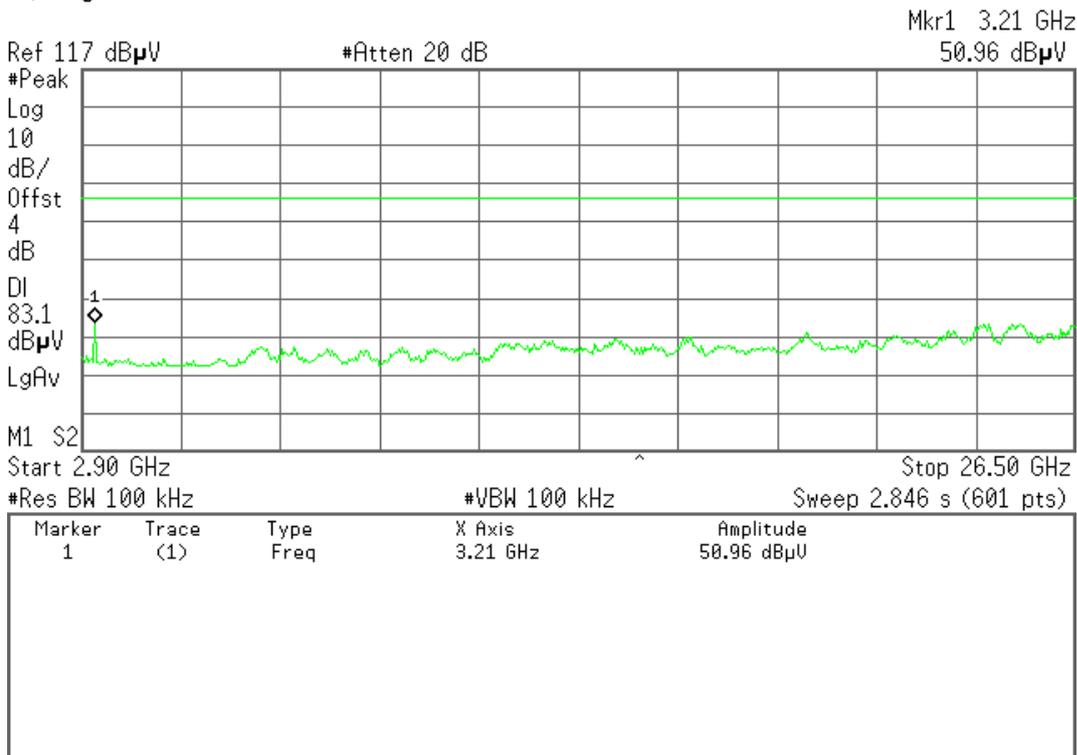
R T



(2.9MHz ~26.5GHz)

Agilent 12:11:01 Jul 8, 2010

R T

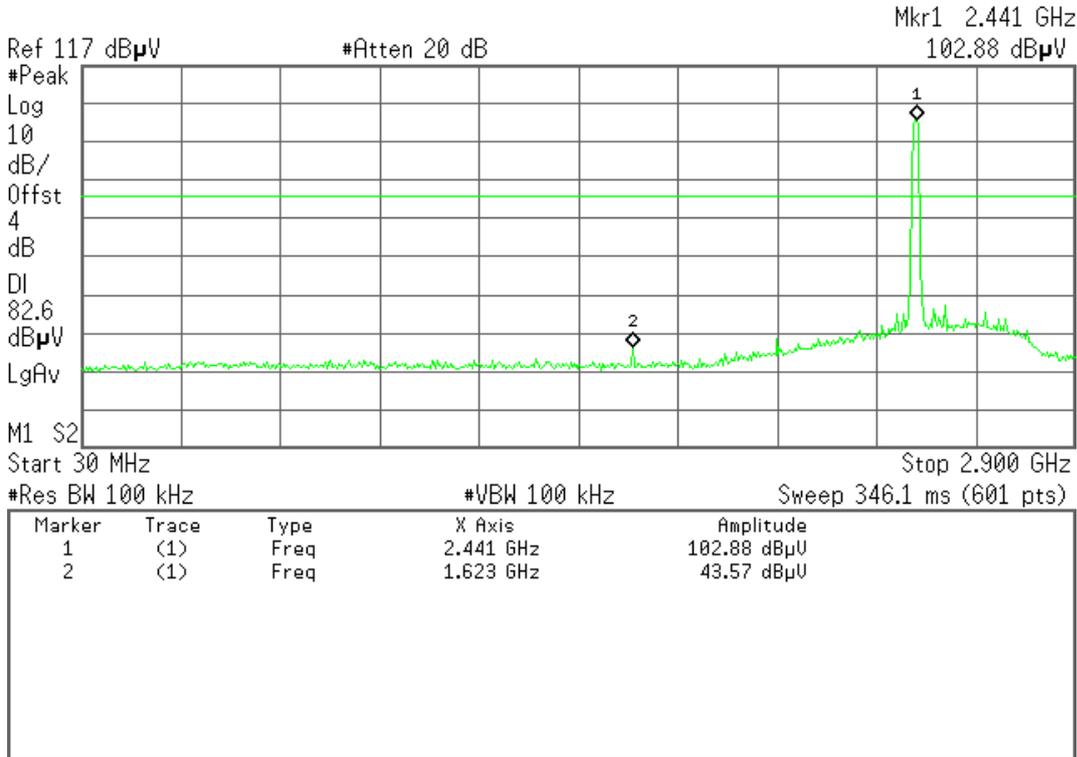




### CH Mid(30MHz ~ 2.9GHz)

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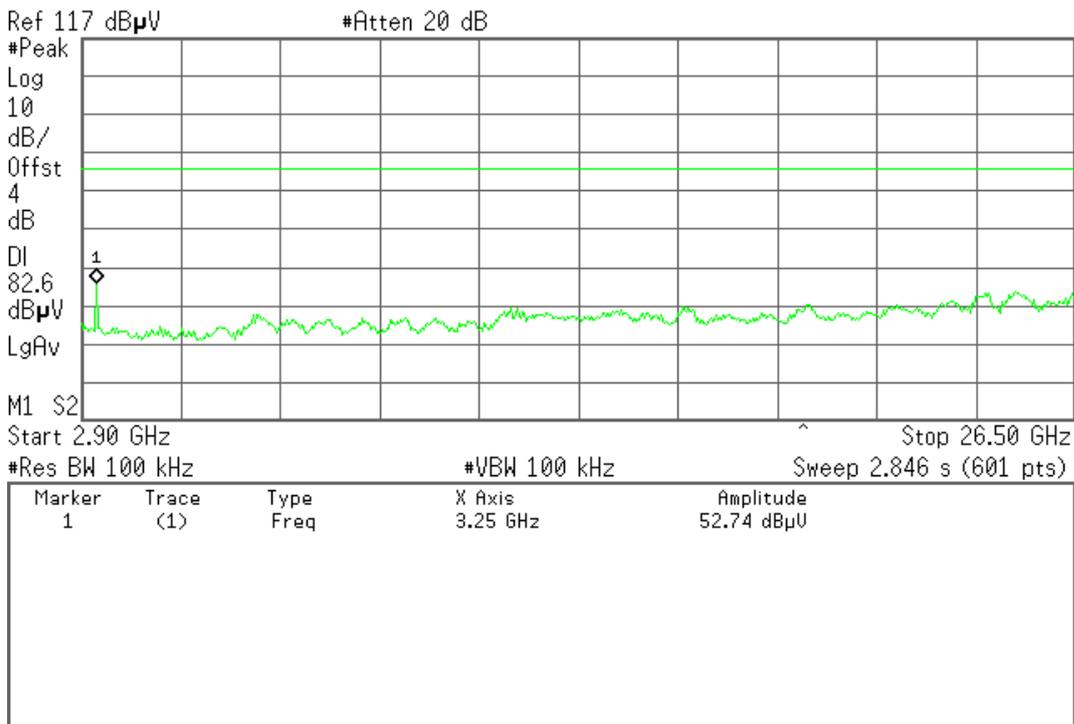
R T



### 2.9GHz ~ 26.5GHz

Agilent 12:08:46 Jul 8, 2010

R T

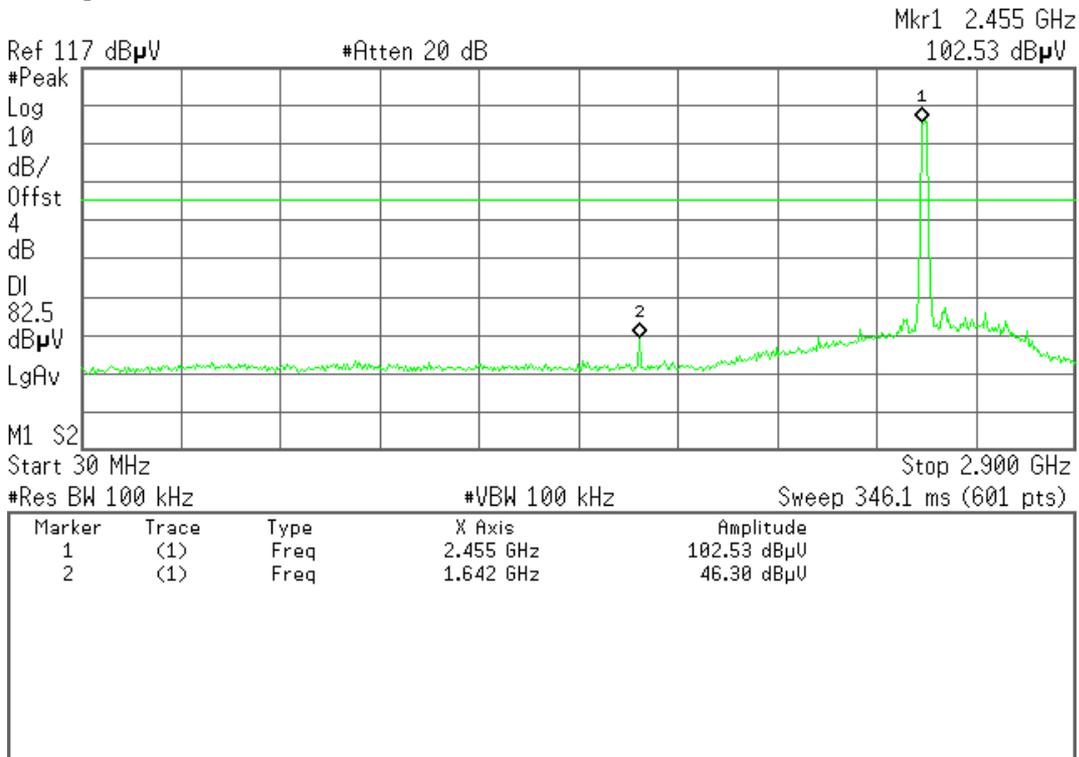




### CH High (30MHz ~ 2.9GHz)

Agilent 12:05:07 Jul 8, 2010

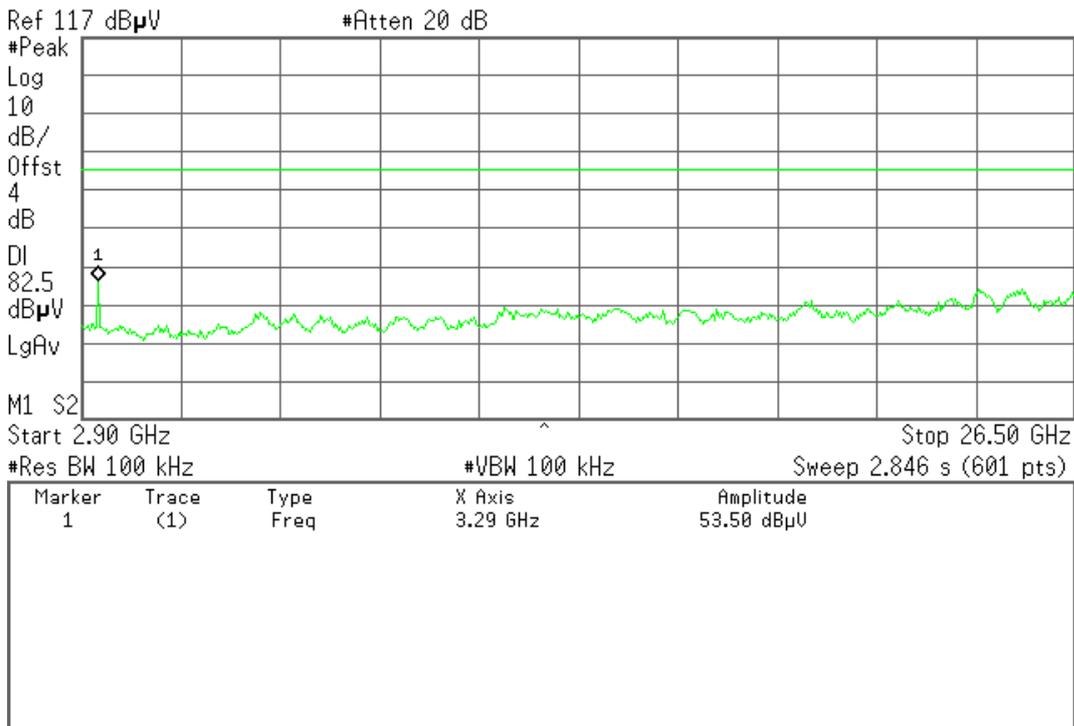
R T



### 2.9GHz ~ 26.5GHz

Agilent 12:06:36 Jul 8, 2010

R T

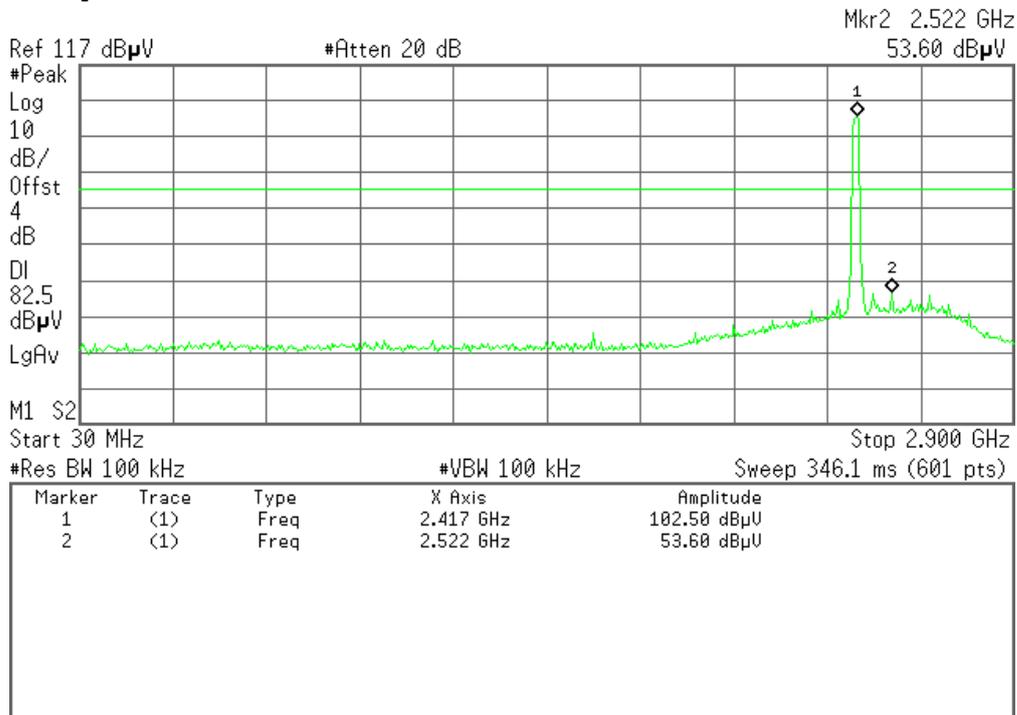




(IEEE 802.11n HT20 MHz mode)  
CH Low (30MHz ~2.9GHz)

\* Agilent 12:12:35 Jul 8, 2010

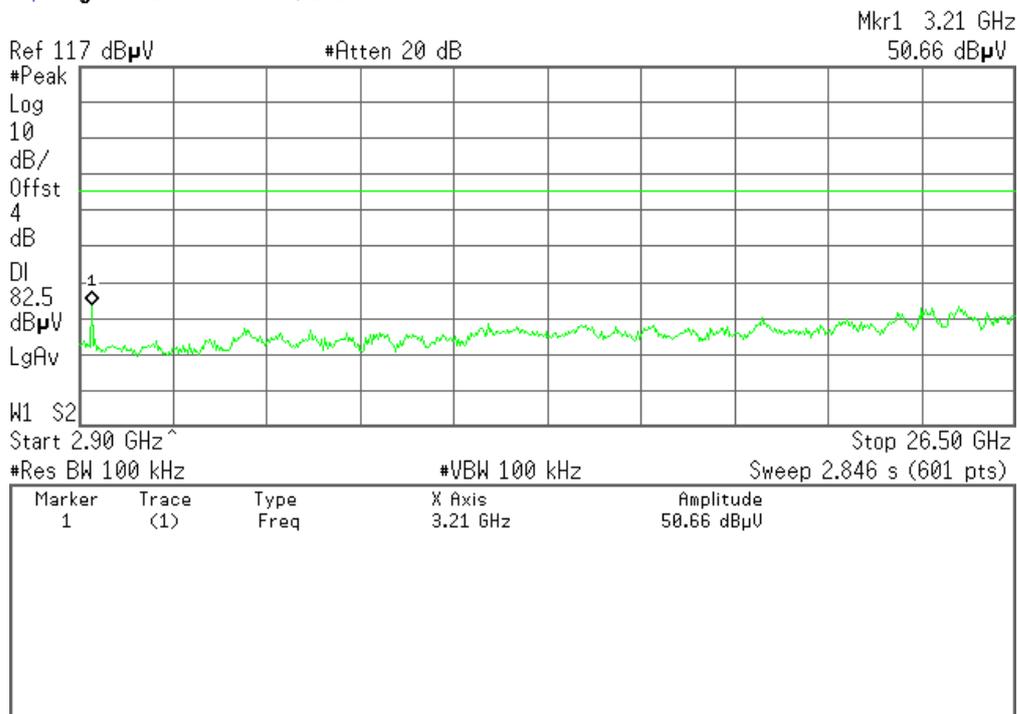
R T



(2.9MHz ~26.5GHz)

\* Agilent 12:13:14 Jul 8, 2010

R T

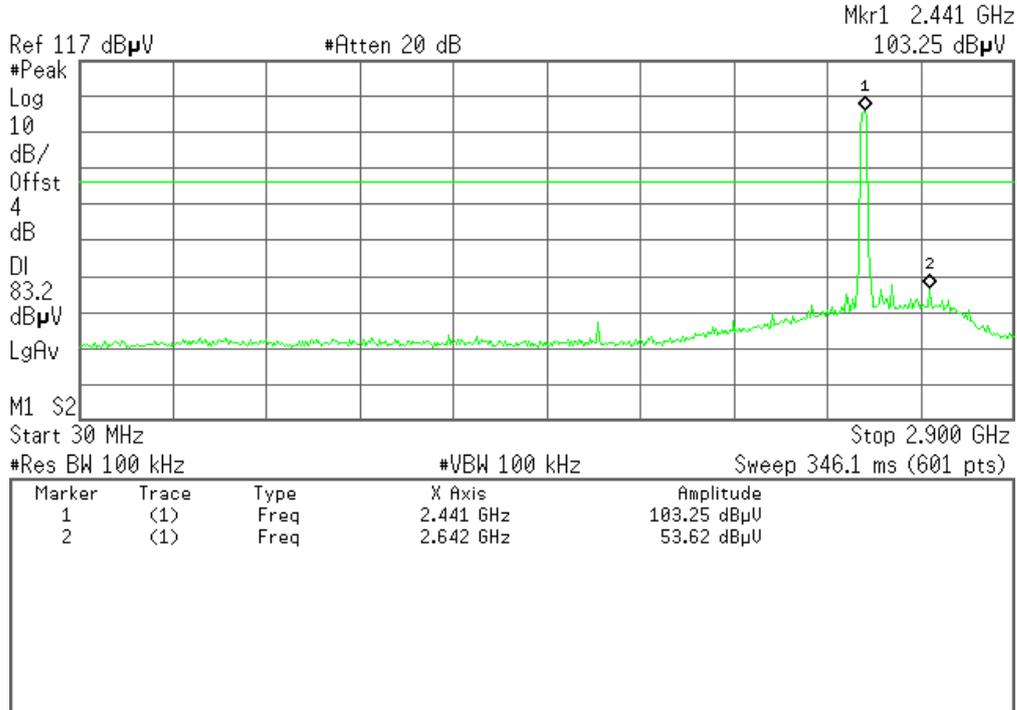




### CH Mid(30MHz ~ 2.9GHz)

Agilent 12:14:34 Jul 8, 2010

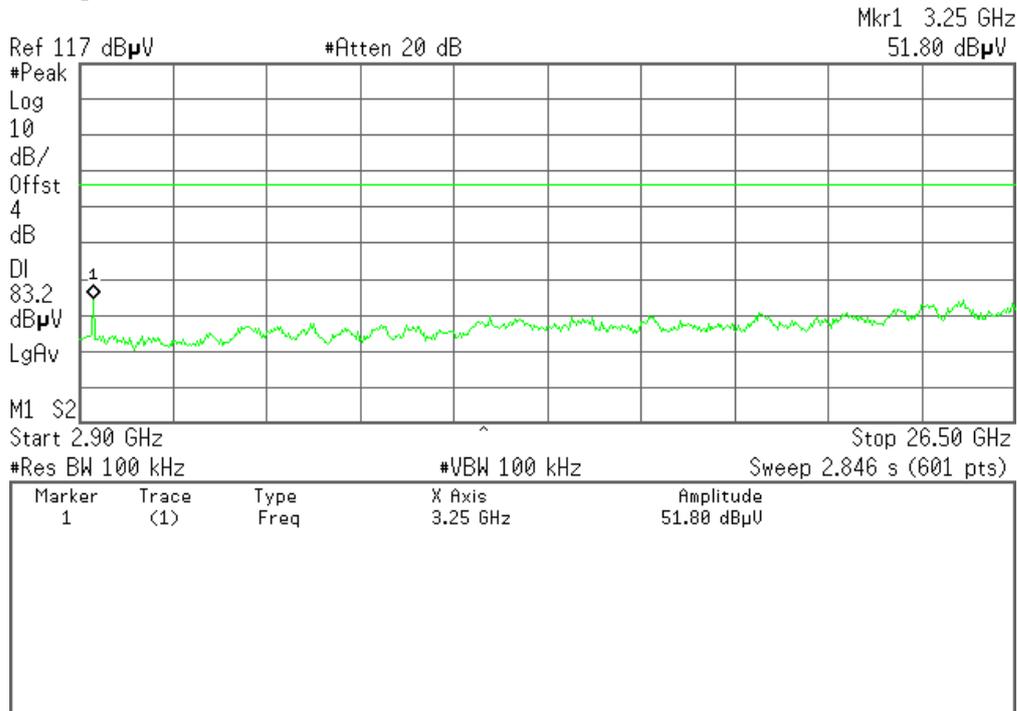
R T



### 2.9GHz ~ 26.5GHz

Agilent 12:15:18 Jul 8, 2010

R T





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

Agilent 12:16:53 Jul 8, 2010

R T

Mkr1 2.460 GHz  
102.12 dBμV



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

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.460 GHz	102.12 dBμU
2	(1)	Freq	1.642 GHz	46.59 dBμU

