



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Wireless-N Touchscreen Controller

Model:

DMRW1000xxx, where x can be 0-9, A-Z, hyphen or blank

Trade Name: LINKSYS by Cisco

Issued to

Cisco-Linksys LLC
121 Theory Drive Irvine, CA 92617 (USA)

Issued by

Compliance Certification Services Inc.
No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan (R.O.C.)
<http://www.ccsemc.com.tw>
service@tw.ccsemc.com



Note: This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.



TABLE OF CONTENTS

- 1. TEST RESULT CERTIFICATION..... 3**
- 2. EUT DESCRIPTION 4**
- 3. TEST METHODOLOGY 5**
 - 3.1 EUT CONFIGURATION 5
 - 3.2 EUT EXERCISE 5
 - 3.3 GENERAL TEST PROCEDURES 5
 - 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS 6
 - 3.5 DESCRIPTION OF TEST MODES 7
- 4. INSTRUMENT CALIBRATION..... 8**
 - 4.1 MEASURING INSTRUMENT CALIBRATION 8
 - 4.2 MEASUREMENT EQUIPMENT USED 8
- 5. FACILITIES AND ACCREDITATIONS 9**
 - 5.1 FACILITIES 9
 - 5.2 EQUIPMENT 9
 - 5.3 TABLE OF ACCREDITATIONS AND LISTINGS 10
- 6. SETUP OF EQUIPMENT UNDER TEST 11**
 - 6.1 SETUP CONFIGURATION OF EUT 11
 - 6.2 SUPPORT EQUIPMENT 11
- 7. FCC PART 15 REQUIREMENTS..... 12**
 - 7.1 26 DB EMISSION BANDWIDTH 12
 - 7.2 PEAK POWER 20
 - 7.3 BAND EDGES MEASUREMENT 29
 - 7.4 PEAK POWER SPECTRAL DENSITY 42
 - 7.5 PEAK EXCURSION 52
 - 7.6 RADIATED UNDESIRABLE EMISSION..... 60
 - 7.7 CONDUCTED UNDESIRABLE EMISSION 71
 - 7.8 POWERLINE CONDUCTED EMISSIONS 80
 - 7.9 FREQUENCY STABILITY 83
 - 7.10 TRANSMISSION IN ABSENCE OF DATA 89
- APPENDIX I RADIO FREQUENCY EXPOSURE 90**
- APPENDIX II PHOTOGRAPHS OF TEST SETUP..... 91**



1. TEST RESULT CERTIFICATION

Applicant: Cisco-Linksys LLC
 121 Theory Drive Irvine, CA 92617 (USA)

Equipment Under Test: Wireless-N Touchscreen Controller

Trade Name: LINKSYS by Cisco

Model: DMRW1000xxx, where x can be 0-9, A-Z, hyphen or blank

Date of Test: July 26 ~ October 29, 2008

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. 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 conducted and radiated emission limits of FCC Rules Part 15.407.

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

Approved by:

Reviewed by:

Rex Lai
 Section Manager
 Compliance Certification Services Inc.

Amanda Wu
 Section Manager
 Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Wireless-N Touchscreen Controller
Trade Name	LINKSYS by Cisco
Model Number	DMRW1000xxx, where x can be 0-9, A-Z, hyphen or blank
Model Discrepancy	The means of all x (x= 0-9, A-Z, hyphen or blank) on model number is just for marketing purpose only.
Power Adapter	<ol style="list-style-type: none"> GARMIN / PSAA05A-050 I/P: 100-240V~200mA, 50-60Hz, 13-20VA; O/P: 5VDC, 1A MUSTEK / MT-A005-00101 I/P: 100-240V~250mA, 50-60Hz; O/P: 5VDC, 1A ENG / 3A-055WU05 I/P: 100-240V~, 50-60Hz, 0.3A O/P: 5V, 1A
Frequency Range	5150 ~ 5250 MHz
Transmit Power	IEEE 802.11a mode: 11.51 dBm draft 802.11n Standard-20 MHz Channel mode: 14.83 dBm draft 802.11n Wide-40 MHz Channel mode: 12.21 dBm
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Data Rate	IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps draft 802.11n Standard-20 MHz Channel mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33, 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps) draft 802.11n Wide-40 MHz Channel mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)
Number of Channels	IEEE 802.11a: 3 Channels draft 802.11n Standard-20 MHz Channel: 3 Channels draft 802.11n Wide-40 MHz Channel: 1 Channel
Antenna Specification	Gain: 5.94 dBi
Antenna Designation	PIFA Antenna

Operation Frequency

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
IEEE 802.11a and draft 802.11n Standard-20 MHz	
36	5180
40	5200
44	5220
draft 802.11n Standard-40 MHz	
38	5190

Remark:

- The sample selected for test was production product and was provided by manufacturer.
- This submittal(s) (test report) is intended for FCC ID: **Q87-DMRW1000** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.



3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4. Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT (model: DMRW1000) comes with three types of power adapter(PSAA05A-050& MT-A005-00101 & 3A-055WU05) for sale. After the preliminary test, the EUT with power adapter (Model: 3A-055WU05) was found to emit the worst emissions and therefore had been tested under operating condition.

The EUT is a 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function that operate in double TX chains and double RX chains. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

Software used to control the EUT for staying in continuous transmitting mode was programmed.

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

IEEE 802.11a mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5220MHz) with 6Mbps data rate were chosen for full testing.

draft 802.11n Standard-20 MHz Channel mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5220MHz) with 6.5Mbps data rate were chosen for full testing.

draft 802.11n Wide-40 MHz Channel mode:

5190 MHz with 13.5Mbps data rate were chosen for full testing.



4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

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

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	02/24/2009

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/30/2008
Switch Controller	TRC	Switch Controller	SC94050010	05/03/2009
4 Port Switch	TRC	4 Port Switch	SC94050020	05/03/2009
Horn-Antenna	TRC	HA-0502	06	06/04/2009
Horn-Antenna	TRC	HA-0801	04	06/18/2009
Horn-Antenna	TRC	HA-1201A	01	08/11/2009
Horn-Antenna	TRC	HA-1301A	01	08/11/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/28/2009
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC: 965860 IC: IC 6106	09/25/2009
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than +/- 3.7046dB (30MHz ~ 1GHz), +/-3.0958dB (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESHS30	828144/003	11/19/2008
TWO-Line V-Network 9kHz-30MHz	Schaffner	NNB41	03/10013	06/11/2009
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/09/2009
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than +/- 2.81dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No. 11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT





Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	EN 55011, EN 55014-1/2, CISPR 11, CISPR 14-1/2, EN 55022, EN 55015, CISPR 22, CISPR 15, AS/NZS 3548, VCCI V3 (2001), CFR 47, FCC Part 15/18, CNS 13783-1, CNS 13439, CNS 13438, CNS 13803, CNS 14115, EN 55024, IEC 801-2, IEC 801-3, IEC 801-4, IEC/EN 61000-3-2, IEC/EN 61000-3-3, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 50081-1/ EN 61000-6-3, EN 50081-2/EN 61000-6-4, EN 50081-2/EN 61000-6-1: 2001	 ACCREDITED TESTING CERT #0824.01
USA	FCC	3M Semi Anechoic Chamber (965860 and 898658) to perform FCC Part 15/18 measurements	 965860, 898658
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 TAF Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 6106 & IC 6106A-2) to perform RSS 212 Issue 1	 Canada IC 6106 IC 6106A-2

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

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

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	Sony	VGN-S44TP	28198080 8100339	WLAN: ETC094LPD0155 Bluetooth: ETC094LPD0156	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



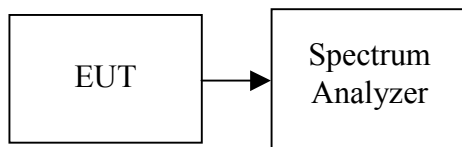
7. FCC PART 15 REQUIREMENTS

7.1 26 dB EMISSION BANDWIDTH

LIMIT

According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as $RBW = 1\%EBW$, $VBW = RBW$, $Span = 50MHz$, and $Sweep = auto$.
Or Set the spectrum analyzer as $RBW > 1\%EBW$, $VBW > RBW$, $Span > 26dB$ bandwidth, and $Sweep = auto$.
4. Mark the peak frequency and $-26dB$ (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5180	19.599
Mid	5200	19.744
High	5220	19.846

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5180	20.269
Mid	5200	20.124
High	5220	20.032

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5180	20.448
Mid	5200	19.959
High	5220	20.205

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	41.239

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	41.851



Test Plot

IEEE 802.11a mode:

CH Low

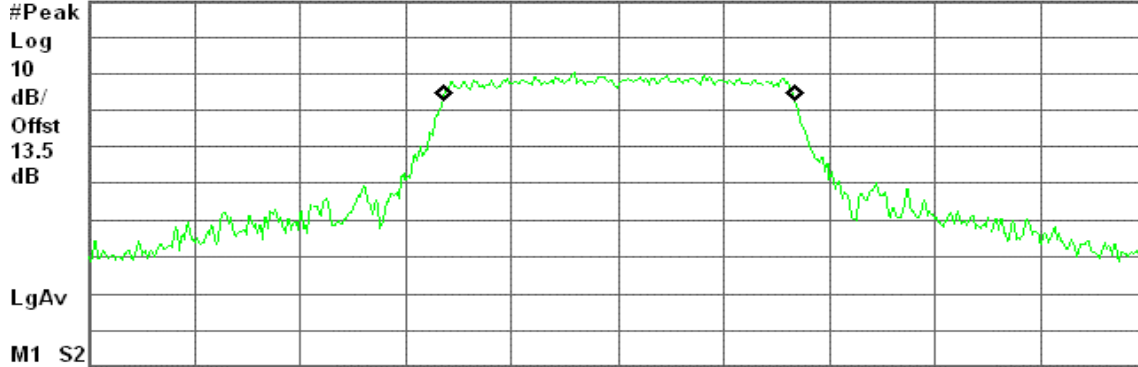
Agilent 12:59:54 Jul 27, 2008

R T

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 5.180 00 GHz

Span 50 MHz

#Res BW 220 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
16.5158 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 64.020 kHz
x dB Bandwidth 19.599 MHz

CH Mid

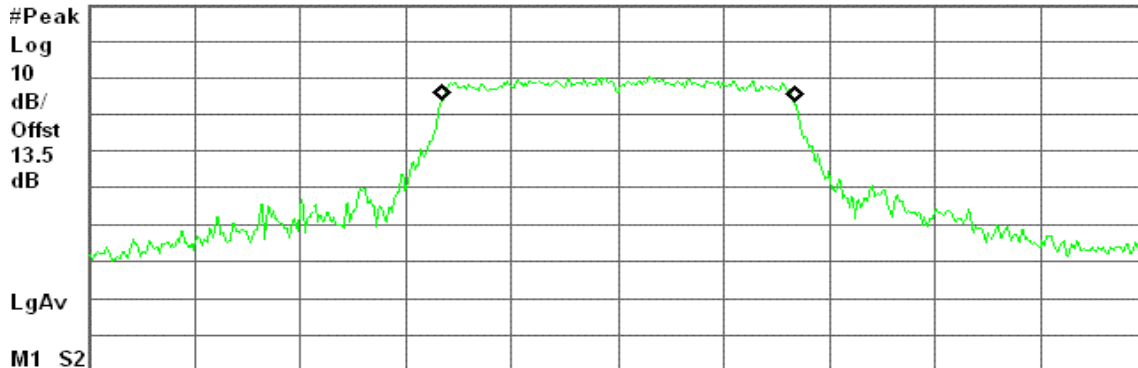
Agilent 13:09:44 Jul 27, 2008

R T

26 dB BW, a Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 5.200 00 GHz

Span 50 MHz

#Res BW 220 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
16.5341 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 35.387 kHz
x dB Bandwidth 19.744 MHz



CH High

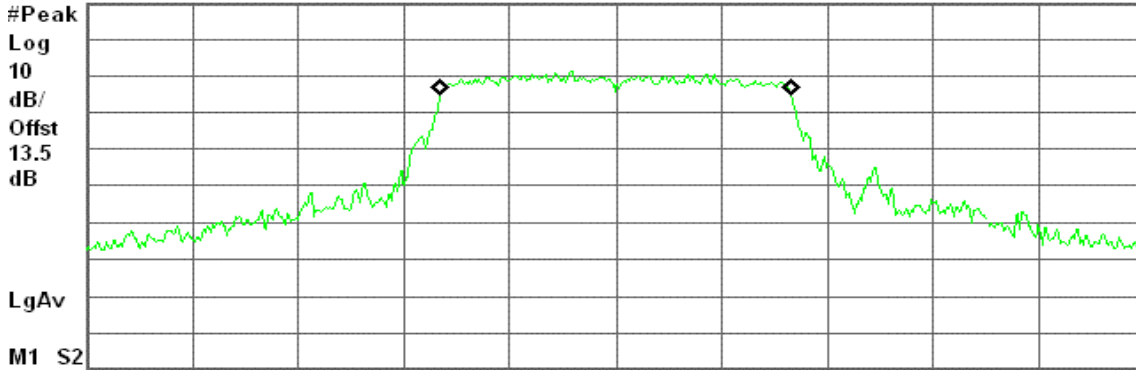
Agilent 13:30:33 Jul 27, 2008

R T

26 dB BW, a Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 5.220 00 GHz

Span 50 MHz

#Res BW 220 kHz

#VBW 620 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
16.5002 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 24.586 kHz
x dB Bandwidth 19.846 MHz

draft 802.11n Standard-20 MHz Channel mode / Chain 0

CH Low

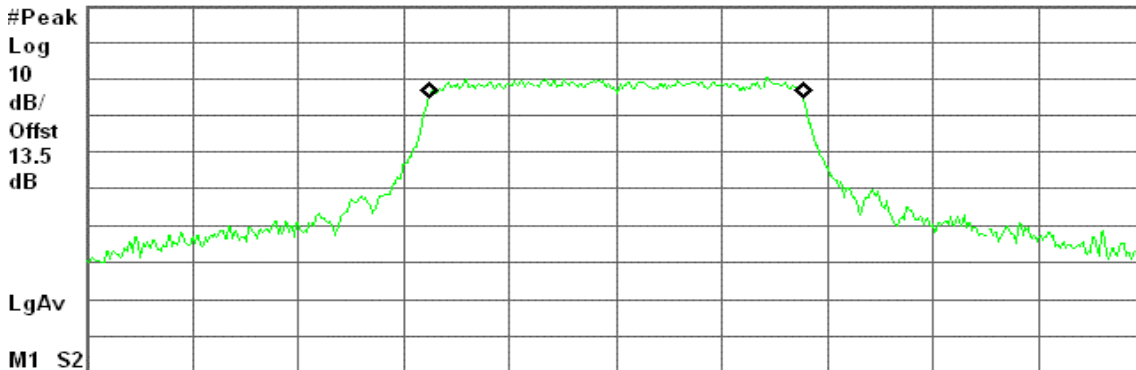
Agilent 13:49:25 Jul 27, 2008

R T

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 5.180 00 GHz

Span 50 MHz

#Res BW 240 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.5927 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 31.185 kHz
x dB Bandwidth 20.269 MHz



CH Mid

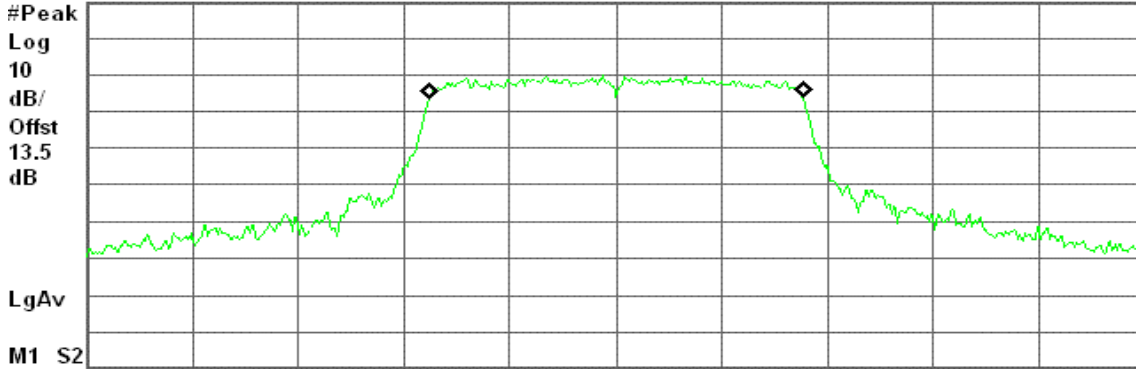
Agilent 14:02:57 Jul 27, 2008

R T

26 dB BW, a Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 5.200 00 GHz

Span 50 MHz

#Res BW 220 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.5400 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 48.429 kHz
x dB Bandwidth 20.124 MHz

CH High

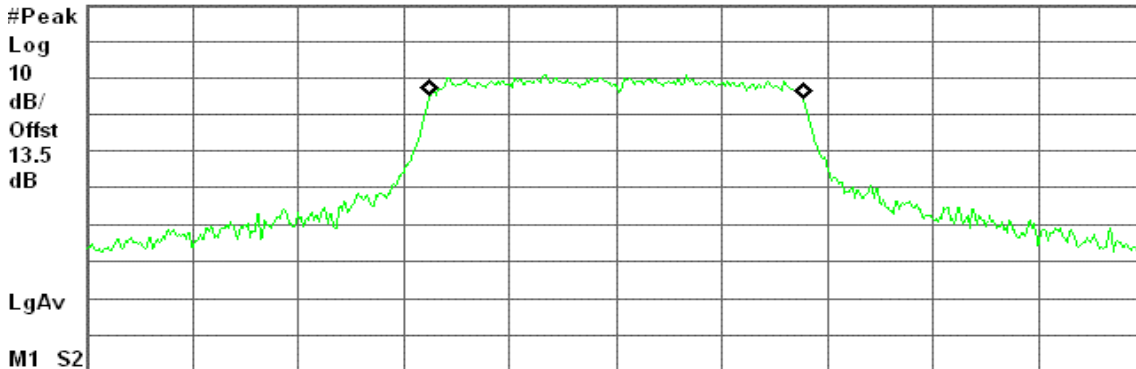
Agilent 14:10:03 Jul 27, 2008

R T

26 dB BW, a Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 5.220 00 GHz

Span 50 MHz

#Res BW 240 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.5292 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 48.156 kHz
x dB Bandwidth 20.032 MHz



draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low

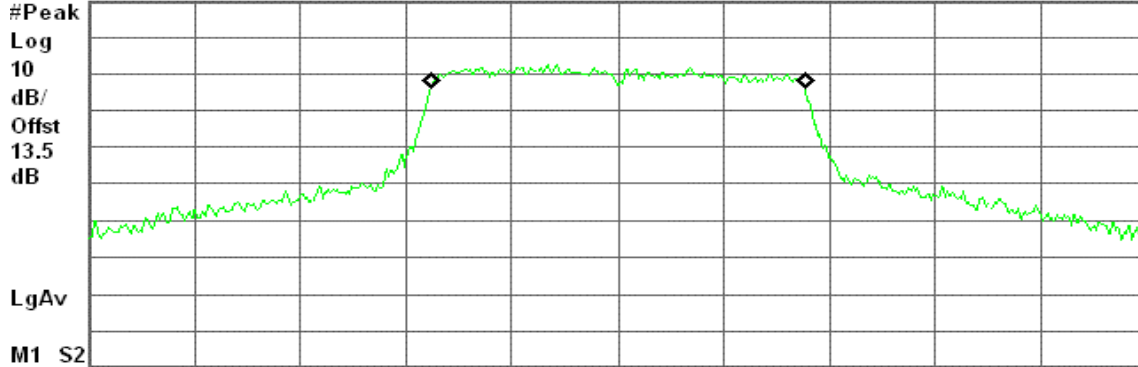
Agilent 15:28:05 Jul 27, 2008

R T

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 5.180 00 GHz

Span 50 MHz

#Res BW 240 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.5926 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 24.899 kHz
x dB Bandwidth 20.448 MHz

CH Mid

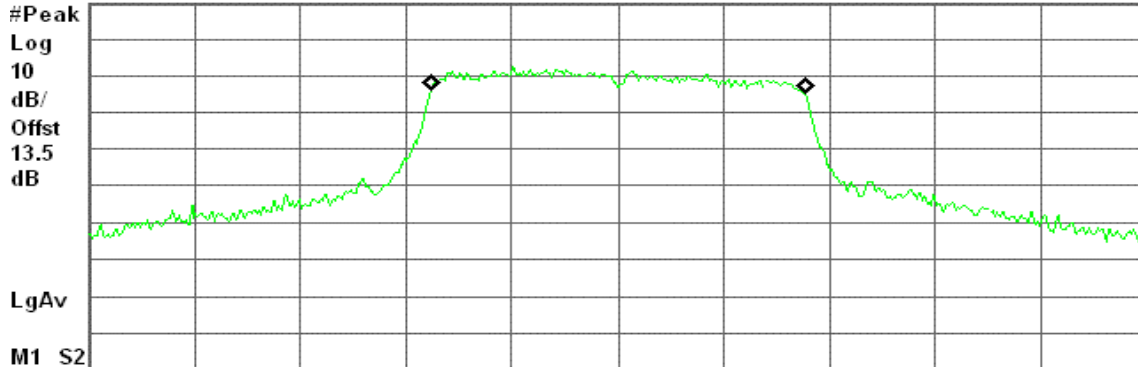
Agilent 15:35:03 Jul 27, 2008

R T

26 dB BW, a Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 5.200 00 GHz

Span 50 MHz

#Res BW 220 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.5731 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 20.519 kHz
x dB Bandwidth 19.959 MHz



CH High

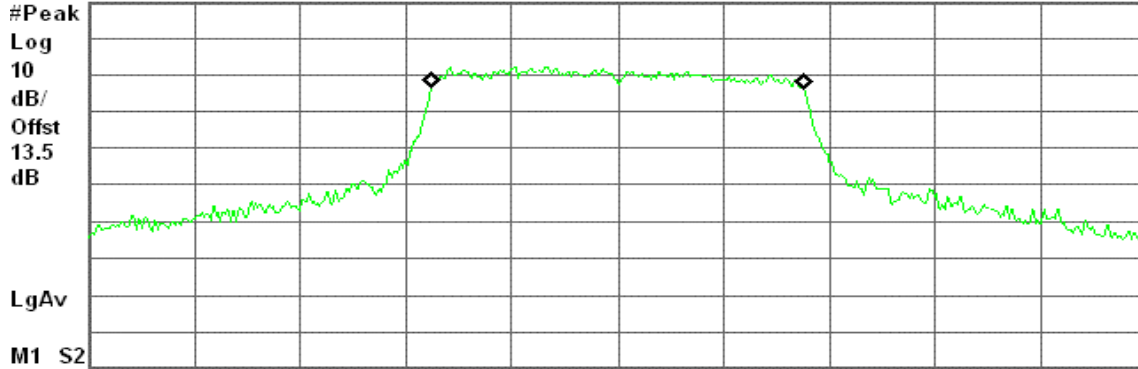
Agilent 15:42:44 Jul 27, 2008

R T

26 dB BW, a Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 5.220 00 GHz

Span 50 MHz

#Res BW 240 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
17.5143 MHz

Occ BW % Pwr	99.00 %
x dB	-26.00 dB

Transmit Freq Error	19.050 kHz
x dB Bandwidth	20.205 MHz



draft 802.11n Wide-40 MHz Channel mode / Chain 0

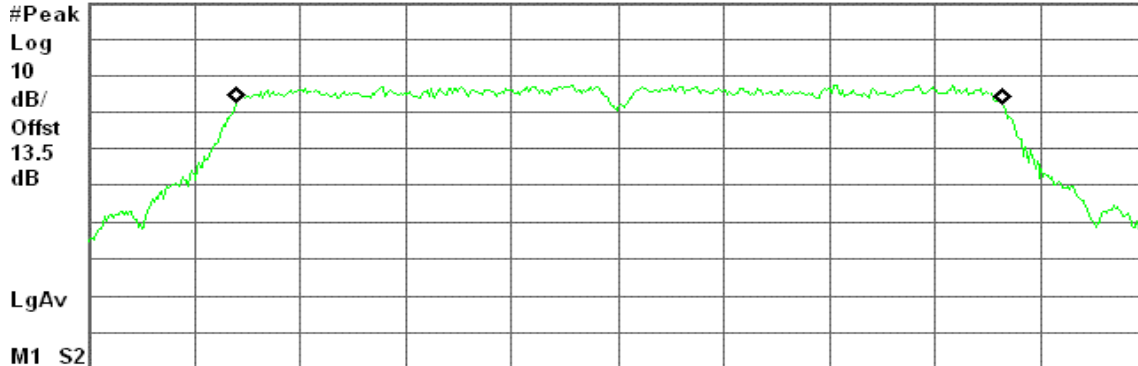
Agilent 18:31:47 Jul 27, 2008

R T

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Occupied Bandwidth
36.1390 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 100.912 kHz
x dB Bandwidth 41.239 MHz

draft 802.11n Wide-40 MHz Channel mode / Chain 1

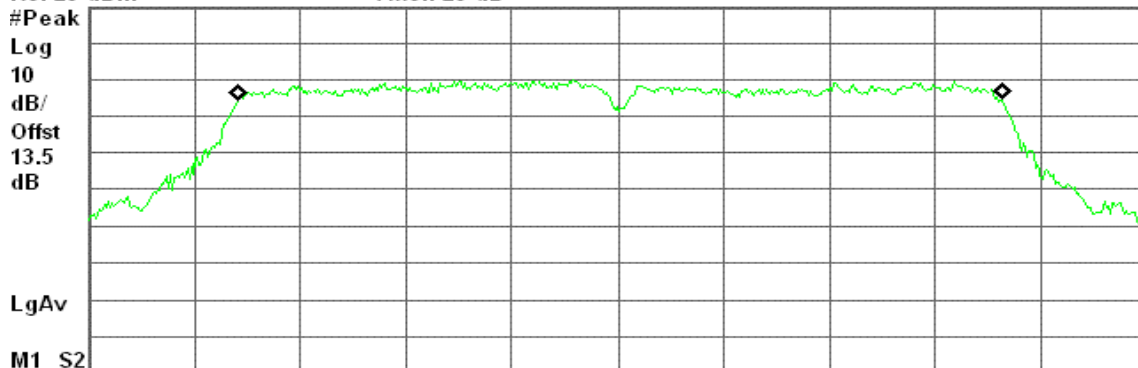
Agilent 18:37:55 Jul 27, 2008

R T

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Occupied Bandwidth
36.0666 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 108.573 kHz
x dB Bandwidth 41.851 MHz



7.2 PEAK POWER

LIMIT

According to §15.407(a),

- (1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW(16.98dBm) or 4 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in MHz.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

The peak power shall not exceed the limit as follow:

Specified Limit of the Peak Power

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	Limit 4 + 10 Log B (dBm)	Power Limit (dBm)
Low	5180	19.59	12.92	16.92	17.00
Mid	5200	19.74	12.95	16.95	17.00
High	5220	19.84	12.97	16.97	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	Limit 4 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	20.26	20.44	23.36	13.68	17.68	17.00
Mid	5200	20.12	19.95	23.05	13.62	17.62	17.00
High	5220	20.03	20.20	23.13	13.64	17.64	17.00

Test mode: draft 802.11n Wide-40 MHz Channel mode

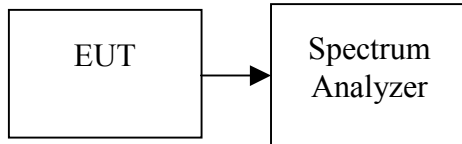
Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	Limit 4 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5190	41.23	41.85	44.56	16.48	20.48	17.00

(Remark: Maximum antenna gain = 5.94dBi, therefore there is no reduction due to antenna gain.)



