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: S9GSC8800
IC: 5912A-SC8800

Report Type: Original Report	**Product Type:** 802.11 a/b/g/n Wireless Access Point

Test Engineers: Bo Li

Report Number: R1212101-407 W52

Report Date: 2013-06-06

Reviewed By: Quinn Jiang, Test Engineer

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1212101-407 W52	Original Report	2013-06-06

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: *SmartCell 8800* with FCC ID: S9GSC8800, IC: 5912A-SC8800 or the "EUT" as referred to in this report. The EUT is a 3x3 MIMO 802.11 a/b/g/n WLAN Access Point.

1.2 Mechanical Description of EUT

The EUT measures approximately 38.5 cm (L) x 30.5 cm (W) x 12 cm (H) and weighs 7.15 kg.

The test data gathered are from typical production sample, serial number: R1212101-01 asigned by BACL

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 add additional antenna with class II permissive change on the original application by determine compliance with FCC/IC 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 DTS with FCC ID: S9GSC8800, IC: 5912A-SC8800

1.5 Test Methodology

FCC CFR 47 Part2, Part15.407 and IC RSS-210 Issue 8, Dec 2010.

1.6 Measurement Uncertainty

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

Based on CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

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

1.7 Test Facility

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 C63.4-2003, 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.

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 *Cyprus ART* was provided by Ruckus Wireless Inc., and was verified Bo Li to comply with the standard requirements being tested against.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Special Accessories

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

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	Ideapad U310	-

2.6 EUT Internal Configuration Details

Manufacturer	Description	Type	Serial Number
Ruckus	PCA, Mother Board, Cyprus2	PCA	120-11190-001 rev 7.1
Ruckus	PCA, Interface Board v2, Cyprus2	PCA	120-11252-001 rev 2.0
Ruckus	Assembly, Power Supply	Sub-Assembly	705-60316-001 rev A
Ruckus	Antenna, GPS, 1575.42 MHz,	Antenna	730-63110-002 rev A
Ruckus	Assembly, Antenna, Thunderbolt3, Cyrpus	Sub-Assembly	705-60287-001 rev A
Ruckus	Radome, Cyprus, Gray	Plastic Component	700-60255-002 rev A1
Ruckus	Mounting Plate, Antenna, Cyprus, Gray	Hardware-Metal	701-60690-002 rev B1
Ruckus	Housing, Base, Cyprus, Gray	Hardware-Metal	701-60692-002 rev B1

2.7 Interface Ports and Cables

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

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
Ruckus	Power Supply cord	-	-
Ruckus	POE Power Adapter	740-64217-001	-

3 Summary of Test Results

FCC & IC Rules	Description of Test	Result (s)
FCC §15.407(f), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207 IC RSS-Gen §7.2.4	AC Power Line Conducted Emissions	Compliant
FCC §15.209(a), 15.407(b) IC RSS-210 §A9.2	Spurious Radiated Emissions	Compliant
FCC §15.407(a) IC RSS-210 §A9.2	26 dB and 99% Emission Bandwidth	Compliant
FCC §407(a)(1) IC RSS-210 §A9.2	Peak Output Power Measurement	Compliant
FCC §2.1051, §15.407(b) IC RSS-210 §A9.2	Band Edges	Compliant
FCC §15.407(a)(1) IC RSS-210 §A9.2	Power Spectral Density	Compliant
FCC §15.407(a)(6)	Peak Excursion Ratio	Compliant
IC RSS-210 §2.3 IC RSS-Gen §6.1	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):	14.85
Maximum peak output power at antenna input terminal (mW):	30.54921
Prediction distance (cm):	20
Prediction frequency (MHz):	5230
Maximum Antenna Gain, typical (dBi):	8
Maximum Antenna Gain (numeric):	6.309573
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.038347
Power density of prediction frequency at 20.0 cm (W/m^2):	0.38347
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 meets FCC/IC MPE requirement for uncontrolled exposure environment at 20 cm distance.

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

5.1 Applicable Standard

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

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

As per IC RSS-Gen §7.1.2: Transmitter Antenna
A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.
When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

5.2 Antenna List

Manufacturers	Models/Name	Antenna Gain (dBi) 2400 -2483.5 MHz
Ruckus	TBolt3	6.0

Manufacturers	Models/Name	Antenna Gain (dBi) 5150 – 5875 MHz
Ruckus	TBolt3	8.0

The antenna consists of non-standard (UFL) connectors with less 6 and 8 dBi gain; Antenna gain that exceeds 6 dBi was added to RF measurement 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 and IC RSS-Gen §7.2.4 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.

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

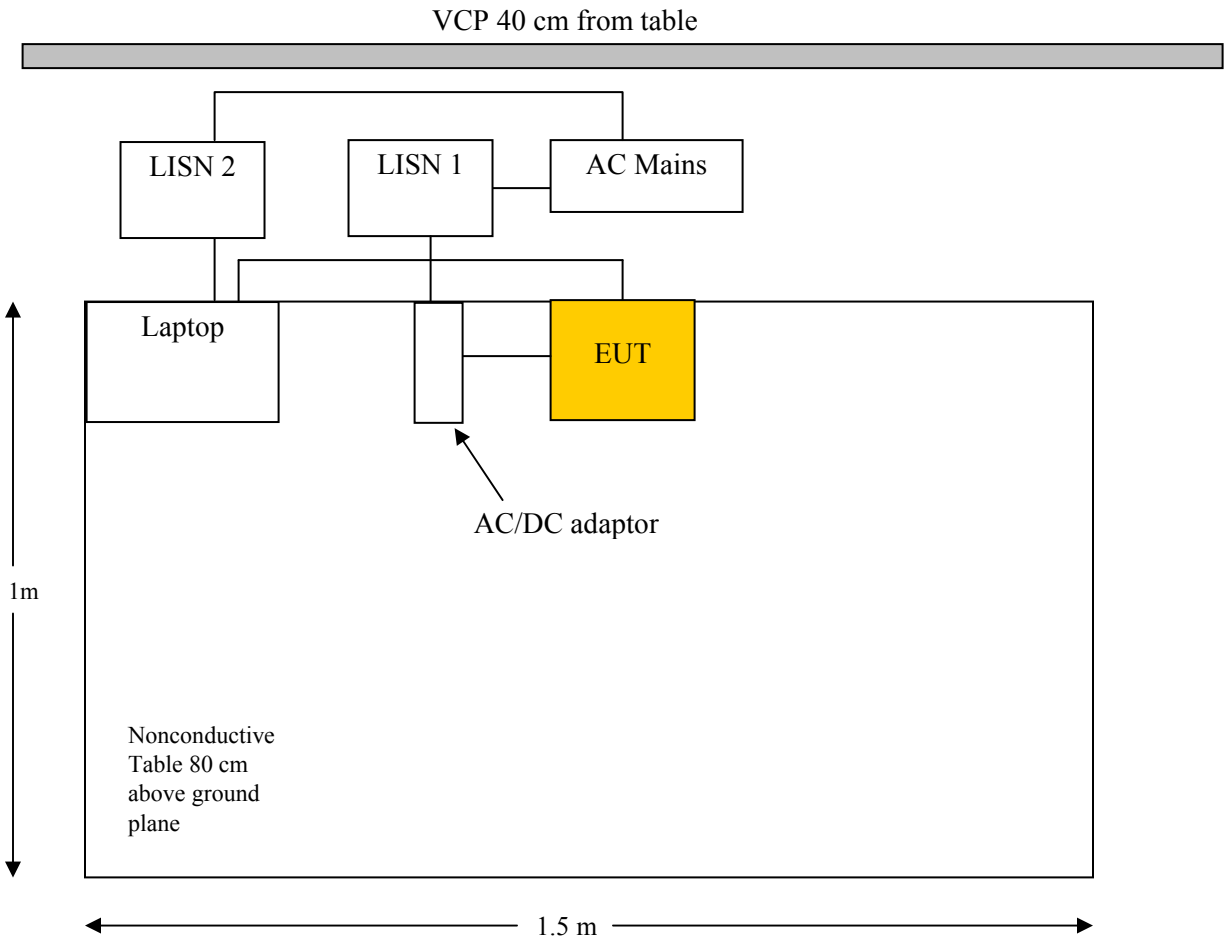
During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cord of the support equipment was connected to LISN-2.

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

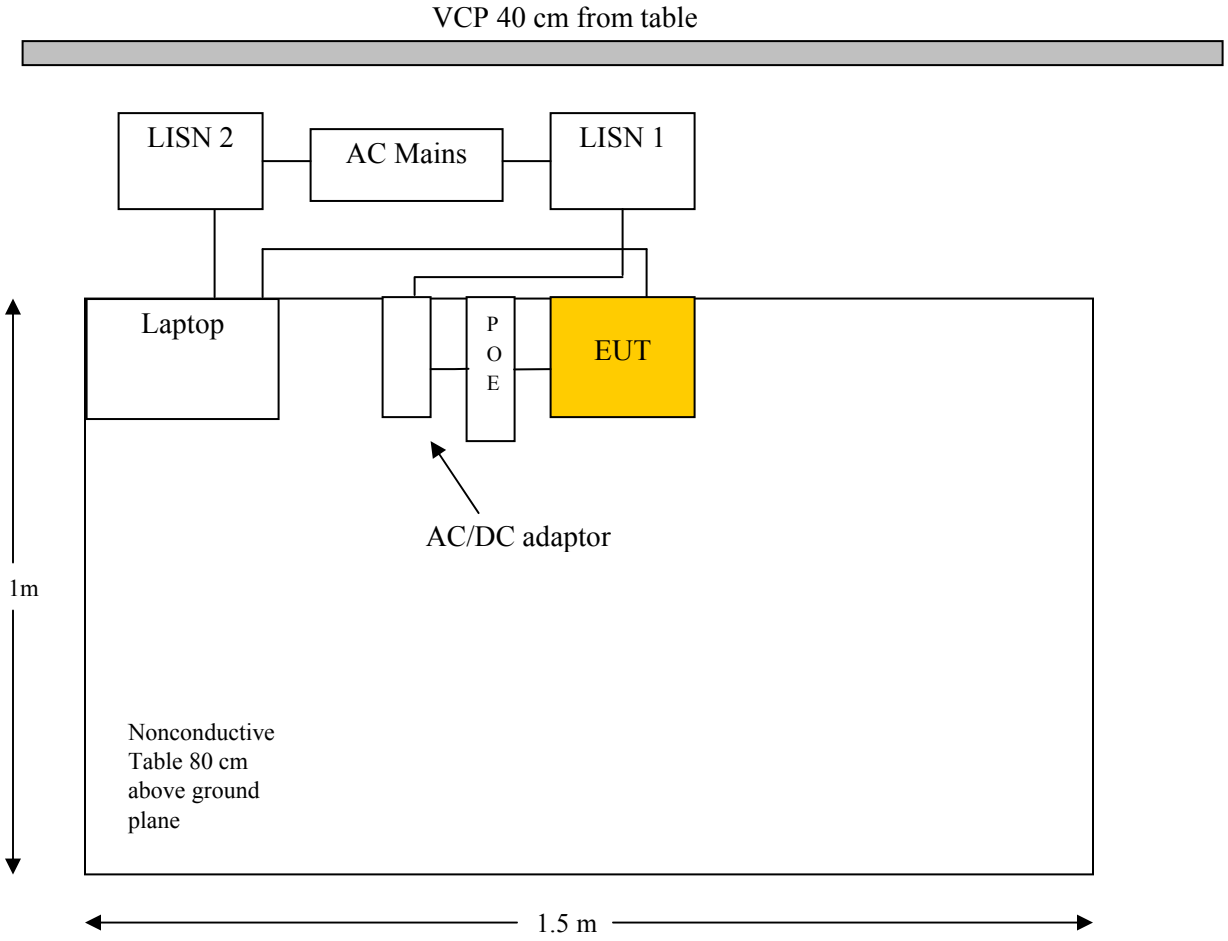
All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram

AC/DC Adaptor:



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	2013-03-28	1 year
Solar Electronics	LISN 1	9252-50-R-24-N	511205	2012-06-25	1 year
Solar Electronics	LISN 2	9252-50-R-24-N	511213	2012-06-25	1 year
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2012-05-30	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:	21 ºC
Relative Humidity:	51%
ATM Pressure:	101.42 kPa

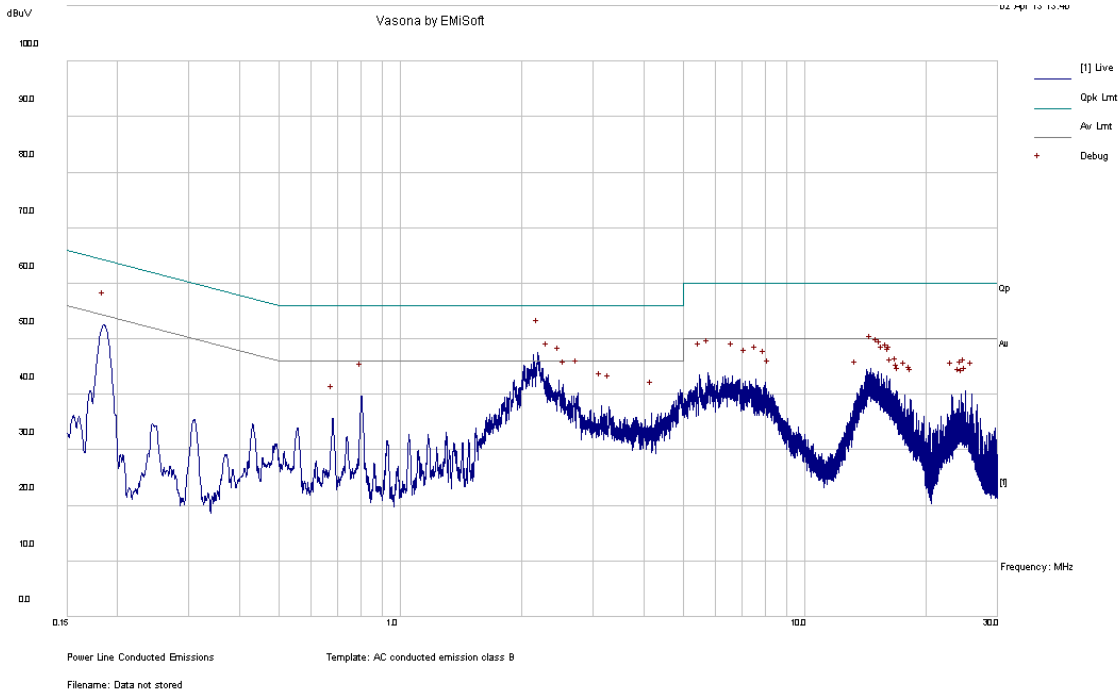
The testing was performed by Bo Li on 2013-03-29 in 5 m chamber 3.

6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC 15C and IC RSS 210 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)**
-6.54	2.181772	Neutral	0.15-30
Connection: AC/DC adapter of POE connected to 120 V/60 Hz, AC			
-2.79	0.349635	Line	0.15-30

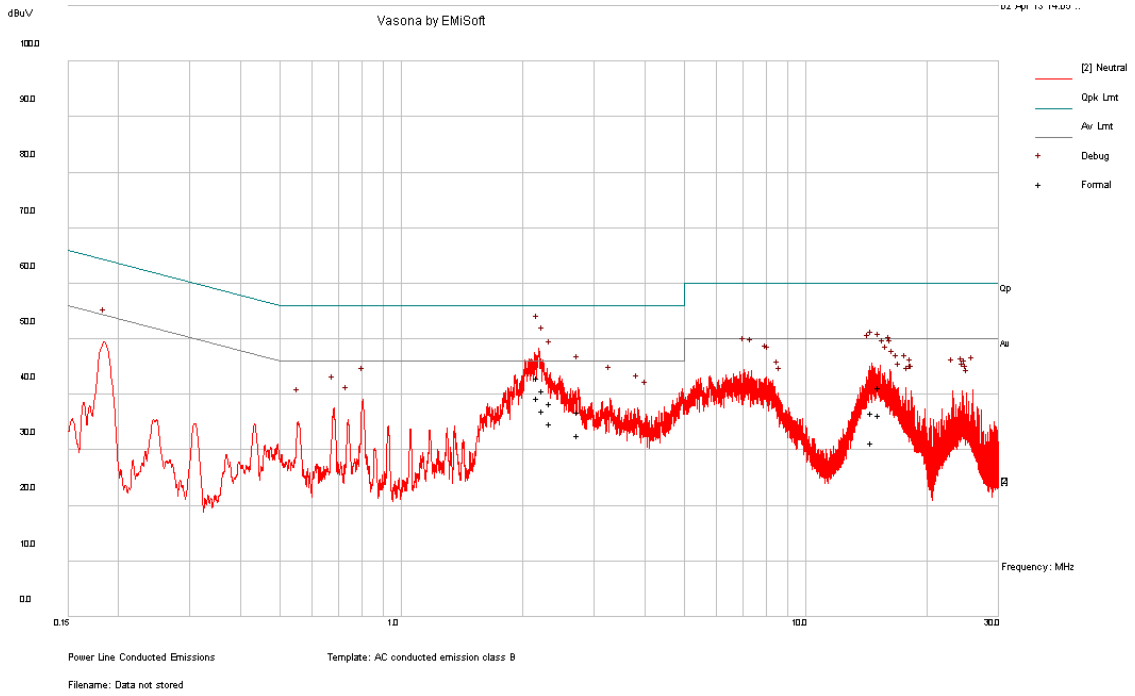
120 V, 60 Hz – Line, AC/DC Adaptor



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
2.18104	41.85	Line	56	-14.15	QP
0.184539	51.3	Line	64.28	-12.98	QP
2.31458	38.52	Line	56	-17.48	QP
2.459606	35.63	Line	56	-20.37	QP
14.584421	36.98	Line	60	-23.02	QP
2.741454	35.26	Line	56	-20.74	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
2.18104	38.28	Line	46	-7.72	Ave.
0.184539	45.78	Line	54.28	-8.50	Ave.
2.31458	34.75	Line	46	-11.25	Ave.
2.459606	31.81	Line	46	-14.19	Ave.
14.584421	31.06	Line	50	-18.94	Ave.
2.741454	31.16	Line	46	-14.84	Ave.

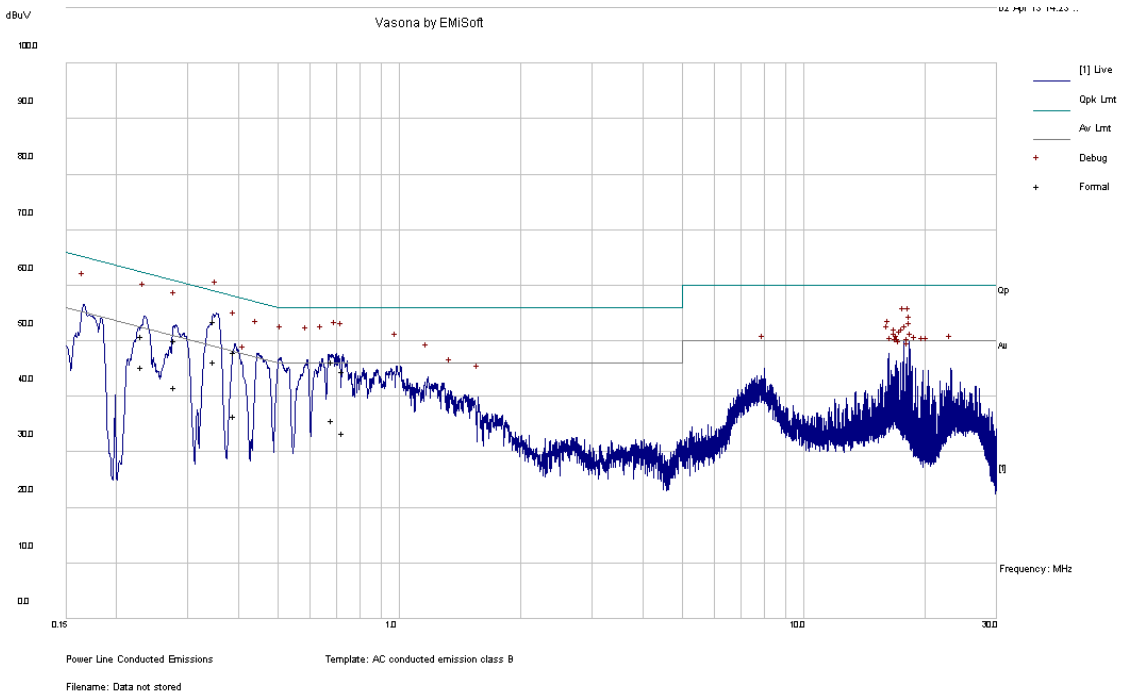
120 V, 60 Hz – Neutral, AC/DC Adaptor



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
2.181772	42.95	Neutral	56	-13.05	QP
2.243066	40.69	Neutral	56	-15.31	QP
2.335658	38.43	Neutral	56	-17.57	QP
14.571438	36.7	Neutral	60	-23.30	QP
15.25089	41.2	Neutral	60	-18.8	QP
2.741088	36.88	Neutral	56	-19.12	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
2.181772	39.46	Neutral	46	-6.54	Ave.
2.243066	37.15	Neutral	46	-8.85	Ave.
2.335658	34.82	Neutral	46	-11.18	Ave.
14.571438	31.34	Neutral	50	-18.66	Ave.
15.25089	36.37	Neutral	50	-13.63	Ave.
2.741088	32.73	Neutral	46	-13.27	Ave.

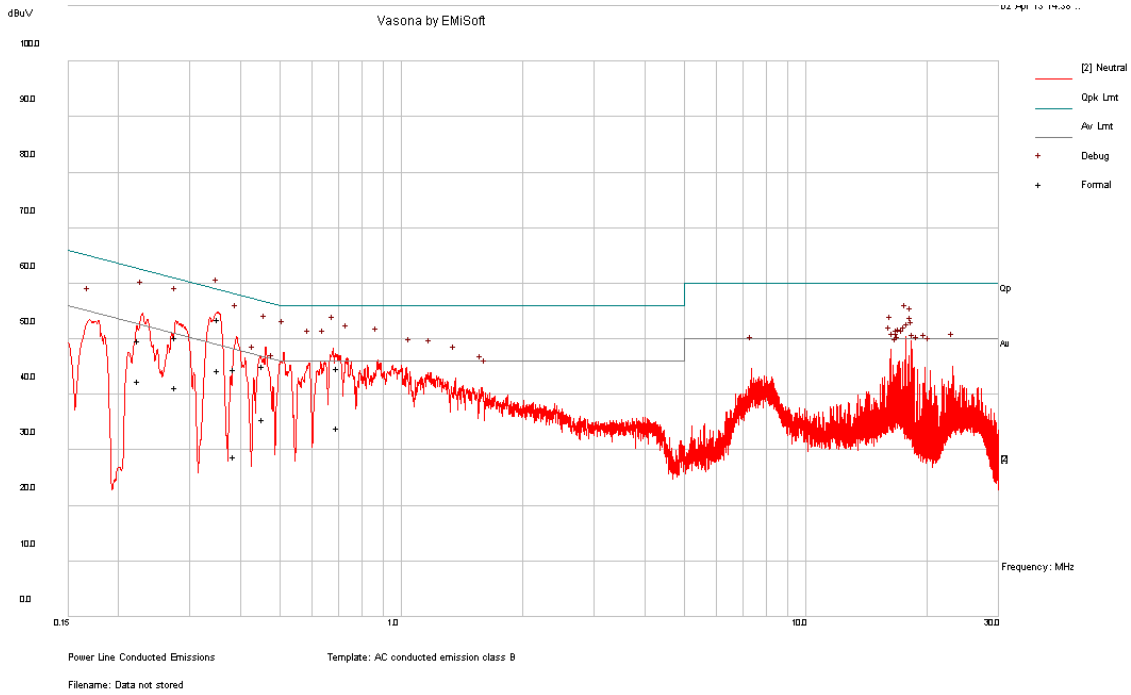
120 V, 60 Hz – Line, POE



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.349635	53.59	Line	58.97	-5.38	QP
0.230999	50.84	Line	62.41	-11.57	QP
0.278517	50.18	Line	60.86	-10.68	QP
0.683361	46.19	Line	56	-9.81	QP
0.724892	44.55	Line	56	-11.45	QP
0.39107	47.98	Line	58.04	-10.06	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.349635	46.18	Line	48.97	-2.79	Ave.
0.230999	45.33	Line	52.41	-7.08	Ave.
0.278517	41.67	Line	50.86	-9.19	Ave.
0.683361	35.67	Line	46	-10.33	Ave.
0.724892	33.4	Line	46	-12.6	Ave.
0.39107	36.42	Line	48.04	-11.62	Ave.

120 V, 60 Hz – Neutral, POE



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.352736	53.57	Neutral	58.9	-5.33	QP
0.277718	50.32	Neutral	60.88	-10.57	QP
0.385872	44.54	Neutral	58.15	-13.62	QP
0.69455	44.8	Neutral	56	-11.20	QP
0.223799	49.7	Neutral	62.68	-12.98	QP
0.454565	45.04	Neutral	56.79	-11.75	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.352736	44.44	Neutral	48.9	-4.46	Ave.
0.277718	41.28	Neutral	50.88	-9.6	Ave.
0.385872	28.81	Neutral	48.15	-19.35	Ave.
0.69455	33.95	Neutral	46	-12.05	Ave.
0.223799	42.37	Neutral	52.68	-10.3	Ave.
0.454565	35.61	Neutral	46.79	-11.18	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

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	2012-06-18	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2012-06-09	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2012-05-09	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year
EMCO	Horn Antenna	3315	9511-4627	2012-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

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

7.6 Test Environmental Conditions

Temperature:	21-24°C
Relative Humidity:	43-46%
ATM Pressure:	101-103kPa

The testing was performed by Bo Li from 2013-2-15 to 2013-3-15 at 5 meter 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**
-4.55	5240	Vertical	Below 1 GHz
-	-	-[1]	Above 1 GHz

Note: Measurements were performed using 50 ohm termination.
Note [1]: Emissions were 20 dB below the margin / under the noise floor.

7.8 Radiated Emissions Test Result Data

1) Radiated Emission at 3 meters, 5150-5250 MHz Band

802.11a Mode, Low Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
73.512	31.34	122	H	348	40	-8.66	QP
123.152	37.87	274	V	302	43.5	-5.63	QP
170.215	35.12	112	H	74	43.5	-8.38	QP
250.1124	38.45	100	V	359	46	-7.55	QP

Above 1 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)	
Low Channel 5180 MHz, measured at 3 meters											
10360	31.47	0	100	V	38.329	7.02	26.98	49.839	74	-24.161	Peak
10360	31.38	0	100	H	38.329	7.02	26.98	49.749	74	-24.251	Peak
10360	17.27	0	100	V	38.329	7.02	26.98	35.639	54	-18.361	Ave
10360	17.31	0	100	H	38.329	7.02	26.98	35.679	54	-18.321	Ave
15540	33.06	0	100	V	38.432	8.38	25.92	53.952	74	-20.048	Peak
15540	32.62	0	100	H	38.432	8.38	25.92	53.512	74	-20.488	Peak
15540	18.29	0	100	V	38.432	8.38	25.92	39.182	54	-14.818	Ave
15540	18.25	0	100	H	38.432	8.38	25.92	39.142	54	-14.858	Ave
20720	32.62	0	100	V	34.4	9.68	29	47.7	74	-26.3	Peak
20720	33.12	0	100	H	34.4	9.68	29	48.2	74	-25.8	Peak
20720	18	0	100	V	34.4	9.68	29	33.08	54	-20.92	Ave
20720	18.01	0	100	H	34.4	9.68	29	33.09	54	-20.91	Ave

802.11a Mode, Middle Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
72.4755	31.23	118	H	359	40	-8.77	QP
169.006	34.26	103	H	68	43.5	-9.24	QP
250.5165	39.79	101	V	360	46	-6.21	QP
124.95575	33	137	V	328	43.5	-10.5	QP

Above 1 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)	
Middle Channel 5200 MHz, measured at 3 meters											
10400	31.94	0	100	V	38.329	6.99	26.97	50.289	74	-23.711	Peak
10400	32.26	0	100	H	38.329	6.99	26.97	50.609	74	-23.391	Peak
10400	17.46	0	100	V	38.329	6.99	26.97	35.809	54	-18.191	Ave
10400	17.47	0	100	H	38.329	6.99	26.97	35.819	54	-18.181	Ave
15600	33.51	0	100	V	38.325	8.4	25.92	54.315	74	-19.685	Peak
15600	32.55	0	100	H	38.325	8.4	25.92	53.355	74	-20.645	Peak
15600	18.24	0	100	V	38.325	8.4	25.92	39.045	54	-14.955	Ave
15600	18.24	0	100	H	38.325	8.4	25.92	39.045	54	-14.955	Ave
20800	32.73	0	100	V	34.6	9.8	28.9	48.23	74	-25.77	Peak
20800	32.62	0	100	H	34.6	9.8	28.9	48.12	74	-25.88	Peak
20800	18.28	0	100	V	34.6	9.8	28.9	33.78	54	-20.22	Ave
20800	18.28	0	100	H	34.6	9.8	28.9	33.78	54	-20.22	Ave

802.11a Mode, High Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
72.434	31.87	131	H	350	40	-8.13	QP
121.156	38.95	234	V	310	43.5	-4.55	QP
170.215	35.34	102	H	86	43.5	-8.16	QP
250.1124	39.32	107	V	355	46	-6.68	QP

Above 1 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)	
High Channel 5240 MHz, measured at 3 meters											
10480	32.16	0	100	V	38.343	7	27.83	49.673	74	-24.327	Peak
10480	31.97	0	100	H	38.343	7	27.83	49.483	74	-24.517	Peak
10480	17.49	0	100	V	38.343	7	27.83	35.003	54	-18.997	Ave
10480	17.94	0	100	H	38.343	7	27.83	35.453	54	-18.547	Ave
15720	33.11	0	100	V	38.188	8.38	25.57	54.108	74	-19.892	Peak
15720	33.25	0	100	H	38.188	8.38	25.57	54.248	74	-19.752	Peak
15720	17.87	0	100	V	38.188	8.38	25.57	38.868	54	-15.132	Ave
15720	18.35	0	100	H	38.188	8.38	25.57	39.348	54	-14.652	Ave
20960	33.12	0	100	V	34.6	9.81	29	48.53	74	-25.47	Peak
20960	33.12	0	100	H	34.6	9.81	29	48.53	74	-25.47	Peak
20960	18.53	0	100	V	34.6	9.81	29	33.94	54	-20.06	Ave
20960	18.52	0	100	H	34.6	9.81	29	33.93	54	-20.07	Ave

802.11n HT20 Mode, Low Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
121.2454	33.99	398	V	188	43.5	-9.51	QP
171.5547	33.54	102	H	345	43.5	-9.96	QP
250.5175	37.94	112	V	54	46	-8.06	QP
125.721	35.47	251	V	348	43.5	-8.03	QP

Above 1 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)	
Low Channel 5180 MHz, measured at 3 meters											
10360	31.82	0	100	V	38.329	7.02	26.98	50.189	74	-23.811	Peak
10360	31.44	0	100	H	38.329	7.02	26.98	49.809	74	-24.191	Peak
10360	17.26	0	100	V	38.329	7.02	26.98	35.629	54	-18.371	Ave
10360	17.21	0	100	H	38.329	7.02	26.98	35.579	54	-18.421	Ave
15540	33.02	0	100	V	38.432	8.38	25.92	53.912	74	-20.088	Peak
15540	32.98	0	100	H	38.432	8.38	25.92	53.872	74	-20.128	Peak
15540	18.25	0	100	V	38.432	8.38	25.92	39.142	54	-14.858	Ave
15540	18.24	0	100	H	38.432	8.38	25.92	39.132	54	-14.868	Ave
20720	32.67	0	100	V	34.4	9.68	29	47.75	74	-26.25	Peak
20720	33.09	0	100	H	34.4	9.68	29	48.17	74	-25.83	Peak
20720	18.01	0	100	V	34.4	9.68	29	33.09	54	-20.91	Ave
20720	17.99	0	100	H	34.4	9.68	29	33.07	54	-20.93	Ave

