FCC 47 CFR PART 15 SUBPART E & INDUSTRY CANADA RSS-210

TEST REPORT

For

Dual-Band Wireless-N ADSL2+ Modem Router with Gigabit

Model: WAG320N

Trade Name: CISCO, Linksys

Issued to

Cisco-Linksys LLC
121 Theory Drive Irvine CA92617 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@ccsrf.com

Testing Laboratory
1309

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1. TEST RESULT CERTIFICATION

Applicant:	Cisco-Linksys LLC 121 Theory Drive Irvine CA92617 USA
Manufacturer:	Cisco-Linksys LLC 121 Theory Drive Irvine CA92617 USA
Equipment Under Test:	Dual-Band Wireless-N ADSL2+ Modem Router with Gigabit
Trade Name:	CISCO, Linksys
Model:	WAG320N
Date of Test:	May 22 ~ July 30, 2009

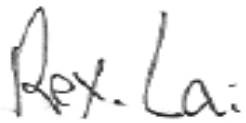
APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart E & Industry Canada RSS-210 Issue 7 June, 2007	No non-compliance noted

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 and Industry Canada RSS-210 Issue 7.

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>Dual-Band Wireless-N ADSL2+ Modem Router with Gigabit</td></tr>
<tr><td>Trade Name</td><td>CISCO, Linksys</td></tr>
<tr><td>Model Number</td><td>WAG320N</td></tr>
<tr><td>Model Discrepancy</td><td>N/A</td></tr>
<tr><td>Power Adapter</td><td>1. LEADER / MU15-C120125-A1
I/P: 100-240V, 50-60Hz, 0.5A
O/P: 12V, 1.25 A
2. Bestec / NA0151WWA
I/P: 100-240V, 50-60Hz
O/P: 12V, 1.25 A</td></tr>
<tr><td>Operating Frequency Range & Number of Channels</td><td>
<table>
<tr><th>Mode</th><th>Frequency Range (MHz)</th><th>Number of Channels</th></tr>
<tr><td>IEEE 802.11a</td><td>5180 – 5220</td><td>3 Channels</td></tr>
<tr><td>draft 802.11n Standard-20 MHz</td><td>5180 – 5220</td><td>3 Channels</td></tr>
<tr><td>draft 802.11n Standard-40 MHz</td><td>5190</td><td>1 Channels</td></tr>
</table>
</td></tr>
<tr><td>Transmit Power</td><td>
<table>
<tr><th>Mode</th><th>Frequency Range (MHz)</th><th>Output Power (dBm)</th><th>Output Power (mw)</th></tr>
<tr><td>IEEE 802.11a</td><td>5180 – 5220</td><td>13.68</td><td>23.3346</td></tr>
<tr><td>draft 802.11n Standard-20 MHz</td><td>5180 – 5220</td><td>14.97</td><td>31.4051</td></tr>
<tr><td>draft 802.11n Standard-40 MHz</td><td>5190</td><td>10.38</td><td>10.9144</td></tr>
</table>
</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: 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: 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)</td></tr>
<tr><td>Antenna Specification</td><td>Gain: 4.6 dBi</td></tr>
<tr><td>Antenna Designation</td><td>PIFA Antenna</td></tr>
</table>

Operation Frequency:

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

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 engineering sample that approximated to production product and was provided by manufacturer.*

3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2003 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests documented in this report were performed in accordance with ANSI C63.4: 2003 and FCC CFR 47 Part 15.207, 15.209 and 15.247, RSS-GEN Issue 2, and RSS-210 Issue 7.

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: 2003.

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: WAG320N) comes with two types of power adapter (MU15-C120125-A1 & NA0151WWA) for sale. After the preliminary test, the EUT with power adapter (Model: MU15-C120125-A1) was found to emit the worst emissions and therefore had been tested under operating condition.

The EUT is a 2x3 configuration spatial MIMO (2Tx & 3Rx) without beam forming function. The 2x3 configuration is implemented with three outside TX & RX chains (Chain 0 and Chain 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, which worst case was in normal link mode only.

IEEE 802.11a for 5180 ~ 5220MHz:
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 for 5180 ~ 5240MHz:
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 for 5190 ~ 5230MHz:
Channel (5190MHz) 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	02/23/2010

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	11/30/2009
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	05/29/2010
Horn-Antenna	TRC	HA-0502	06	06/03/2010
Horn-Antenna	TRC	HA-0801	04	06/17/2010
Horn-Antenna	TRC	HA-1201A	01	08/10/2009
Horn-Antenna	TRC	HA-1301A	01	08/11/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/28/2010
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 # A				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
TEST RECEIVER	R&S	ESHS20	840455/006	02/12/2010
LISN (EUT)	SCHWARZBECK	NSLK 8127	8127382	12/09/2009
LISN	SOLAR	8012-50-R-24-BNC	8305114	12/09/2009
BNC CABLE	MIYAZAKI	5D-FB	BNC A4	05/11/2010
THERMO-HYGRO METER	TECPEL	DTM-303	No.7	11/24/2009
Test S/W	EMI 32.exe			

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.7376
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

***Remark**: The radiated emissions test items was tested at Compliance Certification Services Inc. (Hsintien Lab.) The test equipments were listed in page 9 and the test data, please refer page 93-94.*

☒ 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 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.

5.4 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	Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	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 I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

WuGu Lab

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	IBM	2672 (X31)	9985H9M	WLAN: ANO20030400LEG Bluetooth: ANO20020100MTN	LAN Cable: Unshielded, 1.0m USB to Com Port Cable: Unshielded, 1.5m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	Test Kit	N/A	N/A	N/A	N/A	N/A	N/A

Hsintien Lab

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
3.	PS/2 Mouse	DELL	M071KC	443029525	DOC BSMI: R41108	Shielded, 1.8m	N/A
4.	PS/2 Keyboard	DELL	SK-8110	N/A	DOC BSMI: T3A002	Shielded, 1.8m	N/A
5.	Printer	EPSON	EPSON C60	DR3K039417	BSMI ID: 3902E006	Unshielded, 1.5m	Unshielded, 1.8m
6.	Monitor	SAMSUNG	710V	GS17H9NXA05853A	DOC BSMI: R33475	Shielded, 1.8m with two cores	Unshielded, 1.8m
7.	USB 2.0 HDD	A-Tec	HD-234	N/A	N/A	Shielded, 1.0m with a core	N/A
8.	Host PC	HP	xw4400	N/A	DOC BSMI: R33001	Unshielded, 1.0m	Unshielded, 1.8m
9.	Modem	ACEEX	1414	N/A	IFAXDM1414	Unshielded, 1.5m	Unshielded, 1.8m
10.	Server Notebook	HP	2210B	CNV7472KG5	DoC BSMI: R33001	Unshielded, 10m	Unshielded, 1.8m
11.	ADSL	ZYXEL	IES-1000	N/A	N/A	Unshielded, 10m	Unshielded, 1.8m
12.	LAN Cable	N/A	N/A	N/A	N/A	Unshielded, 1.5m X2	N/A

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. APPLICABLE RULES

RSS-210 §2 General Certification Requirements and Specifications

RSS-210 §2.1 Frequency Stability

When the carrier frequency stability is not specified, it need not be tested, provided that the carrier frequency is chosen such that the fundamental modulation products (meaning the nominal bandwidth) lie totally within the bands listed in Tables 2, 3, 4 and 5 and do not fall into any restricted band listed in Table 1. Due account shall be taken of carrier frequency drift as a result of aging, temperature, humidity, and supply voltage variations when using frequencies near the band edges.

RSS-210 §2.2 Restricted Bands and Unwanted Emission Frequencies

Restricted bands, identified in Table 1, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy, and some government uses. Except where otherwise indicated, the following restrictions apply:
(a) Fundamental components of modulation of LPDs shall not fall within the restricted bands of Table 1.
(b) Unwanted emissions falling into restricted bands of Table 1 shall meet Tables 2 and 3 limits. It should also be noted that unwanted emissions falling in non-restricted bands do not need to be suppressed to a level lower than the Table 2 and 3 limits.
(c) Unwanted emissions not falling within restricted frequency bands may also use the limits specified in the applicable annex.

RSS-210 §2.3 Licence-exempt Receivers

Category I licence-exempt receivers are required to have their spurious emissions comply with Section 7.2.3 of RSS-Gen.

RSS-210 §2.6 General Field Strength Limits

Table 2 and 3 list the permissible levels of unwanted emissions of transmitters and receivers. However, transmitters with field strengths that do not exceed the limits in these tables may also operate in these frequency bands, other than the restricted bands of Table 1 and the TV bands (i.e. unwanted emissions of transmitters and receivers are permitted to fall into Table 1 and TV frequencies but intentional emissions are prohibited). See the note of Table 2 for further details.

RSS-210 §2.7 Tables

RSS-210 Table 1: Restricted Frequency Bands (Note)

MHz	MHz	MHz	MHz	GHz
0.090-0.110	8.37625-8.38675	--	1718.8-1722.2	9.0-9.2
--	8.41425-8.41475	156.52475-156.52525	2200-2300	9.3-9.5
2.1735-2.1905	12.29-12.293	156.7-156.9	2310-2390	10.6-12.7
3.020-3.026	12.51975-12.52025	--	--	13.25-13.4
4.125-4.128	12.57675-12.57725	--	2655-2900	14.47-14.5
4.17725-4.17775	13.36-13.41	240-285	3260-3267	15.35-16.2
4.20725-4.20775	16.42-16.423	322-335.4	3332-3339	17.7-21.4
5.677-5.683	16.69475-16.69525	399.9-410	3345.8-3358	22.01-23.12
6.215-6.218	16.80425-16.80475	608-614	3500-4400	23.6-24.0
6.26775-6.26825	25.5-25.67	960-1427	4500-5150	31.2-31.8
6.31175-6.31225	37.5-38.25	1435-1626.5	5350-5460	36.43-36.5
8.291-8.294	73-74.6; 74.8-75.2	1645.5-1646.5	7250-7750	Above 38.6
8.362-8.366	108-138	1660-1710	8025-8500	

Note: *Certain frequency bands listed in Table 2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as RSS-310.*

RSS-210 Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz (Note)

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Note: *Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.*

RSS-210 Table 3: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in Hz)	300
490-1.705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Note: *The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.*

RSS-210 §Annex 8: Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands

This section applies to systems that employ frequency hopping (FH) and digital modulation technology in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. Systems in these bands may employ frequency hopping, digital modulation and or a combination (hybrid) of both techniques.
A frequency hopping system that synchronizes with another or several other systems (to avoid frequency collision among them) via off-air sensing or via connecting cables is not hopping randomly and therefore is not in compliance with RSS-210.

RSS-210 §A8.1 Frequency Hopping Systems

Frequency hopping systems are spread spectrum systems in which the carrier is modulated with coded information in a conventional manner causing a conventional spreading of the RF energy about the carrier frequency. The frequency of the carrier is not fixed but changes at fixed intervals under the direction of a coded sequence.
Frequency hopping systems are not required to employ all available hopping frequencies during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream.
Incorporation of intelligence into a frequency hopping system that enables it to recognize other users of the band and to avoid occupied frequencies is permitted, provided that the frequency hopping system does it individually, and independently chooses or adapts its hopset. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.
The following applies to frequency hopping systems in each of the three bands.
(a) The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long term distribution appears evenly distributed.

(b) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.
(d) Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

RSS-210 §A8.2 Digital Modulation Systems

These include systems employing digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to all three bands.

RSS-210 §A8.4 Transmitter Output Power and e.i.r.p. Requirements

(4) For systems employing digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum peak conducted power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.
As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen)
(5) Point-to-point systems in the bands 2400-2483.5 MHz and 5725-5850 MHz are permitted to have an e.i.r.p. higher than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be allowed to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to- point systems.
Note: “Fixed, point-to-point operation”, excludes point-to-multipoint systems, omnidirectional applications and multiple co-located transmitters transmitting the same information.

RSS-210 §A8.5 Out-of-band Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

RSS-210 §Annex 9: Local Area Network Devices

This annex provides standards for licence-exempt local area network (LE-LAN) devices operating in the 5150-5350 MHz and 5470-5825 MHz bands.
Devices operating in the 5250-5350 MHz which do not comply with the provisions in this annex but only with the requirements in RSS-210, Issue 5 will be allowed to be certified until May 1, 2008. After that date, devices operating in this band shall be certified only if they comply with the provisions in this annex.
Within the band 5150-5250 MHz, LE-LAN devices are restricted to indoor operation only.

RSS-210 §A9.2 Transmitter power and e.i.r.p. Limits

(1) For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 Log_{10} B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
(2) For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 Log_{10} B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 Log_{10} B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.
In addition to the above requirements, devices operating in the 5250-5350 MHz band with maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. elevation mask where θ is the angle above the local horizontal plane (of the earth) as shown below:

- -13 dB(W/MHz) for $0^\circ \leqq \theta < 8^\circ$
- -13 – 0.716 (θ -8) dB(W/MHz) for $8^\circ \leqq \theta < 40^\circ$
- -35.9 – 1.22 (θ -40) dB(W/MHz) for $40^\circ \leqq \theta \leqq 45^\circ$
- -42 dB(W/MHz) for $\theta > 45^\circ$

(3) For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or 17 + 10 Log_{10} B, dBm, whichever power is less. The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 Log_{10} B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
Fixed point-to-point devices for this band are permitted up to 200 W e.i.r.p. by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited under this high e.i.r.p. category. However, remote stations of point-to-multipoint systems shall be permitted to operate at the point-to-point e.i.r.p. limit provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers.

RSS-210 §A9.3 Out-of-band Emissions Limits

(1) For transmitters operating in the 5150-5250 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p.
(2) For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed an out-of-band emission limit of -27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within 5150-5250 MHz band and shall be labelled “for indoor use only”.
(3) For transmitters operating in the 5470-5725 MHz, all emissions outside the 5470-5725 MHz band shall not exceed -27 dBm/MHz e.i.r.p.
(4) For transmitters operating in the 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27 dBm/MHz.

RSS-210 §A9.5 Other Requirements for All Bands

(a) Digital modulation shall be used. The power measurements (transmitter output power and e.i.r.p., or unwanted emissions) are in terms of average value (i.e. using an averaging meter). If the transmission is in bursts, Section 4.3 (Pulsed Operation) of RSS-Gen applies.
(b) Within the emission bandwidth, when the peak spectral density per MHz over any continuous transmission exceeds the average (10 Log_{10} B) value by more than 3 dB, the permissible power spectral density shall be reduced by the excess amount.
A measurement resolution bandwidth narrower than 1.0 MHz is permitted provided that power integration over 1.0 MHz is performed. On the other hand, if the emission bandwidth of the signal is less than 1.0 MHz, the measurement bandwidth should be reduced to that of the emission bandwidth to obtain the proper power spectral density; alternatively, the measured value could be normalized to 1.0 MHz. (**Note:** B has been defined above as the 99% emission bandwidth).
(c) The outermost carrier frequencies or channels, as permitted by the design of the equipment, shall be used when measuring unwanted emissions. Such carrier or channel centre frequencies are to be indicated in the test report.
(d) The device shall automatically discontinue transmission in case of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.

(e) The transmitter frequency stability shall be better than ±10 ppm. Alternatively, the applicant can show that the unwanted emission masks of the outermost channels are complied with when tested under all conditions of normal operation as specified in the user manual.
(f) Mobile Satellite Service operators may monitor emissions from LE-LAN devices in the 5150-5250 MHz band and, if emissions approach the 10 W/MHz aggregate ground level emission, may request that Industry Canada reassess the technical parameters of LE-LAN devices. The aggregation may be from all devices within the footprint of the MSS satellite antenna beam and not just from Canadian devices.
(g) User Manual
The user manual of local area network devices shall contain clear instructions on the restrictions mentioned above, namely:
・ that the device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems;
・ the maximum antenna gain permitted (for devices in the 5250-5350 MHz and 5470-5725 MHz bands) to comply with the e.i.r.p. limit; and
・ the maximum antenna gain permitted (for devices in the 5725-5825 MHz band) to comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3).
In addition, users should also be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

RSS-Gen §2 General Information

Unless otherwise indicated, radiocommunications equipment is subject to licensing pursuant to subsection 4(1) of the *Radiocommunication Act.*

RSS-Gen §2.1.2 Category II Equipment

Category II equipment comprises radio devices where a standard has been prescribed but for which a TAC is not required, that is, equipment certification by Industry Canada or a Certification Body (CB) is not required (certification exempt), pursuant to subsection 4(3) of the *Radiocommunication Act*. The manufacturer or importer shall nevertheless ensure that the standards are complied with. A test report shall be available on request and the device shall be properly labelled.

RSS-Gen §2.2 Receivers

Radiocommunication receivers are defined as Category I equipment or Category II equipment by the characteristics outlined below.

RSS-Gen §2.2.1 Category I Equipment Receivers

A receiver is classified as Category I equipment if it meets one of the following conditions:
(a) is a stand-alone receiver that is tunable to any frequency in the band 30-960 MHz;
(b) is a receiver that is associated with Category I transmitters; or
(c) is a scanner receiver.

Except for scanner receivers, which have their own RSSs, Category I receivers shall comply with the limits for receiver spurious emissions set out in Section 6 of this RSS-Gen, and shall be certified under the RSS applicable to the transmitter type with which the receiver is associated or designed to operate (NOT under RSS-Gen).

RSS-Gen §2.2.2 Category II Equipment Receivers

A receiver is classified as Category II equipment if it is not meeting the conditions of Section 2.2.1.

RSS-Gen §2.2.3 Licence-exempt Receivers

Paging receivers, "receive-only" earth stations operating with satellites approved by Industry Canada, and stand-alone receivers which are exempted from licensing, can be classified as either Category I or Category II. These receivers shall comply with the requirements of RSS-210 or RSS-310, respectively.

RSS-Gen §2.3 Licence-exempt Low-power Radiocommunication Devices (LPDs)

Licence-exempt low-power radiocommunication devices are devices which have intentional and unwanted emissions of very low signal levels such that they can co-exist with licensed radio services. LPDs are required to operate on a **"no-interference no-protection"** basis (i.e. they may not cause radio interference and cannot claim protection from interference). The requirements for LPDs are generally described in Section 7.

RSS-Gen §5.5 Exposure of Humans to RF Fields

Before equipment certification is granted, the applicable requirements of RSS-102 shall be met.

RSS-Gen §6 Receiver Spurious Emission Standard

The following receiver spurious emission limits shall be complied with:
(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

RSS-Gen Table 1 - Spurious Emission Limits for Receivers

Frequency (MHz)	Field Strength microvolts/m at 3 metres
30-88	100
88-216	150
216-960	200
Above 960	500

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

RSS-Gen §7.1.4 Transmitter Antenna

A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.
When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

RSS-Gen §7.2.2 Transmitter and Receiver AC Power Lines Conducted Emission Limits

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

RSS-Gen Table 2 – AC Power Lines Conducted Emission Limits

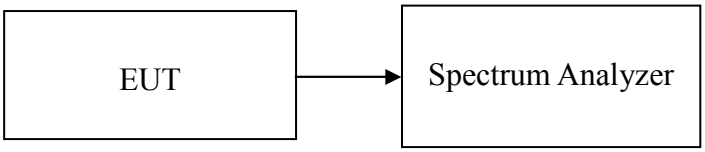
Frequency Range (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

**Decreases with the logarithm of the frequency.*

8. FCC PART 15 REQUIREMENTS & RSS 210 REQUIREMENTS

8.1 99% BANDWIDTH

Test Configuration



TEST PROCEDURE

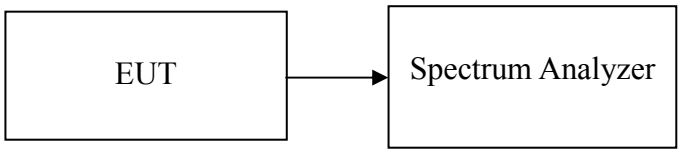
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

8.2 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 / 5180 ~ 5220MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	16.6662
Mid	5200	16.6740
High	5220	16.6326

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 0

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	17.7068
Mid	5200	17.7538
High	5220	17.6935

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 1

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	17.7170
Mid	5200	17.7287
High	5220	17.7520

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190MHz / Chain 0

Frequency (MHz)	Bandwidth (B) (MHz)
5190	36.1428

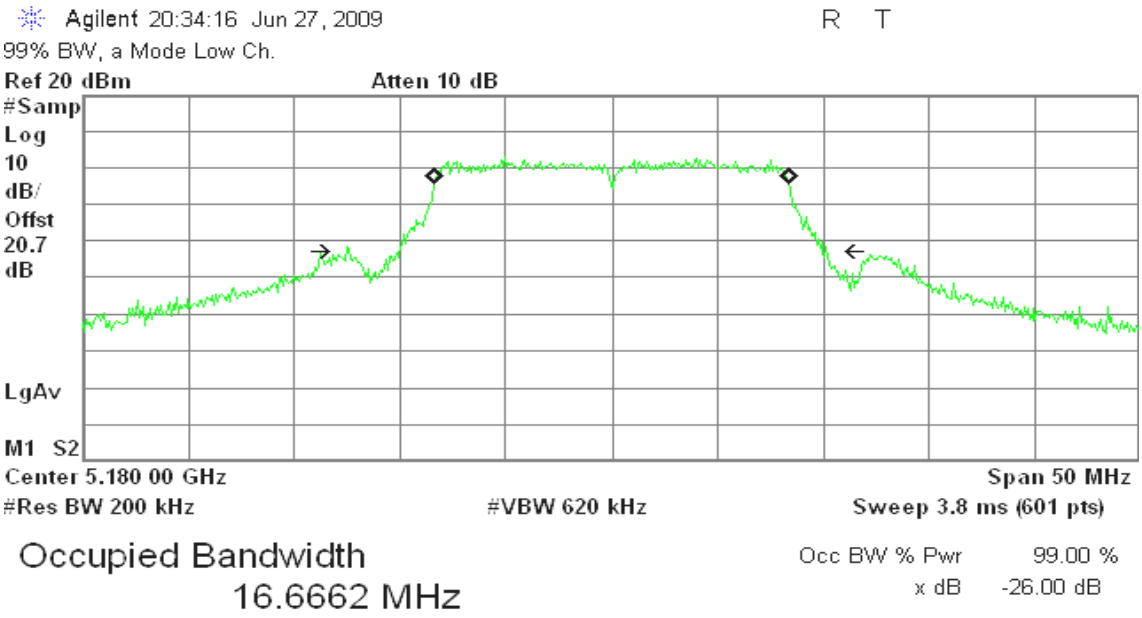
Test mode: draft 802.11n Wide-40 MHz Channel mode/ 5190 MHz / Chain 1

Frequency (MHz)	Bandwidth (B) (MHz)
5190	36.0992

Test Plot

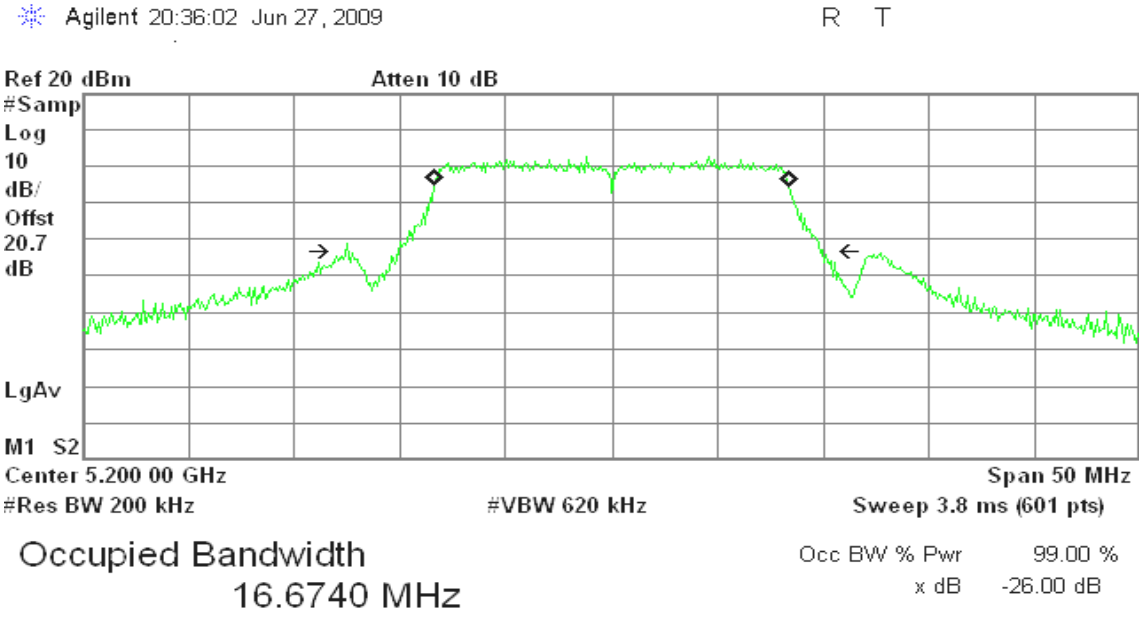
IEEE 802.11a for 5180 ~ 5220MHz

CH Low



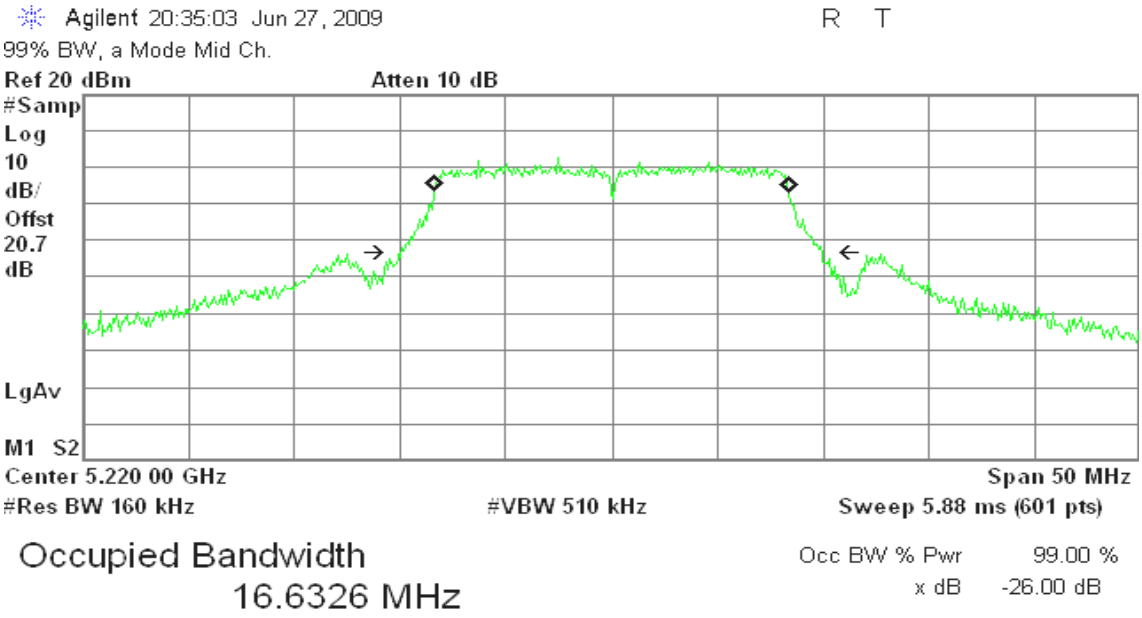
Transmit Freq Error	17.980 kHz
x dB Bandwidth	22.749 MHz*

CH Mid



Transmit Freq Error	20.254 kHz
x dB Bandwidth	22.593 MHz*

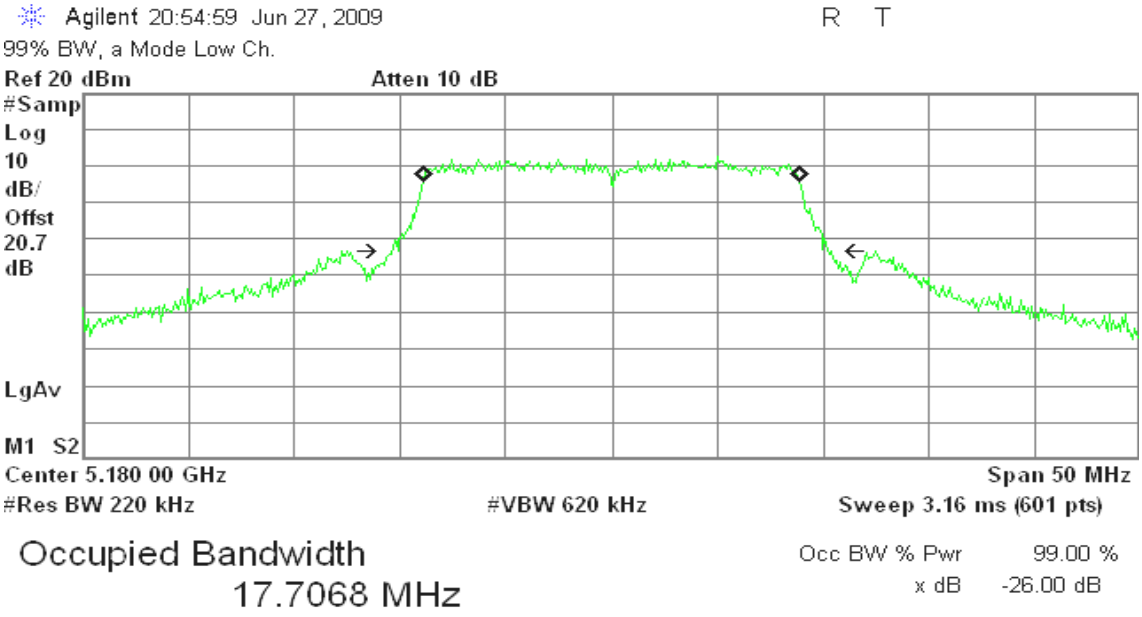
CH High



Transmit Freq Error 6.617 kHz
x dB Bandwidth 19.799 MHz*

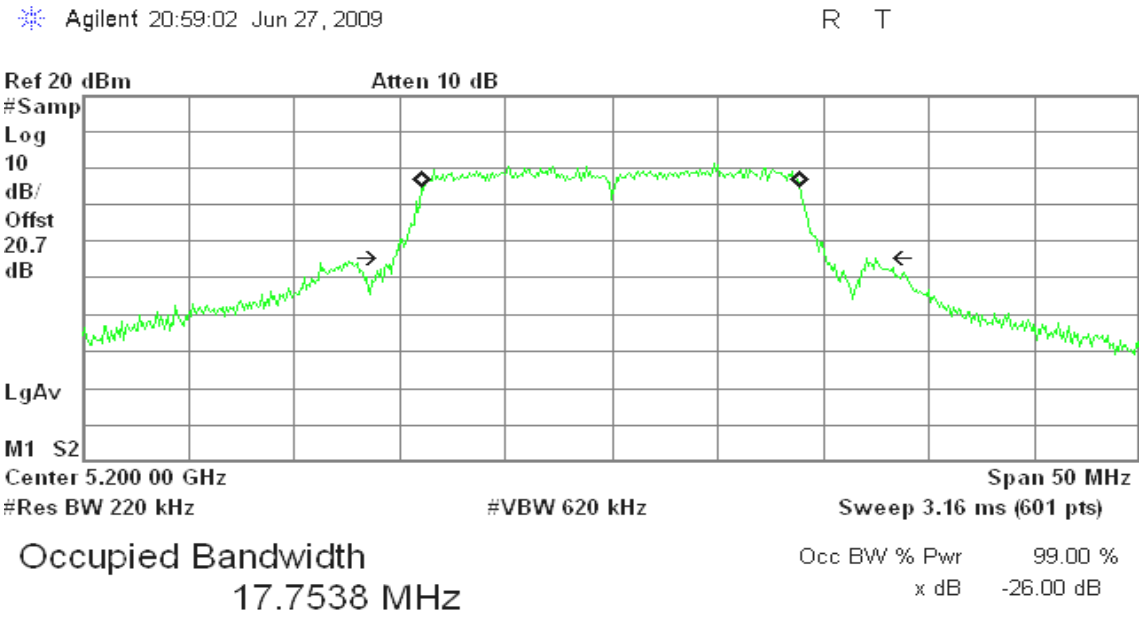
draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 0

