





FCC PART 15.407
TEST AND MEASUREMENT REPORT

For

Ruckus Wireless, Inc.

350 West Java Drive,
 Sunnyvale, CA 94089, USA

FCC ID: S9G-MPE5AC33A

Report Type: Class II Permissive Change	Product Type: 802.11ac mini-PCI Express Radio Module
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 * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" ...

TABLE OF CONTENTS

1	GENERAL DESCRIPTION.....	5
1.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	5
1.2	MECHANICAL DESCRIPTION OF EUT.....	5
1.3	OBJECTIVE.....	5
1.4	RELATED SUBMITTAL(S)/GRANT(S).....	5
1.5	TEST METHODOLOGY.....	5
1.6	MEASUREMENT UNCERTAINTY.....	5
1.7	TEST FACILITY.....	6
2	EUT TEST CONFIGURATION.....	7
2.1	JUSTIFICATION.....	7
2.2	EUT EXERCISE SOFTWARE.....	7
2.3	SPECIAL EQUIPMENT.....	7
2.4	EQUIPMENT MODIFICATIONS.....	7
2.5	LOCAL SUPPORT EQUIPMENT.....	7
2.6	EUT INTERNAL CONFIGURATION DETAILS.....	7
2.7	INTERFACE PORTS AND CABLES.....	7
2.8	POWER SUPPLY LIST AND DETAILS.....	7
3	SUMMARY OF TEST RESULTS.....	8
4	FCC §2.1091 & §15.407(F) - RF EXPOSURE.....	9
4.1	APPLICABLE STANDARD.....	9
4.2	MPE PREDICTION.....	9
4.3	MPE RESULTS.....	9
5	FCC §15.203 – ANTENNA REQUIREMENTS.....	11
5.1	APPLICABLE STANDARD.....	11
5.2	ANTENNA DESCRIPTION.....	11
6	FCC §15.207 - AC POWER LINE CONDUCTED EMISSIONS.....	12
6.1	APPLICABLE STANDARDS.....	12
6.2	TEST SETUP.....	12
6.3	TEST PROCEDURE.....	12
6.4	TEST SETUP BLOCK DIAGRAM.....	13
6.5	CORRECTED AMPLITUDE & MARGIN CALCULATION.....	13
6.6	TEST EQUIPMENT LIST AND DETAILS.....	14
6.7	TEST ENVIRONMENTAL CONDITIONS.....	14
6.8	SUMMARY OF TEST RESULTS.....	14
6.9	CONDUCTED EMISSIONS TEST PLOTS AND DATA.....	15
7	FCC §15.209 & §15.407(B) - SPURIOUS RADIATED EMISSIONS.....	19
7.1	APPLICABLE STANDARD.....	19
7.2	TEST SETUP.....	20
7.3	TEST PROCEDURE.....	20
7.4	CORRECTED AMPLITUDE & MARGIN CALCULATION.....	21
7.5	TEST EQUIPMENT LIST AND DETAILS.....	21
7.6	TEST ENVIRONMENTAL CONDITIONS.....	21
7.7	SUMMARY OF TEST RESULTS.....	22
7.8	RADIATED EMISSIONS TEST RESULT DATA.....	23
8	FCC §15.407(A) & §15.407(E) – EMISSION BANDWIDTH.....	35

8.1	APPLICABLE STANDARDS	35
8.2	MEASUREMENT PROCEDURE	35
8.3	TEST EQUIPMENT LIST AND DETAILS	35
8.4	TEST ENVIRONMENTAL CONDITIONS.....	35
8.5	TEST RESULTS	35
9	FCC §407(A) – MAXIMUM CONDUCTED OUTPUT POWER.....	55
9.1	APPLICABLE STANDARDS	55
9.2	MEASUREMENT PROCEDURE	55
9.3	TEST EQUIPMENT LIST AND DETAILS	55
9.4	TEST ENVIRONMENTAL CONDITIONS.....	55
9.5	TEST RESULTS	56
10	FCC §15.407(B) - SPURIOUS EMISSIONS AT ANTENNA PORTS.....	58
10.1	APPLICABLE STANDARDS	58
10.2	MEASUREMENT PROCEDURE	58
10.3	TEST EQUIPMENT LIST AND DETAILS	58
10.4	TEST ENVIRONMENTAL CONDITIONS.....	58
10.5	TEST RESULTS	58
11	FCC §15.407(A) - POWER SPECTRAL DENSITY	141
11.1	APPLICABLE STANDARDS	141
11.2	MEASUREMENT PROCEDURE	141
11.3	TEST EQUIPMENT LIST AND DETAILS	141
11.4	TEST ENVIRONMENTAL CONDITIONS.....	141
11.5	TEST RESULTS	141
12	EXHIBIT A – FCC EQUIPMENT LABELLING REQUIREMENTS	162
12.1	FCC ID LABEL REQUIREMENTS	162
12.2	FCC ID LABEL CONTENTS AND LOCATION	162
13	EXHIBIT B - EUT SETUP PHOTOGRAPHS	163
13.1	AC LINE CONDUCTED EMISSION FRONT VIEW	163
13.2	AC LINE CONDUCTED EMISSION SIDE VIEW	163
13.3	RADIATED EMISSION FRONT VIEW AT 3 METER	164
13.4	RADIATED EMISSION BELOW 1 GHZ REAR VIEW AT 3 METER	164
13.5	RADIATED EMISSION ABOVE 1 GHZ REAR VIEW AT 3 METER.....	165
14	EXHIBIT C – EUT PHOTOGRAPHS	166
14.1	EUT – TOP VIEW	166
14.2	EUT – BOTTOM VIEW	166
14.3	EUT – TOP VIEW WITHOUT SHIELDING	167
14.4	SUPPORTING BOARD WITH EUT VIEW.....	167
14.5	SUPPORTING BOARD FRONT VIEW	168
14.6	SUPPORTING BOARD REAR VIEW	168
14.7	EUT – AC/DC POWER ADAPTER	169

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1504013-407 W52W58	Initial	2015-06-29

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Ruckus Wireless, Inc.*, and their product FCC ID: S9G-MPE5AC33A, model: *MPE5AC33A* or the “EUT” as referred on this report. The EUT is an 802.11ac mini-PCI Express Radio Module.

1.2 Mechanical Description of EUT

The “EUT” measures approximately *6.7cm (L) x 3.8cm (W) x 1.1cm (H)*, and weighs approximately *16g*.

The test data gathered are from typical production sample, serial number: CTS0413RK0085 provided by the manufacture.

1.3 Objective

This report is prepared on behalf of *Ruckus Wireless, Inc.* in accordance with FCC CFR47 §15.407.

This Class II permissive change is updating W58 band from Part 15.247 DTS to Part 15.407 NII new rules and increasing output power for W52 band under FCC Part 15.407 new rules.

The objective is to determine compliance with FCC Part 15.407 for Output Power, Antenna Requirements, AC Line Conducted Emissions, Bandwidth, and power spectral density, Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS with FCC ID: S9G-MPE5AC33A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, 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.

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 ± 2.0 dB for Conducted Emissions tests and ± 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 Luminaires 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 C63.4-2009 and KDB-789033 D02 General UNII Test Procedures New Rules v01

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 to be as follows for each mode based upon investigation 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 CART Version: 4.4, CartBuildDate: 4494324 was provided by Ruckus Wireless Inc, and was verified Cipher Chu to comply with the standard requirements being tested against.

2.3 Special Equipment

N/A

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E5420	CHZCMQ1

2.6 EUT Internal Configuration Details

N/A: The EUT is a module and the serial number is shown on section 1.2.

2.7 Interface Ports and Cables

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

2.8 Power Supply List and Details

Manufacturer	Description	Model	Serial Number
Ruckus Wireless	Switching adapter	MPBS-12020000	-

3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.407(f), §2.1091	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207	AC Power Line Conducted Emissions	Compliant
§15.209(a), 15.407(b)	Spurious Radiated Emissions	Compliant
§15.407(a)	Emission Bandwidth	Compliant
§407(a)	Peak Output Power Measurement	Compliant
§15.407(a)	Power Spectral Density	Compliant
§2.1051, §15.407(b)	Spurious Emissions at Antenna Terminals	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	Compliant*

Note: * Please refer to DFS report: R1504013-DFS

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

4.1 Applicable Standard

According to FCC §15.407(f) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

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

5.2 GHz band:

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>25.09</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>322.8494</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5180</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1.995</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.128153</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>

5.8 GHz band:

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>25.72</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>373.25</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5745</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1.995</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.14816</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.14816 mW/cm². Limit is 1.0 mW/cm².

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

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 Description

The Antenna gain is 3 dBi at 5 GHz. Please refer to the internal photos.

6 FCC §15.207 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

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 μ H/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 C63.4-2009 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.

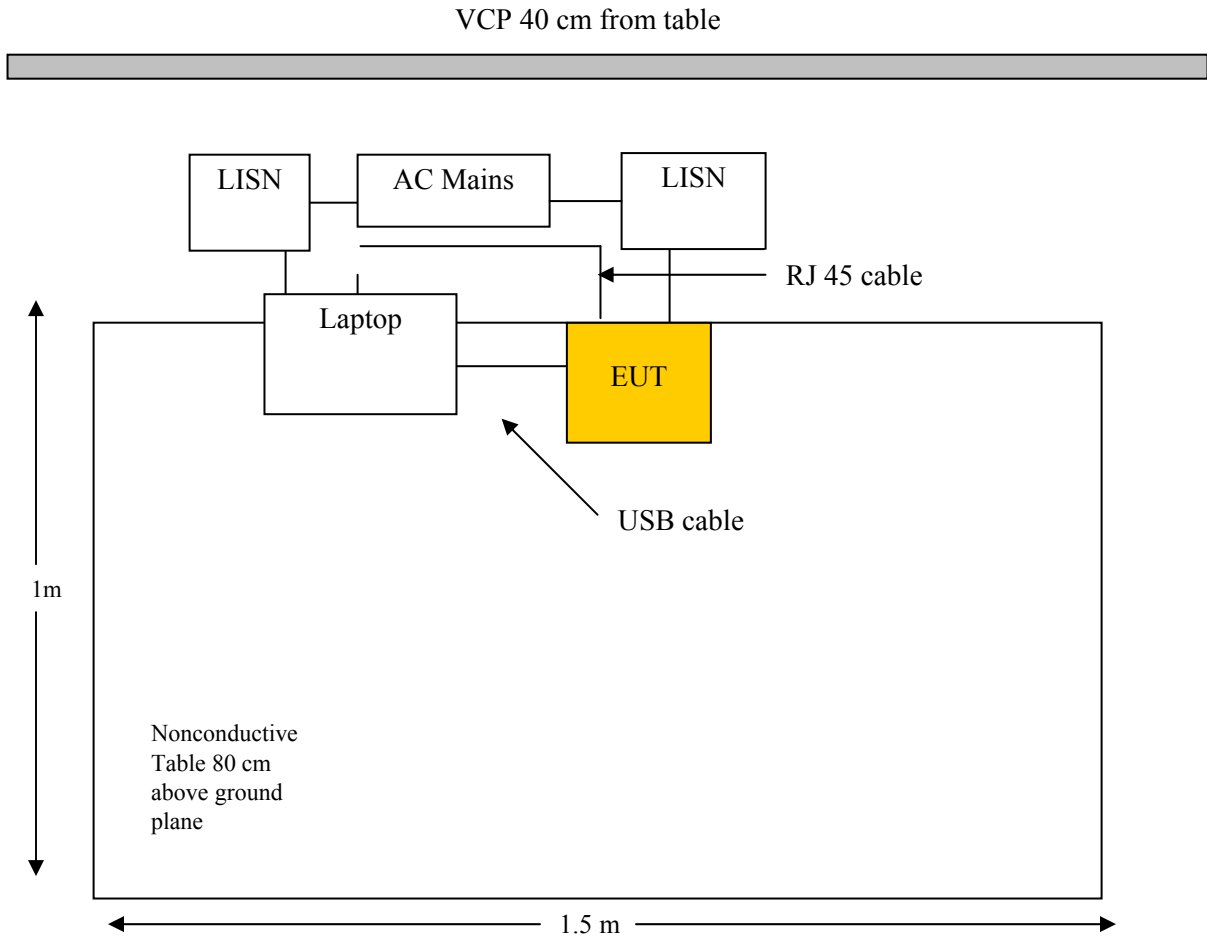
6.3 Test Procedure

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 cord of the support equipment was connected to LISN-2.

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

All data was recorded in the peak detection mode, quasi-peak and average. 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:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

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	100337	2015-03-28	1 year
TTE	Filter, High Pass	H962-150k-50-21378	K7133	2014-05-30	1 year
Solar Electronics	LISN, EMC	9252-50-R-24-N	511205	2014-06-25	1 year
Solar Electronics	LISN, EMC	9252-50-R-24-N	511213	2014-06-25	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:	22-24 °C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 kPa

The testing was performed by ChaoRan Chu on 2015-04-17 in 5 m chamber 3.

6.8 Summary of Test Results

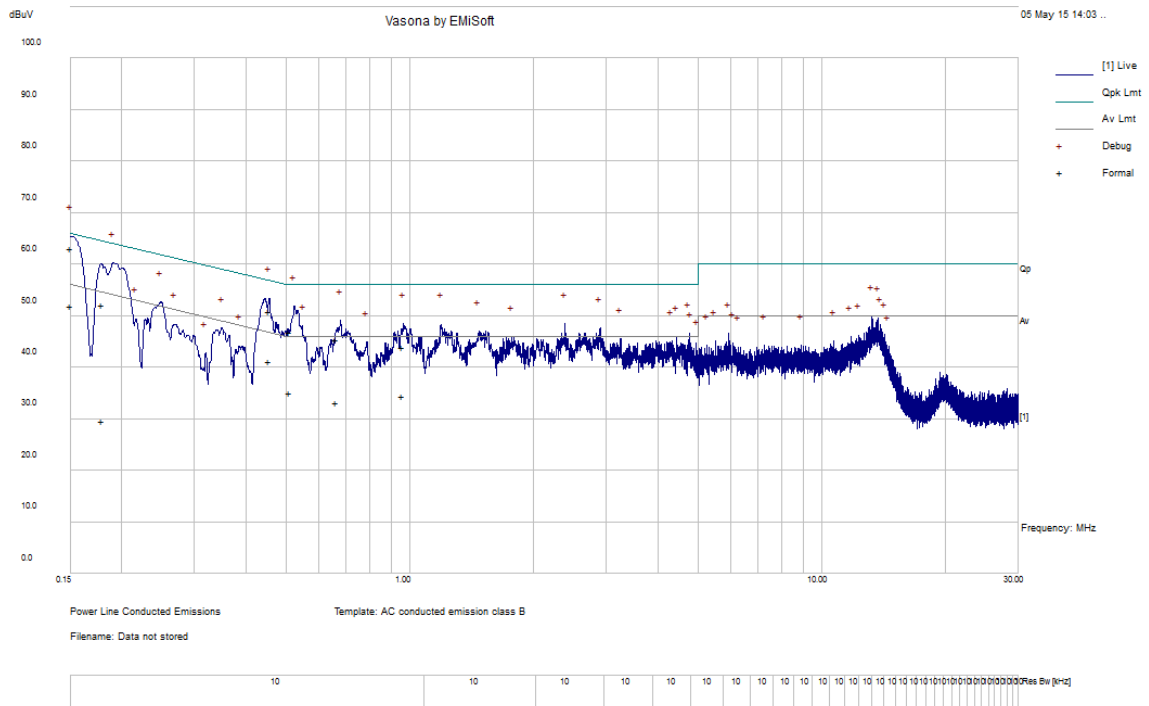
According to the recorded data in following table, the EUT complied with the FCC Part 15 standard's conducted emissions limits, with the margin reading of:

Connection: 120 V/60 Hz, AC			
Margin (dB)	Frequency (MHz)	Conductor (Line/Neutral)	Range (MHz)
-2.84	0.150317	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

W52 Band

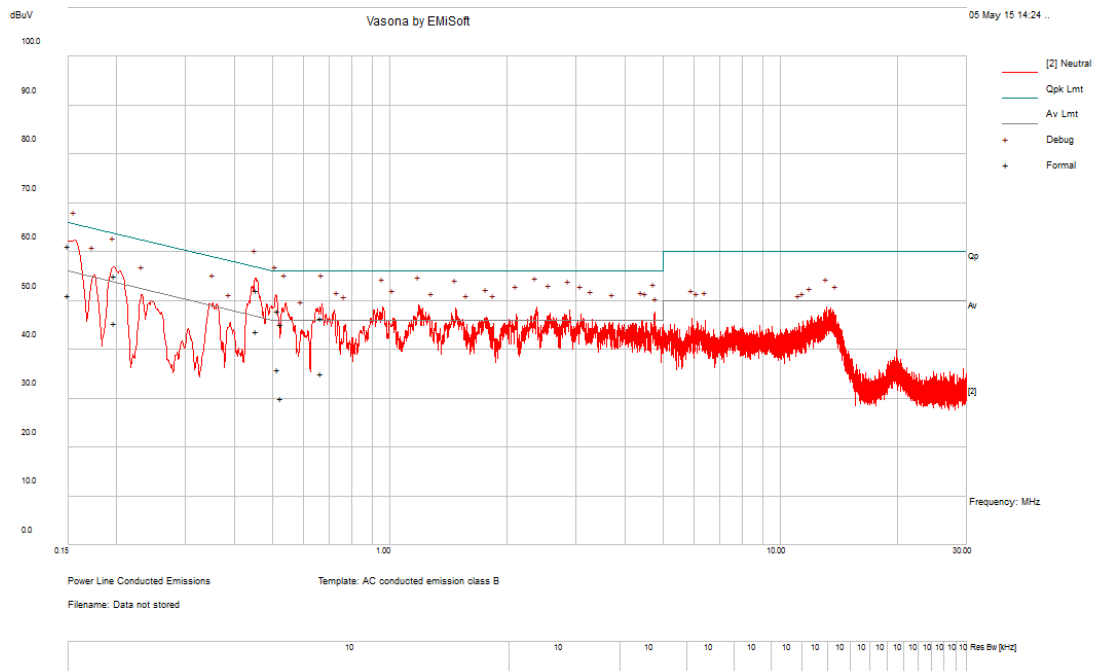
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150317	63.14	Line	65.98	-2.84	QP
0.456171	50.99	Line	56.76	-5.77	QP
0.179714	52.3	Line	64.5	-12.2	QP
0.512487	46.97	Line	56	-9.03	QP
0.66528	45.52	Line	56	-10.48	QP
0.962435	44.08	Line	56	-11.92	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.150317	51.93	Line	55.98	-4.06	Ave.
0.456171	41.33	Line	46.76	-5.43	Ave.
0.179714	29.75	Line	54.5	-24.74	Ave.
0.512487	35.16	Line	46	-10.84	Ave.
0.66528	33.36	Line	46	-12.64	Ave.
0.962435	34.48	Line	46	-11.52	Ave.

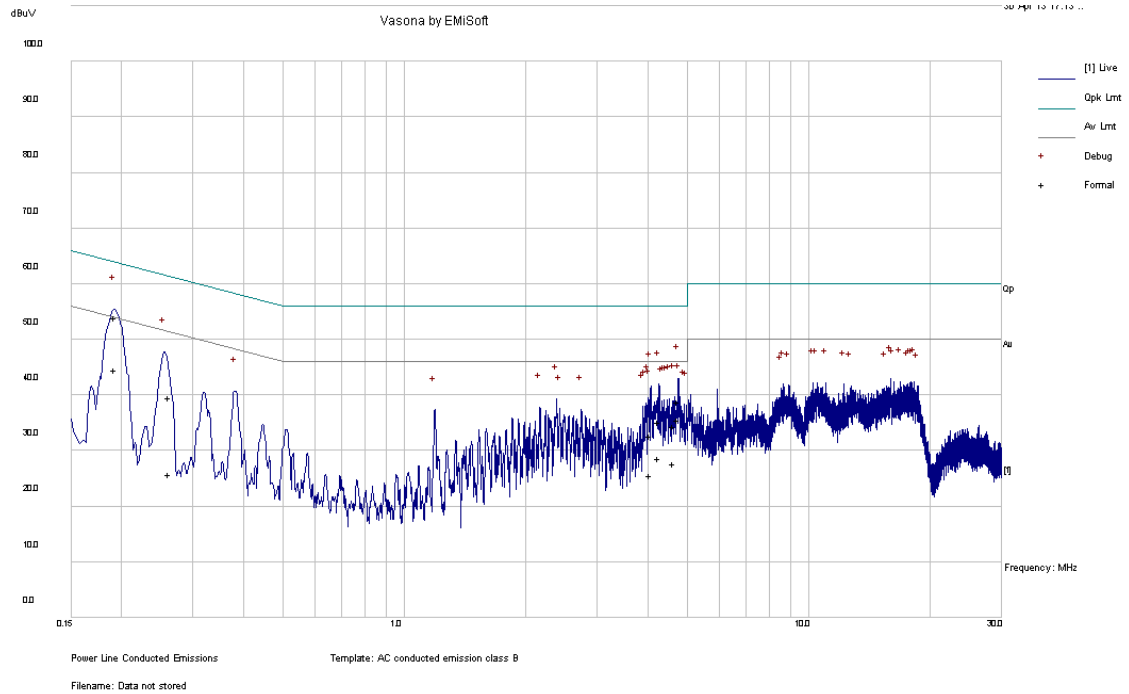
120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.455856	52.25	Neutral	56.77	-4.52	QP
0.150342	61.21	Neutral	65.98	-4.77	QP
0.515967	48.09	Neutral	56	-7.91	QP
0.527877	45.26	Neutral	56	-10.74	QP
0.665682	46.5	Neutral	56	-9.5	QP
0.197082	55.23	Neutral	63.73	-8.51	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.455856	43.75	Neutral	46.77	-3.02	Ave.
0.150342	51.16	Neutral	55.98	-4.82	Ave.
0.515967	35.95	Neutral	46	-10.05	Ave.
0.527877	30.18	Neutral	46	-15.82	Ave.
0.665682	35.21	Neutral	46	-10.79	Ave.
0.197082	45.57	Neutral	53.73	-8.16	Ave.

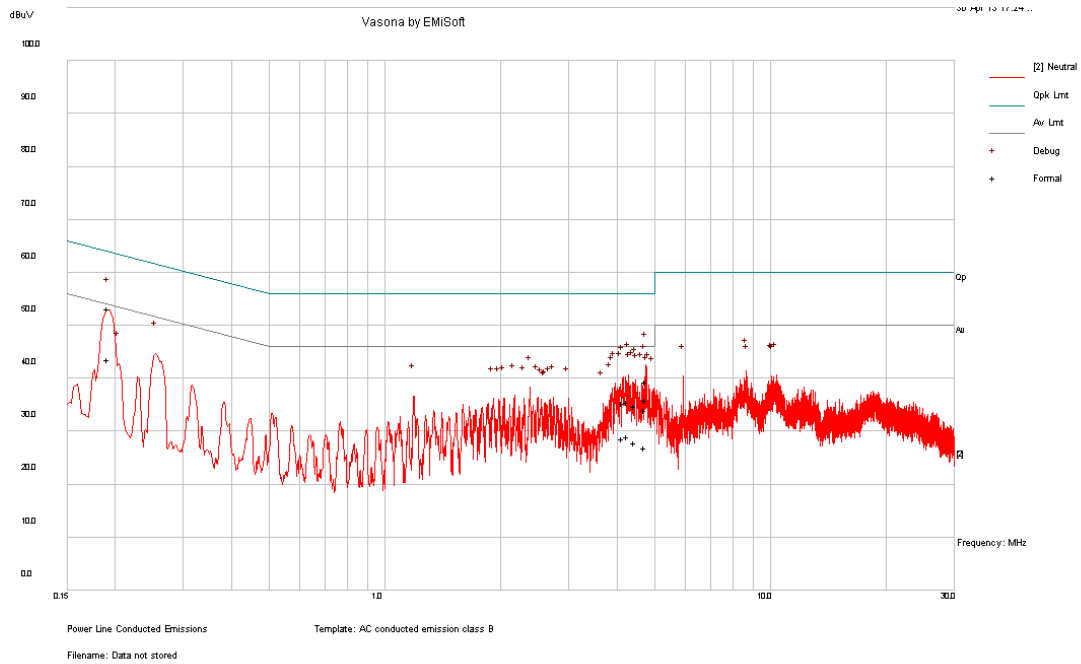
W58 Band 120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.192859	53.85	Line	63.91	-10.06	QP
4.754078	38.89	Line	56	-17.11	QP
0.262226	39.58	Line	61.36	-21.78	QP
4.272782	35.1	Line	56	-20.90	QP
4.062134	32.6	Line	56	-23.40	QP
4.650686	34.44	Line	56	-21.56	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.192859	44.61	Line	53.91	-9.31	Ave.
4.754078	35.51	Line	46	-10.49	Ave.
0.262226	25.71	Line	51.36	-25.65	Ave.
4.272782	28.64	Line	46	-17.36	Ave.
4.062134	25.56	Line	46	-20.44	Ave.
4.650686	27.7	Line	46	-18.30	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.191203	53.25	Neutral	63.98	-10.73	QP
4.749872	39.35	Neutral	56	-16.65	QP
4.268024	35.63	Neutral	56	-20.37	QP
4.718156	34.08	Neutral	56	-21.92	QP
4.146176	35.27	Neutral	56	-20.73	QP
4.453094	34.78	Neutral	56	-21.22	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.191203	43.61	Neutral	53.98	-10.37	Ave.
4.749872	35.86	Neutral	46	-10.14	Ave.
4.268024	29.01	Neutral	46	-16.99	Ave.
4.718156	26.85	Neutral	46	-19.15	Ave.
4.146176	28.73	Neutral	46	-17.27	Ave.
4.453094	27.79	Neutral	46	-18.21	Ave.

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

7.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

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 §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 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.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions 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.

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C/15E 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 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 = 1MHz / Sweep = Auto
- (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:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2014-09-17	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2014-04-26	1 year
Agilent	Pre-amplifier	8449B	3008A01978	2015-02-04	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2014-09-03	1 year
EMCO	Horn Antenna	3315	9511-4627	2015-01-06	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2015-03-28	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° C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 KPa

The testing was performed by ChaoRan Chu on 2015-04-17 in 5 m chamber 3.

7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.205, 15.209 and 15.407 standard's radiated emissions limits, and had the worst margin of:

W52 Band

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range
-5.84	20800	Vertical	1 GHz to 40 GHz,

W58 Band

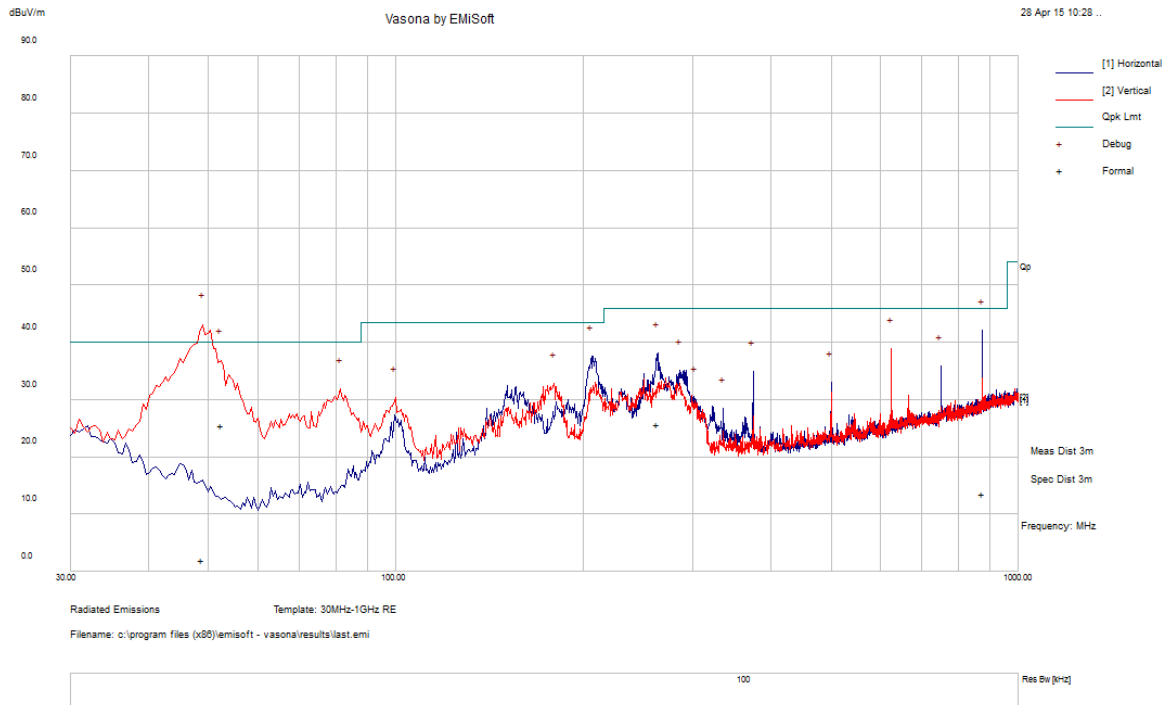
Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range
-0.48	125.0015	Vertical	30 MHz – 40 GHz

Please refer to the following table and plots for specific test result details

7.8 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz

W52 Band



Worst case: 802.11n-HT20 mode, High Channel

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)
48.88075	2.11	144	V	278	40	-37.89
52.474	25.52	158	V	5	40	-14.48
875.2368	13.62	236	H	179	46	-32.38
263.0375	25.74	100	H	30	46	-20.26

Note: Only digital emissions present from 30MHz to 1GHz, therefore only one channel was tested per modulation.

W58 Band

Worst case: 802.11a mode, Middle Channel

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dB μ V/m)	Margin (dB)
874.9955	36.4	159	V	139	46	-9.6
125.0015	43.02	107	V	52	43.5	-0.48
625.015	43.46	124	H	154	46	-2.54
249.999	39.09	112	H	136	46	-6.91

2) 1-40 GHz

5.2 GHz Band

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
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz, measured at 3 meters											
10360	35.85	0	100	V	37.651	6.14	36.3	43.341	74	-30.659	Peak
10360	35.7	0	100	H	37.651	6.14	36.3	43.191	74	-30.809	Peak
10360	25.83	0	100	V	37.651	6.14	36.3	33.321	54	-20.679	Ave
10360	25.71	0	100	H	37.651	6.14	36.3	33.201	54	-20.799	Ave
15540	34.82	0	100	V	34.568	7.47	34	42.858	74	-31.142	Peak
15540	35.32	0	100	H	34.568	7.47	34	43.358	74	-30.642	Peak
15540	21.25	0	100	V	34.568	7.47	34	29.288	54	-24.712	Ave
15540	21.21	0	100	H	34.568	7.47	34	29.248	54	-24.752	Ave
20720	34.81	0	100	V	49.9	9.28	32.5	61.49	74	-12.51	Peak
20720	34.83	0	100	H	49.9	9.28	32.5	61.51	74	-12.49	Peak
20720	20.6	0	100	V	49.9	9.28	32.5	47.28	54	-6.72	Ave
20720	20.58	0	100	H	49.9	9.28	32.5	47.26	54	-6.74	Ave
Middle Channel 5200 MHz, measured at 3 meters											
10400	36.77	0	100	V	37.651	6.14	36.3	44.261	74	-29.739	Peak
10400	36.69	0	100	H	37.651	6.14	36.3	44.181	74	-29.819	Peak
10400	26.63	0	100	V	37.651	6.14	36.3	34.121	54	-19.879	Ave
10400	26.54	0	100	H	37.651	6.14	36.3	34.031	54	-19.969	Ave
15600	36.17	0	100	V	34.568	7.47	34	44.208	74	-29.792	Peak
15600	36.28	0	100	H	34.568	7.47	34	44.318	74	-29.682	Peak
15600	22.08	0	100	V	34.568	7.47	34	30.118	54	-23.882	Ave
15600	22.09	0	100	H	34.568	7.47	34	30.128	54	-23.872	Ave
20800	35.65	0	100	V	49.9	9.28	32.5	62.33	74	-11.67	Peak
20800	35.71	0	100	H	49.9	9.28	32.5	62.39	74	-11.61	Peak
20800	21.48	0	100	V	49.9	9.28	32.5	48.16	54	-5.84	Ave
20800	21.47	0	100	H	49.9	9.28	32.5	48.15	54	-5.85	Ave
High Channel 5240 MHz, measured at 3 meters											
10480	36.58	0	100	V	37.651	6.14	36.3	44.071	74	-29.929	Peak
10480	36.65	0	100	H	37.651	6.14	36.3	44.141	74	-29.859	Peak
10480	26.43	0	100	V	37.651	6.14	36.3	33.921	54	-20.079	Ave
10480	26.62	0	100	H	37.651	6.14	36.3	34.111	54	-19.889	Ave
15720	36.29	0	100	V	34.568	7.47	34	44.328	74	-29.672	Peak
15720	36.22	0	100	H	34.568	7.47	34	44.258	74	-29.742	Peak
15720	22.1	0	100	V	34.568	7.47	34	30.138	54	-23.862	Ave
15720	22.09	0	100	H	34.568	7.47	34	30.128	54	-23.872	Ave
20960	35.65	0	100	V	49.9	9.28	32.5	62.33	74	-11.67	Peak
20960	35.51	0	100	H	49.9	9.28	32.5	62.19	74	-11.81	Peak
20960	21.48	0	100	V	49.9	9.28	32.5	48.16	54	-5.84	Ave
20960	21.47	0	100	H	49.9	9.28	32.5	48.15	54	-5.85	Ave

802.11n-HT20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5180 MHz, measured at 3 meters											
10360	35.21	0	100	V	37.651	6.14	36.3	42.701	74	-31.299	Peak
10360	35.46	0	100	H	37.651	6.14	36.3	42.951	74	-31.049	Peak
10360	25.83	0	100	V	37.651	6.14	36.3	33.321	54	-20.679	Ave
10360	25.71	0	100	H	37.651	6.14	36.3	33.201	54	-20.799	Ave
15540	35.4	0	100	V	34.568	7.47	34	43.438	74	-30.562	Peak
15540	35.33	0	100	H	34.568	7.47	34	43.368	74	-30.632	Peak
15540	21.16	0	100	V	34.568	7.47	34	29.198	54	-24.802	Ave
15540	21.12	0	100	H	34.568	7.47	34	29.158	54	-24.842	Ave
20720	34.8	0	100	V	49.9	9.28	32.5	61.48	74	-12.52	Peak
20720	34.4	0	100	H	49.9	9.28	32.5	61.08	74	-12.92	Peak
20720	20.49	0	100	V	49.9	9.28	32.5	47.17	54	-6.83	Ave
20720	20.46	0	100	H	49.9	9.28	32.5	47.14	54	-6.86	Ave
Middle Channel 5200 MHz, measured at 3 meters											
10400	36.07	0	100	V	37.651	6.14	36.3	43.561	74	-30.439	Peak
10400	35.97	0	100	H	37.651	6.14	36.3	43.461	74	-30.539	Peak
10400	26.63	0	100	V	37.651	6.14	36.3	34.121	54	-19.879	Ave
10400	26.54	0	100	H	37.651	6.14	36.3	34.031	54	-19.969	Ave
15600	34.75	0	100	V	34.568	7.47	34	42.788	74	-31.212	Peak
15600	35.71	0	100	H	34.568	7.47	34	43.748	74	-30.252	Peak
15600	21.47	0	100	V	34.568	7.47	34	29.508	54	-24.492	Ave
15600	21.46	0	100	H	34.568	7.47	34	29.498	54	-24.502	Ave
20800	34.99	0	100	V	49.9	9.28	32.5	61.67	74	-12.33	Peak
20800	35.06	0	100	H	49.9	9.28	32.5	61.74	74	-12.26	Peak
20800	20.84	0	100	V	49.9	9.28	32.5	47.52	54	-6.48	Ave
20800	20.82	0	100	H	49.9	9.28	32.5	47.5	54	-6.5	Ave
High Channel 5240 MHz, measured at 3 meters											
10480	36.29	0	100	V	37.651	6.14	36.3	43.781	74	-30.219	Peak
10480	36.06	0	100	H	37.651	6.14	36.3	43.551	74	-30.449	Peak
10480	26.43	0	100	V	37.651	6.14	36.3	33.921	54	-20.079	Ave
10480	26.62	0	100	H	37.651	6.14	36.3	34.111	54	-19.889	Ave
15720	34.88	0	100	V	34.568	7.47	34	42.918	74	-31.082	Peak
15720	35.74	0	100	H	34.568	7.47	34	43.778	74	-30.222	Peak
15720	21.54	0	100	V	34.568	7.47	34	29.578	54	-24.422	Ave
15720	21.58	0	100	H	34.568	7.47	34	29.618	54	-24.382	Ave
20960	35.1	0	100	V	49.9	9.28	32.5	61.78	74	-12.22	Peak
20960	35.17	0	100	H	49.9	9.28	32.5	61.85	74	-12.15	Peak
20960	20.95	0	100	V	49.9	9.28	32.5	47.63	54	-6.37	Ave
20960	20.93	0	100	H	49.9	9.28	32.5	47.61	54	-6.39	Ave

802.11n-HT40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5190 MHz, measured at 3 meters											
10380	35.85	0	100	V	37.651	6.14	36.3	43.341	74	-30.659	Peak
10380	35.83	0	100	H	37.651	6.14	36.3	43.321	74	-30.679	Peak
10380	25.83	0	100	V	37.651	6.14	36.3	33.321	54	-20.679	Ave
10380	25.71	0	100	H	37.651	6.14	36.3	33.201	54	-20.799	Ave
15570	35.35	0	100	V	34.568	7.47	34	43.388	74	-30.612	Peak
15570	35.33	0	100	H	34.568	7.47	34	43.368	74	-30.632	Peak
15570	21.28	0	100	V	34.568	7.47	34	29.318	54	-24.682	Ave
15570	21.27	0	100	H	34.568	7.47	34	29.308	54	-24.692	Ave
20760	34.93	0	100	V	49.9	9.28	32.5	61.61	74	-12.39	Peak
20760	34.61	0	100	H	49.9	9.28	32.5	61.29	74	-12.71	Peak
20760	20.71	0	100	V	49.9	9.28	32.5	47.39	54	-6.61	Ave
20760	20.7	0	100	H	49.9	9.28	32.5	47.38	54	-6.62	Ave
High Channel 5230 MHz, measured at 3 meters											
10460	36.48	0	100	V	37.651	6.14	36.3	43.971	74	-30.029	Peak
10460	36.12	0	100	H	37.651	6.14	36.3	43.611	74	-30.389	Peak
10460	26.43	0	100	V	37.651	6.14	36.3	33.921	54	-20.079	Ave
10460	26.62	0	100	H	37.651	6.14	36.3	34.111	54	-19.889	Ave
15690	35.92	0	100	V	34.568	7.47	34	43.958	74	-30.042	Peak
15690	35.83	0	100	H	34.568	7.47	34	43.868	74	-30.132	Peak
15690	21.69	0	100	V	34.568	7.47	34	29.728	54	-24.272	Ave
15690	21.67	0	100	H	34.568	7.47	34	29.708	54	-24.292	Ave
20920	35.3	0	100	V	49.9	9.28	32.5	61.98	74	-12.02	Peak
20920	34.98	0	100	H	49.9	9.28	32.5	61.66	74	-12.34	Peak
20920	21.08	0	100	V	49.9	9.28	32.5	47.76	54	-6.24	Ave
20920	21.07	0	100	H	49.9	9.28	32.5	47.75	54	-6.25	Ave

802.11ac80 mode

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
Channel 5210 MHz, measured at 3 meters											
10460	36.37	0	100	V	37.651	6.14	36.3	43.861	74	-30.139	Peak
10460	36.45	0	100	H	37.651	6.14	36.3	43.941	74	-30.059	Peak
10460	26.12	0	100	V	37.651	6.14	36.3	33.611	54	-20.389	Ave
10460	26.67	0	100	H	37.651	6.14	36.3	34.161	54	-19.839	Ave
15690	35.88	0	100	V	34.568	7.47	34	43.918	74	-30.082	Peak
15690	35.3	0	100	H	34.568	7.47	34	43.338	74	-30.662	Peak
15690	21.59	0	100	V	34.568	7.47	34	29.628	54	-24.372	Ave
15690	21.16	0	100	H	34.568	7.47	34	29.198	54	-24.802	Ave
20920	35.6	0	100	V	49.9	9.28	32.5	62.28	74	-11.72	Peak
20920	34.58	0	100	H	49.9	9.28	32.5	61.26	74	-12.74	Peak
20920	21.11	0	100	V	49.9	9.28	32.5	47.79	54	-6.21	Ave
20920	21.24	0	100	H	49.9	9.28	32.5	47.92	54	-6.08	Ave

5.8 GHz Band

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
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
11490	36.04	16	120	V	43.625	7.6	27.54	59.725	74	-14.275	Peak
11490	32.81	245	162	H	41.992	7.6	27.54	54.862	74	-19.138	Peak
11490	21.52	16	120	V	43.625	7.6	27.54	45.205	54	-8.795	Ave
11490	19.21	245	162	H	41.993	7.6	27.54	41.263	54	-12.737	Ave
17235	32.22	0	100	V	44.363	8.63	25.18	60.033	74	-13.967	Peak
17235	32.38	0	100	H	43.875	8.63	25.18	59.705	74	-14.295	Peak
17235	17.16	0	100	V	44.363	8.63	25.18	44.973	54	-9.027	Ave
17235	16.84	0	100	H	43.875	8.63	25.18	44.165	54	-9.835	Ave
5460	29.27	70	128	V	34.343	4.76	0	68.373	74	-5.627	Peak
5460	29.56	114	110	H	34.303	4.76	0	68.623	74	-5.377	Peak
5460	12.92	70	128	V	34.343	4.76	0	52.023	54	-1.977	Ave
5460	12.67	114	110	H	34.303	4.76	0	51.733	54	-2.267	Ave
7250	33.02	0	100	V	37.519	5.49	27.6	48.429	74	-25.571	Peak
7250	33.53	0	100	H	37.633	5.49	27.6	49.053	74	-24.947	Peak
7250	20.33	0	100	V	37.519	5.49	27.6	35.739	54	-18.261	Ave
7250	20.39	0	100	H	37.633	5.49	27.6	35.913	54	-18.087	Ave
Middle Channel 5785 MHz, measured at 3 meters											
11570	37.45	297	179	V	40.195	7.69	27.38	57.955	74	-16.045	Peak
11570	32.14	80	100	H	40.195	7.69	27.38	52.645	74	-21.355	Peak
11570	22.76	297	179	V	40.195	7.69	27.38	43.265	54	-10.735	Ave
11570	18.57	80	100	H	40.195	7.69	27.38	39.075	54	-14.925	Ave
17355	32.23	0	100	V	46.815	8.66	25.08	62.625	74	-11.375	Peak
17355	32.15	0	100	H	44.908	8.66	25.08	60.638	74	-13.362	Peak
17355	16.71	0	100	V	46.815	8.66	25.08	47.105	54	-6.895	Ave
17355	16.43	0	100	H	44.908	8.66	25.08	44.918	54	-9.082	Ave
5460	27.29	86	100	V	34.343	4.76	0	66.393	74	-7.607	Peak
5460	29.73	114	122	H	34.303	4.76	0	68.793	74	-5.207	Peak
5460	12.5	86	100	V	34.343	4.76	0	51.603	54	-2.397	Ave
5460	13.1	114	122	H	34.303	4.76	0	52.163	54	-1.837	Ave
7250	33.46	0	100	V	37.519	5.49	27.6	48.869	74	-25.131	Peak
7250	32.87	0	100	H	37.633	5.49	27.6	48.393	74	-25.607	Peak
7250	17.68	0	100	V	37.519	5.49	27.6	33.089	54	-20.911	Ave
7250	17.69	0	100	H	37.633	5.49	27.6	33.213	54	-20.787	Ave

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
High Channel 5825 MHz, measured at 3 meters											
11650	36.32	186	170	V	40.106	7.78	27.02	57.186	74	-16.814	Peak
11650	31.93	0	100	H	40.106	7.78	27.02	52.796	74	-21.204	Peak
11650	21.72	186	170	V	40.106	7.78	27.02	42.586	54	-11.414	Ave
11650	16.63	0	100	H	40.106	7.78	27.02	37.496	54	-16.504	Ave
17475	35.6	106	100	V	47.044	8.74	25.8	65.584	74	-8.416	Peak
17475	37.24	85	145	H	47.044	8.74	25.8	67.224	74	-6.776	Peak
17475	19.64	106	100	V	47.044	8.74	25.8	49.624	54	-4.376	Ave
17475	22.49	85	145	H	47.044	8.74	25.8	52.474	54	-1.526	Ave
5460	27.35	74	112	V	34.343	4.76	0	66.453	74	-7.547	Peak
5460	28.69	112	108	H	34.303	4.76	0	67.753	74	-6.247	Peak
5460	12.16	74	112	V	34.343	4.76	0	51.263	54	-2.737	Ave
5460	13	112	108	H	34.303	4.76	0	52.063	54	-1.937	Ave
7250	32.8	0	100	V	37.519	5.49	27.6	48.209	74	-25.791	Peak
7250	31.42	0	100	H	37.633	5.49	27.6	46.943	74	-27.057	Peak
7250	17.29	0	100	V	37.519	5.49	27.6	32.699	54	-21.301	Ave
7250	17.2	0	100	H	37.633	5.49	27.6	32.723	54	-21.277	Ave

802.11n-HT20 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
11490	35.99	297	166	V	43.625	7.6	27.54	59.675	74	-14.325	Peak
11490	31.6	0	100	H	41.992	7.6	27.54	53.652	74	-20.348	Peak
11490	21.43	297	100	V	43.625	7.6	27.54	45.115	54	-8.885	Ave
11490	17.98	0	100	H	41.993	7.6	27.54	40.033	54	-13.967	Ave
17235	32.67	0	100	V	44.363	8.63	25.18	60.483	74	-13.517	Peak
17235	31.98	0	100	H	43.875	8.63	25.18	59.305	74	-14.695	Peak
17235	17.04	0	100	V	44.363	8.63	25.18	44.853	54	-9.147	Ave
17235	17.12	0	100	H	43.875	8.63	25.18	44.445	54	-9.555	Ave
5460	27.68	0	100	V	34.343	4.76	0	66.783	74	-7.217	Peak
5460	26.91	0	100	H	34.303	4.76	0	65.973	74	-8.027	Peak
5460	12.36	0	100	V	34.343	4.76	0	51.463	54	-2.537	Ave
5460	12.96	0	100	H	34.303	4.76	0	52.023	54	-1.977	Ave
7250	32.59	0	100	V	37.519	5.49	27.6	47.999	74	-26.001	Peak
7250	33.49	0	100	H	37.633	5.49	27.6	49.013	74	-24.987	Peak
7250	19.88	0	100	V	37.519	5.49	27.6	35.289	54	-18.711	Ave
7250	20.67	0	100	H	37.633	5.49	27.6	36.193	54	-17.807	Ave
Middle Channel 5785 MHz, measured at 3 meters											
11570	37.07	292	177	V	40.195	7.69	27.38	57.575	74	-16.425	Peak
11570	31.87	0	100	H	40.195	7.69	27.38	52.375	74	-21.625	Peak
11570	21.14	292	177	V	40.195	7.69	27.38	41.645	54	-12.355	Ave
11570	17.01	0	100	H	40.195	7.69	27.38	37.515	54	-16.485	Ave
17355	32.07	0	100	V	46.815	8.66	25.08	62.465	74	-11.535	Peak
17355	31.79	0	100	H	44.908	8.66	25.08	60.278	74	-13.722	Peak
17355	17.03	0	100	V	46.815	8.66	25.08	47.425	54	-6.575	Ave
17355	16.75	0	100	H	44.908	8.66	25.08	45.238	54	-8.762	Ave
5460	28.01	0	100	V	34.343	4.76	0	67.113	74	-6.887	Peak
5460	27.95	0	100	H	34.303	4.76	0	67.013	74	-6.987	Peak
5460	12.96	0	100	V	34.343	4.76	0	52.063	54	-1.937	Ave
5460	12.76	0	100	H	34.303	4.76	0	51.823	54	-2.177	Ave
7250	32.19	0	100	V	37.519	5.49	27.6	47.599	74	-26.401	Peak
7250	32.91	0	100	H	37.633	5.49	27.6	48.433	74	-25.567	Peak
7250	17.06	0	100	V	37.519	5.49	27.6	32.469	54	-21.531	Ave
7250	17.52	0	100	H	37.633	5.49	27.6	33.043	54	-20.957	Ave

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
High Channel 5825 MHz, measured at 3 meters											
11650	35.85	20	182	V	40.106	7.78	27.02	56.716	74	-17.284	Peak
11650	31.61	0	100	H	40.106	7.78	27.02	52.476	74	-21.524	Peak
11650	21.3	20	182	V	40.106	7.78	27.02	42.166	54	-11.834	Ave
11650	16.76	0	100	H	40.106	7.78	27.02	37.626	54	-16.374	Ave
17475	33.13	182	100	V	47.044	8.74	25.8	63.114	74	-10.886	Peak
17475	36.96	85	144	H	47.044	8.74	25.8	66.944	74	-7.056	Peak
17475	16.85	182	100	V	47.044	8.74	25.8	46.834	54	-7.166	Ave
17475	22.21	85	144	H	47.044	8.74	25.8	52.194	54	-1.806	Ave
5460	25.19	0	100	V	34.343	4.76	0	64.293	74	-9.707	Peak
5460	26.22	0	100	H	34.303	4.76	0	65.283	74	-8.717	Peak
5460	12.85	0	100	V	34.343	4.76	0	51.953	54	-2.047	Ave
5460	12.31	0	100	H	34.303	4.76	0	51.373	54	-2.627	Ave
7250	33.19	0	100	V	37.519	5.49	27.6	48.599	74	-25.401	Peak
7250	32.06	0	100	H	37.633	5.49	27.6	47.583	74	-26.417	Peak
7250	17.69	0	100	V	37.519	5.49	27.6	33.099	54	-20.901	Ave
7250	17.11	0	100	H	37.633	5.49	27.6	32.633	54	-21.367	Ave

802.11n-HT40 mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5755 MHz, measured at 3 meters											
11510	32.38	10	100	V	40.192	7.6	26.95	53.222	74	-20.778	Peak
11510	31.42	0	100	H	40.192	7.6	26.95	52.262	74	-21.738	Peak
11510	17.54	10	100	V	40.192	7.6	26.95	38.382	54	-15.618	Ave
11510	17.63	0	100	H	40.192	7.6	26.95	38.472	54	-15.528	Ave
17265	31.32	0	100	V	44.363	8.63	25.94	58.373	74	-15.627	Peak
17265	32.19	0	100	H	44.363	8.63	25.94	59.243	74	-14.757	Peak
17265	16.87	0	100	V	44.363	8.63	25.94	43.923	54	-10.077	Ave
17265	17.03	0	100	H	44.363	8.63	25.94	44.083	54	-9.917	Ave
5460	21.63	0	100	V	34.343	4.76	0	60.733	74	-13.267	Peak
5460	21.89	0	100	H	34.303	4.76	0	60.953	74	-13.047	Peak
5460	12.76	0	100	V	34.343	4.76	0	51.863	54	-2.137	Ave
5460	12.26	0	100	H	34.303	4.76	0	51.323	54	-2.677	Ave
7250	33.19	0	100	V	37.519	5.49	27.6	48.599	74	-25.401	Peak
7250	34.52	0	100	H	37.633	5.49	27.6	50.043	74	-23.957	Peak
7250	18.26	0	100	V	37.519	5.49	27.6	33.669	54	-20.331	Ave
7250	17.03	0	100	H	37.633	5.49	27.6	32.553	54	-21.447	Ave
High Channel 5795 MHz, measured at 3 meters											
11590	32.33	0	100	V	40.106	7.69	26.99	53.136	74	-20.864	Peak
11590	31.55	0	100	H	40.106	7.69	26.99	52.356	74	-21.644	Peak
11590	17.21	0	100	V	40.106	7.69	26.99	38.016	54	-15.984	Ave
11590	17.09	0	100	H	40.106	7.69	26.99	37.896	54	-16.104	Ave
17385	31.44	0	100	V	46.815	8.66	25.86	61.055	74	-12.945	Peak
17385	32.09	0	100	H	46.815	8.66	25.86	61.705	74	-12.295	Peak
17385	16.82	0	100	V	46.815	8.66	25.86	46.435	54	-7.565	Ave
17385	16.93	0	100	H	46.815	8.66	25.86	46.545	54	-7.455	Ave
5460	21.39	0	100	V	34.343	4.76	0	60.493	74	-13.507	Peak
5460	22.06	0	100	H	34.303	4.76	0	61.123	74	-12.877	Peak
5460	12.55	0	100	V	34.343	4.76	0	51.653	54	-2.347	Ave
5460	12.63	0	100	H	34.303	4.76	0	51.693	54	-2.307	Ave
7250	31.08	0	100	V	37.519	5.49	27.6	46.489	74	-27.511	Peak
7250	32.57	0	100	H	37.633	5.49	27.6	48.093	74	-25.907	Peak
7250	19.08	0	100	V	37.519	5.49	27.6	34.489	54	-19.511	Ave
7250	18	0	100	H	37.633	5.49	27.6	33.523	54	-20.477	Ave

802.11ac80 mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Channel 5775 MHz, measured at 3 meters											
11550	31.81	0	100	V	40.195	7.69	27.38	52.315	74	-21.685	Peak
11550	32.4	0	100	H	40.195	7.69	27.38	52.905	74	-21.095	Peak
11550	16.35	0	100	V	40.195	7.69	27.38	36.855	54	-17.145	Ave
11550	16.89	0	100	H	40.195	7.69	27.38	37.395	54	-16.605	Ave
17325	32.02	0	100	V	46.815	8.66	25.08	62.415	74	-11.585	Peak
17325	31.26	0	100	H	44.908	8.66	25.08	59.748	74	-14.252	Peak
17325	16.92	0	100	V	46.815	8.66	25.08	47.315	54	-6.685	Ave
17325	17.06	0	100	H	44.908	8.66	25.08	45.548	54	-8.452	Ave
5460	22.65	0	100	V	34.343	4.76	0	61.753	74	-12.247	Peak
5460	22.06	0	100	H	34.303	4.76	0	61.123	74	-12.877	Peak
5460	12.66	0	100	V	34.343	4.76	0	51.763	54	-2.237	Ave
5460	12.02	0	100	H	34.303	4.76	0	51.083	54	-2.917	Ave
7250	33.06	0	100	V	37.519	5.49	27.6	48.469	74	-25.531	Peak
7250	31.79	0	100	H	37.633	5.49	27.6	47.313	74	-26.687	Peak
7250	18.62	0	100	V	37.519	5.49	27.6	34.029	54	-19.971	Ave
7250	17.93	0	100	H	37.633	5.49	27.6	33.453	54	-20.547	Ave

8 FCC §15.407(a) & §15.407(e) – Emission Bandwidth

8.1 Applicable Standards

FCC §15.407(a)

26 dB emission bandwidth is measured as reference for power and PSD measurement.

FCC §15.407(e)

Within the 5.725-5.85 GHz band, the minimum 6 dB Bandwidth of U-NII devices shall be at least 500 kHz.

8.2 Measurement Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section C: Emission bandwidth and section D: 99 Percent Occupied Bandwidth

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2014-10-24	1 year

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

8.4 Test Environmental Conditions

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

The testing was performed by ChaoRan Chu from 2015-04-20 at RF site.

8.5 Test Results

Please refer to the following tables and plots.

