



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

802.11a/b/g/n access point

Model: HiveAP 340

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 340

Date of Test: August 22,2008~December 15, 2008

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

We hereby certify that:

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

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

Approved by:

Reviewed by:

Miro Chueh
EMC Manager
Compliance Certification Services Inc.

Lin Zhang
EMC Section Manager
Compliance Certification Services Inc.



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)
42	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)
52	5260 (802.11a mode/802.11n Standard-20 MHz Channel mode)
54	5270 (802.11n Standard-40 MHz Channel mode)
56	5280 (802.11a mode/802.11n Standard-20 MHz Channel mode)
60	5300 (802.11a mode/802.11n Standard-20 MHz Channel mode)
62	5310 (802.11n Standard-40 MHz Channel mode)
64	5320 (802.11a mode/802.11n Standard-20 MHz Channel mode)
100	5500 (802.11a mode/802.11n Standard-20 MHz Channel mode)
102	5510 (802.11n Standard-40 MHz Channel mode)
104	5520 (802.11a mode/802.11n Standard-20 MHz Channel mode)
108	5540 (802.11a mode/802.11n Standard-20 MHz Channel mode)
112	5560 (802.11a mode/802.11n Standard-20 MHz Channel mode)
116	5580 (802.11a mode/802.11n Standard-20 MHz Channel mode)
118	5590 (802.11n Standard-40 MHz Channel mode)
120	5600 (802.11a mode/802.11n Standard-20 MHz Channel mode)
122	5610 (802.11a mode/802.11n Standard-40 MHz Channel mode)
124	5620 (802.11a mode/802.11n Standard-20 MHz Channel mode)
128	5640 (802.11a mode/802.11n Standard-20 MHz Channel mode)
130	5650 (802.11a mode/802.11n Standard-40 MHz Channel mode)
132	5660 (802.11a mode/802.11n Standard-20 MHz Channel mode)
134	5670 (802.11n Standard-40 MHz Channel mode)
136	5680 (802.11a mode/802.11n Standard-20 MHz Channel mode)
140	5700 (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-HIVEAP340DFS filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.



3. TEST METHODOLOGY

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

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, 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.



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.

Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with 6Mbps data rate were chosen for full testing.

Channel Low (5500MHz), Channel Mid (5600MHz) and Channel High (5700MHz) 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 6Mbps data rate were chosen for full testing.

Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with 6.5Mbps data rate were chosen for full testing.

Channel Low (5500MHz), Channel Mid (5600MHz) and Channel High (5700MHz) with 6Mbps 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.

Channel Low (5270MHz) and Channel Mid (5310MHz) with 13.5Mbps data rate were chosen for full testing.

Channel Low (5510MHz), Channel Mid (5590MHz) and Channel High (5670MHz) with 6Mbps 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.

Mode 2: Table top mounting, set the EUT horizontally on the table top.

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

Mode 2: Table top mounting, set the EUT horizontally on the table top.

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	01/30/2009
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.

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.

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 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	 238958,424105
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-1600 C-1707

* 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	IBM	X31	32P4413	DOC
2.	Notebook	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.*



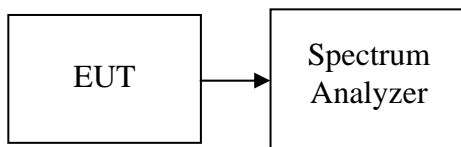
7. FCC PART 15 REQUIREMENTS

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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.064
Mid	5200	22.300
High	5240	22.136

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5260	21.906
Mid	5300	22.336
High	5320	23.090

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5500	23.278
Mid	5600	21.558
High	5700	23.269

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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	20.073
Mid	5200	20.105
High	5240	20.224

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5260	22.174
Mid	5300	21.566
High	5320	21.164

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5500	21.482
Mid	5600	22.122
High	5700	21.296



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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	21.325
Mid	5200	21.306
High	5240	21.372

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5260	21.590
Mid	5300	22.718
High	5320	21.999

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5500	21.691
Mid	5600	21.752
High	5700	21.995

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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	21.265
Mid	5200	22.360
High	5240	21.415

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5260	21.677
Mid	5300	22.303
High	5320	22.143

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5500	21.643
Mid	5600	21.362
High	5700	22.286



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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	43.245
High	5230	43.776

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5270	43.678
High	5310	43.698

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5510	44.302
Mid	5590	42.873
High	5670	46.098

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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	43.159
High	5230	43.002

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5270	43.196
High	5310	42.791

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5510	43.003
Mid	5590	43.356
High	5670	42.881



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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	43.418
High	5230	43.260

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5270	44.871
High	5310	43.506

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5510	43.381
Mid	5590	42.833
High	5670	43.619

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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	21.023
Mid	5200	21.007
High	5240	21.944

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5260	20.870
Mid	5300	21.511
High	5320	21.052

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5500	20.746
Mid	5600	20.282
High	5700	20.095



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

5150~5250MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5190	44.268
High	5230	44.670

5250~5350MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5270	42.105
High	5310	42.756

5470~5725MHz

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5510	44.537
Mid	5590	43.445
High	5670	45.007

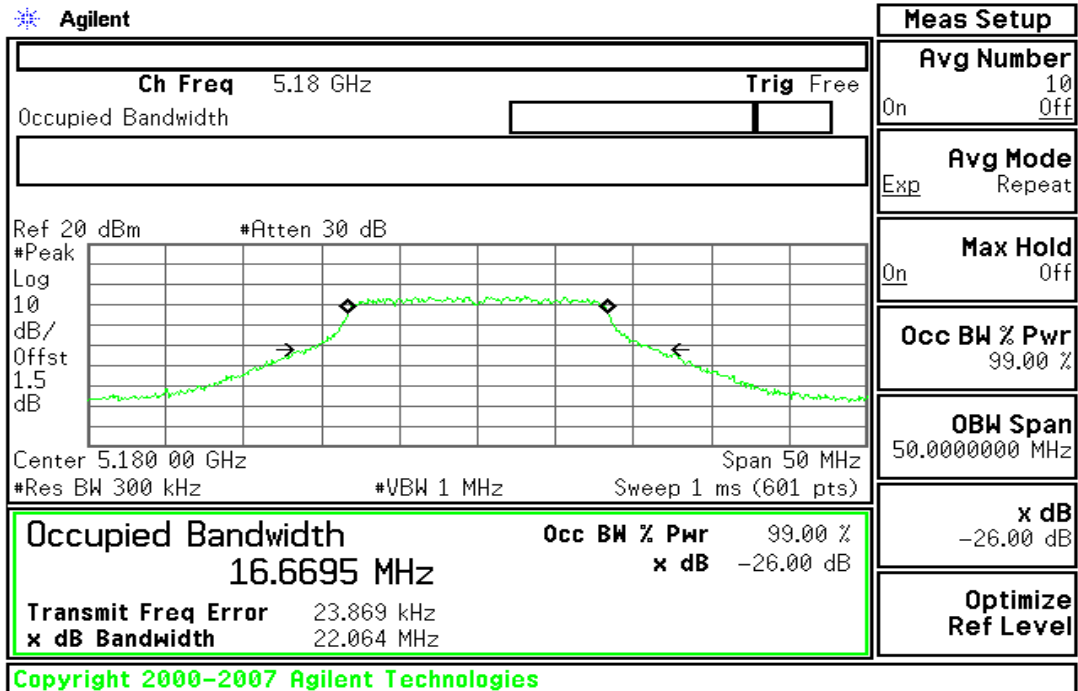


Test Plot

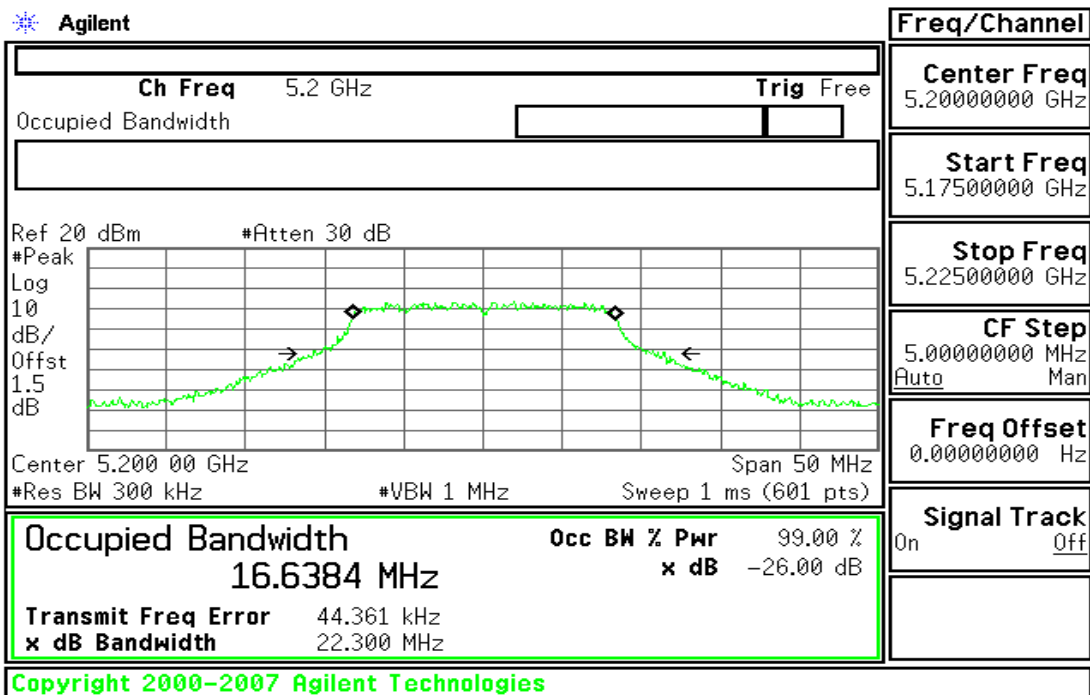
IEEE 802.11a mode:

5150~5250MHz

CH Low

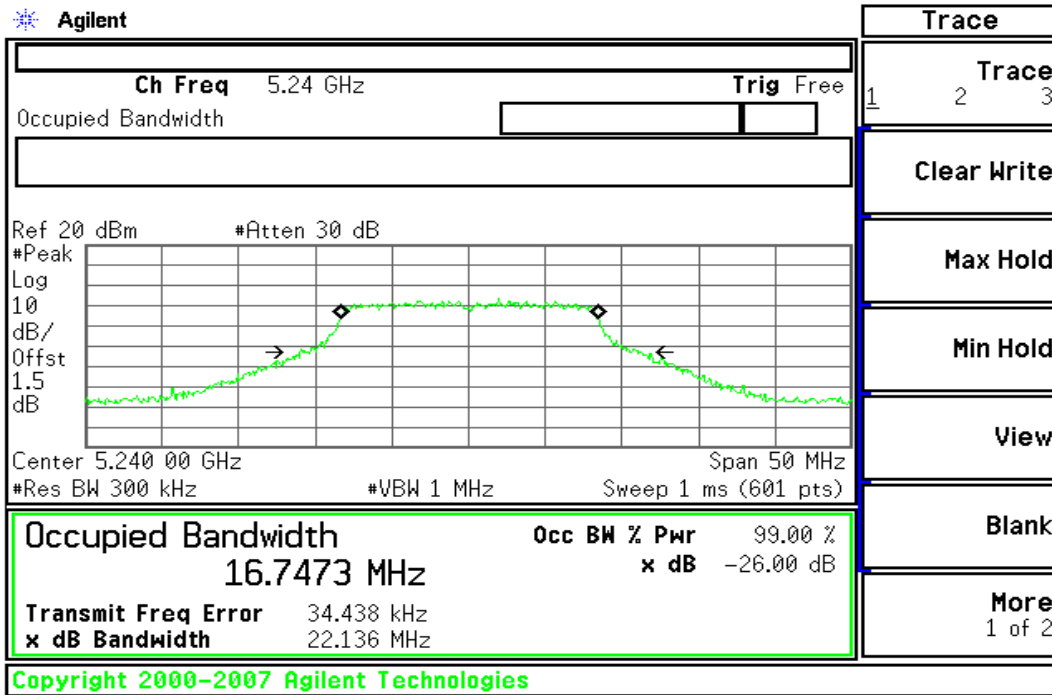


CH Mid



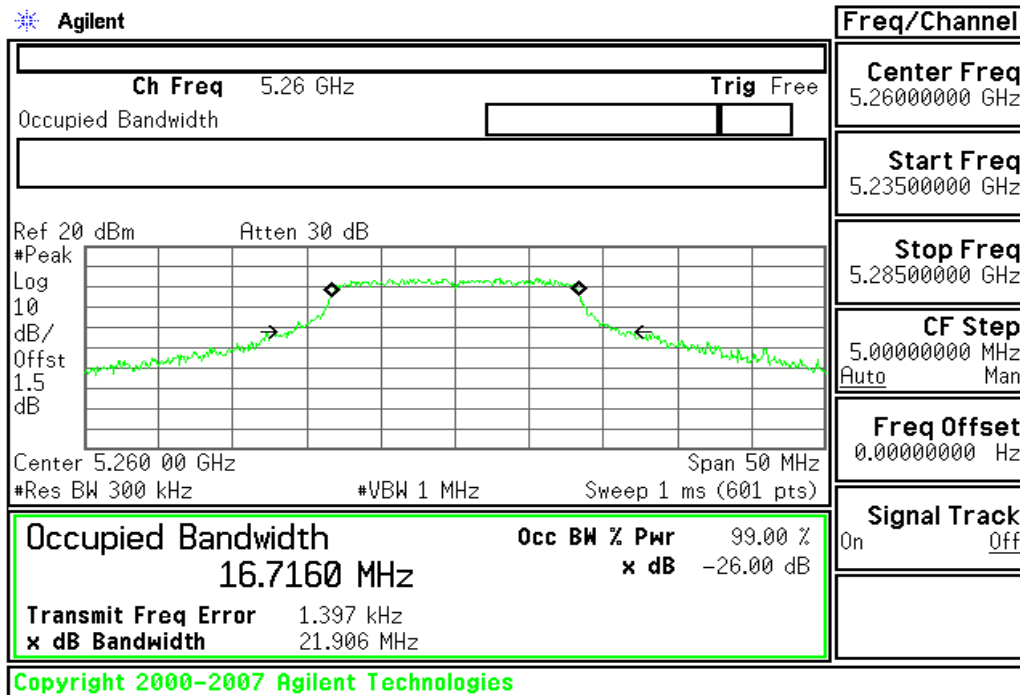


CH High



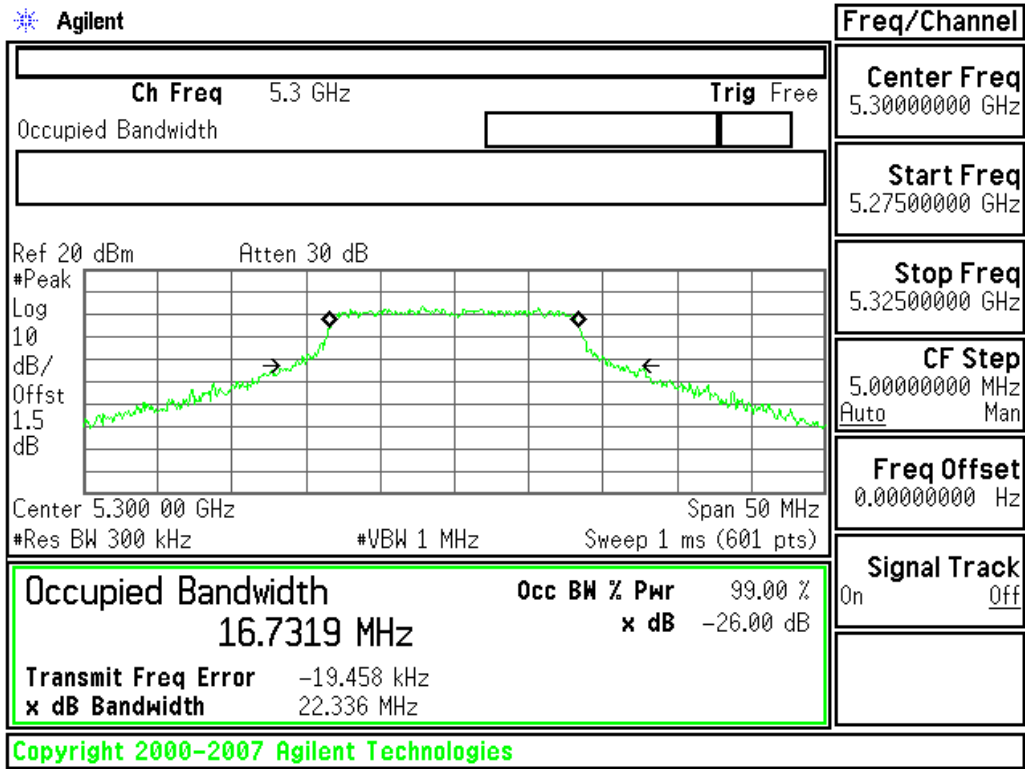
5250~5350MHz

CH Low

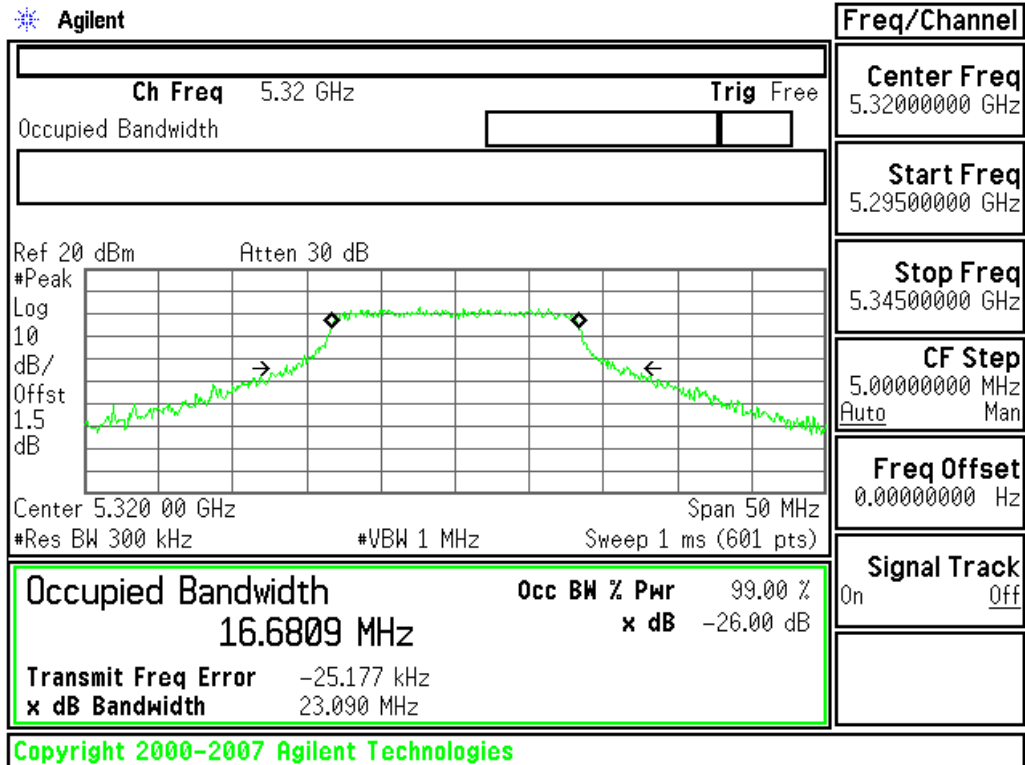




CH Mid



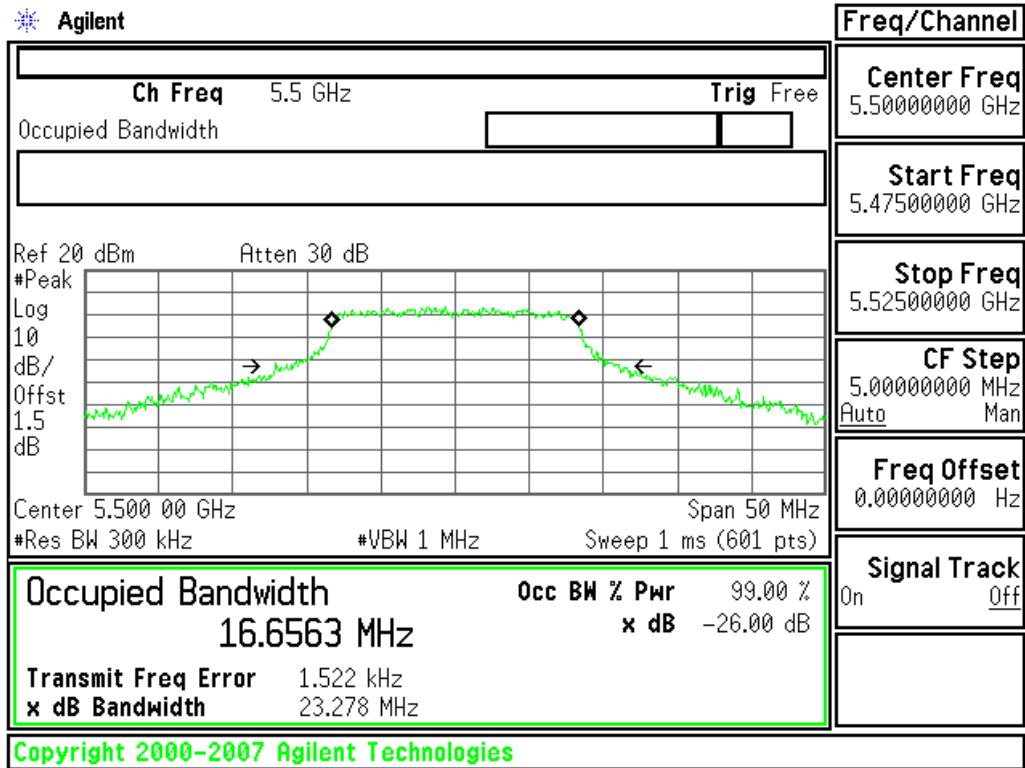
CH High



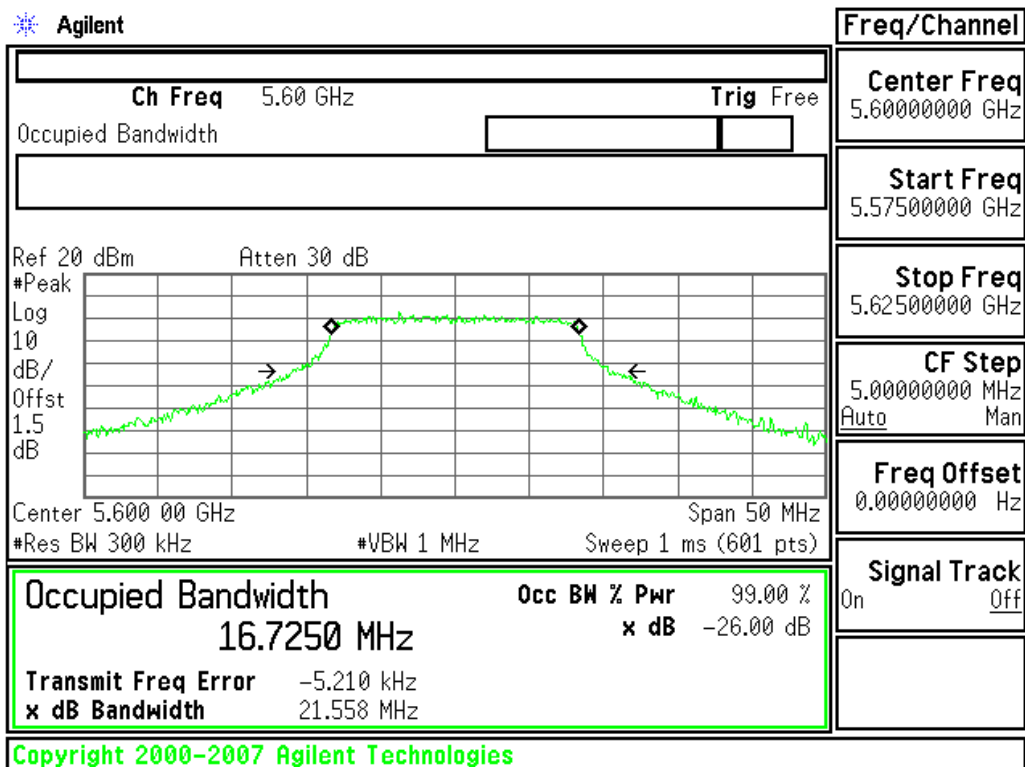


5470~5725MHz

CH Low

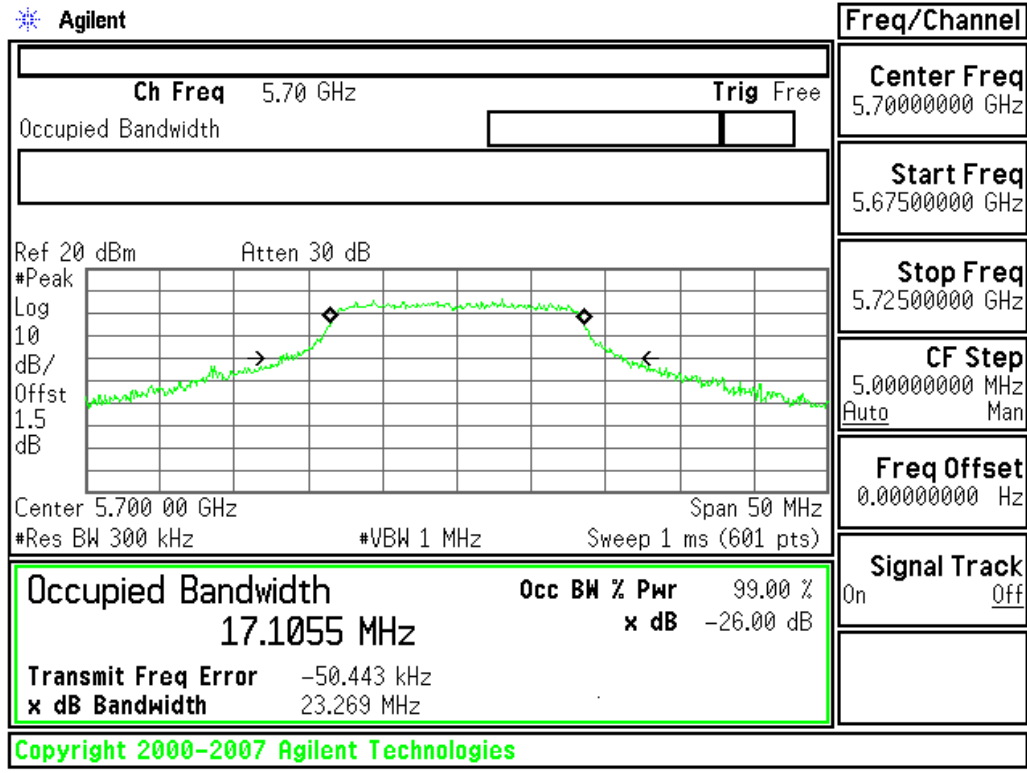


CH Mid





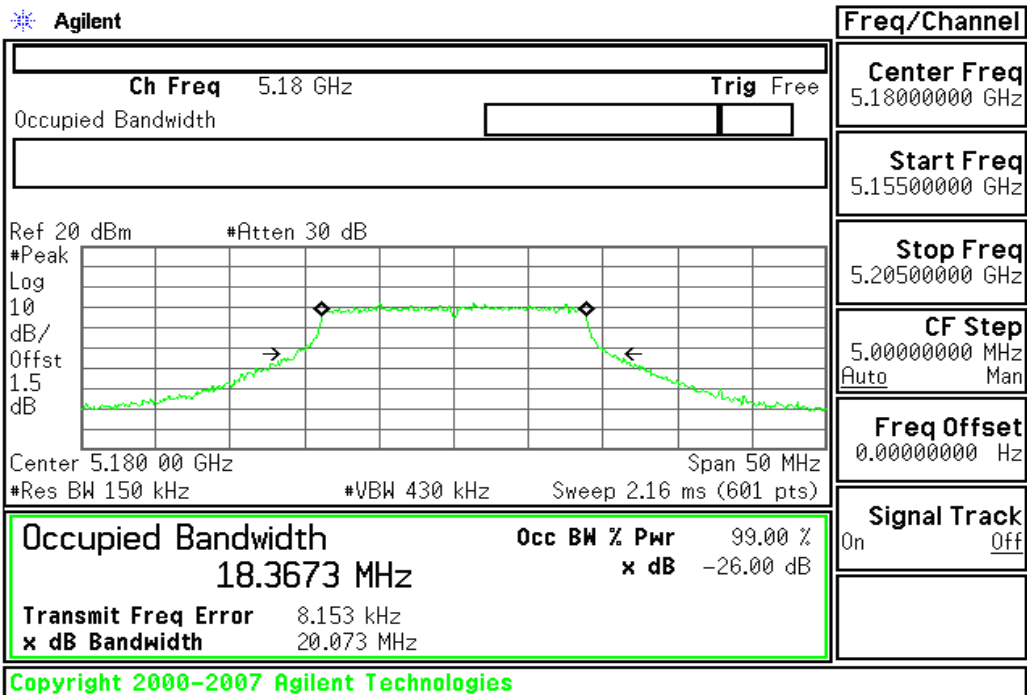
CH High



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

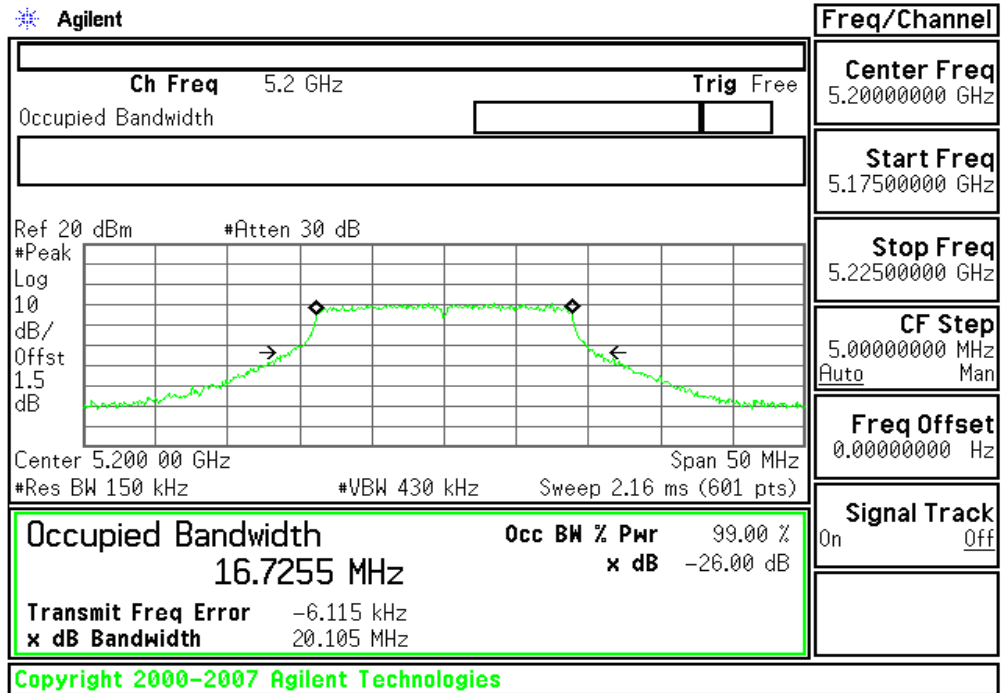
5150~5250MHz

CH Low

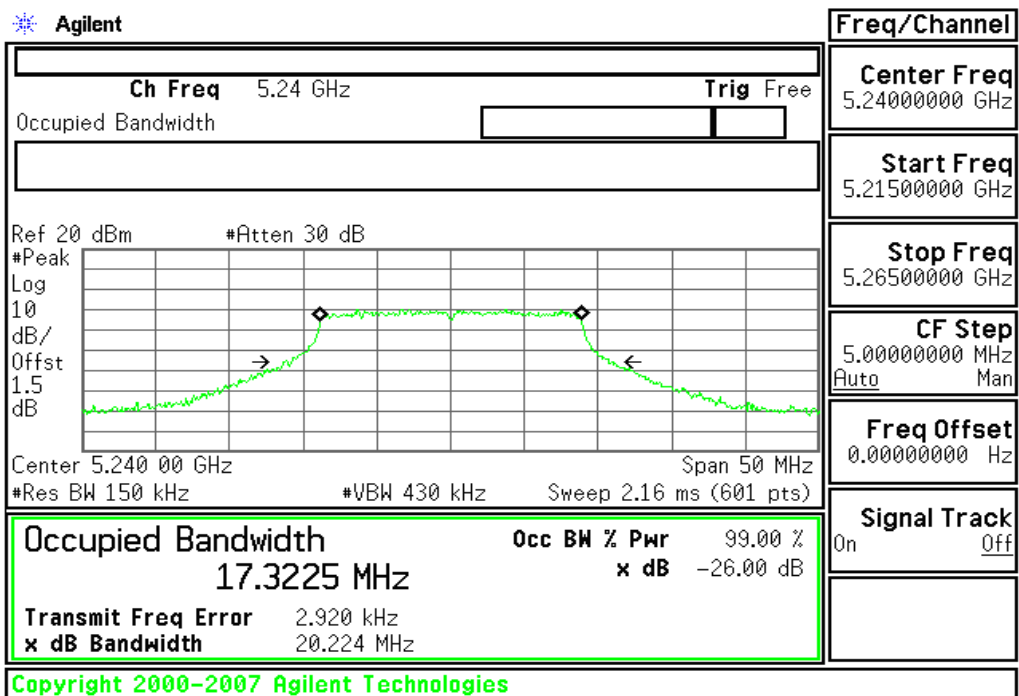




CH Mid



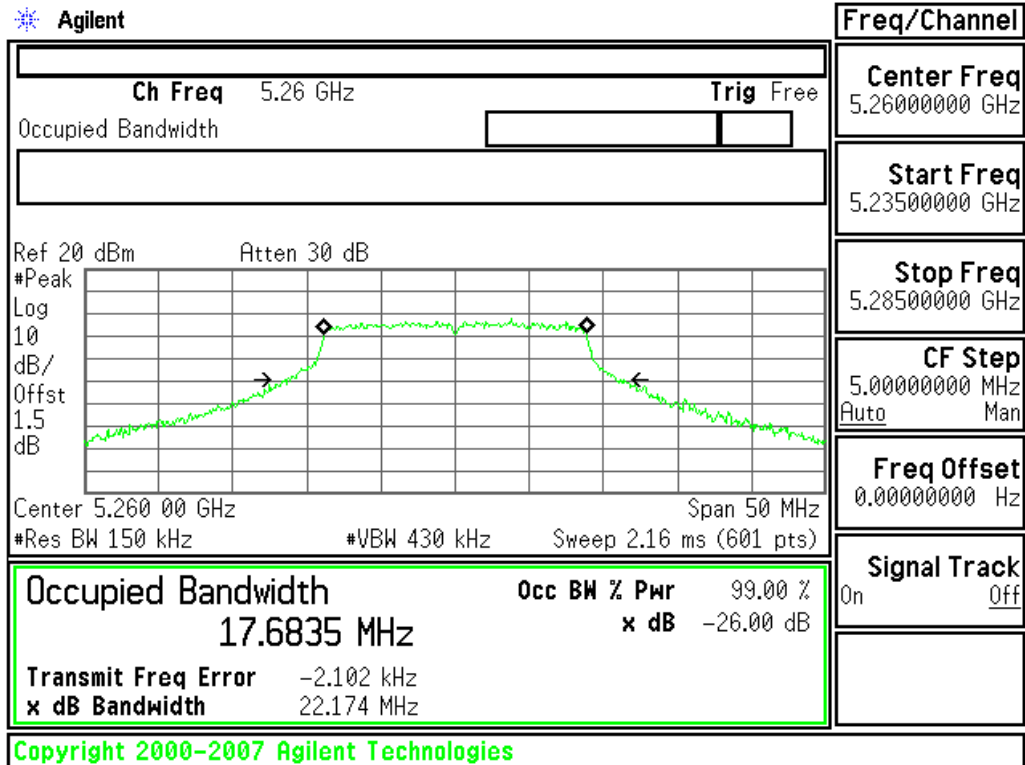
CH High



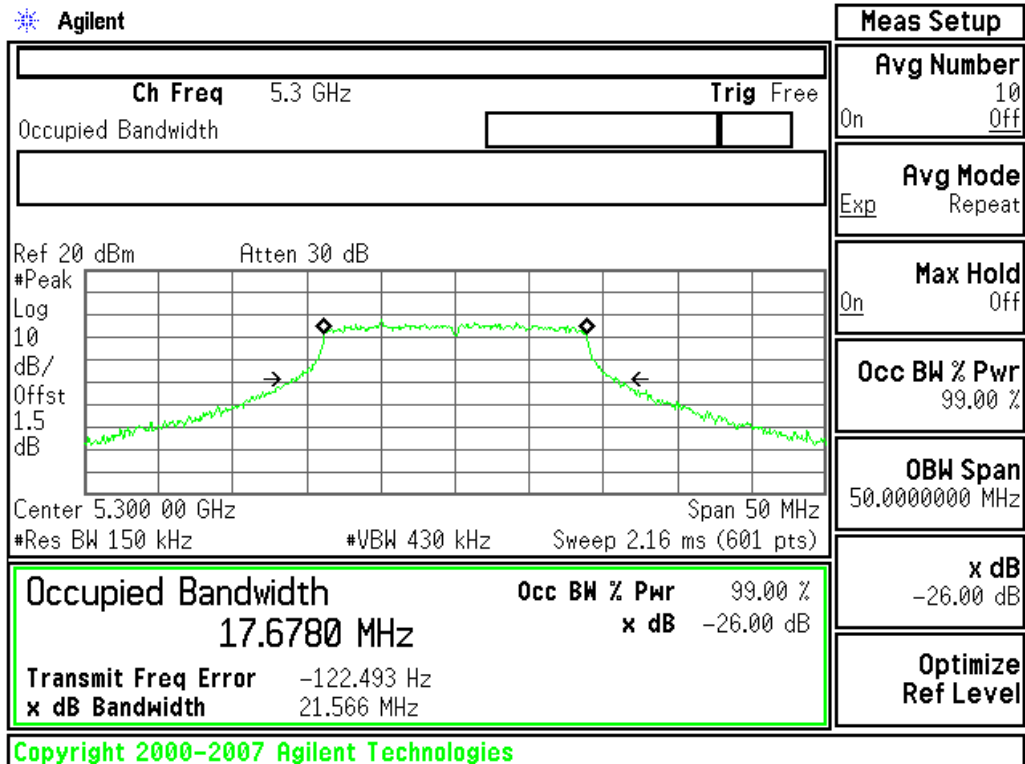


5250~5350MHz

CH Low

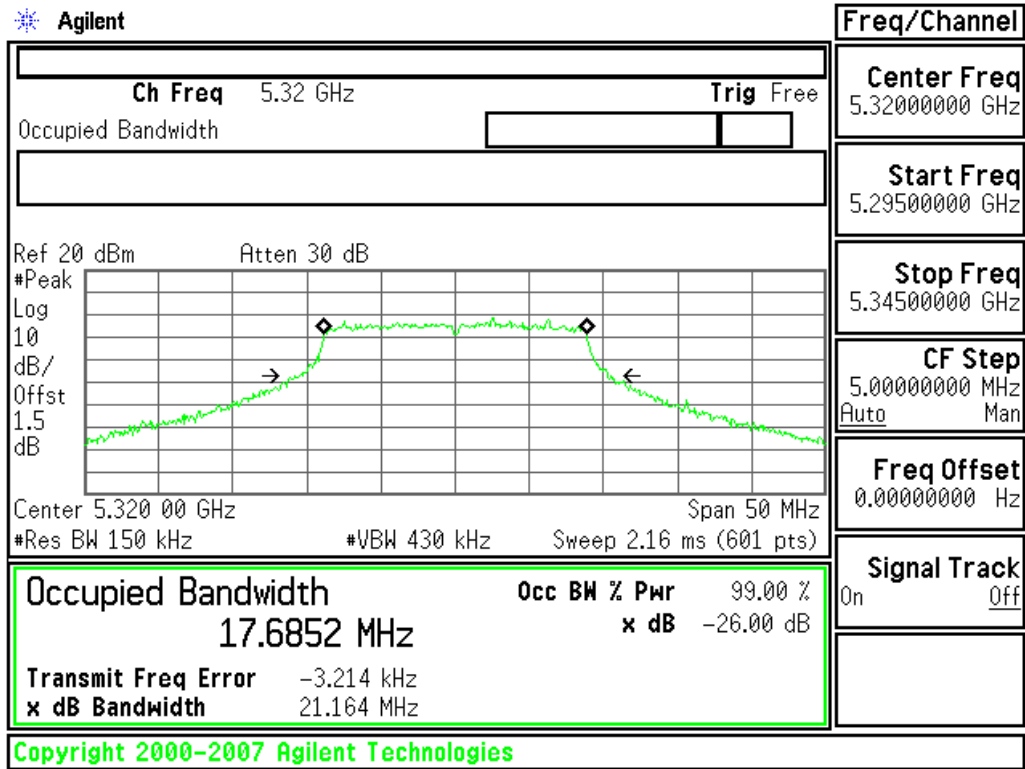


CH Mid



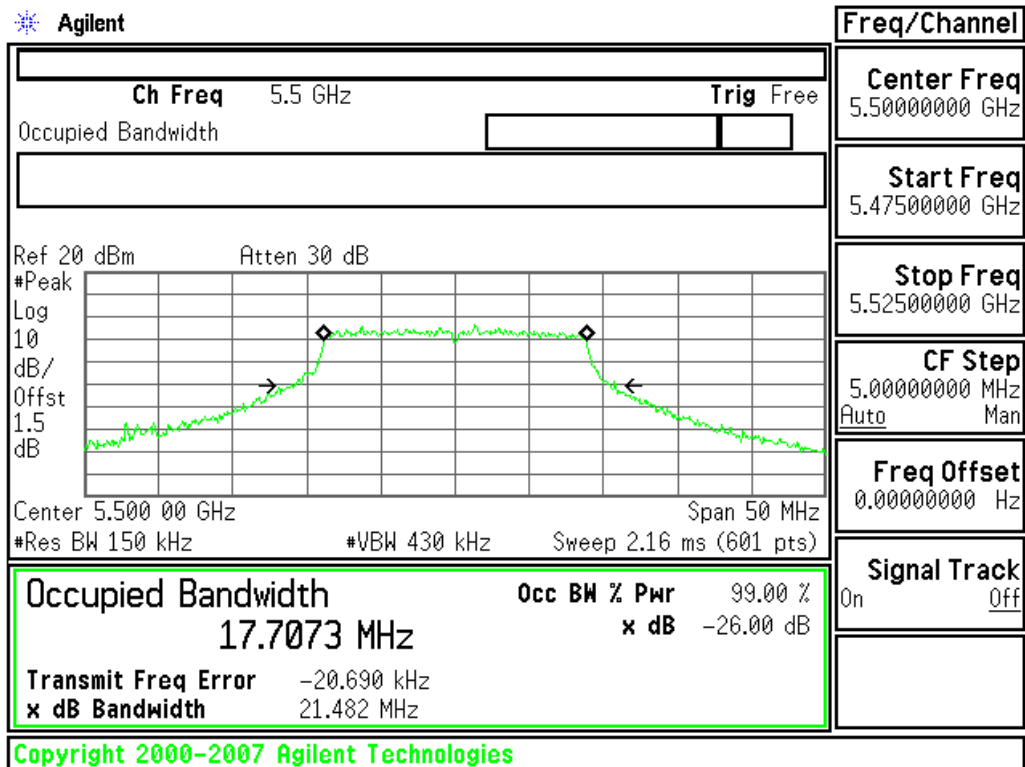


CH High



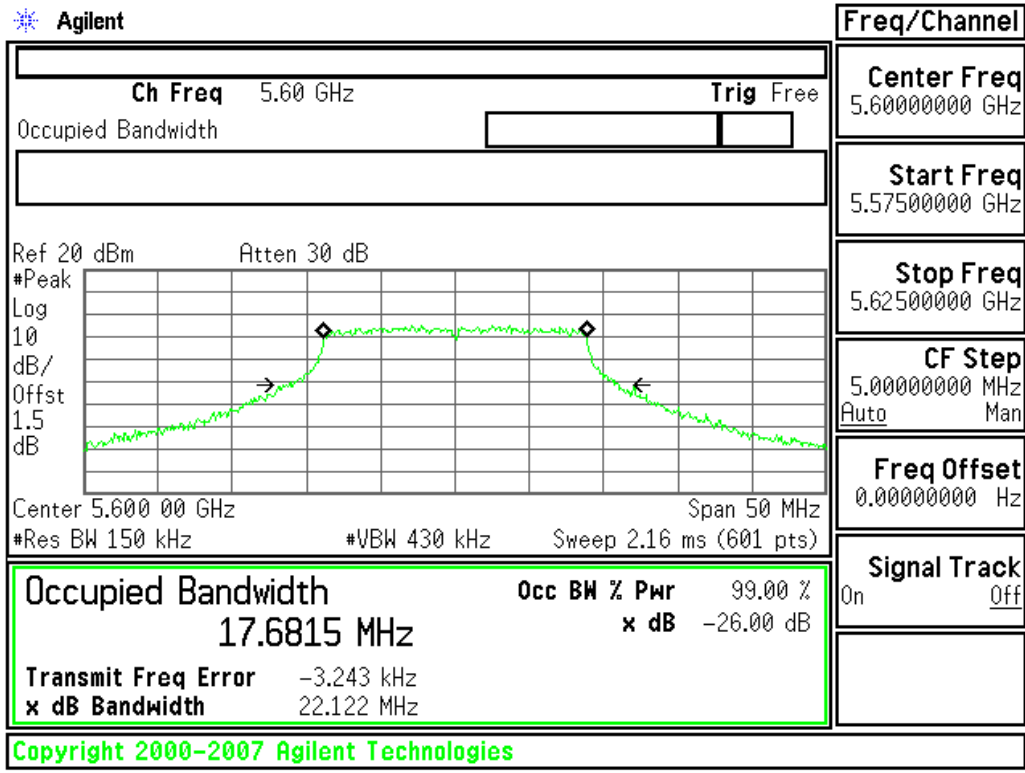
5470~5725MHz

CH Low

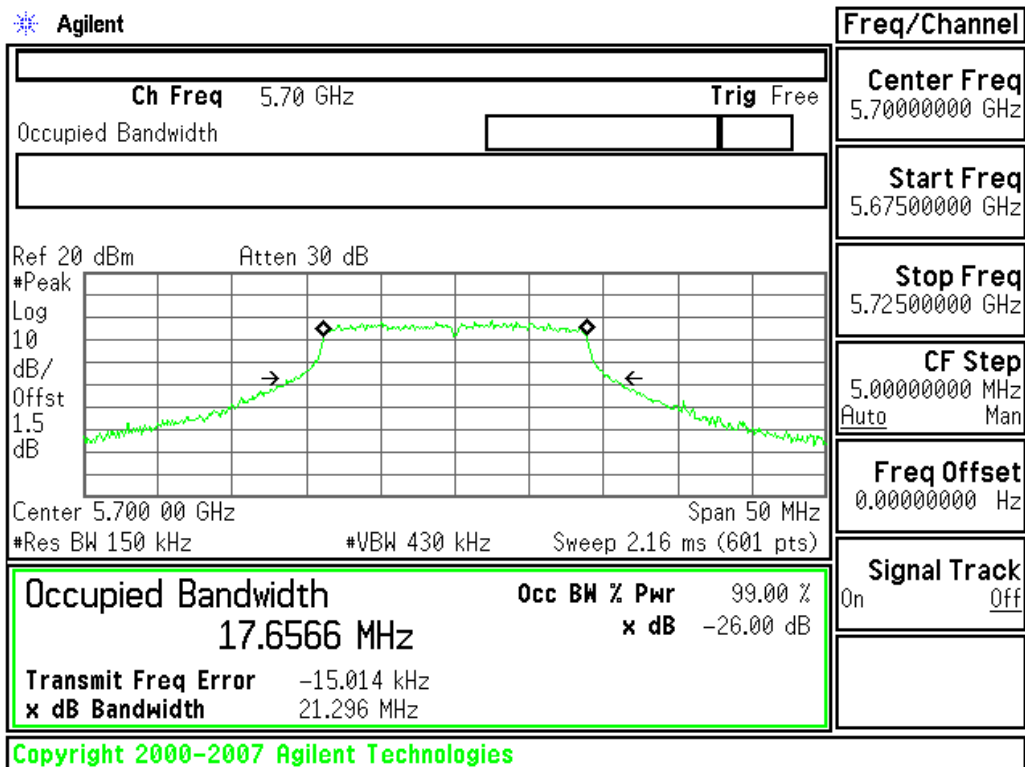




CH Mid



CH High

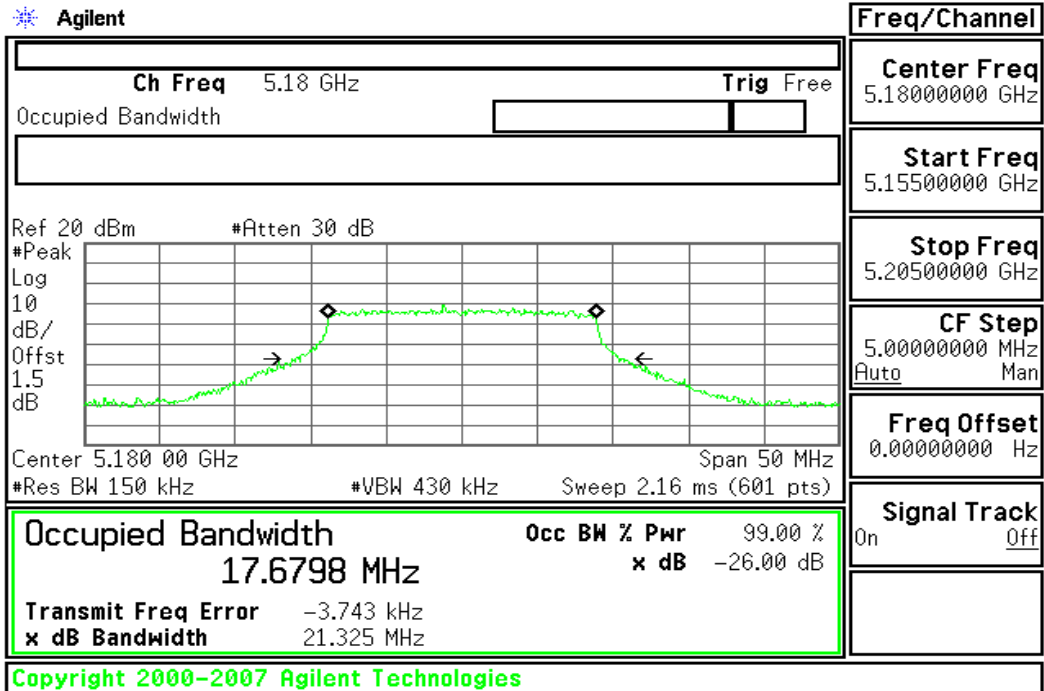




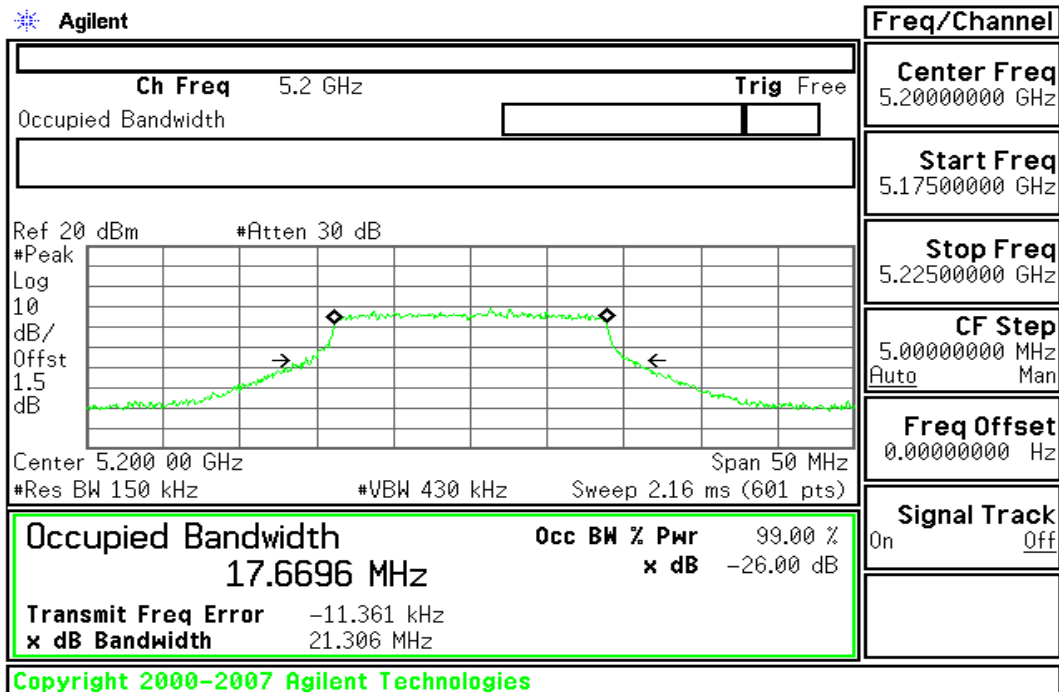
draft 802.11n Standard-20 MHz Channel mode / Chain 1

5150~5250MHz

CH Low

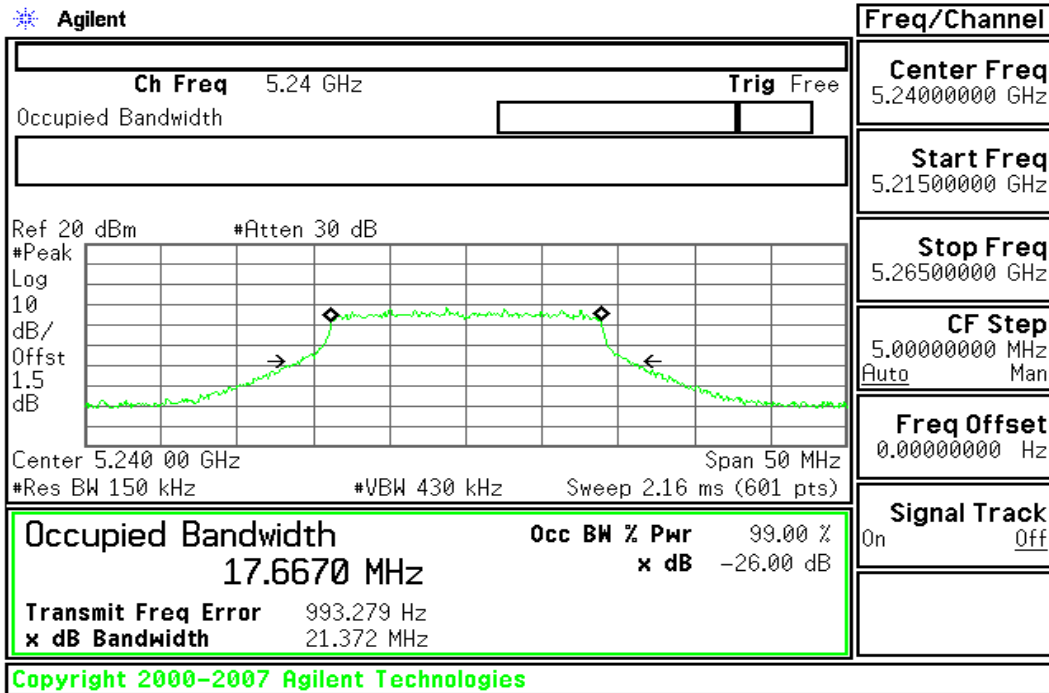


CH Mid



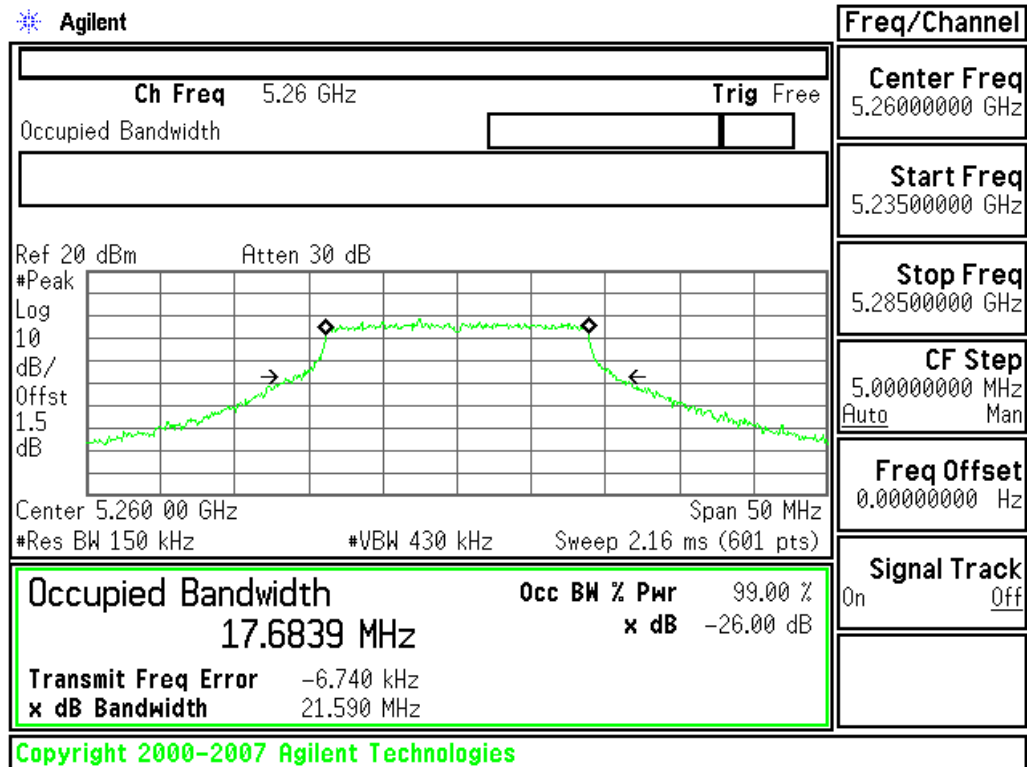


CH High



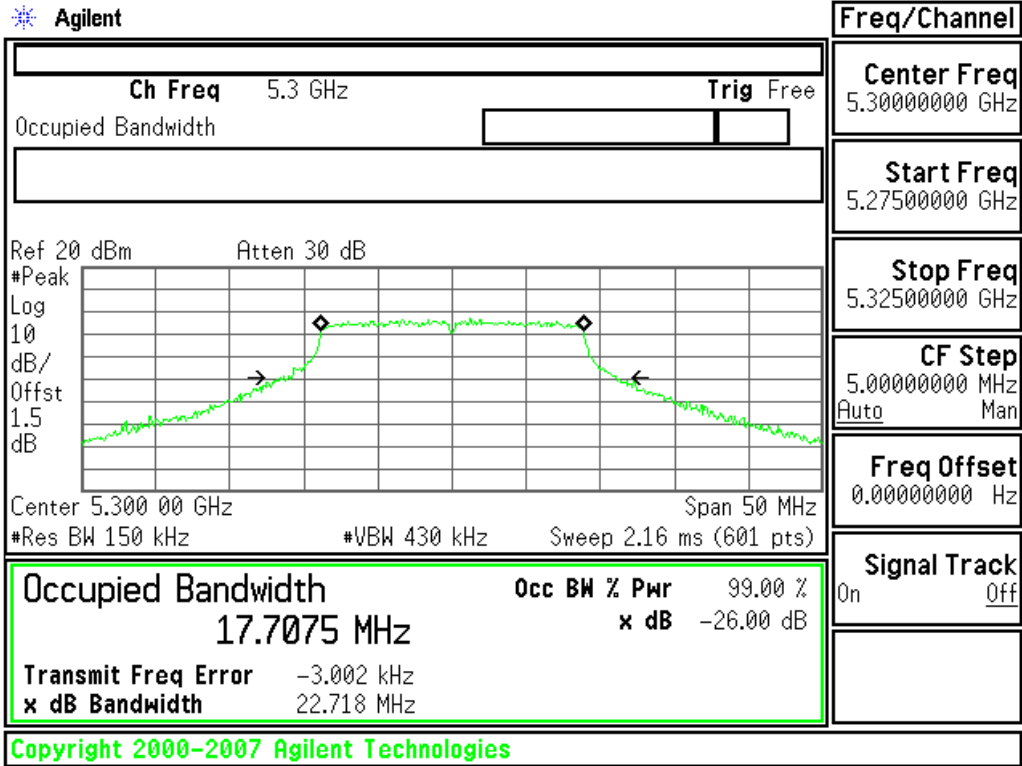
5250~5350MHz

CH Low

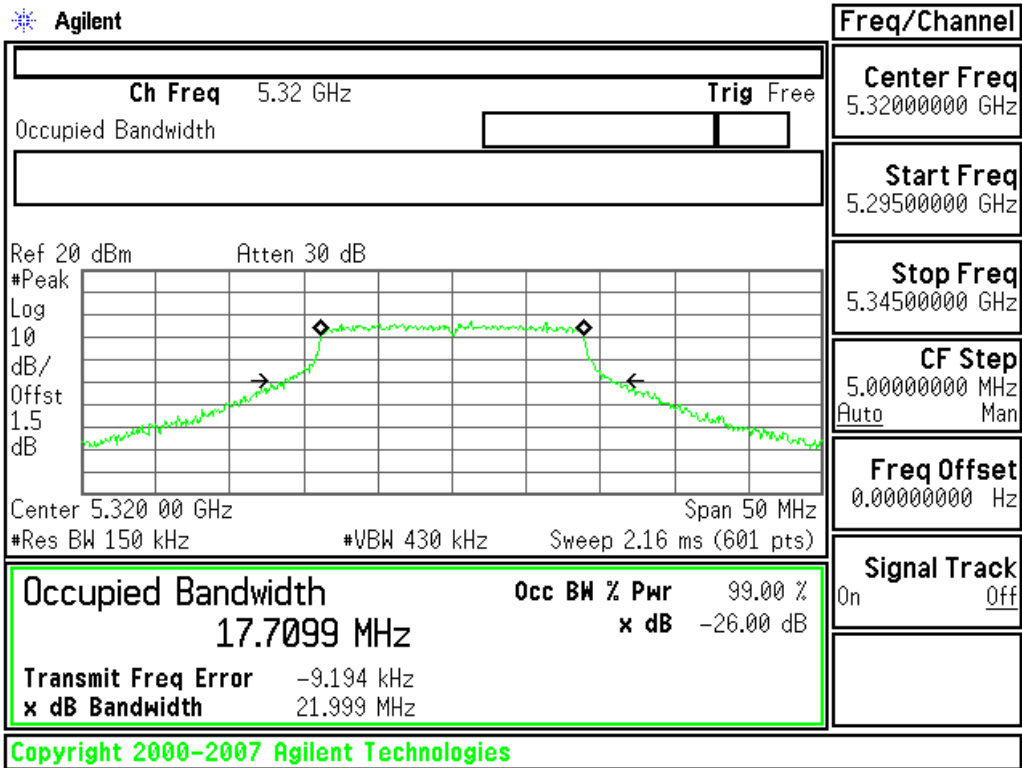




CH Mid



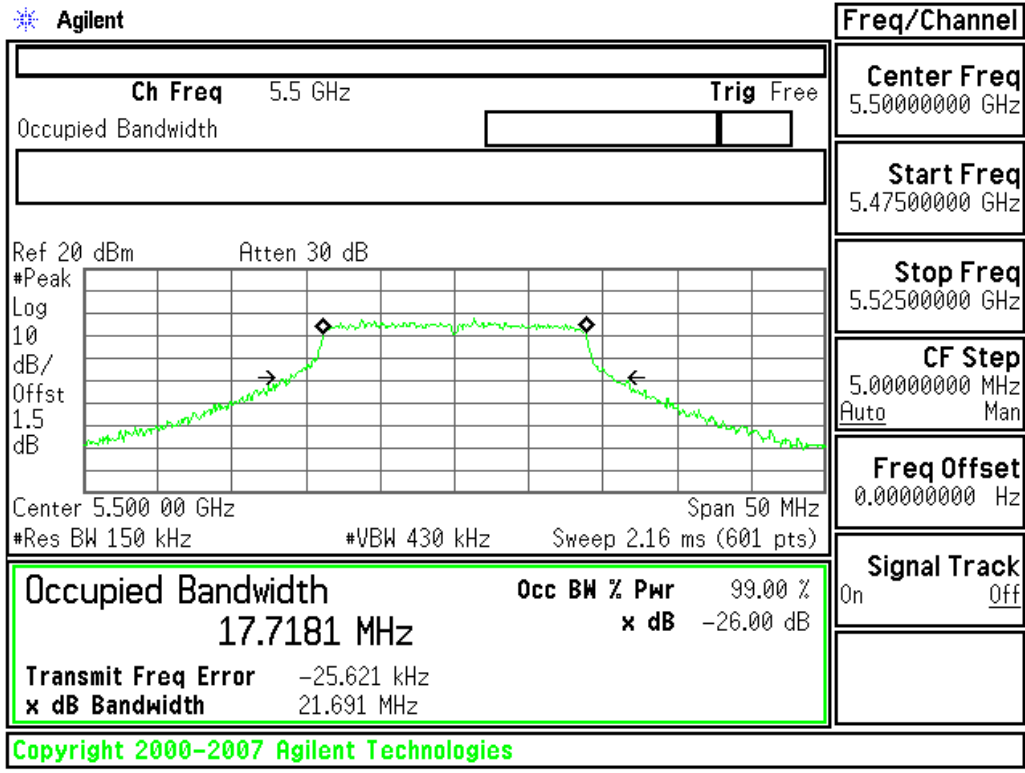
CH High



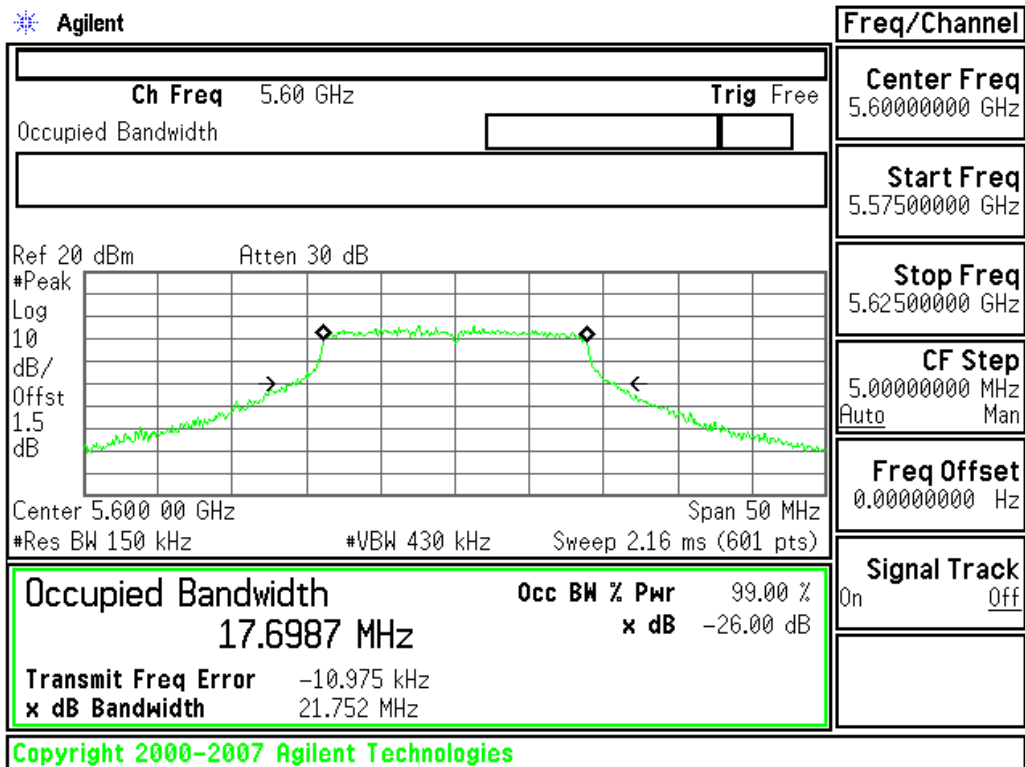


5470~5725MHz

CH Low

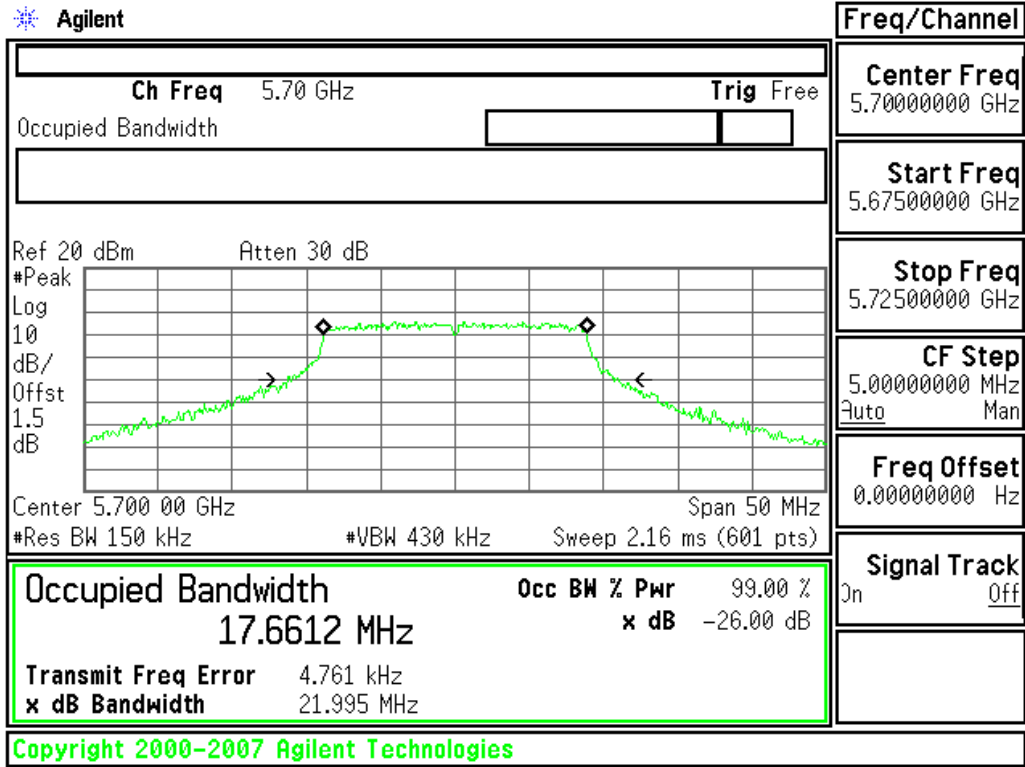


CH Mid





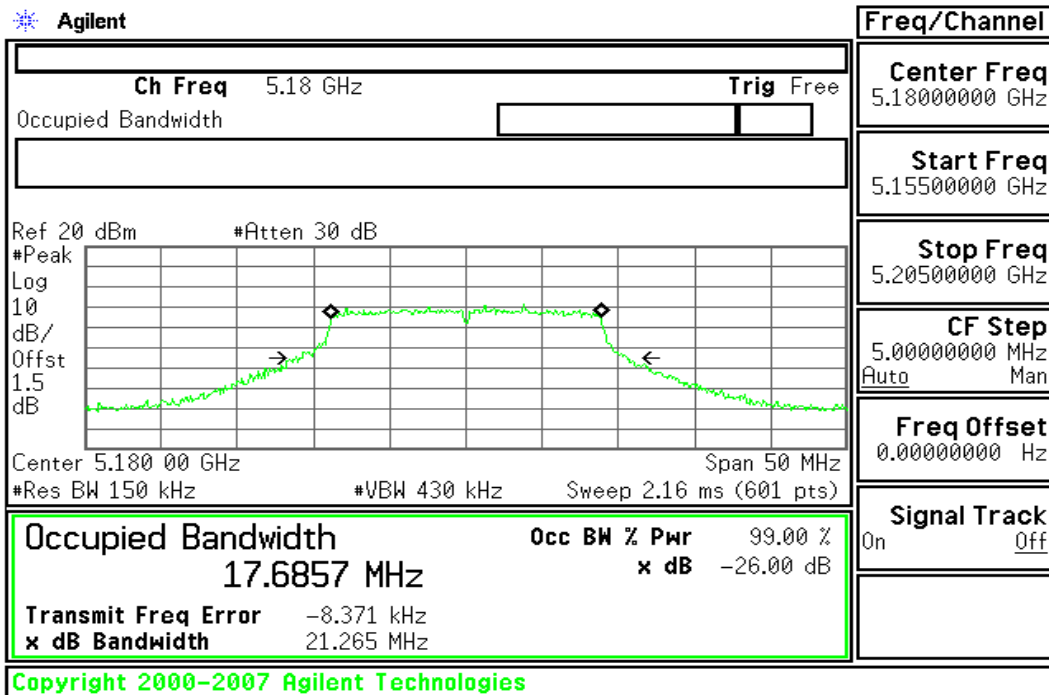
CH High



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

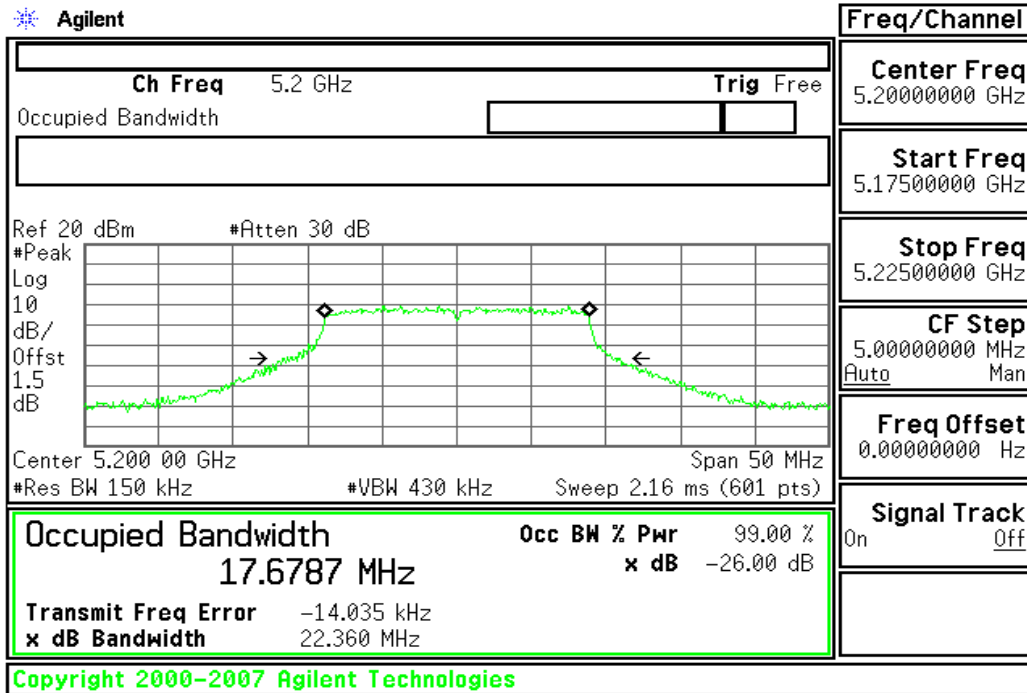
5150~5250MHz

CH Low

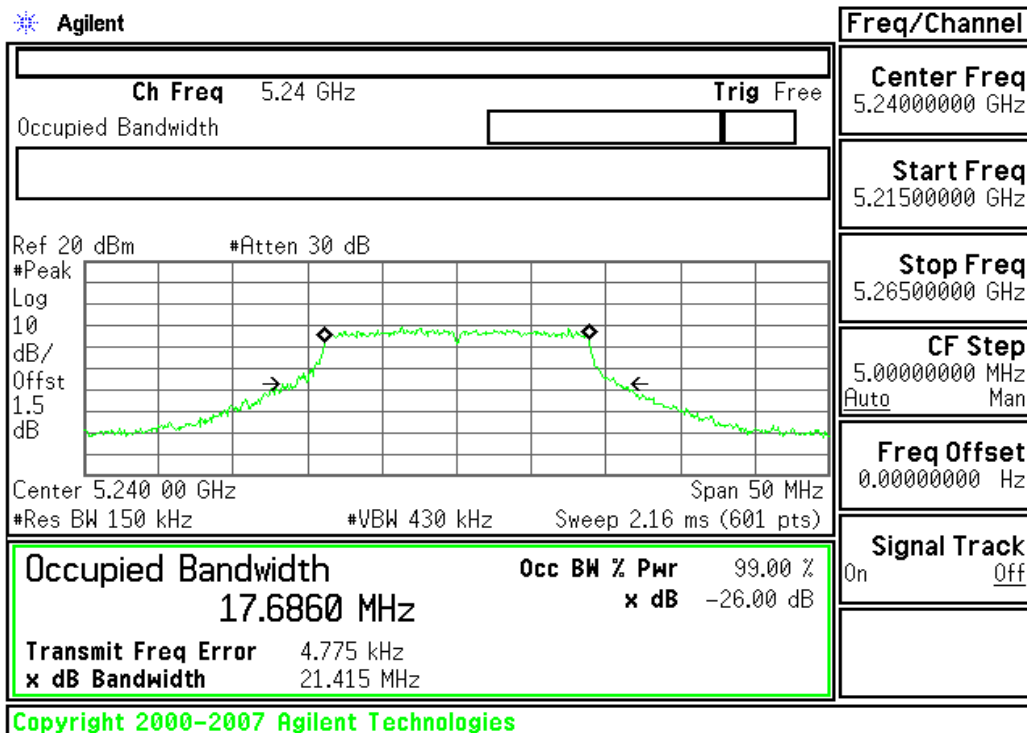




CH Mid



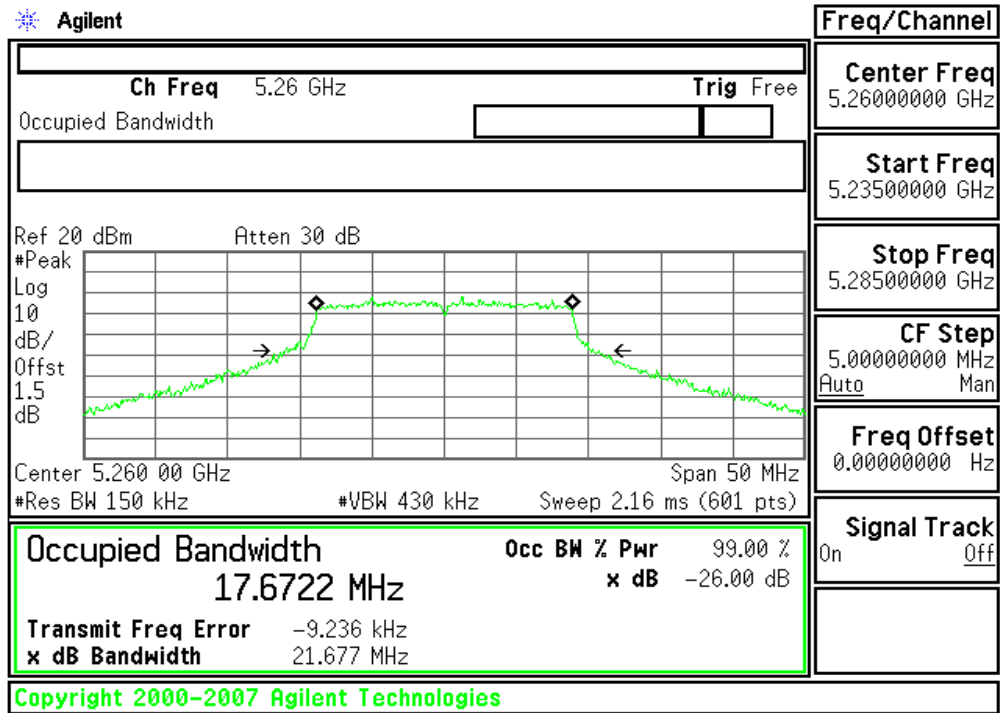
CH High



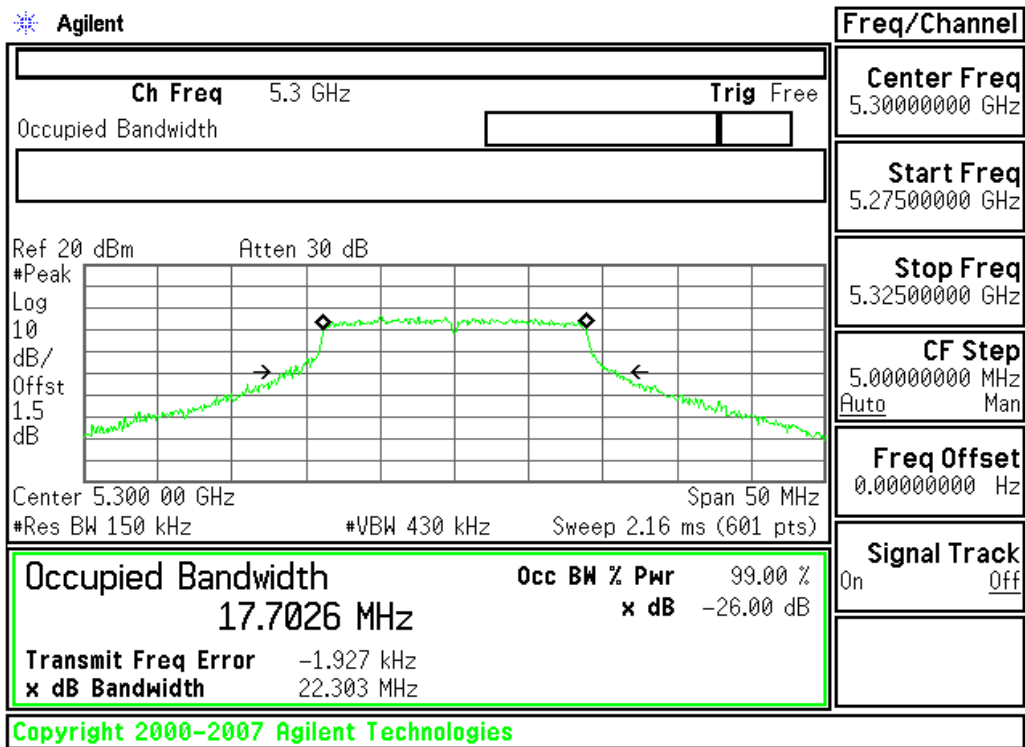


5250~5350MHz

CH Low

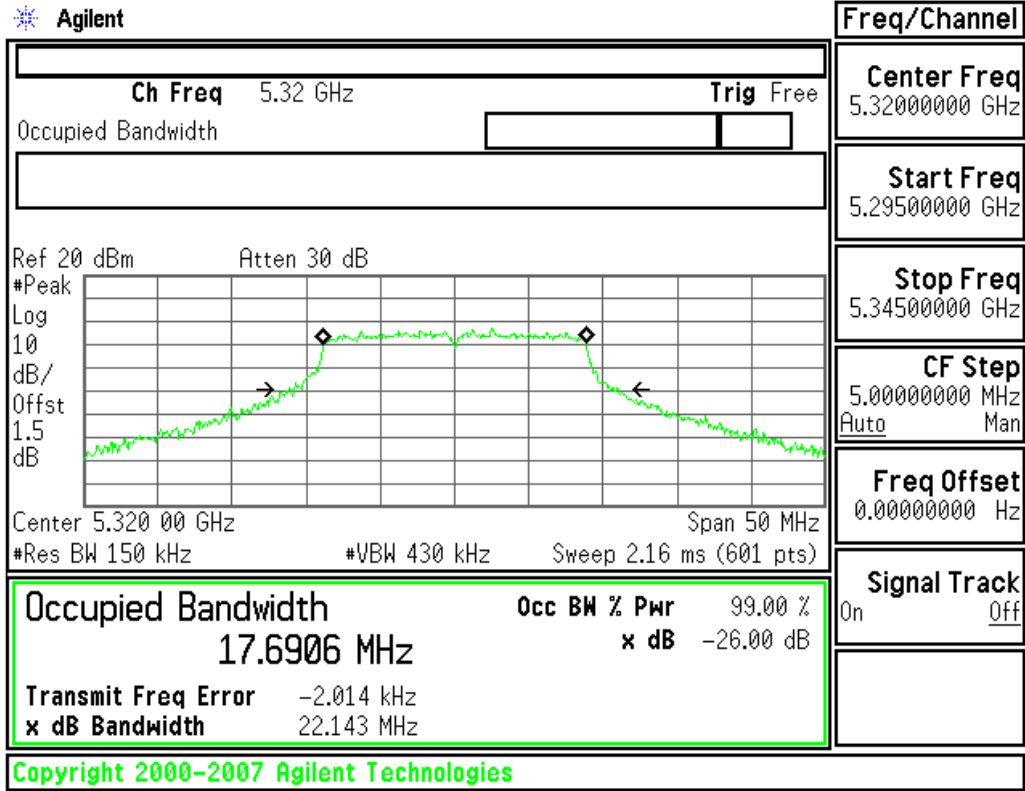


CH Mid



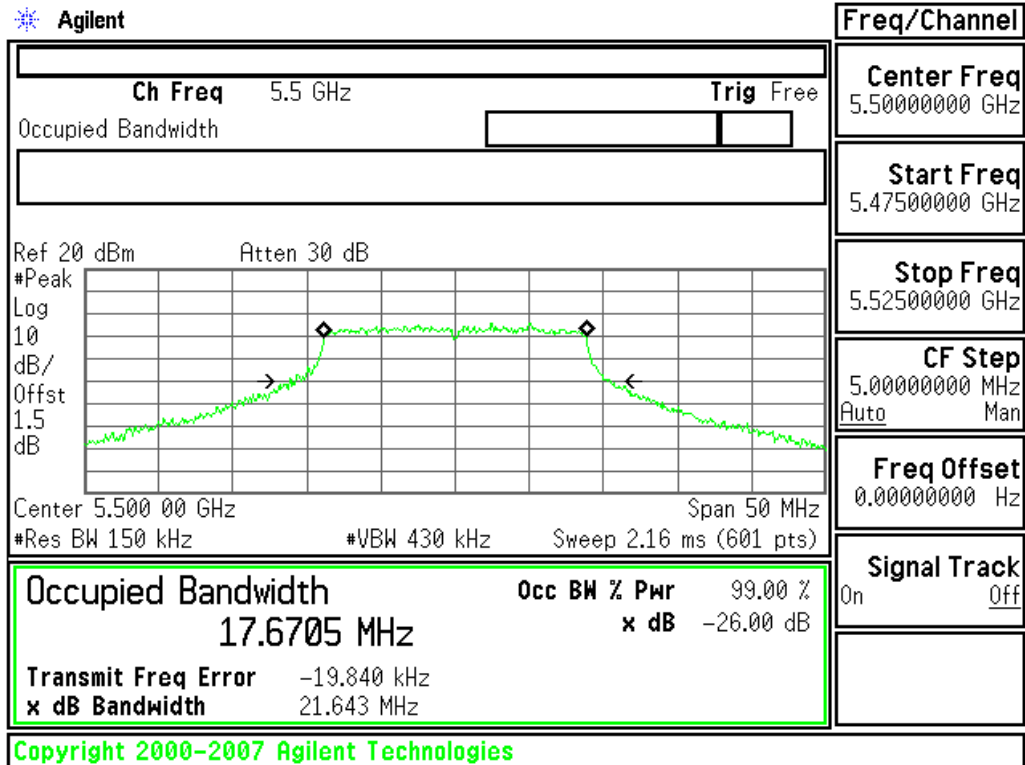


CH High



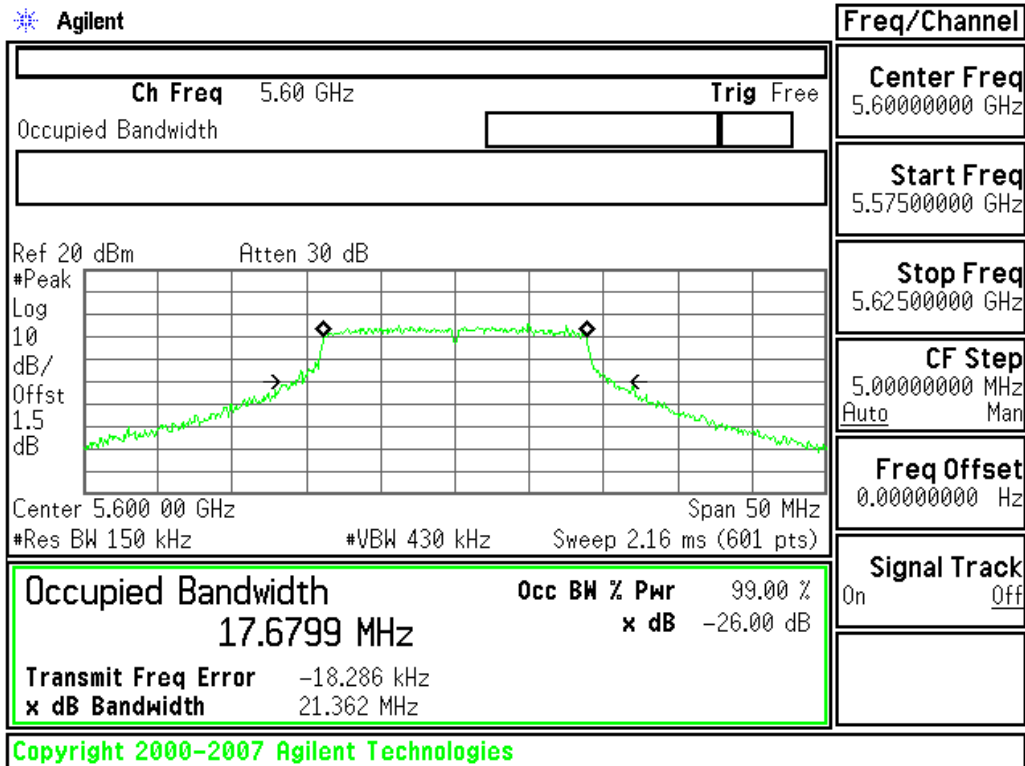
5470~5725MHz

CH Low

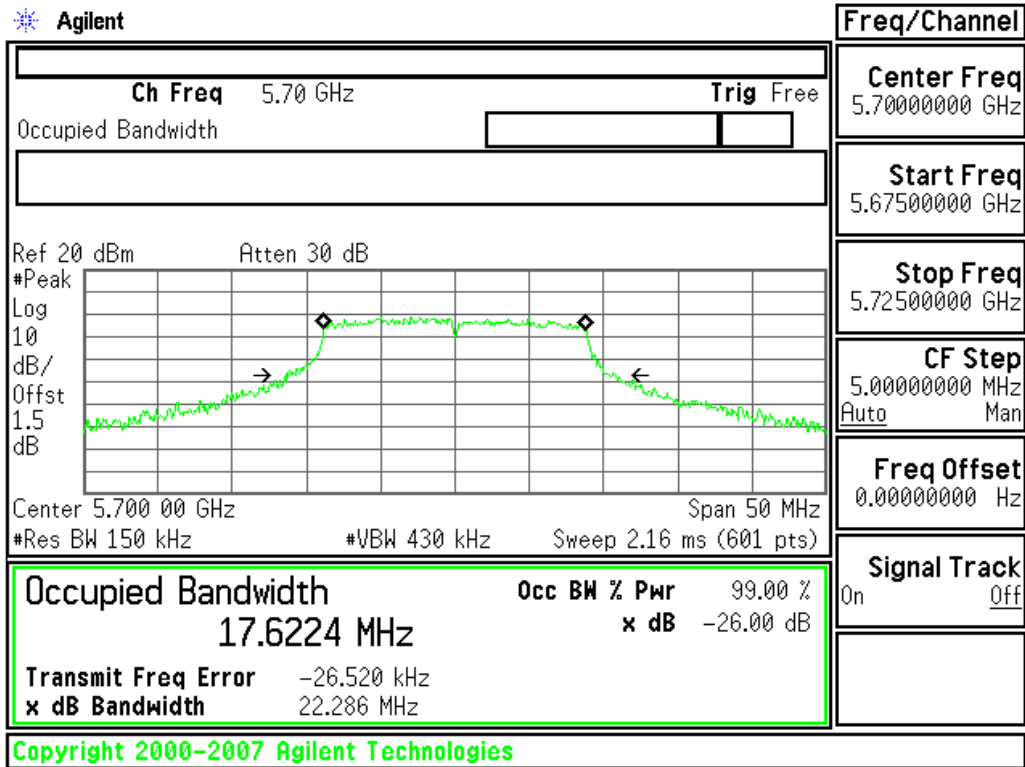




CH Mid



CH High

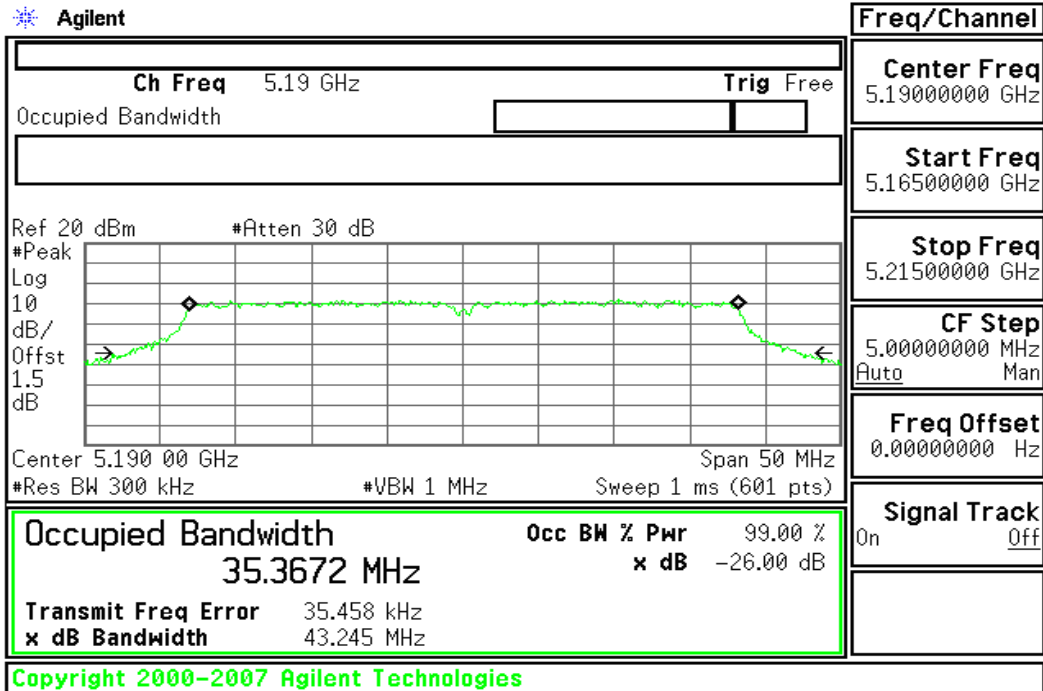




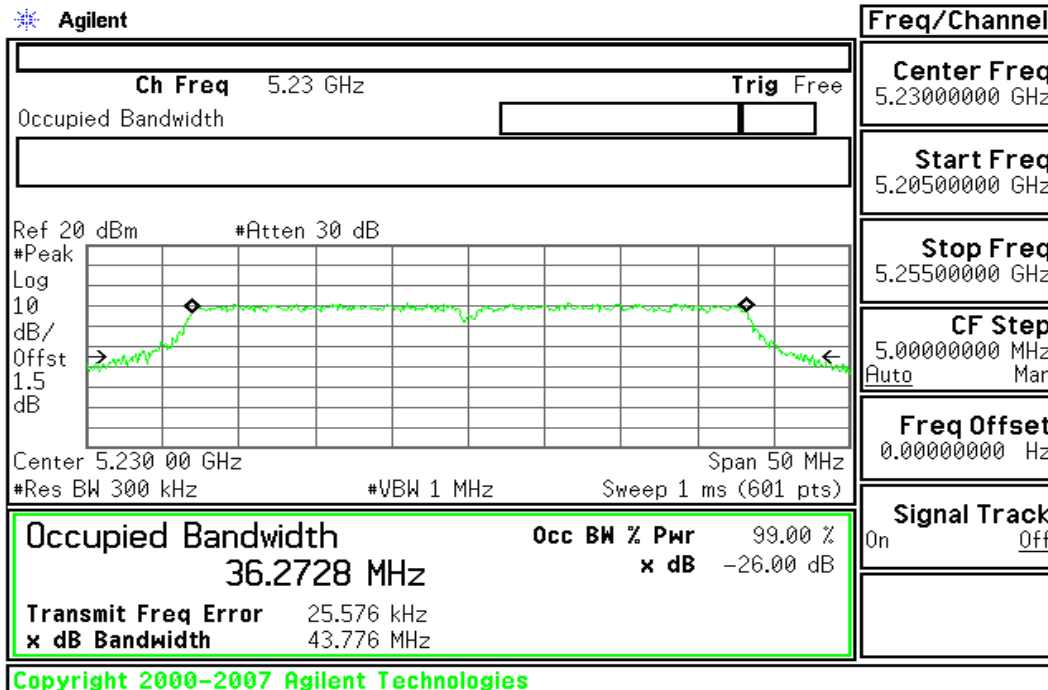
draft 802.11n Wide-40 MHz Channel mode / Chain 0

