



FCC PART 15.407
IC RSS-210, ISSUE 8, DEC 2010
TEST AND MEASUREMENT REPORT

For

Ruckus Wireless, Inc.

350 West Java Drive, Sunnyvale, CA 94089, USA

FCC ID: S9GT504
IC: 5912A-T504

Report Type: Original Report	Product Type: 802.11a/b/g/n/ac Access Point
Prepared By: Rui Zhou 	
Report Number: R1409183-407 W53W56	
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Reviewed By: Bo Li  RF Lead	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164	

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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" ...

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1409183-407 W53W56	Initial	2015-02-18

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: S9GT504, IC: 5912A-T504 or the “EUT” as referred to in this report. The EUT is an 802.11a/b/g/n/ac access point.

1.2 Mechanical Description of EUT

The EUT measures approximately 394 mm (L) x 216 mm (W) x 68 mm (H) and weighs approximately 2.5 kg.

The test data gathered are from typical production sample, serial number: 25140600007

1.3 Objective

This report is prepared on behalf of *Ruckus Wireless, Inc.*, in accordance with FCC CFR47 §15.407 and IC RSS-210 Issue 8, Dec 2010.

This project is a Permissive Change II submission for the purpose of adding DFS frequency bands (5250-5350 MHz; 5470-5725 MHz) to the certified device (FCC ID: S9GT300). The objective is to determine compliance with FCC/IC rules for Antenna Requirements, AC Line Conducted Emissions, Occupied Bandwidth, Maximum Peak Output Power, Power Spectral Density, Radiated and Conducted Spurious Emissions, and Band Edge for adding DFS bands 5250-5350 MHz and 5470-5725 MHz.

1.4 Related Submittal(s)/Grant(s)

N/A

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 C63.10-2009.

2.2 EUT Exercise Software

The test utility used was *T504 ART* was provided by Ruckus Wireless Inc., and was verified by *Rui Zhou* 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

Manufacturer	Description	Model	Serial Number
Ruckus	Main Board (SANTORINI)	ASM 120-11266-001 rev.3.1	RUK03828
Ruckus	PCB Board 2	2PB-C30600B0MWR	-
Ruckus	PCB Board 3	FAQ 100-11273-001REV 3	-
Ruckus	PCB Borad 4	10007275 REV E	-

2.7 Interface Ports and Cables

Cable Description	Length (m)	From	To
Ethernet Cable	1m	Laptop	EUT
RF Cable x2	<1m	EUT	PSA

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
Ruckus	AC Power Supply	MPBS-12020000	740-64129-011

3 Summary of Test Results

FCC & IC Rules	Description of Test	Result
FCC §15.407(f), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207 IC RSS-Gen §7.2.4	AC Power Line Conducted Emissions	Compliant
FCC §15.209(a), 15.407(b) IC RSS-210 §A9.2	Spurious Radiated Emissions	Compliant
FCC §15.407(a) IC RSS-210 §A9.2	26 dB and 99% Emission Bandwidth	Compliant
FCC §407(a)(1) IC RSS-210 §A9.2	Output Power Measurement	Compliant
FCC §15.407(a)(1) IC RSS-210 §A9.2	Power Spectral Density	Compliant
IC RSS-210 §2.3 IC RSS-Gen §6	Receiver Spurious Radiated Emissions	Compliant
FCC §2.1051, §15.407(b) IC RSS-210 §A9.2	Spurious Emissions at Antenna Terminals	Compliant
FCC §15.407(h) IC RSS-210 §A9.3	DFS	Compliant ¹

Note: Compliant¹: Please refer to DFS report R1409183-DFS by Bay Area Compliance Lab.

4 FCC §2.1091, §15.407(f) & IC RSS-102 - RF Exposure

4.1 Applicable Standards

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

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF fields.

According to IC RSS-102 Issue 2 section 4.1, RF limits used for general public will be applied to the EUT.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Time Averaging (minutes)
0.003 - 1	280	2.19	-	6
1 - 10	280 / f	2.19 / f	-	6
10 - 30	28	2.19 / f	-	6
30 - 300	28	0.073	2*	6
300 - 1 500	1.585 f ^{0.5}	0.0042 f ^{0.5}	f / 150	6
1 500 - 15 000	61.4	0.163	10	6
15 000 - 150 000	61.4	0.163	10	616000 / f ^{1.2}
150 000- 300 000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000 / f ^{1.2}

Note: f is frequency in MHz

* = Power density limit is applicable at frequencies greater than 100 MHz

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 GHz:

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>23.89</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>244.91</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5690</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>5</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>3.162</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.1541</u>
<u>Power density of prediction frequency at 20.0 cm (W/m²):</u>	<u>1.541</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (W/m²):</u>	<u>10</u>

2.4 GHz:

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>24.92</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>310.46</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2437</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>0.123</u>
<u>Power density of prediction frequency at 20.0 cm (W/m²):</u>	<u>1.23</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (W/m²):</u>	<u>10</u>

According to KDB 447498 D01 General RF Exposure Guidance v05r02, EUT has two 2.4 GHz band antenna and two 5 GHz band antenna. The power density for 2.4 GHz band is 0.123 (refer to T504 2.4 GHz band report R1409183-247. So the sum of MPE ratio for four antennas is: $0.123 + 0.1541 = 0.2771 \text{ mW/cm}^2$, which is smaller than 1.0 mW/cm^2 . So the colocation exposure exclusion applies.

5 FCC §15.203 & IC RSS-Gen §7.1.2 – Antenna Requirements

5.1 Applicable Standards

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

As per IC RSS-Gen §7.1.2: Transmitter Antenna:

A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

5.2 Antenna Description

The device has 2.4/5 GHz antennas. Antenna gain is 3 dBi at 2.4 GHz and 5 dBi at 5 GHz. Please refer to the internal photos.

6 FCC §15.207 & IC RSS-Gen §7.2.4 - 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.

As per IC RSS-Gen §7.2.4 Conducted limits:

Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The more stringent limit applies at the frequency range boundaries. The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network (LISN).

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 & IC RSS-210/RSS-Gen 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.

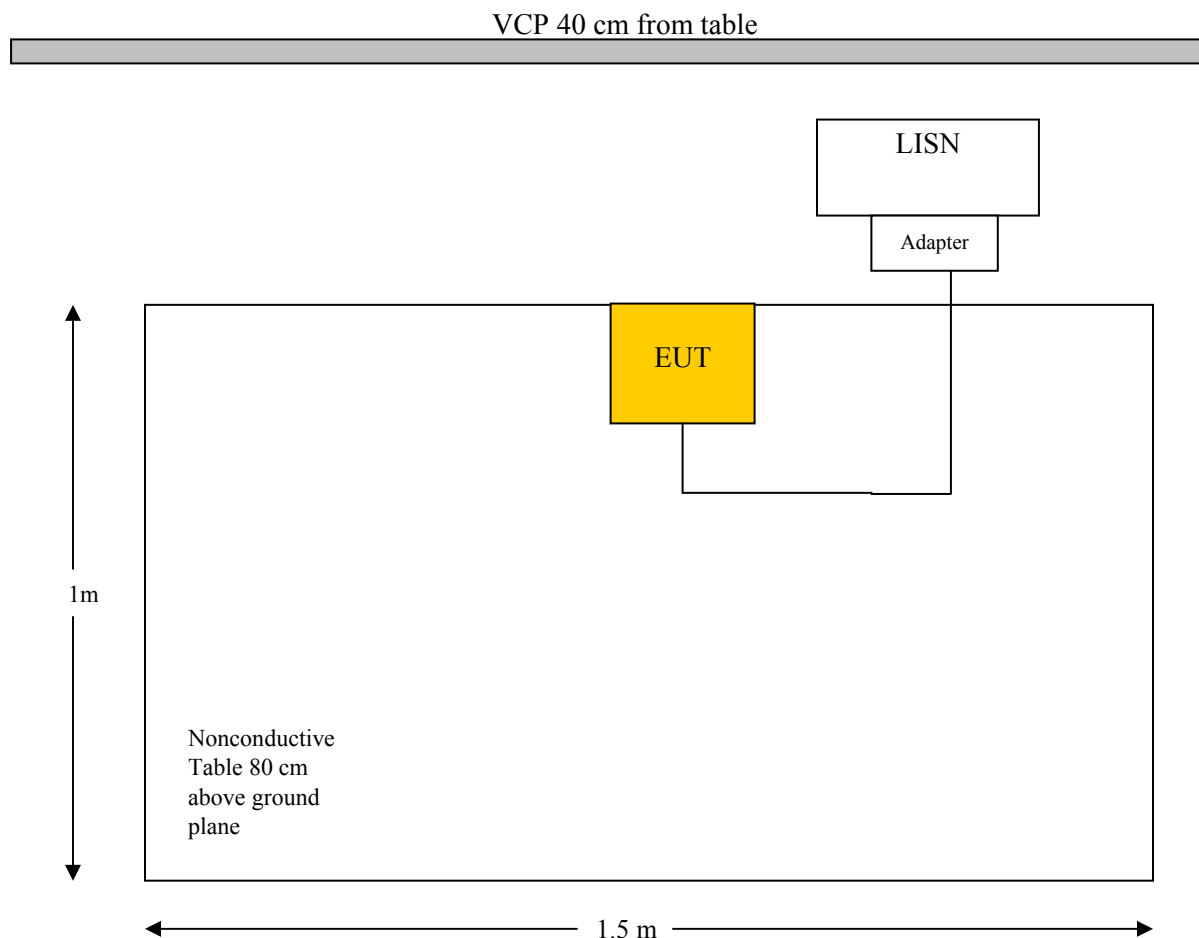
6.3 Test Procedure

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	EMI Test Receiver	ESCI 1166.5950K03	100337	2014-03-28	1 year
Solar Electronics	LISN	9252-50-R-24-N	511213	2014-07-14	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 Rui Zhou on 2014-10-15 in 5 m chamber 3.

6.8 Summary of Test Results

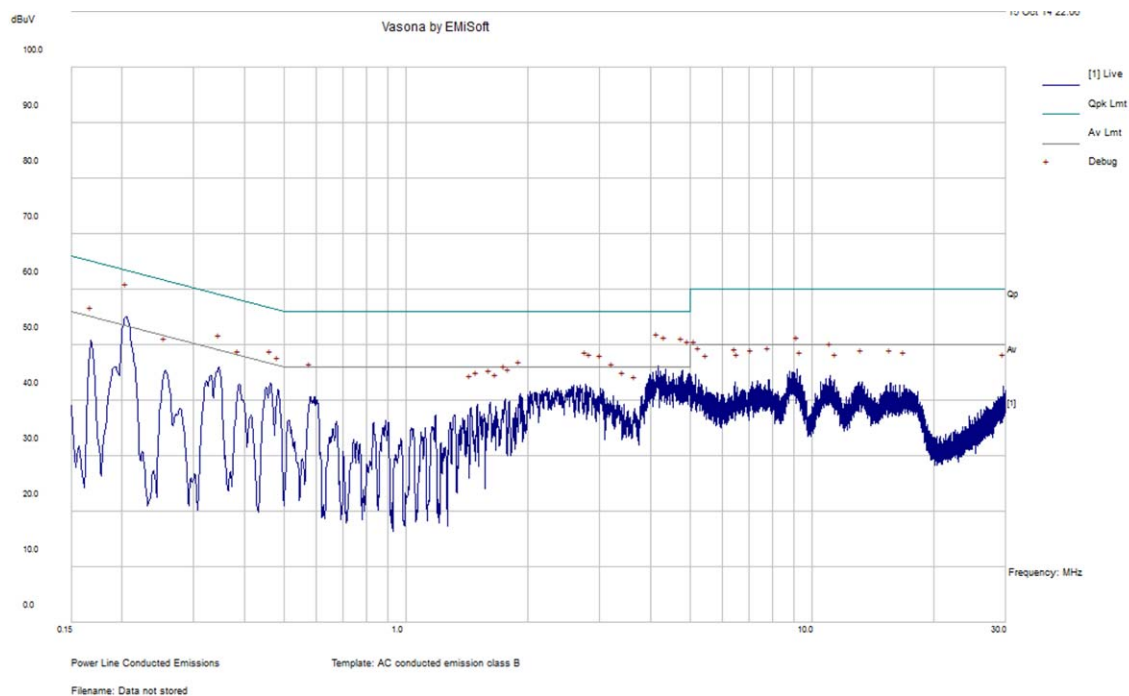
According to the recorded data in following table, the EUT complied with the FCC Part 15, IC RSS-210/Gen standard's conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	Frequency (MHz)	Conductor Mode (Line/Neutral)	Range (MHz)
-11.84	0.194769	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

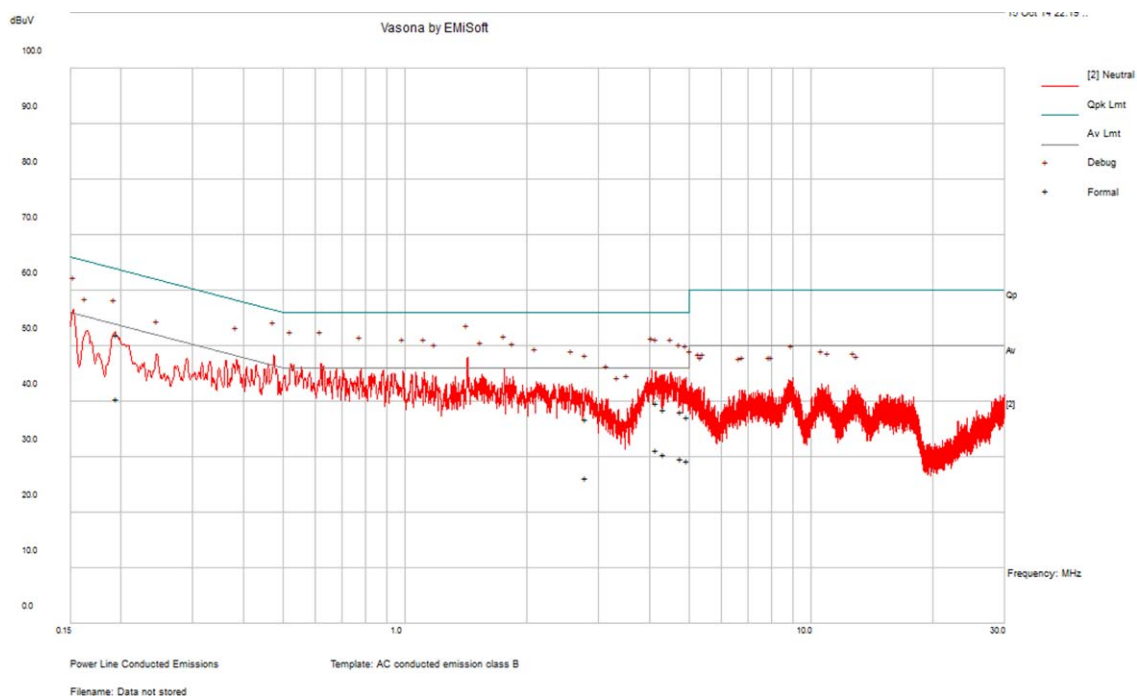
Note: The EUT is transmitting at worst case: 2.4 GHz and 5 GHz colocation.

120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
0.194769	51.99	Line	63.83	-11.84	QP
4.170098	39.75	Line	56	-16.25	QP
4.34813	38.59	Line	56	-17.41	QP
4.786835	38.25	Line	56	-17.75	QP
4.972067	37.28	Line	56	-18.72	QP
2.782478	36.82	Line	56	-19.18	QP

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
0.194769	40.56	Line	53.83	-13.27	Ave.
4.170098	31.27	Line	46	-14.73	Ave.
4.34813	30.44	Line	46	-15.56	Ave.
4.786835	29.84	Line	46	-16.16	Ave.
4.972067	29.32	Line	46	-16.68	Ave.
2.782478	26.22	Line	46	-19.78	Ave.

120 V, 60 Hz – Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
0.469209	34.95	Neutral	56.53	-21.57	QP
1.415133	35.01	Neutral	56	-20.99	QP
0.637149	25.41	Neutral	56	-30.59	QP
0.518499	27.96	Neutral	56	-28.04	QP
0.152601	43.04	Neutral	65.86	-22.81	QP
1.752492	35.42	Neutral	56	-20.58	QP

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
0.469209	23.65	Neutral	46.53	-22.87	Ave.
1.415133	22.71	Neutral	46	-23.29	Ave.
0.637149	10.16	Neutral	46	-35.84	Ave.
0.518499	16.15	Neutral	46	-29.85	Ave.
0.152601	17.99	Neutral	55.86	-37.87	Ave.
1.752492	22.74	Neutral	46	-23.26	Ave.

7 FCC §15.209, §15.407(b) & IC RSS-210 §A9.2 - Spurious Radiated Emissions

7.1 Applicable Standards

FCC §15.205, §15.209, §15.407 (b)

IC RSS-210, §2.2, §A9.2, RSS-Gen §7.2.2

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	2014-07-24	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2014-04-26	1 year
Agilent	Pre-amplifier	8449B	3008A01978	2014-02-04	1 year
WiseWave	Horn Antenna	ARH-4223-02	10555-01	2012-08-09	3 Years
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year
EMCO	Horn Antenna	3315	9511-4627	2013-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-10-28	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 Rui Zhou on 2014-10-16 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 and IC RSS-210/RSS-Gen standard's radiated emissions limits, and had the worst margin of:

30 MHz-1 GHz

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Mode, Channel
-3.44	31.693	Vertical	2.4 GHz and 5 GHz Colocation

Above 1 GHz

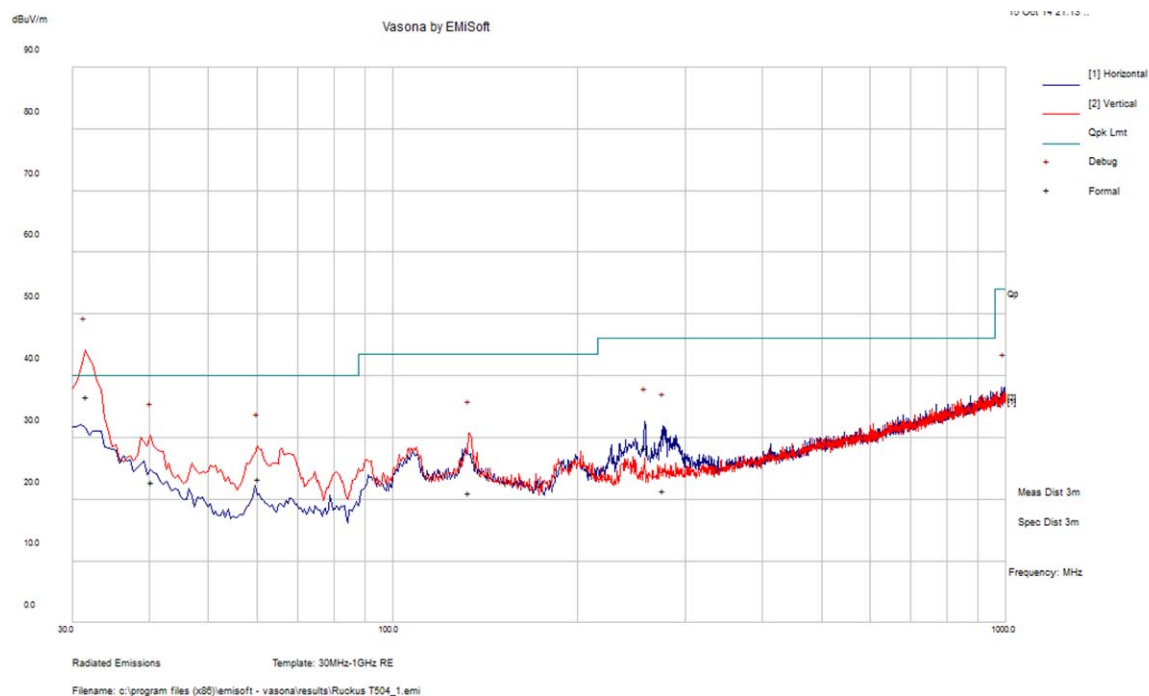
Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range
-5.67	17100	Vertical	1 - 40 GHz

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

Note: The EUT is 2.4 GHz and 5 GHz Colocation.



Worst-case:

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Comment (PK/QP/Ave)
31.693	36.56	124	V	266	40	-3.44	QP
40.366	22.78	106	V	255	40	-17.22	QP
60.27425	23.31	108	V	112	40	-16.69	QP
133.0018	21.04	118	V	328	43.5	-22.46	QP
257.4115	28.29	129	H	139	46	-17.71	QP
275.671	21.42	148	H	140	46	-24.58	QP

2) 1–40 GHz

W53 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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5260 MHz, measured at 3 meters											
10520	45.03	0	100	V	38.34	7	34.49	55.88	74	-18.12	Peak
10520	44.55	0	100	H	38.34	7	34.49	55.40	74	-18.60	Peak
10520	31.59	0	100	V	38.34	7	34.49	42.44	54	-11.56	Ave
10520	31.55	0	100	H	38.34	7	34.49	42.40	54	-11.60	Ave
15780	45.61	0	100	V	37.93	8.35	34.61	57.28	74	-16.72	Peak
15780	45.18	0	100	H	37.93	8.35	34.61	56.85	74	-17.15	Peak
15780	31.31	0	100	V	37.93	8.35	34.61	42.98	54	-11.02	Ave
15780	32.27	0	100	H	37.93	8.35	34.61	43.94	54	-10.06	Ave
21040	43.96	0	100	V	34.60	9.79	34	54.35	74	-19.65	Peak
21040	44.36	0	100	H	34.60	9.79	34	54.75	74	-19.25	Peak
21040	29.75	0	100	V	34.60	9.79	34	40.14	54	-13.86	Ave
21040	30.1	0	100	H	34.60	9.79	34	40.49	54	-13.51	Ave
Middle Channel 5280 MHz, measured at 3 meters											
10560	44.76	0	100	V	38.418	7.07	34.49	55.76	74	-18.24	Peak
10560	44.46	0	100	H	38.418	7.07	34.49	55.45	74	-18.55	Peak
10560	31.94	0	100	V	38.418	7.07	34.49	42.94	54	-11.07	Ave
10560	32.03	0	100	H	38.418	7.07	34.49	43.03	54	-10.98	Ave
15840	45.87	0	100	V	37.914	8.38	34.61	57.55	74	-16.45	Peak
15840	45.73	0	100	H	37.914	8.38	34.61	57.41	74	-16.59	Peak
15840	32.63	0	100	V	37.914	8.38	34.61	44.31	54	-9.69	Ave
15840	32.60	0	100	H	37.914	8.38	34.61	44.28	54	-9.72	Ave
21120	43.56	0	100	V	34.6	9.8	34	53.96	74	-20.04	Peak
21120	43.61	0	100	H	34.6	9.8	34	54.01	74	-19.99	Peak
21120	30.84	0	100	V	34.6	9.8	34	41.24	54	-12.76	Ave
21120	30.80	0	100	H	34.6	9.8	34	41.20	54	-12.80	Ave
High Channel 5320 MHz, measured at 3 meters											
10640	44.45	0	100	V	38.42	7.07	34.49	55.45	74	-18.55	Peak
10640	45.66	0	100	H	38.42	7.07	34.49	56.66	74	-17.34	Peak
10640	31.79	0	100	V	38.42	7.07	34.49	42.79	54	-11.21	Ave
10640	31.86	0	100	H	38.42	7.07	34.49	42.86	54	-11.14	Ave
15960	45.35	0	100	V	37.90	8.39	34.61	57.03	74	-16.97	Peak
15960	45.62	0	100	H	37.90	8.39	34.61	57.30	74	-16.70	Peak
15960	32.82	0	100	V	37.90	8.39	34.61	44.50	54	-9.50	Ave
15960	32.82	0	100	H	37.90	8.39	34.61	44.50	54	-9.50	Ave
21280	44.34	0	100	V	34.60	9.79	34	54.73	74	-19.27	Peak
21280	43.70	0	100	H	34.60	9.79	34	54.09	74	-19.91	Peak
21280	31.06	0	100	V	34.60	9.79	34	41.45	54	-12.55	Ave
21280	31.13	0	100	H	34.60	9.79	34	41.52	54	-12.48	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5260 MHz, measured at 3 meters											
10520	44.94	0	100	V	38.343	7	34.49	55.79	74	-18.21	Peak
10520	45.53	0	100	H	38.343	7	34.49	56.38	74	-17.62	Peak
10520	31.83	0	100	V	38.343	7	34.49	42.68	54	-11.32	Ave
10520	31.92	0	100	H	38.343	7	34.49	42.77	54	-11.23	Ave
15780	46.23	0	100	V	37.928	8.35	34.61	57.90	74	-16.10	Peak
15780	45.38	0	100	H	37.928	8.35	34.61	57.05	74	-16.95	Peak
15780	32.75	0	100	V	37.928	8.35	34.61	44.42	54	-9.58	Ave
15780	32.77	0	100	H	37.928	8.35	34.61	44.44	54	-9.56	Ave
21040	44.03	0	100	V	34.6	9.79	34	54.42	74	-19.58	Peak
21040	44.89	0	100	H	34.6	9.79	34	55.28	74	-18.72	Peak
21040	30.87	0	100	V	34.6	9.79	34	41.26	54	-12.74	Ave
21040	30.83	0	100	H	34.6	9.79	34	41.22	54	-12.78	Ave
Middle Channel 5280 MHz, measured at 3 meters											
10560	45.12	0	100	V	38.42	7.07	34.49	56.12	74	-17.88	Peak
10560	45.60	0	100	H	38.42	7.07	34.49	56.60	74	-17.40	Peak
10560	31.86	0	100	V	38.42	7.07	34.49	42.86	54	-11.14	Ave
10560	32.03	0	100	H	38.42	7.07	34.49	43.03	54	-10.97	Ave
15840	47.52	0	100	V	37.91	8.38	34.61	59.20	74	-14.80	Peak
15840	46.23	0	100	H	37.91	8.38	34.61	57.91	74	-16.09	Peak
15840	32.35	0	100	V	37.91	8.38	34.61	44.03	54	-9.97	Ave
15840	32.31	0	100	H	37.91	8.38	34.61	43.99	54	-10.01	Ave
21120	46.03	0	100	V	34.60	9.8	34	56.43	74	-17.57	Peak
21120	44.45	0	100	H	34.60	9.8	34	54.85	74	-19.15	Peak
21120	30.72	0	100	V	34.60	9.8	34	41.12	54	-12.88	Ave
21120	31.27	0	100	H	34.60	9.8	34	41.67	54	-12.33	Ave
High Channel 5320 MHz, measured at 3 meters											
10640	44.97	0	100	V	38.42	7.07	34.49	55.97	74	-18.03	Peak
10640	44.16	0	100	H	38.42	7.07	34.49	55.16	74	-18.84	Peak
10640	31.83	0	100	V	38.42	7.07	34.49	42.83	54	-11.17	Ave
10640	31.88	0	100	H	38.42	7.07	34.49	42.88	54	-11.12	Ave
15960	45.66	0	100	V	37.90	8.39	34.61	57.34	74	-16.66	Peak
15960	46.45	0	100	H	37.90	8.39	34.61	58.13	74	-15.87	Peak
15960	33.13	0	100	V	37.90	8.39	34.61	44.81	54	-9.19	Ave
15960	33.08	0	100	H	37.90	8.39	34.61	44.76	54	-9.24	Ave
21280	44.34	0	100	V	34.60	9.79	34	54.73	74	-19.27	Peak
21280	44.38	0	100	H	34.60	9.79	34	54.77	74	-19.23	Peak
21280	31.30	0	100	V	34.60	9.79	34	41.69	54	-12.31	Ave
21280	31.29	0	100	H	34.60	9.79	34	41.68	54	-12.32	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5270 MHz, measured at 3 meters											
10540	44.88	0	100	V	38.34	7.05	34.49	55.78	74	-18.22	Peak
10540	44.97	0	100	H	38.34	7.05	34.49	55.87	74	-18.13	Peak
10540	31.81	0	100	V	38.34	7.05	34.49	42.71	54	-11.29	Ave
10540	31.83	0	100	H	38.34	7.05	34.49	42.73	54	-11.27	Ave
15810	46.53	0	100	V	37.93	8.35	34.61	58.20	74	-15.80	Peak
15810	46.78	0	100	H	37.93	8.35	34.61	58.45	74	-15.55	Peak
15810	33.14	0	100	V	37.93	8.35	34.61	44.81	54	-9.19	Ave
15810	33.03	0	100	H	37.93	8.35	34.61	44.70	54	-9.30	Ave
21080	44.37	0	100	V	34.60	9.84	34	54.81	74	-19.19	Peak
21080	43.53	0	100	H	34.60	9.84	34	53.97	74	-20.03	Peak
21080	31.06	0	100	V	34.60	9.84	34	41.50	54	-12.50	Ave
21080	31.04	0	100	H	34.60	9.84	34	41.48	54	-12.52	Ave
High Channel 5310 MHz, measured at 3 meters											
10620	44.53	0	100	V	38.42	7.07	34.49	55.53	74	-18.47	Peak
10620	45.06	0	100	H	38.42	7.07	34.49	56.06	74	-17.94	Peak
10620	31.73	0	100	V	38.42	7.07	34.49	42.73	54	-11.27	Ave
10620	31.72	0	100	H	38.42	7.07	34.49	42.72	54	-11.28	Ave
15930	45.67	0	100	V	37.91	8.38	34.61	57.35	74	-16.65	Peak
15930	46.34	0	100	H	37.91	8.38	34.61	58.02	74	-15.98	Peak
15930	33.09	0	100	V	37.91	8.38	34.61	44.77	54	-9.23	Ave
15930	33.17	0	100	H	37.91	8.38	34.61	44.85	54	-9.15	Ave
21240	44.11	0	100	V	34.60	9.79	34	54.50	74	-19.50	Peak
21240	45.52	0	100	H	34.60	9.79	34	55.91	74	-18.09	Peak
21240	31.41	0	100	V	34.60	9.79	34	41.80	54	-12.20	Ave
21240	31.74	0	100	H	34.60	9.79	34	42.13	54	-11.87	Ave

802.11ac-VHT80 mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5290 MHz, measured at 3 meters											
10580	45.31	0	100	V	38.5	7.05	34.49	56.37	74	-17.63	Peak
10580	44.63	0	100	H	38.5	7.05	34.49	55.69	74	-18.31	Peak
10580	31.60	0	100	V	38.5	7.05	34.49	42.66	54	-11.34	Ave
10580	31.63	0	100	H	38.5	7.05	34.49	42.69	54	-11.31	Ave
15870	46.39	0	100	V	38.6	8.35	34.61	58.73	74	-15.27	Peak
15870	46.33	0	100	H	38.6	8.35	34.61	58.67	74	-15.33	Peak
15870	33.10	0	100	V	38.6	8.35	34.61	45.44	54	-8.56	Ave
15870	33.08	0	100	H	38.6	8.35	34.61	45.42	54	-8.58	Ave
21160	44.97	0	100	V	34.6	9.84	34	55.41	74	-18.59	Peak
21160	45.10	0	100	H	34.6	9.84	34	55.54	74	-18.46	Peak
21160	31.33	0	100	V	34.6	9.84	34	41.77	54	-12.23	Ave
21160	31.54	0	100	H	34.6	9.84	34	41.98	54	-12.02	Ave