Test Configuration

The EUT was connected to a spectrum analyzer through a 50 Ω RF cable.



TEST PROCEDURE

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. 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”. Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	10.52	17.00
Mid	5200	10.88	17.00
High	5220	11.51	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	10.79	12.55	14.77	17.00
Mid	5200	10.80	12.55	14.77	17.00
High	5220	11.08	12.45	14.83	17.00

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
	5190	8.03	10.12	12.21	17.00



Test Plot

IEEE 802.11a mode

CH Low

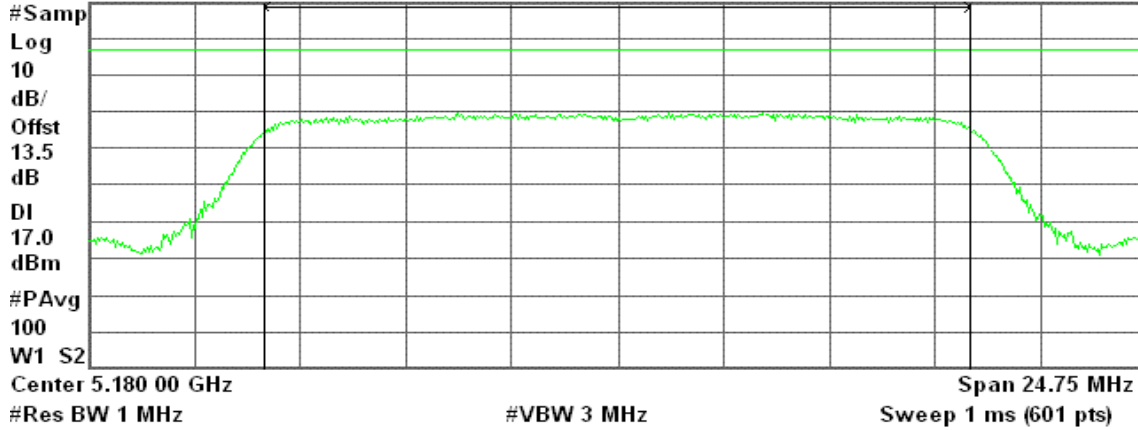
Agilent 13:01:41 Jul 27, 2008

R T

Peak Transmit Power, a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

10.52 dBm / 16.5000 MHz

Power Spectral Density

-61.66 dBm/Hz

CH Mid

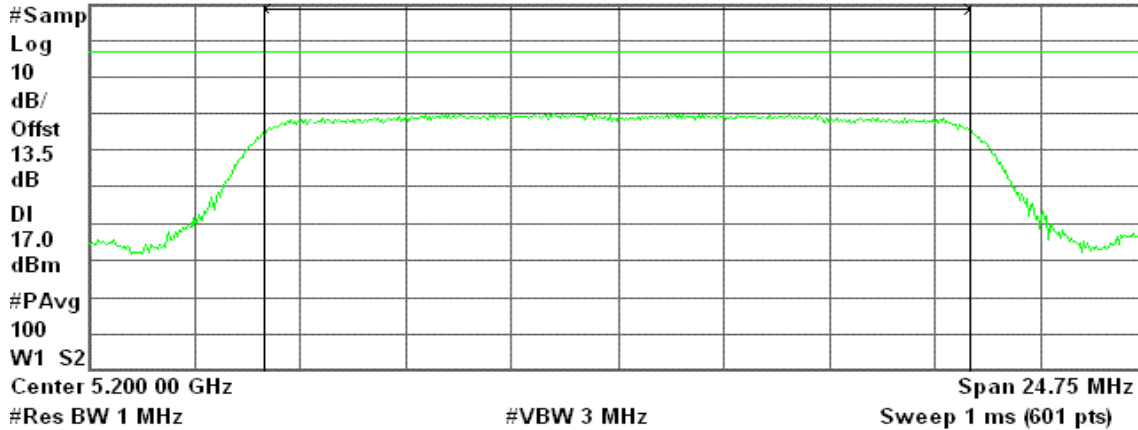
Agilent 13:10:42 Jul 27, 2008

R T

Peak Transmit Power, a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Channel Power

10.88 dBm / 16.5000 MHz

Power Spectral Density

-61.29 dBm/Hz



CH High

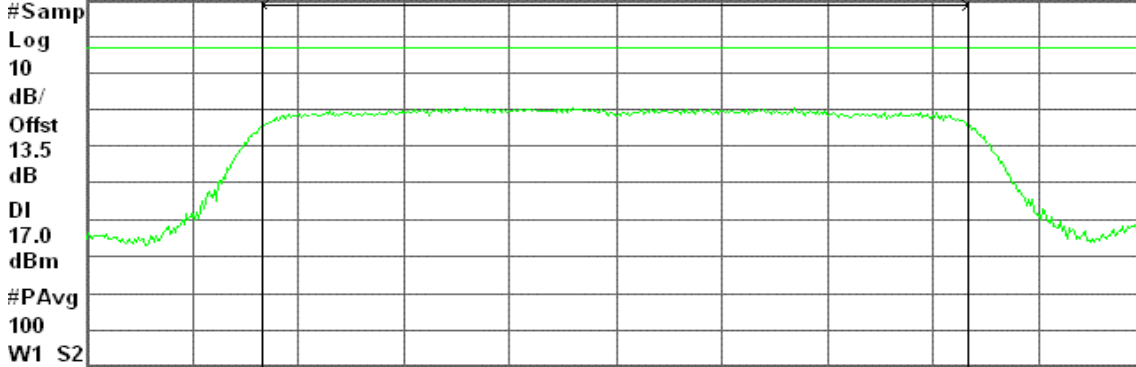
Agilent 13:35:28 Jul 27, 2008

R T

Peak Transmit Power, a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 5.220 00 GHz

Span 24.75 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

11.51 dBm / 16.5000 MHz

-60.66 dBm/Hz

draft 802.11n Standard-20 MHz Channel mode / Chain 0

CH Low

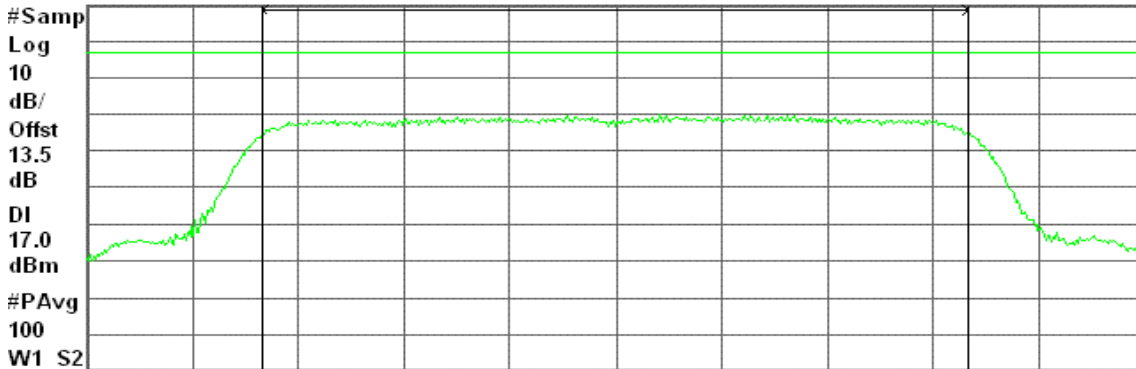
Agilent 13:51:10 Jul 27, 2008

R T

Peak Transmit Power, a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.180 00 GHz

Span 26.31 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

10.79 dBm / 17.5400 MHz

-61.65 dBm/Hz



CH Mid

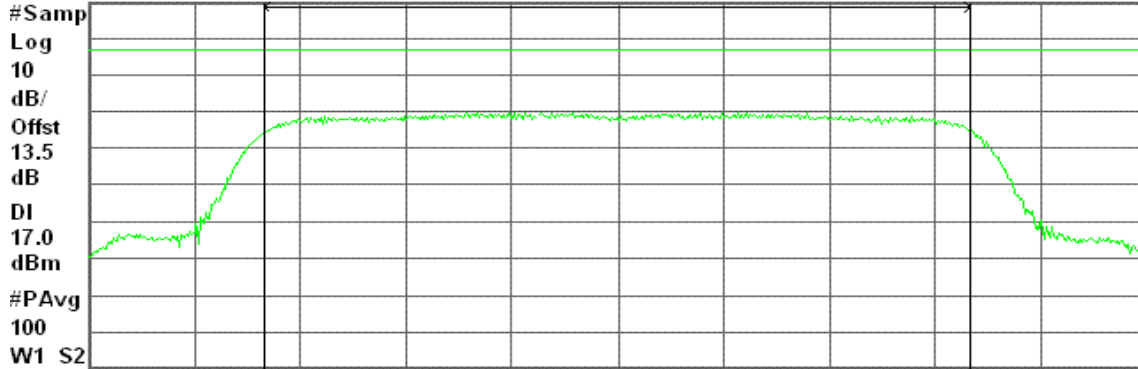
Agilent 14:04:08 Jul 27, 2008

R T

Peak Transmit Power, a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 5.200 00 GHz

Span 26.28 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

10.80 dBm / 17.5200 MHz

-61.63 dBm/Hz

CH High

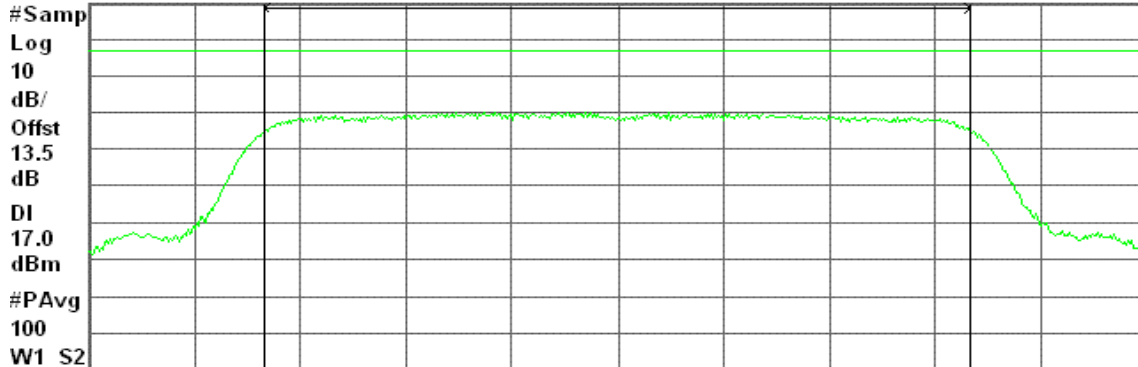
Agilent 14:11:07 Jul 27, 2008

R T

Peak Transmit Power, a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 5.220 00 GHz

Span 26.28 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

11.08 dBm / 17.5200 MHz

-61.36 dBm/Hz



draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low

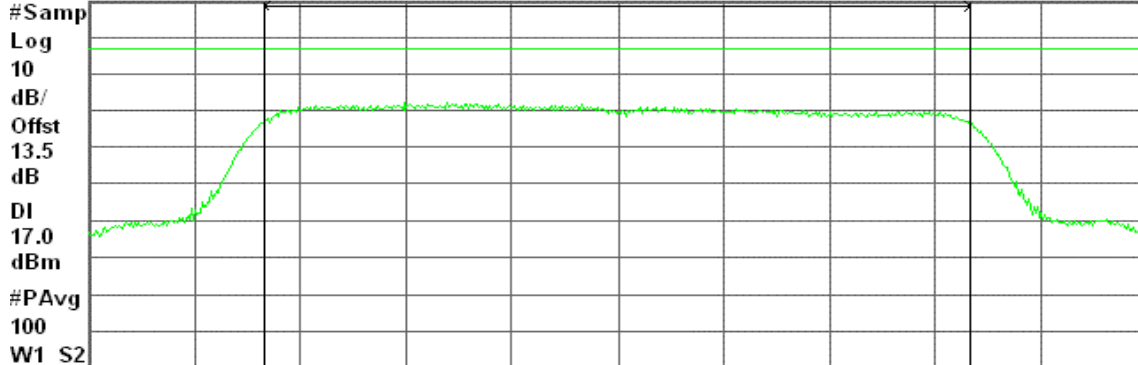
Agilent 15:29:44 Jul 27, 2008

R T

Peak Transmit Power, a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.180 00 GHz

Span 26.39 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.55 dBm / 17.5900 MHz

-59.91 dBm/Hz

CH Mid

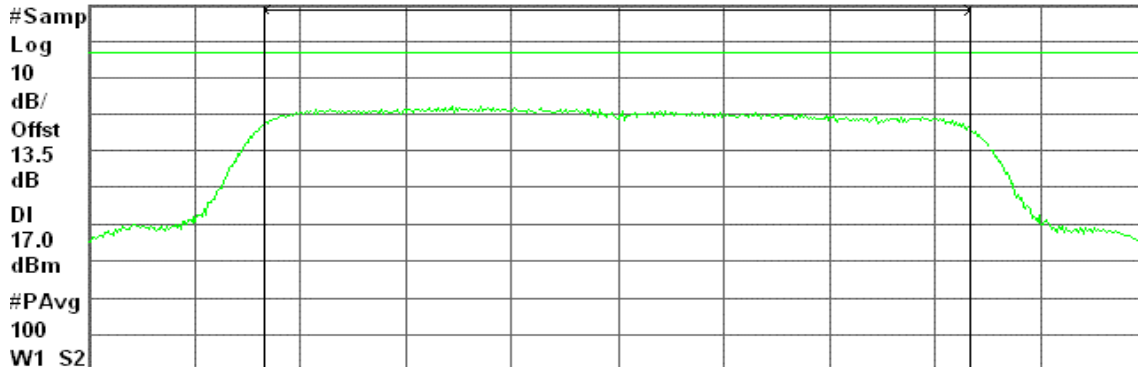
Agilent 15:36:12 Jul 27, 2008

R T

Peak Transmit Power, a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 5.200 00 GHz

Span 26.34 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.55 dBm / 17.5600 MHz

-59.89 dBm/Hz



CH High

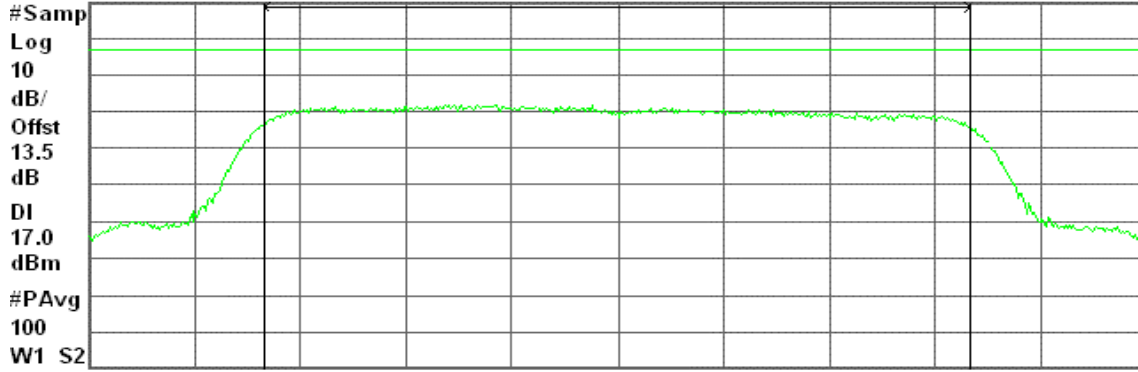
Agilent 15:44:09 Jul 27, 2008

R T

Peak Transmit Power, a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 5.220 00 GHz

Span 26.32 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.45 dBm / 17.5500 MHz

-59.99 dBm/Hz

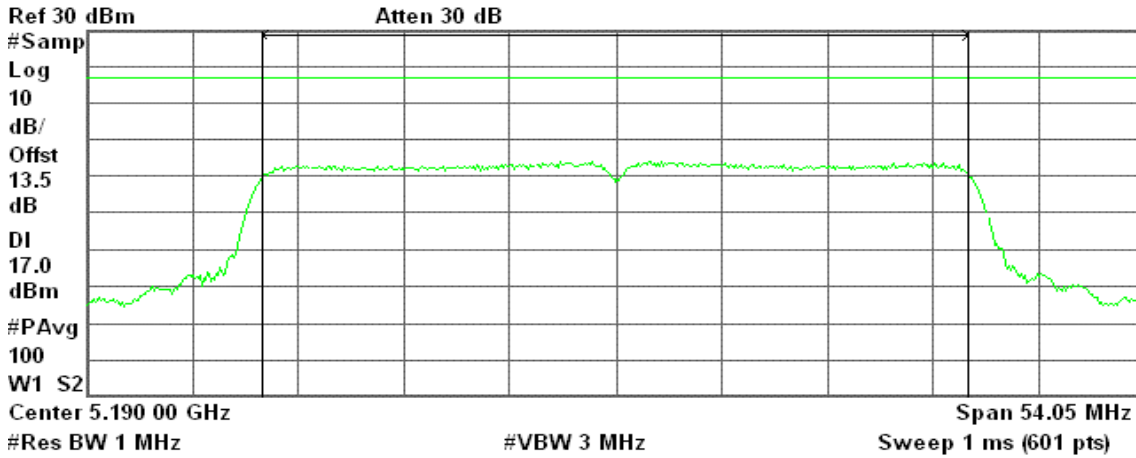


draft 802.11n Wide-40 MHz Channel mode / Chain 0

Agilent 18:33:07 Jul 27, 2008

R T

Peak Transmit Power, a Mode Low Ch.



Channel Power

8.03 dBm / 36.0300 MHz

Power Spectral Density

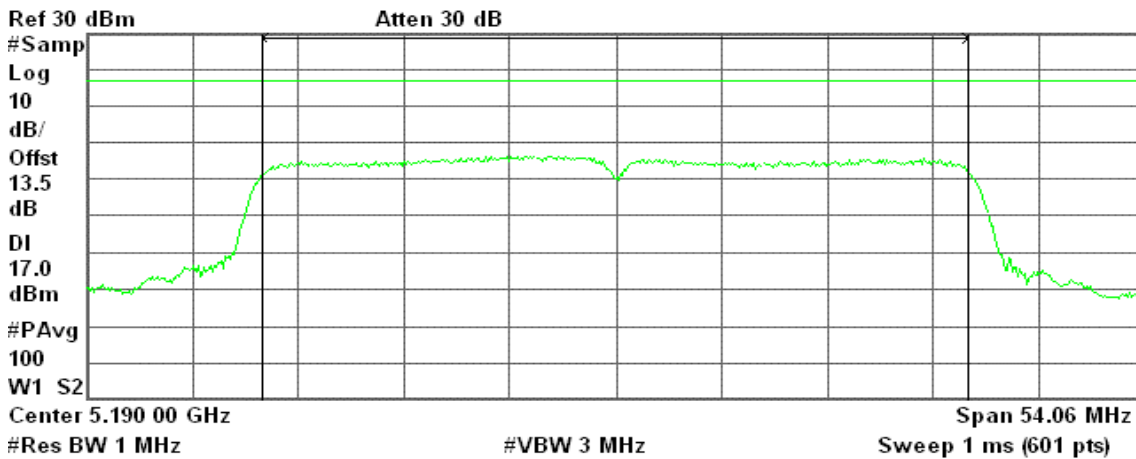
-67.54 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / Chain 1

Agilent 18:39:17 Jul 27, 2008

R T

Peak Transmit Power, a Mode Low Ch.



Channel Power

10.12 dBm / 36.0400 MHz

Power Spectral Density

-65.45 dBm/Hz

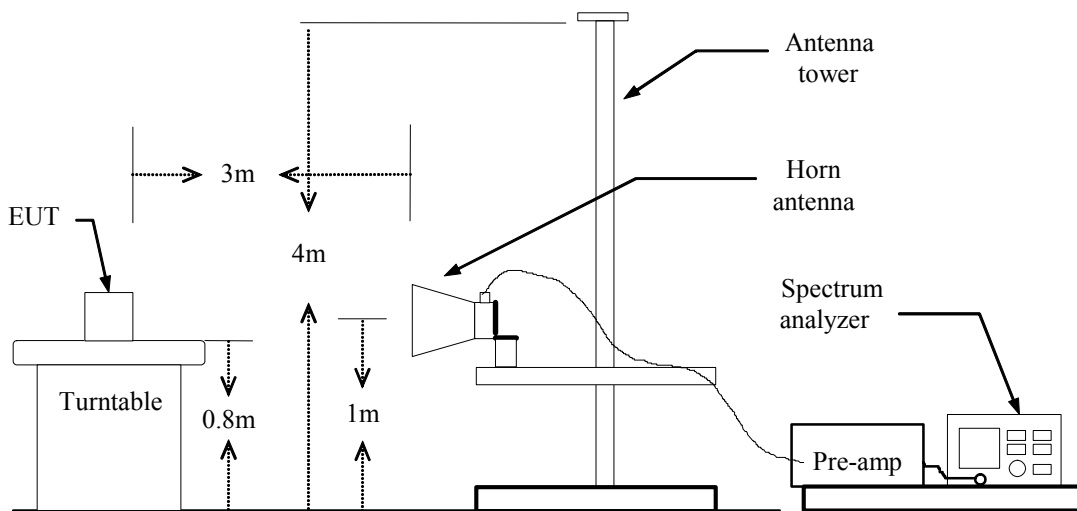
7.3 BAND EDGES MEASUREMENT

LIMIT

According to §15.407(b),

- (1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

Refer to attach spectrum analyzer data chart.