### 2.9GHz ~ 26.5GHz

Agilent 12:17:39 Jul 8, 2010

R T

Mkr1 3.29 GHz  
52.48 dBμV



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

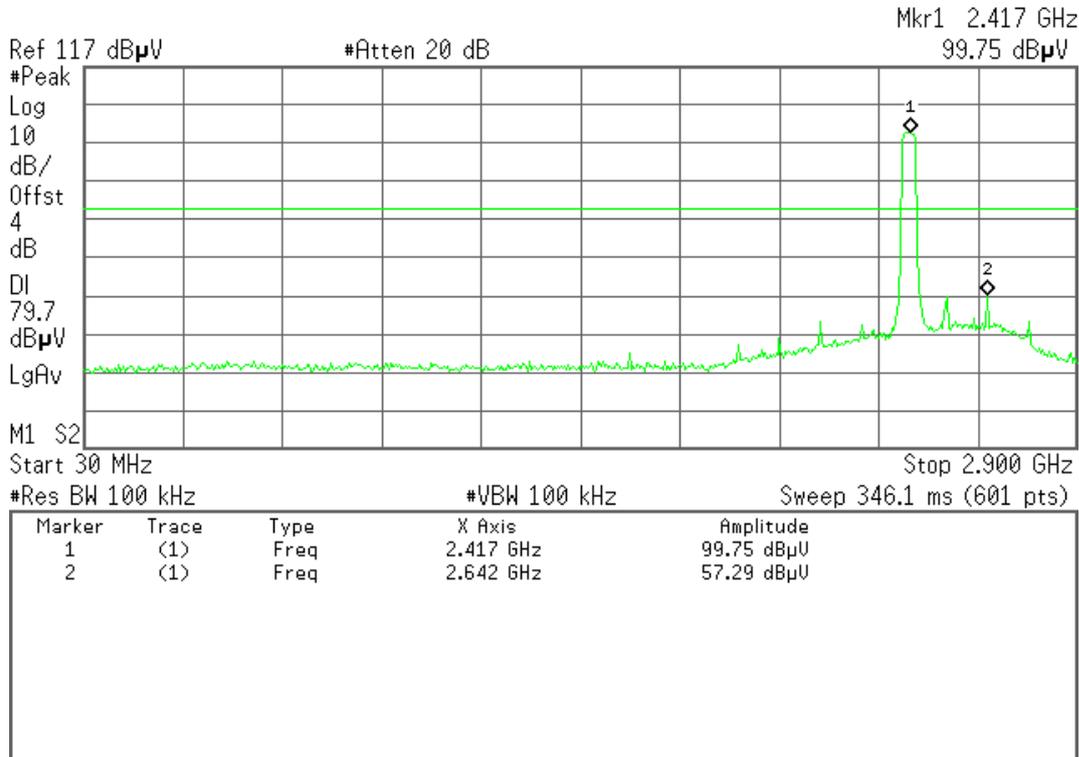
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	3.29 GHz	52.48 dBμU



(IEEE 802.11n HT40 MHz mode)  
CH Low (30MHz ~2.9GHz)

Agilent 12:23:23 Jul 8, 2010

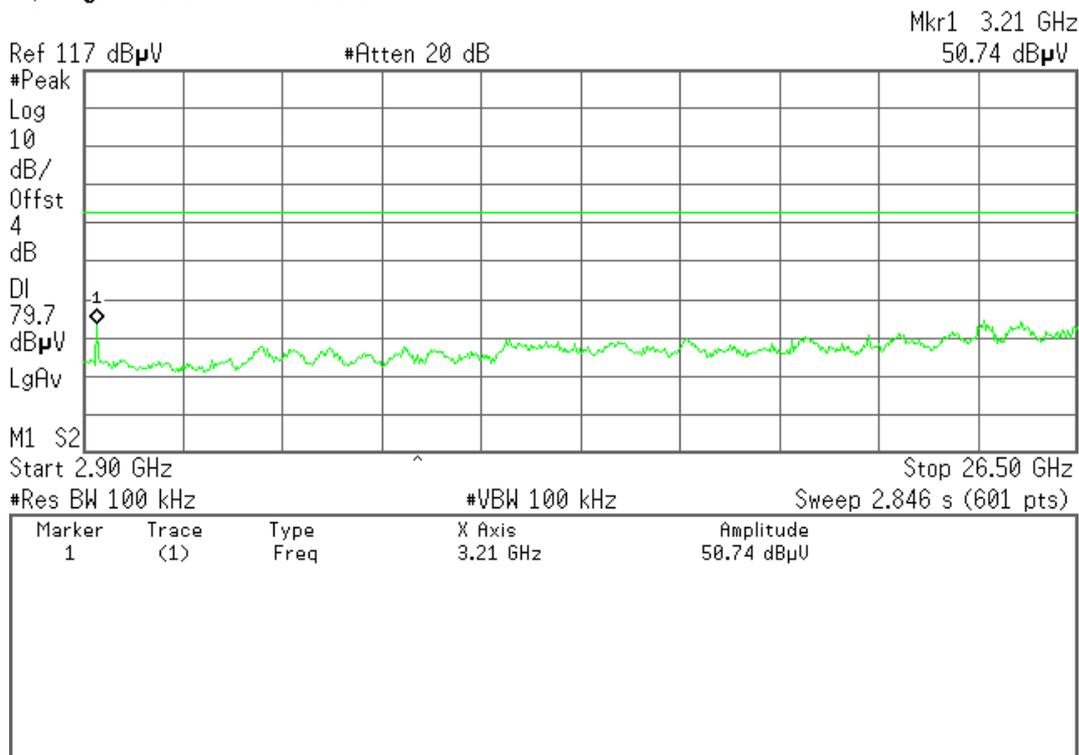
R T



(2.9MHz ~26.5GHz)

Agilent 12:24:07 Jul 8, 2010

R T



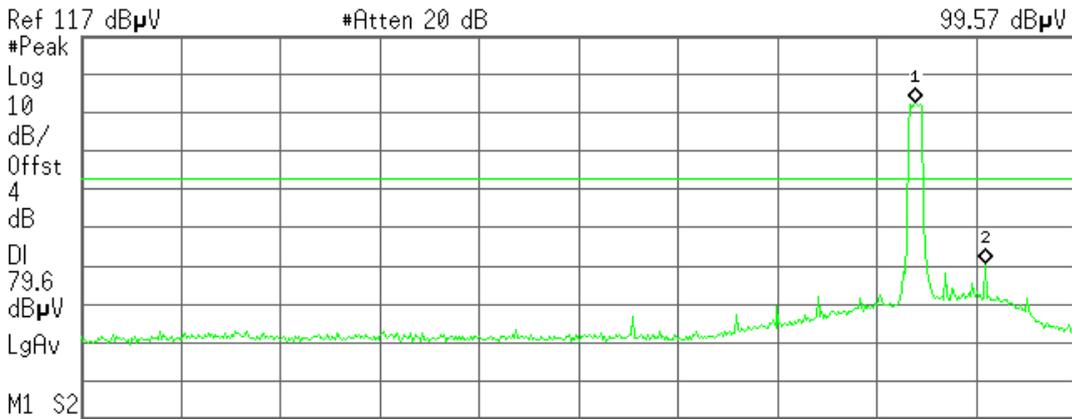


### CH Mid(30MHz ~ 2.9GHz)

Agilent 12:21:49 Jul 8, 2010

R T

Mkr1 2.436 GHz  
99.57 dBμV



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

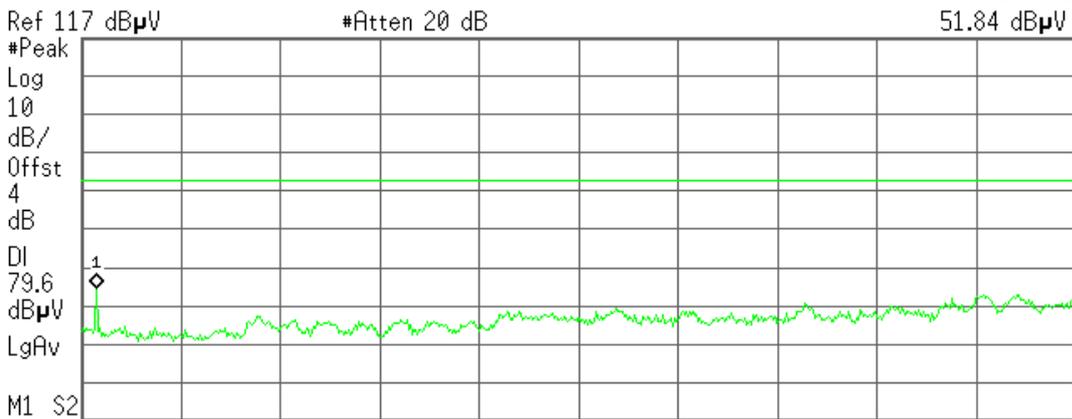
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.436 GHz	99.57 dBμU
2	(1)	Freq	2.642 GHz	57.48 dBμU

### 2.9GHz ~ 26.5GHz

Agilent 12:22:11 Jul 8, 2010

R T

Mkr1 3.25 GHz  
51.84 dBμV



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

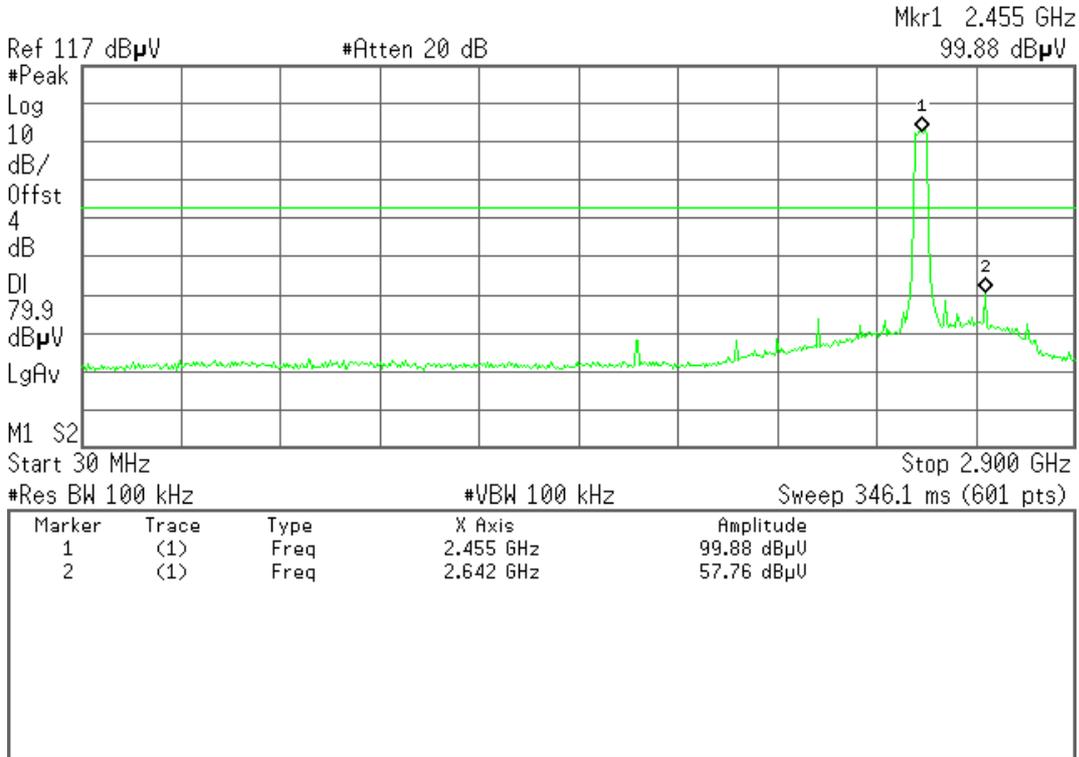
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	3.25 GHz	51.84 dBμU



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

Agilent 12:19:35 Jul 8, 2010

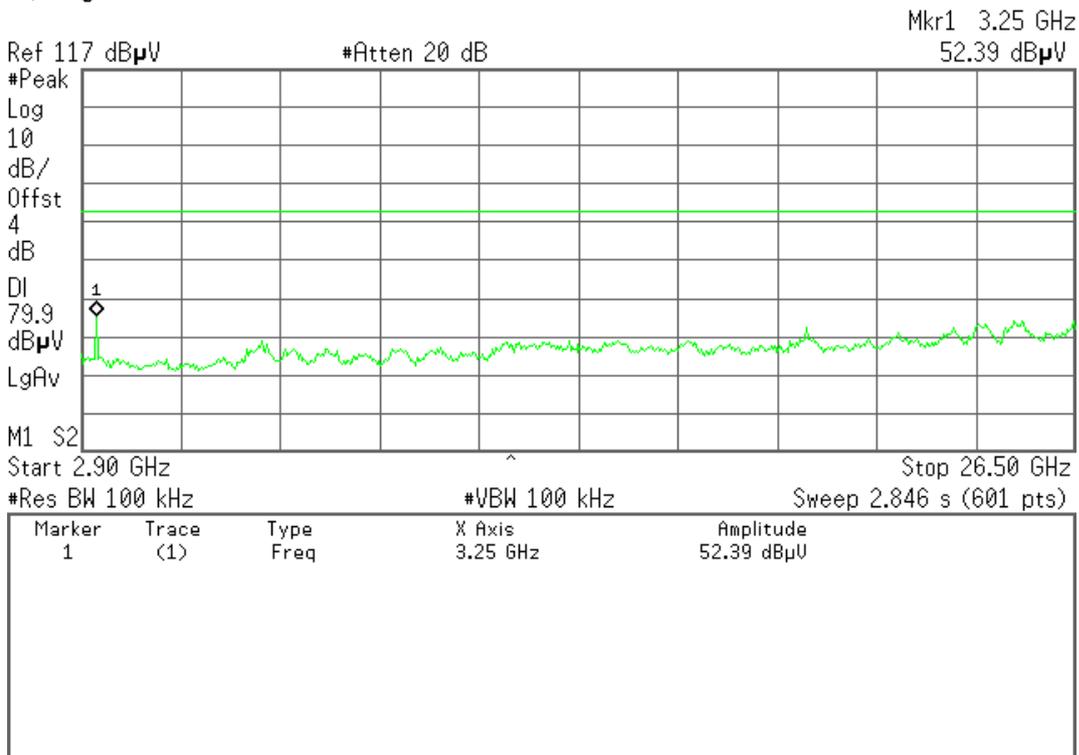
R T



### 2.9GHz ~ 26.5GHz

Agilent 12:20:45 Jul 8, 2010

R T





7.2.5. RADIATED EMISSIONS

7.2.5.1. 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).



7.2.5.2. TEST INSTRUMENTS

Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	03/21/2010	03/21/2011
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	05/29/2010	05/29/2011
Bilog Antenna	SCHAFFNER	CBL6143	5082	06/26/2010	06/26/2011
Horn Antenna	SCHWARZBECK	BBHA9120D	D286	03/19/2010	03/19/2011
Signal Generator	Anritsu	MG3694A	#050125	03/21/2010	03/21/2011
Horn Antenna	TRC	HA0301	N/A	03/19/2010	03/19/2011
Loop Antenna	ARA	PLA-1030/B	1029	03/19/2010	03/19/2011
Power Sensor	Anritsu	MA2491A	030619	03/21/2010	03/21/2011
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/30/2010	03/30/2011
SHF-EHF Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170171	02/24/2010	02/24/2011

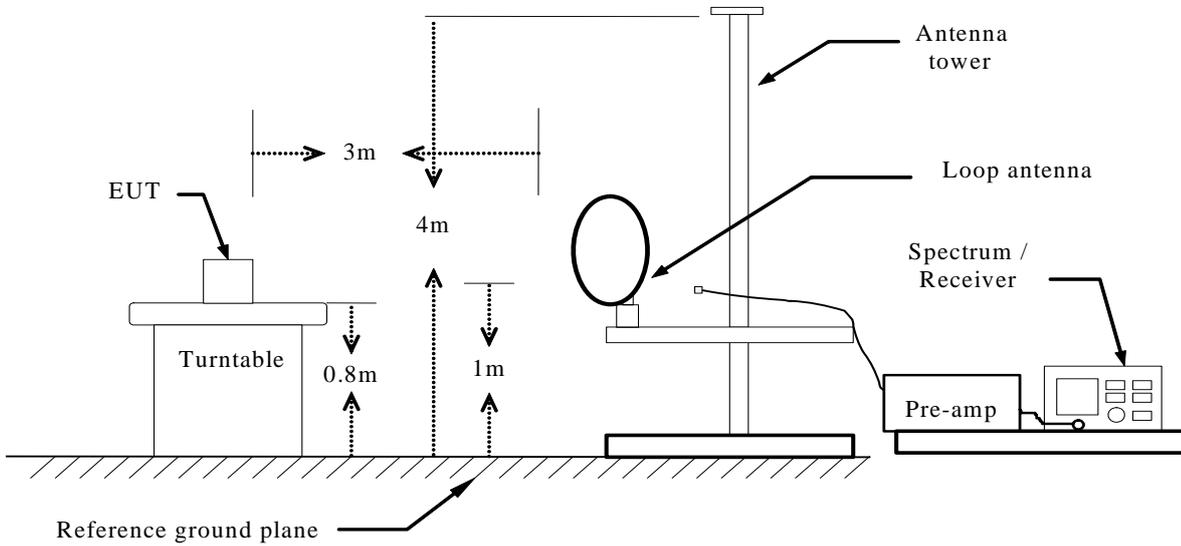
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The FCC Site Registration number is 101879.  
 3. N.C.R = No Calibration Required.

7.2.5.3. TEST PROCEDURE (please refer to measurement standard)

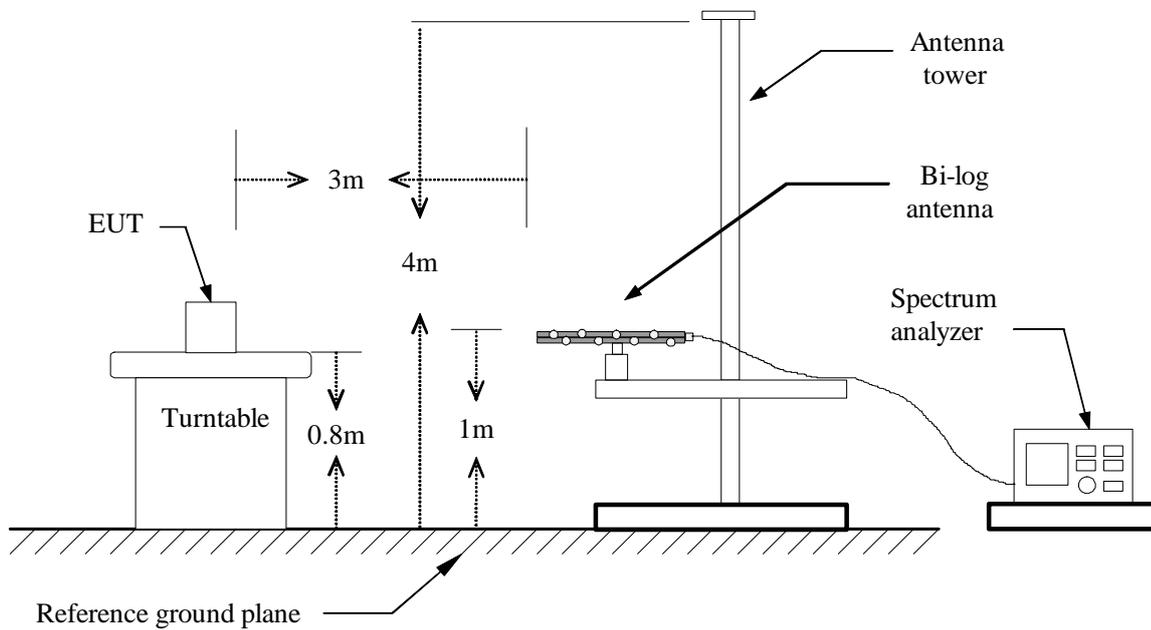
- The EUT is placed on a turntable, which is 0.8m above ground plane.
- The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Maximum procedure 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.

### 7.2.5.4. TEST SETUP

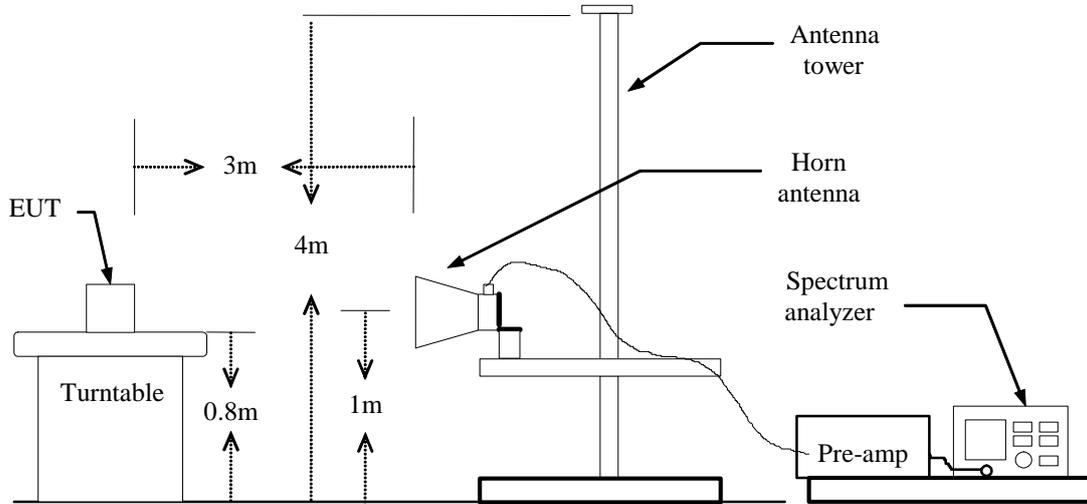
#### Below 30MHz



#### Below 1 GHz



**Above 1 GHz**



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

**7.2.5.5. Data Sample:**

**Below 1 GHz**

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Remark) (dBuV)	Correction Factor (dB/m)	Result (Remark) (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (dB)	Remark
xxx	V	12.12	10.21	22.33	40.00	-17.67	Peak

**Above 1 GHz**

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
xxx	V	65.45	63.00	-11.12	54.33	51.88	74.00	54.00	-2.12	AVG

- Frequency (MHz) = Emission frequency in MHz
- Ant.Pol. (H/V) = Antenna polarization
- Reading (dBuV) = Uncorrected Analyzer / Receiver reading
- Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
- Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)
- Limit (dBuV/m) = Limit stated in standard
- Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)
- Peak = Peak Reading
- QP = Quasi-peak Reading
- AVG = Average Reading



7.2.5.6. TEST RESULTS

**Below 1 GHz**

**Operation Mode:** Normal Link(Adapter 1: FUHUA/UE05L1-050100SPAU) **Test Date:** July 12, 2010

**Temperature:** 24°C **Tested by:** Tom Gan

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
39.900	V	Peak	51.71	-18.84	32.87	40.00	-7.13
60.150	V	Peak	50.99	-19.60	31.39	40.00	-8.61
166.800	V	Peak	47.93	-18.82	29.11	43.50	-14.39
451.666	V	Peak	47.39	-10.19	37.20	46.00	-8.80
499.500	V	Peak	51.96	-9.26	42.70	46.00	-3.30
599.833	V	Peak	42.80	-5.93	36.87	46.00	-9.13
39.000	H	Peak	52.72	-18.24	34.48	40.00	-5.52
106.500	H	Peak	46.88	-20.10	26.78	43.50	-16.72
166.800	H	Peak	53.57	-18.82	34.75	46.00	-11.25
400.333	H	Peak	46.07	-11.55	34.52	46.00	-11.48
499.500	H	Peak	49.02	-9.26	39.76	46.00	-6.24
599.833	H	Peak	45.28	-5.93	39.35	46.00	-6.65

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

**REMARKS:**

1. Measuring frequencies from 9kHz to the 1GHz.
2. Radiated emissions measured in frequency range from 9kHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



**Operation Mode:** Normal Link(Adapter 2: SHENZHEN FRECOM ELECTRONICS Co., LTD  
Test Date: July 12, 2010 /FPS005US-050100)

**Temperature:** 24°C

**Tested by:** Tom Gan

**Humidity:** 54 % RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
39.450	V	Peak	50.82	-18.54	32.28	40.00	-7.72
64.650	V	Peak	49.75	-19.92	29.83	40.00	-10.17
166.800	V	Peak	48.18	-18.82	29.36	43.50	-14.14
400.333	V	Peak	50.40	-11.55	38.85	46.00	-7.15
499.500	V	Peak	53.13	-9.26	43.87	46.00	-2.13
750.333	V	Peak	40.74	-4.76	35.98	46.00	-10.02
32.700	H	Peak	46.96	-14.05	32.91	40.00	-7.09
104.700	H	Peak	48.30	-20.17	28.13	43.50	-15.37
166.800	H	Peak	55.70	-18.82	36.88	43.50	-6.62
400.333	H	Peak	53.07	-11.55	41.52	46.00	-4.48
499.500	H	Peak	52.00	-9.26	42.74	46.00	-3.26
599.833	H	Peak	47.27	-5.93	41.34	46.00	-4.66