802.11n HT20 Mode, Middle Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
120.93525	34.61	403	V	192	43.5	-8.89	QP
169.30525	32.99	100	H	358	43.5	-10.51	QP
249.54125	37.86	116	V	24	46	-8.14	QP
124.774	34.73	243	V	331	43.5	-8.77	QP

Above 1 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)	
Middle Channel 5200 MHz, measured at 3 meters											
10400	31.8	0	100	V	38.329	6.99	26.97	50.149	74	-23.851	Peak
10400	32.33	0	100	H	38.329	6.99	26.97	50.679	74	-23.321	Peak
10400	17.53	0	100	V	38.329	6.99	26.97	35.879	54	-18.121	Ave
10400	17.52	0	100	H	38.329	6.99	26.97	35.869	54	-18.131	Ave
15600	32.56	0	100	V	38.325	8.4	25.92	53.365	74	-20.635	Peak
15600	32.69	0	100	H	38.325	8.4	25.92	53.495	74	-20.505	Peak
15600	18.22	0	100	V	38.325	8.4	25.92	39.025	54	-14.975	Ave
15600	18.21	0	100	H	38.325	8.4	25.92	39.015	54	-14.985	Ave
20800	32.74	0	100	V	34.6	9.8	28.9	48.24	74	-25.76	Peak
20800	32.93	0	100	H	34.6	9.8	28.9	48.43	74	-25.57	Peak
20800	18.29	0	100	V	34.6	9.8	28.9	33.79	54	-20.21	Ave
20800	17.85	0	100	H	34.6	9.8	28.9	33.35	54	-20.65	Ave

802.11n HT20 Mode, High Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
121.8744	32.57	374	V	174	43.5	-10.93	QP
170.784	33.71	100	H	360	43.5	-9.79	QP
250.4772	38.47	105	V	47	46	-7.53	QP
125.7751	35.48	254	V	321	43.5	-8.02	QP

Above 1 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)	
High Channel 5240 MHz, measured at 3 meters											
10480	31.93	0	100	V	38.343	7	27.83	49.443	74	-24.557	Peak
10480	32.66	0	100	H	38.343	7	27.83	50.173	74	-23.827	Peak
10480	17.85	0	100	V	38.343	7	27.83	35.363	54	-18.637	Ave
10480	17.9	0	100	H	38.343	7	27.83	35.413	54	-18.587	Ave
15720	32.54	0	100	V	38.188	8.38	25.57	53.538	74	-20.462	Peak
15720	32.69	0	100	H	38.188	8.38	25.57	53.688	74	-20.312	Peak
15720	18.29	0	100	V	38.188	8.38	25.57	39.288	54	-14.712	Ave
15720	18.31	0	100	H	38.188	8.38	25.57	39.308	54	-14.692	Ave
20960	32.88	0	100	V	34.6	9.81	29	48.29	74	-25.71	Peak
20960	33.26	0	100	H	34.6	9.81	29	48.67	74	-25.33	Peak
20960	18.57	0	100	V	34.6	9.81	29	33.98	54	-20.02	Ave
20960	18.56	0	100	H	34.6	9.81	29	33.97	54	-20.03	Ave

802.11n HT40 Mode, Low Channel

Below 1 GHz

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
122.1845	36.89	187	V	340	43.5	-6.06	QP
169.0418	33.12	117	H	235	43.5	-10.82	QP
247.4785	37.48	103	V	349	46	-9.1	QP
960.784	20.87	334	H	100	46	-26.73	QP

Above 1 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)	
Low Channel 5190 MHz, measured at 3 meters											
10380	31.66	0	100	V	38.329	7.02	27.8	49.209	74	-24.791	Peak
10380	31.6	0	100	H	38.329	7.02	27.8	49.149	74	-24.851	Peak
10380	17.31	0	100	V	38.329	7.02	27.8	34.859	54	-19.141	Ave
10380	17.29	0	100	H	38.329	7.02	27.8	34.839	54	-19.161	Ave
15570	33.15	0	100	V	38.325	8.4	25.66	54.215	74	-19.785	Peak
15570	32.31	0	100	H	38.325	8.4	25.66	53.375	74	-20.625	Peak
15570	18.26	0	100	V	38.325	8.4	25.66	39.325	54	-14.675	Ave
15570	18.23	0	100	H	38.325	8.4	25.66	39.295	54	-14.705	Ave
20760	32.49	0	100	V	34.6	9.75	29	47.84	74	-26.16	Peak
20760	32.46	0	100	H	34.6	9.75	29	47.81	74	-26.19	Peak
20760	18.14	0	100	V	34.6	9.75	29	33.49	54	-20.51	Ave
20760	18.13	0	100	H	34.6	9.75	29	33.48	54	-20.52	Ave

802.11n HT40 Mode, High Channel

Below 1 GHz

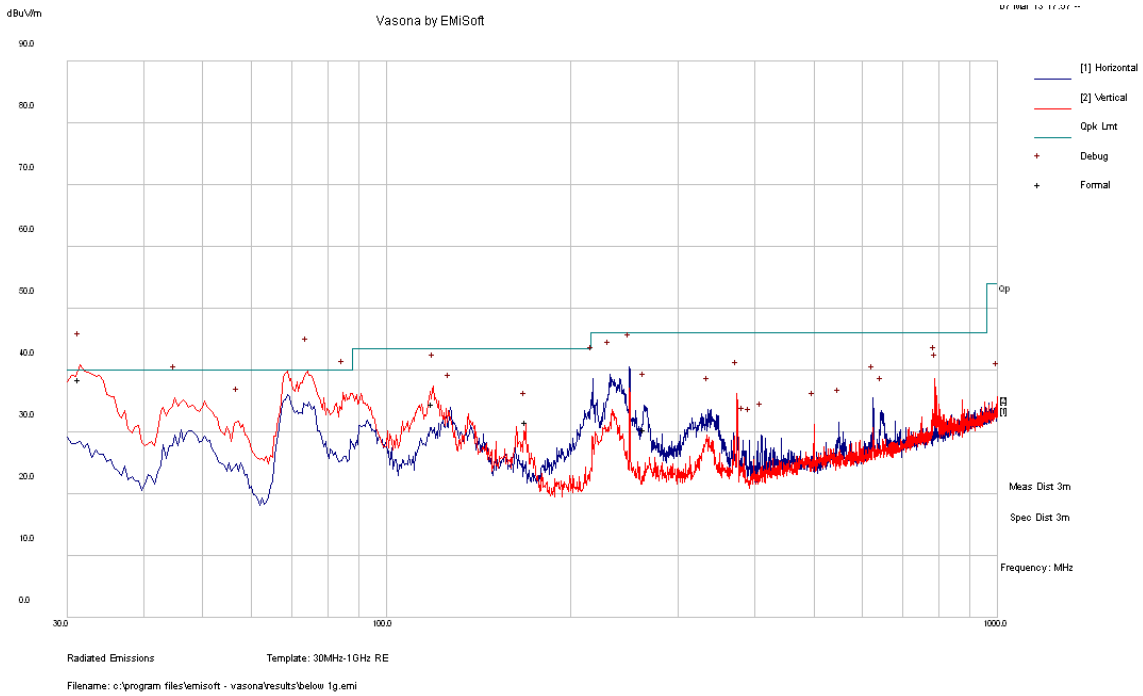
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
121.134	37.44	154	V	360	43.5	-6.06	QP
168.684	32.68	100	H	214	43.5	-10.82	QP
242.1135	36.9	100	V	360	46	-9.1	QP
959.9435	19.27	325	H	90	46	-26.73	QP

Above 1 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)	
High Channel 5230 MHz, measured at 3 meters											
10460	31.72	0	100	V	38.343	6.99	27.83	49.223	74	-24.777	Peak
10460	31.73	0	100	H	38.343	6.99	27.83	49.233	74	-24.767	Peak
10460	17.55	0	100	V	38.343	6.99	27.83	35.053	54	-18.947	Ave
10460	17.55	0	100	H	38.343	6.99	27.83	35.053	54	-18.947	Ave
15690	32.11	0	100	V	38.188	8.44	25.46	53.278	74	-20.722	Peak
15690	32.47	0	100	H	38.188	8.44	25.46	53.638	74	-20.362	Peak
15690	18.17	0	100	V	38.188	8.44	25.46	39.338	54	-14.662	Ave
15690	18.12	0	100	H	38.188	8.44	25.46	39.288	54	-14.712	Ave
20920	33.15	0	100	V	34.6	9.76	29	48.51	74	-25.49	Peak
20920	33.2	0	100	H	34.6	9.76	29	48.56	74	-25.44	Peak
20920	18.5	0	100	V	34.6	9.76	29	33.86	54	-20.14	Ave
20920	18.48	0	100	H	34.6	9.76	29	33.84	54	-20.16	Ave

2) Co-location with 2.4 GHz and 5 GHz

Worst Case: 2.4 GHz: 802.11b, 2437 MHz; 5.2GHz: 802.11HT40, 5230MHz



30-1000 MHz:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
31.43225	38.53	99	V	148	40	-1.47
119.006	34.52	116	V	152	43.5	-8.98
263.92625	30.49	143	H	337	46	-15.51
168.88425	31.7	102	V	118	43.5	-11.8

Above 1 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)	
1195	40.53	303	100	V	25.573	2.16	27.133	41.13	74	-32.87	Peak
1195	39.3	207	100	H	25.573	2.16	27.133	39.9	74	-34.1	Peak
1195	24.61	303	100	V	25.573	2.16	27.133	25.21	54	-28.79	Ave
1195	23.56	207	100	H	25.573	2.16	27.133	24.16	54	-29.84	Ave
14018	35.32	0	100	V	41.852	7.89	26.1675	58.8945	74	-15.1055	Peak
14018	35.42	0	100	H	41.852	7.89	26.1675	58.9945	74	-15.0055	Peak
14018	20.89	0	100	V	41.852	7.89	26.1675	44.4645	54	-9.5355	Ave
14018	20.93	0	100	H	41.852	7.89	26.1675	44.5045	54	-9.4955	Ave
3000	39.22	26	100	V	30.466	3.41	27.8655	45.2305	74	-28.7695	Peak
3000	39.41	334	100	H	30.466	3.41	27.8655	45.4205	74	-28.5795	Peak
3000	32.67	26	100	V	30.466	3.41	27.8655	38.6805	54	-15.3195	Ave
3000	32.88	334	100	H	30.466	3.41	27.8655	38.8905	54	-15.1095	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

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

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	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:	23 °C
Relative Humidity:	42 %
ATM Pressure:	101.1 kPa

The testing was performed by Bo Li from 2013-03-05 to 2013-03-07 in RF site.

8.5 Test Results

802.11a mode:

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz) J0	26 dB Emission Bandwidth (MHz) J1	26 dB Emission Bandwidth (MHz) J2	99% Emission Bandwidth (MHz) J0	99% Emission Bandwidth (MHz) J1	99% Emission Bandwidth (MHz) J2	Limit (MHz)	Results
Low	5180	21.109	20.933	20.710	16.5168	16.4589	16.4657	> 0.5	Compliant
Middle	5200	21.406	20.873	21.146	16.4898	16.4892	16.4727	> 0.5	Compliant
High	5240	20.869	20.489	21.074	16.5076	16.5235	16.4270	> 0.5	Compliant

802.11n HT20 mode:

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz) J0	26 dB Emission Bandwidth (MHz) J1	26 dB Emission Bandwidth (MHz) J2	99% Emission Bandwidth (MHz) J0	99% Emission Bandwidth (MHz) J1	99% Emission Bandwidth (MHz) J2	Limit (MHz)	Results
Low	5180	22.043	21.998	21.800	17.6812	17.6511	17.6555	> 0.5	Compliant
Middle	5200	22.241	22.018	21.837	17.6799	17.6628	17.6545	> 0.5	Compliant
High	5240	22.510	21.388	21.933	17.6924	17.5725	17.6731	> 0.5	Compliant

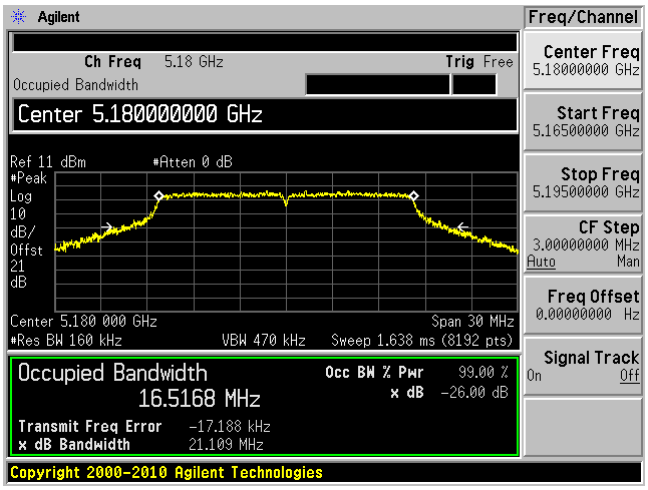
802.11n HT40 mode:

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz) J0	26 dB Emission Bandwidth (MHz) J1	26 dB Emission Bandwidth (MHz) J2	99% Emission Bandwidth (MHz) J0	99% Emission Bandwidth (MHz) J1	99% Emission Bandwidth (MHz) J2	Limit (MHz)	Results
Low	5190	45.163	45.525	45.458	36.3221	36.3007	36.3005	> 0.5	Compliant
High	5230	44.25	43.562	43.984	36.2408	36.1793	36.1959	> 0.5	Compliant

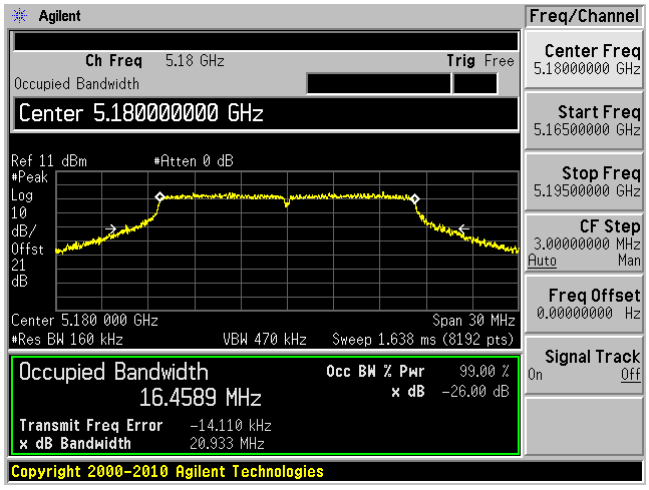
5150-5250 MHz Band

802.11a mode

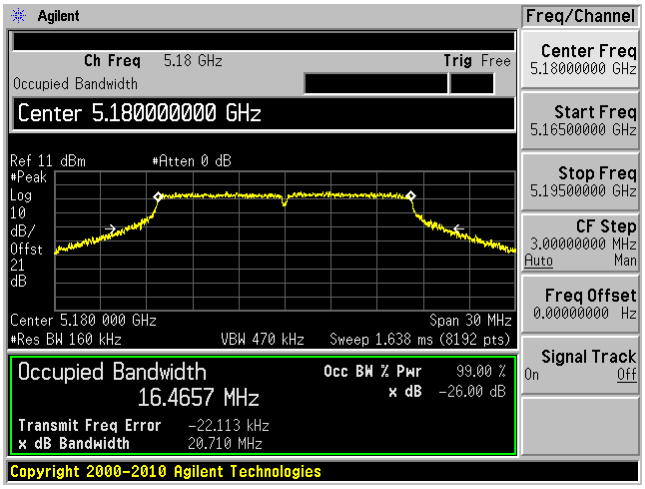
Low channel: 5180 MHz Chain J0



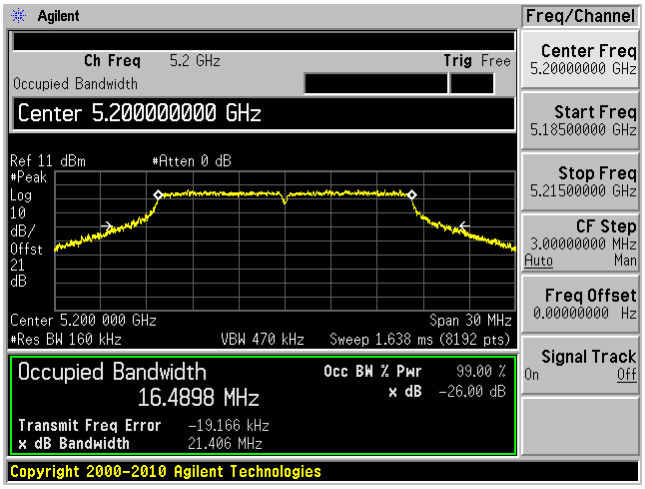
Low channel: 5180 MHz Chain J1



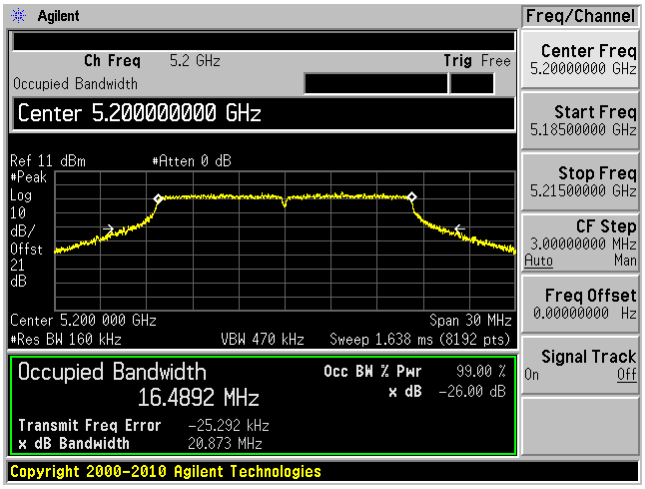
Low channel: 5180 MHz Chain J2



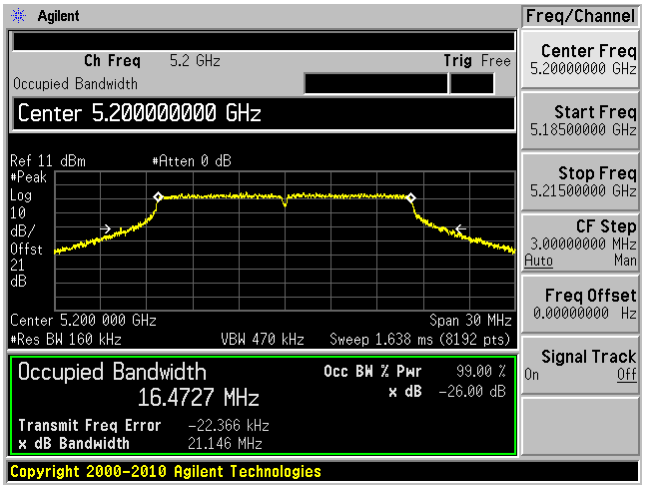
Middle channel: 5200 MHz Chain J0



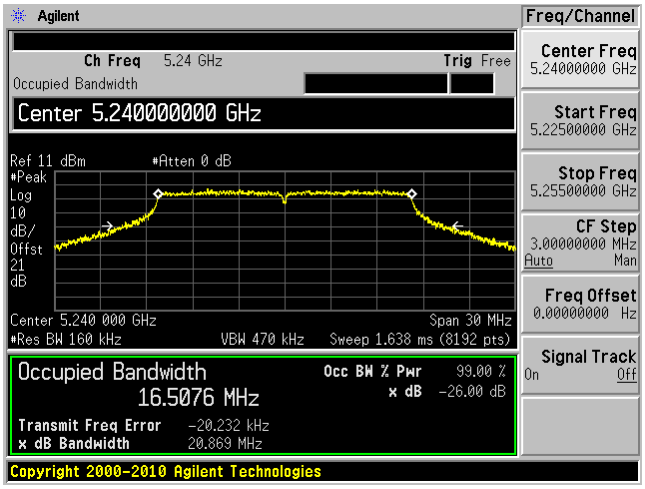
Middle channel: 5200 MHz Chain J1



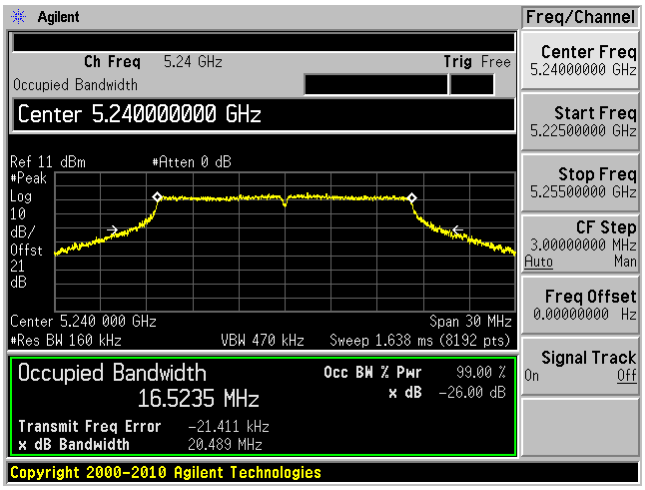
Middle channel: 5200 MHz Chain J2



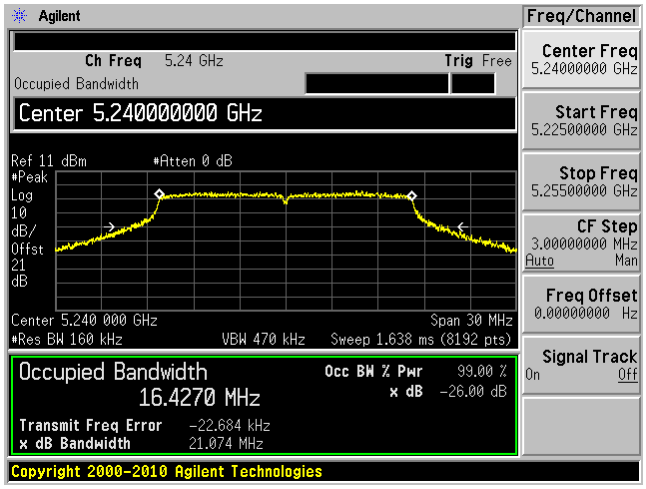
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

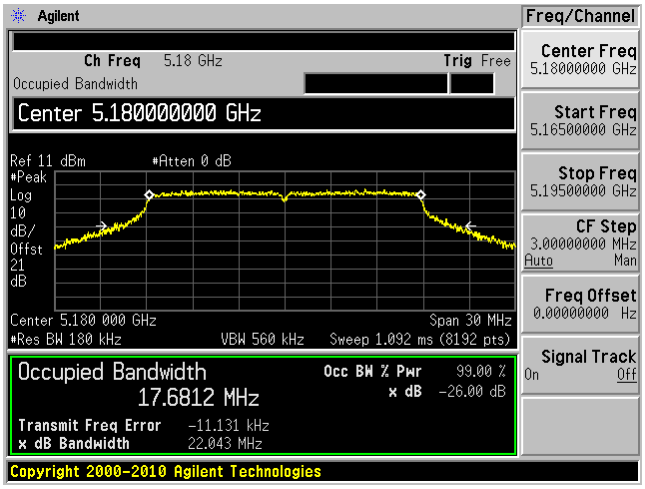


High channel: 5240 MHz Chain J2

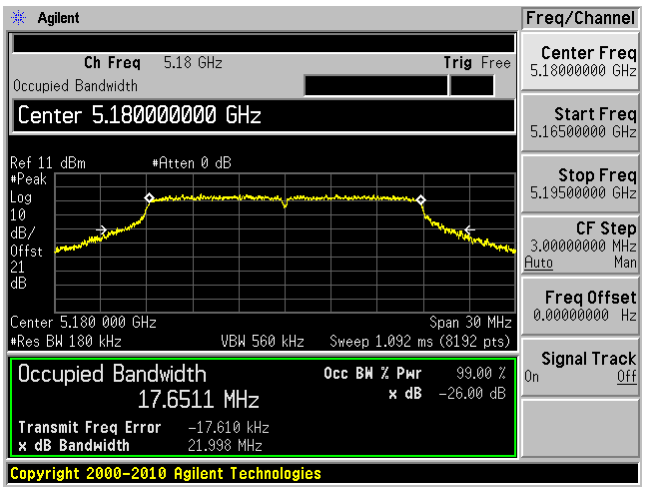


802.11HT20 mode

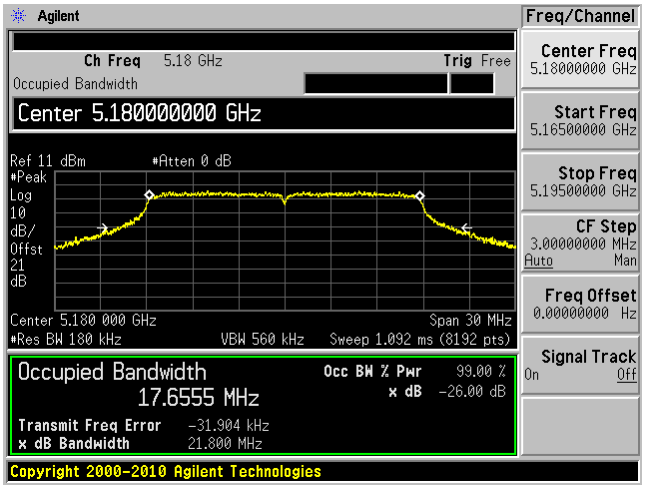
Low channel: 5180 MHz Chain J0



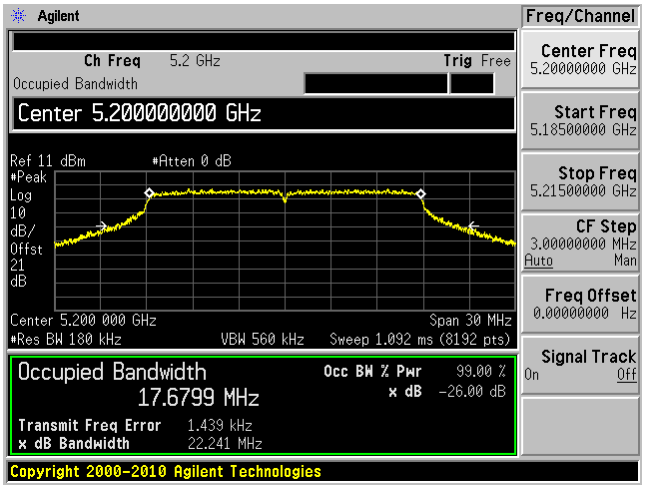
Low channel: 5180 MHz Chain J1



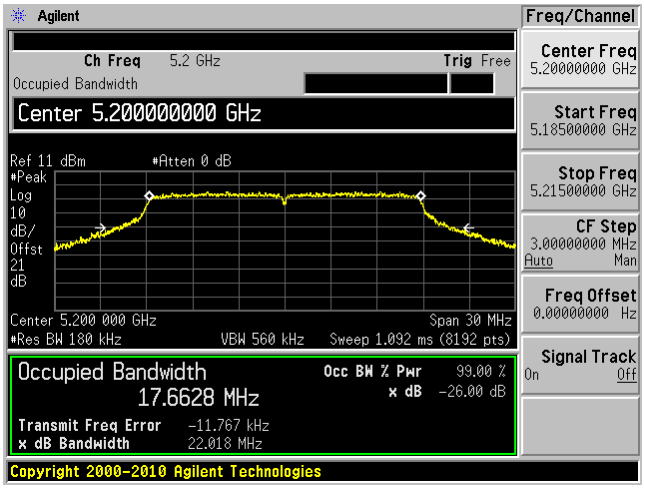
Low channel: 5180 MHz Chain J2



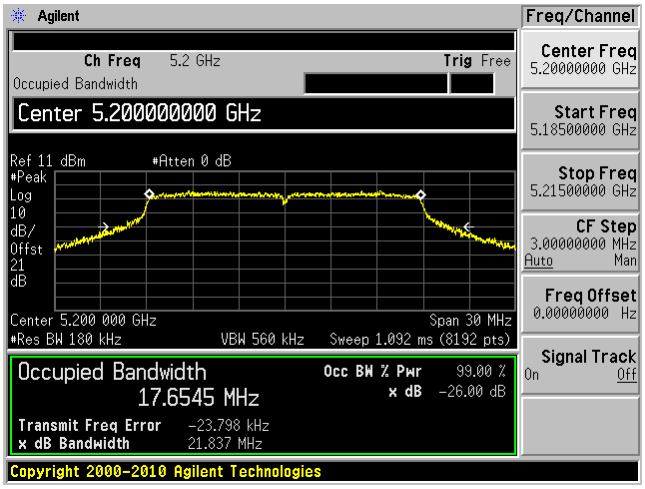
Middle channel: 5200 MHz Chain J0



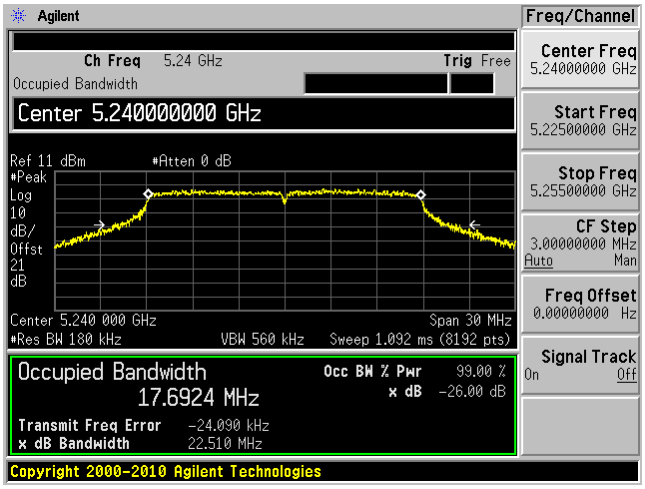
Middle channel: 5200 MHz Chain J1



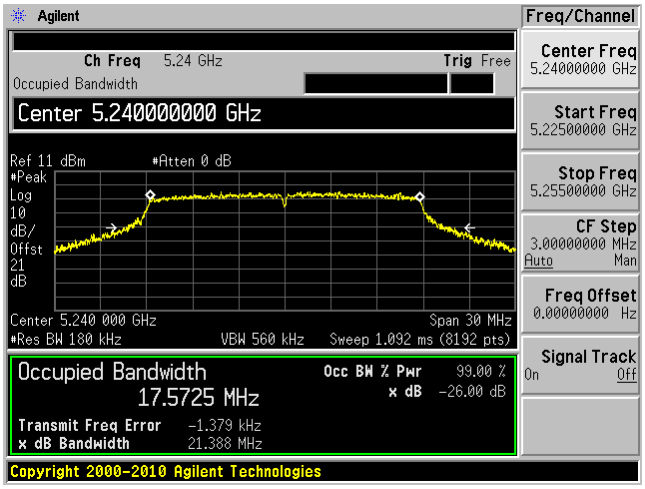
Middle channel: 5200 MHz Chain J2



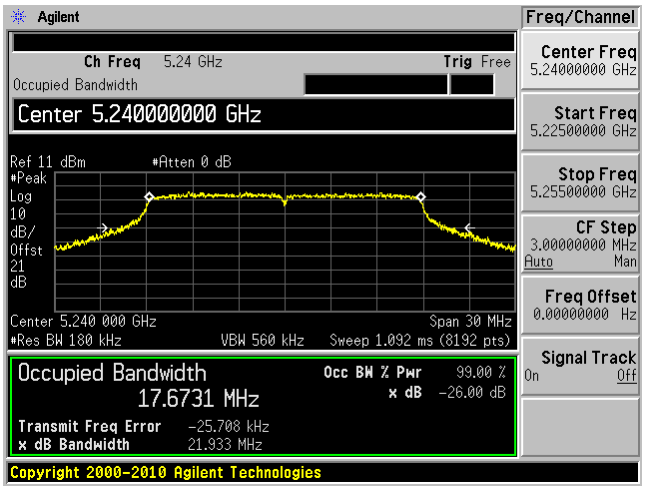
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