W56 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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5500 MHz, measured at 3 meters											
11000	45.28	0	100	V	38.38	7.36	34.05	56.97	74	-17.03	Peak
11000	44.20	0	100	H	38.38	7.36	34.05	55.89	74	-18.11	Peak
11000	31.65	0	100	V	38.38	7.36	34.05	43.34	54	-10.66	Ave
11000	31.65	0	100	H	38.38	7.36	34.05	43.34	54	-10.66	Ave
16500	44.31	0	100	V	38.77	8.5	34.64	56.94	74	-17.06	Peak
16500	45.25	0	100	H	38.77	8.5	34.64	57.88	74	-16.12	Peak
16500	31.69	0	100	V	38.77	8.5	34.64	44.32	54	-9.68	Ave
16500	31.68	0	100	H	38.77	8.5	34.64	44.31	54	-9.69	Ave
22000	44.23	0	100	V	34.90	9.94	34.69	54.38	74	-19.62	Peak
22000	44.90	0	100	H	34.90	9.94	34.69	55.05	74	-18.95	Peak
22000	30.90	0	100	V	34.90	9.94	34.69	41.05	54	-12.95	Ave
22000	30.78	0	100	H	34.90	9.94	34.69	40.93	54	-13.07	Ave
Middle Channel 5580 MHz, measured at 3 meters											
11160	45.00	0	100	V	38.51	7.52	34.05	56.98	74	-17.02	Peak
11160	45.45	0	100	H	38.51	7.52	34.05	57.43	74	-16.57	Peak
11160	31.61	0	100	V	38.51	7.52	34.05	43.59	54	-10.41	Ave
11160	31.60	0	100	H	38.51	7.52	34.05	43.58	54	-10.42	Ave
16740	46.52	0	100	V	39.94	8.63	34.64	60.45	74	-13.55	Peak
16740	46.80	0	100	H	39.94	8.63	34.64	60.73	74	-13.27	Peak
16740	32.31	0	100	V	39.94	8.63	34.64	46.24	54	-7.76	Ave
16740	32.24	0	100	H	39.94	8.63	34.64	46.17	54	-7.83	Ave
22320	44.60	0	100	V	34.90	9.92	34.69	54.73	74	-19.27	Peak
22320	44.20	0	100	H	34.90	9.92	34.69	54.33	74	-19.67	Peak
22320	31.18	0	100	V	34.90	9.92	34.69	41.31	54	-12.69	Ave
22320	31.20	0	100	H	34.90	9.92	34.69	41.33	54	-12.67	Ave
High Channel 5700 MHz, measured at 3 meters											
11400	44.09	0	100	V	38.88	7.57	34.05	56.49	74	-17.51	Peak
11400	43.72	0	100	H	38.88	7.57	34.05	56.12	74	-17.88	Peak
11400	31.55	0	100	V	38.88	7.57	34.05	43.95	54	-10.05	Ave
11400	31.58	0	100	H	38.88	7.57	34.05	43.98	54	-10.02	Ave
17100	44.99	0	100	V	42.64	8.66	34.64	61.65	74	-12.35	Peak
17100	44.79	0	100	H	42.64	8.66	34.64	61.45	74	-12.55	Peak
17100	31.83	0	100	V	42.64	8.66	34.64	48.49	54	-5.51	Ave
17100	31.82	0	100	H	42.64	8.66	34.64	48.48	54	-5.52	Ave
22800	43.20	0	100	V	34.90	10.17	34.69	53.58	74	-20.42	Peak
22800	43.64	0	100	H	34.90	10.17	34.69	54.02	74	-19.98	Peak
22800	30.56	0	100	V	34.90	10.17	34.69	40.94	54	-13.06	Ave
22800	30.58	0	100	H	34.90	10.17	34.69	40.96	54	-13.04	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5500 MHz, measured at 3 meters											
11000	44.20	0	100	V	38.38	7.36	34.05	55.89	74	-18.11	Peak
11000	45.26	0	100	H	38.38	7.36	34.05	56.95	74	-17.05	Peak
11000	31.57	0	100	V	38.38	7.36	34.05	43.26	54	-10.74	Ave
11000	31.46	0	100	H	38.38	7.36	34.05	43.15	54	-10.85	Ave
16500	45.86	0	100	V	38.77	8.5	34.64	58.49	74	-15.51	Peak
16500	45.69	0	100	H	38.77	8.5	34.64	58.32	74	-15.68	Peak
16500	32.12	0	100	V	38.77	8.5	34.64	44.75	54	-9.25	Ave
16500	32.12	0	100	H	38.77	8.5	34.64	44.75	54	-9.25	Ave
22000	43.80	0	100	V	34.90	9.94	34.69	53.95	74	-20.05	Peak
22000	43.42	0	100	H	34.90	9.94	34.69	53.57	74	-20.43	Peak
22000	30.50	0	100	V	34.90	9.94	34.69	40.65	54	-13.35	Ave
22000	30.46	0	100	H	34.9	9.94	34.69	40.61	54	-13.39	Ave
Middle Channel 5580 MHz, measured at 3 meters											
11160	44.69	0	100	V	38.51	7.52	34.05	56.67	74	-17.33	Peak
11160	44.72	0	100	H	38.51	7.52	34.05	56.70	74	-17.30	Peak
11160	31.44	0	100	V	38.51	7.52	34.05	43.42	54	-10.58	Ave
11160	31.44	0	100	H	38.51	7.52	34.05	43.42	54	-10.58	Ave
16740	44.60	0	100	V	39.94	8.63	34.64	58.53	74	-15.47	Peak
16740	46.42	0	100	H	39.94	8.63	34.64	60.35	74	-13.65	Peak
16740	32.00	0	100	V	39.94	8.63	34.64	45.93	54	-8.07	Ave
16740	32.09	0	100	H	39.94	8.63	34.64	46.02	54	-7.98	Ave
22320	43.24	0	100	V	34.90	9.92	34.69	53.37	74	-20.63	Peak
22320	43.74	0	100	H	34.90	9.92	34.69	53.87	74	-20.13	Peak
22320	30.73	0	100	V	34.90	9.92	34.69	40.86	54	-13.14	Ave
22320	30.70	0	100	H	34.90	9.92	34.69	40.83	54	-13.17	Ave
High Channel 5700 MHz, measured at 3 meters											
11400	44.78	0	100	V	38.88	7.57	34.05	57.18	74	-16.82	Peak
11400	44.61	0	100	H	38.88	7.57	34.05	57.01	74	-16.99	Peak
11400	31.50	0	100	V	38.88	7.57	34.05	43.90	54	-10.10	Ave
11400	31.52	0	100	H	38.88	7.57	34.05	43.92	54	-10.08	Ave
17100	45.14	0	100	V	42.64	8.66	34.64	61.80	74	-12.20	Peak
17100	44.99	0	100	H	42.64	8.66	34.64	61.65	74	-12.35	Peak
17100	31.67	0	100	V	42.64	8.66	34.64	48.33	54	-5.67	Ave
17100	31.33	0	100	H	42.64	8.66	34.64	47.99	54	-6.01	Ave
22800	46.39	0	100	V	34.90	10.17	34.69	56.77	74	-17.23	Peak
22800	44.59	0	100	H	34.90	10.17	34.69	54.97	74	-19.03	Peak
22800	31.73	0	100	V	34.90	10.17	34.69	42.11	54	-11.89	Ave
22800	31.66	0	100	H	34.90	10.17	34.69	42.04	54	-11.96	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/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5510 MHz, measured at 3 meters											
11020	44.70	0	100	V	38.38	7.36	34.05	56.39	74	-17.61	Peak
11020	45.50	0	100	H	38.38	7.36	34.05	57.19	74	-16.81	Peak
11020	31.72	0	100	V	38.38	7.36	34.05	43.41	54	-10.59	Ave
11020	31.69	0	100	H	38.38	7.36	34.05	43.38	54	-10.62	Ave
16530	45.89	0	100	V	38.77	8.5	34.64	58.52	74	-15.48	Peak
16530	45.85	0	100	H	38.77	8.5	34.64	58.48	74	-15.52	Peak
16530	32.77	0	100	V	38.77	8.5	34.64	45.40	54	-8.60	Ave
16530	32.73	0	100	H	38.77	8.5	34.64	45.36	54	-8.64	Ave
22040	42.71	0	100	V	34.90	9.76	34.69	52.68	74	-21.32	Peak
22040	42.74	0	100	H	34.90	9.76	34.69	52.71	74	-21.29	Peak
22040	30.37	0	100	V	34.90	9.76	34.69	40.34	54	-13.66	Ave
22040	30.39	0	100	H	34.90	9.76	34.69	40.36	54	-13.64	Ave
Middle Channel 5550 MHz, measured at 3 meters											
11100	44.91	0	100	V	38.51	7.39	34.05	56.76	74	-17.24	Peak
11100	44.96	0	100	H	38.51	7.39	34.05	56.81	74	-17.19	Peak
11100	31.92	0	100	V	38.51	7.39	34.05	43.77	54	-10.23	Ave
11100	31.91	0	100	H	38.51	7.39	34.05	43.76	54	-10.24	Ave
16650	46.78	0	100	V	39.26	8.55	34.64	59.95	74	-14.05	Peak
16650	43.84	0	100	H	39.26	8.55	34.64	57.01	74	-16.99	Peak
16650	31.44	0	100	V	39.26	8.55	34.64	44.61	54	-9.39	Ave
16650	30.57	0	100	H	39.26	8.55	34.64	43.74	54	-10.26	Ave
22200	42.38	0	100	V	35.00	9.91	34.69	52.60	74	-21.40	Peak
22200	41.60	0	100	H	35.00	9.91	34.69	51.82	74	-22.18	Peak
22200	28.77	0	100	V	35.00	9.91	34.69	38.99	54	-15.01	Ave
22200	28.66	0	100	H	35.00	9.91	34.69	38.88	54	-15.12	Ave
High Channel 5670 MHz, measured at 3 meters											
11340	44.61	0	100	V	38.84	7.52	34.05	56.92	74	-17.08	Peak
11340	44.55	0	100	H	38.84	7.52	34.05	56.86	74	-17.14	Peak
11340	31.08	0	100	V	38.84	7.52	34.05	43.39	54	-10.61	Ave
11340	31.16	0	100	H	38.84	7.52	34.05	43.47	54	-10.53	Ave
17010	44.62	0	100	V	41.89	8.61	34.64	60.48	74	-13.52	Peak
17010	44.08	0	100	H	41.89	8.61	34.64	59.94	74	-14.06	Peak
17010	30.94	0	100	V	41.89	8.61	34.64	46.80	54	-7.20	Ave
17010	30.89	0	100	H	41.89	8.61	34.64	46.75	54	-7.25	Ave
22680	42.58	0	100	V	34.90	10.07	34.69	52.86	74	-21.14	Peak
22680	42.08	0	100	H	34.90	10.07	34.69	52.36	74	-21.64	Peak
22680	28.33	0	100	V	34.90	10.07	34.69	38.61	54	-15.39	Ave
22680	28.45	0	100	H	34.90	10.07	34.69	38.73	54	-15.27	Ave

802.11ac-VHT80 mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5530 MHz, measured at 3 meters											
11060	44.45	0	100	V	38.38	7.36	34.05	56.14	74	-17.86	Peak
11060	44.39	0	100	H	38.38	7.36	34.05	56.08	74	-17.92	Peak
11060	31.45	0	100	V	38.38	7.36	34.05	43.14	54	-10.86	Ave
11060	31.19	0	100	H	38.38	7.36	34.05	42.88	54	-11.12	Ave
16590	45.65	0	100	V	38.77	8.5	34.64	58.28	74	-15.72	Peak
16590	44.32	0	100	H	38.77	8.5	34.64	56.95	74	-17.05	Peak
16590	30.98	0	100	V	38.77	8.5	34.64	43.61	54	-10.39	Ave
16590	31.05	0	100	H	38.77	8.5	34.64	43.68	54	-10.32	Ave
22120	41.95	0	100	V	34.90	9.76	34.69	51.92	74	-22.08	Peak
22120	42.03	0	100	H	34.90	9.76	34.69	52.00	74	-22.00	Peak
22120	28.50	0	100	V	34.90	9.76	34.69	38.47	54	-15.53	Ave
22120	28.55	0	100	H	34.90	9.76	34.69	38.52	54	-15.48	Ave
High Channel 5690 MHz, measured at 3 meters											
11380	44.46	0	100	V	38.38	7.36	34.05	56.15	74	-17.85	Peak
11380	44.36	0	100	H	38.38	7.36	34.05	56.05	74	-17.95	Peak
11380	30.97	0	100	V	38.38	7.36	34.05	42.66	54	-11.34	Ave
11380	31.03	0	100	H	38.38	7.36	34.05	42.72	54	-11.28	Ave
17070	44.36	0	100	V	38.77	8.5	34.64	56.99	74	-17.01	Peak
17070	44.33	0	100	H	38.77	8.5	34.64	56.96	74	-17.04	Peak
17070	31.05	0	100	V	38.77	8.5	34.64	43.68	54	-10.32	Ave
17070	31.10	0	100	H	38.77	8.5	34.64	43.73	54	-10.27	Ave
22760	41.57	0	100	V	34.90	9.76	34.69	51.54	74	-22.46	Peak
22760	42.03	0	100	H	34.90	9.76	34.69	52.00	74	-22.00	Peak
22760	28.21	0	100	V	34.90	9.76	34.69	38.18	54	-15.82	Ave
22760	28.19	0	100	H	34.90	9.76	34.69	38.16	54	-15.84	Ave

8 FCC §15.407(a) & IC RSS-210 §A9.2 – 26 dB & 99% Emission Bandwidth

8.1 Applicable Standards

FCC §15.407(a) and IC RSS-210 §A9.2.

8.2 Measurement Procedure

The measurements are base on FCC KDB 789033 D01 General UNII Test Procedures v01r03: 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	E4440A	MY44303352	2013-11-07	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 Rui Zhou from 2014-10-15 at RF site.

8.5 Test Results

Please refer to the following tables and plots.

W53 Band

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)	
		J0	J1	J0	J1
802.11a mode					
Low	5260	21.543	20.91	16.6114	16.5231
Middle	5280	21.166	21.172	16.5448	16.5103
High	5320	20.604	22.477	16.5621	16.6023
802.11n-HT20 mode					
Low	5260	22.666	22.359	17.8215	17.7799
Middle	5280	22.367	22.708	17.7919	17.8115
High	5320	22.304	21.798	17.7883	17.8309
802.11n-HT40 mode					
Low	5270	43.324	43.398	36.2675	36.2128
High	5310	42.53	41.741	36.3472	36.2436
802.11ac-VHT80 mode					
-	5290	87.441	84.536	75.7482	75.5974

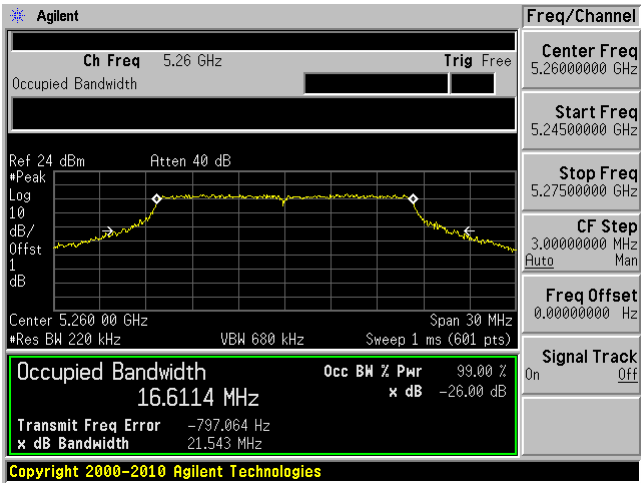
W56 Band

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)	
		J0	J1	J0	J1
802.11a mode					
Low	5500	20.806	21.133	16.5605	16.5772
Middle	5580	22.337	21.182	16.64	16.5332
High	5700	21.999	21.265	16.5757	16.5691
802.11n-HT20 mode					
Low	5500	21.925	21.675	17.7639	17.7278
Middle	5580	22.044	21.774	17.6975	17.7254
High	5700	21.644	21.927	17.7745	17.73
802.11n-HT40 mode					
Low	5510	42.931	43.179	36.1218	36.2523
Middle	5550	44.857	43.371	36.3034	36.2352
High	5670	43.226	43.774	36.2275	36.3626
802.11ac-VHT80 mode					
Low	5530	84.116	86.445	75.6528	75.5426
High	5690	89.746	88.477	75.9592	75.7858

