FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

802.11a/n AP (Master)

Model: AIR FORCE ONE 5

Trade Name: Kozumi

Issued to

Kozumi USA Corp
3005 Hartridge Terrace,Wellington, FL 33414. 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.ccsrf.com
service@ccsrf.com

Testing Laboratory
1309

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1. TEST RESULT CERTIFICATION

Applicant: Kozumi USA Corp
3005 Hartridge Terrace,Wellington, FL 33414. USA

Equipment Under Test: 802.11a/n AP (Master)

Trade Name: Kozumi

Model: AIR FORCE ONE 5

Date of Test: December 31, 2009 ~ February 9, 2010

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:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Gina Lo
Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

<table>
<tr><td>Product</td><td>802.11a/n AP (Master)</td></tr>
<tr><td>Trade Name</td><td>Kozumi</td></tr>
<tr><td>Model Number</td><td>AIR FORCE ONE 5</td></tr>
<tr><td>Model Discrepancy</td><td>N/A</td></tr>
<tr><td>Power Supply</td><td>VDC from PoE</td></tr>
<tr><td>Operating Frequency Range & Number of Channels</td><td>
<table>
<tr><th></th><th>Mode</th><th>Frequency Range (MHz)</th><th>Number of Channels</th></tr>
<tr><td rowspan="3">UNII Band I</td><td>IEEE 802.11a</td><td>5180 – 5230</td><td>4 Channels</td></tr>
<tr><td>draft 802.11n Standard-20 MHz</td><td>5180 – 5230</td><td>4 Channels</td></tr>
<tr><td>draft 802.11n Wide-40 MHz</td><td>5190 ~ 5220</td><td>2 Channels</td></tr>
</table>
</td></tr>
<tr><td>Transmit Power</td><td>IEEE 802.11a mode: 2.50 dBm
draft 802.11n Standard-20 MHz Channel mode: 4.89 dBm
draft 802.11n Wide-40 MHz Channel mode: 4.94 dBm</td></tr>
<tr><td>Modulation Technique</td><td>OFDM (QPSK, BPSK, 16-QAM, 64-QAM)</td></tr>
<tr><td>Transmit Data Rate</td><td>IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps
draft 802.11n Standard-20 MHz Channel mode: OFDM (13, 14.4, 26, 28.89, 39, 43.33, 52, 57.78, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps)
draft 802.11n Wide-40 MHz Channel mode: OFDM (27, 54,81, 108,162, 216,243, 270, 30, 60, 90, 120, 180, 240, 270, 300Mbps)</td></tr>
<tr><td>Antenna Specification</td><td>Antenna Gain:
IEEE 802.11a: 14.84 dBi
MIMO: 14.84 dBi + 10 log (2) = 17.85 dBi
(Numeric gain: 60.95)</td></tr>
<tr><td>Antenna Designation</td><td>Patch Antenna</td></tr>
</table>

Operation Frequency

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	**MHz**
36	5180
38	5190
40	5200
44	5220
46	5230

Remark:

1. *The sample selected for test was production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **XYR-GC730107** 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: AIR FORCE ONE 5) had been tested under operating condition.

After the preliminary test, the EUT with PoE was found to emit the worst emissions and therefore had been tested under standby condition.

The EUT is a 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and Chain1).

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

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z mode), lie-down position (X, Y mode). The worst emission was found in X mode for powerline conducted emissions, Z mode for radiation emissions and the worst cases were recorded.

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 (5230MHz) 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 (5230MHz) with 13Mbps data rate were chosen for full testing.

draft 802.11n Wide-40 MHz Channel mode:

Channel Low (5190MHz) and Channel High (5220MHz) with 27Mbps 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	03/05/2010

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	US42510252	09/09/2010
Test Receiver	Rohde&Schwarz	ESCI	100064	11/28/2010
Switch Controller	TRC	Switch Controller	SC94050010	05/02/2010
4 Port Switch	TRC	4 Port Switch	SC94050020	05/02/2010
Loop Antenna	EMCO	6502	8905/2356	05/28/2010
Horn-Antenna	TRC	HA-0502	06	06/03/2010
Horn-Antenna	TRC	HA-0801	04	06/17/2010
Horn-Antenna	TRC	HA-1201A	01	08/10/2010
Horn-Antenna	TRC	HA-1301A	01	08/10/2010
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/27/2010
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 MRA: TW1039 IC: 2324G-1/-2	10/17/2010 11/04/2010
Test S/W	LABVIEW (V 6.1)			

Powerline Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESHS30	828144/003	11/17/2010
Two-Line V-Network 9kHz-30MHz	Schaffner	NNB41	03/10013	06/10/2010
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/08/2010
Test S/W	LABVIEW (V 6.1)			

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 2.81
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	+/-3.7046
3M Semi Anechoic Chamber / Above 1GHz	+/-3.0958

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

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	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	FCC MRA: TW1039
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 2324G-1 / IC 2324G-2) to perform	Canada IC 2324G-1 IC 2324G-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 II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	PoE	LB	A5-20S48-V	R00080500033	N/A	N/A	Unshielded, 1.8m
2.	Notebook PC (Remote)	HP	HSTNN-Q37C	CNF9491GPS	N/A	N/A	AC I/P: Unshielded, 1.8m with a core DC O/P: Unshielded, 1.8m
3.	Notebook PC (Remote)	DELL	PP19L	GK102 A00	QDS-BRCM1021	LAN Cable: Unshielded, 10m	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.*

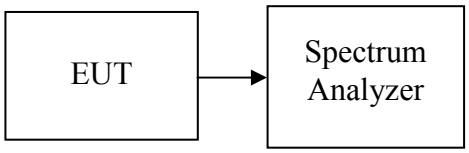
7. FCC PART 15 REQUIREMENTS

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 >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)	Bandwidth (MHz)
Low	5180	19.881
Mid	5200	19.866
High	5230	19.785

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

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	20.219
Mid	5200	19.885
High	5230	19.830

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

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	20.259
Mid	5200	20.111
High	5230	19.448

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

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5190	39.754
High	5220	39.087

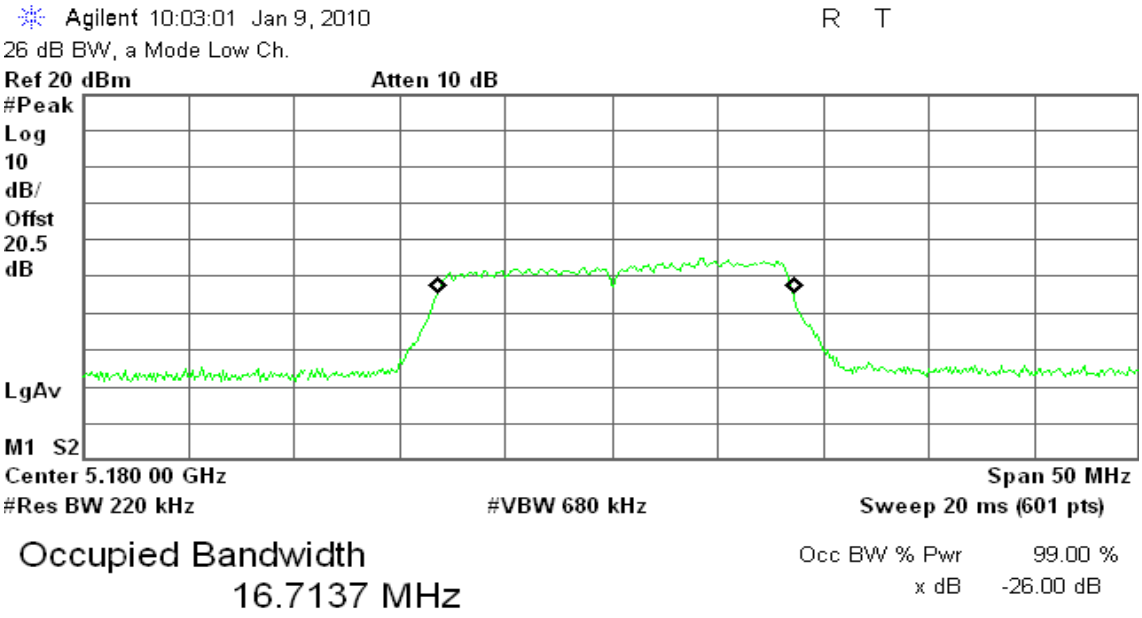
Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5190	39.502
High	5220	39.559

Test Plot

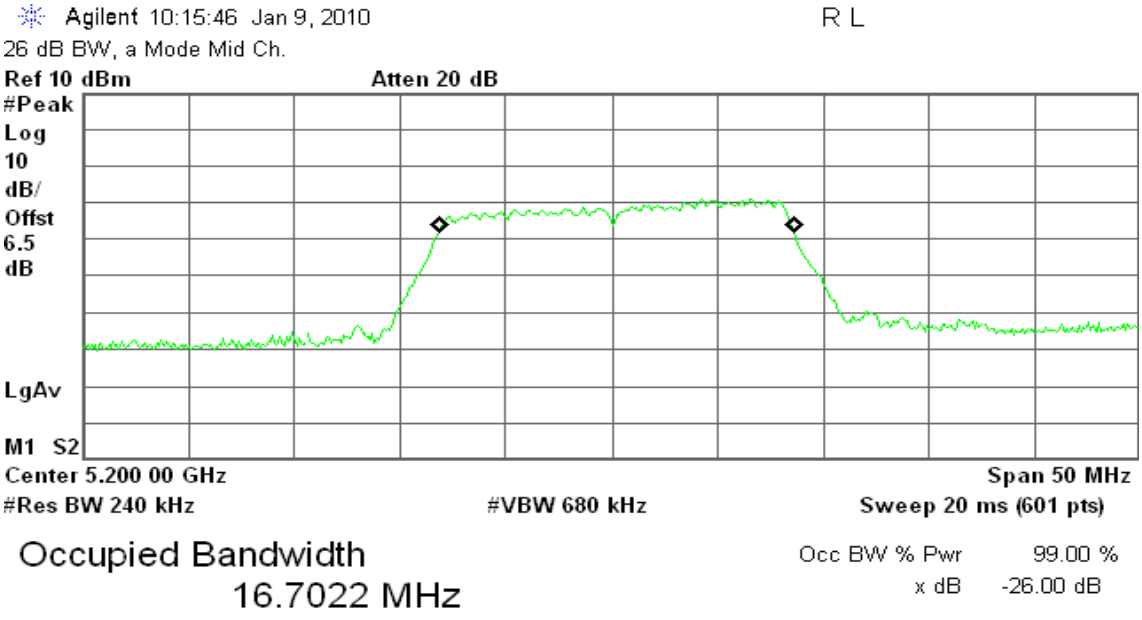
IEEE 802.11a mode

CH Low



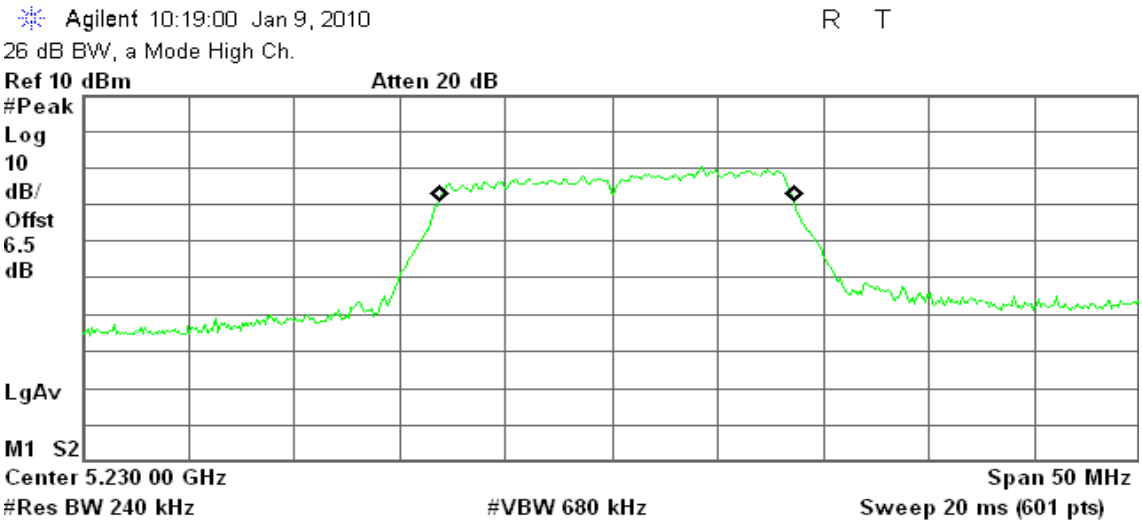
Transmit Freq Error	192.935 kHz
x dB Bandwidth	19.881 MHz

CH Mid



Transmit Freq Error	246.109 kHz
x dB Bandwidth	19.866 MHz

CH High



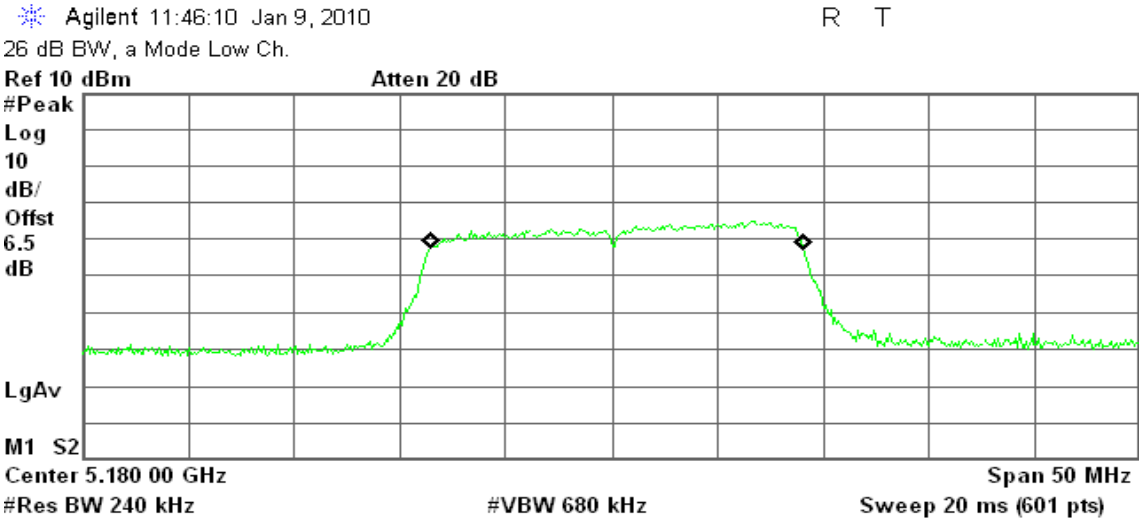
Occupied Bandwidth
16.6846 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 243.259 kHz
x dB Bandwidth 19.785 MHz

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

CH Low

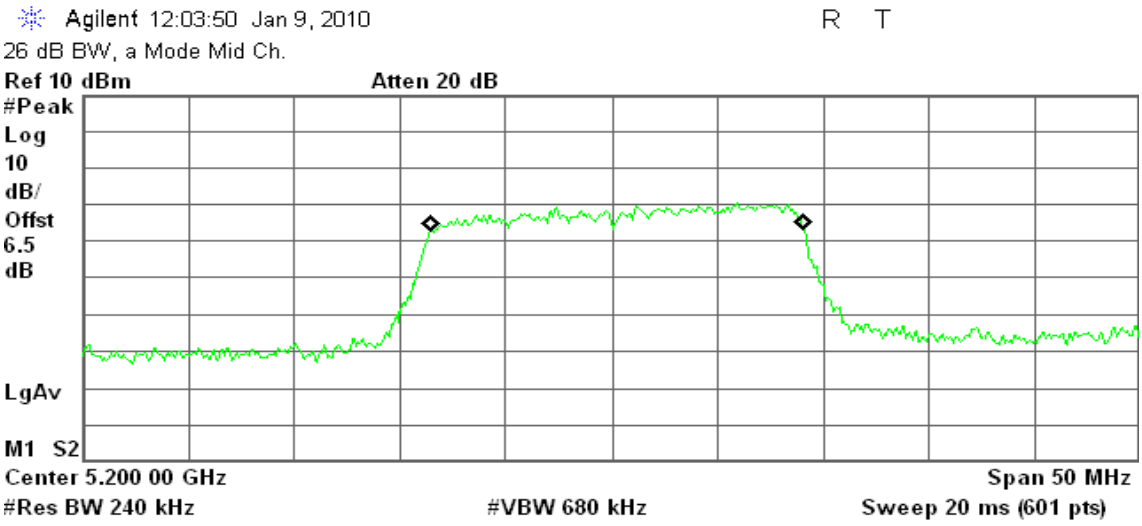


Occupied Bandwidth
17.5526 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 245.709 kHz
x dB Bandwidth 20.219 MHz

CH Mid

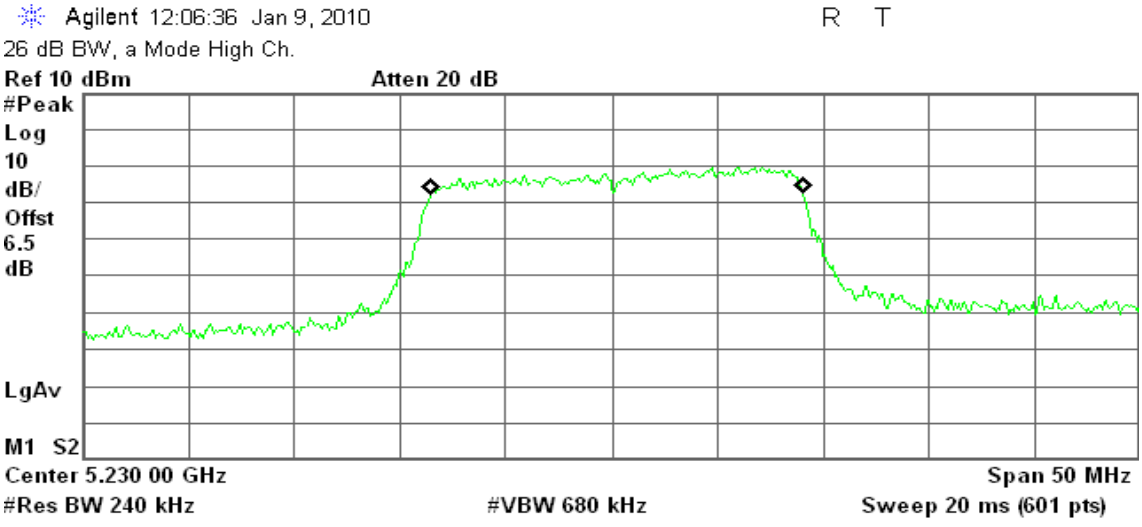


Occupied Bandwidth
17.5273 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 265.707 kHz
x dB Bandwidth 19.885 MHz

CH High



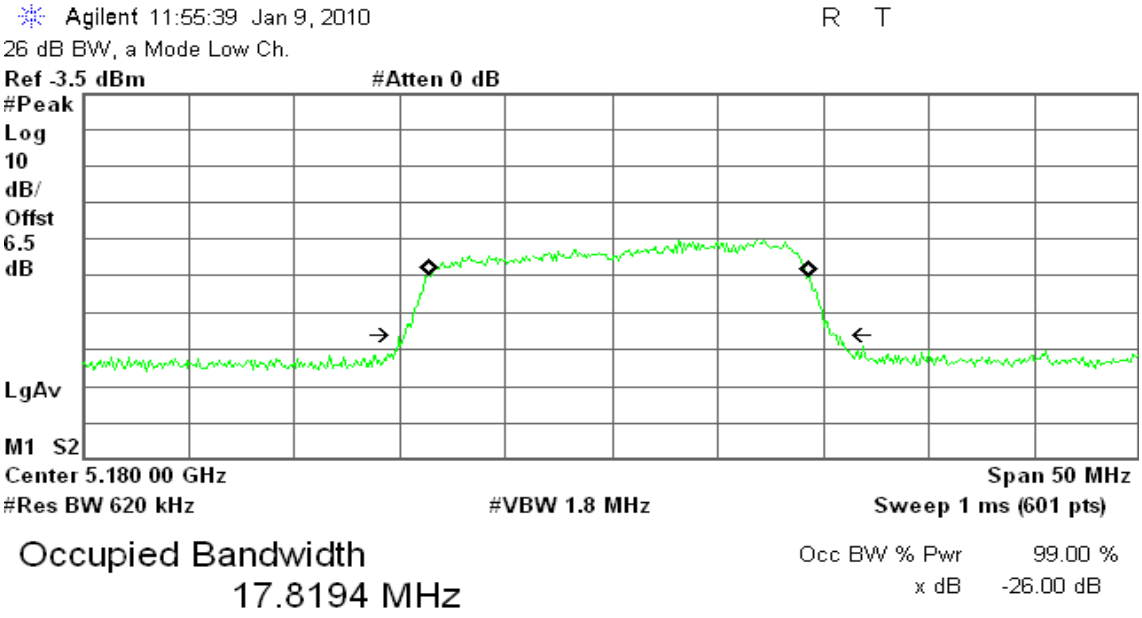
Occupied Bandwidth
17.4670 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 256.769 kHz
x dB Bandwidth 19.830 MHz

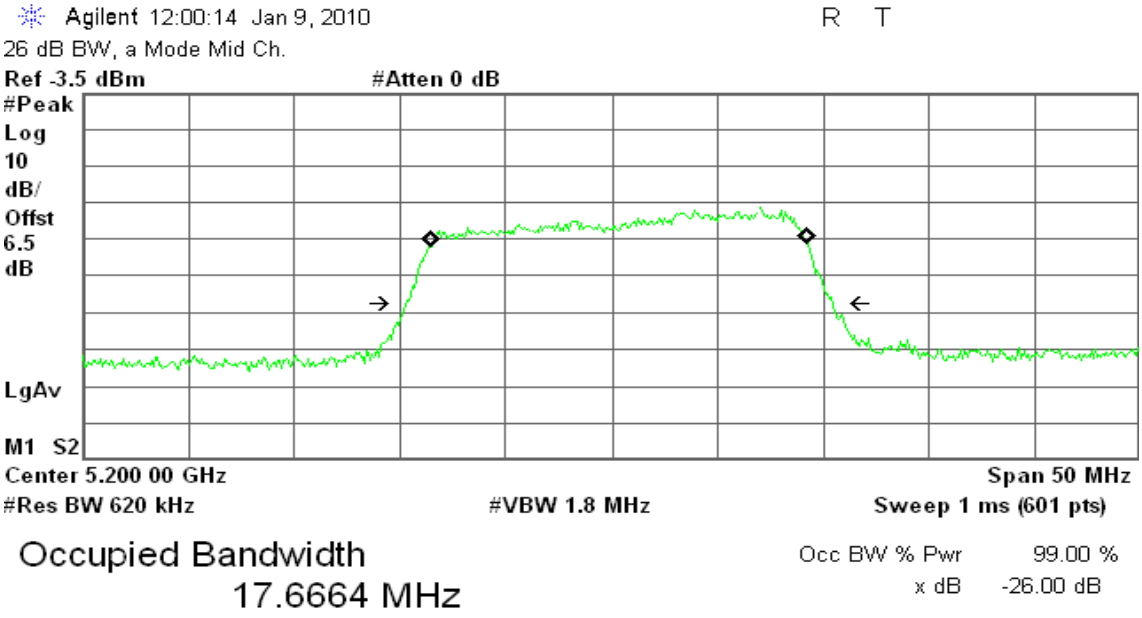
draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low



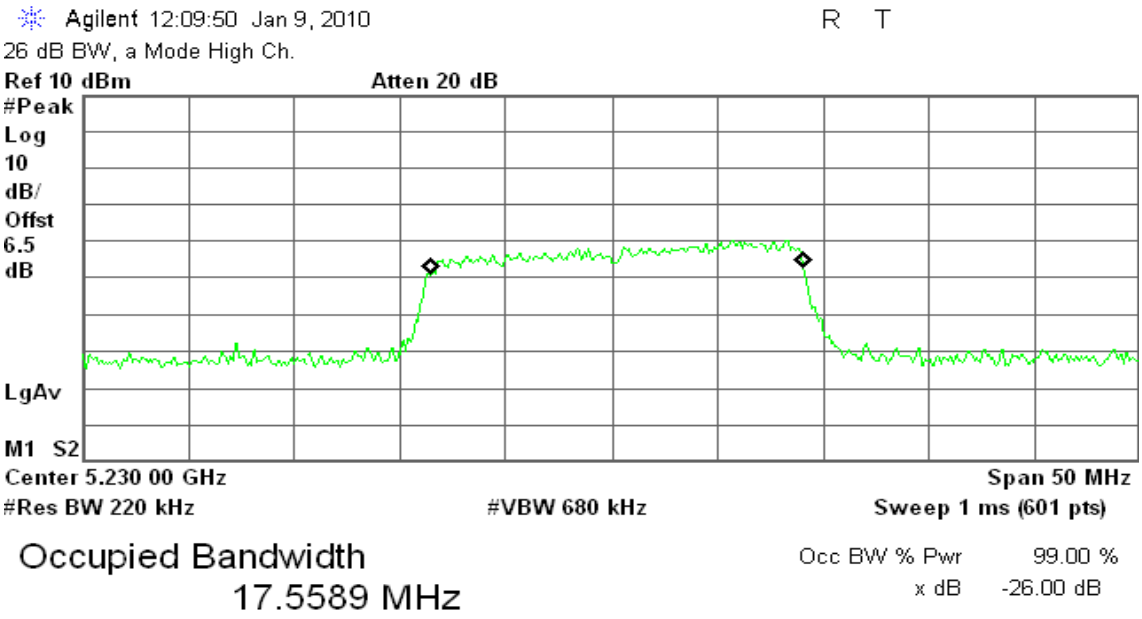
Transmit Freq Error	329.107 kHz
x dB Bandwidth	20.259 MHz

CH Mid



Transmit Freq Error	345.023 kHz
x dB Bandwidth	20.111 MHz

CH High



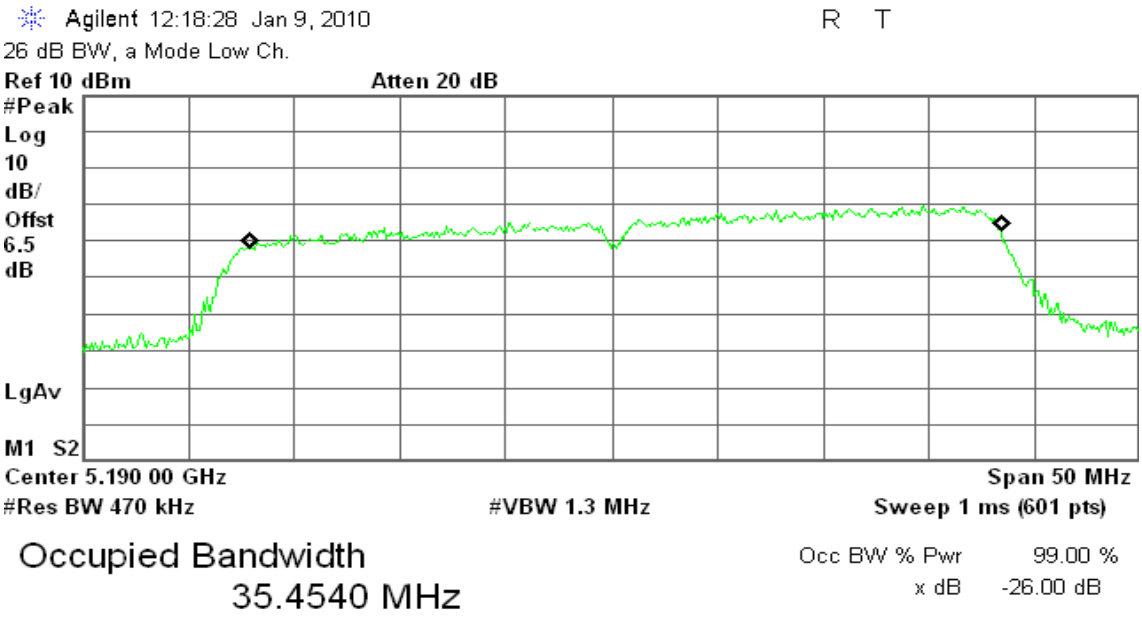
Occupied Bandwidth
17.5589 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 240.031 kHz
x dB Bandwidth 19.448 MHz

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

CH Low

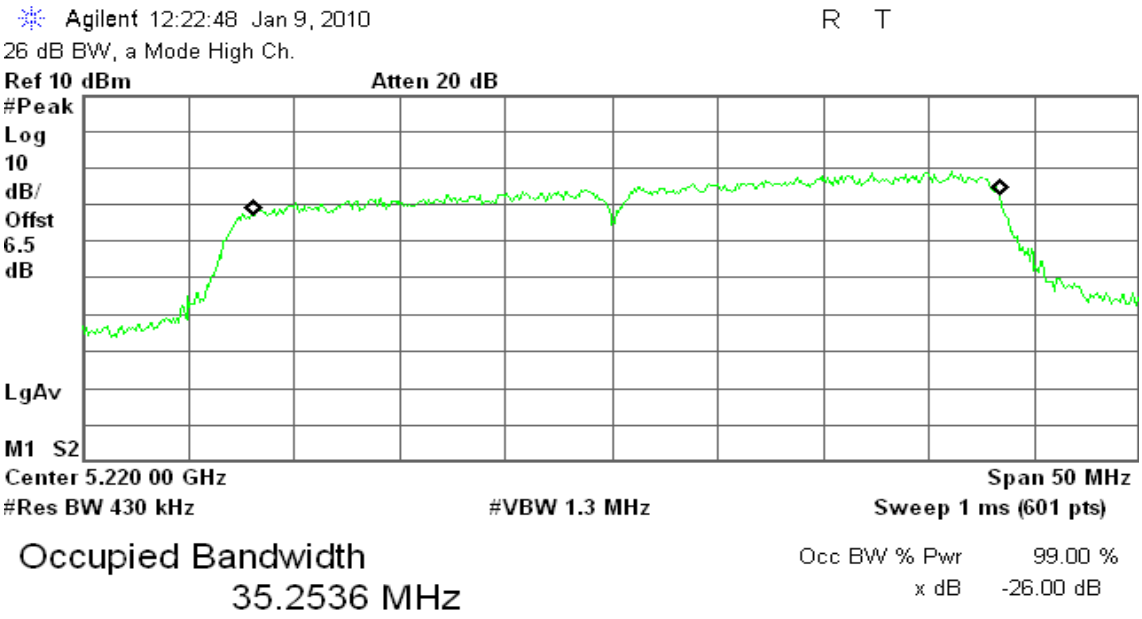


Occupied Bandwidth
35.4540 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 661.482 kHz
x dB Bandwidth 39.754 MHz

CH High



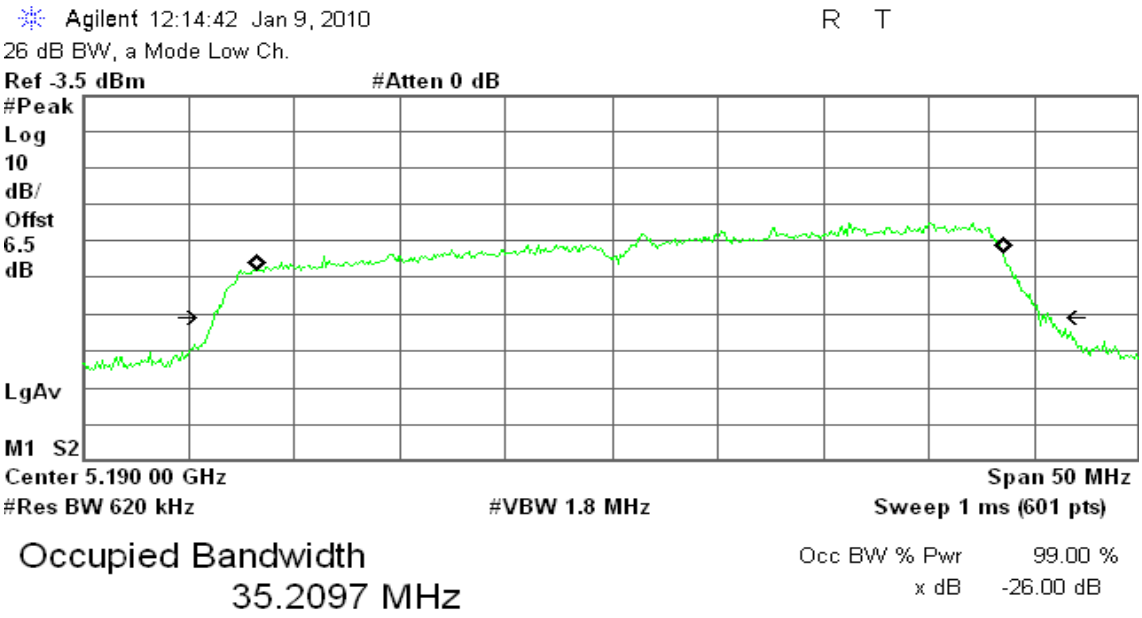
Occupied Bandwidth
35.2536 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 671.257 kHz
x dB Bandwidth 39.087 MHz

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

CH Low

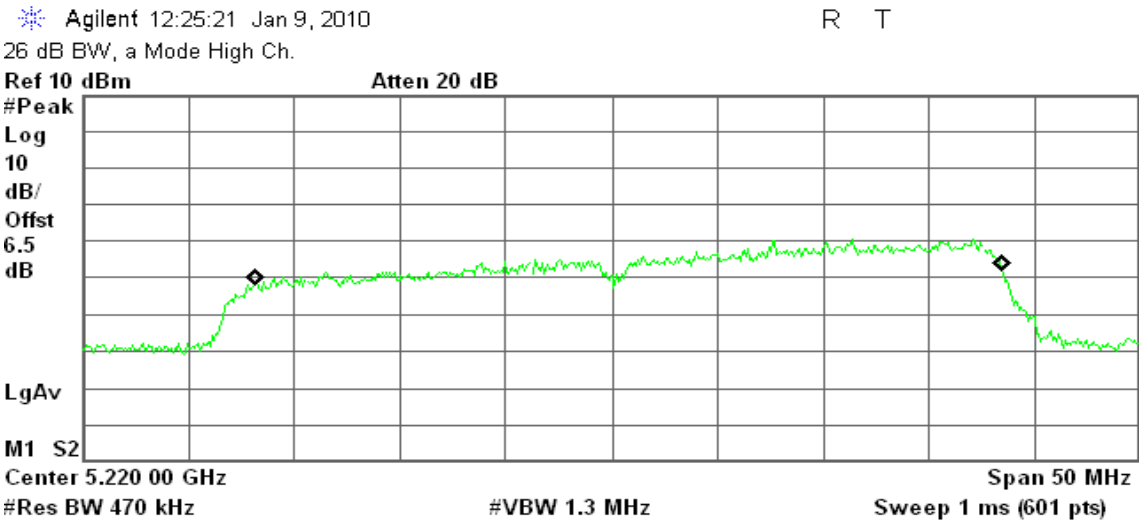


Occupied Bandwidth
35.2097 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 867.580 kHz
x dB Bandwidth 39.502 MHz

CH High



Occupied Bandwidth
35.2862 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error	800.796 kHz
x dB Bandwidth	39.559 MHz

7.2 MAXIMUM CONDUCTED OUTPUT POWER

LIMIT

According to §15.407(a),

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 or 4 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)	4 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	19.881	12.984	16.984	17.00
Mid	5200	19.866	12.981	16.981	17.00
High	5230	19.785	12.963	16.963	17.00

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

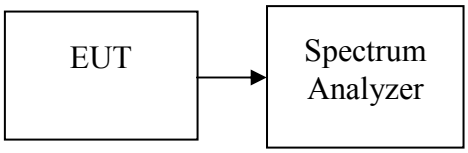
Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	20.219	20.259	13.066	17.066	17.00
Mid	5200	19.885	20.111	13.034	17.034	17.00
High	5230	19.830	19.448	12.973	16.973	17.00

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)	10 Log B (dB)	4 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5190	39.754	39.502	15.994	19.994	17.00
High	5220	39.087	39.559	15.972	19.972	17.00

Test Configuration

The EUT was connected to a spectrum analyzer through a 50Ω 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	2.50	8.00
Mid	5200	2.16	8.00
High	5230	1.00	8.00

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	1.87	1.88	4.89	5.00
Mid	5200	1.78	1.92	4.86	5.00
High	5230	1.86	1.83	4.86	5.00

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)
Low	5190	1.93	1.93	4.94	5.00
High	5220	1.88	1.53	4.72	5.00

Remark:

1. Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000))

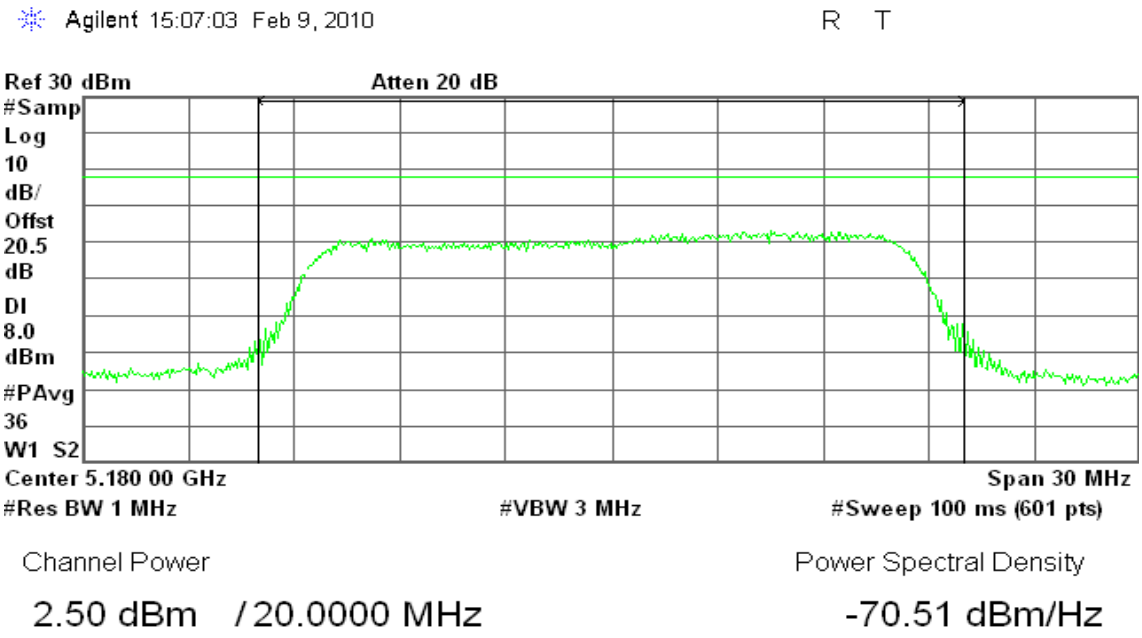
2. The maximum antenna gain is 14.84dBi; therefore the reduction due to antenna gain is 9dB, so the limit is 8dBm.