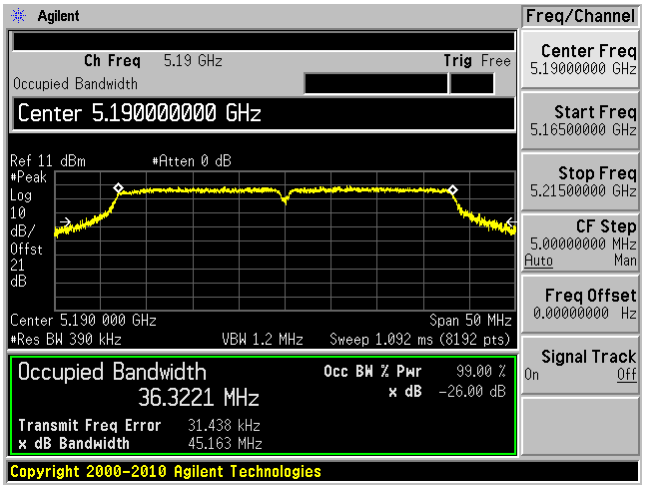


High channel: 5240 MHz Chain J2

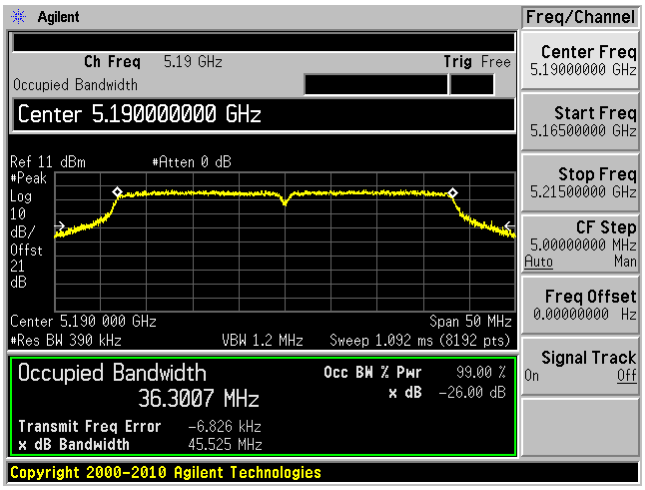


802.11n HT40 mode

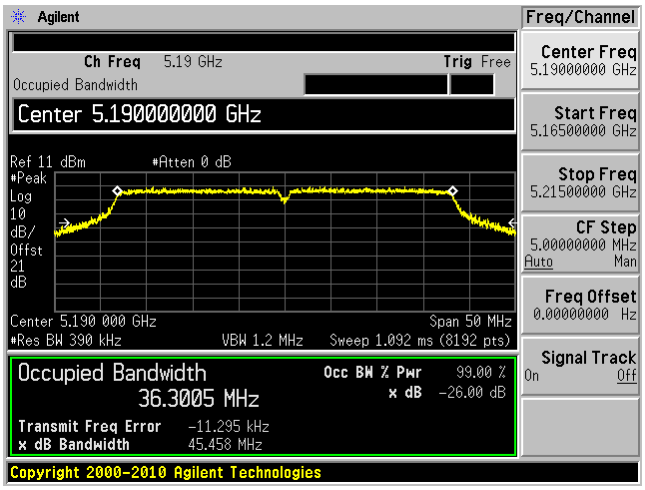
Low channel: 5190 MHz Chain J0



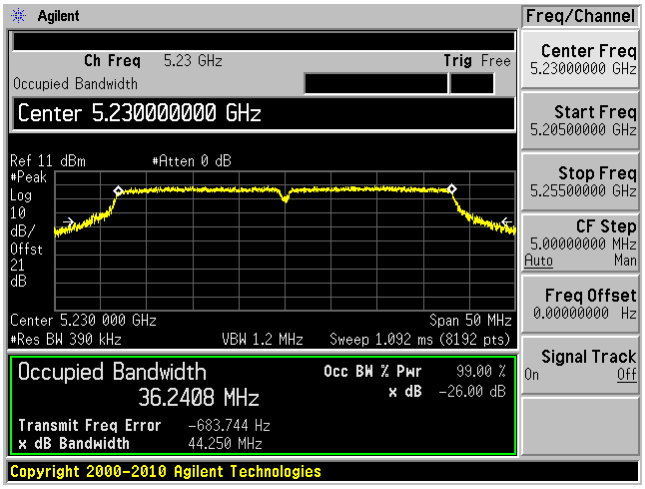
Low channel: 5190 MHz Chain J1



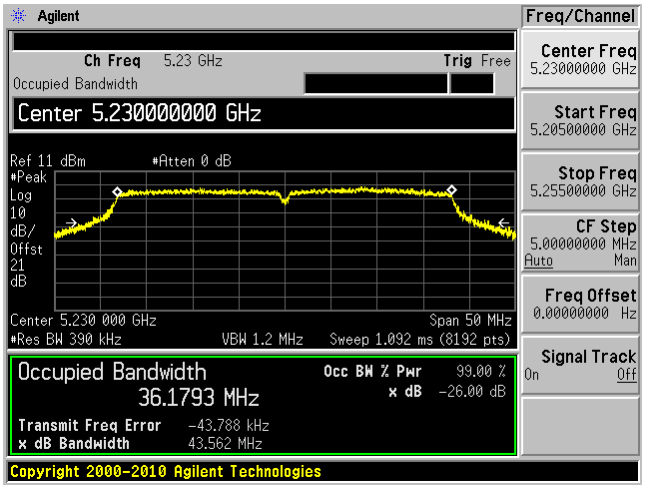
Low channel: 5190 MHz Chain J2



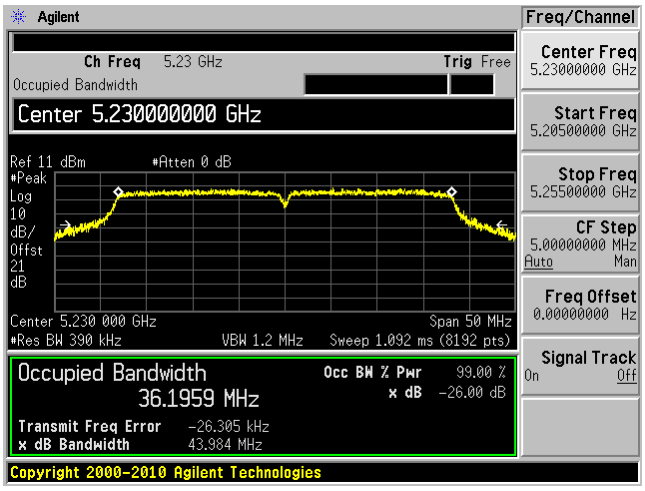
High channel: 5230 MHz Chain J0



High channel: 5230 MHz Chain J1



High channel: 5230 MHz Chain J2



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.

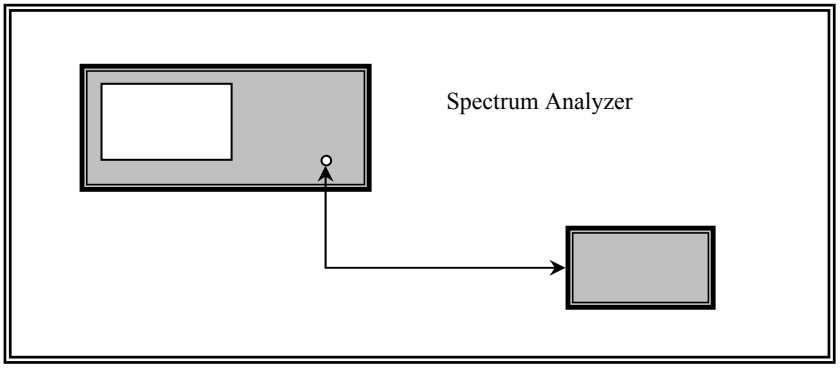
For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to IC RSS-210 §A9.2:

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

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.



9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	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:	23 °C
Relative Humidity:	42 %
ATM Pressure:	101.1 kPa

The testing was performed by Bo Li from 2013-03-05 to 2013-03-07 in RF site.

9.5 Test Results

5150-5250 MHz Band:

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	TX Chain J2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5180	9.23	7.37	8.36	13.16	15	-1.84	8.5
Middle	5200	9.06	7.27	7.81	12.88	15	-2.12	8.5
High	5240	9.37	7.68	8.12	13.22	15	-1.78	9

802.11n HT20 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	TX Chain J2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5180	8.97	7.37	8.26	13.02	15	-1.98	8.5
Middle	5200	9.73	7.71	8.2	13.41	15	-1.59	9
High	5240	9.44	7.5	7.96	13.15	15	-1.85	9

802.11n HT40 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	TX Chain J2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5190	10.79	8.84	9.88	14.68	15	-0.32	10
High	5230	11.08	9.41	9.53	14.85	15	-0.15	10.5

Note: The antenna gain of 5 GHz is 8 dBi; therefore, the output power limit is reduced by 2 dB.

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

According to RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	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:	23 °C
Relative Humidity:	42 %
ATM Pressure:	101.1 kPa

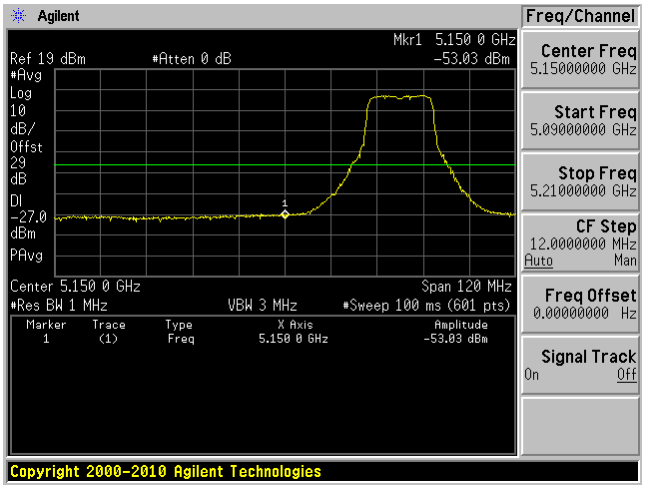
The testing was performed by Bo Li from 2013-03-05 to 2013-03-07 in RF site.

10.5 Test Results

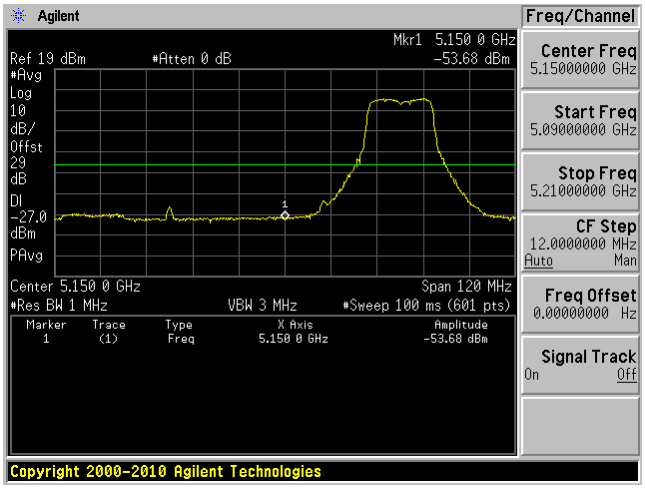
Please refer to following pages for plots of band edge.

5150-5250 MHz Band

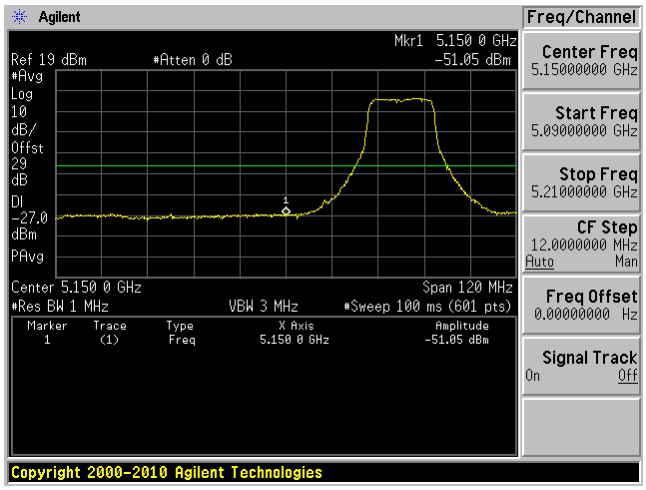
Low channel: 5180 MHz Chain J0



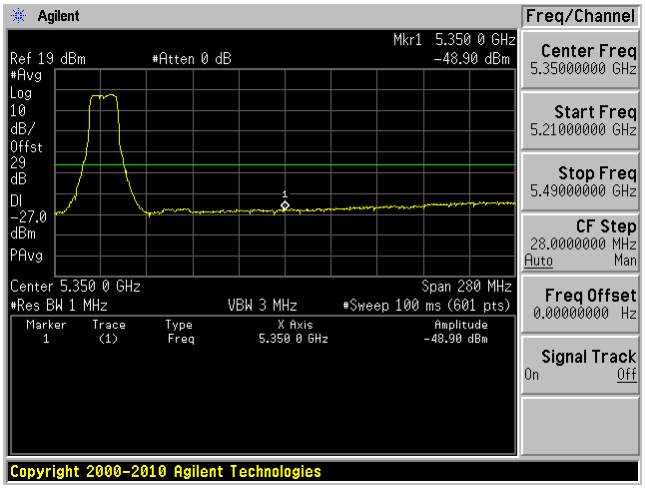
Low channel: 5180 MHz Chain J



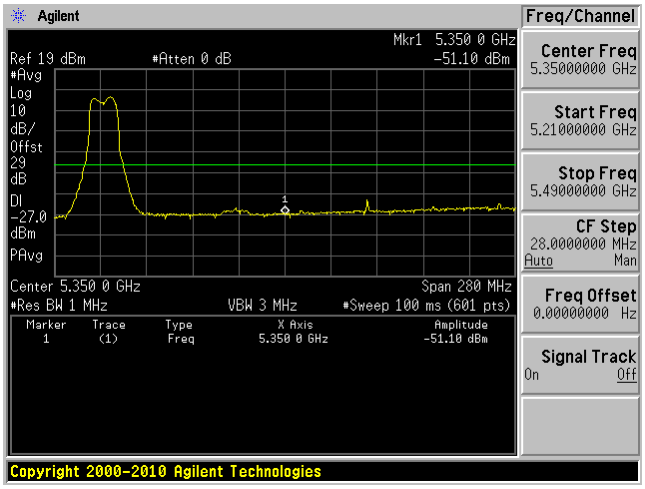
Low channel: 5180 MHz Chain J2



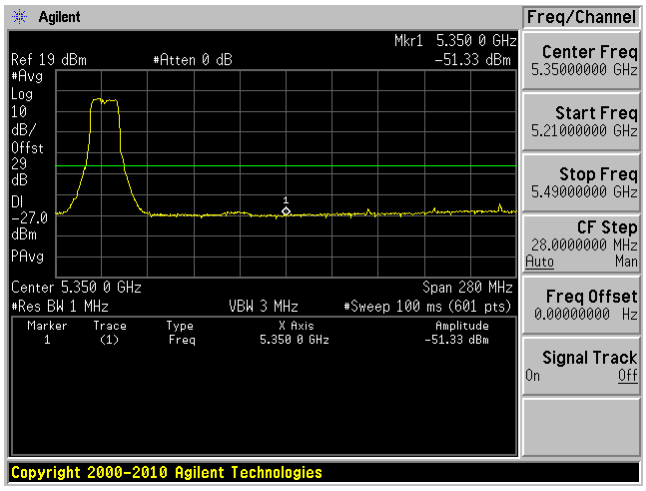
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

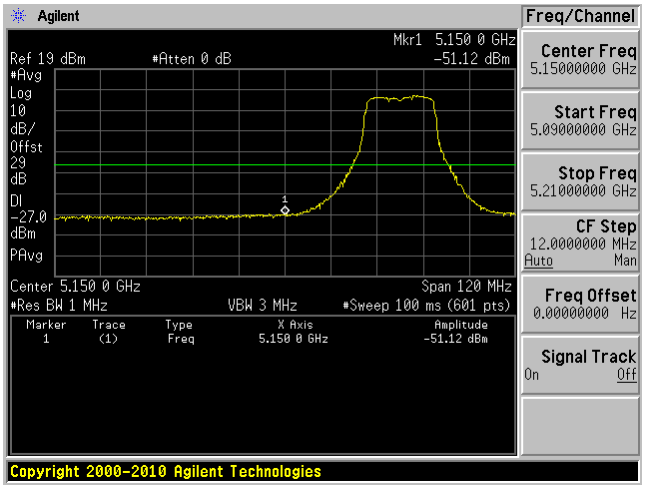


High channel: 5240 MHz Chain J2

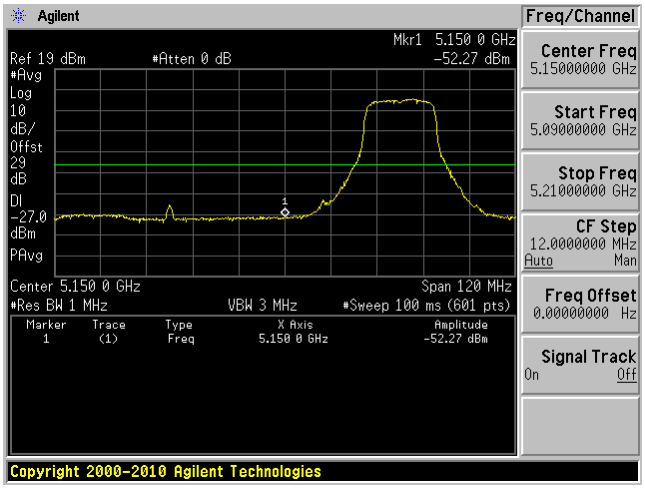


802.11HT20 mode

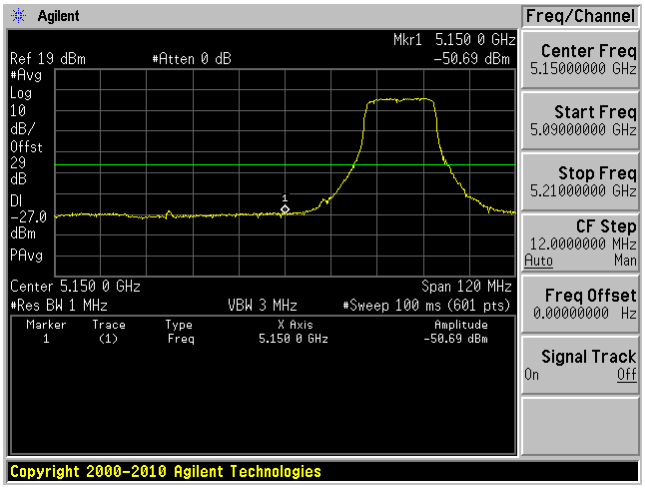
Low channel: 5180 MHz Chain J0



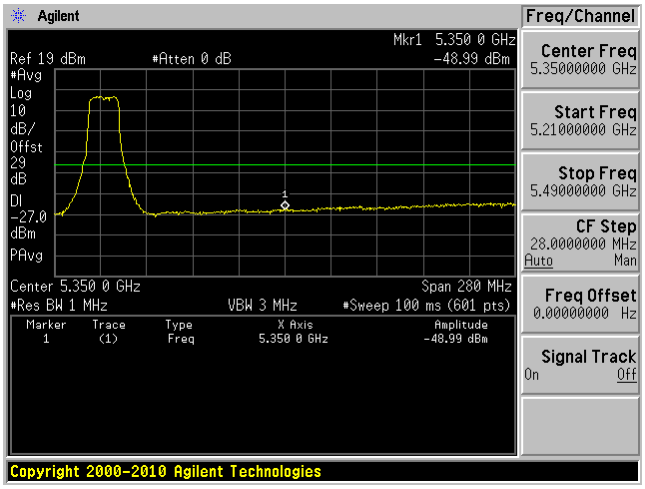
Low channel: 5180 MHz Chain J1



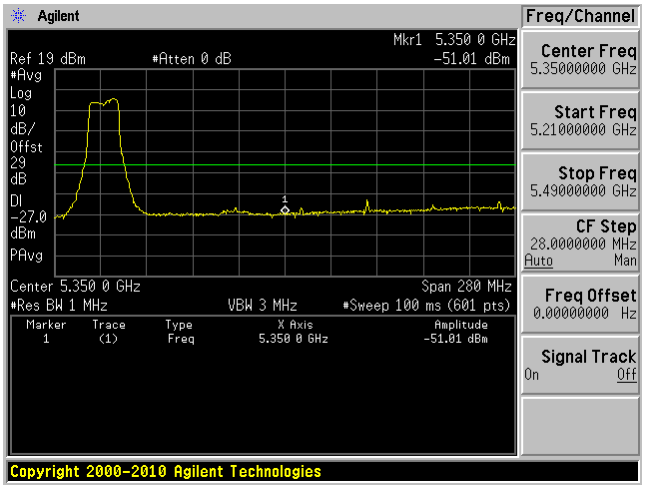
Low channel: 5180 MHz Chain J2



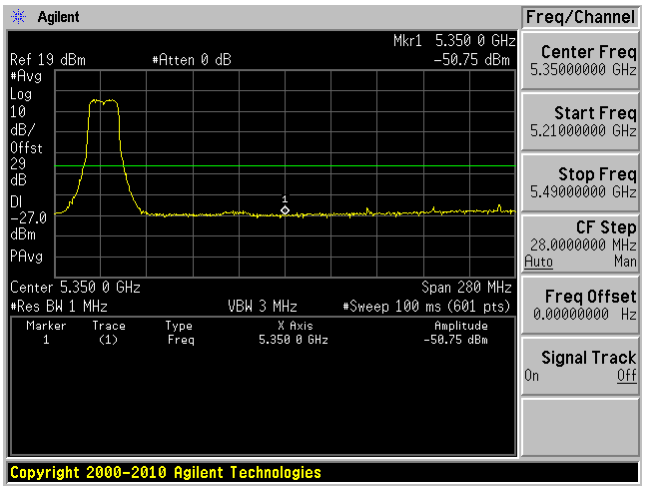
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

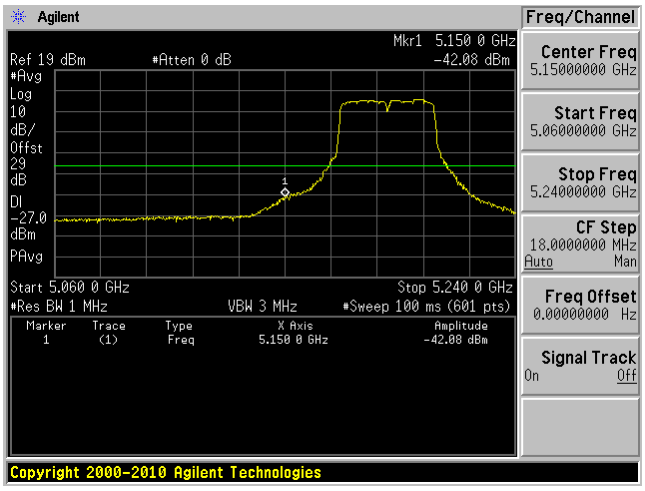


High channel: 5240 MHz Chain J2

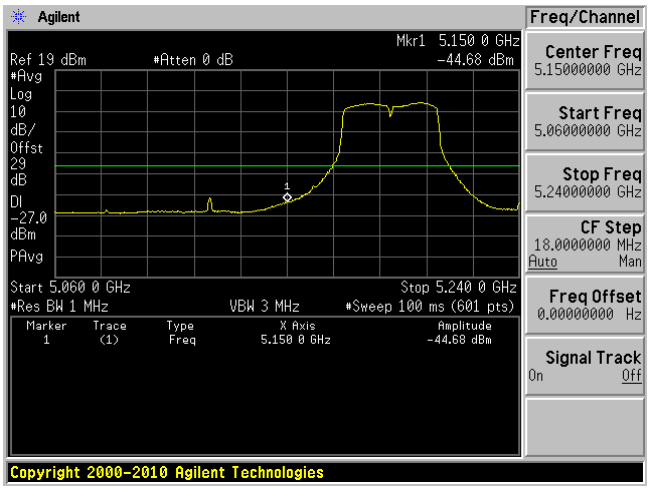


802.11n HT40 mode

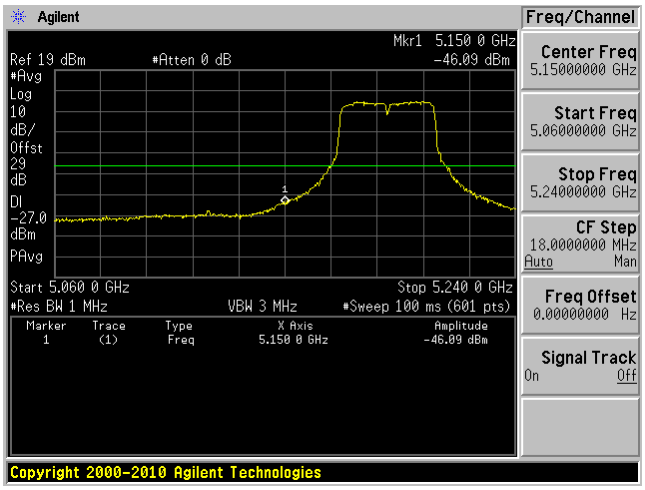
Low channel: 5190 MHz Chain J0



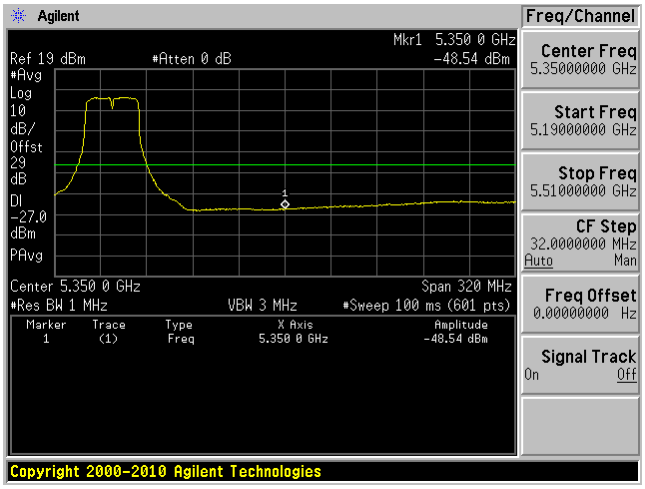
Low channel: 5190 MHz Chain J1



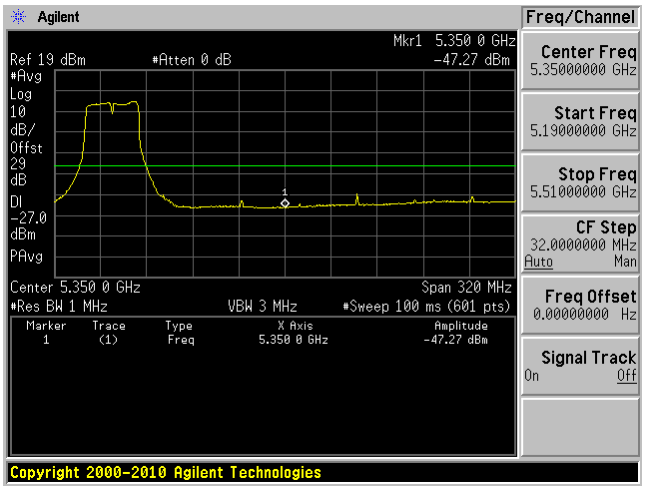
Low channel: 5190 MHz Chain J2



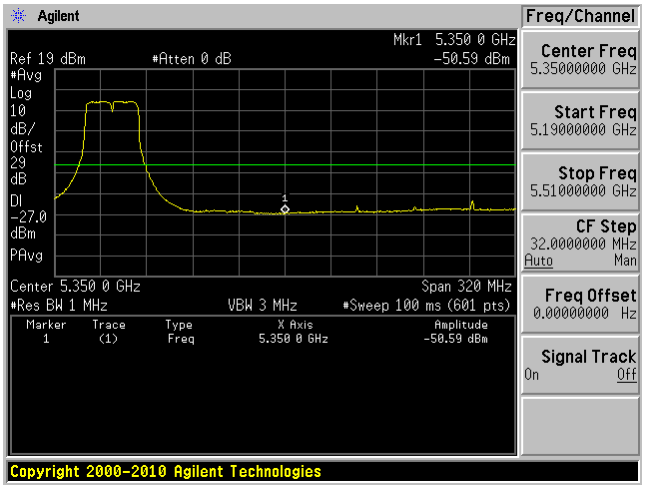
High channel: 5230 MHz Chain J0



High channel: 5230 MHz Chain J1



High channel: 5230 MHz Chain J2



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

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

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	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:	23 °C
Relative Humidity:	42 %
ATM Pressure:	101.1 kPa

The testing was performed by Bo Li from 2013-03-05 to 2013-03-07 in RF site.

11.5 Test Results

5150-5250 MHz Band

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	TX Chain J2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-2.105	-3.662	-2.907	1.93	2	-0.07
Middle	5200	-1.984	-4.206	-3.389	1.68	2	-0.32
High	5240	-2.074	-3.403	-3.307	1.89	2	-0.11

802.11n HT20 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	TX Chain J2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-2.152	-3.475	-3.419	1.8	2	-0.2
Middle	5200	-2.083	-4.04	-3.183	1.74	2	-0.26
High	5240	-2.034	-3.46	-3.511	1.83	2	-0.17

802.11n HT40 mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J8 Power (dBm)	TX Chain J2 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	-4.401	-5.224	-3.239	0.56	2	-1.44
High	5230	-3.04	-4.294	-4.931	0.76	2	-1.24

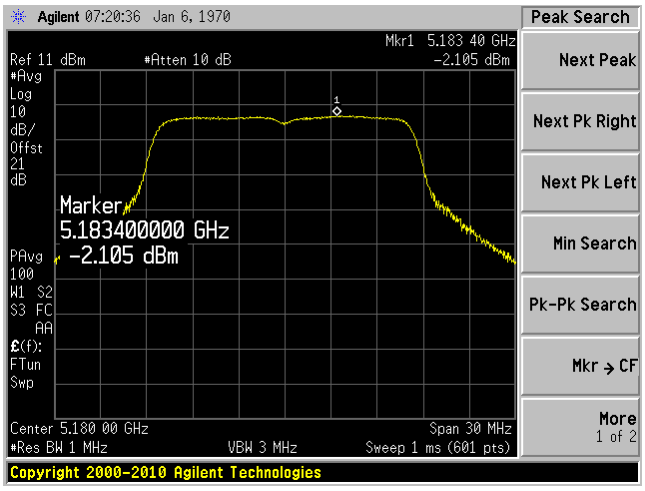
Note: The antenna gain of 5 GHz is 8 dBi; therefore, the power spectral density limit is reduced by 2 dB

Please refer to the following plots.