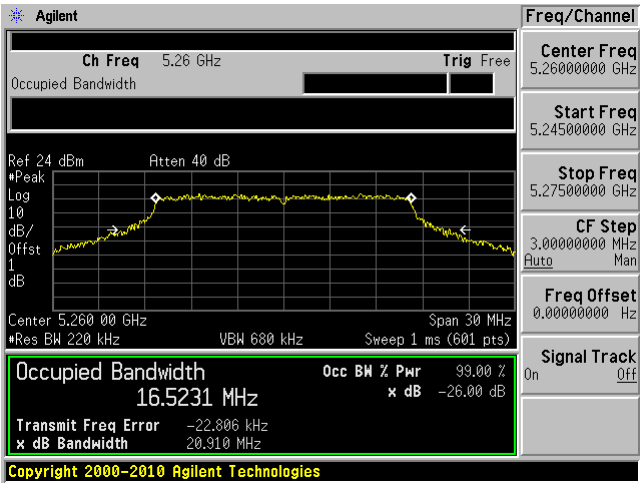
5.3 GHz Band

802.11a mode

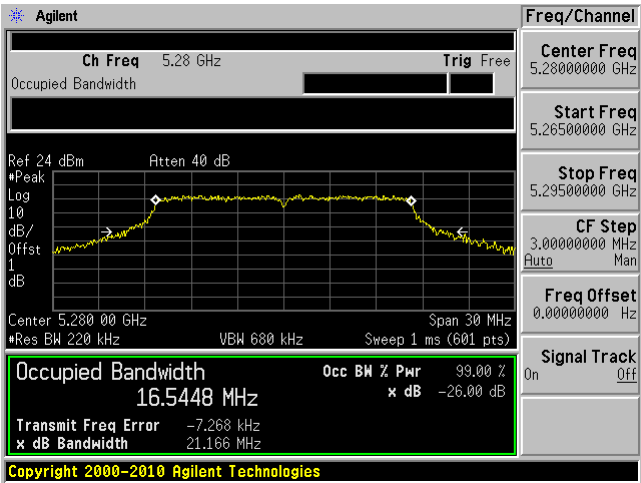
Low channel: 5260 MHz Chain 0



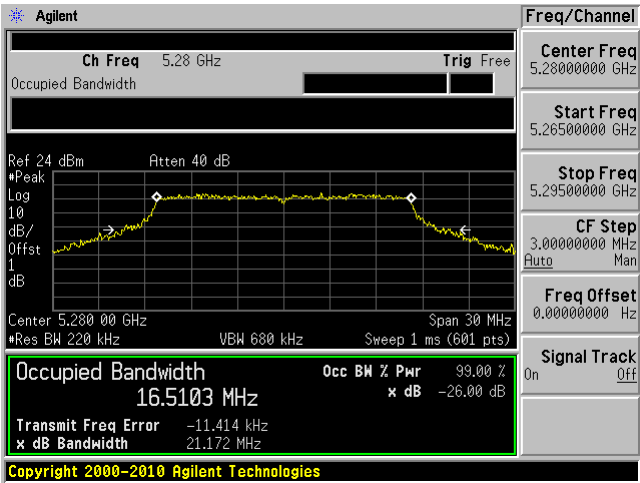
Low channel: 5260 MHz Chain 1



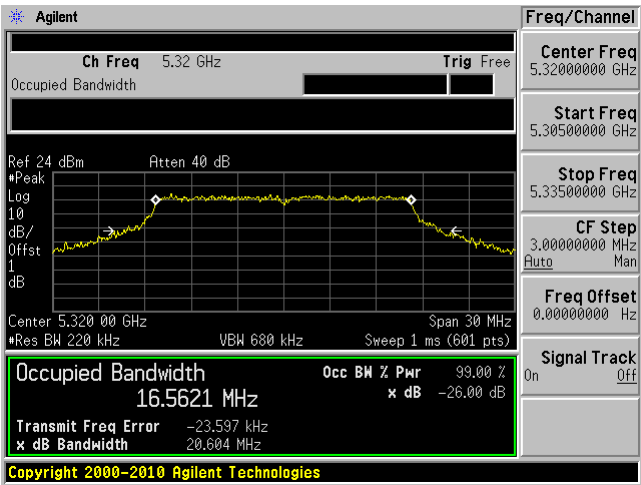
Middle channel: 5280 MHz Chain 0



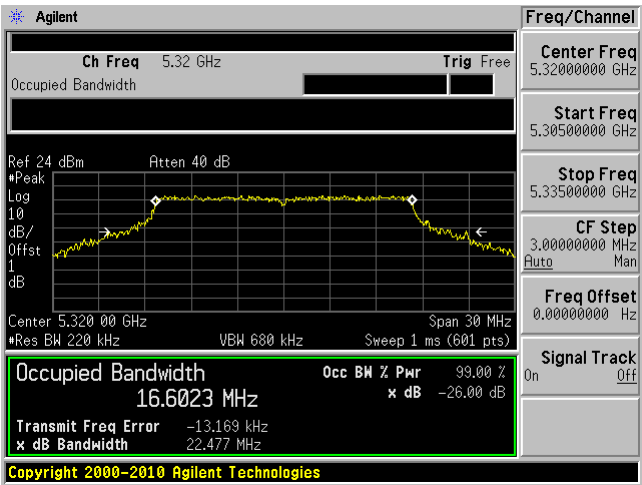
Middle channel: 5280 MHz Chain 1



High channel: 5320 MHz Chain 0

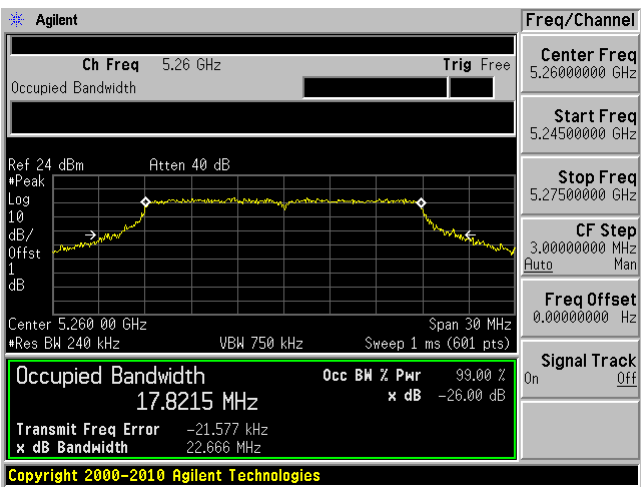


High channel: 5320 MHz Chain 1

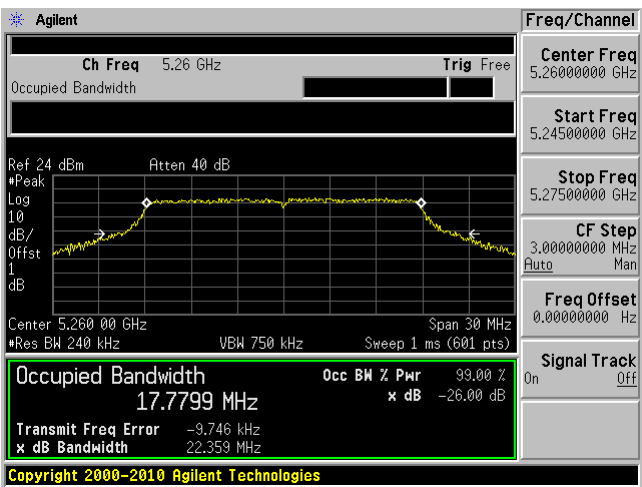


802.11n-HT20 mode

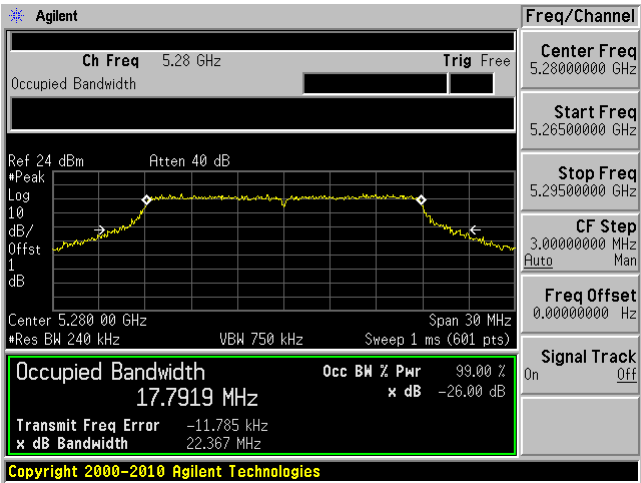
Low channel: 5260 MHz Chain 0



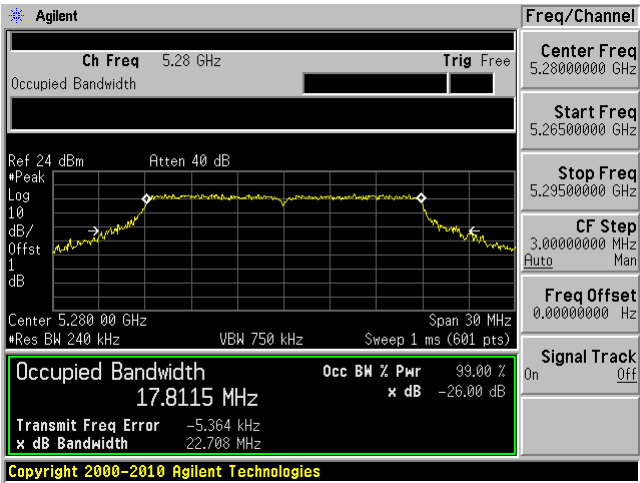
Low channel: 5260 MHz Chain 1



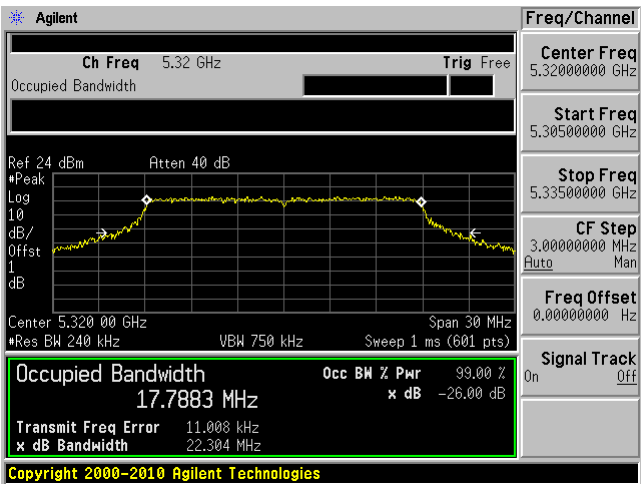
Middle channel: 5280 MHz Chain 0



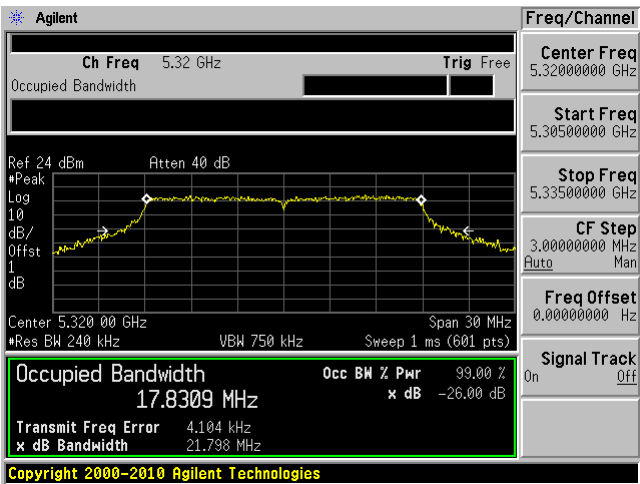
Middle channel: 5280 MHz Chain 1



High channel: 5320 MHz Chain 0

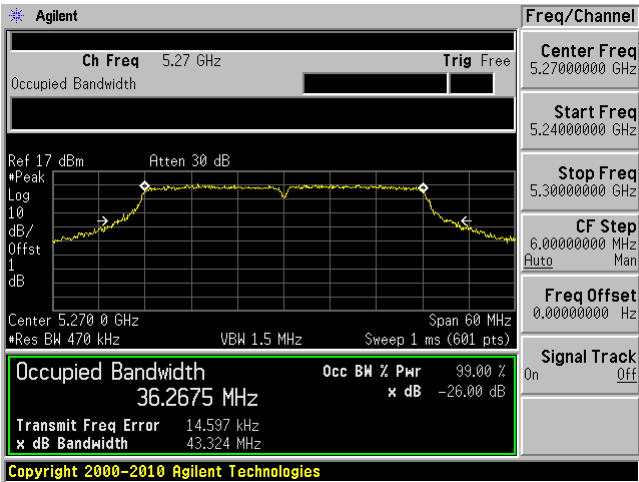


High channel: 5320 MHz Chain 1

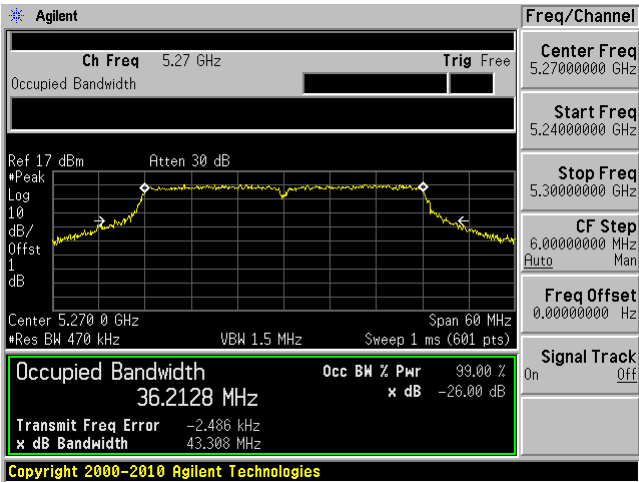


802.11n-HT40 mode

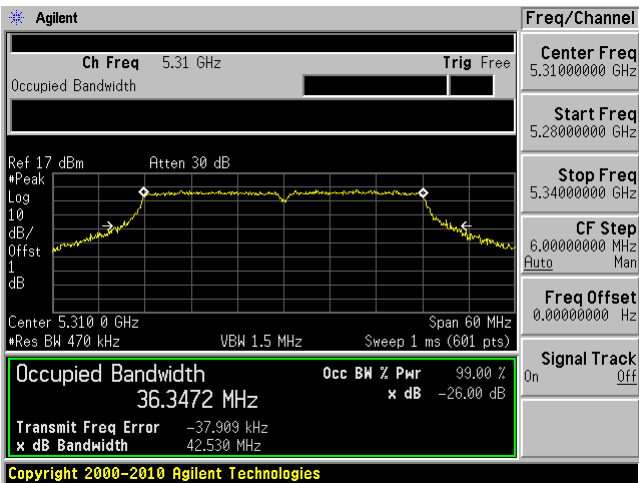
Low channel: 5270 MHz Chain 0



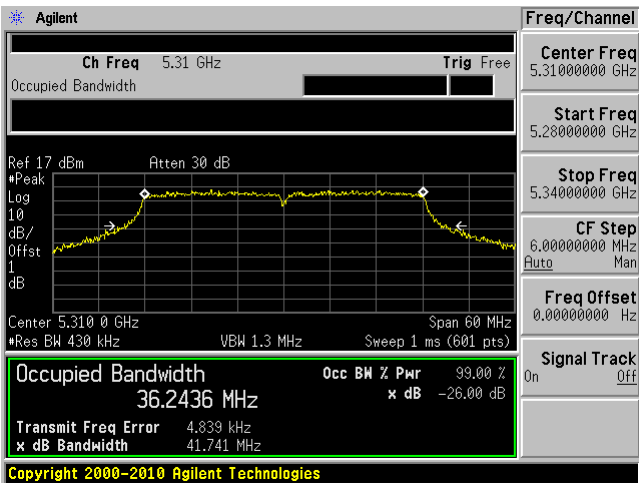
Low channel: 5270 MHz Chain 1



High channel: 5310 MHz Chain 0

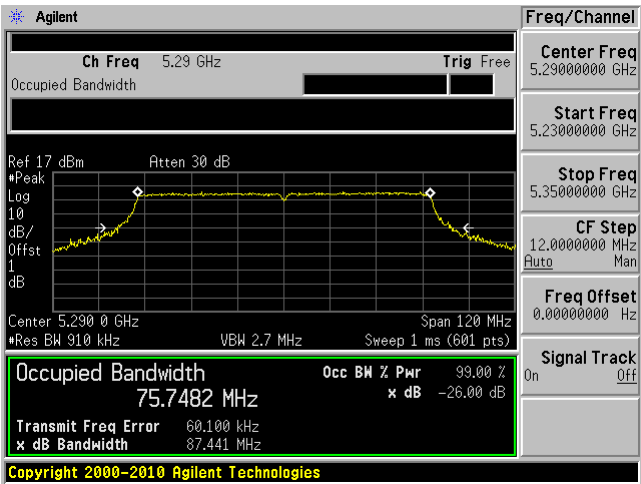


High channel: 5310 MHz Chain 1

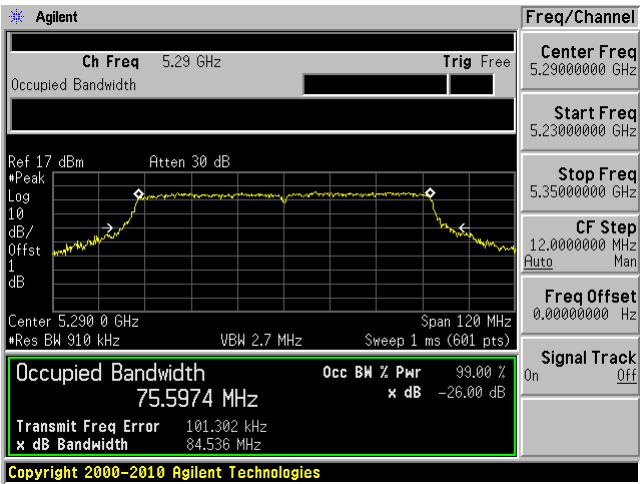


802.11ac VHT80 mode 5290 MHz

Chain 0



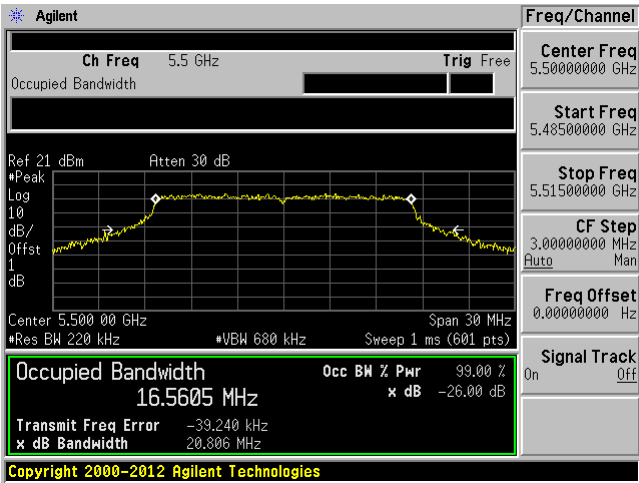
Chain 1



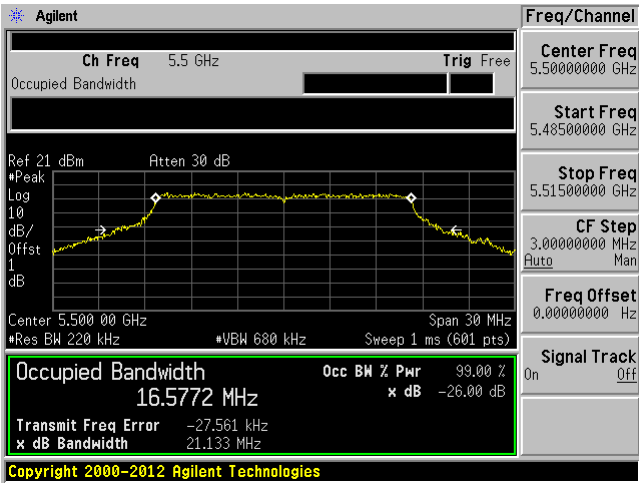
5.6 GHz Band

802.11a, Low Channel, 5500 MHz

Chain 0

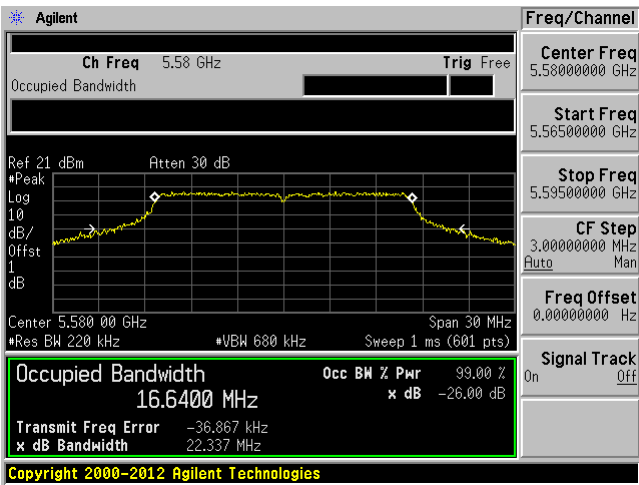


Chain 1

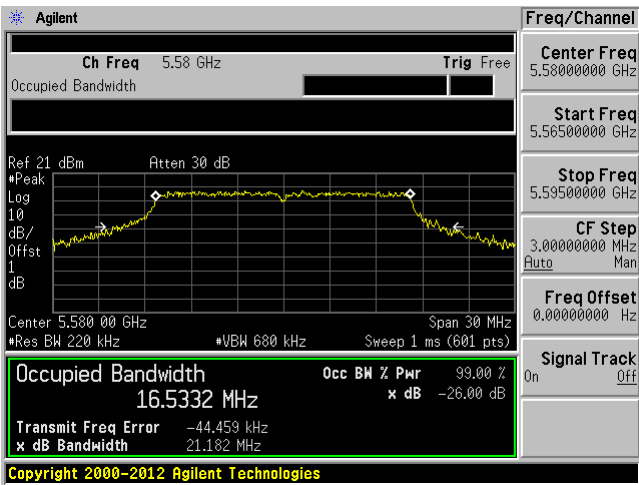


802.11a, Middle Channel, 5580 MHz

Chain 0

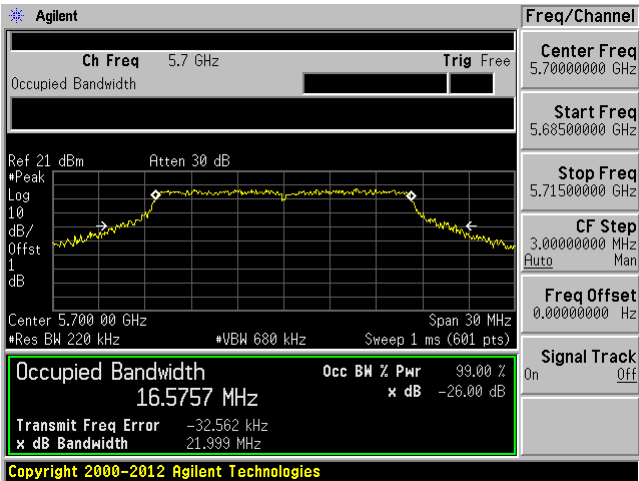


Chain 1

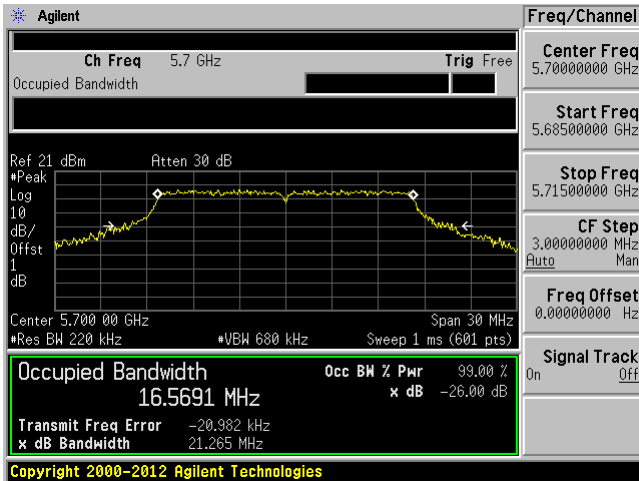


802.11a, High Channel, 5700 MHz

Chain 0

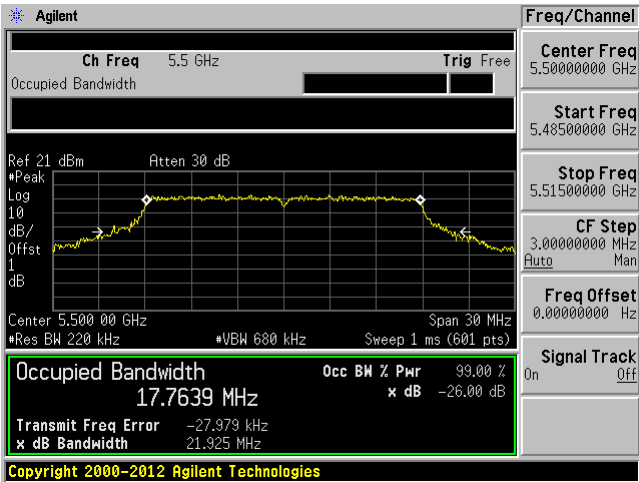


Chain 1

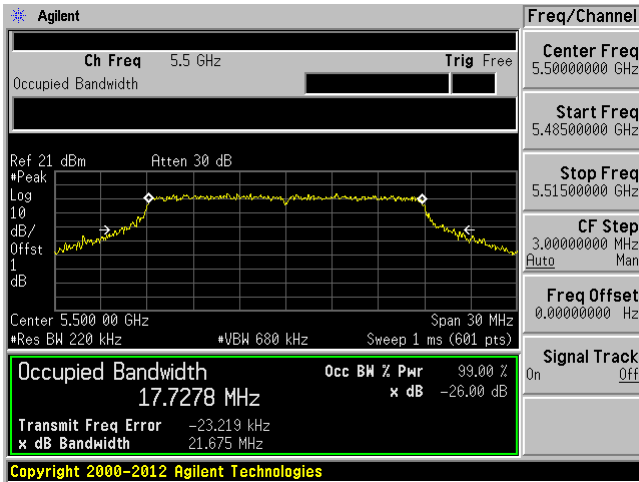


802.11n-HT 20, Low Channel 5500 MHz

Chain 0

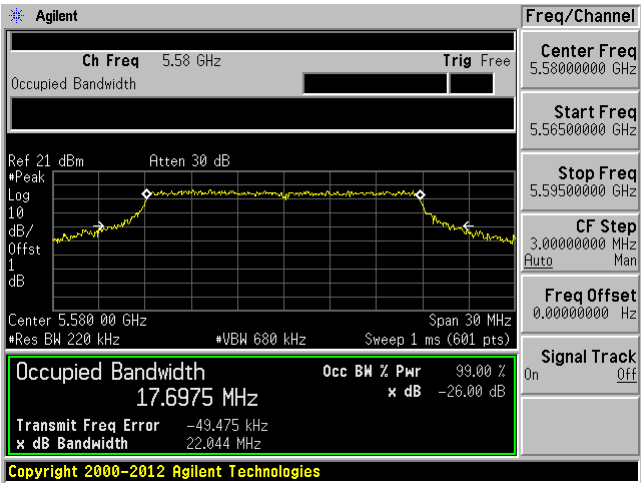


Chain 1

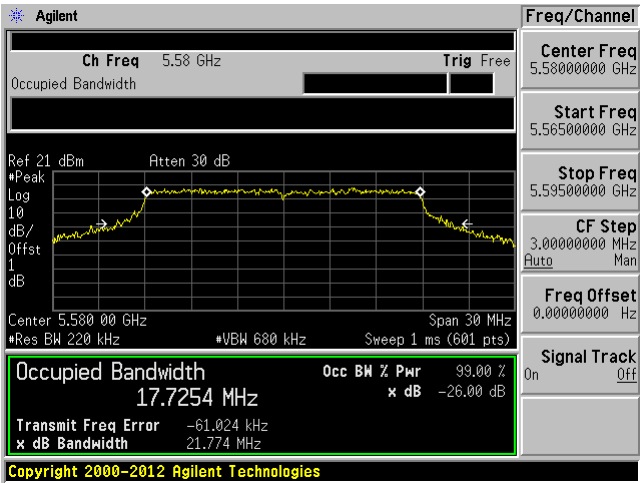


802.11n-HT20, Middle Channel 5580 MHz

Chain 0

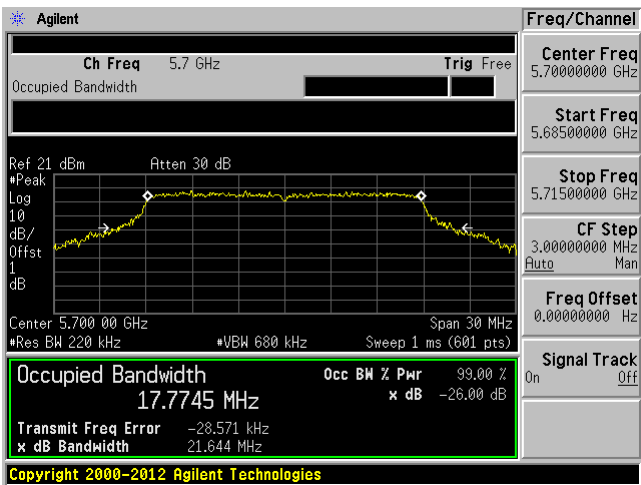


Chain 1

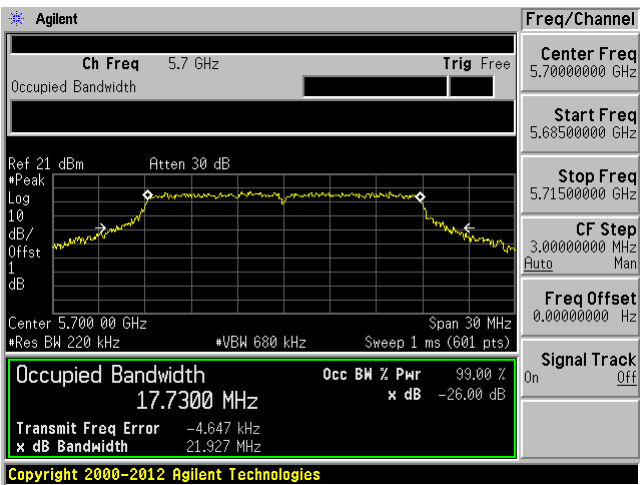


802.11n-HT20, High Channel, 5700 MHz

Chain 0

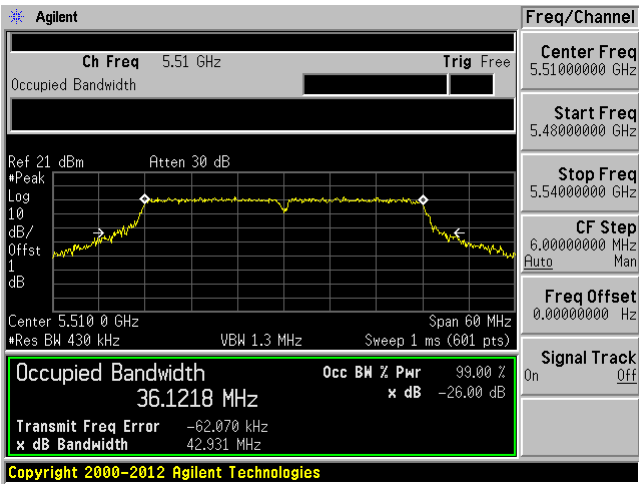


Chain 1

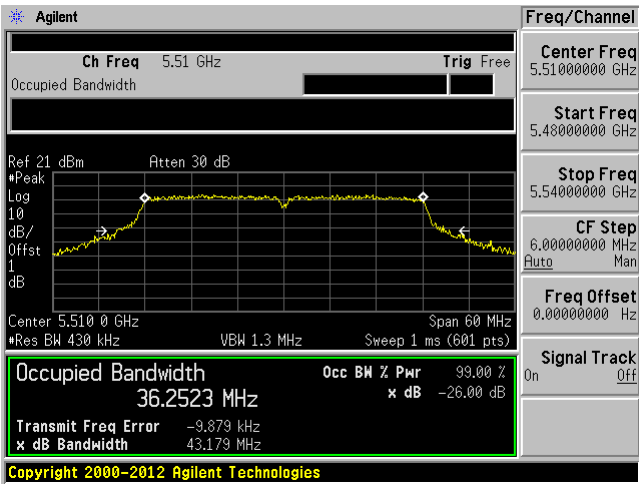


802.11n-HT40, Low Channel 5510 MHz

Chain 0

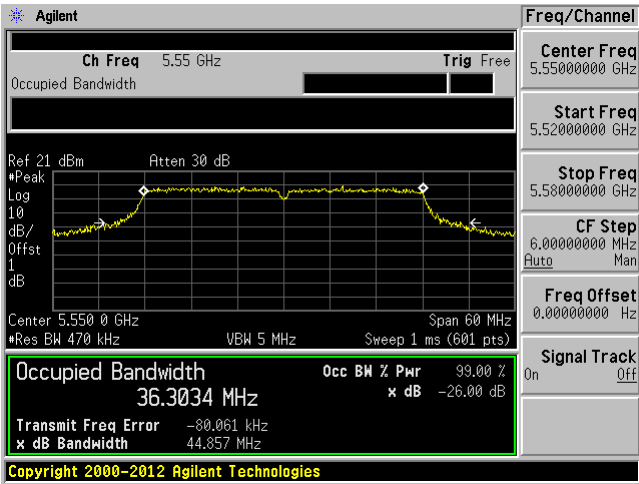


Chain 1

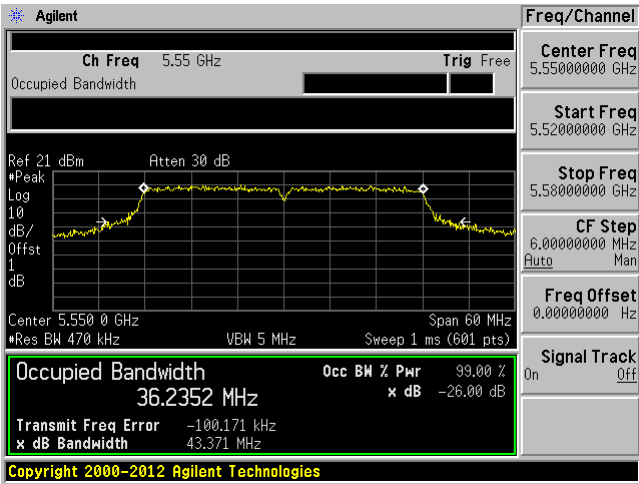


802.11n-HT40, Middle Channel 5550 MHz

Chain 0

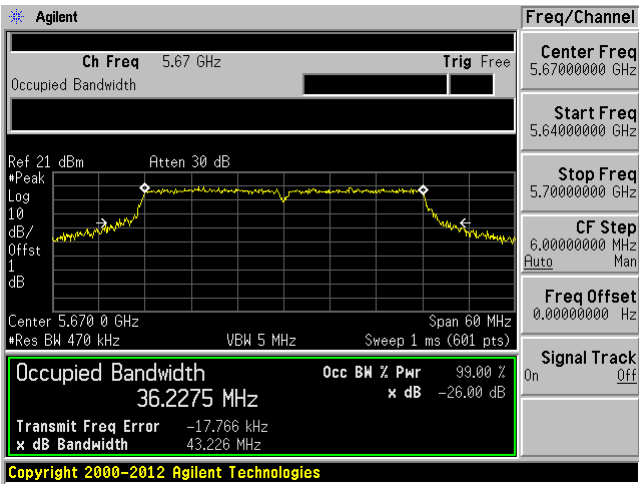


Chain 1

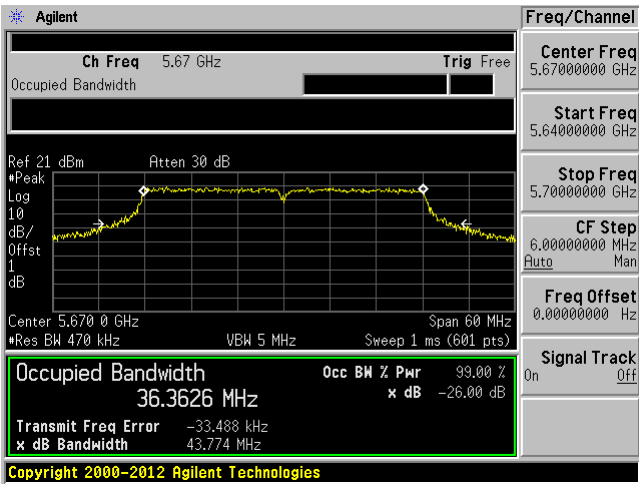


802.11n-HT40, High Channel 5670 MHz

Chain 0

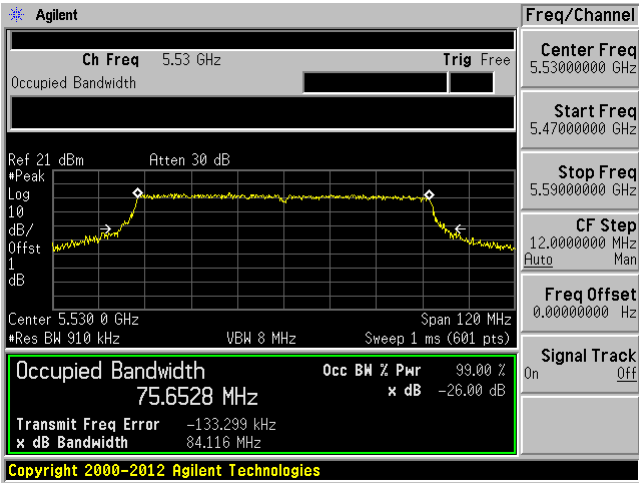


Chain 1

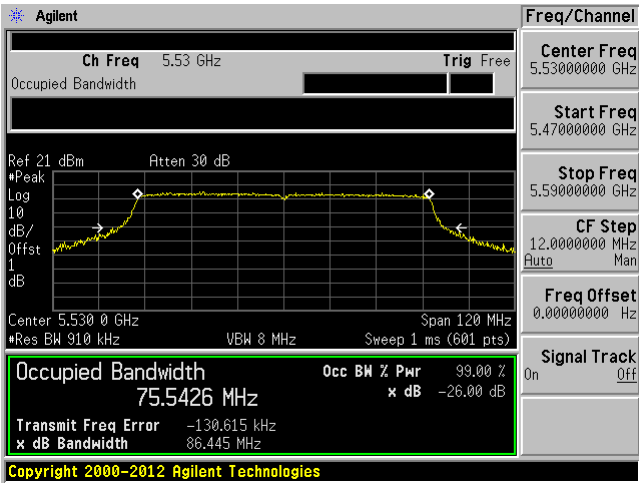


802.11ac-VHT80, Low Channel 5530 MHz

Chain 0

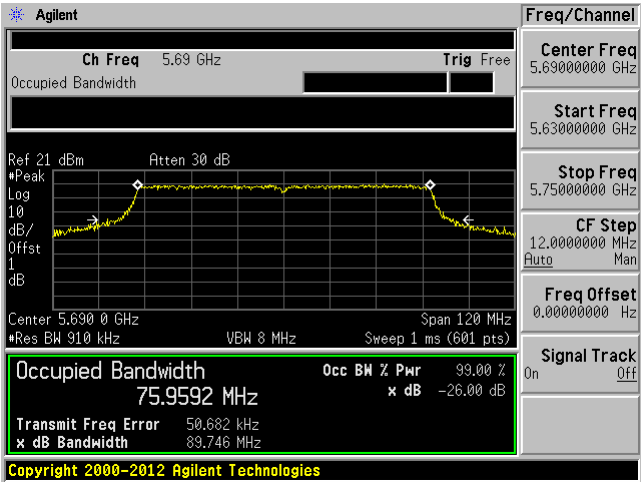


Chain 1

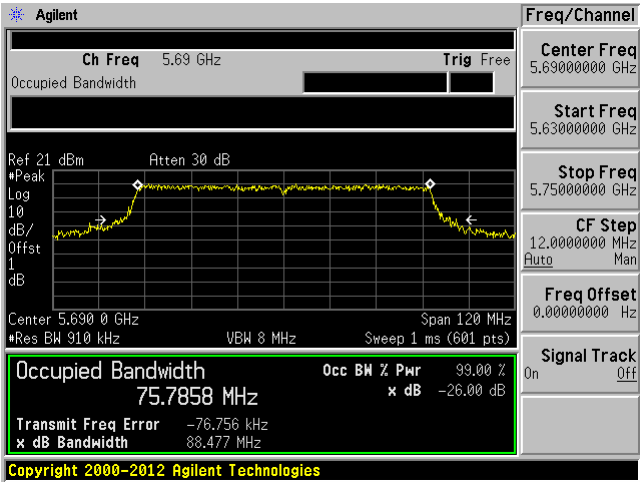


802.11ac-VHT80, High Channel 5690 MHz

Chain 0



Chain 1



9 FCC §407(a) & IC RSS-210 §A9.2 – Output Power

9.1 Applicable Standards

According to FCC §15.407(a)

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm $10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 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.

According to IC RSS-210 §A9.2:

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

9.2 Measurement Procedure

Test measurements are base on FCC KDB 789033 D02 General UNII Test Procedures New Rules v01, GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORAMTION 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	E4440A	MY44303352	2013-11-07	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 Rui Zhou from 2014-10-15 at RF site.

9.5 Test Results

W53 Band

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Output Power (dBm)	Limit (dBm)	Margin (dBm)	Power Setting
		Chain J0	Chain J1				
802.11a mode							
Low	5260	18.26	18.70	21.50	24	-2.50	17.5
Middle	5280	18.41	18.46	21.45	24	-2.55	17.5
High	5320	17.90	18.14	21.03	24	-2.97	17.5
802.11n-HT20 mode							
Low	5260	18.97	19.13	21.40	24	-2.60	17.5
Middle	5280	16.73	17.37	21.44	24	-2.56	17.5
High	5320	15.12	15.53	21.73	24	-2.27	17.5
802.11n-HT40 mode							
Low	5270	17.41	17.67	20.55	24	-3.45	17.5
High	5310	15.06	14.65	17.87	24	-6.13	15
802.11ac-VHT80 mode							
-	5290	12.58	12.56	15.58	24	-8.42	13

W56 Band

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Output Power (dBm)	Limit (dBm)	Margin (dBm)	Power Setting
		Chain J0	Chain J1				
802.11a mode							
Low	5500	15.38	16.04	18.73	24	-5.27	15
Middle	5580	18.21	19.53	21.93	24	-2.07	19
High	5700	18.99	18.96	21.99	24	-2.01	19
802.11n-HT20 mode							
Low	5500	15.19	15.90	18.57	24	-5.43	15
Middle	5580	18.58	19.86	22.28	24	-1.72	19.5
High	5700	19.34	19.28	22.32	24	-1.68	19.5
802.11n-HT40 mode							
Low	5510	14.41	15.22	17.84	24	-6.16	15
Middle	5550	19.71	20.94	23.38	24	-0.62	21
High	5670	20.37	20.62	23.51	24	-0.49	21
802.11ac-VHT80 mode							
Low	5530	14.26	15.04	17.68	24	-6.32	15.5
High	5690	21.01	20.75	23.89	24	-0.11	21.5

10 FCC §15.407(b) & IC RSS-210 §A9.2 - Out of Band Emissions

10.1 Applicable Standard

According to FCC §15.407(b)

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

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

According to RSS-210 §A9.2

Emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.

Emissions outside the band 5470-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p.

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 PART 15, SUBPART E

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-11-07	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:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Rui Zhou from 2014-10-15 at RF site.

10.5 Test Results

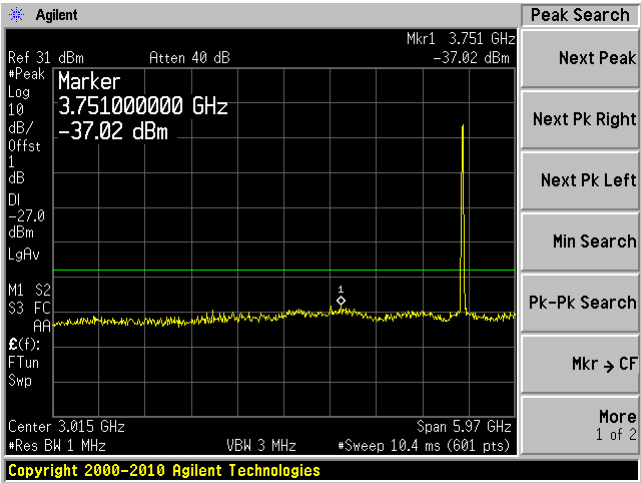
Please refer to the following plots.