3. The maximum antenna gain is 17.85dBi; therefore the reduction due to antenna gain is 12dB, so the limit is 5dBm.

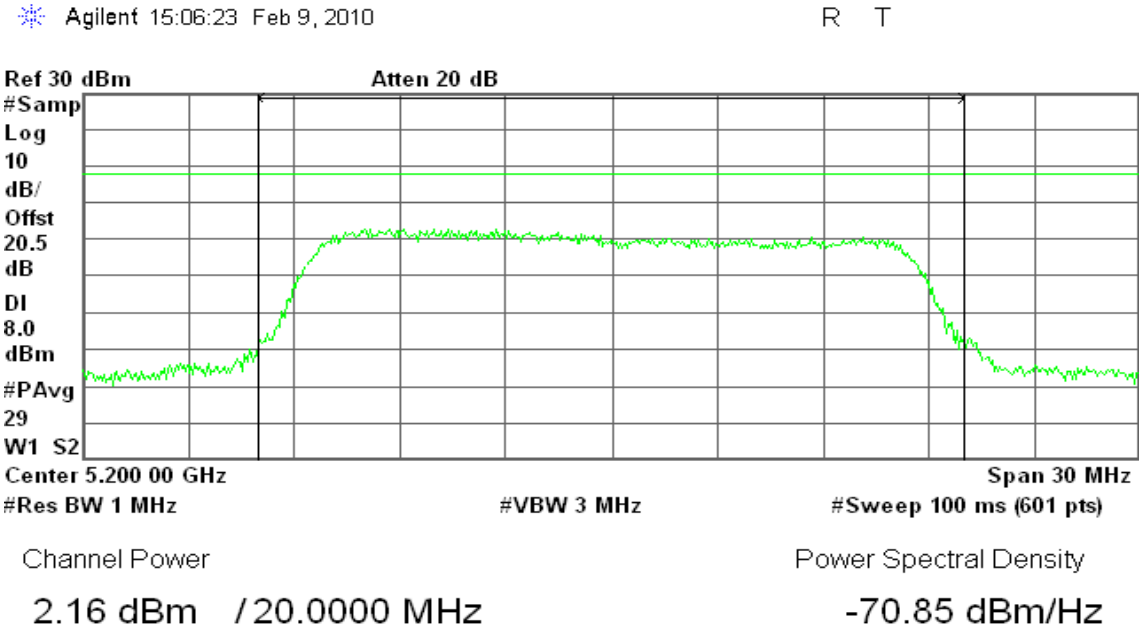
Test Plot

IEEE 802.11a mode

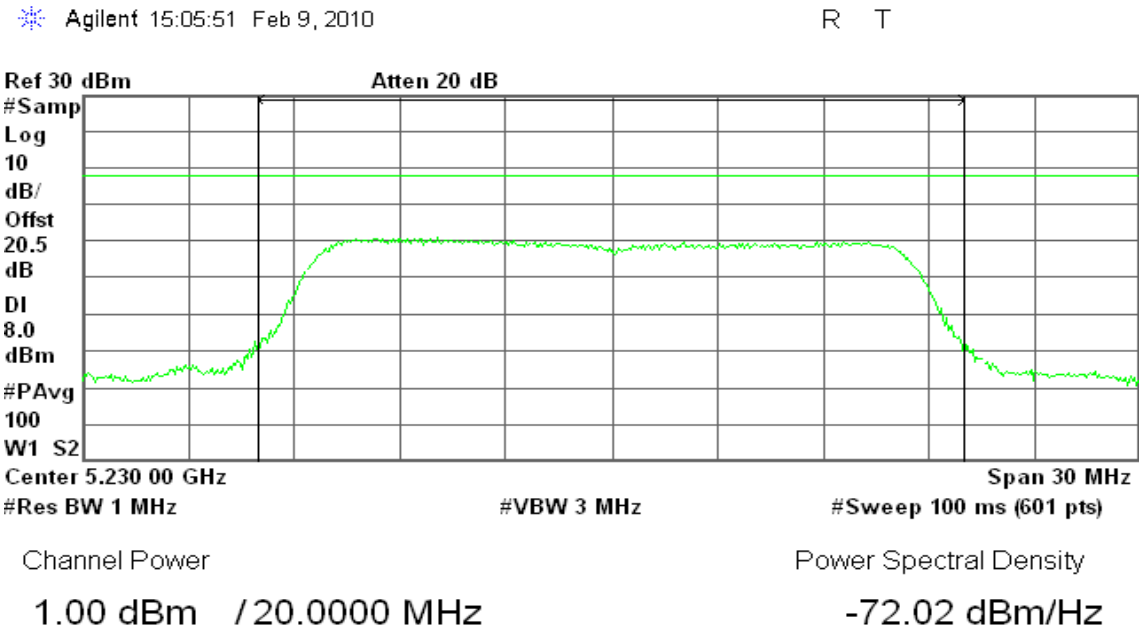
CH Low



CH Mid

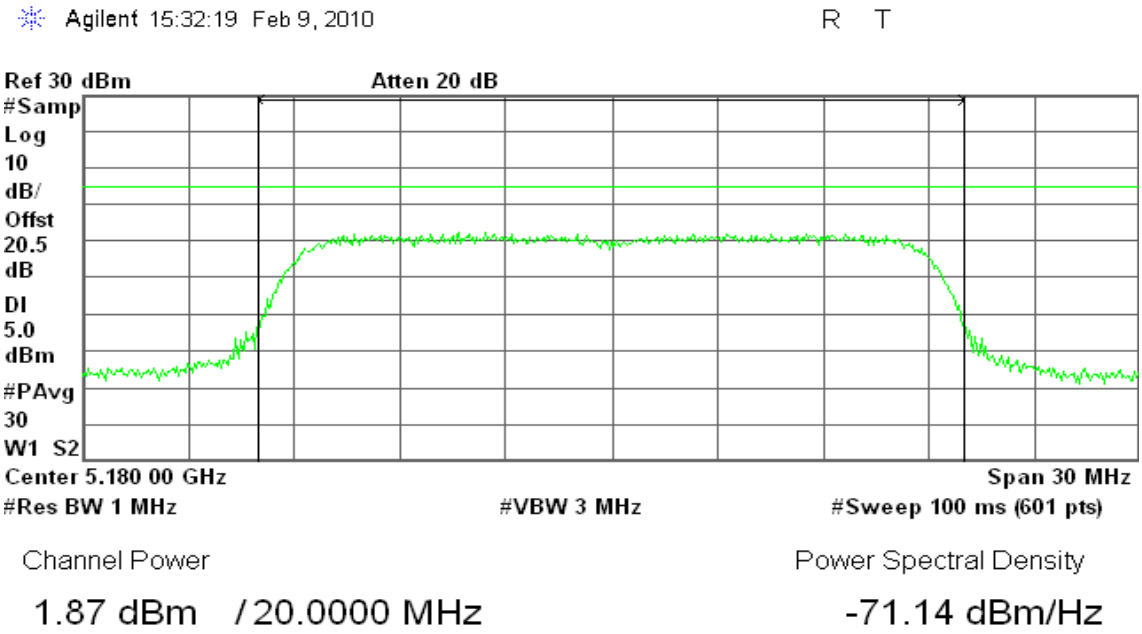


CH High

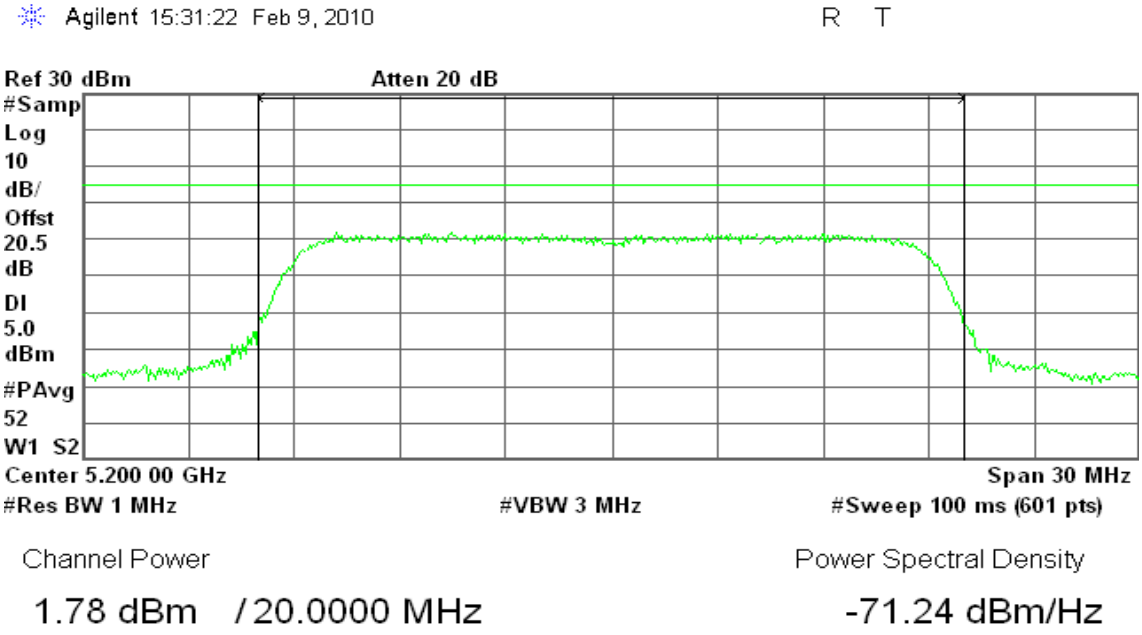


draft 802.11n Standard-20 MHz Channel mode / Chain 0

CH Low



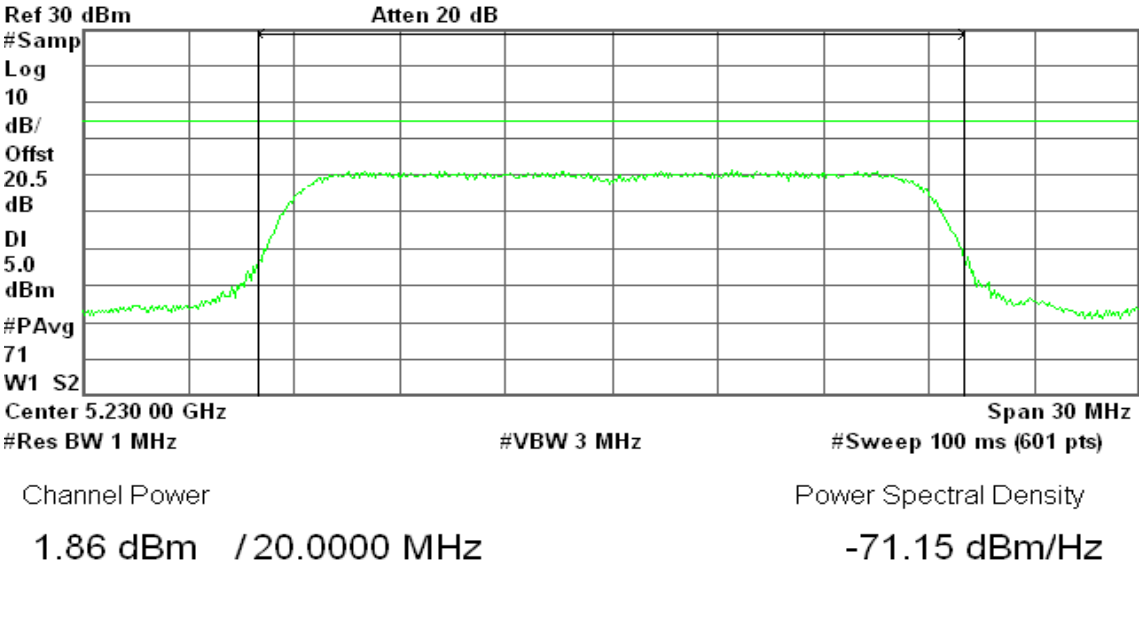
CH Mid



Channel Power
1.78 dBm /20.0000 MHz

Power Spectral Density
-71.24 dBm/Hz

CH High

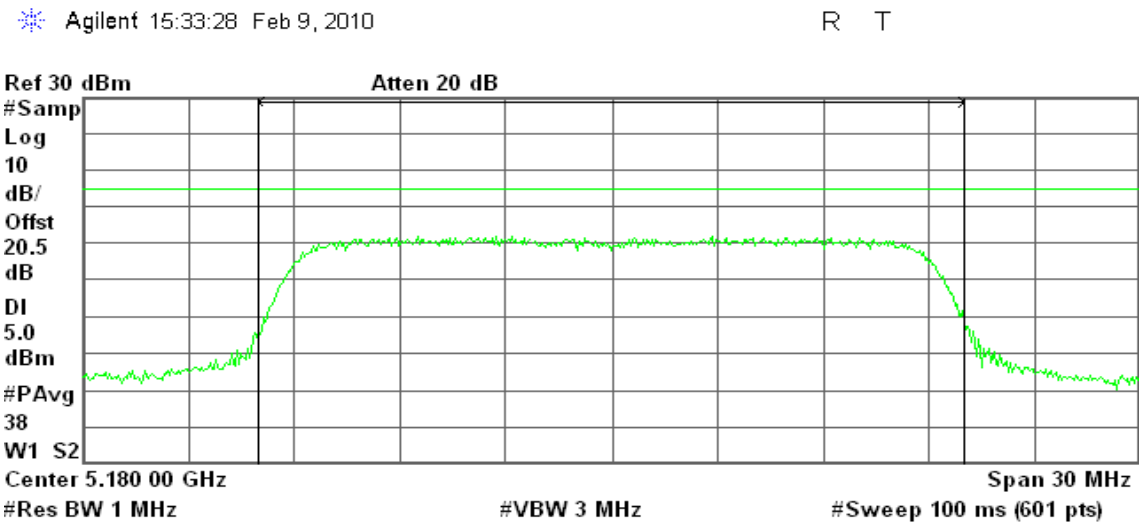


Channel Power
1.86 dBm /20.0000 MHz

Power Spectral Density
-71.15 dBm/Hz

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

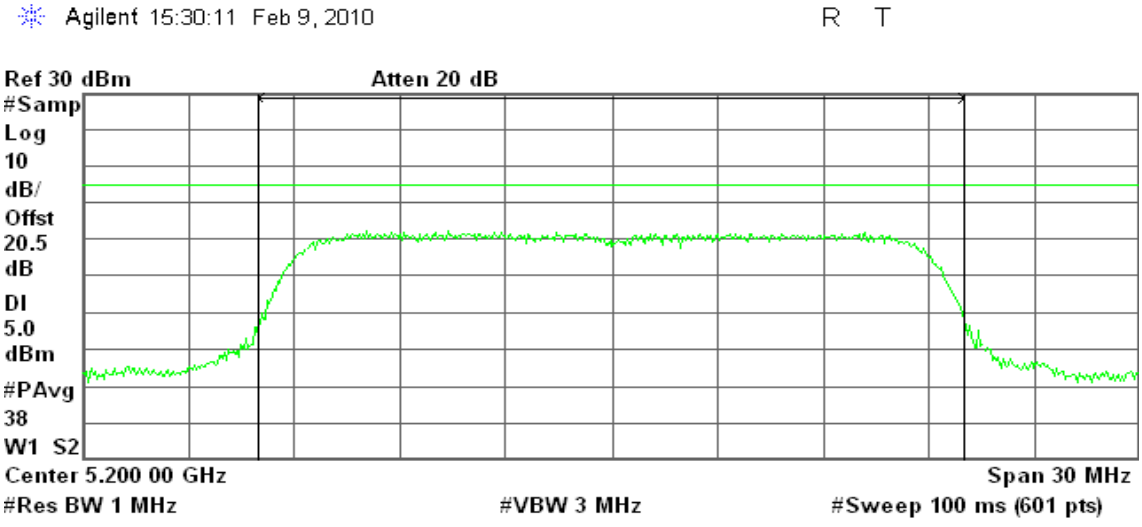
CH Low



Channel Power
1.88 dBm / 20.0000 MHz

Power Spectral Density
-71.13 dBm/Hz

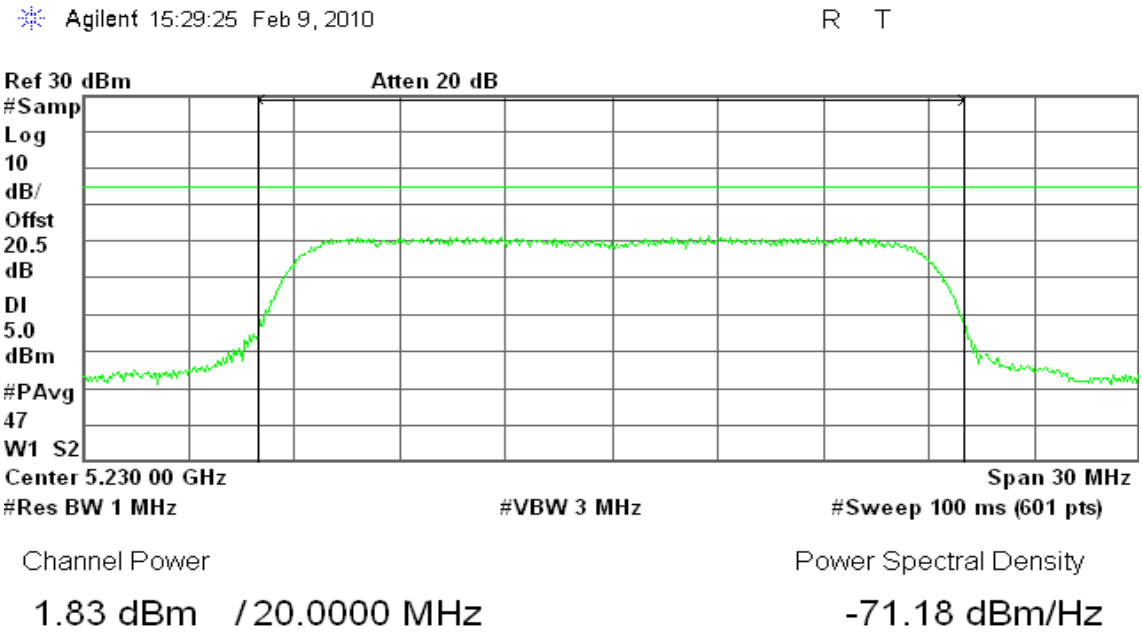
CH Mid



Channel Power
1.92 dBm / 20.0000 MHz

Power Spectral Density
-71.09 dBm/Hz

CH High

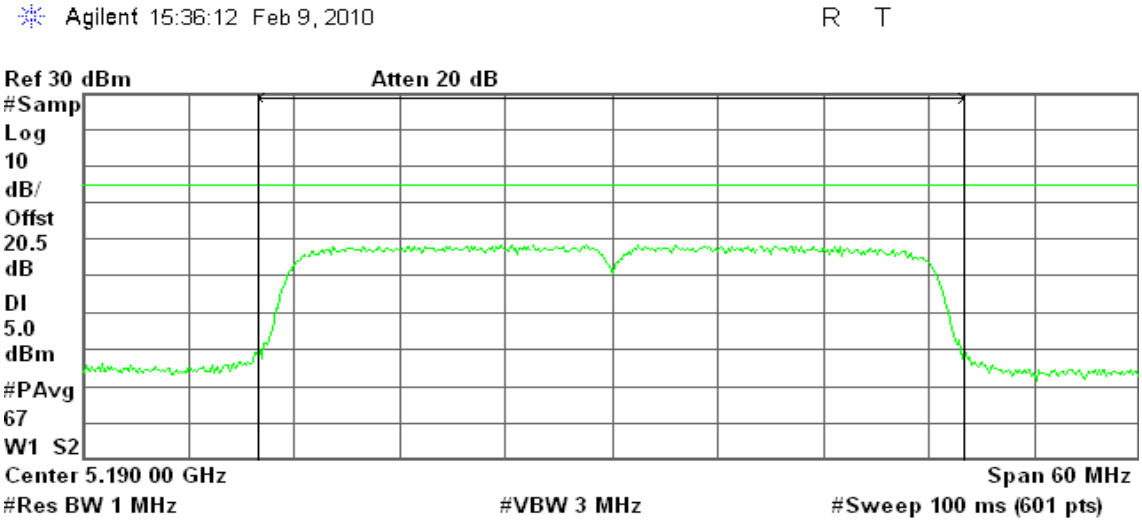


Channel Power
1.83 dBm /20.0000 MHz

Power Spectral Density
-71.18 dBm/Hz

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

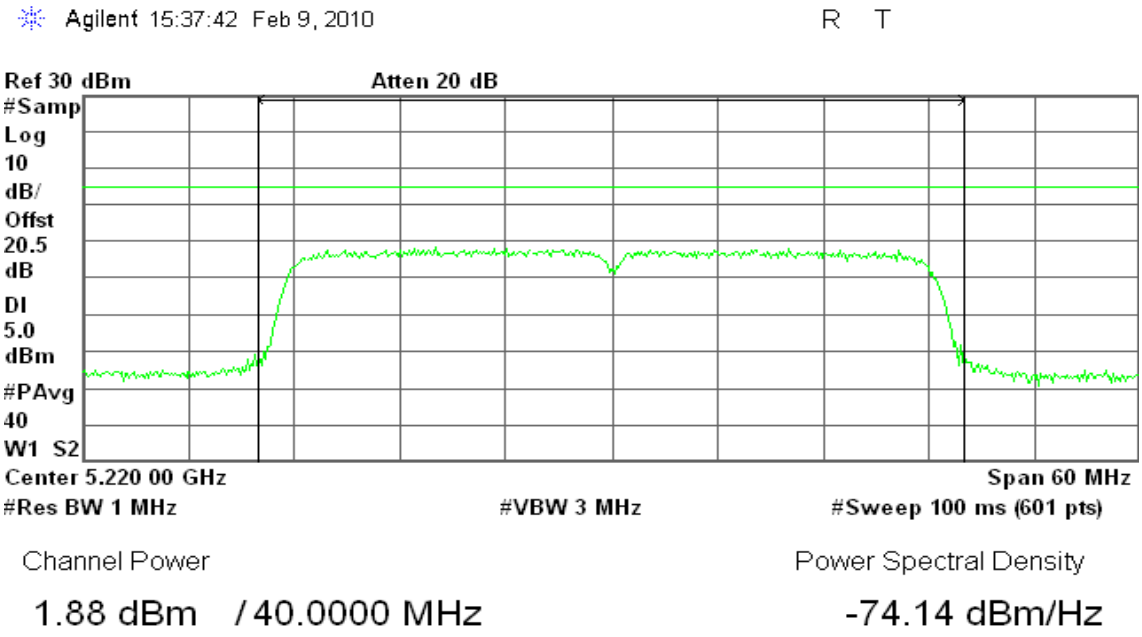
CH Low



Channel Power
1.93 dBm /40.0000 MHz

Power Spectral Density
-74.09 dBm/Hz

CH High

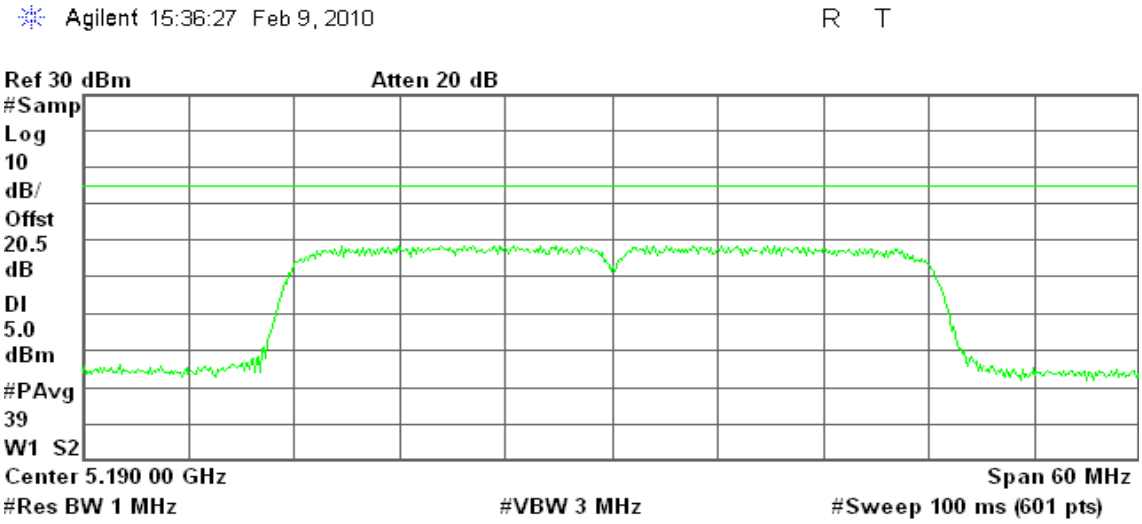


Channel Power
1.88 dBm /40.0000 MHz

Power Spectral Density
-74.14 dBm/Hz

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

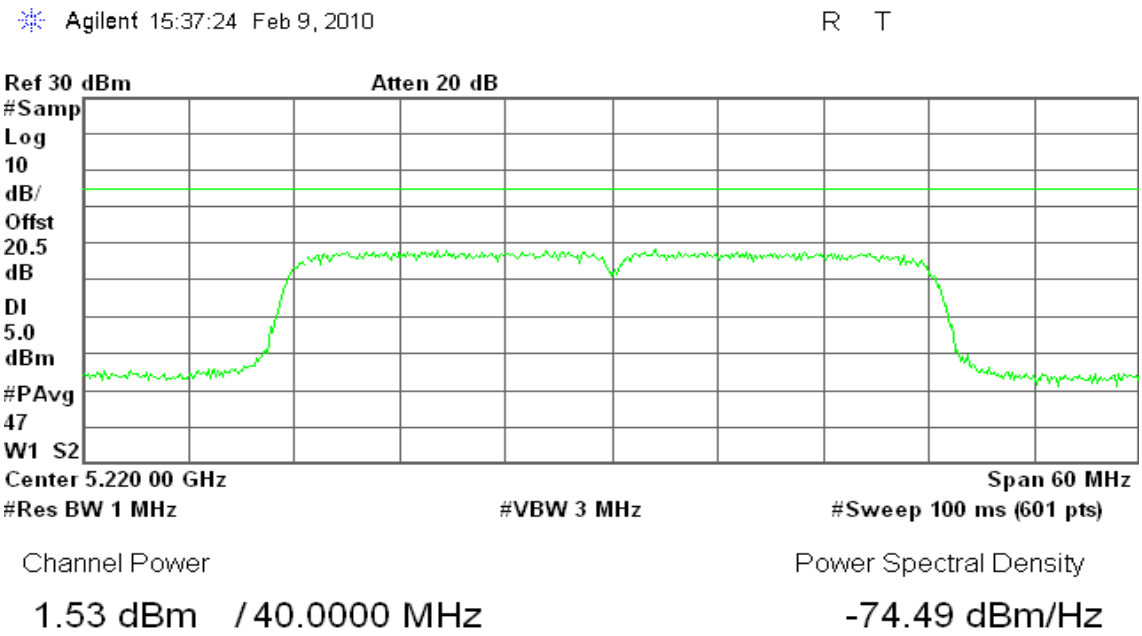
CH Low



Channel Power
1.93 dBm /40.0000 MHz

Power Spectral Density
-74.09 dBm/Hz

CH High



Channel Power

1.53 dBm / 40.0000 MHz

Power Spectral Density

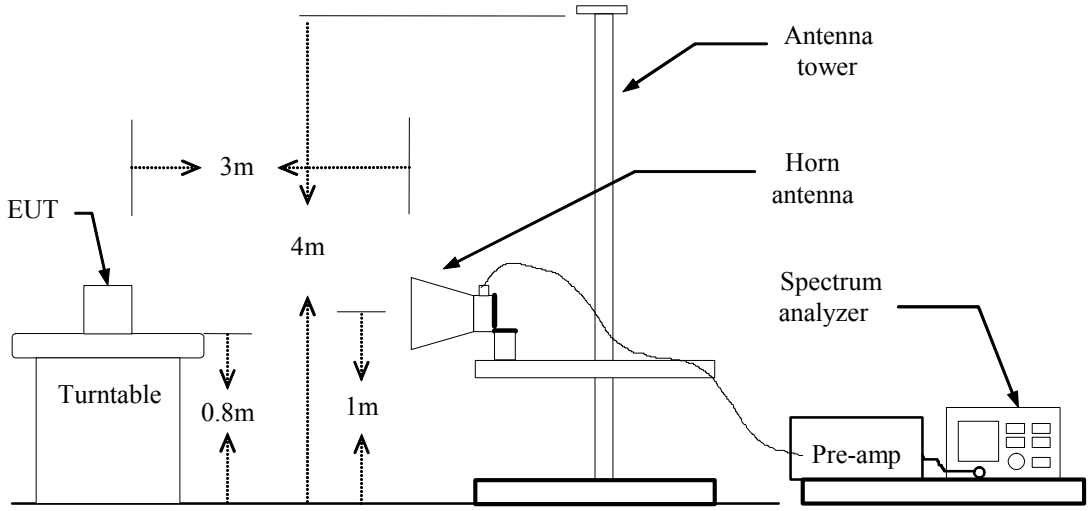
-74.49 dBm/Hz

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

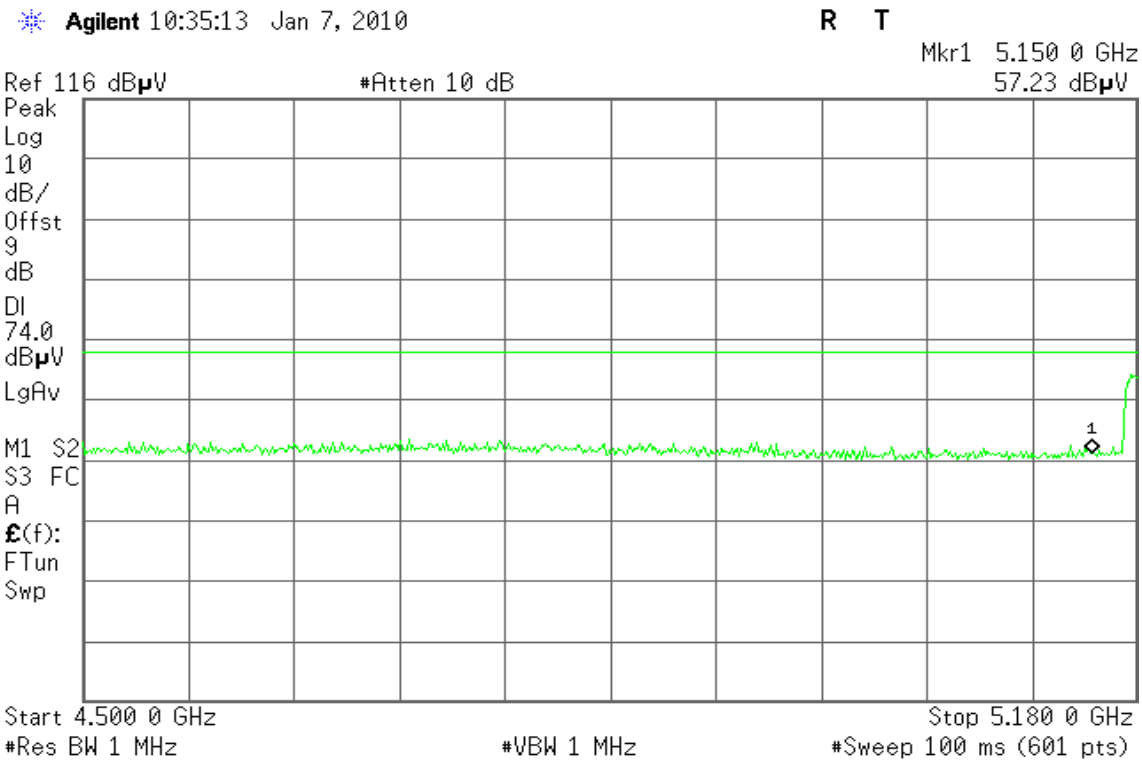
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the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

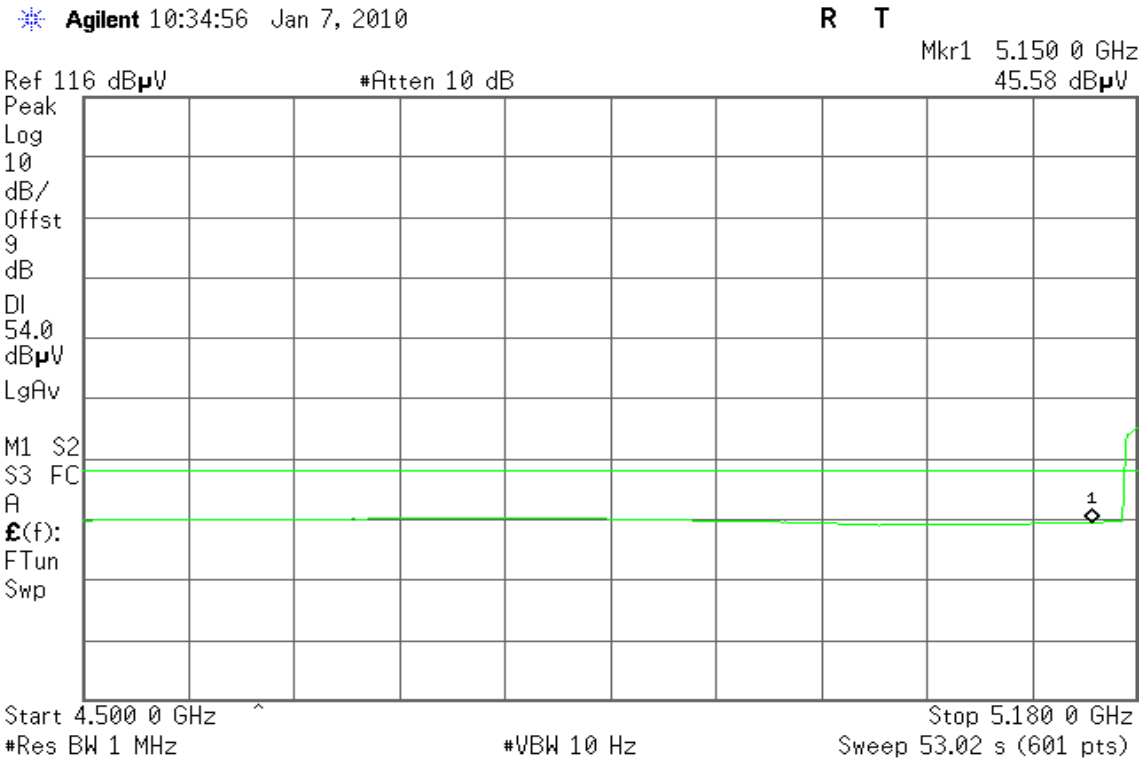
Refer to attach spectrum analyzer data chart.

