



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: S9GT300
IC: 5912A-T300

Report Type: Original Report	Product Type: 802.11 a/b/g/n/ac Wireless Access Point
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1403261-407 W5356	Original Report	2014-06-05

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 model: *T300, FCC ID: S9GT300, IC: 5912A-T300* or the “EUT” as referred to in this report. The EUT is a dual band 2x2 MIMO 802.11 a/b/g/n/ac RLAN Access Point.

1.2 Mechanical Description of EUT

The EUT measures approximately 18.1 cm (L) x 15.1 cm (W) x 8.0 cm (H) and weighs 400 g.
Note: The EUT was tested without enclosure.

The test data gathered are from typical production sample, serial number: 21406000005 assigned by Client.

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)

FCC Part 15.247, IC RSS-210 DTS submission with FCC ID: S9GT300 and IC: 5912A-T300.

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 and FCC KDB 789033 D01 General UNII Test Procedures v01r03: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E

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:

1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.

2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.

3. Radio Communication Equipment for Singapore.

4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.

5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).

6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s), Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

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

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

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

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

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

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009.

2.2 EUT Exercise Software

The test utility used was *T300 ART* was provided by Ruckus Wireless Inc., and was verified by *Chen Ge* to comply with the standard requirements being tested against.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Special Accessories

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Ruckus	DC Adaptor/POE	NPE-5818	740-64157-001
Ruckus	AC Adaptor	PA10244HUB	740-64125-010

2.6 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
Ruckus	Main Board (SANTORINI)	ASM 120-11257-001 rev. 3.1	RUK01946
Ruckus	RJ45 Port Board	ASM 120-11264-001 rev. 2.1	RUK01957
Ruckus	Ruckus Board	ASM 120-11229-002 rev. A	RUK01329
Ruckus	IZAR Board	ASM 120-11261-001 rev. 3	RUK00727
Ruckus	IZAR CROSS Board	ASM 120-11262-001 rev. 3	RUK00908

2.7 Interface Ports and Cables

Cable Description	Length (m)	From	To
RJ45	1m	DC Adaptor/POE	EUT
RJ45	1m	Laptop	DC Adaptor/POE

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
Ruckus	Power Supply cord	PA1024-4HU	-
Ruckus	POE Power Adapter	NPE-5818	740-64157-001

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	Peak Output Power Measurement	Compliant
FCC §2.1051, §15.407(b) IC RSS-210 §A9.2	Band Edges	Compliant
FCC §15.407(a)(1) IC RSS-210 §A9.2	Power Spectral Density	Compliant
FCC §15.407(a)(6)	Peak Excursion Ratio	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	Note ¹

Note¹ please refers to DFS report, Report number: R1403261-DFS.

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

4.1 Applicable Standard

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

Limits for General Population/Uncontrolled Exposure

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

f = frequency in MHz

* = Plane-wave equivalent power density

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

5250-5350 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>23.55</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>226.464</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5270</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3.5</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.238</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.0898</u>
<u>Power density of prediction frequency at 20.0 cm (W/m²):</u>	<u>0.898</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>

5470-5725 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>23.48</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>222.84</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5700</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3.5</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.238</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.0993</u>
<u>Power density of prediction frequency at 20.0 cm (W/m²):</u>	<u>0.993</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>

The device meets FCC/IC MPE requirement for uncontrolled exposure environment at 20 cm distance.

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

5.1 Applicable Standard

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

And according to FCC §15.247 (b)(4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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 List

Manufacturers	Antenna Type/Pattern	Antenna Gain (dBi) @ 5 GHz
Ruckus	Omni	3.5

Note: The power setting was controlled by manufacture with different antenna configuration. The power setting of the different antenna will be set with the corresponded value and no more then the level reported.

The antenna consists of non standard (UFL) connectors with less 6 dBi gain; therefore, it complies with the antenna requirement.

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 *	56 to 46 *
0.5-5	56	46
5-30	60	50

**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 and IC RSS-Gen §7.2.4 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

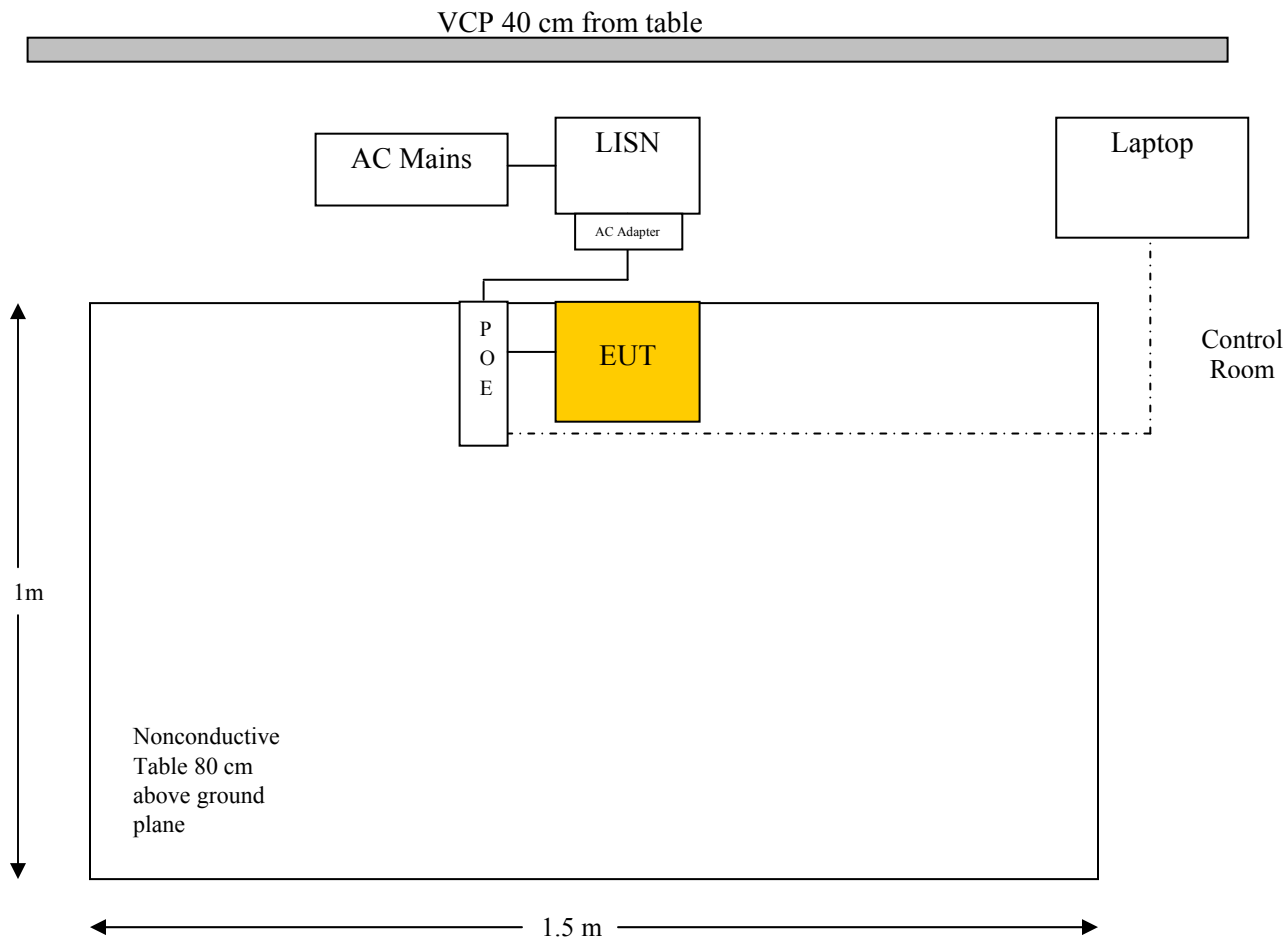
During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cord of the support equipment was connected to LISN-2.

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

POE



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
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2013-05-30	1 year
Solar Electronics	LISN	9252-50-R-24-N	511205	2013-06-25	1 year

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

6.7 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	52 %
ATM Pressure:	101.89 kPa

The testing was performed by Chen Ge on 2014-05-01 in 5 m chamber 3.

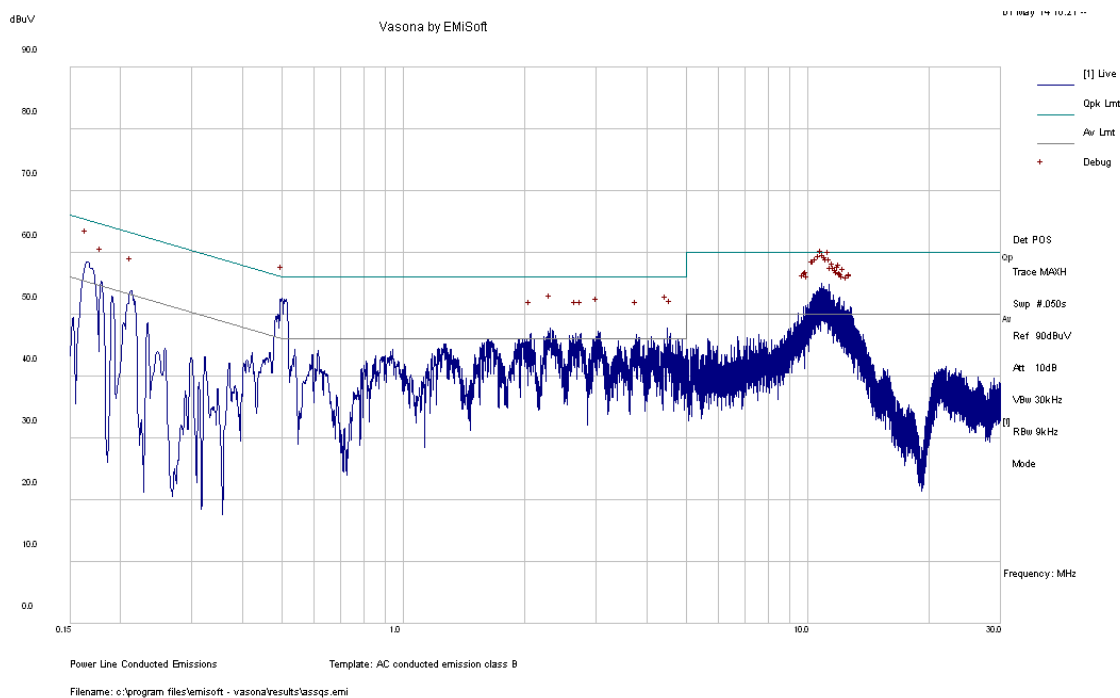
6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC/IC 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)
-1.91	10.96065	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

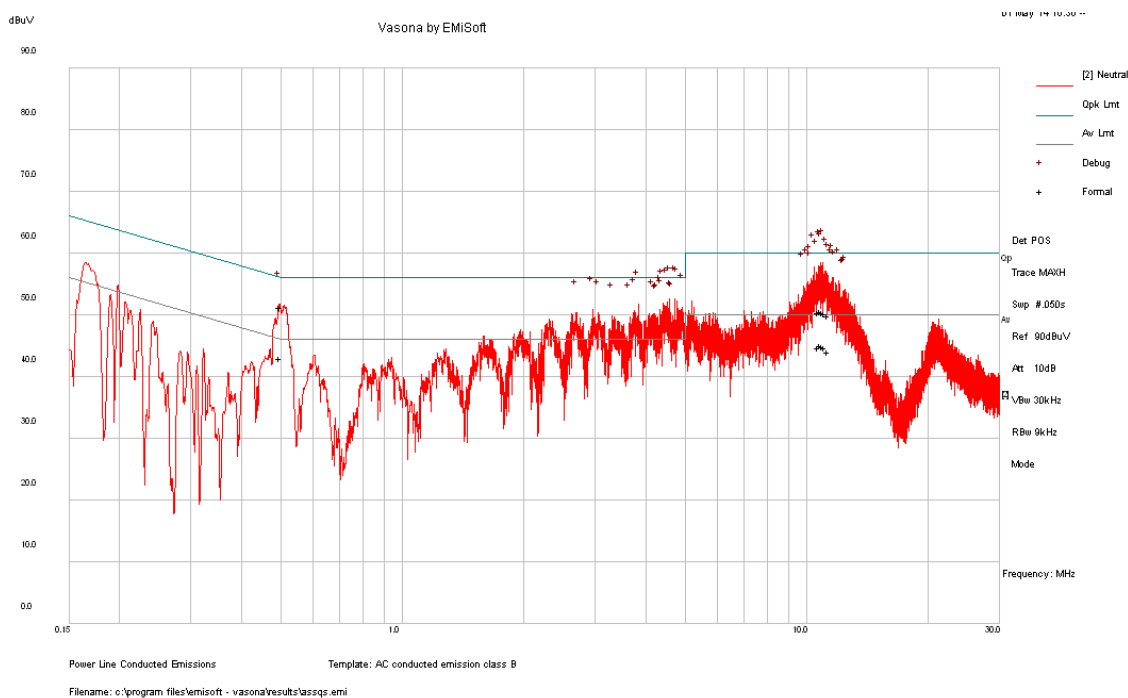
120 V, 60 Hz – Line, POE



Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
0.500016	51.26	Line	56	-4.74	QP
10.85379	50.65	Line	60	-9.35	QP
11.29702	49.86	Line	60	-10.14	QP
10.97747	50.52	Line	60	-9.48	QP
10.72043	50.38	Line	60	-9.62	QP
11.10669	50.31	Line	60	-9.69	QP

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
0.500016	42.95	Line	46	-3.05	Ave.
10.85379	45.06	Line	50	-4.94	Ave.
11.29702	44.06	Line	50	-5.94	Ave.
10.97747	44.85	Line	50	-5.15	Ave.
10.72043	44.68	Line	50	-5.32	Ave.
11.10669	44.76	Line	50	-5.24	Ave.

120 V, 60 Hz – Neutral, POE



Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
10.96065	53.63	Neutral	60	-6.37	QP
10.78804	53.54	Neutral	60	-6.46	QP
10.87897	53.79	Neutral	60	-6.21	QP
10.40451	52.55	Neutral	60	-7.45	QP
11.18884	53.1	Neutral	60	-6.9	QP
10.56529	52.91	Neutral	60	-7.09	QP

Frequency (MHz)	Corrected Amplitude (dBμV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)	Detector (QP/Ave.)
10.96065	48.09	Neutral	50	-1.91	Ave.
10.78804	48.08	Neutral	50	-1.92	Ave.
10.87897	48.16	Neutral	50	-1.84	Ave.
10.40451	46.76	Neutral	50	-3.24	Ave.
11.18884	47.57	Neutral	50	-2.43	Ave.
10.56529	47.22	Neutral	50	-2.78	Ave.

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

7.1 Applicable Standard

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 C63.4-2003. The specification used was the FCC 15C/15E and IC RSS-210/RSS-Gen 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

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 Part 15, Subpart E section H: Unwanted Emissions Measurement. As well as ANSI C63.4: 2009 as described below:

For the radiated emissions test, the EUT host, and all support equipment power cords was 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 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:

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

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	2013-06-18	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2013-06-09	1 year
Agilent	Pre-amplifier	8449B	3008A01978	2014-02-04	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year
EMCO	Horn Antenna	3315	9511-4627	2012-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

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

7.6 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	45 %
ATM Pressure:	101.6 kPa

The testing was performed by Chen Ge on 2014-04-15 in 5 m chamber 3.

7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15, Subpart C, section 15.205, 15.209 and 15.407 & IC RSS-210, RSS-Gen standard's radiated emissions limits, and had the worst margin of:

5250-5350 MHz

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range
-1.88	43.82475	Vertical	30 MHz -40 GHz

5470-5725 MHz

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range
-0.06	42.819	Vertical	30 MHz -40 GHz

7.8 Radiated Emissions Test Result Data

1) 30 MHz–1 GHz, Measured at 3 meters

5250-5350 MHz Band, Quasi-Peak Measurements @ 3m, worst case

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dB μ V/m)	Margin (dB)
43.82475	38.12	184	V	56	40	-1.88
48.45525	32.38	158	V	360	40	-7.62
55.32125	29.61	178	V	46	40	-10.39
77.19025	30.05	100	V	125	40	-9.95
81.17275	27.26	139	V	360	40	-12.74
151.4988	31.62	189	H	273	43.5	-11.88

5470-5725 MHz Band, Quasi-Peak Measurements @ 3m, worst case

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dB μ V/m)	Margin (dB)
42.819	39.94	148	V	307	40	-0.06
48.45425	34.31	148	V	262	40	-5.69
58.7025	33.63	121	V	28	40	-6.37
74.56175	32.01	105	V	11	40	-7.99
82.0635	29.44	100	V	210	40	-10.56
98.49625	34.72	123	V	132	43.5	-8.78

2) 1–40 GHz, Measured at 3 meters

Note: Restricted bands limits are used for non-restricted band, which is most stringent.

5250-5350 MHz 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											
5150	49.15	0	100	V	33.426	4.56	34.74	52.396	74	-21.604	Peak
5150	49.48	0	100	H	33.446	4.56	34.74	52.746	74	-21.254	Peak
5150	33.91	0	100	V	33.426	4.56	34.74	37.156	54	-16.844	Ave
5150	33.59	0	100	H	33.446	4.56	34.74	36.856	54	-17.144	Ave
10520	49.26	0	100	V	38.343	7	34.49	60.113	74	-13.887	Peak
10520	48.99	0	100	H	38.343	7	34.49	59.843	74	-14.157	Peak
10520	33.81	0	100	V	38.343	7	34.49	44.663	54	-9.337	Ave
10520	34.29	0	100	H	38.343	7	34.49	45.143	54	-8.857	Ave
15780	47.07	0	100	V	37.928	8.35	34.61	58.738	74	-15.262	Peak
15780	46.19	0	100	H	37.928	8.35	34.61	57.858	74	-16.142	Peak
15780	32.07	0	100	V	37.928	8.35	34.61	43.738	54	-10.262	Ave
15780	31.5	0	100	H	37.928	8.35	34.61	43.168	54	-10.832	Ave
21040	47.78	0	100	V	34.6	9.79	34	58.17	74	-15.83	Peak
21040	48.13	0	100	H	34.6	9.79	34	58.52	74	-15.48	Peak
21040	33.33	0	100	V	34.6	9.79	34	43.72	54	-10.28	Ave
21040	33.43	0	100	H	34.6	9.79	34	43.82	54	-10.18	Ave
Middle Channel 5280 MHz, measured at 3 meters											
10560	46.33	0	100	V	38.418	7.07	34.49	57.328	74	-16.672	Peak
10560	46.71	0	100	H	38.418	7.07	34.49	57.708	74	-16.292	Peak
10560	32.14	0	100	V	38.418	7.07	34.49	43.138	54	-10.862	Ave
10560	32.42	0	100	H	38.418	7.07	34.49	43.418	54	-10.582	Ave
15840	47.67	0	100	V	37.914	8.38	34.61	59.354	74	-14.646	Peak
15840	47.52	0	100	H	37.914	8.38	34.61	59.204	74	-14.796	Peak
15840	32.31	0	100	V	37.914	8.38	34.61	43.994	54	-10.006	Ave
15840	32.3	0	100	H	37.914	8.38	34.61	43.984	54	-10.016	Ave
21120	48.94	0	100	V	34.6	9.8	34	59.34	74	-14.66	Peak
21120	48.44	0	100	H	34.6	9.8	34	58.84	74	-15.16	Peak
21120	33.31	0	100	V	34.6	9.8	34	43.71	54	-10.29	Ave
21120	33.4	0	100	H	34.6	9.8	34	43.8	54	-10.2	Ave

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)	
High Channel 5320 MHz, measured at 3 meters											
5350	48.38	0	100	V	33.628	4.71	34.61	52.108	74	-21.892	Peak
5350	48.6	0	100	H	33.688	4.71	34.61	52.388	74	-21.612	Peak
5350	33.65	0	100	V	33.628	4.71	34.61	37.378	54	-16.622	Ave
5350	33.68	0	100	H	33.688	4.71	34.61	37.468	54	-16.532	Ave
10640	46.19	0	100	V	38.418	7.07	34.49	57.188	74	-16.812	Peak
10640	45.65	0	100	H	38.418	7.07	34.49	56.648	74	-17.352	Peak
10640	33.35	0	100	V	38.418	7.07	34.49	44.348	54	-9.652	Ave
10640	33.47	0	100	H	38.418	7.07	34.49	44.468	54	-9.532	Ave
15960	47.99	0	100	V	37.902	8.39	34.61	59.672	74	-14.328	Peak
15960	46.69	0	100	H	37.902	8.39	34.61	58.372	74	-15.628	Peak
15960	32.58	0	100	V	37.902	8.39	34.61	44.262	54	-9.738	Ave
15960	32.31	0	100	H	37.902	8.39	34.61	43.992	54	-10.008	Ave
21280	46.89	0	100	V	34.6	9.79	34	57.28	74	-16.72	Peak
21280	47.52	0	100	H	34.6	9.79	34	57.91	74	-16.09	Peak
21280	33.1	0	100	V	34.6	9.79	34	43.49	54	-10.51	Ave
21280	33.25	0	100	H	34.6	9.79	34	43.64	54	-10.36	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											
5150	48.41	0	100	V	33.426	4.56	34.74	51.656	74	-22.344	Peak
5150	48.63	0	100	H	33.446	4.56	34.74	51.896	74	-22.104	Peak
5150	32.54	0	100	V	33.426	4.56	34.74	35.786	54	-18.214	Ave
5150	32.63	0	100	H	33.446	4.56	34.74	35.896	54	-18.104	Ave
10520	44.95	0	100	V	38.343	7	34.49	55.803	74	-18.197	Peak
10520	45.19	0	100	H	38.343	7	34.49	56.043	74	-17.957	Peak
10520	30.39	0	100	V	38.343	7	34.49	41.243	54	-12.757	Ave
10520	30.58	0	100	H	38.343	7	34.49	41.433	54	-12.567	Ave
15780	46.93	0	100	V	37.928	8.35	34.61	58.598	74	-15.402	Peak
15780	46.76	0	100	H	37.928	8.35	34.61	58.428	74	-15.572	Peak
15780	31.66	0	100	V	37.928	8.35	34.61	43.328	54	-10.672	Ave
15780	31.83	0	100	H	37.928	8.35	34.61	43.498	54	-10.502	Ave
21040	48	0	100	V	34.6	9.79	34	58.39	74	-15.61	Peak
21040	48.63	0	100	H	34.6	9.79	34	59.02	74	-14.98	Peak
21040	33.09	0	100	V	34.6	9.79	34	43.48	54	-10.52	Ave
21040	33.41	0	100	H	34.6	9.79	34	43.8	54	-10.2	Ave
Middle Channel 5280 MHz, measured at 3 meters											
10560	45.77	0	100	V	38.418	7.07	34.49	56.768	74	-17.232	Peak
10560	45.8	0	100	H	38.418	7.07	34.49	56.798	74	-17.202	Peak
10560	31.08	0	100	V	38.418	7.07	34.49	42.078	54	-11.922	Ave
10560	31.53	0	100	H	38.418	7.07	34.49	42.528	54	-11.472	Ave
15840	47.21	0	100	V	37.914	8.38	34.61	58.894	74	-15.106	Peak
15840	47.57	0	100	H	37.914	8.38	34.61	59.254	74	-14.746	Peak
15840	32.65	0	100	V	37.914	8.38	34.61	44.334	54	-9.666	Ave
15840	32.54	0	100	H	37.914	8.38	34.61	44.224	54	-9.776	Ave
21120	48.32	0	100	V	34.6	9.8	34	58.72	74	-15.28	Peak
21120	48.19	0	100	H	34.6	9.8	34	58.59	74	-15.41	Peak
21120	33.72	0	100	V	34.6	9.8	34	44.12	54	-9.88	Ave
21120	33.68	0	100	H	34.6	9.8	34	44.08	54	-9.92	Ave

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)	
High Channel 5320 MHz, measured at 3 meters											
5350	48.89	32	100	V	33.628	4.71	34.61	52.618	74	-21.382	Peak
5350	48.61	12	100	H	33.688	4.71	34.61	52.398	74	-21.602	Peak
5350	33.97	32	100	V	33.628	4.71	34.61	37.698	54	-16.302	Ave
5350	33.54	12	100	H	33.688	4.71	34.61	37.328	54	-16.672	Ave
10640	45.53	0	100	V	38.418	7.07	34.49	56.528	74	-17.472	Peak
10640	45.62	0	100	H	38.418	7.07	34.49	56.618	74	-17.382	Peak
10640	31.2	0	100	V	38.418	7.07	34.49	42.198	54	-11.802	Ave
10640	31.41	0	100	H	38.418	7.07	34.49	42.408	54	-11.592	Ave
15960	46.62	0	100	V	37.902	8.39	34.61	58.302	74	-15.698	Peak
15960	46.96	0	100	H	37.902	8.39	34.61	58.642	74	-15.358	Peak
15960	32.69	0	100	V	37.902	8.39	34.61	44.372	54	-9.628	Ave
15960	32.77	0	100	H	37.902	8.39	34.61	44.452	54	-9.548	Ave
21280	48.16	0	100	V	34.6	9.79	34	58.55	74	-15.45	Peak
21280	48.96	0	100	H	34.6	9.79	34	59.35	74	-14.65	Peak
21280	33.77	0	100	V	34.6	9.79	34	44.16	54	-9.84	Ave
21280	33.82	0	100	H	34.6	9.79	34	44.21	54	-9.79	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											
5150	48.75	36	108	V	33.426	4.56	34.74	51.996	74	-22.004	Peak
5150	48.24	0	100	H	33.446	4.56	34.74	51.506	74	-22.494	Peak
5150	33.96	36	108	V	33.426	4.56	34.74	37.206	54	-16.794	Ave
5150	34.05	0	100	H	33.446	4.56	34.74	37.316	54	-16.684	Ave
10540	46.62	0	100	V	38.343	7.05	34.49	57.523	74	-16.477	Peak
10540	47.17	0	100	H	38.343	7.05	34.49	58.073	74	-15.927	Peak
10540	31.86	0	100	V	38.343	7.05	34.49	42.763	54	-11.237	Ave
10540	31.93	0	100	H	38.343	7.05	34.49	42.833	54	-11.167	Ave
15810	46.62	0	100	V	37.928	8.35	34.61	58.288	74	-15.712	Peak
15810	47.56	0	100	H	37.928	8.35	34.61	59.228	74	-14.772	Peak
15810	32.26	0	100	V	37.928	8.35	34.61	43.928	54	-10.072	Ave
15810	32.24	0	100	H	37.928	8.35	34.61	43.908	54	-10.092	Ave
21080	48.85	0	100	V	34.6	9.84	34	59.29	74	-14.71	Peak
21080	48.52	0	100	H	34.6	9.84	34	58.96	74	-15.04	Peak
21080	33.96	0	100	V	34.6	9.84	34	44.4	54	-9.6	Ave
21080	34.02	0	100	H	34.6	9.84	34	44.46	54	-9.54	Ave
High Channel 5310 MHz, measured at 3 meters											
5350	48.58	0	100	V	34.853	4.71	34.61	53.533	74	-20.467	Peak
5350	48.36	0	100	H	34.853	4.71	34.61	53.313	74	-20.687	Peak
5350	34.32	0	100	V	34.853	4.71	34.61	39.273	54	-14.727	Ave
5350	34.04	0	100	H	34.853	4.71	34.61	38.993	54	-15.007	Ave
10620	46.01	0	100	V	38.418	7.07	34.49	57.008	74	-16.992	Peak
10620	46.32	0	100	H	38.418	7.07	34.49	57.318	74	-16.682	Peak
10620	31.41	0	100	V	38.418	7.07	34.49	42.408	54	-11.592	Ave
10620	31.37	0	100	H	38.418	7.07	34.49	42.368	54	-11.632	Ave
15930	46.31	0	100	V	37.914	8.38	34.61	57.994	74	-16.006	Peak
15930	46.24	0	100	H	37.914	8.38	34.61	57.924	74	-16.076	Peak
15930	31.31	0	100	V	37.914	8.38	34.61	42.994	54	-11.006	Ave
15930	31.45	0	100	H	37.914	8.38	34.61	43.134	54	-10.866	Ave

802.11ac-80 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)	
High Channel 5290 MHz, measured at 3 meters											
5150	48.65	0	100	V	33.426	4.56	34.74	51.896	74	-22.104	Peak
5150	48.36	0	103	H	33.446	4.56	34.74	51.626	74	-22.374	Peak
5150	33.54	0	100	V	33.426	4.56	34.74	36.786	54	-17.214	Ave
5150	33.41	0	103	H	33.446	4.56	34.74	36.676	54	-17.324	Ave
5350	48.81	0	105	V	33.628	4.56	34.61	52.388	74	-21.612	Peak
5350	48.67	0	105	H	33.688	4.56	34.61	52.308	74	-21.692	Peak
5350	33.95	0	105	V	33.628	4.56	34.61	37.528	54	-16.472	Ave
5350	33.87	0	105	H	33.688	4.56	34.61	37.508	54	-16.492	Ave
10580	45.2	0	100	V	38.343	7.05	34.49	56.103	74	-17.897	Peak
10580	45.76	0	100	H	38.343	7.05	34.49	56.663	74	-17.337	Peak
10580	31.43	0	100	V	38.343	7.05	34.49	42.333	54	-11.667	Ave
10580	31.24	0	100	H	38.343	7.05	34.49	42.143	54	-11.857	Ave
15870	46.45	0	100	V	37.928	8.35	34.61	58.118	74	-15.882	Peak
15870	46.09	0	100	H	37.928	8.35	34.61	57.758	74	-16.242	Peak
15870	31.6	0	100	V	37.928	8.35	34.61	43.268	54	-10.732	Ave
15870	31.42	0	100	H	37.928	8.35	34.61	43.088	54	-10.912	Ave
21160	48.57	0	100	V	34.6	9.84	34	59.01	74	-14.99	Peak
21160	48.49	0	100	H	34.6	9.84	34	58.93	74	-15.07	Peak
21160	33.93	0	100	V	34.6	9.84	34	44.37	54	-9.63	Ave
21160	34.05	0	100	H	34.6	9.84	34	44.49	54	-9.51	Ave

5470-5725 MHz 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											
5460	44.28	0	100	V	34.821	4.76	34.5	49.361	74	-24.639	Peak
5460	44.79	0	100	H	34.044	4.76	34.5	49.094	74	-24.906	Peak
5460	31.02	0	100	V	34.821	4.76	34.5	36.101	54	-17.899	Ave
5460	30.24	0	100	H	34.044	4.76	34.5	34.544	54	-19.456	Ave
11000	45.84	0	100	V	38.382	7.36	34.05	57.532	74	-16.468	Peak
11000	46.08	0	100	H	38.382	7.36	34.05	57.772	74	-16.228	Peak
11000	31.68	0	100	V	38.382	7.36	34.05	43.372	54	-10.628	Ave
11000	31.66	0	100	H	38.382	7.36	34.05	43.352	54	-10.648	Ave
16500	47.57	0	100	V	38.768	8.5	34.64	60.198	74	-13.802	Peak
16500	47.43	0	100	H	38.768	8.5	34.64	60.058	74	-13.942	Peak
16500	33.19	0	100	V	38.768	8.5	34.64	45.818	54	-8.182	Ave
16500	33.23	0	100	H	38.768	8.5	34.64	45.858	54	-8.142	Ave
22000	48.03	0	100	V	34.9	9.94	34.69	58.18	74	-15.82	Peak
22000	48.45	0	100	H	34.9	9.94	34.69	58.6	74	-15.4	Peak
22000	34.16	0	100	V	34.9	9.94	34.69	44.31	54	-9.69	Ave
22000	34.22	0	100	H	34.9	9.94	34.69	44.37	54	-9.63	Ave
Middle Channel 5580 MHz, measured at 3 meters											
11160	45.42	0	100	V	38.511	7.52	34.05	57.401	74	-16.599	Peak
11160	45.64	0	100	H	38.511	7.52	34.05	57.621	74	-16.379	Peak
11160	31.13	0	100	V	38.511	7.52	34.05	43.111	54	-10.889	Ave
11160	31.21	0	100	H	38.511	7.52	34.05	43.191	54	-10.809	Ave
16740	47.98	0	100	V	39.94	8.63	34.64	61.91	74	-12.09	Peak
16740	47.68	0	100	H	39.94	8.63	34.64	61.61	74	-12.39	Peak
16740	33.15	0	100	V	39.94	8.63	34.64	47.08	54	-6.92	Ave
16740	33.23	0	100	H	39.94	8.63	34.64	47.16	54	-6.84	Ave
22320	47.68	0	100	V	34.9	9.92	34.69	57.81	74	-16.19	Peak
22320	48.48	0	100	H	34.9	9.92	34.69	58.61	74	-15.39	Peak
22320	33.58	0	100	V	34.9	9.92	34.69	43.71	54	-10.29	Ave
22320	33.47	0	100	H	34.9	9.92	34.69	43.6	54	-10.4	Ave

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)	
High Channel 5700 MHz, measured at 3 meters											
11400	46.12	0	100	V	38.882	7.57	34.05	58.522	74	-15.478	Peak
11400	46.39	0	100	H	38.882	7.57	34.05	58.792	74	-15.208	Peak
11400	32.54	0	100	V	38.882	7.57	34.05	44.942	54	-9.058	Ave
11400	32.65	0	100	H	38.882	7.57	34.05	45.052	54	-8.948	Ave
17100	47.84	0	100	V	42.637	8.66	34.64	64.497	74	-9.503	Peak
17100	47.73	0	100	H	42.637	8.66	34.64	64.387	74	-9.613	Peak
17100	33.21	0	100	V	42.637	8.66	34.64	49.867	54	-4.133	Ave
17100	33.29	0	100	H	42.637	8.66	34.64	49.947	54	-4.053	Ave
22800	48.11	0	100	V	34.9	10.17	34.69	58.49	74	-15.51	Peak
22800	47.94	0	100	H	34.9	10.17	34.69	58.32	74	-15.68	Peak
22800	33.32	0	100	V	34.9	10.17	34.69	43.7	54	-10.3	Ave
22800	33.01	0	100	H	34.9	10.17	34.69	43.39	54	-10.61	Ave
11400	46.12	0	100	V	38.882	7.57	34.05	58.522	74	-15.478	Peak
11400	46.39	0	100	H	38.882	7.57	34.05	58.792	74	-15.208	Peak
11400	32.54	0	100	V	38.882	7.57	34.05	44.942	54	-9.058	Ave
11400	32.65	0	100	H	38.882	7.57	34.05	45.052	54	-8.948	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											
5460	47.61	0	100	V	33.904	4.76	34.5	51.774	74	-22.226	Peak
5460	47.99	0	100	H	34.044	4.76	34.5	52.294	74	-21.706	Peak
5460	33.25	0	100	V	33.904	4.76	34.5	37.414	54	-16.586	Ave
5460	33.62	0	100	H	34.044	4.76	34.5	37.924	54	-16.076	Ave
11000	46.74	0	100	V	38.382	7.36	34.05	58.432	74	-15.568	Peak
11000	46.57	0	100	H	38.382	7.36	34.05	58.262	74	-15.738	Peak
11000	32.54	0	100	V	38.382	7.36	34.05	44.232	54	-9.768	Ave
11000	31.99	0	100	H	38.382	7.36	34.05	43.682	54	-10.318	Ave
16500	47.68	0	100	V	38.768	8.5	34.64	60.308	74	-13.692	Peak
16500	47.01	0	100	H	38.768	8.5	34.64	59.638	74	-14.362	Peak
16500	33.54	0	100	V	38.768	8.5	34.64	46.168	54	-7.832	Ave
16500	33.14	0	100	H	38.768	8.5	34.64	45.768	54	-8.232	Ave
22000	48.24	0	100	V	34.9	9.94	34.69	58.39	74	-15.61	Peak
22000	48.36	0	100	H	34.9	9.94	34.69	58.51	74	-15.49	Peak
22000	34.58	0	100	V	34.9	9.94	34.69	44.73	54	-9.27	Ave
22000	34.16	0	100	H	34.9	9.94	34.69	44.31	54	-9.69	Ave
Middle Channel 5580 MHz, measured at 3 meters											
11160	45.24	0	100	V	38.511	7.52	34.05	57.221	74	-16.779	Peak
11160	45.36	0	100	H	38.511	7.52	34.05	57.341	74	-16.659	Peak
11160	31.21	0	100	V	38.511	7.52	34.05	43.191	54	-10.809	Ave
11160	31.54	0	100	H	38.511	7.52	34.05	43.521	54	-10.479	Ave
16740	47.54	0	100	V	39.94	8.63	34.64	61.47	74	-12.53	Peak
16740	47.89	0	100	H	39.94	8.63	34.64	61.82	74	-12.18	Peak
16740	33.41	0	100	V	39.94	8.63	34.64	47.34	54	-6.66	Ave
16740	33.24	0	100	H	39.94	8.63	34.64	47.17	54	-6.83	Ave
22320	47.24	0	100	V	34.9	9.92	34.69	57.37	74	-16.63	Peak
22320	48.32	0	100	H	34.9	9.92	34.69	58.45	74	-15.55	Peak
22320	33.69	0	100	V	34.9	9.92	34.69	43.82	54	-10.18	Ave
22320	33.47	0	100	H	34.9	9.92	34.69	43.6	54	-10.4	Ave

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)	
High Channel 5700 MHz, measured at 3 meters											
11400	46.52	0	100	V	38.882	7.57	34.05	58.922	74	-15.078	Peak
11400	46.78	0	100	H	38.882	7.57	34.05	59.182	74	-14.818	Peak
11400	32.98	0	100	V	38.882	7.57	34.05	45.382	54	-8.618	Ave
11400	33.11	0	100	H	38.882	7.57	34.05	45.512	54	-8.488	Ave
17100	47.68	0	100	V	42.637	8.66	34.64	64.337	74	-9.663	Peak
17100	47.94	0	100	H	42.637	8.66	34.64	64.597	74	-9.403	Peak
17100	33.36	0	100	V	42.637	8.66	34.64	50.017	54	-3.983	Ave
17100	33.58	0	100	H	42.637	8.66	34.64	50.237	54	-3.763	Ave
22800	48.26	0	100	V	34.9	10.17	34.69	58.64	74	-15.36	Peak
22800	48.57	0	100	H	34.9	10.17	34.69	58.95	74	-15.05	Peak
22800	33.23	0	100	V	34.9	10.17	34.69	43.61	54	-10.39	Ave
22800	33.4	0	100	H	34.9	10.17	34.69	43.78	54	-10.22	Ave

802.11n-HT40 mode

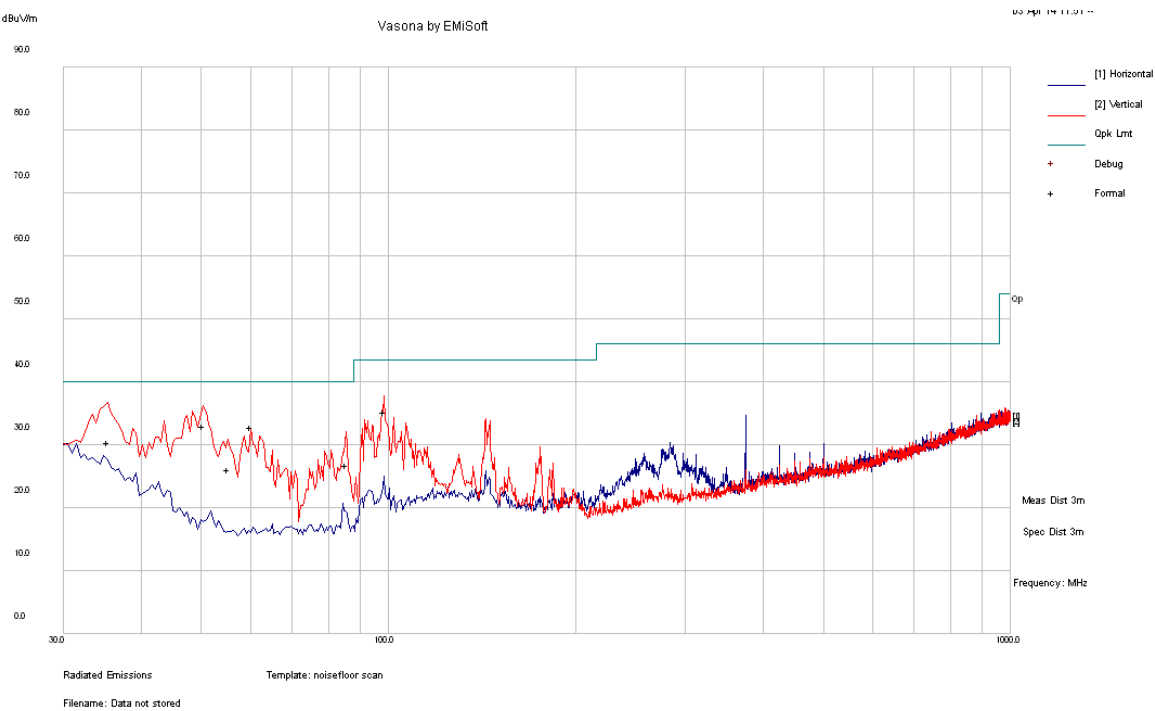
Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre- Amp. (dB)	Cord. Reading (dBμV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5510 MHz, measured at 3 meters											
5460	44.63	0	100	V	34.821	4.76	34.5	49.711	74	-24.289	Peak
5460	44.54	0	100	H	34.821	4.76	34.5	49.621	74	-24.379	Peak
5460	31.25	0	100	V	34.821	4.76	34.5	36.331	54	-17.669	Ave
5460	31.41	0	100	H	34.821	4.76	34.5	36.491	54	-17.509	Ave
11020	47.29	0	100	V	38.382	7.36	34.05	58.982	74	-15.018	Peak
11020	47.28	0	100	H	38.382	7.36	34.05	58.972	74	-15.028	Peak
11020	32.53	0	100	V	38.382	7.36	34.05	44.222	54	-9.778	Ave
11020	32.48	0	100	H	38.382	7.36	34.05	44.172	54	-9.828	Ave
16530	46.87	0	100	V	38.768	8.5	34.64	59.498	74	-14.502	Peak
16530	46.78	0	100	H	38.768	8.5	34.64	59.408	74	-14.592	Peak
16530	32.54	0	100	V	38.768	8.5	34.64	45.168	54	-8.832	Ave
16530	32.65	0	100	H	38.768	8.5	34.64	45.278	54	-8.722	Ave
22040	47.85	0	100	V	34.9	9.76	34.69	57.82	74	-16.18	Peak
22040	47.98	0	100	H	34.9	9.76	34.69	57.95	74	-16.05	Peak
22040	33.21	0	100	V	34.9	9.76	34.69	43.18	54	-10.82	Ave
22040	33.53	0	100	H	34.9	9.76	34.69	43.5	54	-10.5	Ave
Middle Channel 5550 MHz, measured at 3 meters											
11100	45.36	0	100	V	38.511	7.39	34.05	57.211	74	-16.789	Peak
11100	45.42	0	100	H	38.511	7.39	34.05	57.271	74	-16.729	Peak
11100	31.56	0	100	V	38.511	7.39	34.05	43.411	54	-10.589	Ave
11100	31.68	0	100	H	38.511	7.39	34.05	43.531	54	-10.469	Ave
16650	47.63	0	100	V	39.256	8.55	34.64	60.796	74	-13.204	Peak
16650	47.54	0	100	H	39.256	8.55	34.64	60.706	74	-13.294	Peak
16650	33.63	0	100	V	39.256	8.55	34.64	46.796	54	-7.204	Ave
16650	33.24	0	100	H	39.256	8.55	34.64	46.406	54	-7.594	Ave
22200	47.36	0	100	V	35	9.91	34.69	57.58	74	-16.42	Peak
22200	47.21	0	100	H	35	9.91	34.69	57.43	74	-16.57	Peak
22200	33.54	0	100	V	35	9.91	34.69	43.76	54	-10.24	Ave
22200	33.78	0	100	H	35	9.91	34.69	44	54	-10	Ave

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)	
High Channel 5670 MHz, measured at 3 meters											
11340	46.21	0	100	V	38.844	7.52	34.05	58.524	74	-15.476	Peak
11340	46.36	0	100	H	38.844	7.52	34.05	58.674	74	-15.326	Peak
11340	32.68	0	100	V	38.844	7.52	34.05	44.994	54	-9.006	Peak
11340	32.47	0	100	H	38.844	7.52	34.05	44.784	54	-9.216	Peak
17010	47.65	0	100	V	41.889	8.61	34.64	63.509	74	-10.491	Peak
17010	47.24	0	100	H	41.889	8.61	34.64	63.099	74	-10.901	Peak
17010	33.25	0	100	V	41.889	8.61	34.64	49.109	54	-4.891	Ave
17010	33.59	0	100	H	41.889	8.61	34.64	49.449	54	-4.551	Ave
22680	47.51	0	100	V	34.9	10.07	34.69	57.79	74	-16.21	Peak
22680	47.69	0	100	H	34.9	10.07	34.69	57.97	74	-16.03	Peak
22680	33.22	0	100	V	34.9	10.07	34.69	43.5	54	-10.5	Ave
22680	33.87	0	100	H	34.9	10.07	34.69	44.15	54	-9.85	Ave

802.11ac-80 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											
5460	44.36	0	100	V	34.821	4.76	34.5	49.441	74	-24.559	Peak
5460	44.87	0	100	H	34.821	4.76	34.5	49.951	74	-24.049	Peak
5460	31.24	0	100	V	34.821	4.76	34.5	36.321	54	-17.679	Ave
5460	31.65	0	100	H	34.821	4.76	34.5	36.731	54	-17.269	Ave
11060	46.52	0	100	V	38.382	7.36	34.05	58.212	74	-15.788	Peak
11060	46.35	0	100	H	38.382	7.36	34.05	58.042	74	-15.958	Peak
11060	31.95	0	100	V	38.382	7.36	34.05	43.642	54	-10.358	Ave
11060	32.05	0	100	H	38.382	7.36	34.05	43.742	54	-10.258	Ave
16530	47.96	0	100	V	38.768	8.5	34.64	60.588	74	-13.412	Peak
16530	48.21	0	100	H	38.768	8.5	34.64	60.838	74	-13.162	Peak
16530	34.36	0	100	V	38.768	8.5	34.64	46.988	54	-7.012	Ave
16530	34.29	0	100	H	38.768	8.5	34.64	46.918	54	-7.082	Ave
22040	47.95	0	100	V	34.9	9.76	34.69	57.92	74	-16.08	Peak
22040	47.68	0	100	H	34.9	9.76	34.69	57.65	74	-16.35	Peak
22040	34.55	0	100	V	34.9	9.76	34.69	44.52	54	-9.48	Ave
22040	34.36	0	100	H	34.9	9.76	34.69	44.33	54	-9.67	Ave
High Channel 5690 MHz, measured at 3 meters											
11380	47.32	0	100	V	38.844	7.52	34.05	59.634	74	-14.366	Peak
11380	47.55	0	100	H	38.844	7.52	34.05	59.864	74	-14.136	Peak
11380	33.26	0	100	V	38.844	7.52	34.05	45.574	54	-8.426	Peak
11380	32.95	0	100	H	38.844	7.52	34.05	45.264	54	-8.736	Peak
17070	48.35	0	100	V	41.889	8.61	34.64	64.209	74	-9.791	Peak
17070	47.85	0	100	H	41.889	8.61	34.64	63.709	74	-10.291	Peak
17070	33.68	0	100	V	41.889	8.61	34.64	49.539	54	-4.461	Ave
17070	33.65	0	100	H	41.889	8.61	34.64	49.509	54	-4.491	Ave

3) Co-location with 2.4 GHz and 5 GHz



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
35.361	30.38	131	V	290	40	-9.62
50.4415	32.98	124	V	93	40	-7.02
98.4275	35.28	128	V	117	43.5	-8.22
60.22175	32.91	129	V	212	40	-7.09
85.52475	26.86	118	V	250	40	-13.14
55.29675	26.15	223	V	150	40	-13.85

1 to 40 GHz:

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)	
4874.6	53.61	76	105	V	33.2	2.72	34.33	55.2	74	-18.8	Peak
4874.6	50.72	46	109	H	33.2	2.72	34.33	52.31	74	-21.69	Peak
4874.6	39.69	76	105	V	33.2	2.72	34.33	41.28	54	-12.72	Ave
4874.6	36.24	46	109	H	33.2	2.72	34.33	37.83	54	-16.17	Ave
8187	45.28	0	100	V	36.74	3.52	34.57	50.97	74	-23.03	Peak
8187	45.77	0	100	H	36.74	3.52	34.57	51.46	74	-22.54	Peak
8187	31.99	0	100	V	36.74	3.52	34.57	37.68	54	-16.32	Ave
8187	32.58	0	100	H	36.74	3.52	34.57	38.27	54	-15.73	Ave
11488.17	47.63	47	100	V	38.1	4.07	33.85	55.95	74	-18.05	Peak
11488.17	52.58	52	100	H	38.1	4.07	33.85	60.9	74	-13.1	Peak
11488.17	33.91	47	100	V	38.1	4.07	33.85	42.23	54	-11.77	Ave
11488.17	37.27	52	100	H	38.1	4.07	33.85	45.59	54	-8.41	Ave
16085	42.33	0	100	V	37.73	4.84	34.83	50.07	74	-23.93	Peak
16085	43.44	0	100	H	37.73	4.84	34.83	51.18	74	-22.82	Peak
16085	28.72	0	100	V	37.73	4.84	34.83	36.46	54	-17.54	Ave
16085	29.54	0	100	H	37.73	4.84	34.83	37.28	54	-16.72	Ave

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

8.1 Applicable Standard

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	E4446A	US44300386	2013-09-29	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:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Chen Ge from 2014-04-21 at RF site.