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

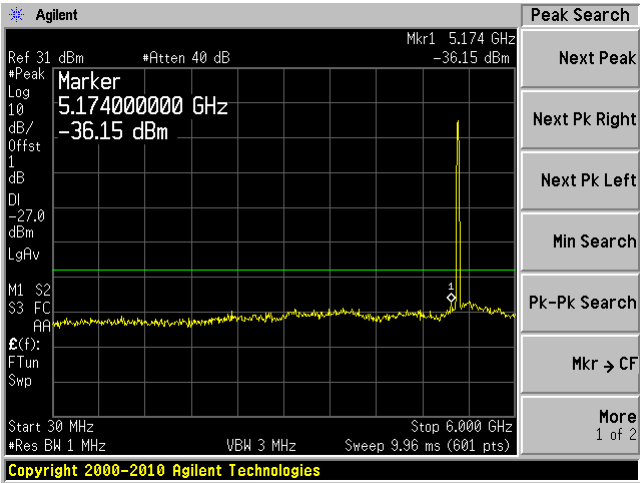
(1) Conducted Spurious Emission from 30 MHz – 40 GHz W53 Band:

802.11a, Low Channel, 5260 MHz

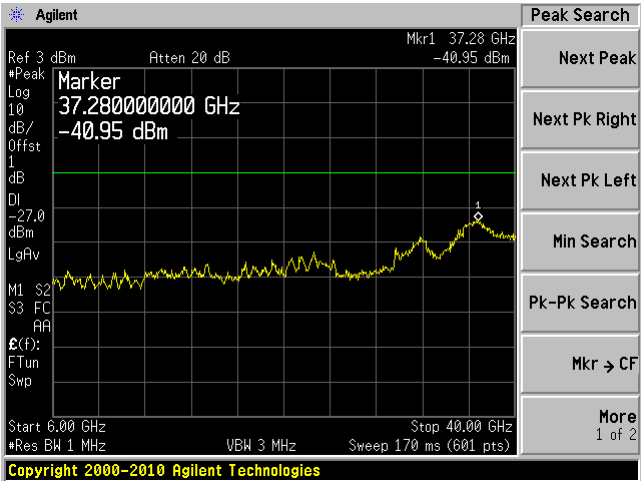
Chain 0, Plot: 30 MHz – 6 GHz



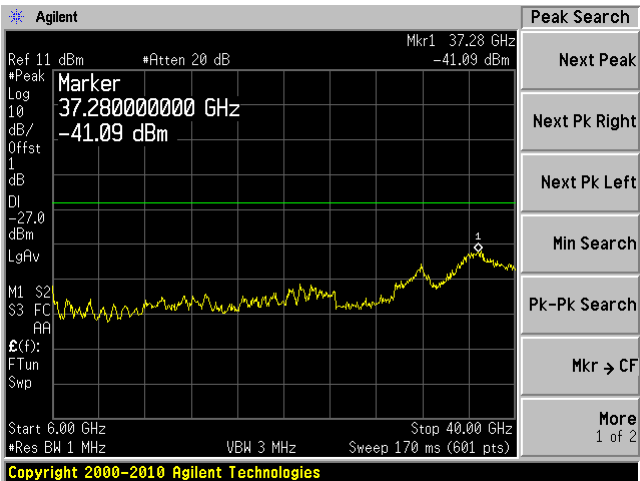
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

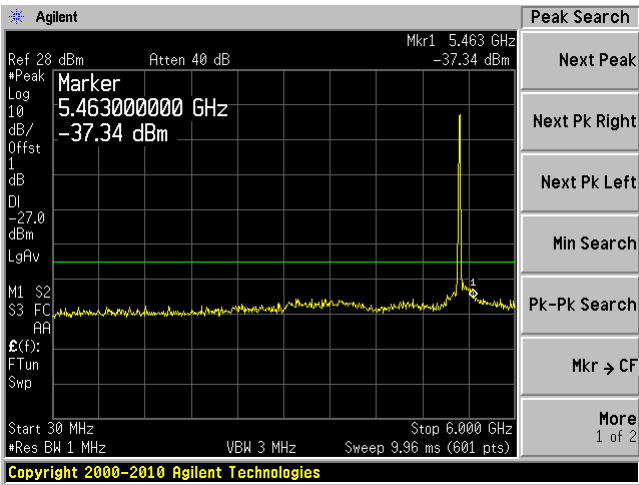


Chain 1, Plot: 6 GHz – 40 GHz

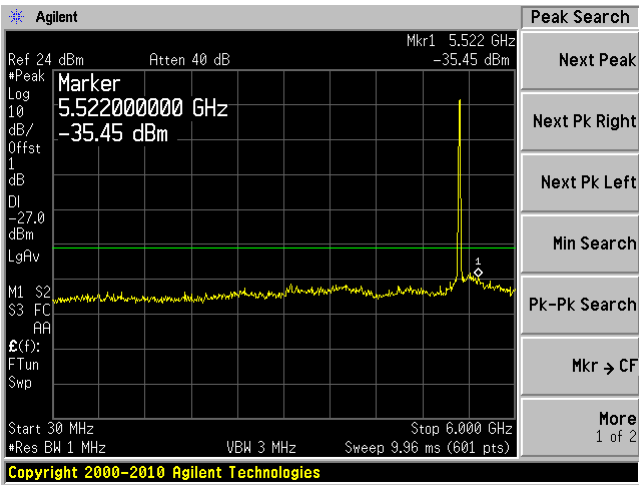


802.11a, Middle Channel, 5280 MHz

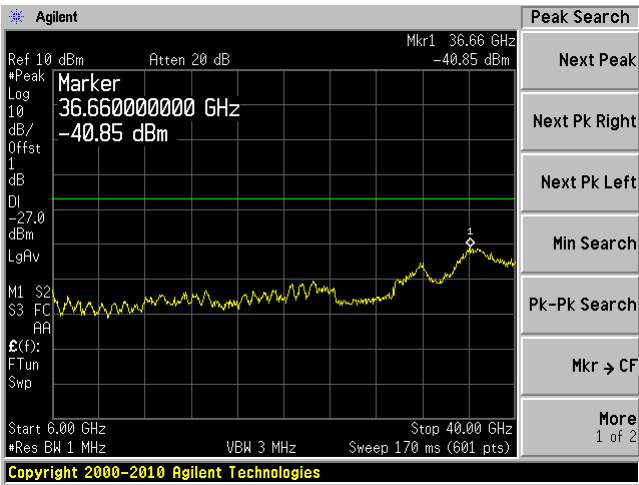
Chain 0, Plot: 30 MHz – 6 GHz



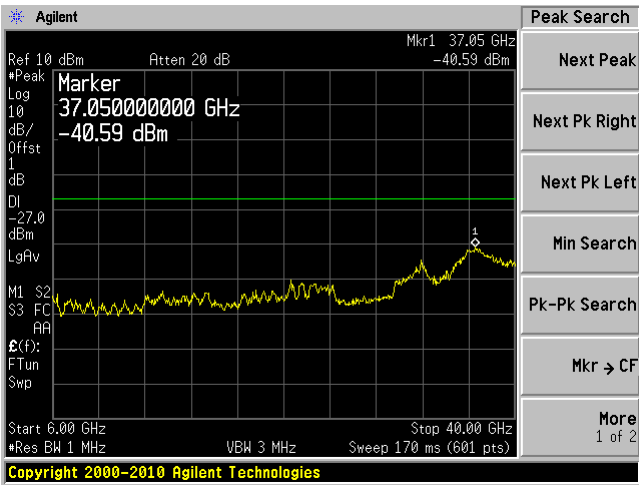
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

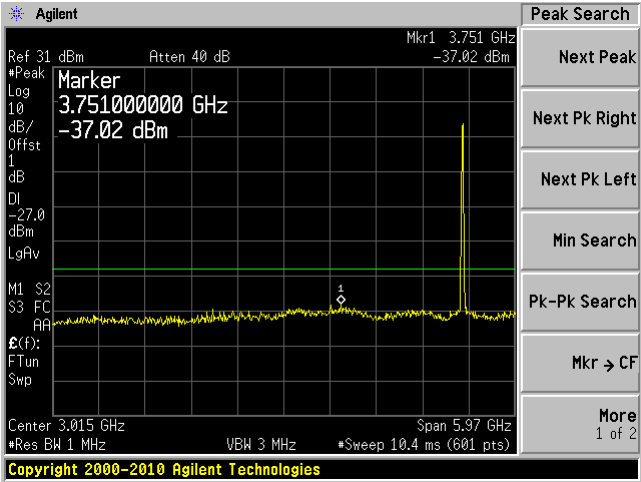


Chain 1, Plot: 6 GHz – 40 GHz

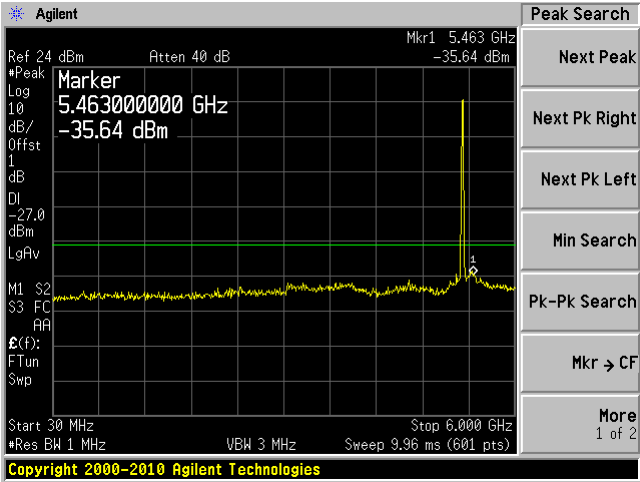


802.11a, High Channel, 5320 MHz

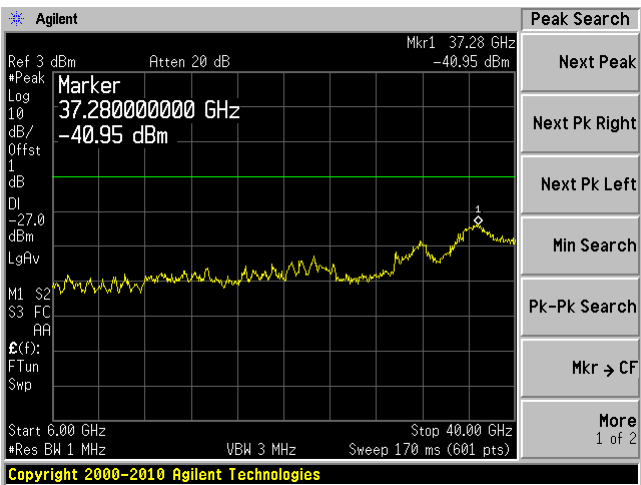
Chain 0, Plot: 30 MHz – 6 GHz



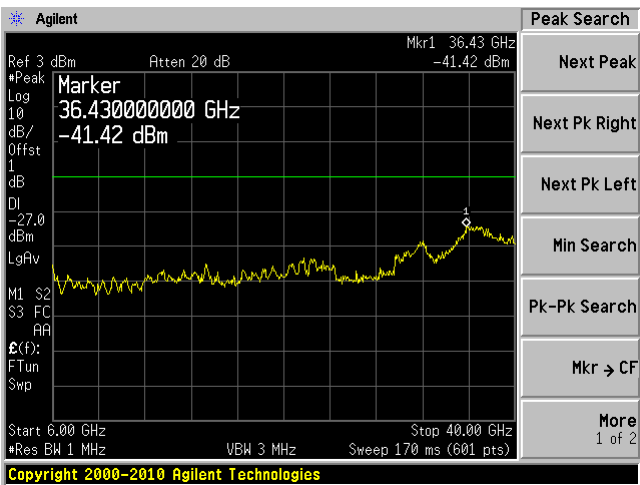
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

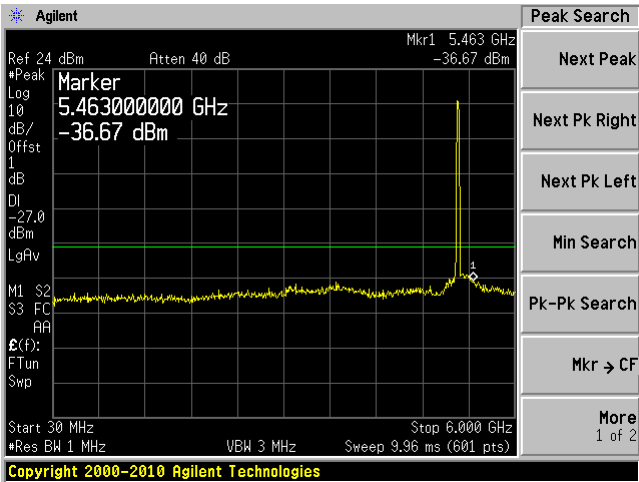


Chain 1, Plot: 6 GHz – 40 GHz

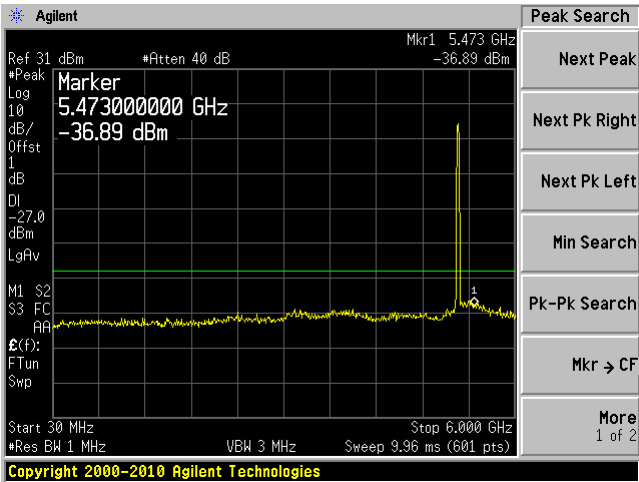


802.11n-HT 20, Low Channel 5260 MHz

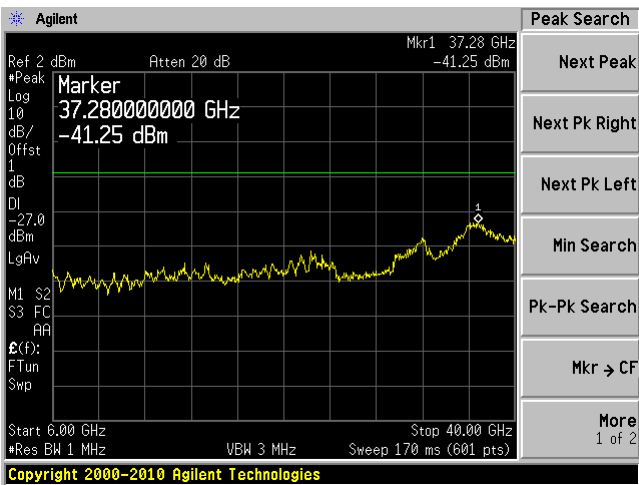
Chain 0, Plot: 30 MHz – 6 GHz



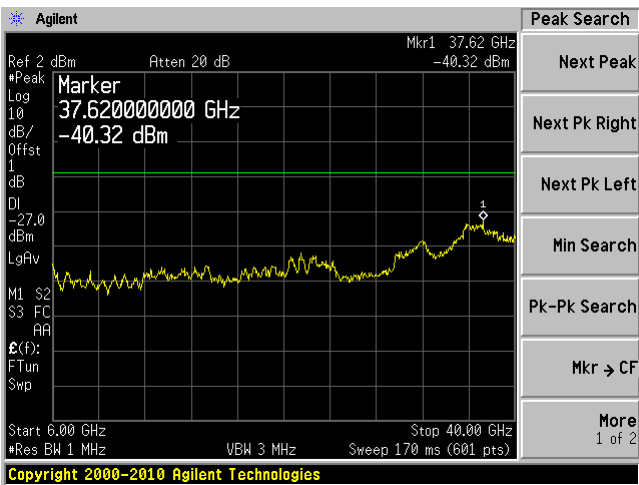
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

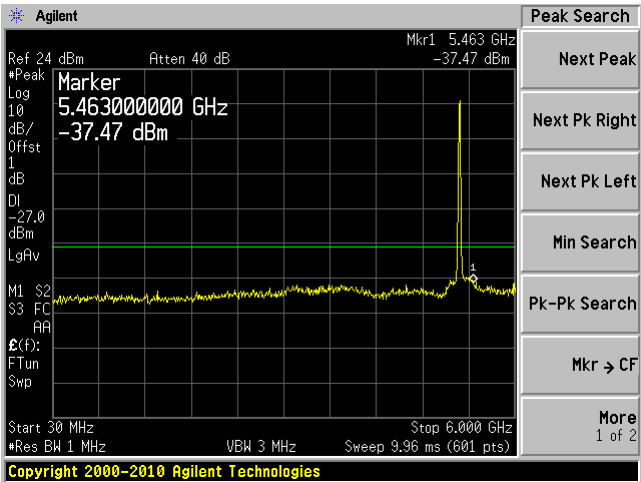


Chain 1, Plot: 6 GHz – 40 GHz

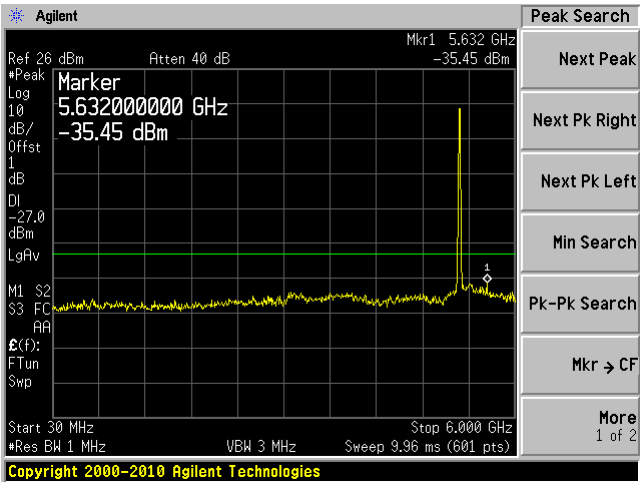


802.11n-HT20, Middle Channel 5280 MHz

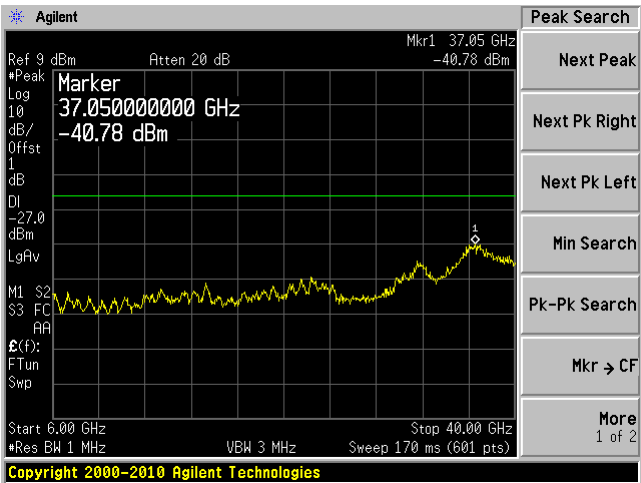
Chain 0, Plot: 30 MHz – 6 GHz



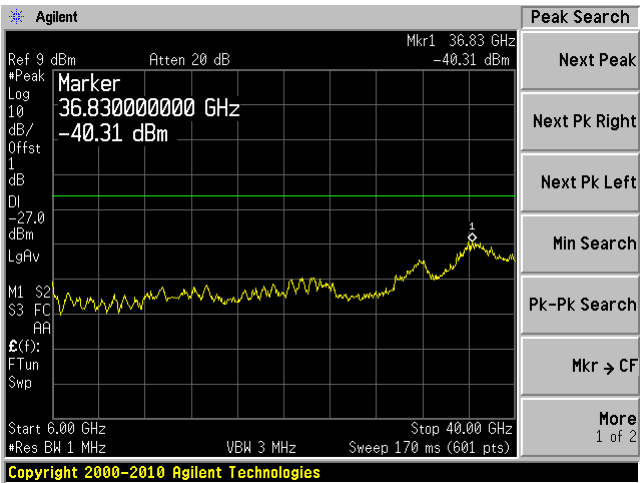
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

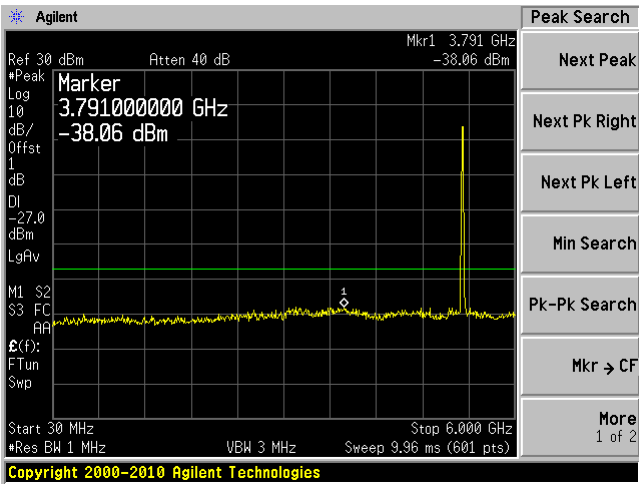


Chain 1, Plot: 6 GHz – 40 GHz

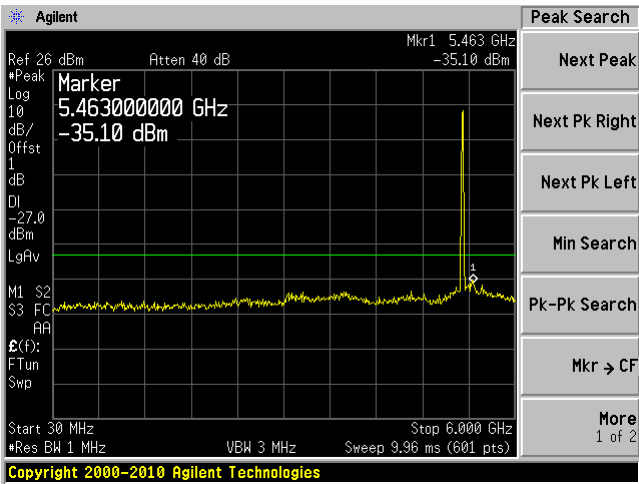


802.11n-HT 20, High Channel 5320 MHz

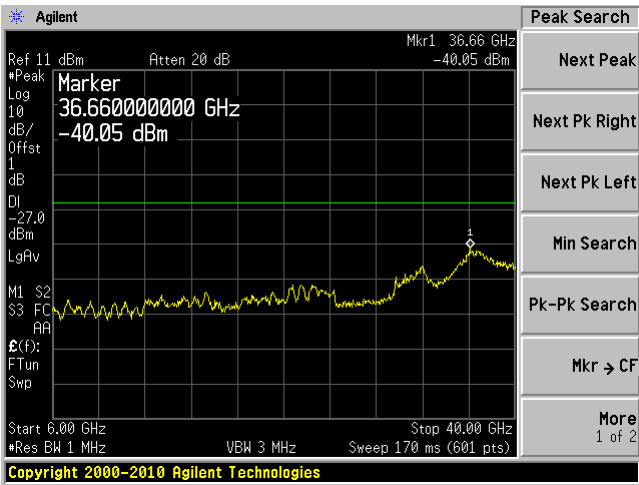
Chain 0, Plot: 30 MHz – 6 GHz



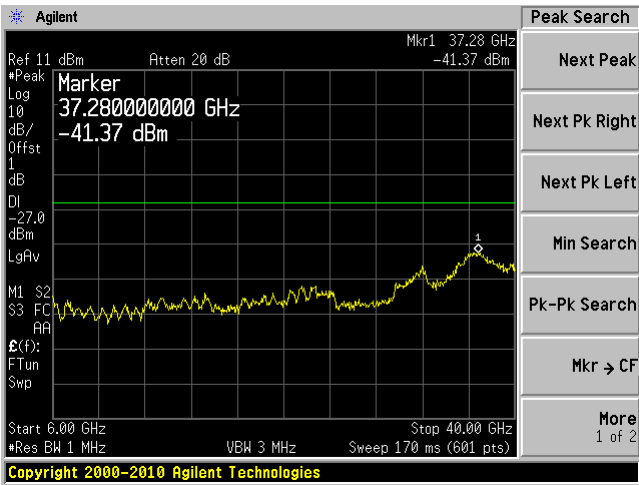
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

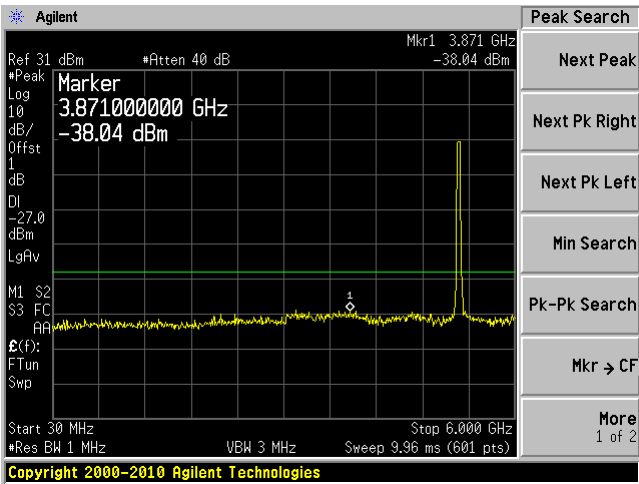


Chain 1, Plot: 6 GHz – 40 GHz

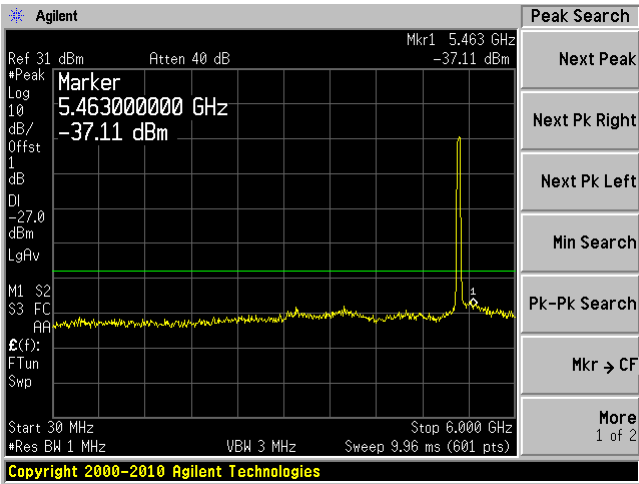


802.11n-HT40, Low Channel 5270 MHz

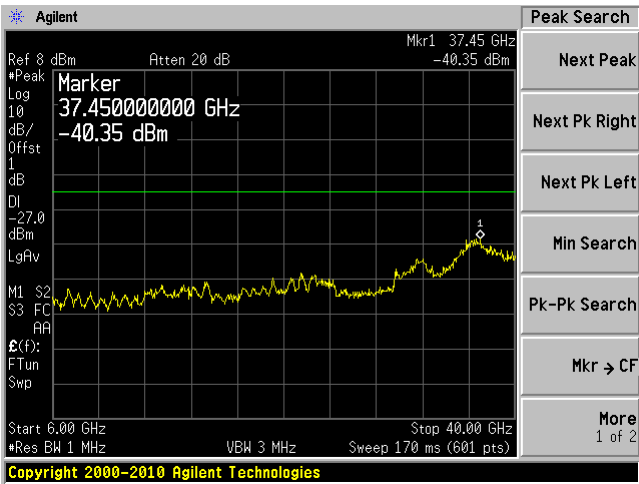
Chain 0, Plot: 30 MHz – 6 GHz



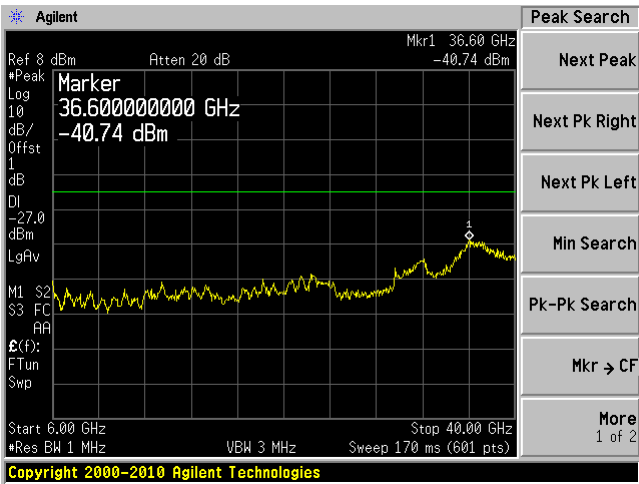
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

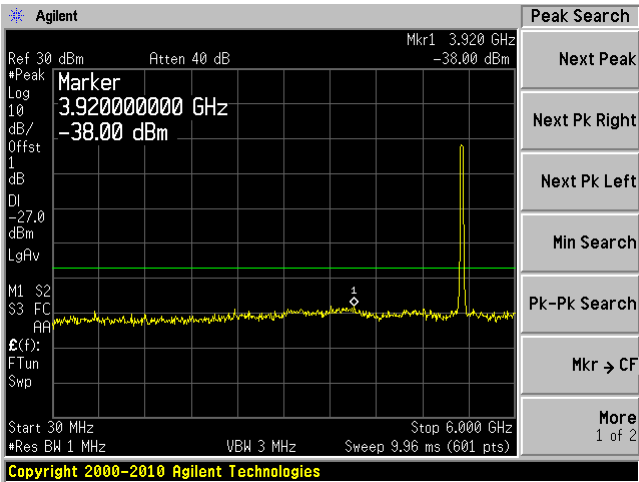


Chain 1, Plot: 6 GHz – 40 GHz

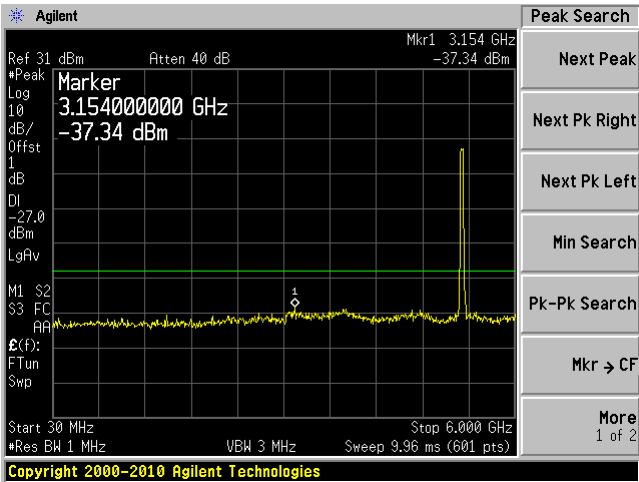


802.11n-HT40, High Channel 5310 MHz

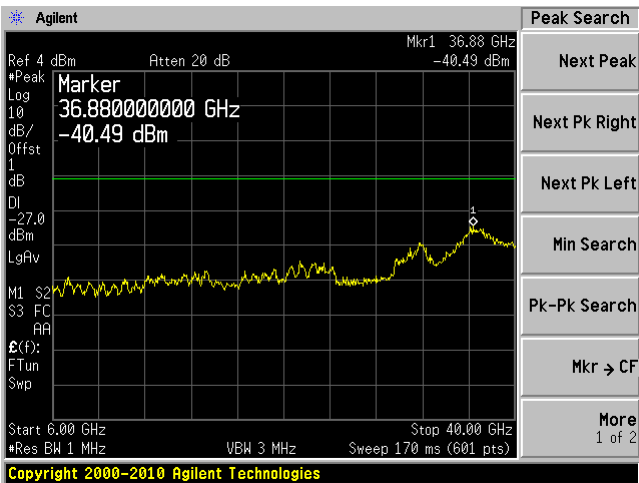
Chain 0, Plot: 30 MHz – 6 GHz



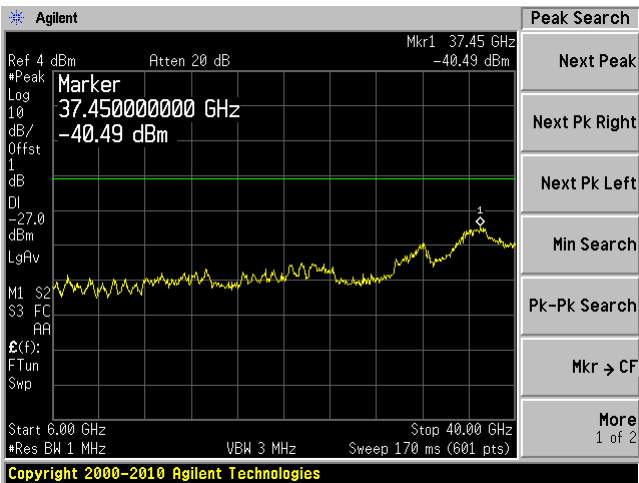
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

