



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

802.11a/b/g/n access point

Model: HiveAP 320

Trade Name: Aerohive

Issued to

Aerohive Networks, Inc.

3150-C Coronado Drive Santa Clara, California 95054

Prepared by

COMPLIANCE CERTIFICATION SERVICES (KUNSHAN) INC.

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1. TEST RESULT CERTIFICATION

Applicant: Aerohive Networks, Inc.
 3150-C Coronado Drive Santa Clara, California 95054

Equipment Under Test: 802.11a/b/g/n access point

Trade Name: Aerohive

Model: HiveAP 320

Date of Test: August 22,2008 ~ February 2,2009

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

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

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

Approved by:

Reviewed by:

Miro Chueh
 EMC Manager
 Compliance Certification Services Inc.

Lin Zhang
 EMC Section Manager
 Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	802.11a/b/g/n access point
Trade Name	Aerohive
Model Number	HiveAP 320
Frequency Range	5.15~5.25 GHz
Transmit Power	IEEE 802.11a mode: 9.90 dBm draft 802.11n Standard-20 MHz Channel mode: 16.65dBm draft 802.11n Wide-40 MHz Channel mode: 16.12 dBm (the EUT transmitting and receiving with three antennas simultaneously working at n mode)
Modulation Technique	IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps draft 802.11n Standard-20 MHz Channel mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33, 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps) draft 802.11n Wide-40 MHz Channel mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)
Number of Channels	IEEE 802.11a mode: 4 Channels draft 802.11n Standard-20 MHz Channel mode: 4 Channels draft 802.11n Wide-40 MHz Channel mode: 2 Channels
Antenna Specification	Three Puck antennas for 5 GHz Gain 3 dBi

Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
36	5180 (802.11a mode/802.11n Standard-20 MHz Channel mode)
38	5190 (802.11n Standard-40 MHz Channel mode)
40	5200 (802.11a mode/802.11n Standard-20 MHz Channel mode)
44	5220 (802.11a mode/802.11n Standard-20 MHz Channel mode)
46	5230 (802.11n Standard-40 MHz Channel mode)
48	5240 (802.11a mode/802.11n Standard-20 MHz Channel mode)

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: WBV-HIVEAP320 filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.



3. TEST METHODOLOGY

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

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.

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.

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 2003, 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.



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.



DESCRIPTION OF TEST MODES

The EUT transmitting and receiving with one (chain 0) antenna working at a mode, so one antenna working configuration was used for a mode testing in this report.

The EUT transmitting and receiving with three antennas simultaneously working at n mode, so 3x3 configuration was used for all testing in this report.

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 mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

draft 802.11n Standard-20 MHz Channel mode:

Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for full testing.

draft 802.11n Wide-40 MHz Channel mode:

Channel Low (5190MHz) and Channel Mid (5230MHz) with 13.5Mbps data rate were chosen for full testing.

The following test mode was scanned during the preliminary test:

Mode 1: Wall, ceiling mounting, set the EUT vertically on the table top with power from AC power.

Mode 2: Wall, ceiling mounting, set the EUT vertically on the table top with power from Ethernet .

Mode 3: Table top mounting, set the EUT horizontally on the table top with power from AC power.

Mode 4: Table top mounting, set the EUT horizontally on the table top with power from Ethernet.

After the preliminary scan, the following test mode was found to produce the highest emission level.

Mode 3: Table top mounting, set the EUT horizontally on the table top with power from AC power.

Then, the EUT configuration and cable configuration of the above highest emission mode was recorded for all final test items.



4. INSTRUMENT CALIBRATION

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.

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	01/30/2010
3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	08/01/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/13/2009
Switch Controller	TRC	Switch Controller	SC94050010	05/04/2009
4 Port Switch	TRC	4 Port Switch	SC94050020	05/04/2009
Horn-Antenna	TRC	HA-0502	06	06/05/2009
Horn-Antenna	TRC	HA-0801	04	06/20/2009
Horn-Antenna	TRC	HA-1201A	01	07/09/2009
Horn-Antenna	TRC	HA-1301A	01	07/17/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/29/2009
SHF-EHF Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170171	04/12/2009
Loop antenna	A.R.A	PLA-1030/B	1026	05/08/2009
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC: 965860 IC: IC 6106	09/25/2009
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than +/-2.0065dB (30MHz ~ 1GHz), +/-3.0958dB (Above 1GHz) which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	10/31/2009
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/12/2009
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/01/2009
Test S/W	LABVIEW (V 6.1)			

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

Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2



Dynamic Frequency Selection				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Rohde&Schwarz	FSEK 30	100264	02/19/2009
Signal Generator	Agilent	E8267C	US42340162	12/05/2009

5. FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 2003 and CISPR Publication 22.

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."



TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.4 :2003); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	

* 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

SETUP CONFIGURATION OF EUT

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

SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID
1.	Notebook pc	IBM	X31	32P4413	DOC
2.	Notebook pc	DELL	4150	CN-04P20	DOC

Remark:

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



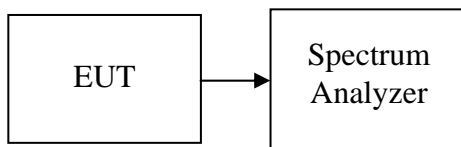
7. FCC PART 15 REQUIREMENTS

26 DB EMISSION BANDWIDTH

LIMIT

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

Test Configuration



TEST PROCEDURE

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

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.961
Mid	5200	22.336
High	5240	21.315

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

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	23.786
Mid	5200	23.464
High	5240	23.921

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

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	23.532
Mid	5200	23.108
High	5240	23.412

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.474
Mid	5200	23.391
High	5240	23.165

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

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	44.444
High	5230	43.024

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

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	43.571
High	5230	43.819

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	42.306
High	5230	42.484



Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	24.016
Mid	5200	23.816
High	5240	23.073

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

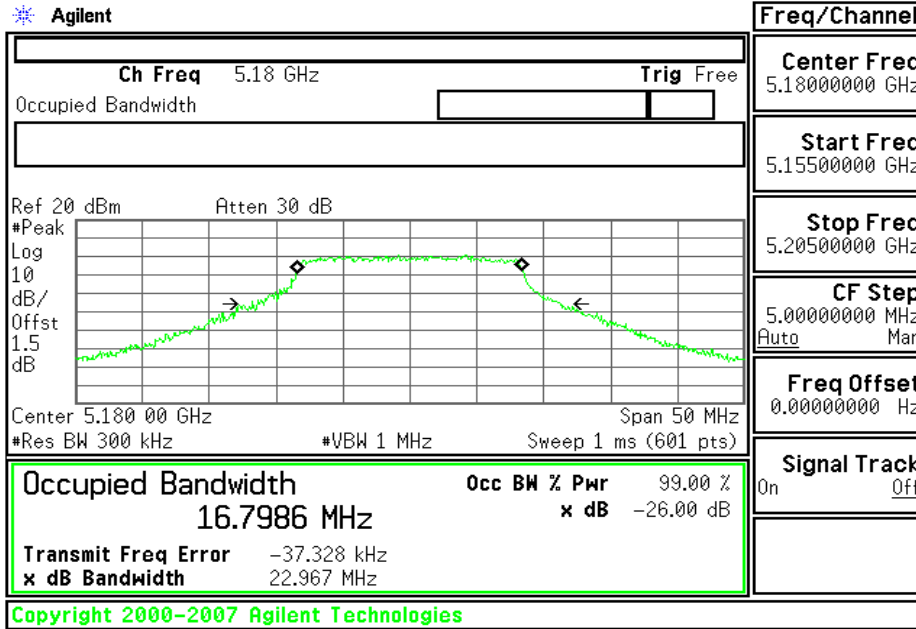
Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	45.104
High	5230	43.961



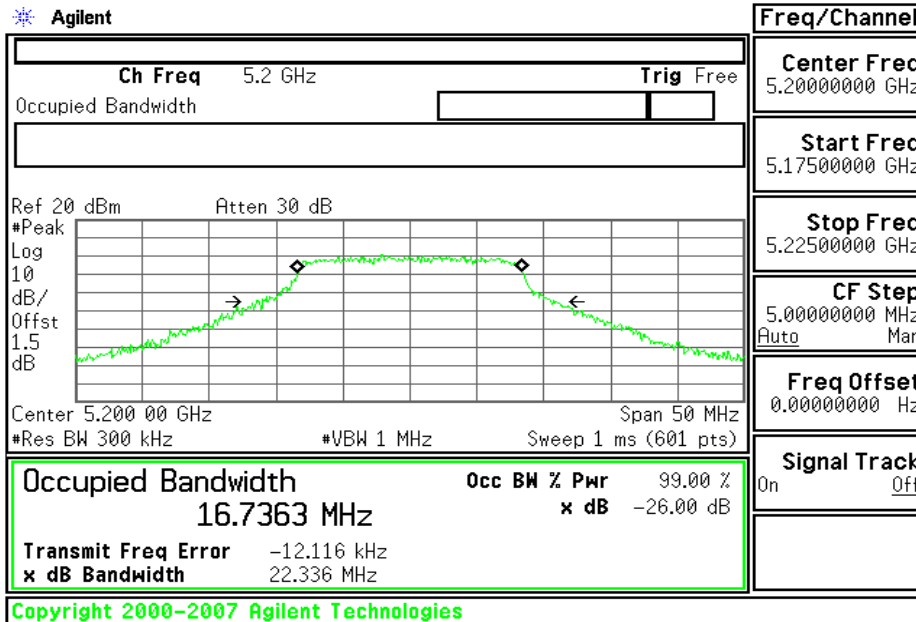
Test Plot

IEEE 802.11a mode:

CH Low



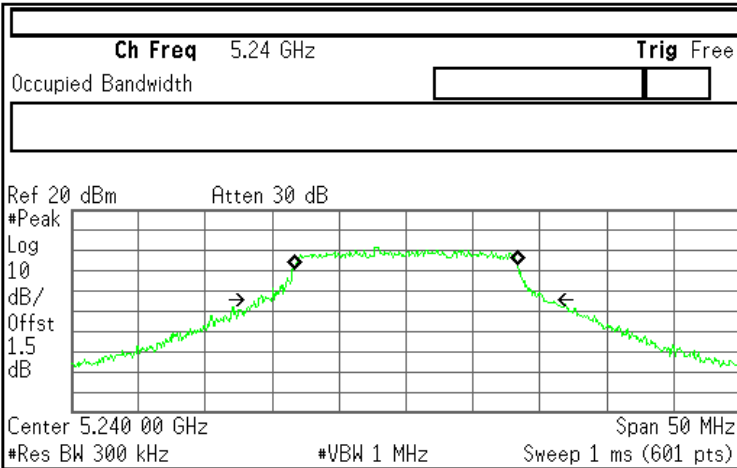
CH Mid





CH High

Agilent



Freq/Channel
Center Freq 5.24000000 GHz
Start Freq 5.21500000 GHz
Stop Freq 5.26500000 GHz
CF Step 5.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

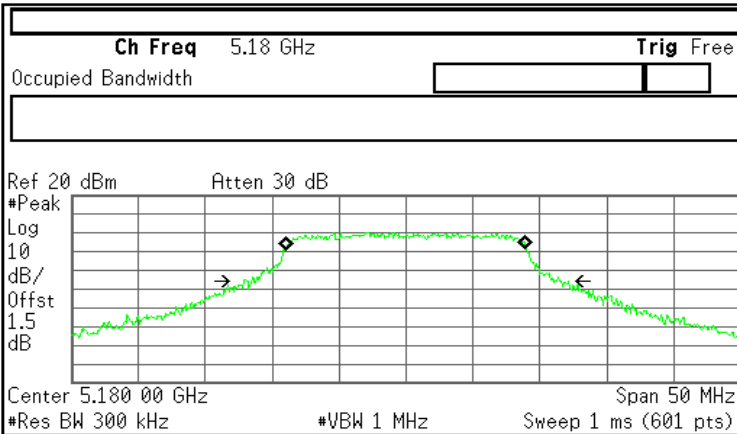
Occupied Bandwidth 16.6853 MHz	Occ BW % Pwr 99.00 %
Transmit Freq Error -19.198 kHz	x dB -26.00 dB
x dB Bandwidth 21.315 MHz	

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

CH Low

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Freq/Channel
Center Freq 5.18000000 GHz
Start Freq 5.15500000 GHz
Stop Freq 5.20500000 GHz
CF Step 5.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

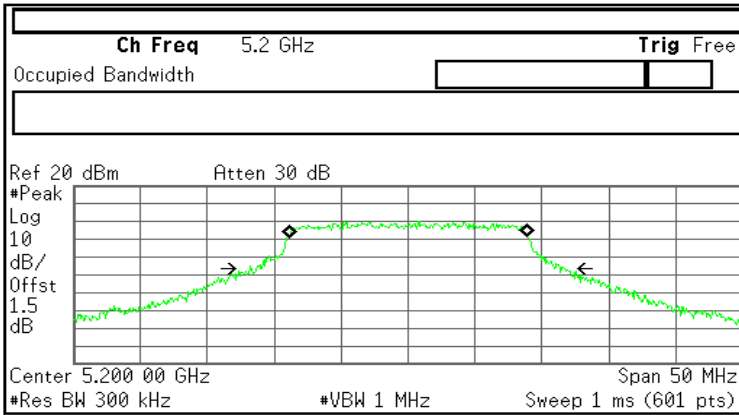
Occupied Bandwidth 17.8857 MHz	Occ BW % Pwr 99.00 %
Transmit Freq Error -35.201 kHz	x dB -26.00 dB
x dB Bandwidth 23.786 MHz	

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CH Mid

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Freq/Channel

Center Freq 5.20000000 GHz

Start Freq 5.17500000 GHz

Stop Freq 5.22500000 GHz

CF Step 5.00000000 MHz
Auto Man

Freq Offset 0.00000000 Hz

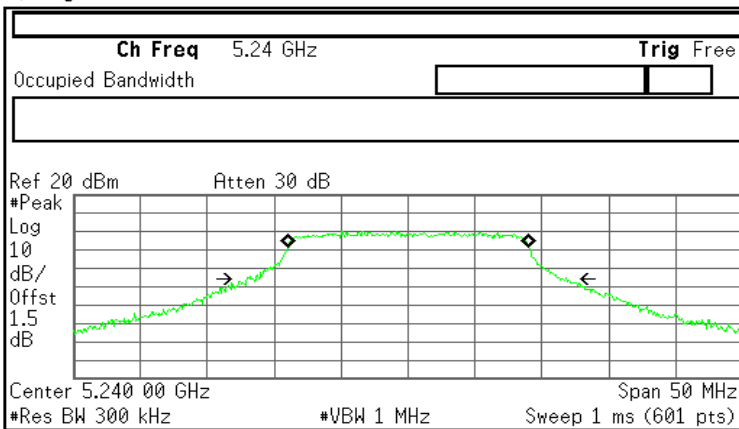
Signal Track On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.8947 MHz	x dB	-26.00 dB
Transmit Freq Error		1.253 kHz
x dB Bandwidth		23.464 MHz

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CH High

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Freq/Channel

Center Freq 5.24000000 GHz

Start Freq 5.21500000 GHz

Stop Freq 5.26500000 GHz

CF Step 5.00000000 MHz
Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.9521 MHz	x dB	-26.00 dB
Transmit Freq Error		-12.853 kHz
x dB Bandwidth		23.921 MHz

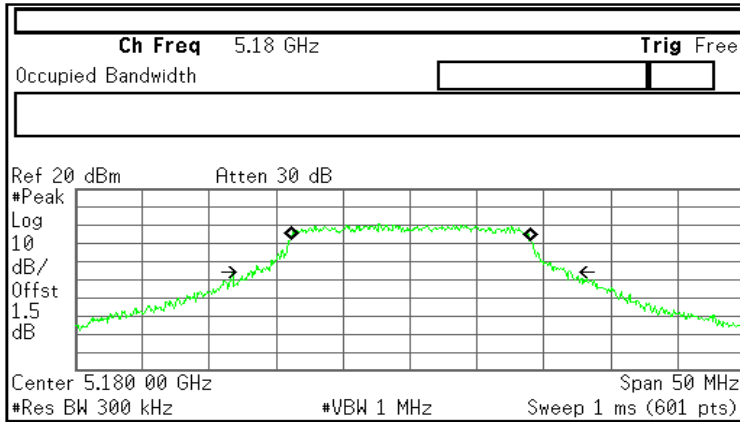
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draft 802.11n Standard-20 MHz Channel mode / Chain 1

CH Low

Agilent



Freq/Channel

Center Freq 5.18000000 GHz

Start Freq 5.15500000 GHz

Stop Freq 5.20500000 GHz

CF Step 5.00000000 MHz
Auto Man

Freq Offset 0.00000000 Hz

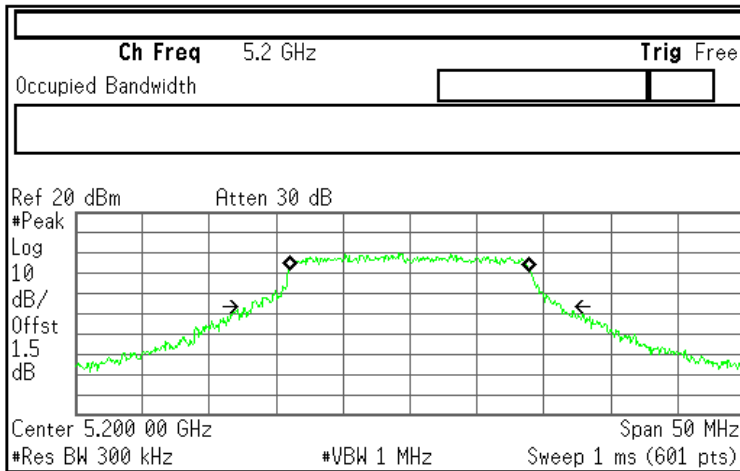
Signal Track On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.9087 MHz	x dB	-26.00 dB
Transmit Freq Error		15.782 kHz
x dB Bandwidth		23.532 MHz

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CH Mid

Agilent



Freq/Channel

Center Freq 5.20000000 GHz

Start Freq 5.17500000 GHz

Stop Freq 5.22500000 GHz

CF Step 5.00000000 MHz
Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

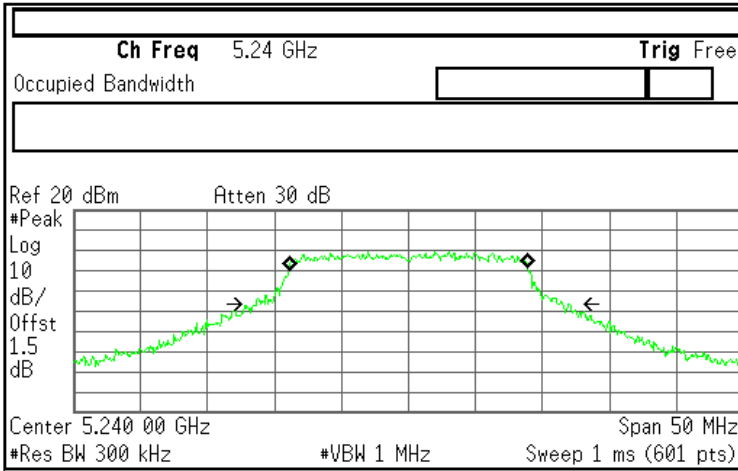
Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.9410 MHz	x dB	-26.00 dB
Transmit Freq Error		-14.464 kHz
x dB Bandwidth		23.108 MHz

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CH High

Agilent



Freq/Channel

Center Freq 5.2400000 GHz

Start Freq 5.2150000 GHz

Stop Freq 5.2650000 GHz

CF Step 5.0000000 MHz
Auto Man

Freq Offset 0.0000000 Hz

Signal Track On Off

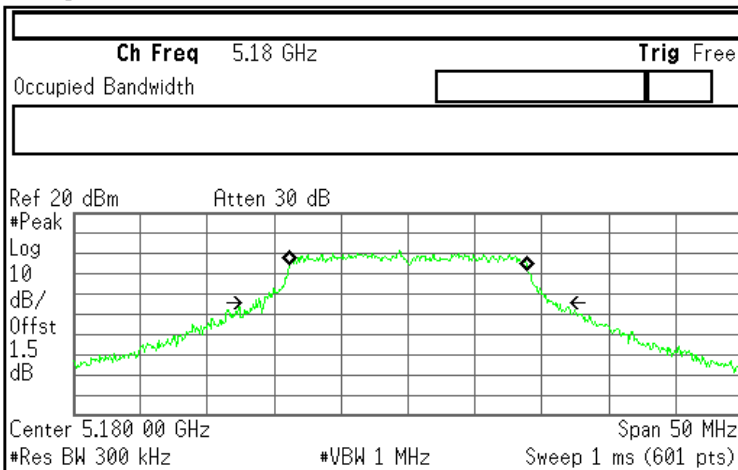
Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.8547 MHz	x dB	-26.00 dB
Transmit Freq Error		-11.783 kHz
x dB Bandwidth		23.412 MHz

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draft 802.11n Standard-20 MHz Channel mode / Chain 2

CH Low

Agilent



Freq/Channel

Center Freq 5.1800000 GHz

Start Freq 5.1550000 GHz

Stop Freq 5.2050000 GHz

CF Step 5.0000000 MHz
Auto Man

Freq Offset 0.0000000 Hz

Signal Track On Off

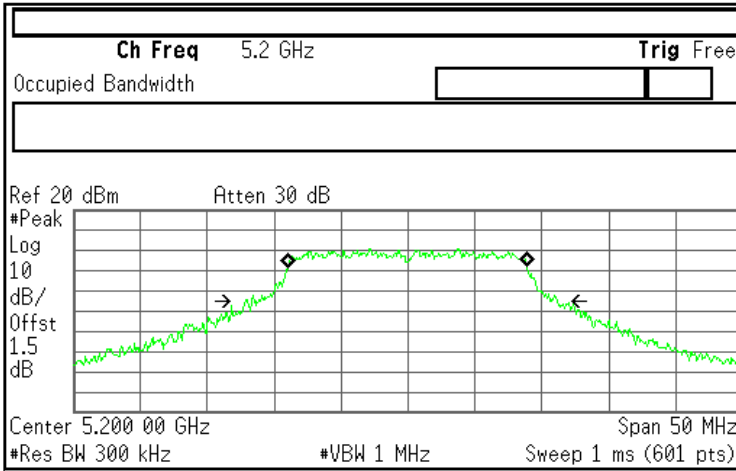
Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.8476 MHz	x dB	-26.00 dB
Transmit Freq Error		-134.657 Hz
x dB Bandwidth		22.474 MHz

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CH Mid

Agilent



Freq/Channel

Center Freq 5.20000000 GHz

Start Freq 5.17500000 GHz

Stop Freq 5.22500000 GHz

CF Step 5.00000000 MHz Auto Man

Freq Offset 0.00000000 Hz

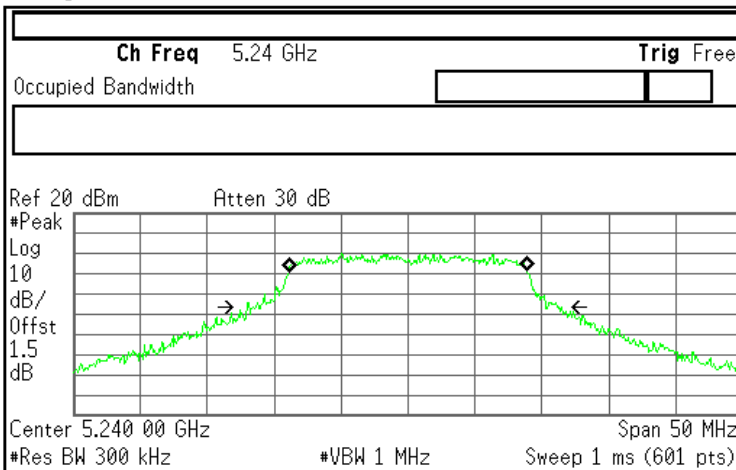
Signal Track On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.8311 MHz	x dB	-26.00 dB
Transmit Freq Error		-62.718 kHz
x dB Bandwidth		23.391 MHz

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Freq/Channel

Center Freq 5.24000000 GHz

Start Freq 5.21500000 GHz

Stop Freq 5.26500000 GHz

CF Step 5.00000000 MHz Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.7708 MHz	x dB	-26.00 dB
Transmit Freq Error		-39.059 kHz
x dB Bandwidth		23.165 MHz

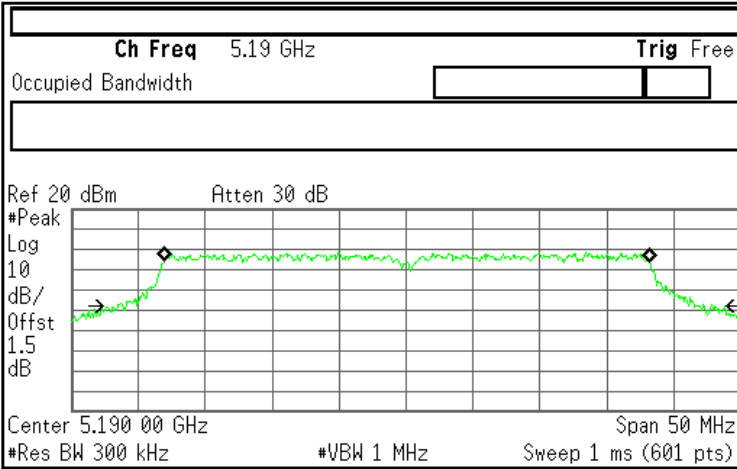
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draft 802.11n Wide-40 MHz Channel mode / Chain 0

CH Low

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Freq/Channel

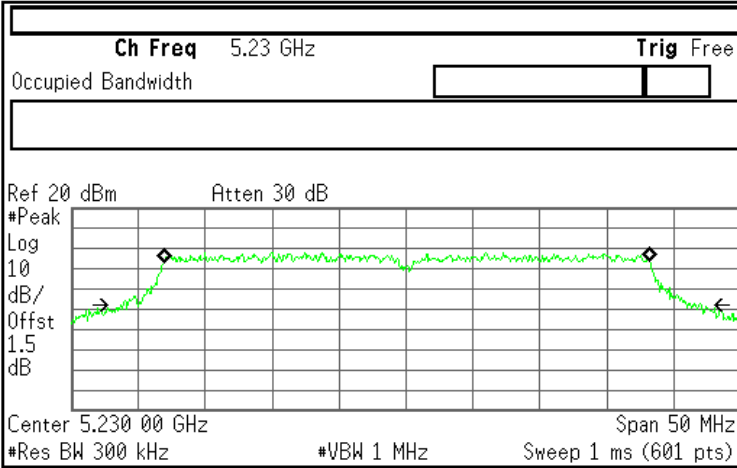
Center Freq	5.19000000 GHz
Start Freq	5.16500000 GHz
Stop Freq	5.21500000 GHz
CF Step	5.00000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

Occupied Bandwidth	36.2534 MHz	Occ BW % Pwr	99.00 %
		x dB	-26.00 dB
Transmit Freq Error	46.012 kHz		
x dB Bandwidth	44.444 MHz		

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Freq/Channel

Center Freq	5.23000000 GHz
Start Freq	5.20500000 GHz
Stop Freq	5.25500000 GHz
CF Step	5.00000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

Occupied Bandwidth	36.2743 MHz	Occ BW % Pwr	99.00 %
		x dB	-26.00 dB
Transmit Freq Error	17.270 kHz		
x dB Bandwidth	43.024 MHz		

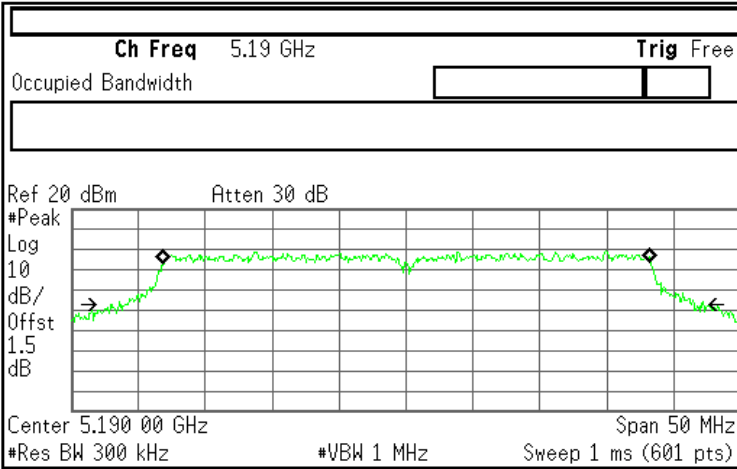
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draft 802.11n Wide-40 MHz Channel mode / Chain 1

CH Low

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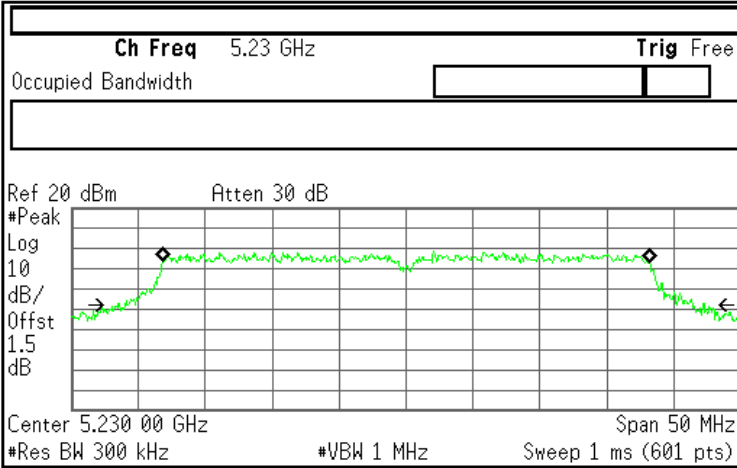
Freq/Channel
Center Freq 5.19000000 GHz
Start Freq 5.16500000 GHz
Stop Freq 5.21500000 GHz
CF Step 5.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

Occupied Bandwidth 36.3113 MHz	Occ BW % Pwr 99.00 %
Transmit Freq Error 25.192 kHz	x dB -26.00 dB
x dB Bandwidth 43.571 MHz	

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Freq/Channel
Center Freq 5.23000000 GHz
Start Freq 5.20500000 GHz
Stop Freq 5.25500000 GHz
CF Step 5.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

Occupied Bandwidth 36.3279 MHz	Occ BW % Pwr 99.00 %
Transmit Freq Error 11.287 kHz	x dB -26.00 dB
x dB Bandwidth 43.819 MHz	

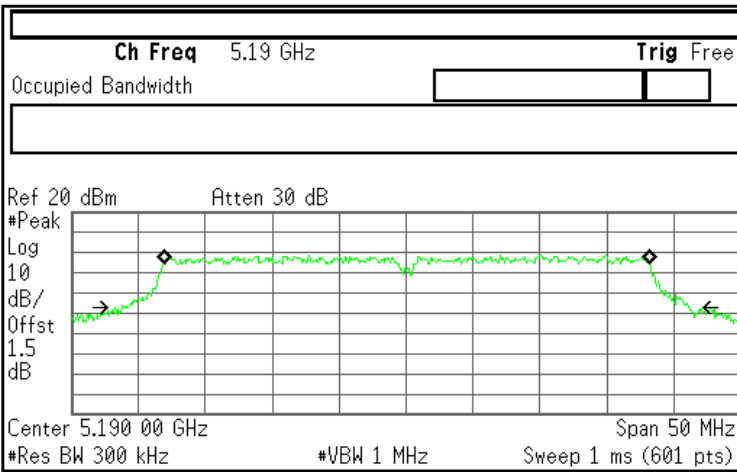
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draft 802.11n Wide-40 MHz Channel mode / Chain 2

CH Low

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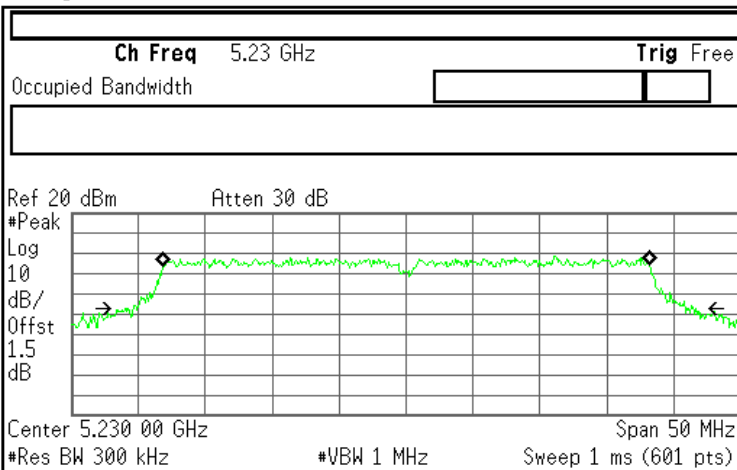
Freq/Channel	
Center Freq	5.19000000 GHz
Start Freq	5.16500000 GHz
Stop Freq	5.21500000 GHz
CF Step	5.00000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
36.2440 MHz	x dB	-26.00 dB
Transmit Freq Error	21.645 kHz	
x dB Bandwidth	42.306 MHz	

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Freq/Channel	
Center Freq	5.23000000 GHz
Start Freq	5.20500000 GHz
Stop Freq	5.25500000 GHz
CF Step	5.00000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