8.5 Test Results

Please refer to the following tables and plots.

5250-5350 MHz Band

Radio Mode	Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)
802.11a	Chain J0			
	Low	5260	22.190	16.8378
	Middle	5280	21.128	16.8033
	High	5320	21.364	16.8183
	Chain J1			
	Low	5260	22.007	16.7241
	Middle	5280	21.605	16.7389
	High	5320	21.252	16.7289
802.11n-HT20 mode	Chain J0			
	Low	5260	22.093	17.9362
	Middle	5280	22.958	17.9645
	High	5320	22.424	17.9998
	Chain J1			
	Low	5260	23.573	18.0376
	Middle	5280	23.470	17.9704
	High	5320	22.566	17.8940
802.11n-HT40 mode	Chain J0			
	Low	5270	46.657	36.2811
	High	5310	41.680	36.2127
	Chain J1			
	Low	5270	59.934	36.5899
	High	5310	45.704	36.2704
802.11ac 80 mode	Chain J0			
	-	5310	83.229	75.5421
	Chain J1			
	-	5310	85.806	75.4532

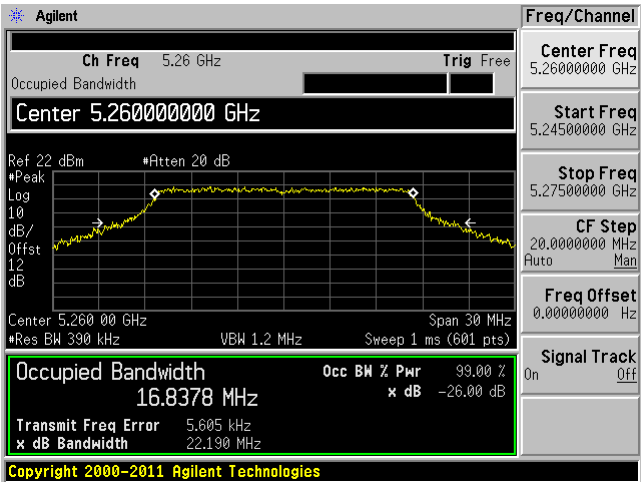
5470-5725 MHz Band

Radio Mode	Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)
802.11a	Chain J0			
	Low	5500	20.479	16.7620
	Middle	5580	21.378	16.7727
	High	5700	21.436	16.7849
	Chain J1			
	Low	5500	21.029	16.7589
	Middle	5580	21.979	16.7997
	High	5700	21.916	16.7491
802.11n-HT20 mode	Chain J0			
	Low	5500	23.064	17.9281
	Middle	5580	22.706	17.9832
	High	5700	22.458	17.8843
	Chain J1			
	Low	5500	22.353	17.9711
	Middle	5580	23.223	17.9647
	High	5700	22.991	17.9458
802.11n-HT40 mode	Chain J0			
	Low	5510	41.373	36.1918
	Middle	5550	46.968	36.2162
	High	5670	42.899	36.2883
	Chain J1			
	Low	5510	42.600	36.2245
	Middle	5550	46.688	36.3159
	High	5670	44.497	36.3071
802.11ac 80 mode	Chain J0			
	Low	5530	83.080	75.3928
	High	5690	90.591	75.9021
	Chain J1			
	Low	5530	85.412	75.6467
	High	5690	87.251	75.6598

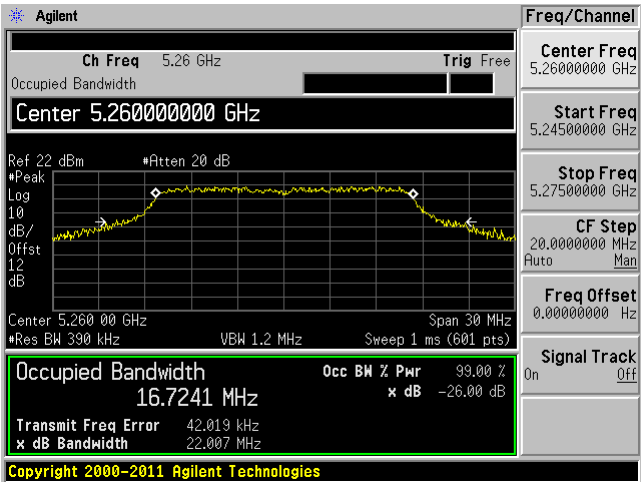
5250-5350 MHz

802.11a mode

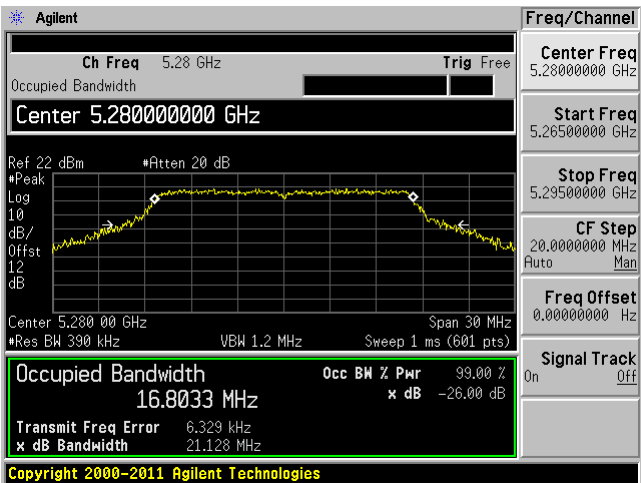
802.11a mode, 5260 MHz, Chain J0



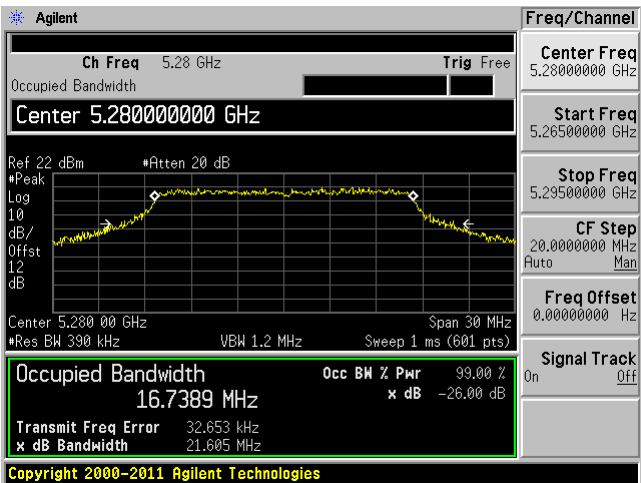
802.11a mode, 5260 MHz, Chain J1



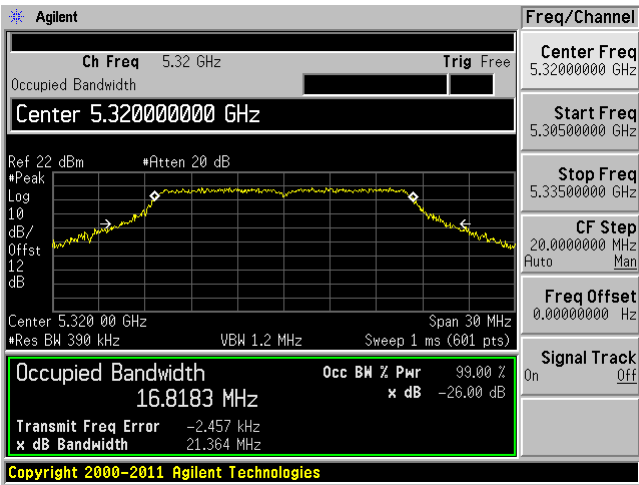
802.11a mode, 5280 MHz, Chain J0



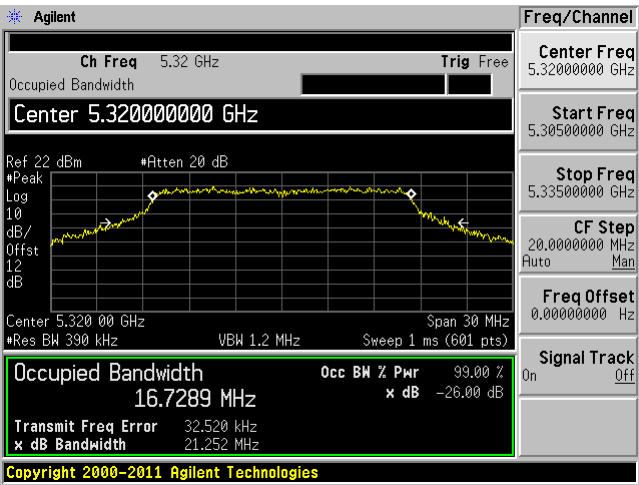
802.11a mode, 5280 MHz, Chain J1



802.11a mode, 5320 MHz, Chain J0

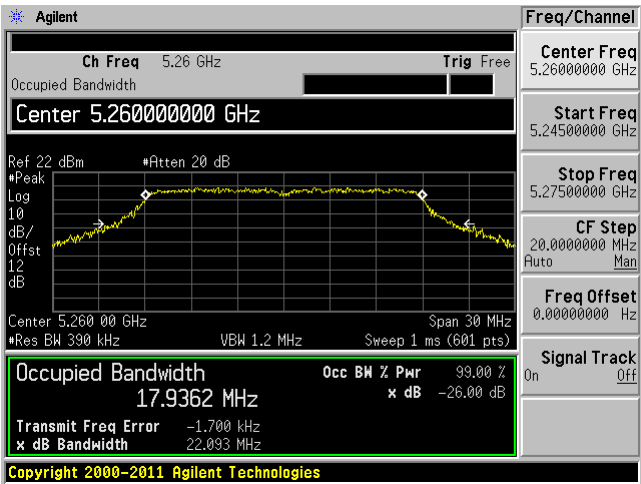


802.11a mode, 5320 MHz, Chain J1

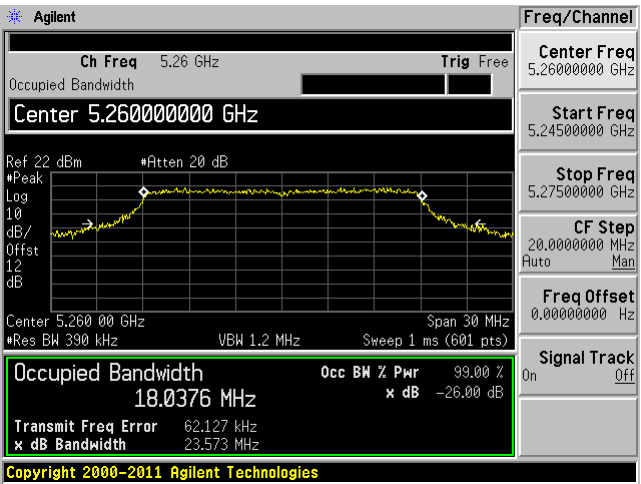


802.11n-HT-20 mode

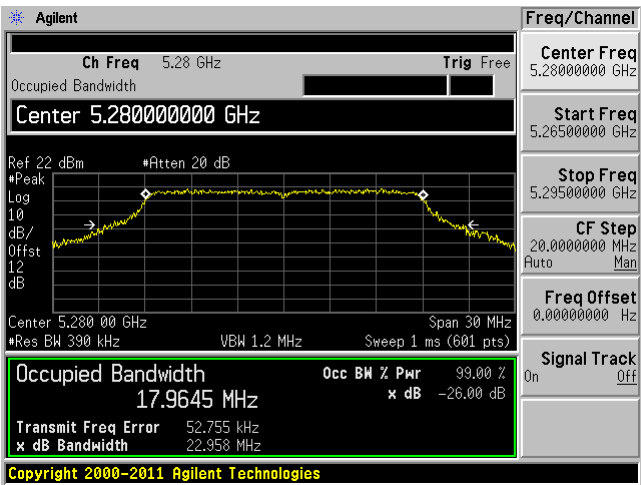
802.11n-HT20 mode, 5260 MHz, Chain J0



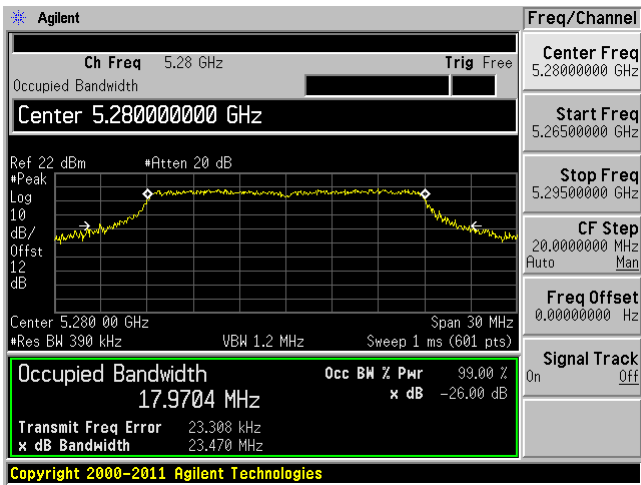
802.11n-HT20 mode, 5260 MHz, Chain J1



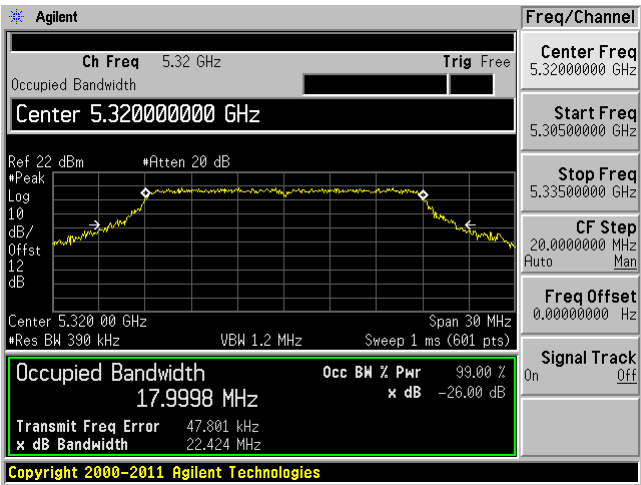
802.11n-HT20 mode, 5280 MHz, Chain J0



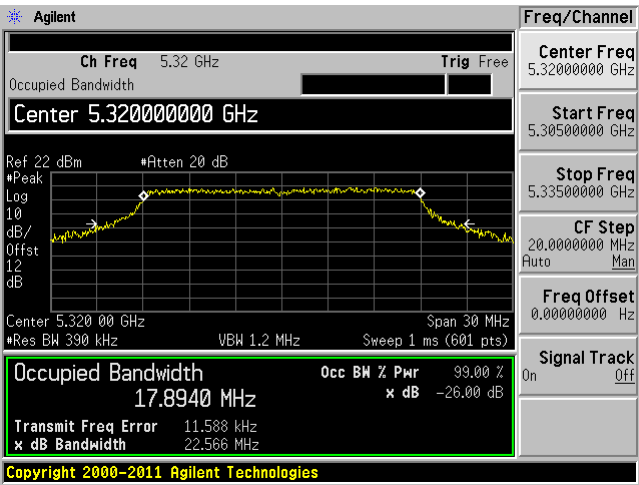
802.11n-HT20 mode, 5280 MHz, Chain J1



802.11n-HT20 mode, 5320 MHz, Chain J0

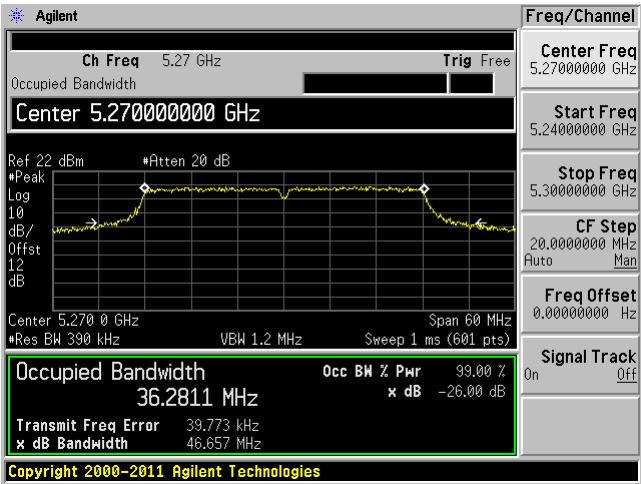


802.11n-HT20 mode, 5320 MHz, Chain J1

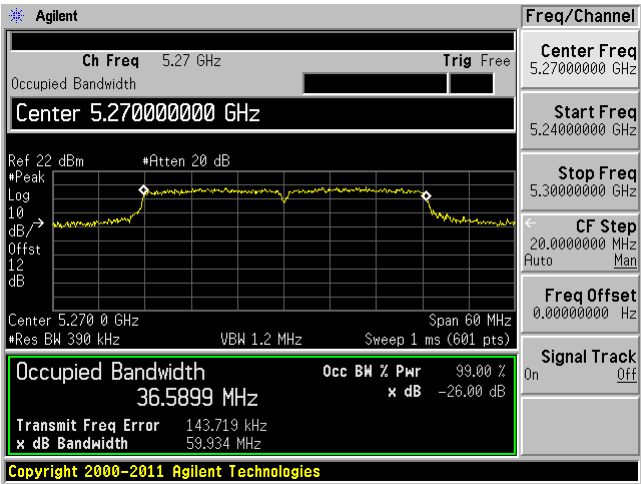


802.11n-HT-40 mode

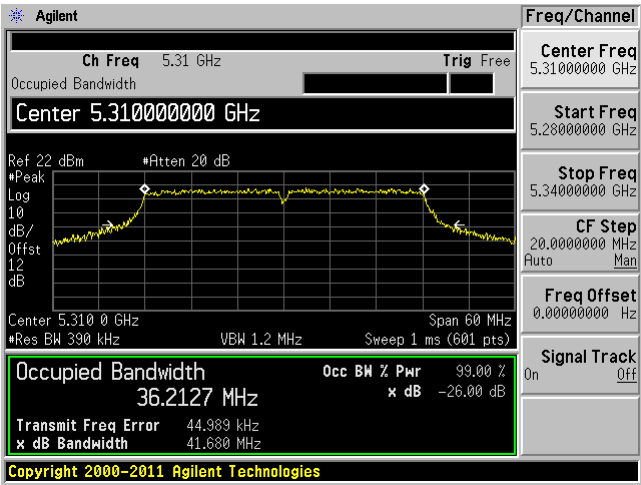
802.11n-HT40 mode, 5270 MHz, Chain J0



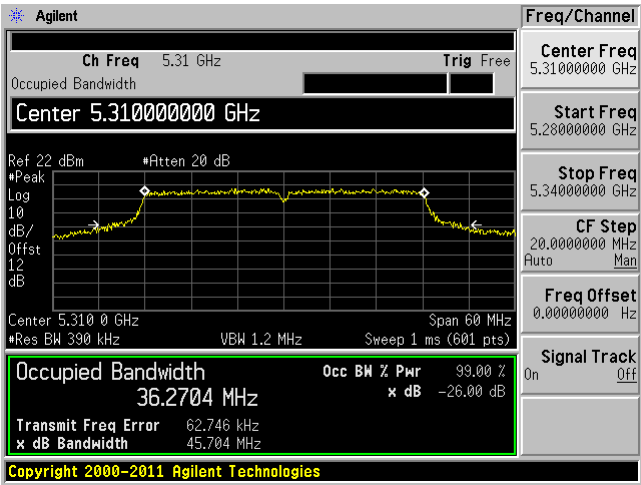
802.11n-HT40 mode, 5270 MHz, Chain J1



802.11n-HT40 mode, 5310 MHz, Chain J0

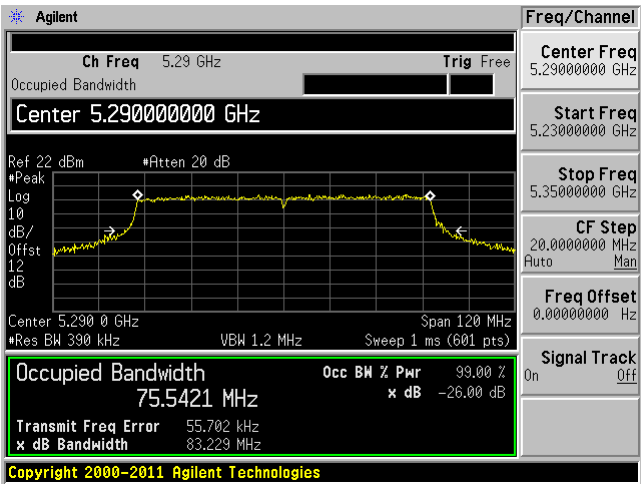


802.11n-HT40 mode, 5310 MHz, Chain J1

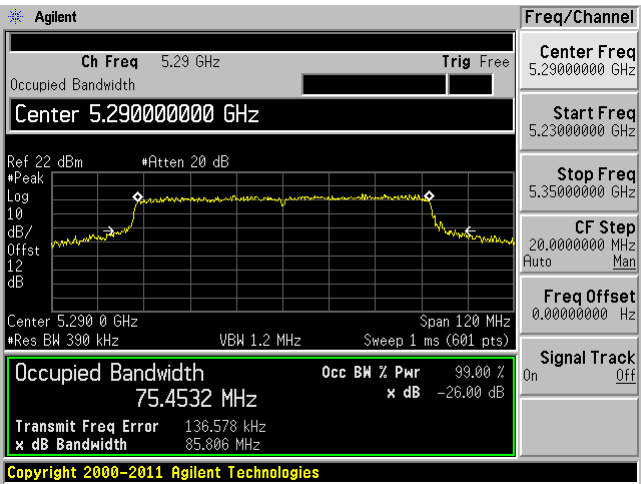


802.11ac 80 mode

802.11ac-80 mode, 5290 MHz, Chain J0



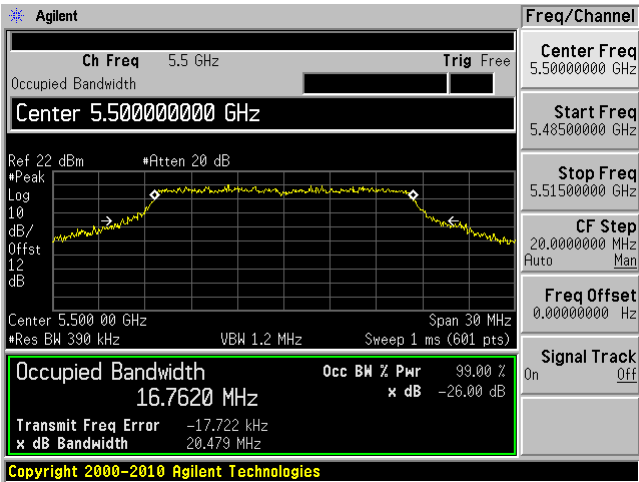
802.11ac-80 mode, 5290 MHz, Chain J1



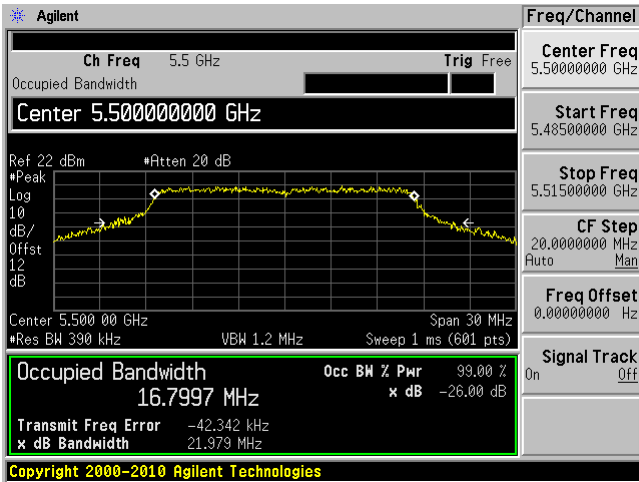
5470-5725 MHz

802.11a mode

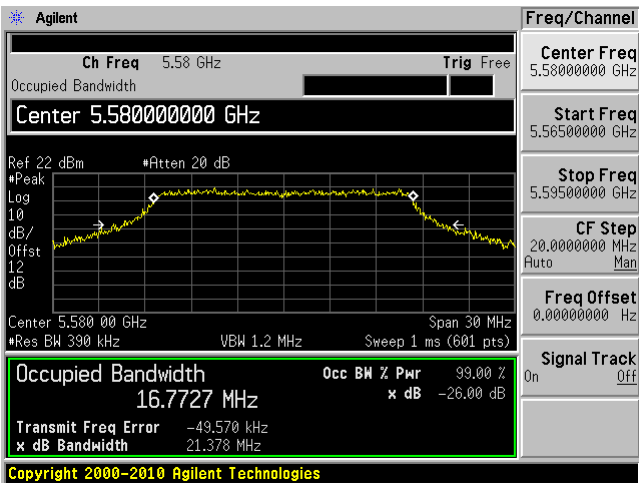
802.11a mode, 5550 MHz, Chain J0



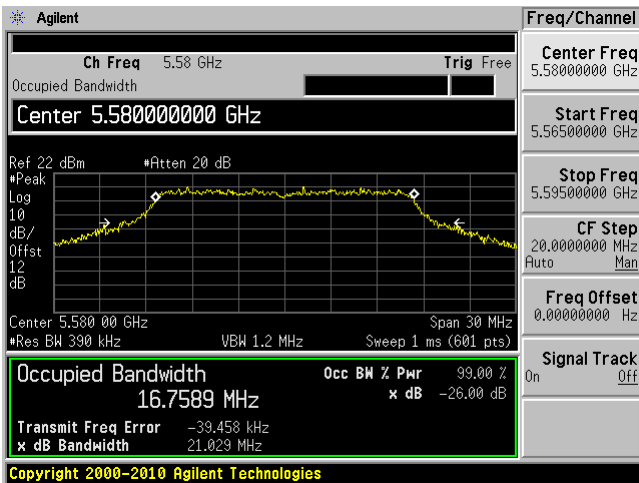
802.11a mode, 5550 MHz, Chain J1



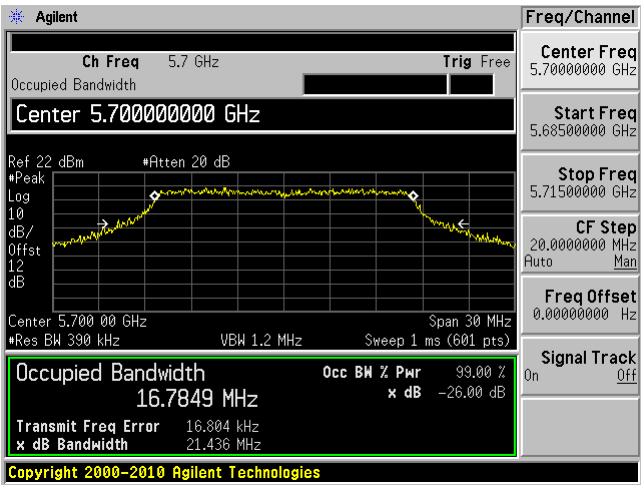
802.11a mode, 5580 MHz, Chain J0



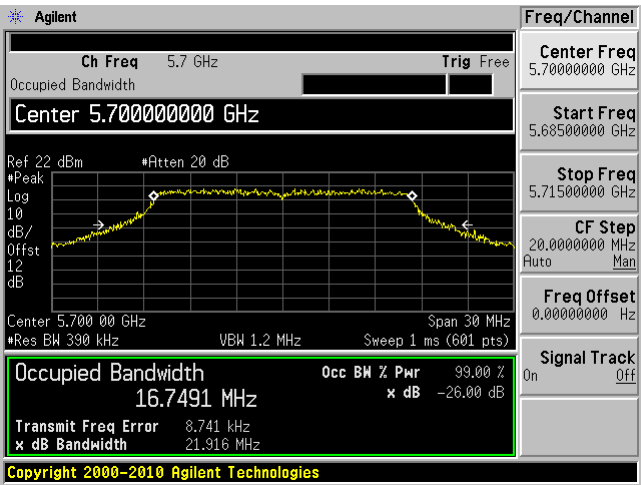
802.11a mode, 5580 MHz, Chain J1



802.11a mode, 5700 MHz, Chain J0

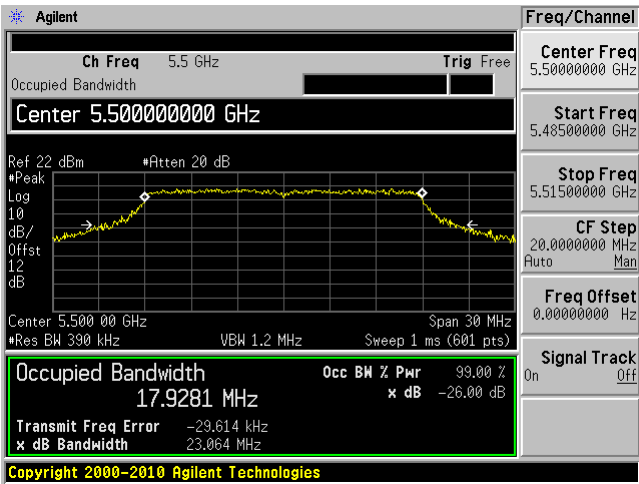


802.11a mode, 5700 MHz, Chain J1

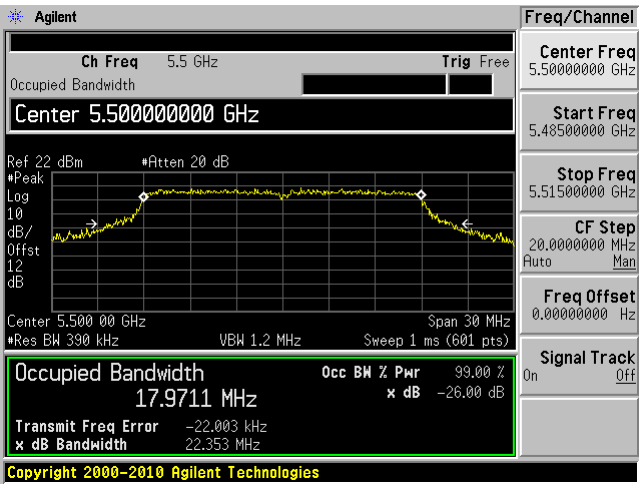


802.11n-HT-20 mode

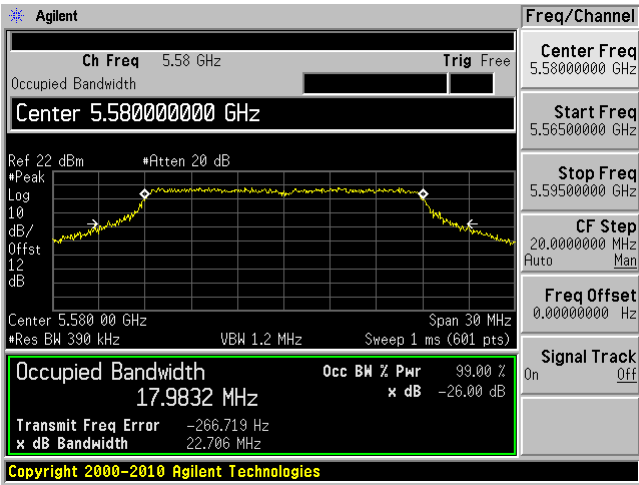
802.11n-HT20 mode, 5500 MHz, Chain J0



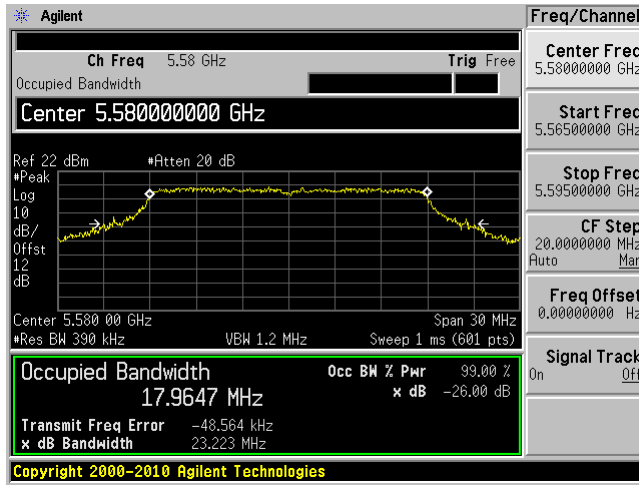
802.11n-HT20 mode, 5500 MHz, Chain J1



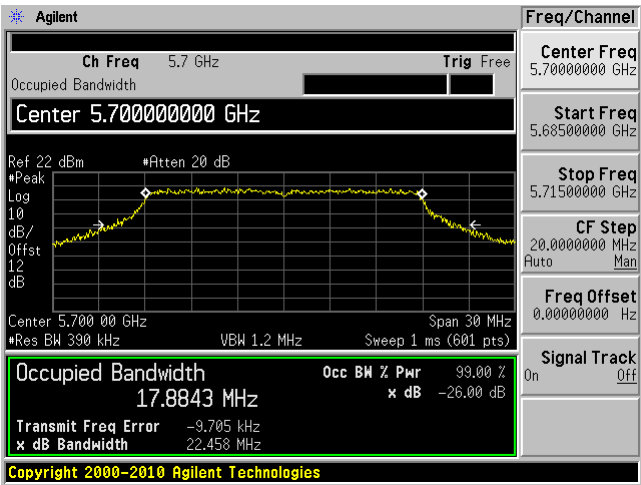
802.11n-HT20 mode, 5580 MHz, Chain J0



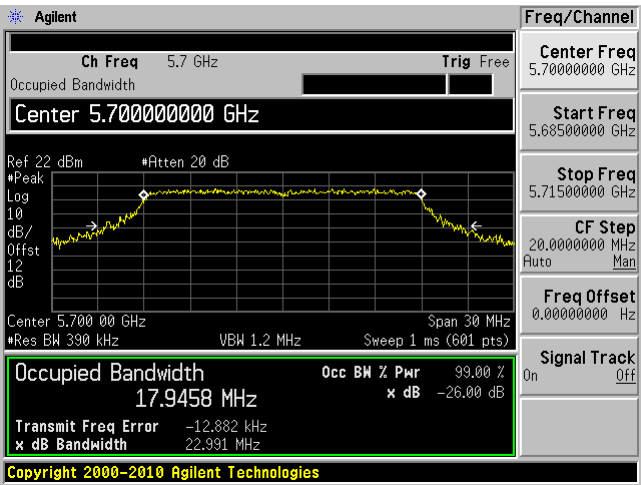
802.11n-HT20 mode, 5580 MHz, Chain J1



802.11n-HT20 mode, 5700 MHz, Chain J0

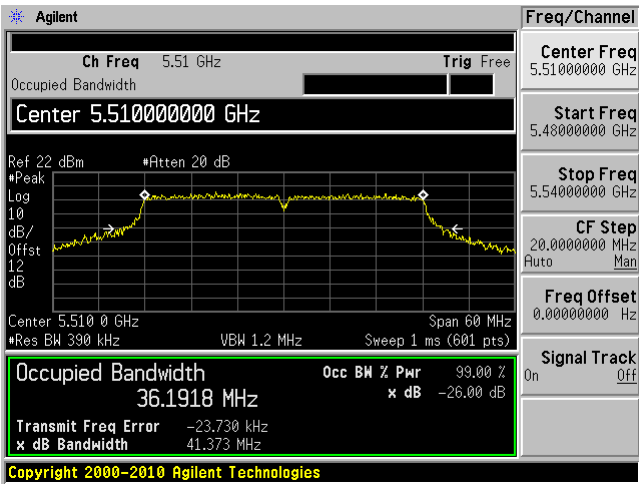


802.11n-HT20 mode, 5700 MHz, Chain J1

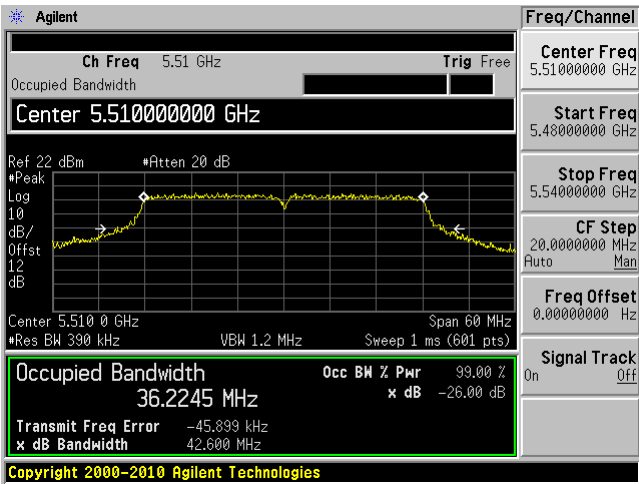


802.11n-HT-40 mode

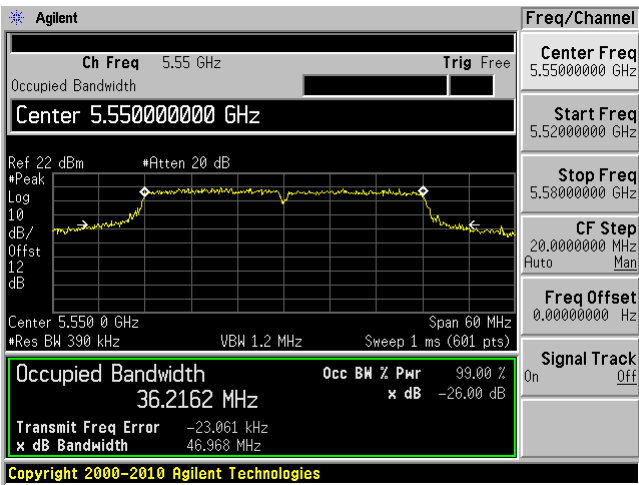
802.11n-HT40 mode, 5510 MHz, Chain J0



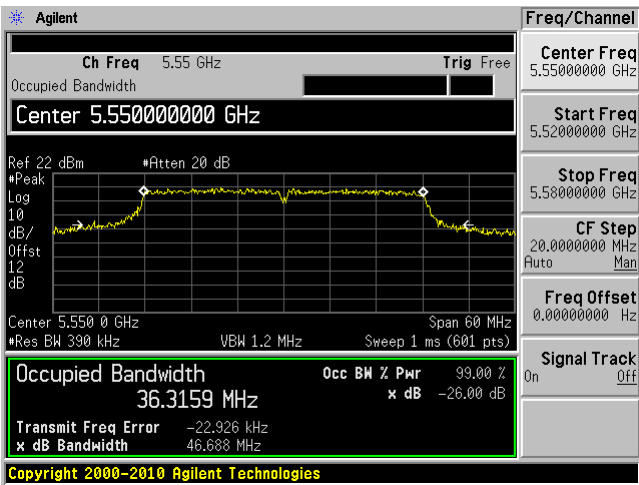
802.11n-HT40 mode, 5510 MHz, Chain J1



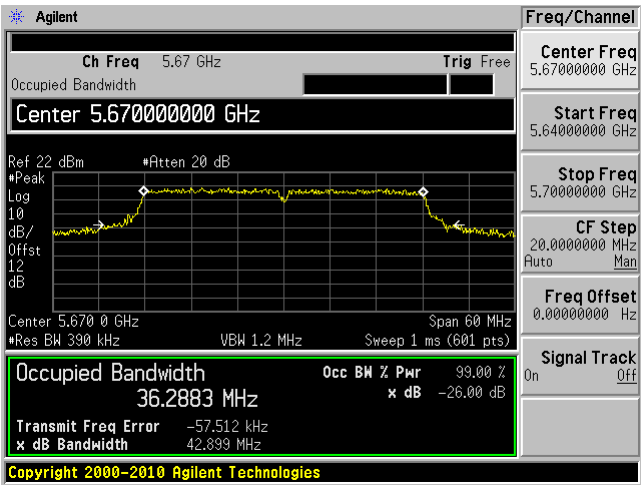
802.11n-HT40 mode, 5550 MHz, Chain J0



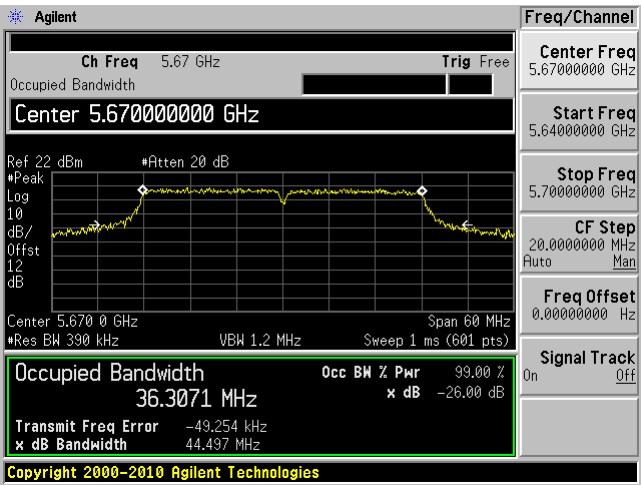
802.11n-HT40 mode, 5550 MHz, Chain J1



802.11n-HT40 mode, 5670 MHz, Chain J0

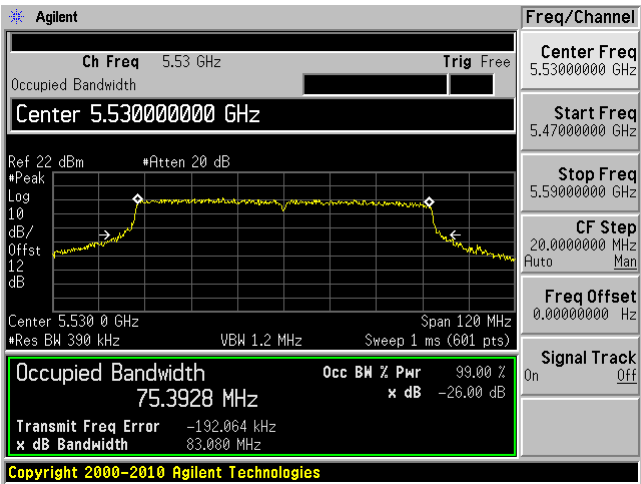


802.11n-HT40 mode, 5670 MHz, Chain J1

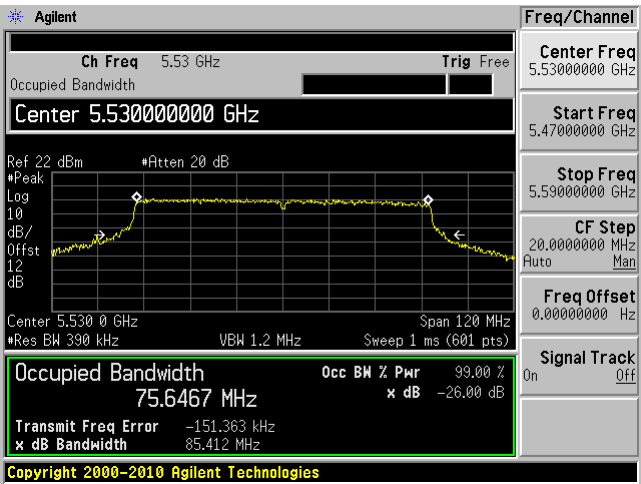


802.11ac 80 mode

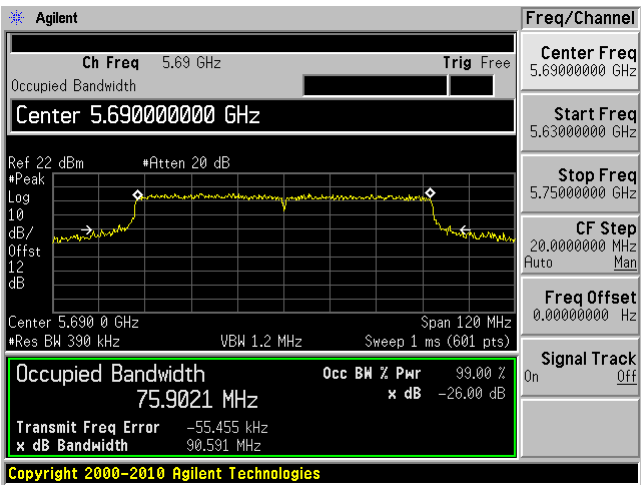
802.11ac-80 mode, 5530 MHz, Chain J0



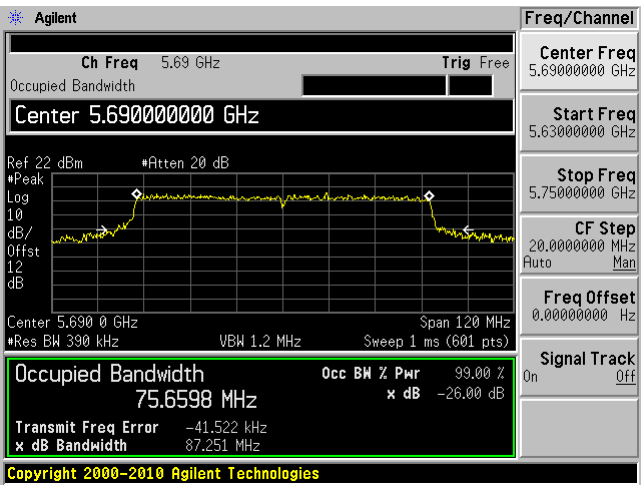
802.11ac-80 mode, 5530 MHz, Chain J1



802.11ac-80 mode, 5690 MHz, Chain J0



802.11ac-80 mode, 5690 MHz, Chain J1



9 FCC §407(a)(1) & IC RSS-210 §A9.2 - Peak Output Power Measurement

9.1 Applicable Standard

According to FCC §15.407(a)(1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

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 E: Maximum conducted output power

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-09-29	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:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Chen Ge from 2014-04-21 at RF site.

