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

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Prepared By:	Chen Ge
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Reviewed By:	Bo Li Test Engineer

Bay Area Compliance Laboratories Corp.
1274 Anvilwood Avenue,
Sunnyvale, CA 94089, USA
Tel: (408) 732-9162
Fax: (408) 732-9164

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1403261-407 W52	Original Report	2014-06-04

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.

The objective is to determine compliance with FCC Part 15.407 and IC RSS-210 rules for Antenna Requirements, Conducted Emissions, Occupied Bandwidth, Output Power, Power Spectral Density, Radiated and Conducted Spurious Emissions, and Band Edge. Please refer to the detail antenna list in the antenna requirement section.

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.

The following calculation follows the procedures as set forth in clause 7.2.3, ETSI TR 100 028-1 V1.4.1 (2001-12), the expression of Uncertainty in Radiated RF Testing is in accordance to ISO/IEC 17025 and TR 100 028-1 V1.4.1 (2001-12).

The expanded Measurement Uncertainty value having a confidence factor of 95%, is within a range of 5.48 dB. This means that the value of conducted RF carrier power test will be within +/- 2.74 dB of the measuring radiated emissions power versus the expected value.
The expected value is defined as the power at the antenna of the Transmitter under Test.

1.7 Test Facility

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

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

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

4- A Product Certification Body accredited to **ISO Guide 65: 1996** by **A2LA** to certify:
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 and FCC KDB 558074 D01 DTS Meas Guidance v03r01.

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

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PPSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

The test utility used was *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 Special Equipment

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

2.4 Equipment Modifications

No modifications were made to the EUT.

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

Results reported relate only to the product tested.

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 RSS-Gen §6.1	Receiver Spurious Radiated Emissions	Compliant
FCC §2.1051, §15.407(b) IC RSS-210 §A9.2	Spurious Emissions at Antenna Terminals	Compliant

4 FCC §15.407(f), §2.1091 & 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 (min)
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	$0.158\ f^{0.5}$	$4.21 \times 10\ -4\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000 / f^{1.2}$

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

W52 Band:

Maximum peak output power at antenna input terminal (dBm):	16.94
Maximum peak output power at antenna input terminal (mW):	49.545
Prediction distance (cm):	20
Prediction frequency (MHz):	5190
Maximum Antenna Gain, typical (dBi):	3.5
Maximum Antenna Gain (numeric):	2.2387
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.02206
Power density of prediction frequency at 20.0 cm (W/m^2):	0.2206
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.02206 mW/cm^2 (0.2206 W/m^2). Limit is 1.0 mW/cm^2 (10 W/m^2).

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.

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

The antenna consists of non-standard (UFL) connectors with less 6 dBi gain; therefore, it complies with the antenna requirement. Please refer to the internal photos.

6 FCC §15.207 & IC RSS-Gen §7.2.4 - AC Power Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

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 abattery 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

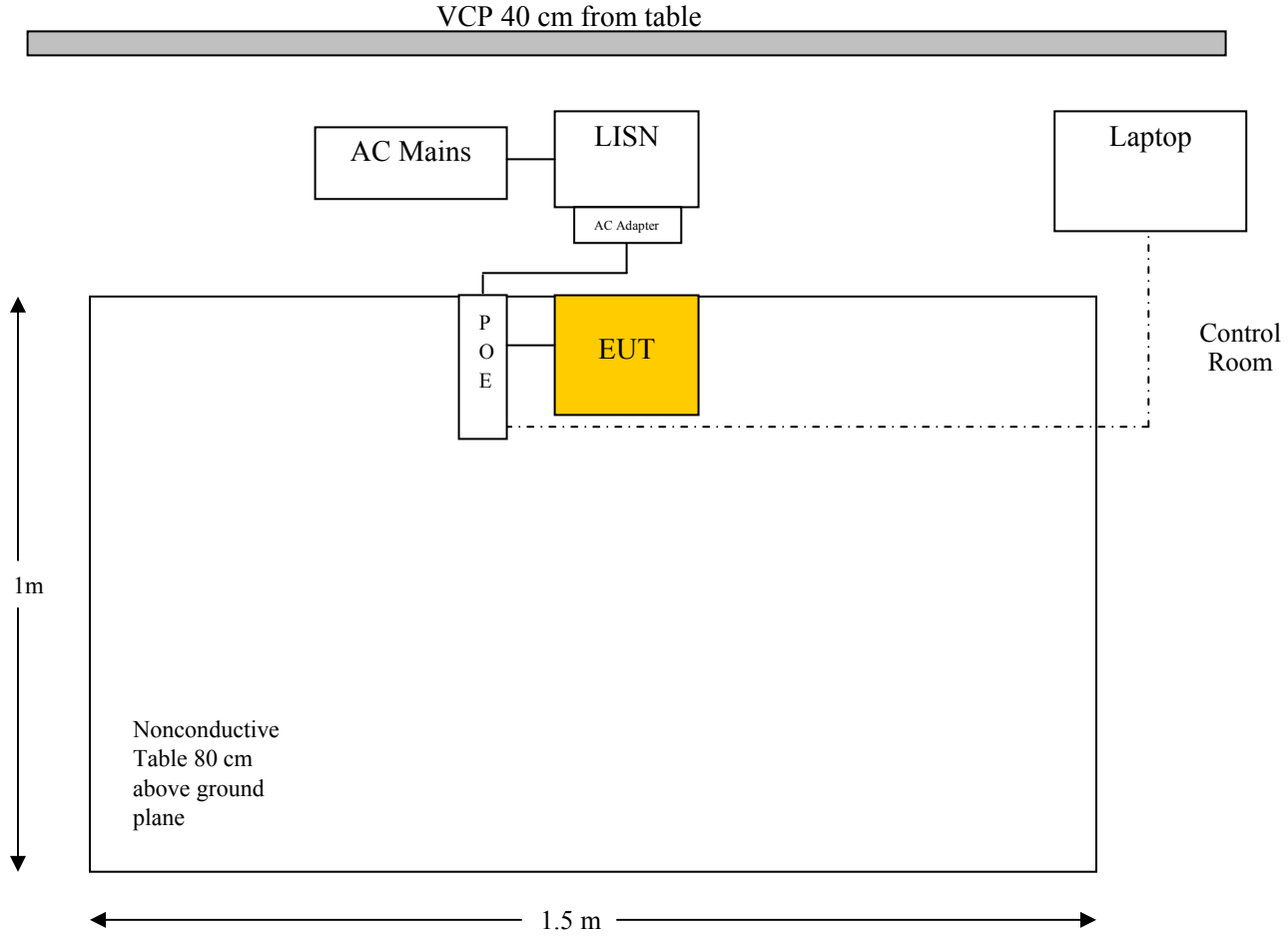
During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cord of the support equipment was connected to LISN-2.

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:

Margin = Corrected Amplitude - 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 ºC
Relative Humidity:	52 %
ATM Pressure:	101.89 kPa

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

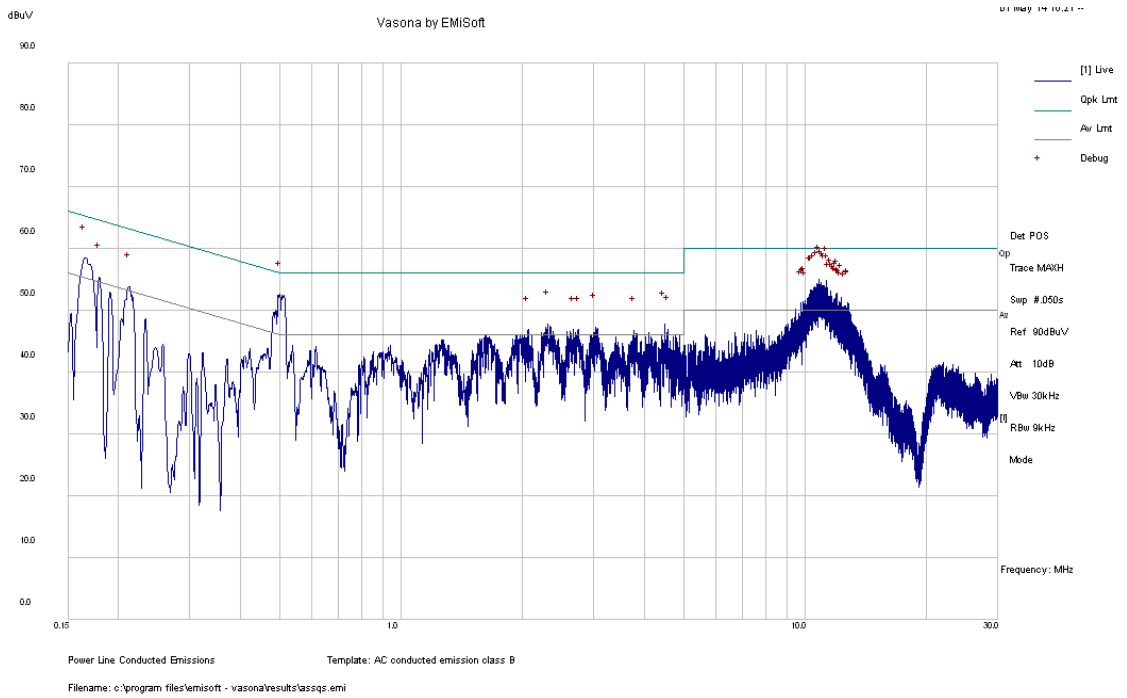
6.8 Summary of Test Results

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

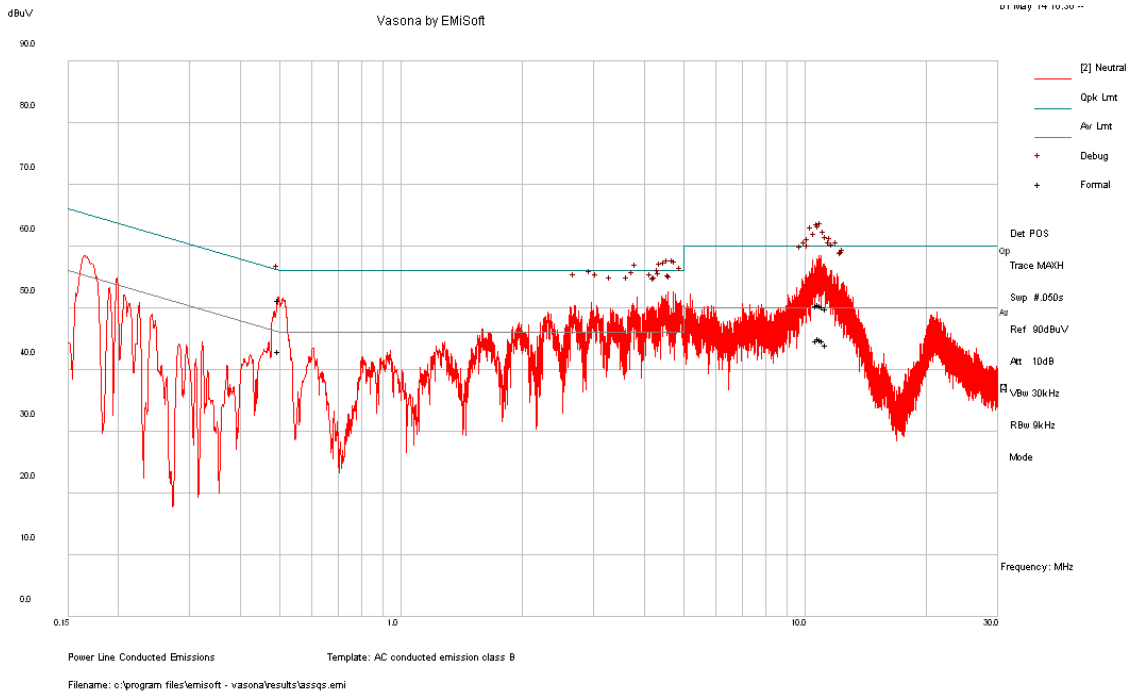
120 V, 60 Hz – Line, POE



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

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

As per FCC §15.209(a) and IC RSS-210: Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

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

Note 1: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.407(b)(1) and IC RSS-210, For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

7.2 Test Setup

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

Margin = Corrected Amplitude – 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	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	2014-03-28	1 year

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

7.6 Test Environmental Conditions

Temperature:	22 ºC
Relative Humidity:	52 %
ATM Pressure:	101.9 kPa

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

7.7 Summary of Test Results

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

5150-5250 MHz

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-7.04	98.4675	Vertical	Below 1 GHz
-15.408	15690	Horizontal	Above 1 GHz

7.8 Radiated Emissions Test Results

1) 30 MHz – 1 GHz, Measured at 3 meters, EUT antenna port was terminated

5150-5250 MHz Band, Quasi-Peak Measurements @ 3m, worst case

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
35.333	29.95	133	V	26	40	-10.05
98.4675	36.46	100	V	277	43.5	-7.04
47.583	30.03	115	V	247	40	-9.97
60.21925	31.69	157	V	68	40	-8.31
101.9058	31.6	116	V	207	43.5	-11.9
143.271	29.59	109	V	245	43.5	-13.91

Note: All 30 MHz – 1 GHz spurious are digital, other emissions are on the noise floor level. The worst case result was reported.

2) 1–40 GHz, Measured at 3 meters, EUT antenna port was terminated

Note: EUT is compliant with restricted band limit in non-restricted band, which is lower than the limit in non-restricted band

5150-5250 MHz Band

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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 5180 MHz, measured at 3 meters											
5150	43.64	0	100	V	33.426	2.82	34.73	45.156	74	-28.844	Peak
5150	43.9	0	100	H	33.446	2.82	34.73	45.436	74	-28.564	Peak
5150	29.71	0	100	V	33.426	2.82	34.73	31.226	54	-22.774	Ave
5150	29.58	0	100	H	33.446	2.82	34.73	31.116	54	-22.884	Ave
10360	42.91	0	100	V	38.343	4.09	33.87	51.473	74	-22.527	Peak
10360	42.63	0	100	H	38.343	4.09	33.87	51.193	74	-22.807	Peak
10360	28.11	0	100	V	38.343	4.09	33.87	36.673	54	-17.327	Ave
10360	28.13	0	100	H	38.343	4.09	33.87	36.693	54	-17.307	Ave
15540	43.97	0	100	V	37.928	4.93	34.34	52.488	74	-21.512	Peak
15540	43.98	0	100	H	37.928	4.93	34.34	52.498	74	-21.502	Peak
15540	29.22	0	100	V	37.928	4.93	34.34	37.738	54	-16.262	Ave
15540	29.2	0	100	H	37.928	4.93	34.34	37.718	54	-16.282	Ave
20720	42.55	0	100	V	34.6	5.79	33.97	48.97	74	-25.03	Peak
20720	42.98	0	100	H	34.6	5.79	33.97	49.4	74	-24.6	Peak
20720	28.21	0	100	V	34.6	5.79	33.97	34.63	54	-19.37	Ave
20720	28.18	0	100	H	34.6	5.79	33.97	34.6	54	-19.4	Ave
Middle Channel 5200 MHz, measured at 3 meters											
10400	43.41	0	100	V	38.418	4.09	33.87	52.048	74	-21.952	Peak
10400	42.77	0	100	H	38.418	4.09	33.87	51.408	74	-22.592	Peak
10400	28.49	0	100	V	38.418	4.09	33.87	37.128	54	-16.872	Ave
10400	28.48	0	100	H	38.418	4.09	33.87	37.118	54	-16.882	Ave
15600	43.4	0	100	V	37.914	4.93	34.34	51.904	74	-22.096	Peak
15600	44.03	0	100	H	37.914	4.93	34.34	52.534	74	-21.466	Peak
15600	28.99	0	100	V	37.914	4.93	34.34	37.494	54	-16.506	Ave
15600	29.21	0	100	H	37.914	4.93	34.34	37.714	54	-16.286	Ave
20800	42.05	0	100	V	34.6	5.79	33.97	48.47	74	-25.53	Peak
20800	42.25	0	100	H	34.6	5.79	33.97	48.67	74	-25.33	Peak
20800	27.44	0	100	V	34.6	5.79	33.97	33.86	54	-20.14	Ave
20800	27.36	0	100	H	34.6	5.79	33.97	33.78	54	-20.22	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 5240 MHz, measured at 3 meters											
5350	44.41	0	100	V	33.628	2.82	34.73	46.128	74	-27.872	Peak
5350	43.42	0	100	H	33.688	2.82	34.73	45.198	74	-28.802	Peak
5350	29.37	0	100	V	33.628	2.82	34.73	31.088	54	-22.912	Ave
5350	29.38	0	100	H	33.688	2.82	34.73	31.158	54	-22.842	Ave
10480	43.21	0	100	V	38.418	4.09	33.87	51.848	74	-22.152	Peak
10480	42.98	0	100	H	38.418	4.09	33.87	51.618	74	-22.382	Peak
10480	28.49	0	100	V	38.418	4.09	33.87	37.128	54	-16.872	Ave
10480	28.51	0	100	H	38.418	4.09	33.87	37.148	54	-16.852	Ave
15720	43.6	0	100	V	37.902	4.93	34.34	52.092	74	-21.908	Peak
15720	4.378	0	100	H	37.902	4.93	34.34	12.87	74	-61.13	Peak
15720	29.07	0	100	V	37.902	4.93	34.34	37.562	54	-16.438	Ave
15720	29.03	0	100	H	37.902	4.93	34.34	37.522	54	-16.478	Ave
20960	43.64	0	100	V	34.6	5.79	33.97	50.06	74	-23.94	Peak
20960	43.44	0	100	H	34.6	5.79	33.97	49.86	74	-24.14	Peak
20960	28.98	0	100	V	34.6	5.79	33.97	35.4	54	-18.6	Ave
20960	28.87	0	100	H	34.6	5.79	33.97	35.29	54	-18.71	Ave

.

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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 5180 MHz, measured at 3 meters											
5150	43.79	0	100	V	33.426	2.82	34.73	45.306	74	-28.694	Peak
5150	44.08	0	100	H	33.446	2.82	34.73	45.616	74	-28.384	Peak
5150	30.17	0	100	V	33.426	2.82	34.73	31.686	54	-22.314	Ave
5150	30.08	0	100	H	33.446	2.82	34.73	31.616	54	-22.384	Ave
10360	43.2	0	100	V	38.343	4.09	33.87	51.763	74	-22.237	Peak
10360	42.97	0	100	H	38.343	4.09	33.87	51.533	74	-22.467	Peak
10360	28.54	0	100	V	38.343	4.09	33.87	37.103	54	-16.897	Ave
10360	28.56	0	100	H	38.343	4.09	33.87	37.123	54	-16.877	Ave
15540	42.43	0	100	V	37.928	4.93	34.34	50.948	74	-23.052	Peak
15540	43.74	0	100	H	37.928	4.93	34.34	52.258	74	-21.742	Peak
15540	28.33	0	100	V	37.928	4.93	34.34	36.848	54	-17.152	Ave
15540	28.64	0	100	H	37.928	4.93	34.34	37.158	54	-16.842	Ave
20720	42.12	0	100	V	34.6	5.79	33.97	48.54	74	-25.46	Peak
20720	42.4	0	100	H	34.6	5.79	33.97	48.82	74	-25.18	Peak
20720	27.74	0	100	V	34.6	5.79	33.97	34.16	54	-19.84	Ave
20720	28.04	0	100	H	34.6	5.79	33.97	34.46	54	-19.54	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)	
Middle Channel 5200 MHz, measured at 3 meters											
10400	44.24	0	100	V	38.418	4.09	33.87	52.878	74	-21.122	Peak
10400	44.49	0	100	H	38.418	4.09	33.87	53.128	74	-20.872	Peak
10400	29.82	0	100	V	38.418	4.09	33.87	38.458	54	-15.542	Ave
10400	29.93	0	100	H	38.418	4.09	33.87	38.568	54	-15.432	Ave
15600	44.1	0	100	V	37.914	4.93	34.34	52.604	74	-21.396	Peak
15600	43.7	0	100	H	37.914	4.93	34.34	52.204	74	-21.796	Peak
15600	29.54	0	100	V	37.914	4.93	34.34	38.044	54	-15.956	Ave
15600	29.3	0	100	H	37.914	4.93	34.34	37.804	54	-16.196	Ave
20800	41.98	0	100	V	34.6	5.79	33.97	48.4	74	-25.6	Peak
20800	42.15	0	100	H	34.6	5.79	33.97	48.57	74	-25.43	Peak
20800	27.92	0	100	V	34.6	5.79	33.97	34.34	54	-19.66	Ave
20800	27.93	0	100	H	34.6	5.79	33.97	34.35	54	-19.65	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 5240 MHz, measured at 3 meters											
5350	43.69	0	100	V	33.628	2.82	34.73	45.408	74	-28.592	Peak
5350	43.99	0	100	H	33.688	2.82	34.73	45.768	74	-28.232	Peak
5350	29.27	0	100	V	33.628	2.82	34.73	30.988	54	-23.012	Ave
5350	29.54	0	100	H	33.688	2.82	34.73	31.318	54	-22.682	Ave
10480	43.43	0	100	V	38.418	4.09	33.87	52.068	74	-21.932	Peak
10480	43.31	0	100	H	38.418	4.09	33.87	51.948	74	-22.052	Peak
10480	28.51	0	100	V	38.418	4.09	33.87	37.148	54	-16.852	Ave
10480	28.6	0	100	H	38.418	4.09	33.87	37.238	54	-16.762	Ave
15720	43.26	0	100	V	37.902	4.93	34.34	51.752	74	-22.248	Peak
15720	43.43	0	100	H	37.902	4.93	34.34	51.922	74	-22.078	Peak
15720	29.07	0	100	V	37.902	4.93	34.34	37.562	54	-16.438	Ave
15720	28.63	0	100	H	37.902	4.93	34.34	37.122	54	-16.878	Ave
20960	42.02	0	100	V	34.6	5.79	33.97	48.44	74	-25.56	Peak
20960	42.21	0	100	H	34.6	5.79	33.97	48.63	74	-25.37	Peak
20960	27.43	0	100	V	34.6	5.79	33.97	33.85	54	-20.15	Ave
20960	27.4	0	100	H	34.6	5.79	33.97	33.82	54	-20.18	Ave

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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 5190 MHz, measured at 3 meters											
5150	44.19	0	100	V	33.426	2.82	34.73	45.706	74	-28.294	Peak
5150	45.14	0	100	H	33.446	2.82	34.73	46.676	74	-27.324	Peak
5150	31.12	0	100	V	33.426	2.82	34.73	32.636	54	-21.364	Ave
5150	31.09	0	100	H	33.446	2.82	34.73	32.626	54	-21.374	Ave
10380	43.17	0	100	V	38.343	4.09	33.87	51.733	74	-22.267	Peak
10380	43.53	0	100	H	38.343	4.09	33.87	52.093	74	-21.907	Peak
10380	29.57	0	100	V	38.343	4.09	33.87	38.133	54	-15.867	Ave
10380	29.85	0	100	H	38.343	4.09	33.87	38.413	54	-15.587	Ave
15570	42.87	0	100	V	37.928	4.93	34.34	51.388	74	-22.612	Peak
15570	43.13	0	100	H	37.928	4.93	34.34	51.648	74	-22.352	Peak
15570	28.82	0	100	V	37.928	4.93	34.34	37.338	54	-16.662	Ave
15570	28.97	0	100	H	37.928	4.93	34.34	37.488	54	-16.512	Ave
20760	41.21	0	100	V	34.6	5.79	33.97	47.63	74	-26.37	Peak
20760	41.36	0	100	H	34.6	5.79	33.97	47.78	74	-26.22	Peak
20760	28.13	0	100	V	34.6	5.79	33.97	34.55	54	-19.45	Ave
20760	28.15	0	100	H	34.6	5.79	33.97	34.57	54	-19.43	Ave