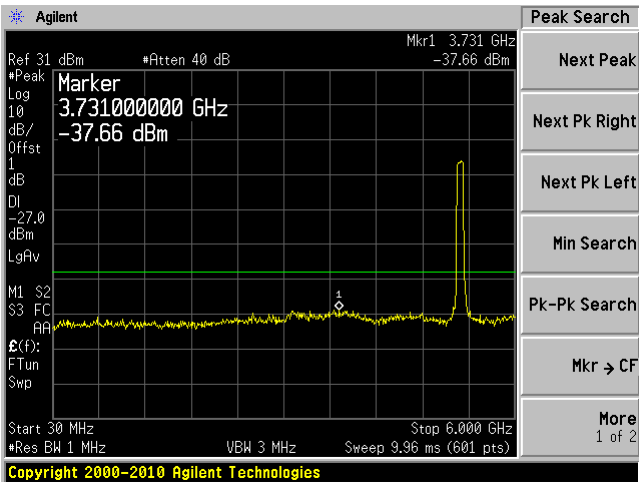


Chain 1, Plot: 6 GHz – 40 GHz

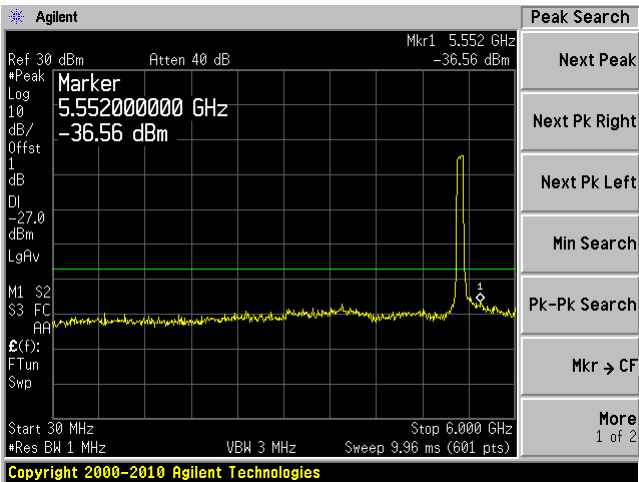


802.11ac-VHT80, 5290 MHz

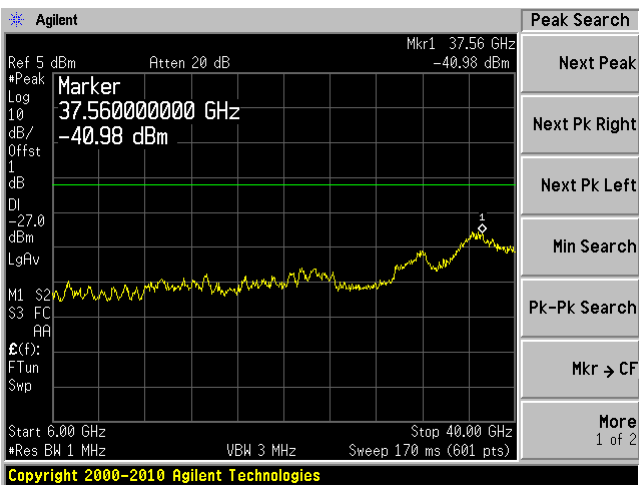
Chain 0, Plot: 30 MHz – 6 GHz



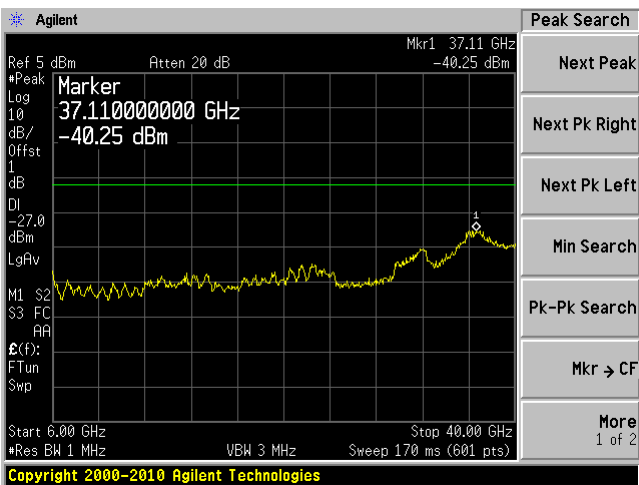
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz



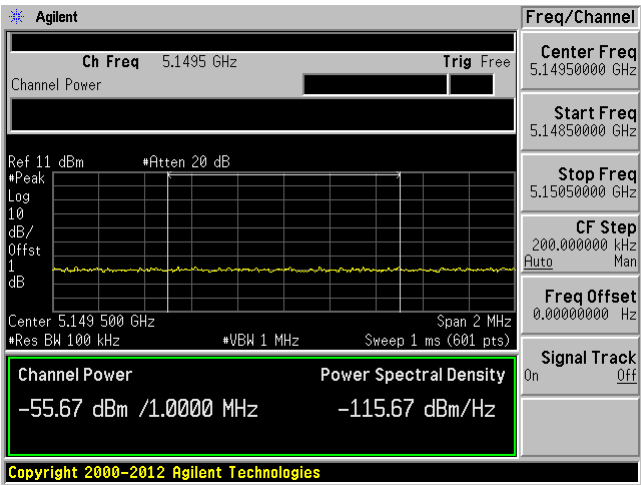
Chain 1, Plot: 6 GHz – 40 GHz



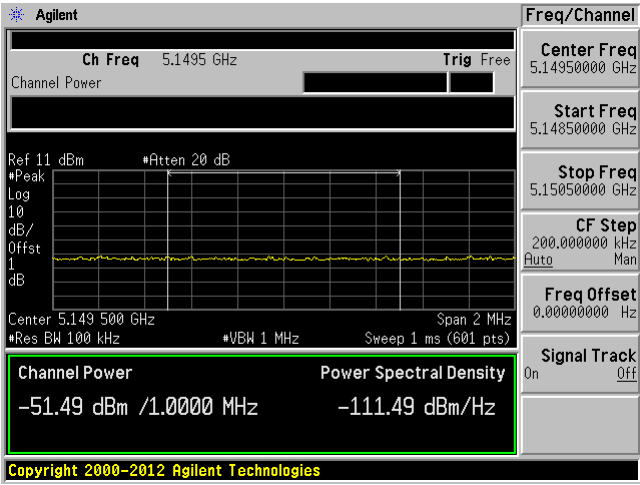
(2) Band Edge Measurement, W53 Bnad:

802.11a, Low Channel, 5260 MHz

Chain 0

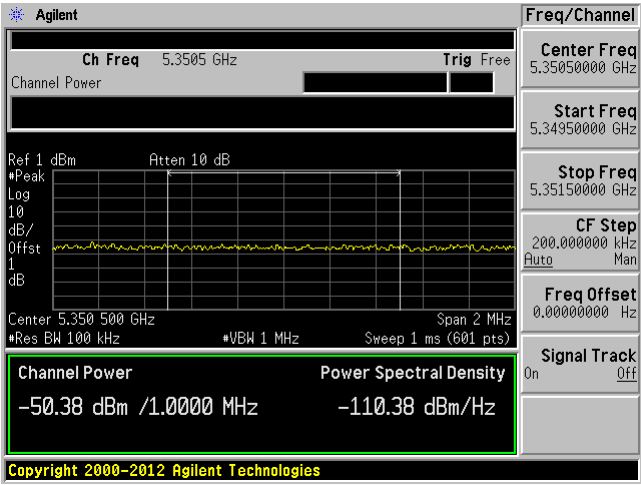


Chain 1

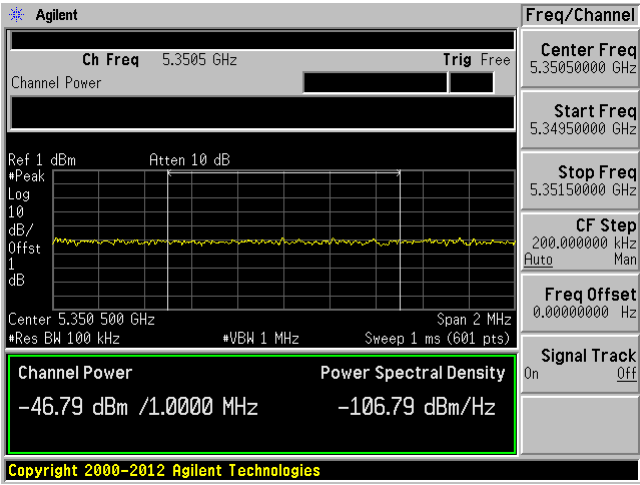


802.11a, High Channel, 5320 MHz

Chain 0

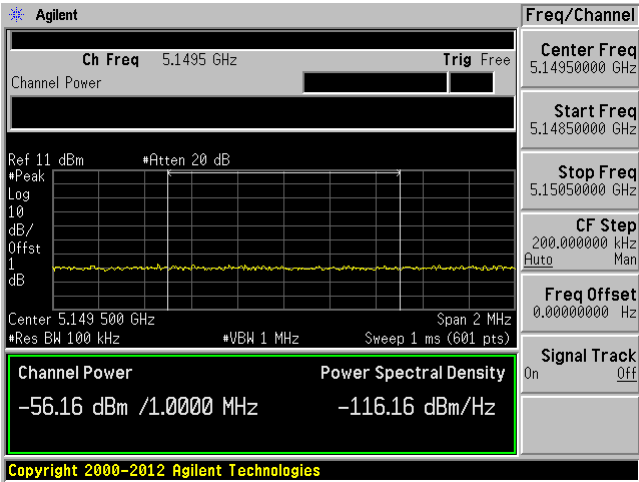


Chain 1

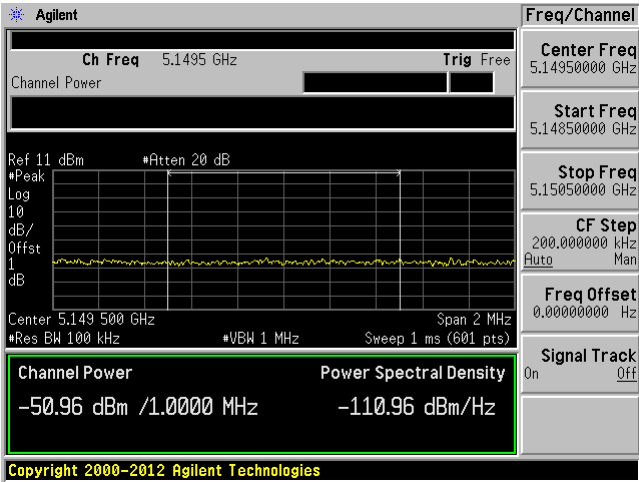


802.11n-HT20, Low Channel 5260 MHz

Chain 0

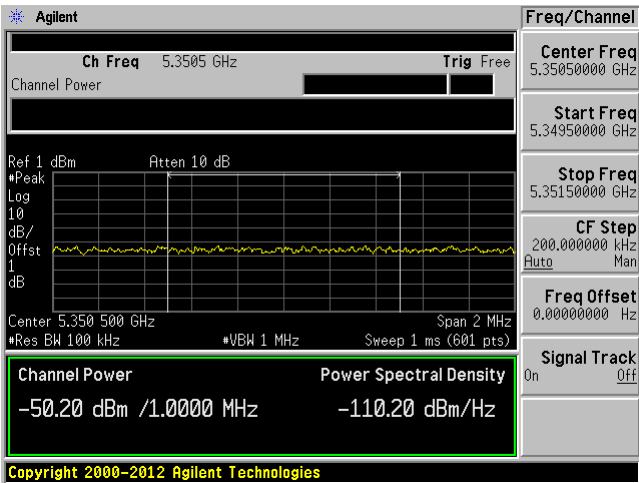


Chain 1

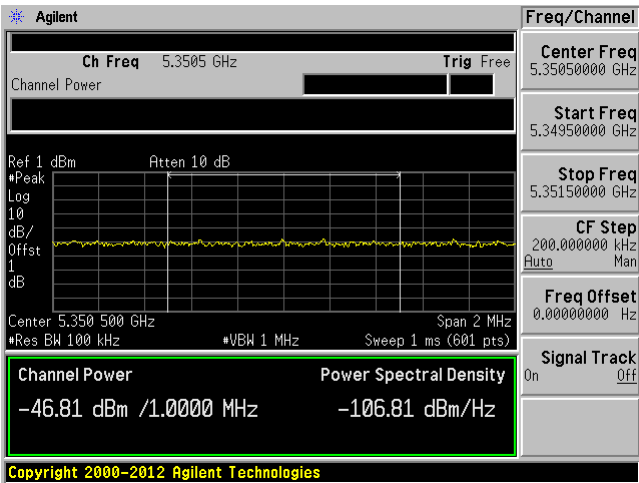


802.11n-HT20, High Channel, 5320 MHz

Chain 0

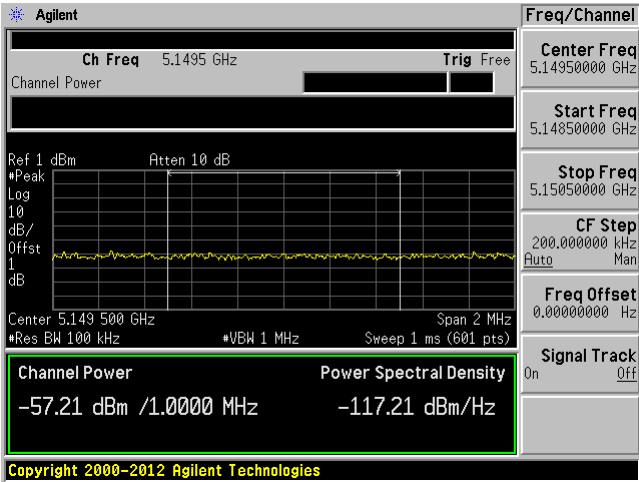


Chain 1

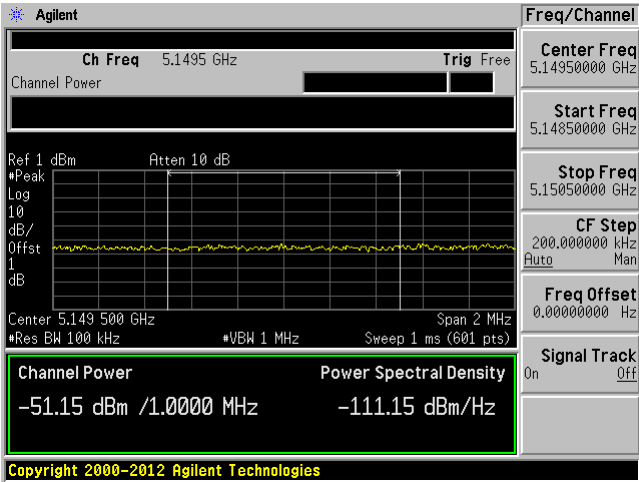


802.11n-HT40, Low Channel 5270 MHz

Chain 0

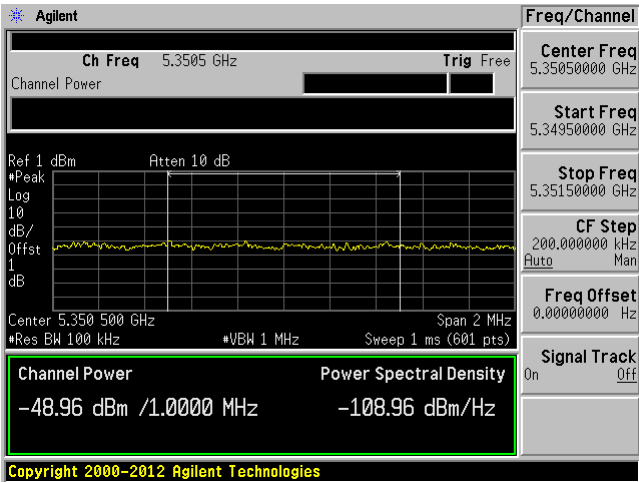


Chain 1

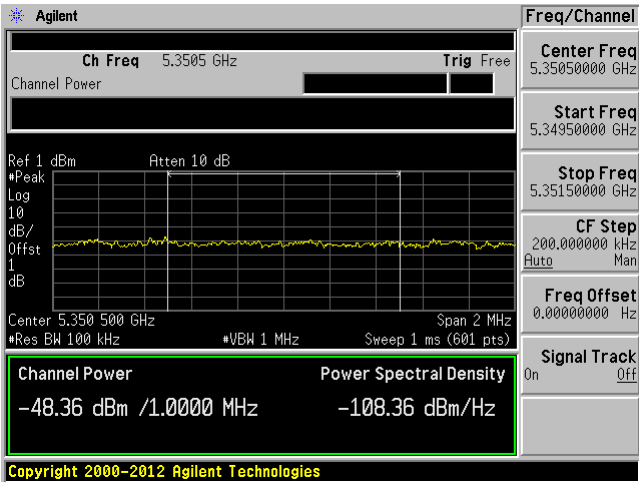


802.11n-HT40, High Channel 5310 MHz

Chain 0

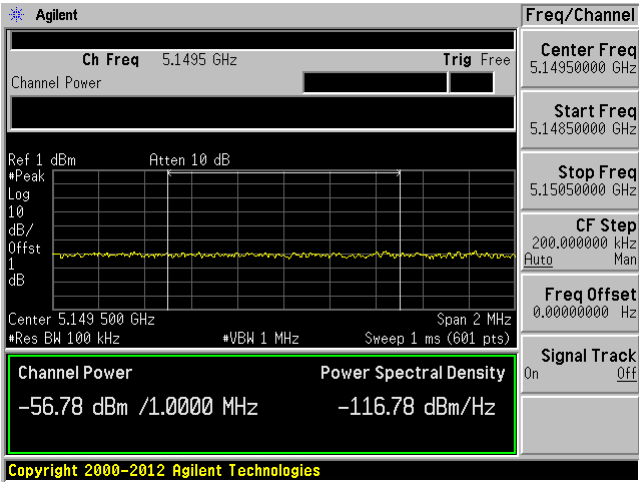


Chain 1

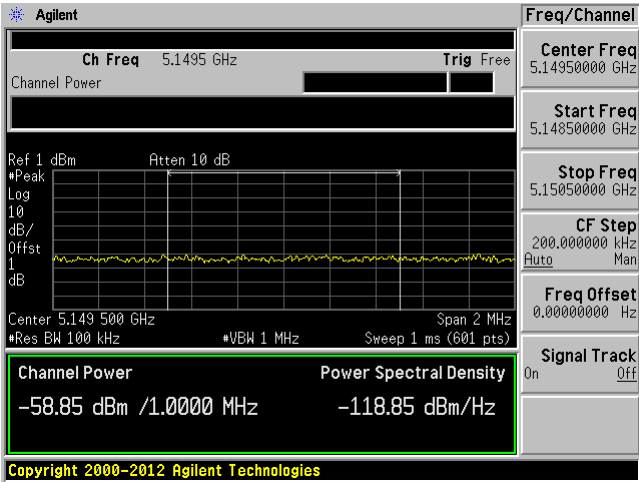


802.11ac-VHT80, Channel 5290 MHz Lower Band Edge at 5150 MHz

Chain 0

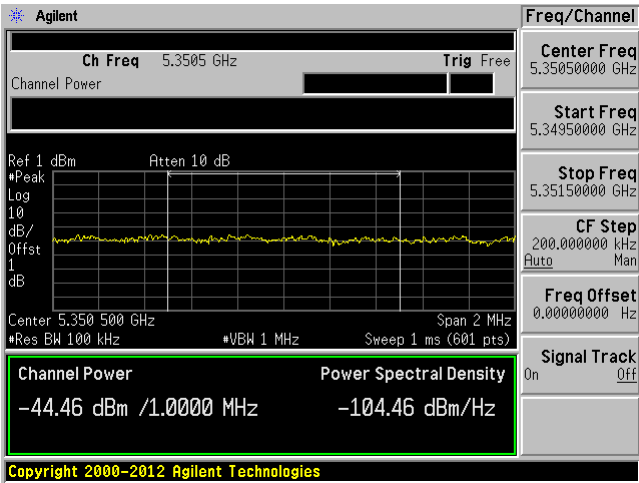


Chain 1

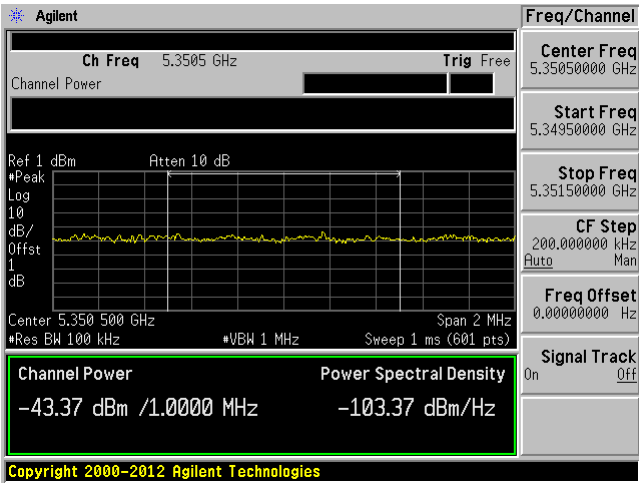


802.11ac-VHT80, Channel 5290 MHz Higher Band Edge at 5350 MHz

Chain 0



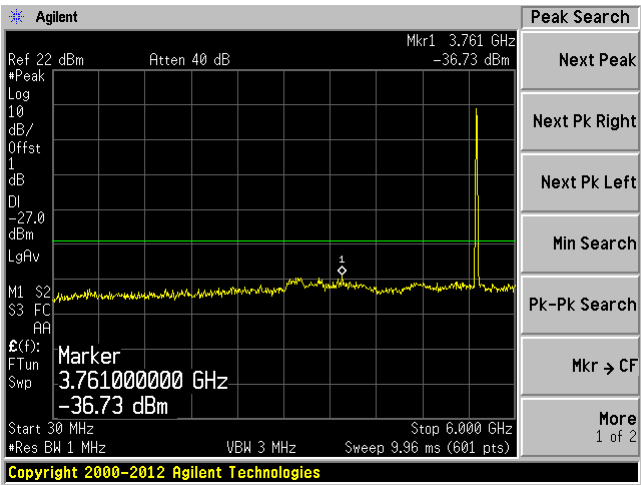
Chain 1



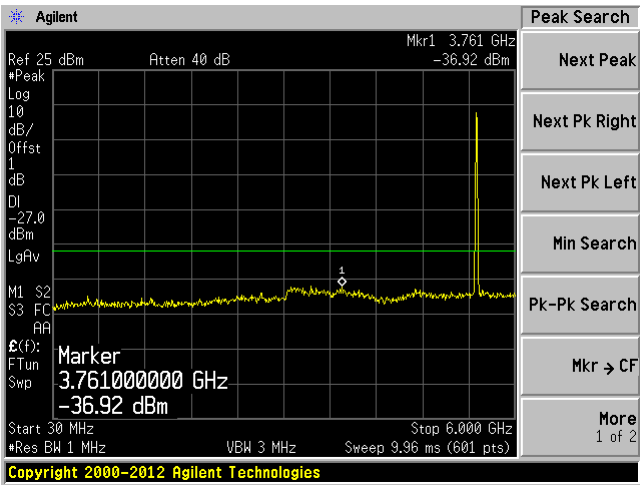
(3) Conducted Spurious Emission from 30 MHz – 40 GHz W56 Band:

802.11 a Mode Low Channel 5500 MHz

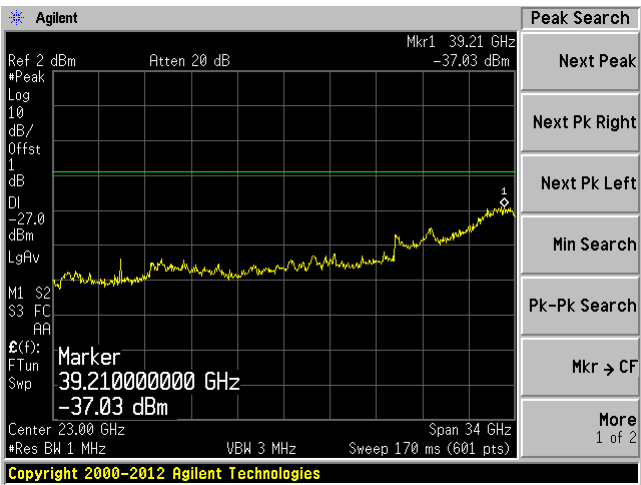
Chain 0, Plot: 30 MHz – 6 GHz



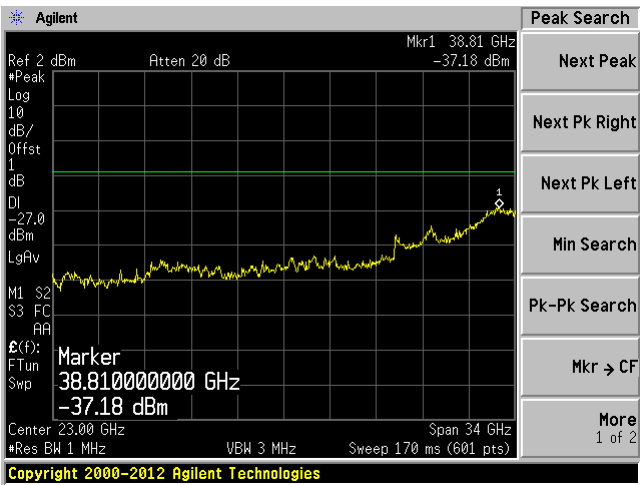
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

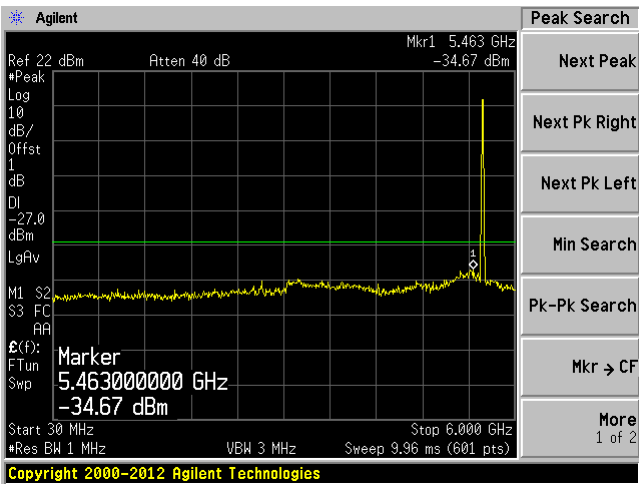


Chain 1, Plot: 6 GHz – 40 GHz

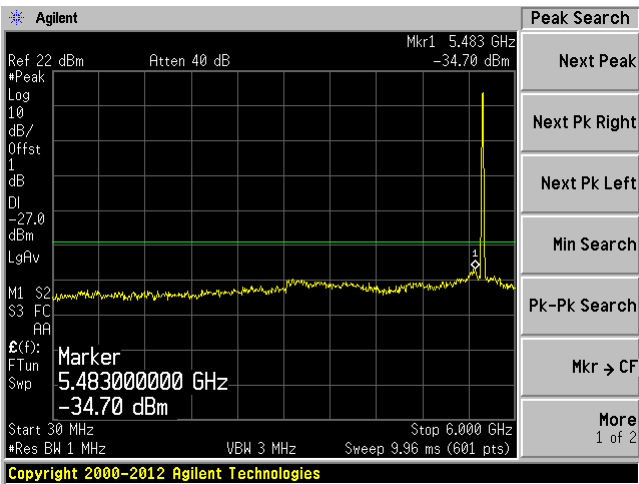


802.11a Mode Middle Channel 5580 MHz

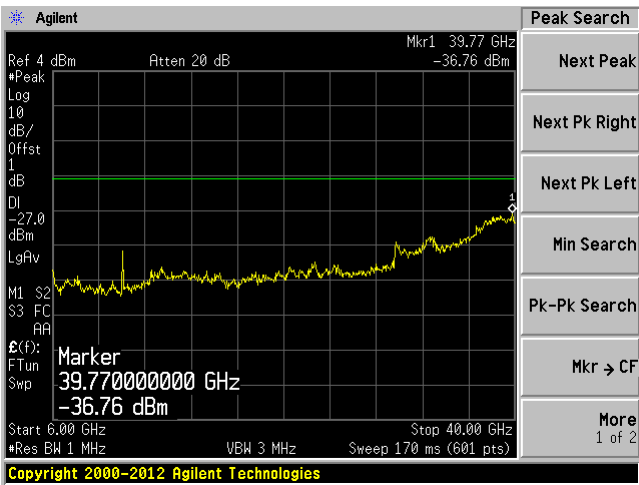
Chain 0, Plot: 30 MHz – 6 GHz



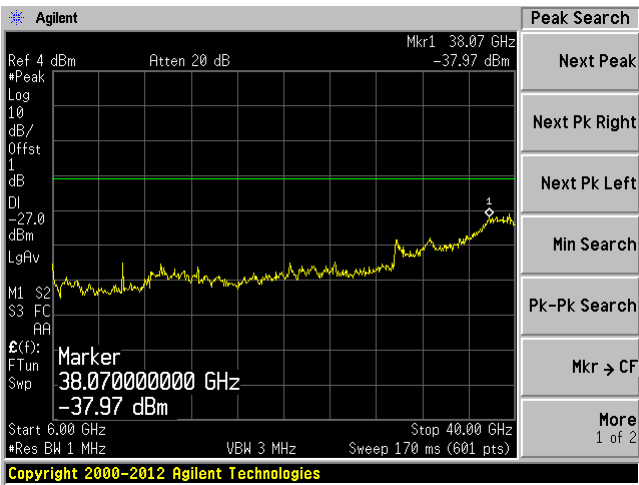
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

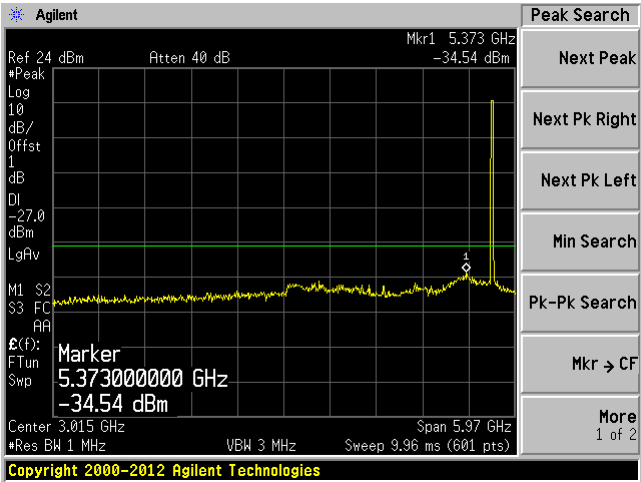


Chain 1, Plot: 6 GHz – 40 GHz

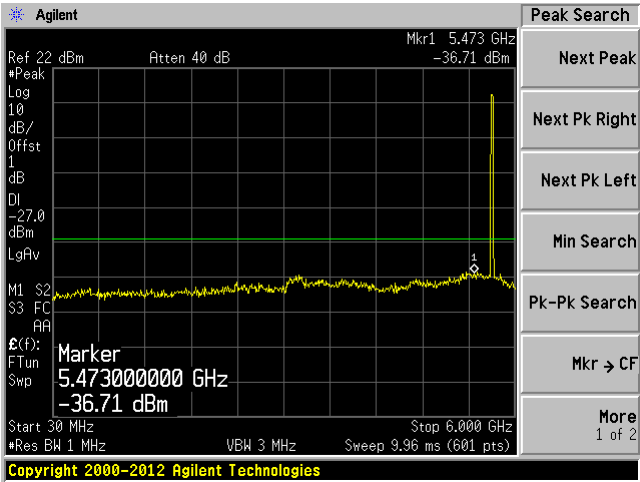


802.11a Mode High Channel 570MHz

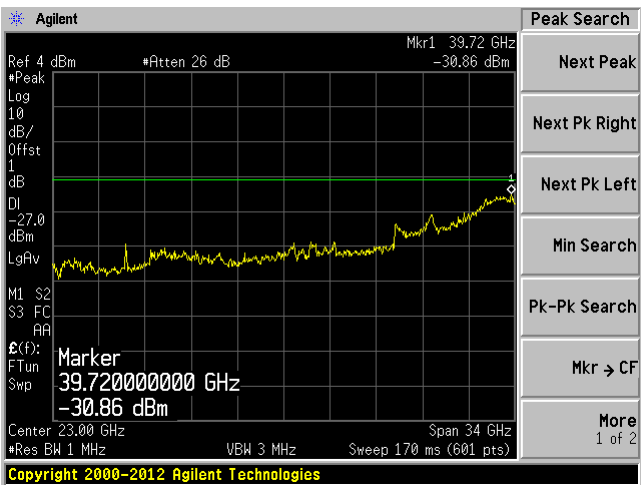
Chain 0, Plot: 30 MHz – 6 GHz



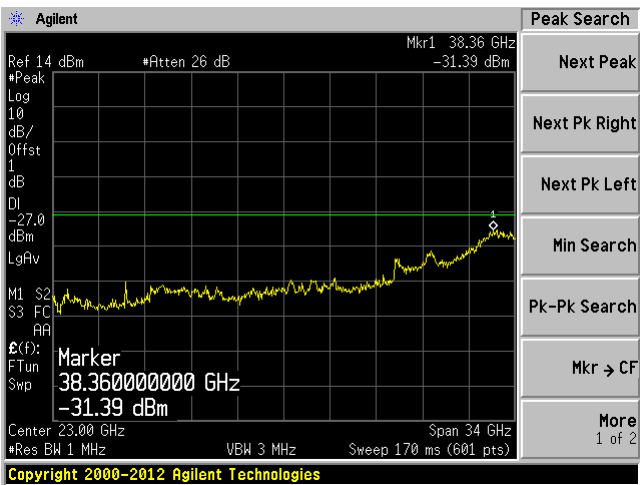
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