9.5 Test Results

For FCC:

5250-5350 MHz Band

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	18.47	18.15	21.32	24	-2.68	18
Middle	5280	18.29	18.23	21.27	24	-2.73	18
High	5320	18.54	18.19	21.38	24	-2.62	18

802.11n-HT20 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	18.87	18.55	21.72	24	-2.28	18.5
Middle	5280	18.81	18.58	21.71	24	-2.29	18.5
High	5320	18.93	18.62	21.79	24	-2.21	18.5

802.11n-HT40 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5270	20.78	20.28	23.55	24	-0.45	20.5
High	5310	17.28	17.18	20.24	24	-3.76	17

802.11ac-80 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
-	5290	14.89	15.08	18.00	24	-6.00	15

5470-5725 MHz Band

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	18.15	18.17	21.17	24	-2.83	17
Middle	5580	17.99	18.12	21.07	24	-2.93	18
High	5700	17.95	17.68	20.83	24	-3.17	18

802.11n-HT20 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	18.01	18.03	21.03	24	-2.97	21
Middle	5580	18.44	18.53	21.50	24	-2.50	21
High	5700	18.42	18.48	21.46	24	-2.54	21

802.11n-HT40 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5510	17.37	17.66	20.53	24	-3.47	17
Middle	5550	20.23	20.67	23.47	24	-0.53	20
High	5670	20.2	20.72	23.48	24	-0.52	20

802.11ac-80 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5530	16.19	16.53	19.37	24	-4.63	16.5
High	5690	20.26	20.46	23.37	24	-0.63	20

For IC:**5250-5350 MHz Band**

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	5.04	4.97	8.02	24	-15.98	8
Middle	5280	18.29	18.23	21.27	24	-2.73	18
High	5320	18.54	18.19	21.38	24	-2.62	18

802.11n-HT20 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	-0.11	-0.05	2.93	24	-21.07	3
Middle	5280	18.81	18.58	21.71	24	-2.29	18.5
High	5320	18.93	18.62	21.79	24	-2.21	18.5

802.11n-HT40 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5270	6.77	6.86	9.83	24	-14.17	10
High	5310	17.28	17.18	20.24	24	-3.76	17

802.11ac-80 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
-	5290	14.89	15.08	18.00	24	-6.00	15

5470-5725 MHz Band

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	18.15	18.17	21.17	24	-2.83	17
Middle	5580	17.99	18.12	21.07	24	-2.93	18
High	5700	17.95	17.68	20.83	24	-3.17	18

802.11n-HT20 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	18.01	18.03	21.03	24	-2.97	21
Middle	5580	18.44	18.53	21.50	24	-2.50	21
High	5700	18.42	18.48	21.46	24	-2.54	21

802.11n-HT40 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5510	17.37	17.66	20.53	24	-3.47	17
Middle	5550	20.23	20.67	23.47	24	-0.53	20
High	5670	20.2	20.72	23.48	24	-0.52	20

802.11ac-80 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5530	16.19	16.53	19.37	24	-4.63	16.5
High	5690	20.26	20.46	23.37	24	-0.63	20

Note: The maximum antenna gain at 5 GHz band is 3.5 dBi. The TPC is not required due to the maximum e.i.r.p is lower than 500 mW (27 dBm).

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

10.1 Applicable Standard

According to FCC §15.407(b)

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

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 EIRP of –27 dBm/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 D01 General UNII Test Procedures v01r03: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices section H: Unwanted emissions measurement

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-09-29	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 Chen Ge from 2014-04-21 at RF site.

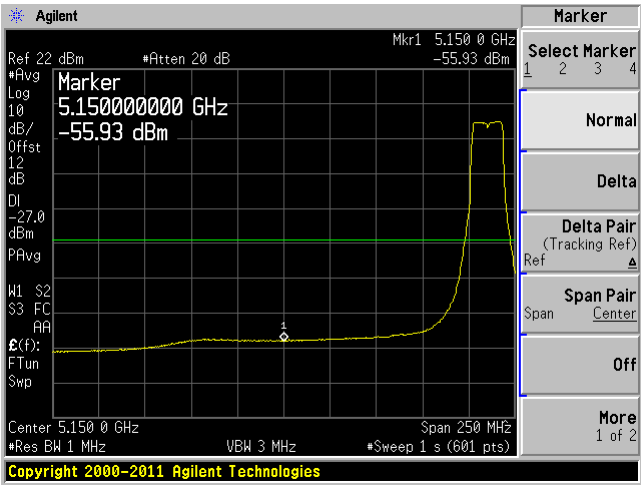
10.5 Test Results

Please refer to following pages for plots of band edge.

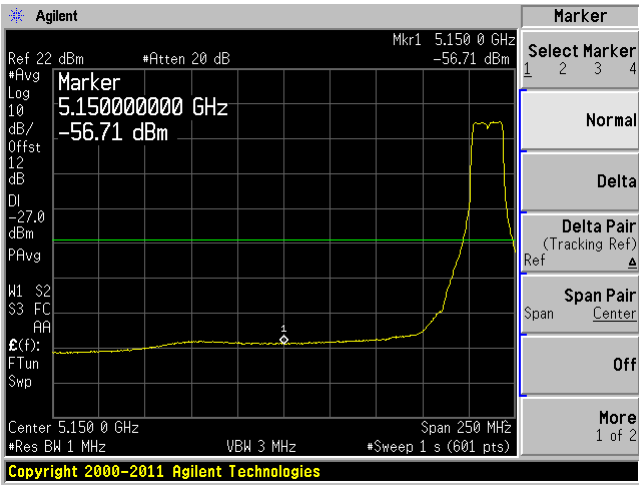
5250-5350 MHz

For FCC :

802.11a mode, 5260 MHz, Chain J0

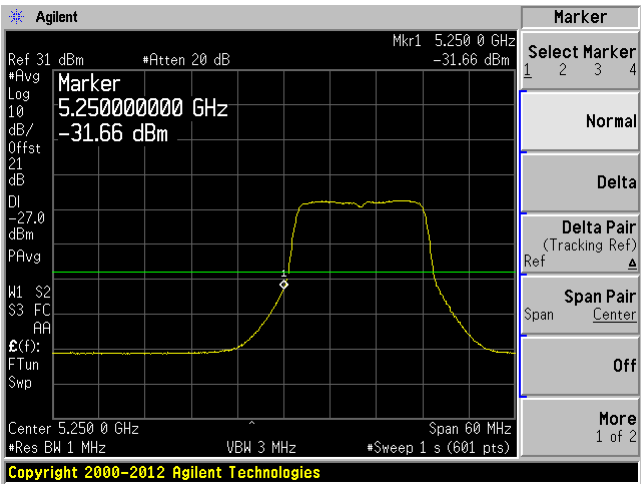


802.11a mode, 5260 MHz, Chain J1

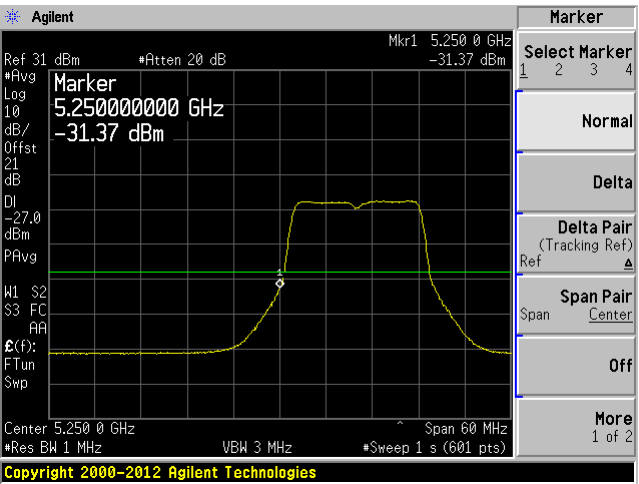


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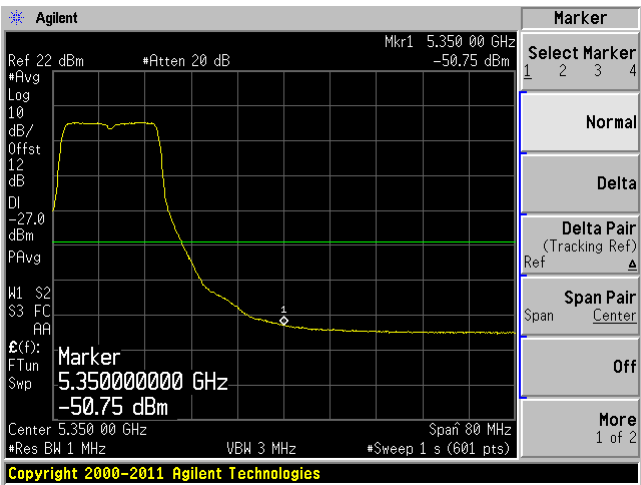
802.11a mode, 5260 MHz, Chain J0



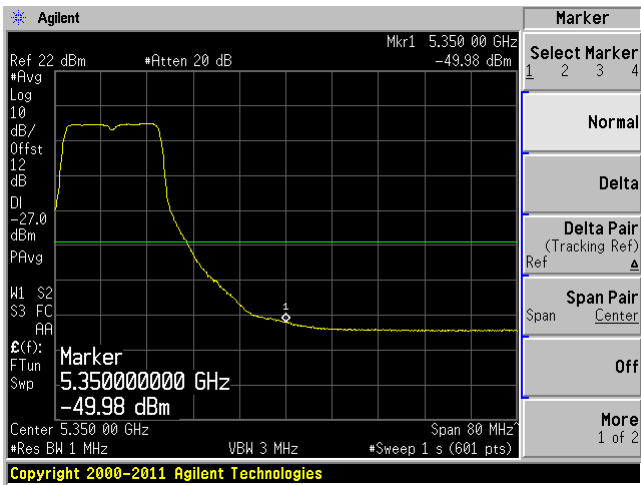
802.11a mode, 5260 MHz, Chain J1



802.11a mode, 5320 MHz, Chain J0

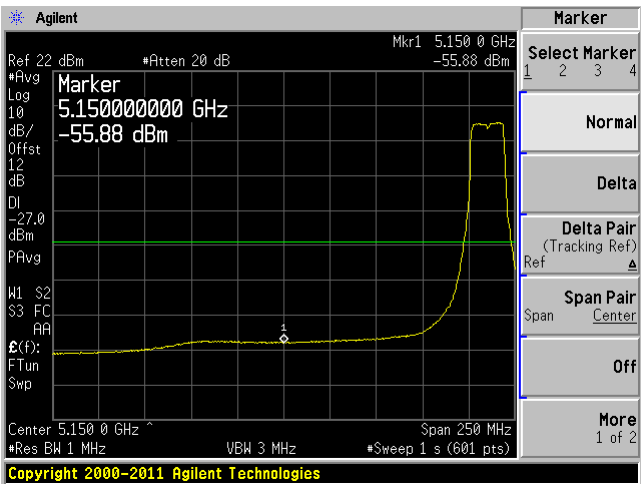


802.11a mode, 5320 MHz, Chain J1

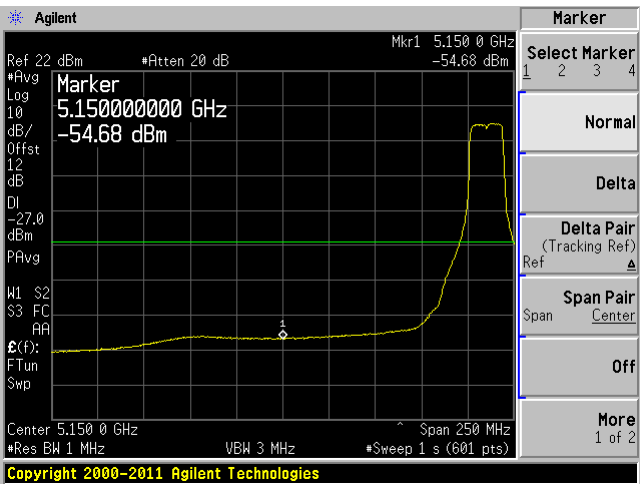


For FCC :

802.11n-HT20 mode, 5260 MHz, Chain J0

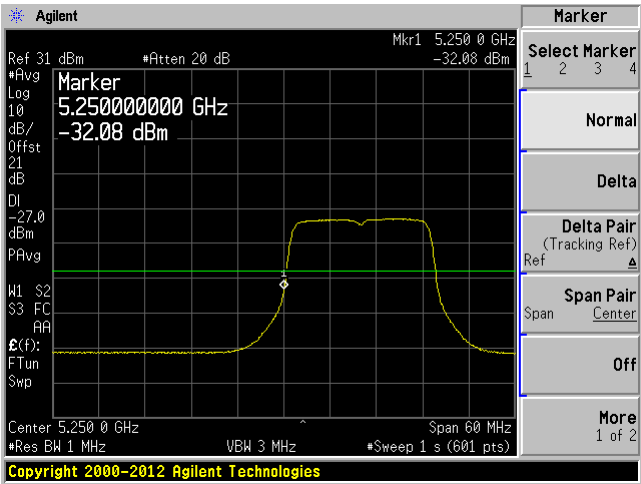


802.11n-HT20 mode, 5260 MHz, Chain J1

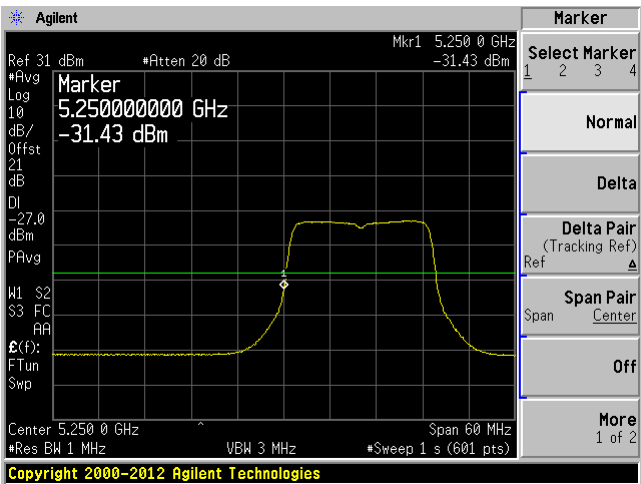


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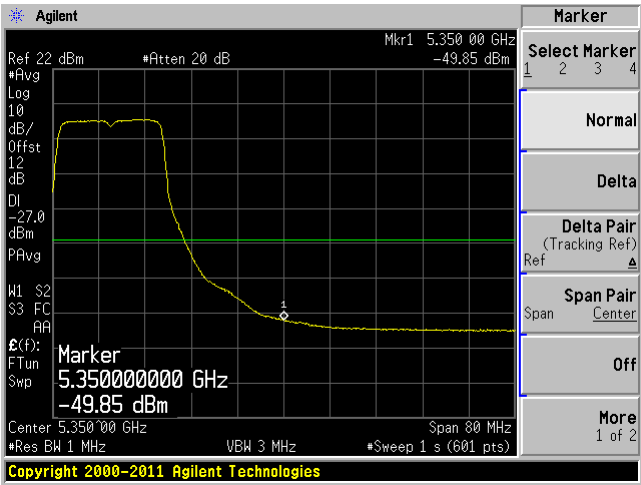
802.11n-HT20 mode, 5260 MHz, Chain J0



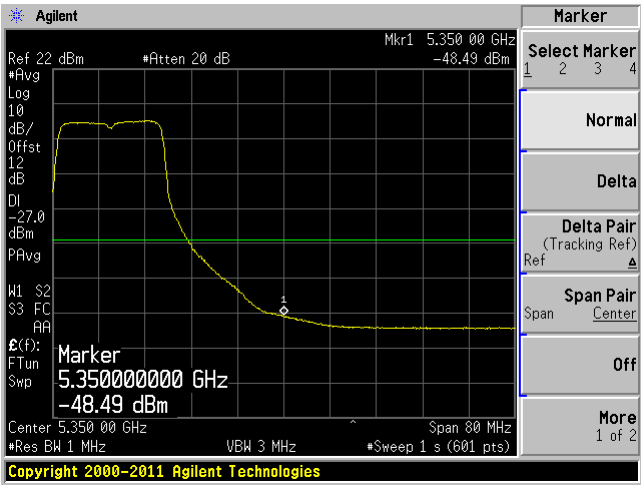
802.11n-HT20 mode, 5260 MHz, Chain J1



802.11n-HT20 mode, 5320 MHz, Chain J0

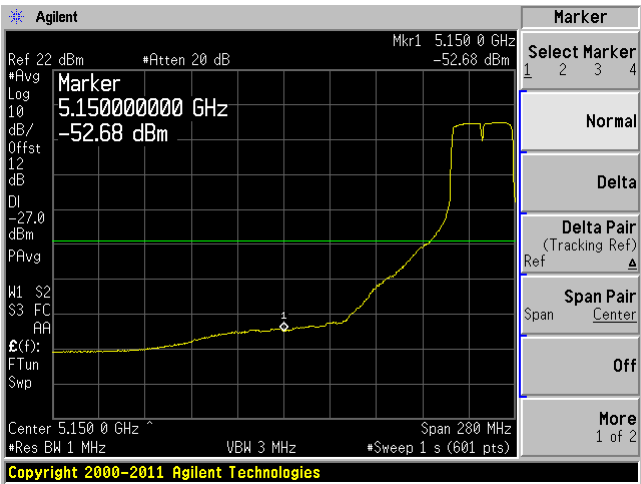


802.11n-HT20 mode, 5320 MHz, Chain J1

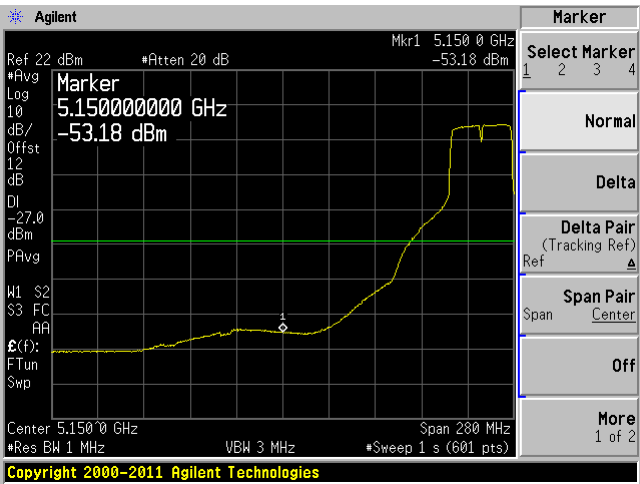


For FCC :

802.11n-HT40 mode, 5270 MHz, Chain J0

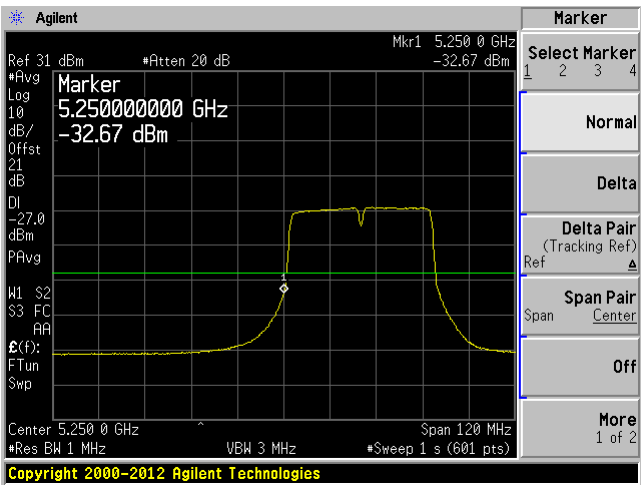


802.11n-HT40 mode, 5270 MHz, Chain J1

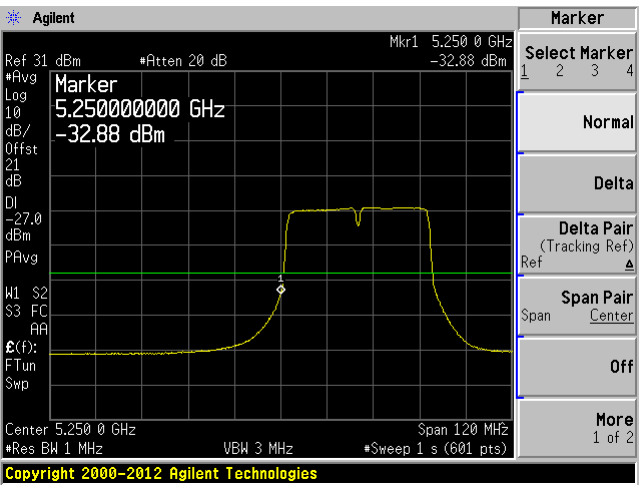


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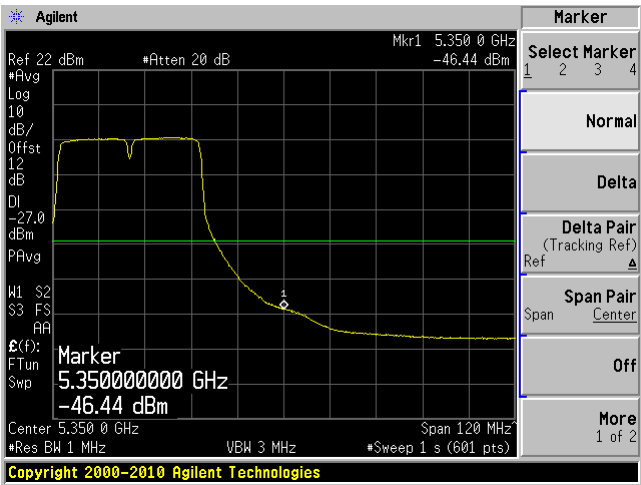
802.11n-HT40 mode, 5270 MHz, Chain J0



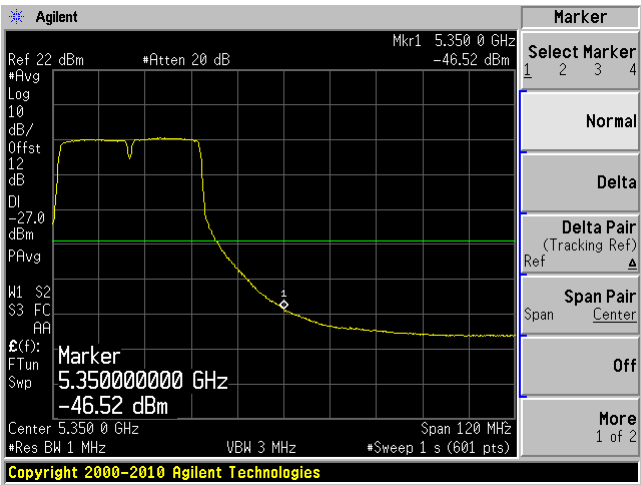
802.11n-HT40 mode, 5270 MHz, Chain J1



802.11n-HT40 mode, 5310 MHz, Chain J0

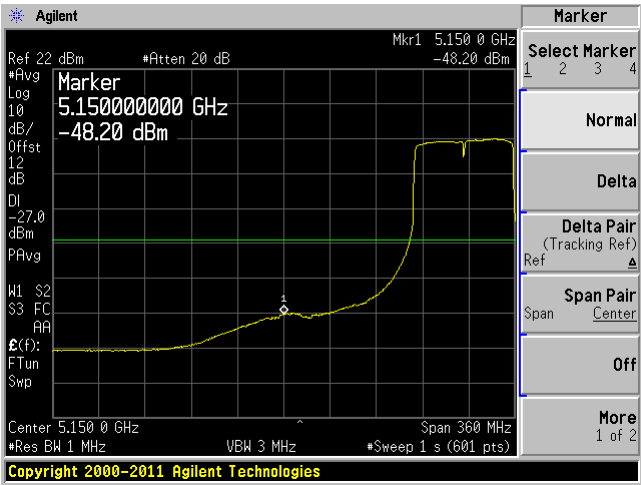


802.11n-HT40 mode, 5310 MHz, Chain J1

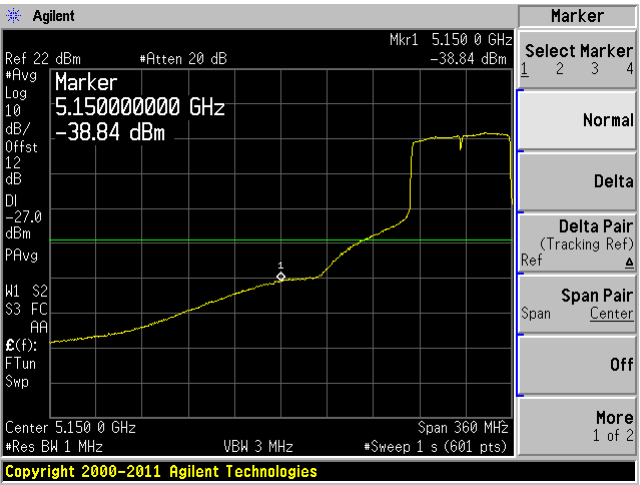


For FCC :

802.11ac-80 mode, 5290 MHz, Chain J0

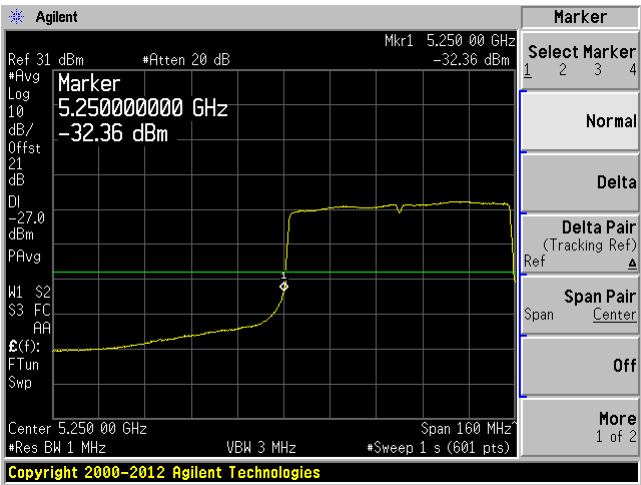


802.11ac-80 mode, 5290 MHz, Chain J1

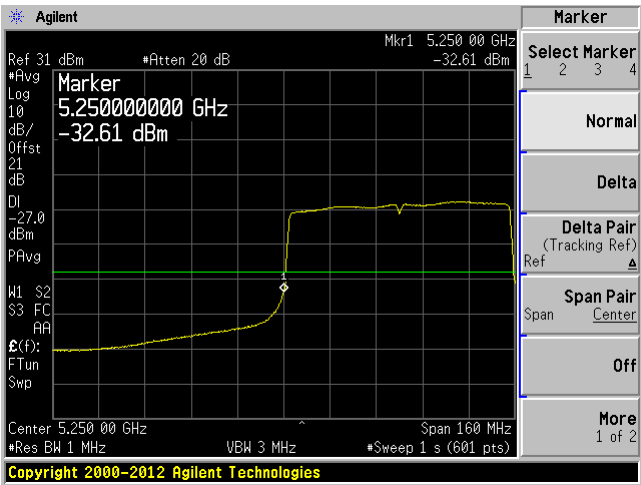


For IC :

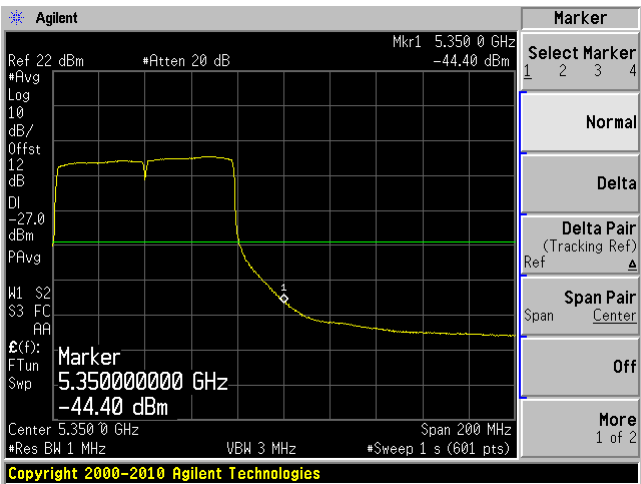
802.11ac-80 mode, 5290 MHz, Chain J0



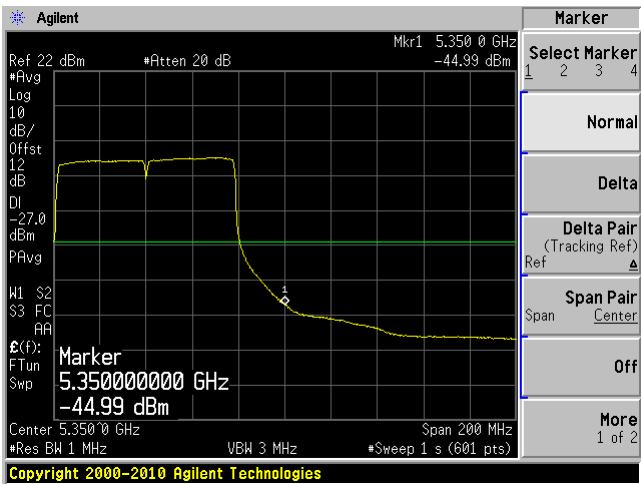
802.11ac-80 mode, 5290 MHz, Chain J1



802.11ac-80 mode, 5290 MHz, Chain J0

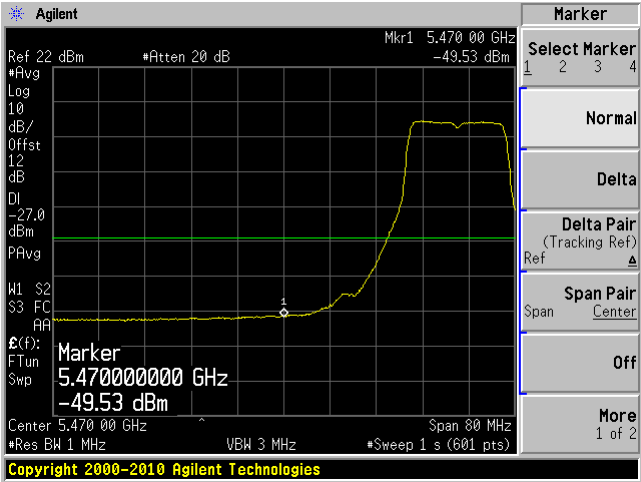


802.11ac-80 mode, 5290 MHz, Chain J1

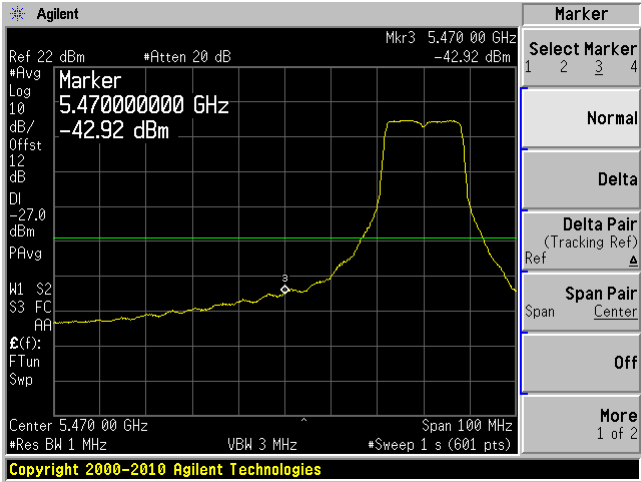


5470-5725 MHz

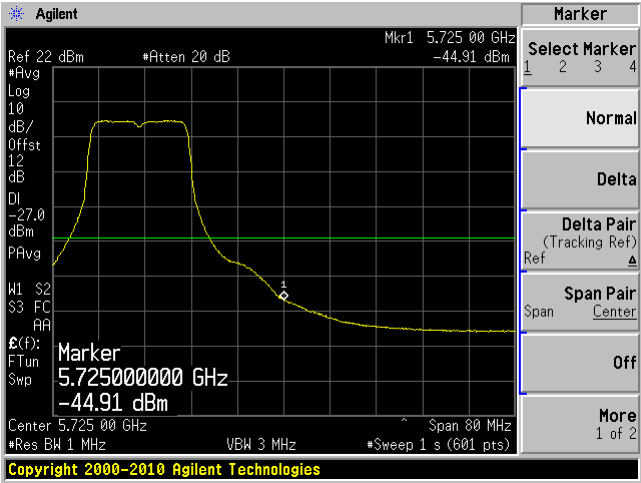
802.11a mode, 5550 MHz, Chain J0



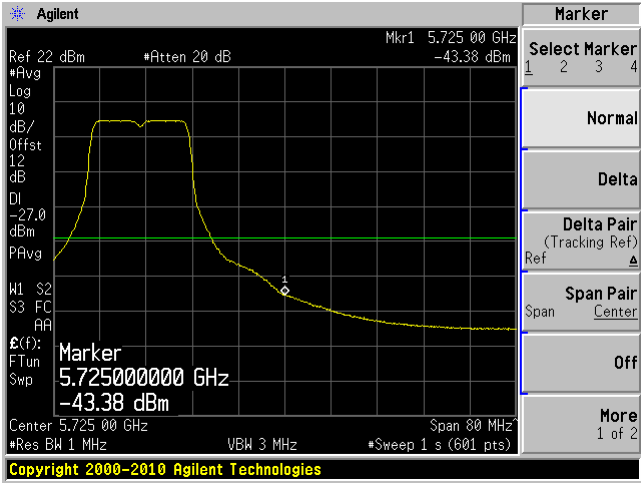
802.11a mode, 5550 MHz, Chain J1



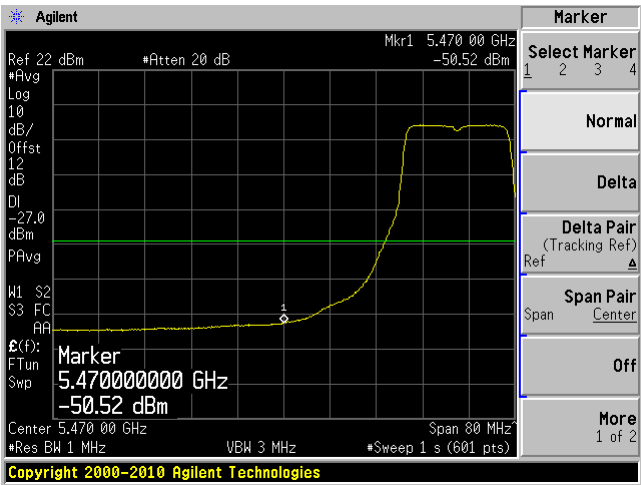
802.11a mode, 5700 MHz, Chain J0



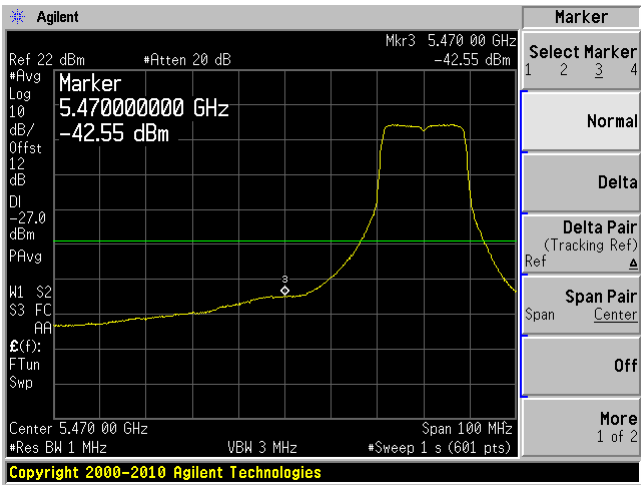
802.11a mode, 5700 MHz, Chain J1



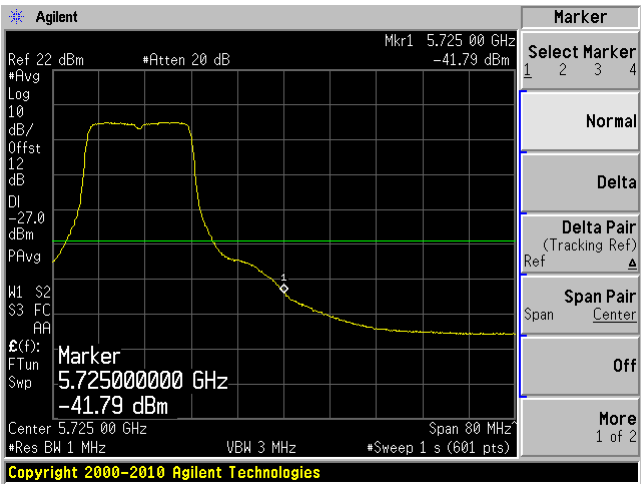
802.11n-HT20 mode, 5500 MHz, Chain J0



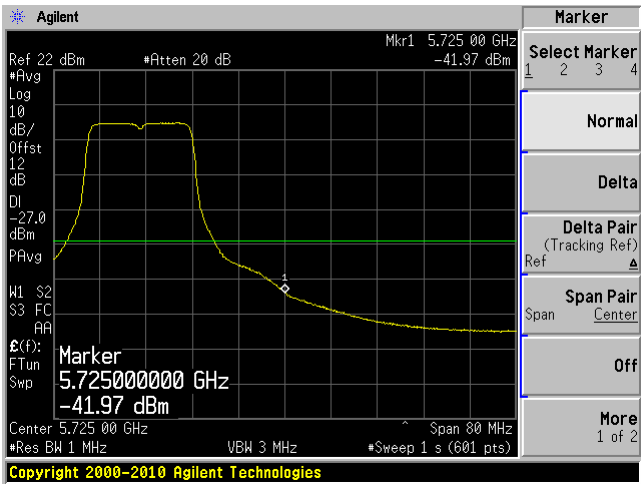
802.11n-HT20 mode, 5500 MHz, Chain J1



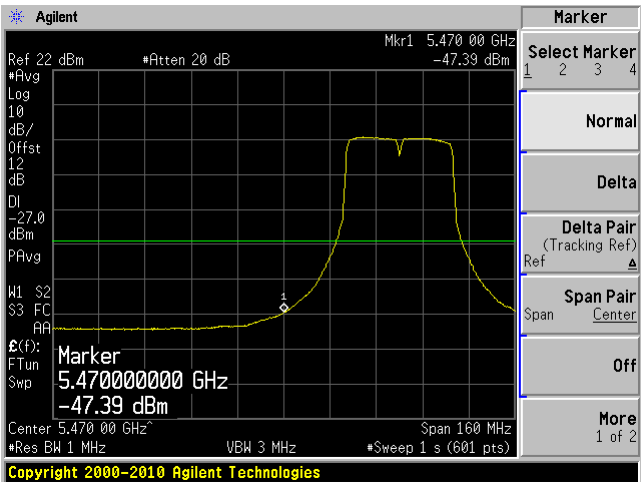
802.11n-HT20 mode, 5700 MHz, Chain J0



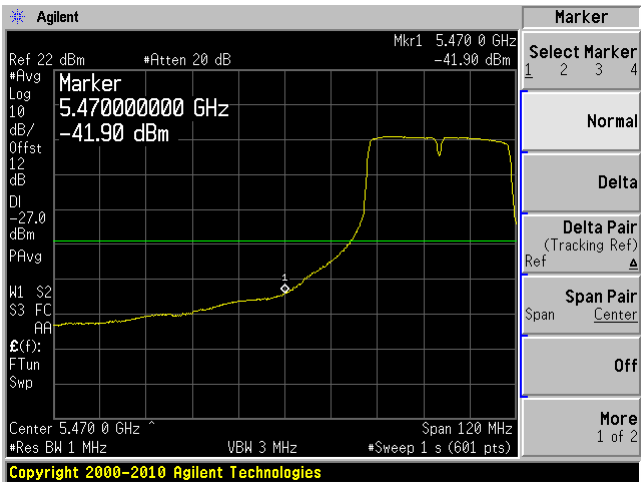
802.11n-HT20 mode, 5700 MHz, Chain J1



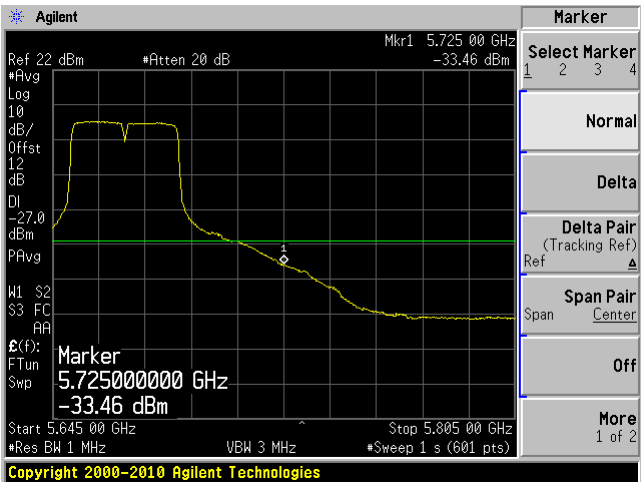
802.11n-HT40 mode, 5510 MHz, Chain J0



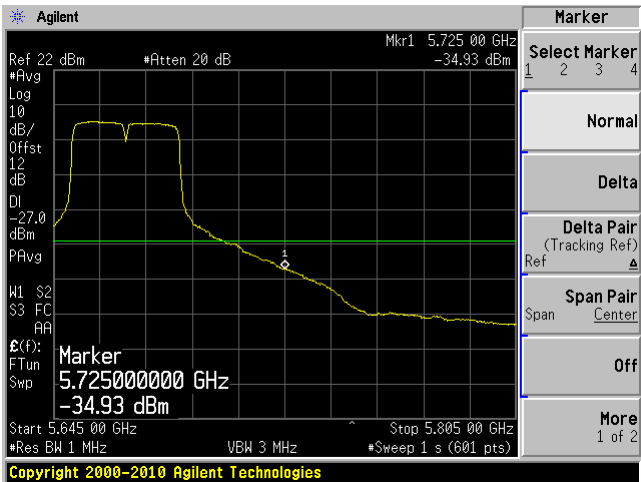
802.11n-HT40 mode, 5510 MHz, Chain J1



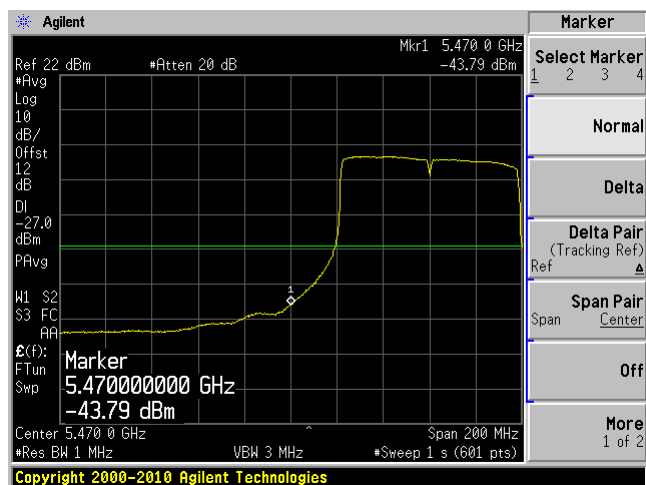
802.11n-HT40 mode, 5670 MHz, Chain J0



802.11n-HT40 mode, 5670 MHz, Chain J1



802.11ac-80 mode, 5530 MHz, Chain J1



11 FCC §15.407(a)(1) & IC RSS-210 §A9.2 - Power Spectral Density

11.1 Applicable Standard

According to FCC §15.407(a)(1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