5150~5250MHz

CH Low



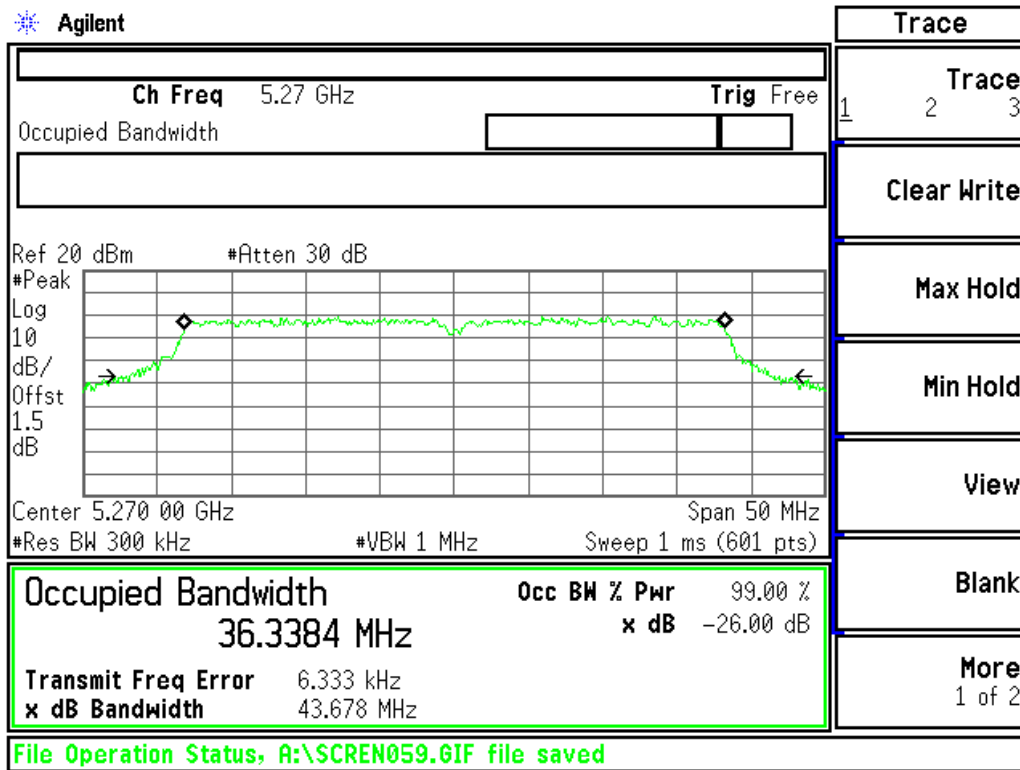
CH High





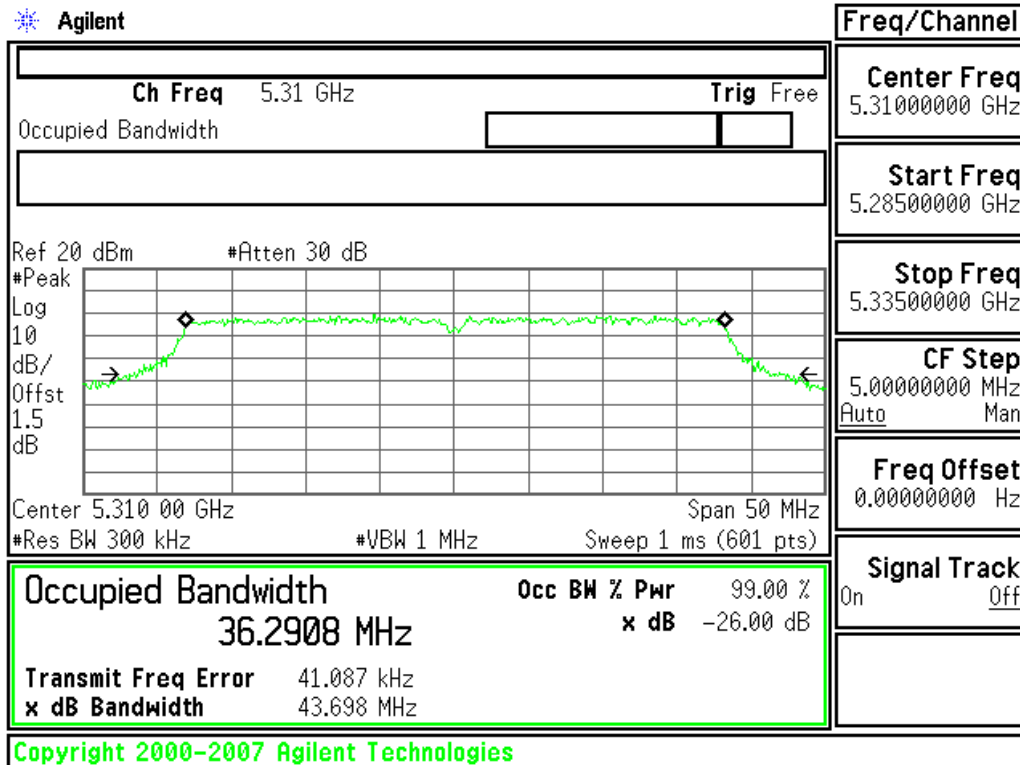
5250~5350MHz

CH Low



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

CH High



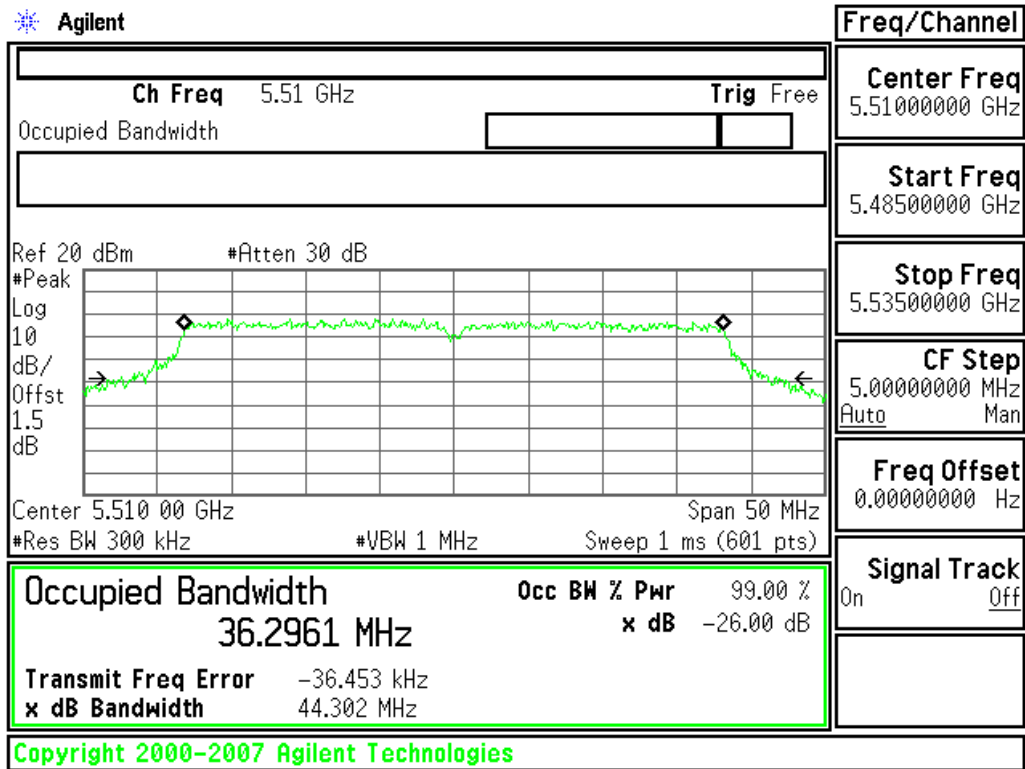
Freq/Channel
Center Freq 5.31000000 GHz
Start Freq 5.28500000 GHz
Stop Freq 5.33500000 GHz
CF Step 5.00000000 MHz
Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

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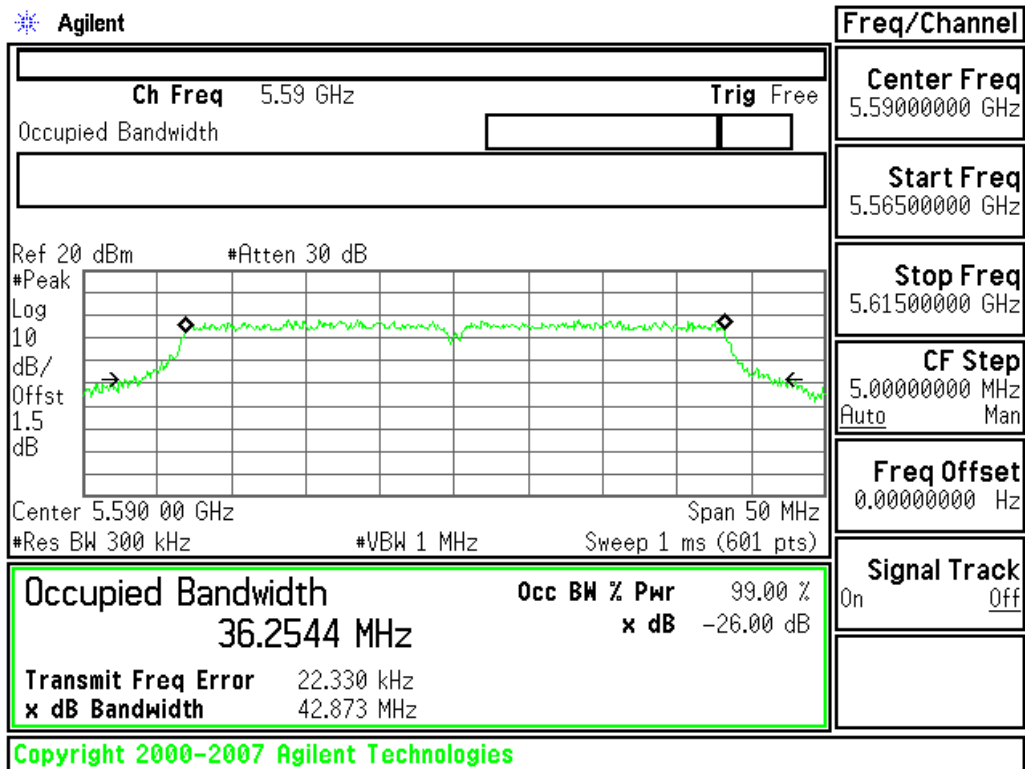


5470~5725MHz

CH Low

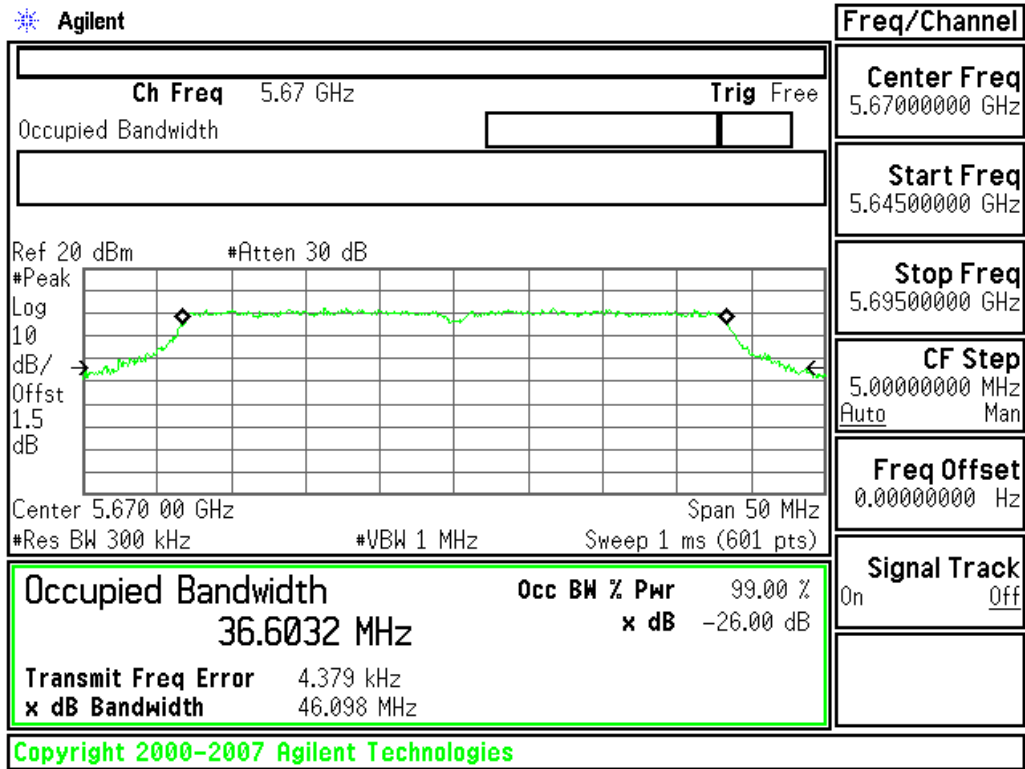


CH Mid





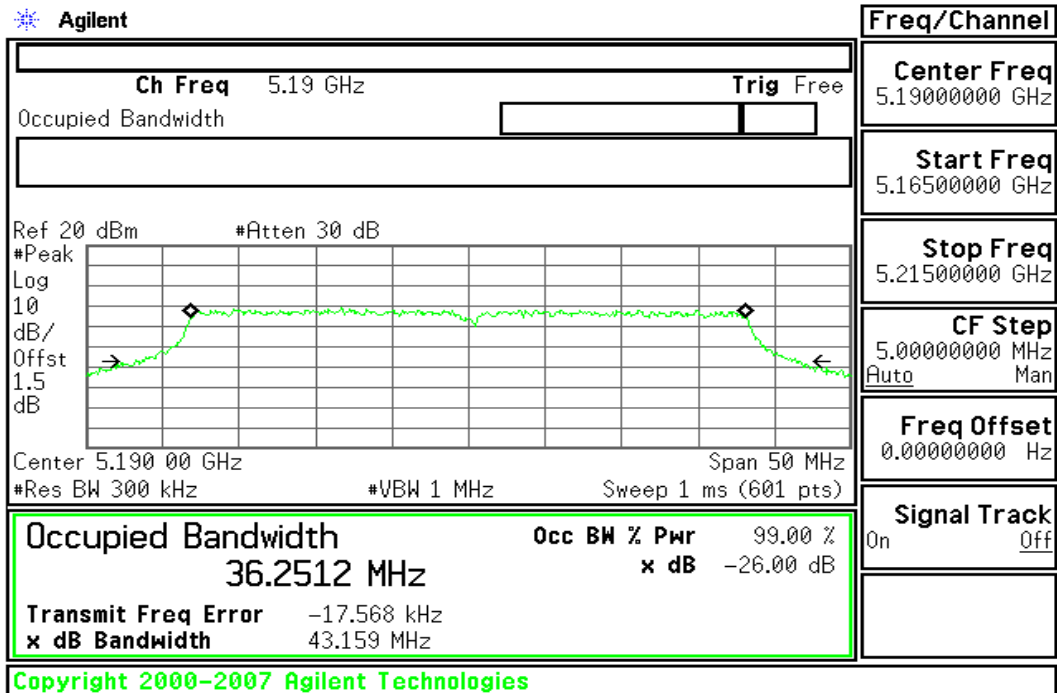
CH High



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

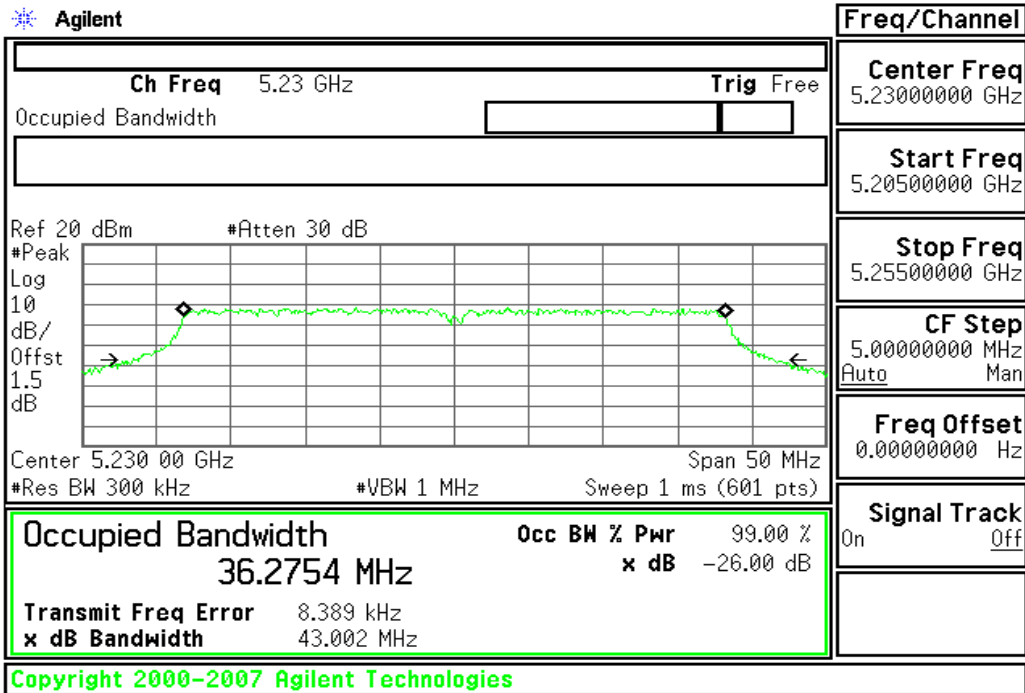
5150~5250MHz

CH Low



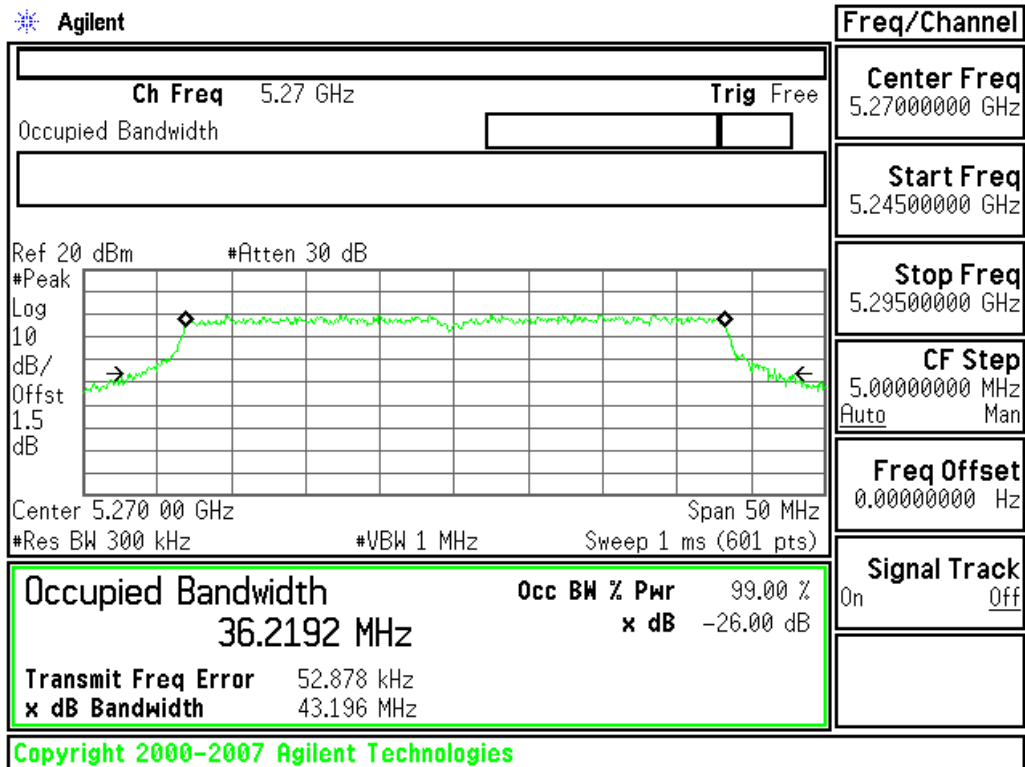


CH High



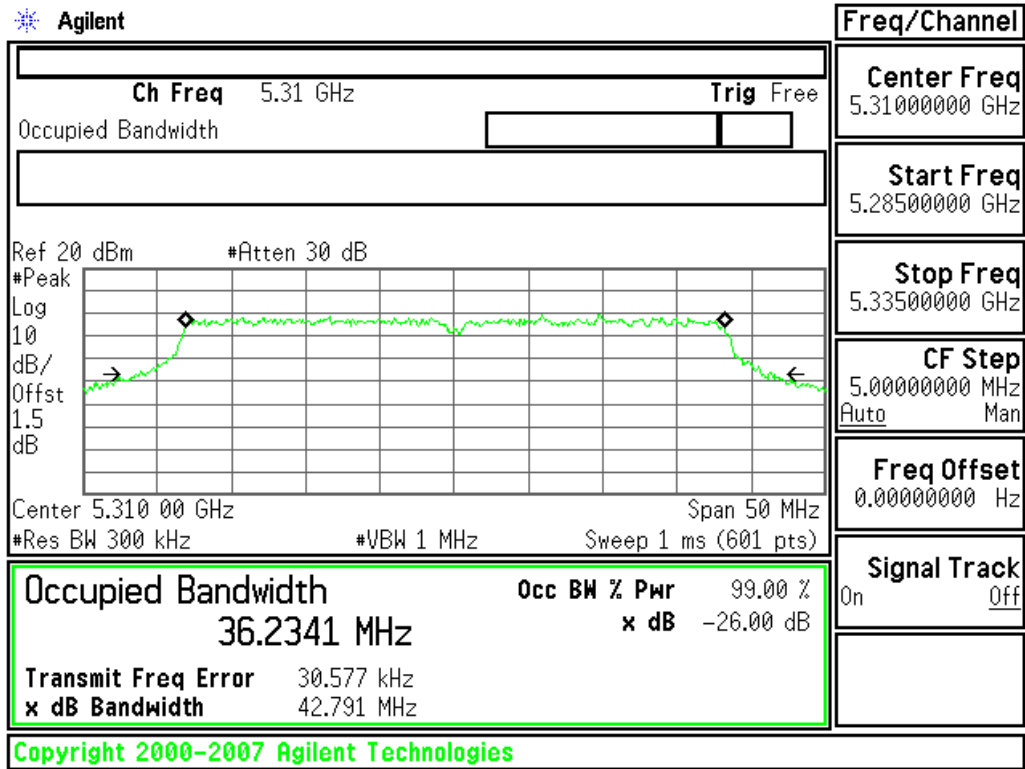
5250~5350MHz

CH Low



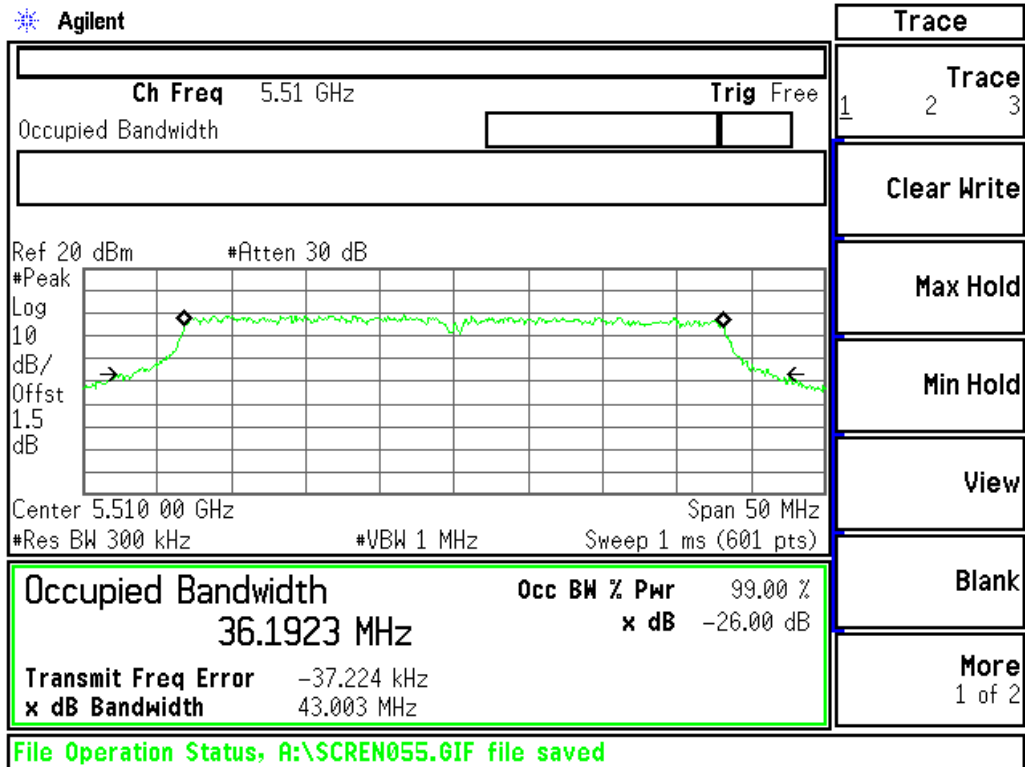


CH High



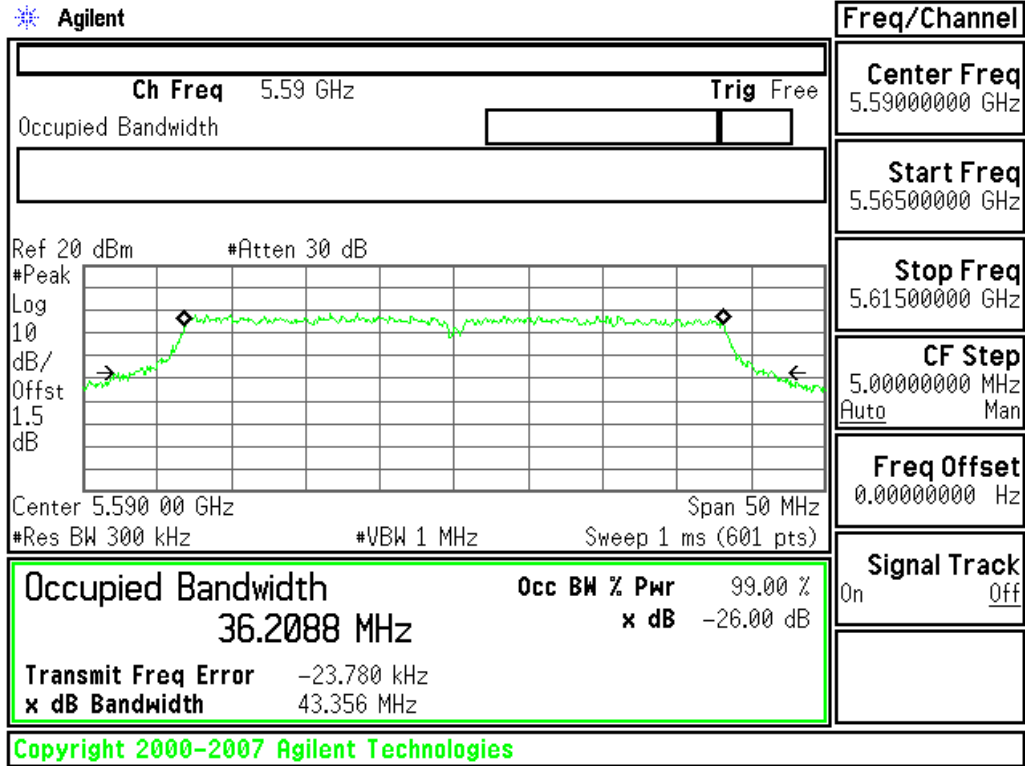
5470~5725MHz

CH Low

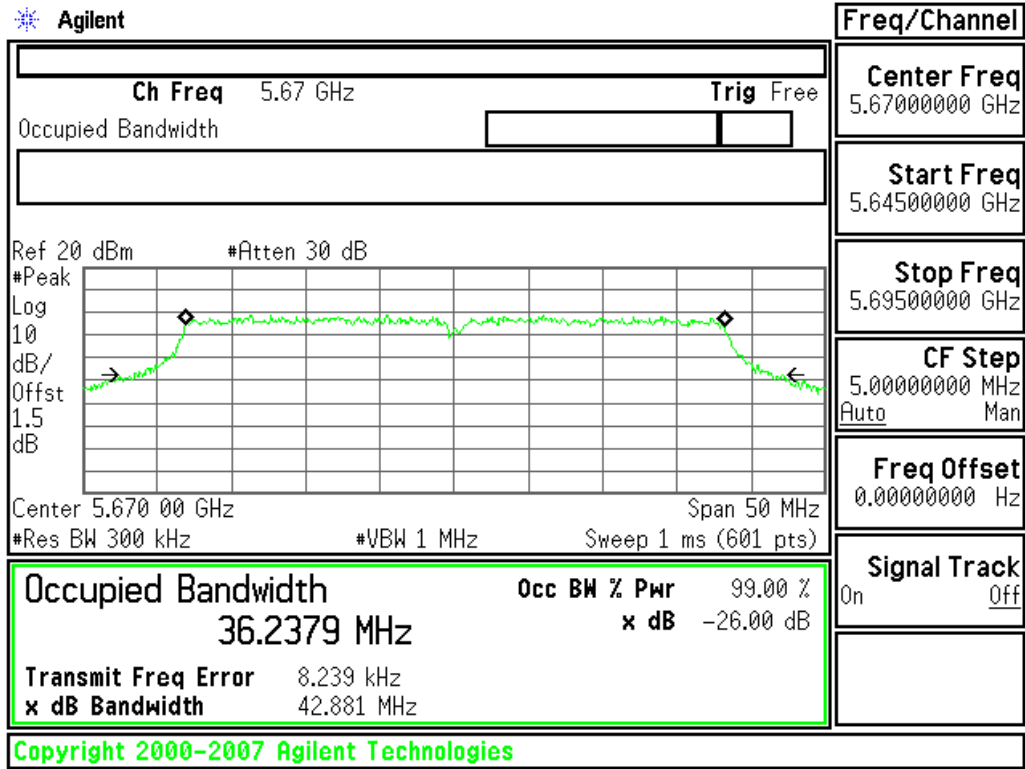




CH Mid



CH High

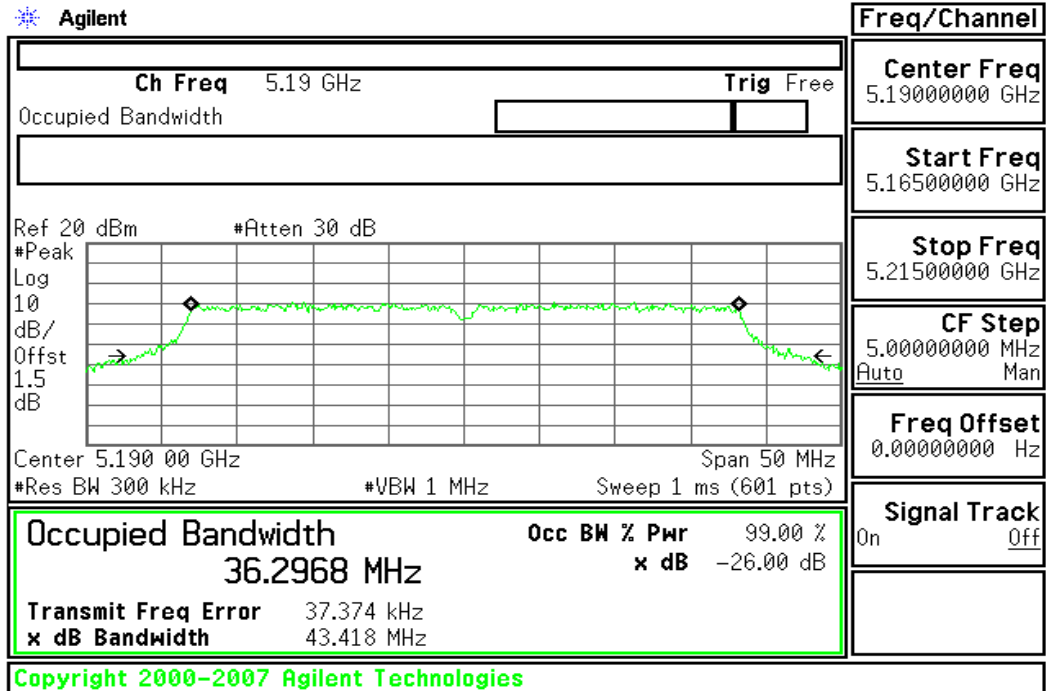




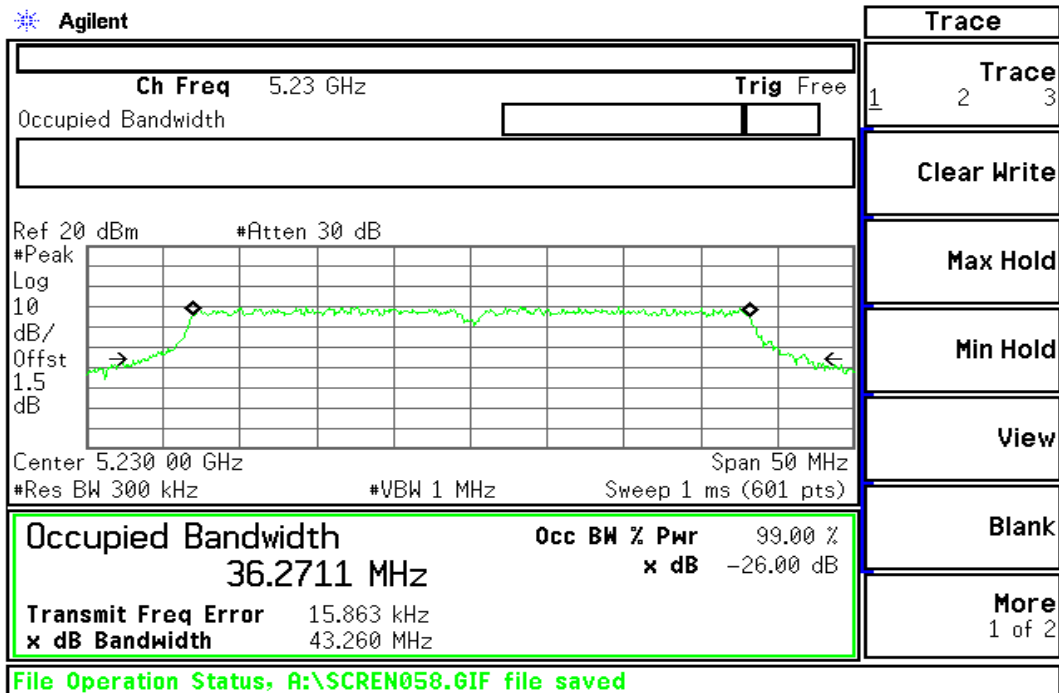
draft 802.11n Wide-40 MHz Channel mode / Chain 2