Occupied Bandwidth	Occ BW % Pwr	99.00 %
36.3044 MHz	x dB	-26.00 dB
Transmit Freq Error	23.903 kHz	
x dB Bandwidth	42.484 MHz	

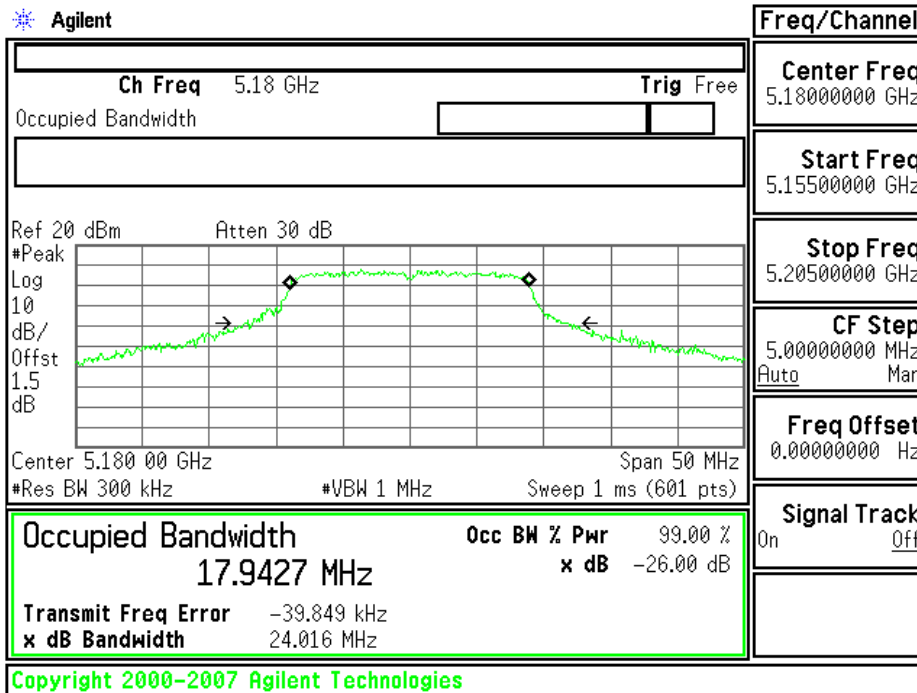
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draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1+ Chain 2

CH Low

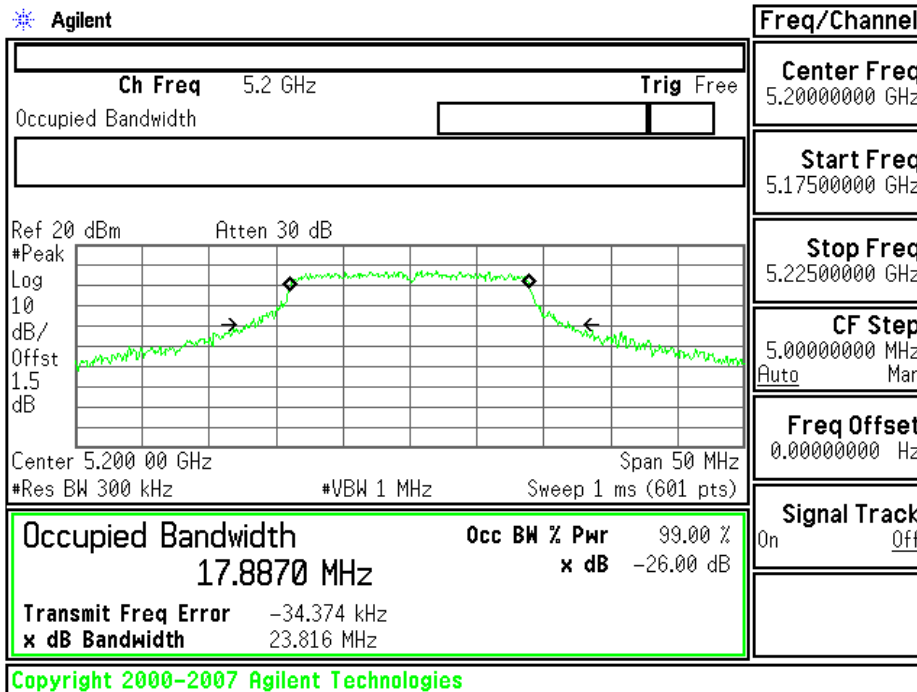
Agilent



Freq/Channel
Center Freq 5.18000000 GHz
Start Freq 5.15500000 GHz
Stop Freq 5.20500000 GHz
CF Step Auto Man 5.00000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

CH Mid

Agilent

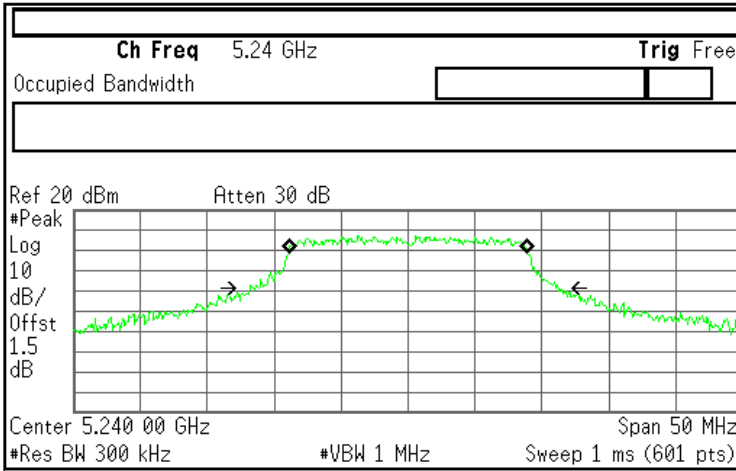


Freq/Channel
Center Freq 5.20000000 GHz
Start Freq 5.17500000 GHz
Stop Freq 5.22500000 GHz
CF Step Auto Man 5.00000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off



CH High

Agilent



Freq/Channel

Center Freq 5.24000000 GHz

Start Freq 5.21500000 GHz

Stop Freq 5.26500000 GHz

CF Step 5.00000000 MHz
Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

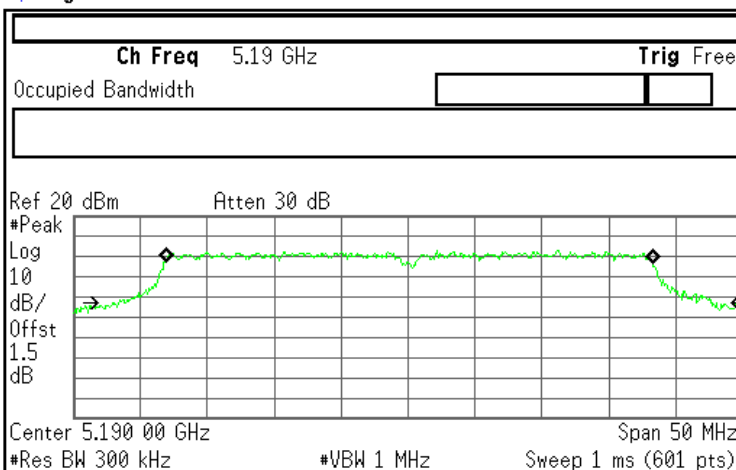
Occupied Bandwidth	Occ BW % Pwr	99.00 %
17.8780 MHz	x dB	-26.00 dB
Transmit Freq Error		-13.705 kHz
x dB Bandwidth		23.073 MHz

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draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2

CH Low

Agilent



Freq/Channel

Center Freq 5.19000000 GHz

Start Freq 5.16500000 GHz

Stop Freq 5.21500000 GHz

CF Step 5.00000000 MHz
Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

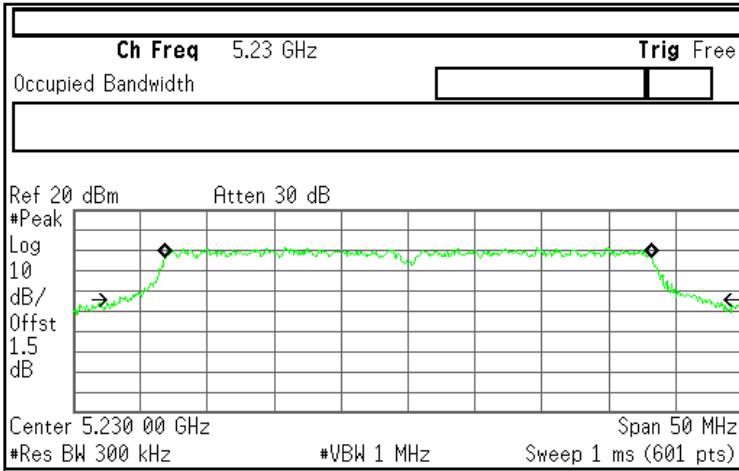
Occupied Bandwidth	Occ BW % Pwr	99.00 %
36.3545 MHz	x dB	-26.00 dB
Transmit Freq Error		60.831 kHz
x dB Bandwidth		45.104 MHz

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Freq/Channel
Center Freq 5.23000000 GHz
Start Freq 5.20500000 GHz
Stop Freq 5.25500000 GHz
CF Step Auto Man 5.00000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

Occupied Bandwidth	Occ BW % Pwr 99.00 %
36.3266 MHz	x dB -26.00 dB
Transmit Freq Error 29.620 kHz	
x dB Bandwidth 43.961 MHz	

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**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 $4 \text{ dBm} + 10 \log B$, 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 $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in MHz.

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

The peak power shall not exceed the limit as follow:

Specified Limit of the Peak Power

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	22.961	13.61	17.61	17.00
Mid	5200	22.336	13.49	17.49	17.00
High	5240	21.315	13.29	17.29	17.00

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

Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Chain 2 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	23.786	23.532	22.474	24.016	13.81	17.81	17.00
Mid	5200	23.464	23.108	23.391	23.816	13.77	17.77	17.00
High	5240	23.921	23.412	23.165	23.073	13.63	17.63	17.00

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

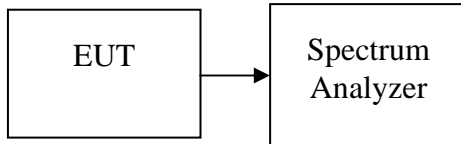
Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Chain 2 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5190	44.444	43.571	42.306	45.104	16.54	20.54	17.00
High	5230	43.024	43.819	42.484	43.961	16.43	20.43	17.00

(Remark: Maximum antenna gain = 2dBi, therefore there is no reduction due to antenna gain.)



Test Configuration

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



TEST PROCEDURE

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

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

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”. Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	9.29	17.00
Mid	5200	9.90	17.00
High	5240	9.21	17.00

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

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	10.94	9.52	9.65	14.86	17.00
Mid	5200	10.61	9.29	9.84	14.72	17.00
High	5240	11.07	9.13	8.56	14.50	17.00



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

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Chain 2 Output Power (dBm)	Output Power (dBm)	Limit (dBm)
Low	5190	10.41	9.52	10.51	14.94	17.00
High	5230	10.14	9.85	9.93	14.75	17.00

Test mode: draft 802.11gn Standard-20 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)
Low	5180	16.65	17.00
Mid	5200	15.74	17.00
High	5240	14.28	17.00

Test mode: draft 802.11gn Wide-40 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)
Low	5190	16.12	17.00
High	5230	14.87	17.00

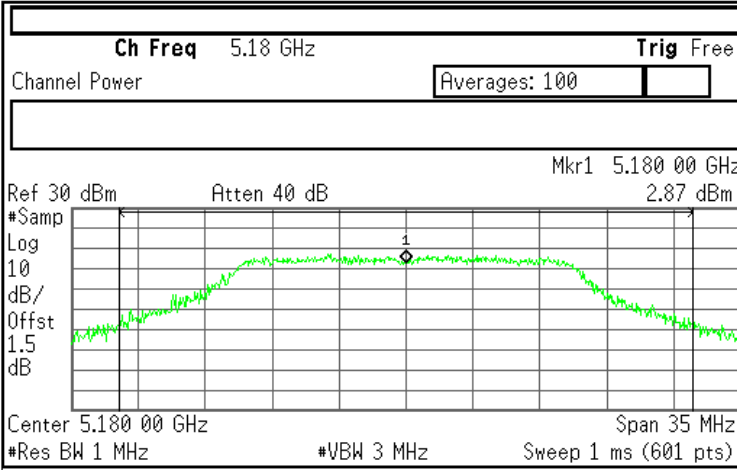


Test Plot

Test mode: IEEE 802.11a mode:

CH Low

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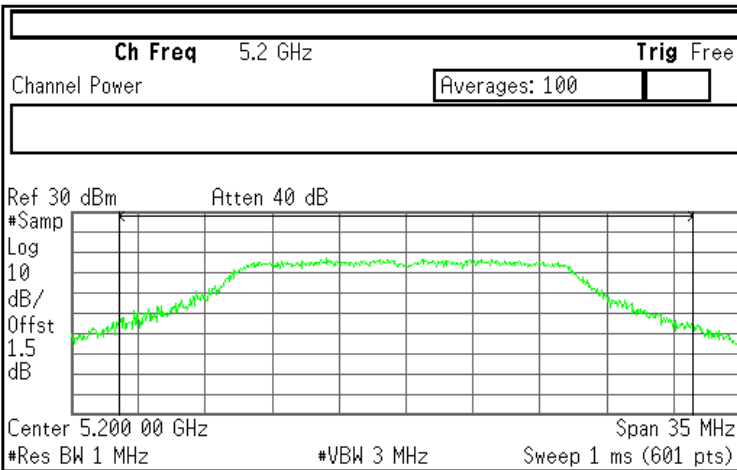
Freq/Channel
Center Freq 5.18000000 GHz
Start Freq 5.16250000 GHz
Stop Freq 5.19750000 GHz
CF Step Auto Man 3.50000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

Channel Power	Power Spectral Density
9.29 dBm /30.0000 MHz	-65.48 dBm/Hz

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CH Mid

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Freq/Channel
Center Freq 5.20000000 GHz
Start Freq 5.18250000 GHz
Stop Freq 5.21750000 GHz
CF Step Auto Man 3.50000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

Channel Power	Power Spectral Density
9.90 dBm /30.0000 MHz	-64.87 dBm/Hz

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CH High

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Ch Freq 5.24 GHz		Trig Free	
Channel Power		Averages: 100	
Center 5.240 00 GHz		Span 35 MHz	
#Res BW 1 MHz		#VBW 3 MHz Sweep 1 ms (601 pts)	
Channel Power		Power Spectral Density	
9.21 dBm /30.0000 MHz		-65.56 dBm/Hz	
Signal Track		On Off	
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Freq/Channel

Center Freq
5.24000000 GHz

Start Freq
5.22250000 GHz

Stop Freq
5.25750000 GHz

CF Step
3.50000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

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

CH Low

Agilent

Ch Freq 5.18 GHz		Trig Free	
Channel Power		Averages: 100	
Center 5.180 00 GHz		Span 35 MHz	
#Res BW 1 MHz		#VBW 3 MHz Sweep 1 ms (601 pts)	
Channel Power		Power Spectral Density	
10.94 dBm /30.0000 MHz		-58.83 dBm/Hz	
Signal Track		On Off	
File Operation Status, A:\SCREN042.GIF file saved			

Freq/Channel

Center Freq
5.18000000 GHz

Start Freq
5.16250000 GHz

Stop Freq
5.19750000 GHz

CF Step
3.50000000 MHz
Auto Man

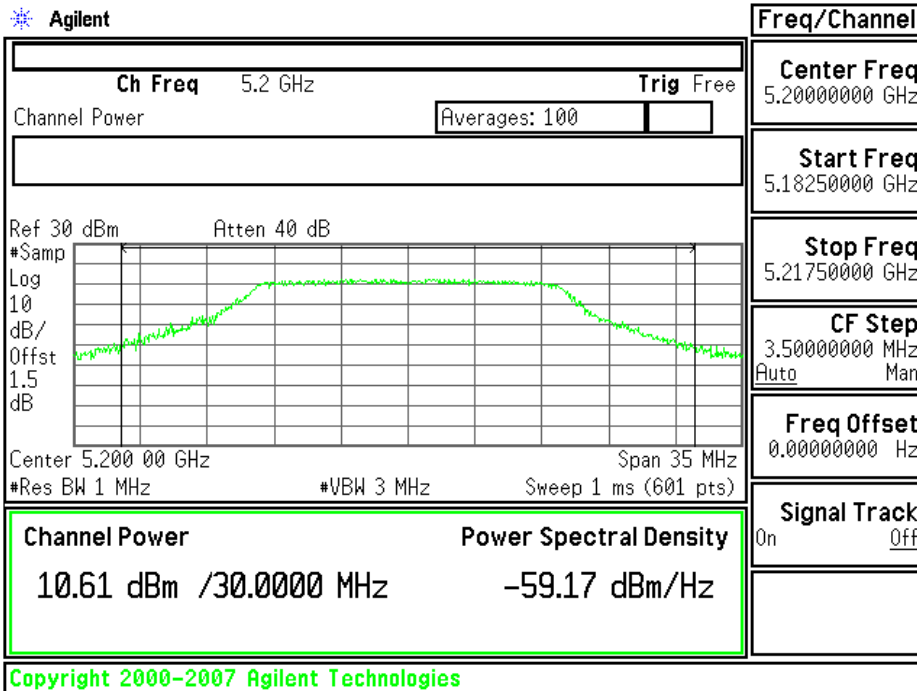
Freq Offset
0.00000000 Hz

Signal Track
On Off



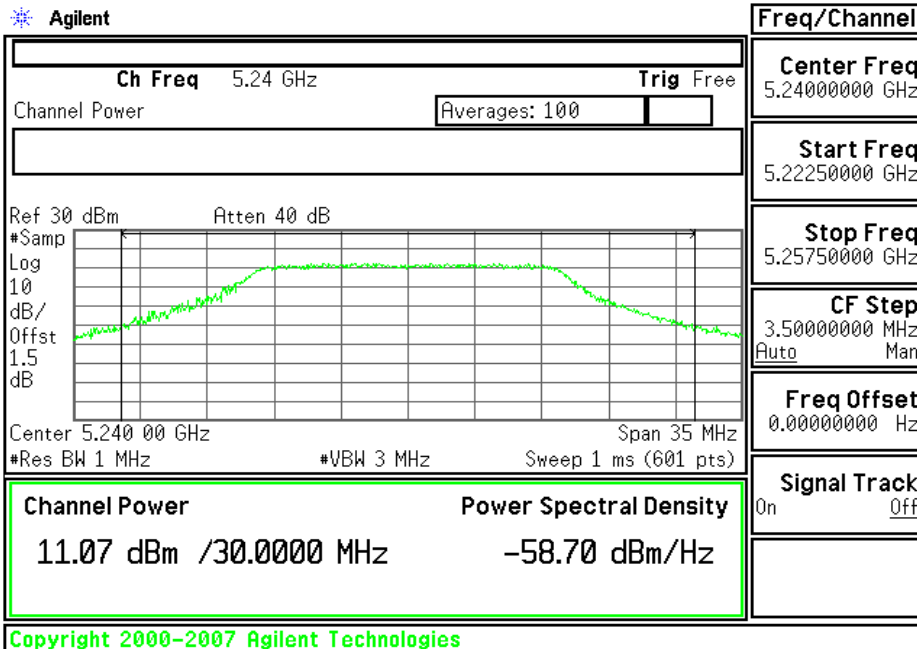
CH Mid

Agilent



CH High

Agilent

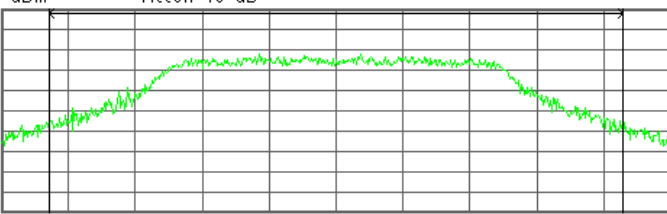




Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1:

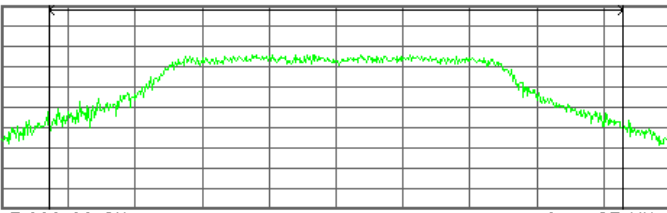
CH Low

Agilent

Ch Freq 5.18 GHz Trig Free Channel Power <input type="text"/> Averages: 100 <input type="text"/>		Freq/Channel Center Freq 5.18000000 GHz Start Freq 5.16250000 GHz Stop Freq 5.19750000 GHz CF Step 3.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
Ref 30 dBm Atten 40 dB #Samp Log 10 dB/Offst 1.5 dB 		
Center 5.180 00 GHz Span 35 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)		
Channel Power 9.52 dBm /30.0000 MHz	Power Spectral Density -65.25 dBm/Hz	
Copyright 2000-2007 Agilent Technologies		

CH Mid

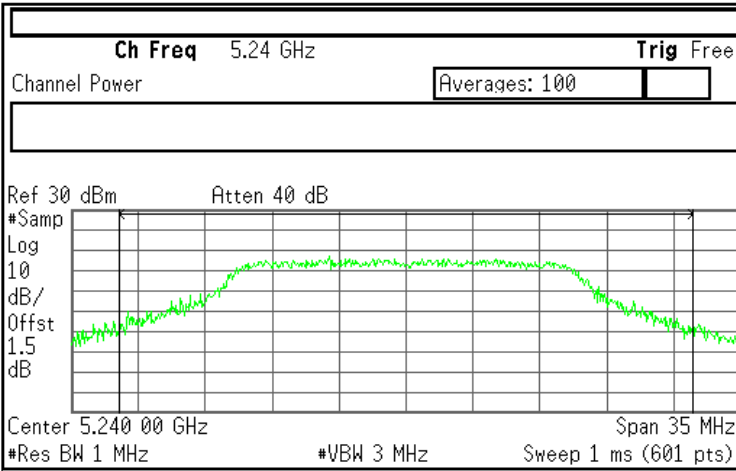
Agilent

Ch Freq 5.2 GHz Trig Free Channel Power <input type="text"/> Averages: 100 <input type="text"/>		Freq/Channel Center Freq 5.20000000 GHz Start Freq 5.18250000 GHz Stop Freq 5.21750000 GHz CF Step 3.50000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
Ref 30 dBm Atten 40 dB #Samp Log 10 dB/Offst 1.5 dB 		
Center 5.200 00 GHz Span 35 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)		
Channel Power 9.29 dBm /30.0000 MHz	Power Spectral Density -65.48 dBm/Hz	
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CH High

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Freq/Channel

Center Freq 5.24000000 GHz

Start Freq 5.22250000 GHz

Stop Freq 5.25750000 GHz

CF Step 3.50000000 MHz Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

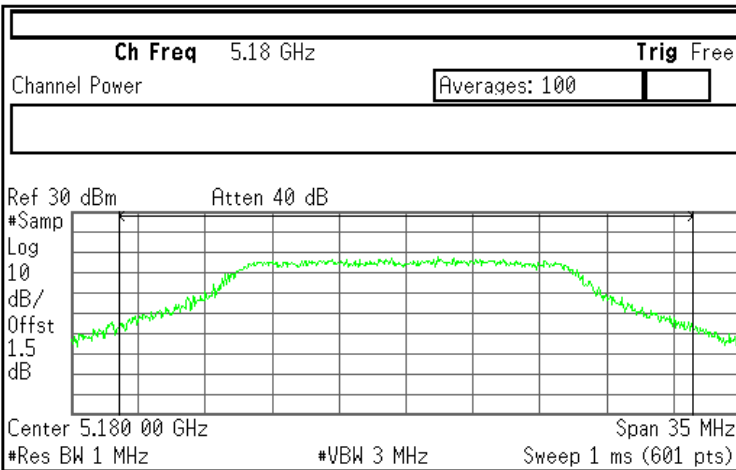
Channel Power	Power Spectral Density
9.13 dBm /30.0000 MHz	-65.64 dBm/Hz

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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2:

CH Low

Agilent



Freq/Channel

Center Freq 5.18000000 GHz

Start Freq 5.16250000 GHz

Stop Freq 5.19750000 GHz

CF Step 3.50000000 MHz Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

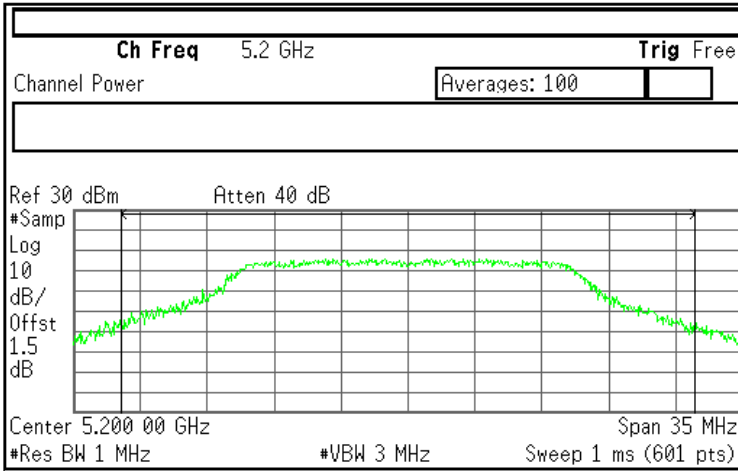
Channel Power	Power Spectral Density
9.65 dBm /30.0000 MHz	-65.12 dBm/Hz

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CH Mid

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Freq/Channel

Center Freq
5.2000000 GHz

Start Freq
5.1825000 GHz

Stop Freq
5.2175000 GHz

CF Step
3.5000000 MHz
Auto Man

Freq Offset
0.0000000 Hz

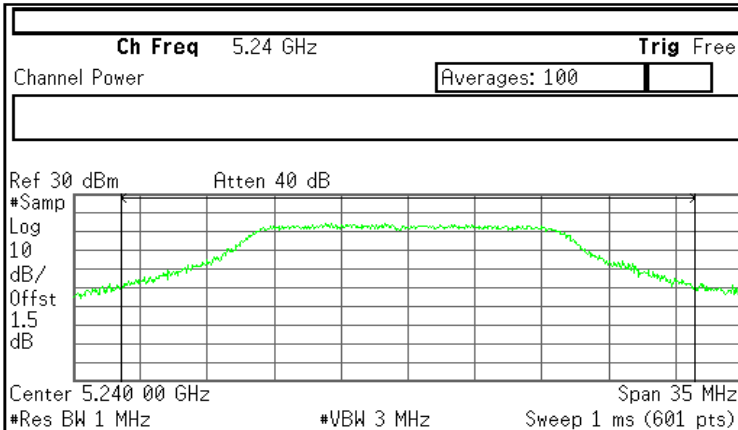
Signal Track
On Off

Channel Power Power Spectral Density
9.84 dBm /30.0000 MHz -64.94 dBm/Hz

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Freq/Channel

Center Freq
5.2400000 GHz

Start Freq
5.2225000 GHz

Stop Freq
5.2575000 GHz

CF Step
3.5000000 MHz
Auto Man

Freq Offset
0.0000000 Hz

Signal Track
On Off

Channel Power Power Spectral Density
11.26 dBm /30.0000 MHz -58.51 dBm/Hz

File Operation Status, A:\SCREEN053.GIF file saved

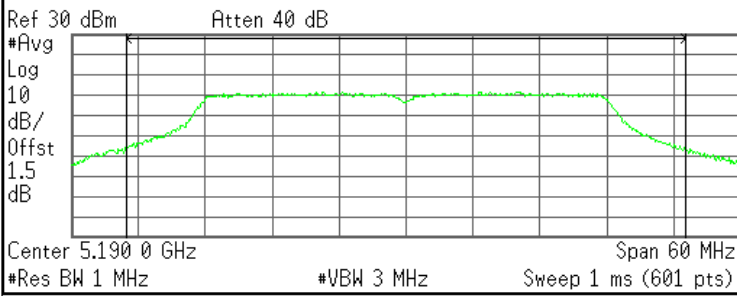


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0:

CH Low

Agilent

Ch Freq 5.19 GHz	Trig Free
Channel Power	Averages: 100



Channel Power	Power Spectral Density
10.41 dBm /50.0000 MHz	-66.58 dBm/Hz

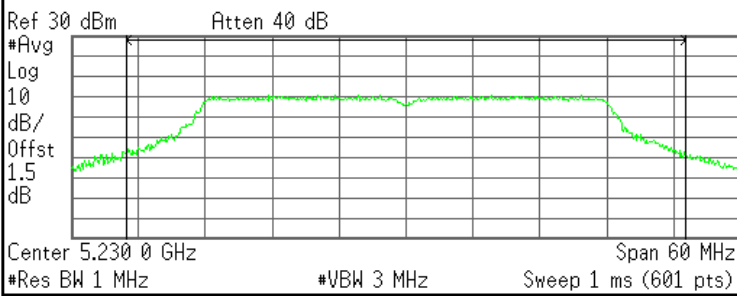
Freq/Channel
Center Freq 5.19000000 GHz
Start Freq 5.16000000 GHz
Stop Freq 5.22000000 GHz
CF Step 6.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

Unable to save file

CH High

Agilent

Ch Freq 5.23 GHz	Trig Free
Channel Power	Averages: 100



Channel Power	Power Spectral Density
10.14 dBm /50.0000 MHz	-66.85 dBm/Hz

Freq/Channel
Center Freq 5.23000000 GHz
Start Freq 5.20000000 GHz
Stop Freq 5.26000000 GHz
CF Step 6.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

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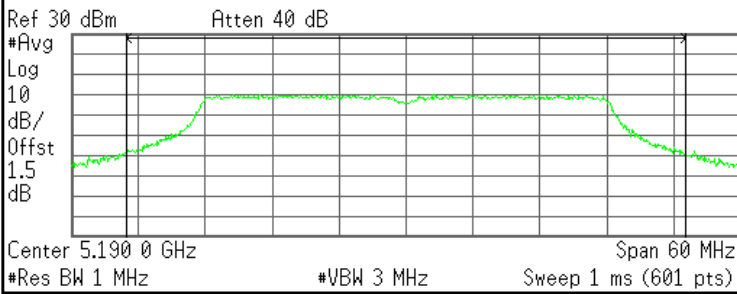


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1:

CH Low

Agilent

Ch Freq	5.19 GHz	Trig	Free
Channel Power	Averages: 100		



Channel Power	Power Spectral Density
9.52 dBm /50.0000 MHz	-67.47 dBm/Hz

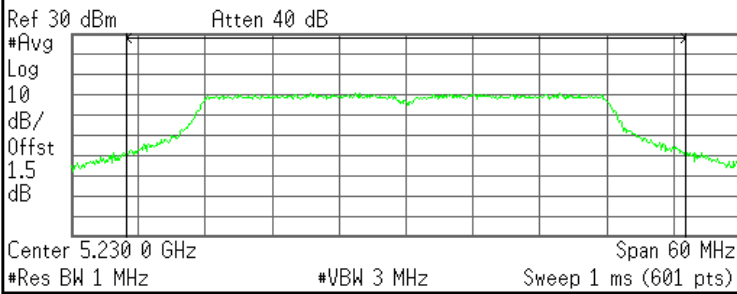
Freq/Channel
Center Freq 5.19000000 GHz
Start Freq 5.16000000 GHz
Stop Freq 5.22000000 GHz
CF Step 6.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

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CH High

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Ch Freq	5.23 GHz	Trig	Free
Channel Power	Averages: 100		



Channel Power	Power Spectral Density
9.85 dBm /50.0000 MHz	-67.14 dBm/Hz

Freq/Channel
Center Freq 5.23000000 GHz
Start Freq 5.20000000 GHz
Stop Freq 5.26000000 GHz
CF Step 6.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

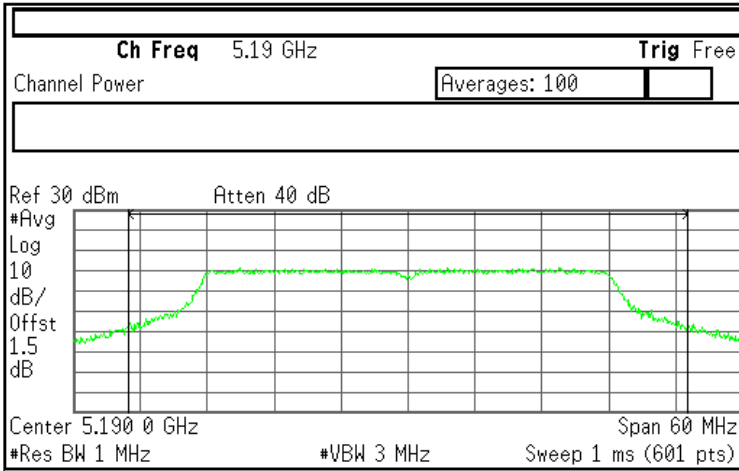
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Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