Band Edges (IEEE 802.11a mode / 5180 MHz)

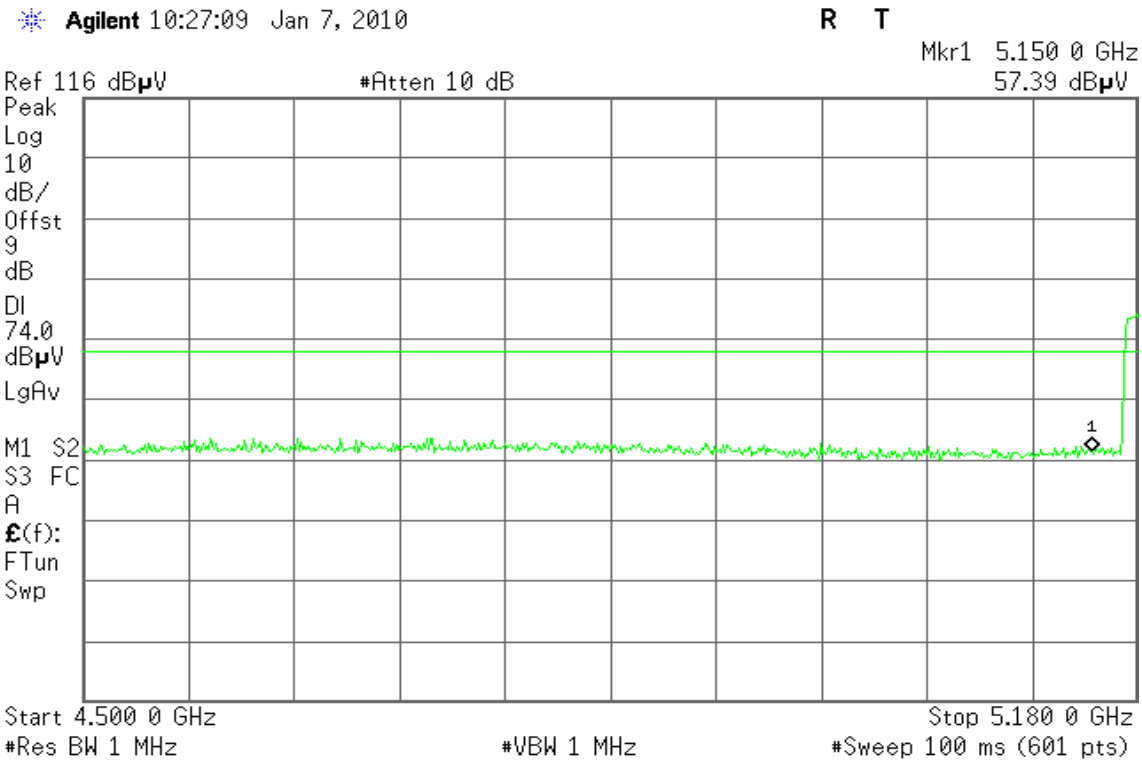
Detector mode: Peak **Polarity: Vertical**



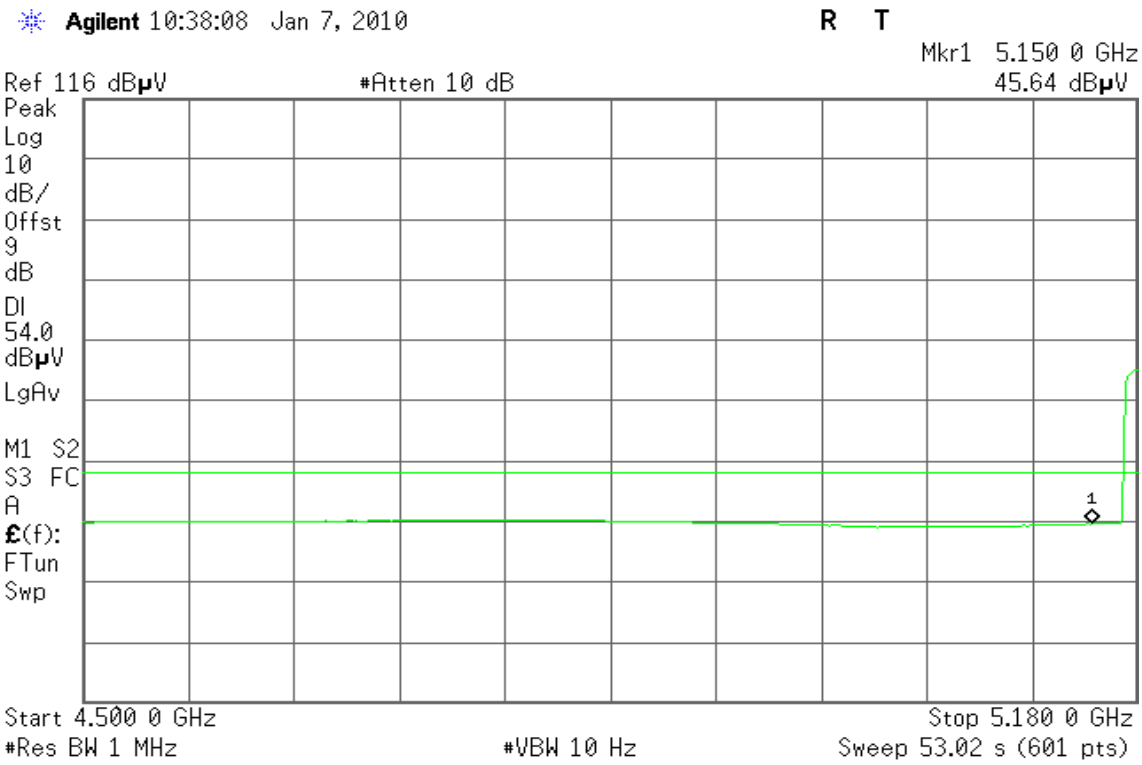
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

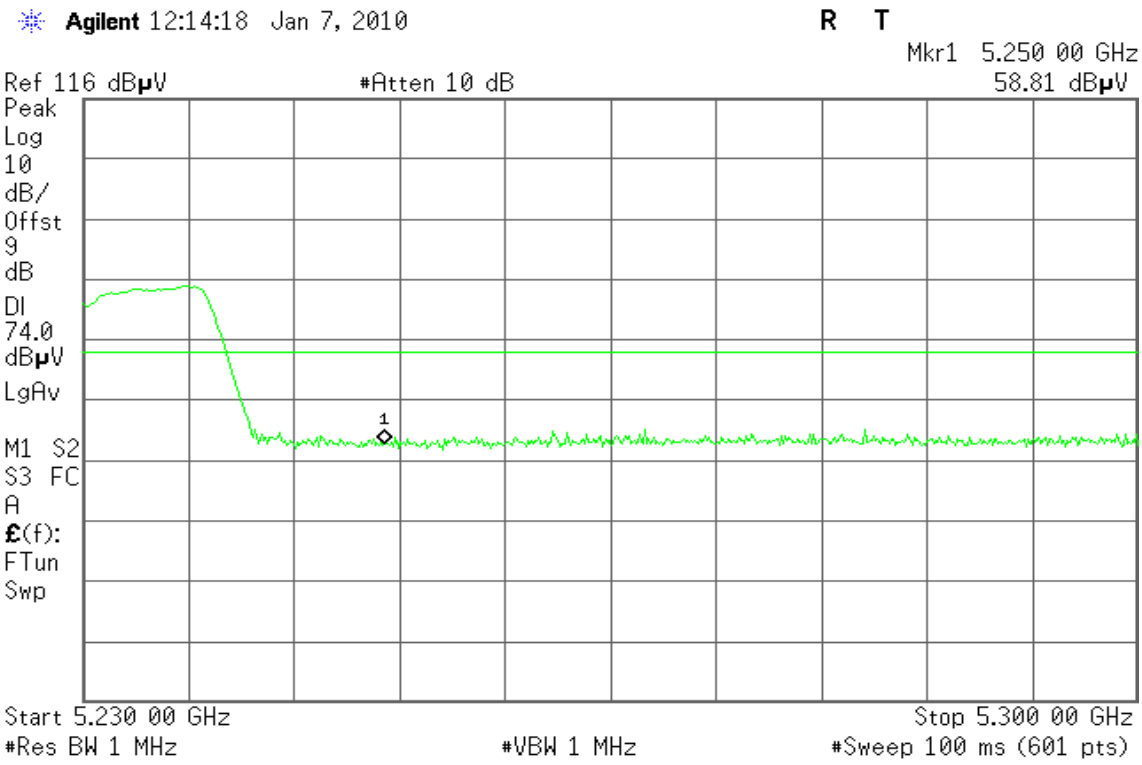


Detector mode: Average **Polarity: Horizontal**

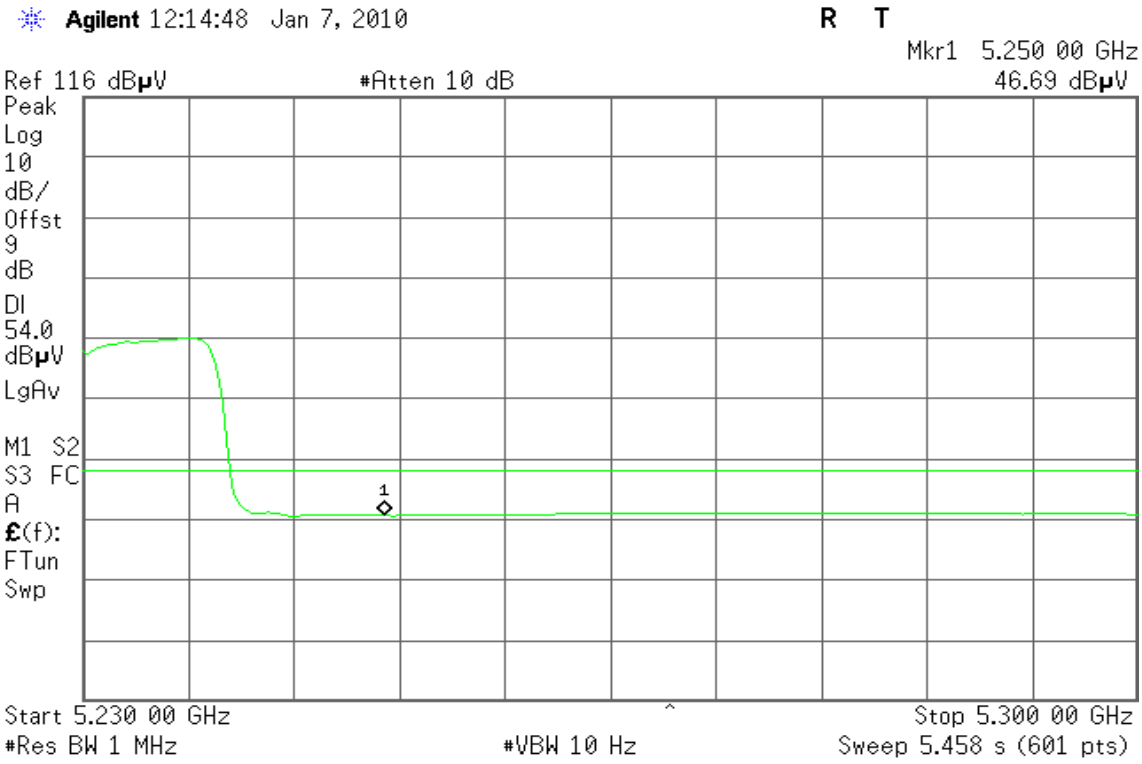


Band Edges (IEEE 802.11a mode / 5230 MHz)

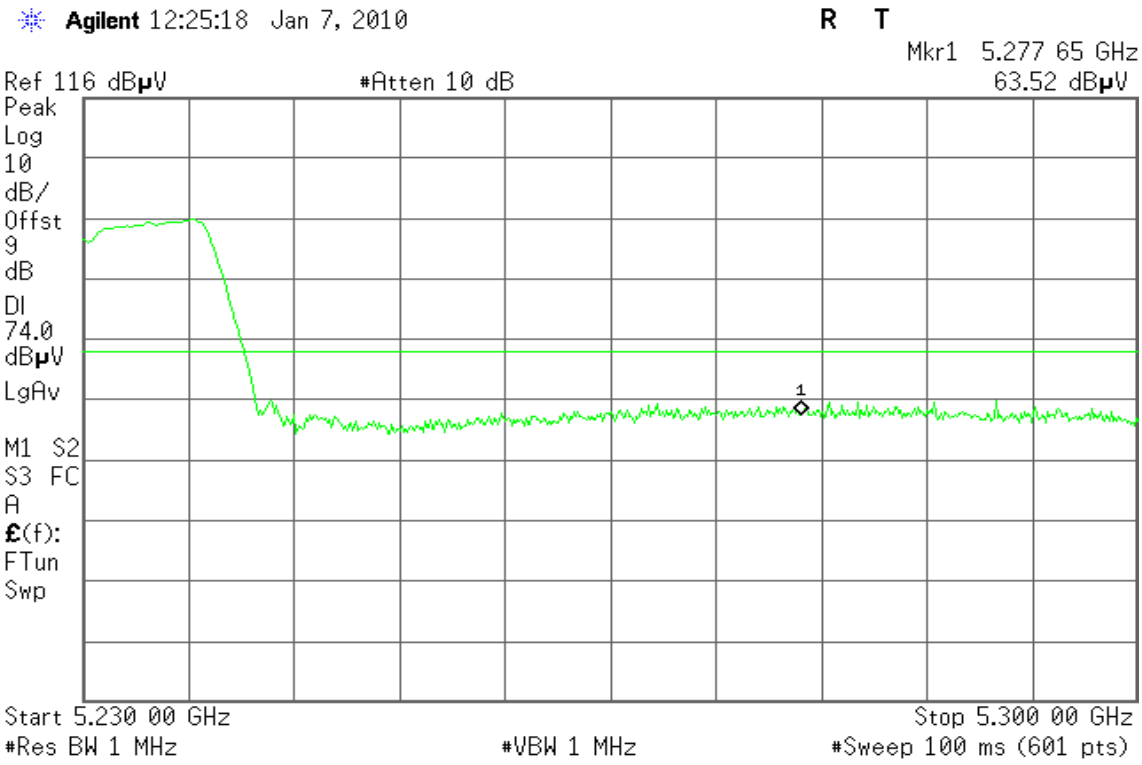
Detector mode: Peak **Polarity: Vertical**



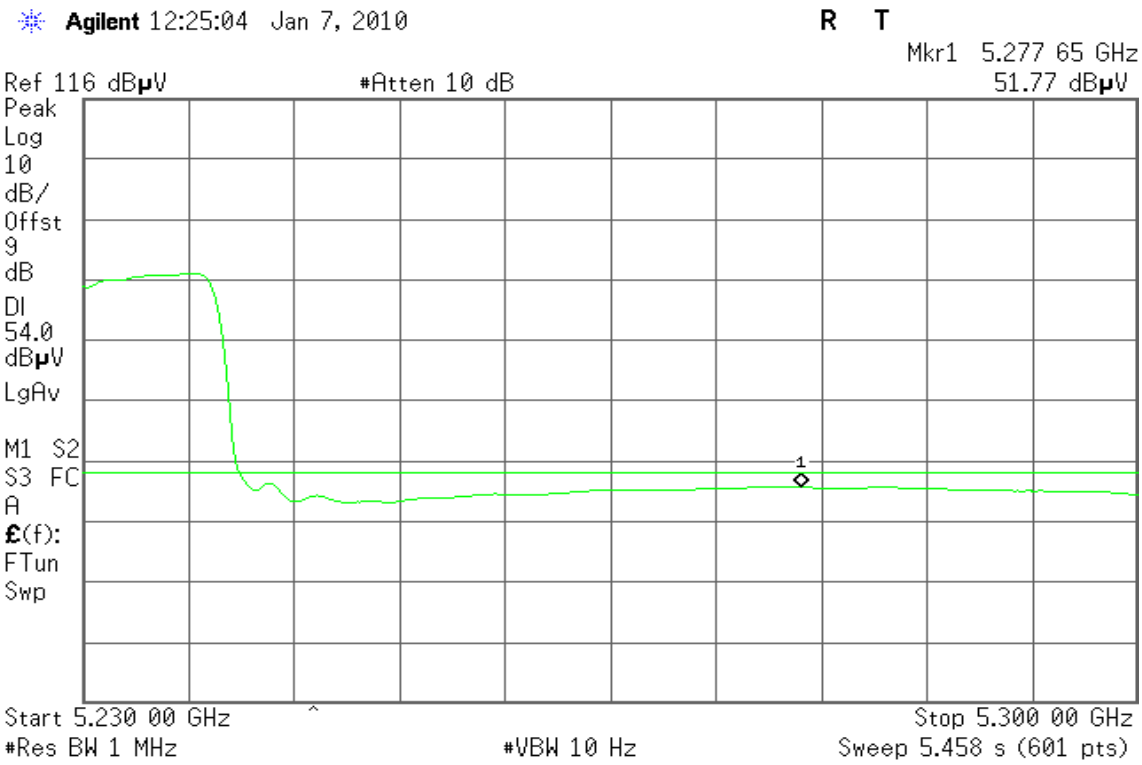
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

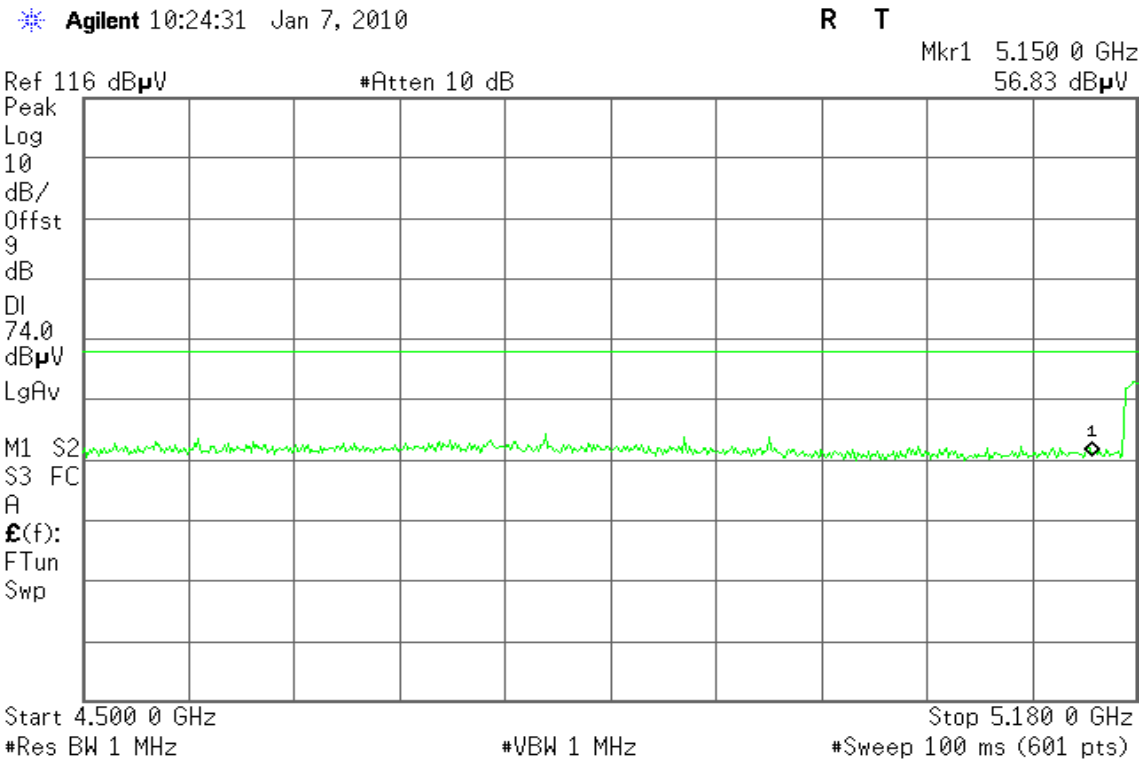


Detector mode: Average **Polarity: Horizontal**

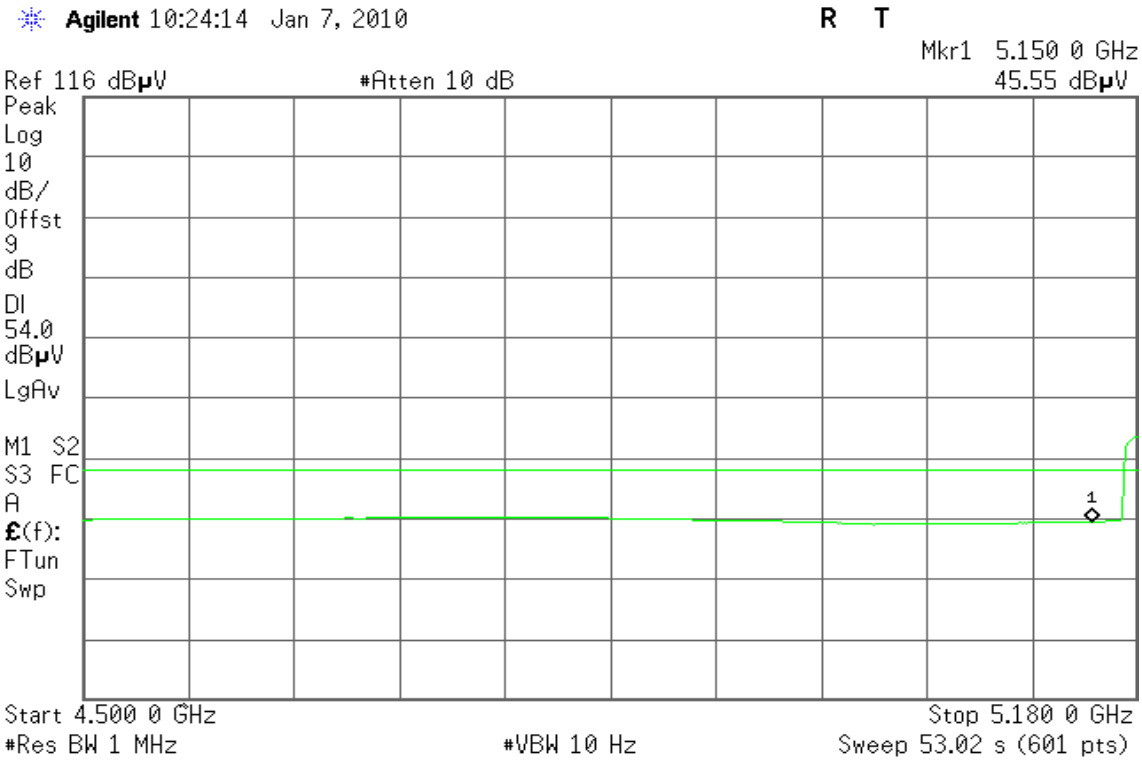


Band Edges (draft 802.11n Standard-20 MHz Channel mode / 5180 MHz)

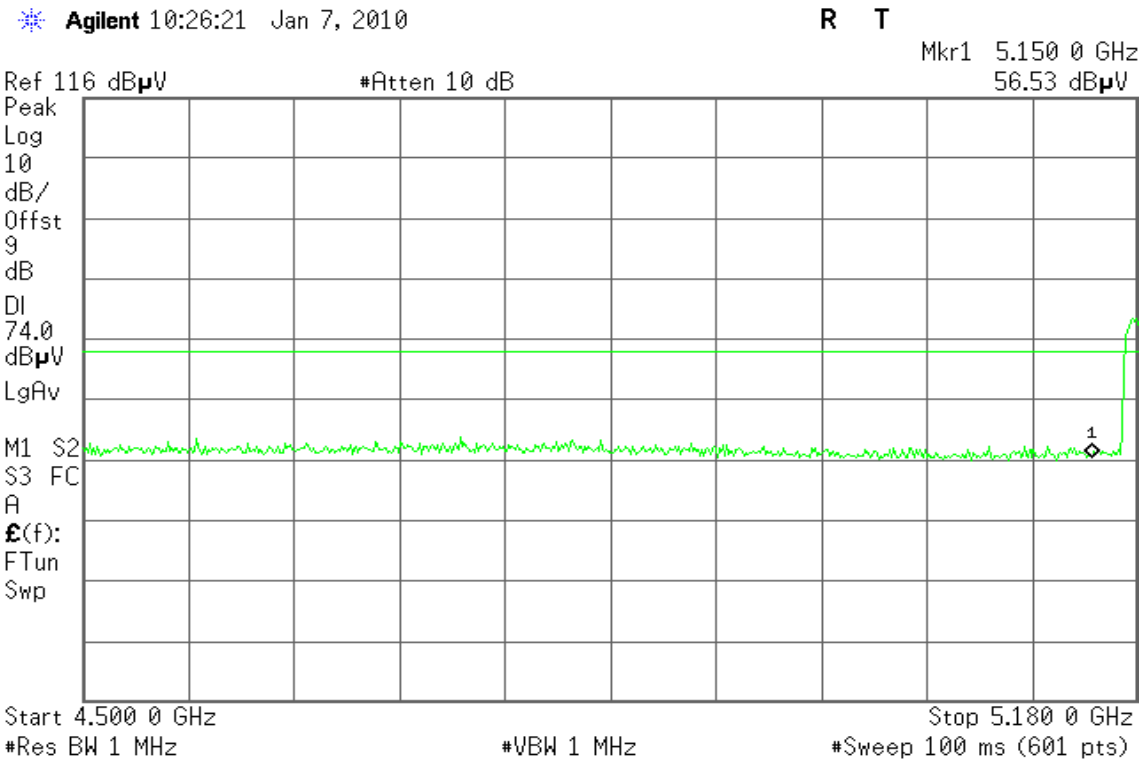
Detector mode: Peak **Polarity: Vertical**



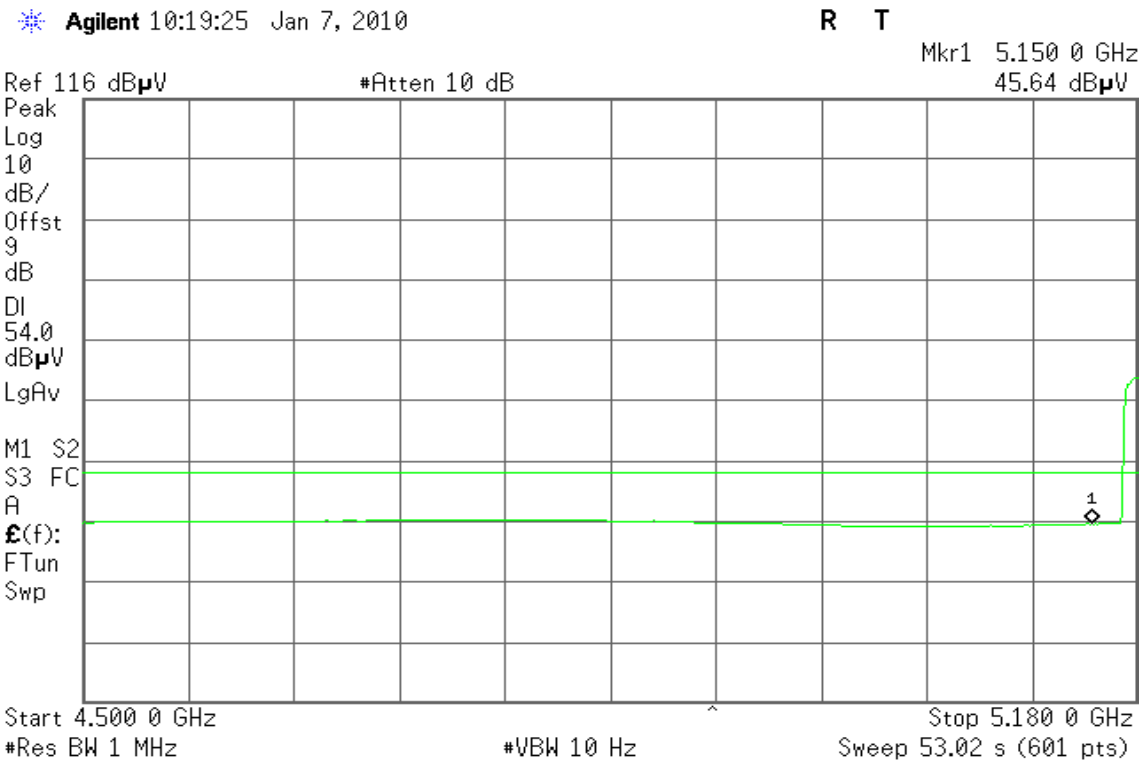
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

