FCC PART 15.407

TEST AND MEASUREMENT REPORT

For

Exalt Wireless Inc.

530 Division Street,

Campbell, CA 95008, USA

FCC ID: TTM-105P25U

Report Type:	**Product Type:**
CIIPC	802.11 RF Module with Host

Prepared By:	Todd Moy Test Engineer
Report Number:	R1605022-407
Report Date:	2016-07-07
Reviewed By:	Bo Li RF Lead

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1605022-407	Initial	2016-07-07

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Exalt Wireless Inc.*, and their product model: e-*MIMO,* FCC ID: TTM-105P25U or the "EUT" as referred to in this report. The EUT is an 802.11 WLAN module and operates on the 4940-4990 MHz, 5150-5350 MHz, 5470-5725 MHz, 5725-5850 UNII bands.

1.2 Mechanical Description of EUT

The EUT measures approximately 33.8 cm (L) x 33.8 cm (W) x 11.4 cm (H) and weight 3.18 kg.

The test data gathered are from typical production sample, serial number: PE13154822 assigned by Exalt Wireless Inc.

1.3 Objective

This report is prepared on behalf of *Exalt Wirless Inc.* in accordance with FCC CFR47 §15.407.

The objective is to determine U-NII-1 band compliance with FCC Part 15.407 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, Emission Bandwidth, Power spectral density, Conducted and Radiated Spurious Emissions. Per manufacturer declaration, U-NII-2A and 2C bands are disabe by firmware.

1.4 Related Submittal(s)/Grant(s)

Original Report FCC ID: TTM-105P25U

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz, and FCC KDB 789033 D02 General UNII Test Procedure New Rules v01r02.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025: 2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65: 1996** by **A2LA** to certify:
.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

The worst-case data rates are determined by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test utility used was Putty provided by *Exalt Wireless Inc.,* the software was verified by *Todd Moy* to comply with the standard requirements being tested against.

Please refer to the following power setting table.

Modulation	Channel	Frequency (MHz)	Low Gain Antenna Power Setting	High Gain Antenna Power Setting
802.11a mode	36	5180	16	-3
	40	5200	16	-3
	48	5240	14	3
NSS =1				
802.11n20 mode	36	5180	16	-3
	40	5200	16	-3
	48	5240	14	3
802.11n40 mode	46	5230	16	-3
NSS =2				
802.11n20 mode	36	5180	16	-3
	40	5200	16	-3
	48	5240	22	3
802.11n40 mode	46	5230	16	-3

Note 1:
The customer will be using two power settings for MCS0 to MCS7 and MCS8 to MCS15. From MCS0 to MCS7 the number of independent spatial streams (N_{ss}) is 1, while from MCS8 to MCS15 is the number of streams (N_{ss}) is 2.

Note 2:
For 802.11n40 mode, this device does not support 5190 MHz channel.

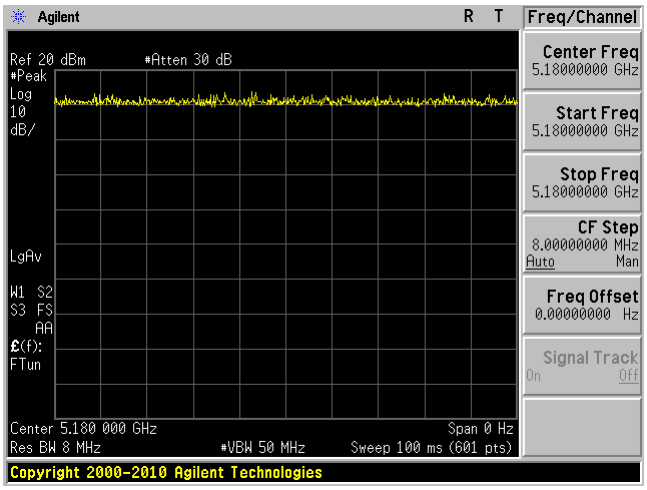
2.3 Duty Cycle Correction Factor

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r02 section B: All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

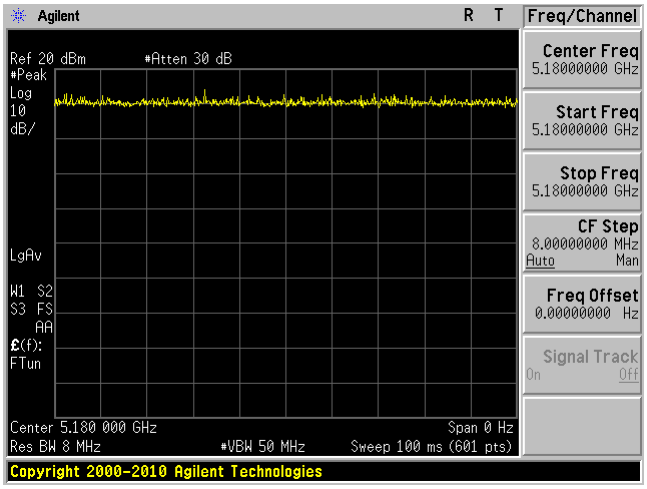
Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	-	-	100	0
802.11n20	-	-	100	0
802.11n40	-	-	100	0

Please refer to the following plots.

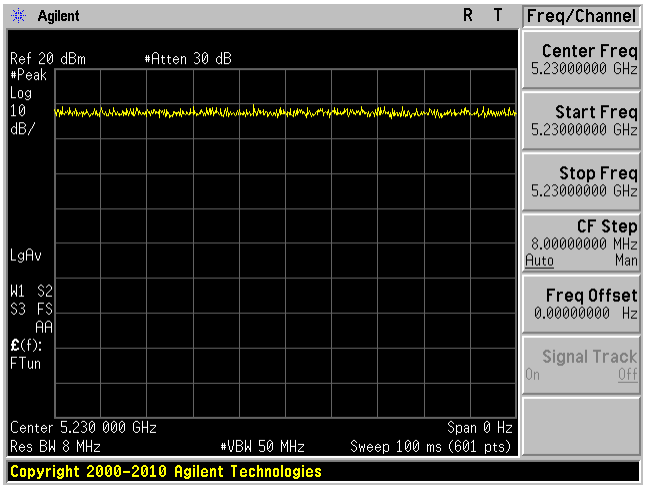
802.11a mode



802.11n20 mode



802.11n40



2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude D630

2.6 EUT Internal Configuration Details

Manufacturer	Description	Serial Number
Exalt	PCA, Mother Board	207463-002

2.7 Interface Ports and Cabling

Cable Description	Length (m)	To	From
RF Cable	< 1.0	PSA	EUT
RJ 45 Cable	< 1.0	LAPTOP	POE
RJ 45 Cable	< 1.0	POE	EUT

2.8 Power Supply List and Detail

Manufacturer	Description	Model
PowerDsine	POE Adapter	PD-3501G/AC

3 Summary of Test Results

FCC Rules	Description of Test	Result
§2.1091, §15.407(f)	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207	AC Power Line Conducted Emissions	Compliant
§2.1053, §15.205, §15.209, 15.407(b)	Spurious Radiated Emissions	Compliant
§15.407(a)(5)	Emission Bandwidth	Compliant
§407(a)(1)	Output Power	Compliant
§2.1051, §15.407(b)	Band Edges	Compliant
§407(a)(1)	Power Spectral Density	Compliant
§2.1051, §15.407(b)	Spurious Emissions at Antenna Terminals	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	N/A

4 FCC §2.1091 & §15.407(f) - RF Exposure

4.1 Applicable Standard

According to FCC §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.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

9.5 dBi antenna

Maximum peak output power at antenna input terminal (dBm):	24.27
Maximum peak output power at antenna input terminal (mW):	267.30
Prediction distance (cm):	180
Prediction frequency (MHz):	5240
Maximum Antenna Gain, typical (dBi):	9.5
Maximum Antenna Gain (numeric):	8.912
Power density of prediction frequency at 180.0 cm (mW/cm^2):	0.005
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.00

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 180 cm is 0.005 mW/cm^2. Limit is 1.0 mW/cm^2.

28 dBi antenna

Maximum peak output power at antenna input terminal (dBm):	6.1
Maximum peak output power at antenna input terminal (mW):	4.074
Prediction distance (cm):	180
Prediction frequency (MHz):	5240
Maximum Antenna Gain, typical (dBi):	28
Maximum Antenna Gain (numeric):	630.96
Power density of prediction frequency at 180.0 cm (mW/cm^2):	0.006
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.00

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 180 cm is 0.006 mW/cm^2. Limit is 1.0 mW/cm^2.

5 FCC §15.203 - Antenna Requirements

5.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.2 Antenna List

The antennas used by the EUT are permanent attached antennas.

Type	Antenna Gain (dBi)	
	Chain 0	Chain 1
Monopole	9.5	9.5
Directional Patch	28	

6 FCC §15.207 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207

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 frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1 Decreases with the logarithm of the frequency.

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used was FCC §15.207 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.
The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

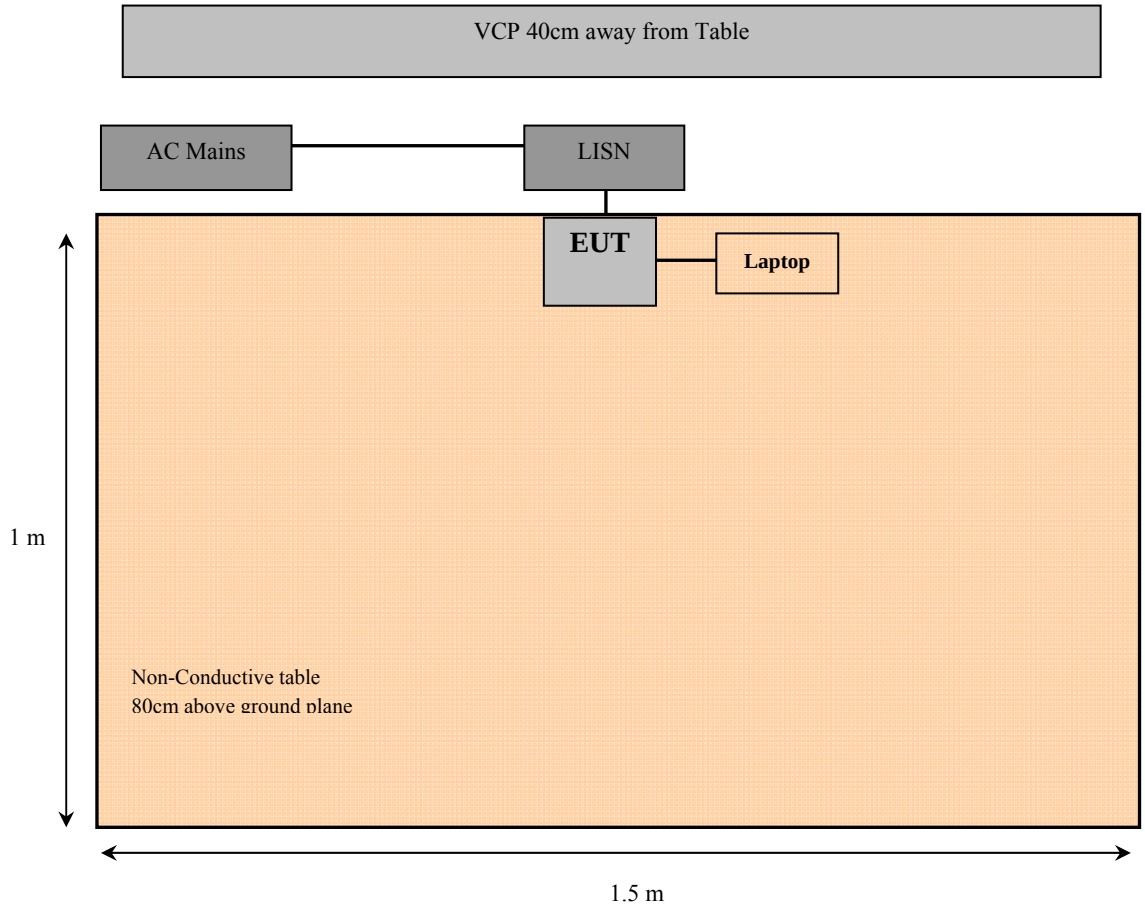
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cords of support equipment were connected to LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL), the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2015-07-23	1 year
Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101963	2015-07-15	1year
Keysight Technologies	RF Limiter	11867A	MY42242932	2015-12-15	1year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150204	2016-03-09	1 Year

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

6.7 Test Environmental Conditions

Temperature:	22-24º C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Todd Moy on 2016-06-03 at 5 meter 3.

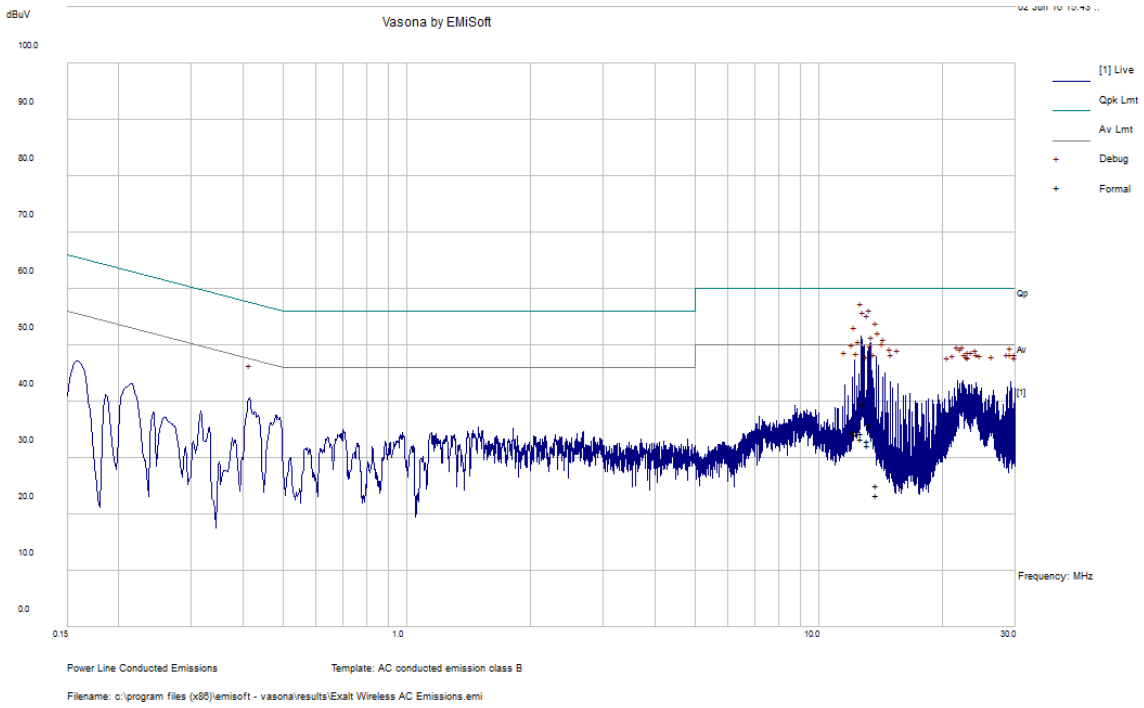
6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Part 15 standard's conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Live/Neutral)**	**Range (MHz)**
-9.85	13.01434	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

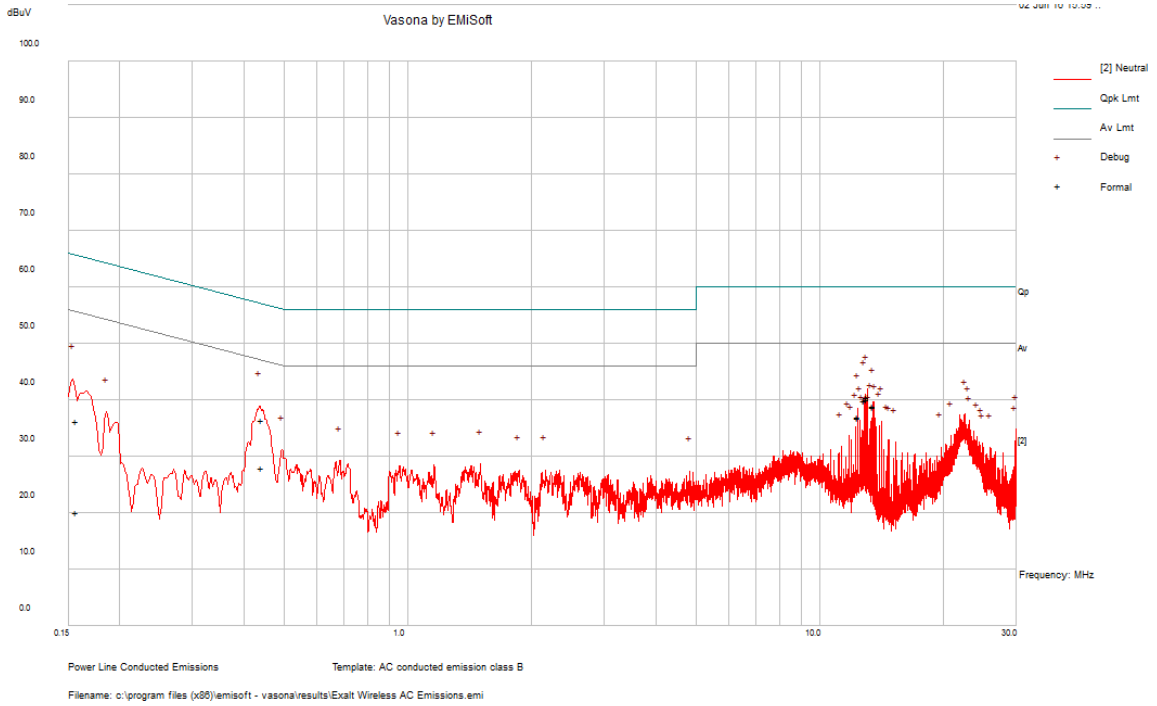
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
12.70206	34.42	Line	60	-25.58	QP
13.33714	36.09	Line	60	-23.91	QP
12.86025	39.53	Line	60	-20.47	QP
13.17487	32.97	Line	60	-27.03	QP
13.80857	25.19	Line	60	-34.81	QP
12.2213	34.68	Line	60	-25.32	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
12.70206	33.45	Line	50	-16.55	Ave.
13.33714	35.67	Line	50	-14.33	Ave.
12.86025	39.47	Line	50	-10.53	Ave.
13.17487	32.21	Line	50	-17.79	Ave.
13.80857	23.47	Line	50	-26.53	Ave.
12.2213	34.07	Line	50	-15.93	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
13.01434	40.58	Neutral	60	-19.42	QP
0.441229	36.38	Neutral	57.04	-20.66	QP
12.85513	39.99	Neutral	60	-20.01	QP
13.48887	38.76	Neutral	60	-21.24	QP
12.37849	37.11	Neutral	60	-22.89	QP
0.156467	36.33	Neutral	65.65	-29.32	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
13.01434	40.15	Neutral	50	-9.85	Ave.
0.441229	28.1	Neutral	47.04	-18.94	Ave.
12.85513	39.98	Neutral	50	-10.02	Ave.
13.48887	38.91	Neutral	50	-11.09	Ave.
12.37849	36.95	Neutral	50	-13.05	Ave.
0.156467	20.04	Neutral	55.65	-35.61	Ave.

7 FCC §15.209 & §15.407(b) - Spurious Radiated Emissions

7.1 Applicable Standard

As Per FCC §15.205(a) except as show 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	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.209: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 Note 1	3
88 - 216	150 Note 1	3
216 - 960	200 Note 1	3
Above 960	500	3

Note 1: 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.

As per FCC Part 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 e.i.r.p. of −27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

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

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15.407 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter or 1.5 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

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

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 3MHz / Sweep = 100ms
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class A. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2015-07-23	1 year
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2015-06-22	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2015-07-11	2 Years
EMCO	Antenna, Horn	3115	9511-4627	2016-01-28	2 years
Agilent	Amplifier, Pre	8447D	2944A10187	2016-03-23	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	2016-07-28	1 year
-	SMA cable	-	C0002	Each time[1]	N/A
IW Microwave	High Frequency Cable	DC-1438	SPS-2303-3840-SPS	2016-01-18	1 year
IW	AOBOR Hi frequency Co AX CabelCable	DC 1531	KPS-1501A3960KPS	2015-08-10	1 Year
Agilent	Pre-Amplifier	8449B	3008A01978	2015-09-02	1year
Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2013-09-20	3 year
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2013-09-20	3 year
Wisewave	Amplifier, Low Noise	ALN-33144030-01	11424-01	2015-04-28	2 year
Wisewave	Amplifier, Low Noise	ALN-22093530-01	12263-01	2016-05-16	1 year

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

7.6 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Todd Moy from 2016-06-03 at 5 meter 3.

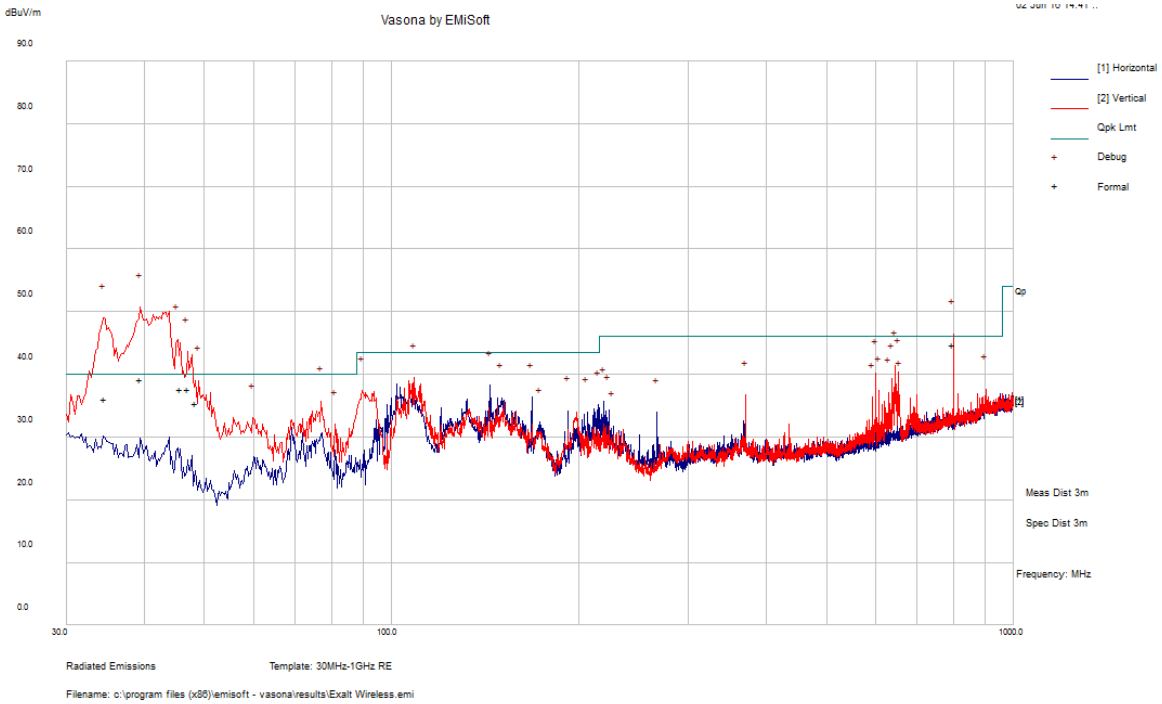
7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.407 standard's radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.83	39.517	Vertical	802.11a mode, 5240 MHz

7.8 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comments (PK/QP/Ave.)
39.517	39.17	100	V	252	40	-0.83	QP
34.60525	36.1	106	V	212	40	-3.9	QP
45.72675	37.64	187	V	294	40	-2.36	QP
47.055	37.71	132	V	319	40	-2.29	QP
800.0108	44.68	109	H	126	46	-1.32	QP
48.442	35.47	101	V	284	40	-4.53	QP

2) 1–40 GHz

802.11a mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
10360	47.52	0	100	V	38.25	9.43	34.41	60.80	68.26	-7.46	Peak
10360	47.01	0	100	H	38.25	9.43	34.41	60.29	68.26	-7.97	Peak
15540	43.67	0	100	V	39.18	10.83	33.73	59.95	74.00	-14.05	Peak
15540	44.00	0	100	H	39.18	10.83	33.73	60.28	74.00	-13.72	Peak
15540	28.46	0	100	V	39.18	10.83	33.73	44.74	54.00	-9.26	Ave
15540	28.40	0	100	H	39.18	10.83	33.73	44.68	54.00	-9.32	Ave
Middle Channel 5200 MHz											
10400	46.47	0	100	V	38.25	9.43	34.41	59.75	68.26	-8.51	Peak
10400	46.44	0	100	H	38.25	9.43	34.41	59.72	68.26	-8.54	Peak
15600	43.93	0	100	V	39.18	10.83	33.73	60.21	74.00	-13.79	Peak
15600	44.14	0	100	H	39.18	10.83	33.73	60.42	74.00	-13.58	Peak
15600	29.30	0	100	V	39.18	10.83	33.73	45.58	54.00	-8.42	Ave
15600	29.34	0	100	H	39.18	10.83	33.73	45.62	54.00	-8.38	Ave
High Channel 5240 MHz											
10480	47.12	0	100	V	38.33	10.07	34.40	61.11	68.26	-7.15	Peak
10480	46.99	0	100	H	38.33	10.07	34.40	60.98	68.26	-7.28	Peak
15720	44.54	0	100	V	39.18	10.83	33.89	60.66	74.00	-13.34	Peak
15720	43.93	0	100	H	39.18	10.83	33.89	60.05	74.00	-13.95	Peak
15720	29.35	0	100	V	39.18	10.83	33.89	45.47	54.00	-8.53	Ave
15720	29.41	0	100	H	39.18	10.83	33.89	45.53	54.00	-8.47	Ave

802.11n20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz											
10360	47.63	0	100	V	38.25	9.43	34.41	60.91	68.26	-7.35	Peak
10360	47.08	0	100	H	38.25	9.43	34.41	60.36	68.26	-7.90	Peak
15540	42.58	0	100	V	39.18	10.83	33.73	58.86	74.00	-15.14	Peak
15540	42.93	0	100	H	39.18	10.83	33.73	59.21	74.00	-14.79	Peak
15540	28.12	0	100	V	39.18	10.83	33.73	44.40	54.00	-9.60	Ave
15540	27.96	0	100	H	39.18	10.83	33.73	44.24	54.00	-9.76	Ave
Middle Channel 5200 MHz											
10400	47.16	0	100	V	38.25	9.43	34.41	60.44	68.26	-7.82	Peak
10400	46.65	0	100	H	38.25	9.43	34.41	59.93	68.26	-8.33	Peak
15600	43.37	0	100	V	39.18	10.83	33.73	59.65	74.00	-14.35	Peak
15600	43.85	0	100	H	39.18	10.83	33.73	60.13	74.00	-13.87	Peak
15600	28.86	0	100	V	39.18	10.83	33.73	45.14	54.00	-8.86	Ave
15600	28.69	0	100	H	39.18	10.83	33.73	44.97	54.00	-9.03	Ave
High Channel 5240 MHz											
10480	44.92	0	100	V	38.33	10.07	34.40	58.91	68.26	-9.35	Peak
10480	45.48	0	100	H	38.33	10.07	34.40	59.47	68.26	-8.79	Peak
15720	42.47	0	100	V	39.18	10.83	33.89	58.59	74.00	-15.41	Peak
15720	43.21	0	100	H	39.18	10.83	33.89	59.33	74.00	-14.67	Peak
15720	29.44	0	100	V	39.18	10.83	33.89	45.56	54.00	-8.44	Ave
15720	29.53	0	100	H	39.18	10.83	33.89	45.65	54.00	-8.35	Ave

802.11 n40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments (PK/Ave.)
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
5230 MHz											
10460	45.94	0	100	V	38.25	9.43	34.41	59.22	68.26	-9.04	Peak
10460	45.48	0	100	H	38.25	9.43	34.41	58.76	68.26	-9.50	Peak
15690	43.37	0	100	V	39.18	10.83	33.73	59.65	74	-14.35	Peak
15690	42.73	0	100	H	39.18	10.83	33.73	59.01	74	-14.99	Peak
15690	29.69	0	100	V	39.18	10.83	33.73	45.97	54	-8.03	Ave
15690	29.73	0	100	H	39.18	10.83	33.73	46.01	54	-7.99	Ave

Note 1: Any emissions above 18 GHz are noise floor.
Note 2: Duty Cycle Correction Factor has been added to the measurements.
Note 3: Termination method was used to show compliance.
Note 4: The worst case in spatial streams was used for testing.

8 FCC §15.407(a) (5) - 26 dB & 99% Occupied Bandwidth

8.1 Applicable Standards

According to FCC §15.407(a) (5): Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 26 dB from the reference level. Record the frequency difference as the minimum emission or emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2016-03-24	1year
-	U. FL to SMA pigtail	-	-	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

8.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Todd Moy on 2016-05-23 at RF site.

8.5 Test Results

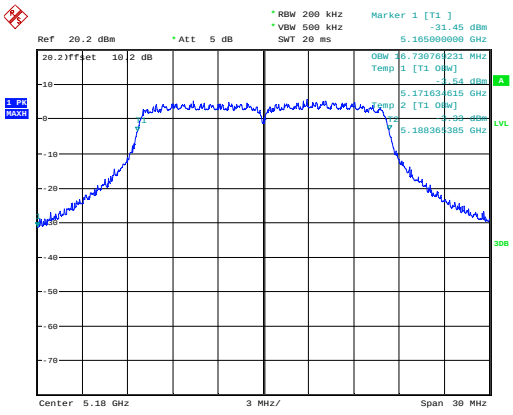
Please refer to the following tables and plots.

Channel	Frequency (MHz)	99% OBW (MHz)		26 dB OBW (MHz)	
		Chain 0	Chain 1	Chain 0	Chain 1
802.11 a mode					
36	5180	16.7308	16.6346	21.9712	22.3077
40	5200	16.7308	16.6346	22.4808	23.0769
48	5240	16.8269	16.7308	23.6058	25.0481
802.11n20 mode					
36	5180	17.8365	17.7885	23.3654	23.6058
40	5200	17.8365	17.7885	23.4615	23.4135
48	5240	17.8365	18.1250	25.1923	30.9295
802.11n40 mode					
46	5230	36.9231	36.7308	47.3077	48.0769

802.11a mode

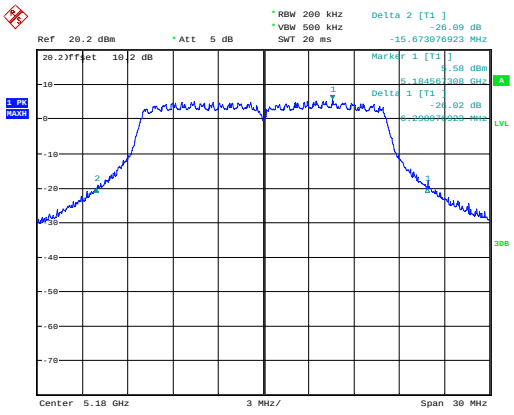
5180 MHz

Chain 0 OBW



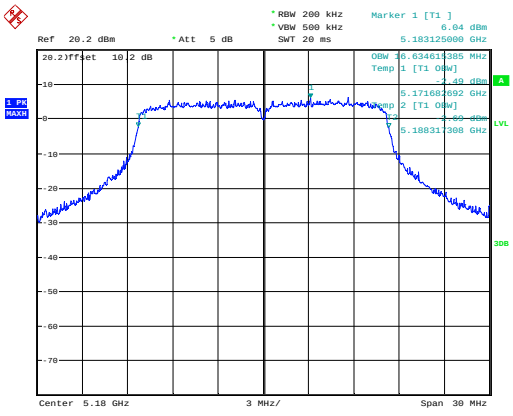
Date: 23.MAY.2016 03:57:08

Chain 0 26 dB OBW



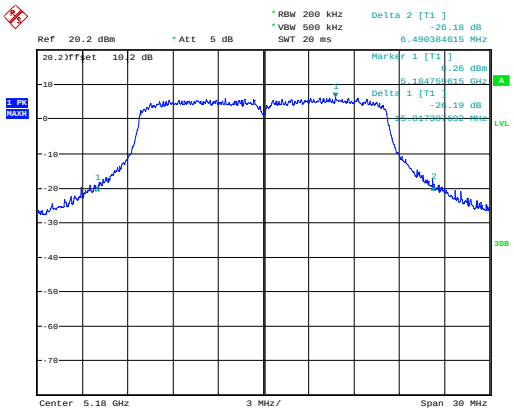
Date: 23.MAY.2016 03:58:29

Chain 1 OBW



Date: 23.MAY.2016 05:09:17

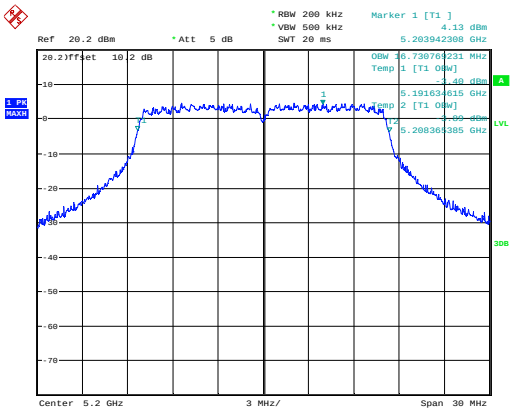
Chain 1 26 dB OBW



Date: 23.MAY.2016 05:08:50

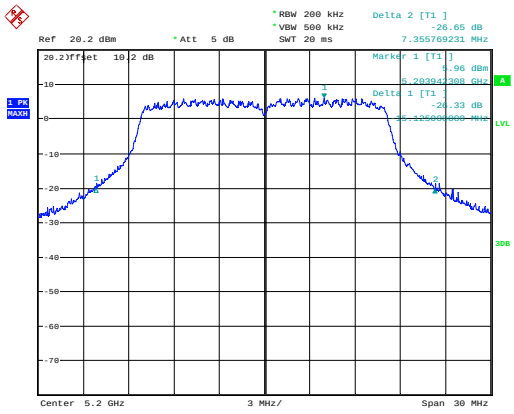
5200 MHz

Chain 0 OBW



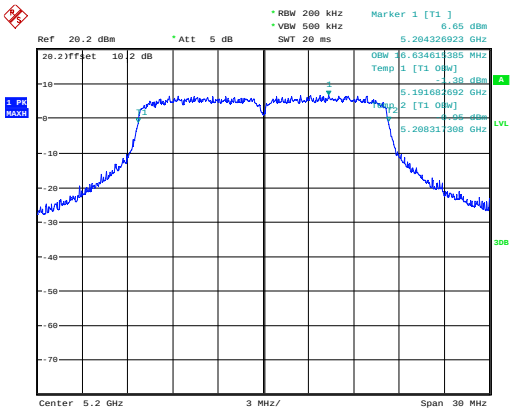
Date: 23.MAY.2016 04:11:01

Chain 0 26 dB OBW



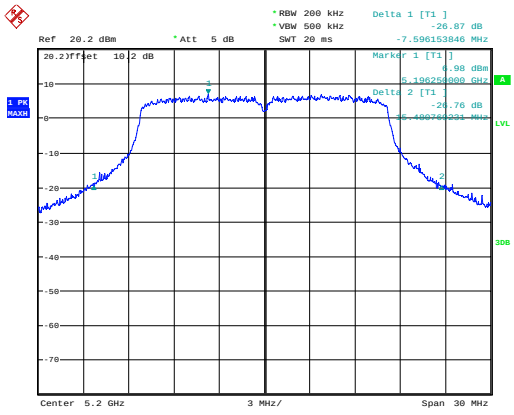
Date: 23.MAY.2016 04:10:05

Chain 1 OBW



Date: 23.MAY.2016 05:10:02

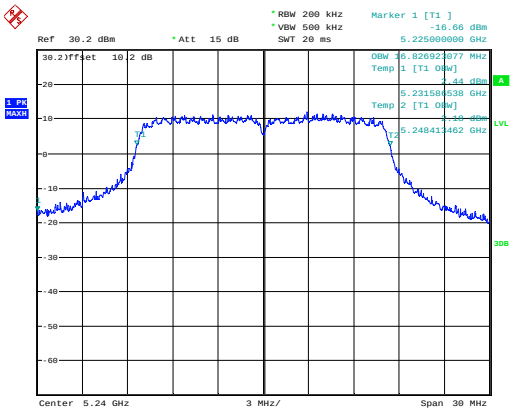
Chain 1 26 dB OBW



Date: 23.MAY.2016 05:11:16

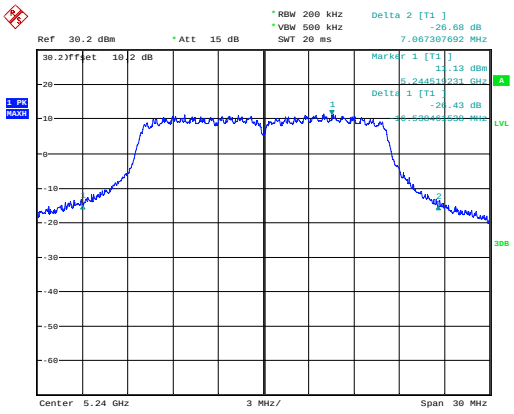
5240 MHz

Chain 0 OBW



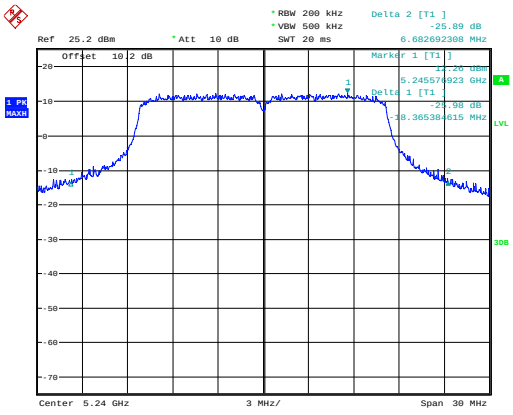
Date: 23.MAY.2016 04:17:17

Chain 0 26 dB OBW



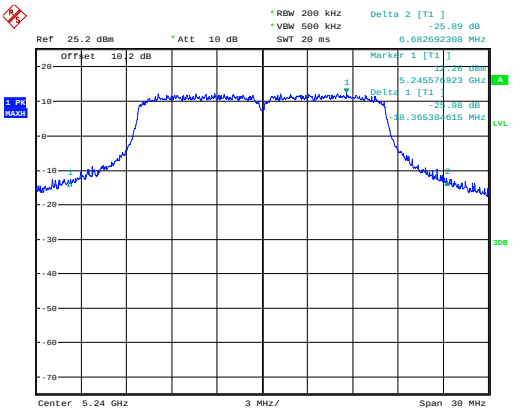
Date: 23.MAY.2016 04:18:04

Chain 1 OBW



Date: 23.MAY.2016 05:13:07

Chain 1 26 dB OBW

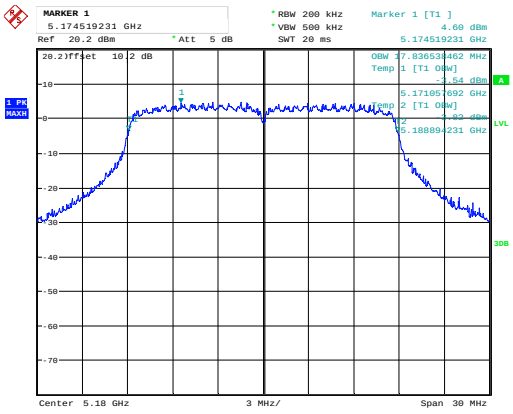


Date: 23.MAY.2016 05:13:07

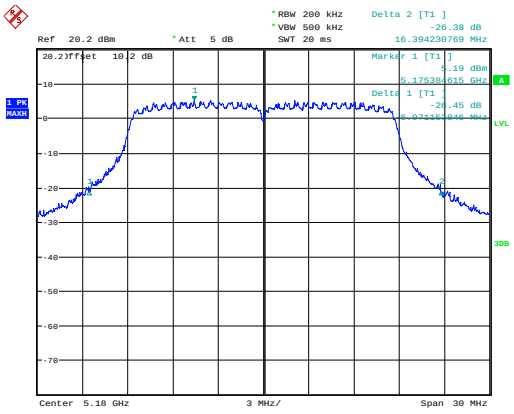
802.11n20 mode

5180 MHz

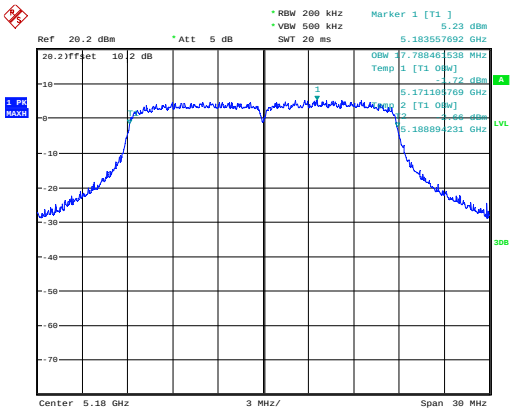
Chain 0 OBW



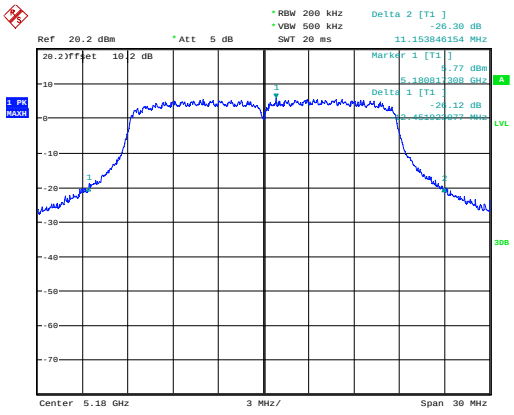
Chain 0 26 dB OBW



Chain 1 OBW

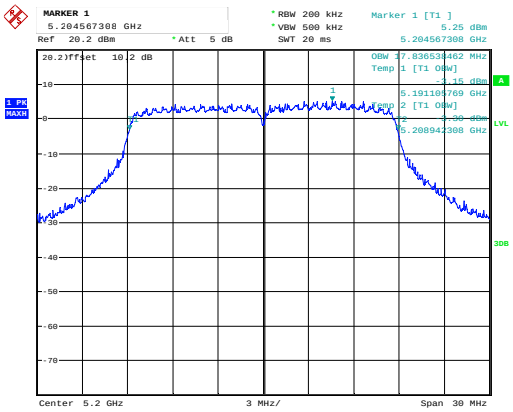


Chain 1 26 dB OBW



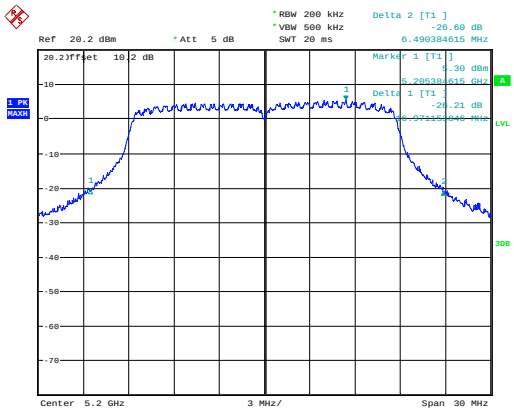
5200 MHz

Chain 0 OBW



Date: 23.MAY.2016 04:27:52

Chain 0 26 dB OBW



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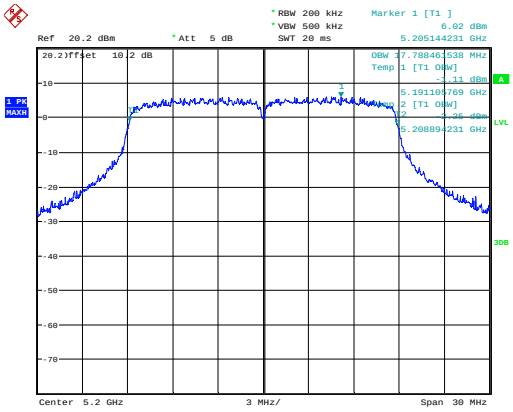
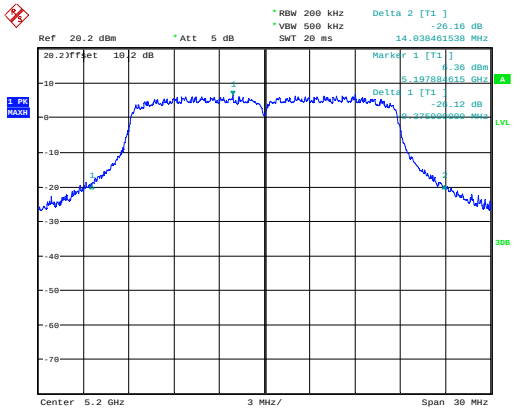
Chain 1 OBW