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

**REMARKS:**

- 6. *Measuring frequencies from 9kHz to the 1GHz.*
- 7. *Radiated emissions measured in frequency range from 9kHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
- 8. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
- 9. *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.*
- 10. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*



**Above 1 GHz**

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

**Test Date:** July 12, 2010

**Temperature:** 24°C

**Tested by:** Tom Gan

**Humidity:** 54% RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1433.333	V	50.83	---	-9.79	41.04	---	74.00	54.00	-12.96	Peak
1963.333	V	50.22	---	-5.75	44.47	---	74.00	54.00	-9.53	Peak
2146.666	V	51.15	---	-4.88	46.27	---	74.00	54.00	-7.73	Peak
4825.000	V	57.94	49.73	2.68	60.62	52.41	74.00	54.00	-1.59	AVG.
N/A										
1520.000	H	49.59	---	-9.26	40.33	---	74.00	54.00	-13.67	Peak
1846.666	H	49.43	---	-6.67	42.76	---	74.00	54.00	-11.24	Peak
2183.333	H	50.03	---	-4.73	45.30	---	74.00	54.00	-8.70	Peak
4825.000	H	54.06	47.00	2.68	56.74	49.68	74.00	54.00	-4.32	AVG.
N/A										

**REMARKS:**

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



Operation Mode: TX / IEEE 802.11b / CH Mid  
Temperature: 24°C  
Humidity: 54% RH

Test Date: July 12, 2010  
Tested by: Tom Gan  
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1250.000	V	51.95	---	-10.79	41.16	---	74.00	54.00	-12.84	Peak
1826.666	V	50.52	---	-6.83	43.69	---	74.00	54.00	-10.31	Peak
1996.666	V	50.43	---	-5.49	44.94	---	74.00	54.00	-9.06	Peak
4875.000	V	48.80	---	2.77	51.57	---	74.00	54.00	-2.43	Peak
N/A										
1560.000	H	50.42	---	-8.94	41.48	---	74.00	54.00	-12.52	Peak
1720.000	H	54.93	---	-7.68	47.25	---	74.00	54.00	-6.75	Peak
2296.666	H	51.21	---	-4.29	46.92	---	74.00	54.00	-7.08	Peak
4875.000	H	45.74	---	2.77	48.51	---	74.00	54.00	-5.49	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11b / CH High

Test Date: July 12, 2010

Temperature: 24°C

Tested by: Tom Gan

Humidity: 54% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1723.333	V	56.75	---	-7.65	49.10	---	74.00	54.00	-4.90	Peak
1876.666	V	50.96	---	-6.44	44.52	---	74.00	54.00	-9.48	Peak
2143.333	V	49.77	---	-4.89	44.88	---	74.00	54.00	-9.12	Peak
4925.000	V	48.84	---	2.85	51.69	---	74.00	54.00	-2.31	Peak
N/A										
1923.333	H	51.15	---	-6.07	45.08	---	74.00	54.00	-8.92	Peak
2213.333	H	51.54	---	-4.62	46.92	---	74.00	54.00	-7.08	Peak
2306.666	H	51.52	---	-4.25	47.27	---	74.00	54.00	-6.73	Peak
4925.000	H	46.29	---	2.85	49.14	---	74.00	54.00	-4.86	Peak
N/A										

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: July 12, 2010

Temperature: 24°C

Tested by: Tom Gan

Humidity: 54% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1436.666	V	50.85	---	-9.77	41.08	---	74.00	54.00	-12.92	Peak
1966.666	V	52.41	---	-5.72	46.69	---	74.00	54.00	-7.31	Peak
2216.666	V	51.15	---	-4.60	46.55	---	74.00	54.00	-7.45	Peak
4800.000	V	48.15	---	2.64	50.79	---	74.00	54.00	-3.21	Peak
N/A										
1813.333	H	49.71	---	-6.94	42.77	---	74.00	54.00	-11.23	Peak
2063.333	H	48.92	---	-5.21	43.71	---	74.00	54.00	-10.29	Peak
2176.666	H	50.60	---	-4.76	45.84	---	74.00	54.00	-8.16	Peak
4825.000	H	45.05	---	2.68	47.73	---	74.00	54.00	-6.27	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11g / CH Mid

Test Date: July 12, 2010

Temperature: 24°C

Tested by: Tom Gan

Humidity: 54 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
726.666	V	50.41	---	-7.62	42.79	---	74.00	54.00	-11.21	Peak
2003.333	V	51.37	---	-5.45	45.92	---	74.00	54.00	-8.08	Peak
2183.333	V	51.94	---	-4.73	47.21	---	74.00	54.00	-6.79	Peak
4858.333	V	48.51	---	2.74	51.25	---	74.00	54.00	-2.75	Peak
N/A										
1780.000	H	50.44	---	-7.20	43.24	---	74.00	54.00	-10.76	Peak
2023.333	H	49.24	---	-5.37	43.87	---	74.00	54.00	-10.13	Peak
2256.666	H	49.87	---	-4.44	45.43	---	74.00	54.00	-8.57	Peak
4866.666	H	45.27	---	2.75	48.02	---	74.00	54.00	-5.98	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11g / CH High

Test Date: July 12, 2010

Temperature: 24°C

Tested by: Tom Gan

Humidity: 54 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1816.666	V	50.39	---	-6.91	43.48	---	74.00	54.00	-10.52	Peak
2053.333	V	51.35	---	-5.25	46.10	---	74.00	54.00	-7.90	Peak
2296.666	V	52.08	---	-4.29	47.79	---	74.00	54.00	-6.21	Peak
4900.000	V	52.04	46.43	2.81	54.85	49.24	74.00	54.00	-4.76	AVG.
N/A										
1436.666	H	54.23	---	-9.77	44.46	---	74.00	54.00	-9.54	Peak
2000.000	H	51.41	---	-5.46	45.95	---	74.00	54.00	-8.05	Peak
2266.666	H	51.51	---	-4.40	47.11	---	74.00	54.00	-6.89	Peak
4900.000	H	45.47	---	2.81	48.28	---	74.00	54.00	-5.72	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11n HT20 MHz / CH Low Test Date: July 12, 2010

Temperature: 24°C

Tested by: Tom Gan

Humidity: 54% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
2000.000	V	51.89	---	-5.46	46.43	---	74.00	54.00	-7.57	Peak
2150.000	V	51.80	---	-4.87	46.93	---	74.00	54.00	-7.07	Peak
2313.333	V	53.06	---	-4.22	48.84	---	74.00	54.00	-5.16	Peak
4825.000	V	46.31	---	2.68	48.99	---	74.00	54.00	-5.01	Peak
N/A										
1250.000	H	52.45	---	-10.79	41.66	---	74.00	54.00	-12.34	Peak
2003.363	H	50.20	---	-5.45	44.75	---	74.00	54.00	-9.25	Peak
2360.000	H	55.43	---	-4.03	51.40	---	74.00	54.00	-2.60	Peak
4825.000	H	47.31	---	2.68	49.99	---	74.00	54.00	-4.01	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11n HT20 MHz / CH Mid Test Date: July 12, 2010  
Temperature: 24°C Tested by: Tom Gan  
Humidity: 54% RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1263.333	V	50.74	---	-10.72	40.02	---	74.00	54.00	-13.98	Peak
1520.000	V	50.67	---	-9.26	41.41	---	74.00	54.00	-12.59	Peak
2200.000	V	52.01	---	-4.67	47.34	---	74.00	54.00	-6.66	Peak
4883.333	V	52.28	47.39	2.78	55.06	50.17	74.00	54.00	-3.83	AVG.
N/A										
1346.666	H	50.22	---	-10.26	39.96	---	74.00	54.00	-14.04	Peak
1780.000	H	50.25	---	-7.20	43.05	---	74.00	54.00	-10.95	Peak
2160.000	H	50.02	---	-4.83	45.19	---	74.00	54.00	-8.81	Peak
4866.666	H	46.33	---	2.75	49.08	---	74.00	54.00	-4.92	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11n HT20 MHz / CH High Test Date: July 12, 2010

Temperature: 24°C

Tested by: Tom Gan

Humidity: 54% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1253.333	V	51.23	---	-10.78	40.45	---	74.00	54.00	-13.55	Peak
1960.000	V	51.75	---	-5.78	45.97	---	74.00	54.00	-8.03	Peak
2293.333	V	53.07	---	-4.30	48.77	---	74.00	54.00	-5.23	Peak
4925.000	V	47.40	---	2.85	50.25	---	74.00	54.00	-3.75	Peak
N/A										
1376.666	H	50.29	---	-10.10	40.19	---	74.00	54.00	-13.81	Peak
1690.000	H	50.60	---	-7.92	42.68	---	74.00	54.00	-11.32	Peak
1966.666	H	50.21	---	-5.72	44.49	---	74.00	54.00	-9.51	Peak
4925.000	H	45.15	---	2.85	48.00	---	74.00	54.00	-6.00	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11n HT40 MHz / CH Low Test Date: July 12, 2010  
Temperature: 24°C Tested by: Tom Gan  
Humidity: 54 % RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1523.333	V	50.17	---	-9.24	40.93	---	74.00	54.00	-13.07	Peak
1993.333	V	52.01	---	-5.51	46.50	---	74.00	54.00	-7.50	Peak
2216.666	V	51.15	---	4.60	55.75	---	74.00	54.00	1.75	Peak
4841.666	V	46.89	---	2.71	49.60	---	74.00	54.00	-4.40	Peak
N/A										
1540.000	H	49.49	---	-9.10	40.39	---	74.00	54.00	-13.61	Peak
1836.666	H	50.29	---	-6.75	43.54	---	74.00	54.00	-10.46	Peak
2170.000	H	49.55	---	-4.79	44.76	---	74.00	54.00	-9.24	Peak
4841.666	H	44.24	---	2.71	46.95	---	74.00	54.00	-7.05	Peak
N/A										

REMARKS:

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



Operation Mode: TX / IEEE 802.11n HT40 MHz / CH Mid Test Date: July 12, 2010  
Temperature: 24°C Tested by: Tom Gan  
Humidity: 54 % RH Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1920.000	V	52.89	---	-6.09	46.80	---	74.00	54.00	-7.20	Peak
2100.000	V	51.57	---	-5.06	46.51	---	74.00	54.00	-7.49	Peak
2333.333	V	55.22	---	-4.14	51.08	---	74.00	54.00	-2.92	Peak
4866.666	V	48.35	---	2.75	51.10	---	74.00	54.00	-2.90	Peak
N/A										
1350.000	H	50.97	---	-10.24	40.73	---	74.00	54.00	-13.27	Peak
2060.000	H	51.45	---	-5.22	46.23	---	74.00	54.00	-7.77	Peak
2333.330	H	53.32	---	-4.14	49.18	---	74.00	54.00	-4.82	Peak
4875.000	H	44.92	---	2.77	47.69	---	74.00	54.00	-6.31	Peak
N/A										

REMARKS:

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



**Operation Mode:** TX / IEEE 802.11n HT40 MHz / CH High **Test Date:** July 01, 2010  
**Temperature:** 24°C **Tested by:** Tom Gan  
**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1773.333	V	50.63	---	-7.26	43.37	---	74.00	54.00	-10.63	Peak
1983.333	V	51.95	---	-5.59	46.36	---	74.00	54.00	-7.64	Peak
2350.000	V	54.94	---	-4.07	50.87	---	74.00	54.00	-3.13	Peak
4900.000	V	48.45	---	2.81	51.26	---	74.00	54.00	-2.74	Peak
N/A										
1750.000	H	49.78	---	-7.44	42.34	---	74.00	54.00	-11.66	Peak
2016.666	H	50.44	---	-5.39	45.05	---	74.00	54.00	-8.95	Peak
2346.666	H	53.37	---	-4.09	49.28	---	74.00	54.00	-4.72	Peak
4850.000	H	44.77	---	2.72	47.49	---	74.00	54.00	-6.51	Peak
N/A										

**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.

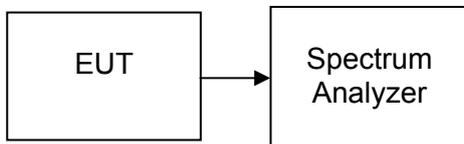
#### 7.3.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011

#### 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 = 300kHz, 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	12118	>500	PASS
Mid	2437	12127		PASS
High	2462	12113		PASS

**Test Data**

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16358	>500	PASS
Mid	2437	16356		PASS
High	2462	16356		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16989	>500	PASS
Mid	2437	17195		PASS
High	2462	17180		PASS

**Test Data**

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35783	>500	PASS
Mid	2437	35773		PASS
High	2452	35576		PASS



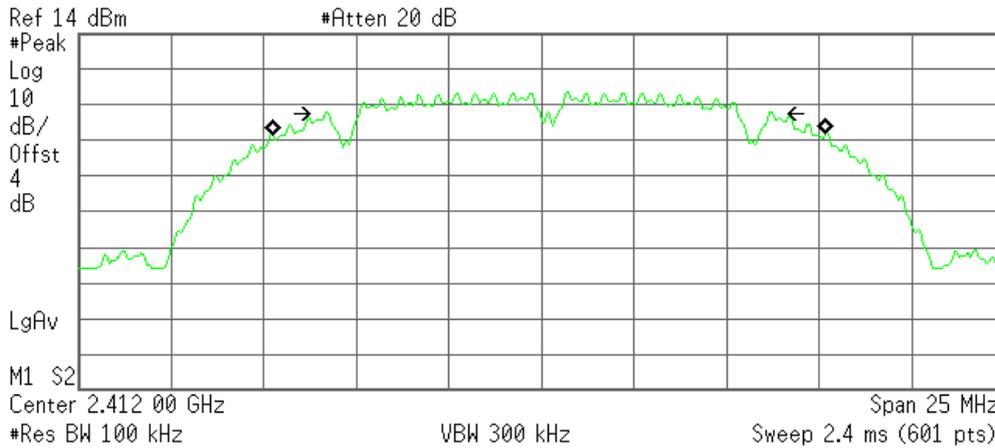
Test Plot

(IEEE 802.11b mode)

6dB Bandwidth (CH Low)

Agilent 17:58:51 Jul 7, 2010

R T



Occupied Bandwidth  
14.9172 MHz

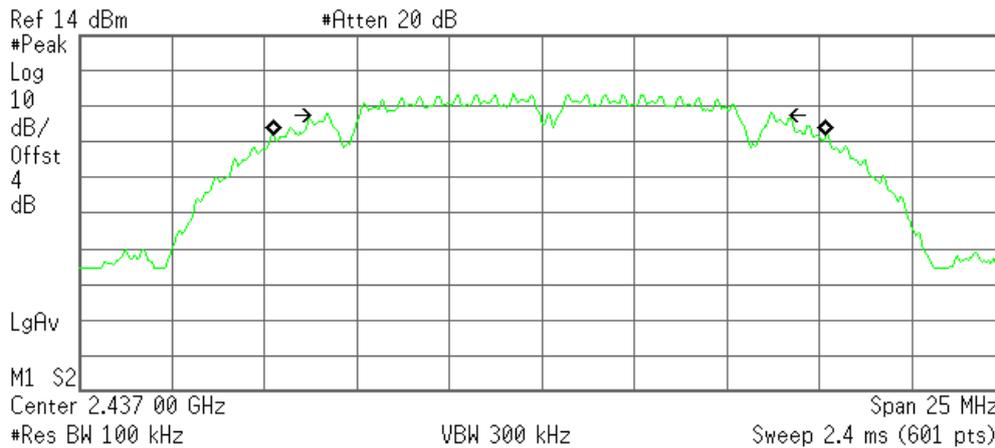
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 219.412 kHz  
x dB Bandwidth 12.118 MHz

6dB Bandwidth (CH Mid)

Agilent 17:59:33 Jul 7, 2010

R T



Occupied Bandwidth  
14.9257 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

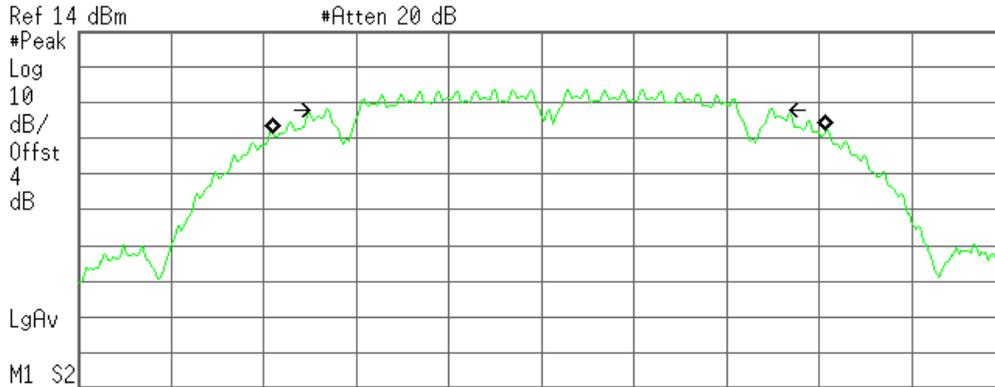
Transmit Freq Error 215.248 kHz  
x dB Bandwidth 12.127 MHz



### 6dB Bandwidth (CH High)

Agilent 17:57:00 Jul 7, 2010

R T



Center 2.462 00 GHz Span 25 MHz  
 #Res BW 100 kHz VBW 300 kHz Sweep 2.4 ms (601 pts)

**Occupied Bandwidth**  
 14.9204 MHz

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

**Transmit Freq Error** 222.937 kHz  
**x dB Bandwidth** 12.113 MHz

### (IEEE 802.11g mode)

### 6dB Bandwidth (CH Low)

Agilent 17:55:06 Jul 7, 2010

R T



Center 2.412 00 GHz Span 25 MHz  
 #Res BW 100 kHz VBW 300 kHz Sweep 2.4 ms (601 pts)

**Occupied Bandwidth**  
 16.4110 MHz

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

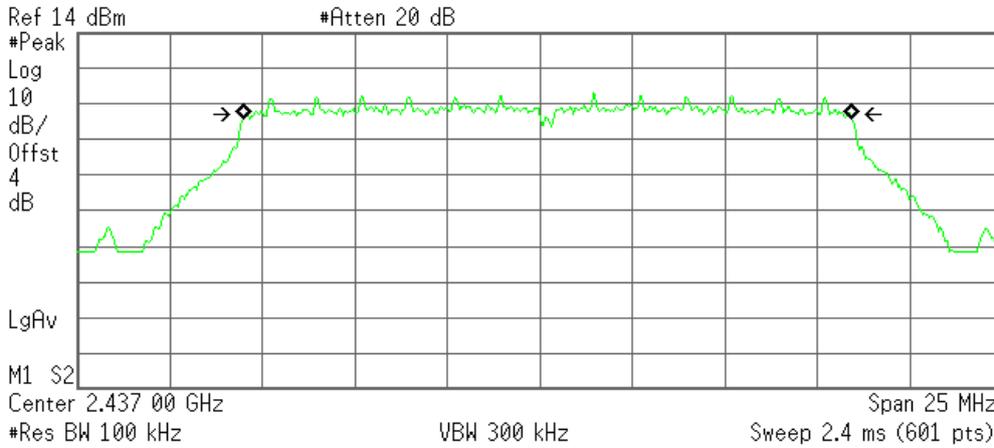
**Transmit Freq Error** 209.573 kHz  
**x dB Bandwidth** 16.358 MHz



6dB Bandwidth (CH Mid)

\* Agilent 17:55:44 Jul 7, 2010

R T



Occupied Bandwidth  
16.4149 MHz

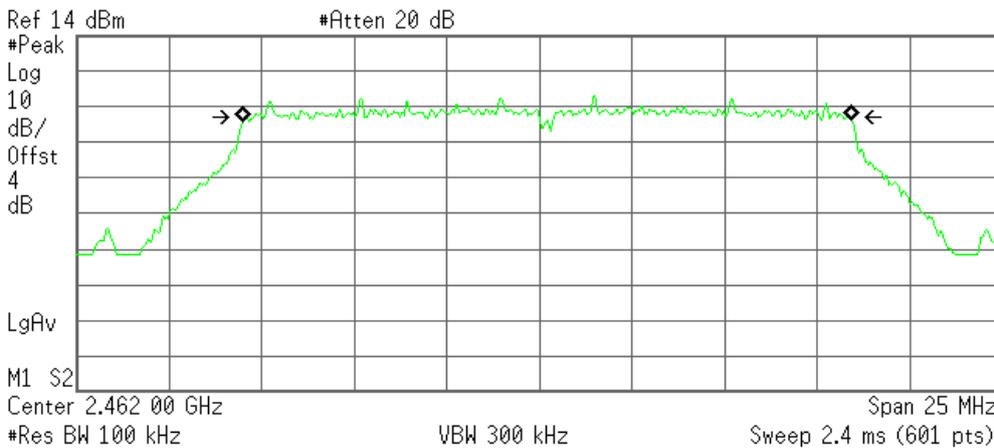
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 211.094 kHz  
x dB Bandwidth 16.356 MHz

6dB Bandwidth (CH High)

\* Agilent 17:56:12 Jul 7, 2010

R T



Occupied Bandwidth  
16.4221 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 213.852 kHz  
x dB Bandwidth 16.356 MHz

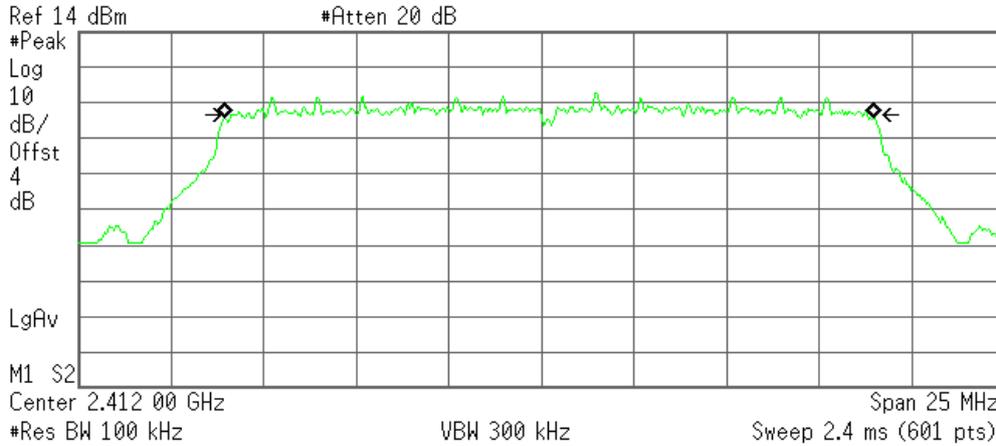


(IEEE 802.11n HT20 MHz mode)

6dB Bandwidth (CH Low)

Agilent 17:54:27 Jul 7, 2010

R T



Occupied Bandwidth  
17.5187 MHz

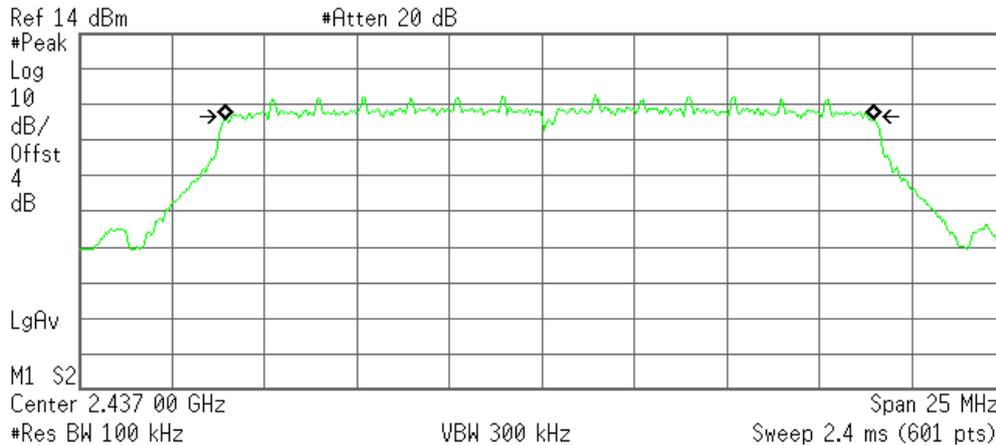
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 215.204 kHz  
x dB Bandwidth 16.989 MHz