CH Low



Transmit Freq Error 10.584 kHz
x dB Bandwidth 20.628 MHz*

CH Mid

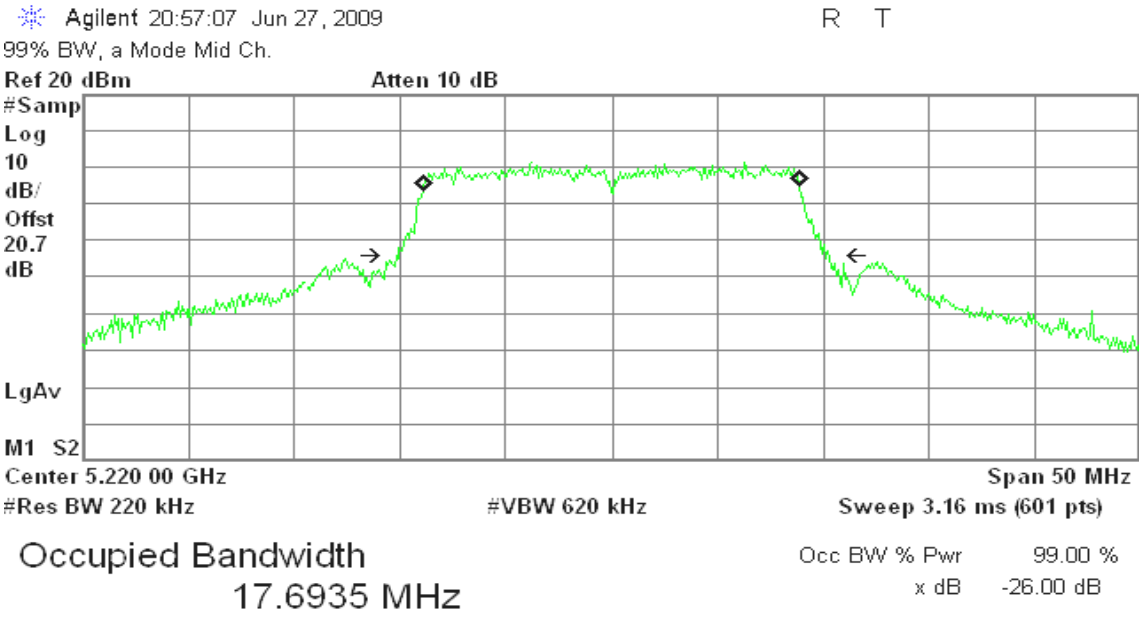


Occupied Bandwidth
17.7538 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -26.729 kHz
x dB Bandwidth 22.868 MHz*

CH High



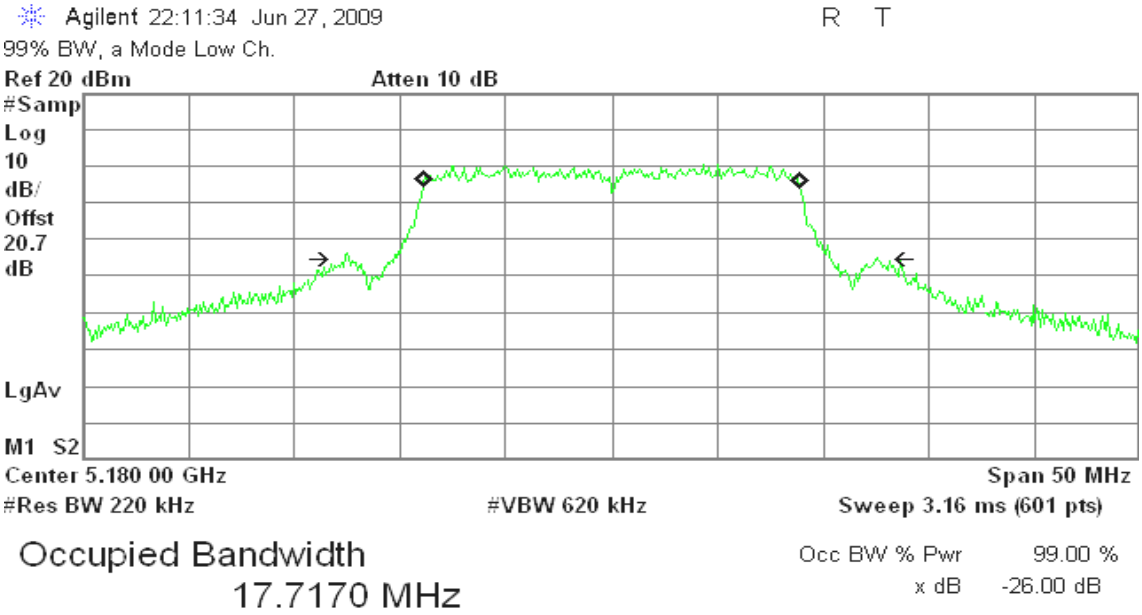
Occupied Bandwidth
17.6935 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 596.290 Hz
x dB Bandwidth 20.487 MHz*

draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 1

CH Low

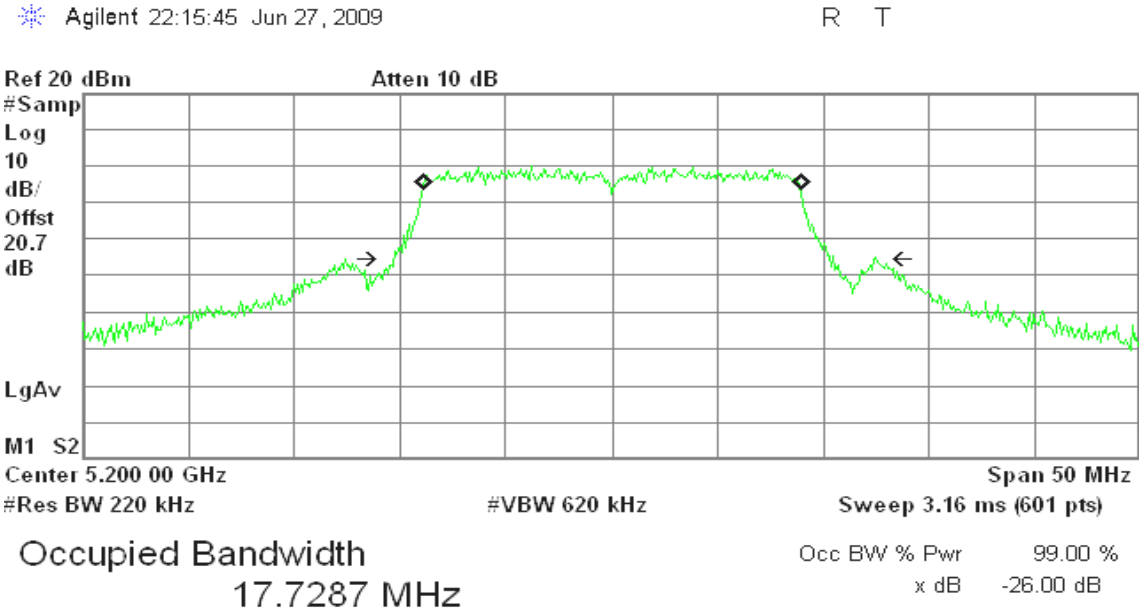


Occupied Bandwidth
17.7170 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 9.867 kHz
x dB Bandwidth 25.207 MHz*

CH Mid

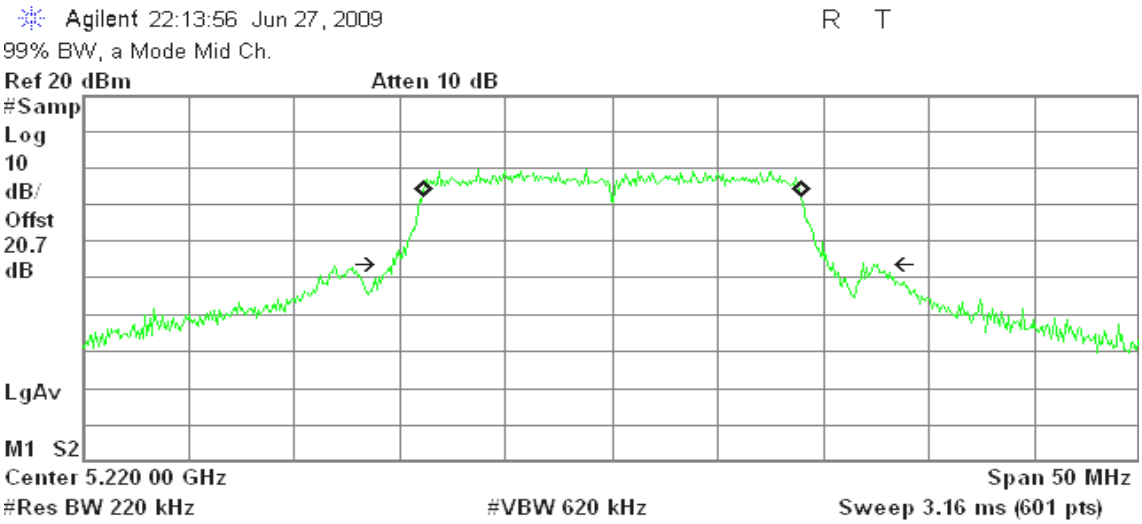


Occupied Bandwidth
17.7287 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

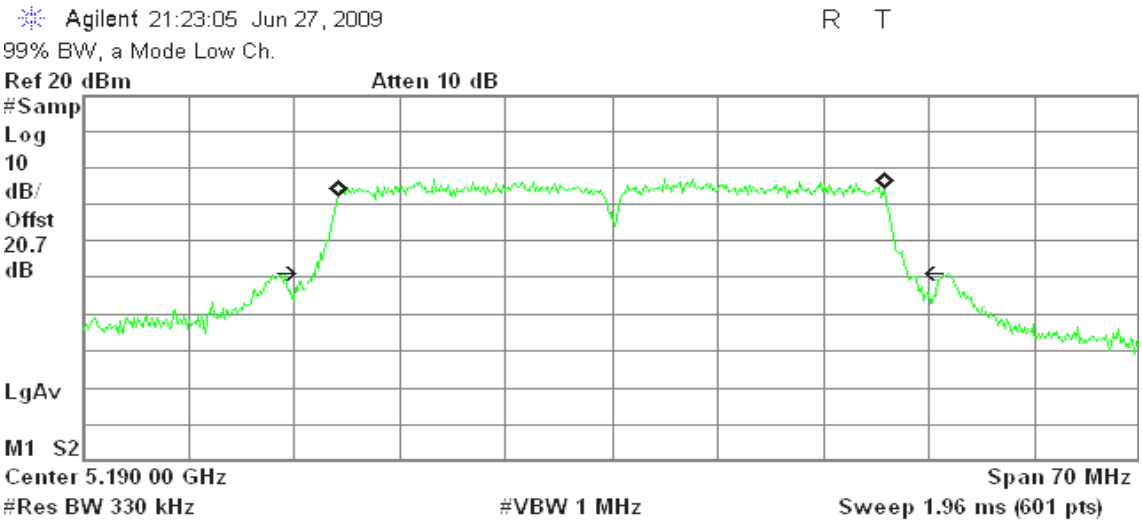
Transmit Freq Error 12.401 kHz
x dB Bandwidth 22.816 MHz*

CH High



Transmit Freq Error	11.284 kHz
x dB Bandwidth	22.963 MHz*

draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 0

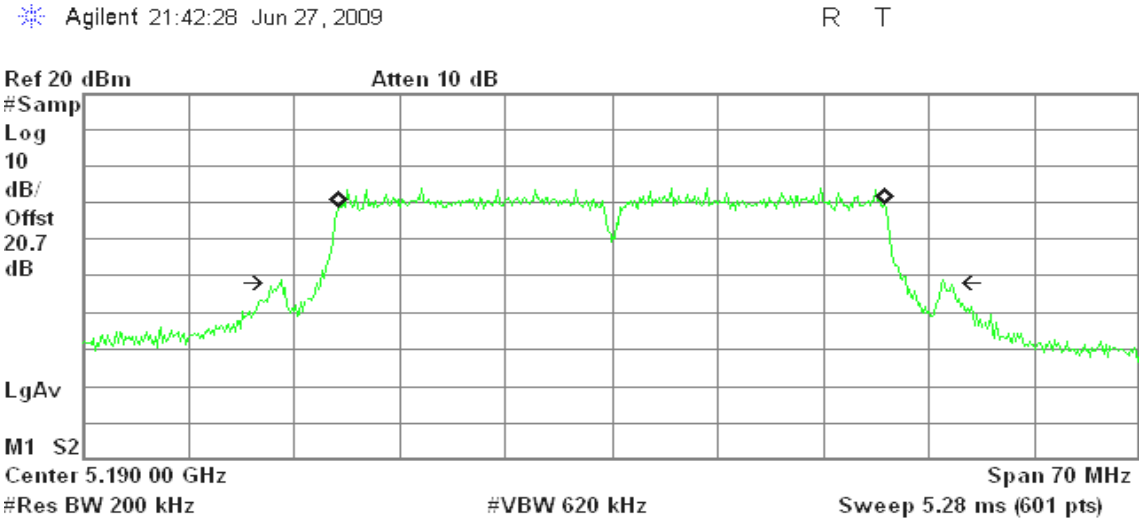


Occupied Bandwidth
36.1428 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 14.091 kHz
x dB Bandwidth 39.358 MHz*

draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 1



Occupied Bandwidth
36.0992 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 23.602 kHz
x dB Bandwidth 43.898 MHz*

8.3 MAXIMUM CONDUCTED OUTPUT 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 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.

According to RSS-210 §A9.2,

(1) For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 Log_{10} B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

(2) For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 Log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 Log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.
The peak power shall not exceed the limit as follow:

Specified Limit of the Peak Power

Test mode: IEEE 802.11a mode / 5180 ~ 5220MHz

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	16.6662	12.21	16.21	17.00
Mid	5200	16.6740	12.22	16.22	17.00
High	5220	16.6326	12.20	16.20	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz

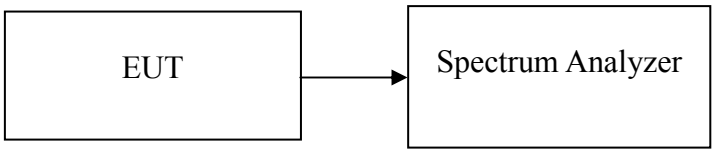
Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	17.7068	17.7170	20.72	13.16	17.16	17.00
Mid	5200	17.7538	17.7287	20.75	13.17	17.17	17.00
High	5220	17.6935	17.7520	20.73	13.16	17.16	17.00

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190MHz

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)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
5190	36.1428	36.0992	39.13	15.92	19.92	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 / 5180 ~ 5220MHz

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	13.68	17.00
Mid	5200	13.34	17.00
High	5220	13.51	17.00

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	12.60	11.20	14.97	17.16
Mid	5200	11.57	10.31	14.00	17.16
High	5220	11.81	10.46	14.20	17.17

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 MHz

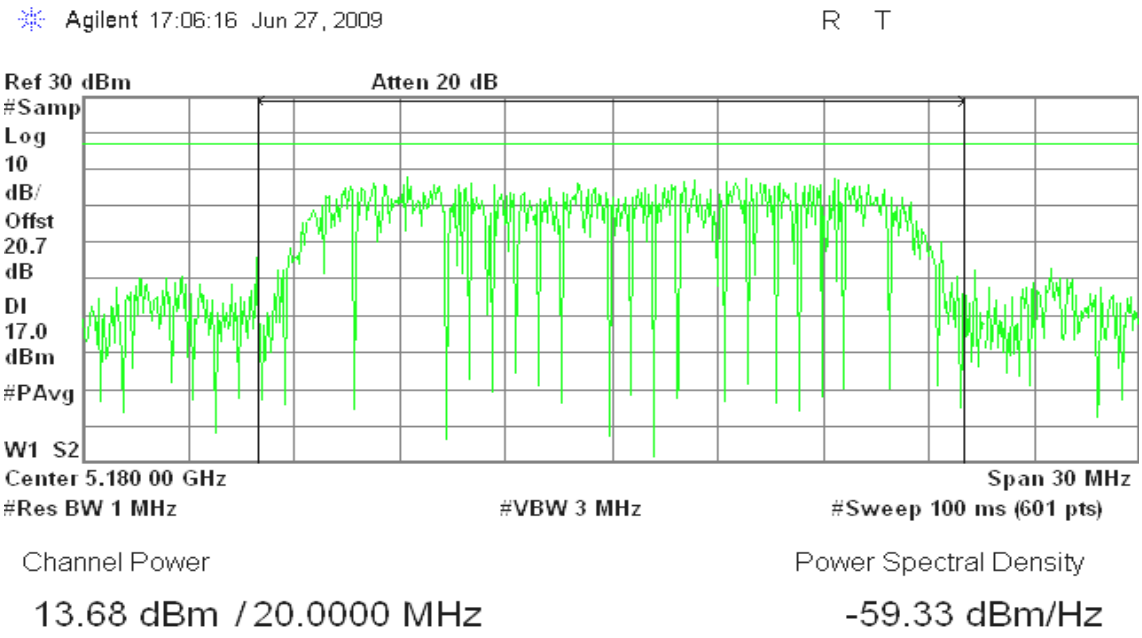
Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
5190	8.18	6.38	10.38	19.92