Band Edges (IEEE 802.11a mode / CH Low)

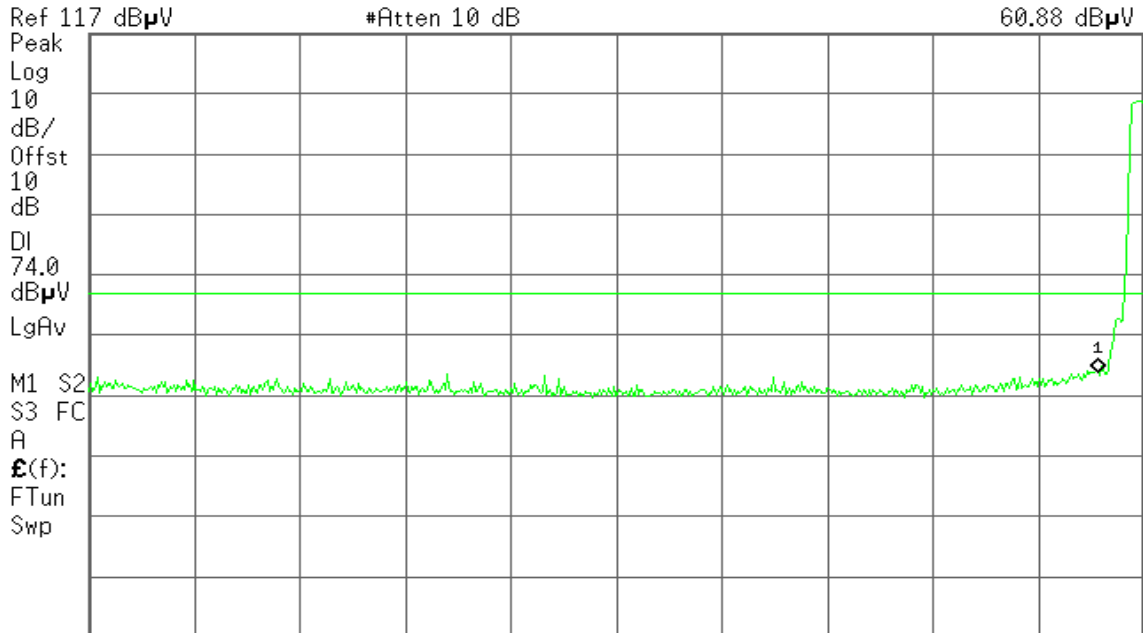
Detector mode: Peak

Polarity: Vertical

Agilent

T

Mkr1 5.150 0 GHz
60.88 dB μ V



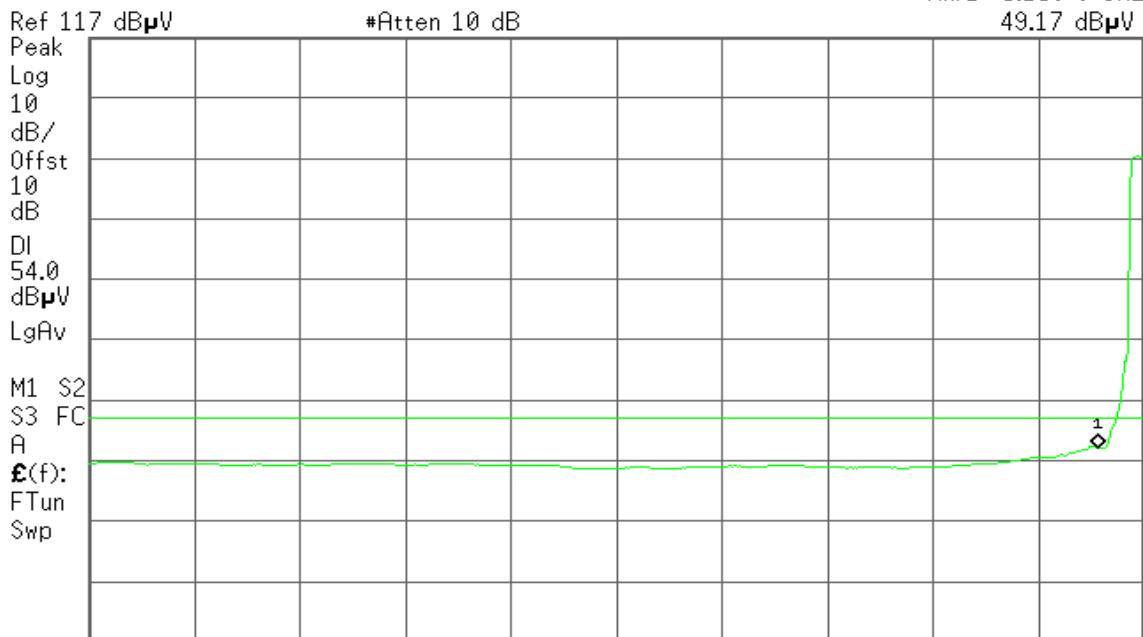
Detector mode: Average

Polarity: Vertical

Agilent

T

Mkr1 5.150 0 GHz
49.17 dB μ V





Detector mode: Peak

Polarity: Horizontal

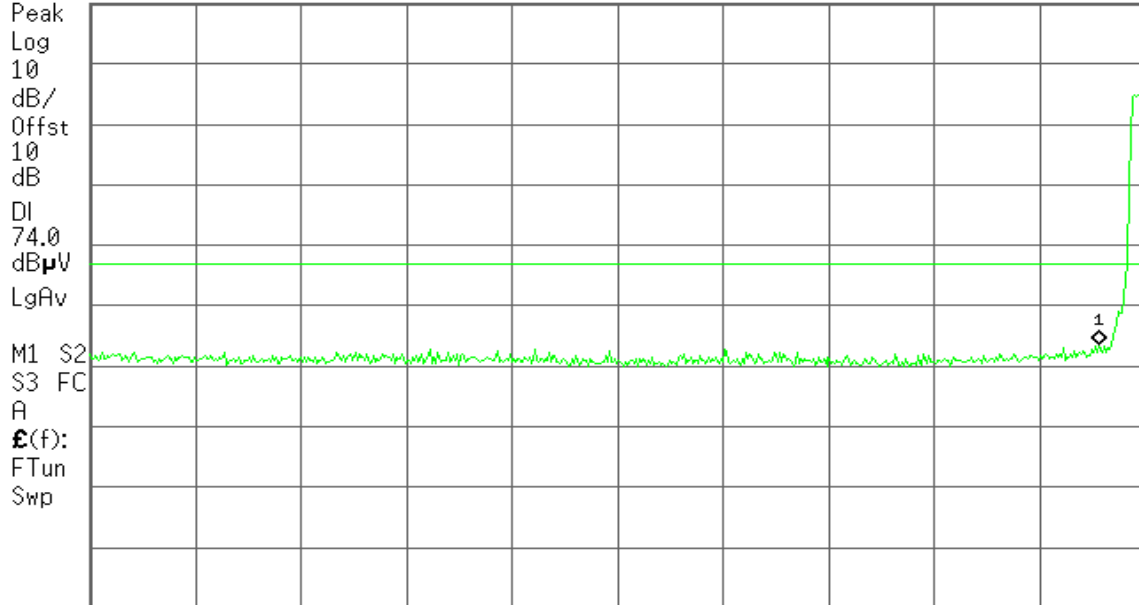
Agilent

R T

Mkr1 5.150 0 GHz
60.62 dBμV

Ref 117 dBμV

#Atten 10 dB



Start 4.500 0 GHz

Stop 5.180 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

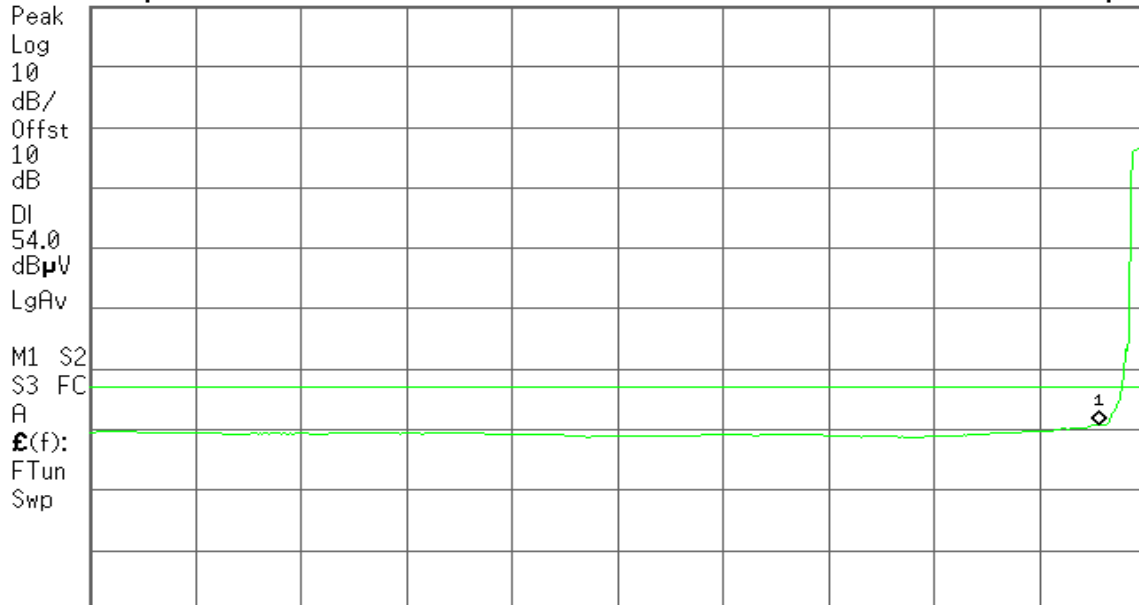
Agilent

R T

Mkr1 5.150 0 GHz
47.72 dBμV

Ref 117 dBμV

#Atten 10 dB



Start 4.500 0 GHz

Stop 5.180 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 53.02 s (601 pts)



Band Edges (IEEE 802.11a mode / CH High)

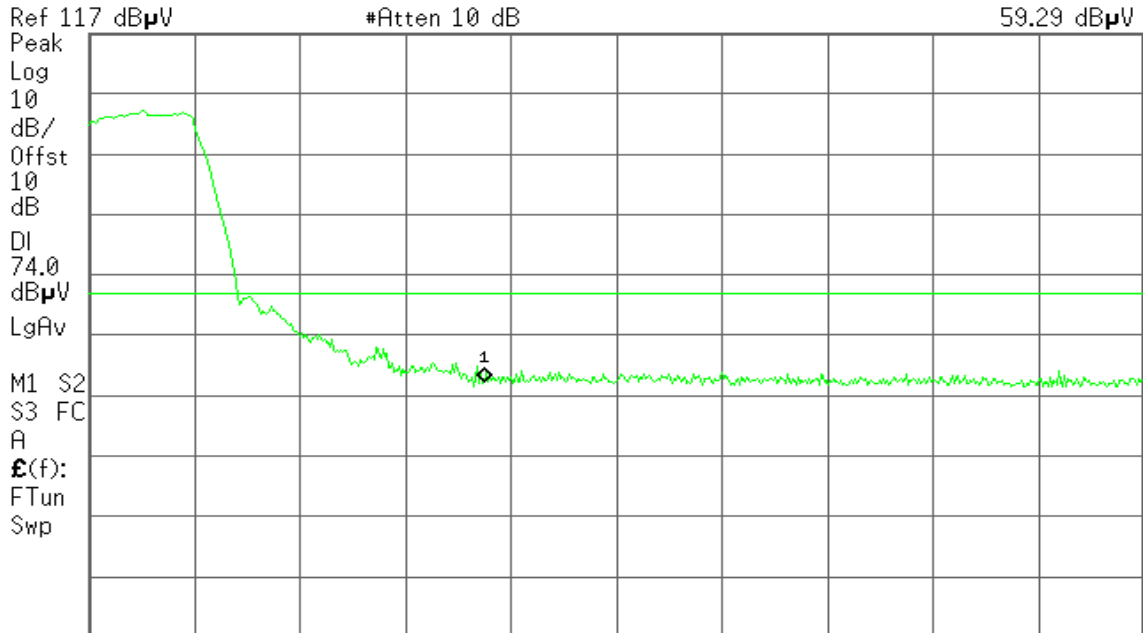
Detector mode: Peak

Polarity: Vertical

Agilent

T

Mkr1 5.250 00 GHz
59.29 dB μ V



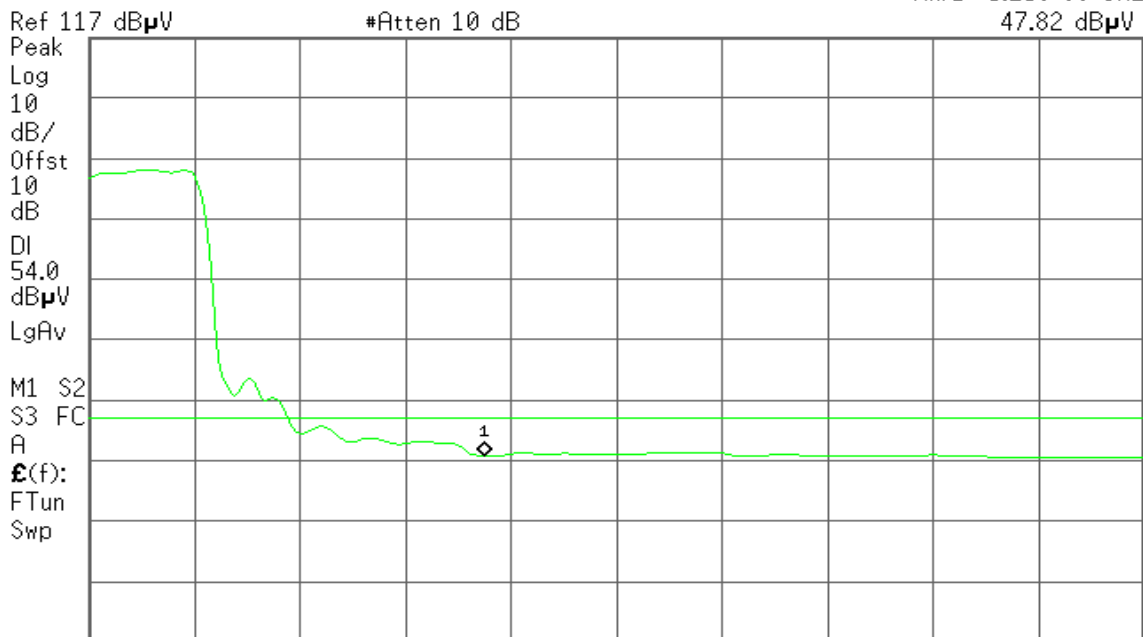
Detector mode: Average

Polarity: Vertical

Agilent

T

Mkr1 5.250 00 GHz
47.82 dB μ V





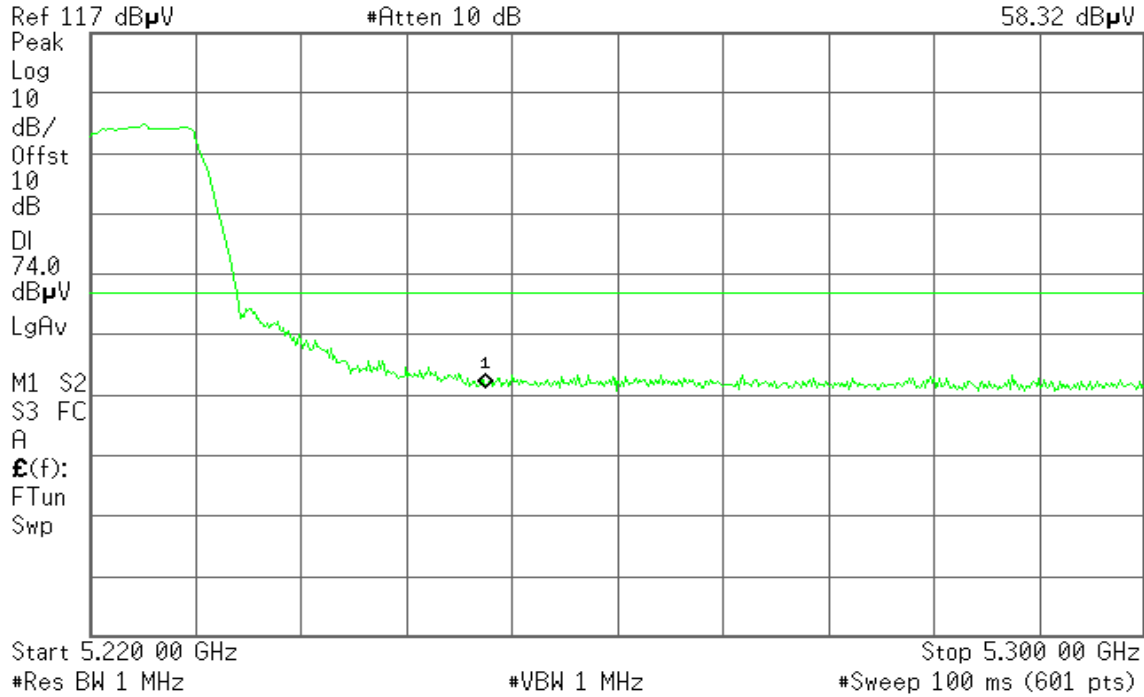
Detector mode: Peak

Polarity: Horizontal

Agilent

T

Mkr1 5.250 00 GHz
58.32 dBµV



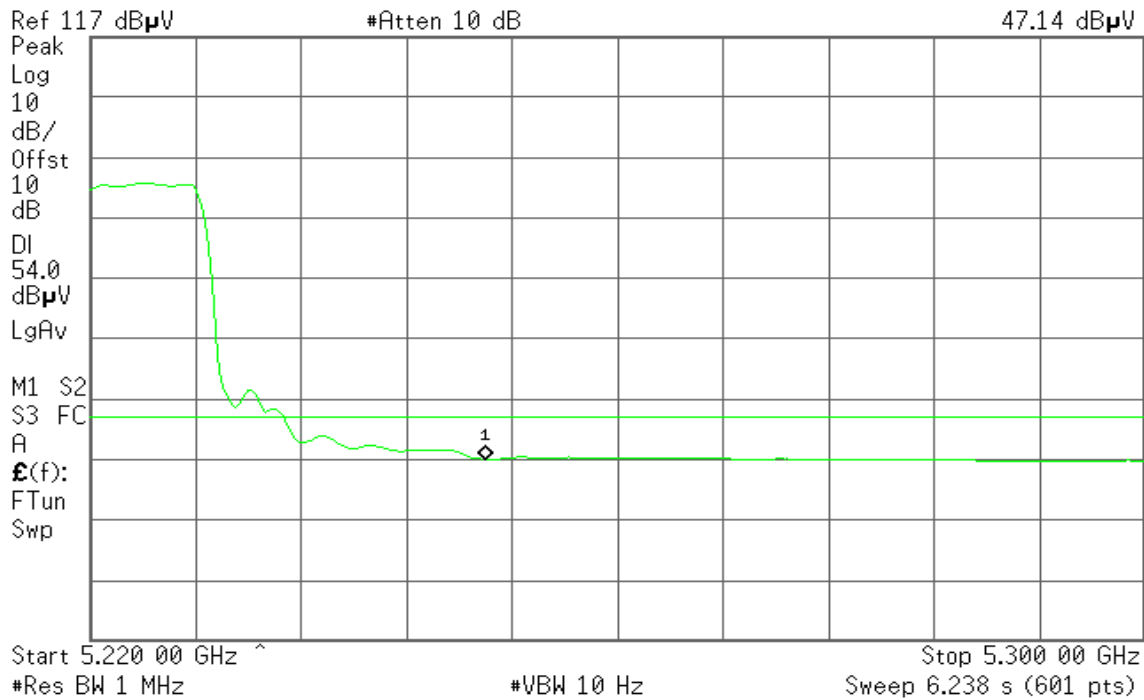
Detector mode: Average

Polarity: Horizontal

Agilent

T

Mkr1 5.250 00 GHz
47.14 dBµV





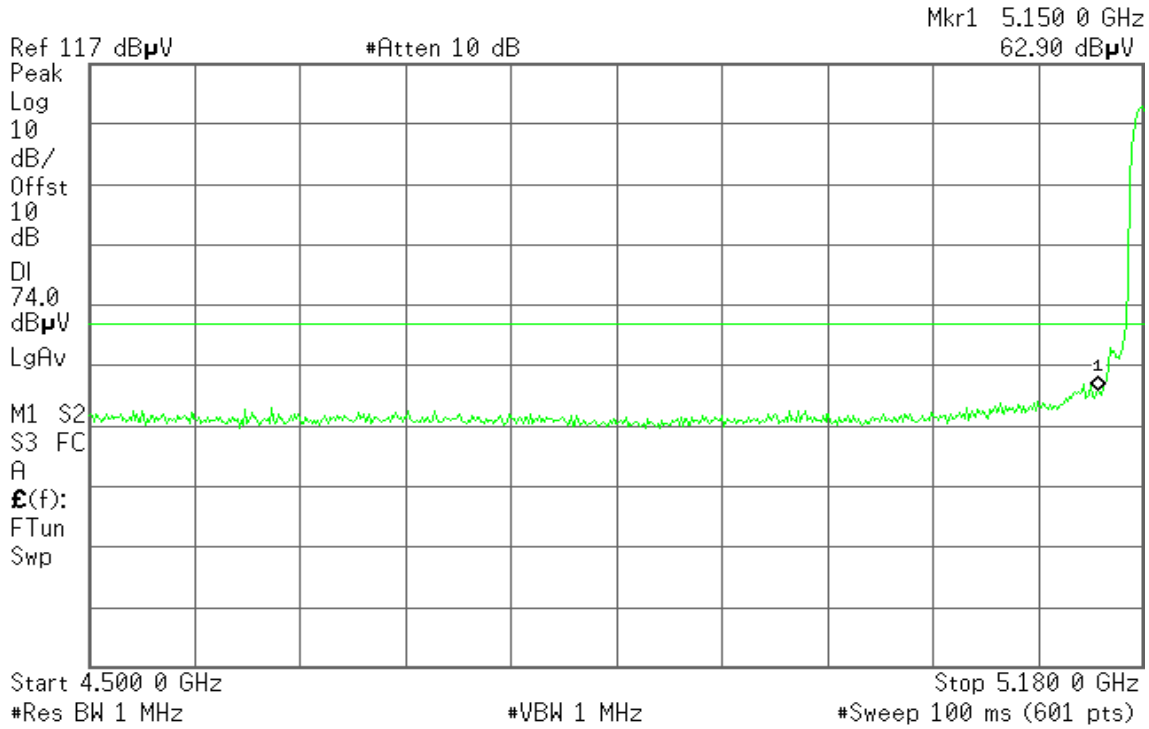
Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent

T

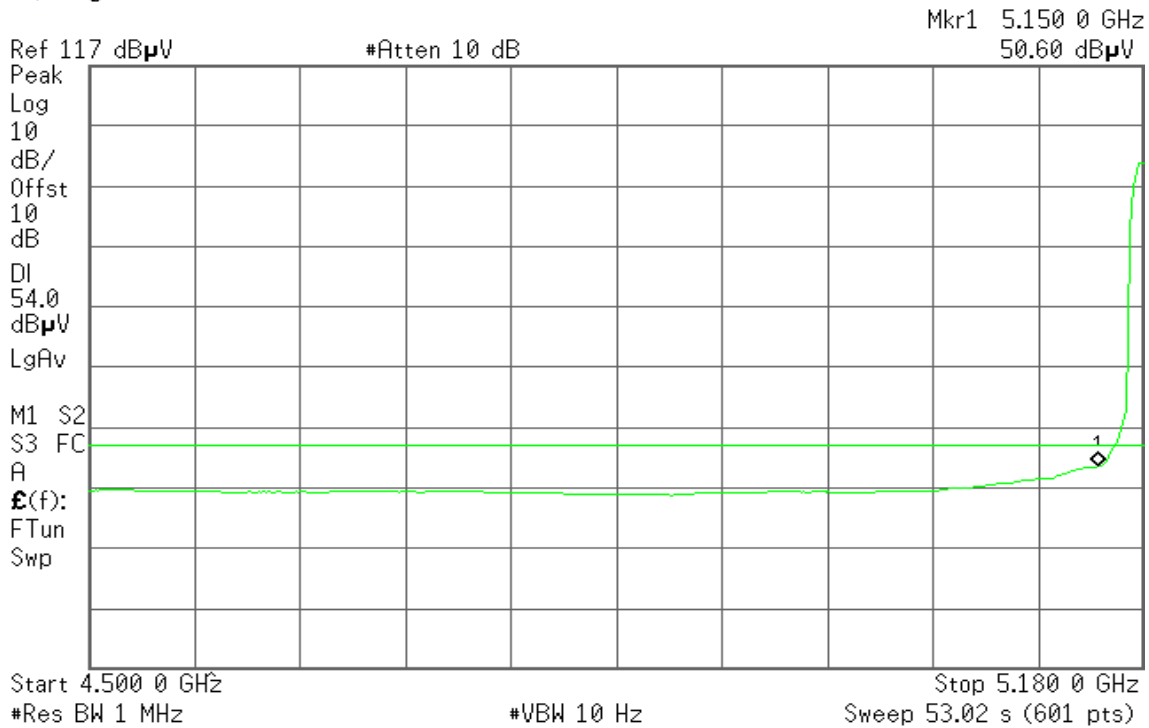


Detector mode: Average

Polarity: Vertical

Agilent

T





Detector mode: Peak

Polarity: Horizontal

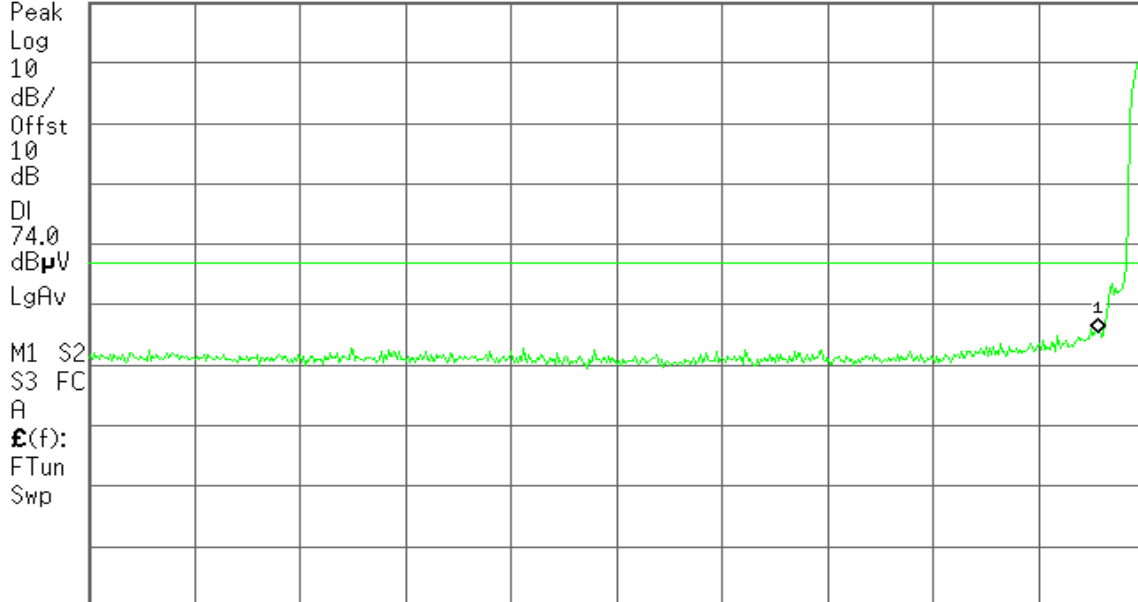
Agilent

R T

Mkr1 5.150 0 GHz
62.53 dBµV

Ref 117 dBµV

#Atten 10 dB



Start 4.500 0 GHz

Stop 5.180 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

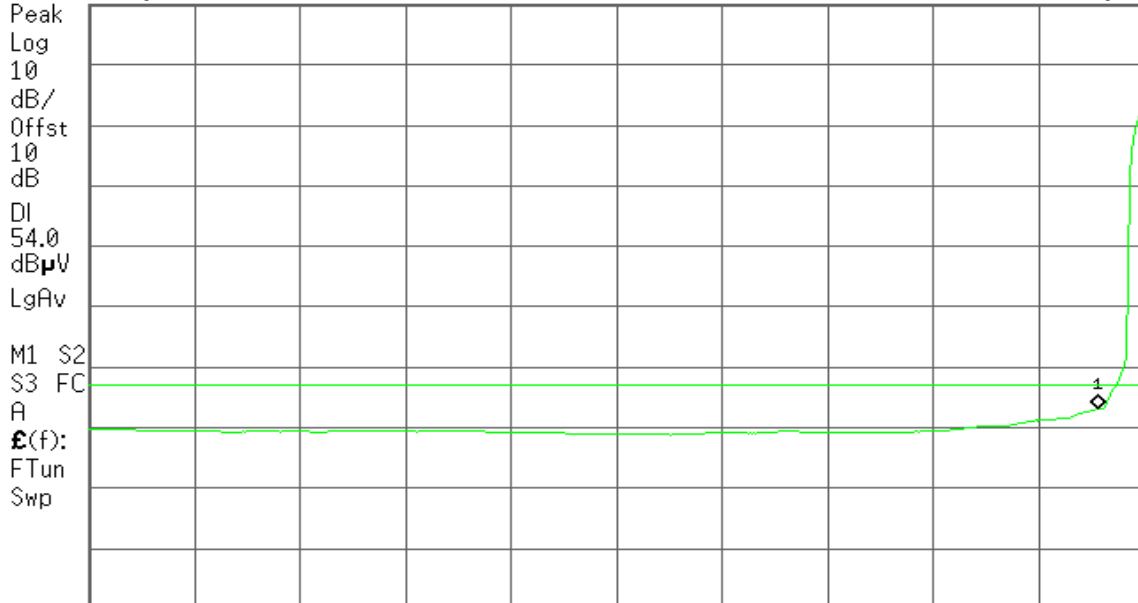
Agilent

R T

Mkr1 5.150 0 GHz
50.13 dBµV

Ref 117 dBµV

#Atten 10 dB



Start 4.500 0 GHz^

Stop 5.180 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 53.02 s (601 pts)



Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH High)

Detector mode: Peak

Polarity: Vertical

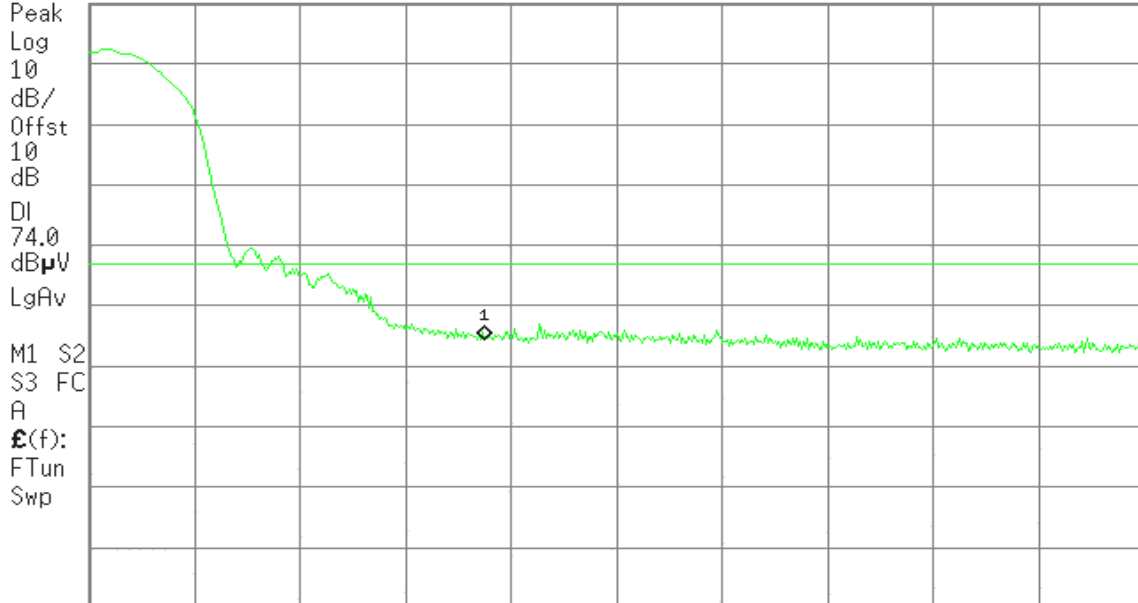
Agilent

T

Mkr1 5.250 00 GHz
61.44 dB μ V

Ref 117 dB μ V

#Atten 10 dB



Start 5.220 00 GHz

#Res BW 1 MHz

VBW 1 MHz

Stop 5.300 00 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Vertical

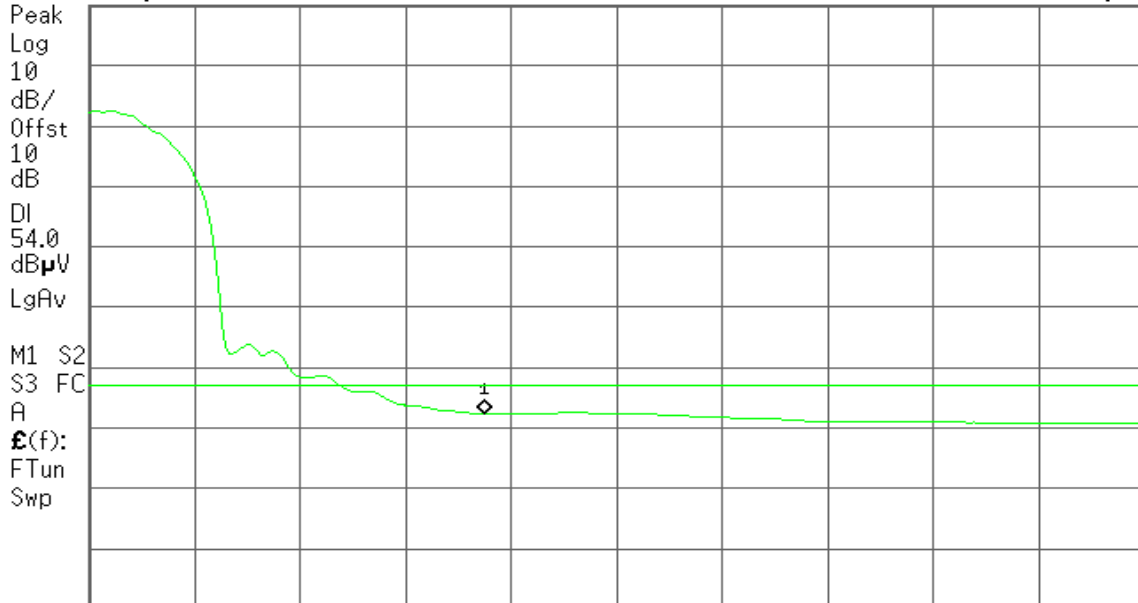
Agilent

T

Mkr1 5.250 00 GHz
49.34 dB μ V

Ref 117 dB μ V

#Atten 10 dB



Start 5.220 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 5.300 00 GHz

Sweep 6.238 s (601 pts)



Detector mode: Peak

Polarity: Horizontal

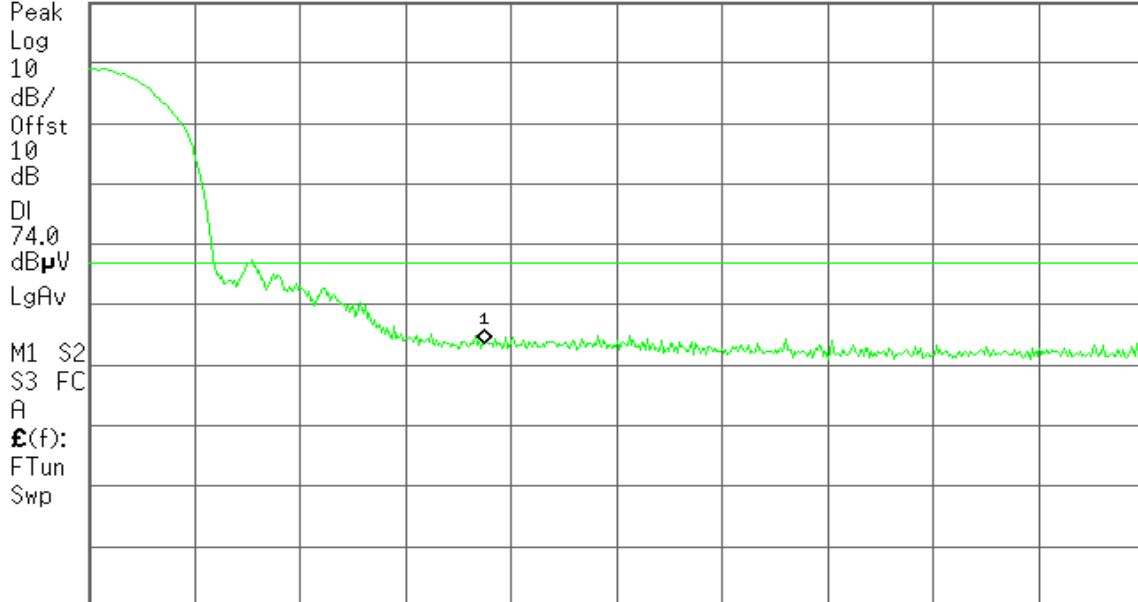
Agilent

T

Mkr1 5.250 00 GHz
60.72 dBμV

Ref 117 dBμV

#Atten 10 dB



Start 5.220 00 GHz

Stop 5.300 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

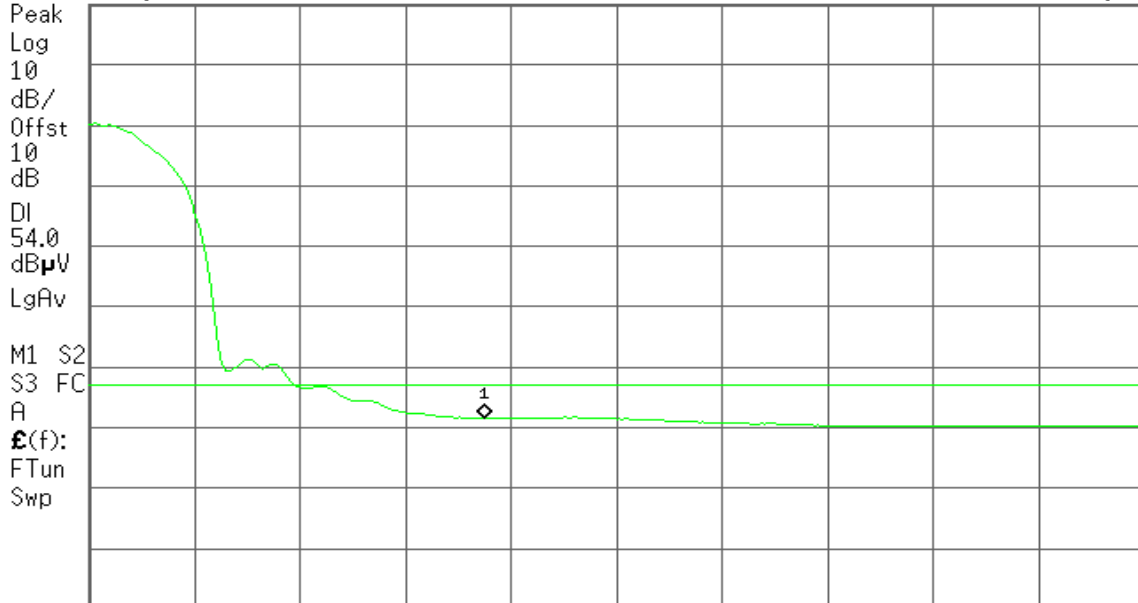
Agilent

T

Mkr1 5.250 00 GHz
48.58 dBμV

Ref 117 dBμV

#Atten 10 dB



Start 5.220 00 GHz

Stop 5.300 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 6.238 s (601 pts)



Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH Low)

Detector mode: Peak

Polarity: Vertical

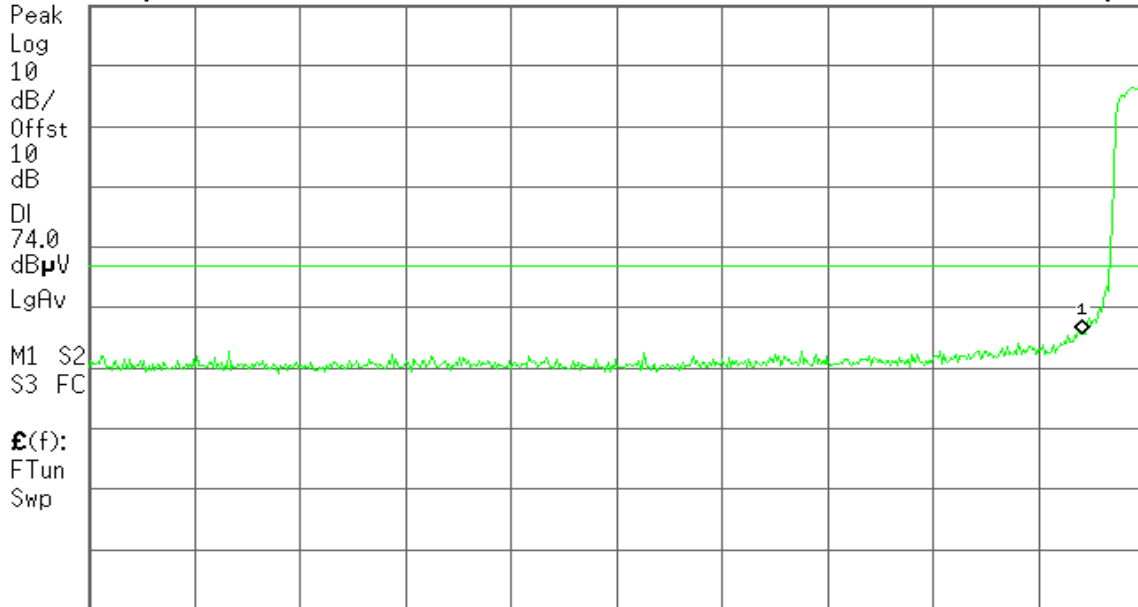
Agilent

T

Mkr1 5.150 0 GHz
62.71 dB μ V

Ref 117 dB μ V

#Atten 10 dB



Start 4.500 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 5.190 0 GHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Vertical

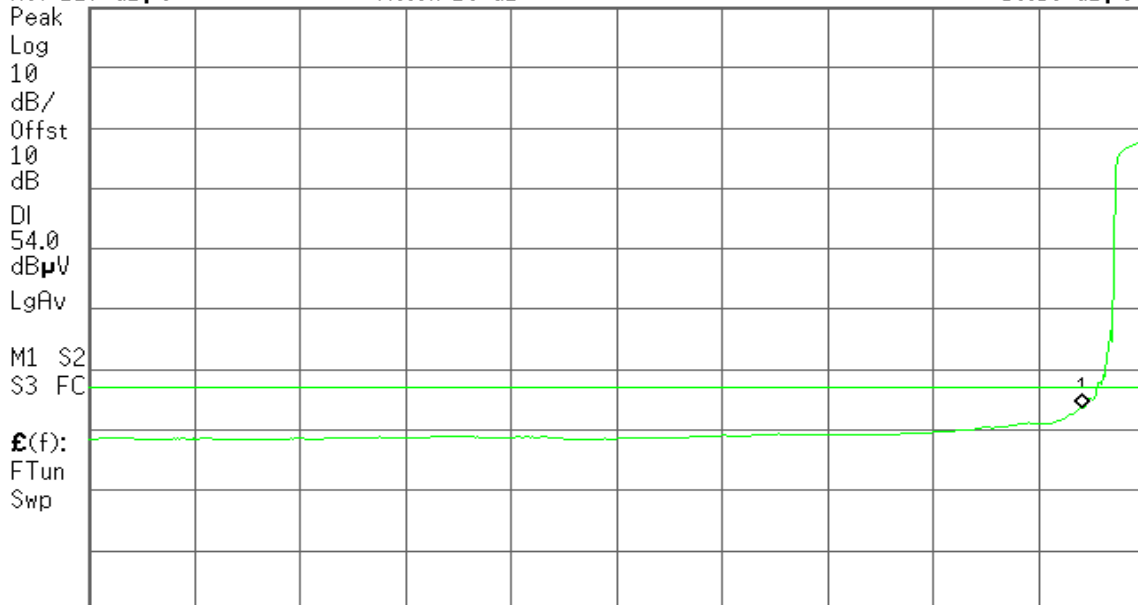
Agilent

T

Mkr1 5.150 0 GHz
50.59 dB μ V

Ref 117 dB μ V

#Atten 10 dB



Start 4.500 0 GHz ^

#Res BW 1 MHz

#VBW 10 Hz

Stop 5.190 0 GHz

Sweep 53.8 s (601 pts)



Detector mode: Peak

Polarity: Horizontal

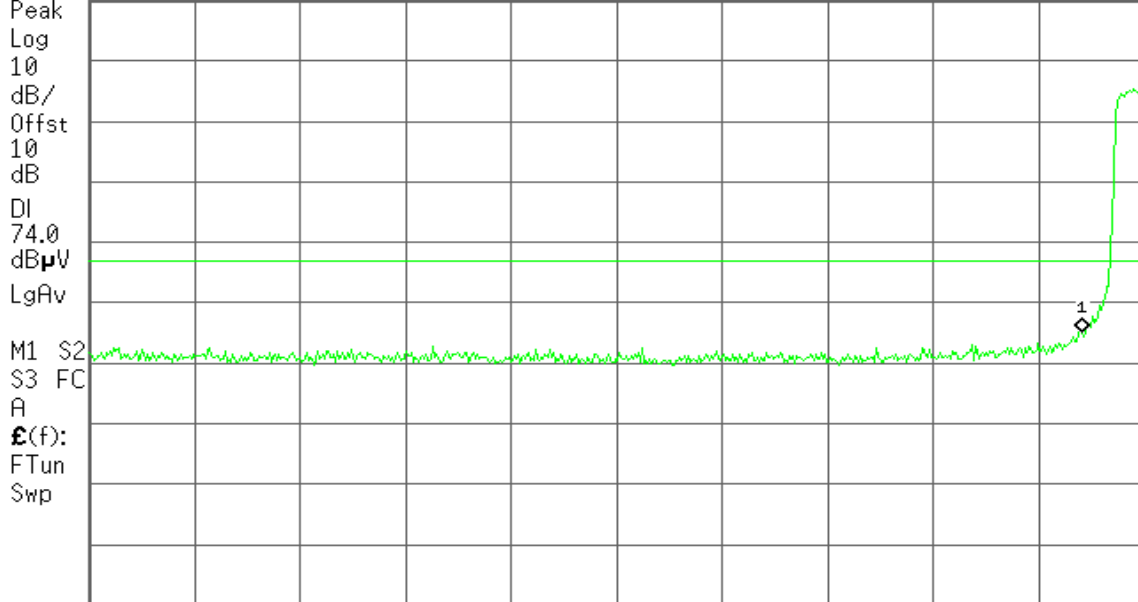
Agilent

T

Mkr1 5.150 0 GHz
62.11 dBµV

Ref 117 dBµV

#Atten 10 dB



Start 4.500 0 GHz

Stop 5.190 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

#Sweep 100 ms (601 pts)

Detector mode: Average

Polarity: Horizontal

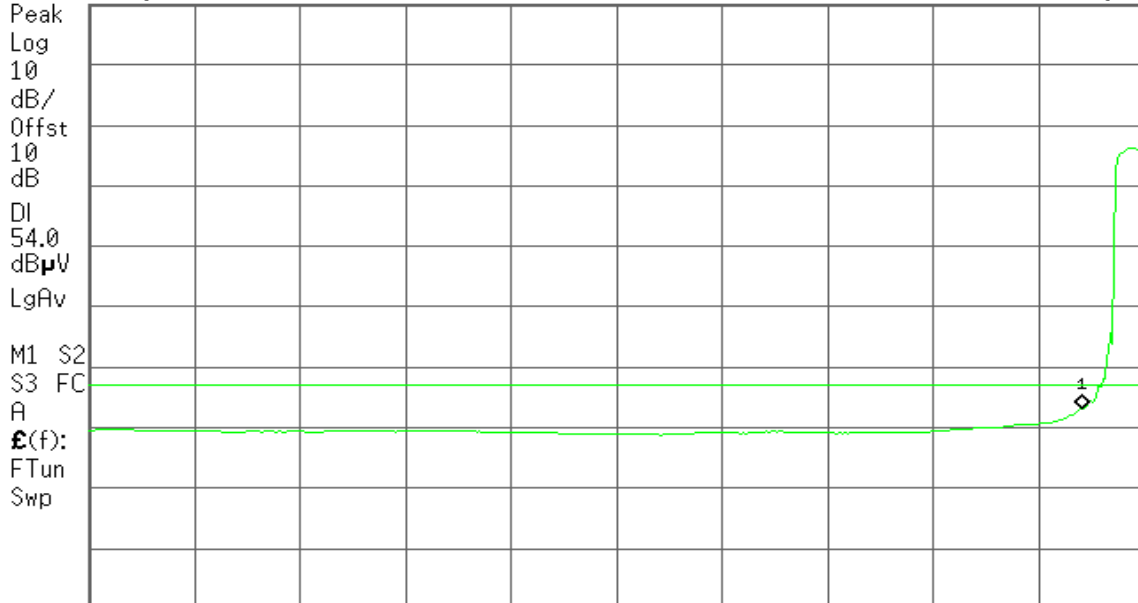
Agilent

T

Mkr1 5.150 0 GHz
50.08 dBµV

Ref 117 dBµV

#Atten 10 dB



Start 4.500 0 GHz

Stop 5.190 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 53.8 s (601 pts)



Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH High)

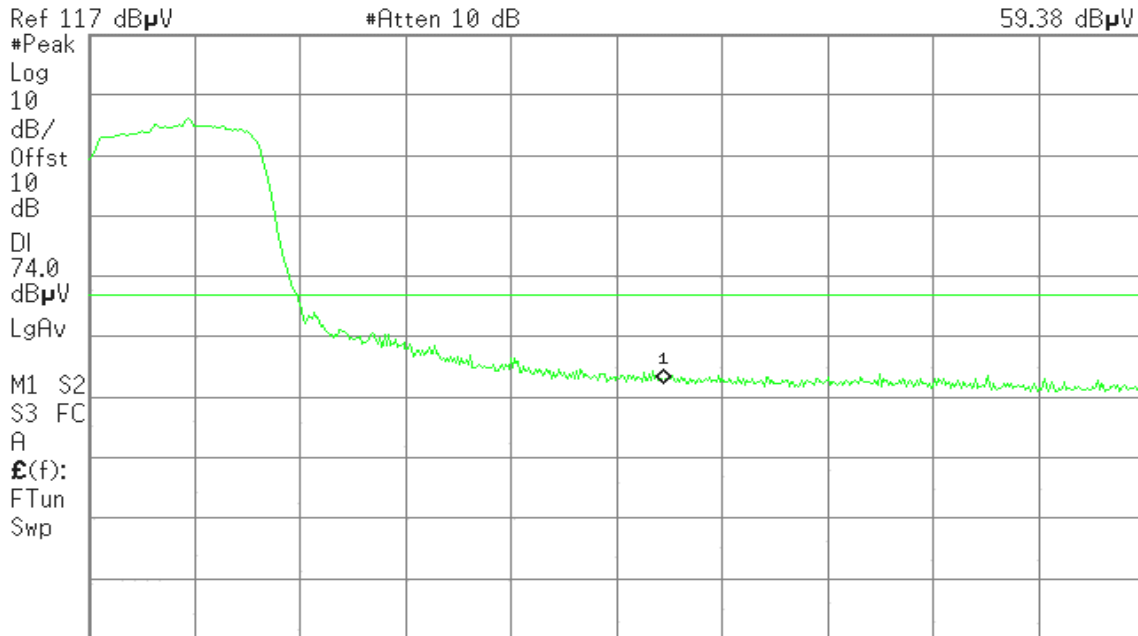
Detector mode: Peak

Polarity: Vertical

Agilent 18:10:49 Oct 20, 2008

R L

Mkr1 5.250 0 GHz
59.38 dBμV



Start 5.190 0 GHz #Res BW 1 MHz #VBW 1 MHz Stop 5.300 0 GHz #Sweep 100 ms (601 pts)

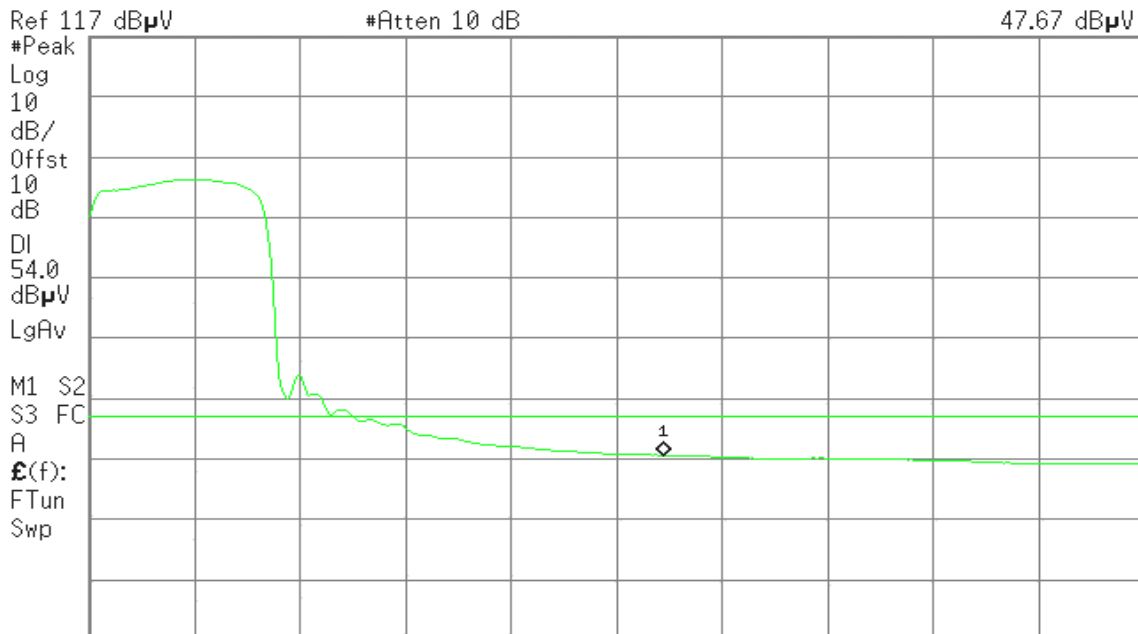
Detector mode: Average

Polarity: Vertical

Agilent 18:11:14 Oct 20, 2008

R L

Mkr1 5.250 0 GHz
47.67 dBμV



Start 5.190 0 GHz #Res BW 1 MHz #VBW 10 Hz Stop 5.300 0 GHz Sweep 8.577 s (601 pts)



