



FCC TEST REPORT

for

Wireless Repeater

MODEL: WS320

Test Report Number:

SZ100612B03-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 02, 2010



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 02, 2010	Initial Issue	ALL	Clinton Kao



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1 TEST CERTIFICATION

Product: Wireless Repeater

Model: WS320

Brand: HUAWEI

Tested: June 02-July 02, 2010

Applicant: **Huawei Technologies Co., Ltd.**
Administration Building, Huawei Base, Bantian, Longgang District, Shenzhen 518129 P.R.C.

Manufacturer: **Huawei Technologies Co., Ltd.**
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:

Clinton Kao
Manager
Compliance Certification Service Inc.

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"> ● Spurious Emissions ● Conducted Measurement ● Radiated Emissions 	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	Pass	Meet the requirement of limit.

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



3 EUT DESCRIPTION

Product	Wireless Repeater
Trade Name	HUAWEI
Model Number	WS320
Model Discrepancy	N/A
Serial Number	SZ100612B03-RP
Power Supply	AC120V/60Hz
Frequency Range	IEEE 802.11b/g: 2412 ~ 2462 MHz IEEE 802.11n HT20 : 2412 ~ 2462 MHz IEEE 802.11n HT40 : 2422MHz~ 2452MHz
Transmit Power	IEEE 802.11b mode: 16.74dBm IEEE 802.11g mode: 12.5014.89 dBm IEEE 802.11n HT20 MHz mode: 12.71 dBm IEEE 802.11n HT40 MHz mode: 12.30 dBm
Modulation Technique	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)
Transmit Data Rate	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
Number of Channels	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
Antenna Specification	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: **QIS-WS320** 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	Studio 1435	5315448686549	N/A	DELL	N/A	Unshielded 1.75m
2	Wireless Router	DI-524M	PK0S186039312	N/A	D-Link	N/A	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.

USA	A2LA
Taiwan	TAF

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

USA	FCC
Japan	VCCI
Canada	INDUSTRY CANADA
Taiwan	BSMI
Norway	Nemko

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

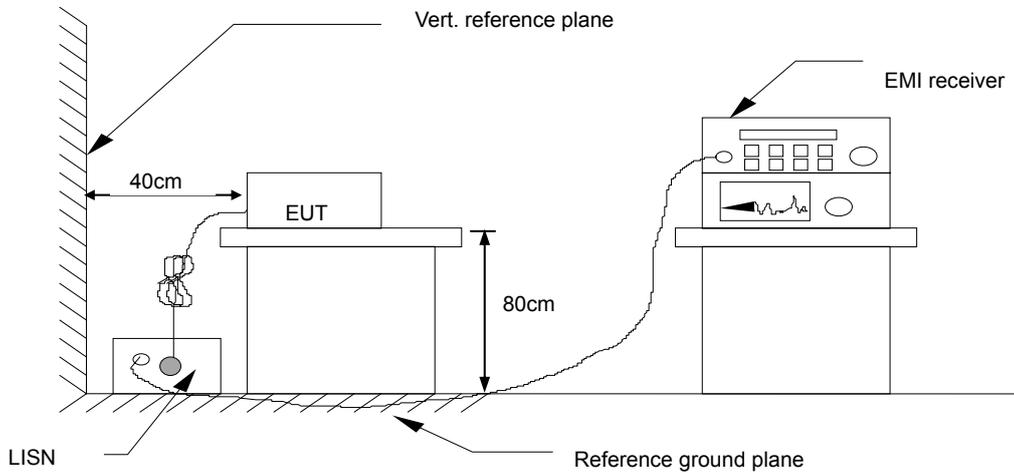
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.



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

Model No.	WS320	Test Mode	Normal Link
Environmental Conditions	24deg.C,54% RH, 1002 hPa	RBW,VBW	9 kHz
Tested by:	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
0.294	55.41	53.27	42.66	61.87	51.87	-8.60	-9.21	L1
0.806	53.32	48.73	33.53	56.00	46.00	-7.27	-12.47	L1
1.907	53.30	49.31	37.06	56.00	46.00	-6.69	-8.94	L1
3.428	53.37	47.24	35.00	56.00	46.00	-8.76	-11.00	L1
4.020	55.57	48.40	36.20	56.00	46.00	-7.60	-9.80	L1
4.597	57.87	50.33	37.70	56.00	46.00	-5.67	-8.30	L1
0.283	48.89	46.40	37.87	62.19	52.19	-15.79	-14.32	L2
0.798	48.96	44.53	30.34	56.00	46.00	-11.47	-15.66	L2
1.277	50.41	45.64	32.27	56.00	46.00	-10.36	-13.73	L2
4.356	53.61	45.53	30.33	56.00	46.00	-10.47	-15.67	L2
4.981	54.94	47.12	32.74	56.00	46.00	-8.88	-13.26	L2
18.248	55.25	52.89	41.51	60.00	50.00	-7.11	-8.49	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

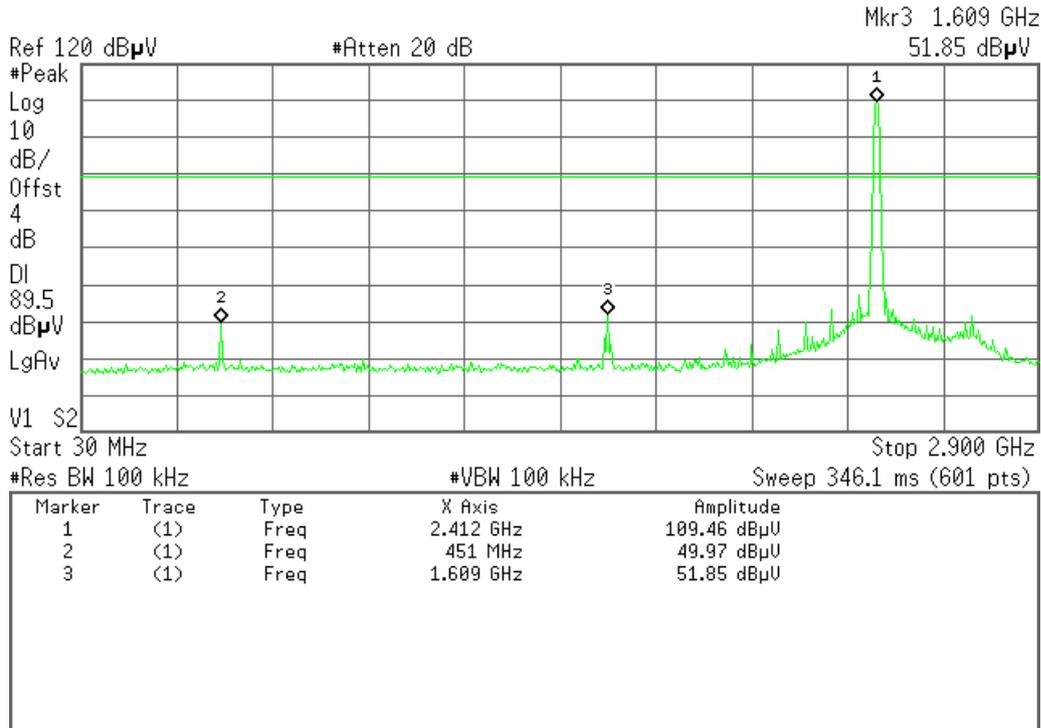
Test Plot

(IEEE 802.11b mode)

CH Low (30MHz ~2.9GHz)

Agilent 17:00:01 Jul 1, 2010

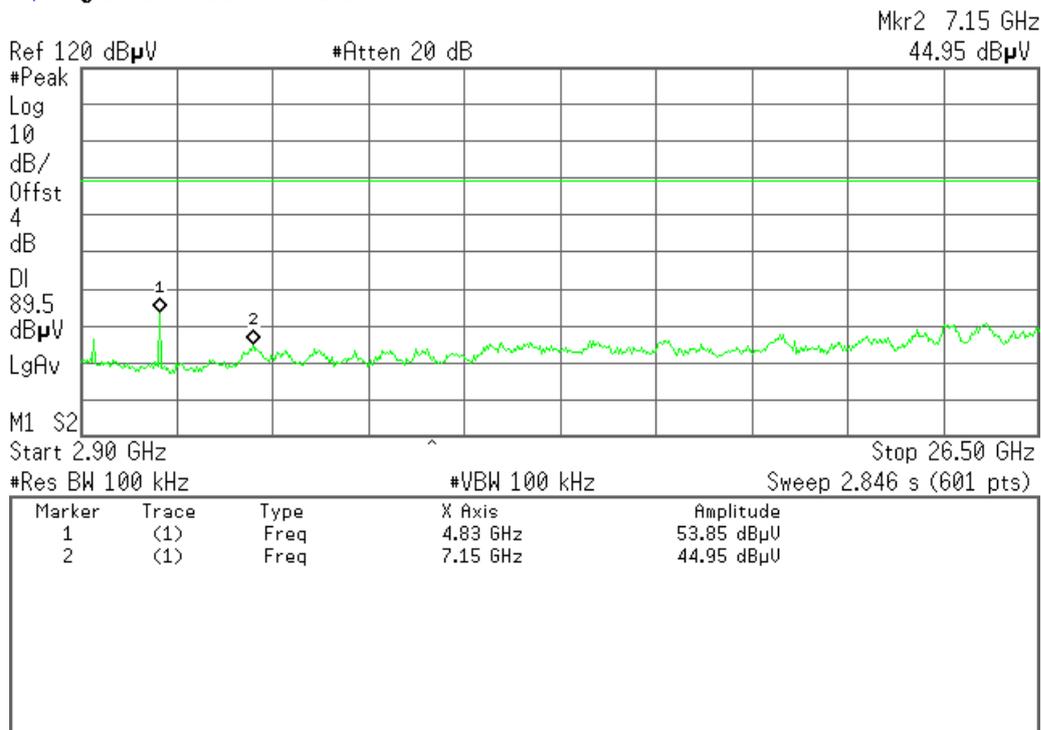
R T



(2.9MHz ~26.5GHz)

Agilent 17:00:52 Jul 1, 2010

R T

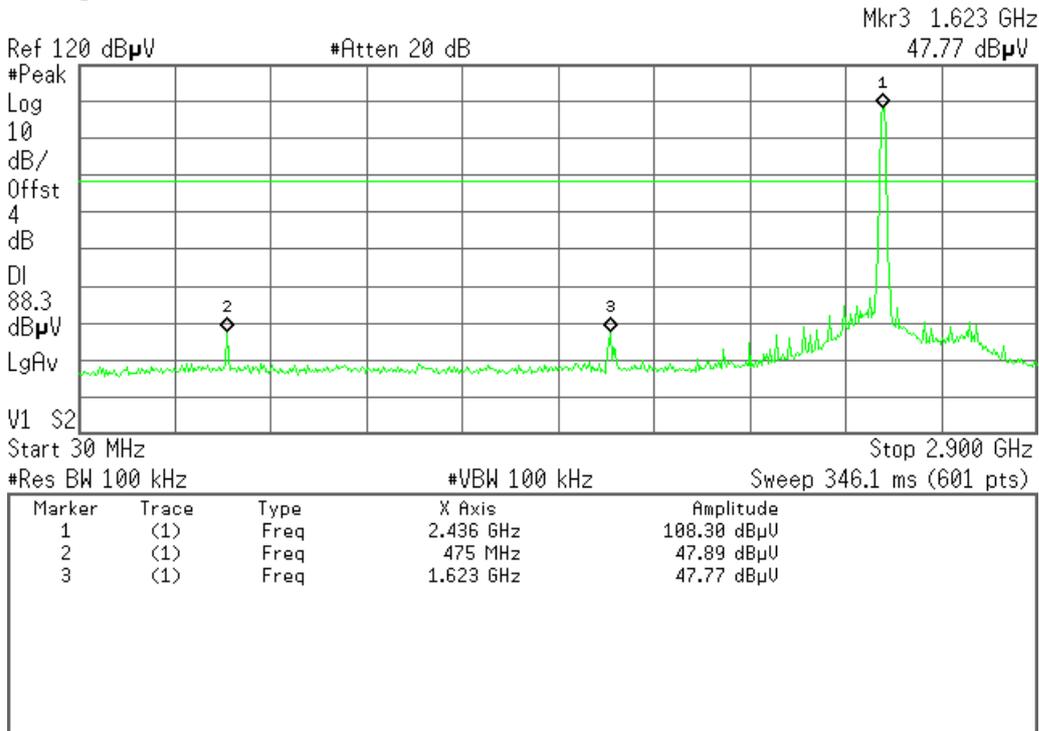




CH Mid(30MHz ~ 2.9GHz)

Agilent 17:04:00 Jul 1, 2010

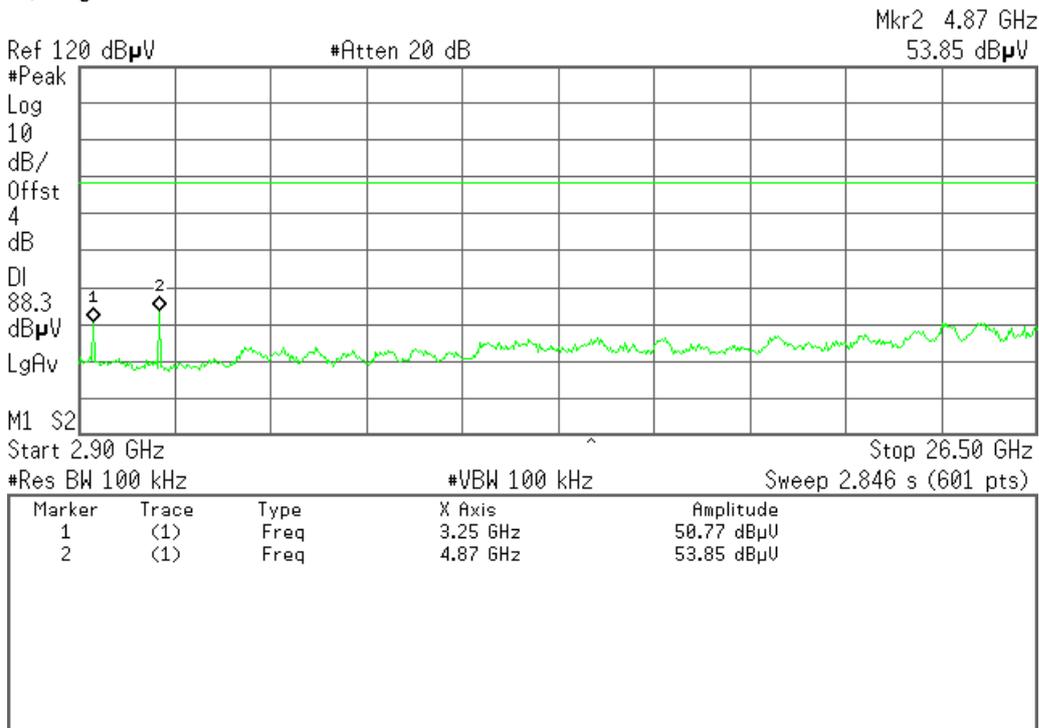
R T



2.9GHz ~ 26.5GHz

Agilent 17:04:54 Jul 1, 2010

R T

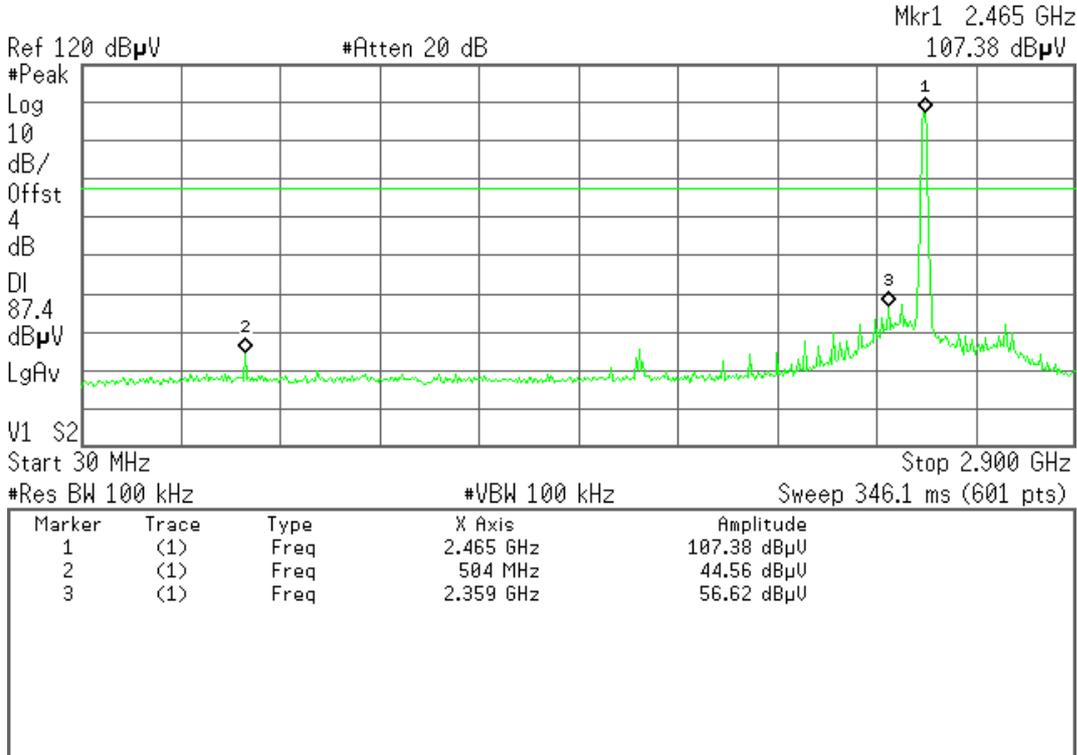




CH High (30MHz ~ 2.9GHz)

Agilent 17:06:12 Jul 1, 2010

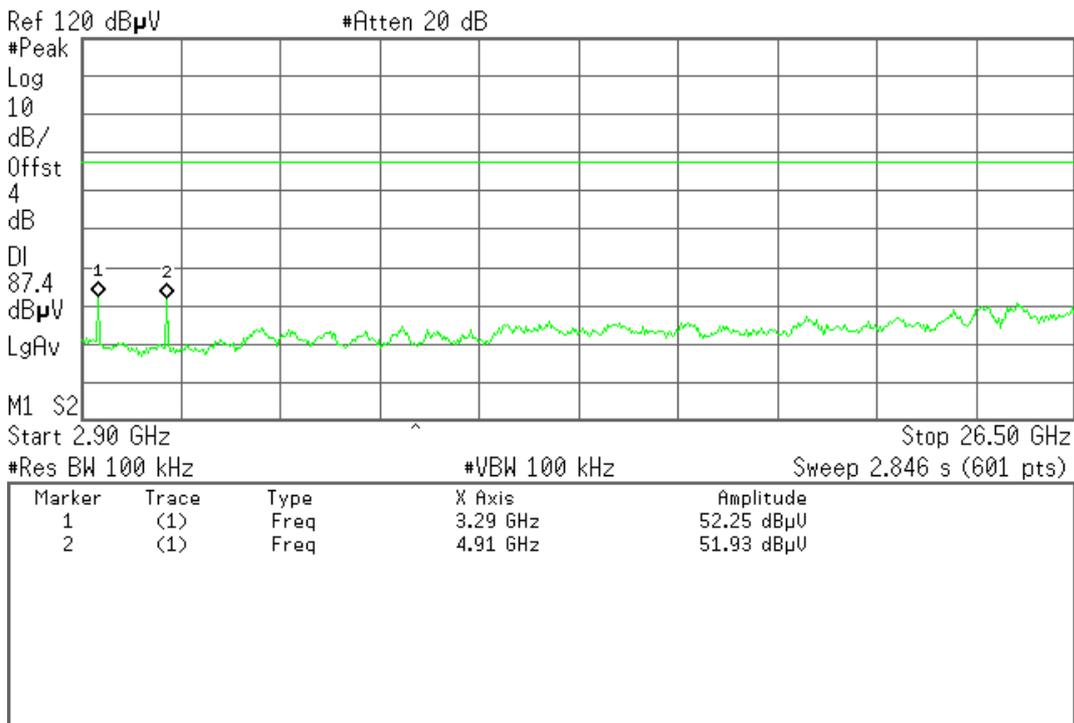
R T



2.9GHz ~ 26.5GHz

Agilent 17:06:55 Jul 1, 2010

R T

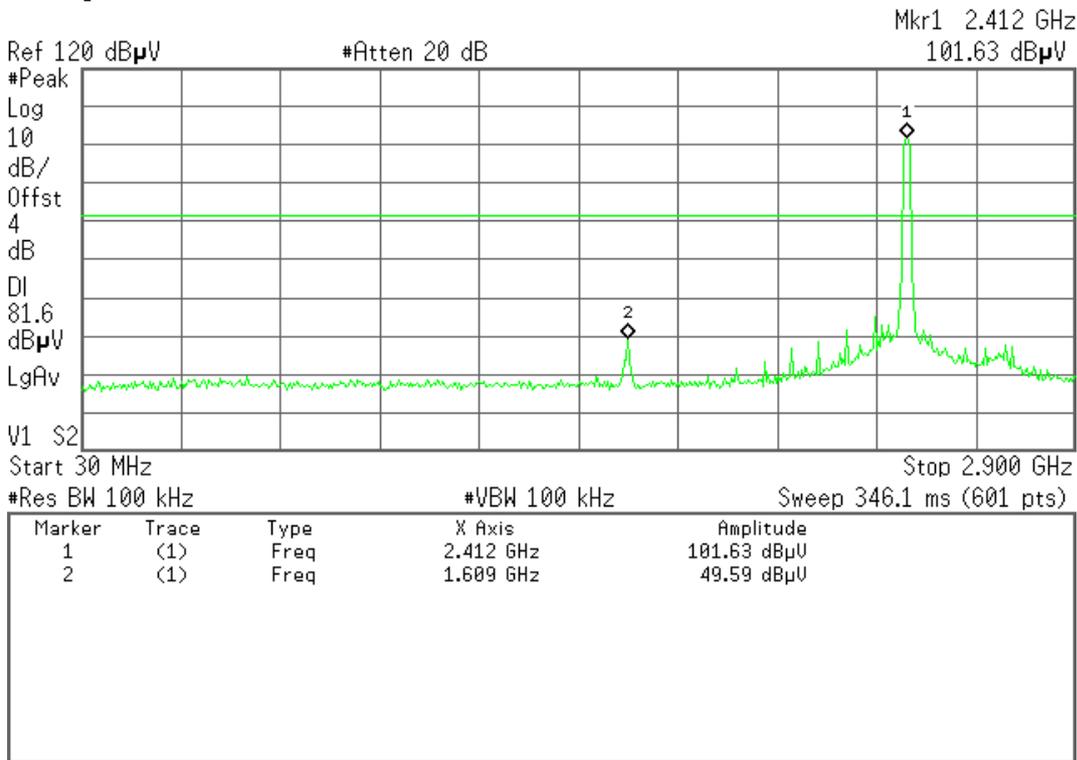




(IEEE 802.11g mode)
CH Low (30MHz ~2.9GHz)

