





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: S9GZF7372
IC: 5912A-ZF7372

Report Type: CIIPC	Product Type: 802.11 a/b/g/n Wireless Access Point
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* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*”

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1209061-407 W5356	Original Report	2012-11-12

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: *ZoneFlex 7372*, FCC ID: S9GZF7372, IC: 5912A-ZF7372 or the “EUT” as referred to in this report. The EUT is an 2x2 MIMO 802.11 a/b/g/n RLAN Access Point.

1.2 Mechanical Description of EUT

The EUT measures approximately 160 cm (L) x 160 cm (W) x 35 cm (H) and weighs 334.5g.

The test data gathered are from typical production sample, serial number: Radiated Unit:407, and Conducted Unit: 405, provided by the manufacturer

1.3 Objective

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

This project is a Permissive Change II submission for the purpose of adding DFS frequency bands (5250-5350 MHz; 5470-5725 MHz) to the certified device (FCC ID: S9GZF7372). The objective is to determine compliance with FCC/IC rules for Antenna Requirements, AC Line Conducted Emissions, Occupied Bandwidth, Maximum Peak Output Power, Power Spectral Density, Radiated and Conducted Spurious Emissions, and Band Edge for adding DFS bands 5250-5350 MHz and 5470-5725 MHz.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS FCC ID: S9GZF7372, IC: 5912A-ZF7372.

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 ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

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

1.7 Test Facility

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 C63.4-2003.

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 St Bernard Art_Ver_2_18_2 was provided by Ruckus Wireless Inc., and was verified Jeffrey Wu 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
DELL	Laptop	Latitude E5420	-

2.6 EUT Internal Configuration

Manufacturer	Description	Model	Serial Number
Ruckus	Motherboard	St. Bernard ASM 120-11214 REV 4	71150401520128H04A
Ruckus	Antenna (2.4 GHz)	ZF7300 Horizontal	-
Ruckus	Antenna (2.4 GHz)	ZF7300 Vertical	-
Ruckus	Antenna (5 GHz)	ZF7300 Horizontal	-
Ruckus	Antenna (5 GHz)	ZF7300 Vertical	-

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	HK-AD-120A100-US	740-64190-001
Ruckus	POE	NPE-5818	-
Ruckus	POE Power Adapter	8A201WU48	740-64125-010

3 Summary of Test Results

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

- **Note:** ¹ please refer to DFS report, Report number: R1209061-DFS.

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 (minutes)
0.003 - 1	280	2.19	-	6
1 - 10	280 / f	2.19 / f	-	6
10 - 30	28	2.19 / f	-	6
30 - 300	28	0.073	2*	6
300 - 1 500	1.585 f ^{0.5}	0.0042 f ^{0.5}	f / 150	6
1 500 - 15 000	61.4	0.163	10	6
15 000 - 150 000	61.4	0.163	10	616000 / f ^{1.2}
150 000- 300 000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000 / f ^{1.2}

Note: f is frequency in MHz

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

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

4.3 MPE Results

5250-5350 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>21.40</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>138.01</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5260</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1.995</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.0548</u>
<u>Power density of prediction frequency at 20.0 cm (W/m²):</u>	<u>0.548</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (W/m²):</u>	<u>10</u>

5470-5725 MHz

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>20.25</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>105.85</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5700</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1.995</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.042</u>
<u>Power density of prediction frequency at 20.0 cm (W/m²):</u>	<u>0.42</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (W/m²):</u>	<u>10</u>

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

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

5.1 Applicable Standard

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

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

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

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

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

5.2 Antenna List

Manufacturers	Models/Name	Antenna Gain (dBi)2.4 GHz
Ruckus	ZF7300 Horizontal	3.0
Ruckus	ZF7300 Vertical	2.0

Manufacturers	Models/Name	Antenna Gain (dBi)5 GHz
Ruckus	ZF7300 Horizontal	3.0
Ruckus	ZF7300 Vertical	2.0

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

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

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

6.1 Applicable Standards

As per FCC §15.207 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 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1 Decreases with the logarithm of the frequency.

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2003 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 test support board was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Procedure