Remark: *Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000)*

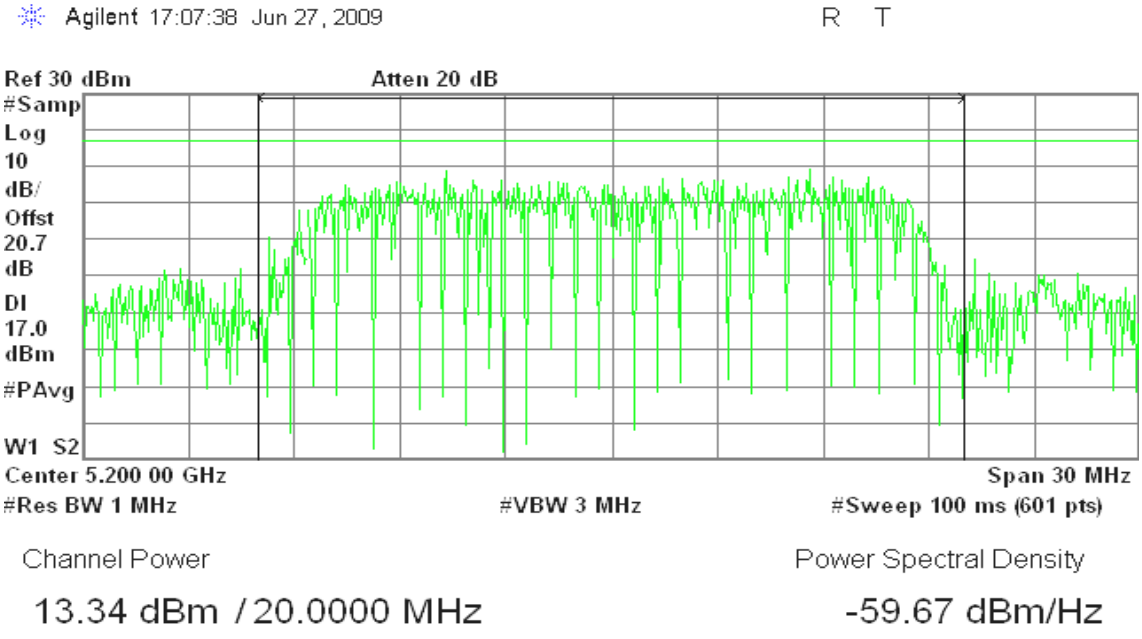
Test Plot

IEEE 802.11a mode / 5180 ~ 5220MHz

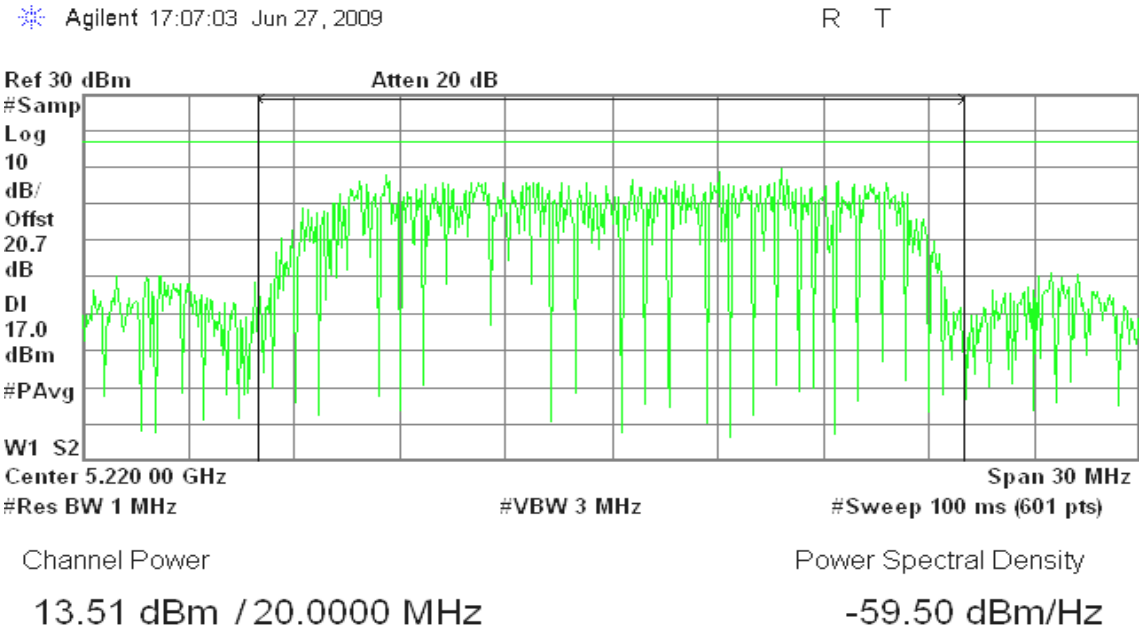
CH Low



CH Mid

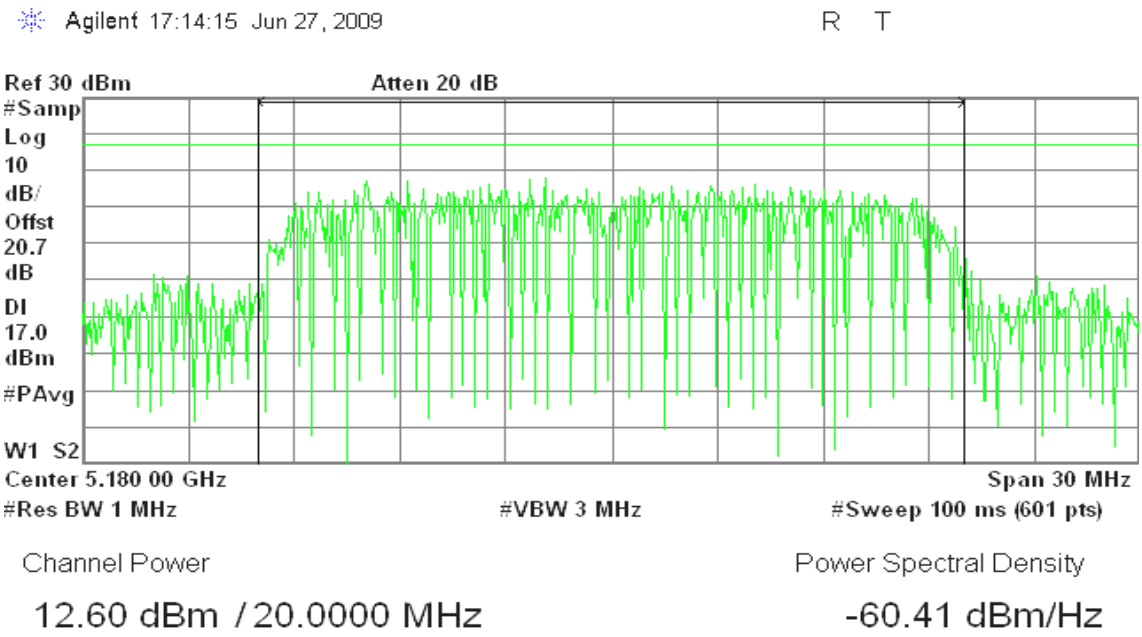


CH High

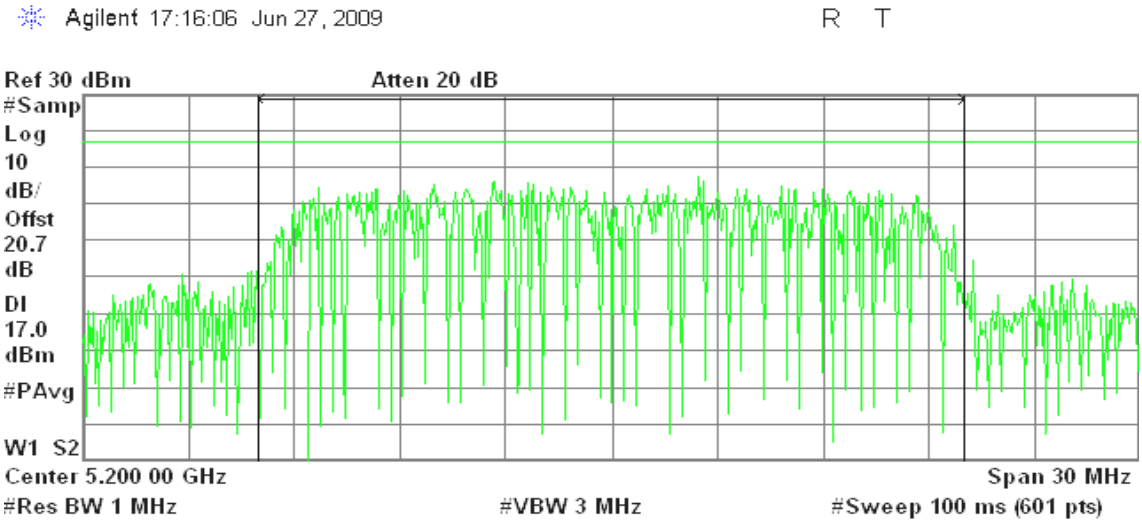


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 0

CH Low



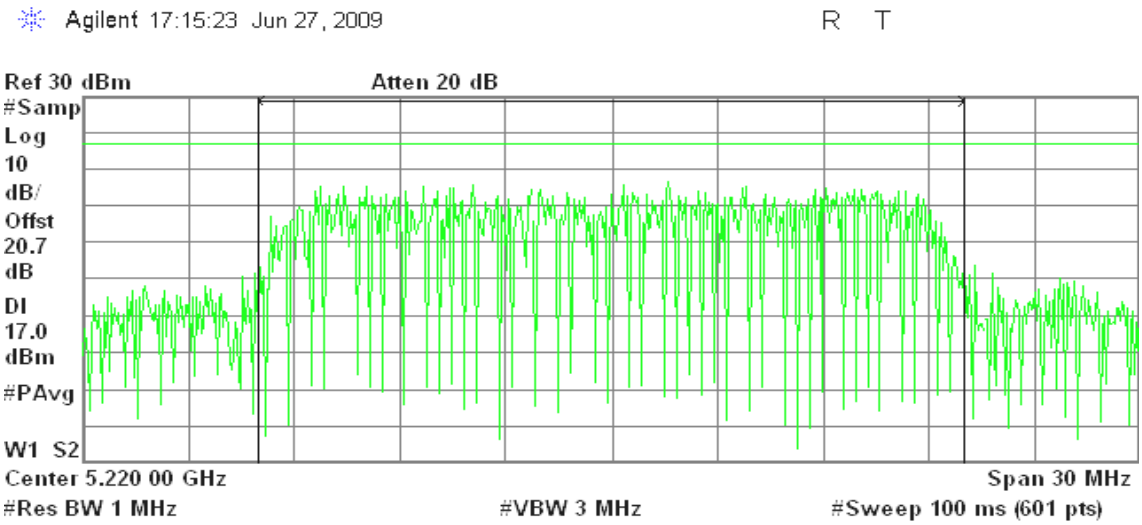
CH Mid



Channel Power
11.57 dBm / 20.0000 MHz

Power Spectral Density
-61.44 dBm/Hz

CH High

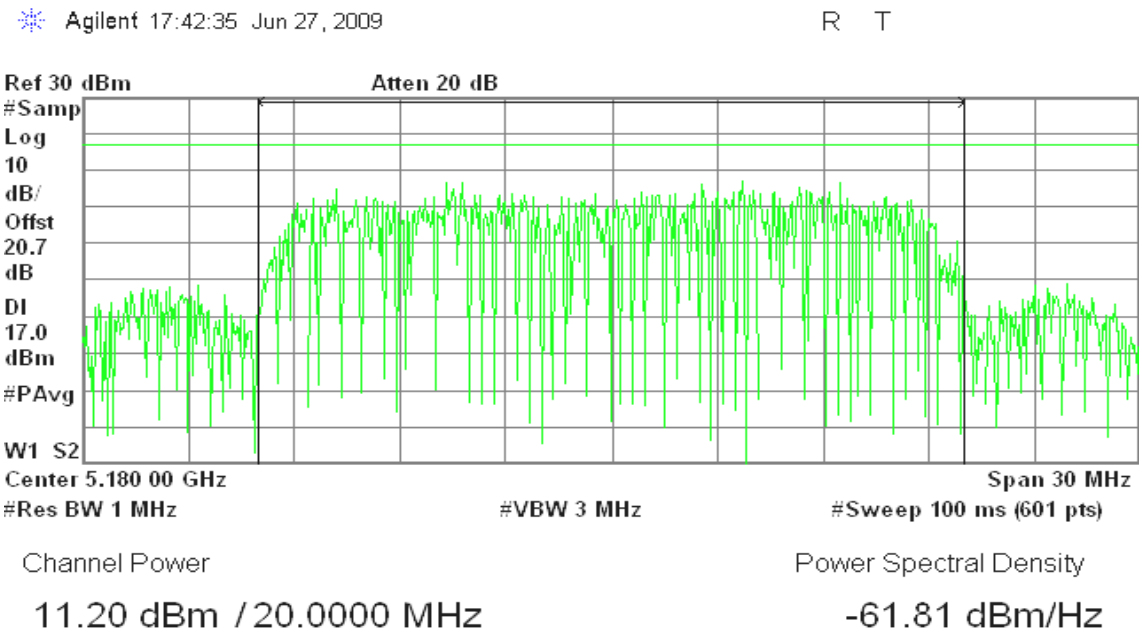


Channel Power
11.81 dBm / 20.0000 MHz

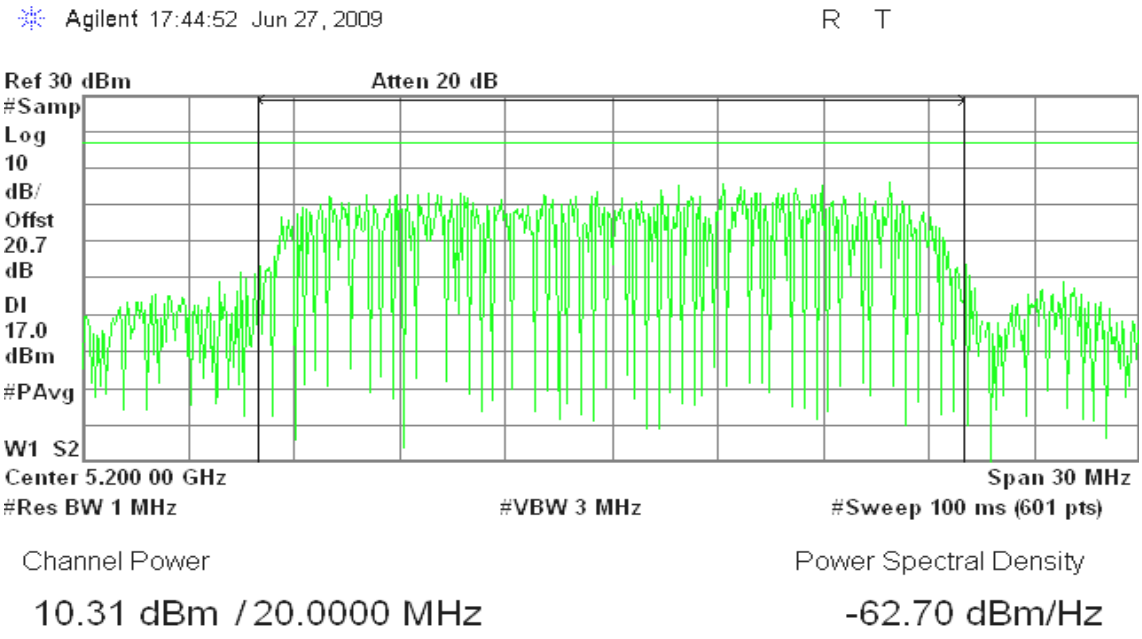
Power Spectral Density
-61.20 dBm/Hz

draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 1

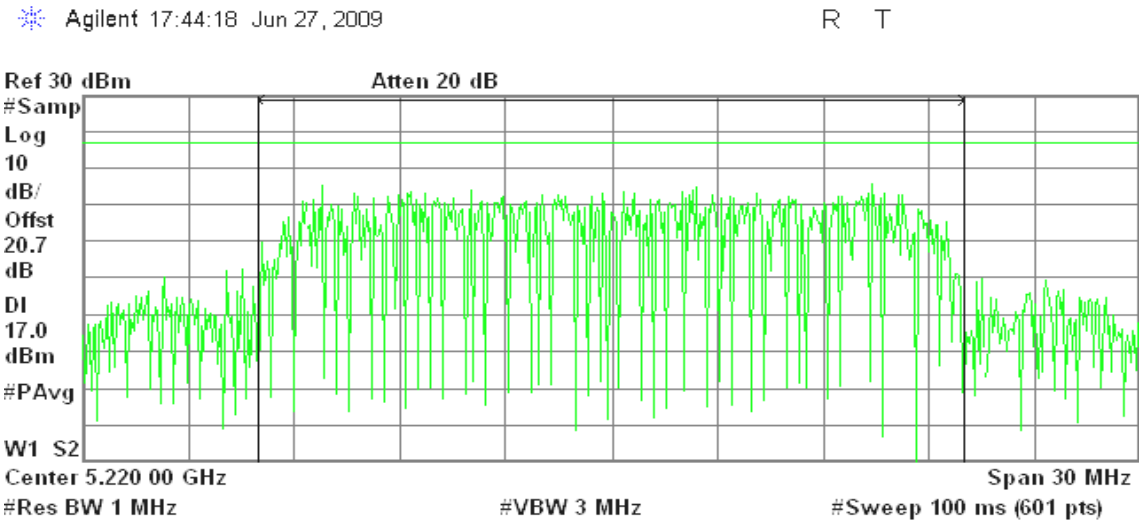
CH Low



CH Mid



CH High



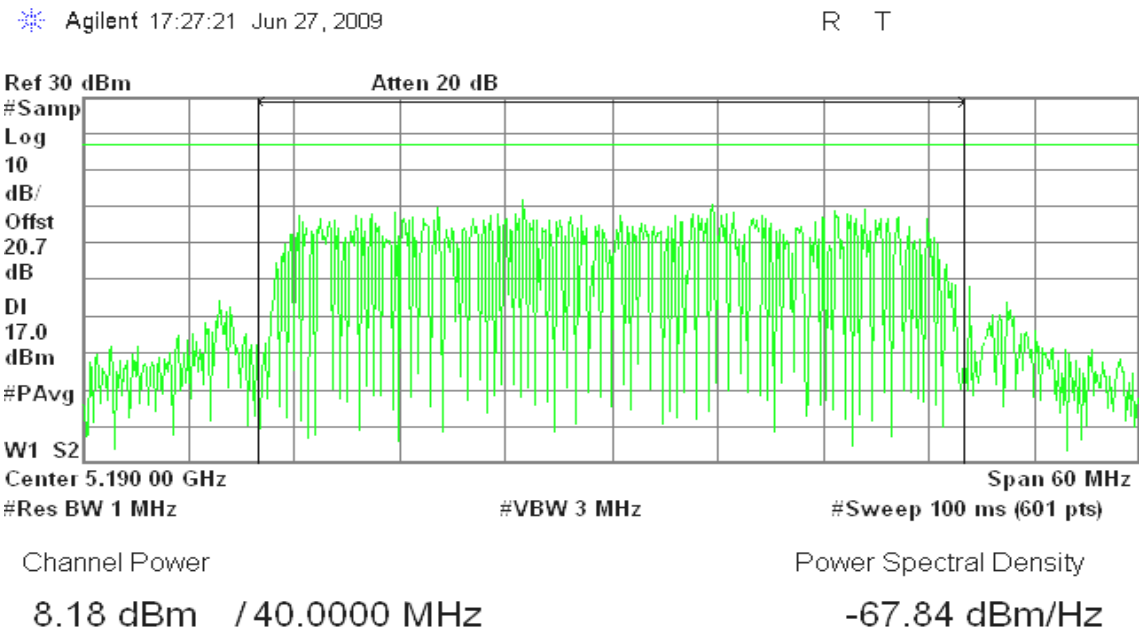
Channel Power

10.46 dBm / 20.0000 MHz

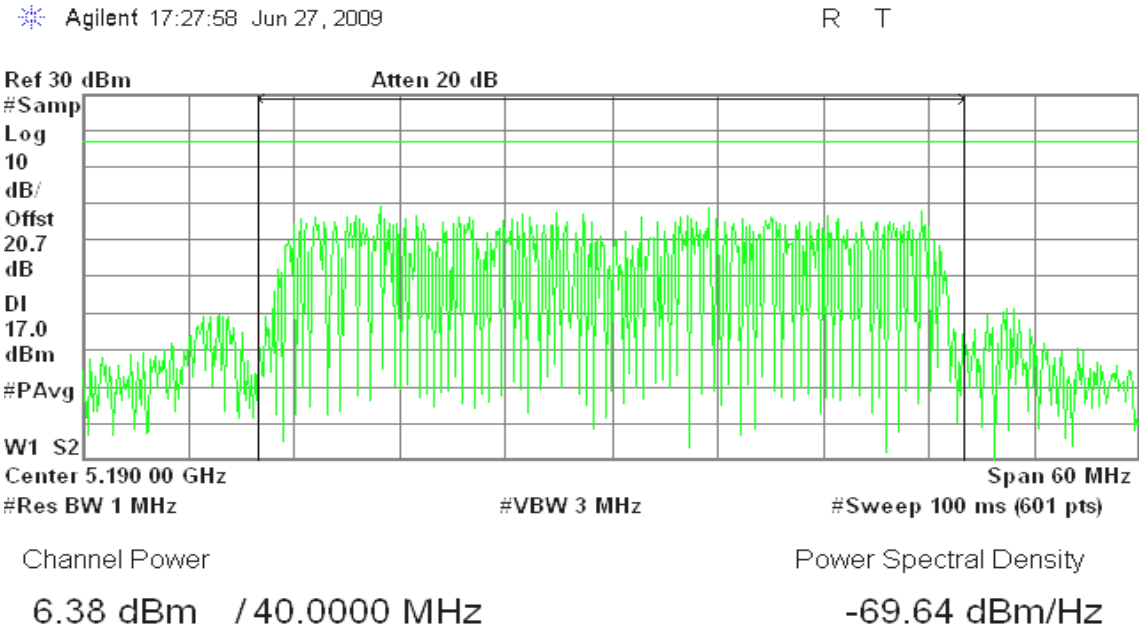
Power Spectral Density

-62.55 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 0



draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 1



8.4 BAND EDGES MEASUREMENT

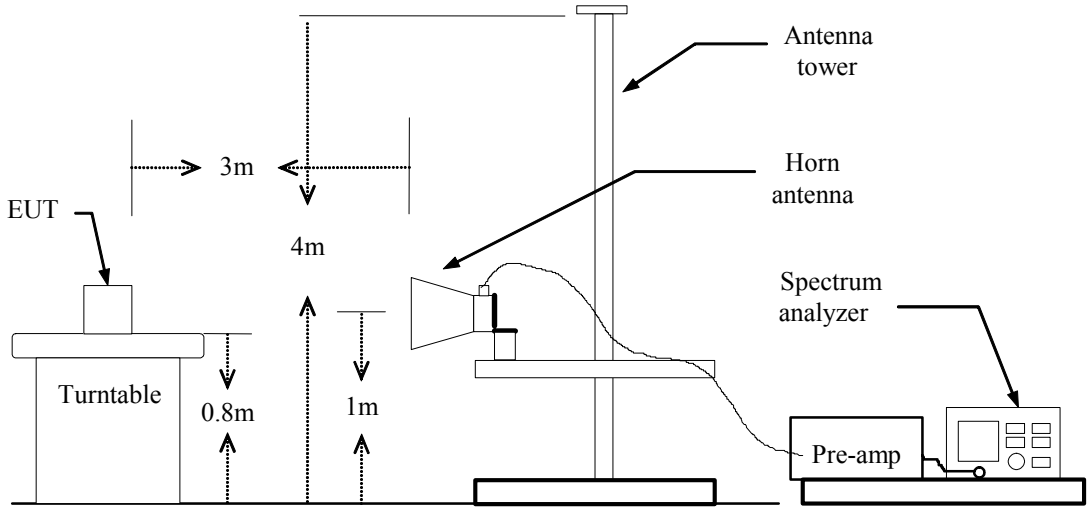
LIMIT

According to §15.407(b) & RSS-210 §A8.5,

(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

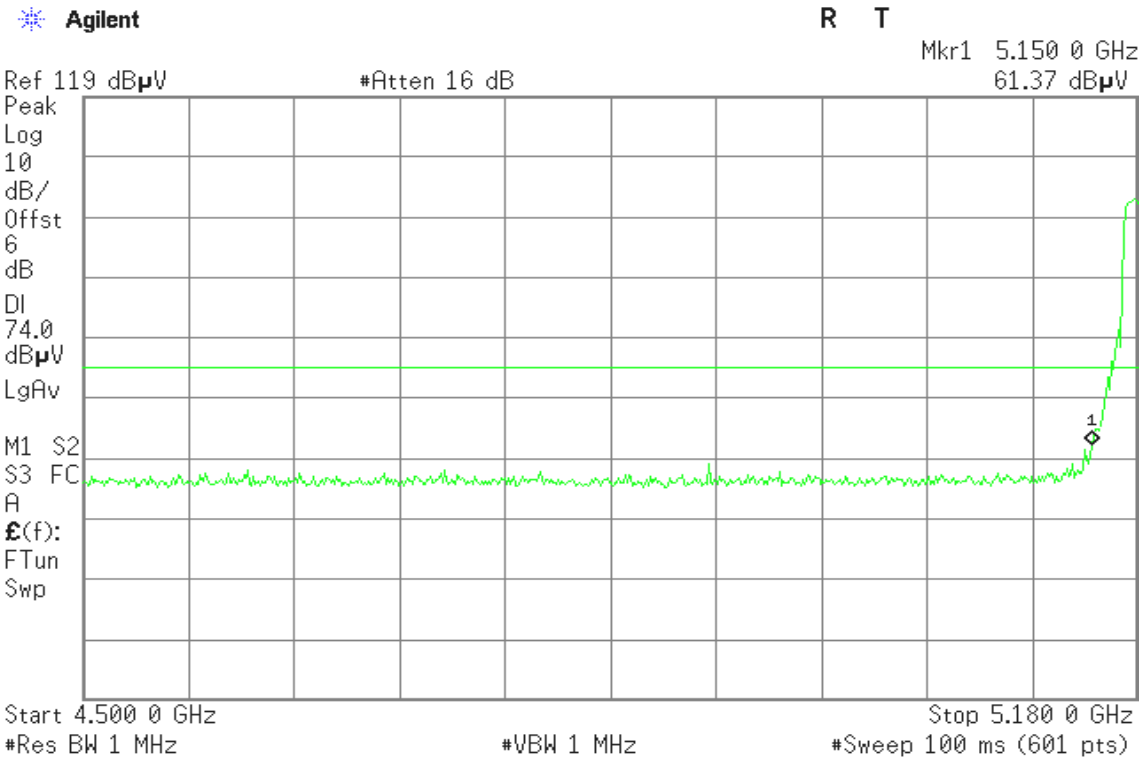
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the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

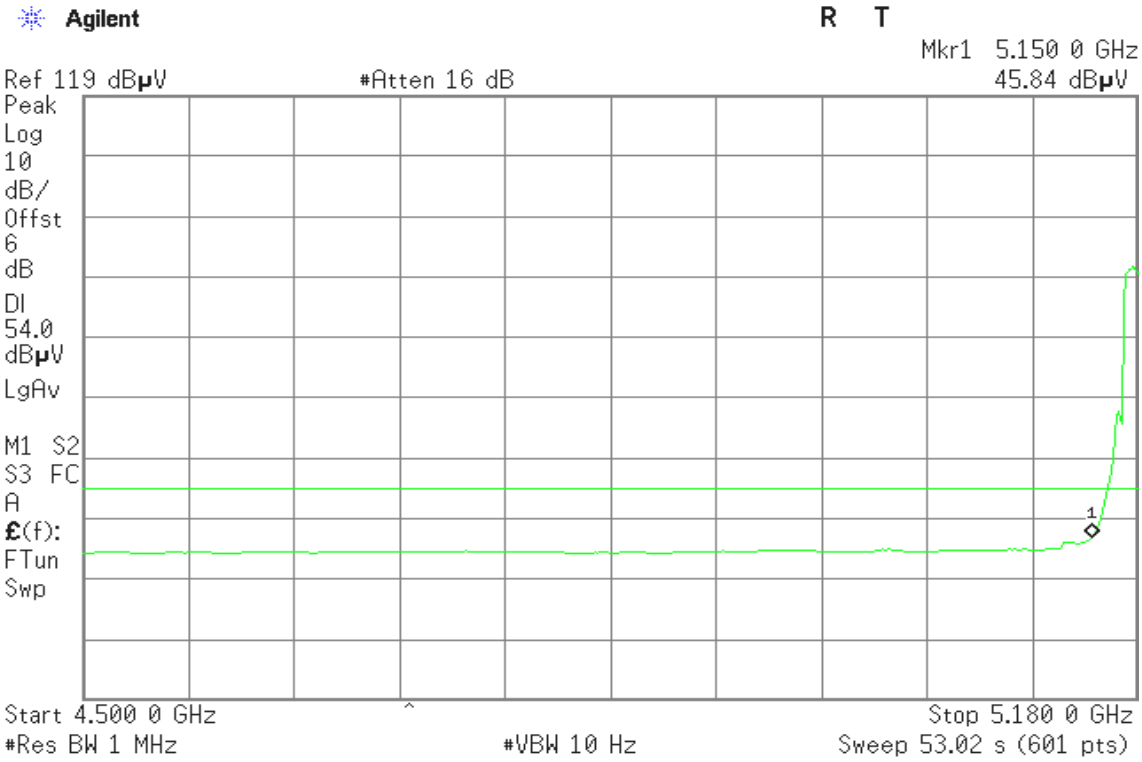
Refer to attach spectrum analyzer data chart.

Band Edges (IEEE 802.11a mode / 5180 MHz)

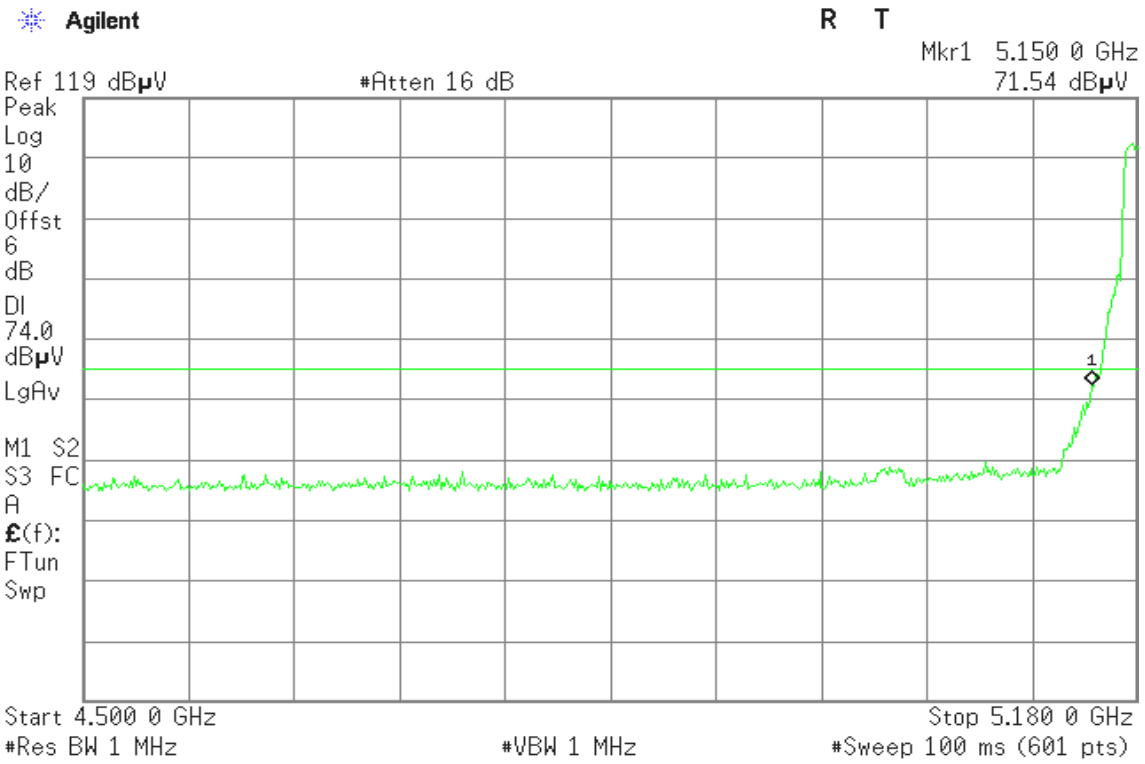
Detector mode: Peak **Polarity: Vertical**



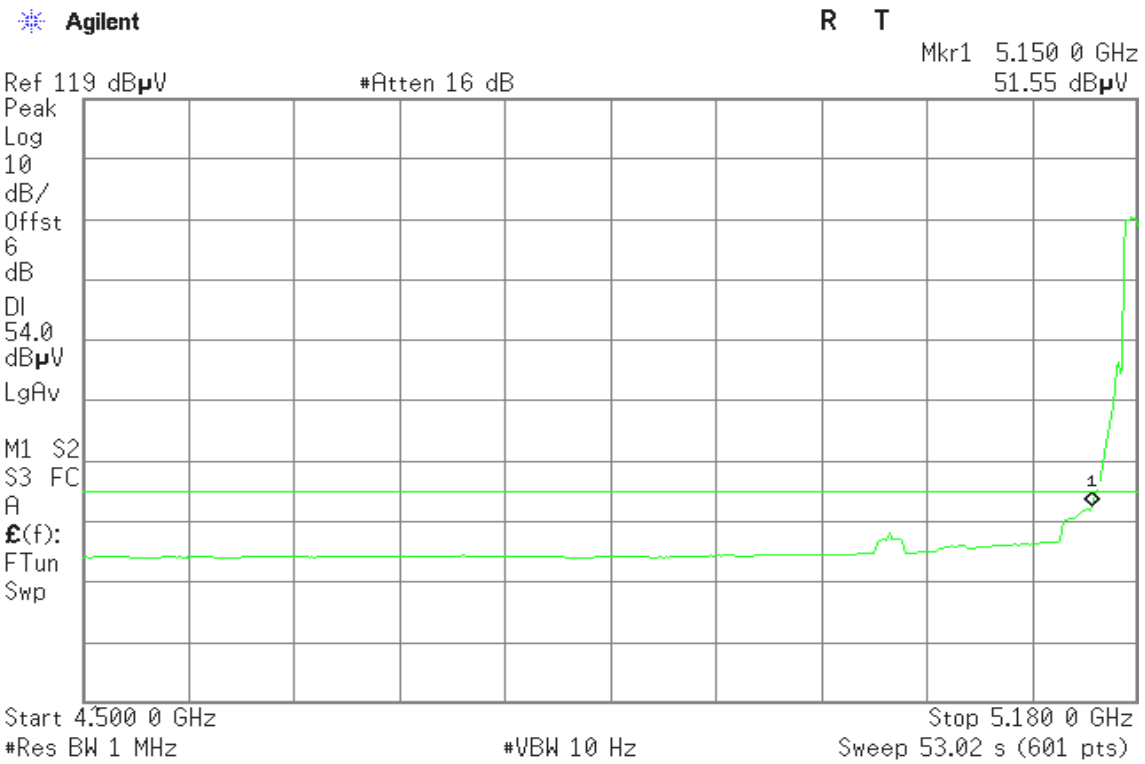
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

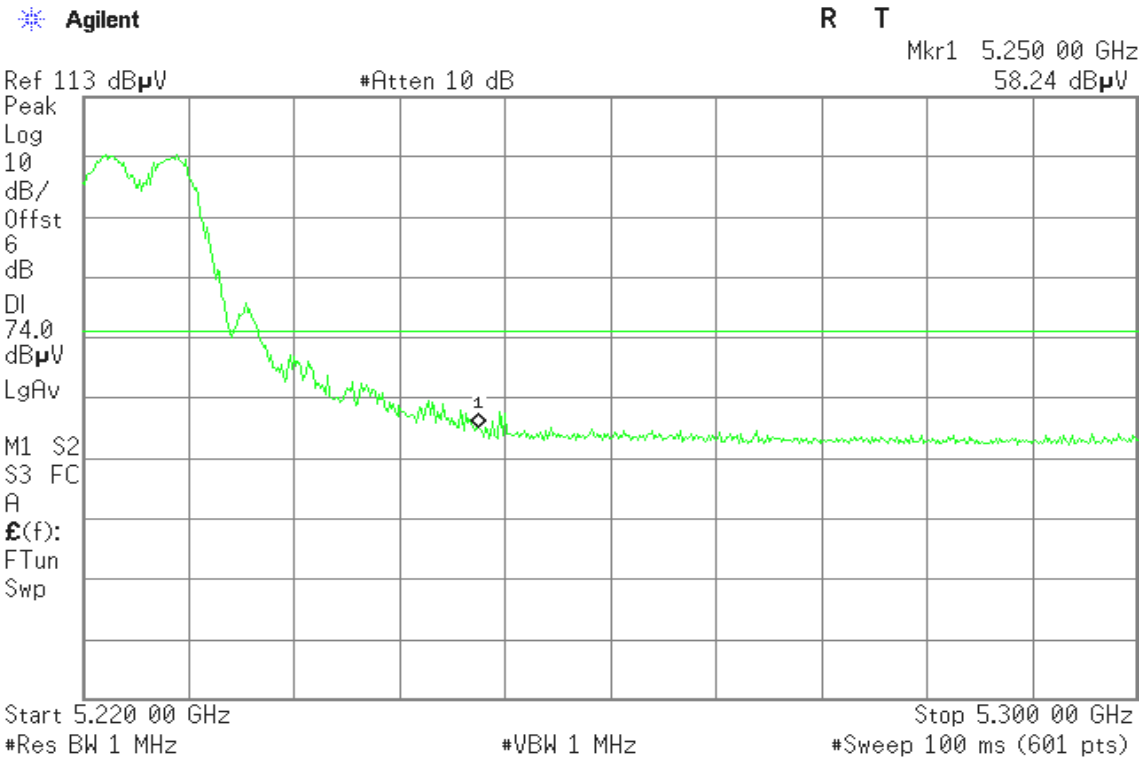


Detector mode: Average **Polarity: Horizontal**

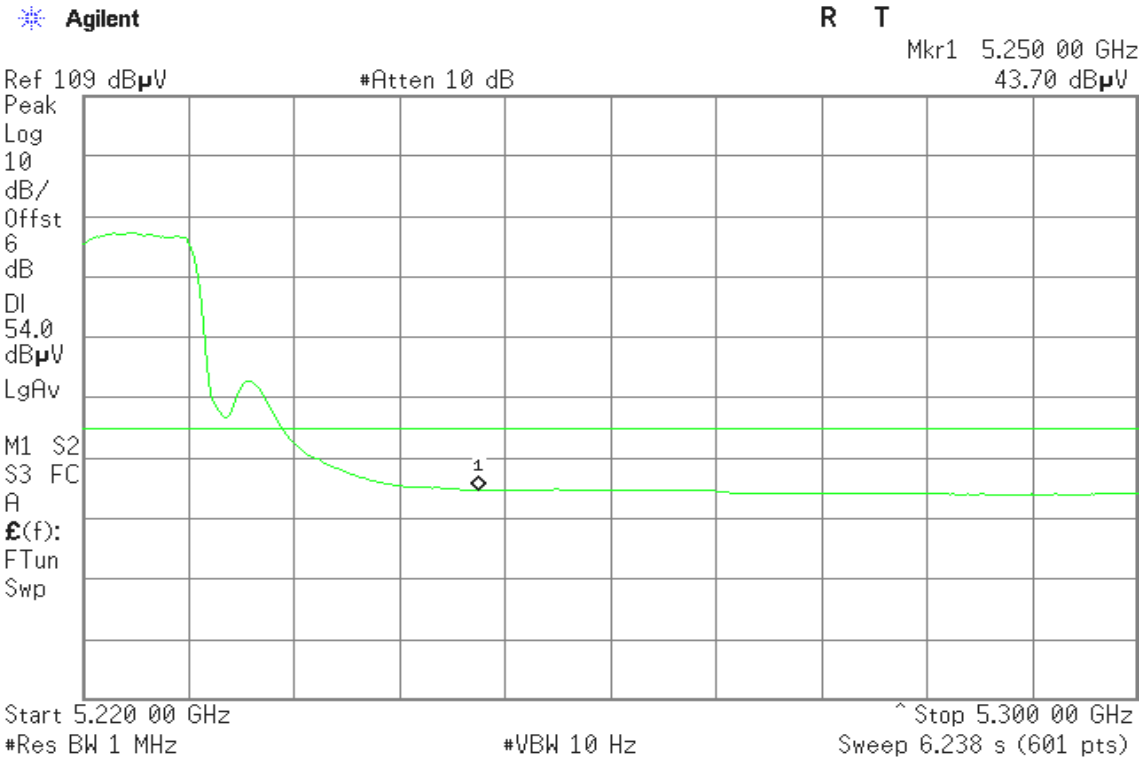


Band Edges (IEEE 802.11a mode / 5220 MHz)

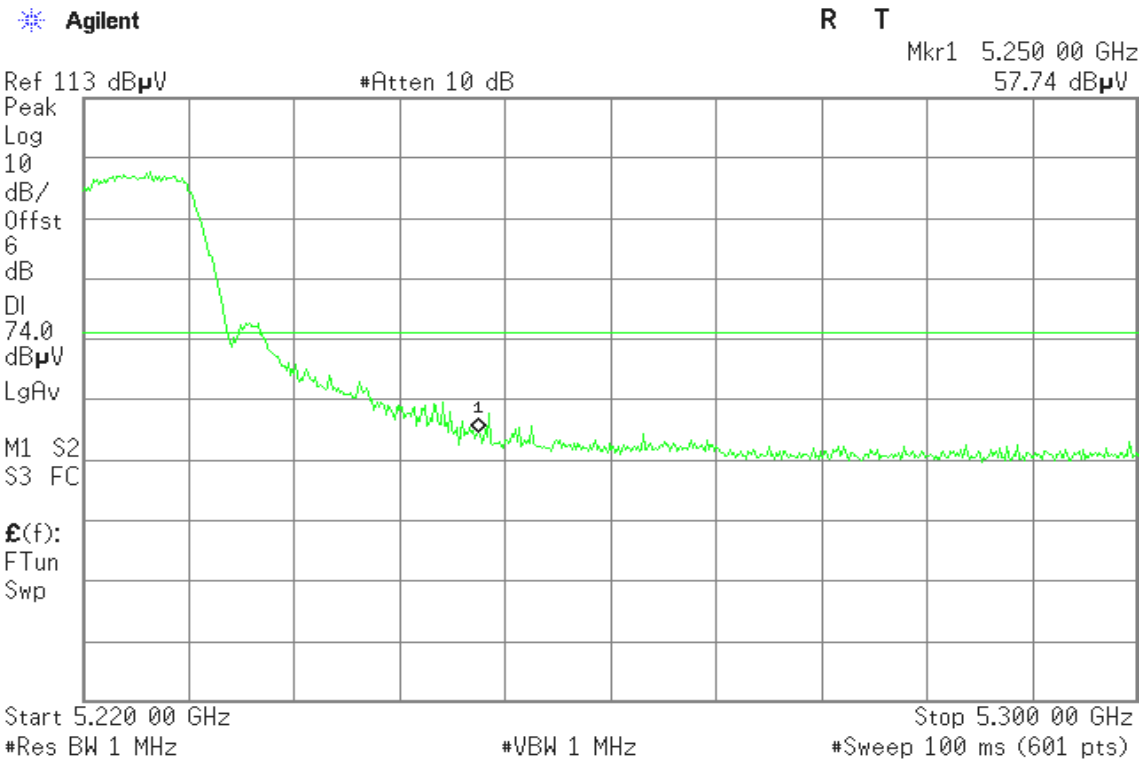
Detector mode: Peak **Polarity: Vertical**



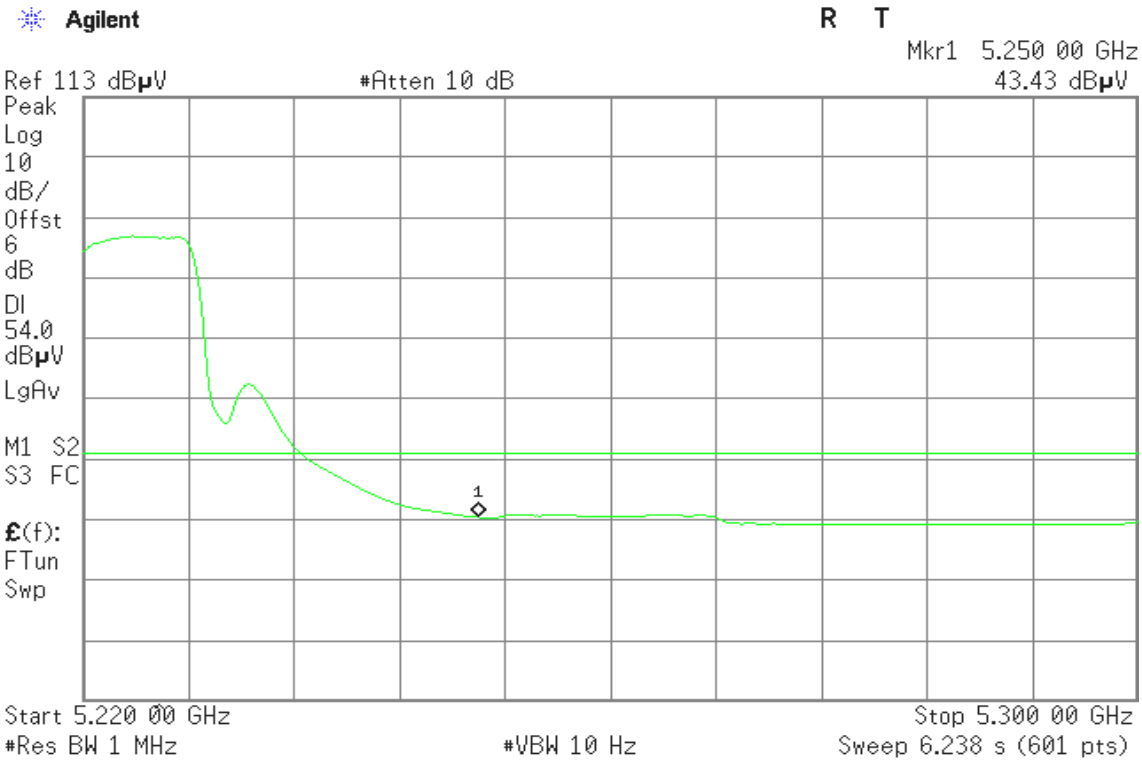
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