Agilent 17:12:17 Jul 1, 2010

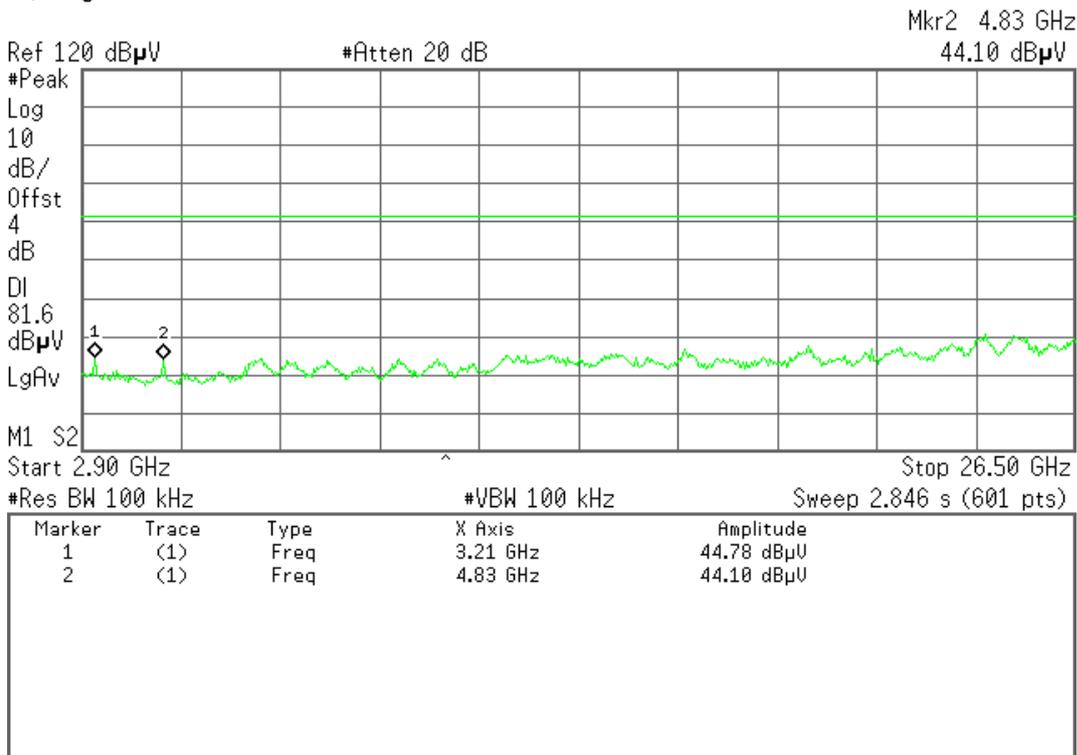
R T



(2.9MHz ~26.5GHz)

Agilent 17:13:04 Jul 1, 2010

R T





CH Mid(30MHz ~ 2.9GHz)

Agilent 17:10:15 Jul 1, 2010

R T

Mkr1 2.436 GHz
100.39 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	100.39 dBμU
2	(1)	Freq	1.623 GHz	48.62 dBμU

2.9GHz ~ 26.5GHz

Agilent 17:11:10 Jul 1, 2010

R T

Mkr2 4.87 GHz
43.92 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	47.62 dBμU
2	(1)	Freq	4.87 GHz	43.92 dBμU

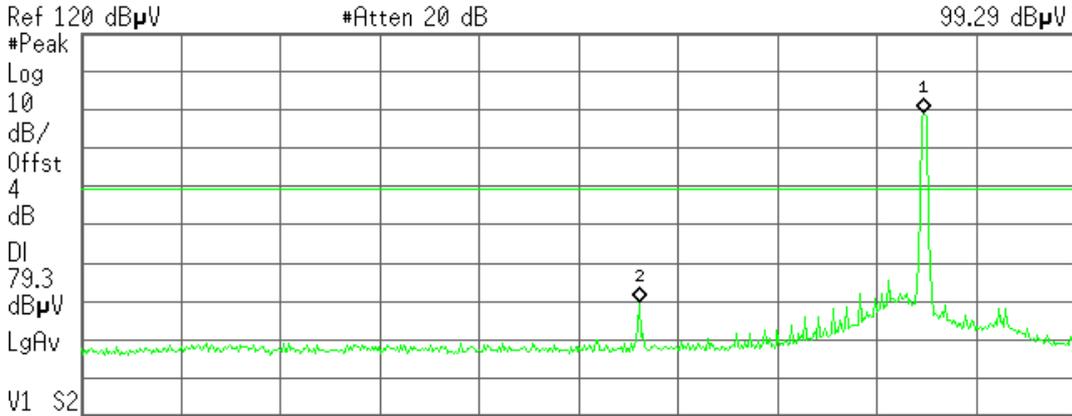


CH High (30MHz ~ 2.9GHz)

Agilent 17:08:27 Jul 1, 2010

R T

Mkr1 2.460 GHz
99.29 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.460 GHz	99.29 dBμU
2	(1)	Freq	1.642 GHz	49.71 dBμU

2.9GHz ~ 26.5GHz

Agilent 17:09:17 Jul 1, 2010

R T

Mkr2 4.91 GHz
42.91 dBμV



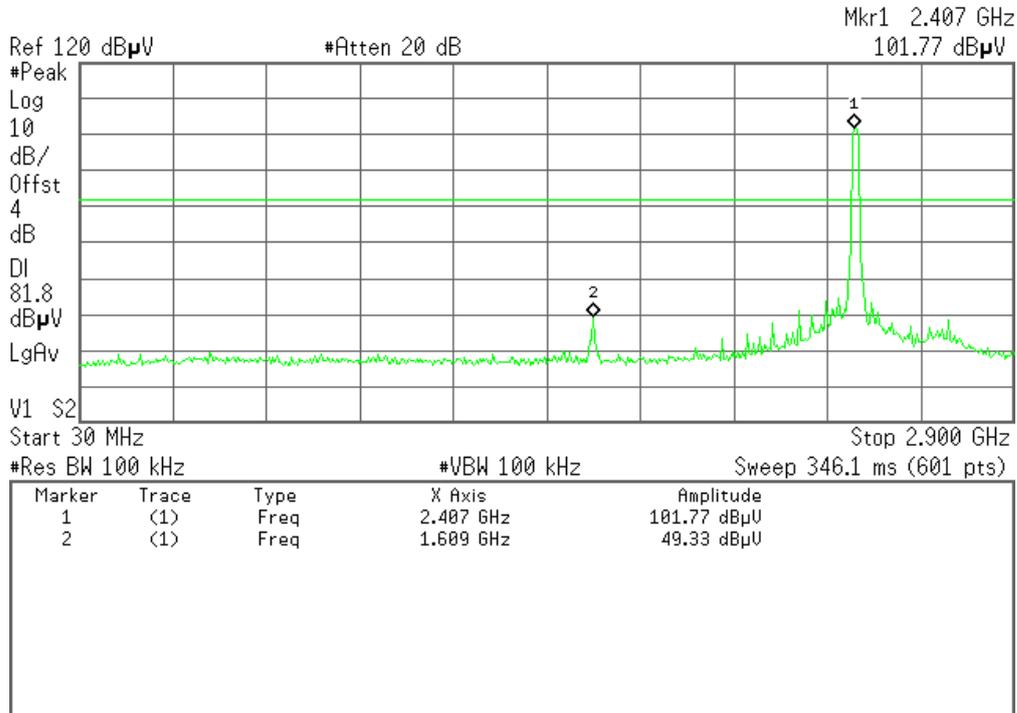
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	3.29 GHz	48.73 dBμU
2	(1)	Freq	4.91 GHz	42.91 dBμU



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

Agilent 17:14:27 Jul 1, 2010

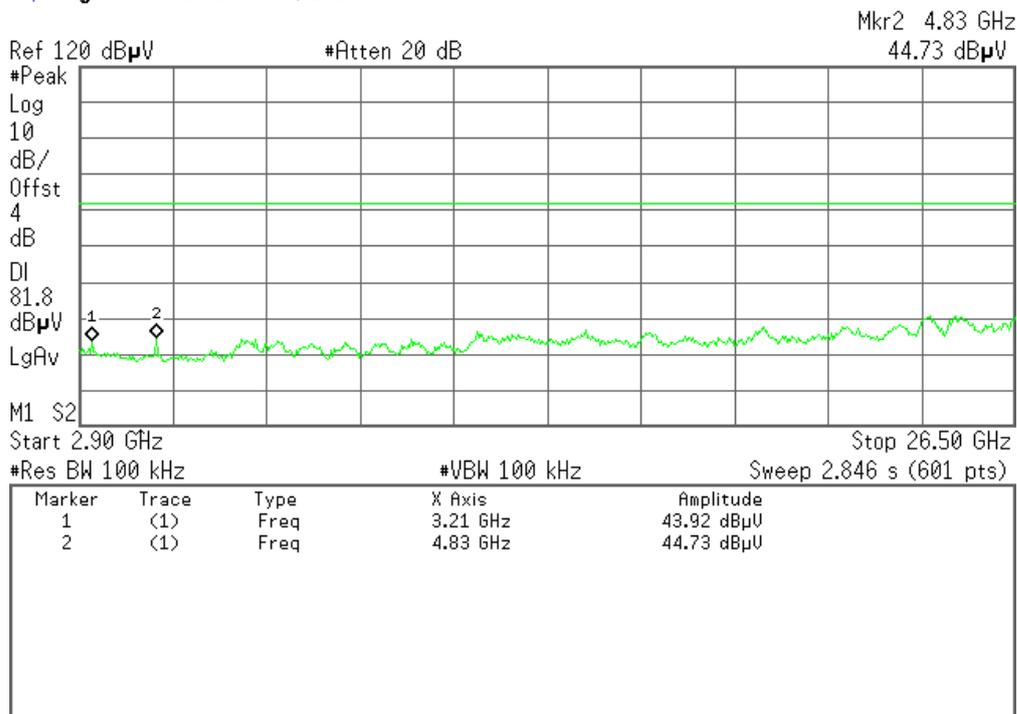
R T



(2.9MHz ~26.5GHz)

Agilent 17:15:35 Jul 1, 2010

R T

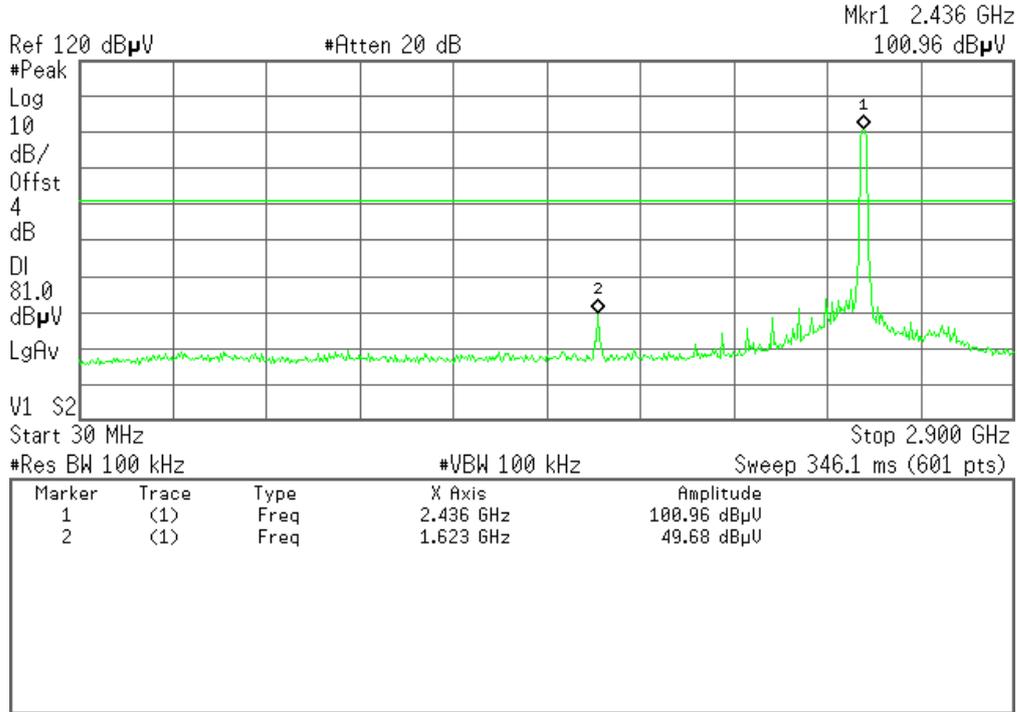




CH Mid(30MHz ~ 2.9GHz)

Agilent 17:16:26 Jul 1, 2010

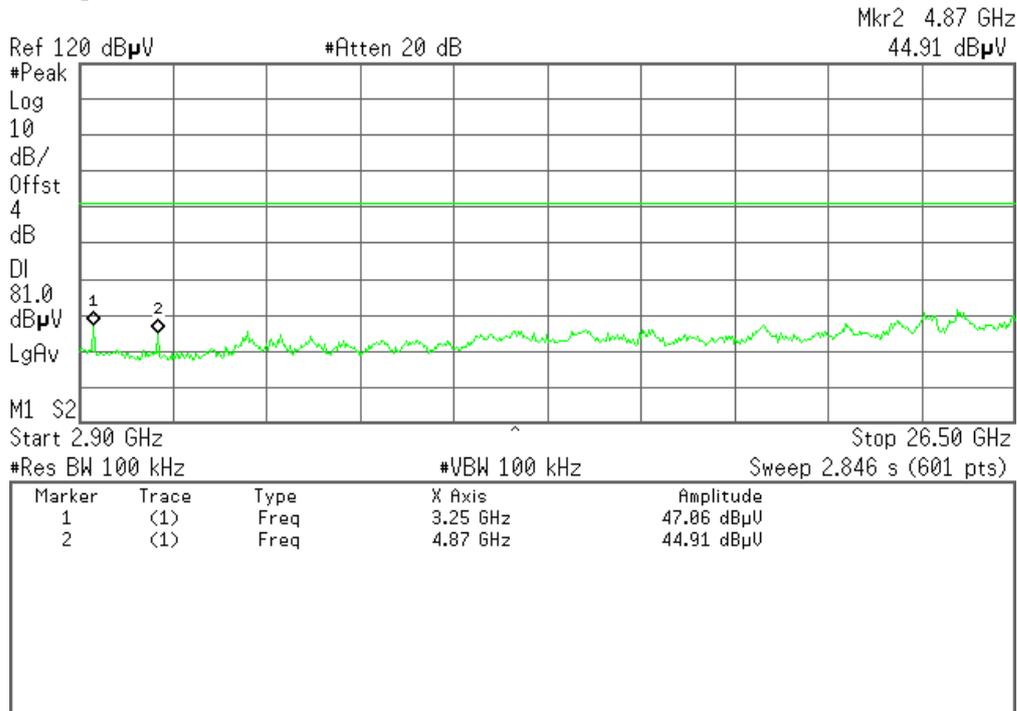
R T



2.9GHz ~ 26.5GHz

Agilent 17:17:07 Jul 1, 2010

R T





CH High (30MHz ~ 2.9GHz)

Agilent 17:18:14 Jul 1, 2010

R T

Mkr2 1.642 GHz
50.55 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	99.32 dBμU
2	(1)	Freq	1.642 GHz	50.55 dBμU

2.9GHz ~ 26.5GHz

Agilent 17:19:04 Jul 1, 2010

R T

Mkr1 3.29 GHz
48.82 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	48.82 dBμU
2	(1)	Freq	4.91 GHz	42.74 dBμU



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

Agilent 16:52:04 Jul 1, 2010

R T

Mkr3 2.522 GHz
56.04 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	2.412 GHz	97.82 dBμV
2	(1)	Freq	1.613 GHz	47.31 dBμV
3	(1)	Freq	2.522 GHz	56.04 dBμV

(2.9MHz ~26.5GHz)

Agilent 16:53:42 Jul 1, 2010

R T

Mkr2 7.11 GHz
44.25 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	3.21 GHz	45.15 dBμV
2	(1)	Freq	7.11 GHz	44.25 dBμV

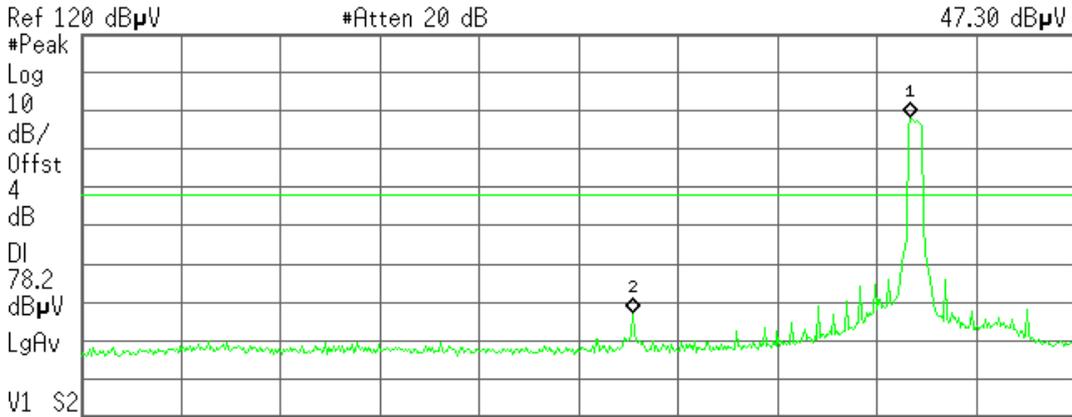


CH Mid(30MHz ~ 2.9GHz)

Agilent 16:55:08 Jul 1, 2010

R T

Mkr2 1.623 GHz
47.30 dBµV



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

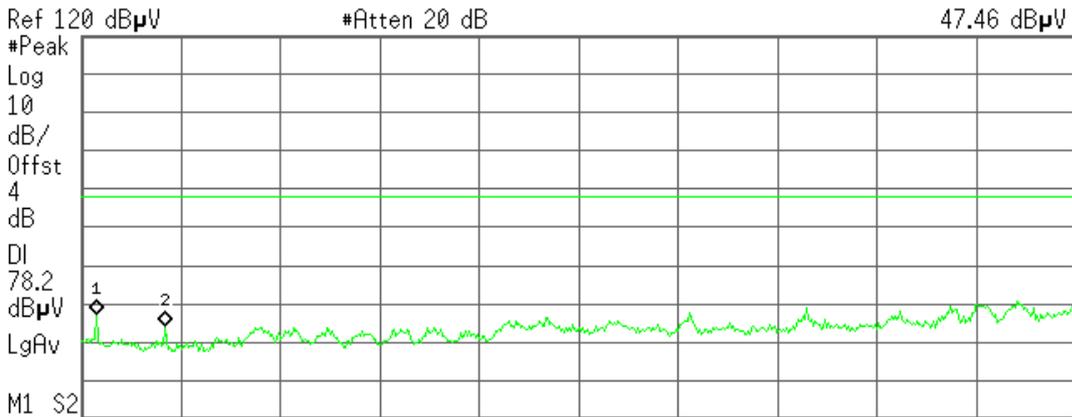
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.422 GHz	98.19 dBµU
2	(1)	Freq	1.623 GHz	47.30 dBµU

2.9GHz ~ 26.5GHz

Agilent 16:55:56 Jul 1, 2010

R T

Mkr1 3.25 GHz
47.46 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	47.46 dBµU
2	(1)	Freq	4.87 GHz	44.02 dBµU

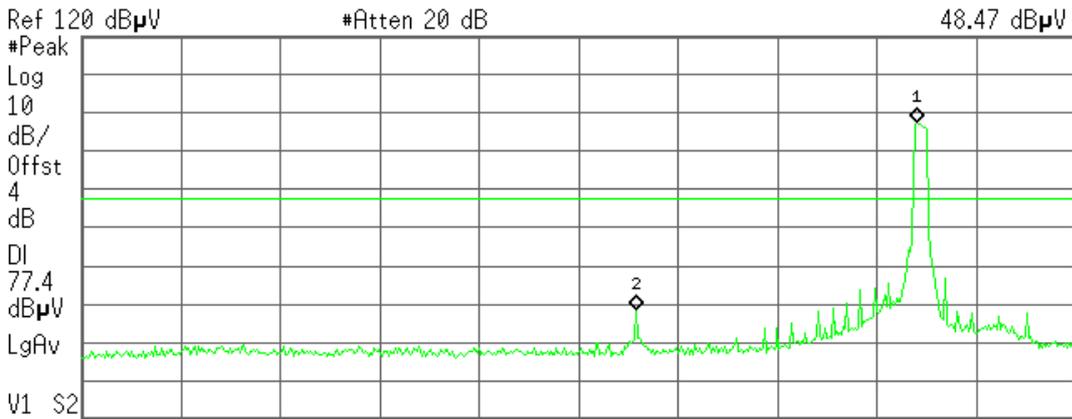


CH High (30MHz ~ 2.9GHz)

Agilent 16:57:21 Jul 1, 2010

R T

Mkr2 1.632 GHz
48.47 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	2.441 GHz	97.37 dBμU
2	(1)	Freq	1.632 GHz	48.47 dBμU

2.9GHz ~ 26.5GHz

Agilent 16:58:06 Jul 1, 2010

R T

Mkr1 3.25 GHz
48.61 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	48.61 dBμU
2	(1)	Freq	4.91 GHz	41.85 dBμU



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

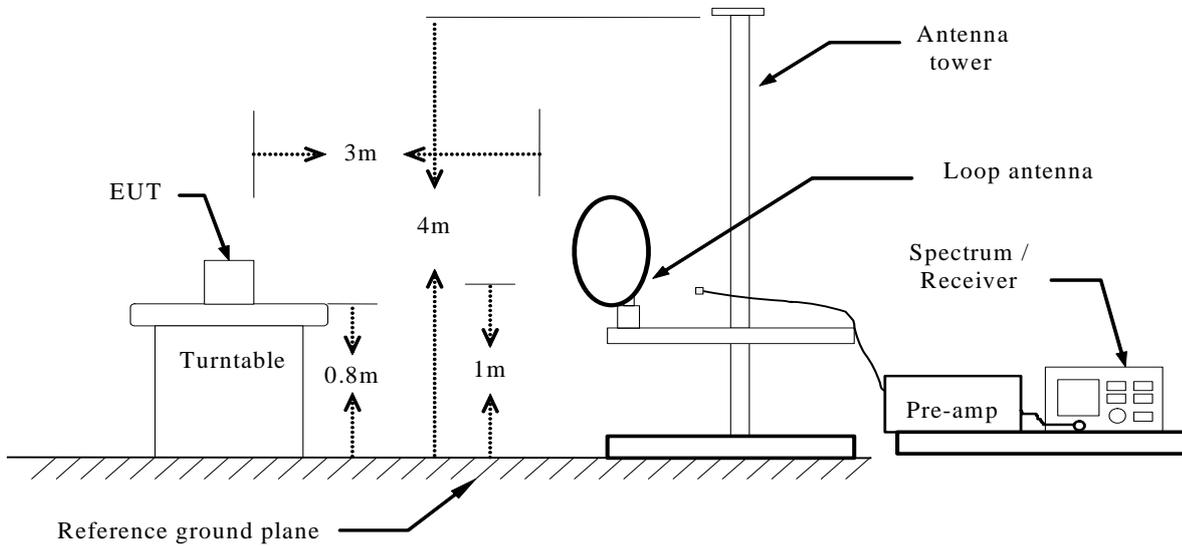
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The FCC Site Registration number is 101879.
 3. N.C.R = No Calibration Required.