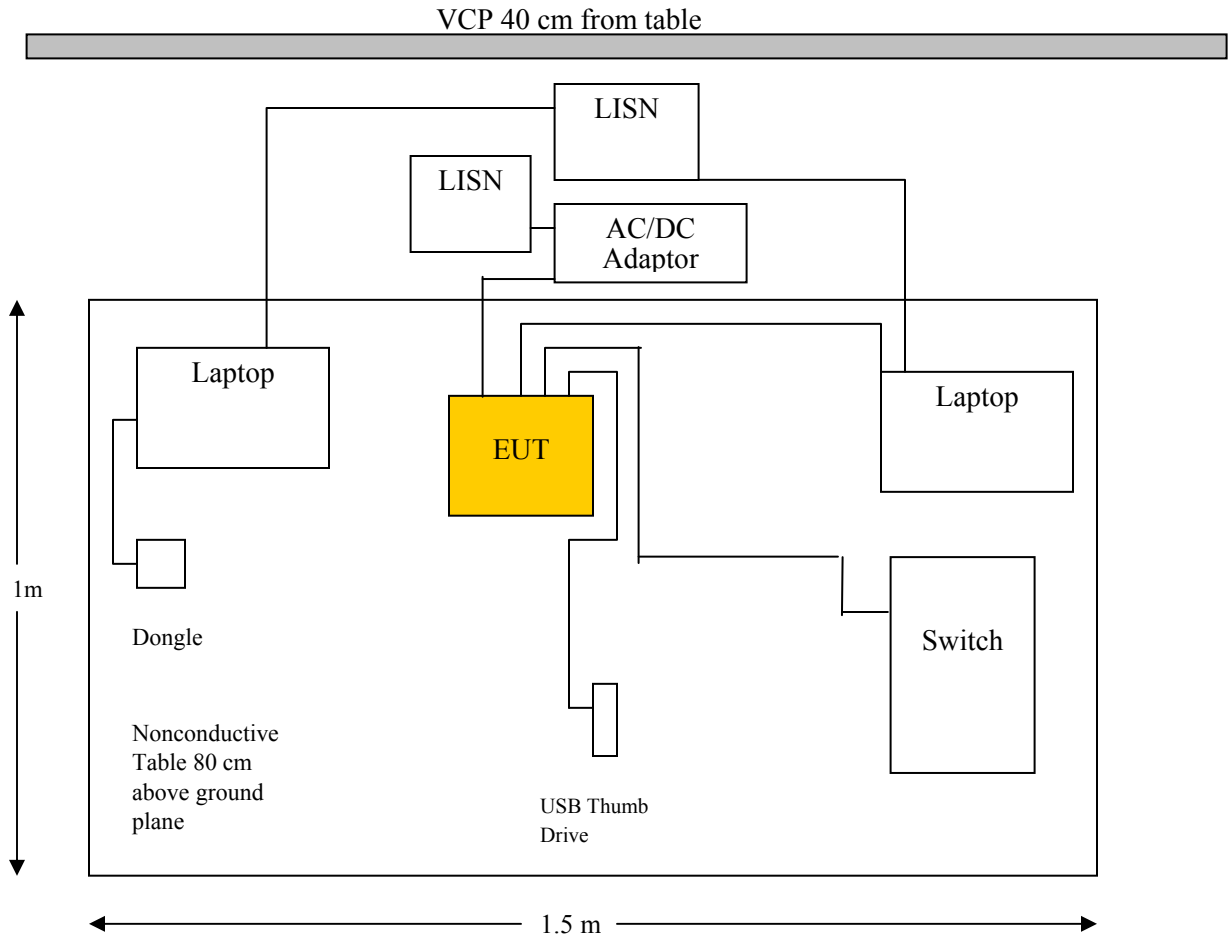
During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

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".

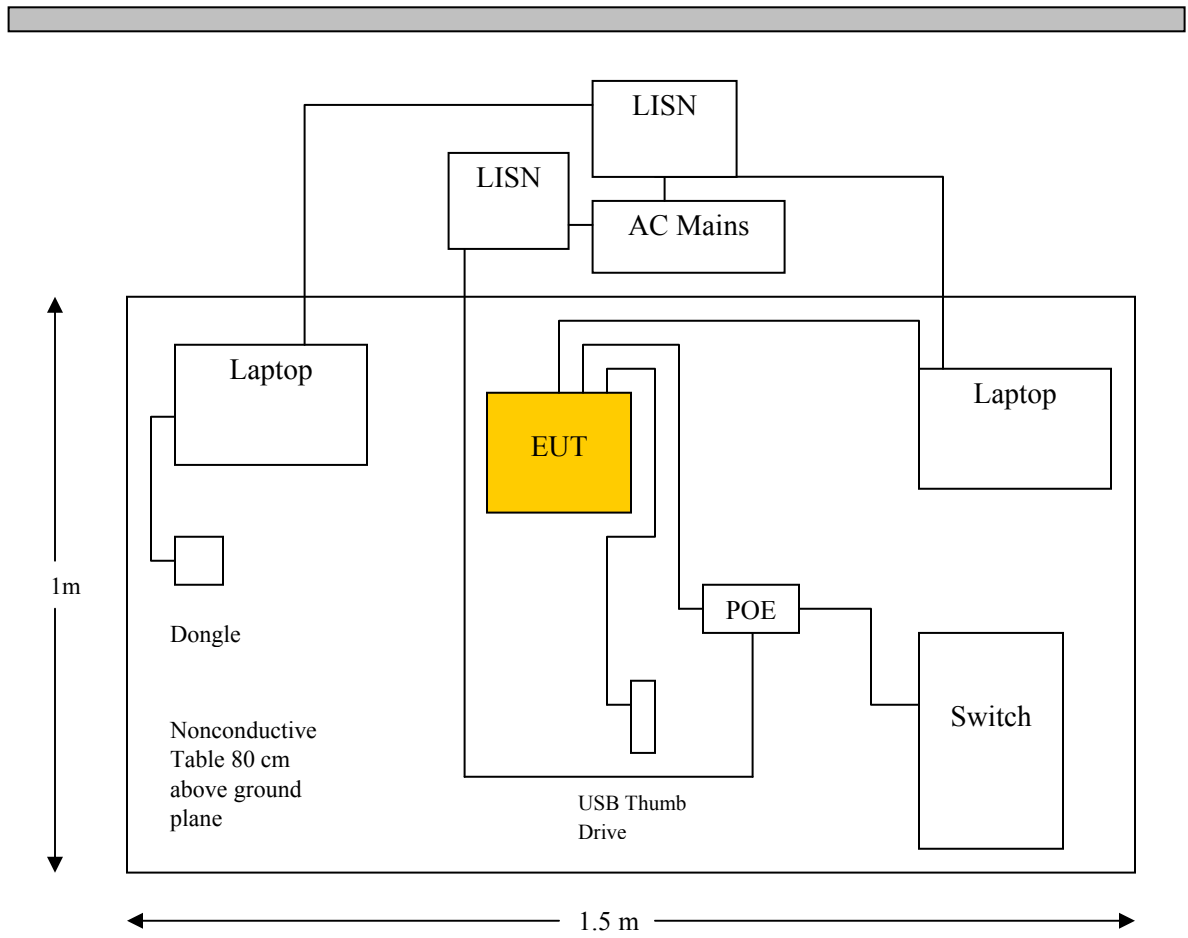
6.4 Test Setup Block Diagram

AC/DC Adaptor



POE

VCP 40 cm from table



6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + AF + CL + Atten - Ga$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

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

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	100044	2012-04-18	1 year
Solar Electronics	LISN	9252-R-24-BNC	511205	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 according to A2LA requirements, traceable to the NIST.