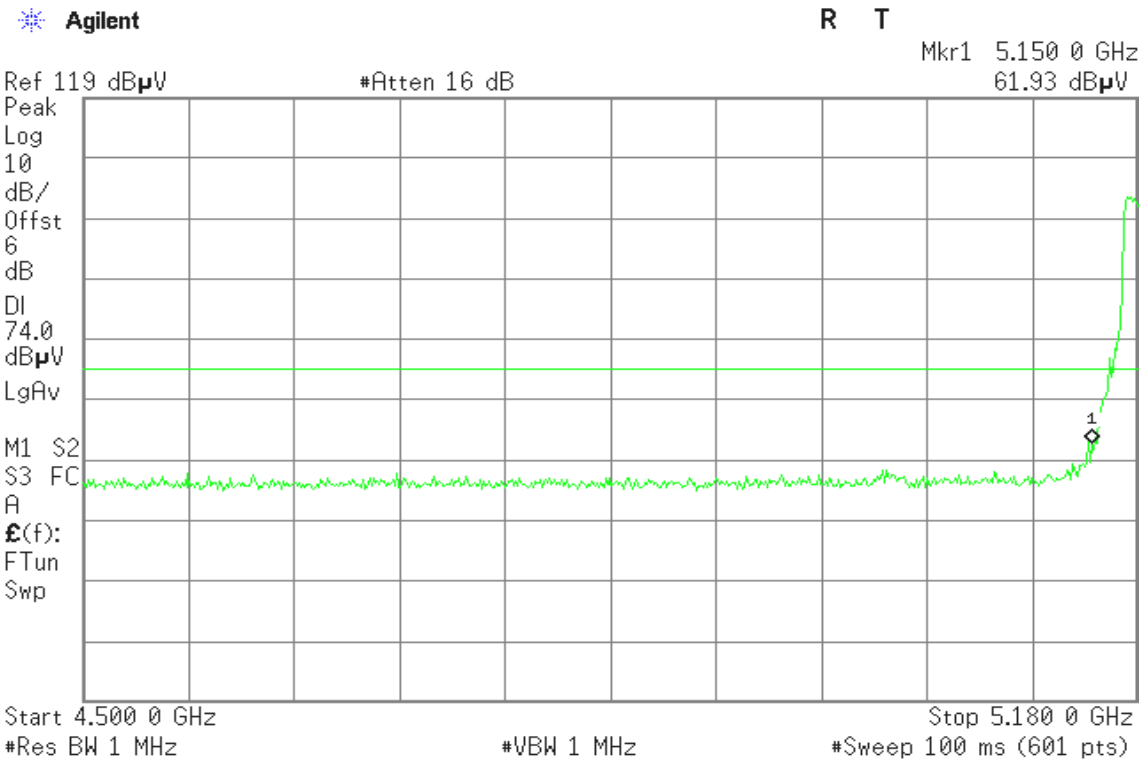


Detector mode: Average **Polarity: Horizontal**

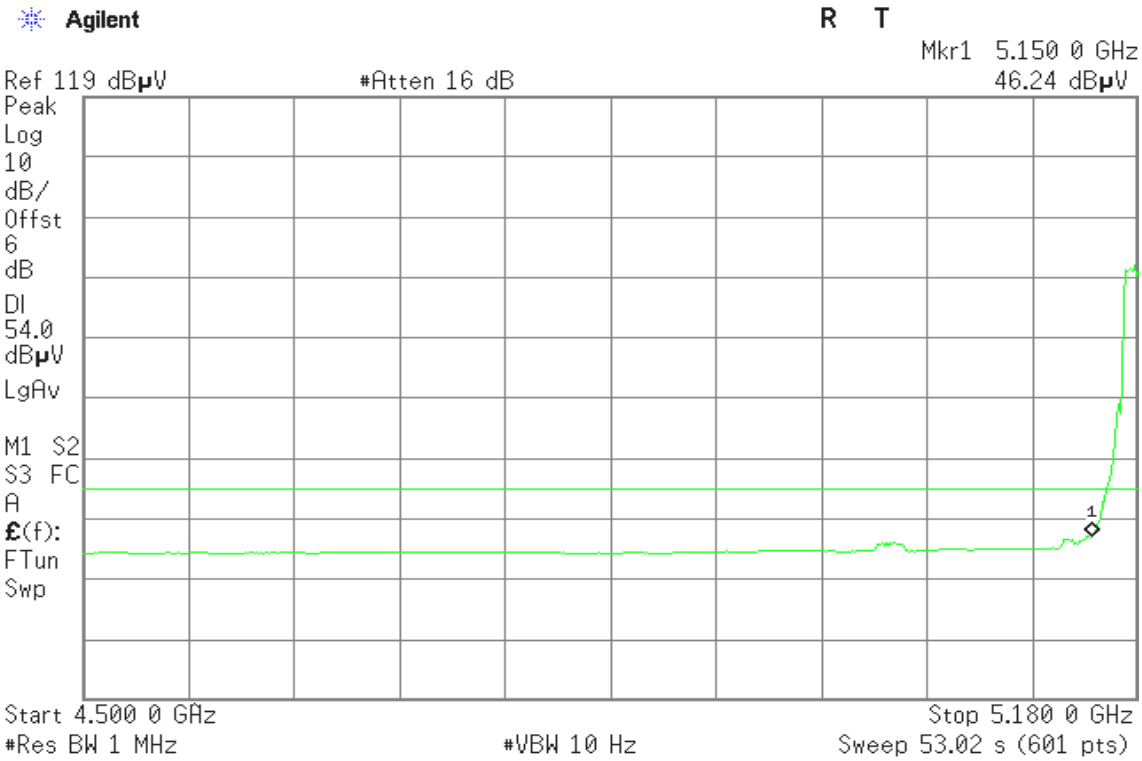


Band Edges (draft 802.11n Standard-20 MHz Channel mode / 5180 MHz)

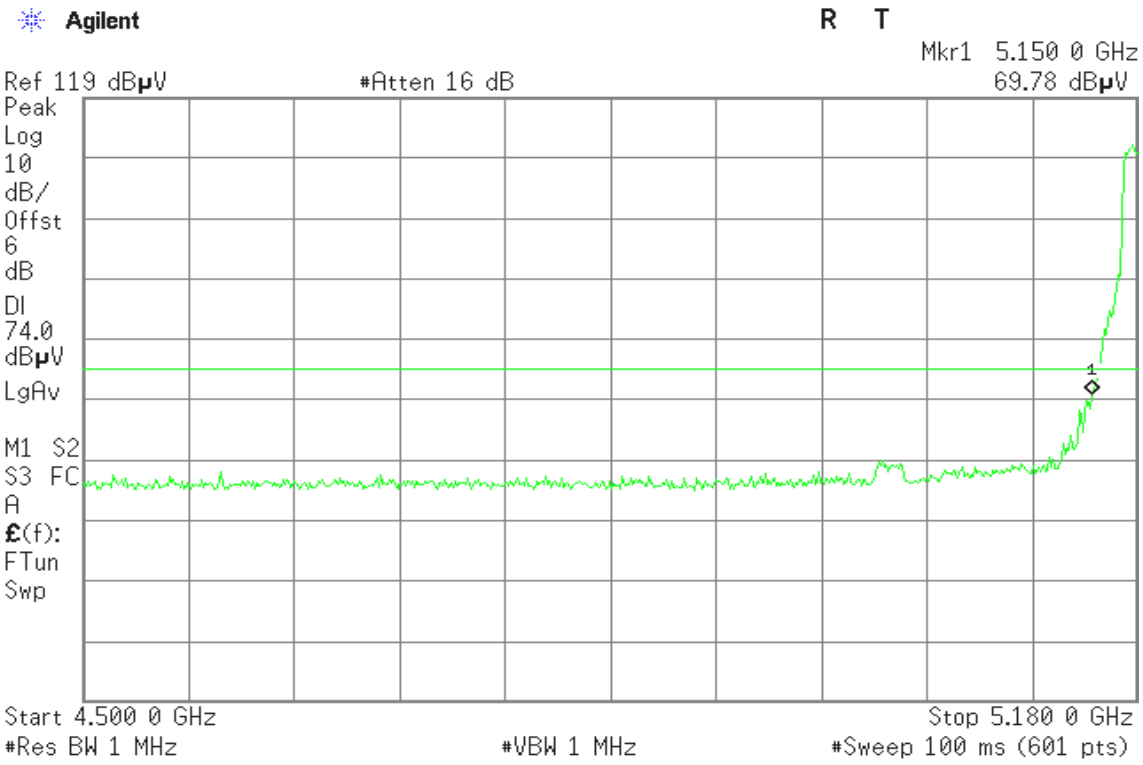
Detector mode: Peak **Polarity: Vertical**



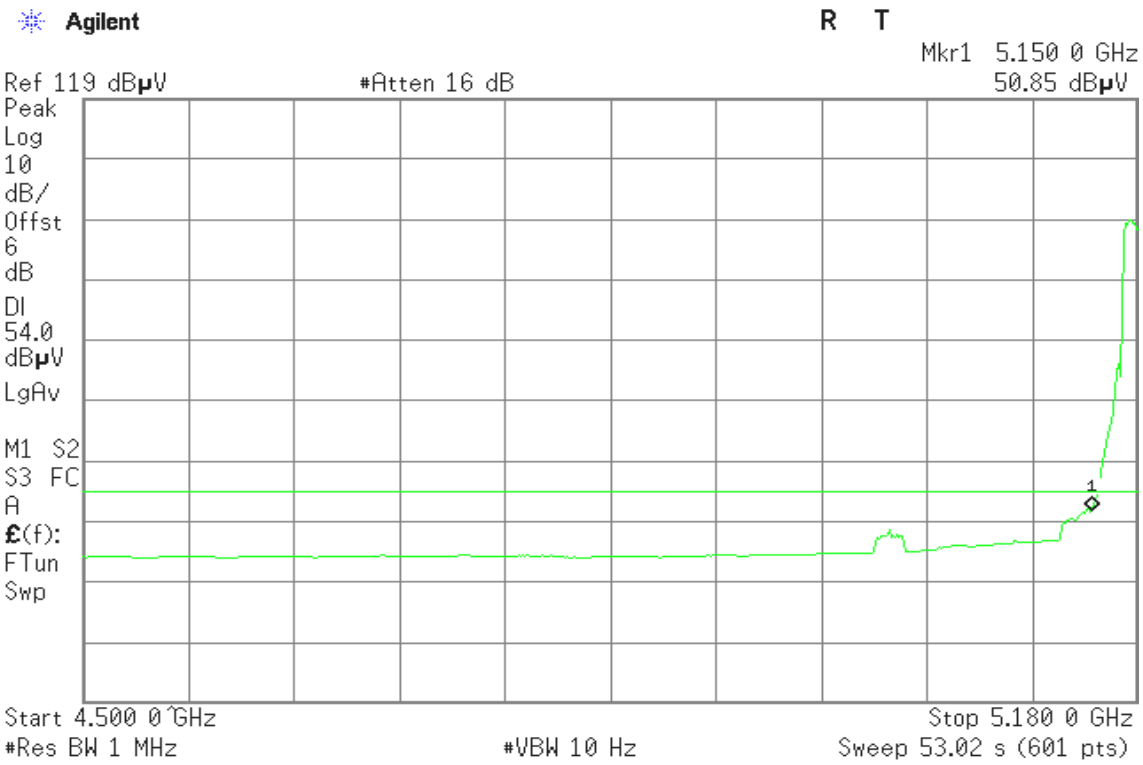
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

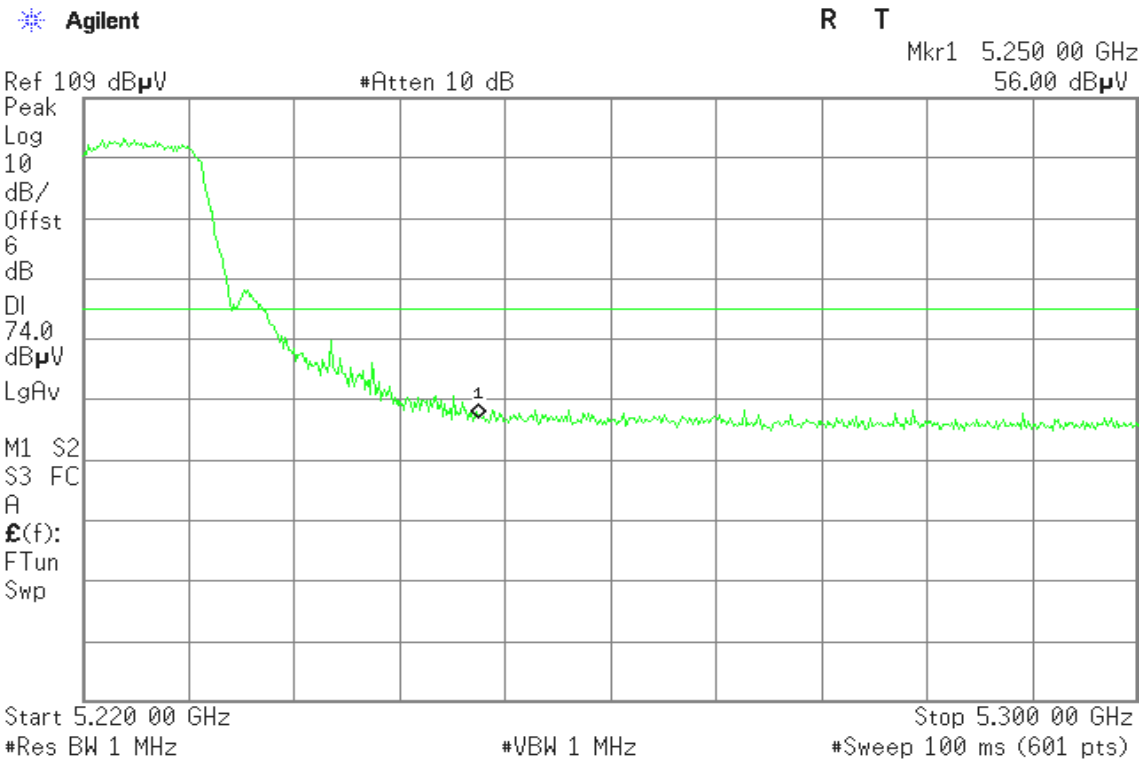


Detector mode: Average **Polarity: Horizontal**

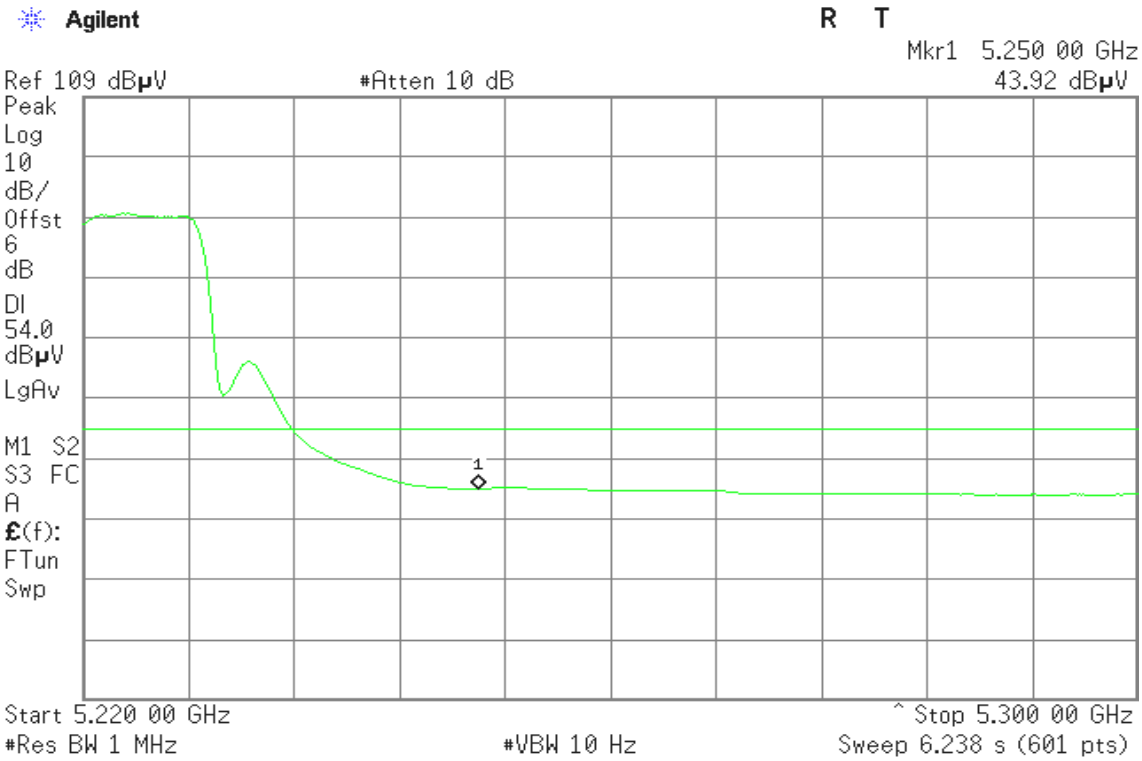


Band Edges (draft 802.11n Standard-20 MHz Channel mode / 5220 MHz)

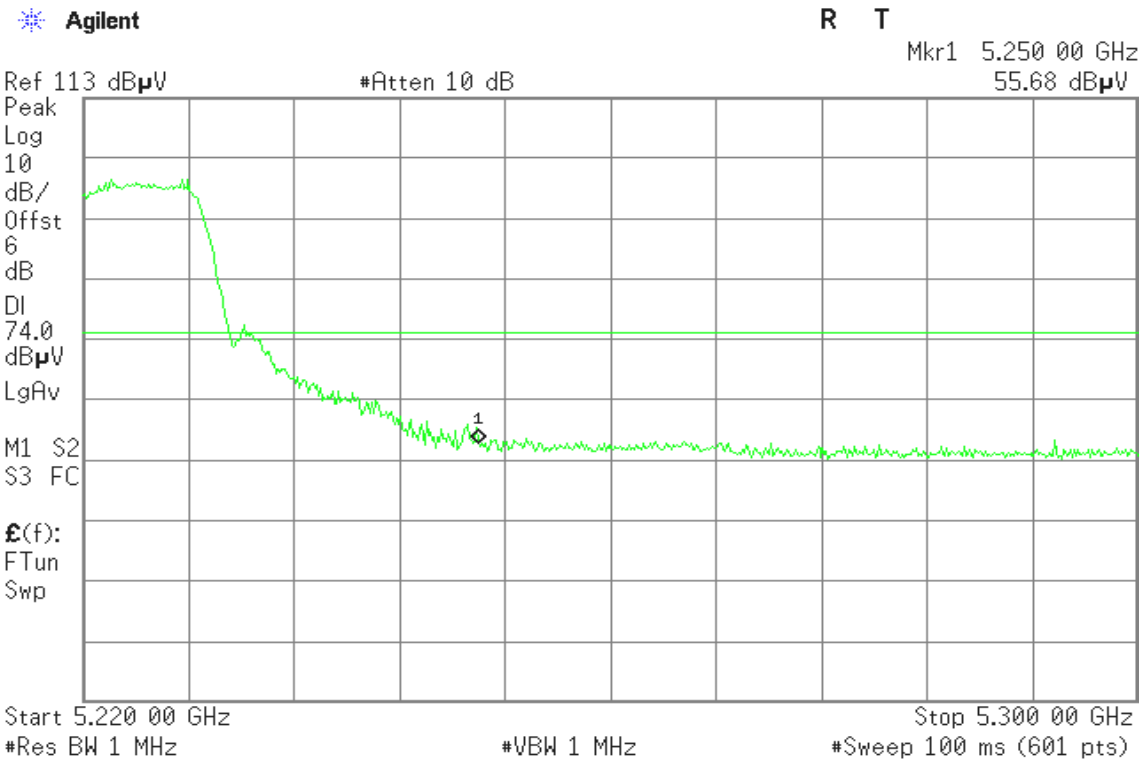
Detector mode: Peak **Polarity: Vertical**



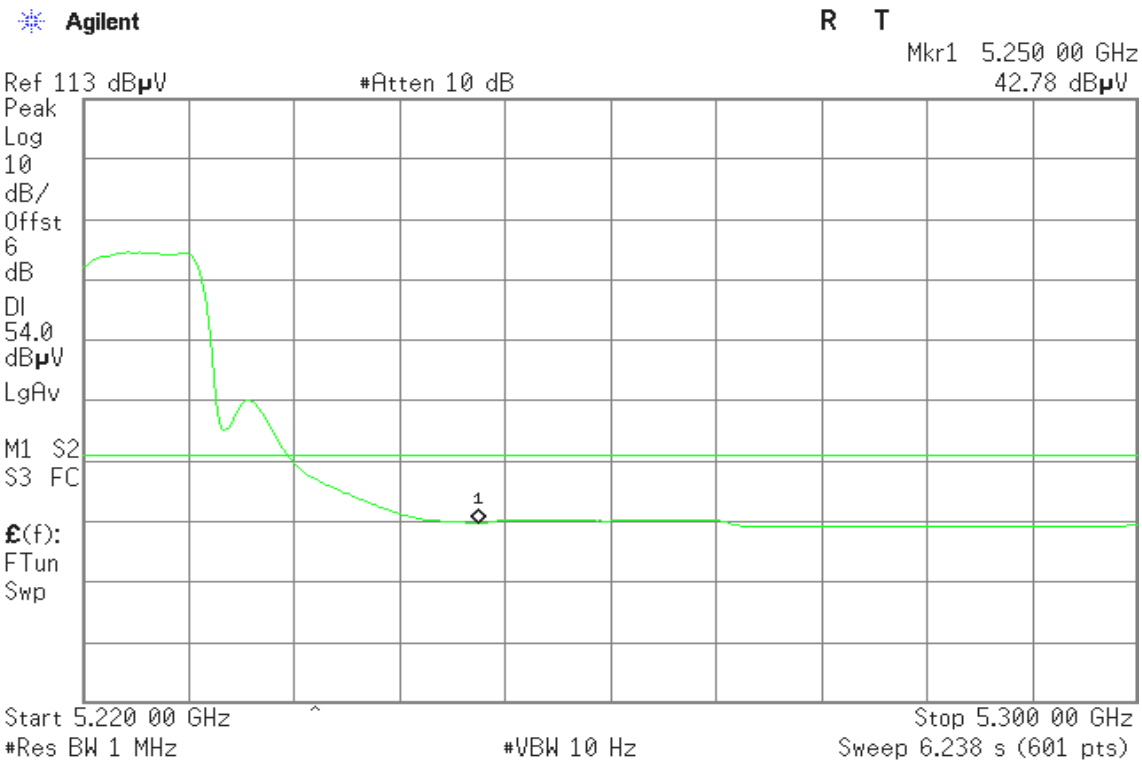
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

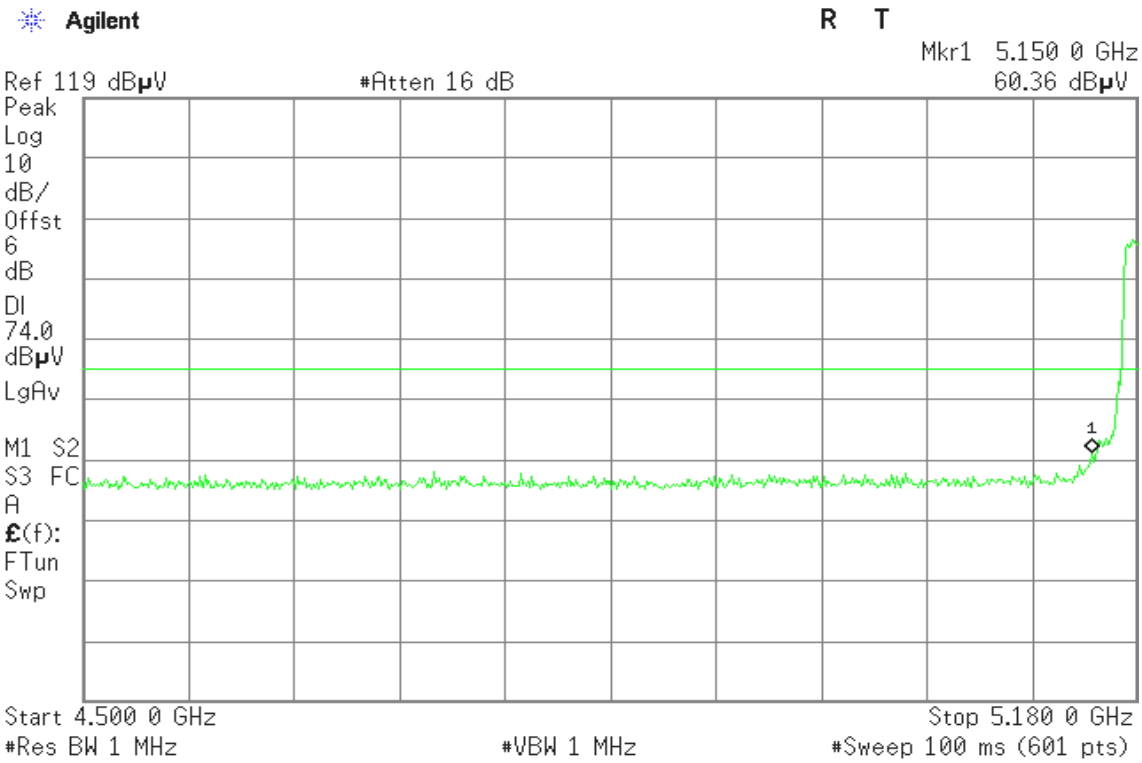


Detector mode: Average **Polarity: Horizontal**

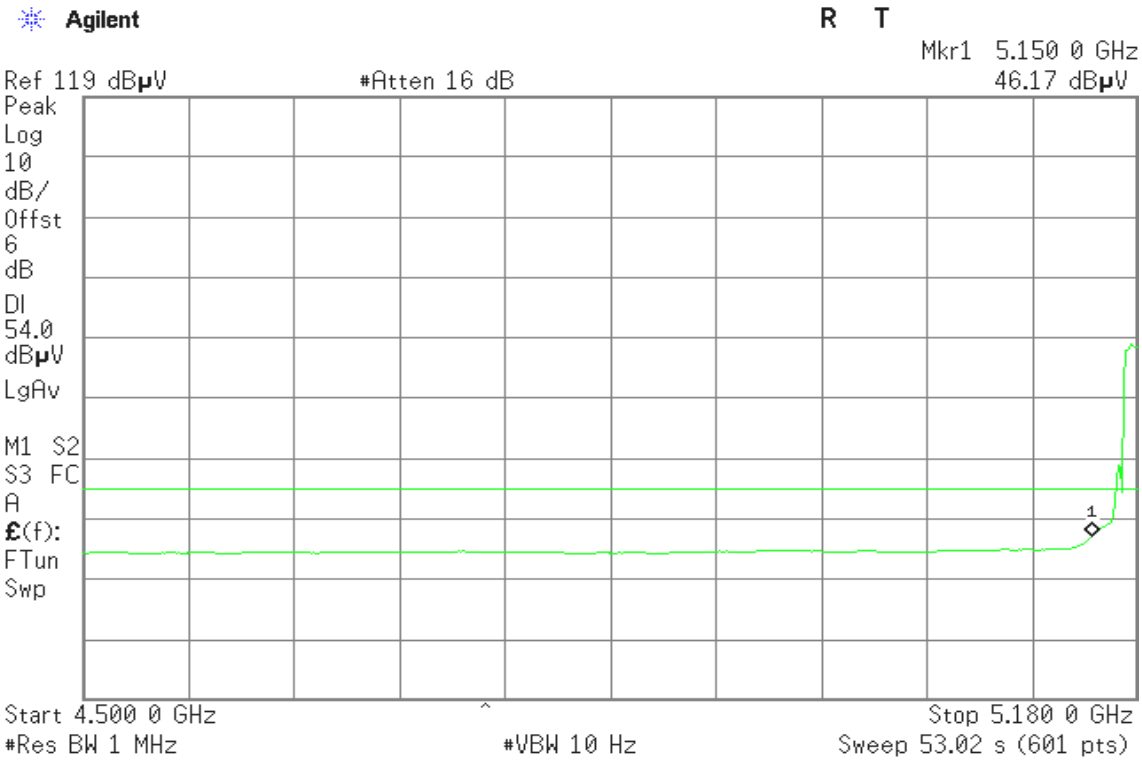


Band Edges (draft 802.11n Wide-40 MHz Channel mode / 5190 MHz)

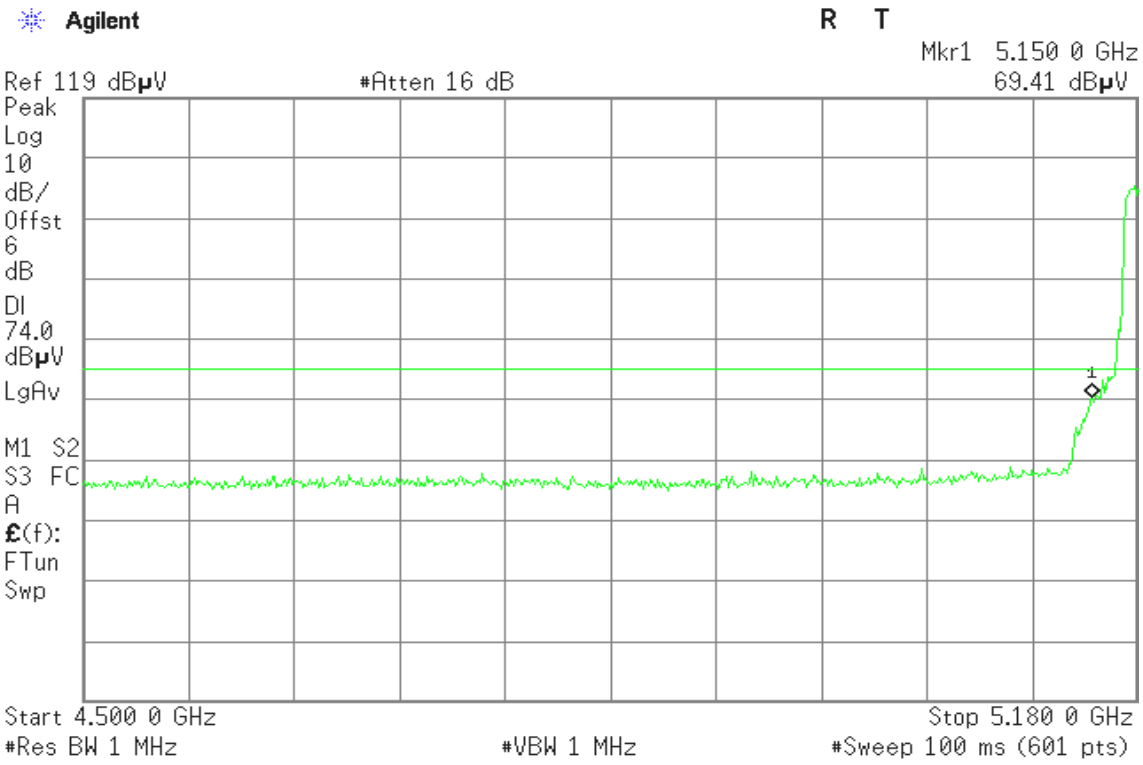
Detector mode: Peak **Polarity: Vertical**



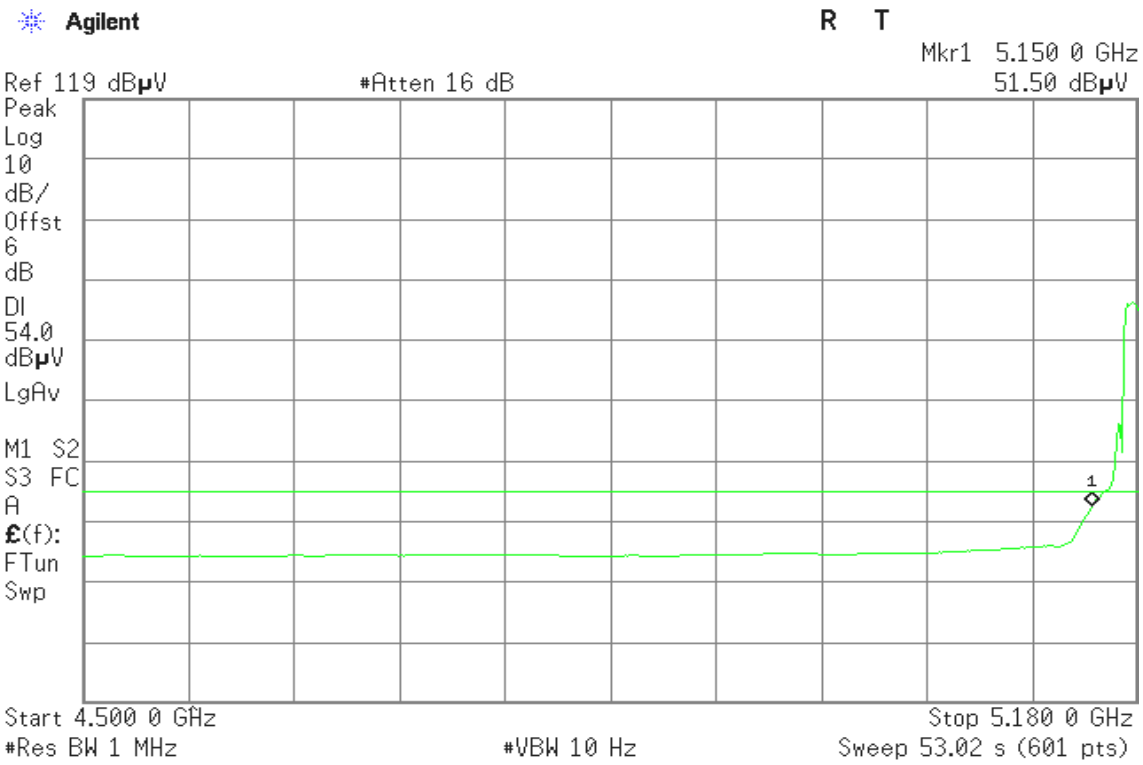
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



8.5 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.