7.2.5.3. TEST PROCEDURE (please refer to measurement standard)

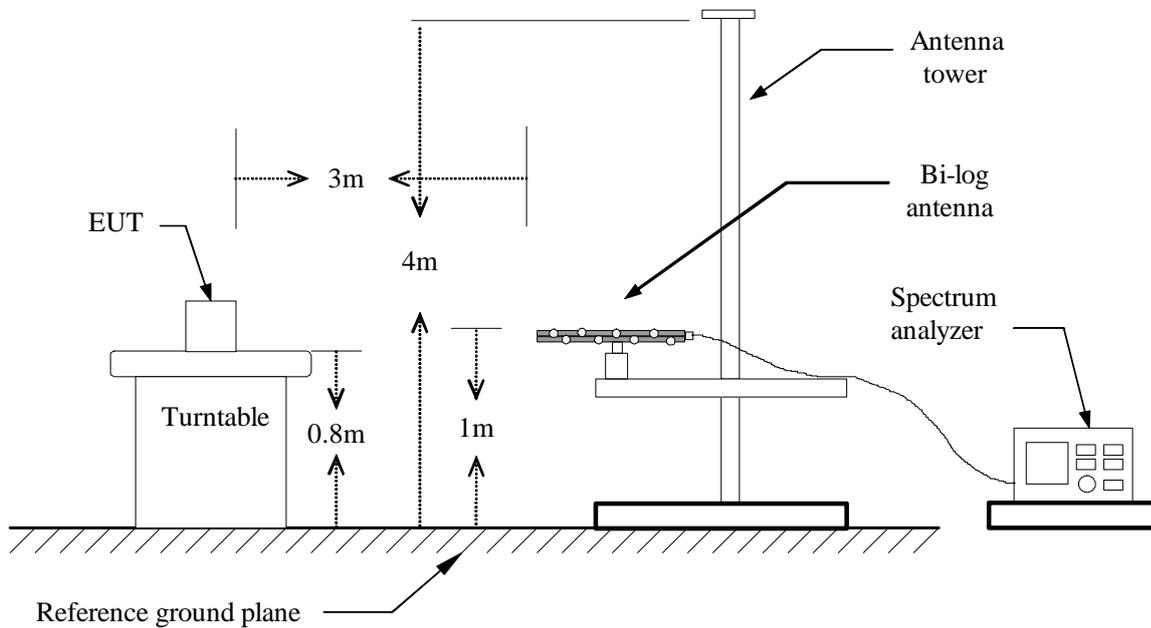
- The EUT is placed on a turntable, which is 0.8m above ground plane.
- The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Maximum procedure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

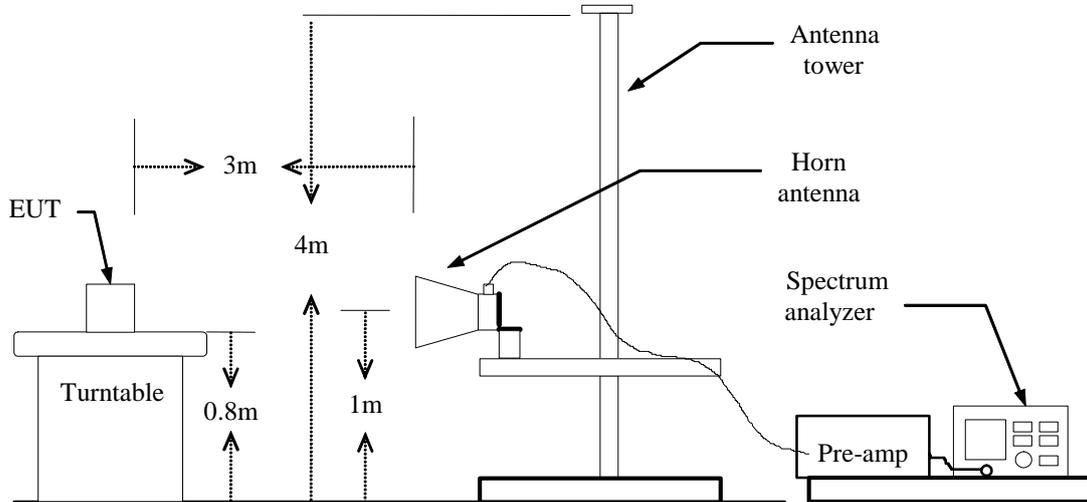
Below 30MHz



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

Test Date: July 01, 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)
36.750	V	Peak	47.86	-16.73	31.13	40.00	-8.87
106.500	V	Peak	52.47	-20.10	32.37	43.50	-11.13
250.050	V	Peak	50.22	-16.43	33.79	46.00	-12.21
319.833	V	Peak	51.60	-13.91	37.69	46.00	-8.31
499.500	V	Peak	48.42	-9.26	39.16	46.00	-6.84
746.833	V	Peak	44.01	-4.78	39.23	46.00	-6.77
37.200	H	Peak	46.42	-17.03	29.39	40.00	-10.61
106.500	H	Peak	60.46	-20.10	40.36	43.50	-3.14
250.050	H	Peak	58.32	-16.43	41.89	46.00	-4.11
319.833	H	QP	57.08	-13.91	43.17	46.00	-2.83
499.500	H	Peak	48.29	-9.26	39.03	46.00	-6.97
746.833	H	Peak	46.09	-4.78	41.31	46.00	-4.69

****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).



Above 1 GHz

Operation Mode: TX / IEEE 802.11b / CH Low

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)				
1600.000	V	57.78	---	-8.63	49.15	---	74.00	54.00	-4.85	Peak
1633.333	V	57.60	---	-8.36	49.24	---	74.00	54.00	-4.76	Peak
2256.666	V	50.41	---	-4.44	45.97	---	74.00	54.00	-8.03	Peak
4825.000	V	49.21	---	2.68	51.89	---	74.00	54.00	-2.11	Peak
N/A										
1606.666	H	56.11	---	-8.58	47.53	---	74.00	54.00	-6.47	Peak
2160.000	H	52.00	---	-4.83	47.17	---	74.00	54.00	-6.83	Peak
2240.000	H	54.48	---	-4.51	49.97	---	74.00	54.00	-4.03	Peak
4825.000	H	56.84	50.44	2.68	59.52	53.12	74.00	54.00	-0.88	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 01, 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)				
1196.666	V	55.03	---	-11.09	43.94	---	74.00	54.00	-10.06	Peak
1600.000	V	53.26	---	-8.63	44.63	---	74.00	54.00	-9.37	Peak
2120.000	V	49.83	---	-4.98	44.85	---	74.00	54.00	-9.15	Peak
4875.000	V	48.71	---	2.77	51.48	---	74.00	54.00	-2.52	Peak
N/A										
1623.333	H	52.58	---	-8.58	44.00	---	74.00	54.00	-10.00	Peak
1963.333	H	50.48	---	-4.83	45.65	---	74.00	54.00	-8.35	Peak
2160.000	H	52.05	---	-4.51	47.54	---	74.00	54.00	-6.46	Peak
4875.000	H	55.70	49.41	2.77	58.47	52.18	74.00	54.00	-1.82	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 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)				
1103.333	V	58.03	---	-11.60	46.43	---	74.00	54.00	-7.57	Peak
1600.000	V	58.32	---	-8.63	49.69	---	74.00	54.00	-4.31	Peak
1633.333	V	58.61	---	-8.36	50.25	---	74.00	54.00	-3.75	Peak
4925.000	V	54.84	48.50	2.85	57.69	51.35	74.00	54.00	-2.65	AVG.
N/A										
1600.000	H	51.42	---	-8.63	42.79	---	74.00	54.00	-11.21	Peak
1916.666	H	50.96	---	-6.12	44.84	---	74.00	54.00	-9.16	Peak
2160.000	H	52.16	---	-4.83	47.33	---	74.00	54.00	-6.67	Peak
4925.000	H	55.17	49.25	2.85	58.02	52.10	74.00	54.00	-1.90	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 802.11g / CH Low

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)				
1593.333	V	55.25	---	-8.68	46.57	---	74.00	54.00	-7.43	Peak
1920.000	V	50.12	---	-6.09	44.03	---	74.00	54.00	-9.97	Peak
2163.333	V	49.55	---	-4.81	44.74	---	74.00	54.00	-9.26	Peak
4816.666	V	55.31	42.96	2.66	57.97	45.62	74.00	54.00	-8.38	AVG.
N/A										
1596.666	H	52.91	---	-8.65	44.26	---	74.00	54.00	-9.74	Peak
1803.333	H	51.84	---	-7.02	44.82	---	74.00	54.00	-9.18	Peak
1980.000	H	50.23	---	-5.62	44.61	---	74.00	54.00	-9.39	Peak
4825.000	H	60.38	46.66	2.68	63.06	49.34	74.00	54.00	-4.66	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 802.11g / CH Mid

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)				
1730.000	V	50.54	---	-7.60	42.94	---	74.00	54.00	-11.06	Peak
2060.000	V	49.64	---	-5.22	44.42	---	74.00	54.00	-9.58	Peak
2266.666	V	50.46	---	-4.40	46.06	---	74.00	54.00	-7.94	Peak
4875.000	V	57.20	45.87	2.77	59.97	48.64	74.00	54.00	-5.36	AVG.
N/A										
1416.666	H	50.20	---	-9.88	40.32	---	74.00	54.00	-13.68	Peak
1623.333	H	53.91	---	-8.44	45.47	---	74.00	54.00	-8.53	Peak
1920.000	H	51.17	---	-6.09	45.08	---	74.00	54.00	-8.92	Peak
4875.000	H	57.87	45.37	2.77	60.64	48.14	74.00	54.00	-5.86	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 802.11g / 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)				
1063.333	V	55.61	---	-11.82	43.79	---	74.00	54.00	-10.21	Peak
1640.000	V	52.16	---	-8.31	43.85	---	74.00	54.00	-10.15	Peak
2100.000	V	50.93	---	-5.06	45.87	---	74.00	54.00	-8.13	Peak
4925.000	V	56.97	44.53	2.85	59.82	47.38	74.00	54.00	-6.62	AVG.
N/A										
1066.666	H	54.06	---	-11.80	42.26	---	74.00	54.00	-11.74	Peak
1640.000	H	54.14	---	-8.31	45.83	---	74.00	54.00	-8.17	Peak
2120.000	H	50.81	---	-4.98	45.83	---	74.00	54.00	-8.17	Peak
4925.000	H	56.80	45.27	2.85	59.65	48.12	74.00	54.00	-5.88	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 802.11n HT20 MHz / CH Low 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)				
1063.333	V	54.61	---	-11.82	42.79	---	74.00	54.00	-11.21	Peak
1600.000	V	58.39	---	-8.63	49.76	---	74.00	54.00	-4.24	Peak
1920.000	V	51.91	---	-6.09	45.82	---	74.00	54.00	-8.18	Peak
4825.000	V	58.93	44.71	2.68	61.61	47.39	74.00	54.00	-6.61	AVG.
N/A										
1606.666	H	53.19	---	-8.58	44.61	---	74.00	54.00	-9.39	Peak
1890.000	H	49.79	---	-6.33	43.46	---	74.00	54.00	-10.54	Peak
2200.000	H	52.36	---	-4.67	47.69	---	74.00	54.00	-6.31	Peak
4825.000	H	60.33	47.01	2.68	63.01	49.69	74.00	54.00	-4.31	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 802.11n HT20 MHz / CH Mid 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)				
1463.333	V	55.21	---	-9.62	45.59	---	74.00	54.00	-8.41	Peak
1603.333	V	54.46	---	-8.60	45.86	---	74.00	54.00	-8.14	Peak
2006.666	V	49.03	---	-5.43	43.60	---	74.00	54.00	-10.40	Peak
4866.666	V	57.03	44.94	2.75	59.78	47.69	74.00	54.00	-6.31	AVG.
N/A										
1623.333	H	54.26	---	-8.44	45.82	---	74.00	54.00	-8.18	Peak
1920.000	H	50.74	---	-6.09	44.65	---	74.00	54.00	-9.35	Peak
2200.000	H	52.80	---	-4.67	48.13	---	74.00	54.00	-5.87	Peak
4875.000	H	58.52	45.31	2.77	61.29	48.08	74.00	54.00	-5.92	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 802.11n HT20 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)				
1063.333	V	56.81	---	-11.82	44.99	---	74.00	54.00	-9.01	Peak
1596.666	V	53.81	---	-8.65	45.16	---	74.00	54.00	-8.84	Peak
2216.666	V	50.58	---	-4.60	45.98	---	74.00	54.00	-8.02	Peak
4916.666	V	58.17	45.50	2.84	61.01	48.34	74.00	54.00	-5.66	AVG.
N/A										
1640.000	H	54.62	---	-8.31	46.31	---	74.00	54.00	-7.69	Peak
1920.000	H	50.86	---	-6.09	44.77	---	74.00	54.00	-9.23	Peak
2200.000	H	53.28	---	-4.67	48.61	---	74.00	54.00	-5.39	Peak
4925.000	H	60.21	46.83	2.85	63.06	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 802.11n HT40 MHz / CH Low **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)				
1623.333	V	52.05	---	-8.44	43.61	---	74.00	54.00	-10.39	Peak
1920.000	V	51.30	---	-6.09	45.21	---	74.00	54.00	-8.79	Peak
2240.000	V	53.20	---	-4.51	48.69	---	74.00	54.00	-5.31	Peak
4850.000	V	56.20	40.24	2.72	58.92	42.96	74.00	54.00	-11.04	AVG.
N/A										
1600.000	H	52.16	---	-8.63	43.53	---	74.00	54.00	-10.47	Peak
1920.000	H	51.33	---	-6.09	45.24	---	74.00	54.00	-8.76	Peak
2190.000	H	50.91	---	-4.71	46.20	---	74.00	54.00	-7.80	Peak
4850.000	H	55.77	40.56	2.72	58.49	43.28	74.00	54.00	-10.72	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 802.11n HT40 MHz / CH Mid **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)				
1063.333	V	55.02	---	-11.82	43.20	---	74.00	54.00	-10.80	Peak
1200.000	V	55.39	---	-11.07	44.32	---	74.00	54.00	-9.68	Peak
1626.666	V	54.57	---	-8.42	46.15	---	74.00	54.00	-7.85	Peak
4866.666	V	51.89	37.49	2.75	54.64	40.24	74.00	54.00	-13.76	AVG.
N/A										
1463.333	H	53.01	---	-9.62	43.39	---	74.00	54.00	-10.61	Peak
1920.000	H	51.23	---	-6.09	45.14	---	74.00	54.00	-8.86	Peak
2160.000	H	52.32	---	-4.83	47.49	---	74.00	54.00	-6.51	Peak
4866.666	H	56.20	40.45	2.75	58.95	43.20	74.00	54.00	-10.80	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 802.11n 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)				
1240.000	V	57.20	---	-10.85	46.35	---	74.00	54.00	-7.65	Peak
1910.000	V	55.14	---	-6.17	48.97	---	74.00	54.00	-5.03	Peak
2136.666	V	50.53	---	-4.92	45.61	---	74.00	54.00	-8.39	Peak
4900.000	V	56.51	38.81	2.81	59.32	41.62	74.00	54.00	-12.38	AVG.
N/A										
1573.333	H	50.74	---	-8.84	41.90	---	74.00	54.00	-12.10	Peak
1636.666	H	49.70	---	-8.34	41.36	---	74.00	54.00	-12.64	Peak
1910.000	H	49.91	---	-6.17	43.74	---	74.00	54.00	-10.26	Peak
4900.000	H	55.38	38.86	2.81	58.19	41.67	74.00	54.00	-12.33	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).



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.

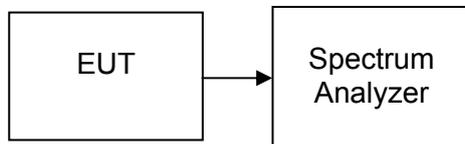
7.3.2. TEST INSTRUMENTS

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	11131	>500	PASS
Mid	2437	12075		PASS
High	2462	11144		PASS

Test Data

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	15534	>500	PASS
Mid	2437	15504		PASS
High	2462	15465		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16914	>500	PASS
Mid	2437	16543		PASS
High	2462	16658		PASS

Test Data

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2422	35427	>500	PASS
Mid	2437	35248		PASS
High	2452	35510		PASS



Test Plot

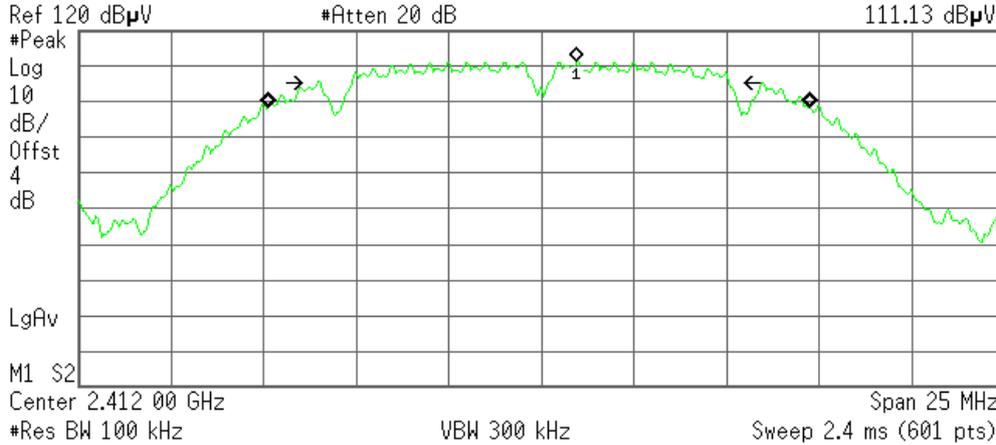
(IEEE 802.11b mode)

6dB Bandwidth (CH Low)

Agilent 15:38:41 Jul 1, 2010

R T

Mkr1 2.412 96 GHz
111.13 dBμV



Occupied Bandwidth
14.6348 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

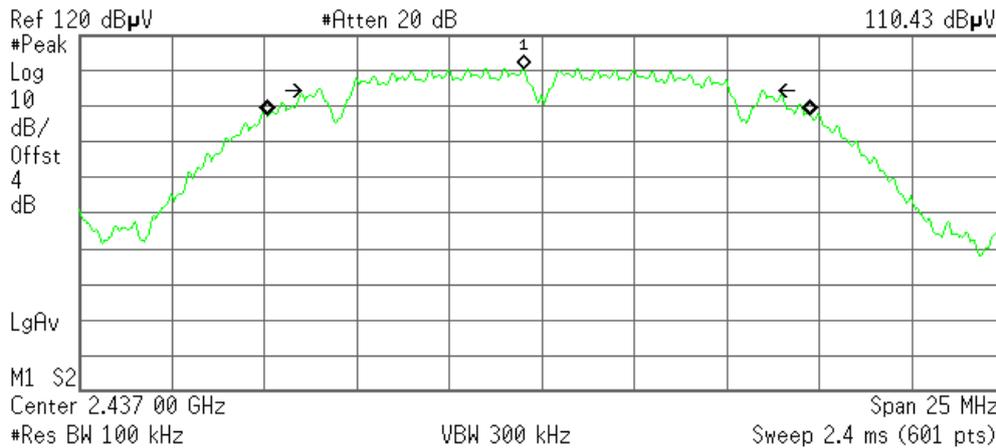
Transmit Freq Error -68.926 kHz
x dB Bandwidth 11.131 MHz

6dB Bandwidth (CH Mid)

Agilent 15:44:13 Jul 1, 2010

R T

Mkr1 2.436 50 GHz
110.43 dBμV



Occupied Bandwidth
14.6349 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -86.154 kHz
x dB Bandwidth 12.075 MHz

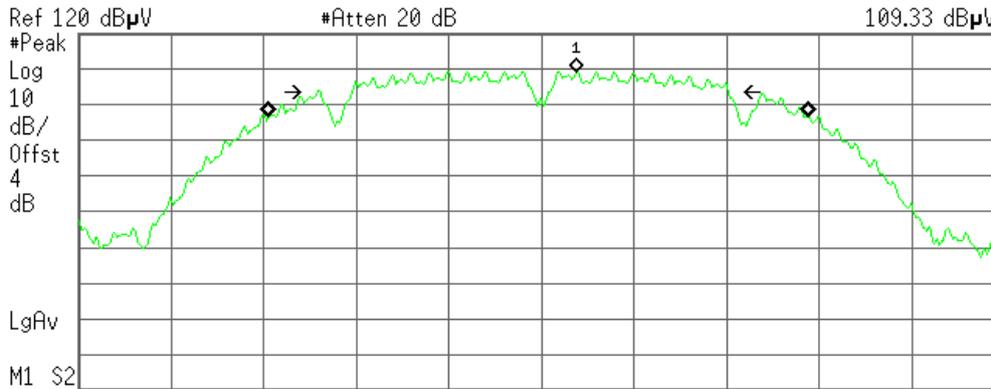


6dB Bandwidth (CH High)

Agilent 15:48:37 Jul 1, 2010

R T

Mkr1 2.462 96 GHz
109.33 dBμV



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

Occupied Bandwidth
14.5948 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -74.447 kHz
x dB Bandwidth 11.144 MHz

(IEEE 802.11g mode)

6dB Bandwidth (CH Low)

Agilent 15:39:47 Jul 1, 2010

R T

Mkr1 2.413 21 GHz
106.28 dBμV



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

Occupied Bandwidth
16.3026 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -28.089 kHz
x dB Bandwidth 15.534 MHz

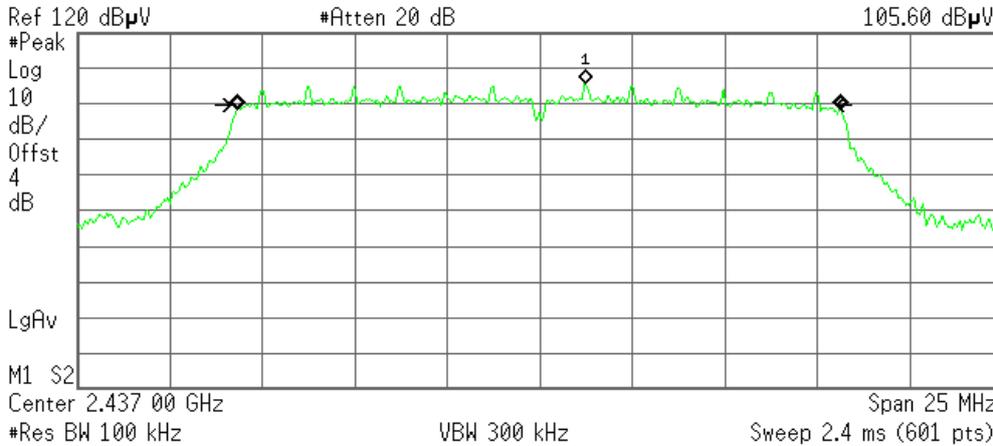


6dB Bandwidth (CH Mid)

Agilent 15:42:11 Jul 1, 2010

R T

Mkr1 2.438 25 GHz
105.60 dBμV



Occupied Bandwidth
16.3051 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

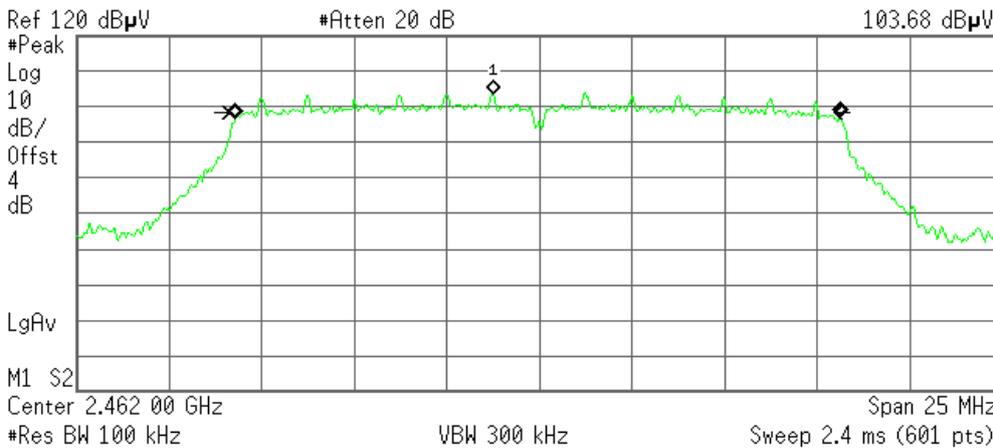
Transmit Freq Error -32.476 kHz
x dB Bandwidth 15.504 MHz