6.7 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	51%
ATM Pressure:	101.42 kPa

The testing was performed by Bryan Smith on 2012-09-27 in 5 m chamber 2.

6.8 Summary of Test Results

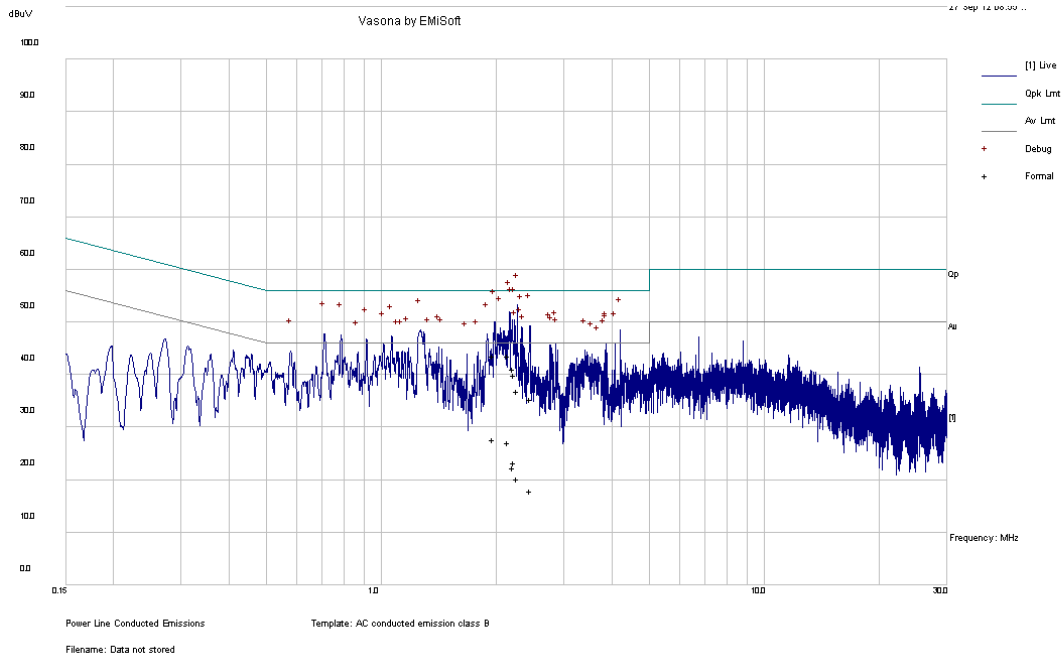
According to the recorded data in following table, the EUT complied with the FCC/IC standard's conducted emissions limits, with the margin reading of:

Connection: 120 V/60 Hz, AC			
Margin (dB)	Frequency (MHz)	Conductor (Line/Neutral)	Range (MHz)
-10.1	2.033856	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

Transmitting Mode: Worst case with both 2.4 GHz and 5 GHz operating:

120 V, 60 Hz – Line, AC/DC Adaptor



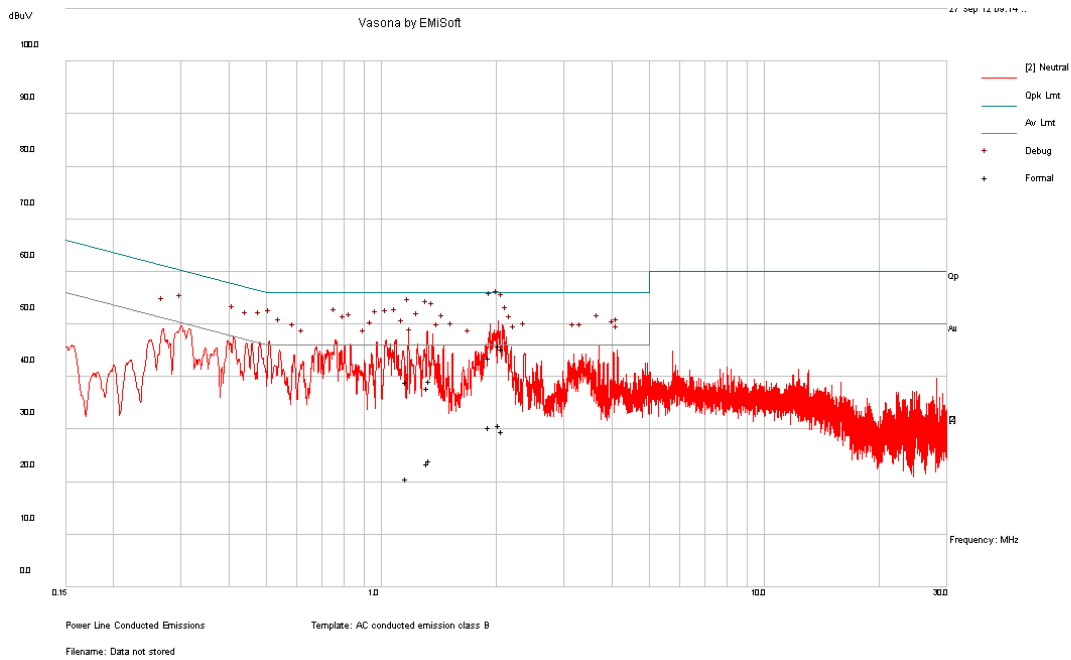
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
2.14583	43.66	Line	56	-12.34
1.961336	43.55	Line	56	-12.45
2.2109	41.09	Line	56	-14.91
2.224376	40.04	Line	56	-15.96
2.272382	36.93	Line	56	-19.07
2.42981	34.75	Line	56	-21.25