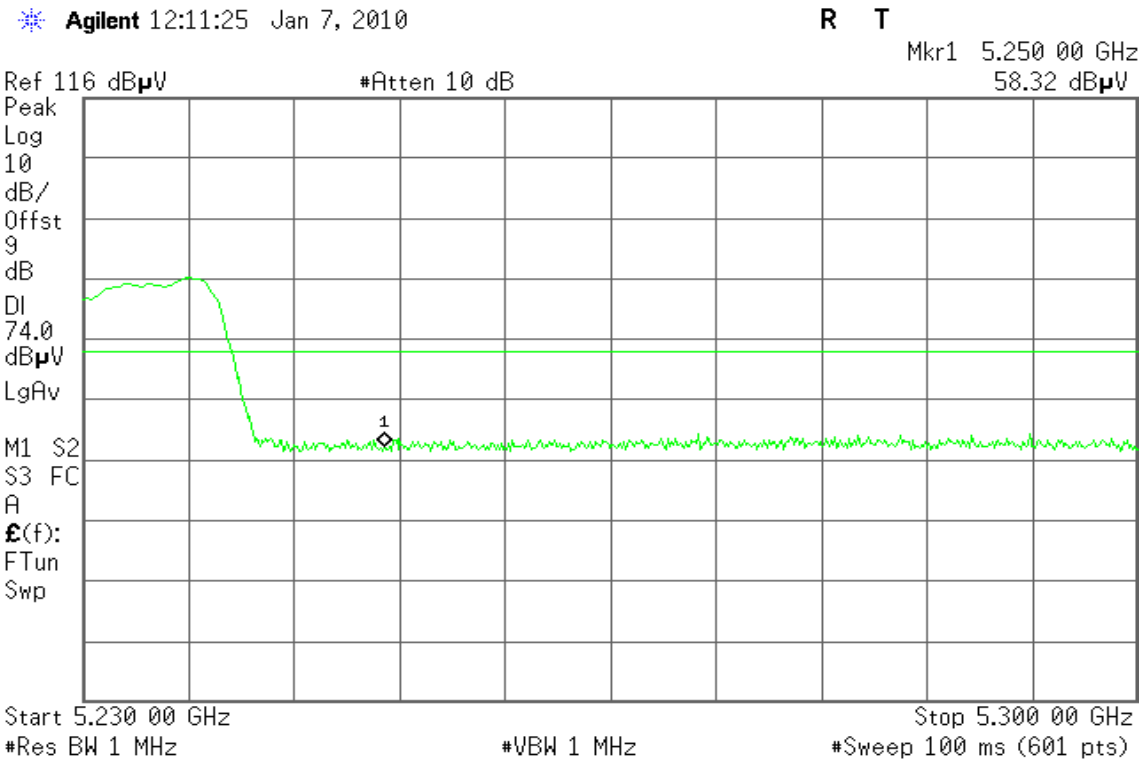


Detector mode: Average **Polarity: Horizontal**

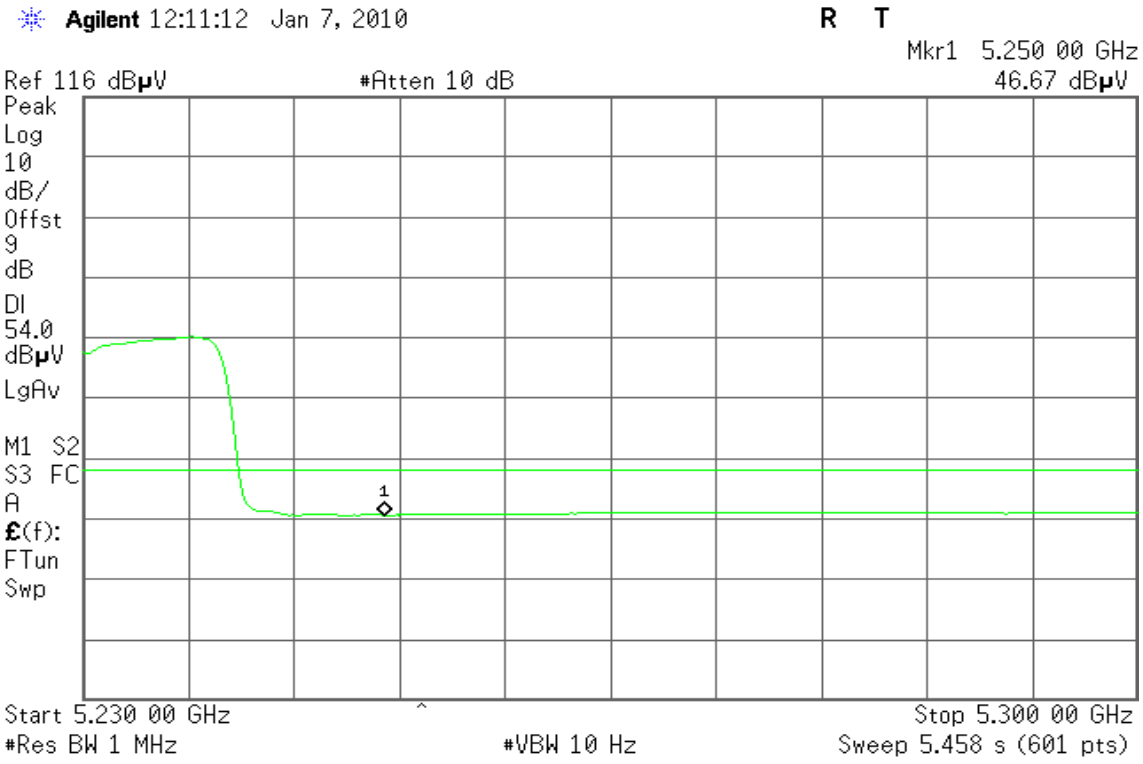


Band Edges (draft 802.11n Standard-20 MHz Channel mode / 5230 MHz)

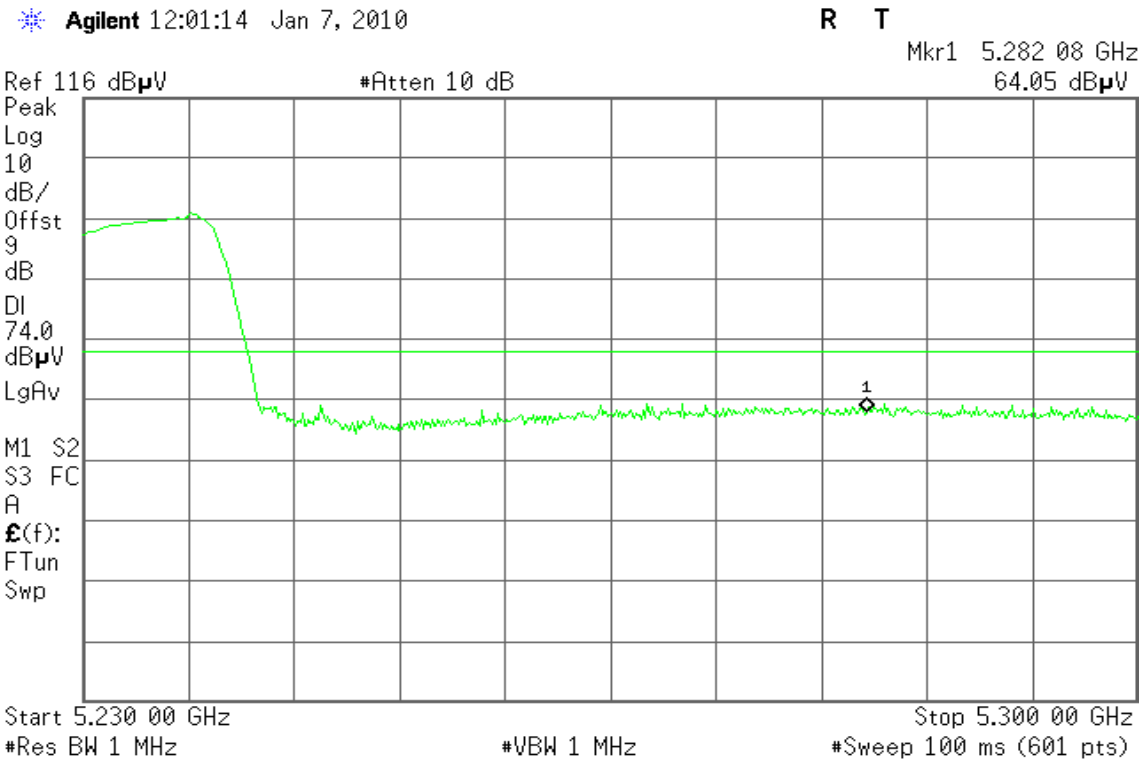
Detector mode: Peak **Polarity: Vertical**



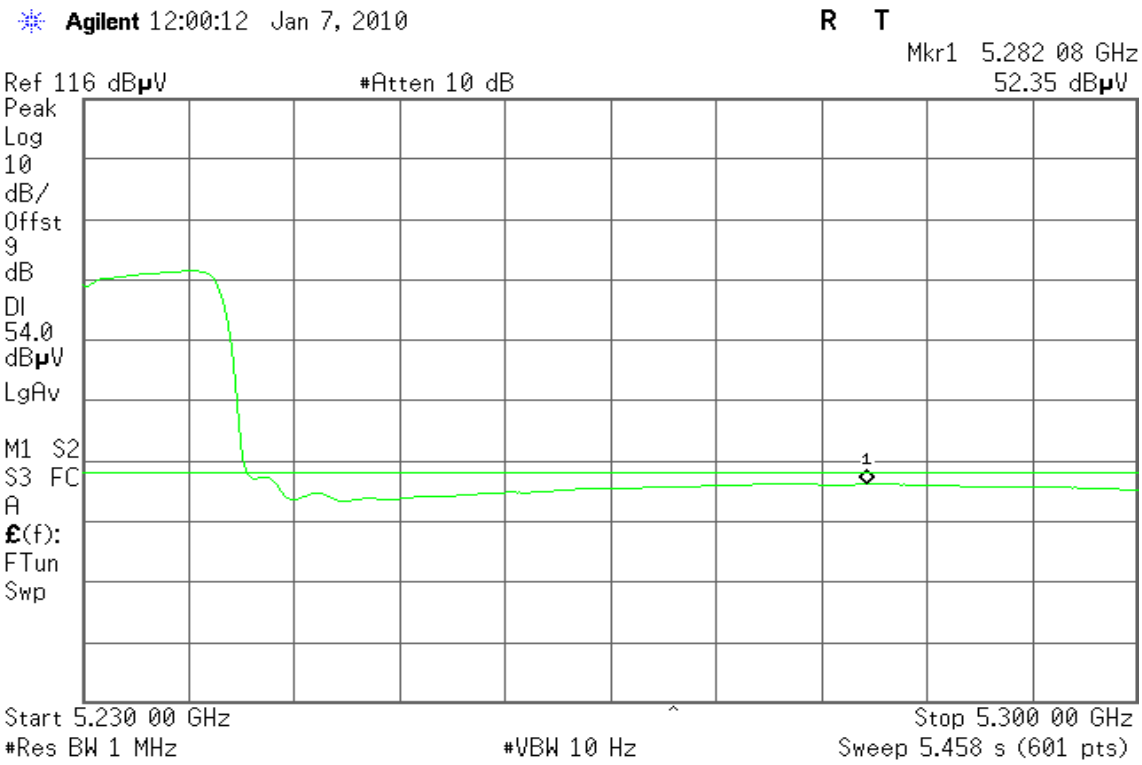
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

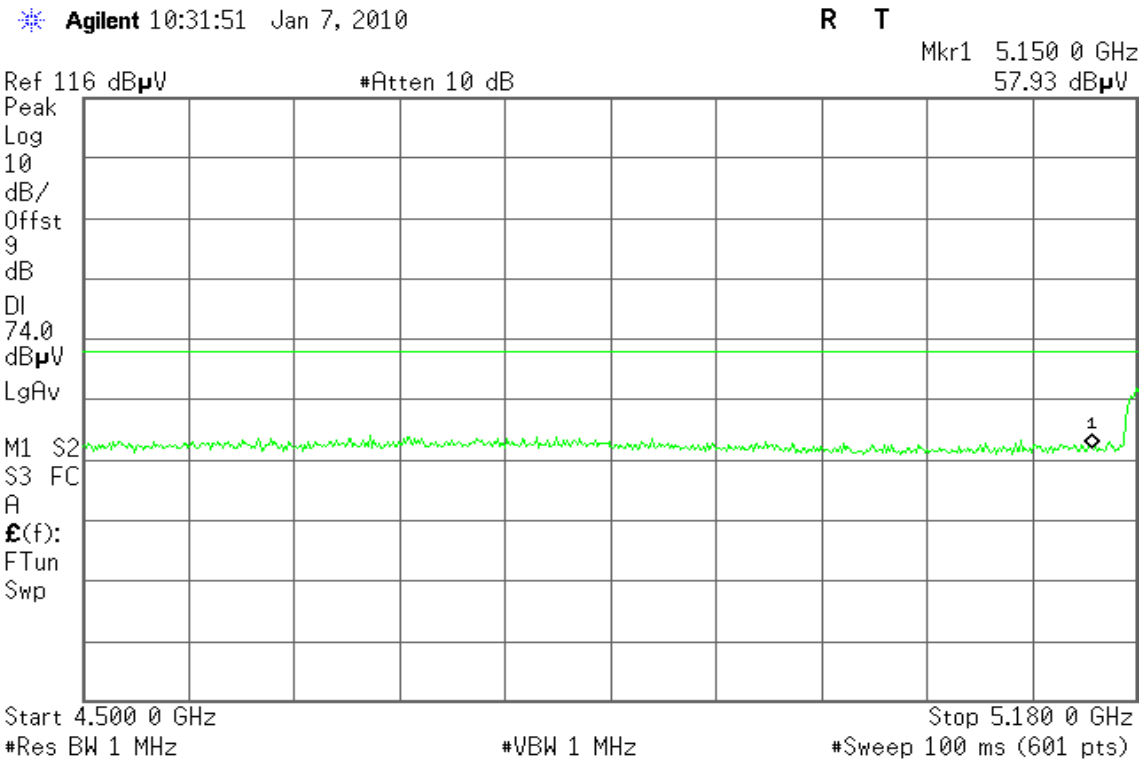


Detector mode: Average **Polarity: Horizontal**

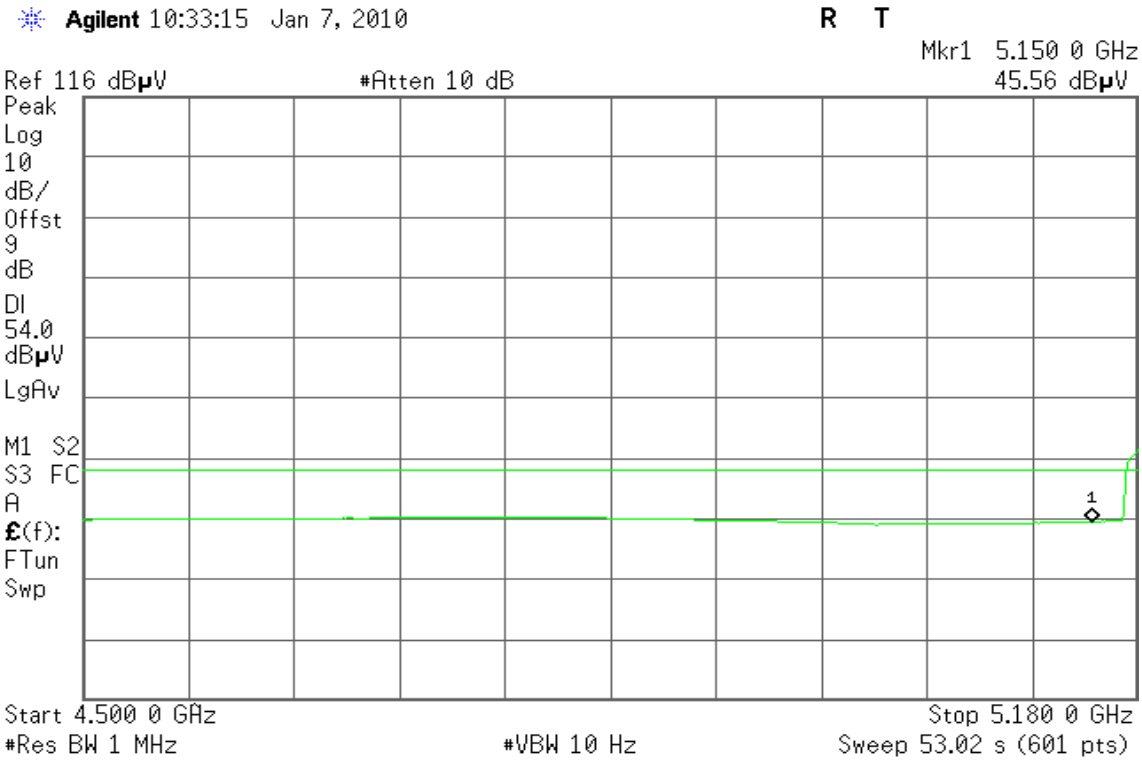


Band Edges (draft 802.11n Wide-40 MHz Channel mode / 5190 MHz)

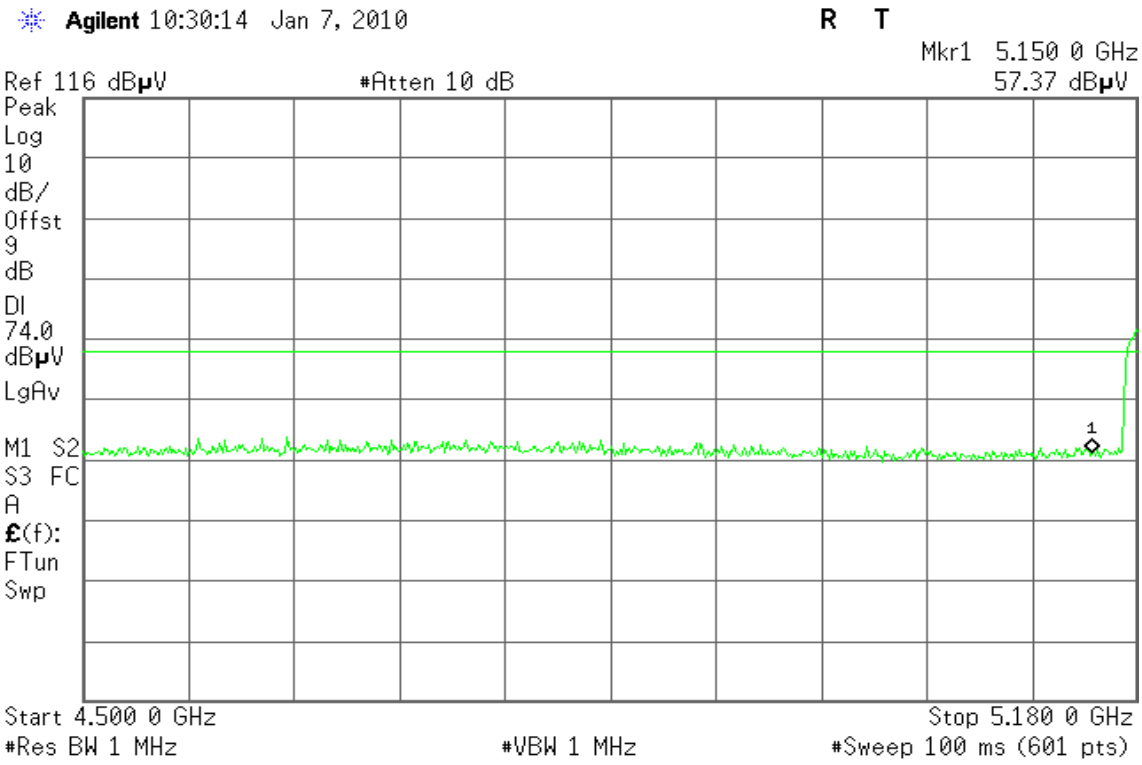
Detector mode: Peak **Polarity: Vertical**



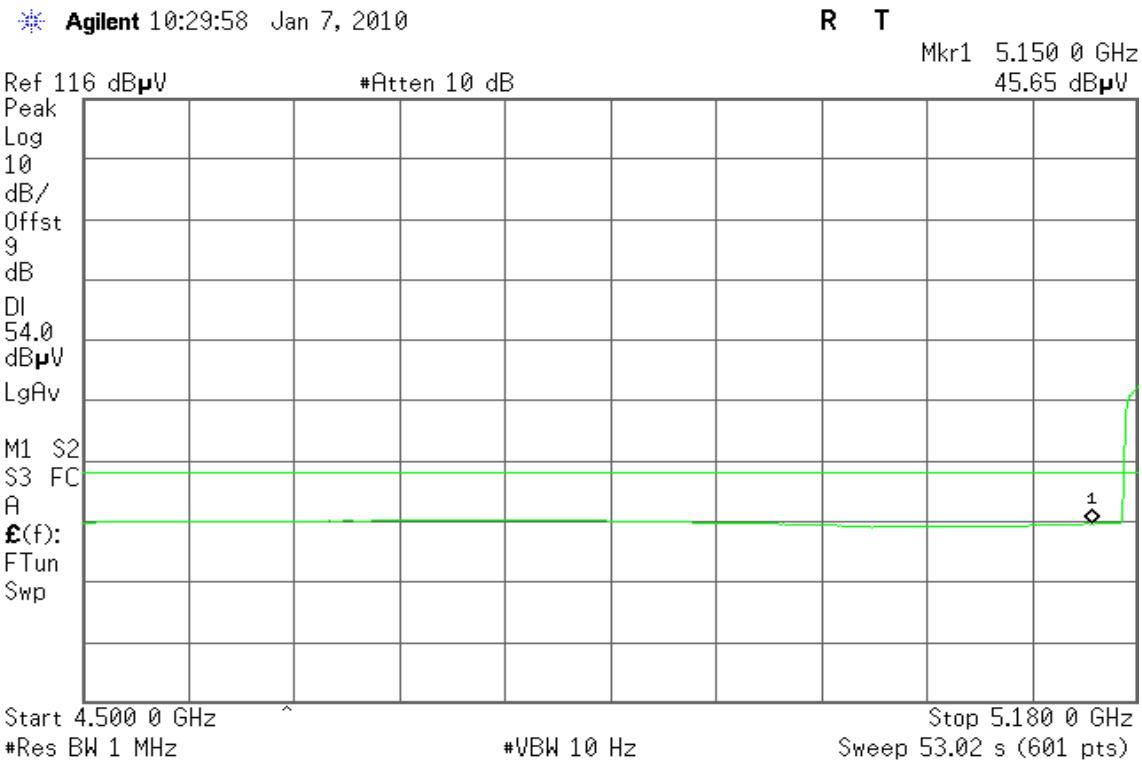
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

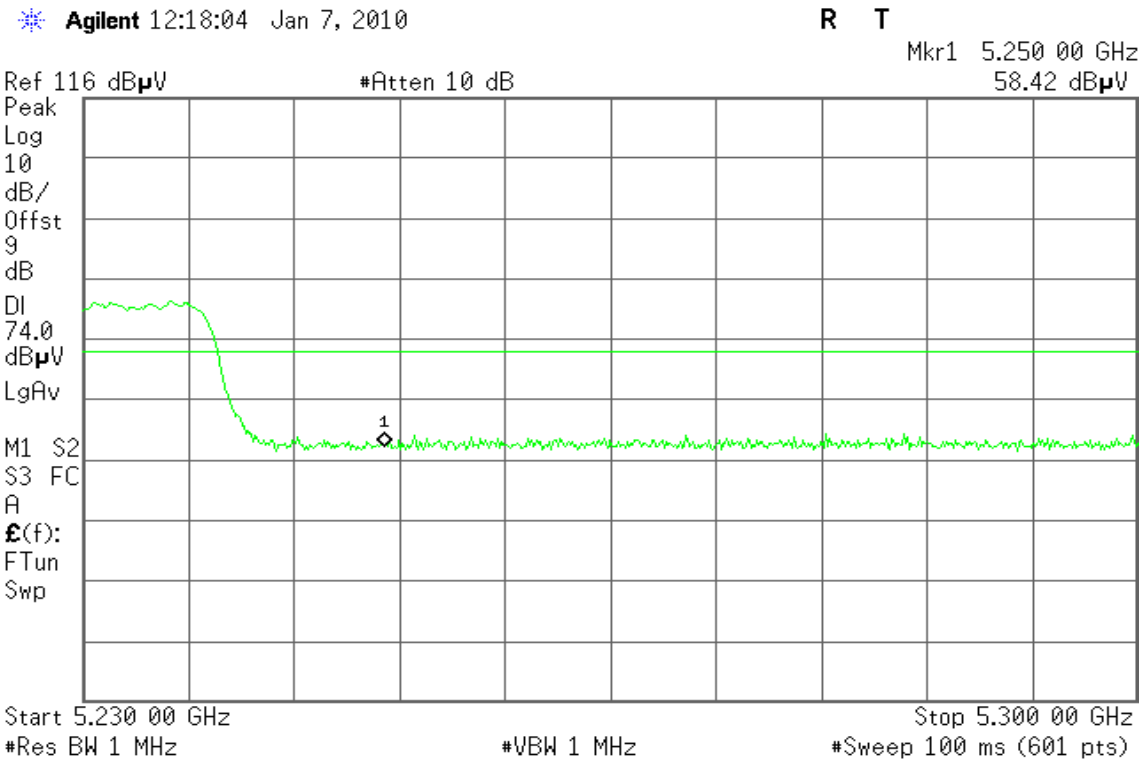


Detector mode: Average **Polarity: Horizontal**

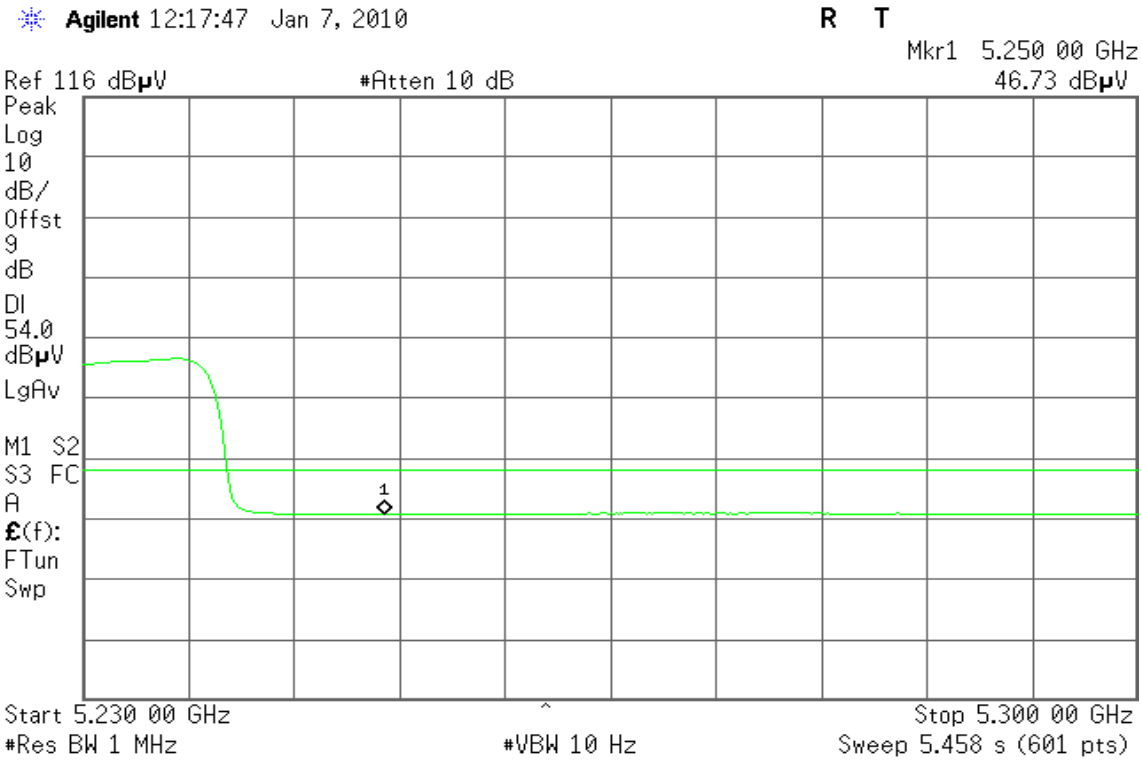


Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH 5220 MHz)

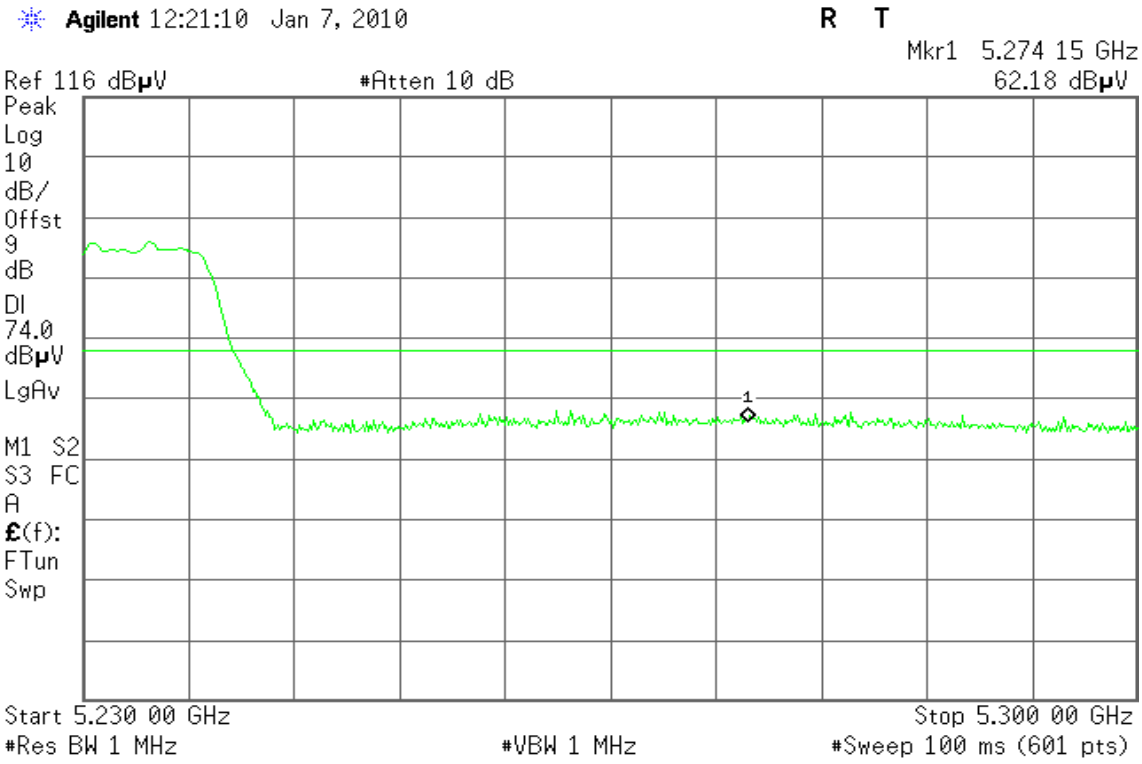
Detector mode: Peak **Polarity: Vertical**



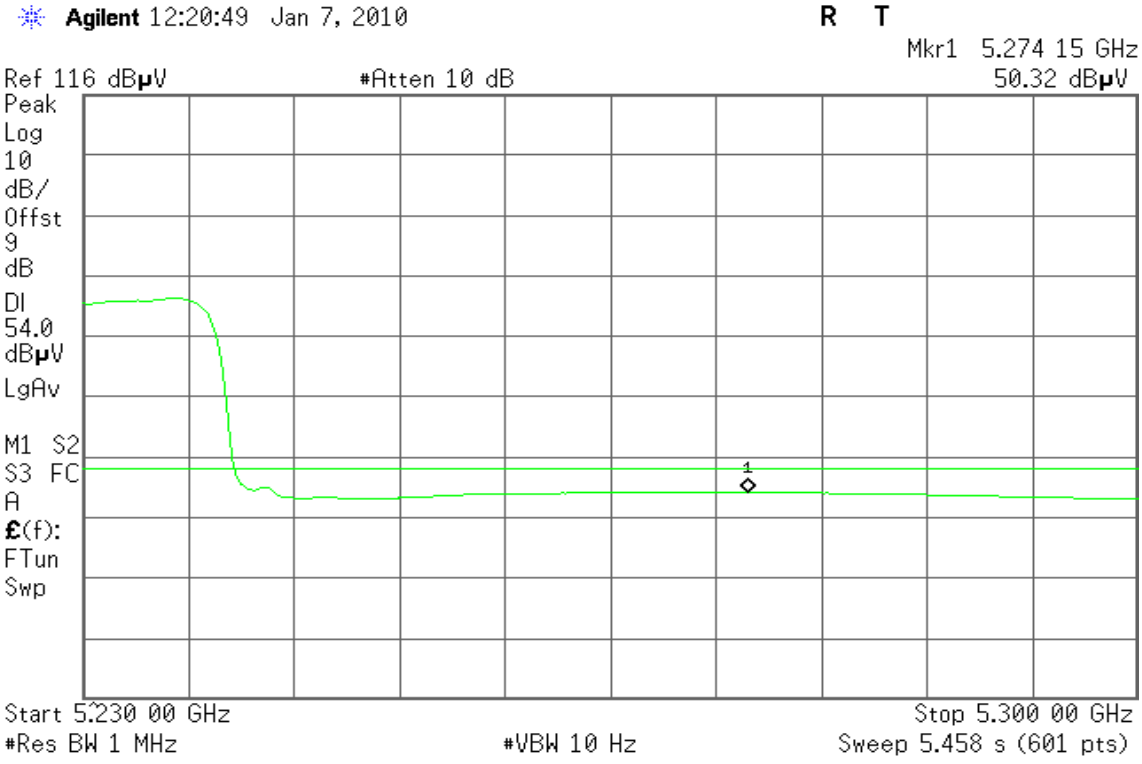
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



7.4 PEAK POWER SPECTRAL DENSITY

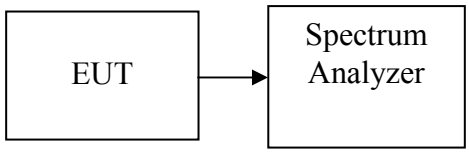
LIMIT

According to §15.407(a),

For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm 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 = 30MHz, Sweep=20ms
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	-8.085	-5.00	-3.085	PASS
Mid	5200	-9.305	-5.00	-4.305	PASS
High	5230	-8.538	-5.00	-3.538	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	-9.113	-9.560	-6.32	-8.00	1.68	PASS
Mid	5200	-8.777	-8.704	-5.73	-8.00	2.27	PASS
High	5230	-9.431	-8.470	-5.91	-8.00	2.09	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
Low	5190	-12.666	-13.159	-9.90	-8.00	-1.9	PASS
High	5220	-11.984	-12.150	-9.06	-8.00	-1.06	PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	-8.940	-8.00	-0.94	PASS
Mid	5200	-9.266	-8.00	-1.266	PASS
High	5230	-8.936	-8.00	-0.936	PASS

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

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5190	-9.396	-8.00	-1.396	PASS
High	5220	-9.897	-8.00	-1.897	PASS

Remark:

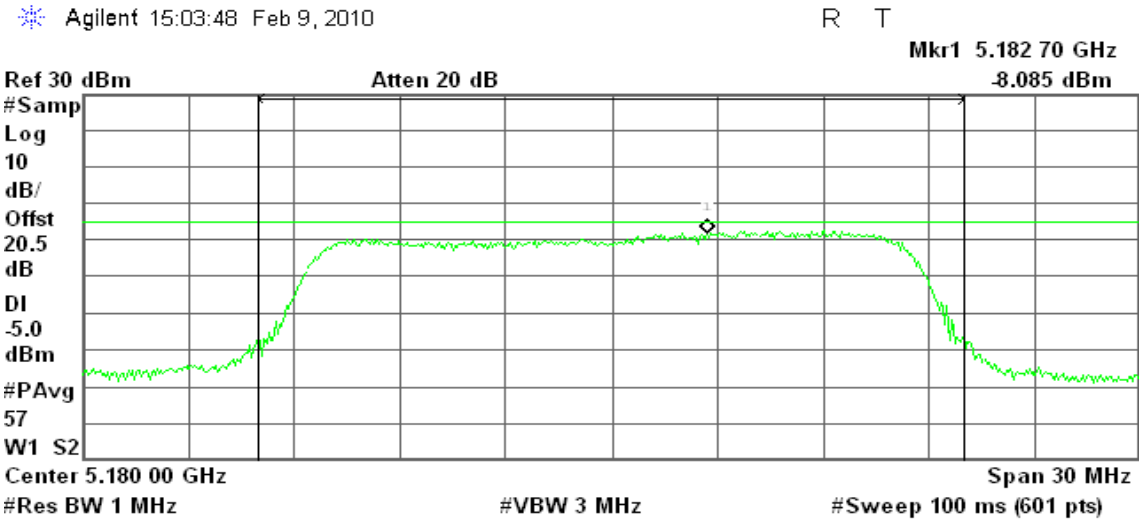
1. Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000))