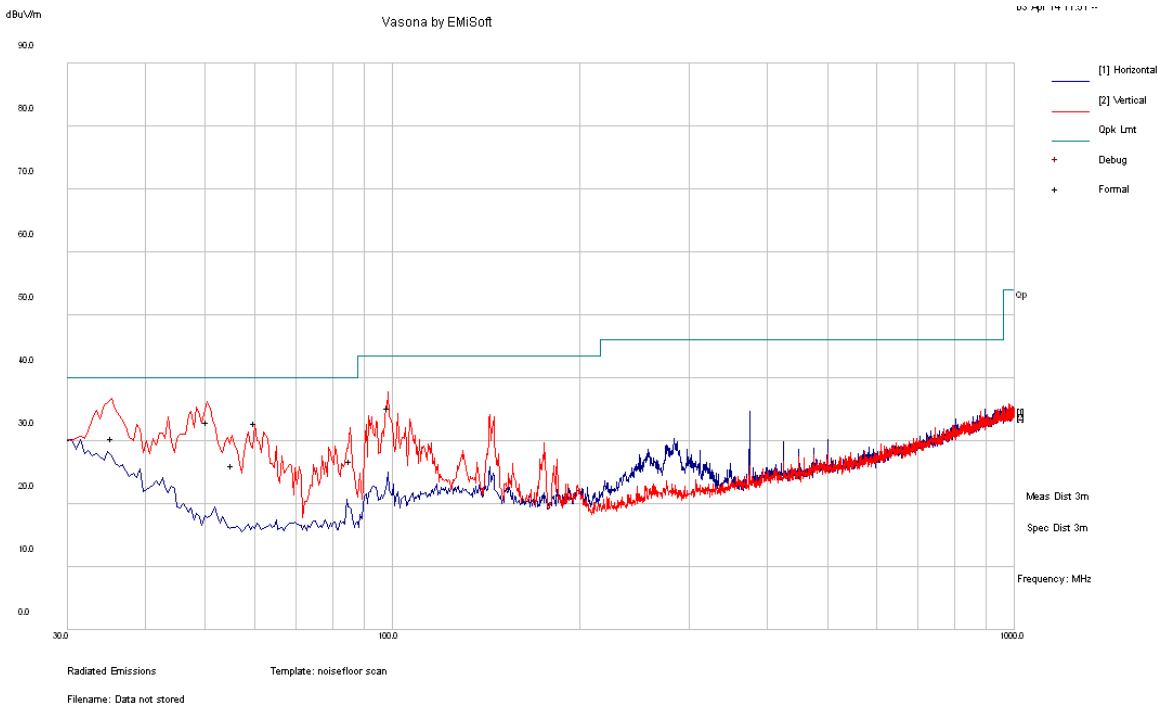
Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 5230 MHz, measured at 3 meters											
5350	44.48	0	100	V	33.628	2.82	34.73	46.198	74	-27.802	Peak
5350	44.51	0	100	H	33.688	2.82	34.73	46.288	74	-27.712	Peak
5350	29.92	0	100	V	33.628	2.82	34.73	31.638	54	-22.362	Ave
5350	30.21	0	100	H	33.688	2.82	34.73	31.988	54	-22.012	Ave
10460	43.81	0	100	V	38.418	4.09	33.87	52.448	74	-21.552	Peak
10460	44.24	0	100	H	38.418	4.09	33.87	52.878	74	-21.122	Peak
10460	29.44	0	100	V	38.418	4.09	33.87	38.078	54	-15.922	Ave
10460	29.54	0	100	H	38.418	4.09	33.87	38.178	54	-15.822	Ave
15690	42.67	0	100	V	37.902	4.93	34.34	51.162	74	-22.838	Peak
15690	42.38	0	100	H	37.902	4.93	34.34	50.872	74	-23.128	Peak
15690	28.13	0	100	V	37.902	4.93	34.34	36.622	54	-17.378	Ave
15690	30.1	0	100	H	37.902	4.93	34.34	38.592	54	-15.408	Ave
20920	41.2	0	100	V	34.6	5.79	33.97	47.62	74	-26.38	Peak
20920	41.4	0	100	H	34.6	5.79	33.97	47.82	74	-26.18	Peak
20920	27.03	0	100	V	34.6	5.79	33.97	33.45	54	-20.55	Ave
20920	27.1	0	100	H	34.6	5.79	33.97	33.52	54	-20.48	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 5210 MHz, measured at 3 meters											
5150	45.19	0	100	V	33.426	2.82	34.73	46.706	74	-27.294	Peak
5150	45.2	0	103	H	33.446	2.82	34.73	46.736	74	-27.264	Peak
5150	30.9	0	100	V	33.426	2.82	34.73	32.416	54	-21.584	Ave
5150	30.93	0	103	H	33.446	2.82	34.73	32.466	54	-21.534	Ave
5350	44.03	0	105	V	33.628	2.82	34.73	45.748	74	-28.252	Peak
5350	44.27	0	105	H	33.688	2.82	34.73	46.048	74	-27.952	Peak
5350	29.99	0	105	V	33.628	2.82	34.73	31.708	54	-22.292	Ave
5350	30.05	0	105	H	33.688	2.82	34.73	31.828	54	-22.172	Ave
10420	43.62	0	100	V	38.418	4.09	33.87	52.258	74	-21.742	Peak
10420	43.54	0	100	H	38.418	4.09	33.87	52.178	74	-21.822	Peak
10420	29.74	0	100	V	38.418	4.09	33.87	38.378	54	-15.622	Ave
10420	29.25	0	100	H	38.418	4.09	33.87	37.888	54	-16.112	Ave
15630	44.28	0	100	V	37.914	4.93	34.34	52.784	74	-21.216	Peak
15630	44.35	0	100	H	37.914	4.93	34.34	52.854	74	-21.146	Peak
15630	29.28	0	100	V	37.914	4.93	34.34	37.784	54	-16.216	Ave
15630	29.29	0	100	H	37.914	4.93	34.34	37.794	54	-16.206	Ave
20840	38.81	0	100	V	34.6	5.79	33.97	45.23	74	-28.77	Peak
20840	38.99	0	100	H	34.6	5.79	33.97	45.41	74	-28.59	Peak
20840	24.42	0	100	V	34.6	5.79	33.97	30.84	54	-23.16	Ave
20840	24.41	0	100	H	34.6	5.79	33.97	30.83	54	-23.17	Ave

3) Co-location with 2.4 GHz and 5 GHz

Worst Case: 2.4 GHz: 802.11n-HT20, 2437 MHz; 5.2 GHz: 802.11n-HT40, 5190 MHz



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.

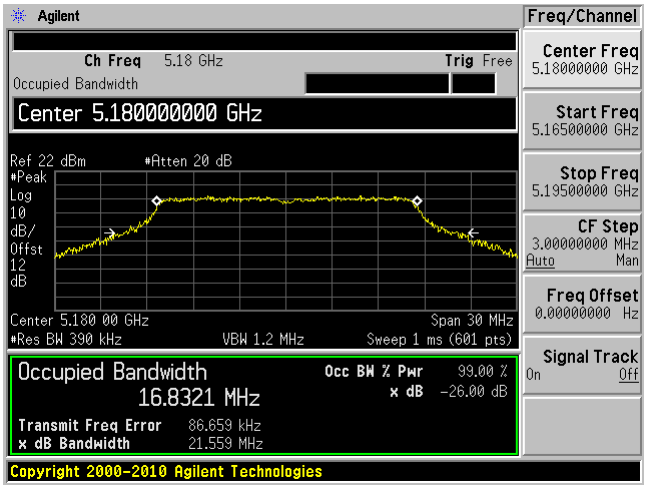
5150-5250 MHz Band:

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)	
		Chain J0	Chain J1	Chain J0	Chain J1
802.11a mode					
Low	5180	21.559	20.983	16.8321	16.7788
Middle	5200	22.290	21.530	16.8650	16.7123
High	5240	22.105	21.216	16.8751	16.7286
802.11n-HT20 mode					
Low	5180	22.880	22.453	17.9951	17.9855
Middle	5200	22.124	23.392	17.9839	17.9995
High	5240	22.737	22.030	17.8994	17.9192
802.11n-HT40 mode					
Low	5190	42.571	43.717	36.3003	36.3178
High	5230	43.386	42.988	36.3304	36.1511
802.11ac-80 mode					
-	5210	84.179	82.546	75.6965	75.6284

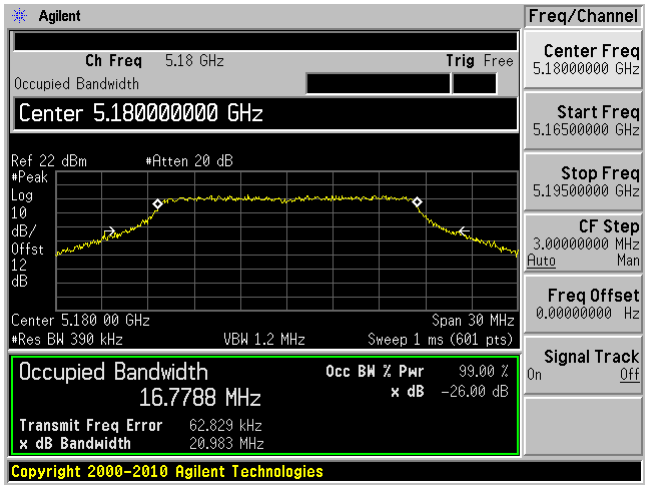
5150-5250 MHz Band

802.11a mode

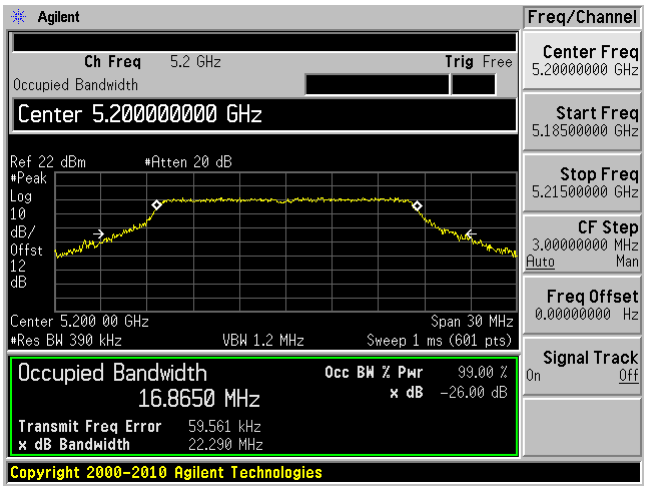
Low channel: 5180 MHz Chain J0



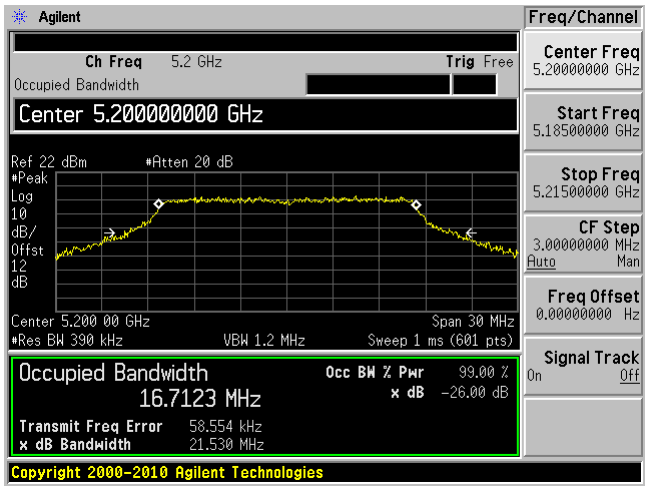
Low channel: 5180 MHz Chain J1



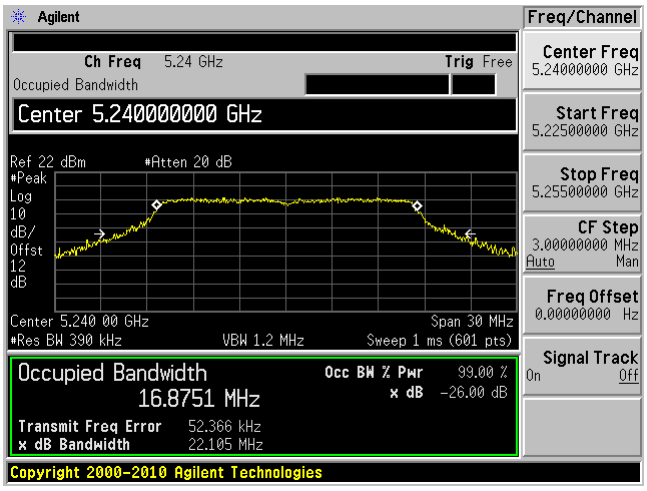
Middle channel: 5200 MHz Chain J0



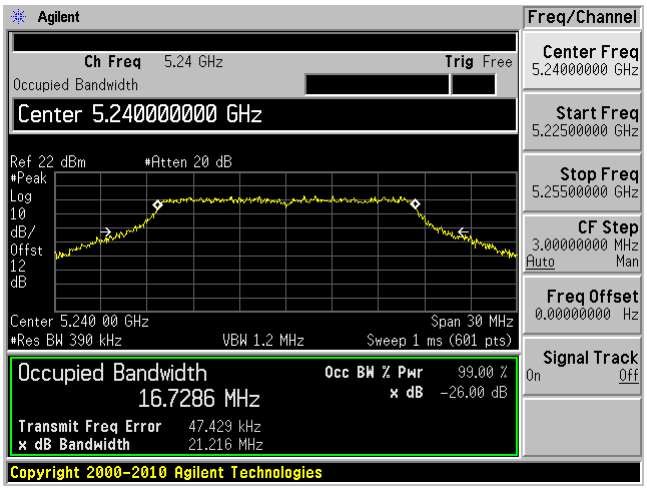
Middle channel: 5200 MHz Chain J1



High channel: 5240 MHz Chain J0

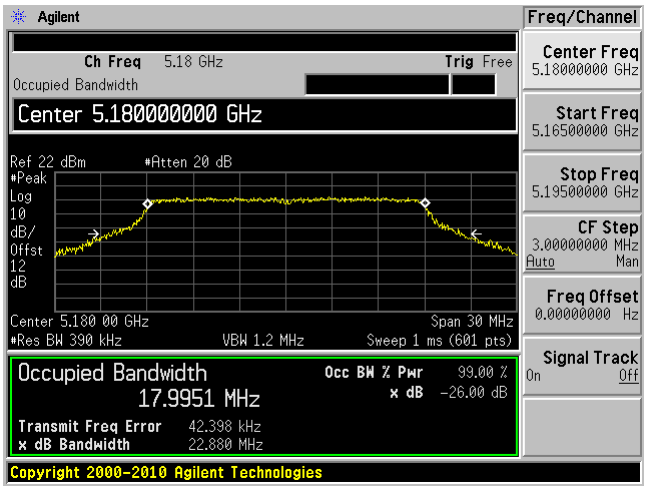


High channel: 5240 MHz Chain J1

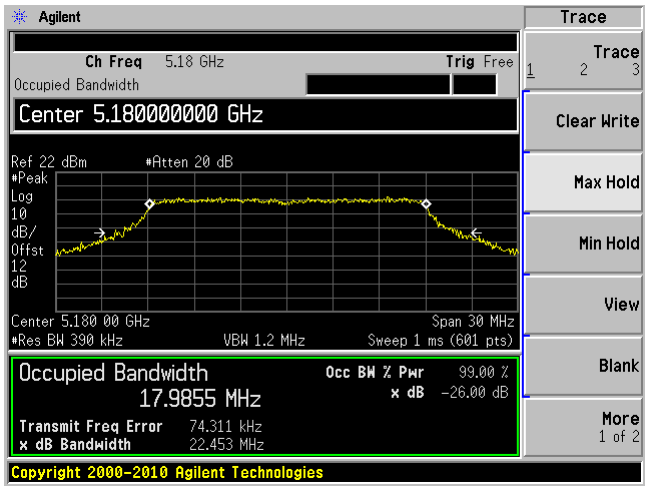


802.11n-HT20 mode

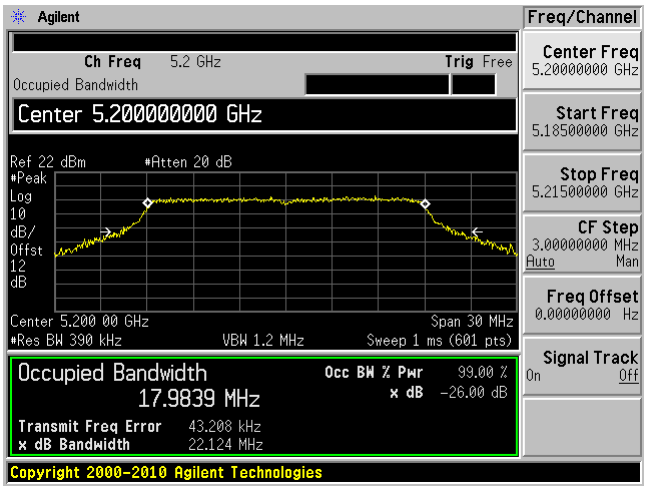
Low channel: 5180 MHz Chain J0



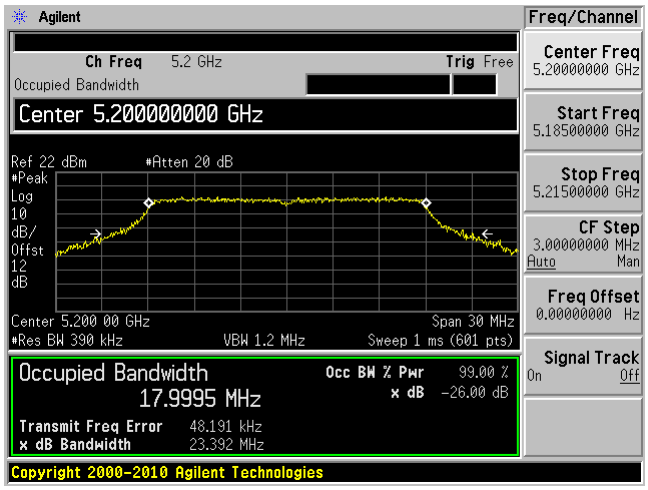
Low channel: 5180 MHz Chain J1



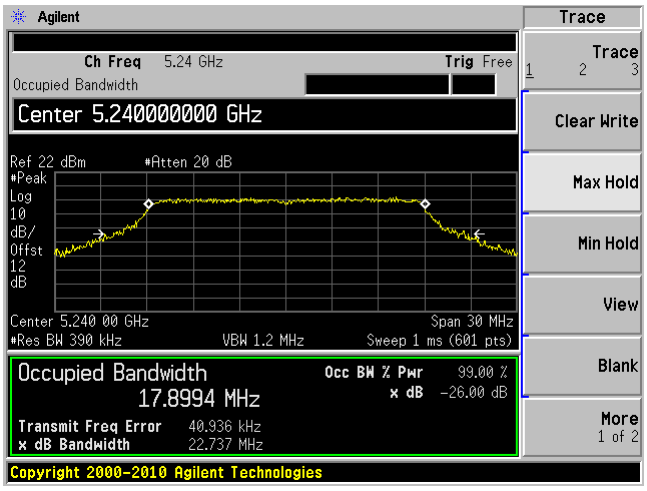
Middle channel: 5200 MHz Chain J0



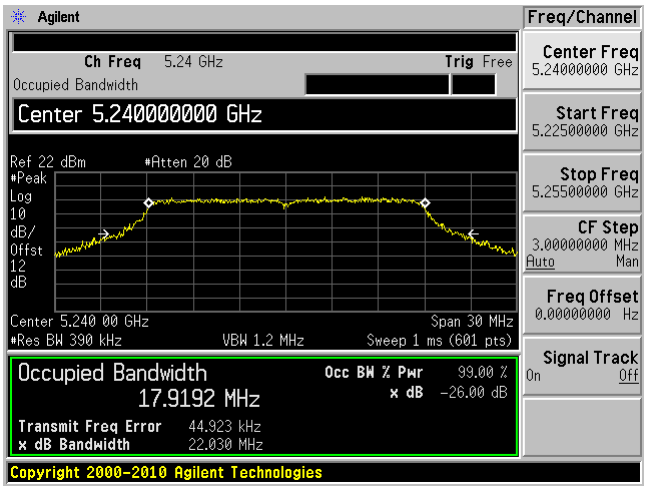
Middle channel: 5200 MHz Chain J1



High channel: 5240 MHz Chain J0

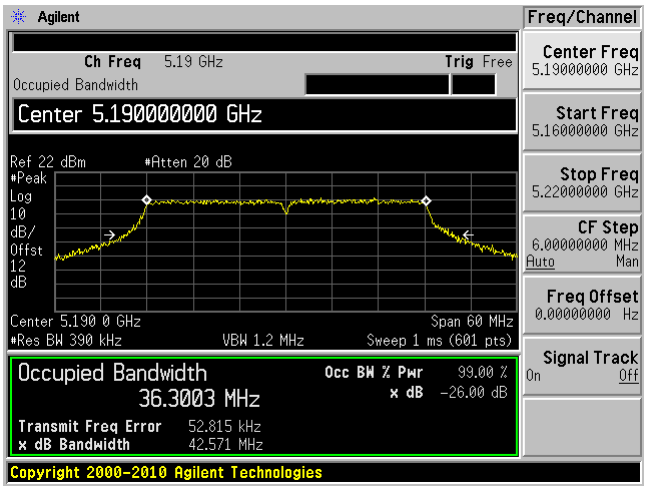


High channel: 5240 MHz Chain J1

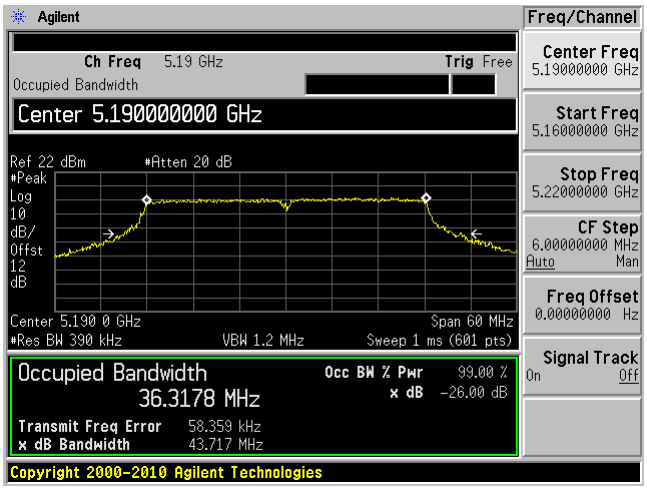


802.11n-HT40 mode

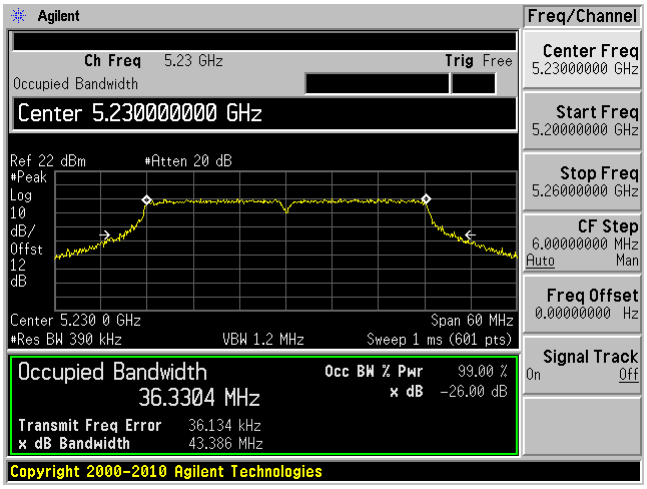
Low channel: 5190 MHz Chain J0



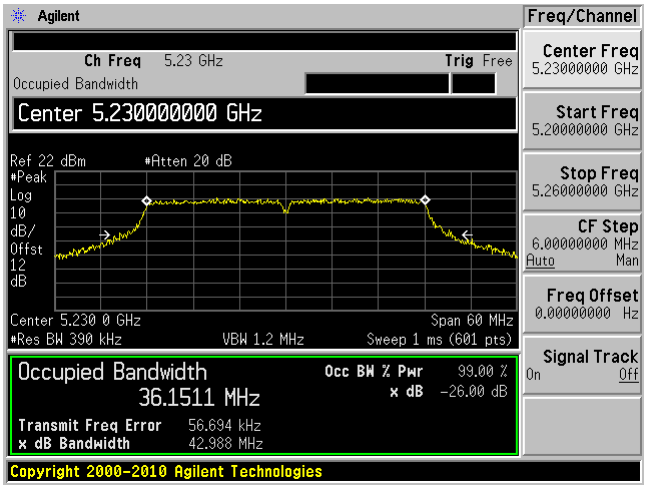
Low channel: 5190 MHz Chain J1



High channel: 5230 MHz Chain J0

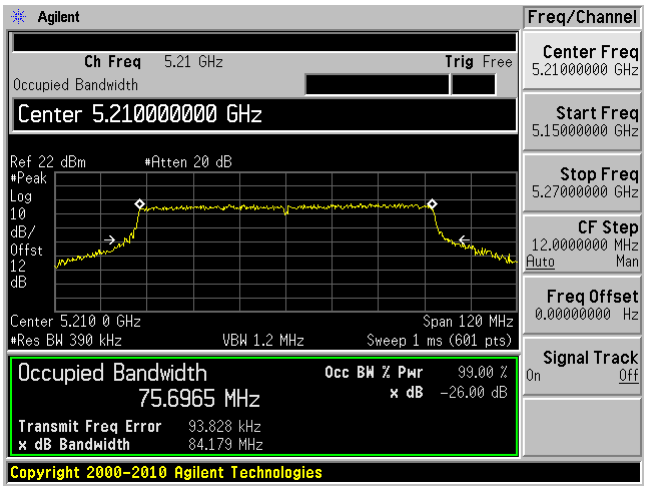


High channel: 5230 MHz Chain J1

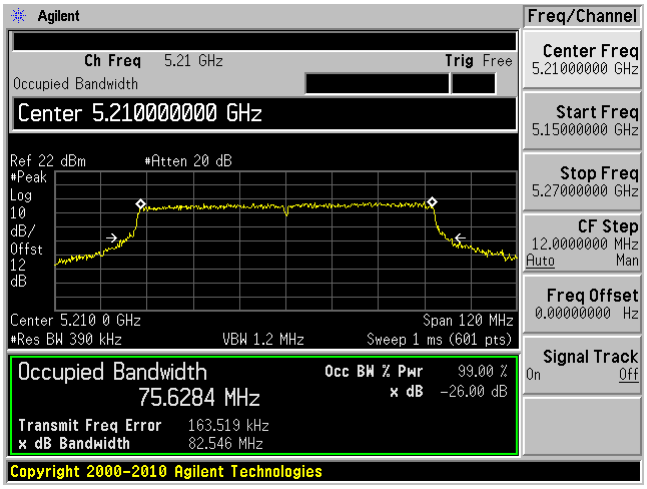


802.11ac-80 mode

Channel: 5210 MHz Chain J0



Channel: 5210 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 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.

According to IC RSS-210 §A9.2:

For the 5.15–5.250 GHz bands, the maximum e.i.r.p shall not exceed 200 mW or 10 + 10 log B, 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.