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
1.961336	28.18	Line	46	-17.82
2.14583	27.08	Line	46	-18.92
2.224376	23.21	Line	46	-22.79
2.2109	22.26	Line	46	-23.74
2.272382	20.26	Line	46	-25.74
2.42981	16.59	Line	46	-29.41

120 V, 60 Hz – Neutral, AC/DC Adaptor



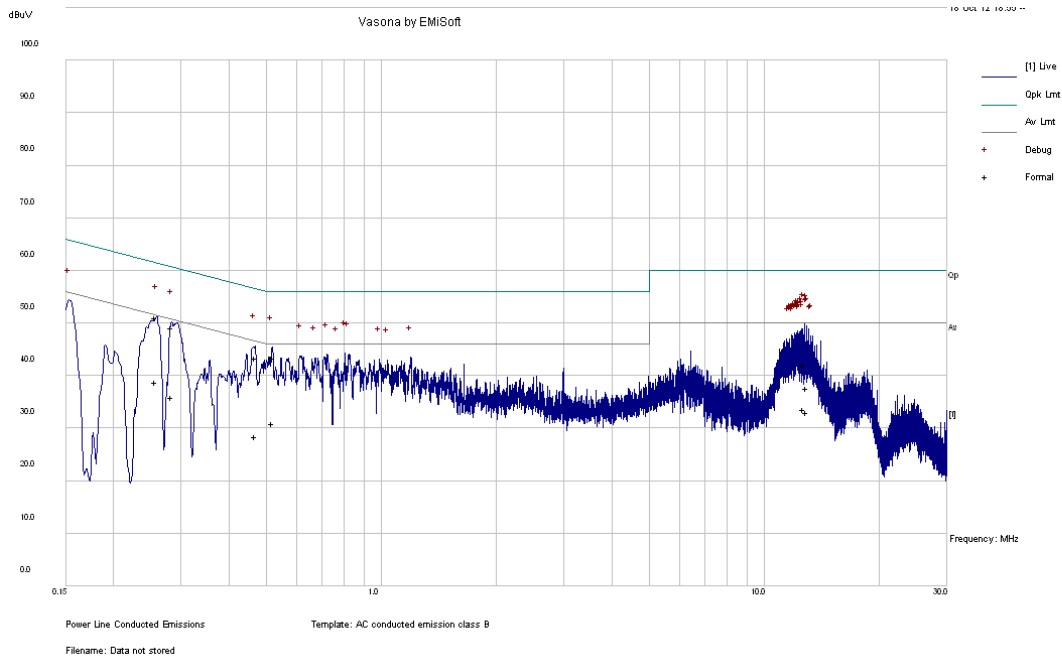
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
2.033856	45.9	Neutral	56	-10.1
2.069532	45.25	Neutral	56	-10.75
1.913054	43.57	Neutral	56	-12.43
1.342622	39.21	Neutral	56	-16.79
1.168757	39.01	Neutral	56	-16.99
1.324043	37.93	Neutral	56	-18.07

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
2.033856	30.74	Neutral	46	-15.26
1.913054	30.3	Neutral	46	-15.7
2.069532	29.64	Neutral	46	-16.36
1.342622	24.12	Neutral	46	-21.88
1.324043	23.38	Neutral	46	-22.62
1.168757	20.62	Neutral	46	-25.38

120 V, 60 Hz – Line, POE



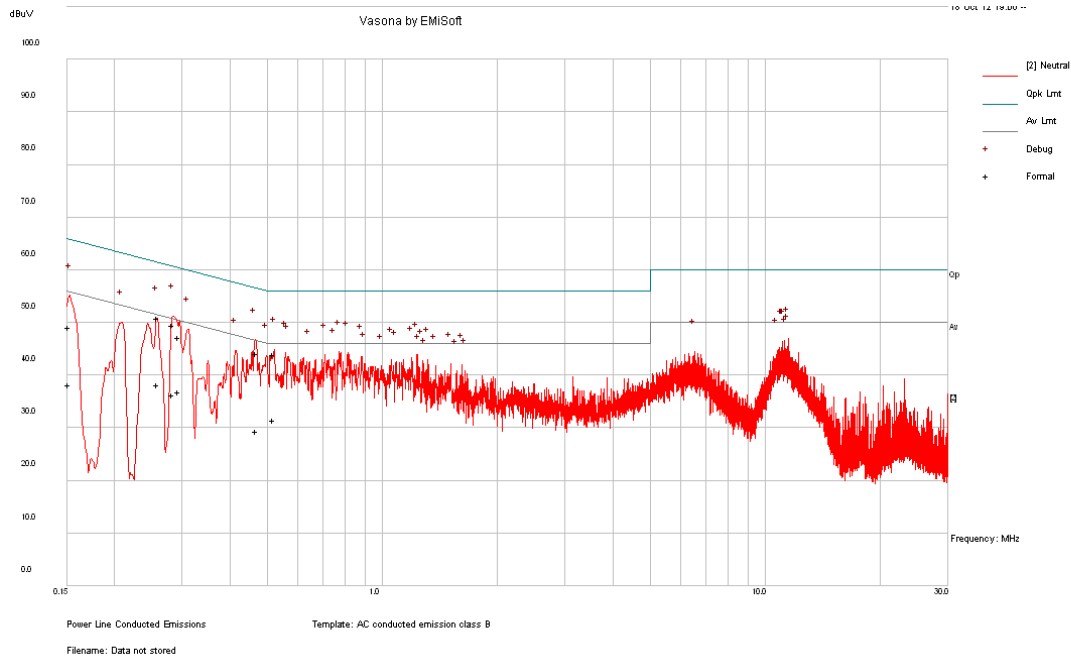
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.258441	51.1	Line	61.48	-10.38
0.283167	49.13	Line	60.72	-11.59
0.519939	43.43	Line	56	-12.57
0.468858	43.39	Line	56.53	-13.15
12.69896	41.97	Line	60	-18.03
12.89667	37.71	Line	60	-22.29