2. The maximum antenna gain is 14.84dBi; therefore the reduction due to antenna gain is 9dB, so the limit is -5dBm.

3. The maximum antenna gain is 17.85dBi; therefore the reduction due to antenna gain is 12dB, so the limit is -8dBm.

Test Plot
IEEE 802.11a mode

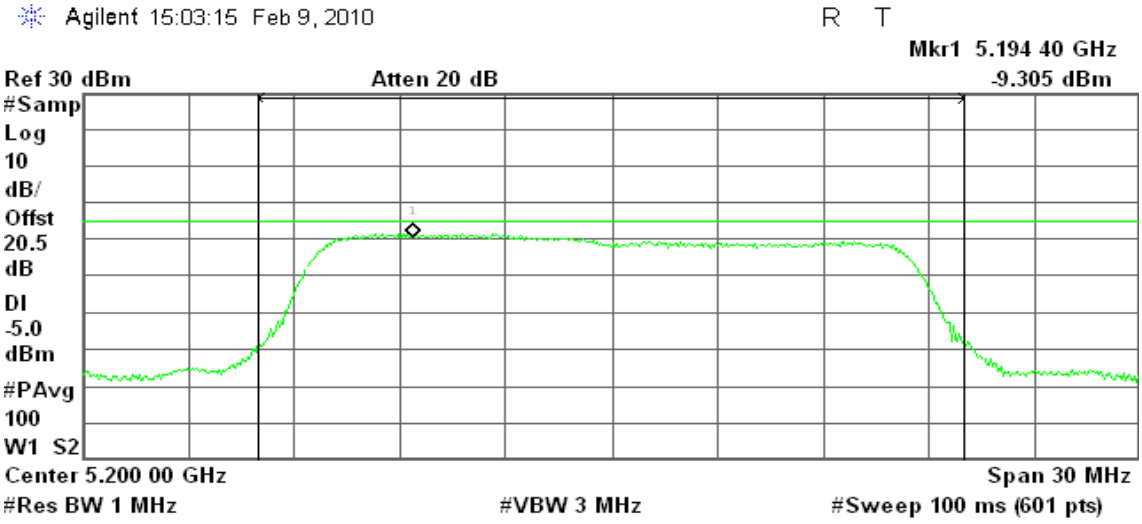
CH Low



Channel Power
2.08 dBm / 20.0000 MHz

Power Spectral Density
-70.93 dBm/Hz

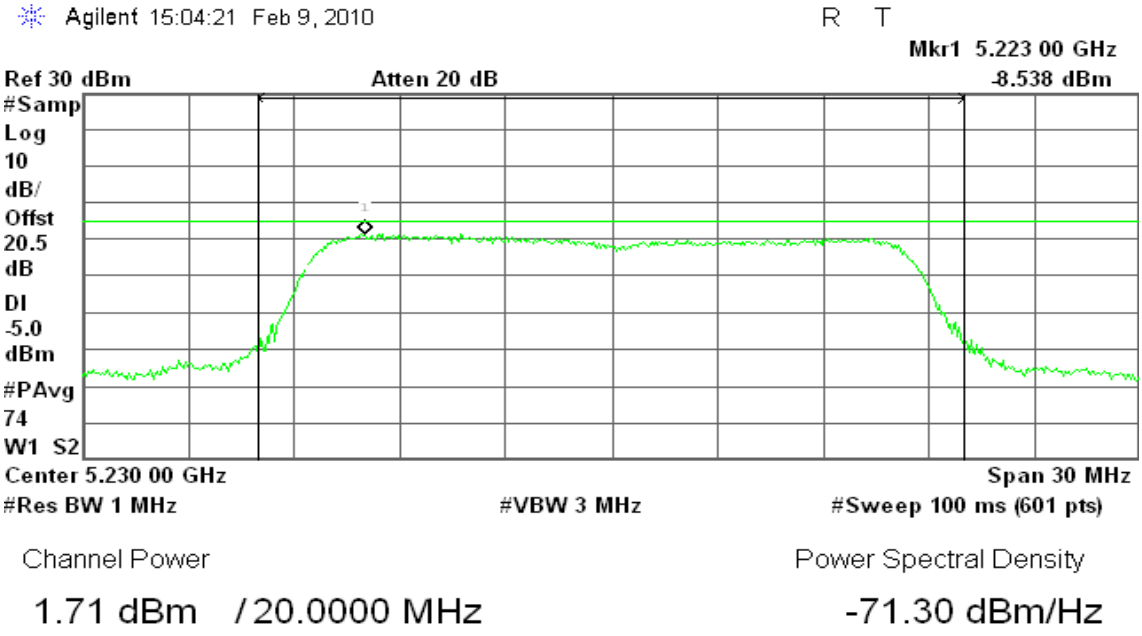
CH Mid



Channel Power
1.73 dBm / 20.0000 MHz

Power Spectral Density
-71.28 dBm/Hz

CH High

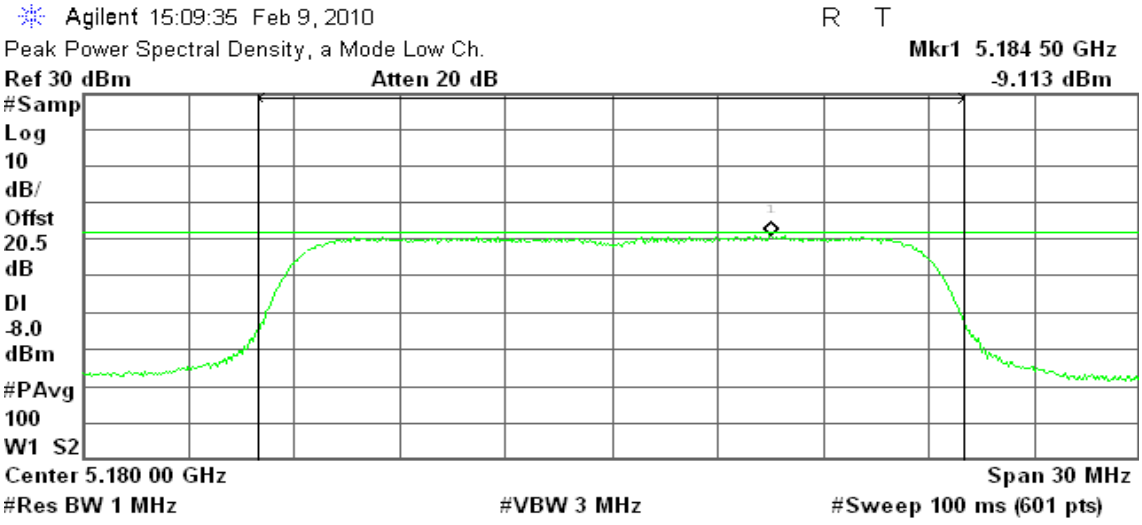


Channel Power
1.71 dBm /20.0000 MHz

Power Spectral Density
-71.30 dBm/Hz

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

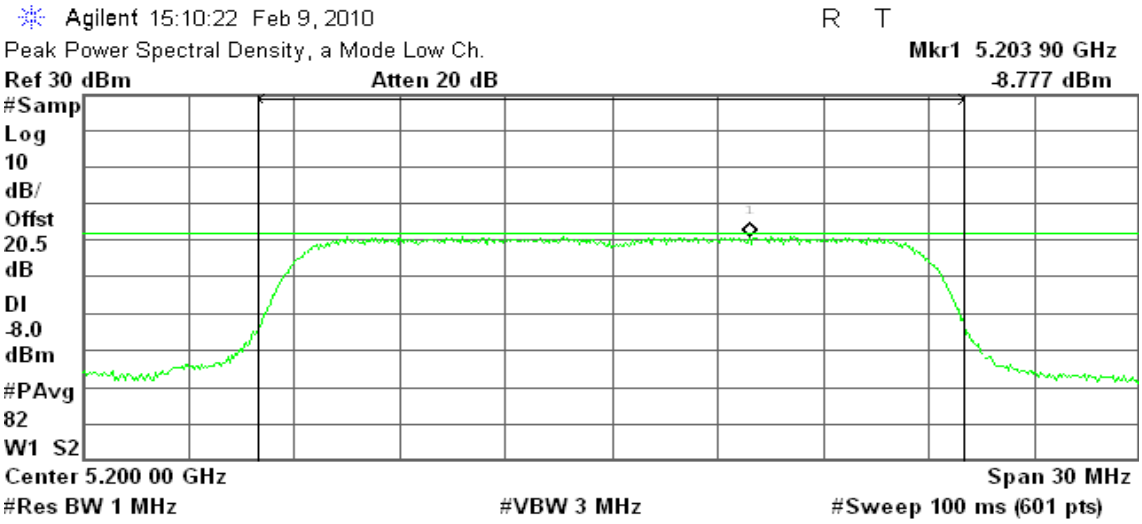
CH Low



Channel Power
2.31 dBm /20.0000 MHz

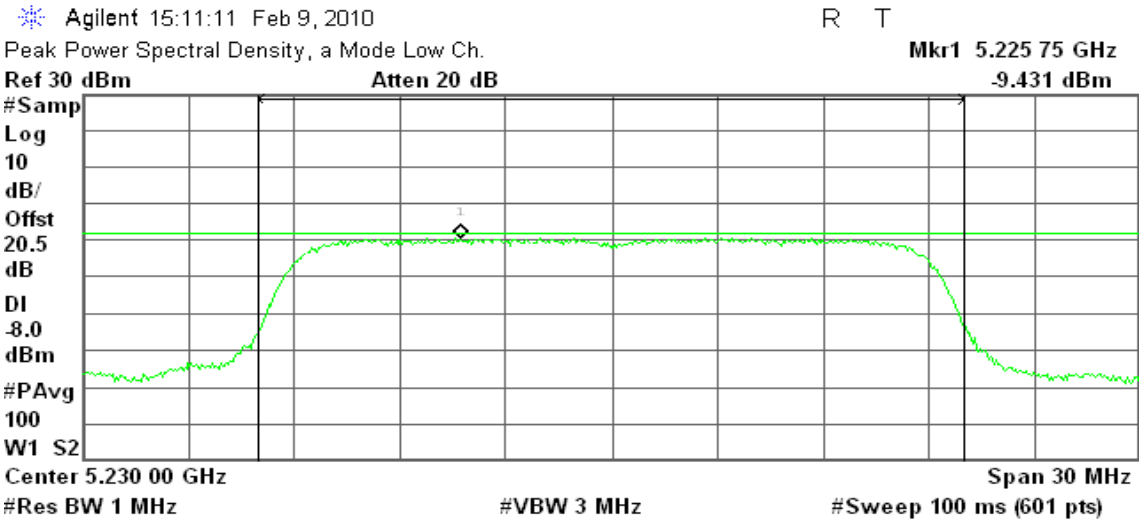
Power Spectral Density
-70.70 dBm/Hz

CH Mid



Channel Power	Power Spectral Density
1.95 dBm / 20.0000 MHz	-71.06 dBm/Hz

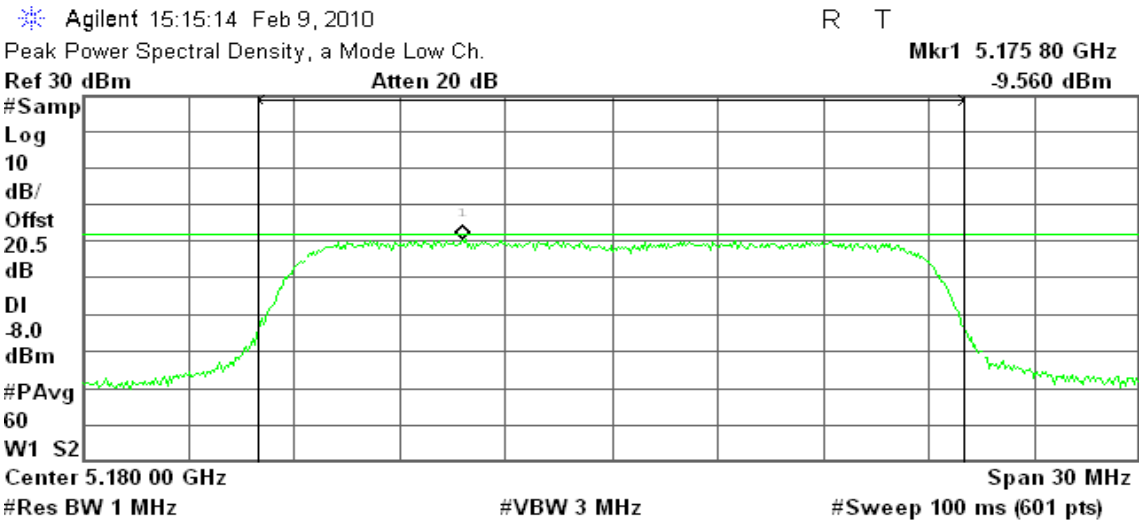
CH High



Channel Power	Power Spectral Density
1.71 dBm / 20.0000 MHz	-71.30 dBm/Hz

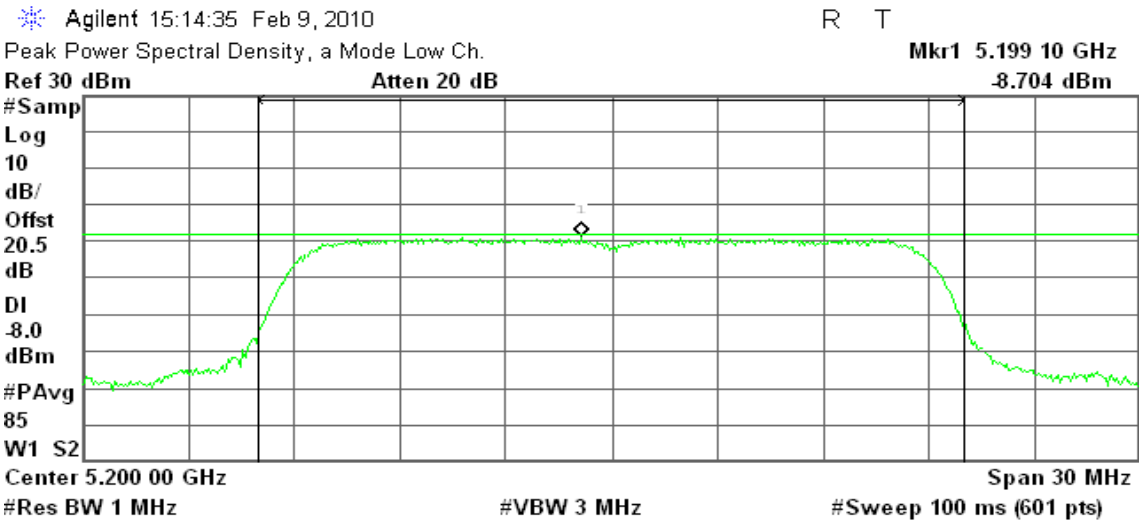
draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low



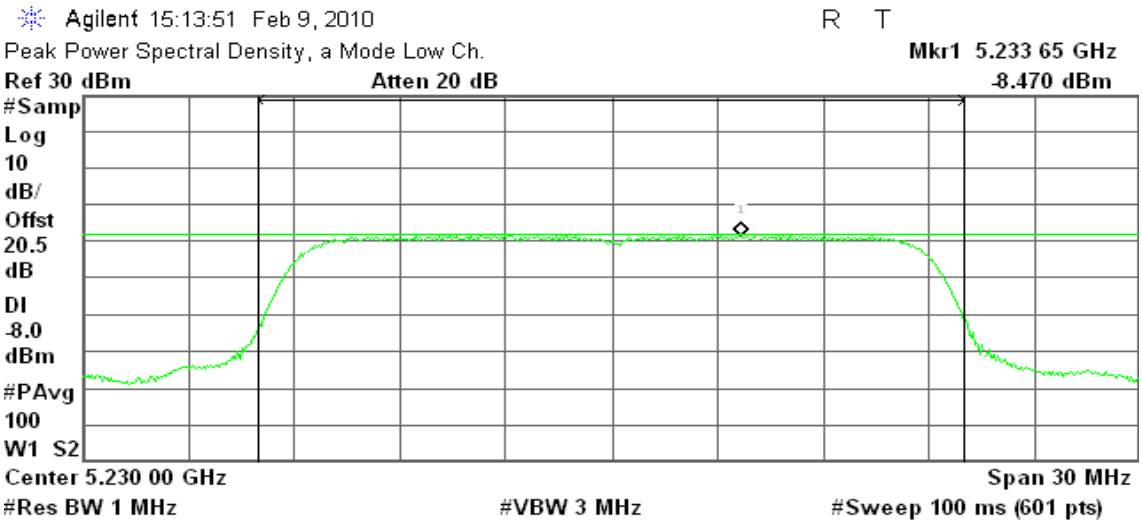
Channel Power	Power Spectral Density
1.07 dBm / 20.0000 MHz	-71.94 dBm/Hz

CH Mid



Channel Power	Power Spectral Density
2.19 dBm / 20.0000 MHz	-70.82 dBm/Hz

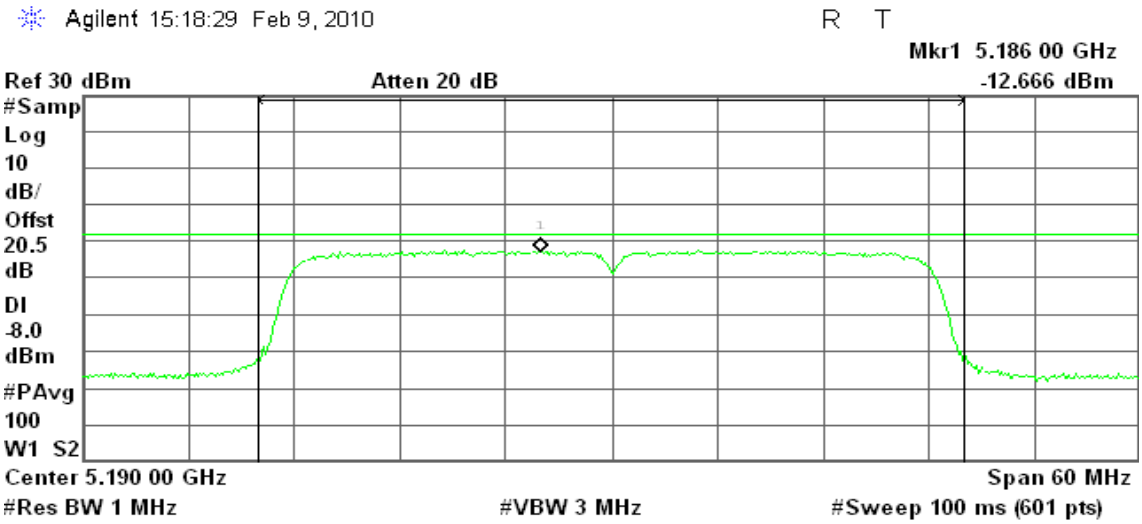
CH High



Channel Power	Power Spectral Density
2.18 dBm / 20.0000 MHz	-70.83 dBm/Hz

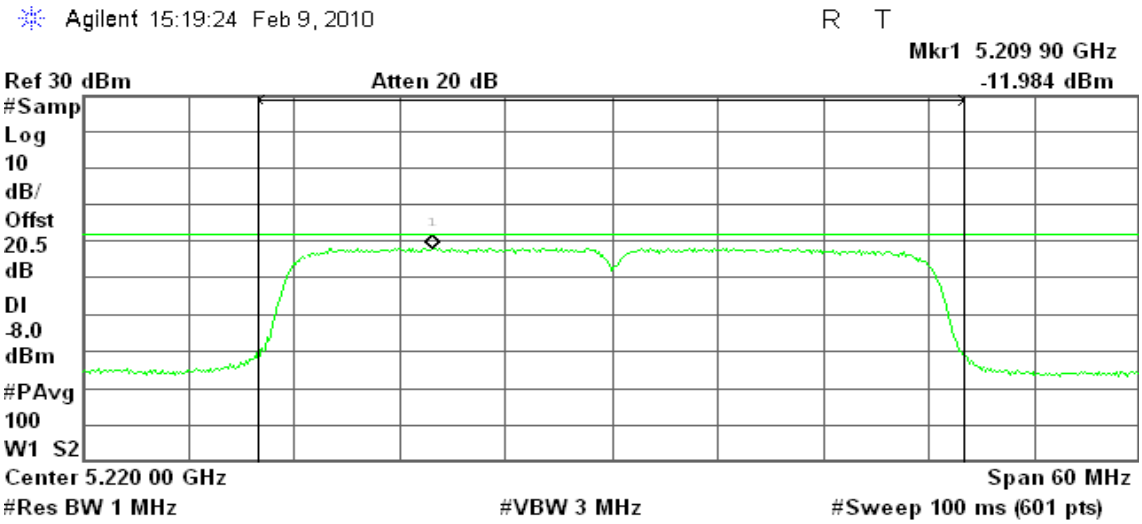
draft 802.11n Wide-40 MHz Channel mode / Chain 0

CH Low



Channel Power	Power Spectral Density
2.54 dBm / 40.0000 MHz	-73.49 dBm/Hz

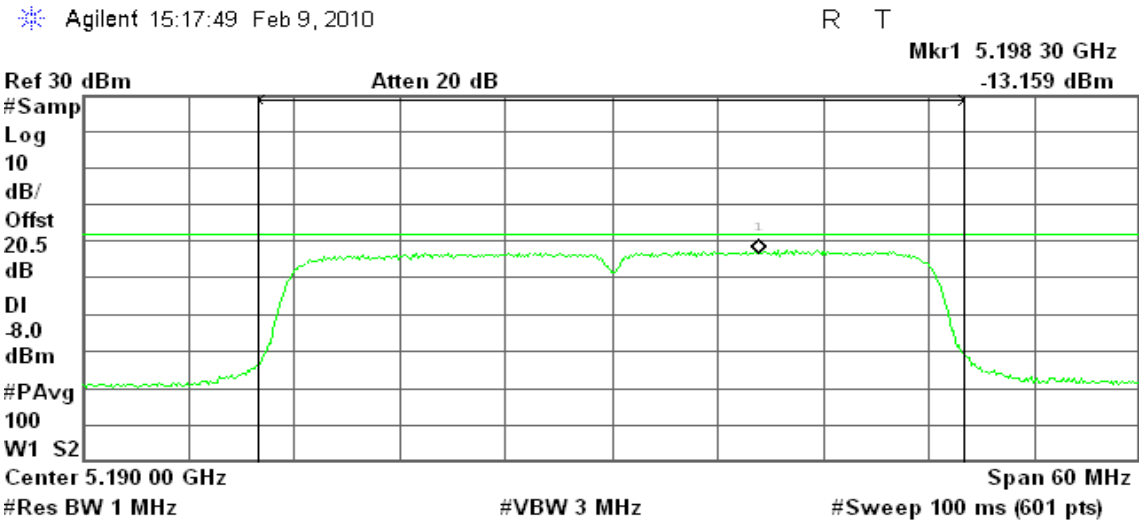
CH High



Channel Power	Power Spectral Density
2.66 dBm / 40.0000 MHz	-73.36 dBm/Hz

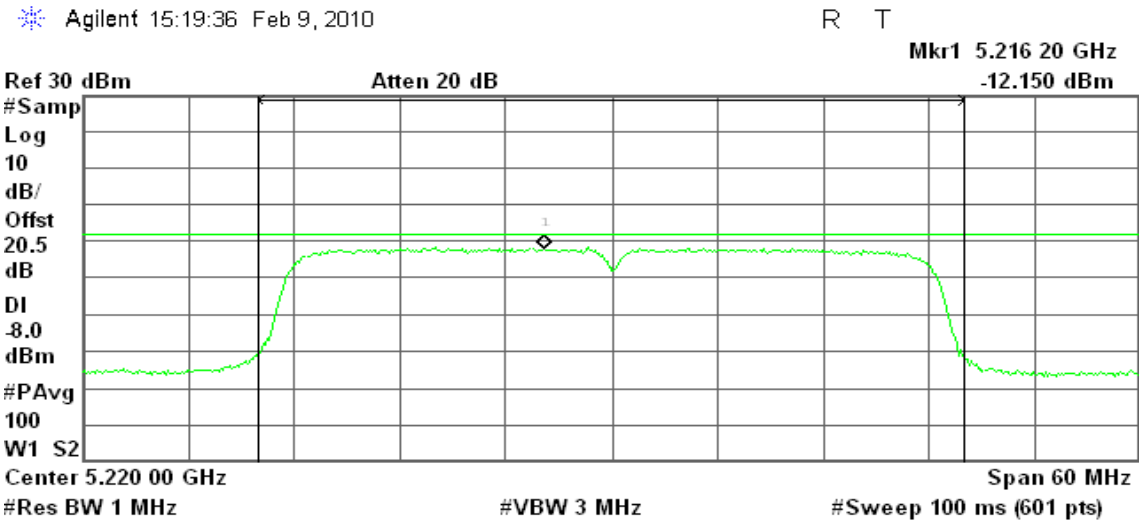
draft 802.11n Wide-40 MHz Channel mode / Chain 1

CH Low



Channel Power	Power Spectral Density
1.42 dBm / 40.0000 MHz	-74.60 dBm/Hz

CH High

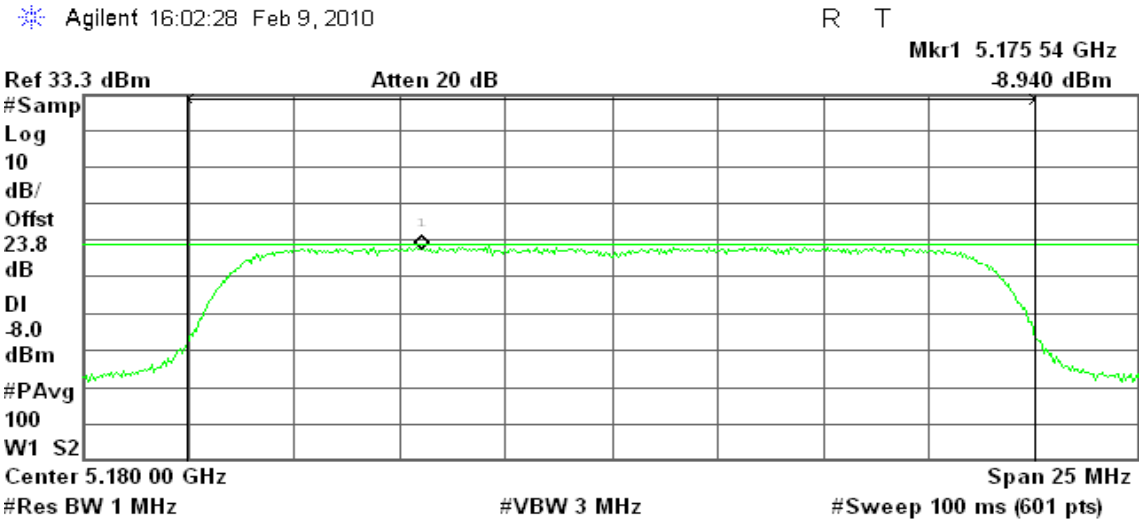


Channel Power
2.37 dBm /40.0000 MHz

Power Spectral Density
-73.65 dBm/Hz

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

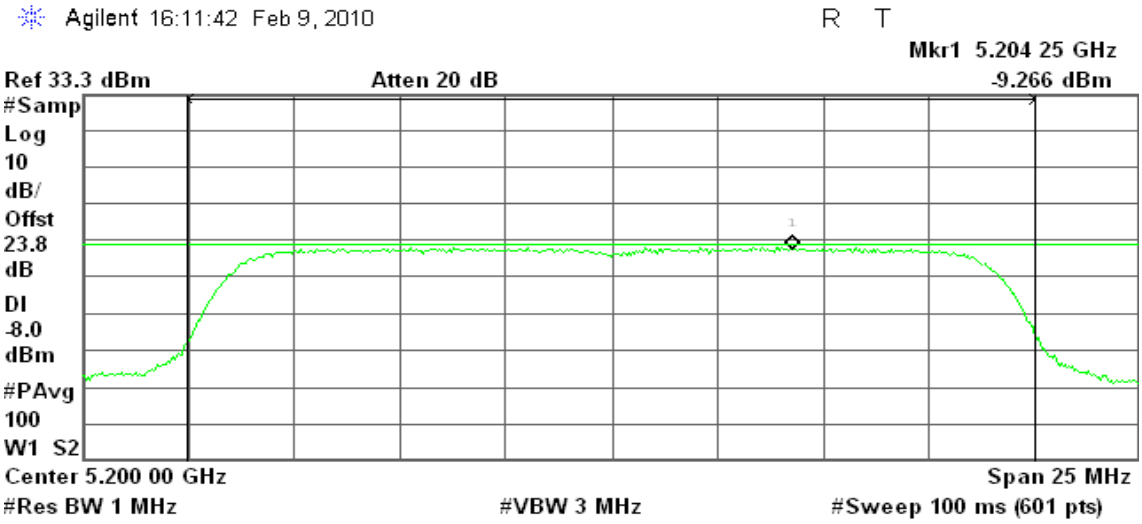
CH Low



Channel Power
2.64 dBm /20.0000 MHz

Power Spectral Density
-70.37 dBm/Hz

CH Mid



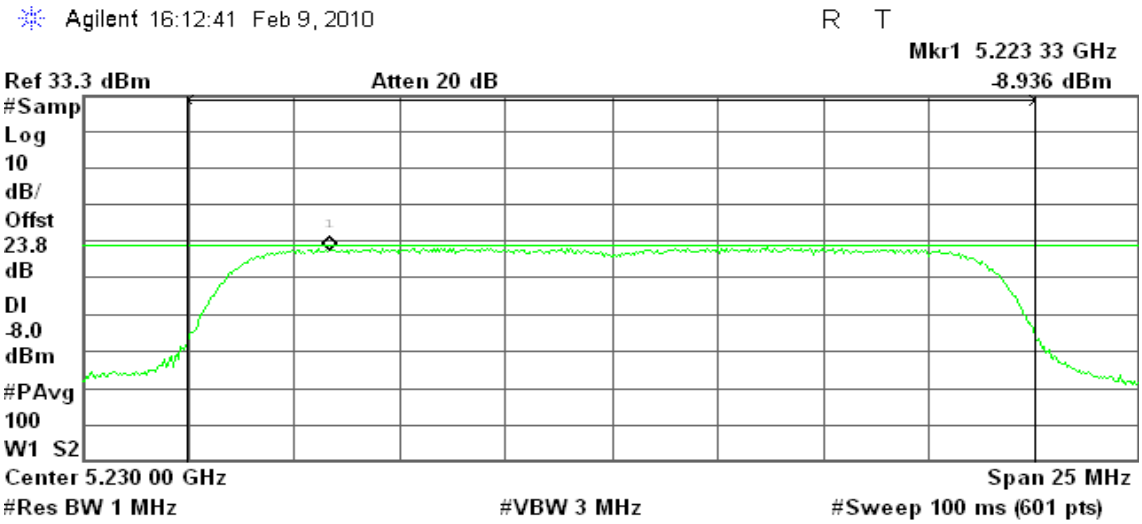
Channel Power

2.33 dBm /20.0000 MHz

Power Spectral Density

-70.68 dBm/Hz

CH High



Channel Power

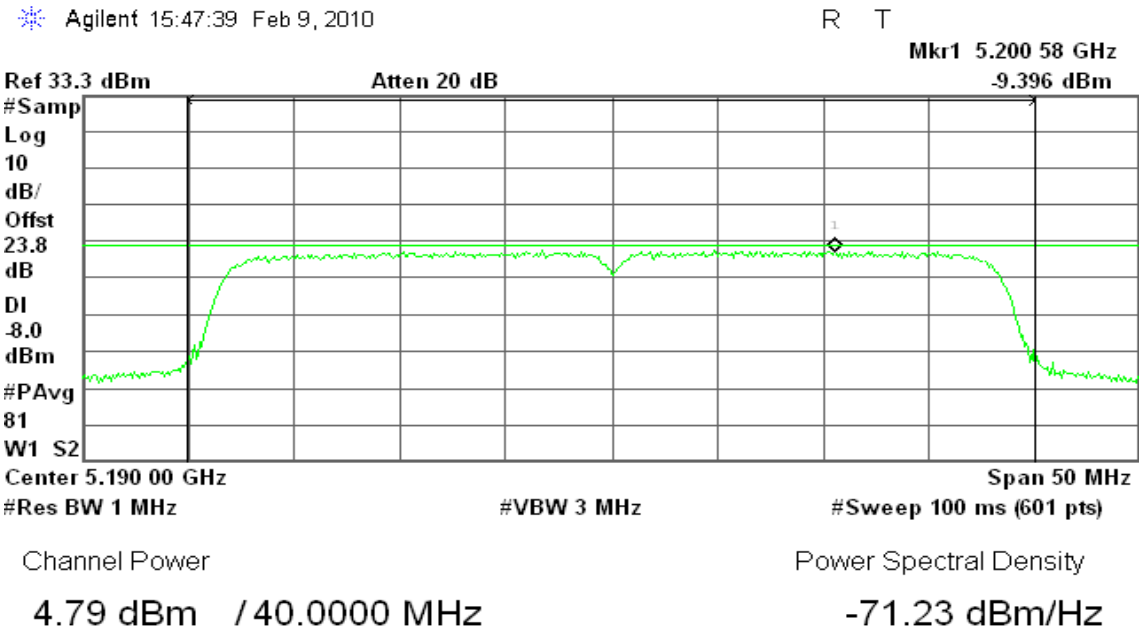
1.91 dBm /20.0000 MHz

Power Spectral Density

-71.10 dBm/Hz

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

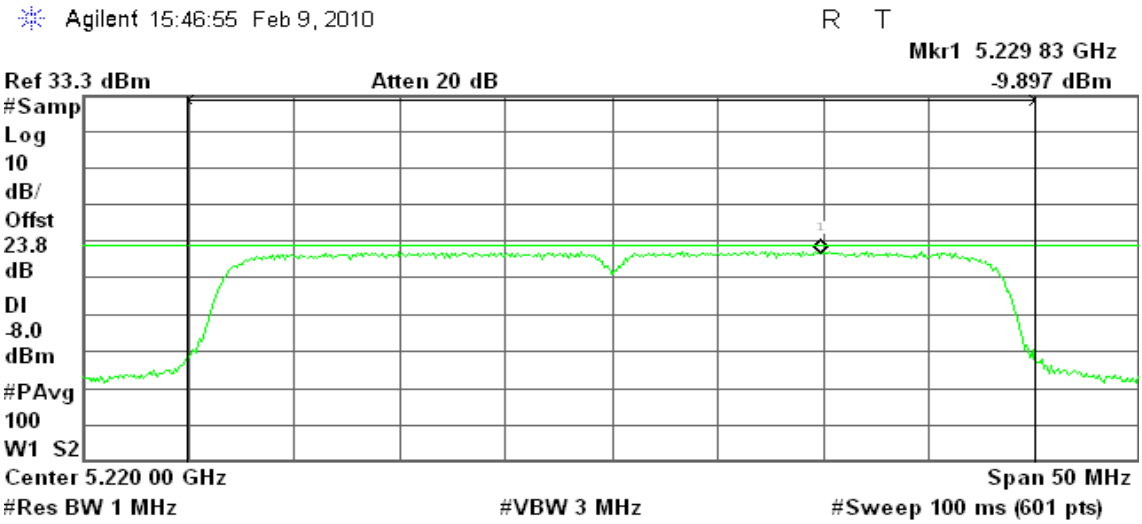
CH Low



Channel Power
4.79 dBm / 40.0000 MHz

Power Spectral Density
-71.23 dBm/Hz

CH High



Channel Power
4.89 dBm / 40.0000 MHz

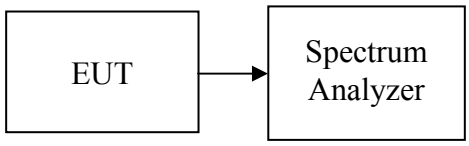
Power Spectral Density
-71.13 dBm/Hz

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	7.51	13.00	-5.49	PASS
Mid	5200	8.49	13.00	-4.51	PASS
High	5230	7.30	13.00	-5.70	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	10.19	13.00	-2.81	PASS
Mid	5200	7.96	13.00	-5.04	PASS
High	5230	8.54	13.00	-4.46	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	4.52	13.00	-8.48	PASS
Mid	5200	3.48	13.00	-9.52	PASS
High	5230	1.05	13.00	-11.95	PASS