CH Low

Agilent



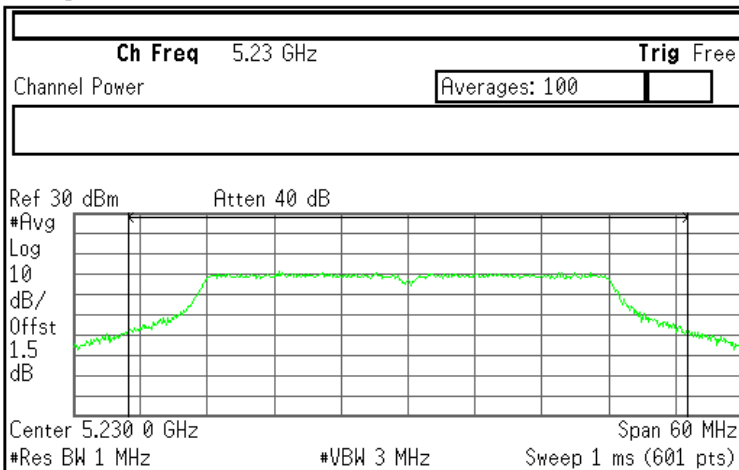
Freq/Channel
Center Freq 5.19000000 GHz
Start Freq 5.16000000 GHz
Stop Freq 5.22000000 GHz
CF Step 6.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

Channel Power	Power Spectral Density
10.51 dBm /50.0000 MHz	-66.47 dBm/Hz

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Freq/Channel
Center Freq 5.23000000 GHz
Start Freq 5.20000000 GHz
Stop Freq 5.26000000 GHz
CF Step 6.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

Channel Power	Power Spectral Density
9.93 dBm /50.0000 MHz	-67.06 dBm/Hz

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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1 +Chain 2:

CH Low

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Ch Freq 5.18 GHz Trig Free Channel Power <input type="text"/> Averages: 100 <input type="text"/>		Freq/Channel Center Freq 5.18000000 GHz	
Ref 30 dBm Atten 40 dB #Samp Log 10 dB/ Offst 1.5 dB		Start Freq 5.16250000 GHz	
		Stop Freq 5.19750000 GHz	
Center 5.180 00 GHz Span 35 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)		CF Step 3.50000000 MHz Auto Man	
Channel Power Power Spectral Density 16.65 dBm /30.0000 MHz -58.12 dBm/Hz		Freq Offset 0.00000000 Hz	
		Signal Track On Off	
Copyright 2000-2007 Agilent Technologies			

CH Mid

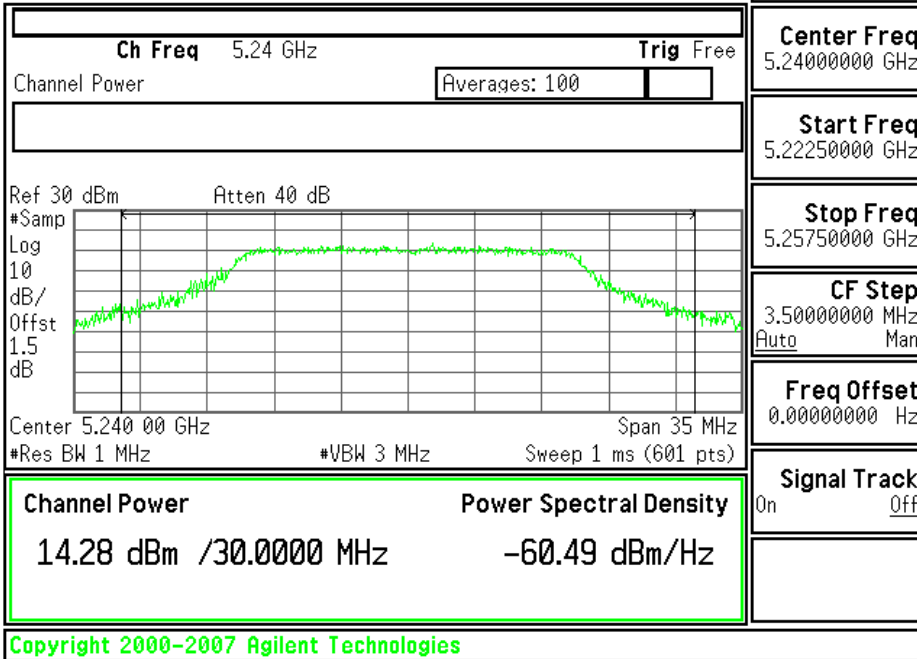
Agilent

Ch Freq 5.2 GHz Trig Free Channel Power <input type="text"/> Averages: 100 <input type="text"/>		Freq/Channel Center Freq 5.20000000 GHz	
Ref 30 dBm Atten 40 dB #Samp Log 10 dB/ Offst 1.5 dB		Start Freq 5.18250000 GHz	
		Stop Freq 5.21750000 GHz	
Center 5.200 00 GHz Span 35 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)		CF Step 3.50000000 MHz Auto Man	
Channel Power Power Spectral Density 15.74 dBm /30.0000 MHz -59.03 dBm/Hz		Freq Offset 0.00000000 Hz	
		Signal Track On Off	
Copyright 2000-2007 Agilent Technologies			



CH High

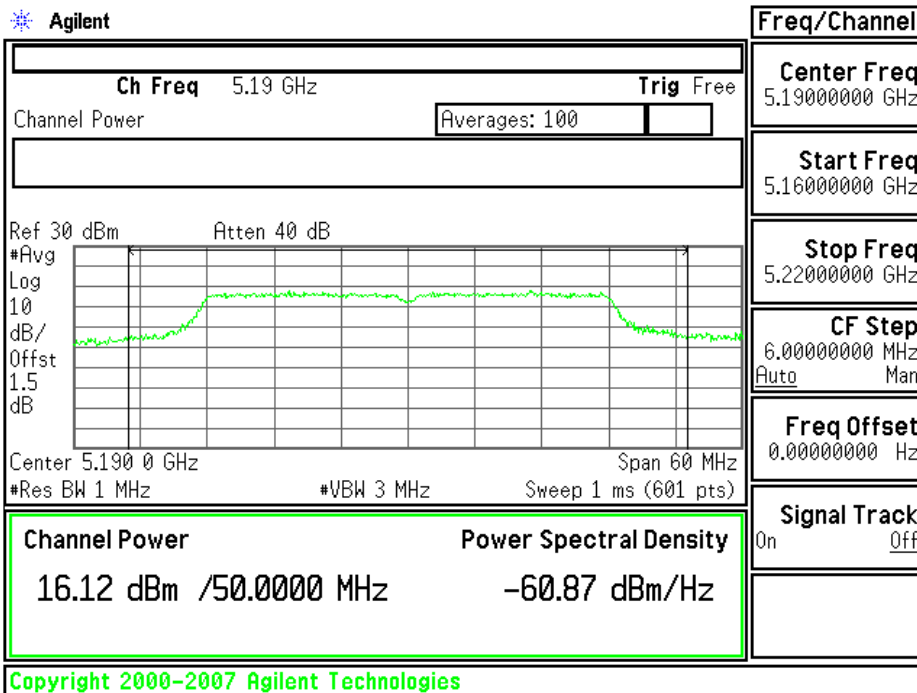
Agilent



Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1 +Chain 2:

CH Low

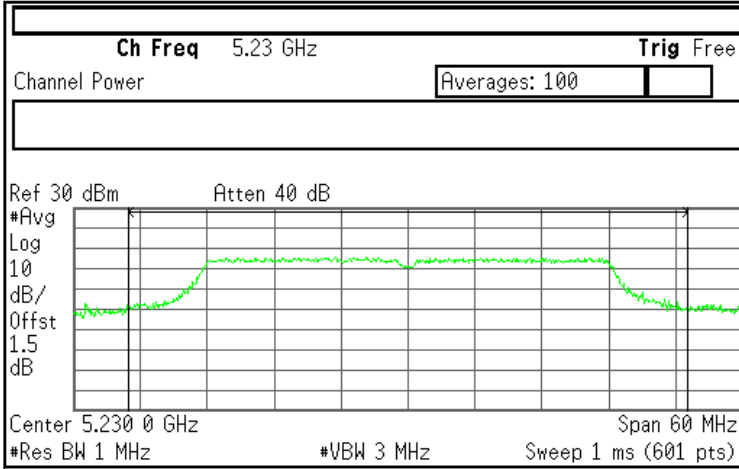
Agilent





CH High

Agilent



Freq/Channel
Center Freq 5.23000000 GHz
Start Freq 5.20000000 GHz
Stop Freq 5.26000000 GHz
CF Step Auto Man 6.00000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

Channel Power	Power Spectral Density
14.87 dBm /50.0000 MHz	-62.12 dBm/Hz

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BAND EDGES MEASUREMENT

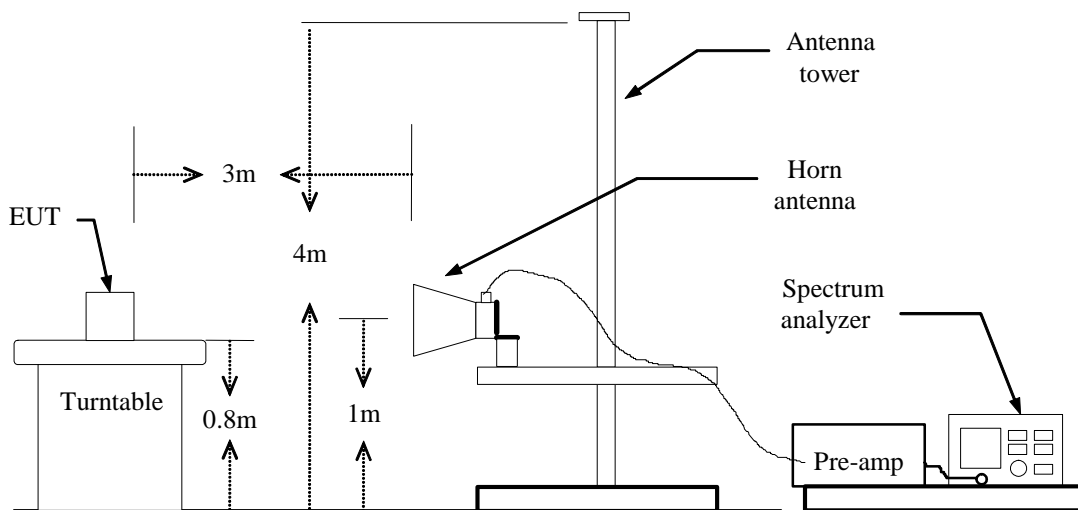
LIMIT

According to §15.407(b),

(1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

Test Configuration



TEST PROCEDURE

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

TEST RESULTS

Refer to attach spectrum analyzer data chart.

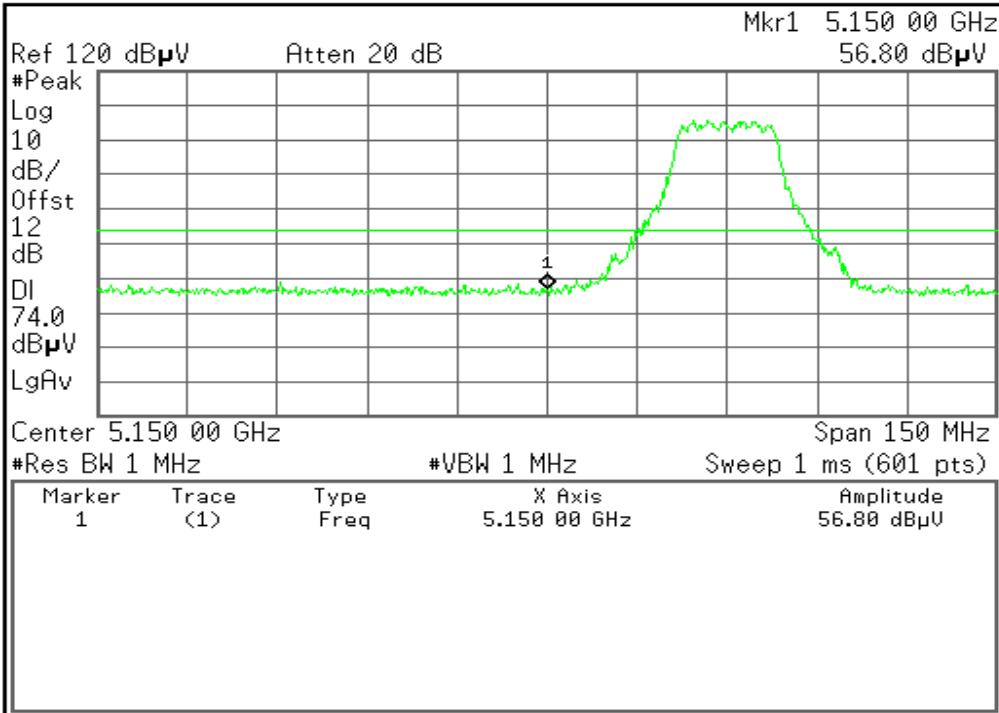


Band Edges (IEEE 802.11a mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent



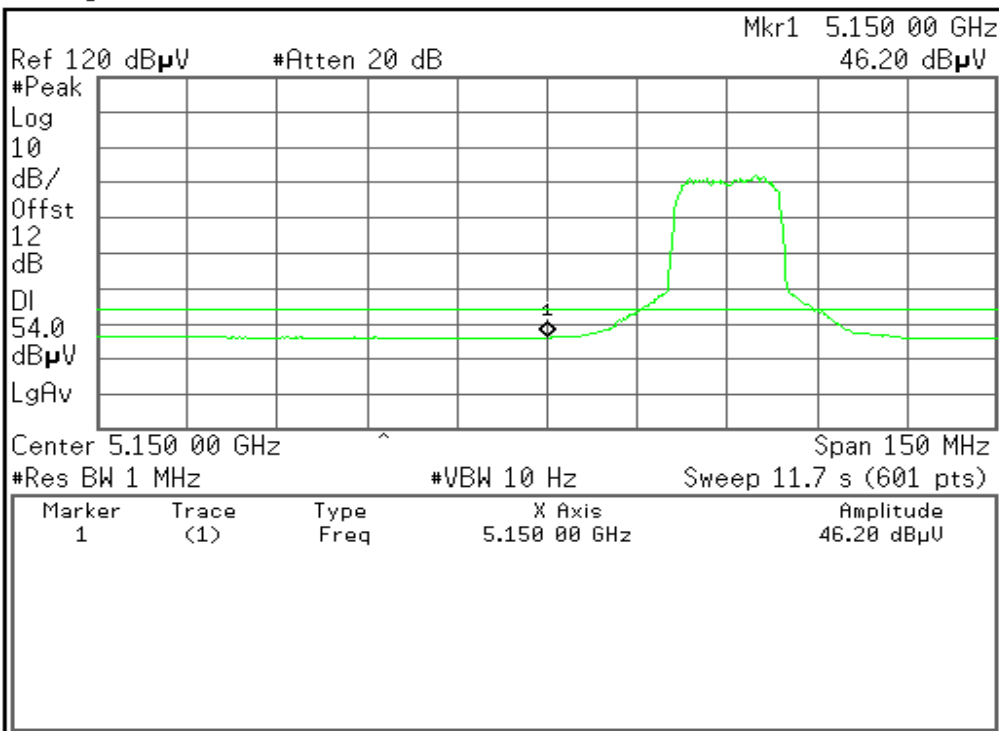
Trace		
1	2	3
Trace		
Clear Write		
Max Hold		
Min Hold		
View		
Blank		
More 1 of 2		

Copyright 2000-2007 Agilent Technologies

Detector mode: Average

Polarity: Vertical

Agilent



Freq/Channel	
Center Freq 5.15000000 GHz	
Start Freq 5.07500000 GHz	
Stop Freq 5.22500000 GHz	
CF Step 15.0000000 MHz Auto Man	
Freq Offset 0.00000000 Hz	
Signal Track On Off	

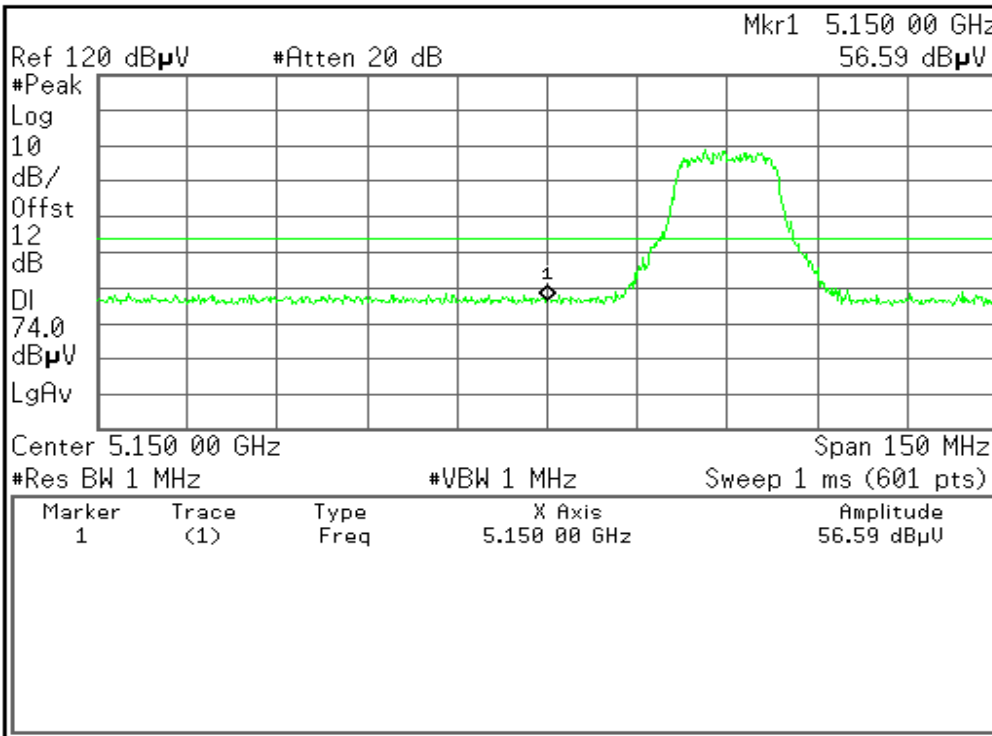
Copyright 2000-2007 Agilent Technologies



Detector mode: Peak

Polarity: Horizontal

Agilent



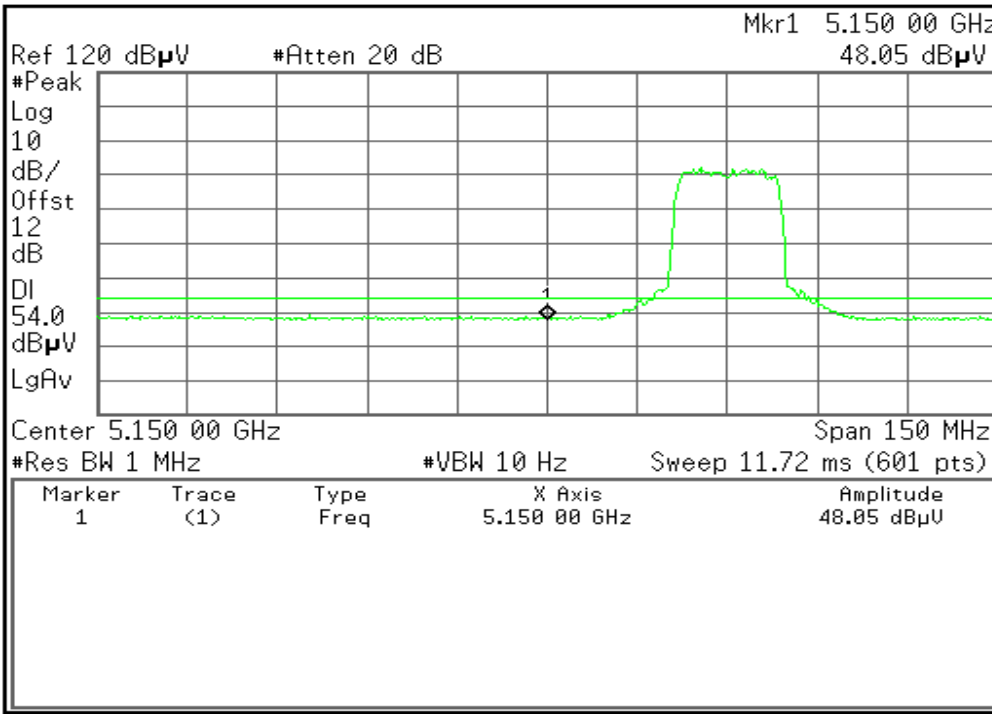
Freq/Channel	
Center Freq	5.15000000 GHz
Start Freq	5.07500000 GHz
Stop Freq	5.22500000 GHz
CF Step	15.0000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

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Detector mode: Average

Polarity: Horizontal

Agilent



Trace		
1	2	3
Clear Write		
Max Hold		
Min Hold		
View		
Blank		
More 1 of 2		

Copyright 2000-2007 Agilent Technologies

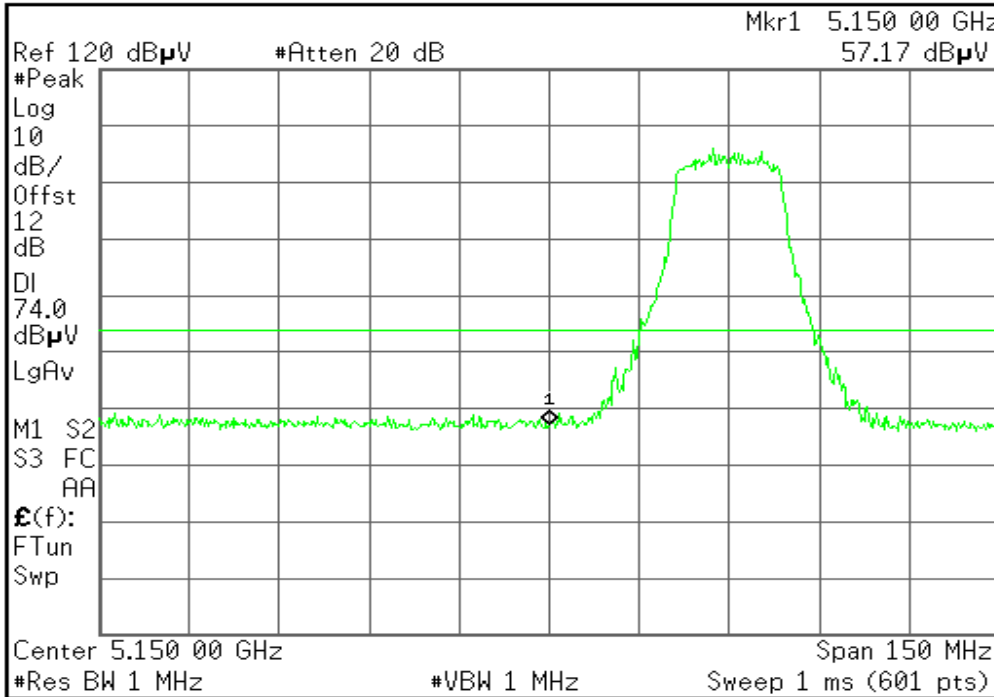


Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent



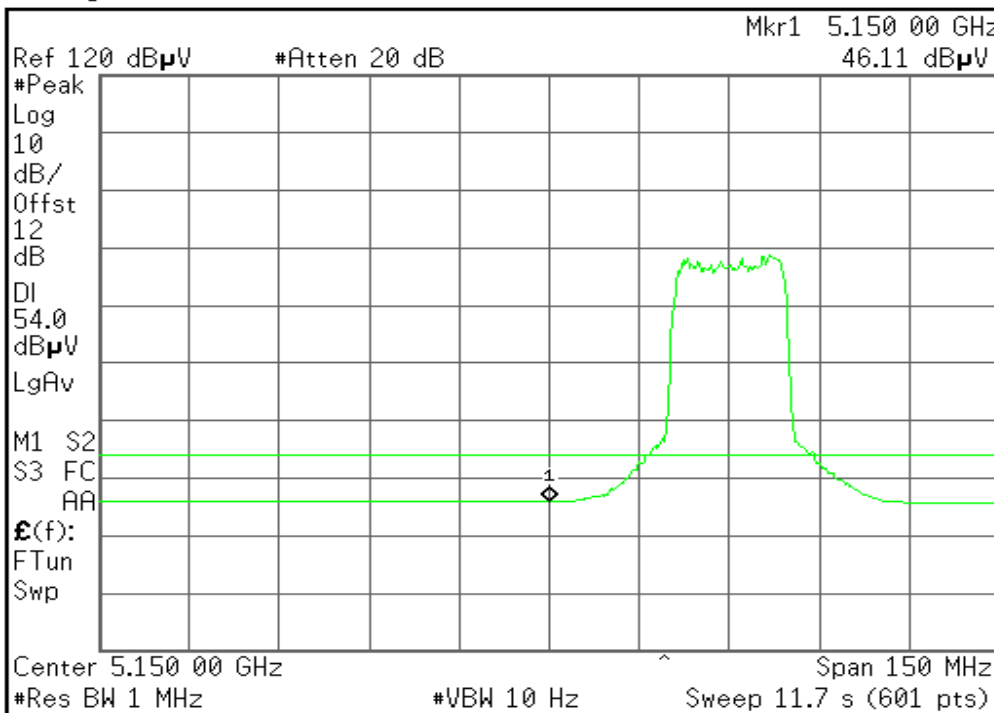
Freq/Channel	
Center Freq	5.15000000 GHz
Start Freq	5.07500000 GHz
Stop Freq	5.22500000 GHz
CF Step	15.0000000 MHz
	Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

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Detector mode: Average

Polarity: Vertical

Agilent



Freq/Channel	
Center Freq	5.15000000 GHz
Start Freq	5.07500000 GHz
Stop Freq	5.22500000 GHz
CF Step	15.0000000 MHz
	Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

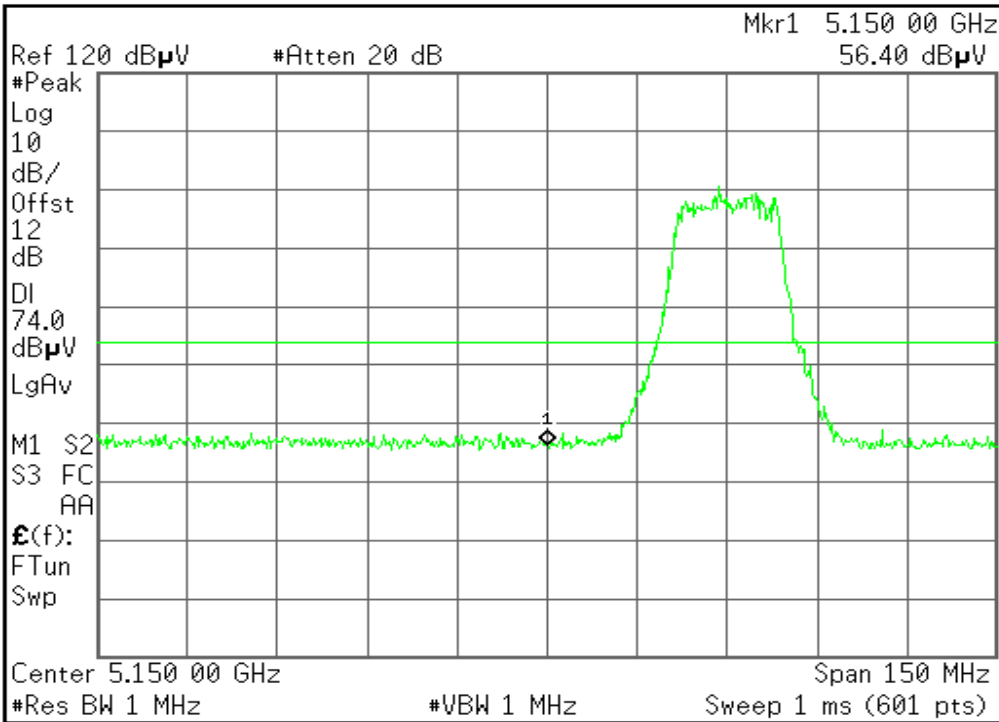
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Detector mode: Peak

Polarity: Horizontal

Agilent



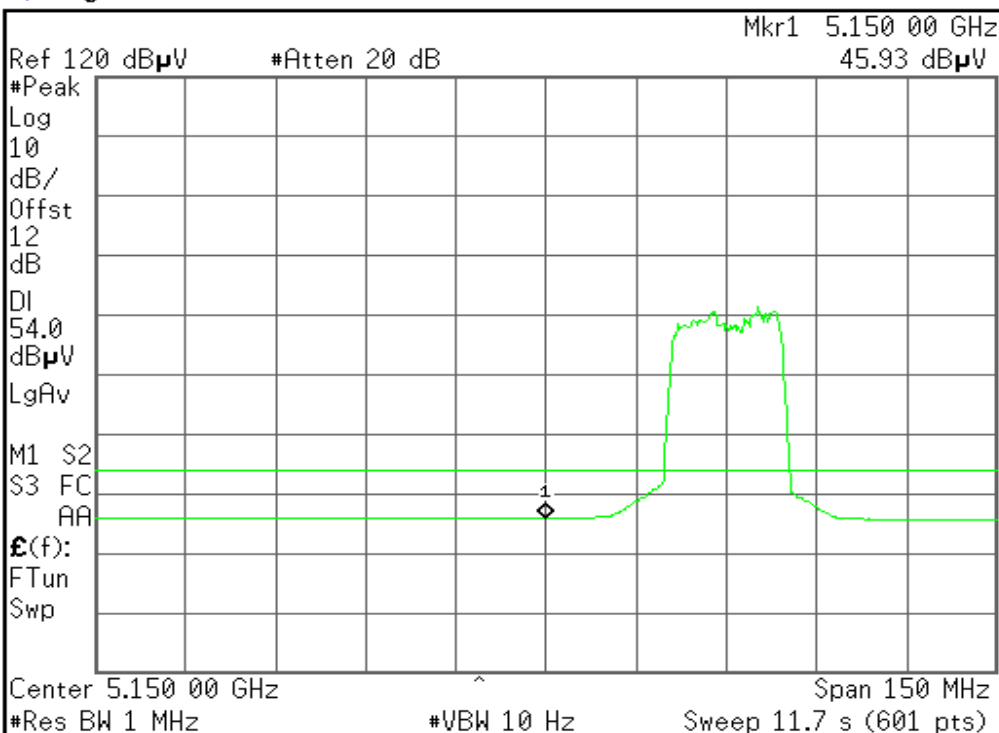
Trace		
1	2	3
Trace		
Clear Write		
Max Hold		
Min Hold		
View		
Blank		
More 1 of 2		

Copyright 2000-2007 Agilent Technologies

Detector mode: Average

Polarity: Horizontal

Agilent



Peak Search		
Next Peak		
Next Pk Right		
Next Pk Left		
Min Search		
Pk-Pk Search		
Mkr \rightarrow CF		
More 1 of 2		

Copyright 2000-2007 Agilent Technologies

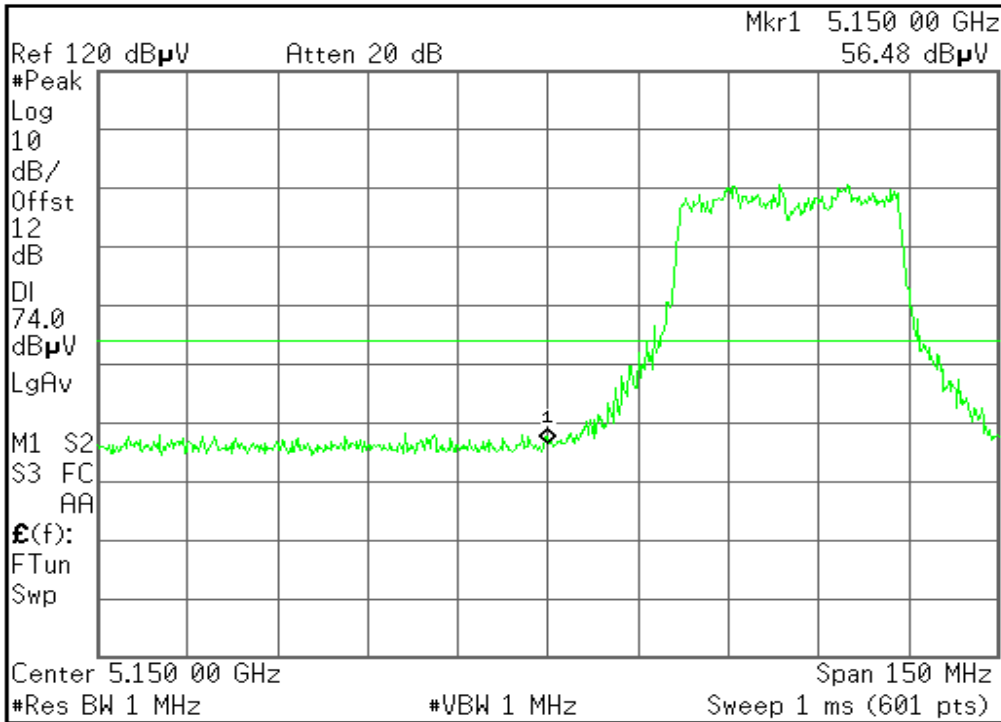


Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent



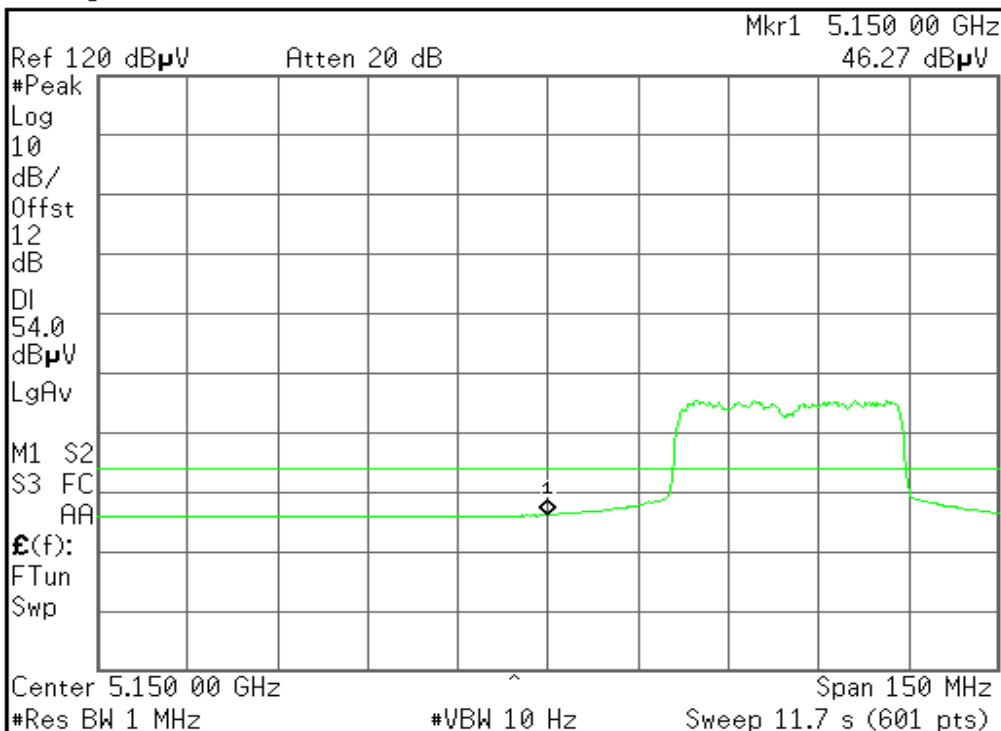
Trace		
1	Trace	2 3
Clear Write		
Max Hold		
Min Hold		
View		
Blank		
More 1 of 2		