6dB Bandwidth (CH Mid)

Agilent 17:53:57 Jul 7, 2010

R T



Occupied Bandwidth  
17.5160 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

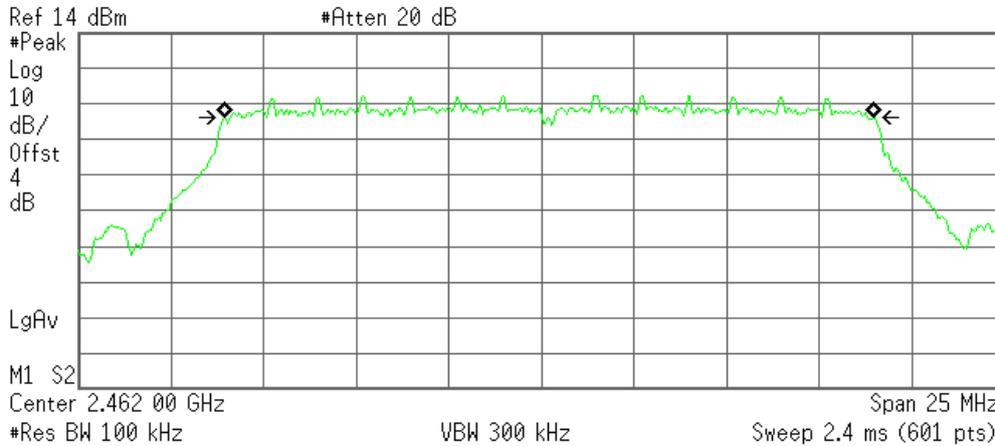
Transmit Freq Error 213.995 kHz  
x dB Bandwidth 17.195 MHz



6dB Bandwidth (CH High)

Agilent 17:53:23 Jul 7, 2010

R T



Occupied Bandwidth 17.5190 MHz

Occ BW % Pwr 99.00 % x dB -6.00 dB

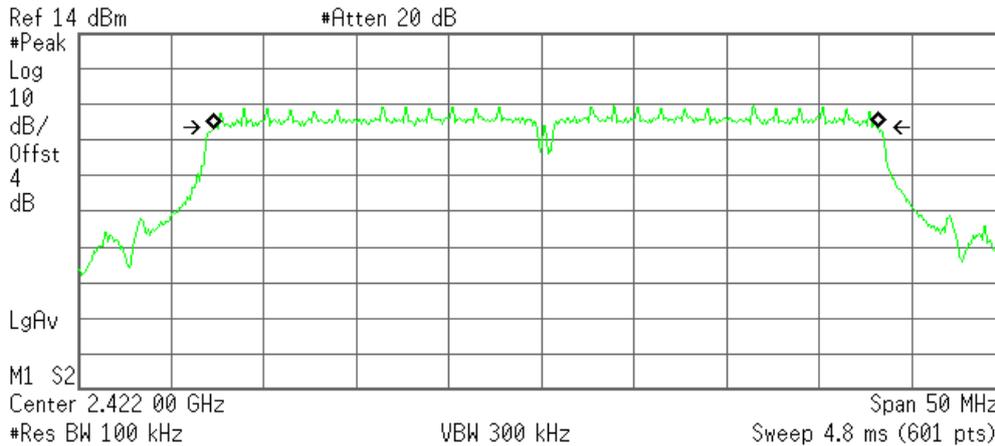
Transmit Freq Error 215.644 kHz x dB Bandwidth 17.180 MHz

(IEEE 802.11n HT40 MHz mode)

6dB Bandwidth (CH Low)

Agilent 17:50:31 Jul 7, 2010

R T



Occupied Bandwidth 35.8485 MHz

Occ BW % Pwr 99.00 % x dB -6.00 dB

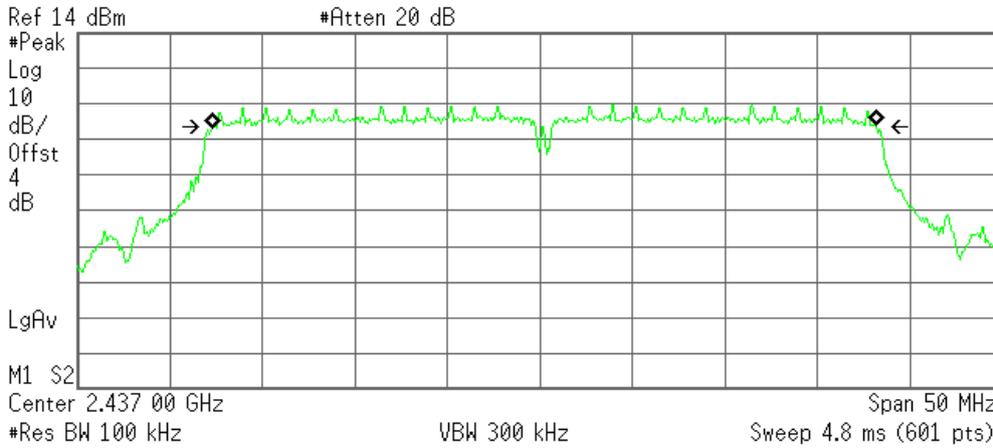
Transmit Freq Error 219.755 kHz x dB Bandwidth 35.783 MHz



### 6dB Bandwidth (CH Mid)

\* Agilent 17:51:25 Jul 7, 2010

R T



Occupied Bandwidth  
35.8425 MHz

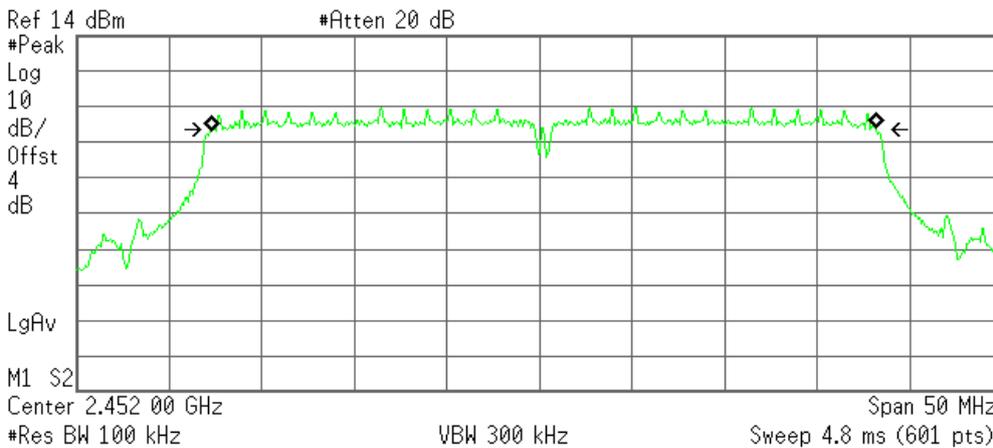
Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 222.453 kHz  
x dB Bandwidth 35.773 MHz

### 6dB Bandwidth (CH High)

\* Agilent 17:52:11 Jul 7, 2010

R T



Occupied Bandwidth  
35.8487 MHz

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

Transmit Freq Error 224.500 kHz  
x dB Bandwidth 35.576 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.

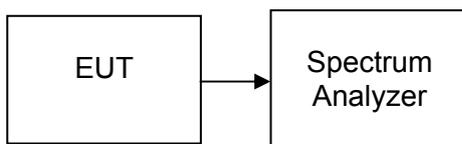
### 7.4.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011

### 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	15.70	0.03715	1	PASS
Mid	2437	15.73	0.03741		PASS
High	2462	15.72	0.03733		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	11.23	0.01327	1	PASS
Mid	2437	11.38	0.01374		PASS
High	2462	11.45	0.01396		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	11.13	0.01297	1	PASS
Mid	2437	11.22	0.01324		PASS
High	2462	11.27	0.01340		PASS

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	11.29	0.01346	1	PASS
Mid	2437	11.22	0.01324		PASS
High	2452	11.47	0.01403		PASS



Test Plot

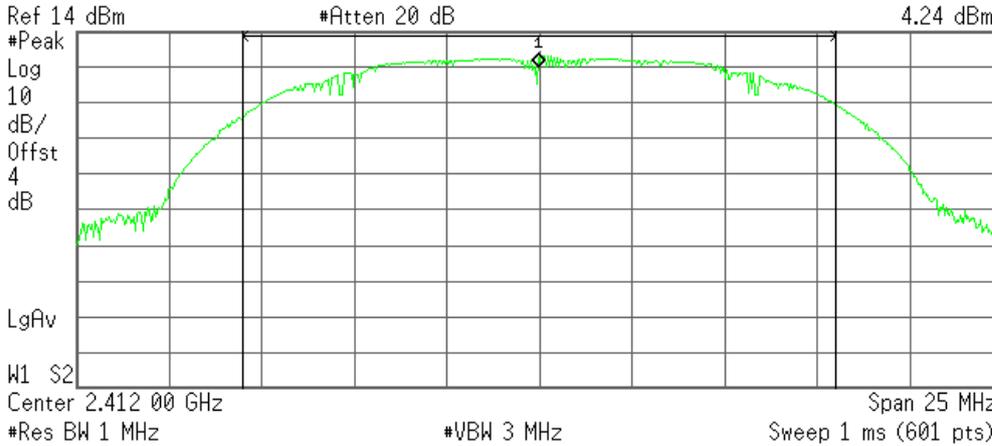
(IEEE 802.11b mode)

Peak power (CH Low)

Agilent 17:33:21 Jul 7, 2010

R T

Mkr1 2.412 00 GHz  
4.24 dBm



Channel Power

15.70 dBm /16.0000 MHz

Power Spectral Density

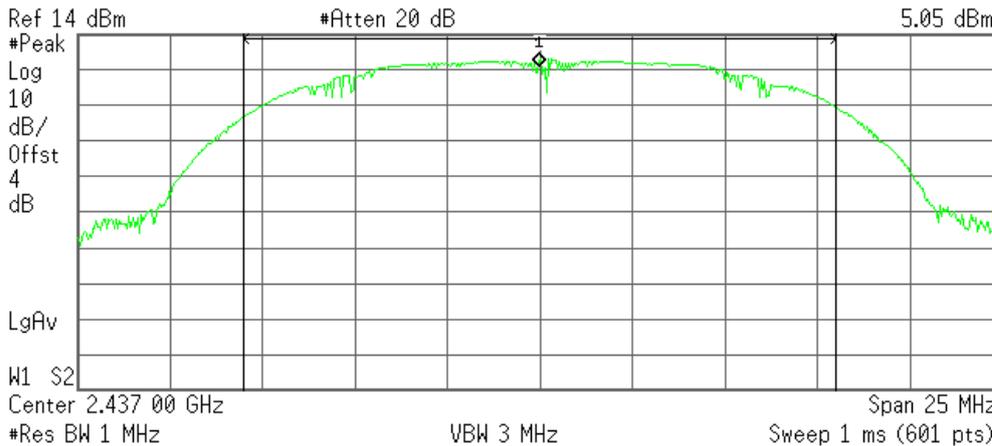
-56.34 dBm/Hz

Peak power (CH Mid)

Agilent 17:34:14 Jul 7, 2010

R T

Mkr1 2.437 00 GHz  
5.05 dBm



Channel Power

15.73 dBm /16.0000 MHz

Power Spectral Density

-56.31 dBm/Hz

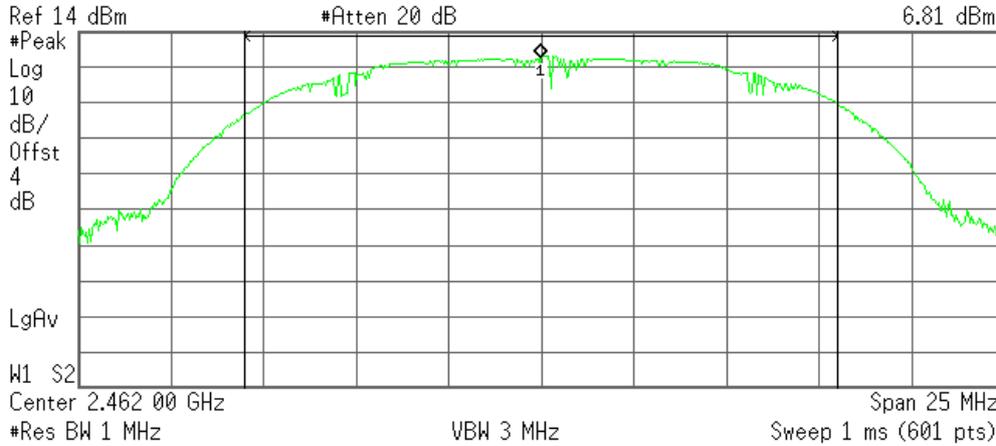


Peak power (CH High)

Agilent 17:35:47 Jul 7, 2010

R T

Mkr1 2.462 00 GHz  
6.81 dBm



Channel Power

15.72 dBm /16.0000 MHz

Power Spectral Density

-56.32 dBm/Hz

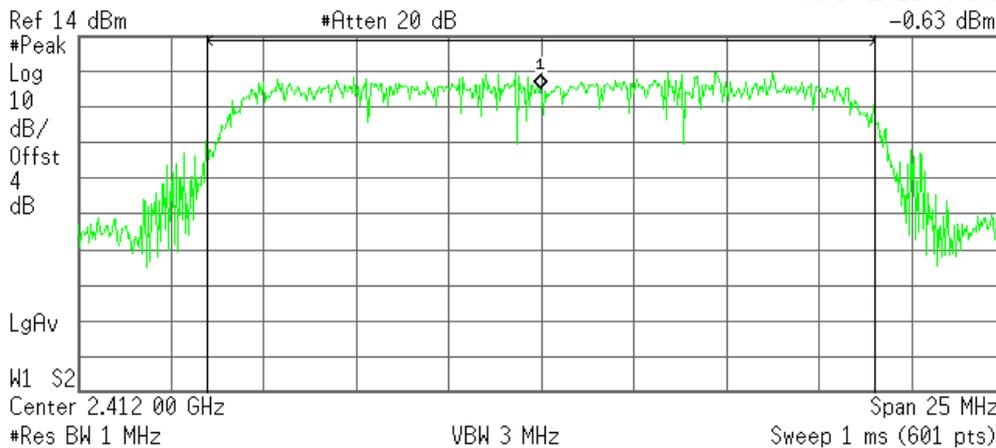
(IEEE 802.11g mode)

Peak power (CH Low)

Agilent 17:40:59 Jul 7, 2010

R T

Mkr1 2.412 00 GHz  
-0.63 dBm



Channel Power

11.23 dBm /18.0000 MHz

Power Spectral Density

-61.32 dBm/Hz

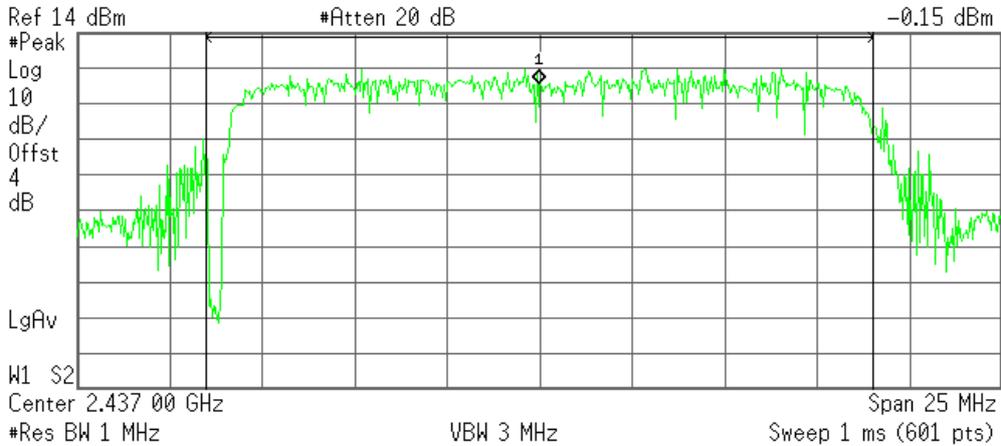


Peak power (CH Mid)

Agilent 17:40:09 Jul 7, 2010

R T

Mkr1 2.437 00 GHz  
-0.15 dBm



Channel Power

11.38 dBm /18.0000 MHz

Power Spectral Density

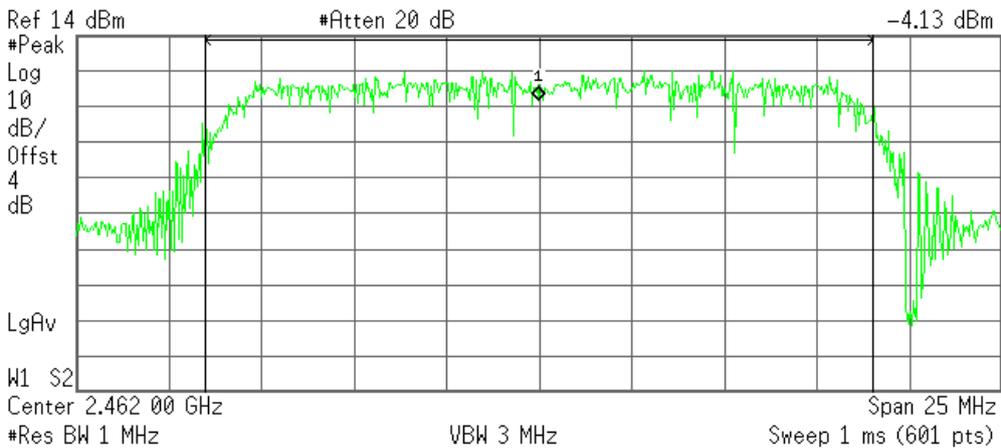
-61.17 dBm/Hz

Peak power (CH High)

Agilent 17:38:59 Jul 7, 2010

R T

Mkr1 2.462 00 GHz  
-4.13 dBm



Channel Power

11.45 dBm /18.0000 MHz

Power Spectral Density

-61.10 dBm/Hz



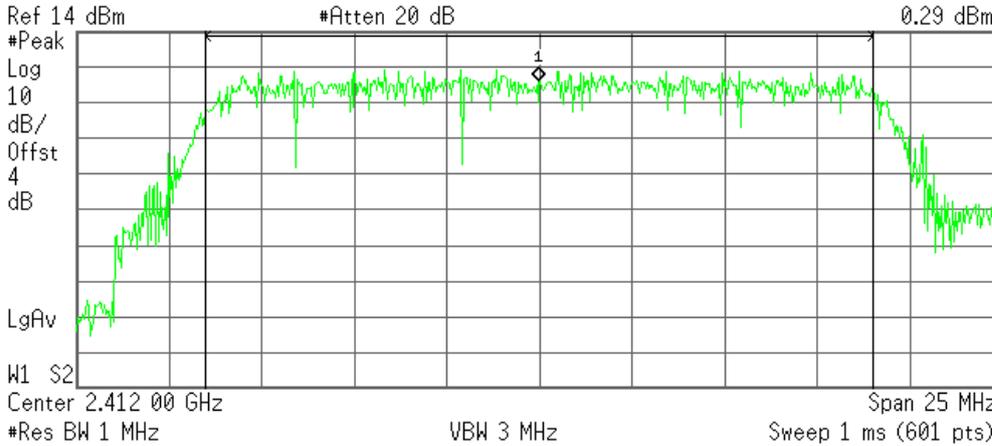
(IEEE 802.11n HT20 MHz mode)

Peak power (CH Low)

Agilent 17:41:50 Jul 7, 2010

R T

Mkr1 2.412 00 GHz  
0.29 dBm



Channel Power

11.13 dBm /18.0000 MHz

Power Spectral Density

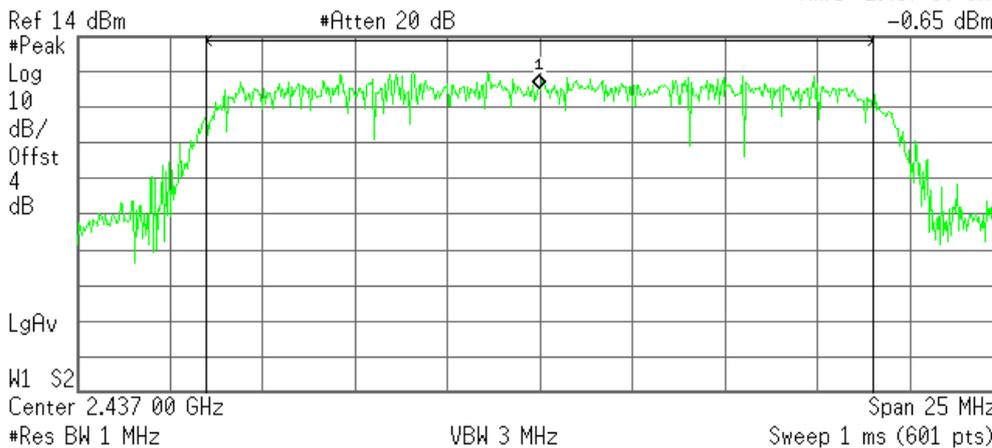
-61.42 dBm/Hz

Peak power (CH Mid)