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

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	8.82	13.00	-4.18	PASS
High	5220	8.07	13.00	-4.93	PASS

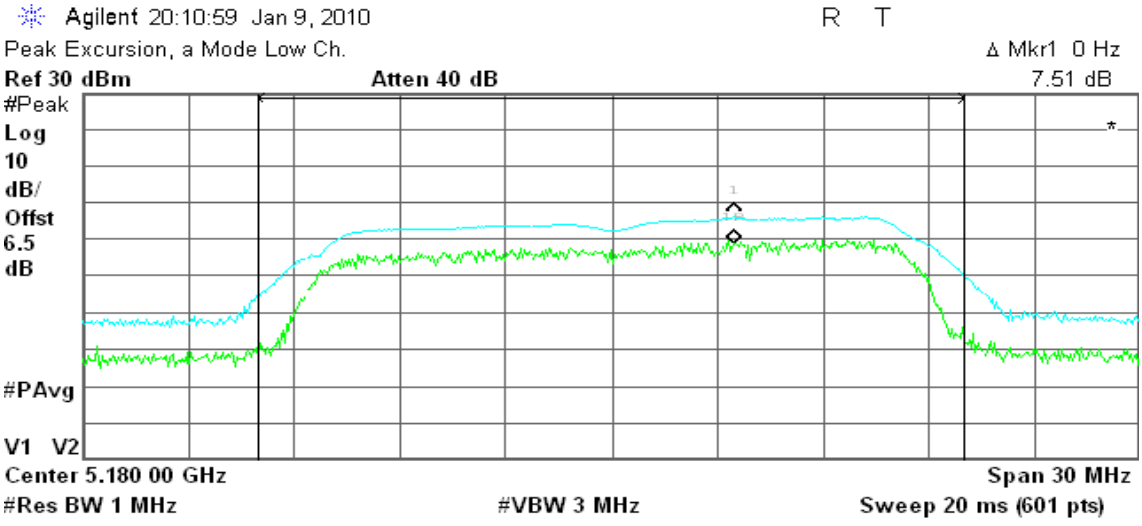
Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	3.09	13.00	-9.91	PASS
High	5220	3.85	13.00	-9.15	PASS

Test Plot

IEEE 802.11a mode

CH Low



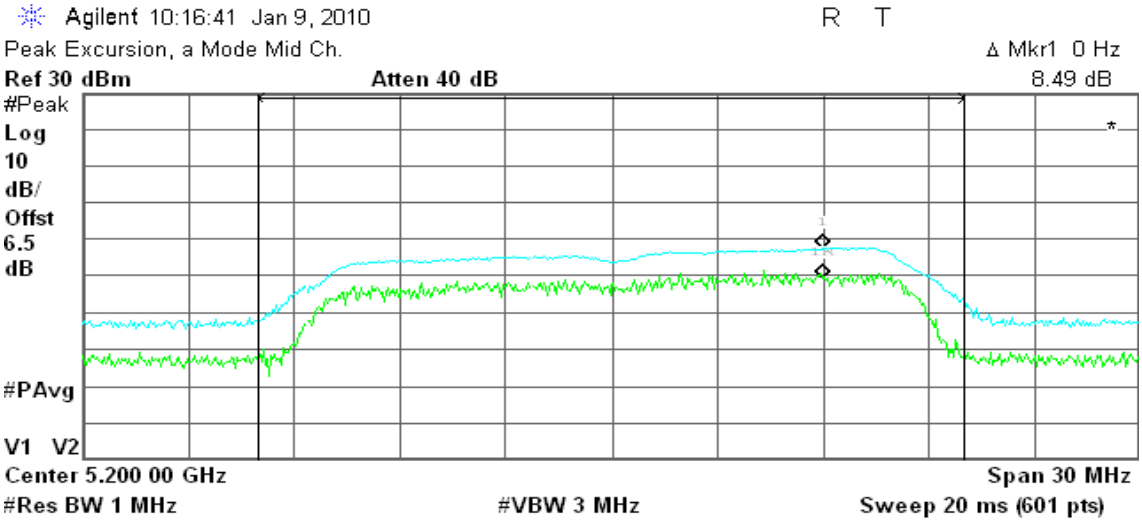
Channel Power

4.98 dBm / 20.0000 MHz

Power Spectral Density

-52.03 dBm/Hz

CH Mid



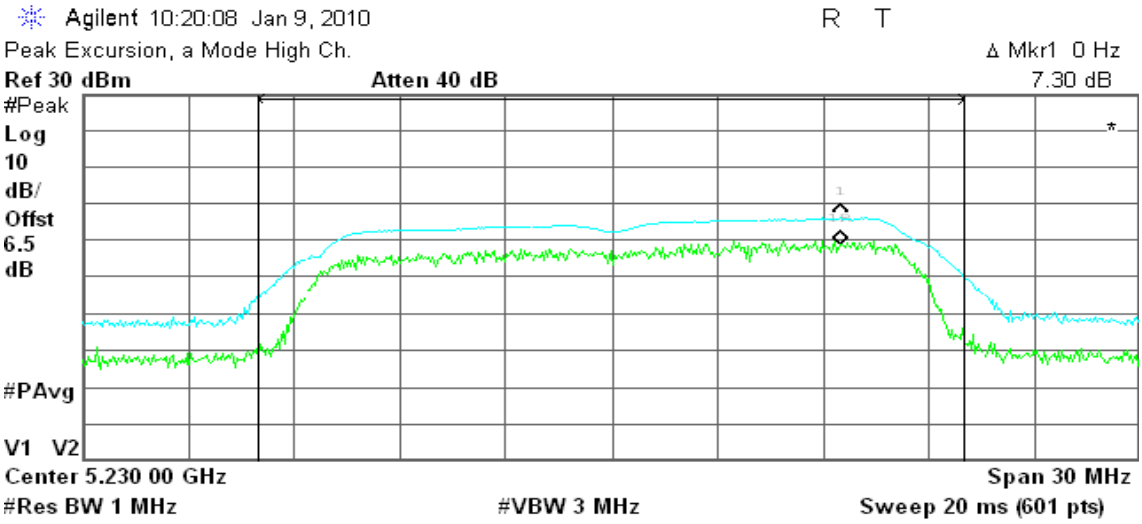
Channel Power

-4.09 dBm / 20.0000 MHz

Power Spectral Density

-77.10 dBm/Hz

CH High



Channel Power

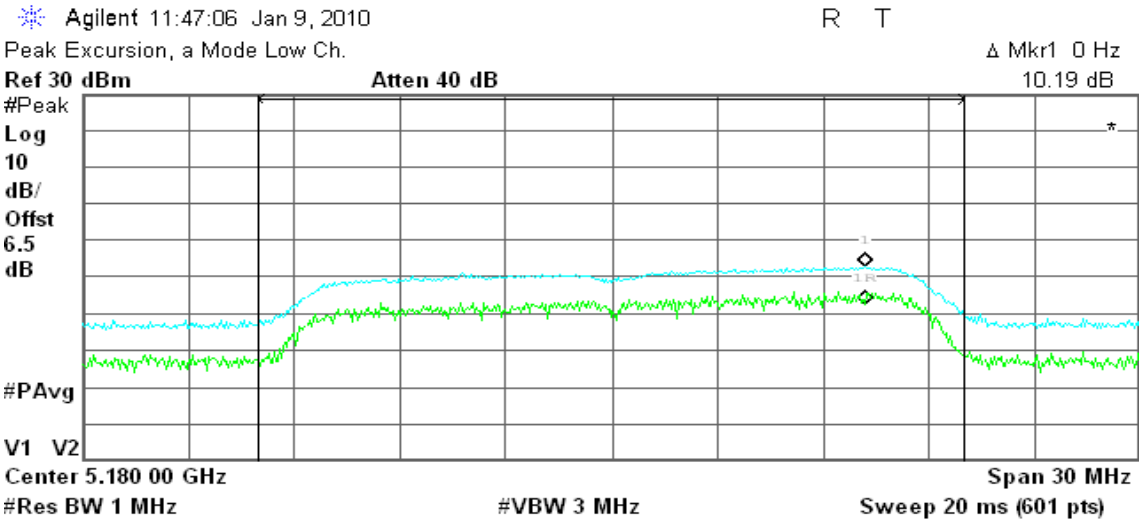
4.73 dBm /20.0000 MHz

Power Spectral Density

-68.28 dBm/Hz

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

CH Low



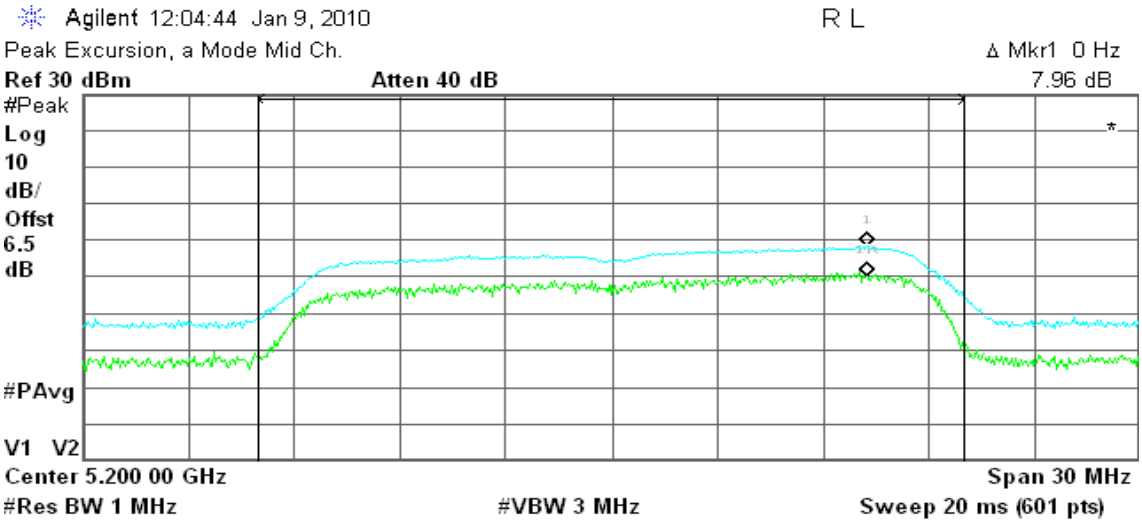
Channel Power

-9.12 dBm /20.0000 MHz

Power Spectral Density

-82.13 dBm/Hz

CH Mid



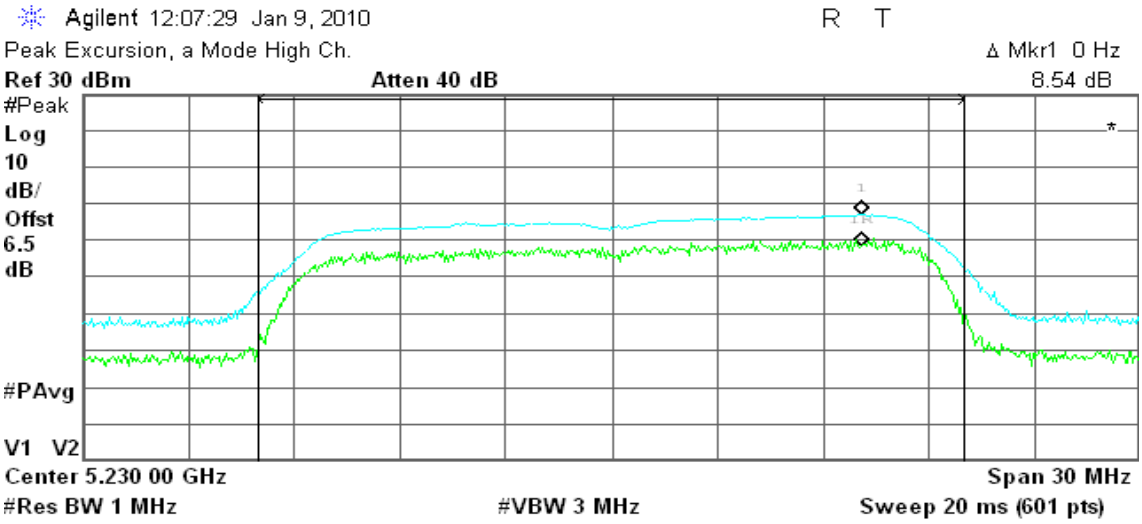
Channel Power

-3.59 dBm /20.0000 MHz

Power Spectral Density

-76.60 dBm/Hz

CH High



Channel Power

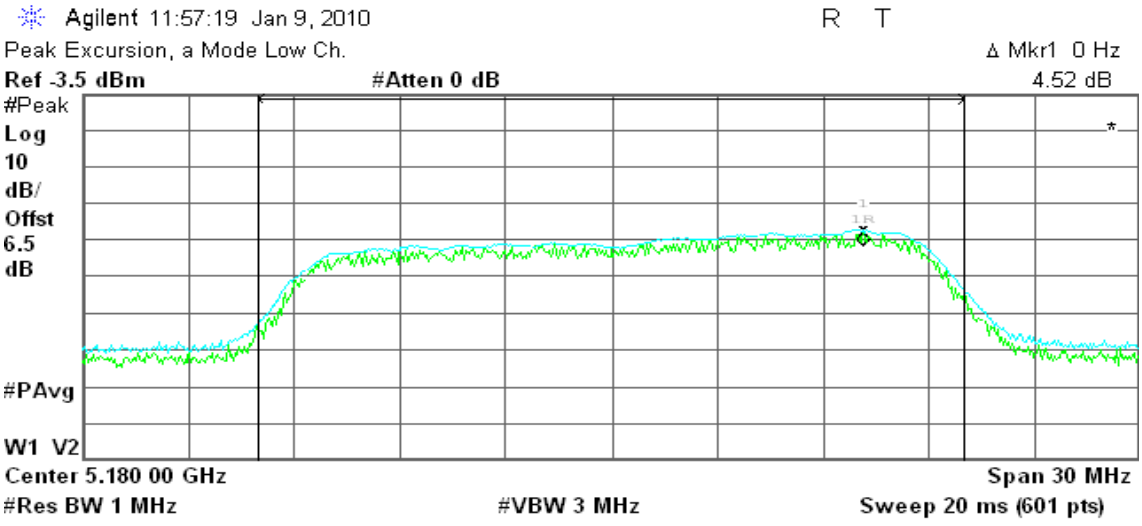
5.56 dBm /20.0000 MHz

Power Spectral Density

-67.45 dBm/Hz

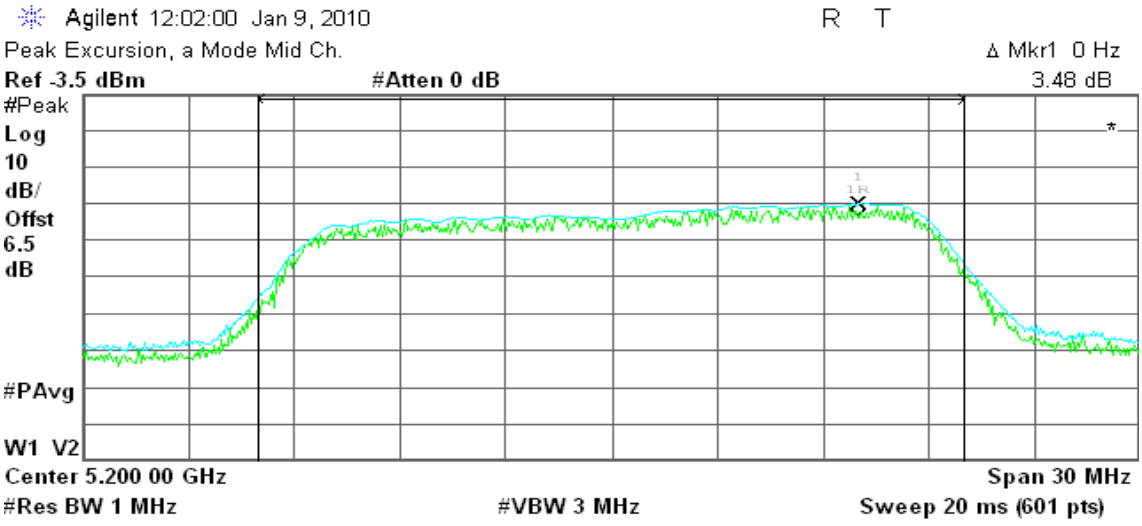
draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low



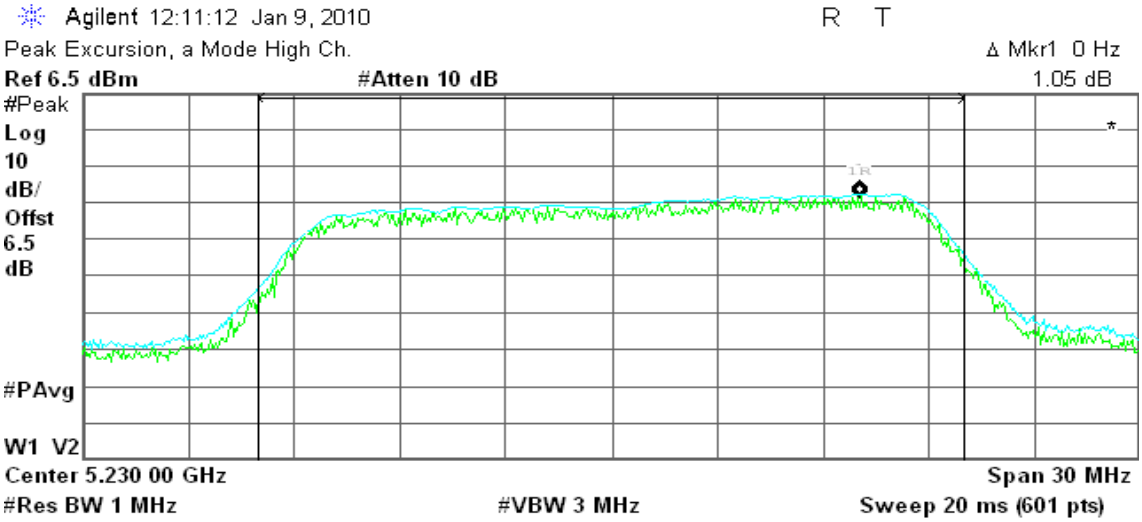
Channel Power	Power Spectral Density
-33.53 dBm / 20.0000 MHz	-106.54 dBm/Hz

CH Mid



Channel Power	Power Spectral Density
-25.87 dBm / 20.0000 MHz	-98.88 dBm/Hz

CH High



Channel Power

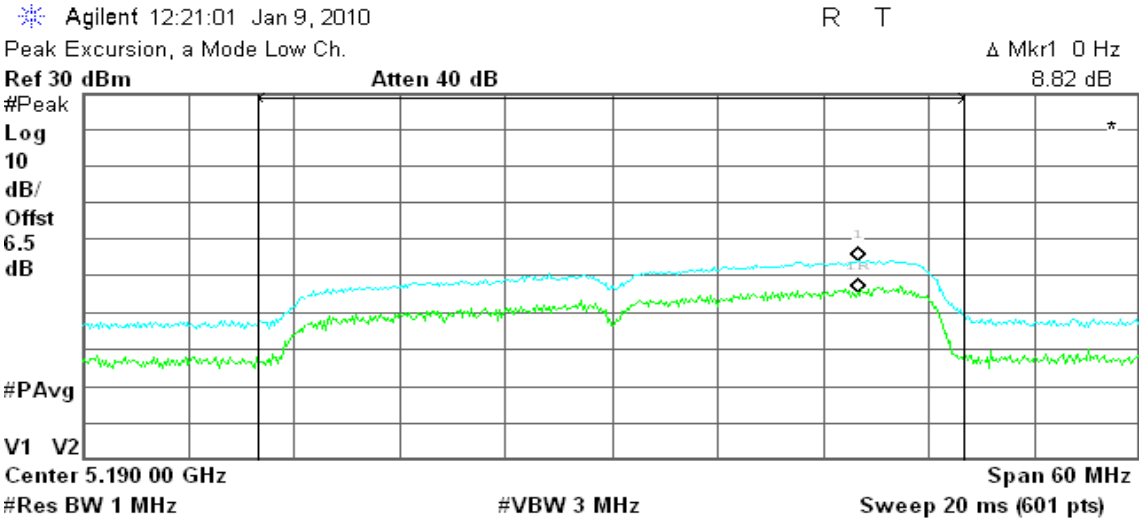
-13.35 dBm / 20.0000 MHz

Power Spectral Density

-86.36 dBm/Hz

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

CH Low



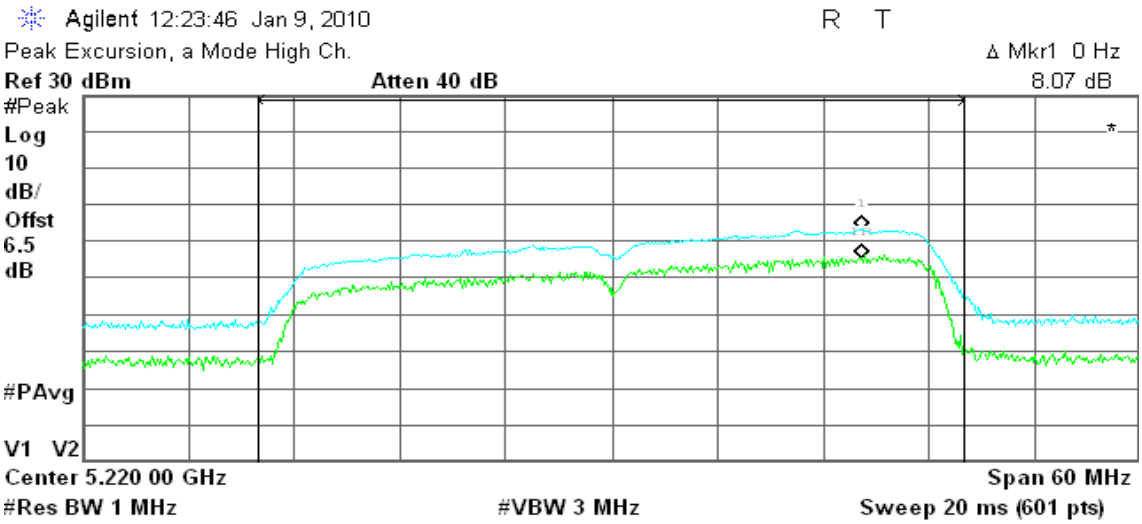
Channel Power

-6.00 dBm / 40.0000 MHz

Power Spectral Density

-82.02 dBm/Hz

CH High



Channel Power

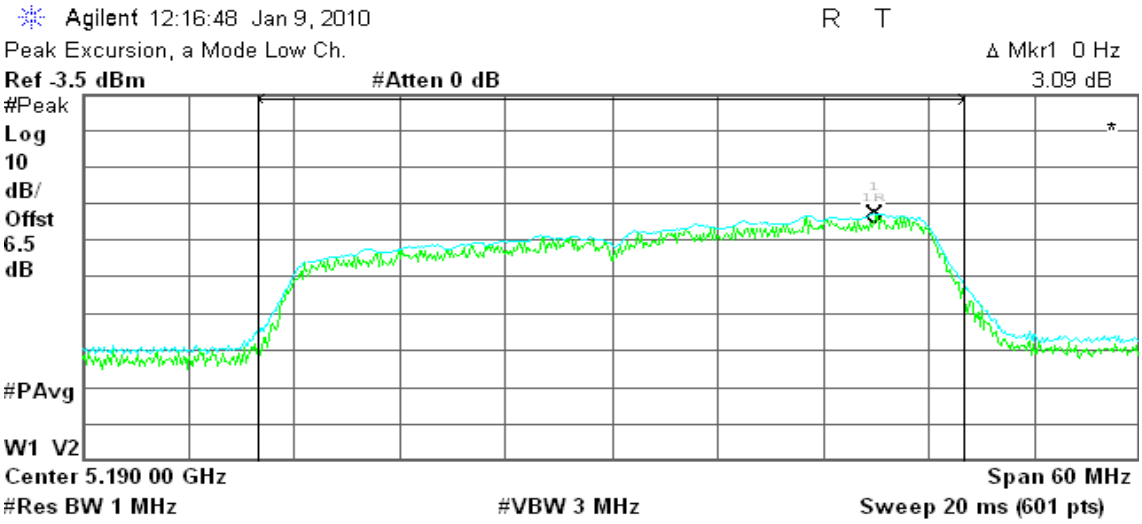
2.94 dBm / 40.0000 MHz

Power Spectral Density

-73.08 dBm/Hz

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

CH Low



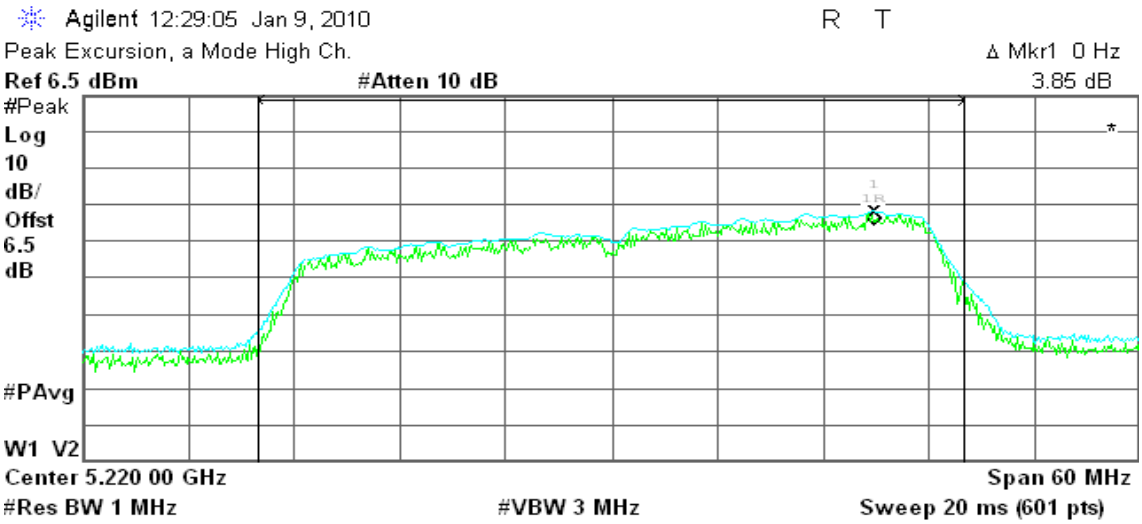
Channel Power

-27.35 dBm / 40.0000 MHz

Power Spectral Density

-103.37 dBm/Hz

CH High



Channel Power

-16.37 dBm / 40.0000 MHz

Power Spectral Density

-92.39 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

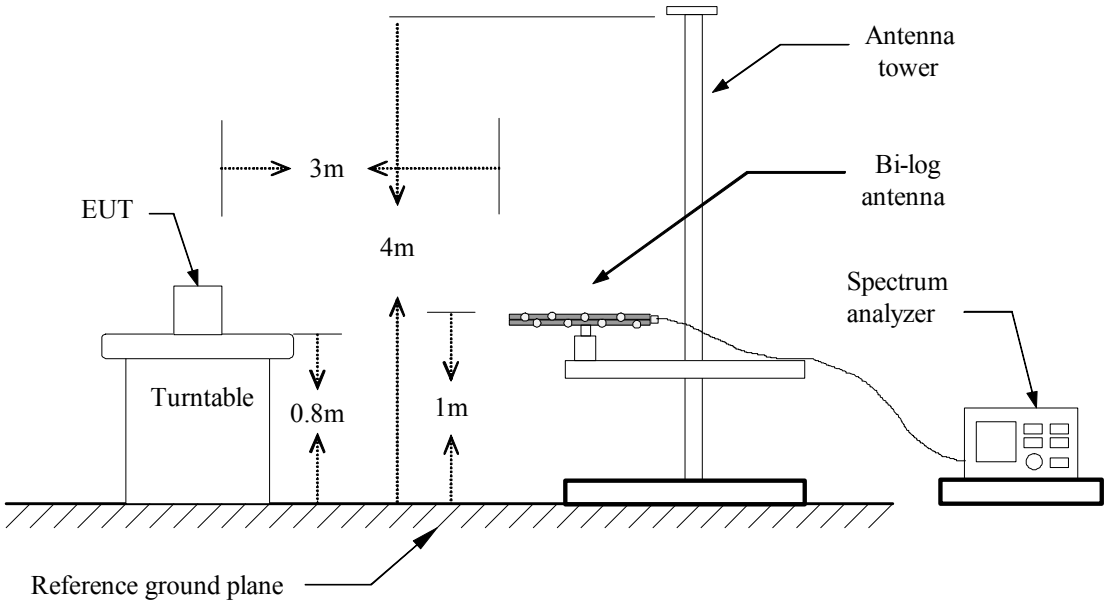
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

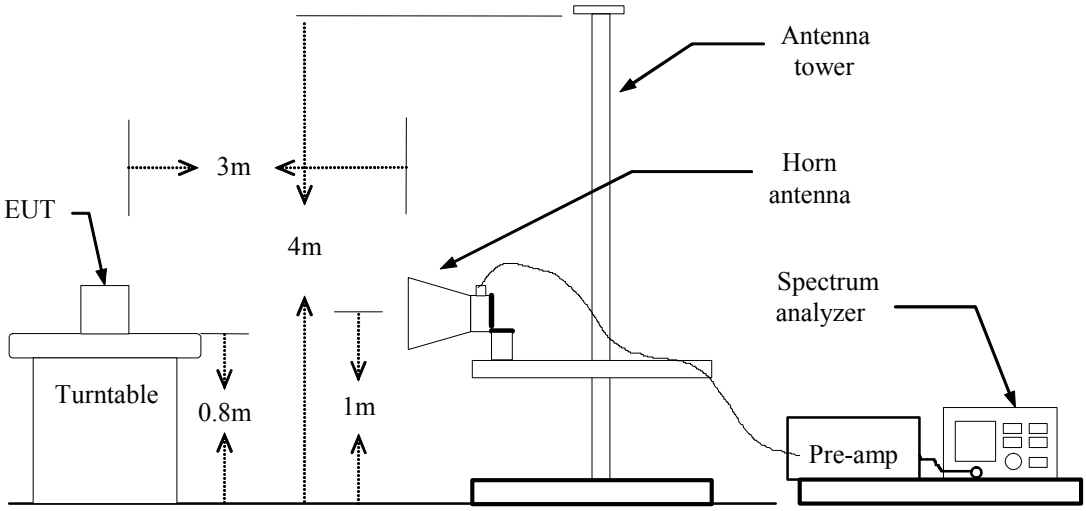
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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:** December 31, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
47.78	V	49.76	-13.74	36.02	40.00	-3.98	QP
54.25	V	50.74	-15.28	35.46	40.00	-4.54	QP
94.67	V	48.59	-14.18	34.41	43.50	-9.09	Peak
125.38	V	43.85	-9.44	34.41	43.50	-9.09	Peak
266.03	V	50.61	-9.38	41.23	46.00	-4.77	Peak
400.22	V	43.07	-6.39	36.67	46.00	-9.33	Peak
266.03	H	51.97	-9.38	42.59	46.00	-3.41	QP
324.23	H	45.97	-8.08	37.90	46.00	-8.10	Peak
400.22	H	47.37	-6.39	40.98	46.00	-5.02	Peak
666.97	H	37.15	-1.57	35.57	46.00	-10.43	Peak
799.53	H	38.60	0.04	38.64	46.00	-7.36	Peak
933.72	H	39.46	1.60	41.06	46.00	-4.94	Peak

Remark:

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).*
2. *Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

Above 1 GHz

Operation Mode: Tx / IEEE 802.11a mode / CH Low **Test Date:** January 7, 2010

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
1066.67	V	52.88	---	-7.84	45.05	---	74.00	54.00	-8.95	Peak
1333.33	V	50.38	---	-7.34	43.04	---	74.00	54.00	-10.96	Peak
N/A										
1066.67	H	52.05	---	-7.84	44.21	---	74.00	54.00	-9.79	Peak
1333.33	H	54.30	---	-7.34	46.96	---	74.00	54.00	-7.04	Peak
5475.00	H	60.49	49.39	1.54	62.03	50.93	74.00	54.00	-3.07	AVG
5575.00	H	60.38	48.40	1.67	62.05	50.07	74.00	54.00	-3.93	AVG
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).*

Operation Mode: Tx / IEEE 802.11a mode /CH Mid **Test Date:** January 7, 2010

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
1066.67	V	52.38	---	-7.84	44.55	---	74.00	54.00	-9.45	Peak
N/A										
1066.67	H	52.24	---	-7.84	44.41	---	74.00	54.00	-9.59	Peak
1333.33	H	54.96	---	-7.34	47.62	---	74.00	54.00	-6.38	Peak
5475.00	H	61.40	49.80	1.54	62.94	51.34	74.00	54.00	-2.66	AVG
5583.33	H	59.83	48.68	1.68	61.52	50.36	74.00	54.00	-3.64	AVG
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).*

Operation Mode: Tx / IEEE 802.11a mode /CH High **Test Date:** January 7, 2010

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
1066.67	V	52.67	---	-7.84	44.84	---	74.00	54.00	-9.16	Peak
N/A										
1066.67	H	52.67	---	-7.84	44.83	---	74.00	54.00	-9.17	Peak
1333.33	H	54.29	---	-7.34	46.95	---	74.00	54.00	-7.05	Peak
5425.00	H	62.85	50.12	1.48	64.33	51.60	74.00	54.00	-2.40	AVG
5558.33	H	60.05	48.90	1.65	61.70	50.55	74.00	54.00	-3.45	AVG
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).*

Operation Mode:	Tx / draft 802.11n Standard-20 MHz Channel mode / CH Low	**Test Date:**	January 7, 2010
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
1066.67	V	52.54	---	-7.84	44.71	---	74.00	54.00	-9.29	Peak
N/A										
1066.67	H	53.34	---	-7.84	45.50	---	74.00	54.00	-8.50	Peak
1333.33	H	54.69	---	-7.34	47.35	---	74.00	54.00	-6.65	Peak
5433.33	H	60.75	50.03	1.49	62.24	51.52	74.00	54.00	-2.48	AVG
5558.33	H	61.64	48.55	1.65	63.29	50.20	74.00	54.00	-3.80	AVG
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).*

Operation Mode:	Tx / draft 802.11n Standard-20 MHz Channel mode / CH Mid	**Test Date:**	January 7, 2010
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
1066.67	V	53.47	---	-7.84	45.64	---	74.00	54.00	-8.36	Peak
N/A										
1066.67	H	53.41	---	-7.84	45.57	---	74.00	54.00	-8.43	Peak
1333.33	H	54.93	---	-7.34	47.59	---	74.00	54.00	-6.41	Peak
5458.33	H	61.11	50.08	1.52	62.63	51.60	74.00	54.00	-2.40	AVG
5591.67	H	59.95	48.82	1.69	61.65	50.51	74.00	54.00	-3.49	AVG
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).*

Operation Mode: Tx / draft 802.11n Standard-20 MHz Channel mode / CH High **Test Date:** January 7, 2010

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
1066.67	V	52.06	---	-7.84	44.22	---	74.00	54.00	-9.78	Peak
1333.33	V	51.25	---	-7.34	43.91	---	74.00	54.00	-10.09	Peak
N/A										
1066.67	H	51.28	---	-7.84	43.45	---	74.00	54.00	-10.55	Peak
1333.33	H	54.26	---	-7.34	46.92	---	74.00	54.00	-7.08	Peak
5425.00	H	62.67	50.14	1.48	64.16	51.62	74.00	54.00	-2.38	AVG
5591.67	H	60.41	47.76	1.69	62.11	49.45	74.00	54.00	-4.55	AVG
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).*

Operation Mode:	Tx / draft 802.11n Wide-40 MHz Channel mode / CH Low	**Test Date:**	January 7, 2010
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
1066.67	V	53.33	---	-7.84	45.50	---	74.00	54.00	-8.50	Peak
1600.00	V	51.64	---	-6.07	45.57	---	74.00	54.00	-8.43	Peak
N/A										
1066.67	H	52.60	---	-7.84	44.76	---	74.00	54.00	-9.24	Peak
1333.33	H	54.09	---	-7.34	46.75	---	74.00	54.00	-7.25	Peak
5416.67	H	60.55	48.07	1.47	62.02	49.54	74.00	54.00	-4.46	AVG
5583.33	H	60.92	48.32	1.68	62.60	50.00	74.00	54.00	-4.00	AVG
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).*

Operation Mode: Tx / draft 802.11n Wide-40 MHz Channel mode / CH High **Test Date:** January 7, 2010

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
1066.67	V	53.07	---	-7.84	45.24	---	74.00	54.00	-8.76	Peak
N/A										
1066.67	H	51.97	---	-7.84	44.14	---	74.00	54.00	-9.86	Peak
1333.33	H	54.69	---	-7.34	47.35	---	74.00	54.00	-6.65	Peak
5450.00	H	60.79	49.53	1.51	62.30	51.04	74.00	54.00	-2.96	AVG
5575.00	H	60.50	48.75	1.67	62.17	50.42	74.00	54.00	-3.58	AVG
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).*

7.7 CONDUCTED UNDESIRABLE EMISSION

LIMIT

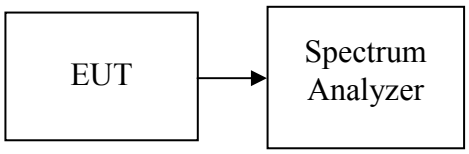
According to 15.407(b),

(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.