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.258441	38.73	Line	51.48	-12.75
0.283167	36.02	Line	50.72	-14.7
0.519939	31.03	Line	46	-14.97
12.69896	33.58	Line	50	-16.42
12.89667	33.06	Line	50	-16.94
0.468858	28.48	Line	46.53	-18.05

120 V, 60 Hz – Neutral, POE



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.259128	50.95	Neutral	61.46	-10.51
0.283362	49.59	Neutral	60.72	-11.13
0.520359	43.88	Neutral	56	-12.12
0.468399	44.21	Neutral	56.54	-12.34
0.294582	47.32	Neutral	60.39	-13.07
0.152043	49.2	Neutral	65.89	-16.68

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.259128	38.19	Neutral	51.46	-13.27
0.294582	36.98	Neutral	50.39	-13.42
0.283362	36.33	Neutral	50.72	-14.39
0.520359	31.56	Neutral	46	-14.44
0.468399	29.42	Neutral	46.54	-17.12
0.152043	38.23	Neutral	55.89	-17.65

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

7.1 Applicable Standard

FCC §15.205, §15.209, §15.407 (b).
IC RSS-210, §2.2, §A9.2, RSS-Gen §7.2.2

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15C/15E and IC RSS-210/RSS-Gen limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Test Procedure

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:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

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:

$$\text{CA} = \text{Ai} + \text{CL} + \text{Atten}$$

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

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

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2012-08-15	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	E4440A	US42221851	2012-02-28	1 year
Sunol Science Corp	Horn Antenna	DHR-118	A052704	2012-02-24	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2012-03-22	1 year

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

7.6 Test Environmental Conditions

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

The testing was performed by Lionel Lara from 2012-10-18 to 2012-10-24 at 5 meter 3.

7.7 Summary of Test Results

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

5250-5350 MHz

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range
-0.62	5357.7	Vertical	30 MHz -40 GHz

5470-5725 MHz

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range
-1.19	5458.4	Vertical	30 MHz -40 GHz

Note: Radiated emissions were performed on 802.11a/ht20 and 802.11.ht40. Between 802.11a and 802.11n HT20, worst case was measured.

7.8 Radiated Emissions Test Result Data**Radiated Emission at 3 meters, 30 MHz – 40 GHz****5250-5350 MHz Band:**

802.11a Mode

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
Low Channel 5260 MHz, measured at 3 meters											
5260	72.44	293	126	H	33.68	4.59	0	110.71	-	-	Peak
5260	71.22	227	100	V	33.68	4.59	0	109.49	-	-	Peak
5260	60.06	293	126	H	33.68	4.59	0	98.33	-	-	Avg
5260	59.08	227	100	V	33.68	4.59	0	97.35	-	-	Avg
4769.8	31.99	293	126	H	32.54	4.06	0	68.59	74	-5.41	Peak
4666.8	32.11	227	100	V	32.25	4.08	0	68.44	74	-5.56	Peak
4769.8	16.15	293	126	H	32.54	4.06	0	52.75	54	-1.25	Avg
4666.8	16.16	227	100	V	32.25	4.08	0	52.49	54	-1.51	Avg
10520	38.52	125	149	H	37.9	6.14	26.9	55.66	74	-18.34	Peak
10520	35.46	126	159	V	37.9	6.14	26.9	52.6	74	-21.4	Peak
10520	23.77	125	149	H	37.9	6.14	26.9	40.91	54	-13.09	Avg
10520	21.26	126	159	V	37.9	6.14	26.9	38.4	54	-15.6	Avg
15780	38.38	39	100	H	37.35	7.71	26.01	57.43	74	-16.57	Peak
15780	35.17	120	99	V	37.35	7.71	26.01	54.22	74	-19.78	Peak
15780	22.78	39	100	H	37.35	7.71	26.01	41.83	54	-12.17	Avg
15780	19.79	120	99	V	37.35	7.71	26.01	38.84	54	-15.16	Avg
21040	33.25	0	100	H	34.6	9.36	29	48.21	74	-25.79	Peak
21040	34.35	0	100	V	34.6	9.36	29	49.31	74	-24.69	Peak
21040	18.66	0	100	H	34.6	9.36	29	33.62	54	-20.38	Avg
21040	18.61	0	100	V	34.6	9.36	29	33.57	54	-20.43	Avg
331.38	18.65	181	121	H	13.8	11.8	10.5	33.75	46	-12.25	QP