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Detector mode: Average

Polarity: Vertical

Agilent



Display	
Full Screen	
Display Line	54.00 dBµV
On	Off
Limits>	
Active Fctn Position>	Center
Title>	
Preferences>	

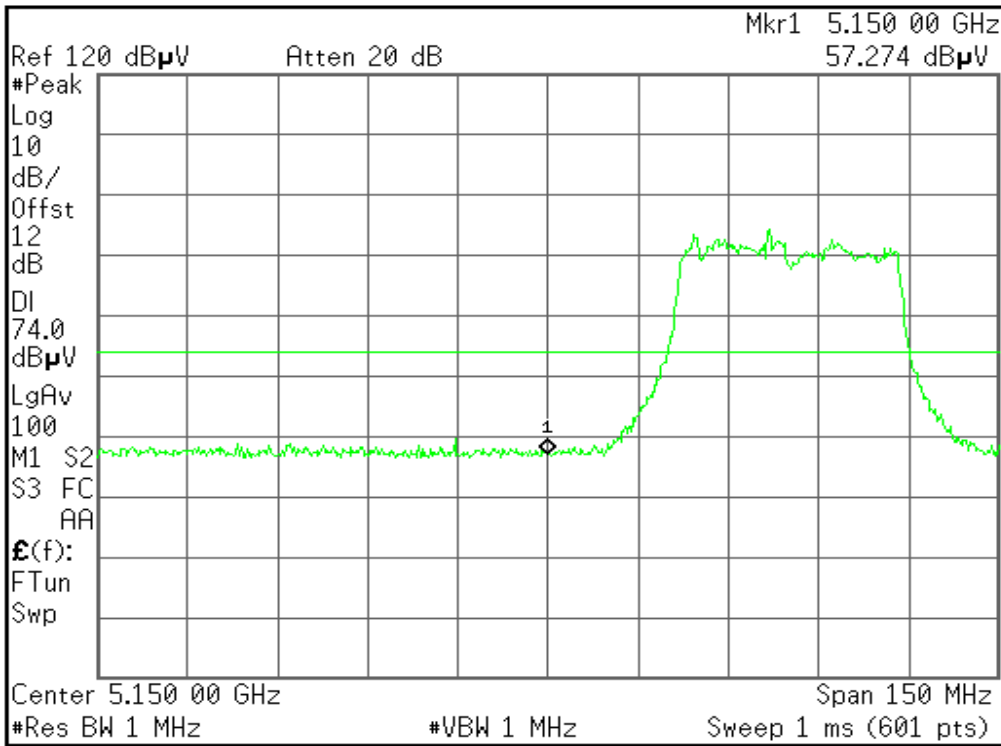
Copyright 2000-2007 Agilent Technologies



Detector mode: Peak

Polarity: Horizontal

Agilent



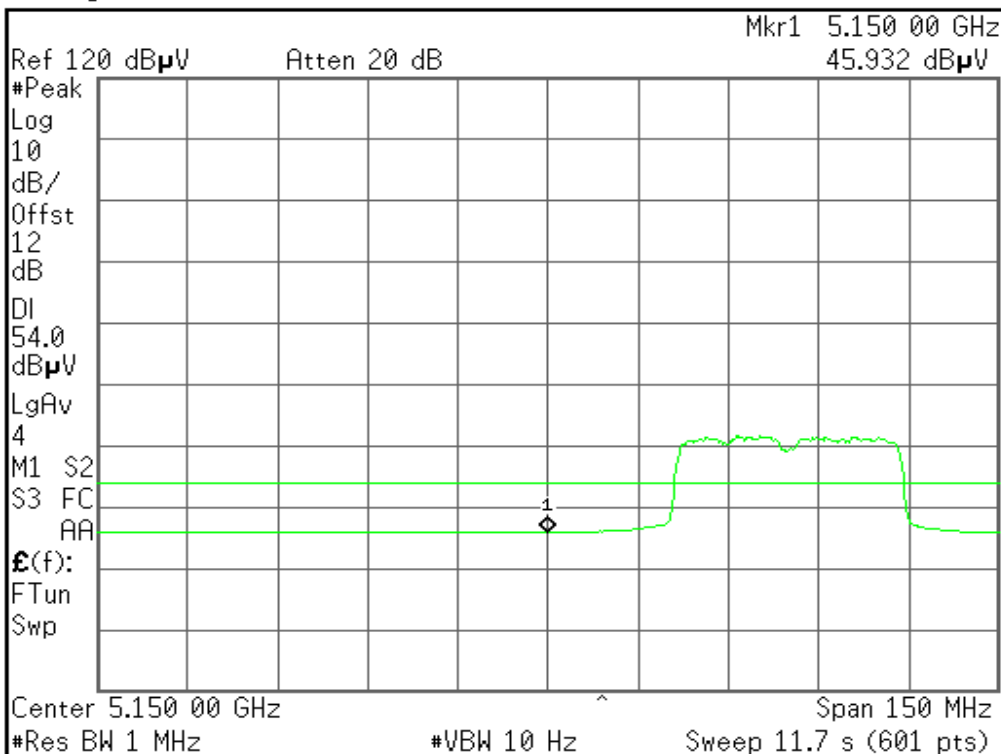
Display
Full Screen
Display Line 74.00 dBµV On Off
Limits>
Active Fctn Position> Center
Title>
Preferences>

File Operation Status, A:\SCREN052.GIF file saved

Detector mode: Average

Polarity: Horizontal

Agilent



Display
Full Screen
Display Line 54.00 dBµV On Off
Limits>
Active Fctn Position> Center
Title>
Preferences>

Copyright 2000-2007 Agilent Technologies



PEAK POWER SPECTRAL DENSITY

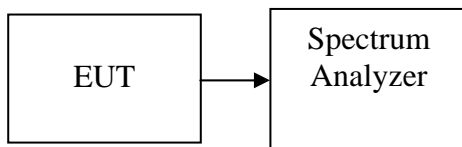
LIMIT

According to §15.407(a),

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

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

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = 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**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	2.93	4.00	-1.07	PASS
Mid	5200	2.82	4.00	-1.18	PASS
High	5240	2.63	4.00	-1.37	PASS

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

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	-2.24	-1.84	-1.81	2.81	4.00	-2.45	PASS
Mid	5200	-1.78	-2.06	-1.69	2.93	4.00	-2.69	PASS
High	5240	-2.47	-2.69	-1.53	2.57	4.00	-3.22	PASS

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

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	Chain 2 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5190	-2.44	-2.76	-2.24	2.30	4.00	-1.23	PASS
Mid	5230	-2.72	-2.63	-1.97	2.34	4.00	-1.72	PASS

Test mode: draft 802.11gn Standard-20 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	1.55	4.00	-1.07	PASS
Mid	5200	1.31	4.00	-1.18	PASS
High	5240	0.78	4.00	-1.37	PASS

Test mode: draft 802.11gn Wide-40 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin	Result
Low	5180	2.77	4.00	-1.07	PASS
High	5240	2.28	4.00	-1.37	PASS

(Remark: 1. Maximum antenna gain =2dBi, therefore there is no reduction due to antenna gain.)

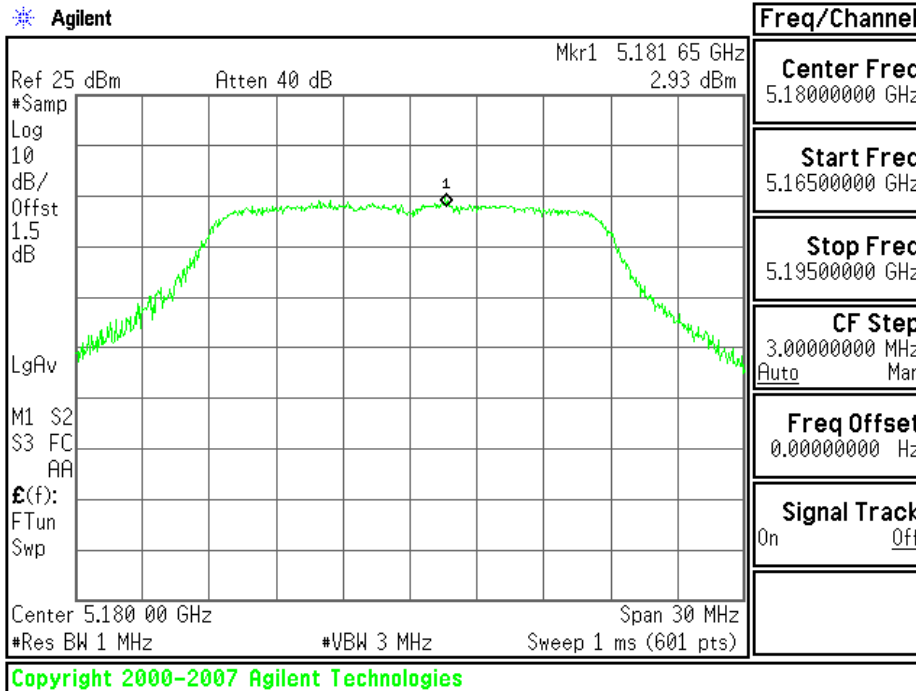


Test Plot

Test mode: IEEE 802.11a mode:

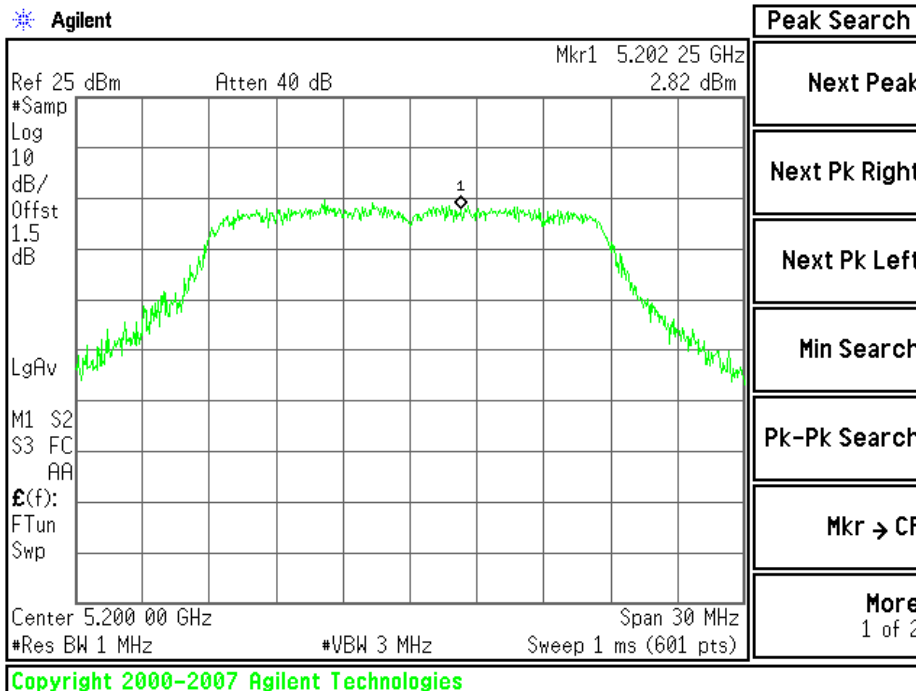
CH Low

Agilent



CH Mid

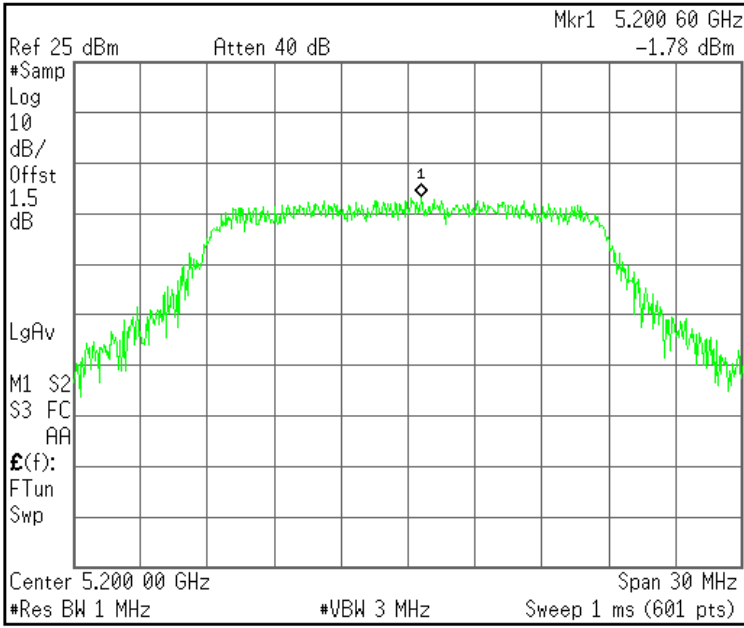
Agilent





CH Mid

Agilent



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

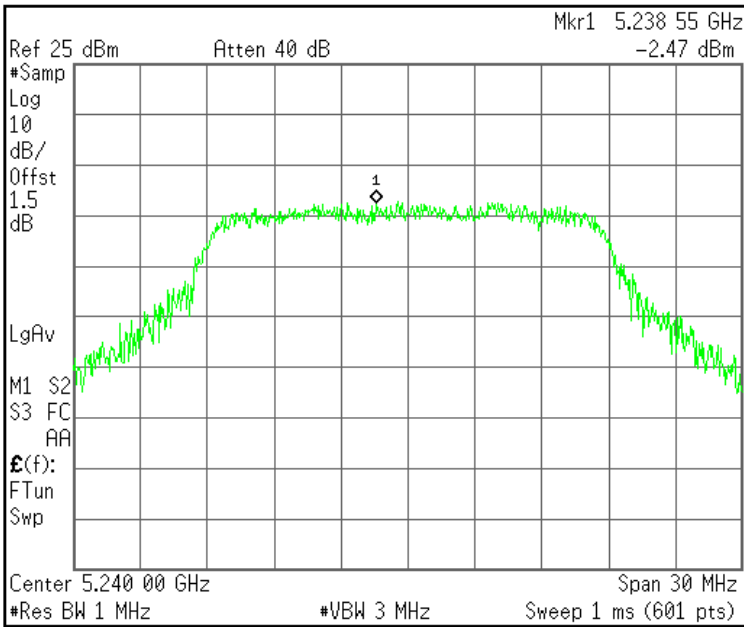
Mkr → CF

More
1 of 2

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CH High

Agilent



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

Mkr → CF

More
1 of 2

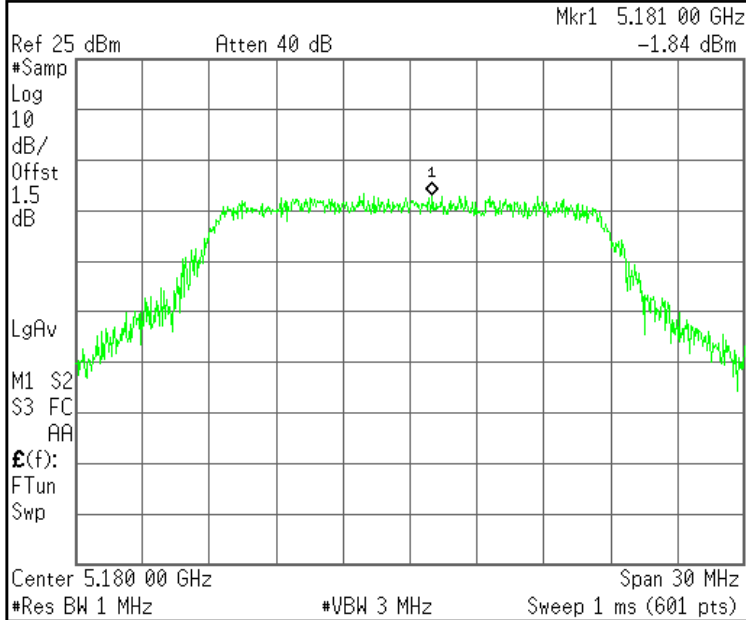
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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1:

CH Low

Agilent

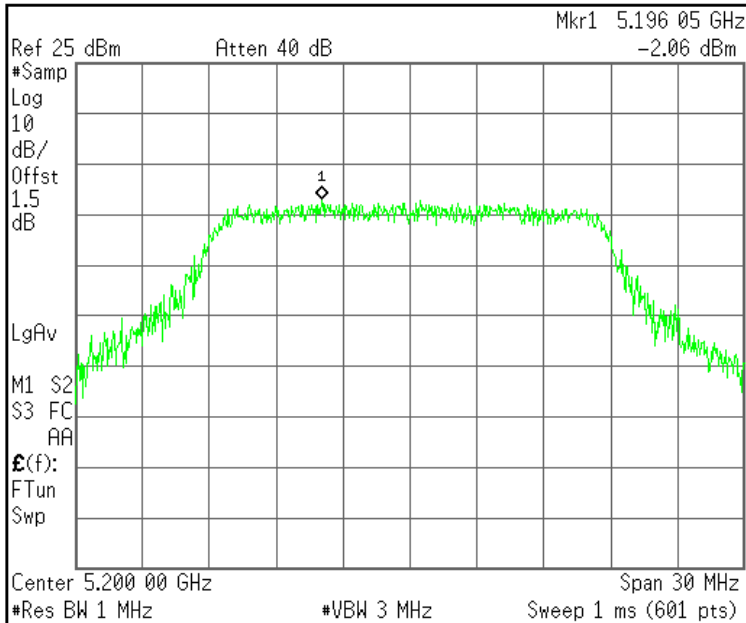


Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More 1 of 2

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CH Mid

Agilent



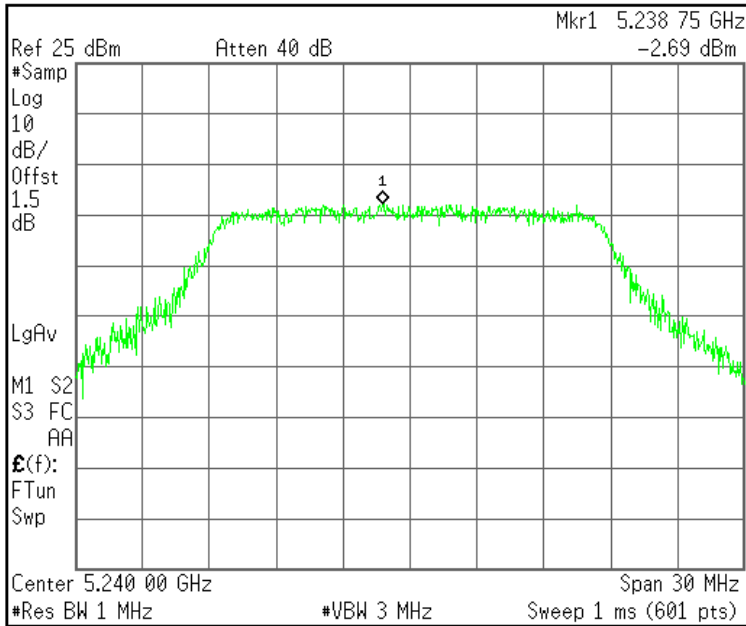
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More 1 of 2

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CH High

Agilent



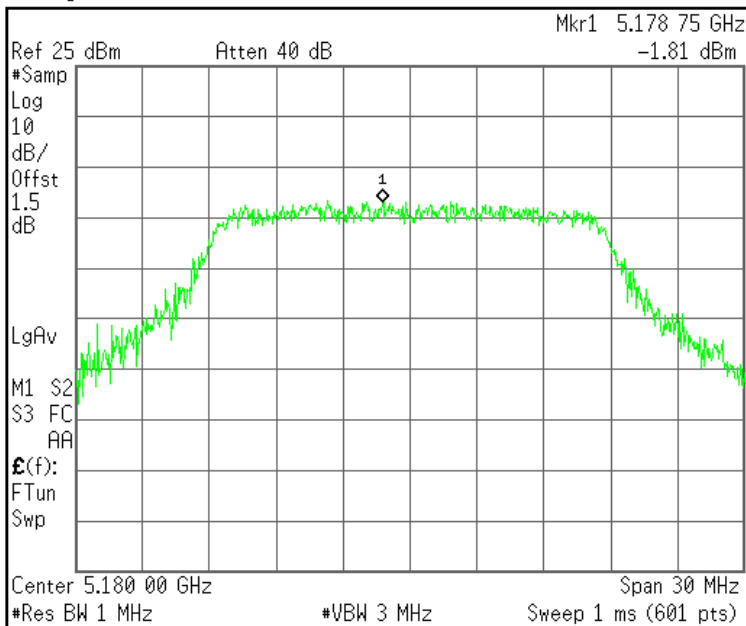
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More 1 of 2

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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2:

CH Low

Agilent



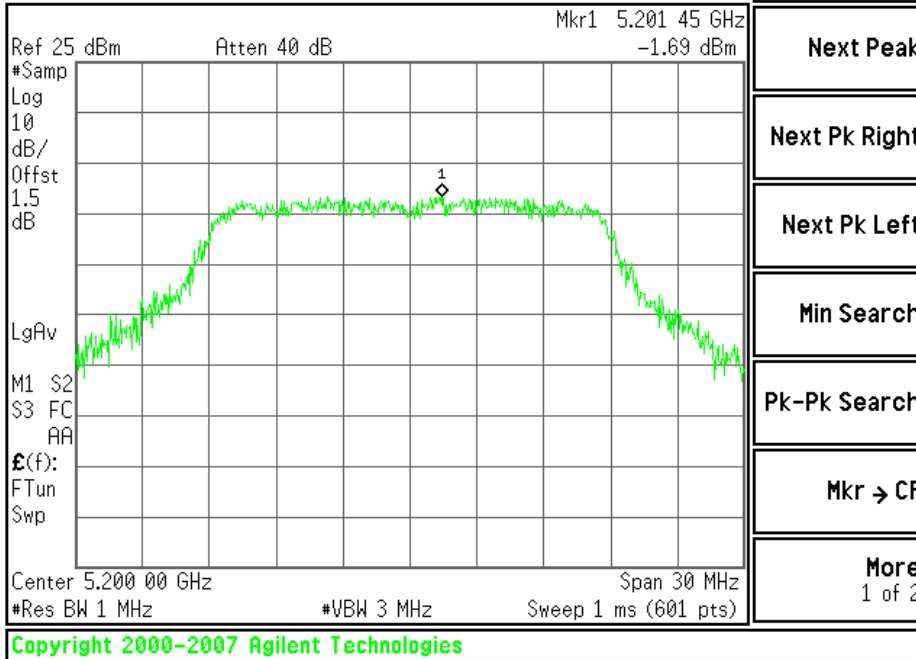
Freq/Channel
Center Freq 5.18000000 GHz
Start Freq 5.16500000 GHz
Stop Freq 5.19500000 GHz
CF Step 3.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

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CH Mid

Agilent



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

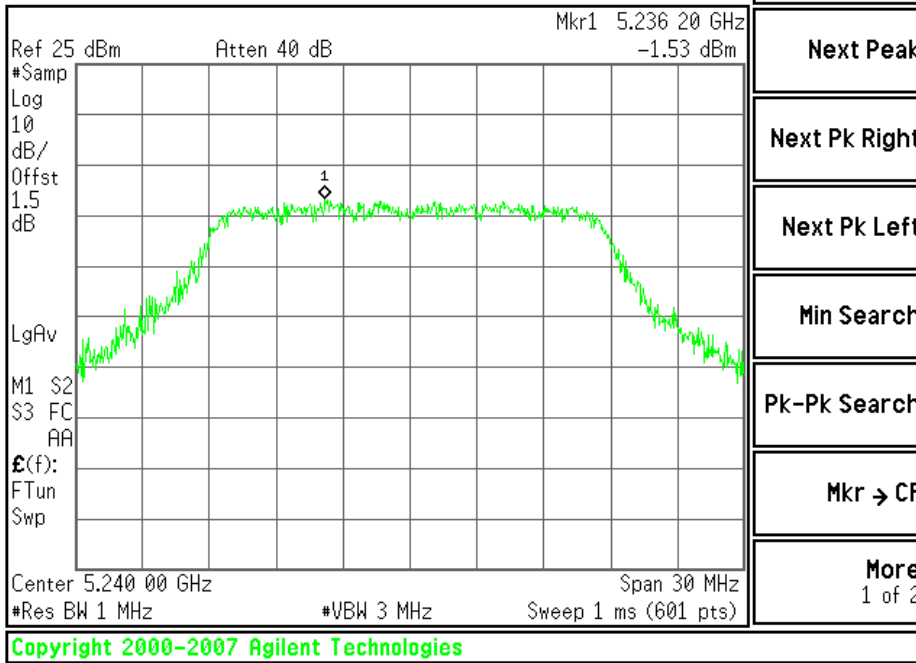
Pk-Pk Search

Mkr → CF

More
1 of 2

CH High

Agilent



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

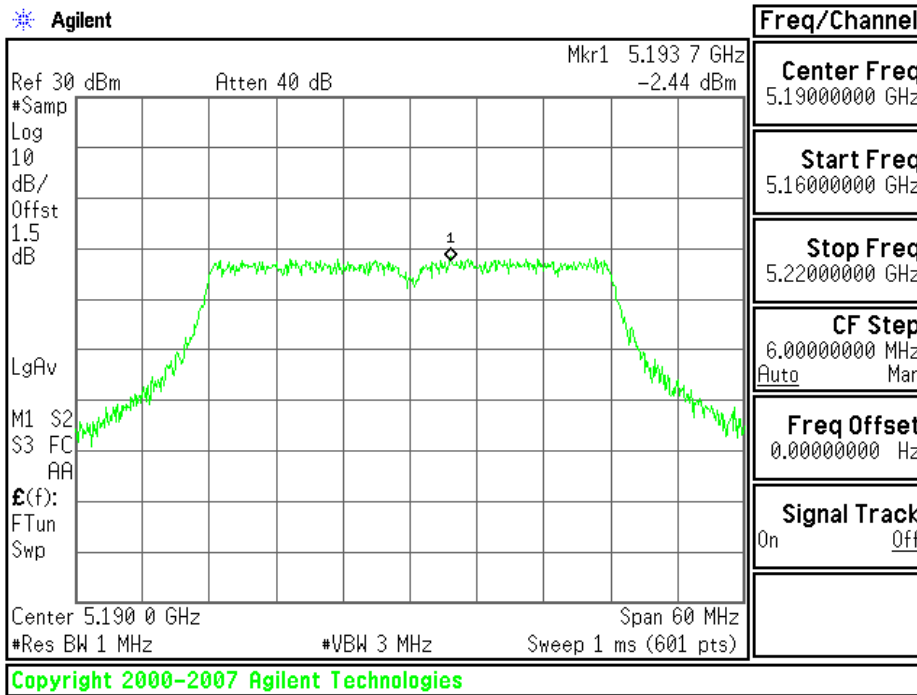
Mkr → CF

More
1 of 2

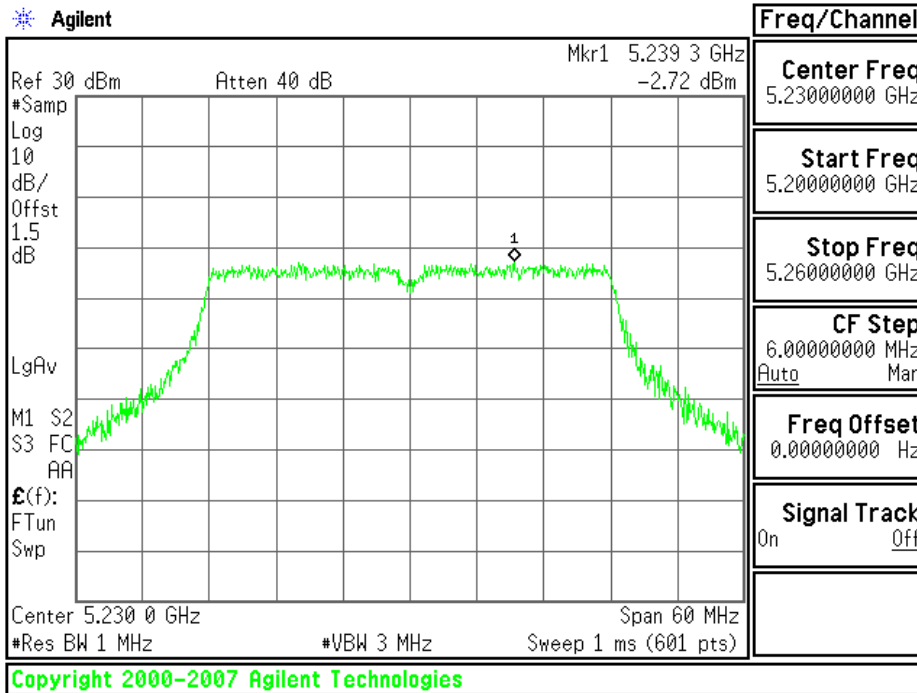


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0:

CH Low



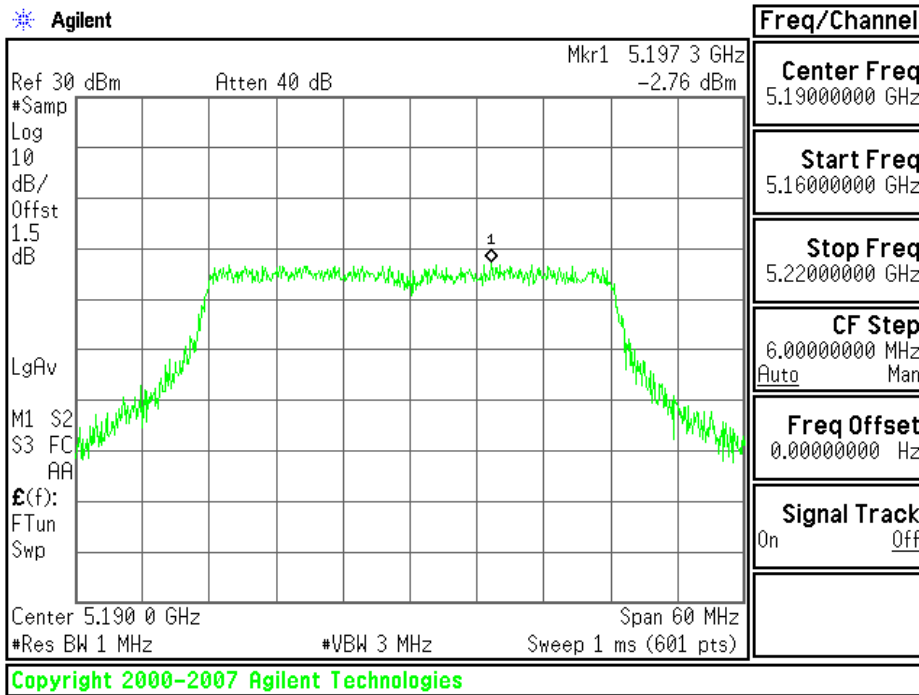
CH High



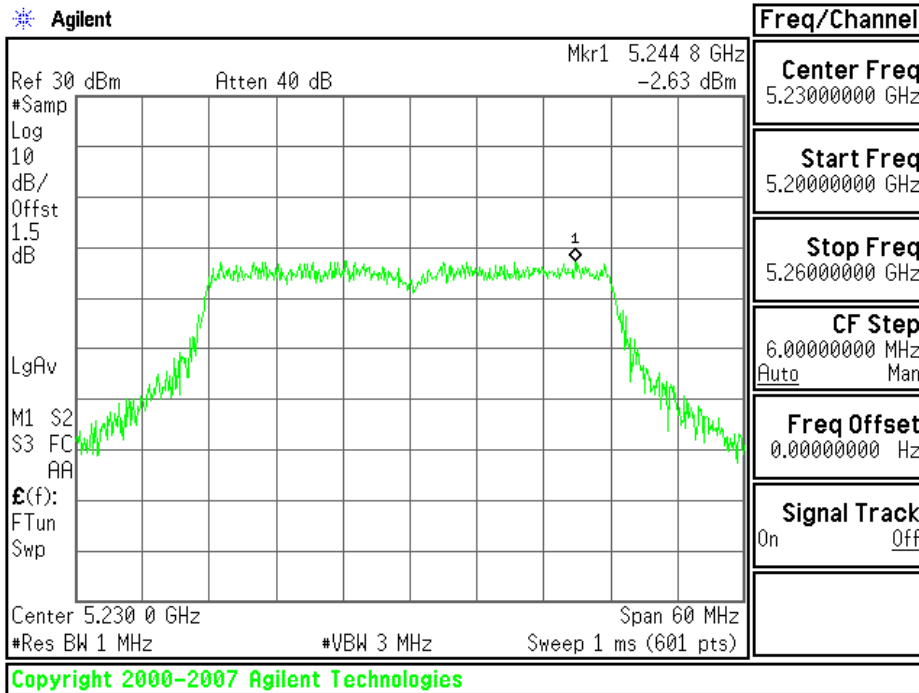


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1:

CH Low



CH High

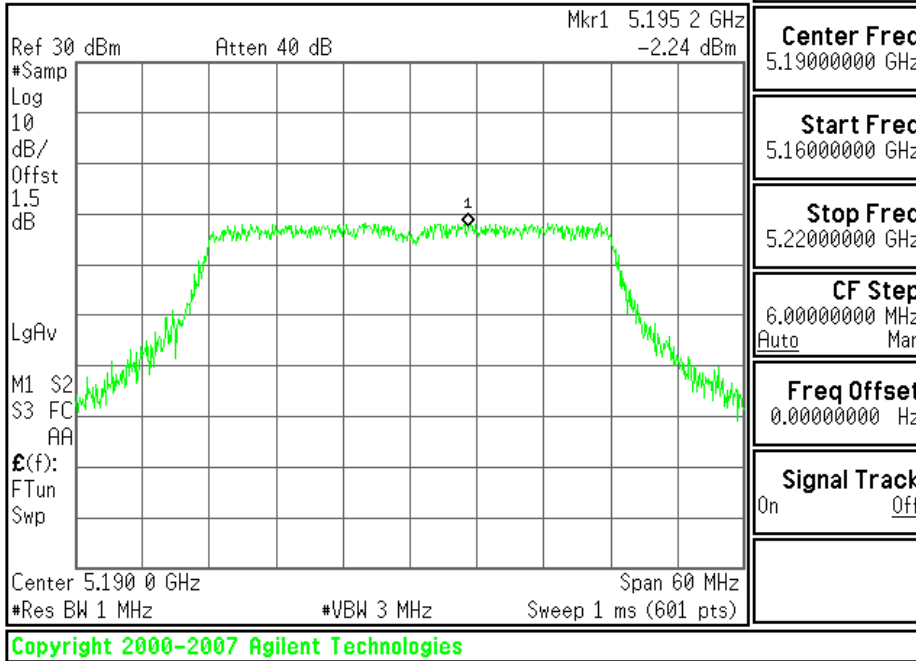




Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

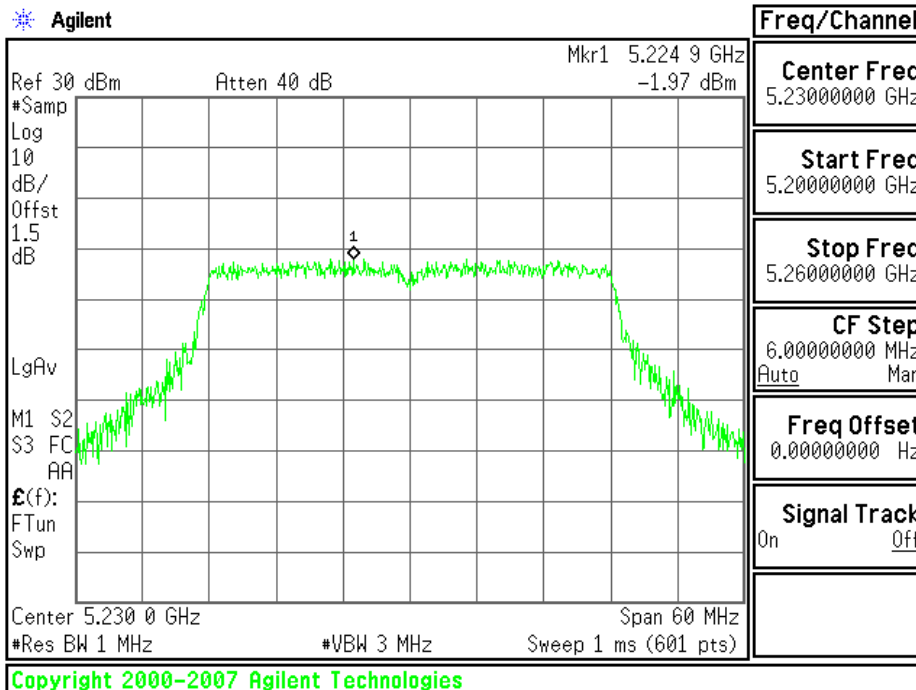
CH Low

Agilent



CH High

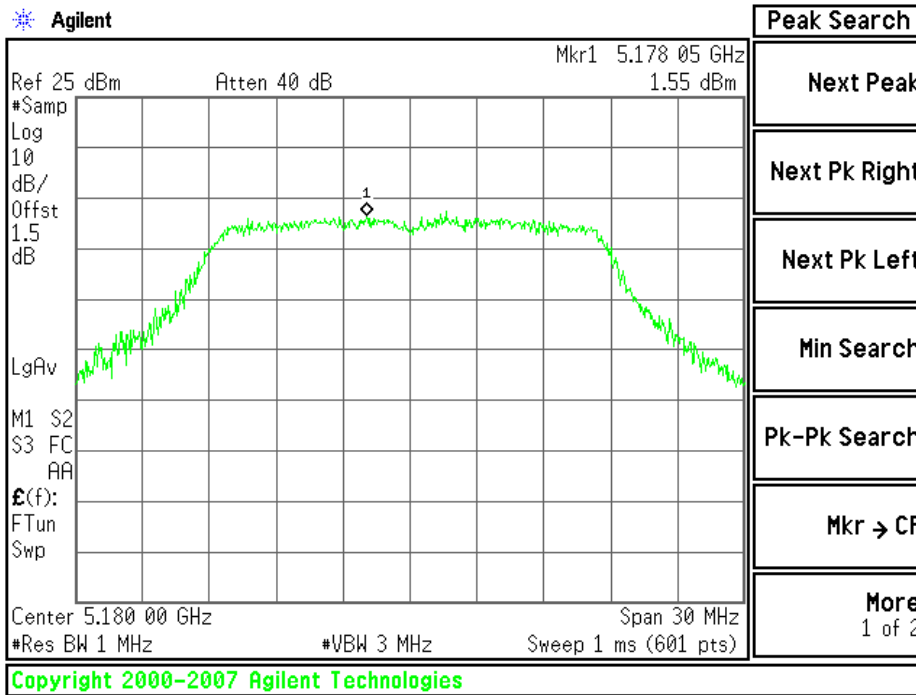
Agilent



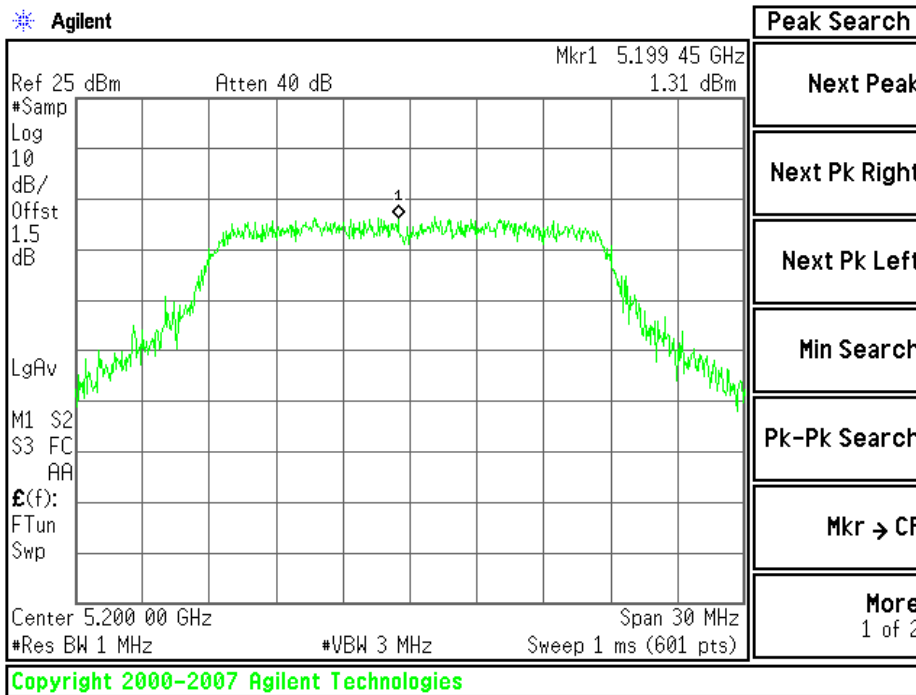


Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:

CH Low

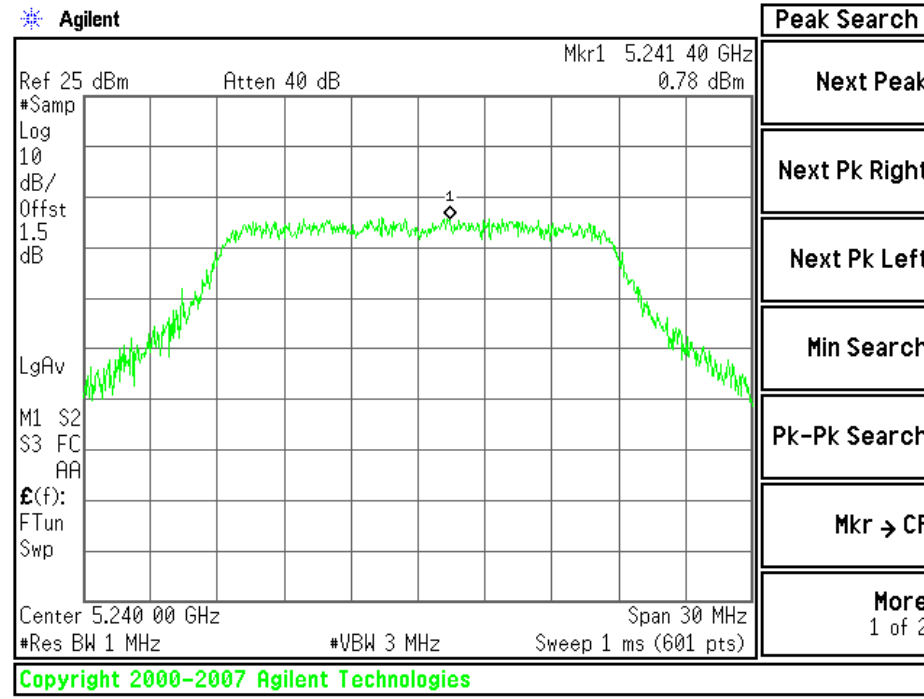


CH Mid



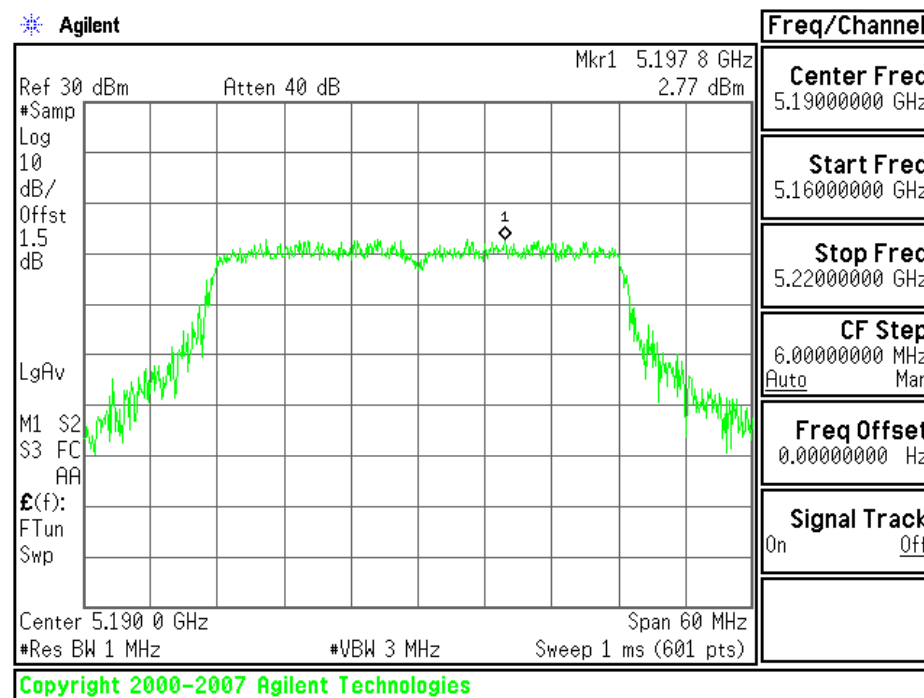


CH High



Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:

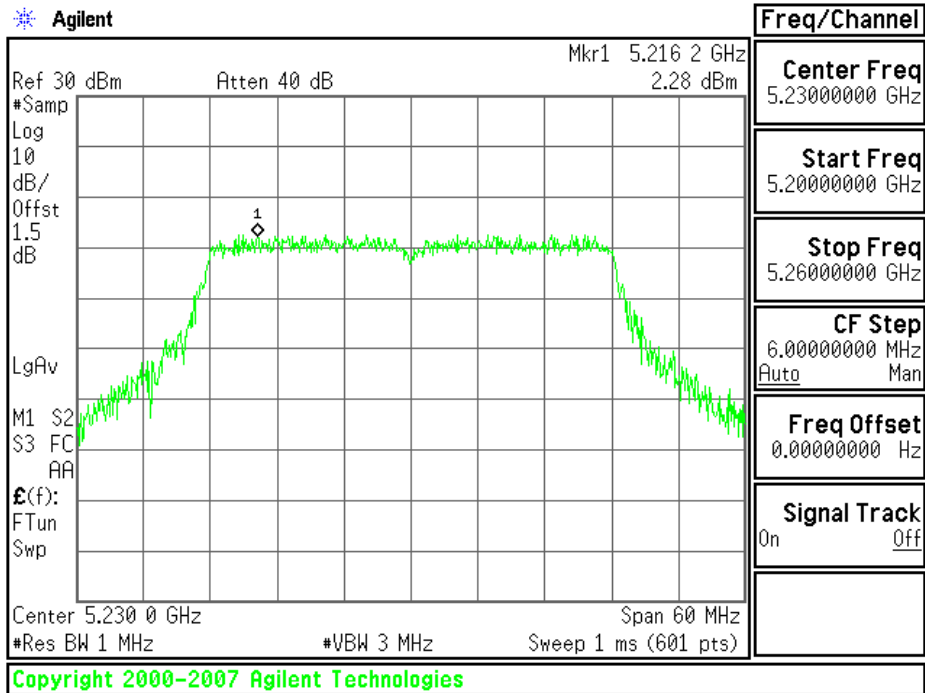
CH Low





CH High

Agilent



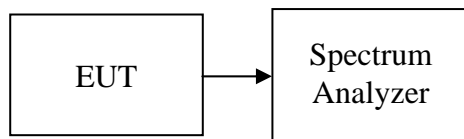


PEAK EXCURSION

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**

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	9.50	13.00	-3.50	PASS
Mid	5200	8.21	13.00	-4.79	PASS
High	5240	8.13	13.00	-4.87	PASS

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

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	7.54	13.00	-5.46	PASS
Mid	5200	8.45	13.00	-4.55	PASS
High	5240	8.26	13.00	-4.74	PASS

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

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	8.38	13.00	-4.62	PASS
Mid	5200	8.81	13.00	-4.19	PASS
High	5240	7.86	13.00	-5.14	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	8.53	13.00	-4.47	PASS
Mid	5200	9.19	13.00	-3.81	PASS
High	5240	8.44	13.00	-4.56	PASS

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

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	7.90	13.00	-5.10	PASS
High	5230	7.97	13.00	-5.03	PASS



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

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	8.54	13.00	-4.46	PASS
High	5230	7.75	13.00	-5.25	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	7.86	13.00	-5.14	PASS
High	5230	8.07	13.00	-4.93	PASS

Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1+ Chain 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	7.91	13.00	-5.09	PASS
Mid	5200	8.60	13.00	-4.40	PASS
High	5240	8.76	13.00	-4.24	PASS

Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	8.42	13.00	-4.58	PASS
High	5230	7.51	13.00	-5.49	PASS

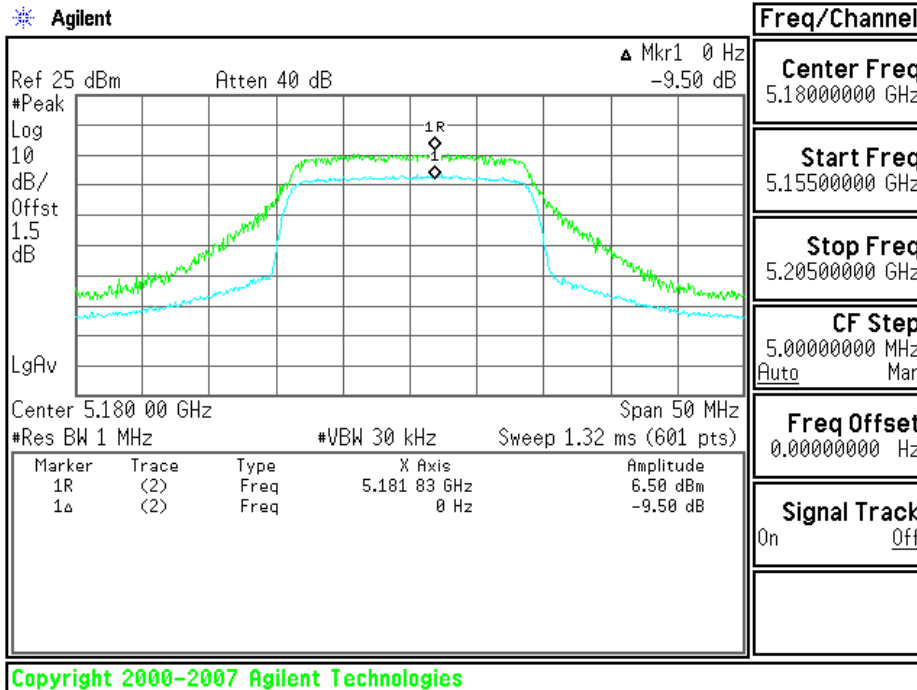


Test Plot

Test mode: IEEE 802.11a mode:

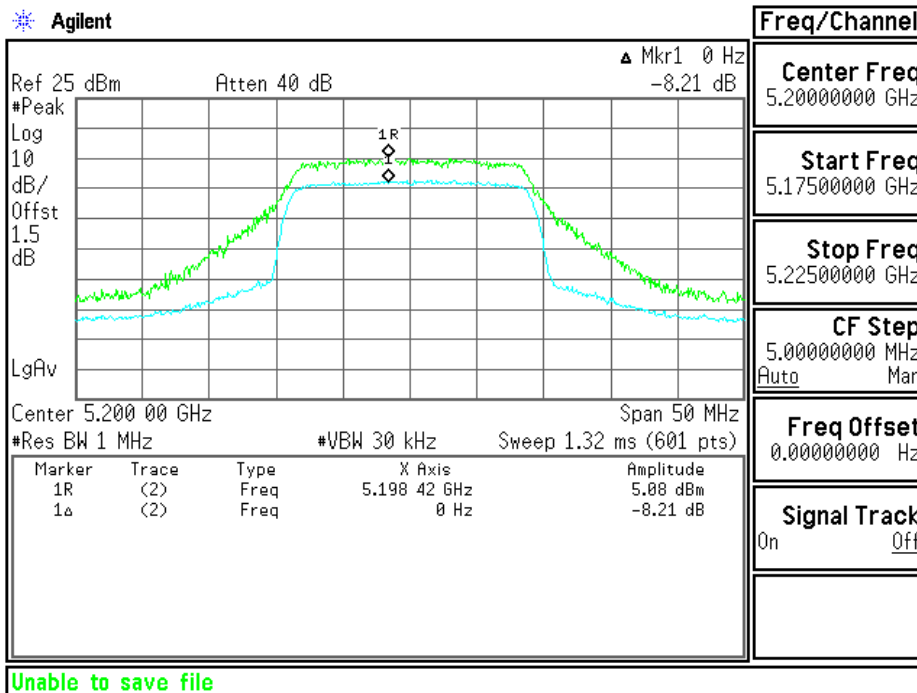
CH Low

Agilent



CH Mid

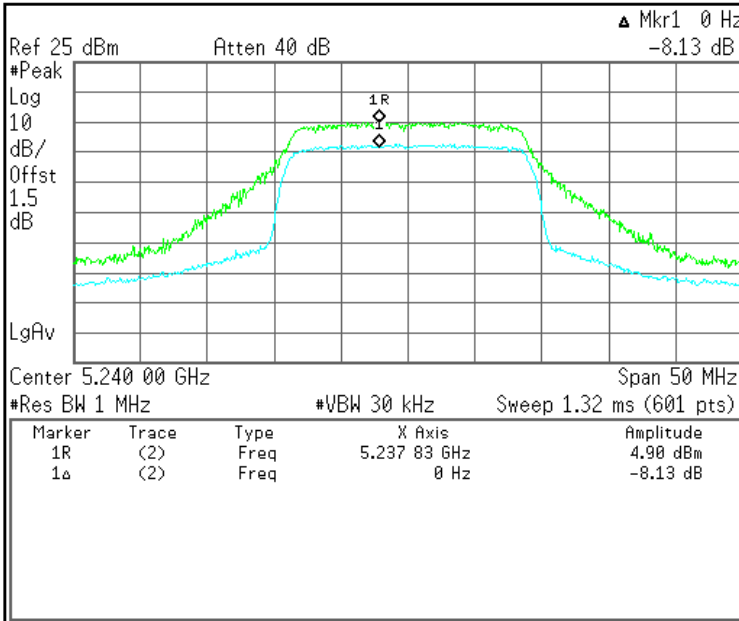
Agilent





CH High

Agilent



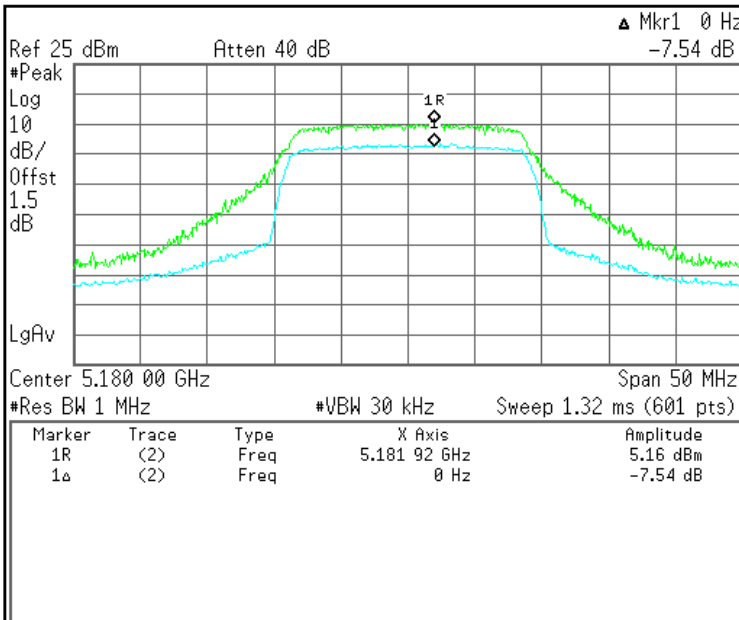
Freq/Channel
Center Freq 5.24000000 GHz
Start Freq 5.21500000 GHz
Stop Freq 5.26500000 GHz
CF Step Auto Man 5.00000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

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

CH Low

Agilent



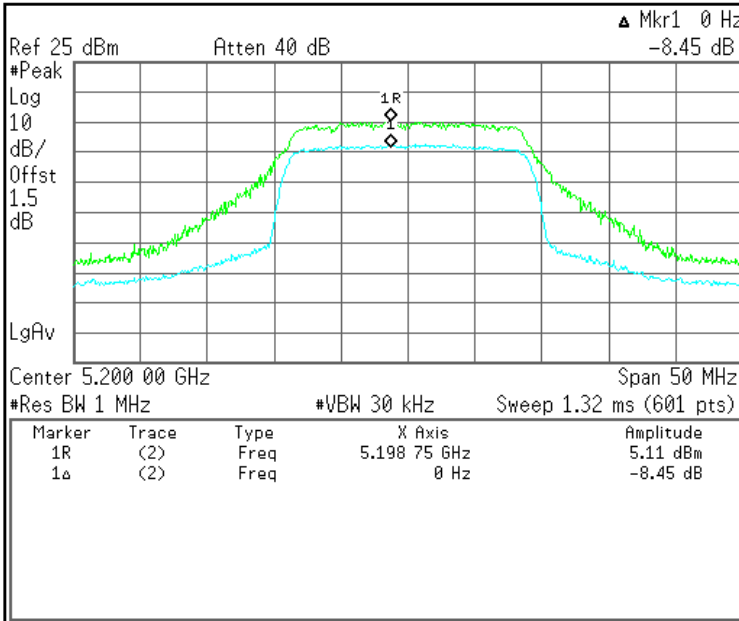
Freq/Channel
Center Freq 5.18000000 GHz
Start Freq 5.15500000 GHz
Stop Freq 5.20500000 GHz
CF Step Auto Man 5.00000000 MHz
Freq Offset 0.00000000 Hz
Signal Track On Off

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CH Mid

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Freq/Channel

Center Freq
5.20000000 GHz

Start Freq
5.17500000 GHz

Stop Freq
5.22500000 GHz

CF Step
5.00000000 MHz
Auto Man

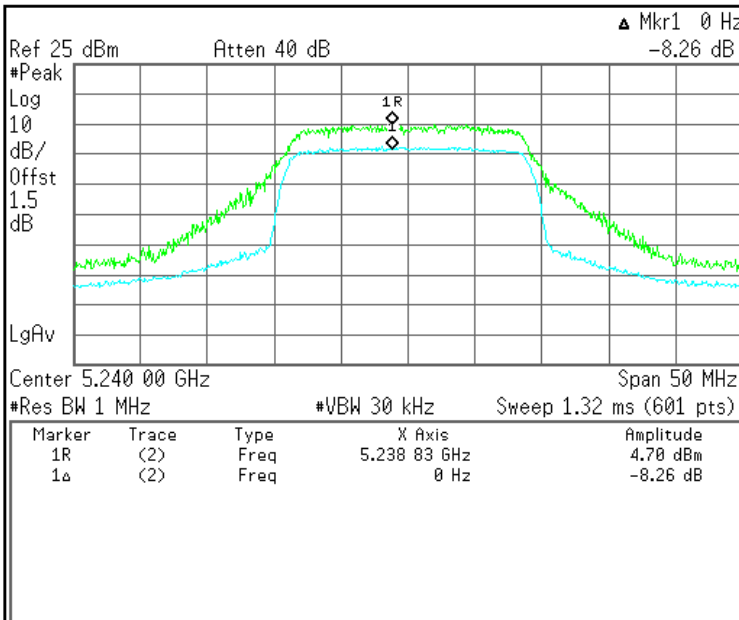
Freq Offset
0.00000000 Hz

Signal Track
On Off

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CH High

Agilent



Freq/Channel

Center Freq
5.24000000 GHz

Start Freq
5.21500000 GHz

Stop Freq
5.26500000 GHz

CF Step
5.00000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

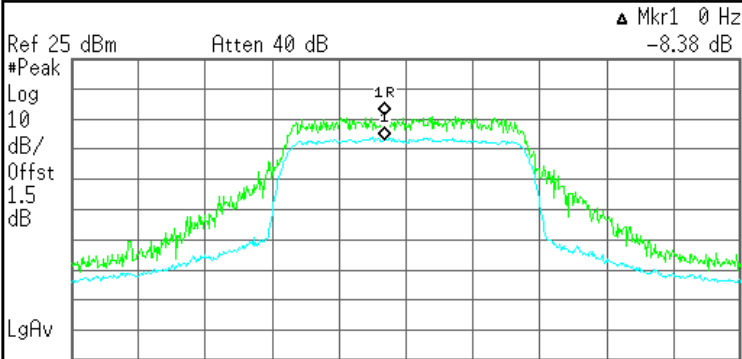
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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1:

CH Low

Agilent



Ref 25 dBm Atten 40 dB Δ Mkr1 0 Hz -8.38 dB

Center 5.180 00 GHz Span 50 MHz

#Res BW 1 MHz #VBW 30 kHz Sweep 1.32 ms (601 pts)

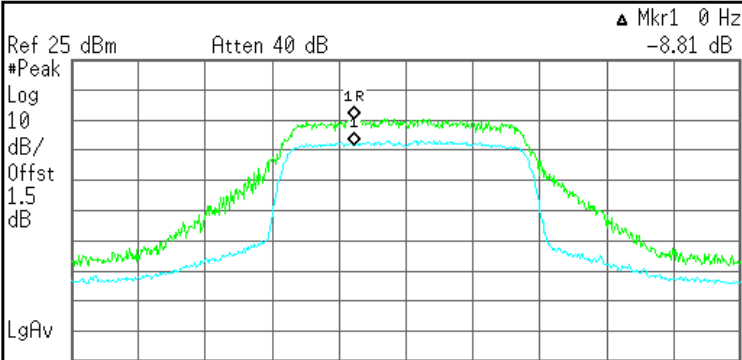
Marker	Trace	Type	X Axis	Amplitude
1R	(2)	Freq	5.178 42 GHz	6.47 dBm
1 Δ	(2)	Freq	0 Hz	-8.38 dB

Freq/Channel	
Center Freq	5.18000000 GHz
Start Freq	5.15500000 GHz
Stop Freq	5.20500000 GHz
CF Step	5.00000000 MHz
	Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

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CH Mid

Agilent



Ref 25 dBm Atten 40 dB Δ Mkr1 0 Hz -8.81 dB

Center 5.200 00 GHz Span 50 MHz

#Res BW 1 MHz #VBW 30 kHz Sweep 1.32 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(2)	Freq	5.196 08 GHz	5.44 dBm
1 Δ	(2)	Freq	0 Hz	-8.81 dB

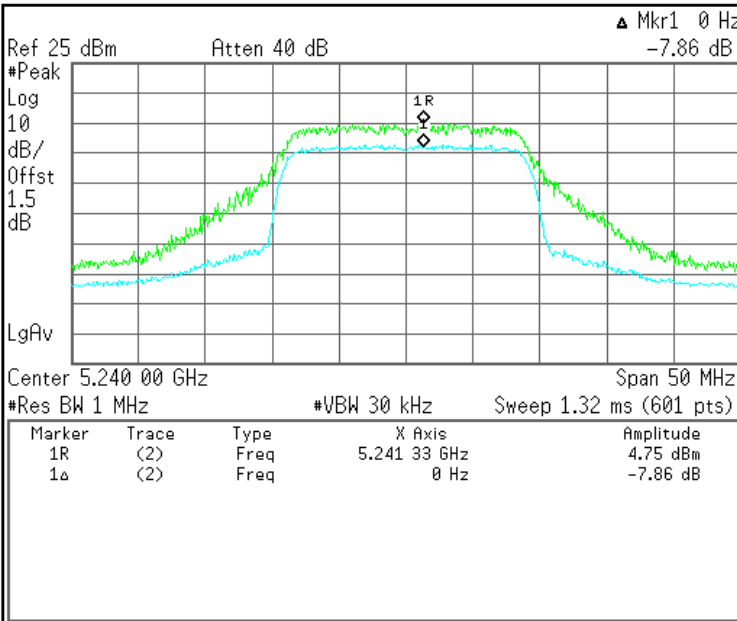
Freq/Channel	
Center Freq	5.20000000 GHz
Start Freq	5.17500000 GHz
Stop Freq	5.22500000 GHz
CF Step	5.00000000 MHz
	Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