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:

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Output Power (dBm)	Limit (dBm)	Margin (dB)
		Chain J0	Chain J1			
802.11a mode						
Low	5180	11.97	11.33	14.67	17	-2.33
Middle	5200	11.93	11.53	14.74	17	-2.26
High	5240	11.89	11.87	14.89	17	-2.11
802.11n-HT20 mode						
Low	5180	12.38	11.75	15.09	17	-1.91
Middle	5200	12.24	11.98	15.12	17	-1.88
High	5240	12.28	12.33	15.32	17	-1.68
802.11n-HT40 mode						
Low	5190	14.12	13.73	16.94	17	-0.06
High	5230	13.56	13.68	16.63	17	-0.37
802.11ac-80 mode						
	5210	13.68	13.6	16.65	17	-0.35

For IC:

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Output Power (dBm)	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)
		Chain J0	Chain J1				
802.11a mode							
Low	5180	11.97	11.33	14.67	18.17	23	-4.83
Middle	5200	11.93	11.53	14.74	18.24	23	-4.76
High	5240	4.87	5.31	8.11	11.61	23	-11.39
802.11n-HT20 mode							
Low	5180	12.38	11.75	15.09	18.59	23	-4.41
Middle	5200	12.24	11.98	15.12	18.62	23	-4.38
High	5240	0.96	0.99	3.99	7.49	23	-15.51
802.11n-HT40 mode							
Low	5190	14.12	13.73	16.94	20.44	23	-2.56
High	5230	6.88	7.33	10.12	13.62	23	-9.38
802.11ac-80 mode							
	5210	9.11	9.27	12.20	15.7	23	-7.3

Note : The antenna gain is 3.5 dBi@5 GHz

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 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz

As per IC RSS-210 §9.2, for transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

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

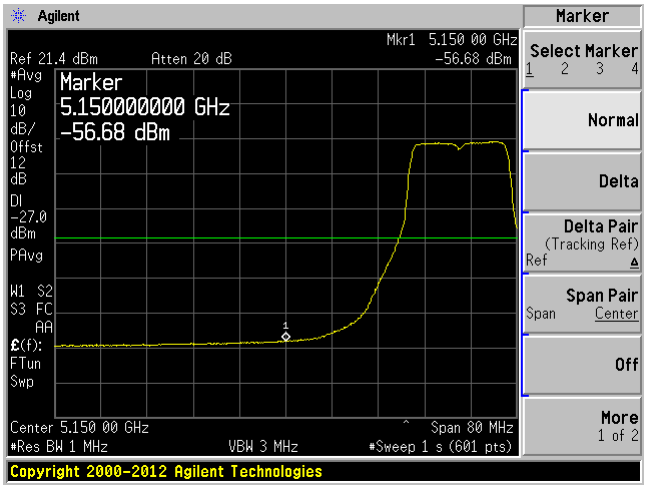
Note: The emission level has at least 3.5dB margin for this test from the limit, which is the antenna gain. Please refer to following pages for plots of band edge.

For FCC:

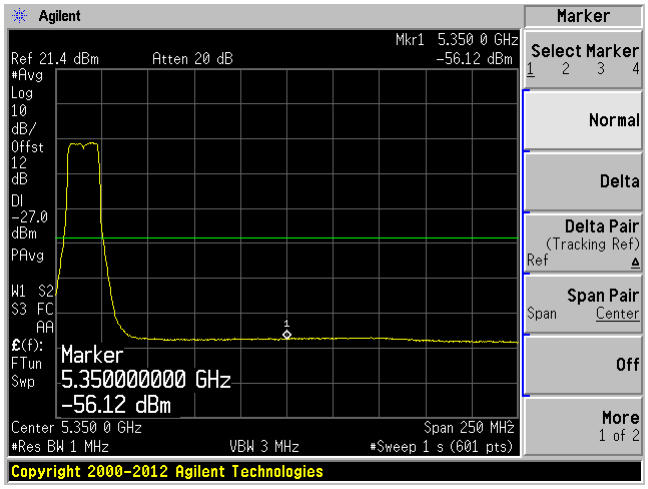
5150-5250 MHz Band

802.11a mode

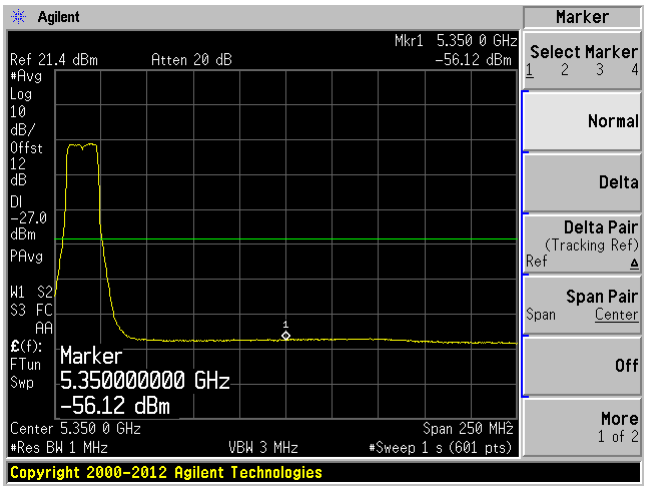
Low channel: 5180 MHz Chain J0



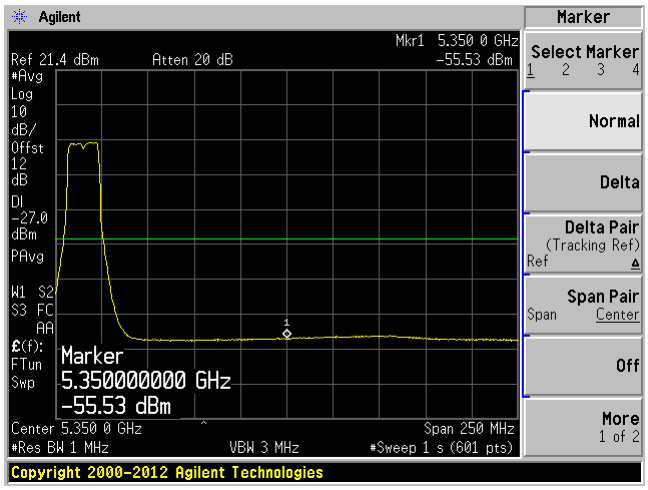
Low channel: 5180 MHz Chain J1



High channel: 5240 MHz Chain J0

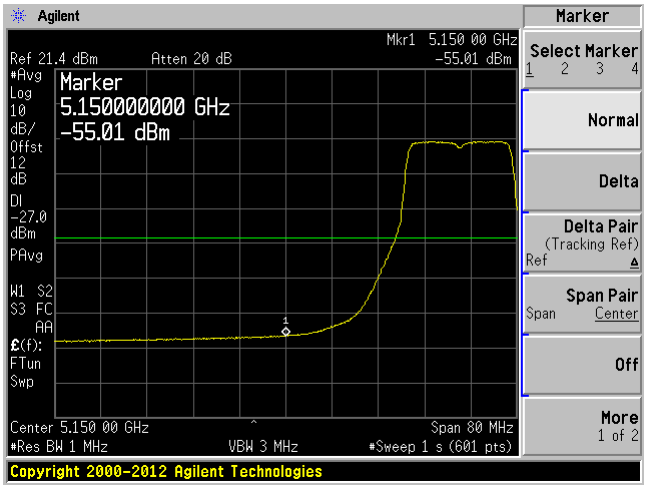


High channel: 5240 MHz Chain J1

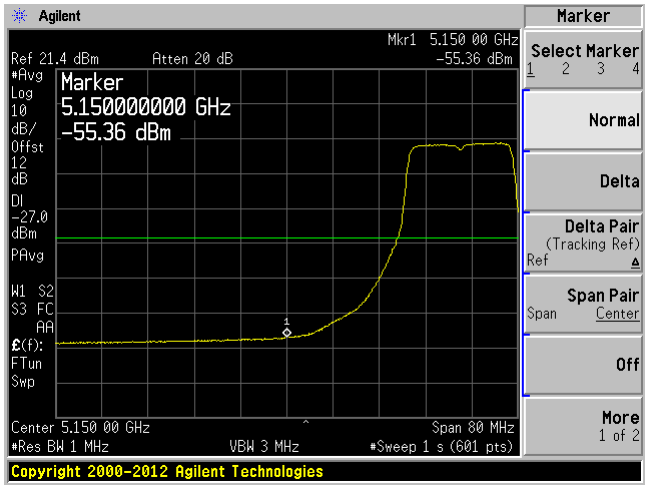


802.11n-HT20 mode

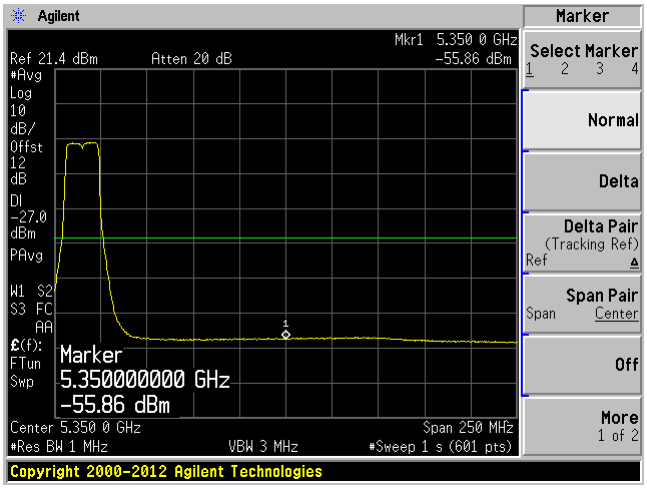
Low channel: 5180 MHz Chain J0



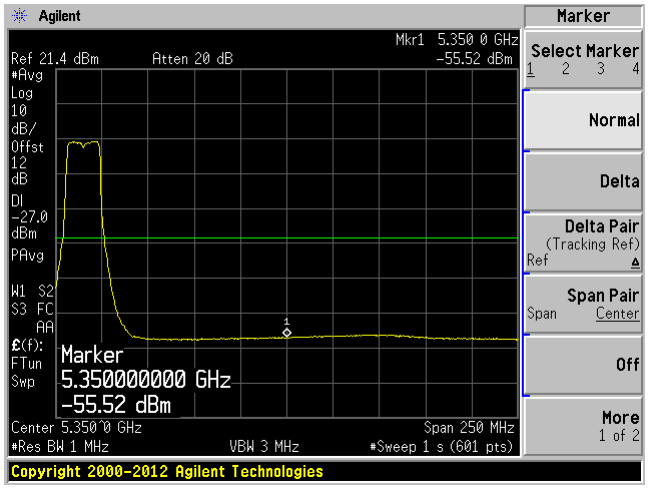
Low channel: 5180 MHz Chain J1



High channel: 5240 MHz Chain J0

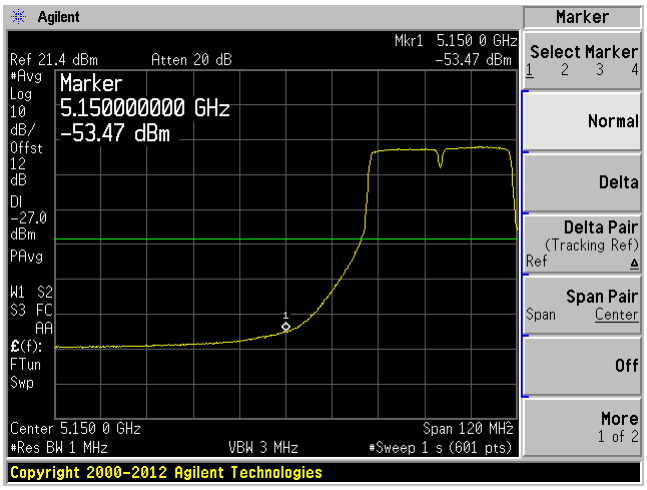


High channel: 5240 MHz Chain J1

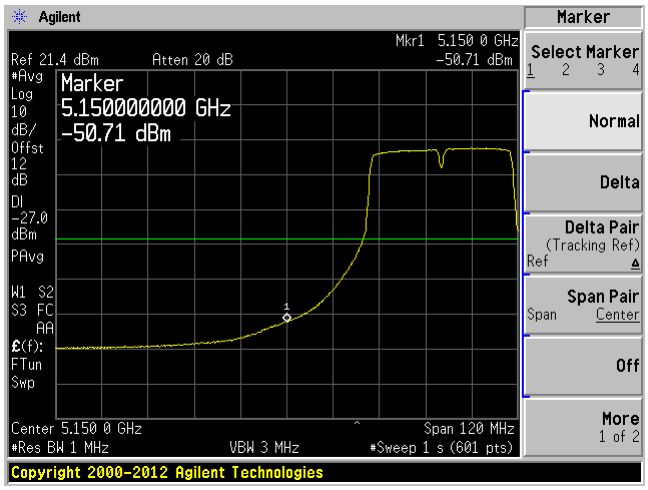


802.11n-HT40 mode

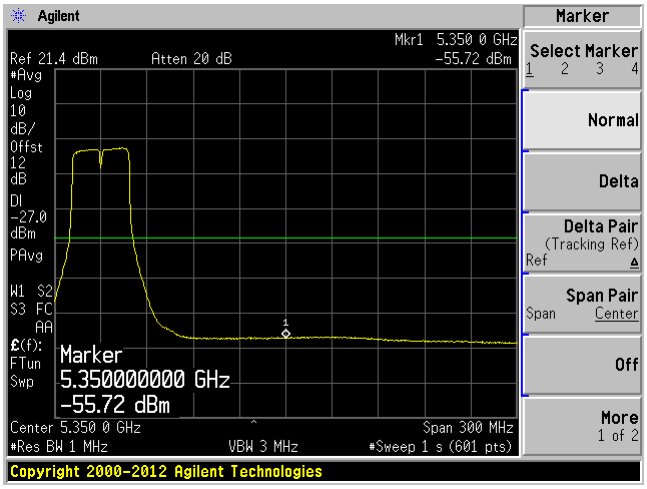
Low channel: 5190 MHz Chain J0



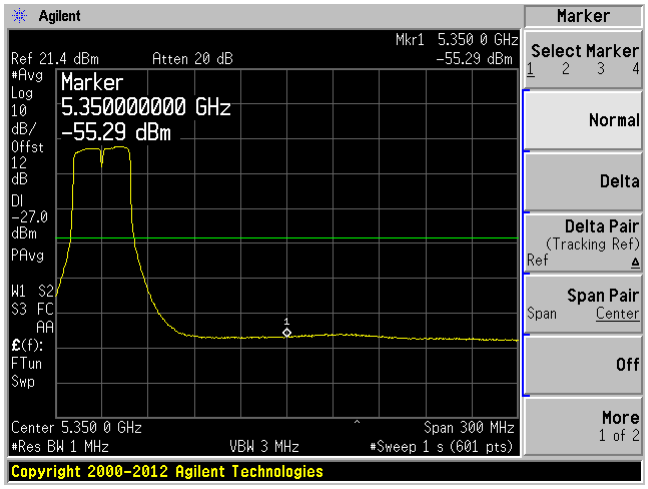
Low channel: 5190 MHz Chain J1



High channel: 5230 MHz Chain J0

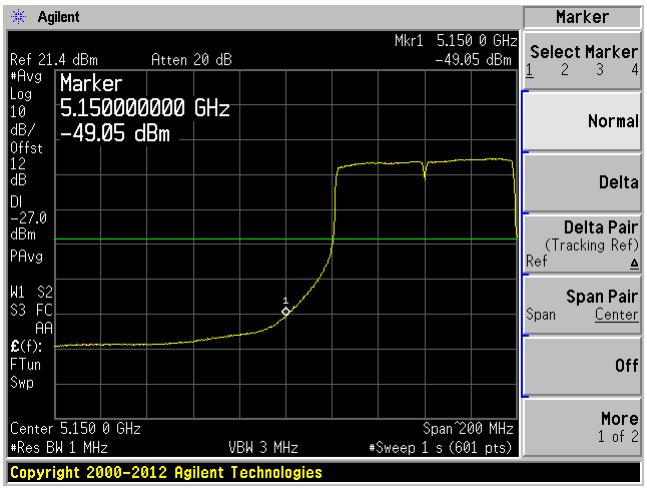


High channel: 5230 MHz Chain J1

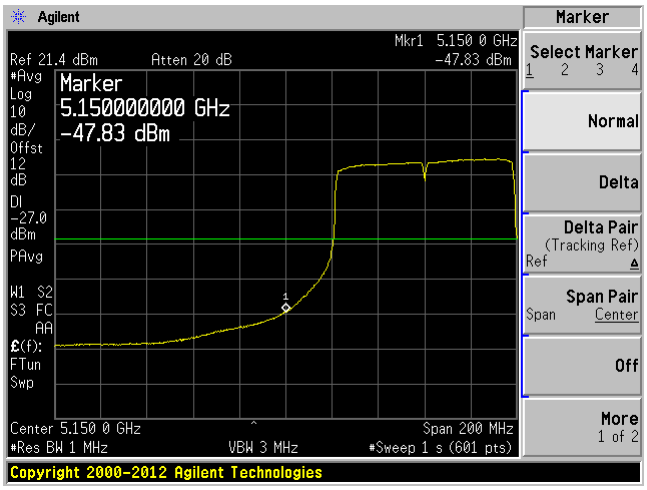


802.11ac-80 mode

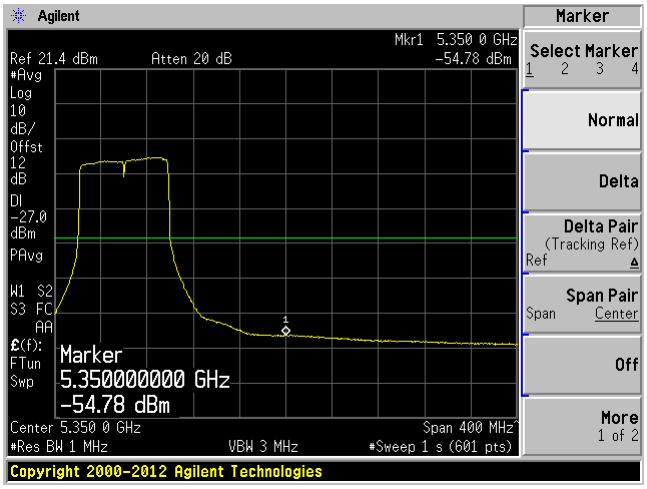
Low channel: 5210 MHz Chain J0



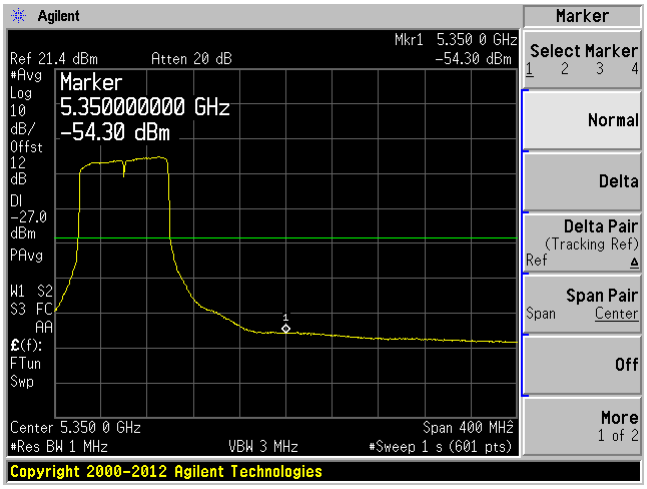
Low channel: 5210 MHz Chain J1



High channel: 5210 MHz Chain J0



High channel: 5210 MHz Chain J1

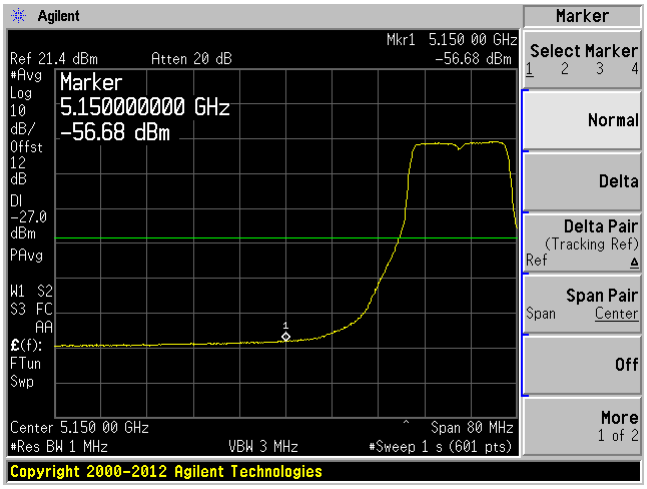


For IC:

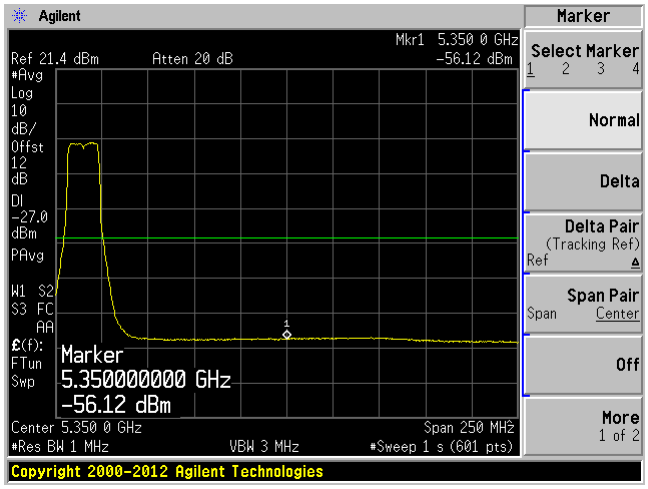
5150-5250 MHz Band

802.11a mode

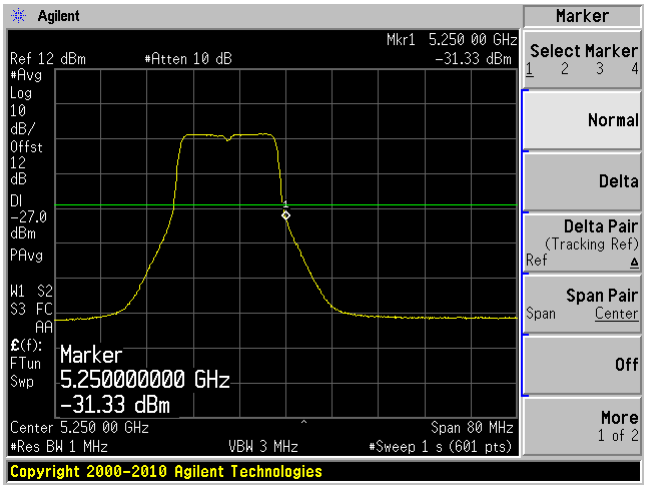
Low channel: 5180 MHz Chain J0



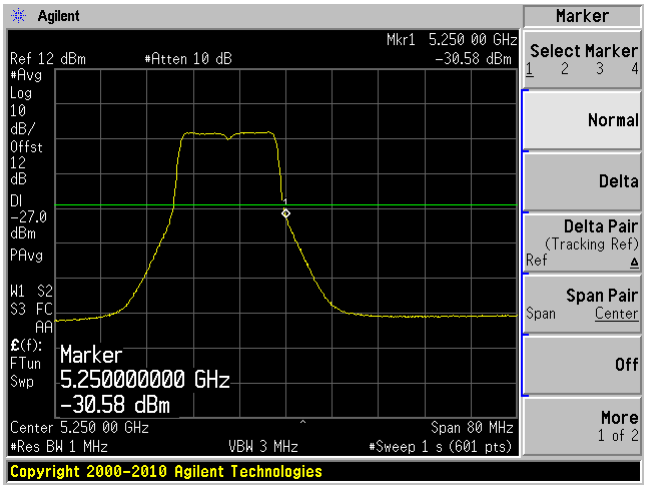
Low channel: 5180 MHz Chain J1



High channel: 5240 MHz Chain J0

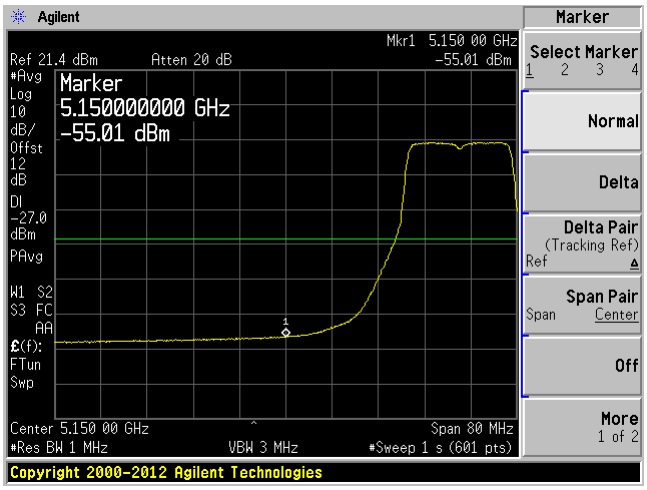


High channel: 5240 MHz Chain J1

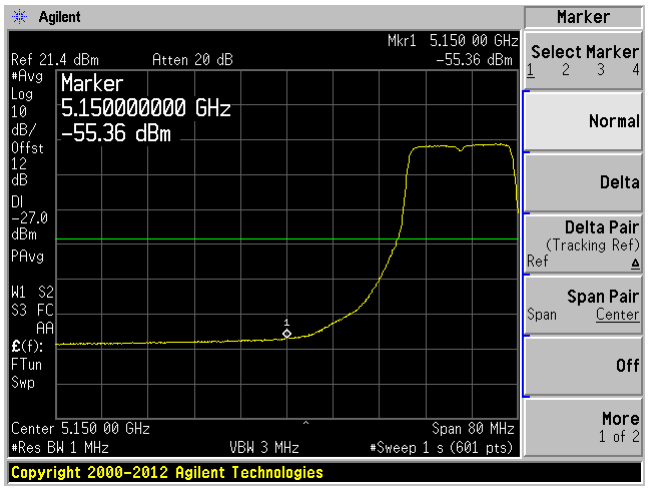


802.11n-HT20 mode

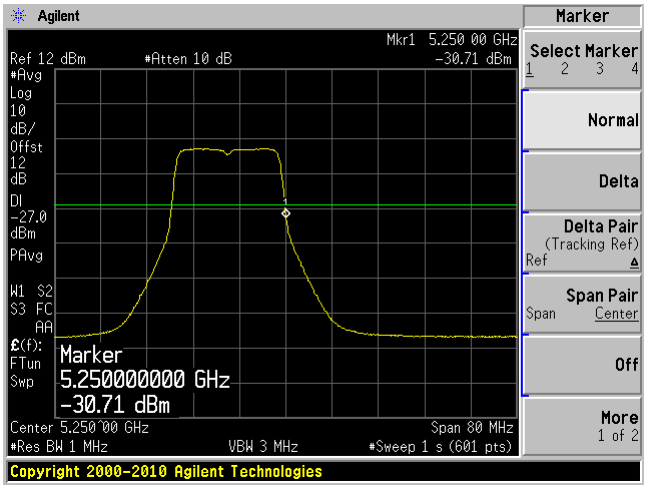
Low channel: 5180 MHz Chain J0



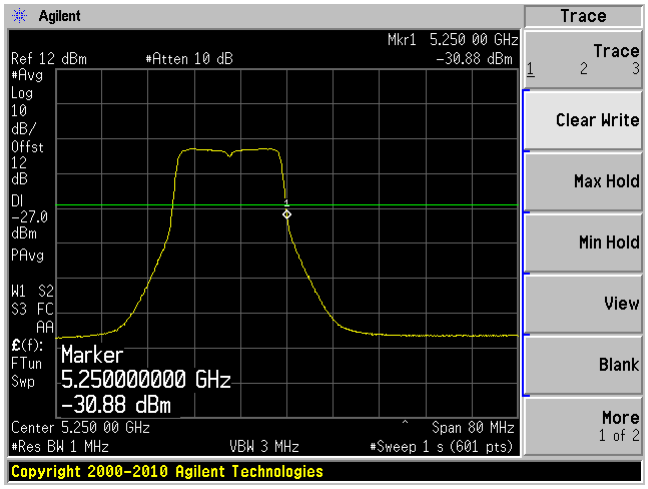
Low channel: 5180 MHz Chain J1



High channel: 5240 MHz Chain J0

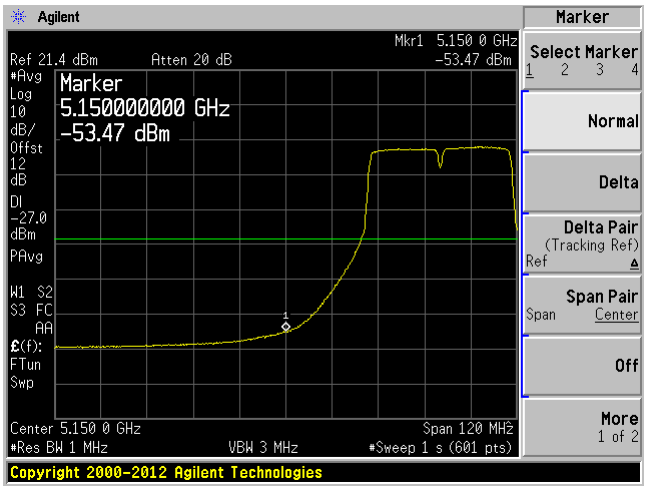


High channel: 5240 MHz Chain J1

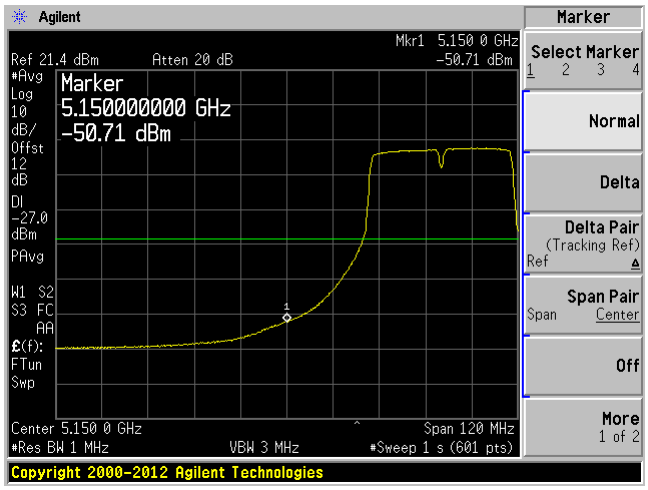


802.11n-HT40 mode

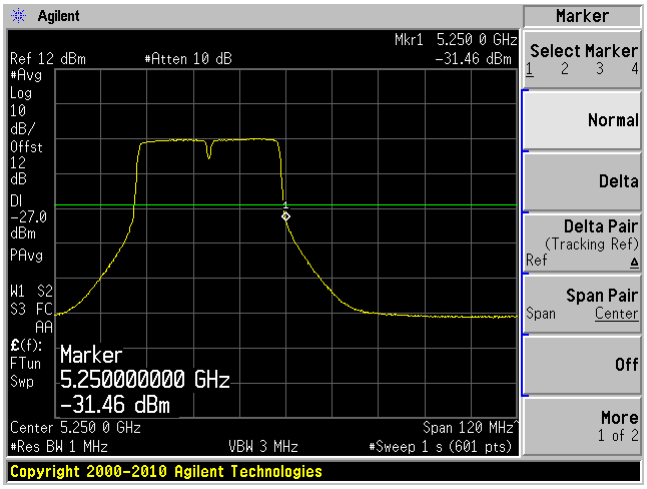
Low channel: 5190 MHz Chain J0



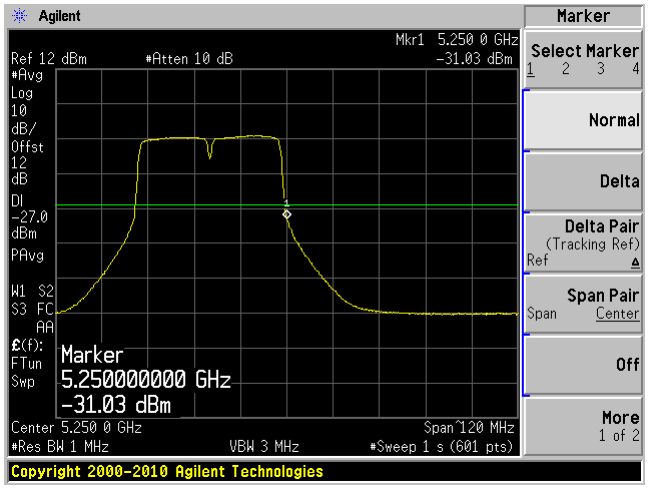
Low channel: 5190 MHz Chain J1



High channel: 5230 MHz Chain J0

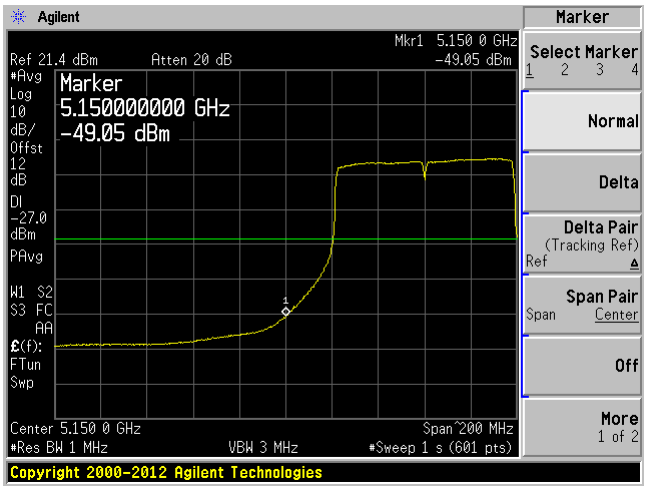


High channel: 5230 MHz Chain J1

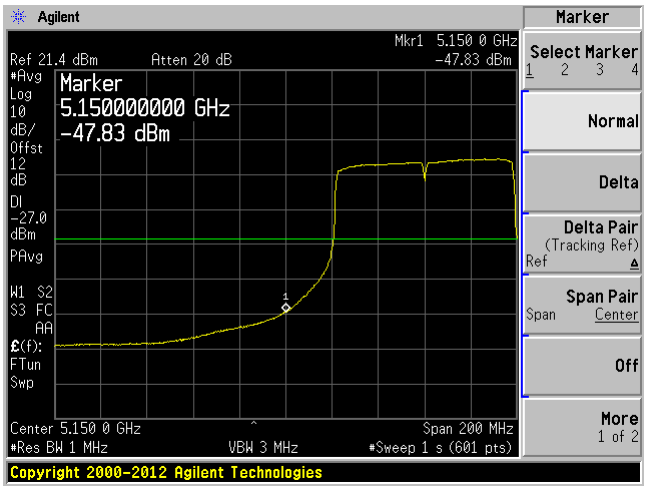


802.11ac-80 mode

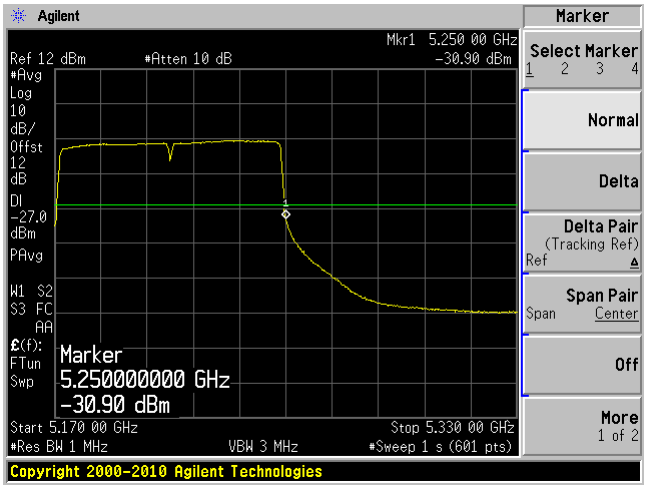
Low channel: 5210 MHz Chain J0



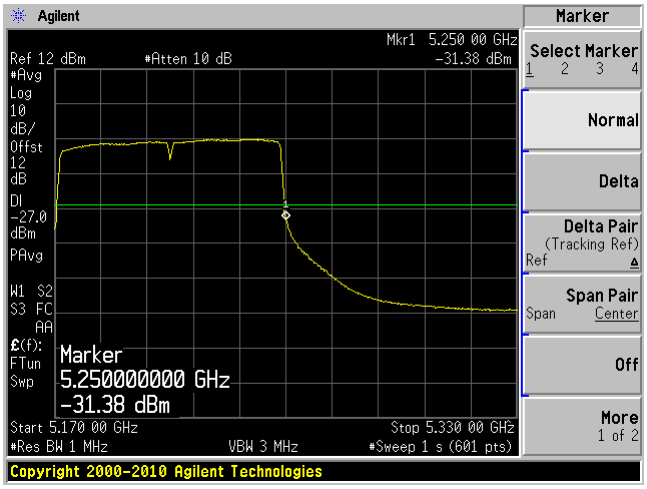
Low channel: 5210 MHz Chain J1



High channel: 5210 MHz Chain J0



High channel: 5210 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 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.

According to IC RSS-210 §A9.2:

5150-5250MHz the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 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.

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

For FCC:

Channel	Frequency (MHz)	PSD (dBm)		Total PSD (dBm)	Limit (dBm)	Margin (dB)
		Chain J0	Chain J1			
802.11a mode						
Low	5180	0.744	0.385	3.58	4	-0.42
Middle	5200	0.573	0.496	3.54	4	-0.46
High	5240	0.595	0.629	3.62	4	-0.38
802.11n-HT20 mode						
Low	5180	0.876	0.365	3.64	4	-0.36
Middle	5200	0.813	0.552	3.69	4	-0.31
High	5240	0.727	0.909	3.83	4	-0.17
802.11n-HT40 mode						
Low	5190	-0.471	-0.666	2.44	4	-1.56
High	5230	-0.976	-0.877	2.08	4	-1.92
802.11ac- 80 mode						
	5210	-3.75	-2.986	-0.34	4	-4.34

For IC :

Channel	Frequency (MHz)	PSD (dBm)		Total PSD (dBm)	E.I.R.P Density(dBm)	Limit (dBm)	Margin (dB)
		Chain J0	Chain J1				
802.11a mode							
Low	5180	0.744	0.385	3.58	7.08	10	-2.92
Middle	5200	0.573	0.496	3.54	7.04	10	-2.96
High	5240	-6.023	-5.877	-2.94	0.56	10	-9.44
802.11n-HT20 mode							
Low	5180	0.876	0.365	3.64	7.14	10	-2.86
Middle	5200	0.813	0.552	3.69	7.19	10	-2.81
High	5240	-10.001	-10.019	-7.00	-3.5	10	-13.5
802.11n-HT40 mode							
Low	5190	-0.471	-0.666	2.44	5.94	10	-4.06
High	5230	-7.939	-7.389	-4.64	-1.14	10	-11.14
802.11ac- 80 mode							
	5210	-8.068	-8.130	-5.09	-1.59	10	-11.59

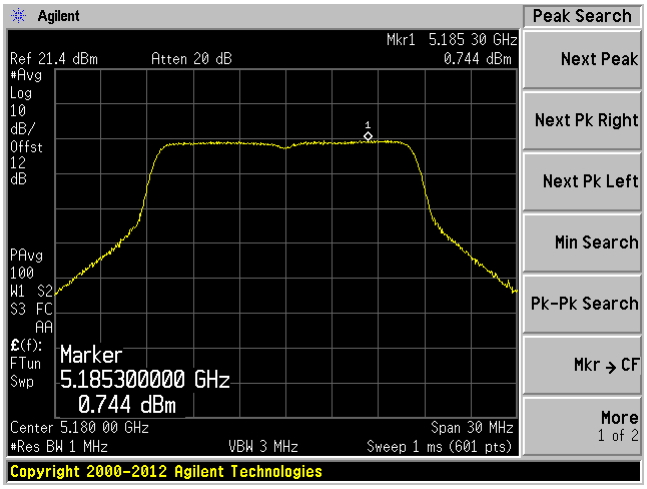
Note : The aantyenna gain is 3.5 dBi@5GHz.

Please refer to the following plots.