5.2 GHz Band

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)			99% Emission Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2
802.11a mode							
Low	5180	24.877	22.635	22.887	16.5568	16.6996	16.6732
Middle	5200	23.901	22.157	24.309	16.6686	16.6801	16.6595
High	5240	23.268	24.778	24.824	16.7373	16.7217	16.6907
802.11n-HT20 mode							
Low	5180	23.978	24.736	24.490	17.7369	17.8246	17.8081
Middle	5200	24.959	24.742	25.156	17.8943	17.8333	17.8299
High	5240	22.661	23.689	24.157	17.7988	17.8521	17.8708
802.11n-HT40 mode							
Low	5190	47.737	47.500	48.217	36.3400	36.3019	36.3154
High	5230	46.606	46.831	49.631	36.2571	36.2722	36.3337
802.11ac 80 mode							
/	5210	94.257	95.725	96.607	75.6279	75.7279	75.7476

5.8 GHz Band

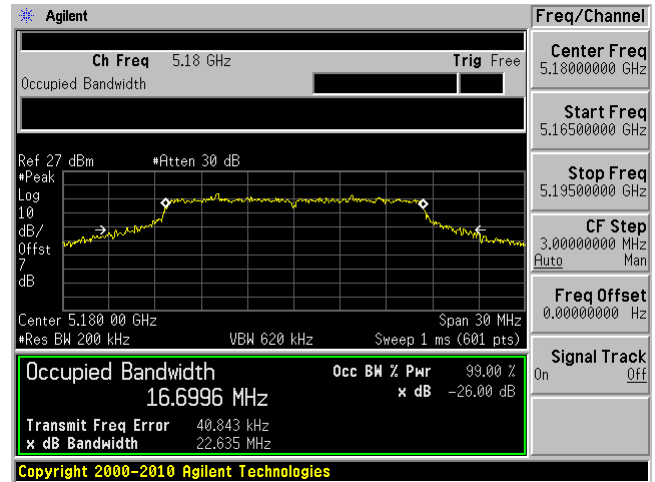
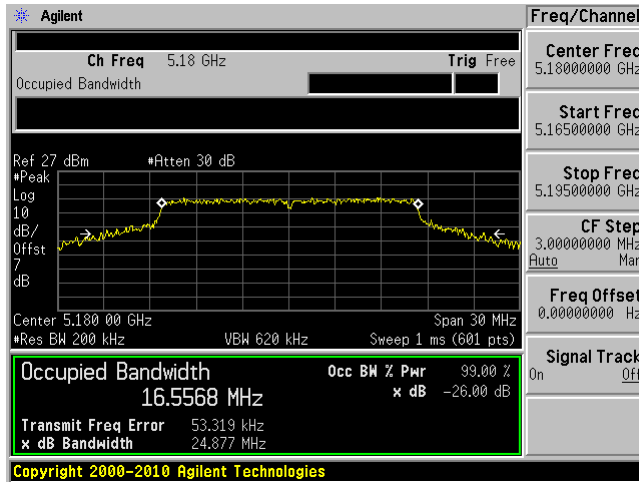
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)			99% Emission Bandwidth (MHz)			Limit (MHz)	Results
		Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2		
802.11a mode									
Low	5745	15.726	15.719	15.993	16.9706	18.1149	17.1230	> 0.5	Compliant
Middle	5785	15.935	16.125	16.345	17.1272	18.0784	16.7798	> 0.5	Compliant
High	5825	16.034	15.993	16.360	16.8063	17.2893	16.6938	> 0.5	Compliant
802.11n-HT20 mode									
Low	5745	15.966	16.347	17.033	17.8626	18.6694	17.8620	> 0.5	Compliant
Middle	5785	16.304	16.929	17.582	18.0906	18.1530	17.9103	> 0.5	Compliant
High	5825	16.334	16.321	17.337	17.8418	18.4053	17.7373	> 0.5	Compliant
802.11n-HT40 mode									
Low	5755	35.795	35.447	35.809	36.3130	36.5369	36.3095	> 0.5	Compliant
High	5795	34.246	35.780	35.723	36.2932	36.4804	36.3005	> 0.5	Compliant
802.11ac 80 mode									
/	5775	69.384	75.118	72.520	75.8077	75.8570	75.8622	> 0.5	Compliant

5.2 GHz Band

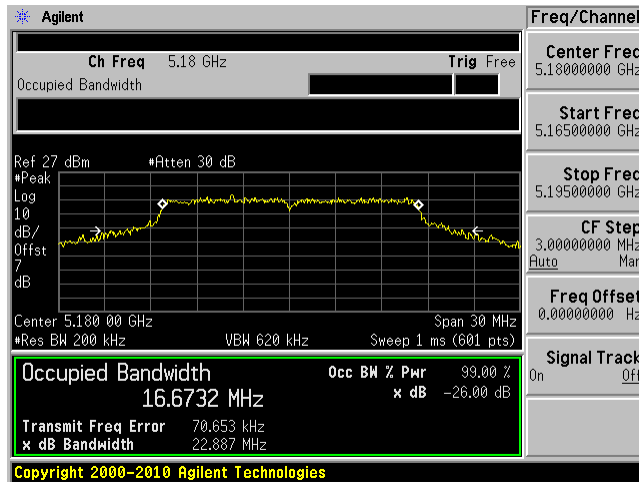
802.11a mode

Low channel: Chain 0

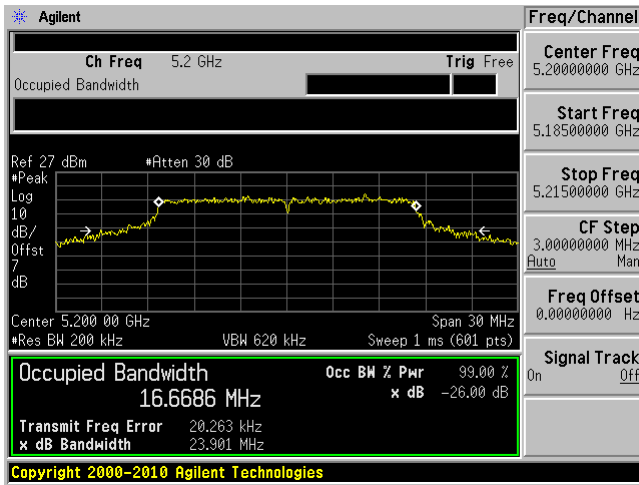
Low channel: Chain 1



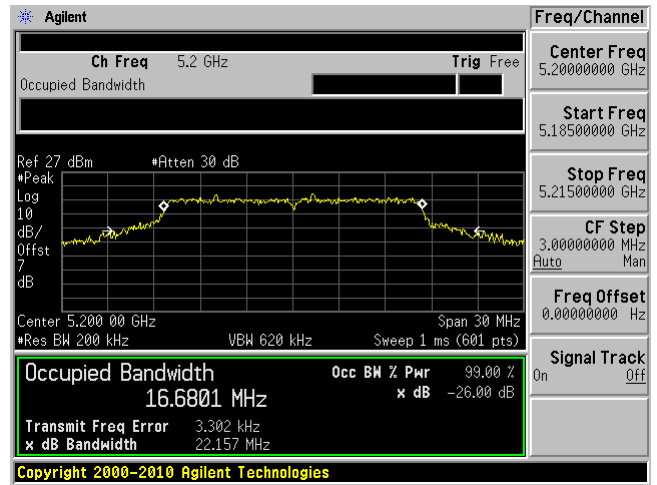
Low Channel: Chain 2



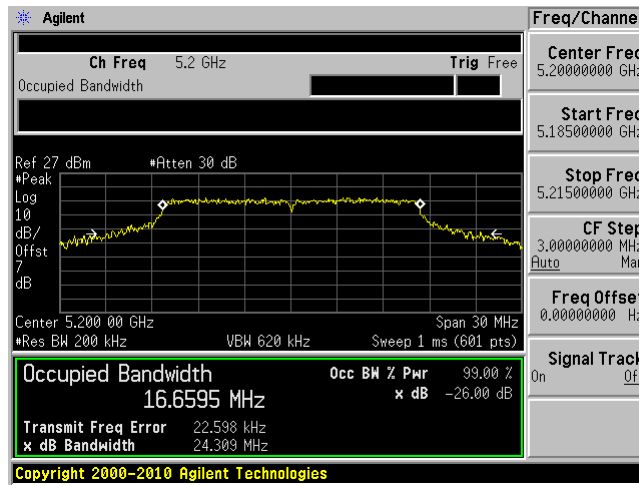
Middle channel: Chain 0



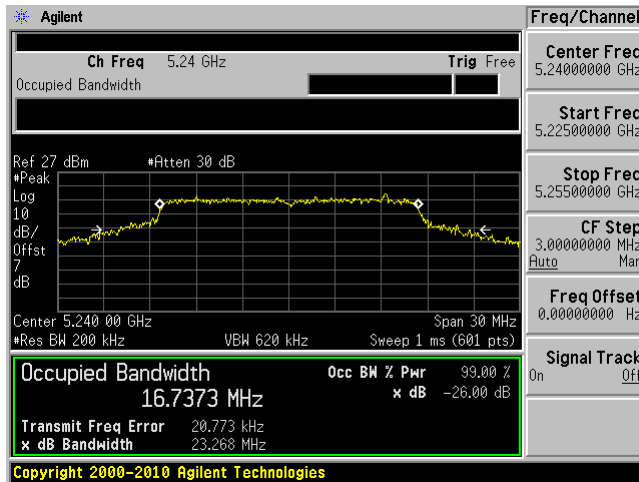
Middle channel: Chain 1



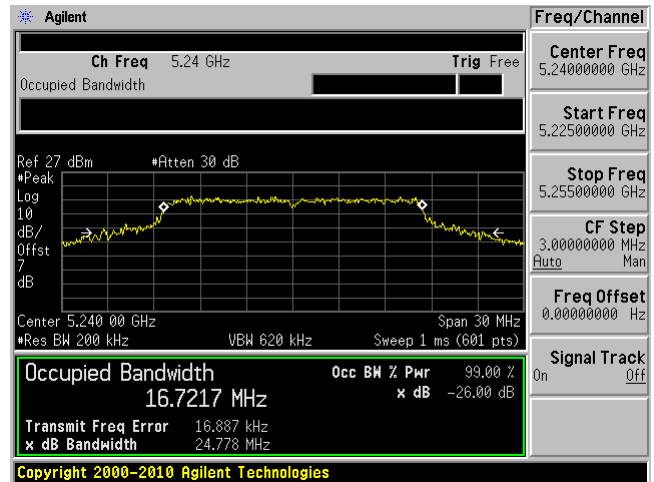
Middle Channel: Chain 2



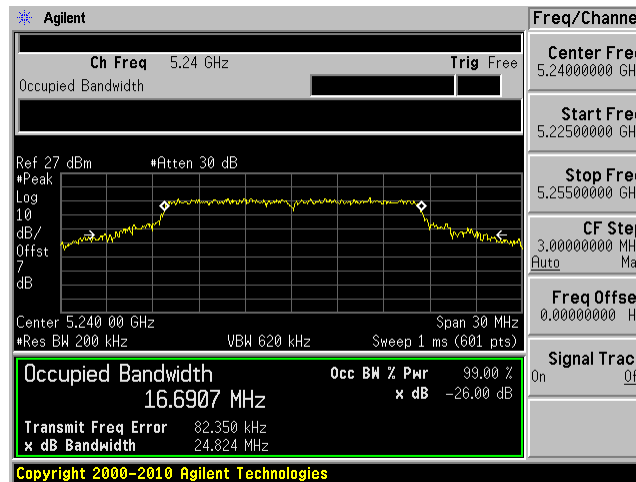
High channel: Chain 0



High channel: Chain 1

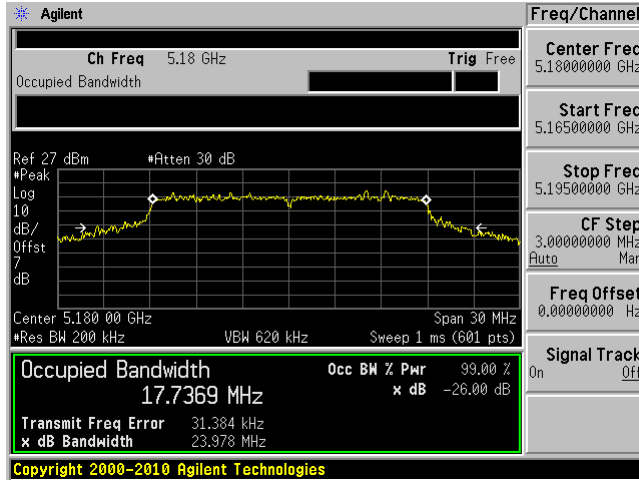


High Channel: Chain 2

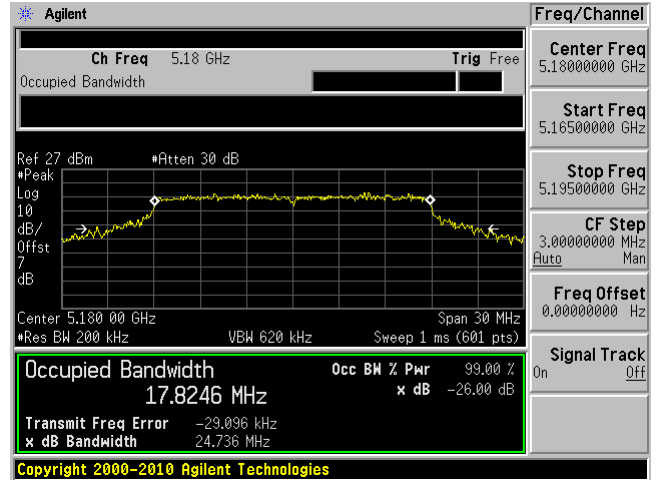


802.11n-HT20 mode

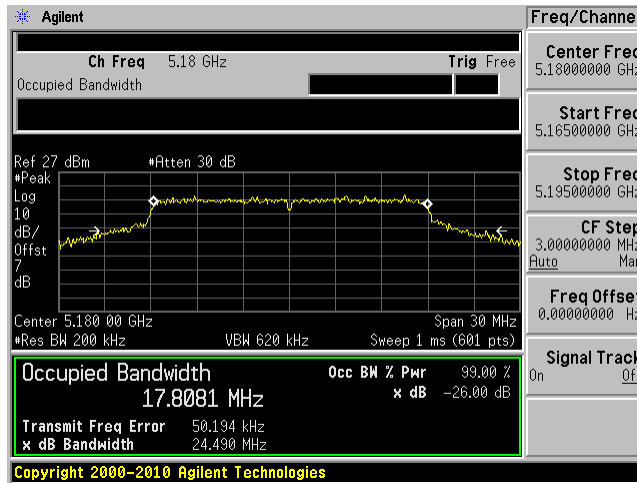
Low channel: Chain 0



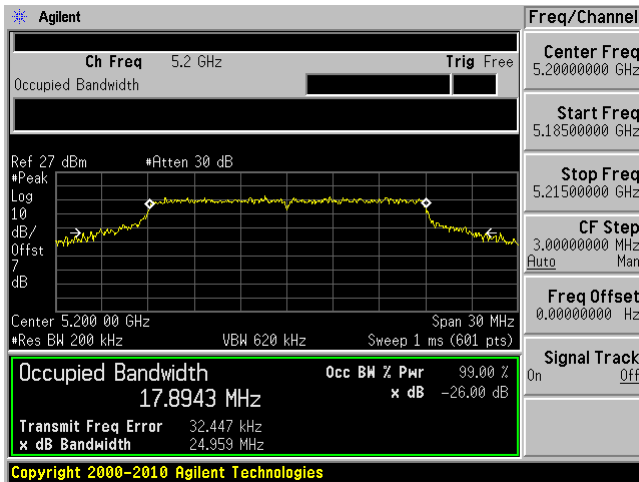
Low channel: Chain 1



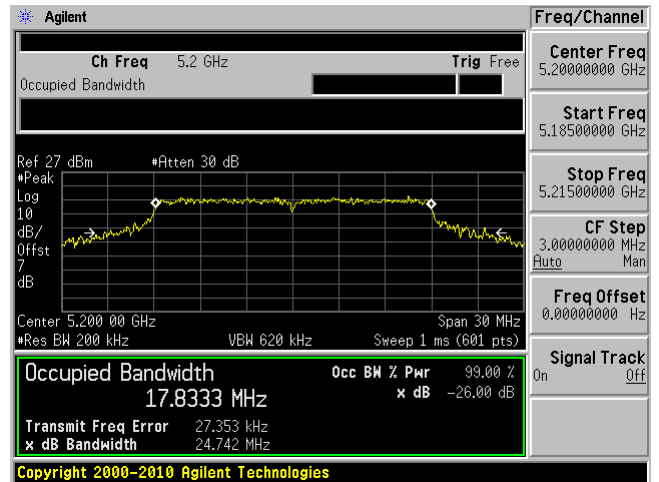
Low Channel: Chain 2



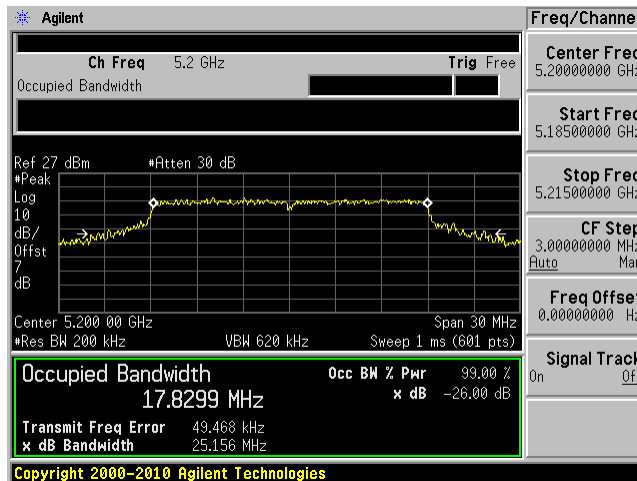
Middle channel: Chain 0



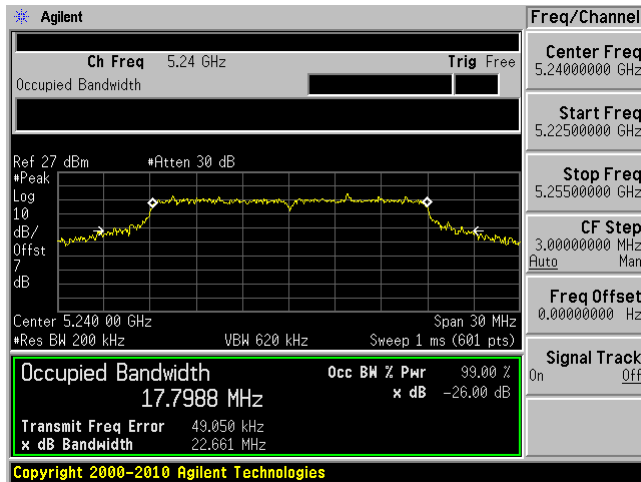
Middle channel: Chain 1



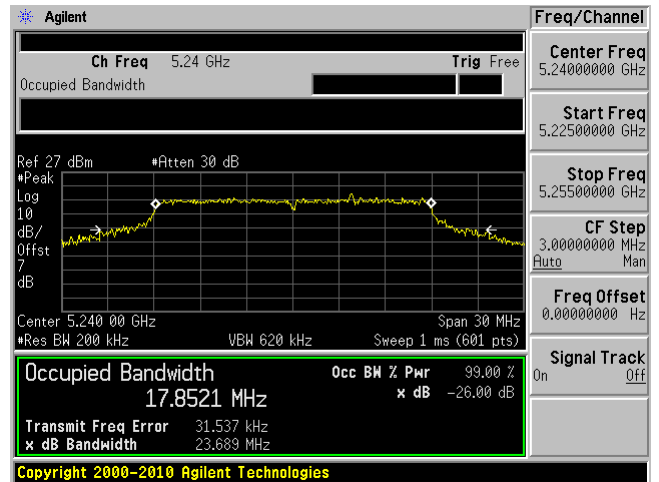
Middle Channel: Chain 2



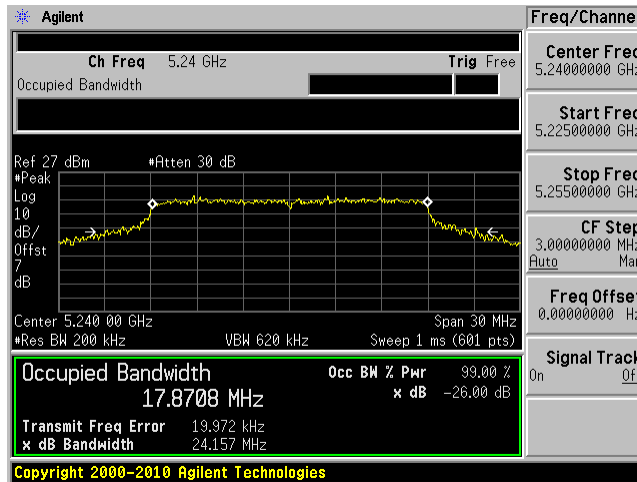
High channel: Chain 0



High channel: Chain 1



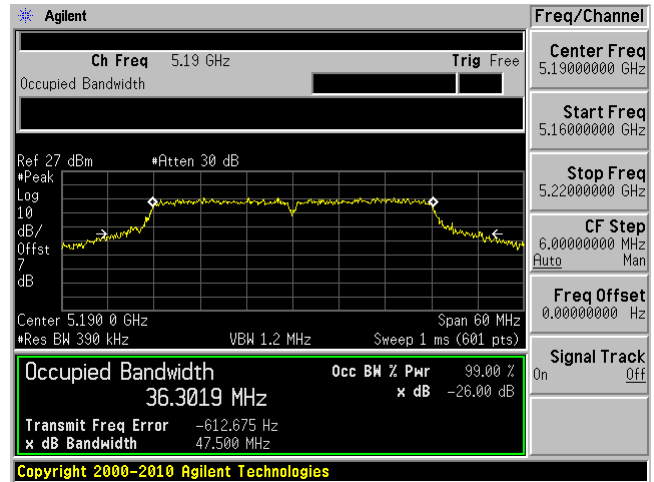
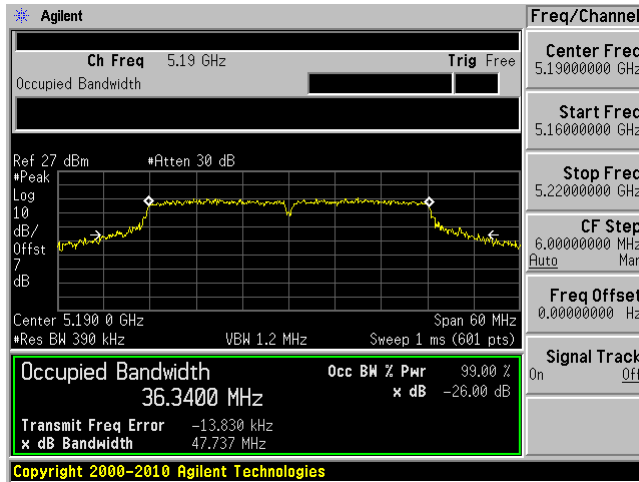
High Channel: Chain 2



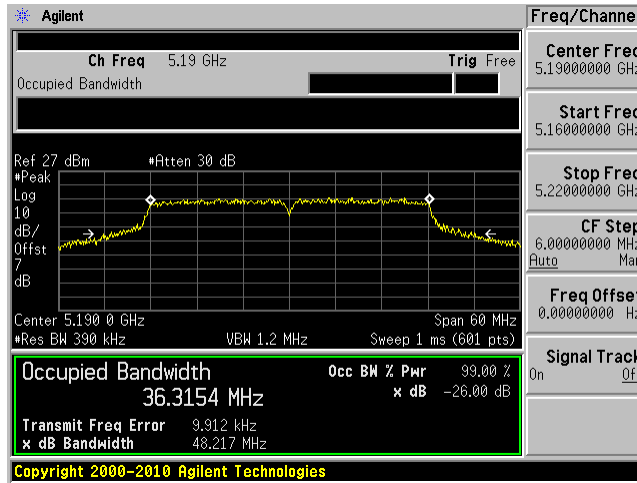
802.11n-HT40 mode

Low channel: Chain 0

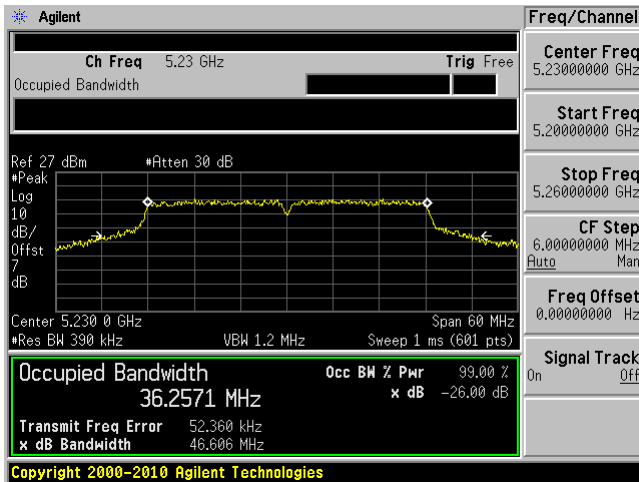
Low channel: Chain 1



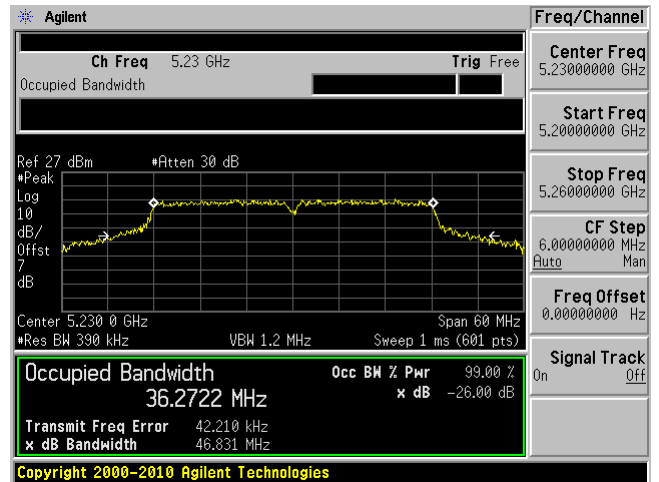
Low Channel: Chain 2



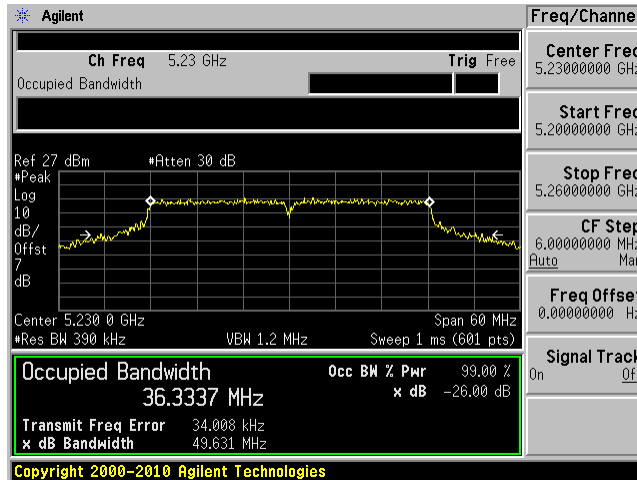
High channel: Chain 0



High channel: Chain 1

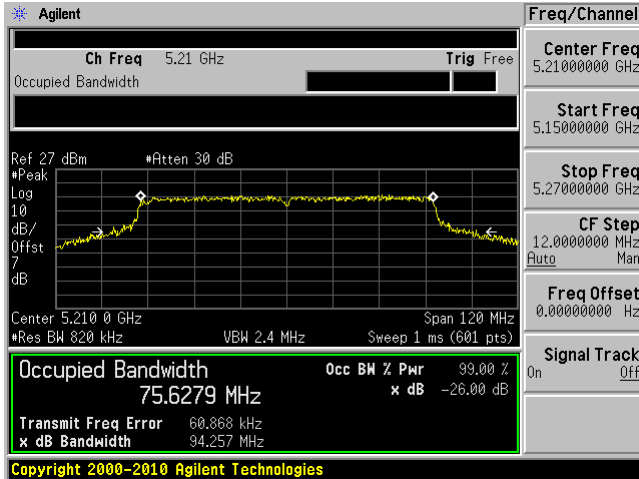


High Channel: Chain 2

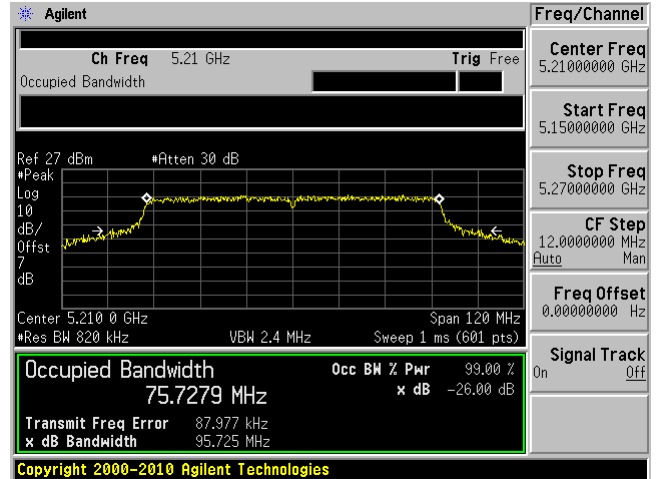


802.11ac 80 mode

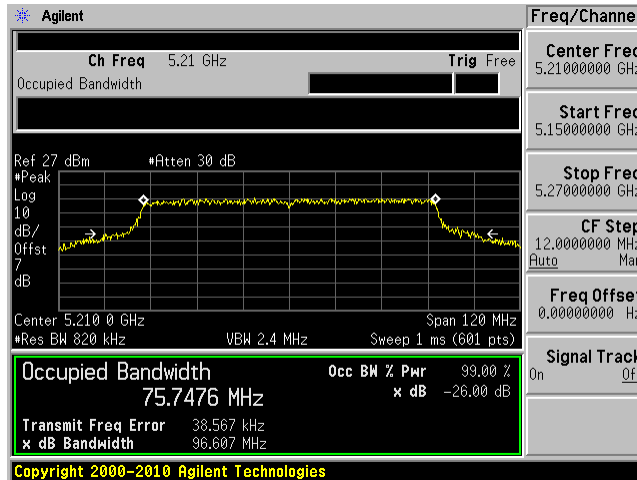
Chain 0



Chain 1



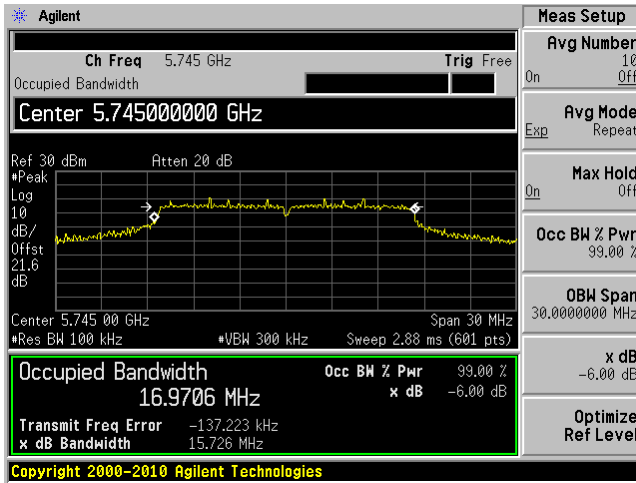
Chain 2



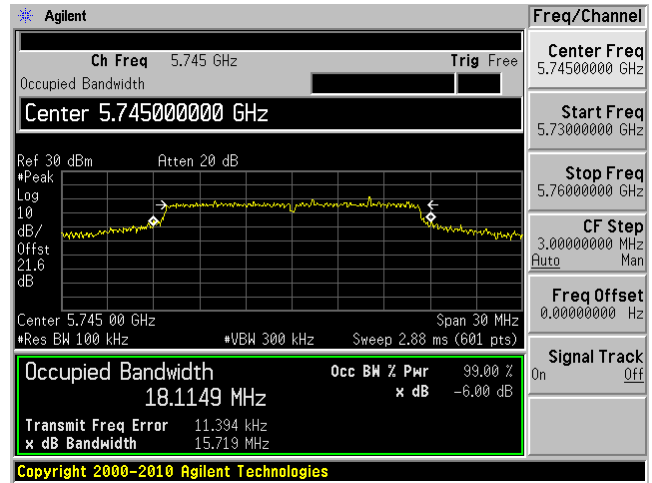
5.8 GHz Band

802.11a mode

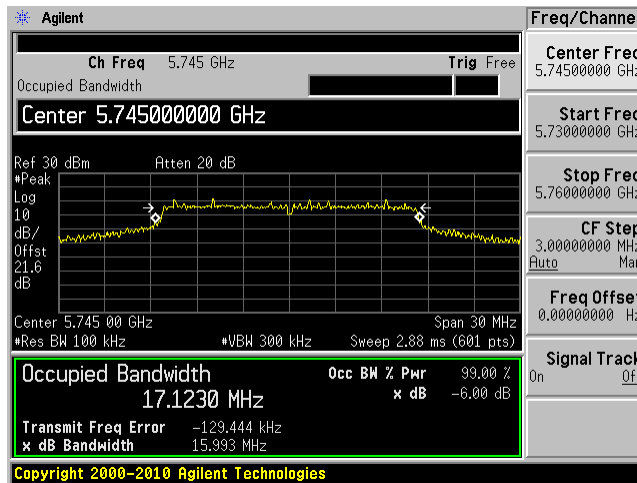
Low channel: Chain 0



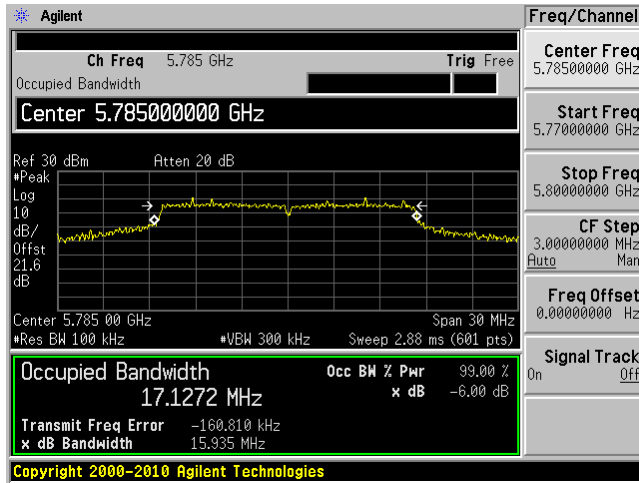
Low channel: Chain 1



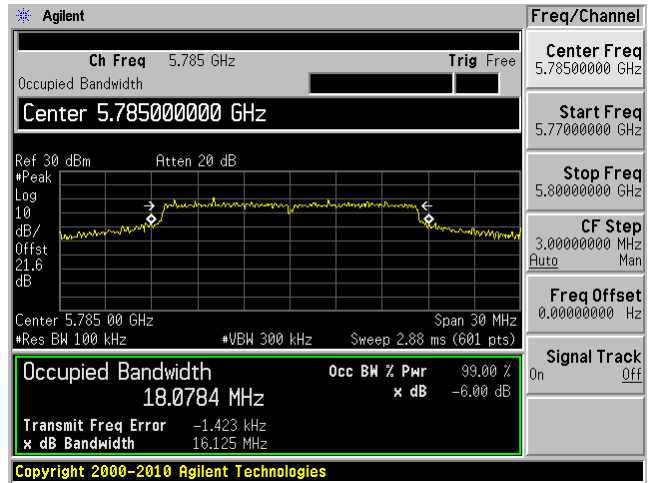
Low Channel: Chain 2



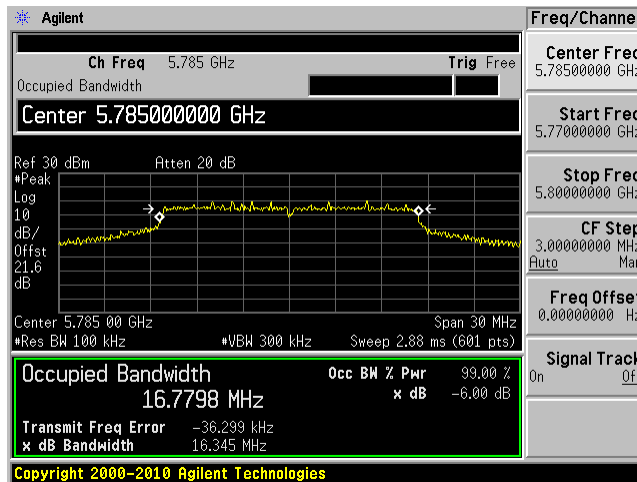
Middle channel: Chain 0



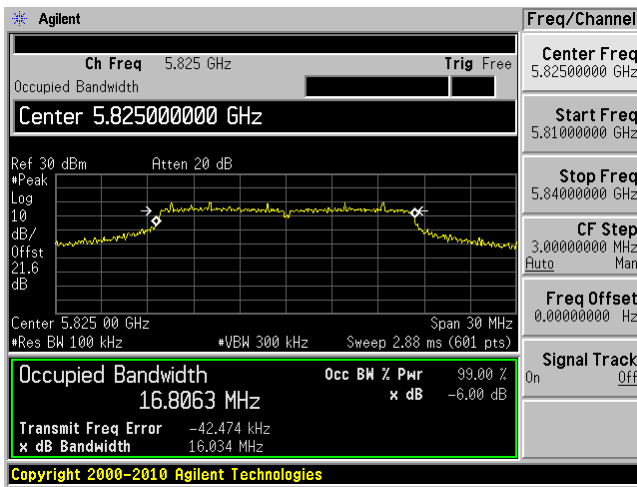
Middle channel: Chain 1



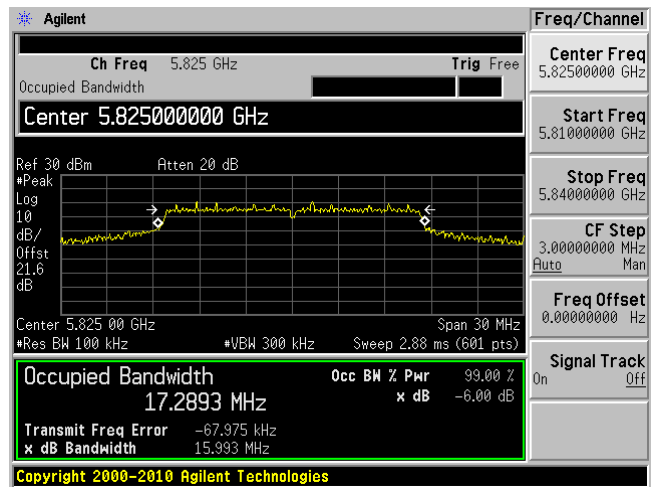
Middle Channel: Chain 2



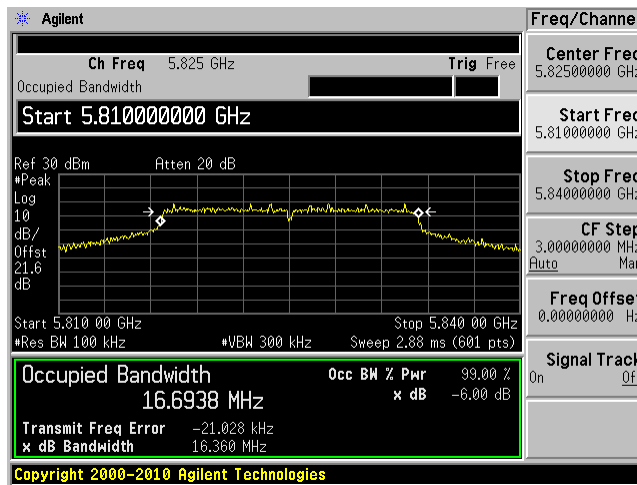
High channel: Chain 0



High channel: Chain 1

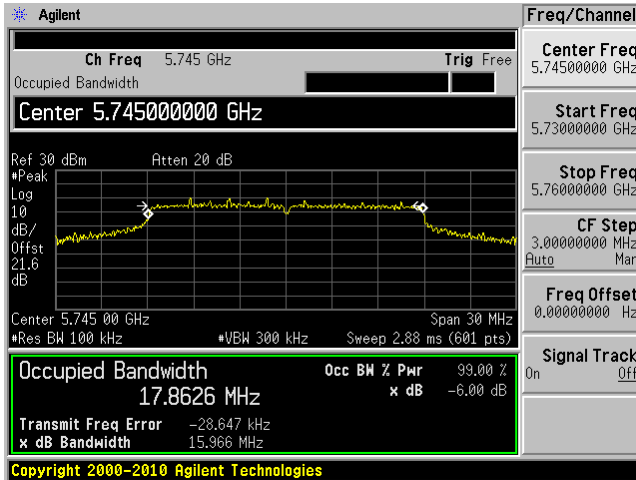


High Channel: Chain 2

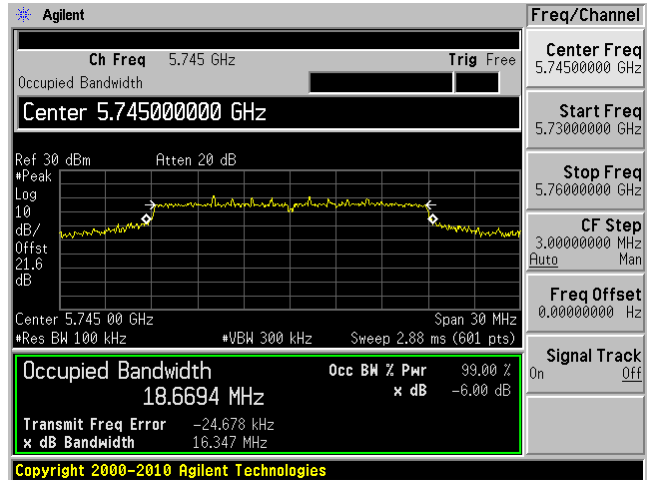


802.11n-HT20 mode

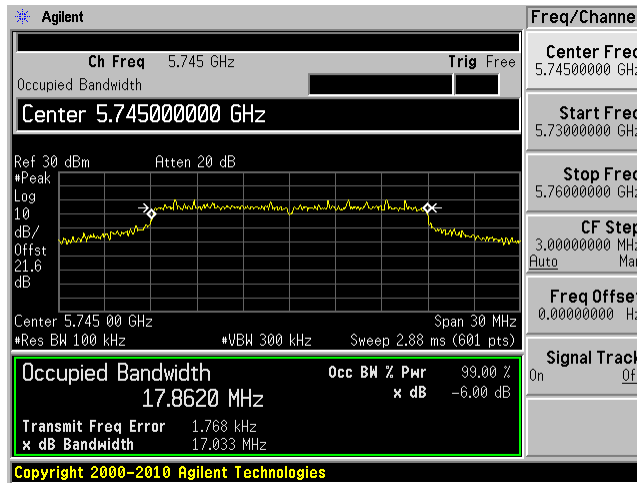
Low channel: Chain 0



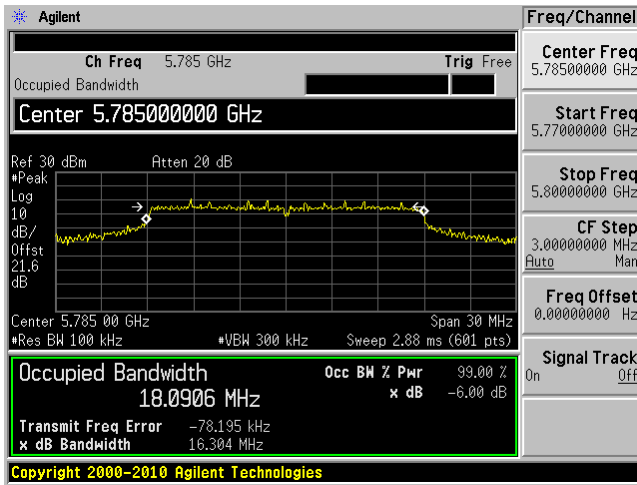
Low channel: Chain 1



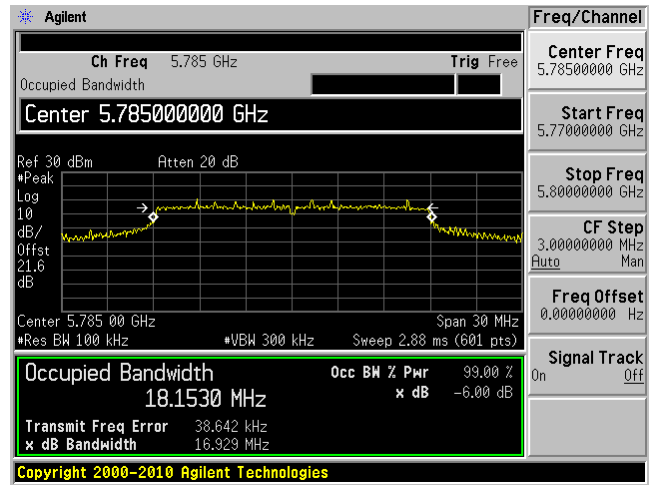
Low Channel: Chain 2



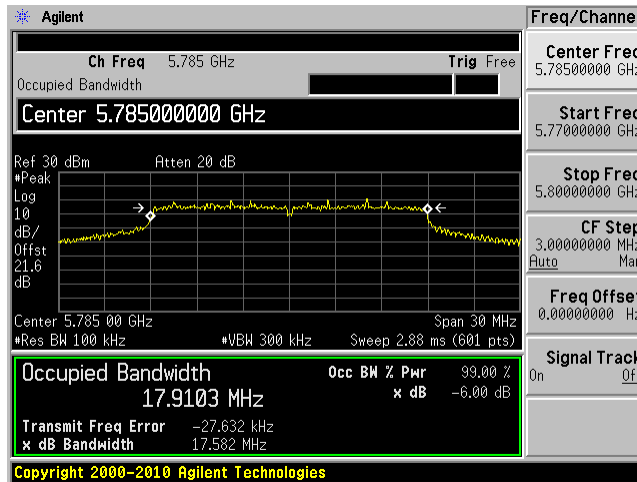
Middle channel: Chain 0



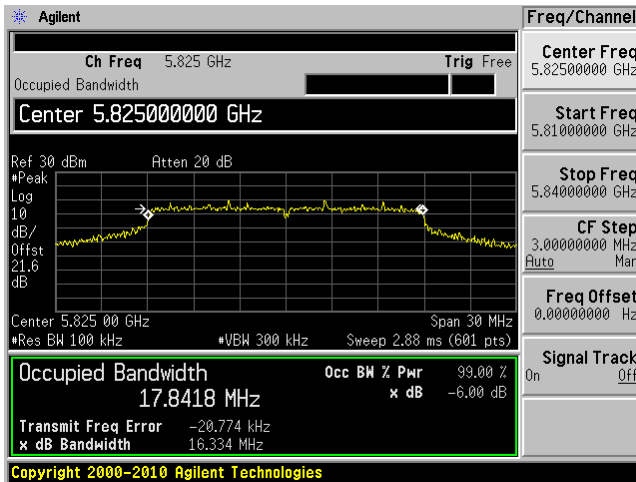
Middle channel: Chain 1



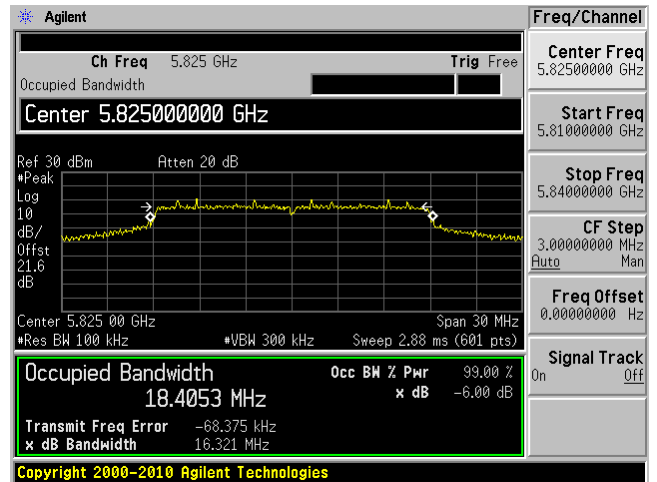
Middle Channel: Chain 2



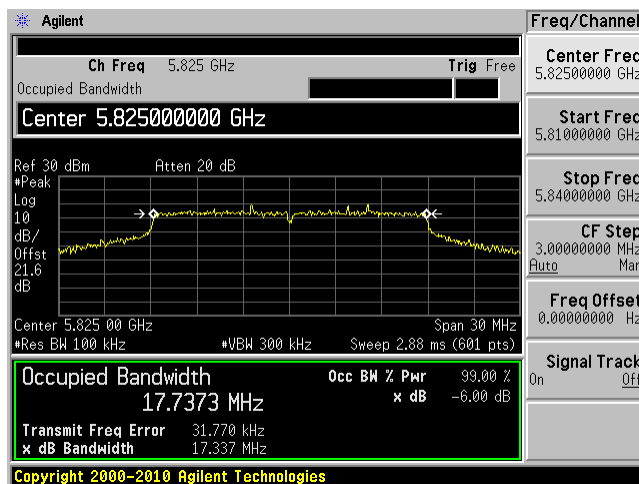
High channel: Chain 0



High channel: Chain 1

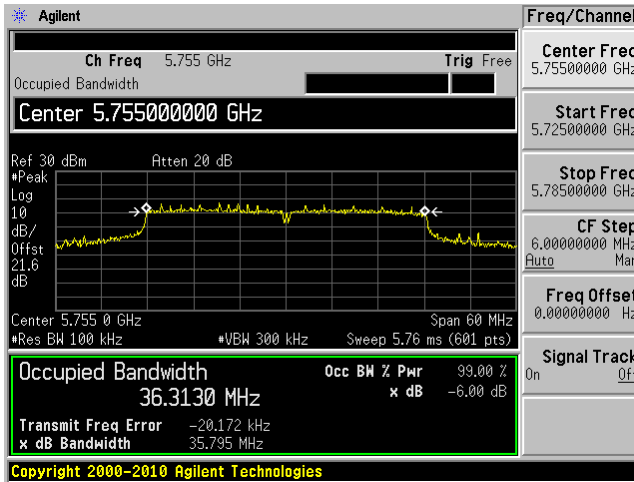


High Channel: Chain 2

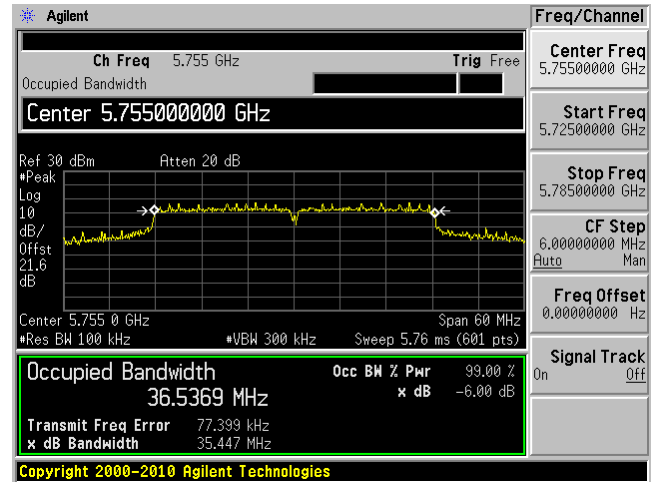


802.11n-HT40 mode

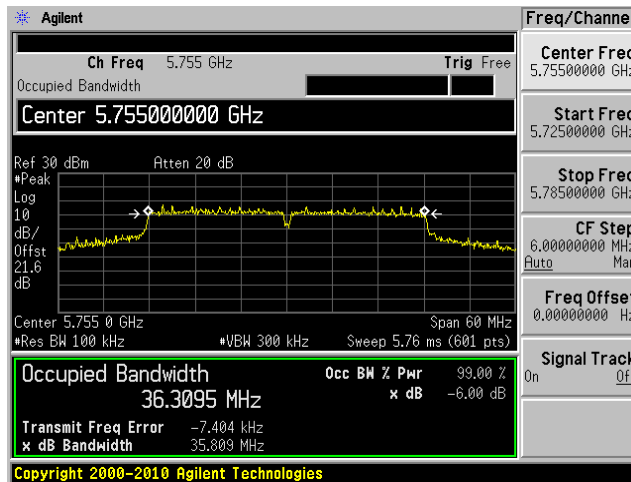
Low channel: Chain 0



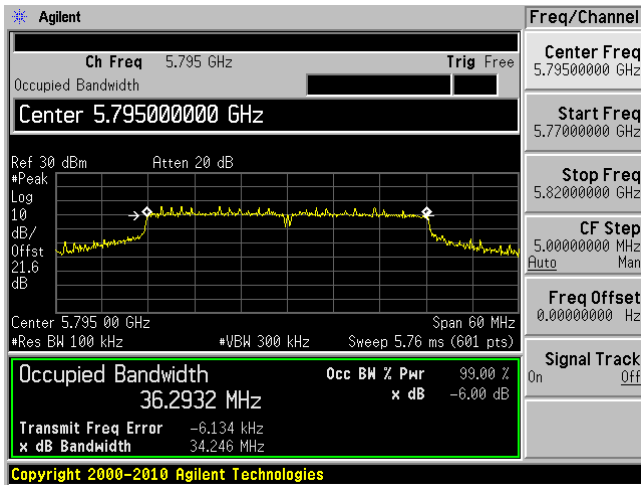
Low channel: Chain 1



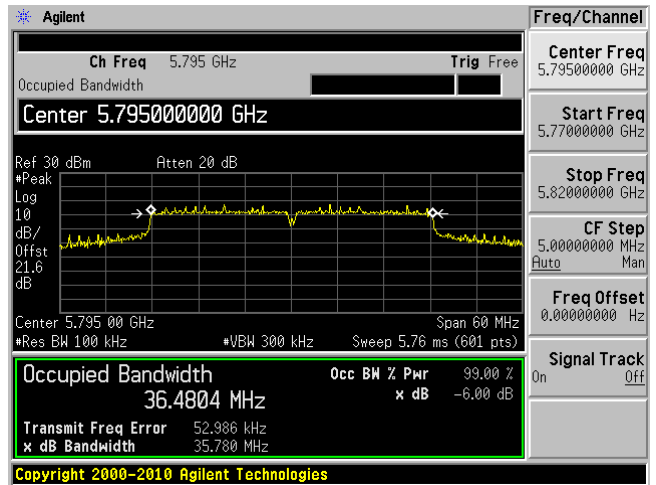
Low Channel: Chain 2



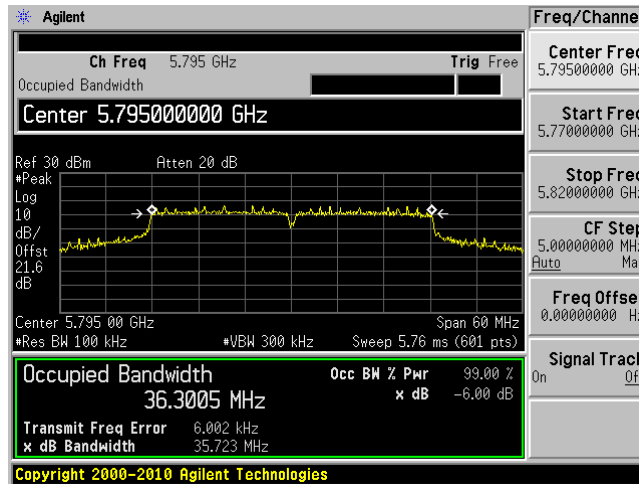
High channel: Chain 0



High channel: Chain 1

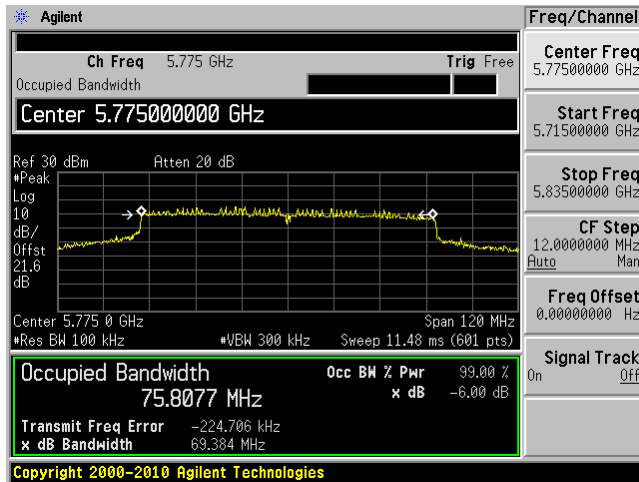


High Channel: Chain 2

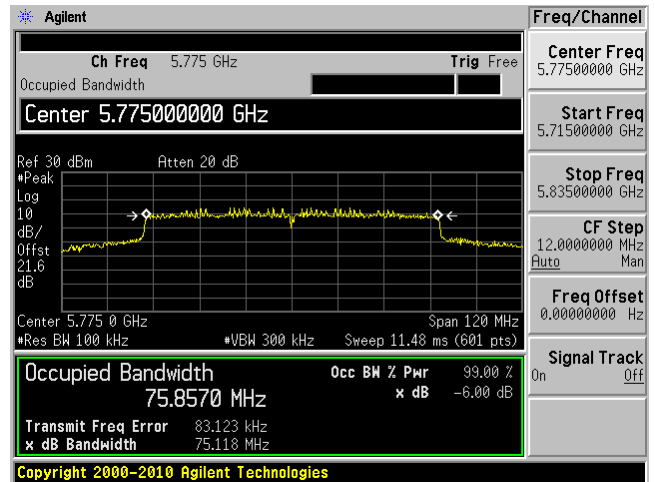


802.11ac 80 mode

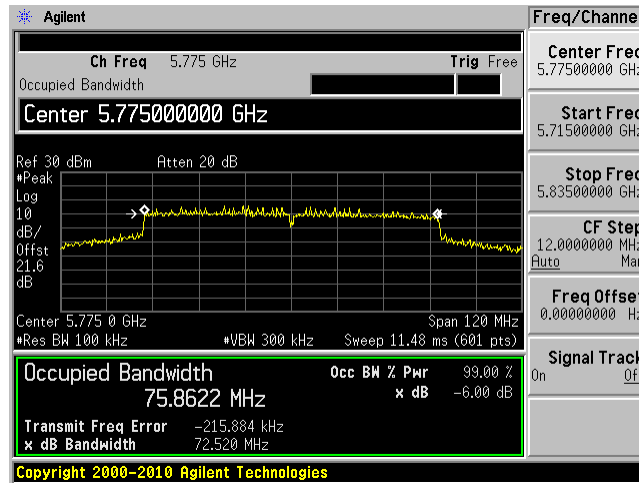
Chain 0



Chain 1



Chain 2



9 FCC §407(a) – Maximum Conducted Output Power

9.1 Applicable Standards

According to FCC §15.407(a)

(1) For the band 5.15-5.25 GHz.

(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).

(3) For the band 5.725-5.85 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 30 dBm in any 500-kHz 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. 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

Test measurements are based on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2014-10-24	1 year

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

9.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 KPa

The testing was performed by ChaoRan Chu from 2015-04-20 at RF site.

9.5 Test Results

5.2 GHz Band

802.11a mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5180	19.38	19.92	19.94	24.53	30	-5.47	Target
5200	20.25	20.25	20.37	25.06	30	-4.94	Target
5240	20.33	20.2	20.22	25.02	30	-4.98	Target

802.11n-HT20 mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5180	20.15	20.42	20.37	25.09	30	-4.91	Target
5200	20.33	20.18	20.12	24.98	30	-5.02	Target
5240	20.2	20.2	20.28	25.00	30	-5.00	Target

802.11n-HT40 mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5190	18.31	18.3	18.3	23.07	30	-6.93	Target
5230	18.29	18.24	18.27	23.04	30	-6.96	Target

802.11ac 80 mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5210	17.88	17.88	17.7	22.59	30	-7.41	Target

5.8 GHz Band

802.11a mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5745	20.33	20.21	20.71	25.19	30	-4.81	24
5785	20.48	21.46	20.66	25.66	30	-4.34	24
5825	20.17	20.73	19.84	25.03	30	-4.97	24

802.11n-HT20 mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5745	20.13	21.45	21.15	25.72	30	-4.28	24
5785	21.2	20.87	20.08	25.51	30	-4.49	24
5825	19.69	20.45	20.74	25.09	30	-4.91	24

802.11n-HT40 mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5755	20.1	21.11	20.33	25.31	30	-4.69	24
5795	19.04	20.06	19.58	24.35	30	-5.65	24

802.11ac 80 mode:

Frequency (MHz)	Conducted Output Power (dBm)			Total Power (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5775	19.25	20.35	20.01	24.67	30	-5.33	25

10 FCC §15.407(b) - Spurious Emissions at Antenna Ports

10.1 Applicable Standards

According to FCC §15.407(b)

(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.

(b) (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz

10.2 Measurement Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section H: Unwanted emissions measurement

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2014-10-24	1 year

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

10.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 KPa

The testing was performed by ChaoRan Chu from 2015-04-25 at RF site.

10.5 Test Results

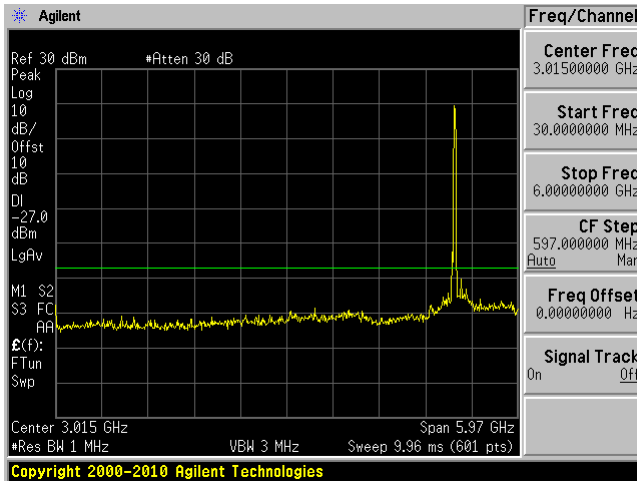
Please refer to following plots of spurious emissions.

Note: the offset include the attenuation, cable loss. And the margin between limit line and the emission covers other requirements in the KDB 789033.