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CH High

Agilent



Freq/Channel

Center Freq
5.24000000 GHz

Start Freq
5.21500000 GHz

Stop Freq
5.26500000 GHz

CF Step
5.00000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

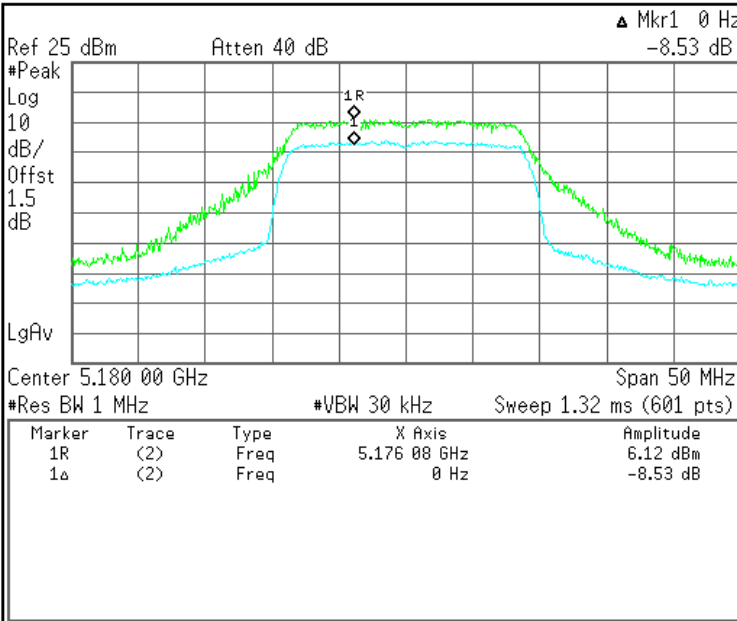
Signal Track
On Off

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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2:

CH Low

Agilent



Freq/Channel

Center Freq
5.18000000 GHz

Start Freq
5.15500000 GHz

Stop Freq
5.20500000 GHz

CF Step
5.00000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

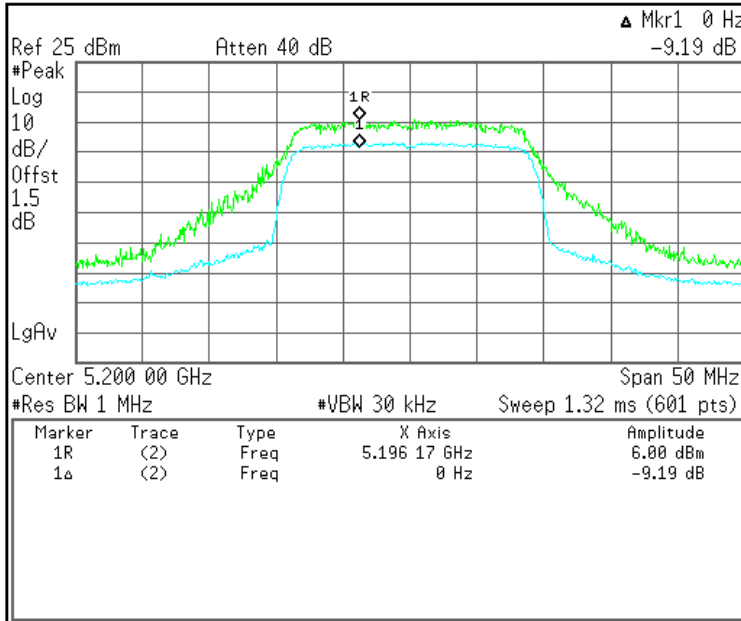
Signal Track
On Off

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CH Mid

Agilent



Freq/Channel

Center Freq
5.20000000 GHz

Start Freq
5.17500000 GHz

Stop Freq
5.22500000 GHz

CF Step
5.00000000 MHz
Auto Man

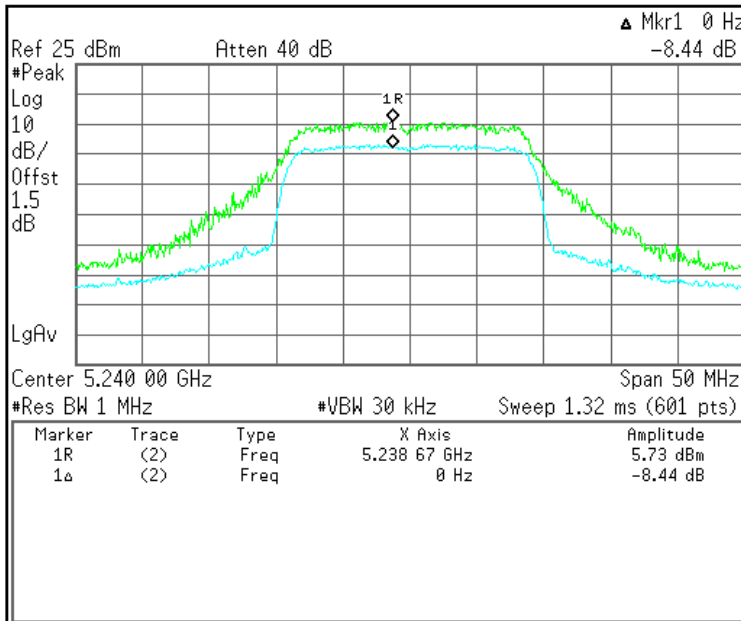
Freq Offset
0.00000000 Hz

Signal Track
On Off

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CH High

Agilent



Freq/Channel

Center Freq
5.24000000 GHz

Start Freq
5.21500000 GHz

Stop Freq
5.26500000 GHz

CF Step
5.00000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

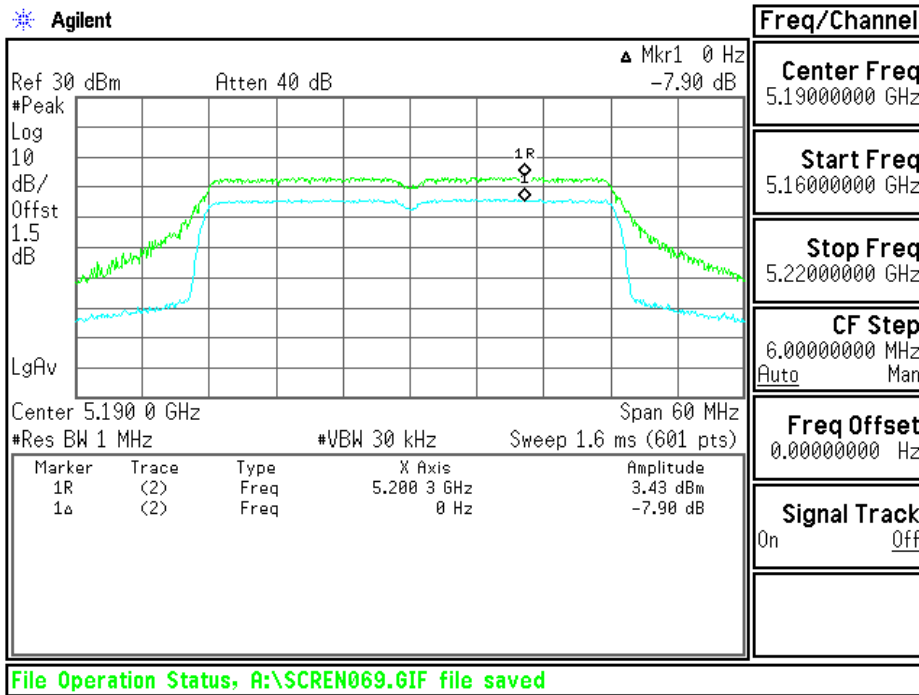
Signal Track
On Off

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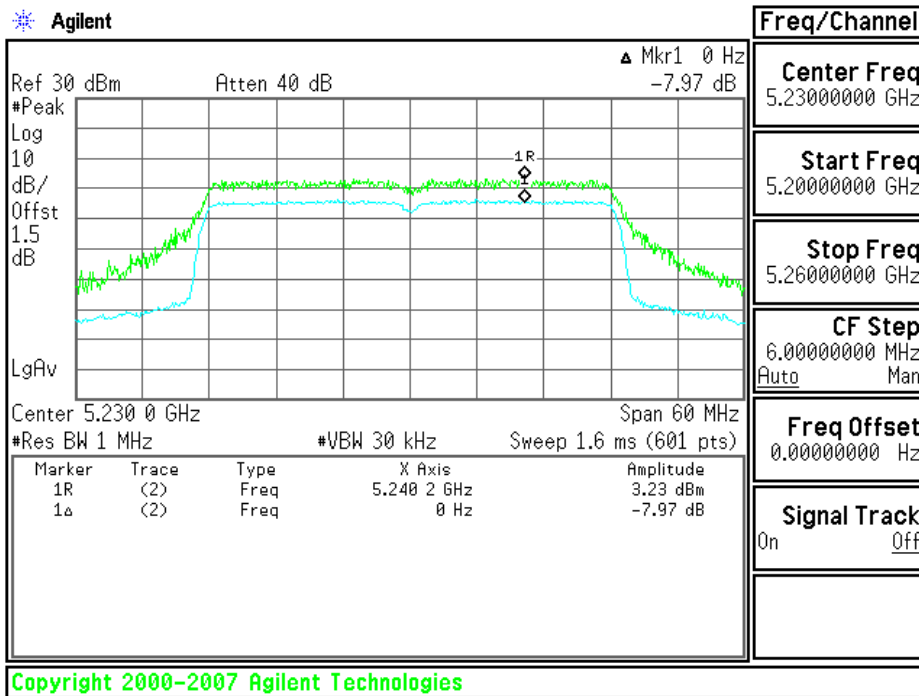


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0:

CH Low



CH High

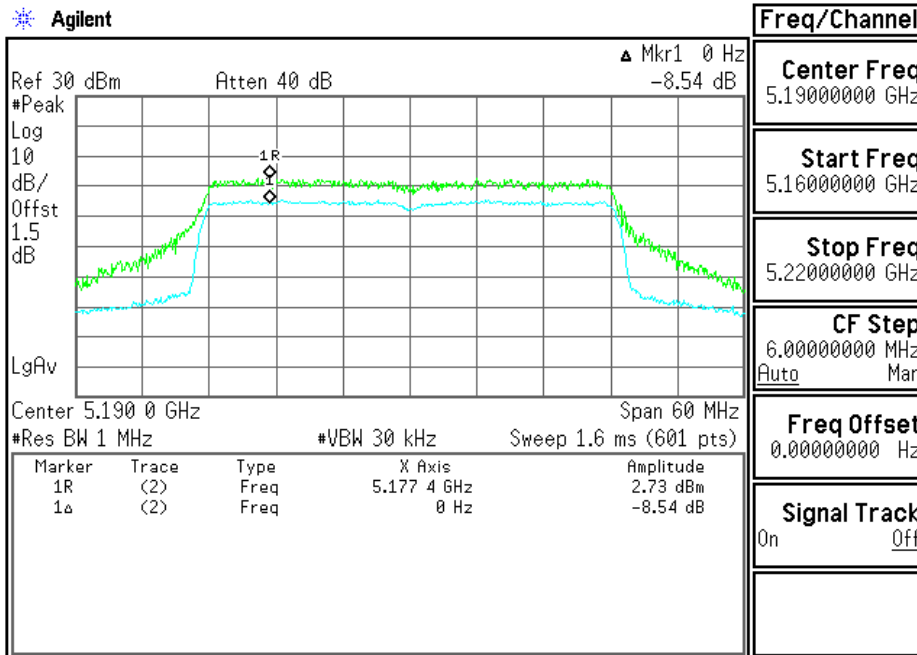




Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1:

CH Low

Agilent



Freq/Channel

Center Freq
5.19000000 GHz

Start Freq
5.16000000 GHz

Stop Freq
5.22000000 GHz

CF Step
6.00000000 MHz
Auto Man

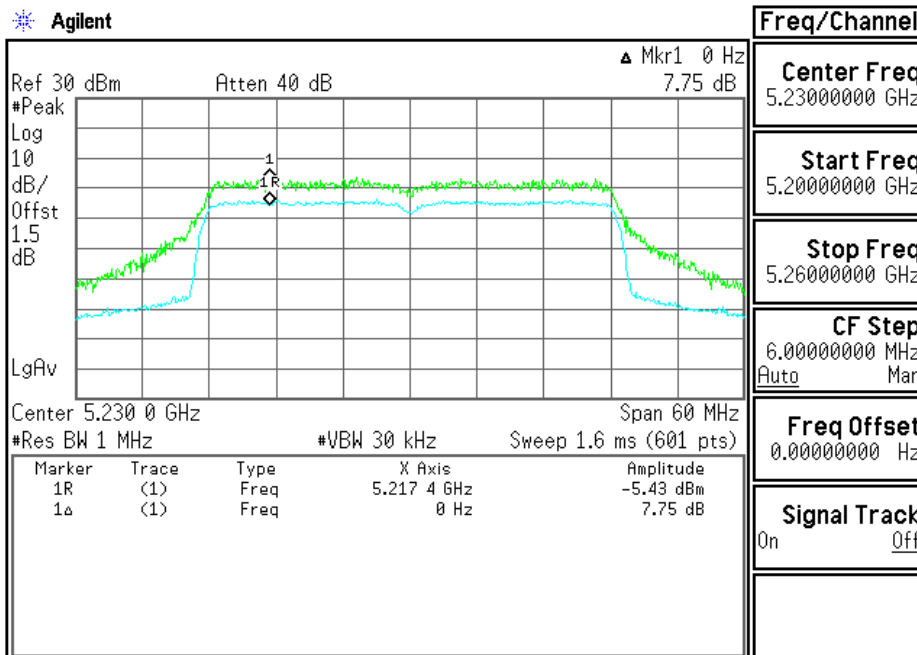
Freq Offset
0.00000000 Hz

Signal Track
On Off

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CH High

Agilent



Freq/Channel

Center Freq
5.23000000 GHz

Start Freq
5.20000000 GHz

Stop Freq
5.26000000 GHz

CF Step
6.00000000 MHz
Auto Man

Freq Offset
0.00000000 Hz

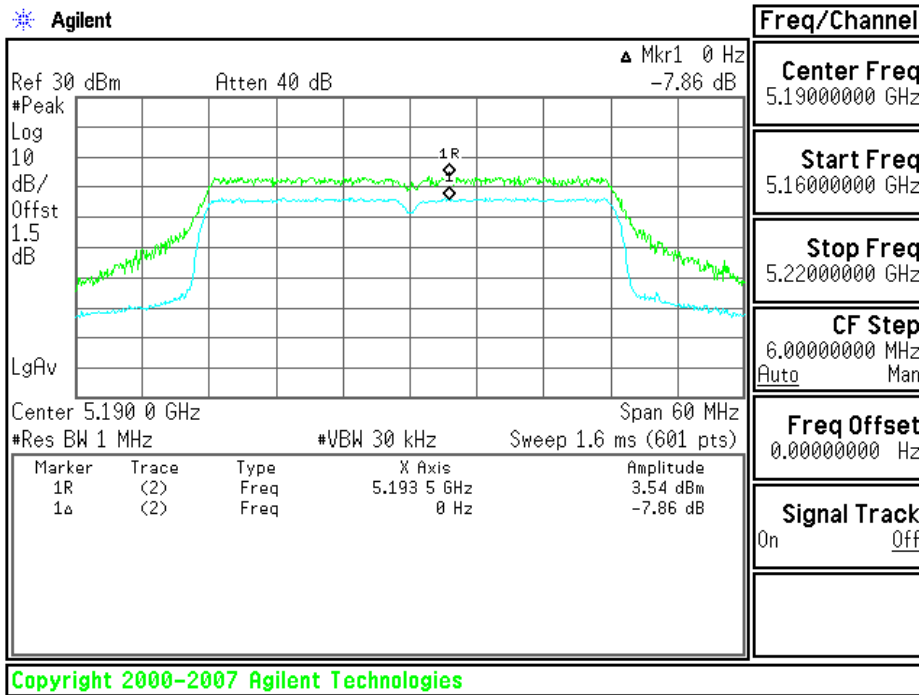
Signal Track
On Off

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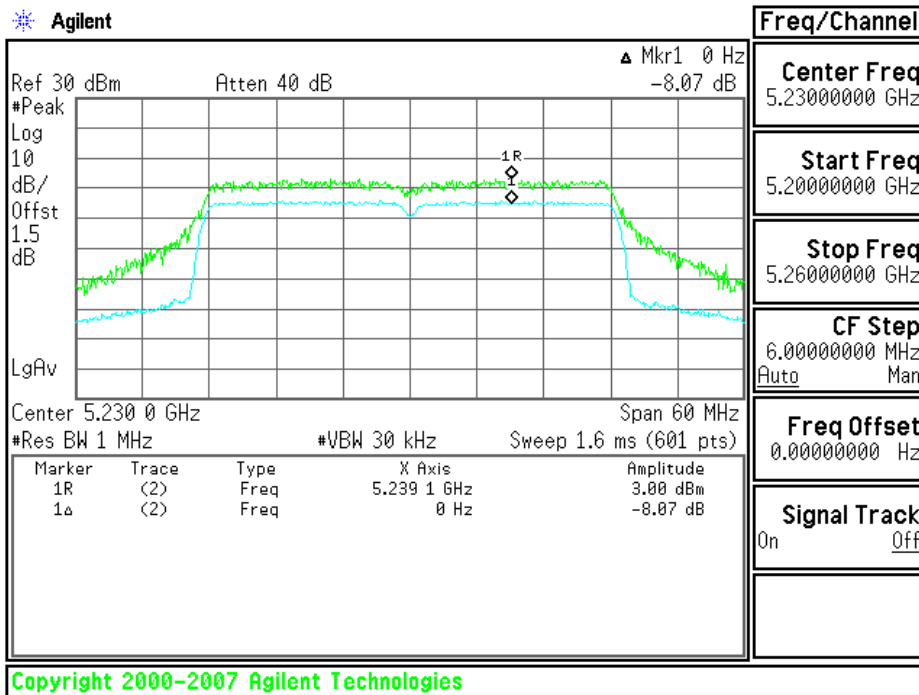


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

CH Low



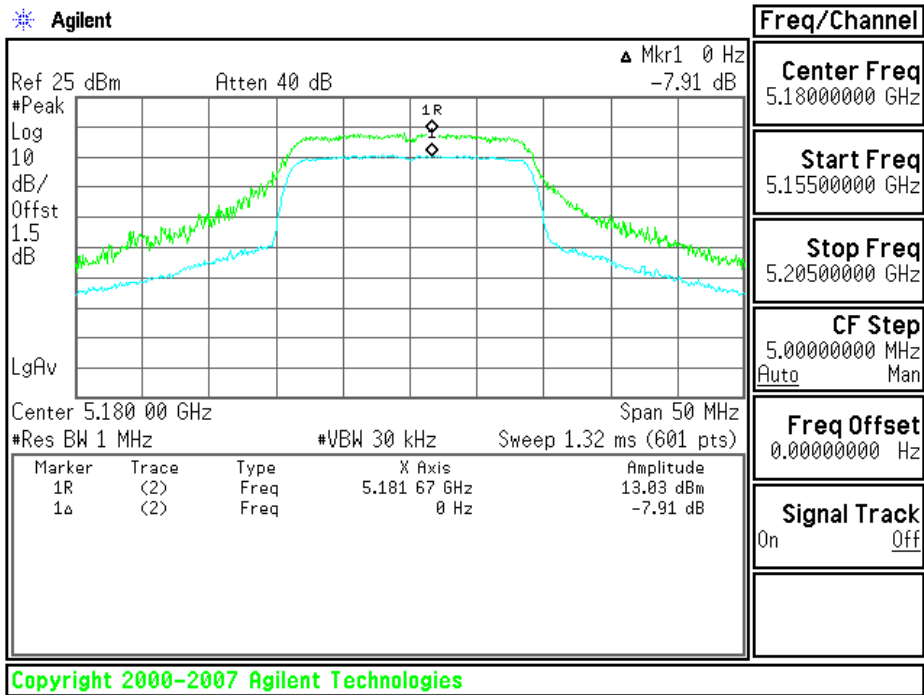
CH High



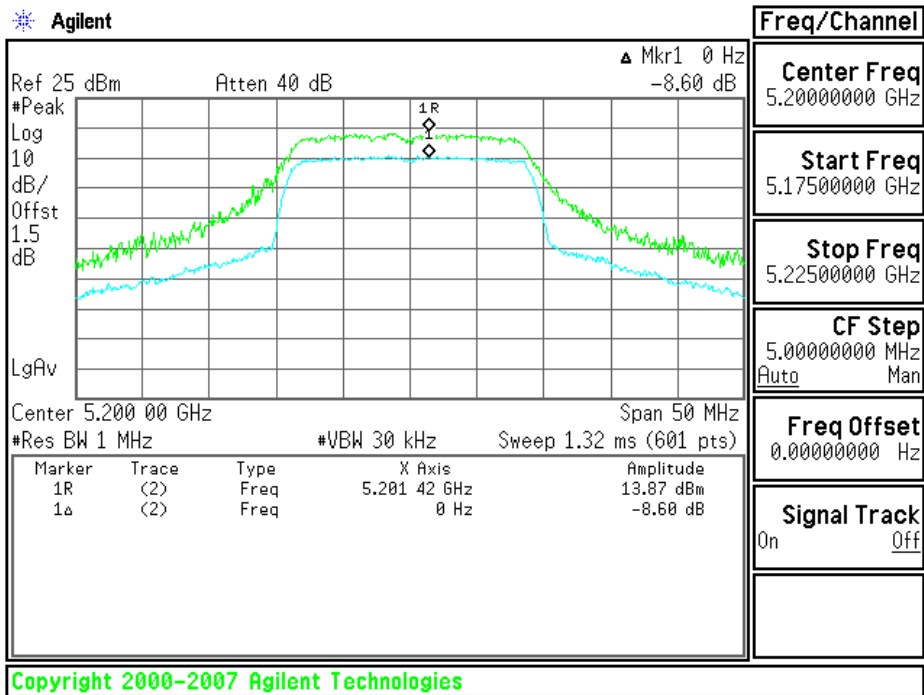


Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:

CH Low



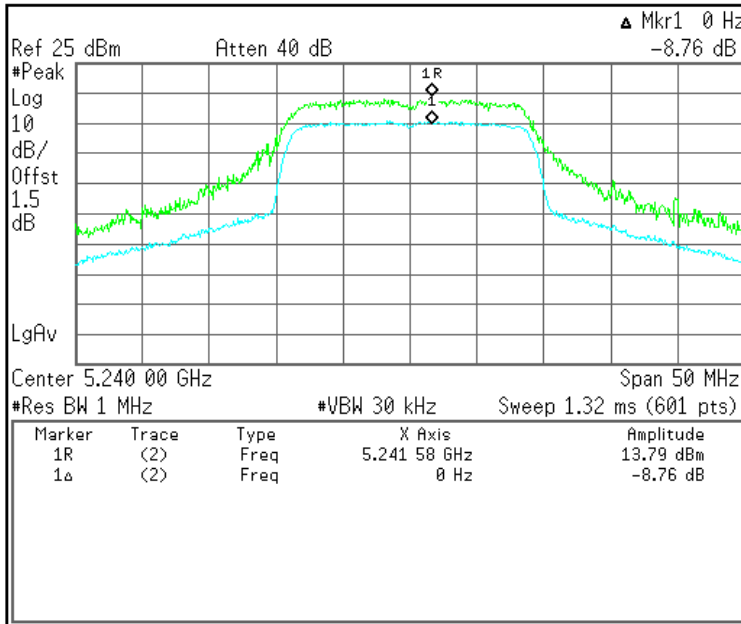
CH Mid





CH High

Agilent



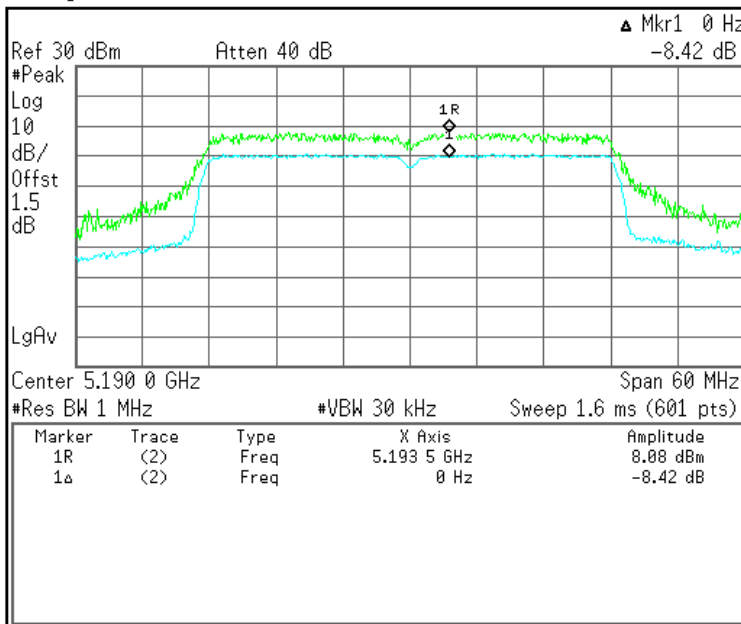
Freq/Channel	
Center Freq	5.24000000 GHz
Start Freq	5.21500000 GHz
Stop Freq	5.26500000 GHz
CF Step	5.00000000 MHz
	Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

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Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:

CH Low

Agilent



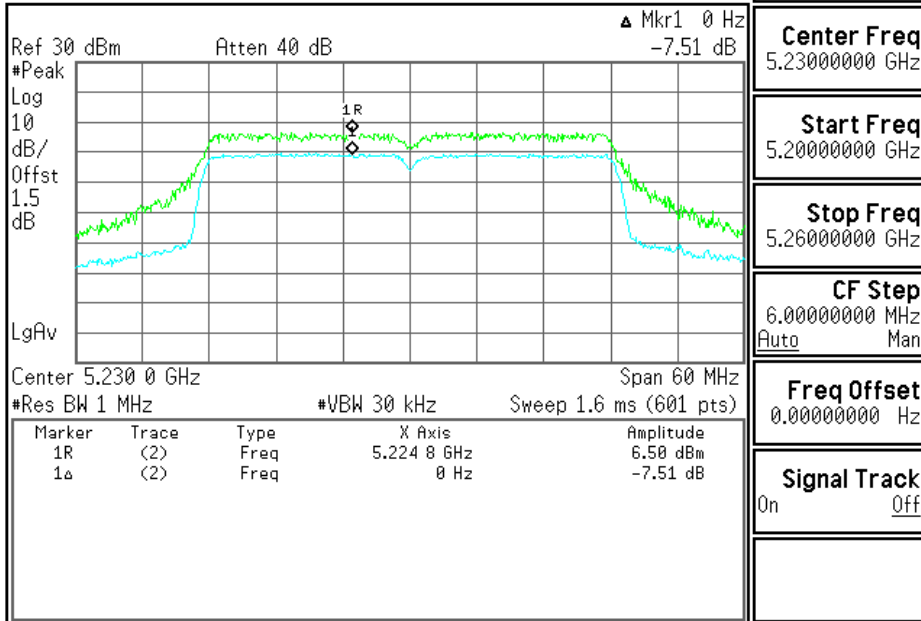
Freq/Channel	
Center Freq	5.19000000 GHz
Start Freq	5.16000000 GHz
Stop Freq	5.22000000 GHz
CF Step	6.00000000 MHz
	Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

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CH High

Agilent



Freq/Channel

Center Freq
5.23000000 GHz

Start Freq
5.20000000 GHz

Stop Freq
5.26000000 GHz

CF Step
Auto Man
6.00000000 MHz

Freq Offset
0.00000000 Hz

Signal Track
On Off

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RADIATED UNDESIRABLE EMISSION

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

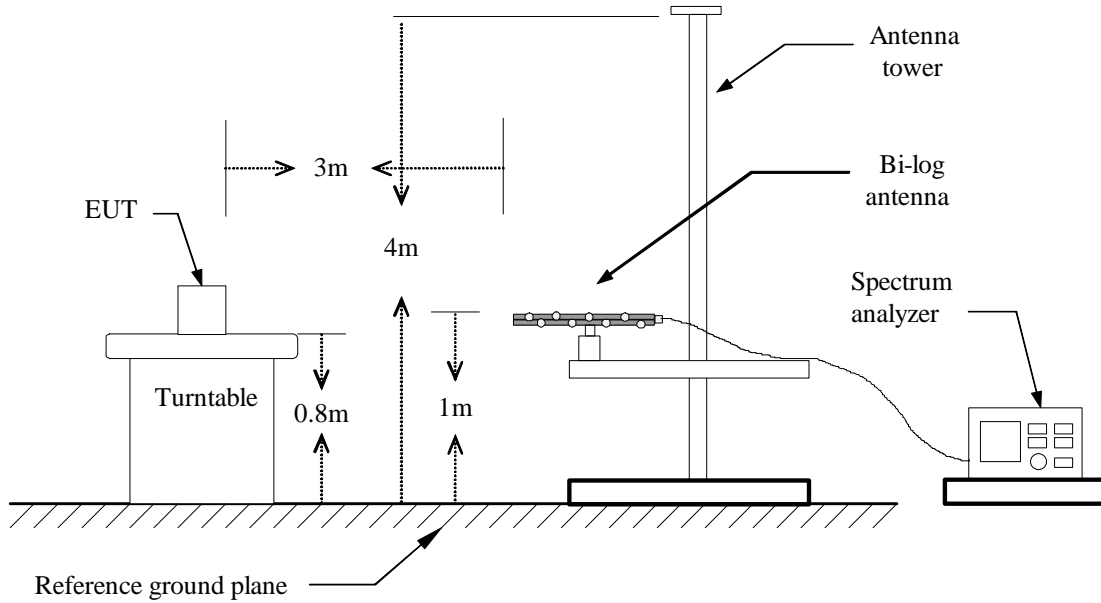
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

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

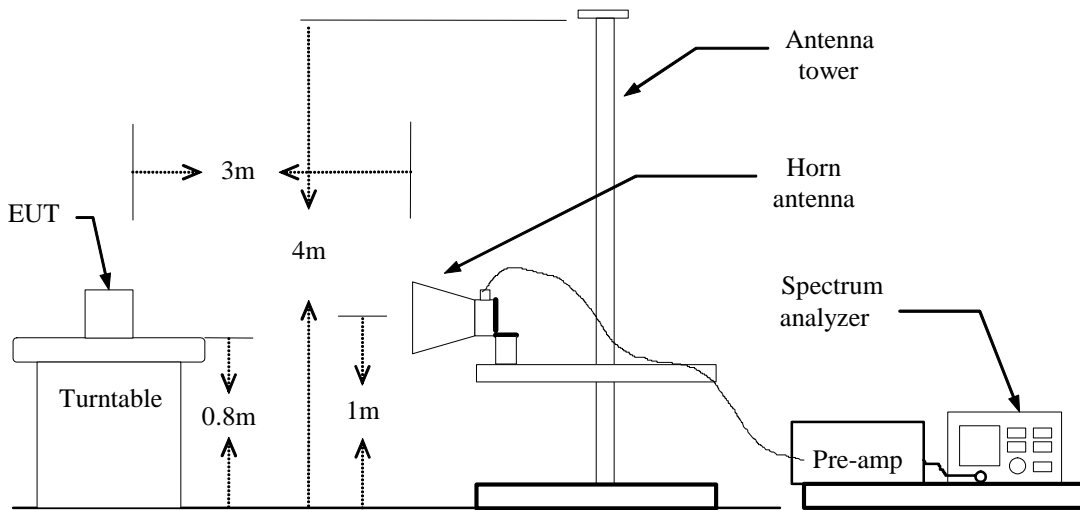
Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



Above 1 GHz





TEST PROCEDURE

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

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

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

**TEST RESULTS****Below 1 GHz****Operation Mode:** Normal Link**Test Date:** February 2, 2009**Temperature:** 25°C**Tested by:** Nan Tsai**Humidity:** 55% 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
65.3258	V	49.17	-12.22	36.95	40.00	-3.05	Peak
71.6033	V	42.79	-14.41	28.38	40.00	-11.62	Peak
199.5741	V	34.53	-9.49	25.04	43.50	-18.46	Peak
399.4669	V	31.90	1.44	33.34	46.00	-12.66	Peak
760.3878	V	30.50	2.38	32.88	46.00	-13.12	Peak
765.3658	V	35.90	3.27	39.17	46.00	-6.83	Peak
66.2535	H	33.96	-5.87	28.09	40.00	-11.91	Peak
70.6471	H	42.67	-14.45	28.22	46.00	-11.78	Peak
198.3694	H	38.03	-9.01	29.02	46.00	-14.48	Peak
398.2554	H	35.63	1.44	37.07	46.00	-8.93	Peak
755.1420	H	34.24	2.38	36.62	46.00	-9.38	Peak
796.2545	H	39.96	3.24	43.20	46.00	-2.80	QP

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.(no emission found from the lowest internal used/generated frequency to 30MHz)
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 / CH Low

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55% 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
10360.12	V	44.76	38.04	2.40	46.40	40.44	74.00	54.00	-13.56	AVG
N/A										
10351.31	H	40.85	36.78	2.40	43.25	39.18	74.00	54.00	-14.82	AVG
N/A										

Remark:

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



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

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55% 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
10461.67	V	43.85	37.37	3.56	47.41	40.93	74.00	54.00	-13.07	AVG
N/A										
10430.67	H	40.90	34.38	3.56	44.46	37.94	74.00	54.00	-16.06	AVG
N/A										

Remark:

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



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

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55% 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
10481.33	V	45.13	37.68	3.56	48.69	41.24	74.00	54.00	-12.76	AVG
N/A										
10488.33	H	39.94	33.74	3.56	43.50	37.30	74.00	54.00	-16.70	AVG
N/A										

Remark:

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



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

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55 % 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
10320.67	V	45.06	38.21	2.40	47.46	40.61	74.00	54.00	-13.39	AVG
N/A										
10325.67	H	40.26	33.21	2.40	42.66	35.61	74.00	54.00	-18.39	AVG
N/A										

Remark:

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



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

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55 % 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
10410.67	V	50.93	38.02	3.56	54.49	41.58	74.00	54.00	-12.42	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 Standard-20 MHz Channel mode / CH High

Test Date: August 22, 2008

Temperature: 25°C

Tested by: Steven Young

Humidity: 55 % 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
10500.33	V	47.36	36.14	3.56	50.92	39.7	74	54	-14.3	AVG
N/A										
10493.67	H	48.46	37.56	3.56	52.02	41.12	74	54	-12.88	AVG
N/A										

Remark:

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



Operation Mode: TX / draft 802.11n Wide-40 MHz Channel mode / CH Low

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55 % 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
10383.33	V	40.36	35.41	3.56	43.92	38.97	74	54	-15.03	AVG
N/A										
10385.67	H	40.11	35.24	3.56	43.67	38.8	74	54	-15.2	AVG
N/A										

Remark:

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



Operation Mode: TX / draft 802.11n Wide-40 MHz Channel mode / CH High

Test Date: February 2, 2009

Temperature: 25°C

Tested by: Steven Young

Humidity: 55 % 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
10459.33	V	45.17	36.74	3.56	48.73	40.3	74	54	-13.70	AVG
N/A										
10460.03	H	44.36	35.14	3.56	47.92	38.7	74	54	-15.30	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).