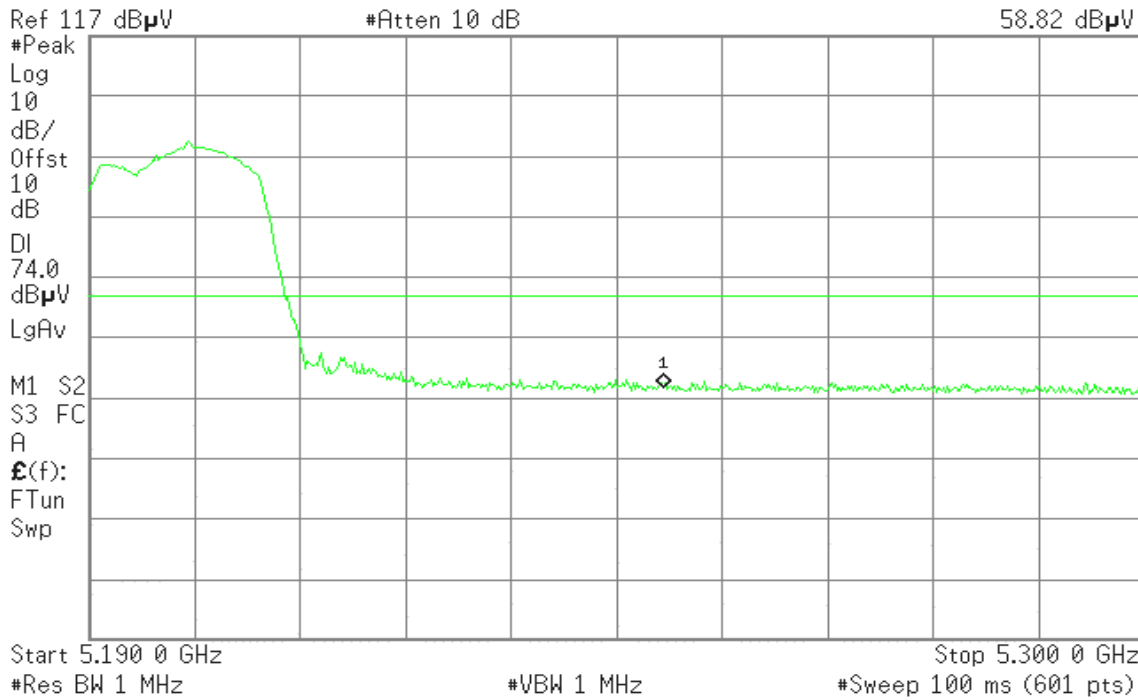
Detector mode: Peak

Polarity: Horizontal

Agilent 18:14:30 Oct 20, 2008

R L

Mkr1 5.250 0 GHz
58.82 dBµV



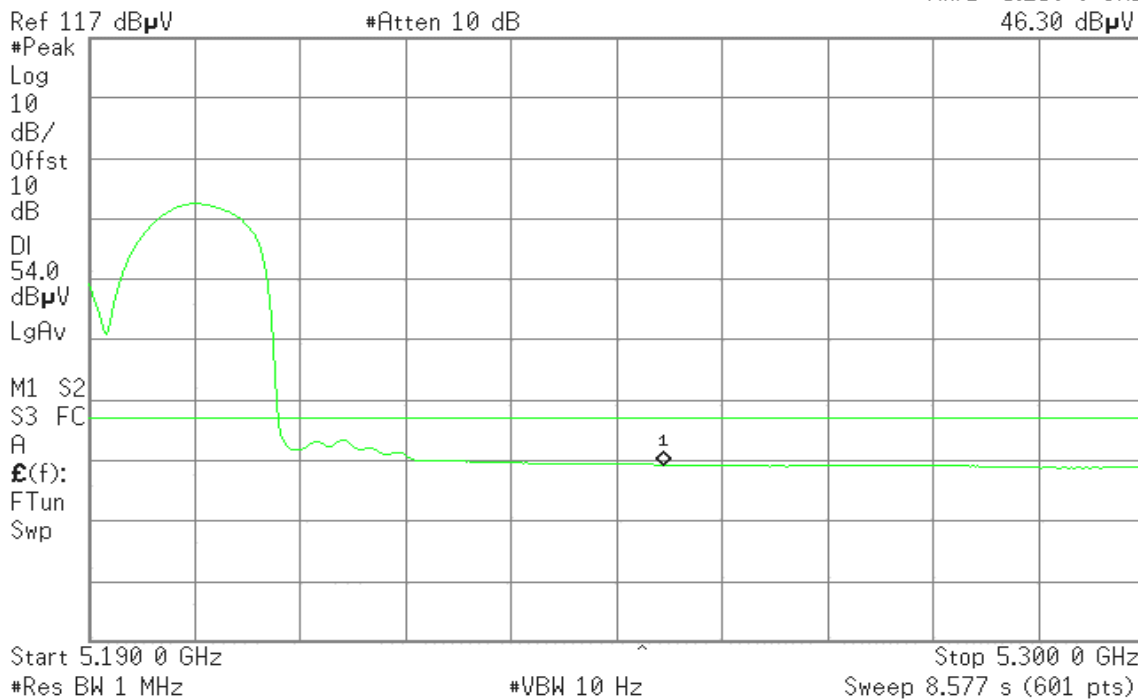
Detector mode: Average

Polarity: Horizontal

Agilent 18:15:06 Oct 20, 2008

R L

Mkr1 5.250 0 GHz
46.30 dBµV



7.4 PEAK POWER SPECTRAL DENSITY

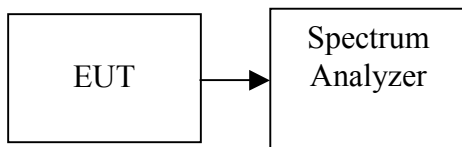
LIMIT

According to §15.407(a),

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm in any 1MHz band.
- (2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = 50MHz, Sweep=1ms
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed

TEST RESULTS

No non-compliance noted.



Test Data

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	-1.642	4.00	-5.642	PASS
Mid	5200	-1.004	4.00	-5.004	PASS
High	5220	-1.085	4.00	-5.085	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	-2.387	1.652	3.10	4.00	-0.900	PASS
Mid	5200	0.204	1.509	3.92	4.00	-0.080	PASS
High	5220	-7.769	1.085	1.62	4.00	-2.380	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
	5190	-7.151	-4.390	-2.54	4.00	-6.540	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode with combiner

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	3.466	4.00	-0.534	PASS
Mid	5200	3.813	4.00	-0.187	PASS
High	5220	3.048	4.00	-0.952	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode with combiner

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
	5190	0.746	4.00	-3.254	PASS

*(Remark: 1. Maximum antenna gain = 5.94dBi, therefore there is no reduction due to antenna gain.
2. Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD / 10))*



Test Plot

IEEE 802.11a mode

CH Low

Agilent 13:02:00 Jul 27, 2008

R T

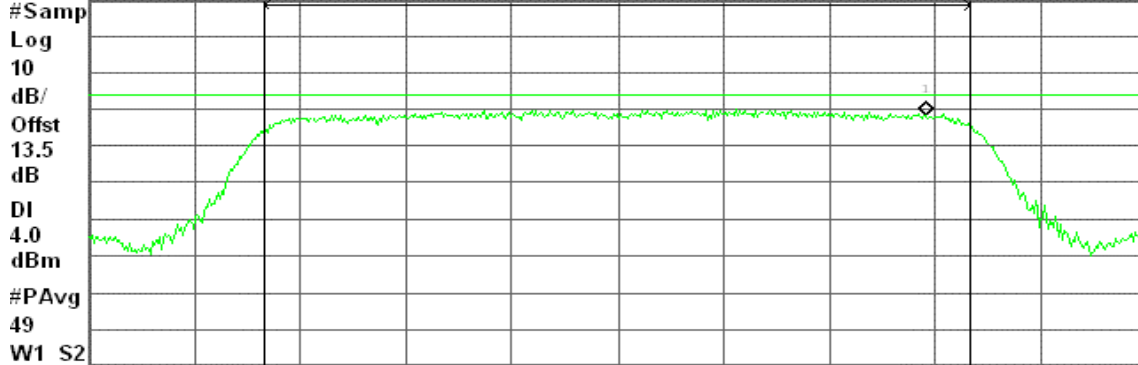
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.187 22 GHz

Ref 30 dBm

Atten 30 dB

-1.642 dBm



Center 5.180 00 GHz

Span 24.75 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

10.12 dBm / 16.5000 MHz

-62.06 dBm/Hz

CH Mid

Agilent 13:11:41 Jul 27, 2008

R T

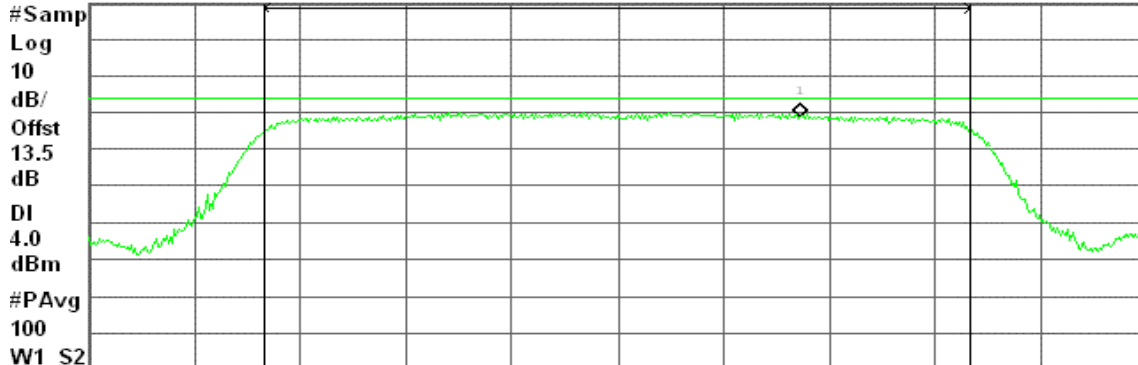
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.204 25 GHz

Ref 30 dBm

Atten 30 dB

-1.004 dBm



Center 5.200 00 GHz

Span 24.75 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

10.77 dBm / 16.5000 MHz

-61.41 dBm/Hz



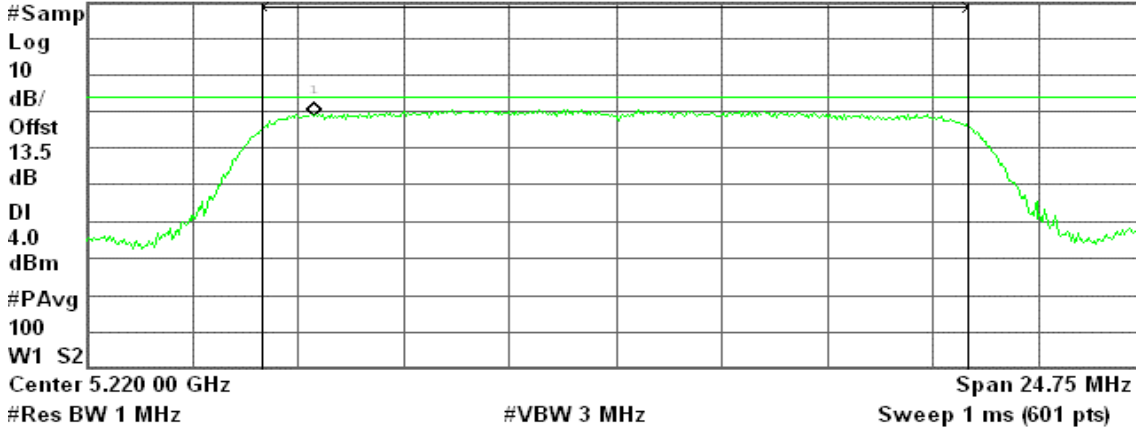
CH High

Agilent 13:35:59 Jul 27, 2008

R T

Peak Power Spectral Density, a Mode High Ch.
Ref 30 dBm Atten 30 dB

Mkr1 5.212 95 GHz
-1.085 dBm



Channel Power

11.21 dBm / 16.5000 MHz

Power Spectral Density

-60.96 dBm/Hz

draft 802.11n Standard-20 MHz Channel mode / Chain 0

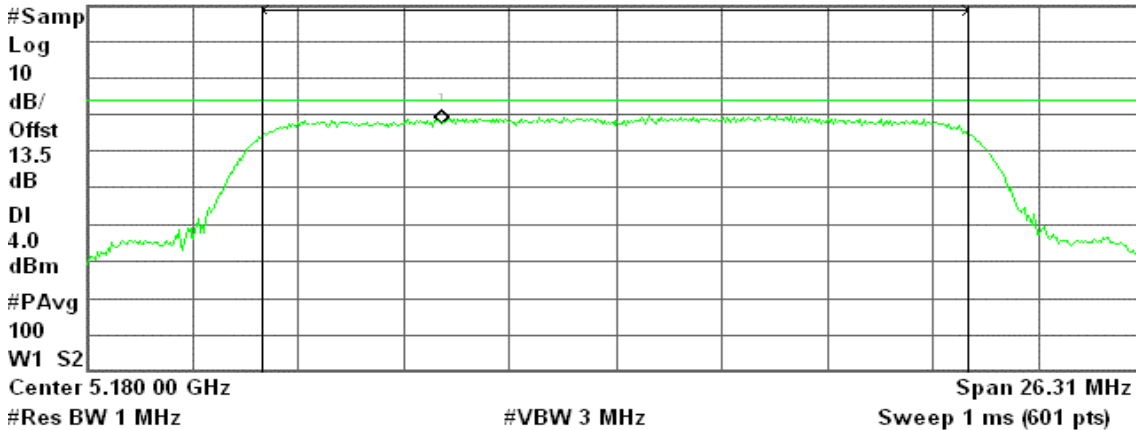
CH Low

Agilent 13:51:38 Jul 27, 2008

R T

Peak Power Spectral Density, a Mode Low Ch.
Ref 30 dBm Atten 30 dB

Mkr1 5.175 70 GHz
-2.387 dBm



Channel Power

10.64 dBm / 17.5400 MHz

Power Spectral Density

-61.80 dBm/Hz



CH Mid

Agilent 14:04:23 Jul 27, 2008

R T

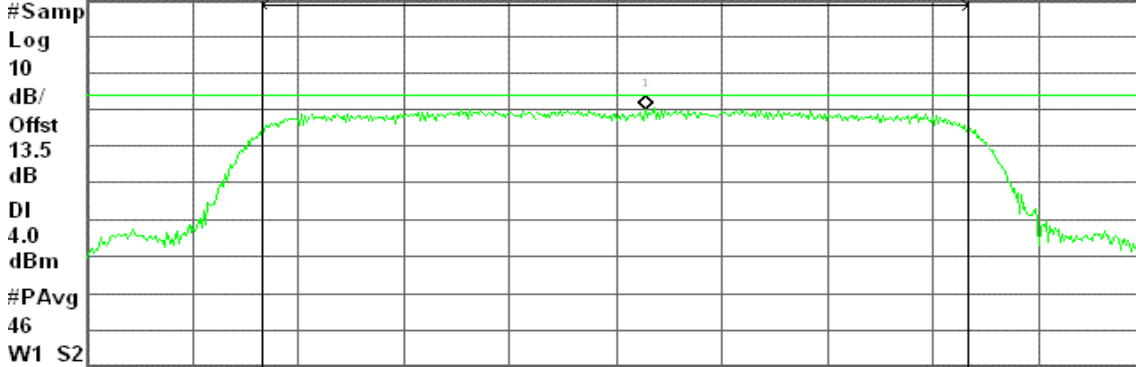
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.200 74 GHz

Ref 30 dBm

Atten 30 dB

0.204 dBm



Center 5.200 00 GHz

Span 26.28 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

10.44 dBm / 17.5200 MHz

-61.99 dBm/Hz

CH High

Agilent 14:12:20 Jul 27, 2008

R T

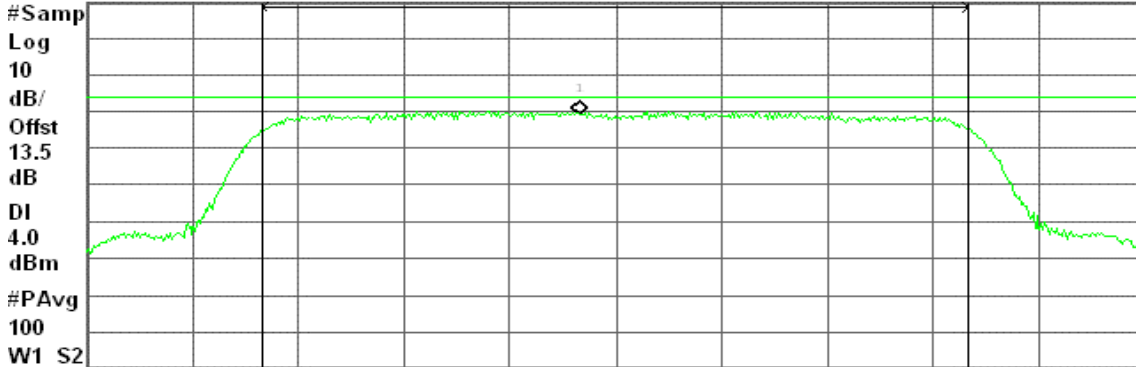
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.219 08 GHz

Ref 30 dBm

Atten 30 dB

-0.769 dBm



Center 5.220 00 GHz

Span 26.28 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

10.78 dBm / 17.5200 MHz

-61.65 dBm/Hz



draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low

Agilent 15:30:12 Jul 27, 2008

R T

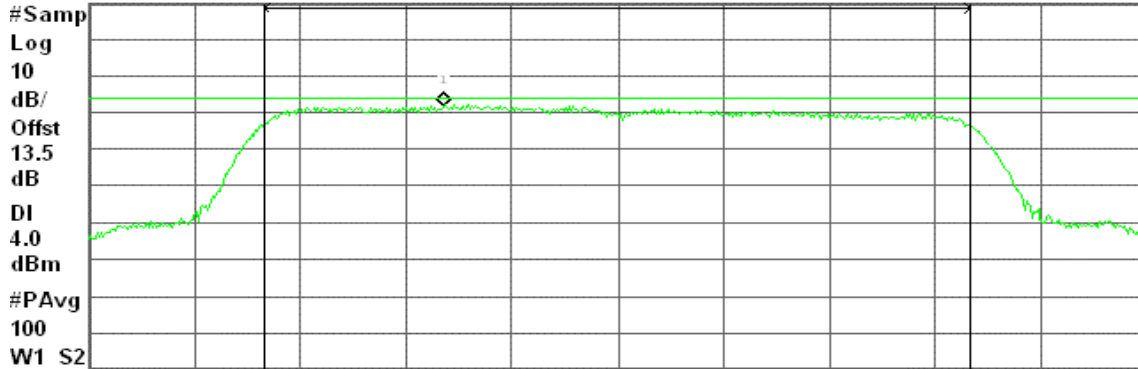
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.175 69 GHz

Ref 30 dBm

Atten 30 dB

1.652 dBm



Center 5.180 00 GHz

Span 26.39 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.28 dBm / 17.5900 MHz

-60.17 dBm/Hz

CH Mid

Agilent 15:36:46 Jul 27, 2008

R T

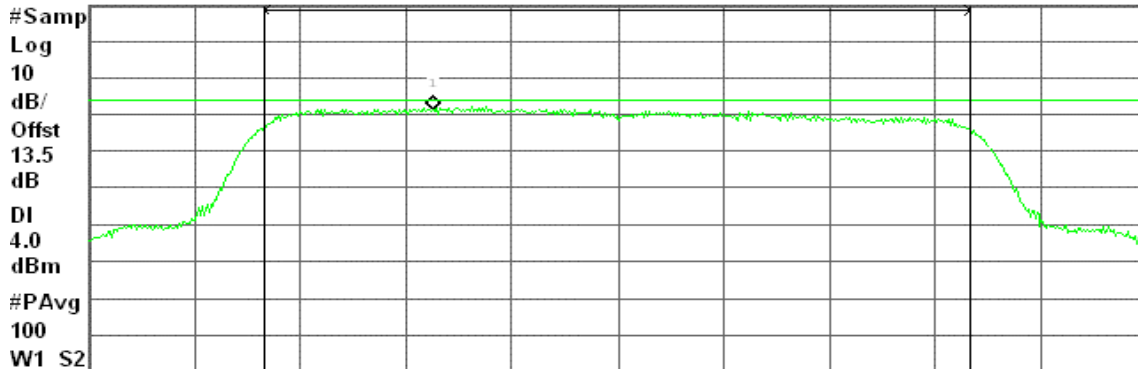
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.195 43 GHz

Ref 30 dBm

Atten 30 dB

1.509 dBm



Center 5.200 00 GHz

Span 26.34 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.40 dBm / 17.5600 MHz

-60.04 dBm/Hz



CH High

Agilent 15:44:35 Jul 27, 2008

R T

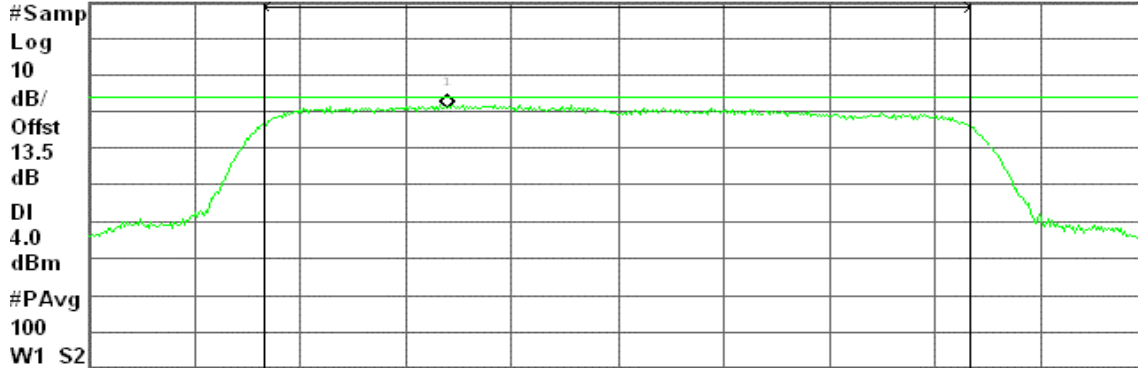
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.215 79 GHz

Ref 30 dBm

Atten 30 dB

1.085 dBm



Center 5.220 00 GHz

Span 26.32 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.33 dBm / 17.5500 MHz

-60.11 dBm/Hz



draft 802.11n Wide-40 MHz Channel mode / Chain 0

Agilent 18:34:11 Jul 27, 2008

R T

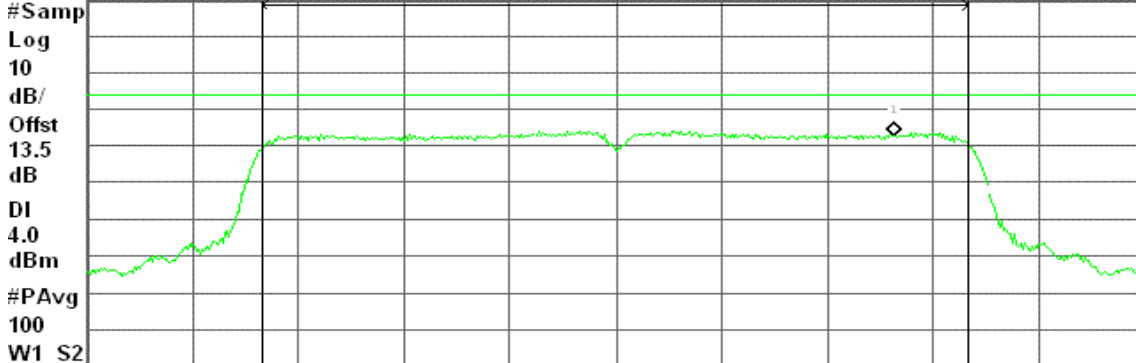
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.204 23 GHz