5150-5250 MHz the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

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 $11 \text{ dBm} + 10 \log B$, 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	E4446A	US44300386	2013-09-29	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:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Chen Ge from 2014-04-21 at RF site

11.5 Test Results

5250-5350 MHz

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	7.096	7.442	10.28	11	-0.72	18
Middle	5280	7.189	7.224	10.22	11	-0.78	18
High	5320	7.171	7.011	10.10	11	-0.90	18

802.11n-HT20 mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	7.173	7.212	10.20	11	-0.80	18.5
Middle	5280	7.386	7.276	10.34	11	-0.66	18.5
High	5320	7.389	7.311	10.36	11	-0.64	18.5

802.11n-HT40 mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5270	5.826	5.675	8.76	11	-2.24	20.5
High	5310	2.284	2.632	5.47	11	-5.53	17

802.11ac-80 mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
-	5290	-2.991	-2.349	0.35	11	-10.65	15

5470-5725 MHz**802.11a mode**

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5550	6.679	7.063	9.89	11	-1.11	17
Middle	5580	6.747	7.086	9.93	11	-1.07	18
High	5700	6.498	6.697	9.61	11	-1.39	18

802.11n-HT20 mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	6.585	6.559	9.58	11	-1.42	17
Middle	5580	6.965	7.222	10.11	11	-0.89	18
High	5700	6.748	7.008	9.89	11	-1.11	18

802.11n-HT40 mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5510	2.614	3.155	5.90	11	-5.10	17
Middle	5550	5.818	6.518	9.19	11	-1.81	20
High	5670	6.156	6.517	9.35	11	-1.65	20

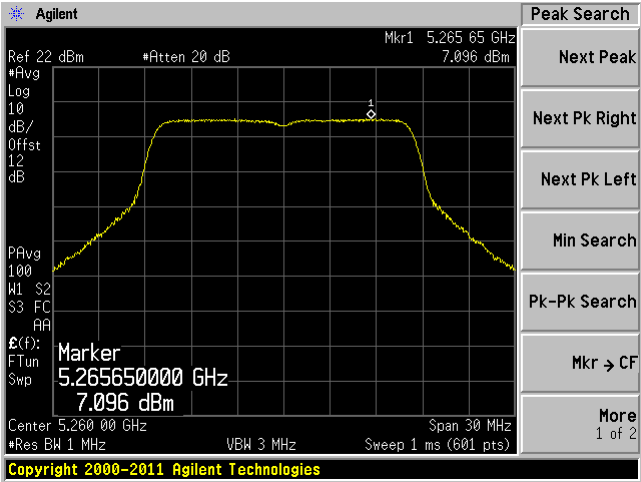
802.11ac-80 mode

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5530	-1.327	-0.783	1.96	11	-9.04	16.5
High	5690	2.446	2.738	5.60	11	-5.40	20

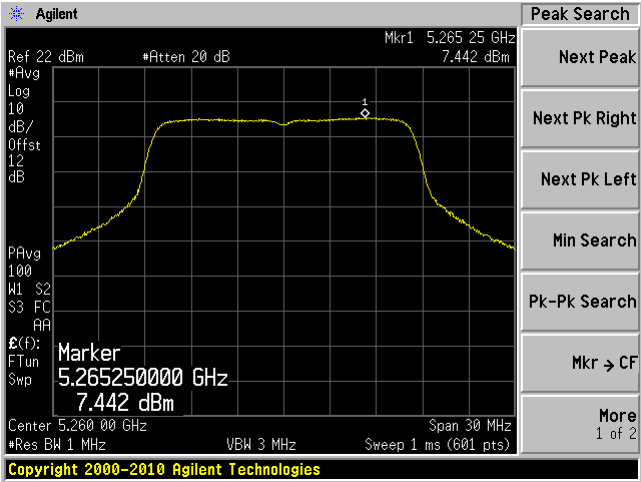
Please refer to the following plots.

5250-5350 MHz

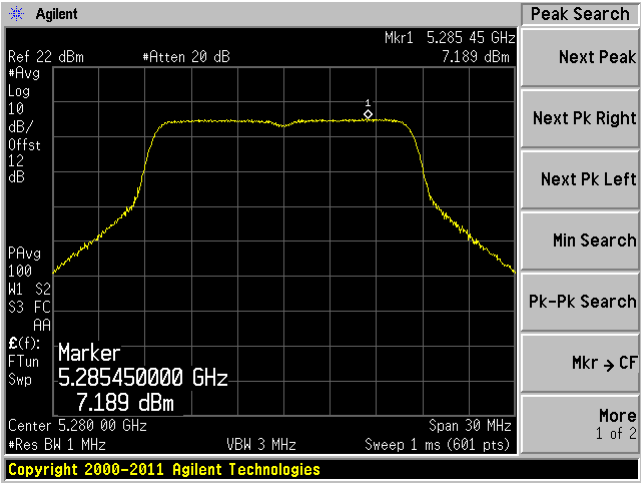
802.11a mode, 5260 MHz, Chain J0



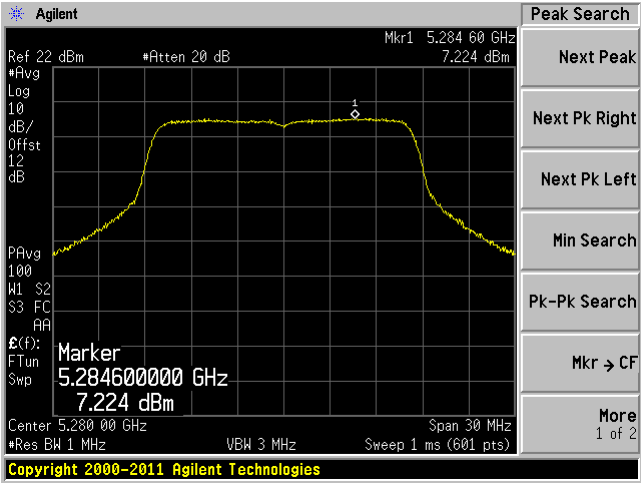
802.11a mode, 5260 MHz, Chain J1



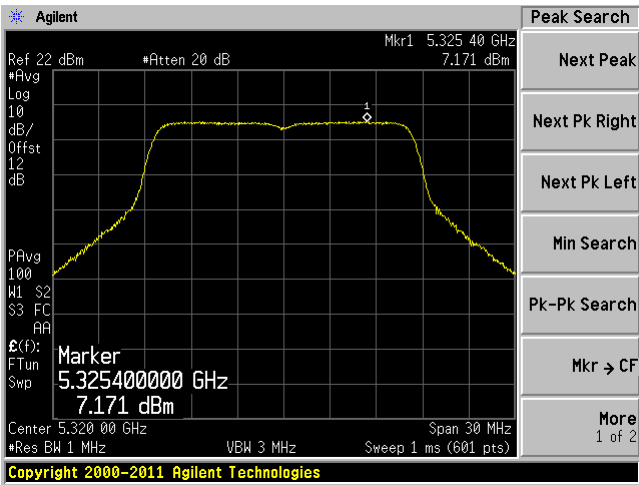
802.11a mode, 5280 MHz, Chain J0



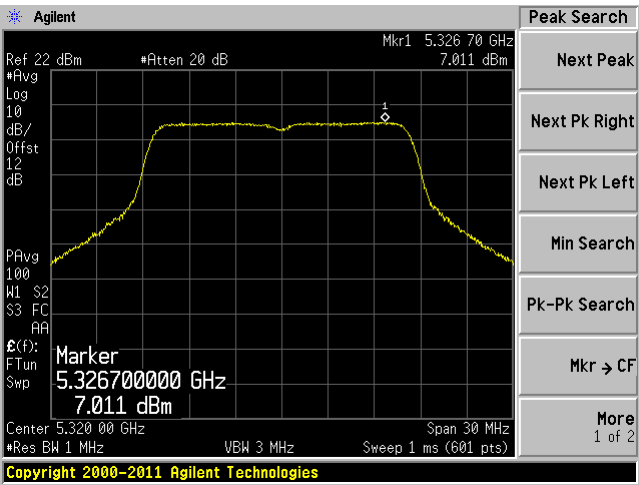
802.11a mode, 5280 MHz, Chain J1



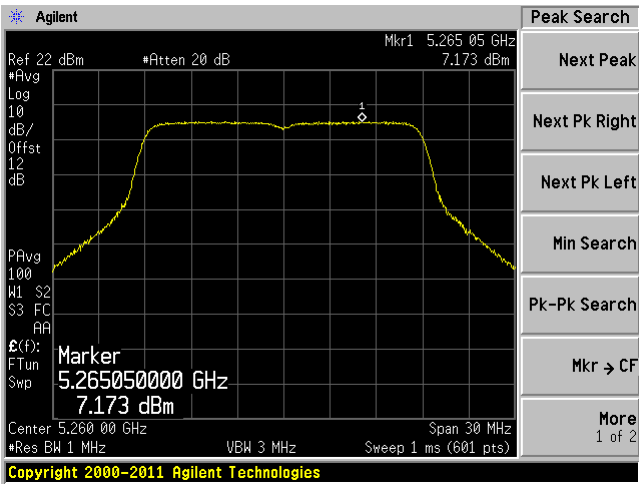
802.11a mode, 5320 MHz, Chain J0



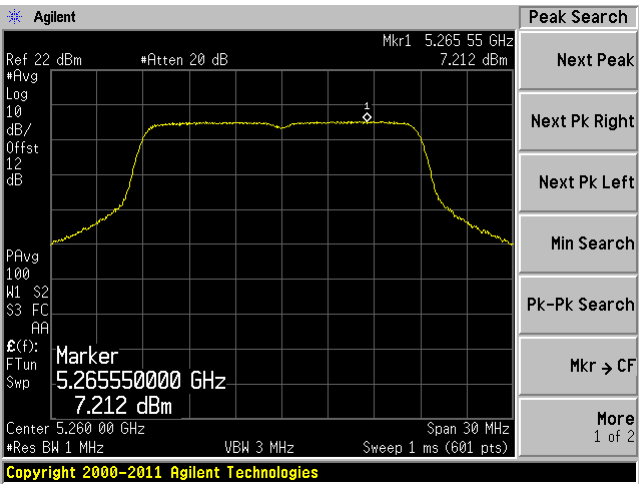
802.11a mode, 5320 MHz, Chain J1



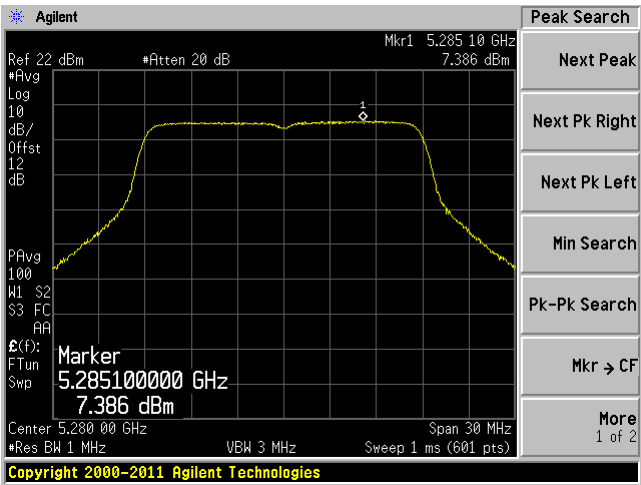
802.11n-HT20 mode, 5260 MHz, Chain J0



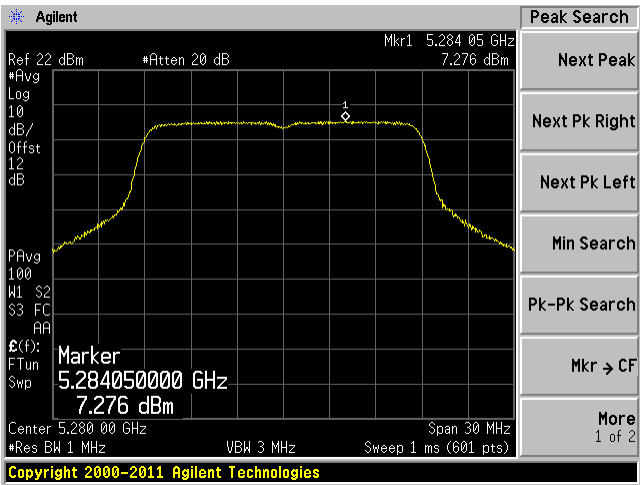
802.11n-HT20 mode, 5260 MHz, Chain J1



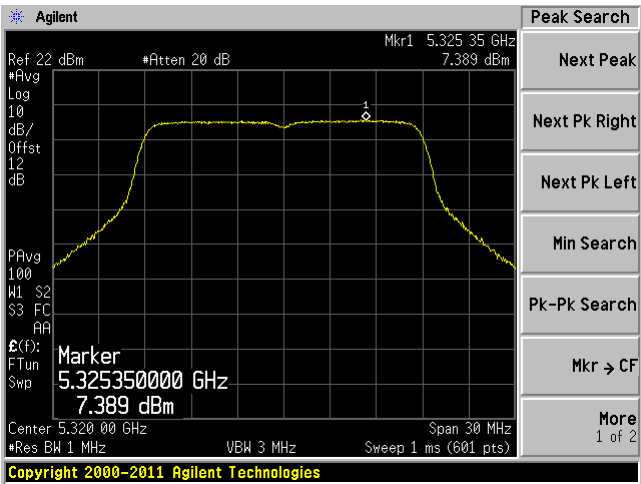
802.11n-HT20 mode, 5280 MHz, Chain J0



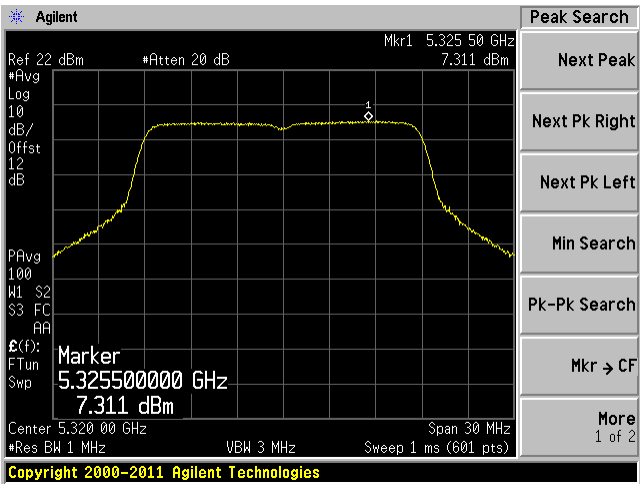
802.11n-HT20 mode, 5280 MHz, Chain J1



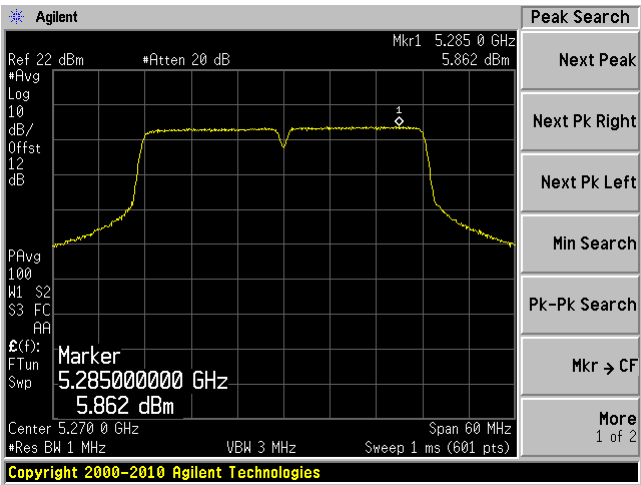
802.11n-HT20 mode, 5320 MHz, Chain J0



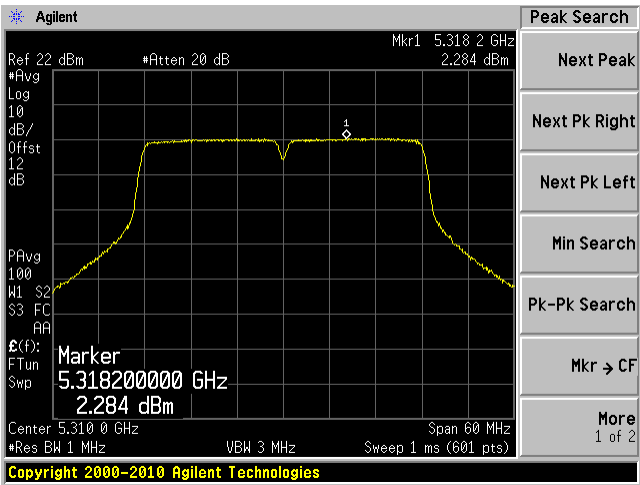
802.11n-HT20 mode, 5320 MHz, Chain J1



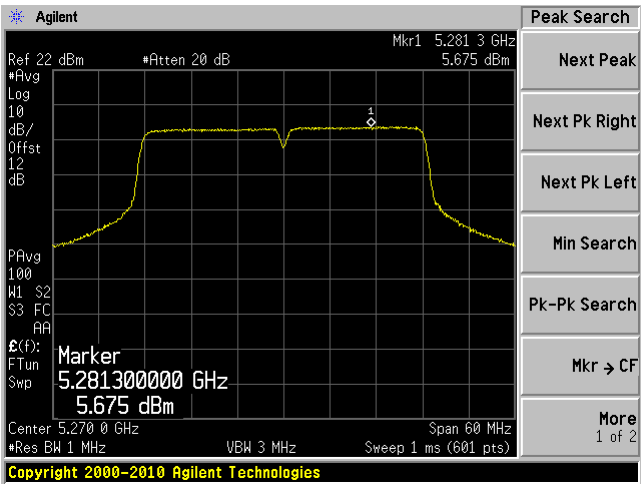
802.11n-HT40 mode, 5270 MHz, Chain J0



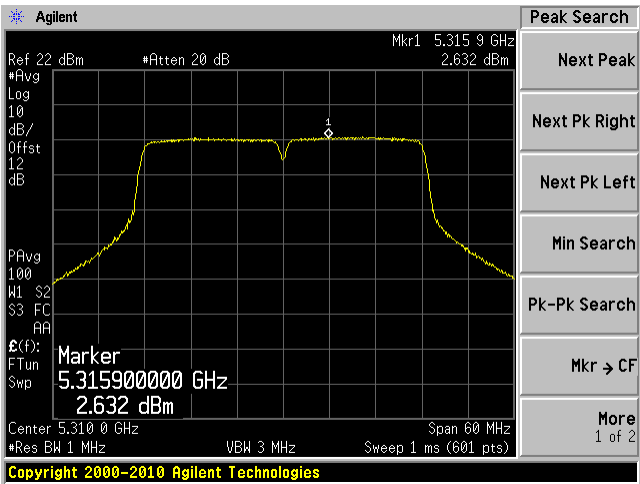
802.11n-HT40 mode, 5270 MHz, Chain J1



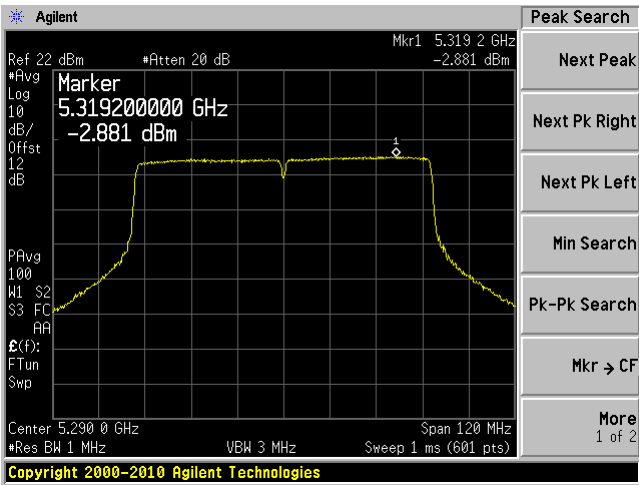
802.11n-HT40 mode, 5310 MHz, Chain J0



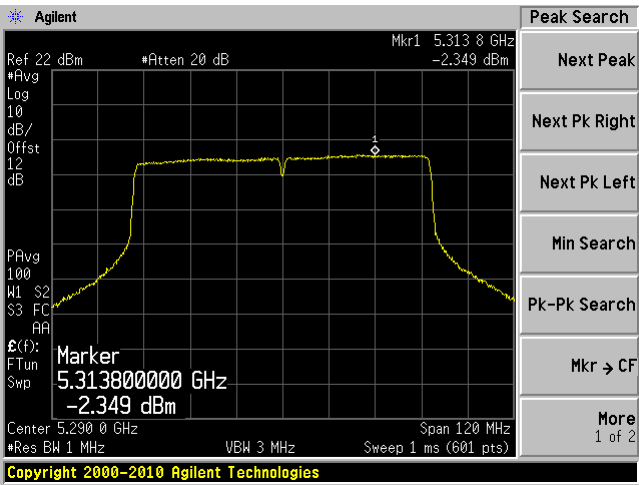
802.11n-HT40 mode, 5310 MHz, Chain J1



802.11ac-80 mode, 5290 MHz, Chain J0

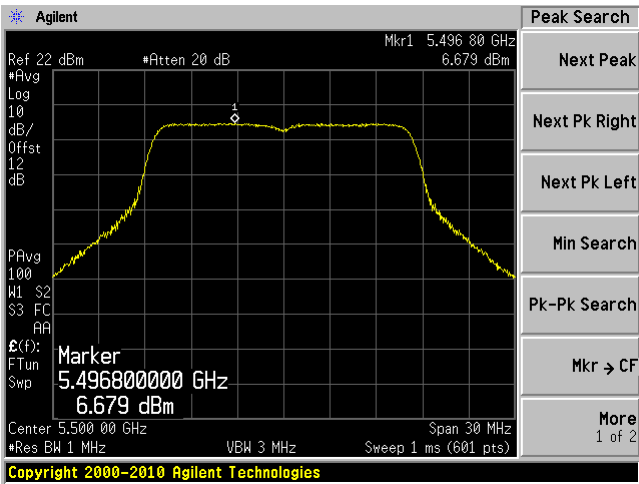


802.11ac-80 mode, 5290 MHz, Chain J1

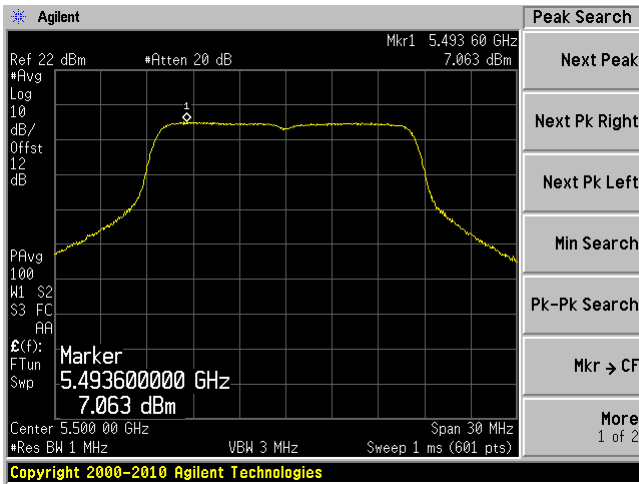


5470-5725 MHz

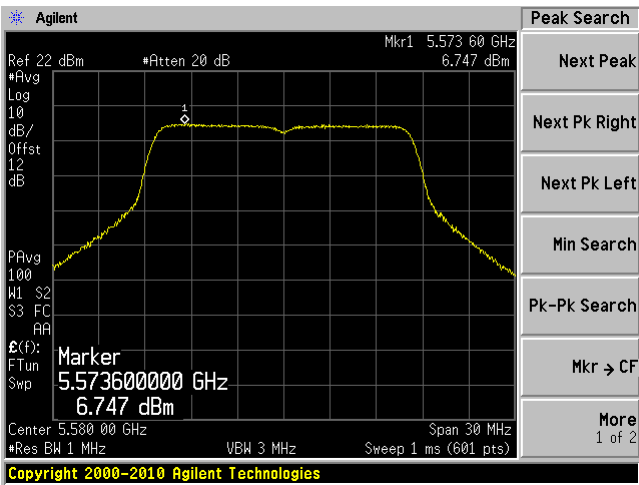
802.11a mode, 5500 MHz, Chain J0



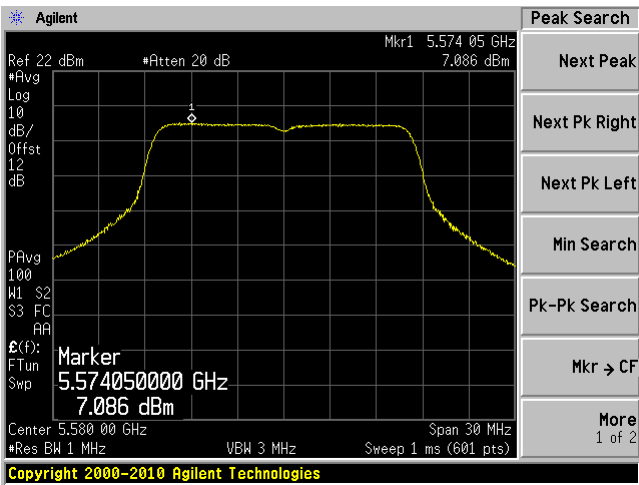
802.11a mode, 5500 MHz, Chain J1



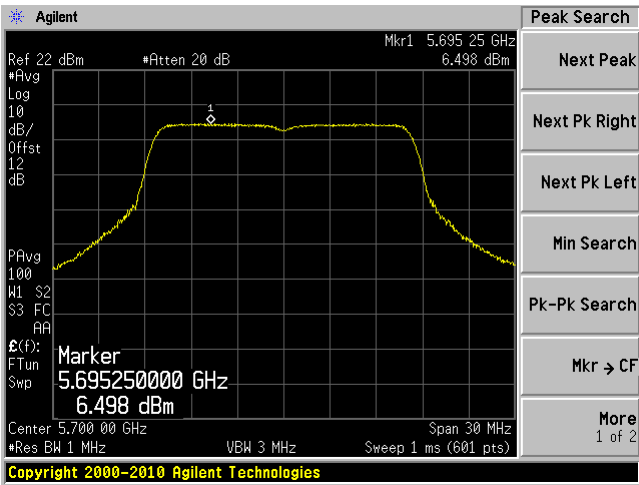
802.11a mode, 5580 MHz, Chain J0



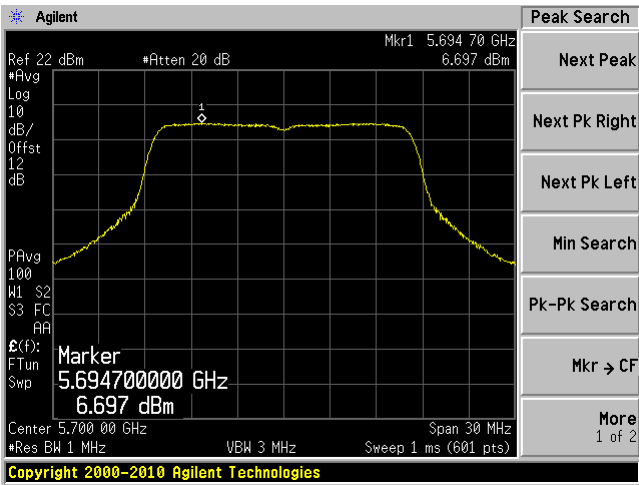
802.11a mode, 5580 MHz, Chain J1



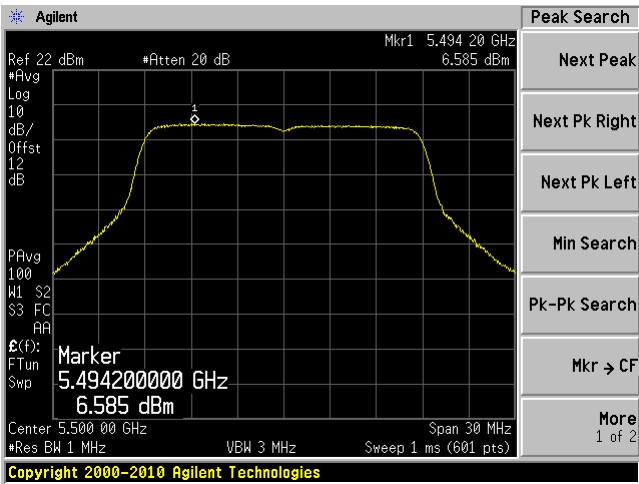
802.11a mode, 5700 MHz, Chain J0



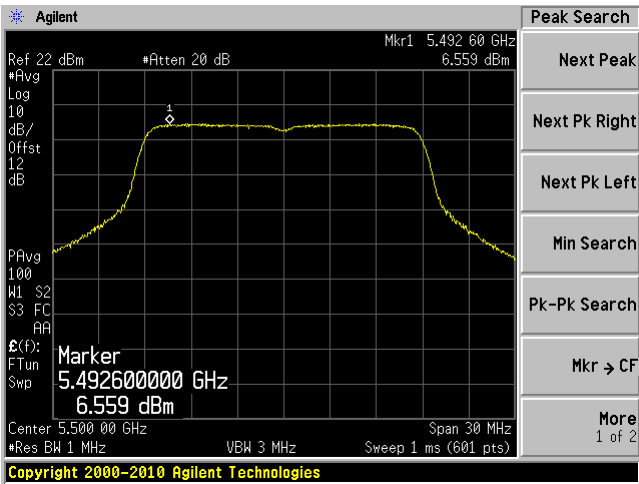
802.11a mode, 5700 MHz, Chain J1



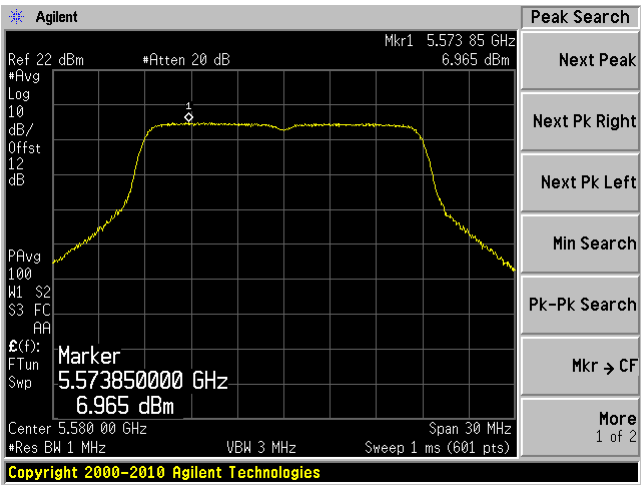
802.11n-HT20 mode, 5500 MHz, Chain J0



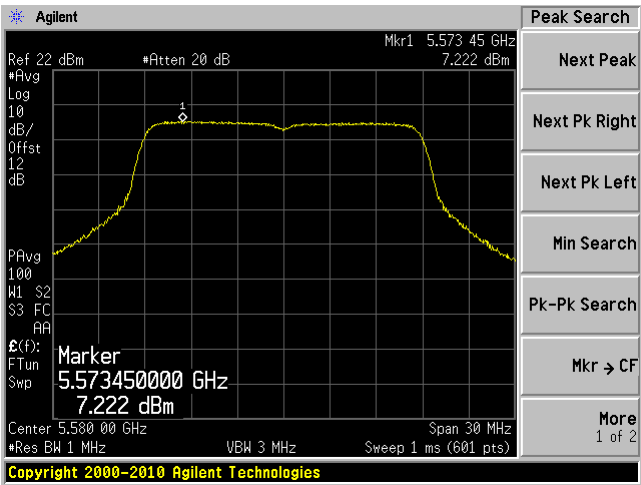
802.11n-HT20 mode, 5500 MHz, Chain J1



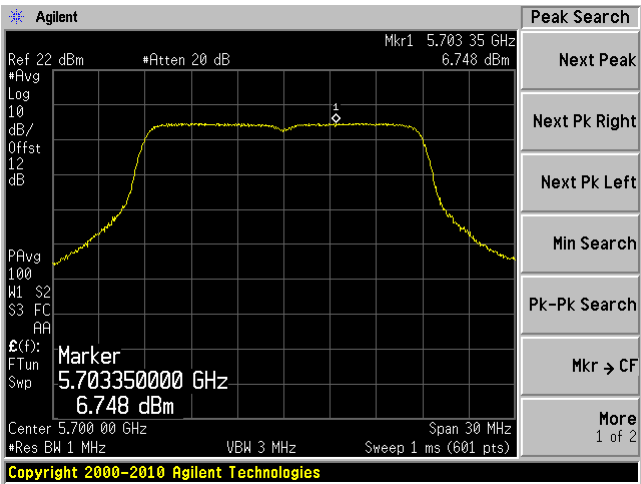
802.11n-HT20 mode, 5580 MHz, Chain J0



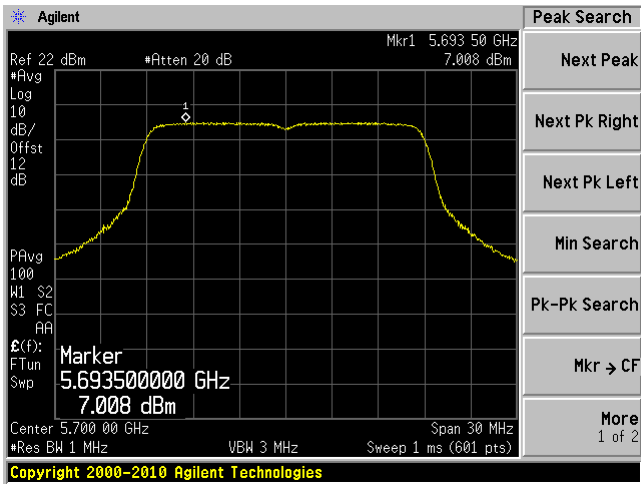
802.11n-HT20 mode, 5580 MHz, Chain J1



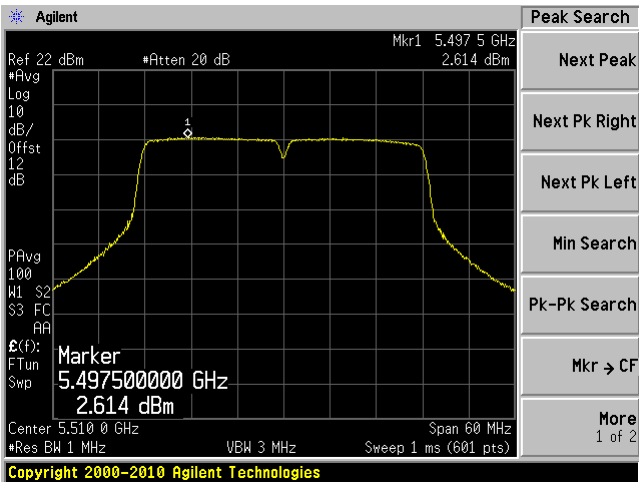
802.11n-HT20 mode, 5700 MHz, Chain J0



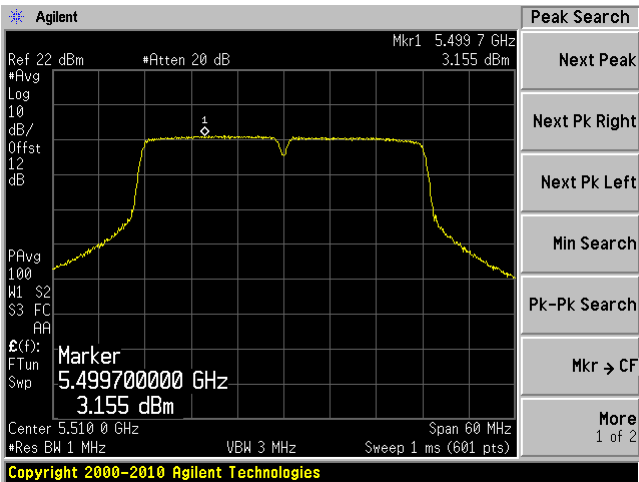
802.11n-HT20 mode, 5700 MHz, Chain J1



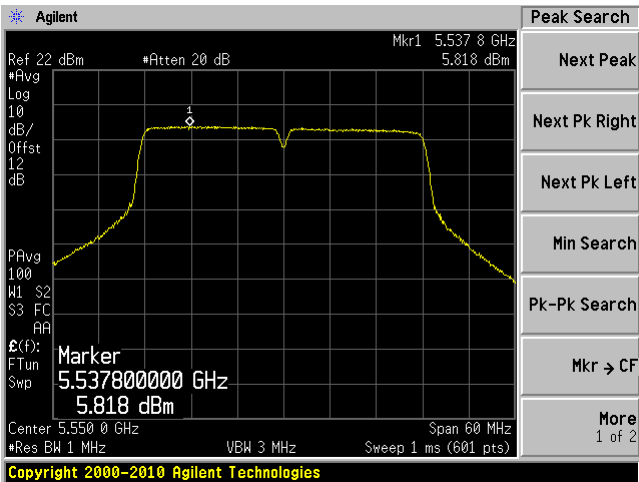
802.11n-HT40 mode, 5510 MHz, Chain J0



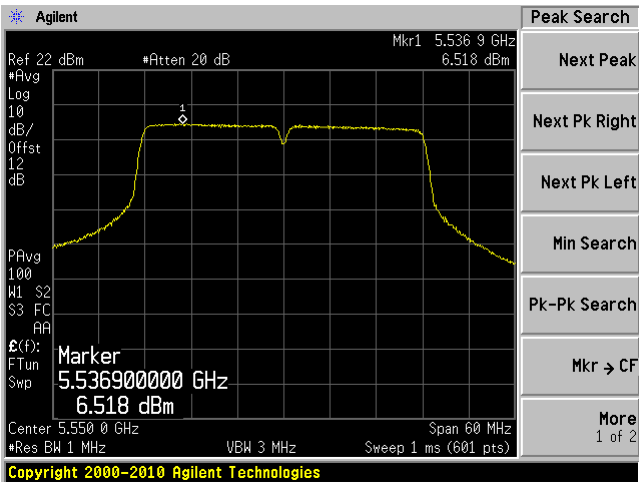
802.11n-HT40 mode, 5510 MHz, Chain J1



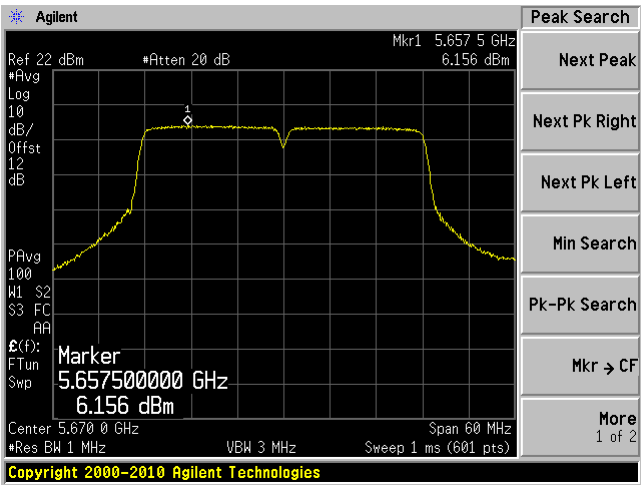
802.11n-HT40 mode, 5550 MHz, Chain J0



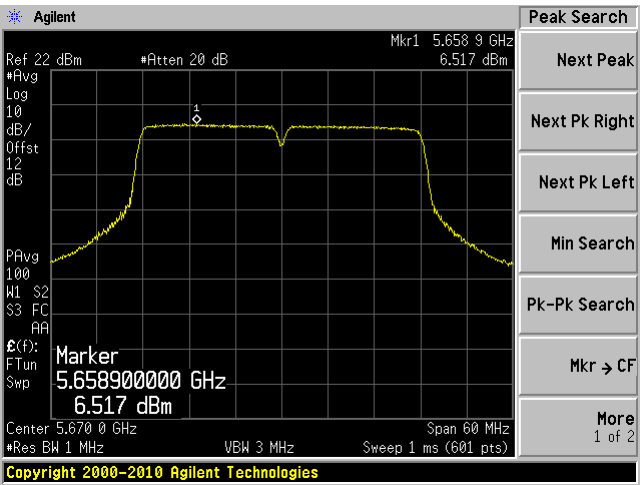
802.11n-HT40 mode, 5550 MHz, Chain J1



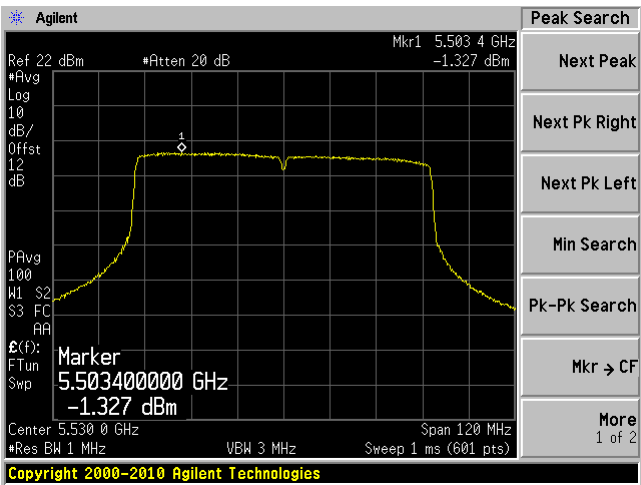
802.11n-HT40 mode, 5670 MHz, Chain J0



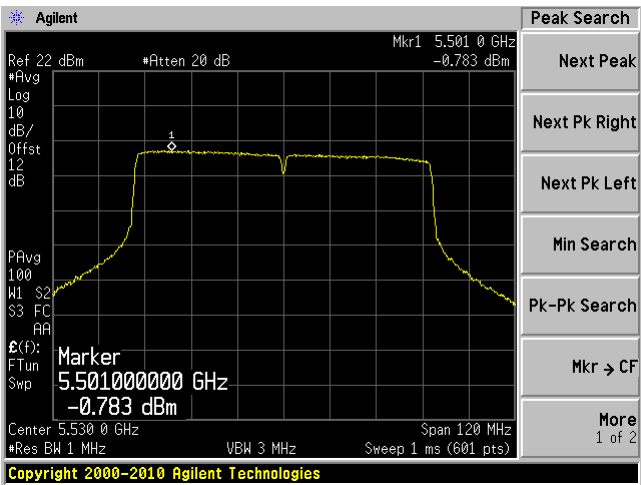
802.11n-HT40 mode, 5670 MHz, Chain J1



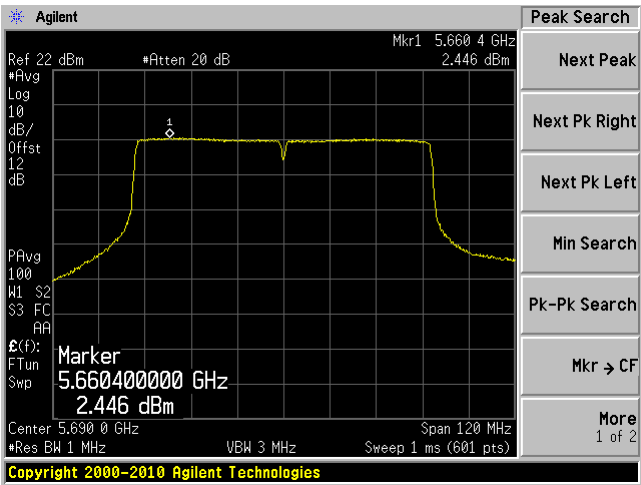
802.11ac-80 mode, 5530 MHz, Chain J0



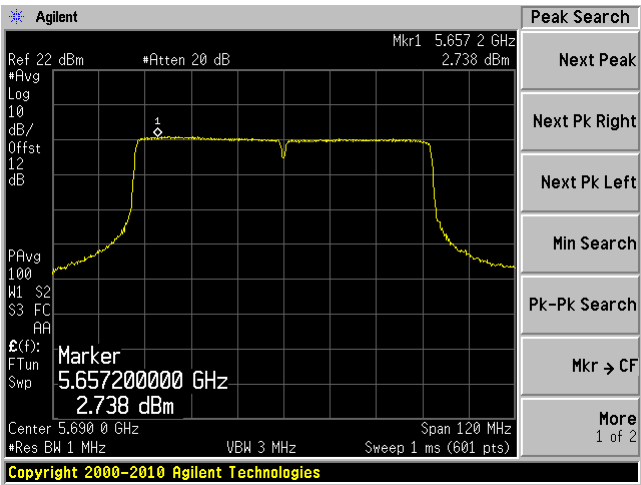
802.11ac-80 mode, 5530 MHz, Chain J1



802.11ac-80 mode, 5690 MHz, Chain J0



802.11ac-80 mode, 5690 MHz, Chain J1



12 FCC §15.407(a)(6) – Peak Excursion Ratio

12.1 Applicable Standard

According to FCC §15.407(a) (6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

12.2 Test 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 G: Peak excursion measurement

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year

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

12.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Chen Ge from 2014-04-21 at RF site.