CONDUCTED UNDESIRABLE EMISSION

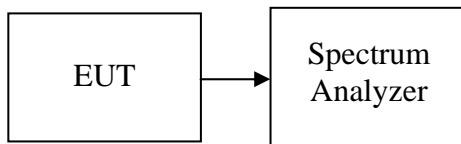
LIMIT

According to 15.407(b),

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

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

Test Configuration



TEST PROCEDURE

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

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

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

TEST RESULTS

No non-compliance noted



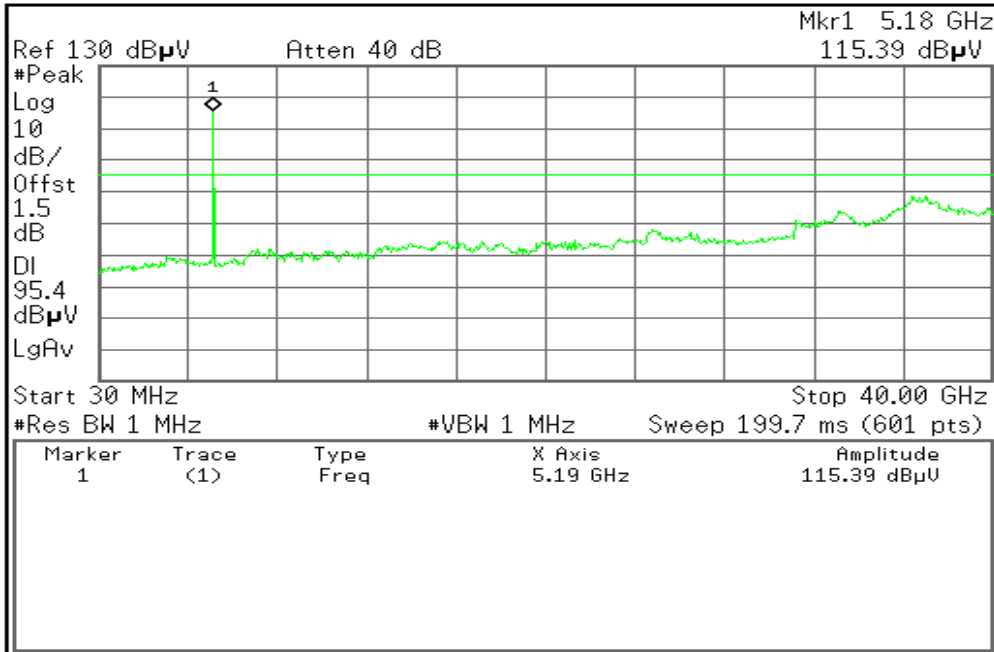
Test Plot

Test mode: IEEE 802.11a mode:

CH Low

30MHz ~ 40GHz

Agilent



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

Mkr \rightarrow CF

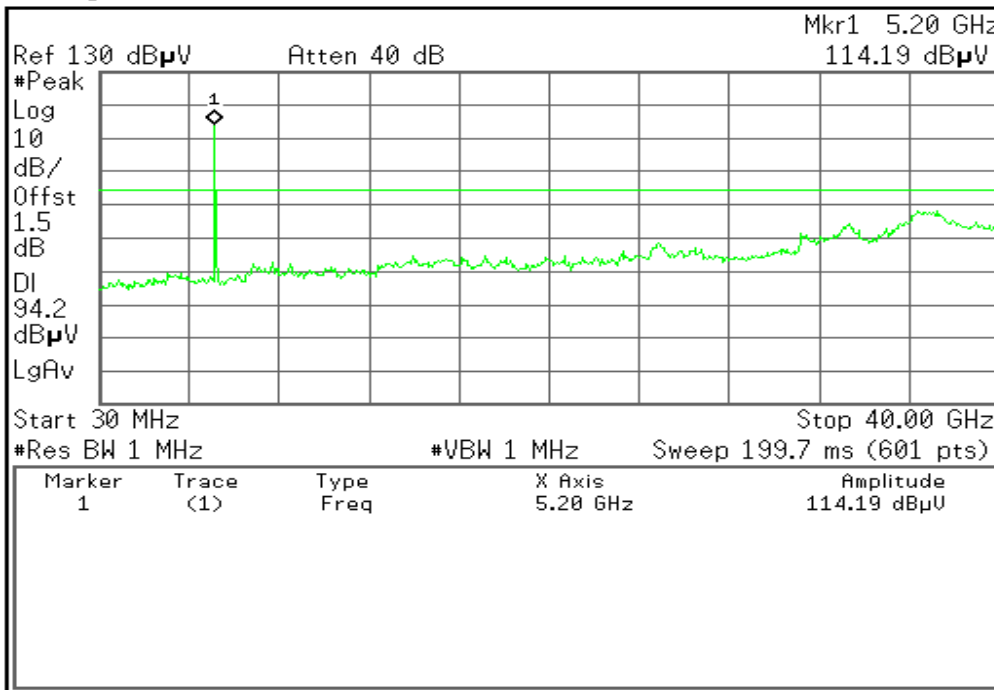
More
1 of 2

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CH Mid

30MHz ~ 40GHz

Agilent



Marker

Select Marker
1 2 3 4

Normal

Delta

Delta Pair
(Tracking Ref)
Ref \blacktriangle

Span Pair
Span Center

Off

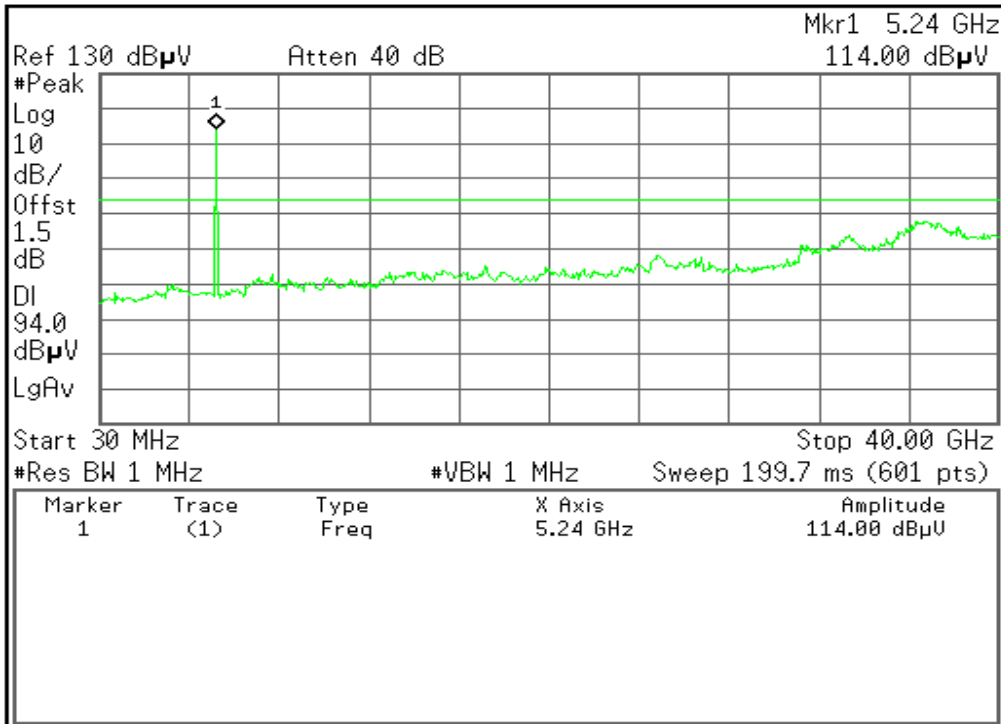
More
1 of 2

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CH High
30MHz ~ 40GHz

Agilent



Display

Full Screen

Display Line
94.00 dBµV
On Off

Limits>

Active Fctn
Position>
Center

Title>

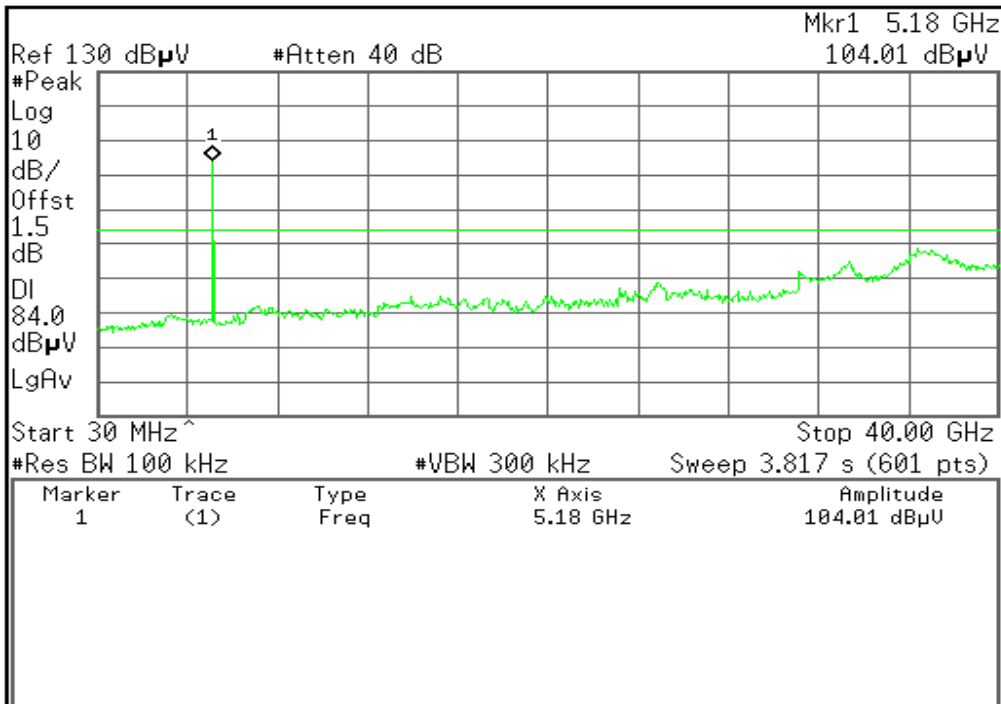
Preferences>

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

CH Low
30MHz ~ 40GHz

Agilent



Marker

Select Marker
1 2 3 4

Normal

Delta

Delta Pair
(Tracking Ref)
Ref ▲

Span Pair
Span Center

Off

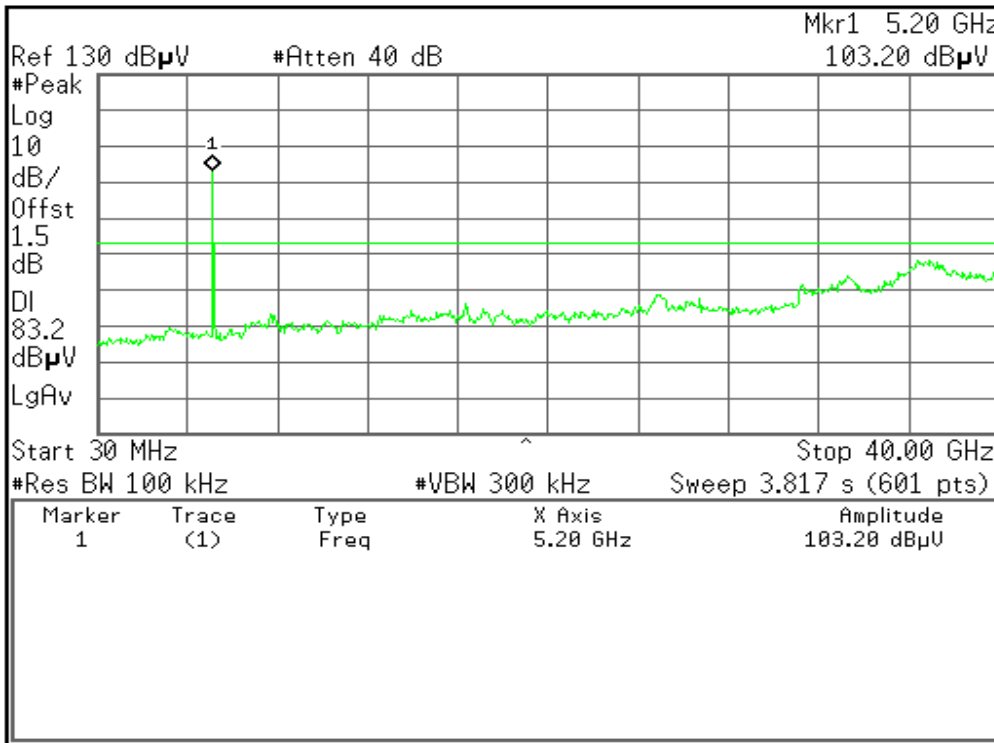
More
1 of 2

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CH Mid
30MHz ~ 40GHz

Agilent

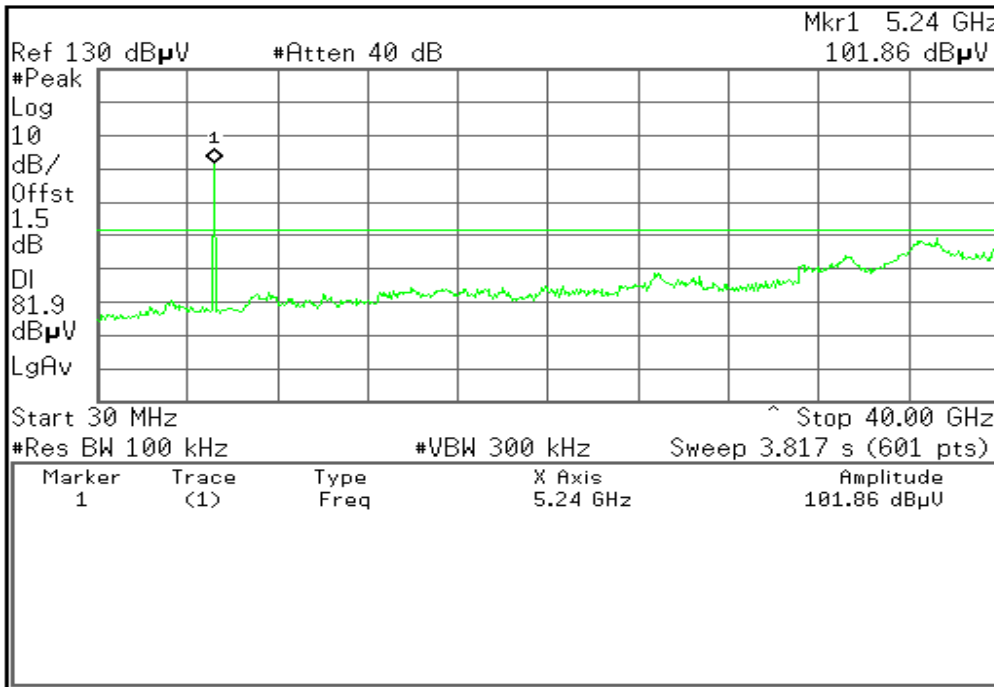


Marker			
Select Marker	1	2	3 4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Ref			
Span Pair			
Span <u>Center</u>			
Off			
More			
1 of 2			

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CH High
30MHz ~ 40GHz

Agilent



Marker			
Select Marker	1	2	3 4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Ref			
Span Pair			
Span <u>Center</u>			
Off			
More			
1 of 2			

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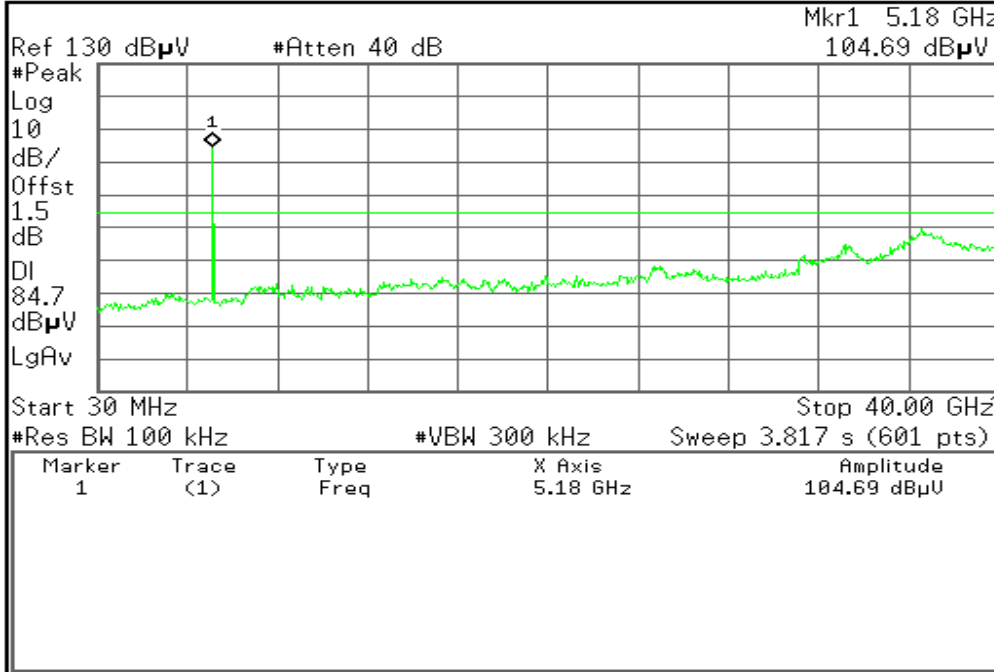


Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1:

CH Low

30MHz ~ 40GHz

Agilent



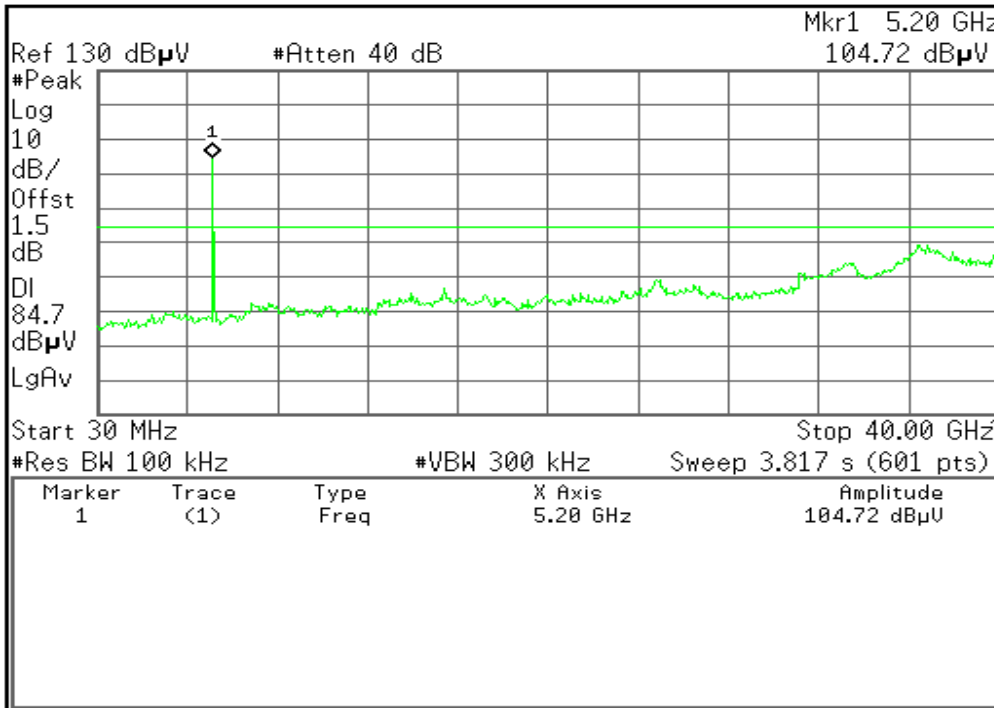
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref ▲				
Span Pair Center				
Off				
More 1 of 2				

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CH Mid

30MHz ~ 40GHz

Agilent



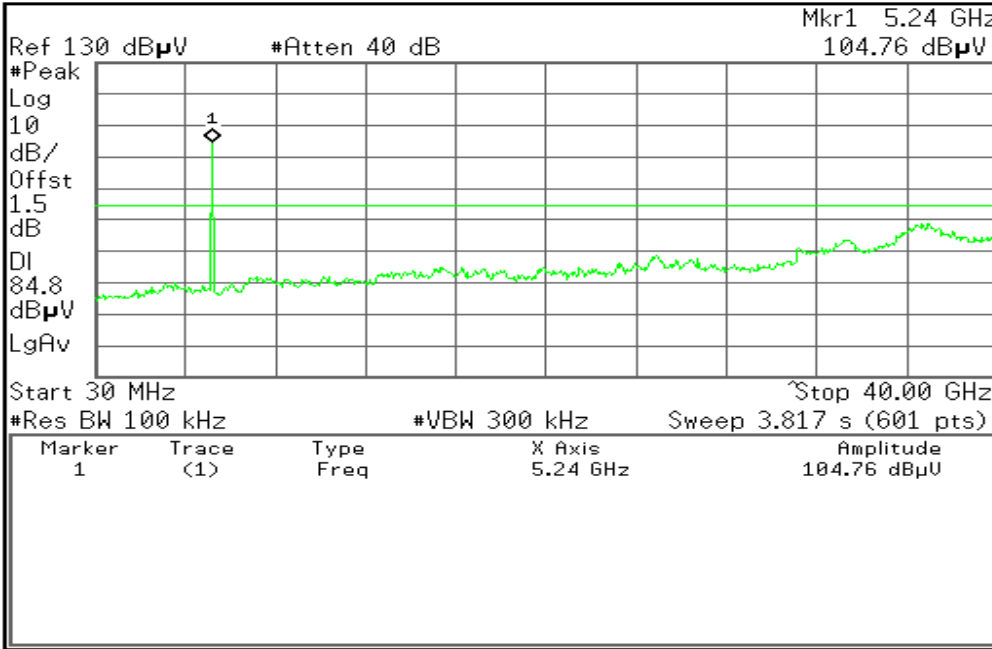
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref ▲				
Span Pair Center				
Off				
More 1 of 2				

File Operation Status, A:\SCREN116.GIF file saved



CH High
30MHz ~ 40GHz

Agilent



Marker

Select Marker
1 2 3 4

Normal

Delta

Delta Pair
(Tracking Ref)
Ref \blacktriangle

Span Pair
Span Center

Off

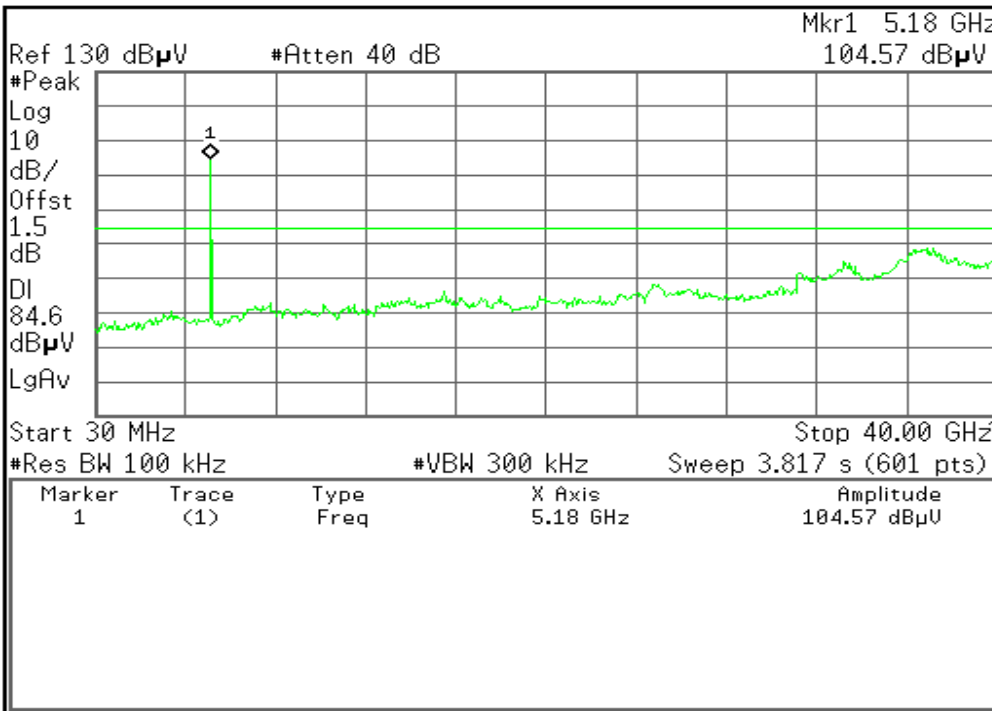
More
1 of 2

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Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2:

CH Low
30MHz ~ 40GHz

Agilent



Marker

Select Marker
1 2 3 4

Normal

Delta

Delta Pair
(Tracking Ref)
Ref \blacktriangle

Span Pair
Span Center

Off

More
1 of 2

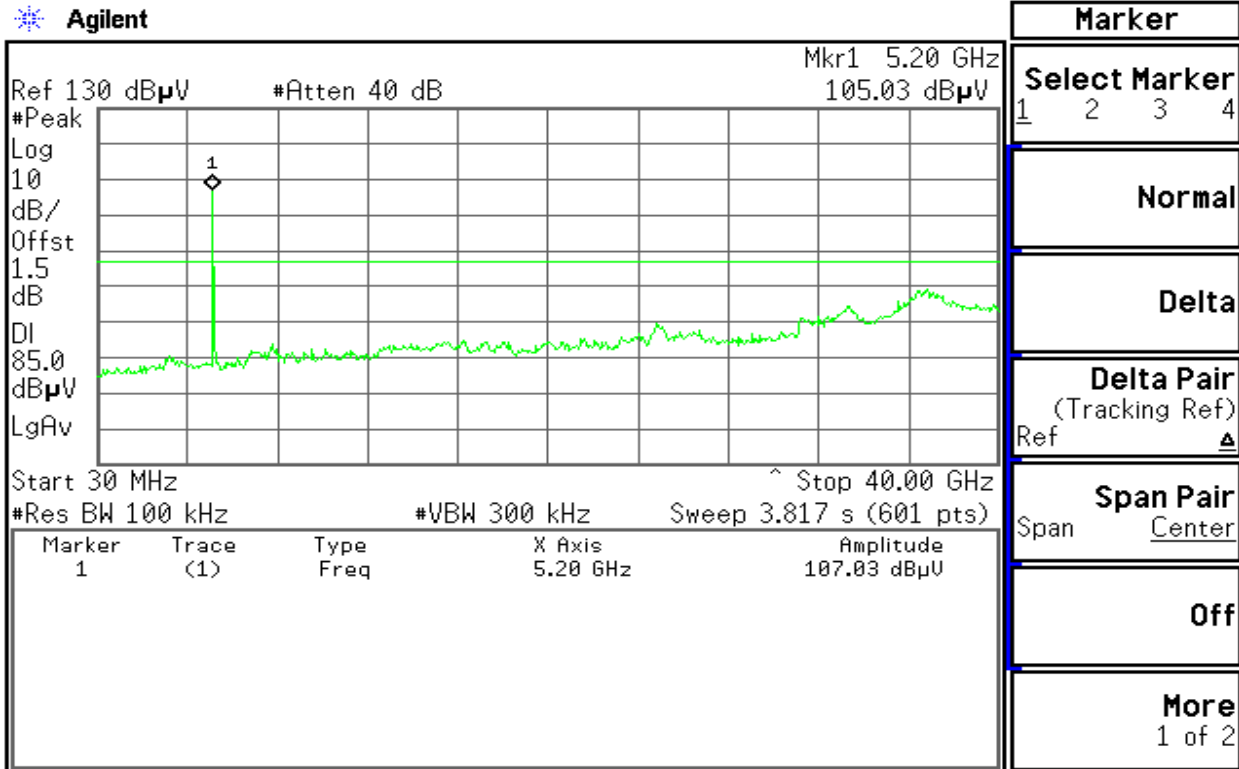
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CH Mid

30MHz ~ 40GHz

Agilent

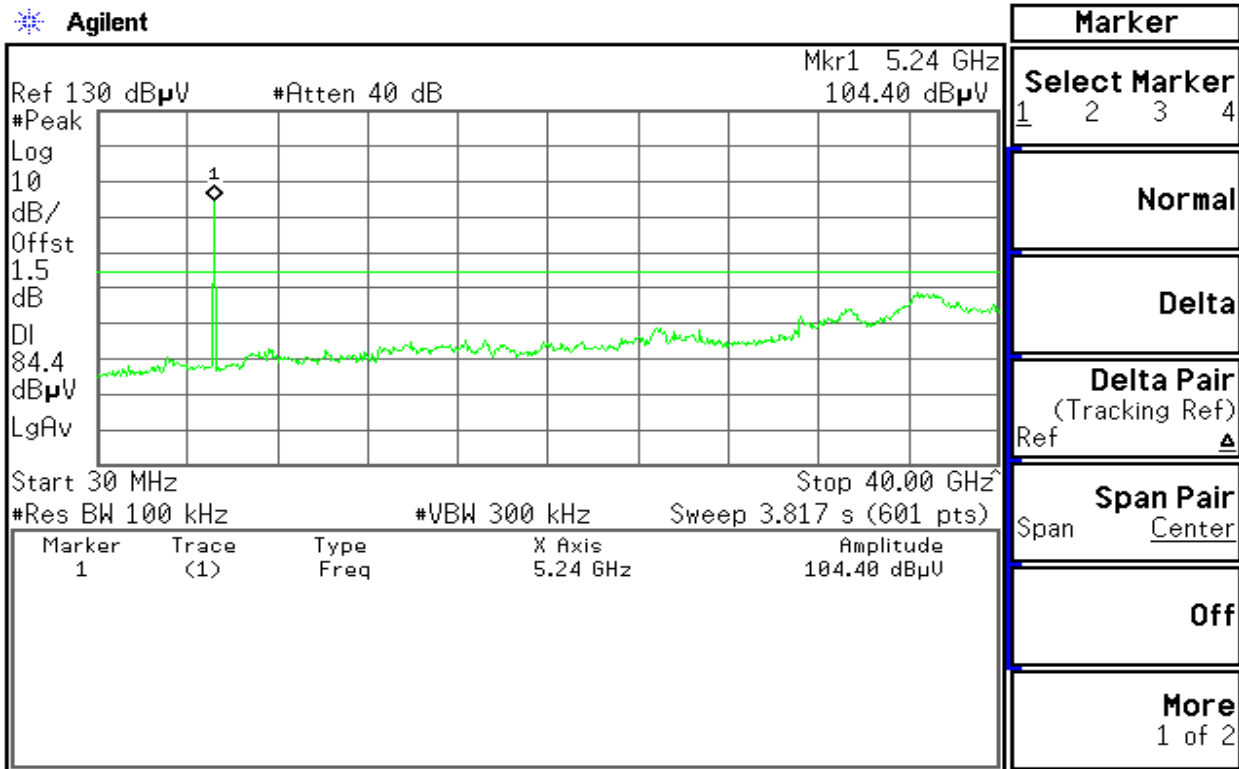


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CH High

30MHz ~ 40GHz

Agilent



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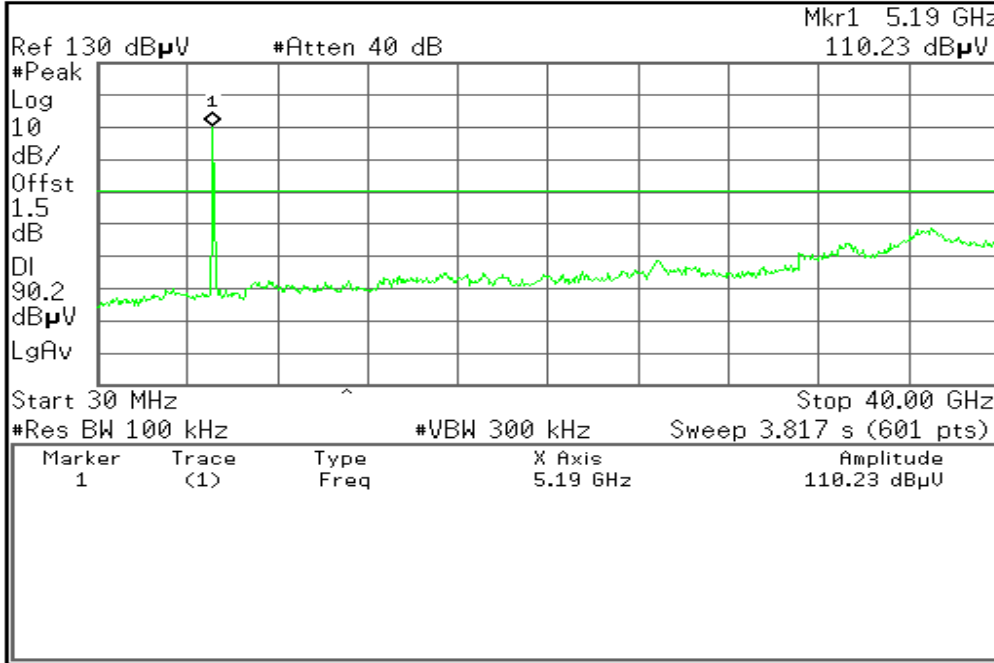