Agilent 17:42:52 Jul 7, 2010

R T

Mkr1 2.437 00 GHz  
-0.65 dBm



Channel Power

11.22 dBm /18.0000 MHz

Power Spectral Density

-61.34 dBm/Hz

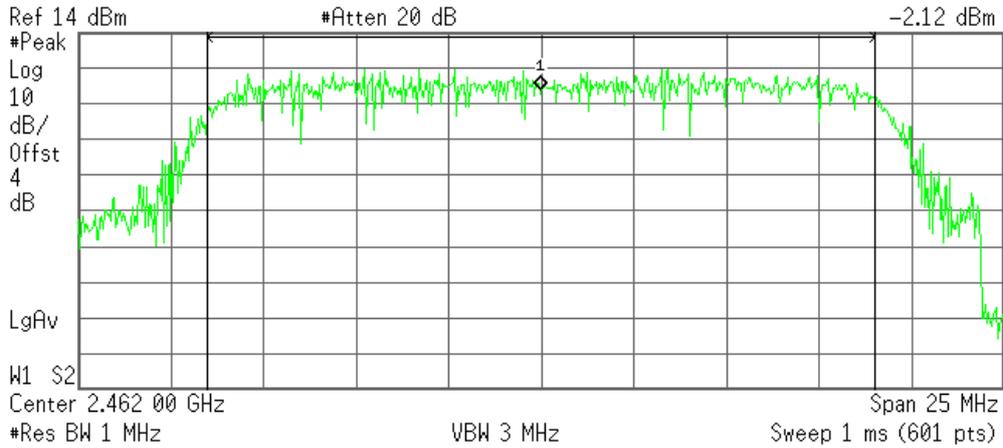


**Peak power (CH High)**

Agilent 17:44:03 Jul 7, 2010

R T

Mkr1 2.462 00 GHz  
-2.12 dBm



**Channel Power**

11.27 dBm /18.0000 MHz

**Power Spectral Density**

-61.29 dBm/Hz

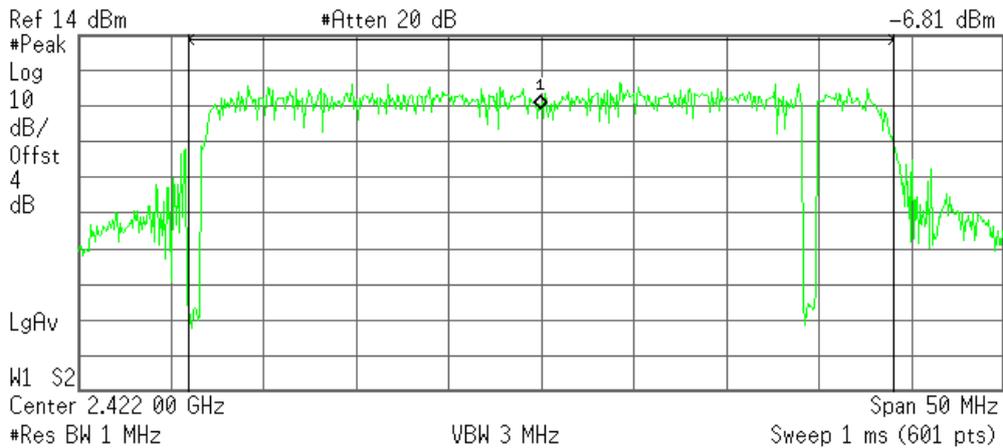
**(IEEE 802.11n HT40 MHz mode)**

**Peak power (CH Low)**

Agilent 17:48:02 Jul 7, 2010

R T

Mkr1 2.422 00 GHz  
-6.81 dBm



**Channel Power**

11.29 dBm /38.0000 MHz

**Power Spectral Density**

-64.51 dBm/Hz

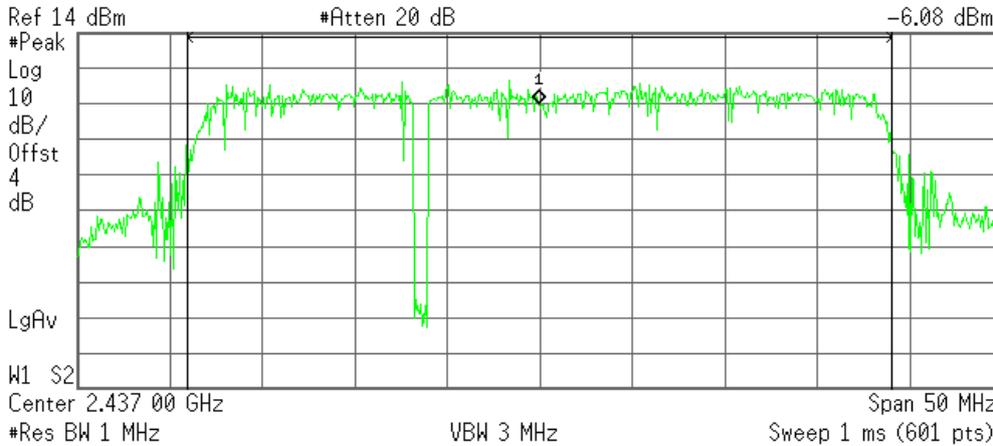


### Peak power (CH Mid)

Agilent 17:47:08 Jul 7, 2010

R T

Mkr1 2.437 00 GHz  
-6.08 dBm



Channel Power

11.22 dBm /38.0000 MHz

Power Spectral Density

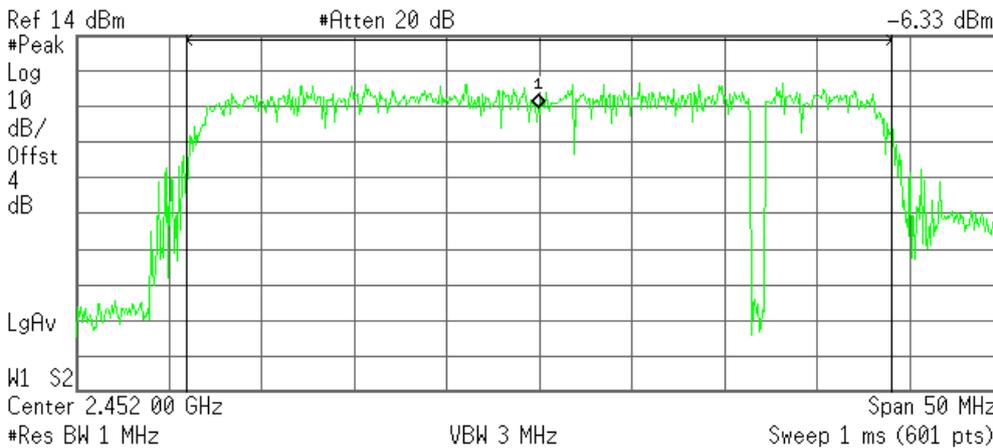
-64.58 dBm/Hz

### Peak power (CH High)

Agilent 17:46:15 Jul 7, 2010

R T

Mkr1 2.452 00 GHz  
-6.33 dBm



Channel Power

11.47 dBm /38.0000 MHz

Power Spectral Density

-64.33 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

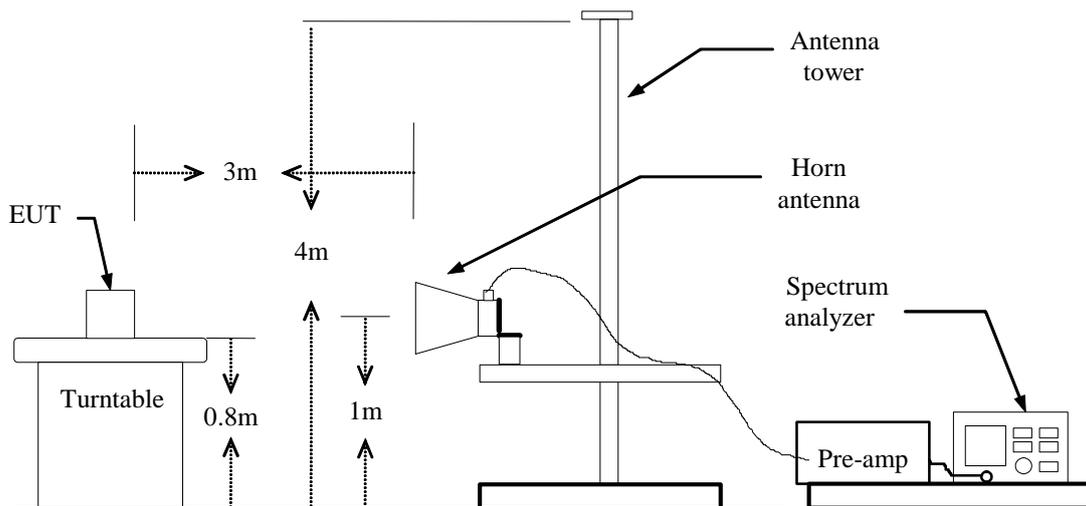
Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	03/21/2010	03/21/2011
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	05/29/2010	05/29/2011
Bilog Antenna	SCHAFFNER	CBL6143	5082	06/26/2010	06/26/2011
Horn Antenna	SCHWARZBECK	BBHA9120D	D286	03/19/2010	03/19/2011
Signal Generator	Anritsu	MG3694A	#050125	03/21/2010	03/21/2011
Horn Antenna	TRC	HA0301	N/A	03/19/2010	03/19/2011
Loop Antenna	ARA	PLA-1030/B	1029	03/19/2010	03/19/2011
Power Sensor	Anritsu	MA2491A	030619	03/21/2010	03/21/2011
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/30/2010	03/30/2011
SHF-EHF Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170171	02/24/2010	02/24/2011

- 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.
  4. 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	56.23	44.95	-3.92	52.31	41.03	74	54	-21.69	-12.97
N/A										
2390.00	H	60.99	50.86	-3.92	57.07	46.94	74	54	-16.93	-7.06
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	59.33	51.66	-3.82	55.51	47.84	74	54	-18.49	-6.16
N/A										
2483.50	H	64.63	55.84	-3.82	60.81	52.02	74	54	-13.19	-1.98
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	57.84	43.31	-3.92	53.92	39.39	74	54	-20.08	-14.61
N/A										
2390.00	H	59.34	43.08	-3.92	55.42	39.16	74	54	-18.58	-14.84
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	64.16	46.83	-3.82	60.34	43.01	74	54	-13.66	-10.99
N/A										
2483.50	H	70.14	49.18	-3.82	66.32	45.36	74	54	-7.68	-8.64
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	60.46	43.91	-3.92	56.54	39.99	74	54	-17.46	-14.01
N/A										
2390.00	H	61.66	43.58	-3.92	57.74	39.66	74	54	-16.26	-14.34
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	72.63	49.13	-3.82	68.81	45.31	74	54	-5.19	-8.69
N/A										
2483.50	H	71.58	50.56	-3.82	67.76	46.74	74	54	-6.24	-7.26
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	64.46	47.51	-3.92	60.54	43.59	74	54	-13.46	-10.41
N/A										
2390.00	H	69.64	52.09	-3.92	65.72	48.17	74	54	-8.28	-5.83
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	70.49	52.06	-3.82	66.67	48.24	74	54	-7.33	-5.76
N/A										
2483.50	H	74.13	56.08	-3.82	70.31	52.26	74	54	-3.69	-1.74
N/A										



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

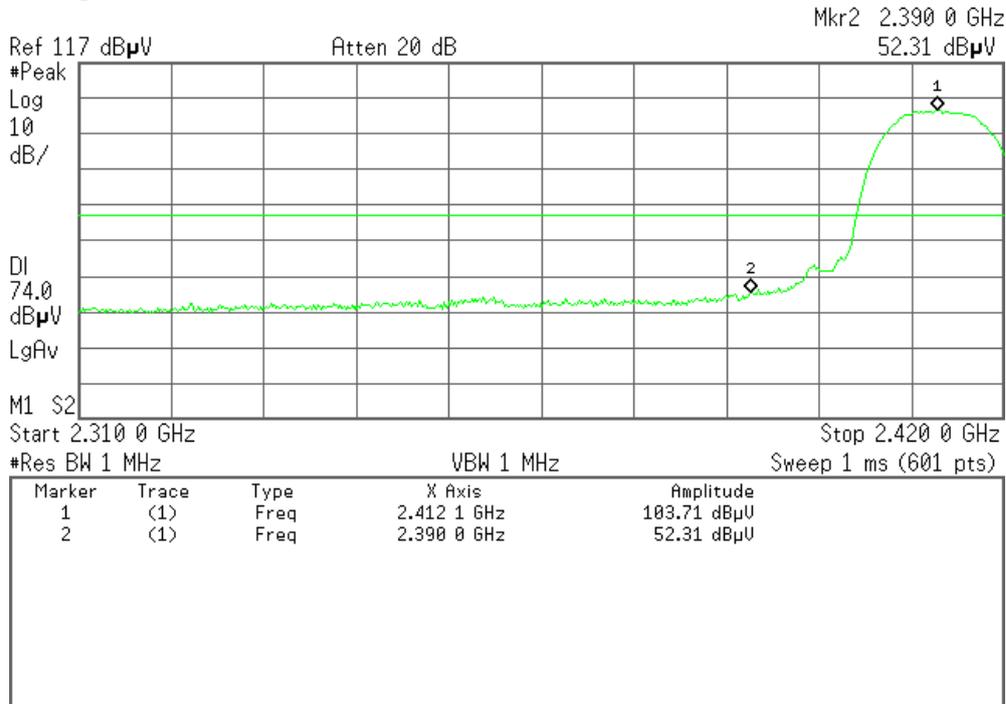
**Band Edges (CH Low)**

**Detector mode: Peak**

**Polarity: Vertical**

Agilent 12:45:31 Jul 8, 2010

R T

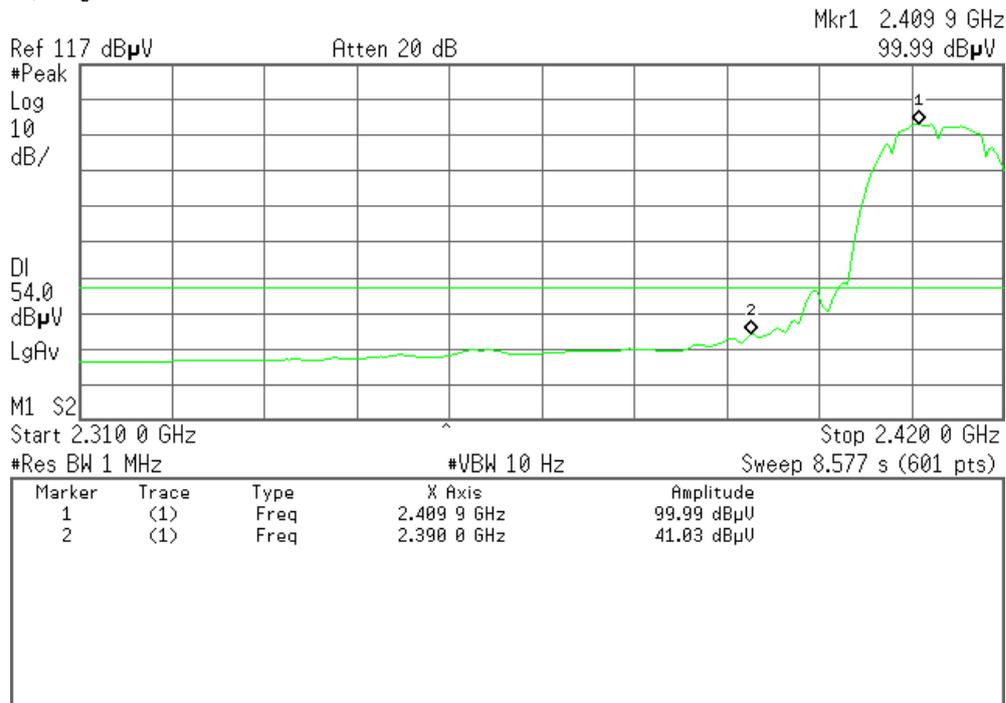


**Detector mode: Average**

**Polarity: Vertical**

Agilent 12:47:48 Jul 8, 2010

R T



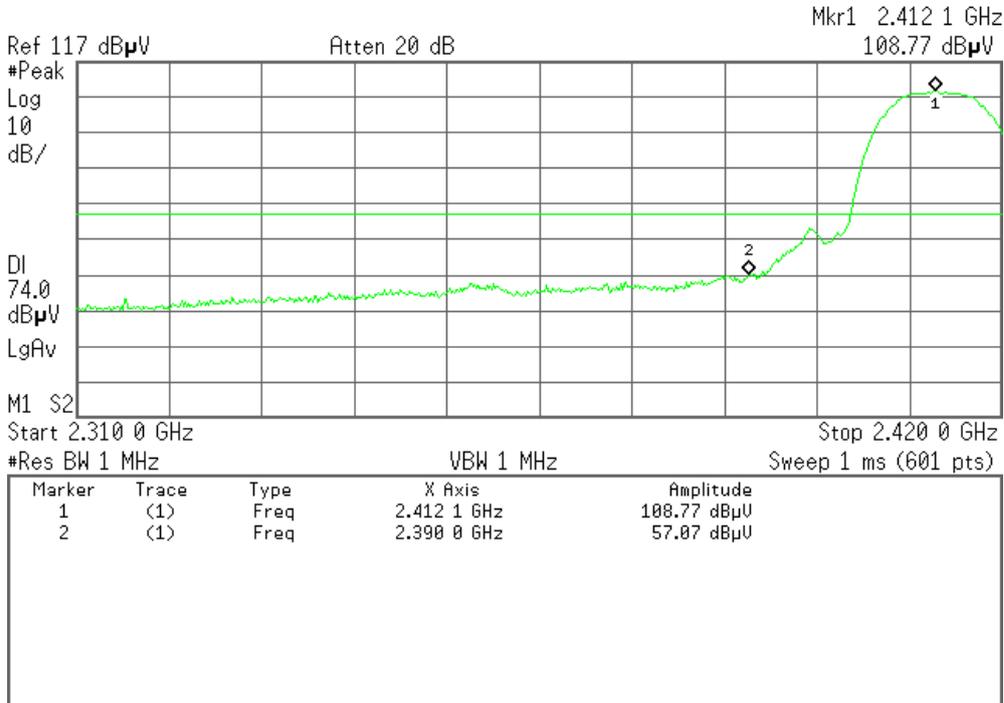


Detector mode: Peak

Polarity: Horizontal

Agilent 12:56:13 Jul 8, 2010

R T

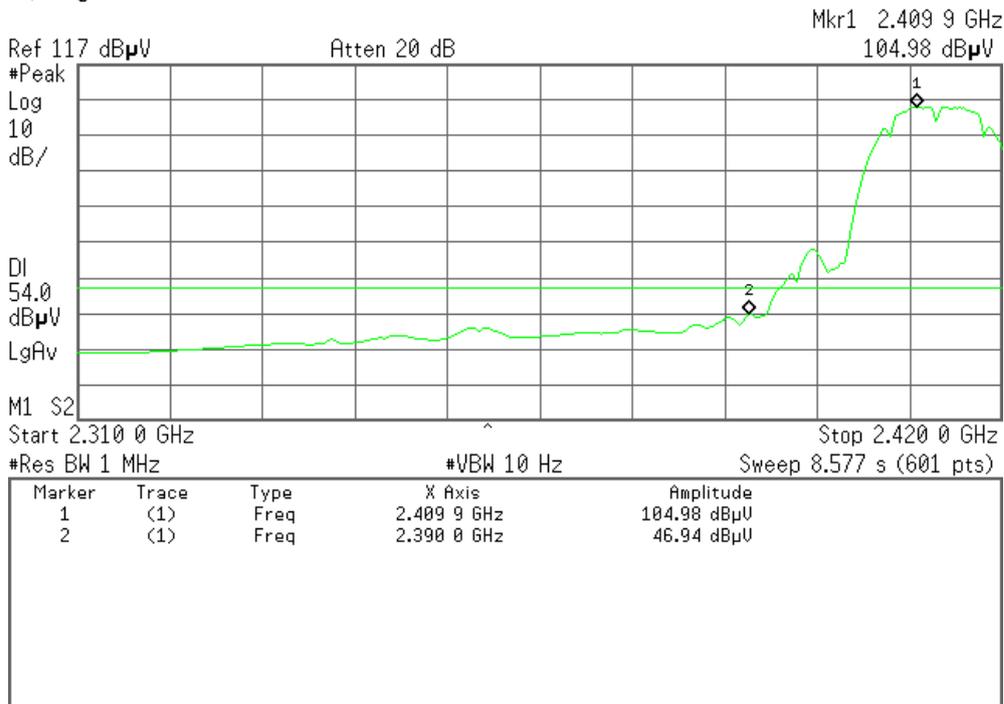


Detector mode: Average

Polarity: Horizontal

Agilent 12:58:02 Jul 8, 2010

R T





### Band Edges (CH High)

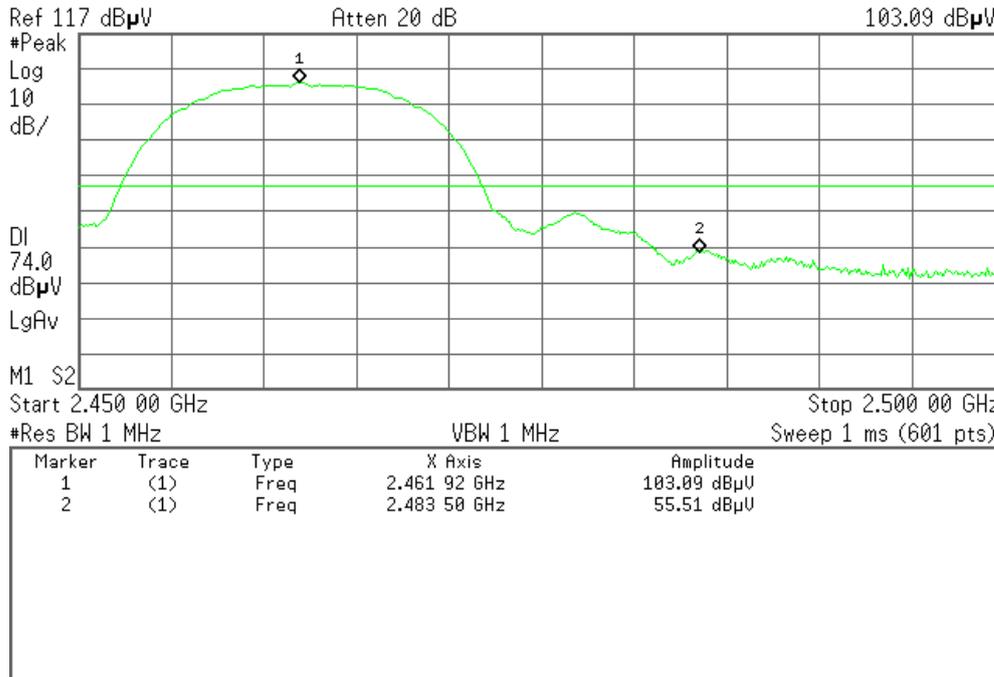
Detector mode: Peak

Polarity: Vertical

Agilent 14:34:07 Jul 8, 2010

R T

Mkr1 2.461 92 GHz  
103.09 dBμV



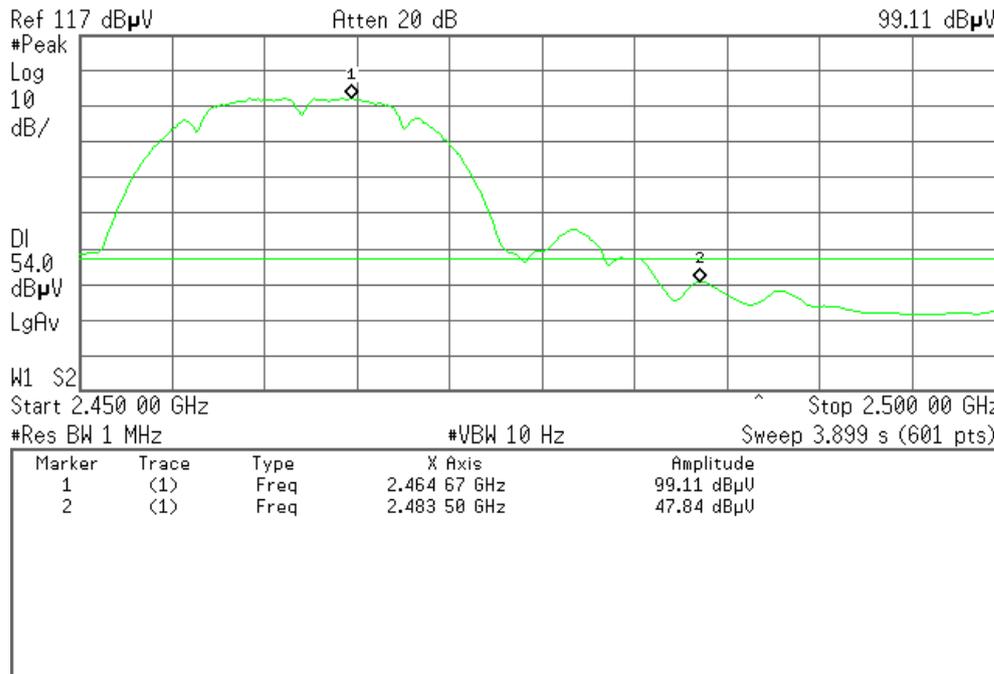
Detector mode: Average

Polarity: Vertical

Agilent 14:35:03 Jul 8, 2010

R T

Mkr1 2.464 67 GHz  
99.11 dBμV





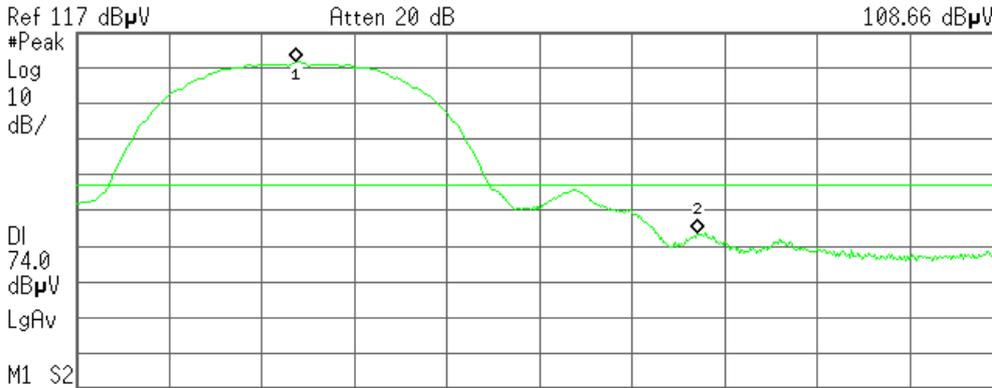
Detector mode: Peak

Polarity: Horizontal

Agilent 14:39:10 Jul 8, 2010

R T

Mkr1 2.461 83 GHz  
108.66 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 83 GHz	108.66 dBµV
2	(1)	Freq	2.483 50 GHz	60.81 dBµV