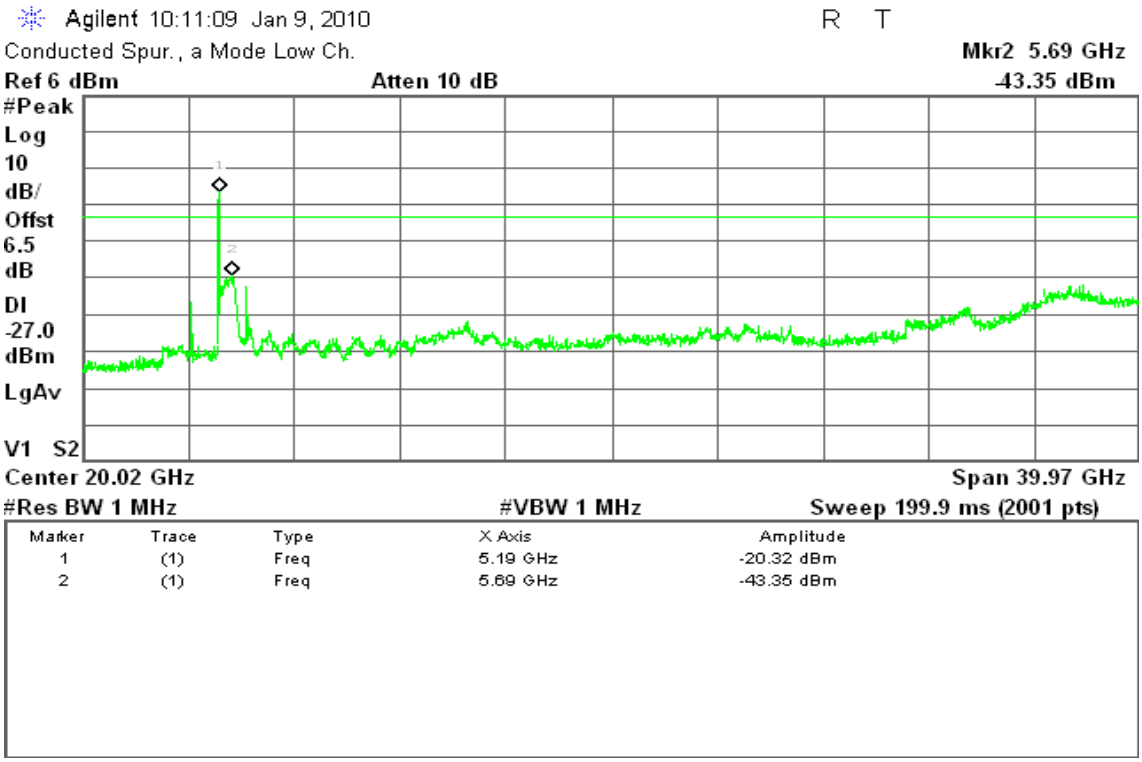
TEST RESULTS

No non-compliance noted

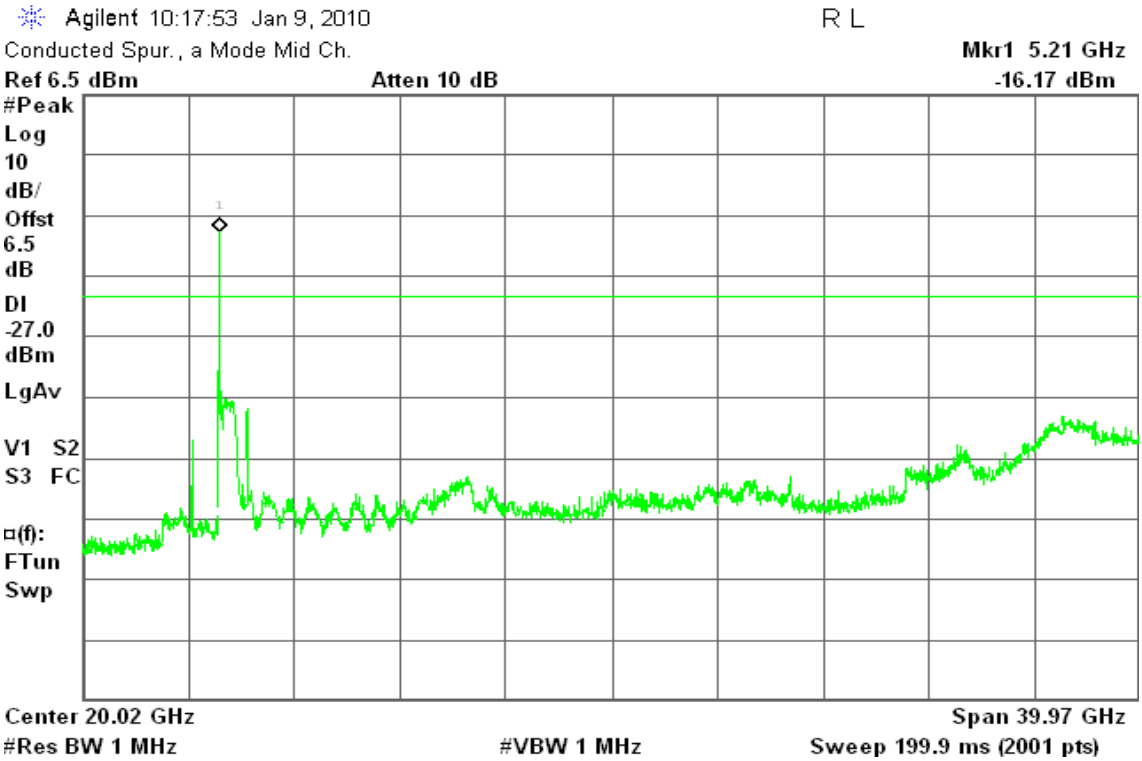
Test Plot

IEEE 802.11a mode

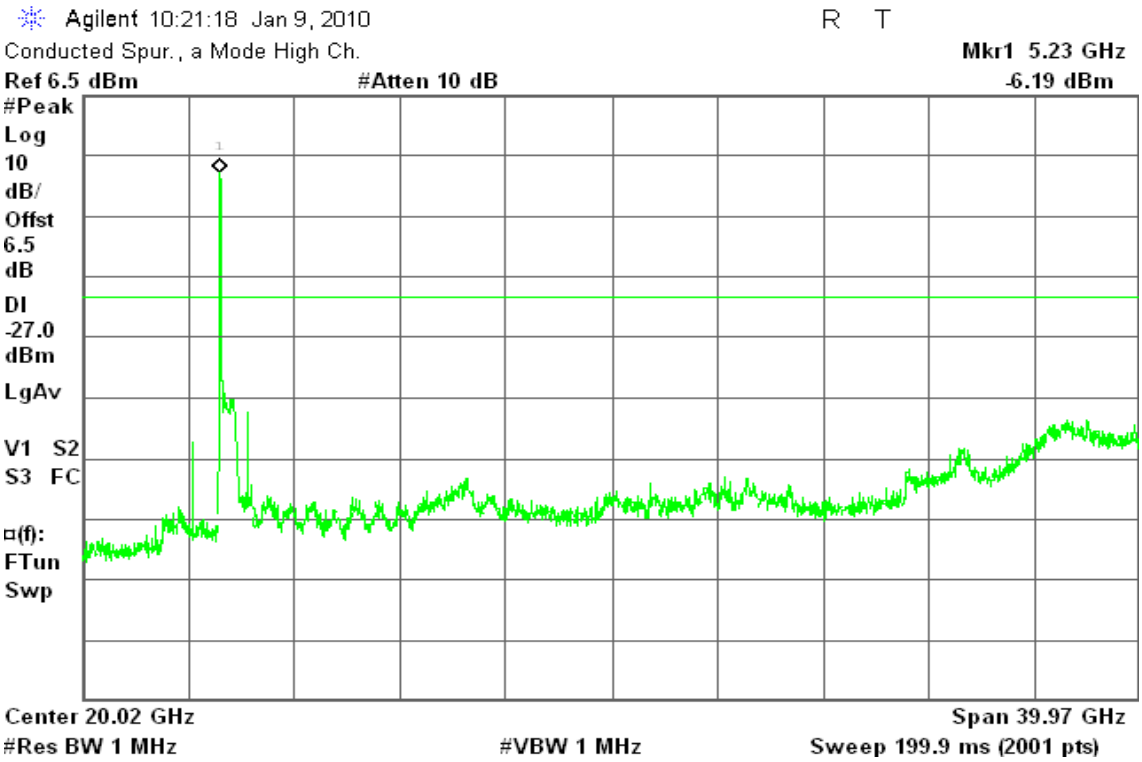
CH Low



CH Mid

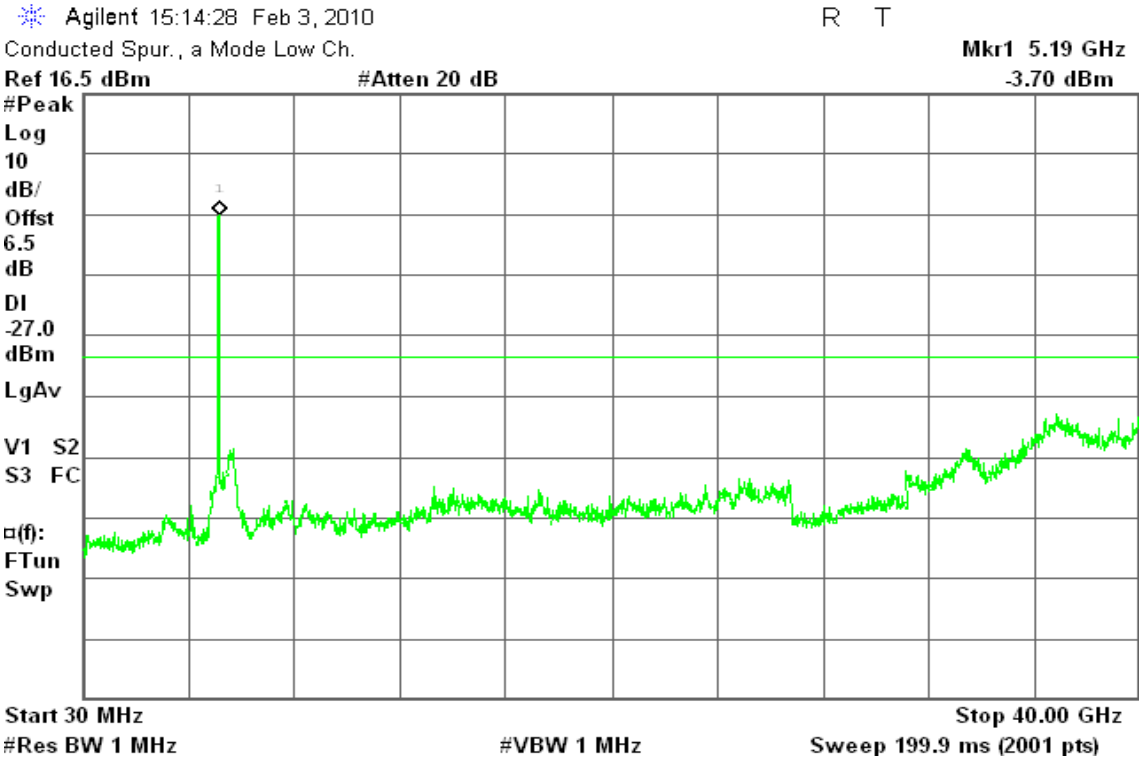


CH High

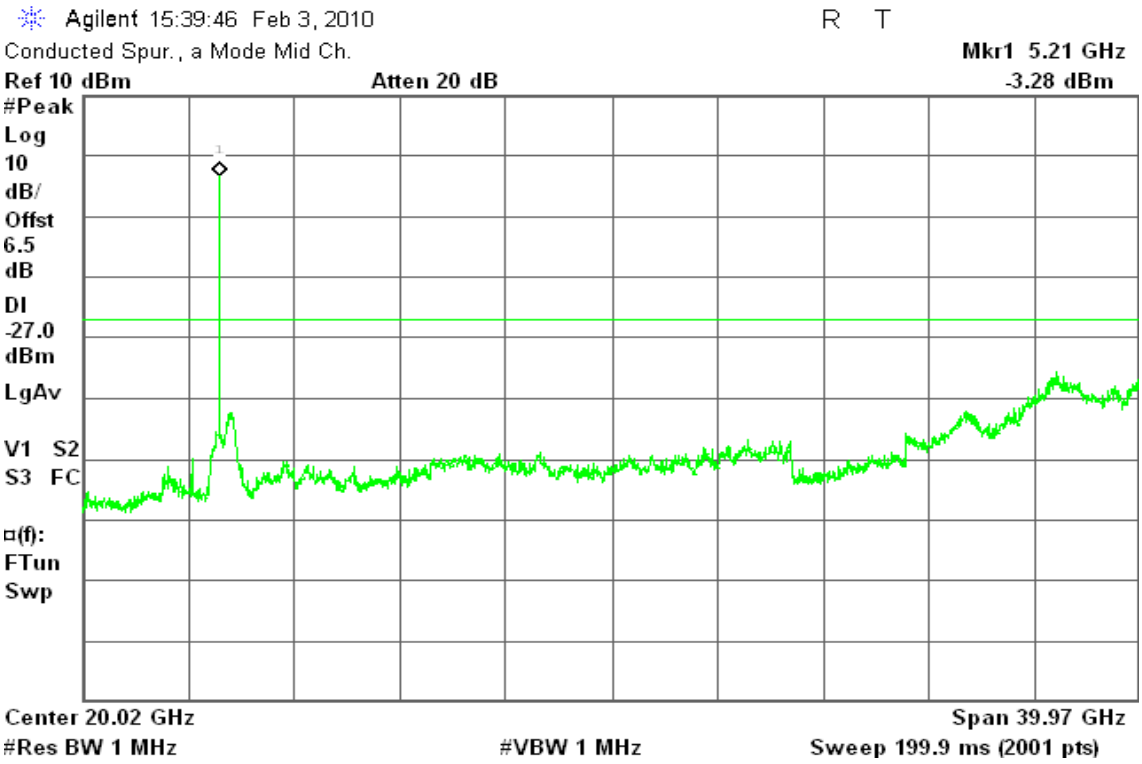


draft 802.11n Standard-20 MHz Channel mode / Chain 0

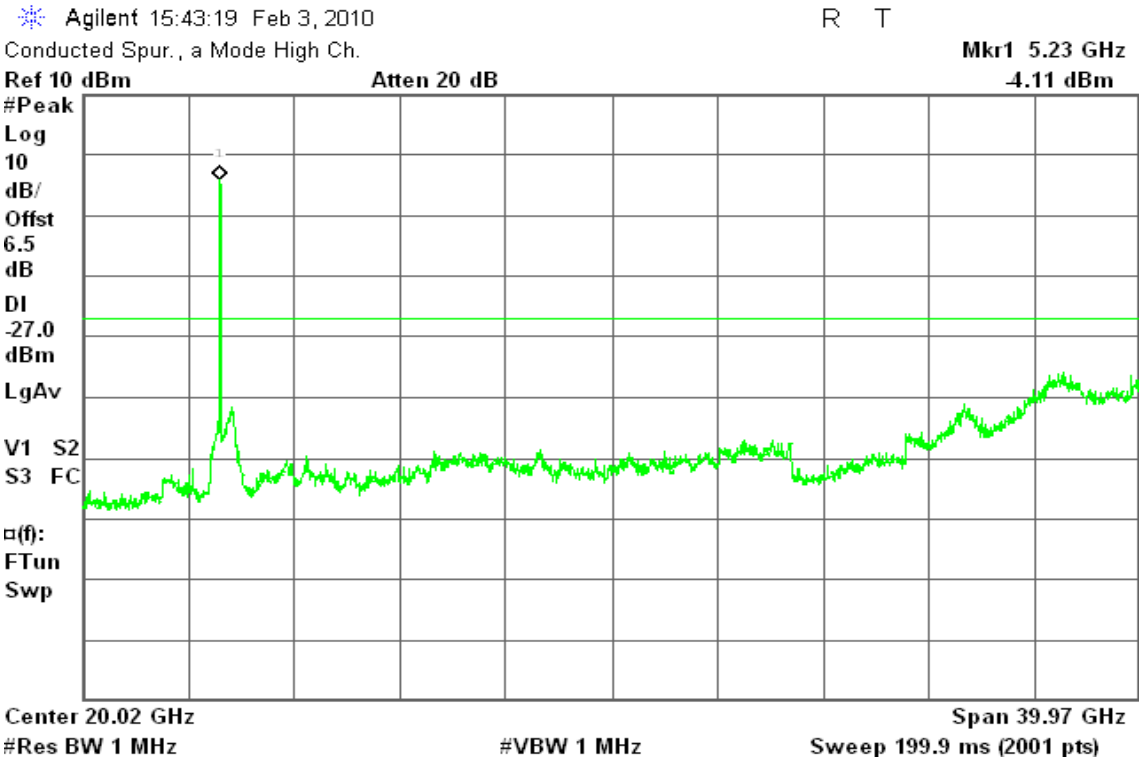
CH Low



CH Mid

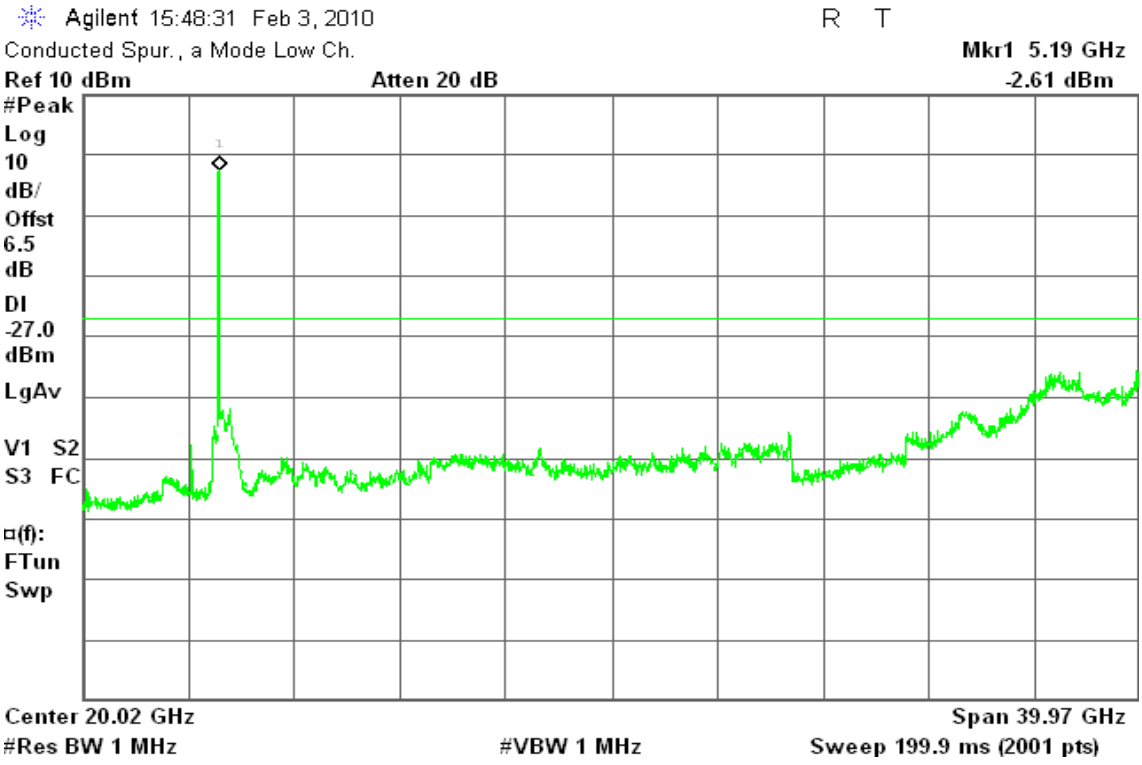


CH High

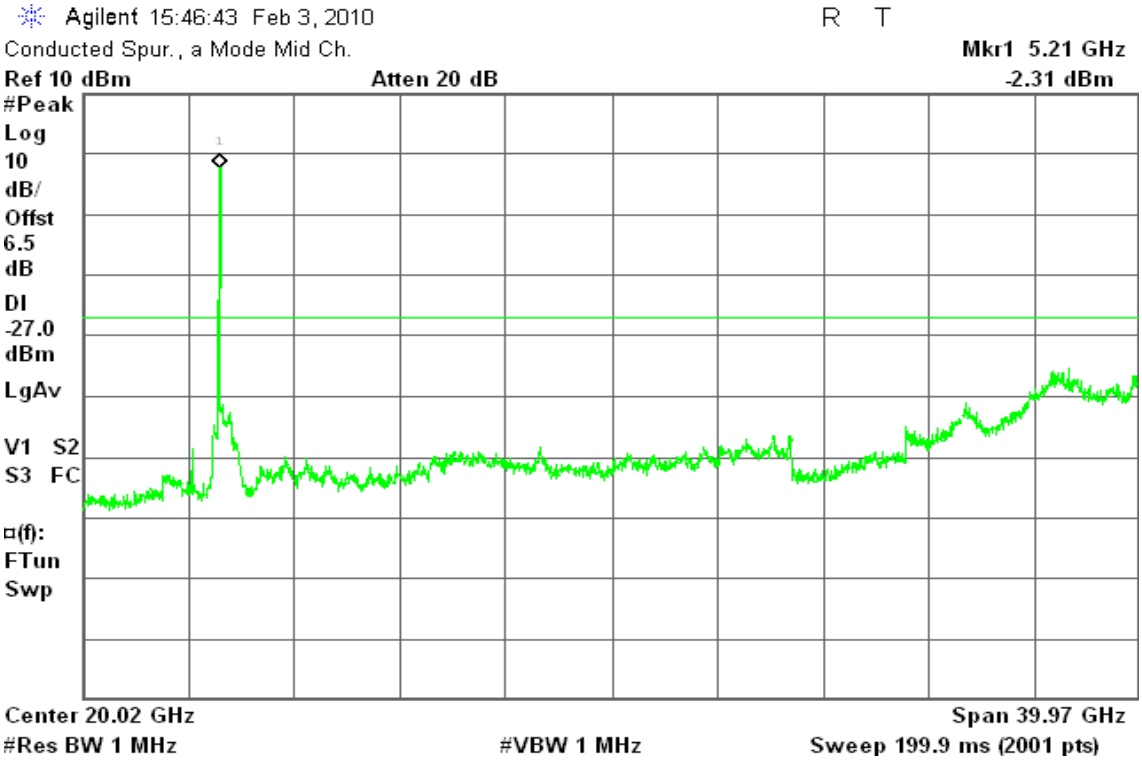


draft 802.11n Standard-20 MHz Channel mode / Chain 1

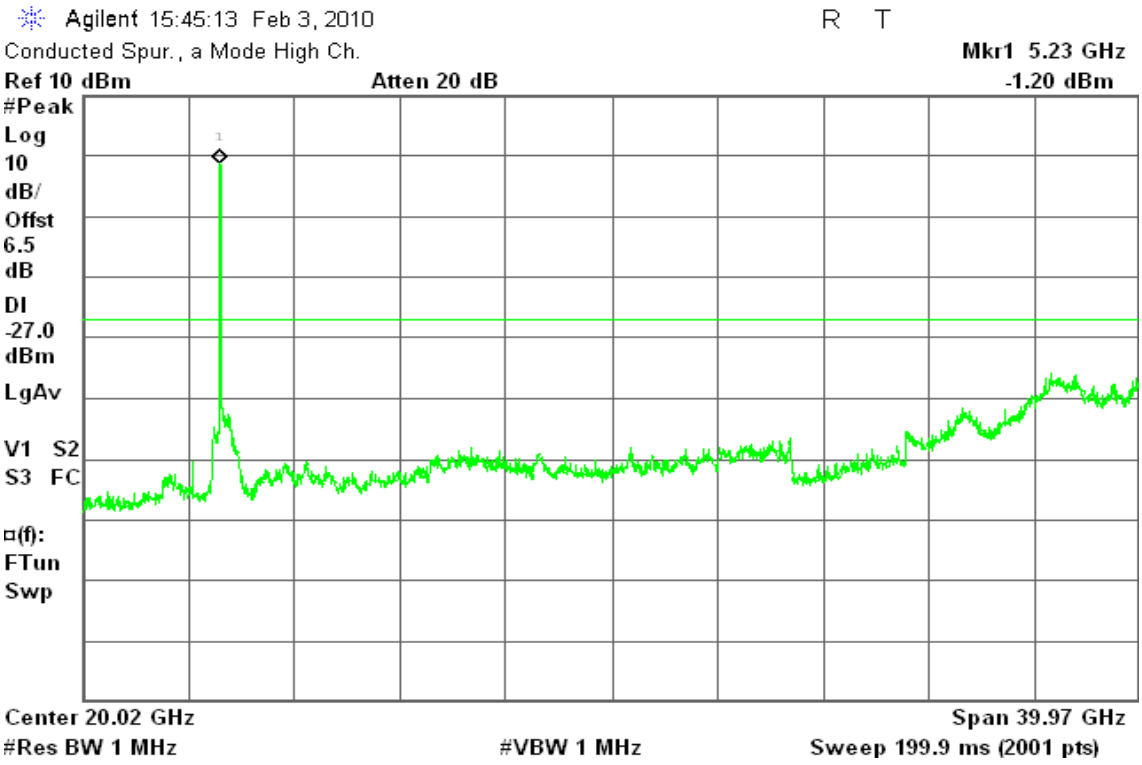
CH Low



CH Mid

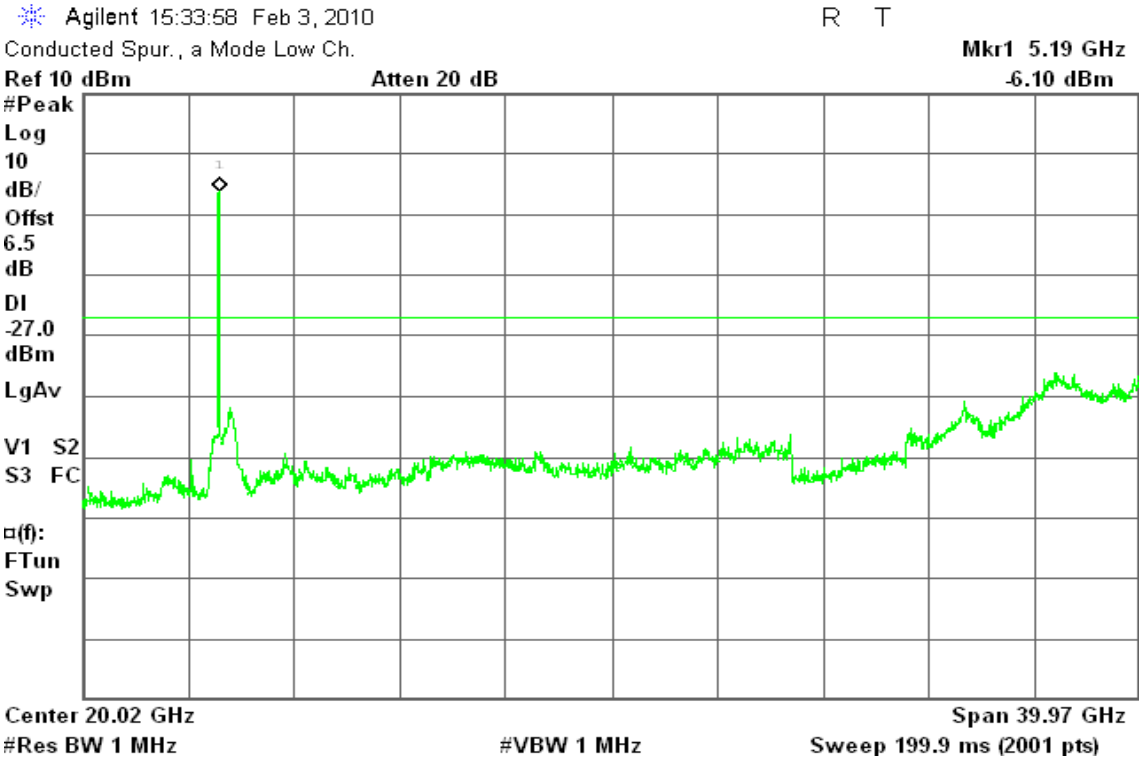


CH High

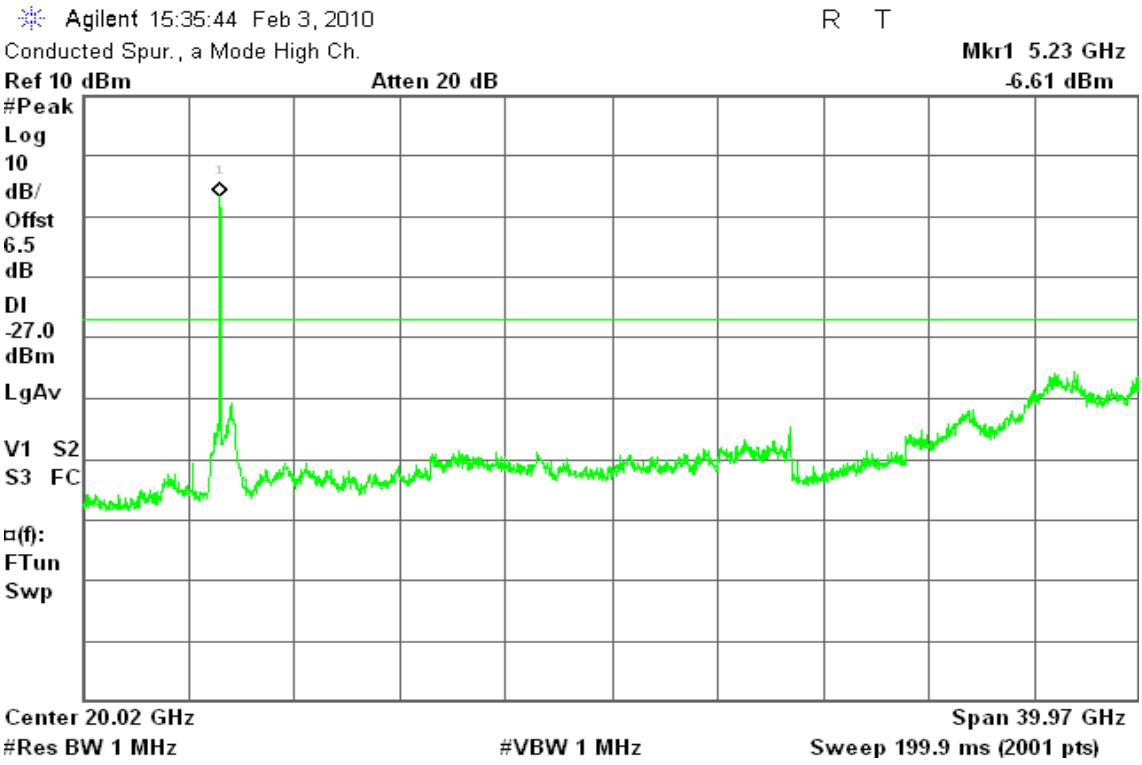


draft 802.11n Wide-40 MHz Channel mode / Chain 0

CH Low

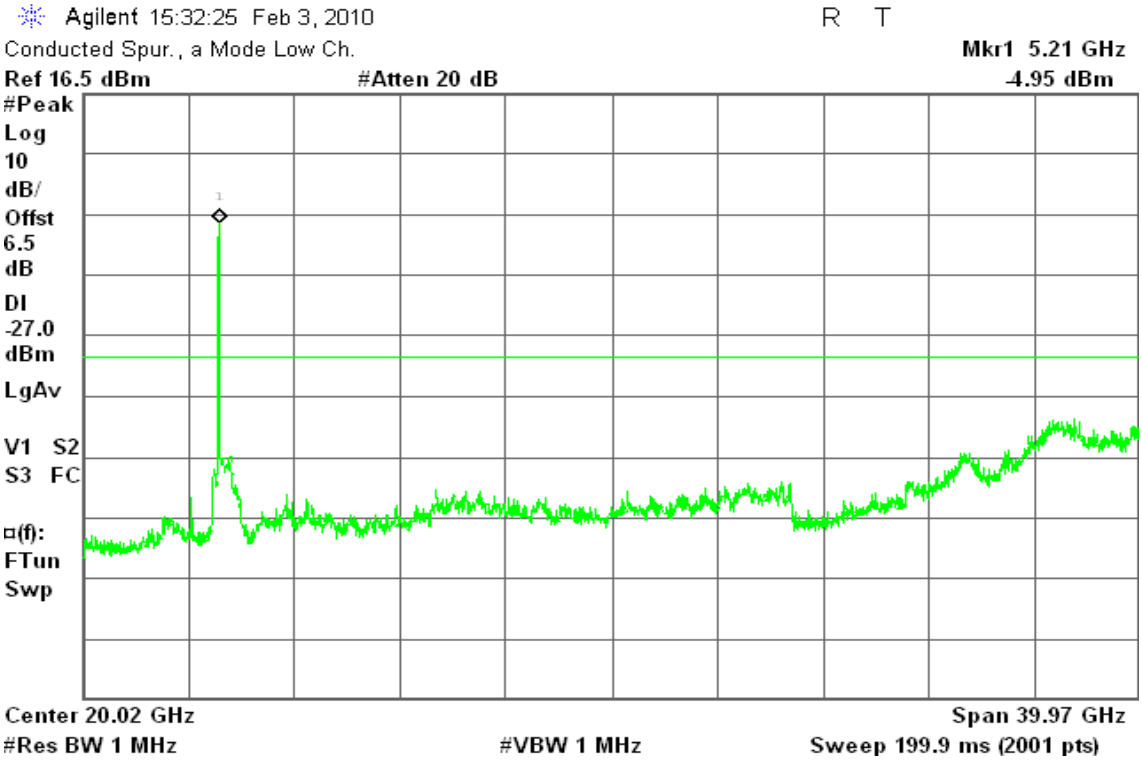


CH High

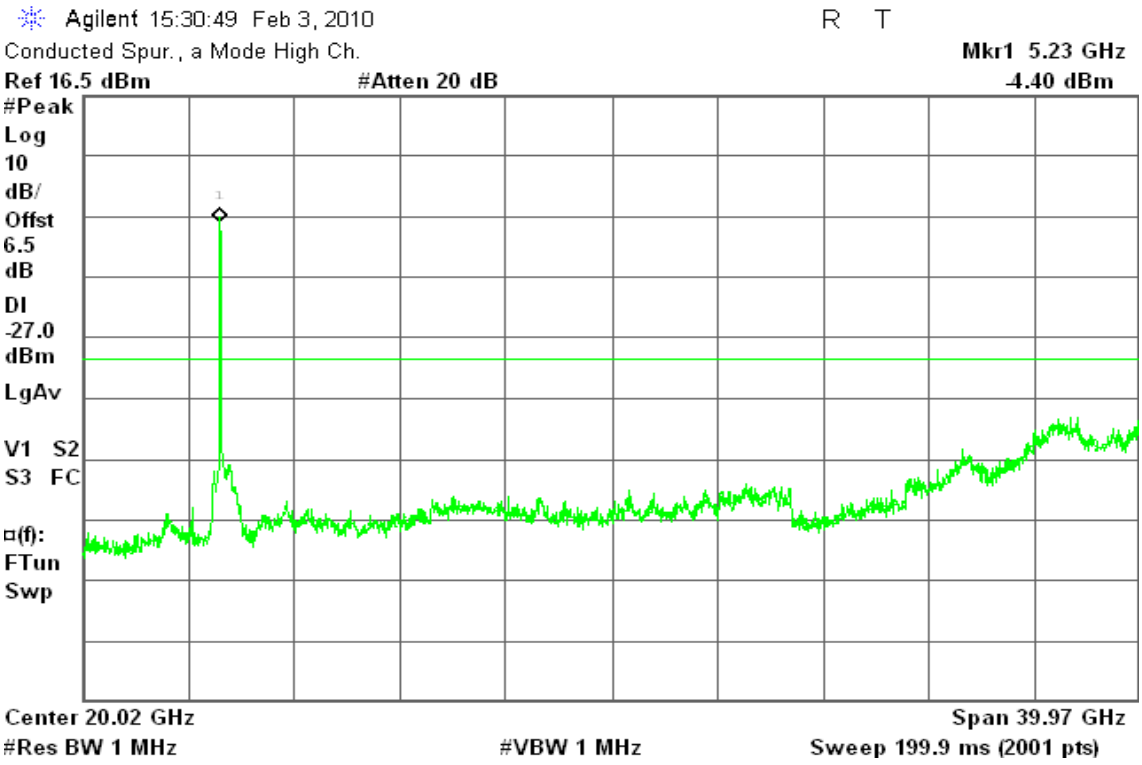


draft 802.11n Wide-40 MHz Channel mode / Chain 1

CH Low

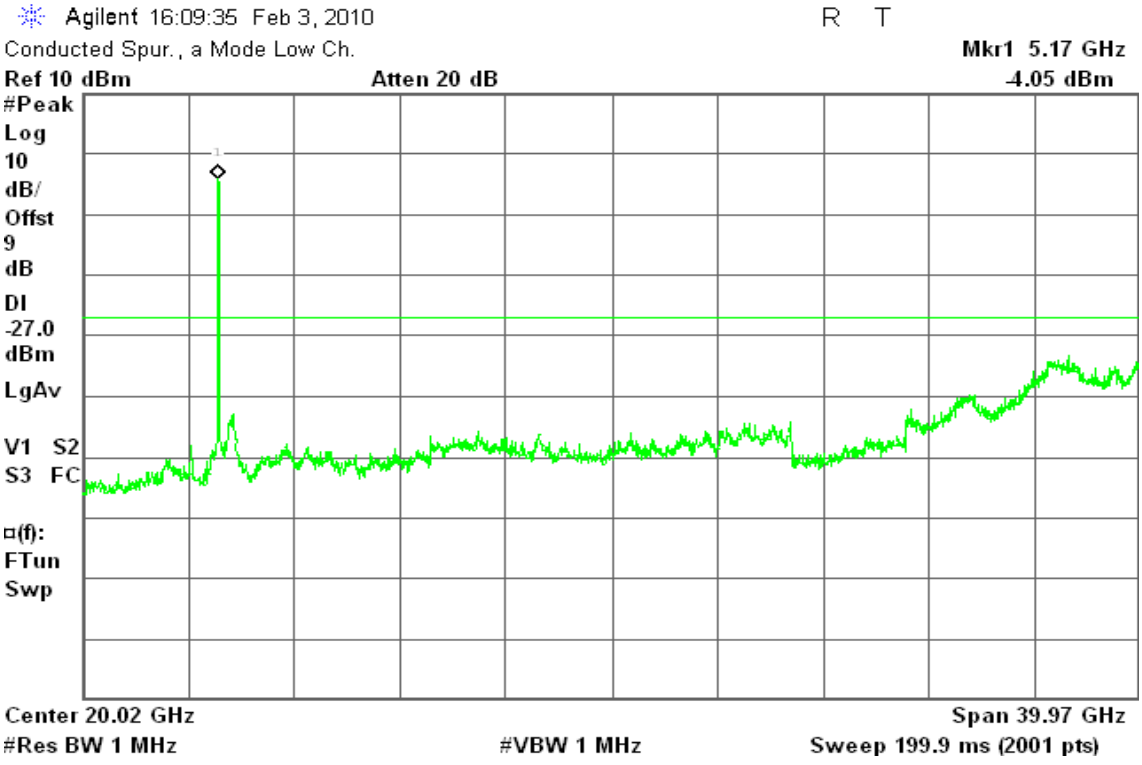


CH High

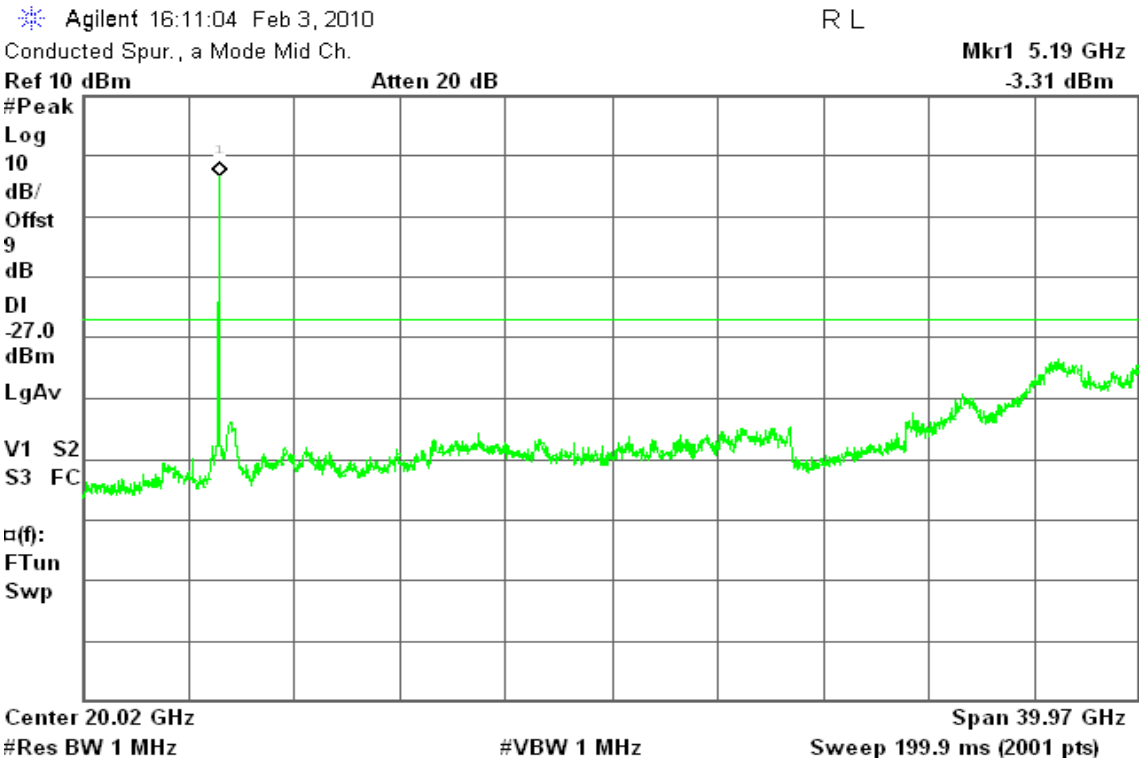


draft 802.11n Standard-20 MHz Channel mode / with combiner

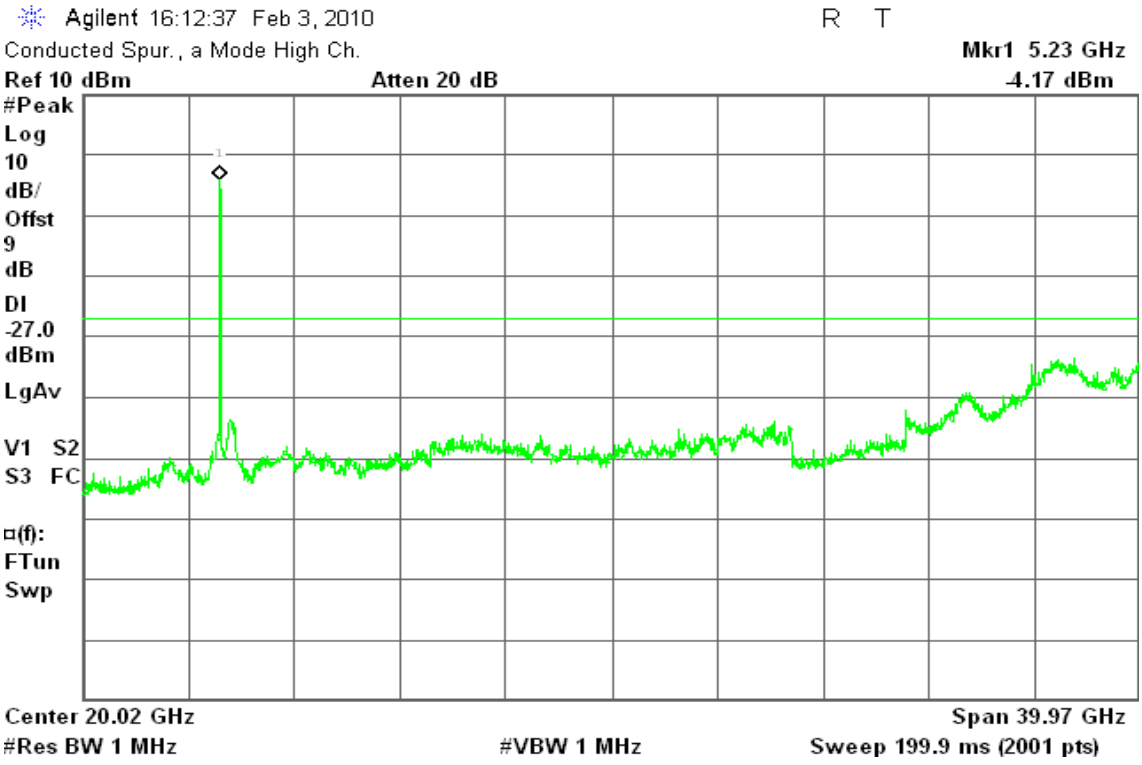
CH Low



CH Mid

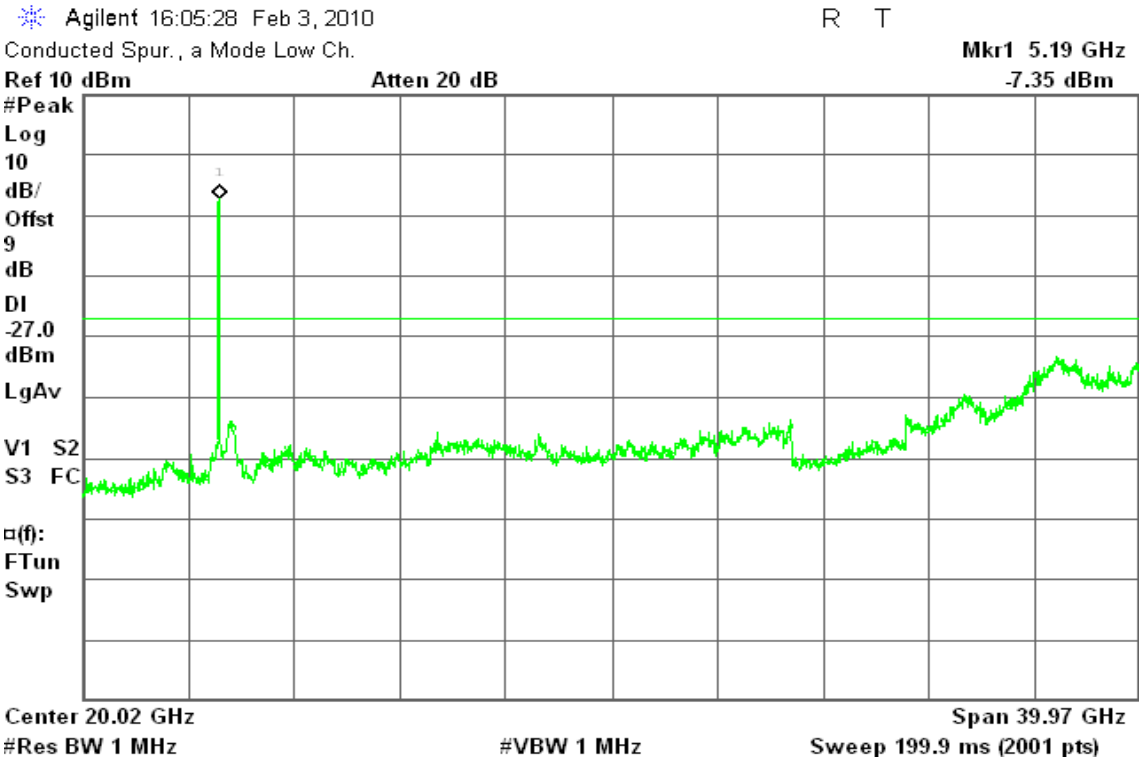


CH High

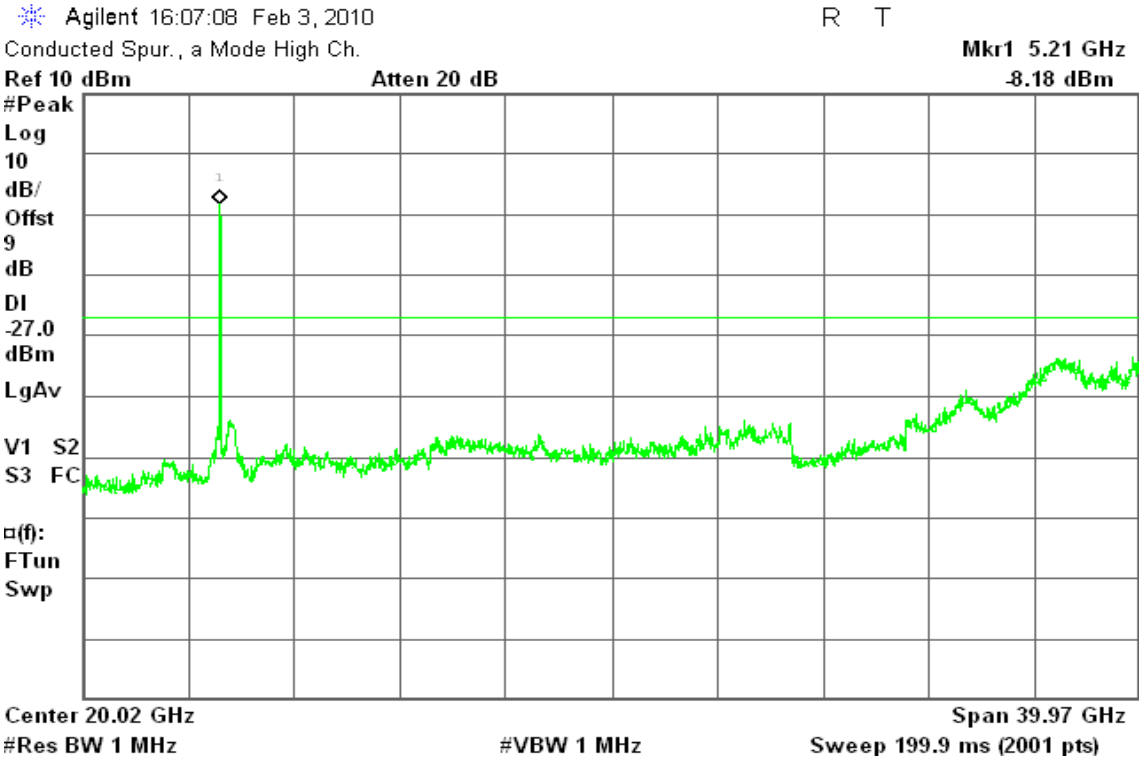


draft 802.11n Wide-40 MHz Channel mode / with combiner

CH Low



CH High



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:**	January 28, 2010
Temperature:	22°C	**Tested by:**	Mark Yang
Humidity:	45% RH		

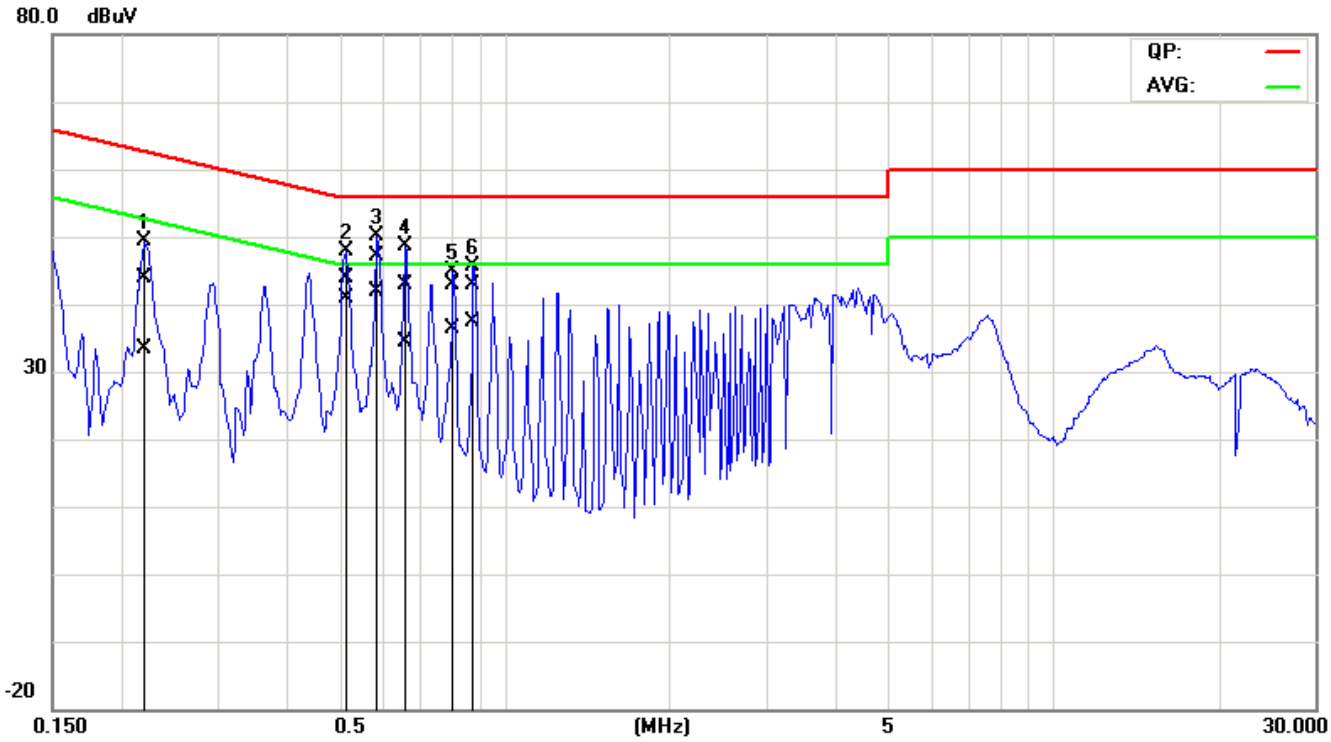
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.2200	43.73	33.33	0.17	43.90	33.50	62.82	52.82	-18.92	-19.32	L1
0.5150	43.74	40.74	0.06	43.80	40.80	56.00	46.00	-12.20	-5.20	L1
0.5850	47.14	41.84	0.06	47.20	41.90	56.00	46.00	-8.80	-4.10	L1
0.6600	42.74	34.44	0.06	42.80	34.50	56.00	46.00	-13.20	-11.50	L1
0.8050	42.95	36.45	0.05	43.00	36.50	56.00	46.00	-13.00	-9.50	L1
0.8800	42.95	37.25	0.05	43.00	37.30	56.00	46.00	-13.00	-8.70	L1
0.2200	43.51	33.51	0.19	43.70	33.70	62.82	52.82	-19.12	-19.12	L2
0.5150	45.22	42.12	0.08	45.30	42.20	56.00	46.00	-10.70	-3.80	L2
0.5900	45.42	41.52	0.08	45.50	41.60	56.00	46.00	-10.50	-4.40	L2
0.6624	41.32	33.92	0.08	41.40	34.00	56.00	46.00	-14.60	-12.00	L2
0.8100	44.22	40.72	0.08	44.30	40.80	56.00	46.00	-11.70	-5.20	L2
0.8850	43.12	40.02	0.08	43.20	40.10	56.00	46.00	-12.80	-5.90	L2

Remark:

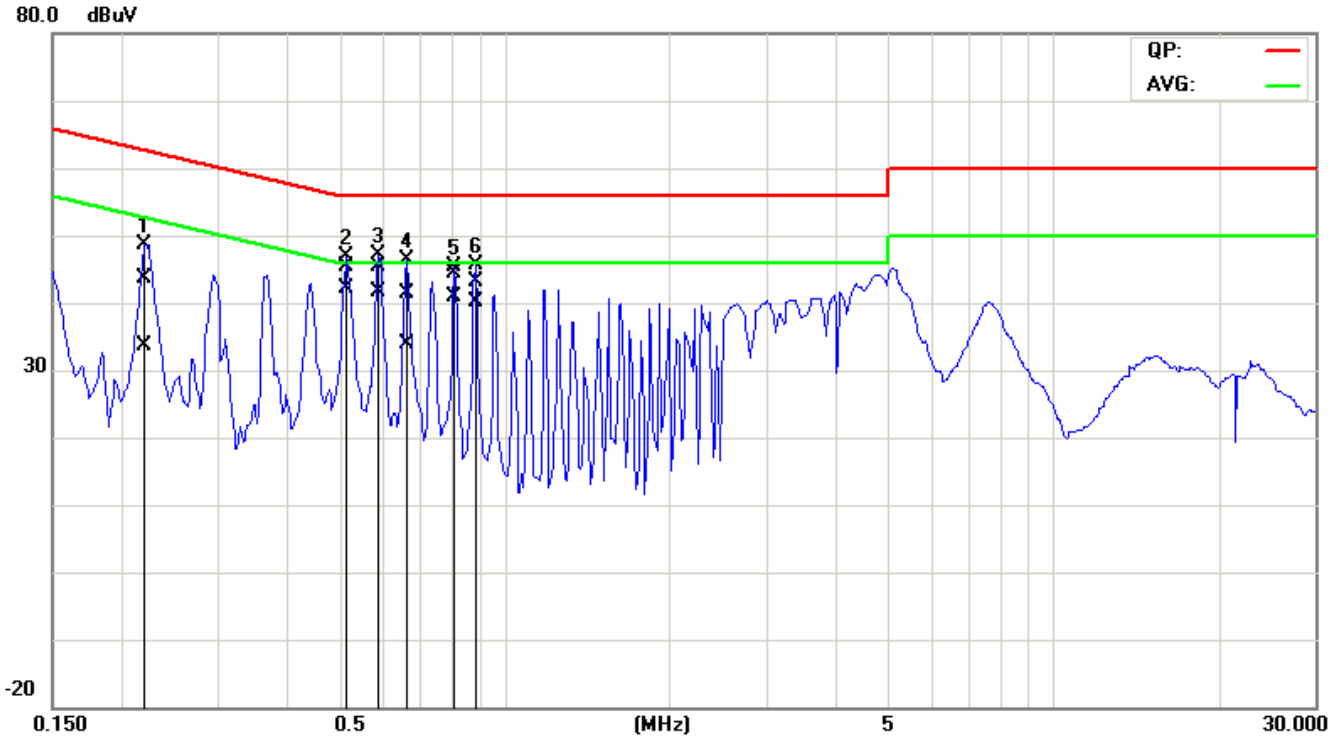
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 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)

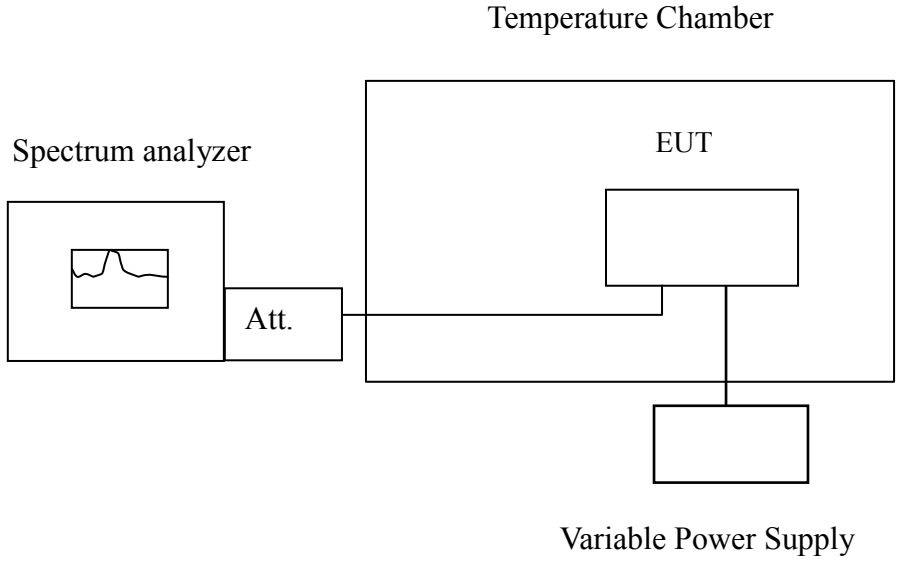


7.9 FREQUENCY STABILITY

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	48	5180.019007	5150~5250	Pass
40	48	5179.984448	5150~5250	Pass
30	48	5179.996700	5150~5250	Pass
20	48	5180.011605	5150~5250	Pass
10	48	5180.018181	5150~5250	Pass
0	48	5179.984985	5150~5250	Pass
-10	48	5180.018112	5150~5250	Pass
-20	48	5180.020665	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	37	5179.989114	5150~5250	Pass
	48	5180.004767	5150~5250	Pass
	52.8	5179.984792	5150~5250	Pass

CH High

Operating Frequency: 5230 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	48	5240.007443	5150~5250	Pass
40	48	5239.986447	5150~5250	Pass
30	48	5239.988081	5150~5250	Pass
20	48	5239.972987	5150~5250	Pass
10	48	5239.996031	5150~5250	Pass
0	48	5240.014309	5150~5250	Pass
-10	48	5240.008238	5150~5250	Pass