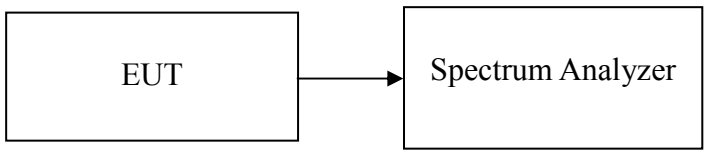
According to RSS-210 §A9.2,

(1) The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

(2) The power spectral density shall not exceed 11 dBm in any 1.0 MHz 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 = Sweep= AUTO
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 / 5180 ~ 5220MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	2.937	4.00	-1.06	PASS
Mid	5200	2.674	4.00	-1.33	PASS
High	5220	2.424	4.00	-1.58	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	1.659	0.141	3.98	4.00	-0.02	PASS
Mid	5200	0.691	-0.369	3.20	4.00	-0.80	PASS
High	5220	0.752	-0.557	3.16	4.00	-0.84	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 MHz

Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
5190	-5.805	-6.803	-3.27	4.00	-7.27	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz with combiner

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	-5.408	4.00	-9.41	PASS
Mid	5200	-5.633	4.00	-9.63	PASS
High	5220	-4.539	4.00	-8.54	PASS

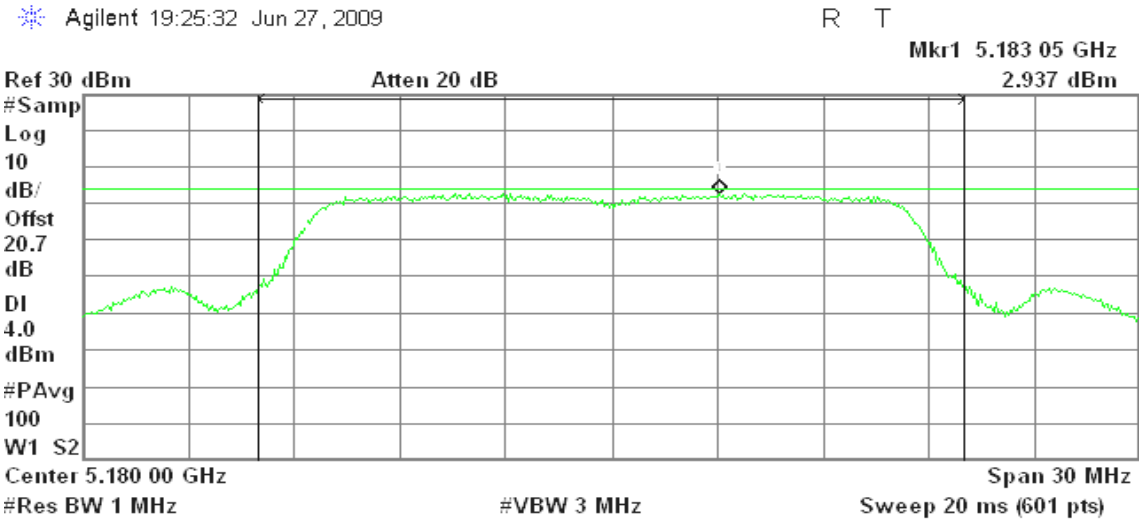
Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 MHz with combiner

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
5190	-1.071	4.00	-5.07	PASS

Remark: *Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD /10))*

Test Plot
IEEE 802.11a mode / 5180 ~ 5220MHz

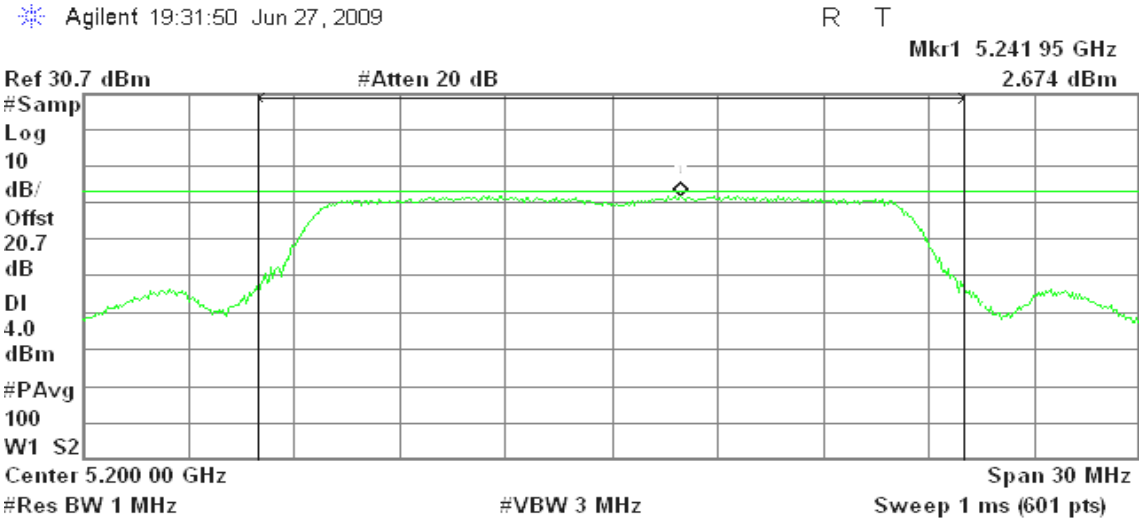
CH Low



Channel Power
13.22 dBm / 20.0000 MHz

Power Spectral Density
-59.79 dBm/Hz

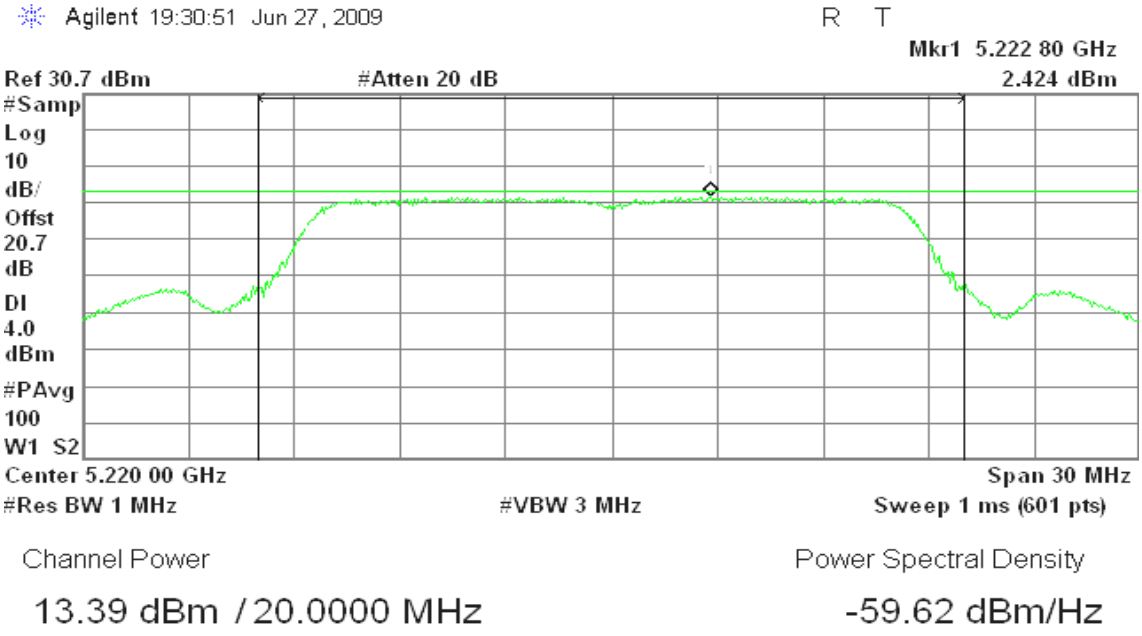
CH Mid



Channel Power
13.68 dBm / 20.0000 MHz

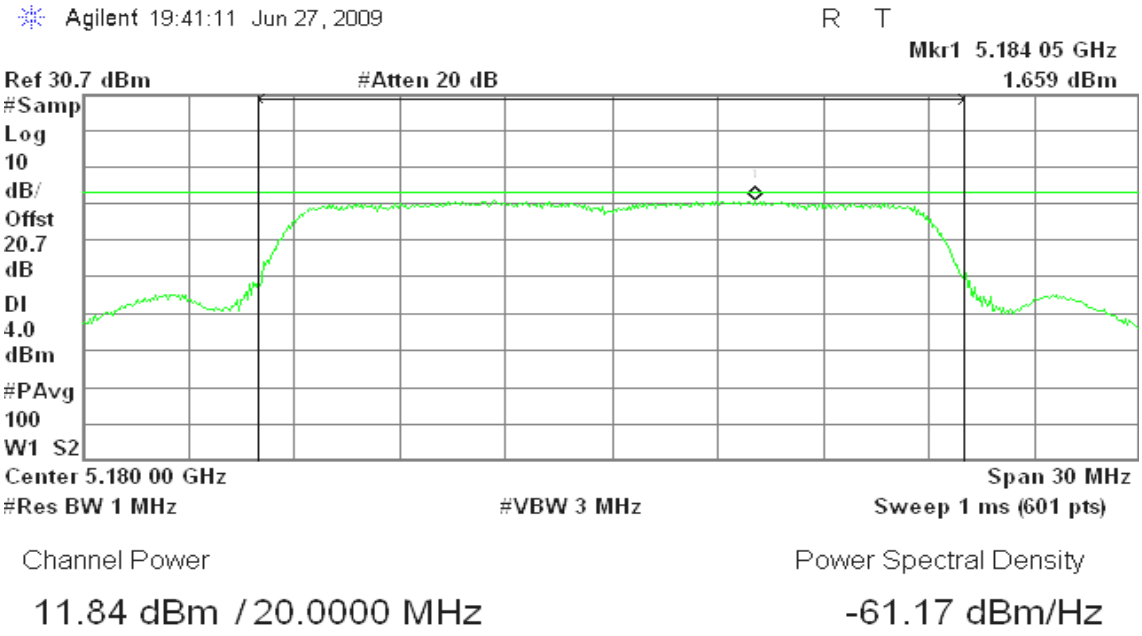
Power Spectral Density
-59.33 dBm/Hz

CH High

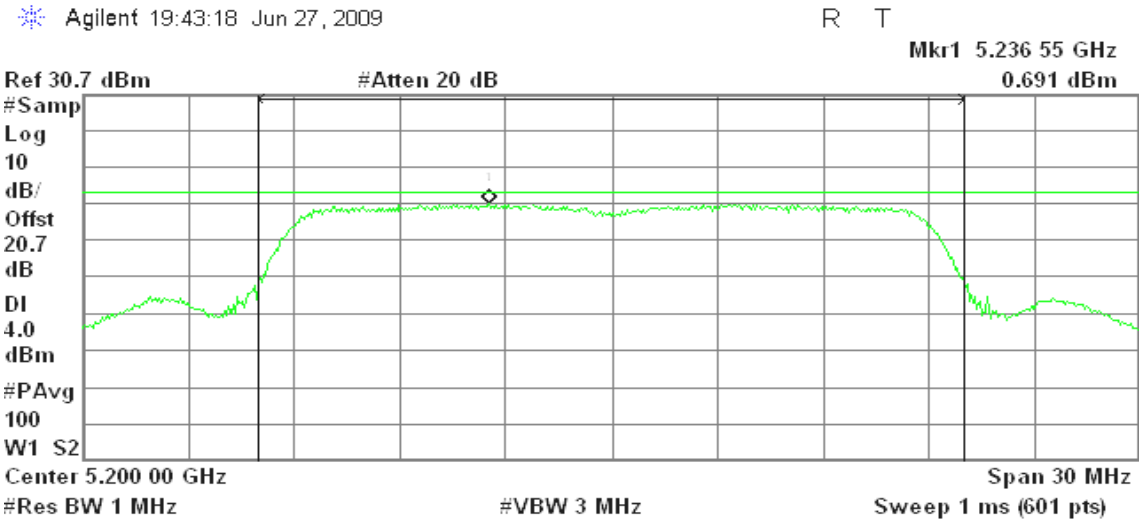


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 0

CH Low



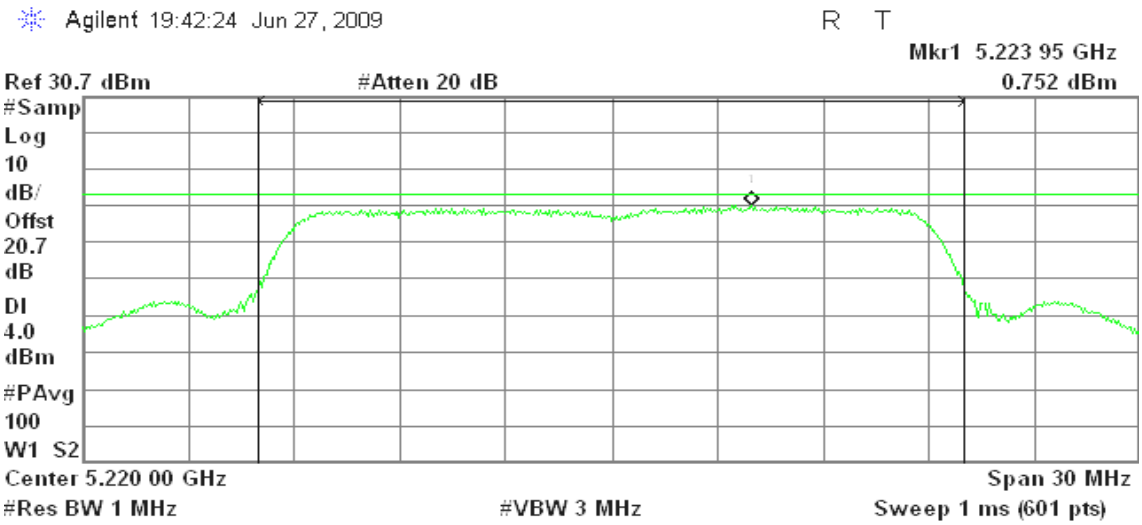
CH Mid



Channel Power
11.60 dBm / 20.0000 MHz

Power Spectral Density
-61.41 dBm/Hz

CH High

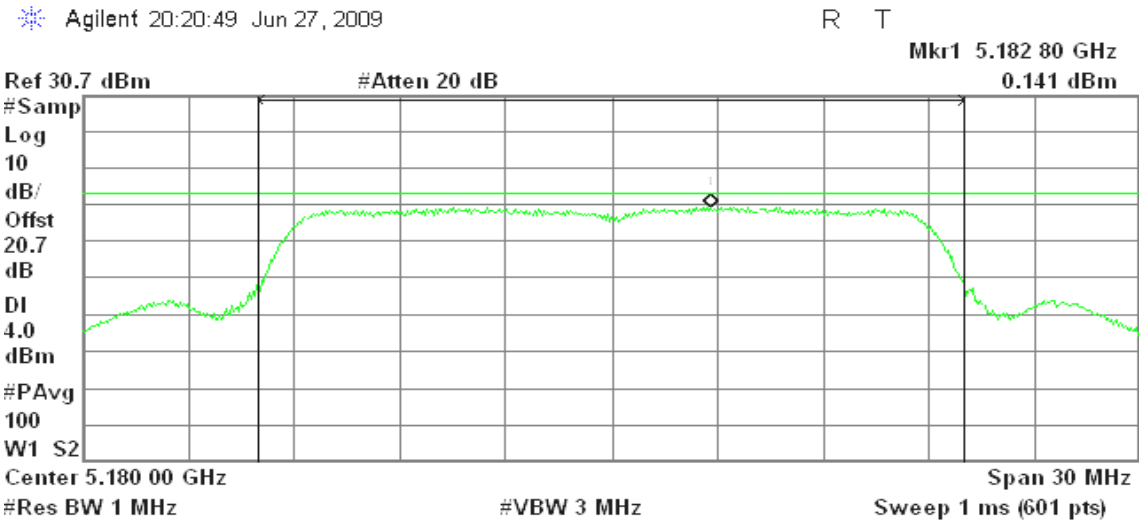


Channel Power
11.24 dBm / 20.0000 MHz

Power Spectral Density
-61.77 dBm/Hz

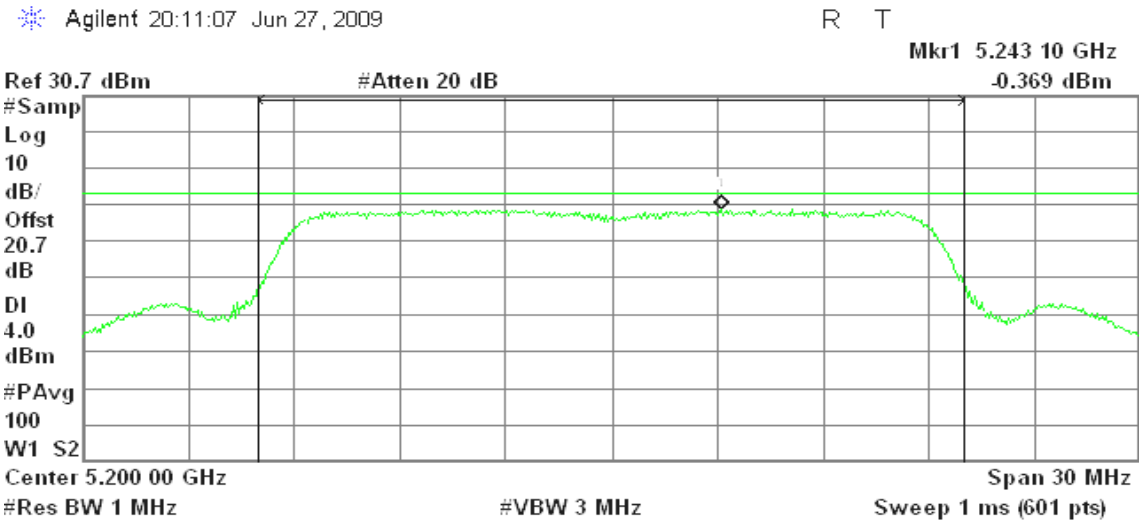
draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 1

CH Low



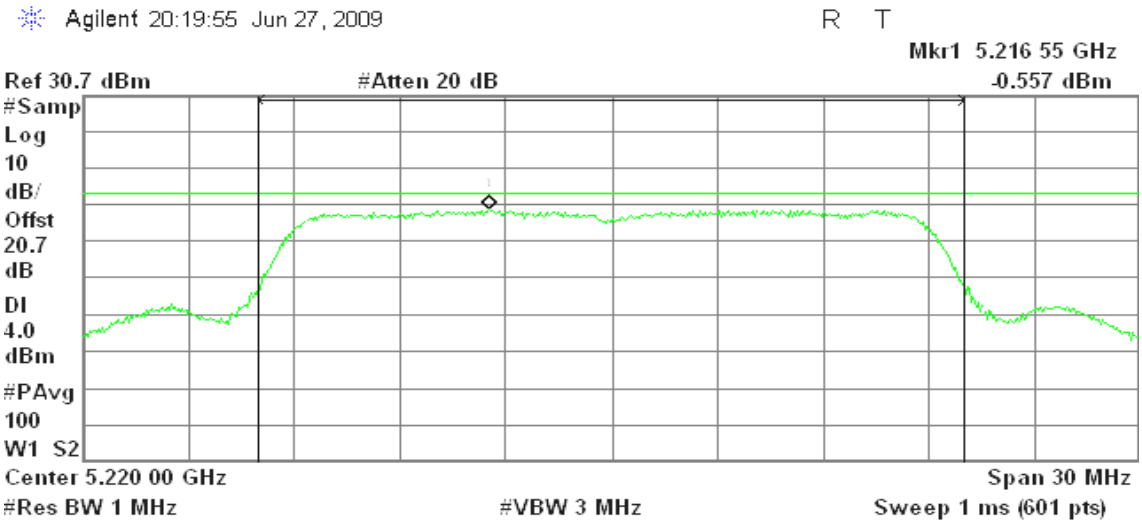
Channel Power	Power Spectral Density
11.38 dBm / 20.0000 MHz	-61.63 dBm/Hz

CH Mid



Channel Power	Power Spectral Density
9.94 dBm / 20.0000 MHz	-63.07 dBm/Hz

CH High



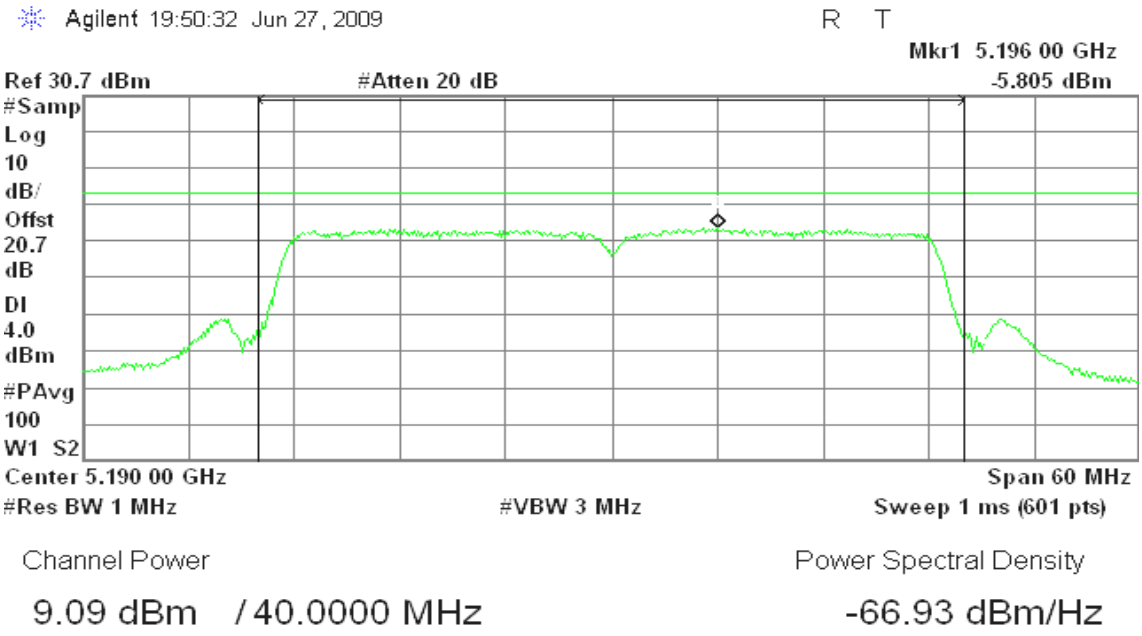
Channel Power

10.42 dBm / 20.0000 MHz

Power Spectral Density

-62.59 dBm/Hz

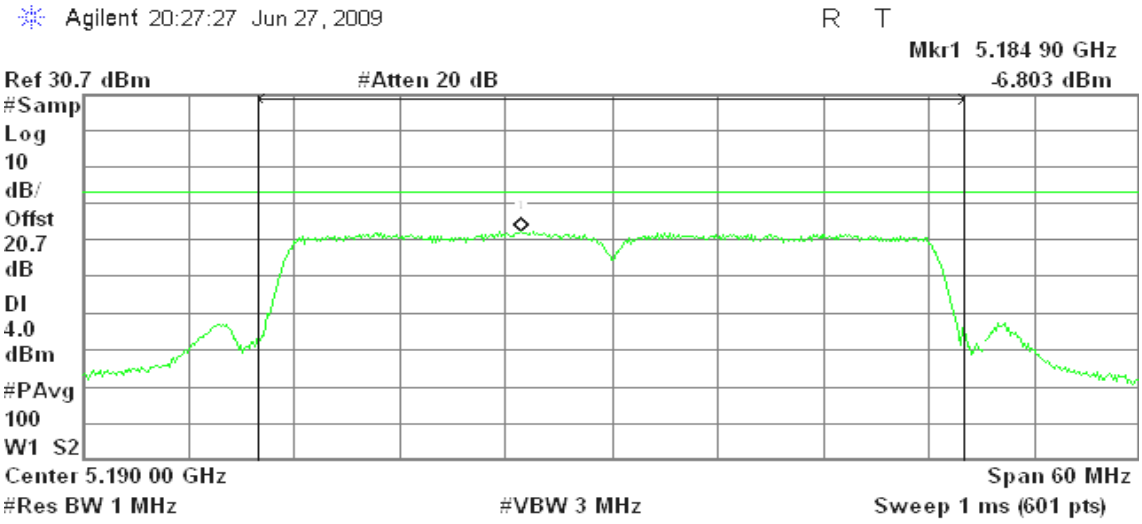
draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 0



Channel Power
9.09 dBm / 40.0000 MHz

Power Spectral Density
-66.93 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 1

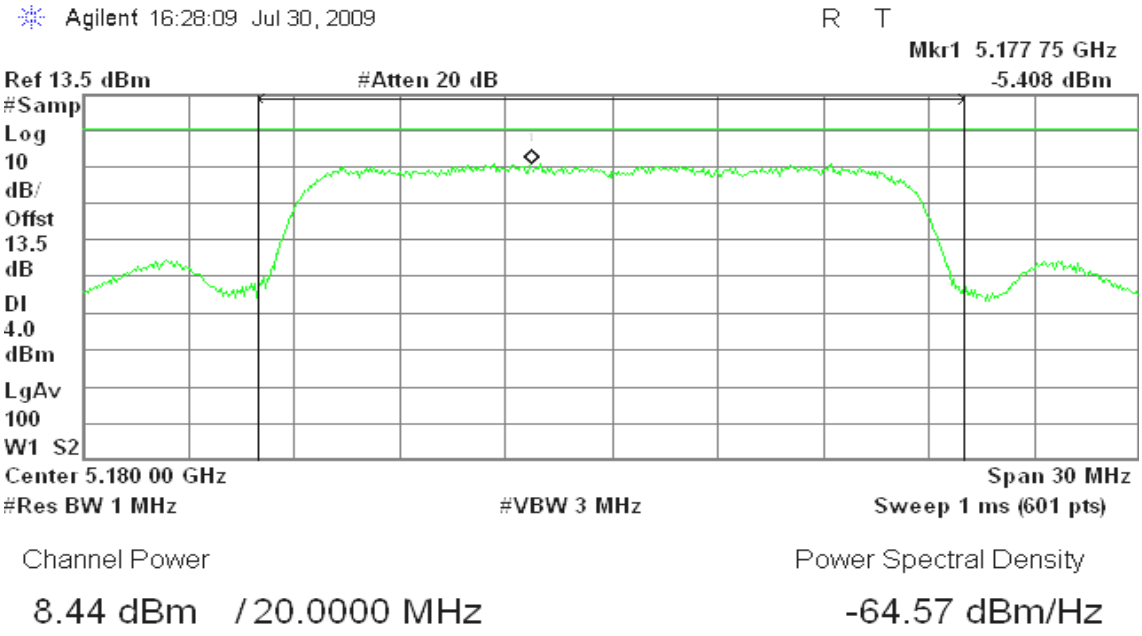


Channel Power
6.38 dBm / 40.0000 MHz

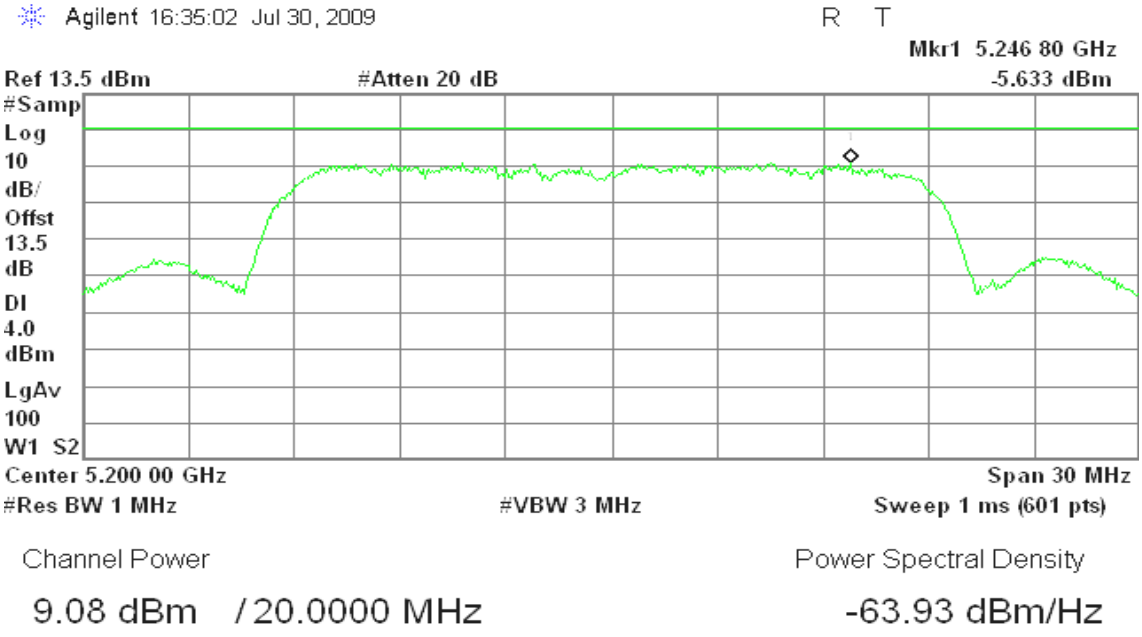
Power Spectral Density
-69.64 dBm/Hz

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz with combiner:

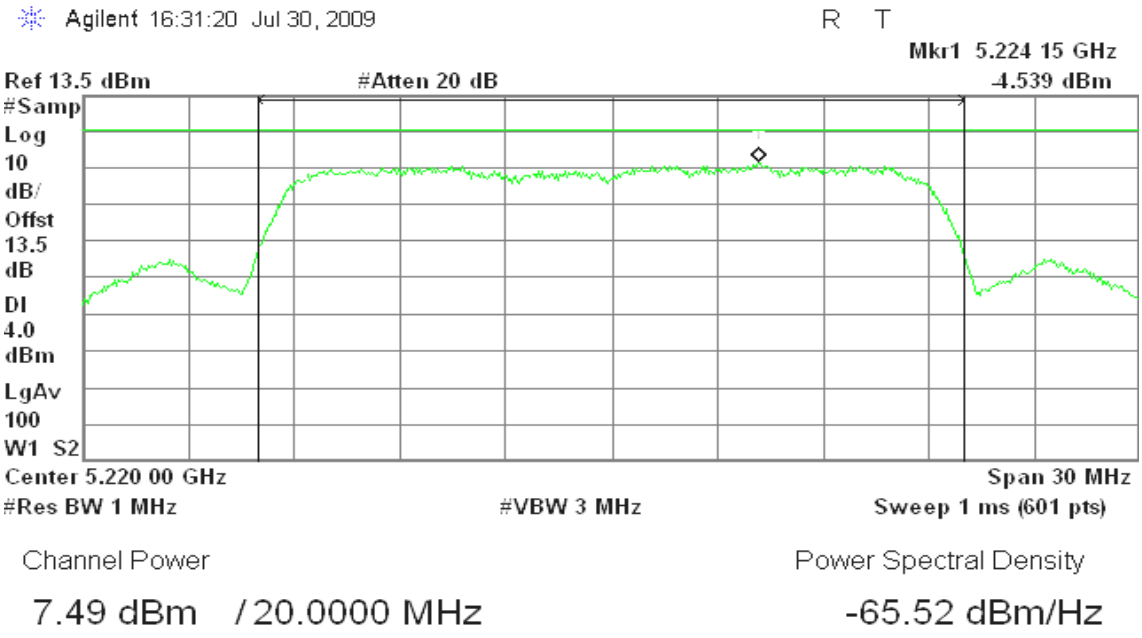
CH Low



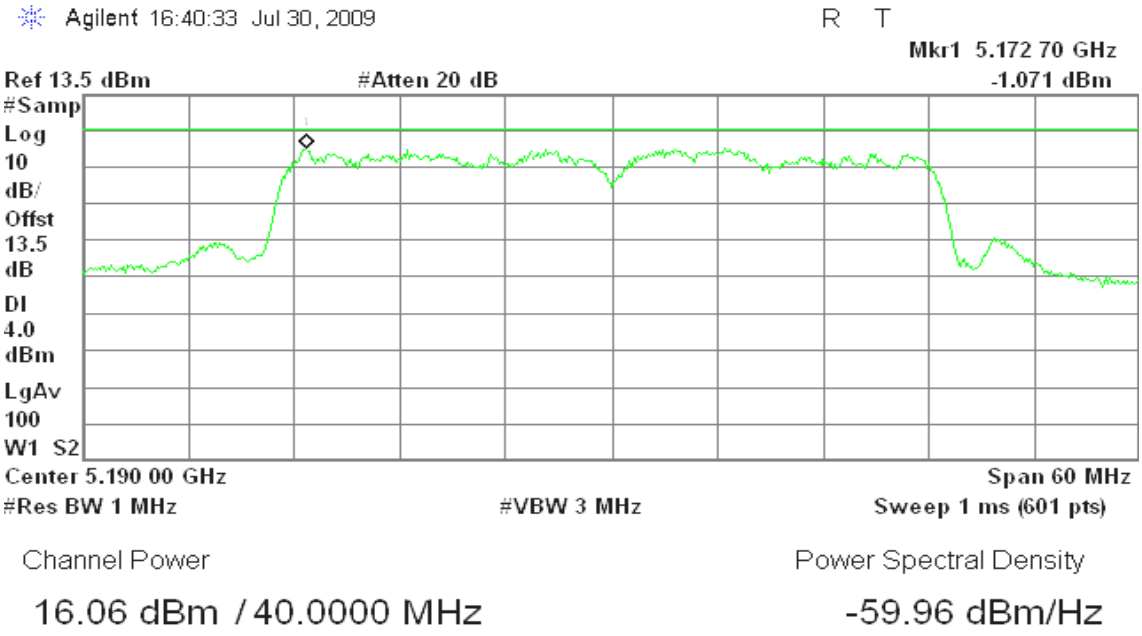
CH Mid



CH High



Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 MHz with combiner:

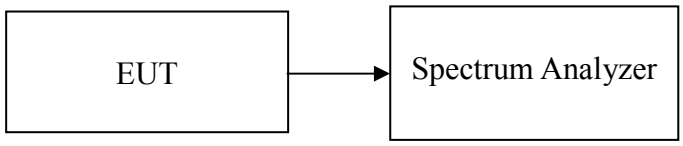


8.6 PEAK EXCURSION

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. Delta Mark trace A Maximum frequency and trace B same frequency.
5. 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 / 5180 ~ 5220MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	12.09	13.00	-0.91	PASS
Mid	5200	11.38	13.00	-1.62	PASS
High	5220	11.30	13.00	-1.70	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 0

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	11.74	13.00	-1.26	PASS
Mid	5200	8.48	13.00	-4.52	PASS
High	5220	10.62	13.00	-2.38	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 1

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	12.18	13.00	-0.82	PASS
Mid	5200	11.05	13.00	-1.95	PASS
High	5220	9.02	13.00	-3.98	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 0

Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
5190	11.96	13.00	-1.04	PASS

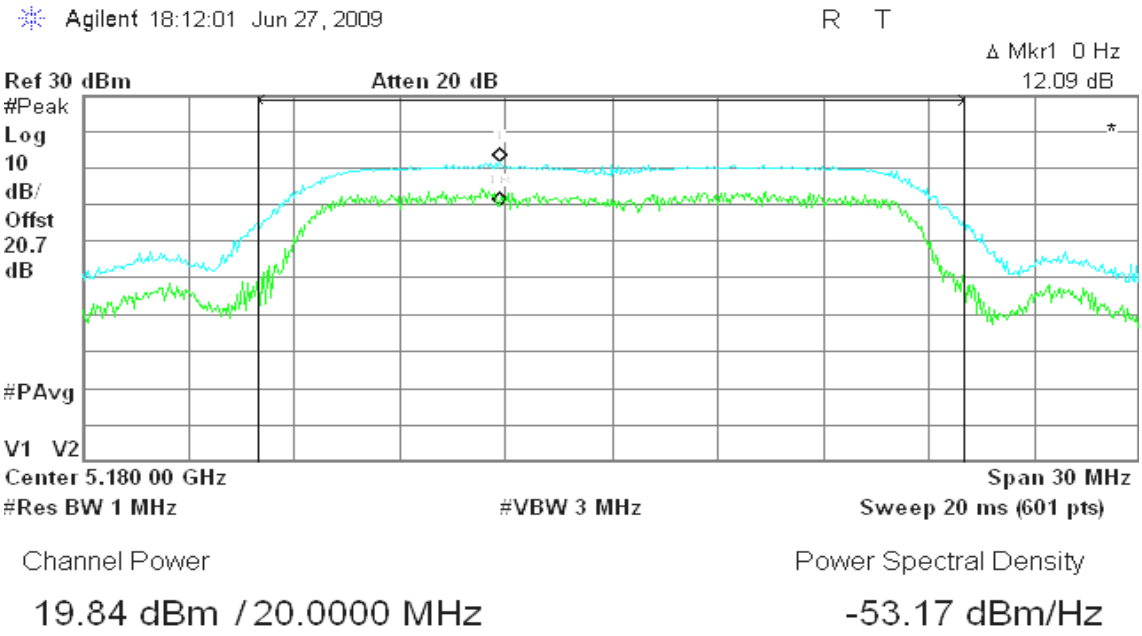
Test mode: draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 1

Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
5190	12.31	13.00	-0.69	PASS

Test Plot

IEEE 802.11a mode / 5180 ~ 5220MHz

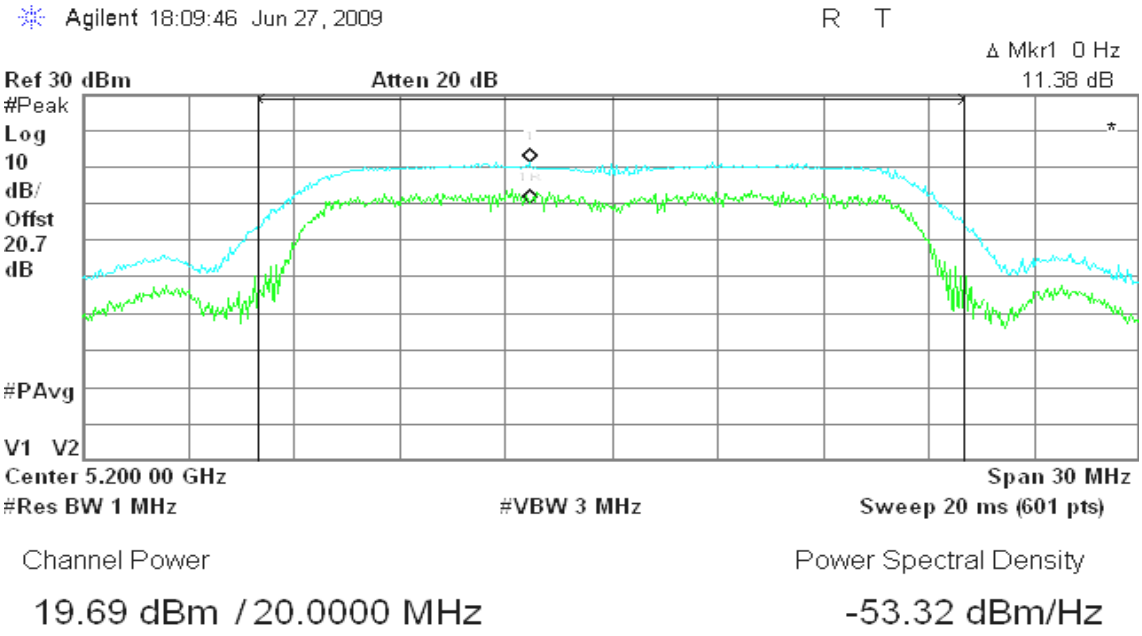
CH Low



Channel Power
19.84 dBm / 20.0000 MHz

Power Spectral Density
-53.17 dBm/Hz

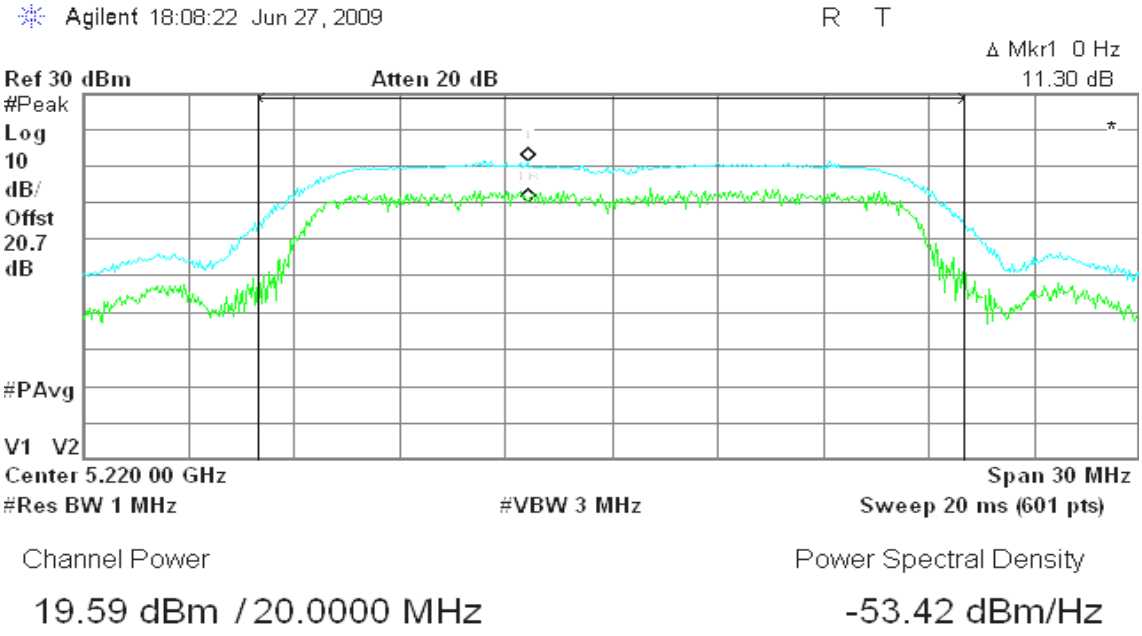
CH Mid



Channel Power
19.69 dBm / 20.0000 MHz

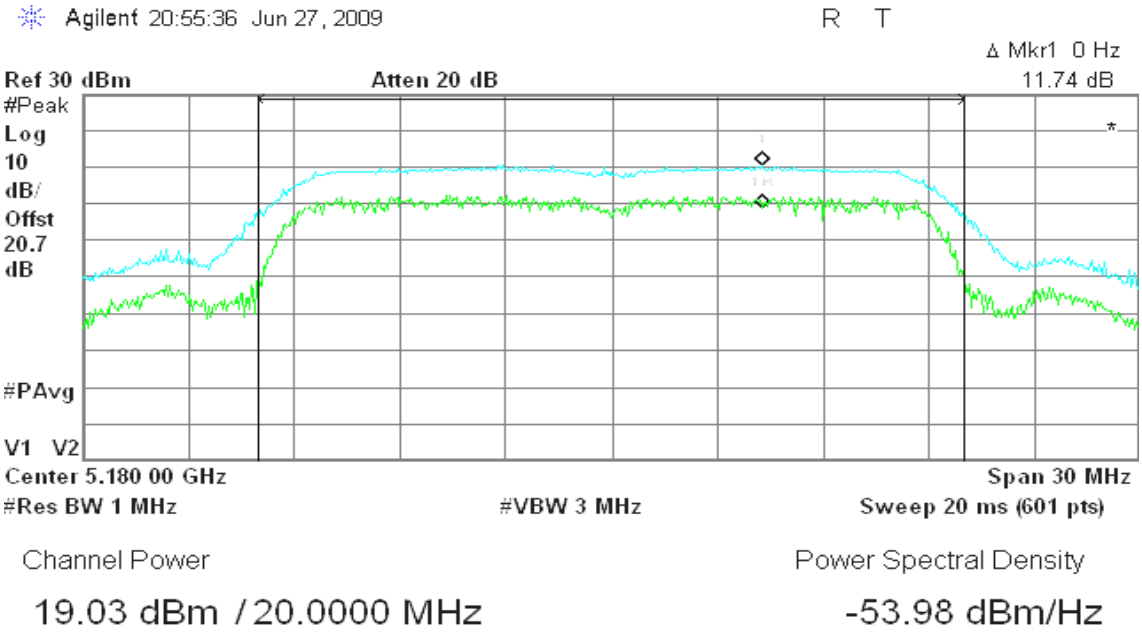
Power Spectral Density
-53.32 dBm/Hz

CH High

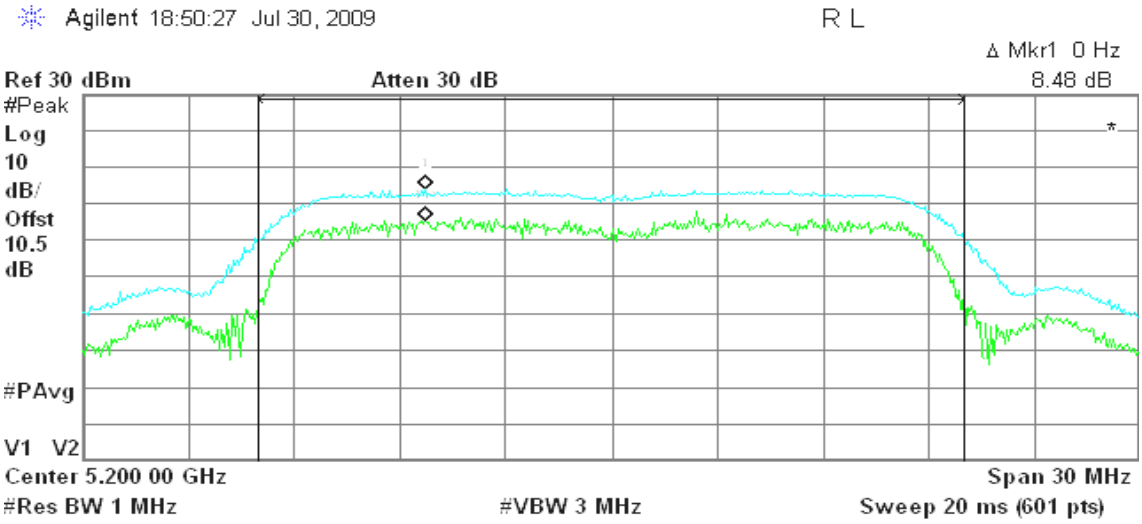


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 0

CH Low



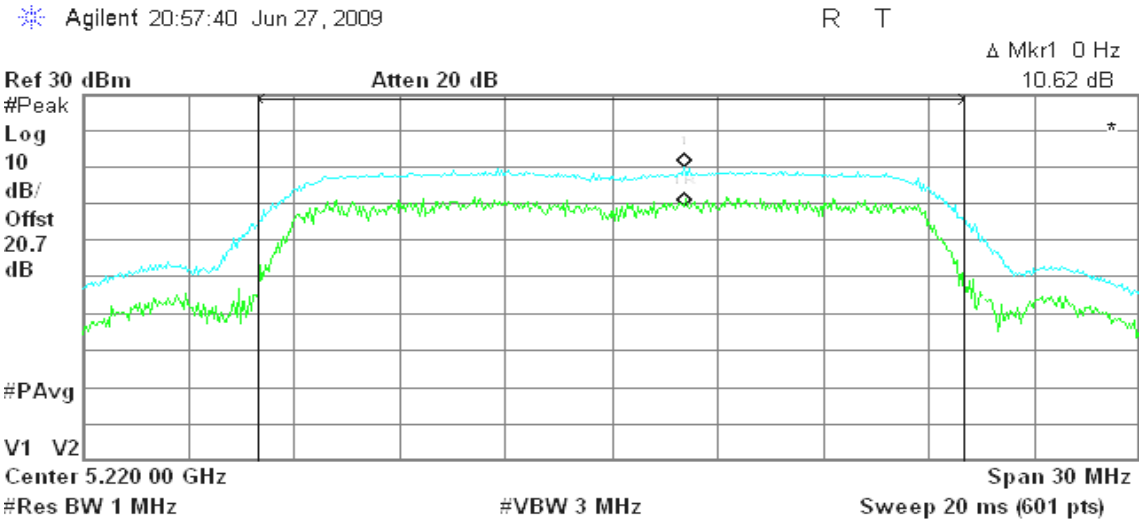
CH Mid



Channel Power
12.23 dBm / 20.0000 MHz

Power Spectral Density
-60.78 dBm/Hz

CH High

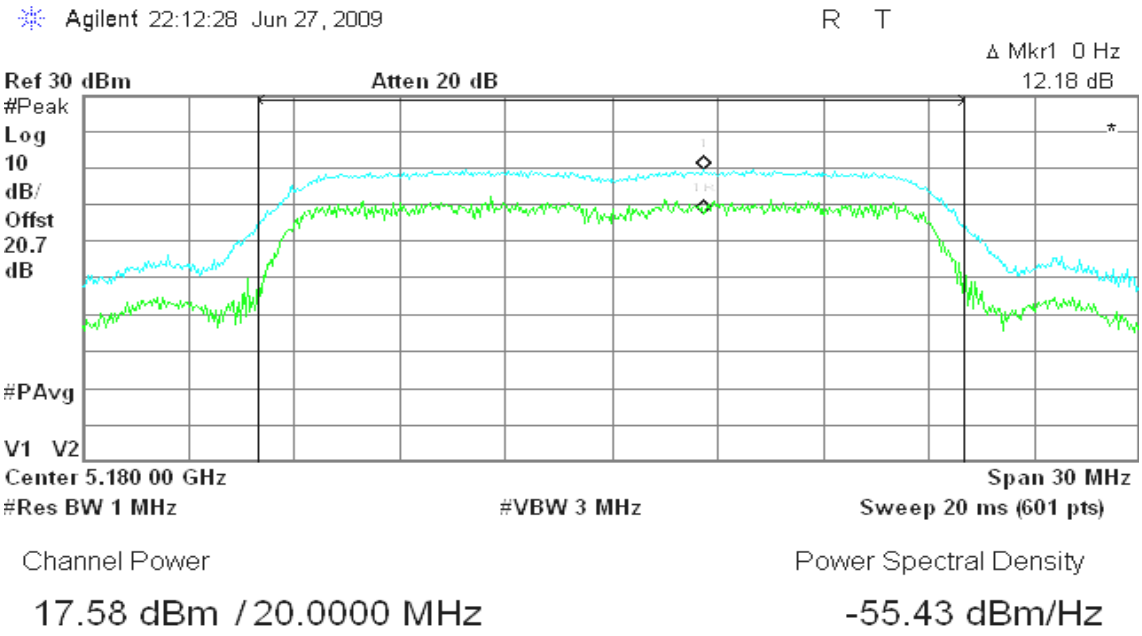


Channel Power
17.83 dBm / 20.0000 MHz

Power Spectral Density
-55.18 dBm/Hz

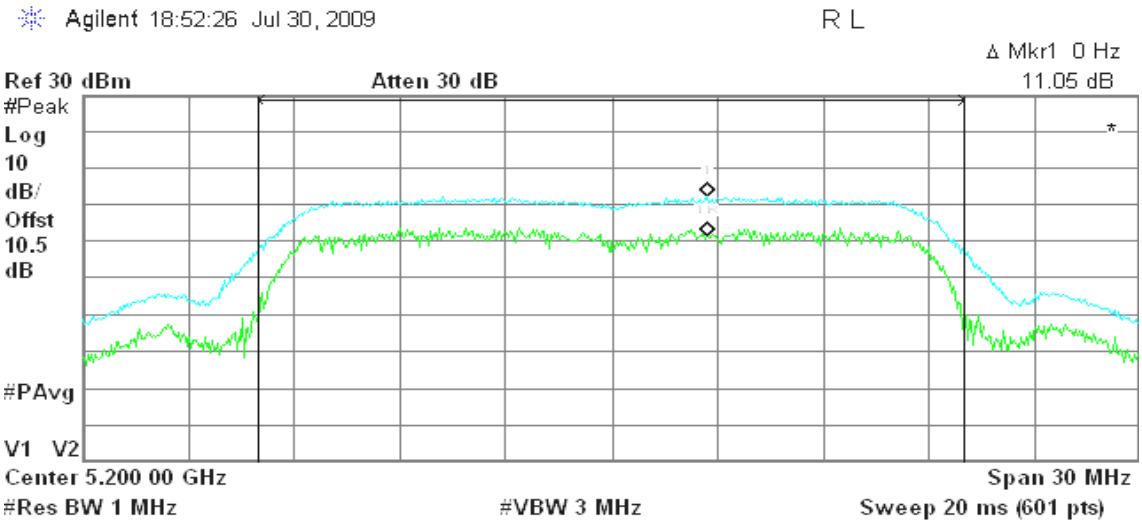
draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / Chain 1

CH Low



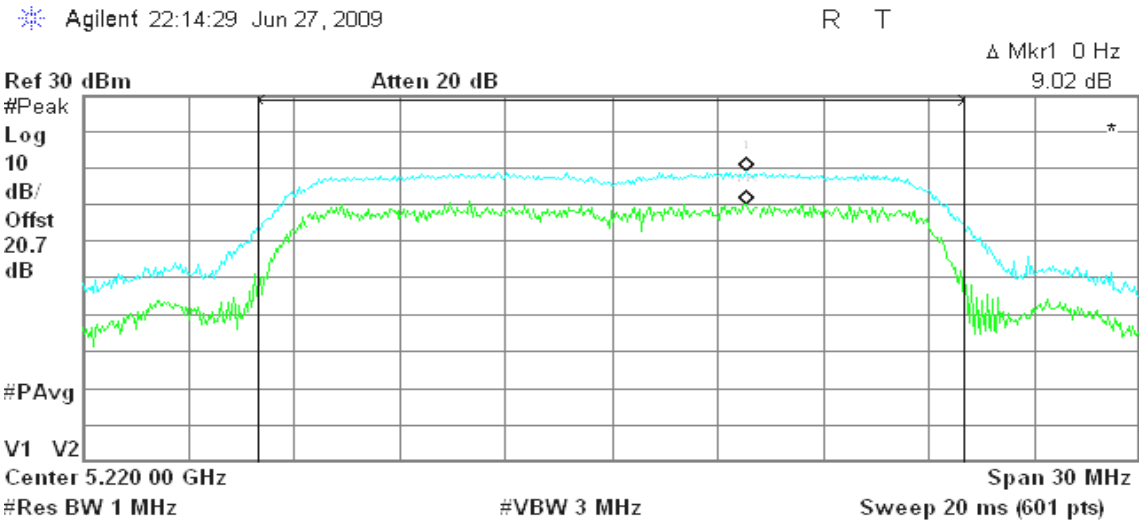
Channel Power	Power Spectral Density
17.58 dBm / 20.0000 MHz	-55.43 dBm/Hz

CH Mid



Channel Power	Power Spectral Density
9.76 dBm / 20.0000 MHz	-63.25 dBm/Hz

CH High



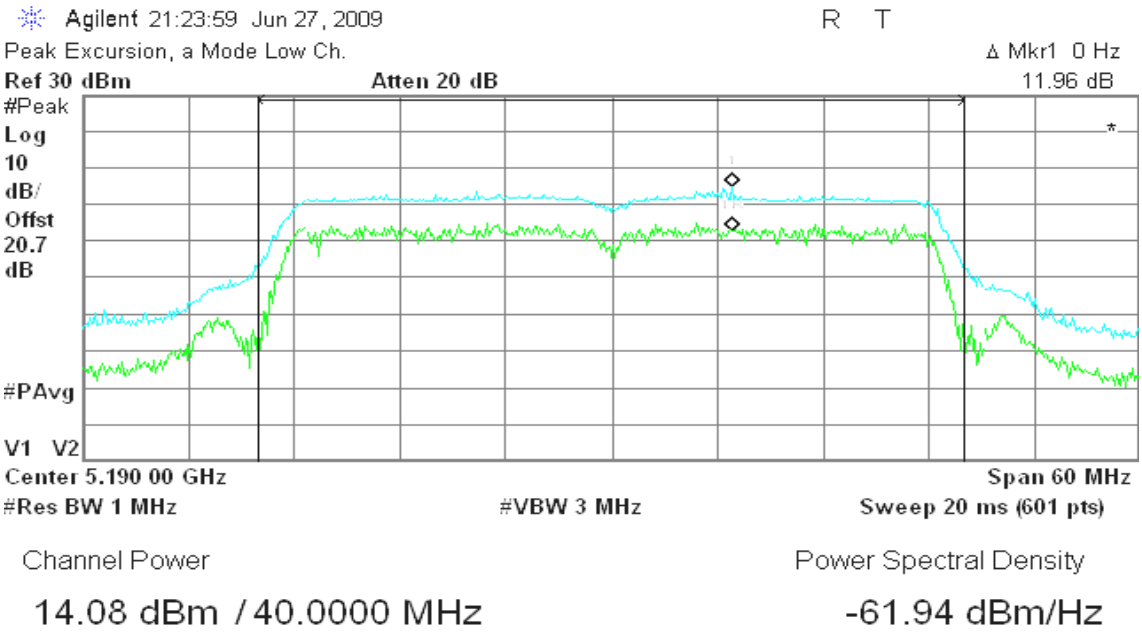
Channel Power

16.97 dBm / 20.0000 MHz

Power Spectral Density

-56.04 dBm/Hz

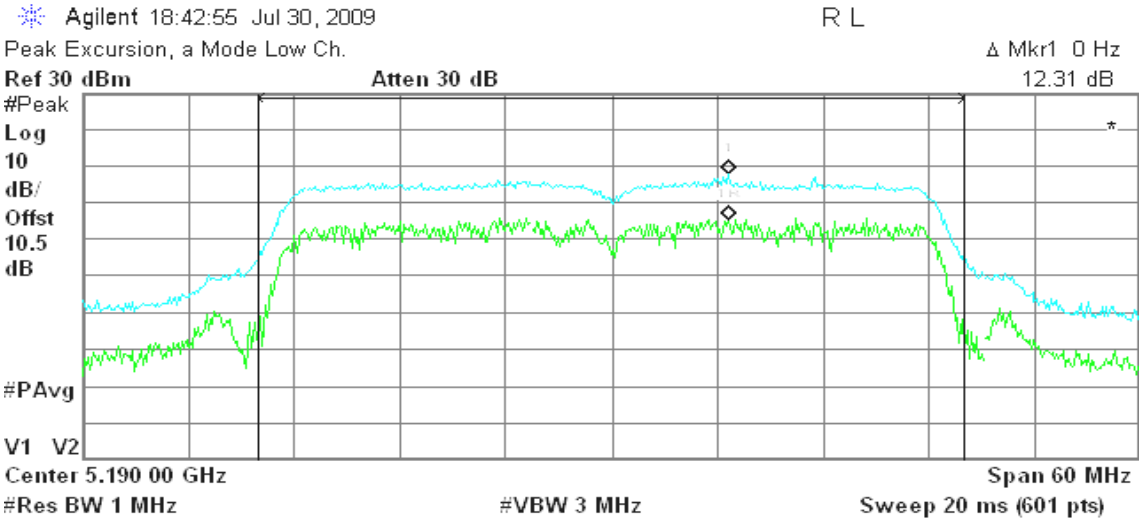
draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 0



Channel Power
14.08 dBm / 40.0000 MHz

Power Spectral Density
-61.94 dBm/Hz

draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / Chain 1



Channel Power
14.35 dBm / 40.0000 MHz

Power Spectral Density
-61.67 dBm/Hz

8.7 RADIATED UNDESIRABLE EMISSION

1. According to §15.209(a) & RSS-210 §A9.3, 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

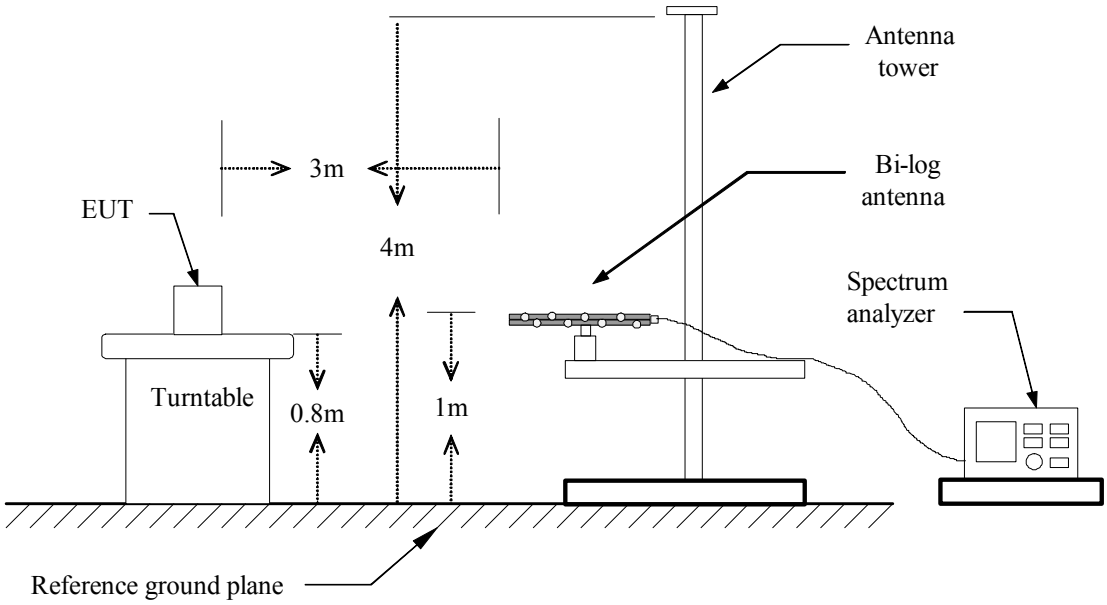
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