Ref 30 dBm

Atten 30 dB

-7.151 dBm



Center 5.190 00 GHz

Span 54.05 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

8.13 dBm / 36.0300 MHz

-67.44 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / Chain 1

Agilent 18:42:37 Jul 27, 2008

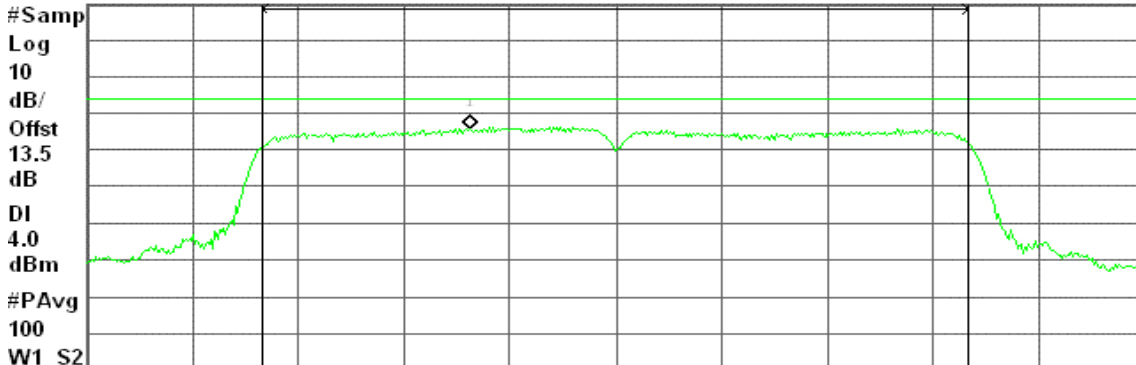
R L

Ref 30 dBm

Atten 30 dB

Mkr1 5.182 61 GHz

-4.390 dBm



Center 5.190 00 GHz

Span 54.06 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

9.49 dBm / 36.0400 MHz

-66.08 dBm/Hz



draft 802.11n Standard-20 MHz Channel mode with combiner

CH Low

Agilent 16:13:51 Jul 27, 2008

R T

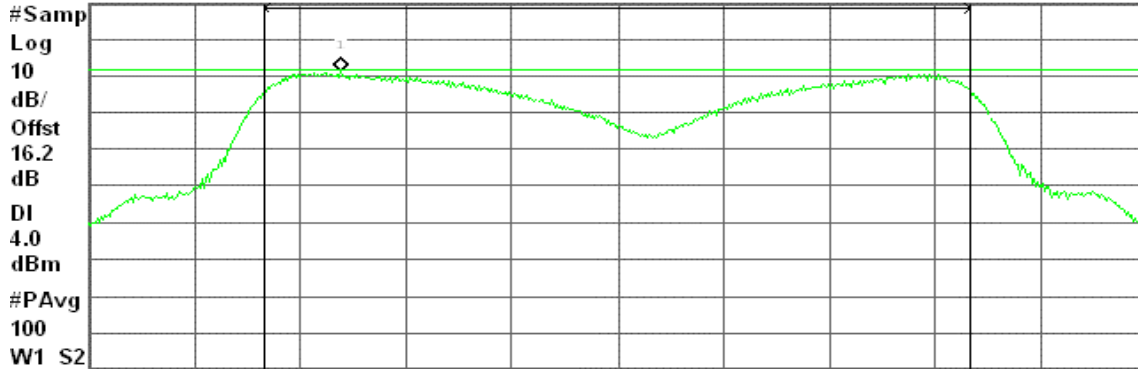
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.172 95 GHz

Ref 22.2 dBm

#Atten 16 dB

3.466 dBm



Center 5.180 00 GHz

Span 26.93 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.03 dBm / 17.9500 MHz

-60.51 dBm/Hz

CH Mid

Agilent 16:24:06 Jul 27, 2008

R T

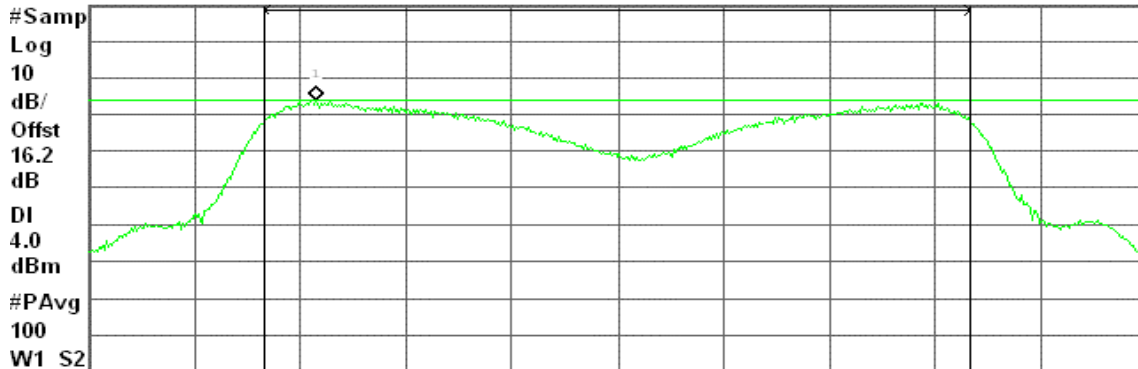
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.192 31 GHz

Ref 30 dBm

Atten 30 dB

3.813 dBm



Center 5.200 00 GHz

Span 26.98 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

11.67 dBm / 17.9900 MHz

-60.88 dBm/Hz



CH High

Agilent 16:34:52 Jul 27, 2008

R T

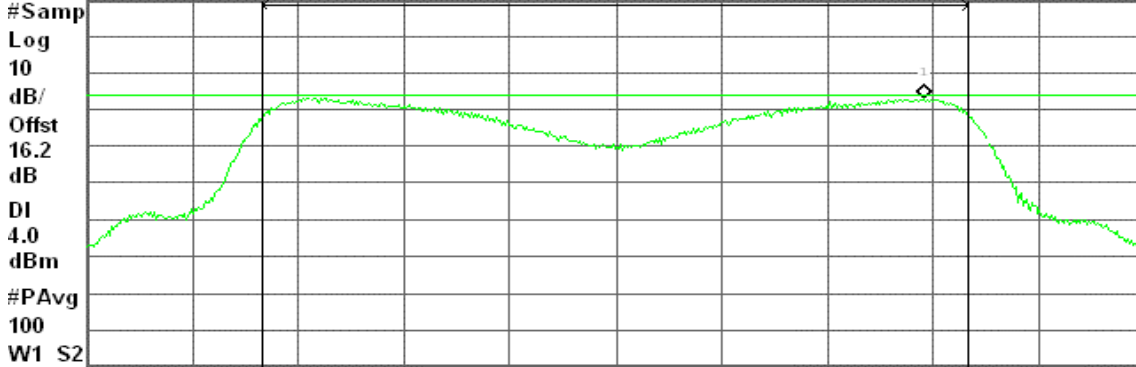
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.227 86 GHz

Ref 30 dBm

Atten 30 dB

3.048 dBm



Center 5.220 00 GHz

Span 26.95 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

11.96 dBm / 17.9700 MHz

-60.59 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode with combiner

Agilent 17:18:16 Jul 27, 2008

R T

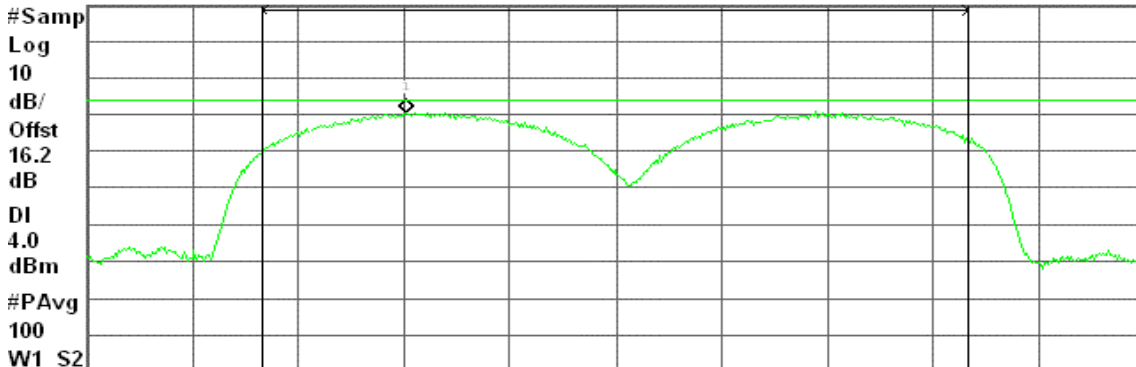
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.179 96 GHz

Ref 30 dBm

Atten 30 dB

0.746 dBm



Center 5.190 00 GHz

Span 51.08 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

12.97 dBm / 34.0500 MHz

-62.36 dBm/Hz

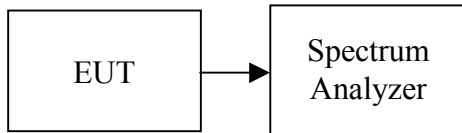


7.5 PEAK EXCURSION

LIMIT

According to §15.407(a)(6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Configuration



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A, Set RBW = 1MHz, VBW = 3MHz, Span >26dB bandwidth, Max. hold.
4. Trace B, Set RBW = 1MHz, VBW = 30kHz, Span >26dB bandwidth, Max. hold.
5. Delta Mark trace A Maximum frequency and trace B same frequency.
6. Repeat the above procedure until measurements for all frequencies were complete.

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	1.81	13.00	-11.19	PASS
Mid	5200	2.36	13.00	-10.64	PASS
High	5220	2.35	13.00	-10.65	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	0.60	13.00	-12.40	PASS
Mid	5200	2.33	13.00	-10.67	PASS
High	5220	2.81	13.00	-10.19	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	0.91	13.00	-12.09	PASS
Mid	5200	0.04	13.00	-12.96	PASS
High	5220	2.64	13.00	-10.36	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
	5190	0.94	13.00	-12.06	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
	5190	2.39	13.00	-10.61	PASS



Test Plot

IEEE 802.11a mode

CH Low

Agilent 13:03:21 Jul 27, 2008

R T

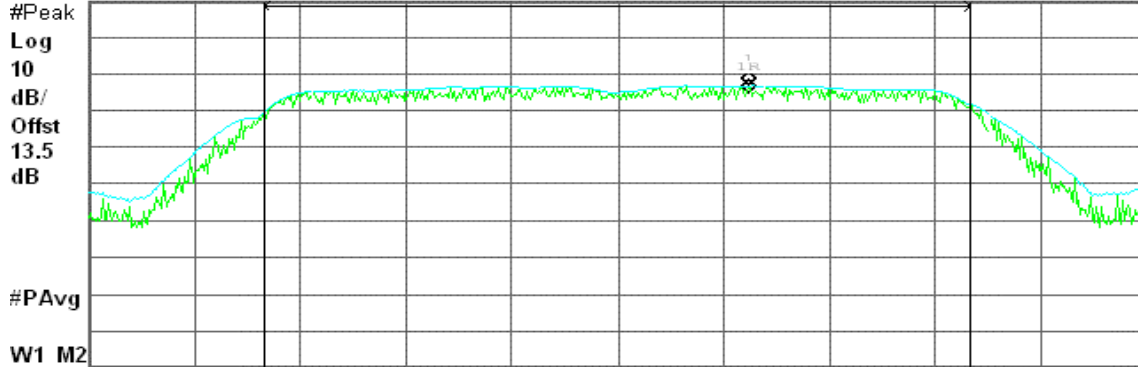
Peak Excursion, a Mode Low Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

1.81 dB



Center 5.180 00 GHz

Span 24.75 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

16.50 dBm / 16.5000 MHz

-55.68 dBm/Hz

CH Mid

Agilent 13:19:41 Jul 27, 2008

R T

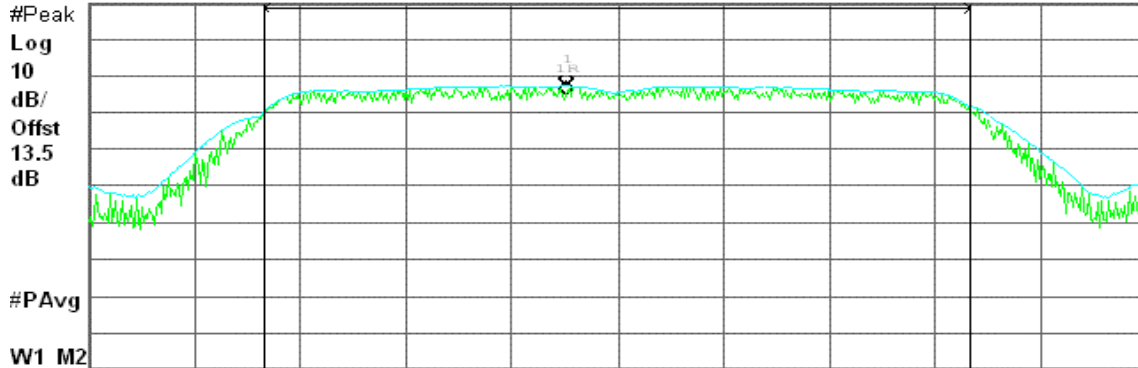
Peak Excursion, a Mode Mid Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

2.36 dB



Center 5.200 00 GHz

Span 24.75 MHz

#Res BW 1 MHz

#VBW 8 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

17.01 dBm / 16.5000 MHz

-55.17 dBm/Hz



CH High

Agilent 13:36:50 Jul 27, 2008

R T

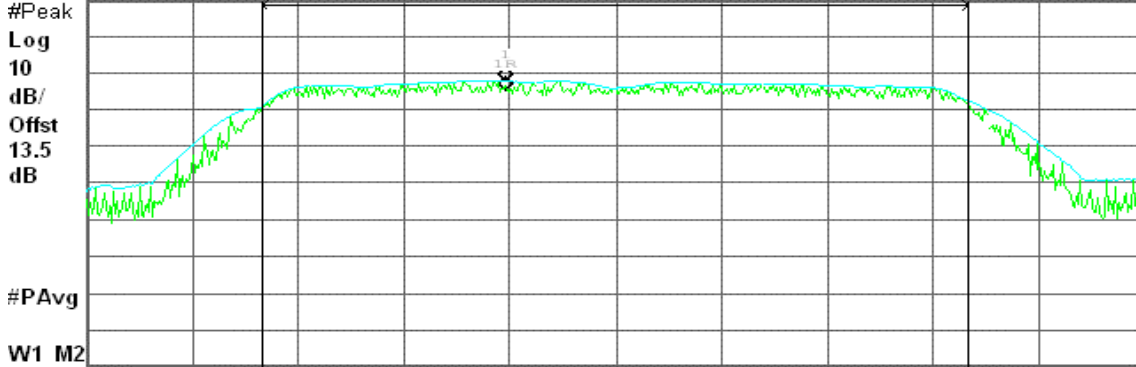
Peak Excursion, a Mode High Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

2.35 dB



Center 5.220 00 GHz

Span 24.75 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

17.42 dBm / 16.5000 MHz

-54.76 dBm/Hz

draft 802.11n Standard-20 MHz Channel mode / Chain 0

CH Low

Agilent 13:58:48 Jul 27, 2008

R T

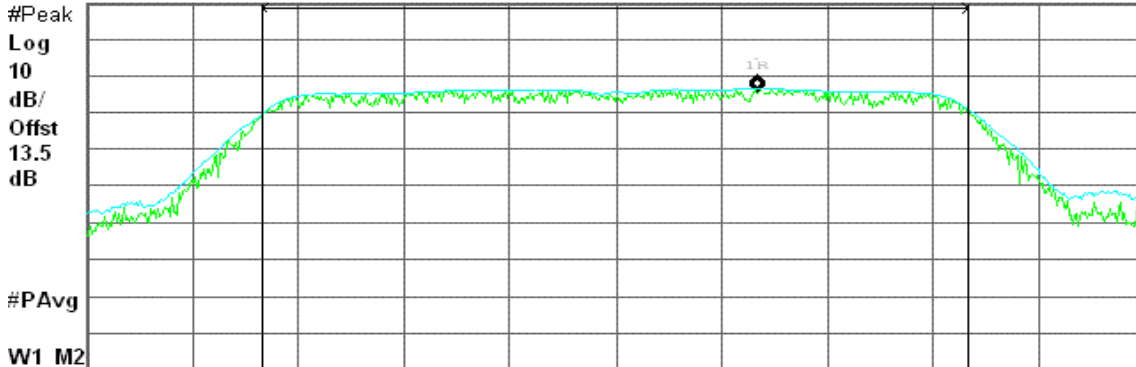
Peak Excursion, a Mode Low Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

0.60 dB



Center 5.180 00 GHz

Span 26.31 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

16.64 dBm / 17.5400 MHz

-55.80 dBm/Hz



CH Mid

Agilent 14:05:51 Jul 27, 2008

R T

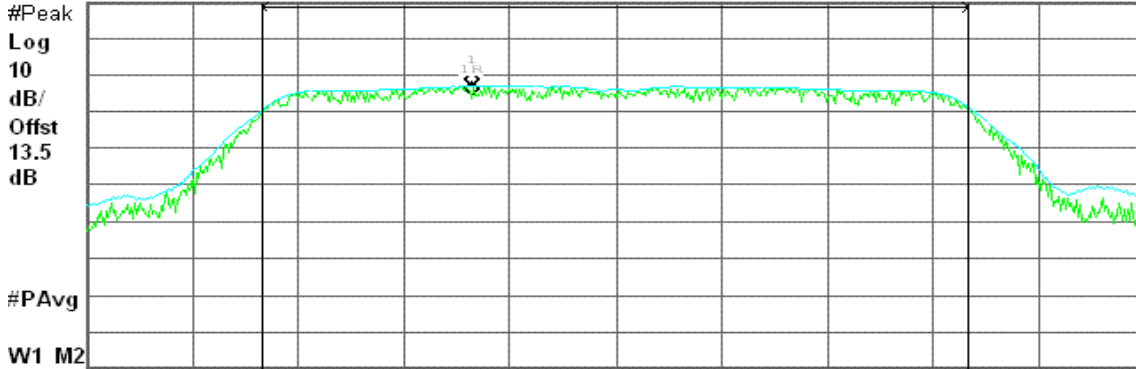
Peak Excursion, a Mode Mid Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

2.33 dB



Channel Power

Power Spectral Density

17.18 dBm / 17.5200 MHz

-55.25 dBm/Hz

CH High

Agilent 14:21:20 Jul 27, 2008

R T

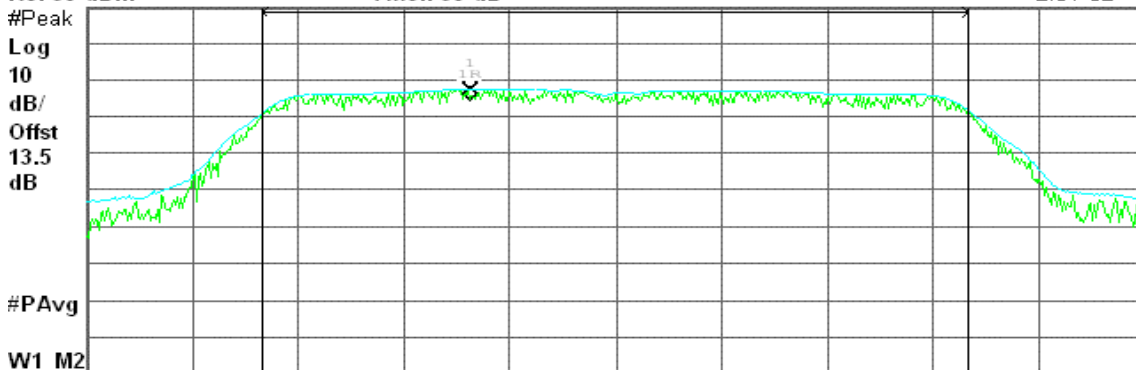
Peak Excursion, a Mode High Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

2.81 dB



Channel Power

Power Spectral Density

17.49 dBm / 17.5200 MHz

-54.95 dBm/Hz



draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low

Agilent 15:31:17 Jul 27, 2008

R T

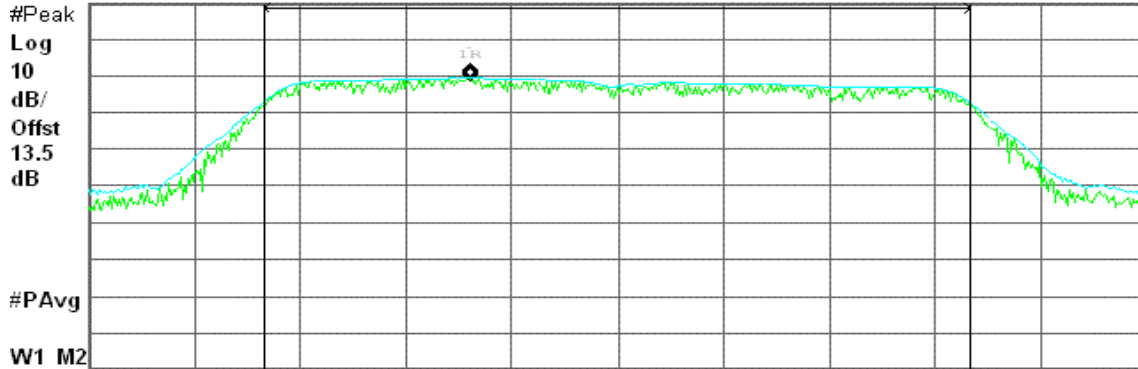
Peak Excursion, a Mode Low Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

0.91 dB



Center 5.180 00 GHz

Span 26.39 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

19.14 dBm / 17.5900 MHz

-53.31 dBm/Hz

CH Mid

Agilent 15:37:36 Jul 27, 2008

R T

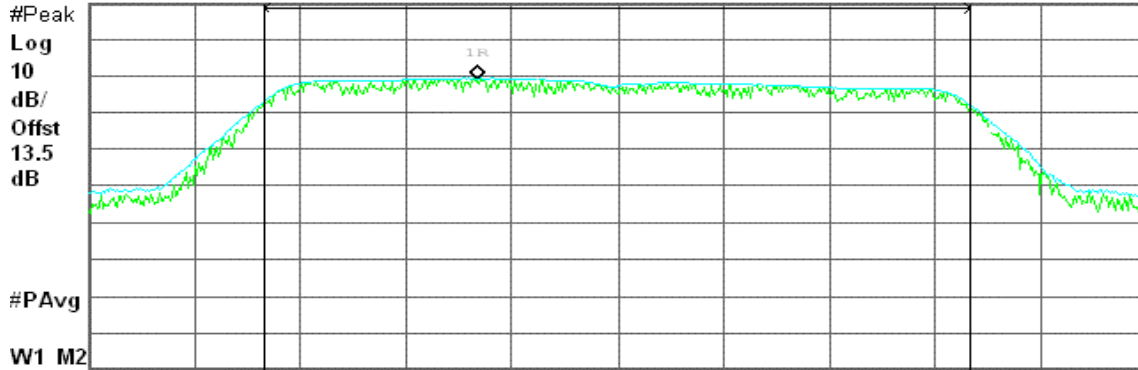
Peak Excursion, a Mode Mid Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

0.04 dB



Center 5.200 00 GHz

Span 26.34 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

18.98 dBm / 17.5600 MHz

-53.46 dBm/Hz



CH High

Agilent 15:45:42 Jul 27, 2008

R T

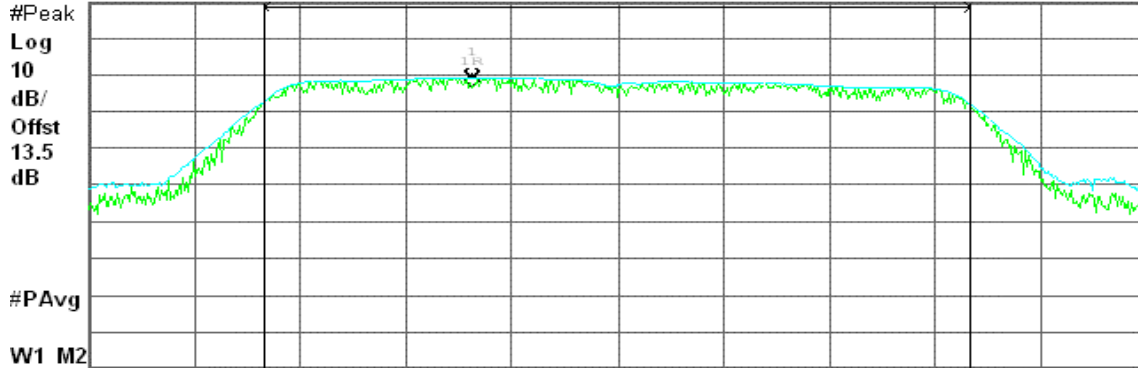
Peak Excursion, a Mode High Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

2.64 dB



Center 5.220 00 GHz

Span 26.32 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

19.01 dBm / 17.5500 MHz

-53.43 dBm/Hz



draft 802.11n Wide-40 MHz Channel mode / Chain 0

Agilent 18:34:56 Jul 27, 2008

R T

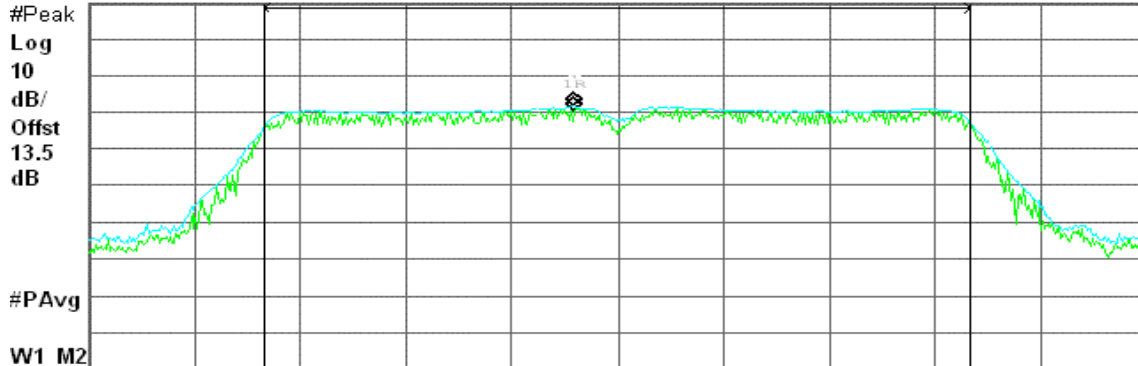
Peak Excursion, a Mode Low Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