6dB Bandwidth (CH High)

Agilent 15:47:59 Jul 1, 2010

R T

Mkr1 2.460 75 GHz
103.68 dBμV



Occupied Bandwidth
16.3122 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -37.699 kHz
x dB Bandwidth 15.465 MHz



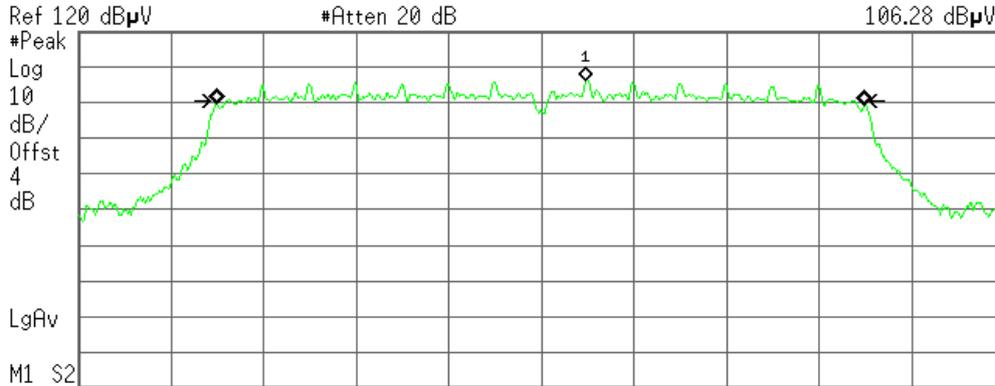
(IEEE 802.11n HT20 MHz mode)

6dB Bandwidth (CH Low)

Agilent 15:40:34 Jul 1, 2010

R T

Mkr1 2.413 21 GHz
106.28 dBμV



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

Occupied Bandwidth
17.4836 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

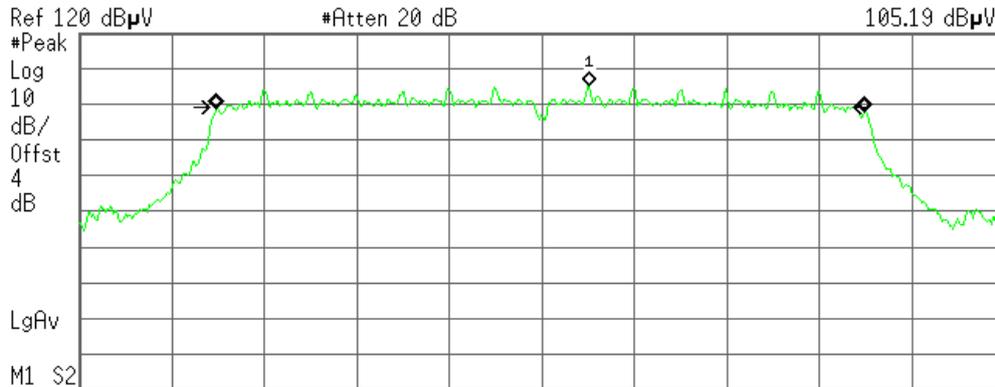
Transmit Freq Error -27.077 kHz
x dB Bandwidth 16.914 MHz

6dB Bandwidth (CH Mid)

Agilent 15:41:23 Jul 1, 2010

R T

Mkr1 2.438 29 GHz
105.19 dBμV



Center 2.437 00 GHz Span 25 MHz
#Res BW 100 kHz VBW 300 kHz Sweep 2.4 ms (601 pts)

Occupied Bandwidth
17.4906 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -35.331 kHz
x dB Bandwidth 16.543 MHz

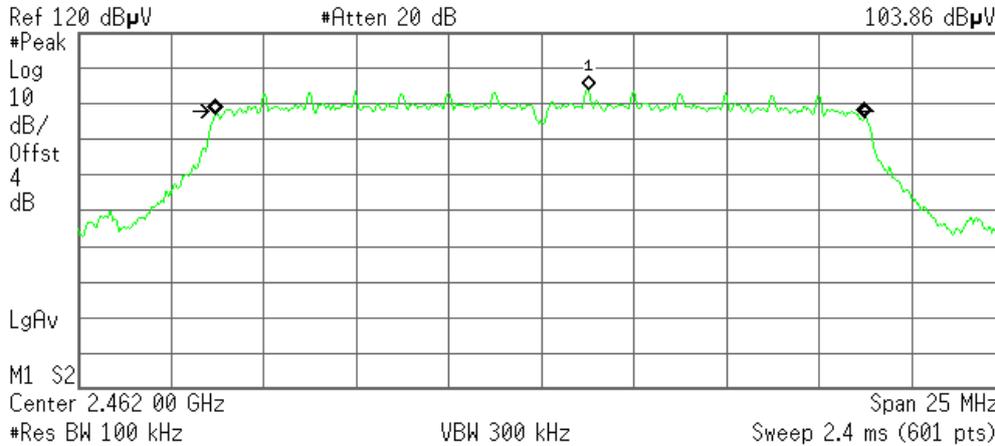


6dB Bandwidth (CH High)

Agilent 15:46:40 Jul 1, 2010

R T

Mkr1 2.463 29 GHz
103.86 dBμV



Occupied Bandwidth
17.4831 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -34.116 kHz
x dB Bandwidth 16.658 MHz

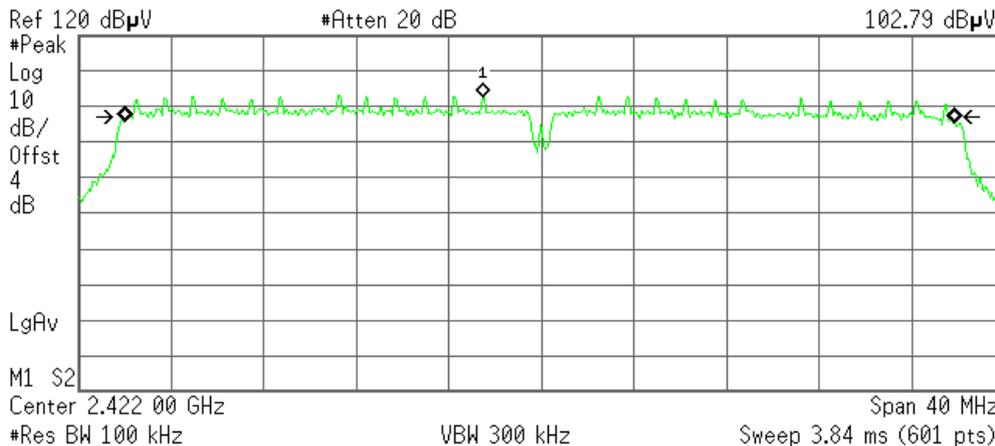
(IEEE 802.11n HT40 MHz mode)

6dB Bandwidth (CH Low)

Agilent 15:52:11 Jul 1, 2010

R T

Mkr1 2.419 47 GHz
102.79 dBμV



Occupied Bandwidth
35.8431 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -62.238 kHz
x dB Bandwidth 35.427 MHz

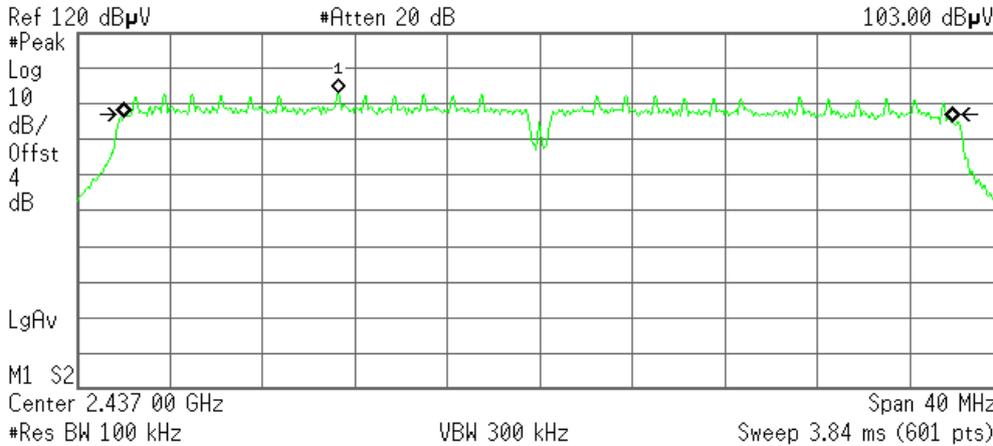


6dB Bandwidth (CH Mid)

Agilent 15:51:25 Jul 1, 2010

R T

Mkr1 2.428 27 GHz
103.00 dBμV



Occupied Bandwidth
35.8452 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

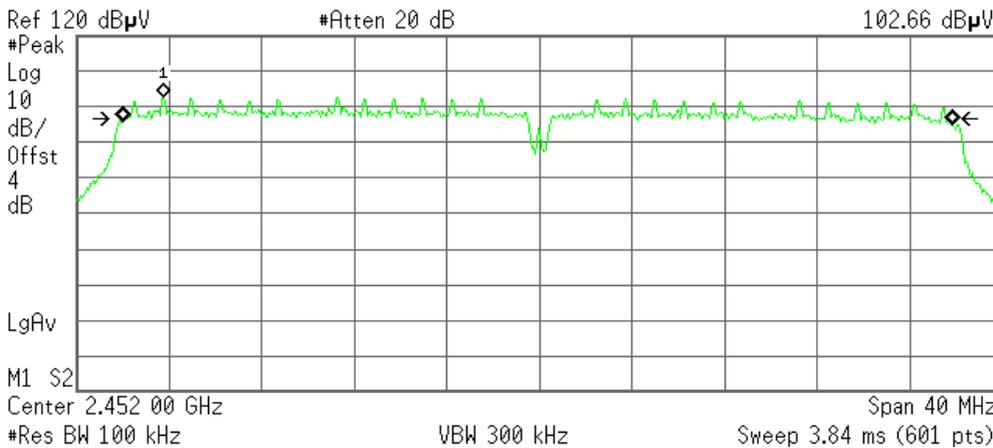
Transmit Freq Error -86.095 kHz
x dB Bandwidth 35.248 MHz

6dB Bandwidth (CH High)

Agilent 15:50:41 Jul 1, 2010

R T

Mkr1 2.435 73 GHz
102.66 dBμV



Occupied Bandwidth
35.8525 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -82.825 kHz
x dB Bandwidth 35.510 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.

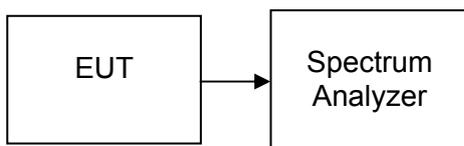
7.4.2. TEST INSTRUMENTS

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 ≥ 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	16.74	0.04721	1	PASS
Mid	2437	15.76	0.03767		PASS
High	2462	14.62	0.02897		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	12.50	0.01778	1	PASS
Mid	2437	11.59	0.01442		PASS
High	2462	10.53	0.01130		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	12.71	0.01866	1	PASS
Mid	2437	11.65	0.01462		PASS
High	2462	10.47	0.01114		PASS

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	12.30	0.01698	1	PASS
Mid	2437	12.20	0.01660		PASS
High	2452	11.74	0.01493		PASS



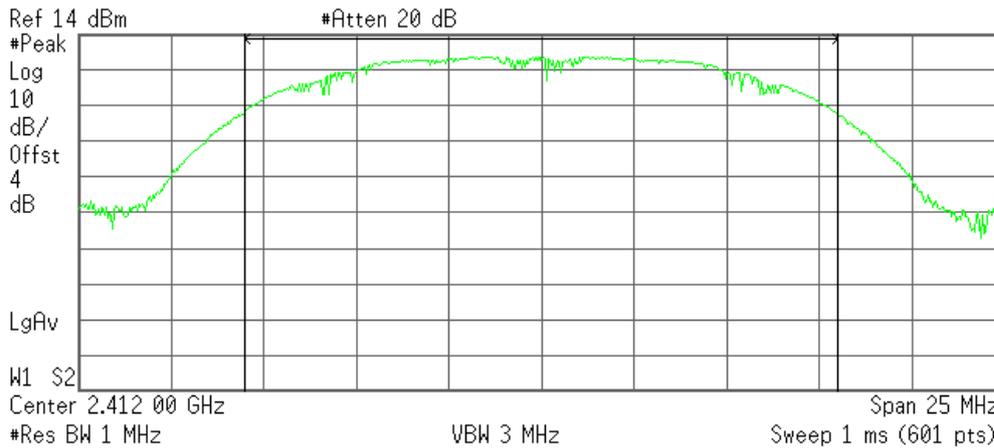
Test Plot

(IEEE 802.11b mode)

Peak power (CH Low)

Agilent 16:00:17 Jul 1, 2010

R T



Channel Power

16.74 dBm /16.0000 MHz

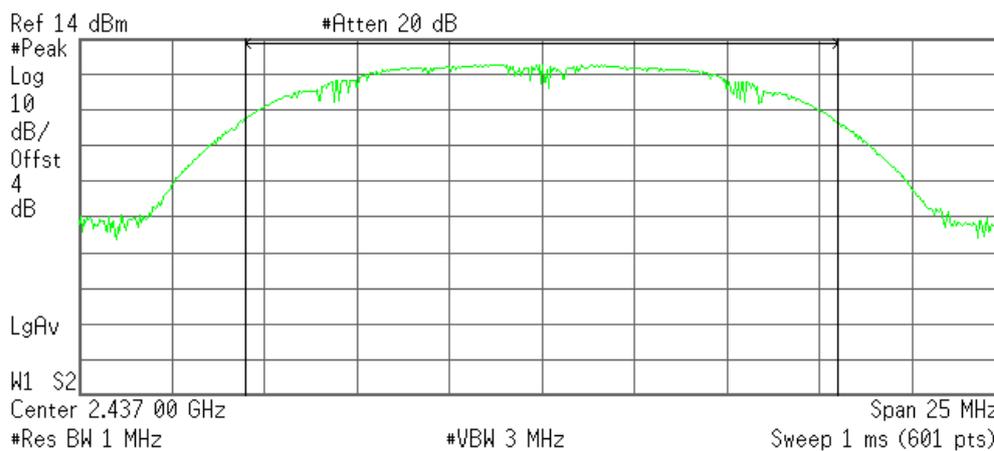
Power Spectral Density

-55.30 dBm/Hz

Peak power (CH Mid)

Agilent 16:01:35 Jul 1, 2010

R T



Channel Power

15.76 dBm /16.0000 MHz

Power Spectral Density

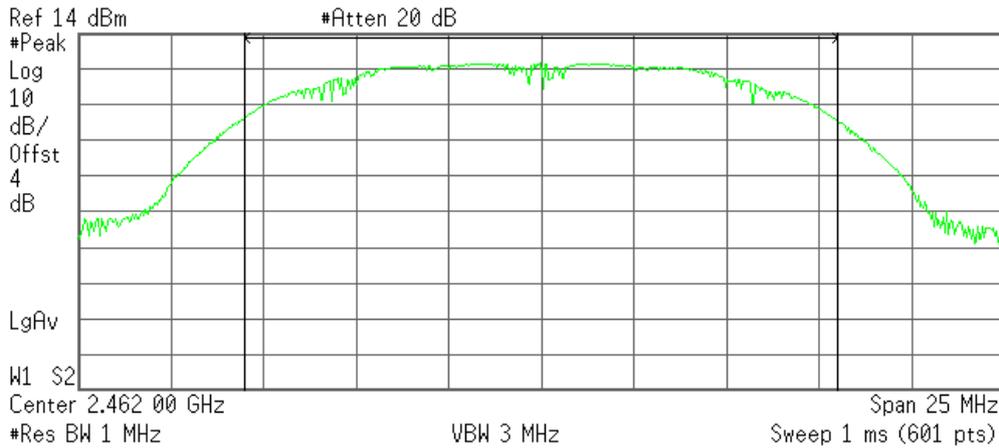
-56.28 dBm/Hz



Peak power (CH High)

Agilent 16:02:24 Jul 1, 2010

R T



Channel Power

14.62 dBm /16.0000 MHz

Power Spectral Density

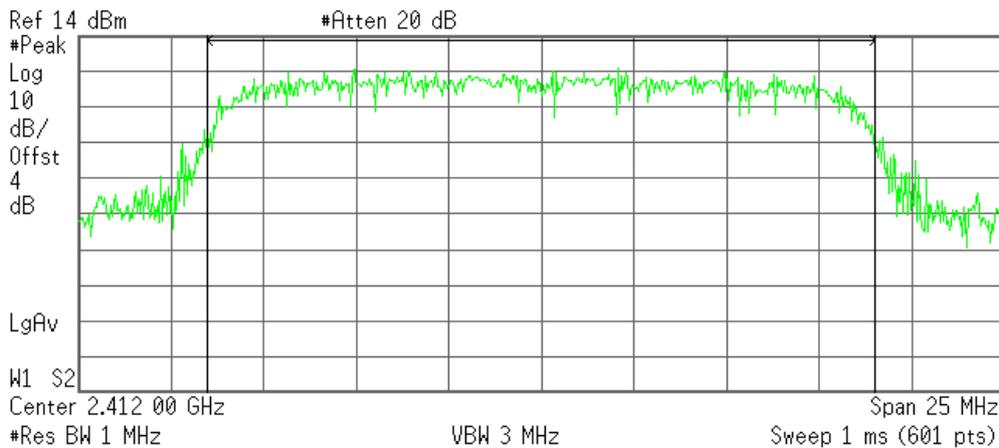
-57.42 dBm/Hz

(IEEE 802.11g mode)

Peak power (CH Low)

Agilent 16:06:47 Jul 1, 2010

R T



Channel Power

12.50 dBm /18.0000 MHz

Power Spectral Density

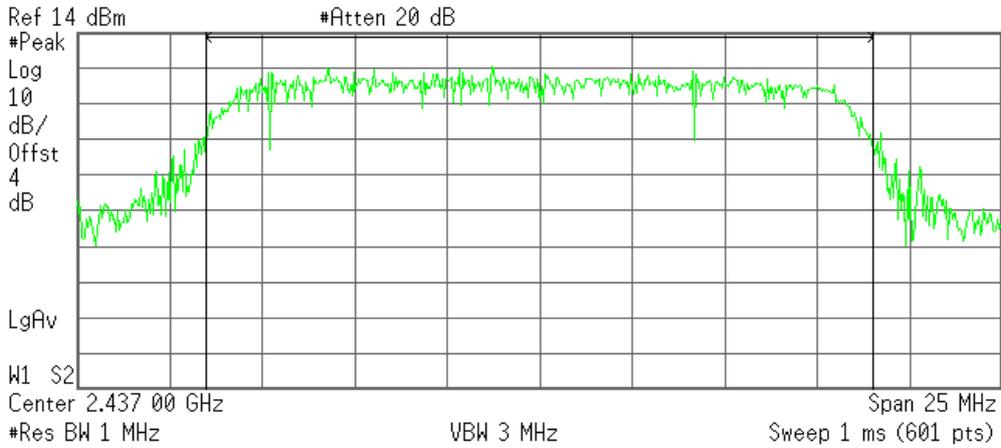
-60.05 dBm/Hz



Peak power (CH Mid)

Agilent 16:07:58 Jul 1, 2010

R T



Channel Power

11.59 dBm /18.0000 MHz

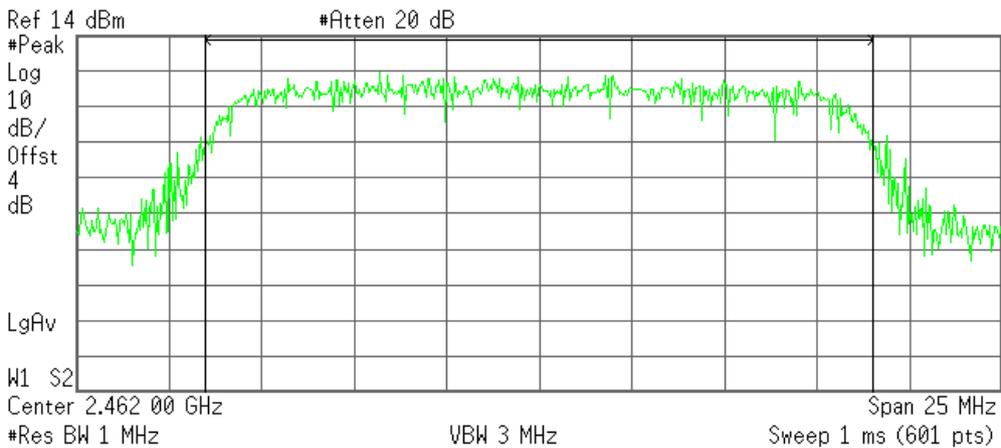
Power Spectral Density

-60.96 dBm/Hz

Peak power (CH High)

Agilent 16:08:46 Jul 1, 2010

R T



Channel Power

10.53 dBm /18.0000 MHz

Power Spectral Density

-62.02 dBm/Hz

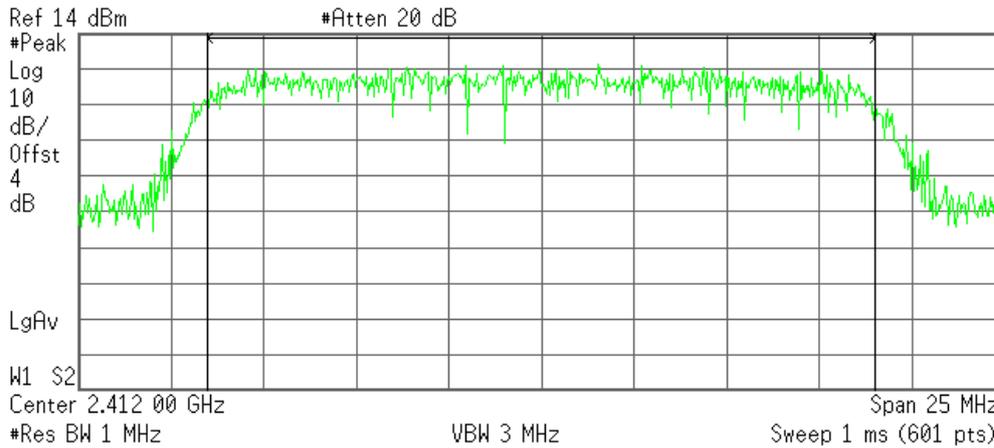


(IEEE 802.11n HT20 MHz mode)

Peak power (CH Low)

Agilent 16:11:20 Jul 1, 2010

R T



Channel Power

12.71 dBm /18.0000 MHz

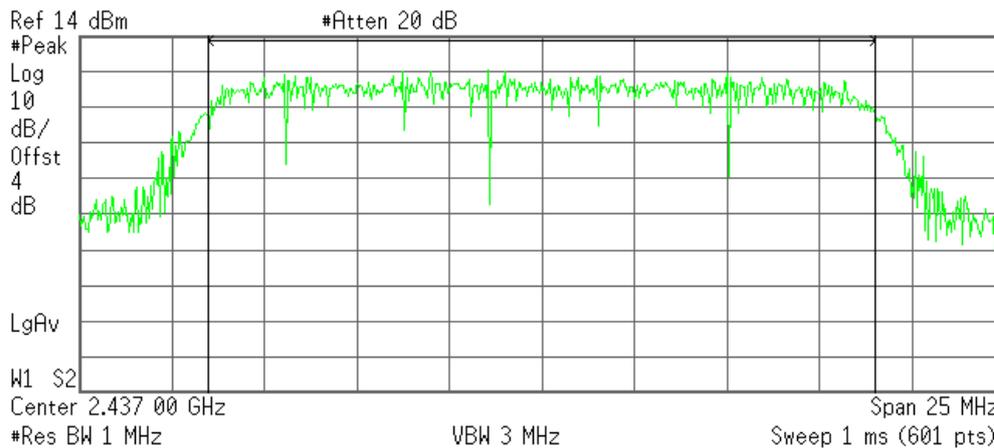
Power Spectral Density

-59.84 dBm/Hz

Peak power (CH Mid)