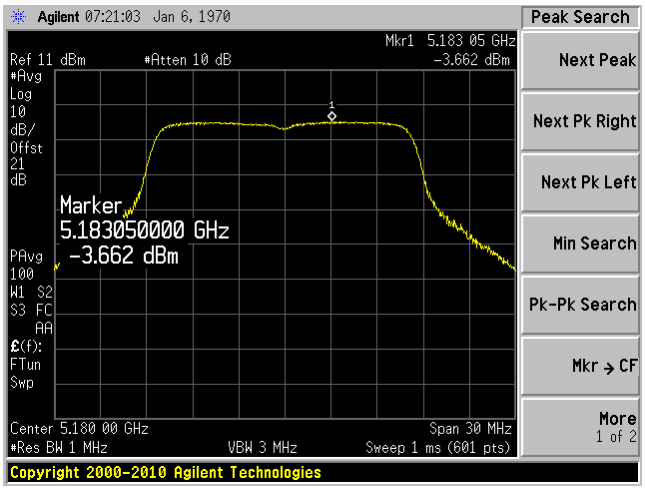
5150-5250 MHz Band

802.11a mode

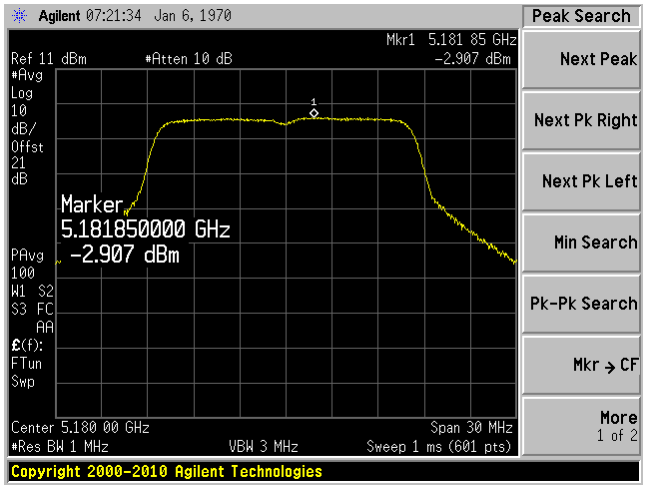
Low channel: 5180 MHz Chain J0



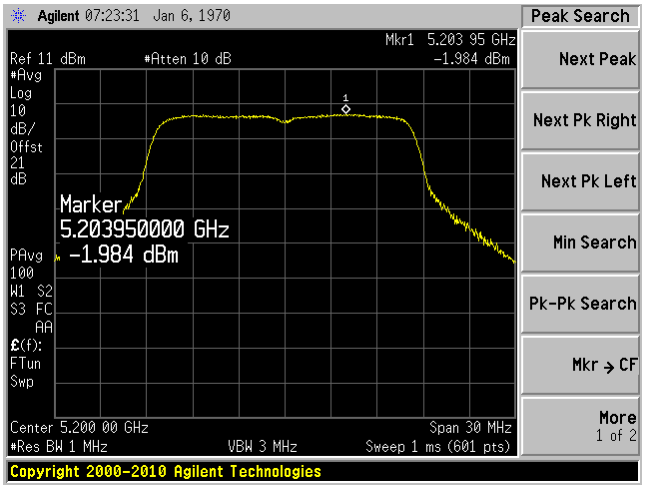
Low channel: 5180 MHz Chain J1



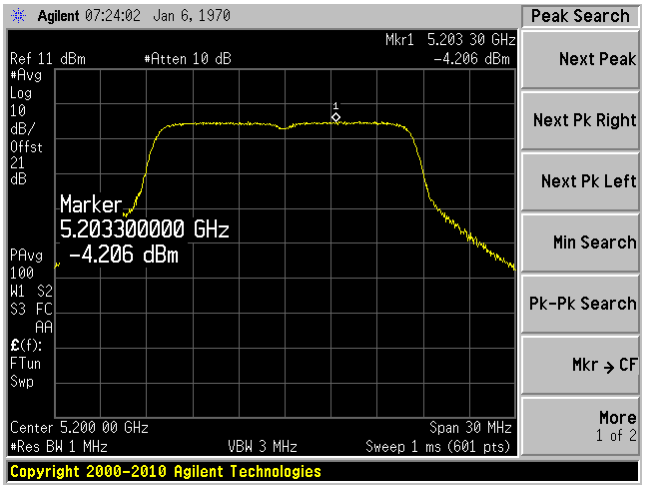
Low channel: 5180 MHz Chain J2



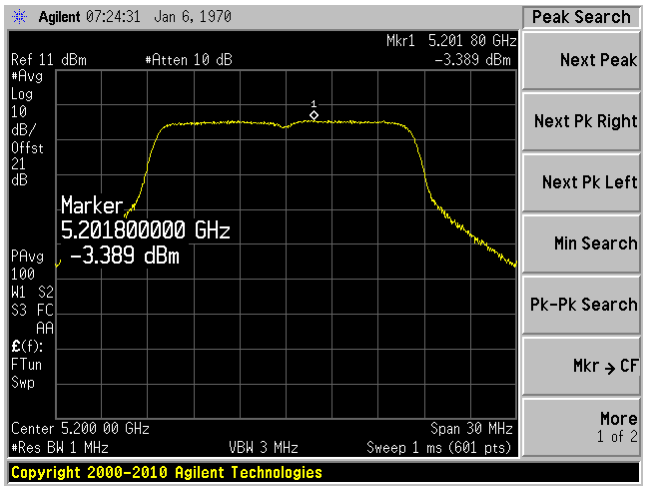
Middle channel: 5200 MHz Chain J0



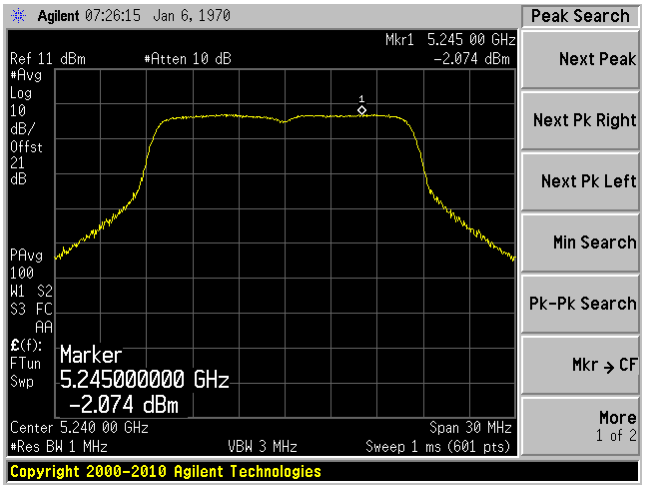
Middle channel: 5200 MHz Chain J1



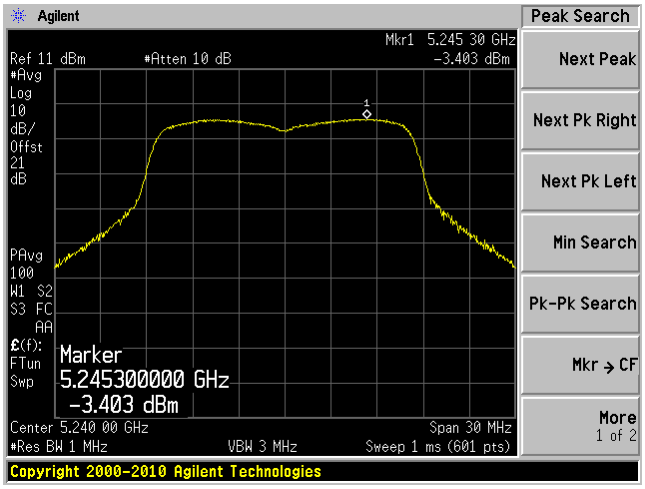
Middle channel: 5200 MHz Chain J2



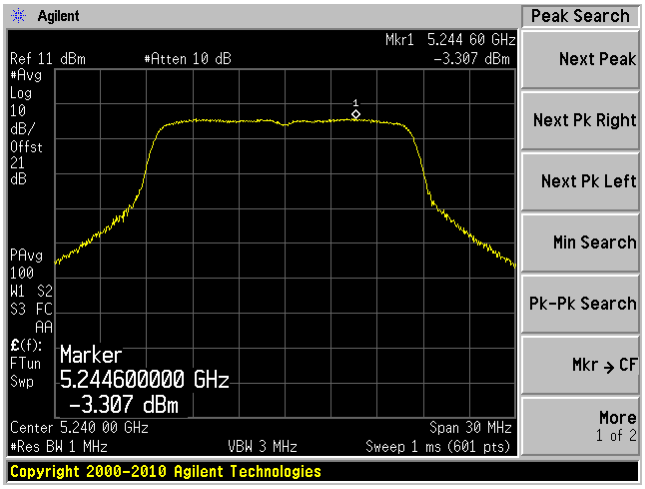
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

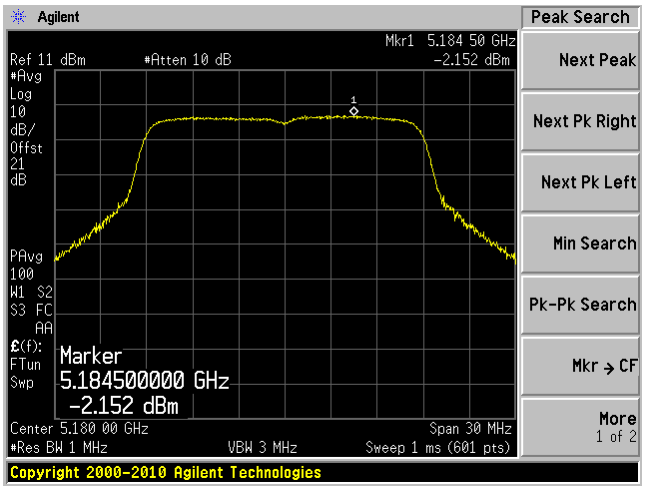


High channel: 5240 MHz Chain J2

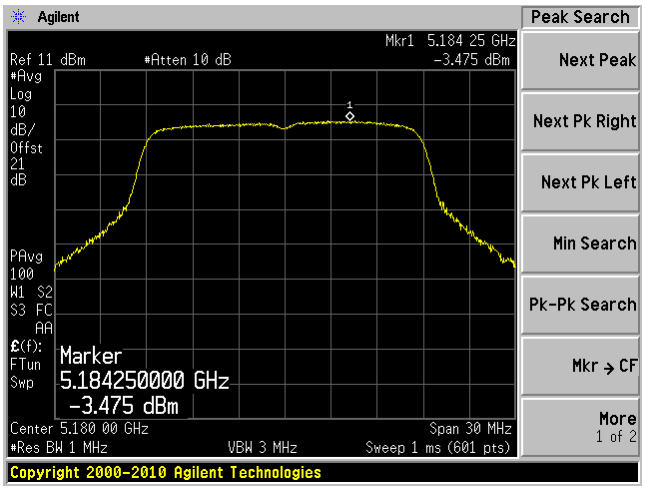


802.11HT20 mode

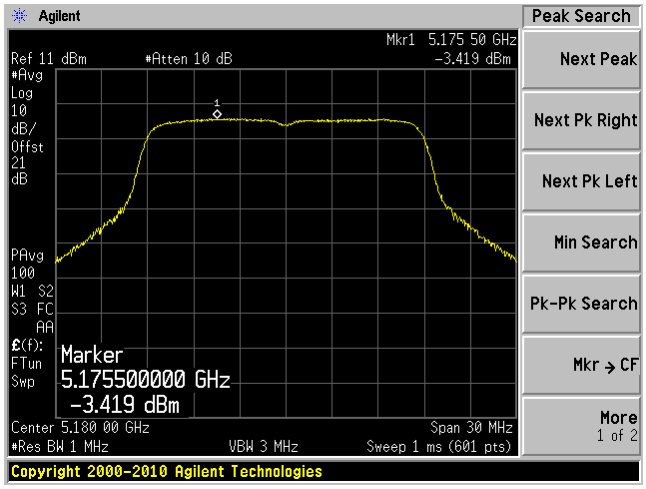
Low channel: 5180 MHz Chain J0



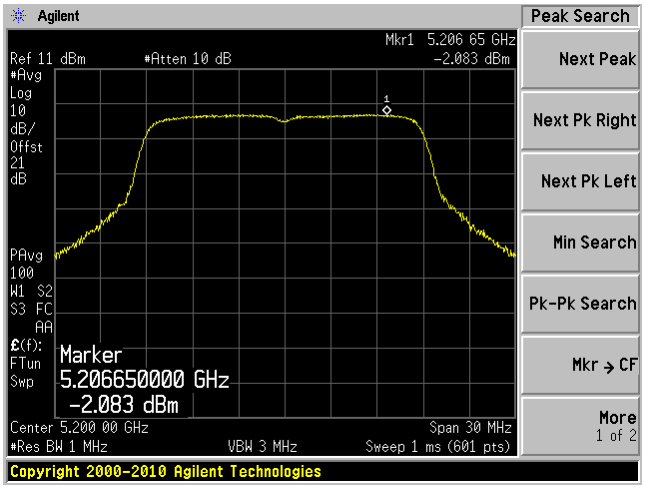
Low channel: 5180 MHz Chain J1



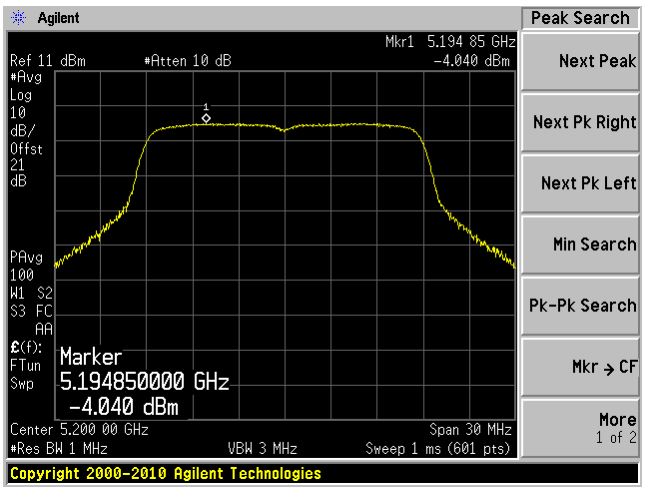
Low channel: 5180 MHz Chain J2



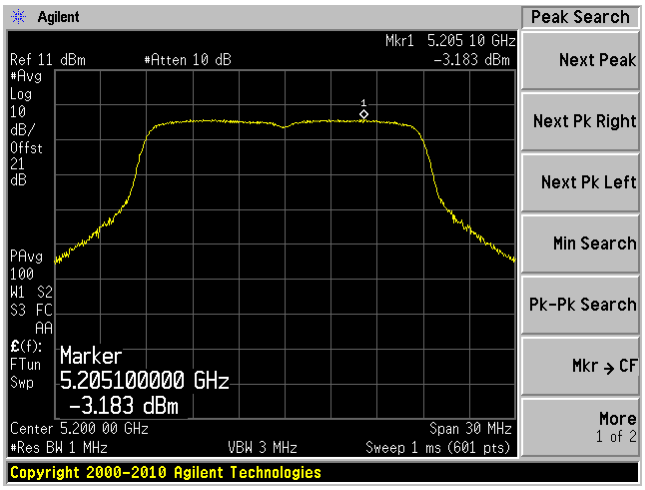
Middle channel: 5200 MHz Chain J0



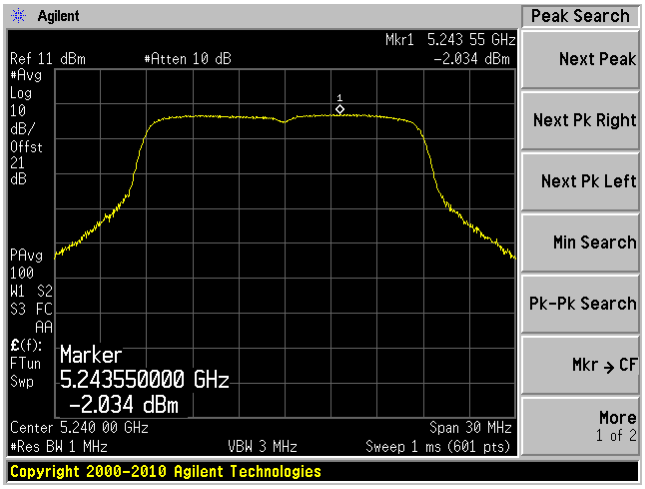
Middle channel: 5200 MHz Chain J1



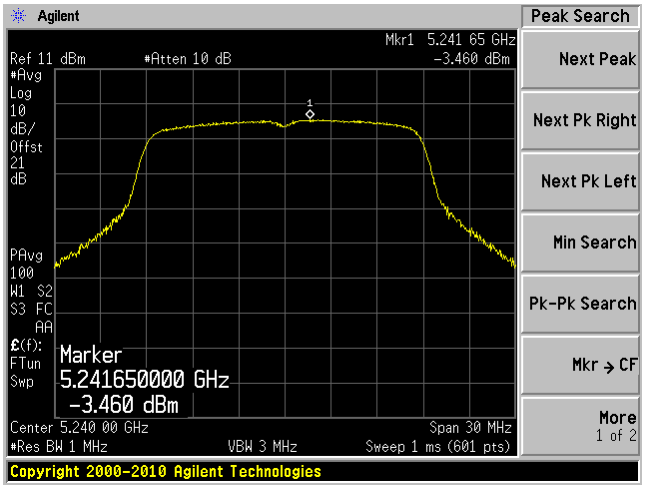
Middle channel: 5200 MHz Chain J2



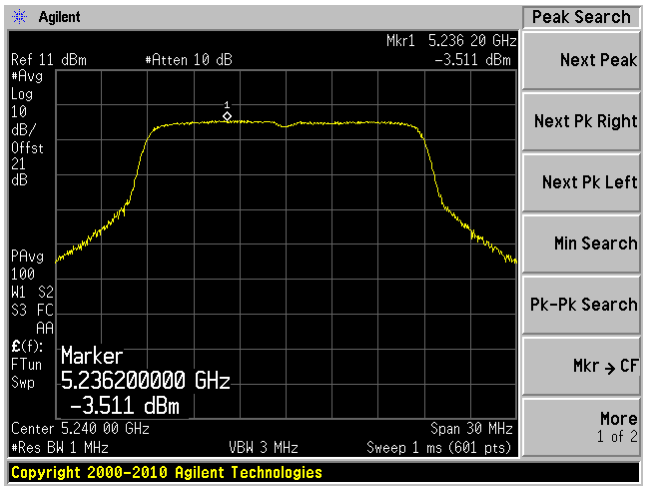
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

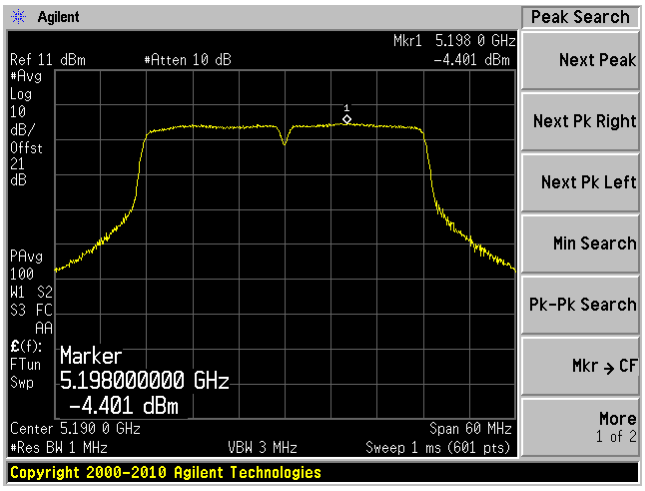


High channel: 5240 MHz Chain J2

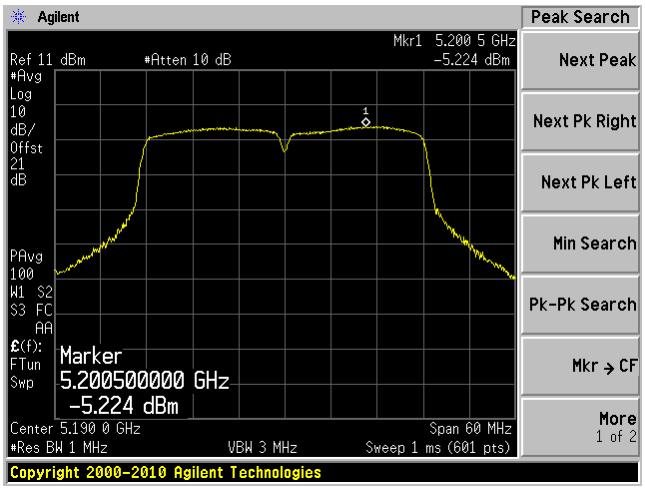


802.11n HT40 mode

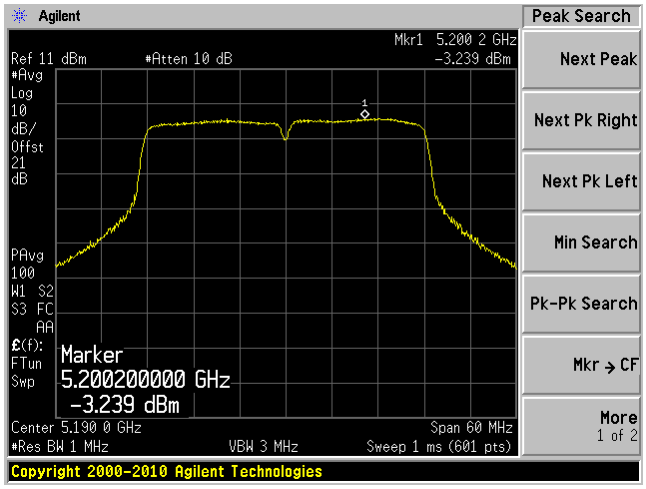
Low channel: 5190 MHz Chain J0



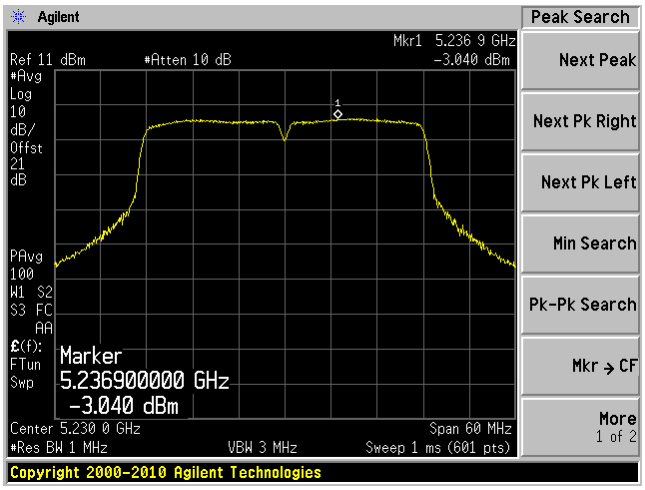
Low channel: 5190 MHz Chain J1



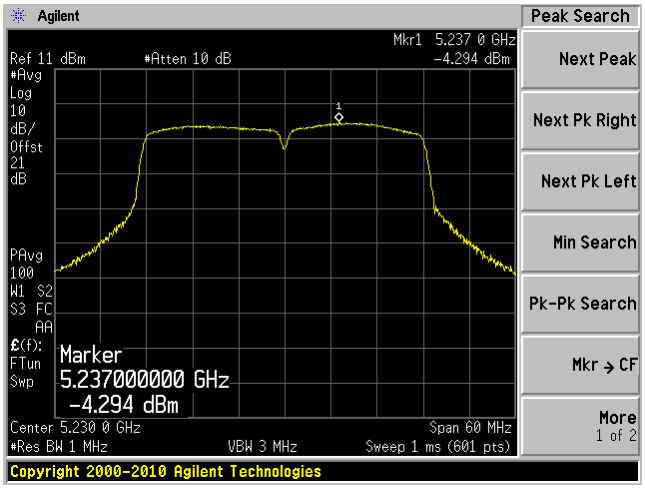
Low channel: 5190 MHz Chain J2



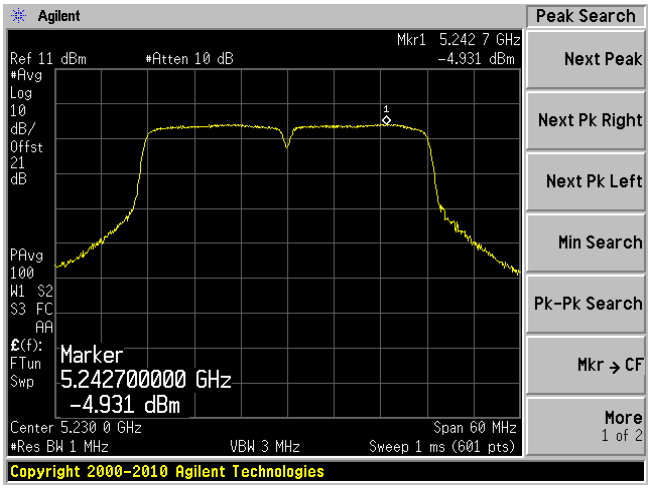
High channel: 5230 MHz Chain J0



High channel: 5230 MHz Chain J1



High channel: 5230 MHz Chain J2



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

Set the spectrum analyzer span to view the entire emission bandwidth.
The largest difference between the following two traces must be ≤ 13 dB for all frequencies across the emission bandwidth. Submit a plot.

1st Trace:
• Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and maxhold settings.

2nd Trace:
• create the 2nd trace using the settings described in the setion "FCC §15.407(a)(1)(2) – CONDUCTED TRANSMITTER OUTPUT POWER".

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	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:	23 °C
Relative Humidity:	42 %
ATM Pressure:	101.1 kPa

The testing was performed by Bo Li from 2013-03-05 to 2013-03-07 in RF site.

12.5 Test Results

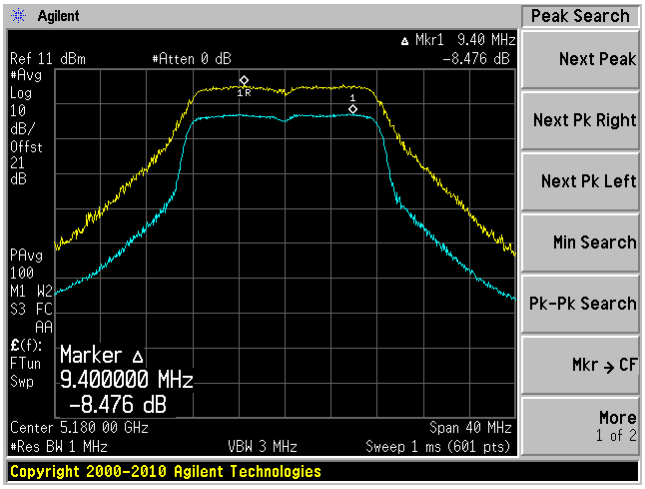
Channel	Frequency (MHz)	TX Chain J0 PER (dB)	TX Chain J1 PER (dB)	TX Chain J2 PER (dB)	Limit (dB)
802.11a mode					
Low	5180	8.476	8.798	11.031	13
Middle	5200	8.106	8.291	8.809	
High	5240	8.368	8.386	9.236	
802.11n HT20 mode					
Low	5180	8.111	8.933	8.313	13
Middle	5200	8.914	8.718	9.32	
High	5240	6.524	8.586	9.364	
802.11n HT40 mode					
Low	5190	8.038	8.934	9.058	13
High	5230	9.137	8.206	9.907	

Please refer to the following plots for detailed test results:

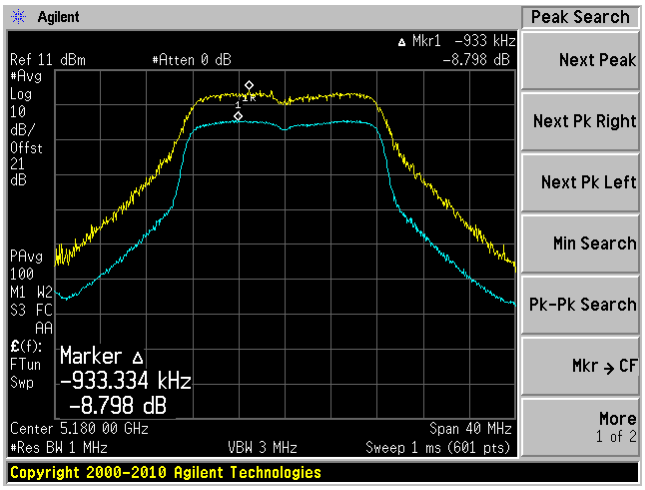
5150-5250 MHz Band

802.11a mode

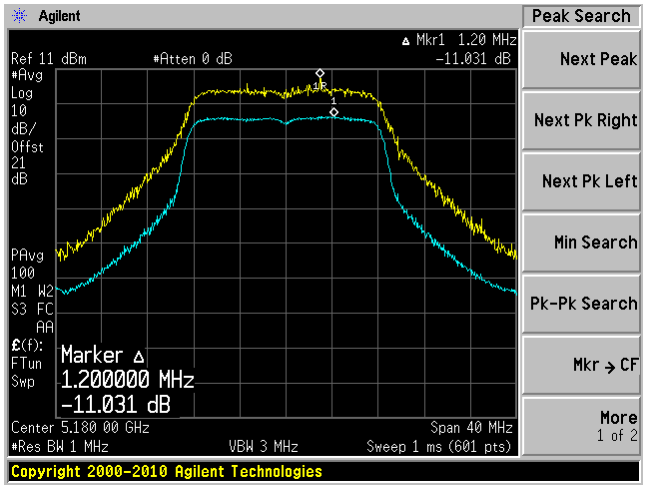
Low channel: 5180 MHz Chain J0



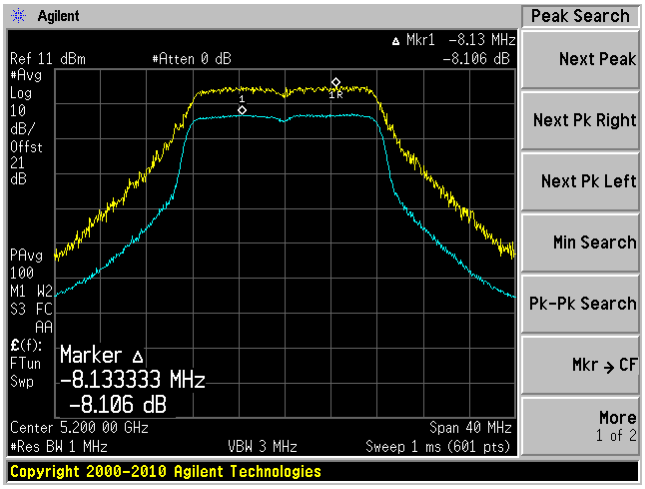
Low channel: 5180 MHz Chain J1



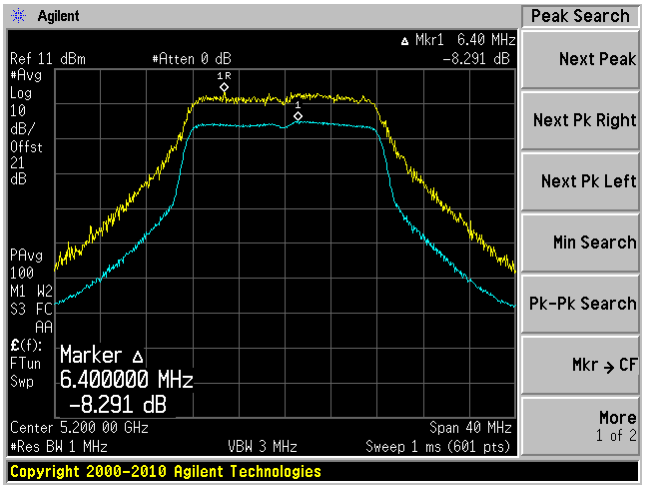
Low channel: 5180 MHz Chain J2



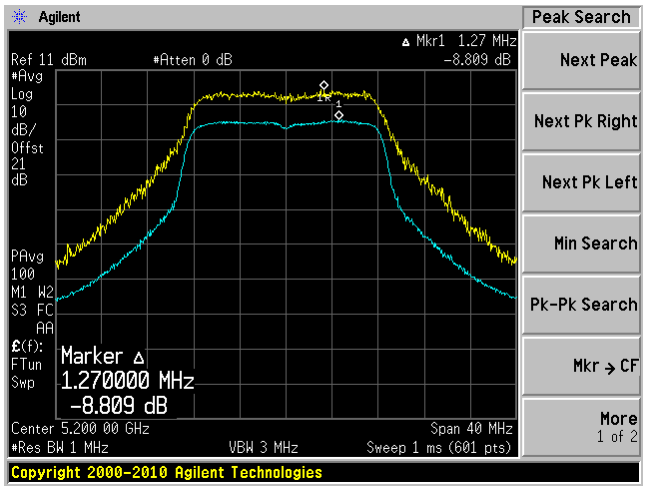
Middle channel: 5200 MHz Chain J0



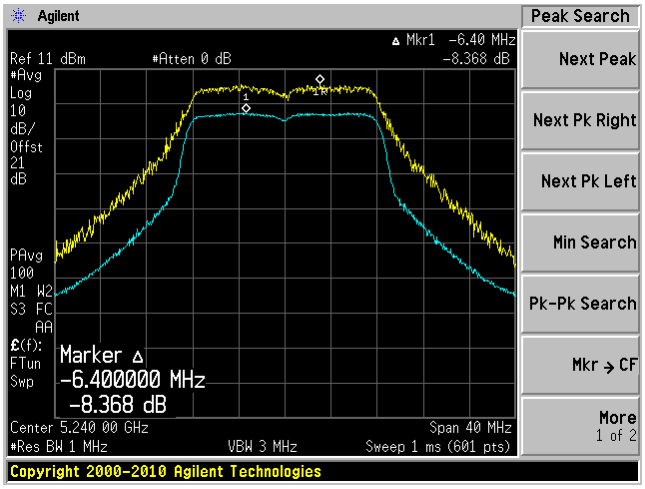
Middle channel: 5200 MHz Chain J1



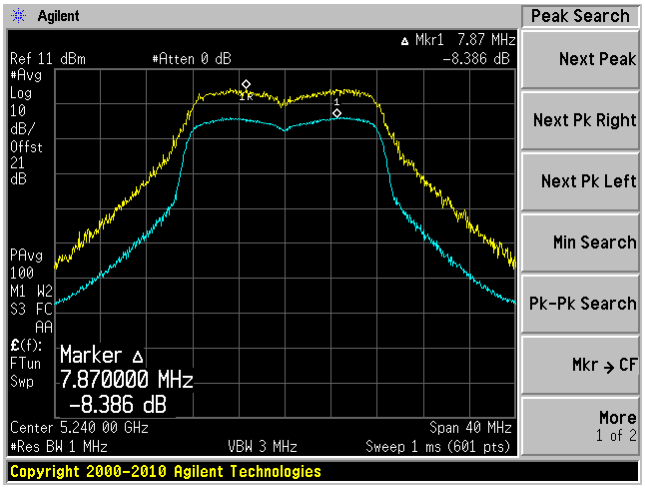
Middle channel: 5200 MHz Chain J2



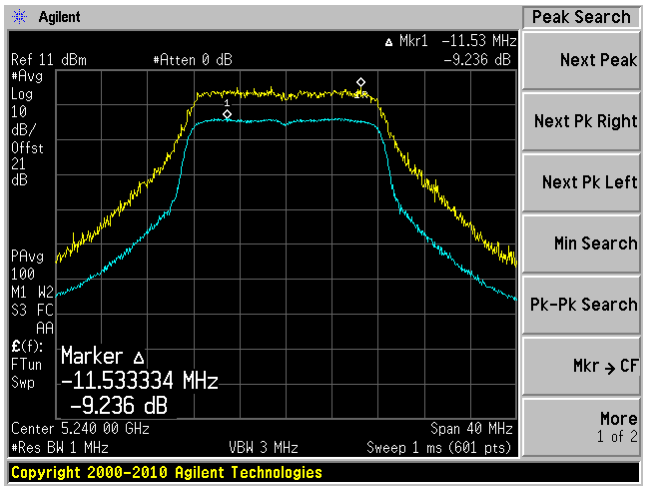
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