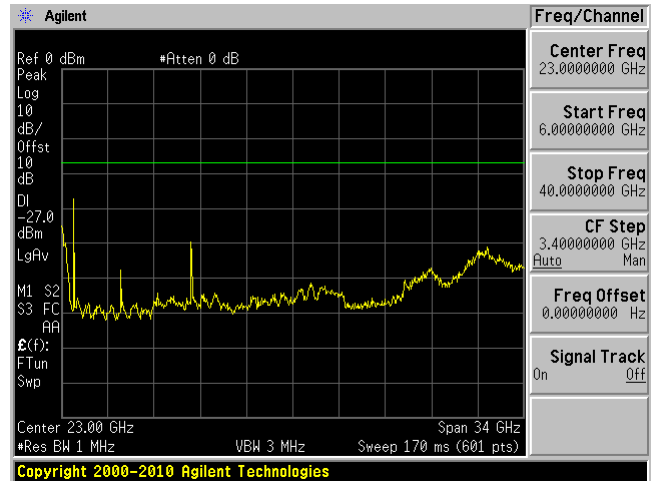
5.2 GHz Band

802.11a, Low Channel

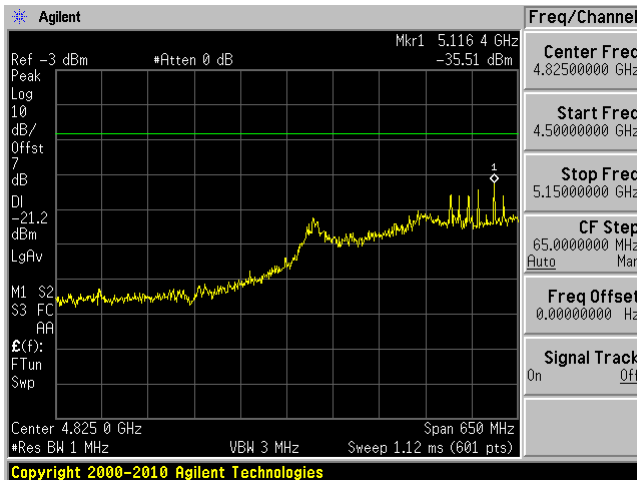
Chain 0, Plot: 30 MHz – 6 GHz



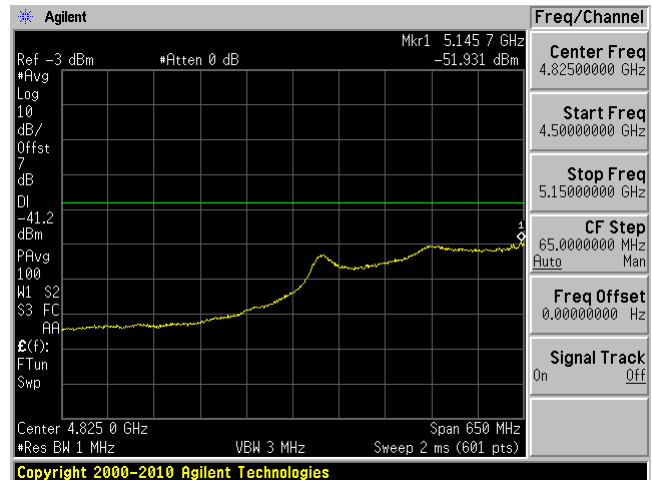
Chain 0, Plot: 6 GHz – 40 GHz



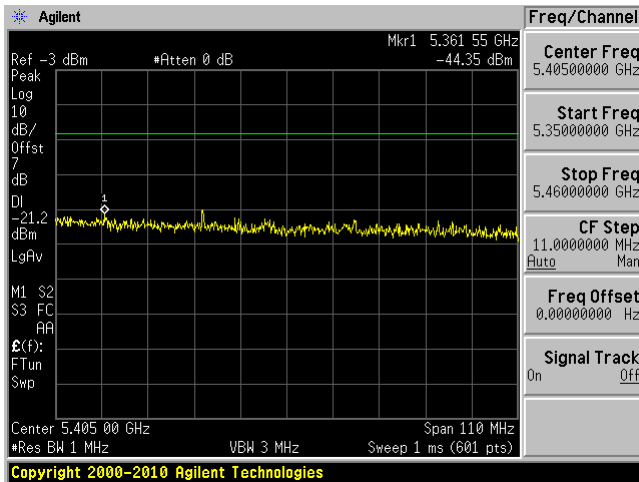
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



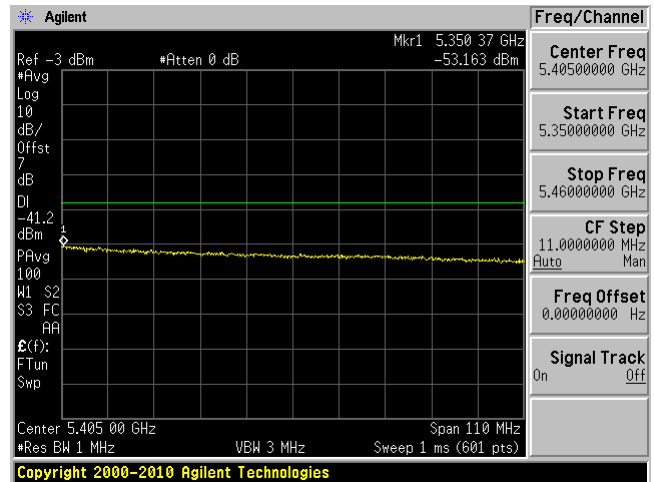
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



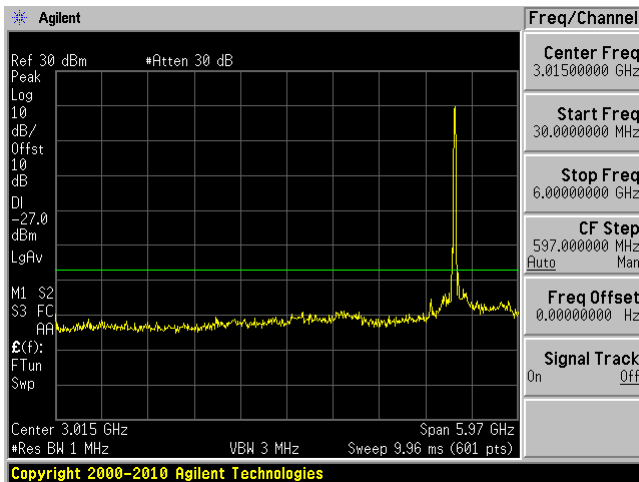
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



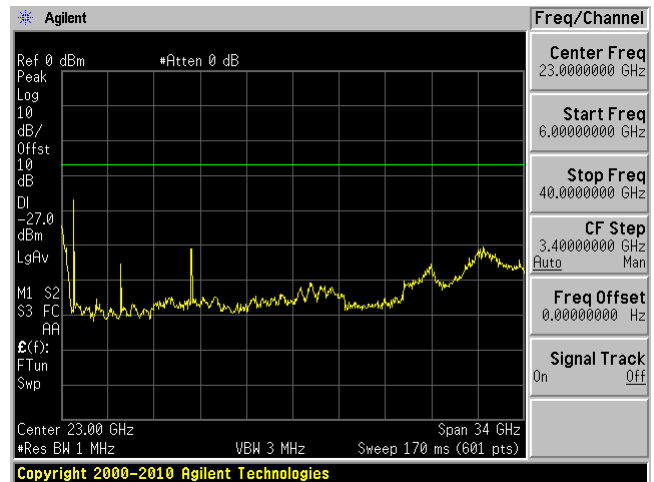
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



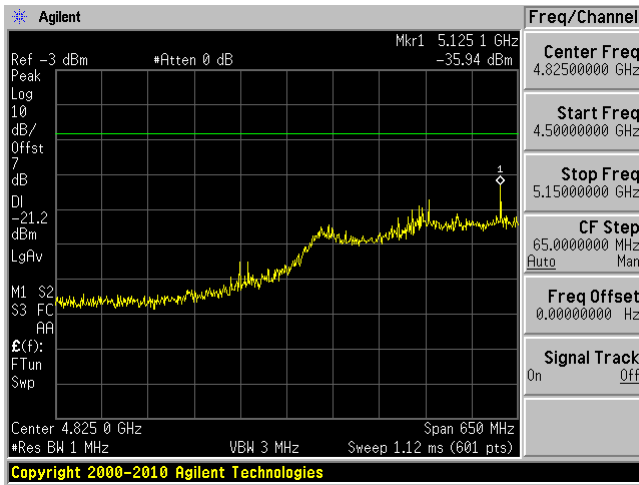
Chain 1, Plot: 30 MHz – 6 GHz



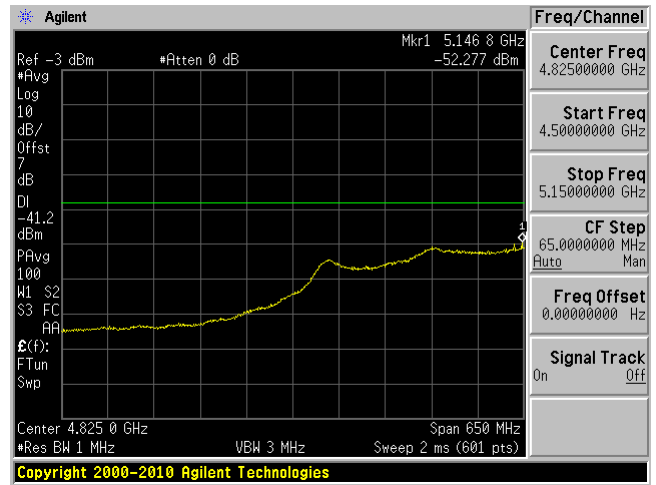
Chain 1, Plot: 6 GHz – 40 GHz



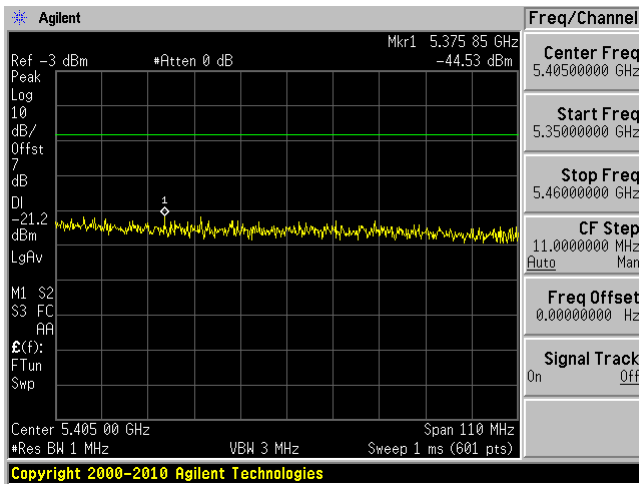
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



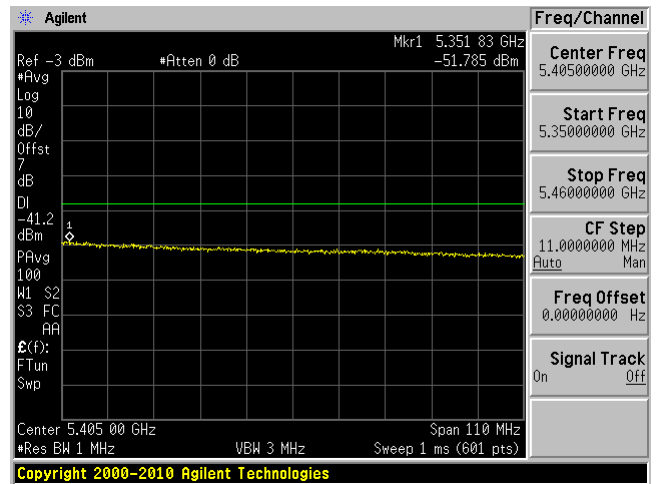
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



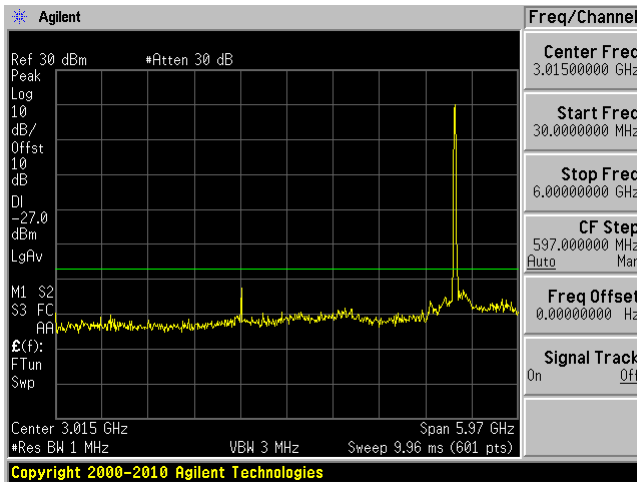
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



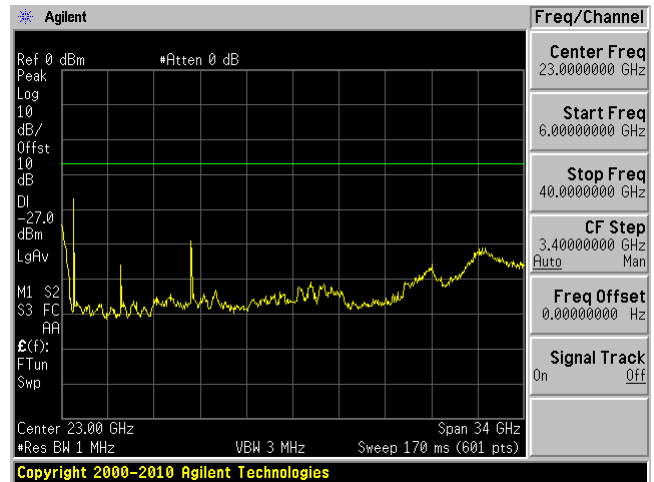
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



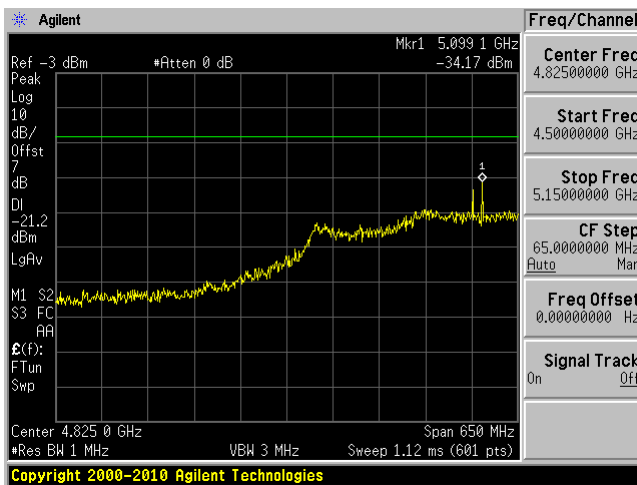
Chain 2, Plot: 30 MHz – 6 GHz



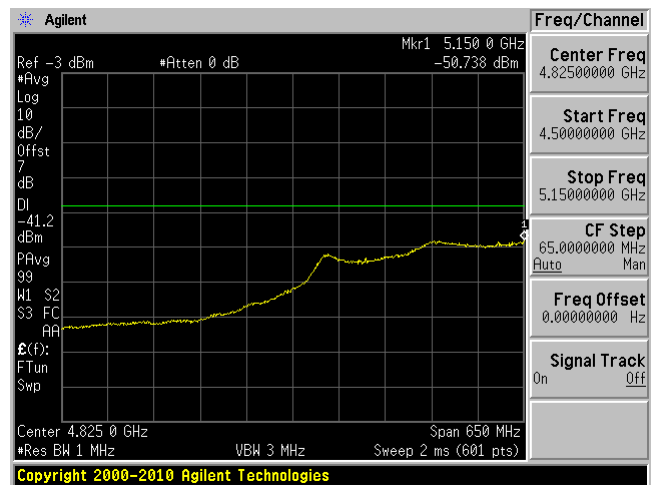
Chain 2, Plot: 6 GHz – 40 GHz



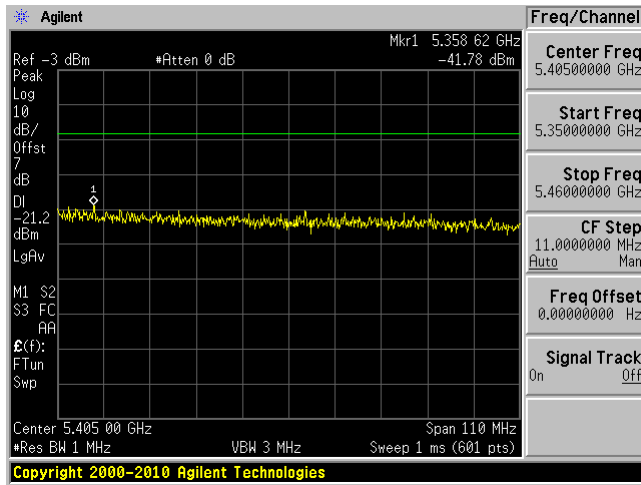
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



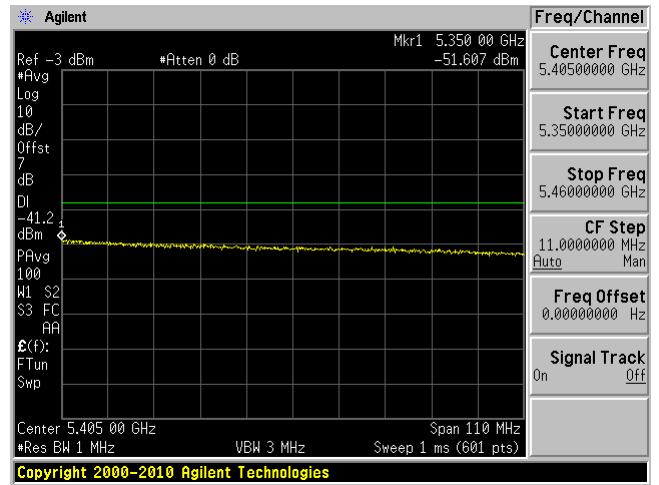
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

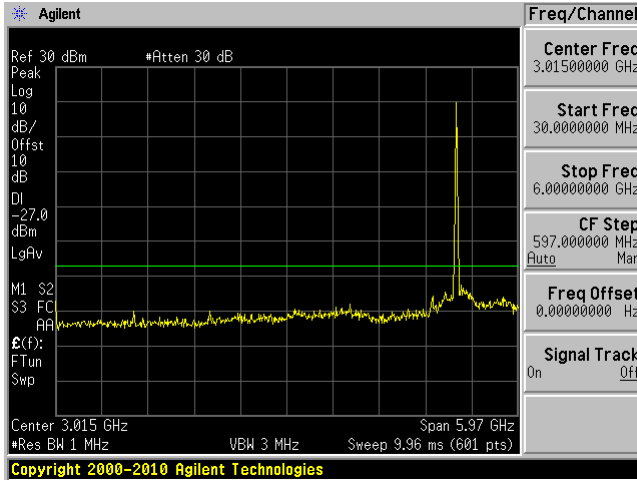


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

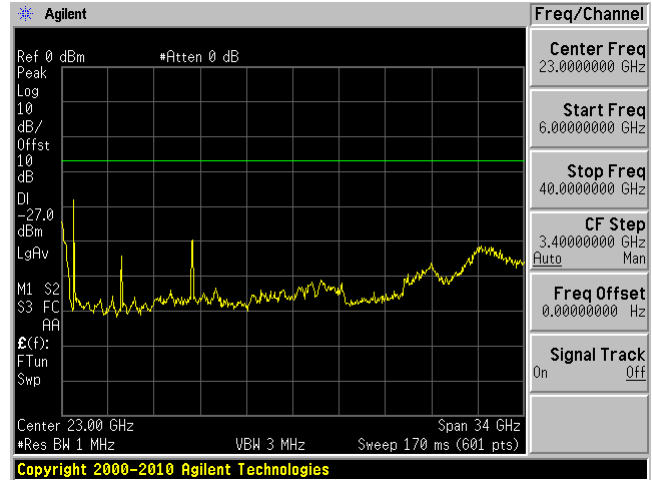


802.11a, Middle Channel

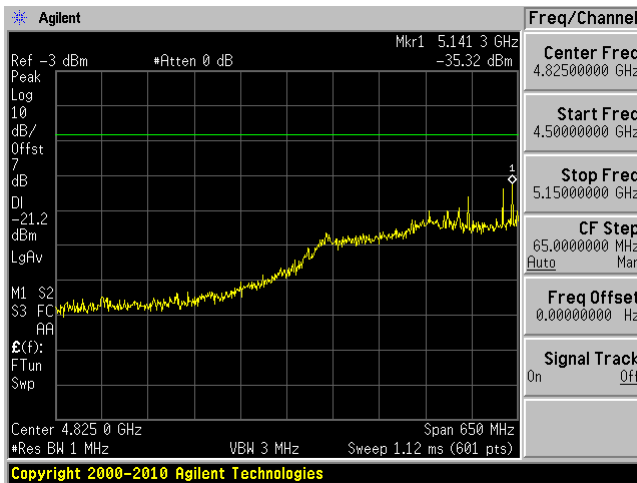
Chain 0, Plot: 30 MHz – 6 GHz



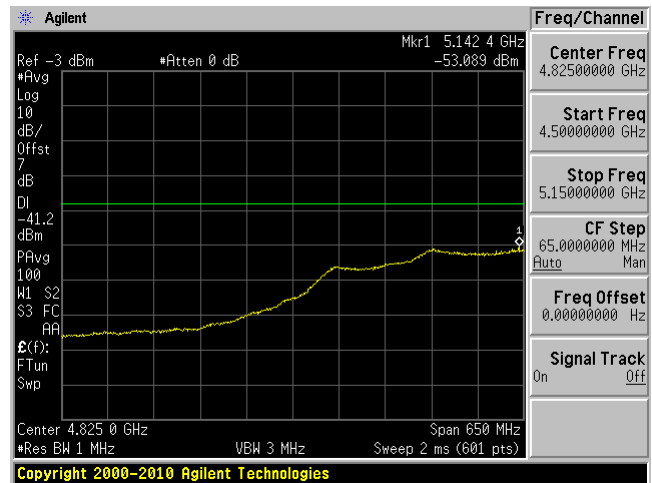
Chain 0, Plot: 6 GHz – 40 GHz



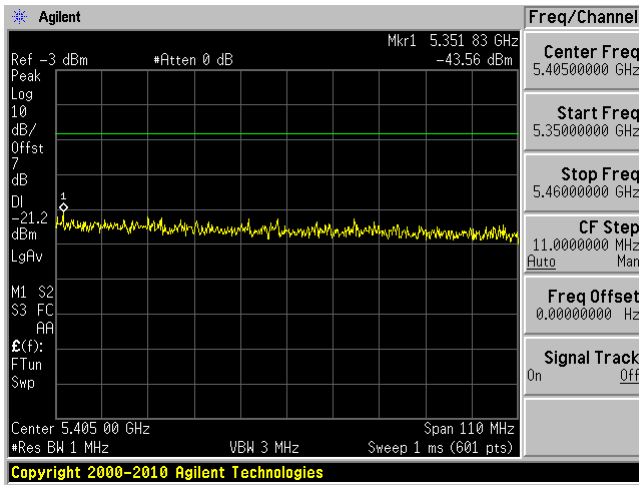
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



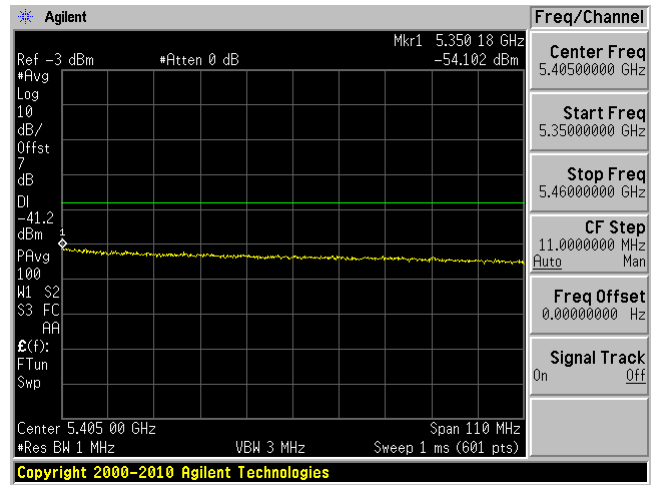
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



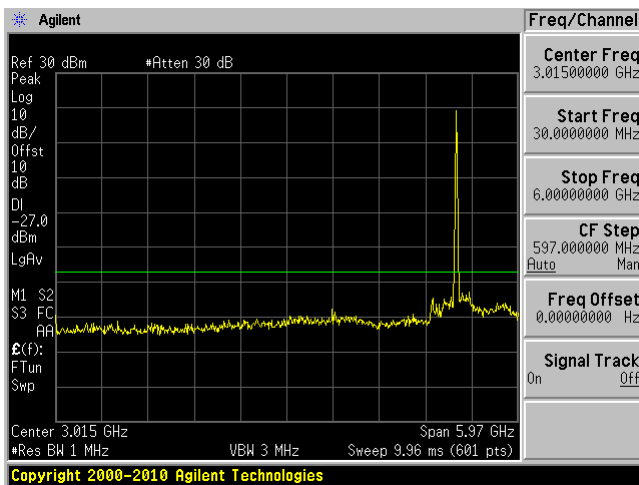
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



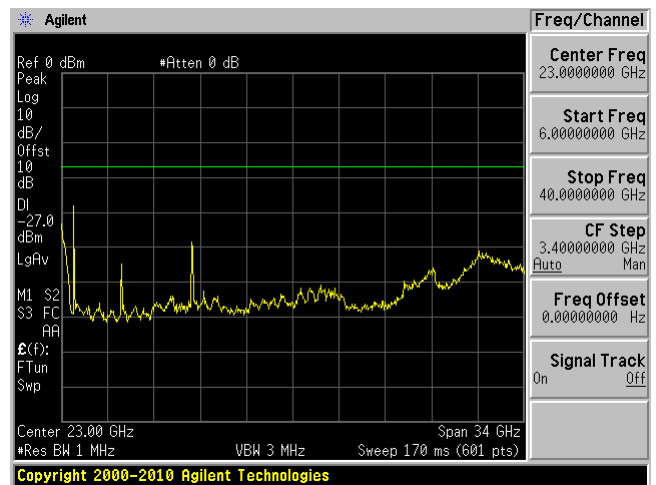
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



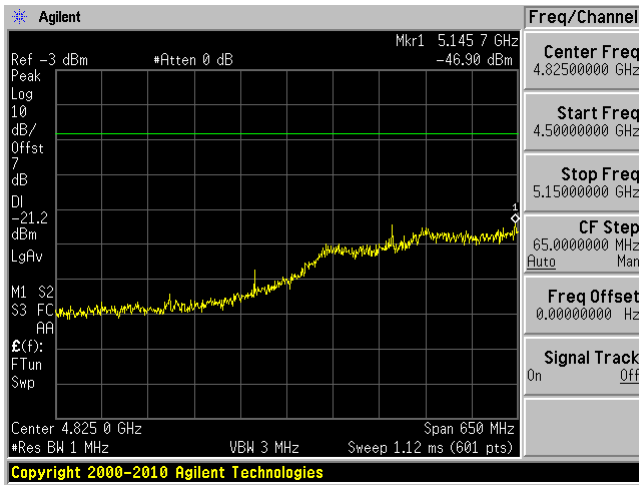
Chain 1, Plot: 30 MHz – 6 GHz



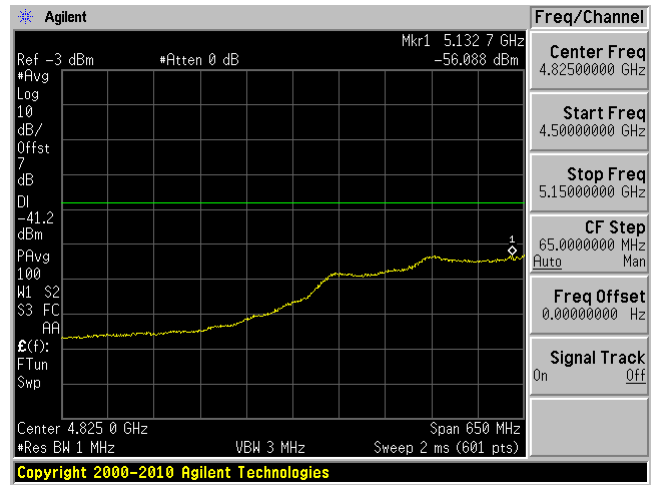
Chain 1, Plot: 6 GHz – 40 GHz



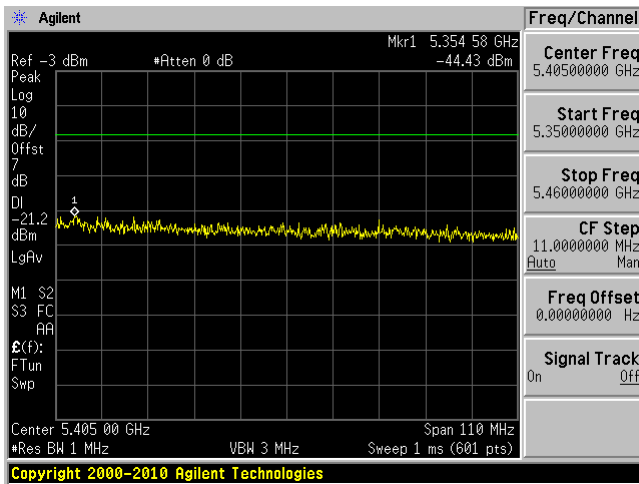
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



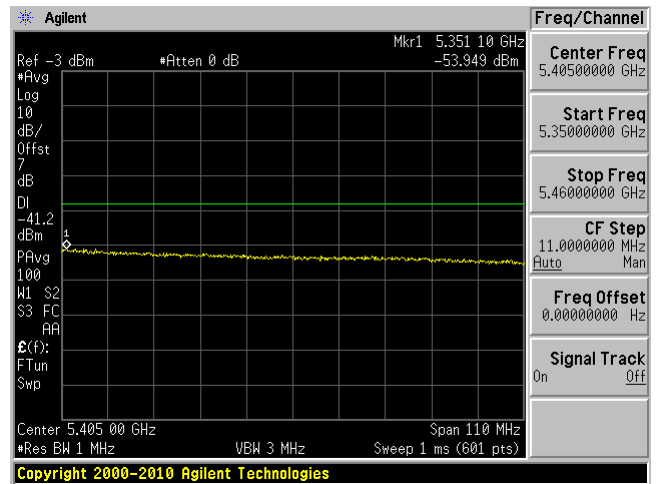
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



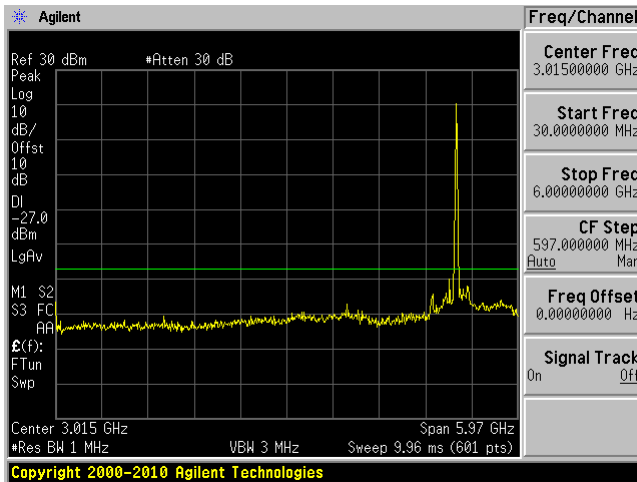
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



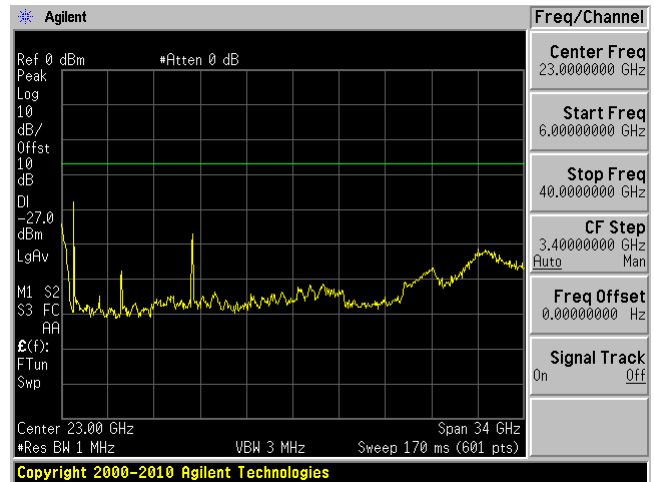
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



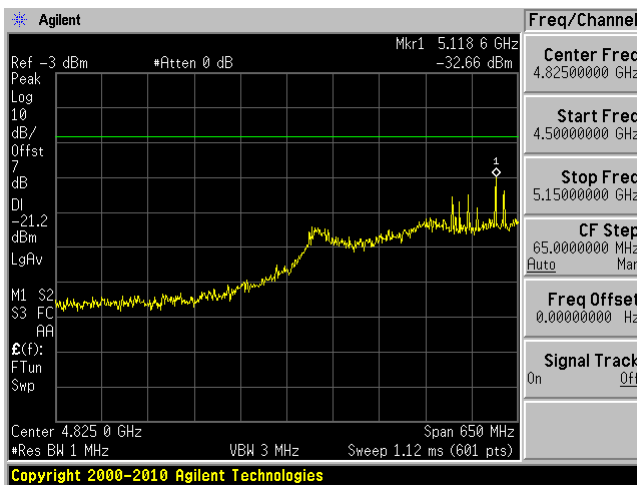
Chain 2, Plot: 30 MHz – 6 GHz



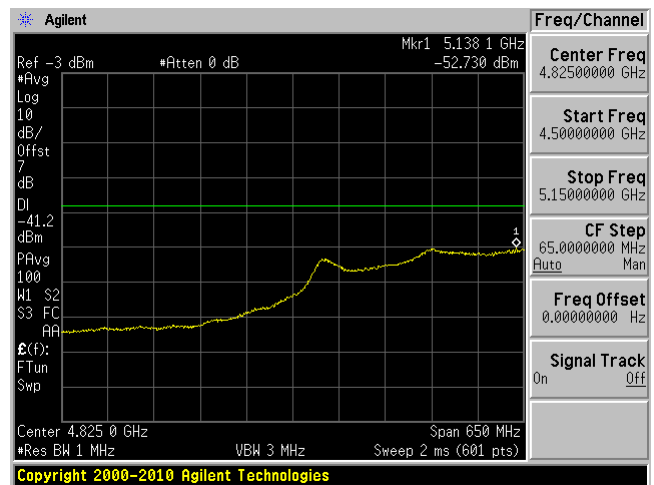
Chain 2, Plot: 6 GHz – 40 GHz



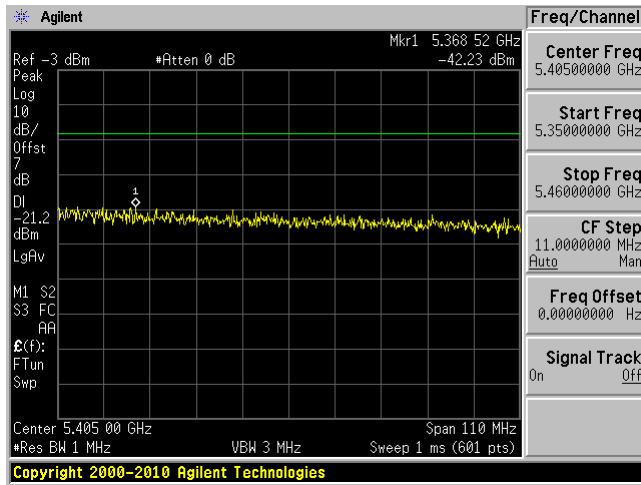
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



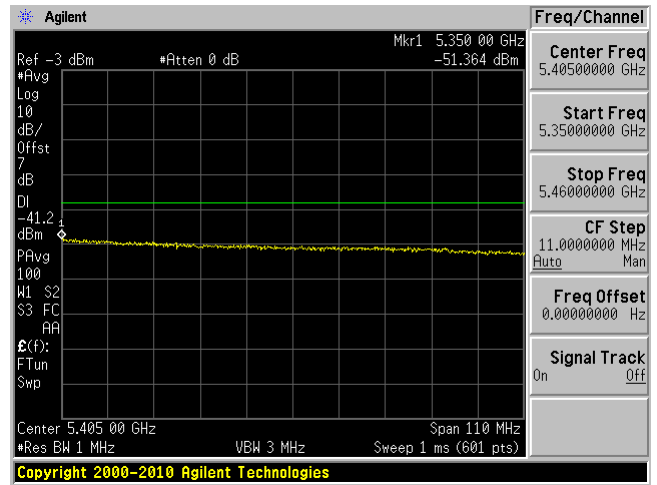
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

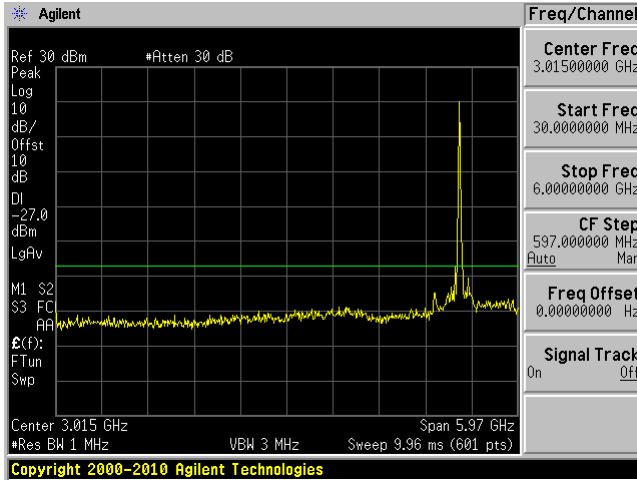


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

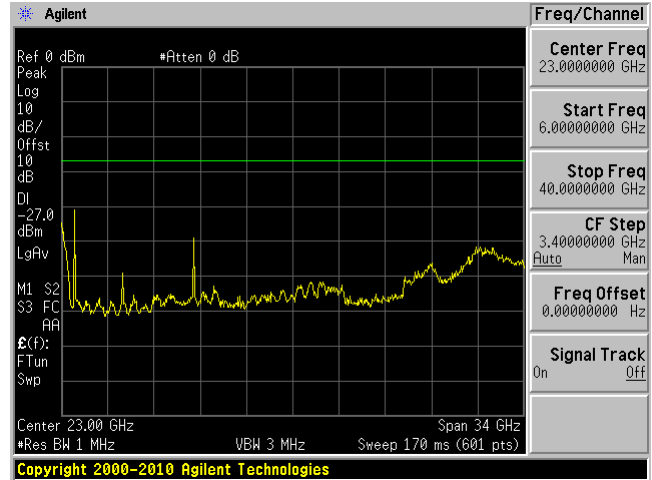


802.11a, High Channel

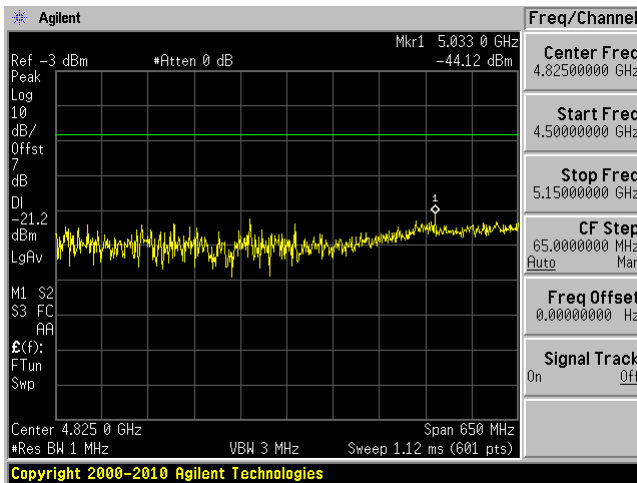
Chain 0, Plot: 30 MHz – 6 GHz



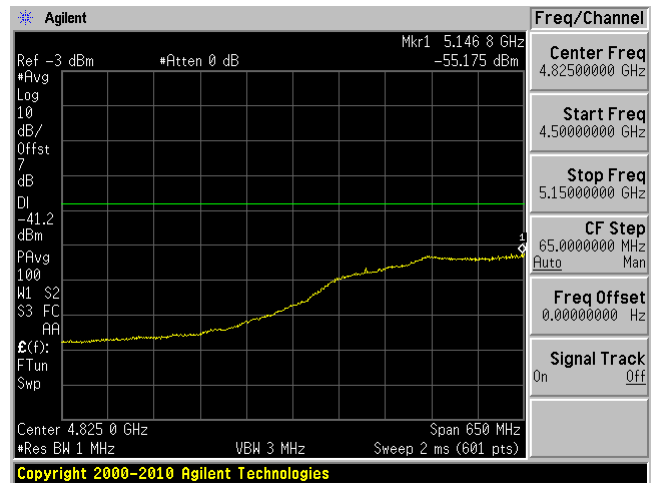
Chain 0, Plot: 6 GHz – 40 GHz



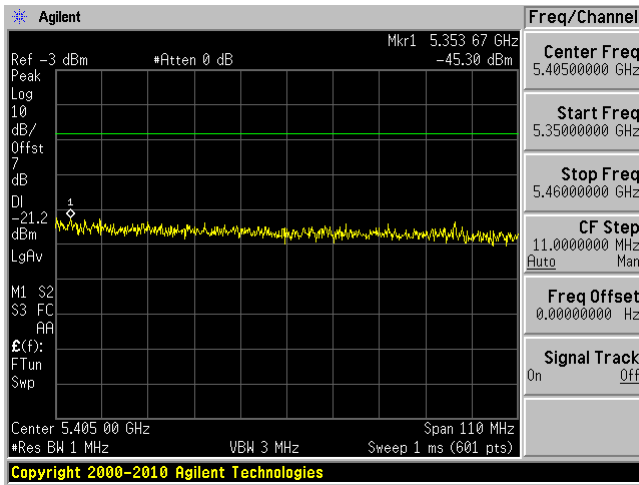
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



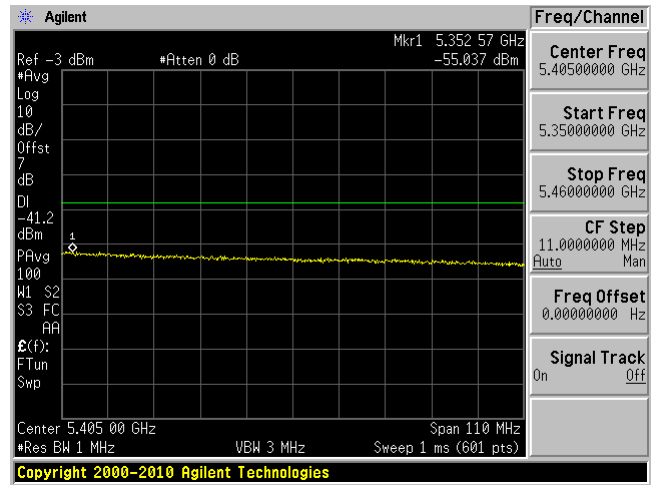
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



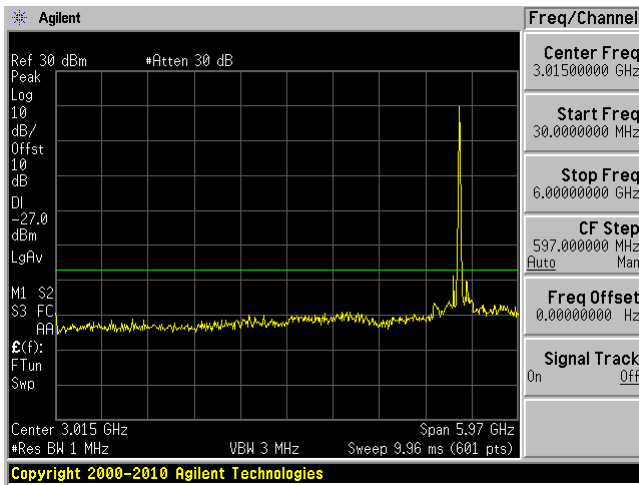
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



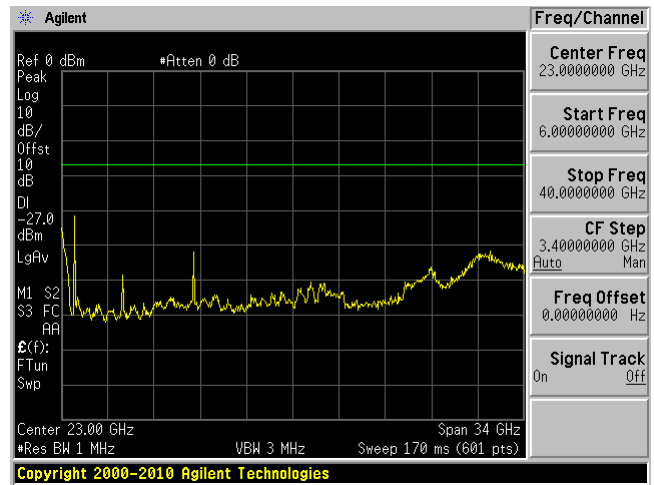
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



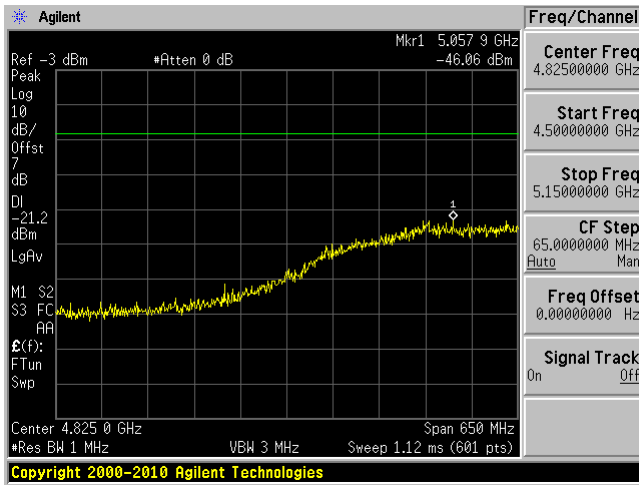
Chain 1, Plot: 30 MHz – 6 GHz



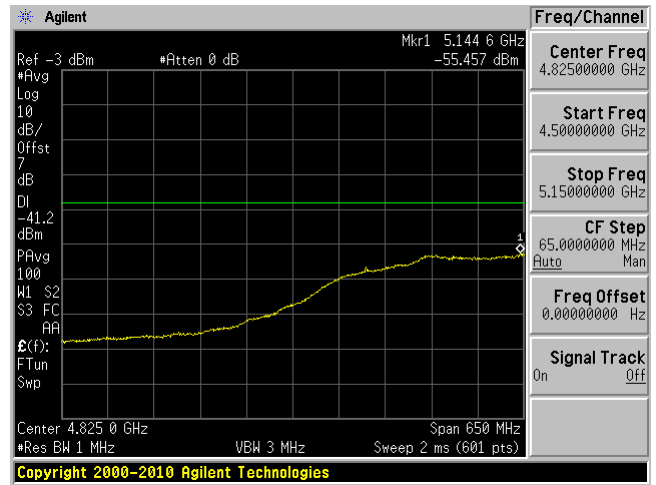
Chain 1, Plot: 6 GHz – 40 GHz



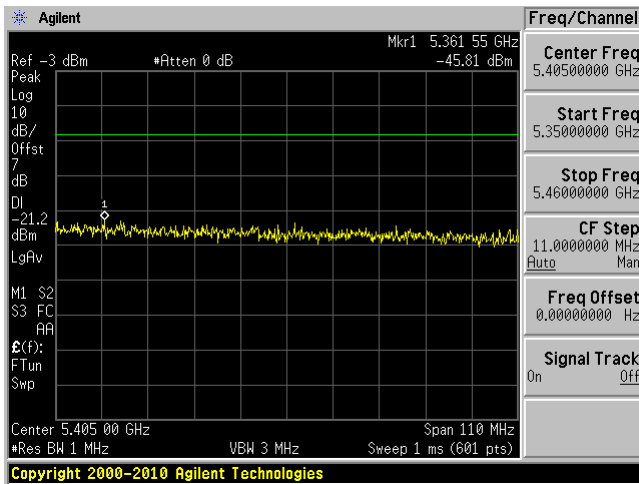
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



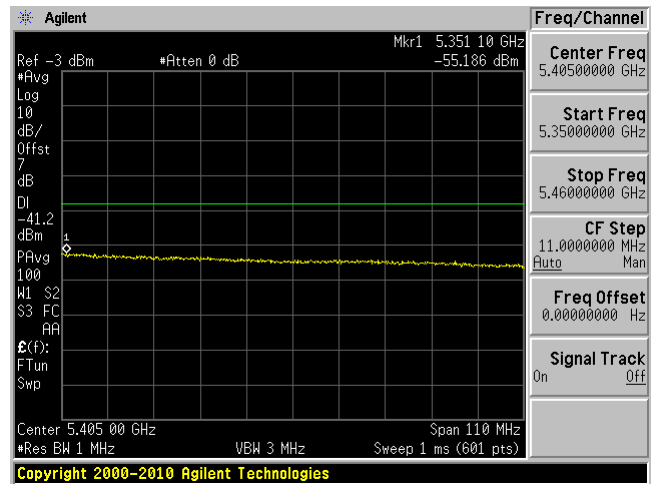
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



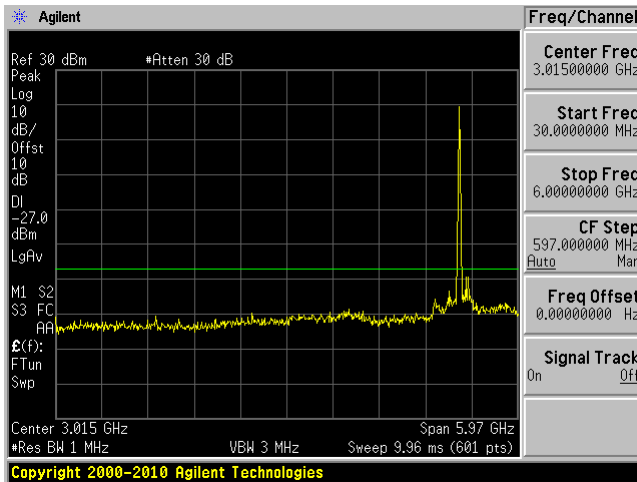
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



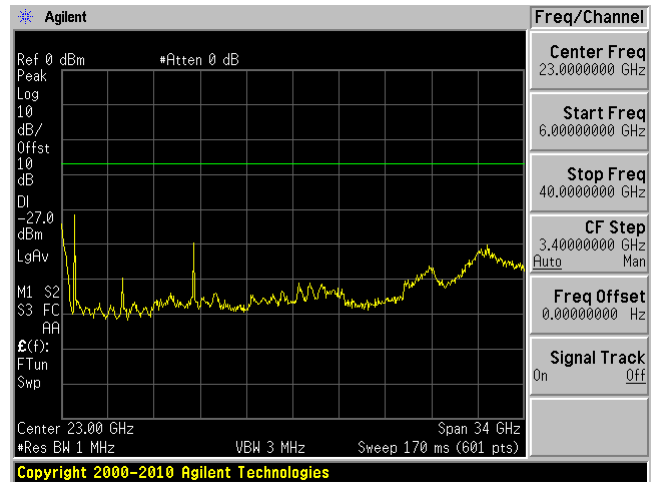
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



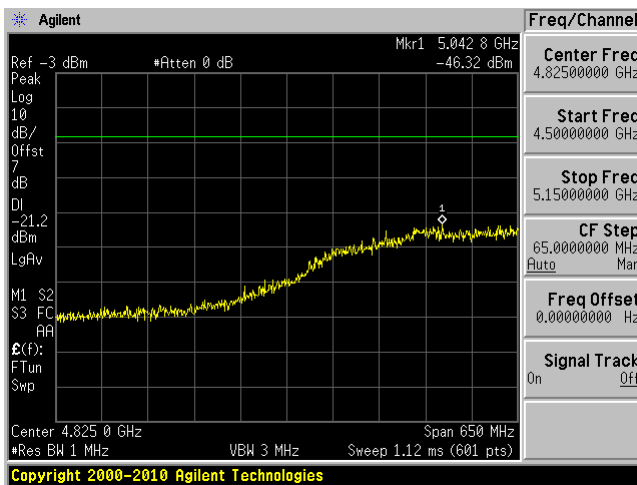
Chain 2, Plot: 30 MHz – 6 GHz



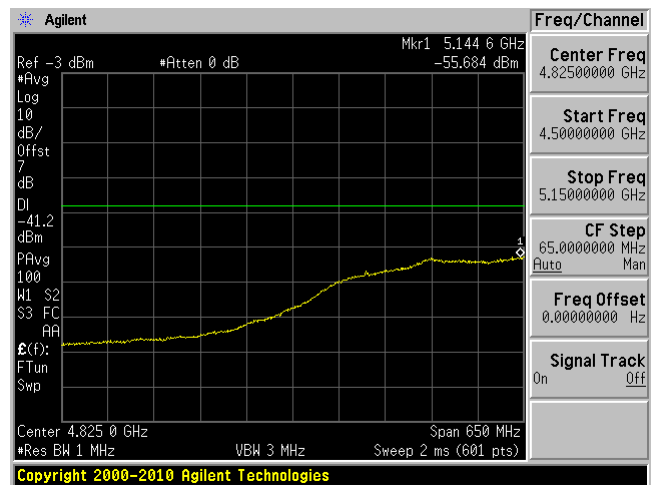
Chain 2, Plot: 6 GHz – 40 GHz



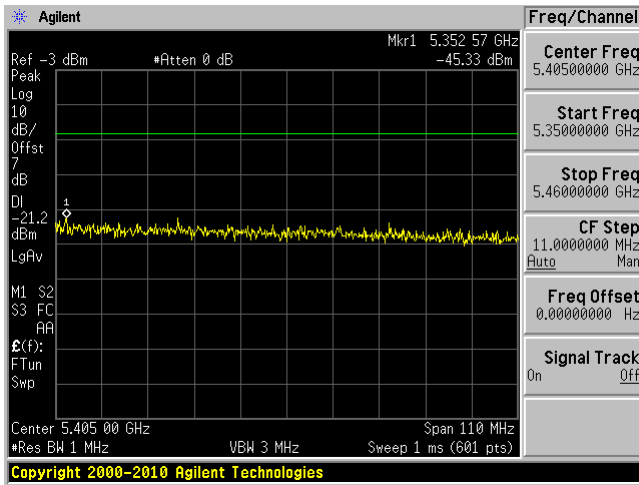
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



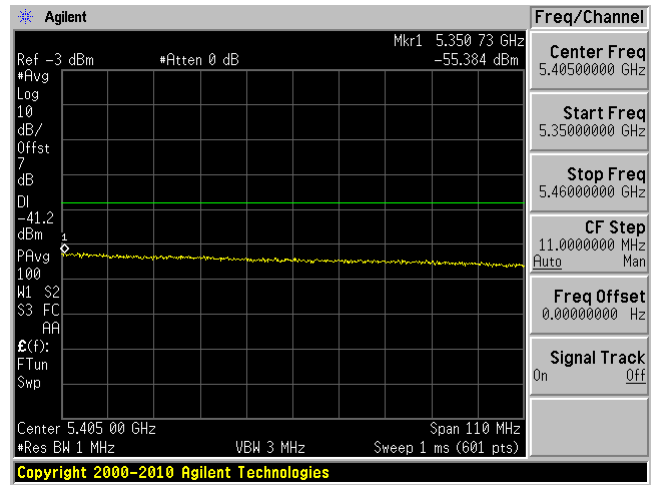
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

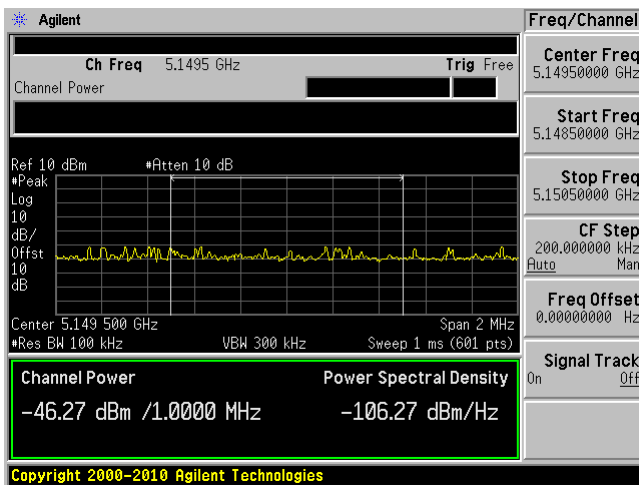


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

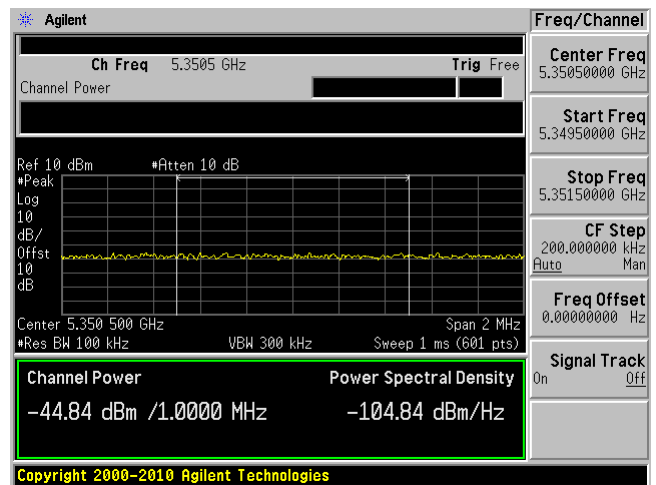


Band Edge

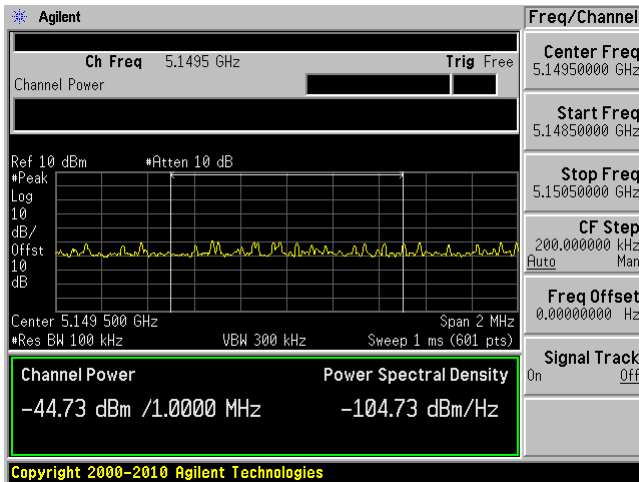
802.11a, Chain 0 Low Band Edge



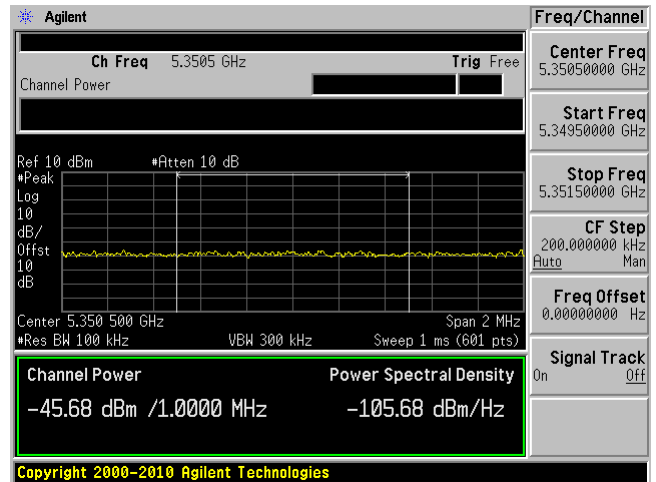
802.11a, Chain 0 High Band Edge



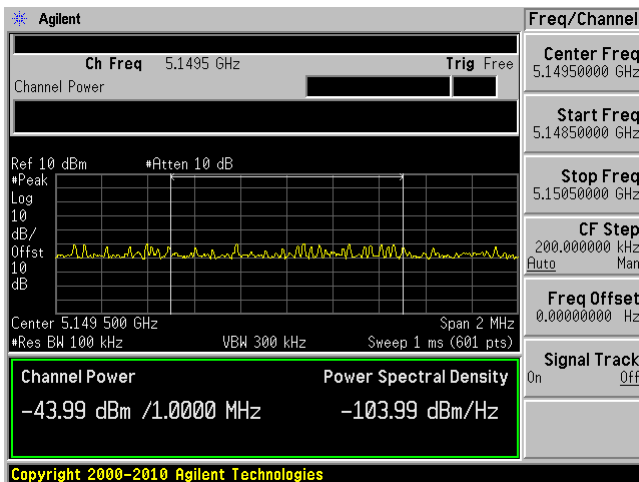
802.11a, Chain 1 Low Band Edge



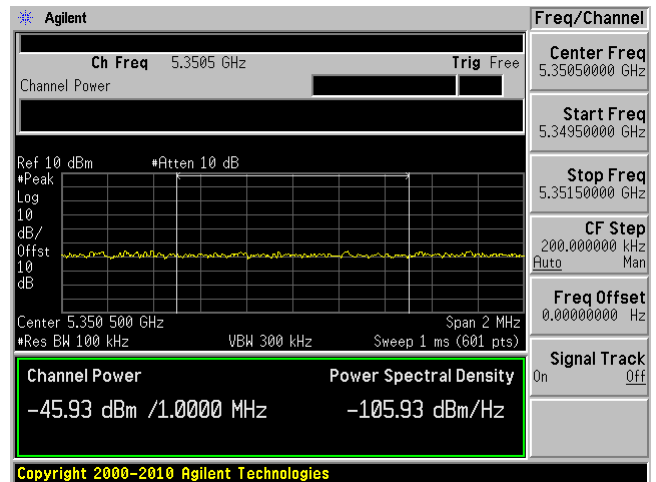
802.11a, Chain 1 High Band Edge



802.11a, Chain 2 Low Band Edge

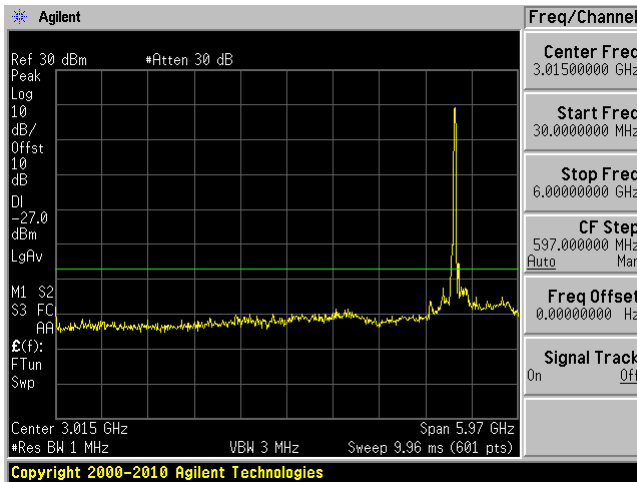


802.11a, Chain 2 High Band Edge

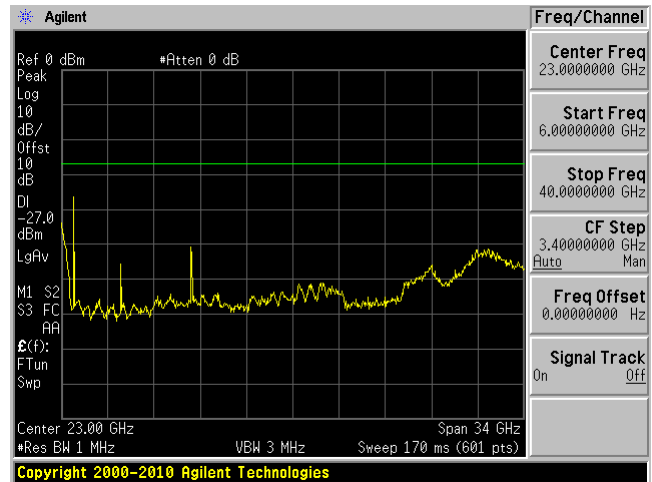


802.11n-HT20, Low Channel

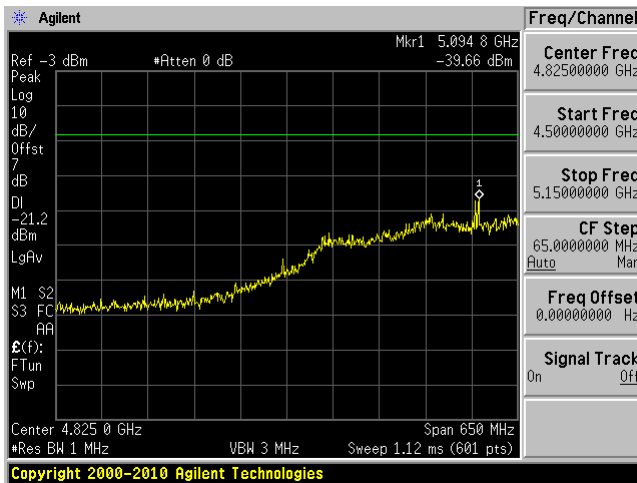
Chain 0, Plot: 30 MHz – 6 GHz



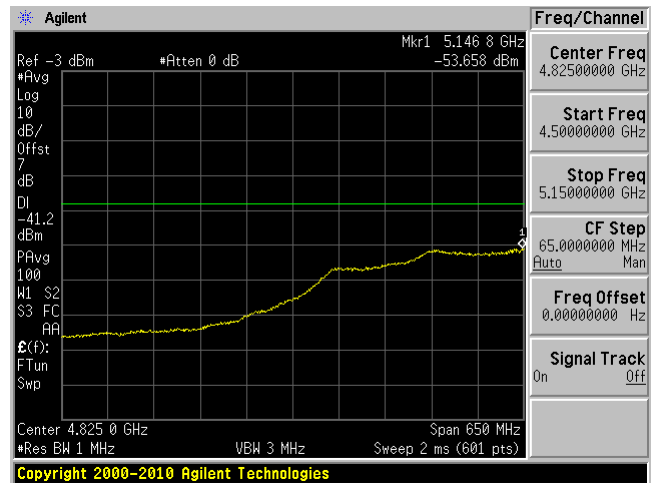
Chain 0, Plot: 6 GHz – 40 GHz



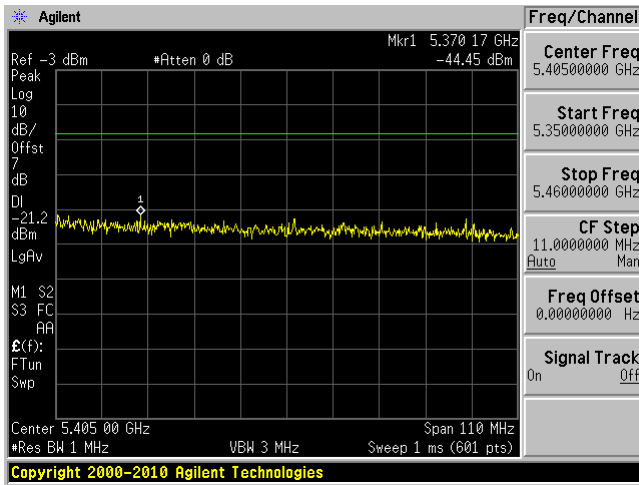
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