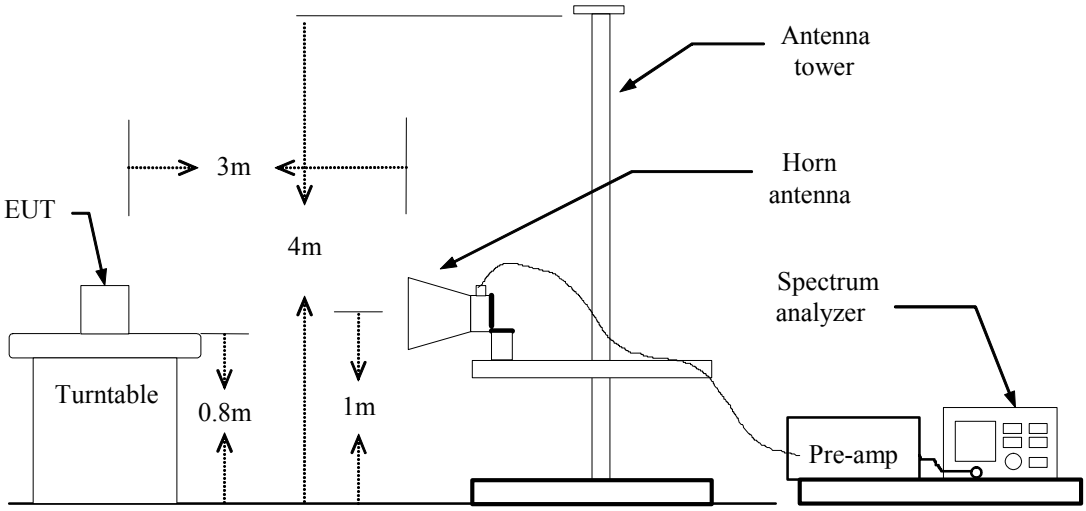
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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:** July 27, 2009

Temperature: 25°C **Tested by:** Nan Tsai

Humidity: 50% 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
60.72	V	50.63	-14.86	35.77	40.00	-4.23	Peak
133.47	V	37.64	-9.01	28.63	43.50	-14.87	Peak
228.85	V	52.18	-10.03	42.15	46.00	-3.85	Peak
233.70	V	49.59	-9.95	39.65	46.00	-6.35	Peak
405.07	V	33.72	-6.02	27.69	46.00	-18.31	Peak
666.97	V	38.48	-2.20	36.28	46.00	-9.72	Peak
233.70	H	52.48	-9.95	42.53	46.00	-3.47	QP
400.22	H	44.32	-6.06	38.27	46.00	-7.73	Peak
479.43	H	34.48	-4.70	29.77	46.00	-16.23	Peak
532.78	H	34.09	-3.25	30.84	46.00	-15.16	Peak
799.53	H	29.74	0.21	29.95	46.00	-16.05	Peak
959.58	H	29.97	2.17	32.15	46.00	-13.85	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 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 / 5180 ~ 5220MHz / CH Low	**Test Date:**	June 27, 2009
Temperature:	25°C	**Tested by:**	Nan Tsai
Humidity:	50% 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
1063.33	V	57.40	---	-7.84	49.56	---	74.00	54.00	-4.44	Peak
1600.00	V	54.01	---	-6.07	47.94	---	74.00	54.00	-6.06	Peak
1866.67	V	50.62	---	-3.52	47.09	---	74.00	54.00	-6.91	Peak
10366.67	V	50.49	37.23	13.80	64.29	51.03	74.00	54.00	-2.97	AVG
N/A										
1066.67	H	54.50	---	-7.84	46.67	---	74.00	54.00	-7.33	Peak
1203.33	H	54.66	---	-7.58	47.07	---	74.00	54.00	-6.93	Peak
1376.67	H	51.13	---	-7.26	43.87	---	74.00	54.00	-10.13	Peak
1600.00	H	52.51	---	-6.07	46.43	---	74.00	54.00	-7.57	Peak
10350.00	H	47.75	36.57	13.69	61.44	50.26	74.00	54.00	-3.74	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 / 5180 ~ 5220MHz / CH Mid	**Test Date:**	July 30, 2009
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
1063.33	V	62.19	45.54	-7.84	54.34	37.70	74.00	54.00	-16.30	AVG
1333.33	V	52.76	---	-7.34	45.42	---	74.00	54.00	-8.58	Peak
1600.00	V	54.32	---	-6.07	48.25	---	74.00	54.00	-5.75	Peak
N/A										
1066.67	H	54.66	---	-7.84	46.82	---	74.00	54.00	-7.18	Peak
1376.67	H	51.99	---	-7.26	44.73	---	74.00	54.00	-9.27	Peak
1600.00	H	53.03	---	-6.07	46.95	---	74.00	54.00	-7.05	Peak
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 / 5180 ~ 5220MHz / CH High **Test Date:** June 27, 2009

Temperature: 25°C **Tested by:** Nan Tsai

Humidity: 50% 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	54.85	---	-7.84	47.01	---	74.00	54.00	-6.99	Peak
1200.00	V	54.44	---	-7.59	46.85	---	74.00	54.00	-7.15	Peak
1600.00	V	52.19	---	-6.07	46.12	---	74.00	54.00	-7.88	Peak
1866.67	V	50.64	---	-3.52	47.12	---	74.00	54.00	-6.88	Peak
N/A										
1376.67	H	52.23	---	-7.26	44.97	---	74.00	54.00	-9.03	Peak
1463.33	H	52.80	---	-7.10	45.70	---	74.00	54.00	-8.30	Peak
1596.67	H	51.85	---	-6.11	45.75	---	74.00	54.00	-8.25	Peak
2336.67	H	50.41	---	-1.69	48.72	---	74.00	54.00	-5.28	Peak
10450.00	H	49.83	37.02	14.35	64.18	51.37	74.00	54.00	-2.63	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 / 5180 ~ 5220MHz / CH Low	**Test Date:**	June 25, 2009
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	59.73	---	-7.84	51.89	---	74.00	54.00	-2.11	Peak
1333.33	V	53.88	---	-7.34	46.54	---	74.00	54.00	-7.46	Peak
1600.00	V	54.59	---	-6.07	48.51	---	74.00	54.00	-5.49	Peak
10350.00	V	51.33	36.30	13.69	65.02	49.99	74.00	54.00	-4.01	AVG
N/A										
1063.33	H	54.16	---	-7.84	46.32	---	74.00	54.00	-7.68	Peak
1600.00	H	52.88	---	-6.07	46.80	---	74.00	54.00	-7.20	Peak
10366.67	H	46.00	32.88	13.80	59.80	46.68	74.00	54.00	-7.32	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 / 5180 ~ 5220MHz / CH Mid	**Test Date:**	July 30, 2009
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	58.30	---	-7.84	50.46	---	74.00	54.00	-3.54	Peak
1193.33	V	53.48	---	-7.60	45.88	---	74.00	54.00	-8.12	Peak
1596.67	V	52.89	---	-6.11	46.79	---	74.00	54.00	-7.21	Peak
1866.67	V	50.42	---	-3.52	46.89	---	74.00	54.00	-7.11	Peak
N/A										
1066.67	H	53.29	---	-7.84	45.45	---	74.00	54.00	-8.55	Peak
1373.33	H	51.54	---	-7.27	44.27	---	74.00	54.00	-9.73	Peak
1603.33	H	52.98	---	-6.04	46.94	---	74.00	54.00	-7.06	Peak
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 / 5180 ~ 5220MHz / CH High **Test Date:** June 27, 2009

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	58.22	---	-7.84	50.38	---	74.00	54.00	-3.62	Peak
1600.00	V	56.27	---	-6.07	50.20	---	74.00	54.00	-3.80	Peak
10450.00	V	50.40	37.21	14.35	64.75	51.56	74.00	54.00	-2.44	AVG
N/A										
1066.67	H	55.67	---	-7.84	47.84	---	74.00	54.00	-6.16	Peak
10433.33	H	45.68	34.43	14.24	59.92	48.67	74.00	54.00	-5.33	AVG
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).*

Operation Mode:	Tx / draft 802.11n Wide-40 MHz Channel mode / 5190 MHz	**Test Date:**	June 27, 2009
Temperature:	23°C	**Tested by:**	Nan Tsai
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
1063.33	V	54.25	---	-7.84	46.40	---	74.00	54.00	-7.60	Peak
1123.33	V	54.30	---	-7.73	46.57	---	74.00	54.00	-7.43	Peak
1603.33	V	54.02	---	-6.04	47.98	---	74.00	54.00	-6.02	Peak
1863.33	V	51.64	---	-3.56	48.08	---	74.00	54.00	-5.92	Peak
N/A										
1066.67	H	53.20	---	-7.84	45.37	---	74.00	54.00	-8.63	Peak
1600.00	H	51.41	---	-6.07	45.33	---	74.00	54.00	-8.67	Peak
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: RX / IEEE 802.11a / CH Mid **Test Date:** June 27, 2009

Temperature: 25°C **Tested by:** Nan Tsai

Humidity: 50 % 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
2633.33	V	48.92	---	-1.16	47.77	---	74.00	54.00	-6.23	Peak
N/A										
3251.67	H	48.19	---	-0.15	48.05	---	74.00	54.00	-5.95	Peak
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 or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

8.8 CONDUCTED UNDESIRABLE EMISSION

LIMIT

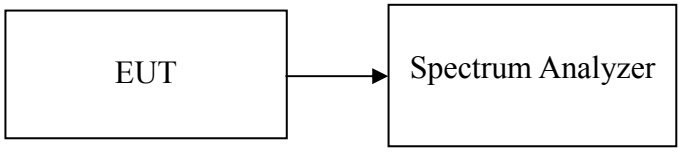
According to 15.407(b) & RSS-210 §A9.3,

(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 20GHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

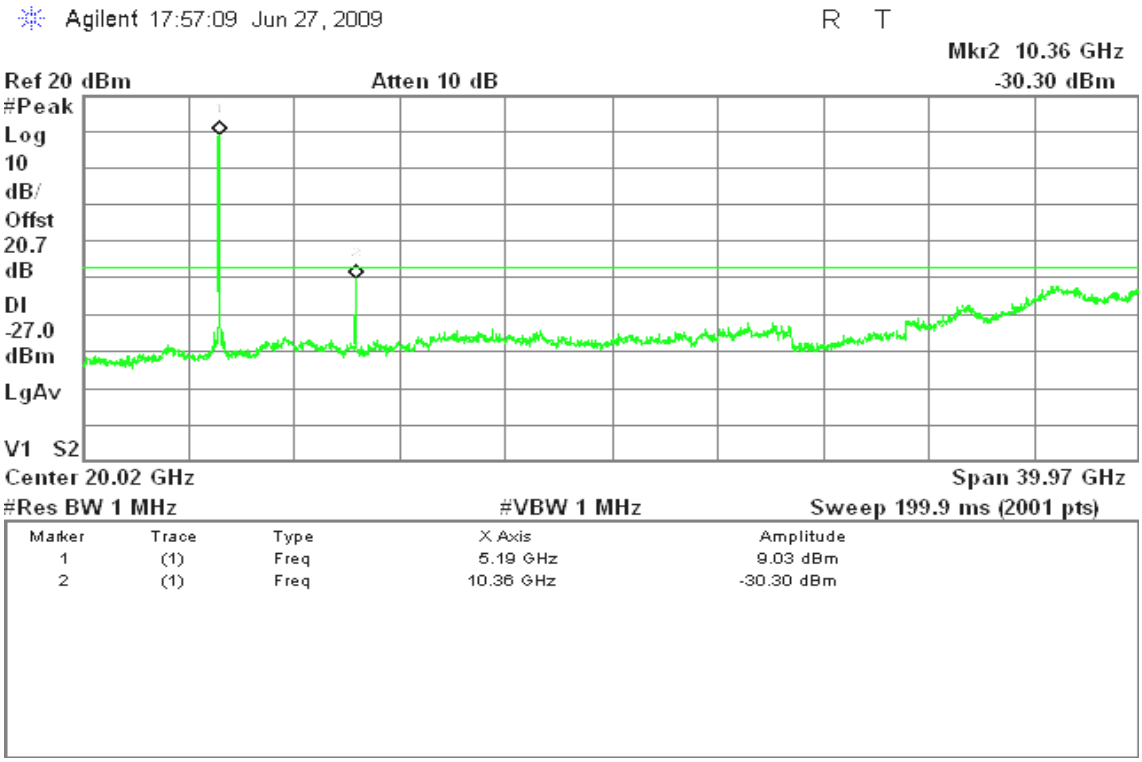
TEST RESULTS

No non-compliance noted

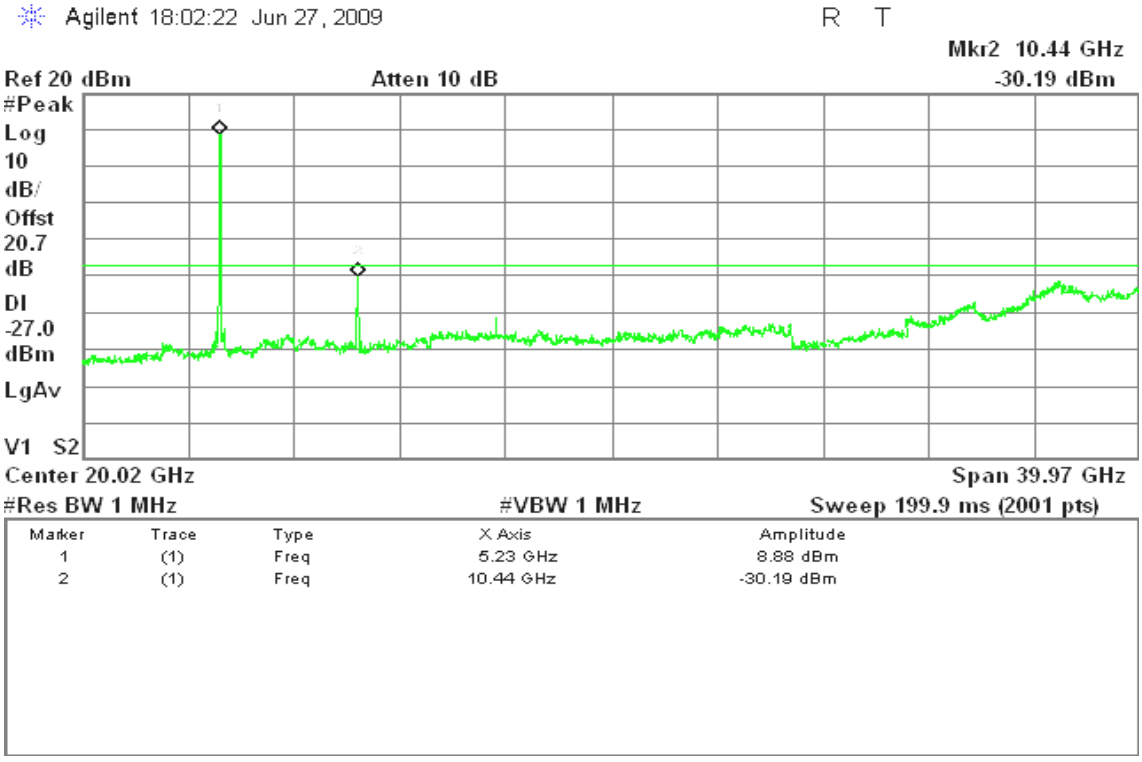
Test Plot

IEEE 802.11a (5180 ~ 5220MHz)