Agilent 16:10:39 Jul 1, 2010

R T



Channel Power

11.65 dBm /18.0000 MHz

Power Spectral Density

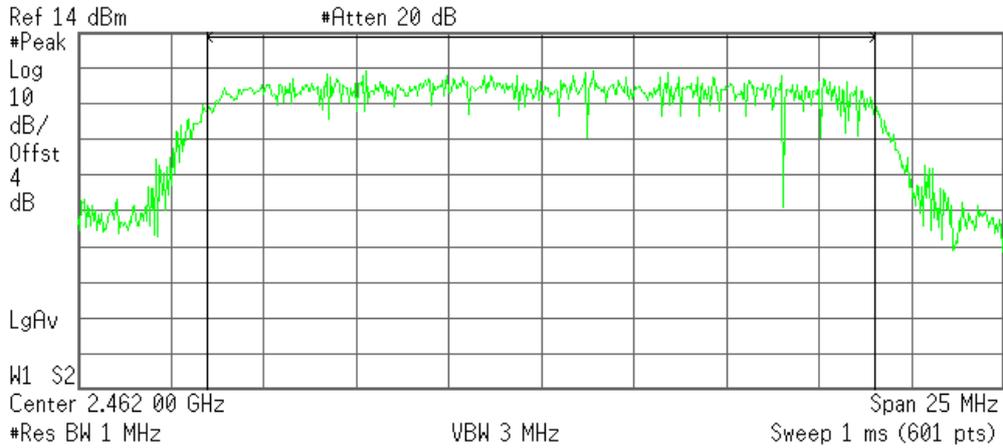
-60.90 dBm/Hz



Peak power (CH High)

* Agilent 16:09:38 Jul 1, 2010

R T



Channel Power

10.47 dBm /18.0000 MHz

Power Spectral Density

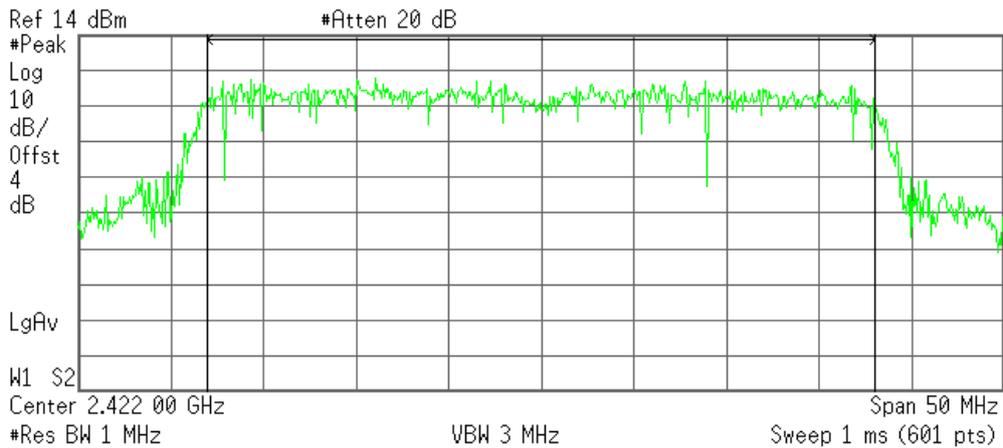
-62.08 dBm/Hz

(IEEE 802.11n HT40 MHz mode)

Peak power (CH Low)

* Agilent 15:55:55 Jul 1, 2010

R T



Channel Power

12.30 dBm /36.0000 MHz

Power Spectral Density

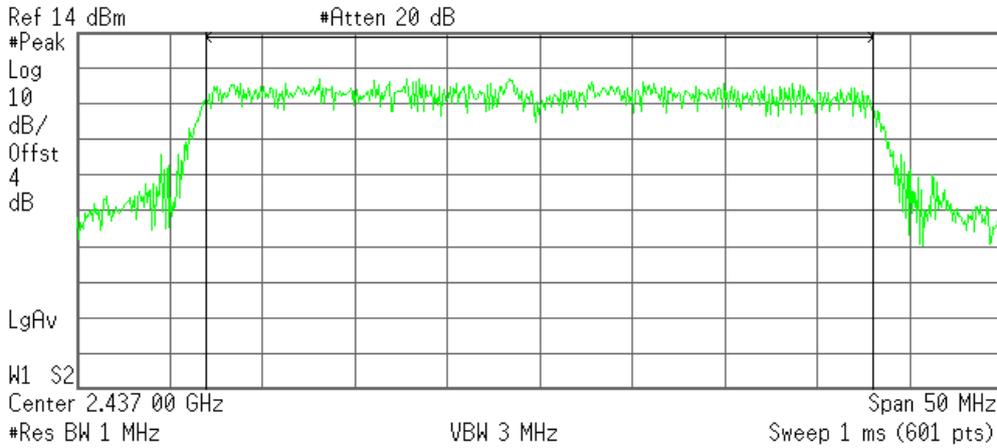
-63.26 dBm/Hz



Peak power (CH Mid)

* Agilent 15:56:50 Jul 1, 2010

R T



Channel Power

12.20 dBm /36.0000 MHz

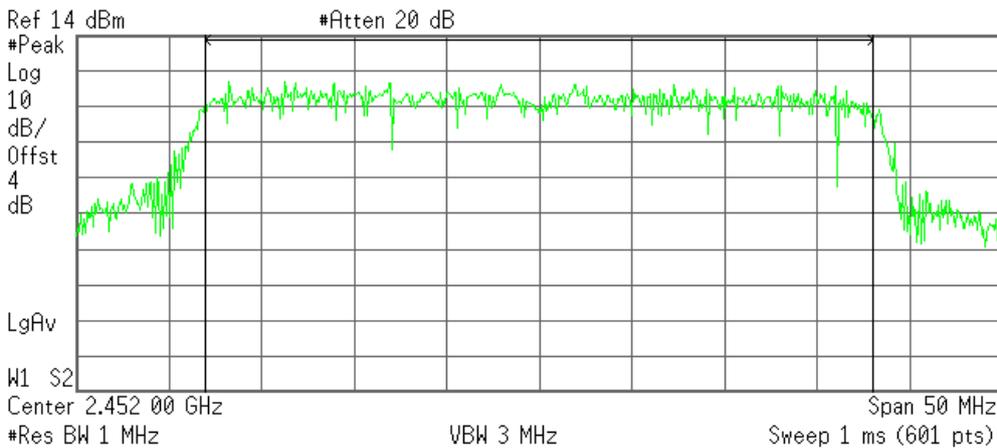
Power Spectral Density

-63.36 dBm/Hz

Peak power (CH High)

* Agilent 15:58:09 Jul 1, 2010

R T



Channel Power

11.74 dBm /36.0000 MHz

Power Spectral Density

-63.82 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

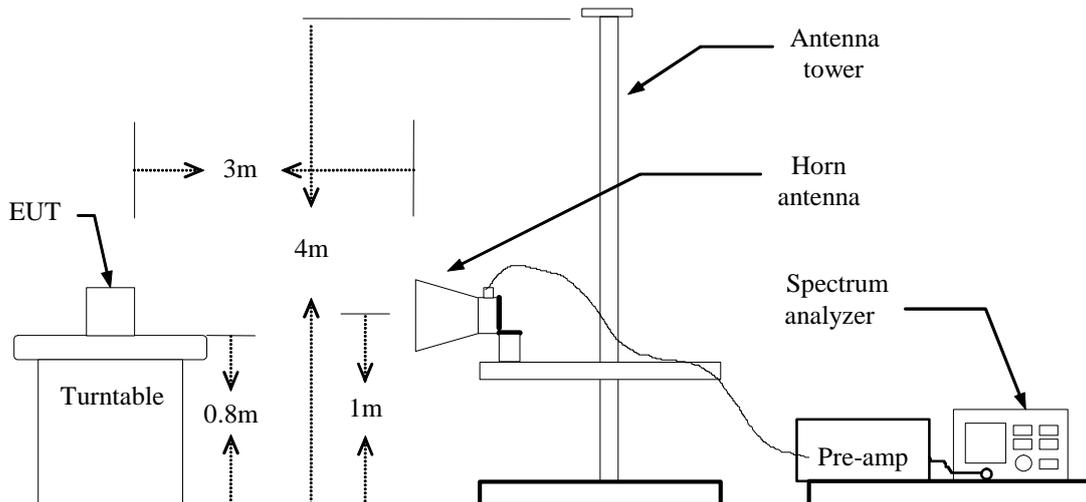
Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/21/2010	03/21/2011
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	03/21/2010	03/21/2011
Turn Table	EMCO	2081-1.21	N/A	N.C.R	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	56.35	43.76	-3.92	52.43	39.84	74	54	-21.57	-14.16
N/A										
2390.00	H	61.17	48.82	-3.92	57.25	44.90	74	54	-16.75	-9.10
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	52.62	41.45	-3.82	48.80	37.63	74	54	-25.20	-16.37
N/A										
2483.50	H	46.78	46.78	-3.82	42.96	42.96	74	54	-31.04	-11.04
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	56.38	43.98	-3.92	52.46	40.06	74	54	-21.54	-13.94
N/A										
2390.00	H	65.80	51.52	-3.92	61.88	47.60	74	54	-12.12	-6.40
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	55.19	41.39	-3.82	51.37	37.57	74	54	-22.63	-16.43
N/A										
2483.50	H	60.16	45.94	-3.82	56.34	42.12	74	54	-17.66	-11.88
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	63.18	46.04	-3.92	59.26	42.12	74	54	-14.74	-11.88
N/A										
2390.00	H	72.61	54.87	-3.92	68.69	50.95	74	54	-5.31	-3.05
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	63.08	42.87	-3.82	59.26	39.05	74	54	-14.74	-14.95
N/A										
2483.50	H	63.42	48.62	-3.82	59.60	44.80	74	54	-14.40	-9.20
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	62.00	48.10	-3.92	58.08	44.18	74	54	-15.92	-9.82
N/A										
2390.00	H	71.52	56.60	-3.92	67.60	52.68	74	54	-6.40	-1.32
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	60.22	48.99	-3.82	56.40	45.17	74	54	-17.60	-8.83
N/A										
2483.50	H	67.28	55.36	-3.82	63.46	51.54	74	54	-10.54	-2.46
N/A										



Test Plot (IEEE 802.11b mode)

Band Edges (CH Low)

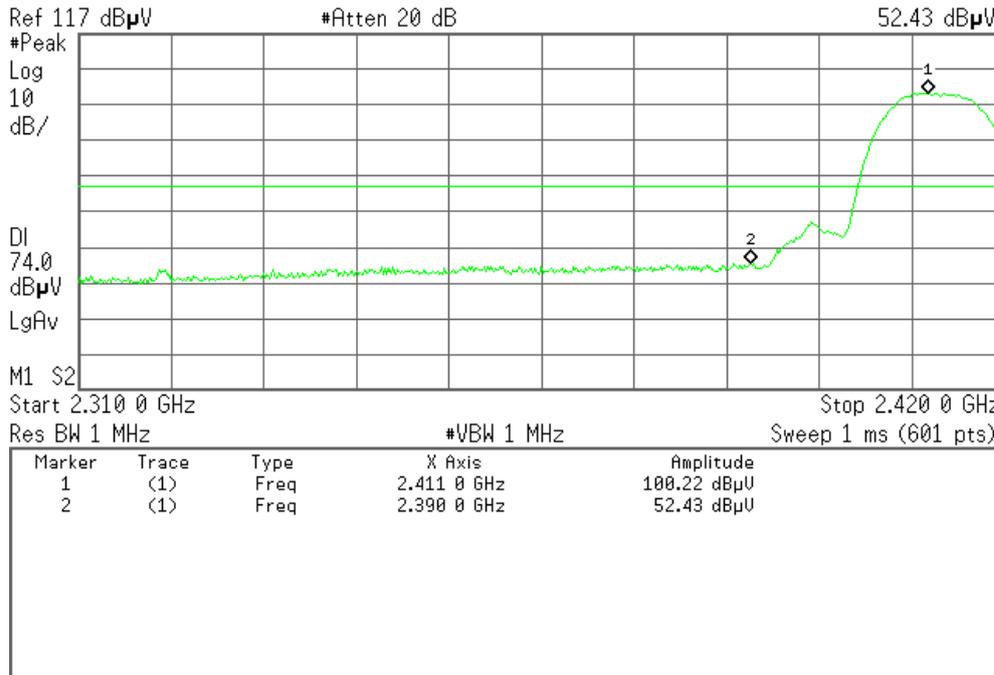
Detector mode: Peak

Polarity: Vertical

Agilent 11:22:22 Jun 30, 2010

R T

Mkr2 2.390 0 GHz
52.43 dBμV



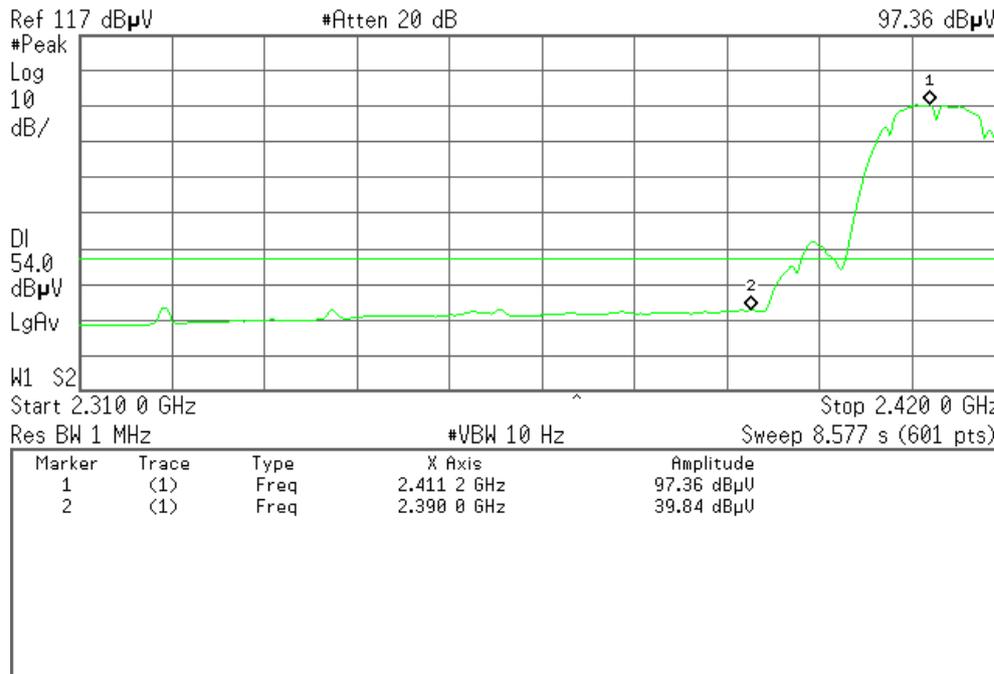
Detector mode: Average

Polarity: Vertical

Agilent 11:23:54 Jun 30, 2010

R T

Mkr1 2.411 2 GHz
97.36 dBμV



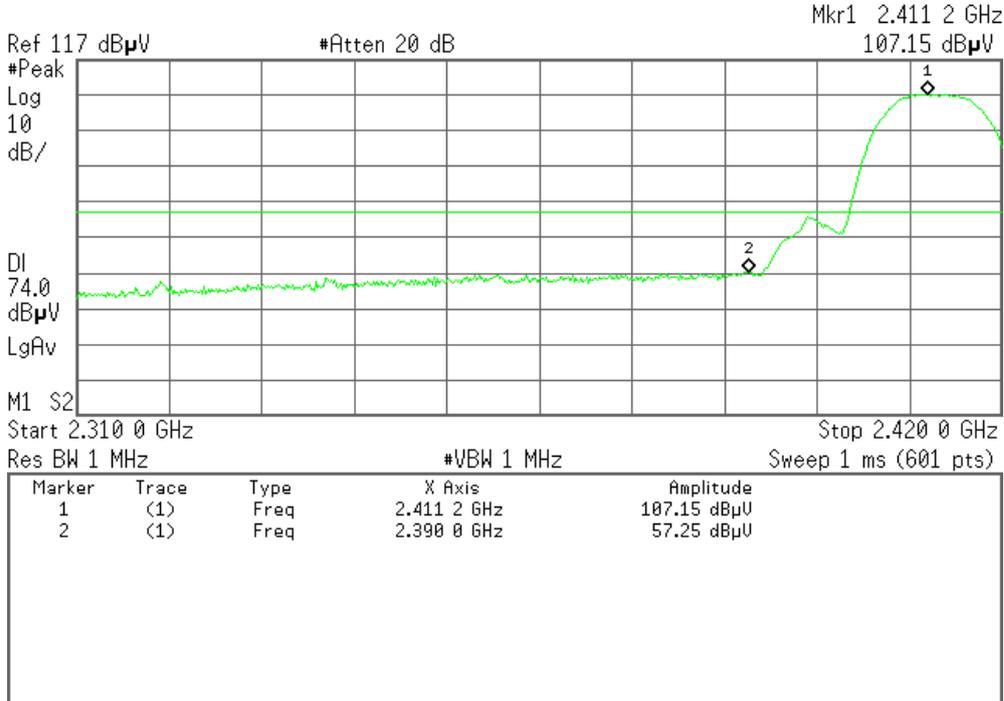


Detector mode: Peak

Polarity: Horizontal

Agilent 11:40:41 Jun 30, 2010

R T

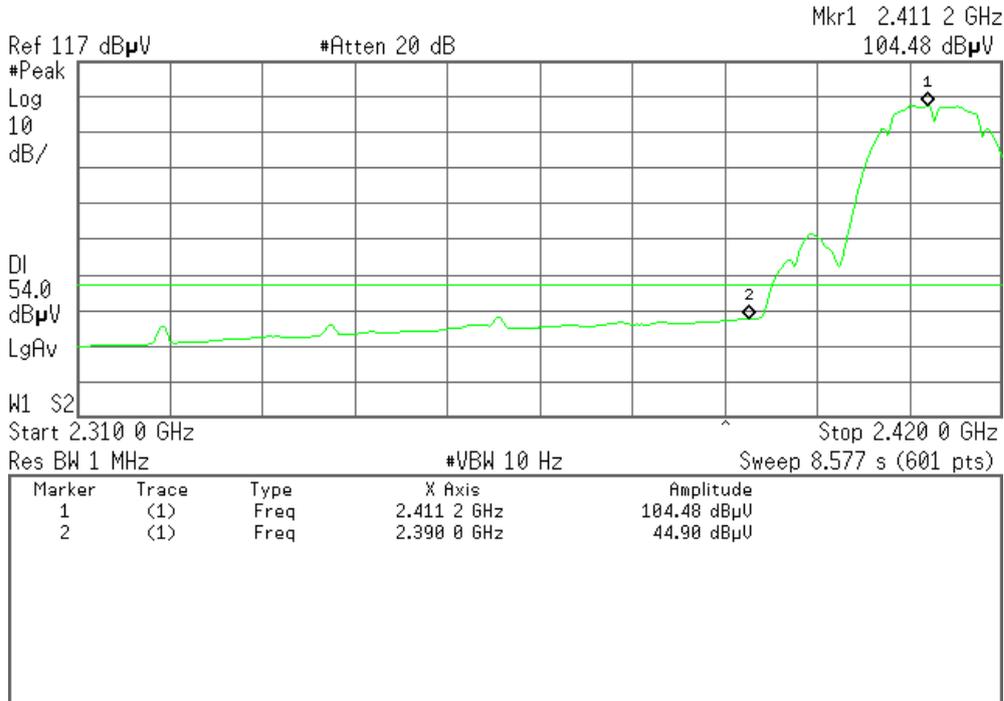


Detector mode: Average

Polarity: Horizontal

Agilent 11:41:36 Jun 30, 2010

R T





Band Edges (CH High)

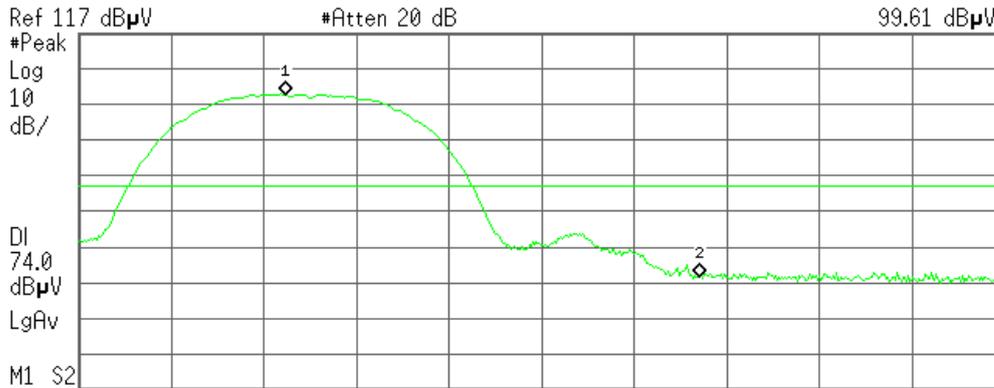
Detector mode: Peak

Polarity: Vertical

Agilent 11:57:38 Jun 30, 2010

R T

Mkr1 2.461 17 GHz
99.61 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 17 GHz	99.61 dBμV
2	(1)	Freq	2.483 50 GHz	48.80 dBμV

Detector mode: Average

Polarity: Vertical

Agilent 11:58:40 Jun 30, 2010

R T

Mkr1 2.461 17 GHz
96.96 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 17 GHz	96.96 dBμV
2	(1)	Freq	2.483 50 GHz	37.62 dBμV



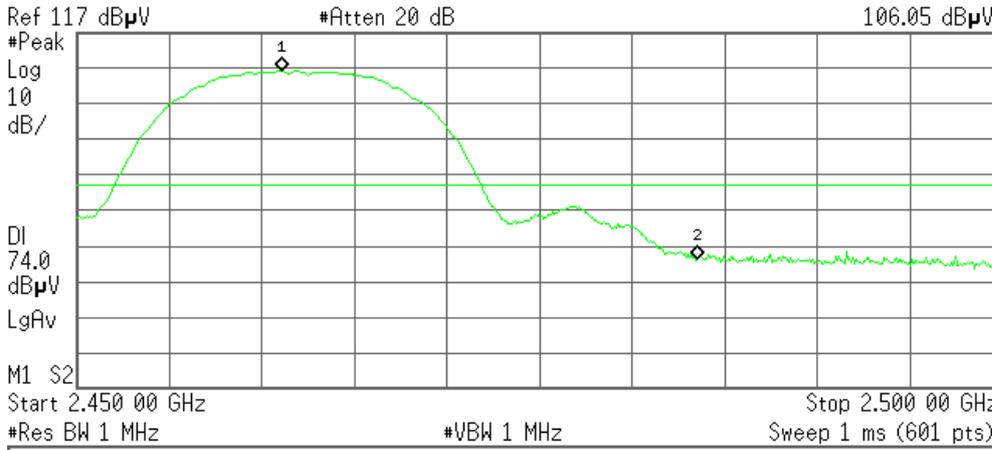
Detector mode: Peak

Polarity: Horizontal

Agilent 11:52:27 Jun 30, 2010

R T

Mkr1 2.461 08 GHz
106.05 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 08 GHz	106.05 dBµV
2	(1)	Freq	2.483 50 GHz	53.16 dBµV