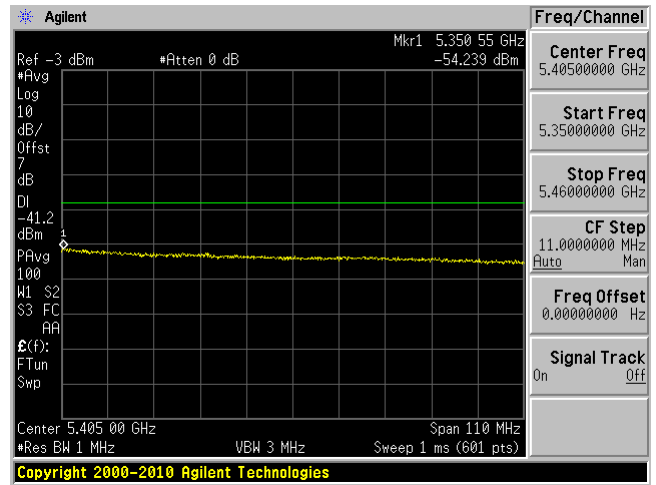
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



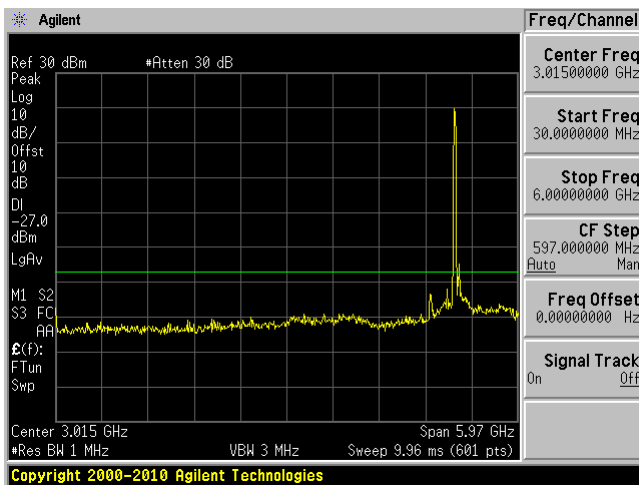
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



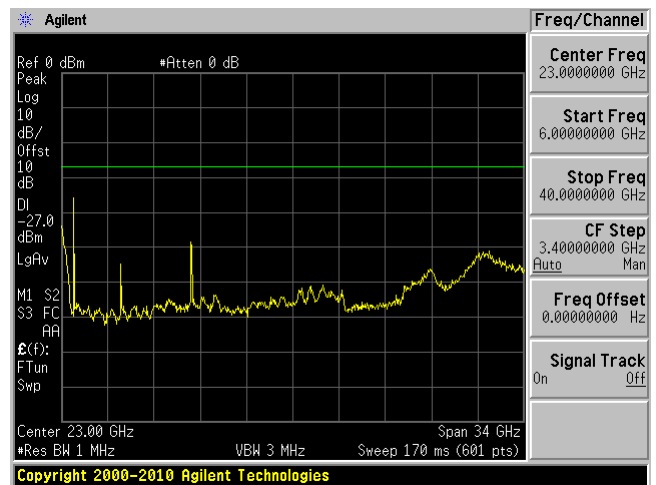
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



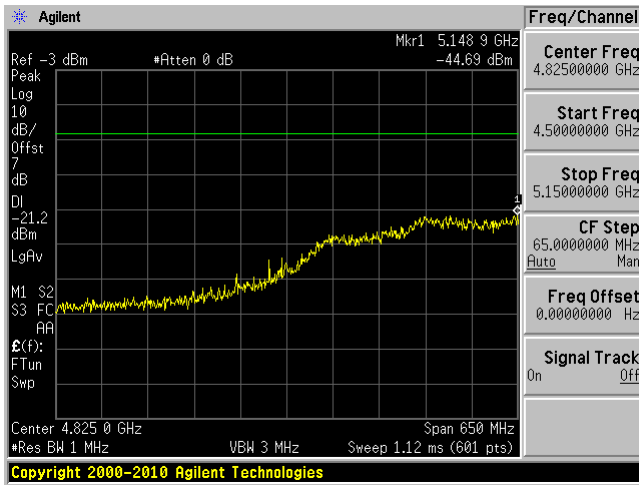
Chain 1, Plot: 30 MHz – 6 GHz



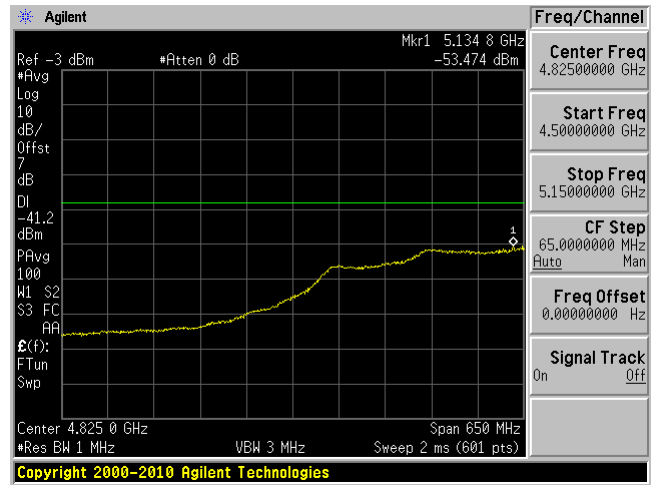
Chain 1, Plot: 6 GHz – 40 GHz



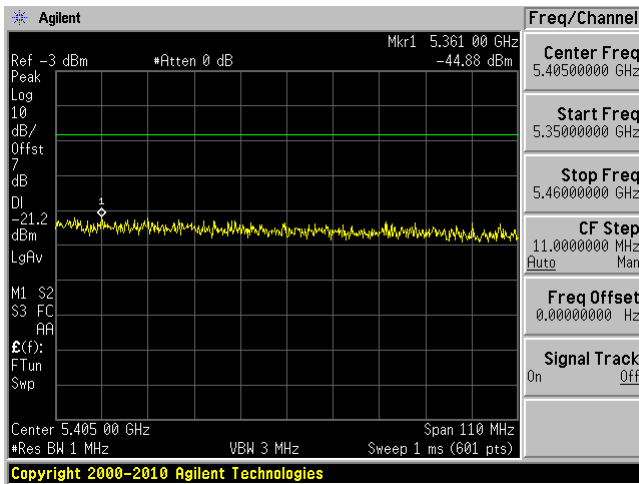
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



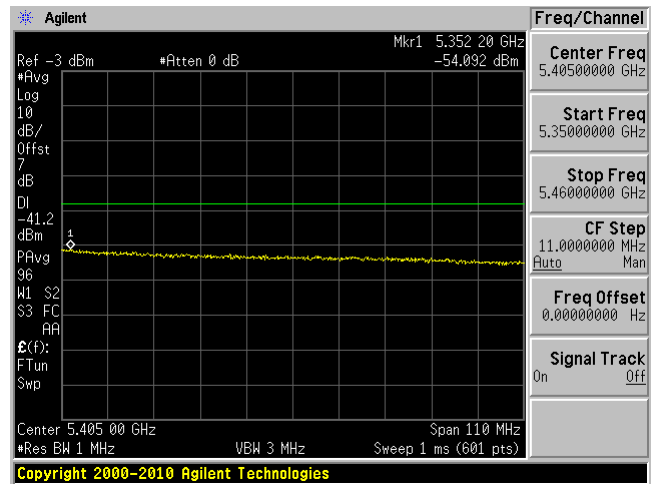
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



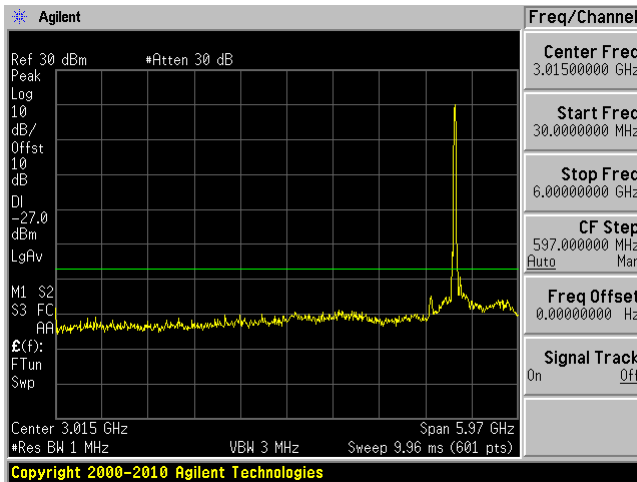
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



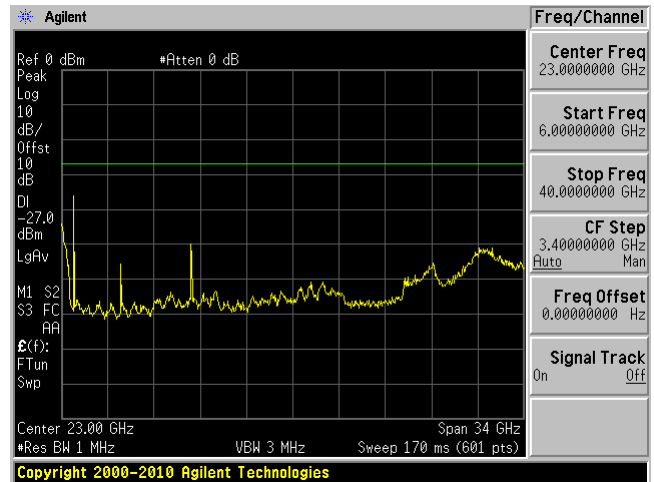
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



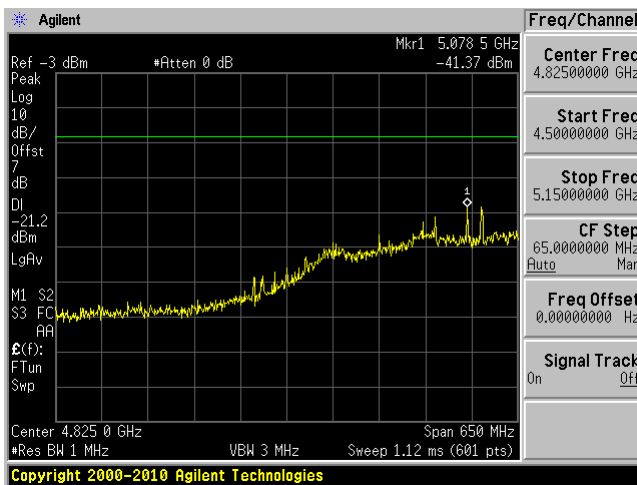
Chain 2, Plot: 30 MHz – 6 GHz



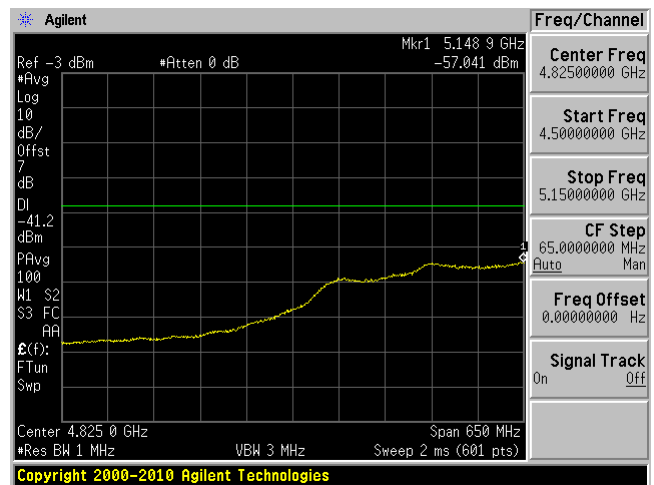
Chain 2, Plot: 6 GHz – 40 GHz



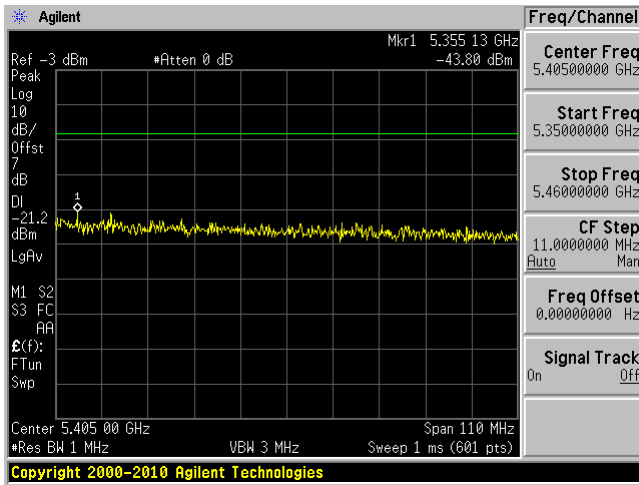
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



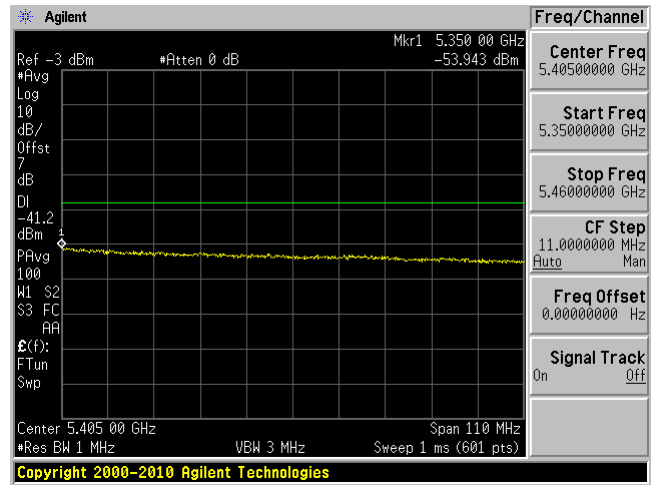
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

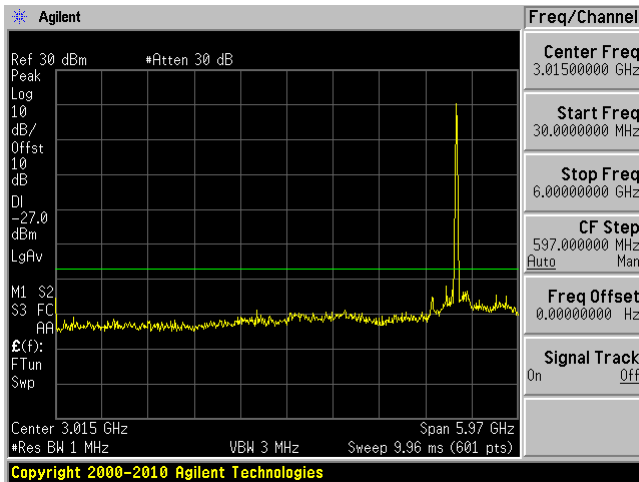


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

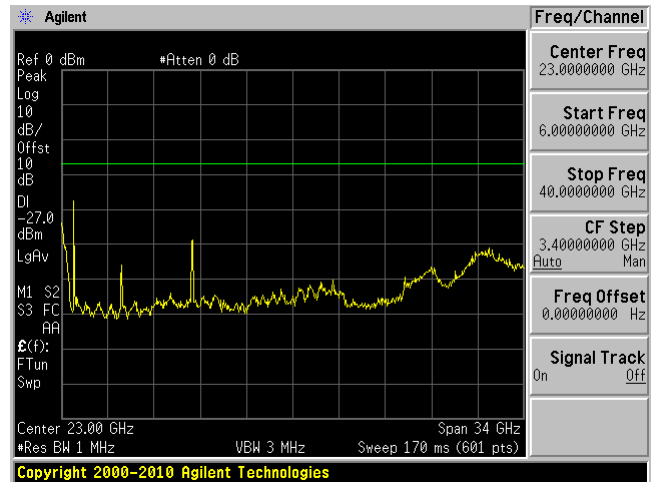


802.11n-HT20, Middle Channel

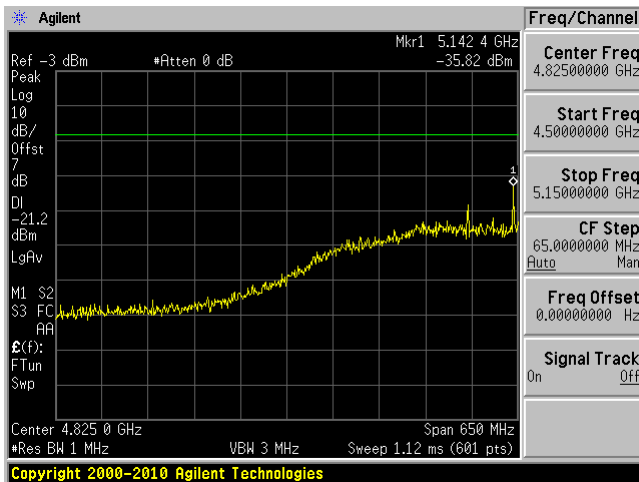
Chain 0, Plot: 30 MHz – 6 GHz



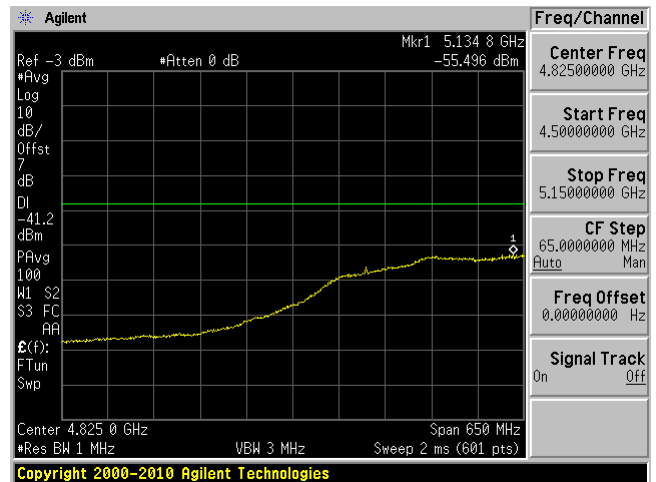
Chain 0, Plot: 6 GHz – 40 GHz



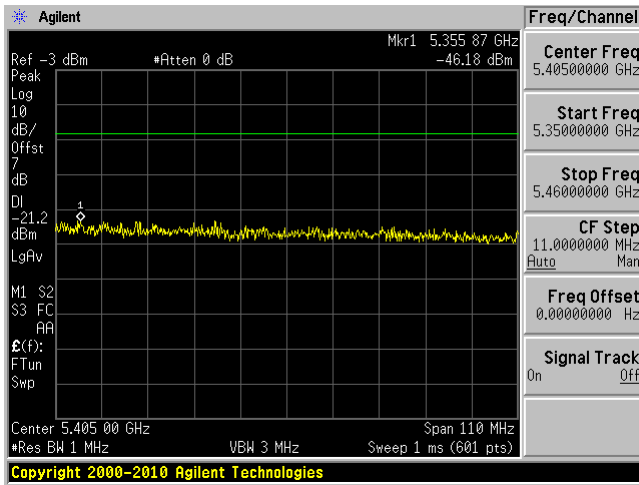
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



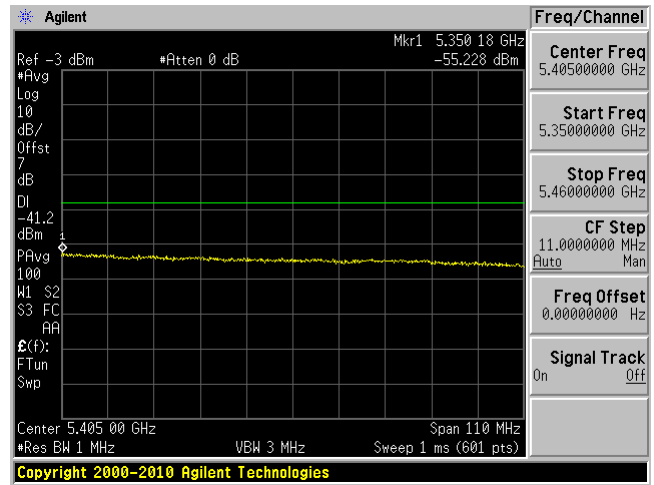
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



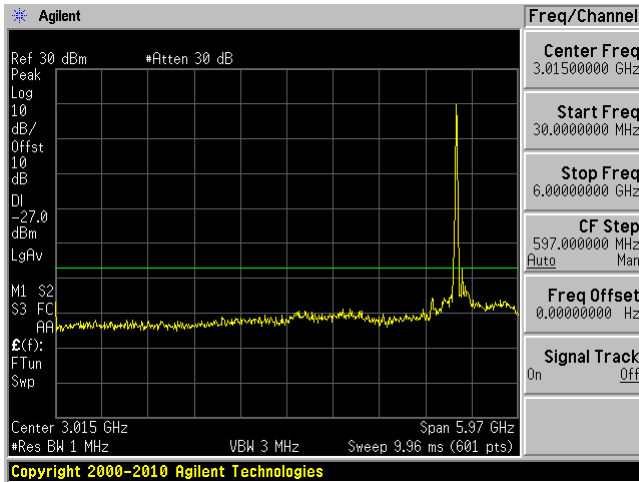
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



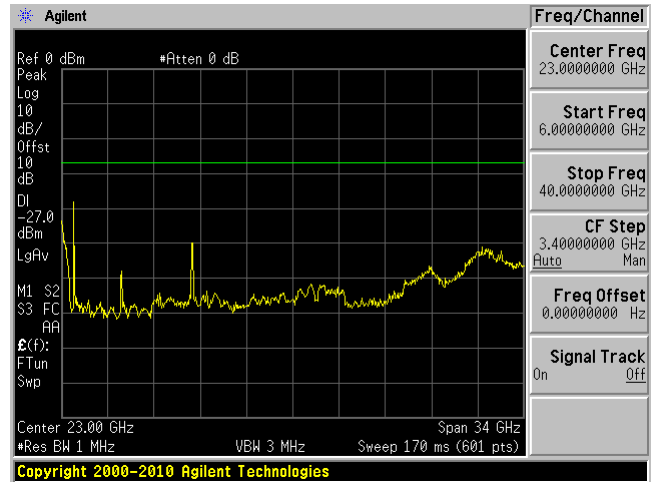
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



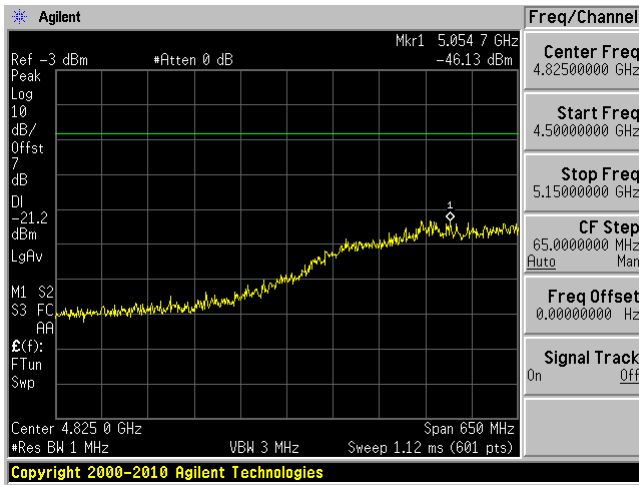
Chain 1, Plot: 30 MHz – 6 GHz



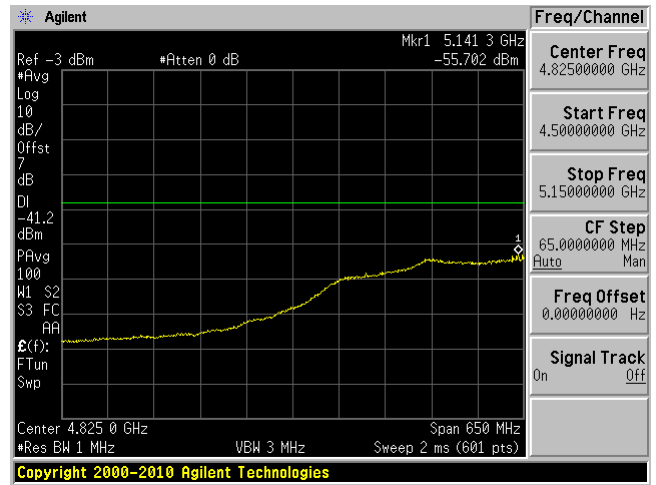
Chain 1, Plot: 6 GHz – 40 GHz



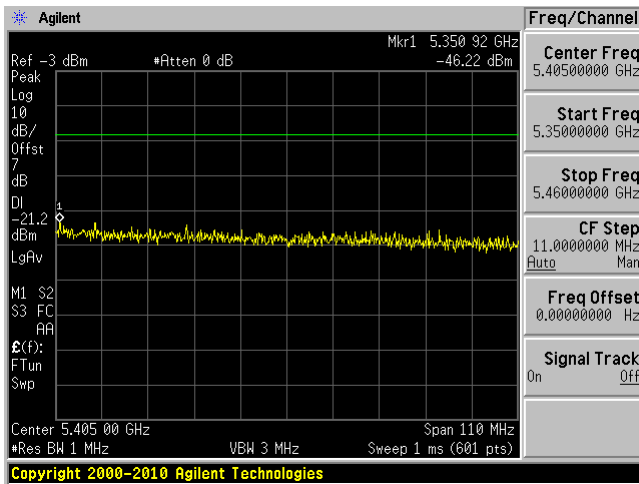
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



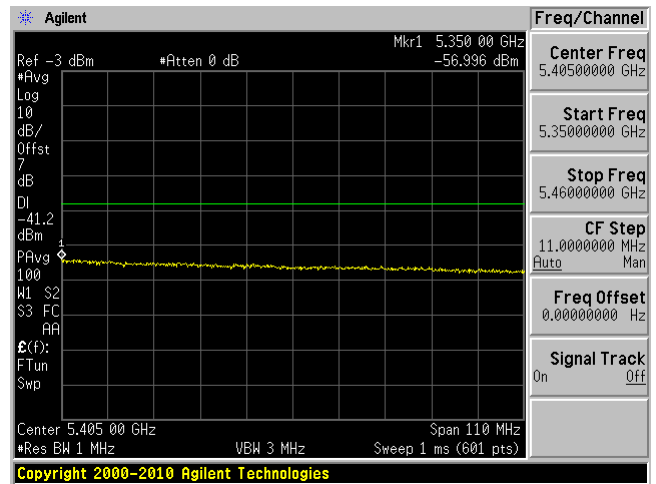
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



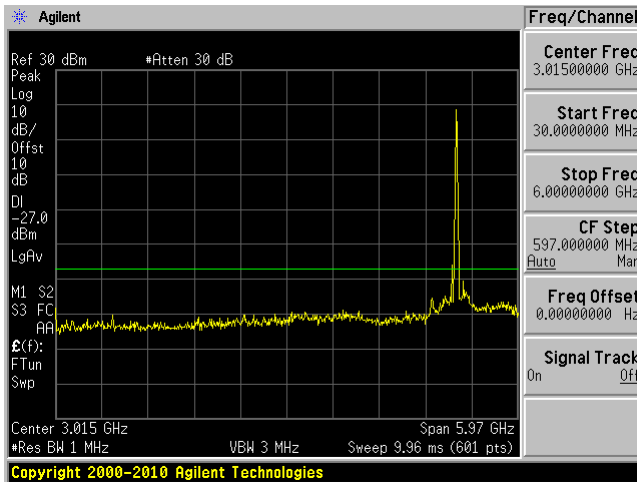
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



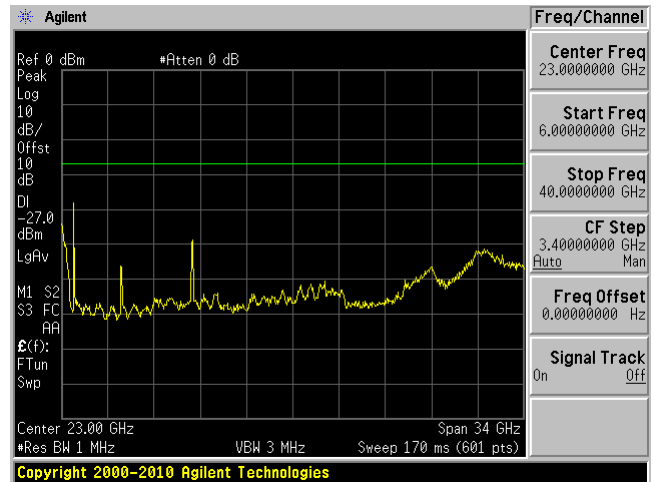
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



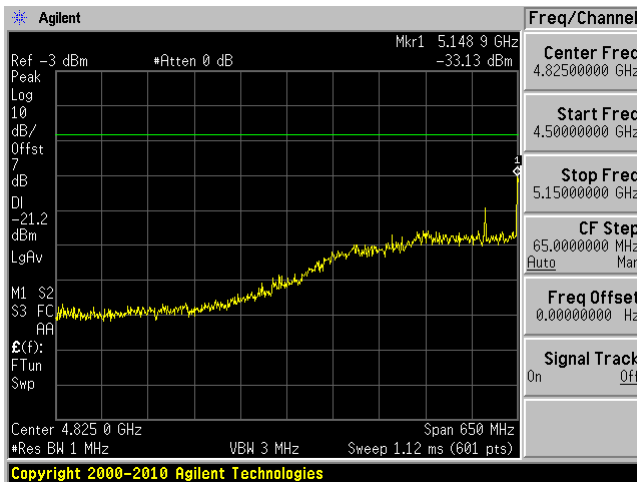
Chain 2, Plot: 30 MHz – 6 GHz



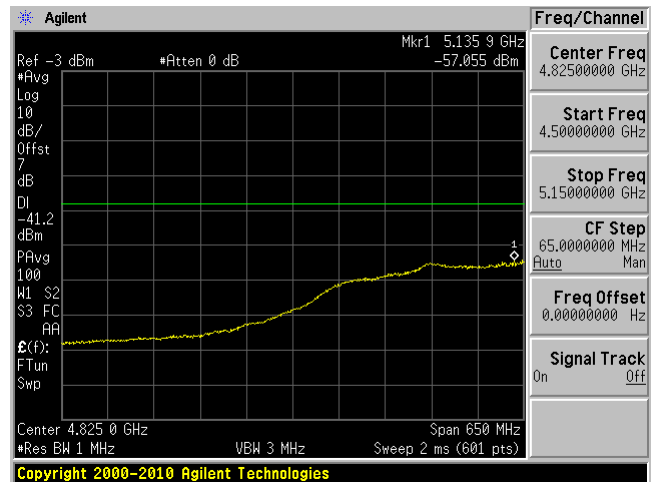
Chain 2, Plot: 6 GHz – 40 GHz



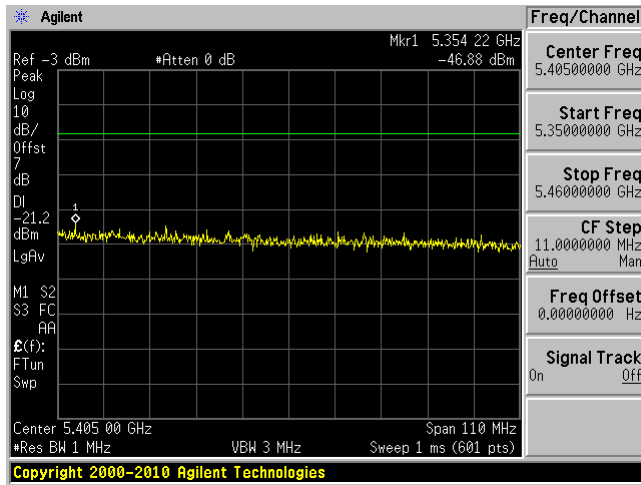
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



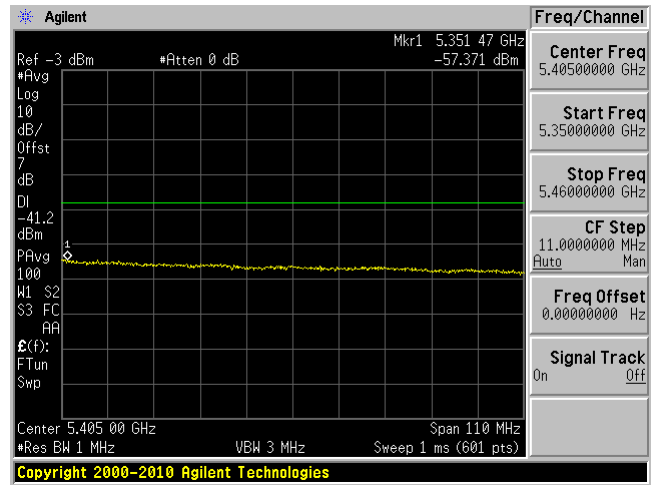
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

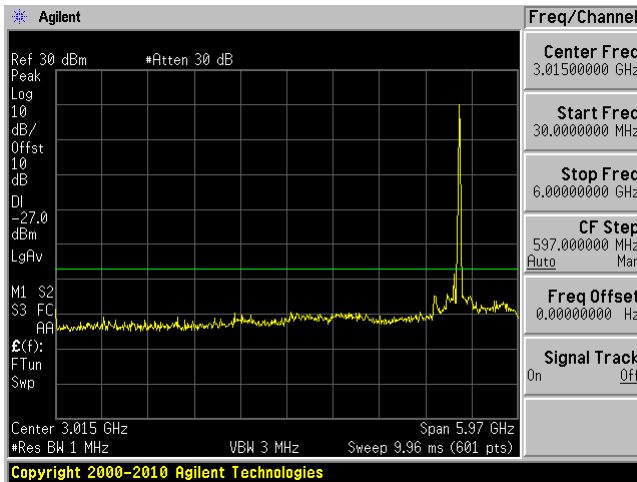


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

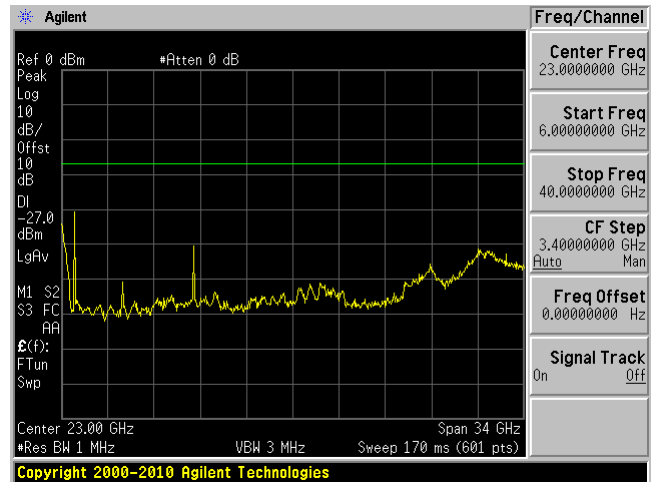


802.11n-HT20, High Channel

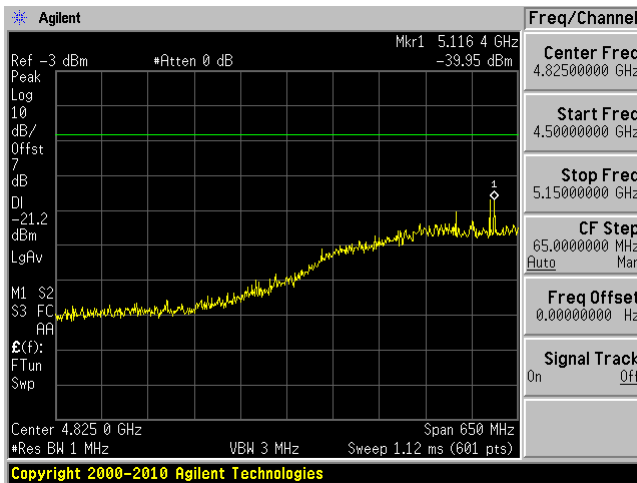
Chain 0, Plot: 30 MHz – 6 GHz



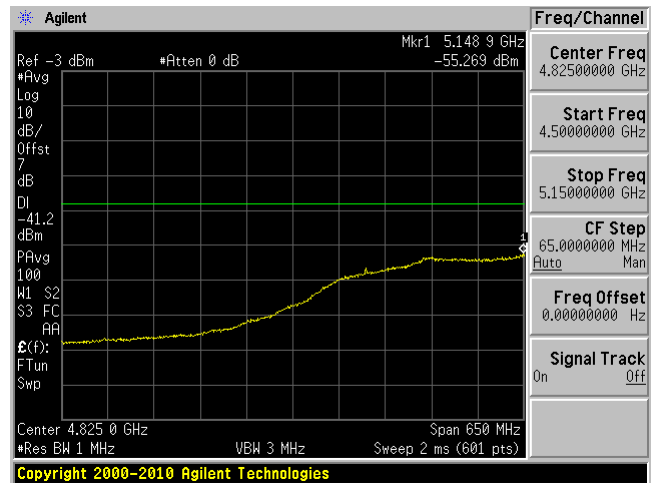
Chain 0, Plot: 6 GHz – 40 GHz



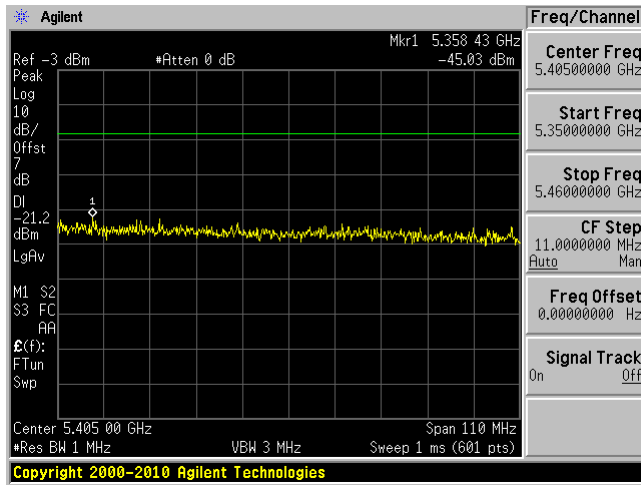
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



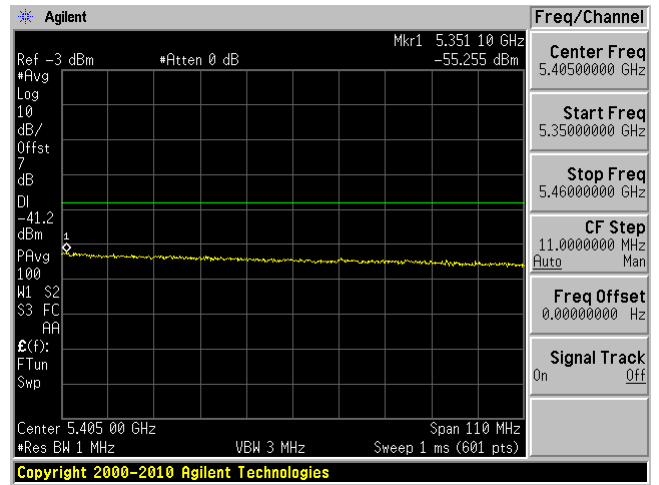
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



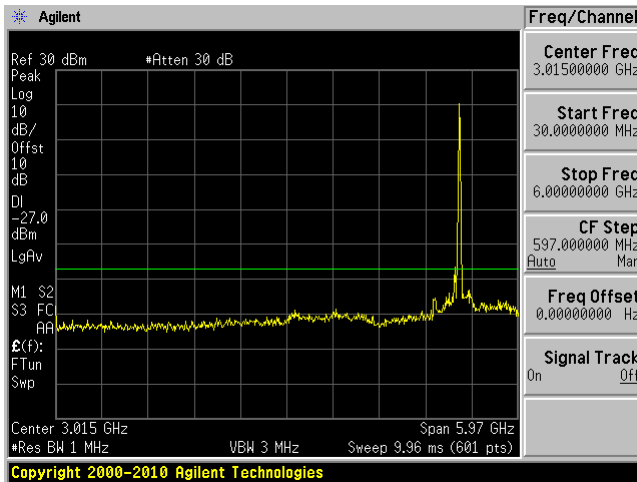
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



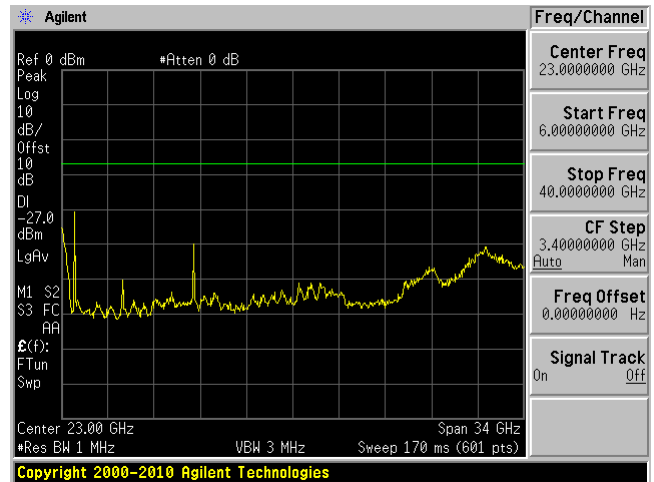
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



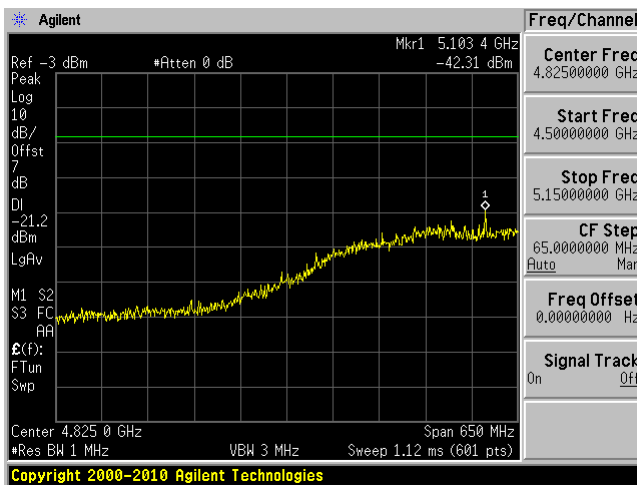
Chain 1, Plot: 30 MHz – 6 GHz



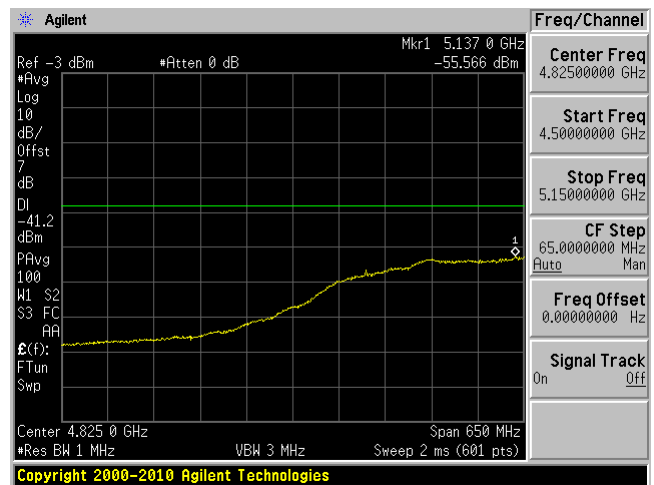
Chain 1, Plot: 6 GHz – 40 GHz



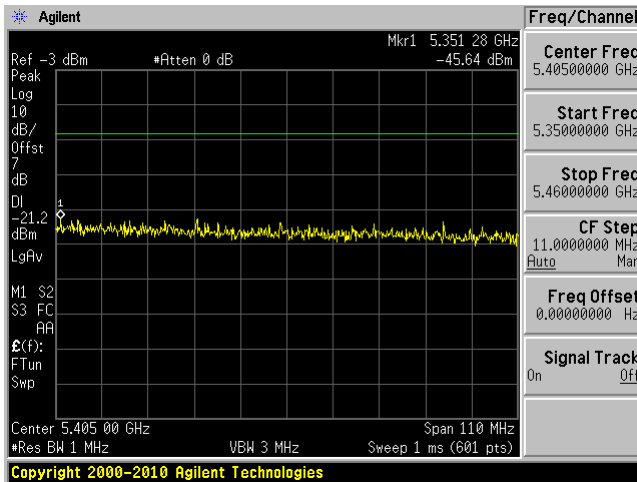
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



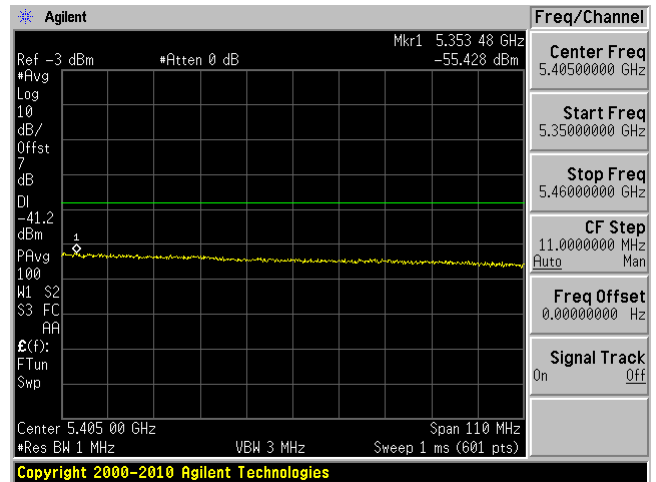
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



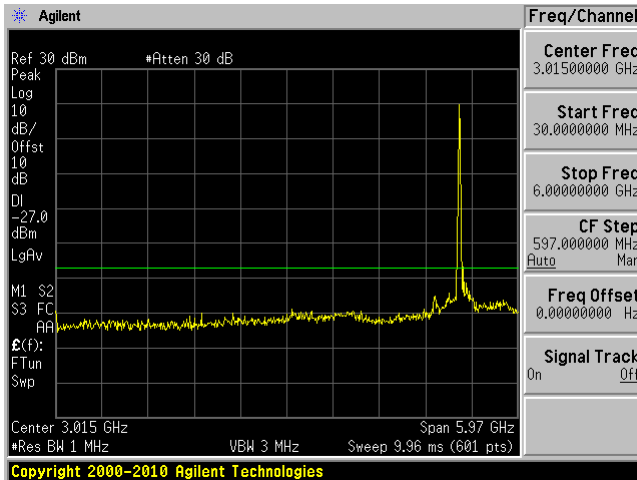
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



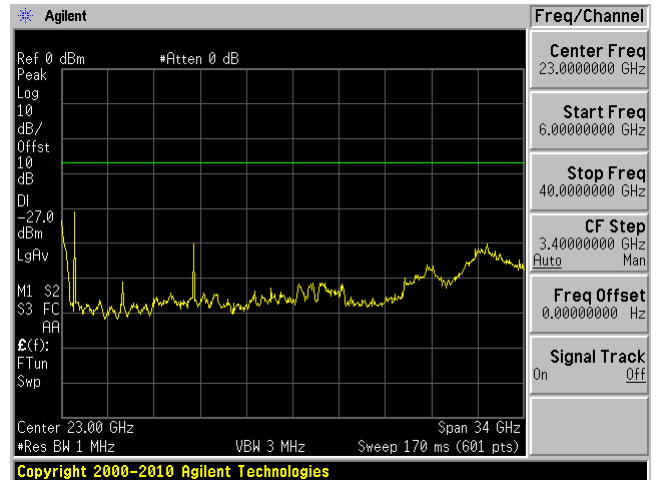
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



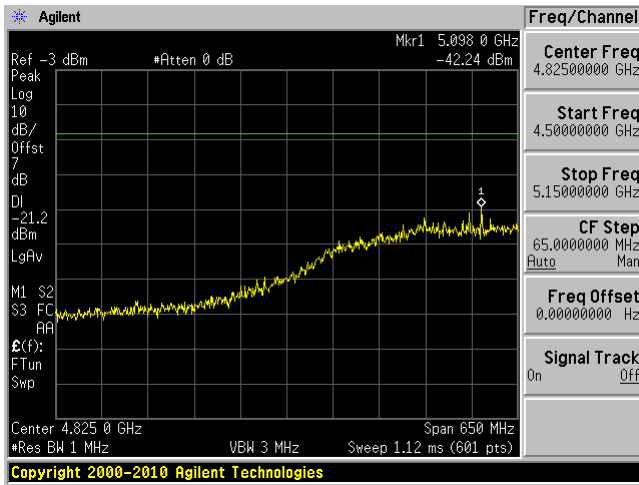
Chain 2, Plot: 30 MHz – 6 GHz



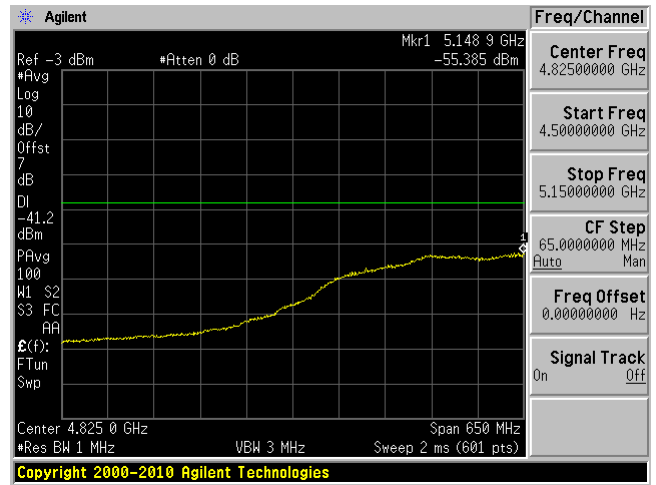
Chain 2, Plot: 6 GHz – 40 GHz



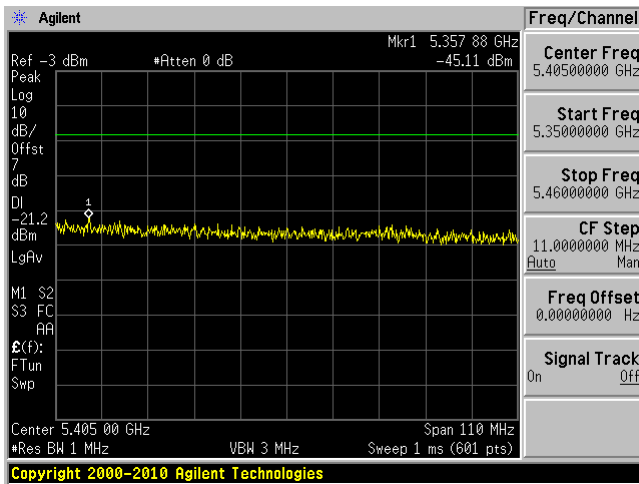
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



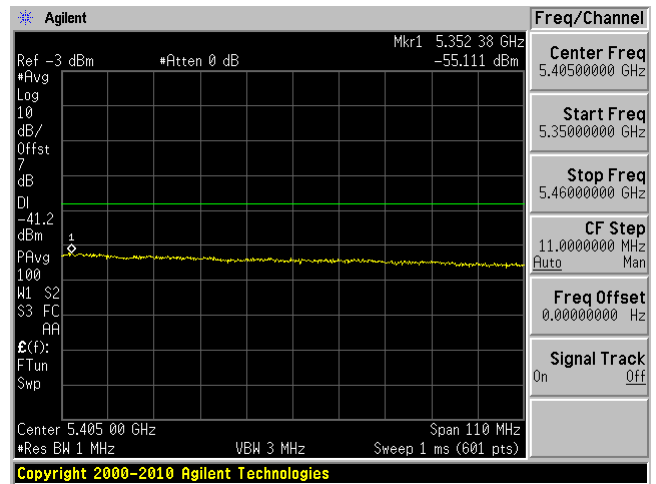
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

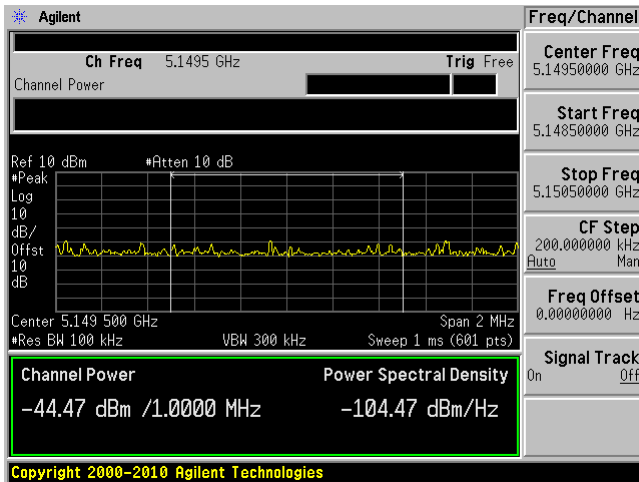


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

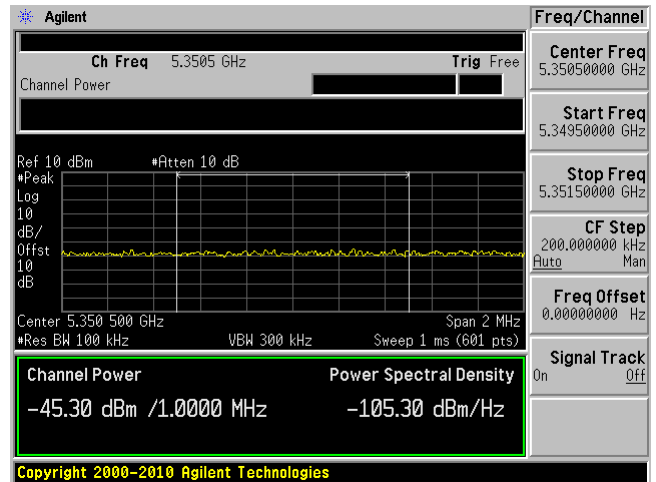


Band Edge

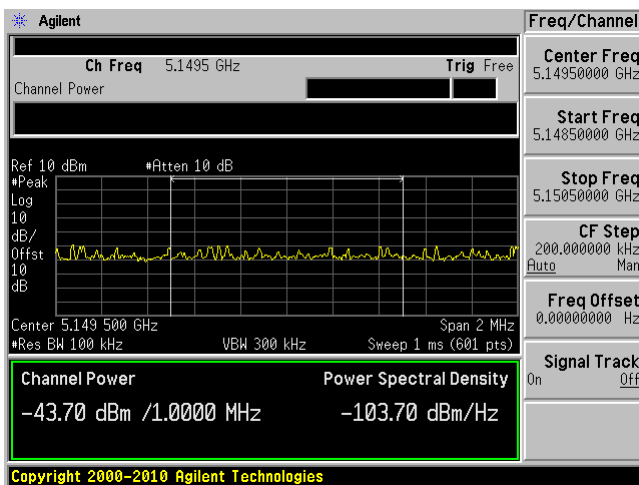
802.11n HT20, Chain 0 Low Band Edge



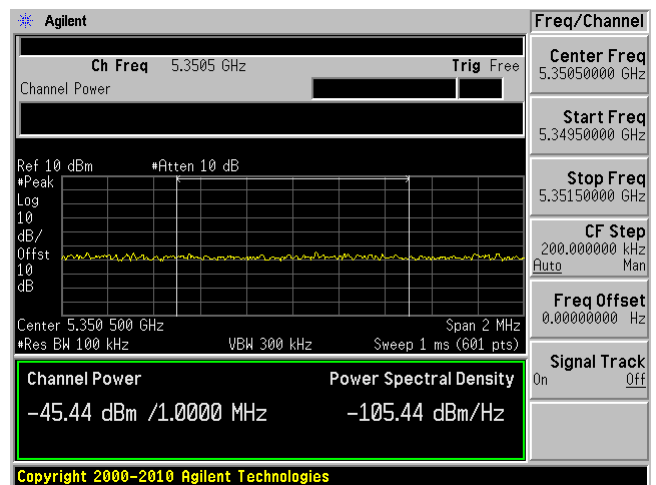
802.11n HT20, Chain 0 High Band Edge



802.11n HT20, Chain 1 Low Band Edge

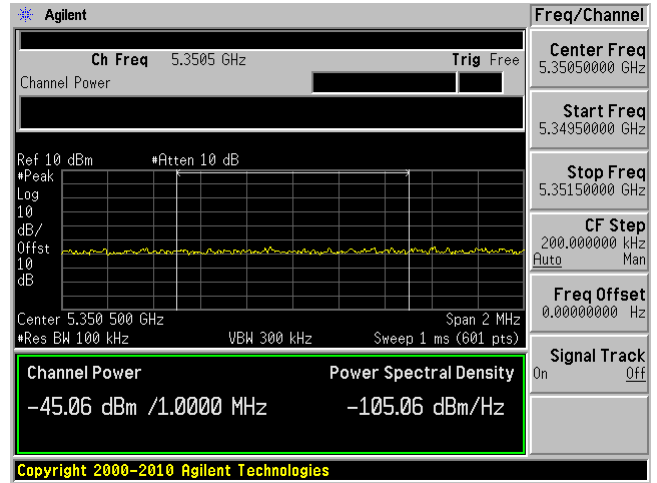
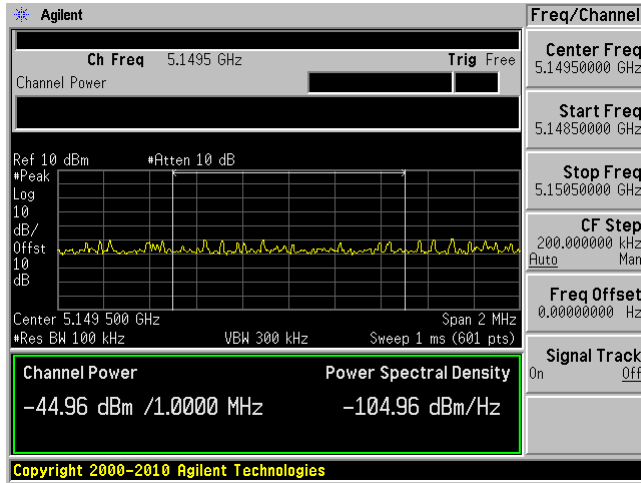