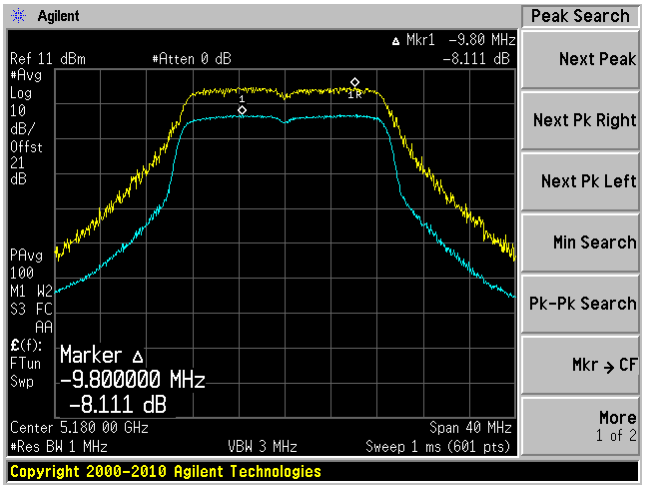


High channel: 5240 MHz Chain J2

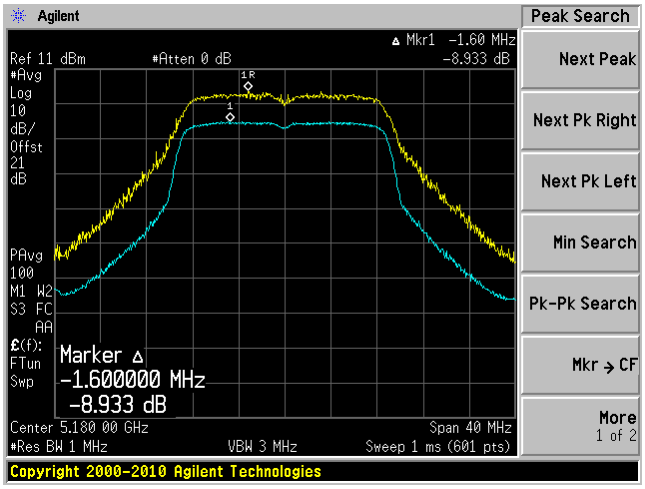


802.11HT20 mode

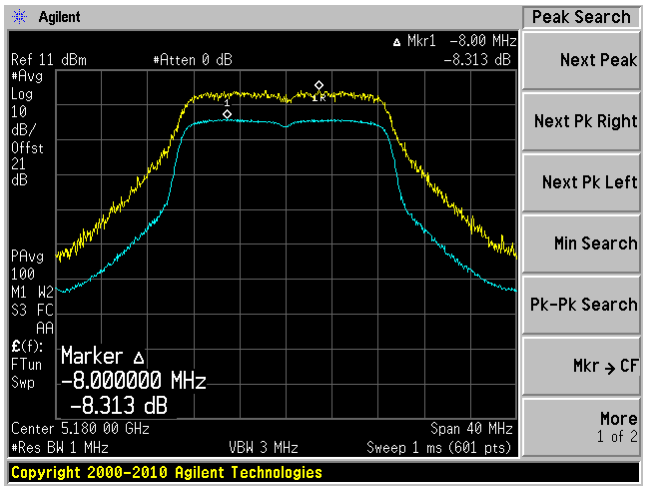
Low channel: 5180 MHz Chain J0



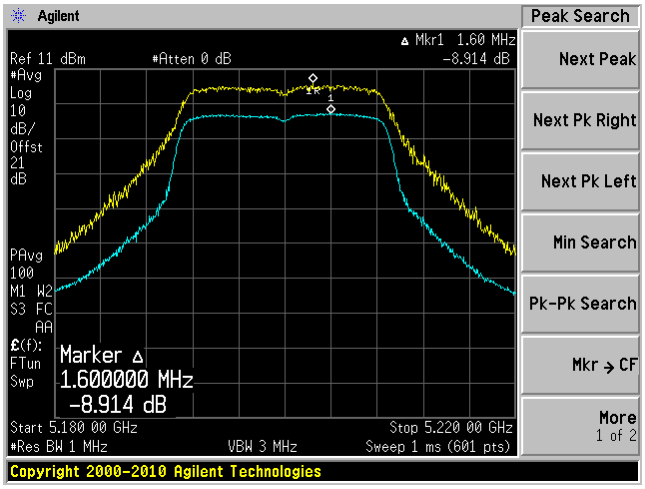
Low channel: 5180 MHz Chain J1



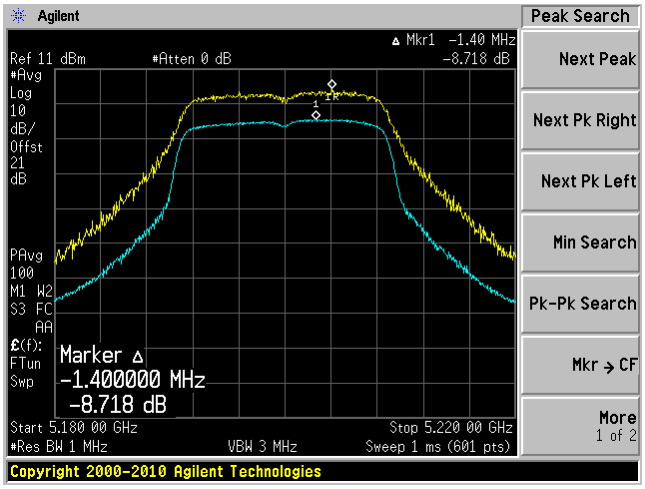
Low channel: 5180 MHz Chain J2



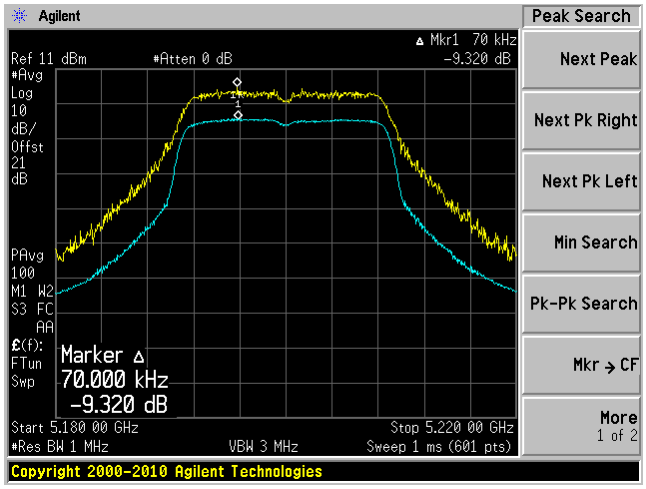
Middle channel: 5200 MHz Chain J0



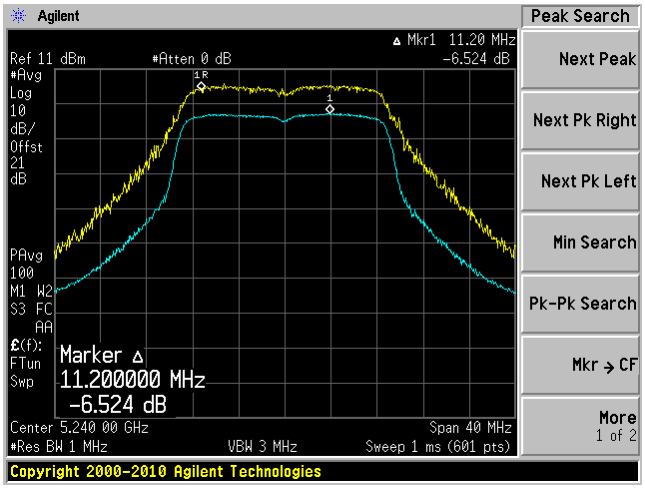
Middle channel: 5200 MHz Chain J1



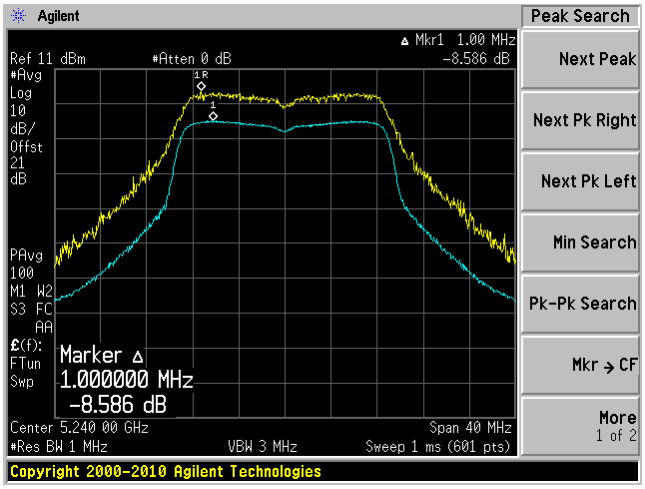
Middle channel: 5200 MHz Chain J2



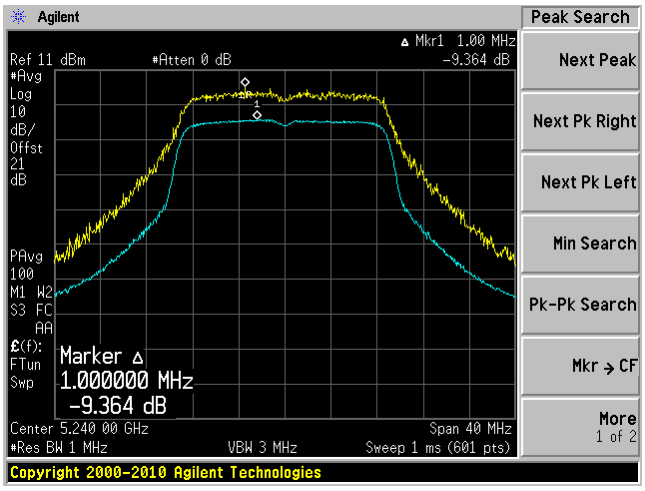
High channel: 5240 MHz Chain J0



High channel: 5240 MHz Chain J1

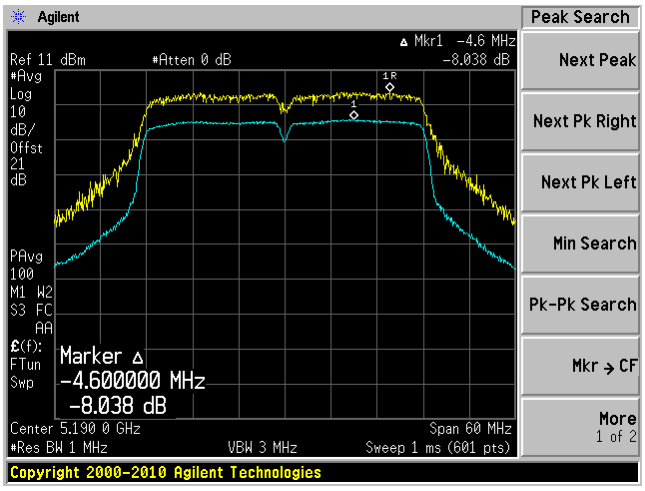


High channel: 5240 MHz Chain J2

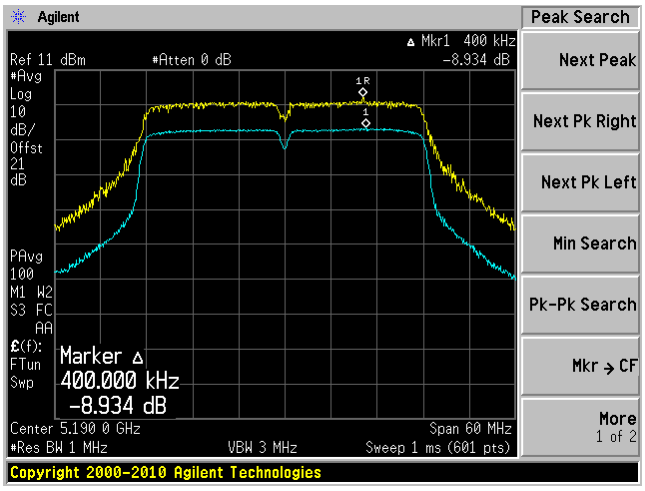


802.11n HT40 mode

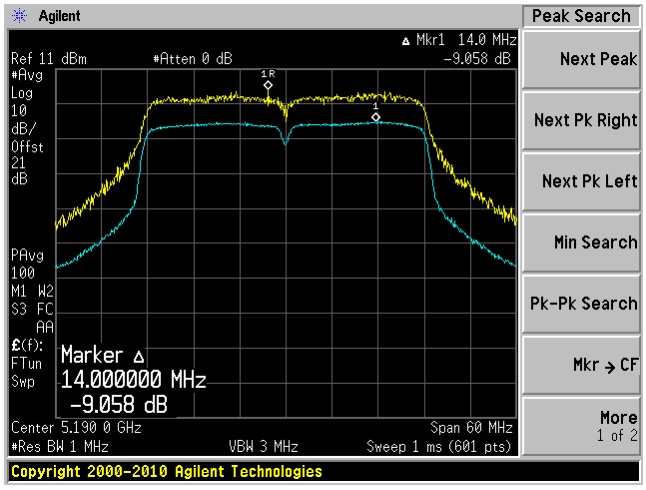
Low channel: 5190 MHz Chain J0



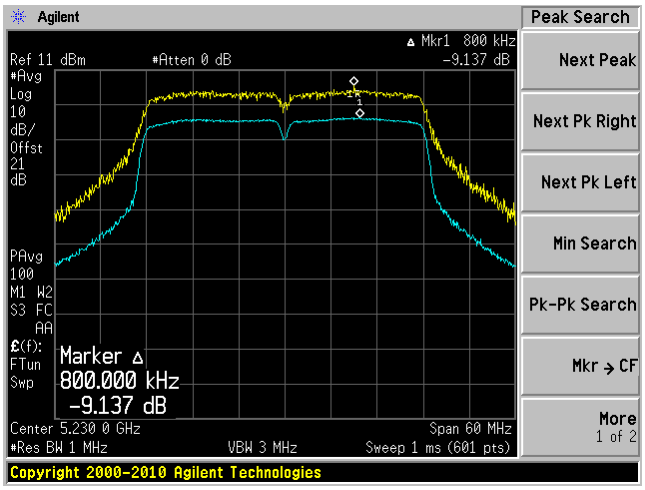
Low channel: 5190 MHz Chain J1



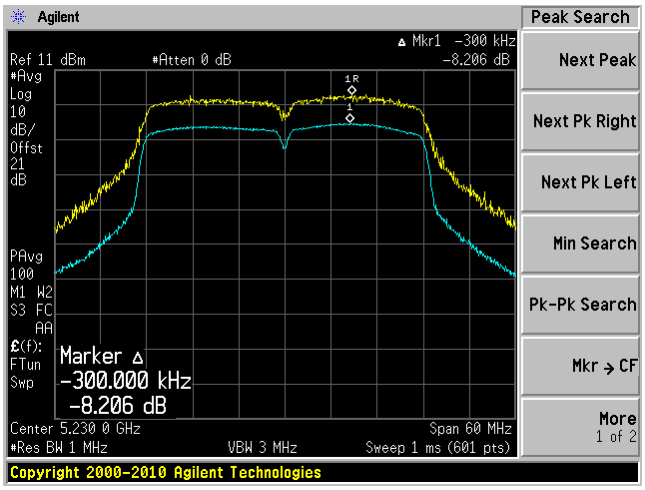
Low channel: 5190 MHz Chain J2



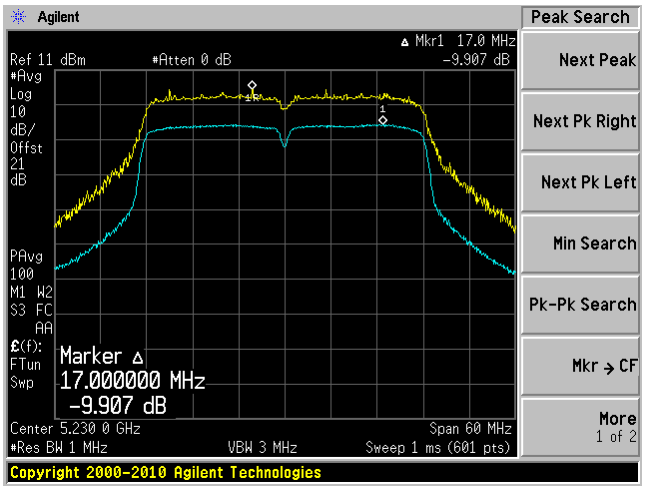
High channel: 5230 MHz Chain J0



High channel: 5230 MHz Chain J1



High channel: 5230 MHz Chain J2



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	2012-06-18	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2012-06-09	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2012-05-09	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year
EMCO	Horn Antenna	3315	9511-4627	2012-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

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

13.6 Test Environmental Conditions

Temperature:	21-24°C
Relative Humidity:	43-46%
ATM Pressure:	101-103kPa

The testing was performed by Bo Li from 2013-2-15 to 2013-3-15 at 5 meter 3.

13.7 Summary of Test Results

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

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-2.18	168.7445	Horizontal	30-1000

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-21.29	1592	Horizontal	1000-18000

1) 30-1000 MHz, Measured at 3 meters

With AC/DC Adaptor

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (QP/Ave.)
34.58725	31.76	172	V	286	40	-8.24	QP
120.39275	30.56	365	H	148	43.5	-12.94	QP
249.521	39.38	118	H	334	46	-6.62	QP
125.2515	34.77	255	H	321	43.5	-8.73	QP
168.68	29.62	100	V	127	43.5	-13.88	QP
993.4375	23.03	296	V	166	54	-30.97	QP

With POE

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (QP/Ave.)
168.7445	41.32	260	H	349	43.5	-2.18	QP
72.4335	27.46	316	V	40	40	-12.54	QP
119.9435	34.1	164	V	251	43.5	-9.4	QP
229.68425	38.2	109	H	42	46	-7.8	QP
172.29125	34.42	146	H	347	43.5	-9.08	QP
268.69725	33.98	107	H	289	46	-12.02	QP
249.98425	31.47	149	H	144	46	-14.53	QP
975.77475	19.2	99	V	6	54	-34.8	QP

2) Above 1 GHz Measured at 3 meters

With AC/DC Adaptor

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
1592	27.29	115	V	211	54	-26.71	Ave
1592	26.82	100	H	77	54	-27.18	Ave
1592	52.46	115	V	211	74	-21.54	Peak
1592	52.71	100	H	77	74	-21.29	Peak
1098	22.85	100	V	191	54	-31.15	Ave
1098	22.72	100	H	80	54	-31.28	Ave
1098	45.9	100	V	191	74	-28.1	Peak
1098	51.76	100	H	80	74	-22.24	Peak

With POE

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
1592	26.4	102	V	205	54	-27.6	Ave
1592	25.86	100	H	88	54	-28.14	Ave
1592	48.27	102	V	205	74	-25.73	Peak
1592	48.04	100	H	88	74	-25.96	Peak
1972	25.67	100	V	113	54	-28.33	Ave
1972	25.01	117	H	20	54	-28.99	Ave
1972	47.8	100	V	113	74	-26.2	Peak
1972	46.45	117	H	20	74	-27.55	Peak

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

According to RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

14.2 Measurement Procedure

4) Procedure for Unwanted Emissions Measurements Below 1000 MHz.
a) Follow the requirements in section G)3), “General Requirements for Unwanted Emissions Measurements”.
b) Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

6) Procedures for Average Unwanted Emissions Measurements above 1000 MHz.
a) Follow the requirements in section G)3), “General Requirements for Unwanted Emissions Measurements”.
b) Average emission levels shall be measured using one of the following two methods.
c) Method AD (Average Detection): Primary method
(i) RBW = 1 MHz.
(ii) VBW ≥ 3 MHz.
(iii) Detector = RMS, if span/(# of points in sweep) ≤ RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
(iv) Averaging type = power (i.e., RMS)
• As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
(v) Sweep time = auto.
(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces should be averaged.
(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
• If power averaging (RMS) mode was used in step (iv) above, the correction factor is10 log(1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.

• If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log(1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.

14.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	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:	23 °C
Relative Humidity:	42 %
ATM Pressure:	101.1 kPa

The testing was performed by Bo Li from 2013-03-05 to 2013-03-07 in RF site.

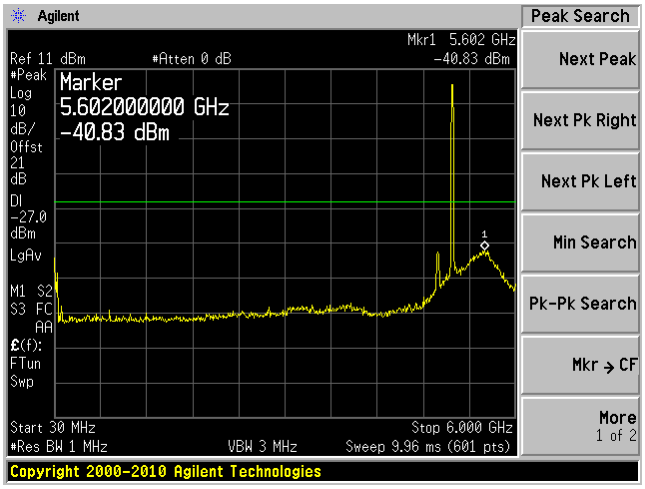
14.5 Test Results

Please refer to following plots of spurious emissions.

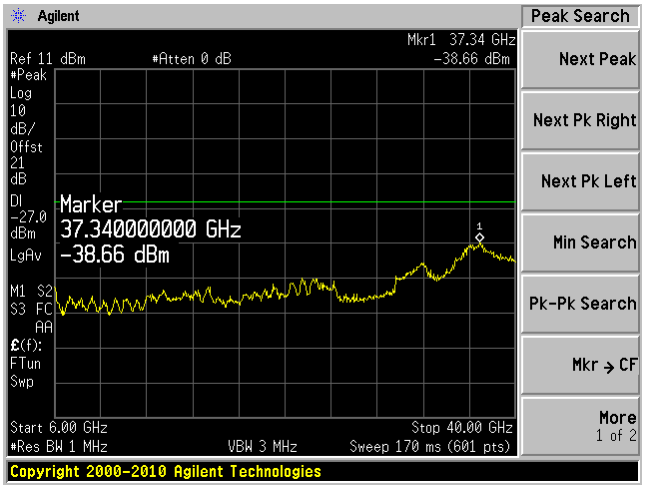
5150-5250 MHz

802.11a, Low Channel, 5180 MHz

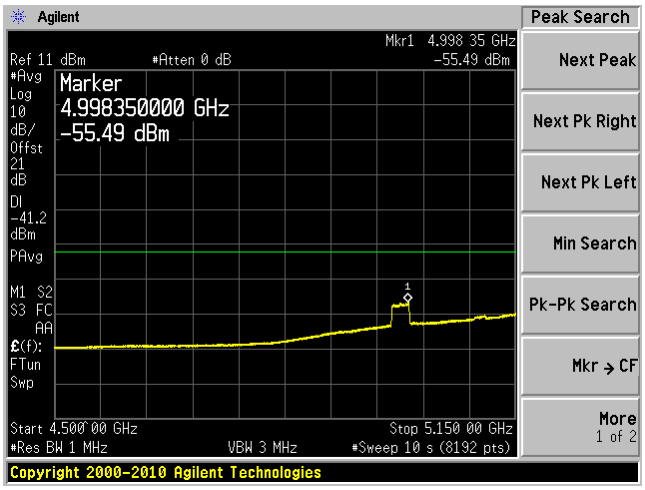
Chain J0, Plot: 30 MHz – 6 GHz



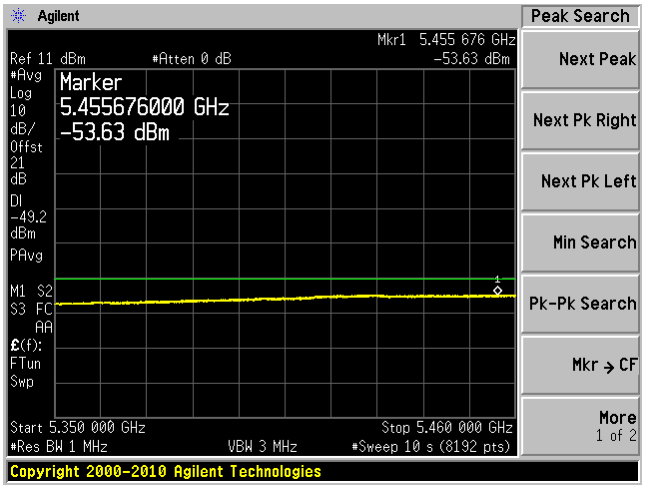
Chain J0, Plot: 6 GHz – 40 GHz



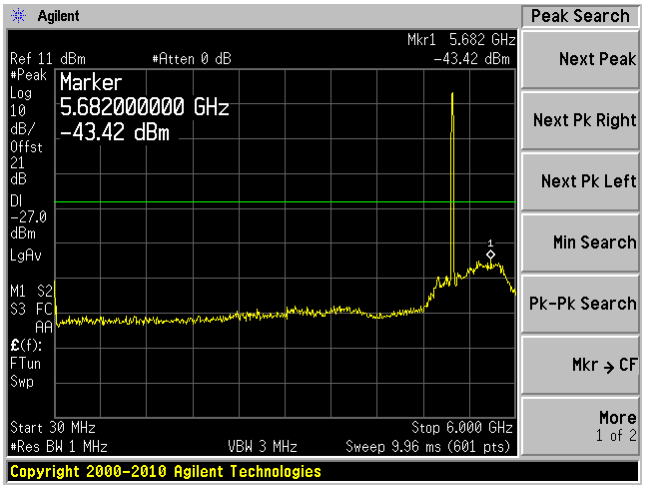
Chain J0, Plot: 4500 MHz – 5150 MHz



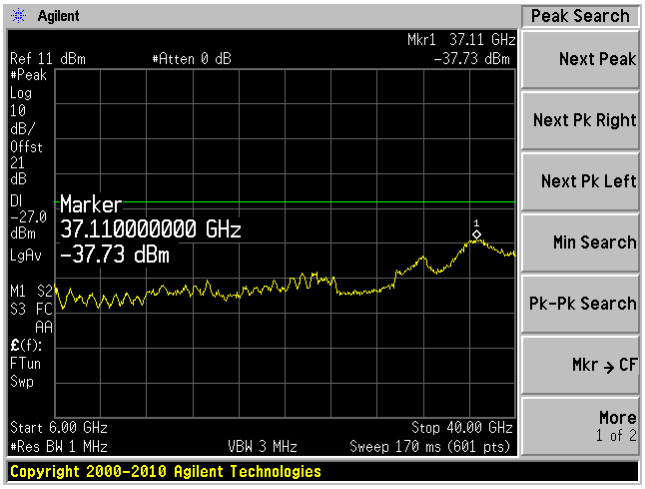
Chain J0, Plot: 5350MHz – 5460 MHz



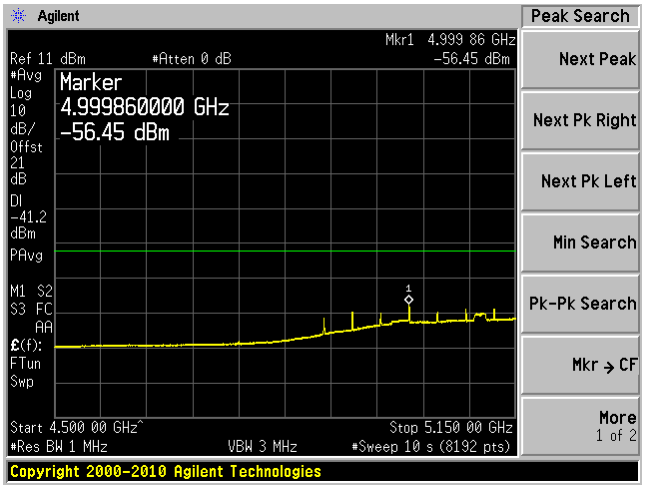
Chain J1, Plot: 30 MHz – 6 GHz



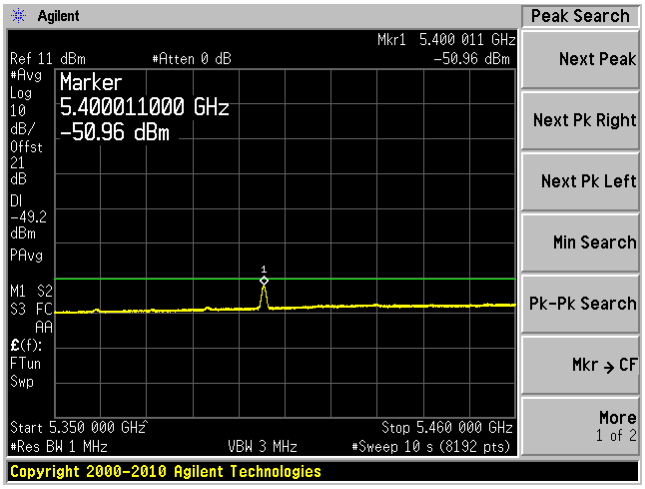
Chain J1, Plot: 6 GHz – 40 GHz



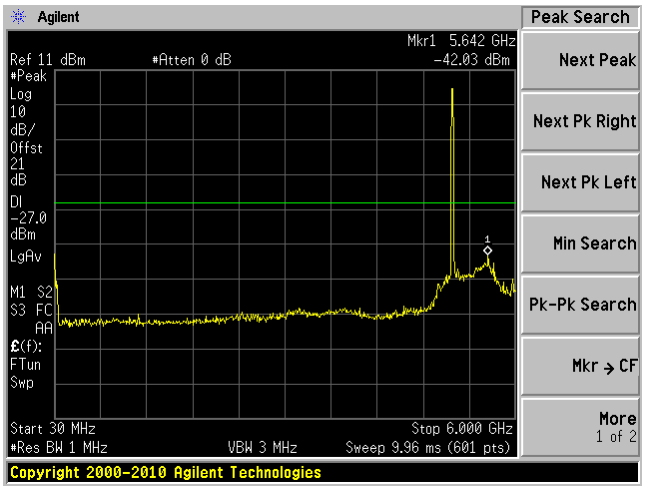
Chain J1, Plot: 4500 MHz – 5150 MHz



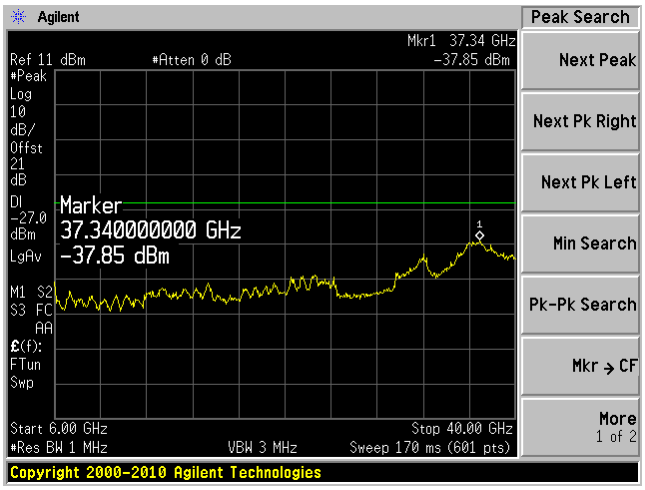
Chain J1, Plot: 5350MHz – 5460 MHz



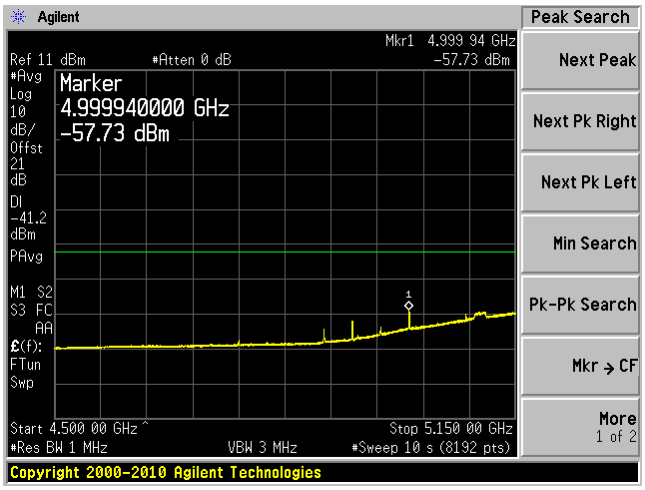
Chain J2, Plot: 30 MHz – 6 GHz



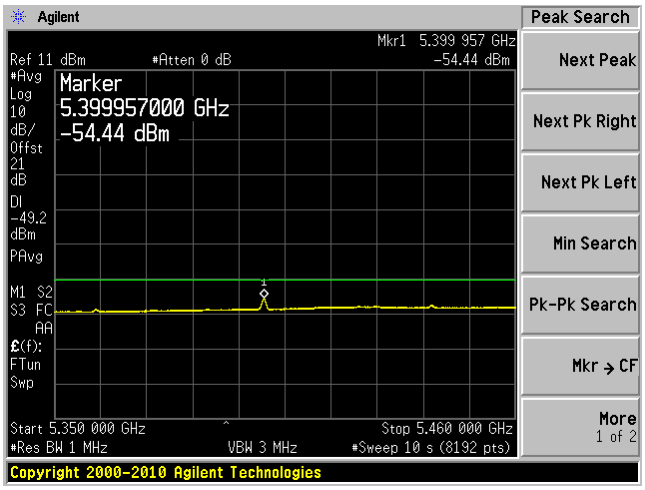
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