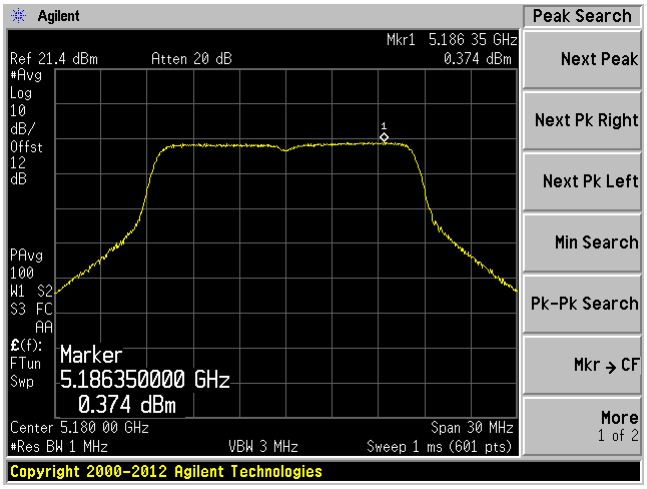
5150-5250 MHz Band

802.11a mode

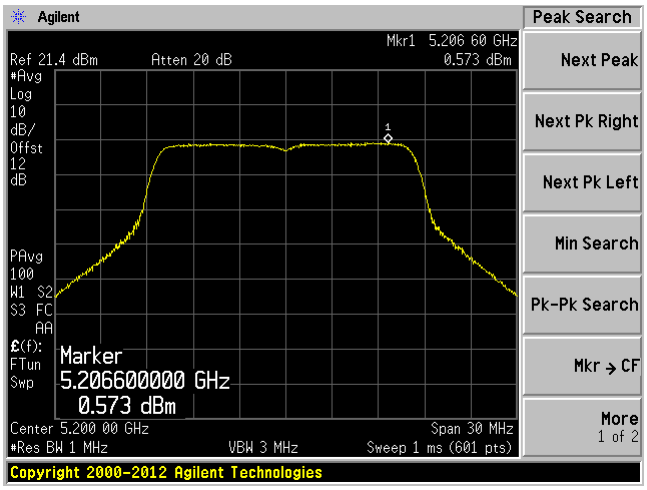
Low channel: 5180 MHz Chain J0



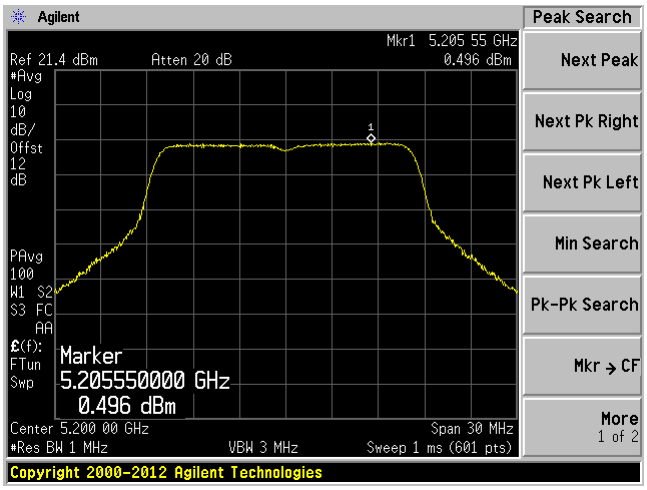
Low channel: 5180 MHz Chain J1



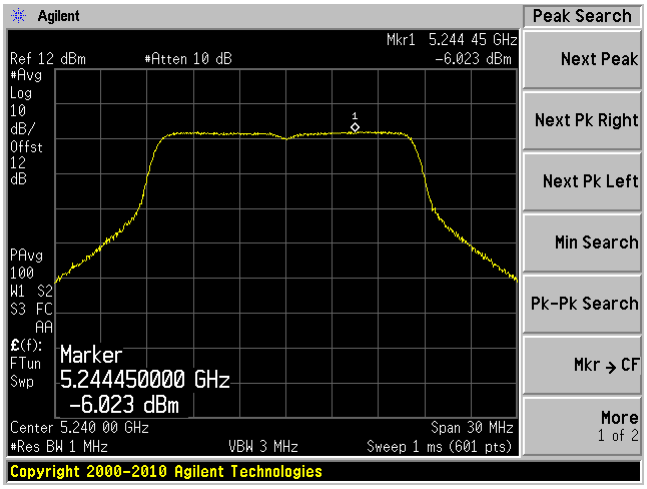
Middle channel: 5200 MHz Chain J0



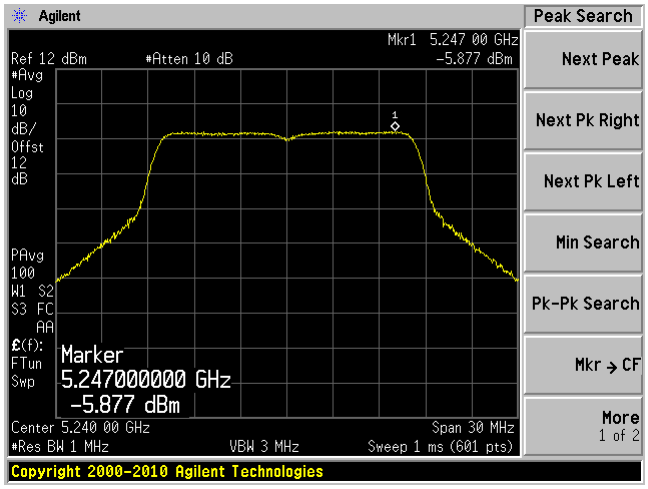
Middle channel: 5200 MHz Chain J1



High channel: 5240 MHz Chain J0

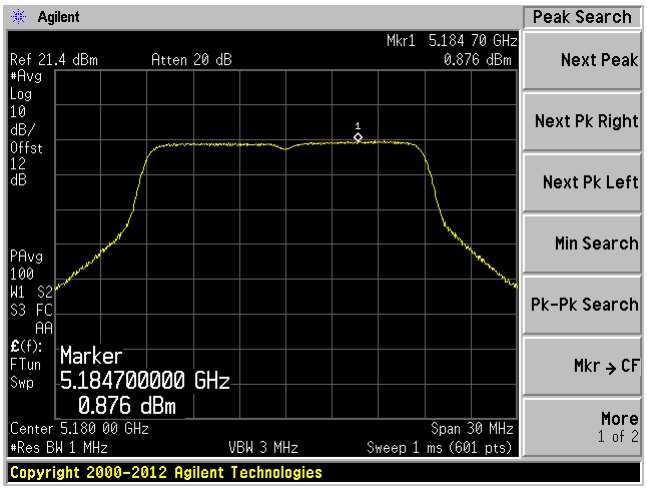


High channel: 5240 MHz Chain J1

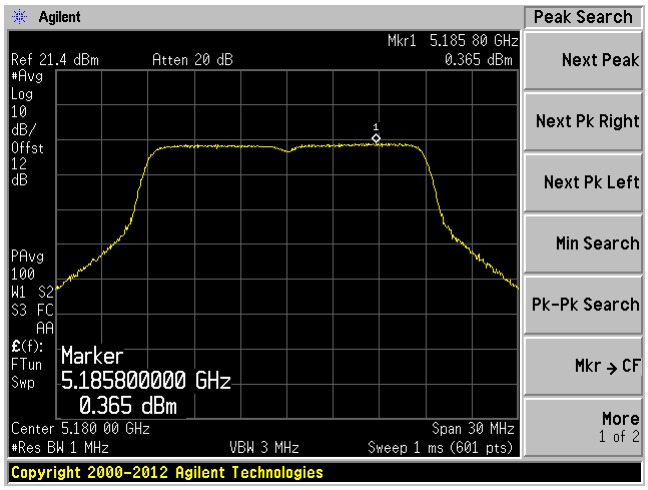


802.11n-HT20 mode

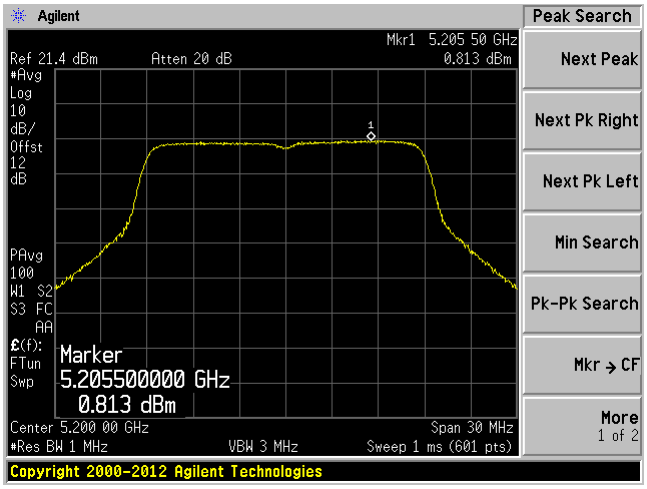
Low channel: 5180 MHz Chain J0



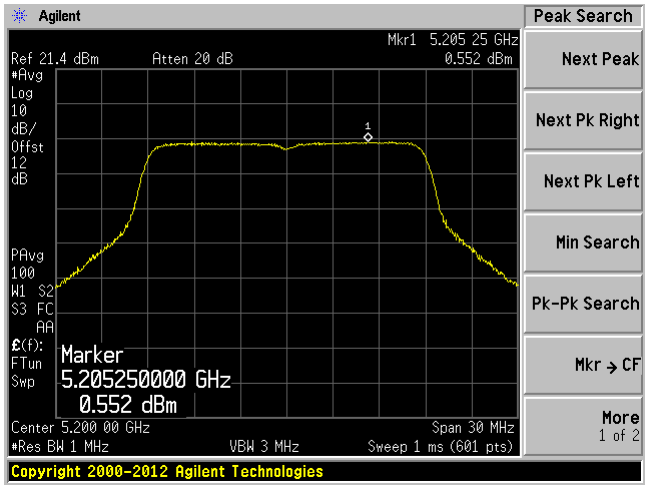
Low channel: 5180 MHz Chain J1



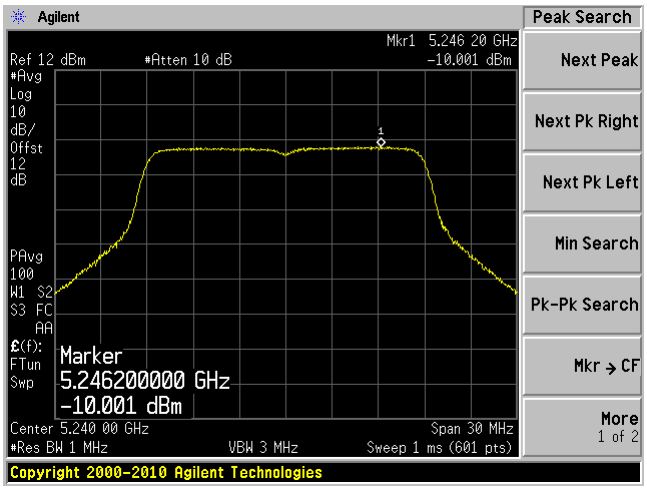
Middle channel: 5200 MHz Chain J0



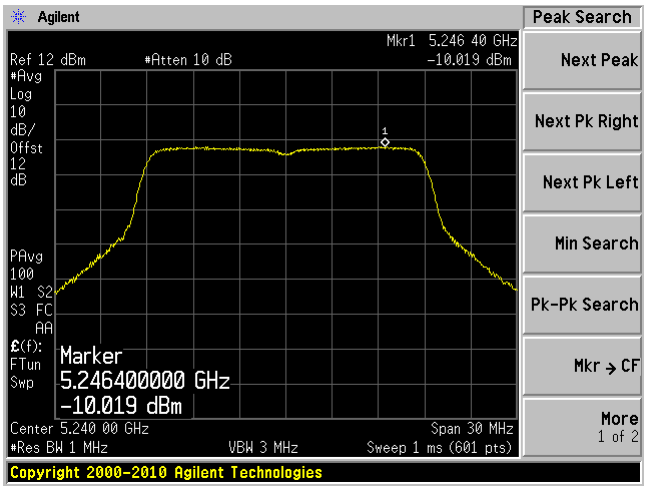
Middle channel: 5200 MHz Chain J1



High channel: 5240 MHz Chain J0

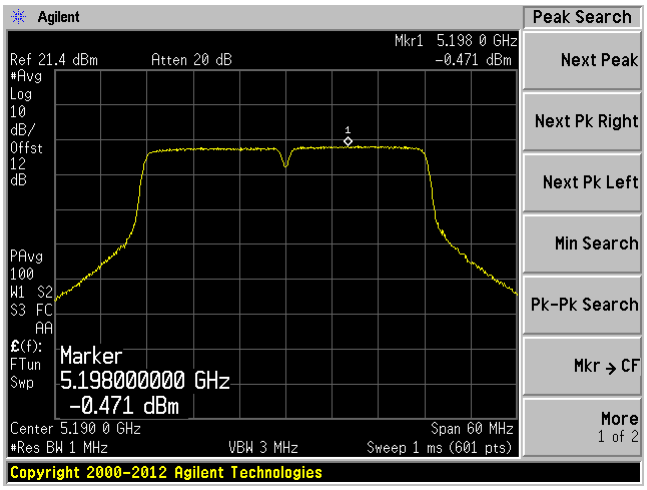


High channel: 5240 MHz Chain J1

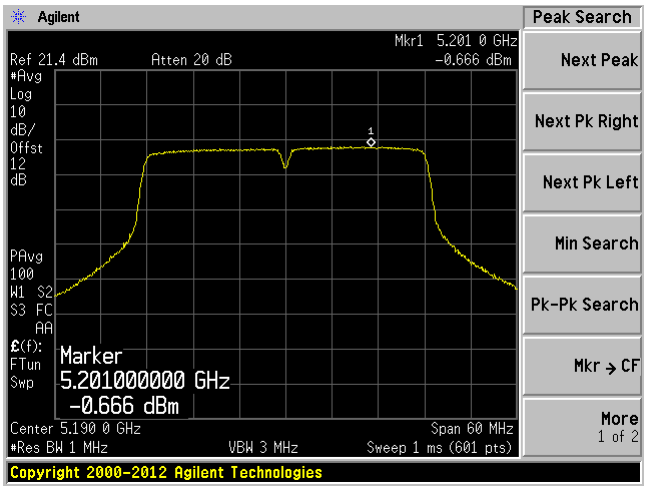


802.11n-HT40 mode

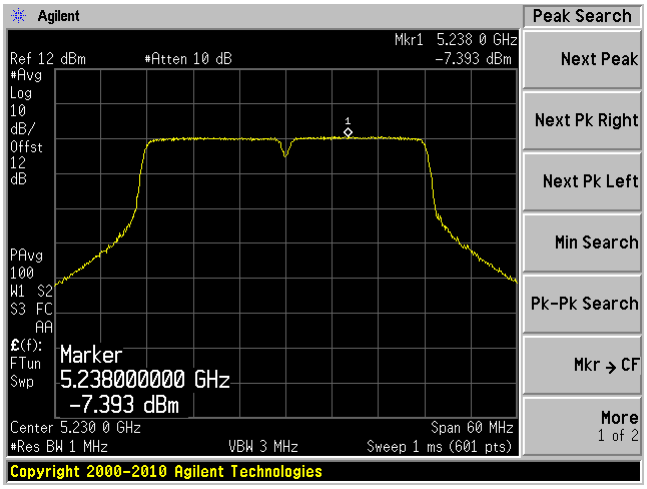
Low channel: 5190 MHz Chain J0



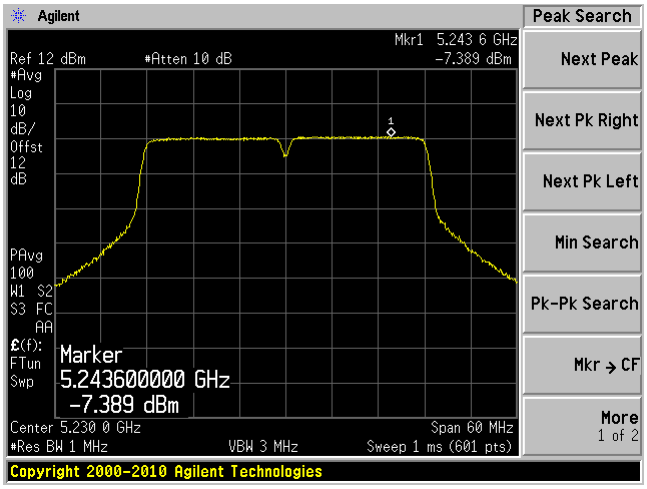
Low channel: 5190 MHz Chain J1



High channel: 5230 MHz Chain J0

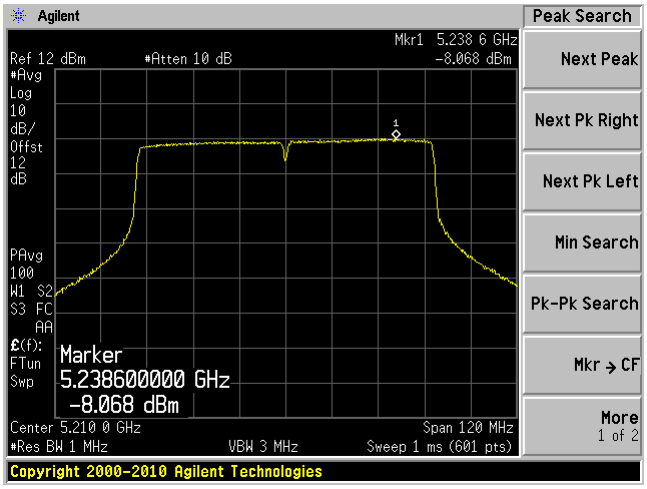


High channel: 5230 MHz Chain J1

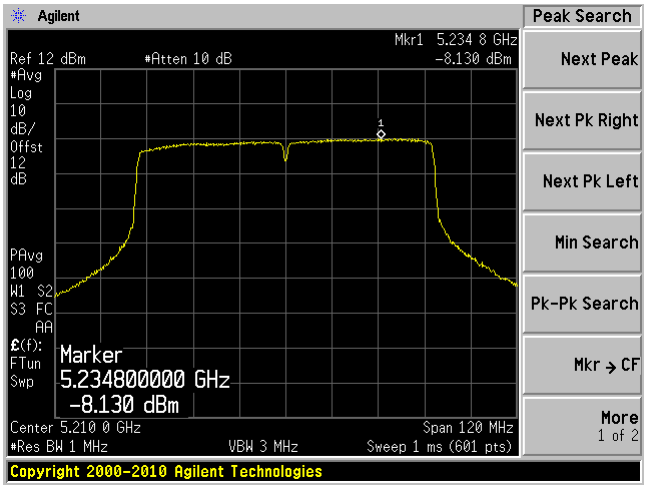


802.11ac-80 mode

Channel: 5210 MHz Chain J0



Channel: 5210 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 on 2014-04-21 in RF site.

12.5 Test Results

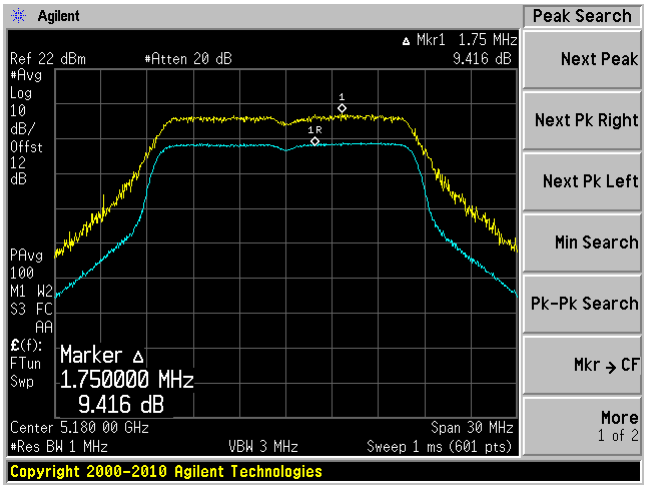
Channel	Frequency (MHz)	TX Chain J0 (dB)	TX ChainJ1 (dB)	Limit (dB)
802.11a mode				
Low	5180	9.416	8.747	13
Middle	5200	7.814	9.506	
High	5240	8.315	9.448	
802.11n HT20 mode				
Low	5180	8.333	8.835	13
Middle	5200	8.430	8.324	
High	5240	8.383	8.885	
802.11n HT40 mode				
Low	5190	8.152	8.301	13
High	5230	7.729	8.233	
802.11ac 80 mode				
-	5210	7.901	10.455	13

Please refer to the following plots for detailed test results:

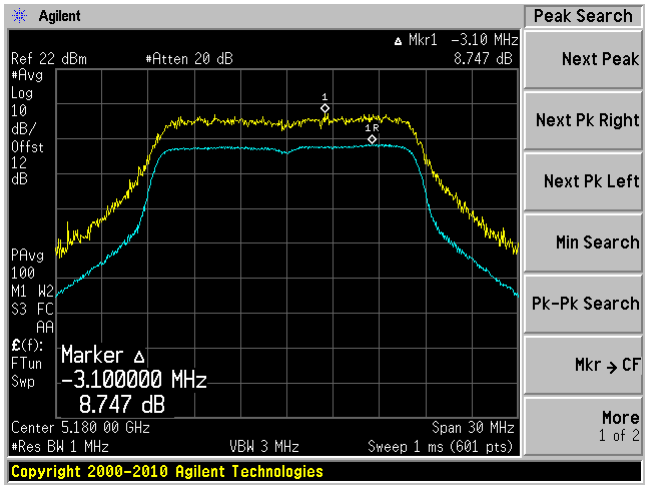
5150-5250 MHz Band

802.11a mode

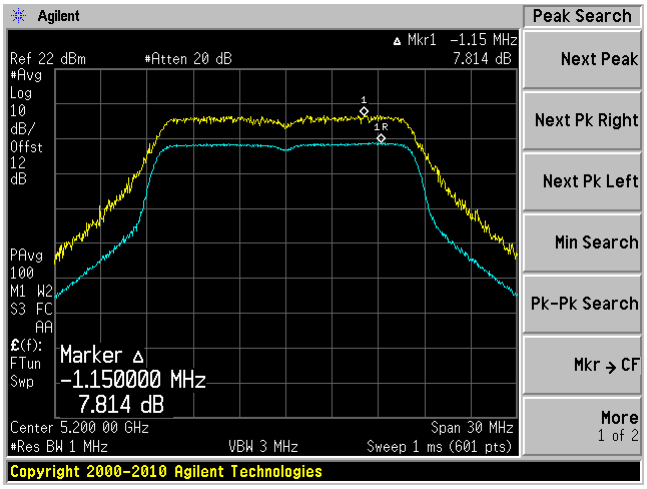
Low channel: 5180 MHz Chain J0



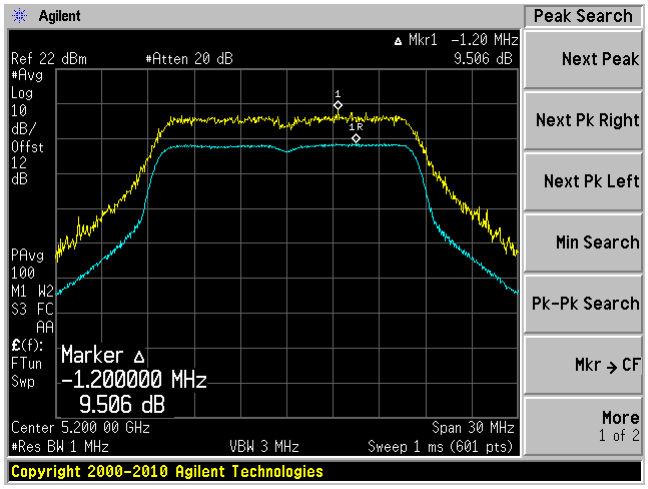
Low channel: 5180 MHz Chain J1



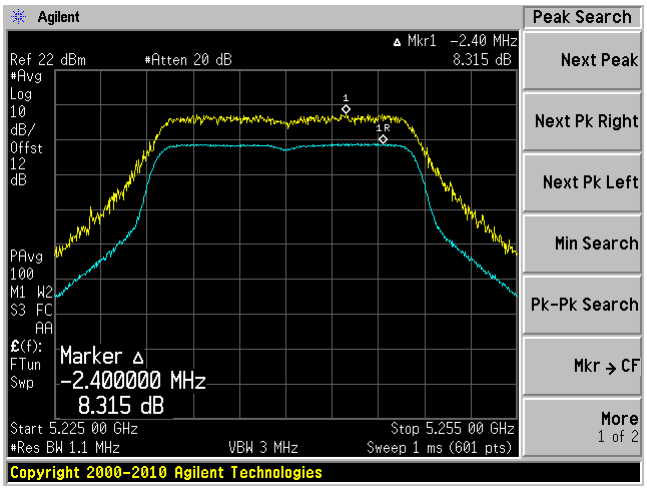
Middle channel: 5200 MHz Chain J0



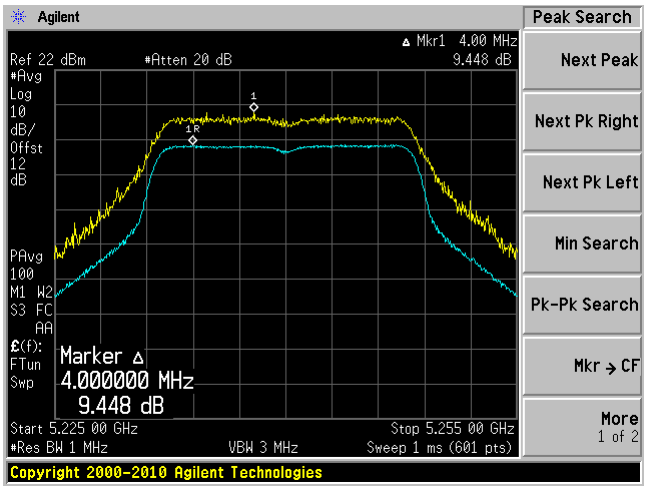
Middle channel: 5200 MHz Chain J1



High channel: 5240 MHz Chain J0

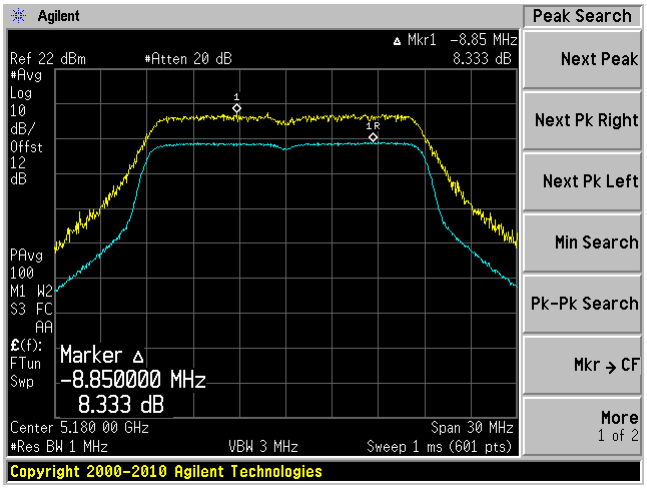


High channel: 5240 MHz Chain J1

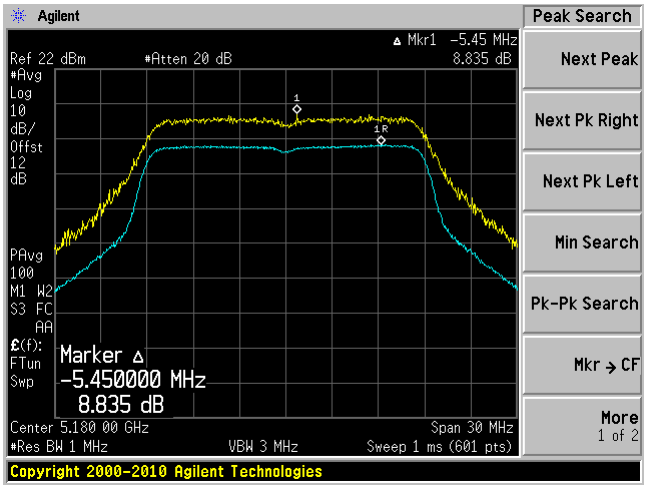


802.11n-HT20 mode

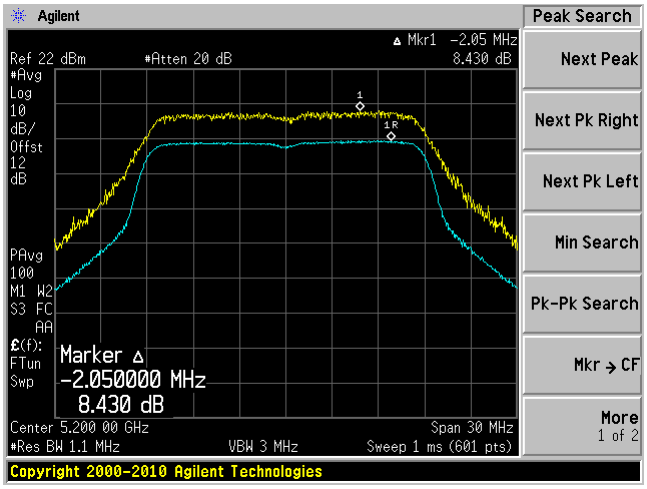
Low channel: 5180 MHz Chain J0



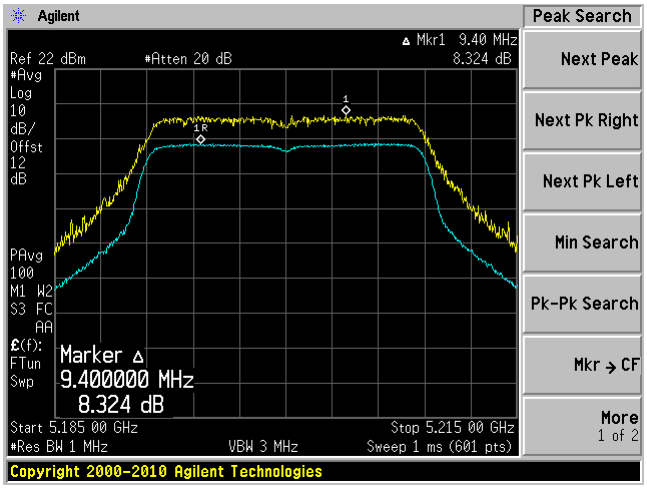
Low channel: 5180 MHz Chain J1



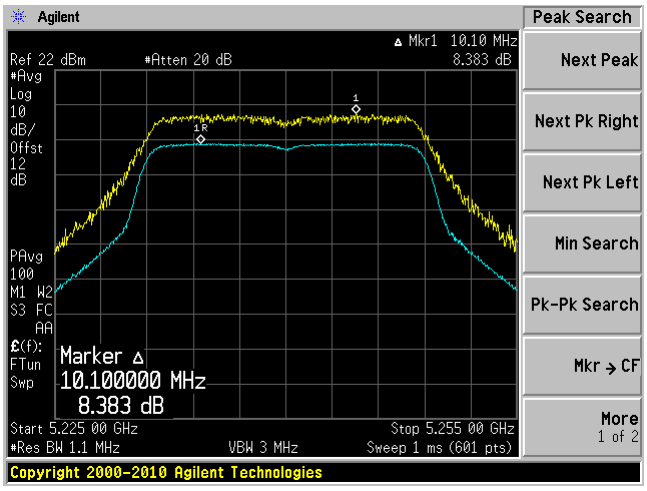
Middle channel: 5200 MHz Chain J0



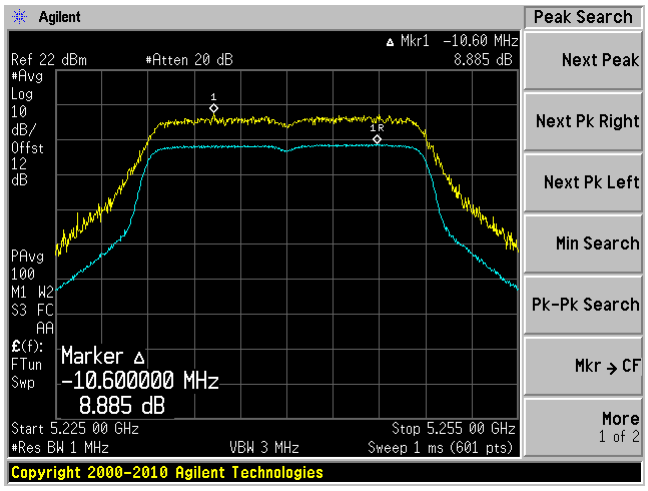
Middle channel: 5200 MHz Chain J1



High channel: 5240 MHz Chain J0

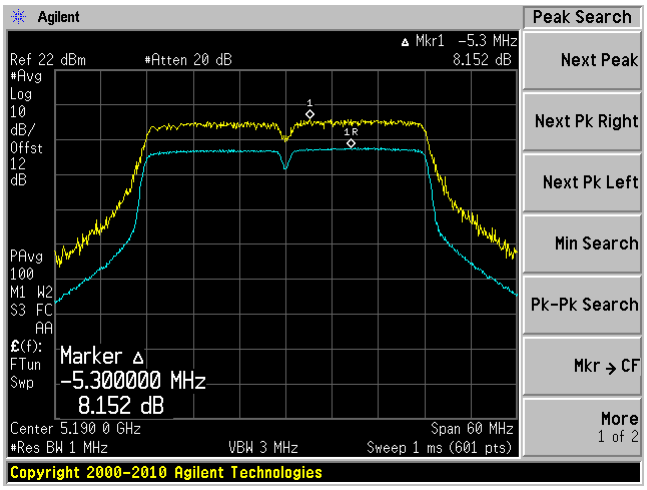


High channel: 5240 MHz Chain J1

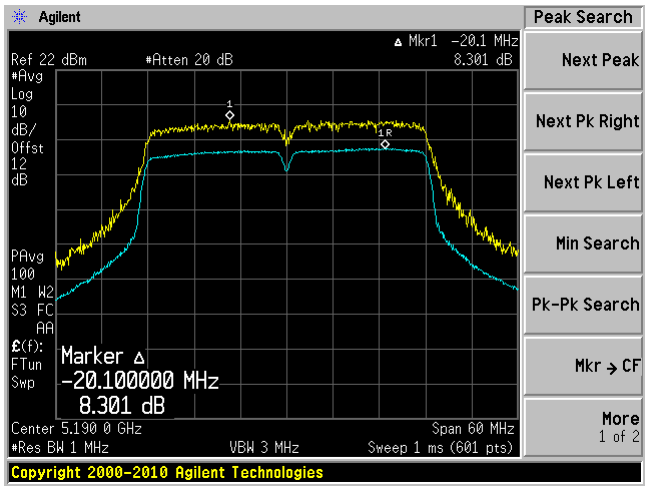


802.11n-HT40 mode

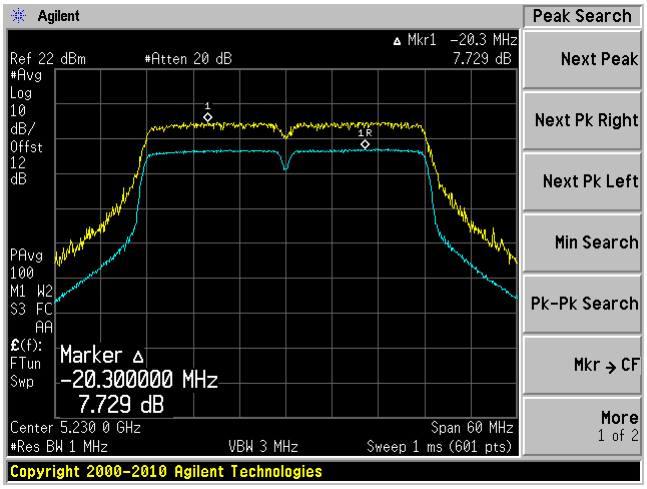
Low channel: 5190 MHz Chain J0



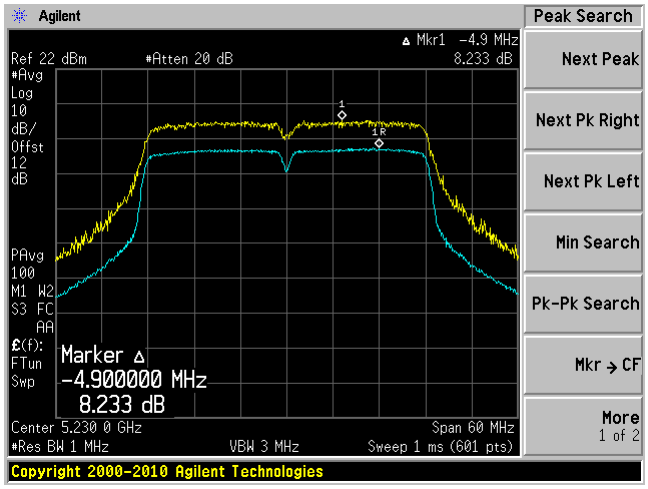
Low channel: 5190 MHz Chain J1



High channel: 5230 MHz Chain J0

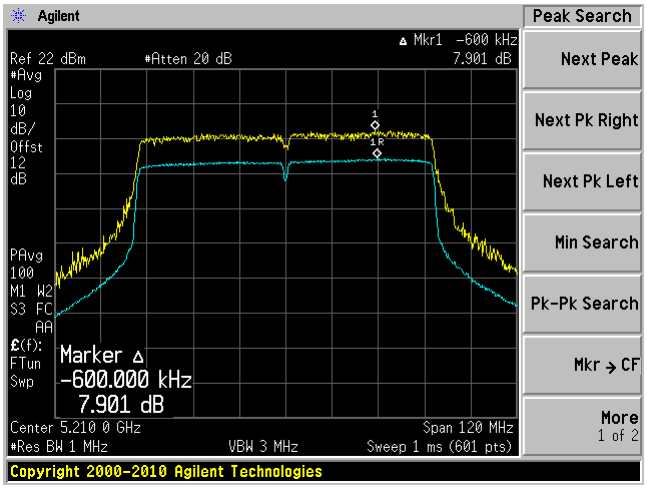


High channel: 5230 MHz Chain J1

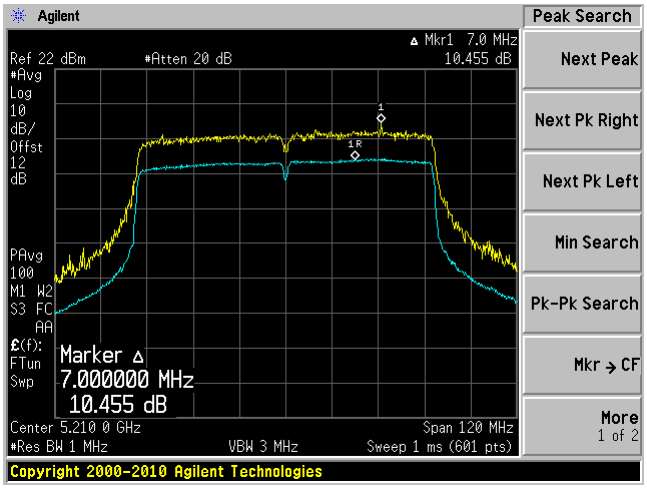


802.11ac-80 mode

Low channel: 5210 MHz Chain J0



Low channel: 5210 MHz Chain J1



13 IC RSS-210 §2.3 & RSS-Gen §6.1 - Receiver Spurious Radiated Emissions

13.1 Applicable Standard

According to IC RSS-Gen §6.1, spurious emissions from receivers shall not exceed the radiated limits shown in the table below.

Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies above 30 MHz

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 C63.4-2009.

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:

Margin = Corrected Amplitude - 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 ºC
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 RSS-210/RSS-Gen, with the closest margins from the limit listed below:

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

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 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 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz

As per IC RSS-210 §9.2, for transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

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.

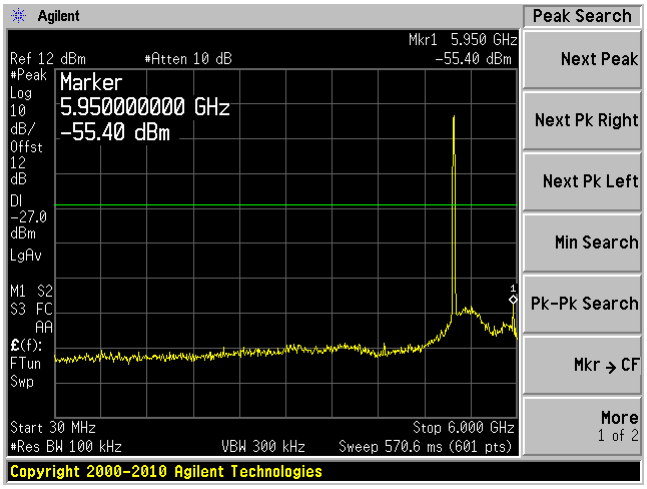
14.5 Test Results

Please refer to following plots of spurious emissions.

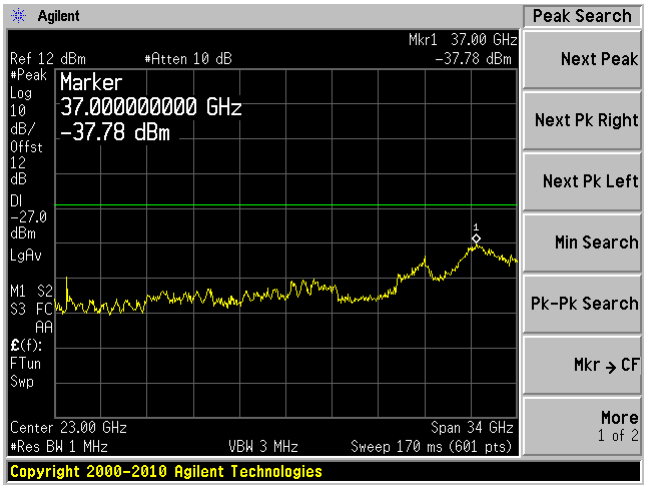
5150-5250 MHz

802.11a, Low Channel, 5180 MHz

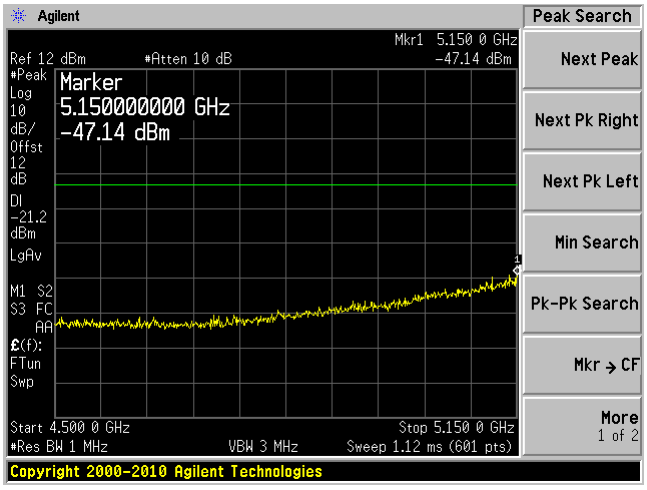
Chain J0, Plot: 30 MHz – 6 GHz



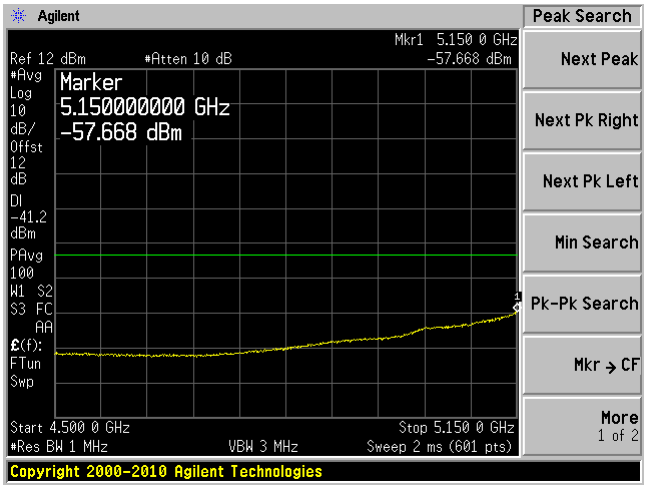
Chain J0, Plot: 6 GHz – 40 GHz



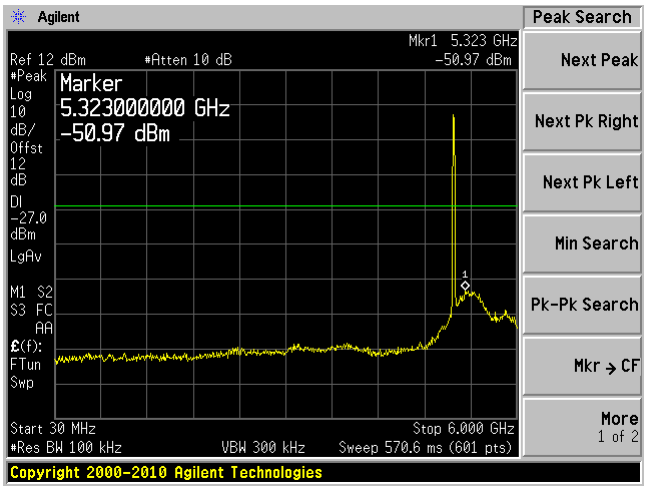
Chain J0, Plot: 4500 MHz – 5150 MHz Peak



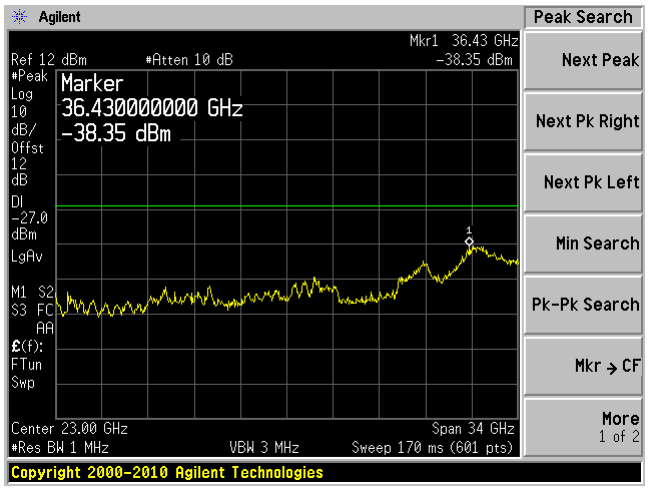
Chain J0, Plot: 4500 MHz – 5150 MHz Ave



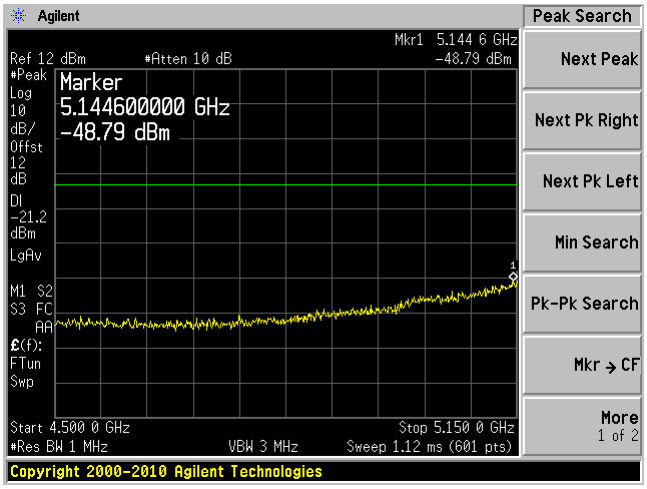
Chain J1, Plot: 30 MHz – 6 GHz



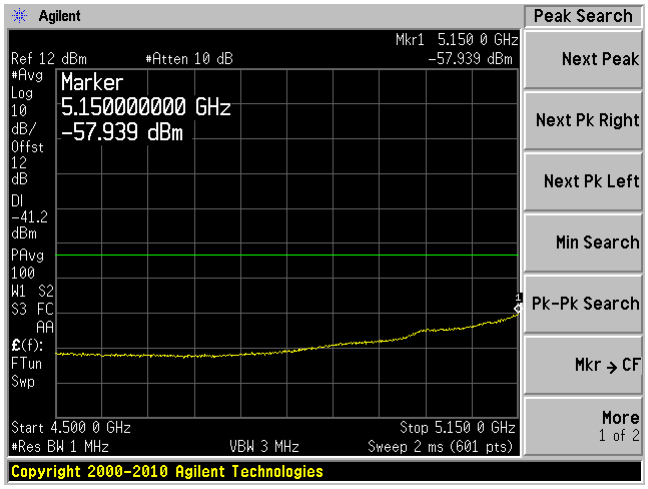
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 4500 MHz – 5150 MHz Peak

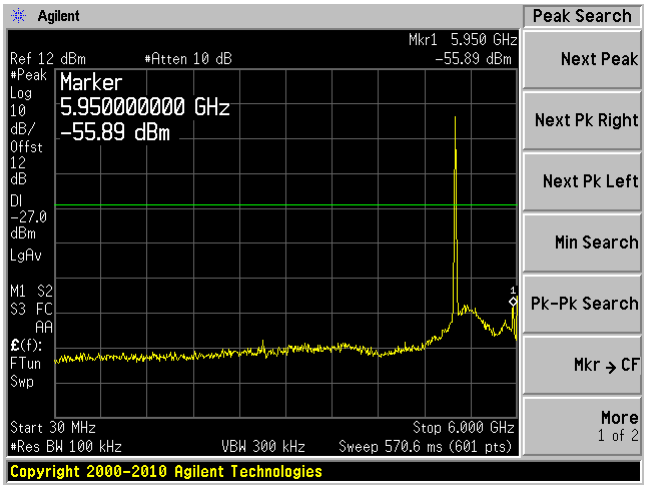


Chain J1, Plot: 4500 MHz – 5150 MHz Ave

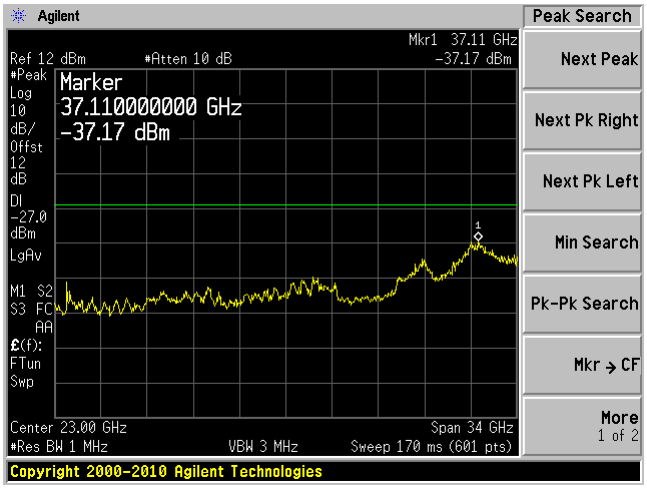


802.11a, Middle Channel, 5200 MHz

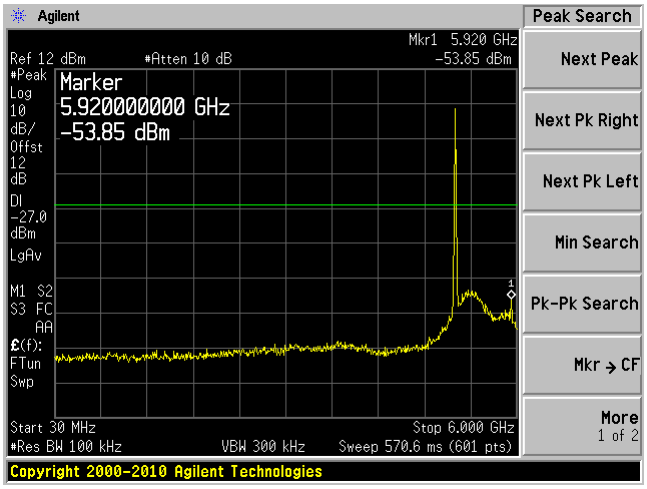
Chain J0, Plot: 30 MHz – 6 GHz



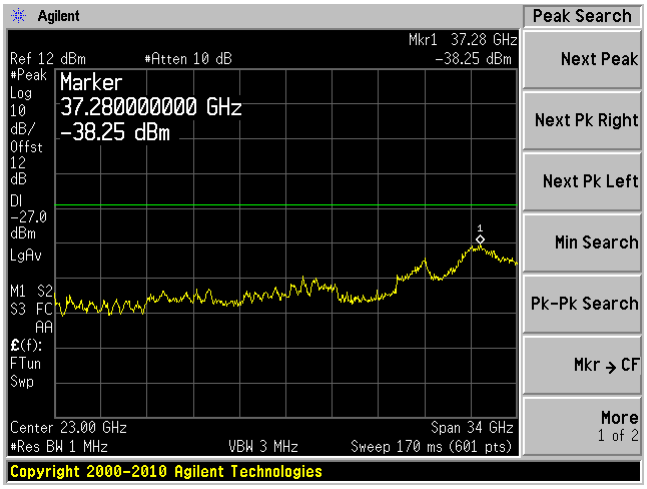
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

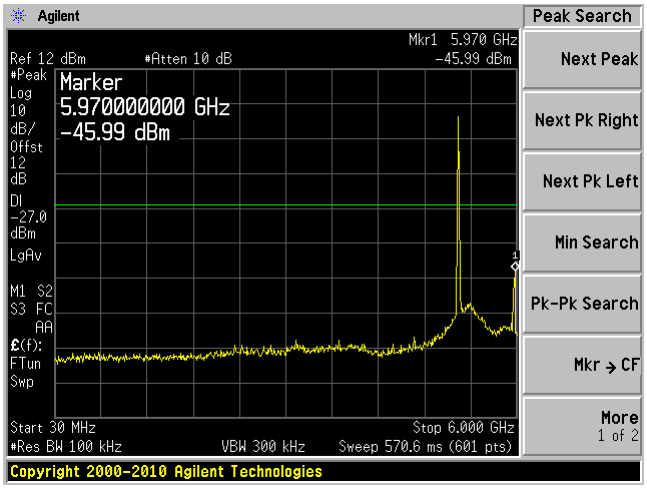


Chain J1, Plot: 6 GHz – 40 GHz

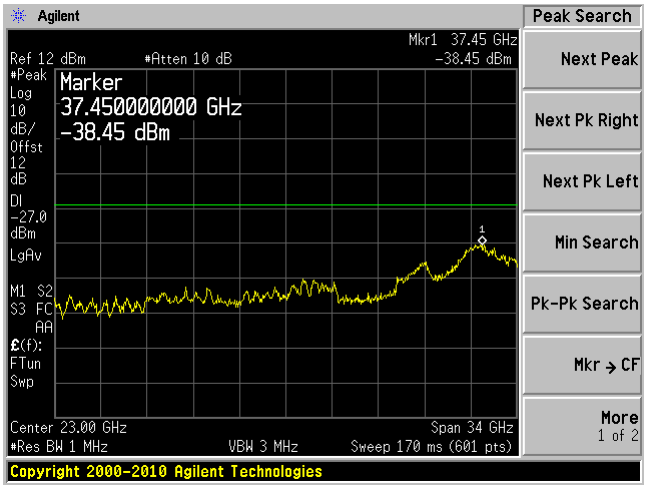


802.11a, High Channel, 5240 MHz

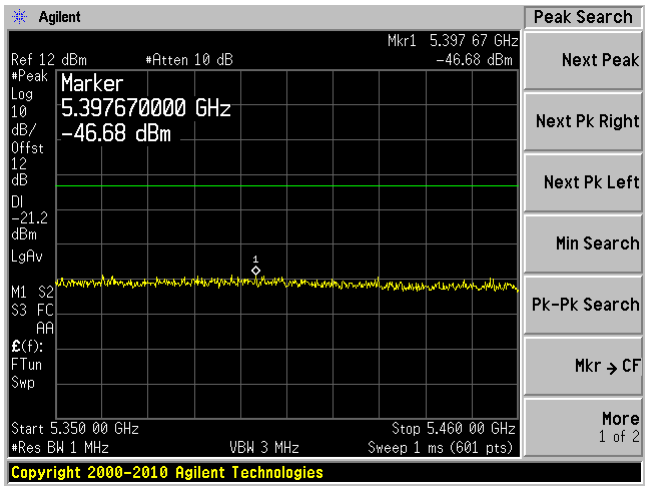
Chain J0, Plot: 30 MHz – 6 GHz



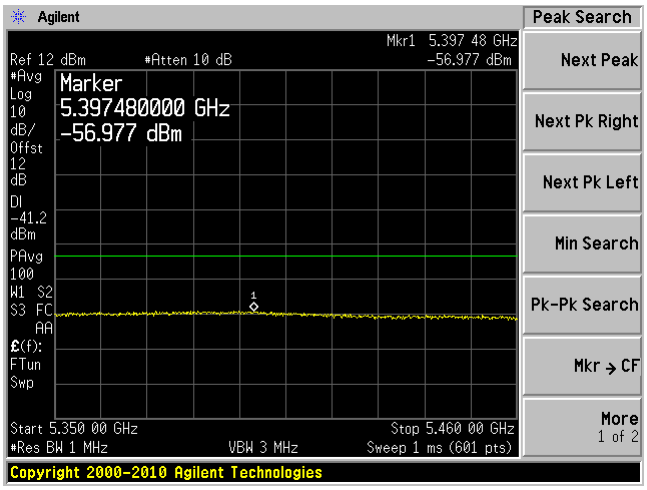
Chain J0, Plot: 6 GHz – 40 GHz



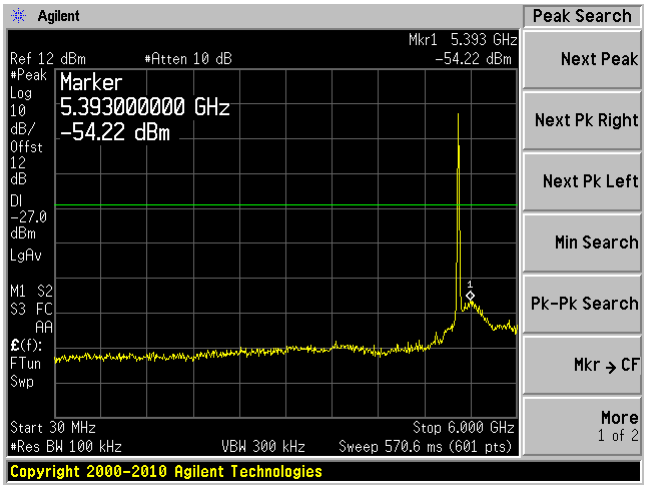
Chain J0, Plot: 5350MHz – 5460 MHz Peak



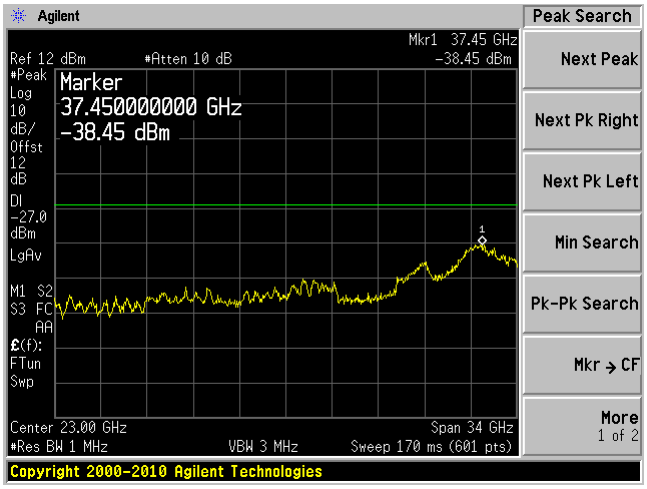
Chain J0, Plot: 5350MHz – 5460 MHz Ave



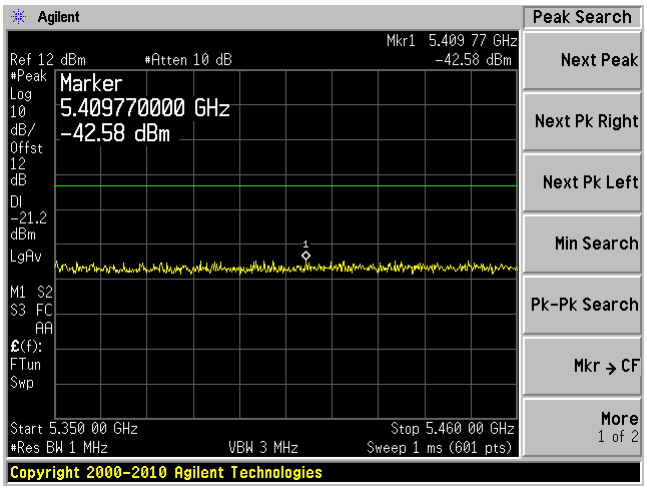
Chain J1, Plot: 30 MHz – 6 GHz



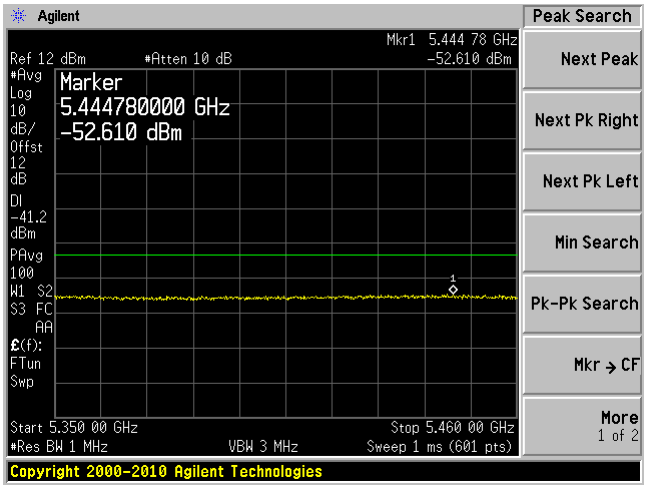
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz Peak