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 5280 MHz, measured at 3 meters											
5280	72.89	294	111	H	33.68	4.59	0	111.16	-	-	Peak
5280	71.87	282	132	V	33.68	4.59	0	110.14	-	-	Peak
5280	60.48	294	111	H	33.68	4.59	0	98.75	-	-	Avg
5280	60.12	282	132	V	33.68	4.59	0	98.39	-	-	Avg
10560	38.58	129	139	H	37.95	6.14	26.98	55.69	74	-18.31	Peak
10560	36.32	69	132	V	37.95	6.14	26.98	53.43	74	-20.57	Peak
10560	22.23	129	139	H	37.95	6.14	26.98	39.34	54	-14.66	Avg
10560	21.05	69	132	V	37.95	6.14	26.98	38.16	54	-15.84	Avg
15840	38.83	38	99	H	37.35	7.71	26.04	57.85	74	-16.15	Peak
15840	37.05	111	99	V	37.35	7.71	26.04	56.07	74	-17.93	Peak
15840	22.7	38	99	H	37.35	7.71	26.04	41.72	54	-12.28	Avg
15840	20.98	111	99	V	37.35	7.71	26.04	40	54	-14	Avg
21120	33.18	0	100	H	34.6	9.36	29	48.14	74	-25.86	Peak
21120	32.69	0	100	V	34.6	9.36	29	47.65	74	-26.35	Peak
21120	18.25	0	100	H	34.6	9.36	29	33.21	54	-20.79	Avg
21120	17.81	0	100	V	34.6	9.36	29	32.77	54	-21.23	Avg
331.95	18.06	180	122	H	13.8	11.8	10.5	33.16	46	-12.84	QP

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBμV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
High Channel 5320 MHz, measured at 3 meters											
5320	73.05	292	126	H	33.68	4.59	0	111.32	-	-	Peak
5320	72.22	281	130	V	33.68	4.59	0	110.49	-	-	Peak
5320	61.3	292	126	H	33.68	4.59	0	99.57	-	-	Avg
5320	60.2	281	130	V	33.68	4.59	0	98.47	-	-	Avg
5411.1	30.06	292	126	H	33.74	4.6	0	68.4	74	-5.6	Peak
5386.4	30.39	281	130	V	33.74	4.6	0	68.73	74	-5.27	Peak
5411.1	14.96	292	126	H	33.74	4.6	0	53.3	54	-0.7	Avg
5386.4	14.91	281	130	V	33.74	4.6	0	53.25	54	-0.75	Avg
10640	40.89	121	137	H	37.95	6.14	26.92	58.06	74	-15.94	Peak
10640	39.28	69	138	V	37.95	6.14	26.92	56.45	74	-17.55	Peak
10640	21.05	121	137	H	37.95	6.14	26.92	38.22	54	-15.78	Avg
10640	20.78	69	138	V	37.95	6.14	26.92	37.95	54	-16.05	Avg
15960	37.95	39	100	H	36.94	7.71	26.05	56.55	74	-17.45	Peak
15960	35.81	122	100	V	36.94	7.71	26.05	54.41	74	-19.59	Peak
15960	21.45	39	100	H	36.94	7.71	26.05	40.05	54	-13.95	Avg
15960	19.31	122	100	V	36.94	7.71	26.05	37.91	54	-16.09	Avg
21280	34.35	0	100	H	34.6	9.4	29	49.35	74	-24.65	Peak
21280	34.07	0	100	V	34.6	9.4	29	49.07	74	-24.93	Peak
21280	19.4	0	100	H	34.6	9.4	29	34.4	54	-19.6	Avg
21280	19.37	0	100	V	34.6	9.4	29	34.37	54	-19.63	Avg
330.12	19.12	180	122	H	13.8	11.8	10.6	34.12	46	-11.88	QP

802.11n HT40 Mode

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBμV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
Low Channel 5270 MHz, measured at 3 meters											
5270	72.02	291	127	H	33.68	4.59	0	110.29	-	-	Peak
5270	71.18	282	128	V	33.68	4.59	0	109.45	-	-	Peak
5270	59.46	291	127	H	33.68	4.59	0	97.73	-	-	Avg
5270	58.35	282	128	V	33.68	4.59	0	96.62	-	-	Avg
4849.9	32.08	291	127	H	32.54	4.06	0	68.68	74	-5.32	Peak
4613.8	32.09	282	128	V	32.19	4.08	0	68.36	74	-5.64	Peak
4849.9	15.68	291	127	H	32.54	4.06	0	52.28	54	-1.72	Avg
4613.8	15.68	282	128	V	32.19	4.08	0	51.95	54	-2.05	Avg
10540	36.51	122	140	H	37.9	6.14	26.9	53.65	74	-20.35	Peak
10540	32.81	0	100	V	37.9	6.14	26.9	49.95	74	-24.05	Peak
10540	20.54	122	140	H	37.9	6.14	26.9	37.68	54	-16.32	Avg
10540	17.56	0	100	V	37.9	6.14	26.9	34.7	54	-19.3	Avg
15810	36.85	39	100	H	37.35	7.71	26.01	55.9	74	-18.1	Peak
15810	34.87	113	100	V	37.35	7.71	26.01	53.92	74	-20.08	Peak
15810	21.59	39	100	H	37.35	7.71	26.01	40.64	54	-13.36	Avg
15810	19.74	113	100	V	37.35	7.71	26.01	38.79	54	-15.21	Avg
21080	32.28	0	100	H	34.6	9.36	29	47.24	74	-26.76	Peak
21080	32.79	0	100	V	34.6	9.36	29	47.75	74	-26.25	Peak
21080	17.88	0	100	H	34.6	9.36	29	32.84	54	-21.16	Avg
21080	17.88	0	100	V	34.6	9.36	29	32.84	54	-21.16	Avg
229.88	24.78	179	122	H	11	11.3	13.3	33.78	46	-12.22	QP