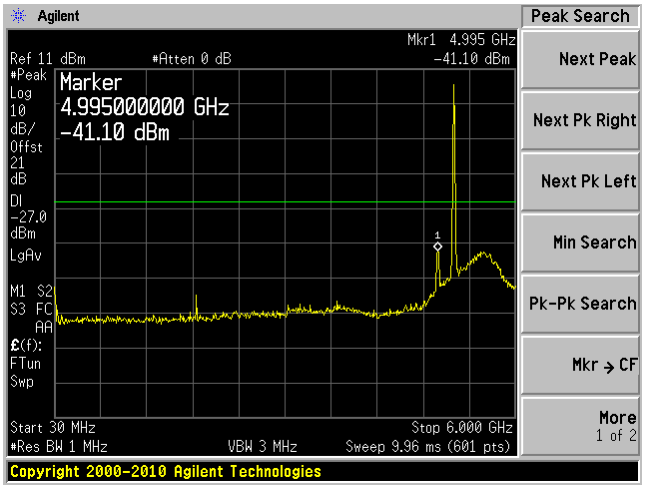


Chain J2, Plot: 5350MHz – 5460 MHz

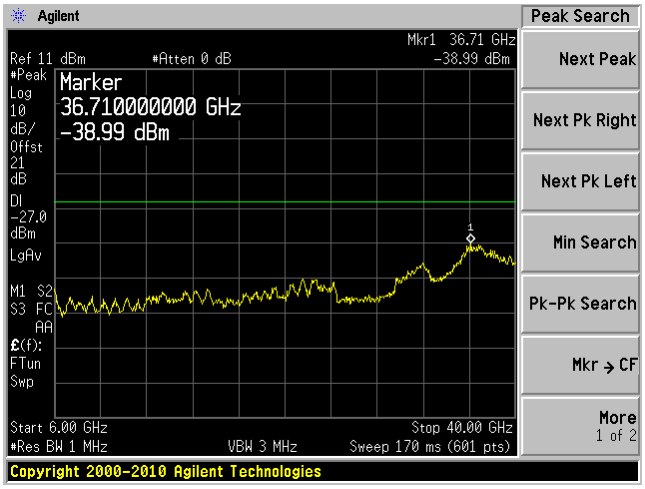


802.11a, Middle Channel, 5200 MHz

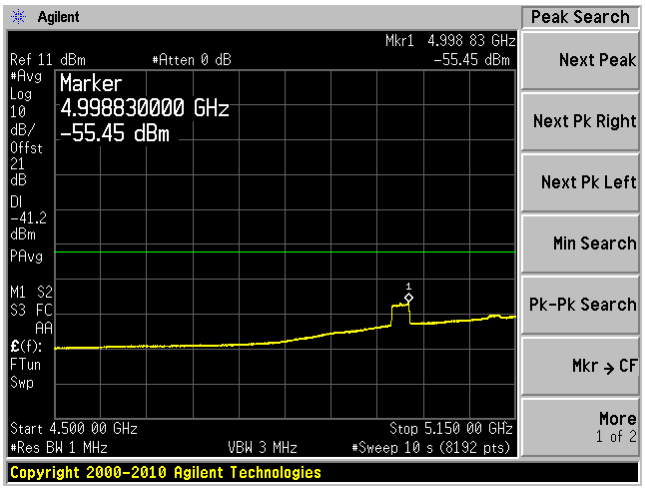
Chain J0, Plot: 30 MHz – 6 GHz



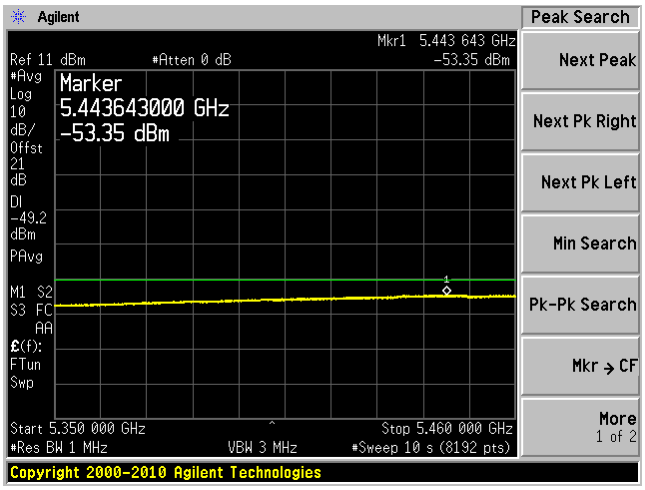
Chain J0, Plot: 6 GHz – 40 GHz



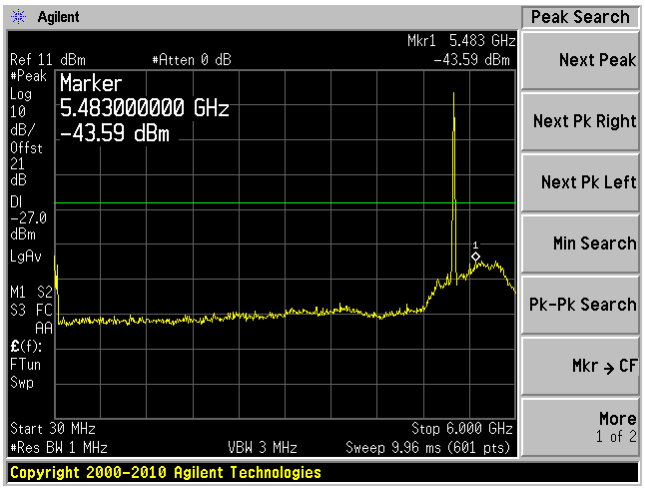
Chain J0, Plot: 4500 MHz – 5150 MHz



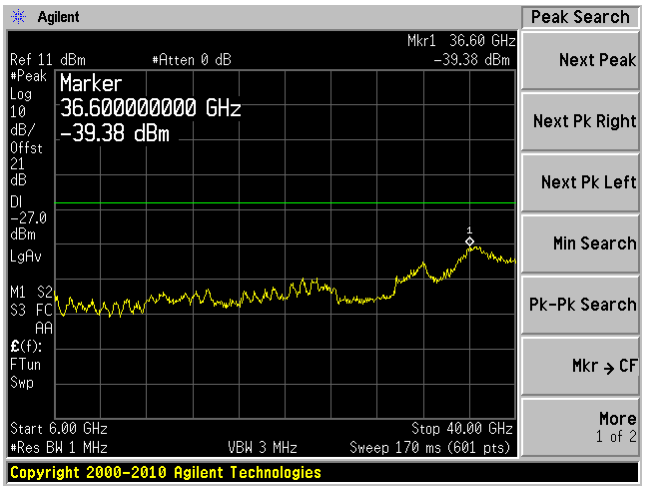
Chain J0, Plot: 5350MHz – 5460 MHz



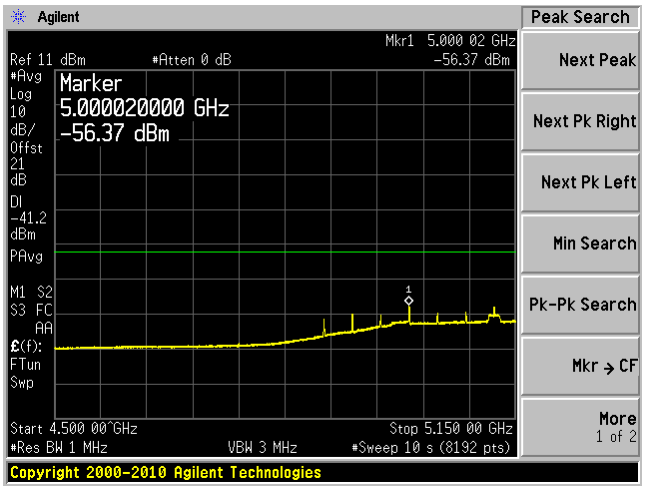
Chain J1, Plot: 30 MHz – 6 GHz



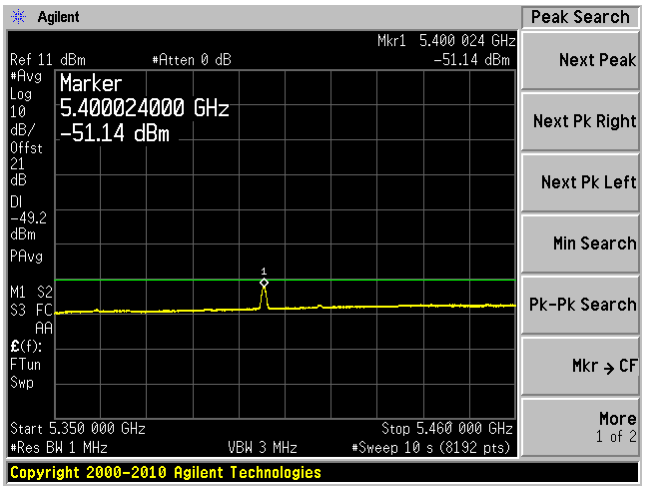
Chain J1, Plot: 6 GHz – 40 GHz



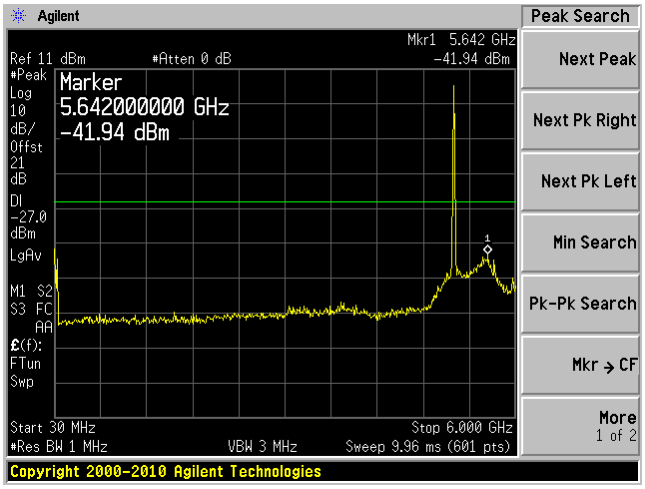
Chain J1, Plot: 4500 MHz – 5150 MHz



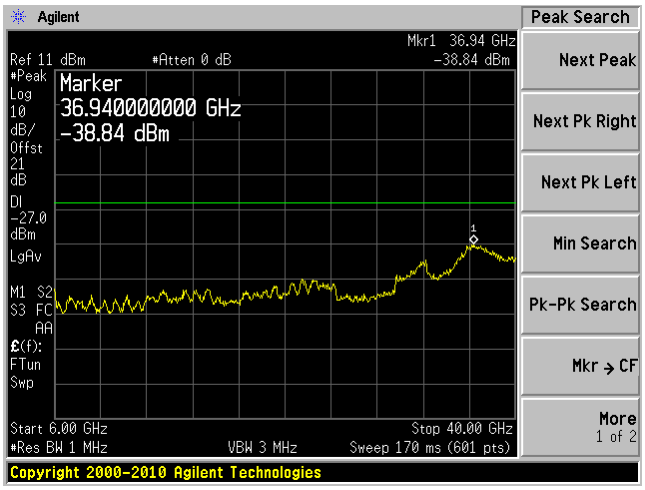
Chain J1, Plot: 5350MHz – 5460 MHz



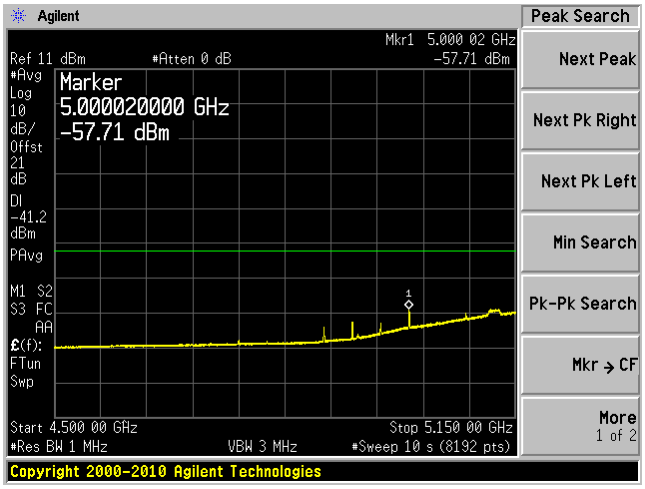
Chain J2, Plot: 30 MHz – 6 GHz



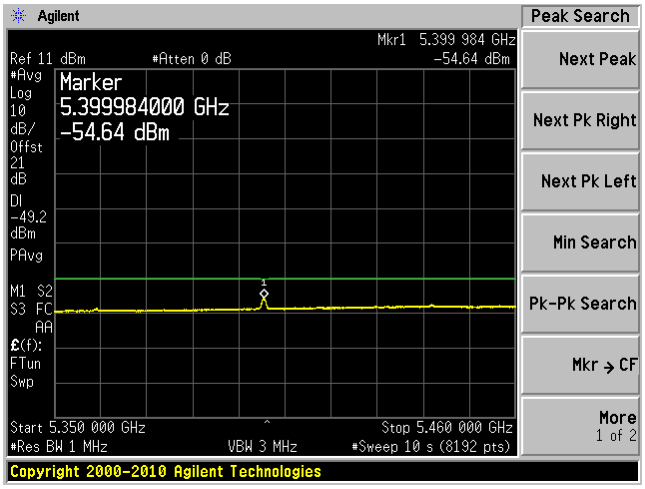
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

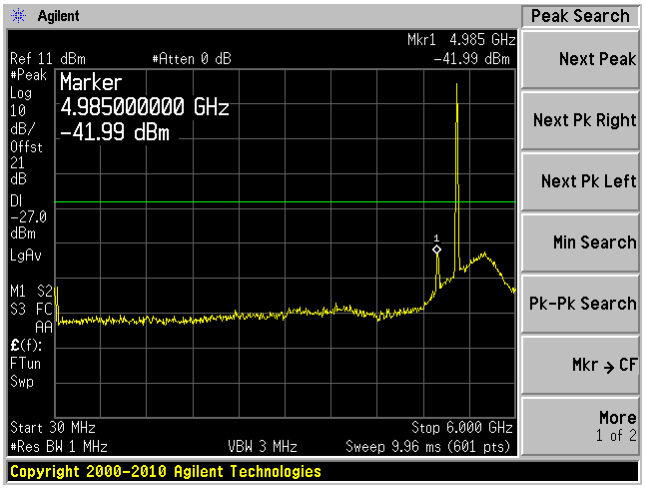


Chain J2, Plot: 5350MHz – 5460 MHz

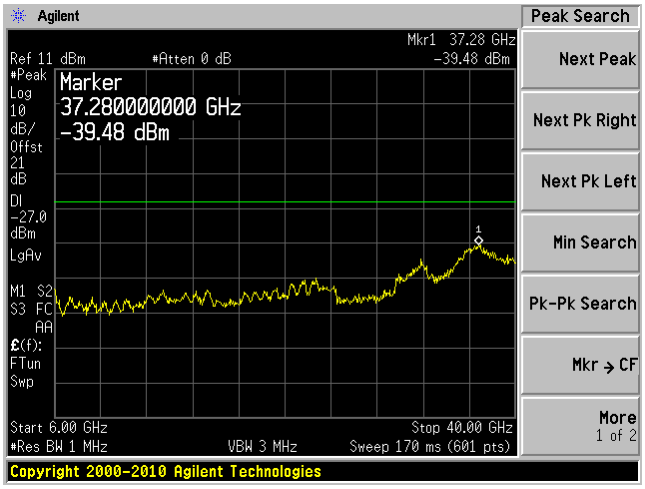


802.11a, High Channel, 5240 MHz

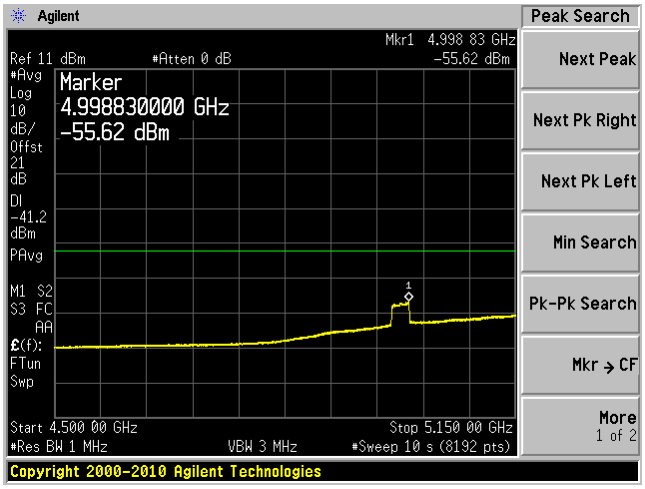
Chain J0, Plot: 30 MHz – 6 GHz



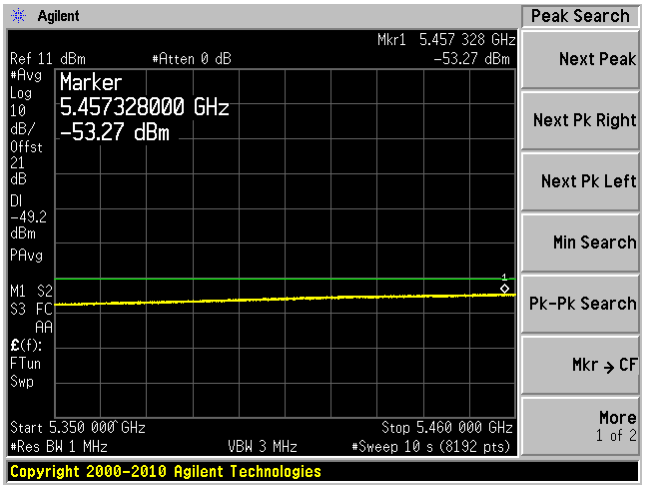
Chain J0, Plot: 6 GHz – 40 GHz



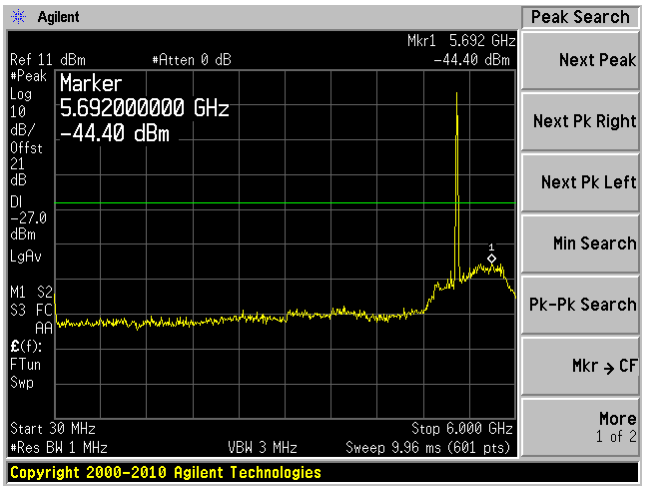
Chain J0, Plot: 4500 MHz – 5150 MHz



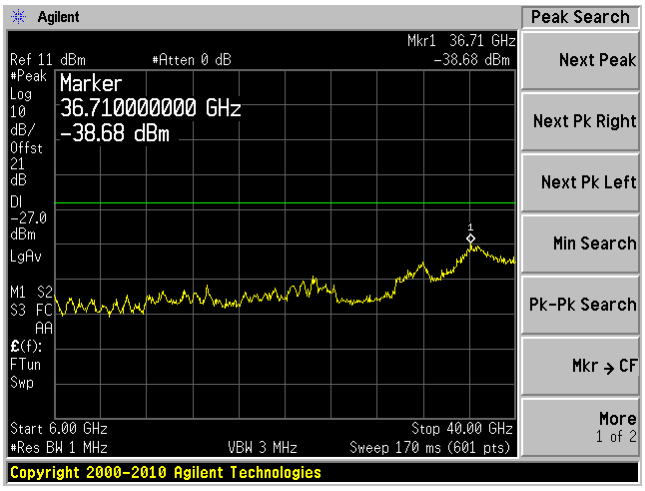
Chain J0, Plot: 5350MHz – 5460 MHz



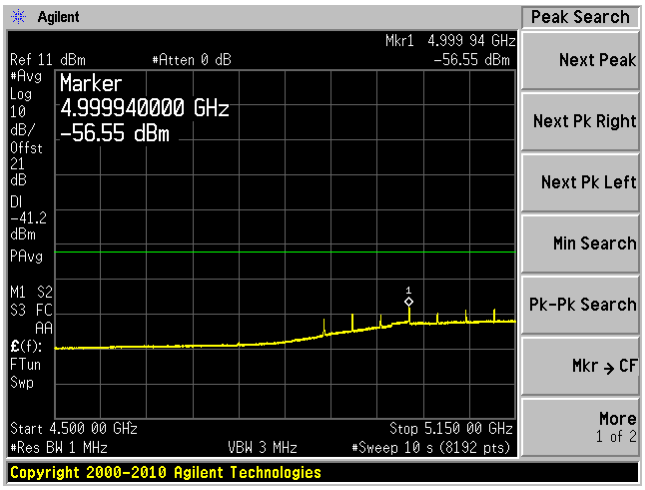
Chain J1, Plot: 30 MHz – 6 GHz



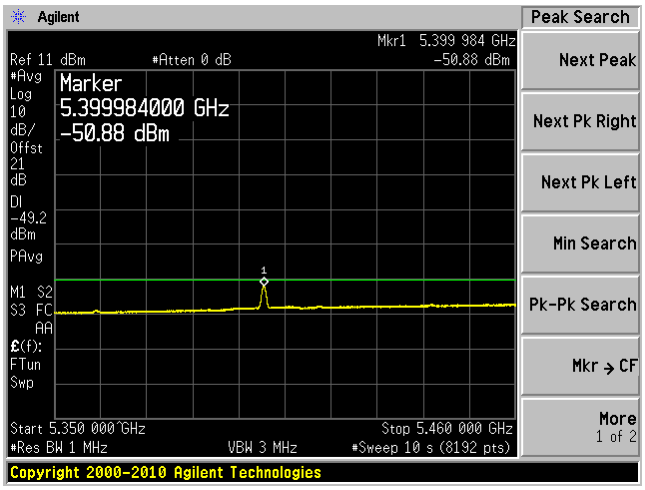
Chain J1, Plot: 6 GHz – 40 GHz



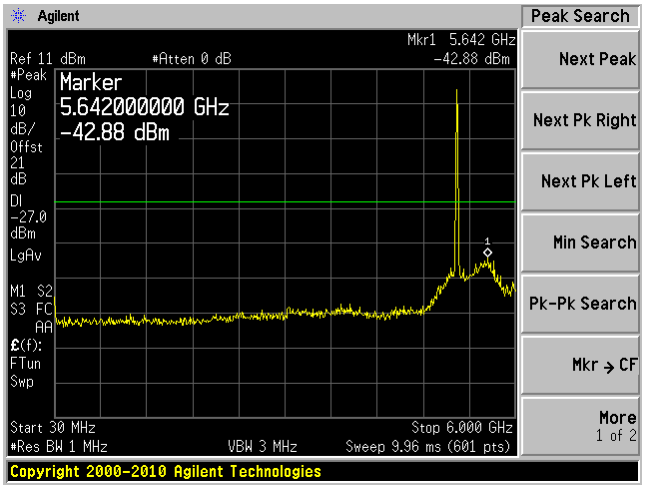
Chain J1, Plot: 4500 MHz – 5150 MHz



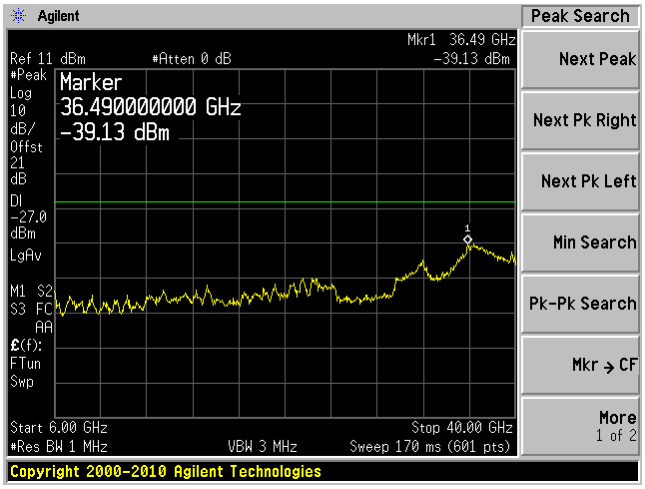
Chain J1, Plot: 5350MHz – 5460 MHz



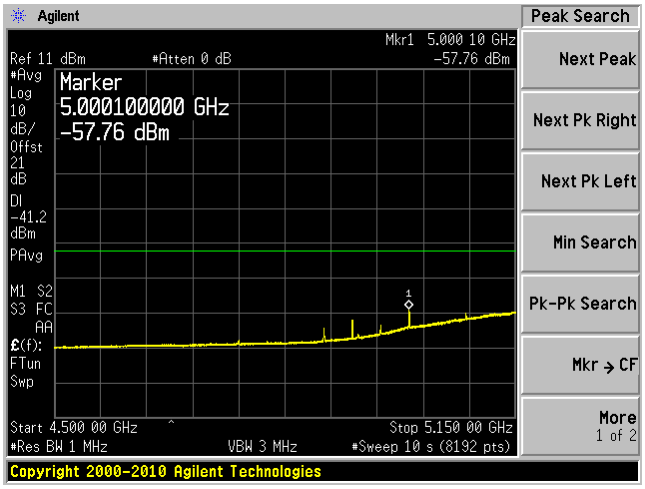
Chain J2, Plot: 30 MHz – 6 GHz



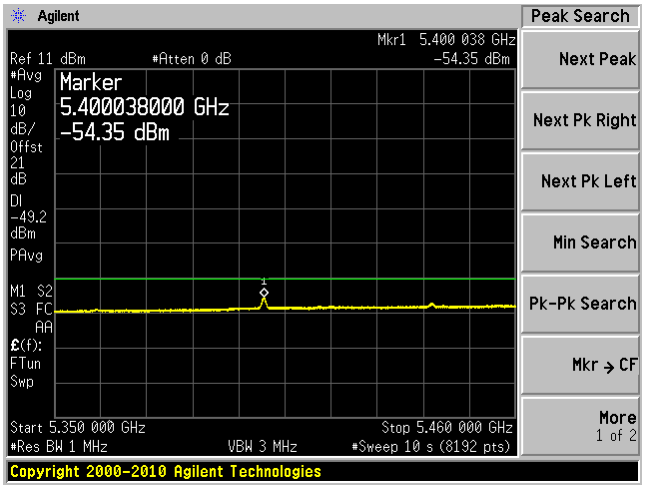
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