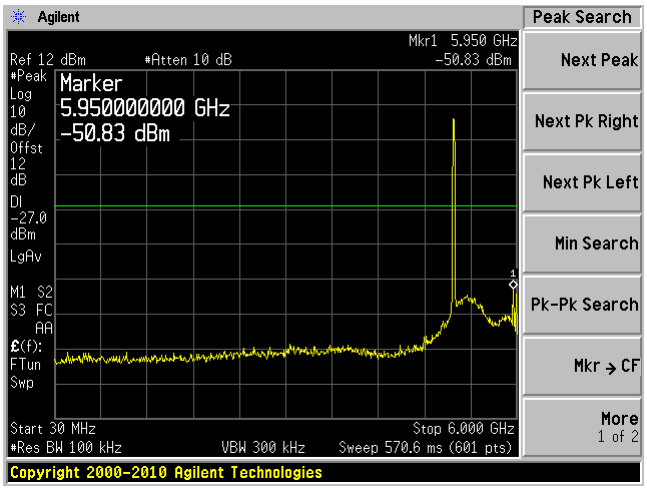


Chain J1, Plot: 5350MHz – 5460 MHz Ave

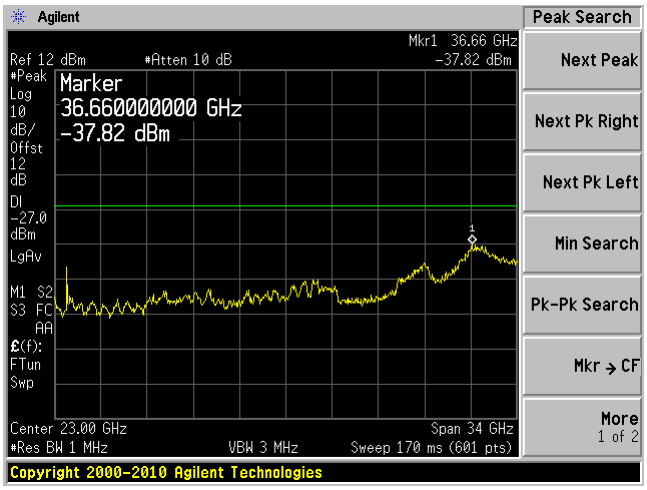


802.11n-HT 20, Low Channel 5180 MHz

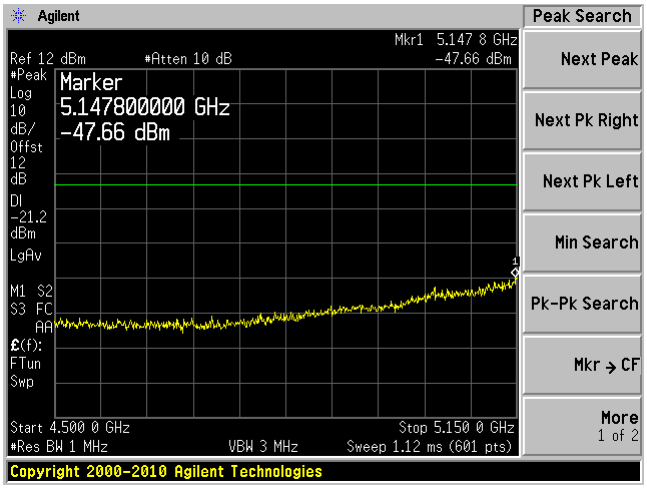
Chain J0, Plot: 30 MHz – 6 GHz



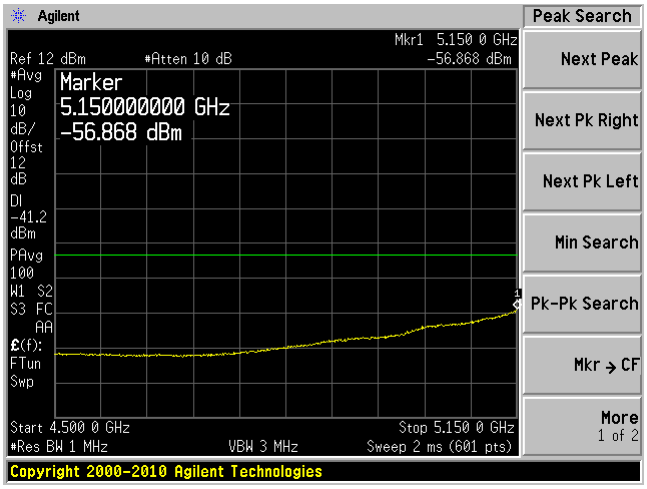
Chain J0, Plot: 6 GHz – 40 GHz



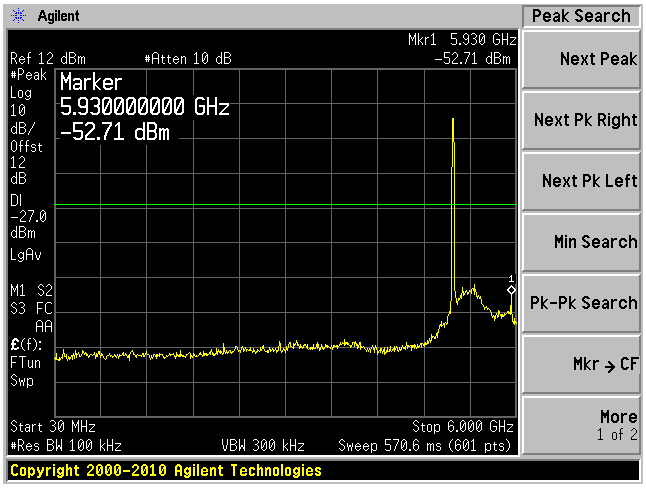
Chain J0, Plot: 4500 MHz – 5150 MHz Peak



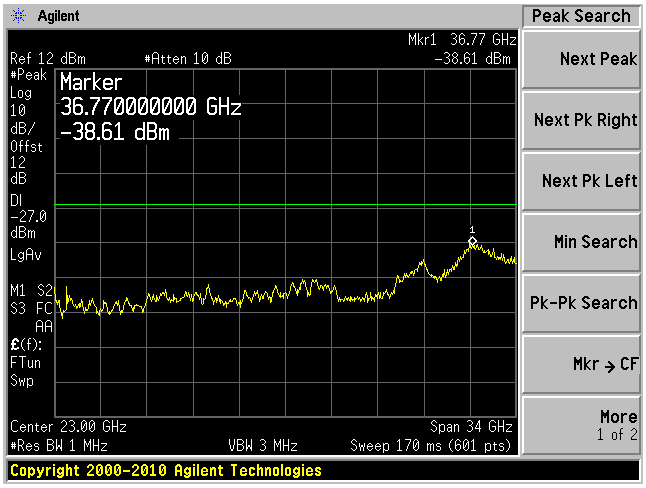
Chain J0, Plot: 4500 MHz – 5150 MHz Ave



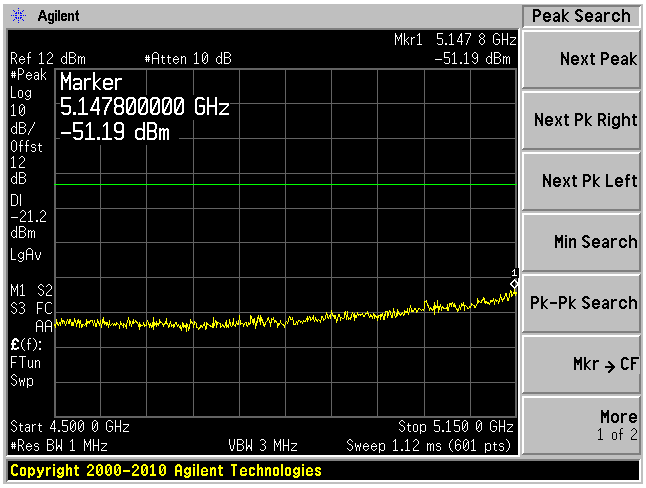
Chain J1, Plot: 30 MHz – 6 GHz



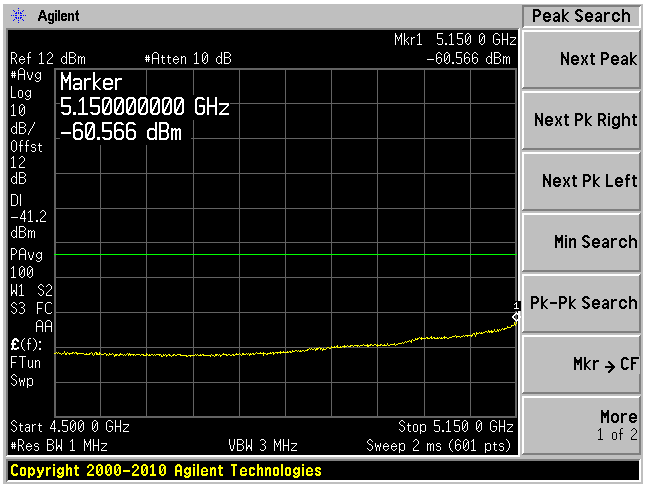
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 4500 MHz – 5150 MHz Peak

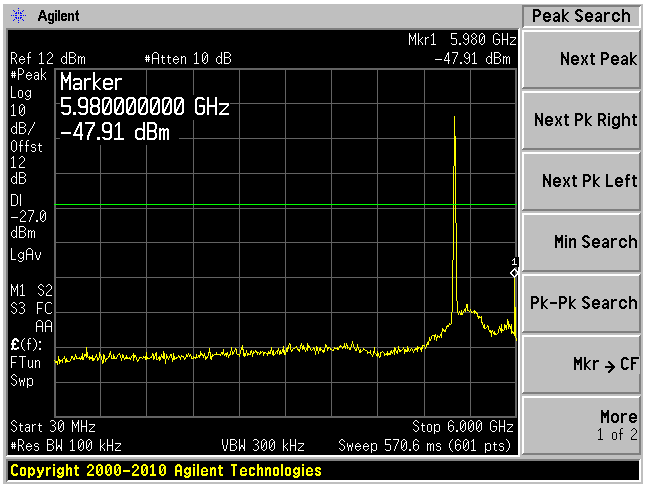


Chain J1, Plot: 4500 MHz – 5150 MHz Ave

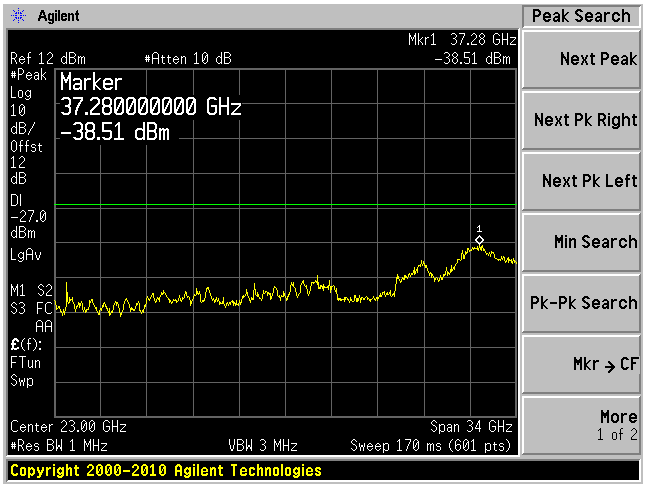


802.11n-HT20, Middle Channel 5200 MHz

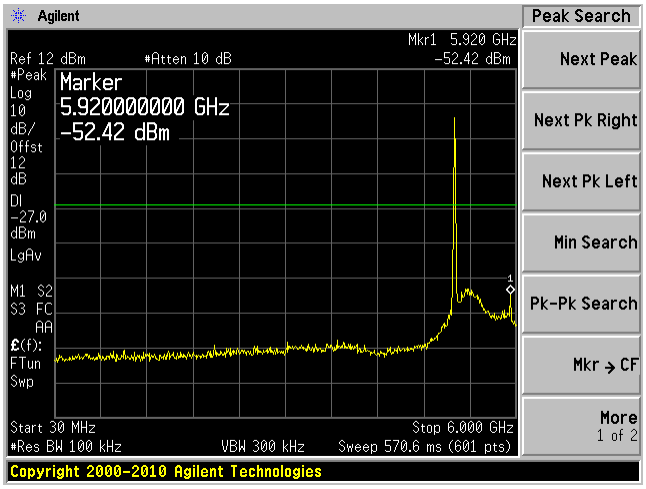
Chain J0, Plot: 30 MHz – 6 GHz



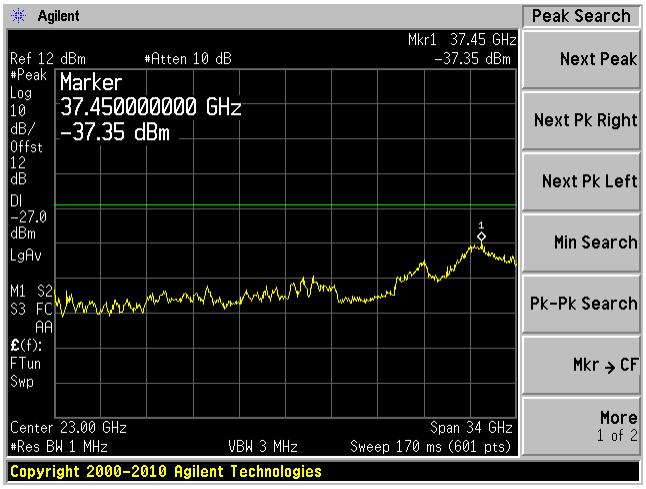
Chain J0, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 30 MHz – 6 GHz

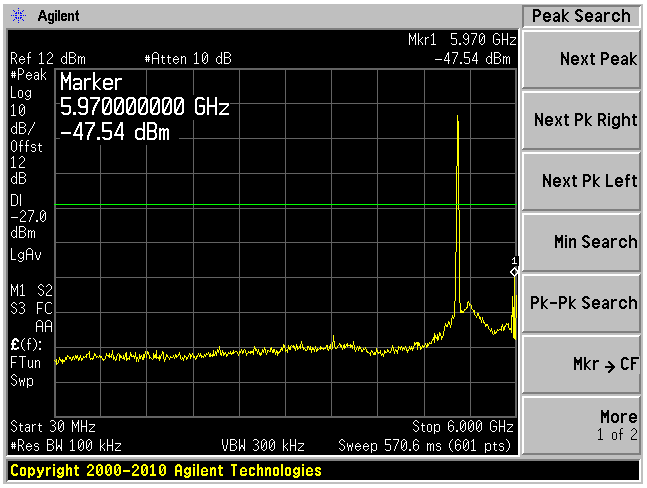


Chain J1, Plot: 6 GHz – 40 GHz

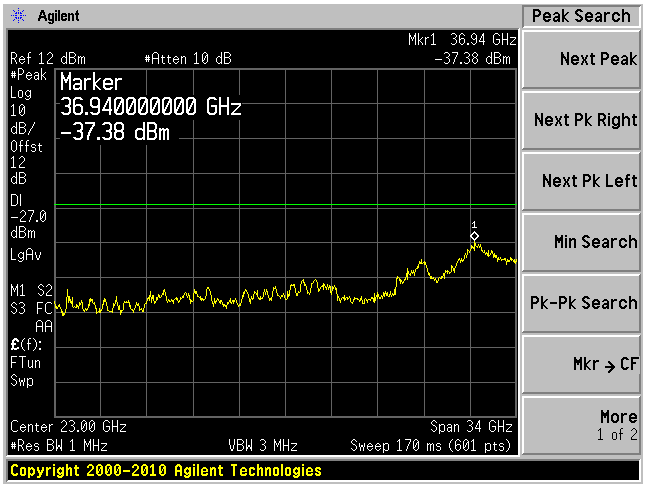


802.11n-HT 20, High Channel 5240 MHz

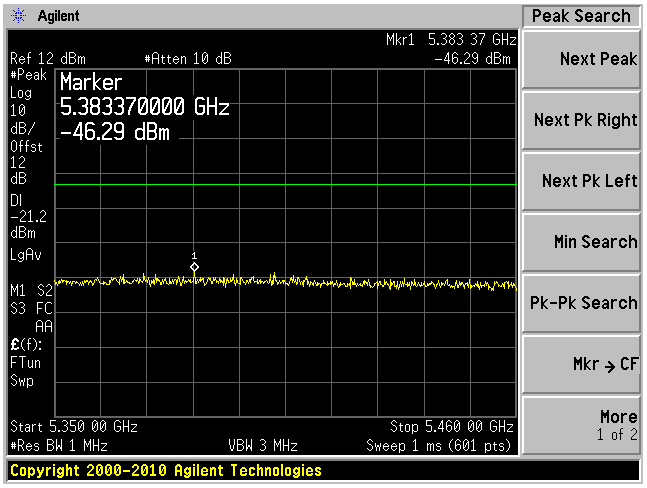
Chain J0, Plot: 30 MHz – 6 GHz



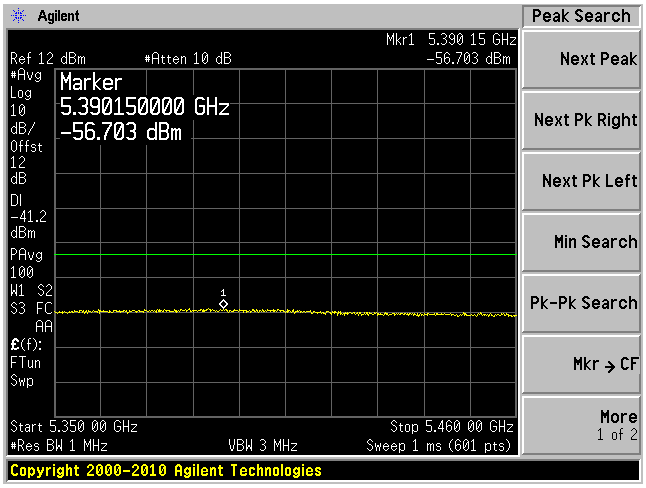
Chain J0, Plot: 6 GHz – 40 GHz



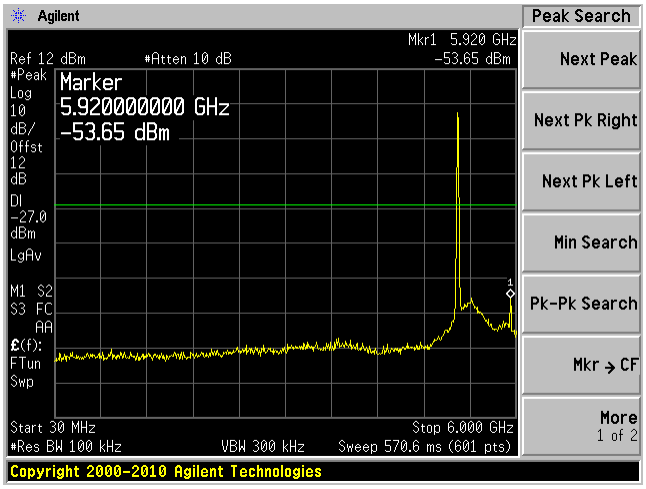
Chain J0, Plot: 5350 MHz – 5460 MHz Peak



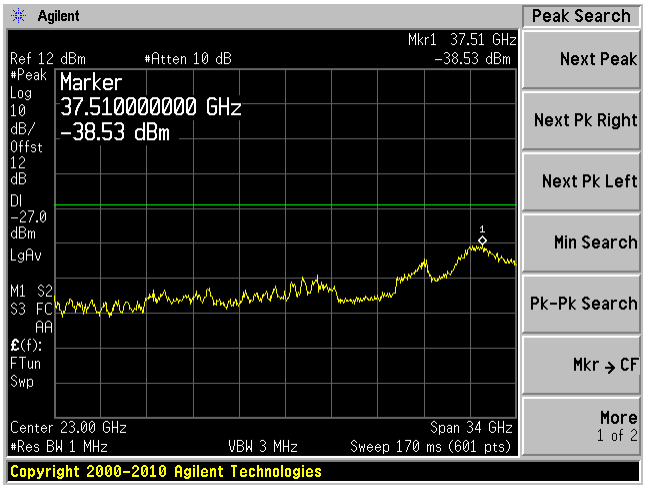
Chain J0, Plot: 5350 MHz – 5460 MHz Ave



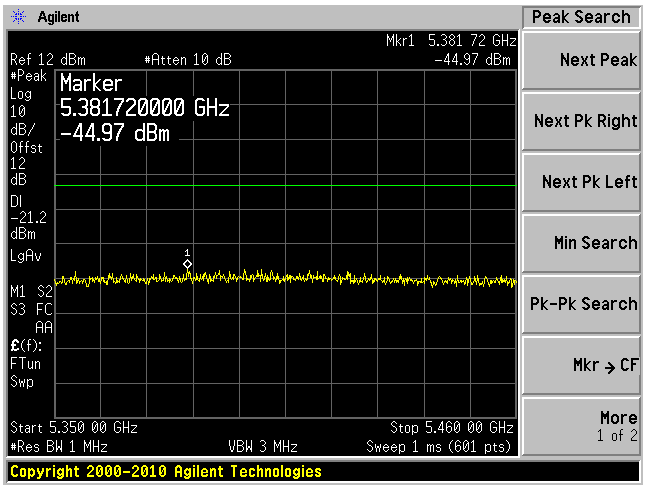
Chain J1, Plot: 30 MHz – 6 GHz



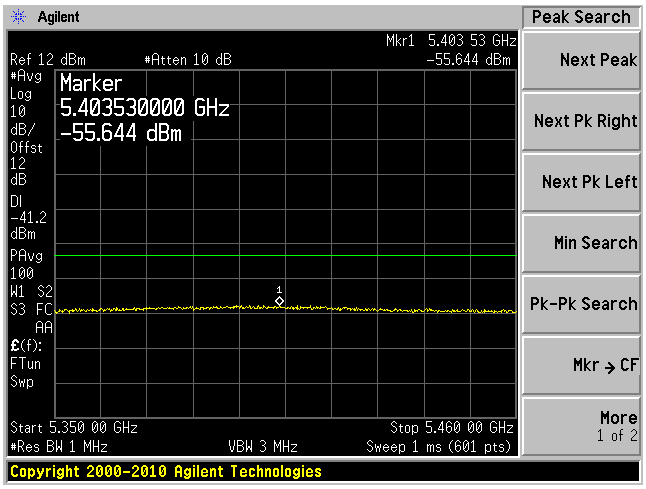
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350 MHz – 5460 MHz Peak

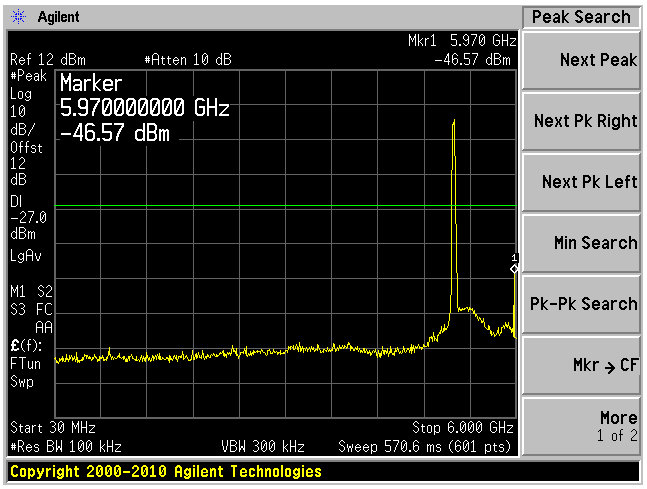


Chain J1, Plot: 5350 MHz – 5460 MHz Ave

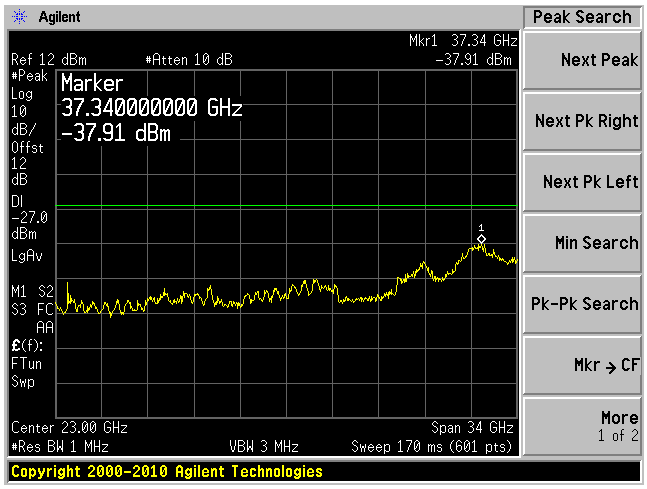


802.11n-HT40, Low Channel 5190 MHz

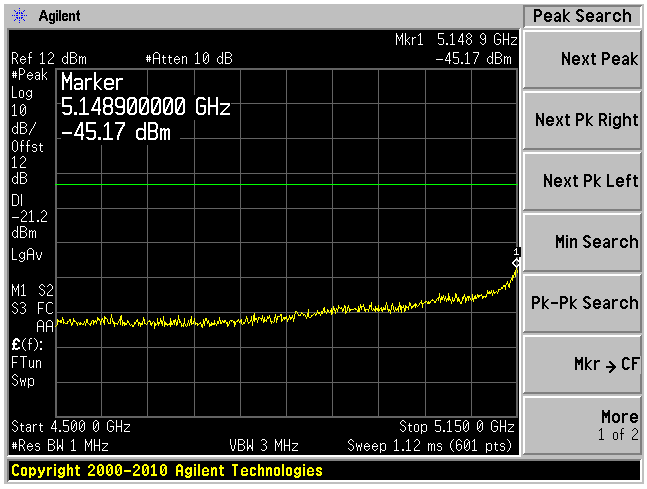
Chain J0, Plot: 30 MHz – 6 GHz



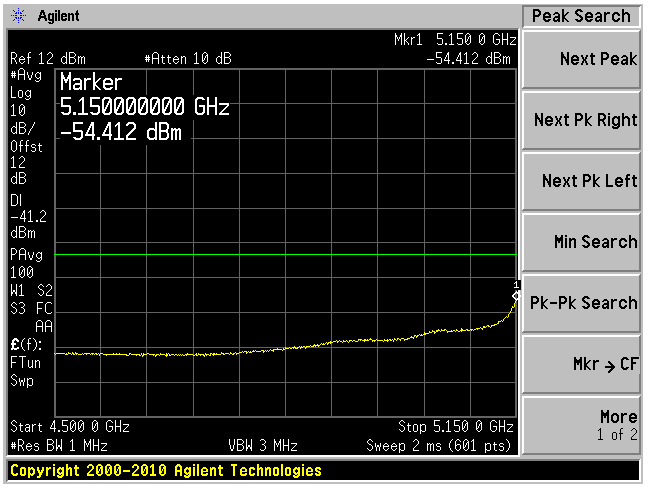
Chain J0, Plot: 6 GHz – 40 GHz



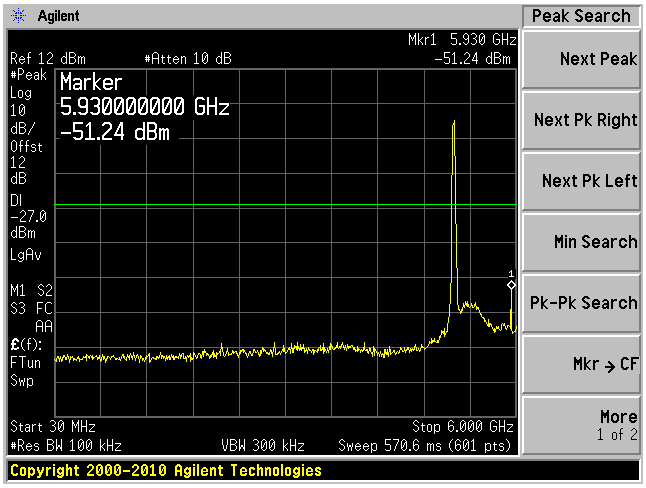
Chain J0, Plot: 4500 MHz – 5150 MHz Peak