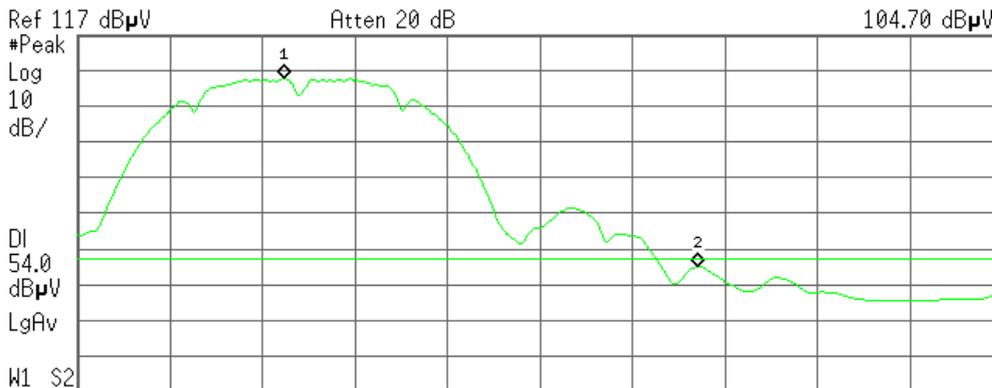
Detector mode: Average

Polarity: Horizontal

Agilent 14:40:00 Jul 8, 2010

R T

Mkr1 2.461 17 GHz  
104.70 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 17 GHz	104.70 dBµV
2	(1)	Freq	2.483 50 GHz	52.02 dBµV



(IEEE 802.11g mode)

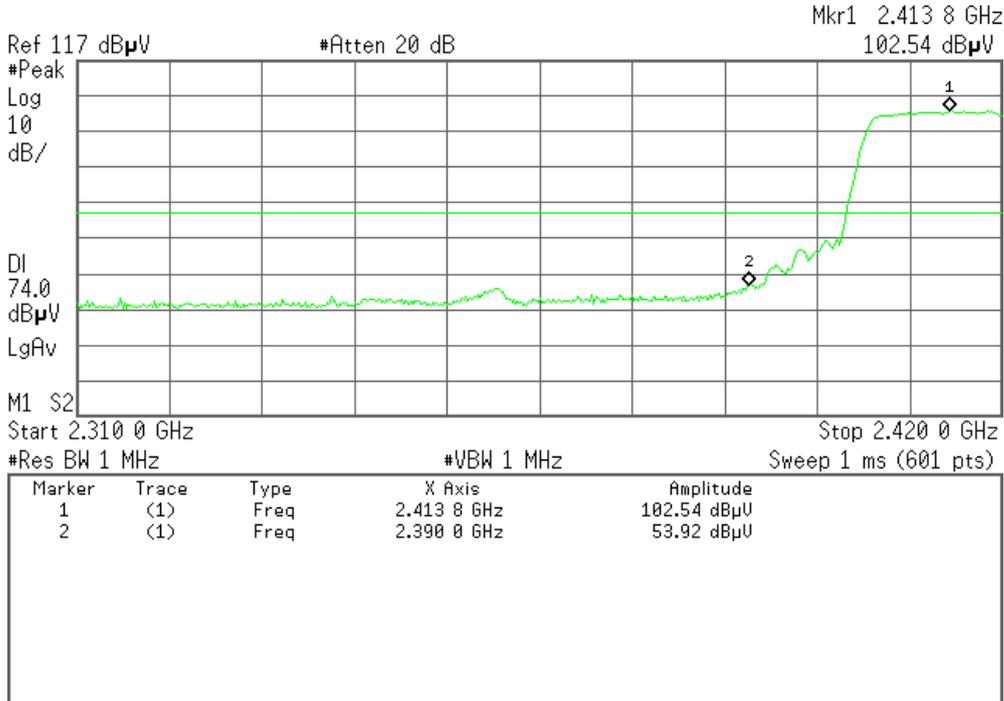
Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 16:49:08 Jul 7, 2010

R T

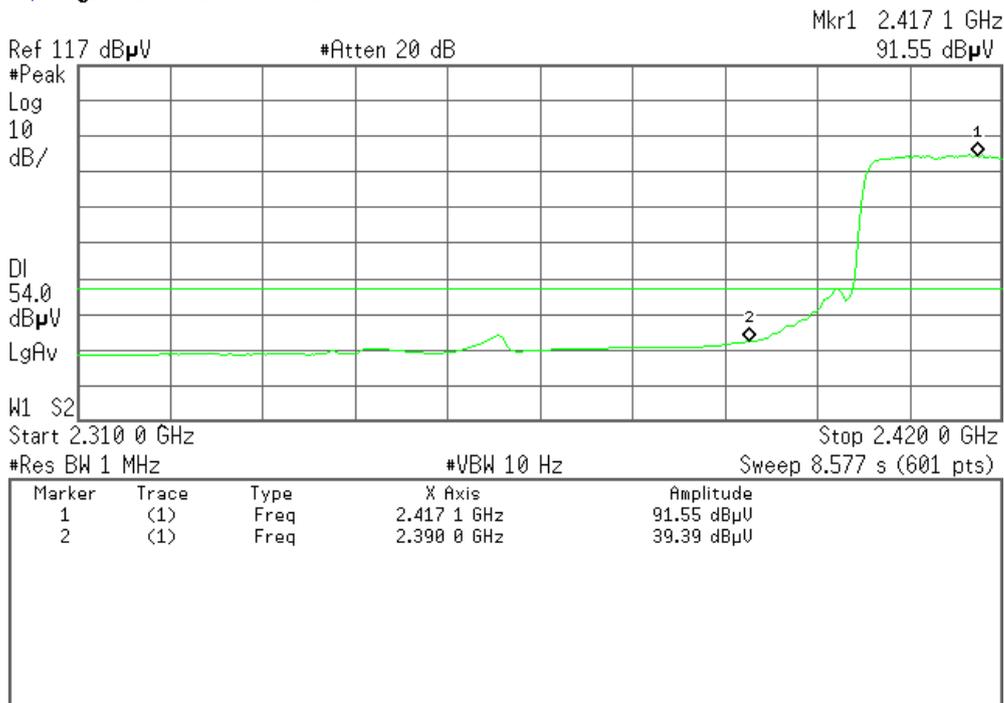


Detector mode: Average

Polarity: Vertical

Agilent 16:49:54 Jul 7, 2010

R T



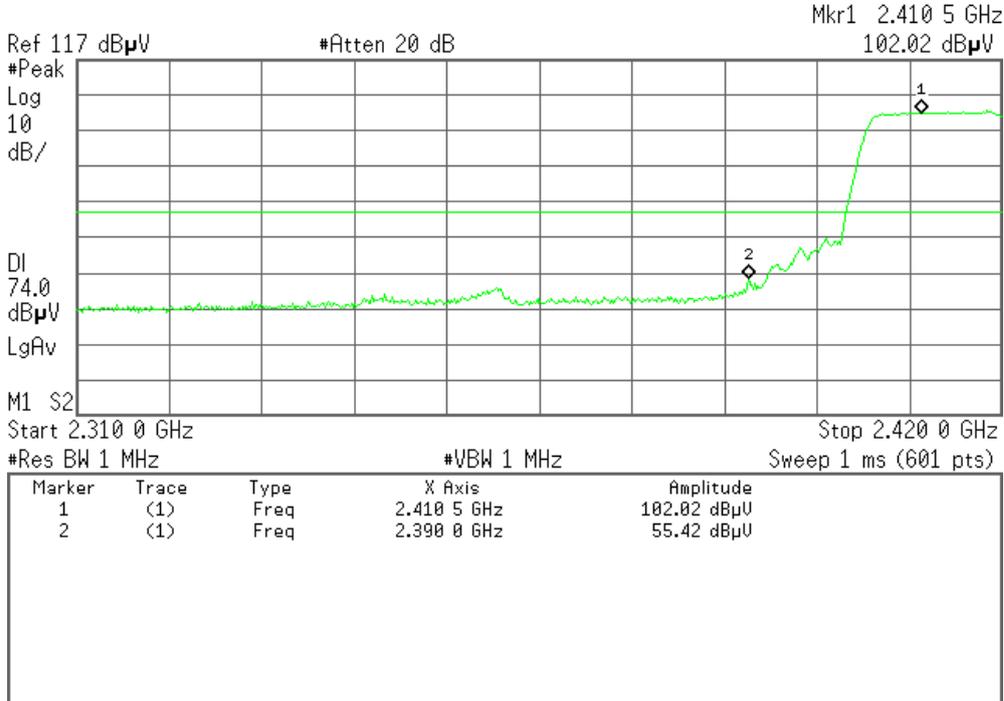


Detector mode: Peak

Polarity: Horizontal

Agilent 16:57:40 Jul 7, 2010

R T

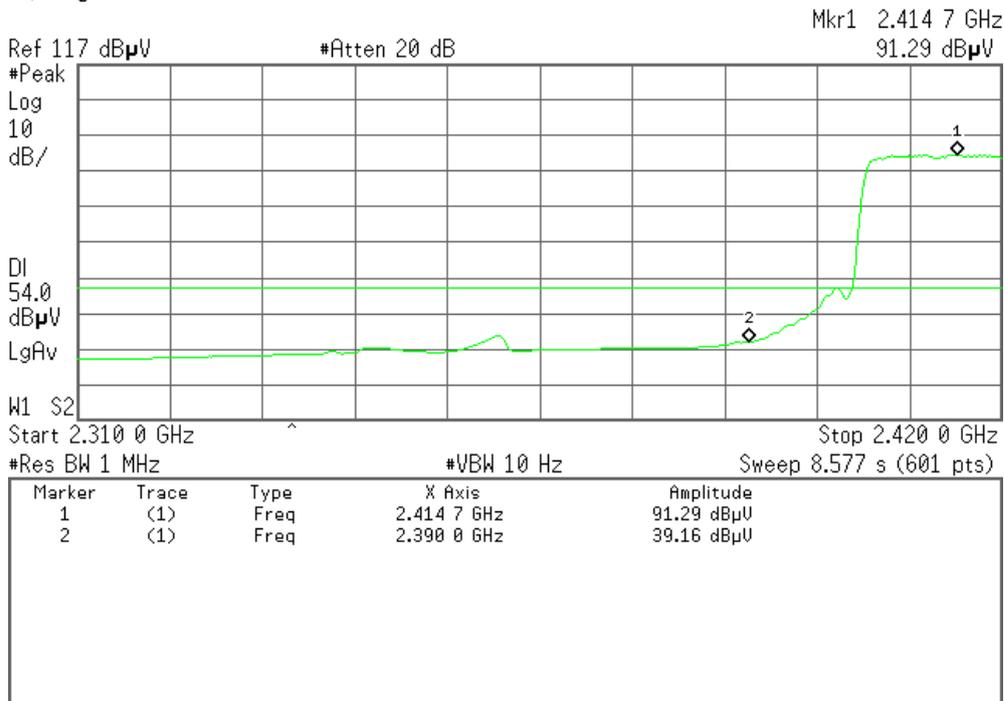


Detector mode: Average

Polarity: Horizontal

Agilent 16:58:09 Jul 7, 2010

R T





### Band Edges (CH High)

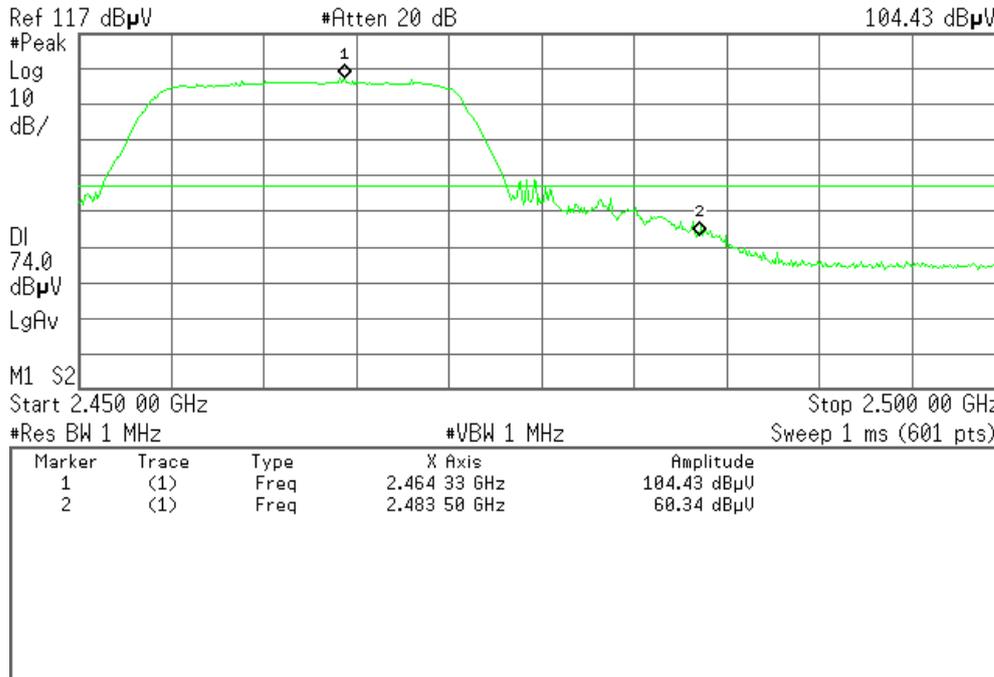
Detector mode: Peak

Polarity: Vertical

Agilent 16:44:54 Jul 7, 2010

R T

Mkr1 2.464 33 GHz  
104.43 dBμV



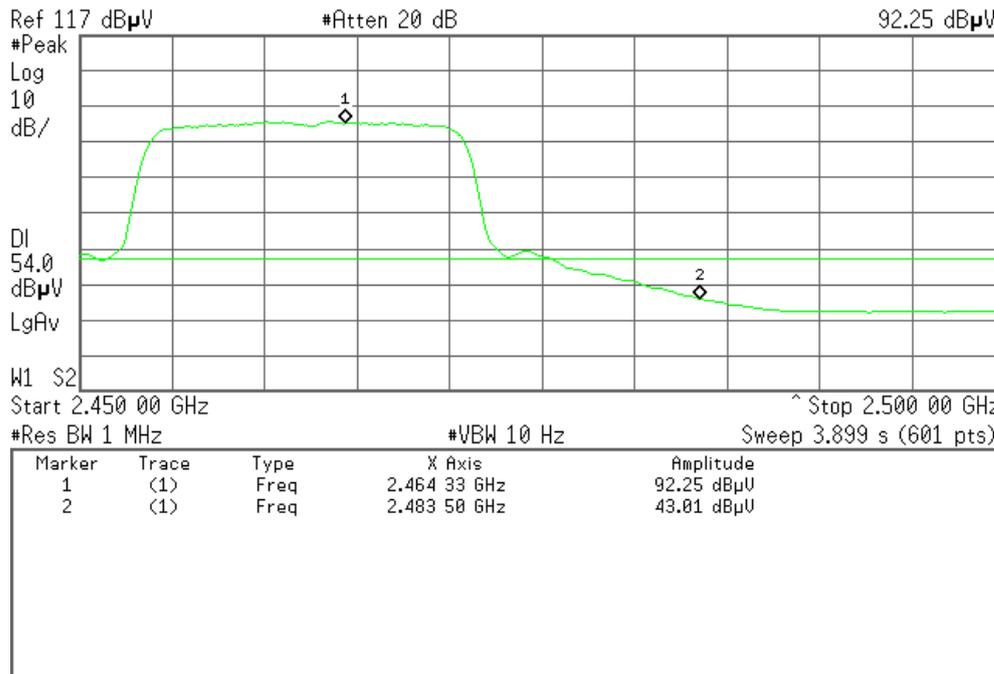
Detector mode: Average

Polarity: Vertical

Agilent 16:45:26 Jul 7, 2010

R T

Mkr1 2.464 33 GHz  
92.25 dBμV





Detector mode: Peak

Polarity: Horizontal

Agilent 16:40:54 Jul 7, 2010

R T

Mkr1 2.463 75 GHz  
106.07 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.463 75 GHz	106.07 dBμV
2	(1)	Freq	2.483 50 GHz	66.32 dBμV

Detector mode: Average

Polarity: Horizontal

Agilent 16:40:03 Jul 7, 2010

R T

Mkr1 2.463 75 GHz  
94.48 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.463 75 GHz	94.48 dBμV
2	(1)	Freq	2.483 50 GHz	45.36 dBμV



(IEEE 802.11n HT20 MHz mode)

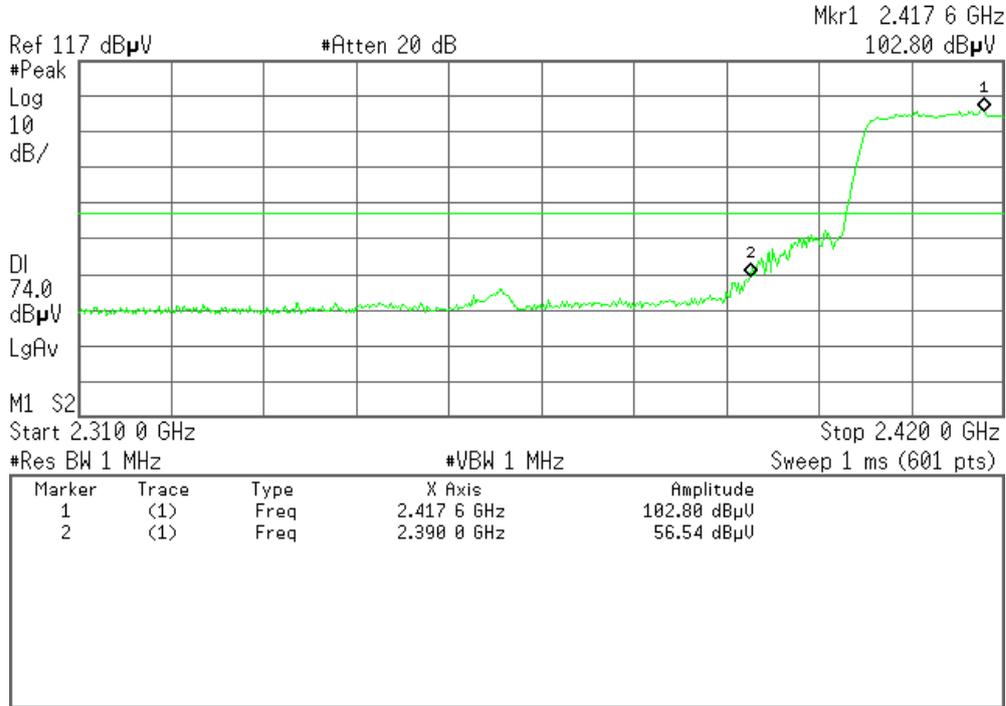
Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 16:51:20 Jul 7, 2010

R T

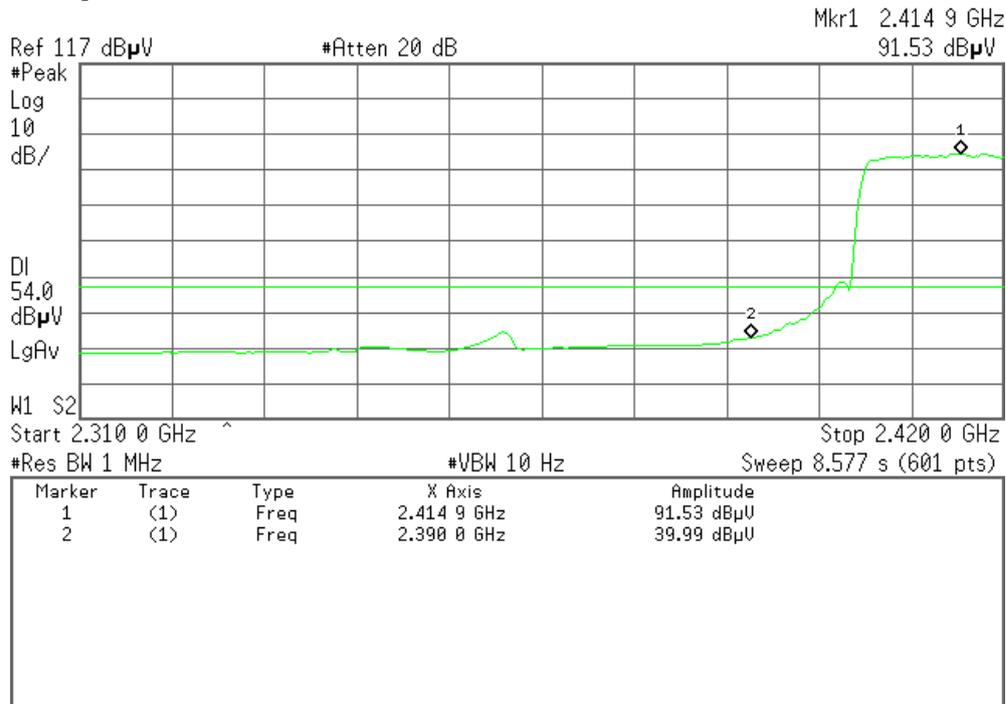


Detector mode: Average

Polarity: Vertical

Agilent 16:50:39 Jul 7, 2010

R T



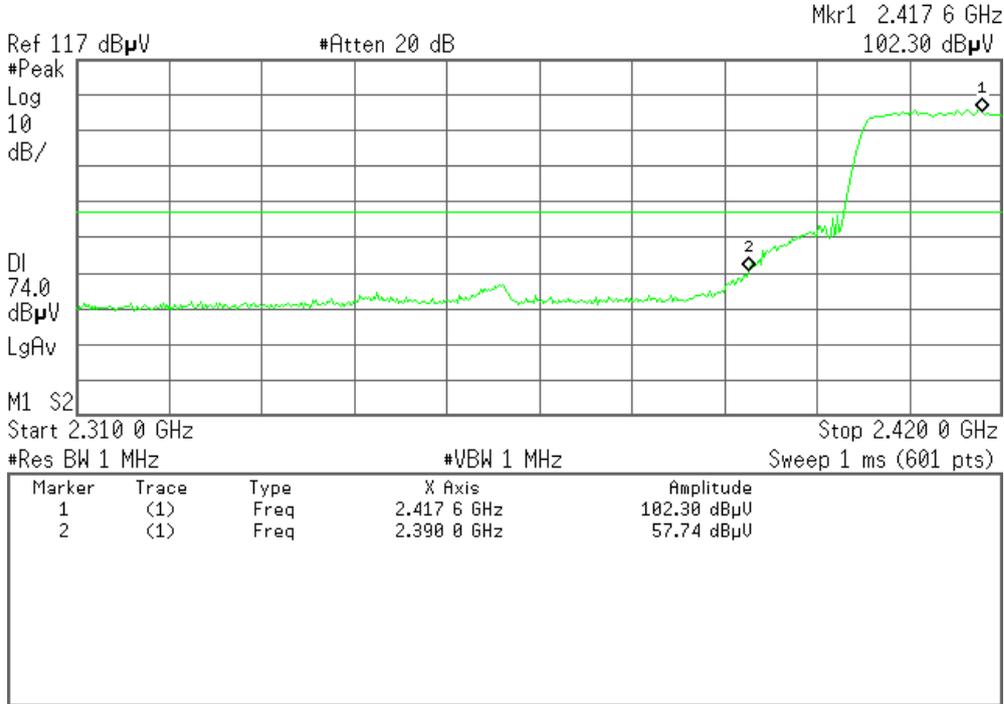


Detector mode: Peak

Polarity: Horizontal

Agilent 16:54:51 Jul 7, 2010

R T

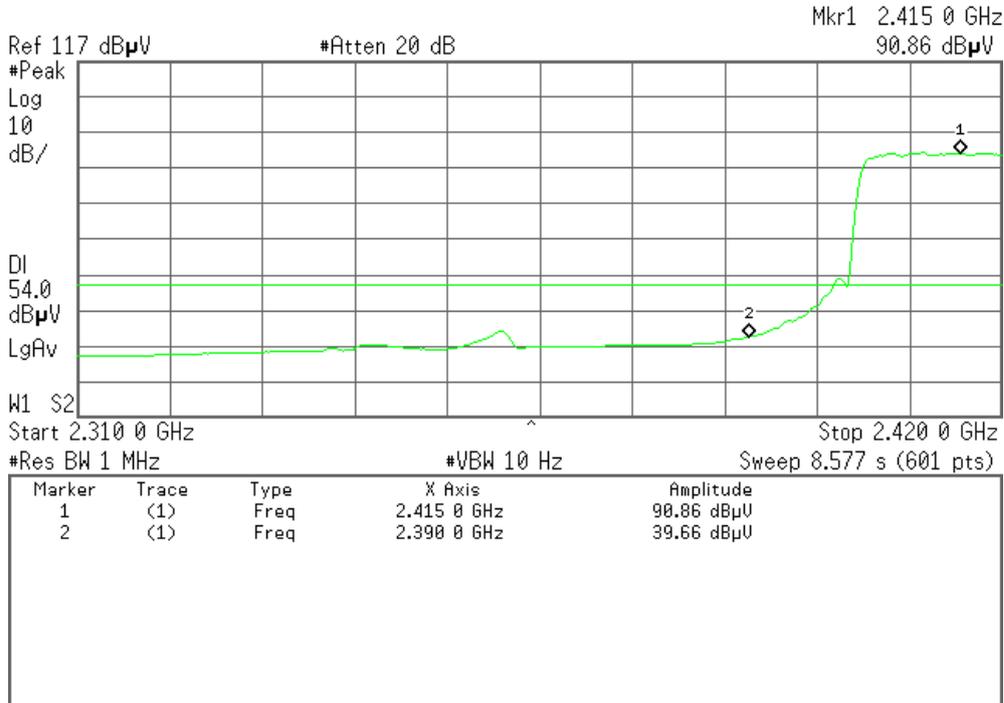


Detector mode: Average

Polarity: Horizontal

Agilent 16:58:47 Jul 7, 2010

R T





Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 16:32:18 Jul 7, 2010

R T

Mkr1 2.467 25 GHz  
105.08 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	105.08 dBµV
2	(1)	Freq	2.483 50 GHz	68.81 dBµV