12.5 Test Results

5250-5350 MHz Band

Channel	Frequency (MHz)	TX Chain J0 PER (dB)	TX Chain J1 PER (dB)	Limit (dB)
802.11a mode				
Low	5260	8.966	9.050	13
Middle	5280	9.768	9.532	
High	5320	10.236	9.717	
802.11n-HT20 mode				
Low	5260	7.985	7.822	13
Middle	5280	8.056	7.717	
High	5320	8.571	8.977	
802.11n-HT40 mode				
Low	5270	7.478	7.897	13
High	5310	8.300	8.317	
802.11ac-80 mode				
-	5290	8.070	8.186	13

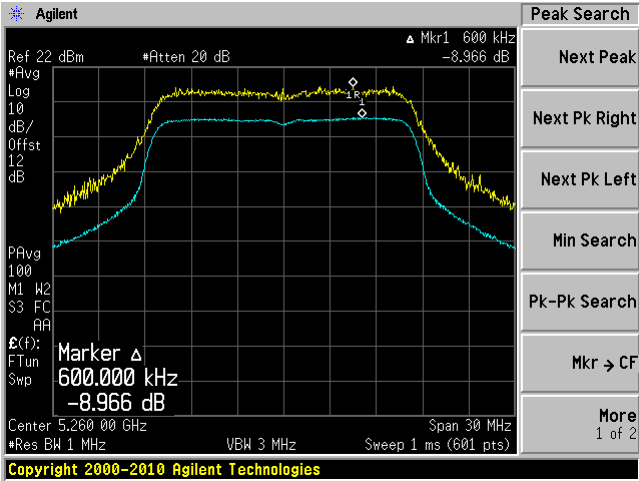
5470-5725 MHz Band

Channel	Frequency (MHz)	TX Chain J10 PER (dB)	TX Chain J8 PER (dB)	Limit (dB)
802.11a mode				
Low	5500	8.106	8.752	13
Middle	5580	9.789	8.937	
High	5700	9.232	8.581	
802.11n-HT20 mode				
Low	5500	8.957	8.242	13
Middle	5580	7.838	8.030	
High	5700	8.789	8.138	
802.11n-HT40 mode				
Low	5510	8.382	7.872	13
Middle	5550	8.312	8.135	
High	5670	7.883	8.117	
802.11ac-80 mode				
Low	5530	8.046	8.137	13
High	5690	8.658	8.584	

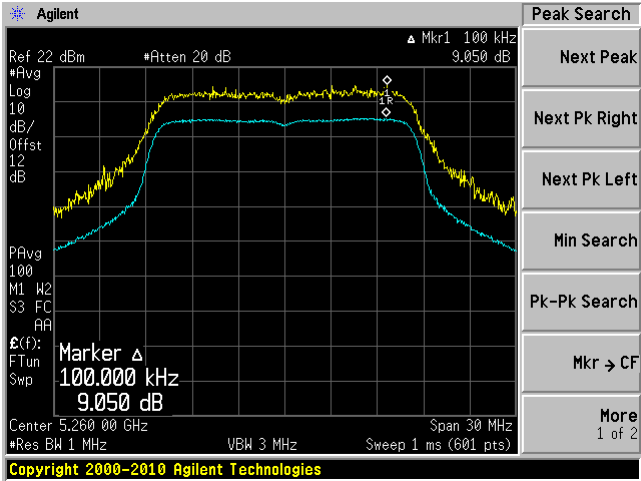
Please refer to the following plots for detailed test results.

5250-5350 MHz Band

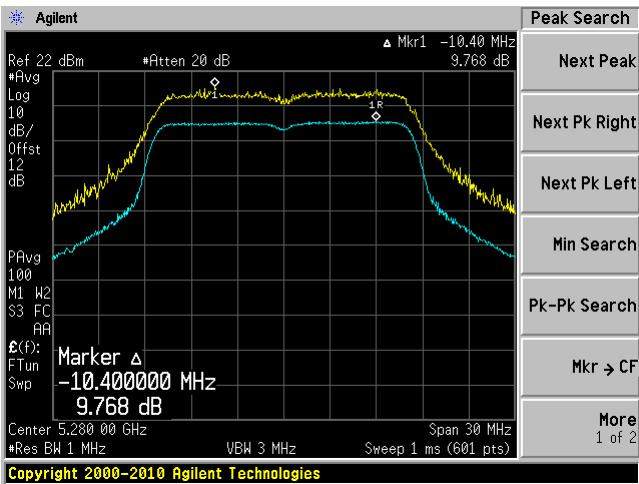
802.11a mode, 5260 MHz, Chain J0



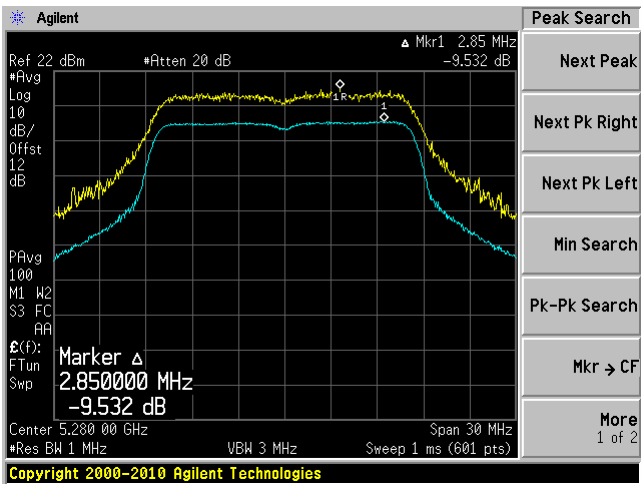
802.11a mode, 5260 MHz, Chain J1



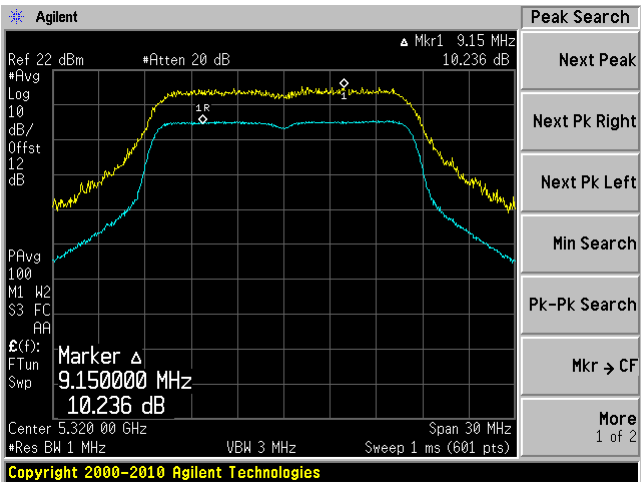
802.11a mode, 5280 MHz, Chain J0



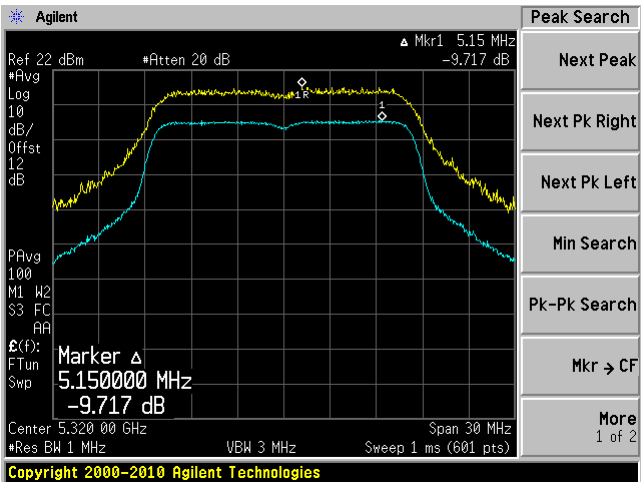
802.11a mode, 5280 MHz, Chain J1



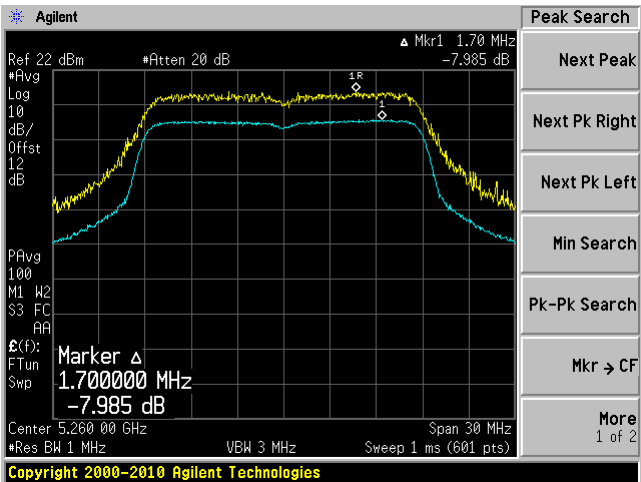
802.11a mode, 5320 MHz, Chain J0



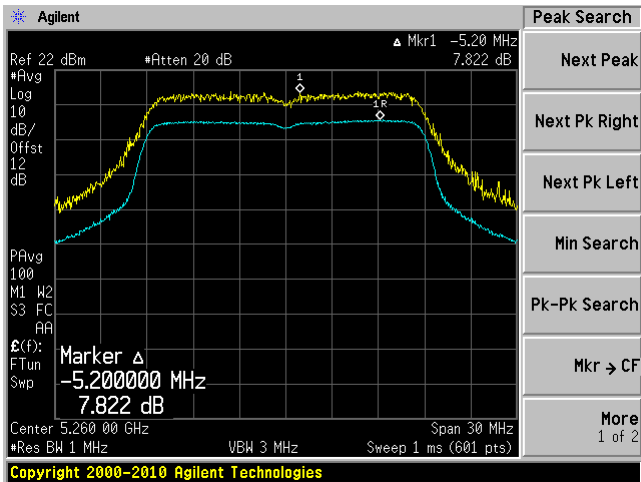
802.11a mode, 5320 MHz, Chain J1



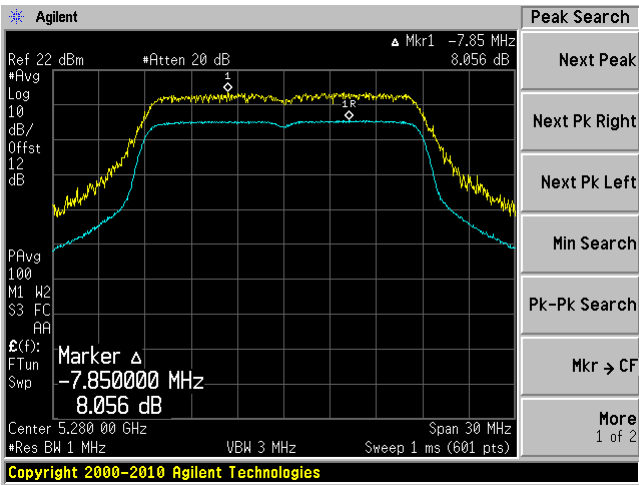
802.11n-HT20 mode, 5260 MHz, Chain J0



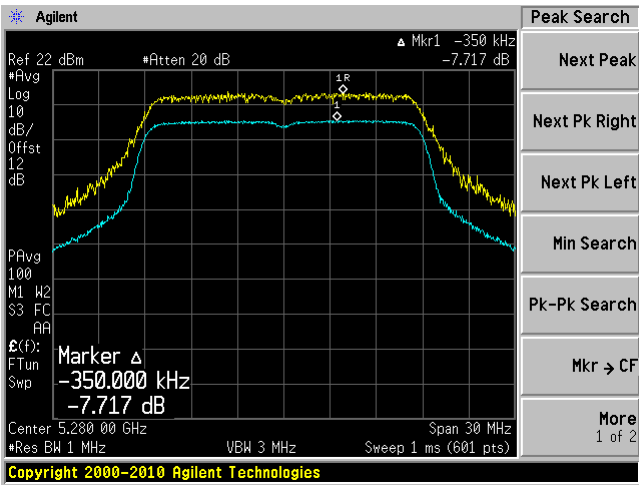
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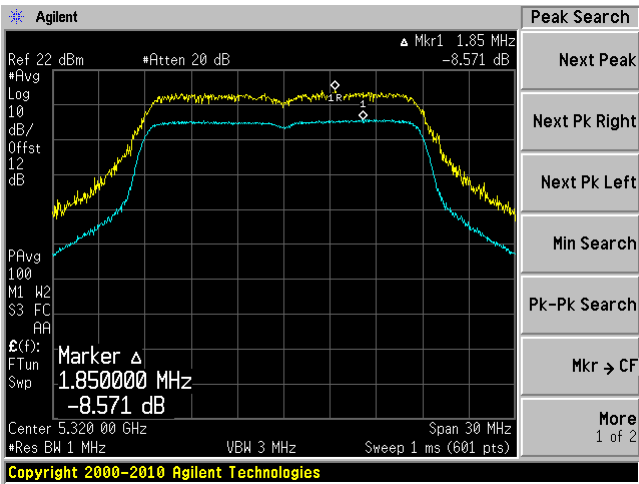
802.11n-HT20 mode, 5280 MHz, Chain J0



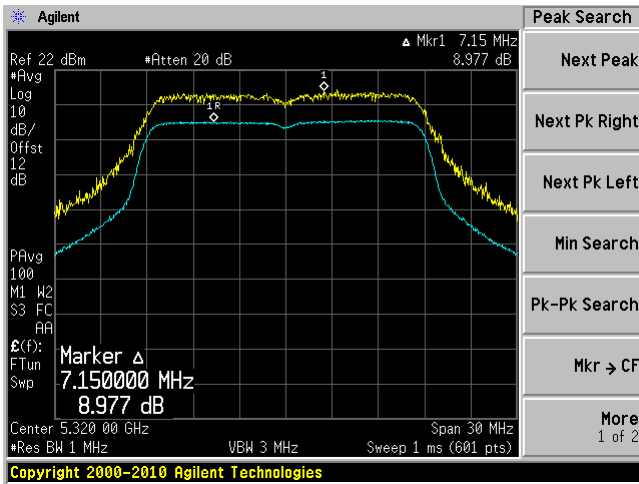
802.11n-HT20 mode, 5280 MHz, Chain J1



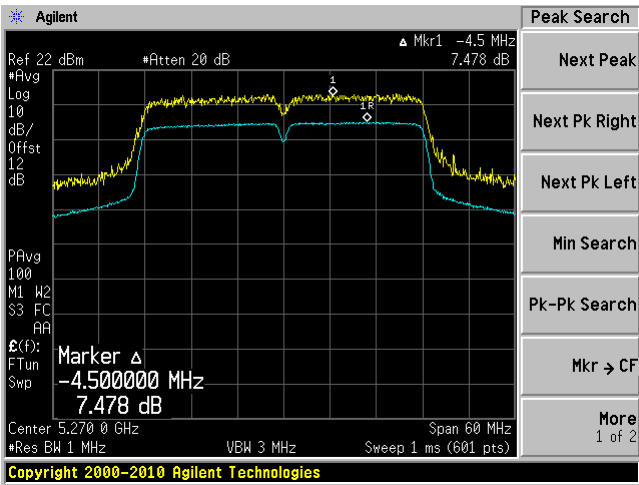
802.11n-HT20 mode, 5320 MHz, Chain J0



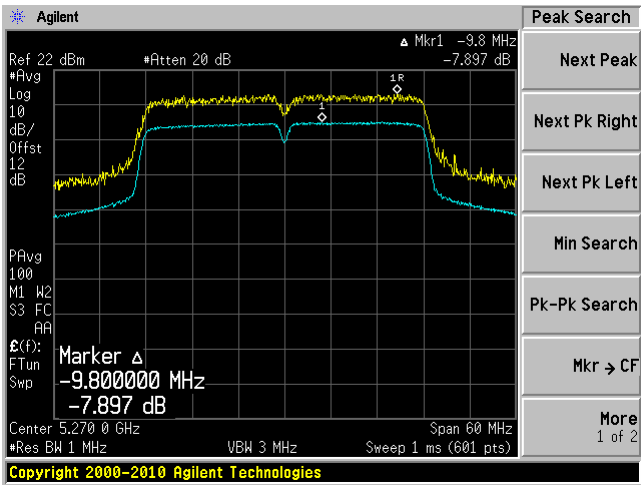
802.11n-HT20 mode, 5320 MHz, Chain J1



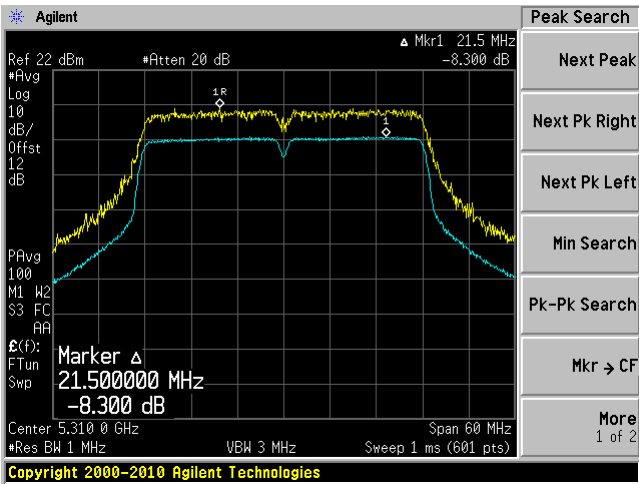
802.11n-HT40 mode, 5270 MHz, Chain J0



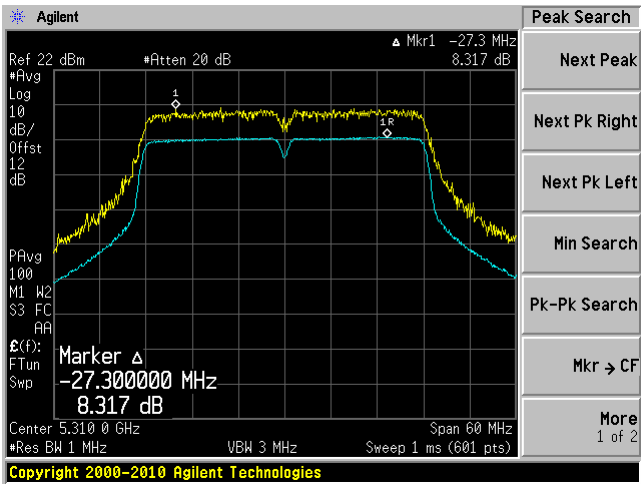
802.11n-HT40 mode, 5270 MHz, Chain J1



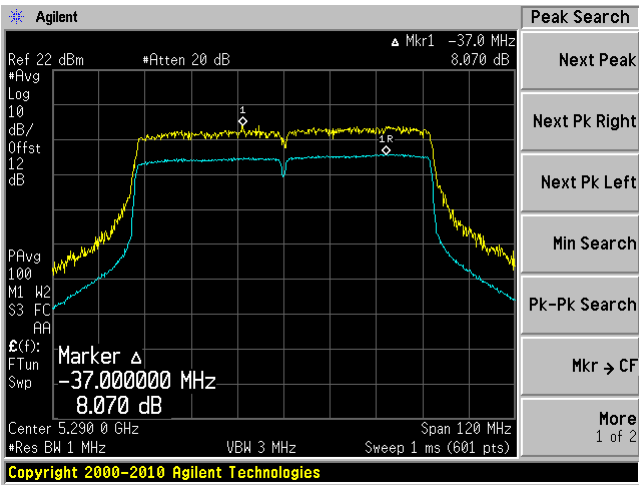
802.11n-HT40 mode, 5310 MHz, Chain J0



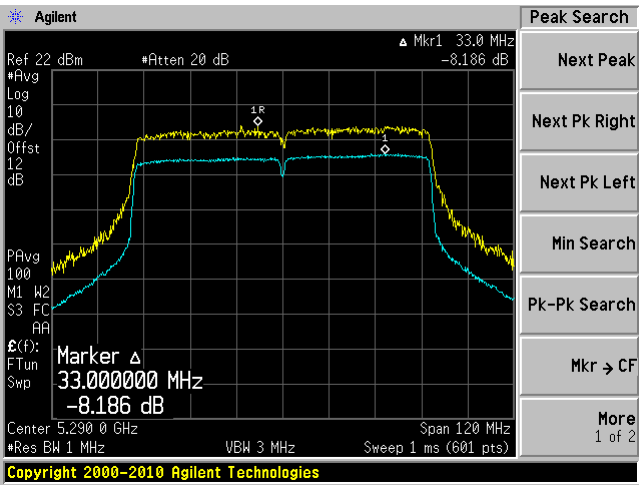
802.11n-HT40 mode, 5310 MHz, Chain J1



802.11ac-80 mode, 5310 MHz, Chain J0

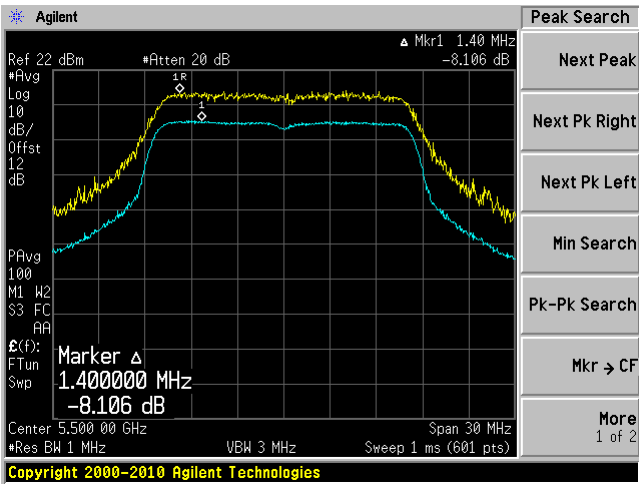


802.11ac-80 mode, 5310 MHz, Chain J1

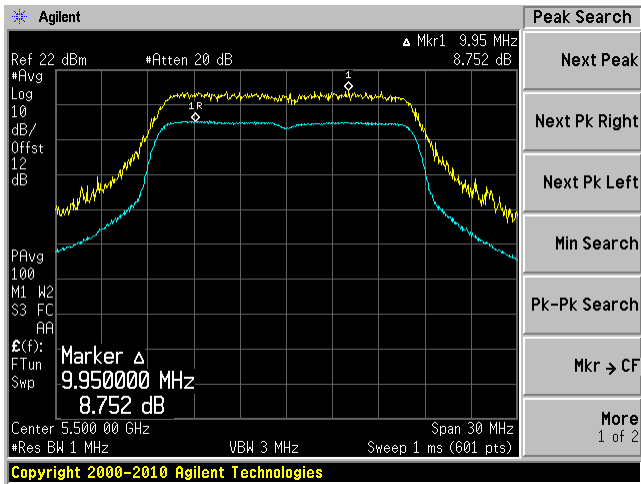


5470-5725 MHz Band

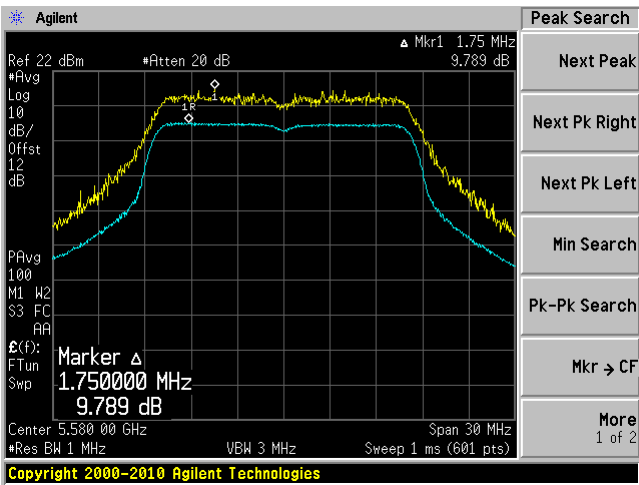
802.11a mode, 5500 MHz, Chain J0



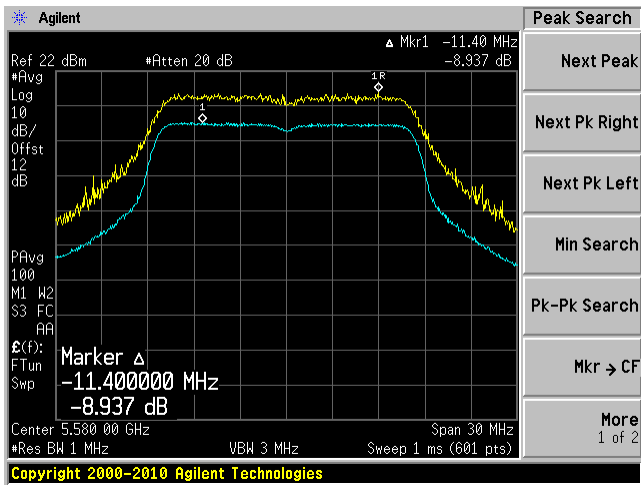
802.11a mode, 5500 MHz, Chain J1



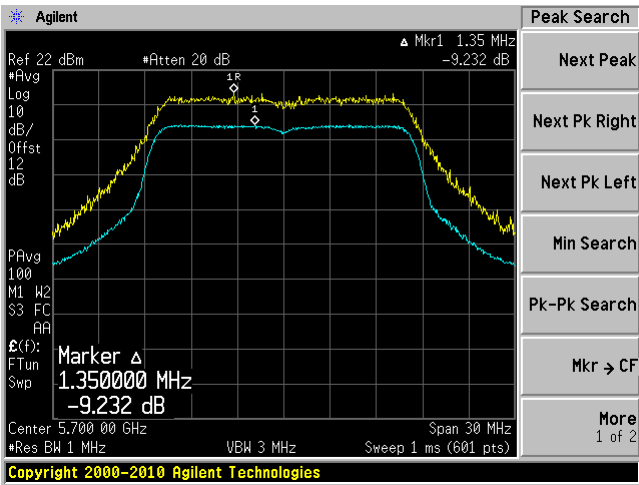
802.11a mode, 5580 MHz, Chain J0



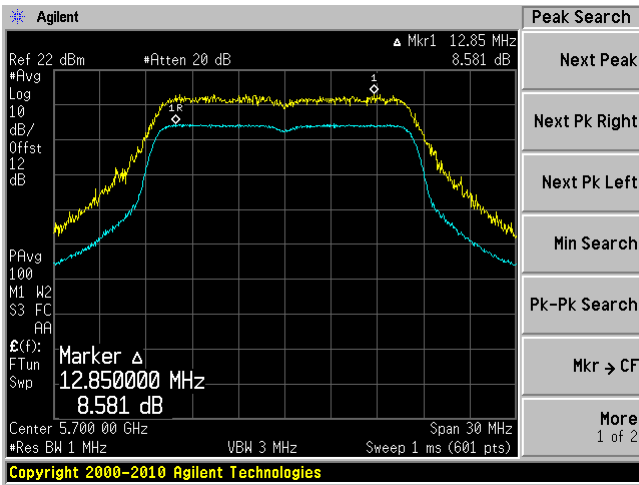
802.11a mode, 5580 MHz, Chain J1



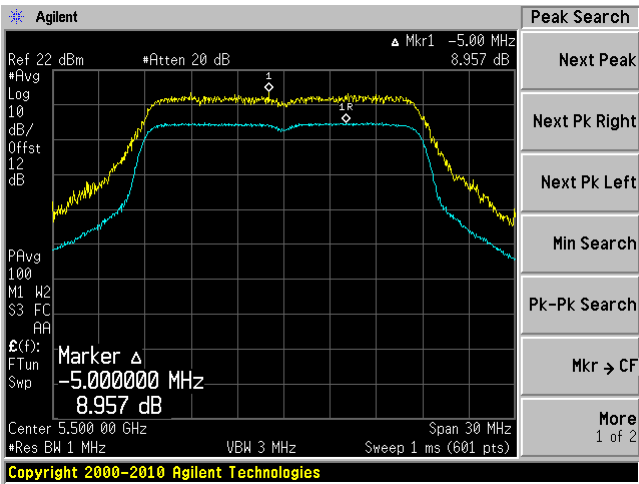
802.11a mode, 5700 MHz, Chain J0



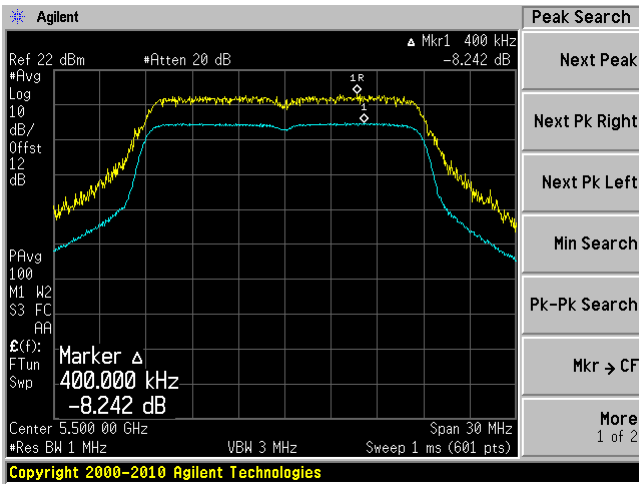
802.11a mode, 5700 MHz, Chain J1



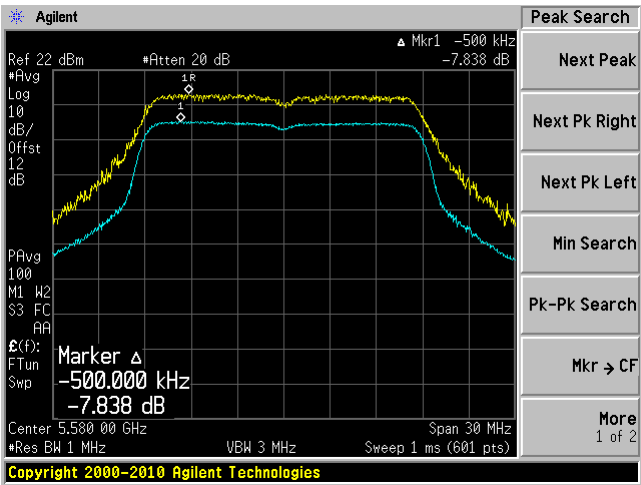
802.11n-HT20 mode, 5500 MHz, Chain J0



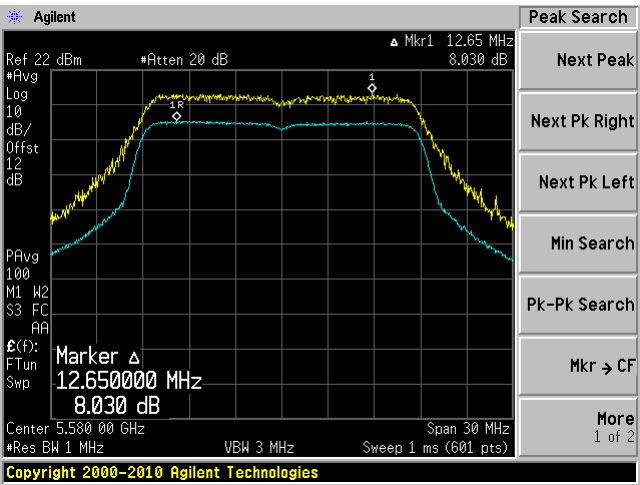
802.11n-HT20 mode, 5500 MHz, Chain J1



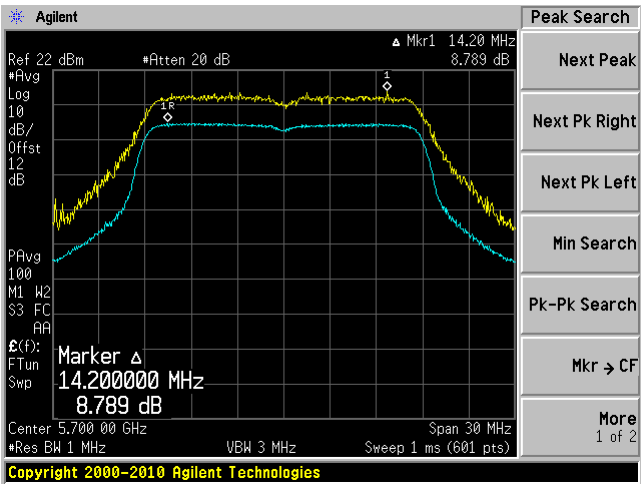
802.11n-HT20 mode, 5580 MHz, Chain J0



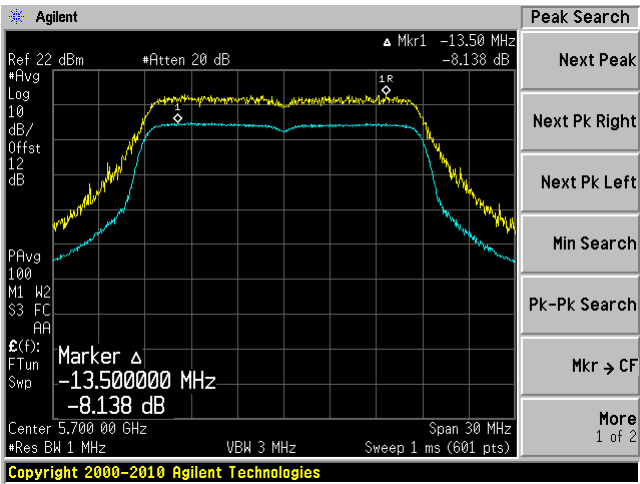
802.11n-HT20 mode, 5580 MHz, Chain J1



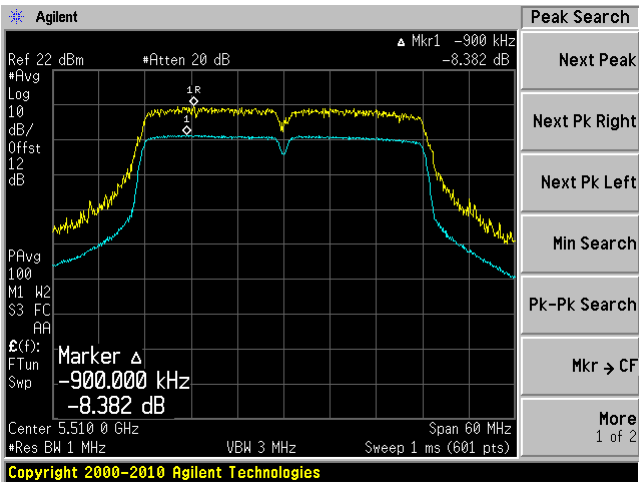
802.11n-HT20 mode, 5700 MHz, Chain J0



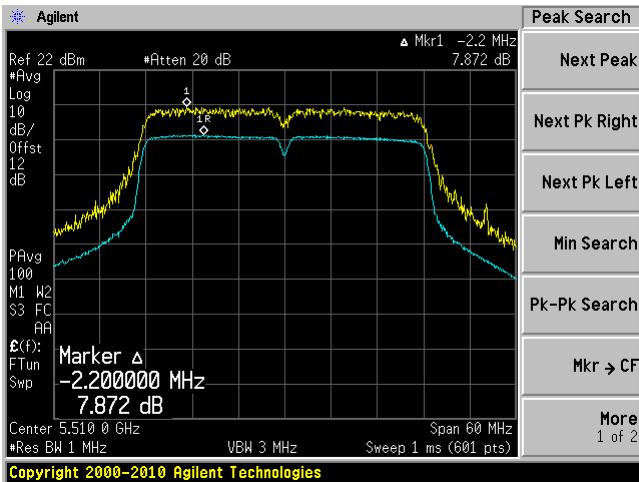
802.11n-HT20 mode, 5700 MHz, Chain J1



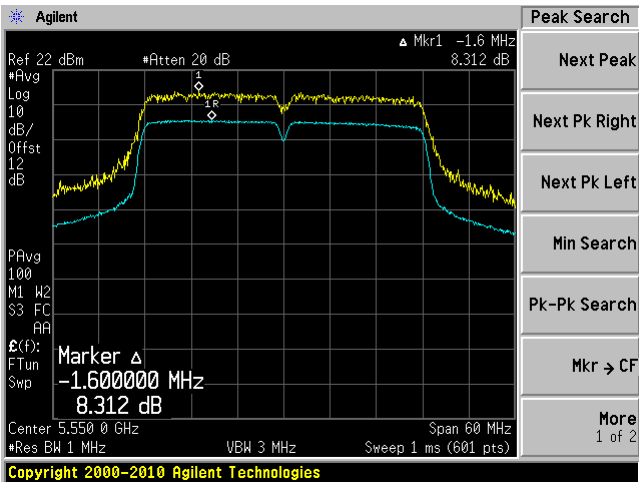
802.11n-HT40 mode, 5510 MHz, Chain J0



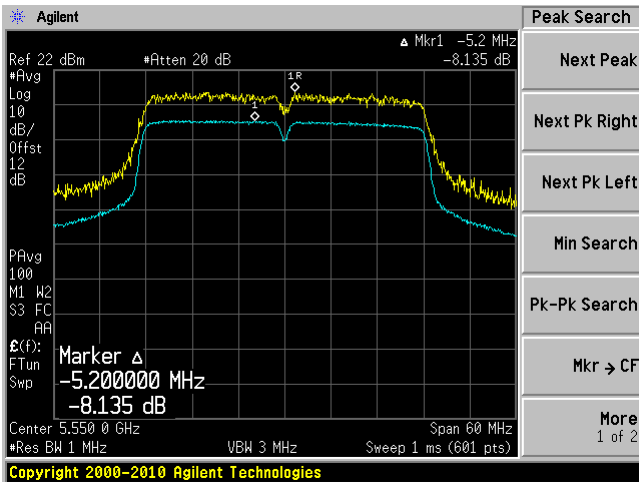
802.11n-HT40 mode, 5510 MHz, Chain J1



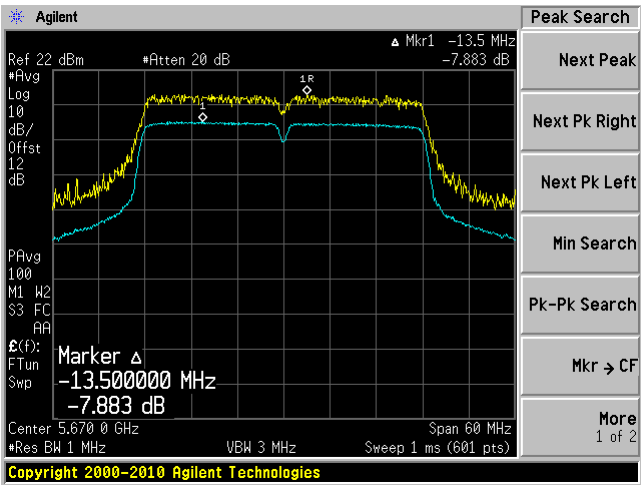
802.11n-HT40 mode, 5550 MHz, Chain J0



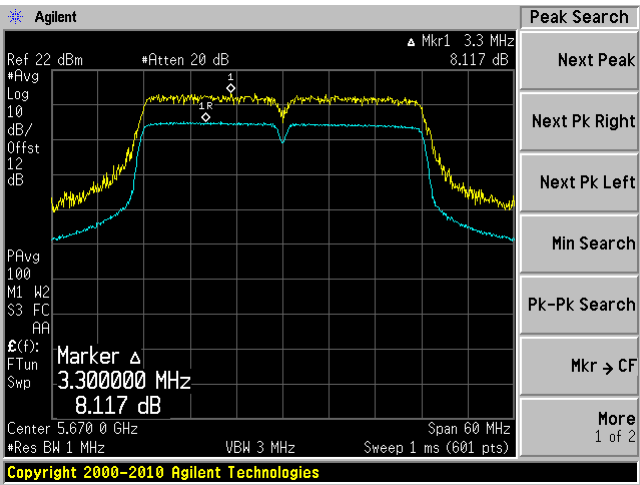
802.11n-HT40 mode, 5550 MHz, Chain J1



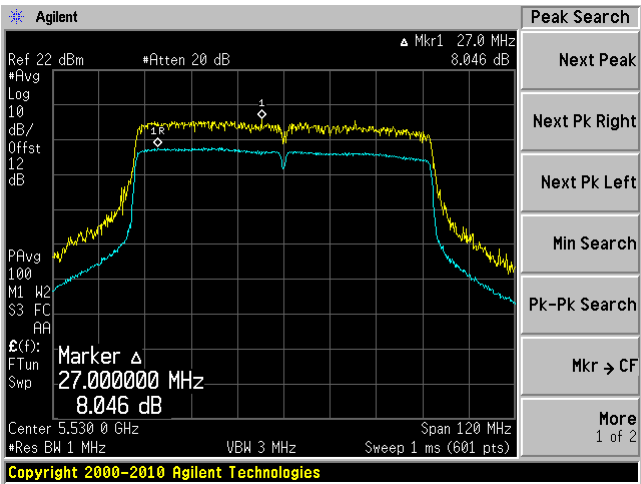
802.11n-HT40 mode, 5670 MHz, Chain J0



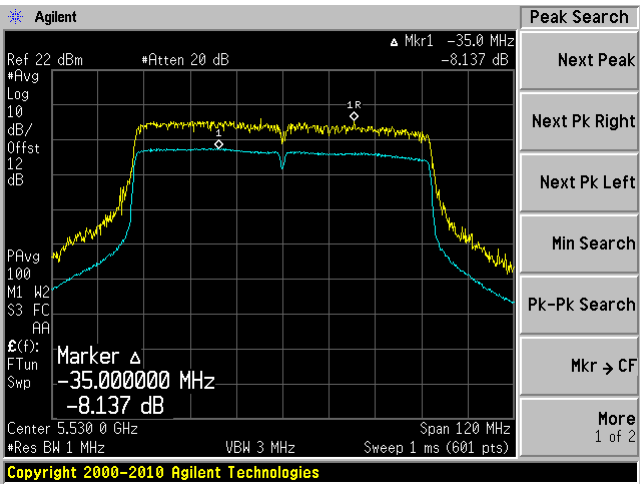
802.11n-HT40 mode, 5670 MHz, Chain J1



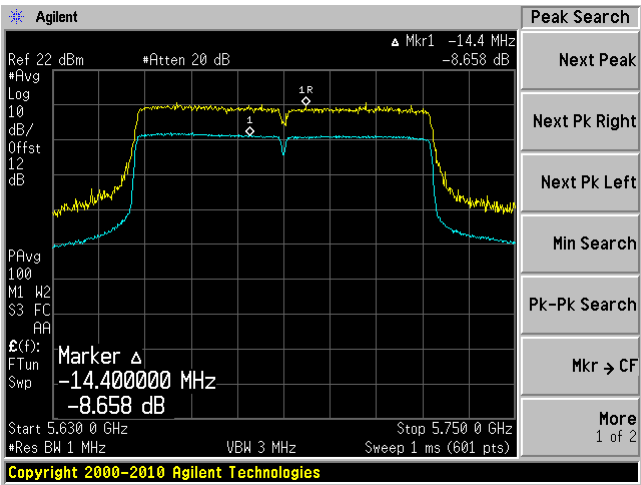
802.11a-80 mode, 5530 MHz, Chain J0



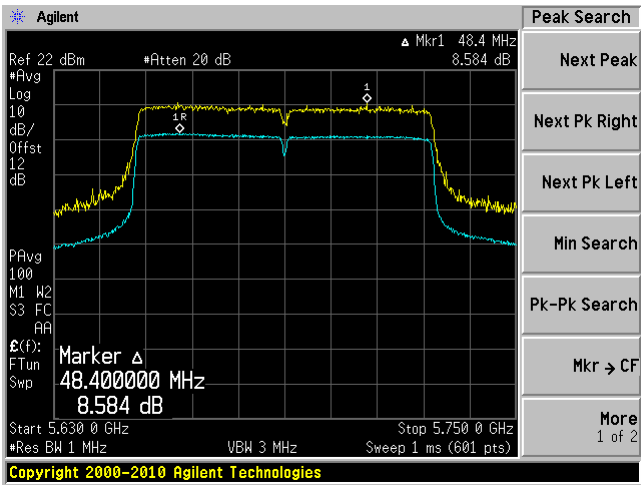
802.11a-80 mode, 5530 MHz, Chain J1



802.11ac-80 mode, 5630 MHz, Chain J0



802.11ac-80 mode, 5630 MHz, Chain J1



13 IC RSS-210 §2.3 & RSS-Gen §6 - Receiver Spurious Radiated Emissions

13.1 Applicable Standard

According to IC RSS-Gen §4.10, the receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate.

Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions.

Radiated emission measurements are to be performed using a calibrated open-area test site.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

According to RSS-Gen §6.1, Table 2, the radiated limit of receiver spurious emissions

Frequency (MHz)	Field Strength (Microvolts/m at 3 meters)
30-88	100
88-216	150
216-960	200
Above 960	500

13.2 EUT Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2003.

13.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "QP" in the data table.

13.4 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. The equation for margin calculation is as follows:

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

13.5 Test Equipment Lists 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	2013-06-18	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2013-06-09	1 year
Agilent	Pre-amplifier	8449B	3008A01978	2014-02-04	1 year
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	2013-03-28	1 year

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

13.6 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	52 %
ATM Pressure:	101.9 kPa

The testing was performed by Chen Ge on 2014-04-13 in 5 m chamber 3.

13.7 Summary of Test Results

According to the test data, the EUT complied with the with the IC RSS-210, with the closest margins from the limit listed below:

30 MHz – 1 GHz

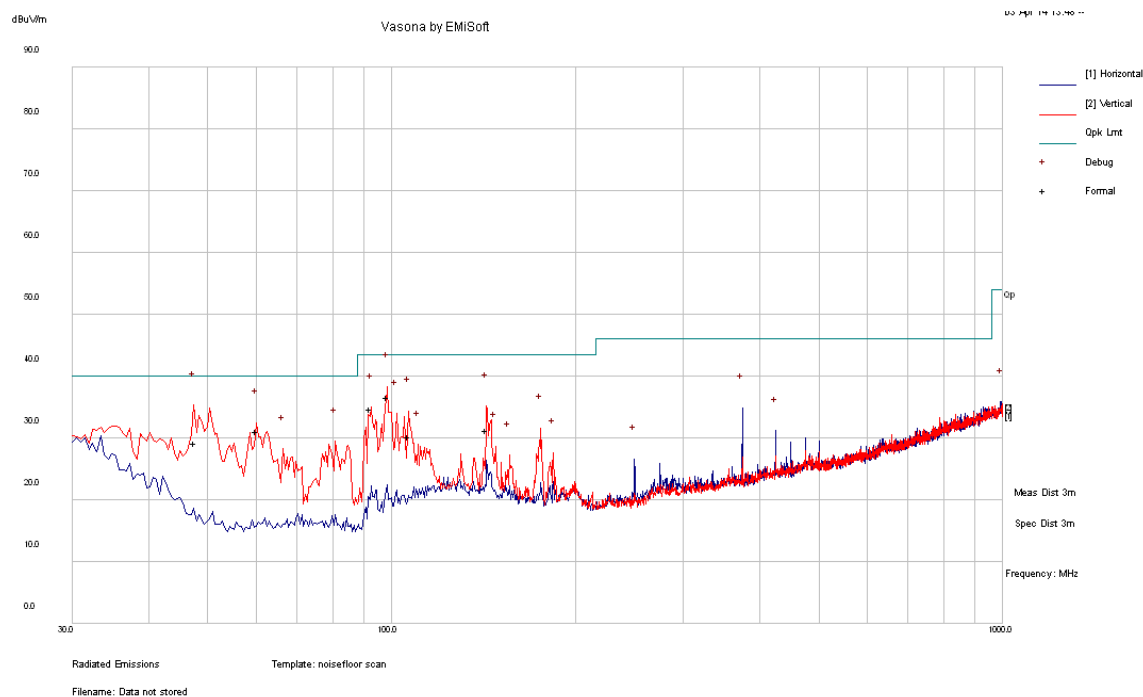
Mode: Receiving			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range (MHz)
-6.87	98.43825	Vertical	30-1000

1 GHz – 12.75 GHz

Mode: Receiving			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range (MHz)
-14.263	9241.2	Horizontal	1000-12750

13.8 Test Results and Plots

1) 30-1000 MHz, Measured at 3 meters



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Detector (QP/Ave.)
47.5615	29.17	129	V	0	40	-10.83	QP
98.43825	36.63	101	V	264	43.5	-6.87	QP
60.208	31.18	109	V	67	40	-8.82	QP
143.2545	31.37	104	V	168	43.5	-12.13	QP
92.3895	34.82	103	V	187	43.5	-8.68	QP
106.7025	30.31	137	V	140	43.5	-13.19	QP

2) 1 GHz to 12.75 GHz measured at 3 meters

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)	Comment
1187.6	39.101	100	V	0	74	-34.899	Peak
1187.6	38.505	100	H	0	74	-35.495	Peak
1187.6	24.081	100	V	0	54	-29.919	Ave
1187.6	24.145	100	H	0	54	-29.855	Ave
9241.2	53.797	100	V	0	74	-20.203	Peak
9241.2	54.897	100	H	0	74	-19.103	Peak
9241.2	38.857	100	V	0	54	-15.143	Ave
9241.2	39.737	100	H	0	54	-14.263	Ave

14 FCC §15.407(b) & IC RSS-210 §A9.2 - Spurious Emissions at Antenna Terminals

14.1 Applicable Standard

According to FCC §15.407(b)

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

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 EIRP of –27 dBm/MHz

As per IC 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.

14.2 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 H: Unwanted emissions measurement

14.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2013-09-29	1 year

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

14.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	43 %
ATM Pressure:	101-102 kPa

The testing was performed by Chen Ge from 2014-04-21 at RF site.

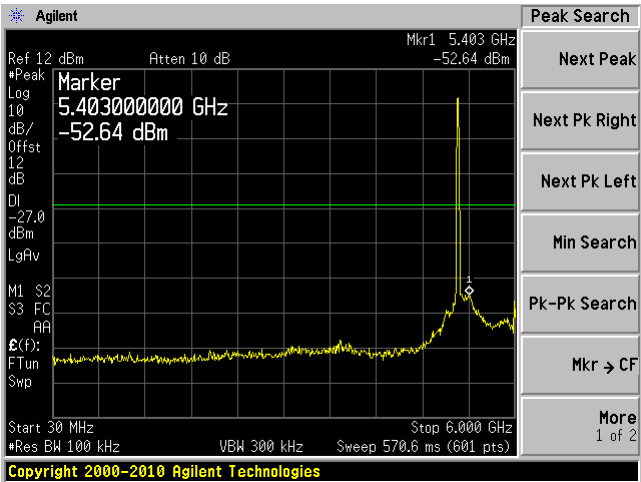
14.5 Test Results

Please refer to following plots of spurious emissions.

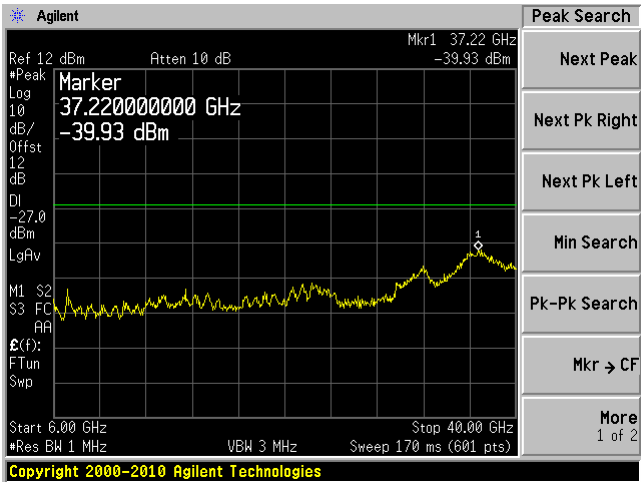
5250-5350 MHz Band

802.11a, Low Channel, 5260 MHz

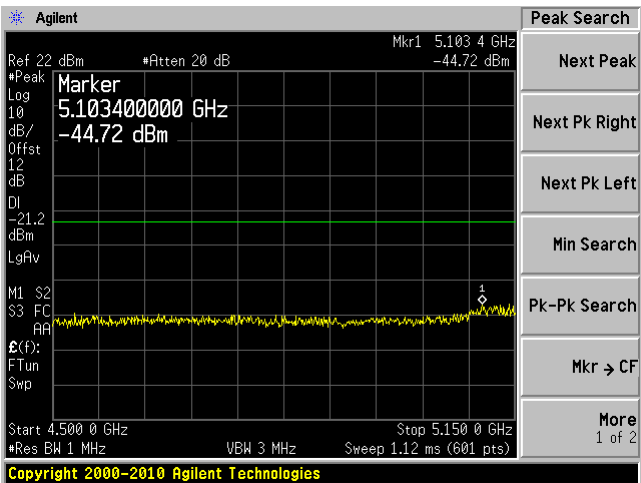
Chain J0, Plot: 30 MHz – 6 GHz



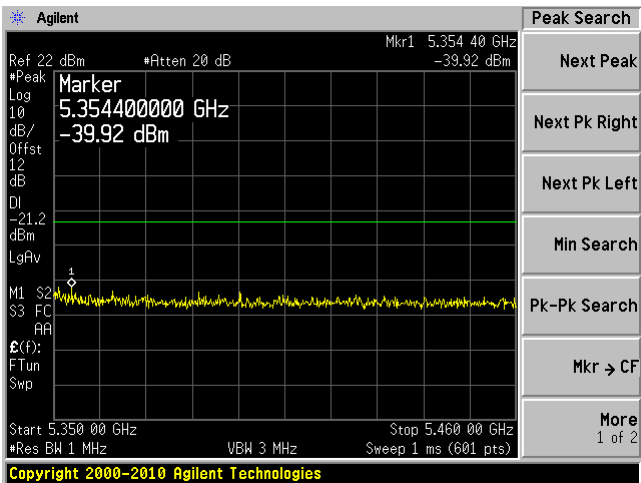
Chain J0, Plot: 6 GHz – 40 GHz



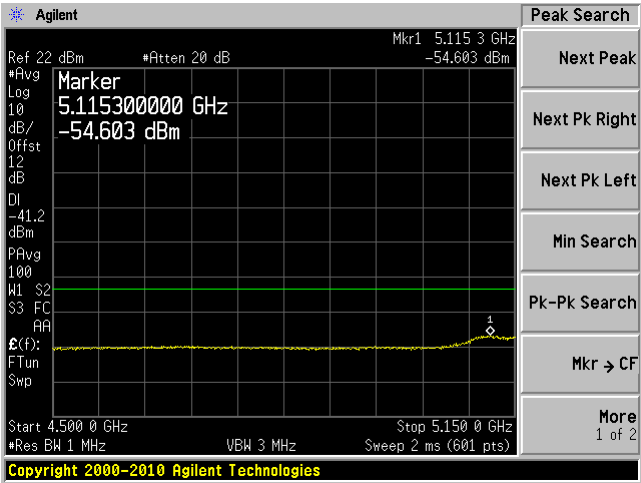
Chain J0, Plot: 4500 MHz – 5150 MHz-Peak



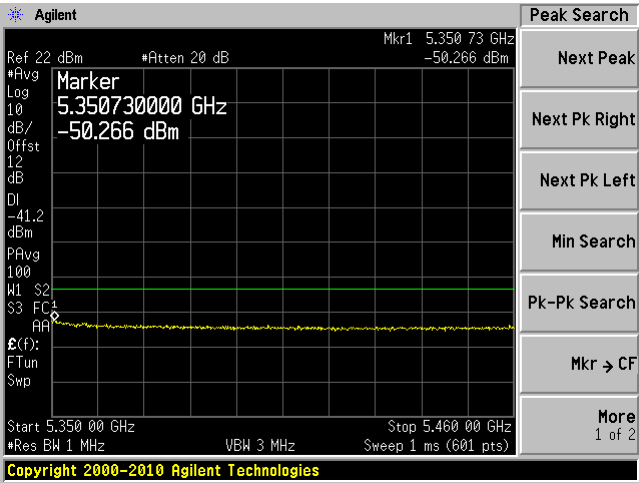
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



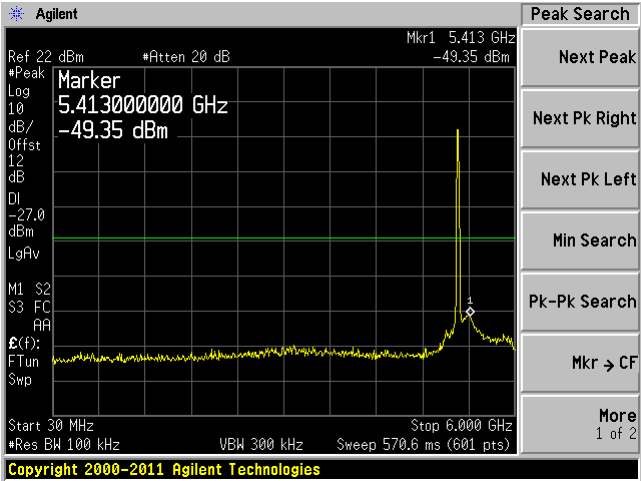
Chain J0, Plot: 4500 MHz – 5150 MHz-Ave



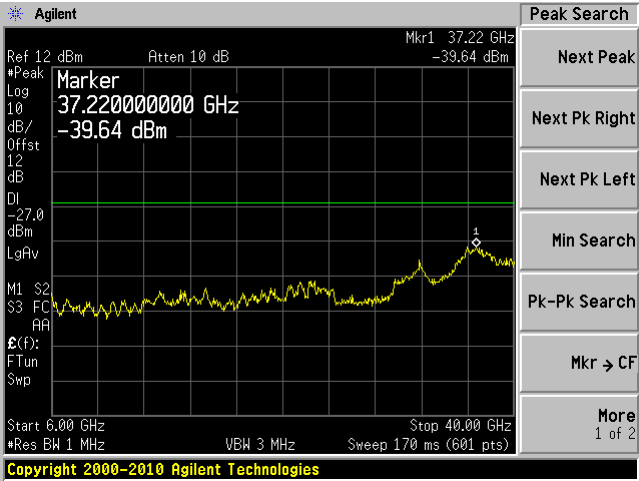
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



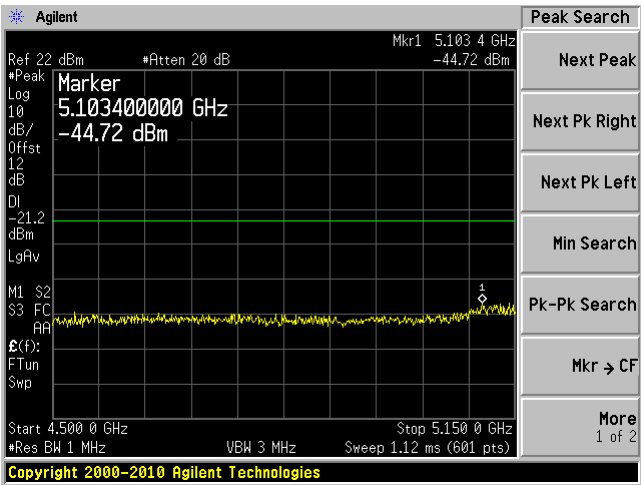
Chain J1, Plot: 30 MHz – 6 GHz



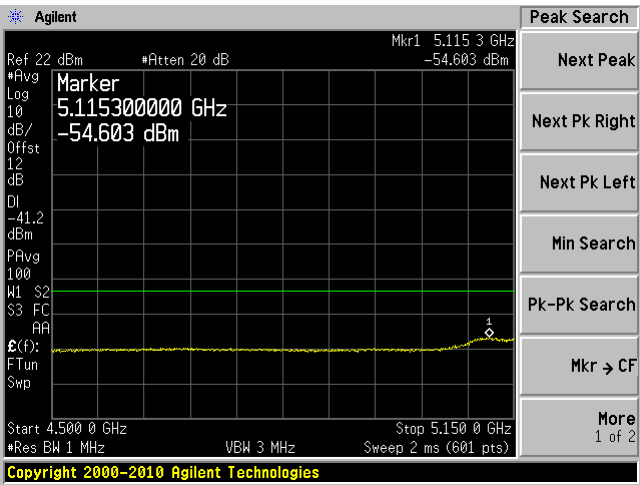
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 4500 MHz – 5150 MHz-Peak

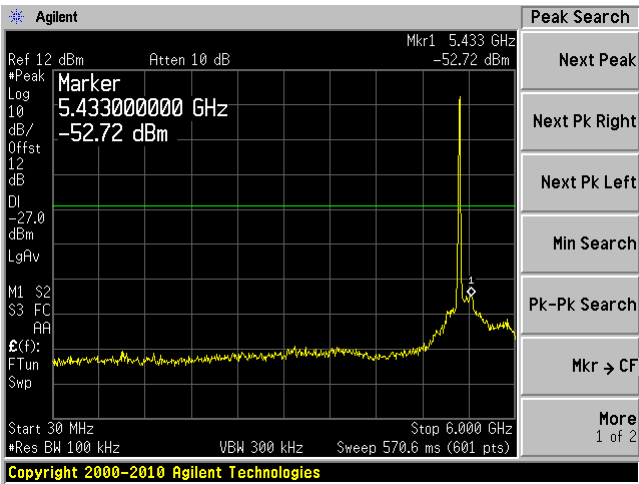


Chain J1, Plot: 4500 MHz – 5150 MHz-Ave

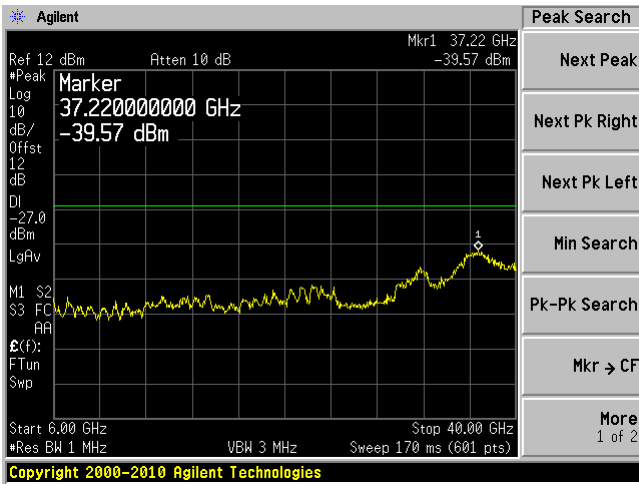


802.11a, Middle Channel, 5280 MHz

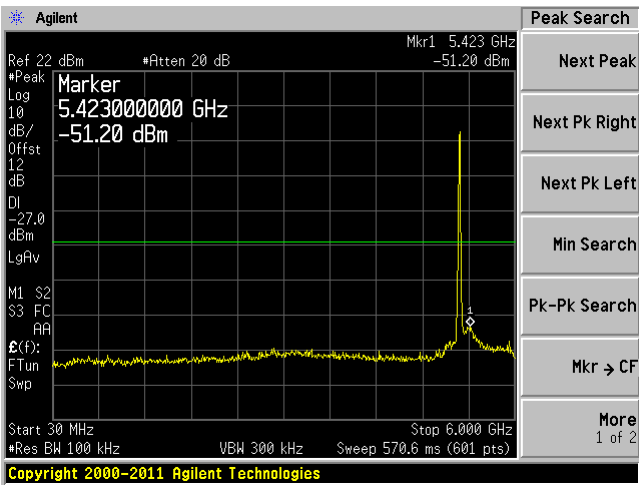
Chain J0, Plot: 30 MHz – 6 GHz



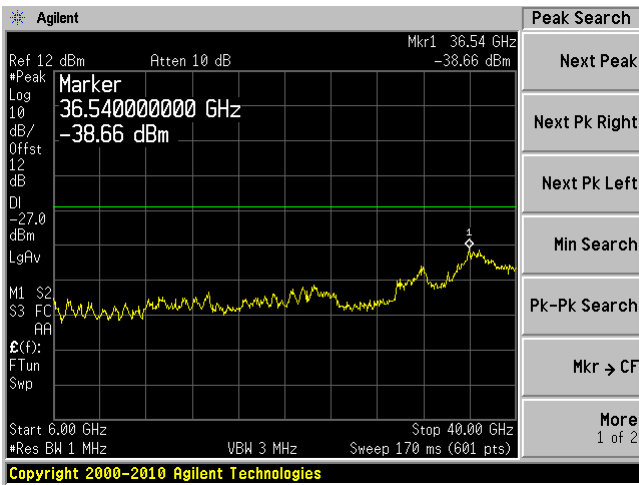
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

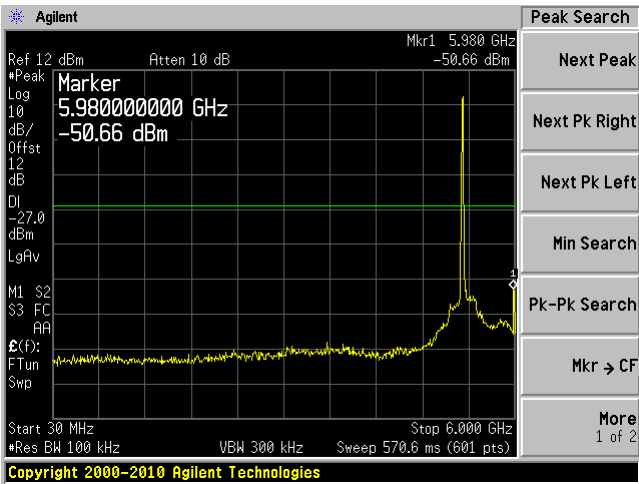


Chain J1, Plot: 6 GHz – 40 GHz

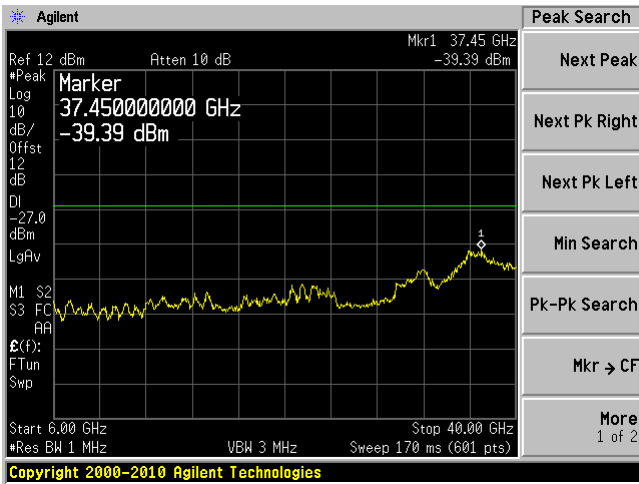


802.11a, High Channel, 5320 MHz

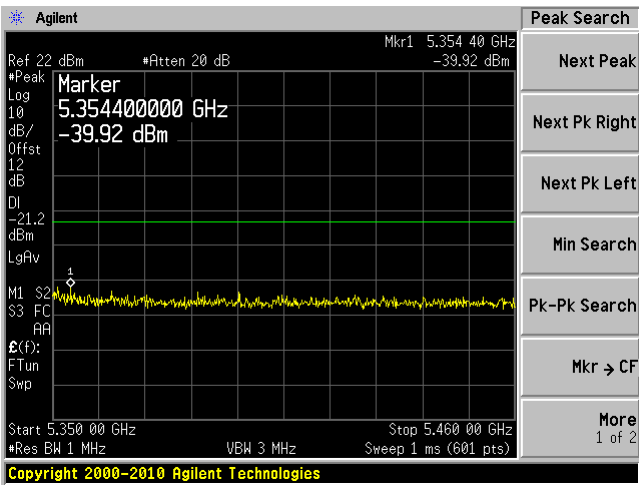
Chain J0, Plot: 30 MHz – 6 GHz



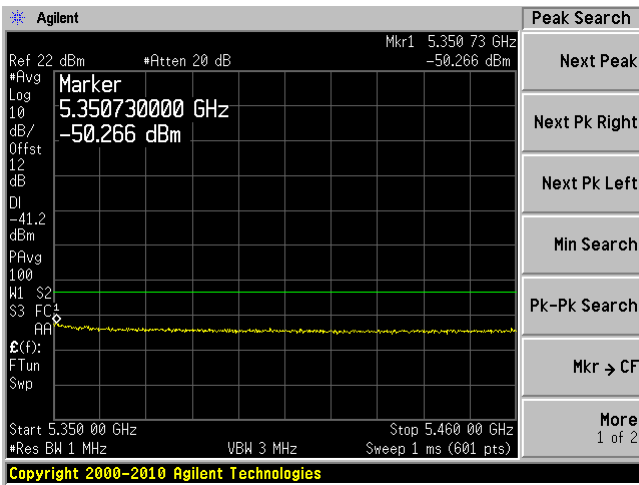
Chain J0, Plot: 6 GHz – 40 GHz



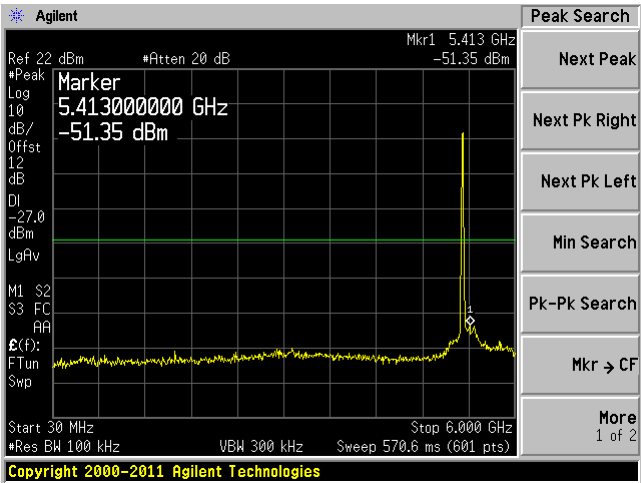
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



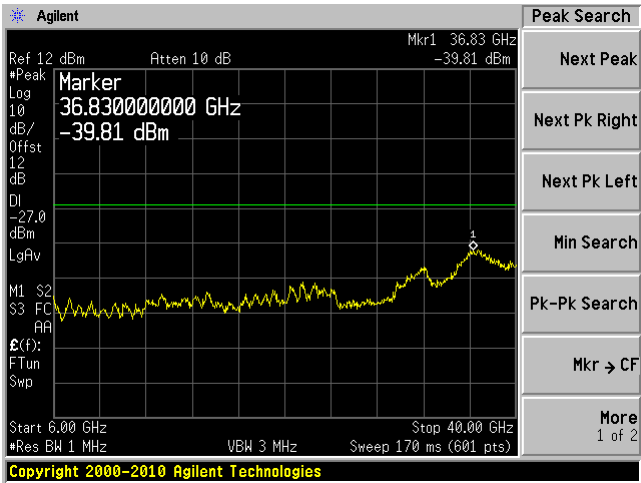
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



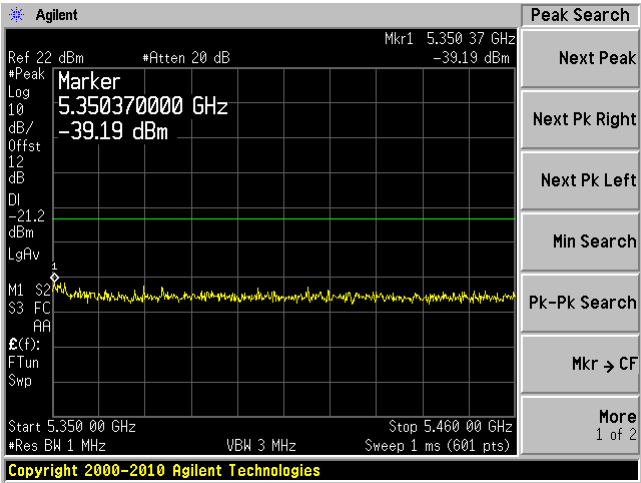
Chain J1, Plot: 30 MHz – 6 GHz



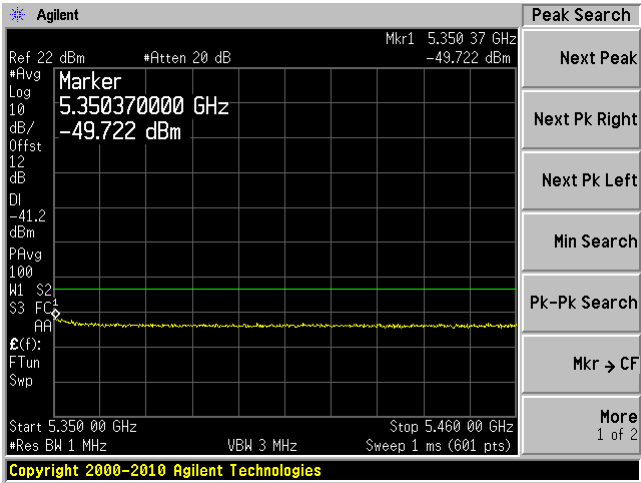
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz-Ave

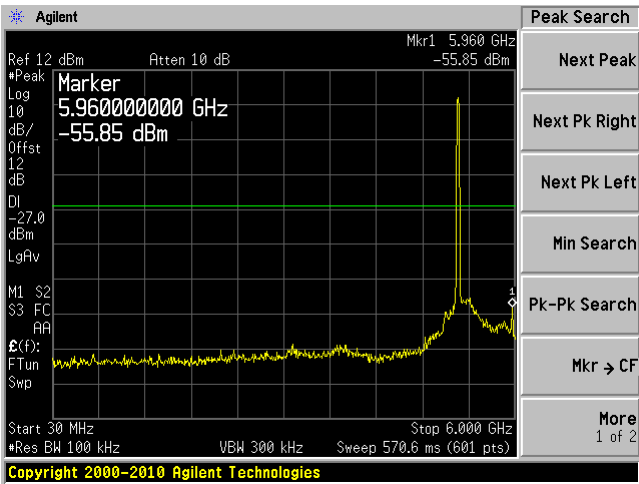


Chain J1, Plot: 5350MHz – 5460 MHz-Ave

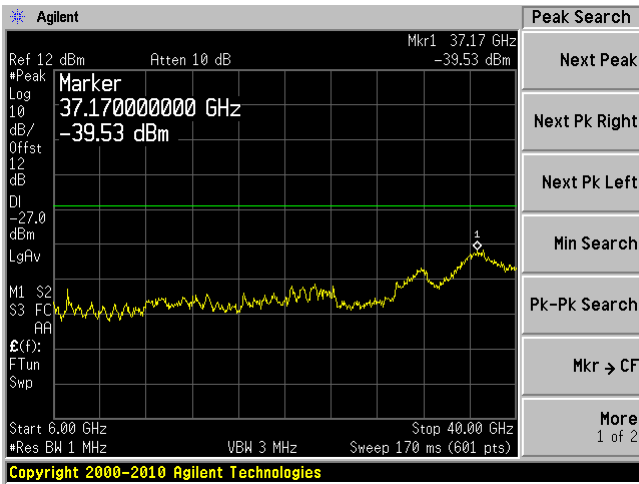


802.11n-HT 20, Low Channel 5260 MHz

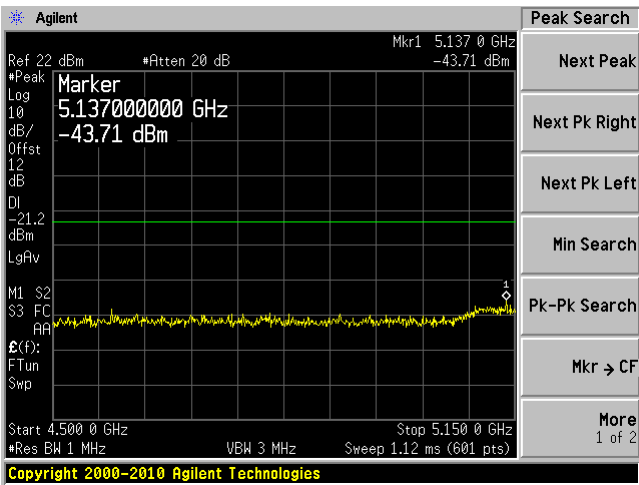
Chain J0, Plot: 30 MHz – 6 GHz



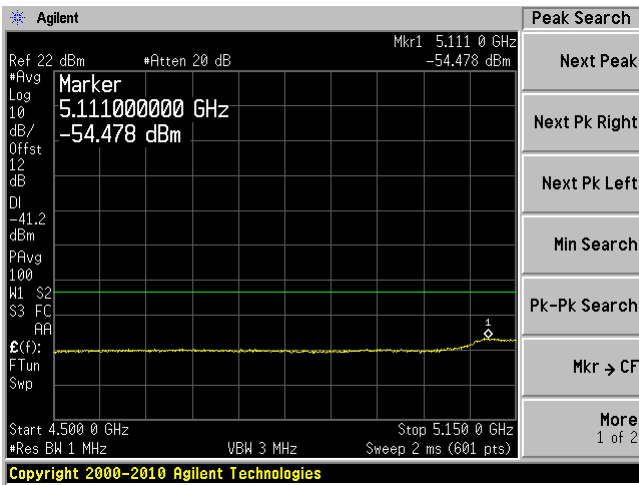
Chain J0, Plot: 6 GHz – 40 GHz



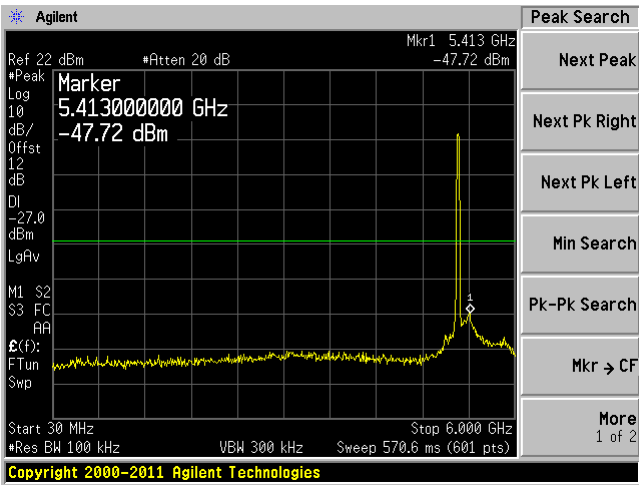
Chain J0, Plot: 4500 MHz – 5150 MHz-Peak



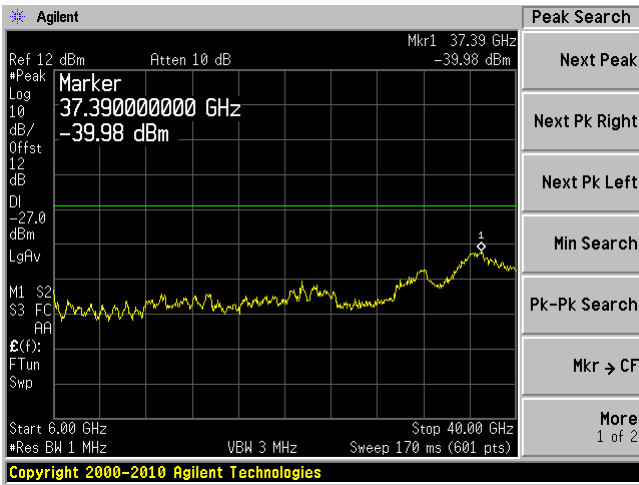
Chain J0, Plot: 4500 MHz – 5150 MHz-Ave



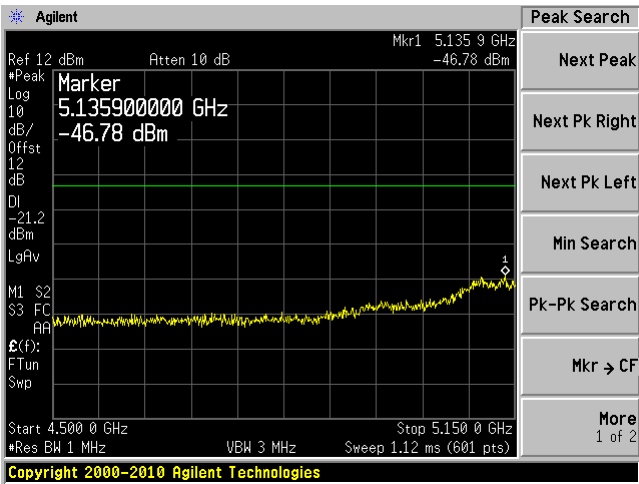
Chain J1, Plot: 30 MHz – 6 GHz



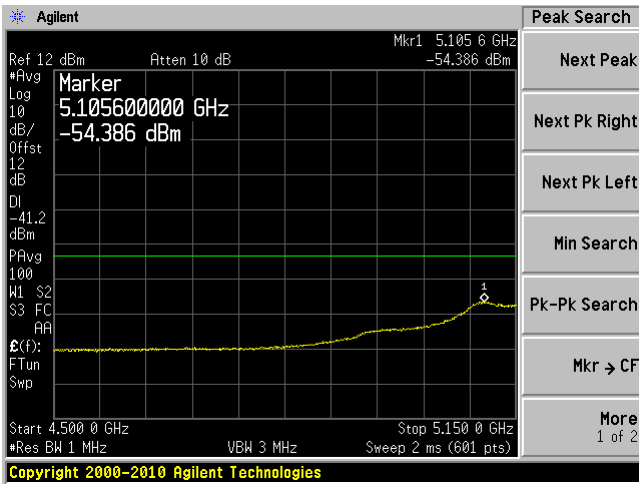
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 4500 MHz – 5150 MHz-Peak

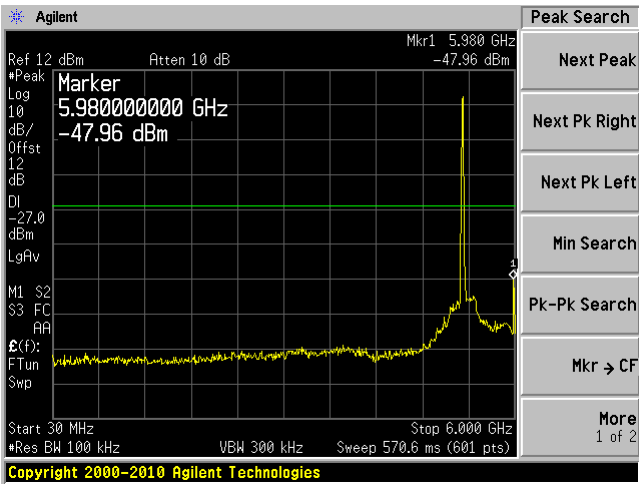


Chain J1, Plot: 4500 MHz – 5150 MHz-Ave

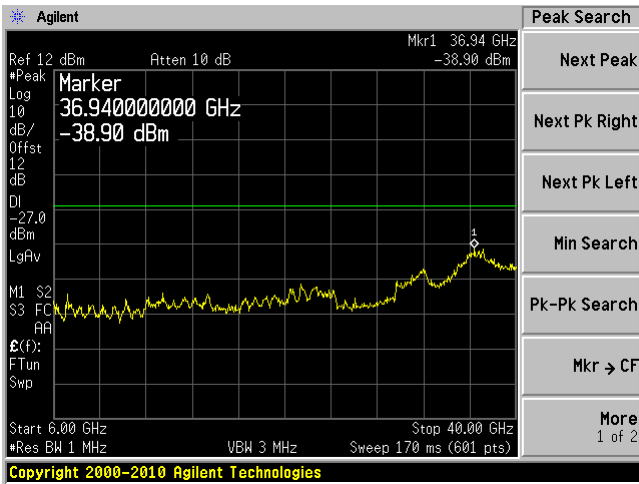


802.11n-HT20, Middle Channel 5280 MHz

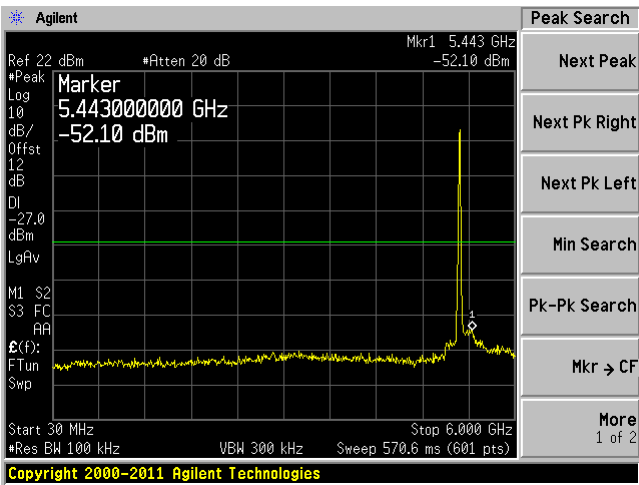
Chain J0, Plot: 30 MHz – 6 GHz



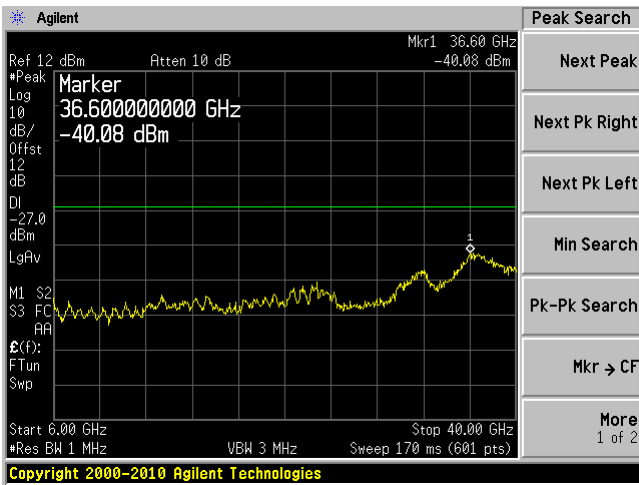
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