Date: 23.MAY.2016 04:50:09

Chain 1 26 dB OBW



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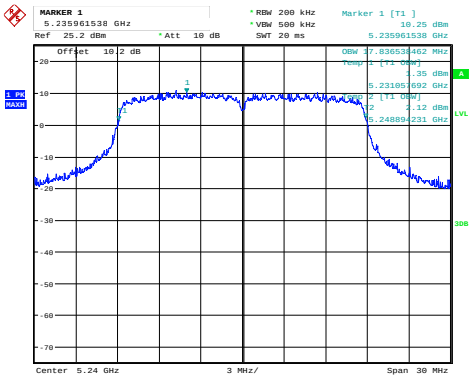
5240 MHz

Chain 0 OBW



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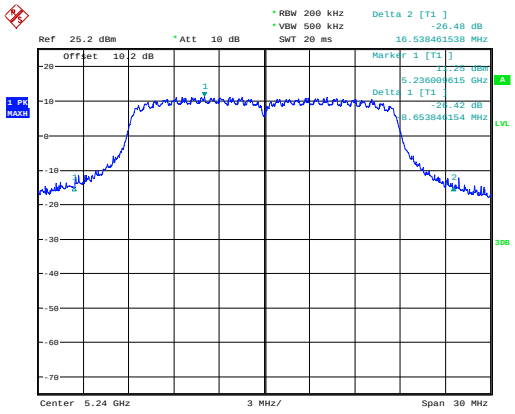
Chain 0 26 dB OBW



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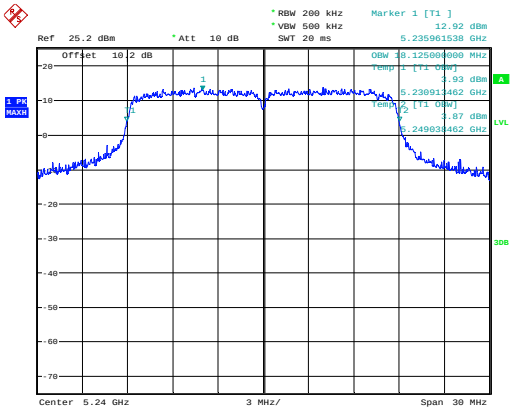
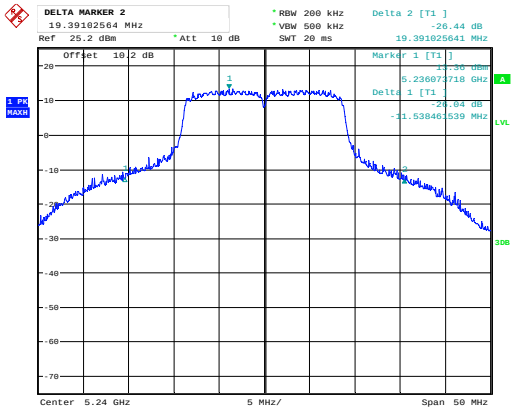
Chain 1 OBW



Date: 23.MAY.2016 04:42:07

Chain 1 26 dB OBW

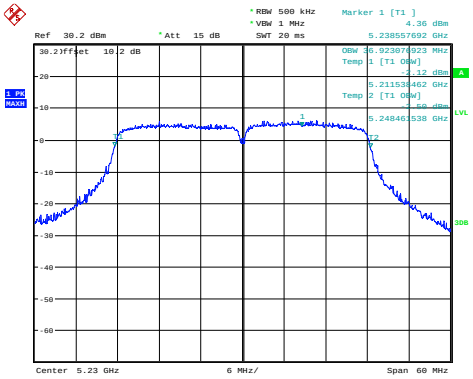


Date: 23.MAY.2016 04:44:48

802.11n40 mode

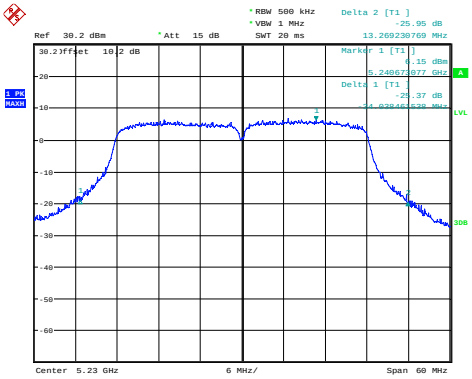
5230 MHz

Chain 0 OBW



Date: 23.MAY.2016 04:22:08

Chain 0 26 dB OBW



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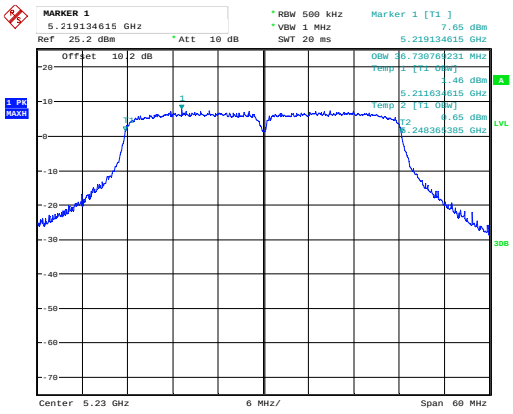
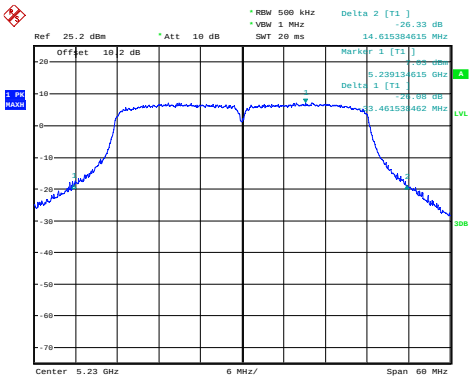
Chain 1 OBW



Date: 23.MAY.2016 05:21:22

Chain 1 26 dB OBW



Date: 23.MAY.2016 05:23:40

9 FCC §407(a) - Output Power

9.1 Applicable Standards

According to FCC §15.407(a)(1)(i):

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

According to FCC §15.407(a)(1)(iii):

For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

9.2 Measurement Procedure

1. Place the EUT on a bench 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 a power meter.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
ETS- Lingerin	Power Sensor	7002-006	160097	2014-10-21	2 years
-	U. FL to SMA pigtail	-	-	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

9.4 Test Environmental Conditions

Temperature:	22º C
Relative Humidity:	42 %
ATM Pressure:	102.7 KPa

The testing was performed by Todd Moy on 2016-05-19 in RF site.

9.5 Test Results

Low Gain Antenna

Frequency (MHz)	Conducted Average Power (dBm)		Total Average Power (dBm)	FCC Limit (dBm)
	Chain 0	Chain 1		
802.11a mode				
5180	15.79	14.84	18.35	23.5
5200	16.76	15.53	19.20	23.5
5240	14.69	14.22	17.47	23.5
802.11n20 mode				
5180 (N_{SS}=1)	15.73	14.72	18.26	23.5
5180 (N_{SS}=2)	15.75	14.72	18.28	26.5
5200 (N_{SS}=1)	15.54	15.33	18.45	23.5
5200 (N_{SS}=2)	15.55	15.34	18.46	26.5
5240 (N_{SS}=1)	14.27	13.91	17.10	23.5
5240 (N_{SS}=2)	20.91	21.59	24.27	26.5
802.11n40 mode				
5230 (N_{SS}=1)	16.18	17.82	20.09	23.5
5230 (N_{SS}=2)	16.15	17.8	20.06	26.5

Note:
Based on KDB 622911 D01 Multiple Transmitter Output v02r01, section F) 2) e) i), Directional Gain = $Gain_{ant}$ + 10Log (N_{ant}/N_{SS}), there fore, for NSS=1, Two 9.5 dBi antennas will be used with the EUT; therefore, the combined effective antenna gain is 12.5 dBi. The conducted output power limit is 30 dBm, since the antenna gain is greater than 6 dBi; the output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The effective antenna gain is 12.5 dBi; therefore, the conducted output power limit is reduced to 23.5 dBm. For NSS=2, the limit is 26.5dBm.

High Gain Antenna

Frequency (MHz)	Conducted Average Power (dBm)		Total Average Power (dBm)	FCC Limit (dBm)
	Chain 0	Chain 1		
802.11a mode				
5180	-4.23	-3.07	-0.60	25
5200	-4.22	-3.52	-0.85	25
5240	1.78	2.01	4.91	25
802.11n20 mode				
5180 (N_{SS}=1)	-4.31	-3.89	-1.08	25
5180 (N_{SS}=2)	-4.45	-3.87	-1.14	25
5200 (N_{SS}=1)	-4.29	-3.76	-1.01	25
5200 (N_{SS}=2)	-4.3	-3.72	-0.99	25
5240 (N_{SS}=1)	3.75	2.31	6.10	25
5240 (N_{SS}=2)	3.7	2.3	6.07	25
802.11n40 mode				
5230 (N_{SS}=1)	-1.36	-2.86	0.96	25
5230 (N_{SS}=2)	-1.35	-2.88	0.96	25

Note: The conducted output power limit is 30 dBm, based on ECFR 15.407 (a) (1) (iii), for fixed point-to-point device, the conducted output power should be reduced by 1 dB for each dB the directional gain exceed 23 dBi. The effective antenna gain is 28 dBi; therefore, the conducted output power limit is reduced to 23 dBm.

Note: Duty cycle correction factor has already been added to the measurements.

Maximum EIRP at Elevation Greater Than 30°

Antenna Type	Maximum Average Power (dBm)	Maximum Antenna Gain Above 30° (dBi)	EIRP (dBm)	FCC Limit (dBm)
Monopole (9.5 dBi antenna)	24.27	-5.13	19.14	21
Directional (28 dBi antenna)	6.10	8.95	15.05	21

10 FCC §15.407(a) - Power Spectral Density

10.1 Applicable Standards

According to FCC §15.407(a)(1)(i):

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

According to FCC §15.407(a)(1)(iii):

For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

10.2 Measurement Procedure

(i) Set span to encompass the entire emission bandwidth (EBW) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
(ix) Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2015-06-22	1 year
-	U. FL to SMA pigtail	-	-	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

10.4 Test Environmental Conditions

Temperature:	22-24 ºC
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Todd Moy on 2016-06-08 at RF site.

10.5 Test Results

Low Gain Antenna

Frequency (MHz)	Conducted Power Density (dBm)		Total Power Density (dBm)	FCC Limit (dBm)
	Chain 0	Chain 1		
802.11a mode				
5180	7.865	4.392	9.48	10.5
5200	4.848	5.614	8.26	10.5
5240	2.824	2.467	5.66	10.5
802.11n20 mode				
5180	4.443	4.056	7.26	13.5
5200	5.463	3.611	7.65	13.5
5240 (N_{ss}=2)	9.569	9.171	12.38	13.5
802.11n40 mode				
5230	2.261	5.242	7.01	13.5

Note: Based on KDB 622911 D01 Multiple Transmitter Output v02r01, section F) 2) e) i), Directional Gain = $Gain_{ant}$ + 10Log (N_{ant}/N_{SS}), there fore, for NSS=1, Two 9.5 dBi antennas will be used with the EUT; therefore, the combined effective antenna gain is 12.5 dBi. The PSD limit is 17 dBm, since the antenna gain is greater than 6 dBi; the output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The effective antenna gain is 12.5 dBi; therefore, the conducted output power limit is reduced to 10.5 dBm. For NSS=2, the limit is 13.5dBm. All the testing was done with worst case NSS=2 based on the power measurement result.

High Gain Antenna

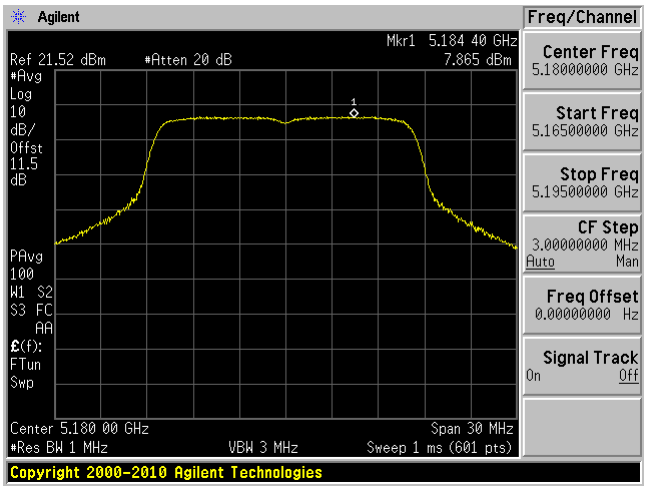
Frequency (MHz)	Conducted Power Density (dBm)		Total Power Density (dBm)	FCC Limit (dBm)
	Chain 0	Chain 1		
802.11a mode				
5180	-14.830	-14.936	-11.87	12
5200	-15.328	-15.179	-12.24	12
5240	-8.809	-8.735	-5.76	12
802.11n20 mode				
5180	-15.037	-14.819	-11.92	12
5200	-15.603	-14.870	-12.21	12
5240	-9.083	-8.9030	-5.98	12
802.11n40 mode				
5230	-14.655	-17.673	-12.90	12

Note: The PSD limit is 17 dBm, based on ECFR 15.407 (a) (1) (iii), for fixed point-to-point device, the conducted output power should be reduced by 1 dB for each dB the directional gain exceed 23 dBi. The effective antenna gain is 28 dBi; therefore, the PSD limit is reduced to 12 dBm. All the testing was done with worst case NSS=1 based on power measurement result.

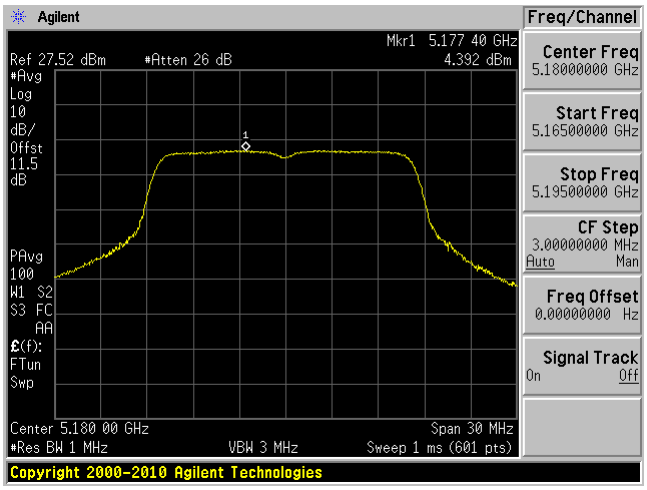
Low Gain Antenna

802.11a mode 5180 MHz

Chain 0

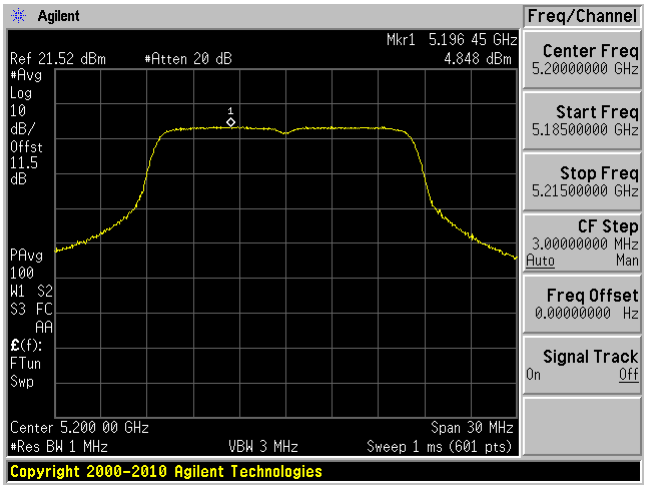


Chain 1

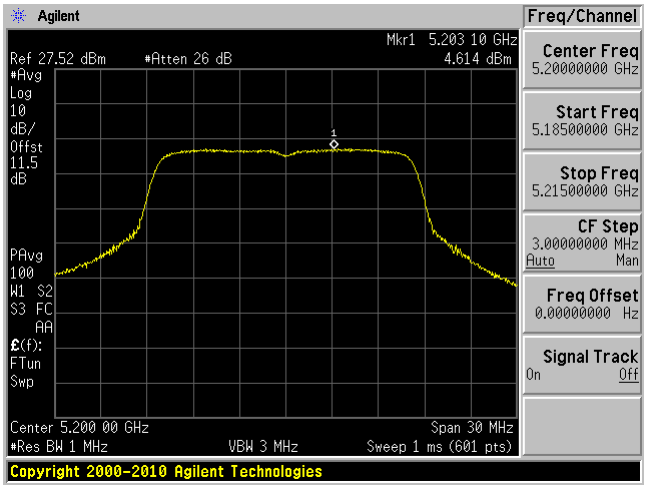


802.11a mode 5200 MHz

Chain 0

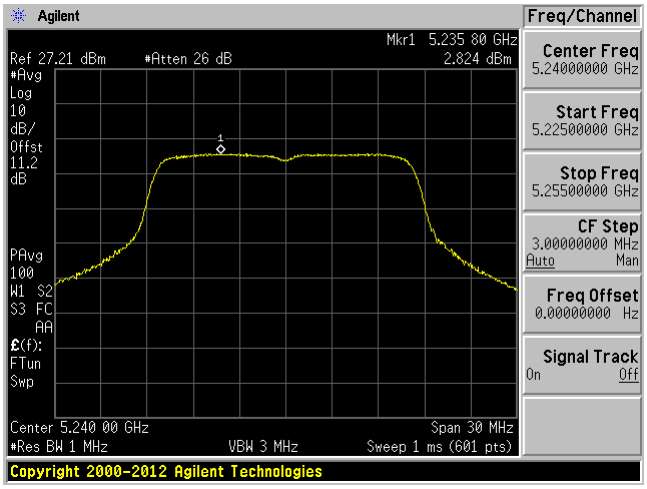


Chain 1



802.11a mode 5240 MHz

Chain 0



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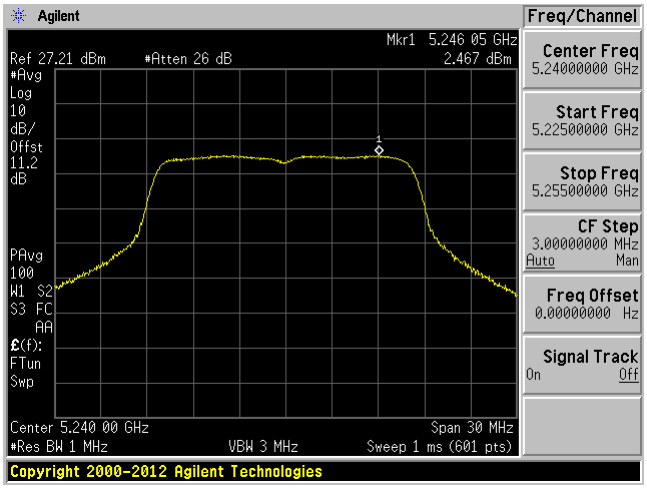
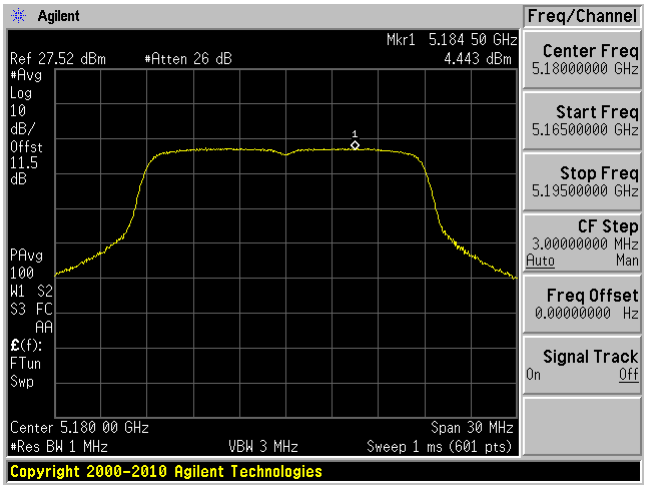


802.11n20 mode 5180 MHz

Chain 0



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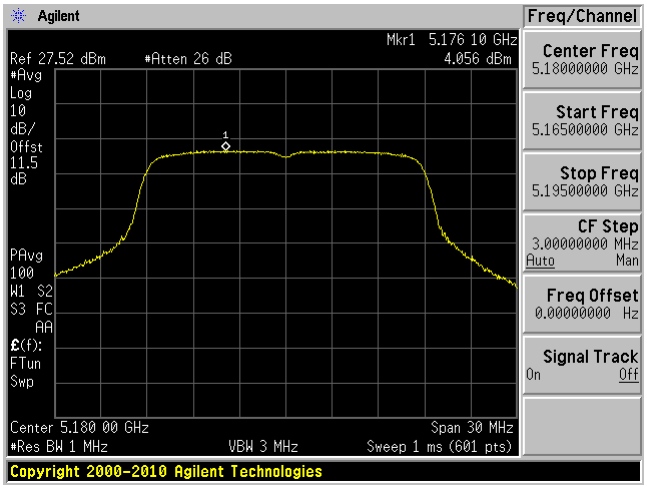
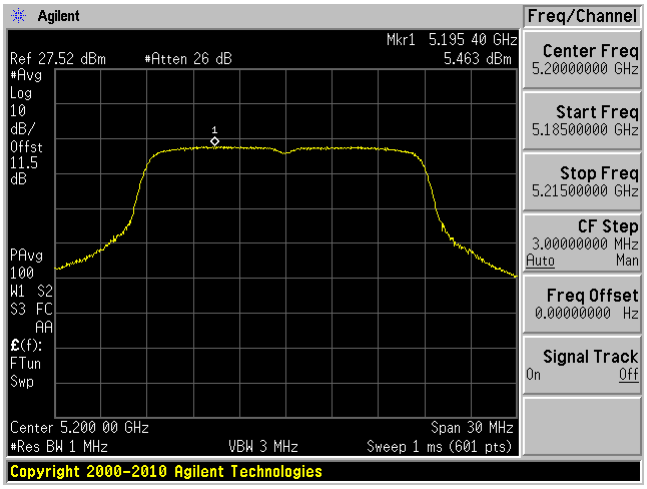


802.11n20 mode 5200 MHz

Chain 0



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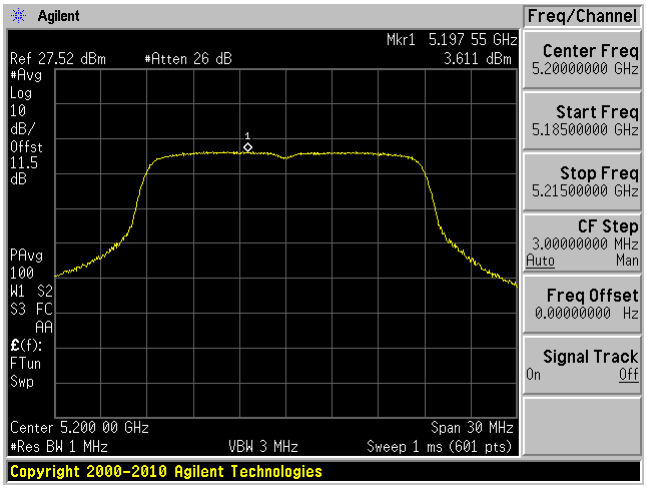
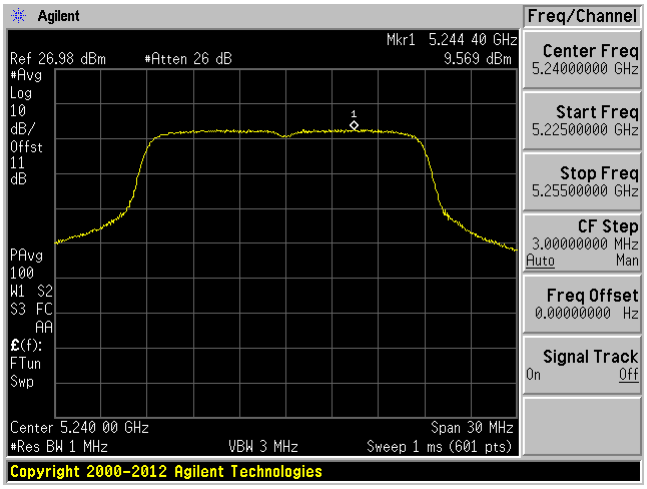
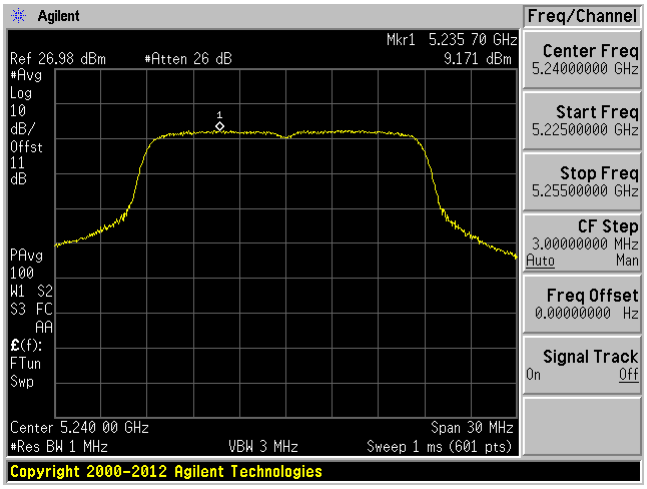