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 5310 MHz, measured at 3 meters											
5310	70.78	289	133	H	33.68	4.59	0	109.05	-	-	Peak
5310	70	277	100	V	33.68	4.59	0	108.27	-	-	Peak
5310	58.48	289	133	H	33.68	4.59	0	96.75	-	-	Avg
5310	57.64	277	100	V	33.68	4.59	0	95.91	-	-	Avg
5359.4	29.81	289	133	H	33.74	4.6	0	68.15	74	-5.85	Peak
5357.7	30.53	277	100	V	33.74	4.6	0	68.87	74	-5.13	Peak
5359.4	14.99	289	133	H	33.74	4.6	0	53.33	54	-0.67	Avg
5357.7	15.04	277	100	V	33.74	4.6	0	53.38	54	-0.62	Avg
10620	33.42	0	100	H	37.95	6.14	26.92	50.59	74	-23.41	Peak
10620	32.43	0	100	V	37.95	6.14	26.92	49.6	74	-24.4	Peak
10620	17.52	0	100	H	37.95	6.14	26.92	34.69	54	-19.31	Avg
10620	17.19	0	100	V	37.95	6.14	26.92	34.36	54	-19.64	Avg
15930	34.07	109	100	H	37.2	7.71	26.05	52.93	74	-21.07	Peak
15930	33.57	0	100	V	37.2	7.71	26.05	52.43	74	-21.57	Peak
15930	19.08	109	100	H	37.2	7.71	26.05	37.94	54	-16.06	Avg
15930	17.73	0	100	V	37.2	7.71	26.05	36.59	54	-17.41	Avg
21240	34.01	0	100	H	34.6	9.4	29	49.01	74	-24.99	Peak
21240	34	0	100	V	34.6	9.4	29	49	74	-25	Peak
21240	18.84	0	100	H	34.6	9.4	29	33.84	54	-20.16	Avg
21240	18.82	0	100	V	34.6	9.4	29	33.82	54	-20.18	Avg
331.03	18.55	180	121	H	13.8	11.8	10.6	33.55	46	-12.45	QP

5470-5725 MHz Band

802.11a Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5500 MHz, measured at 3 meters											
5500	73.7	201	100	H	33.97	4.57	0	112.24	-	-	Peak
5500	75.7	302	100	V	33.97	4.57	0	114.24	-	-	Peak
5500	62.29	201	100	H	33.97	4.57	0	100.83	-	-	Avg
5500	64.01	302	100	V	33.97	4.57	0	102.55	-	-	Avg
5413.8	31.05	201	100	H	33.74	4.6	0	69.39	74	-4.61	Peak
5458.4	31.28	302	100	V	33.74	4.6	0	69.62	74	-4.38	Peak
5413.8	14.43	201	100	H	33.74	4.6	0	52.77	54	-1.23	Avg
5458.4	14.47	302	100	V	33.74	4.6	0	52.81	54	-1.19	Avg
11000	40.23	149	138	H	38.15	6.23	26.98	57.63	74	-16.37	Peak
11000	35.73	121	100	V	38.15	6.23	26.98	53.13	74	-20.87	Peak
11000	19.97	149	138	H	38.15	6.23	26.98	37.37	54	-16.63	Avg
11000	18.19	121	100	V	38.15	6.23	26.98	35.59	54	-18.41	Avg
16500	35.47	30	100	H	37.93	8.1	26.1	55.4	74	-18.6	Peak
16500	35.35	115	100	V	37.93	8.1	26.1	55.28	74	-18.72	Peak
16500	19.61	30	100	H	37.93	8.1	26.1	39.54	54	-14.46	Avg
16500	19.36	115	100	V	37.93	8.1	26.1	39.29	54	-14.71	Avg
22000	31.68	0	100	H	34.9	9.55	29.1	47.03	74	-26.97	Peak
22000	31.75	0	100	V	34.9	9.55	29.1	47.1	74	-26.9	Peak
22000	16.77	0	100	H	34.9	9.55	29.1	32.12	54	-21.88	Avg
22000	16.78	0	100	V	34.9	9.55	29.1	32.13	54	-21.87	Avg
333.55	18.36	188	119	H	13.8	11.8	10.5	33.46	46	-12.54	QP