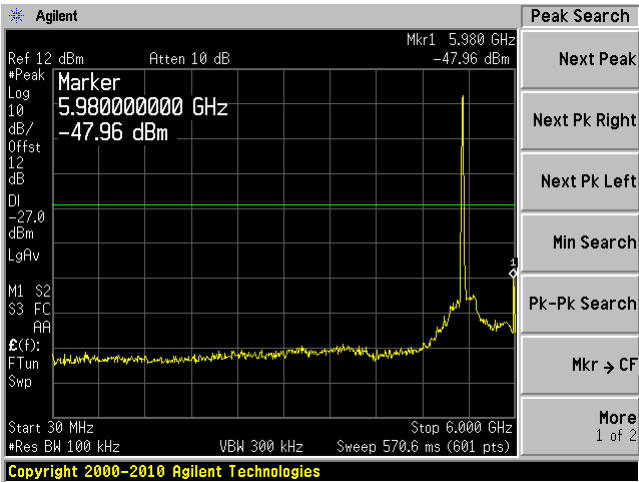


Chain J1, Plot: 6 GHz – 40 GHz

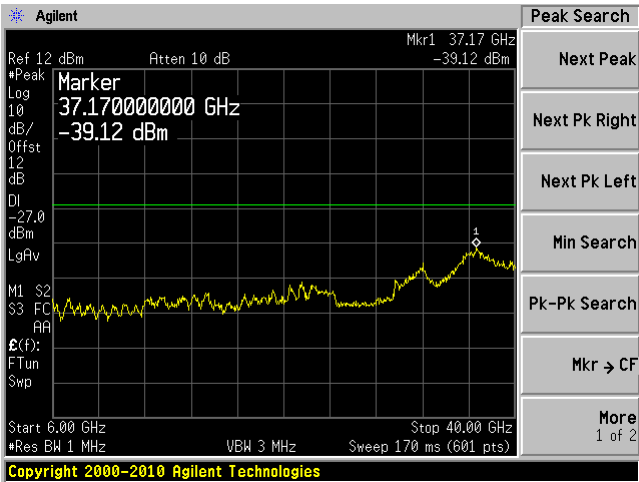


802.11n-HT20, High Channel, 5320 MHz

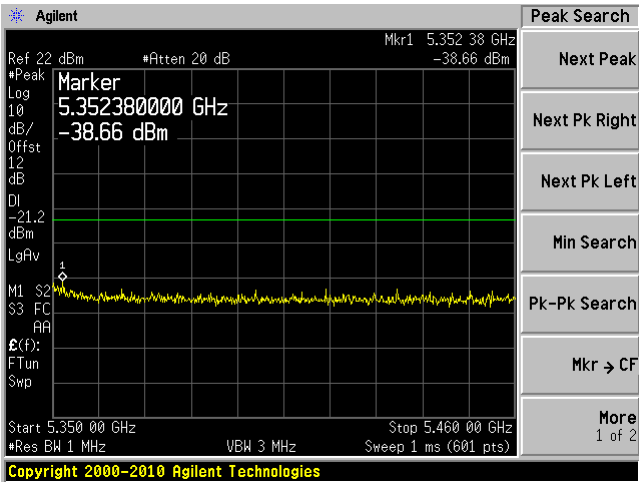
Chain J0, Plot: 30 MHz – 6 GHz



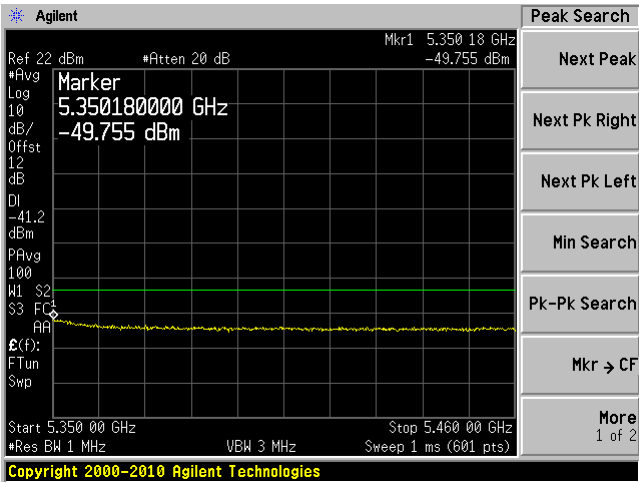
Chain J0, Plot: 6 GHz – 40 GHz



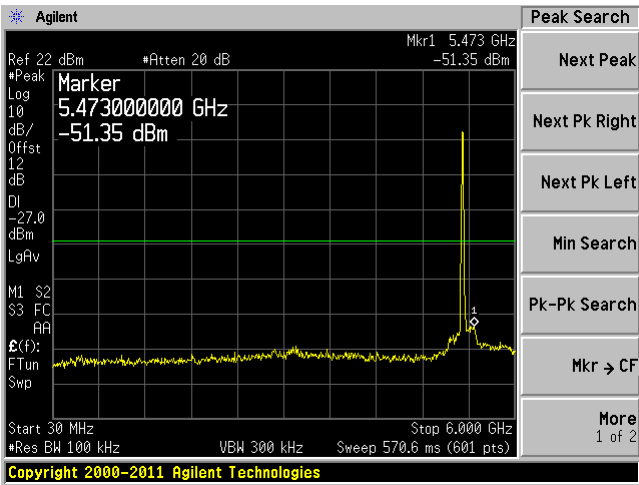
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



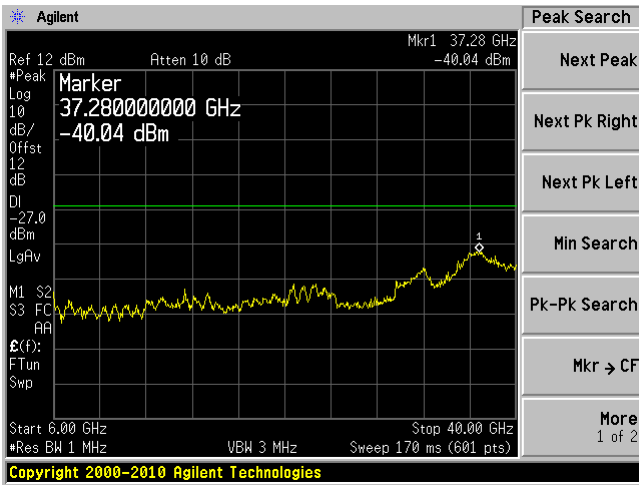
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



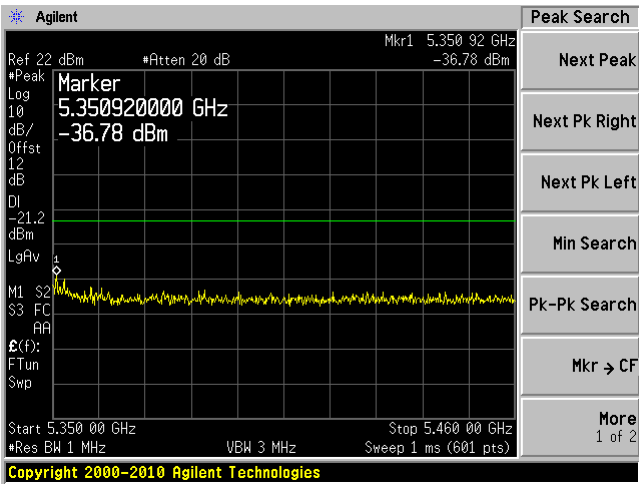
Chain J1, Plot: 30 MHz – 6 GHz



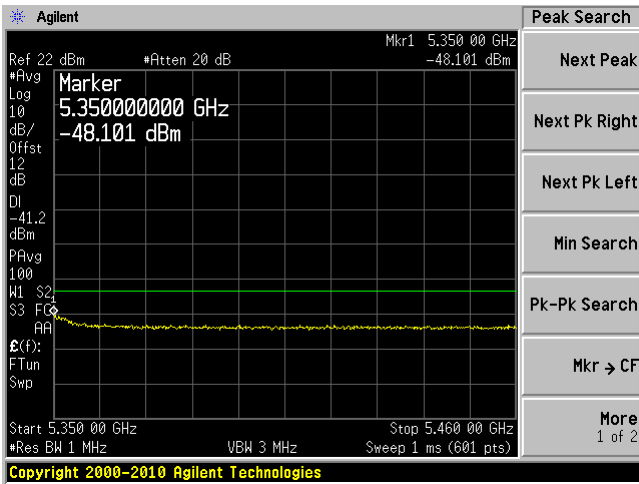
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz-Peak

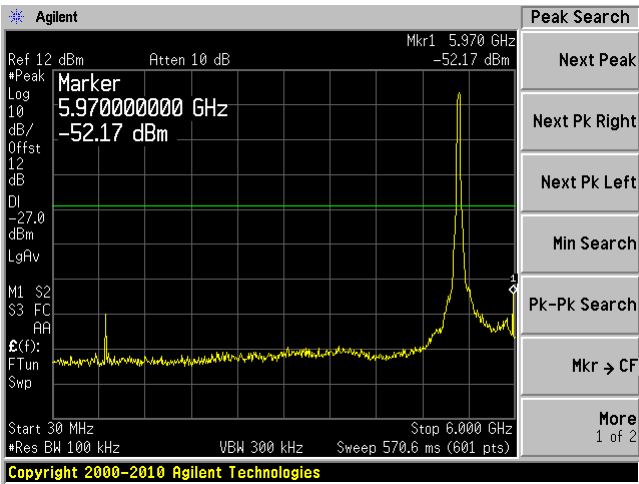


Chain J1, Plot: 5350MHz – 5460 MHz-Peak

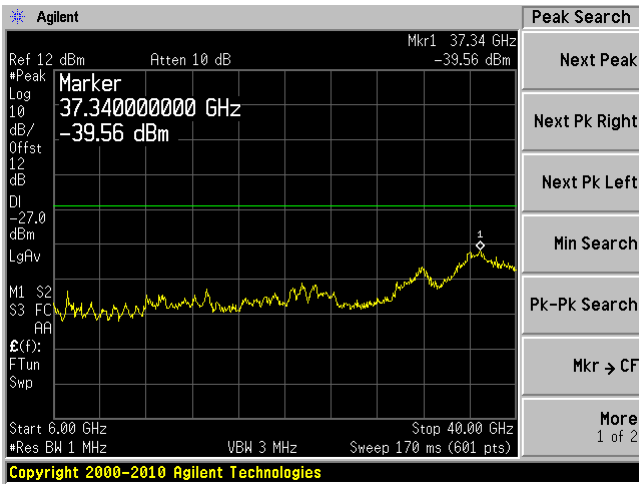


802.11n-HT40, Low Channel 5270 MHz

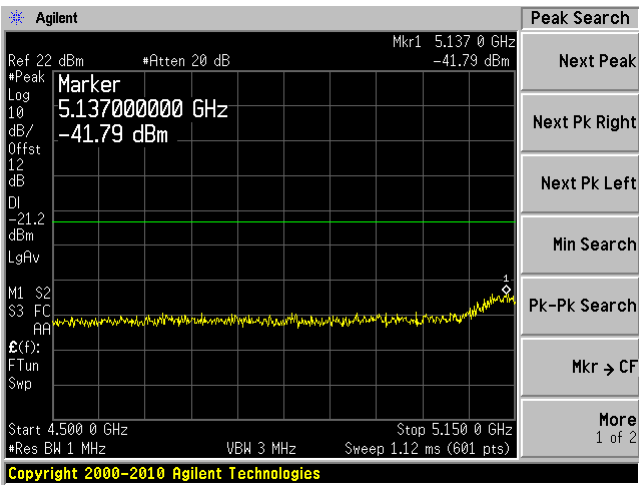
Chain J0, Plot: 30 MHz – 6 GHz



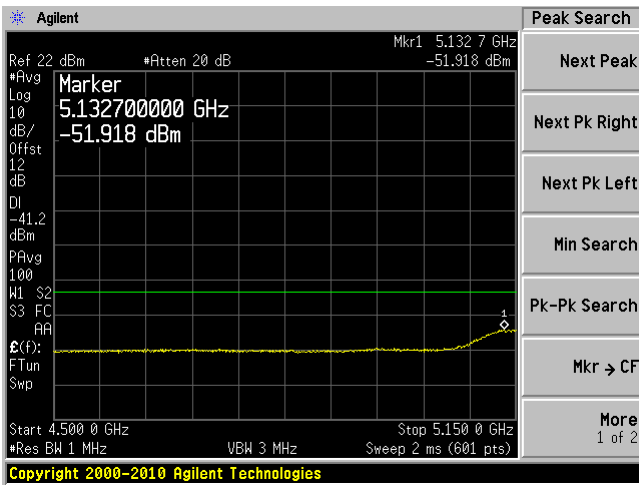
Chain J0, Plot: 6 GHz – 40 GHz



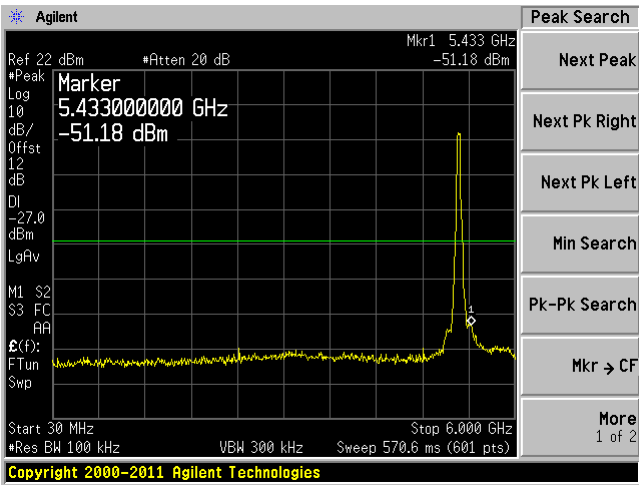
Chain J0, Plot: 4500 MHz – 5150 MHz-Peak



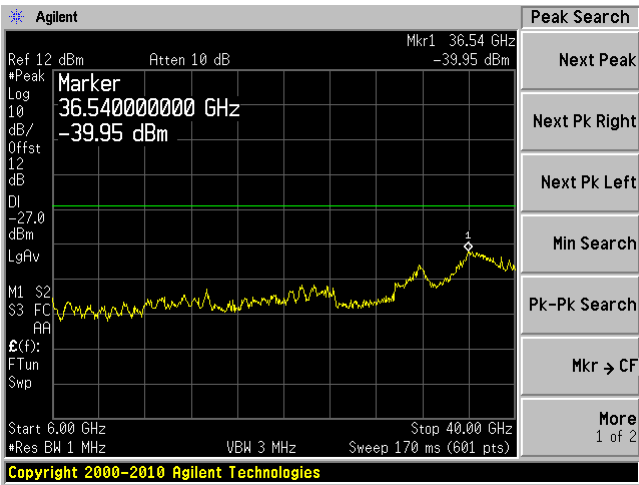
Chain J0, Plot: 4500 MHz – 5150 MHz-Ave



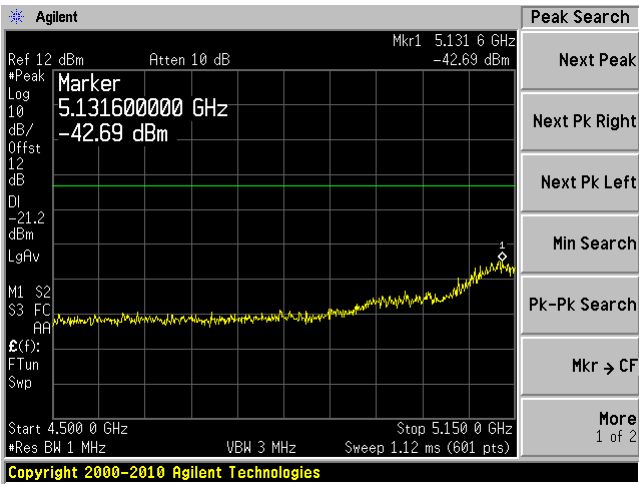
Chain J1, Plot: 30 MHz – 6 GHz



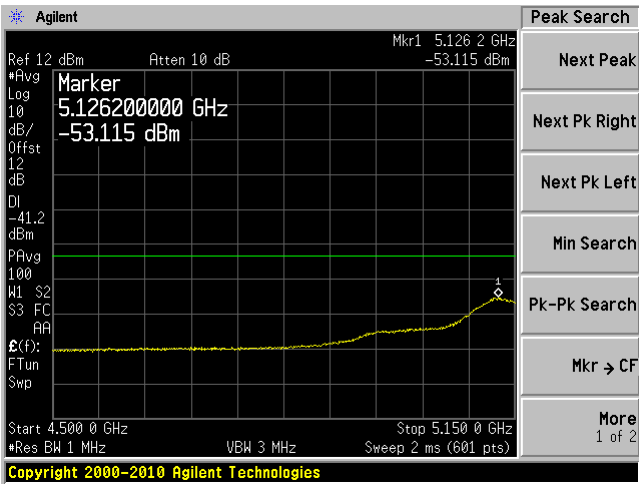
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 4500 MHz – 5150 MHz-Peak

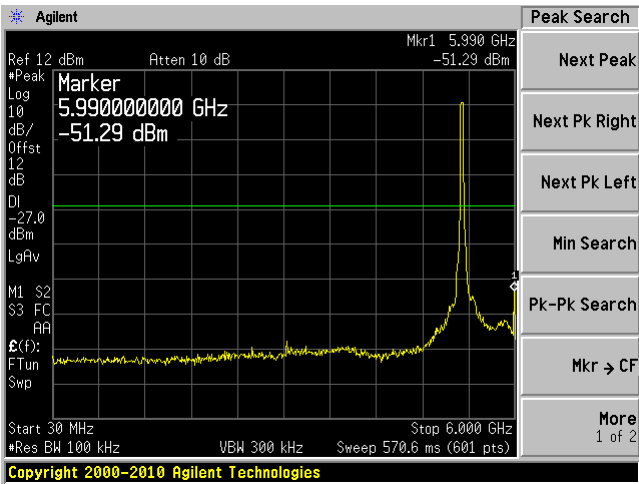


Chain J1, Plot: 4500 MHz – 5150 MHz-Ave

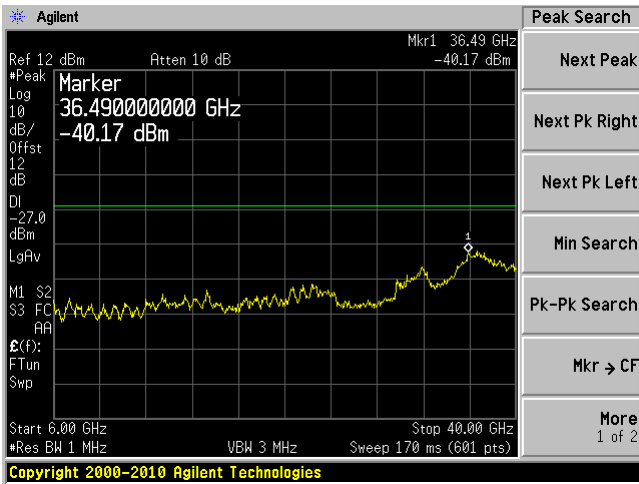


802.11n-HT40, High Channel 5310 MHz

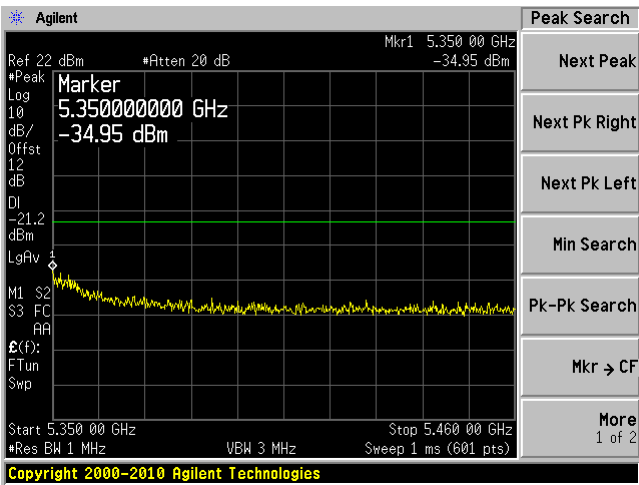
Chain J0, Plot: 30 MHz – 6 GHz



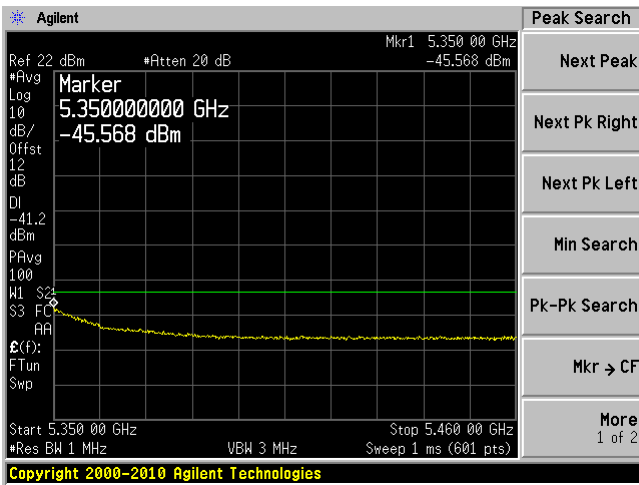
Chain J0, Plot: 6 GHz – 40 GHz



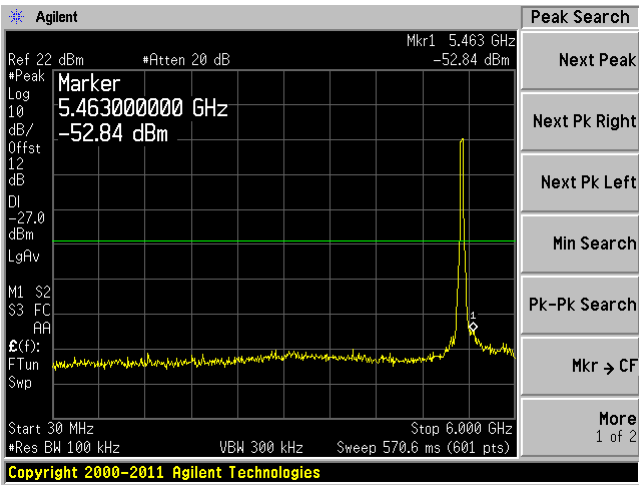
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



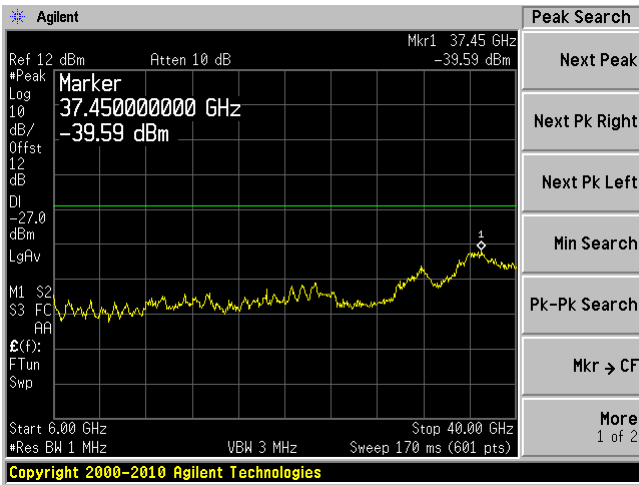
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



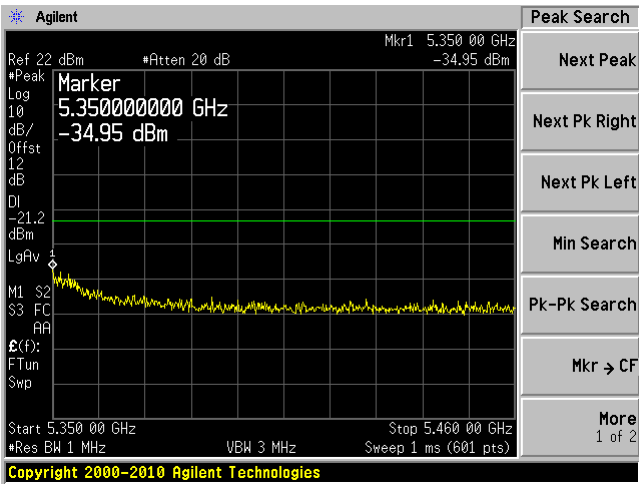
Chain J1, Plot: 30 MHz – 6 GHz



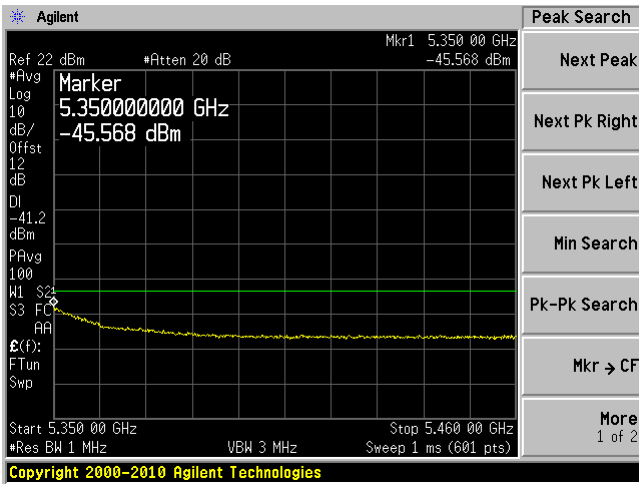
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz-Peak



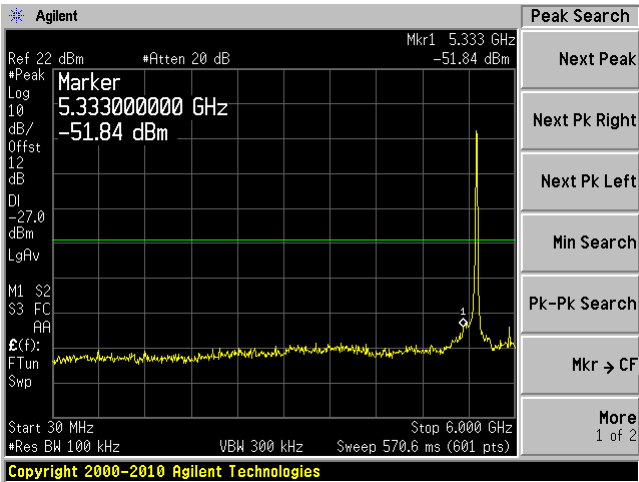
Chain J1, Plot: 5350MHz – 5460 MHz-Ave



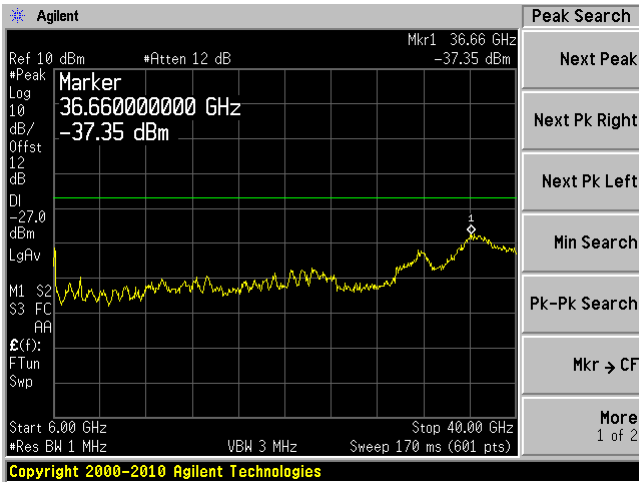
5470-5725 MHz Band

802.11a, Low Channel, 5500 MHz

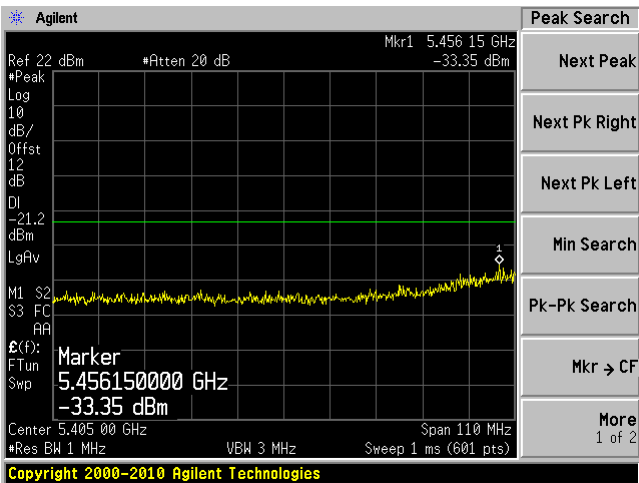
Chain J0, Plot: 30 MHz – 6 GHz



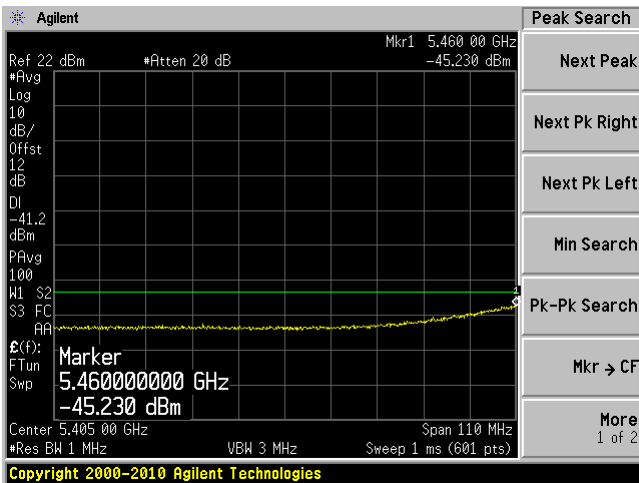
Chain J0, Plot: 6 GHz – 40 GHz



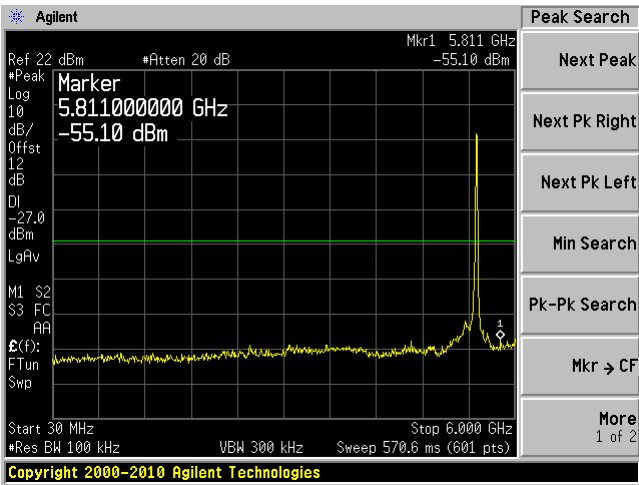
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



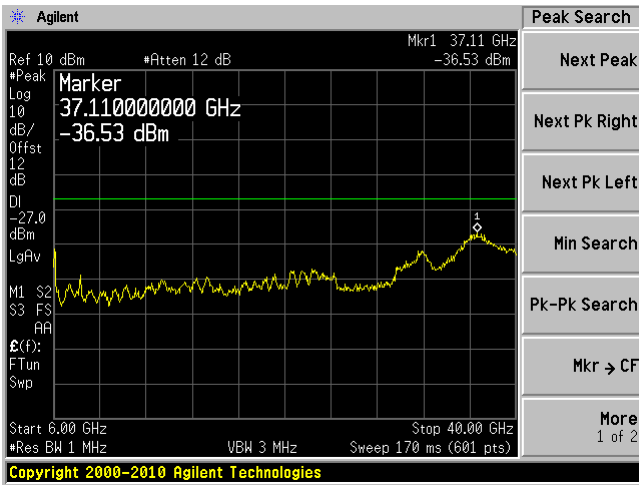
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



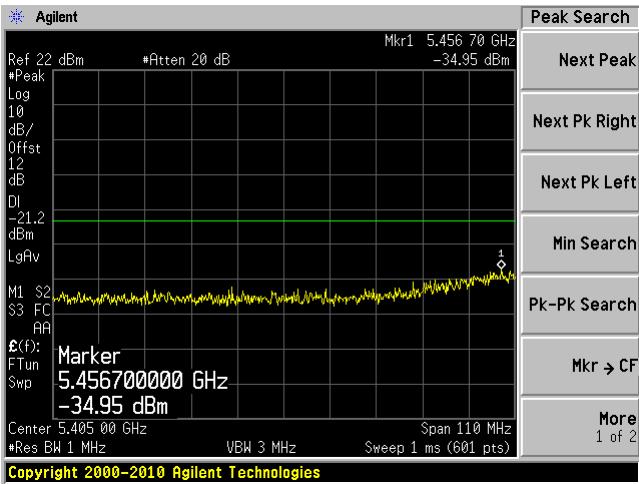
Chain J1, Plot: 30 MHz – 6 GHz



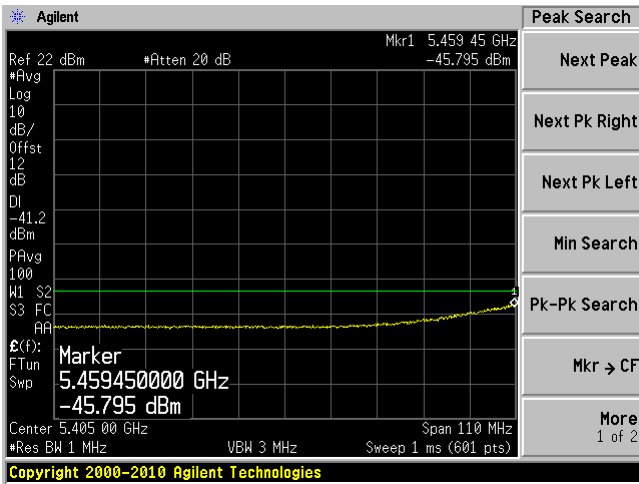
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz-Peak

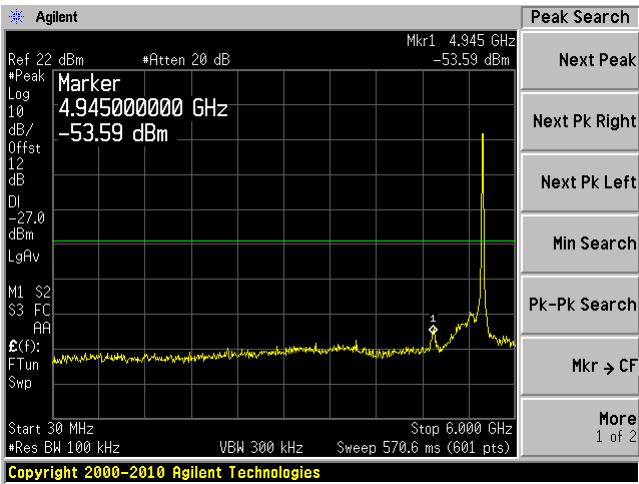


Chain J1, Plot: 5350MHz – 5460 MHz-Ave

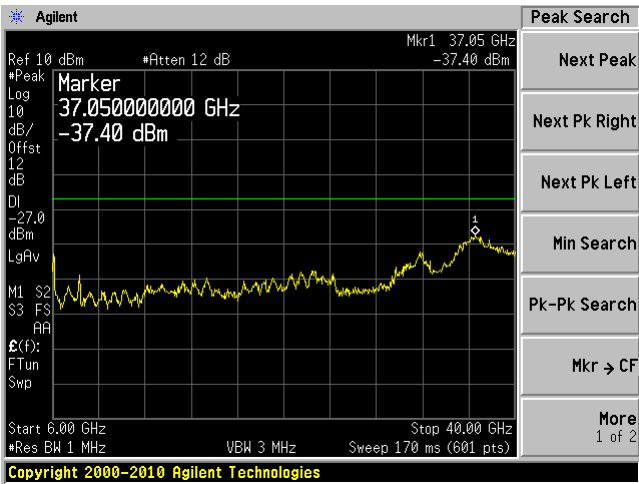


802.11a, Middle Channel, 5580 MHz

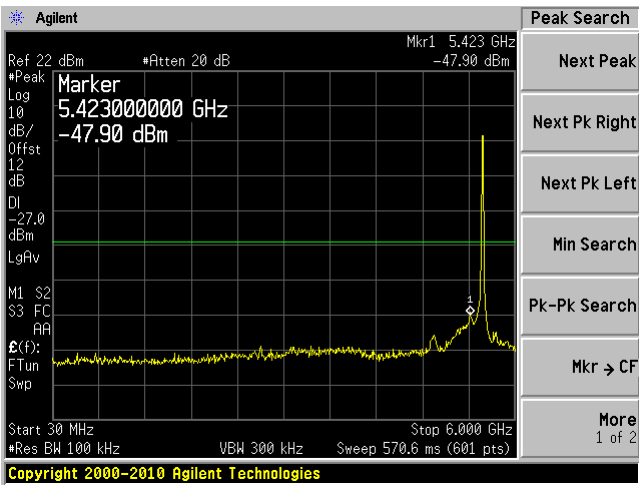
Chain J0, Plot: 30 MHz – 6 GHz



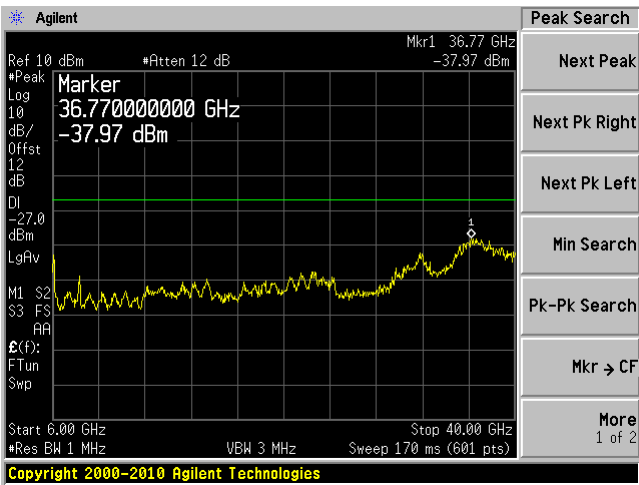
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

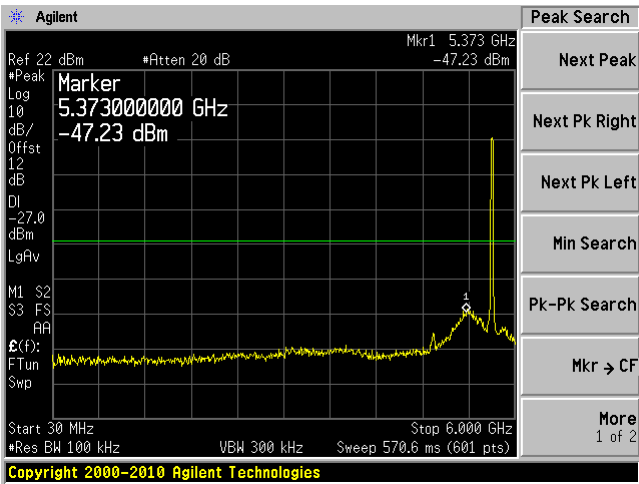


Chain J1, Plot: 6 GHz – 40 GHz

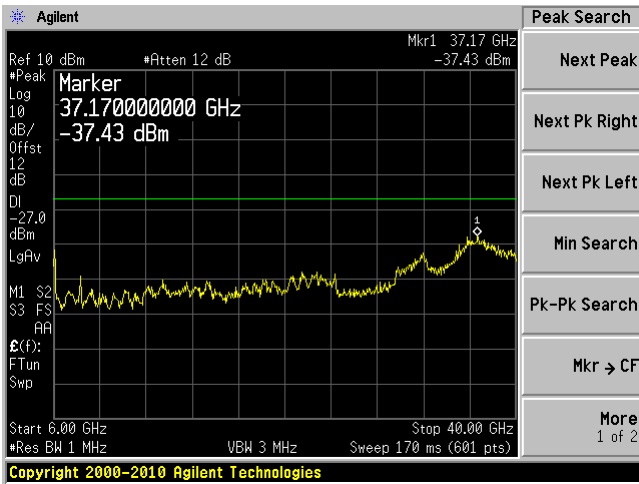


802.11a, High Channel, 5700 MHz

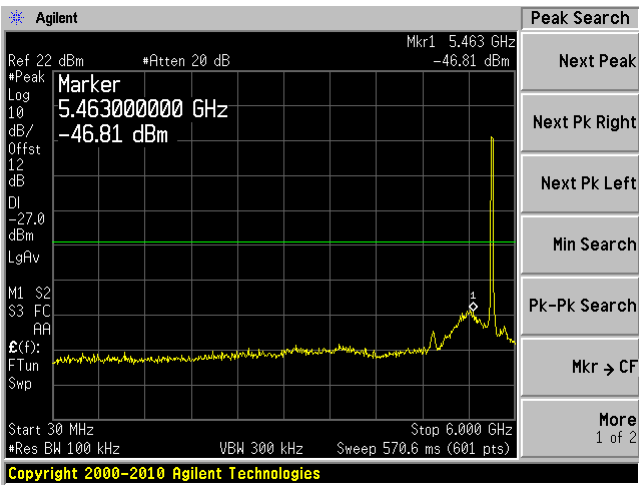
Chain J0, Plot: 30 MHz – 6 GHz



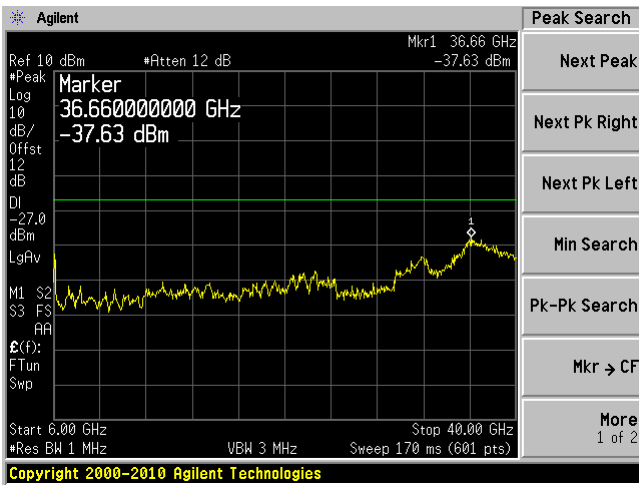
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