802.11n20 mode 5240 MHz, N_{ss}=2

Chain 0

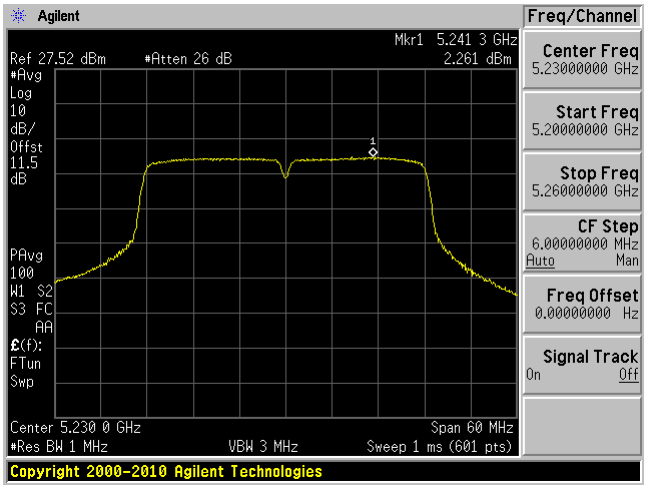


Chain 1

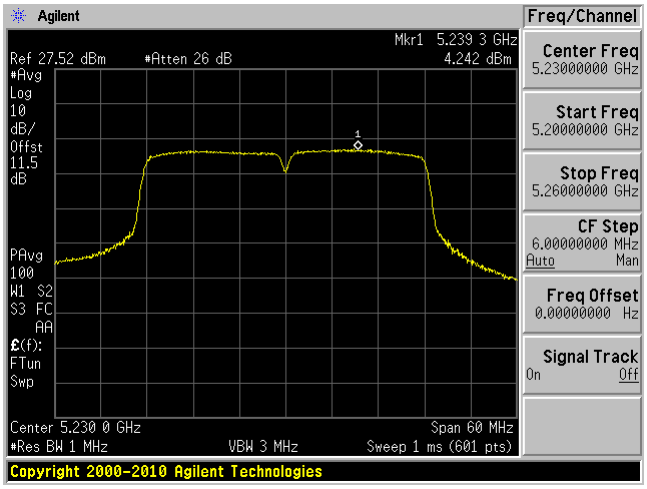


802.11n40 mode 5230 MHz

Chain 0



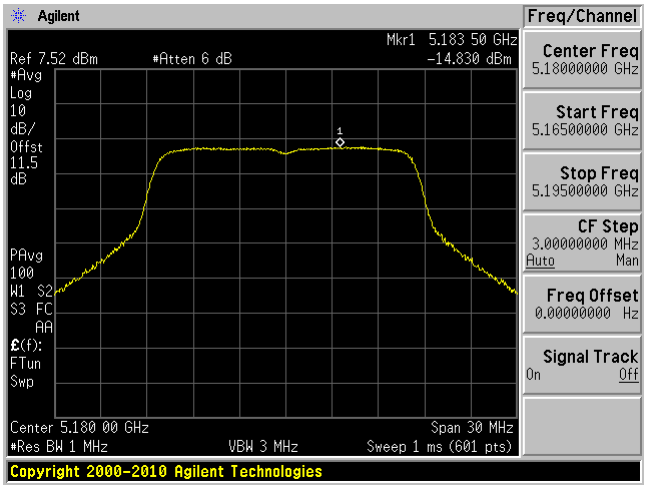
Chain 1



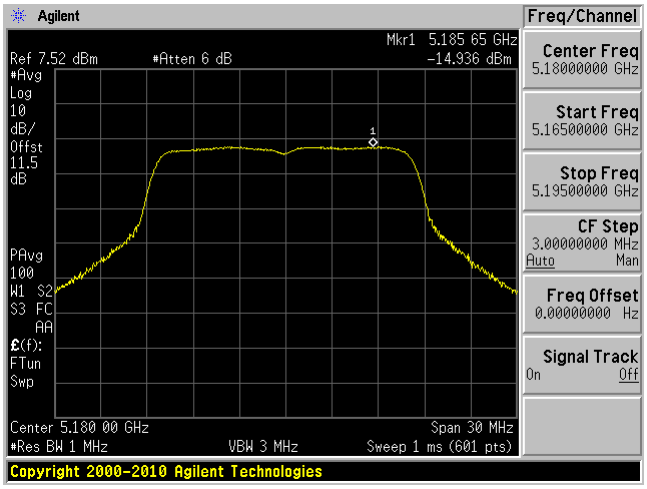
High Antenna Gain

802.11a mode 5180 MHz

Chain 0

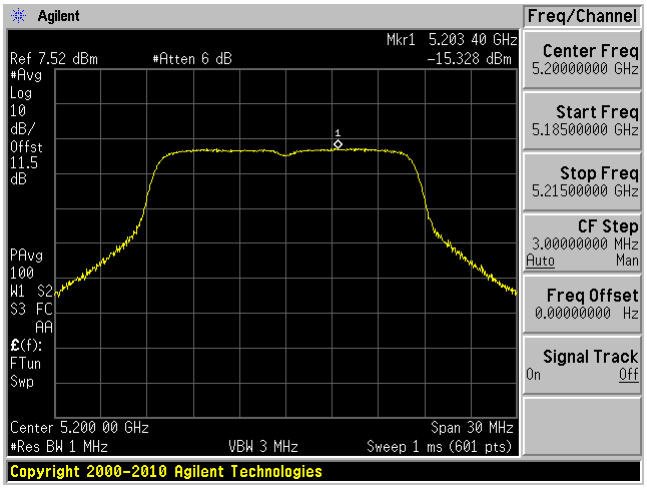


Chain 1

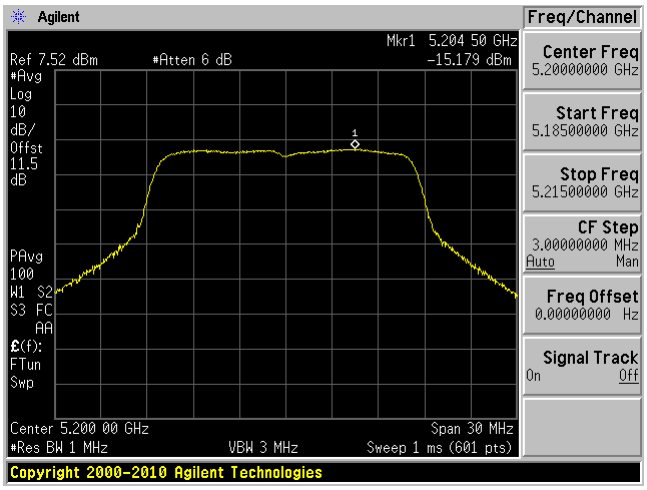


802.11a mode 5200 MHz

Chain 0

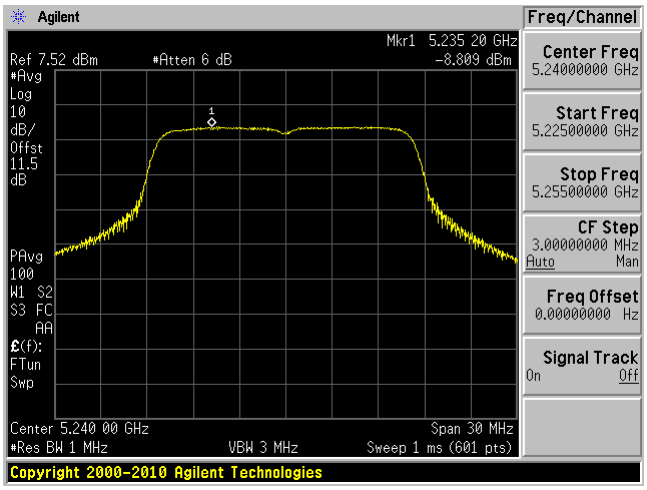


Chain 1

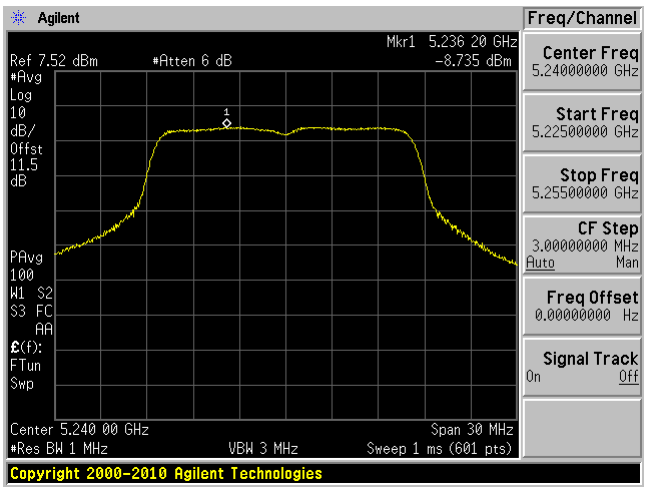


802.11a mode 5240 MHz

Chain 0

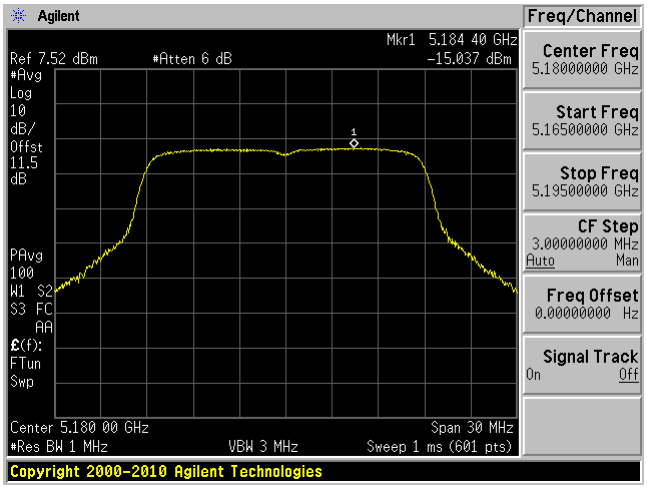


Chain 1

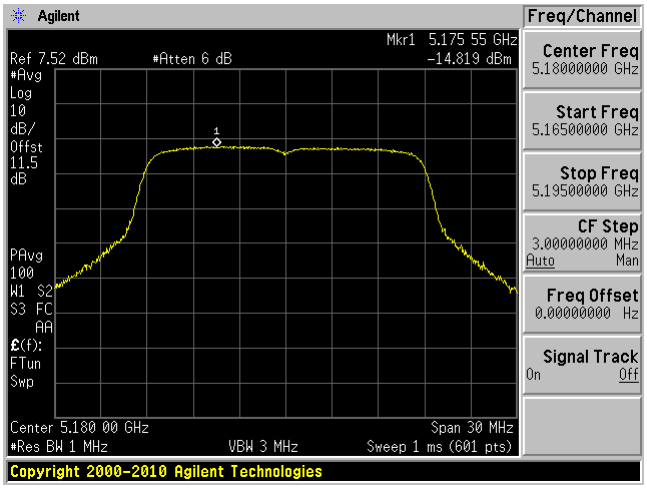


802.11n20 mode 5180 MHz

Chain 0

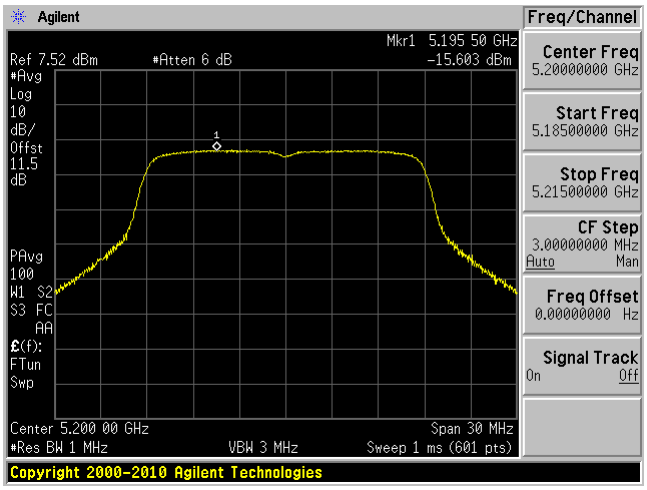


Chain 1

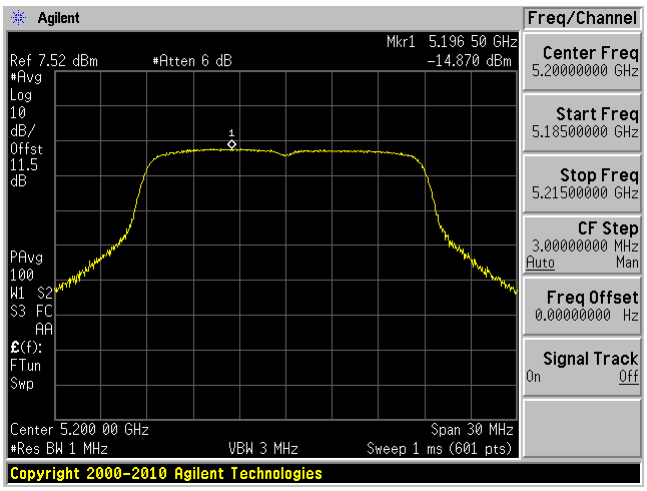


802.11n20 mode 5200 MHz

Chain 0

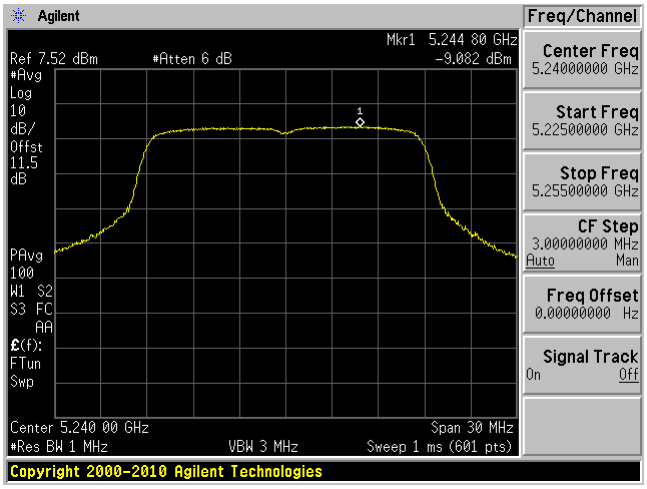


Chain 1

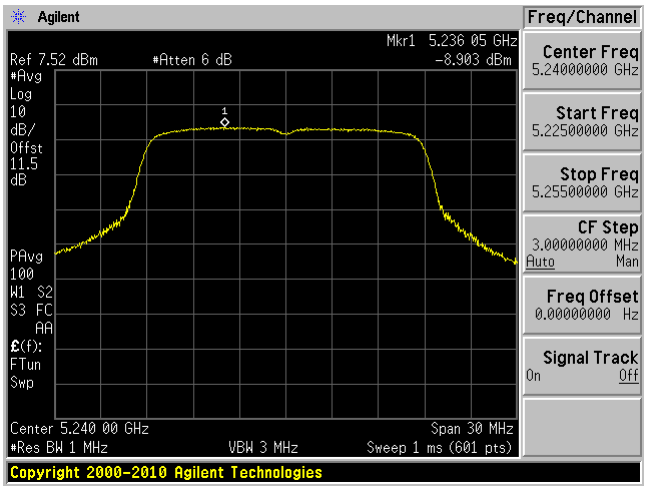


802.11n20 mode 5240 MHz

Chain 0

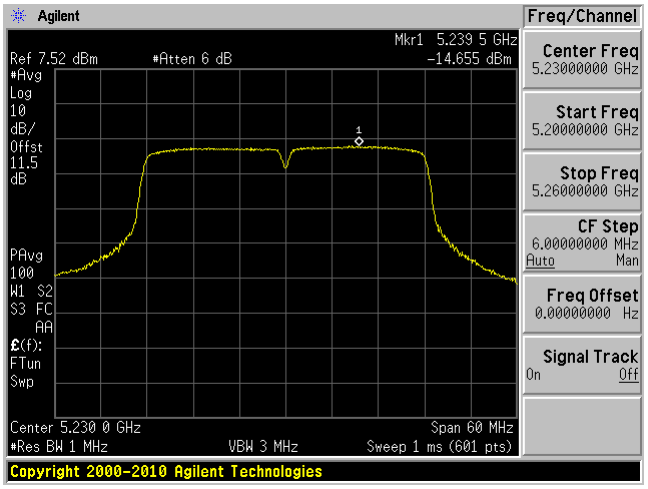


Chain 1

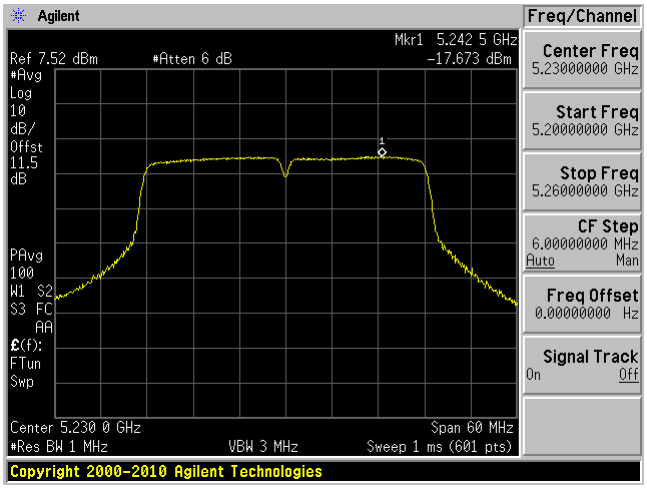


802.11n40 mode 5230 MHz

Chain 0



Chain 1



11 FCC §15.407(b) - Out of Band Emissions

11.1 Applicable Standards

According to FCC §15.407(b):

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 e.i.r.p. of −27 dBm/MHz.

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

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

11.2 Measurement Procedure

Add a correction factor (antenna gain+ Attenuator loss+cable loss) to the offset of the spectrum analyzer.
Integration Method

1. For peak emissions measurements, follow the procedures described in section H)5), "Procedures for Peak Unwanted Emissions Measurements above 1000 MHz", except for the following changes:
- Set RBW = 100 kHz
- Set VBW = 3RBW
- Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured. CAUTION: You must ensure that the spectrum analyzer or EMI receiver is set for peak-detection and max-hold for this measurement.
2. For average emissions measurements, follow the procedures described in section H)6), "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes:
- Set RBW = 100 kHz
- Set VBW = 3RBW
- Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2015-06-22	1 year
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2016-03-24	1year
HP	Amplifier, Pre	8449B	3147A00400	2016-03-30	1 year
-	U. FL to SMA pigtail	-	-	Each time[1]	N/A
-	10dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

11.4 Test Environmental Conditions

Temperature:	22-24º C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by Todd Moy on 2016-06-09 at RF site.

11.5 Test Results

Band Edge Emissions

Low Gain Antenna

Modulation	Frequency (MHz)	Chain 0 Emissions (dBm/MHz)	Chain 1 Emissions (dBm/MHz)	Total Emission (dBm/MHz)	Total EIRP Emissions (dBm/MHz)	Limit (dBmMHz)
802.11a	5180	-54	-50.63	-48.99	-36.49	-27
	5240	-60.38	-58.25	-56.18	-43.68	-27
802.11n20	5180	-52.81	-48.86	-47.39	-34.89	-27
	5240 (N_{ss}=2)	-54.17	-54.37	-51.26	-41.76	-27
802.11n40	5230 (lower edge)	-54.72	-50.27	-48.94	-36.44	-27
	5230 (upper edge)	-57.9	-58.17	-55.02	-42.52	-27

High Gain Antenna

Modulation	Frequency (MHz)	Chain 0 Emissions (dBm/MHz)	Chain 1 Emissions (dBm/MHz)	Total Emission (dBm/MHz)	Total EIRP Emissions (dBm/MHz)	Limit (dBmMHz)
802.11a	5180	-72.94	-71.29	-69.03	-41.03	-27
	5240	-74.83	-69.21	-68.16	-40.16	-27
802.11n20	5180	-71.23	-70.3	-67.73	-39.73	-27
	5240	-70.16	-68.45	-66.21	-38.21	-27
802.11n40	5230 (lower edge)	-69.27	-68.37	-65.79	-37.79	-27
	5230 (upper edge)	-70.23	-68.9	-66.50	-38.50	-27

Note: all the testing was done with worst case based on power measurement result.

Emissions in the Restricted Band

Modulation	Frequency (MHz)	Chain 0 Emissions (dBm/MHz)	Chain 1 Emissions (dBm/MHz)	Maximum Emission (dBm/MHz)	Antenna Gain (dBi)	Maximum EIRP Emissions (dBm/MHz)	Limit (dBmMHz)
802.11a	5240	-55.771	-59.997	-54.38	12.5	-41.88	-41.26
802.11a	5240	-70.945	-74.308	-69.30	28	-41.3	-41.26
802.11n20	5240	-72.026	-75.546	-70.43	28	-42.43	-41.26

Note: The table above is to show that the emissions from the high channel of 802.11a and 802.11n20 comply with the average restricted band limit.

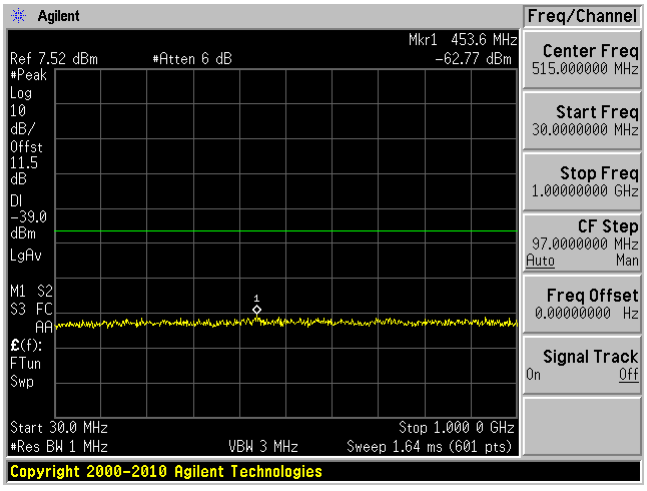
Please refer to the following plots.

TX Spurious Emissions:

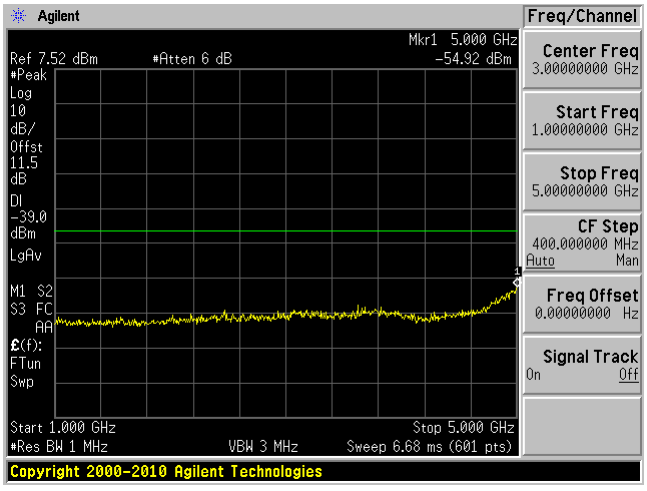
Low Gain Antenna

802.11a mode 5180 MHz Chain 0

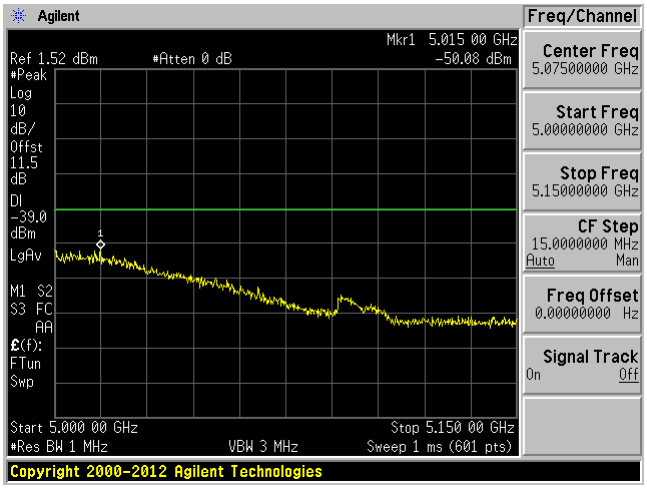
0 MHz – 1 GHz



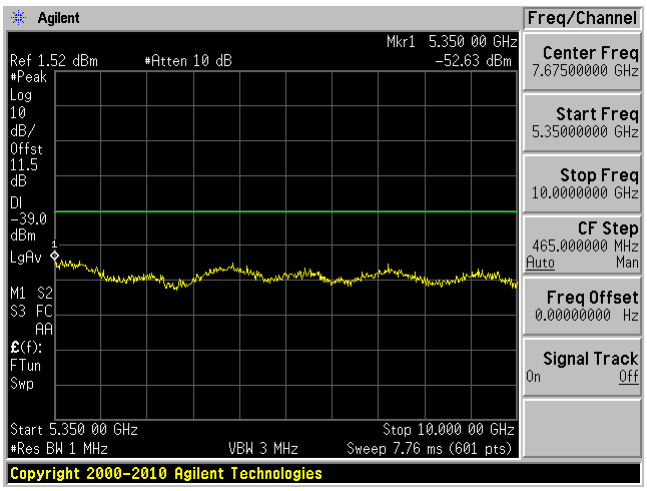
1 GHz – 5 GHz



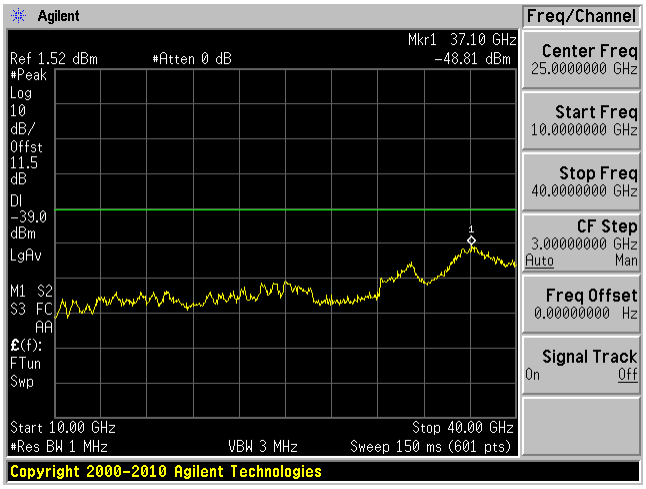
5 GHz – 5150 MHz



5350 MHz – 10 GHz

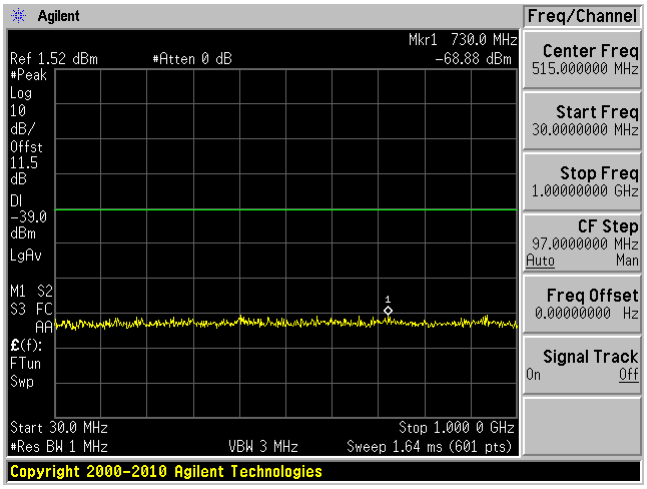


10 GHz – 40 GHz

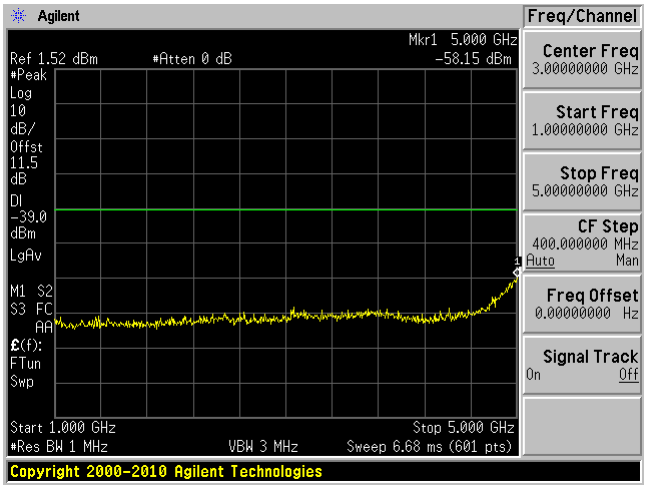


802.11a mode 5180 MHz Chain 1

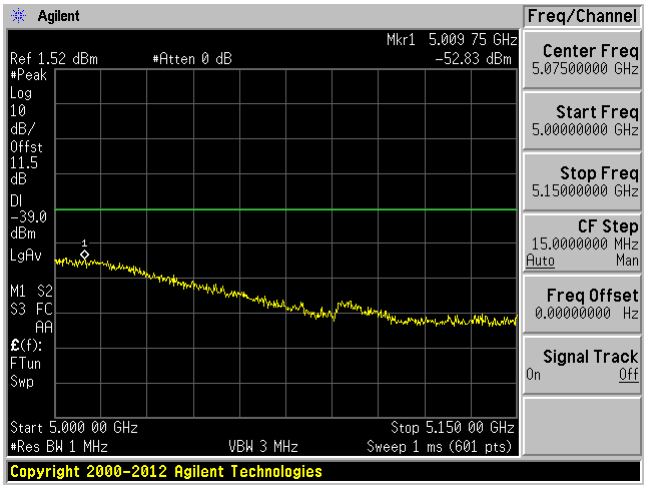
30 MHz – 1 GHz



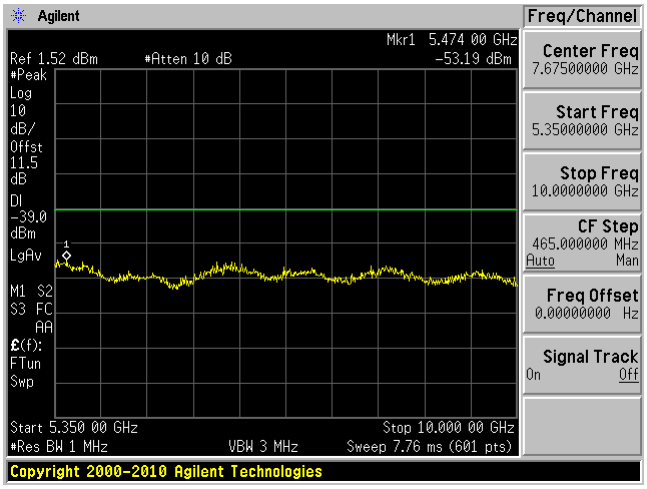
1 GHz – 5 GHz



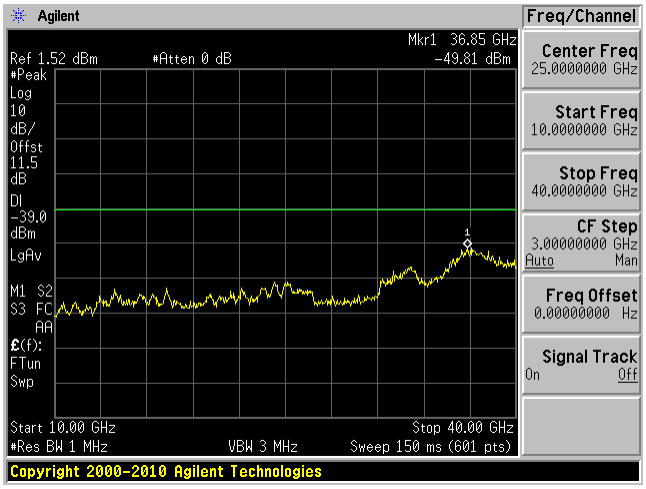
5 GHz – 5150 MHz



5350 MHz – 10 GHz

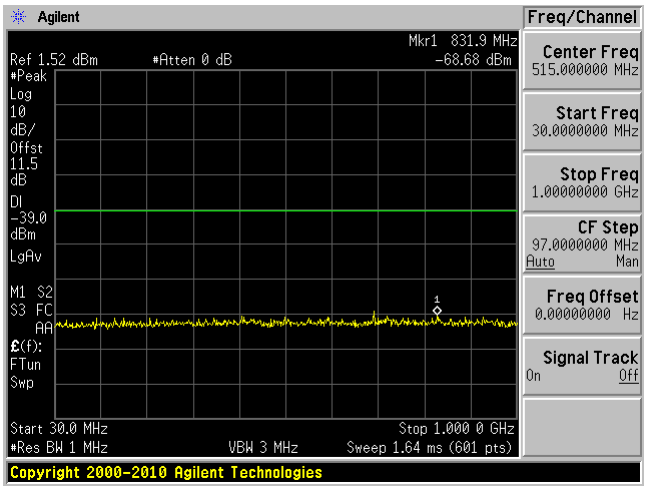


10 GHz – 40 GHz

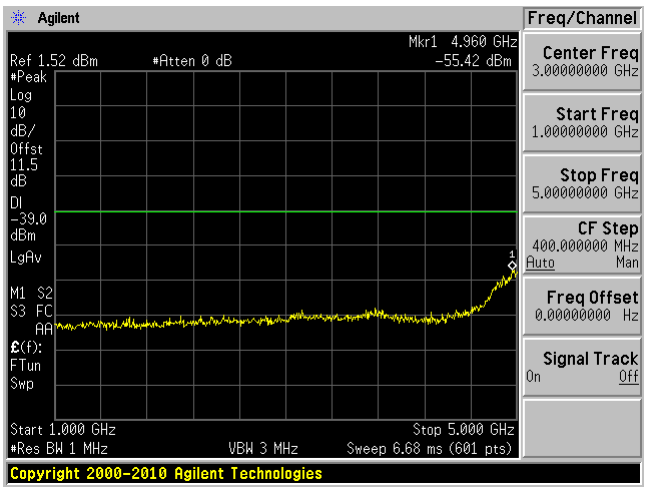


802.11a mode 5200 MHz Chain 0

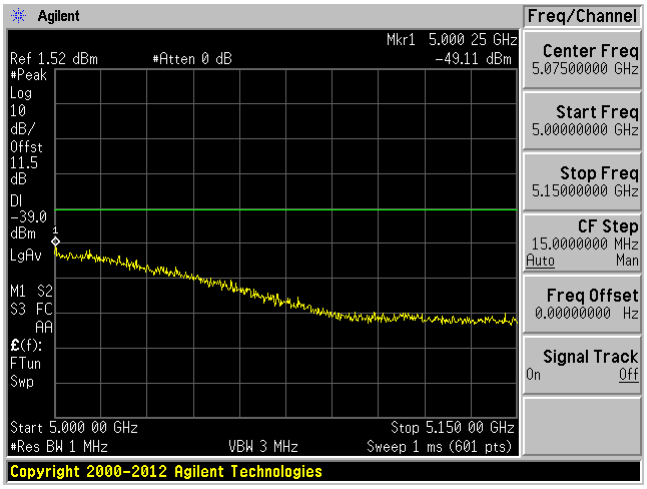
30 MHz – 1 GHz



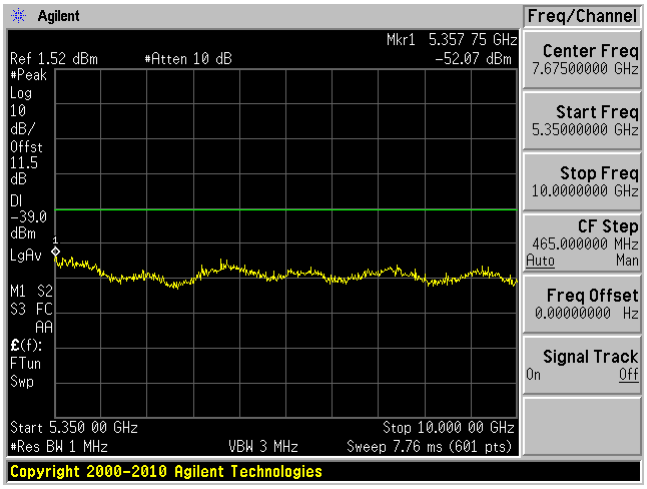
1 GHz – 5 GHz



5 GHz – 5150 MHz



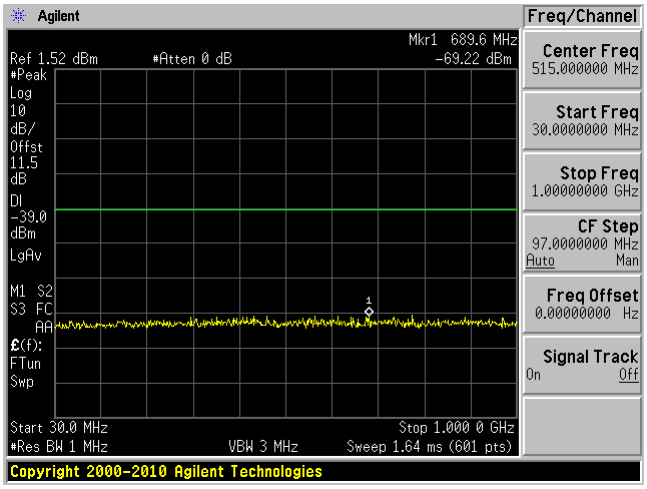
5350 MHz – 10 GHz



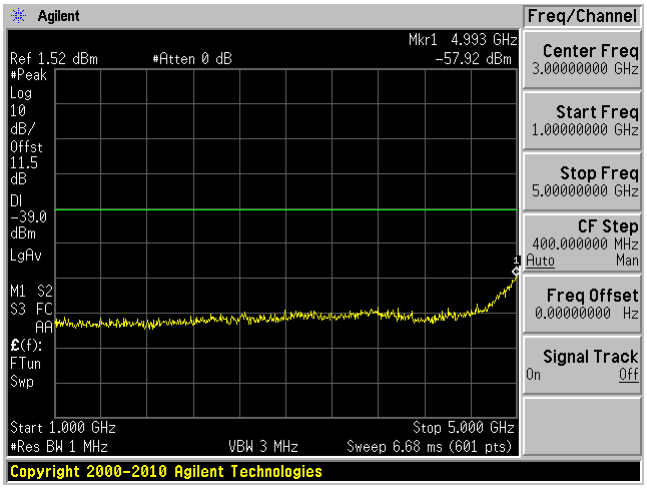
10 GHz – 40 GHz

802.11a mode 5200 MHz Chain 1

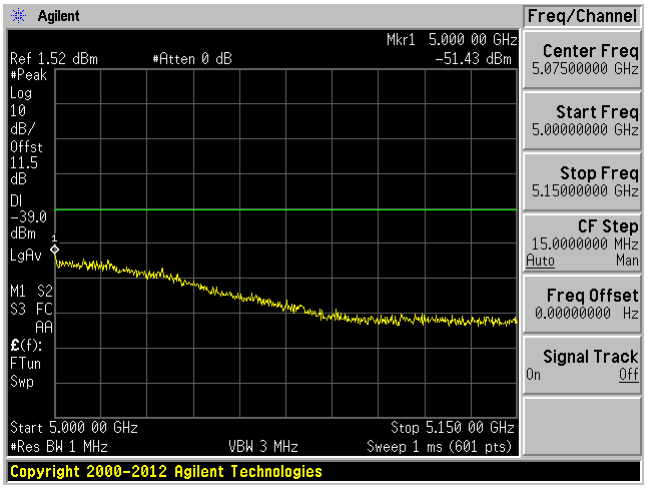
30 MHz – 1 GHz



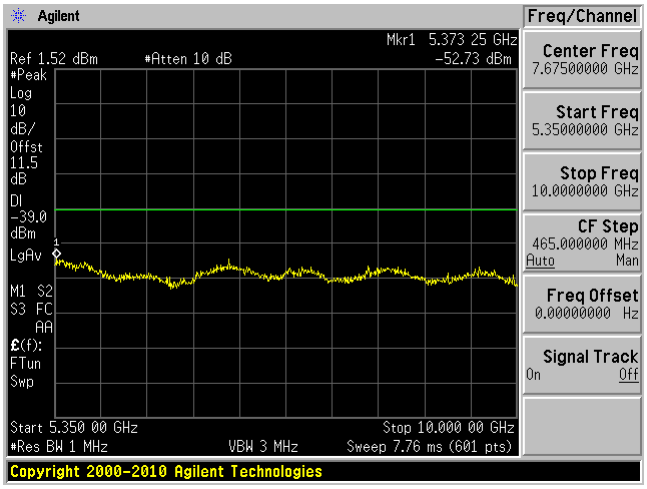
1 GHz – 5 GHz



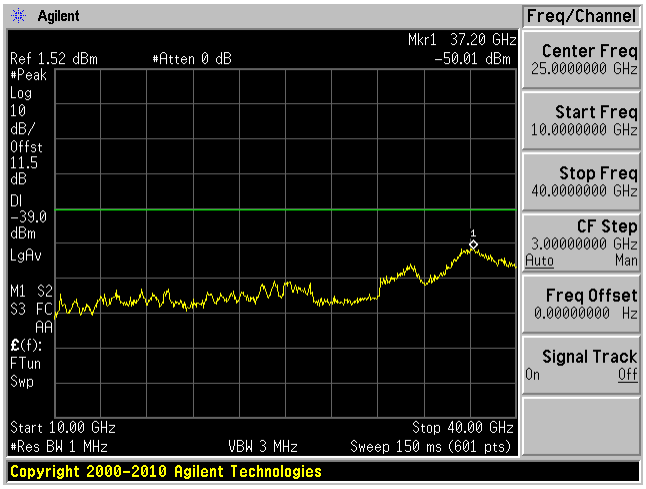
5 GHz – 5150 MHz



5350 MHz – 10 GHz

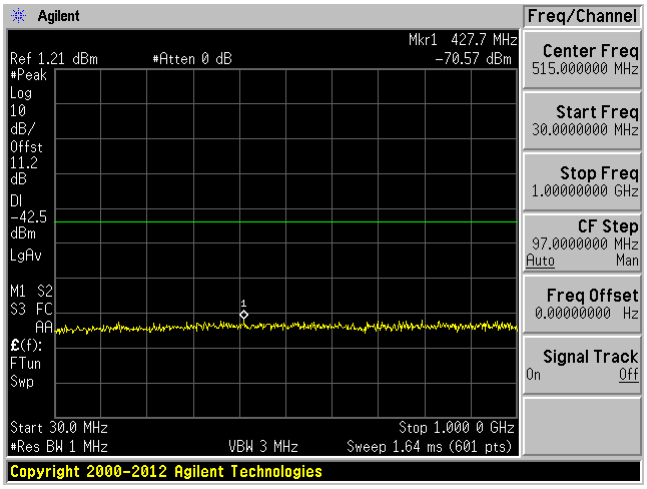


10 GHz – 40 GHz

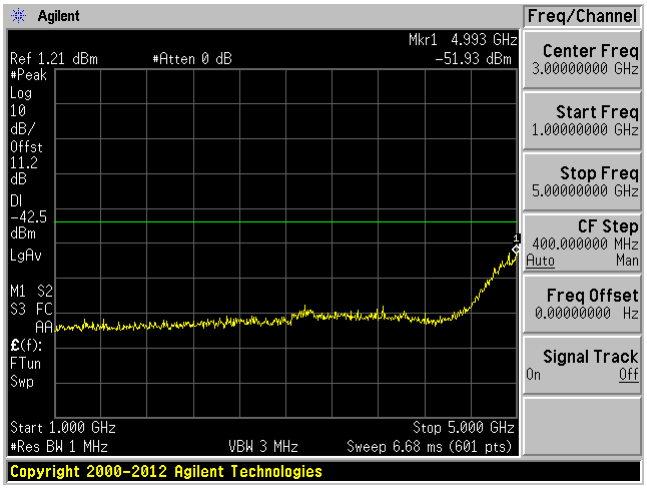


802.11a mode 5240 MHz Chain 0

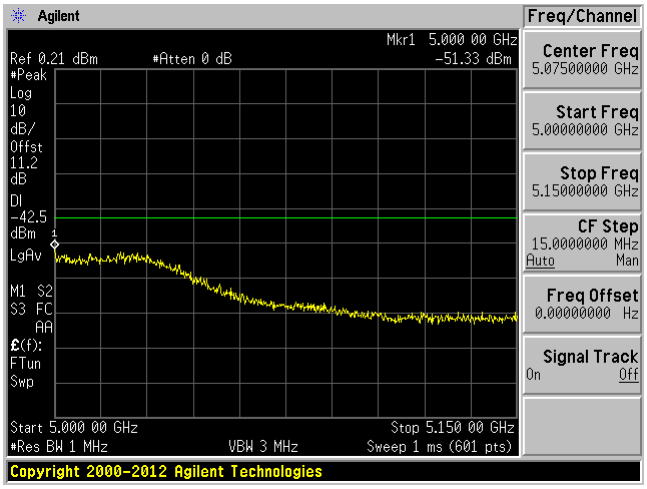
30 MHz – 1 GHz



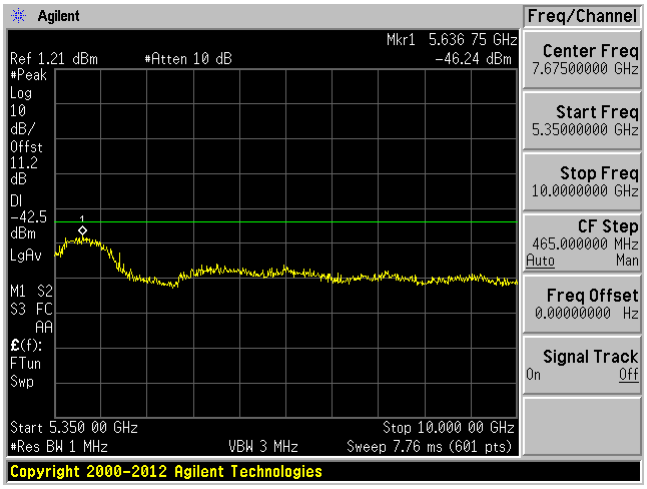
1 GHz – 5 GHz



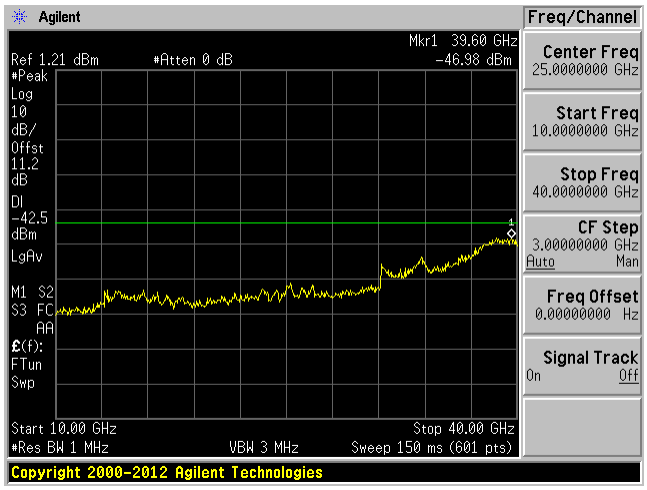
5 GHz – 5150 MHz



5350 MHz – 10 GHz

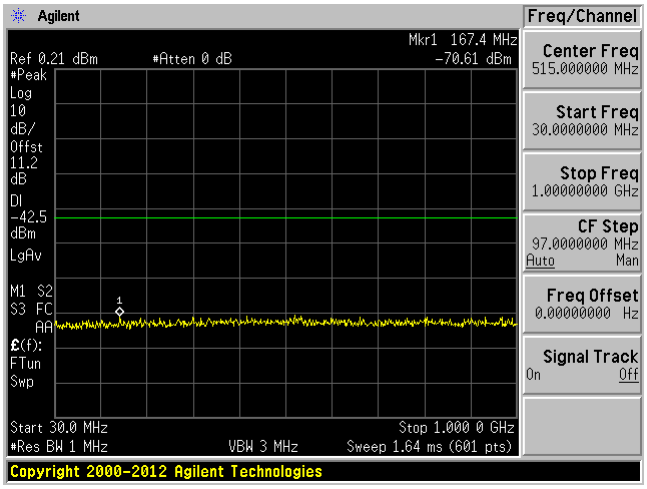


10 GHz – 40 GHz

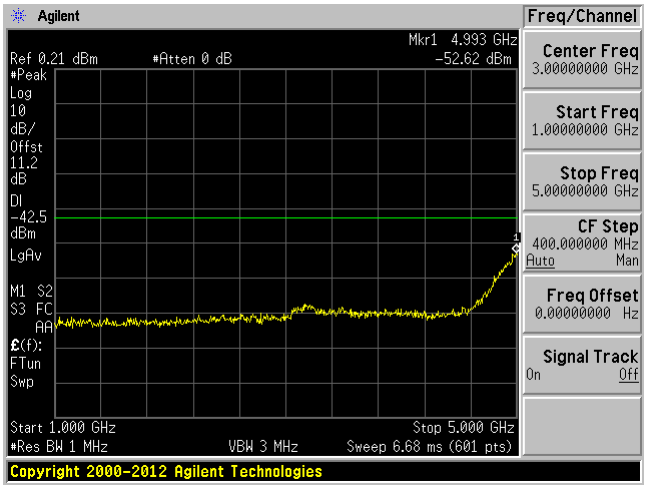


802.11a mode 5240 MHz Chain 1

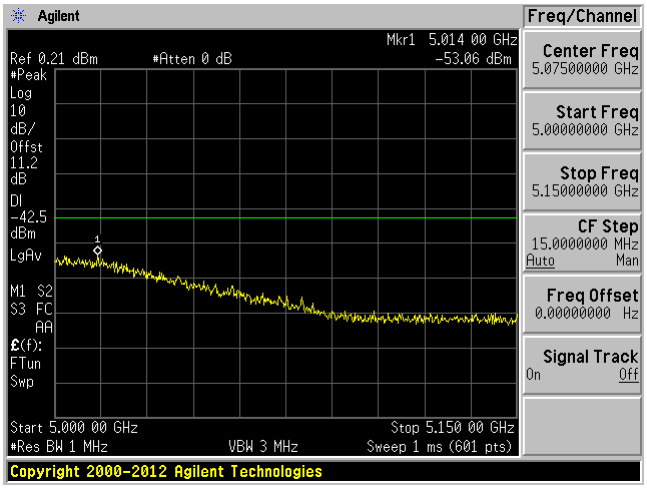
30 MHz – 1 GHz



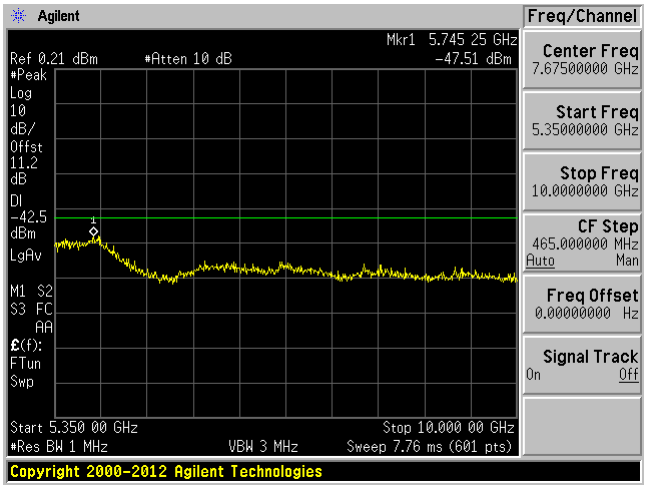
1 GHz – 5 GHz



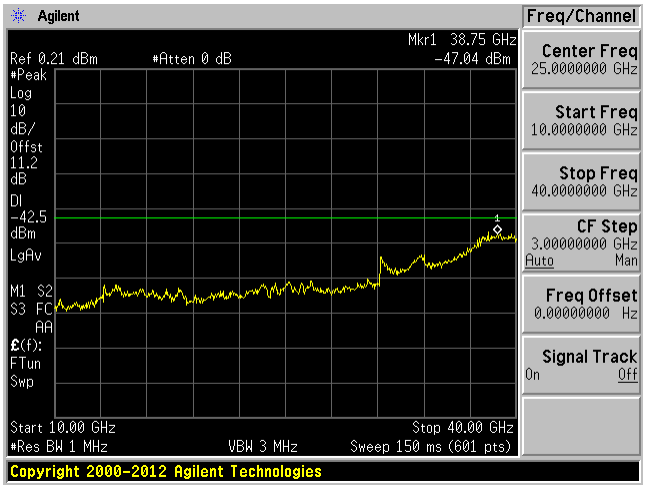
5 GHz – 5150 MHz



5350 MHz – 10 GHz

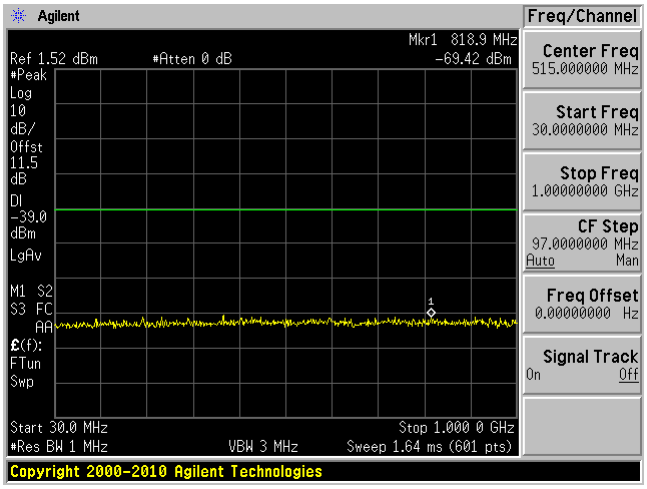


10 GHz – 40 GHz

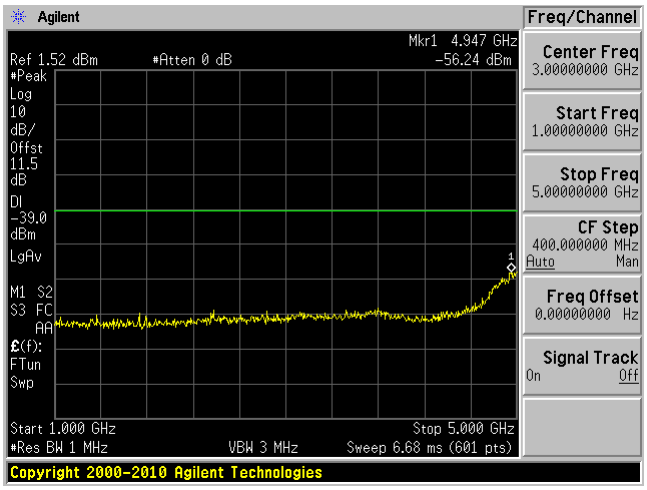


802.11n20 mode 5180 MHz Chain 0

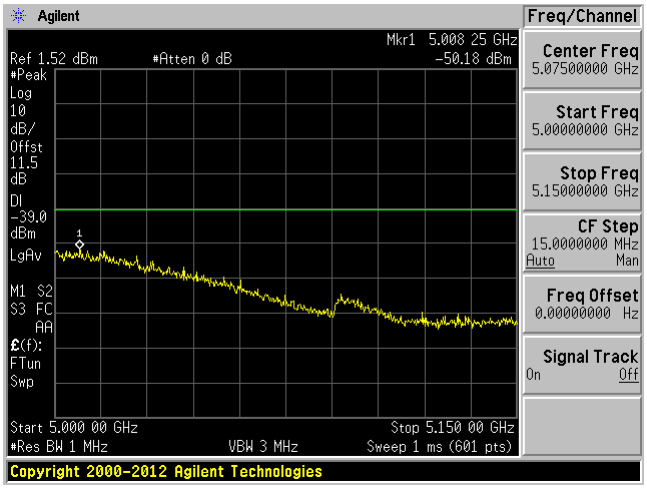
30 MHz – 1 GHz



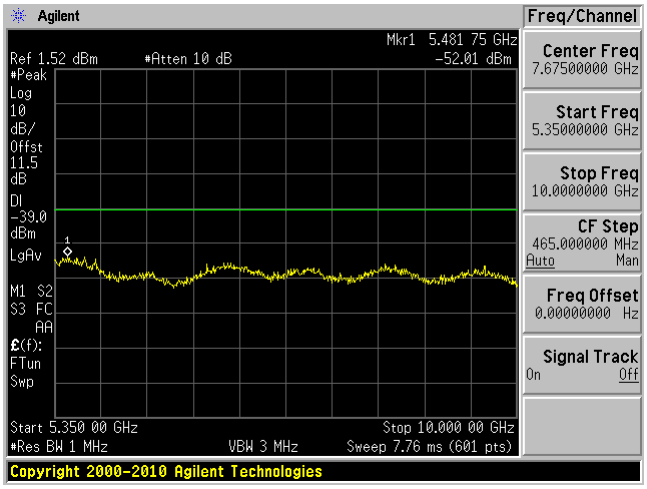
1 GHz – 5 GHz



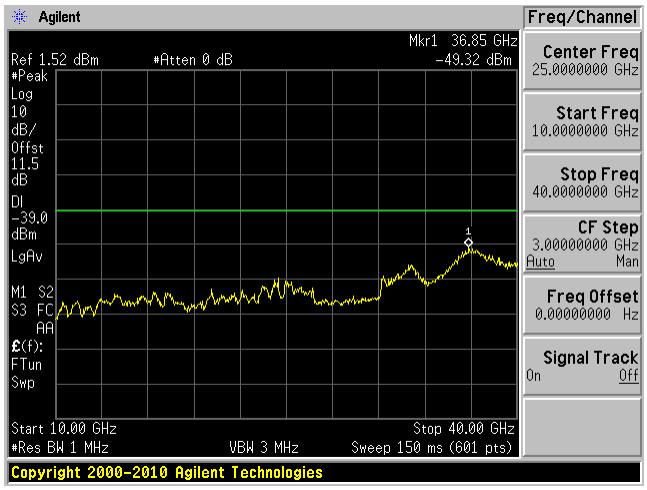
5 GHz – 5150 MHz



5350 MHz – 10 GHz

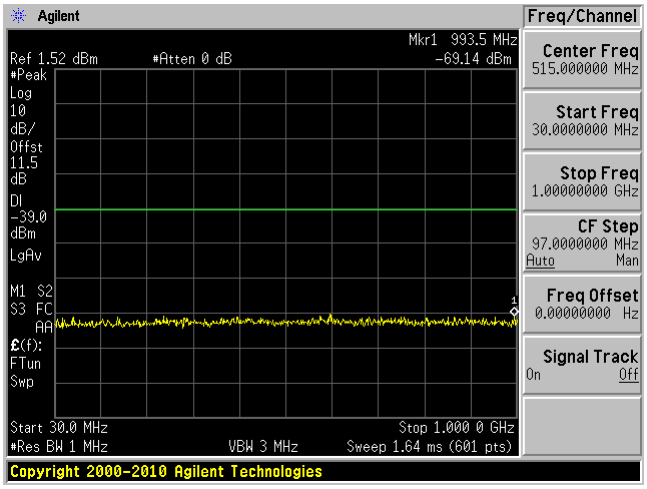


10 GHz – 40 GHz

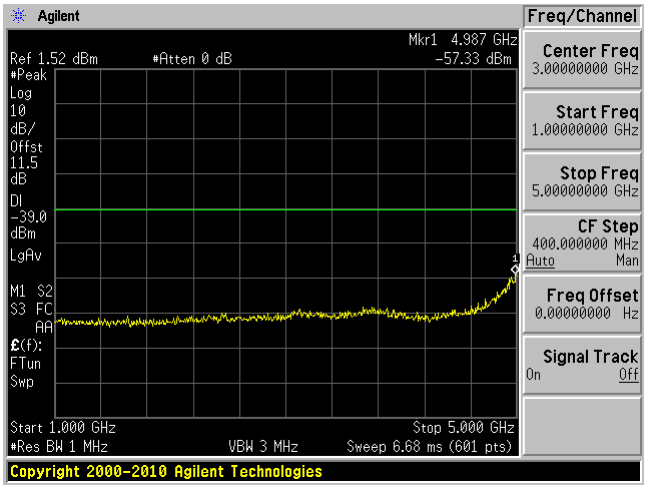


802.11n20 mode 5180 MHz Chain 1

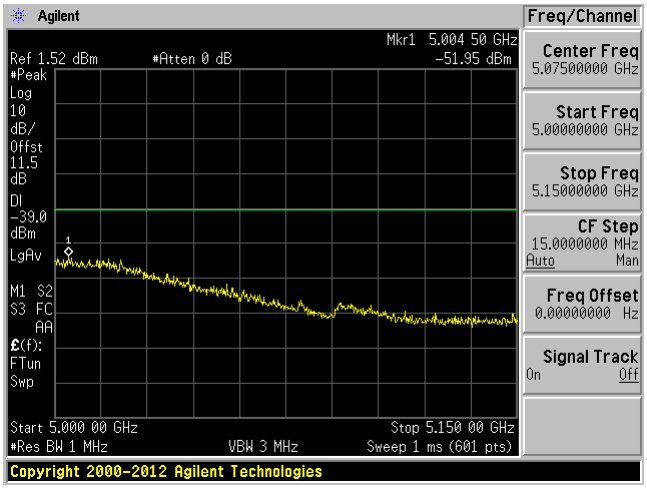
30 MHz – 1 GHz



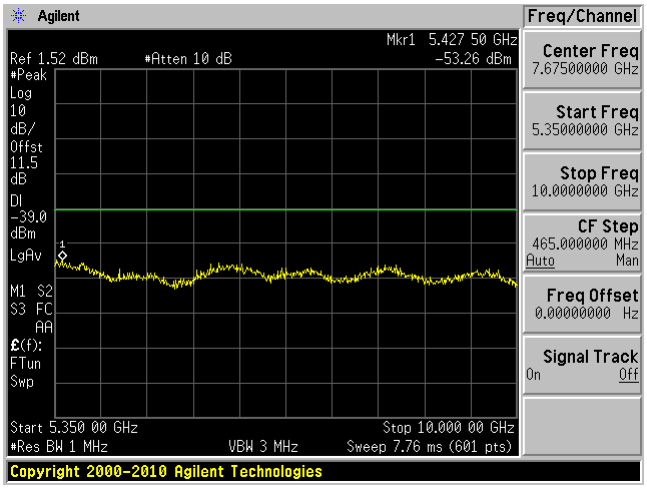
1 GHz – 5 GHz



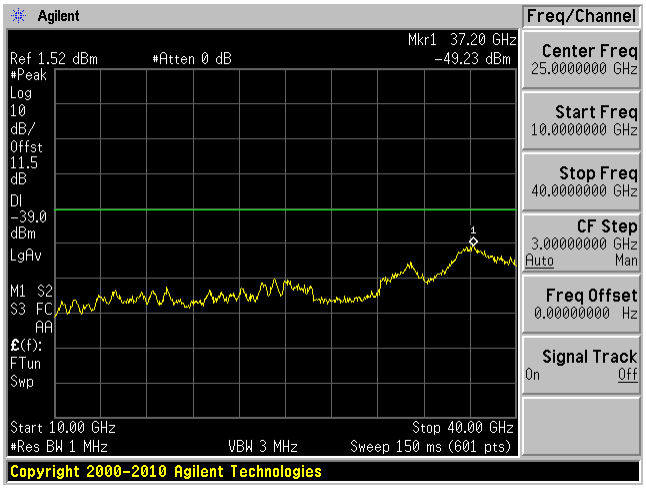