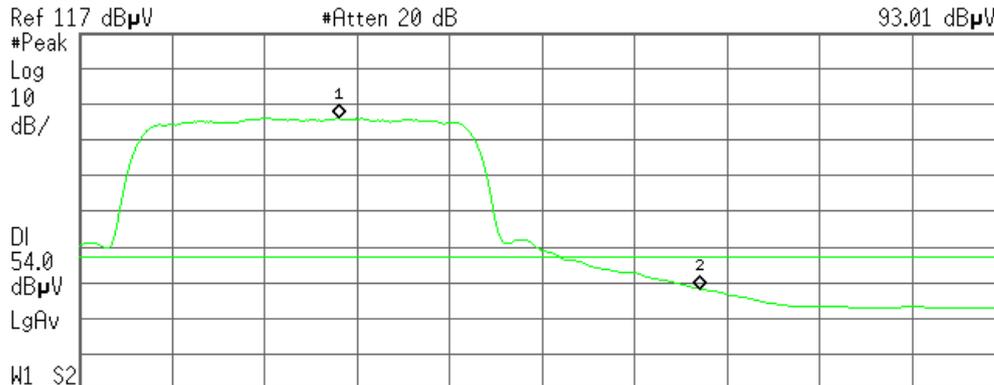
Detector mode: Average

Polarity: Vertical

Agilent 16:32:50 Jul 7, 2010

R T

Mkr1 2.464 00 GHz  
93.01 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	2.464 00 GHz	93.01 dBµV
2	(1)	Freq	2.483 50 GHz	45.31 dBµV



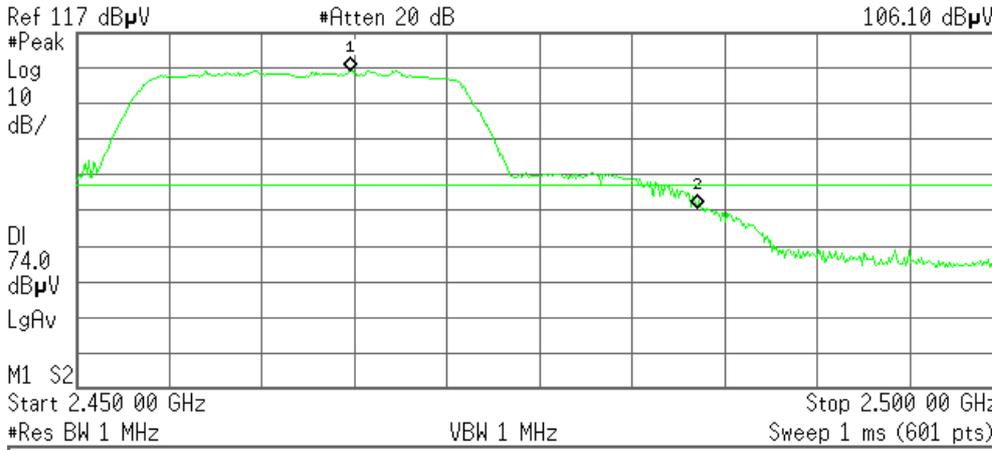
Detector mode: Peak

Polarity: Horizontal

Agilent 16:38:43 Jul 7, 2010

R T

Mkr1 2.464 75 GHz  
106.10 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.464 75 GHz	106.10 dBµV
2	(1)	Freq	2.483 50 GHz	67.76 dBµV

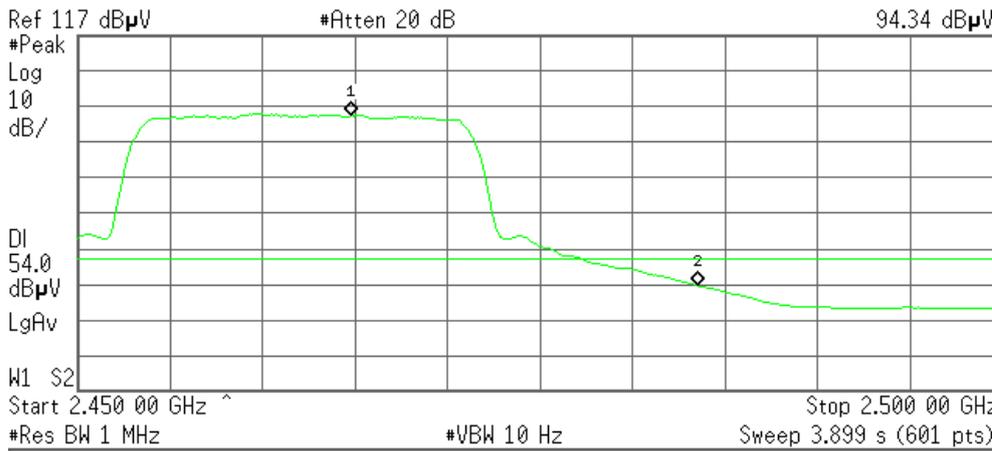
Detector mode: Average

Polarity: Horizontal

Agilent 16:39:10 Jul 7, 2010

R T

Mkr1 2.464 75 GHz  
94.34 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.464 75 GHz	94.34 dBµV
2	(1)	Freq	2.483 50 GHz	46.74 dBµV



(IEEE 802.11n HT40 MHz mode)

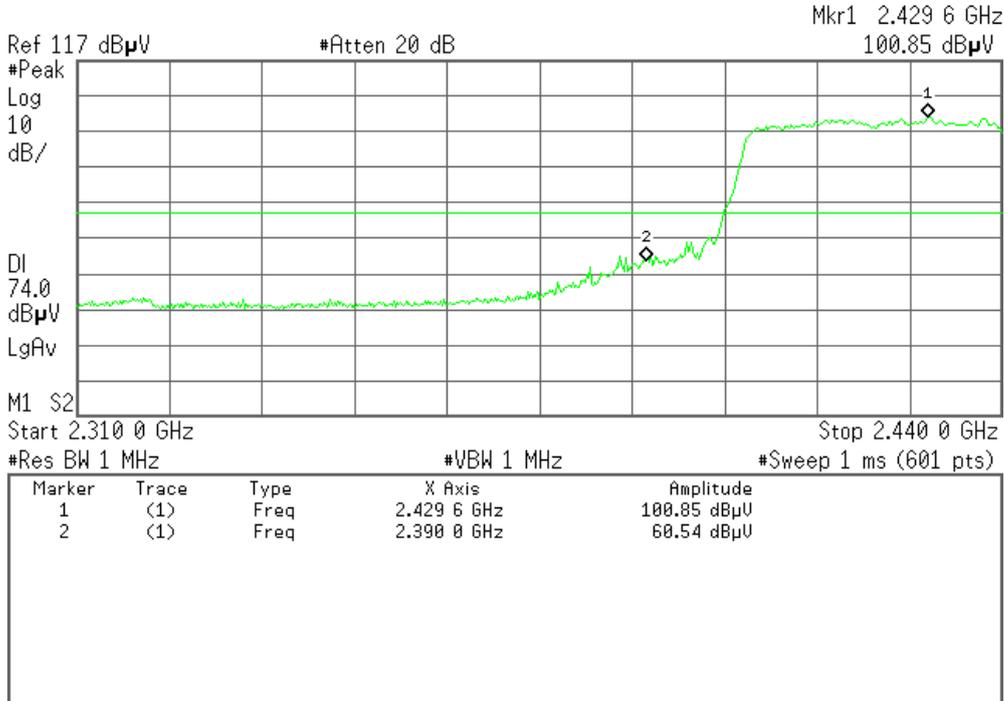
Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 17:09:13 Jul 7, 2010

R T

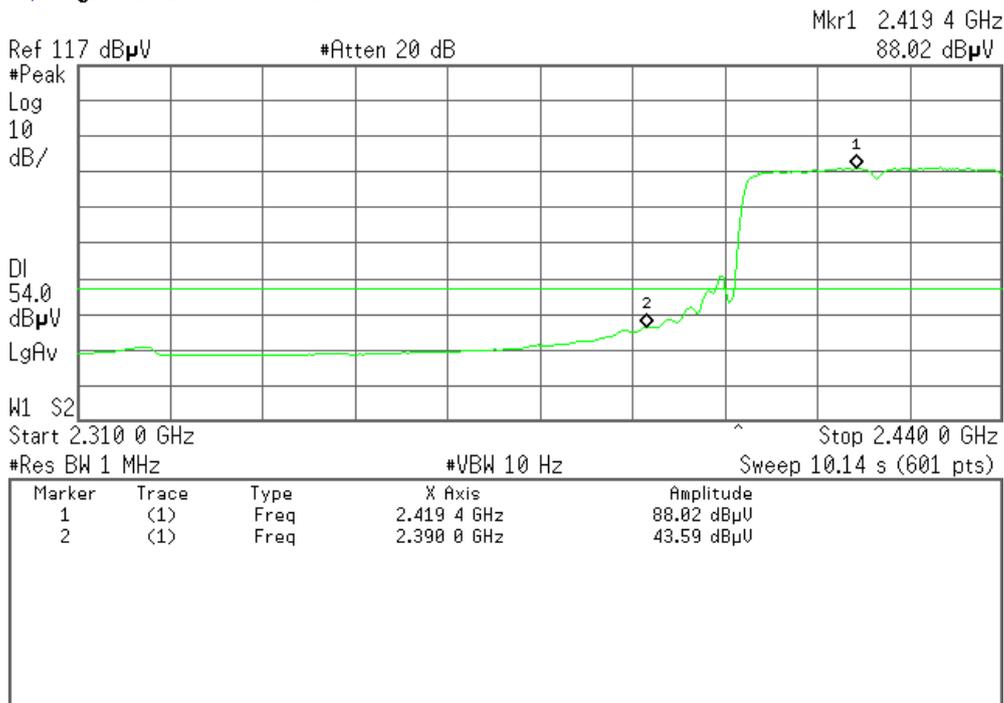


Detector mode: Average

Polarity: Vertical

Agilent 17:10:04 Jul 7, 2010

R T



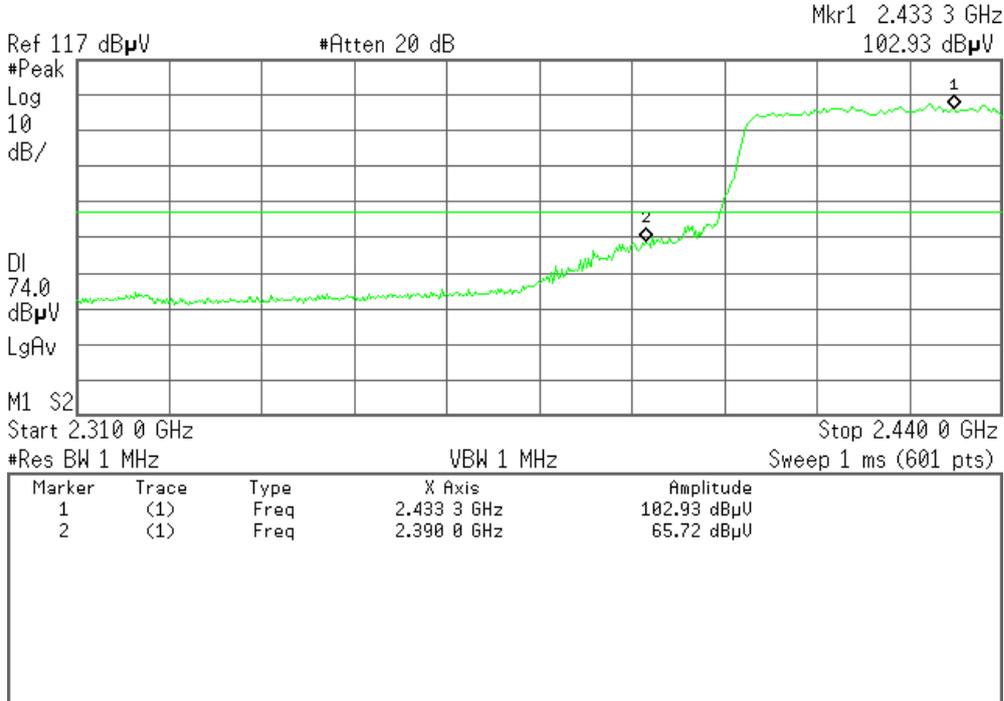


Detector mode: Peak

Polarity: Horizontal

Agilent 17:03:48 Jul 7, 2010

R T

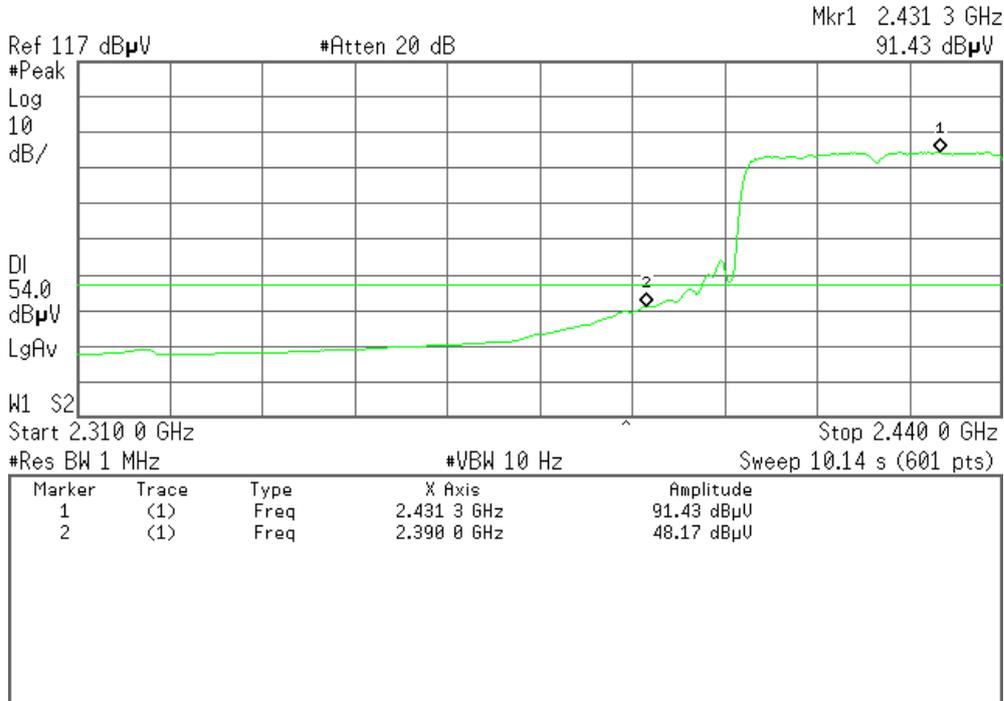


Detector mode: Average

Polarity: Horizontal

Agilent 17:04:27 Jul 7, 2010

R T





Band Edges (CH High)

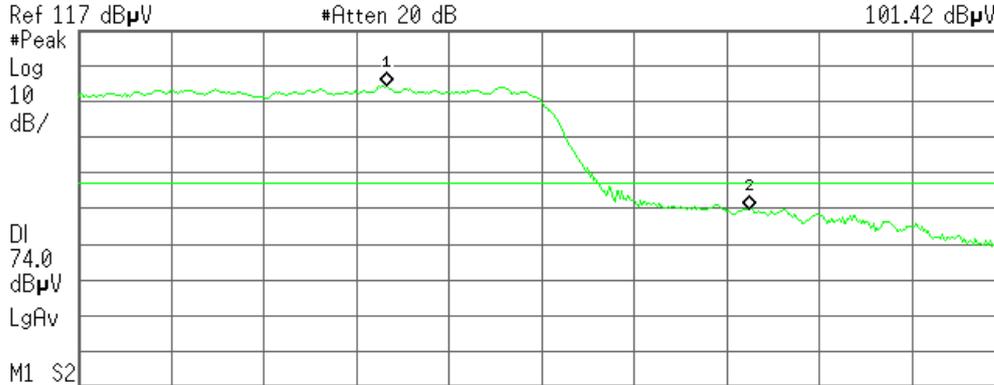
Detector mode: Peak

Polarity: Vertical

Agilent 17:14:15 Jul 7, 2010

R T

Mkr1 2.460 00 GHz  
101.42 dBµV



Start 2.440 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	2.460 00 GHz	101.42 dBµV
2	(1)	Freq	2.483 50 GHz	66.67 dBµV

Detector mode: Average

Polarity: Vertical

Agilent 17:14:42 Jul 7, 2010

R T

Mkr1 2.461 20 GHz  
88.36 dBµV



Start 2.440 00 GHz Stop 2.500 00 GHz  
#Res BW 1 MHz #VBW 10 Hz Sweep 4.678 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 20 GHz	88.36 dBµV
2	(1)	Freq	2.483 50 GHz	48.24 dBµV



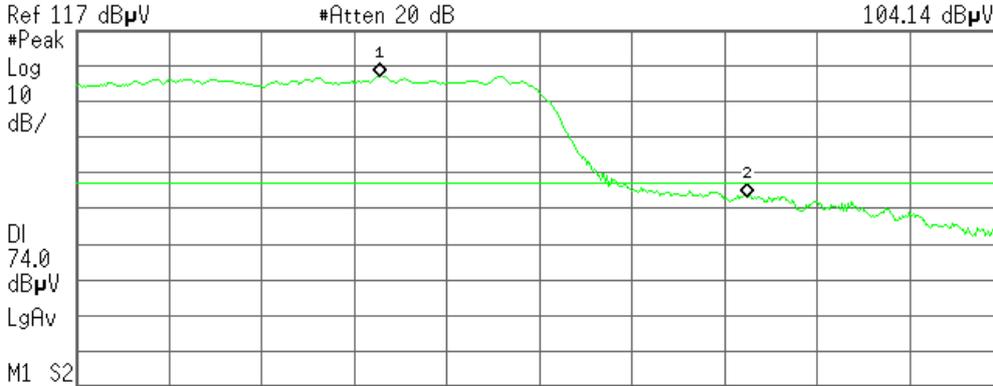
Detector mode: Peak

Polarity: Horizontal

Agilent 17:18:50 Jul 7, 2010

R T

Mkr1 2.459 70 GHz  
104.14 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.459 70 GHz	104.14 dBμV
2	(1)	Freq	2.483 50 GHz	70.31 dBμV

Detector mode: Average

Polarity: Horizontal

Agilent 17:19:33 Jul 7, 2010

R T

Mkr1 2.456 80 GHz  
91.09 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.456 80 GHz	91.09 dBμV
2	(1)	Freq	2.483 50 GHz	52.26 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.

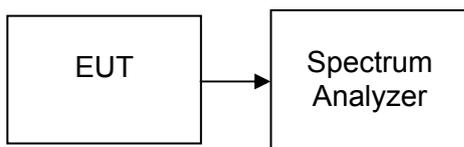
**7.6.2. TEST INSTRUMENTS**

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011

**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 = 500kHz, 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	-10.27	8.00	PASS
Mid	2437	-10.20		PASS
High	2462	-10.15		PASS

**Test mode: IEEE 802.11g**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-14.76	8.00	PASS
Mid	2437	-14.58		PASS
High	2462	-14.41		PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-14.63	8.00	PASS
Mid	2437	-14.45		PASS
High	2462	-14.34		PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2422	-14.65	8.00	PASS
Mid	2437	-14.57		PASS
High	2452	-14.48		PASS

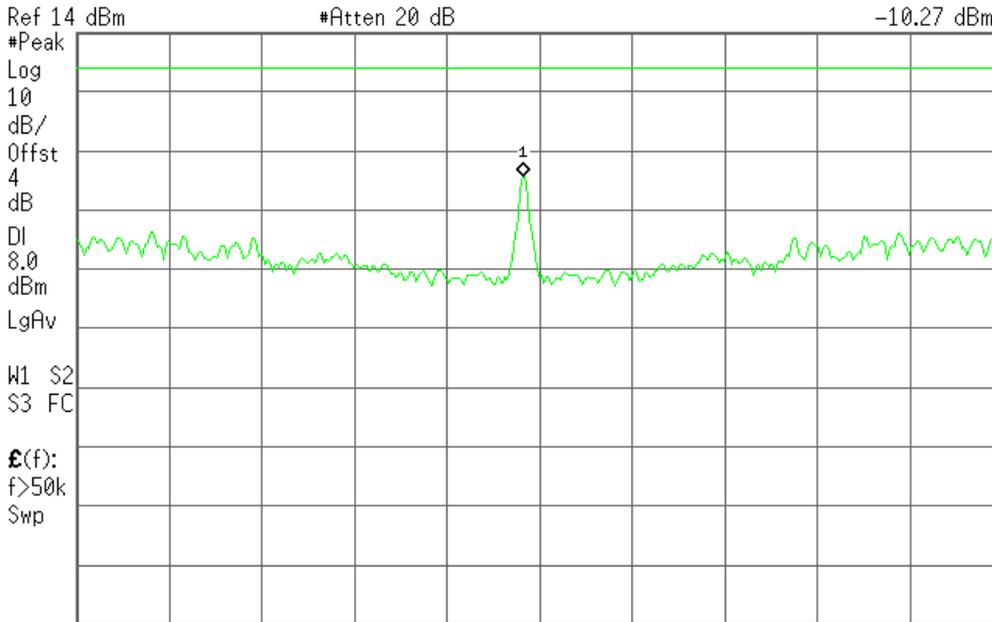


Test Plot (IEEE 802.11b mode)

PPSD (CH Low)

Agilent 18:09:30 Jul 7, 2010

R T Mkr1 2.411 990 8 GHz -10.27 dBm

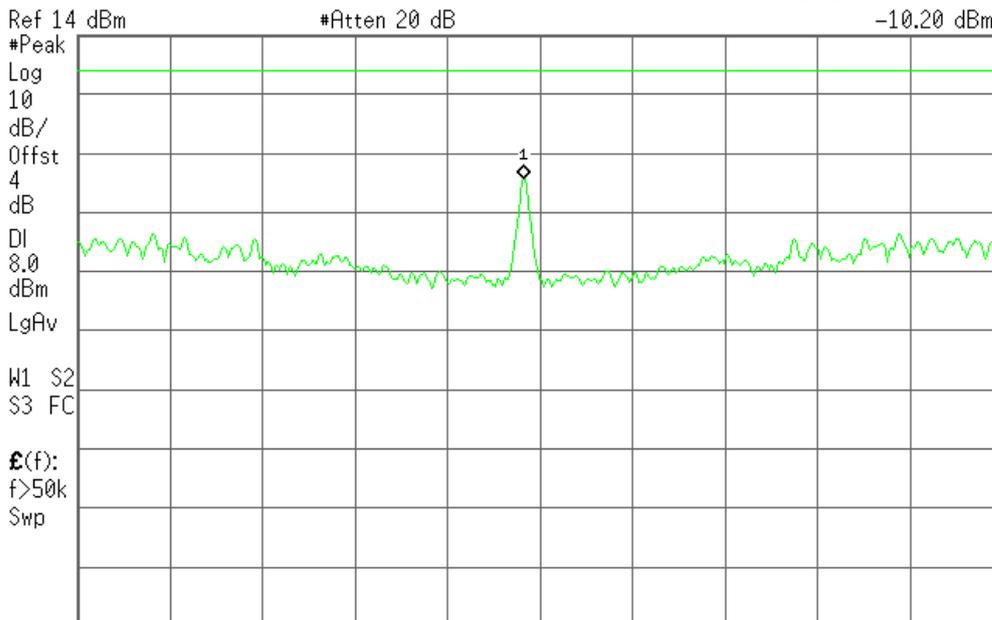


Center 2.412 000 0 GHz Span 500 kHz #Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)