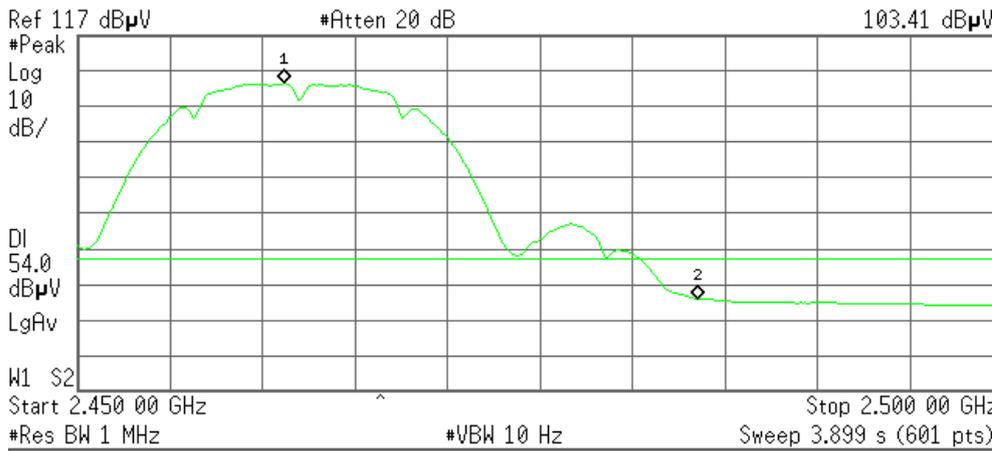
Detector mode: Average

Polarity: Horizontal

Agilent 11:53:19 Jun 30, 2010

R T

Mkr1 2.461 17 GHz
103.41 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 17 GHz	103.41 dBµV
2	(1)	Freq	2.483 50 GHz	42.96 dBµV



(IEEE 802.11g mode)

Band Edges (CH Low)

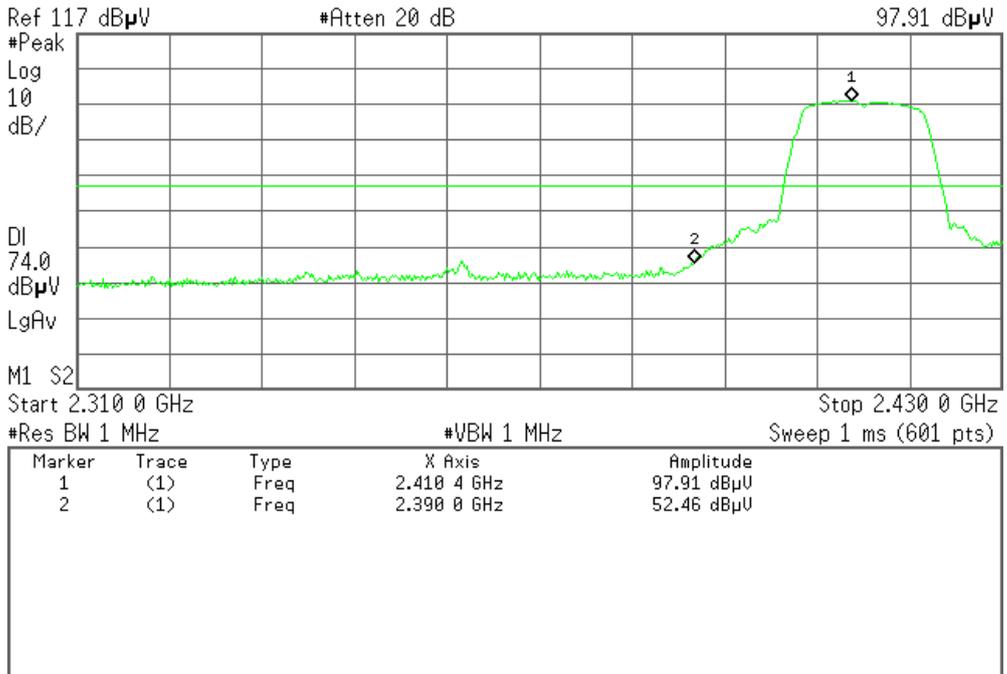
Detector mode: Peak

Polarity: Vertical

Agilent 12:54:02 Jun 30, 2010

R T

Mkr1 2.410 4 GHz
97.91 dBµV



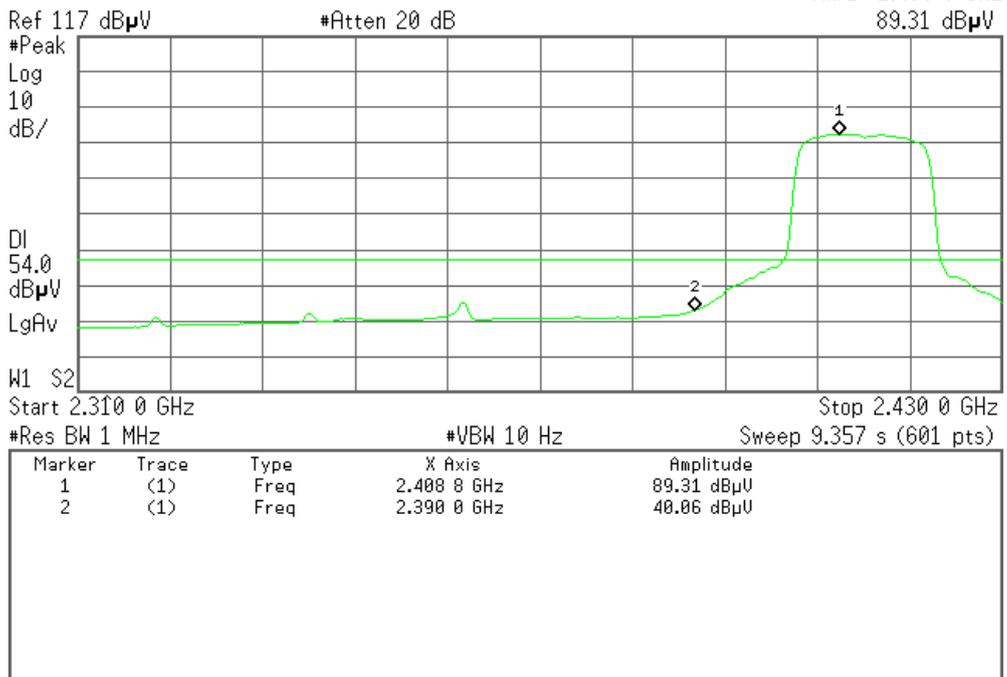
Detector mode: Average

Polarity: Vertical

Agilent 12:53:16 Jun 30, 2010

R T

Mkr1 2.408 8 GHz
89.31 dBµV



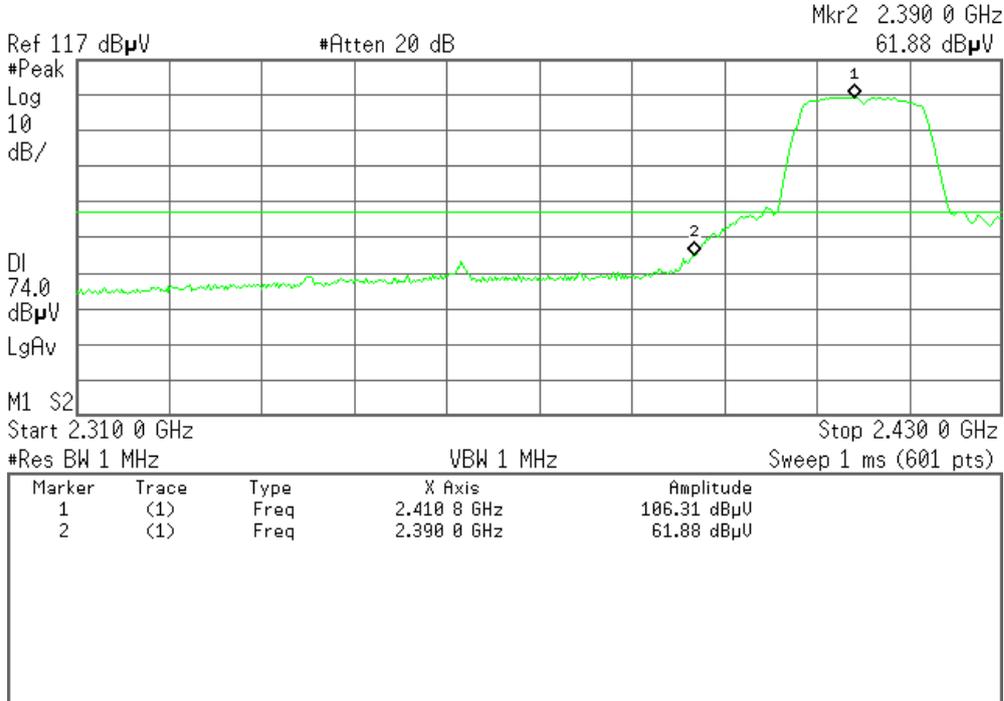


Detector mode: Peak

Polarity: Horizontal

Agilent 12:44:51 Jun 30, 2010

R T

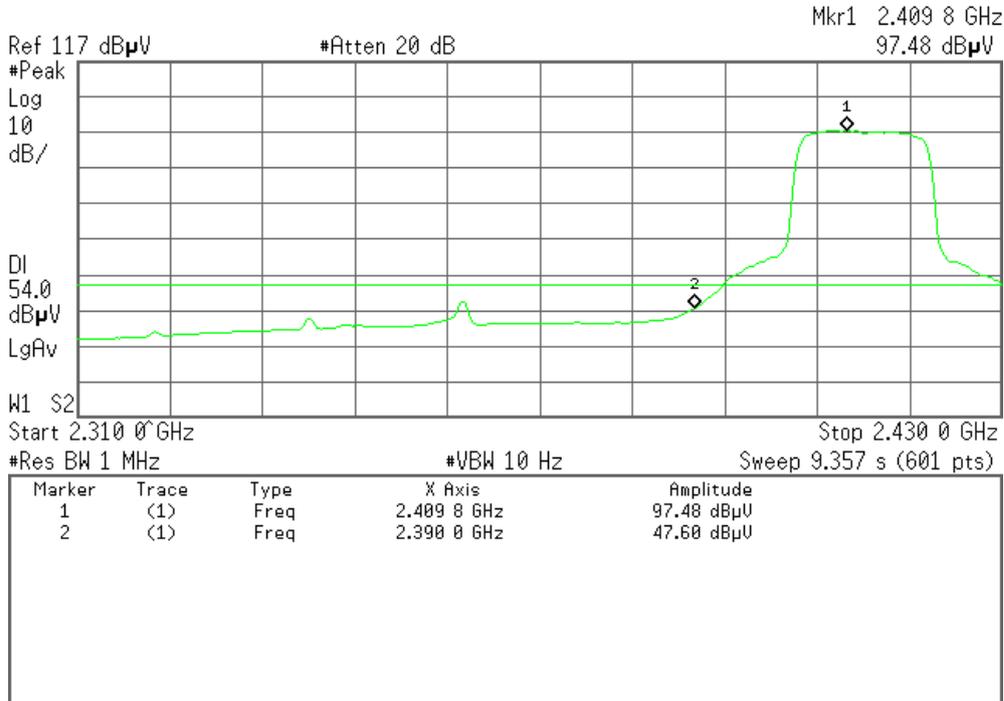


Detector mode: Average

Polarity: Horizontal

Agilent 12:45:35 Jun 30, 2010

R T





Band Edges (CH High)

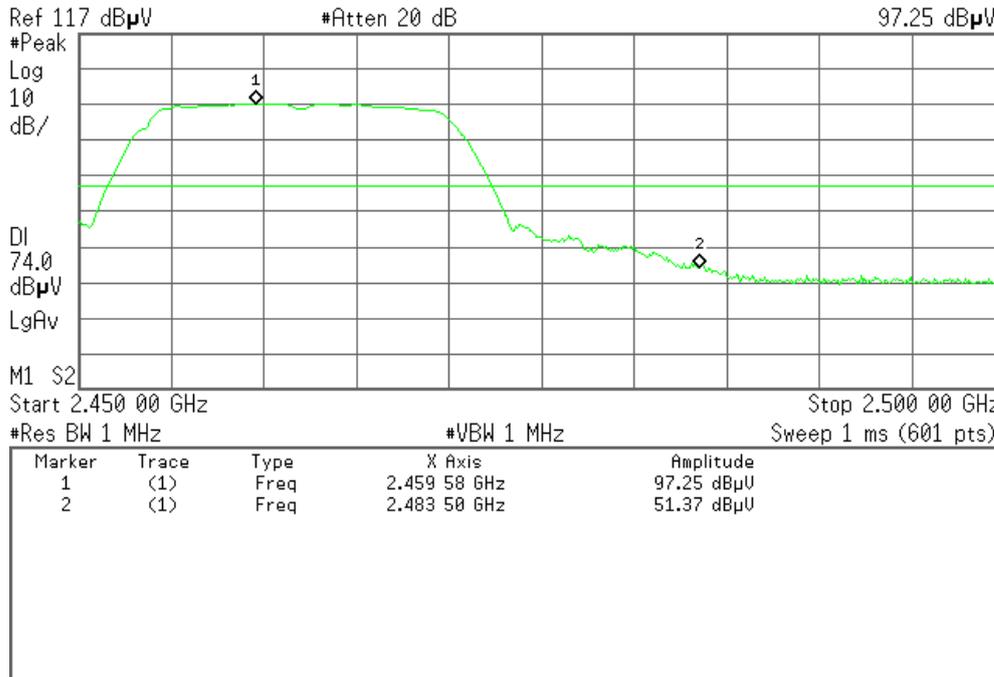
Detector mode: Peak

Polarity: Vertical

Agilent 12:06:16 Jun 30, 2010

R T

Mkr1 2.459 58 GHz
97.25 dBµV



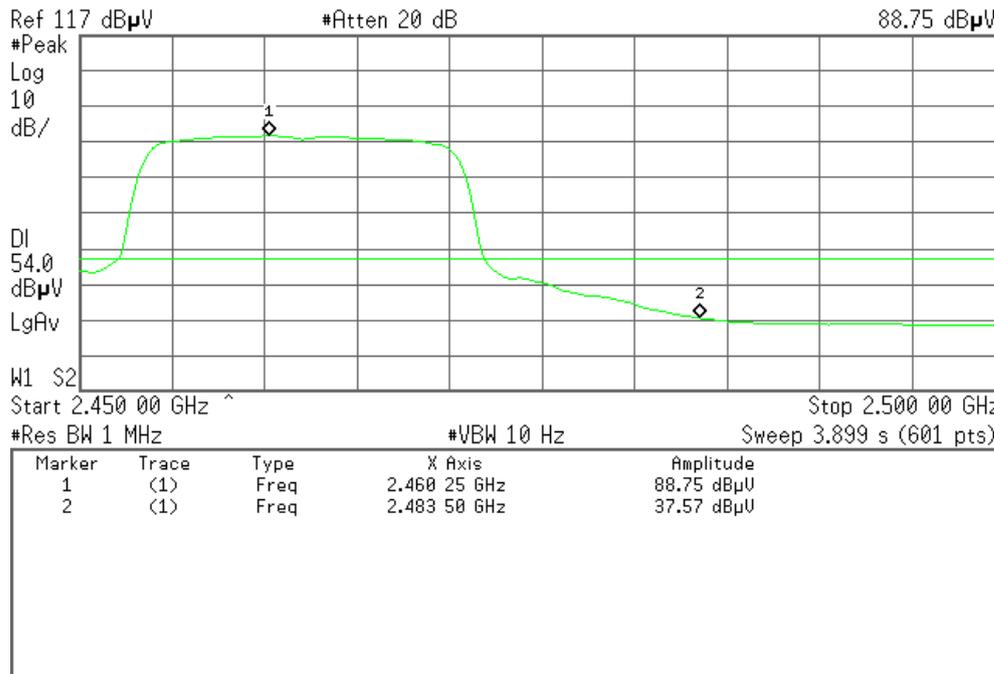
Detector mode: Average

Polarity: Vertical

Agilent 12:07:04 Jun 30, 2010

R T

Mkr1 2.460 25 GHz
88.75 dBµV





Detector mode: Peak

Polarity: Horizontal

Agilent 12:15:09 Jun 30, 2010

R T

Mkr1 2.460 25 GHz
102.78 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	2.460 25 GHz	102.78 dBµV
2	(1)	Freq	2.483 50 GHz	56.34 dBµV

Detector mode: Average

Polarity: Horizontal

Agilent 12:15:37 Jun 30, 2010

R T

Mkr1 2.460 25 GHz
94.51 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	2.460 25 GHz	94.51 dBµV
2	(1)	Freq	2.483 50 GHz	42.12 dBµV



(IEEE 802.11n HT20 MHz mode)

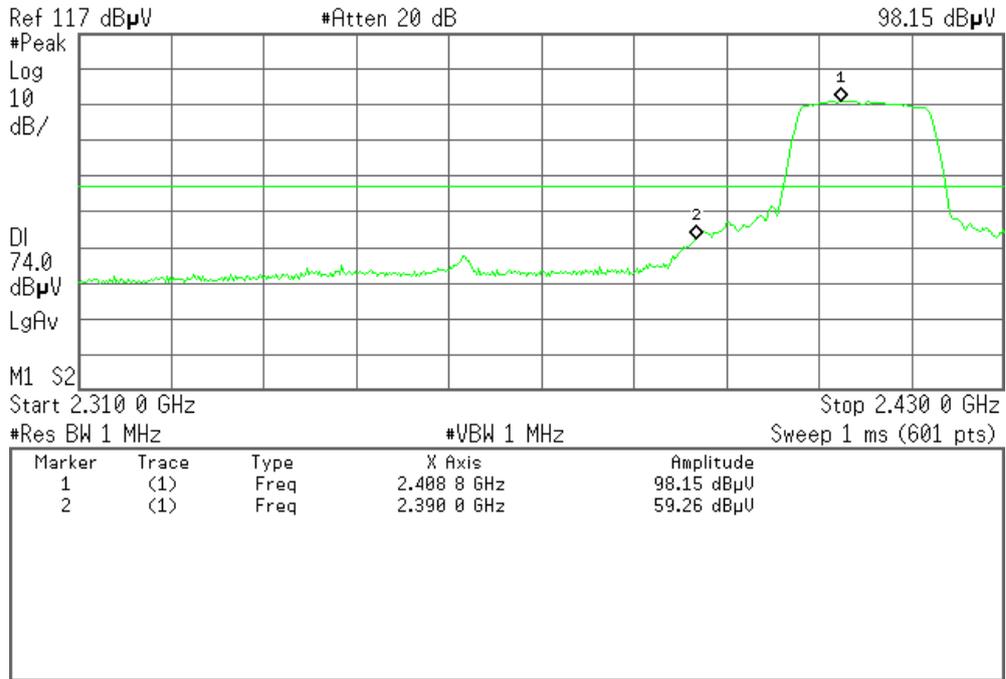
Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 12:51:48 Jun 30, 2010

R T

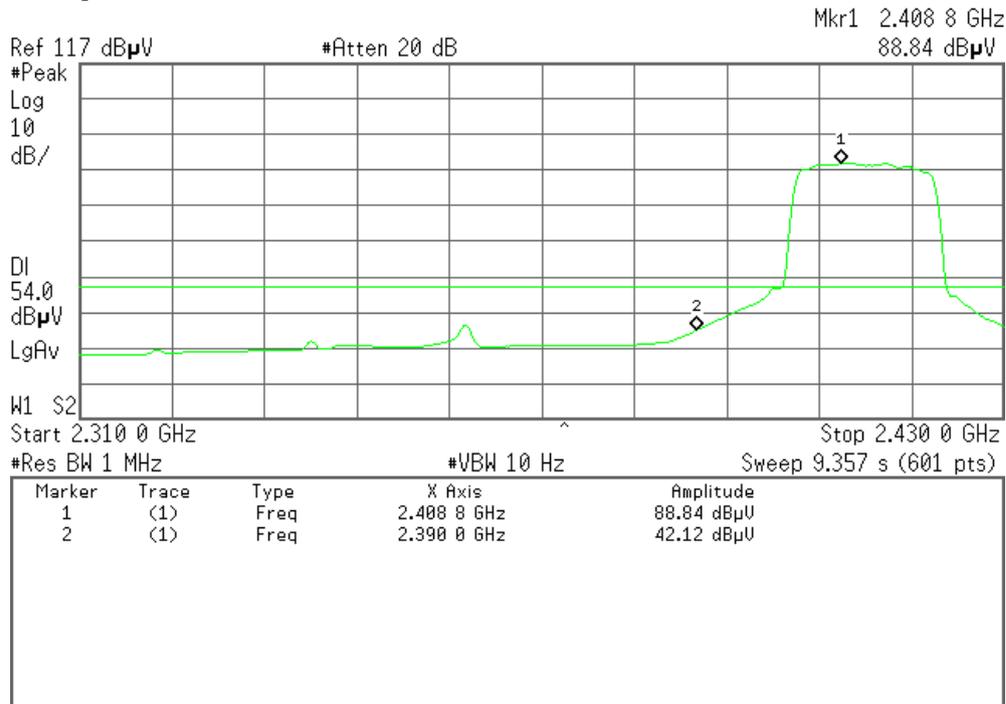


Detector mode: Average

Polarity: Vertical

Agilent 12:52:34 Jun 30, 2010

R T



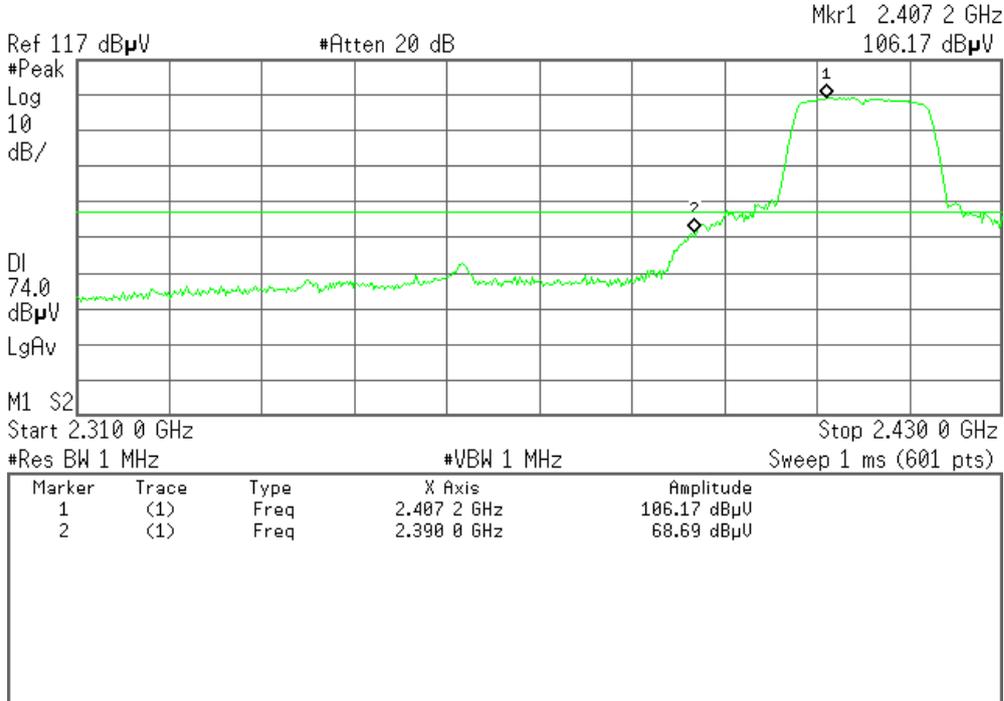


Detector mode: Peak

Polarity: Horizontal

Agilent 12:47:20 Jun 30, 2010

R T

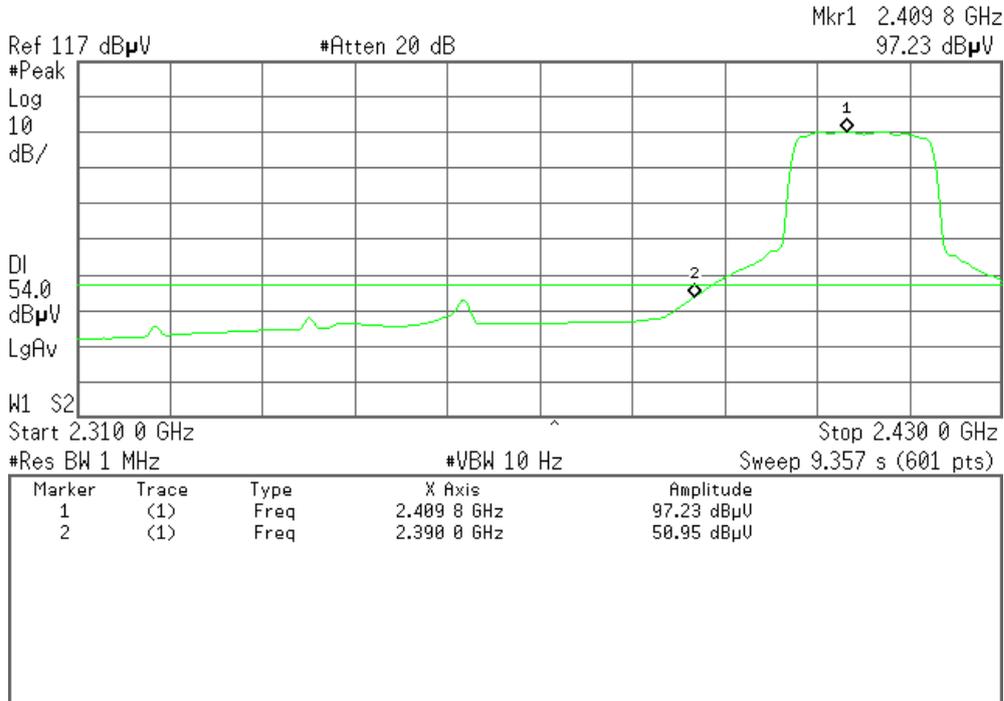


Detector mode: Average

Polarity: Horizontal

Agilent 12:46:38 Jun 30, 2010

R T





Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 12:58:00 Jun 30, 2010

R T

Mkr1 2.458 67 GHz
97.52 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	2.458 67 GHz	97.52 dBμU
2	(1)	Freq	2.483 50 GHz	55.32 dBμU