0.94 dB



Center 5.190 00 GHz

Span 54.05 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

14.14 dBm / 36.0300 MHz

-61.43 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / Chain 1

Agilent 18:44:21 Jul 27, 2008

R L

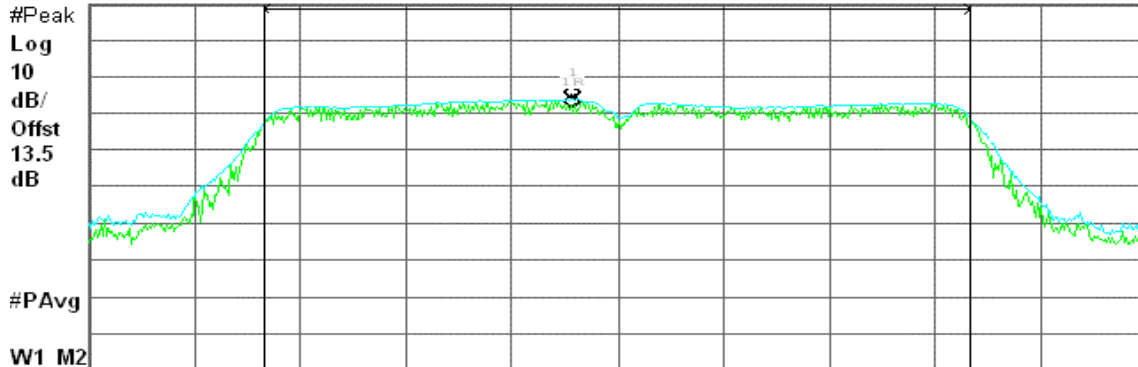
Peak Excursion, a Mode Low Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

2.39 dB



Center 5.190 00 GHz

Span 54.06 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

16.10 dBm / 36.0400 MHz

-59.47 dBm/Hz



7.6 RADIATED UNDESIRABLE EMISSION

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

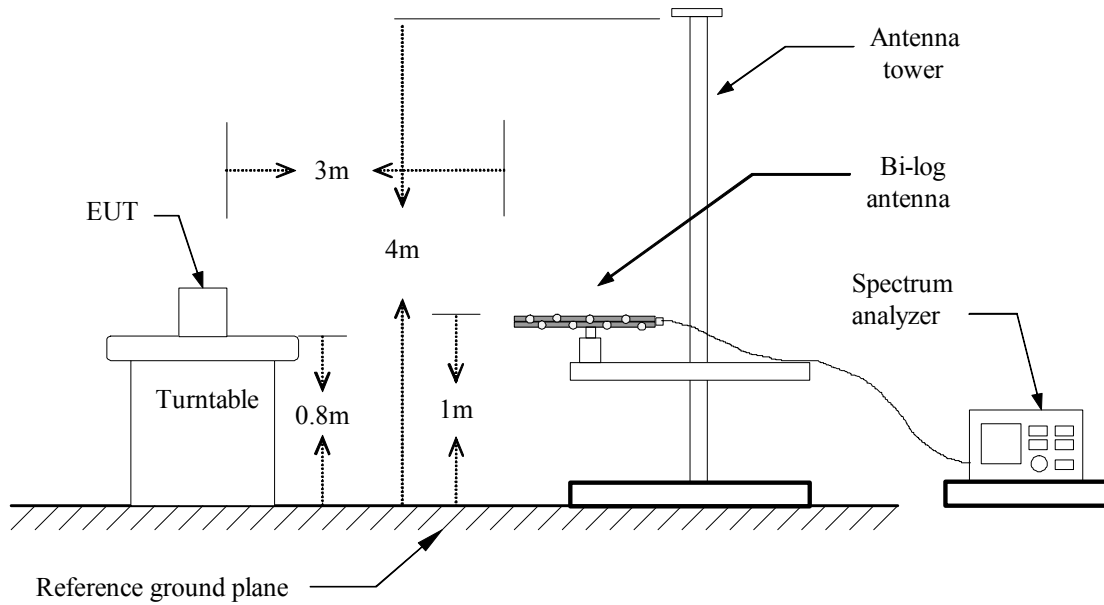
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

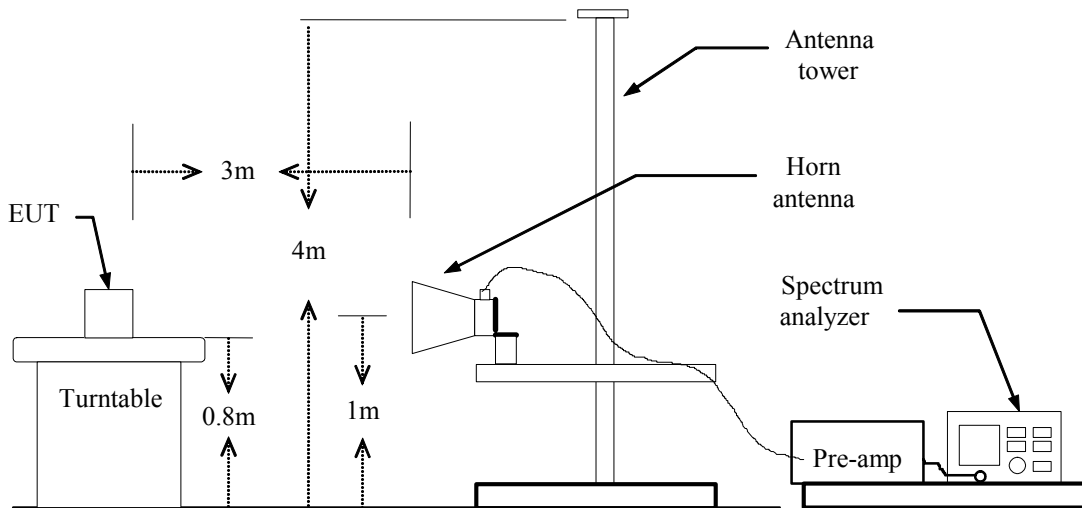
Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



Above 1 GHz





TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. 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

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



Below 1 GHz

Operation Mode: Normal Link

Test Date: October 29, 2008

Temperature: 25°C

Tested by: Mimic Yang

Humidity: 45% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak/QP) (dBuV)	Correction Factor (dB/m)	Result (Peak/QP) (dBuV/m)	Limit (Peak/QP) (dBuV/m)	Margin (dB)	Remark
42.93	V	46.89	-11.44	35.45	40.00	-4.55	Peak
52.63	V	49.16	-15.70	33.46	40.00	-6.54	Peak
83.35	V	52.93	-17.55	35.39	40.00	-4.61	Peak
416.38	V	34.66	-7.88	26.79	46.00	-19.21	Peak
754.27	V	29.74	-1.94	27.80	46.00	-18.20	Peak
959.58	V	28.59	0.39	28.98	46.00	-17.02	Peak
159.33	H	37.98	-12.19	25.79	43.50	-17.71	Peak
359.80	H	39.12	-9.35	29.76	46.00	-16.24	Peak
416.38	H	32.45	-7.88	24.57	46.00	-21.43	Peak
720.32	H	32.36	-3.04	29.32	46.00	-16.68	Peak
754.27	H	30.19	-1.94	28.25	46.00	-17.75	Peak
959.58	H	34.79	0.39	35.18	46.00	-10.82	Peak

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz 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.
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) – Quasi-peak limit (dBuV/m).



Above 1 GHz

Operation Mode: Tx / IEEE 802.11a mode / CH Low

Test Date: July 24, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53% RH

Polarity: Ver. / Hor.

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
5183.33	V	106.30	97.21	0.11	106.41	97.32	Fundamental			
1070.00	V	52.54	---	-9.38	43.17	---	74.00	54.00	-10.83	Peak
2000.00	V	50.51	---	-4.18	46.34	---	74.00	54.00	-7.66	Peak
6216.67	V	68.57	63.70	1.42	69.99	65.12	86.41	77.32	-12.2	20dBc AVG Fundamental
N/A										
5183.33	H	103.46	93.32	0.11	103.57	93.43	Fundamental			
6216.67	H	65.60	53.10	1.42	67.02	54.52	83.57	73.43	-18.91	20dBc AVG Fundamental
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.



Operation Mode: Tx / IEEE 802.11a mode / CH Mid

Test Date: July 24, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53% RH

Polarity: Ver. / Hor.

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
5200.00	V	105.34	95.54	0.13	105.47	95.67	Fundamental			
1073.33	V	50.90	---	-9.37	41.53	---	74.00	54.00	-12.47	Peak
1996.67	V	50.79	---	-4.20	46.59	---	74.00	54.00	-7.41	Peak
6241.67	V	67.22	61.35	1.45	68.67	62.80	85.47	75.67	-12.87	20dBc AVG Fundamental
N/A										
5200.00	H	102.28	93.09	0.12	102.40	93.21	Fundamental			
6241.67	H	66.51	60.13	1.45	67.96	61.58	82.40	73.21	-11.63	20dBc AVG Fundamental
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.



Operation Mode: Tx / IEEE 802.11a mode / CH High

Test Date: July 24, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53% RH

Polarity: Ver. / Hor.

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
5225.00	V	104.68	96.64	0.15	104.83	96.79	Fundamental			
1200.00	V	53.74	---	-9.07	44.67	---	74.00	54.00	-9.33	Peak
2000.00	V	53.69	---	-4.18	49.52	---	74.00	54.00	-4.48	Peak
6266.67	V	65.82	59.48	1.48	67.30	60.96	84.83	76.79	-15.83	20dBc AVG Fundamental
N/A										
5225.00	H	102.23	92.66	0.14	102.37	92.80	Fundamental			
6266.67	H	62.64	55.29	1.48	64.12	56.77	82.37	72.80	-16.03	20dBc AVG Fundamental
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.



Operation Mode: TX / draft 802.11n Standard-20 MHz Channel mode / CH Low

Test Date: July 25, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % RH

Polarity: Ver. / Hor.

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
5183.33	V	109.90	100.79	0.11	110.01	100.90	Fundamental			
6216.67	V	70.96	64.59	1.42	72.38	66.01	90.01	80.9	-14.89	20dBc AVG Fundamental
N/A										
5183.33	H	108.19	98.22	0.11	108.30	98.33	Fundamental			
6216.67	H	65.38	57.90	1.42	66.80	59.32	88.30	78.33	-11.53	20dBc AVG Fundamental
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.



Operation Mode: TX / draft 802.11n Standard-20 MHz Channel mode / CH Mid

Test Date: July 25, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % RH

Polarity: Ver. / Hor.

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
5200.00	V	110.30	100.37	0.13	110.43	100.50	Fundamental			
6241.67	V	69.37	63.79	1.45	70.82	65.24	90.43	80.50	-15.26	20dBc AVG Fundamental
N/A										
5200.00	H	106.74	97.78	0.13	106.87	97.91	Fundamental			
6241.67	H	65.37	59.19	1.45	66.82	60.64	86.87	77.91	-17.27	20dBc AVG Fundamental
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.



Operation Mode: TX / draft 802.11n Standard-20 MHz Channel mode / CH High

Test Date: July 25, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % RH

Polarity: Ver. / Hor.

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
5216.67	V	108.50	99.62	0.14	108.64	99.76	Fundamental			
6266.67	V	65.81	59.55	1.48	67.29	61.03	88.64	79.76	-18.73	20dBc AVG Fundamental
N/A										
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.



Operation Mode: TX / draft 802.11n Wide-40 MHz Channel mode Test Date: July 25, 2008

Temperature: 23°C

Tested by: Mimic Yang

Humidity: 53 % RH

Polarity: Ver. / Hor.

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
5191.67	V	104.18	94.72	0.12	104.30	94.84	Fundamental			
6225.00	V	62.89	57.53	1.43	64.32	58.96	84.30	74.84	-15.88	20dBc AVG Fundamental
N/A										
5191.67	H	102.45	92.80	0.11	102.56	92.91	Fundamental			
6225.00	H	63.13	56.93	1.43	64.56	58.36	82.56	72.91	-14.55	20dBc AVG Fundamental
N/A										

Remark:

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.
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. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

7.7 CONDUCTED UNDESIRABLE EMISSION

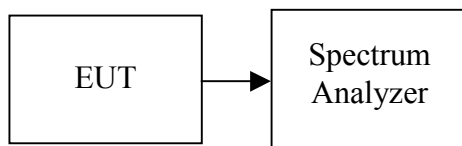
LIMIT

According to 15.407(b),

- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

The provisions of §15.205 apply to intentional radiators operating under this section.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted



Test Plot

IEEE 802.11a mode / CH Low

30MHz ~ 40GHz

Agilent 13:04:27 Jul 27, 2008

R T

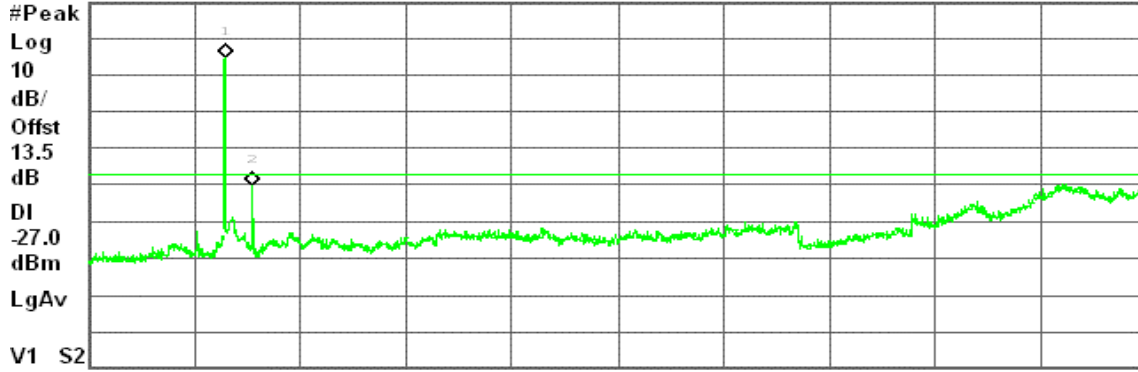
Conducted Spur., a Mode Low Ch.

Mkr2 6.23 GHz

Ref 20 dBm

Atten 20 dB

-30.02 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	4.96 dBm
2	(1)	Freq	6.23 GHz	-30.02 dBm

CH Mid

30MHz ~ 40GHz

Agilent 13:28:34 Jul 27, 2008

R T

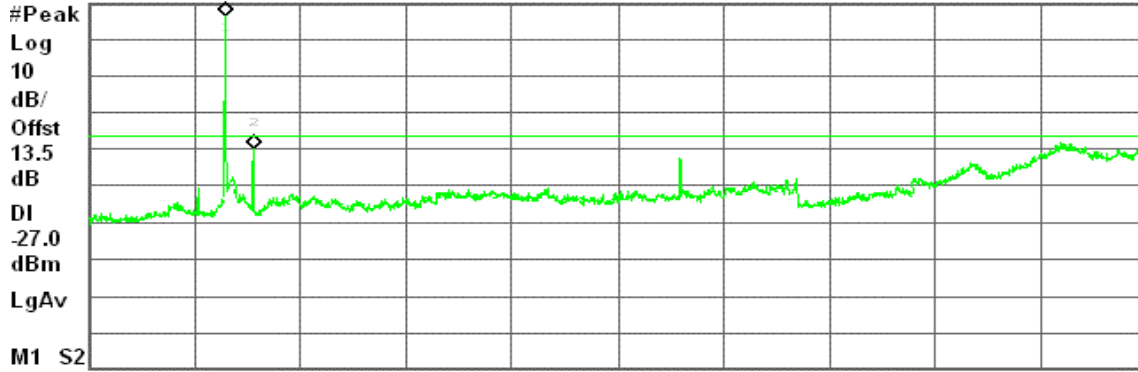
Conducted Spur., a Mode Mid Ch.

Mkr2 6.25 GHz

Ref 9.5 dBm

#Atten 20 dB

-30.17 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.21 GHz	6.00 dBm
2	(1)	Freq	6.25 GHz	-30.17 dBm



CH High 30MHz ~ 40GHz

Agilent 13:37:42 Jul 27, 2008

R T

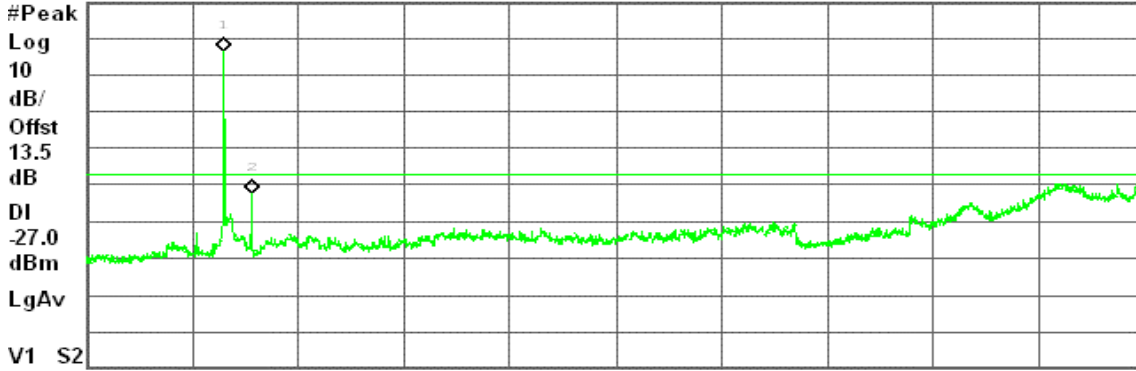
Conducted Spur., a Mode High Ch.

Mkr2 6.27 GHz

Ref 20 dBm

Atten 20 dB

-32.49 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	6.49 dBm
2	(1)	Freq	6.27 GHz	-32.49 dBm

draft 802.11n Standard-20 MHz Channel mode / Chain 0 / CH Low 30MHz ~ 40GHz

Agilent 14:01:22 Jul 27, 2008

R T

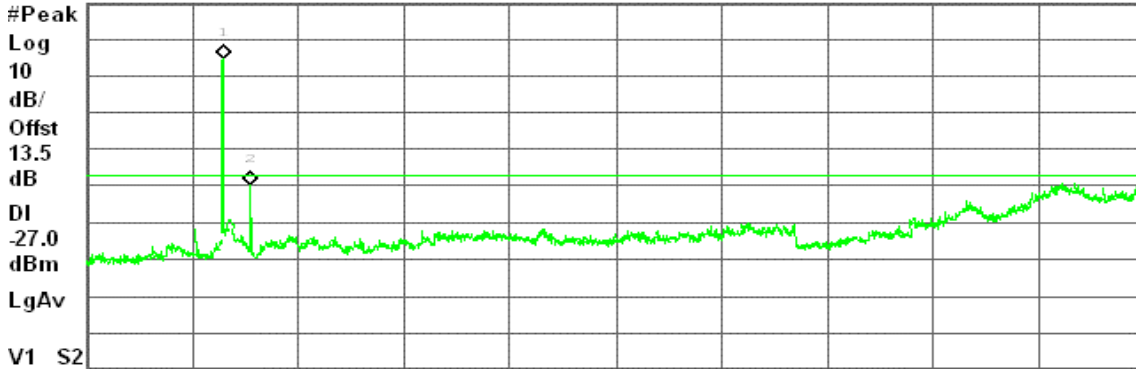
Conducted Spur., a Mode Low Ch.

Mkr2 6.23 GHz

Ref 20 dBm

Atten 20 dB

-29.95 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	4.93 dBm
2	(1)	Freq	6.23 GHz	-29.95 dBm



CH Mid

30MHz ~ 40GHz

Agilent 14:06:39 Jul 27, 2008

R T

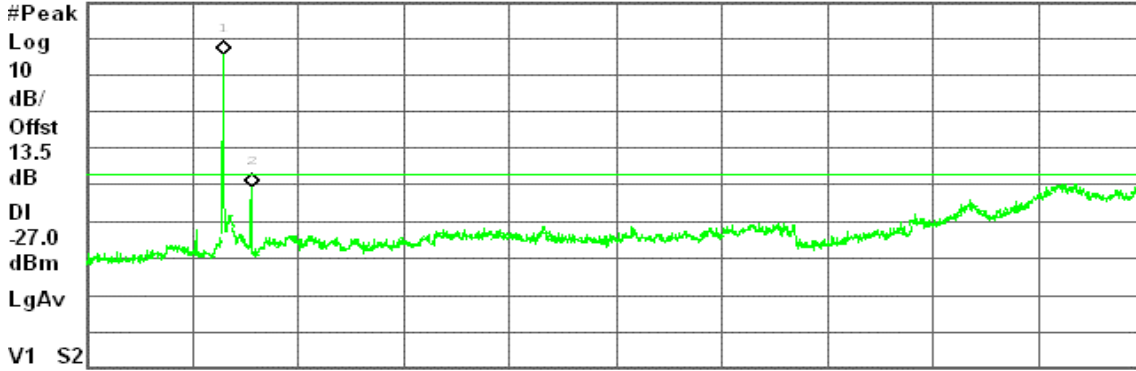
Conducted Spur., a Mode Mid Ch.

Mkr2 6.25 GHz

Ref 20 dBm

Atten 20 dB

-30.76 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.21 GHz	5.56 dBm
2	(1)	Freq	6.25 GHz	-30.76 dBm

CH High

30MHz ~ 40GHz

Agilent 14:22:17 Jul 27, 2008

R T

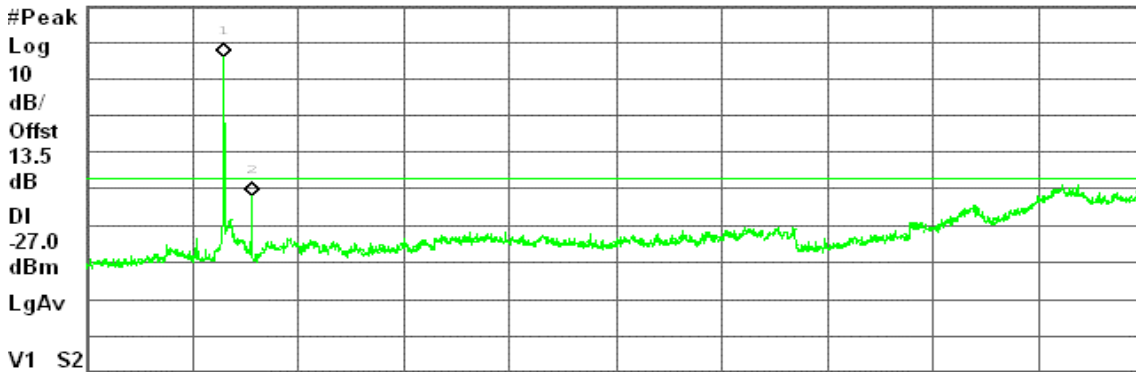
Conducted Spur., a Mode High Ch.

Mkr2 6.27 GHz

Ref 20 dBm

Atten 20 dB

-32.09 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	5.97 dBm
2	(1)	Freq	6.27 GHz	-32.09 dBm



draft 802.11n Standard-20 MHz Channel mode / Chain 1 / CH Low
30MHz ~ 40GHz

Agilent 15:40:48 Jul 27, 2008

R T

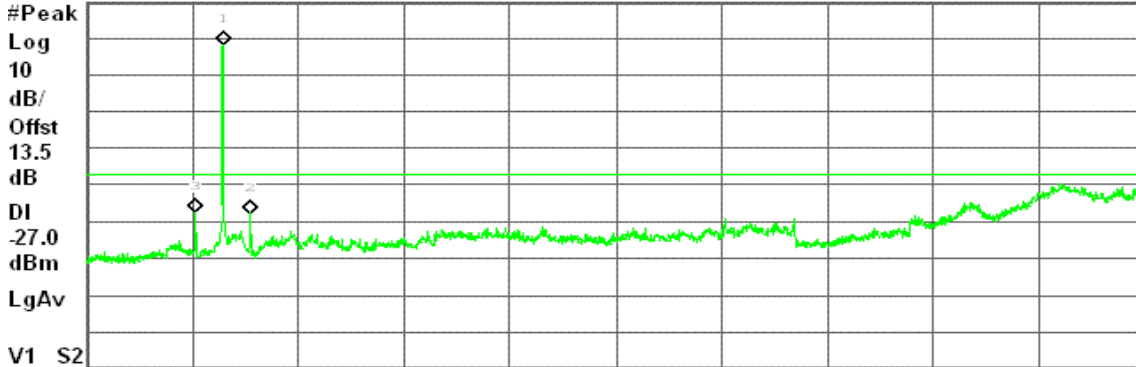
Conducted Spur., a Mode Low Ch.

Mkr3 4.15 GHz

Ref 20 dBm

Atten 20 dB

-37.42 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	8.25 dBm
2	(1)	Freq	6.23 GHz	-37.99 dBm
3	(1)	Freq	4.15 GHz	-37.42 dBm

CH Mid

30MHz ~ 40GHz

Agilent 15:38:55 Jul 27, 2008

R T

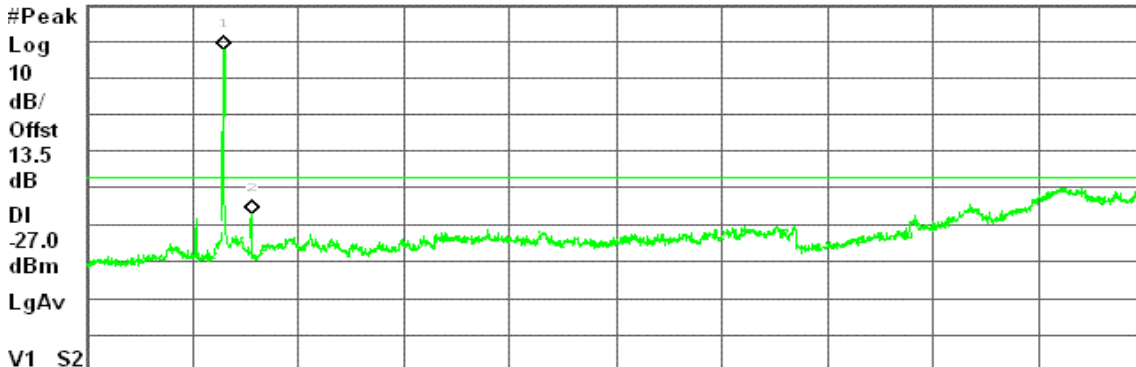
Conducted Spur., a Mode Mid Ch.