5150~5250MHz

CH Low



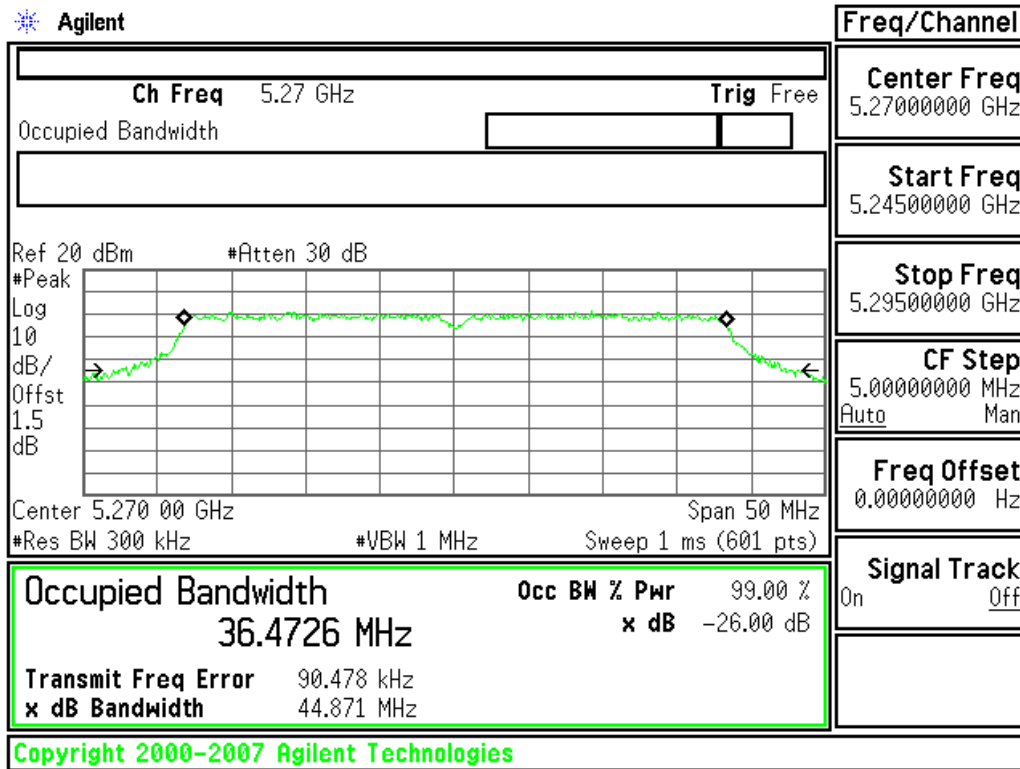
CH High



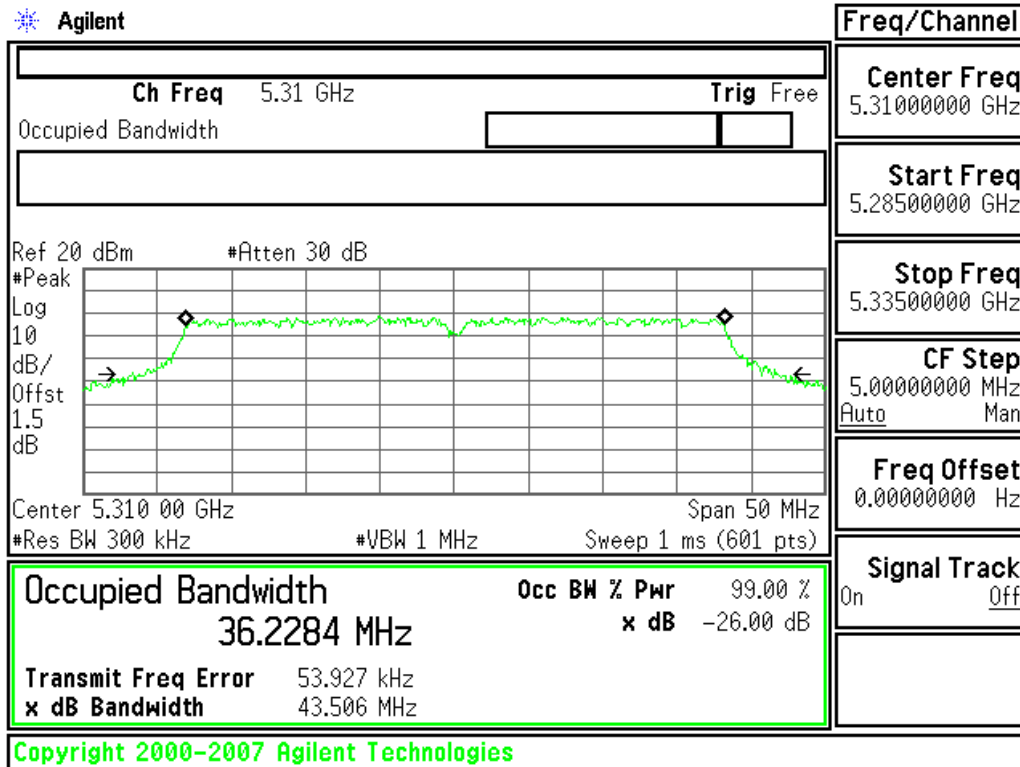


5250~5350MHz

CH Low



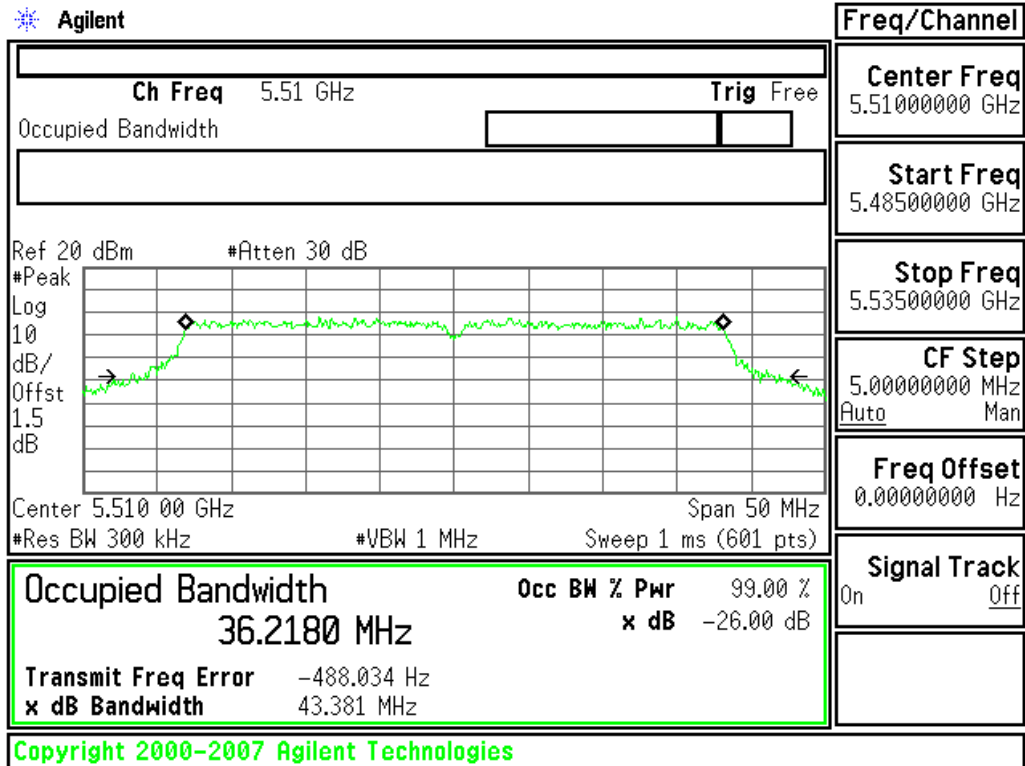
CH High



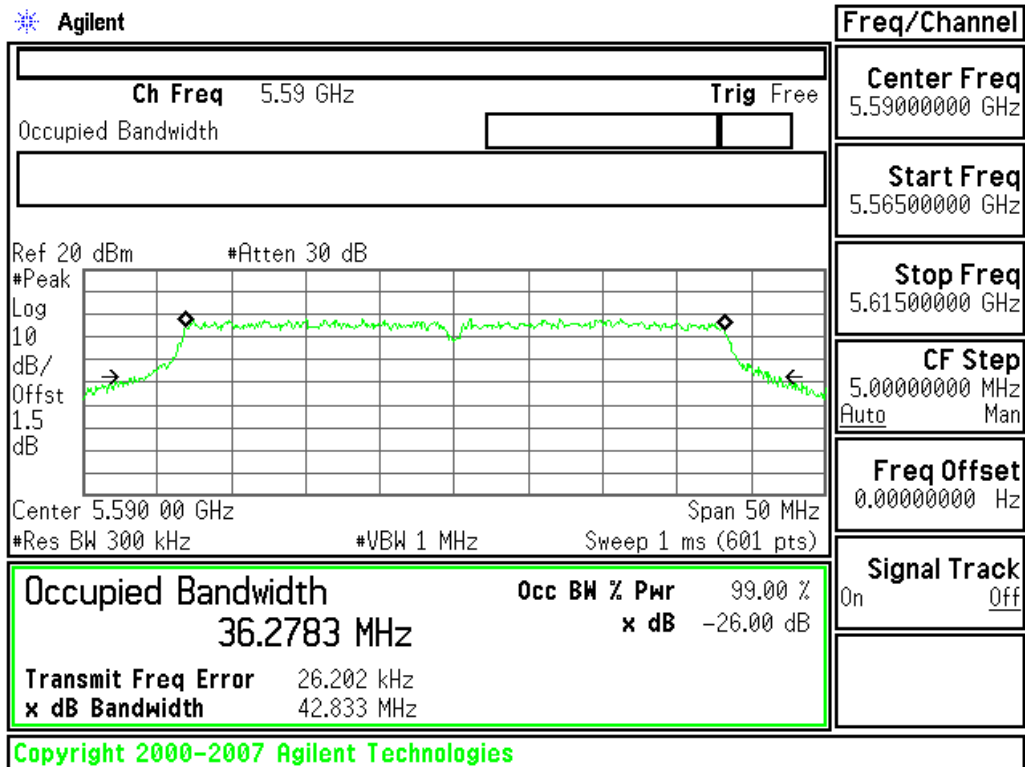


5470~5725MHz

CH Low

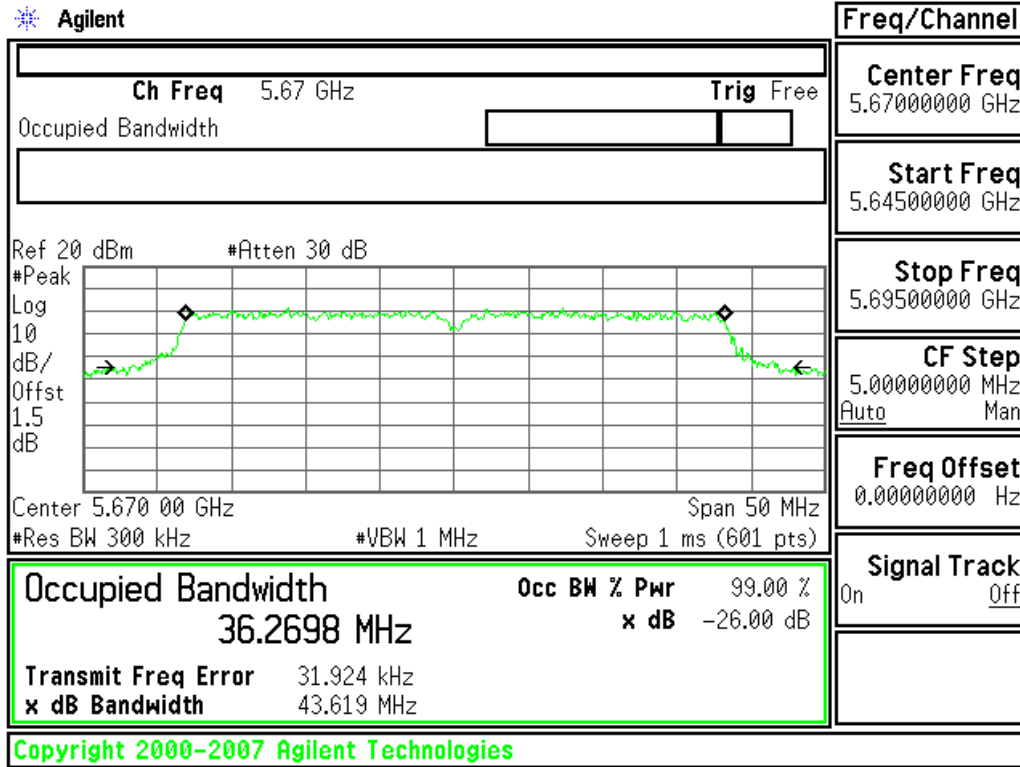


CH Mid





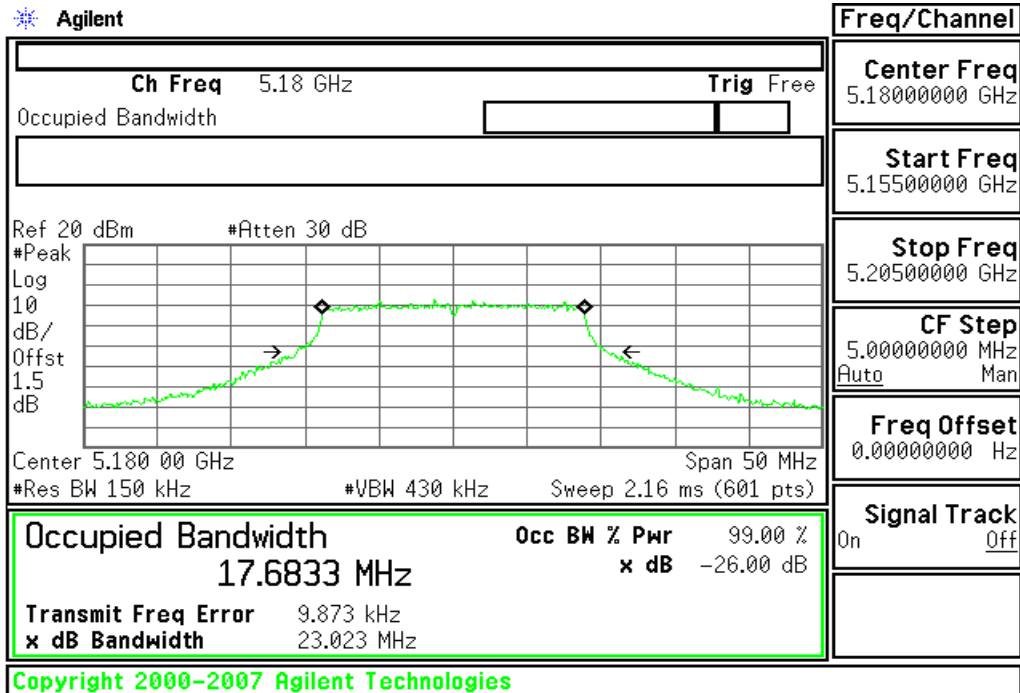
CH High



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

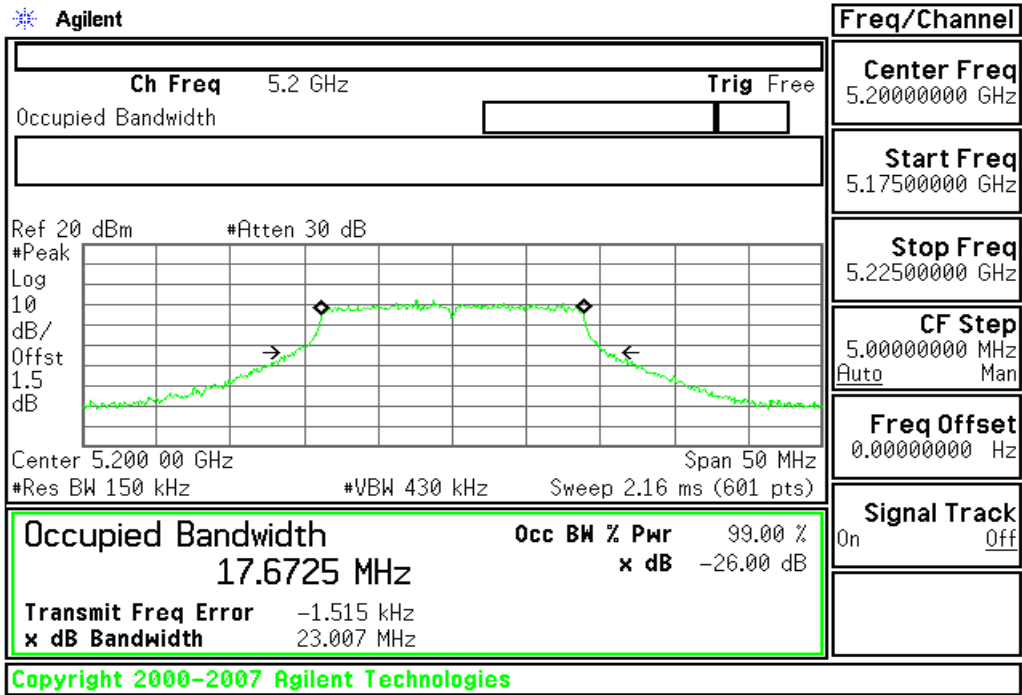
5150~5250MHz

CH Low

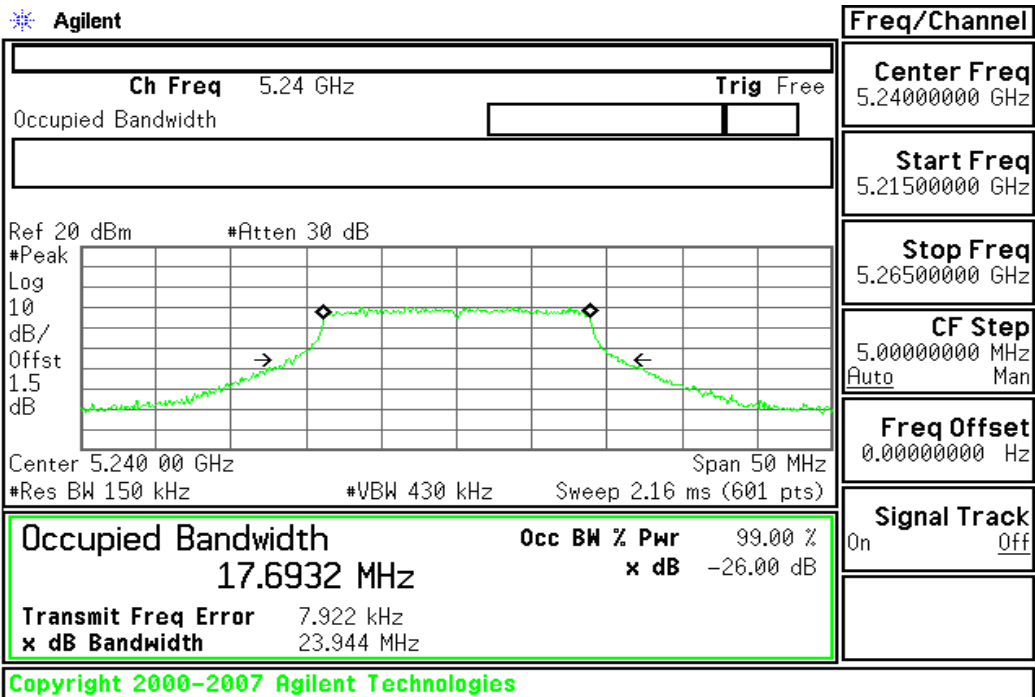




CH Mid



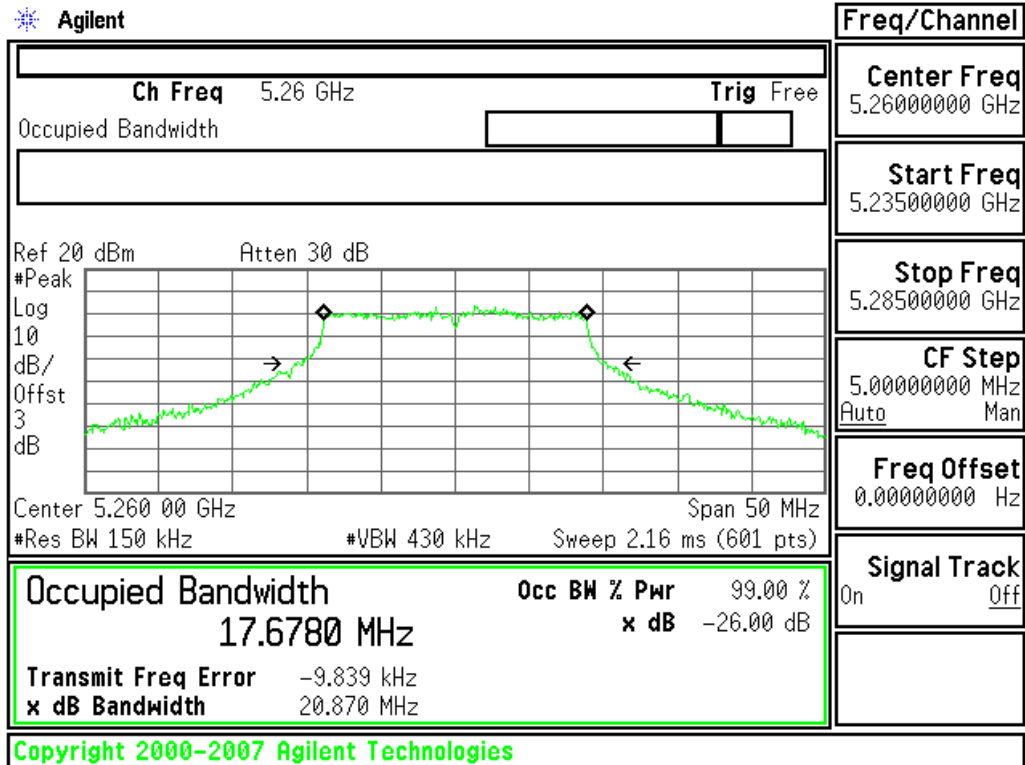
CH High



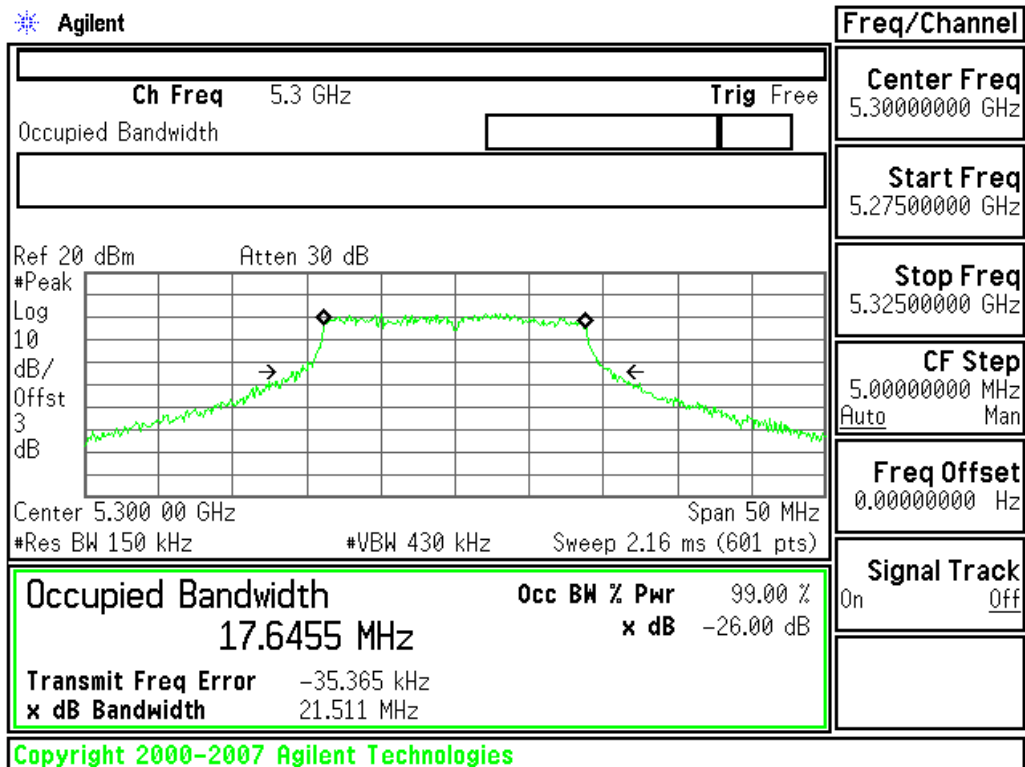


5250~5350MHz

CH Low

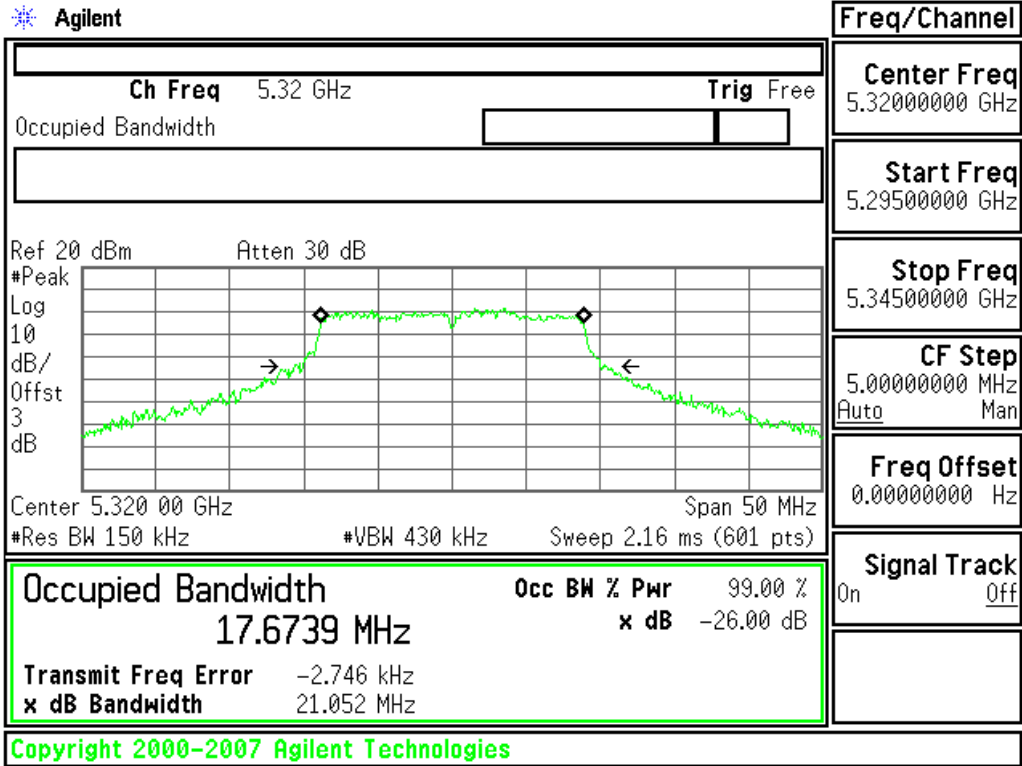


CH Mid



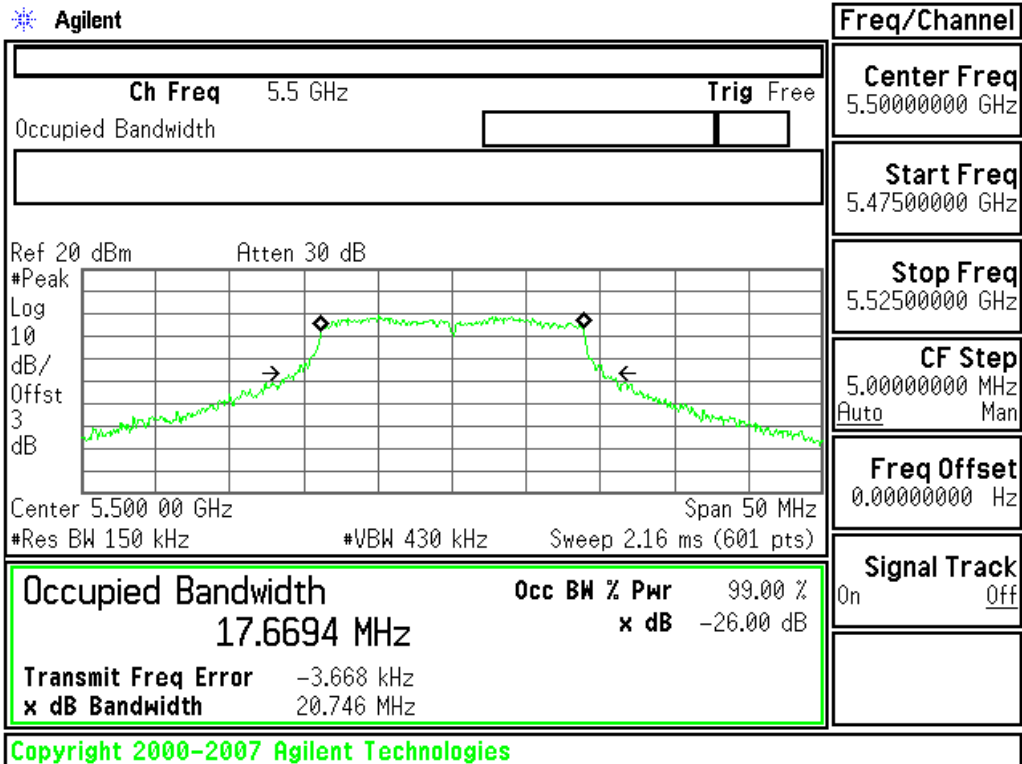


CH High



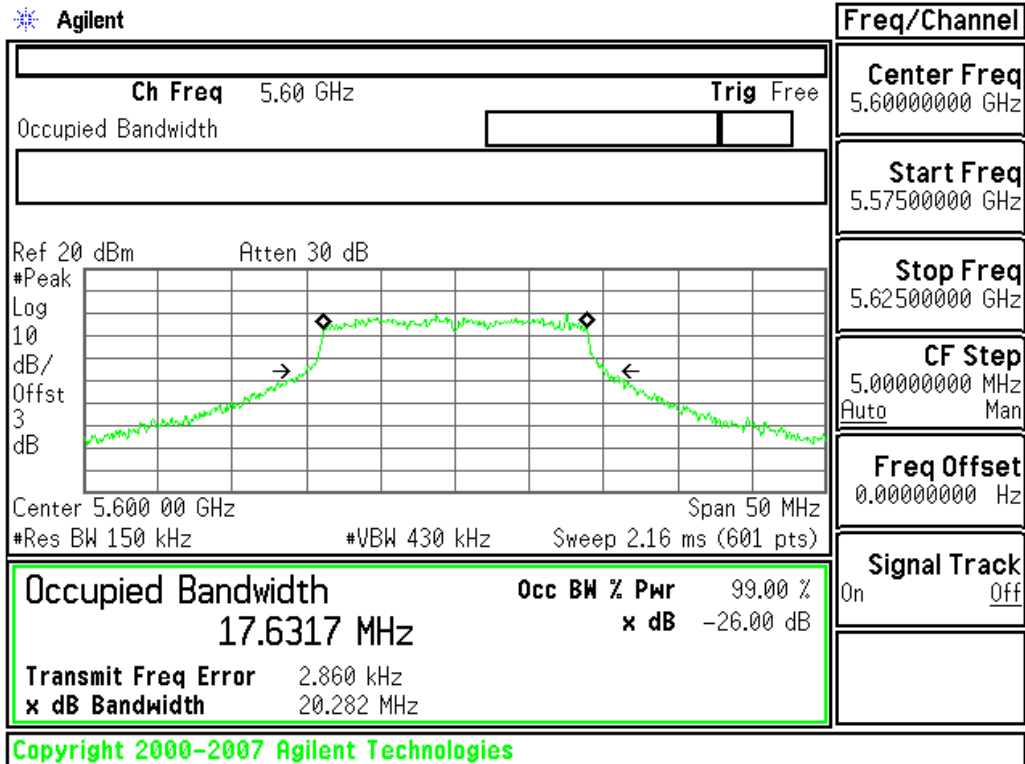
5470~5725MHz

CH Low

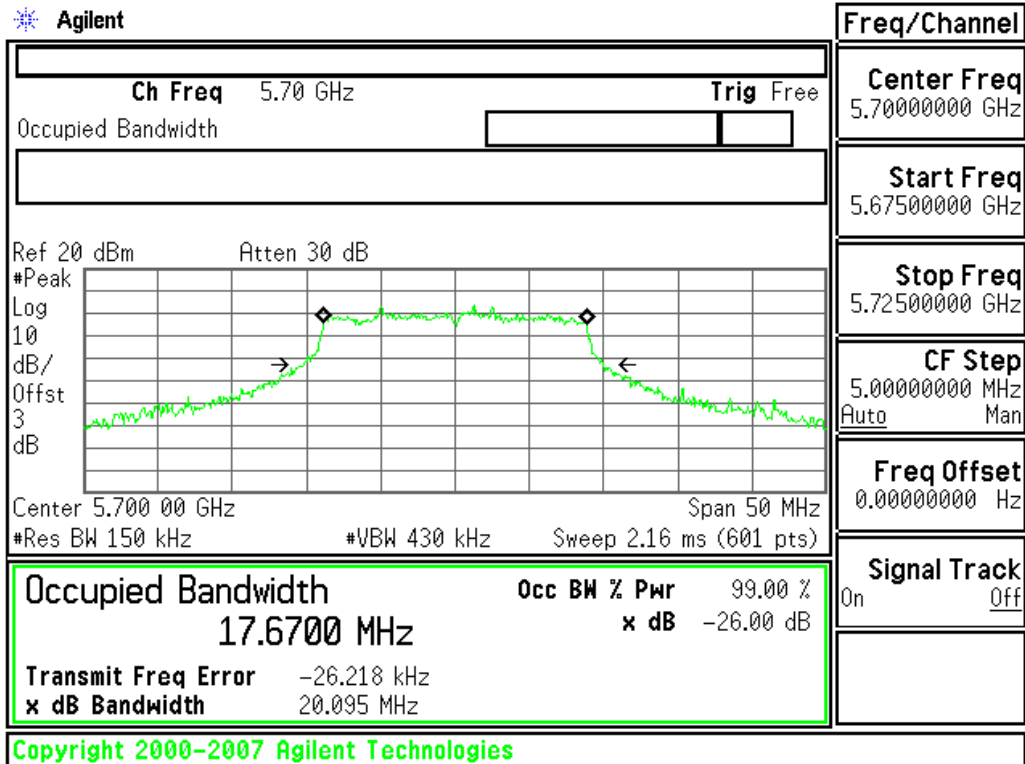




CH Mid



CH High

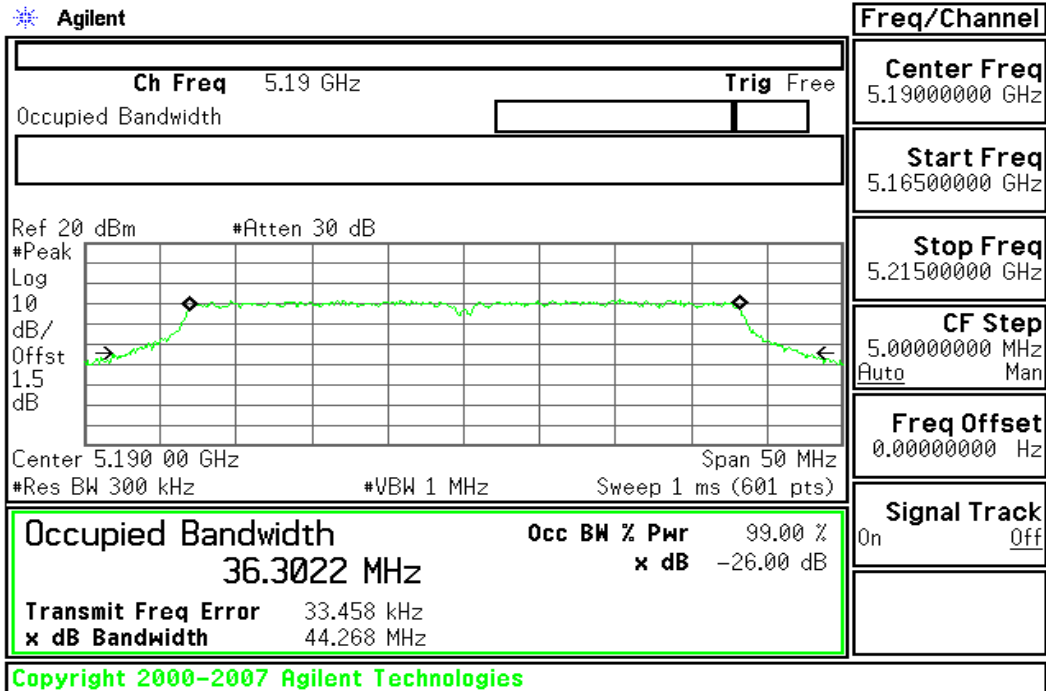




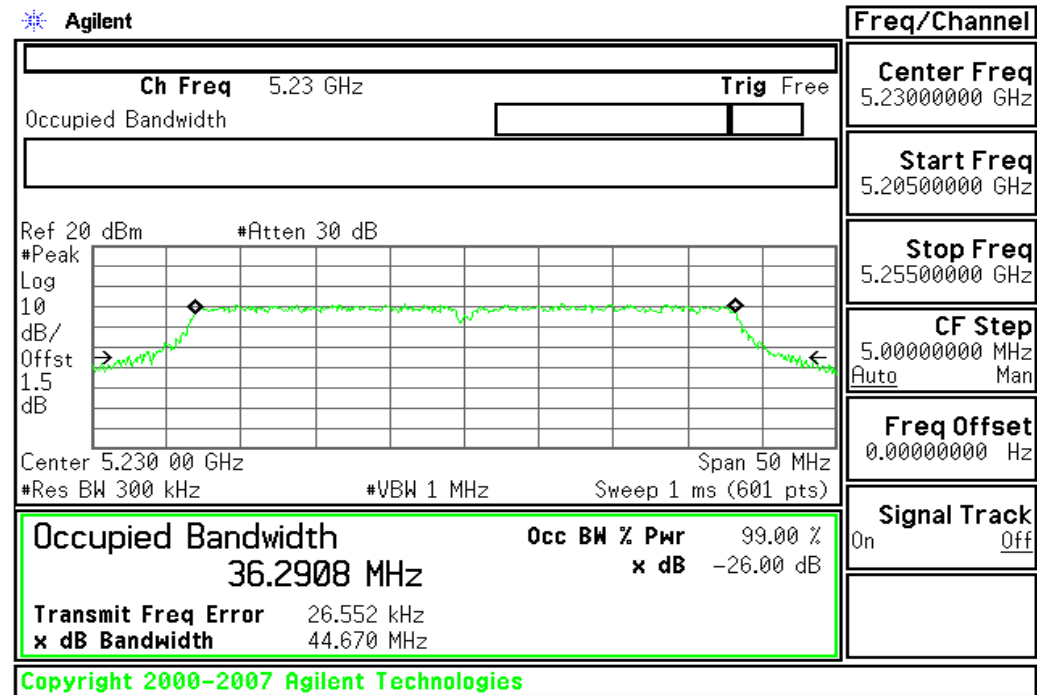
draft 802.11n Wide-40 MHz Channel mode / Chain 0+ Chain 1+ Chain 2

5150~5250MHz

CH Low



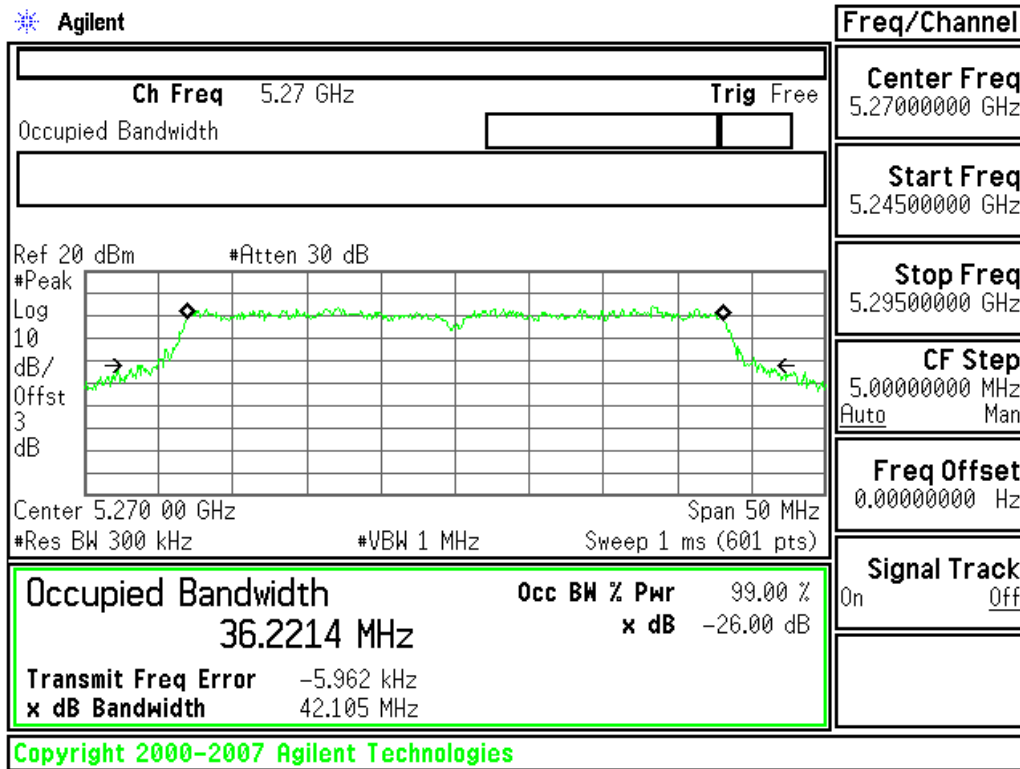
CH High



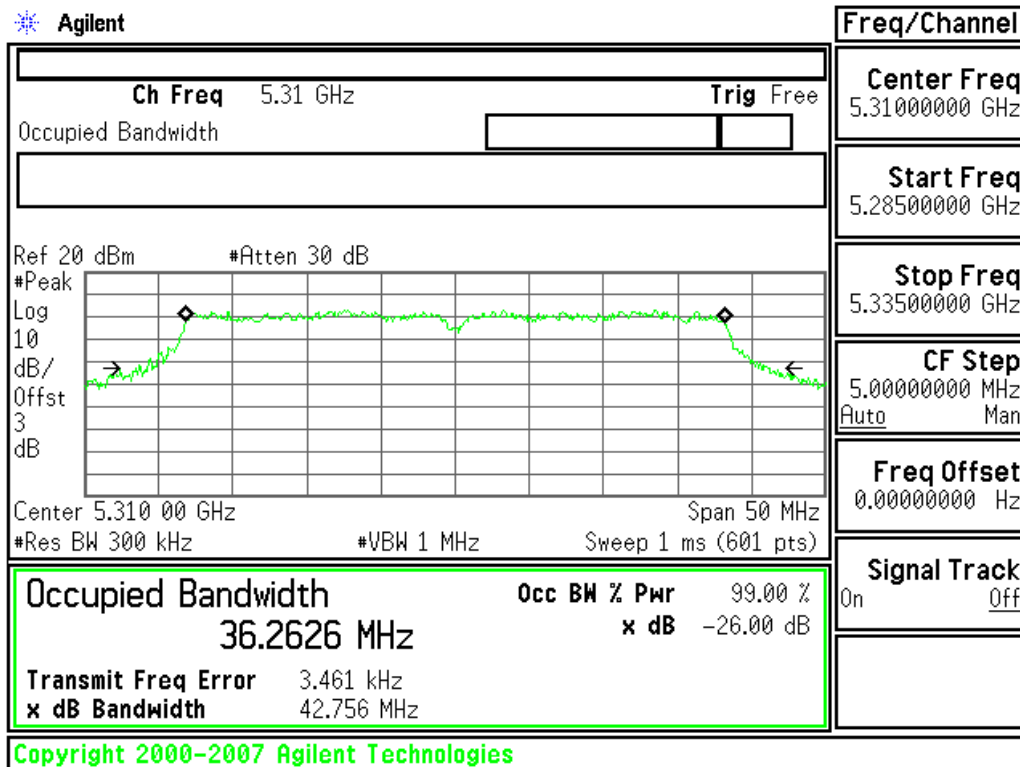


5250~5350MHz

CH Low



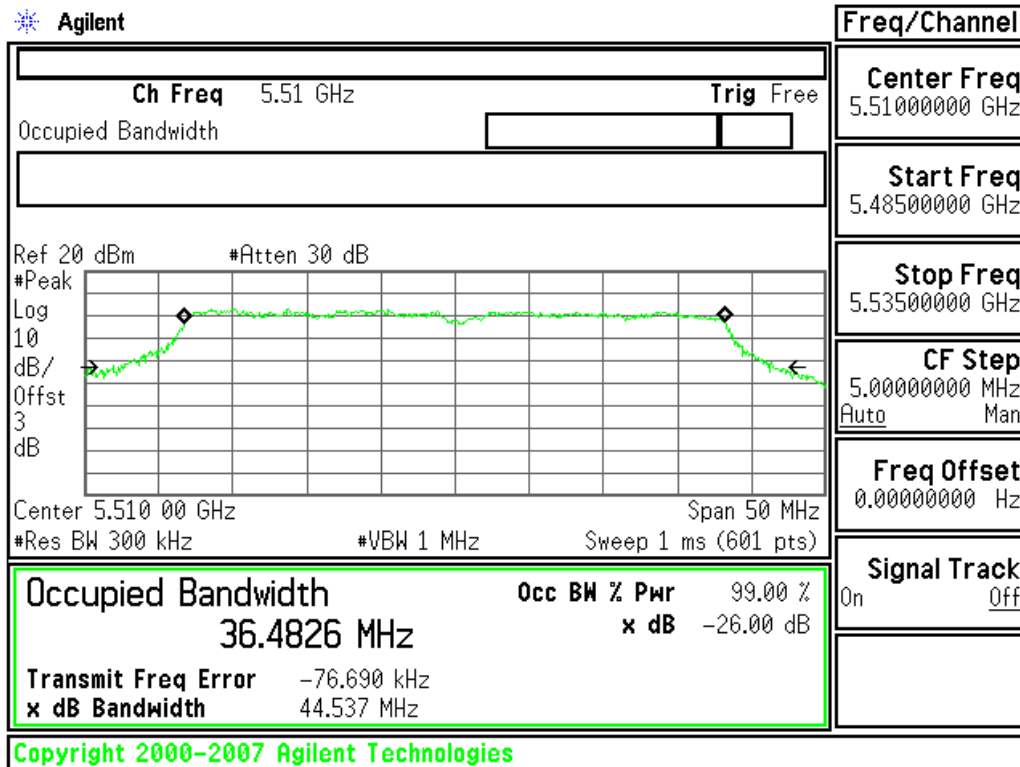
CH High



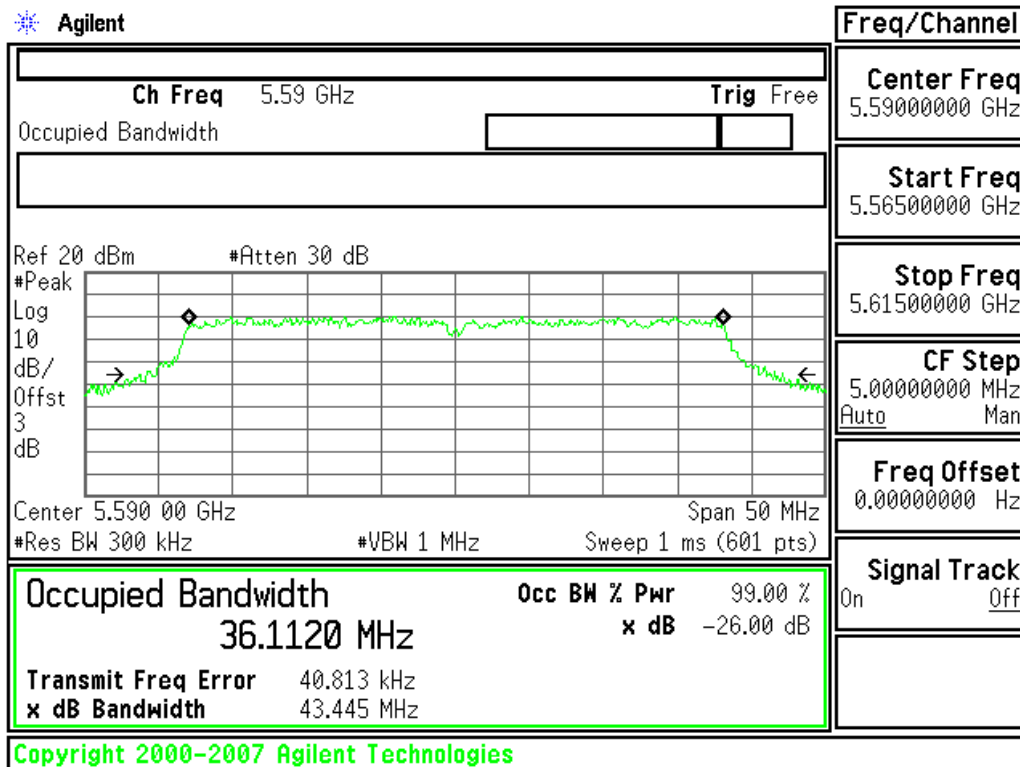


5470~5725MHz

CH Low

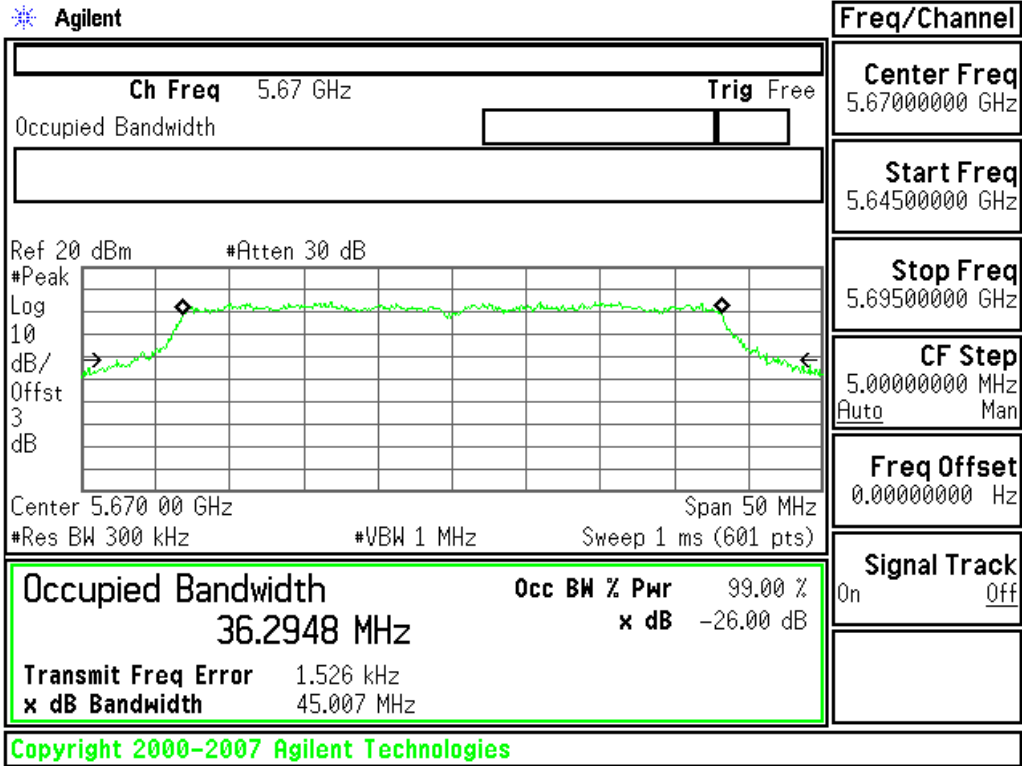


CH Mid





CH High





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

5150~5250MHz

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	22.064	13.44	17.44	17.00
Mid	5200	22.300	13.48	17.48	17.00
High	5240	22.136	13.45	17.45	17.00