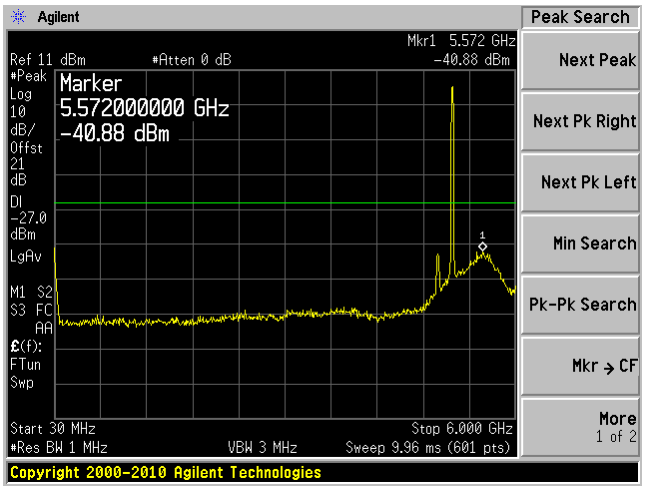


Chain J2, Plot: 5350MHz – 5460 MHz

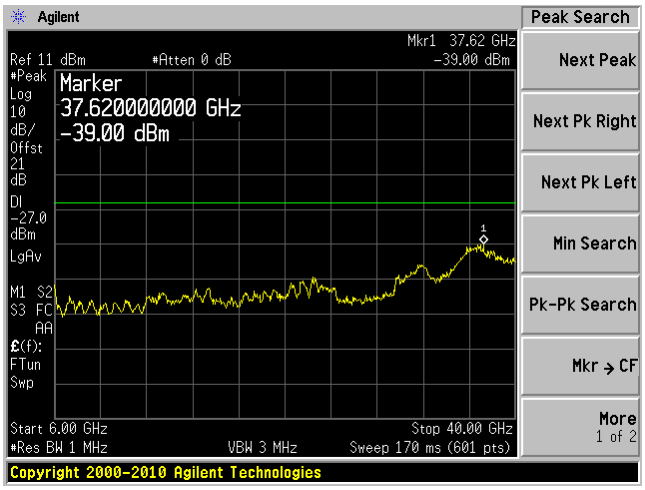


802.11n HT 20, Low Channel 5180 MHz

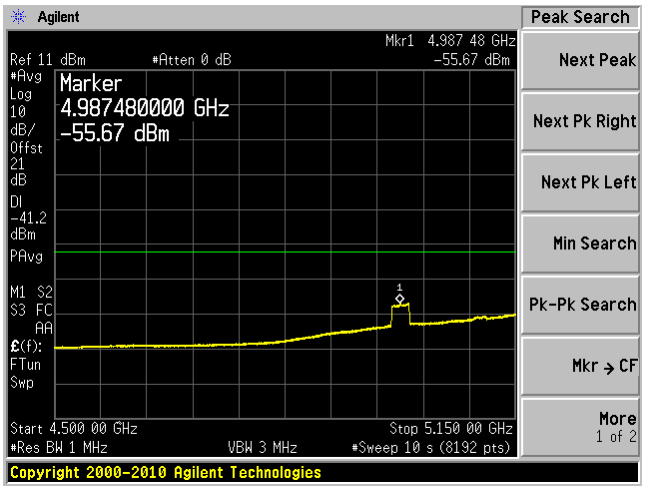
Chain J0, Plot: 30 MHz – 6 GHz



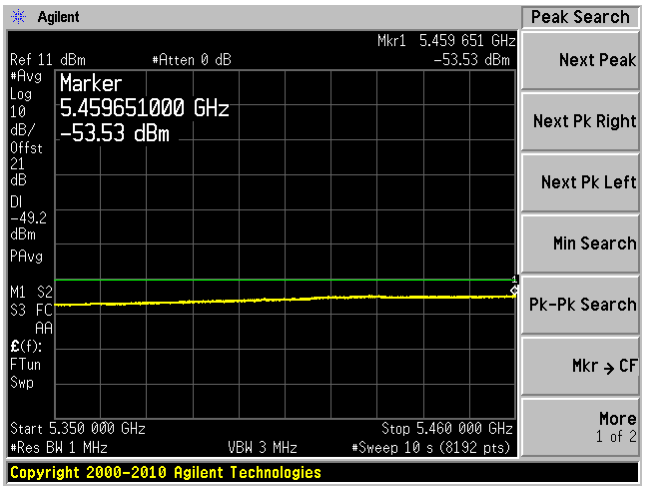
Chain J0, Plot: 6 GHz – 40 GHz



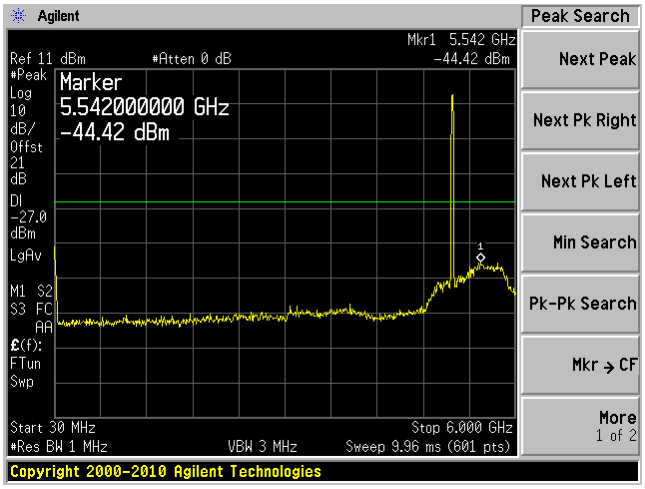
Chain J0, Plot: 4500 MHz – 5150 MHz



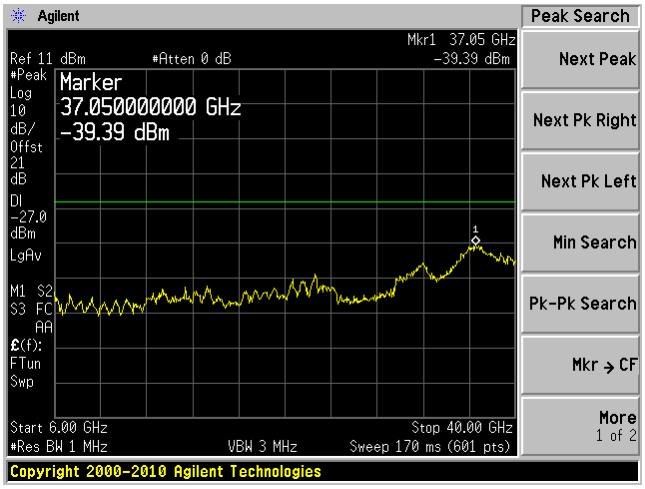
Chain J0, Plot: 5350MHz – 5460 MHz



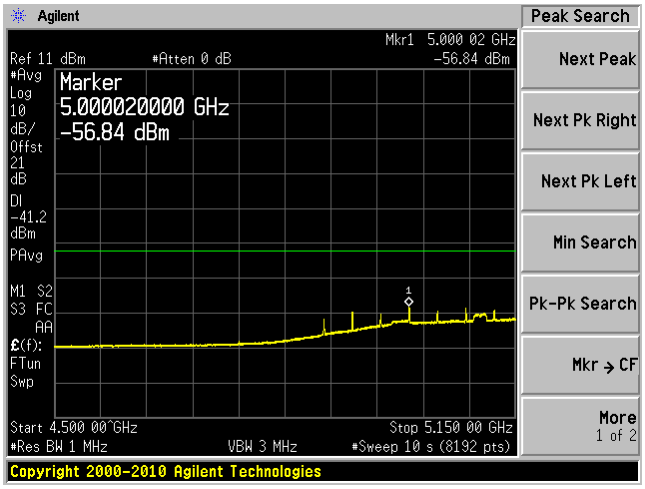
Chain J1, Plot: 30 MHz – 6 GHz



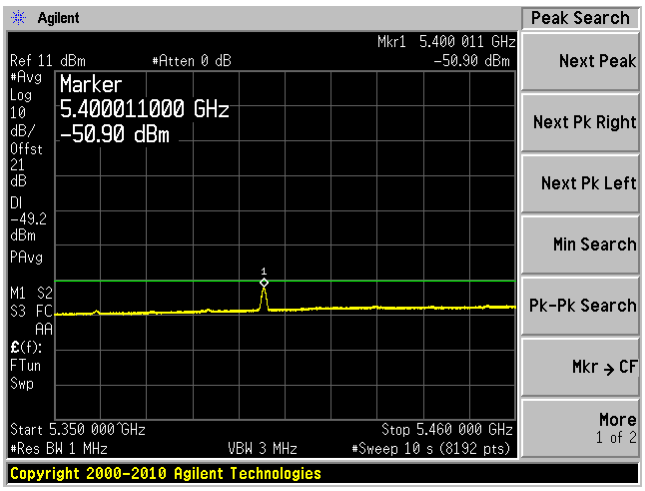
Chain J1, Plot: 6 GHz – 40 GHz



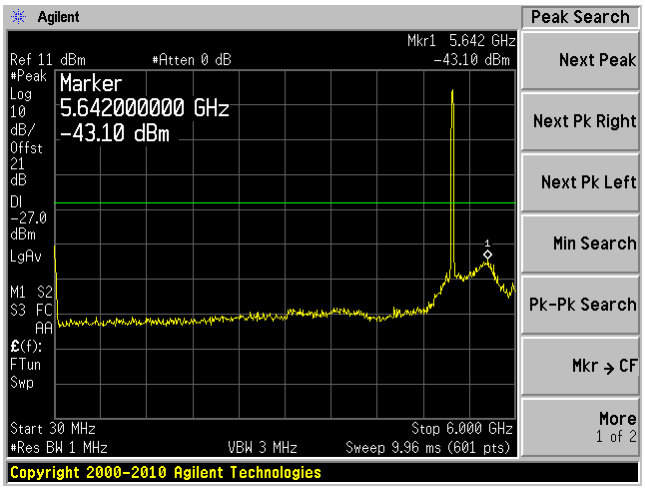
Chain J1, Plot: 4500 MHz – 5150 MHz



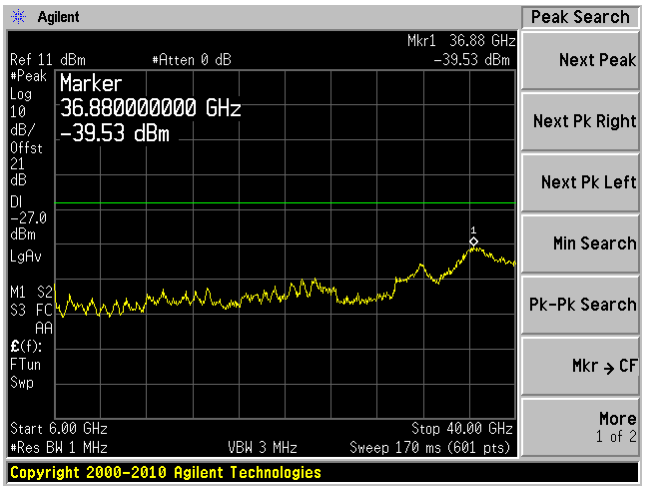
Chain J1, Plot: 5350MHz – 5460 MHz



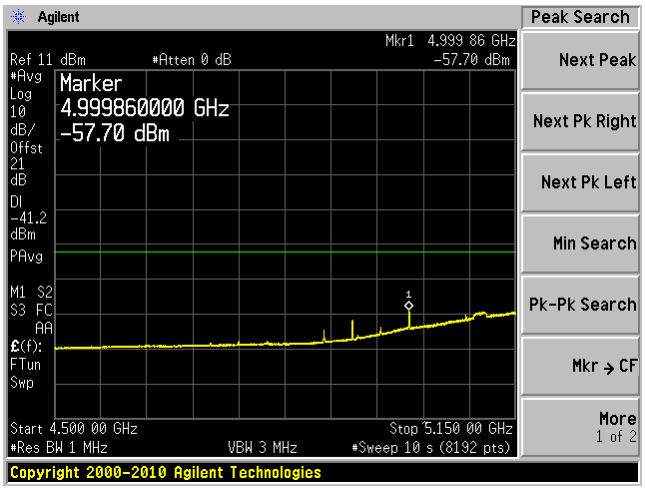
Chain J2, Plot: 30 MHz – 6 GHz



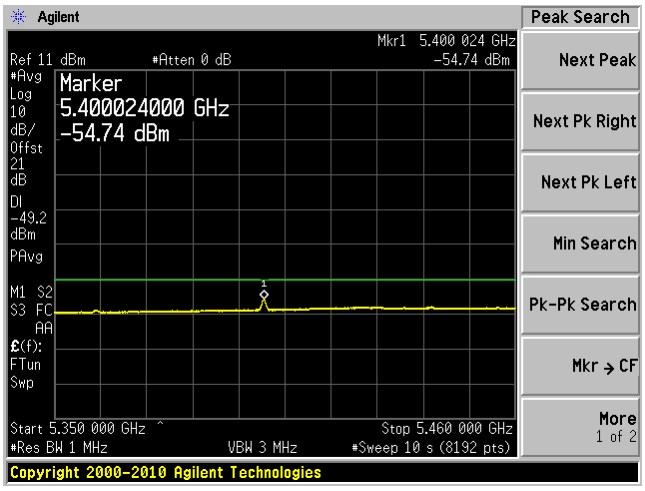
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

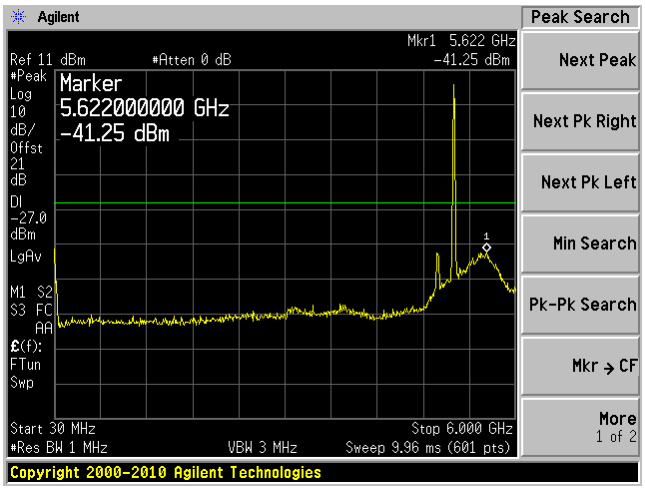


Chain J2, Plot: 5350MHz – 5460 MHz

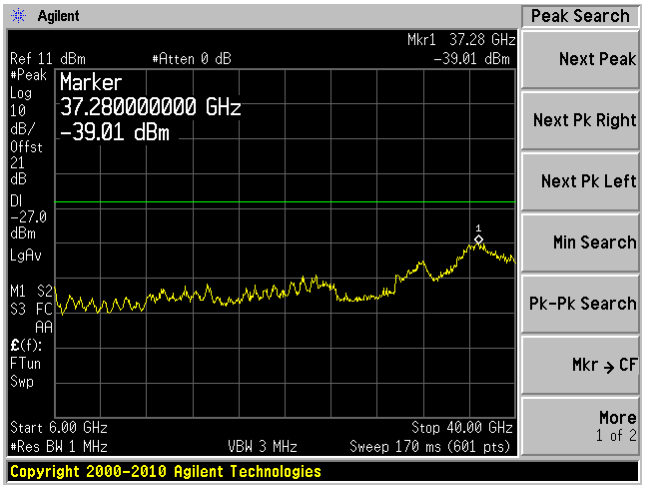


802.11n HT20, Middle Channel 5200 MHz

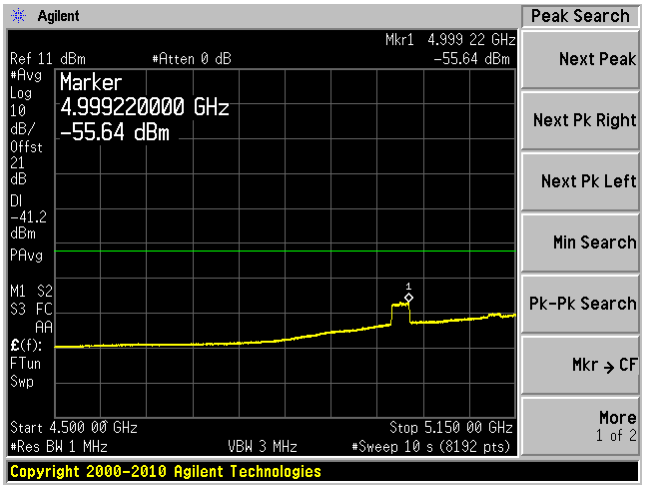
Chain J0, Plot: 30 MHz – 6 GHz



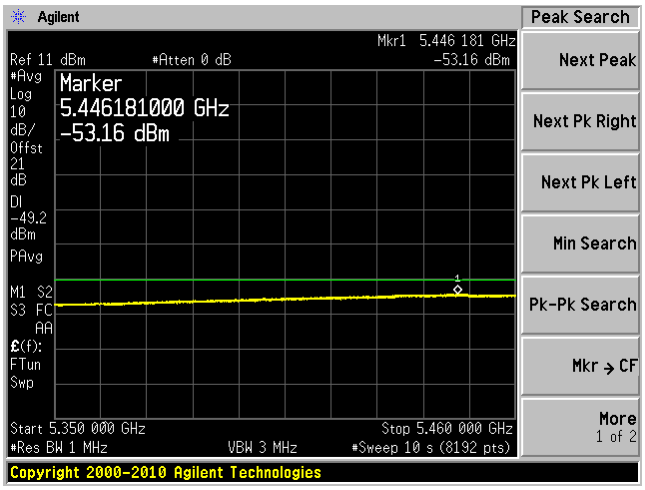
Chain J0, Plot: 6 GHz – 40 GHz



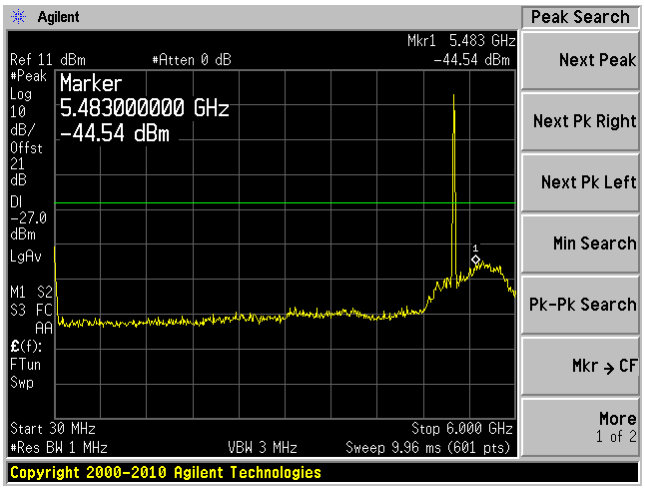
Chain J0, Plot: 4500 MHz – 5150 MHz



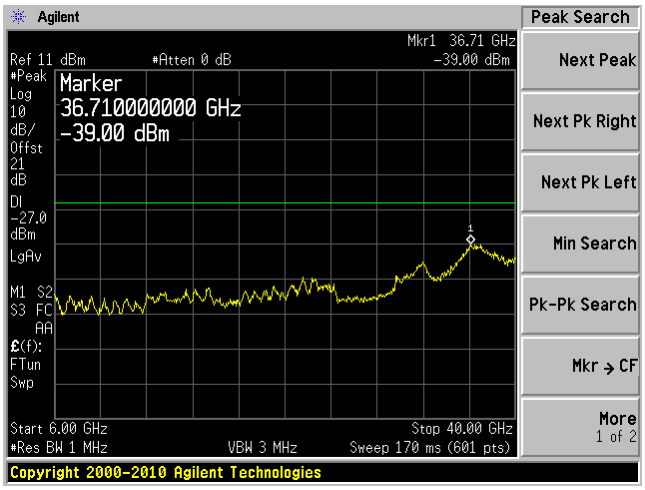
Chain J0, Plot: 5350MHz – 5460 MHz



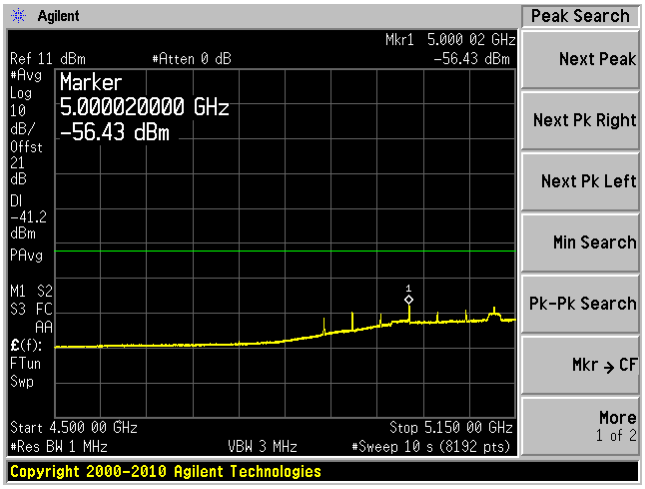
Chain J1, Plot: 30 MHz – 6 GHz



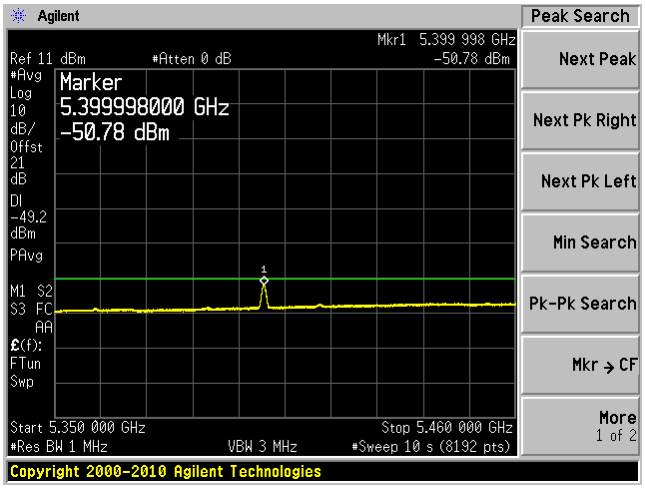
Chain J1, Plot: 6 GHz – 40 GHz



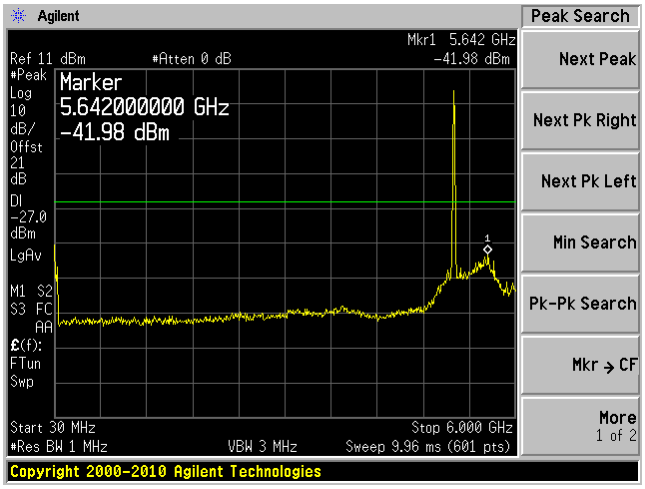
Chain J1, Plot: 4500 MHz – 5150 MHz



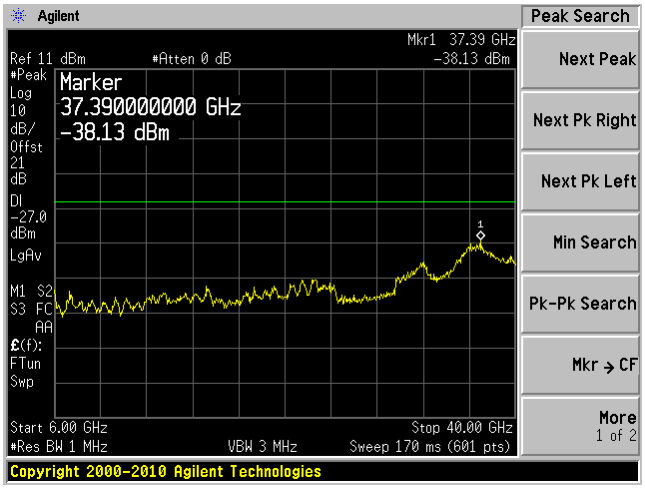
Chain J1, Plot: 5350MHz – 5460 MHz



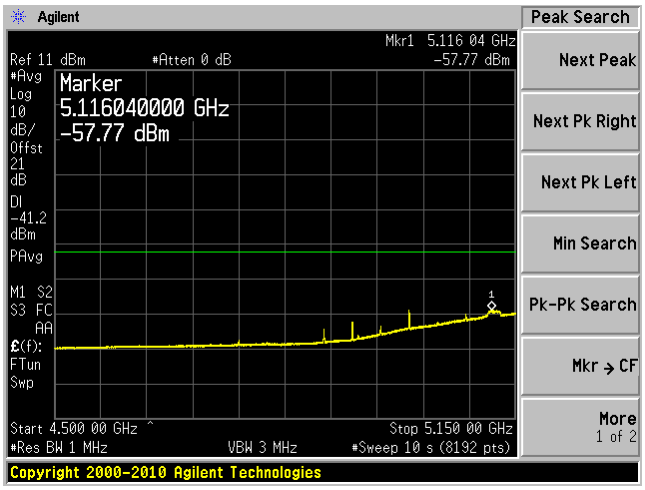
Chain J2, Plot: 30 MHz – 6 GHz



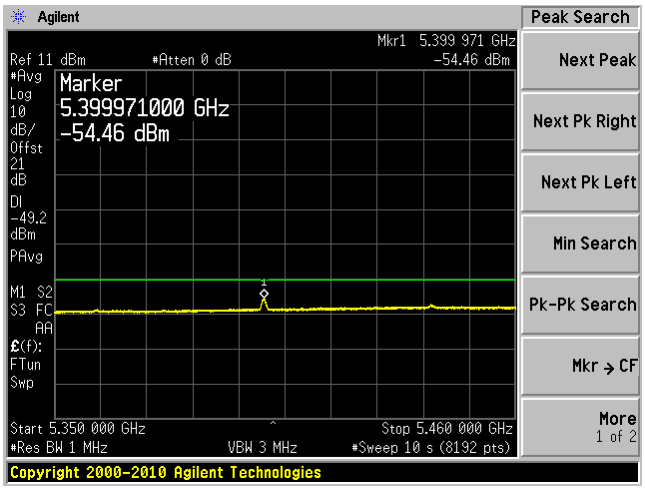
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