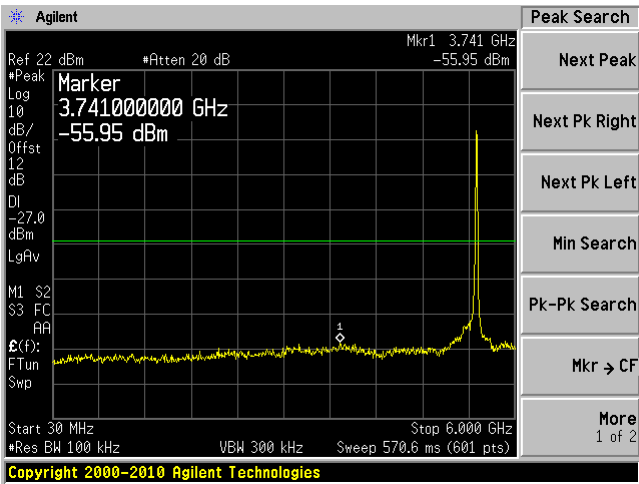


Chain J1, Plot: 6 GHz – 40 GHz

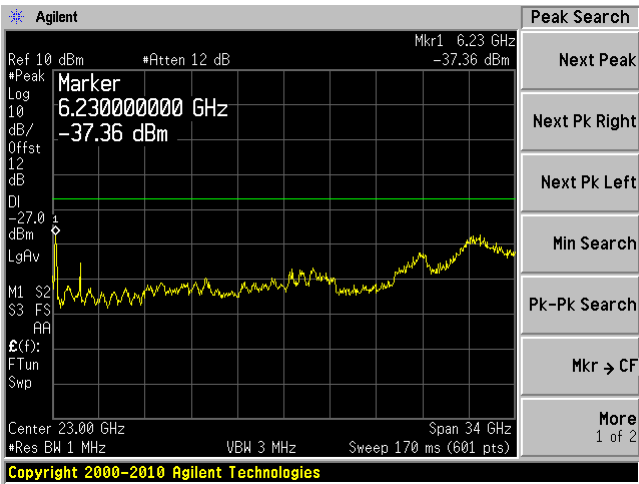


802.11n-HT 20, Low Channel 5500 MHz

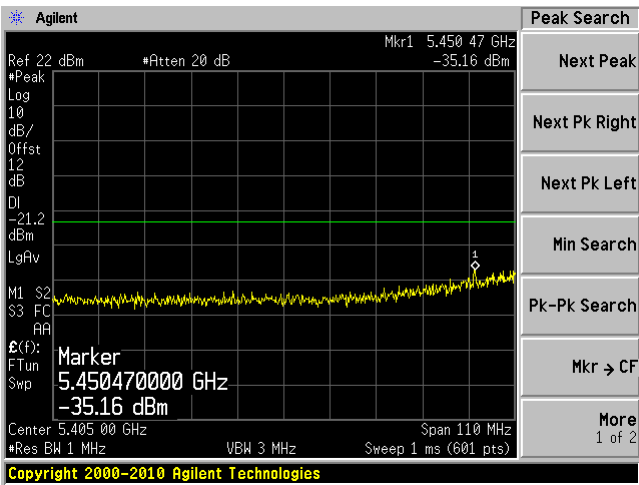
Chain J0, Plot: 30 MHz – 6 GHz



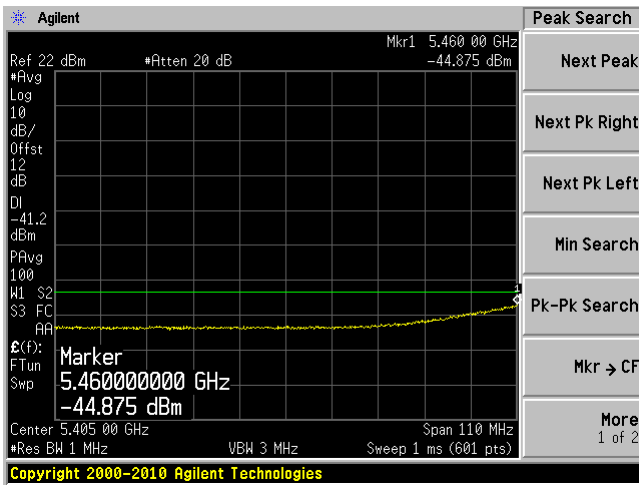
Chain J0, Plot: 6 GHz – 40 GHz



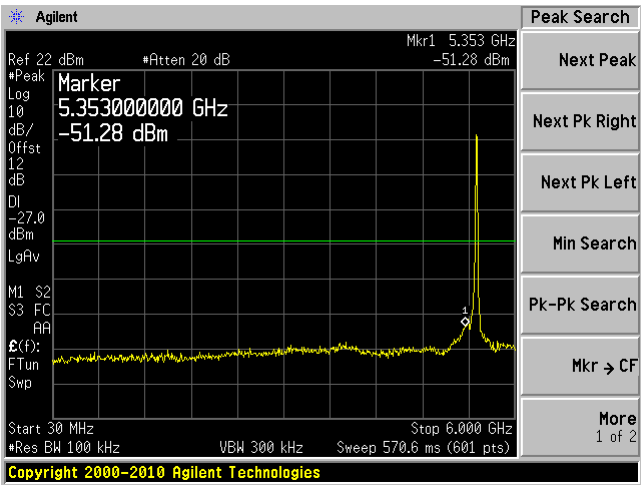
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



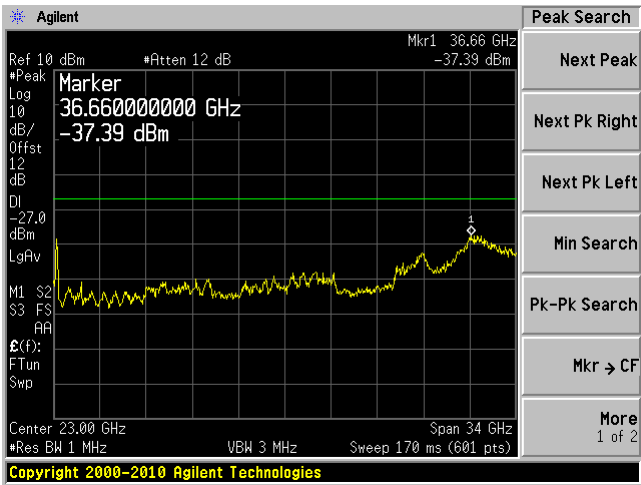
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



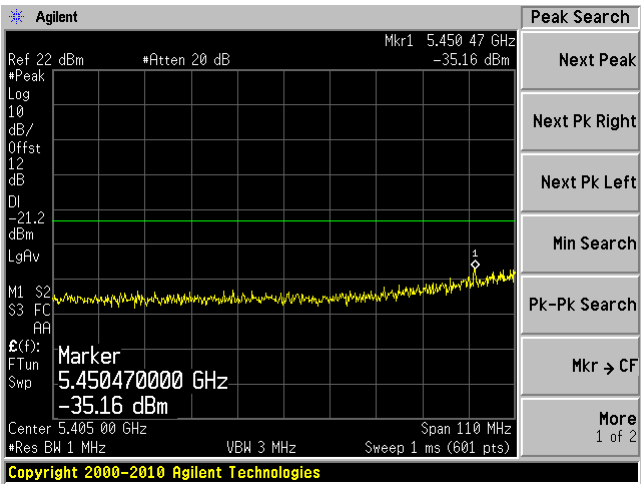
Chain J1, Plot: 30 MHz – 6 GHz



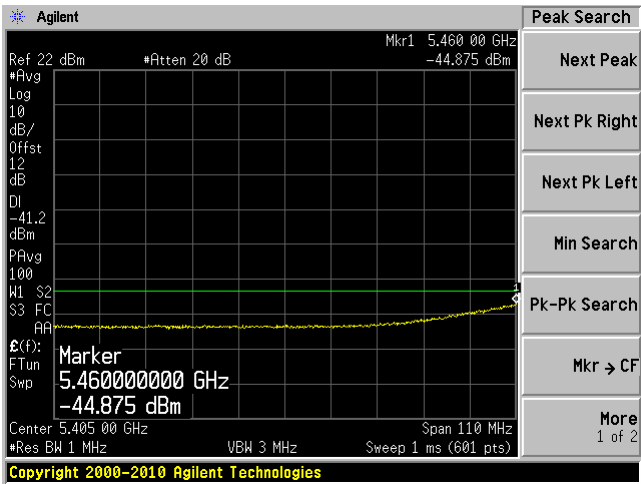
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz-Peak

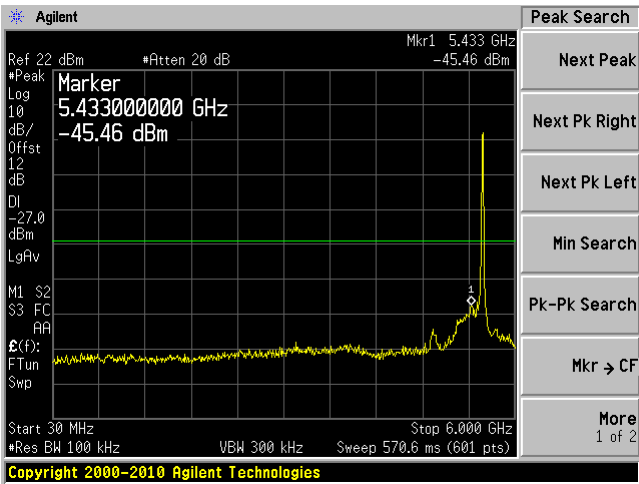


Chain J1, Plot: 5350MHz – 5460 MHz-Ave

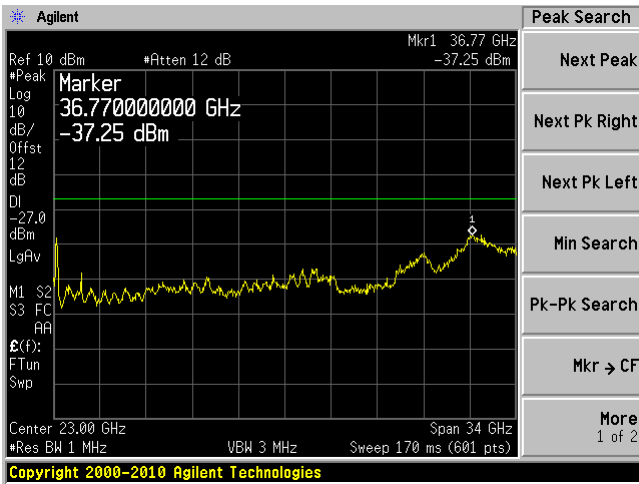


802.11n-HT20, Middle Channel 5580 MHz

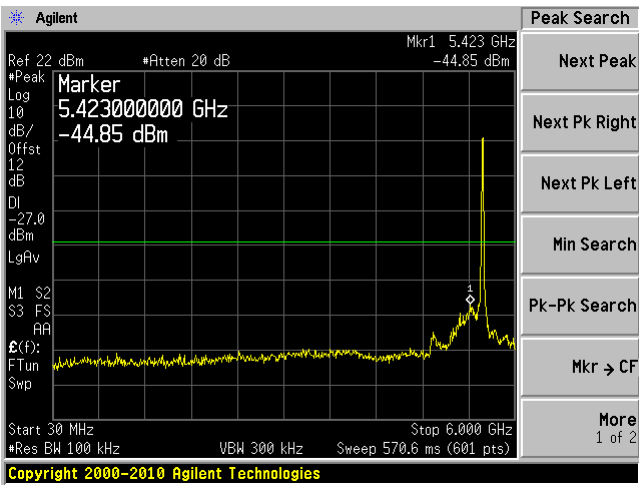
Chain J0, Plot: 30 MHz – 6 GHz



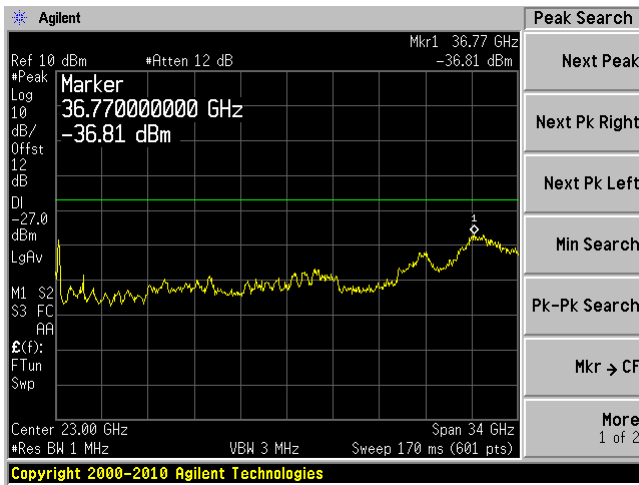
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

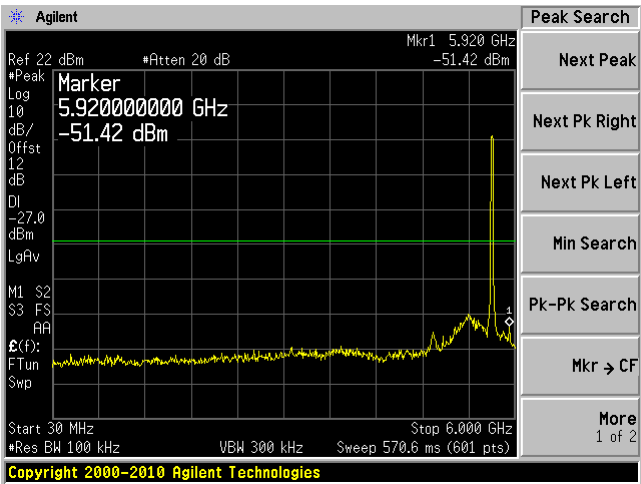


Chain J1, Plot: 6 GHz – 40 GHz

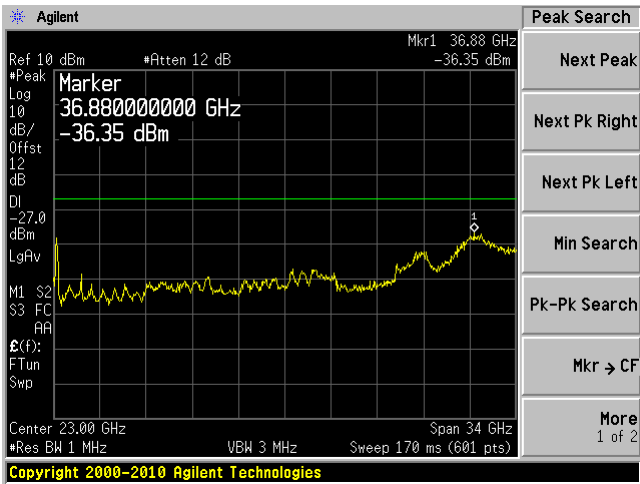


802.11n-HT20, High Channel 5700 MHz

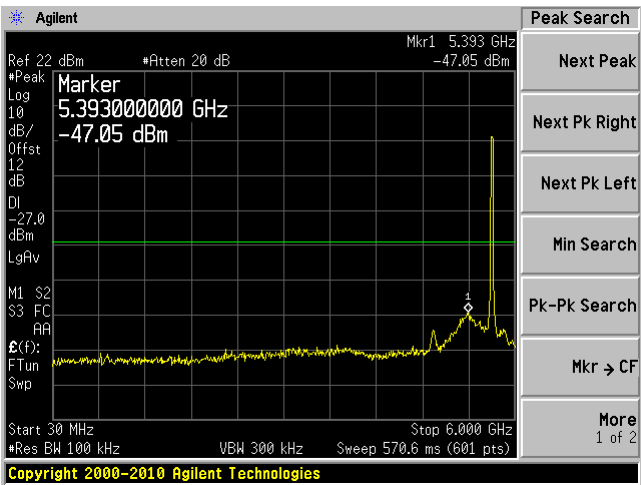
Chain J0, Plot: 30 MHz – 6 GHz



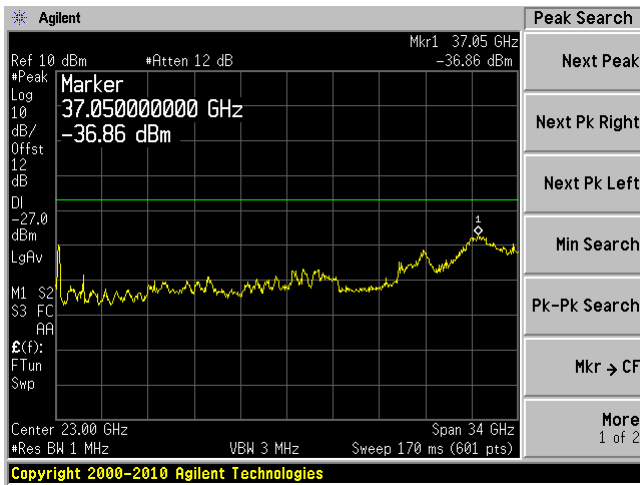
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

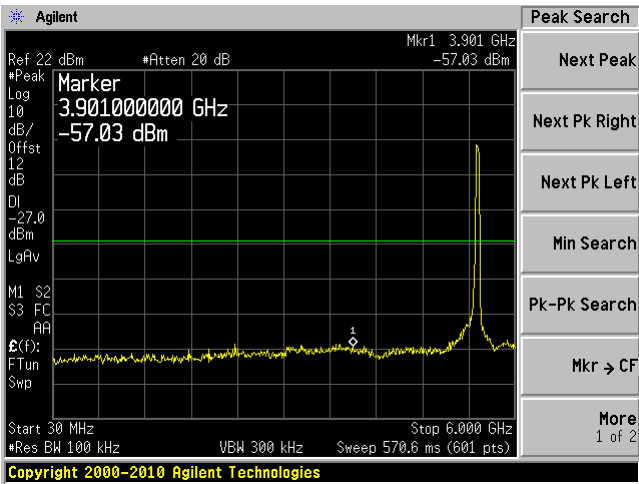


Chain J1, Plot: 6 GHz – 40 GHz

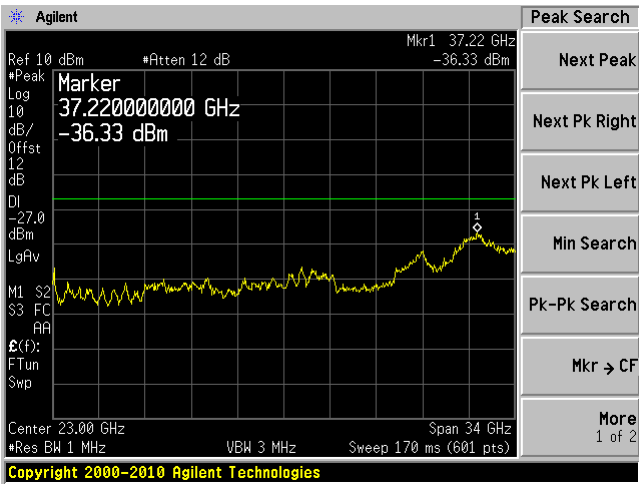


802.11n-HT40, Low Channel 5510 MHz

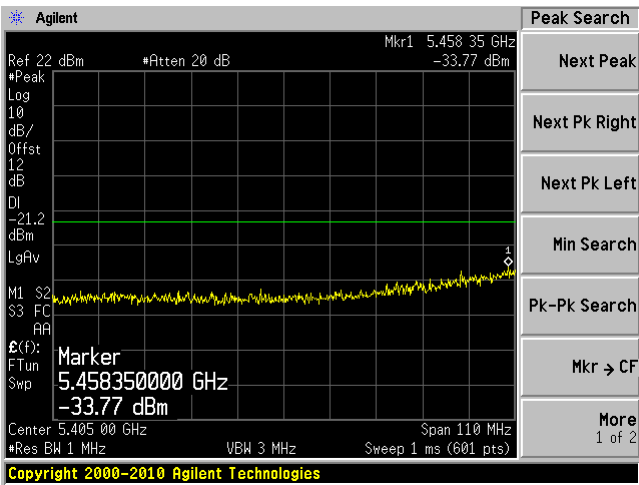
Chain J0, Plot: 30 MHz – 6 GHz



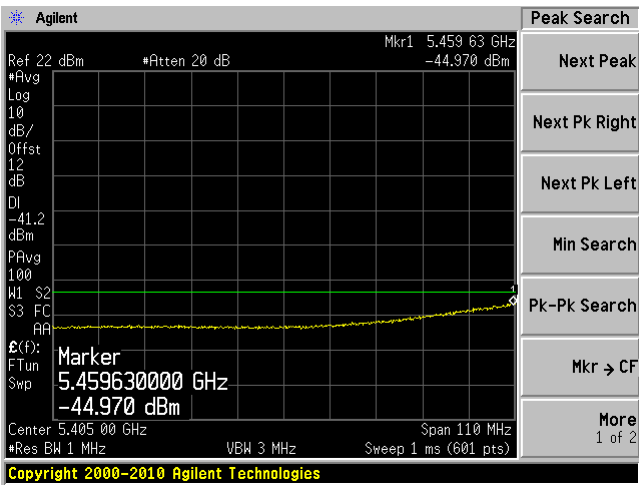
Chain J0, Plot: 6 GHz – 40 GHz



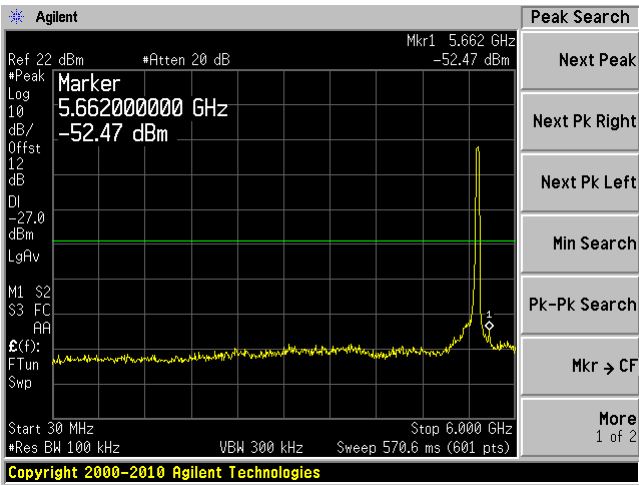
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



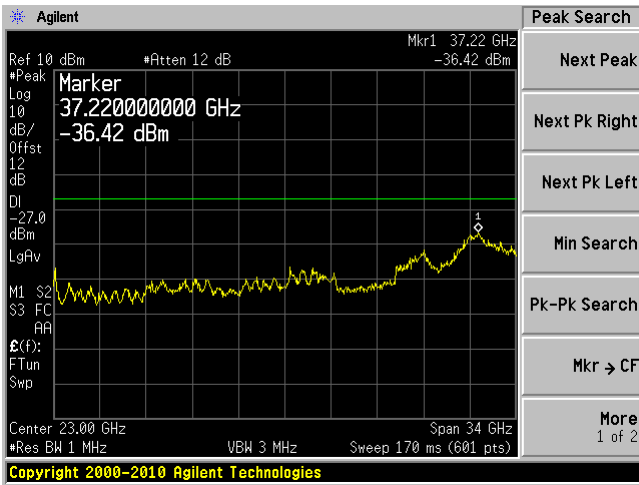
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



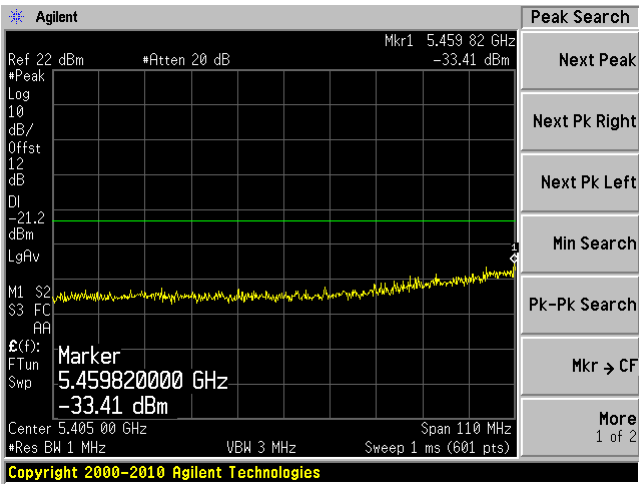
Chain J1, Plot: 30 MHz – 6 GHz



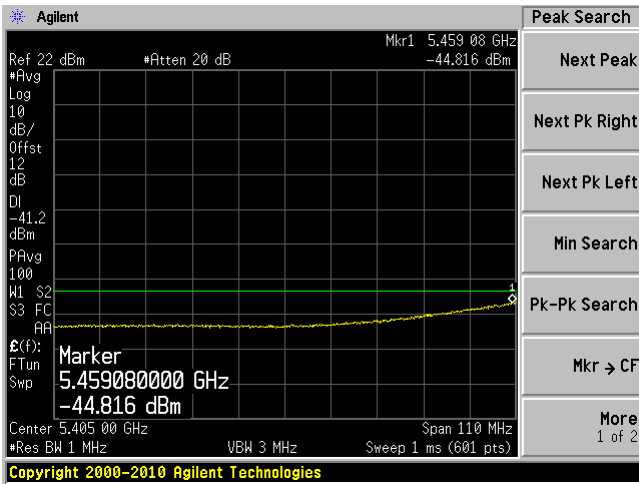
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz-Peak

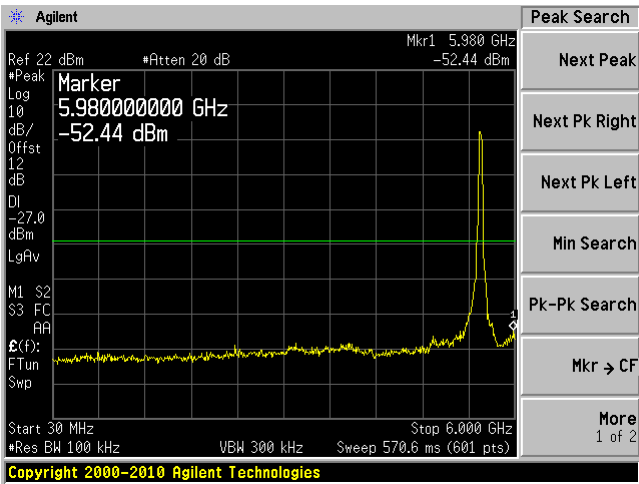


Chain J1, Plot: 5350MHz – 5460 MHz-Ave

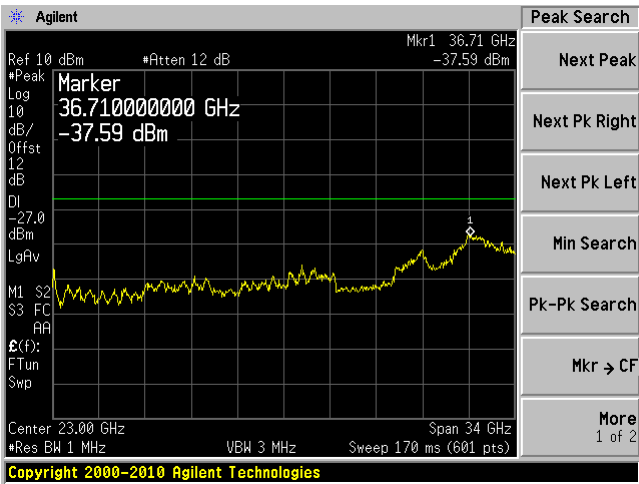


802.11n-HT40, Middle Channel 5550 MHz

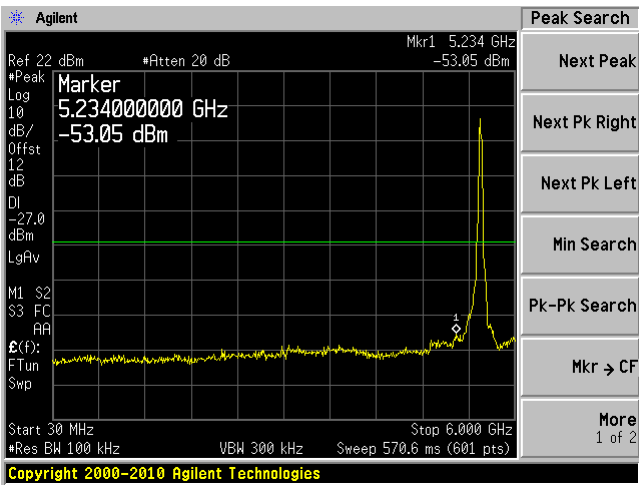
Chain J0, Plot: 30 MHz – 6 GHz



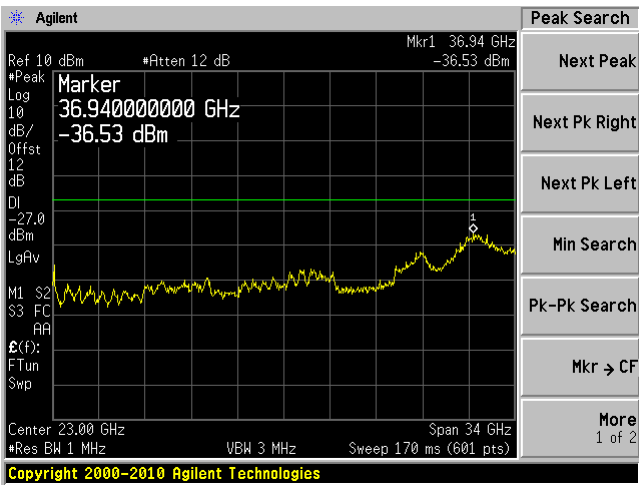
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

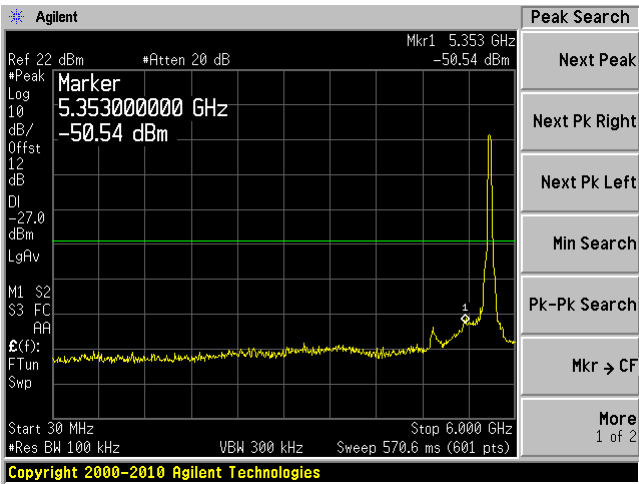


Chain J1, Plot: 6 GHz – 40 GHz

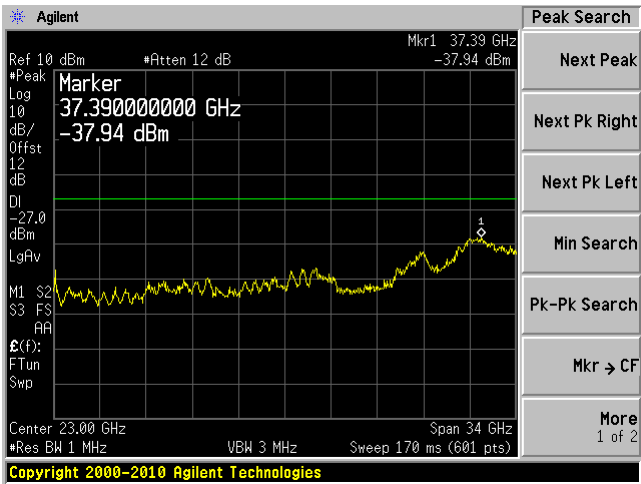


802.11n-HT40, High Channel 5670 MHz

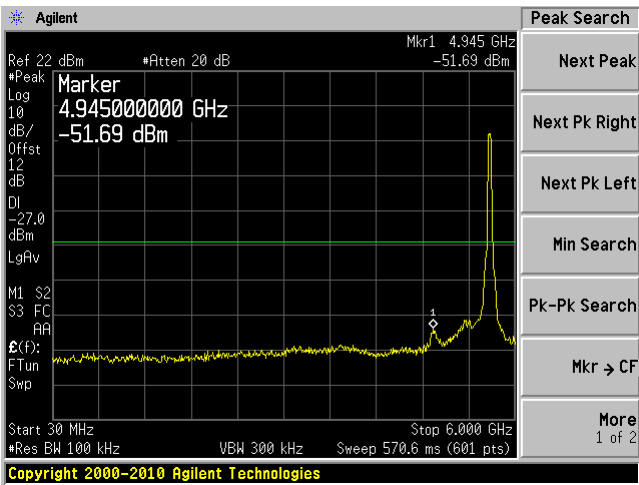
Chain J0, Plot: 30 MHz – 6 GHz



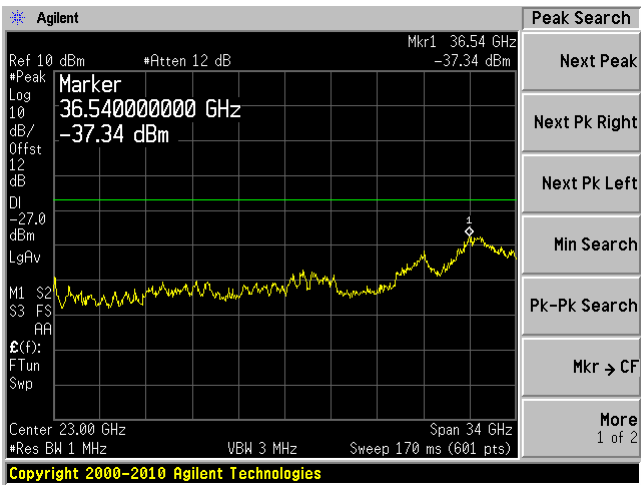
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

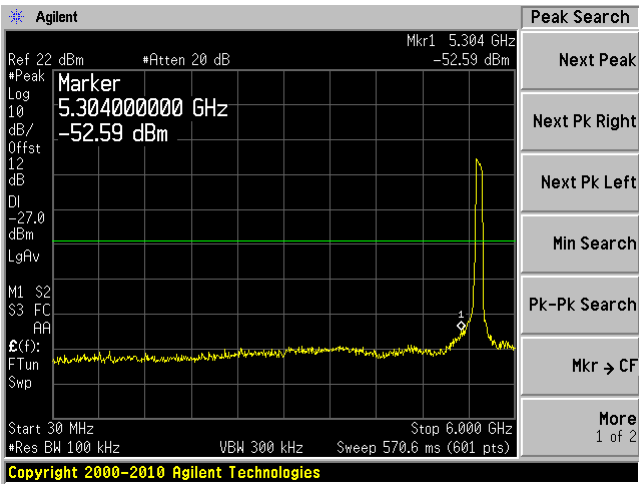


Chain J1, Plot: 6 GHz – 40 GHz

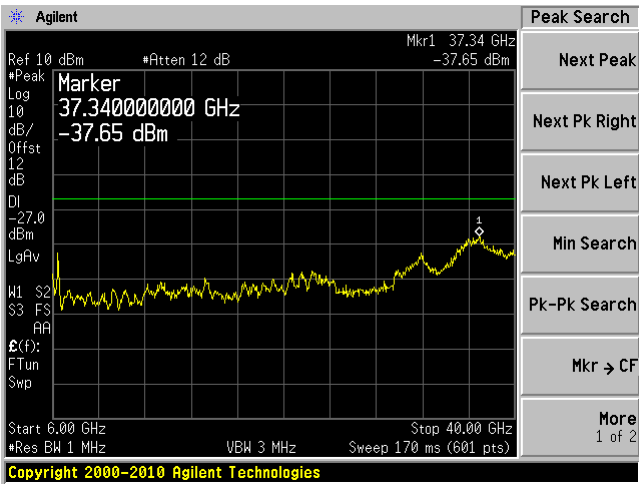


802.11ac-80, Low Channel 5530 MHz

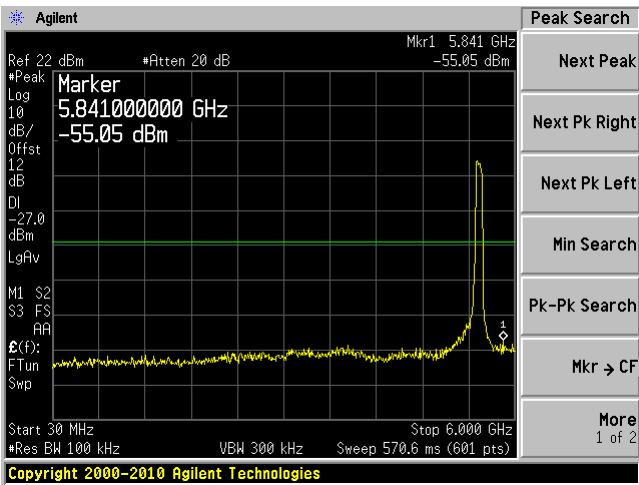
Chain J0, Plot: 30 MHz – 6 GHz



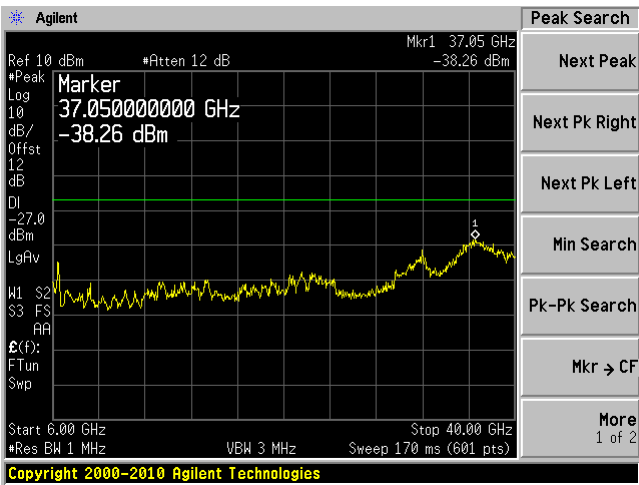
Chain J0, Plot: 6 GHz – 40 GHz



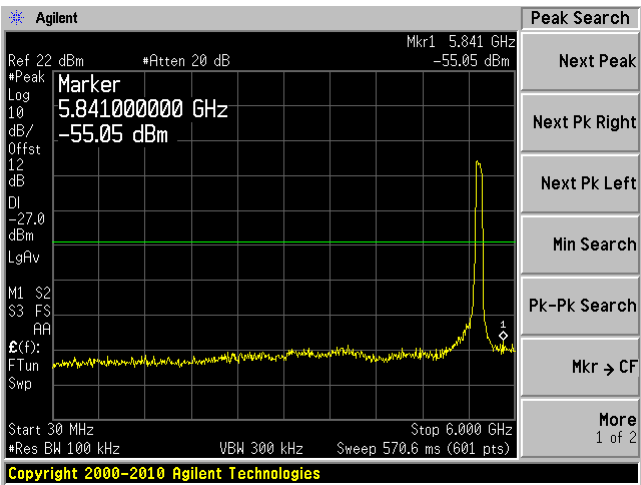
Chain J0, Plot: 5350MHz – 5460 MHz-Peak



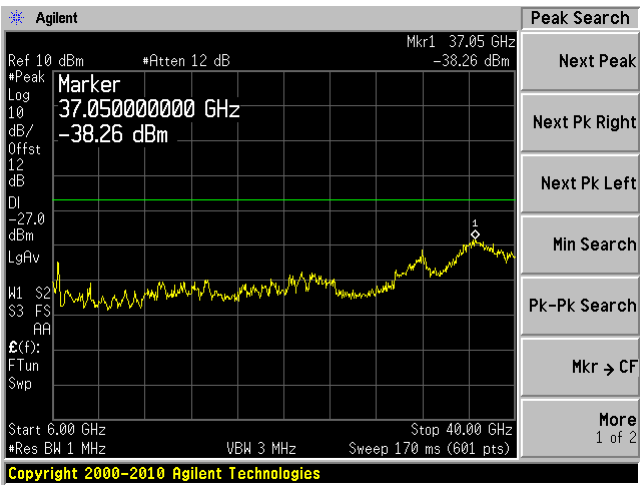
Chain J0, Plot: 5350MHz – 5460 MHz-Ave



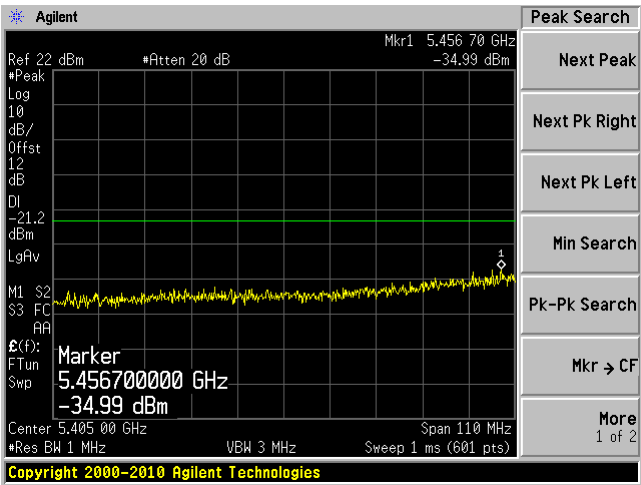
Chain J1, Plot: 30 MHz – 6 GHz



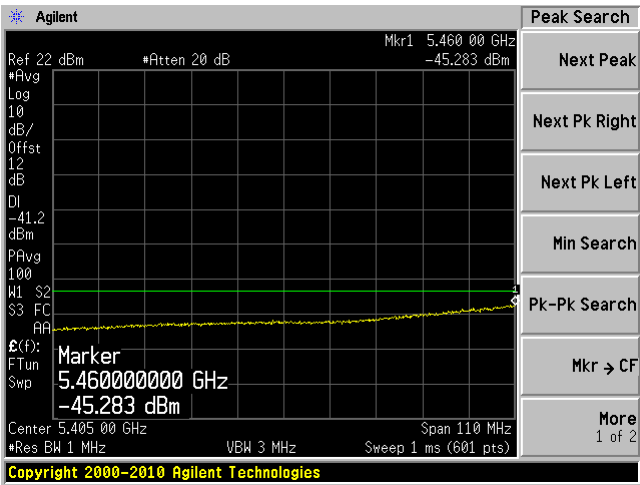
Chain J1, Plot: 6 GHz – 40 GHz



Chain J0, Plot: 5350MHz – 5460 MHz-Peak

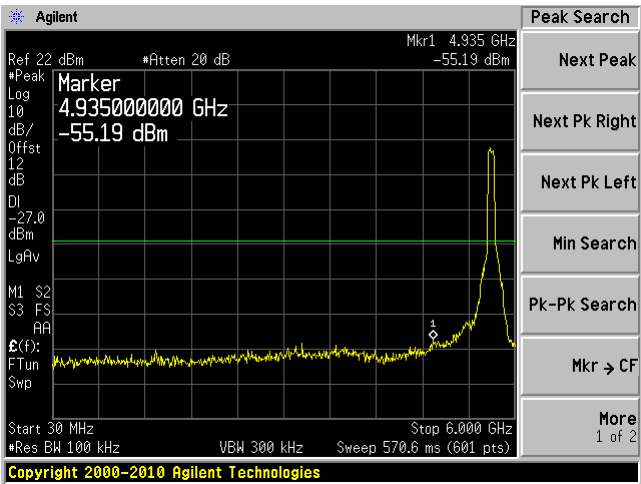


Chain J0, Plot: 5350MHz – 5460 MHz-Ave

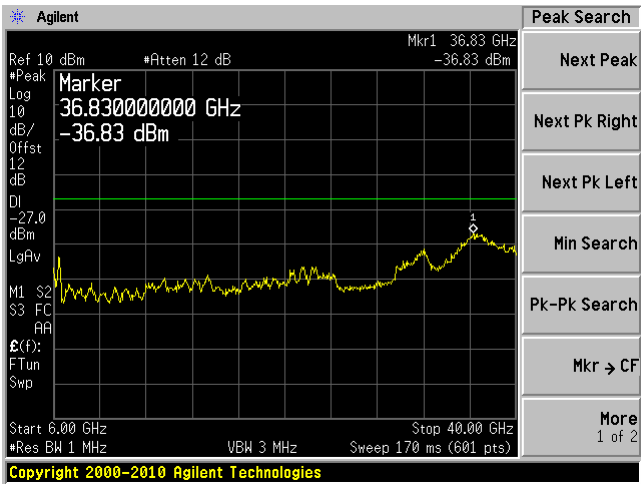


802.11ac-80, High Channel 5690 MHz

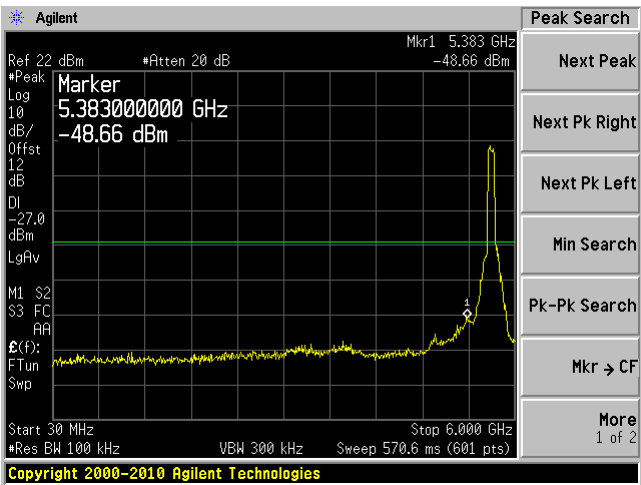
Chain J0, Plot: 30 MHz – 6 GHz



Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz



Chain J1, Plot: 6 GHz – 40 GHz