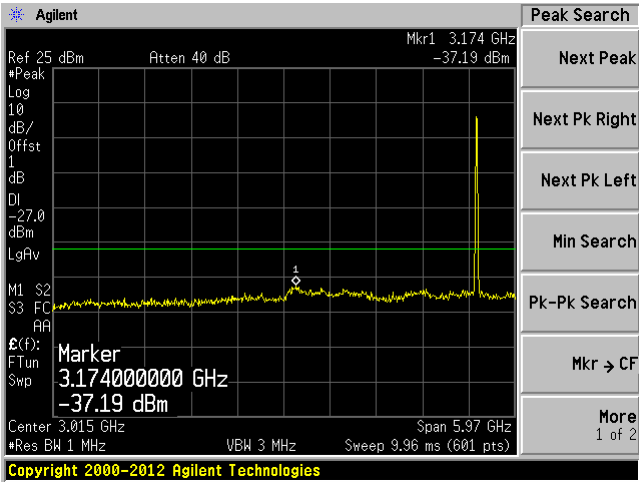


Chain 1, Plot: 6 GHz – 40 GHz

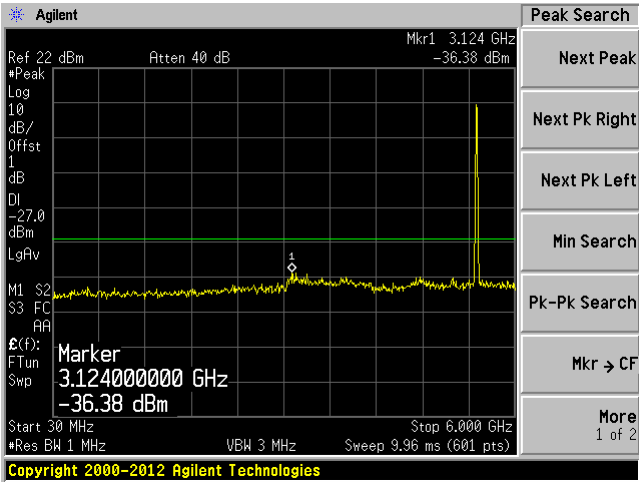


802.11n-HT20 Mode Low Channel 5500MHz

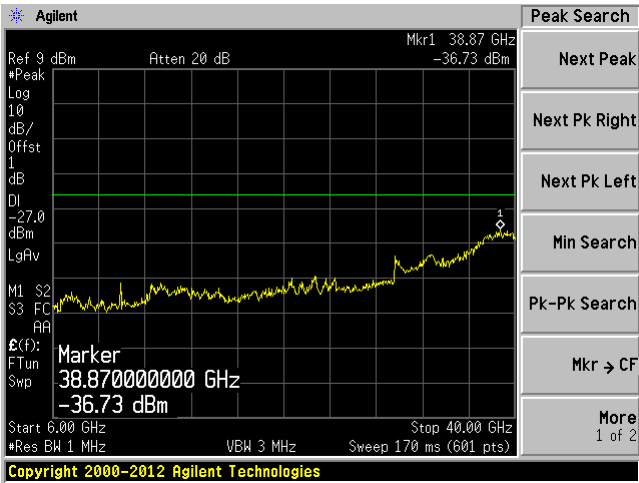
Chain 0, Plot: 30 MHz – 6 GHz



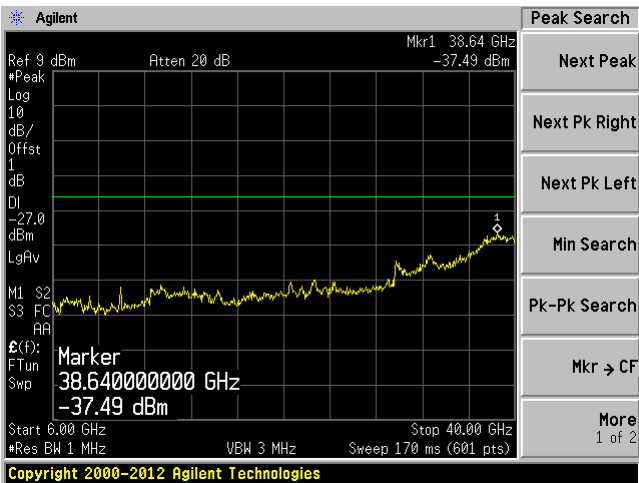
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

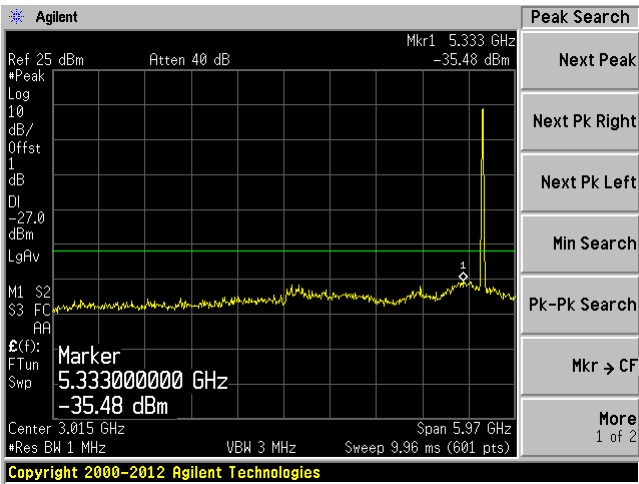


Chain 1, Plot: 6 GHz – 40 GHz

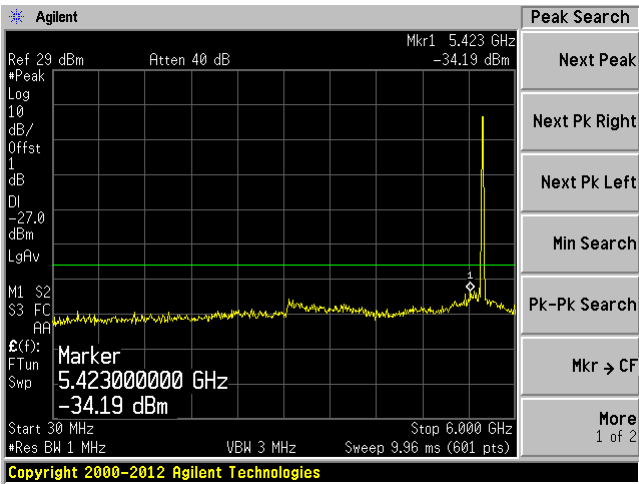


802.11n-HT20 Mode Mid Channel 5580 MHz

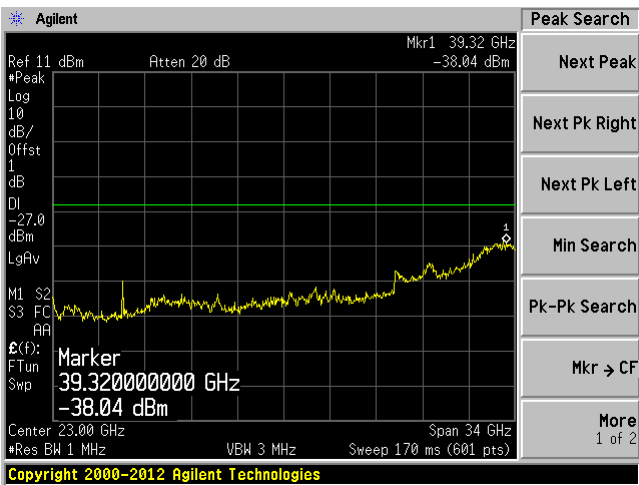
Chain 0, Plot: 30 MHz – 6 GHz



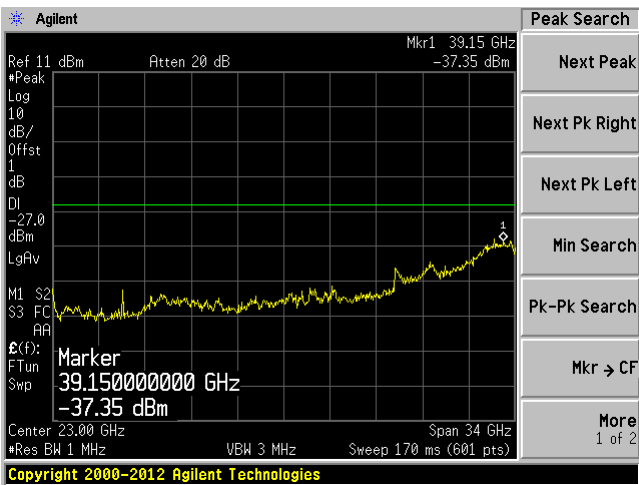
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

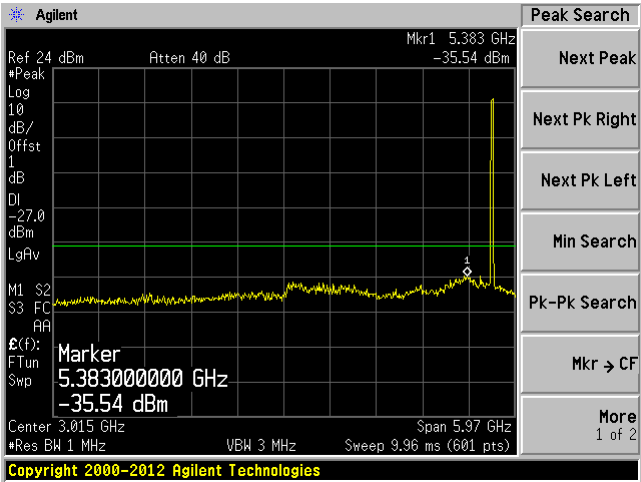


Chain 1, Plot: 6 GHz – 40 GHz

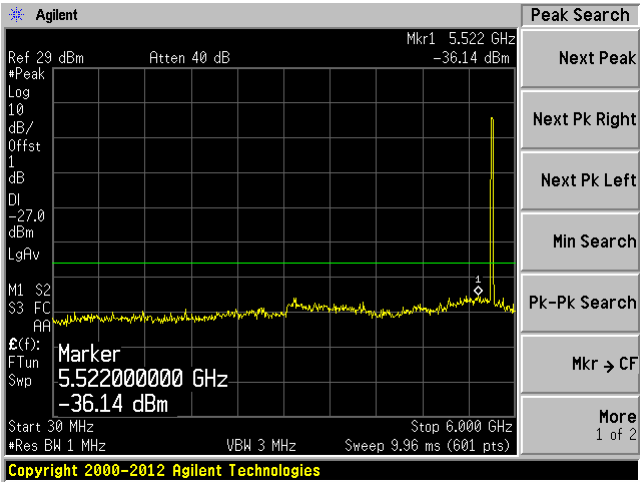


802.11 n-HT20 Mode High Channel 5700 MHz

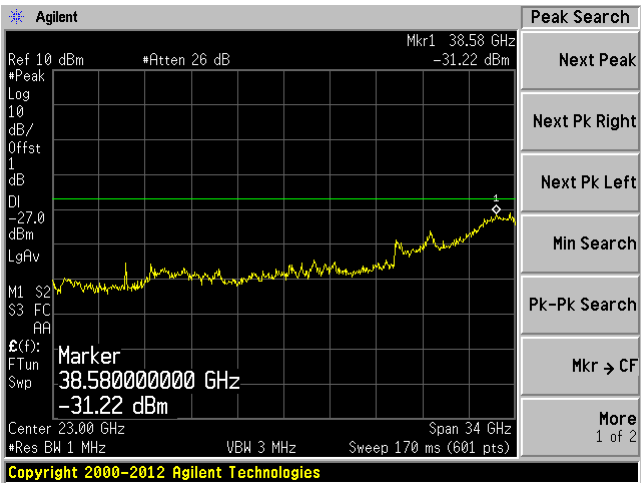
Chain 0, Plot: 30 MHz – 6 GHz



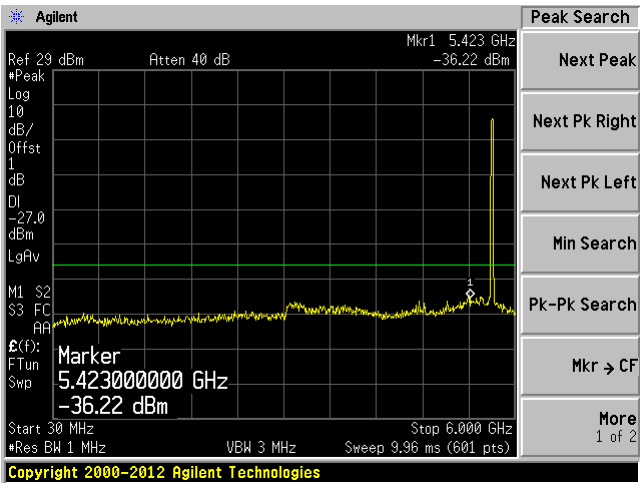
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

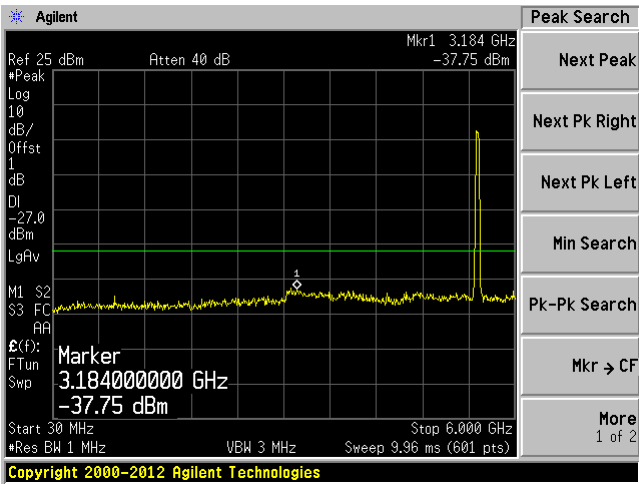


Chain 1, Plot: 6 GHz – 40 GHz

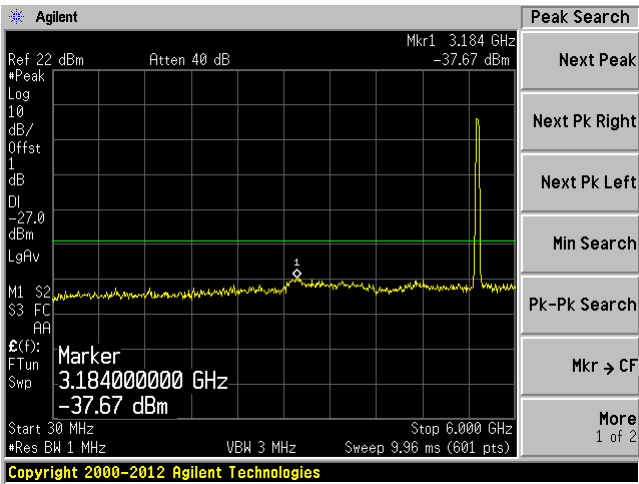


802.11n-HT40 Mode Low Channel 5510MHz

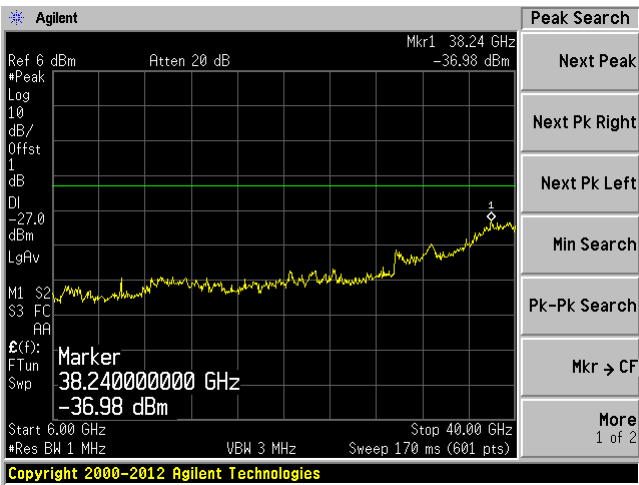
Chain 0, Plot: 30 MHz – 6 GHz



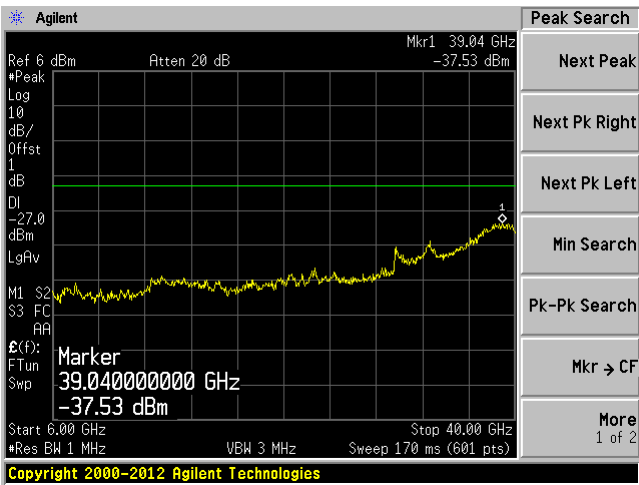
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

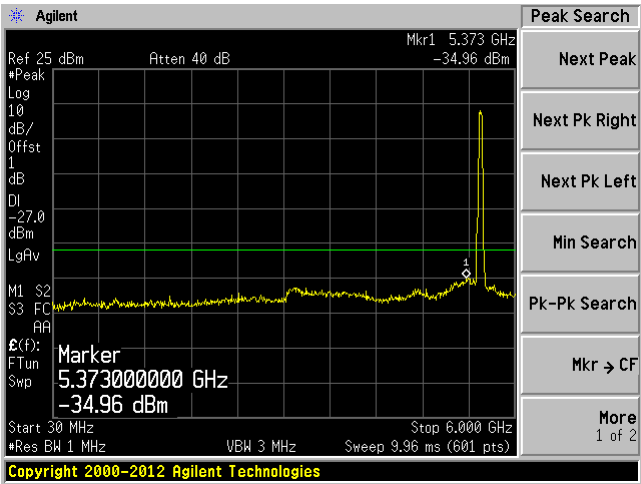


Chain 1, Plot: 6 GHz – 40 GHz

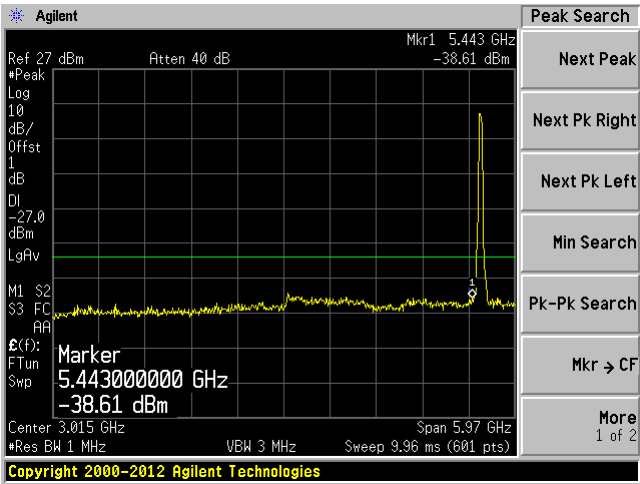


802.11n-HT40 Mode Middle Channel 5550MHz

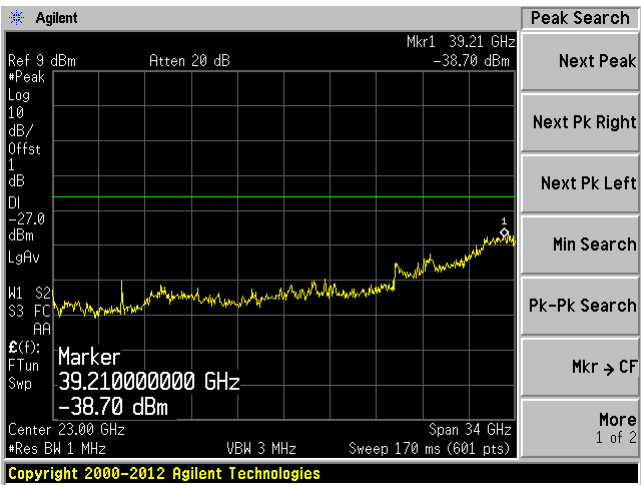
Chain 0, Plot: 30 MHz – 6 GHz



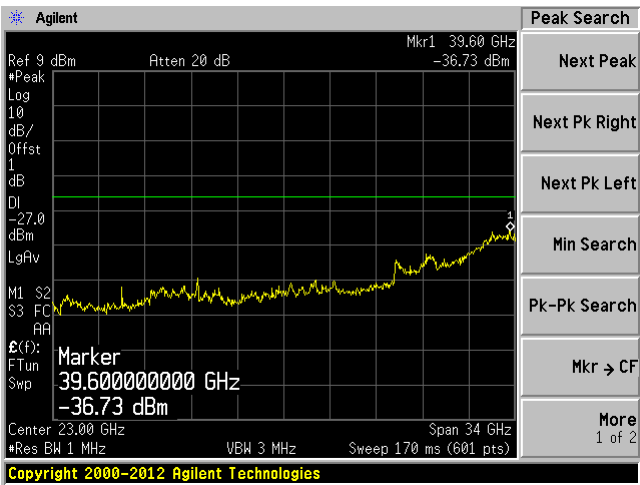
Chain 1, Plot: 30 MHz – 6 GHz



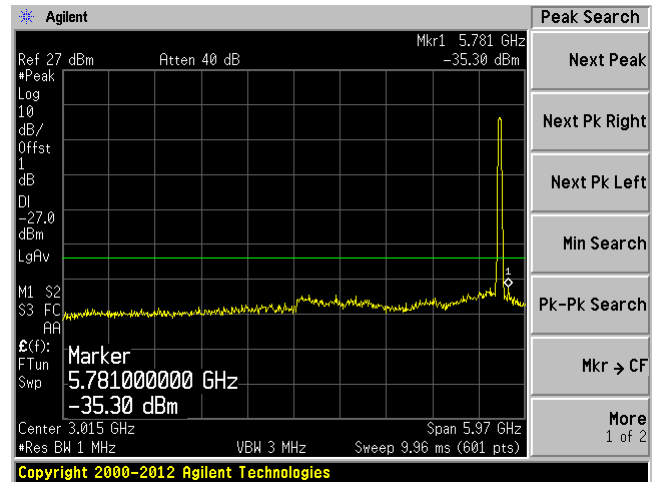
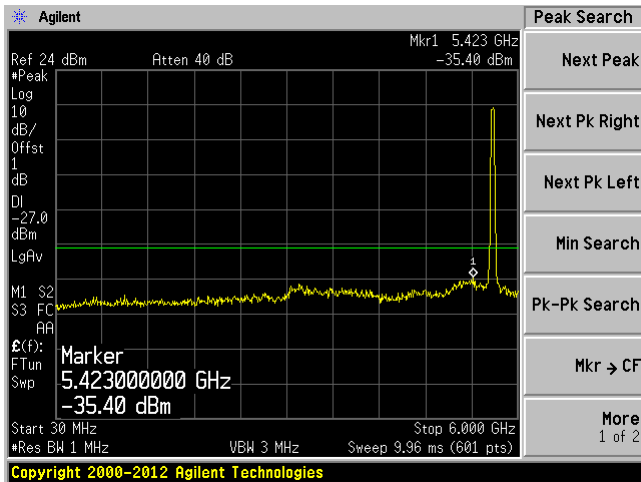
Chain 0, Plot: 6 GHz – 40 GHz



Chain 1, Plot: 6 GHz – 40 GHz

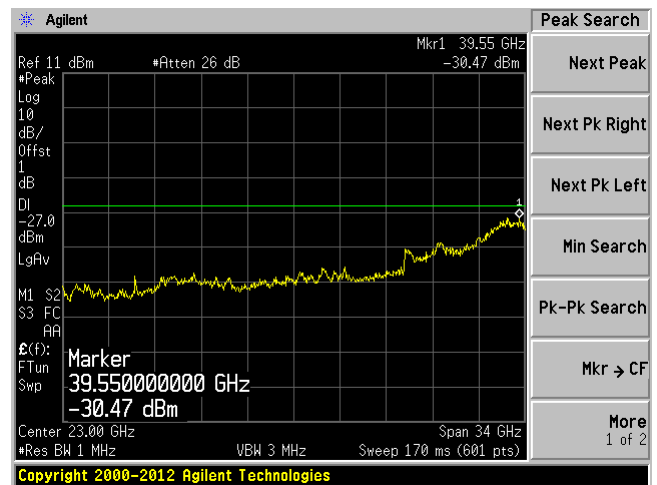
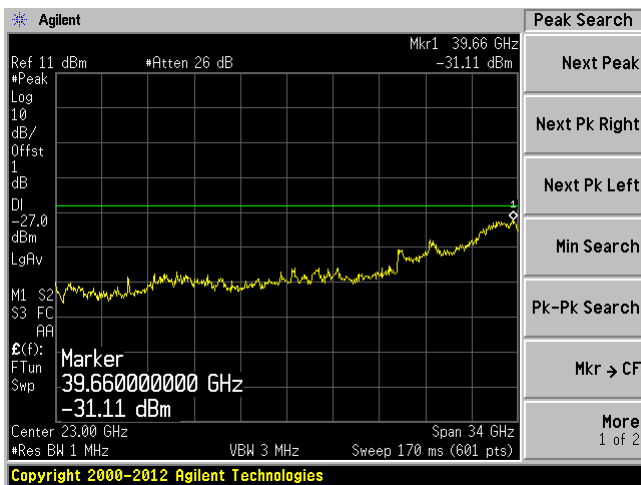


Chain 1, Plot: 30 MHz – 6 GHz



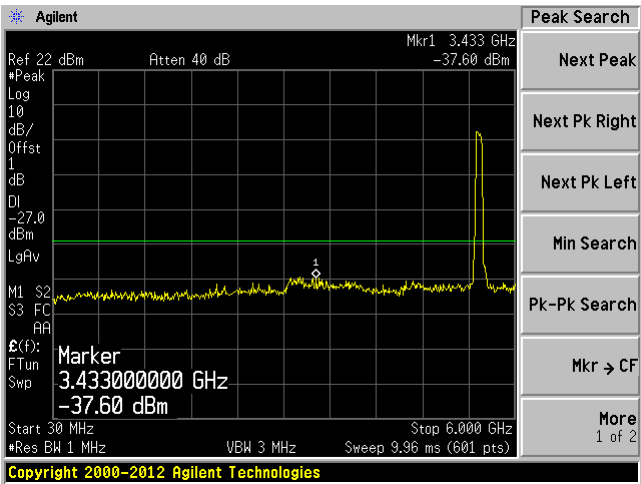
Chain 0, Plot: 6 GHz–40 GHz

Chain 1, Plot: 6 GHz – 40 GHz

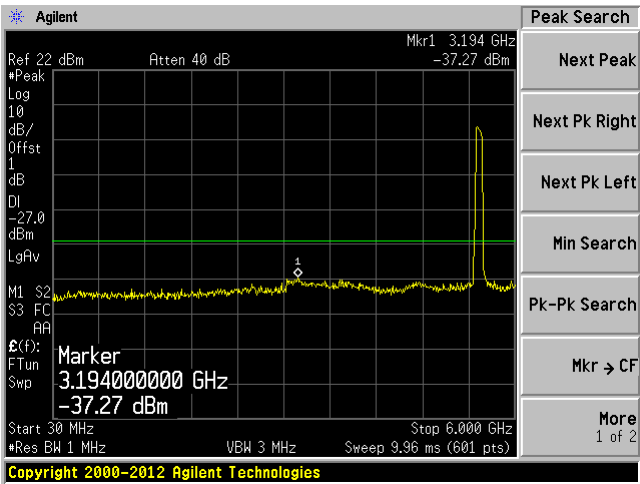


802.11ac-VHT80 Mode Low Channel 5530MHz

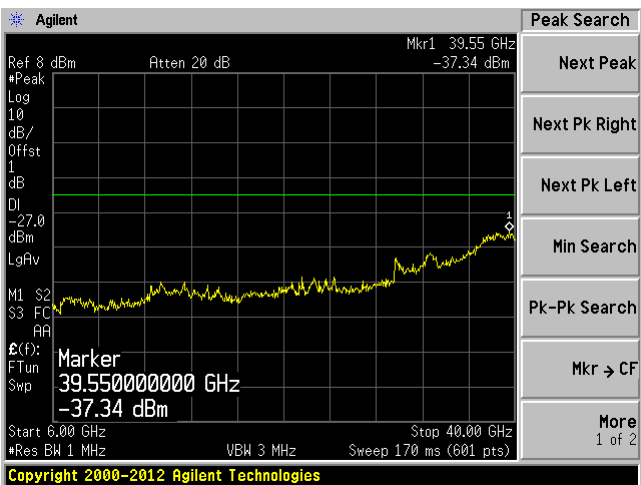
Chain 0, Plot: 30 MHz – 6 GHz



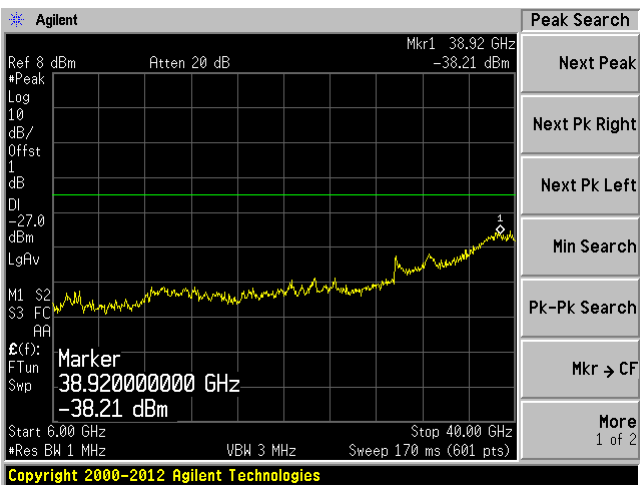
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz

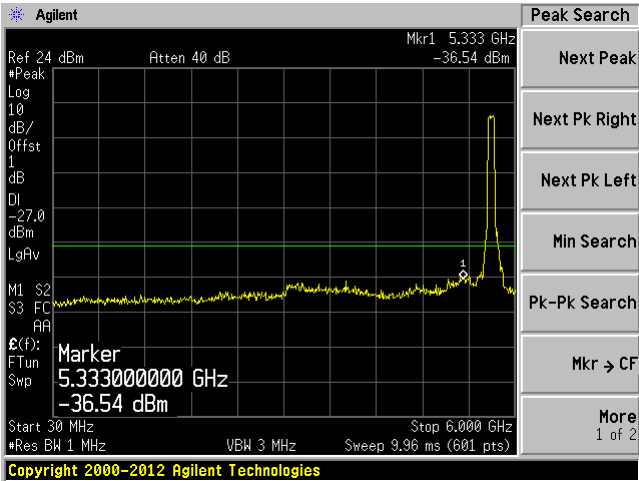


Chain 1, Plot: 6 GHz – 40 GHz

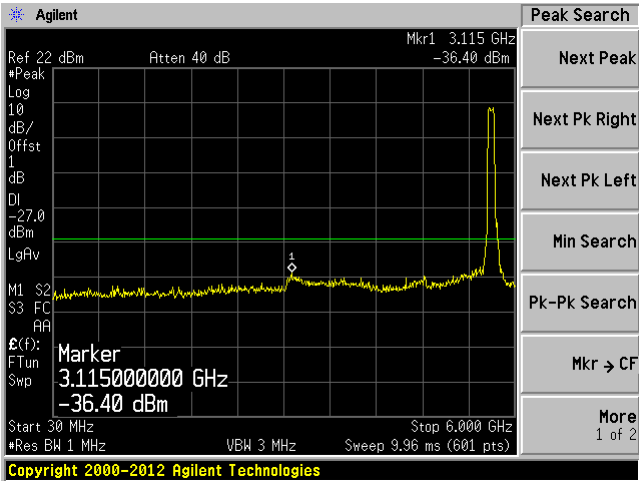


802.11ac-VHT80 Mode High Channel 5690MHz

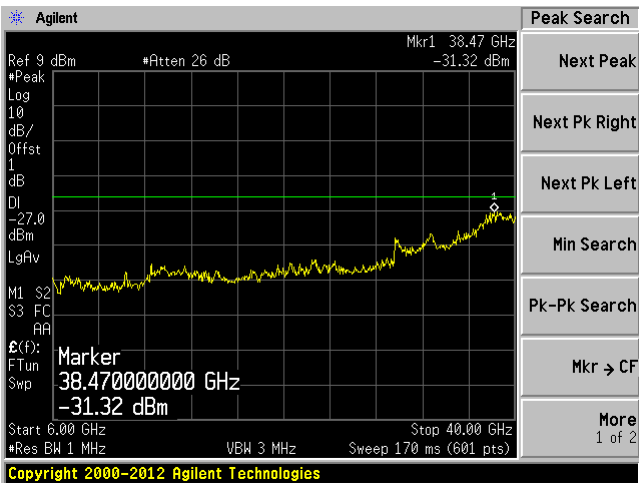
Chain 0, Plot: 30 MHz – 6 GHz



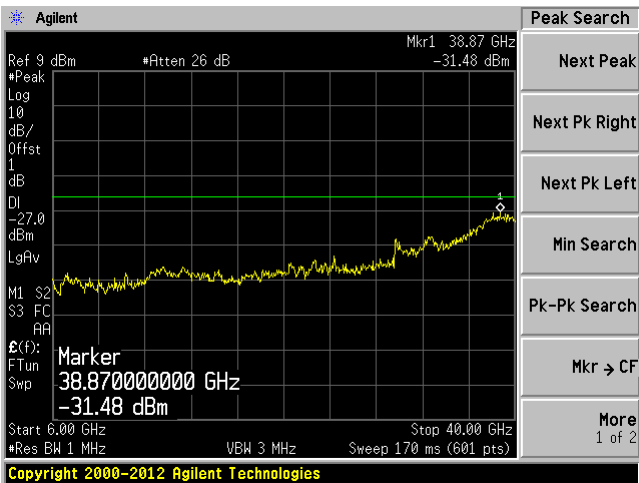
Chain 1, Plot: 30 MHz – 6 GHz



Chain 0, Plot: 6 GHz – 40 GHz



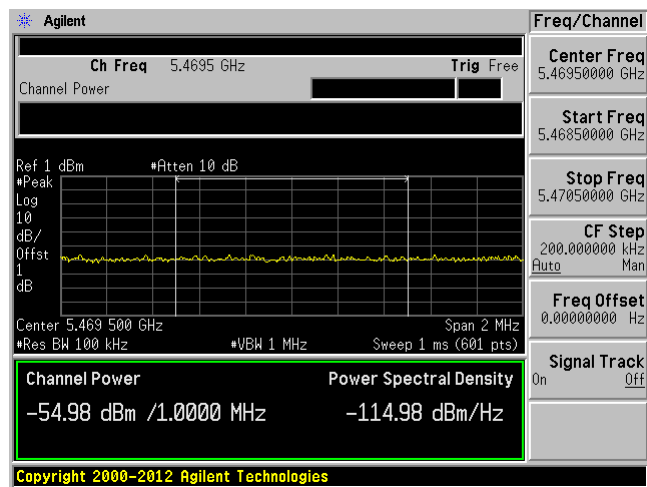
Chain 1, Plot: 6 GHz – 40 GHz



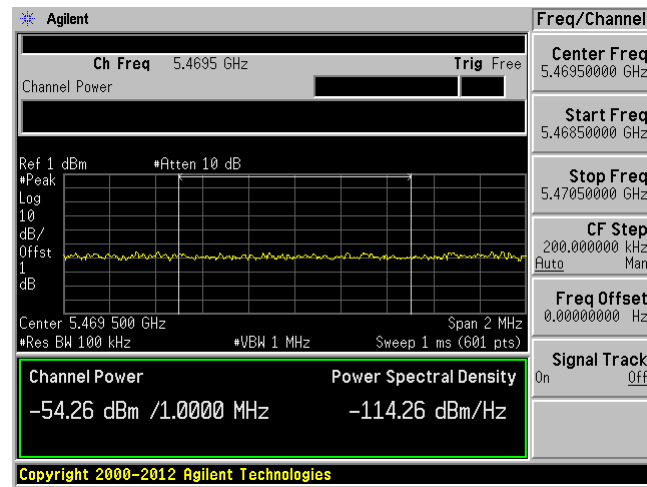
(4) Band Edge Measurement, W56 Bnad:

802.11a, Low Channel, 5500 MHz

Chain 0

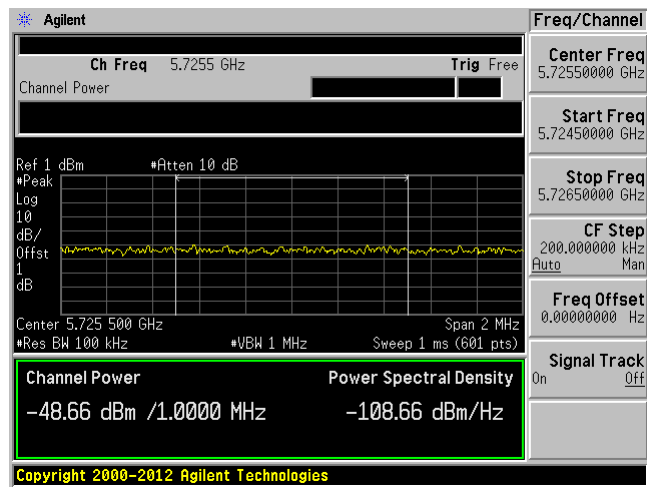


Chain 1

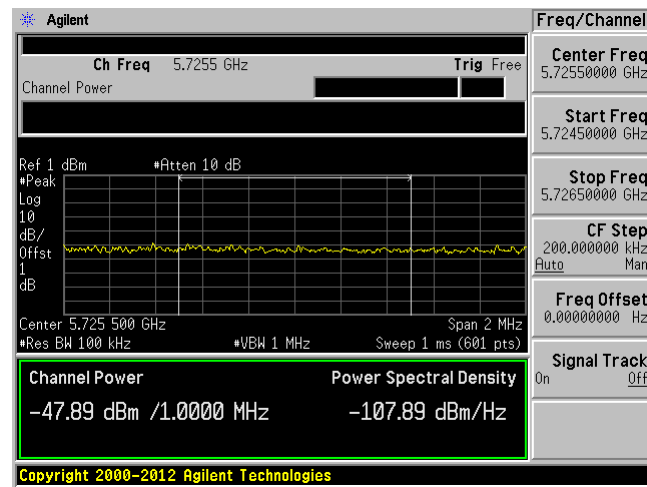


802.11a, High Channel, 5700 MHz

Chain 0



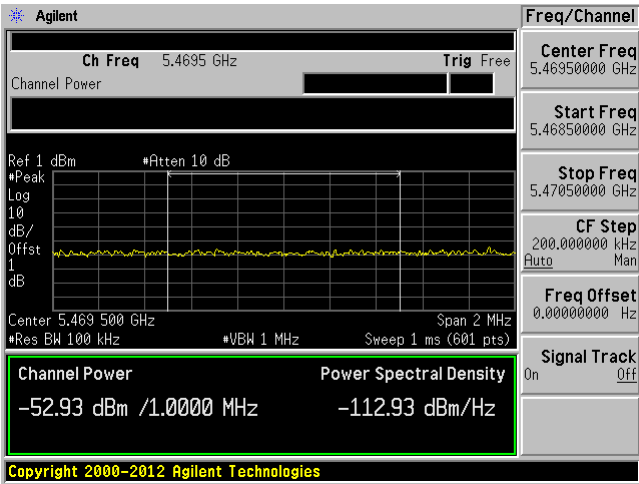
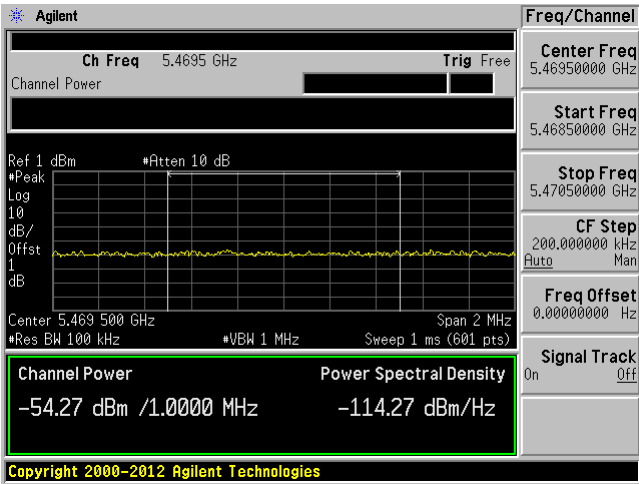
Chain 1



802.11n-HT20, Low Channel 5500 MHz

Chain 0

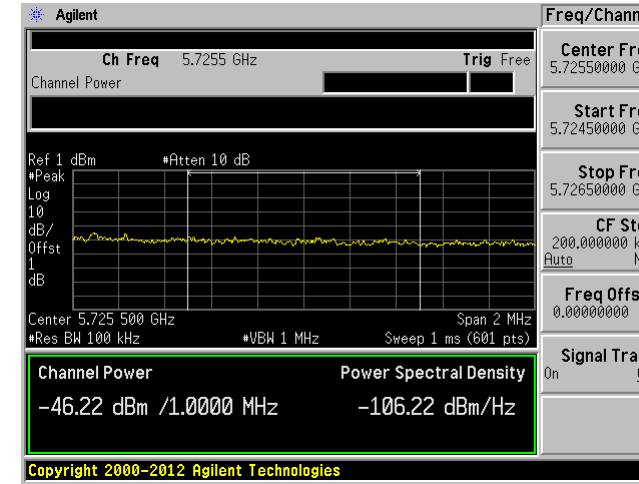
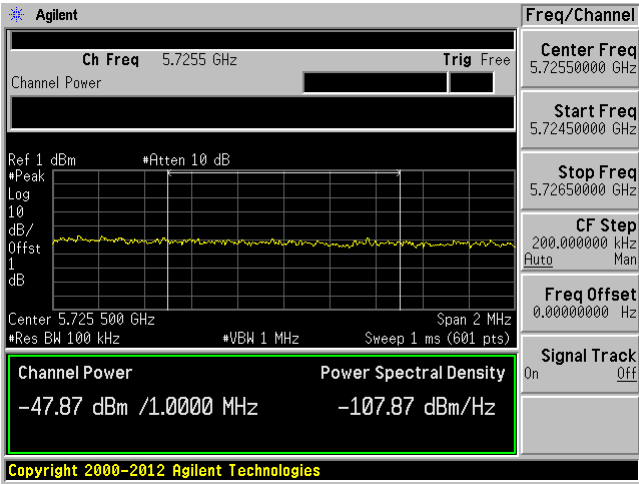
Chain 1



802.11n-HT20, High Channel, 5700 MHz

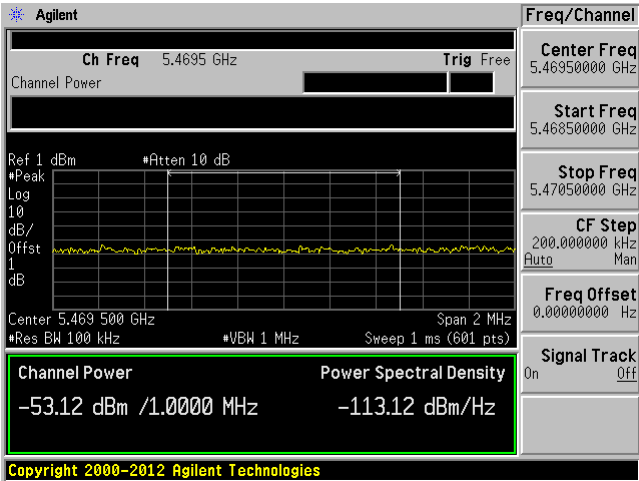
Chain 0

Chain 1

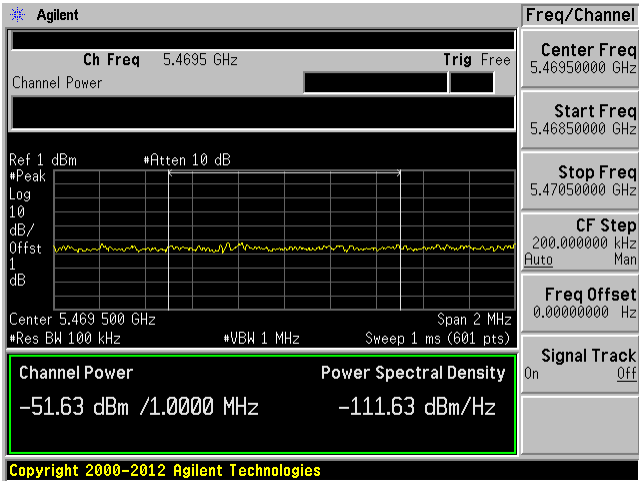


802.11n-HT40, Low Channel 5510 MHz

Chain 0

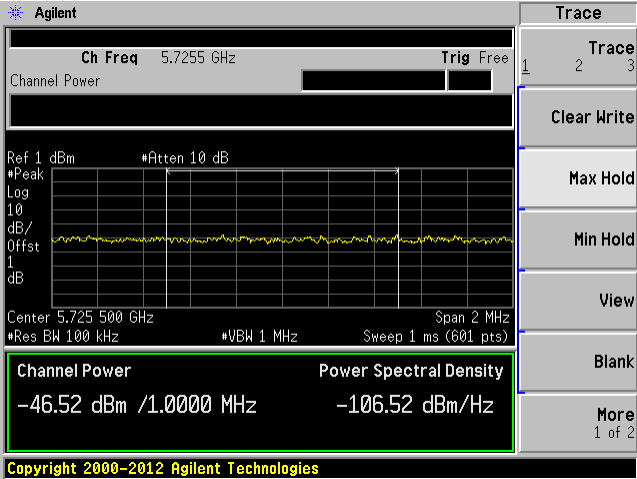


Chain 1

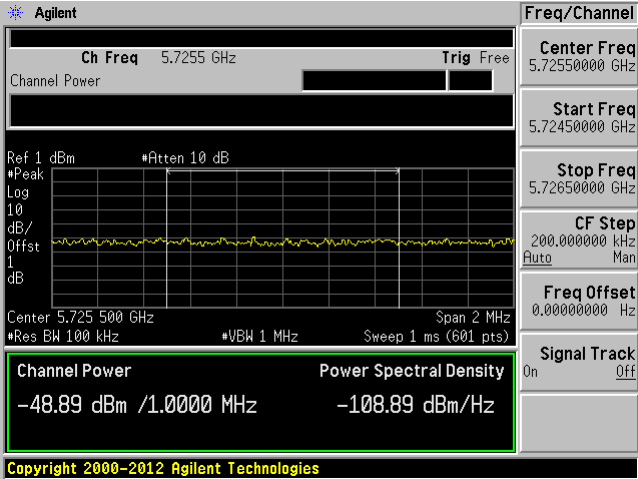


802.11n-HT40, High Channel 5670 MHz

Chain 0



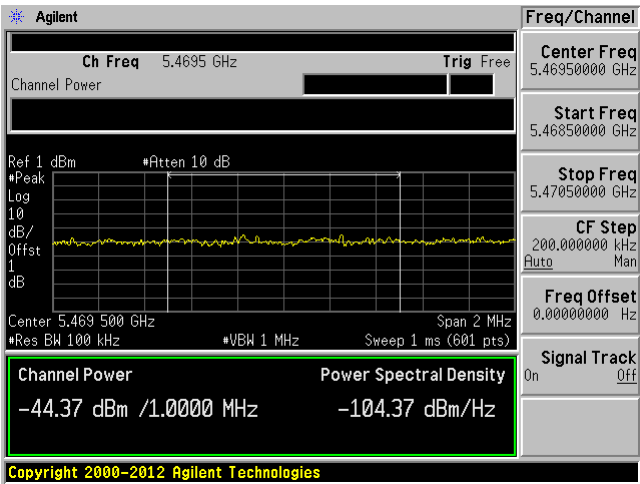
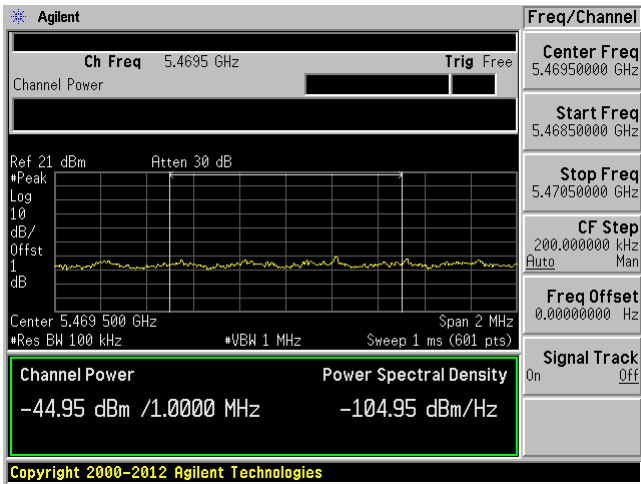
Chain 1



802.11ac-VHT80, Low Channel 5530 MHz

Chain 0

Chain 1



11 FCC §15.407(a) & IC RSS-210 §A9.2 - Power Spectral Density

11.1 Applicable Standards

According to FCC §15.407(a)

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm $10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 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.

According to IC RSS-210 §A9.2:

For the 5.25–5.35 GHz, 5.47-5.6 GHz, and 5.650–5.725 GHz bands, the maximum conducted output power shall not exceed 250 mW or 11 dBm + $10 \log B$, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1 megahertz band. The maximum e.i.r.p shall not exceed 1.0W or $17 + 10 \log B$, dBm, whichever is less. B is the 99% emission bandwidth in MHz.

11.2 Measurement Procedure

The measurements are base on FCC KDB 789033 D01 General UNII Test Procedures v01r03: 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	E4440A	MY44303352	2013-11-07	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 Rui Zhou from 2014-10-15 at RF site.

11.5 Test Results

5.3 GHz Band

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total PSD (dBm)	Limit (dBm)
802.11a mode					
Low	5260	7.19	7.43	10.32	11
Middle	5280	7.12	7.45	10.30	11
High	5320	6.65	7.33	10.01	11
802.11n-HT20 mode					
Low	5260	6.86	7.31	10.10	11
Middle	5280	7.03	6.97	10.01	11
High	5320	6.37	6.60	9.50	11
802.11n-HT40 mode					
Low	5270	2.88	3.27	6.09	11
High	5310	0.42	0.14	3.29	11
802.11ac-VHT80 mode					
-	5290	-5.22	-4.58	-1.88	11

5.6 GHz Band

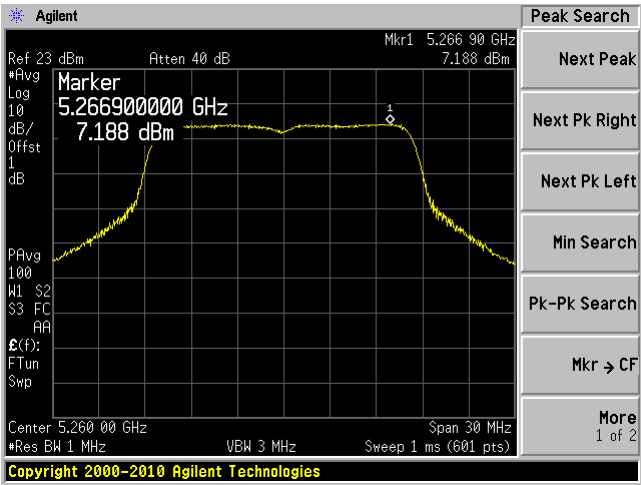
Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total PSD (dBm)	Limit (dBm)
802.11a mode					
Low	5500	4.24	4.60	7.43	11
Middle	5580	7.02	8.13	10.62	11
High	5700	7.49	7.60	10.56	11
802.11n-HT20 mode					
Low	5500	3.93	4.46	7.21	11
Middle	5580	6.88	8.14	10.57	11
High	5700	8.10	7.67	10.90	11
802.11n-HT40 mode					
Low	5510	-0.03	0.79	3.41	11
Middle	5550	5.32	6.40	8.90	11
High	5670	5.75	6.06	8.92	11
802.11ac-VHT80 mode					
Low	5530	-3.12	-2.45	0.24	11
High	5690	3.19	3.06	6.13	11

Please refer to the following plots.