802.11n HT20, Chain 1 High Band Edge



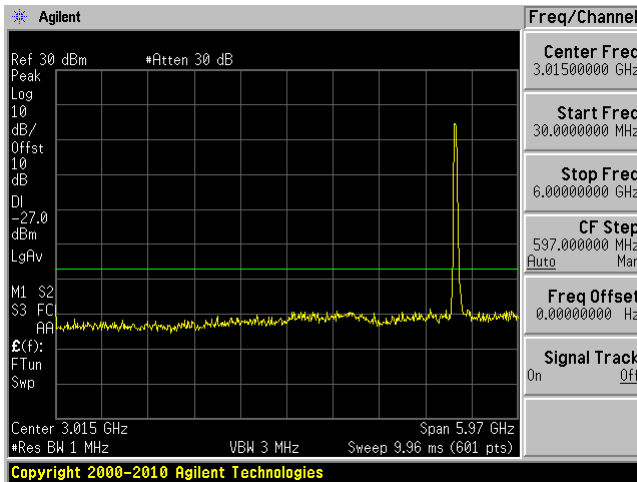
802.11n HT20, Chain 2 Low Band Edge

802.11n HT20, Chain 2 High Band Edge

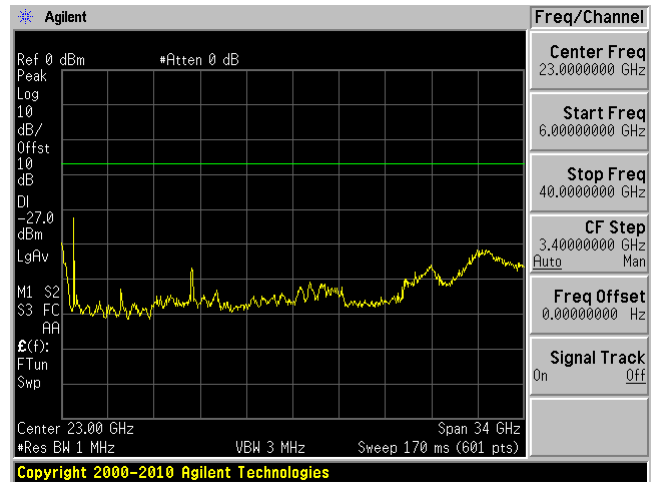


802.11n-HT40, Low Channel

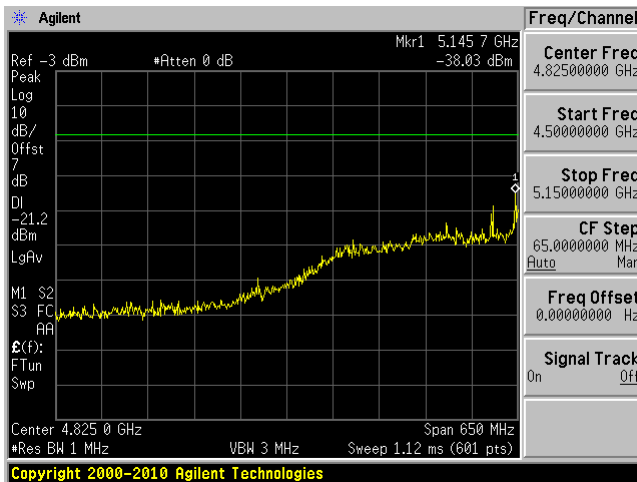
Chain 0, Plot: 30 MHz – 6 GHz



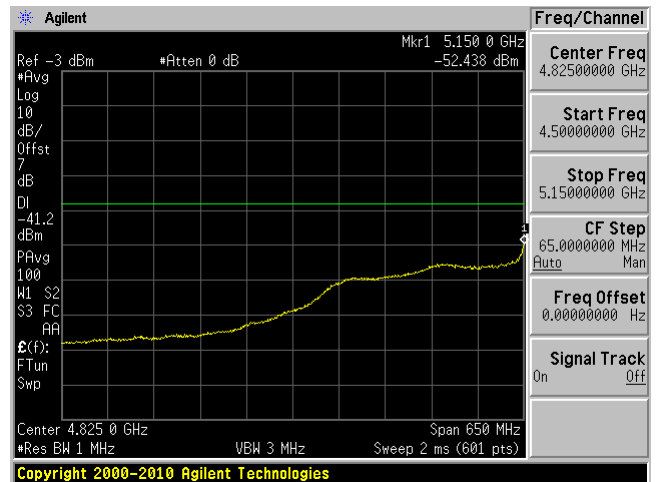
Chain 0, Plot: 6 GHz – 40 GHz



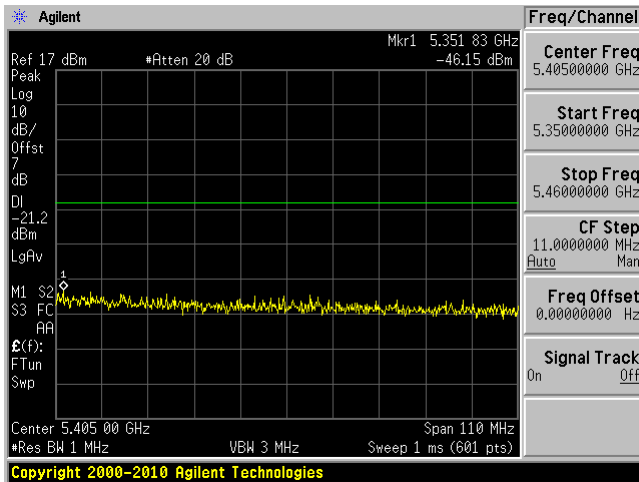
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



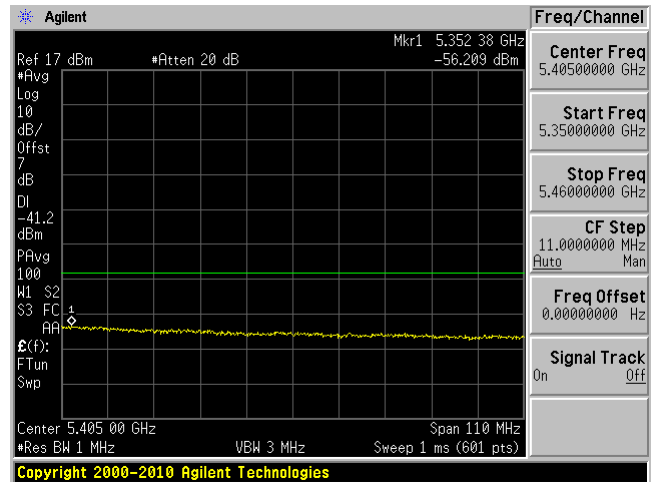
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



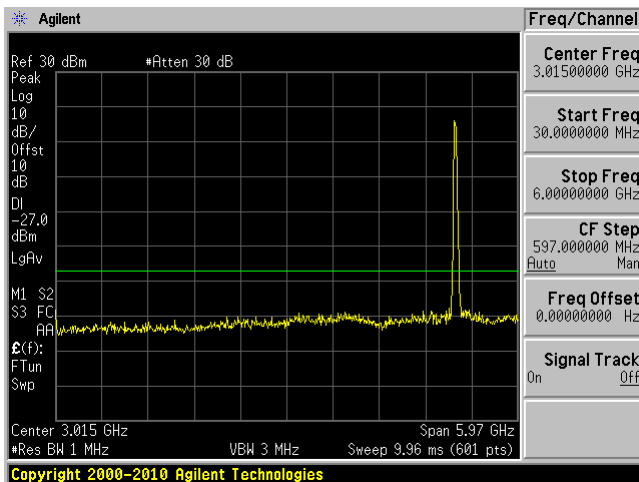
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



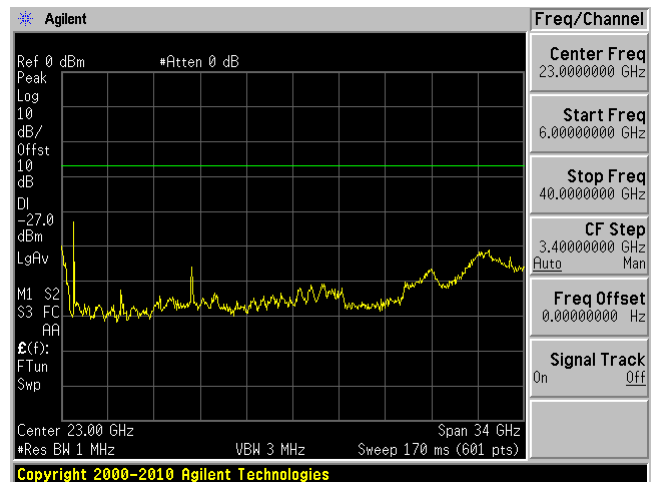
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



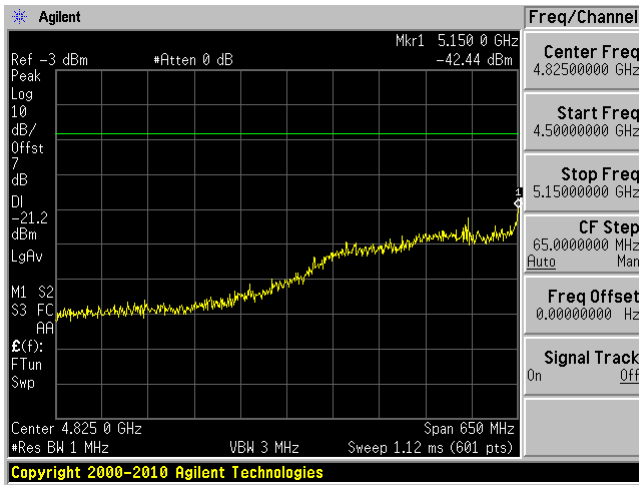
Chain 1, Plot: 30 MHz – 6 GHz



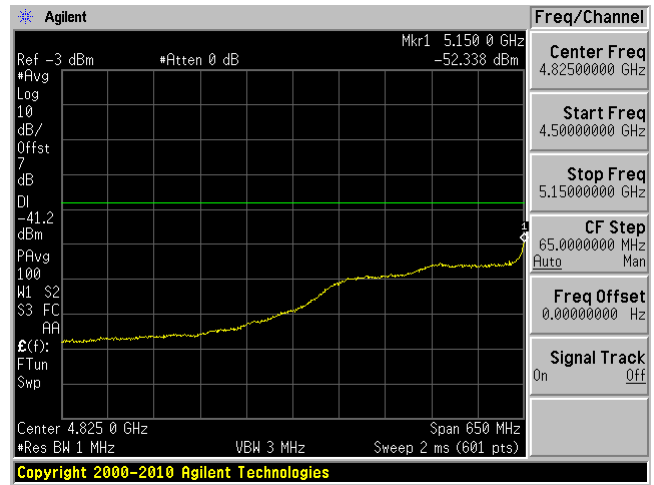
Chain 1, Plot: 6 GHz – 40 GHz



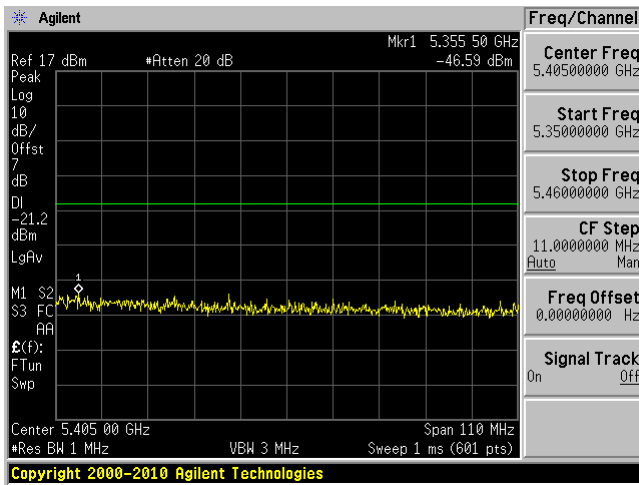
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band)
Peak



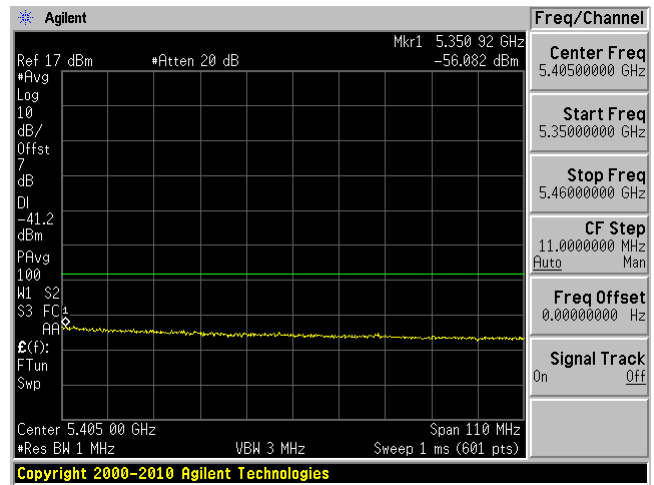
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band)
Ave



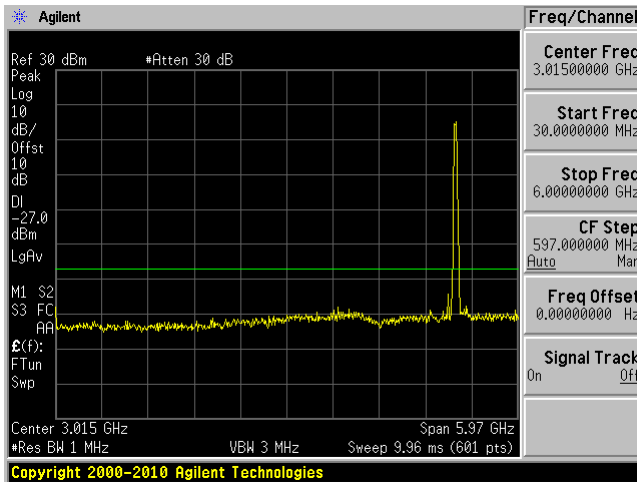
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



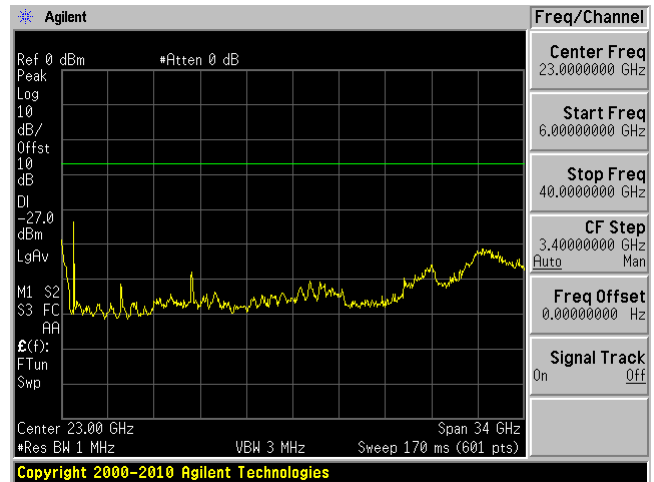
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



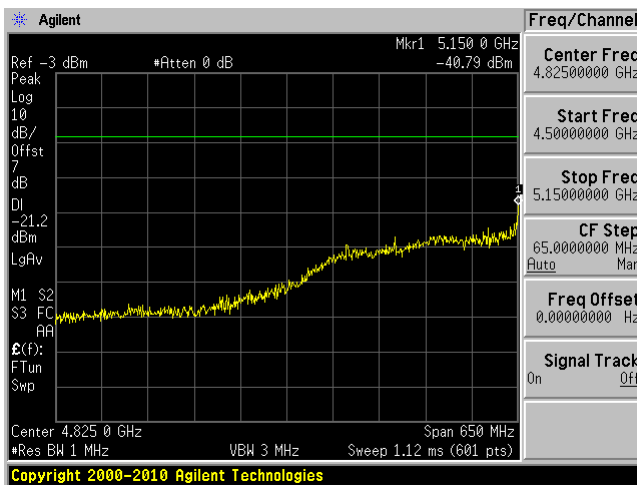
Chain 2, Plot: 30 MHz – 6 GHz



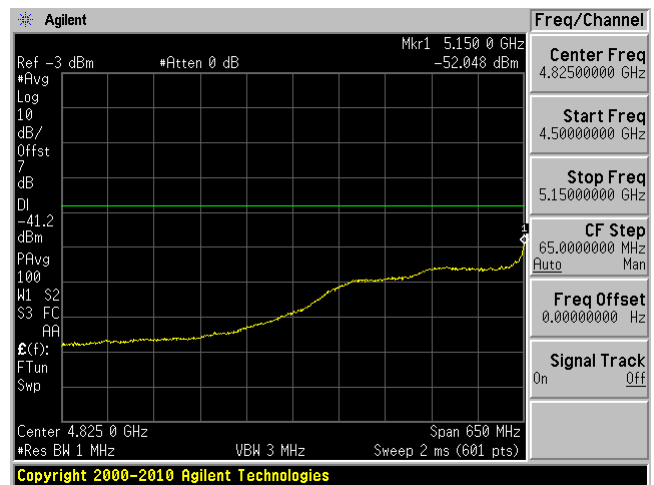
Chain 2, Plot: 6 GHz – 40 GHz



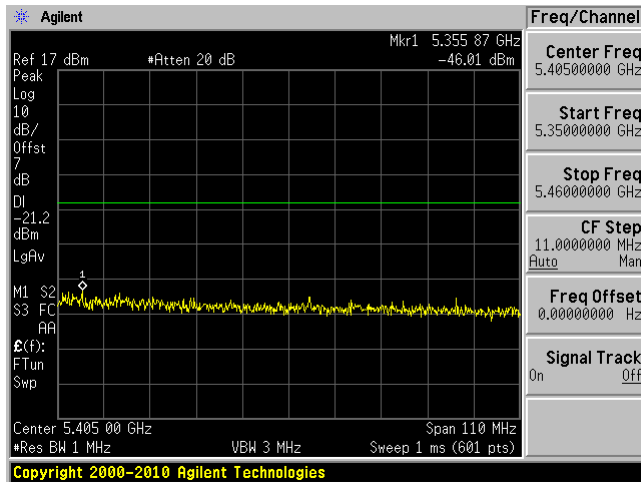
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



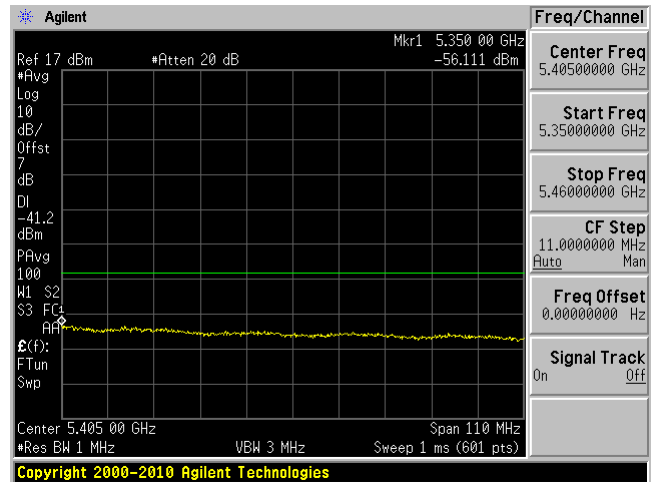
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

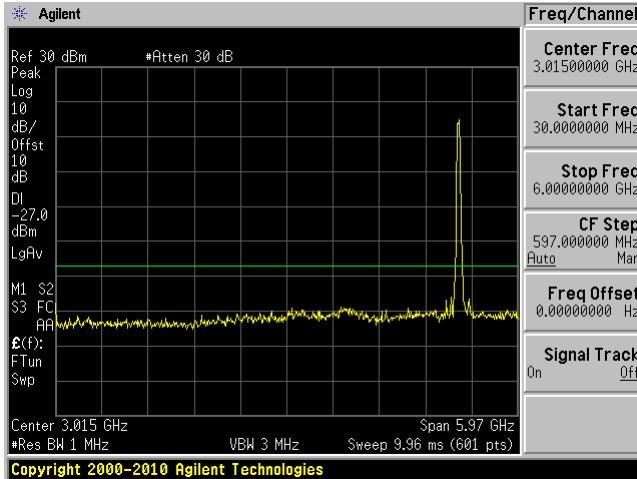


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

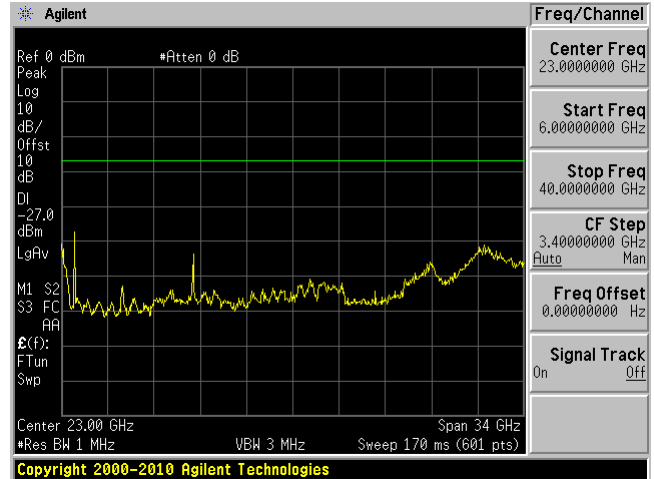


802.11n-HT40, High Channel

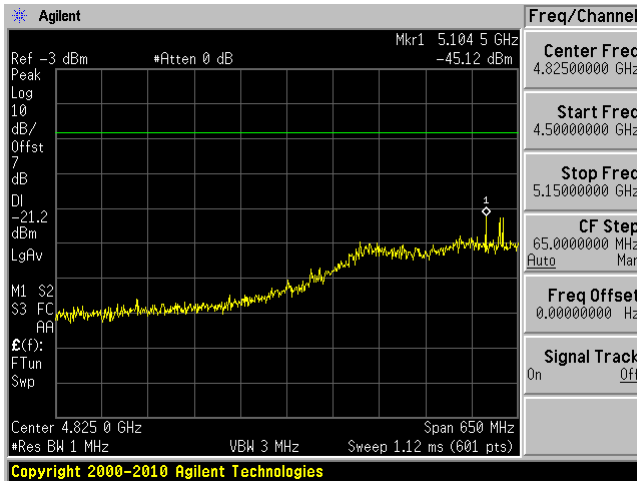
Chain 0, Plot: 30 MHz – 6 GHz



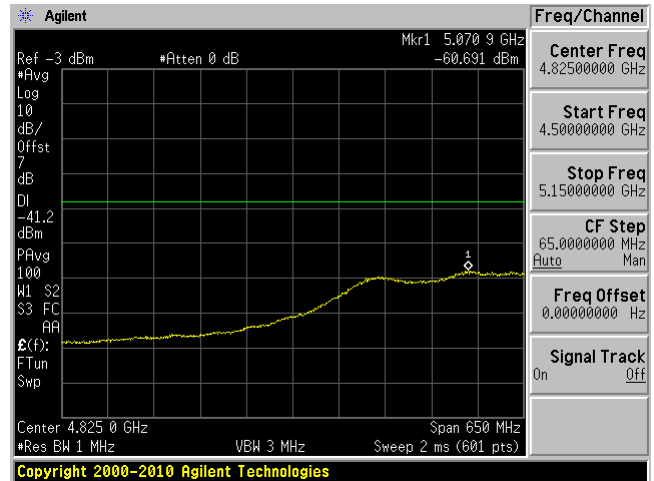
Chain 0, Plot: 6 GHz – 40 GHz



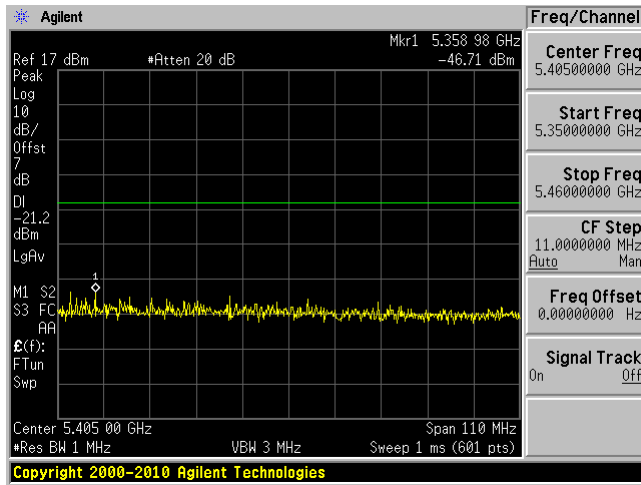
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



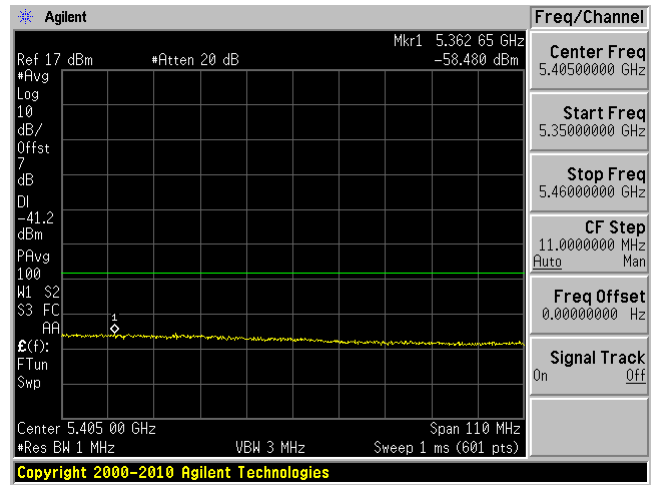
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



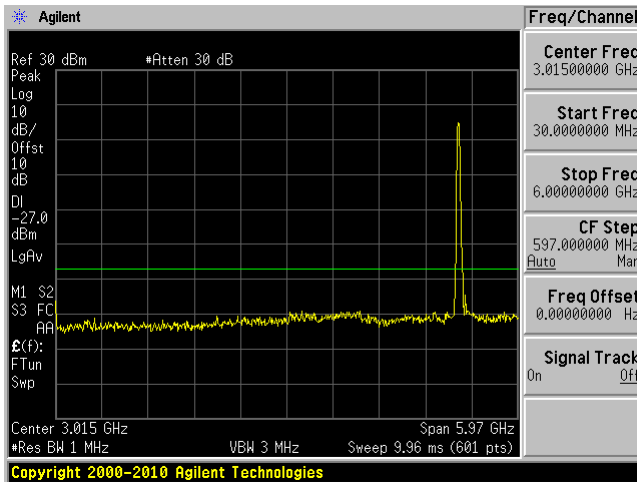
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



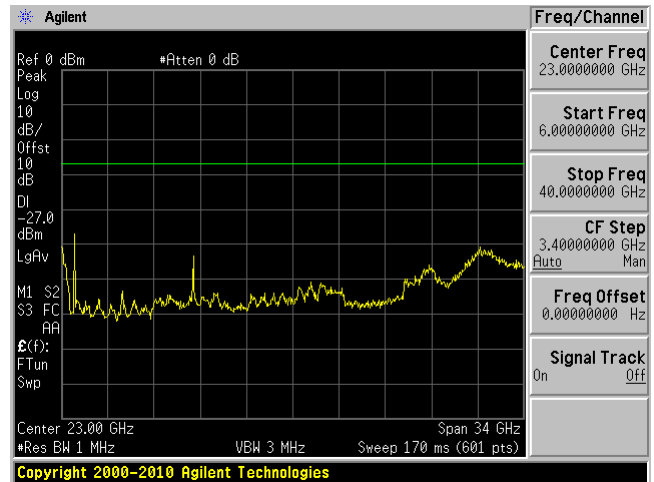
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



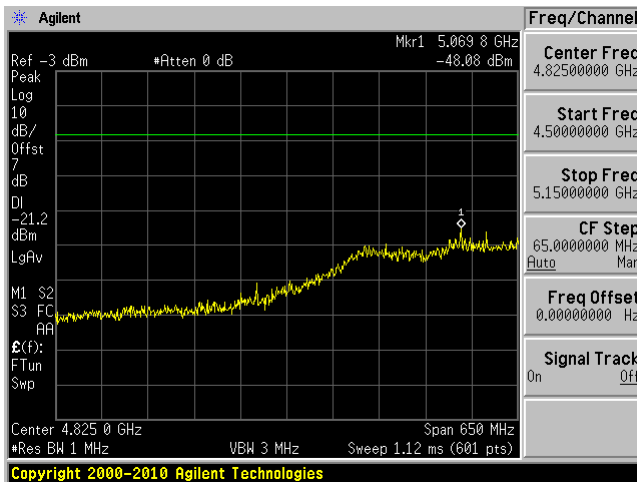
Chain 1, Plot: 30 MHz – 6 GHz



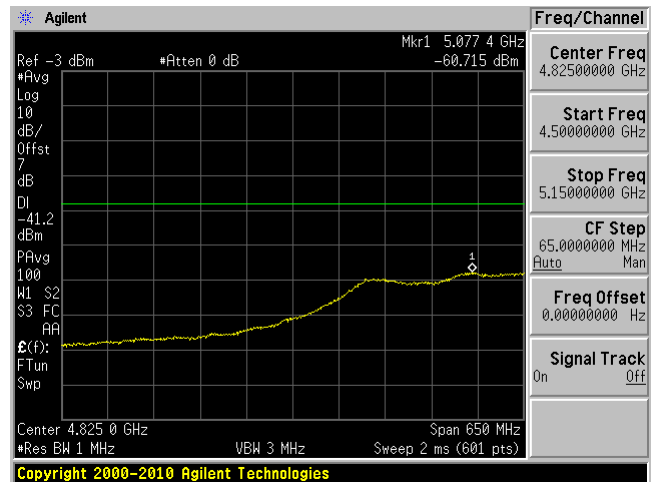
Chain 1, Plot: 6 GHz – 40 GHz



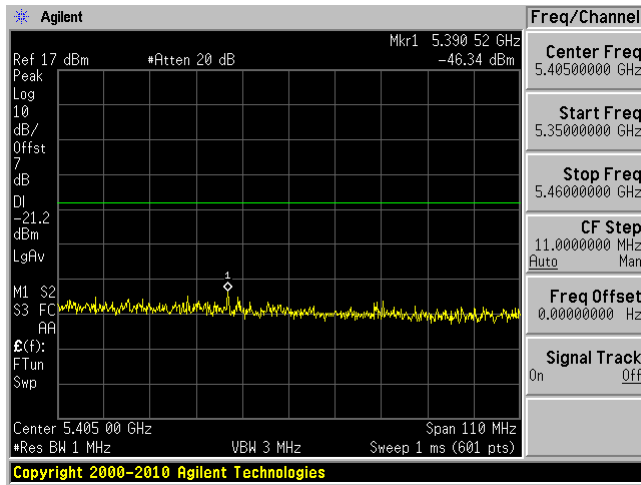
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



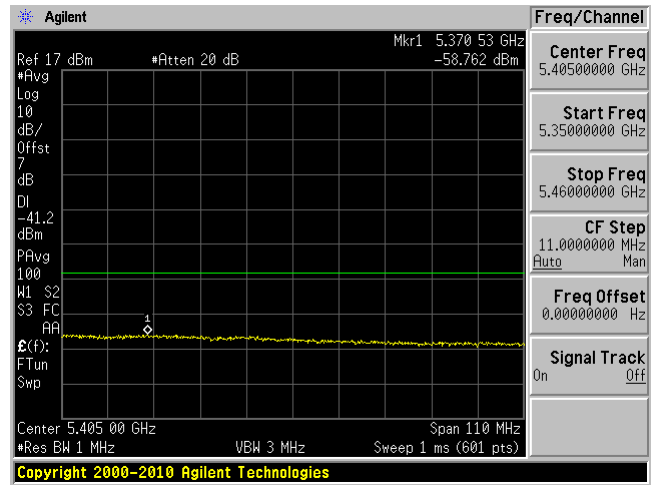
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



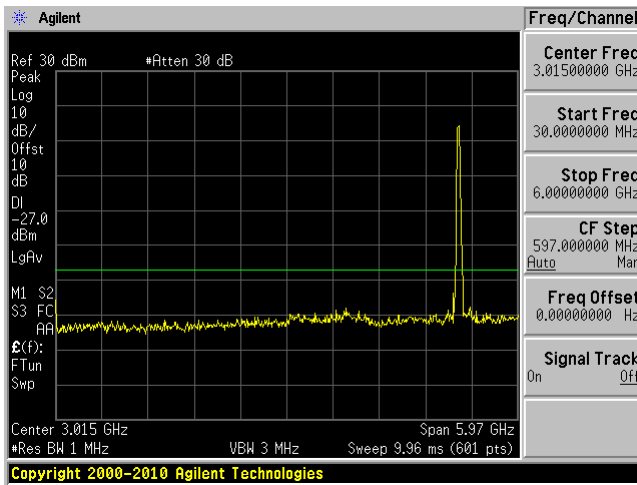
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



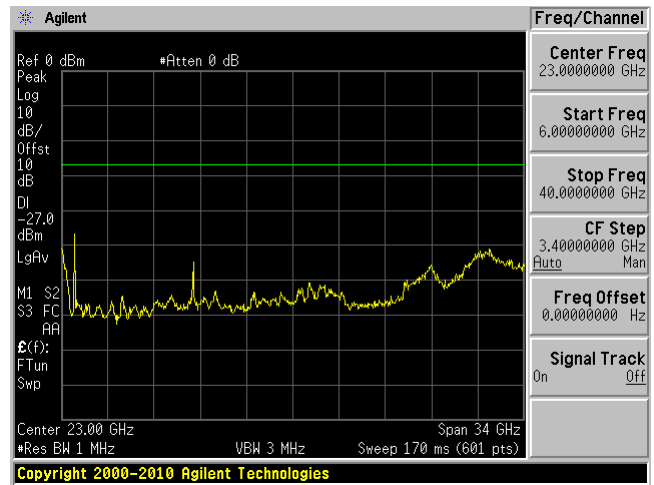
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



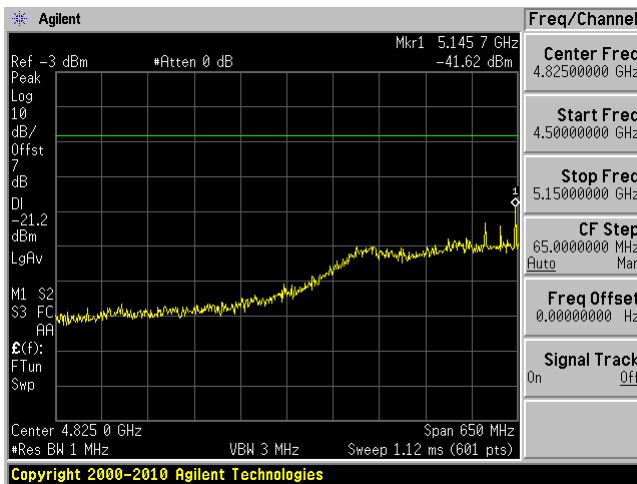
Chain 2, Plot: 30 MHz – 6 GHz



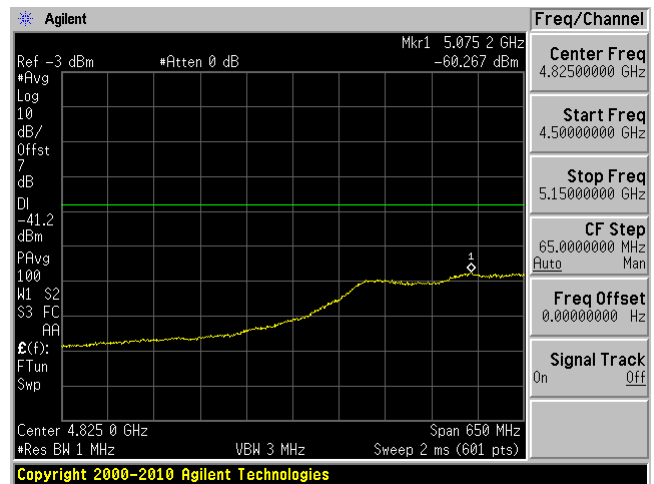
Chain 2, Plot: 6 GHz – 40 GHz



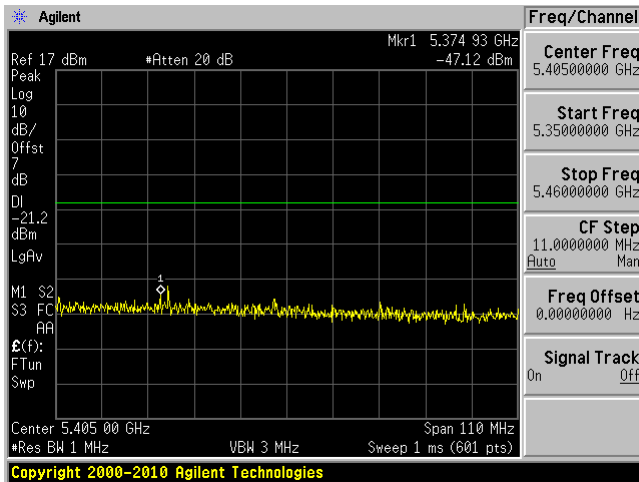
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



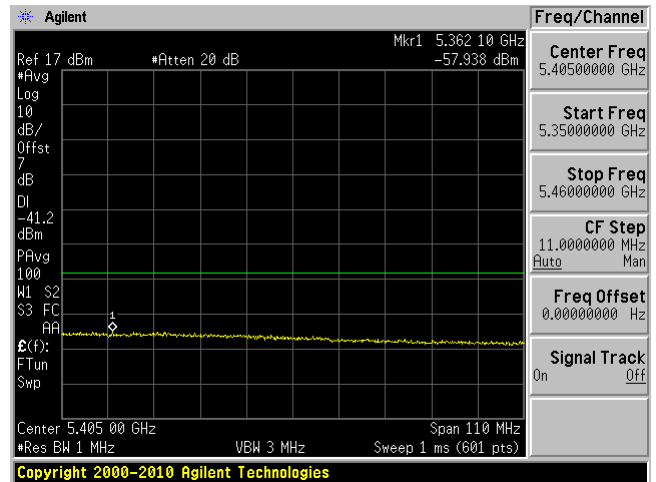
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

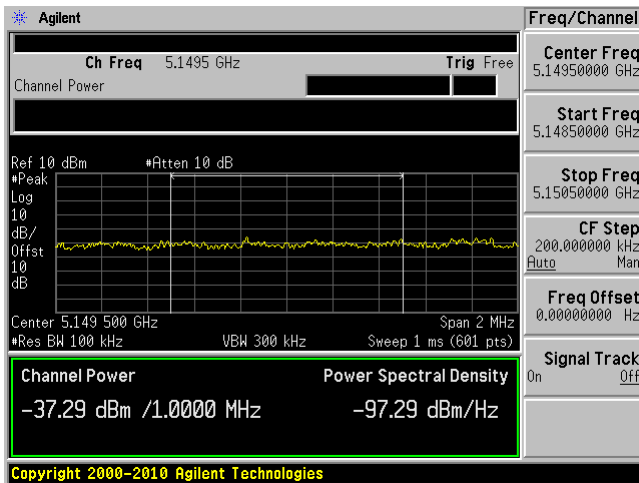


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

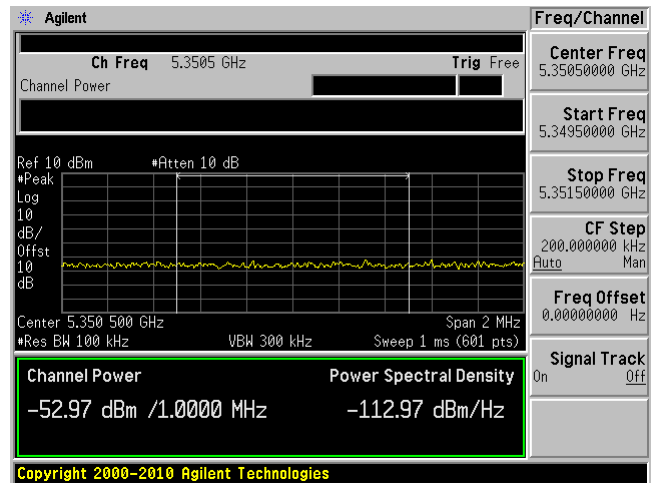


Band Edge

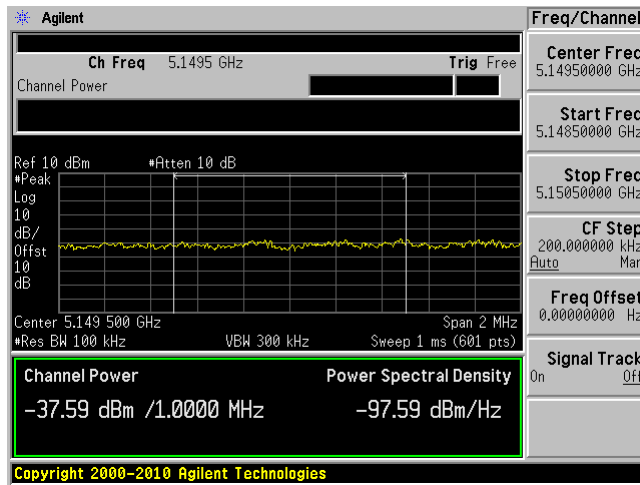
802.11n HT40, Chain 0 Low Band Edge



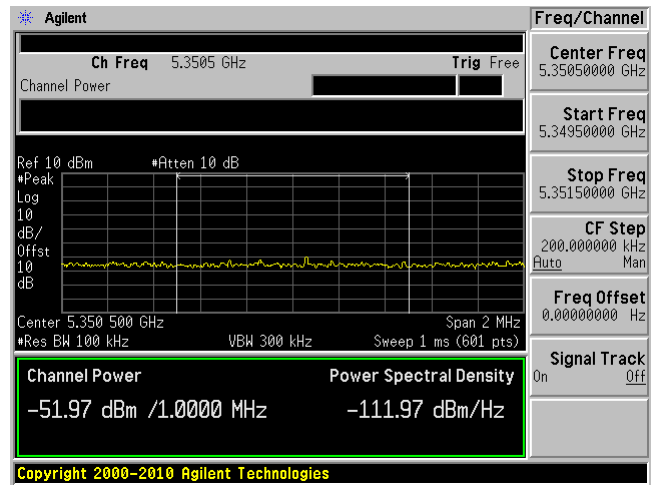
802.11n HT40, Chain 0 High Band Edge



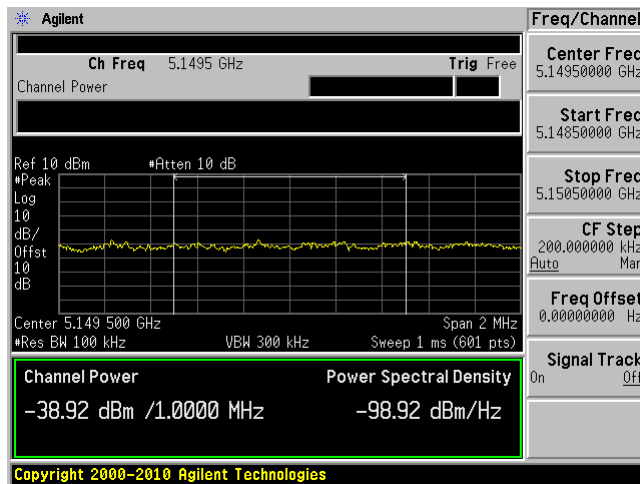
802.11n HT40, Chain 1 Low Band Edge



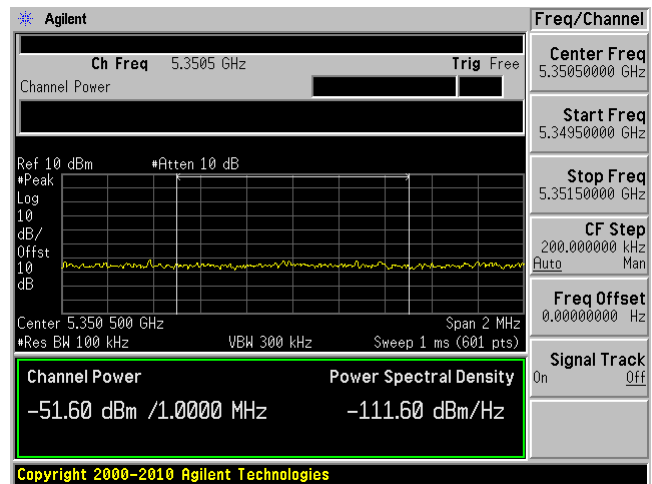
802.11n HT40, Chain 1 High Band Edge



802.11n HT40, Chain 2 Low Band Edge

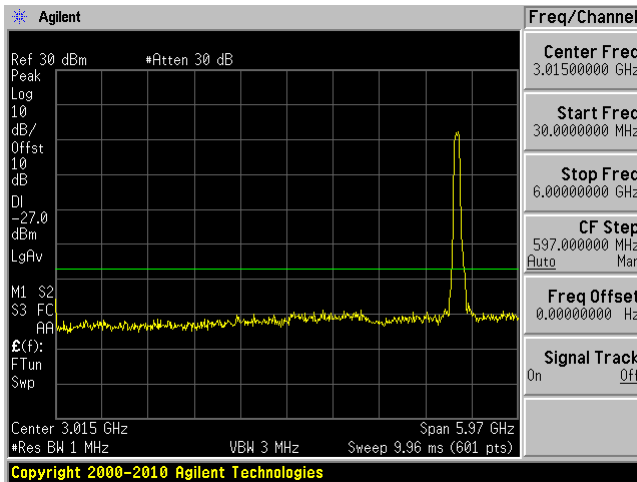


802.11n HT40, Chain 2 High Band Edge

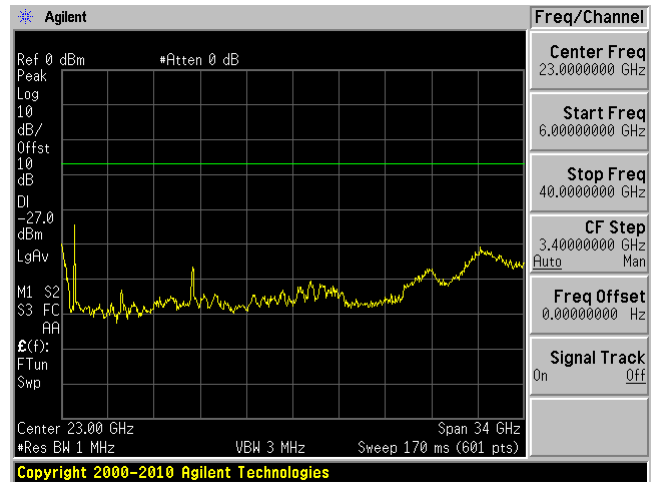


802.11ac 80

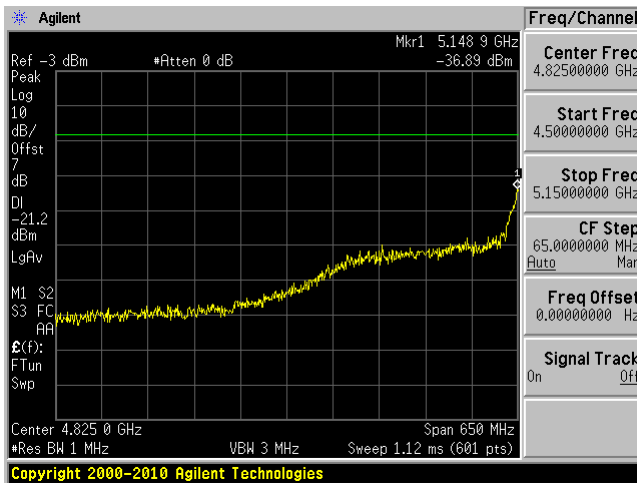
Chain 0, Plot: 30 MHz – 6 GHz



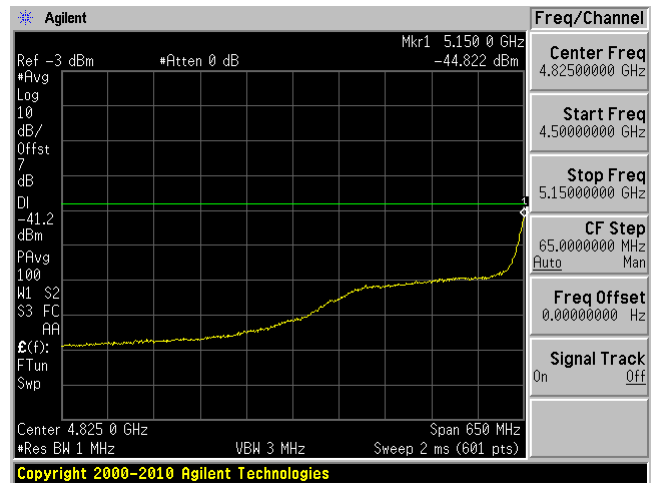
Chain 0, Plot: 6 GHz – 40 GHz



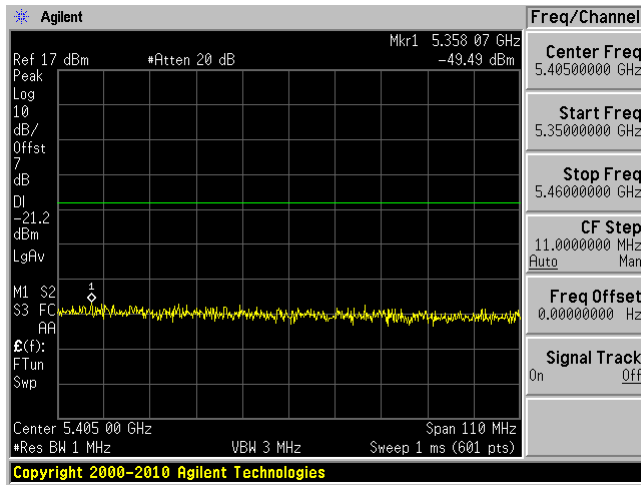
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



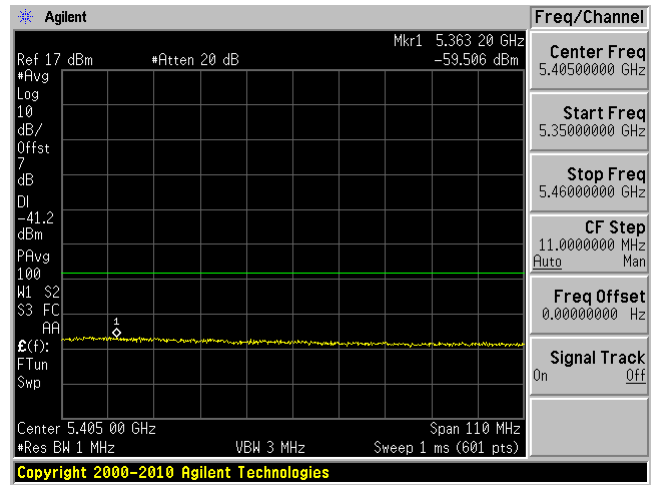
Chain 0, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



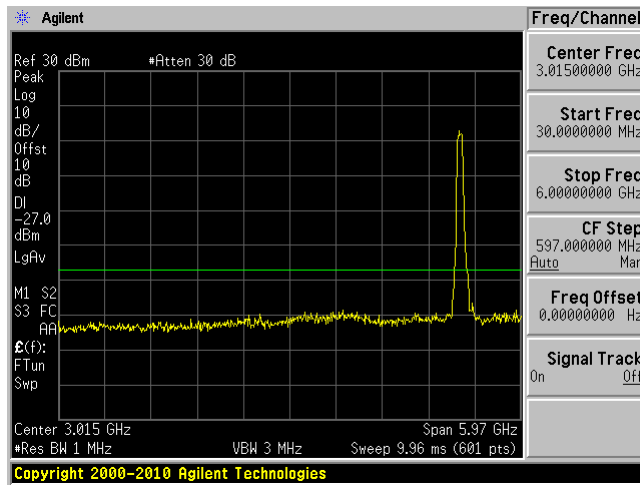
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



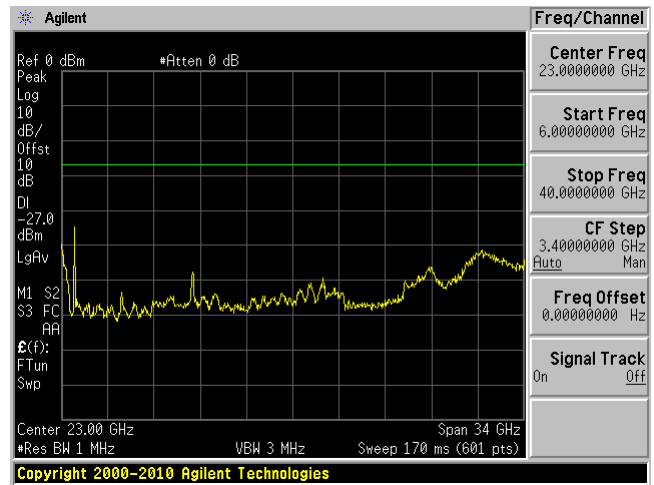
Chain 0, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



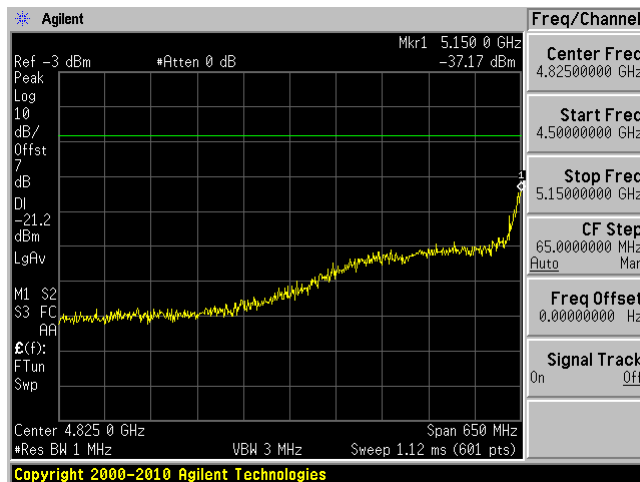
Chain 1, Plot: 30 MHz – 6 GHz



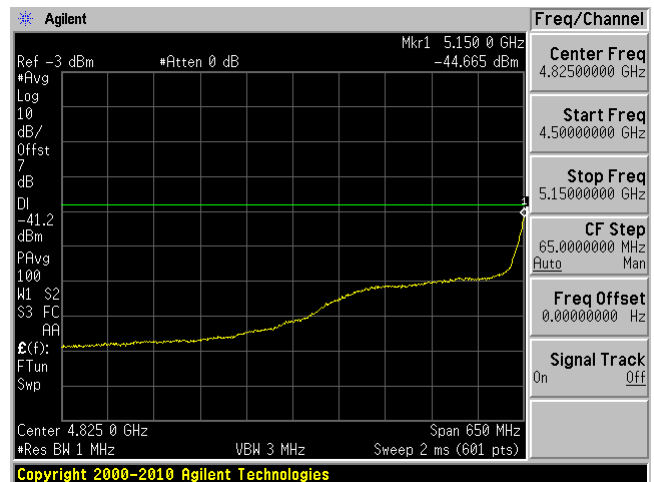
Chain 1, Plot: 6 GHz – 40 GHz



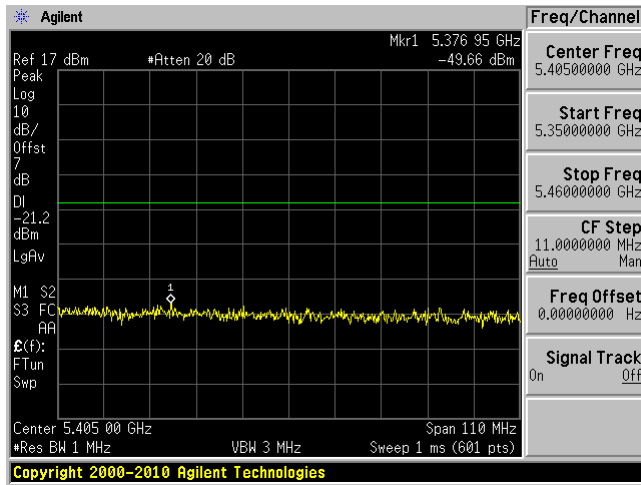
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



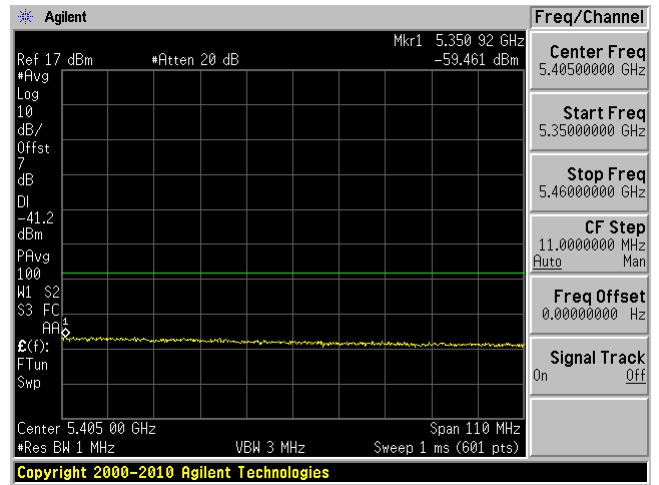
Chain 1, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



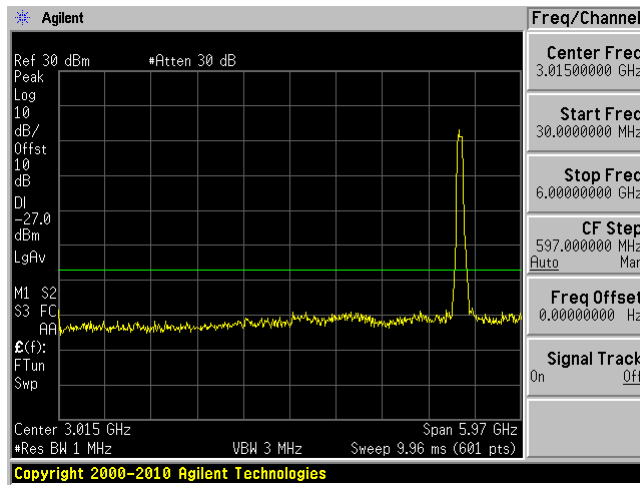
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak



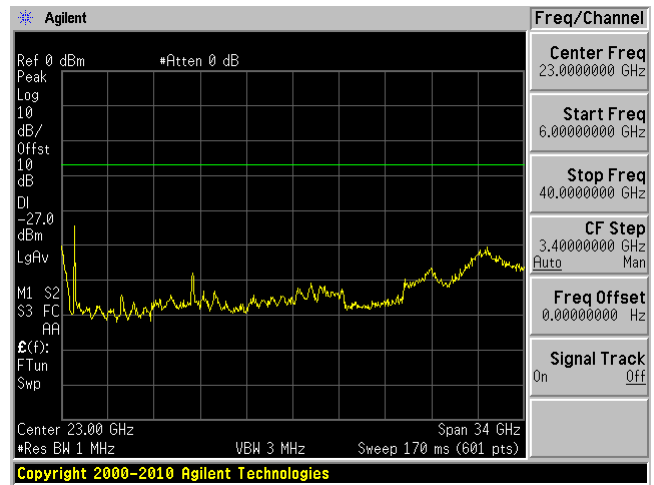
Chain 1, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave



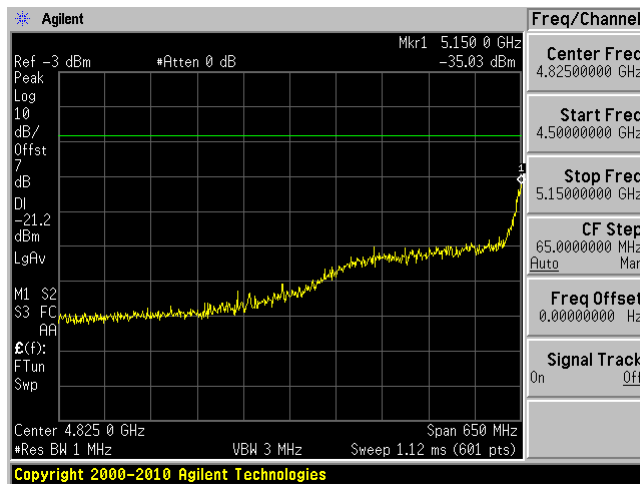
Chain 2, Plot: 30 MHz – 6 GHz



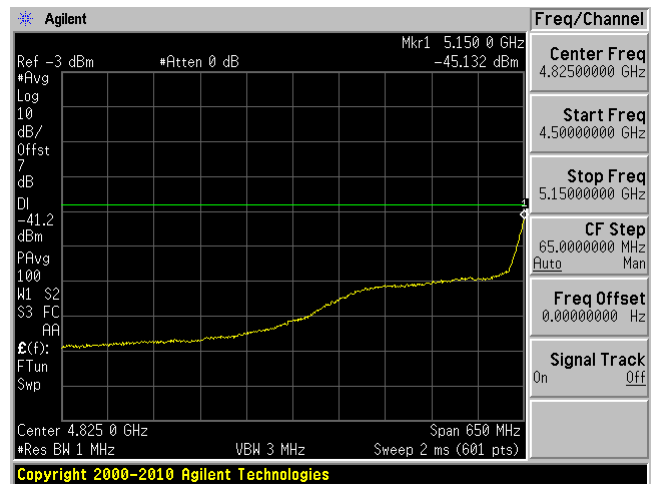
Chain 2, Plot: 6 GHz – 40 GHz



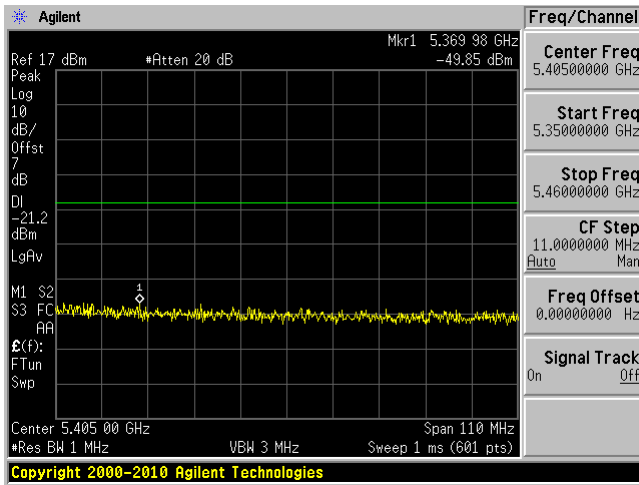
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict Band) Peak



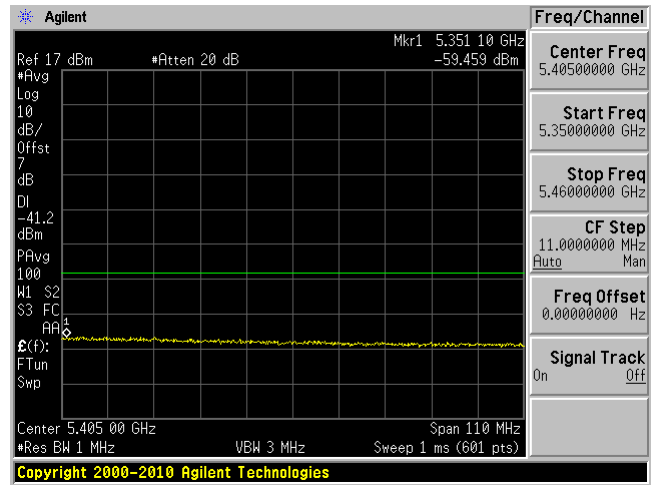
Chain 2, Plot: 4.5 GHz – 5.15 GHz (restrict band) Ave



Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict Band)
Peak

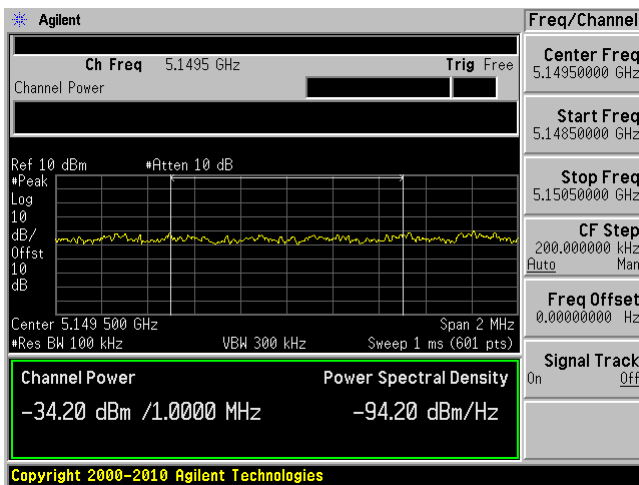


Chain 2, Plot: 5.35 GHz – 5.46 GHz (restrict band)
Ave

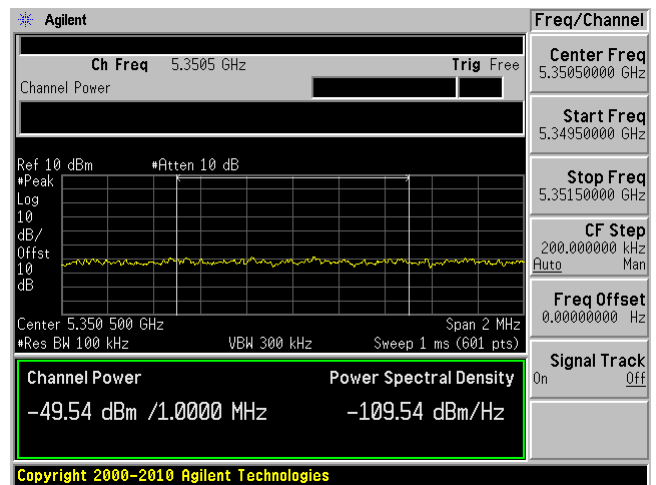


Band Edge

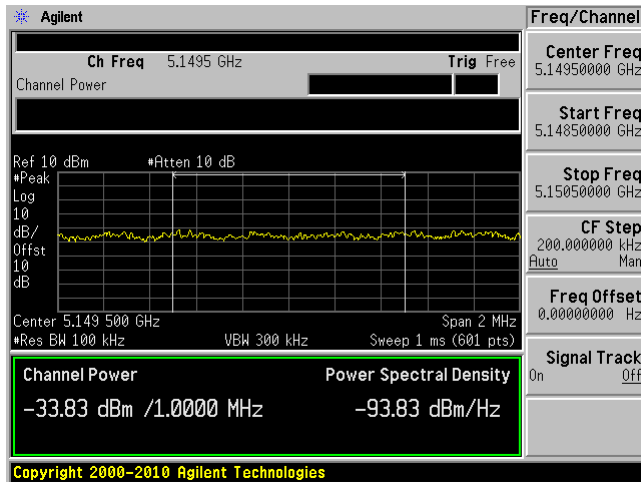
802.11ac 80, Chain 0 Low Band Edge



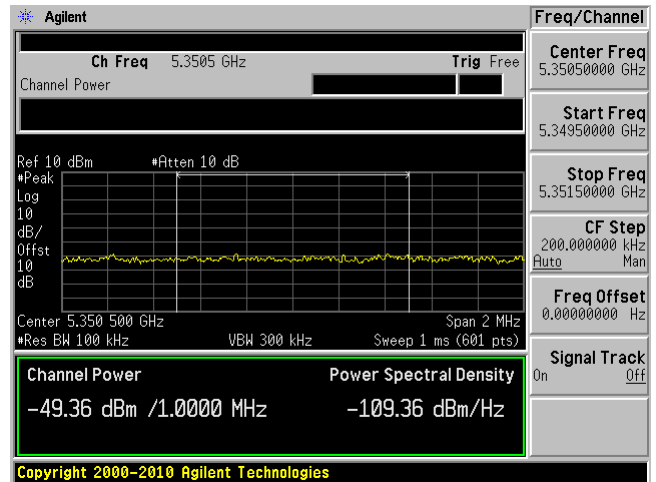
802.11ac 80, Chain 0 High Band Edge



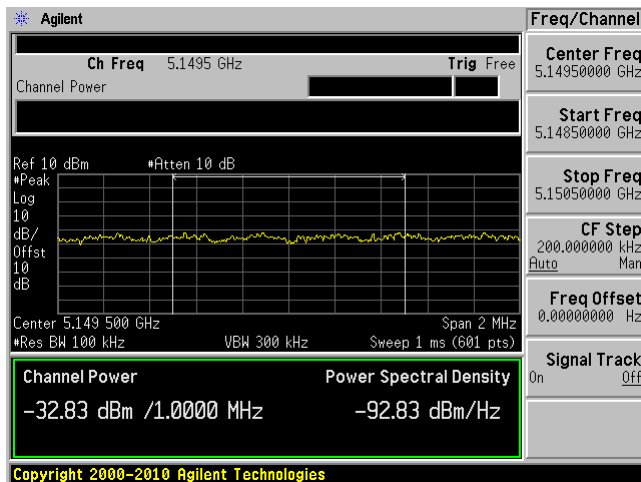
802.11ac 80, Chain 1 Low Band Edge



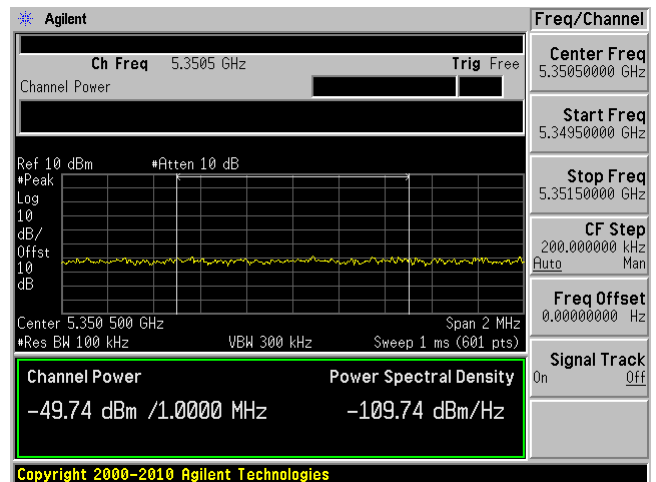
802.11ac 80, Chain 1 High Band Edge



802.11ac 80, Chain 2 Low Band Edge



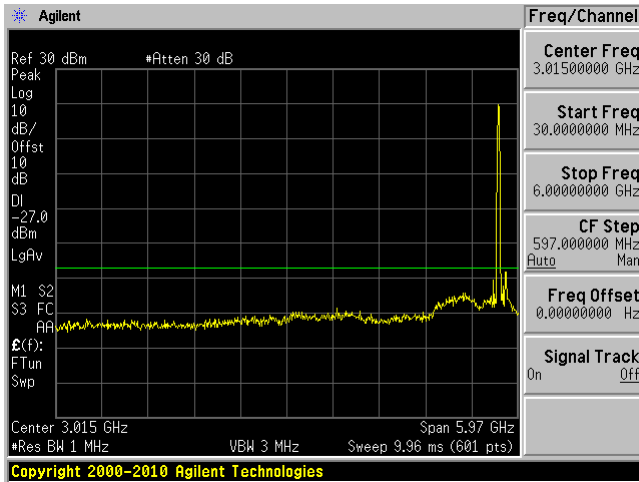
802.11ac 80, Chain 2 High Band Edge



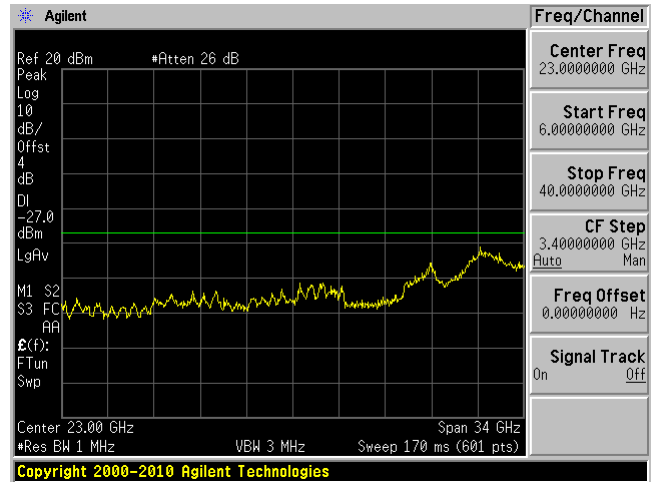
5.8 GHz Band

802.11a, Low Channel

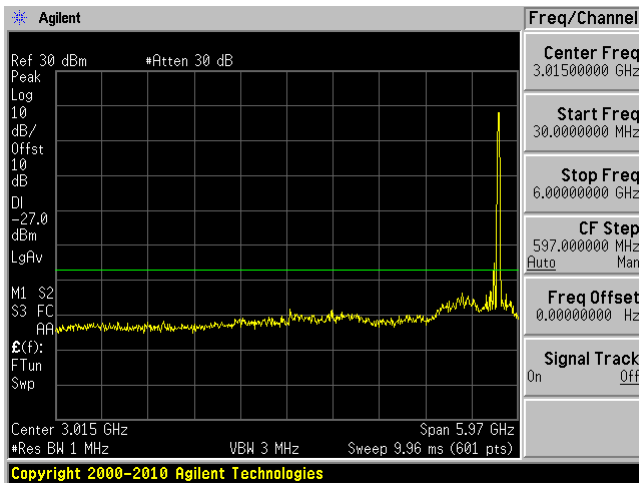
Chain 0, Plot: 30 MHz – 6 GHz



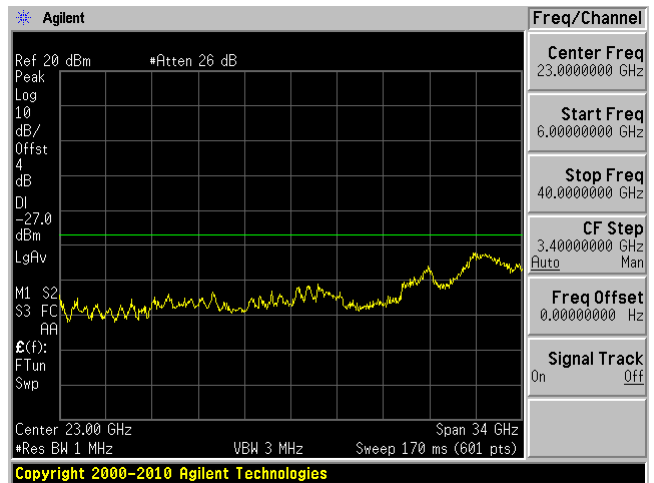
Chain 0, Plot: 6 GHz – 40 GHz



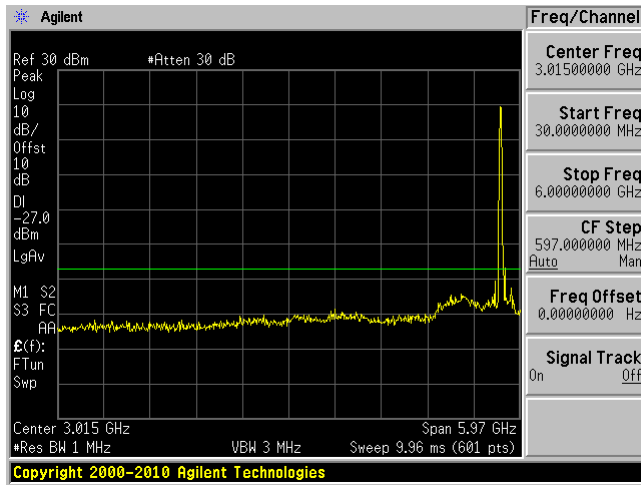
Chain 1, Plot: 30 MHz – 6 GHz



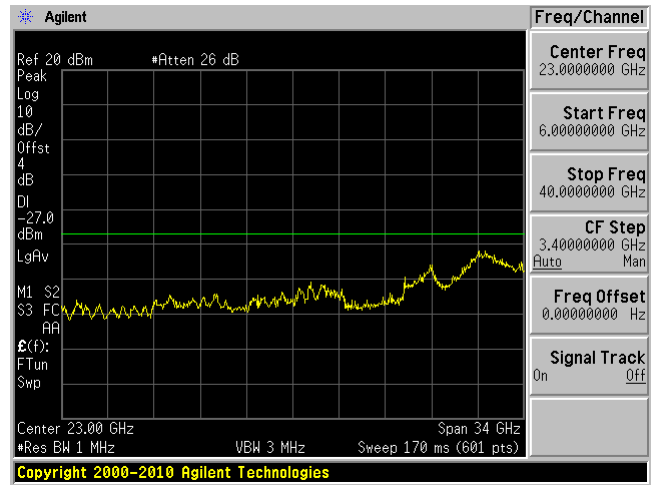
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz

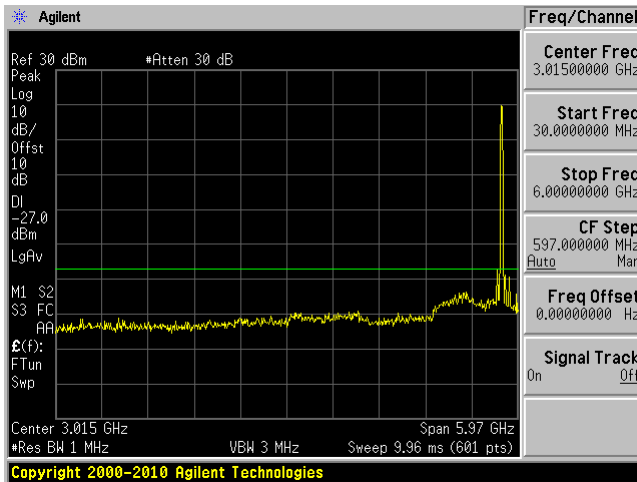


Chain 2, Plot: 6 GHz – 40 GHz

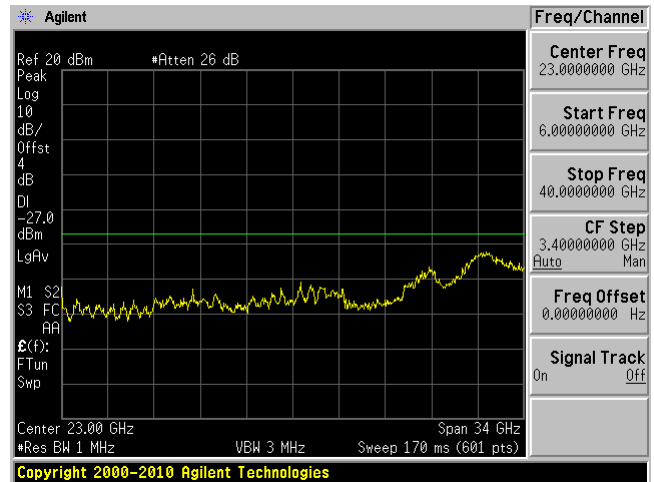


802.11a, Middle Channel

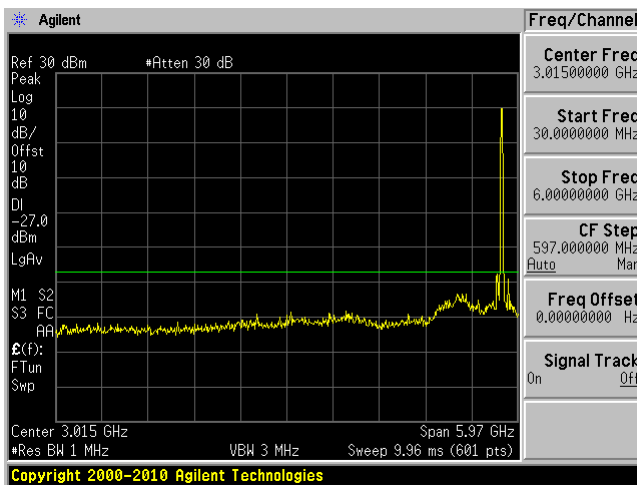
Chain 0, Plot: 30 MHz – 6 GHz



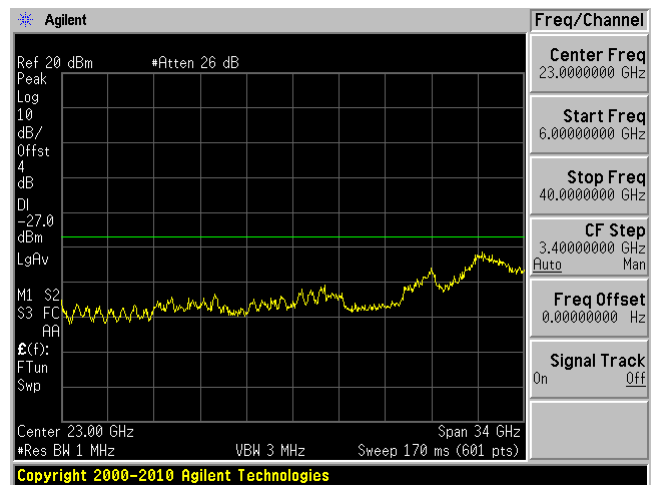
Chain 0, Plot: 6 GHz – 40 GHz



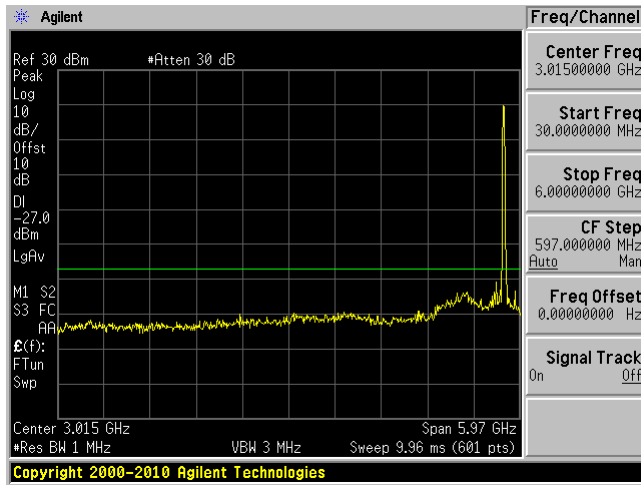
Chain 1, Plot: 30 MHz – 6 GHz



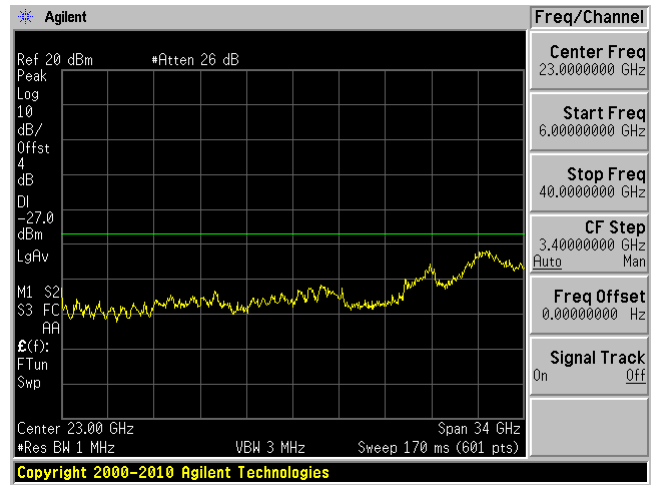
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz

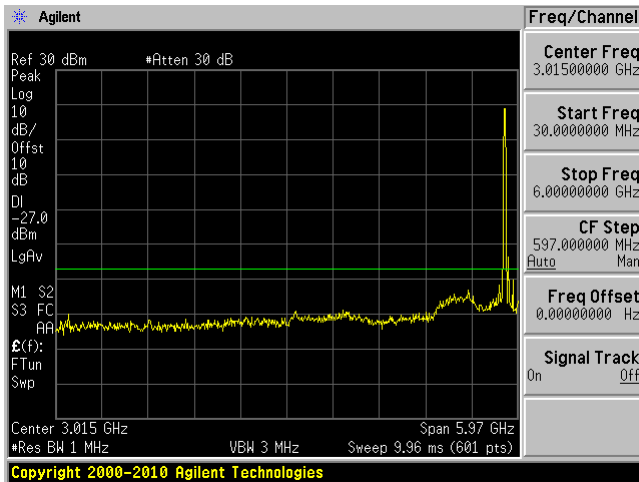


Chain 2, Plot: 6 GHz – 40 GHz

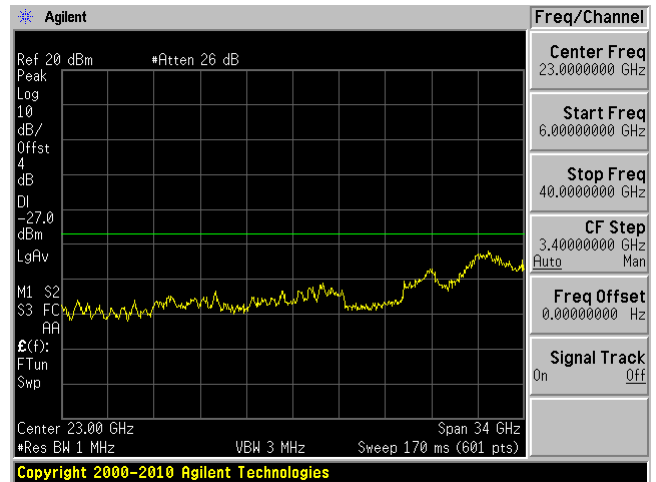


802.11a, High Channel

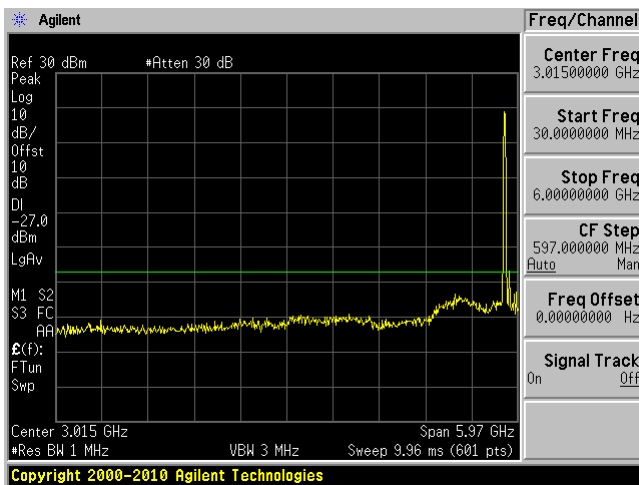
Chain 0, Plot: 30 MHz – 6 GHz



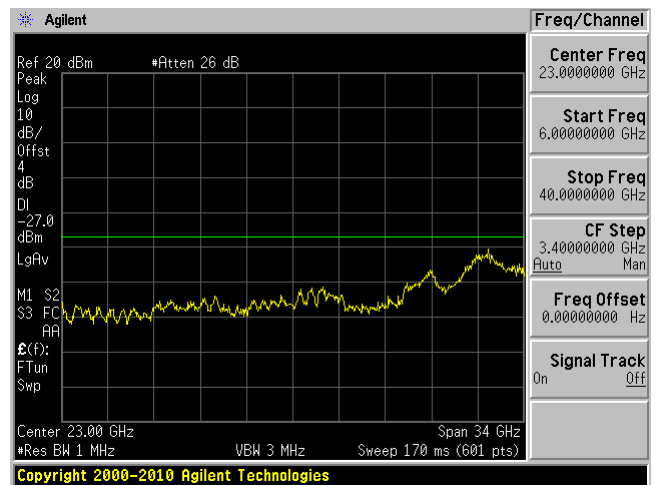
Chain 0, Plot: 6 GHz – 40 GHz



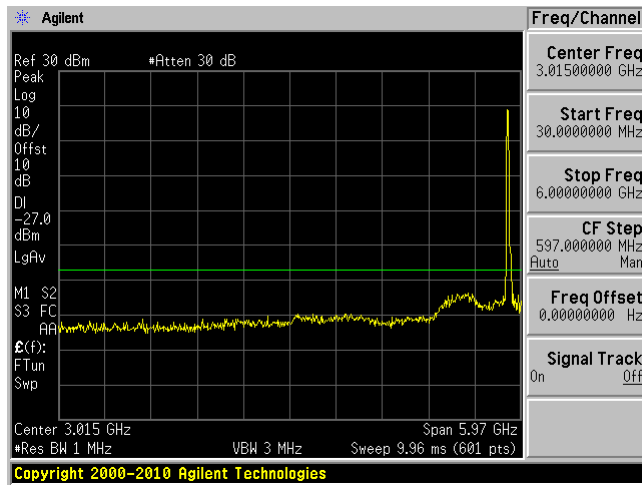
Chain 1, Plot: 30 MHz – 6 GHz



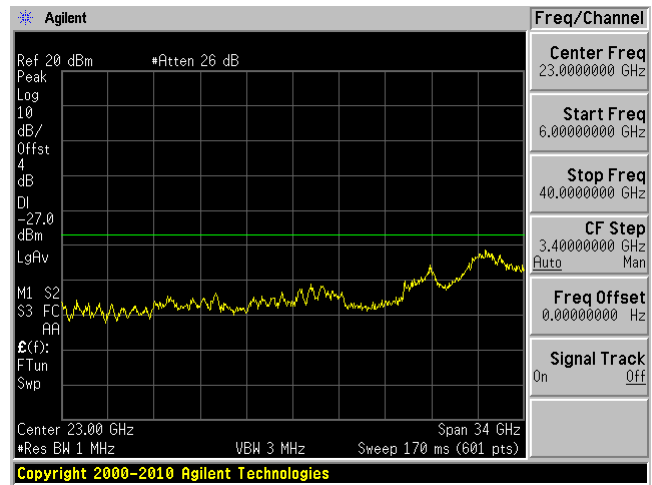
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz



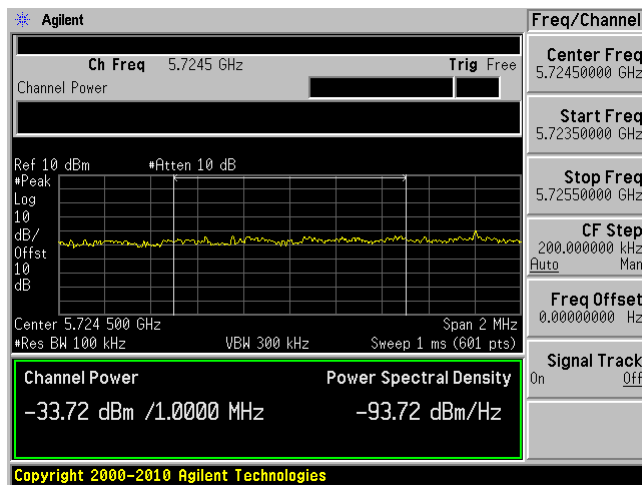
Chain 2, Plot: 6 GHz – 40 GHz



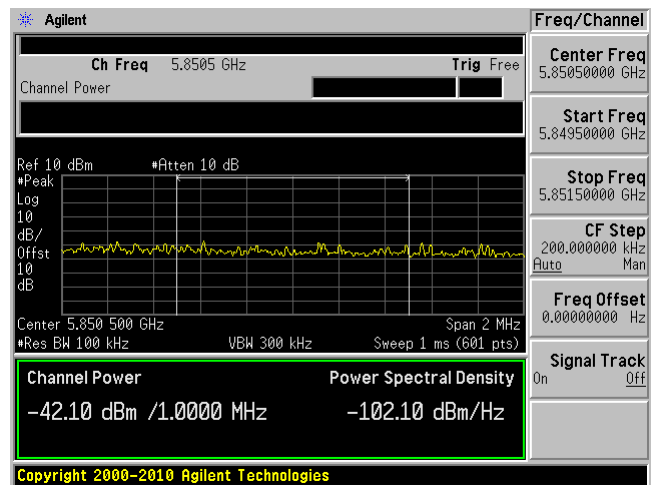
-17 dBm/MHz

802.11a mode

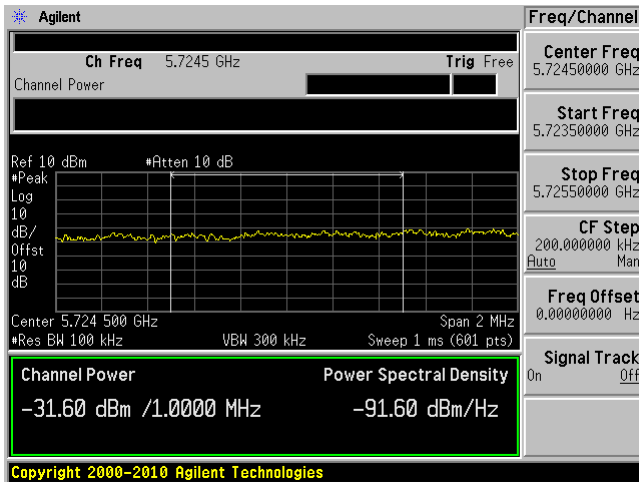
802.11a, Chain 0 Low Band Edge



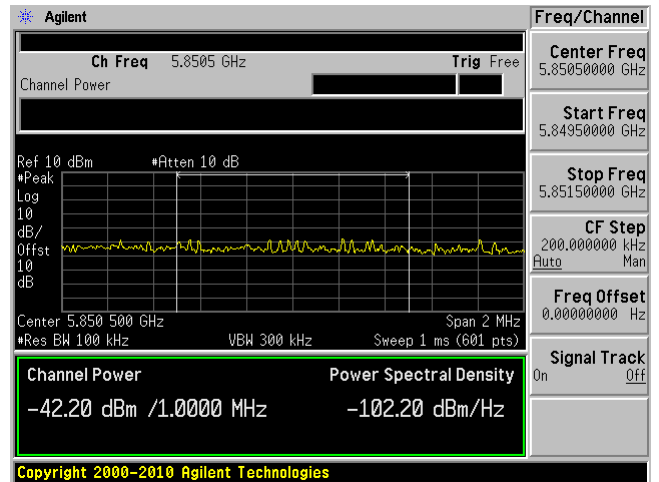
802.11a, Chain 0 High Band Edge



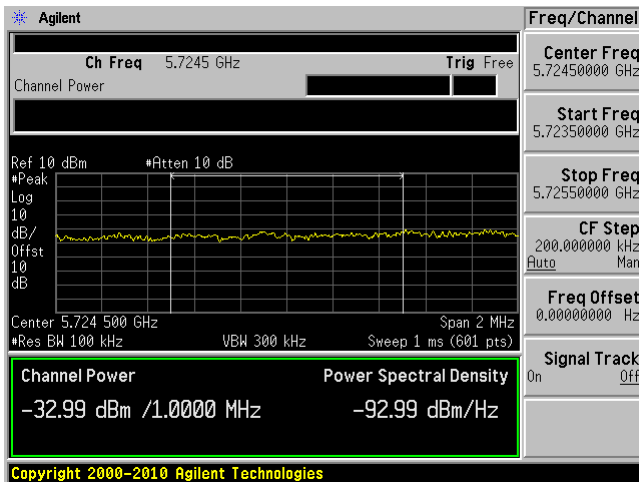
802.11a, Chain 1 Low Band Edge



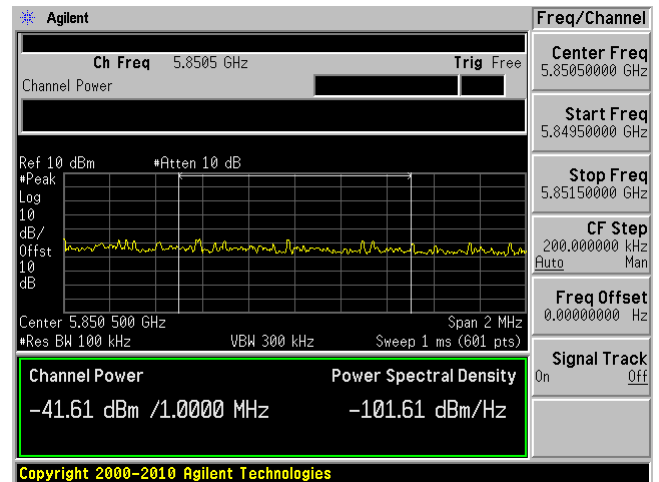
802.11a, Chain 1 High Band Edge



802.11a, Chain 2 Low Band Edge



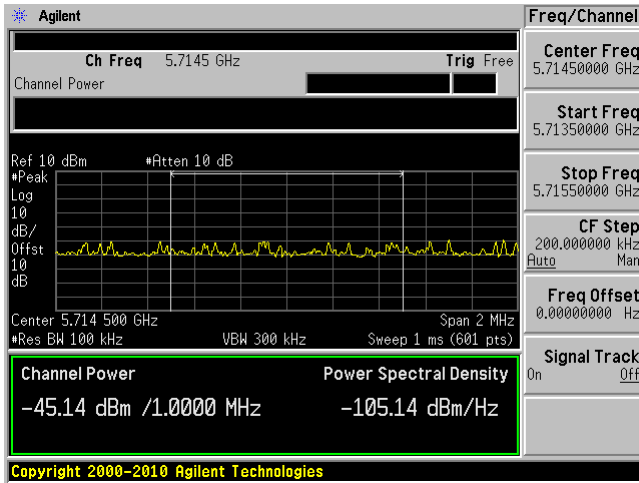
802.11a, Chain 2 High Band Edge



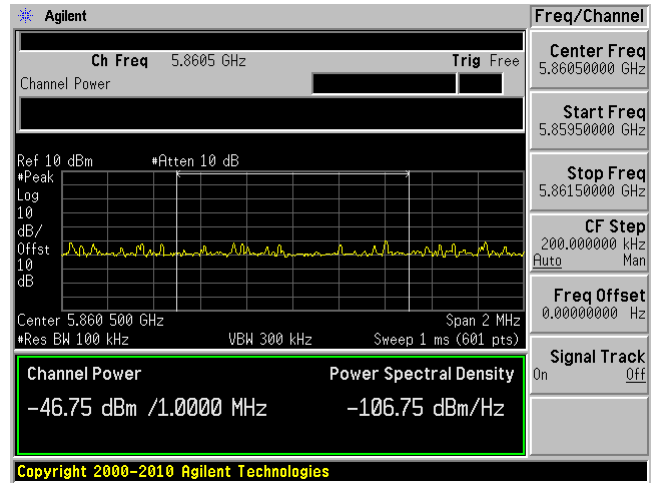
-27 dBm/MHz

802.11a mode

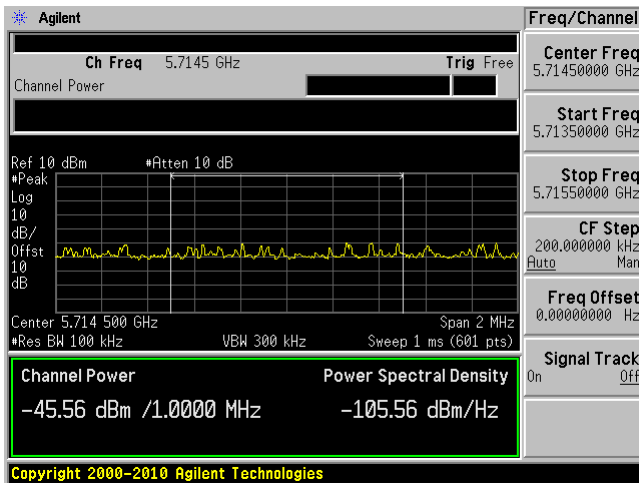
802.11a, Chain 0 Low Band Edge



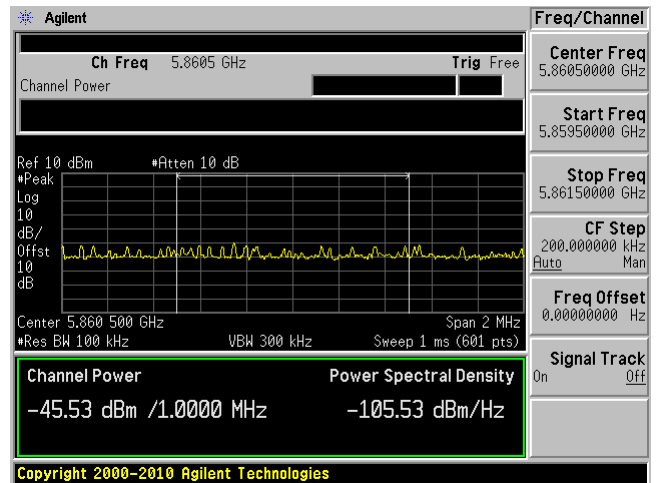
802.11a, Chain 0 High Band Edge



802.11a, Chain 1 Low Band Edge

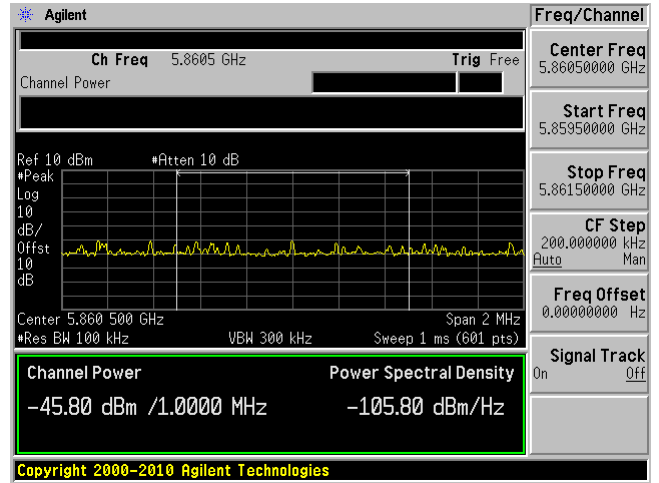
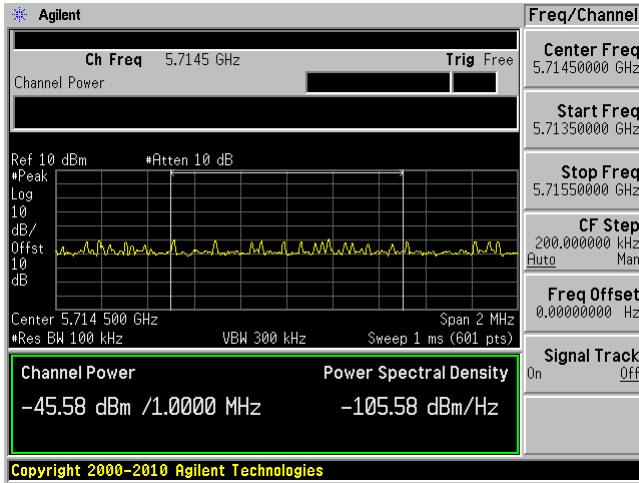


802.11a, Chain 1 High Band Edge



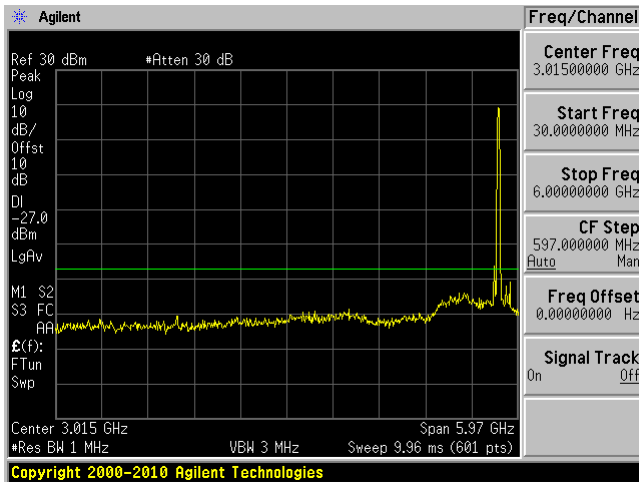
802.11a, Chain 2 Low Band Edge

802.11a, Chain 2 High Band Edge

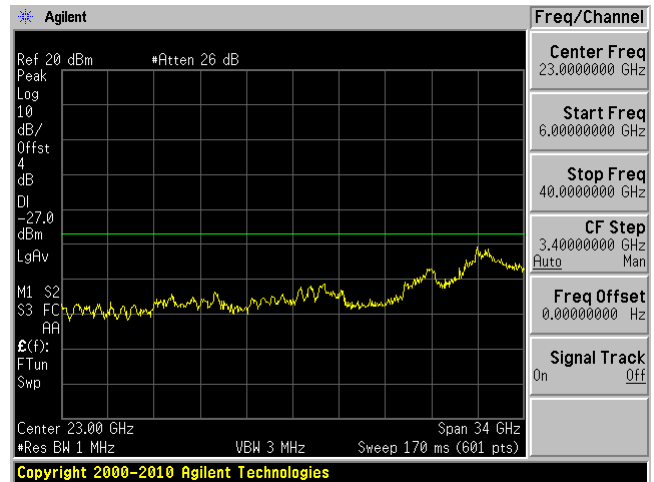


802.11n-HT20, Low Channel

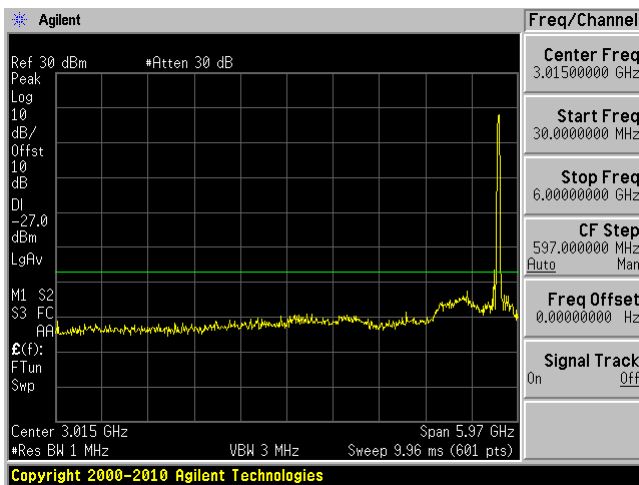
Chain 0, Plot: 30 MHz – 6 GHz



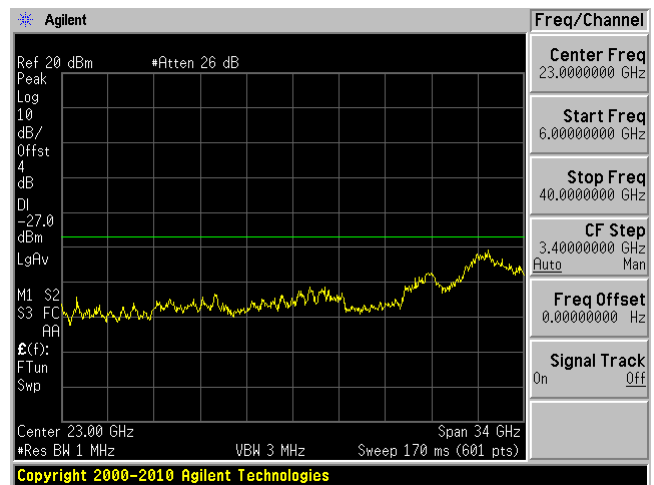
Chain 0, Plot: 6 GHz – 40 GHz



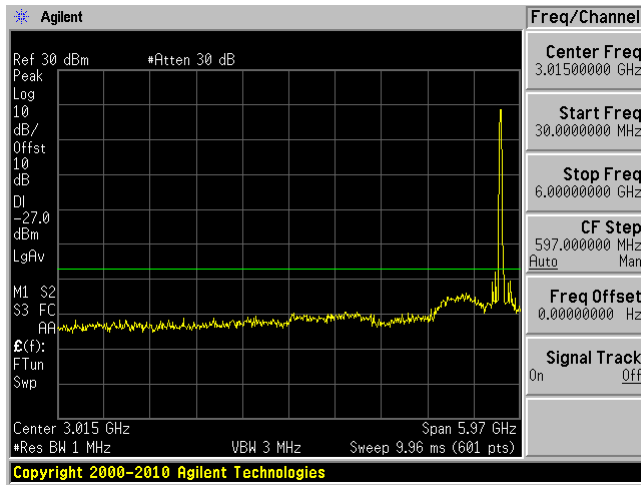
Chain 1, Plot: 30 MHz – 6 GHz



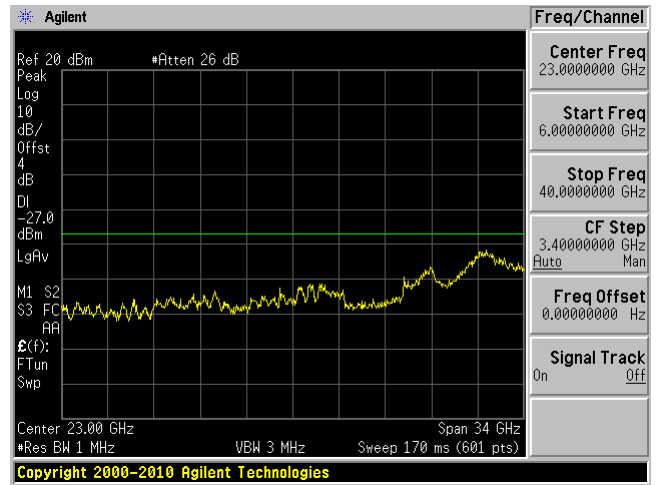
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz

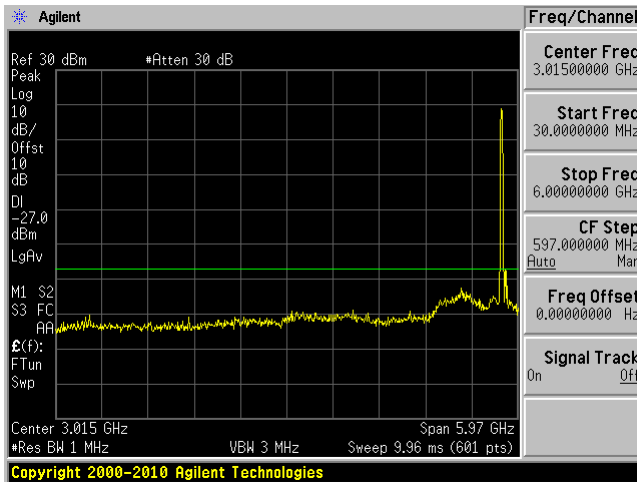


Chain 2, Plot: 6 GHz – 40 GHz

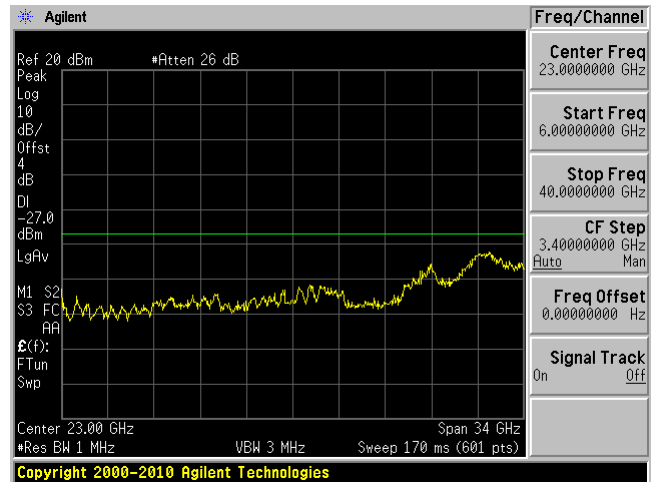


802.11n-HT20, Middle Channel

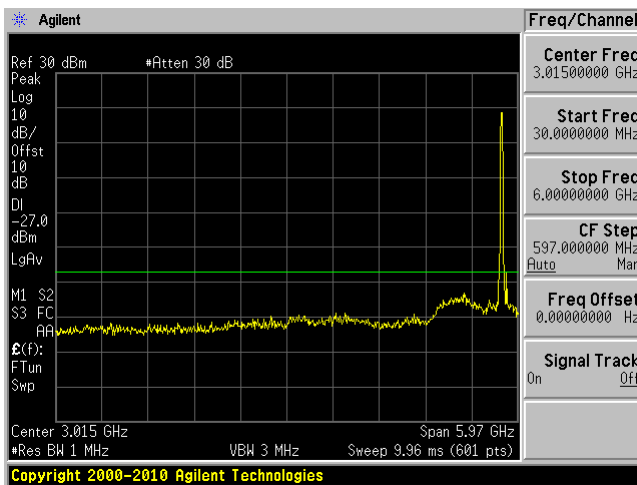
Chain 0, Plot: 30 MHz – 6 GHz



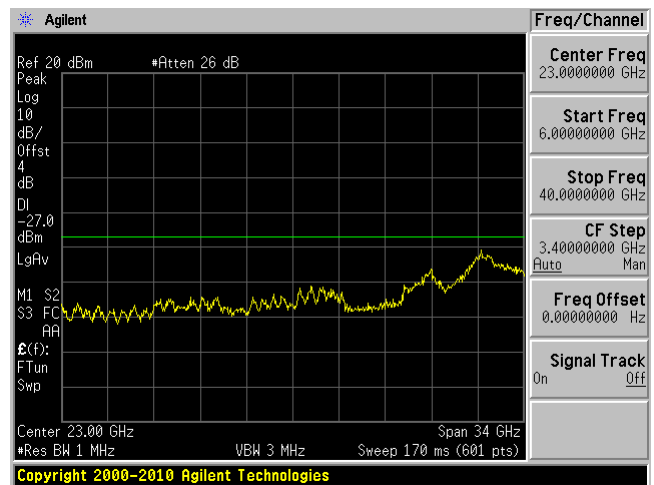
Chain 0, Plot: 6 GHz – 40 GHz



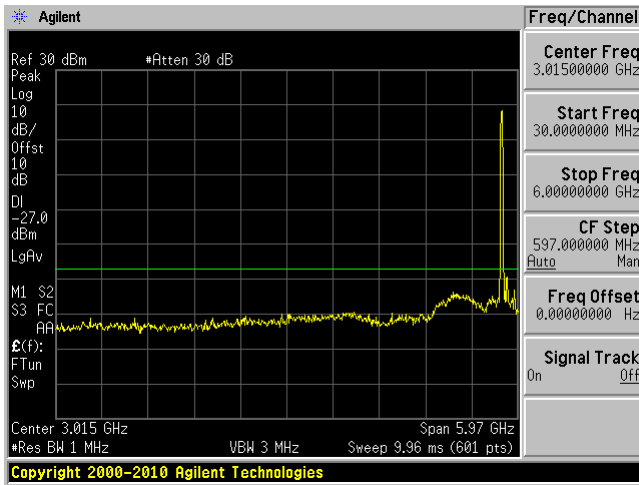
Chain 1, Plot: 30 MHz – 6 GHz



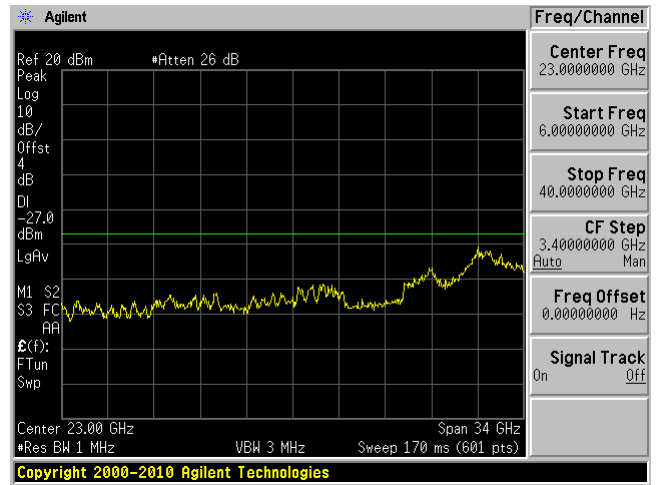
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz

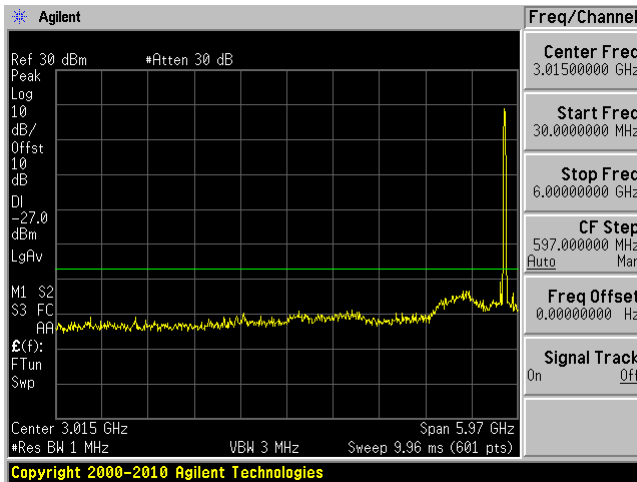


Chain 2, Plot: 6 GHz – 40 GHz

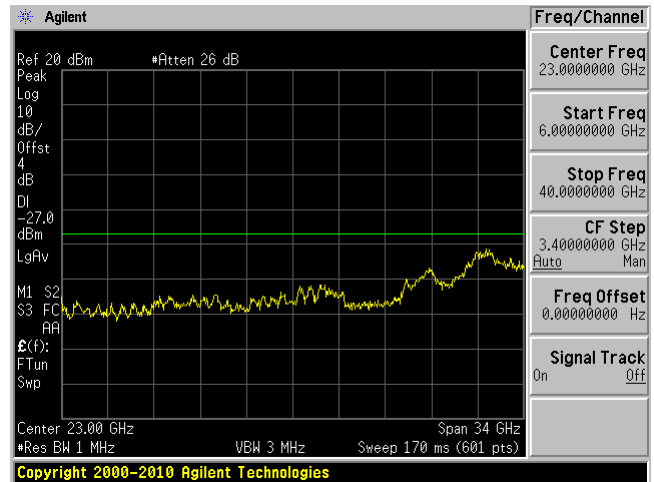


802.11n-HT20, High Channel

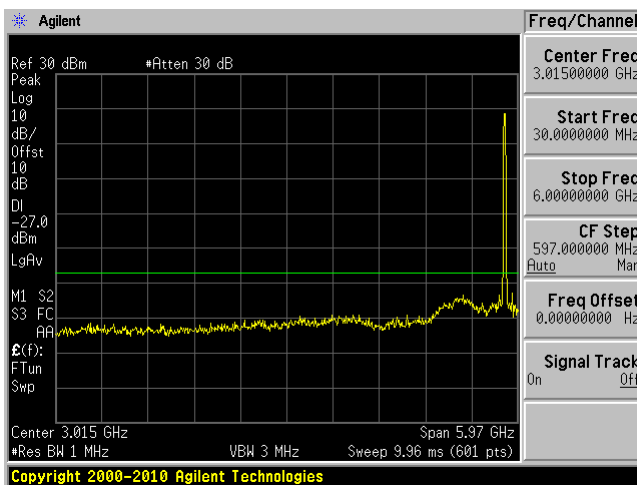
Chain 0, Plot: 30 MHz – 6 GHz



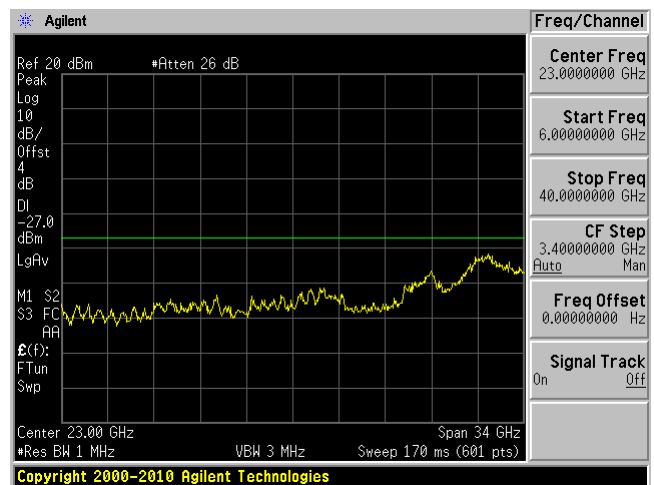
Chain 0, Plot: 6 GHz – 40 GHz



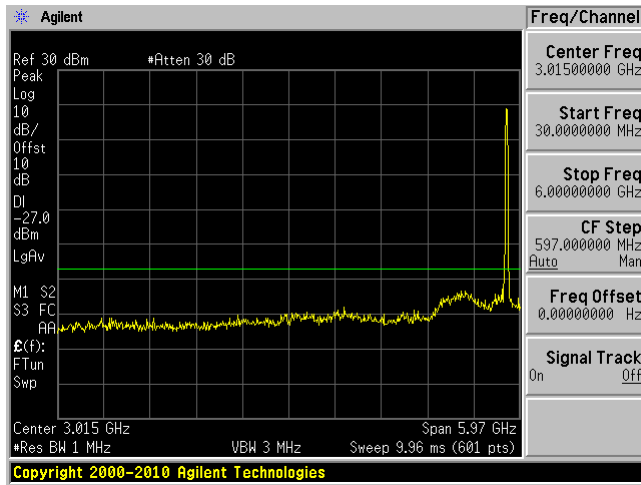
Chain 1, Plot: 30 MHz – 6 GHz



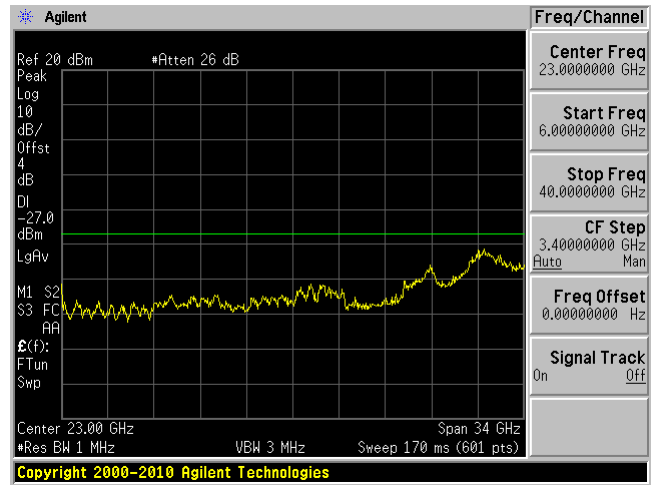
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz



Chain 2, Plot: 6 GHz – 40 GHz

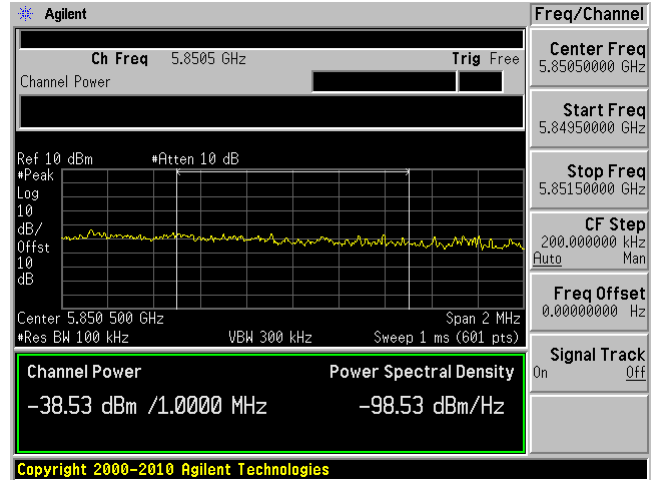
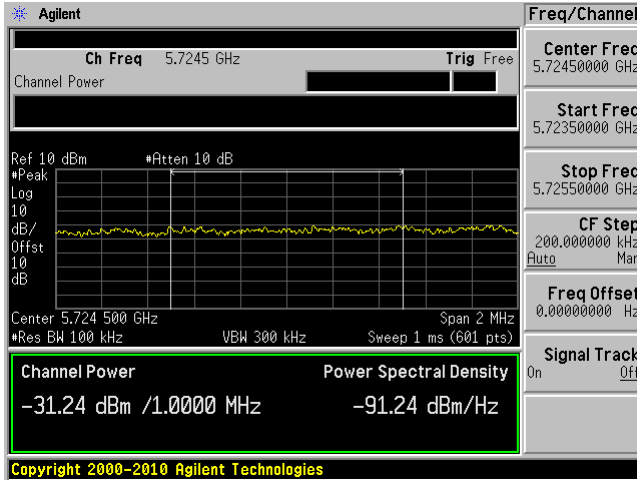


-17 dBm/MHz

802.11n-HT20 mode

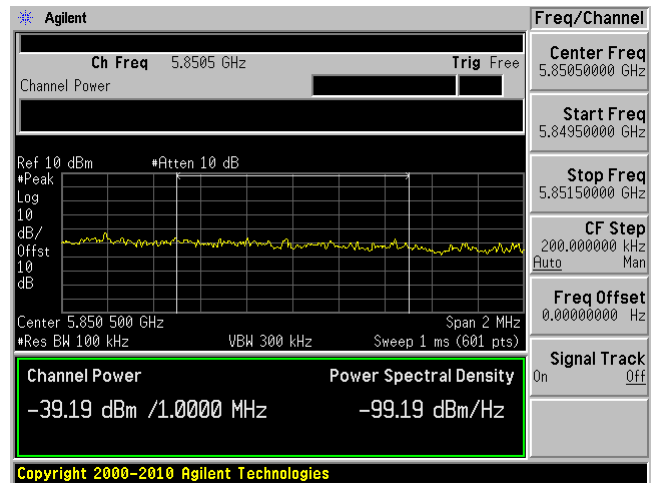
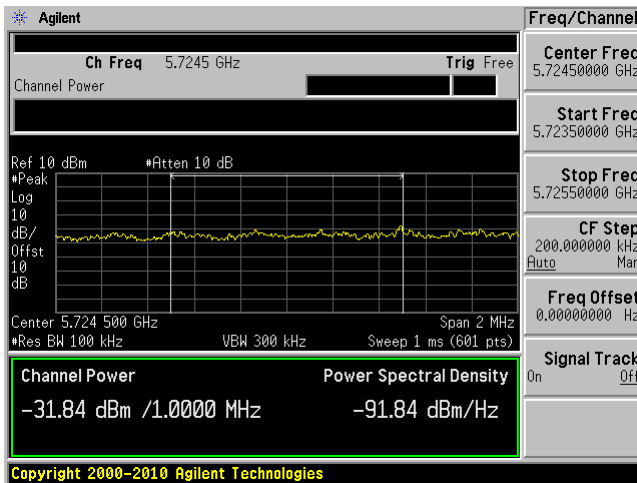
802.11n HT20, Chain 0 Low Band Edge

802.11 n HT20, Chain 0 High Band Edge

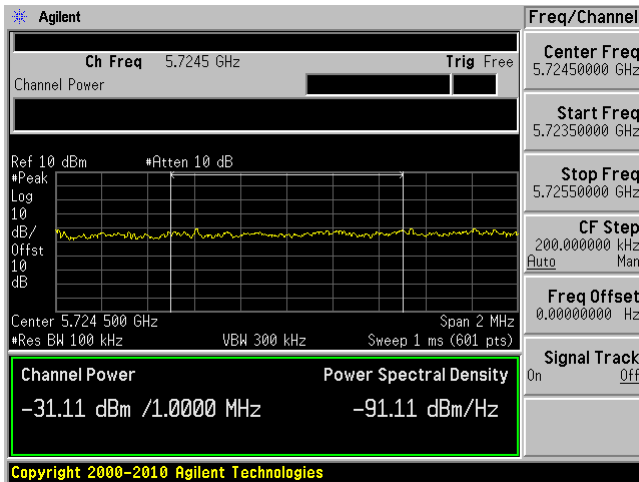


802.11n HT20, Chain 1 Low Band Edge

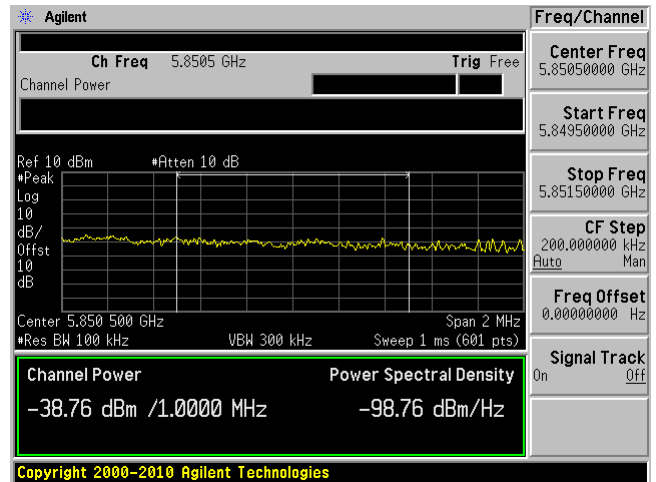
802.11n HT20, Chain 1 High Band Edge



802.11n HT20, Chain 2 Low Band Edge



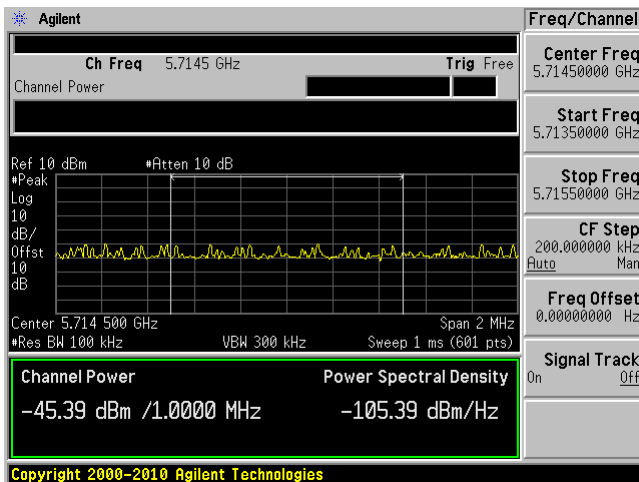
802.11n HT20, Chain 2 High Band Edge



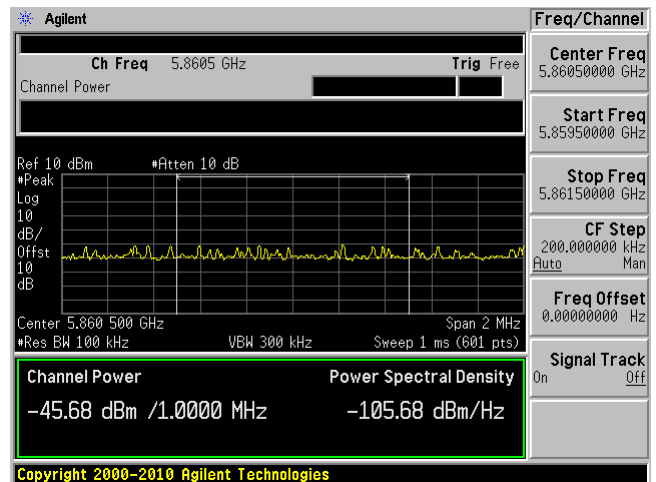
-27 dBm/MHz

802.11n-HT20 mode

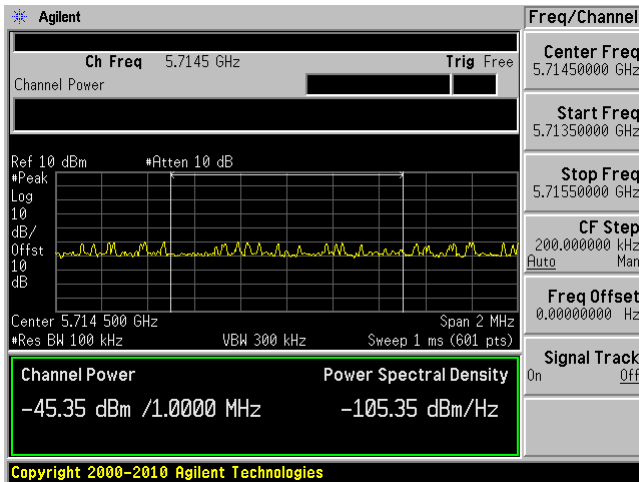
802.11n HT20, Chain 0 Low Band Edge



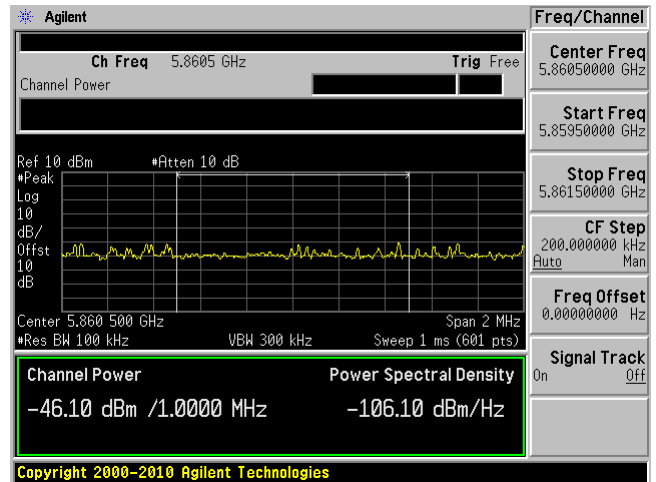
802.11 n HT20, Chain 0 High Band Edge



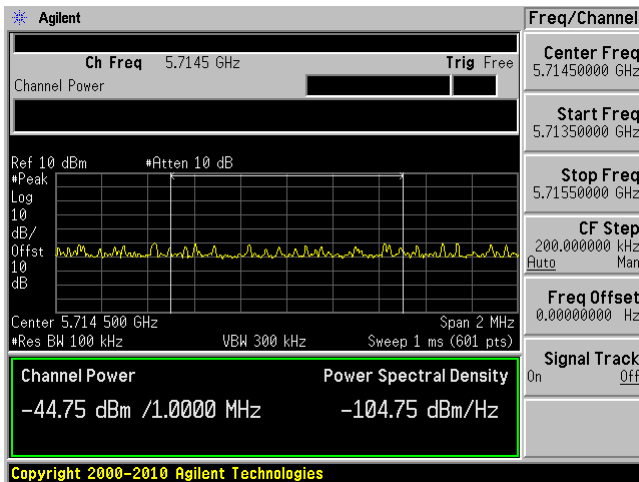
802.11n HT20, Chain 1 Low Band Edge



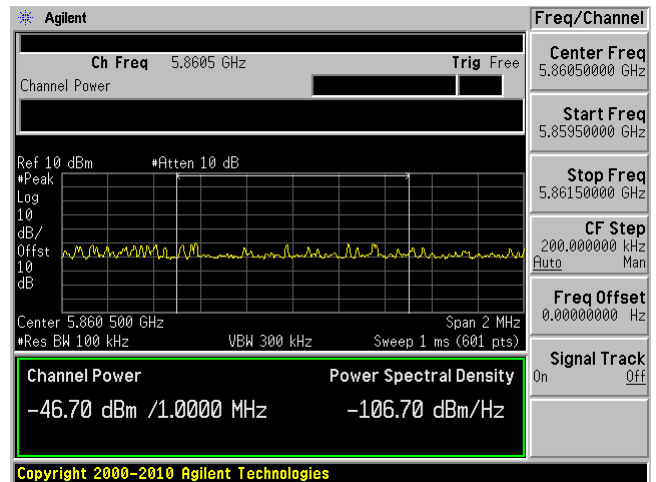
802.11n HT20, Chain 1 High Band Edge



802.11n HT20, Chain 2 Low Band Edge

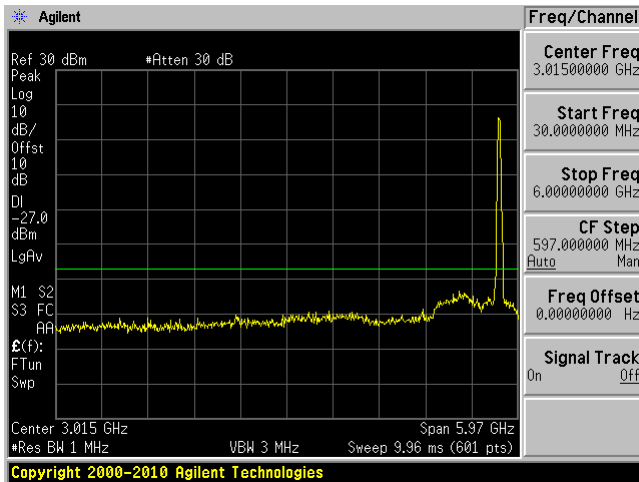


802.11n HT20, Chain 2 High Band Edge

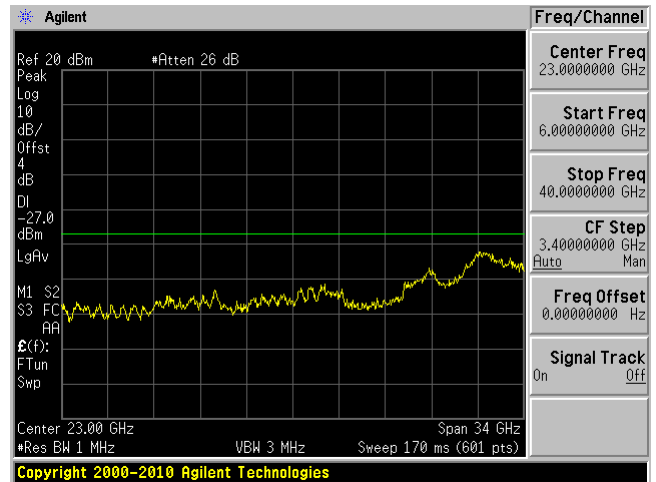


802.11n-HT40, Low Channel

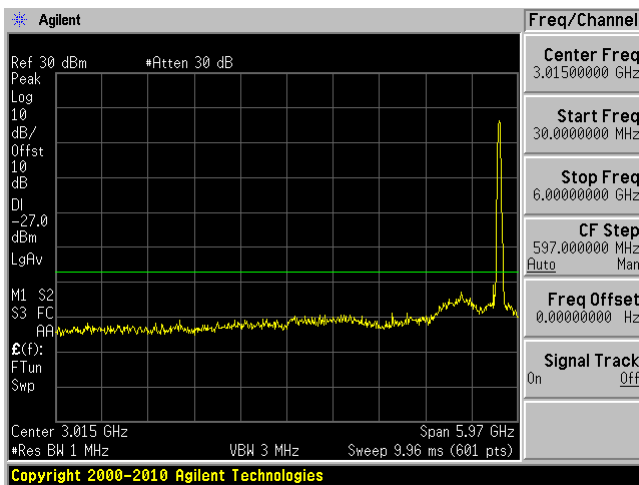
Chain 0, Plot: 30 MHz – 6 GHz



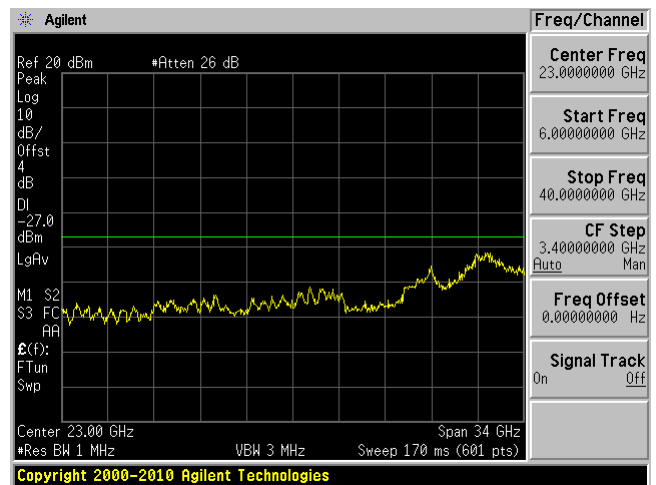
Chain 0, Plot: 6 GHz – 40 GHz



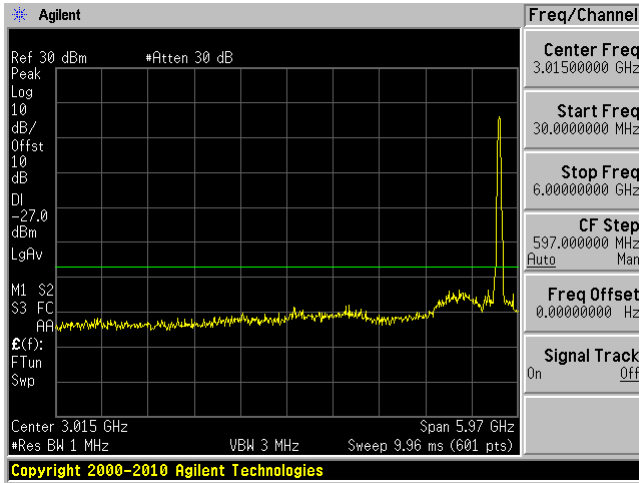
Chain 1, Plot: 30 MHz – 6 GHz



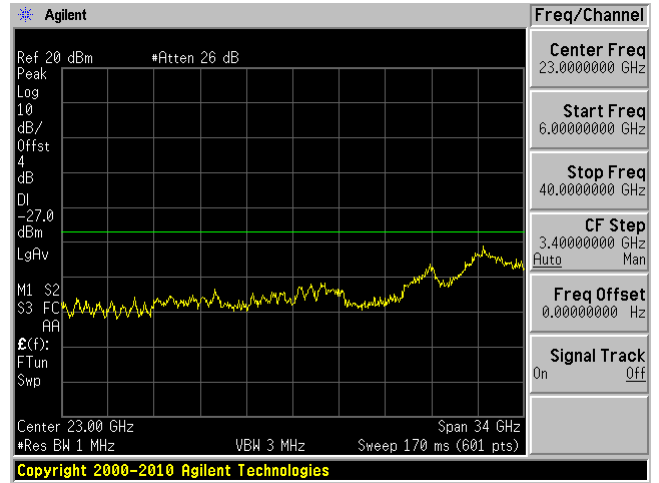
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz

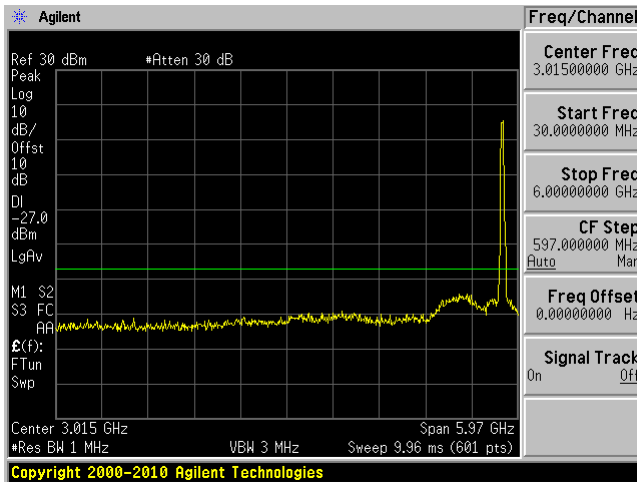


Chain 2, Plot: 6 GHz – 40 GHz

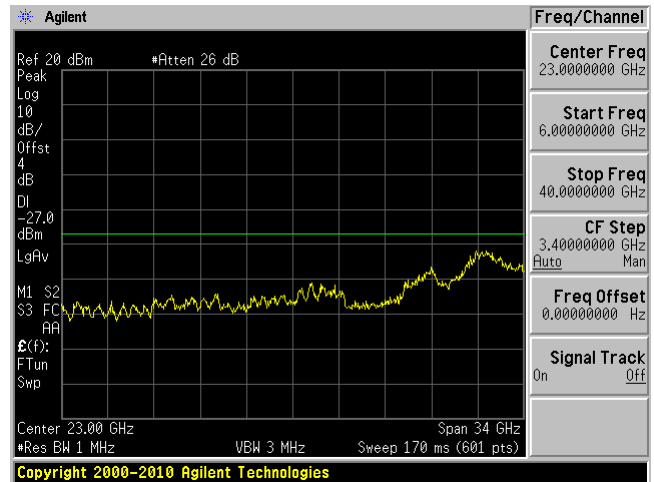


802.11n-HT40, High Channel

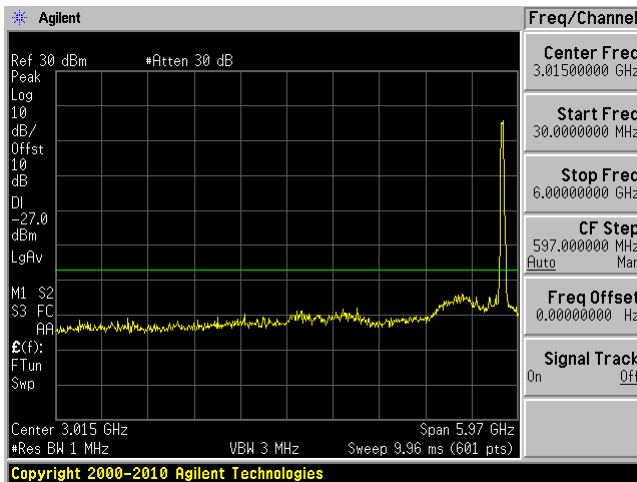
Chain 0, Plot: 30 MHz – 6 GHz



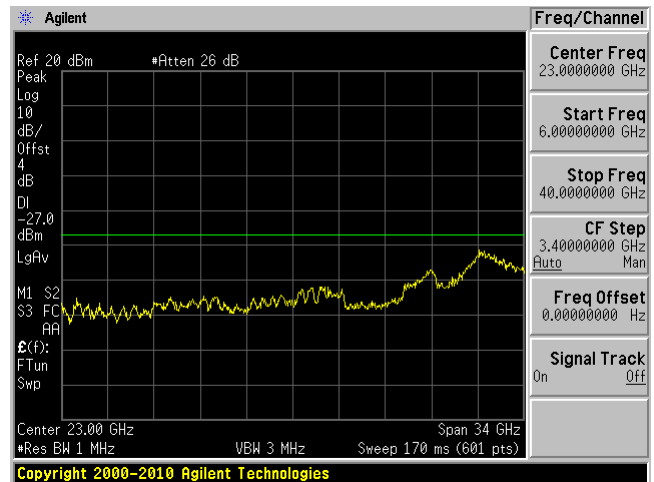
Chain 0, Plot: 6 GHz – 40 GHz



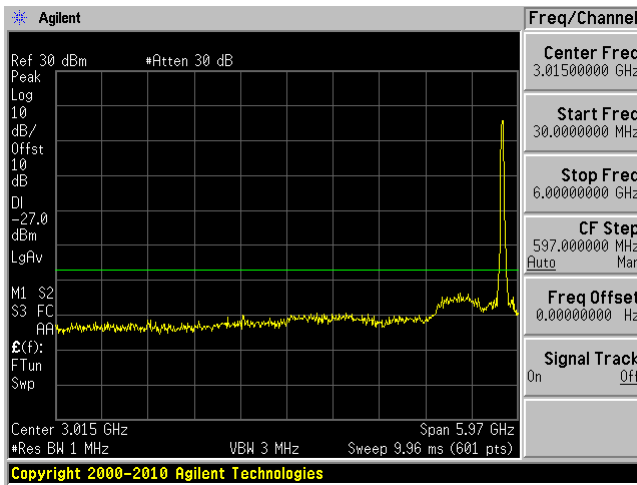
Chain 1, Plot: 30 MHz – 6 GHz



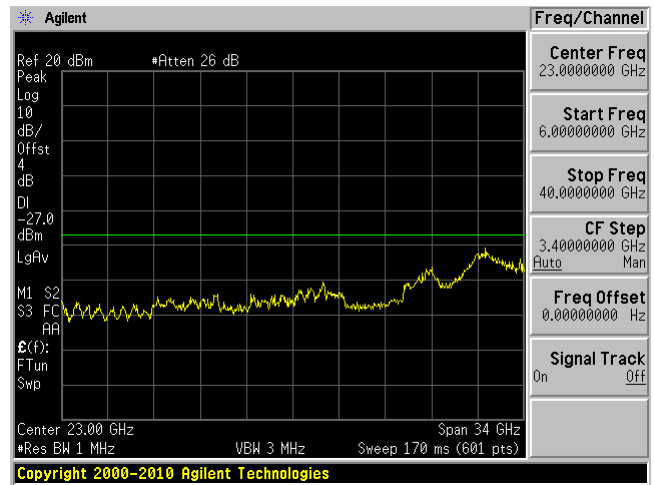
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz



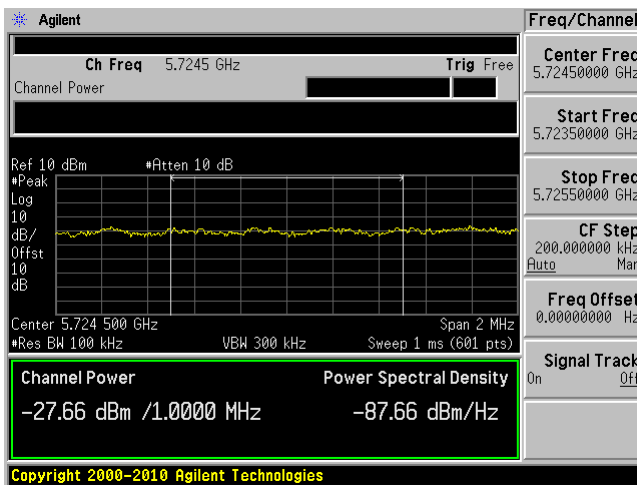
Chain 2, Plot: 6 GHz – 40 GHz



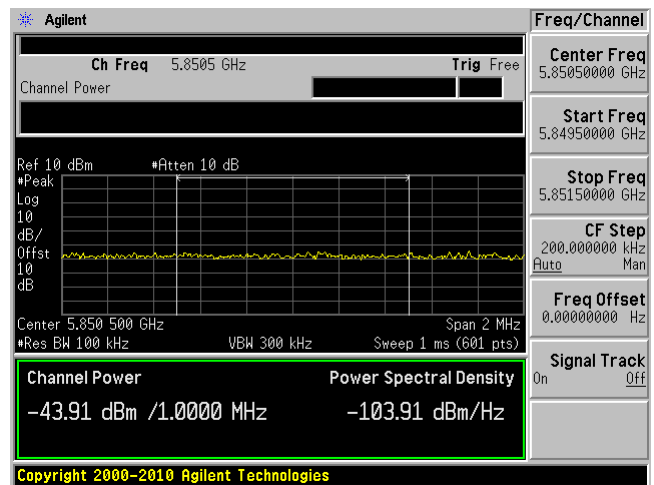
-17 dBm/MHz

802.11n-HT40 mode

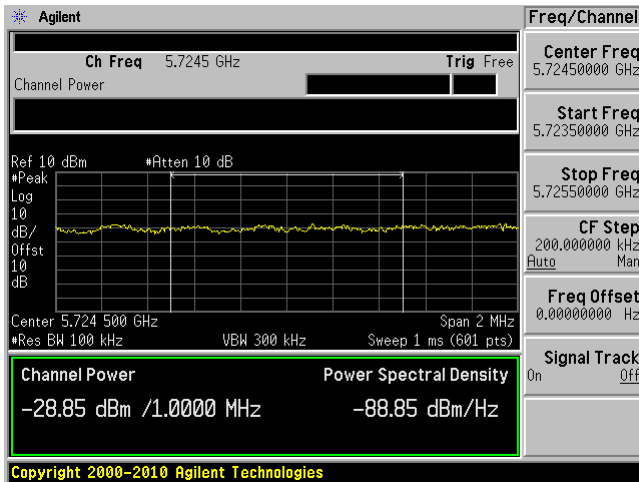
802.1 n HT40, Chain 0 Low Band Edge



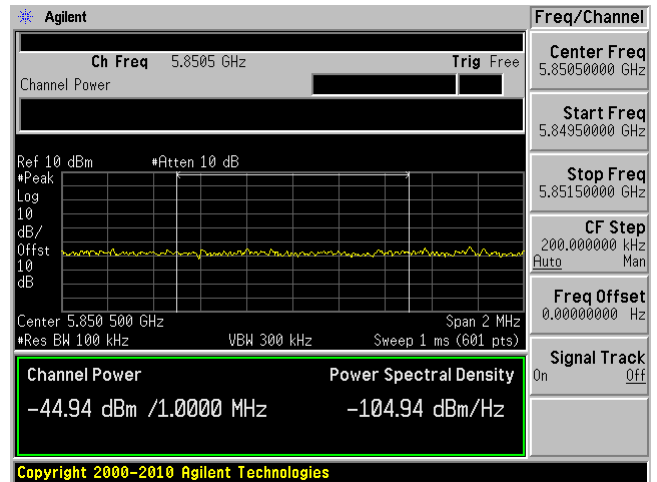
802.11n HT40, Chain 0 High Band Edge



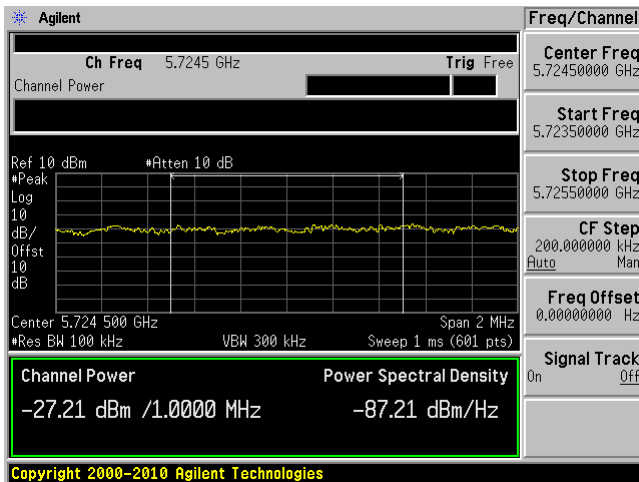
802.11n HT40, Chain 1 Low Band Edge



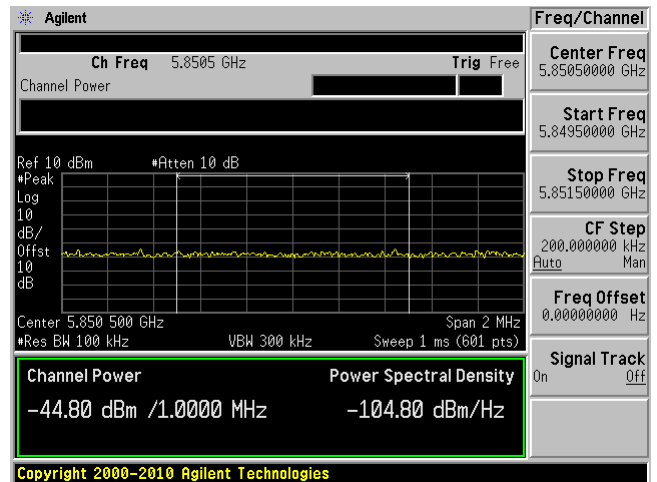
802.11n HT40, Chain 1 High Band Edge



802.11n HT40, Chain 2 Low Band Edge



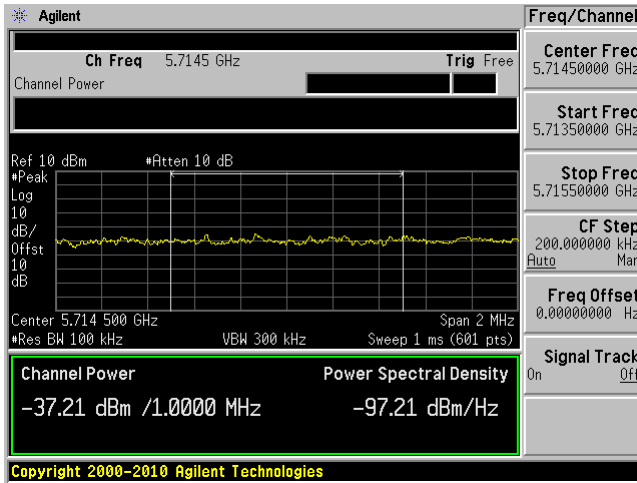
802.11n HT40, Chain 2 High Band Edge



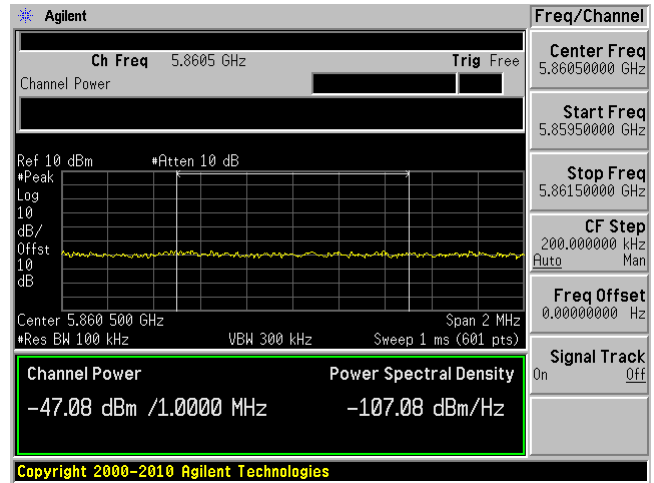
-27 dBm/MHz

802.11n-HT40 mode

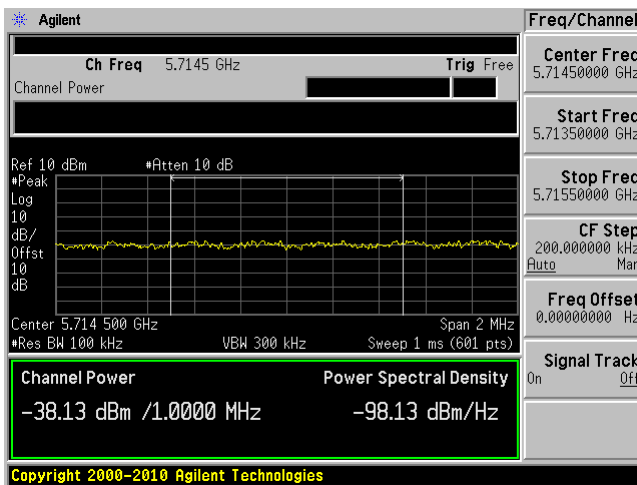
802.11 n HT40, Chain 0 Low Band Edge



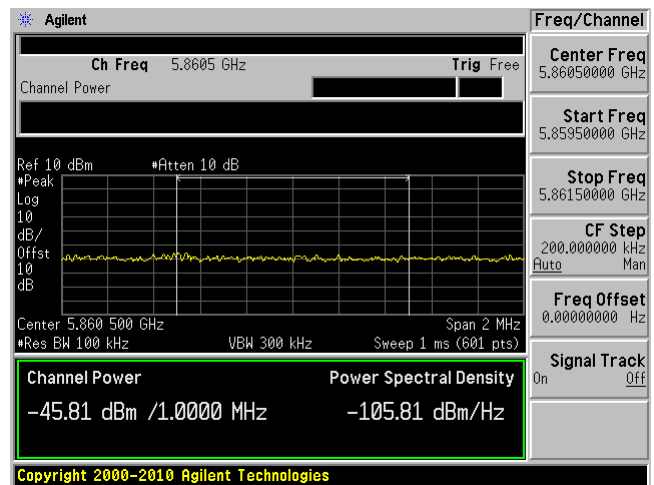
802.11n HT40, Chain 0 High Band Edge



802.11n HT40, Chain 1 Low Band Edge

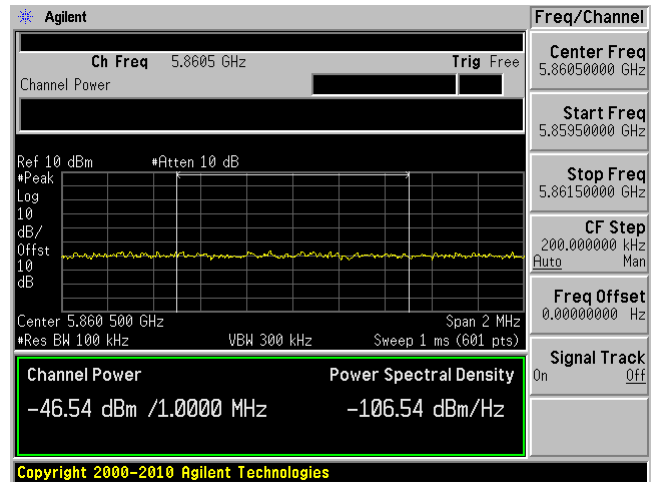
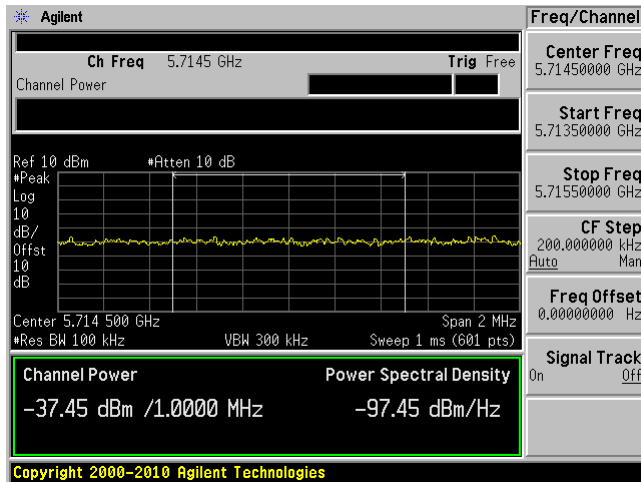


802.11n HT40, Chain 1 High Band Edge



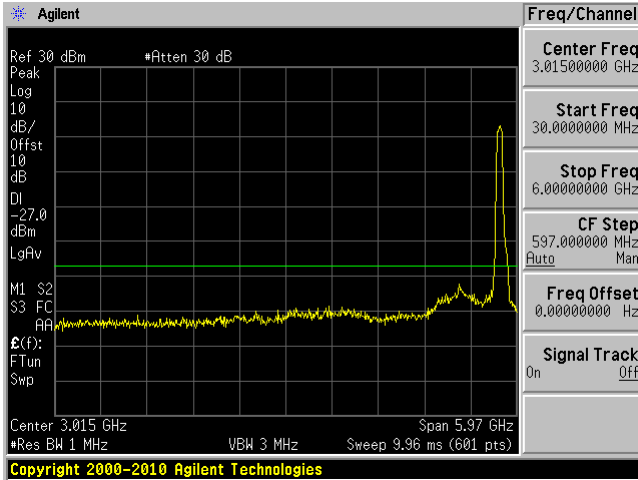
802.11n HT40, Chain 2 Low Band Edge

802.11n HT40, Chain 2 High Band Edge

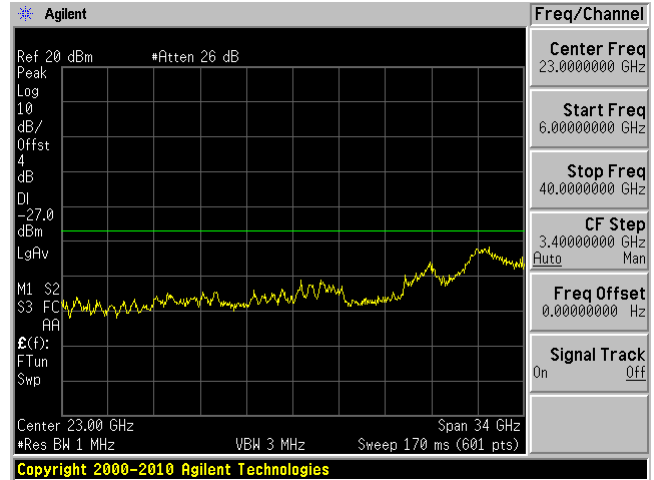


802.11ac 80

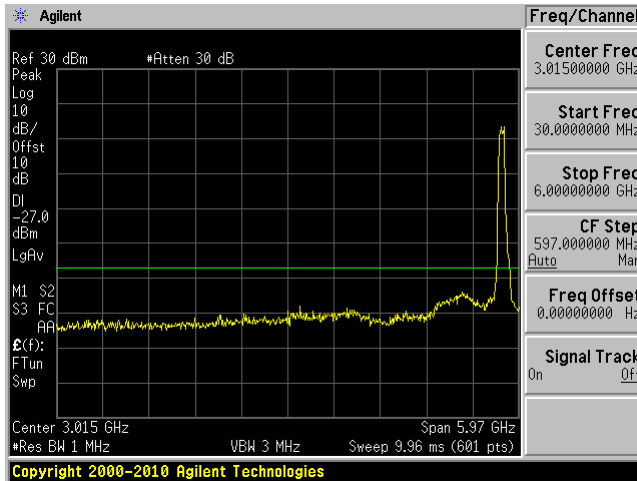
Chain 0, Plot: 30 MHz – 6 GHz



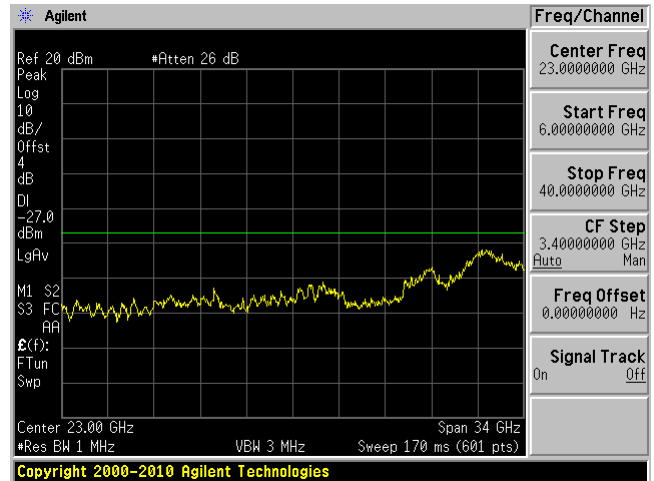
Chain 0, Plot: 6 GHz – 40 GHz



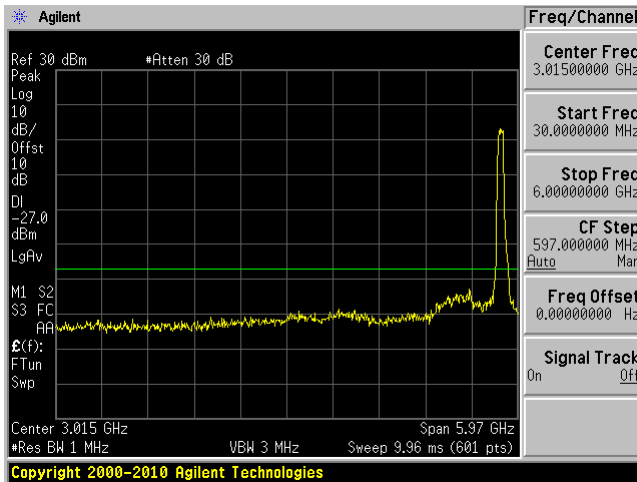
Chain 1, Plot: 30 MHz – 6 GHz



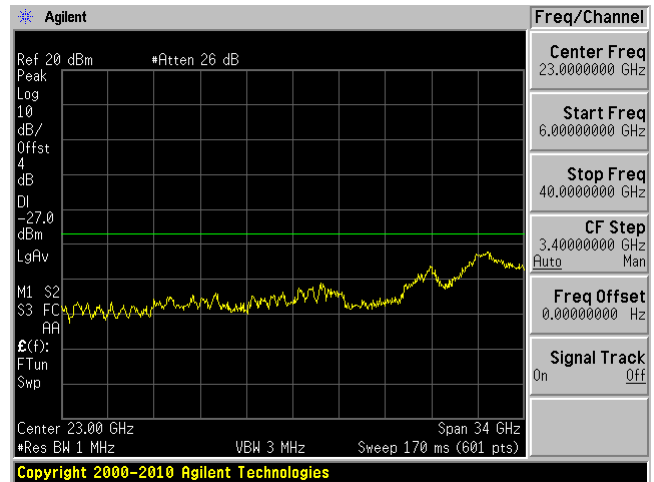
Chain 1, Plot: 6 GHz – 40 GHz



Chain 2, Plot: 30 MHz – 6 GHz



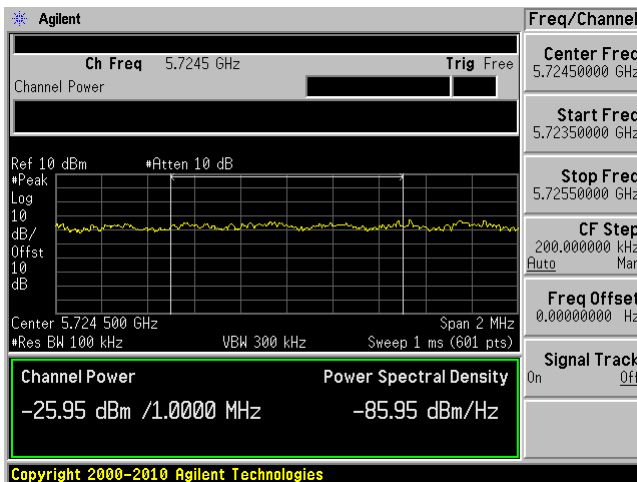
Chain 2, Plot: 6 GHz – 40 GHz



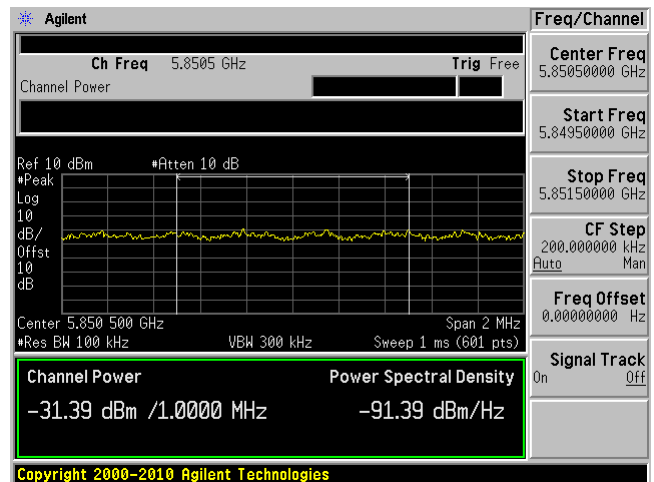
-17 dBm/MHz

802.11ac 80 MHz mode

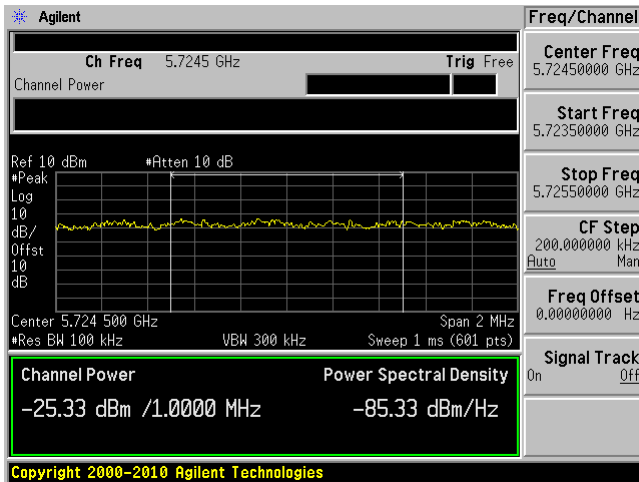
802.11ac 80, Chain 0 Low Band Edge



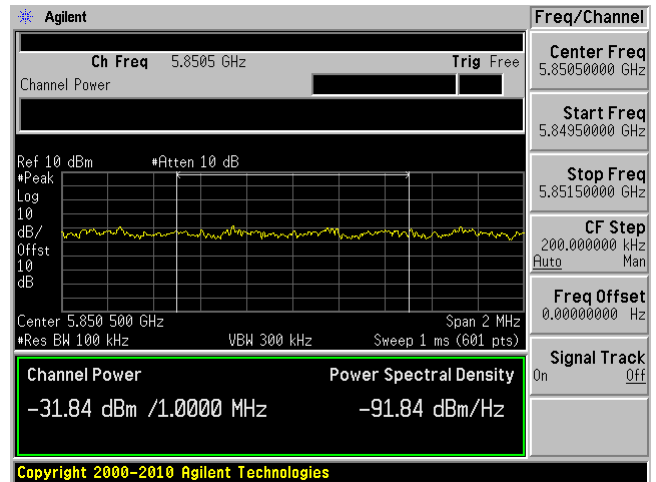
802.11ac 80, Chain 0 High Band Edge



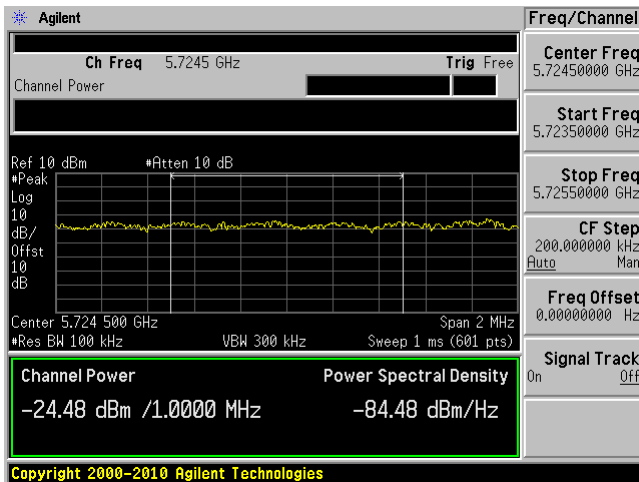
802.11ac 80, Chain 1 Low Band Edge



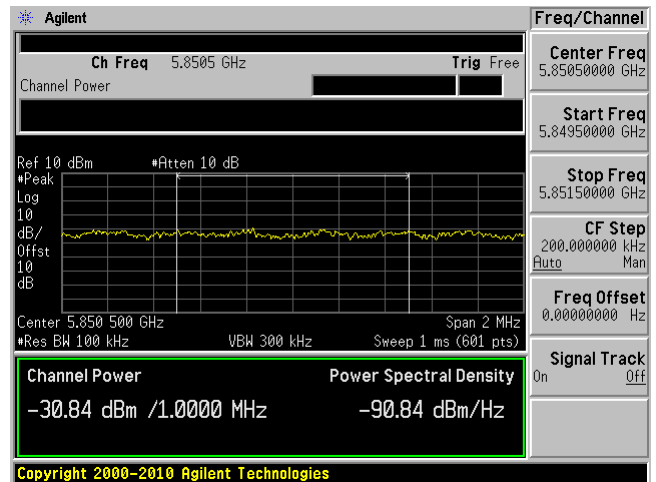
802.11ac 80, Chain 1 High Band Edge



802.11ac 80, Chain 2 Low Band Edge



802.11ac 80, Chain 2 High Band Edge

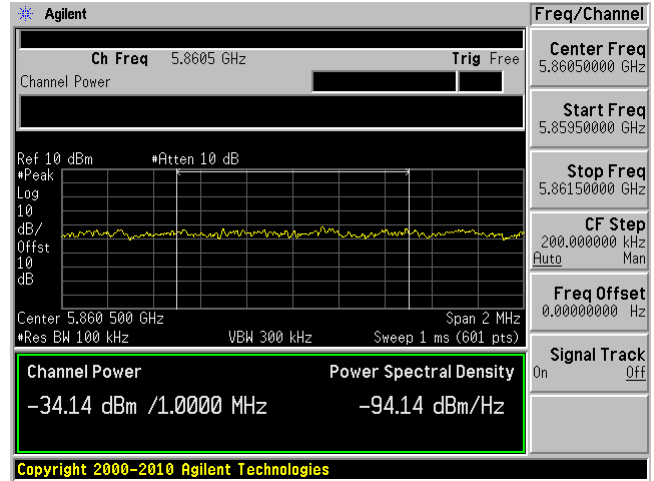
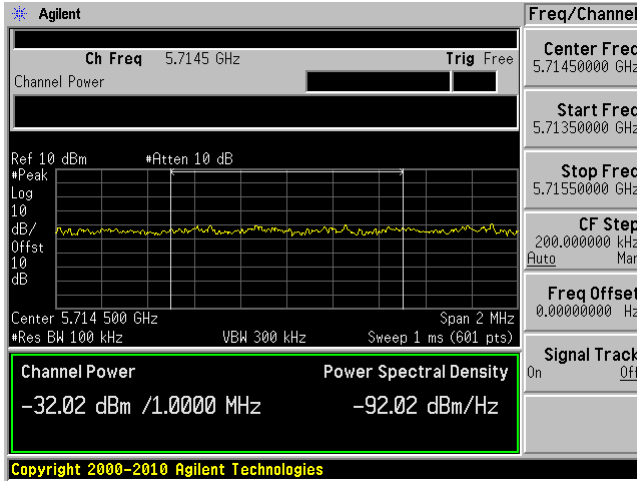


-27 dBm/MHz

802.11ac 80 MHz mode

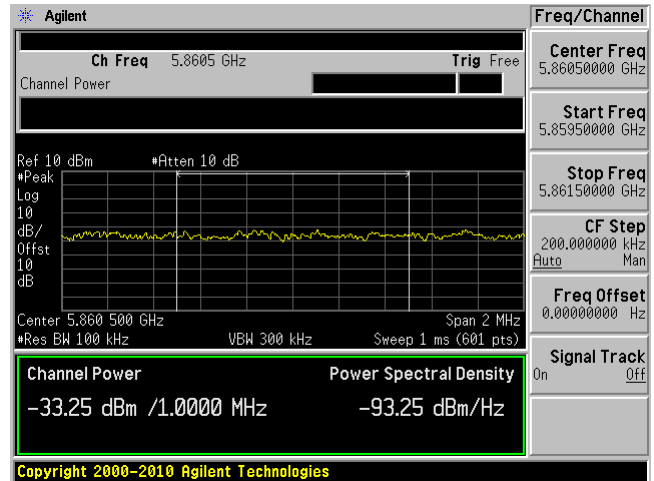
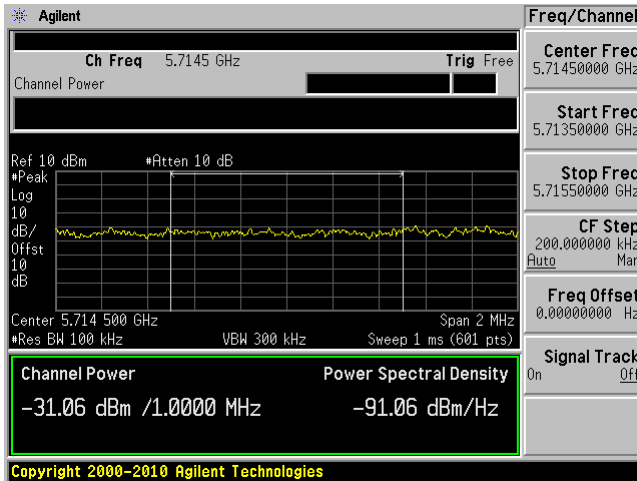
802.11ac 80, Chain 0 Low Band Edge

802.11ac 80, Chain 0 High Band Edge



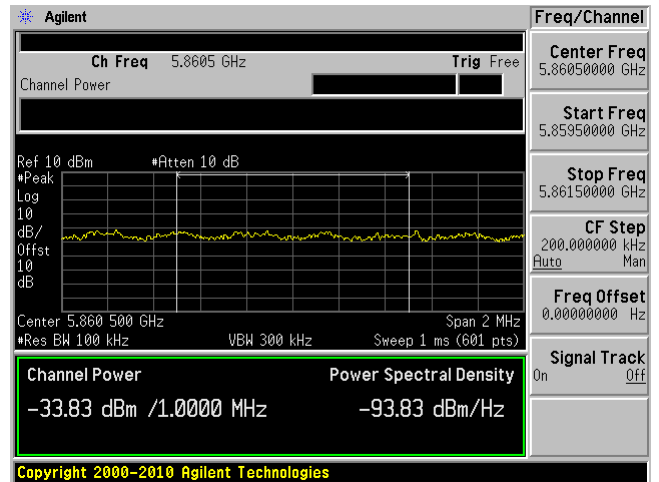
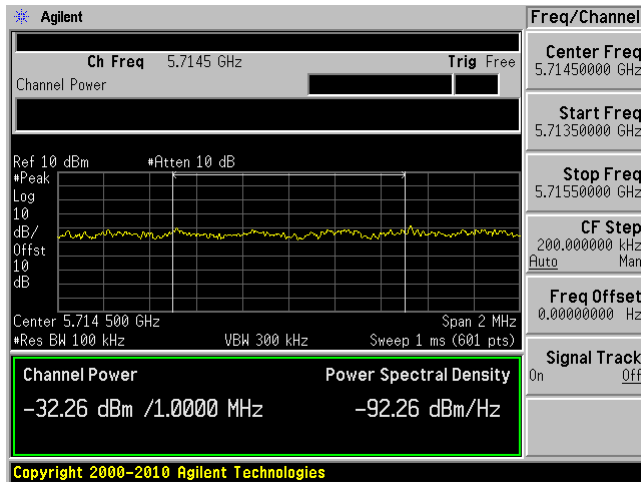
802.11ac 80, Chain 1 Low Band Edge

802.11ac 80, Chain 1 High Band Edge



802.11ac 80, Chain 2 Low Band Edge

802.11ac 80, Chain 2 High Band Edge



11 FCC §15.407(a) - Power Spectral Density

11.1 Applicable Standards

According to FCC §15.407(a)

(1) For the band 5.15-5.25 GHz.