Detector mode: Average

Polarity: Vertical

Agilent 12:58:43 Jun 30, 2010

R T

Mkr1 2.459 08 GHz
88.35 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	2.459 08 GHz	88.35 dBμU
2	(1)	Freq	2.483 50 GHz	39.05 dBμU



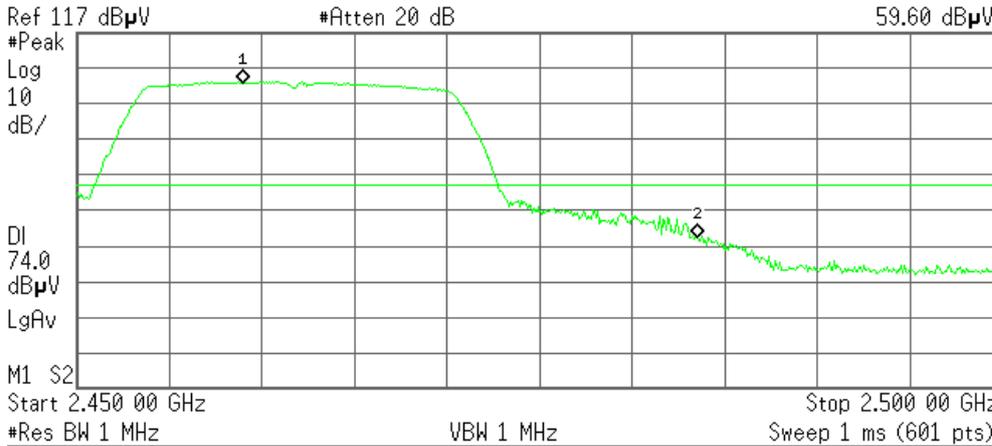
Detector mode: Peak

Polarity: Horizontal

Agilent 13:06:39 Jun 30, 2010

R T

Mkr2 2.483 50 GHz
59.60 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.450 00 GHz	102.80 dBμV
2	(1)	Freq	2.483 50 GHz	59.60 dBμV

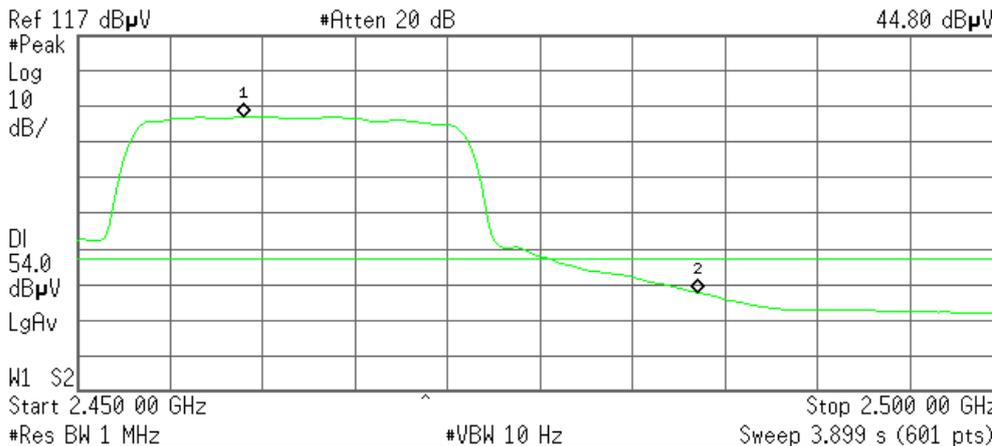
Detector mode: Average

Polarity: Horizontal

Agilent 13:06:11 Jun 30, 2010

R T

Mkr2 2.483 50 GHz
44.80 dBμV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.450 00 GHz	94.17 dBμV
2	(1)	Freq	2.483 50 GHz	44.80 dBμV



(IEEE 802.11n HT40 MHz mode)

Band Edges (CH Low)

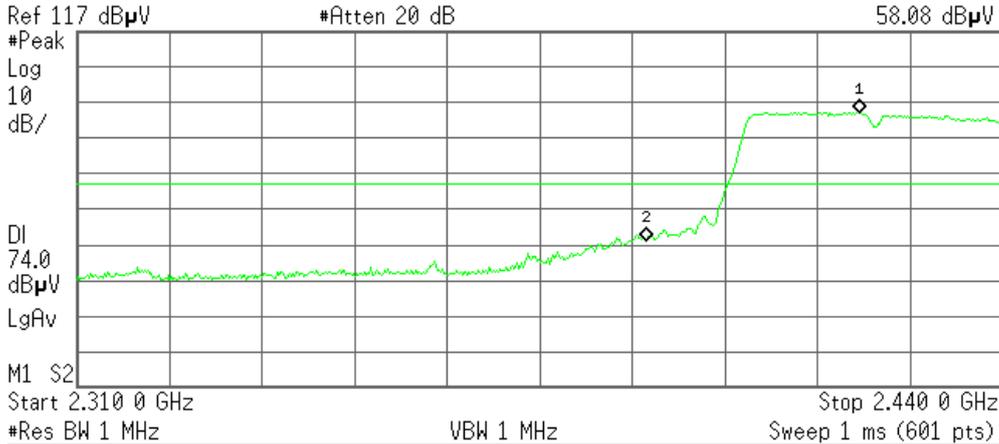
Detector mode: Peak

Polarity: Vertical

Agilent 13:17:03 Jun 30, 2010

R T

Mkr2 2.390 0 GHz
58.08 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.419 8 GHz	94.28 dBµV
2	(1)	Freq	2.390 0 GHz	58.08 dBµV

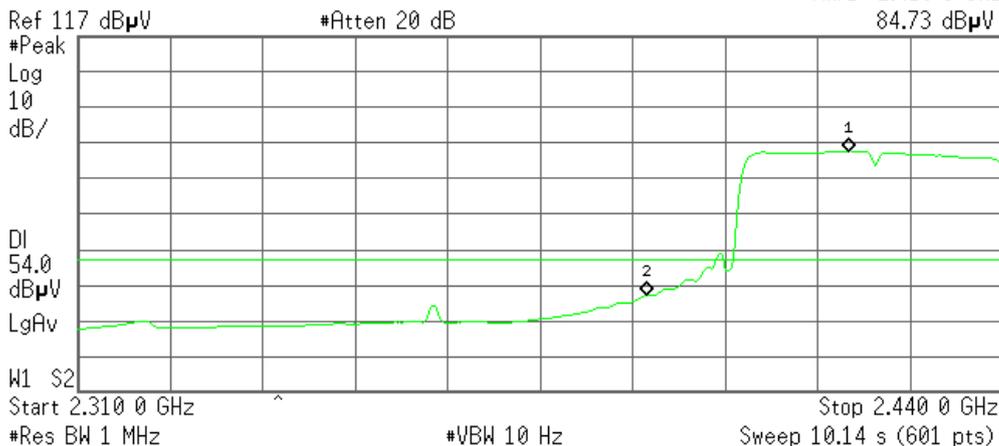
Detector mode: Average

Polarity: Vertical

Agilent 13:17:47 Jun 30, 2010

R T

Mkr1 2.418 3 GHz
84.73 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.418 3 GHz	84.73 dBµV
2	(1)	Freq	2.390 0 GHz	44.18 dBµV

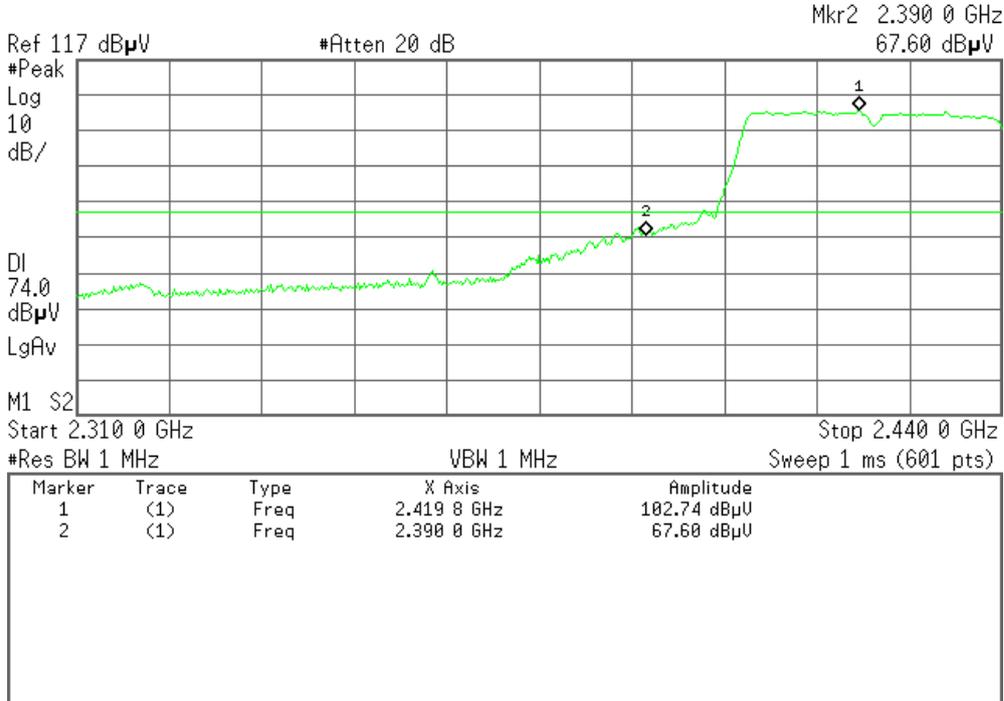


Detector mode: Peak

Polarity: Horizontal

Agilent 13:10:49 Jun 30, 2010

R T

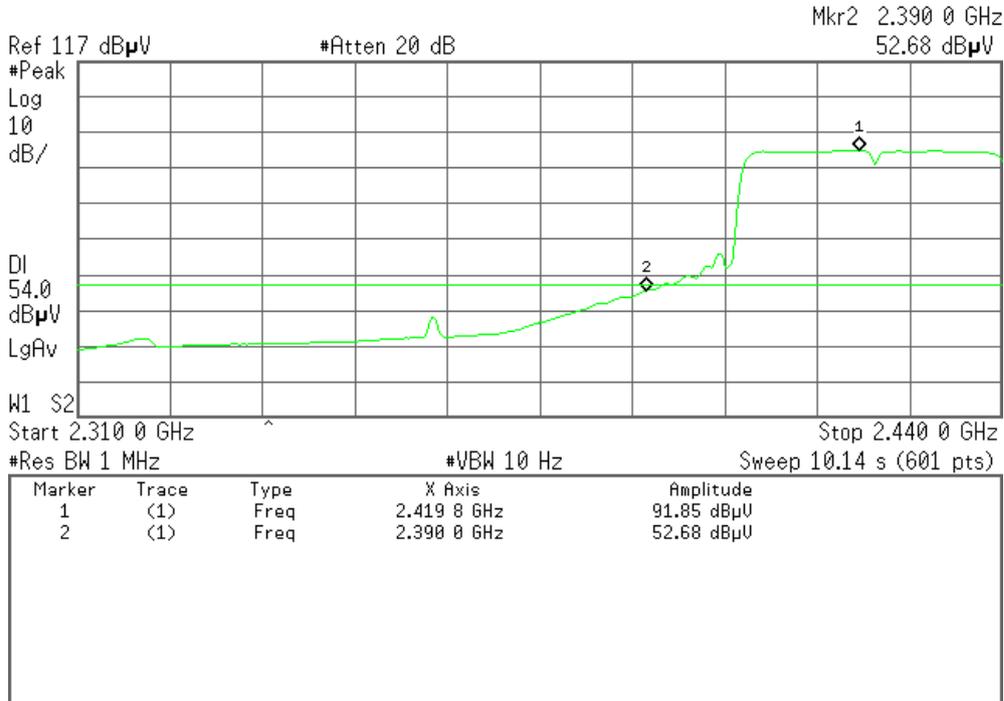


Detector mode: Average

Polarity: Horizontal

Agilent 13:13:07 Jun 30, 2010

R T





Band Edges (CH High)

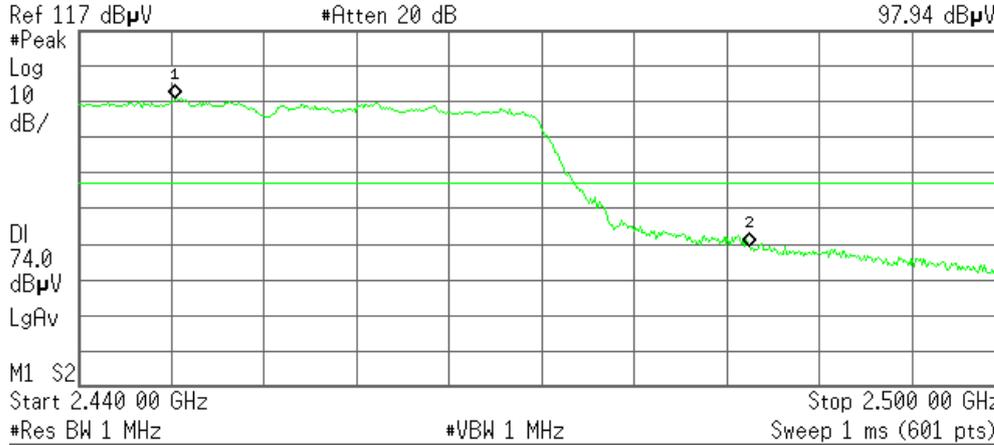
Detector mode: Peak

Polarity: Vertical

Agilent 13:00:45 Jun 30, 2010

R T

Mkr1 2.446 30 GHz
97.94 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.446 30 GHz	97.94 dBµV
2	(1)	Freq	2.483 50 GHz	56.40 dBµV

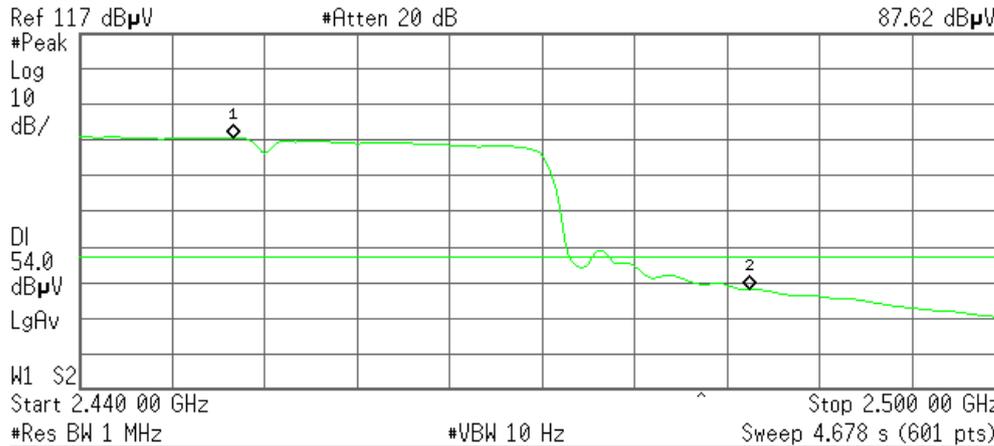
Detector mode: Average

Polarity: Vertical

Agilent 13:00:19 Jun 30, 2010

R T

Mkr1 2.450 00 GHz
87.62 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.450 00 GHz	87.62 dBµV
2	(1)	Freq	2.483 50 GHz	45.17 dBµV



Detector mode: Peak

Polarity: Horizontal

Agilent 13:04:26 Jun 30, 2010

R T

Mkr1 2.446 80 GHz
102.39 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.446 80 GHz	102.39 dBµV
2	(1)	Freq	2.483 50 GHz	63.46 dBµV

Detector mode: Average

Polarity: Horizontal

Agilent 13:04:55 Jun 30, 2010

R T

Mkr1 2.446 80 GHz
92.15 dBµV



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.446 80 GHz	92.15 dBµV
2	(1)	Freq	2.483 50 GHz	51.54 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.

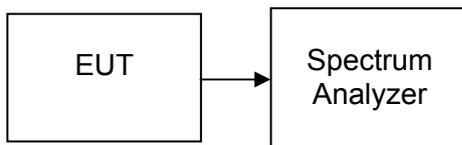
7.6.2. TEST INSTRUMENTS

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	-14.13	8.00	PASS
Mid	2437	-15.14		PASS
High	2462	-15.92		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-15.68	8.00	PASS
Mid	2437	-16.88		PASS
High	2462	-17.57		PASS

Test mode: IEEE 802.11n HT20 MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-15.65	8.00	PASS
Mid	2437	-16.68		PASS
High	2462	-17.81		PASS

Test mode: IEEE 802.11n HT40 MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-16.83	8.00	PASS
Mid	2437	-17.16		PASS
High	2462	-17.66		PASS

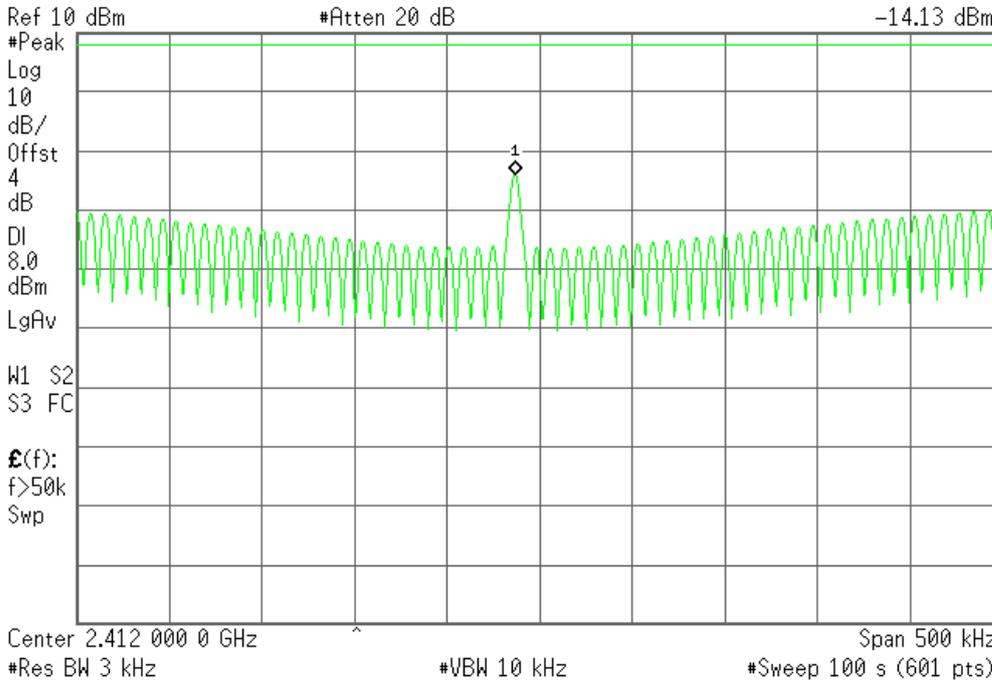


Test Plot (IEEE 802.11b mode)

PPSD (CH Low)

Agilent 16:25:38 Jul 1, 2010

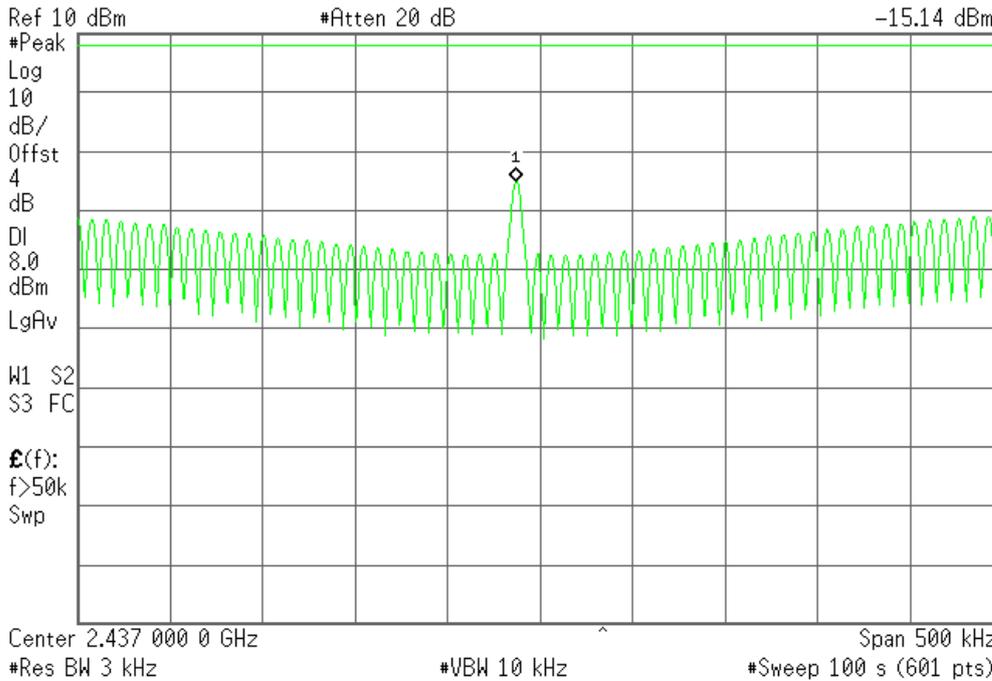
R T Mkr1 2.411 986 6 GHz -14.13 dBm



PPSD (CH Mid)