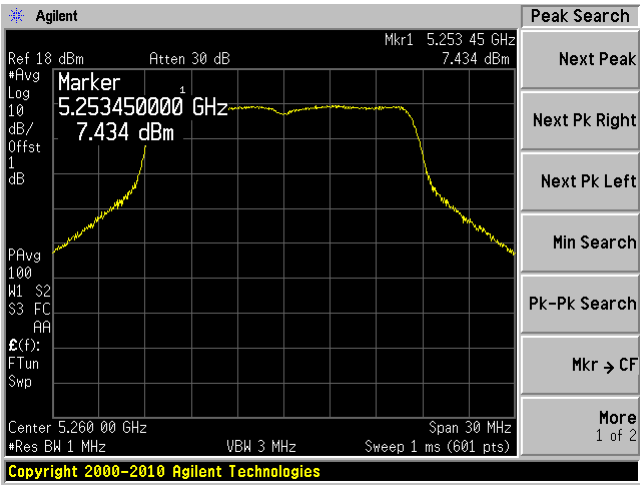
5.3 GHz Band

802.11a, Low Channel, 5260 MHz

Chain 0

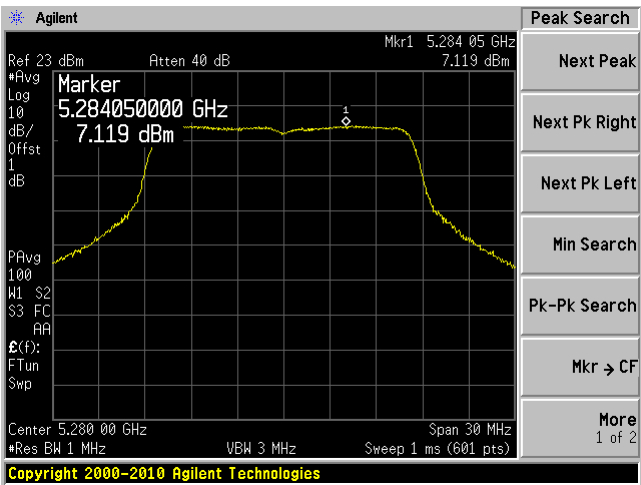


Chain 1

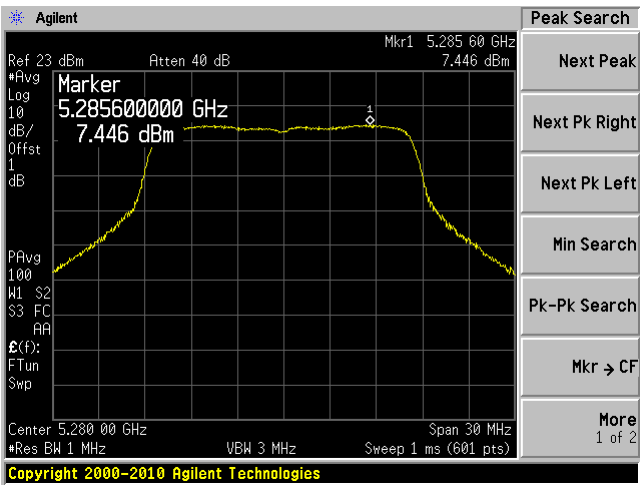


802.11a, Middle Channel, 5280 MHz

Chain 0

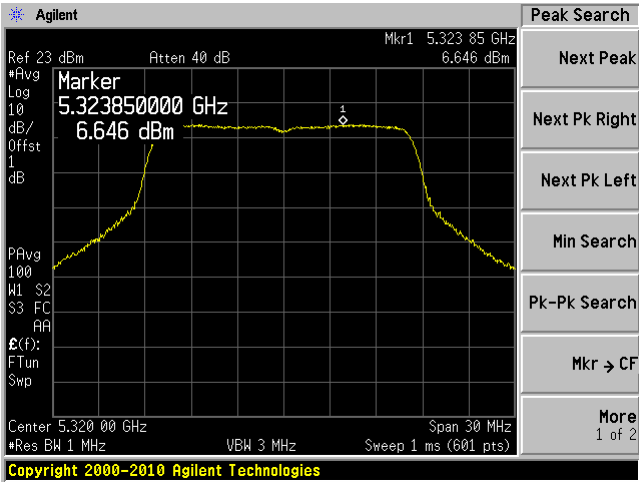


Chain 1

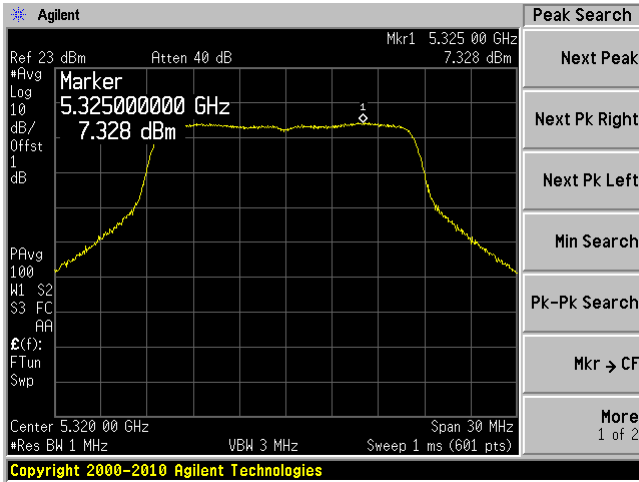


802.11a, High Channel, 5320 MHz

Chain 0

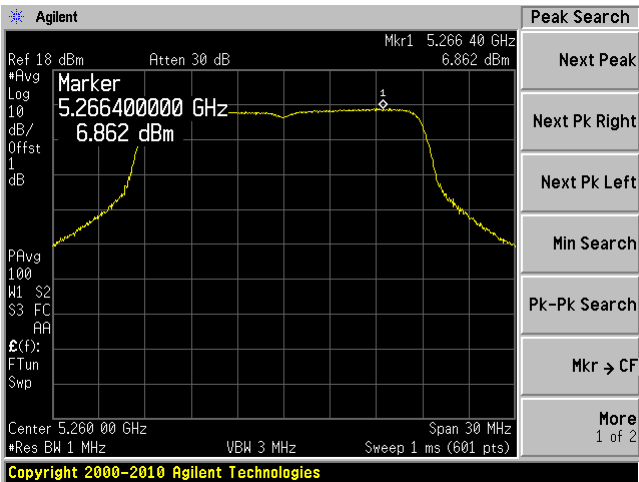


Chain 1

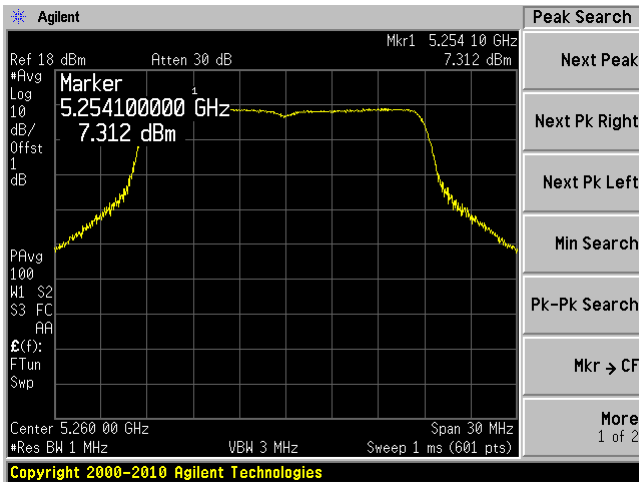


802.11n-HT 20, Low Channel 5260 MHz

Chain 0

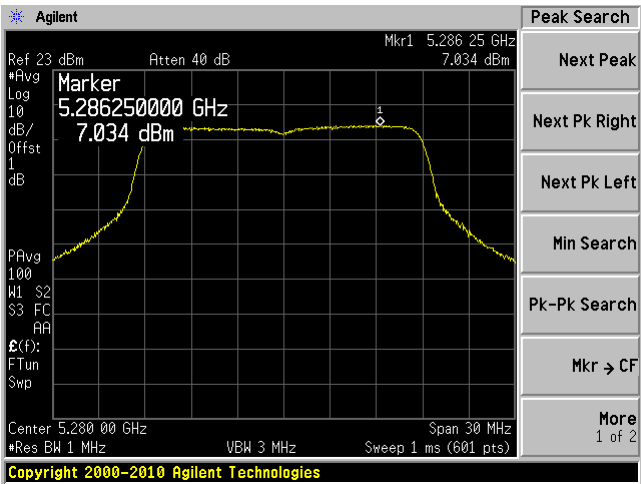


Chain 1

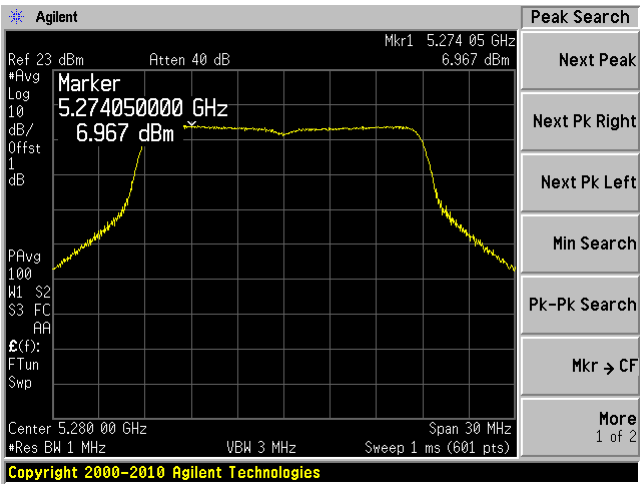


802.11n-HT20, Middle Channel 5280 MHz

Chain 0

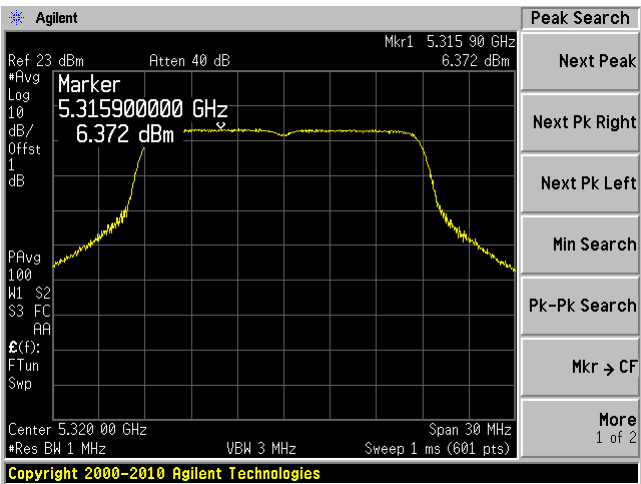


Chain 1

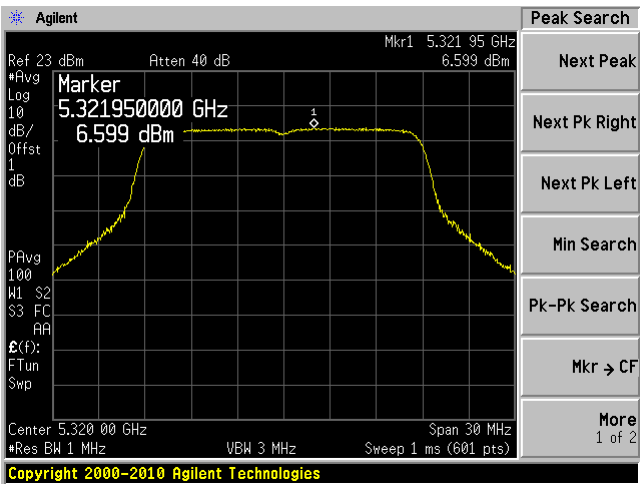


802.11n-HT20, High Channel, 5320 MHz

Chain 0

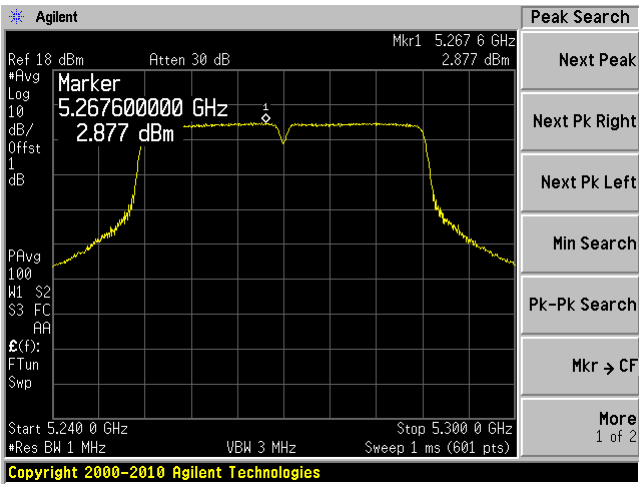


Chain 1

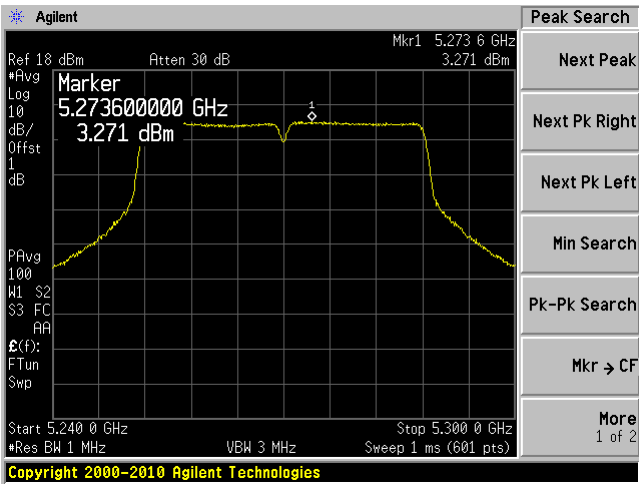


802.11n-HT40, Low Channel 5270 MHz

Chain 0

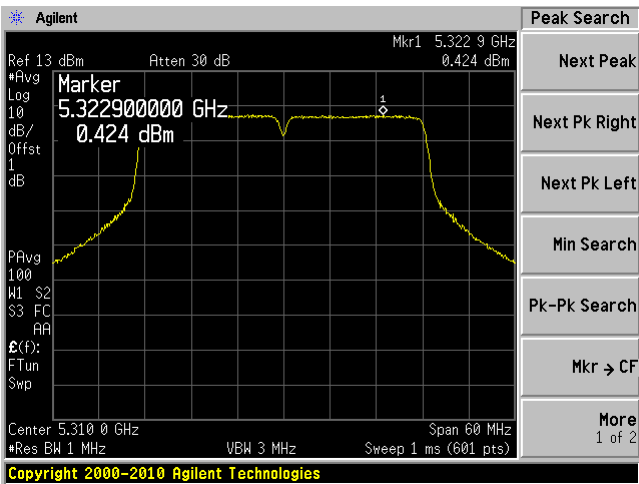


Chain 1

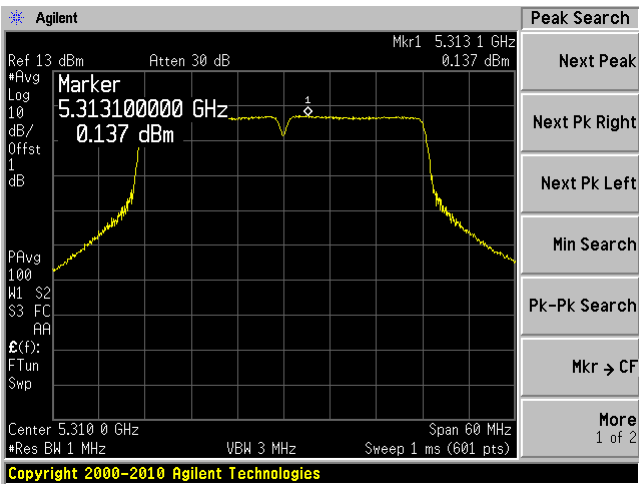


802.11n-HT40, High Channel 5310 MHz

Chain 0

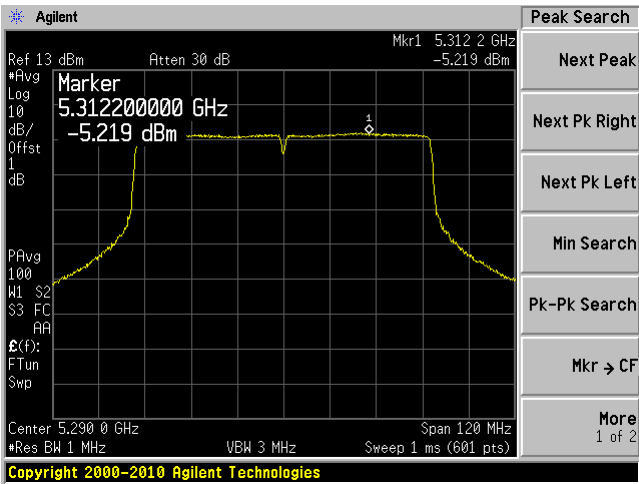


Chain 1

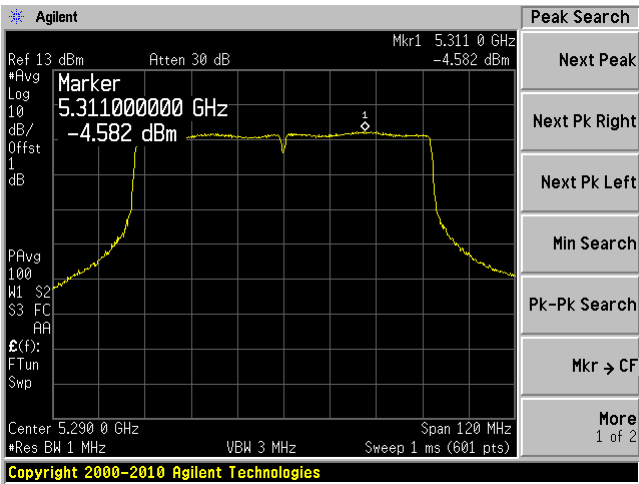


802.11ac-VHT80, High Channel 5290 MHz

Chain 0



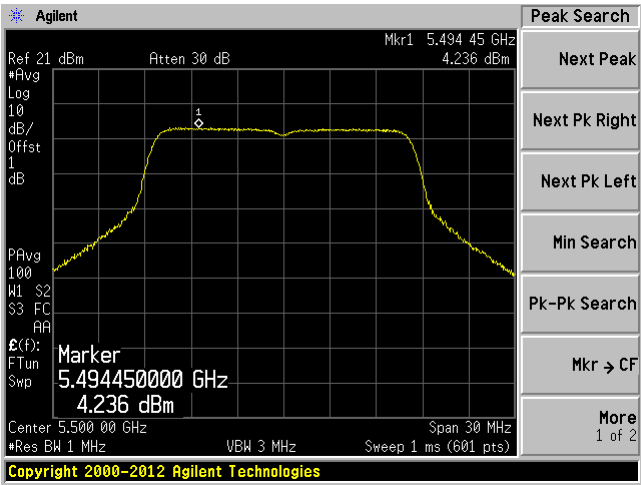
Chain 1



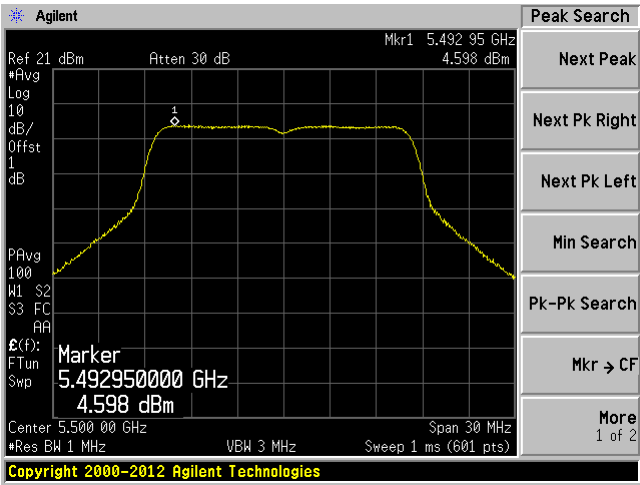
5.6 GHz Band

802.11a, Low Channel, 5500 MHz

Chain 0

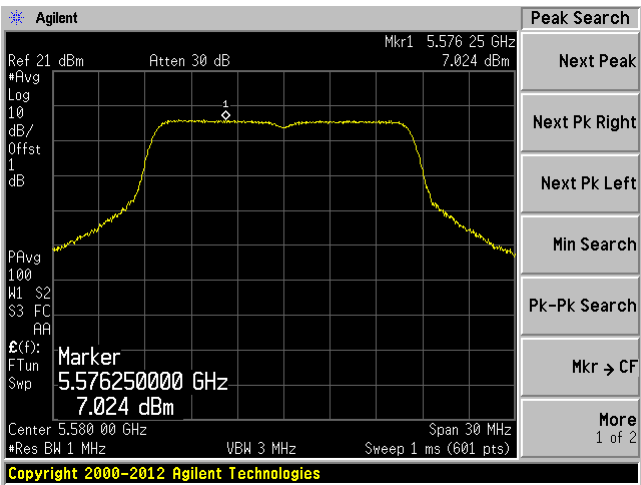


Chain 1

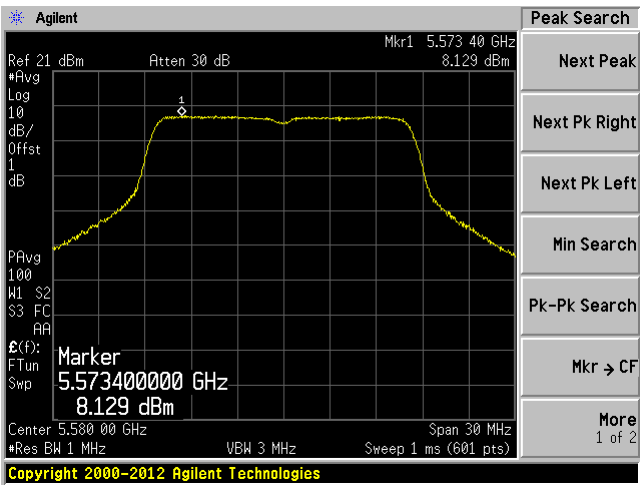


802.11a, Middle Channel, 5580 MHz

Chain 0

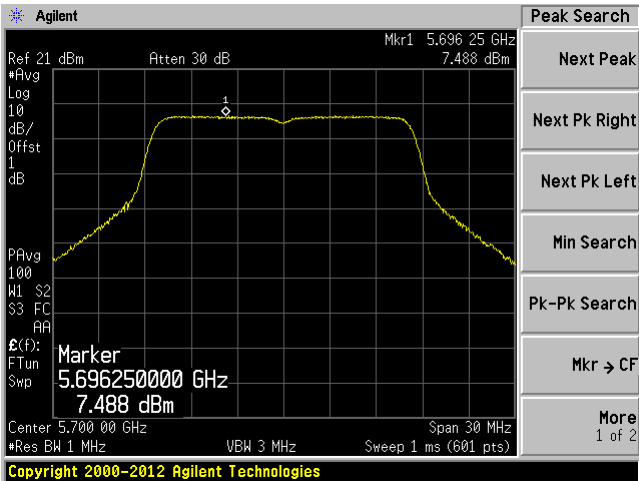


Chain 1

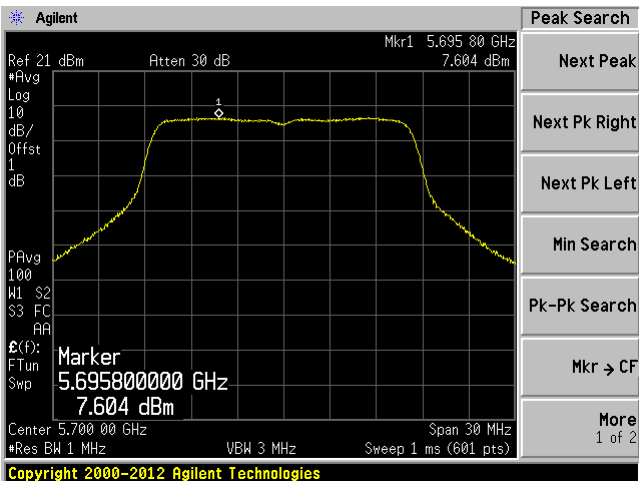


802.11a, High Channel, 5700 MHz

Chain 0

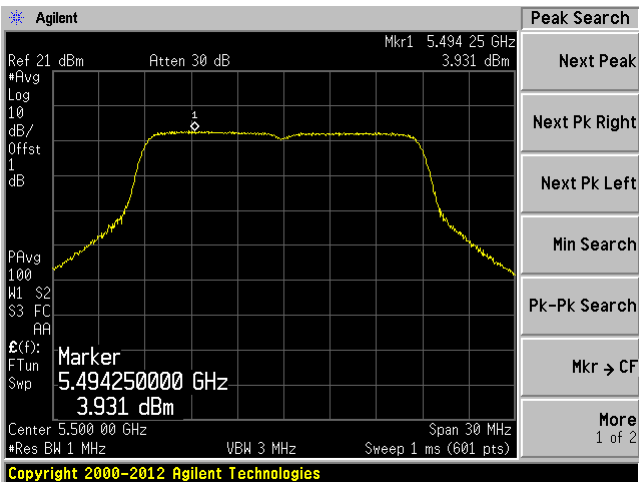


Chain 1

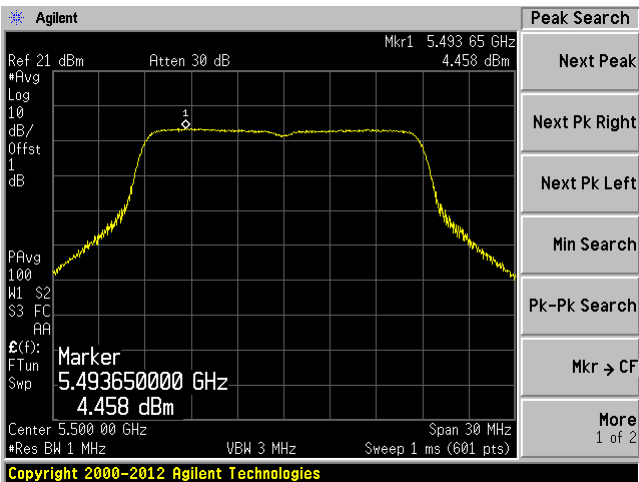


802.11n-HT 20, Low Channel 5500 MHz

Chain 0

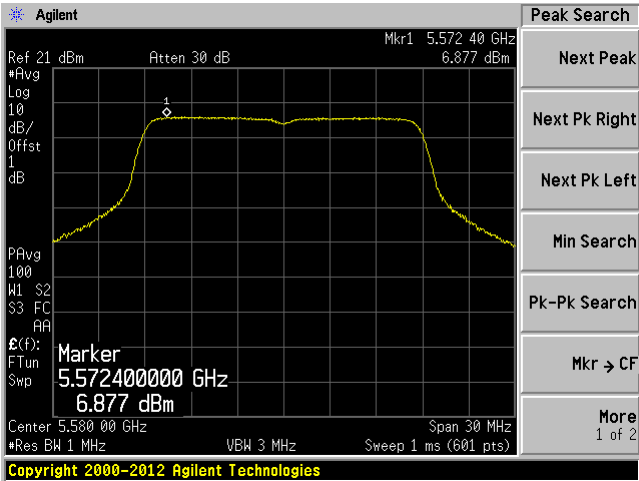


Chain 1

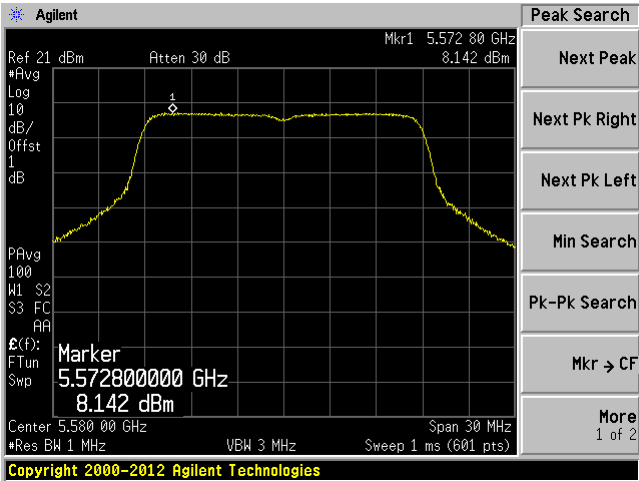


802.11n-HT20, Middle Channel 5580 MHz

Chain 0

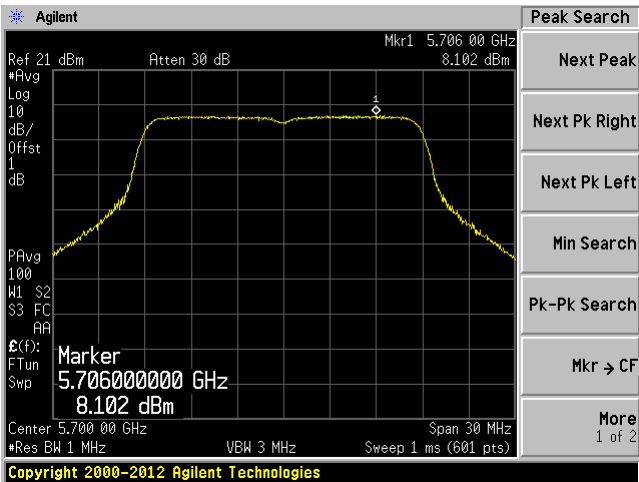


Chain 1

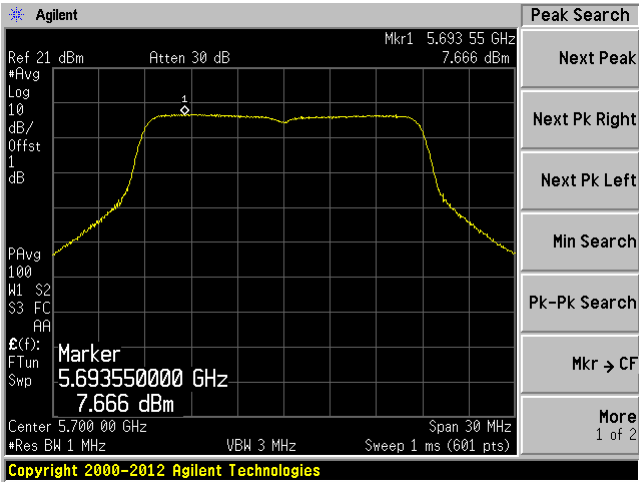


802.11n-HT20, High Channel 5700 MHz

Chain 0

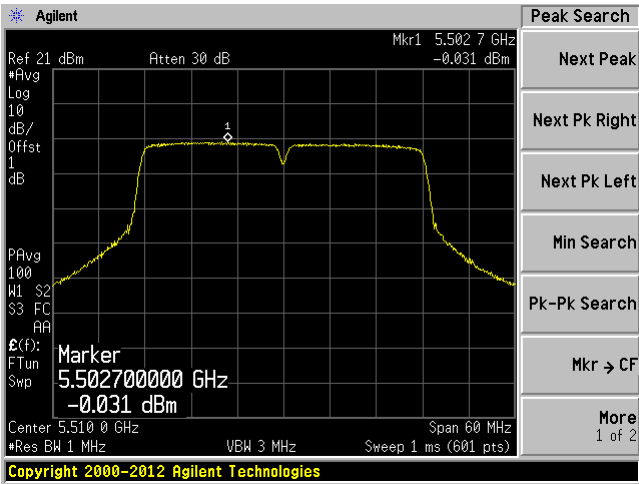


Chain 1

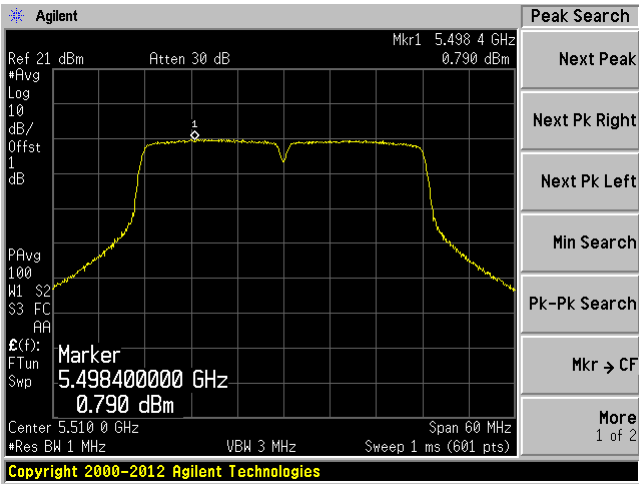


802.11n-HT40, Low Channel 5510 MHz

Chain 0

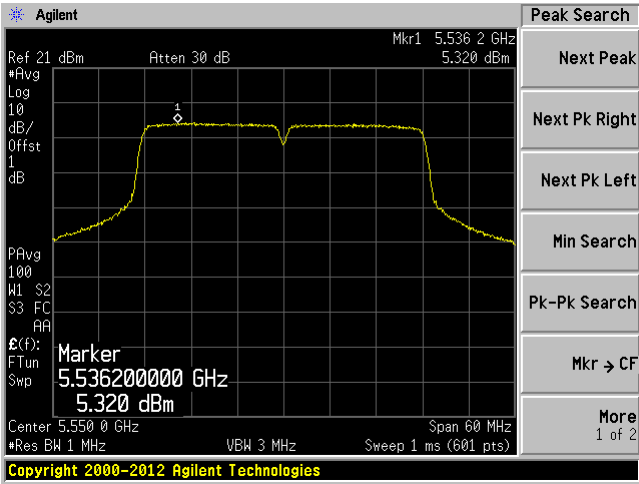


Chain 1

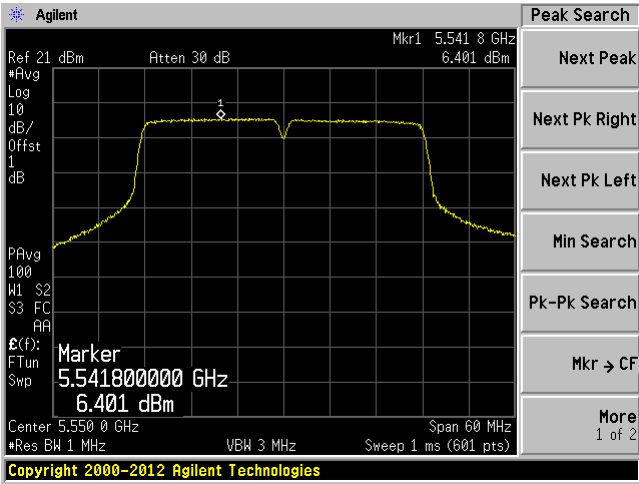


802.11n-HT40, Middle Channel 5550 MHz

Chain 0

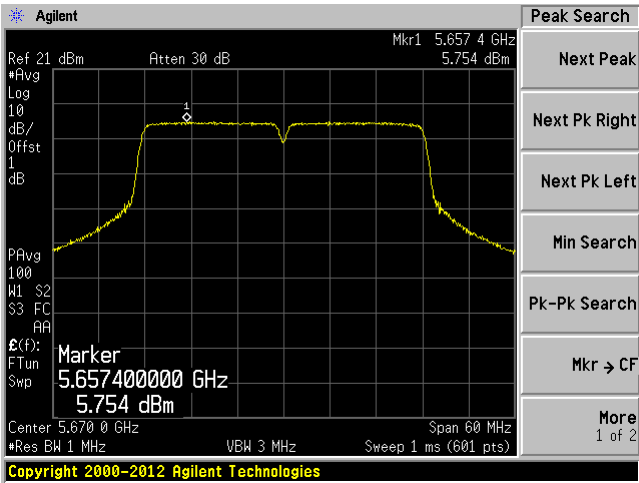


Chain 1

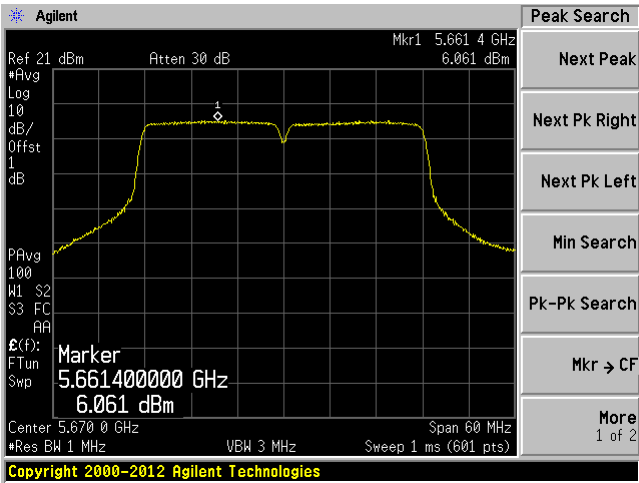


802.11n-HT40, High Channel 5670 MHz

Chain 0

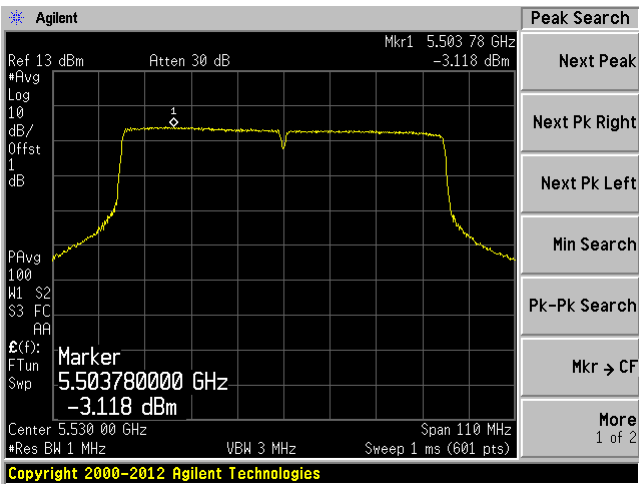


Chain 1

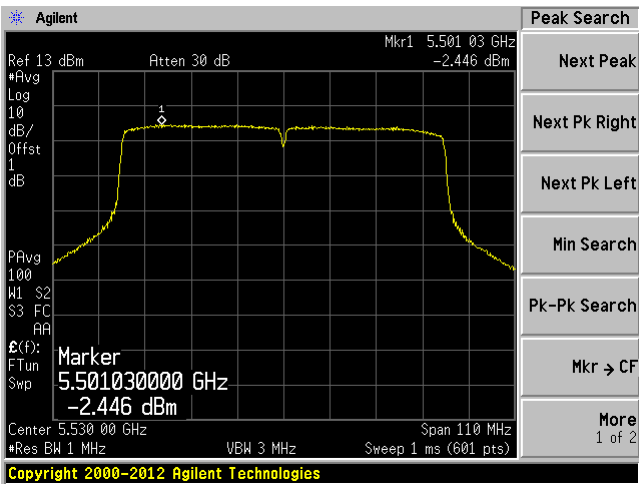


802.11ac-VHT80, Low Channel 5530 MHz

Chain 0

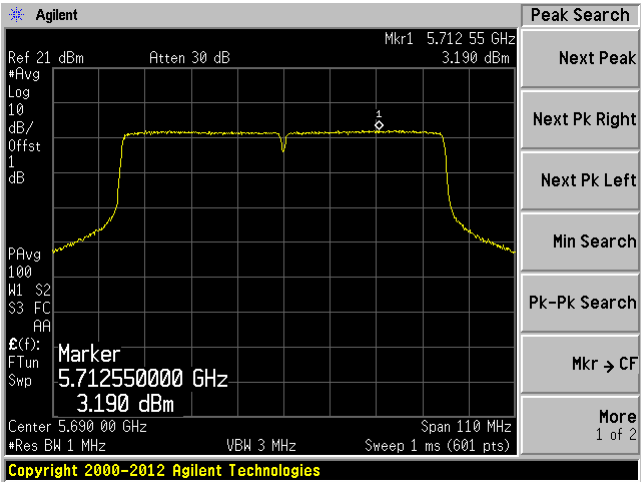


Chain 1



802.11ac-VHT80, High Channel 5690 MHz

Chain 0



Chain 1