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).

(3) For the band 5.725-5.85 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 30 dBm in any 500-kHz 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.

11.2 Measurement Procedure

The measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section F: Peak power spectral density (PPSD)

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2014-10-24	1 year

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

11.4 Test Environmental Conditions

Temperature:	22-24° C
Relative Humidity:	40-41 %
ATM Pressure:	103.1-104.1 KPa

The testing was performed by ChaoRan Chu from 2015-04-25 at RF site.

11.5 Test Results

Please refer to the following tables and plots.

5.2 GHz Band

802.11a mode:

Frequency (MHz)	Power Spectral Density (dBm)			Total PSD (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5180	8.14	8.724	8.692	13.30	17	-3.70	Target
5200	8.971	8.975	8.995	13.75	17	-3.25	Target
5240	9.059	9.069	9.015	13.82	17	-3.18	Target

802.11n-HT20 mode:

Frequency (MHz)	Power Spectral Density (dBm)			Total PSD (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5180	8.916	8.852	8.965	13.68	17	-3.32	Target
5200	8.807	8.663	8.658	13.48	17	-3.52	Target
5240	8.679	8.672	8.638	13.43	17	-3.57	Target

802.11n-HT40 mode:

Frequency (MHz)	Power Spectral Density (dBm)			Total PSD (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5190	3.799	3.761	3.872	8.58	17	-8.42	Target
5230	4.109	3.815	3.931	8.72	17	-8.28	Target

802.11ac 80 mode:

Frequency (MHz)	Power Spectral Density (dBm)			Total PSD (dBm)	Limit (dBm)	Margin (dB)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5210	0.469	0.603	0.443	5.28	17	-11.72	Target

5.8 GHz Band

802.11a Mode:

Frequency (MHz)	Power Spectral Density (dBm)			Factor	Total PSD (dBm)	Limit (dBm)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5745	1.193	1.986	1.084	6.99	13.2	30	24
5785	0.106	1.209	0.569	6.99	12.41	30	24
5825	0.132	0.617	0.071	6.99	12.04	30	24

802.11n HT20 Mode:

Frequency (MHz)	Power Spectral Density (dBm)			Factor	Total PSD (dBm)	Limit (dBm)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5745	0.353	1.43	0.21	6.99	12.46	30	24
5785	0.392	0.242	0.384	6.99	12.10	30	24
5825	-0.339	0.385	0.041	6.99	11.80	30	24

802.11n HT40 Mode:

Frequency (MHz)	Power Spectral Density (dBm)			Factor	Total PSD (dBm)	Limit (dBm)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5755	-0.921	-2.152	-2.671	6.99	9.91	30	24
5795	-3.703	-2.92	-2.763	6.99	8.65	30	24

802.11ac 80 MHz Mode

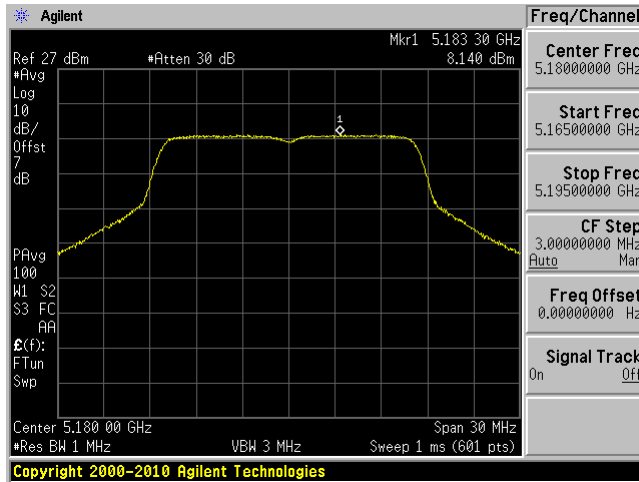
Frequency (MHz)	Power Spectral Density (dBm)			Factor	Total PSD (dBm)	Limit (dBm)	Software Power Setting
	Chain 0	Chain 1	Chain 2				
5775	-6.378	-5.949	-5.332	6.99	5.9	30	25

Note: The PSA's RBW=100kHz and a $10 \cdot \log(5)$ factor is added to compare the limit as 30 dBm/500 kHz for W58 Band.

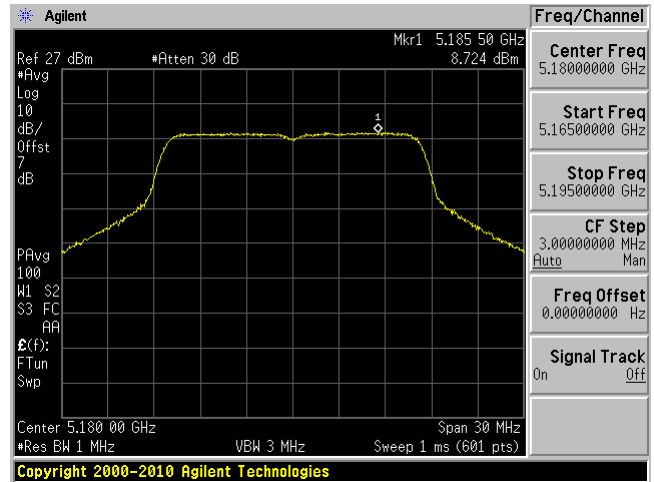
5.2 GHz Band

802.11a mode

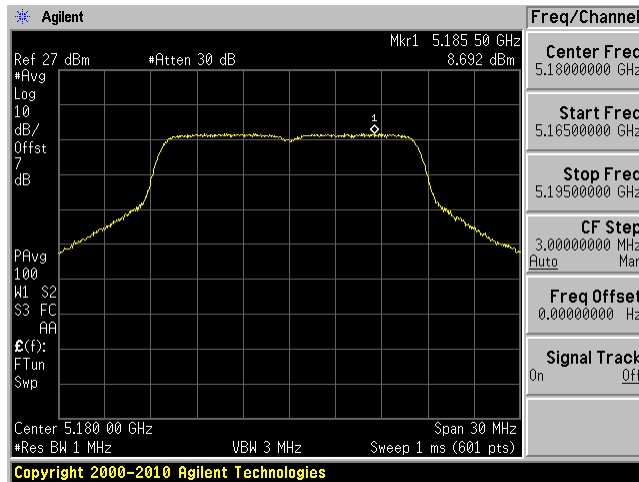
Low channel: Chain 0



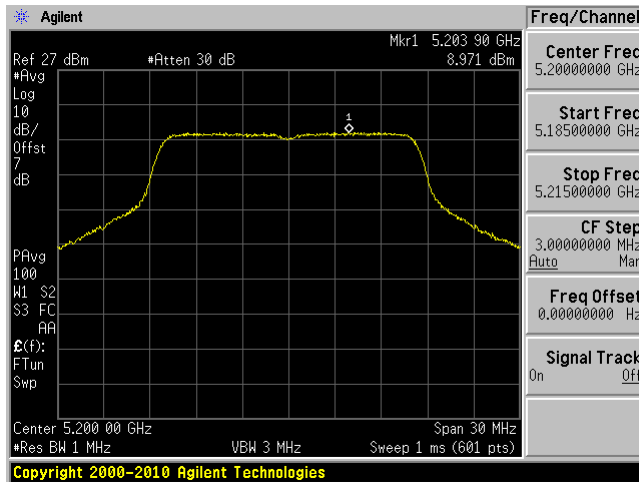
Low channel: Chain 1



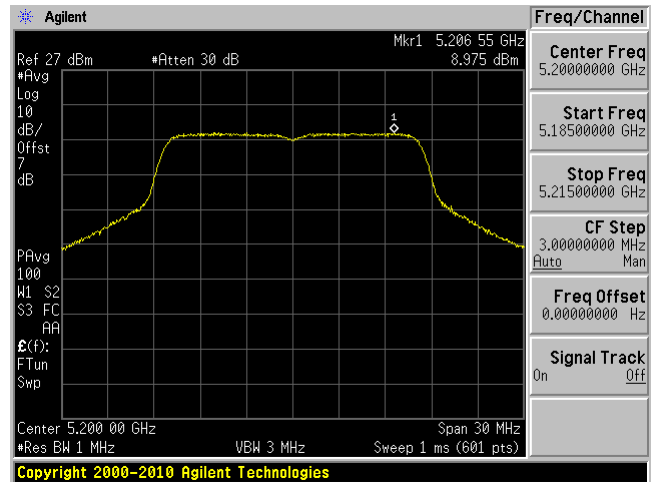
Low Channel: Chain 2



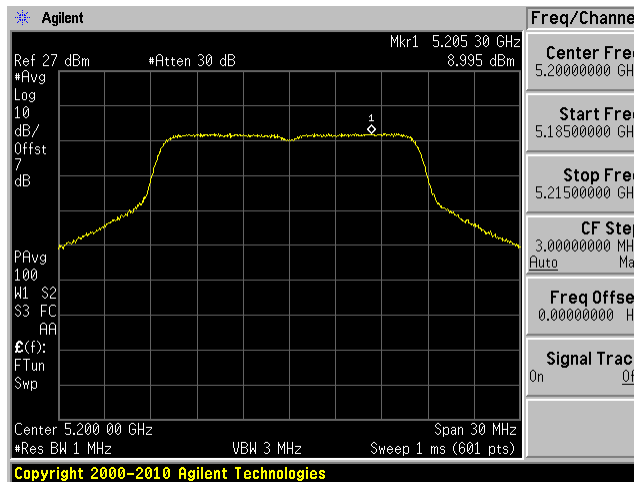
Middle channel: Chain 0



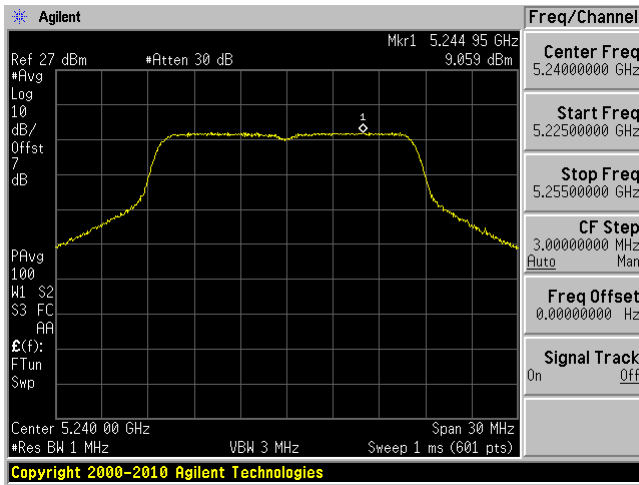
Middle channel: Chain 1



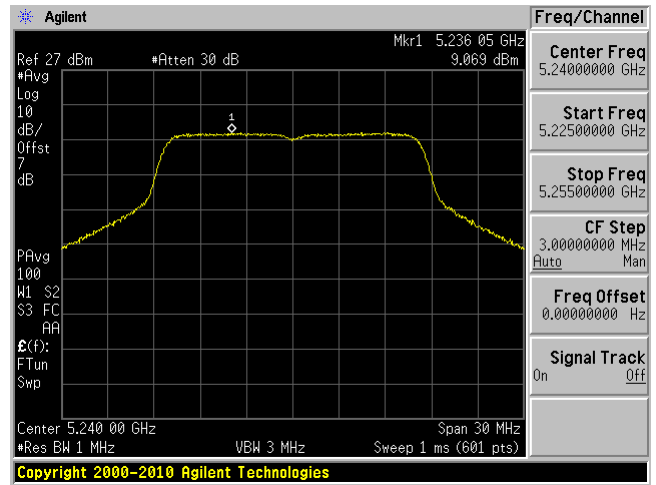
Middle Channel: Chain 2



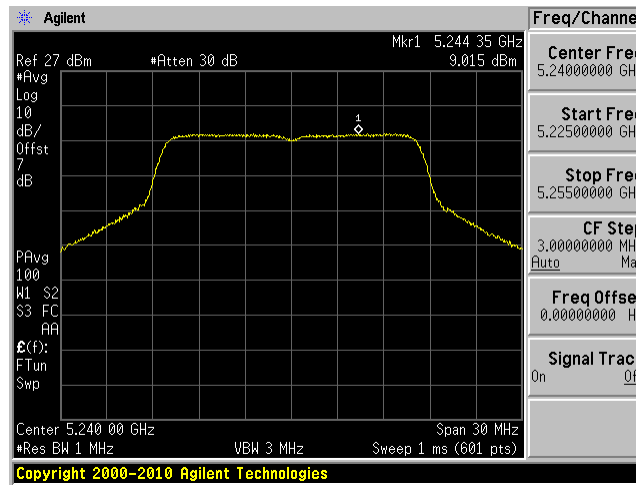
High channel: Chain 0



High channel: Chain 1

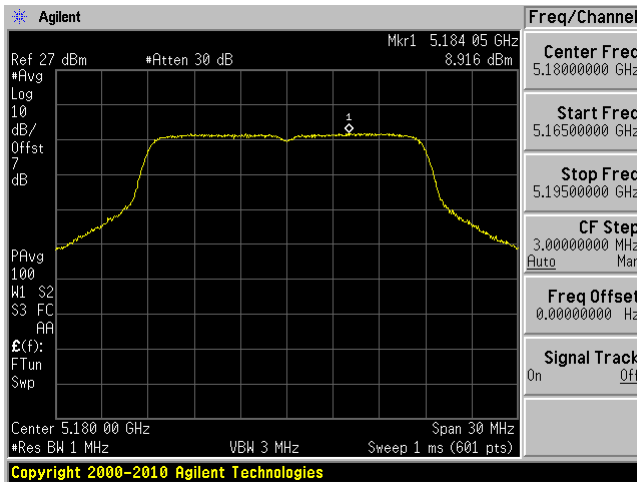


High Channel: Chain 2

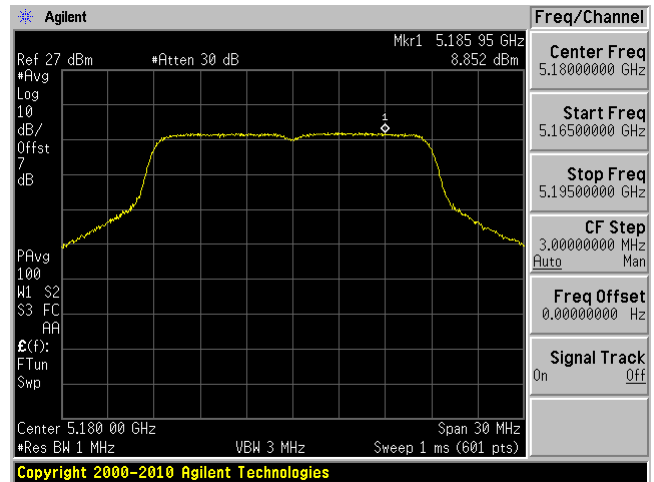


802.11n-HT20 mode

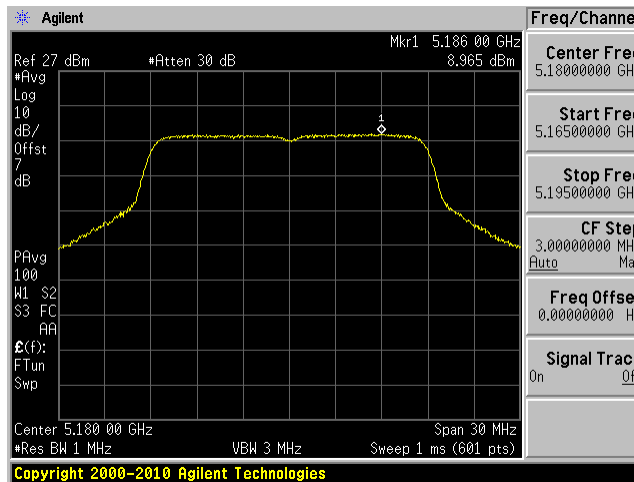
Low channel: Chain 0



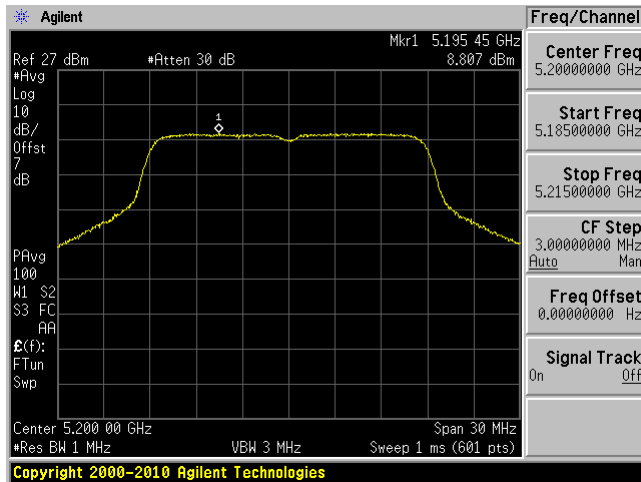
Low channel: Chain 1



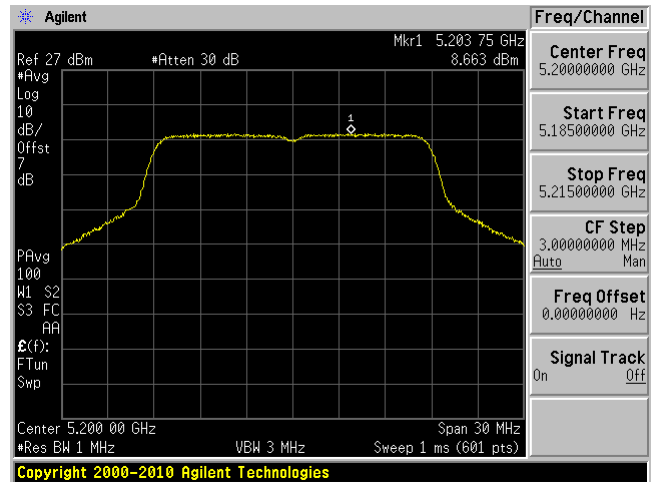
Low Channel: Chain 2



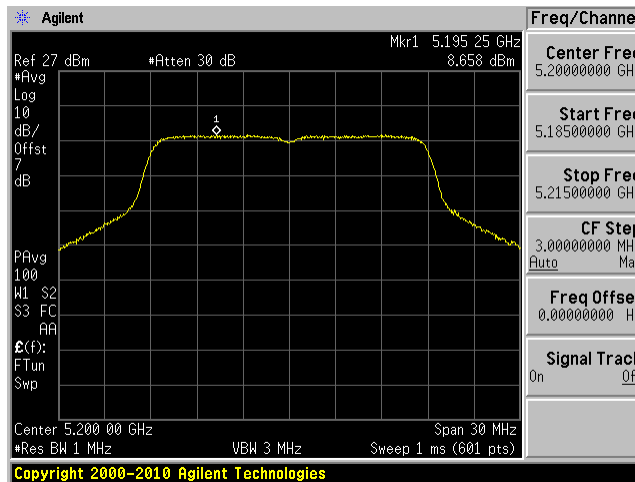
Middle channel: Chain 0



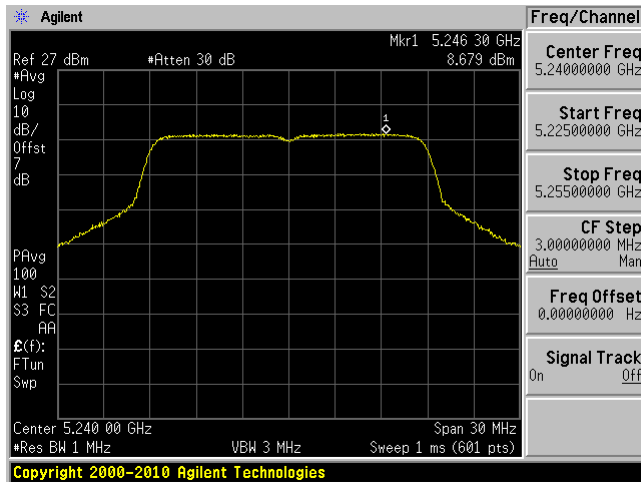
Middle channel: Chain 1



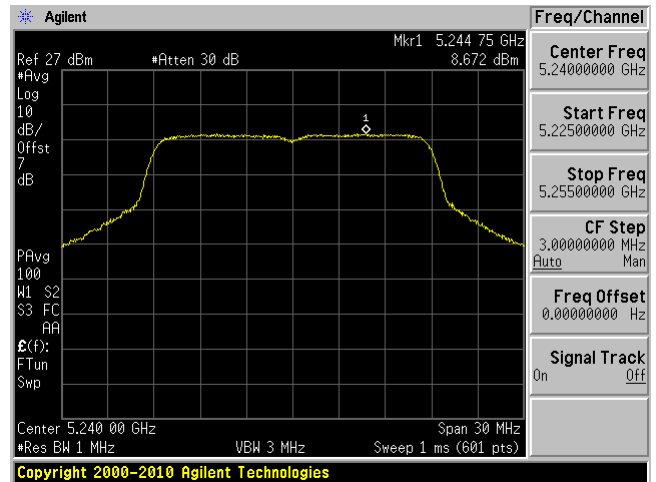
Middle Channel: Chain 2



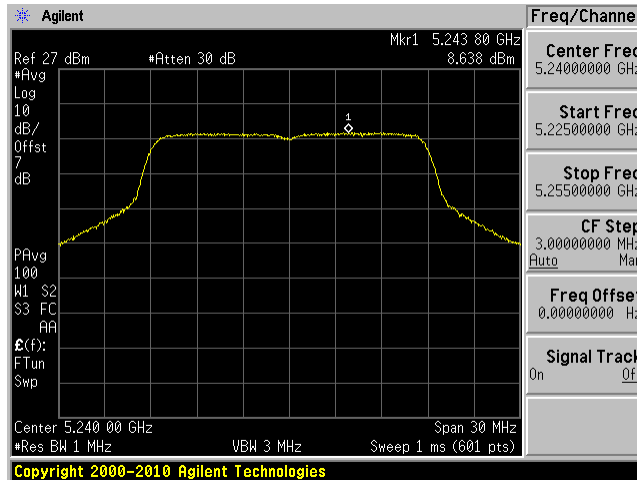
High channel: Chain 0



High channel: Chain 1

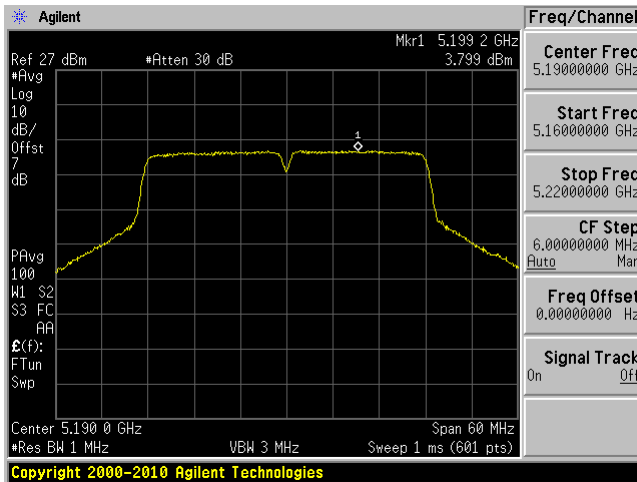


High Channel: Chain 2

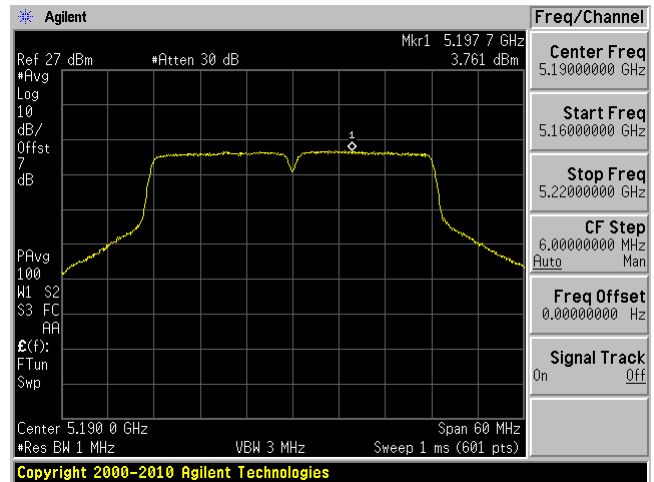


802.11n-HT40 mode

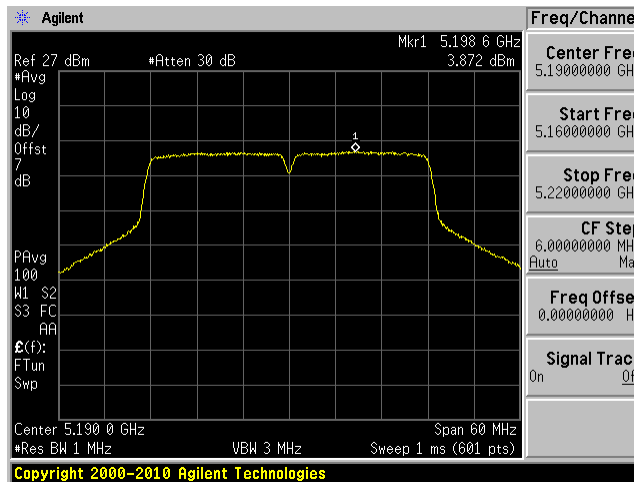
Low channel: Chain 0



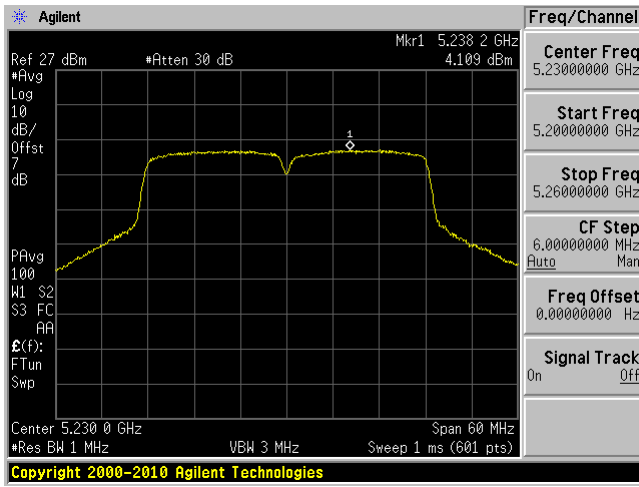
Low channel: Chain 1



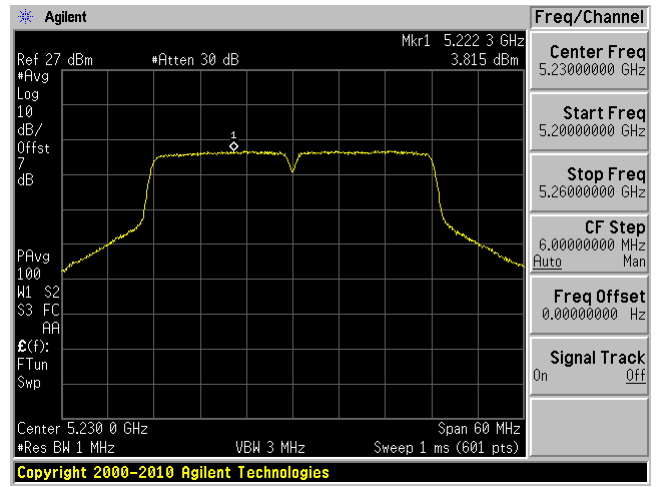
Low Channel: Chain 2



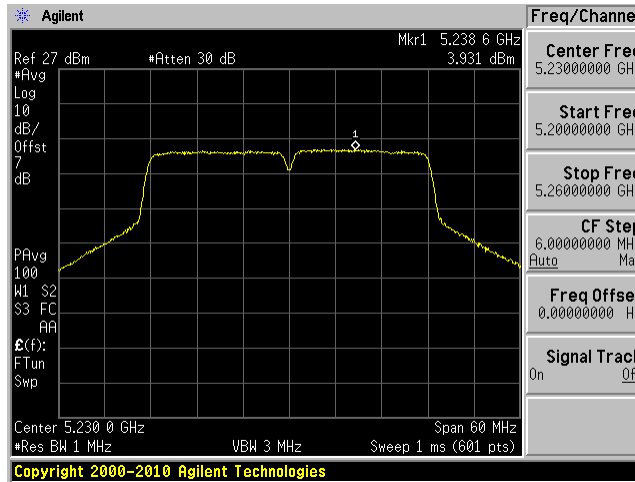
High channel: Chain 0



High channel: Chain 1

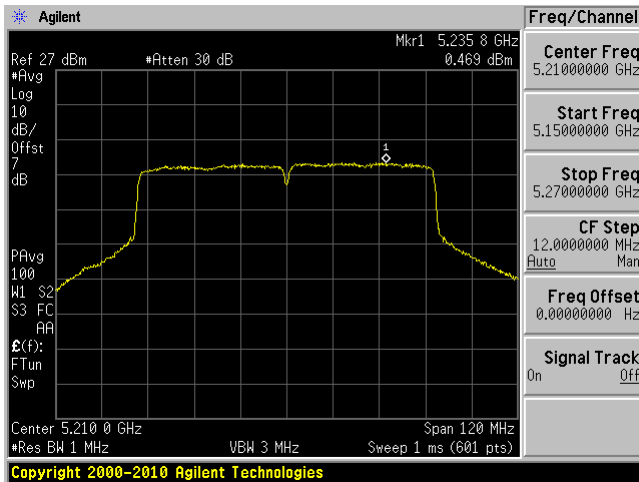


High Channel: Chain 2

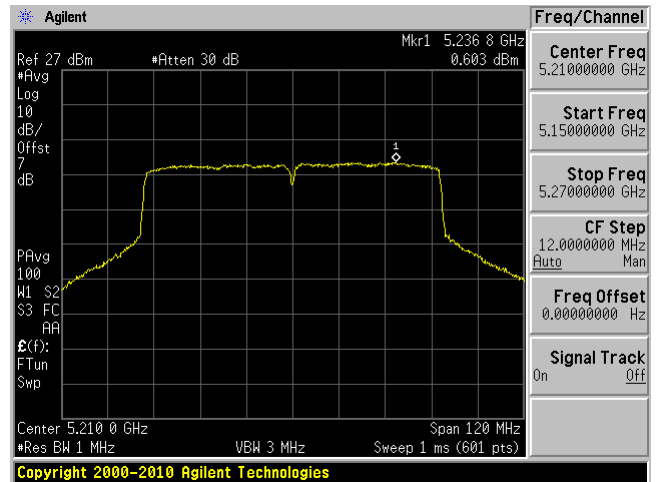


802.11 ac 80 mode

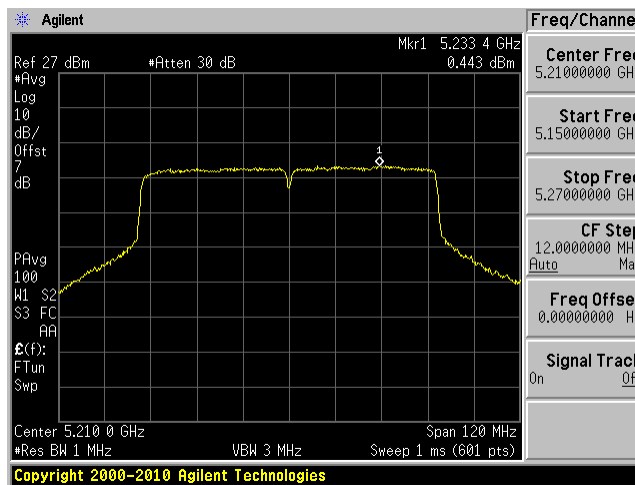
Chain 0



Chain 1

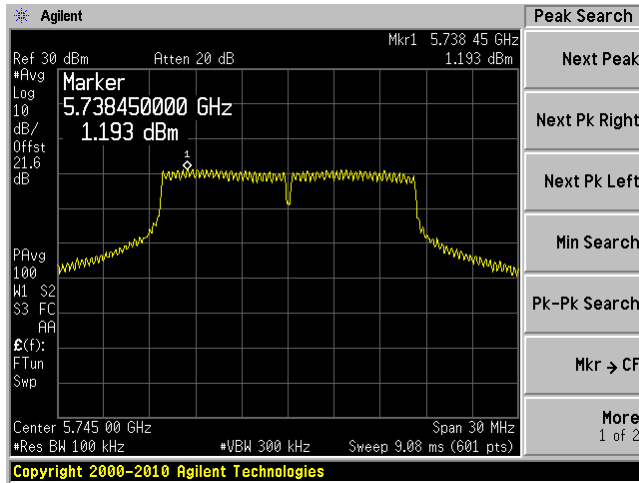


Chain 2

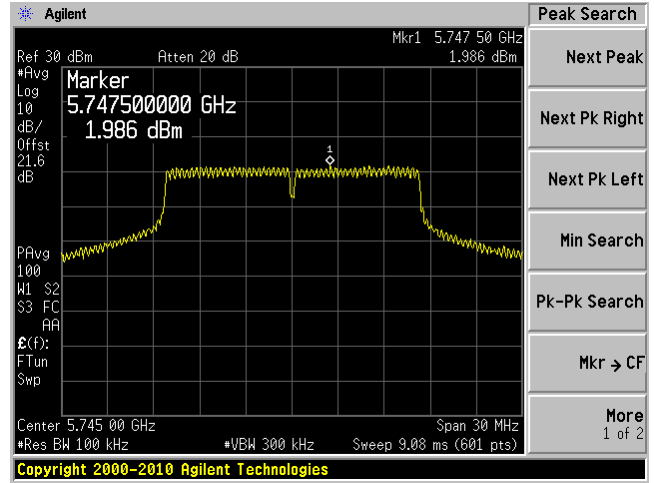


5.8 GHz Band 802.11a mode

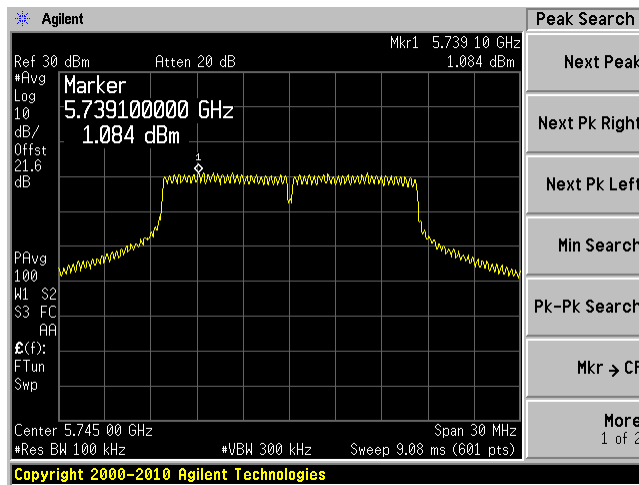
Low channel: Chain 0



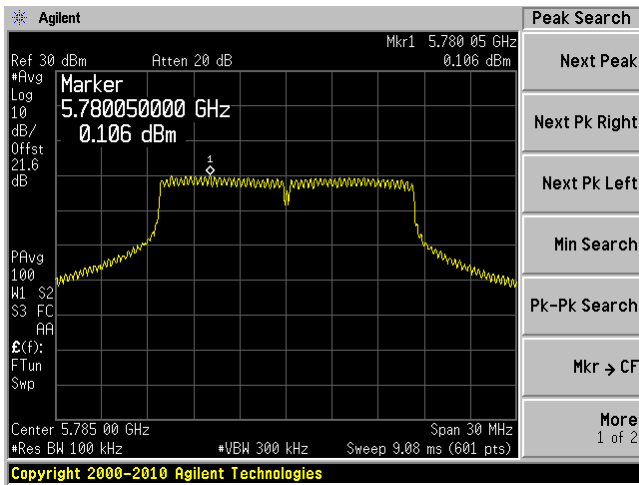
Low channel: Chain 1



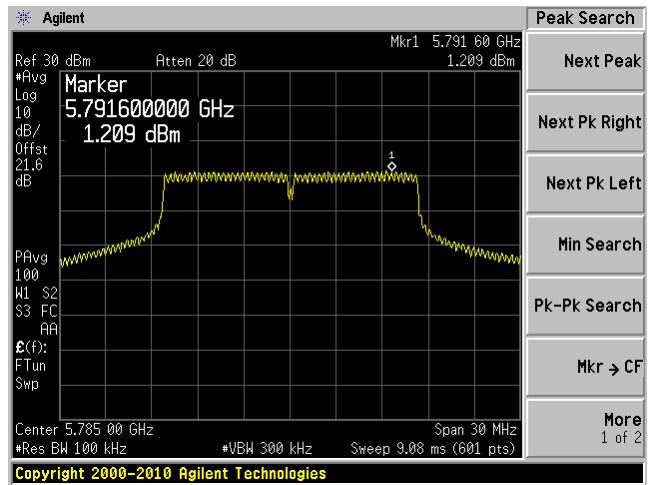
Low Channel: Chain 2



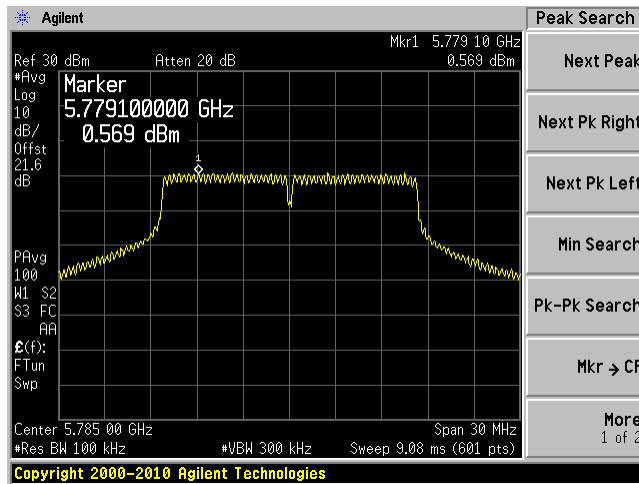
Middle channel: Chain 0



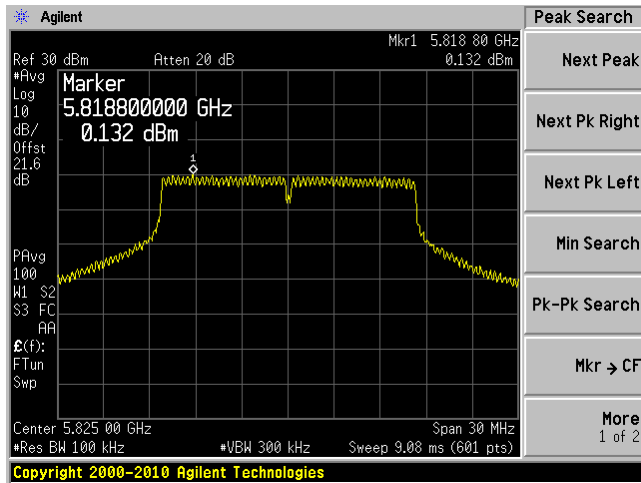
Middle channel: Chain 1



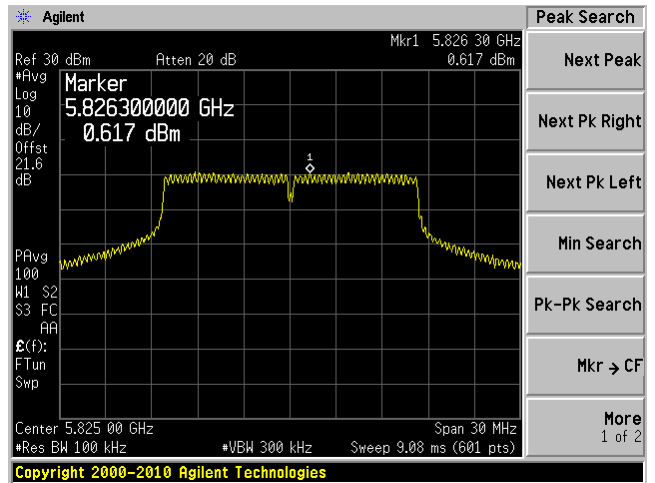
Middle Channel: Chain 2



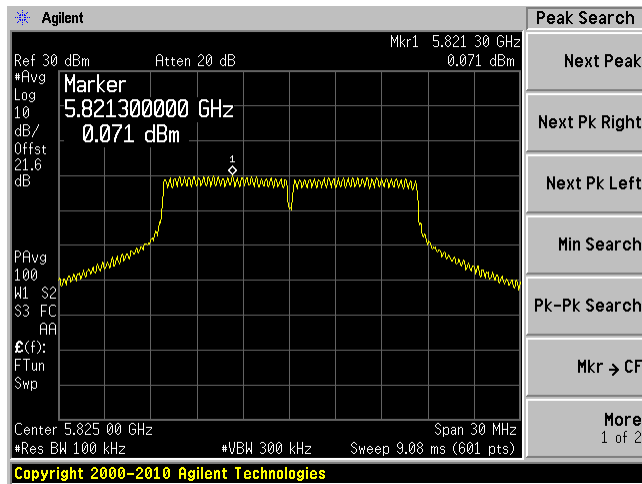
High channel: Chain 0



High channel: Chain 1

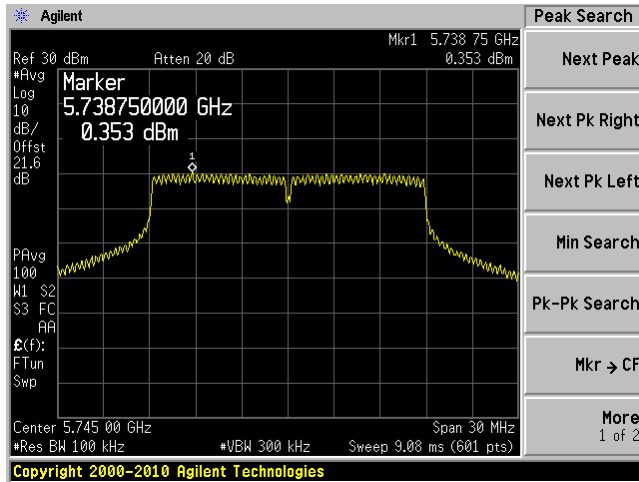


High Channel: Chain 2

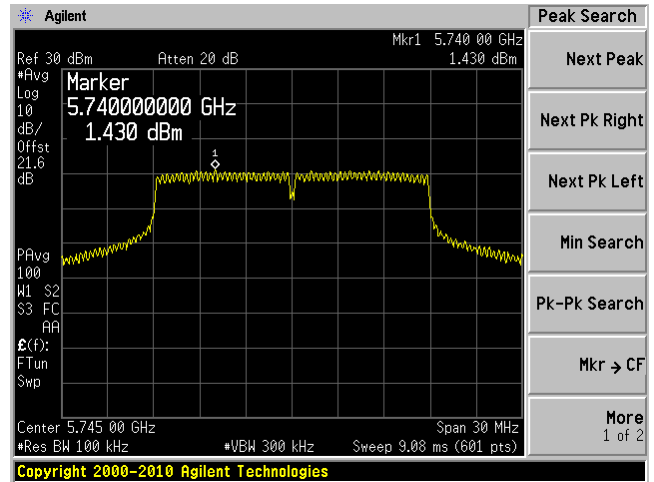


802.11n-HT20 mode

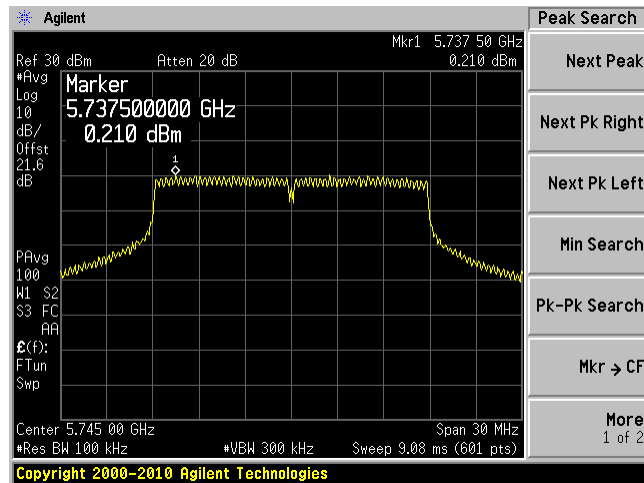
Low channel: Chain 0



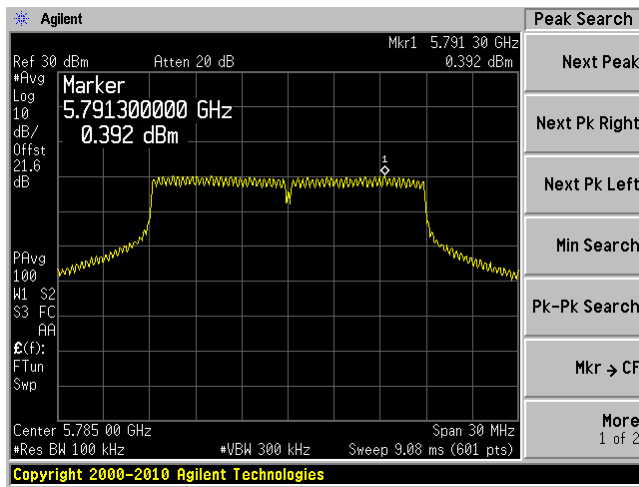
Low channel: Chain 1



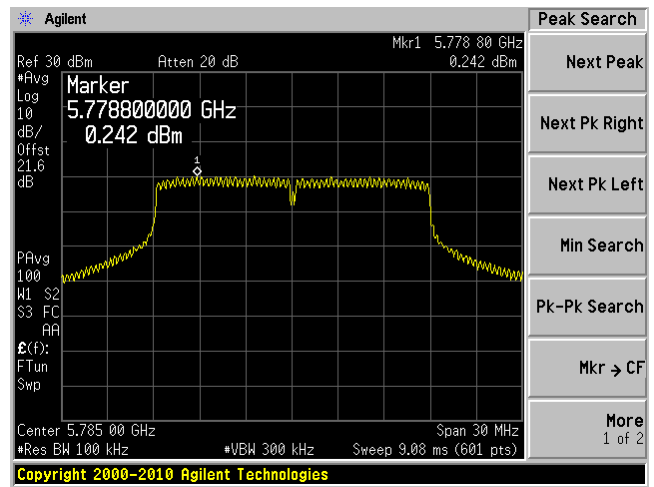
Low Channel: Chain 2



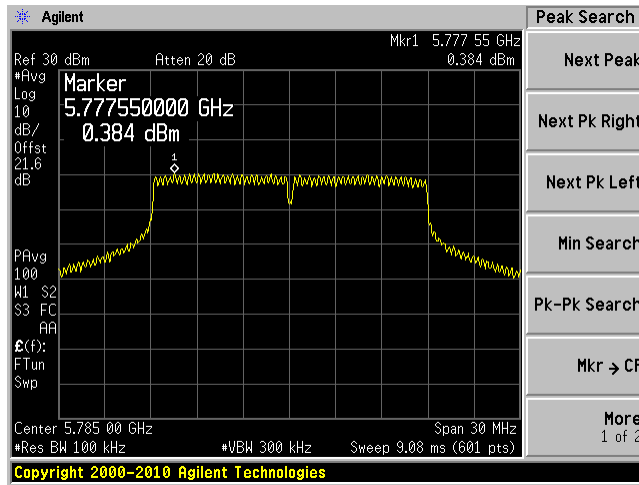
Middle channel: Chain 0



Middle channel: Chain 1

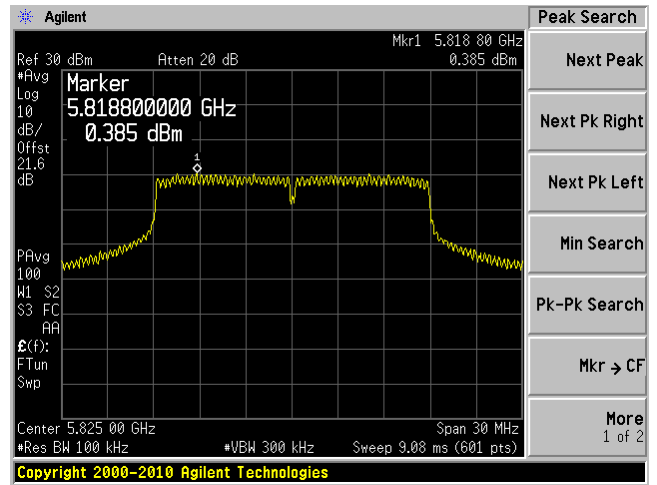
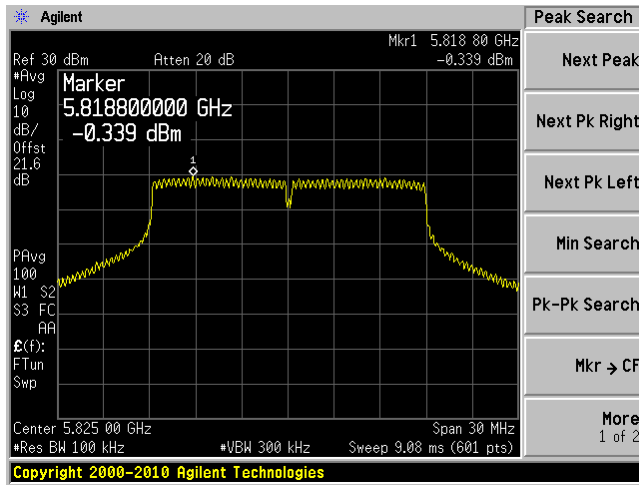


Middle Channel: Chain 2

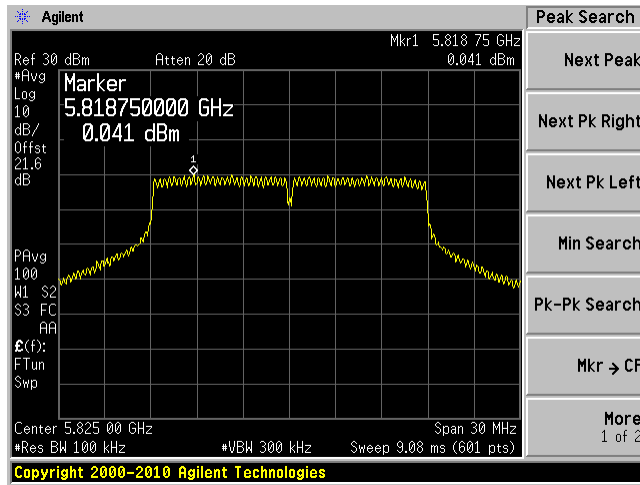


High channel: Chain 0

High channel: Chain 1

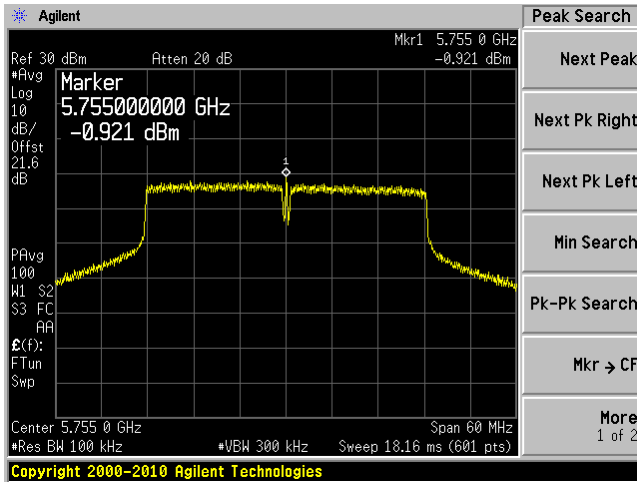


High Channel: Chain 2

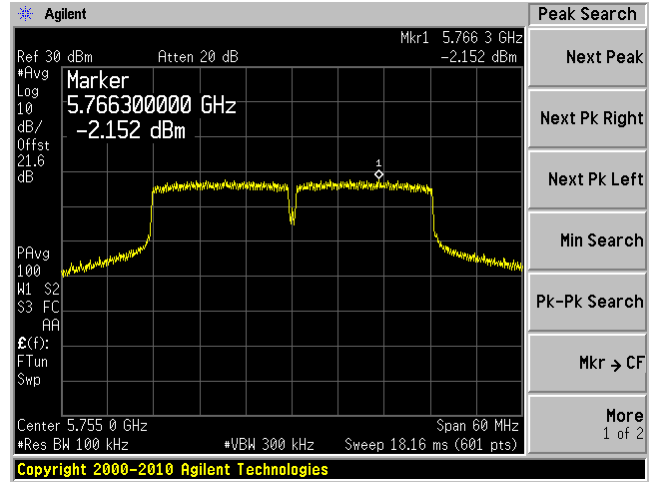


802.11n-HT40 mode

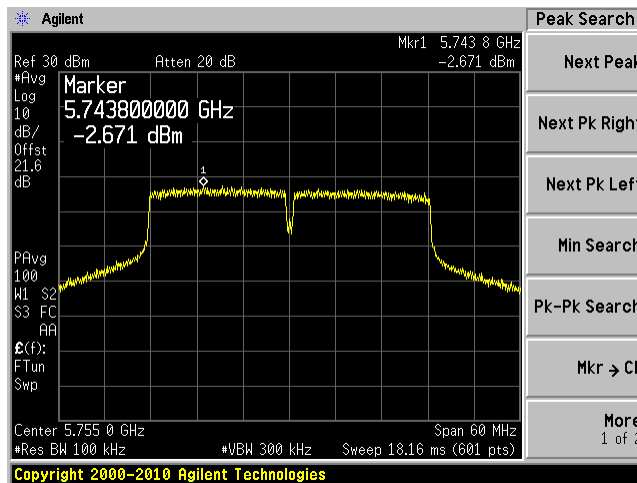
Low channel: Chain 0



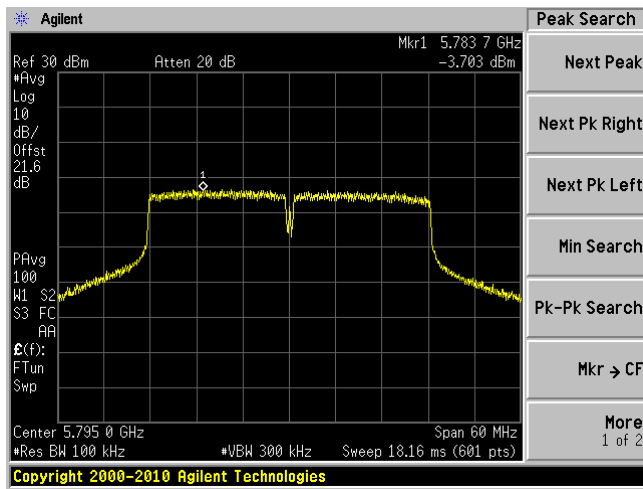
Low channel: Chain 1



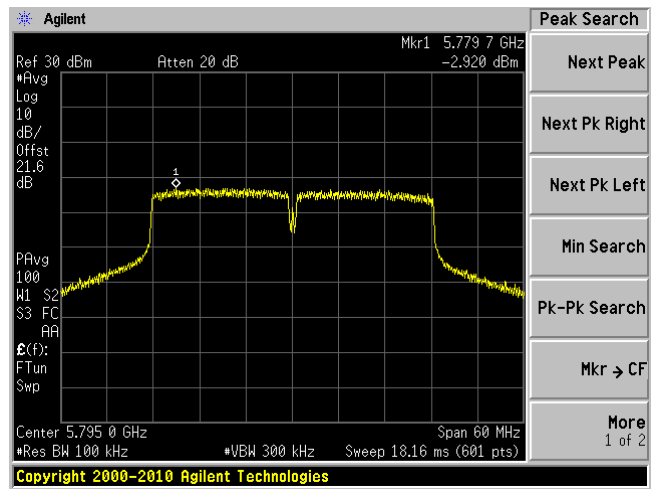
Low Channel: Chain 2



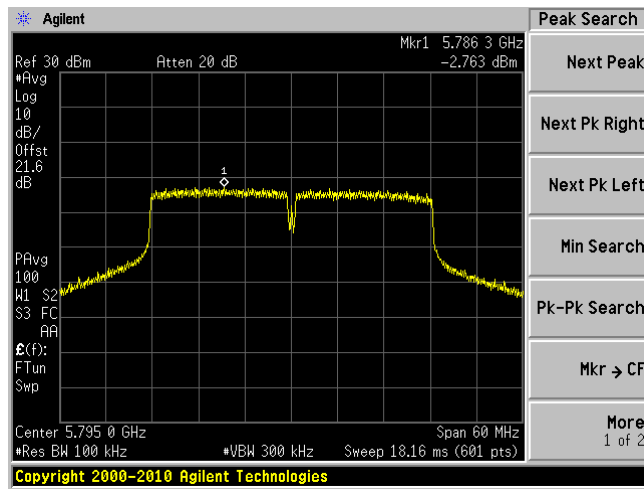
High channel: Chain 0



High channel: Chain 1

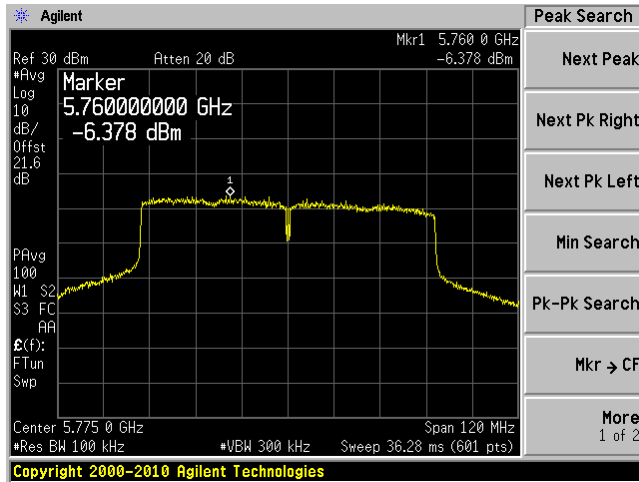


High Channel: Chain 2

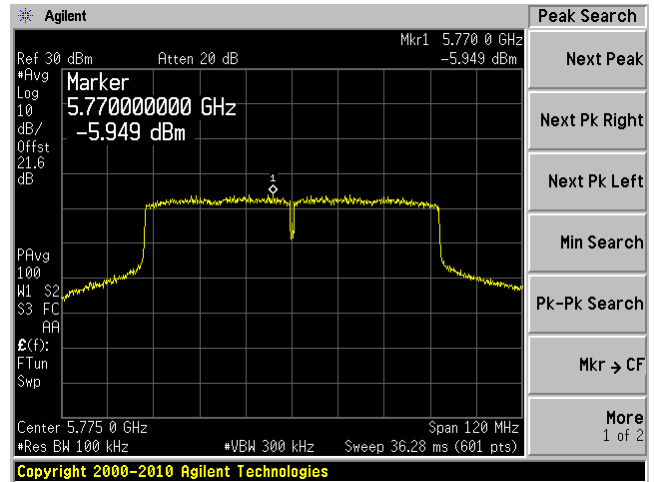


802.11ac 80 MHz mode

Chain 0



Chain 1



Chain 2