5 GHz – 5150 MHz



5350 MHz – 10 GHz

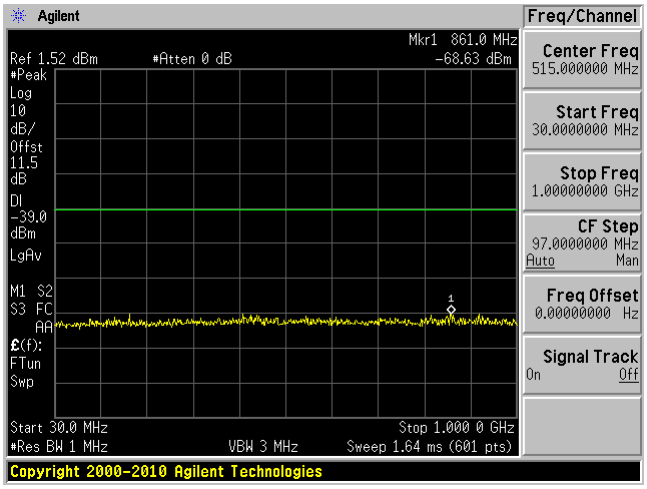


10 GHz – 40 GHz

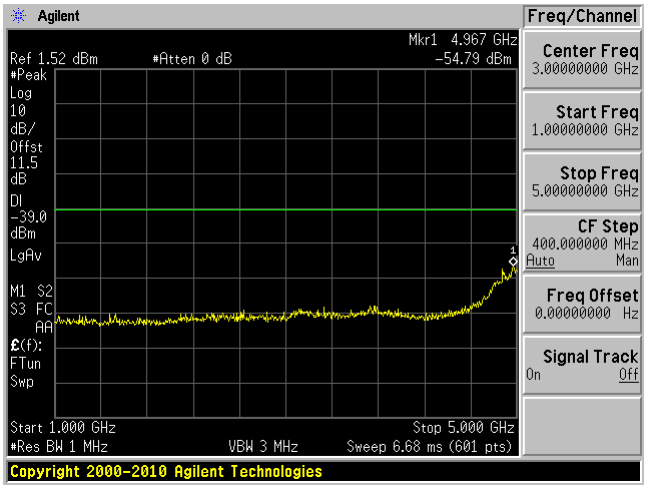


802.11n20 mode 5200 MHz Chain 0

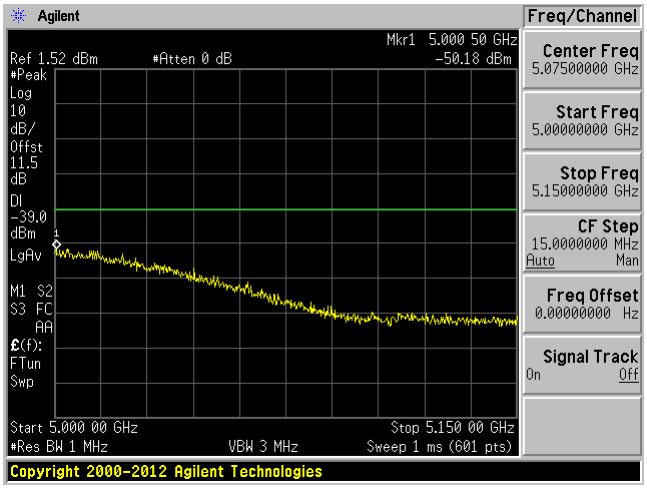
30 MHz – 1 GHz



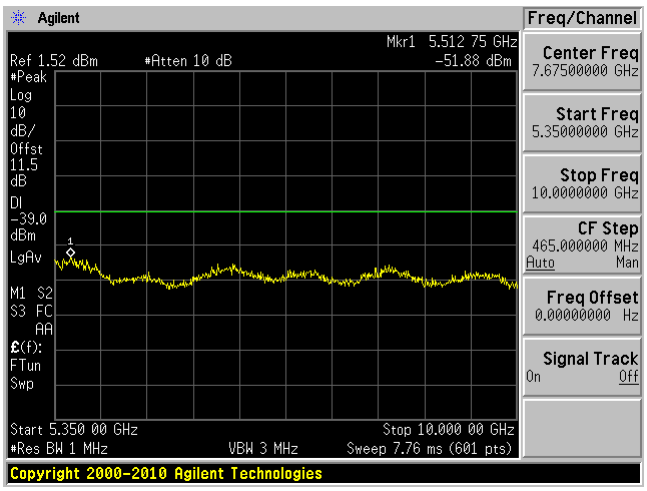
1 GHz – 5 GHz



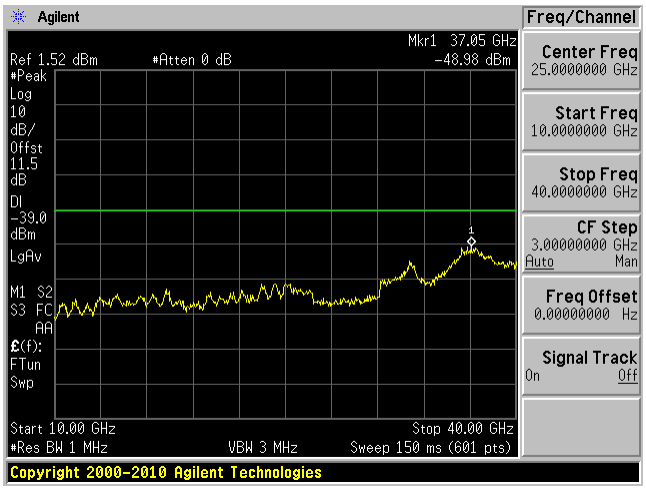
5 GHz – 5150 MHz



5350 MHz – 10 GHz

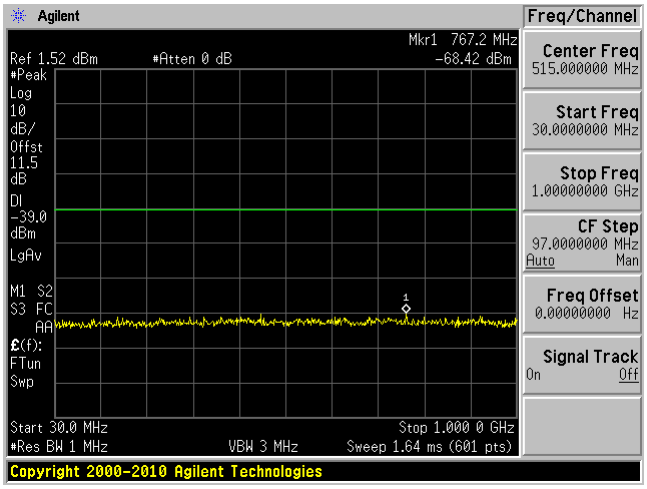


10 GHz – 40 GHz

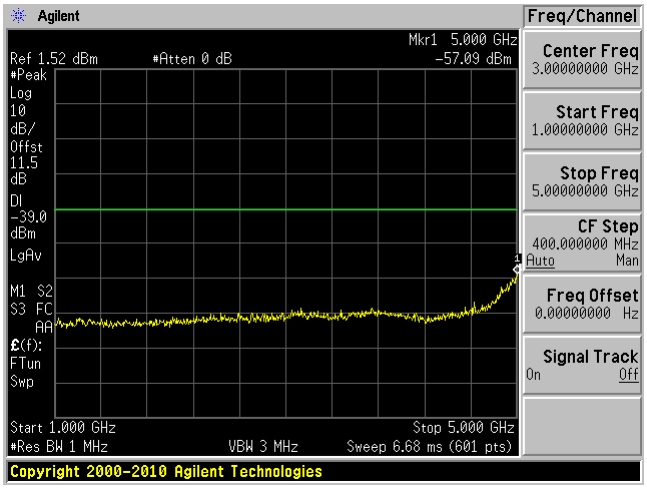


802.11n20 mode 5200 MHz Chain 1

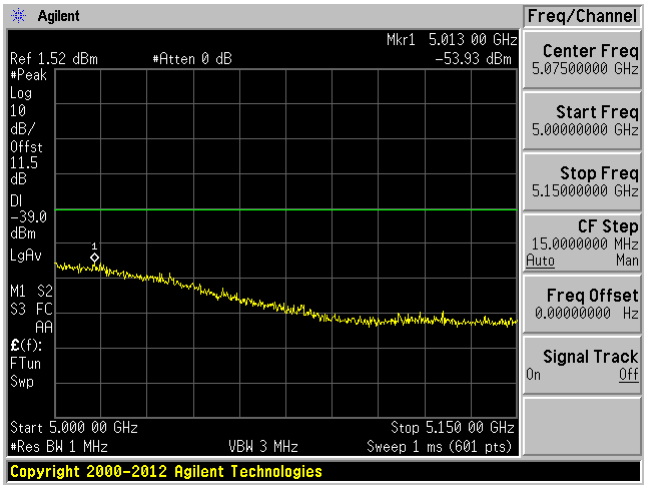
30 MHz – 1 GHz



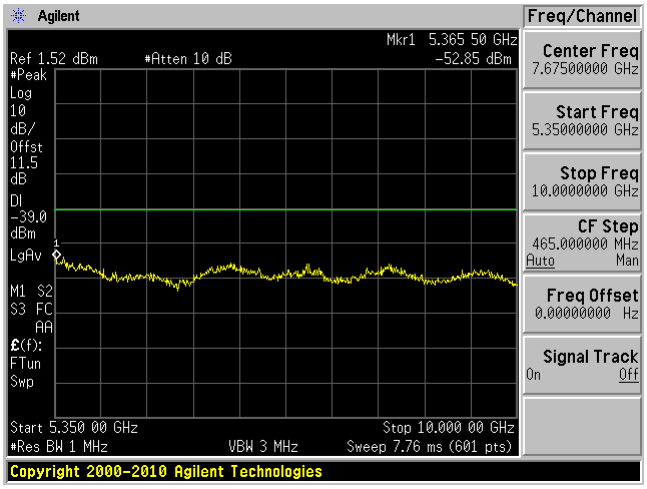
1 GHz – 5 GHz



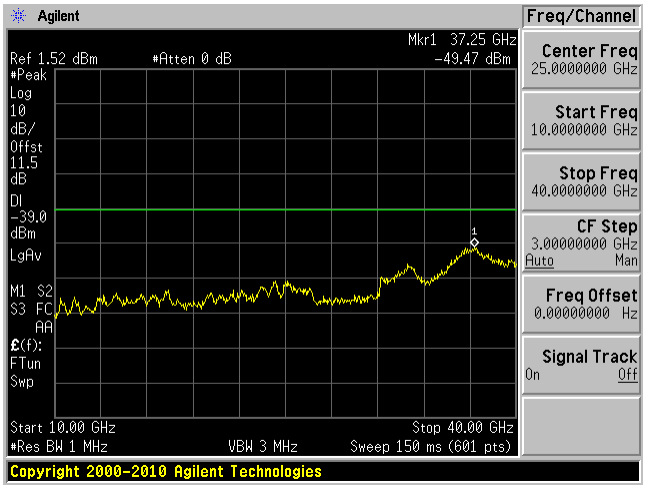
5 GHz – 5150 MHz



5350 MHz – 10 GHz

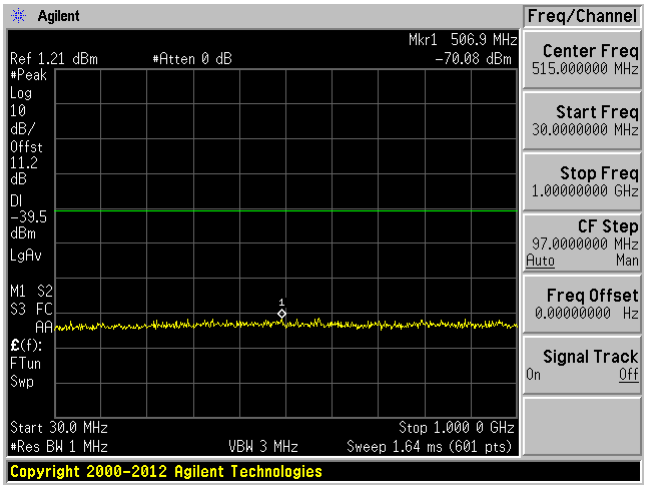


10 GHz – 40 GHz

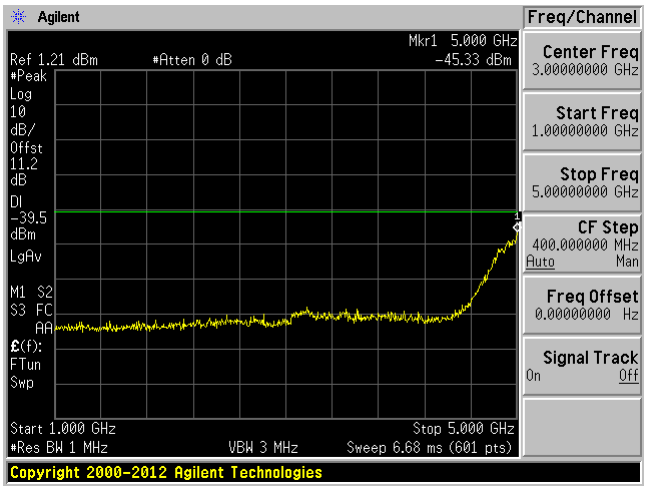


802.11n20 mode 5240 MHz Chain 0

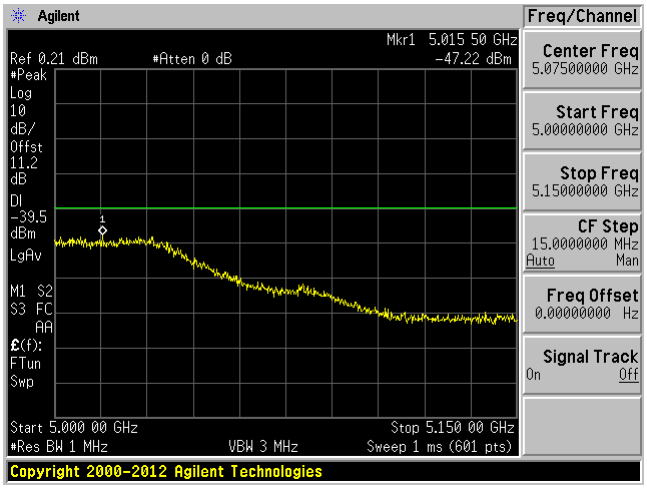
30 MHz – 1 GHz



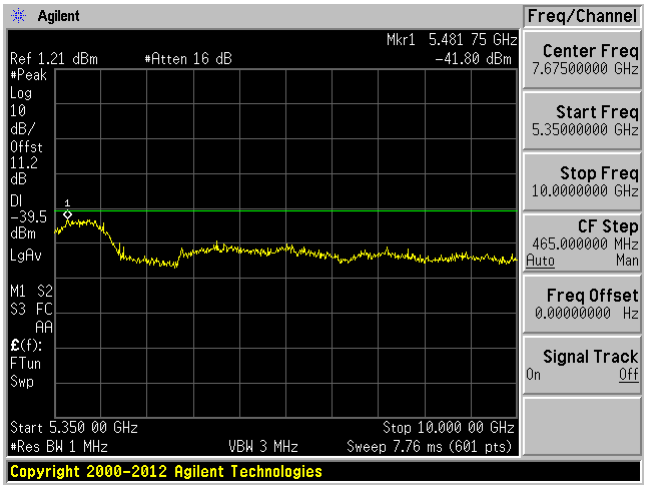
1 GHz – 5 GHz



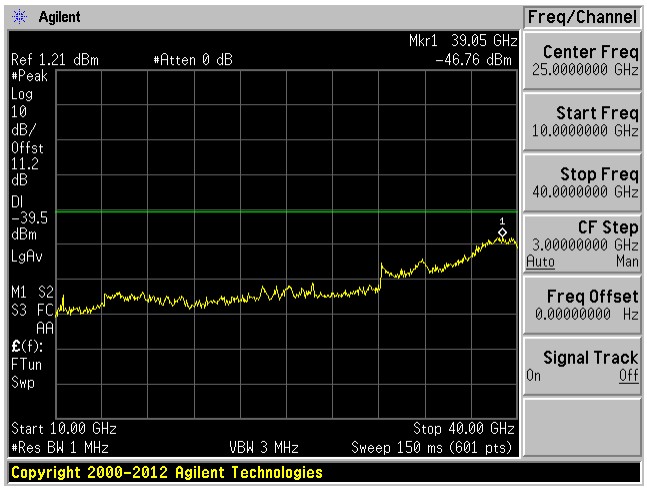
5 GHz – 5150 MHz



5350 MHz – 10 GHz

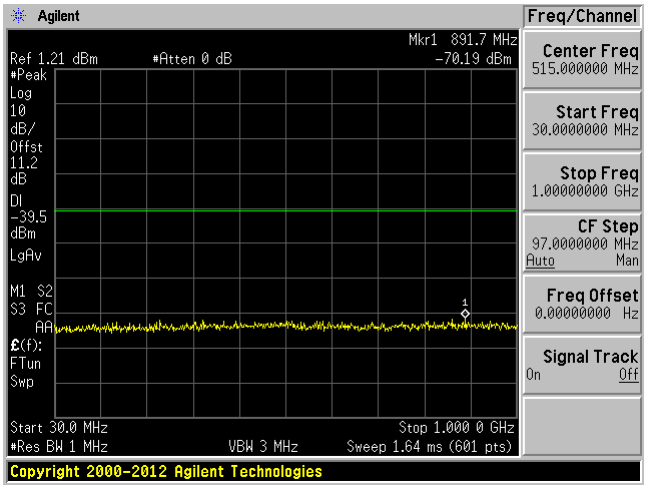


10 GHz – 40 GHz

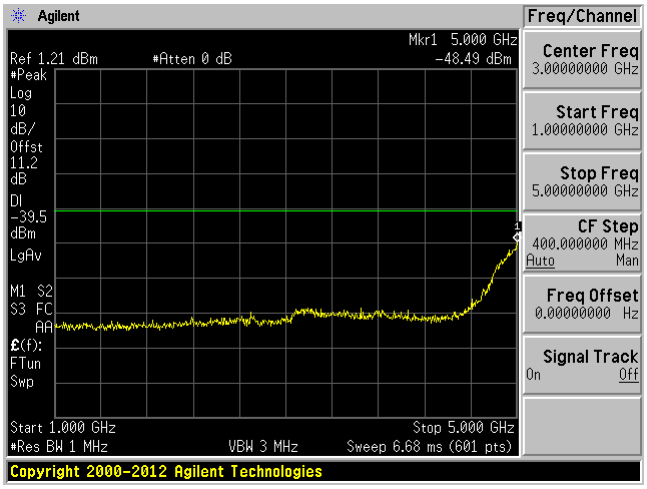


802.11n20 mode 5240 MHz Chain 1

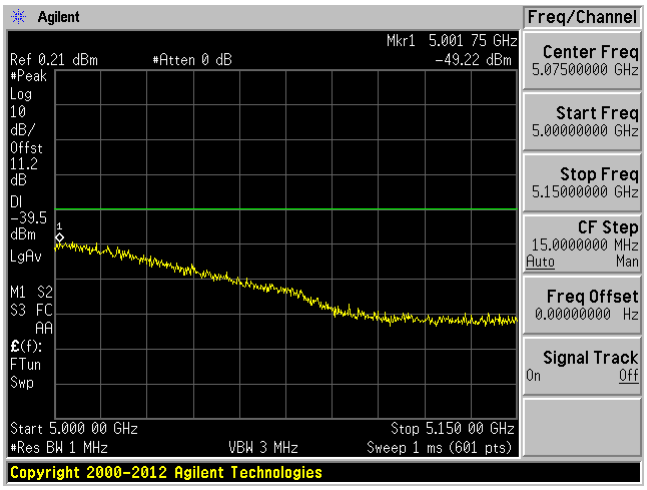
30 MHz – 1 GHz



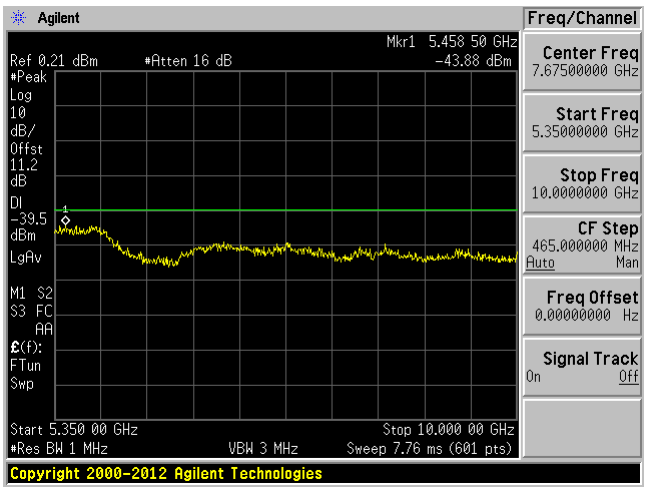
1 GHz – 5 GHz



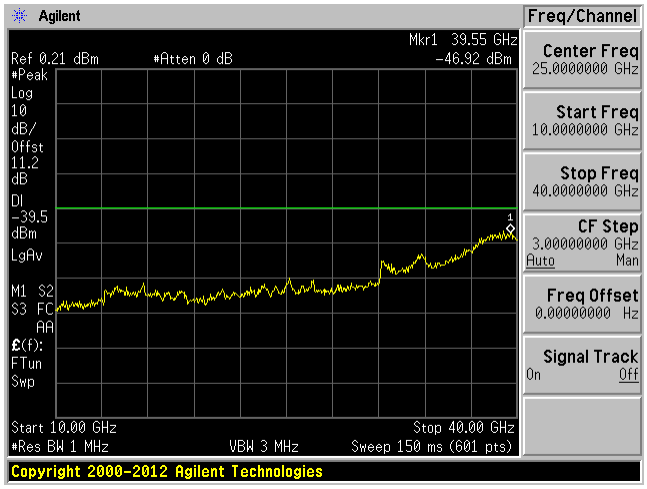
5 GHz – 5150 MHz



5350 MHz – 10 GHz

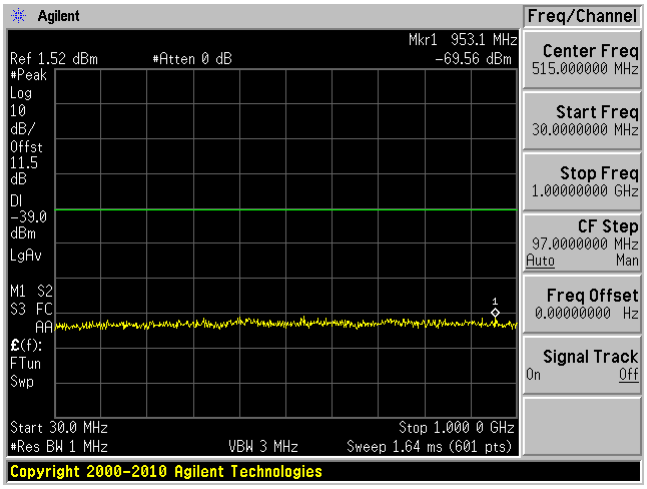


10 GHz – 40 GHz

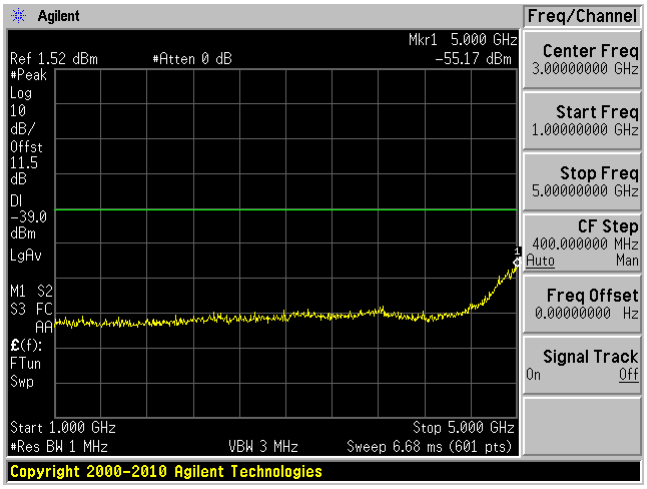


802.11n40 mode 5230 MHz Chain 0

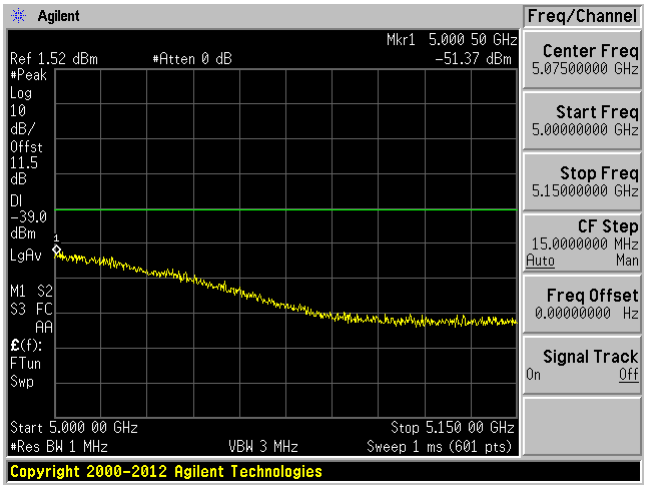
30 MHz – 1 GHz



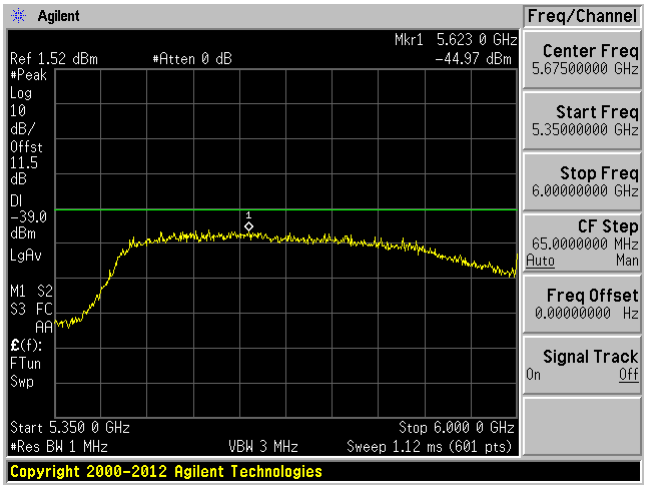
1 GHz – 5 GHz



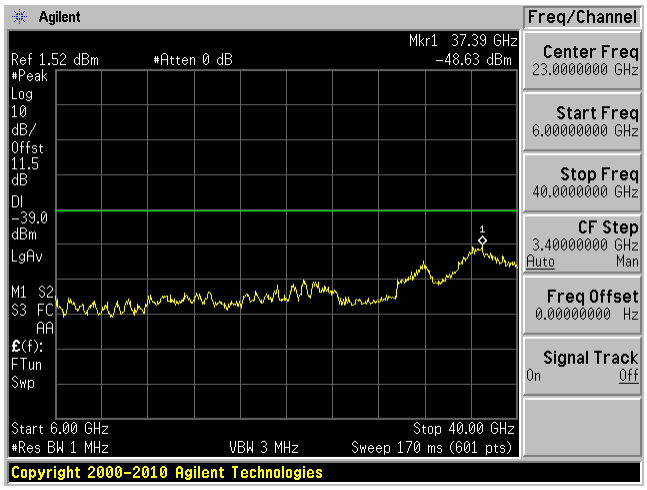
5 GHz – 5150 MHz



5350 MHz – 6 GHz

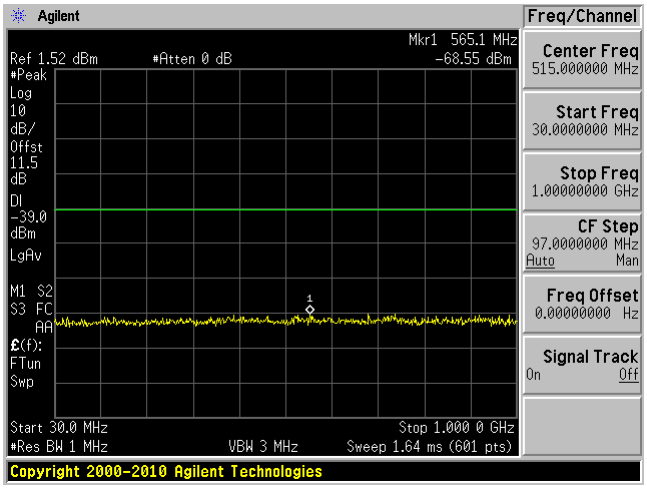


6 GHz – 40 GHz

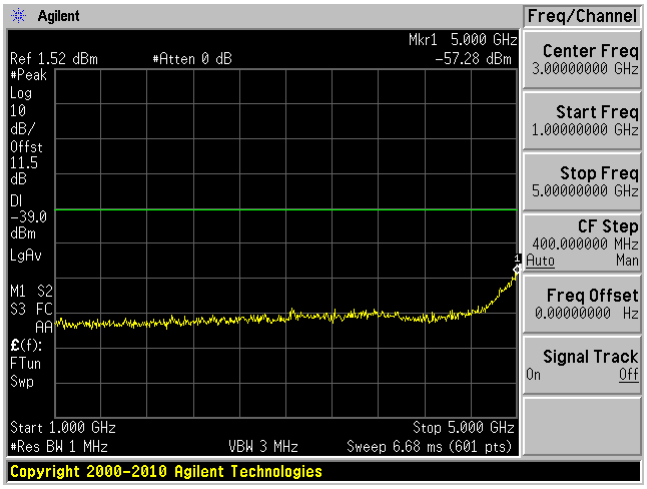


802.11n40 mode 5230 MHz, Chain 1

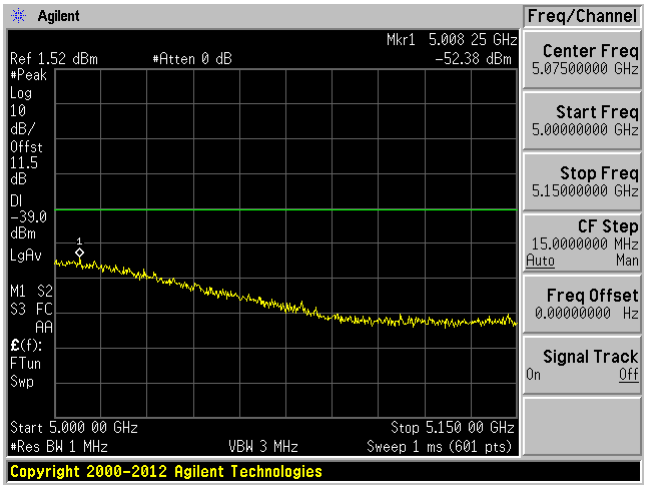
30 MHz – 1 GHz



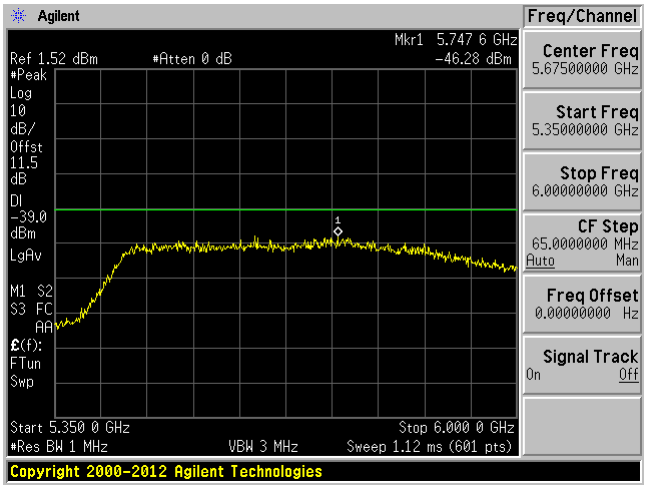
1 GHz – 5 GHz



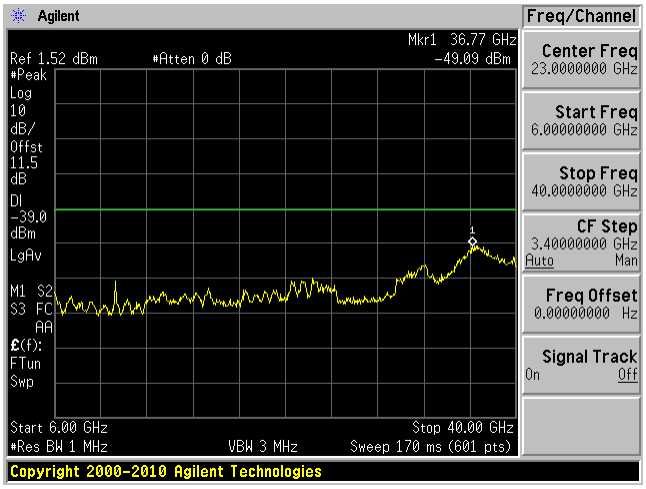
5 GHz – 5150 MHz



5350 MHz – 6 GHz



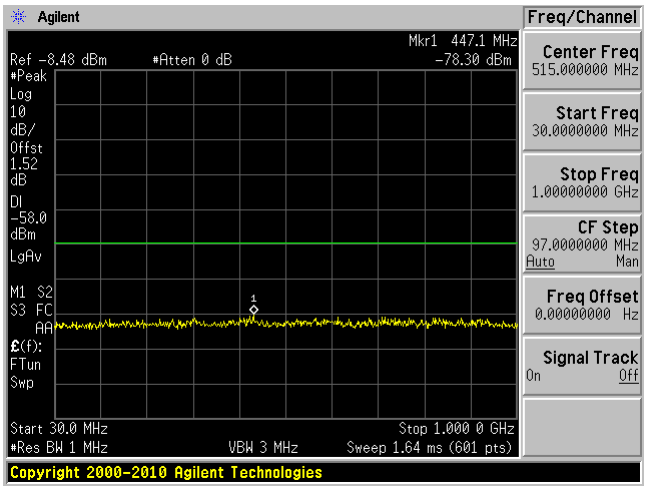
6 GHz – 40 GHz


Agilent
Freq/Channel
Mkr1 36.77 GHz
Ref 1.52 dBm
#Atten 0 dB
-49.09 dBm
#Peak
Log
10
dB/
Offst
11.5
dB
Dl
-39.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center Freq
23.0000000 GHz
Start Freq
6.00000000 GHz
Stop Freq
40.0000000 GHz
CF Step
3.40000000 GHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 6.00 GHz
Stop 40.00 GHz
#Res BW 1 MHz
VBW 3 MHz
Sweep 170 ms (601 pts)
Copyright 2000-2010 Agilent Technologies