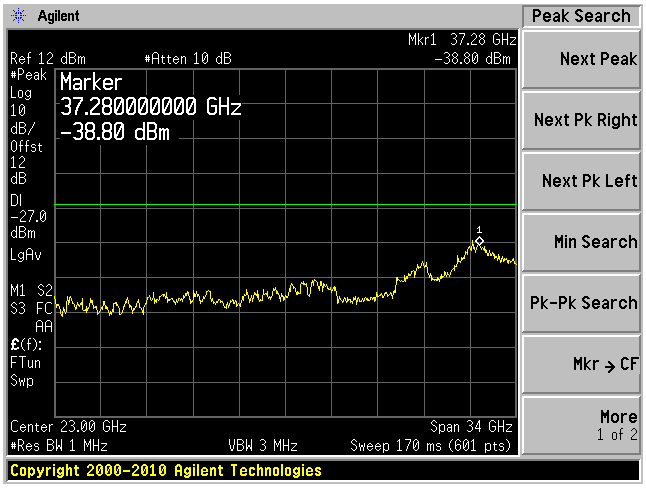
Chain J0, Plot: 4500 MHz – 5150 MHz Ave



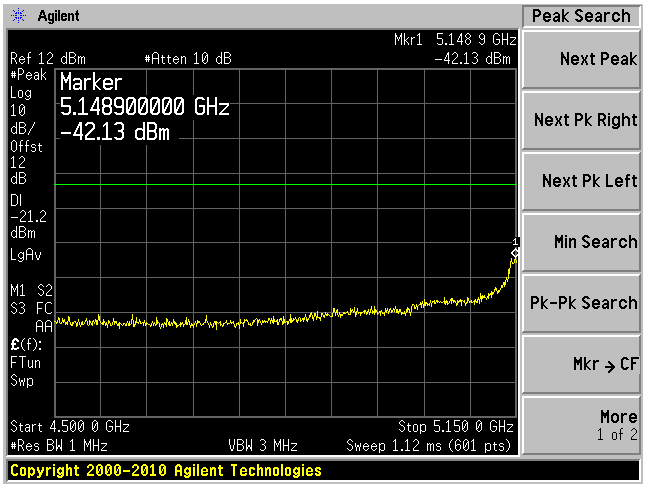
Chain J1, Plot: 30 MHz – 6 GHz



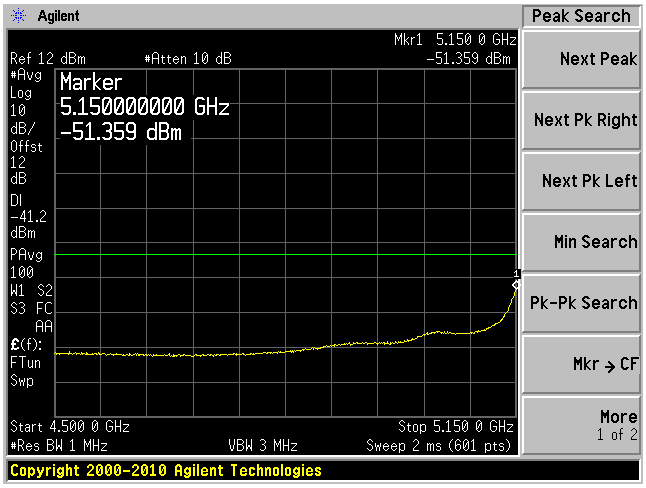
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 4500 MHz – 5150 MHz Peak

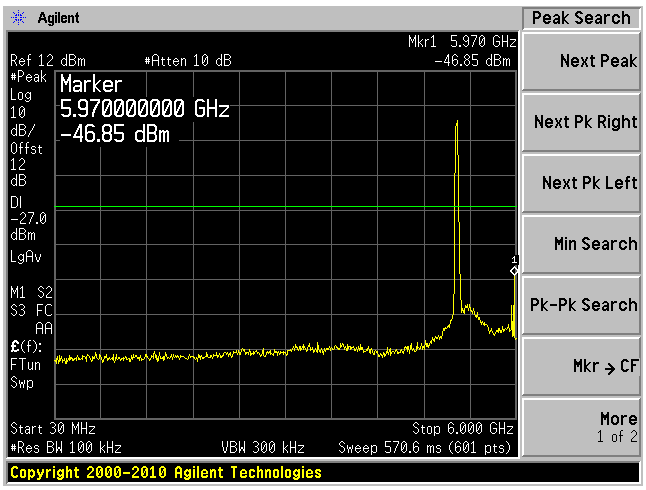


Chain J1, Plot: 4500 MHz – 5150 MHz Ave

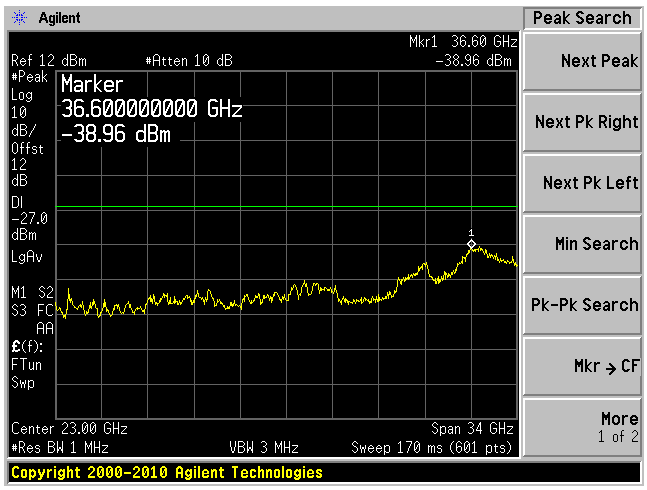


802.11n-HT40, High Channel 5230 MHz

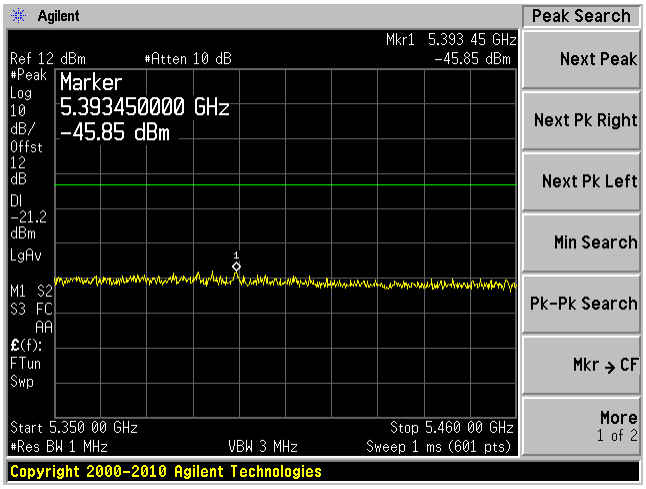
Chain J0, Plot: 30 MHz – 6 GHz



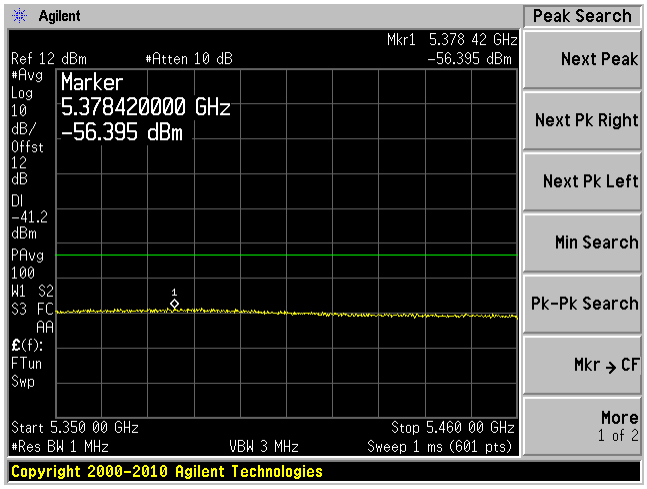
Chain J0, Plot: 6 GHz – 40 GHz



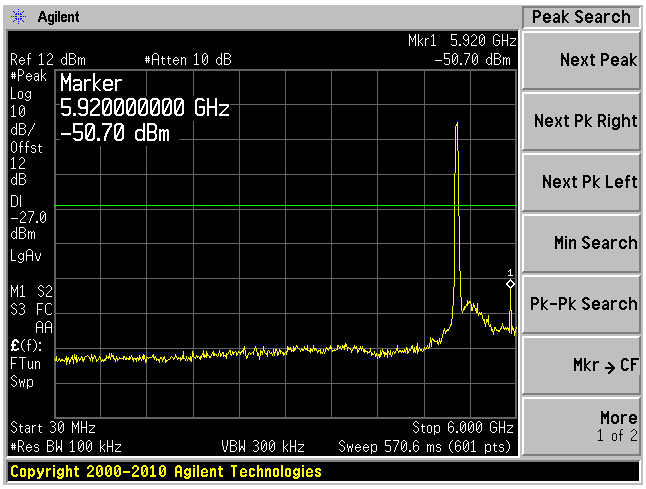
Chain J0, Plot: 5350MHz – 5460 MHz Peak



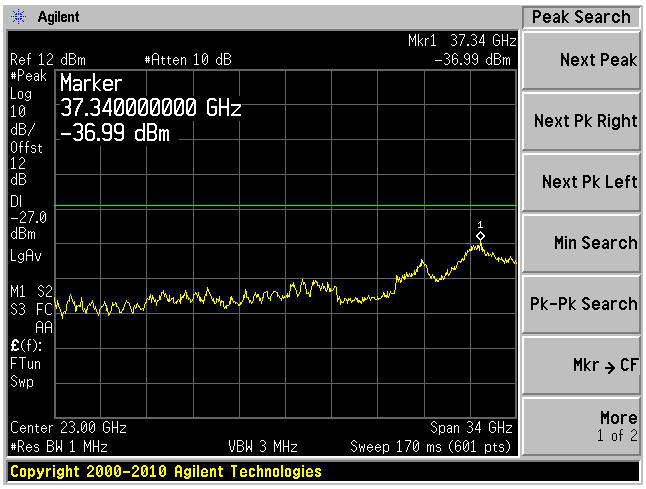
Chain J0, Plot: 5350MHz – 5460 MHz Ave



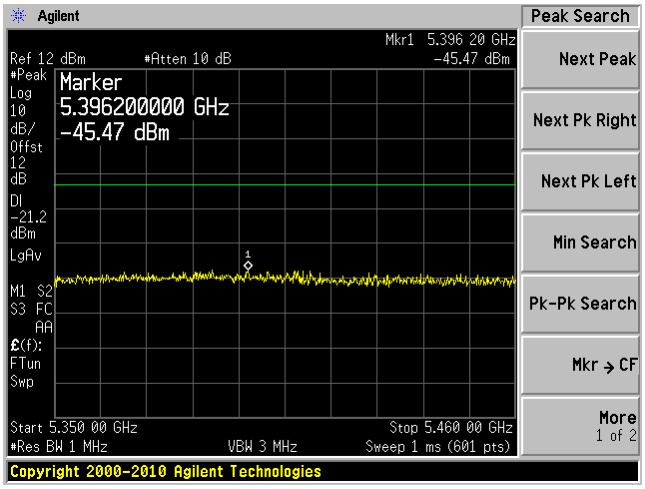
Chain J1, Plot: 30 MHz – 6 GHz



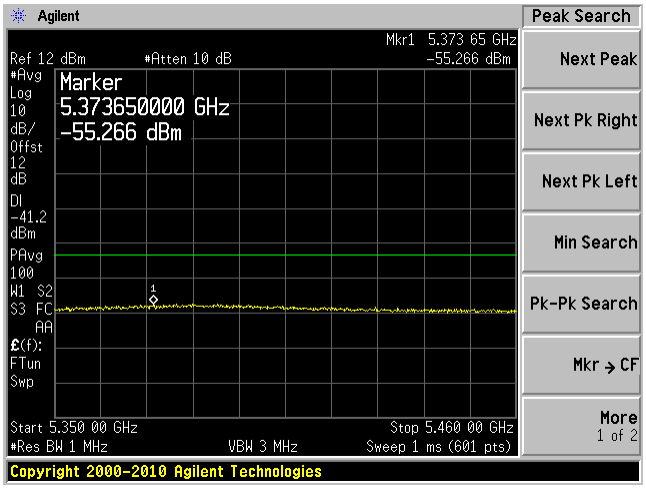
Chain J1, Plot: 6 GHz – 40 GHz



Chain J1, Plot: 5350MHz – 5460 MHz Peak

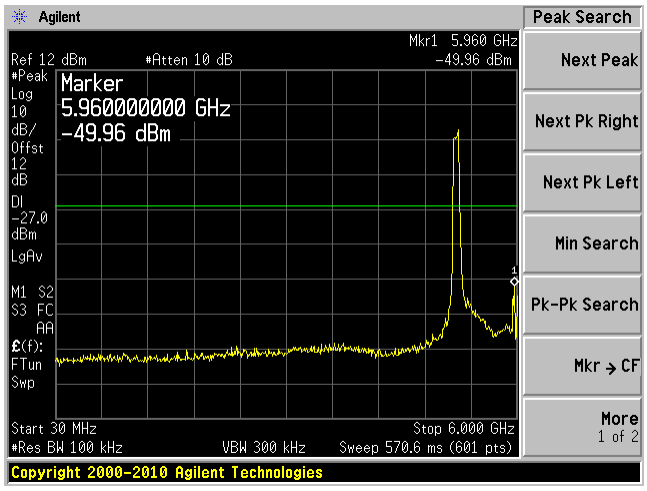


Chain J1, Plot: 5350MHz – 5460 MHz Ave

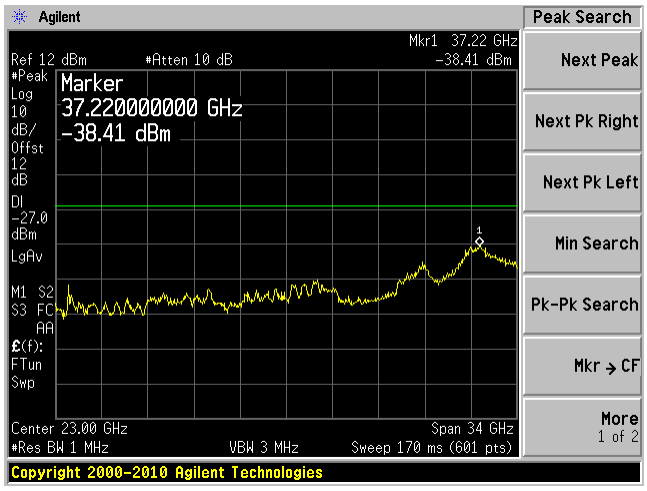


802.11ac-80, Channel 5210MHz

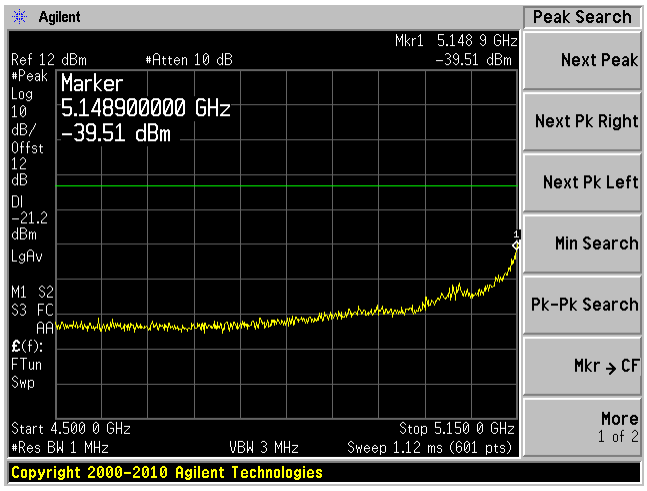
Chain J0, Plot: 30 MHz – 6 GHz



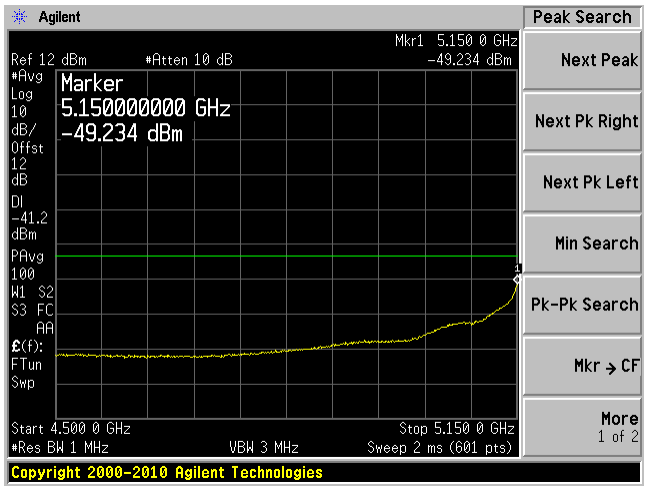
Chain J0, Plot: 6 GHz – 40 GHz



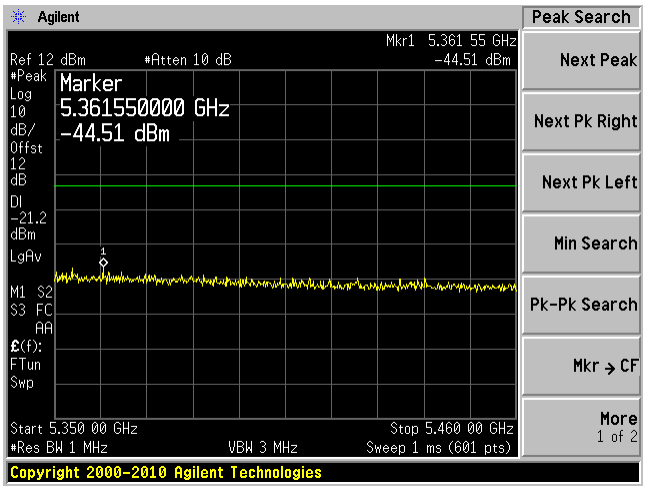
Chain J0, Plot: 4500 MHz – 5150 MHz Peak



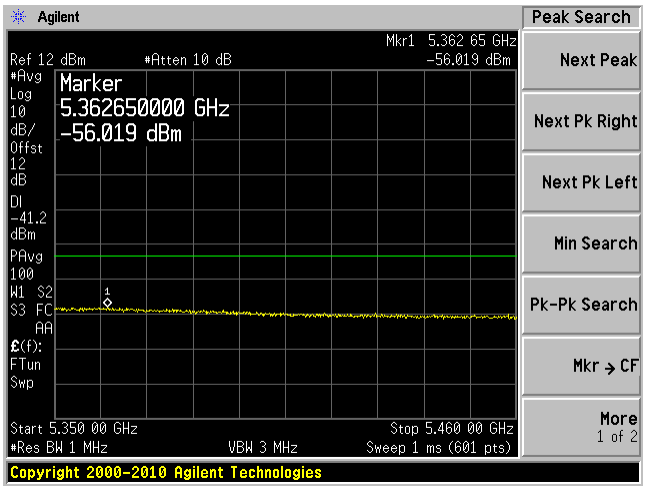
Chain J0, Plot: 4500 MHz – 5150 MHz Ave



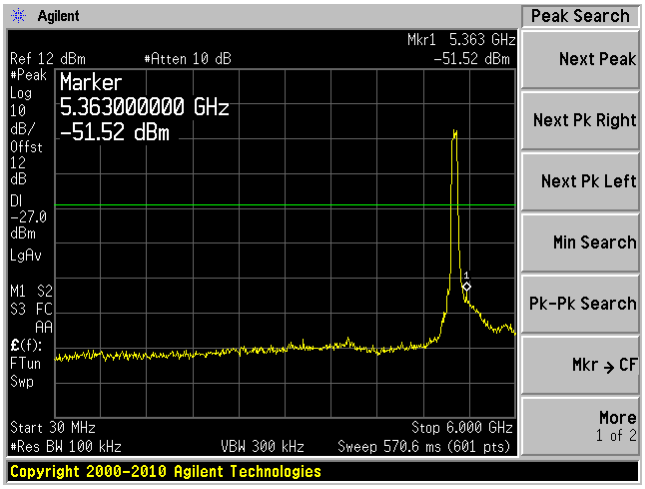
Chain J0, Plot: 5350 MHz – 5460 MHz Peak



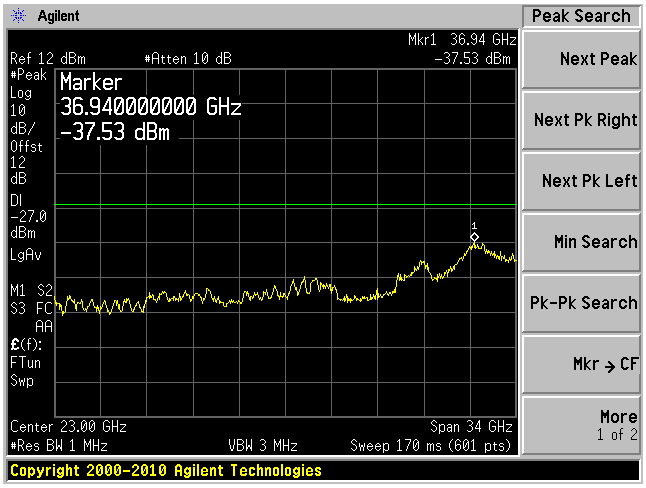
Chain J0, Plot: 5350 MHz – 5460 MHz Ave



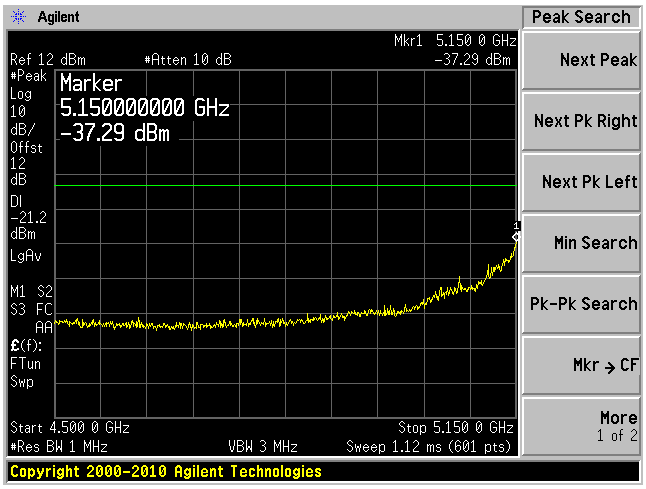
Chain J1, Plot: 30 MHz – 6 GHz



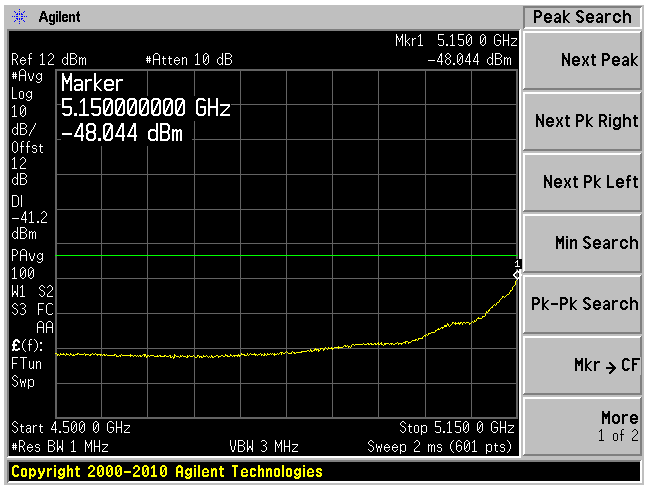
Chain J1, Plot: 6 GHz – 40 GHz



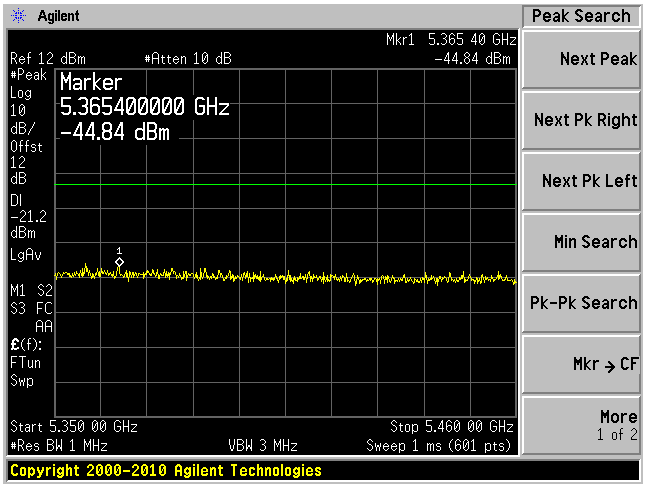
Chain J1, Plot: 4500 MHz – 5150 MHz Peak



Chain J1, Plot: 4500 MHz – 5150 MHz Ave



Chain J1, Plot: 5350 MHz – 5460 MHz Peak



Chain J1, Plot: 5350 MHz – 5460 MHz Ave