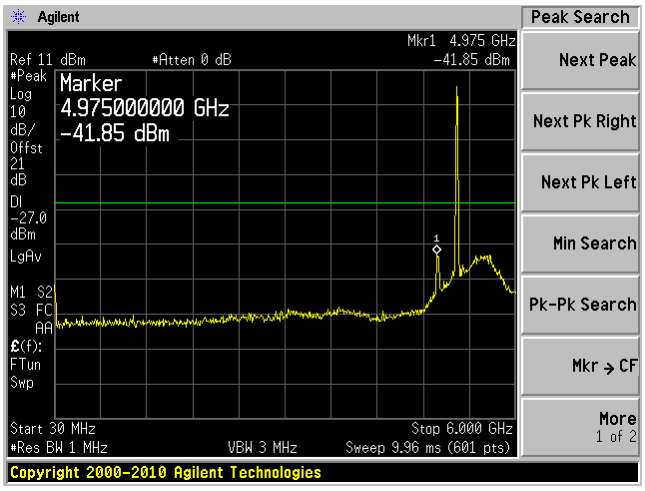


Chain J2, Plot: 5350MHz – 5460 MHz

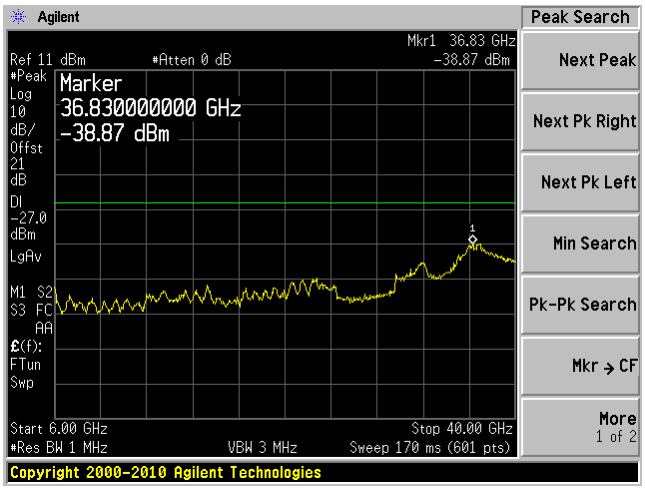


802.11n HT 20, High Channel 5240 MHz

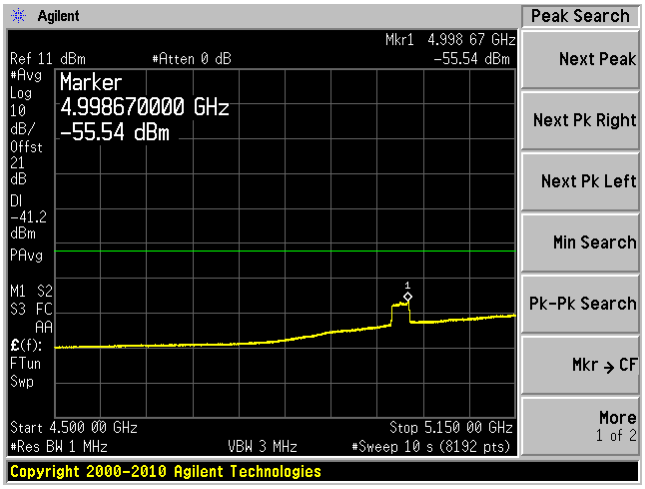
Chain J0, Plot: 30 MHz – 6 GHz



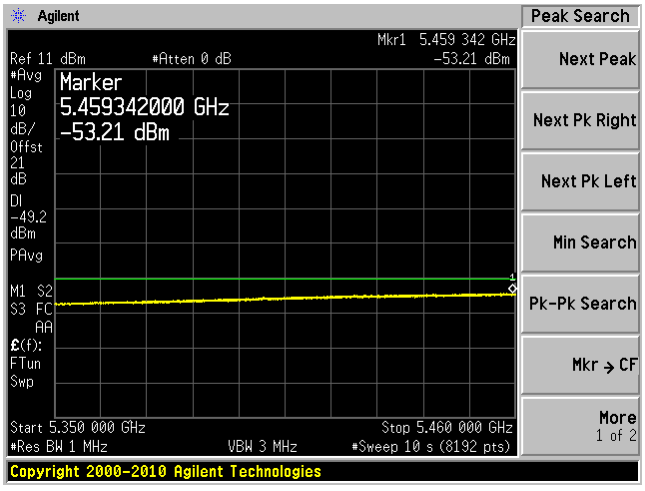
Chain J0, Plot: 6 GHz – 40 GHz



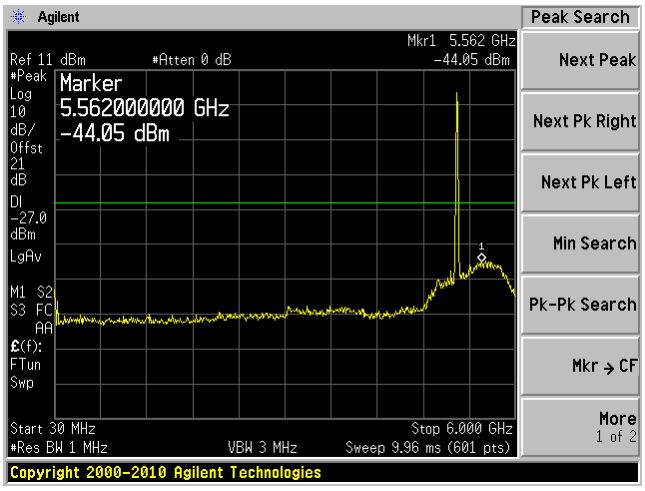
Chain J0, Plot: 4500 MHz – 5150 MHz



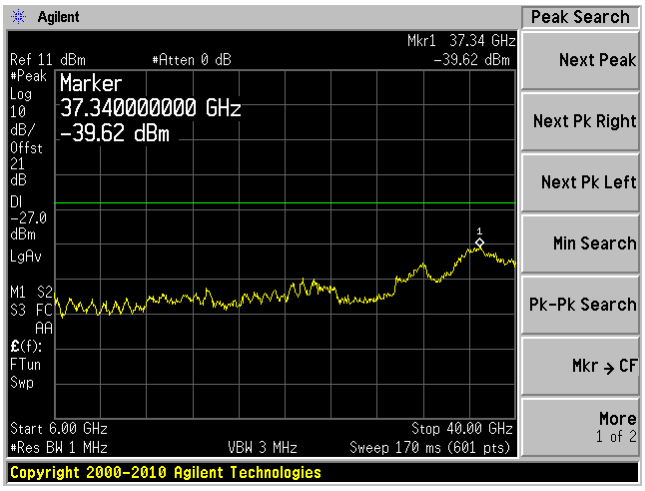
Chain J0, Plot: 5350MHz – 5460 MHz



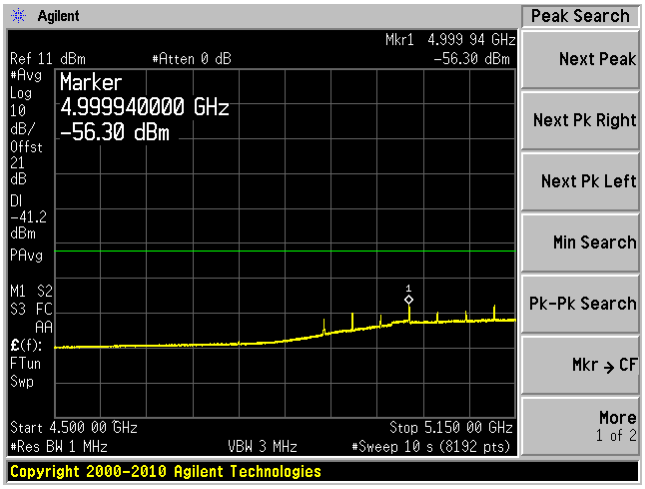
Chain J1, Plot: 30 MHz – 6 GHz



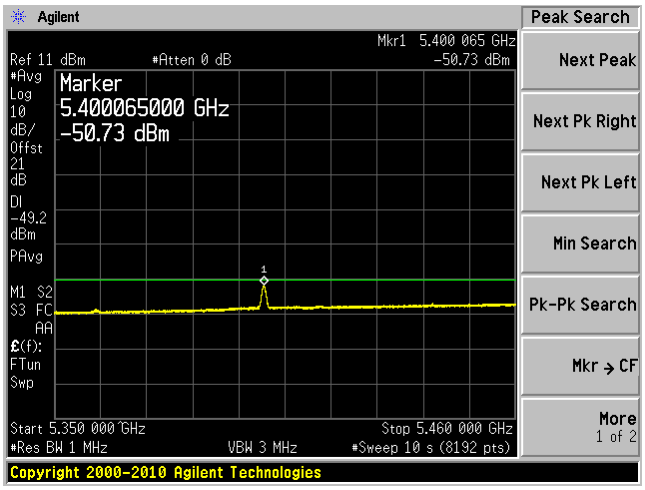
Chain J1, Plot: 6 GHz – 40 GHz



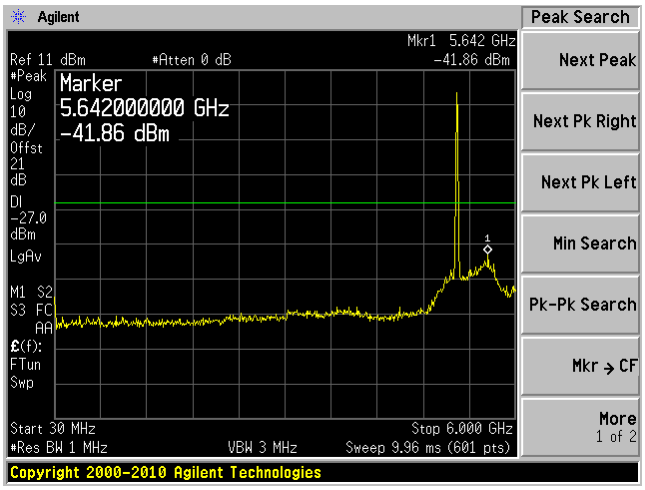
Chain J1, Plot: 4500 MHz – 5150 MHz



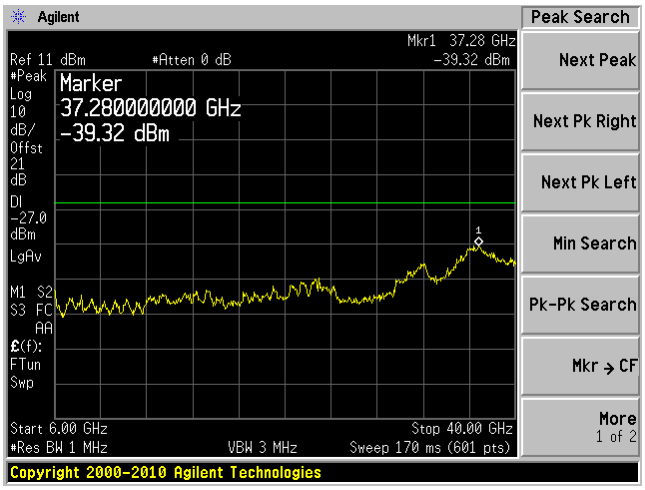
Chain J1, Plot: 5350MHz – 5460 MHz



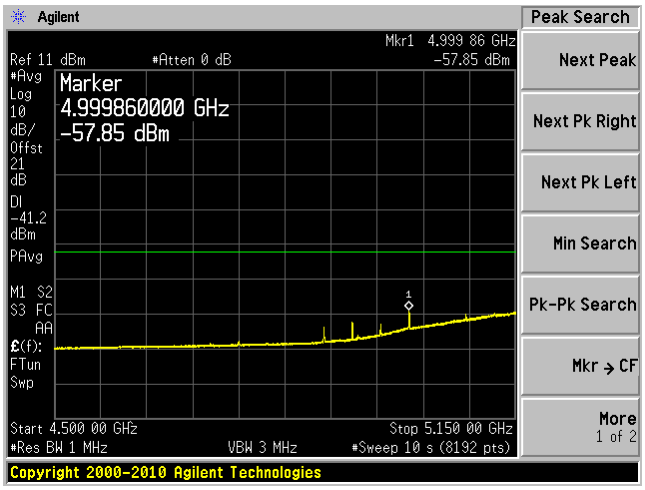
Chain J2, Plot: 30 MHz – 6 GHz



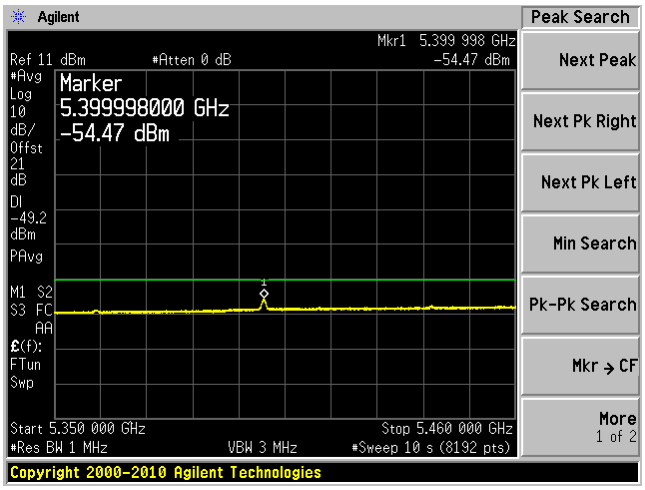
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

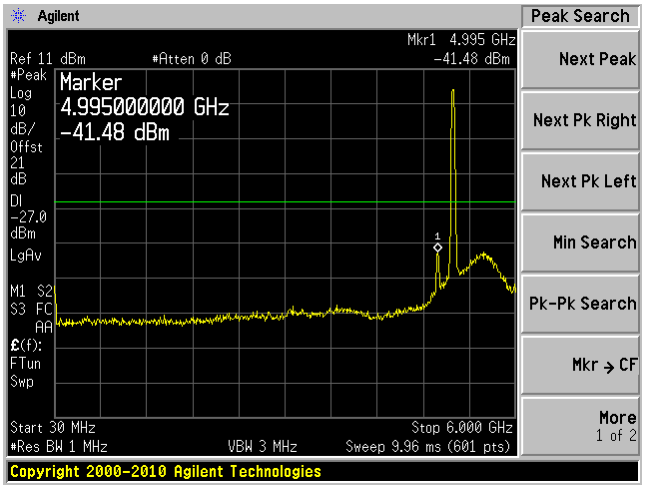


Chain J2, Plot: 5350MHz – 5460 MHz

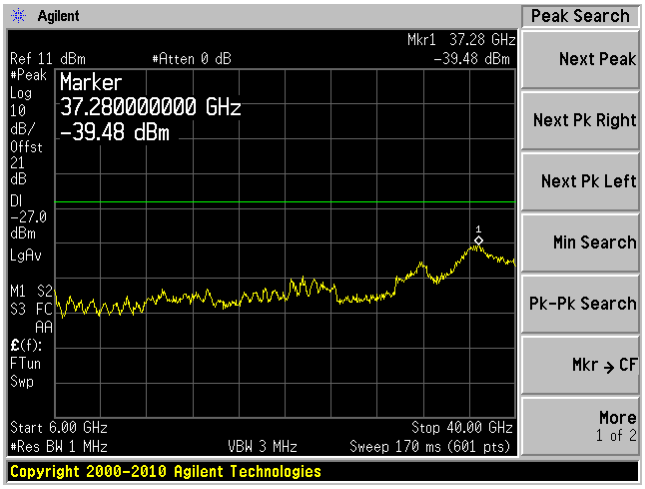


802.11n HT40, Low Channel 5190 MHz

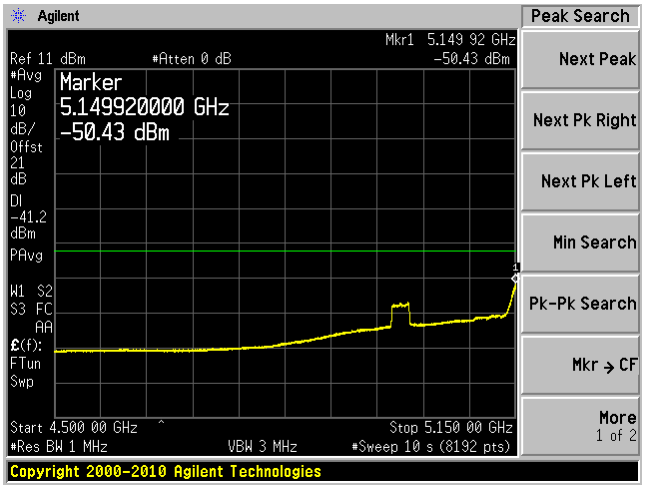
Chain J0, Plot: 30 MHz – 6 GHz



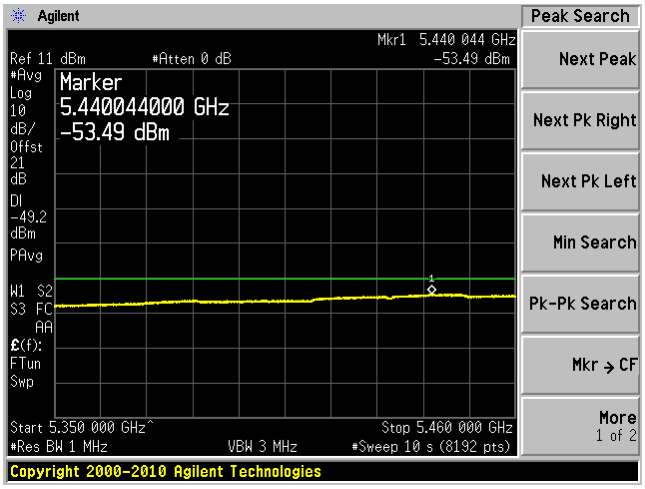
Chain J0, Plot: 6 GHz – 40 GHz



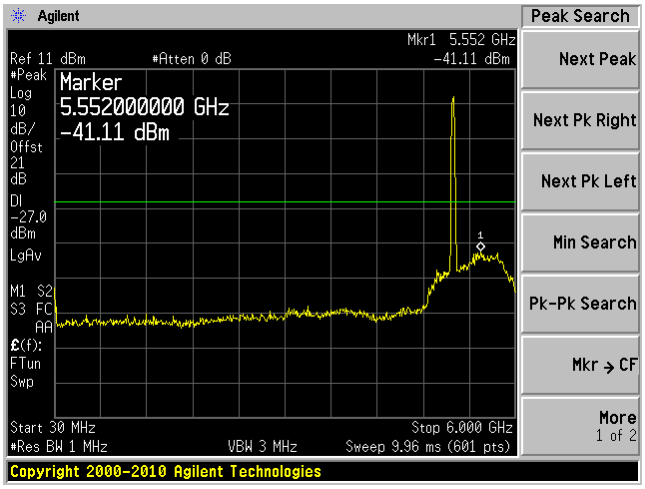
Chain J0, Plot: 4500 MHz – 5150 MHz



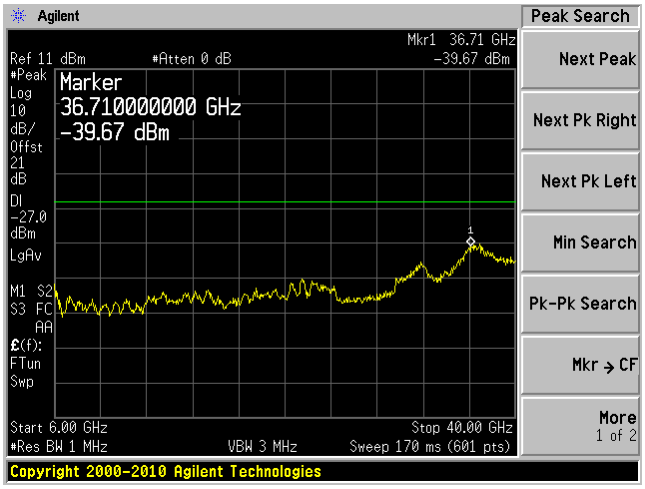
Chain J0, Plot: 5350MHz – 5460 MHz



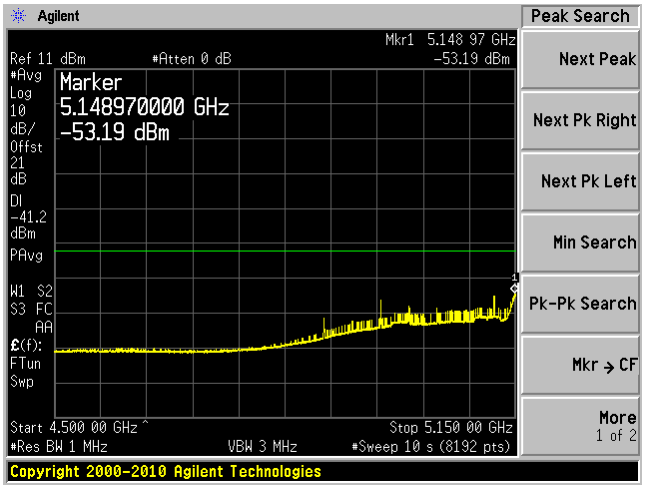
Chain J1, Plot: 30 MHz – 6 GHz



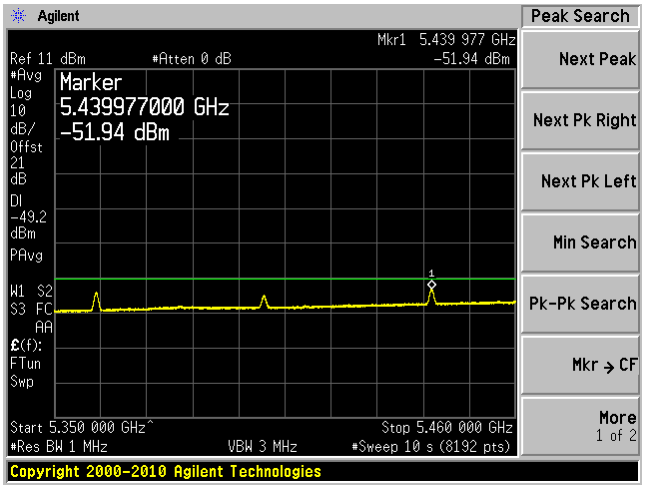
Chain J1, Plot: 6 GHz – 40 GHz



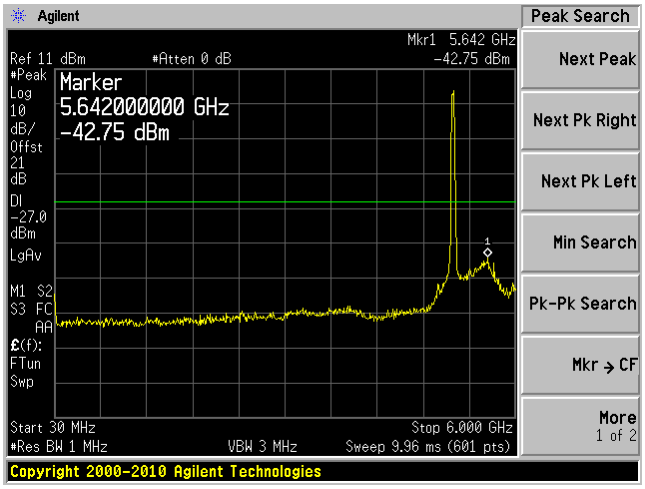
Chain J1, Plot: 4500 MHz – 5150 MHz



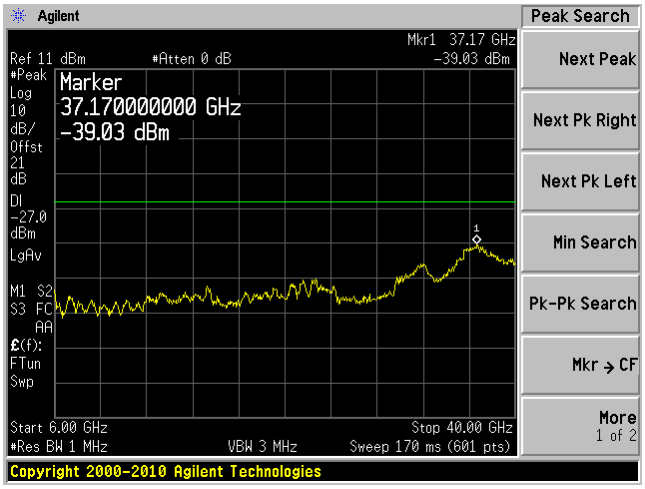
Chain J1, Plot: 5350MHz – 5460 MHz



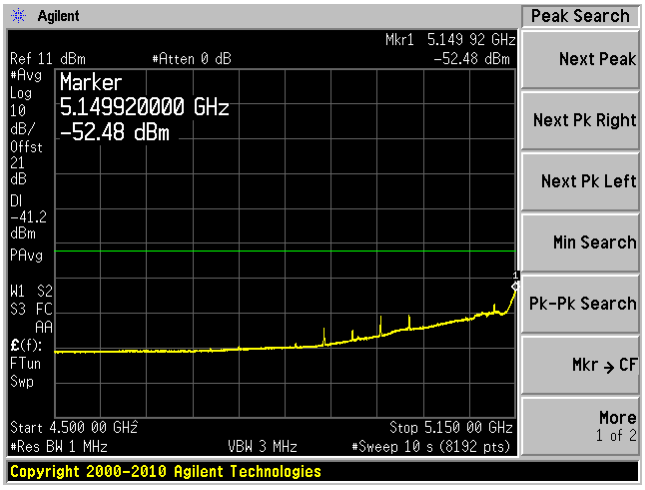
Chain J2, Plot: 30 MHz – 6 GHz



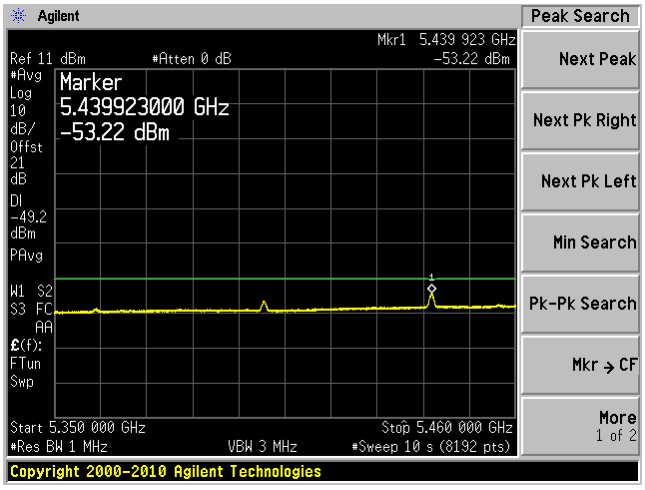
Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz

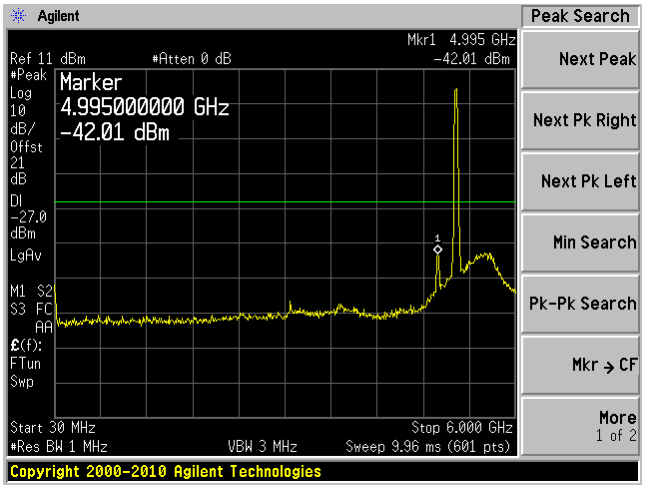


Chain J2, Plot: 5350MHz – 5460 MHz

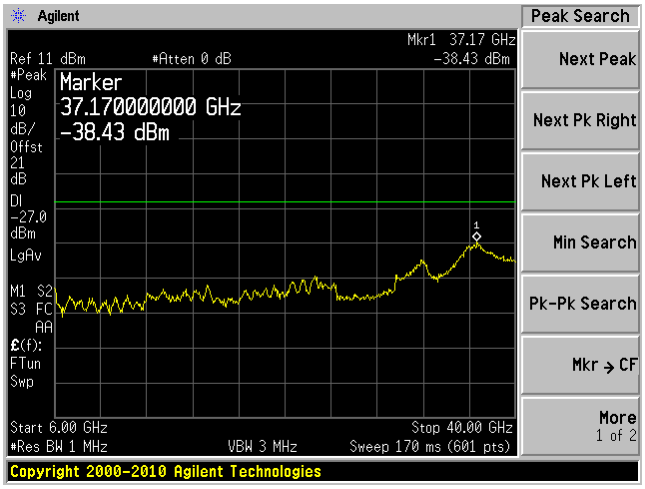


802.11n HT40, High Channel 5230 MHz

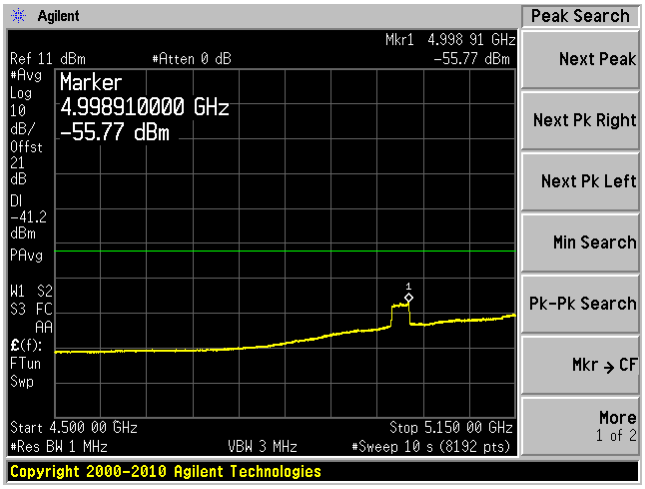
Chain J0, Plot: 30 MHz – 6 GHz



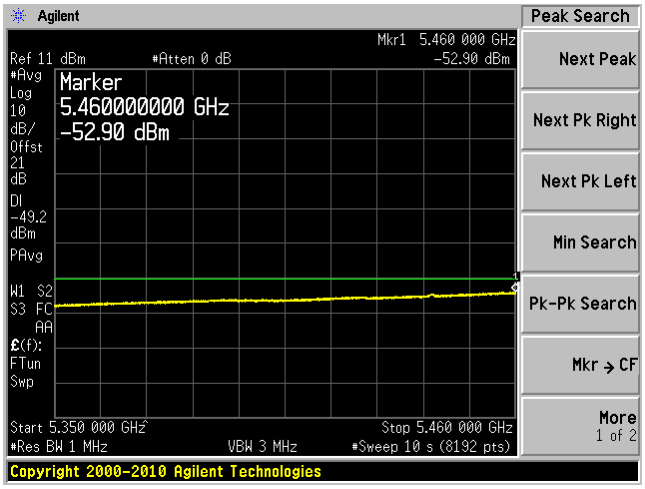
Chain J0, Plot: 6 GHz – 40 GHz



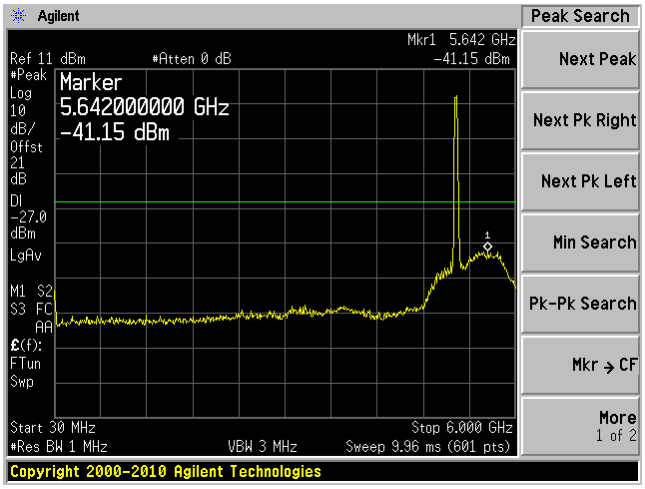
Chain J0, Plot: 4500 MHz – 5150 MHz



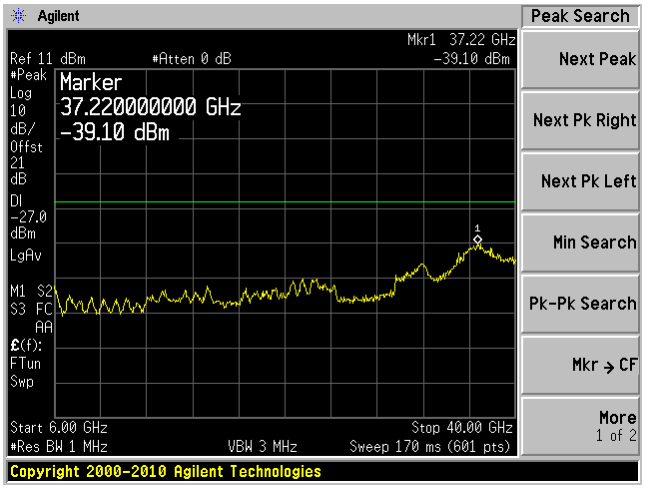
Chain J0, Plot: 5350MHz – 5460 MHz



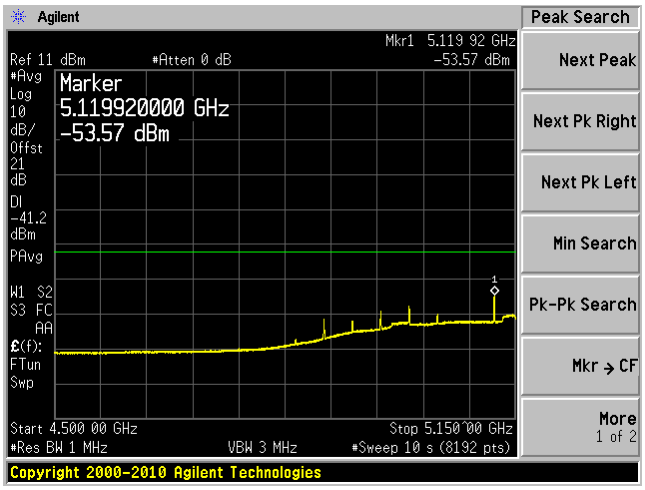
Chain J1, Plot: 30 MHz – 6 GHz



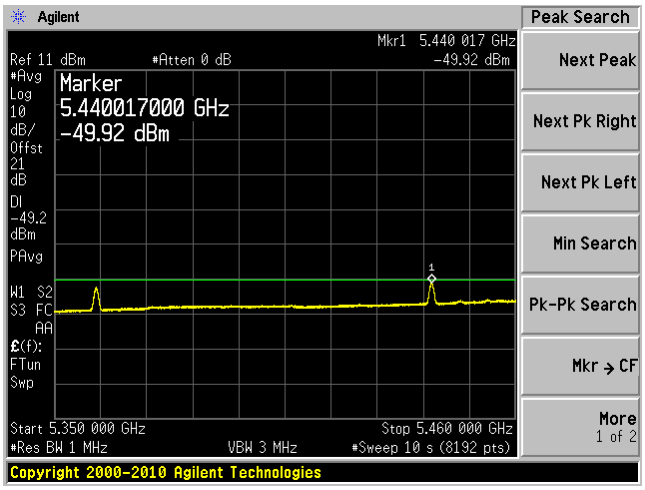
Chain J1, Plot: 6 GHz – 40 GHz



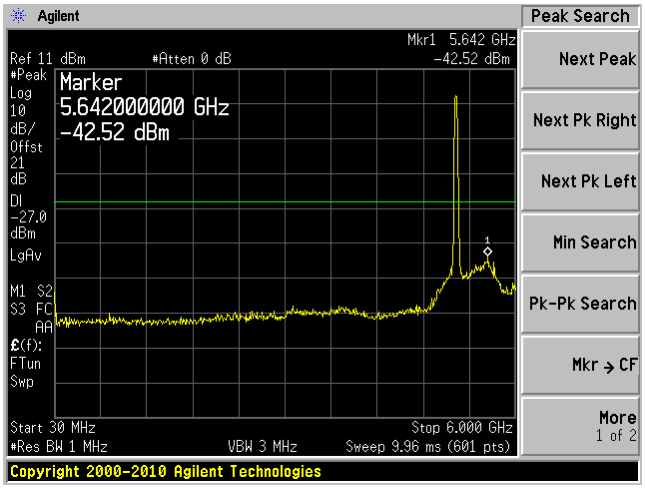
Chain J1, Plot: 4500 MHz – 5150 MHz



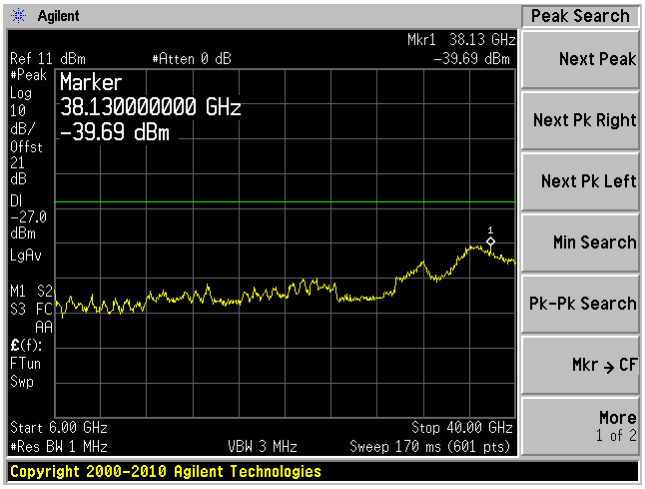
Chain J1, Plot: 5350MHz – 5460 MHz



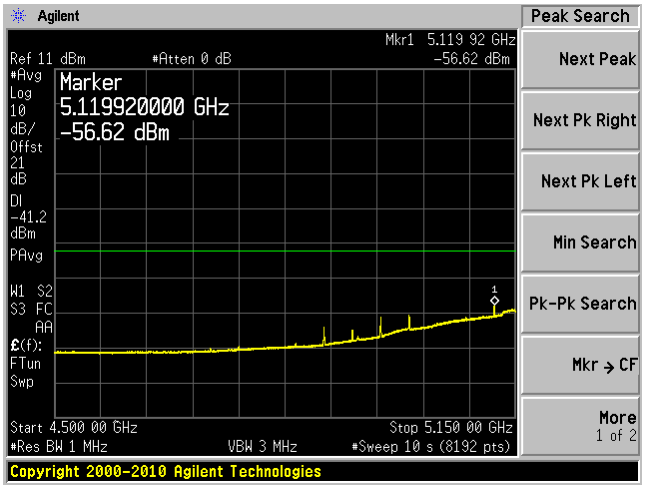
Chain J2, Plot: 30 MHz – 6 GHz



Chain J2, Plot: 6 GHz – 40 GHz



Chain J2, Plot: 4500 MHz – 5150 MHz



Chain J2, Plot: 5350MHz – 5460 MHz