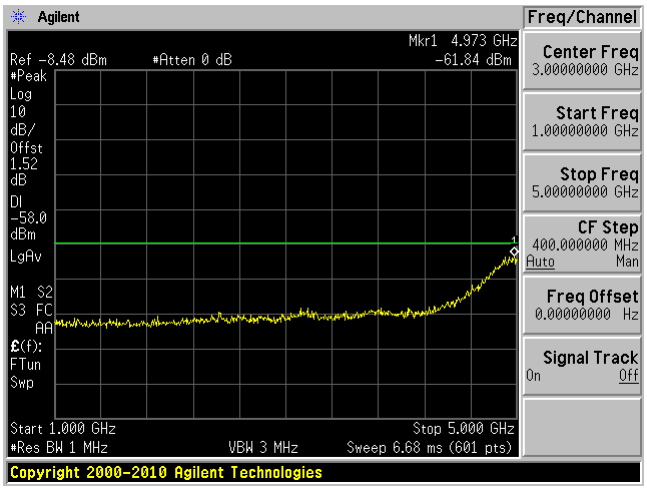
High Gain Antenna

802.11a mode 5180 MHz Chain 0

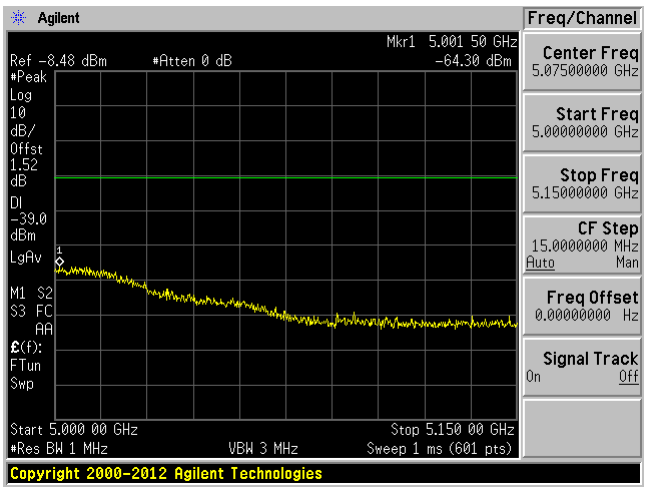
30 MHz – 1 GHz



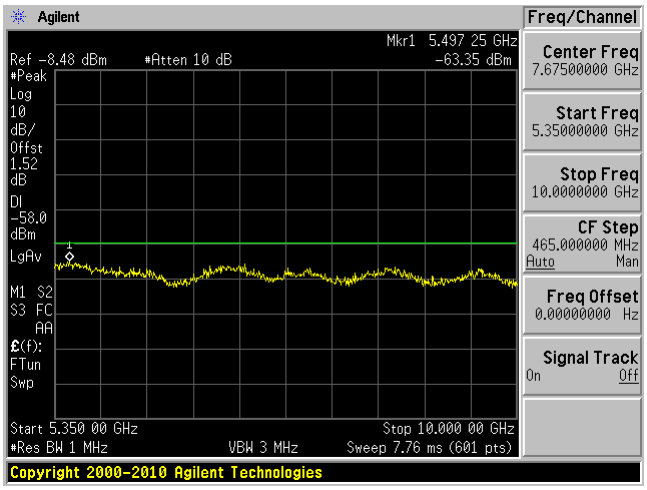
1 GHz – 5 GHz



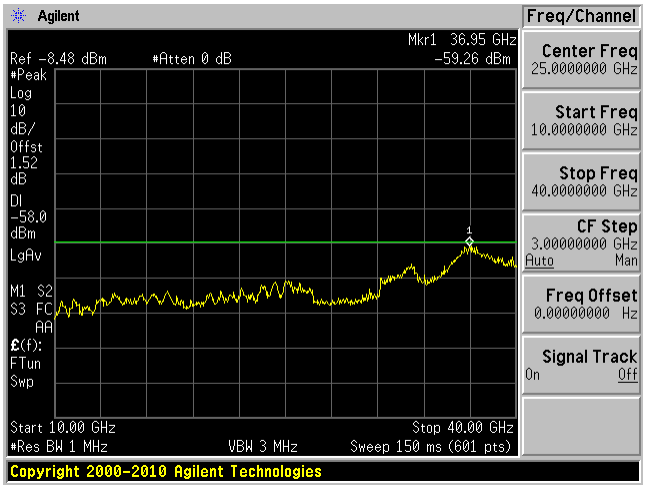
5 GHz – 5150 MHz



5350 MHz – 10 GHz

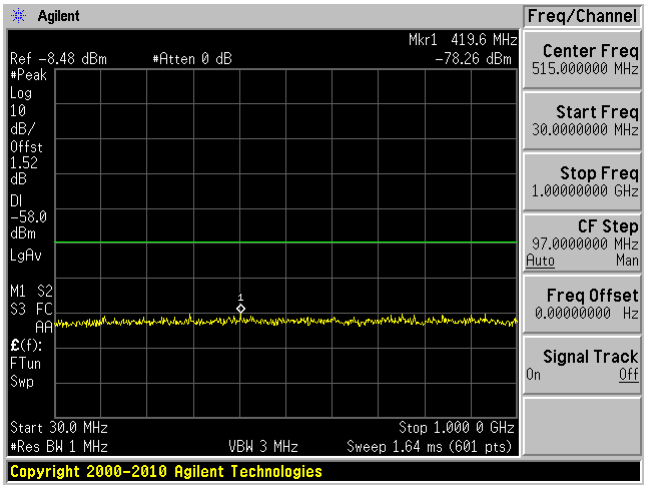


10 GHz – 40 GHz

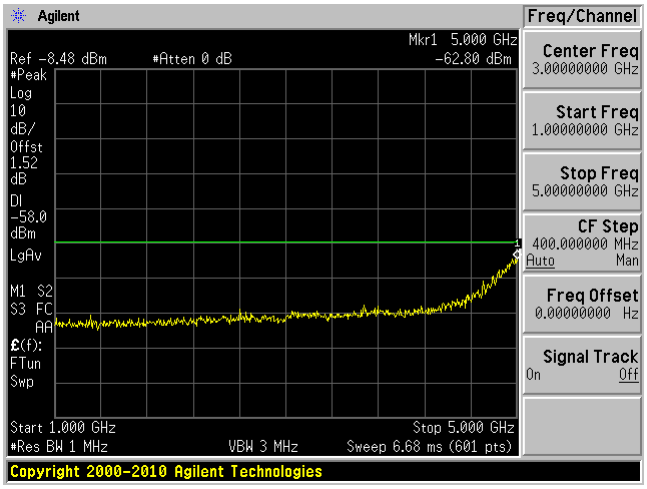


802.11a mode 5180 MHz Chain 1

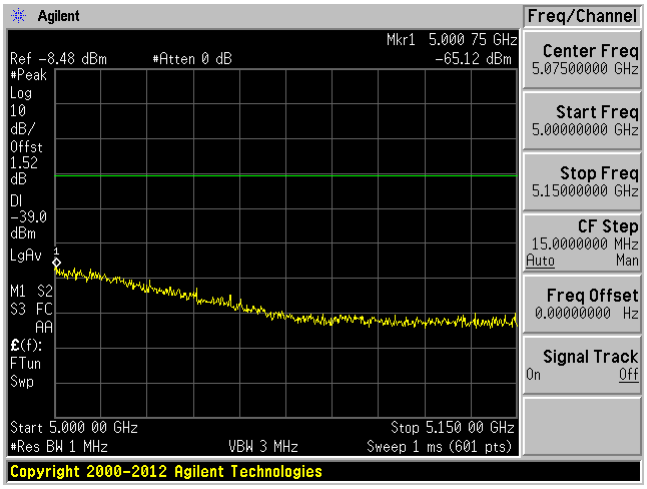
30 MHz – 1 GHz



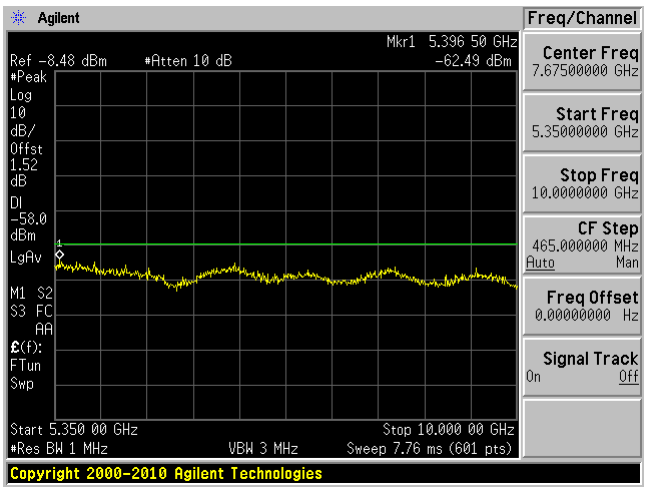
1 GHz – 5 GHz



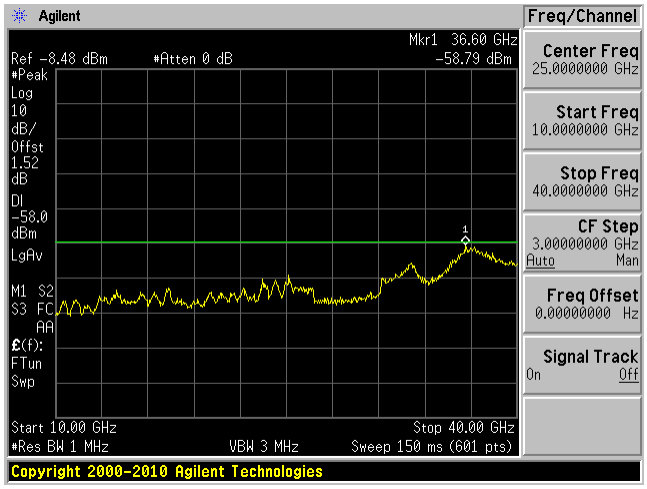
5 GHz – 5150 MHz



5350 MHz – 10 GHz

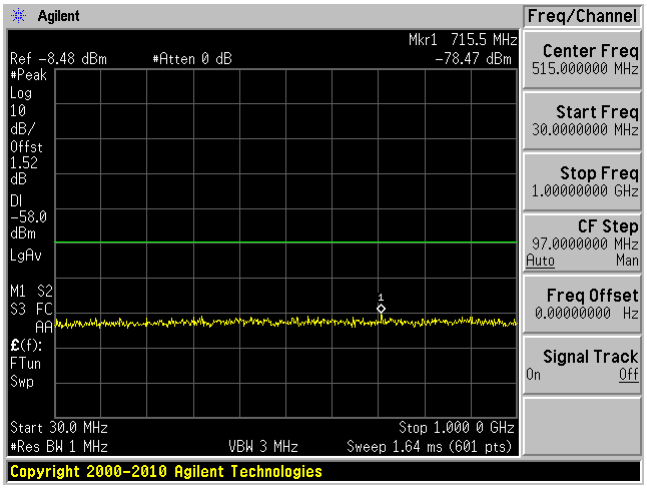


10 GHz – 40 GHz

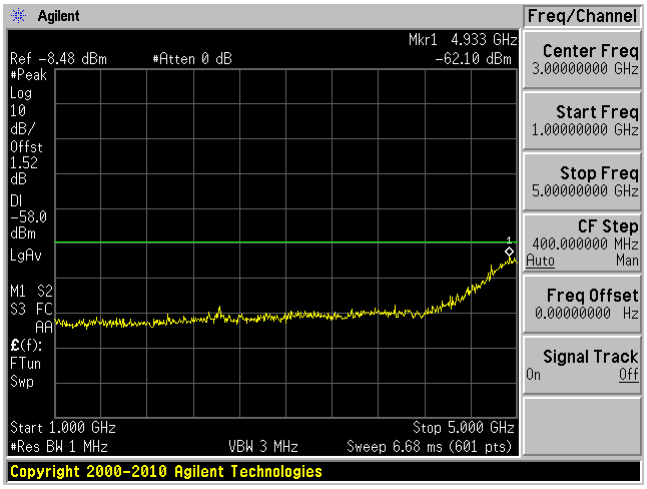


802.11a mode 5200 MHz Chain 0

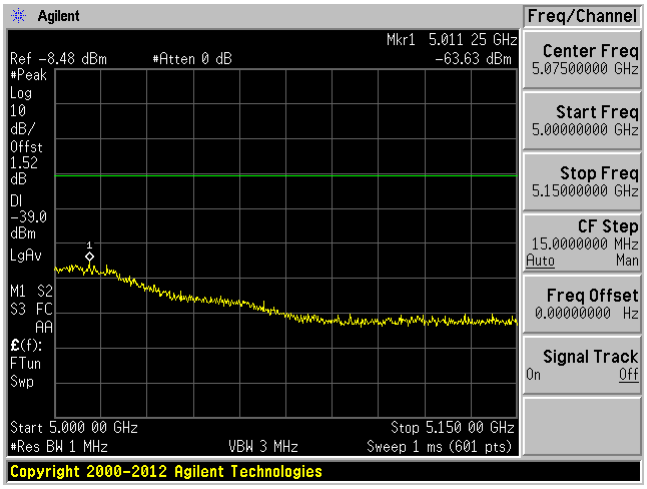
30 MHz – 1 GHz



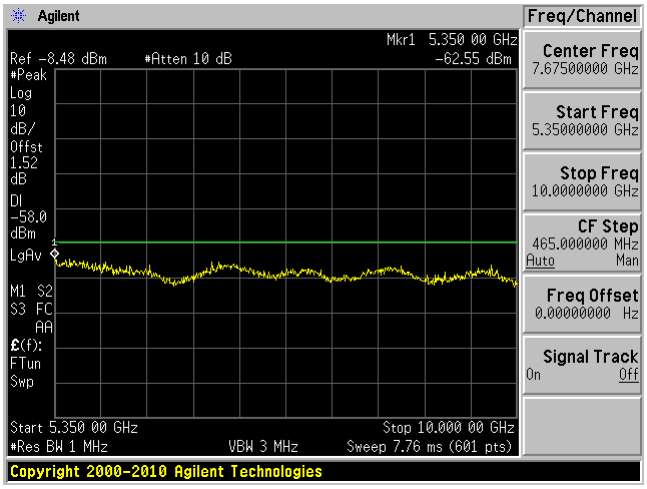
1 GHz – 5 GHz



5 GHz – 5150 MHz



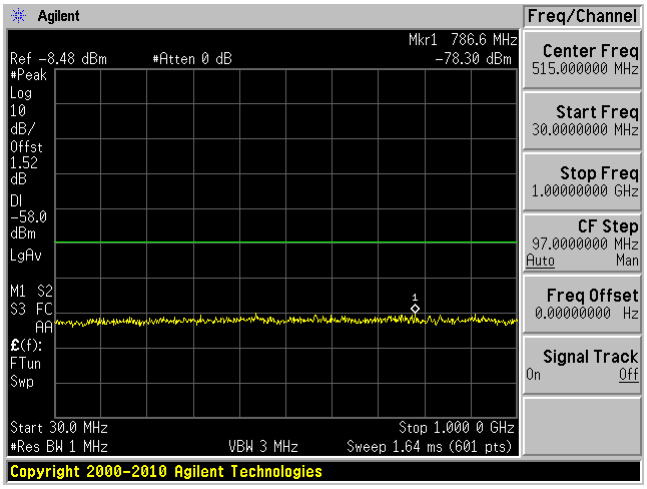
5350 MHz – 10 GHz



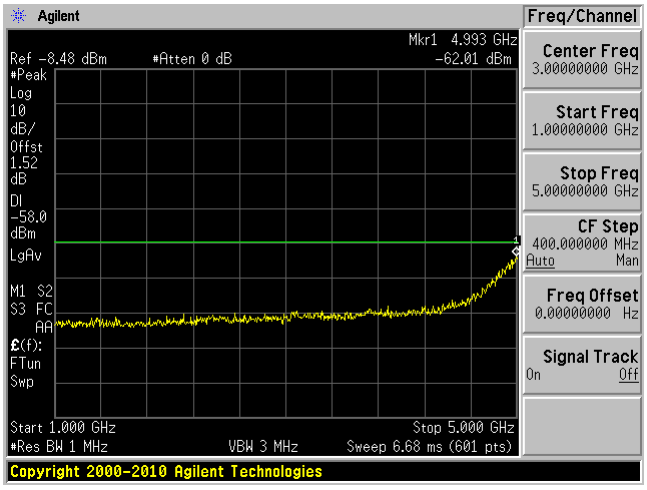
10 GHz – 40 GHz

802.11a mode 5200 MHz Chain 1

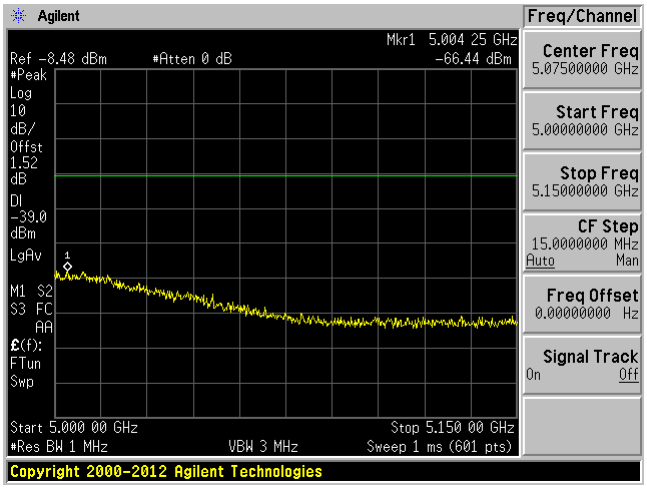
30 MHz – 1 GHz



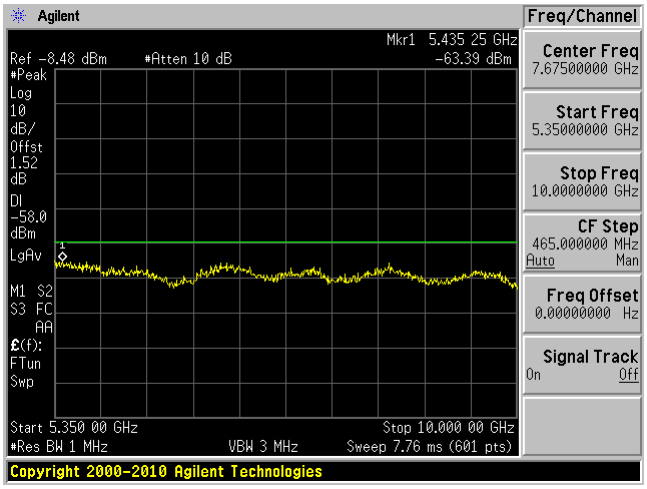
1 GHz – 5 GHz



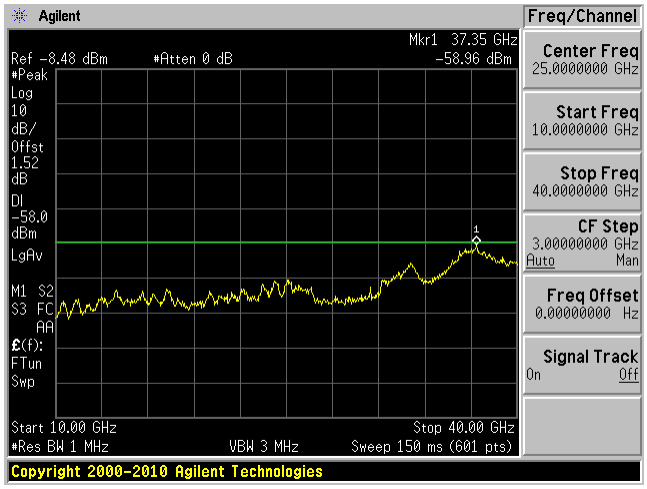
5 GHz – 5150 MHz



5350 MHz – 10 GHz

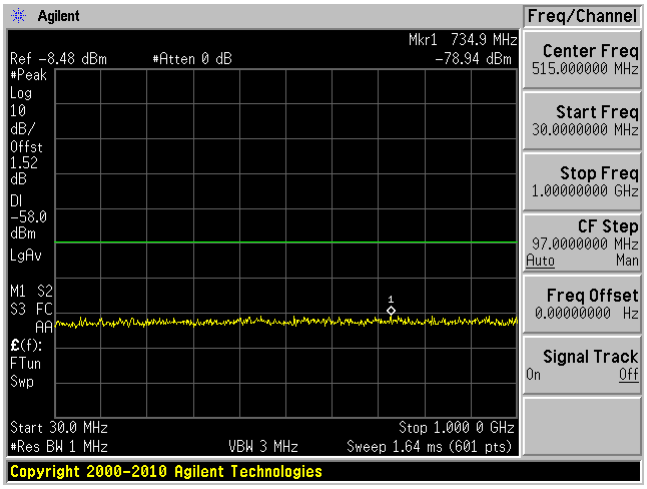


10 GHz – 40 GHz

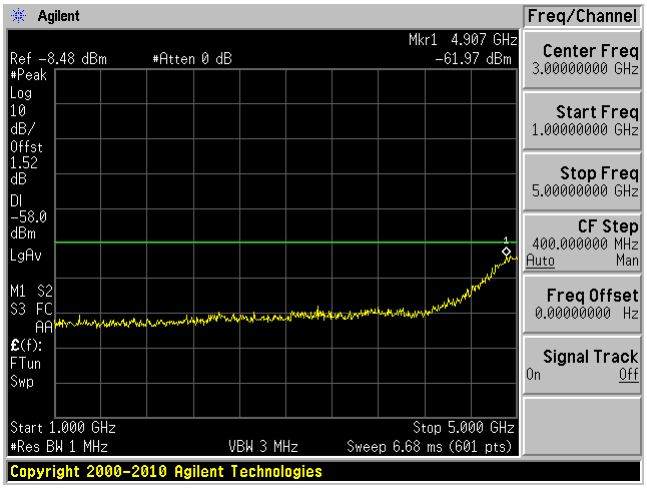


802.11a mode 5240 MHz Chain 0

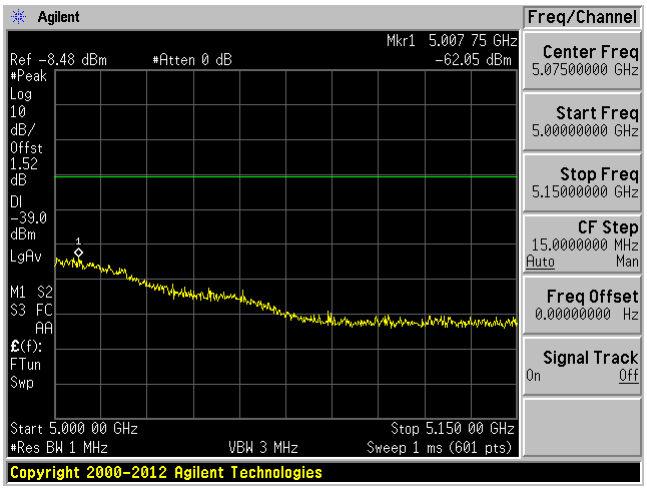
30 MHz – 1 GHz



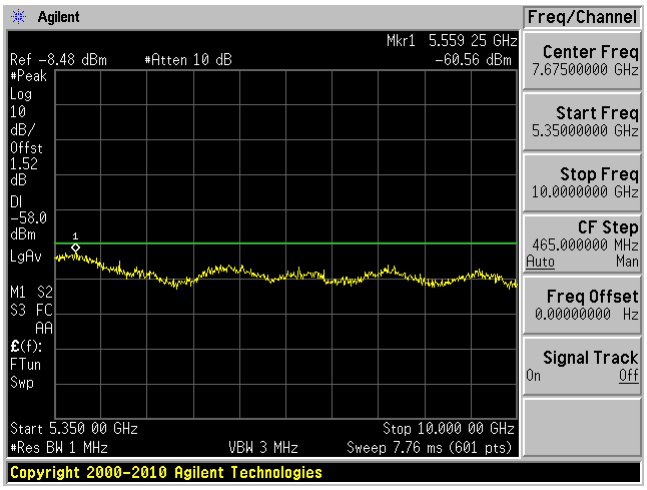
1 GHz – 5 GHz



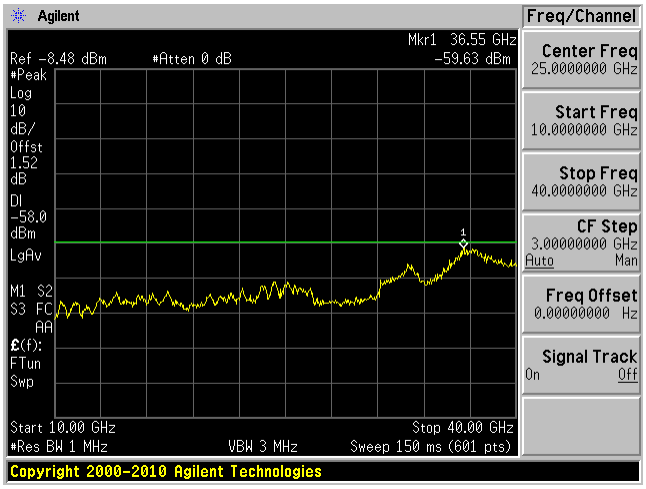
5 GHz – 5150 MHz



5350 MHz – 10 GHz

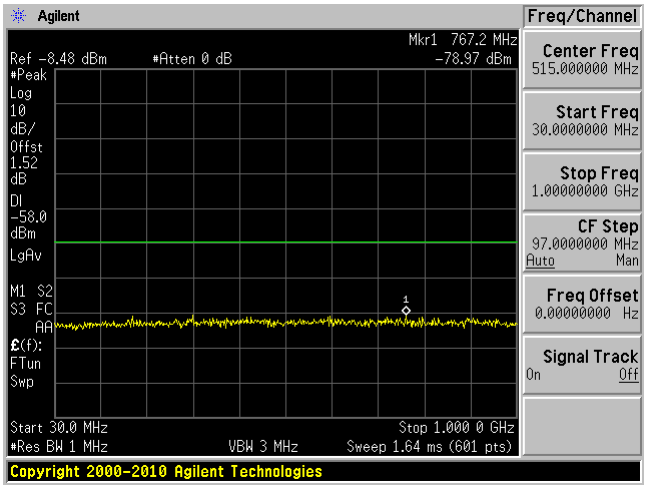


10 GHz – 40 GHz

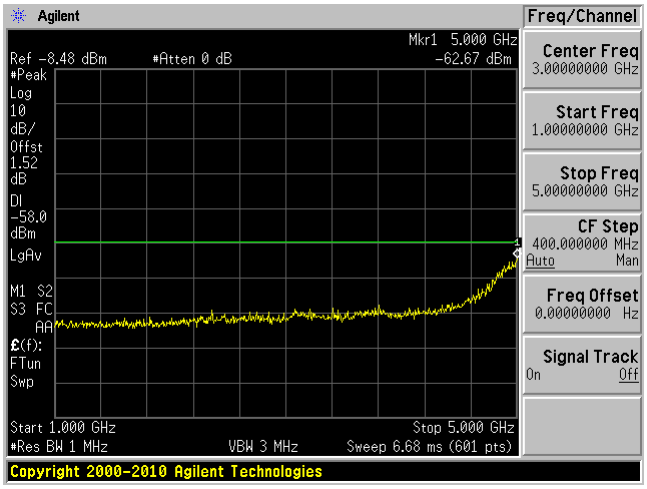


802.11a mode 5240 MHz Chain 1

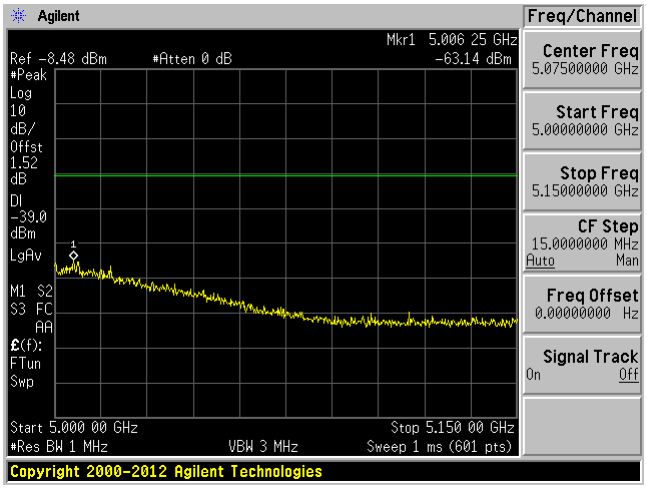
30 MHz – 1 GHz



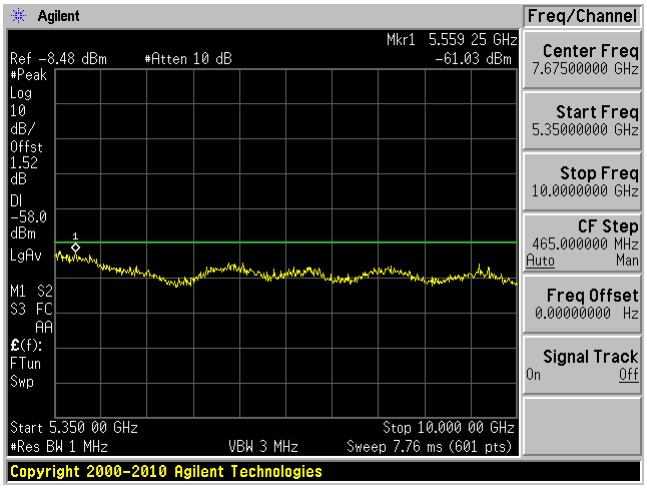
1 GHz – 5 GHz



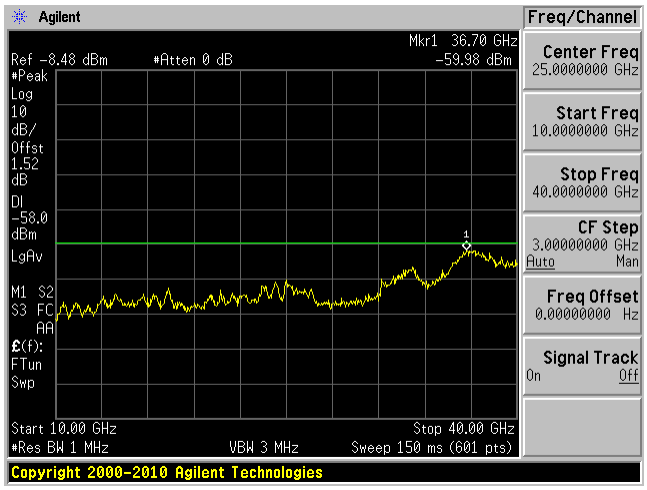
5 GHz – 5150 MHz



5350 MHz – 10 GHz

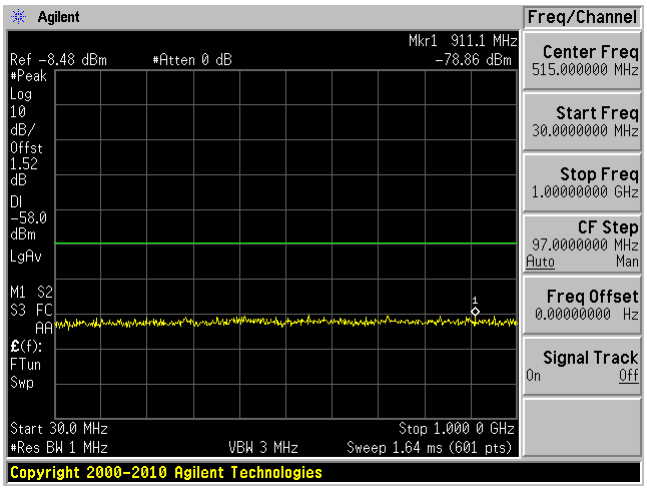


10 GHz – 40 GHz

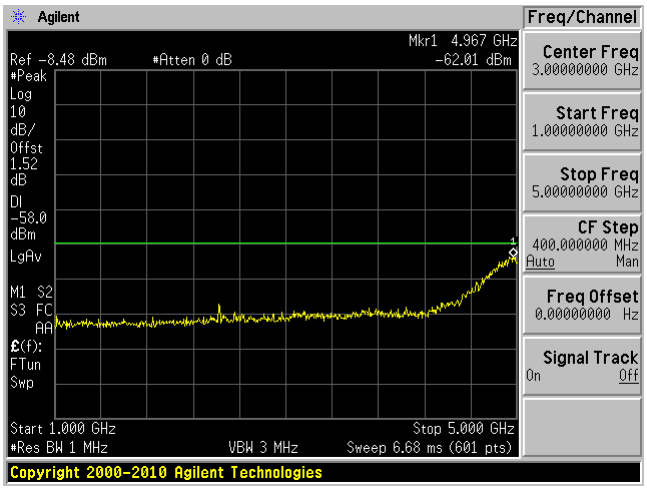


802.11n20 mode 5180 MHz Chain 0

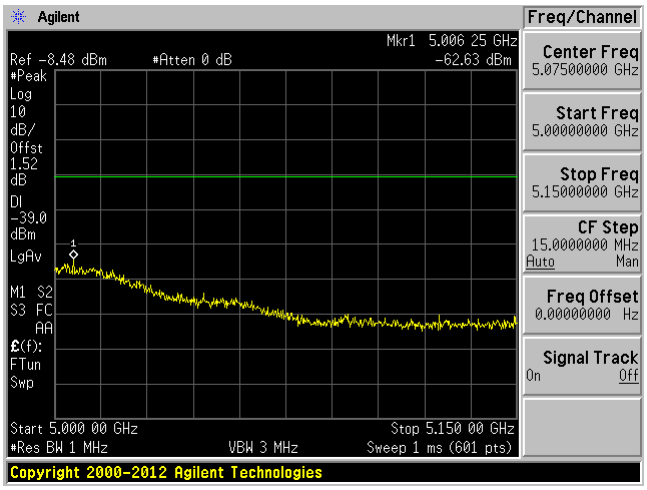
30 MHz – 1 GHz



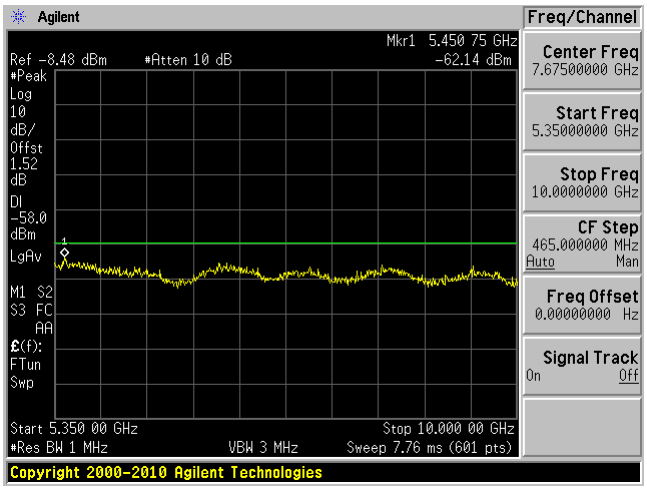
1 GHz – 5 GHz



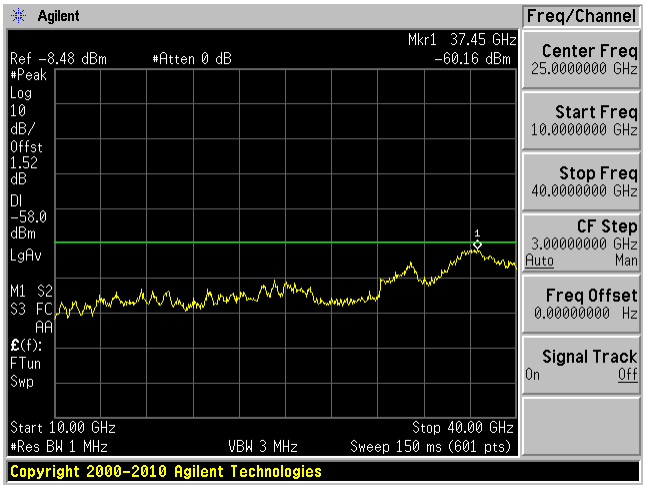
5 GHz – 5150 MHz



5350 MHz – 10 GHz

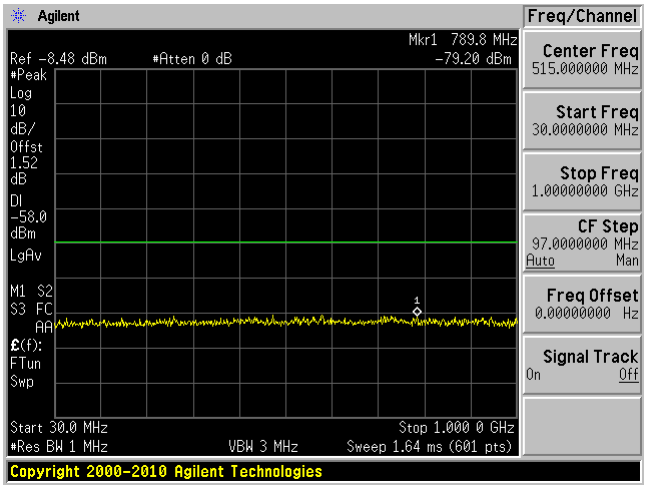


10 GHz – 40 GHz

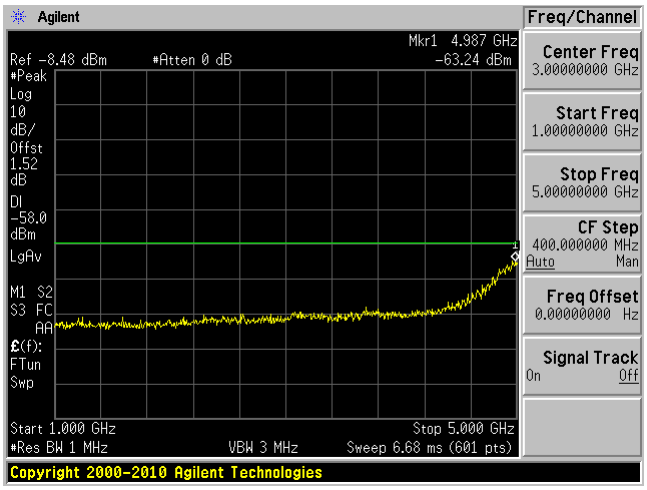


802.11n20 mode 5180 MHz Chain 1

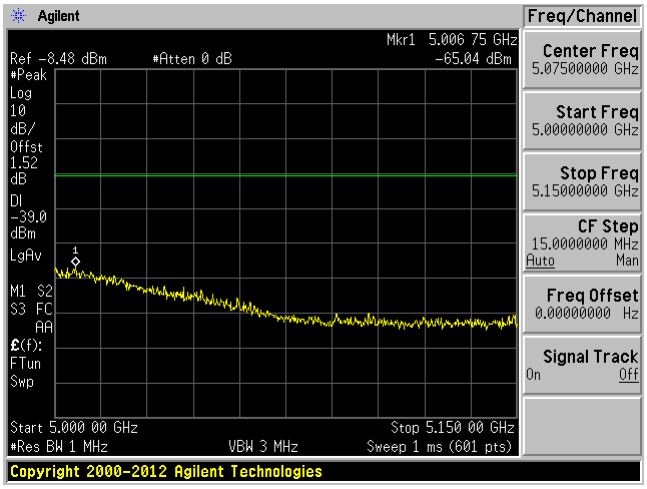
30 MHz – 1 GHz



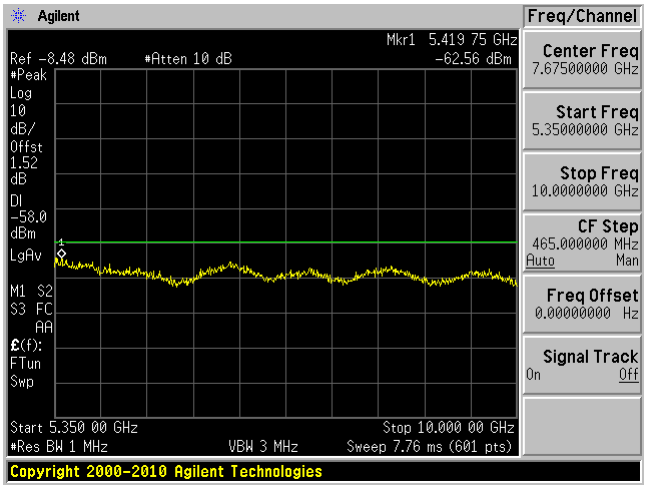
1 GHz – 5 GHz



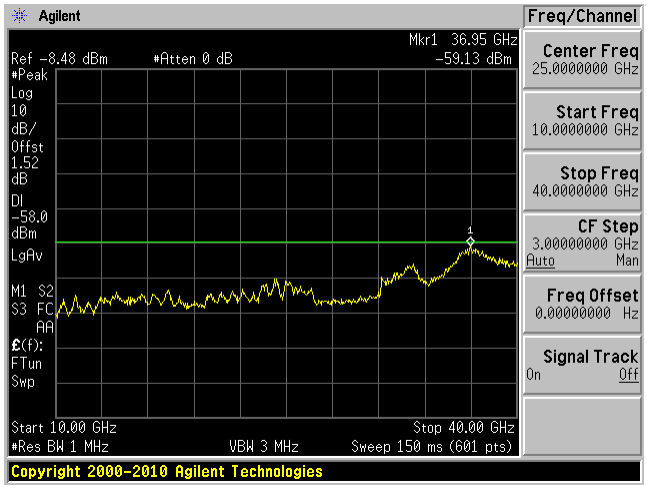
5 GHz – 5150 MHz



5350 MHz – 10 GHz

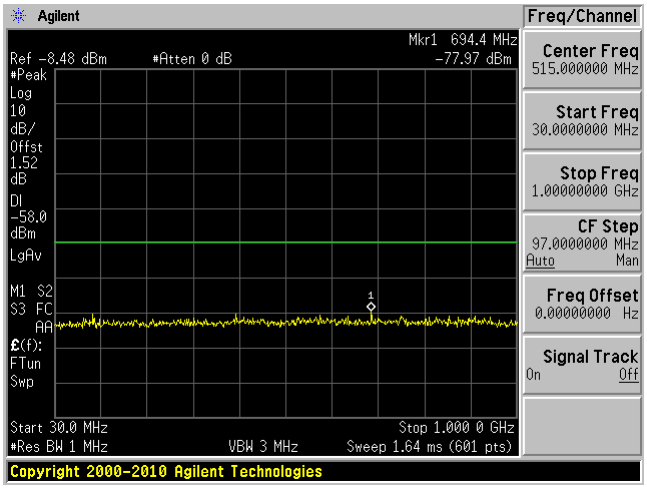


10 GHz – 40 GHz

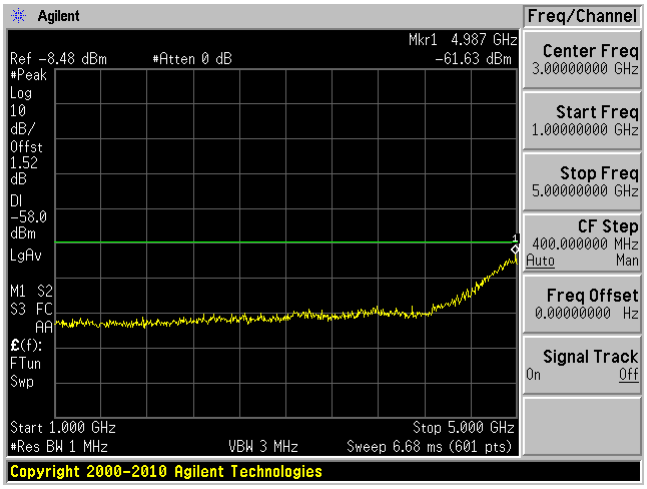


802.11n20 mode 5200 MHz Chain 0

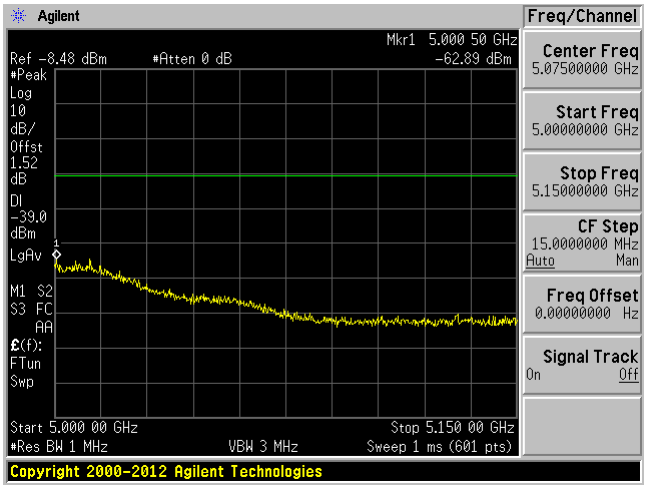
30 MHz – 1 GHz



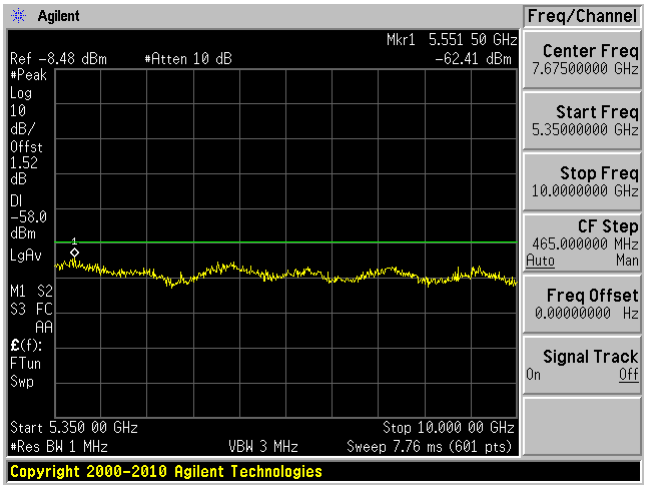
1 GHz – 5 GHz



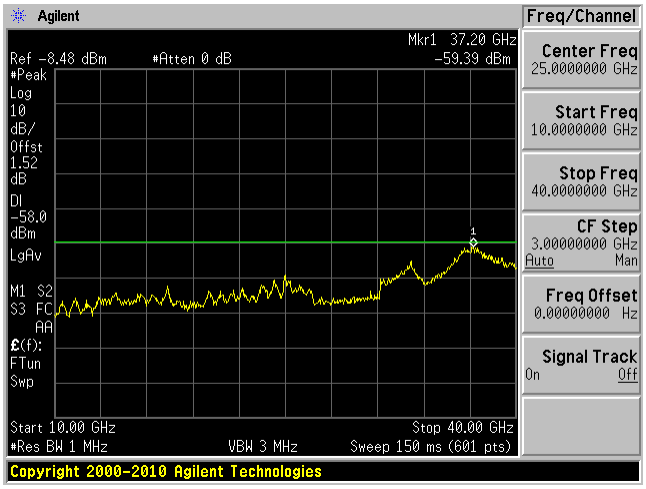
5 GHz – 5150 MHz



5350 MHz – 10 GHz

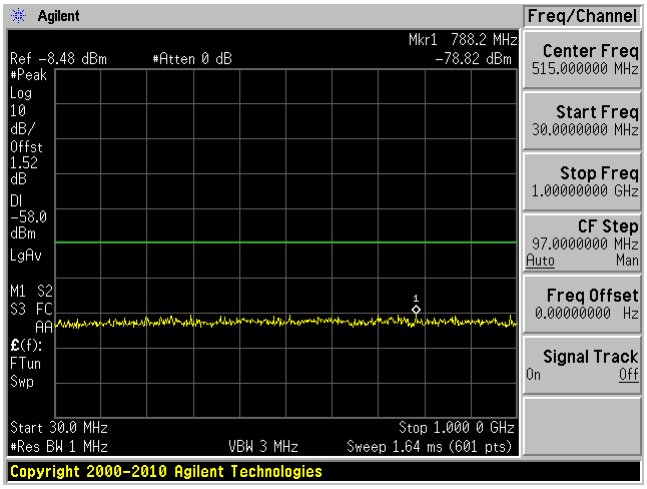


10 GHz – 40 GHz

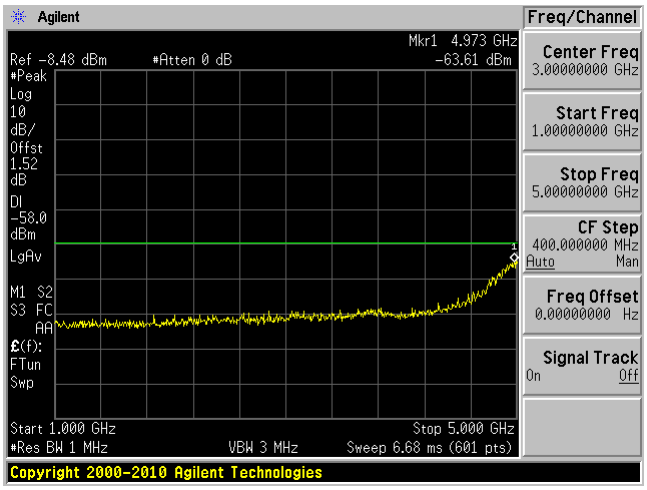


02.11n20 mode 5200 MHz Chain 1

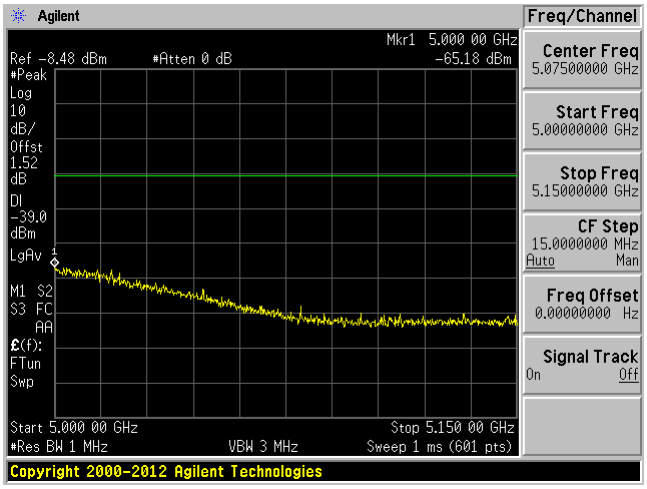
30 MHz – 1 GHz



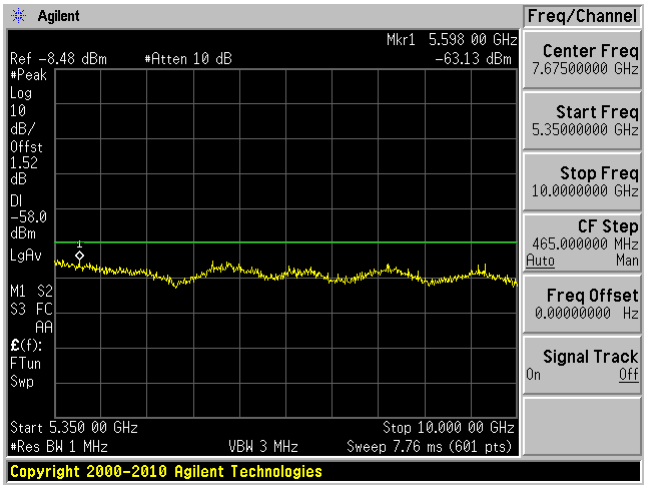
1 GHz – 5 GHz



5 GHz – 5150 MHz



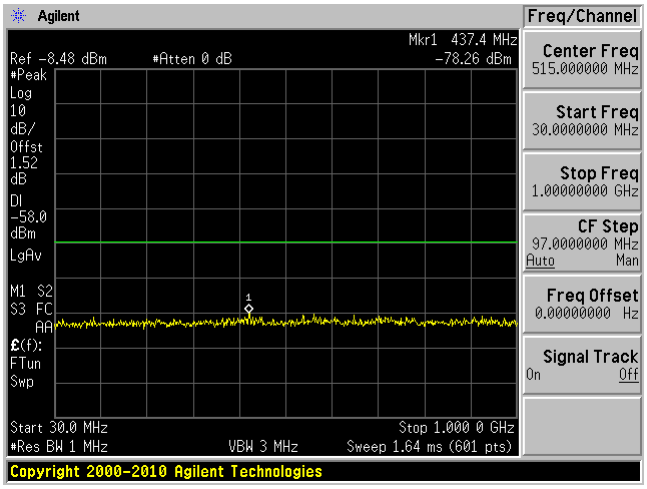
5350 MHz – 10 GHz



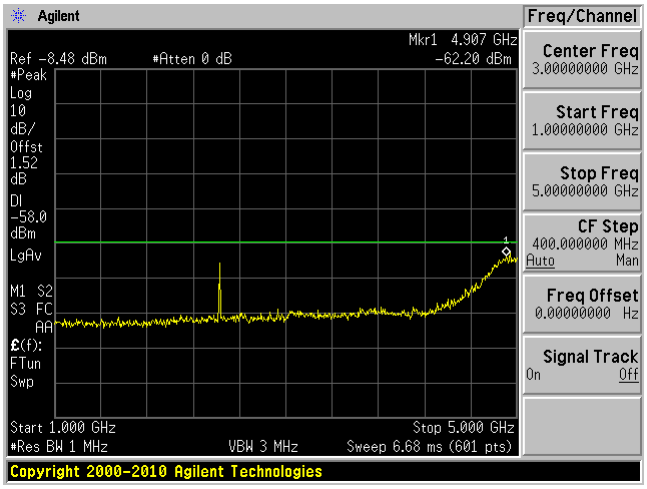
10 GHz – 40 GHz

802.11n20 mode 5240 MHz Chain 0

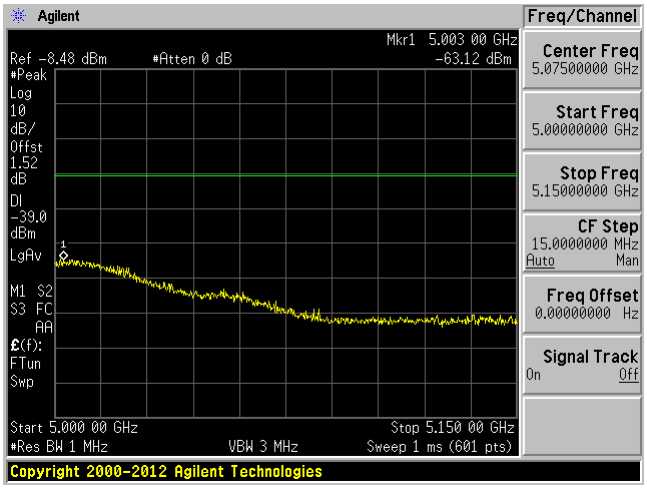
30 MHz – 1 GHz



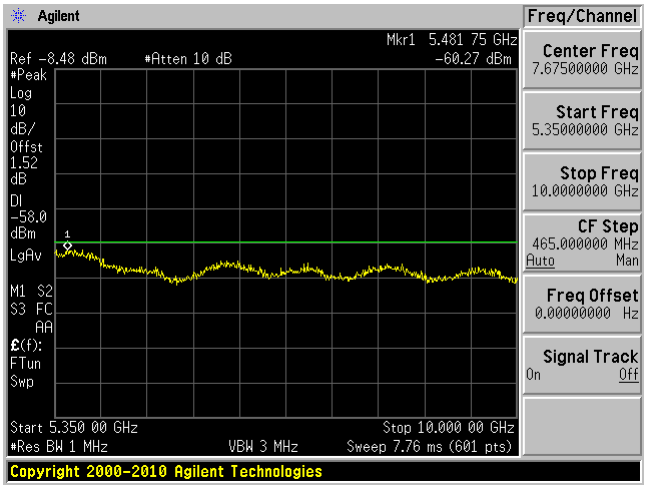
1 GHz – 5 GHz



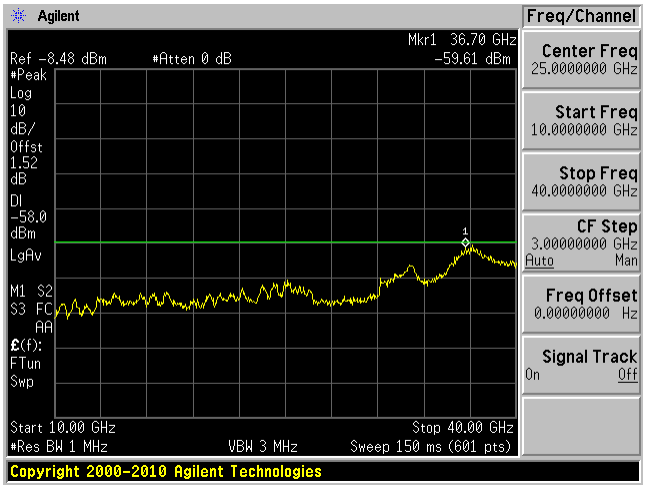
5 GHz – 5150 MHz



5350 MHz – 10 GHz

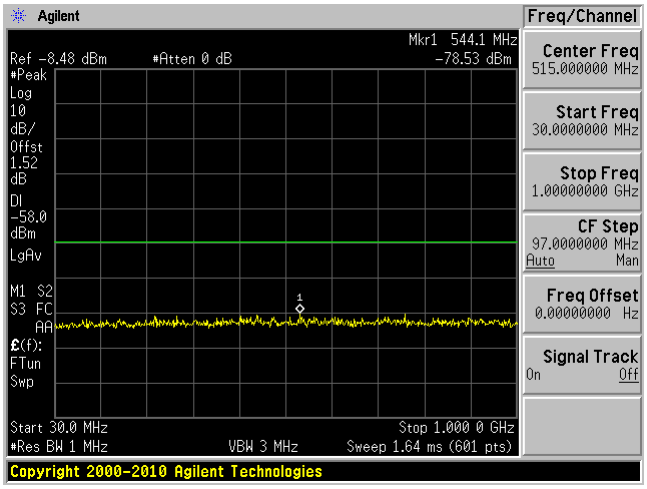


10 GHz – 40 GHz

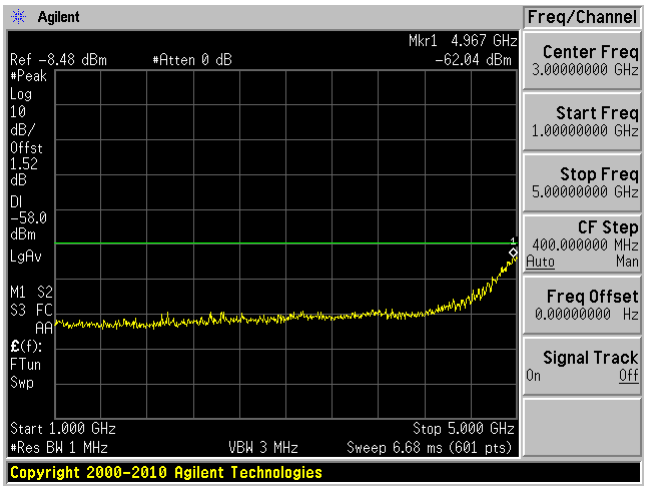


802.11n20 mode 5240 MHz Chain 1

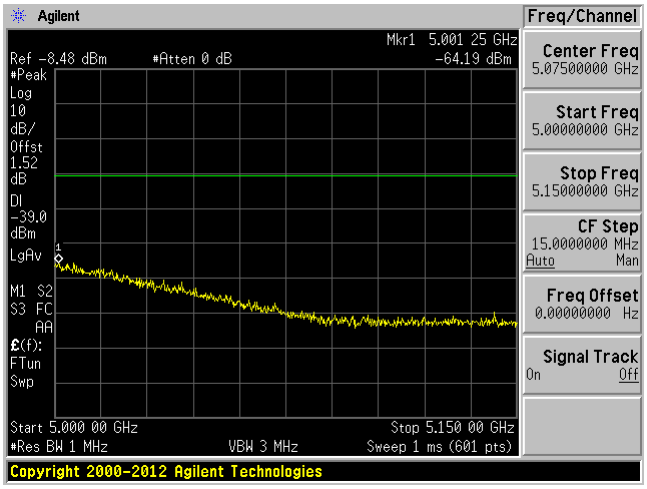
30 MHz – 1 GHz



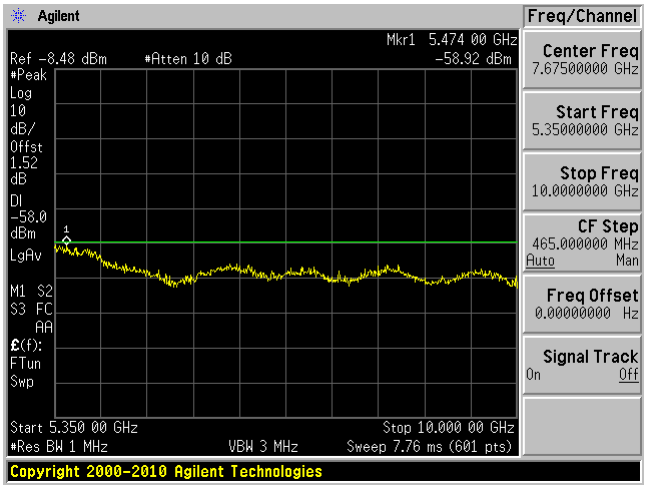
1 GHz – 5 GHz



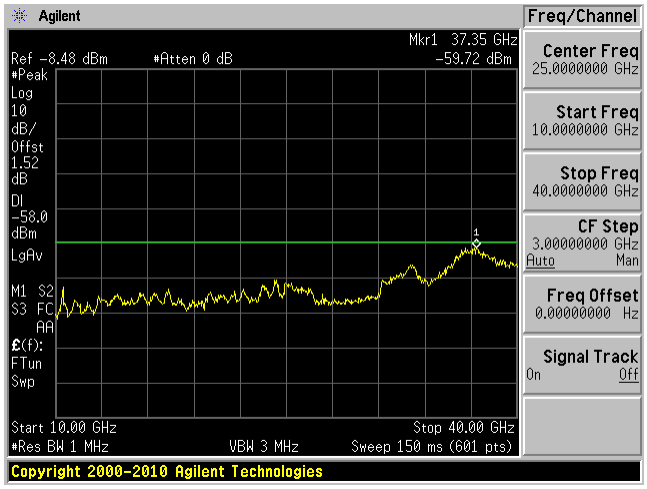
5 GHz – 5150 MHz



5350 MHz – 10 GHz

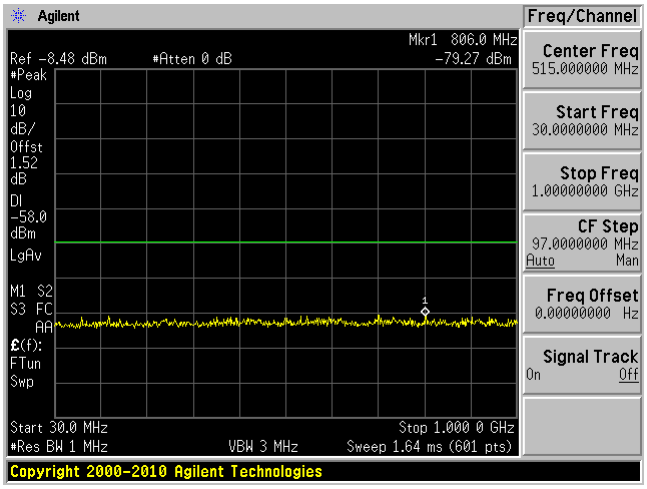


10 GHz – 40 GHz

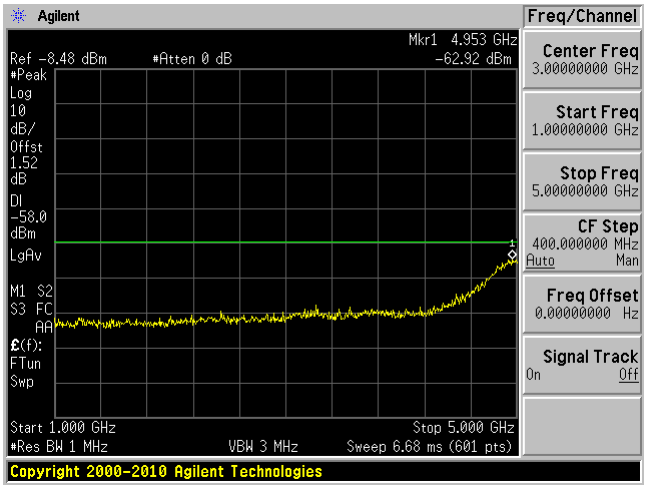


802.11n40 mode 5230 MHz Chain 0

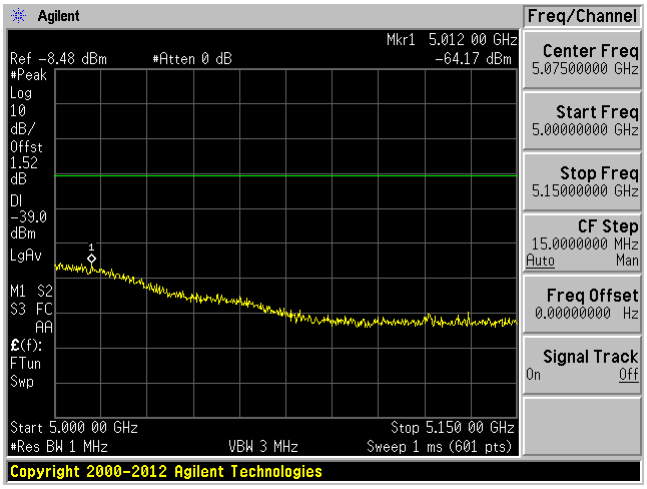
30 MHz – 1 GHz



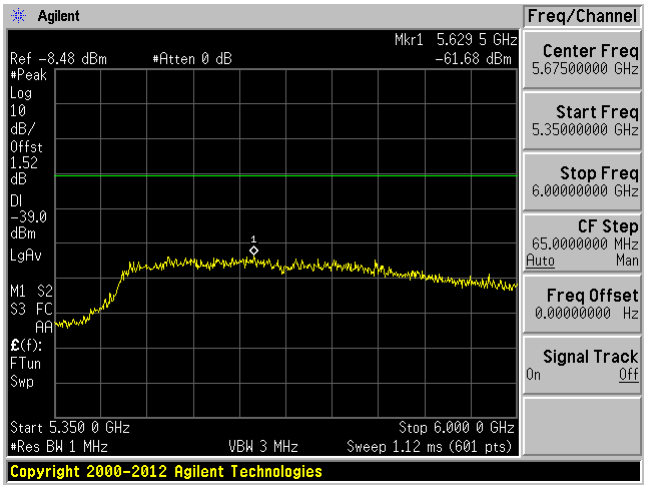
1 GHz – 5 GHz



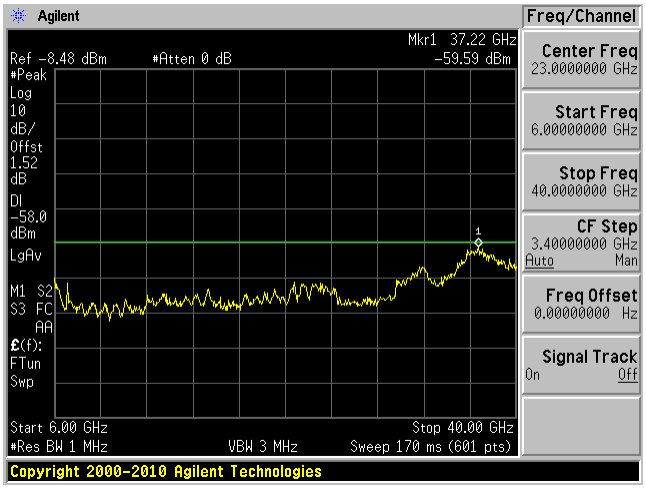
5 GHz – 5150 MHz



5350 MHz – 6 GHz

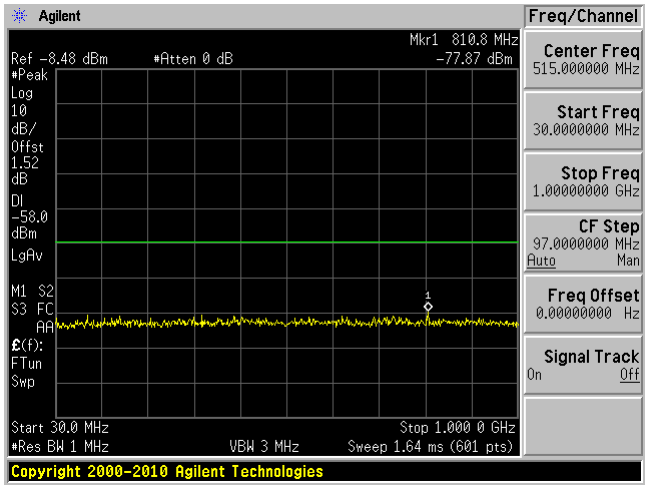


6 GHz – 40 GHz

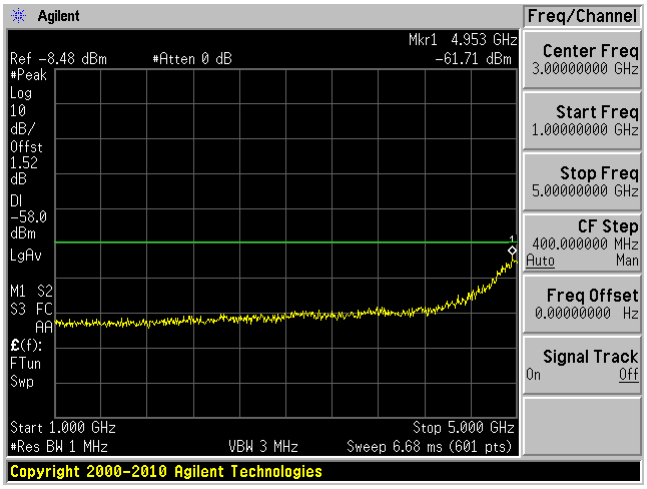


802.11n40 mode 5230 Chain 1

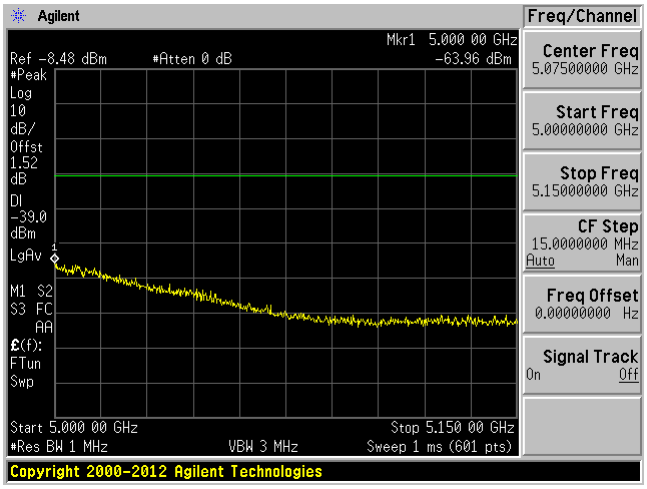
30 MHz – 1 GHz



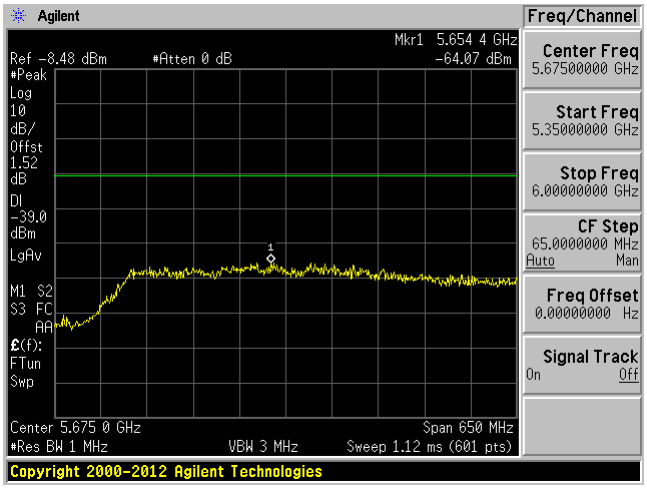
1 GHz – 5 GHz



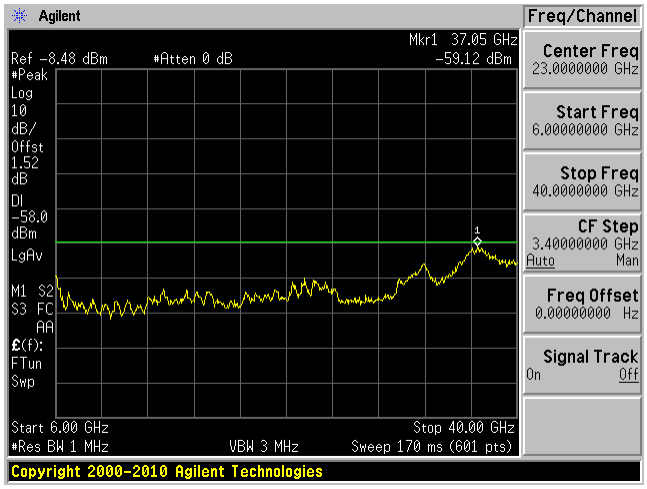
5 GHz – 5150 MHz



5350 MHz – 6 GHz



6 GHz – 40 GHz

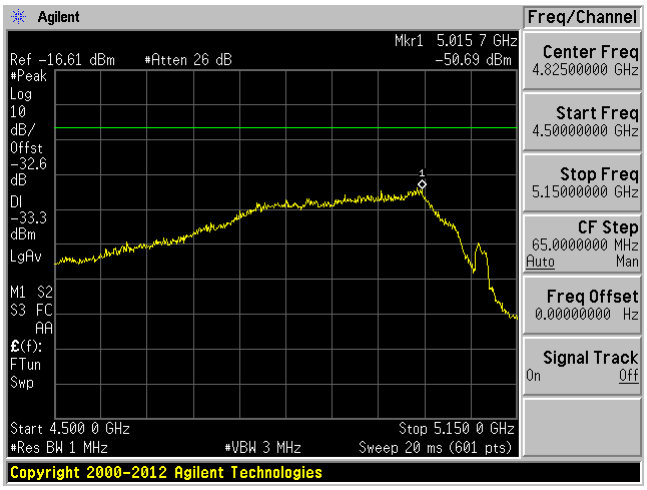


Restricted Band:

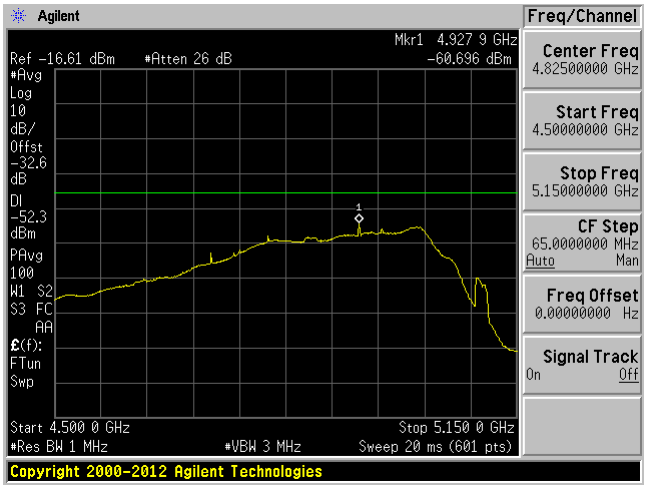
Low Antenna Gain

802.11a mode 5180 MHz chain 0

4500 MHz – 5150 MHz Peak

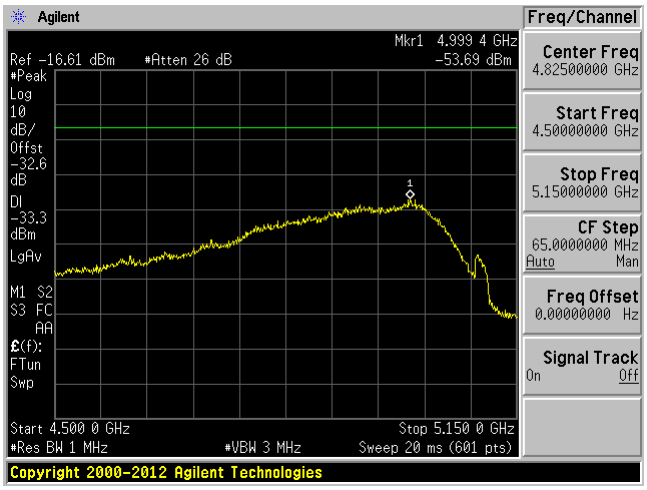


4500 MHz – 5150 MHz Average

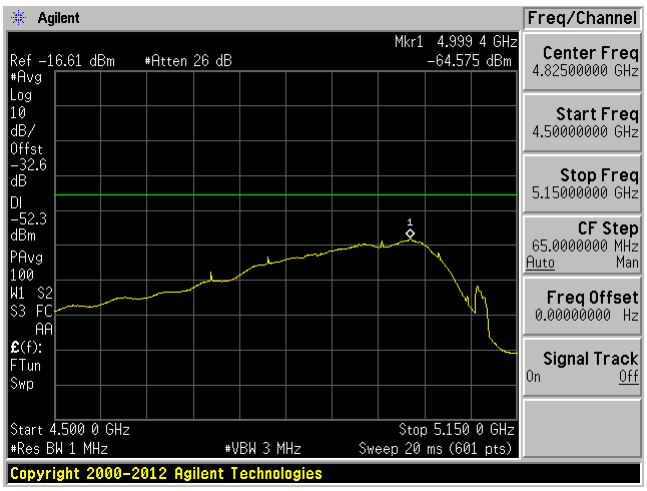


802.11a mode 5180 MHz chain 1

4500 MHz – 5150 MHz Peak

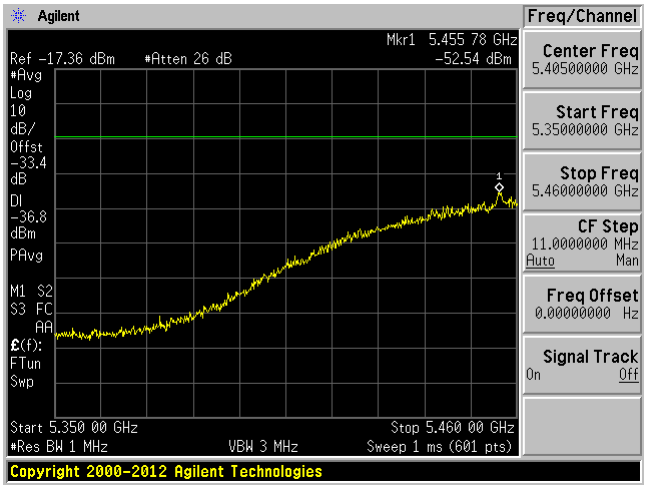


4500 MHz – 5150 MHz Average

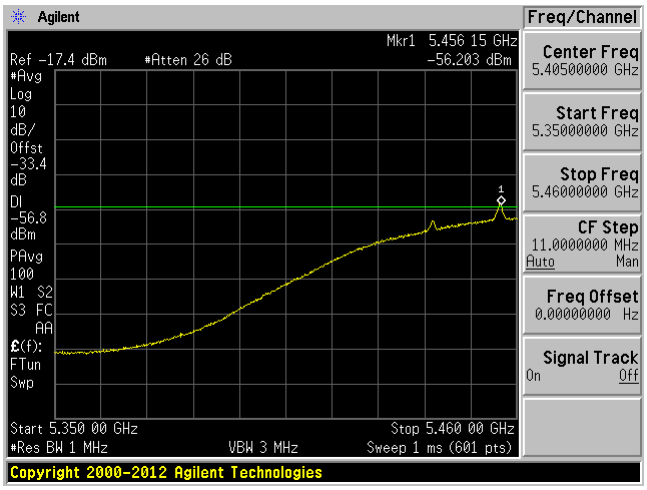


802.11a mode 5240 MHz chain 0

5350 MHz – 5460 MHz Peak

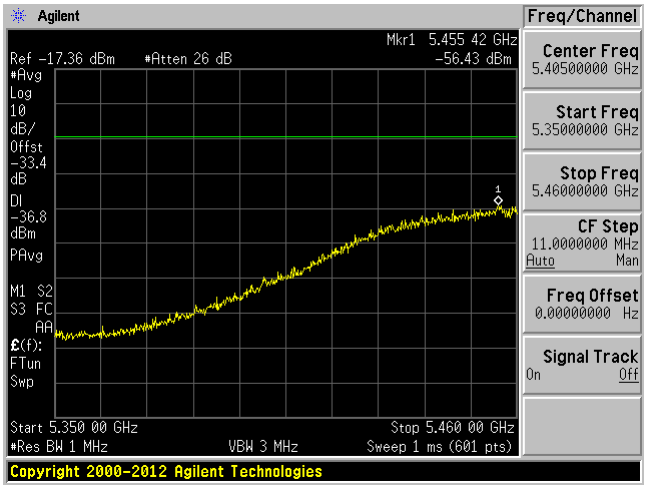


5350 MHz – 5460 MHz Average

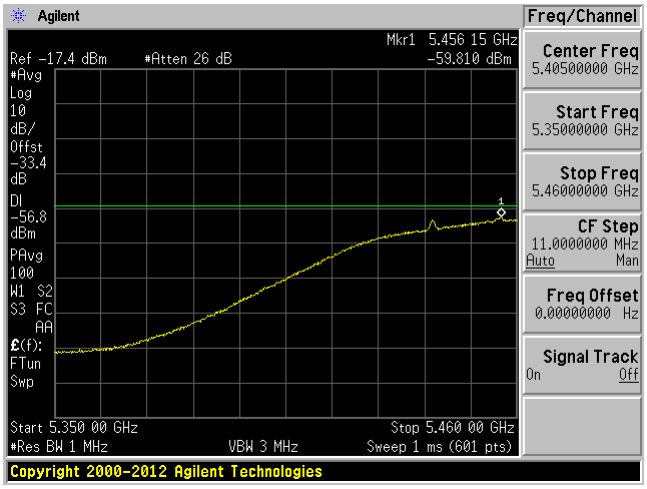


802.11a mode 5240 MHz chain 1

5350 MHz – 5460 MHz Peak

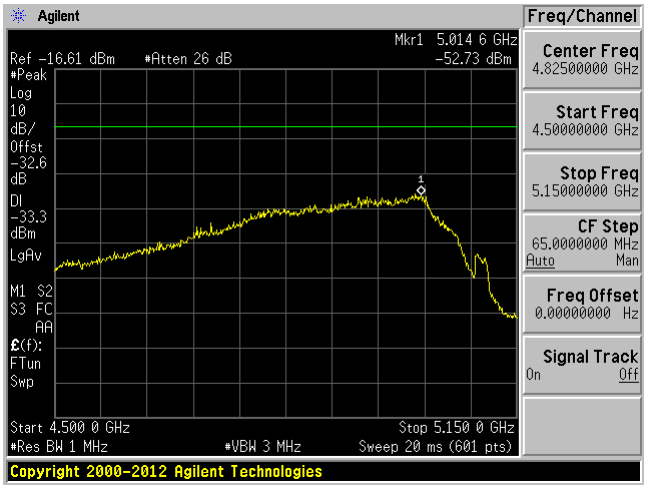


5350 MHz – 5460 MHz Average

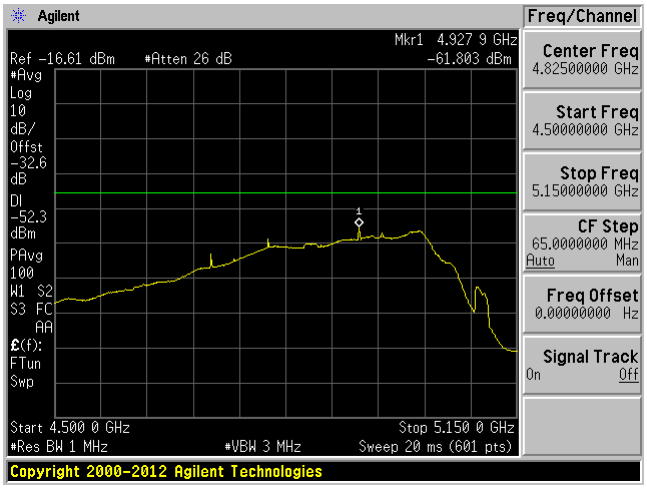


802.11n20 mode 5180 MHz chain 0

4500 MHz – 5150 MHz Peak

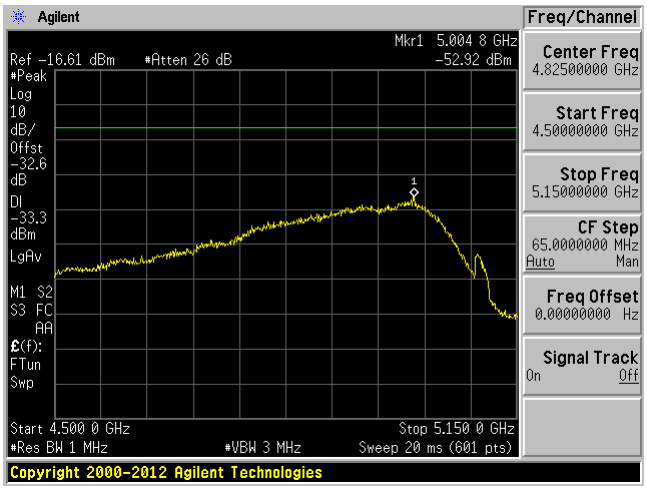


4500 MHz – 5150 MHz Average

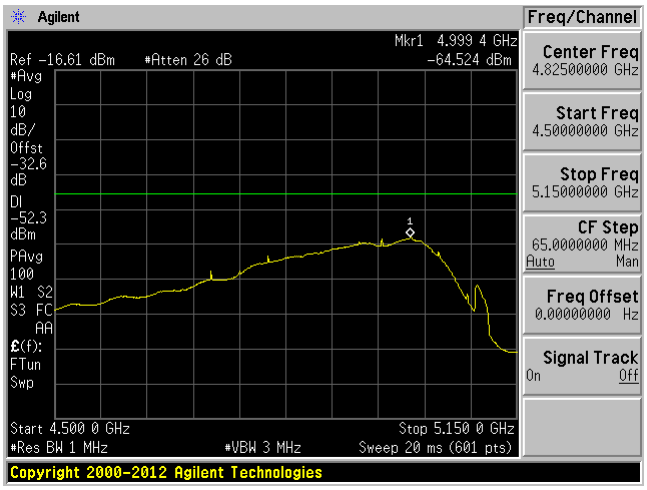


802.11n20 mode 5180 MHz chain 1

4500 MHz – 5150 MHz Peak

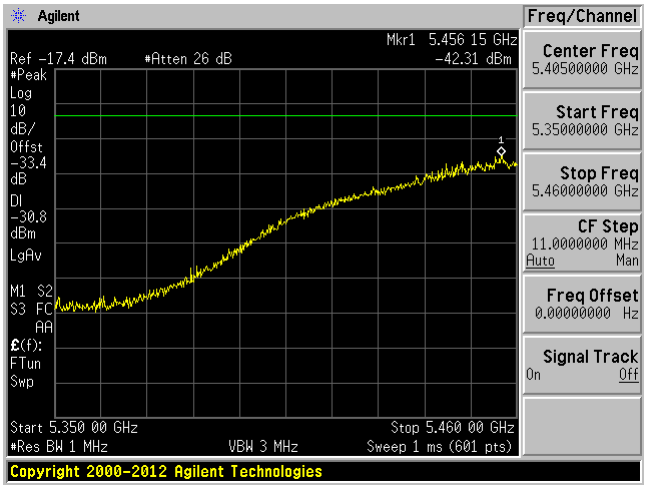


4500 MHz – 5150 MHz Average

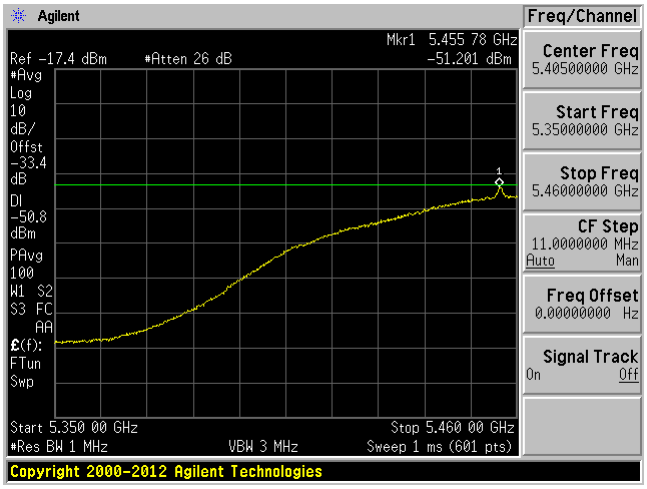


802.11n20 mode 5240 MHz chain 0, N_{ss}=2

5350 MHz – 5460 MHz Peak

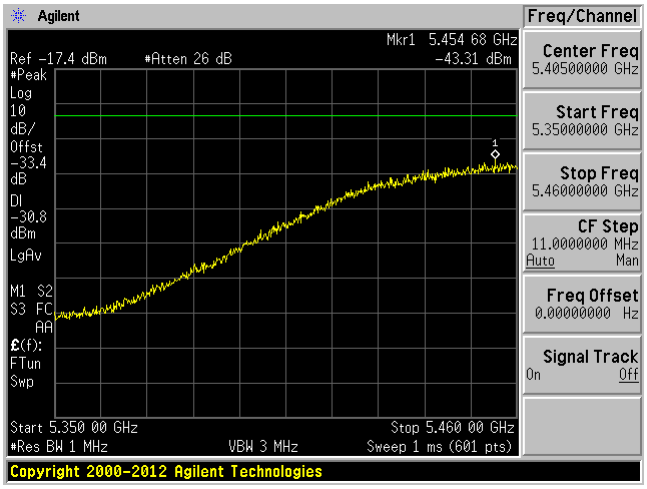


5350 MHz – 5460 MHz Average

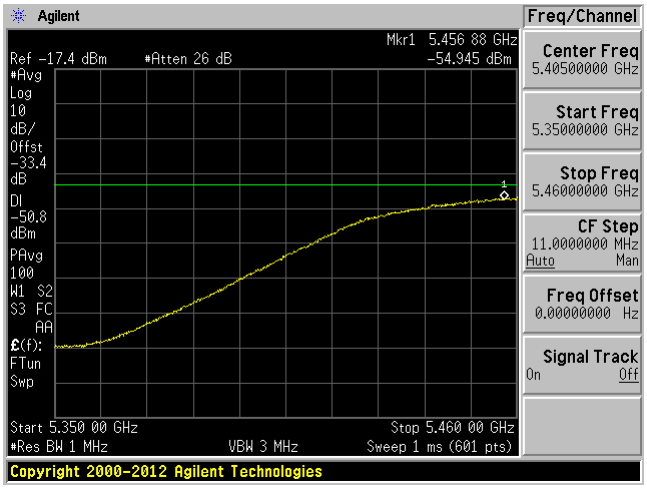


802.11n20 mode 5240 MHz chain 1, N_{ss}=2

5350 MHz – 5460 MHz Peak

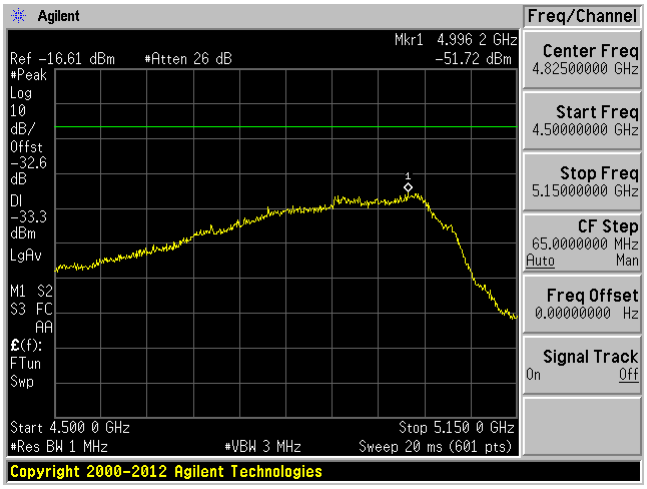


5350 MHz – 5460 MHz Average

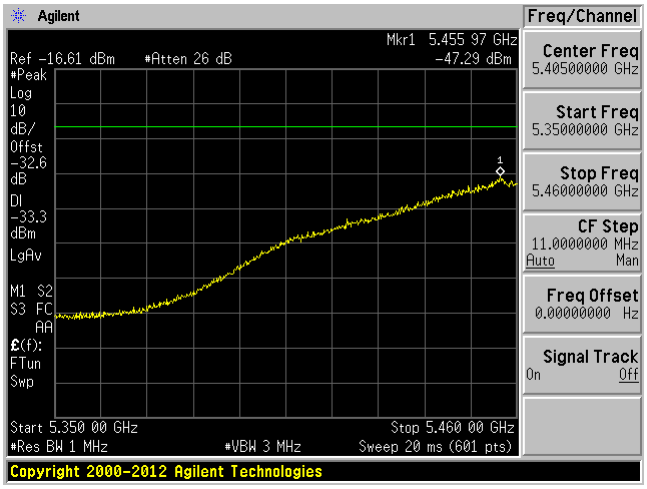


802.11n40 mode 5230 MHz chain 0 Peak

4500 MHz – 5150 MHz

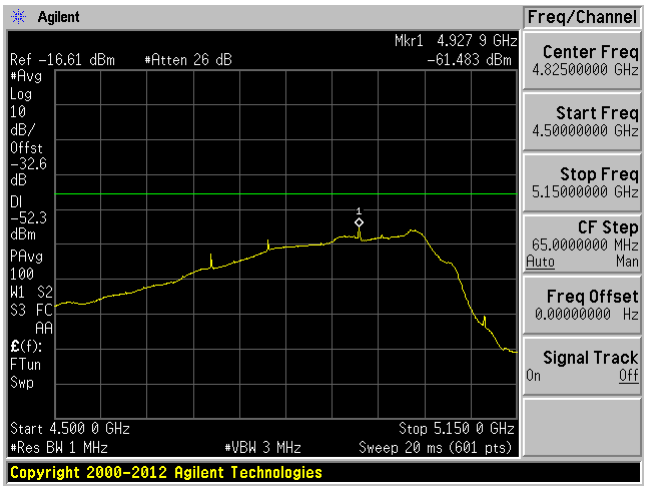


5350 MHz – 5460 MHz

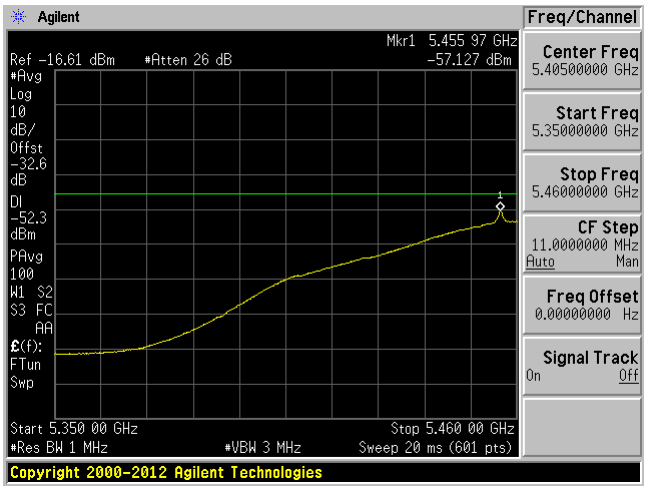


802.11n40 mode 5230 MHz chain 0 Average

4500 MHz – 5150 MHz

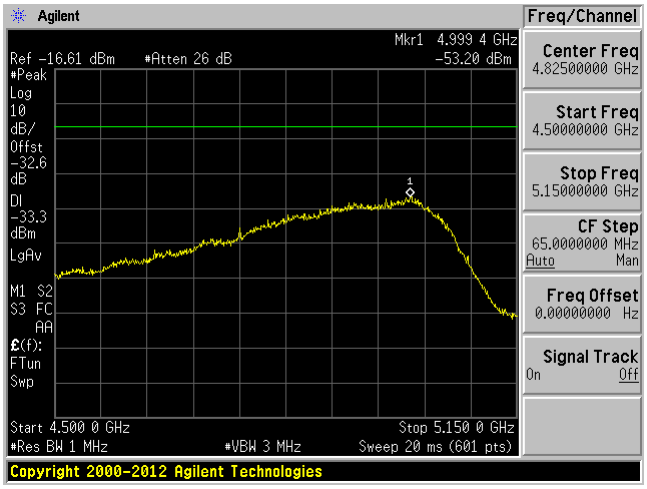


5350 MHz – 5460 MHz

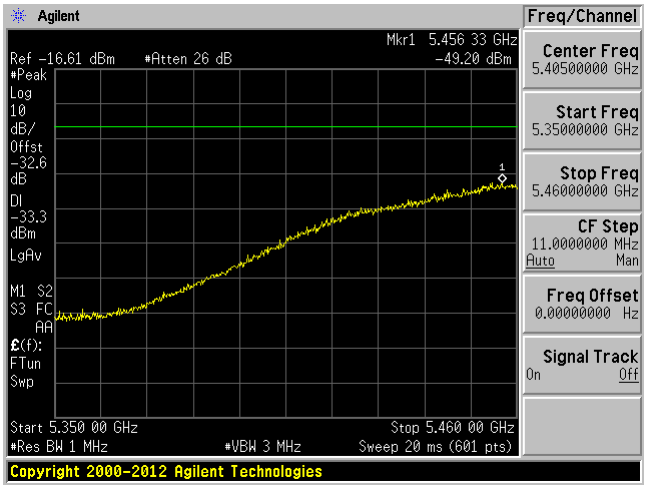


802.11n40 mode 5230 MHz chain 1 Peak

4500 MHz – 5150 MHz

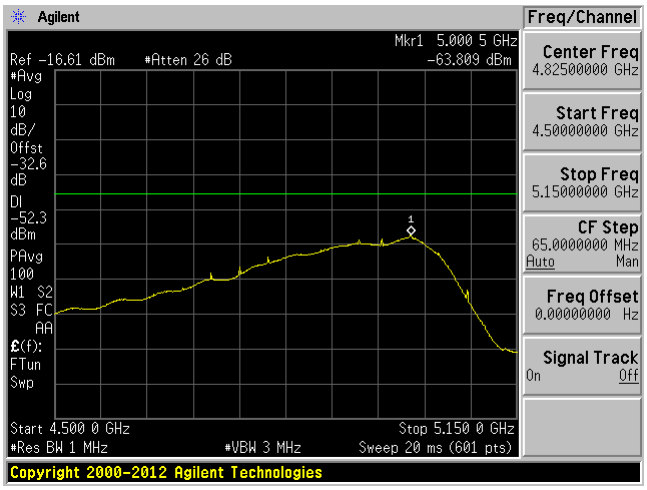


5350 MHz – 5460 MHz

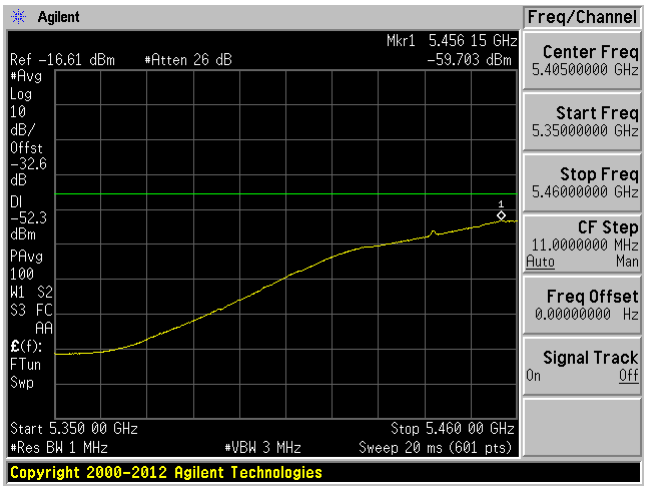


802.11n40 mode 5230 MHz chain 1 Average

4500 MHz – 5150 MHz



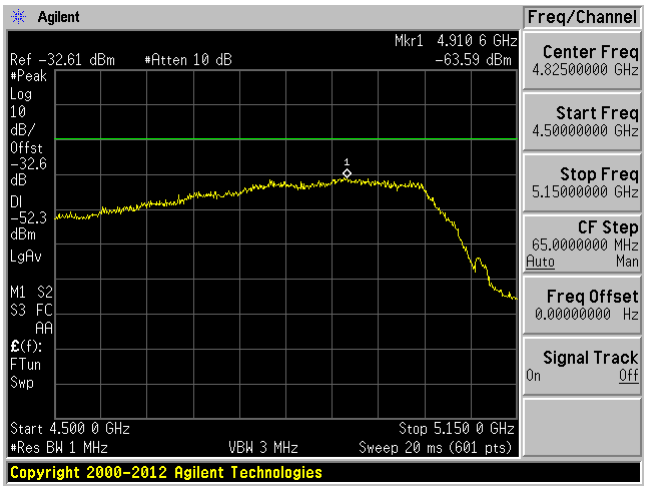
5350 MHz – 5460 MHz



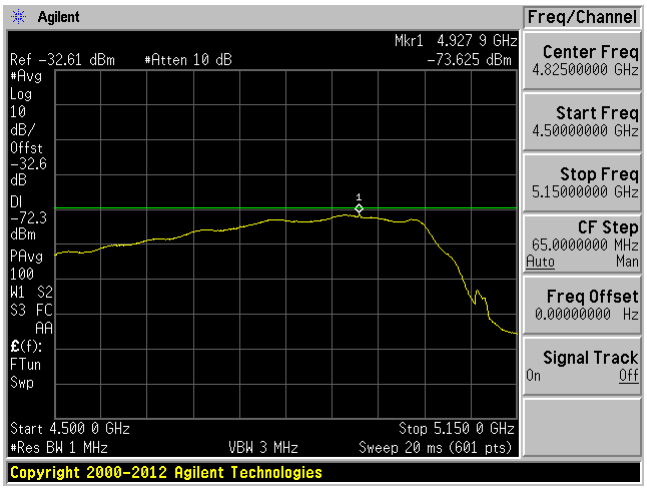
High Antenna Gain

802.11a mode 5180 MHz chain 0

4500 MHz – 5150 MHz Peak

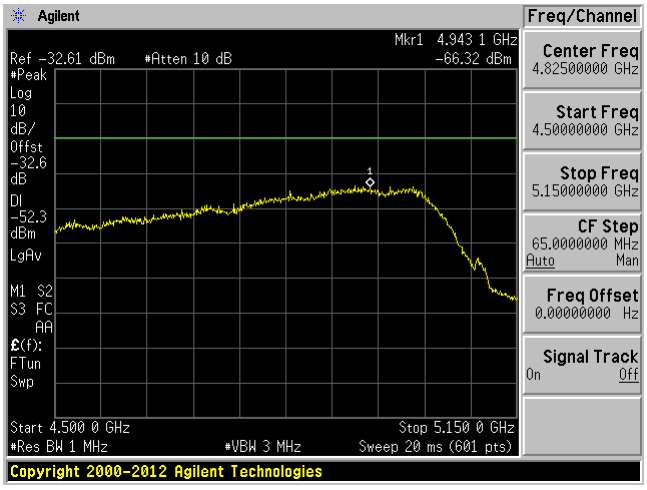


4500 MHz – 5150 MHz Average

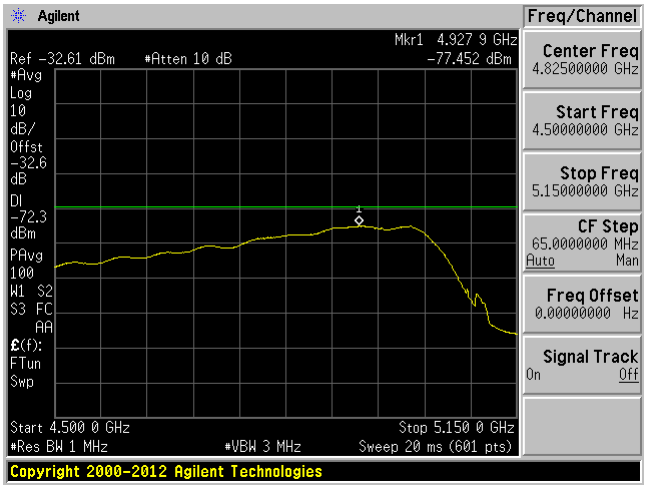


802.11a mode 5180 MHz chain 1

4500 MHz – 5150 MHz Peak

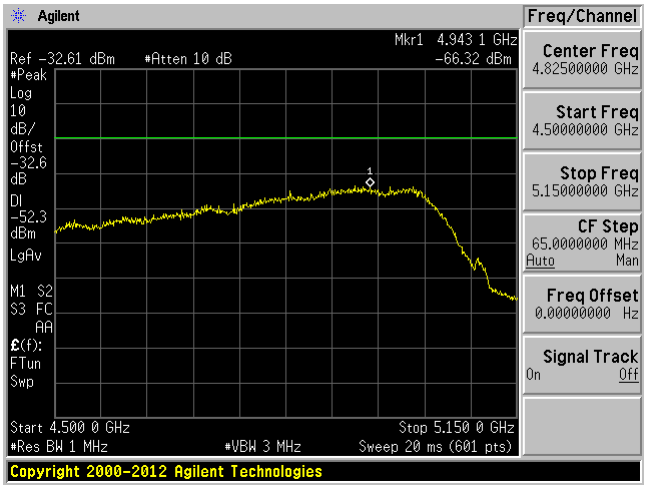


4500 MHz – 5150 MHz Average

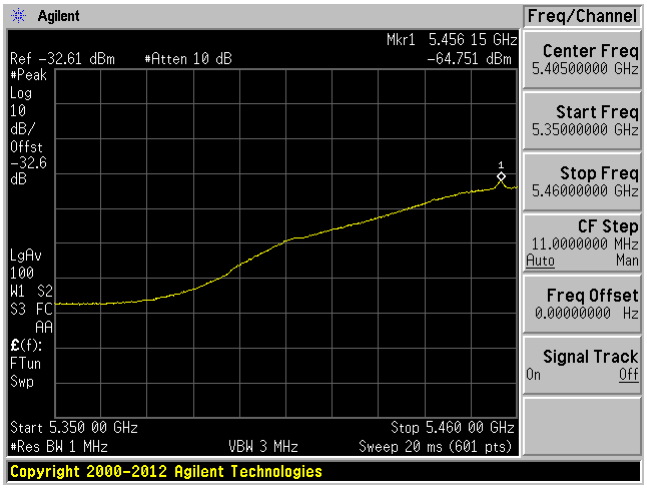


802.11a mode 5240 MHz chain 0

5350 MHz – 5460 MHz Peak

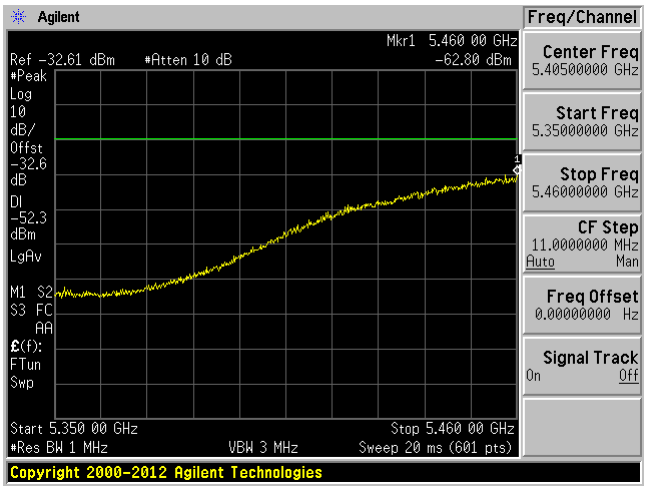


5350 MHz – 5460 MHz Average

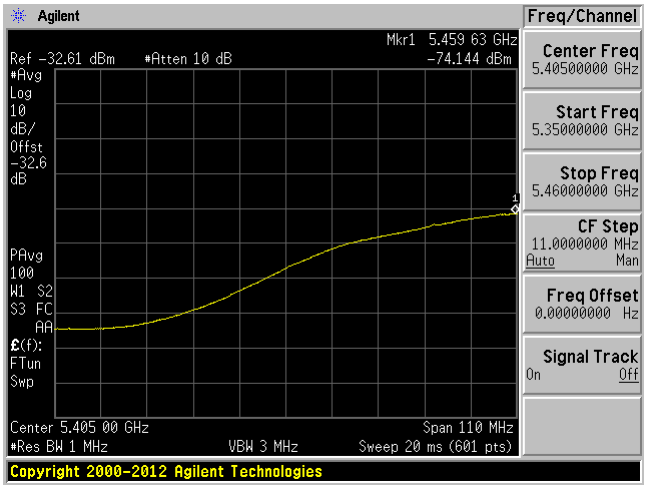


802.11a mode 5240 MHz chain 1

5350 MHz – 5460 MHz Peak

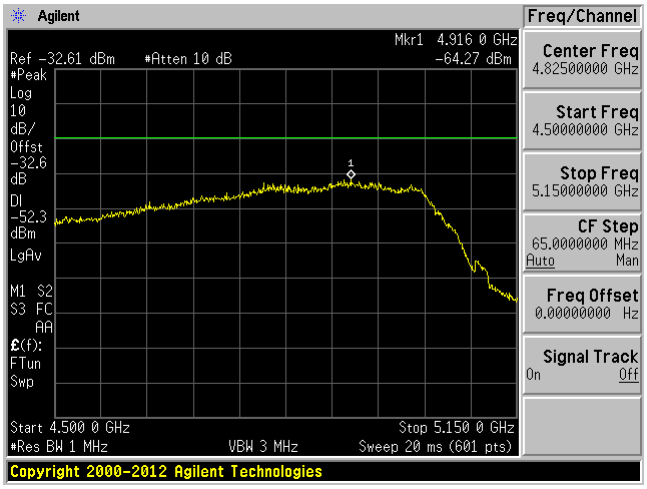


5350 MHz – 5460 MHz Average

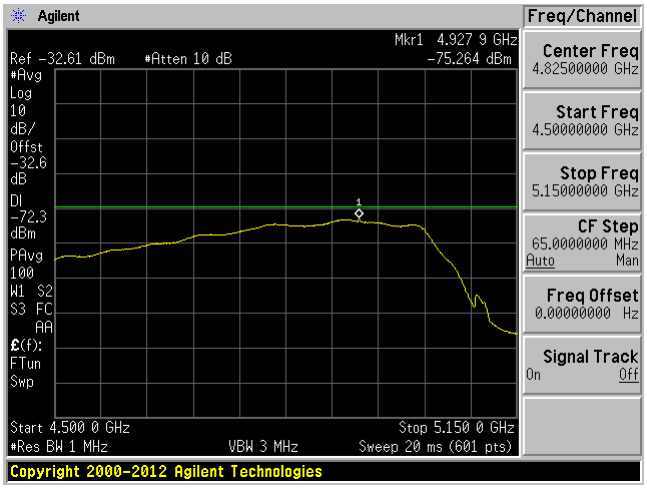


802.11n20 mode 5180 MHz chain 0

4500 MHz – 5150 MHz Peak