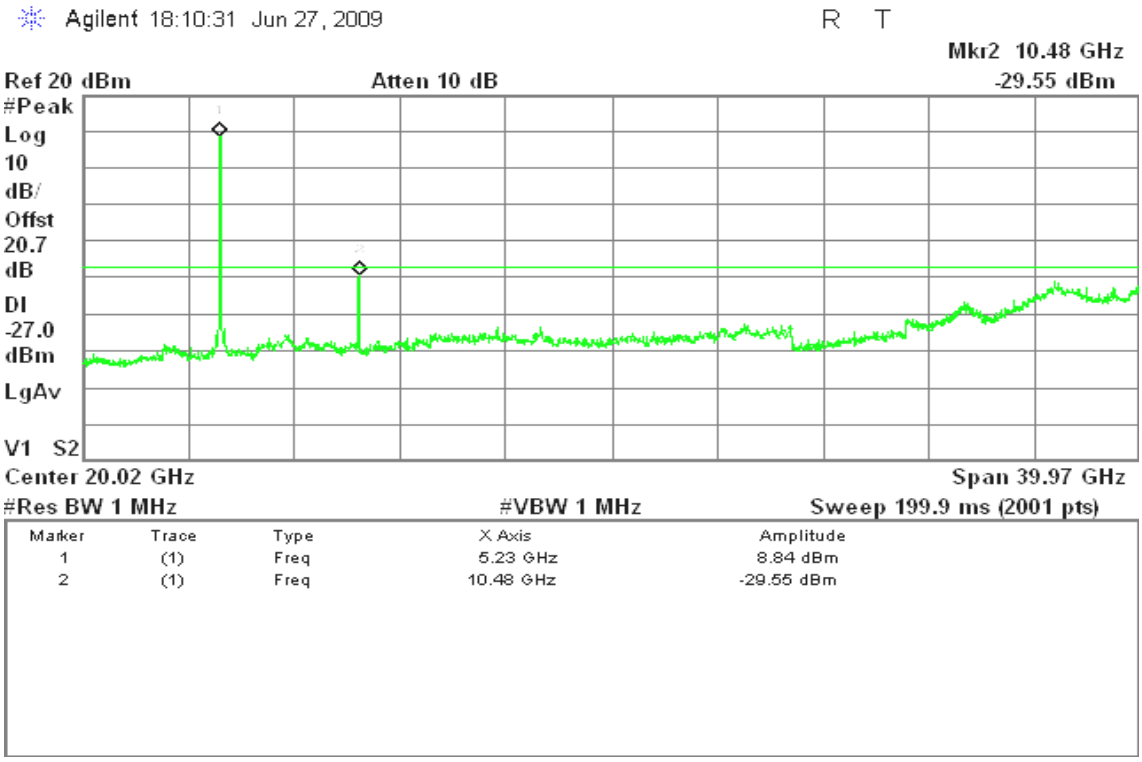
CH Low



CH Mid

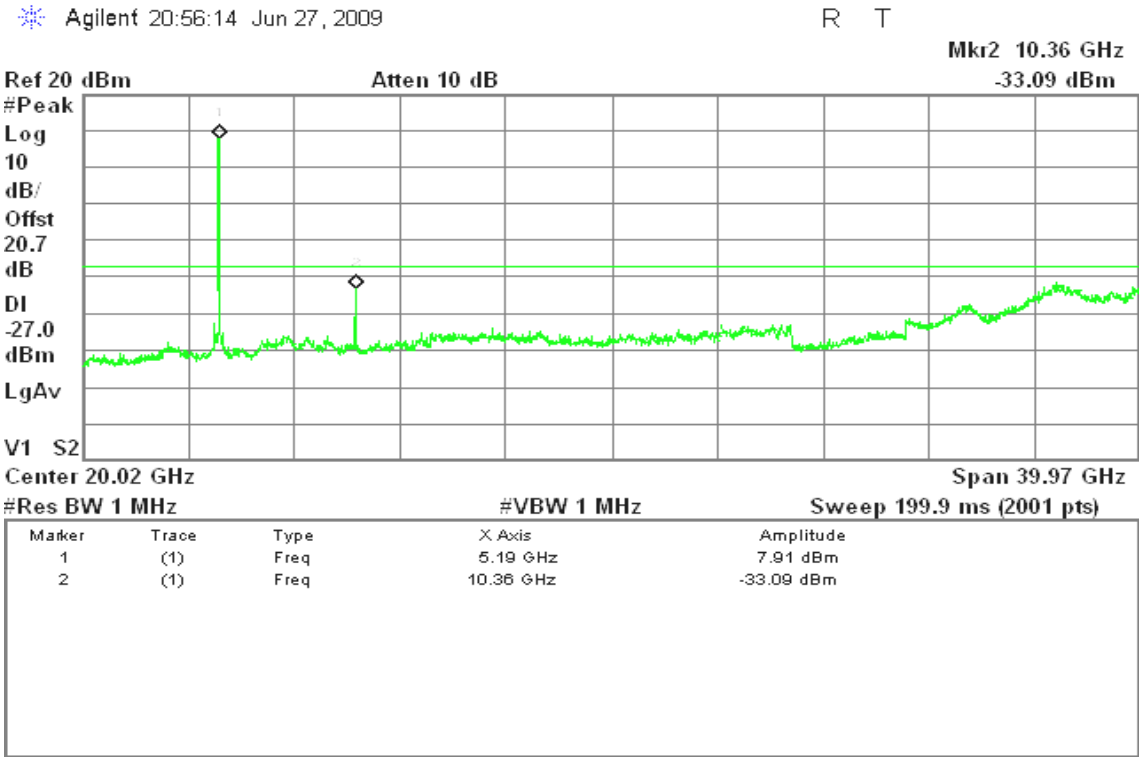


CH High

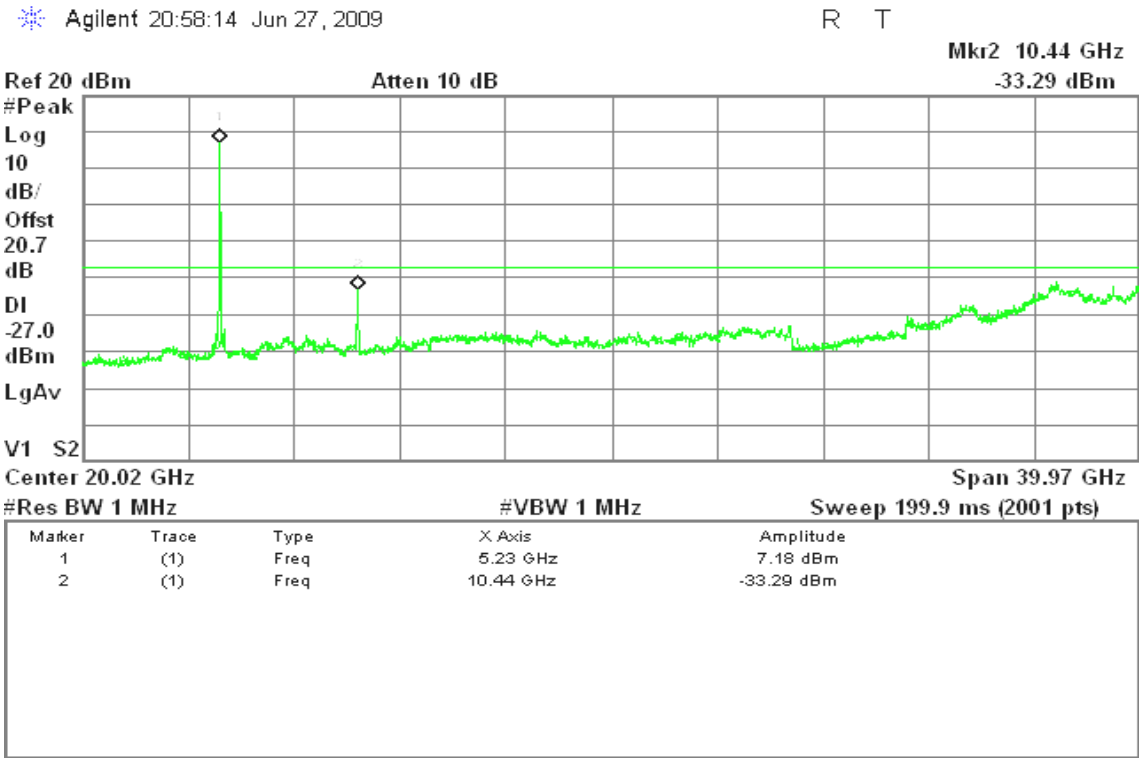


draft 802.11n Standard-20 MHz (5180 ~ 5220MHz) / Chain 0

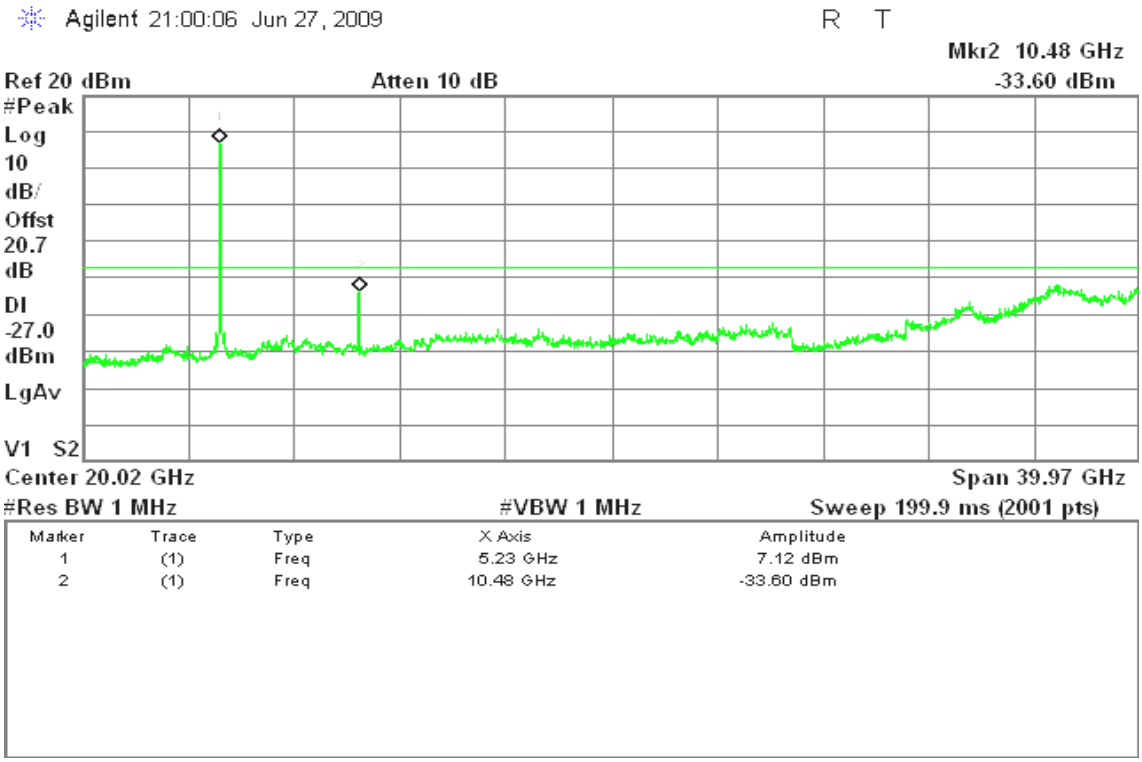
CH Low



CH Mid

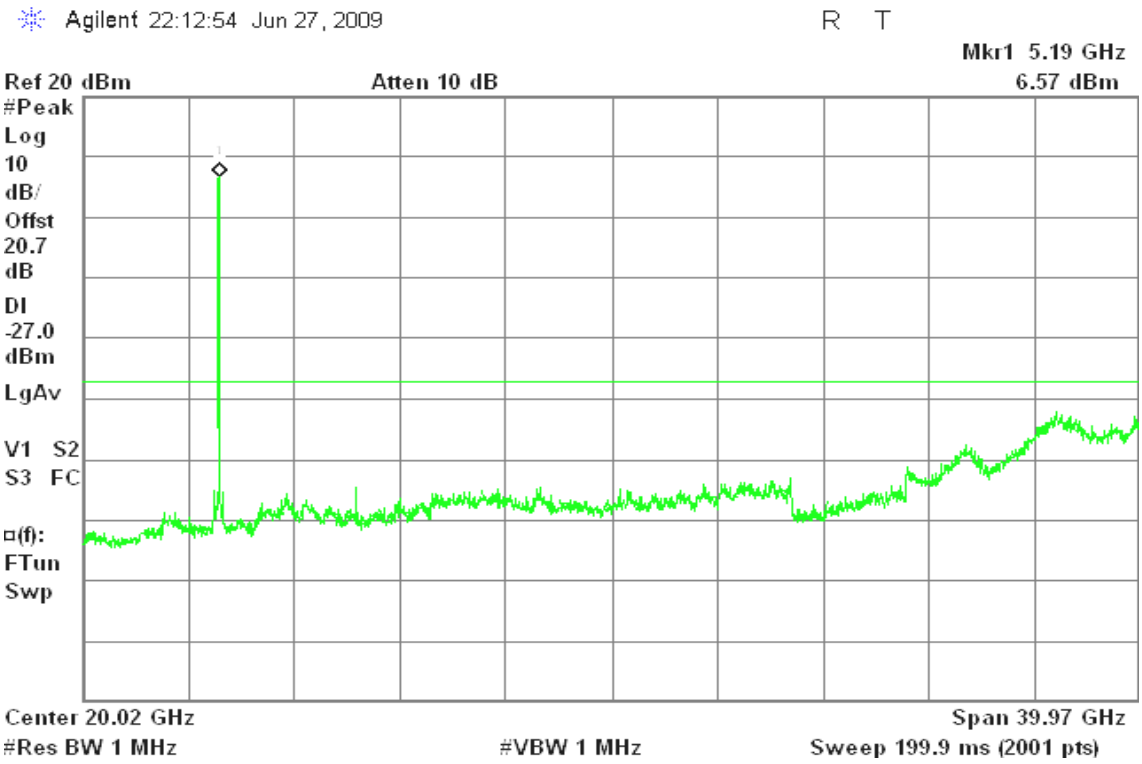


CH High

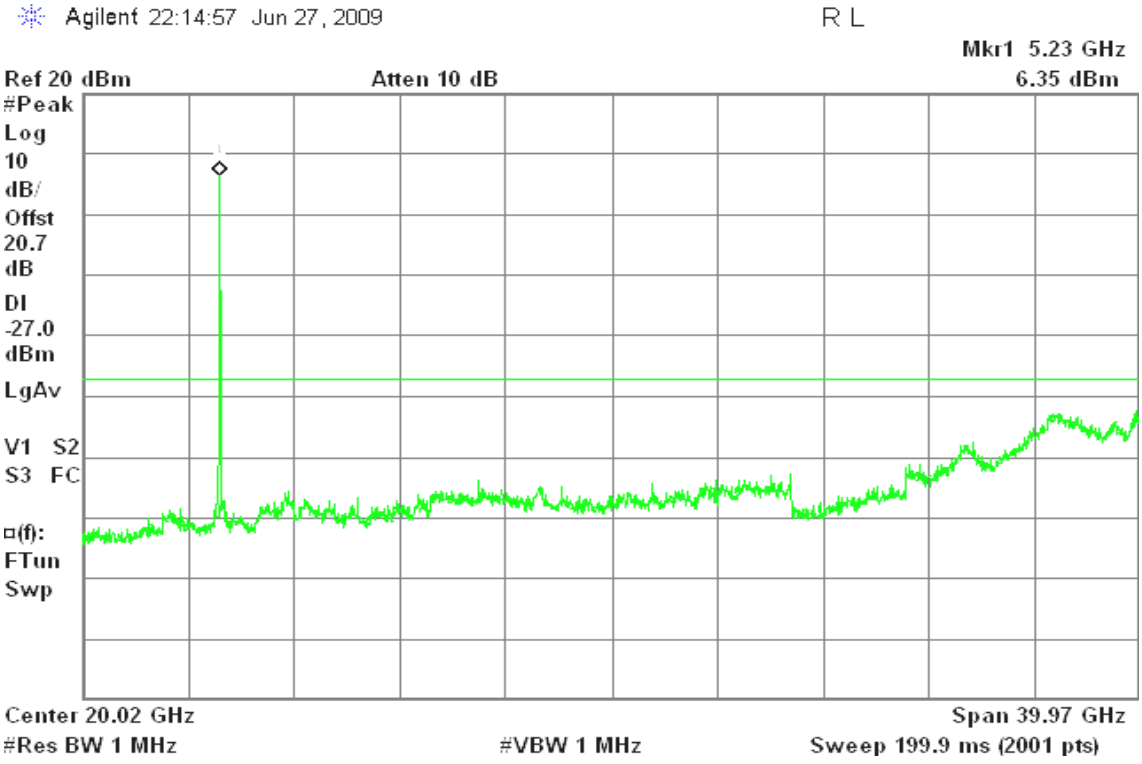


draft 802.11n Standard-20 MHz (5180 ~ 5220MHz) / Chain 1

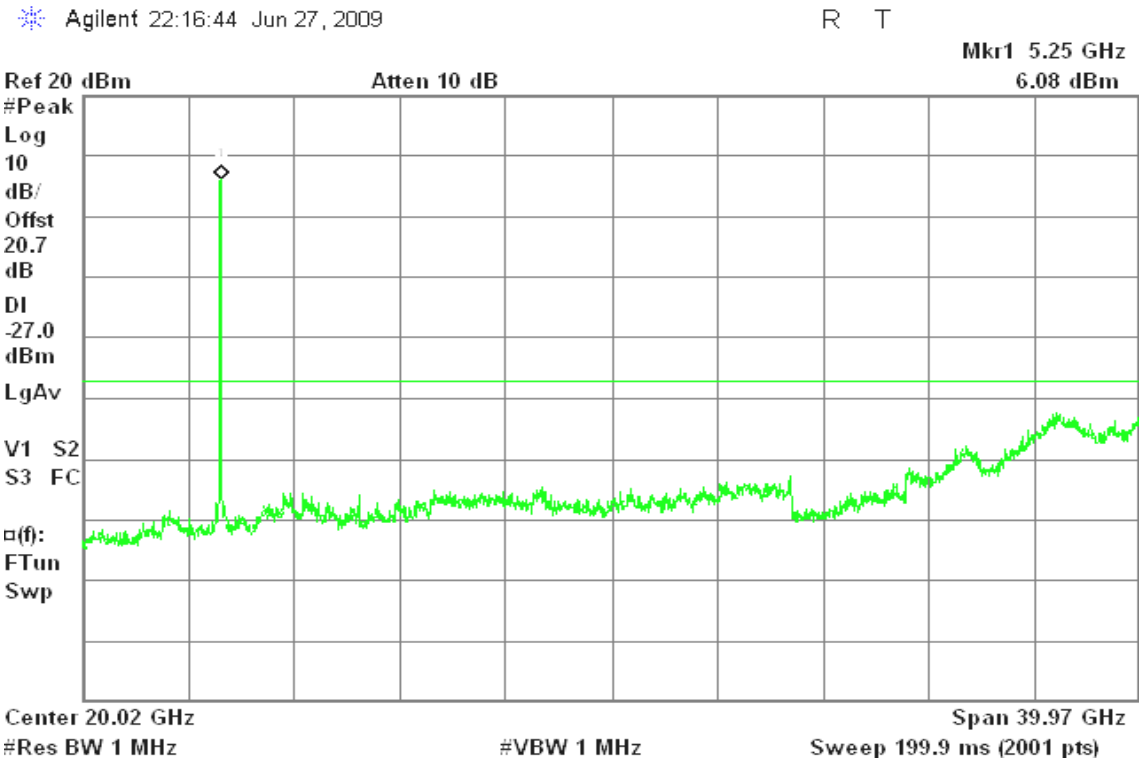
CH Low



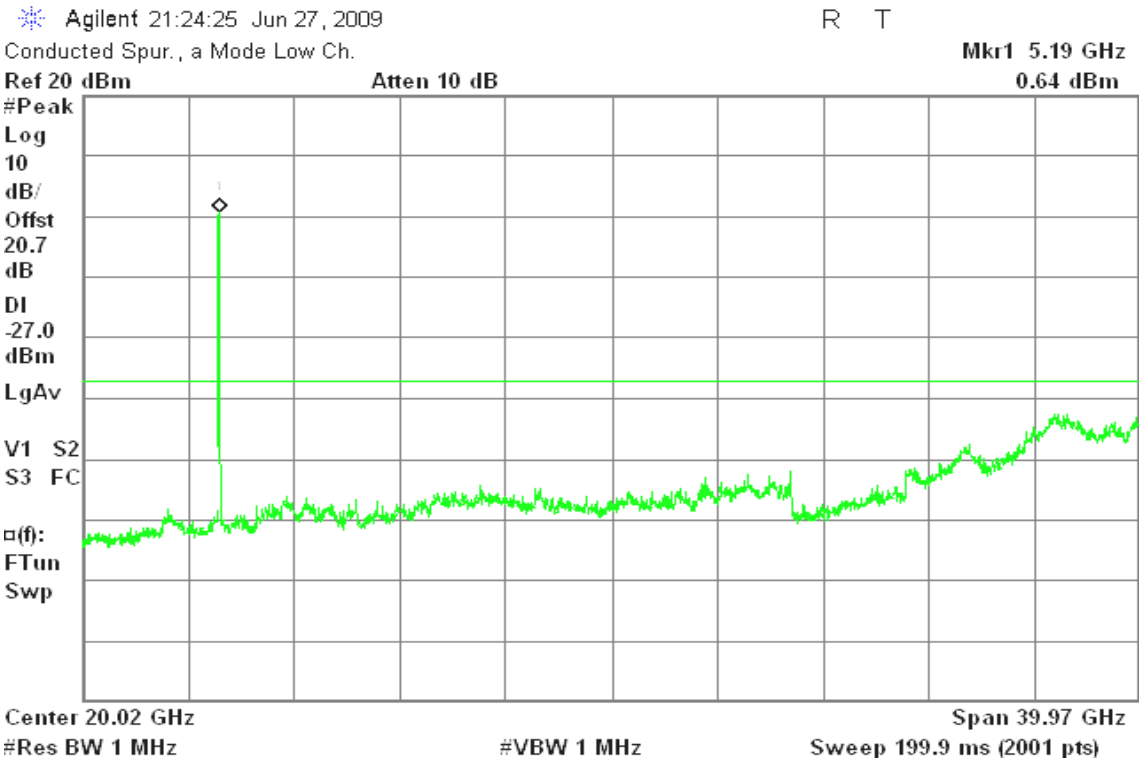
CH Mid



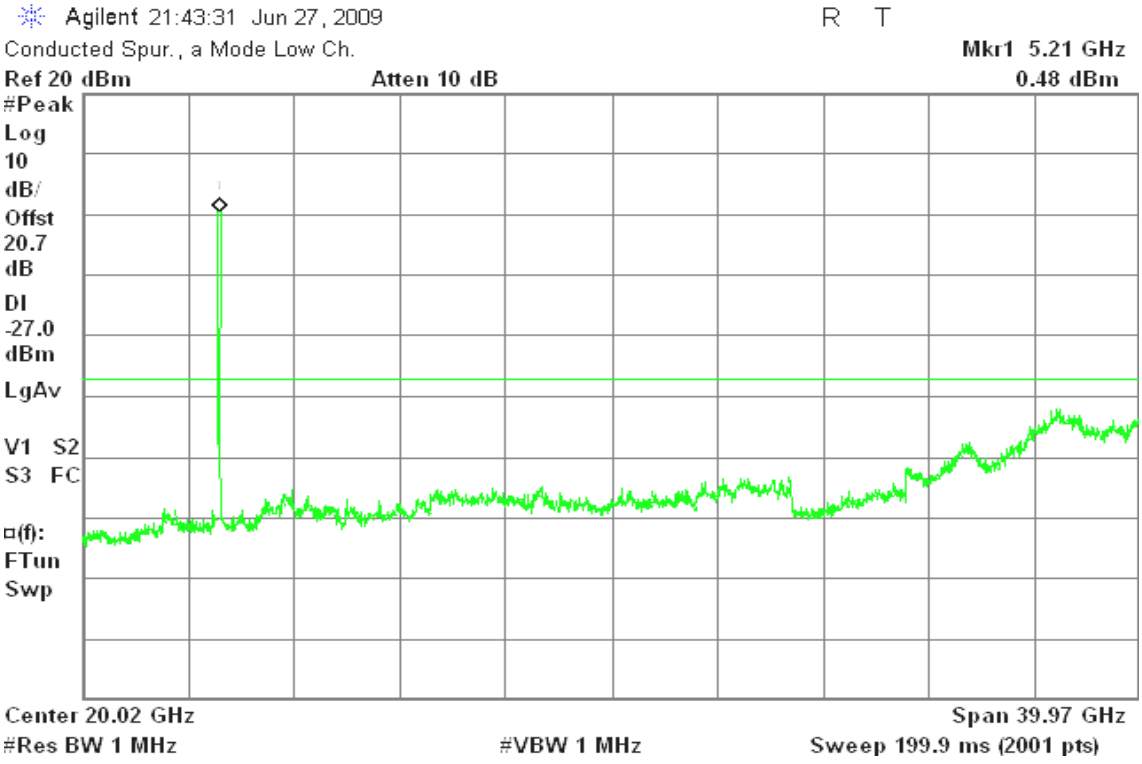
CH High


Agilent 22:16:44 Jun 27, 2009
R T
Mkr1 5.25 GHz
6.08 dBm
Ref 20 dBm
Atten 10 dB
#Peak
Log
10
dB/
Offst
20.7
dB
Dl
-27.0
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Center 20.02 GHz
Span 39.97 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 199.9 ms (2001 pts)

draft 802.11n Wide-40 MHz (5190 MHz) / Chain 0

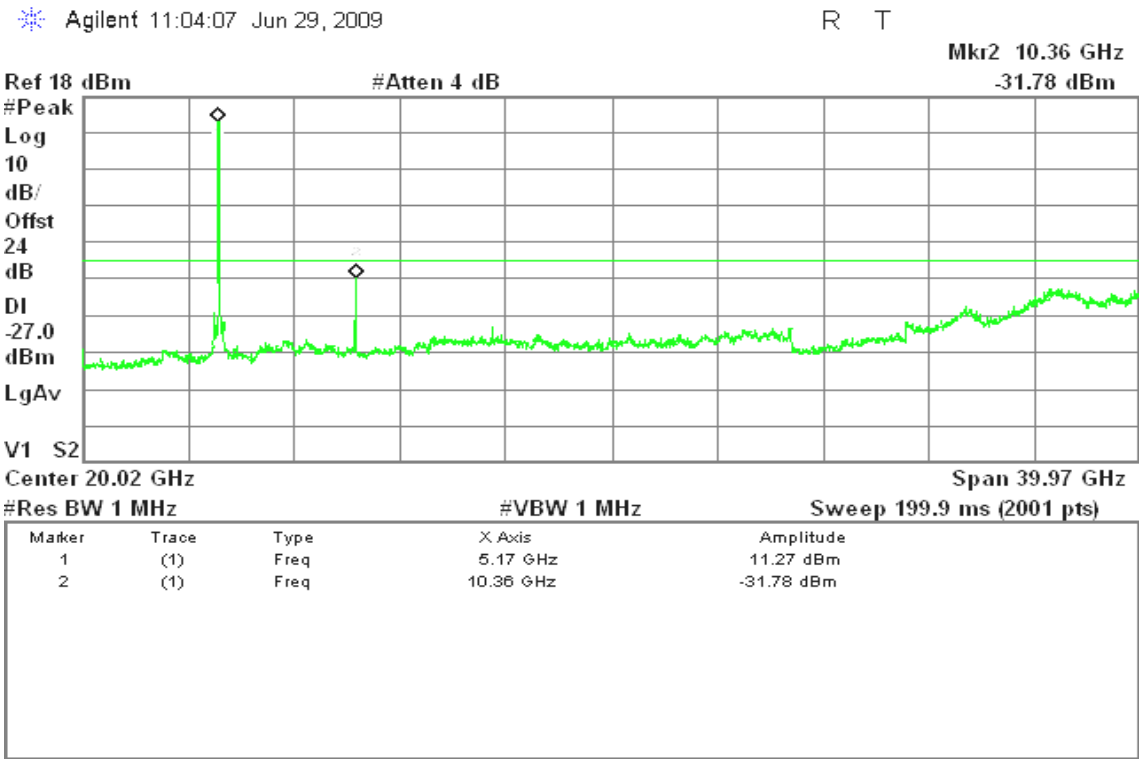


draft 802.11n Wide-40 MHz (5190 MHz) / Chain 1

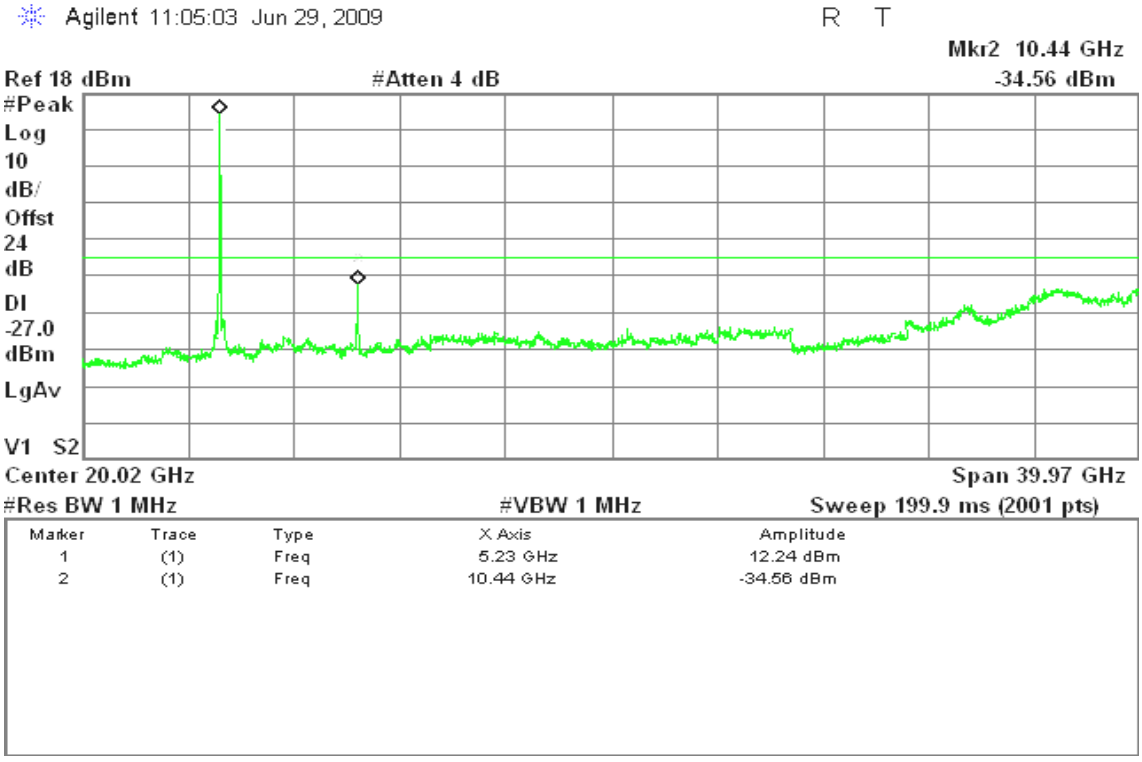


draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220MHz / with combiner

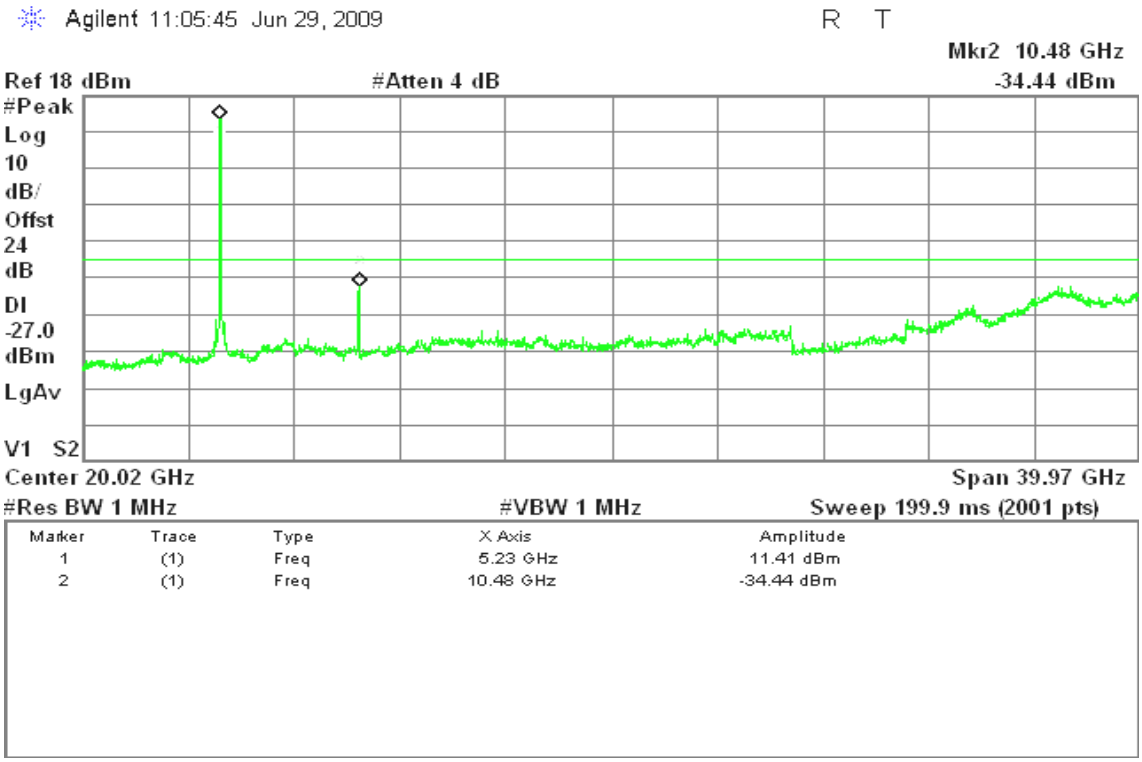
CH Low



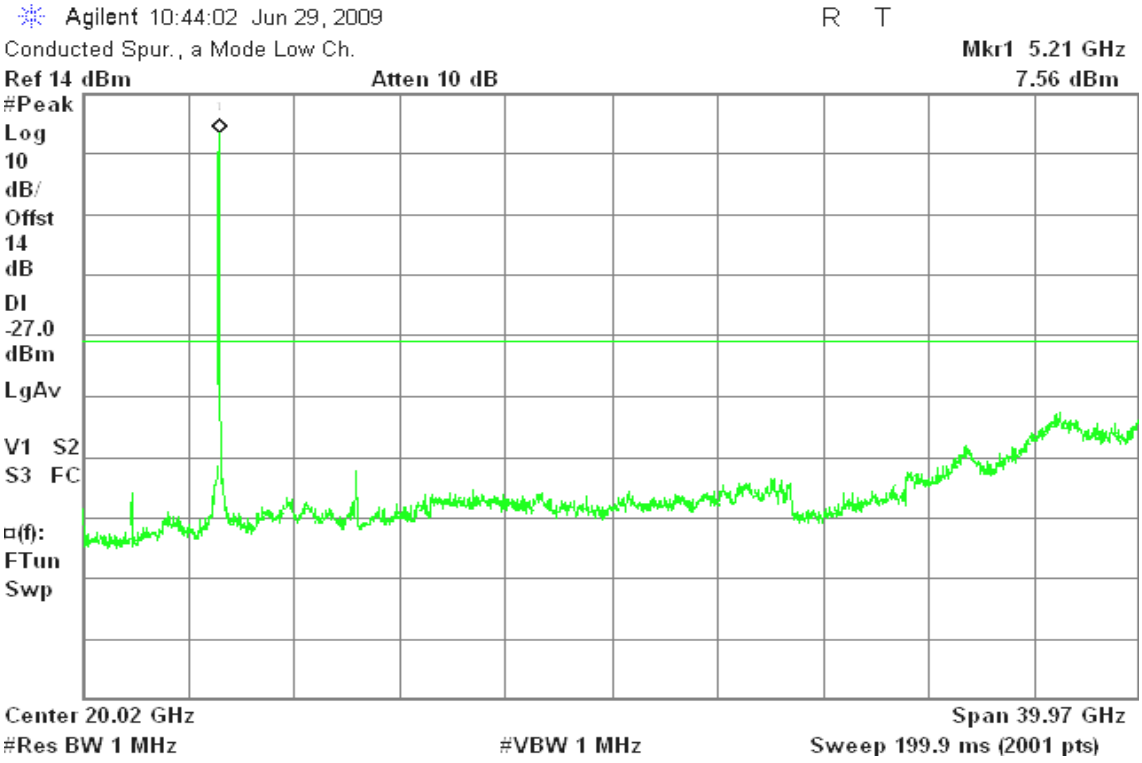
CH Mid



CH High



draft 802.11n Wide-40 MHz Channel mode / 5190 MHz / with combiner



8.9 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 II 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:**	May 22, 2009
Temperature:	24°C	**Tested by:**	Webber Chung
Humidity:	59% RH		

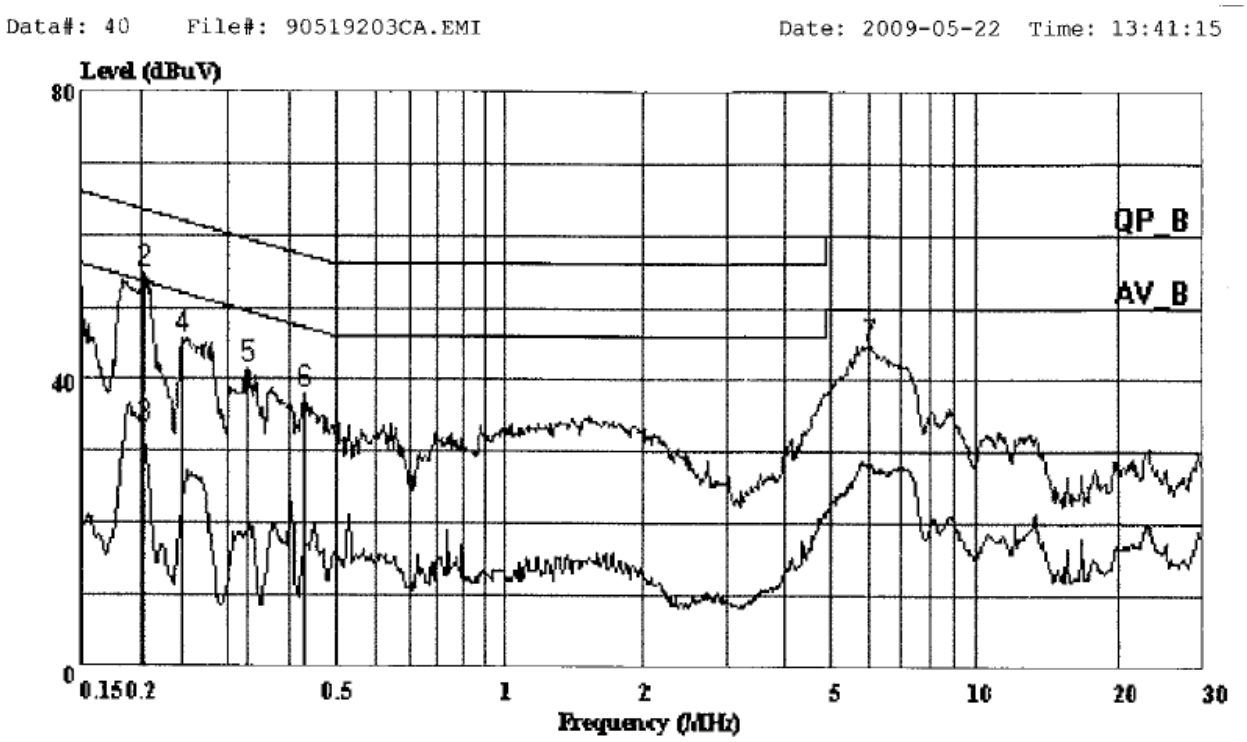
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.151	48.81	---	0.07	48.88	---	65.96	---	-17.08	---	L1
0.203	54.52	33.09	0.06	54.58	33.15	63.49	53.49	-8.91	-20.34	L1
0.243	45.60	---	0.06	45.66	---	62.00	---	-16.34	---	L1
0.330	41.34	--	0.06	41.40	---	59.44	---	-18.04	---	L1
0.428	38.03	---	0.06	38.09	---	57.29	----	-19.19	---	L1
6.089	44.40	---	0.42	44.82	---	60.00	---	-15.18	---	L1
0.151	47.55	---	0.08	47.63	---	65.96	---	-18.33	---	L2
0.188	56.88	36.99	0.07	56.95	37.06	64.11	54.11	-7.16	-17.05	L2
0.247	49.89	---	0.07	49.96	---	61.86	---	-11.90	---	L2
0.317	42.32	---	0.07	42.39	---	59.80	---	-17.41	---	L2
0.449	37.61	---	0.08	37.61	---	56.89	---	-19.20	---	L2
6.024	44.76	---	0.34	45.10	---	60.00	---	-14.90	---	L2

Remark:

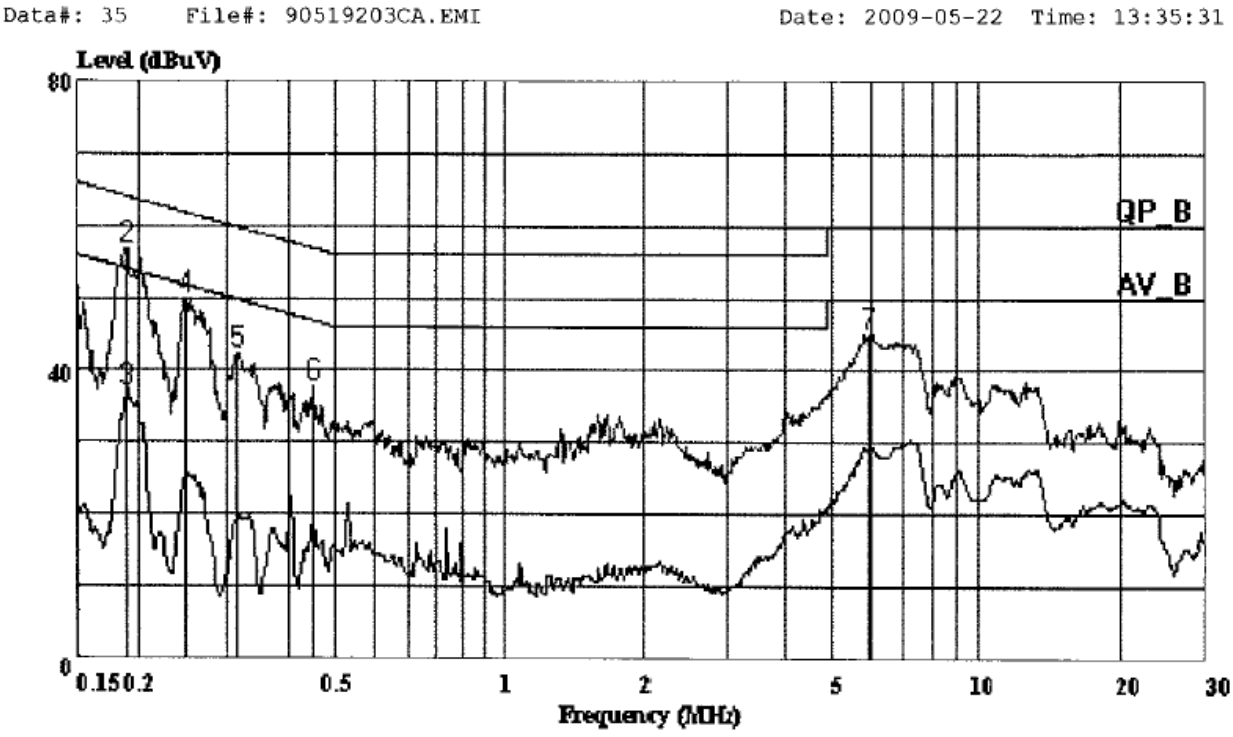
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between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

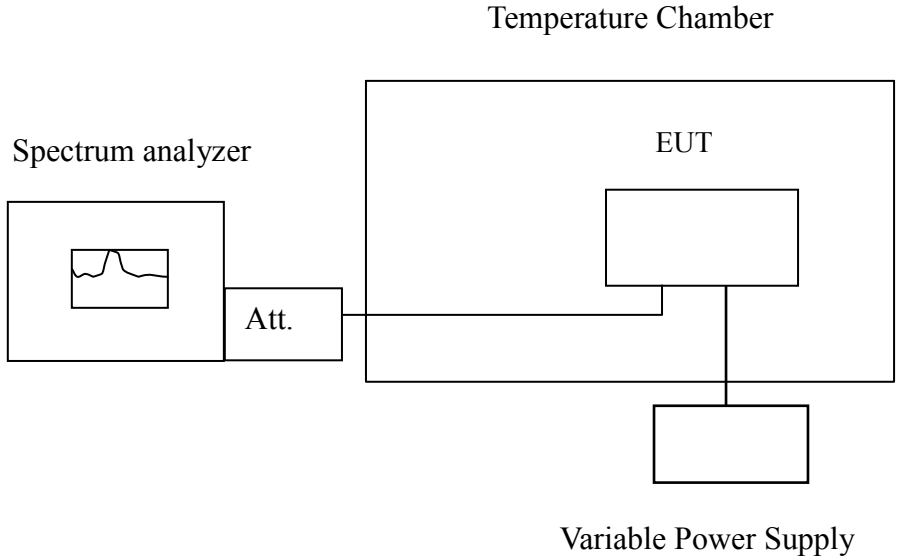


8.10 FREQUENCY STABILITY

LIMIT

According to §15.407(g) & RSS-210 §A9.5(5), 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 operational description.

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 / 5180 ~ 5220 MHz:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5180.019007	5150~5250	Pass
40	110	5179.984448	5150~5250	Pass
30	110	5179.996700	5150~5250	Pass
20	110	5180.011605	5150~5250	Pass
10	110	5180.018181	5150~5250	Pass
0	110	5179.984985	5150~5250	Pass
-10	110	5180.018112	5150~5250	Pass
-20	110	5180.020665	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5179.989114	5150~5250	Pass
	110	5180.004767	5150~5250	Pass
	121	5179.984792	5150~5250	Pass

CH High

Operating Frequency: 5220 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5219.99213	5150~5250	Pass
40	110	5219.998329	5150~5250	Pass
30	110	5219.976254	5150~5250	Pass
20	110	5219.991966	5150~5250	Pass
10	110	5219.995623	5150~5250	Pass
0	110	5219.980678	5150~5250	Pass
-10	110	5220.01212	5150~5250	Pass
-20	110	5219.981708	5150~5250	Pass

Operating Frequency: 5220 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5220.005465	5150~5250	Pass
	110	5219.982543	5150~5250	Pass
	121	5220.010718	5150~5250	Pass

draft 802.11n Standard-20 MHz Channel mode / 5180 ~ 5220 MHz:

CH Low

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5180.001264	5150~5250	Pass
40	110	5179.992734	5150~5250	Pass
30	110	5179.976220	5150~5250	Pass
20	110	5180.019668	5150~5250	Pass
10	110	5180.000187	5150~5250	Pass
0	110	5179.986879	5150~5250	Pass
-10	110	5179.997586	5150~5250	Pass
-20	110	5179.993536	5150~5250	Pass

Operating Frequency: 5180 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5179.971623	5150~5250	Pass
	110	5180.014185	5150~5250	Pass
	121	5180.012982	5150~5250	Pass

CH High

Operating Frequency: 5220 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5220.006386	5150~5250	Pass
40	110	5219.986391	5150~5250	Pass
30	110	5220.01706	5150~5250	Pass
20	110	5219.990983	5150~5250	Pass
10	110	5219.996963	5150~5250	Pass
0	110	5220.00643	5150~5250	Pass
-10	110	5219.988547	5150~5250	Pass
-20	110	5220.004898	5150~5250	Pass

Operating Frequency: 5220 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5219.97042	5150~5250	Pass
	110	5220.016788	5150~5250	Pass
	121	5220.010234	5150~5250	Pass

draft 802.11n Wide-40 MHz Channel mode / 5190 MHz:

Operating Frequency: 5190 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
50	110	5189.986827	5150~5250	Pass
40	110	5189.995626	5150~5250	Pass
30	110	5190.01822	5150~5250	Pass
20	110	5190.010512	5150~5250	Pass
10	110	5189.996066	5150~5250	Pass
0	110	5190.003479	5150~5250	Pass
-10	110	5189.977551	5150~5250	Pass
-20	110	5189.983803	5150~5250	Pass

Operating Frequency: 5190 MHz,				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	99	5190.005008	5150~5250	Pass
	110	5189.996665	5150~5250	Pass
	121	5189.976008	5150~5250	Pass

8.11 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".

***Remark**: IC RSS-210 §A9.5 is closely harmonized with FCC Part 15 DFS rules.*

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	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

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

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

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

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