-20	48	5239.999374	5150~5250	Pass

Operating Frequency: 5230 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	37	5239.982208	5150~5250	Pass
	48	5240.014544	5150~5250	Pass
	52.8	5240.017307	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	48	5179.970272	5150~5250	Pass
40	48	5179.970201	5150~5250	Pass
30	48	5179.980847	5150~5250	Pass
20	48	5180.004684	5150~5250	Pass
10	48	5180.004364	5150~5250	Pass
0	48	5179.977215	5150~5250	Pass
-10	48	5179.992895	5150~5250	Pass
-20	48	5180.010657	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	37	5179.97972	5150~5250	Pass
	48	5179.98709	5150~5250	Pass
	52.8	5180.018238	5150~5250	Pass

CH High

Operating Frequency: 5230 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	48	5240.001775	5150~5250	Pass
40	48	5240.011593	5150~5250	Pass
30	48	5240.014606	5150~5250	Pass
20	48	5239.970268	5150~5250	Pass
10	48	5240.005618	5150~5250	Pass
0	48	5240.018889	5150~5250	Pass
-10	48	5239.975913	5150~5250	Pass
-20	48	5240.01213	5150~5250	Pass

Operating Frequency: 5230 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	37	5239.98626	5150~5250	Pass
	48	5239.970758	5150~5250	Pass
	52.8	5239.976329	5150~5250	Pass

draft 802.11n Wide-40 MHz Channel mode:

CH Low

Operating Frequency: 5190 MHz				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
50	48	5189.991462	5150~5250	Pass
40	48	5189.98748	5150~5250	Pass
30	48	5189.988981	5150~5250	Pass
20	48	5190.004534	5150~5250	Pass
10	48	5190.008088	5150~5250	Pass
0	48	5190.013702	5150~5250	Pass
-10	48	5189.990557	5150~5250	Pass
-20	48	5189.9755	5150~5250	Pass

Operating Frequency: 5190 MHz,				
Environment Temperature (°C)	**Voltage (V)**	**Measured Frequency (MHz)**	**Limit Range**	**Test Result**
20	37	5189.984574	5150~5250	Pass
	48	5189.993192	5150~5250	Pass
	52.8	5189.999627	5150~5250	Pass

CH High

Operating Frequency: 5220 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	48	5229.989434	5150~5250	Pass
40	48	5230.009395	5150~5250	Pass
30	48	5230.006458	5150~5250	Pass
20	48	5229.973289	5150~5250	Pass
10	48	5229.97675	5150~5250	Pass
0	48	5229.986497	5150~5250	Pass
-10	48	5229.975905	5150~5250	Pass
-20	48	5229.972933	5150~5250	Pass

Operating Frequency: 5220 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	37	5230.014435	5150~5250	Pass
	48	5230.001504	5150~5250	Pass
	52.8	5229.975615	5150~5250	Pass

7.10 DYNAMIC FREQUENCY SELECTION

LIMIT

According to §15.407 (h) and FCC 06-96 appendix "compliance measurement procedures for unlicensed-national information infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection".

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client(with radar detection)
Non-Occupancy Period	Yes	Yes	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client(with radar detection)
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service

Maximum Transmit Power	Value (see note)
>=200 Milliwatt	-64 dBm
< 200 Milliwatt	-62 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
U-NII Detection Bandwidth	Minimum 80% of the UNII 99% transmission power bandwidth. See Note 3.

The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (µsec)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses Per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	0.33	70%	30

TEST RESULTS

Due to the frequency Range is 5150 ~ 5250MHz, DFS was not done.