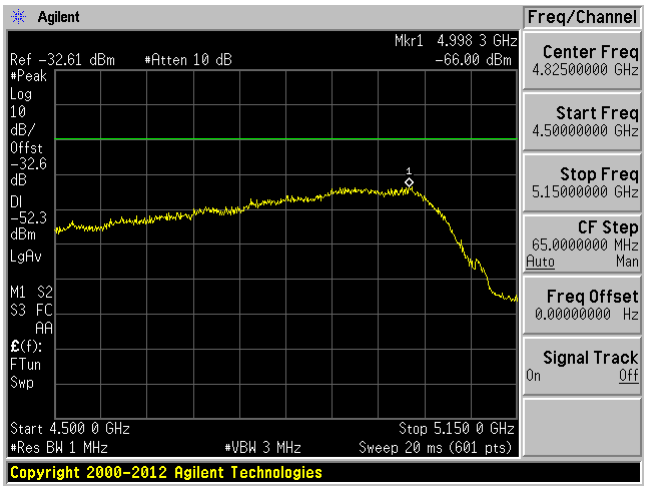


4500 MHz – 5150 MHz Average

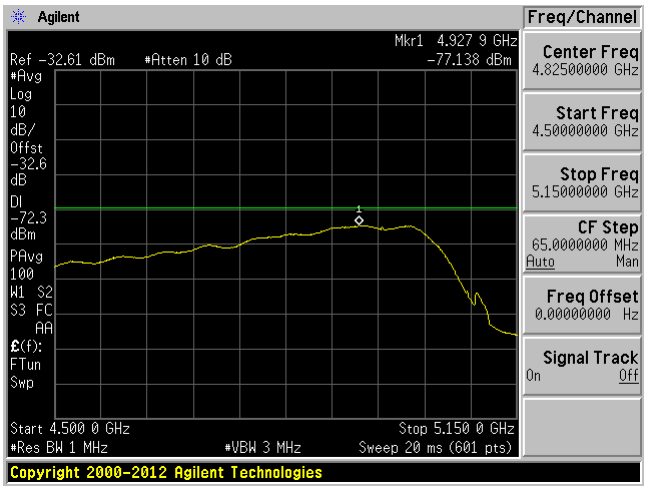


802.11n20 mode 5180 MHz chain 1

4500 MHz – 5150 MHz Peak

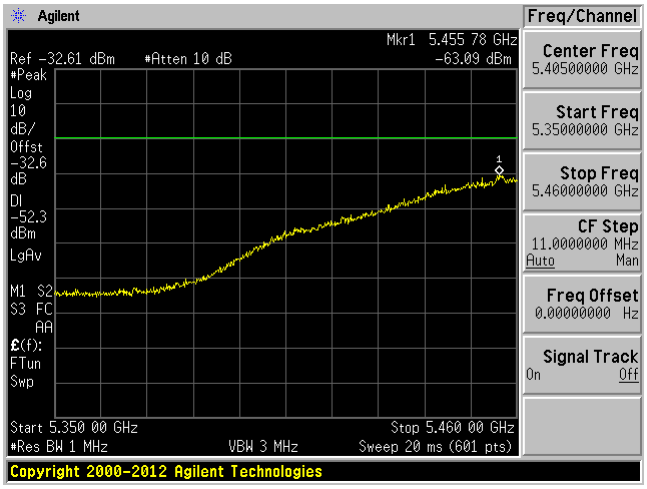


4500 MHz – 5150 MHz Average

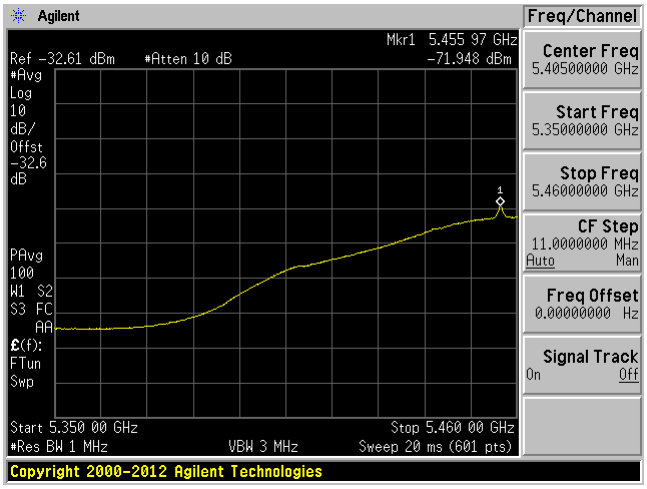


802.11n20 mode 5240 MHz chain 0

5350 MHz – 5460 MHz Peak

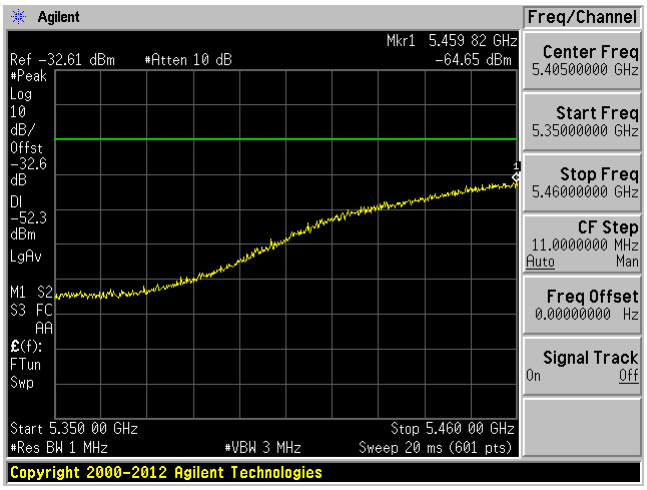


5350 MHz – 5460 MHz Average

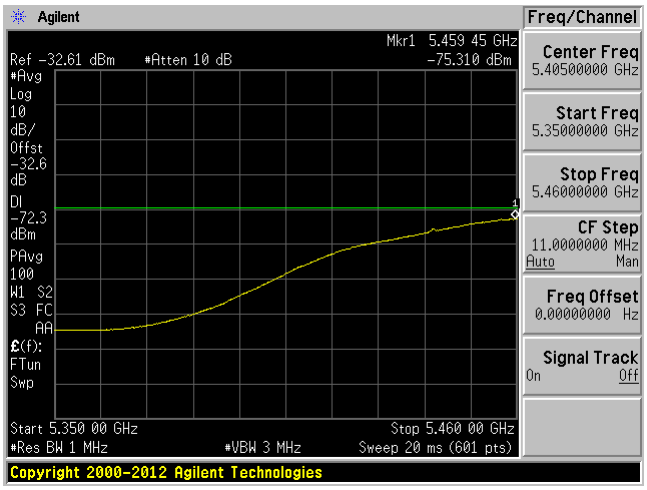


802.11a mode 5240 MHz chain 1

5350 MHz – 5460 MHz Peak

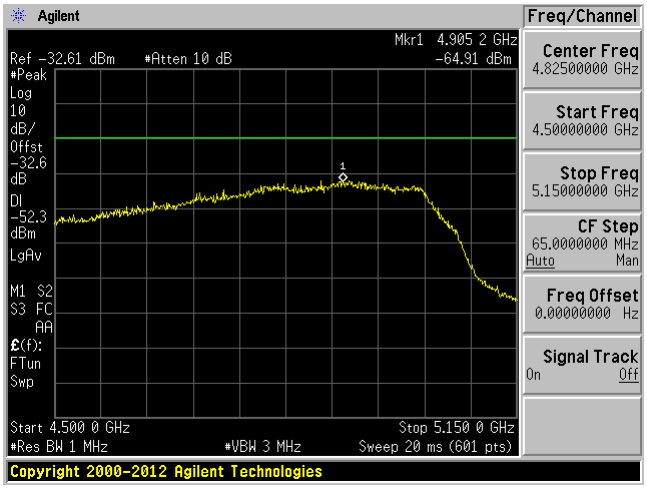


5350 MHz – 5460 MHz Average

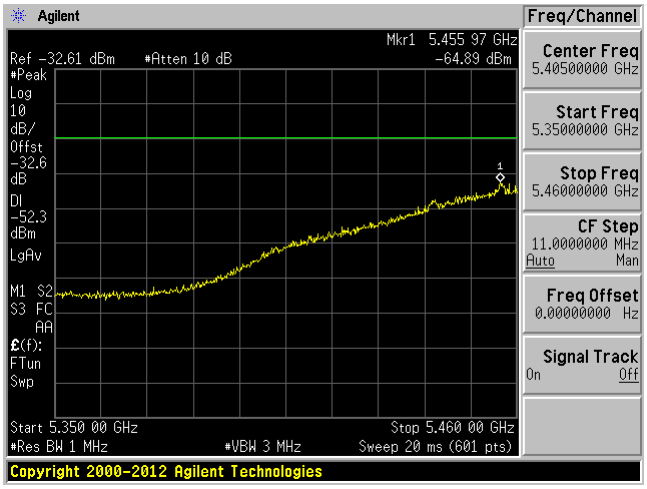


802.11n40 mode 5230 MHz chain 0 Peak

4500 MHz – 5150 MHz

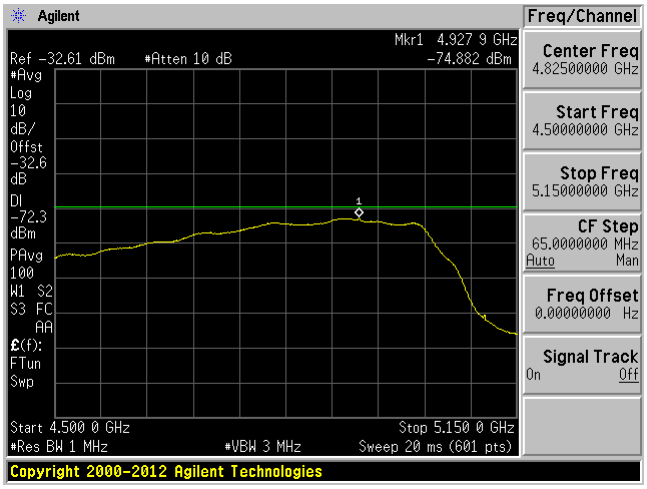


5350 MHz – 5460 MHz

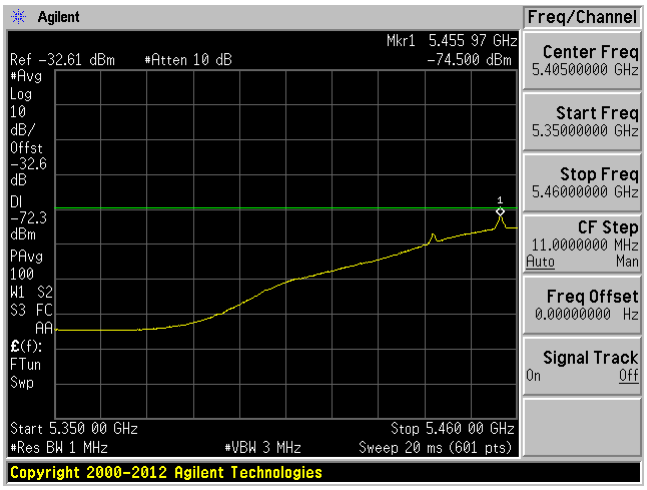


802.11n40 mode 5230 MHz chain 0 Average

4500 MHz – 5150 MHz

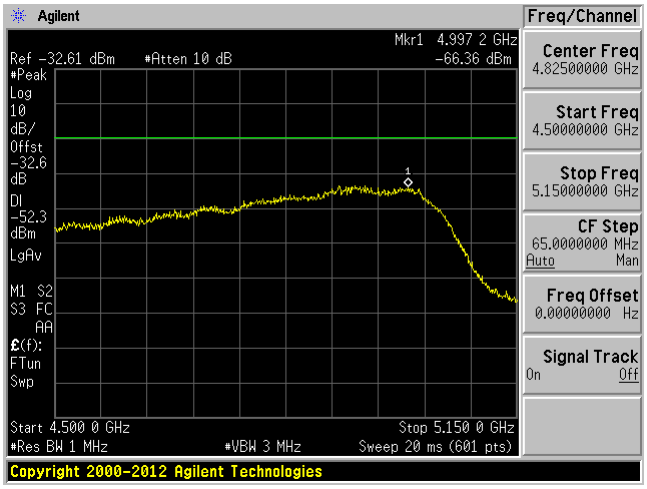


5350 MHz – 5460 MHz

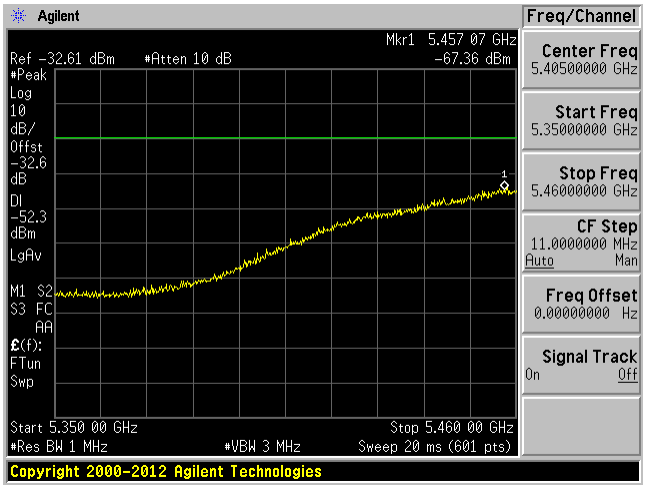


802.11n40 mode 5230 MHz chain 1 Peak

4500 MHz – 5150 MHz

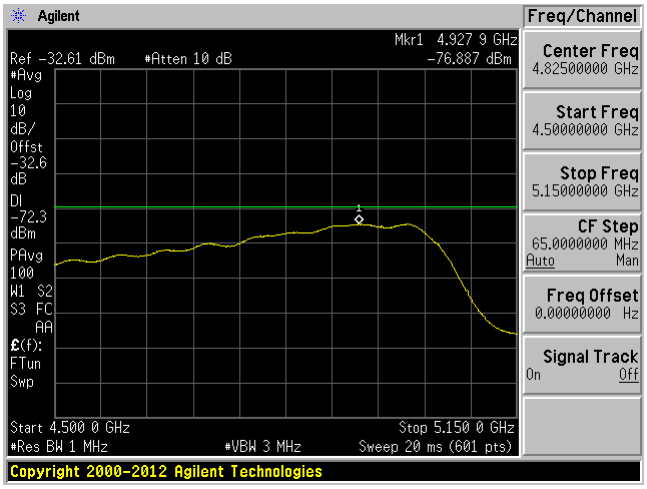


5350 MHz – 5460 MHz

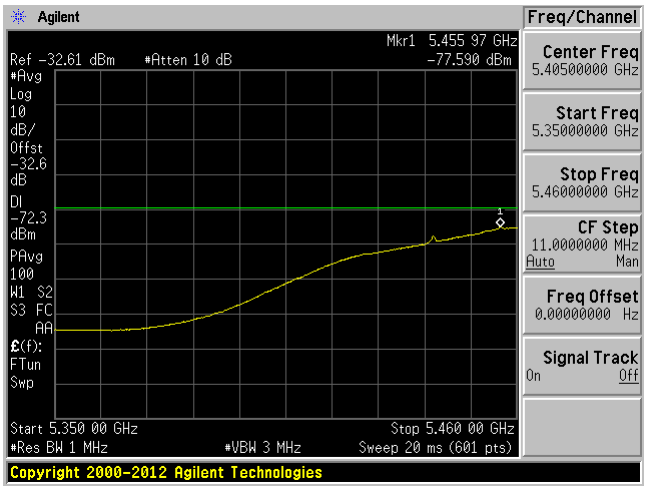


802.11n40 mode 5230 MHz chain 1 Average

4500 MHz – 5150 MHz



5350 MHz – 5460 MHz



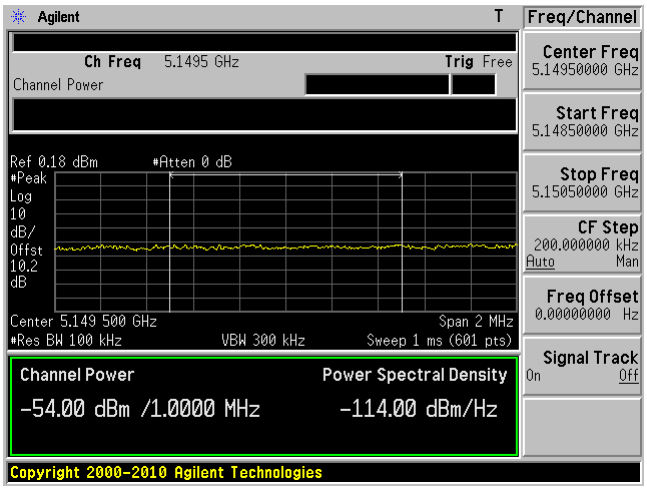
Note: Directional Gain has been added to the emissions lines in the plots.

Band Edge:

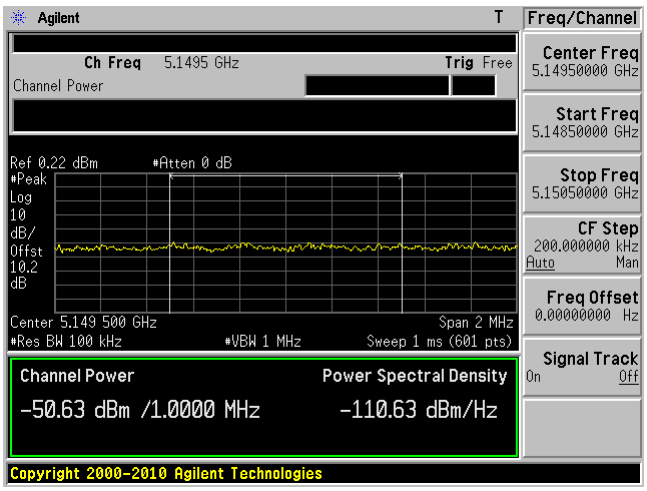
Low Antenna Gain

802.11a mode 5180 MHz

Chain 0

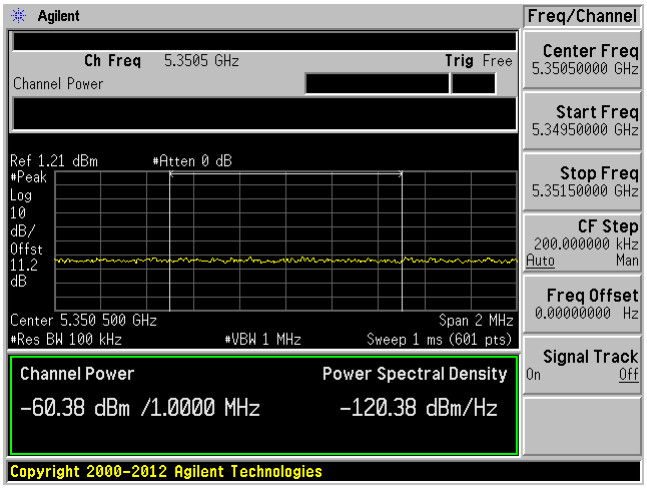


Chain 1

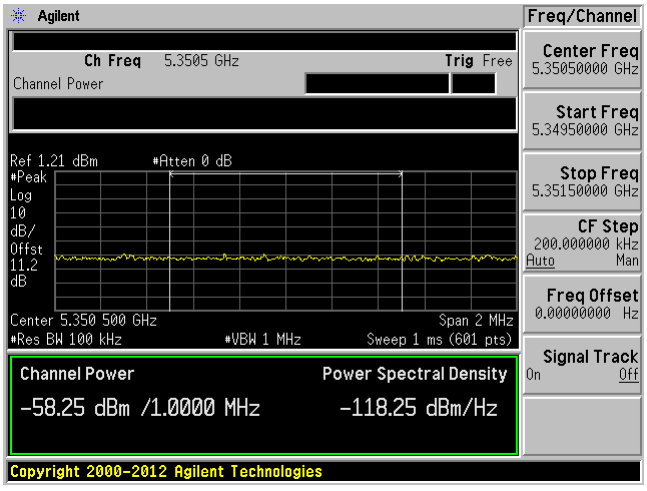


802.11a mode 5240 MHz

Chain 0

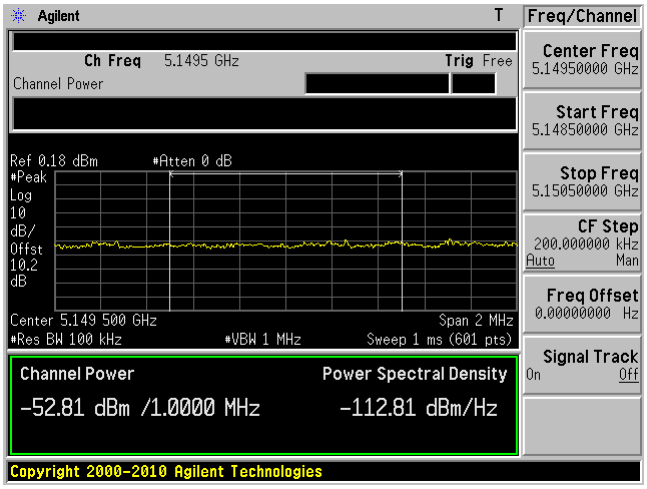


Chain 1

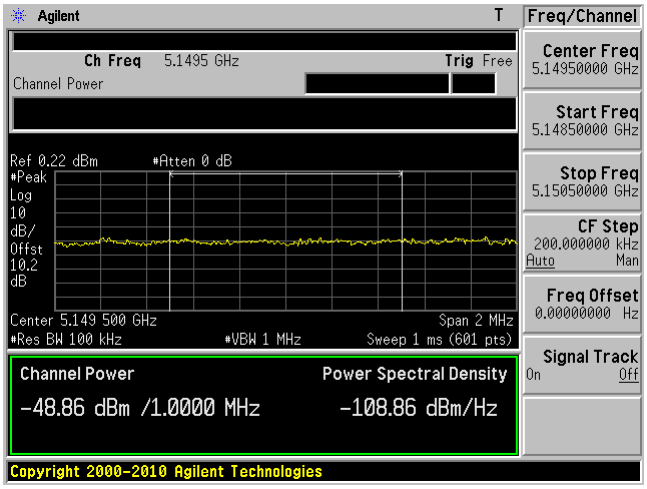


802.11n20 mode 5180 MHz

Chain 0

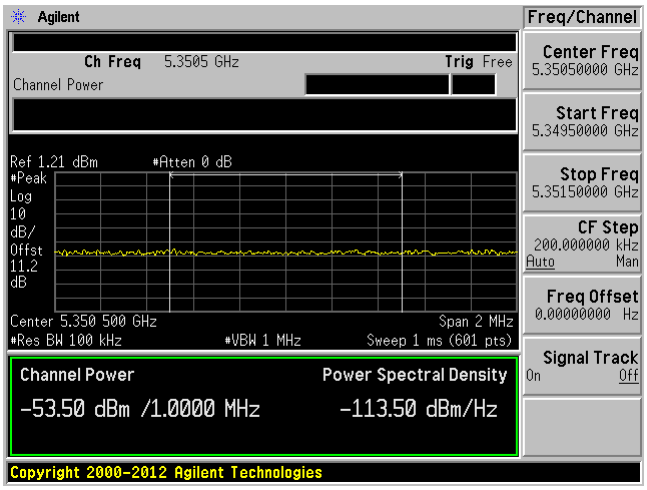


Chain 1

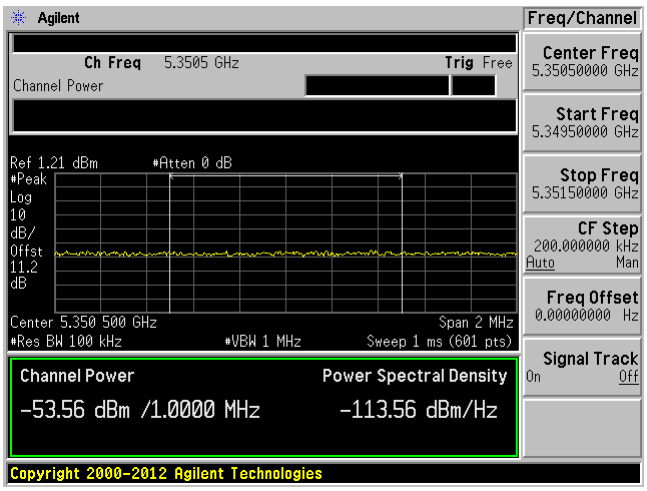


802.11a mode 5240 MHz

Chain 0

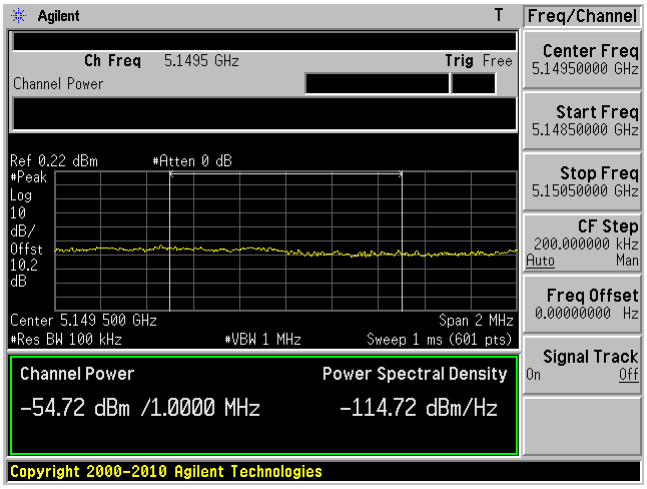


Chain 1

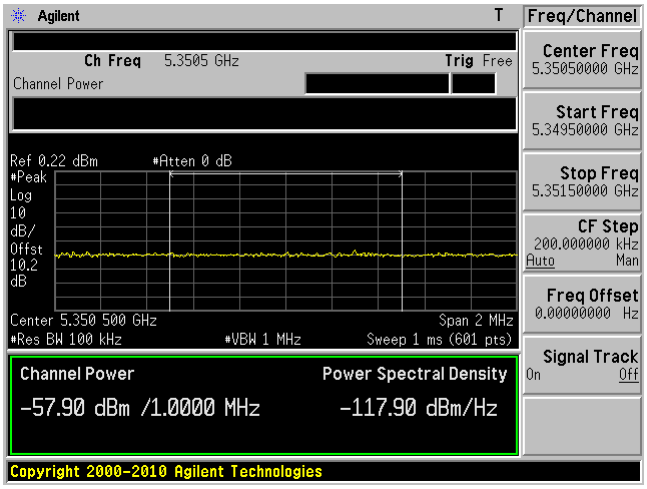


802.11n40 mode 5230 MHz Chain 0

Lower Band Edge

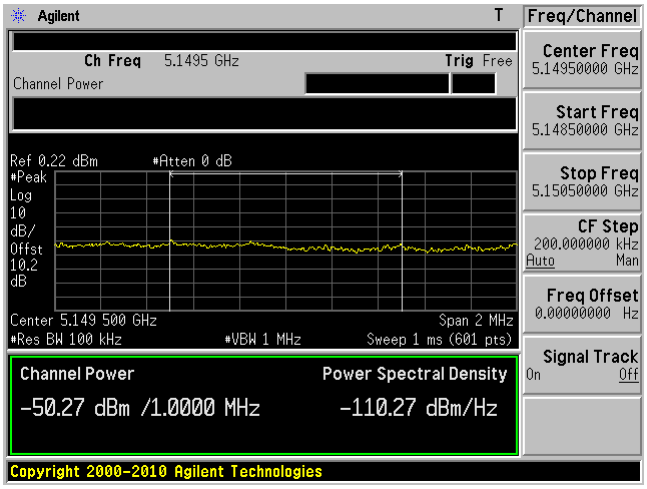


Upper Band Edge

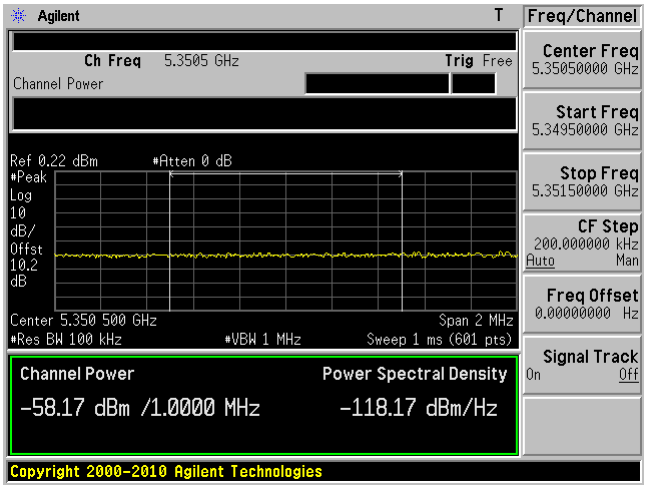


802.11n40 mode 5230 MHz Chain 1

Lower Band Edge



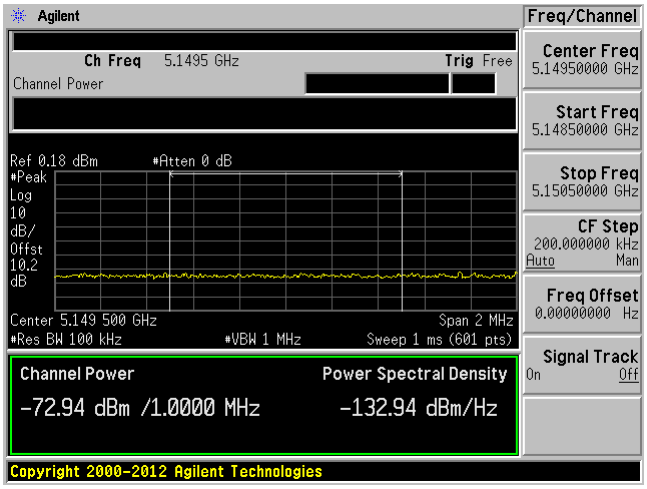
Upper Band Edge



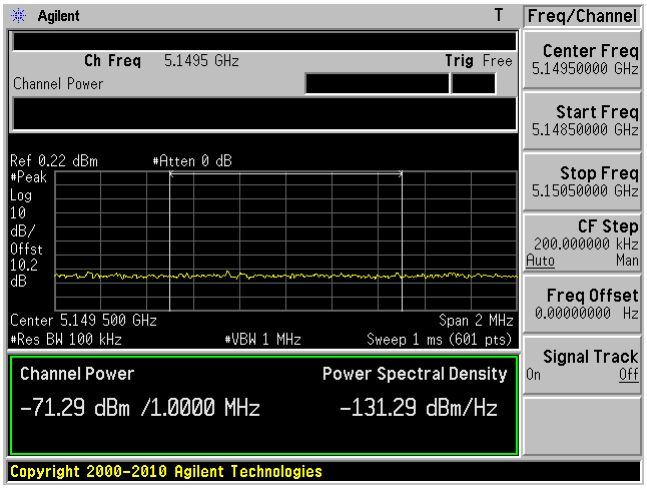
High Antenna Gain

802.11a mode 5180 MHz

Chain 0

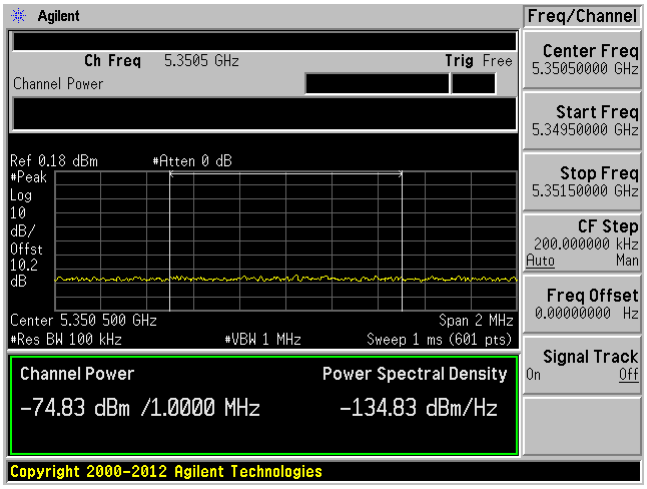


Chain 1

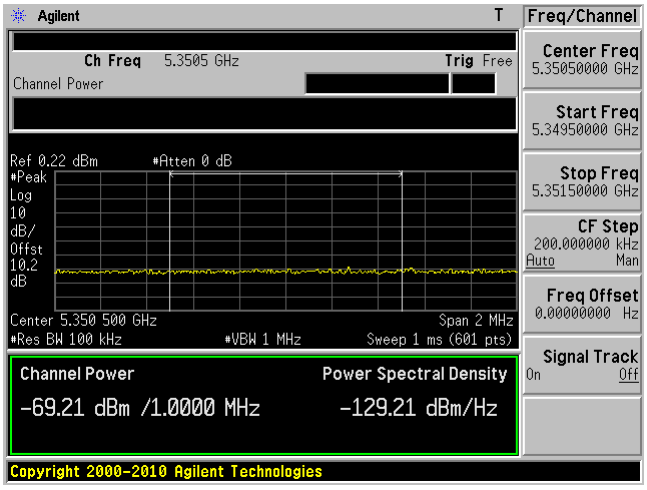


802.11a mode 5240 MHz

Chain 0

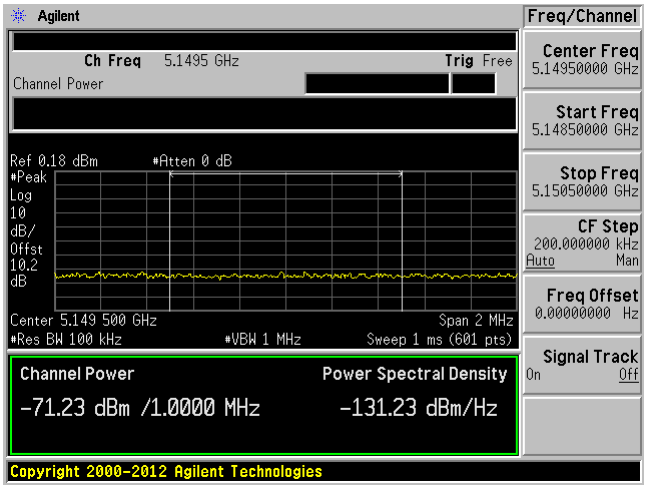


Chain 1

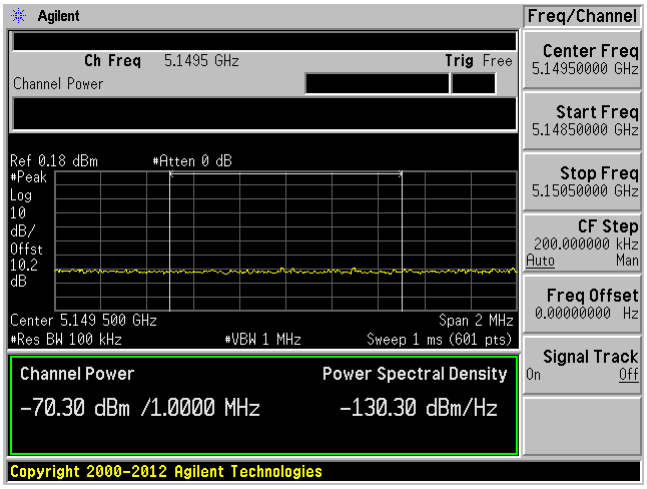


802.11n20 mode 5180 MHz

Chain 0

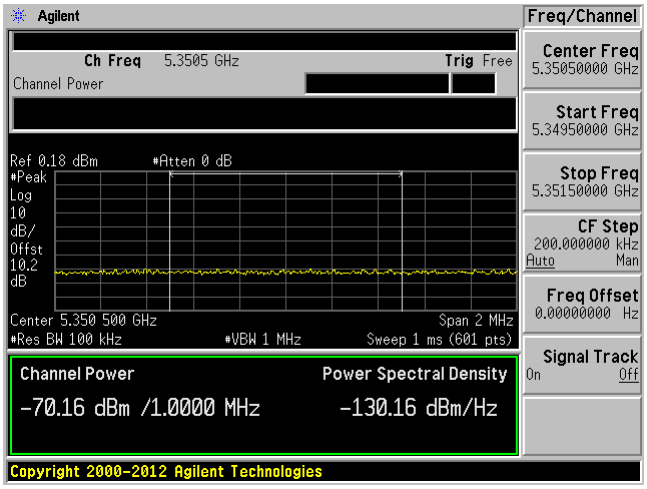


Chain 1

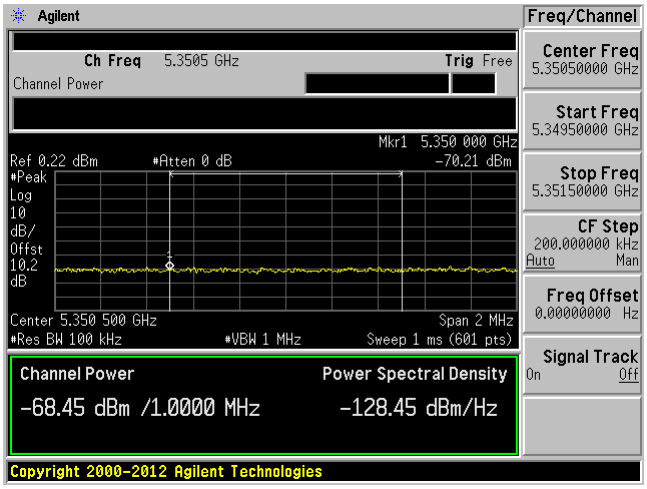


802.11n20 mode 5240 MHz

Chain 0

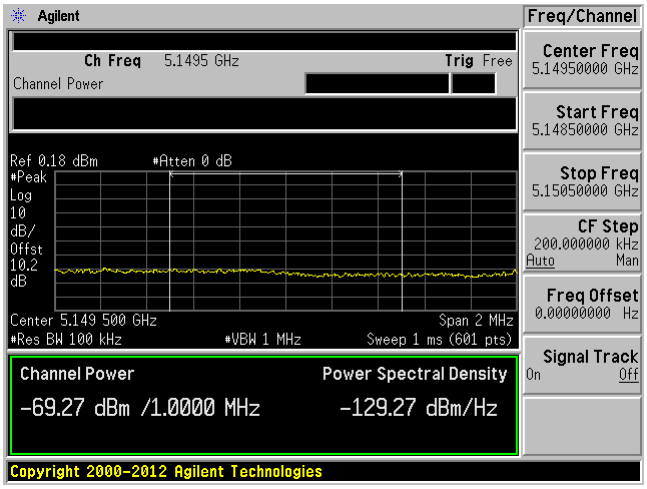


Chain 1

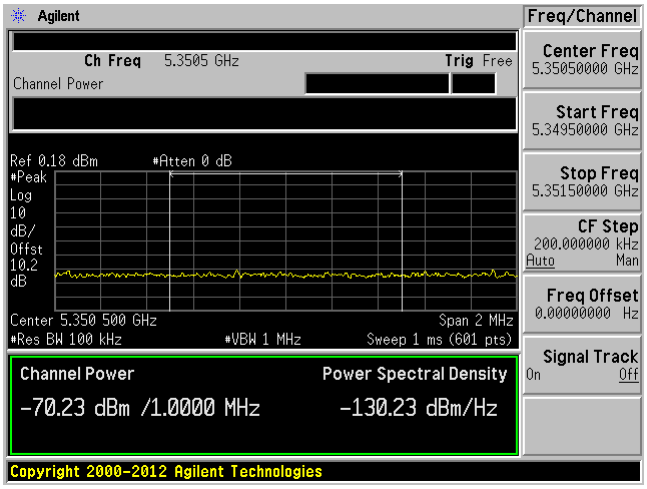


802.11n40 mode 5230 MHz Chain 0

Lower Band Edge

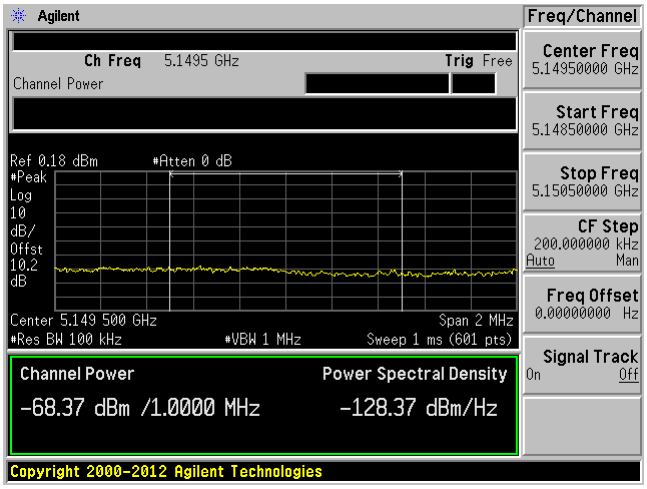


Upper Band Edge



802.11n40 mode 5230 MHz Chain 1

Lower Band Edge



Upper Band Edge