Mkr2 6.25 GHz

Ref 20 dBm

Atten 20 dB

-36.99 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	8.04 dBm
2	(1)	Freq	6.25 GHz	-36.99 dBm



CH High 30MHz ~ 40GHz

Agilent 15:46:49 Jul 27, 2008

R T

Conducted Spur., a Mode High Ch.

Mkr3 4.17 GHz

Ref 20 dBm

Atten 20 dB

-42.41 dBm

#Peak

Log

10

dB/

Offst

13.5

dB

Dl

-27.0

dBm

LgAv

V1 S2

Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.23 GHz	7.92 dBm
2	(1)	Freq	6.27 GHz	-39.23 dBm
3	(1)	Freq	4.17 GHz	-42.41 dBm



draft 802.11n Wide-40 MHz Channel mode / Chain 0

30MHz ~ 40GHz

Agilent 18:35:40 Jul 27, 2008

R T

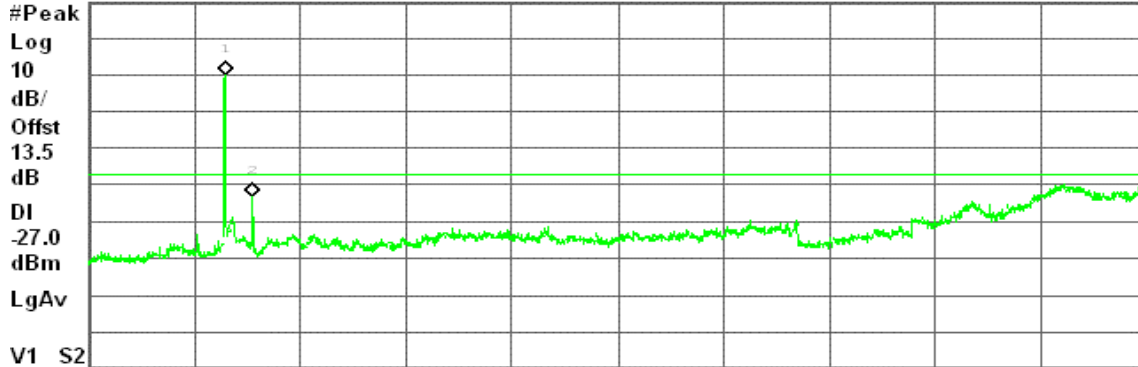
Conducted Spur., a Mode Low Ch.

Mkr2 6.23 GHz

Ref 20 dBm

Atten 20 dB

-33.26 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	-0.09 dBm
2	(1)	Freq	6.23 GHz	-33.26 dBm

draft 802.11n Wide-40 MHz Channel mode / Chain 1

30MHz ~ 40GHz

Agilent 18:45:37 Jul 27, 2008

R T

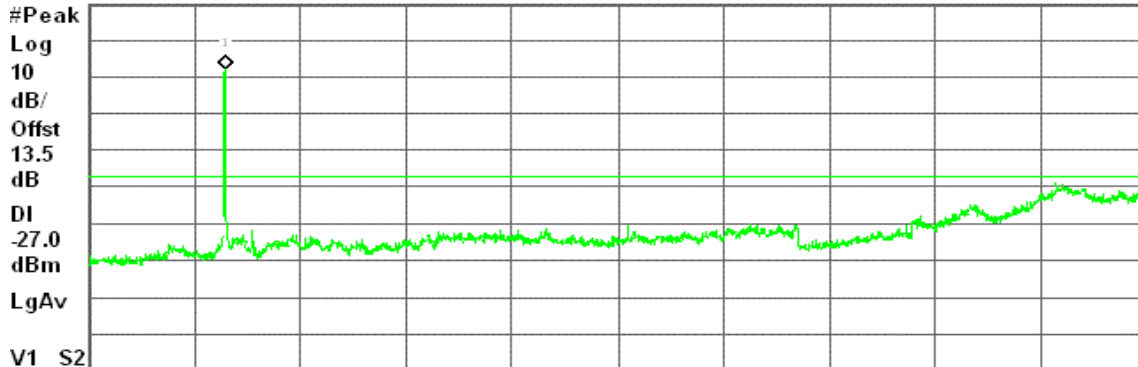
Conducted Spur., a Mode Low Ch.

Mkr1 5.19 GHz

Ref 20 dBm

Atten 20 dB

2.17 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	2.17 dBm



draft 802.11n Standard-20 MHz Channel mode with combiner / CH Low
30MHz ~ 40GHz

Agilent 16:17:29 Jul 27, 2008

R T

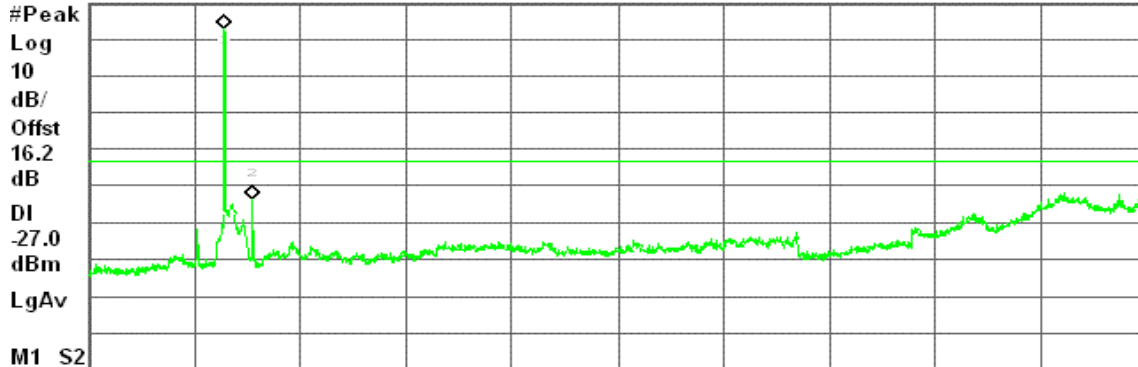
Conducted Spur., a Mode Low Ch.

Mkr1 5.17 GHz

Ref 16.2 dBm

#Atten 10 dB

9.27 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.17 GHz	9.27 dBm
2	(1)	Freq	6.23 GHz	-37.46 dBm

CH Mid

30MHz ~ 40GHz

Agilent 16:26:27 Jul 27, 2008

R T

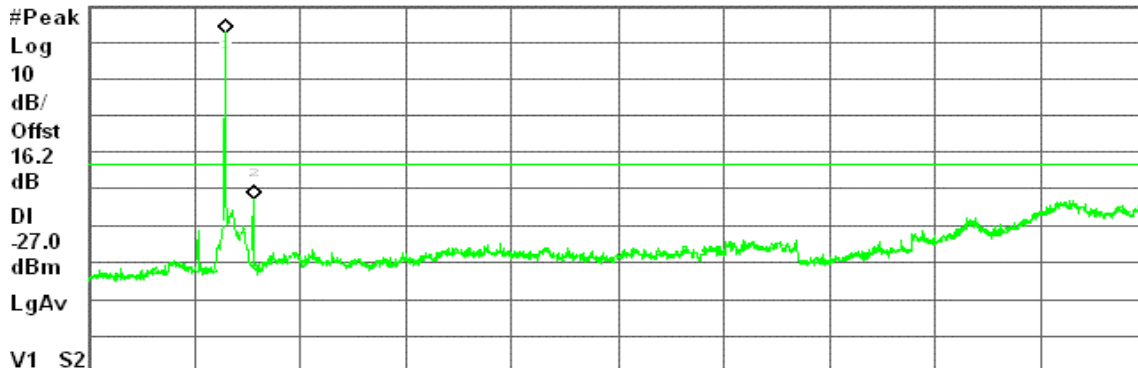
Conducted Spur., a Mode Mid Ch.

Mkr2 6.25 GHz

Ref 16.2 dBm

#Atten 10 dB

-36.71 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.21 GHz	8.88 dBm
2	(1)	Freq	6.25 GHz	-36.71 dBm



CH High 30MHz ~ 40GHz

Agilent 16:36:53 Jul 27, 2008

R T

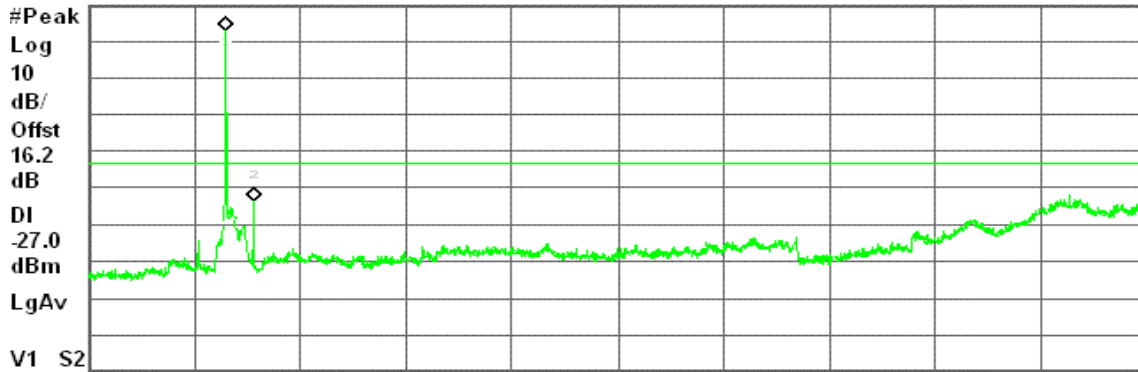
Conducted Spur., a Mode High Ch.

Mkr2 6.27 GHz

Ref 16.2 dBm

#Atten 10 dB

-37.38 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.21 GHz	9.35 dBm
2	(1)	Freq	6.27 GHz	-37.38 dBm

draft 802.11n Wide-40 MHz Channel mode with combiner 30MHz ~ 40GHz

Agilent 17:20:43 Jul 27, 2008

R T

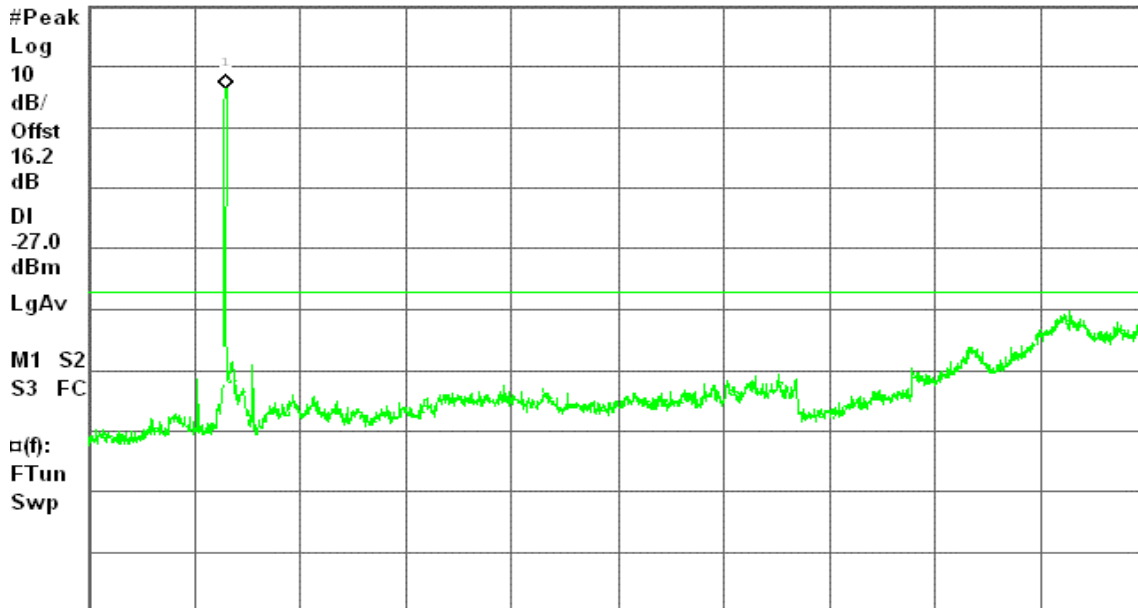
Conducted Spur., a Mode Low Ch.

Mkr1 5.19 GHz

Ref 20 dBm

#Atten 16 dB

6.52 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 199.9 ms (2001 pts)



7.8 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration

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

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode: Normal Link **Test Date:** October 29, 2008
Temperature: 22°C **Tested by:** Eddy Cheng
Humidity: 45% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1550	34.30	0.30	0.20	34.50	0.50	65.73	55.73	-31.23	-55.23	L1
0.4500	38.25	29.05	0.05	38.30	29.10	56.88	46.88	-18.58	-17.78	L1
0.4800	37.66	27.36	0.04	37.70	27.40	56.34	46.34	-18.64	-18.94	L1
0.5350	38.57	25.17	0.03	38.60	25.20	56.00	46.00	-17.40	-20.80	L1
1.2450	32.97	22.57	0.03	33.00	22.60	56.00	46.00	-23.00	-23.40	L1
3.9200	28.24	18.54	0.16	28.40	18.70	56.00	46.00	-27.60	-27.30	L1
0.1600	33.11	6.01	0.19	33.30	6.20	65.46	55.46	-32.16	-49.26	L2
0.2200	32.26	22.76	0.14	32.40	22.90	62.82	52.82	-30.42	-29.92	L2
0.4500	36.05	27.05	0.05	36.10	27.10	56.88	46.88	-20.78	-19.78	L2
0.4800	34.76	24.06	0.04	34.80	24.10	56.34	46.34	-21.54	-22.24	L2
0.8500	31.47	22.27	0.03	31.50	22.30	56.00	46.00	-24.50	-23.70	L2
2.8000	30.41	21.71	0.09	30.50	21.80	56.00	46.00	-25.50	-24.20	L2

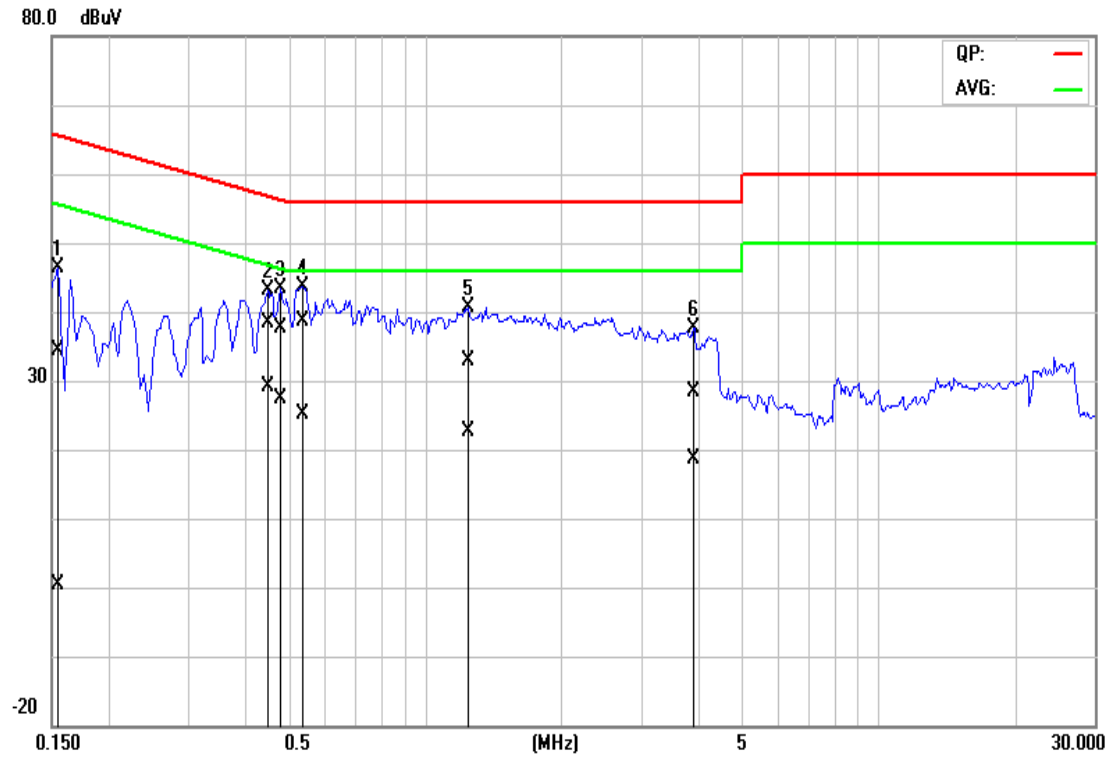
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

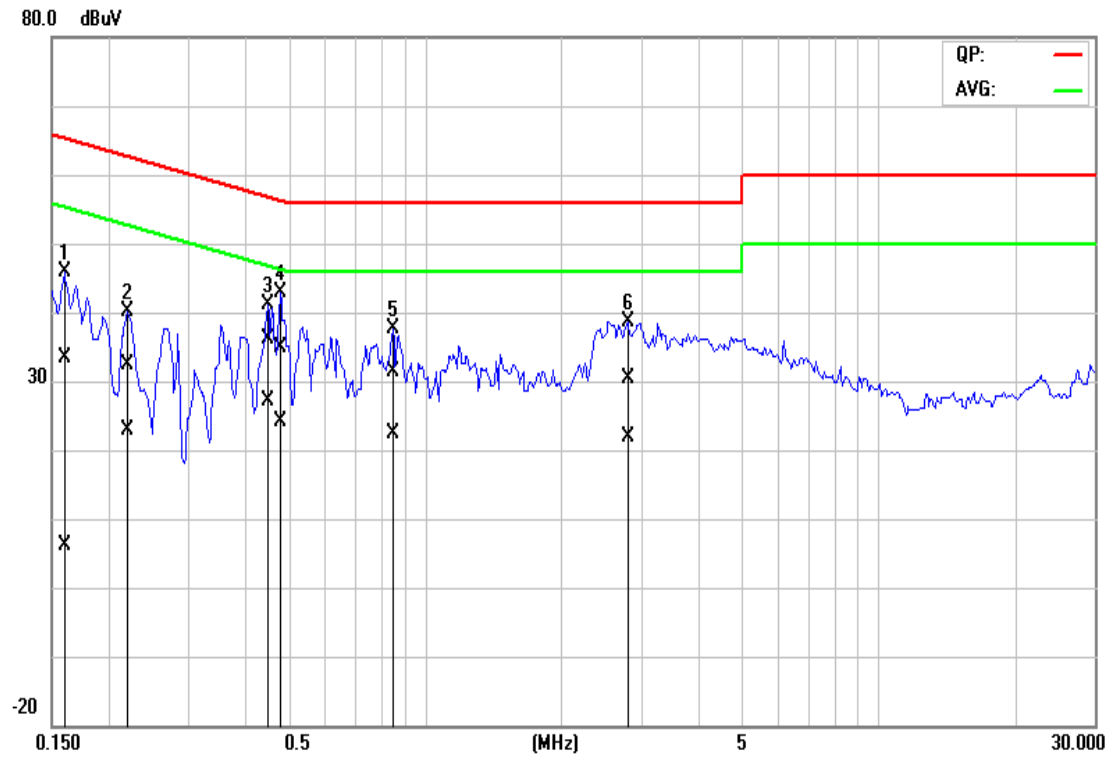


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)

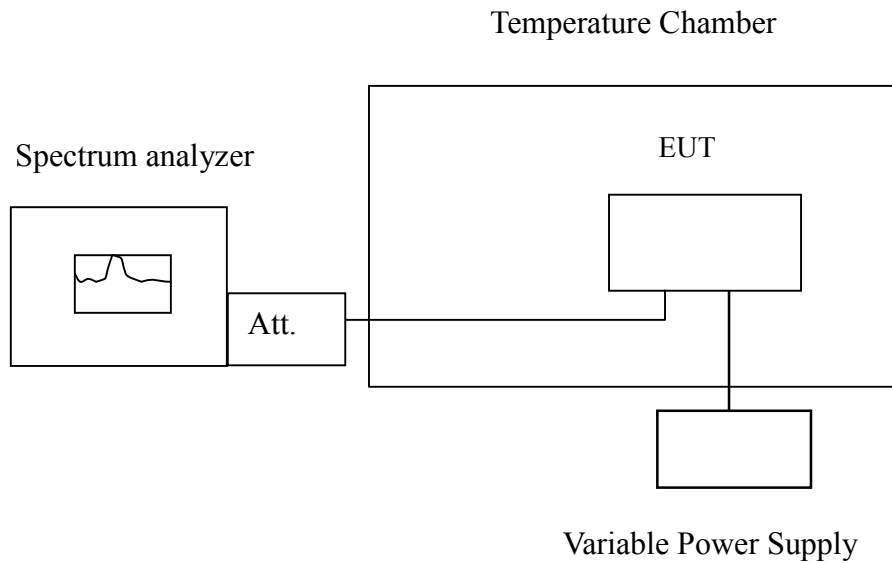


7.9 FREQUENCY STABILITY

LIMIT

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Test Configuration



Remark: Measurement setup for testing on Antenna connector



TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

TEST RESULTS

No non-compliance noted.

IEEE 802.11a mode:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5179.970267	5150~5250	Pass
40	110	5179.984846	5150~5250	Pass
30	110	5179.996131	5150~5250	Pass
20	110	5180.010606	5150~5250	Pass
10	110	5180.020118	5150~5250	Pass
0	110	5179.981755	5150~5250	Pass
-10	110	5179.994568	5150~5250	Pass
-20	110	5180.010546	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5180.030241	5150~5250	Pass
	110	5179.991546	5150~5250	Pass
	121	5180.010145	5150~5250	Pass



CH High

Operating Frequency: 5220 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5220.000022	5150~5250	Pass
40	110	5220.01422	5150~5250	Pass
30	110	5219.994769	5150~5250	Pass
20	110	5220.002407	5150~5250	Pass
10	110	5219.97529	5150~5250	Pass
0	110	5220.001458	5150~5250	Pass
-10	110	5220.001456	5150~5250	Pass
-20	110	5219.987412	5150~5250	Pass

Operating Frequency: 5220 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5220.003154	5150~5250	Pass
	110	5219.984576	5150~5250	Pass
	121	5220.041252	5150~5250	Pass



draft 802.11n Standard-20 MHz Channel mode:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5179.987573	5150~5250	Pass
40	110	5180.006774	5150~5250	Pass
30	110	5180.006774	5150~5250	Pass
20	110	5179.972503	5150~5250	Pass
10	110	5180.003548	5150~5250	Pass
0	110	5180.025489	5150~5250	Pass
-10	110	5179.024741	5150~5250	Pass
-20	110	5179.021415	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5180.054123	5150~5250	Pass
	110	5179.945813	5150~5250	Pass
	121	5180.012523	5150~5250	Pass



CH High

Operating Frequency: 5220 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5219.997098	5150~5250	Pass
40	110	5219.98654	5150~5250	Pass
30	110	5220.003078	5150~5250	Pass
20	110	5219.974779	5150~5250	Pass
10	110	5219.994259	5150~5250	Pass
0	110	5220.002148	5150~5250	Pass
-10	110	5220.002475	5150~5250	Pass
-20	110	5219.974158	5150~5250	Pass

Operating Frequency: 5220 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5220.002415	5150~5250	Pass
	110	5219.971458	5150~5250	Pass
	121	5220.039845	5150~5250	Pass



draft 802.11n Wide-40 MHz Channel mode:

Operating Frequency: 5190 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5190.014782	5150~5250	Pass
40	110	5189.984597	5150~5250	Pass
30	110	5190.01723	5150~5250	Pass
20	110	5190.016528	5150~5250	Pass
10	110	5189.977047	5150~5250	Pass
0	110	5189.021489	5150~5250	Pass
-10	110	5189.024122	5150~5250	Pass
-20	110	5190.031482	5150~5250	Pass

Operating Frequency: 5190 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5189.858972	5150~5250	Pass
	110	5190.001477	5150~5250	Pass
	121	5189.024523	5150~5250	Pass



7.10 TRANSMISSION IN ABSENCE OF DATA

LIMIT

According to §15.407(c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Applicants shall include in their application for equipment authorization a description of how this requirement is met.

TEST RESULTS

Please refer to the operational description for details.

Remark: *For the details, please refer to the theory of the operation.*



APPENDIX I RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

EUT Specification

EUT	Wireless-N Touchscreen Controller
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.15GHz ~ 5.25GHz <input type="checkbox"/> WLAN: 5.25GHz ~ 5.35GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input type="checkbox"/> Bluetooth: 2.402 GHz ~ 2.482 GHz <input type="checkbox"/> Others: _____
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others: _____
Exposure classification	General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <ul style="list-style-type: none"> <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11a mode: 11.51 dBm (14.16 mW) draft 802.11n Standard-20 MHz Channel mode: 14.83 dBm(30.41 mW) draft 802.11n Wide-40 MHz Channel mode: 12.21 dBm(16.63mW)
Antenna gain (Max)	5.94 dBi (Numeric gain: 3.93)
Evaluation applied	<input type="checkbox"/> MPE Evaluation <input checked="" type="checkbox"/> SAR Evaluation* <input type="checkbox"/> N/A
Remark:	
1. The maximum output power is <u>14.83dBm (30.41mW)</u> at <u>5220MHz</u> (with <u>3.93 numeric antenna gain.</u>)	

TEST RESULTS

No non-compliance noted.

Remark: Please refer to the separated SAR report.