Agilent 16:28:38 Jul 1, 2010

R T Mkr1 2.436 986 6 GHz -15.14 dBm



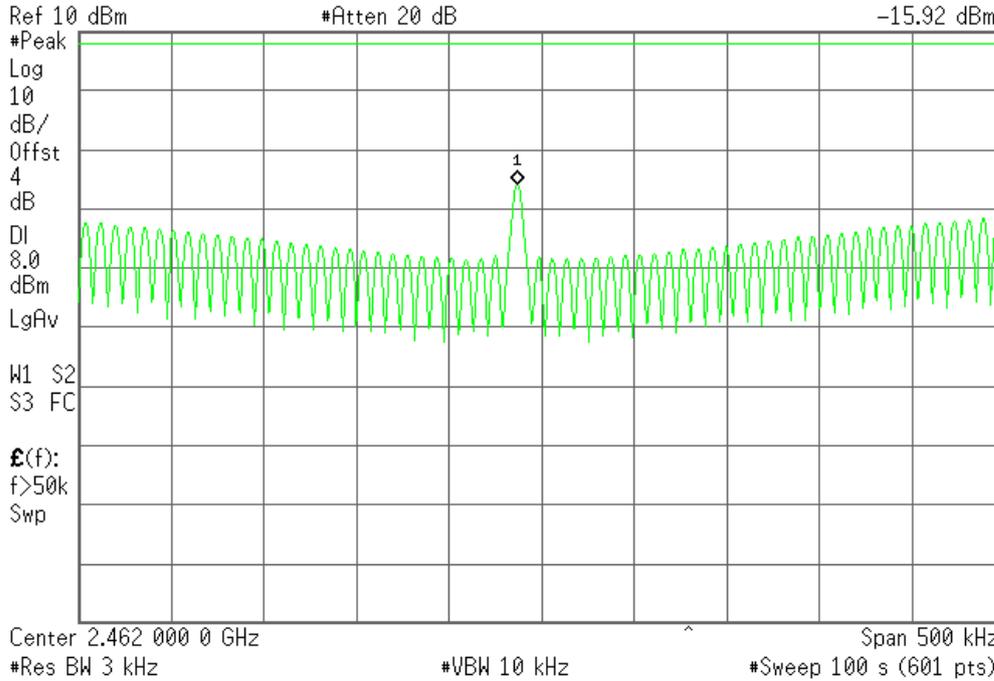


PPSD (CH High)

Agilent 16:39:39 Jul 1, 2010

R T

Mkr1 2.461 986 6 GHz
-15.92 dBm



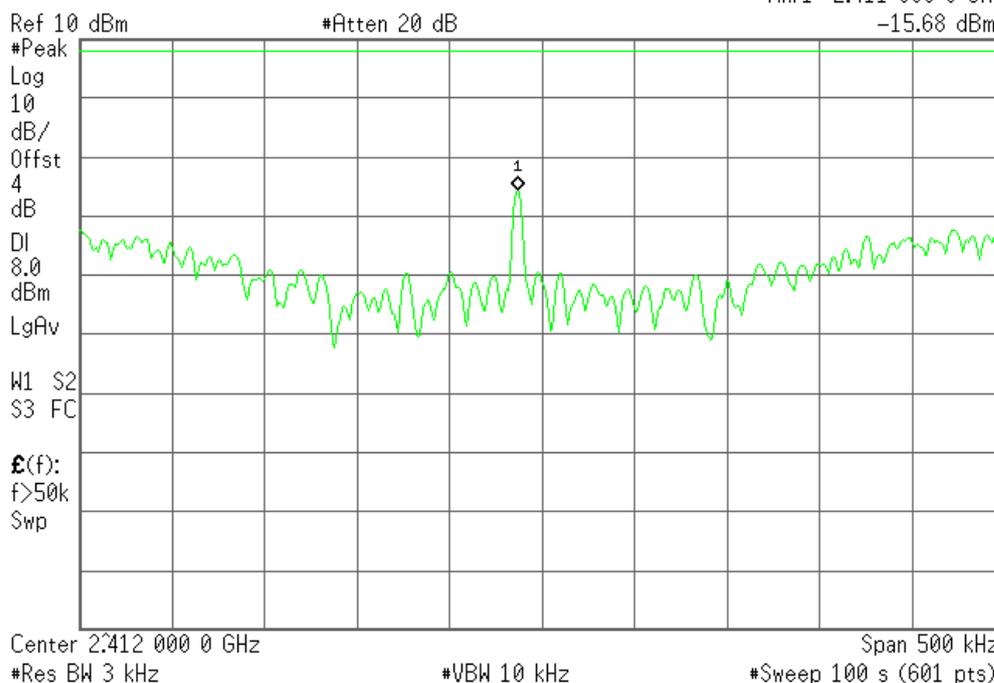
(IEEE 802.11g mode)

PPSD (CH Low)

Agilent 16:23:22 Jul 1, 2010

R T

Mkr1 2.411 986 6 GHz
-15.68 dBm



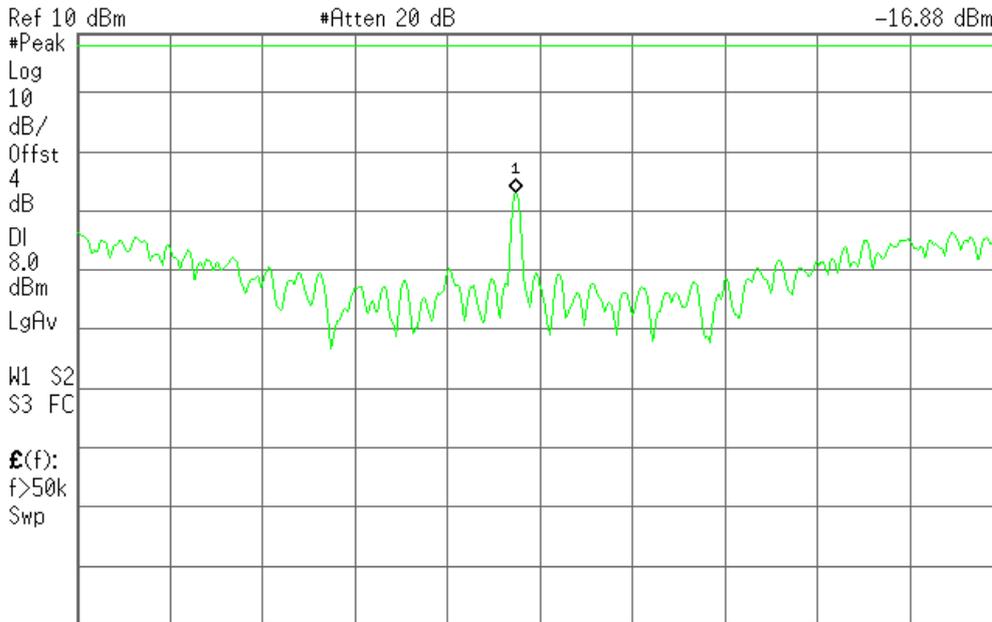


PPSD (CH Mid)

Agilent 16:30:42 Jul 1, 2010

R T

Mkr1 2.436 986 6 GHz -16.88 dBm



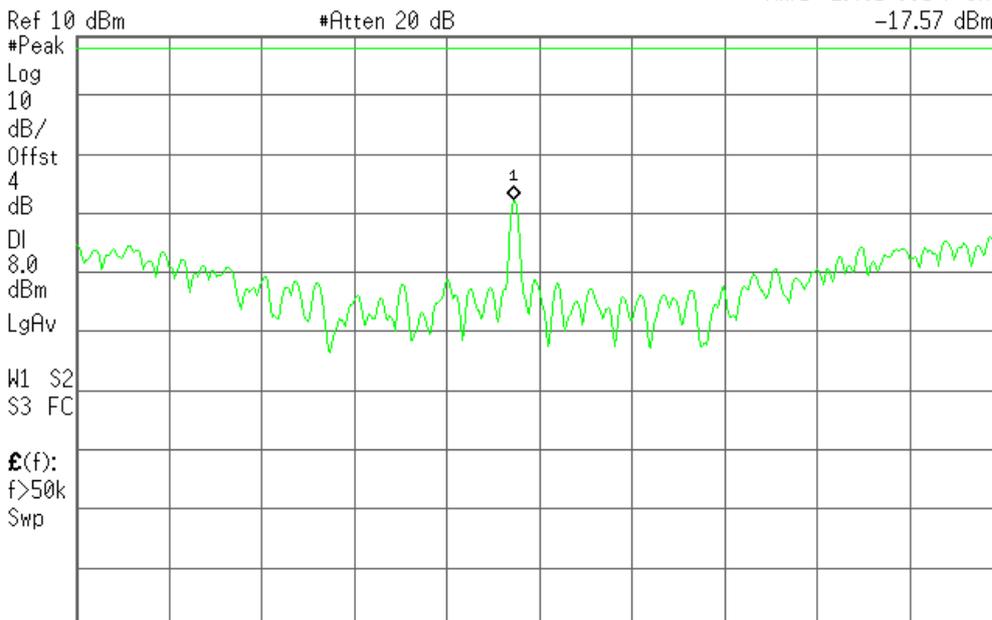
Center 2.437 000 0 GHz Span 500 kHz #Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)

PPSD (CH High)

Agilent 16:37:32 Jul 1, 2010

R T

Mkr1 2.461 985 7 GHz -17.57 dBm



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



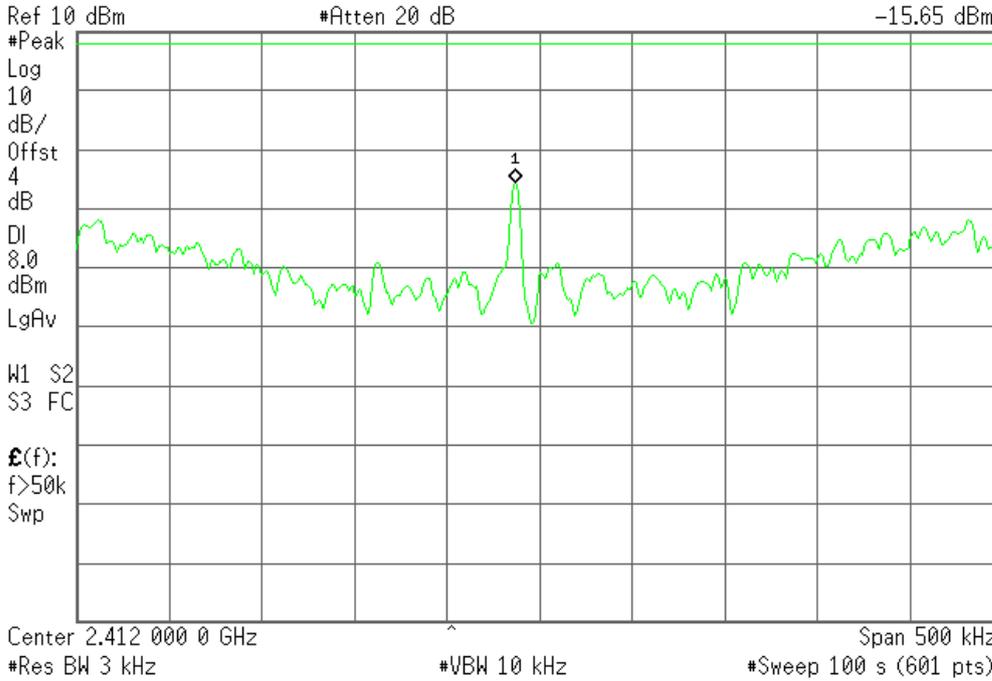
(IEEE 802.11n HT20 MHz mode)

PPSD (CH Low)

Agilent 16:19:09 Jul 1, 2010

R T

Mkr1 2.411 986 6 GHz -15.65 dBm

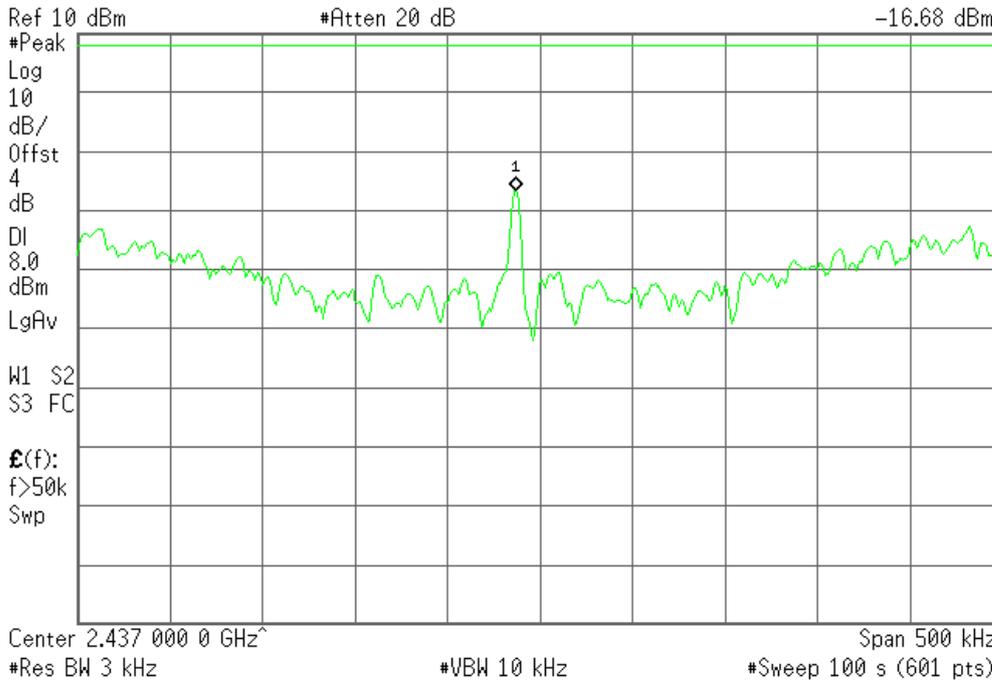


PPSD (CH Mid)

Agilent 16:32:52 Jul 1, 2010

R T

Mkr1 2.436 986 6 GHz -16.68 dBm



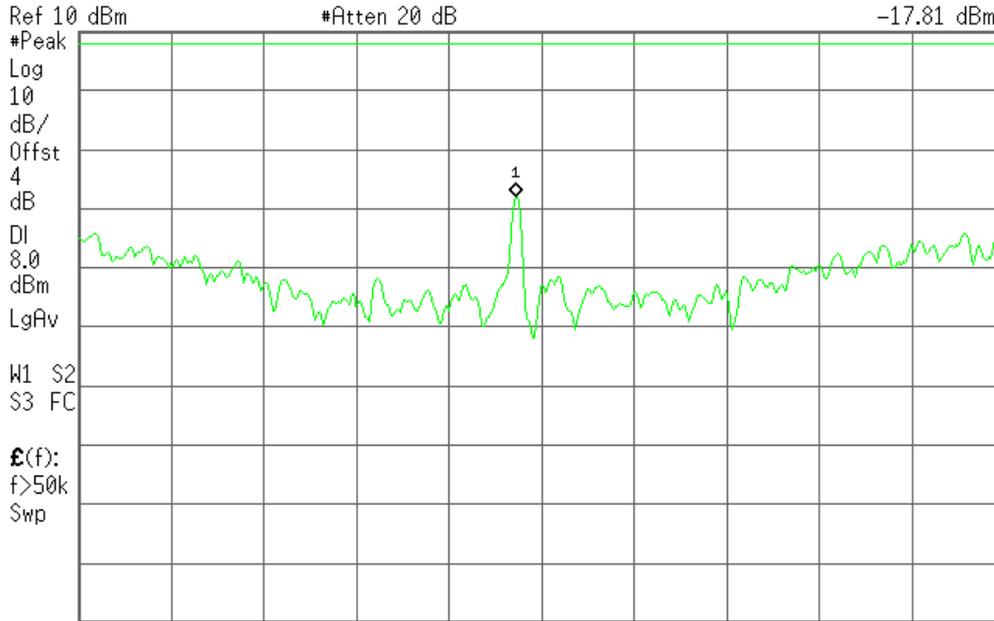


PPSD (CH High)

Agilent 16:35:24 Jul 1, 2010

R T

Mkr1 2.461 985 7 GHz -17.81 dBm



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

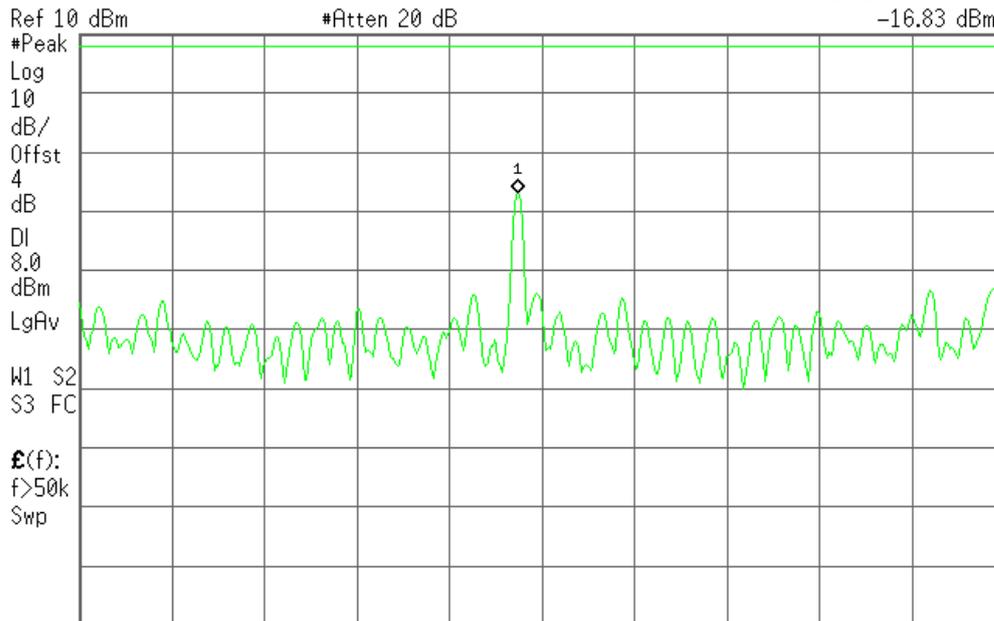
(IEEE 802.11n HT40 MHz mode)

PPSD (CH Low)

Agilent 16:47:32 Jul 1, 2010

R T

Mkr1 2.421 986 6 GHz -16.83 dBm



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

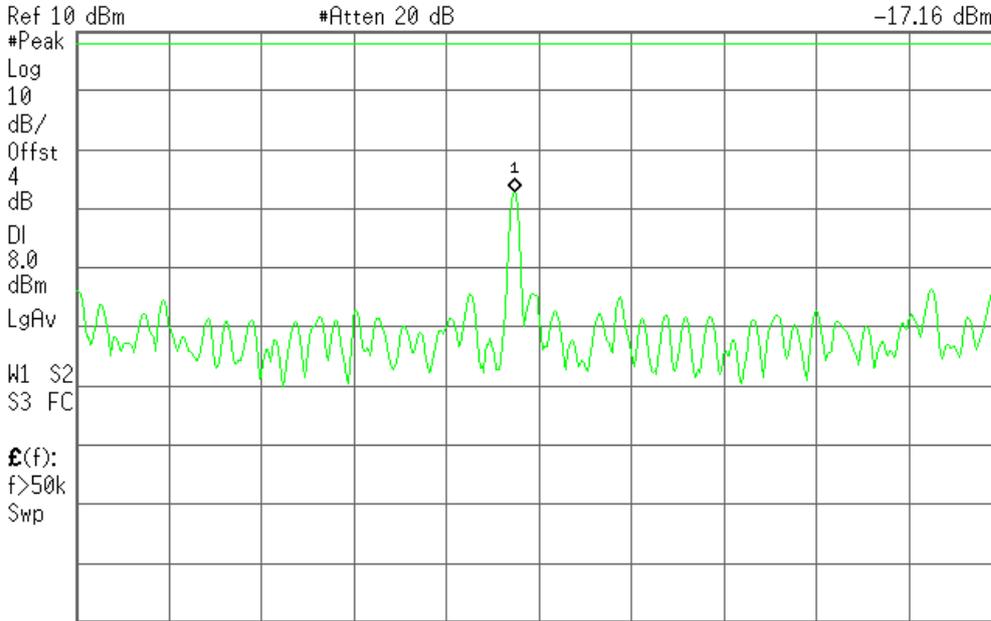


PPSD (CH Mid)

Agilent 16:44:32 Jul 1, 2010

R T

Mkr1 2.436 986 6 GHz -17.16 dBm



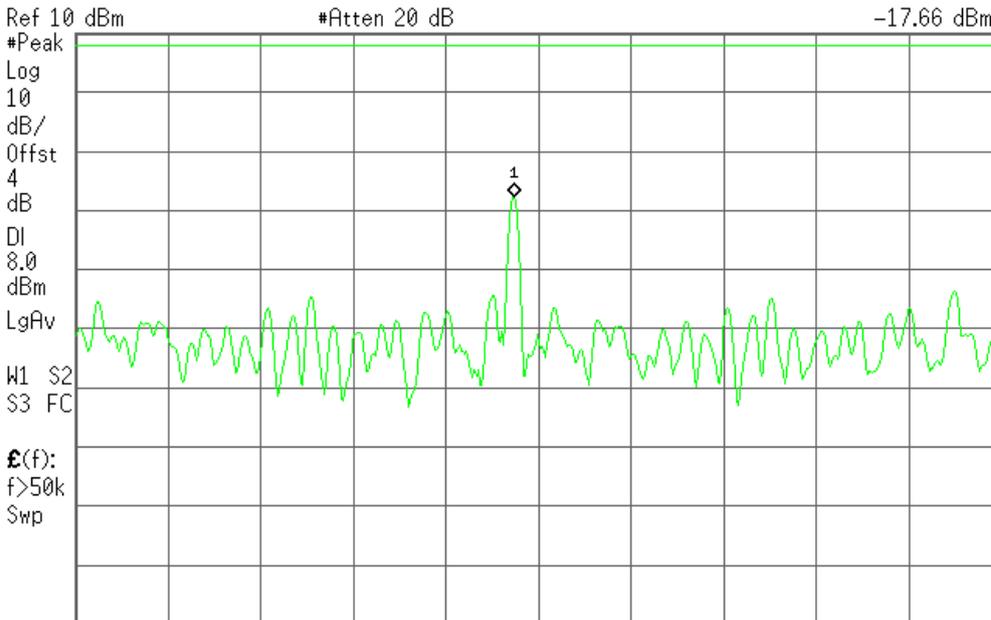
Center 2.437 000 0 GHz Span 500 kHz #Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)

PPSD (CH High)

Agilent 16:42:10 Jul 1, 2010

R T

Mkr1 2.451 986 6 GHz -17.66 dBm



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