PPSD (CH Mid)

Agilent 18:12:04 Jul 7, 2010

R T Mkr1 2.436 990 8 GHz -10.20 dBm



Center 2.437 000 0 GHz Span 500 kHz #Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)

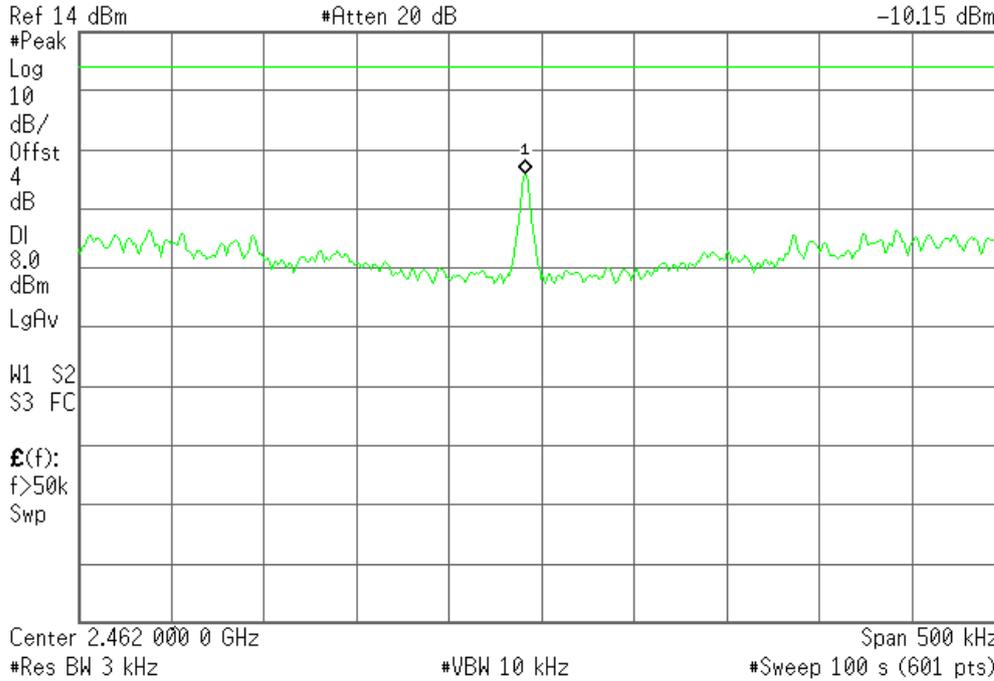


### PPSD (CH High)

Agilent 18:14:23 Jul 7, 2010

R T

Mkr1 2.461 990 8 GHz  
-10.15 dBm



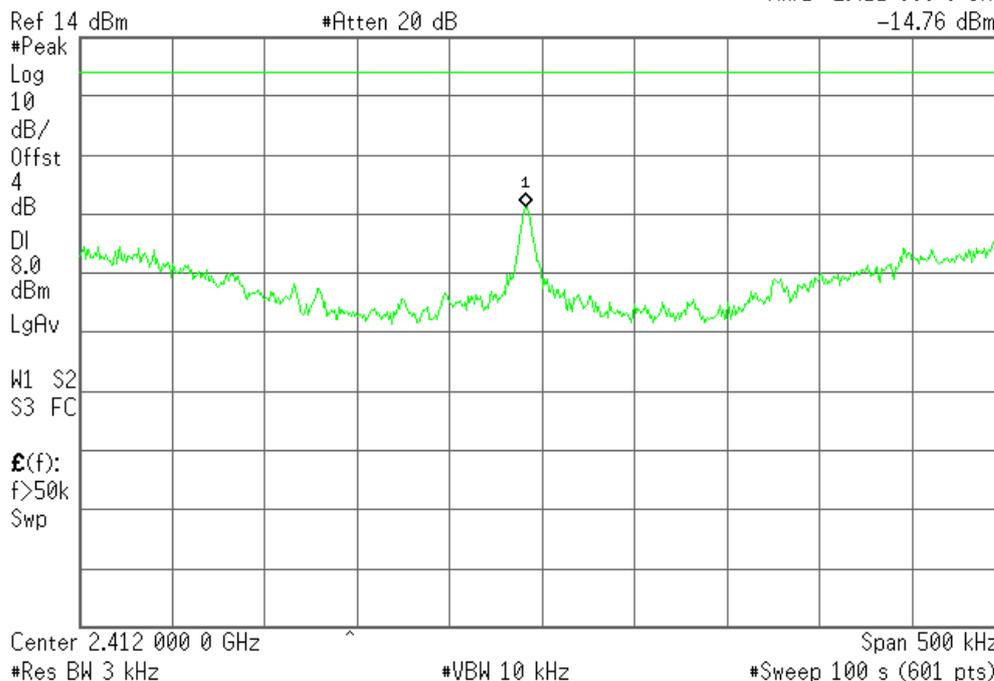
### (IEEE 802.11g mode)

### PPSD (CH Low)

Agilent 18:31:16 Jul 7, 2010

R T

Mkr1 2.411 990 8 GHz  
-14.76 dBm



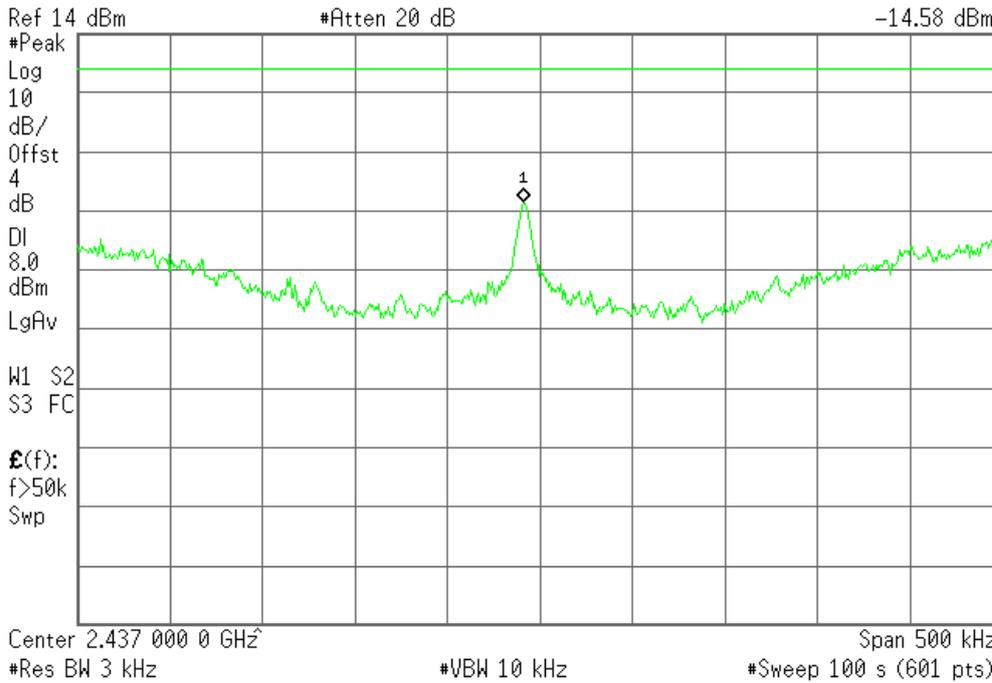


### PPSD (CH Mid)

Agilent 18:28:34 Jul 7, 2010

R T

Mkr1 2.436 990 8 GHz  
-14.58 dBm

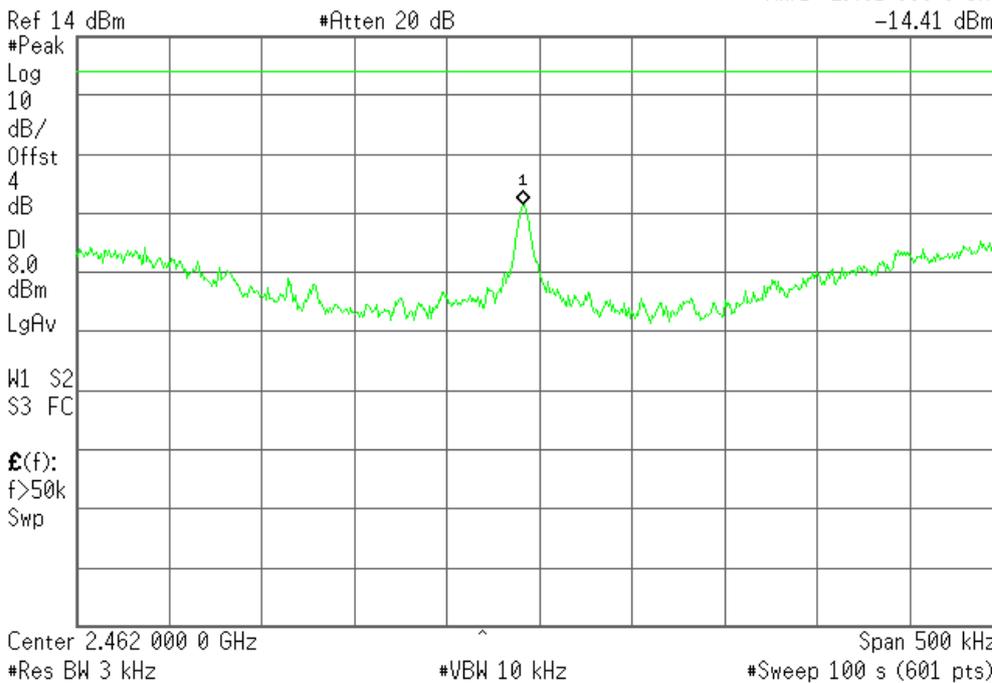


### PPSD (CH High)

Agilent 18:25:52 Jul 7, 2010

R T

Mkr1 2.461 990 8 GHz  
-14.41 dBm





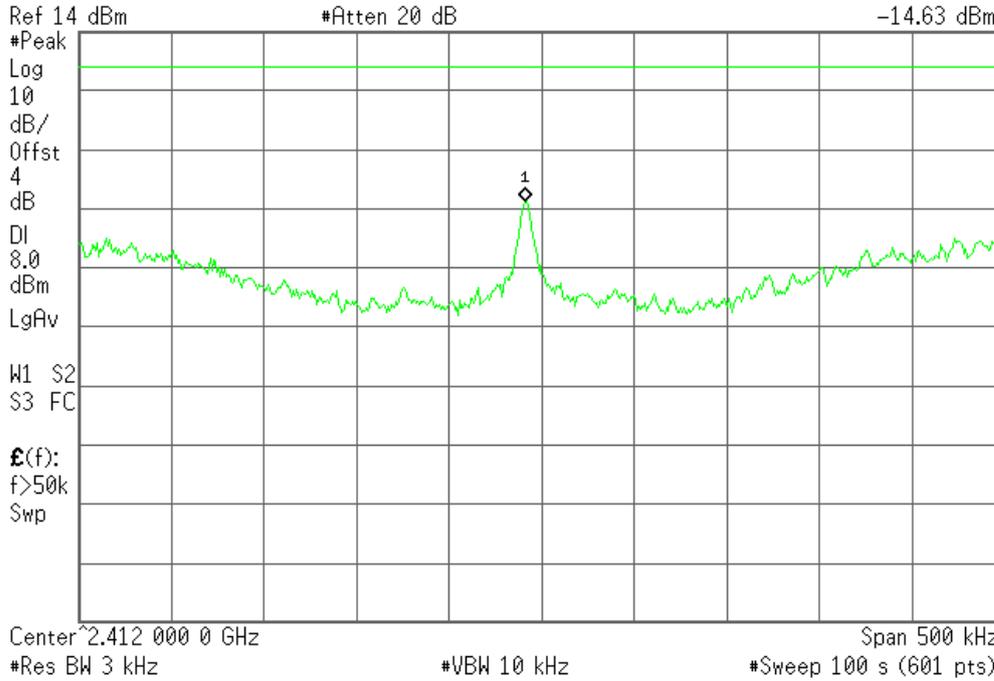
(IEEE 802.11n HT20 MHz mode)

PPSD (CH Low)

Agilent 18:34:00 Jul 7, 2010

R T

Mkr1 2.411 990 8 GHz  
-14.63 dBm

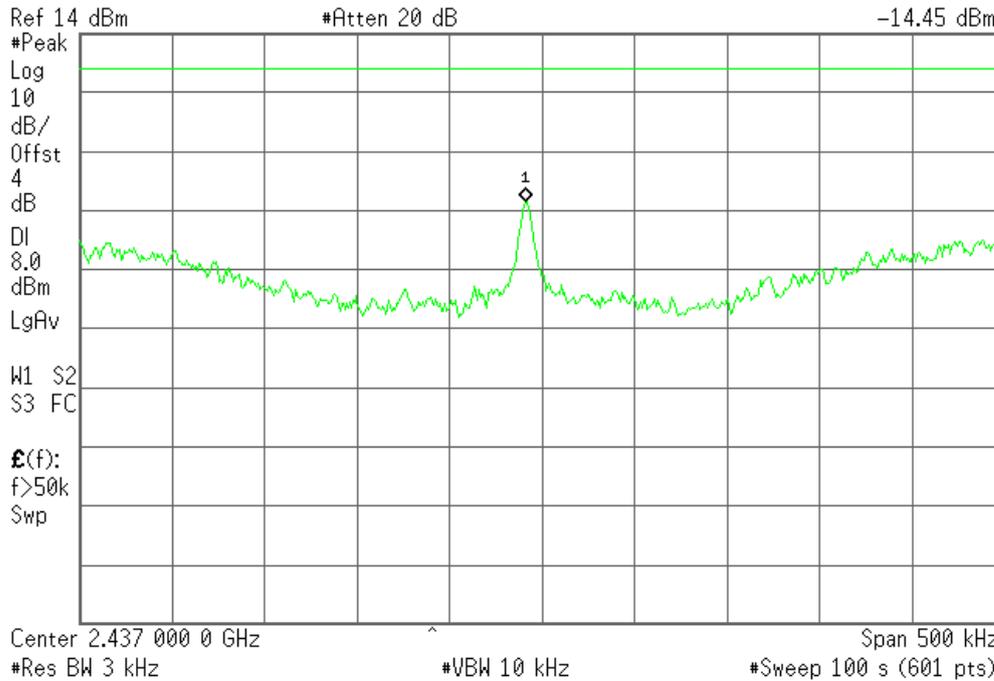


PPSD (CH Mid)

Agilent 18:36:50 Jul 7, 2010

R T

Mkr1 2.436 990 8 GHz  
-14.45 dBm



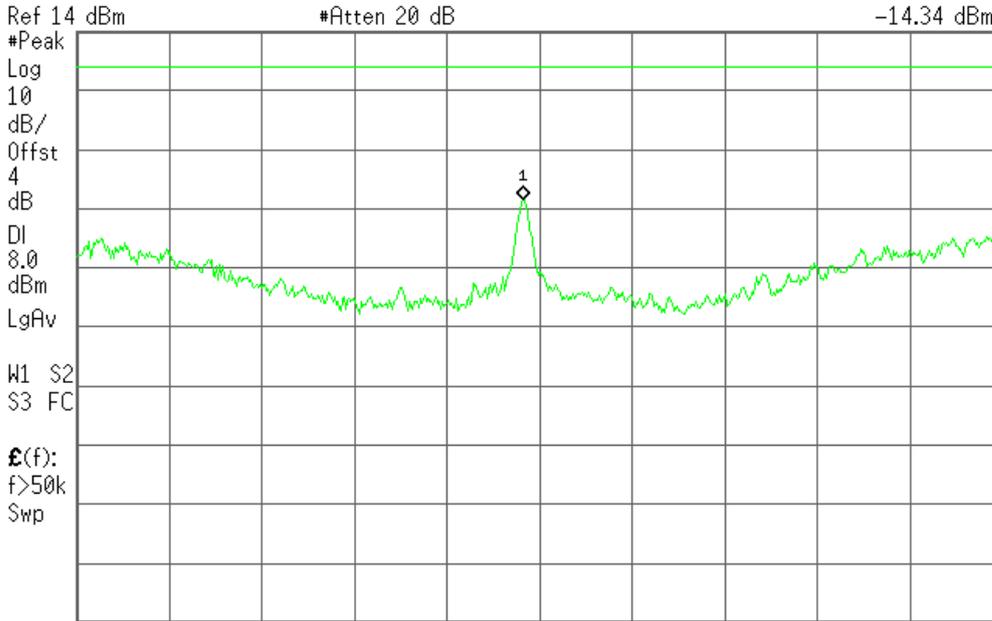


PPSD (CH High)

Agilent 18:39:31 Jul 7, 2010

R T

Mkr1 2.461 990 8 GHz -14.34 dBm



Center 2.462 000 0 GHz #Res BW 3 kHz #VBW 10 kHz Span 500 kHz #Sweep 100 s (601 pts)

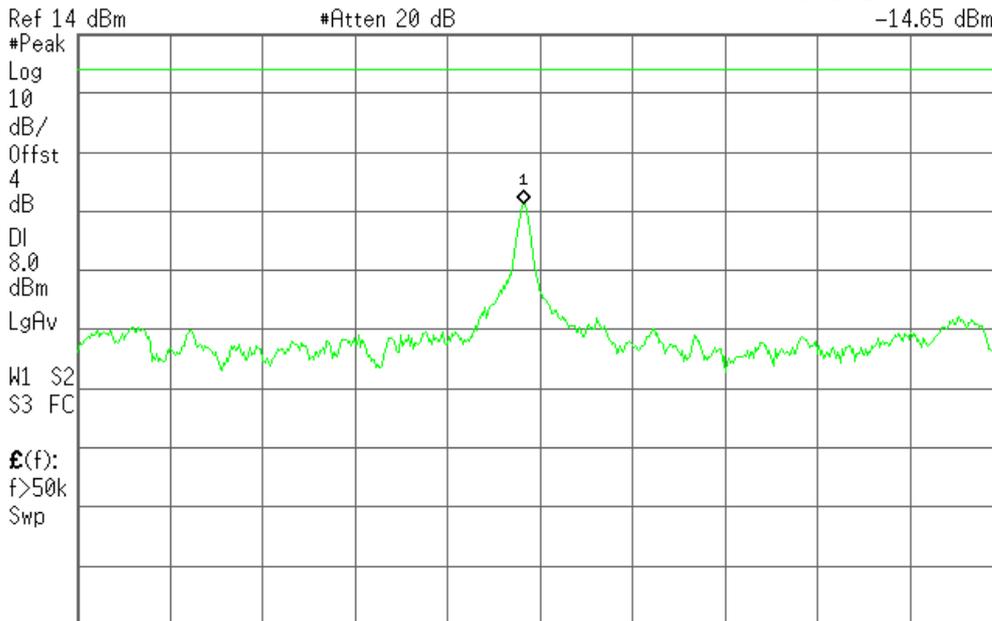
(IEEE 802.11n HT40 MHz mode)

PPSD (CH Low)

Agilent 18:47:19 Jul 7, 2010

R T

Mkr1 2.421 990 8 GHz -14.65 dBm



Center 2.422 000 0 GHz #Res BW 3 kHz #VBW 10 kHz Span 500 kHz #Sweep 100 s (601 pts)

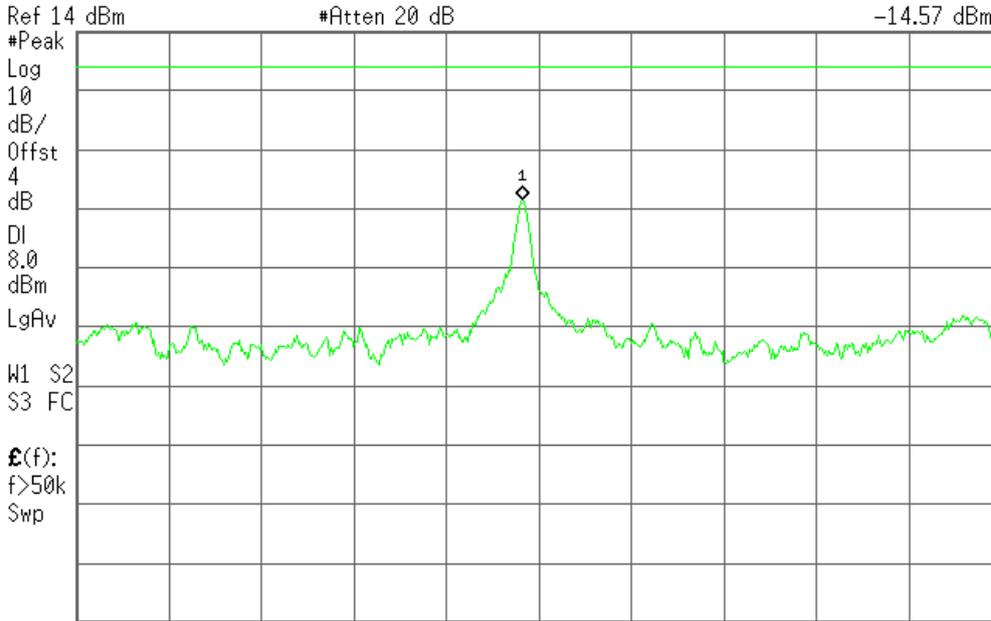


### PPSD (CH Mid)

Agilent 18:44:47 Jul 7, 2010

R T

Mkr1 2.436 990 8 GHz  
-14.57 dBm



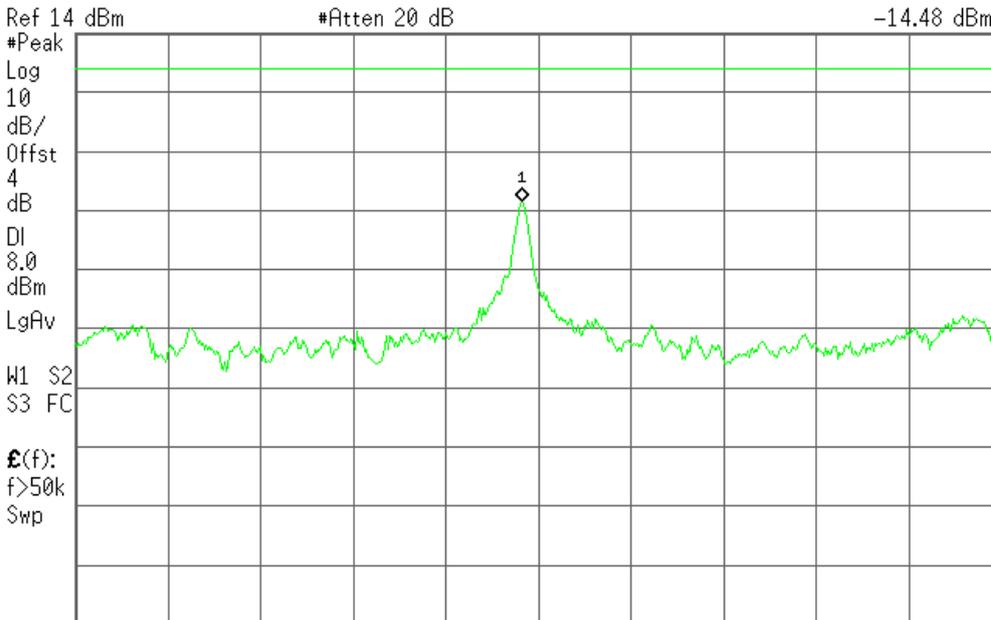
Center 2.437 000 0 GHz ^ Span 500 kHz  
#Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)

### PPSD (CH High)

Agilent 18:42:13 Jul 7, 2010

R T

Mkr1 2.451 990 8 GHz  
-14.48 dBm



Center 2.452 000 0 GHz ^ Span 500 kHz  
#Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)