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0:

CH Low

30MHz ~ 40GHz

Agilent



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Center

Off

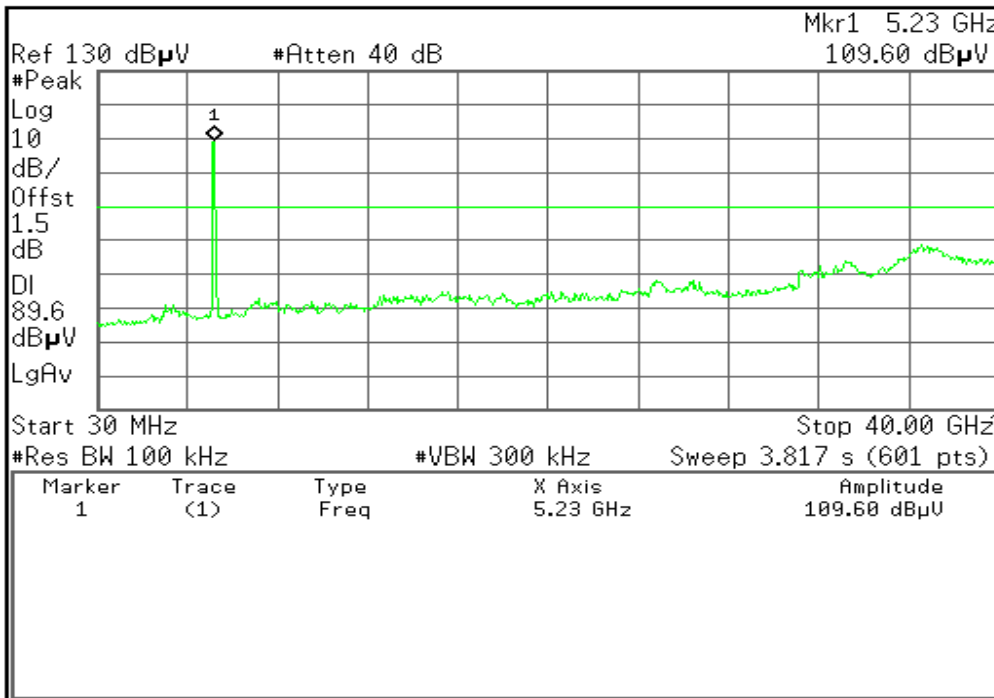
More 1 of 2

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CH Mid

30MHz ~ 40GHz

Agilent



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Center

Off

More 1 of 2

File Operation Status, A:\SCREN245.GIF file saved

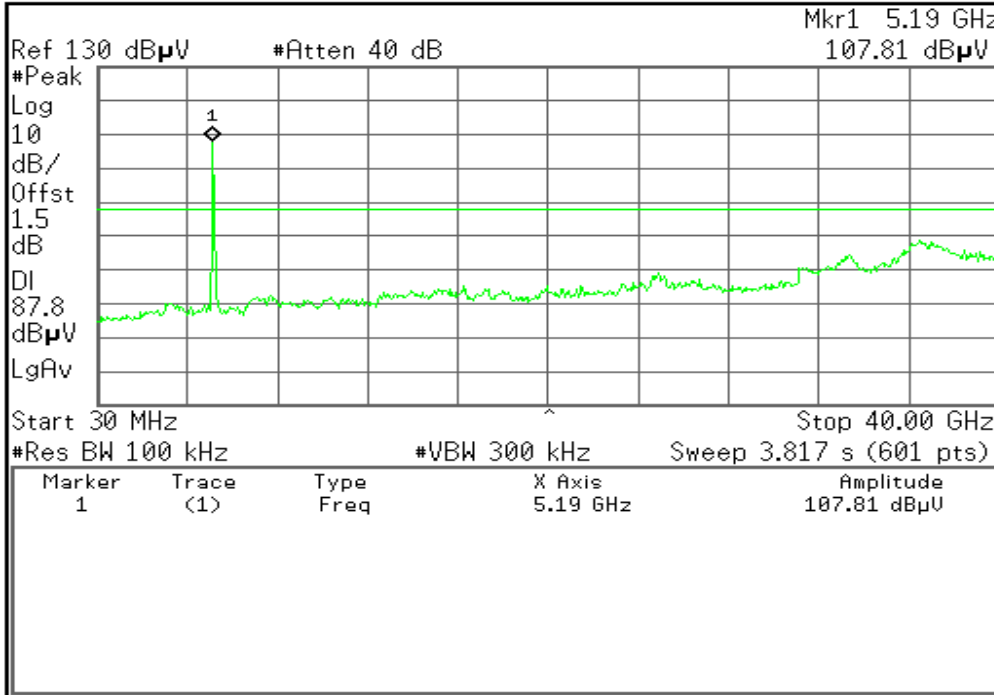


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1:

CH Low

30MHz ~ 40GHz

Agilent



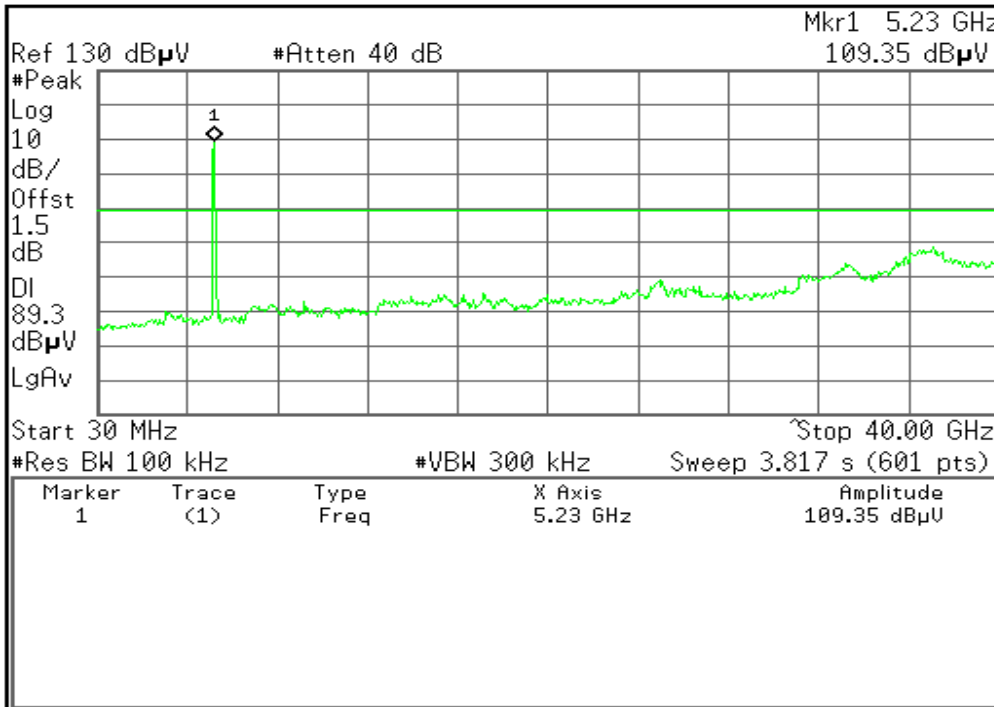
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref Δ				
Span Pair Center				
Off				
More 1 of 2				

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CH High

30MHz ~ 40GHz

Agilent



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref Δ				
Span Pair Center				
Off				
More 1 of 2				

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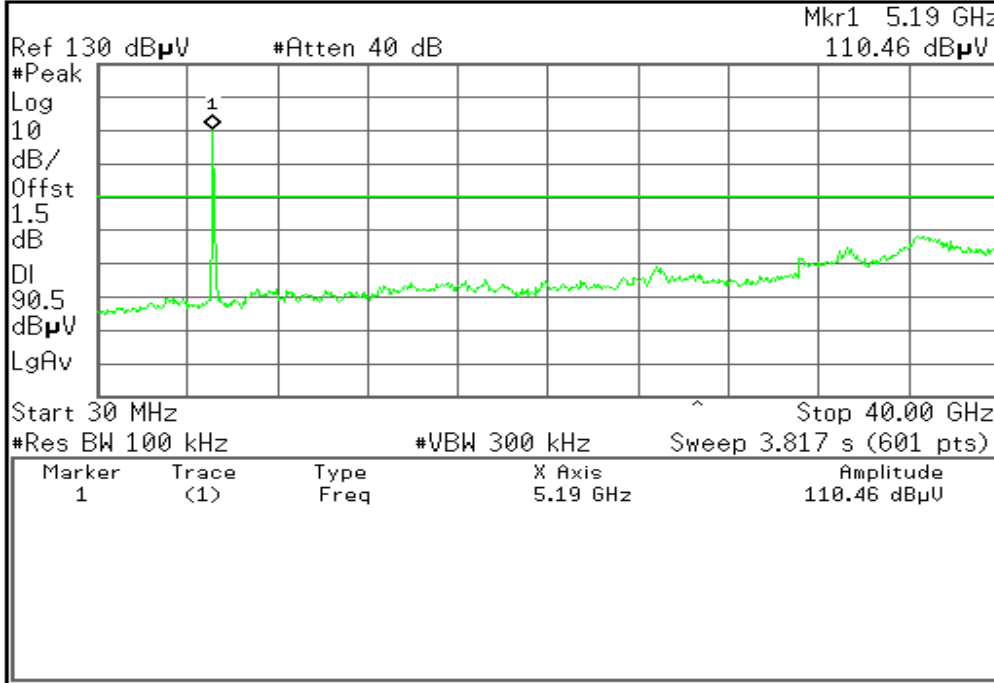


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

CH Low

30MHz ~ 40GHz

Agilent



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref Δ

Span Pair Center

Off

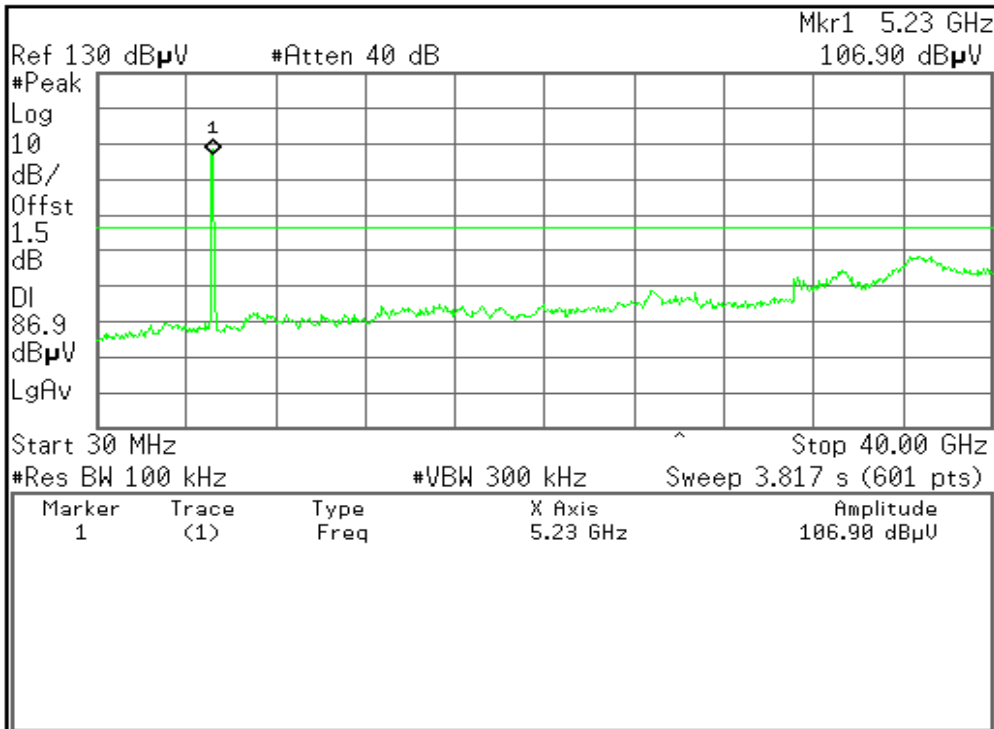
More 1 of 2

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CH High

30MHz ~ 40GHz

Agilent



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref Δ

Span Pair Center

Off

More 1 of 2

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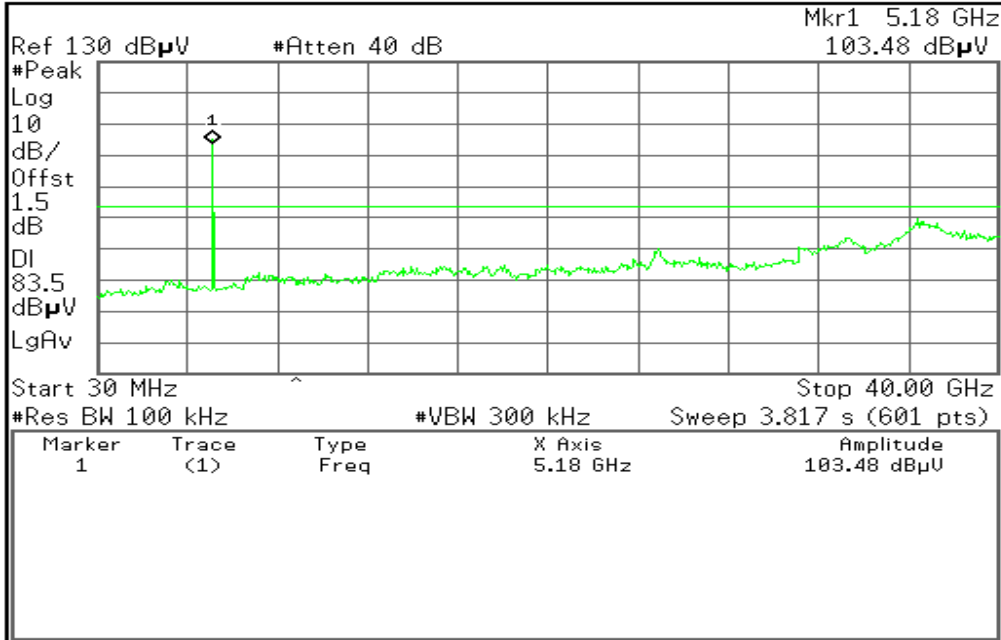


Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:

CH Low

30MHz ~ 40GHz

Agilent



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref \blacktriangle

Span Pair Center

Off

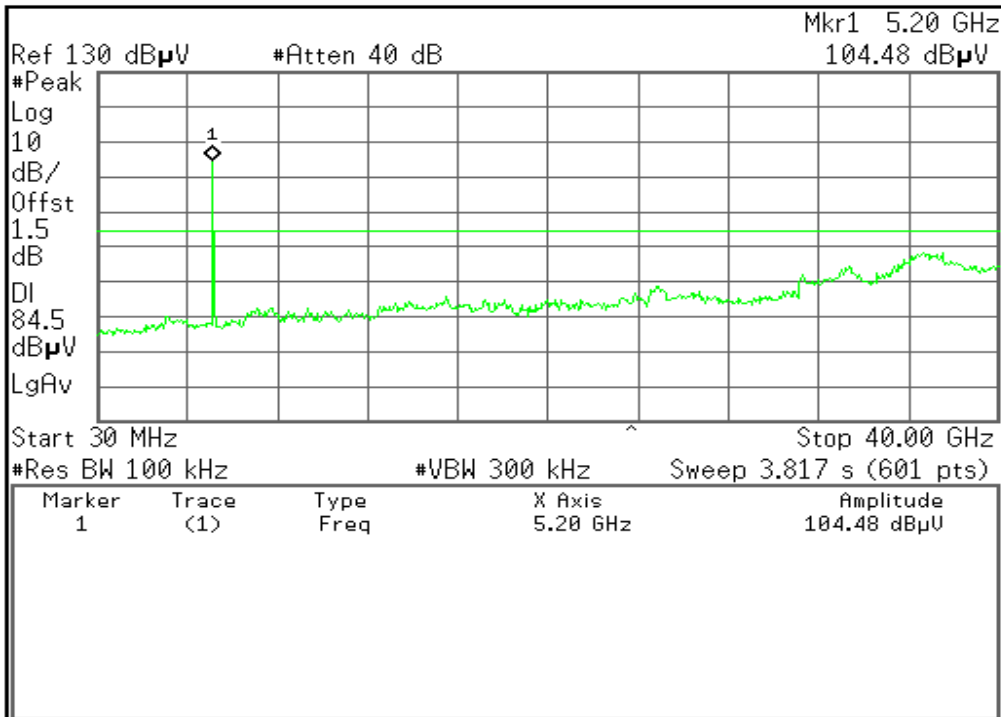
More 1 of 2

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CH Mid

30MHz ~ 40GHz

Agilent



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref \blacktriangle

Span Pair Center

Off

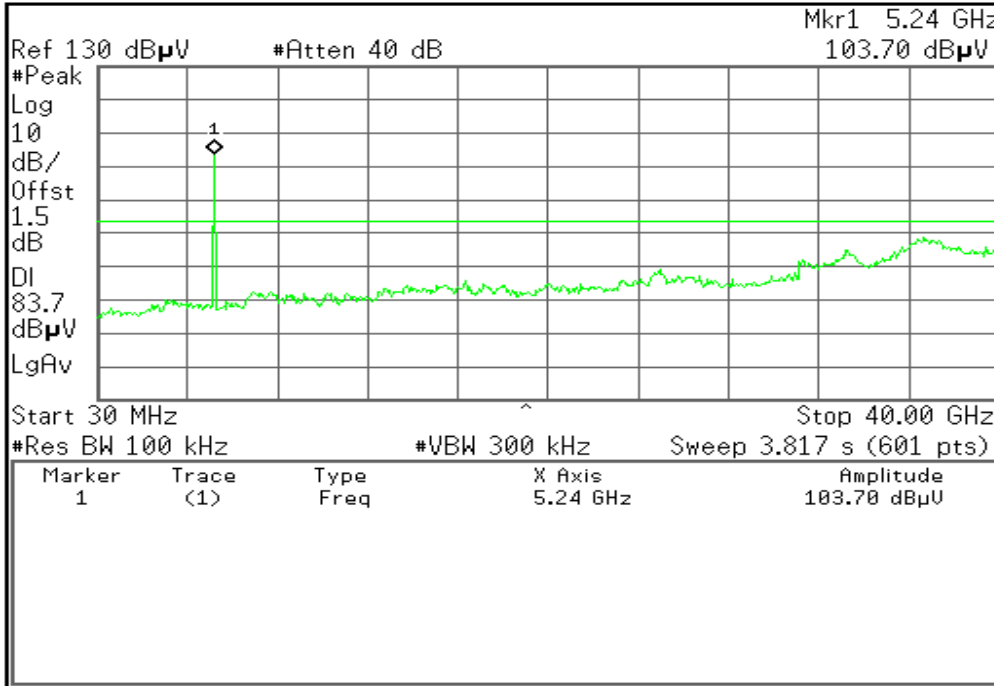
More 1 of 2

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CH High
30MHz ~ 40GHz

Agilent



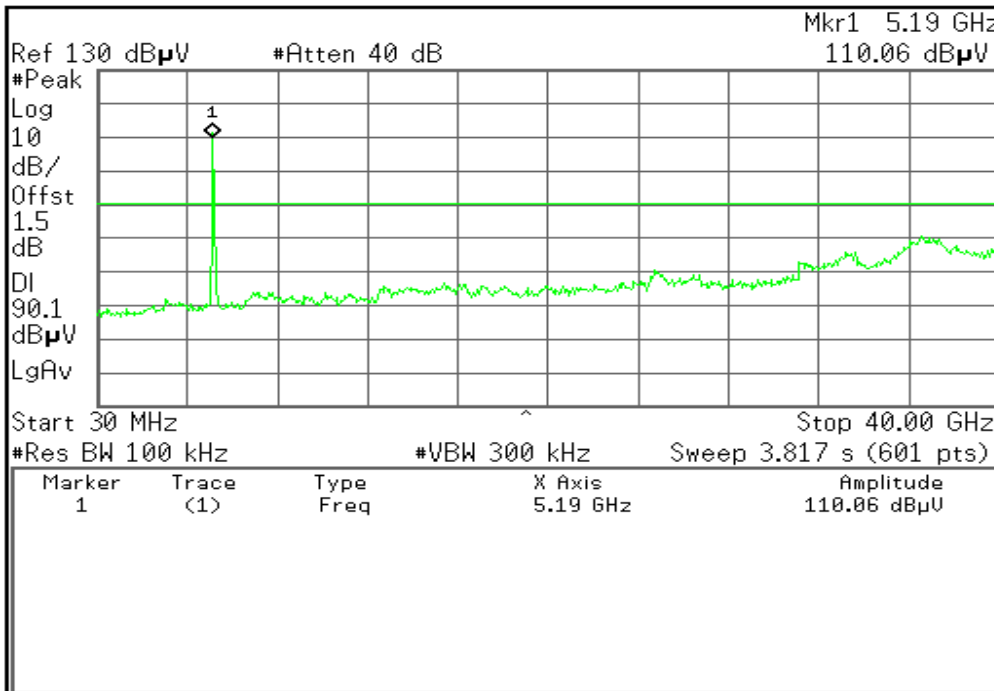
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref ▲				
Span Pair				
Span Center				
Off				
More 1 of 2				

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Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2:

CH Low
30MHz ~ 40GHz

Agilent



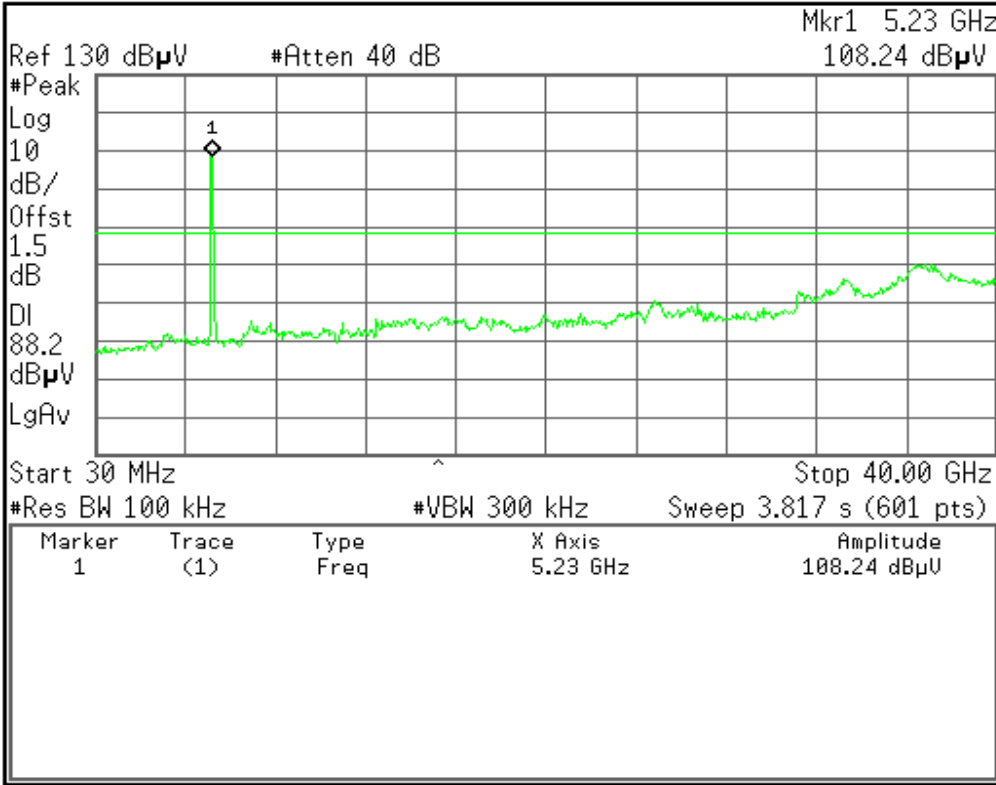
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref ▲				
Span Pair				
Span Center				
Off				
More 1 of 2				

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CH High
30MHz ~ 40GHz

Agilent



Marker			
Select Marker			
<u>1</u>	2	3	4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Ref	▲		
Span Pair			
Span	Center		
Off			
More 1 of 2			

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POWERLINE CONDUCTED EMISSIONS

LIMIT

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

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

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

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

TEST PROCEDURE

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

**TEST RESULTS**

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

Test Data

Operation Mode: Normal Link **Test Date:** August 22, 2008
Temperature: 25°C **Tested by:** Jeff
Humidity: 55% RH

Freq. (MHz)	PEAK. Raw (dBuV)	Q.P. Raw (dBuV)	AVG Raw (dBuV)	Q.P. Limit (dBuV)	AVG Limit (dBuV)	Margin (dB)	Factor (dB)	Remark
0.204	53.21	48.61	41.01	64.47	54.47	-13.46	12.65	Line
0.348	54.46	47.28	35.78	60.33	50.33	-14.55	12.89	Line
0.414	56.48	51.41	44.58	58.46	48.46	-3.88	12.94	Line
0.482	54.37	50.83	43.42	56.51	46.51	-3.09	12.96	Line
1.565	53.87	49.83	37.72	56.00	46.00	-8.28	13.18	Line
2.158	51.31	47.48	33.68	56.00	46.00	-12.32	13.27	Line
0.205	51.99	46.77	39.16	64.43	54.43	-15.27	11.57	Neutral
0.345	51.76	45.26	33.05	60.43	50.43	-17.38	11.68	Neutral
0.411	54.66	50.08	43.93	58.55	48.55	-4.62	11.69	Neutral
0.482	52.70	49.13	41.79	56.51	46.51	-4.72	11.71	Neutral
1.046	52.34	45.46	34.08	56.00	46.00	-11.92	11.81	Neutral
2.164	51.96	47.34	33.54	56.00	46.00	-12.46	11.92	Neutral

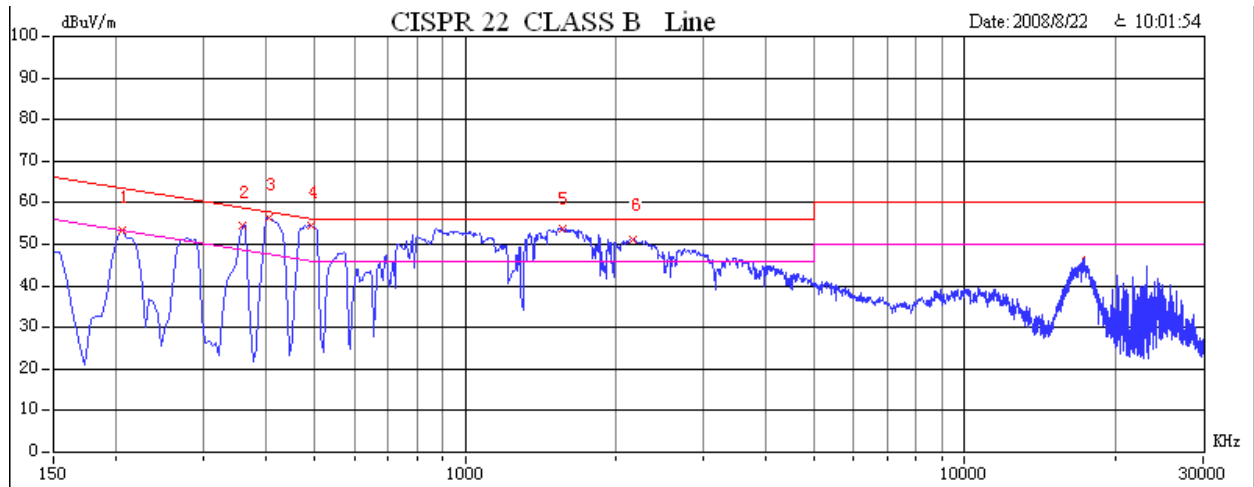
Remark:

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)

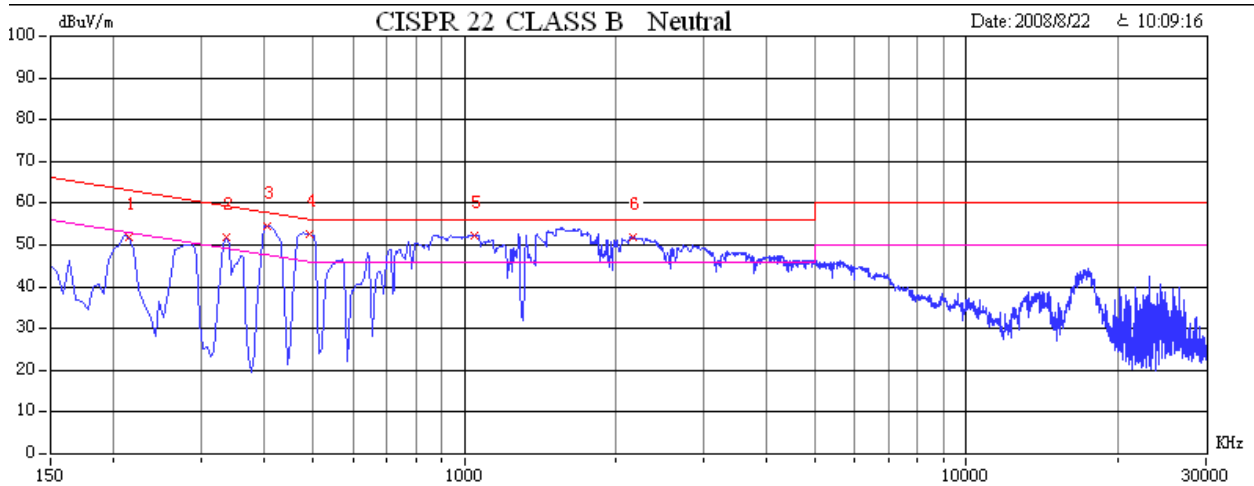


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)





APPENDIX I RADIO FREQUENCY EXPOSURE

LIMIT

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

EUT Specification

EUT	802.11a/b/g/n access point
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.15GHz ~ 5.25GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz <input type="checkbox"/> Bluetooth: 2.402 GHz ~ 2.482 GHz <input type="checkbox"/> Others: _____
Device category	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others: _____
Exposure classification	General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11a mode: 9.90 dBm (9.77mW) draft 802.11n Standard-20 MHz Channel mode: 16.65 dBm (46.24mW) draft 802.11n Wide-40 MHz Channel mode: 16.12 dBm (40.93mW)
Antenna gain (Max)	3 dBi (Numeric gain: 2.00) TOTAL ANTENNA GAIN=7.77dBi(Numeric gain: 5.98)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation* <input type="checkbox"/> N/A
Remark:	
<ol style="list-style-type: none"> The maximum output power is 16.65 dBm (46.24mW) at <u>5180MHz</u> (with <u>5.98 numeric antenna gain</u>.) For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is $1.0 mW/cm^2$ even if the calculation indicates that the power density would be larger. 	



TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where $E =$ Field strength in Volts / meter

$P =$ Power in Watts

$G =$ Numeric antenna gain

$d =$ Distance in meters

$S =$ Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where $d =$ Distance in cm

$P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²

Maximum Permissible Exposure

EUT output power = 45.71mW

Numeric Antenna gain = 5.98

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where $P =$ Power in mW

$G =$ Numeric antenna gain

$S =$ Power density in mW / cm²



IEEE 802.11a:

EUT output power = 9.77mW

Numeric Antenna gain = 5.98

→ Power density = 0.0116 mW / cm²

draft 802.11an Standard-20 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

EUT output power = 46.24mW

Numeric Antenna gain = 5.98

→ Power density = 0.0550mW / cm²

draft 802.11an Wide-40 MHz Channel mode / Chain 0+ Chain 1 +Chain 2

EUT output power = 40.93mW

Numeric Antenna gain = 5.98

→ Power density = 0.0487 mW / cm²

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm² even if the calculation indicates that the power density would be larger.)