5250~5350MHz

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5260	21.906	13.41	24.41	24.00
Mid	5300	22.336	13.49	24.49	24.00
High	5320	23.090	13.63	24.63	24.00



5470~5725MHz

Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5500	23.278	13.67	24.67	24.00
Mid	5600	21.558	13.34	24.34	24.00
High	5700	23.269	13.67	24.67	24.00

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

5150~5250MHz

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 (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5180	20.073	21.325	21.265	23.02	13.62	17.62	17.00
Mid	5200	20.105	21.306	22.360	23.00	13.62	17.62	17.00
High	5240	22.224	21.372	21.415	23.94	13.79	17.79	17.00

5250~5350MHz

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)	11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5260	22.174	21.590	21.677	20.87	13.20	24.20	24.00
Mid	5300	21.566	22.718	22.303	21.51	13.33	24.33	24.00
High	5320	21.164	21.999	22.143	21.05	13.23	24.23	24.00

5470~5725MHz

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)	11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5500	21.482	21.691	21.643	20.75	13.17	24.17	24.00
Mid	5600	22.122	21.752	21.362	20.28	13.07	24.07	24.00
High	5700	21.296	21.995	22.286	20.10	13.03	24.03	24.00

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

5150~5250MHz

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 (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5190	43.25	43.16	43.42	44.27	16.46	20.46	17.00
High	5230	43.78	43.00	43.26	44.67	16.50	20.50	17.00



5250~5350MHz

Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Chain2 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5270	43.678	43.196	44.871	42.105	16.24	27.24	24.00
High	5310	43.698	42.791	43.506	42.756	16.31	27.31	24.00

5470~5725MHz

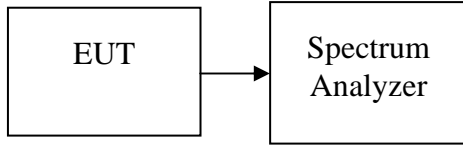
Channel	Frequency (MHz)	Chain 0 26 dB Bandwidth (B) (MHz)	Chain 1 26 dB Bandwidth (B) (MHz)	Chain 2 26 dB Bandwidth (B) (MHz)	Total 26 dB Bandwidth (B) (MHz)	10 Log B (dB)	11 + 10 Log B (dBm)	Maximum Conducted Output Power Limit (dBm)
Low	5510	44.302	43.003	43.381	44.54	16.49	27.49	24.00
Mid	5590	42.873	43.356	42.833	43.45	16.38	27.38	24.00
High	5670	46.098	42.881	43.619	45.01	16.53	27.53	24.00

(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

5150~5250MHz

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	9.89	17.00
Mid	5200	10.09	17.00
High	5240	10.34	17.00

5250~5350MHz

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5260	12.77	24.00
Mid	5300	11.22	24.00
High	5320	10.90	24.00



5470~5725MHz

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5500	11.51	24.00
Mid	5600	9.91	24.00
High	5700	10.87	24.00

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

5150~5250MHz

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	3.18	-0.41	1.84	6.55	17.00
Mid	5200	2.92	-0.66	1.44	6.24	17.00
High	5240	2.45	-1.19	2.42	6.30	17.00

Total maximum conducted power Chain 0+Chain 1+Chain 2:

$$\text{Maximum Conducted Output Power(dBm)}=10\log(10^{(\text{chain0outputpower}/10)}+ 10^{(\text{chain1outputpower}/10)}+ 10^{(\text{chain2outputpower}/10)})$$

5250~5350MHz

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	5260	9.01	9.29	8.29	13.65	24.00
Mid	5300	8.65	8.60	7.64	13.09	24.00
High	5320	9.25	8.35	8.09	13.36	24.00

Total maximum conducted power Chain 0+Chain 1+Chain 2:

$$\text{Maximum Conducted Output Power(dBm)}=10\log(10^{(\text{chain0outputpower}/10)}+ 10^{(\text{chain1outputpower}/10)}+ 10^{(\text{chain2outputpower}/10)})$$

5470~5725MHz

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	5500	6.63	8.96	6.93	12.41	24.00
Mid	5600	6.45	6.72	6.76	11.42	24.00
High	5700	8.47	7.80	9.85	13.56	24.00

Total maximum conducted power Chain 0+Chain 1+Chain 2:

$$\text{Maximum Conducted Output Power(dBm)}=10\log(10^{(\text{chain0outputpower}/10)}+ 10^{(\text{chain1outputpower}/10)}+ 10^{(\text{chain2outputpower}/10)})$$



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

5150~5250MHz

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	5190	3.97	0.14	2.15	7.13	17.00
High	5230	3.29	-0.08	1.35	6.51	17.00

Total maximum conducted power Chain 0+Chain 1+Chain 2:

$$\text{Maximum Conducted Output Power(dBm)}=10\log(10^{(\text{chain0outputpower}/10)}+ 10^{(\text{chain1outputpower}/10)}+ 10^{(\text{chain2outputpower}/10)})$$

5250~5350MHz

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	5270	10.87	11.45	11.57	16.08	24.00
High	5310	10.99	10.09	10.22	15.22	24.00

Total maximum conducted power Chain 0+Chain 1+Chain 2:

$$\text{Maximum Conducted Output Power(dBm)}=10\log(10^{(\text{chain0outputpower}/10)}+ 10^{(\text{chain1outputpower}/10)}+ 10^{(\text{chain2outputpower}/10)})$$

5470~5725MHz

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	5510	8.91	10.35	10.55	14.77	24.00
Mid	5590	9.19	9.54	9.64	14.23	24.00
High	5670	10.76	10.20	10.01	15.11	24.00

Total maximum conducted power Chain 0+Chain 1+Chain 2:

$$\text{Maximum Conducted Output Power(dBm)}=10\log(10^{(\text{chain0outputpower}/10)}+ 10^{(\text{chain1outputpower}/10)}+ 10^{(\text{chain2outputpower}/10)})$$

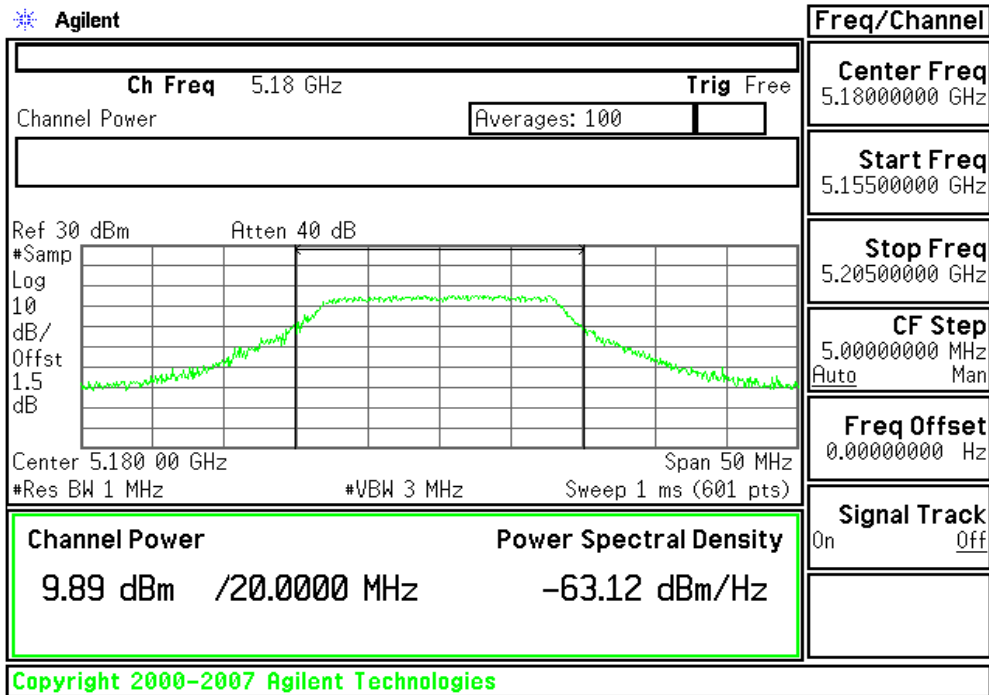


Test Plot

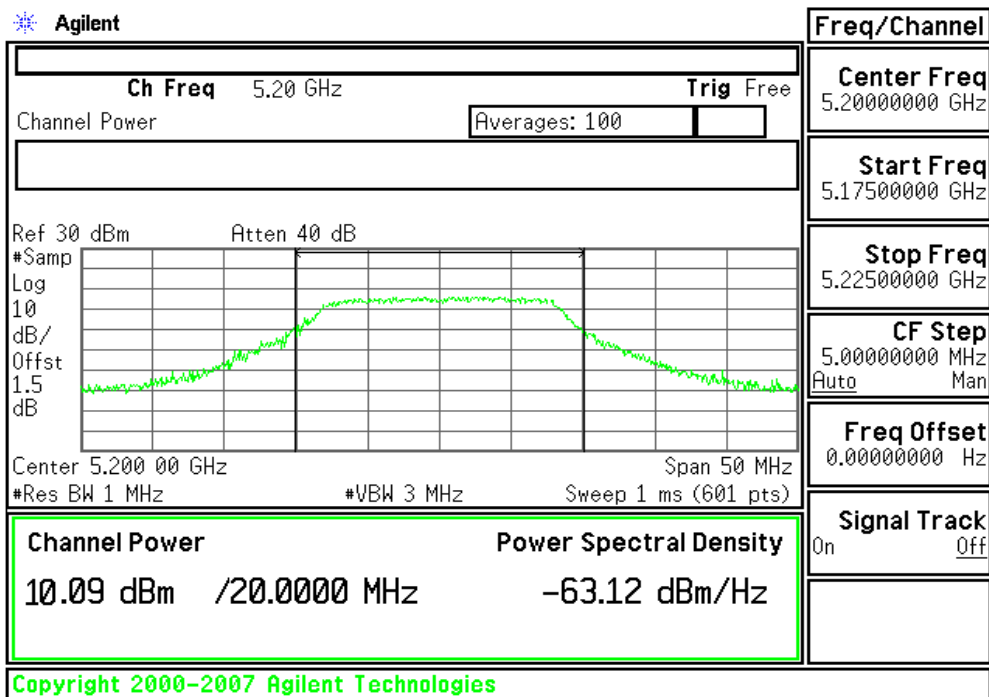
Test mode: IEEE 802.11a mode:

5150~5250MHz

CH Low

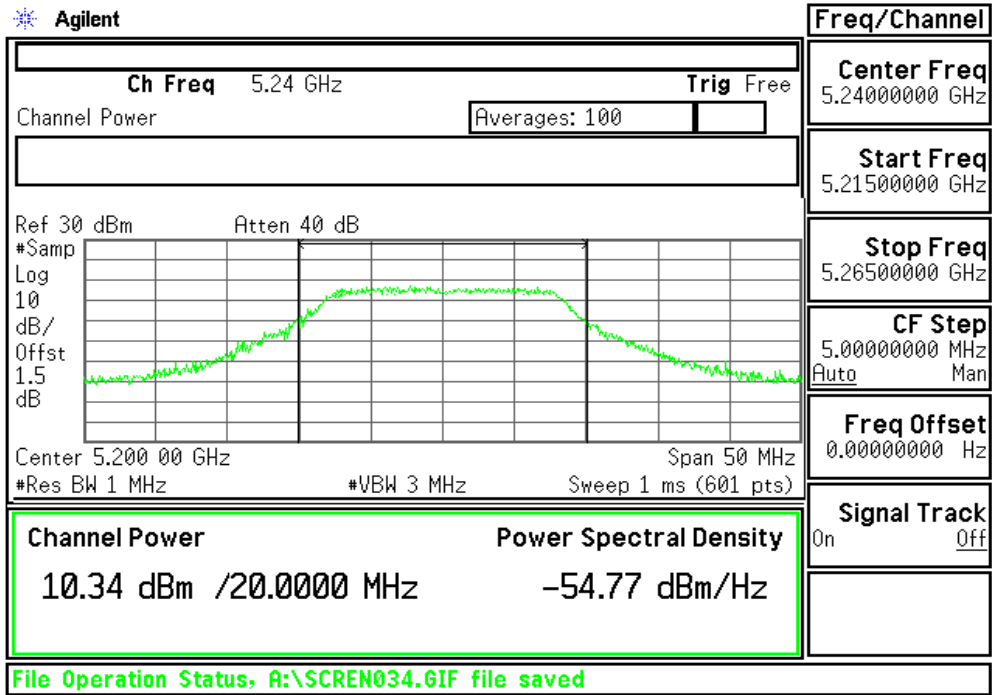


CH Mid



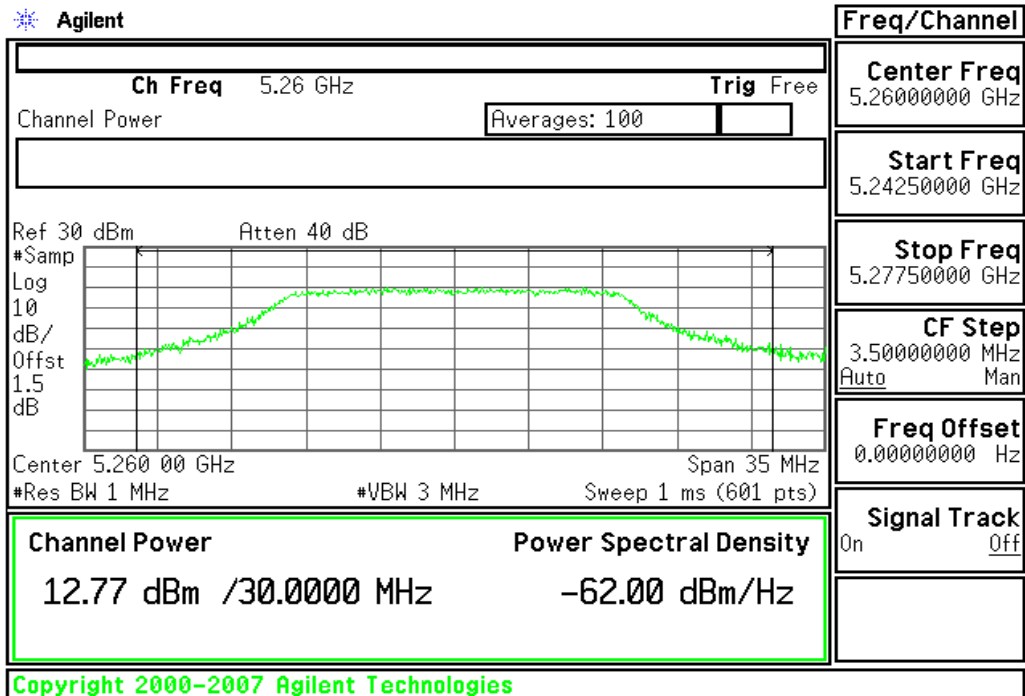


CH High



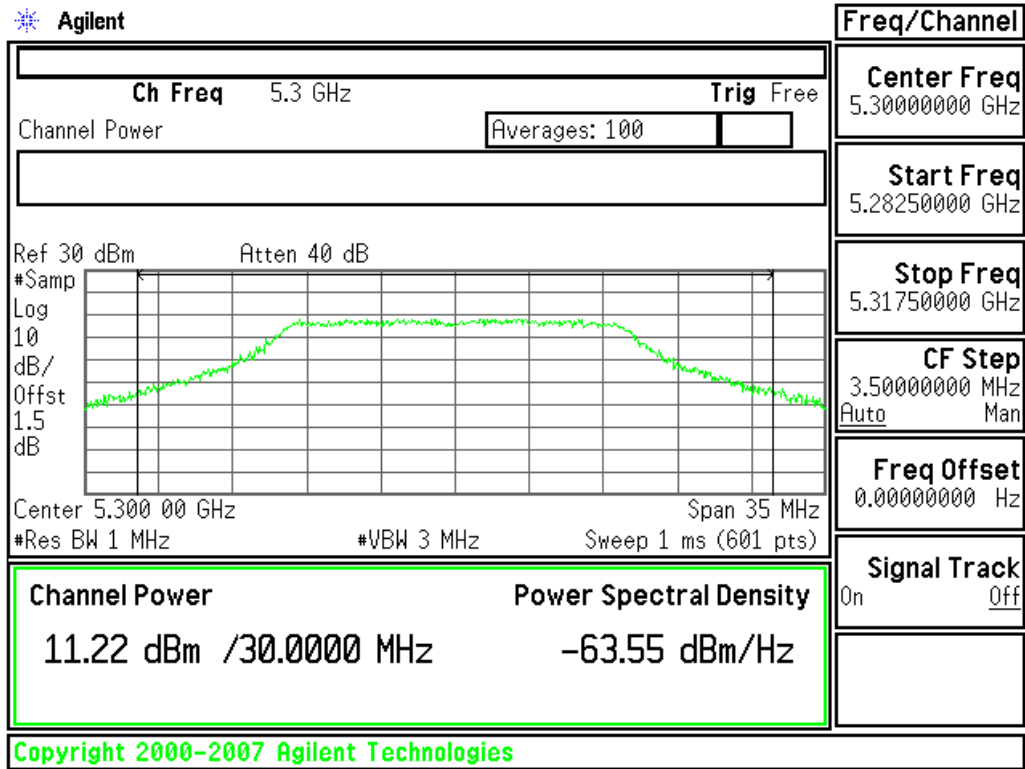
5250~5350MHz

CH Low

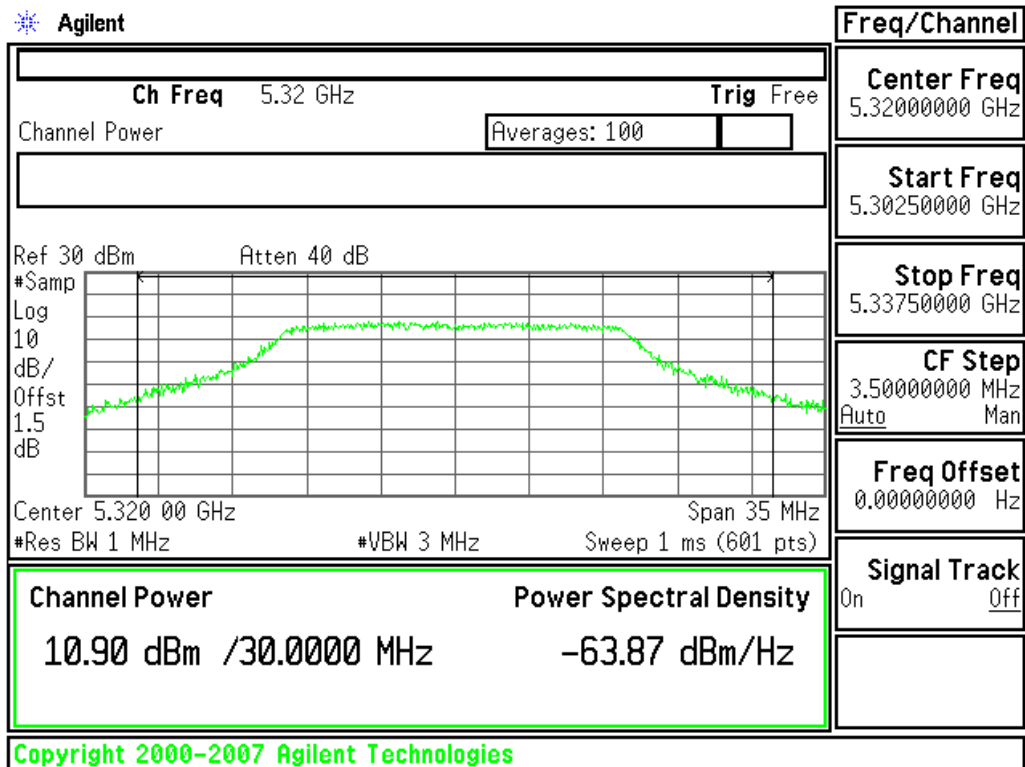




CH Mid



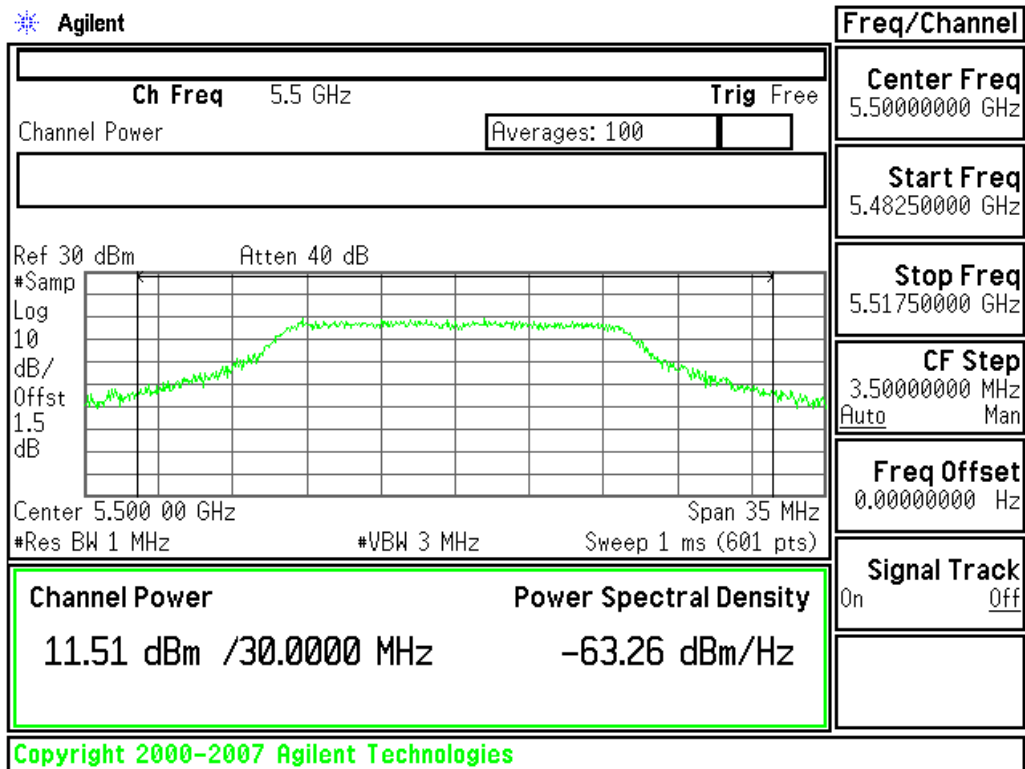
CH High



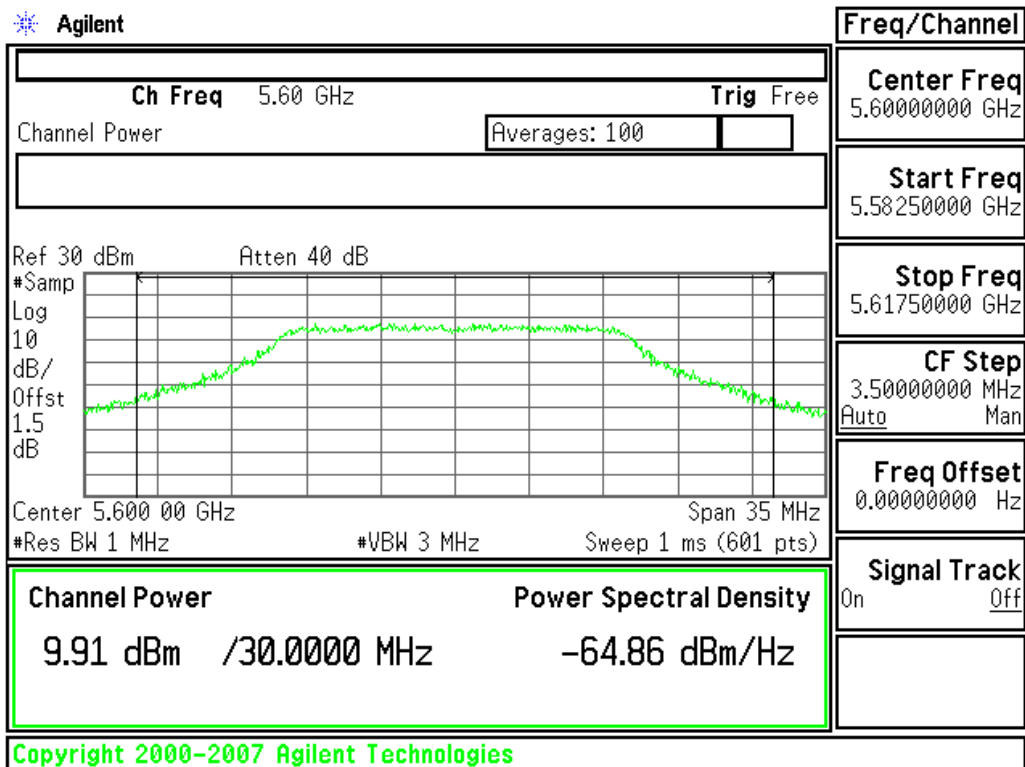


5470~5725MHz

CH Low

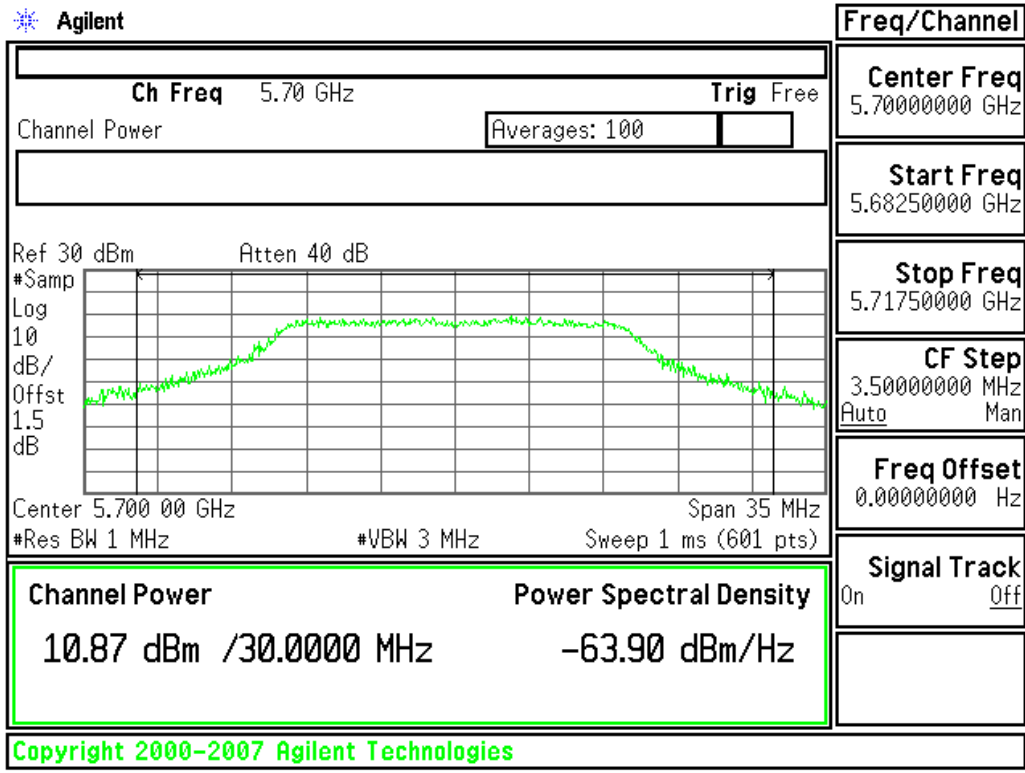


CH Mid



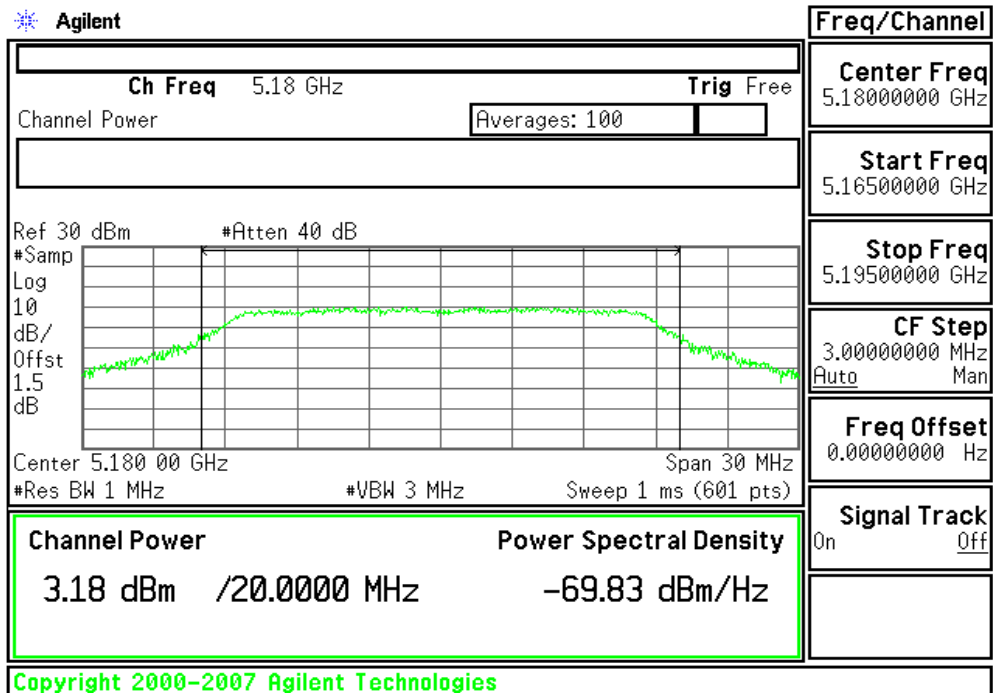


CH High



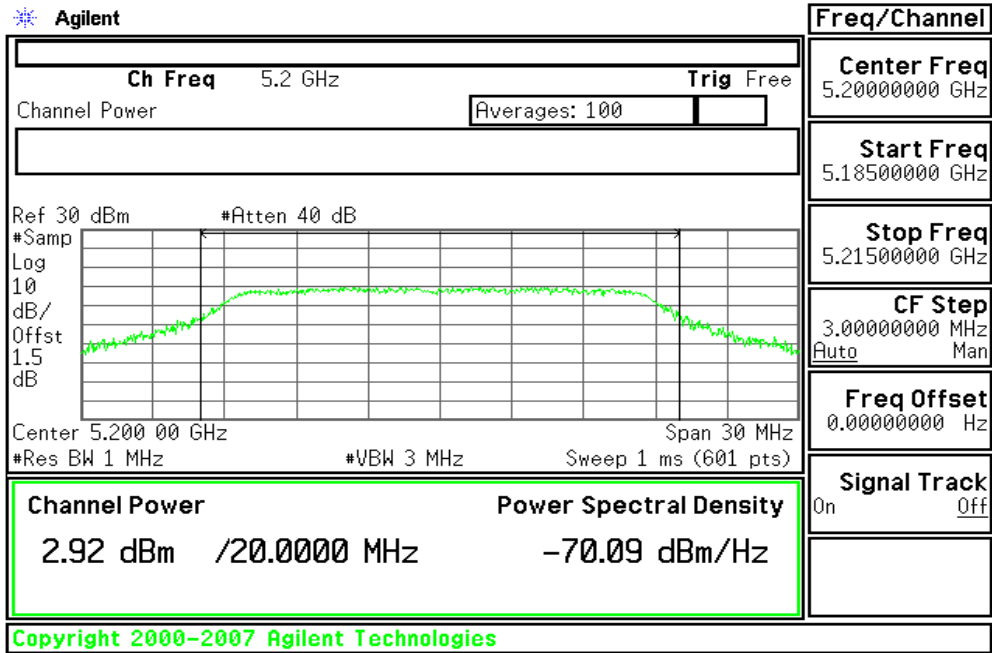
**Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0:
5150~5250MHz**

CH Low

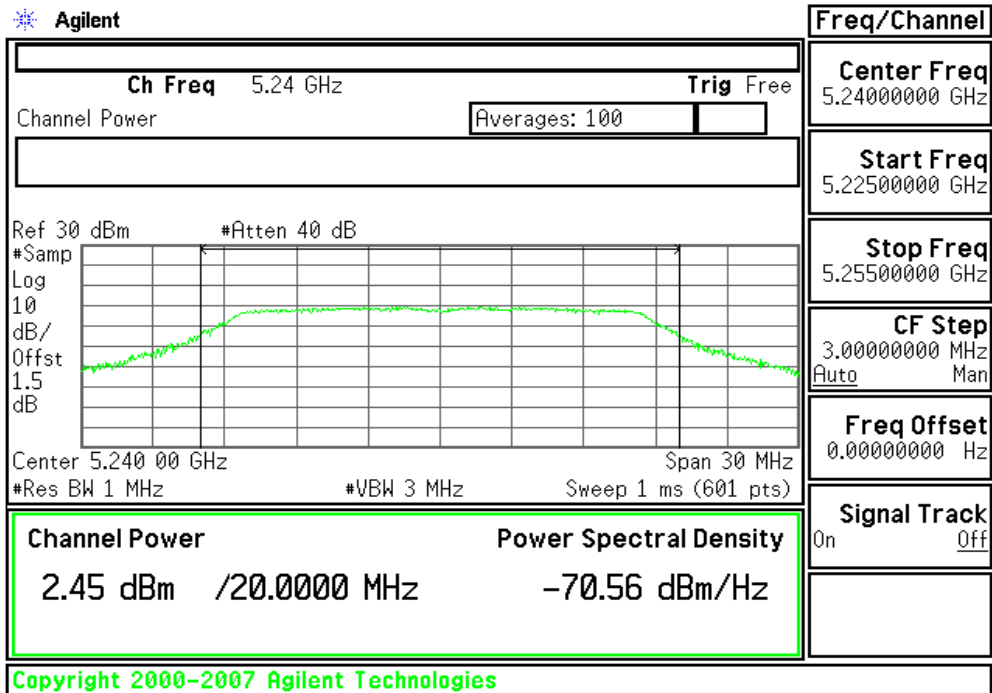




CH Mid



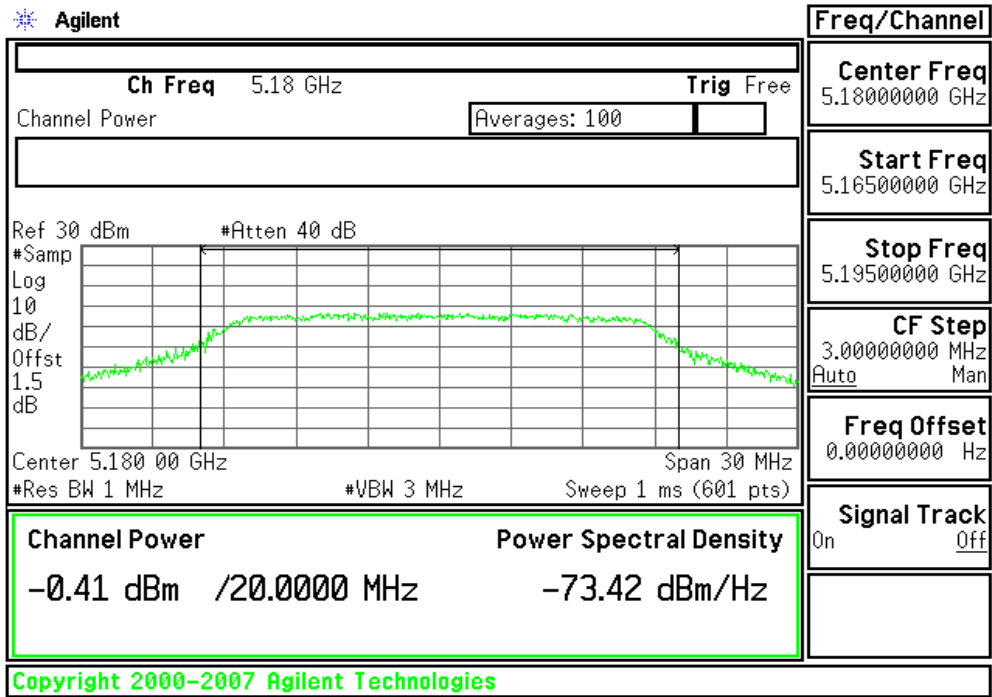
CH High



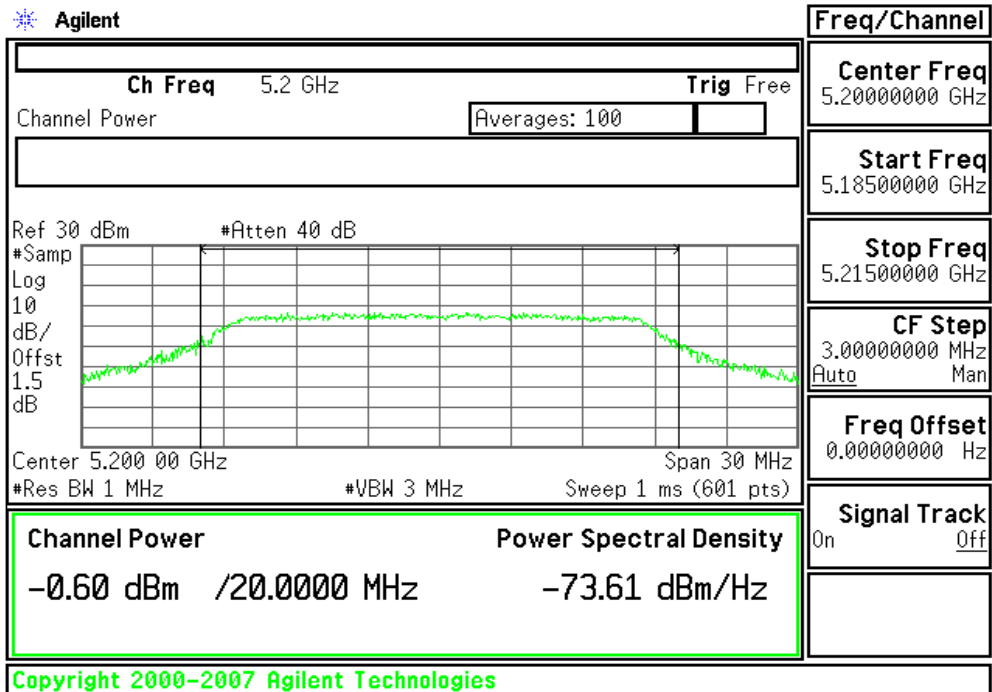


Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1:

CH Low

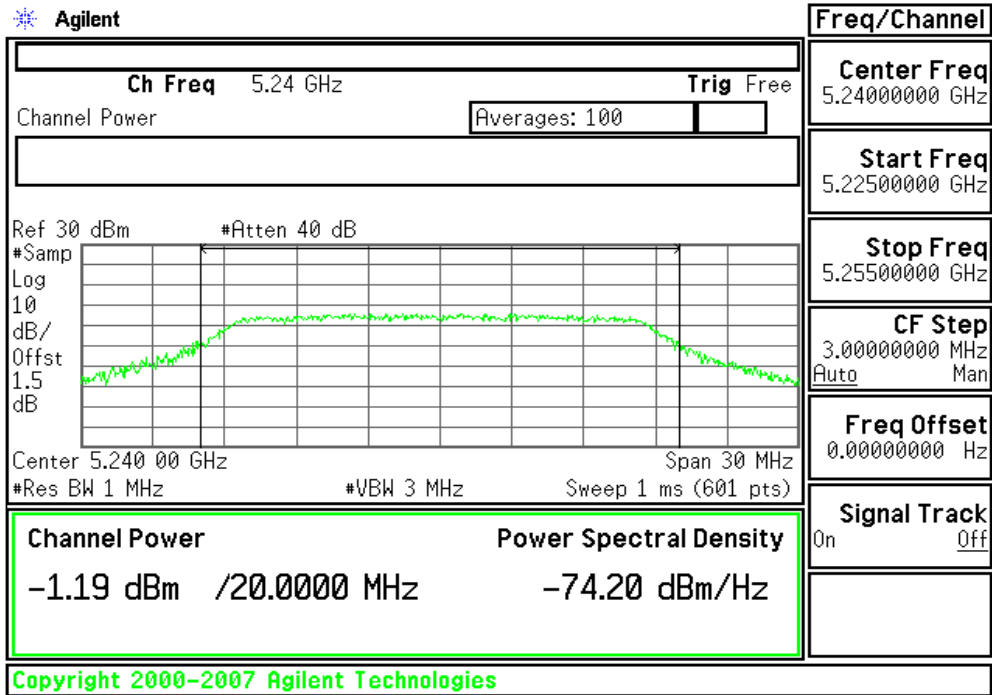


CH Mid



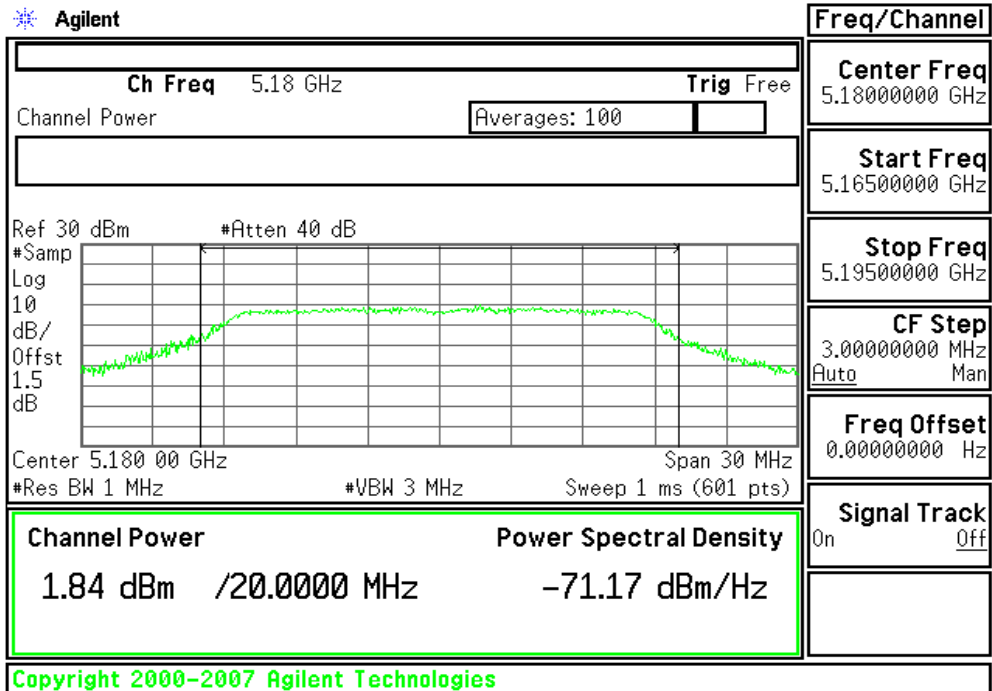


CH High



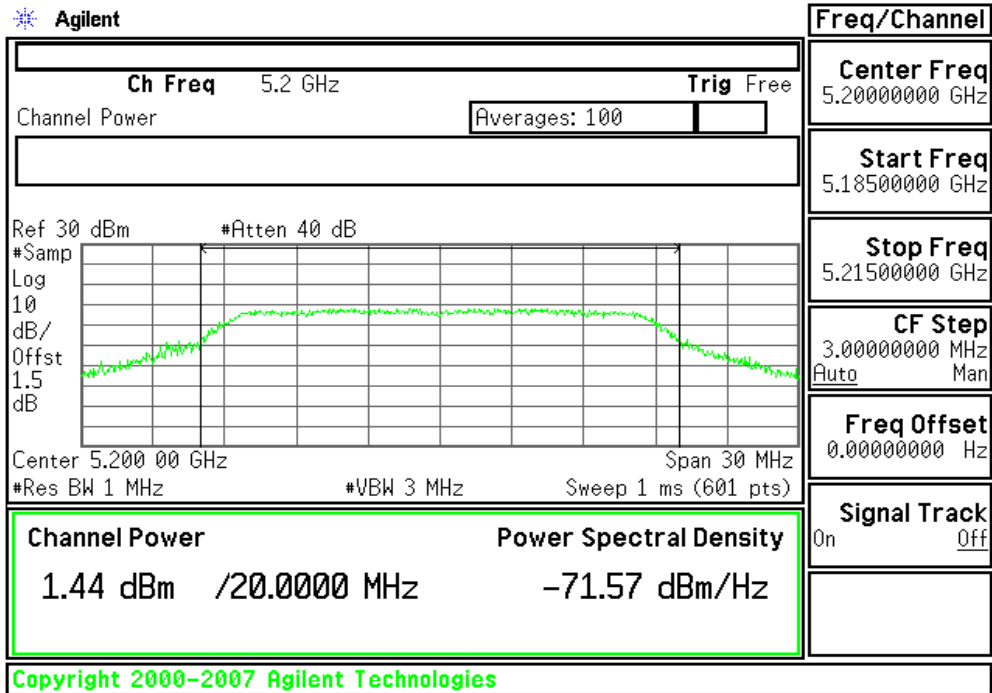
Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2:

CH Low

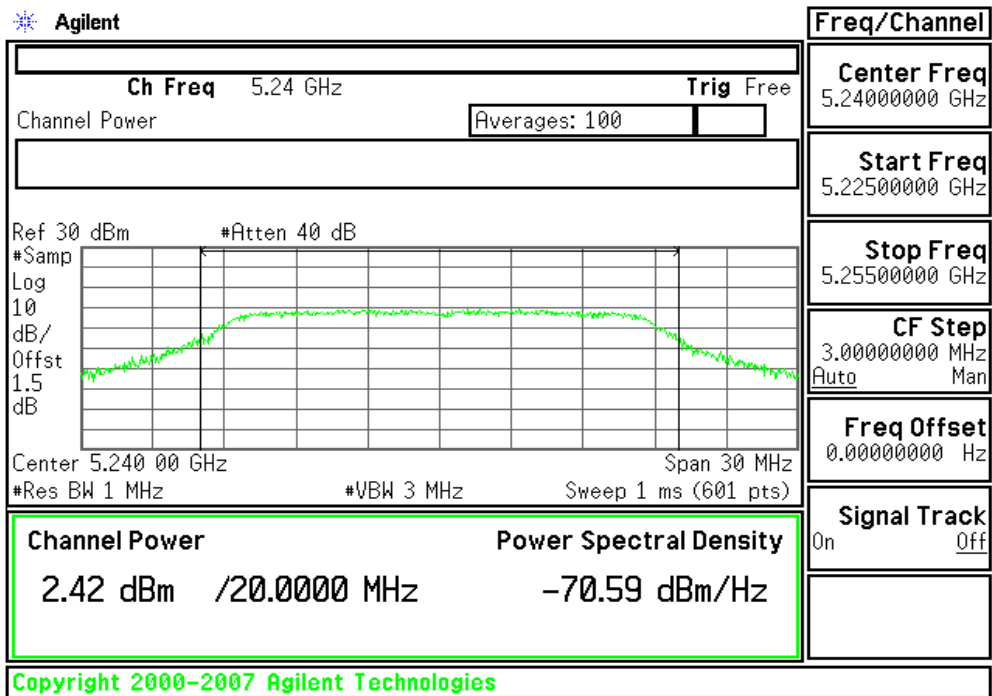




CH Mid



CH High

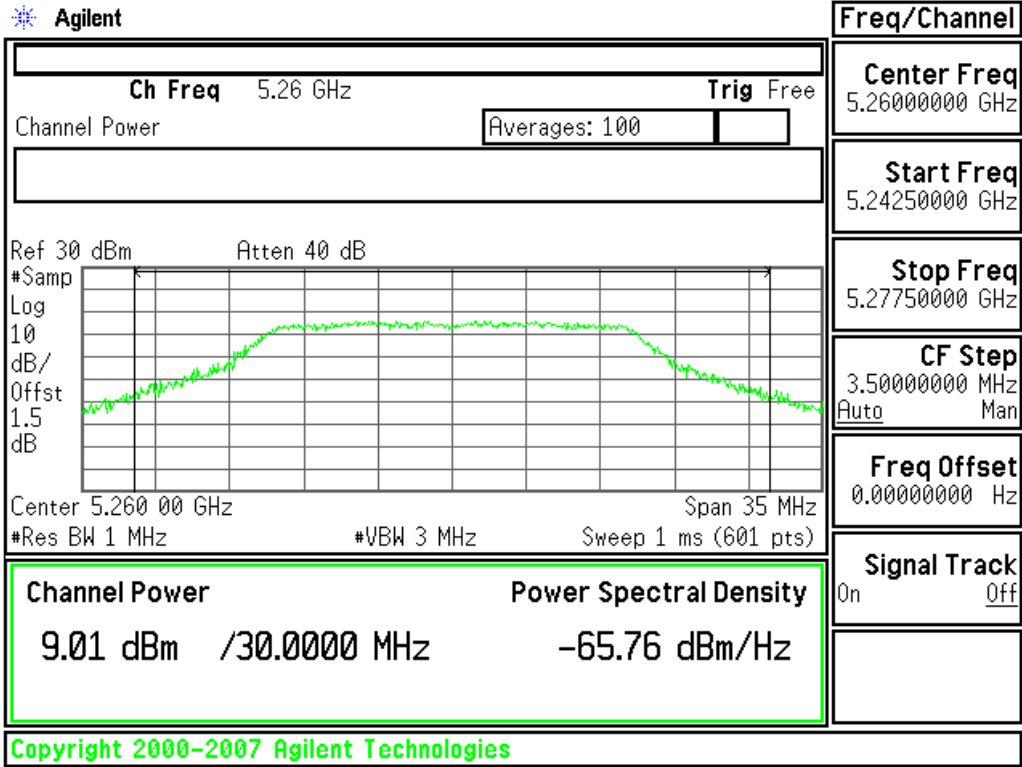




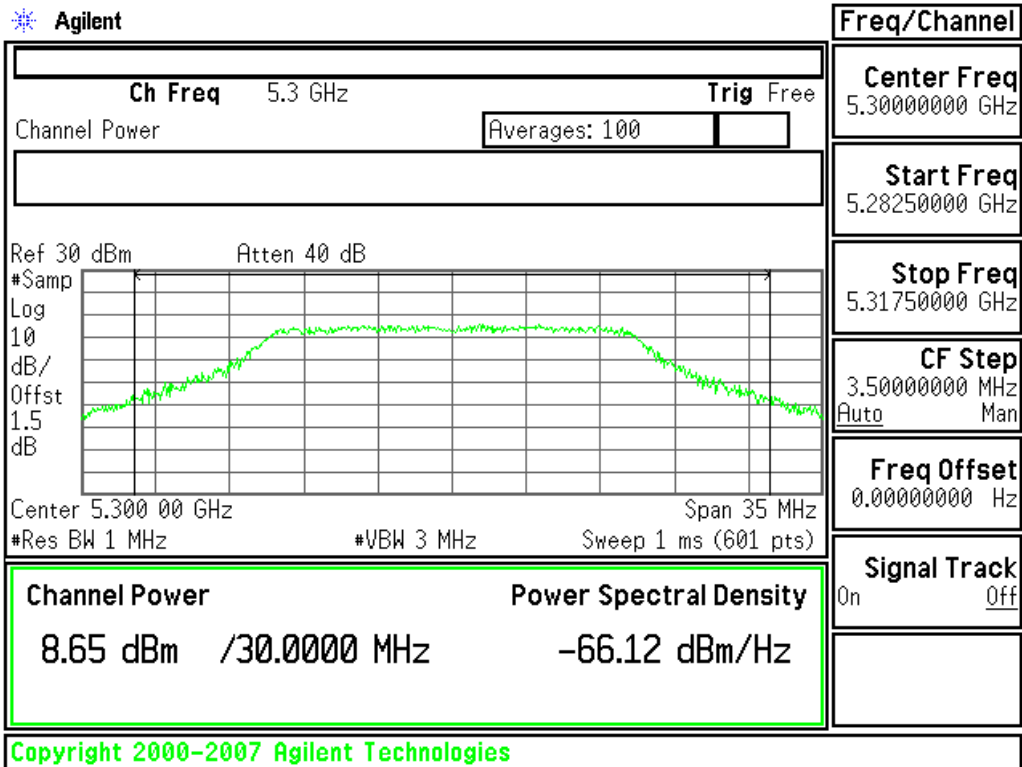
Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 0:

5250~5350MHz

CH Low

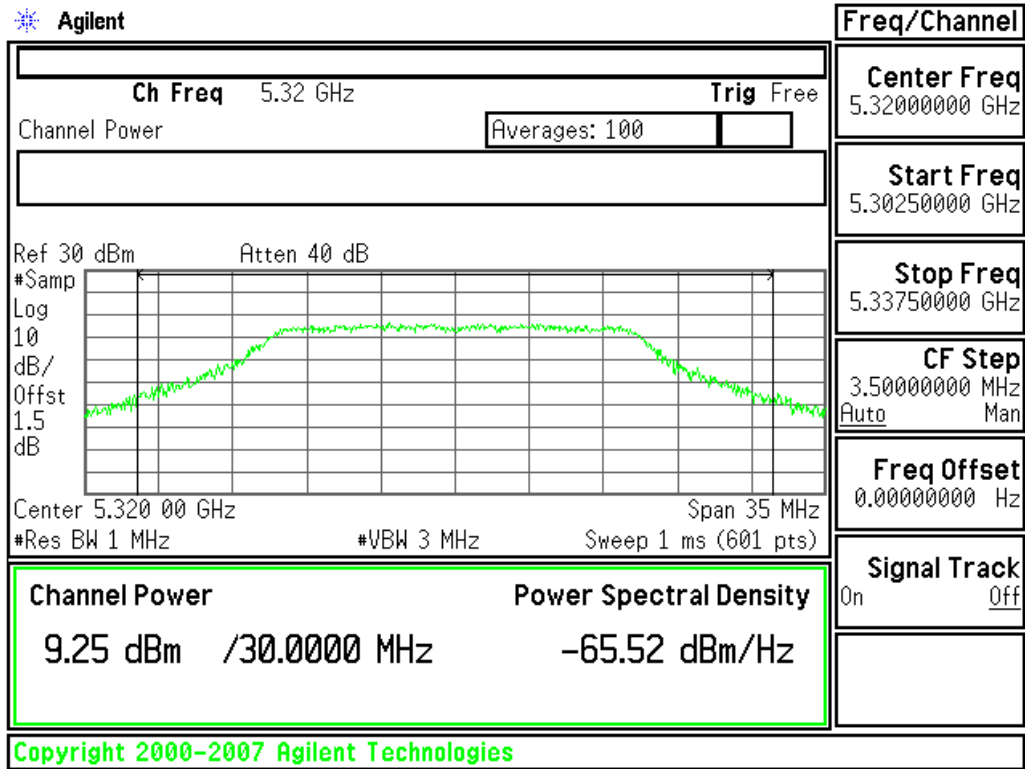


CH Mid



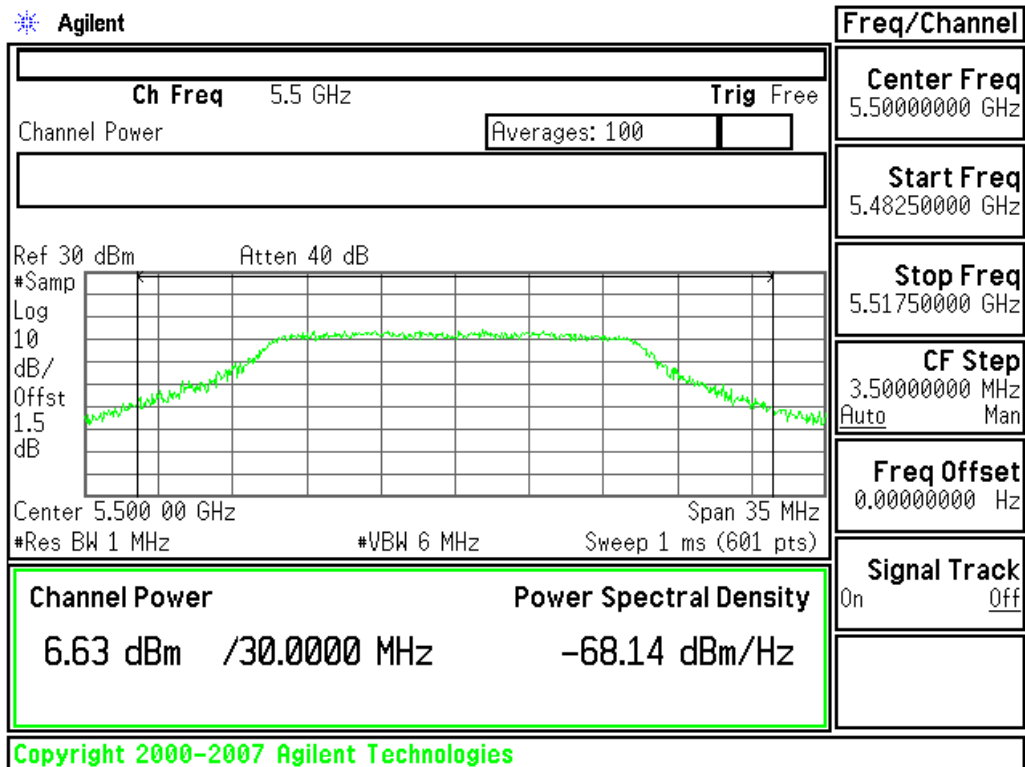


CH High



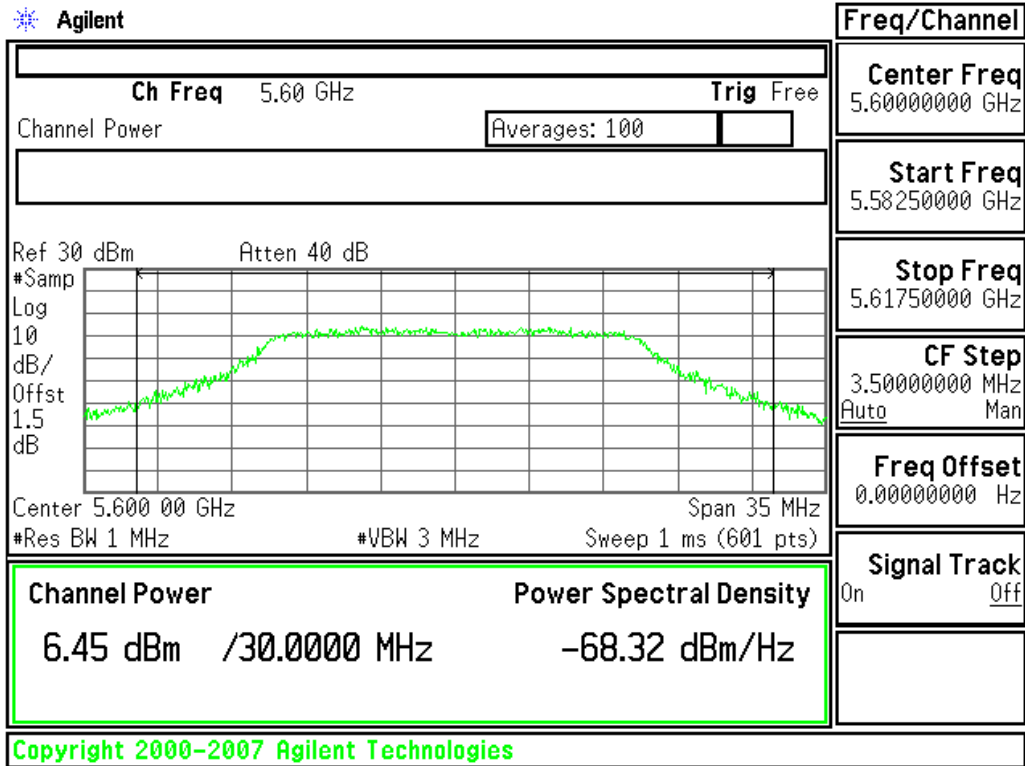
5470~5725MHz

CH Low

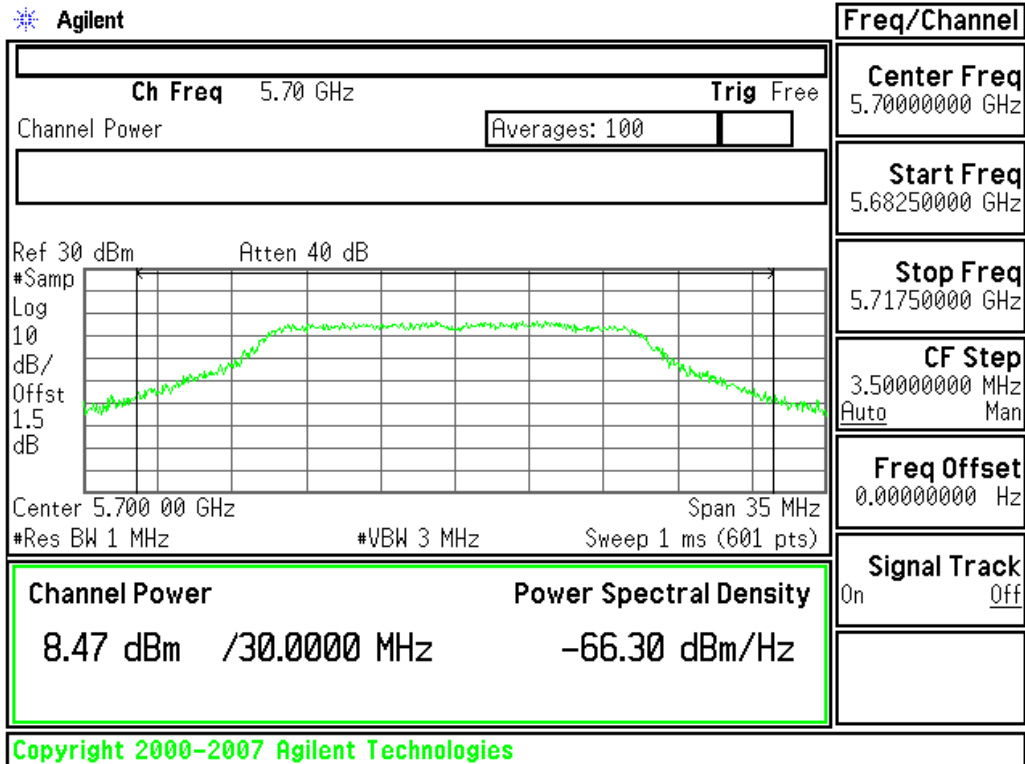




CH Mid



CH High

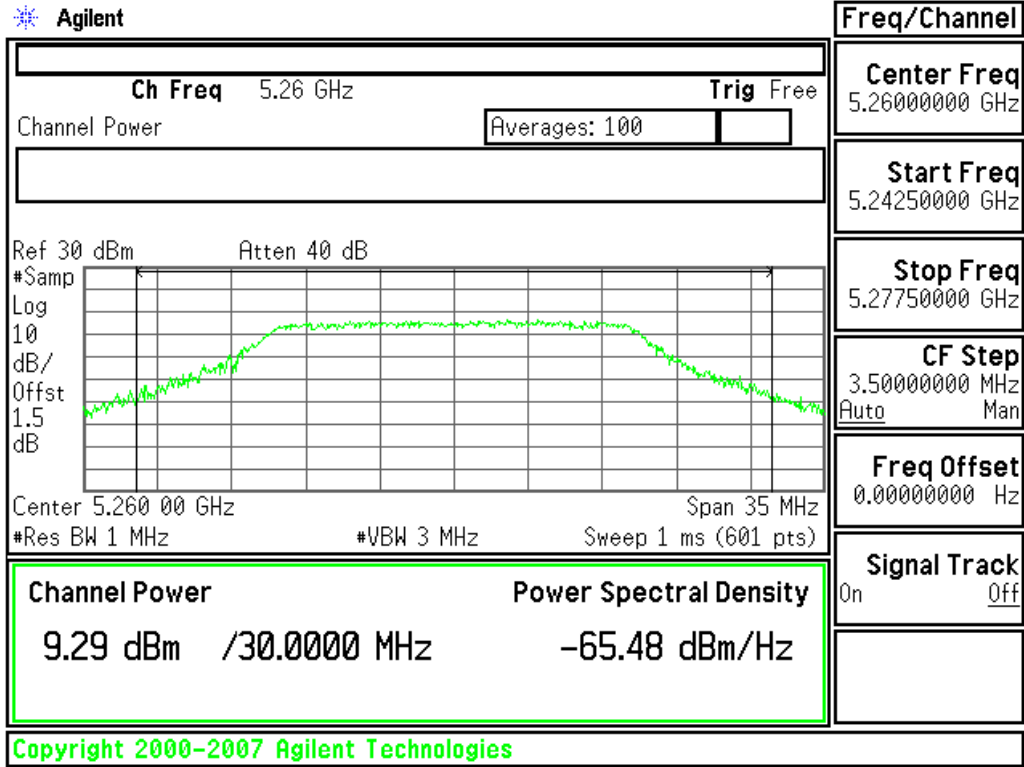




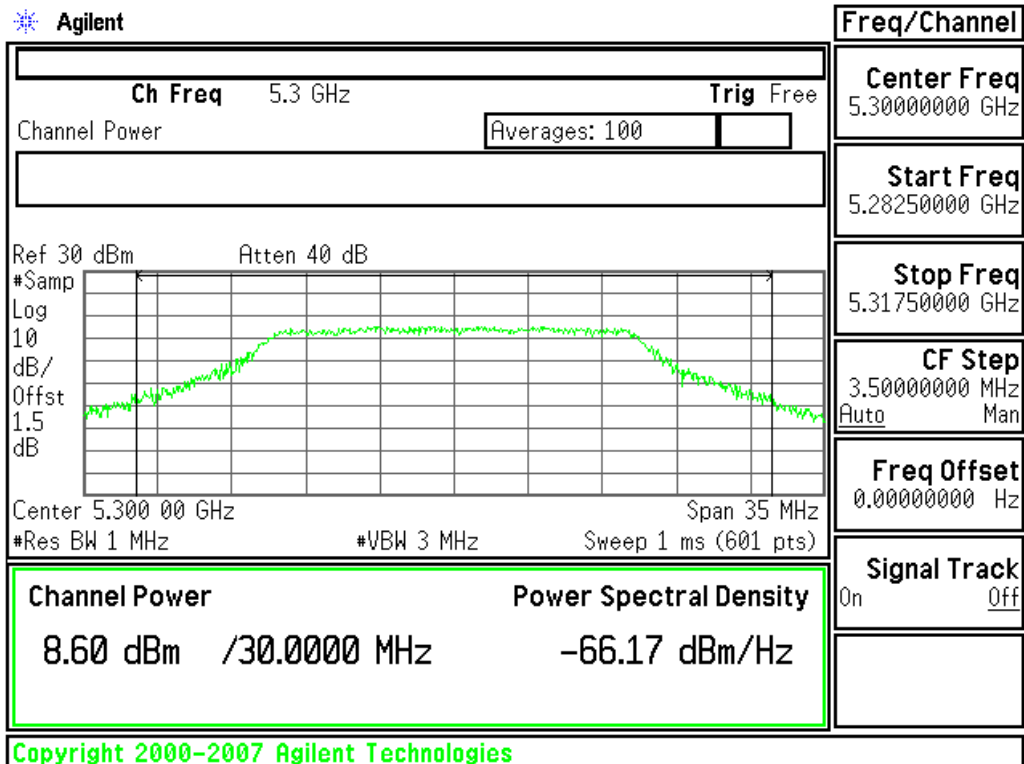
Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 1:

5250~5350MHz

CH Low

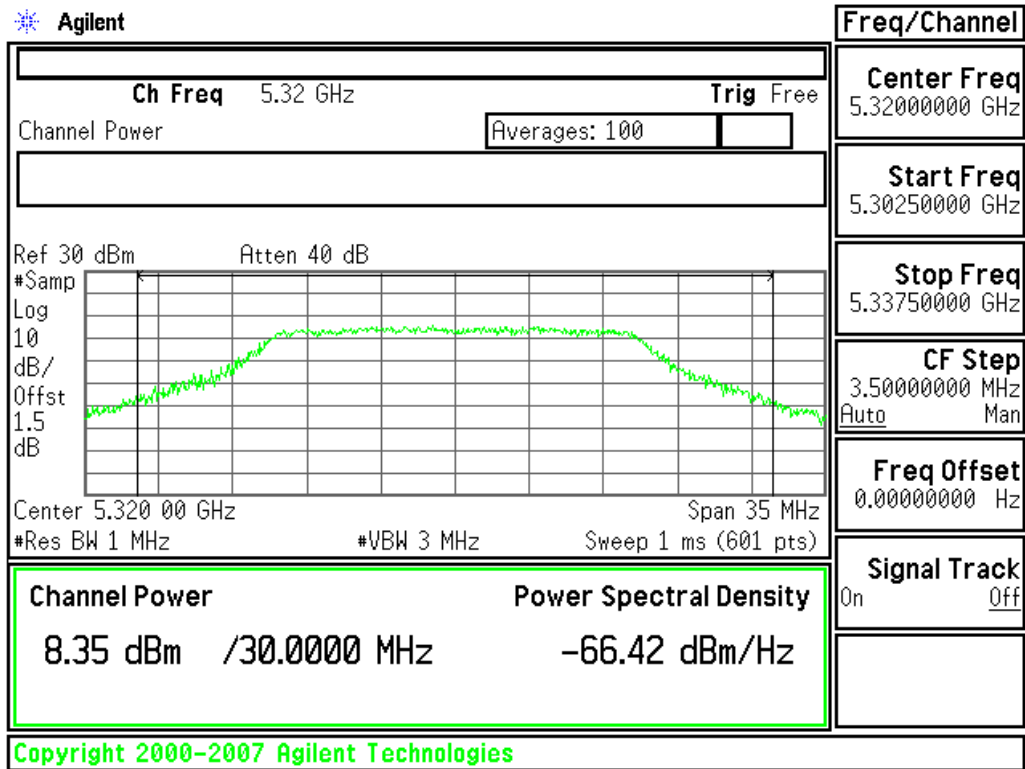


CH Mid



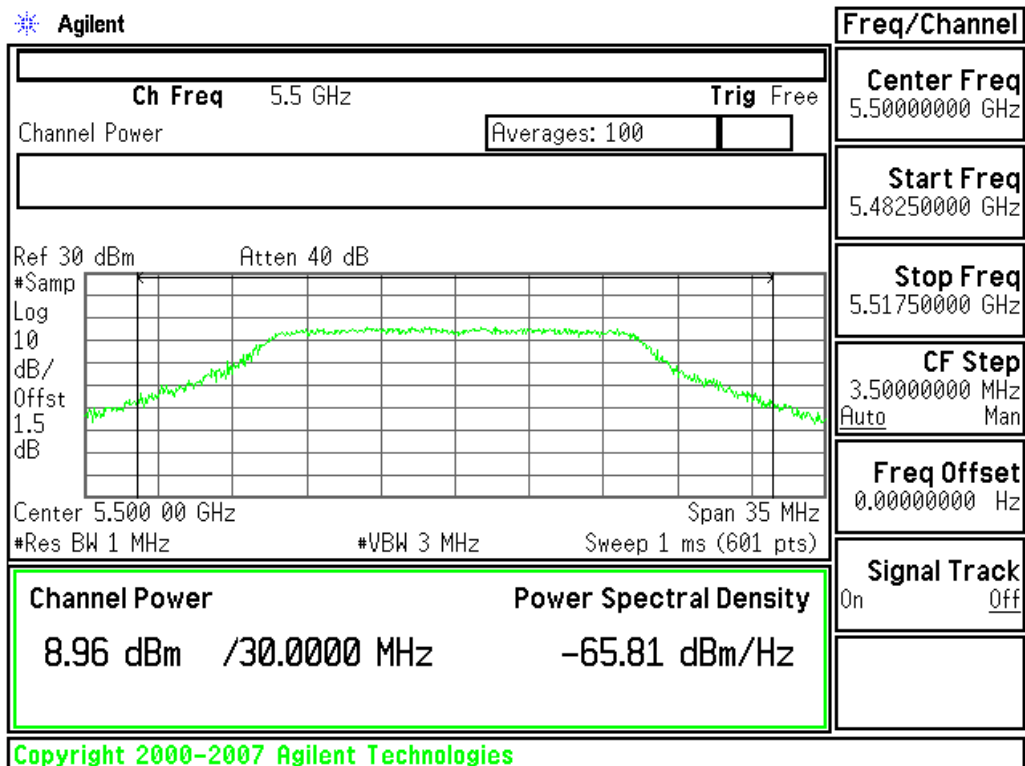


CH High



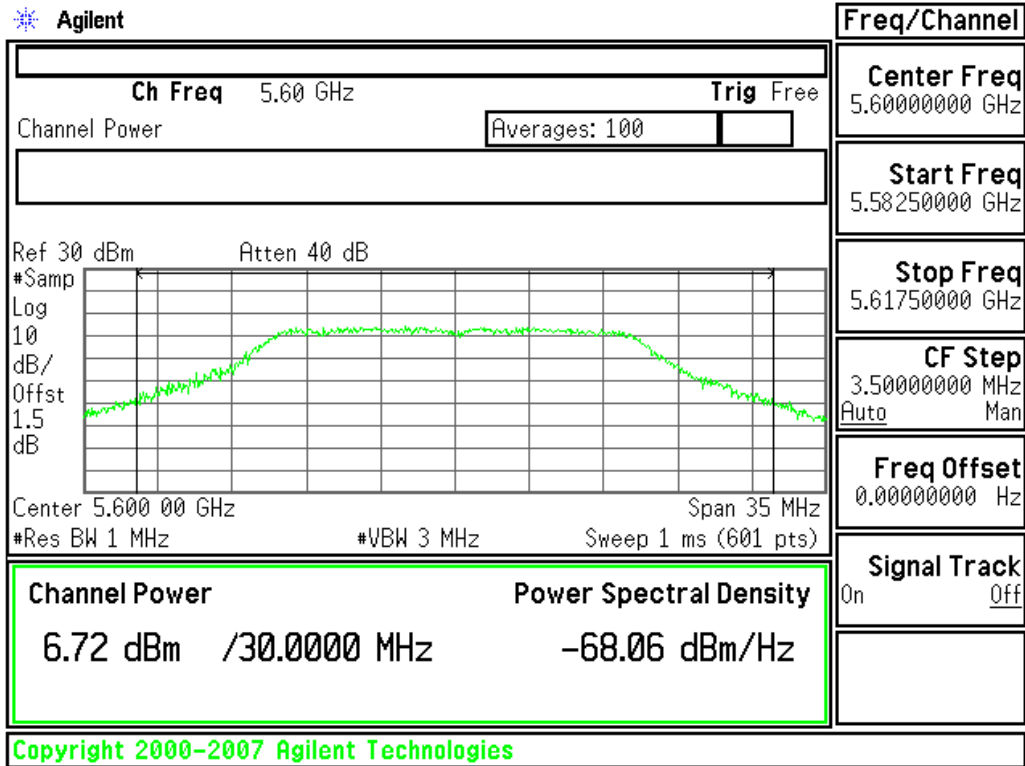
5470~5725MHz

CH Low

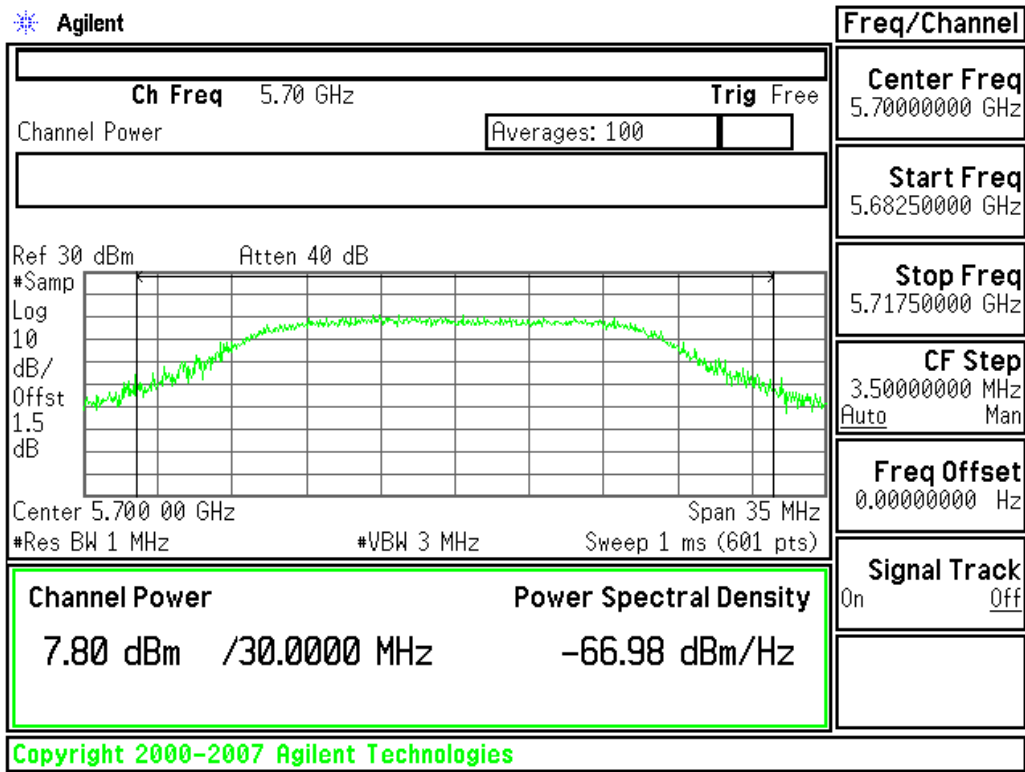




CH Mid



CH High

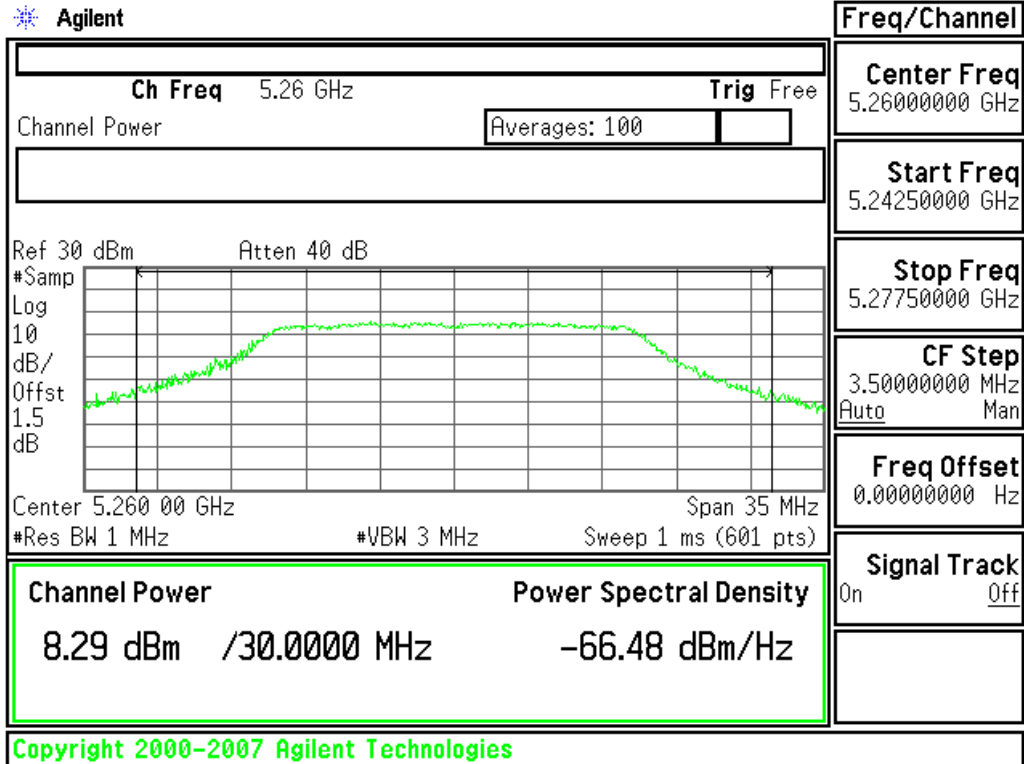




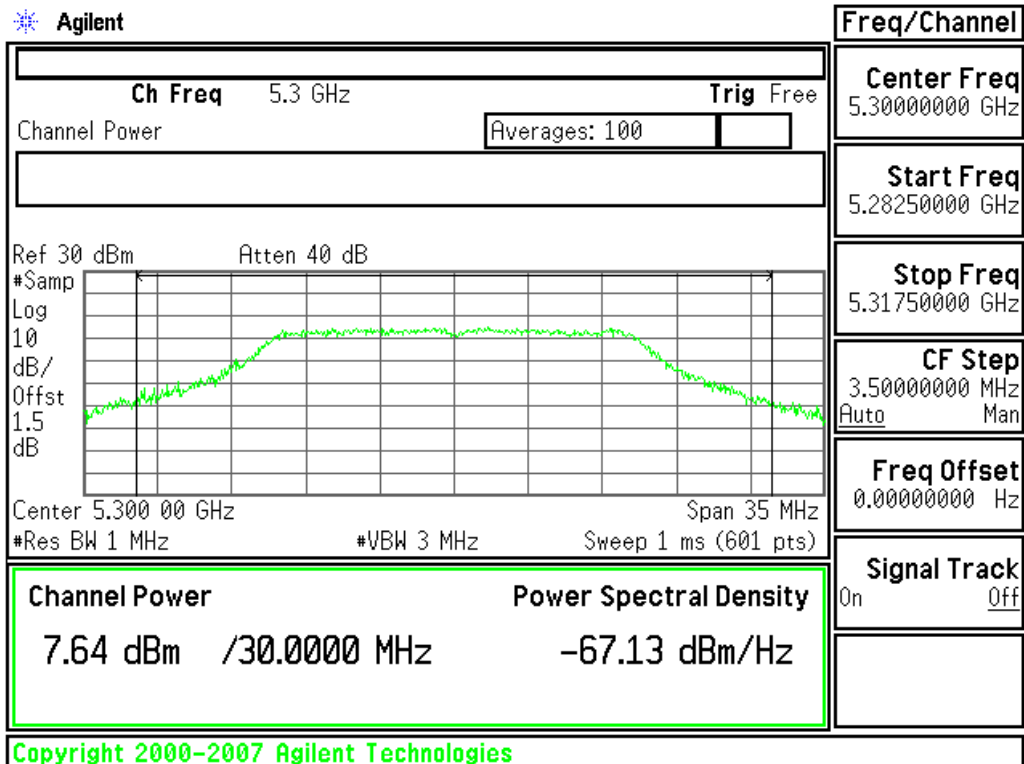
Test mode: draft 802.11n Standard-20 MHz Channel mode / Chain 2:

5250~5350MHz

CH Low

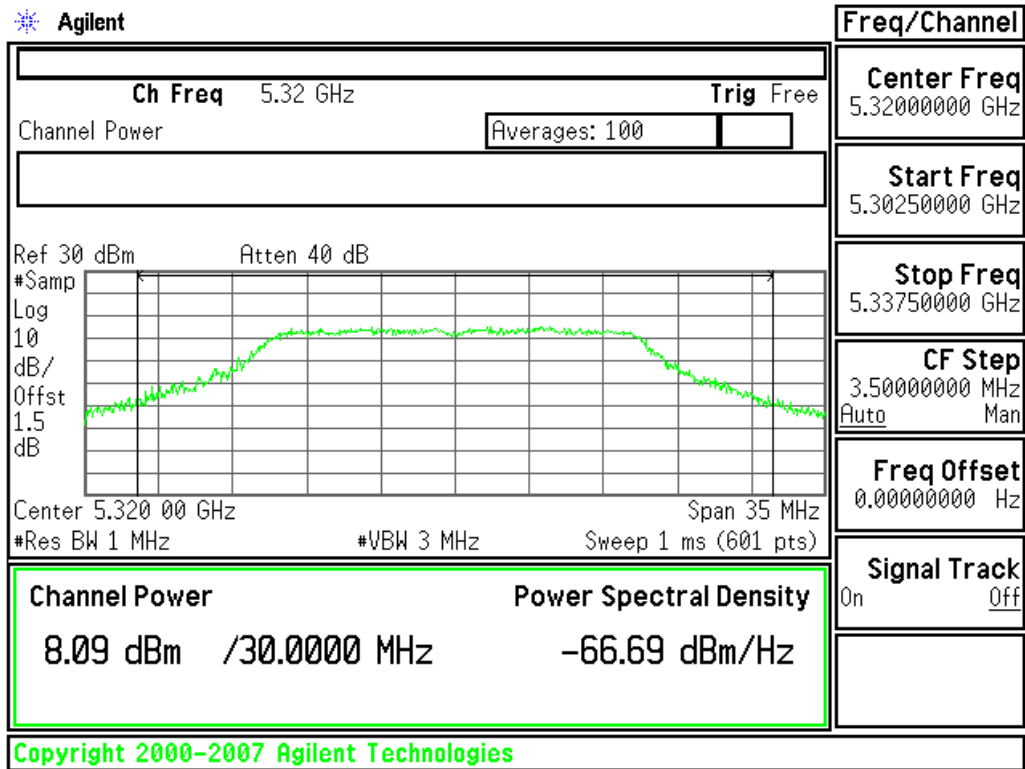


CH Mid



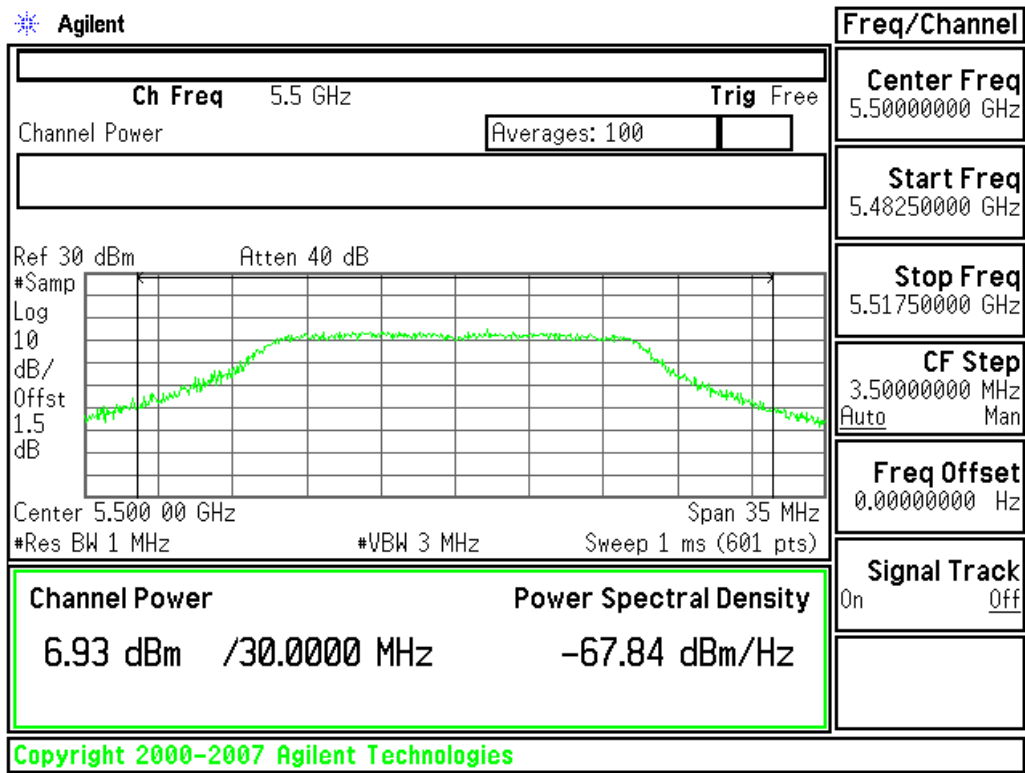


CH High



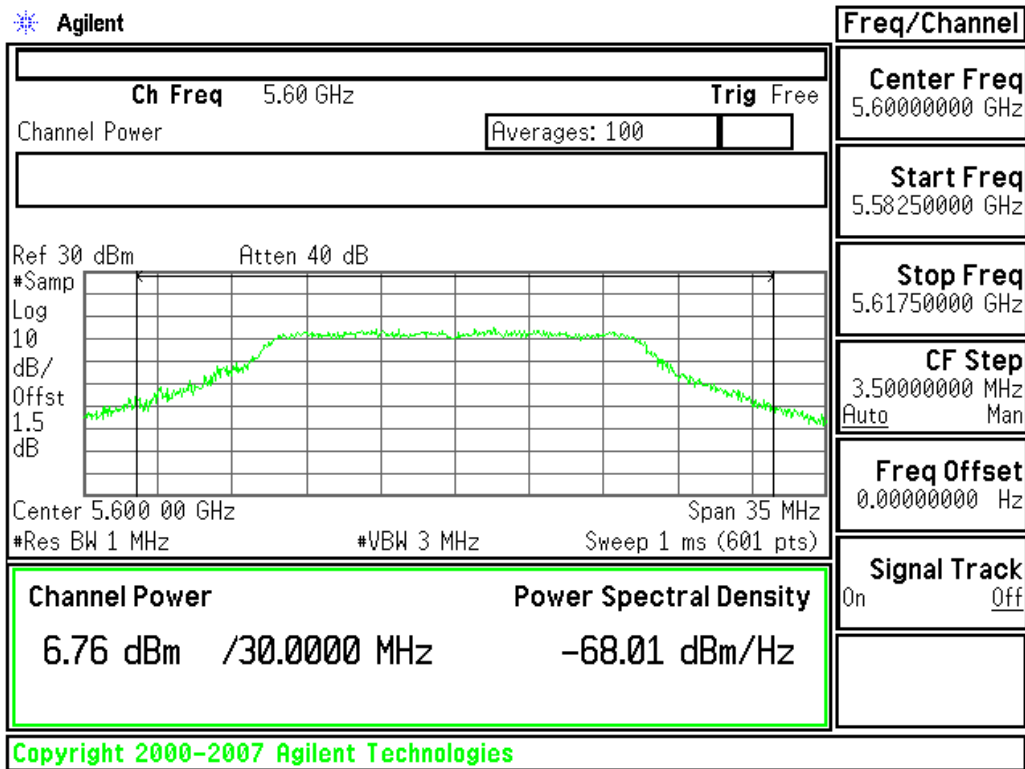
5470~5725MHz

CH Low

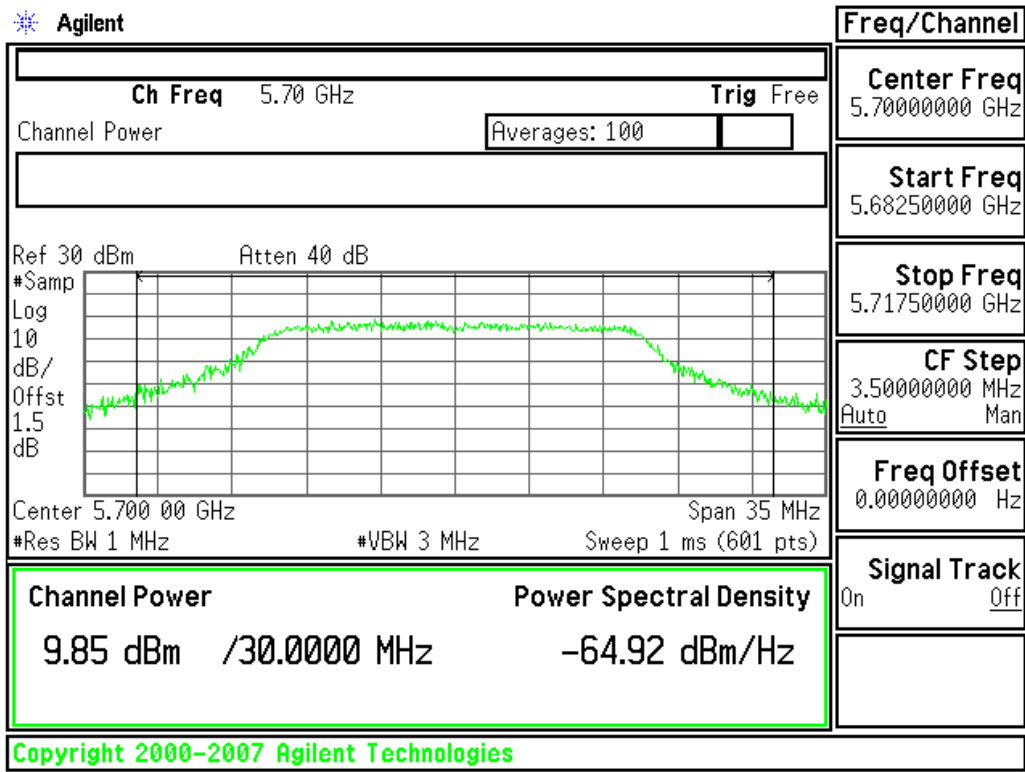




CH Mid



CH High

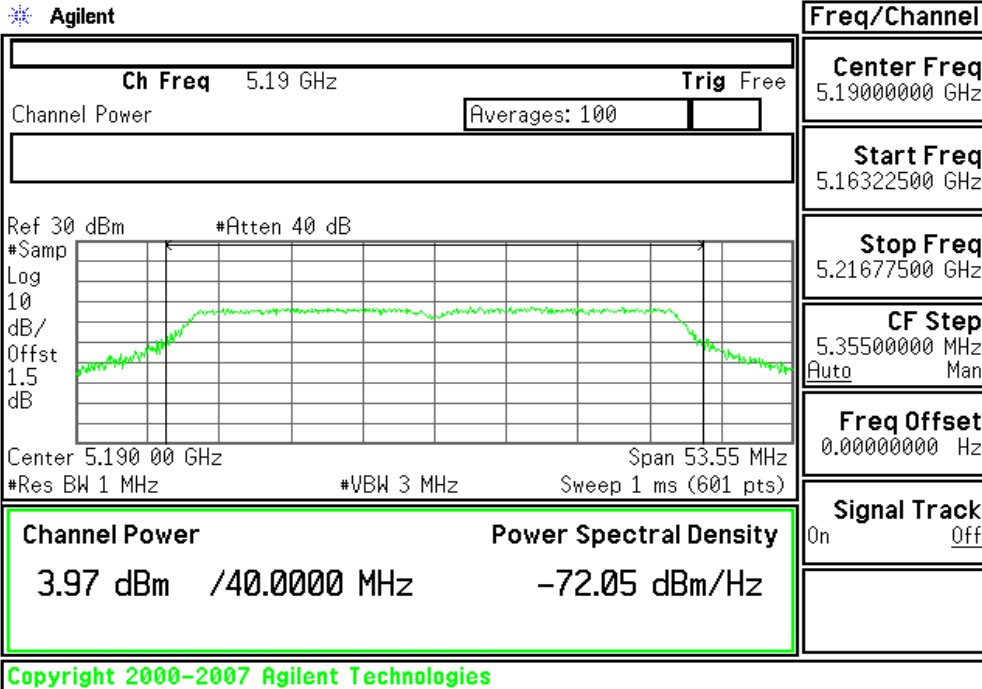




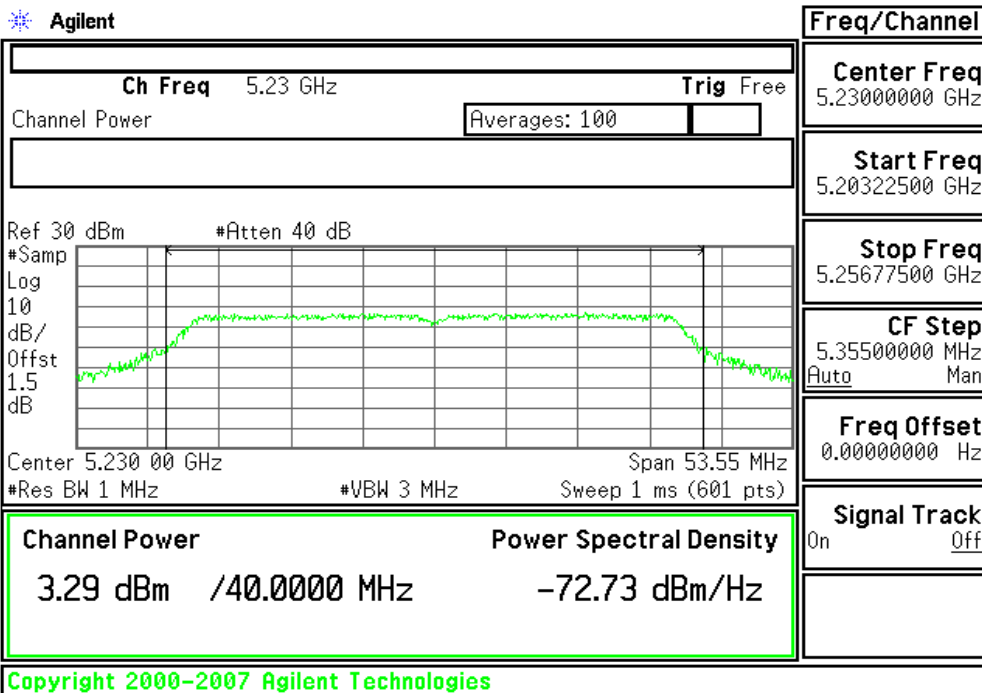
Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 0:

5150~5250MHz

CH Low



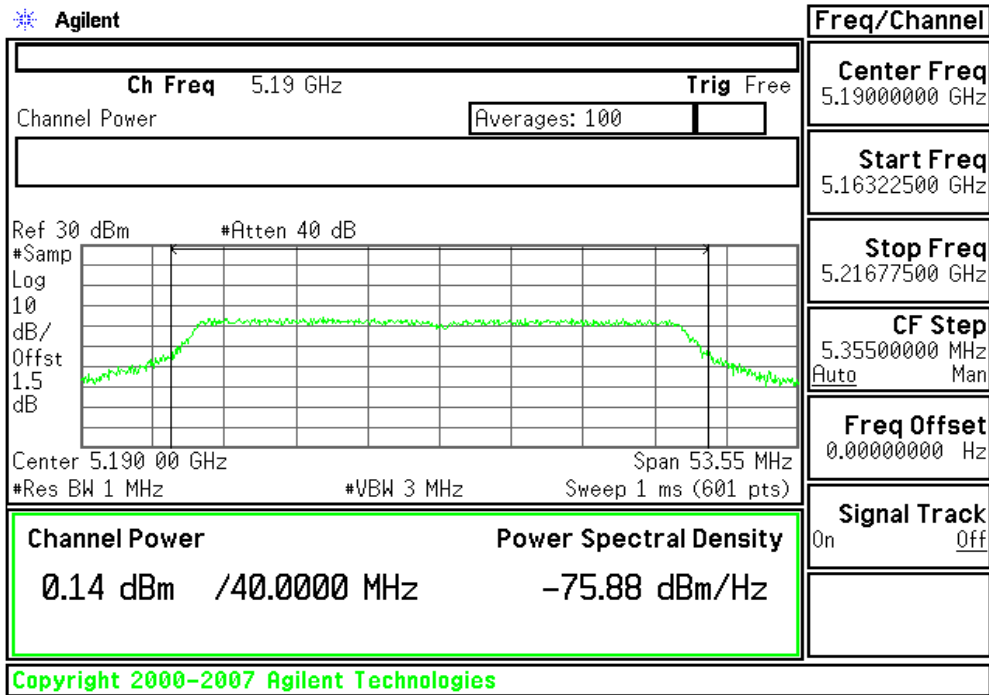
CH High



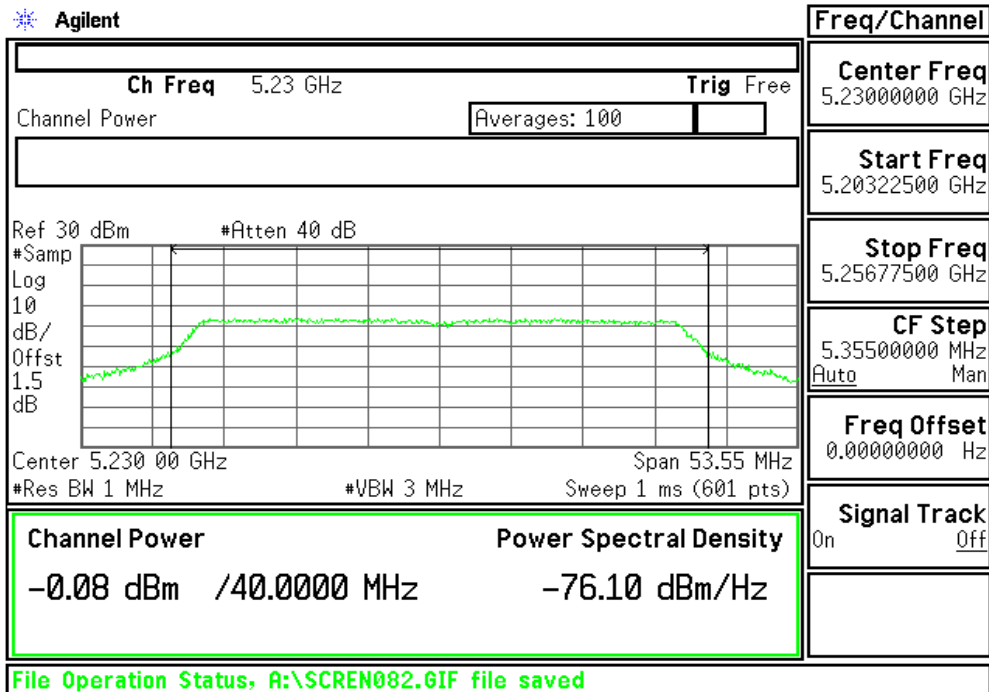


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 1:

CH Low



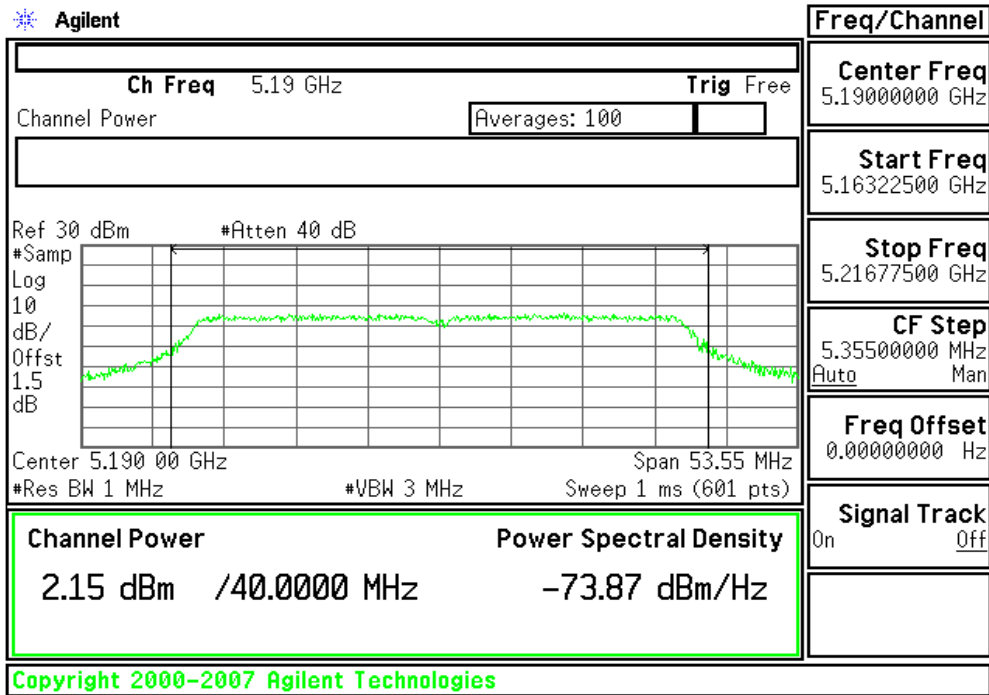
CH High



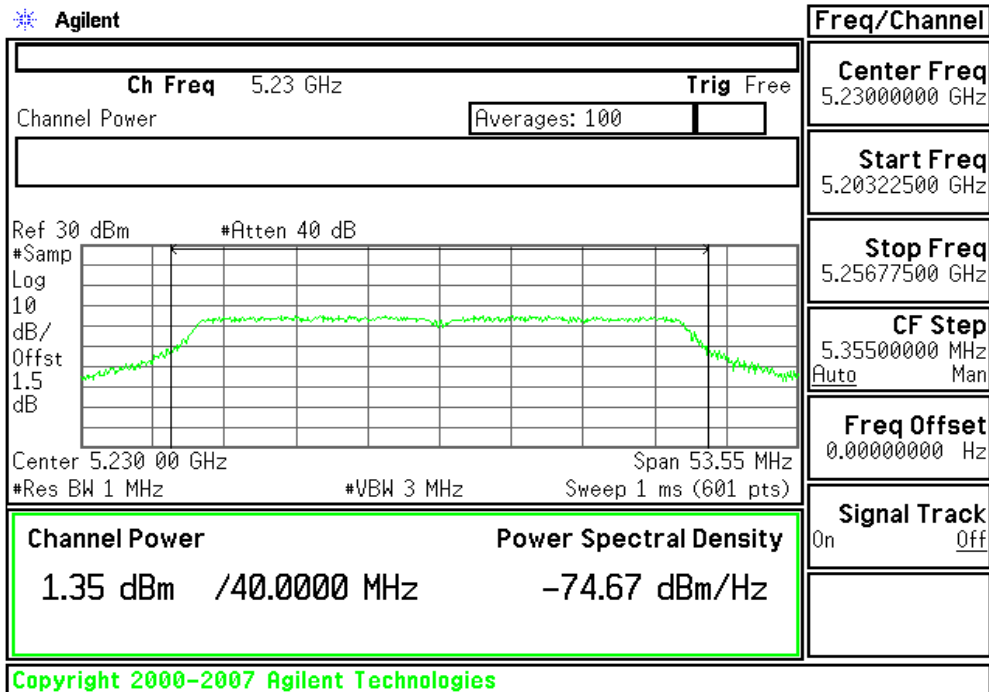


Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

CH Low



CH High

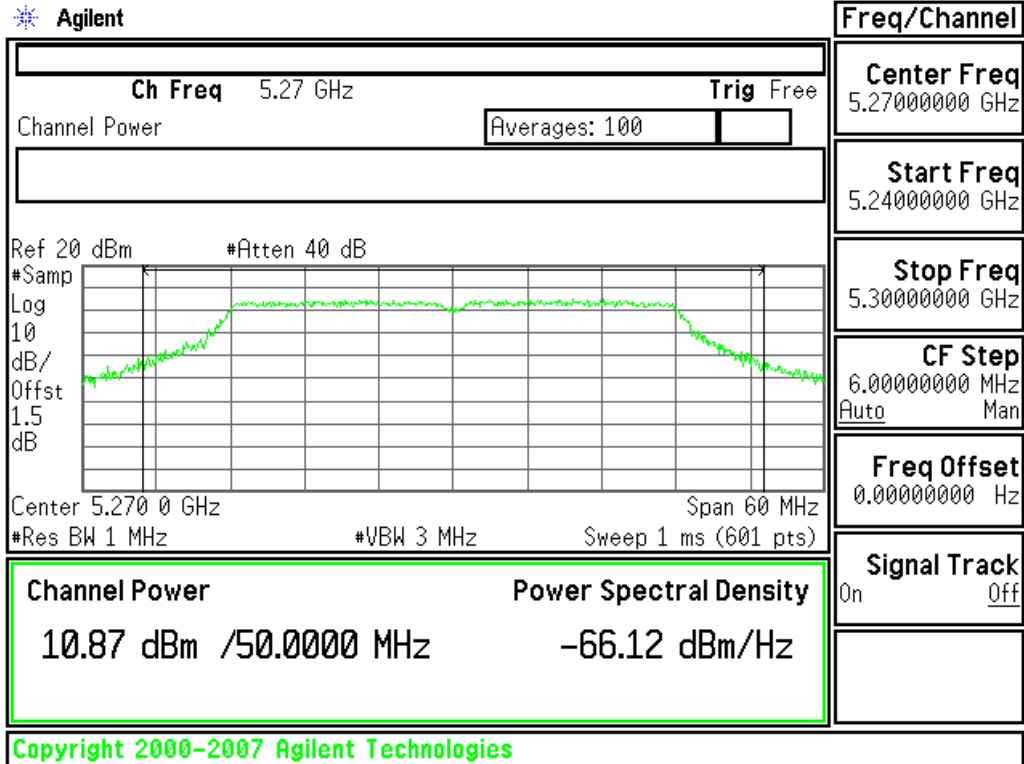




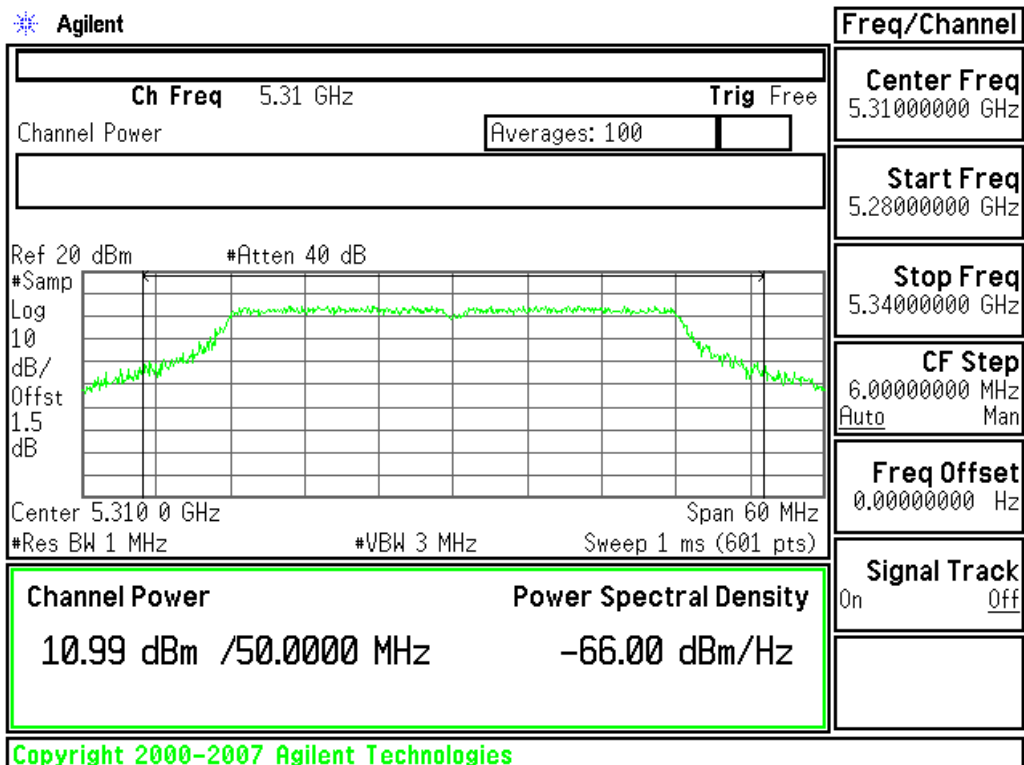
Test mode: draft 802.11n Standard-40 MHz Channel mode / Chain 0:

5250~5350MHz

CH Low

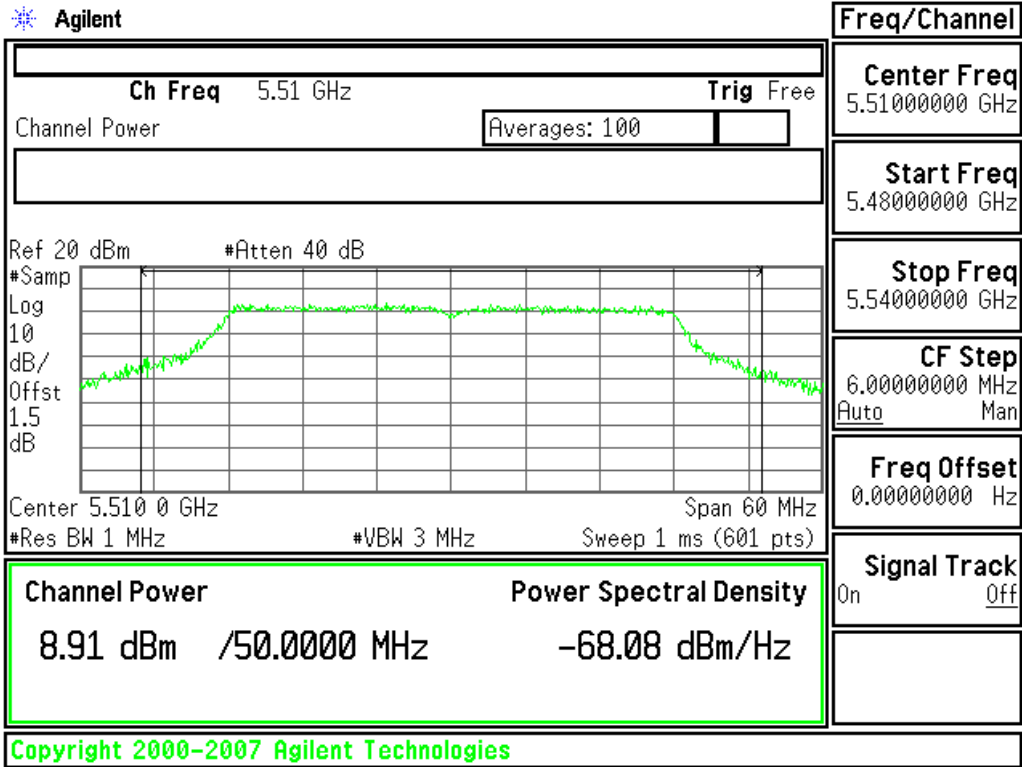


CH High

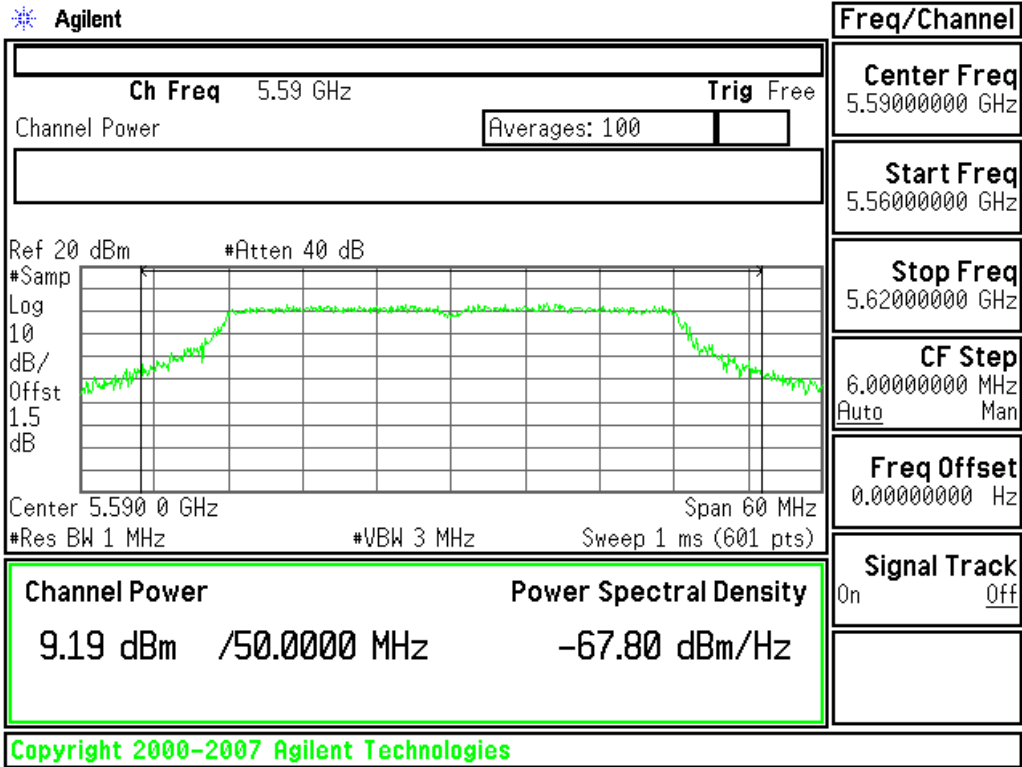




5470~5725MHz
CH Low

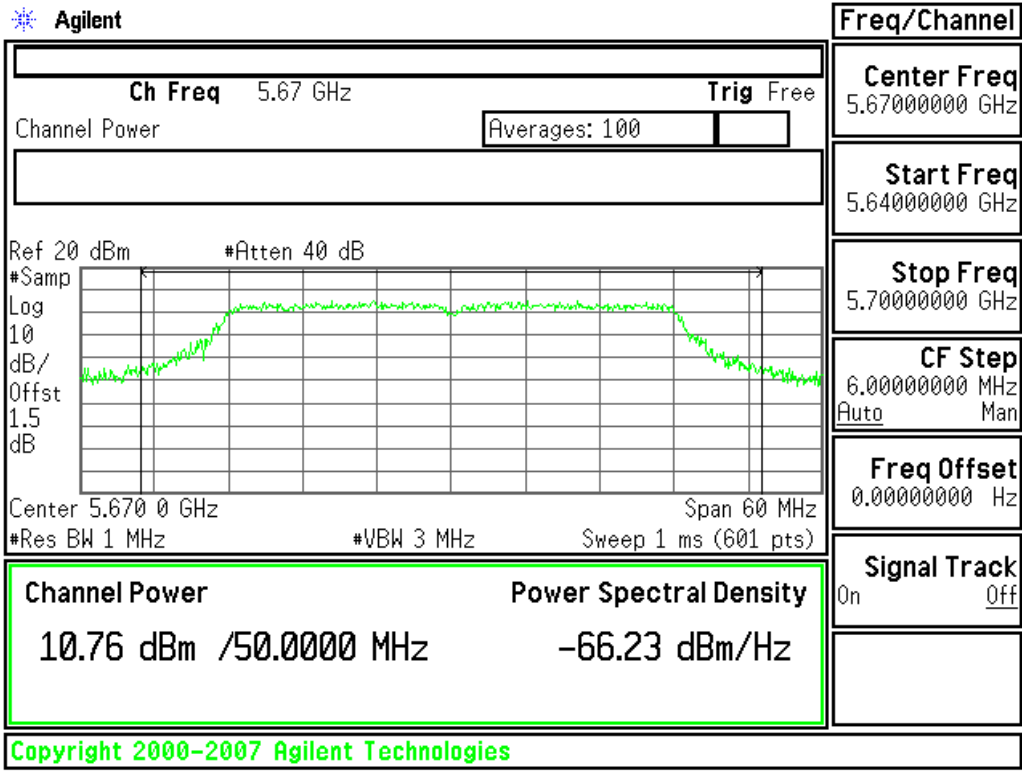


CH Mid





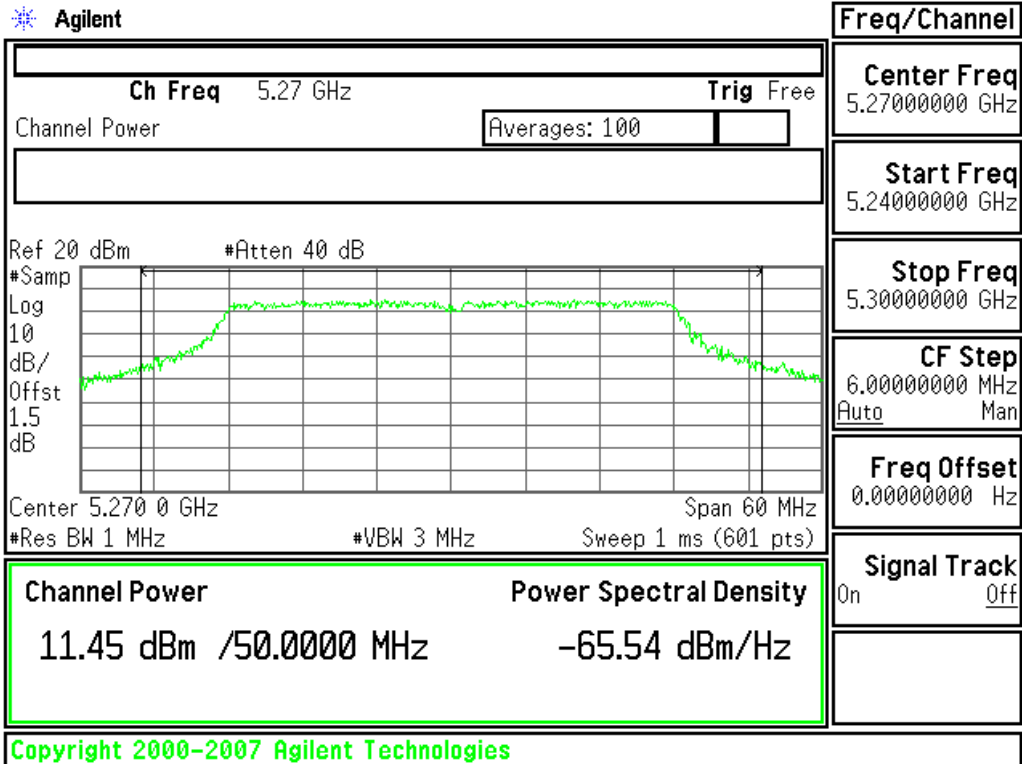
CH High



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

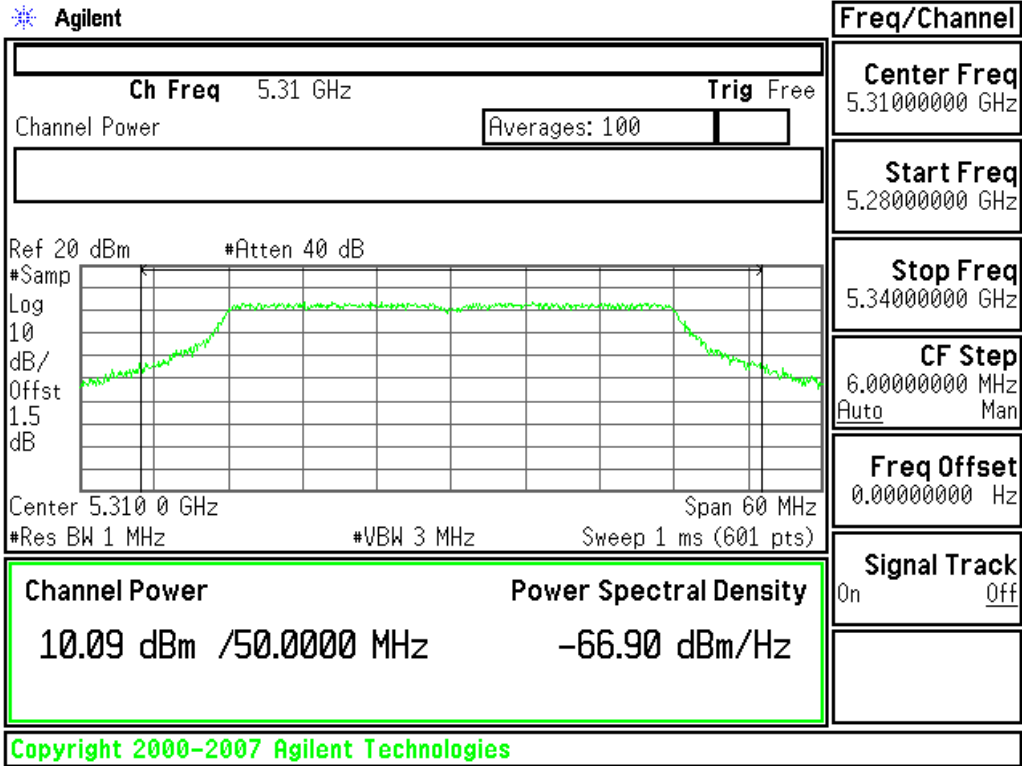
5250~5350MHz

CH Low



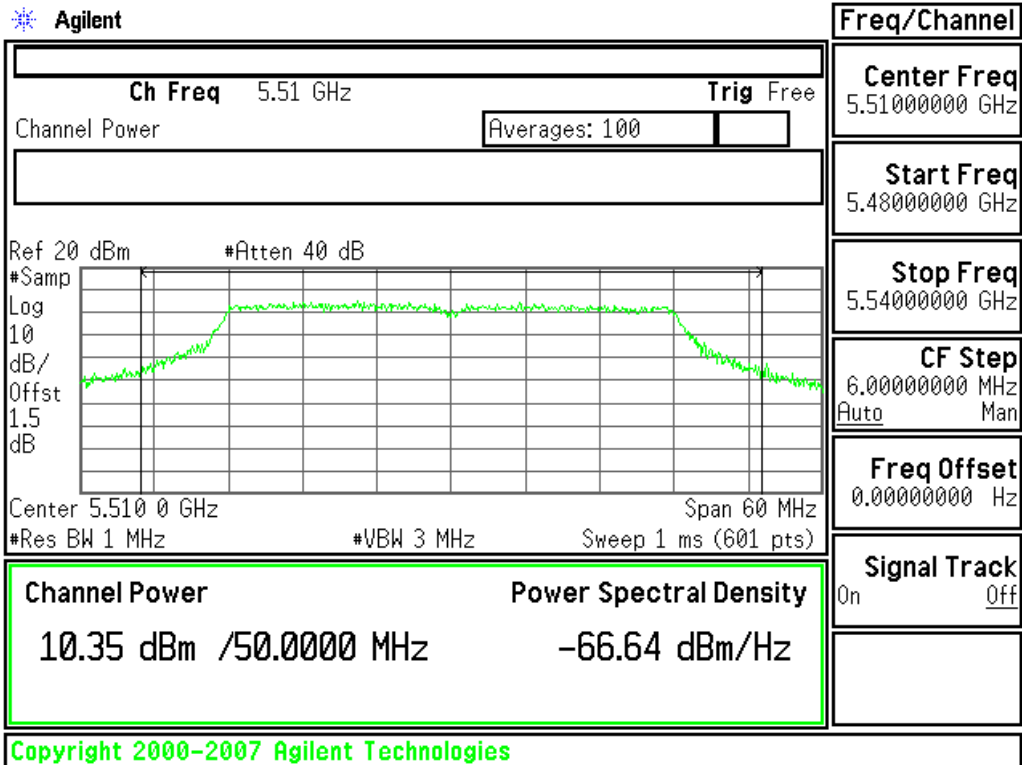


CH High



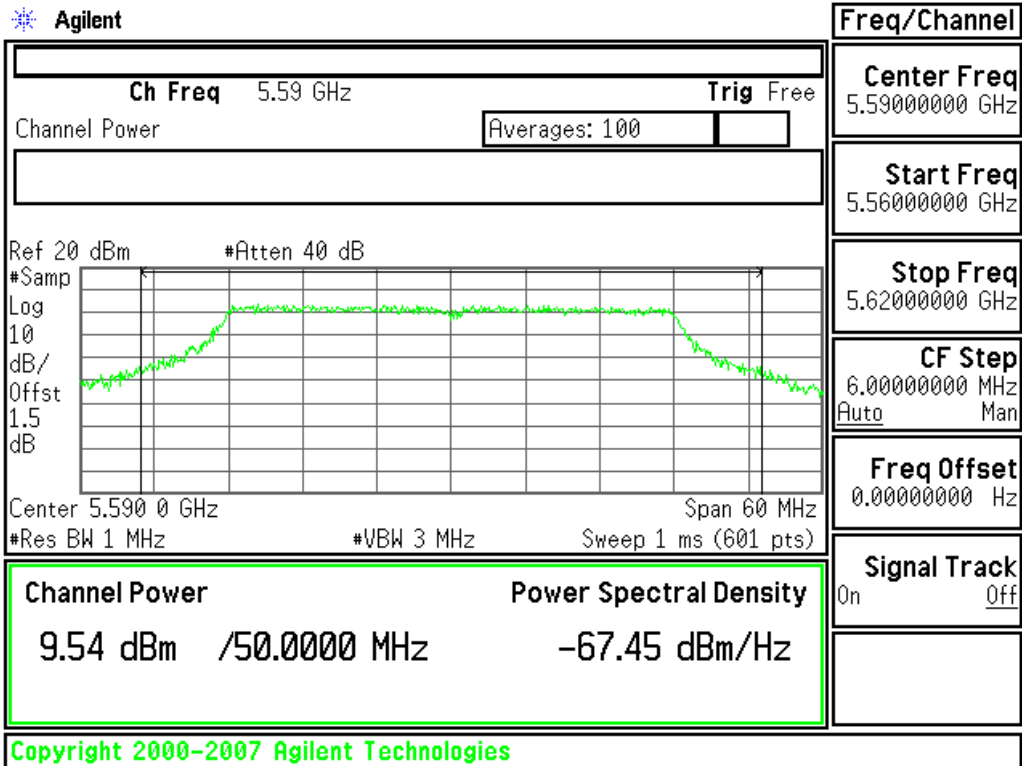
5470~5725MHz

CH Low

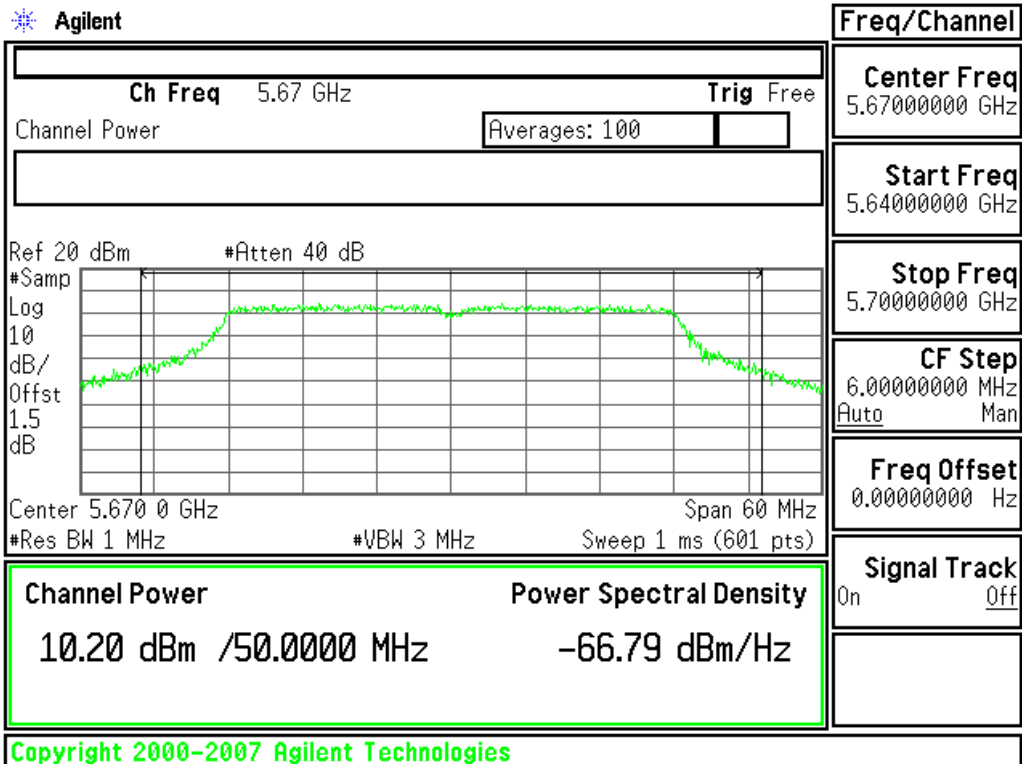




CH Mid



CH High

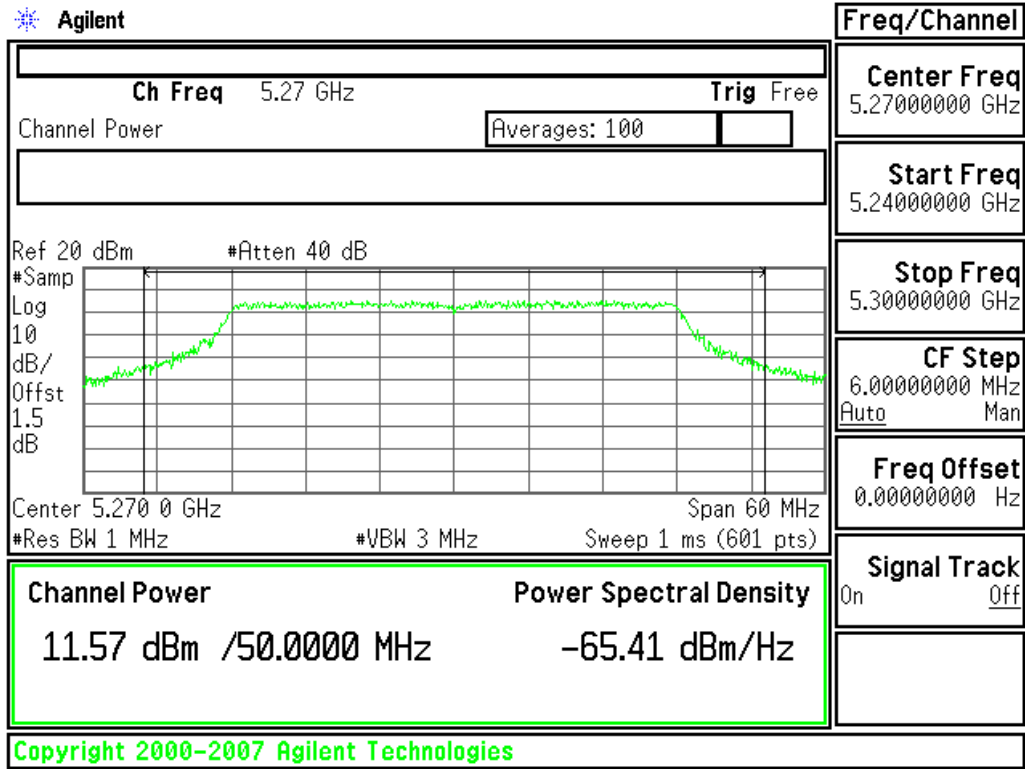




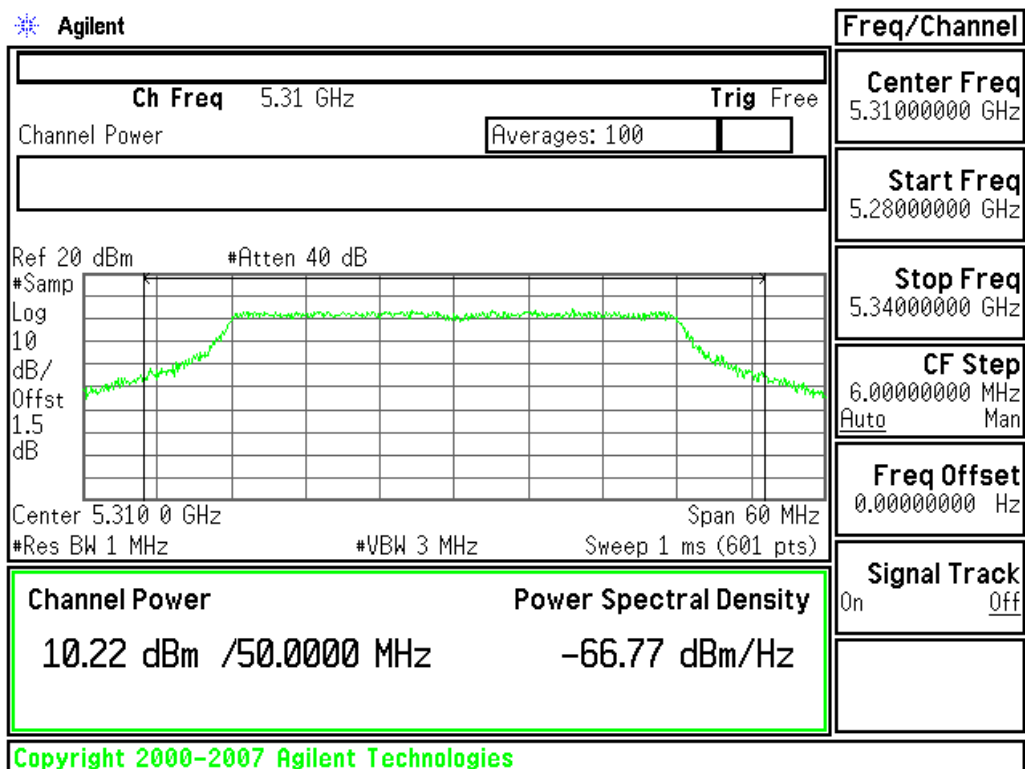
Test mode: draft 802.11n Wide-40 MHz Channel mode / Chain 2:

5250~5350MHz

CH Low



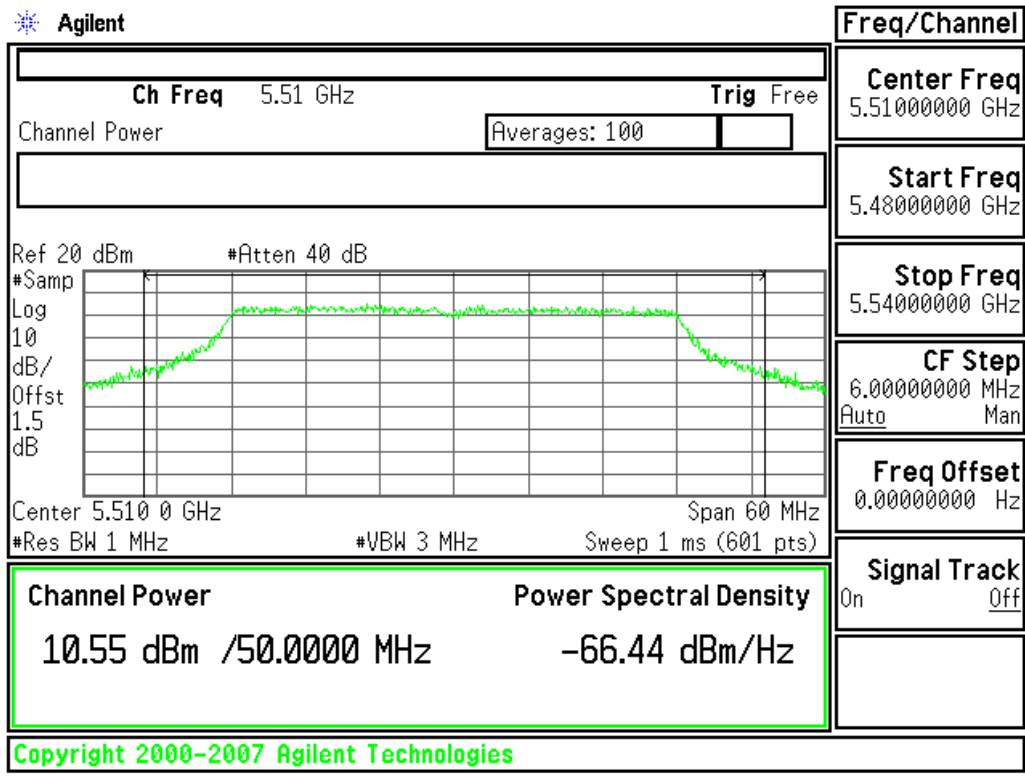
CH High



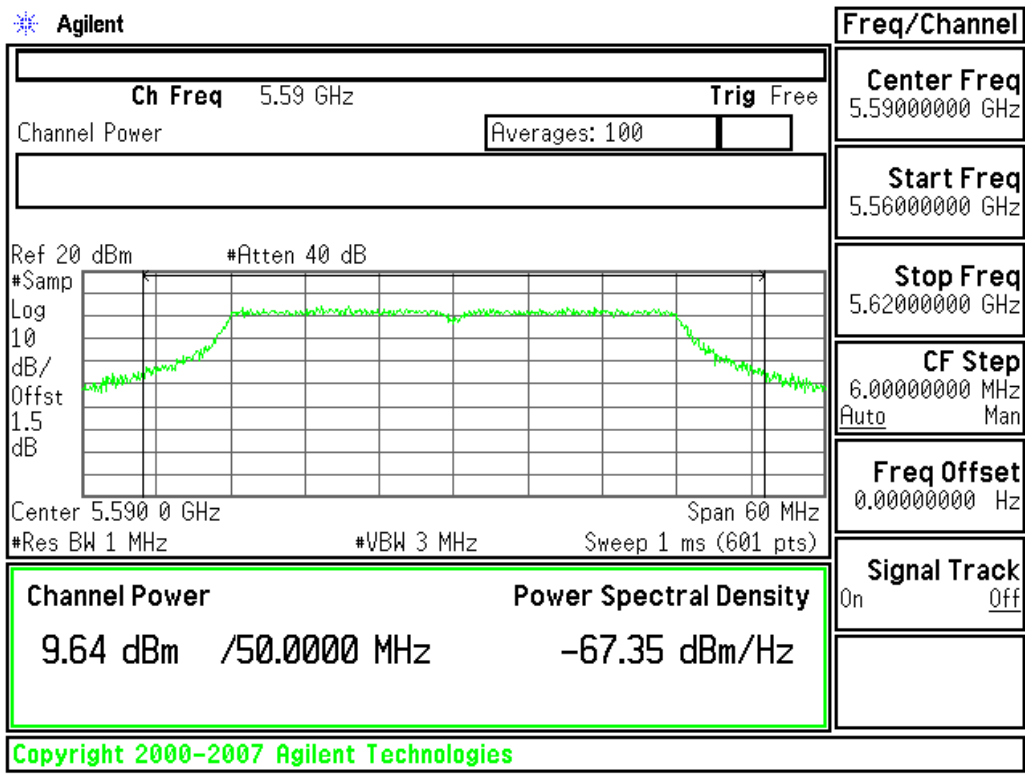


5470~5725MHz

CH Low

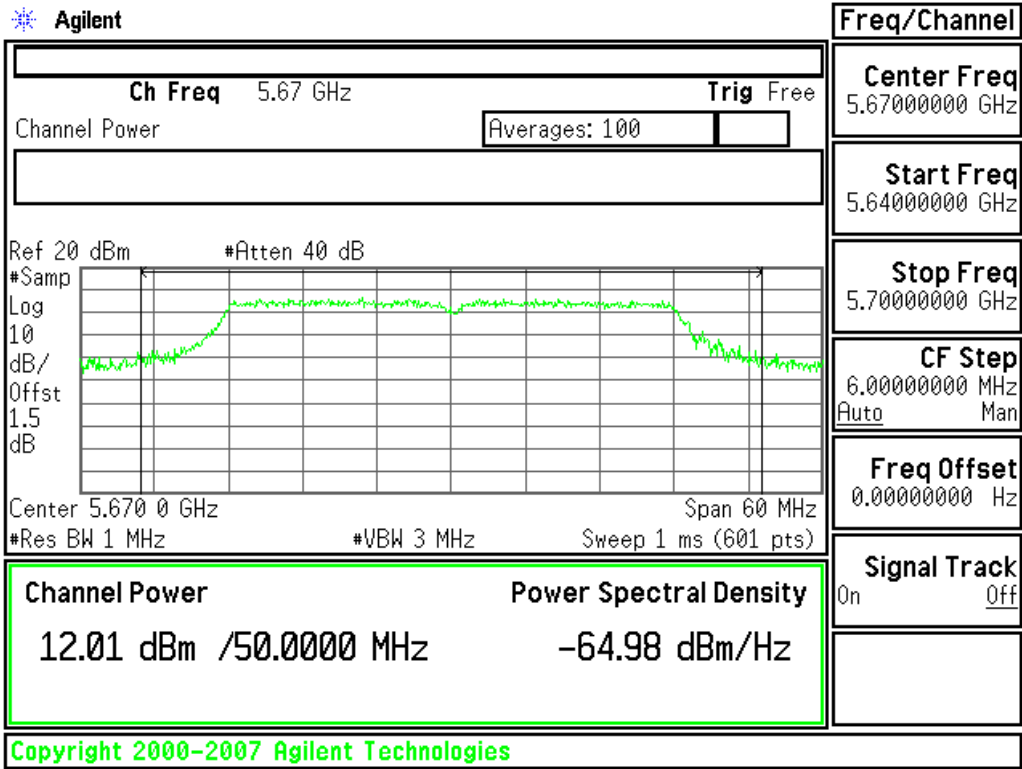


CH Mid





CH High



BAND EDGES MEASUREMENT

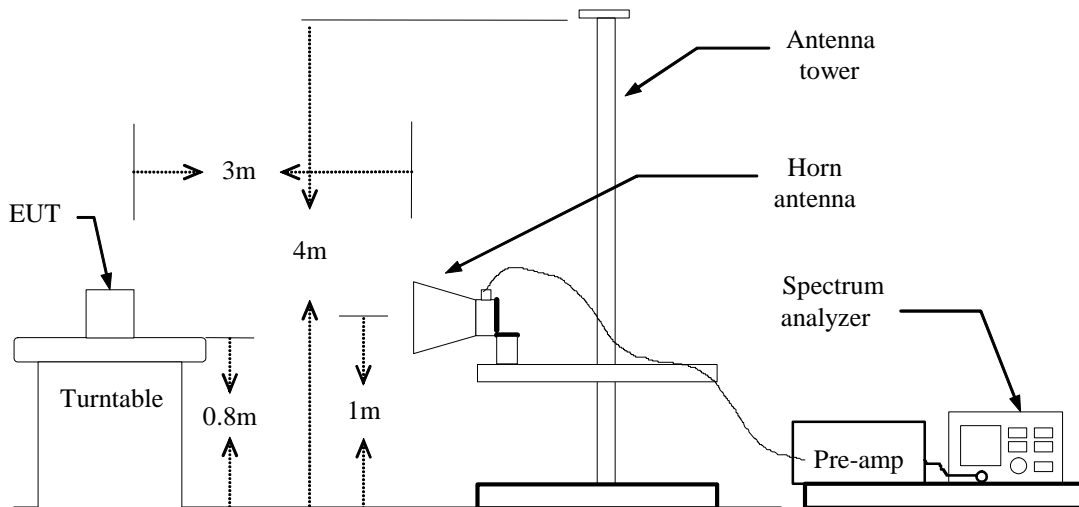
LIMIT

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

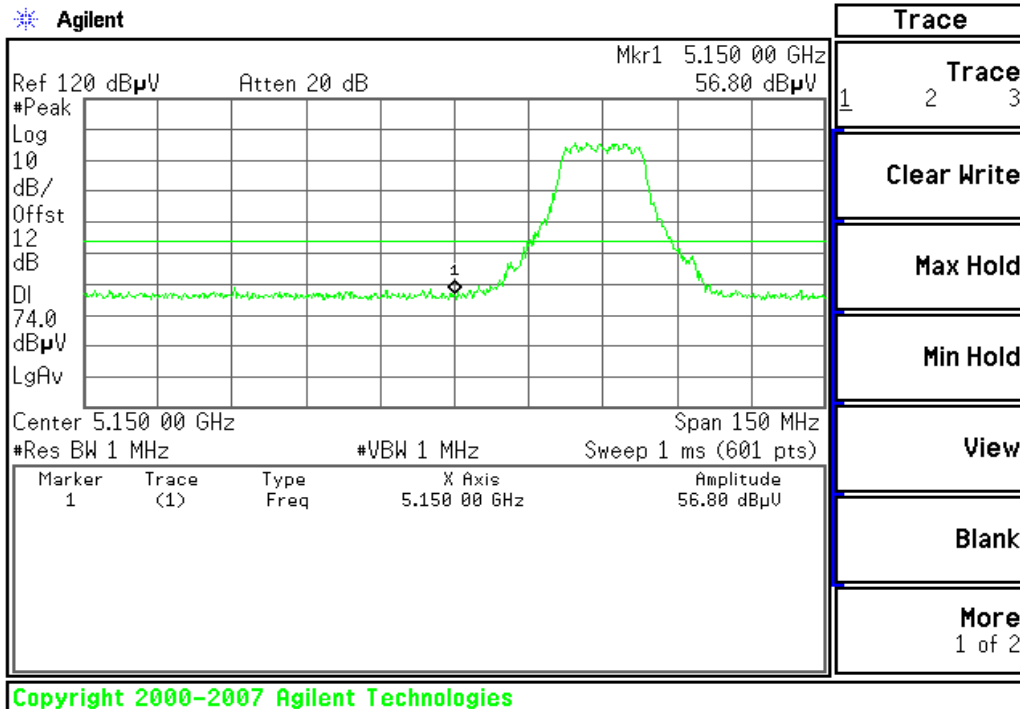
Refer to attach spectrum analyzer data chart.



Band Edges (draft 802.11a mode /5180MHz)

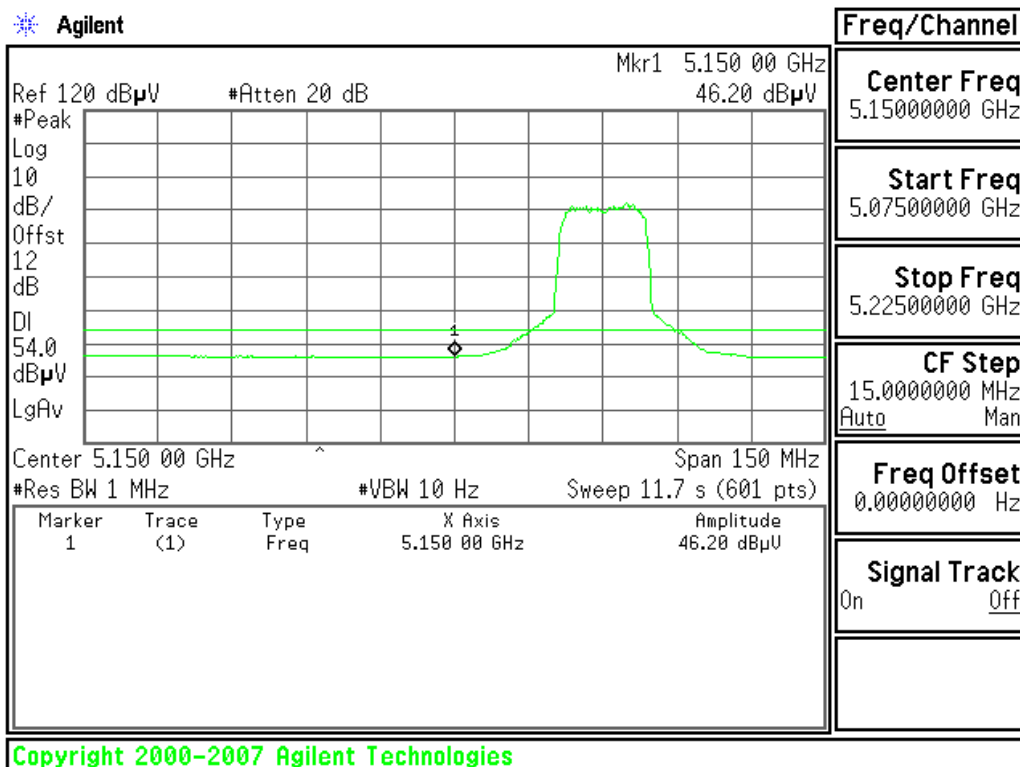
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

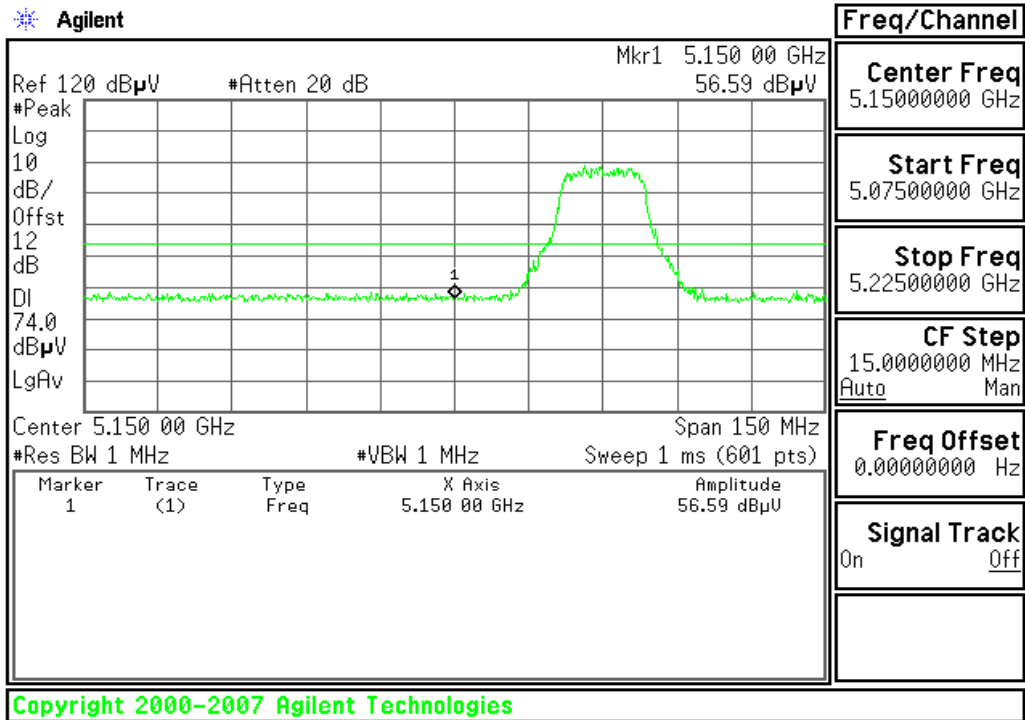
Polarity: Vertical





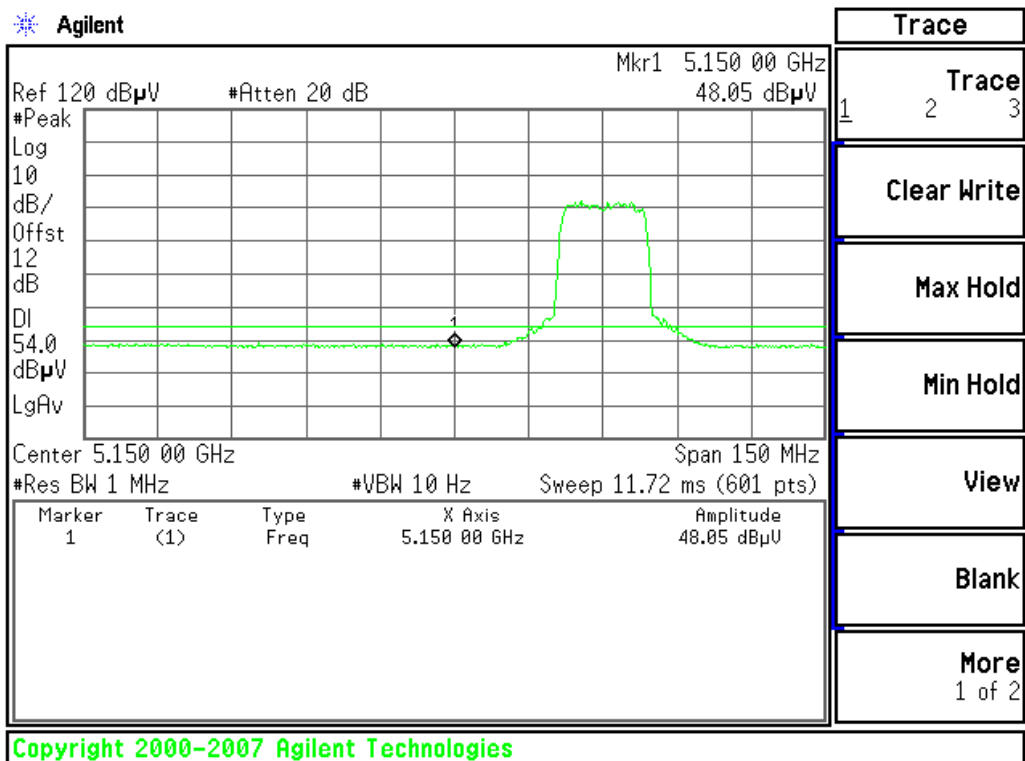
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

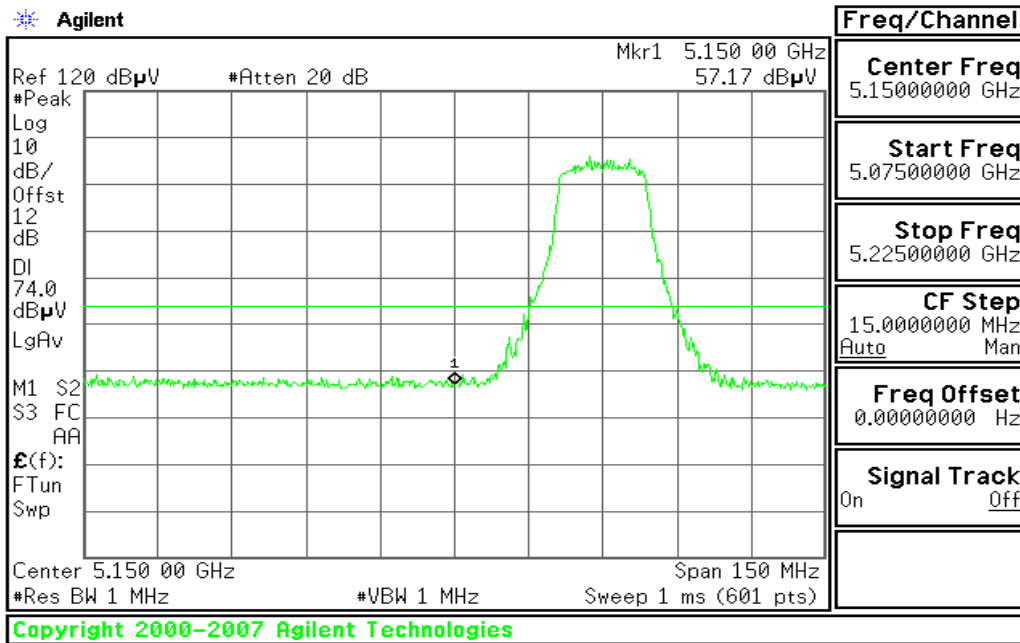




Band Edges (draft 802.11n Standard-20 MHz Channel mode/ 5180MHz)

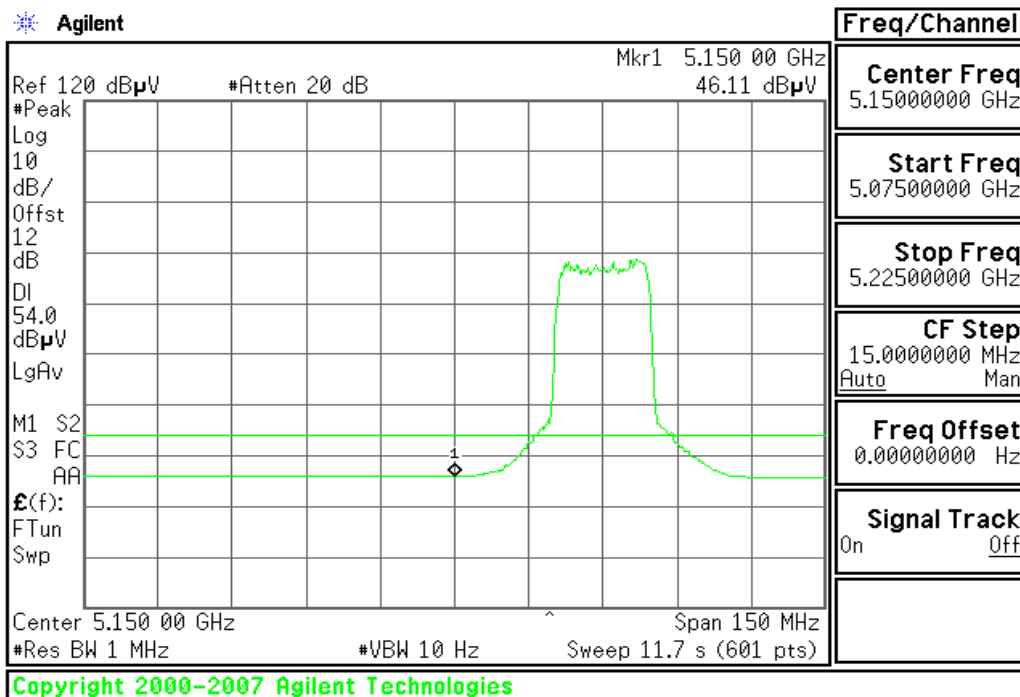
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

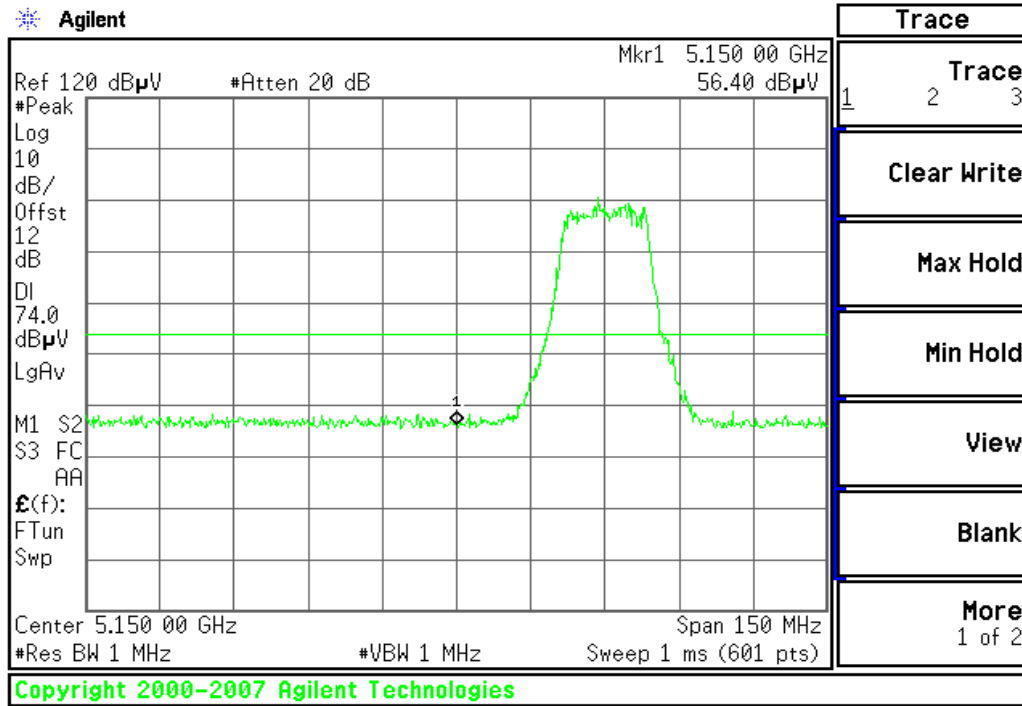
Polarity: Vertical





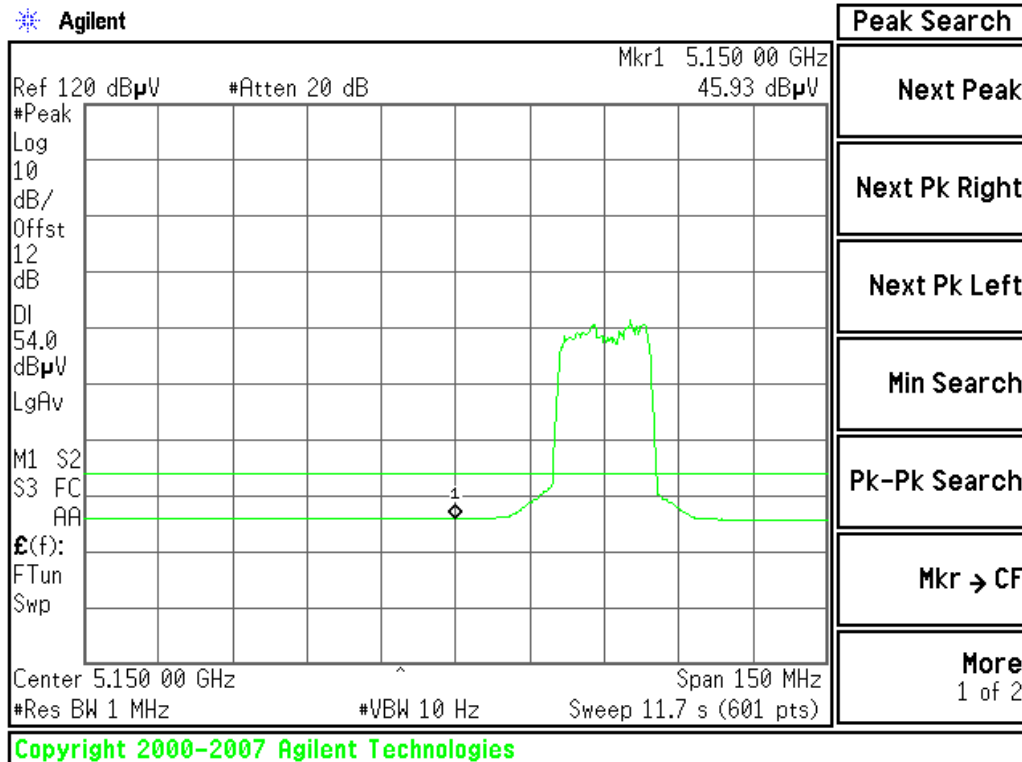
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

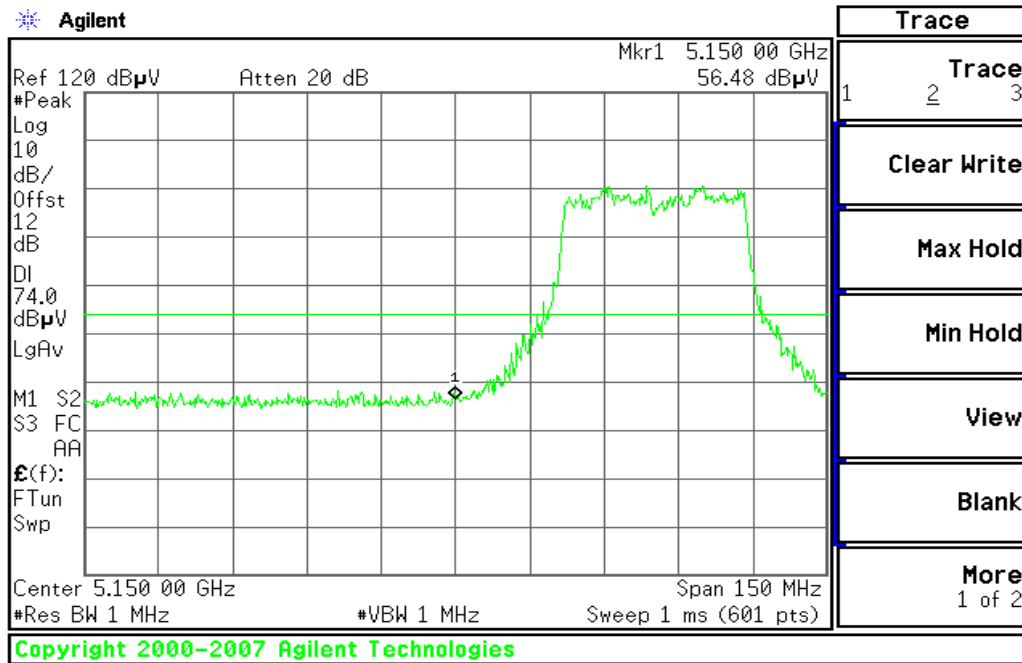




Band Edges (draft 802.11n Wide-40 MHz Channel mode / 5190MHz)

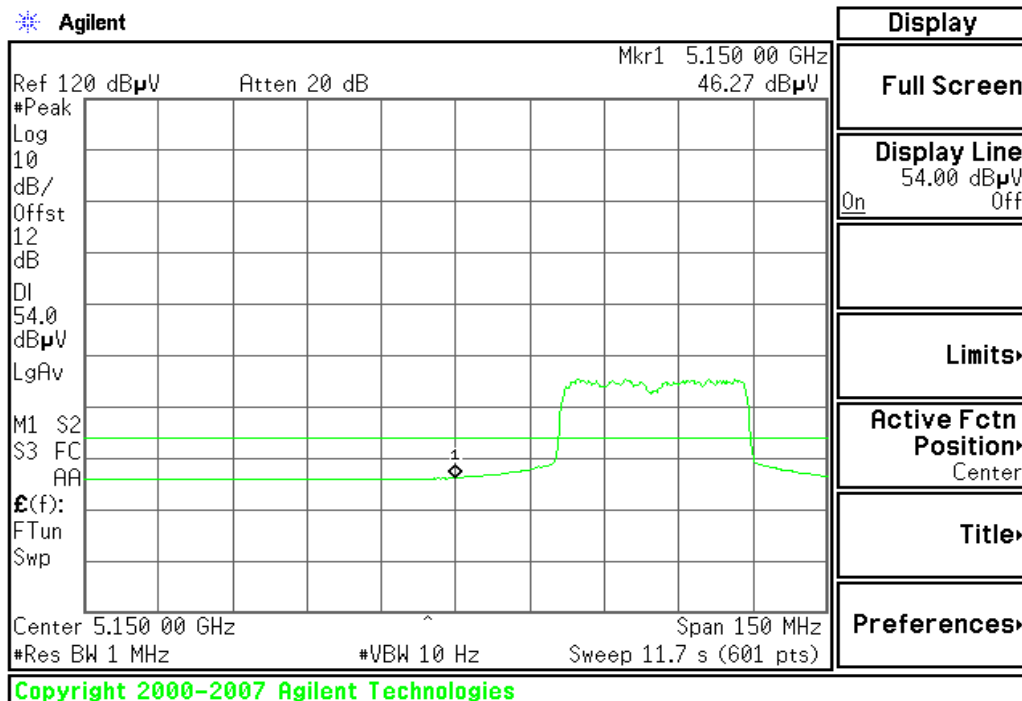
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

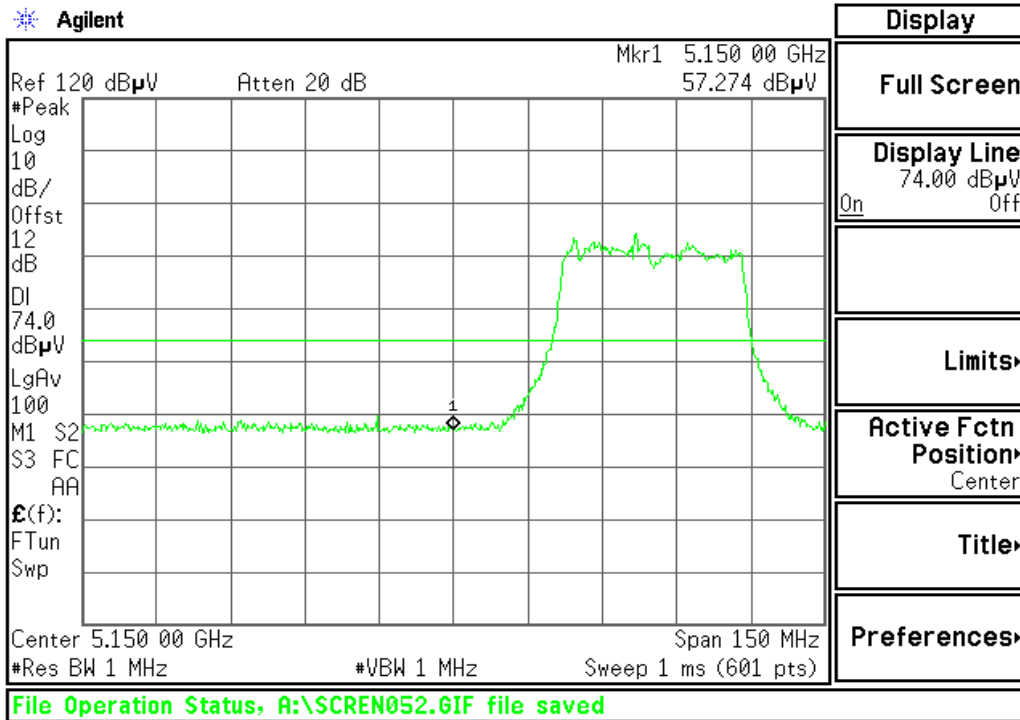
Polarity: Vertical





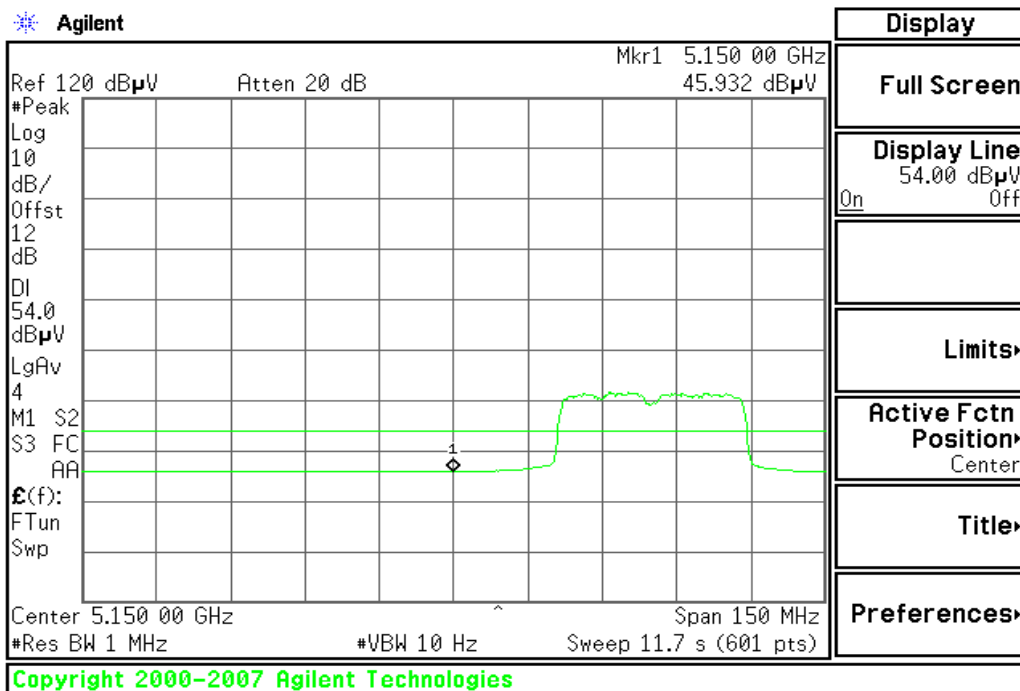
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

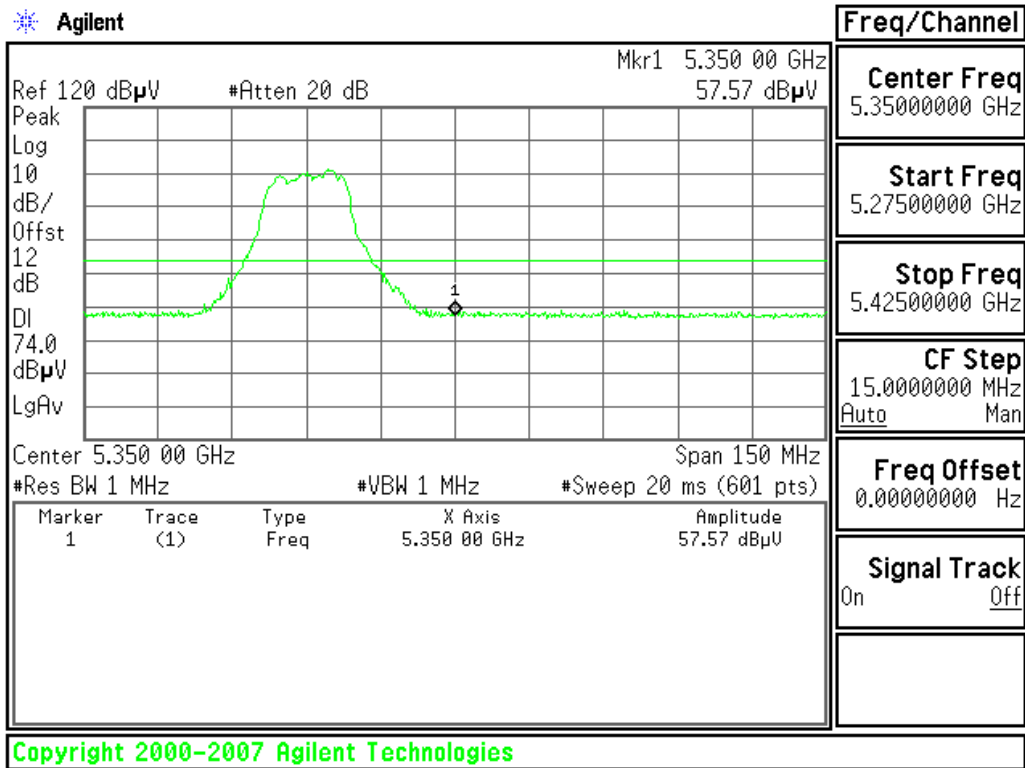




Band Edges (draft 802.11a mode 5320MHz)

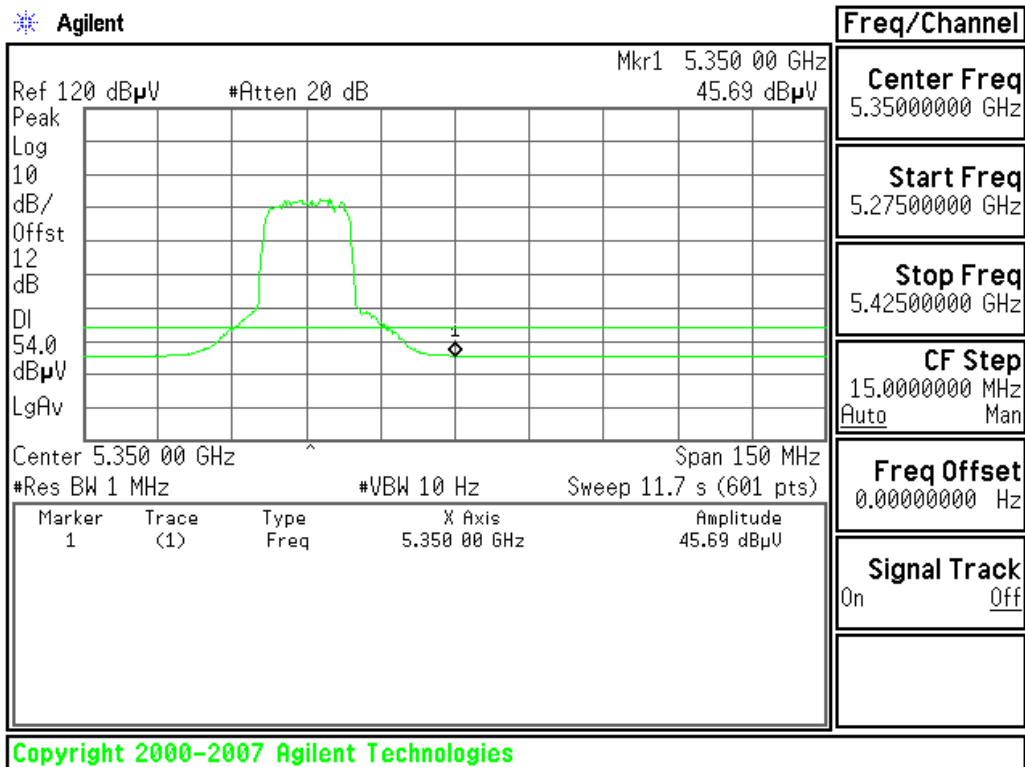
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

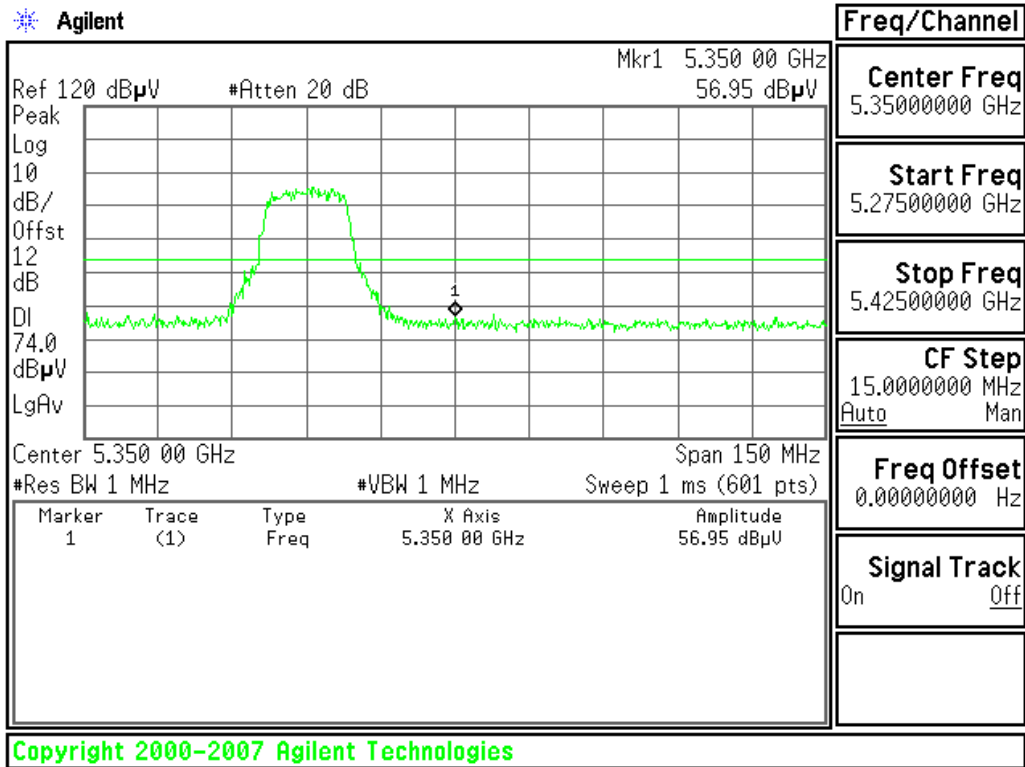
Polarity: Vertical





Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