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 5580 MHz, measured at 3 meters											
5580	75.71	279	118	H	34	4.57	0	114.28	-	-	Peak
5580	77.63	302	119	V	34	4.57	0	116.2	-	-	Peak
5580	62.52	279	118	H	34	4.57	0	101.09	-	-	Avg
5580	64.87	302	119	V	34	4.57	0	103.44	-	-	Avg
11160	40.9	145	142	H	38.66	6.23	26.94	58.85	74	-15.15	Peak
11160	36.98	120	140	V	38.66	6.23	26.94	54.93	74	-19.07	Peak
11160	20.65	145	142	H	38.66	6.23	26.94	38.6	54	-15.4	Avg
11160	18.91	120	140	V	38.66	6.23	26.94	36.86	54	-17.14	Avg
16740	39.86	154	99	H	38.88	8.31	26.12	60.93	74	-13.07	Peak
16740	35.84	110	100	V	38.88	8.31	26.12	56.91	74	-17.09	Peak
16740	21.62	154	99	H	38.88	8.31	26.12	42.69	54	-11.31	Avg
16740	19.58	110	100	V	38.88	8.31	26.12	40.65	54	-13.35	Avg
22320	31.52	0	100	H	34.9	9.6	29.1	46.92	74	-27.08	Peak
22320	31.41	0	100	V	34.9	9.6	29.1	46.81	74	-27.19	Peak
22320	16.99	0	100	H	34.9	9.6	29.1	32.39	54	-21.61	Avg
22320	16.91	0	100	V	34.9	9.6	29.1	32.31	54	-21.69	Avg
334.19	17.99	188	119	H	13.8	11.8	10.5	33.09	46	-12.91	QP

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 5700 MHz, measured at 3 meters											
5700	74.52	211	103	H	34.08	4.62	0	113.22	-	-	Peak
5700	75.09	359	100	V	34.08	4.62	0	113.79	-	-	Peak
5700	61.89	211	103	H	34.08	4.62	0	100.59	-	-	Avg
5700	62.85	359	100	V	34.08	4.62	0	101.55	-	-	Avg
11400	50.91	151	141	H	39.09	6.2	27	69.2	74	-4.8	Peak
11400	43.57	61	135	V	39.09	6.2	27	61.86	74	-12.14	Peak
11400	30.42	151	141	H	39.09	6.2	27	48.71	54	-5.29	Avg
11400	24.34	61	135	V	39.09	6.2	27	42.63	54	-11.37	Avg
17100	31.98	0	100	H	44.85	8.31	26.03	59.11	74	-14.89	Peak
17100	32.12	0	100	V	44.85	8.31	26.03	59.25	74	-14.75	Peak
17100	17.57	0	100	H	44.85	8.31	26.03	44.7	54	-9.3	Avg
17100	17.49	0	100	V	44.85	8.31	26.03	44.62	54	-9.38	Avg
22800	31.16	0	100	H	35.4	9.74	28.9	47.4	74	-26.6	Peak
22800	31.2	0	100	V	35.4	9.74	28.9	47.44	74	-26.56	Peak
22800	17.18	0	100	H	35.4	9.74	28.9	33.42	54	-20.58	Avg
22800	17.27	0	100	V	35.4	9.74	28.9	33.51	54	-20.49	Avg
11400	50.91	151	141	H	39.09	6.2	27	69.2	74	-4.8	Peak
11400	43.57	61	135	V	39.09	6.2	27	61.86	74	-12.14	Peak
11400	30.42	151	141	H	39.09	6.2	27	48.71	54	-5.29	Avg
11400	24.34	61	135	V	39.09	6.2	27	42.63	54	-11.37	Avg
334.58	17.02	189	119	H	13.8	11.8	10.5	32.12	46	-13.88	QP

802.11 n HT40 Mode

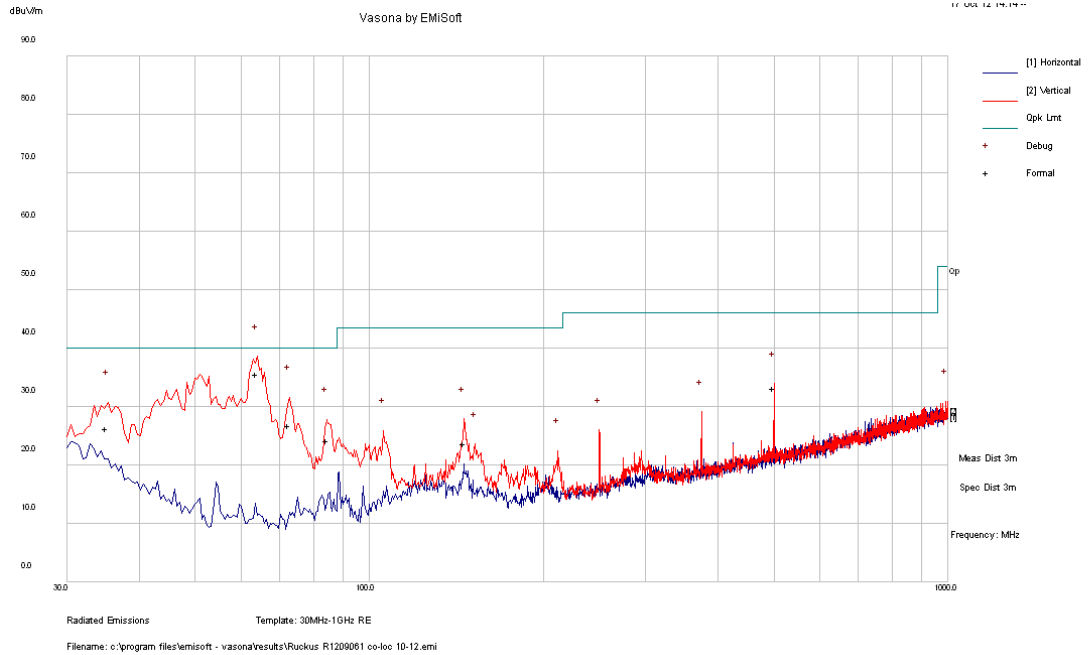
Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5510 MHz, measured at 3 meters											
5510	69.09	198	100	H	33.97	4.57	0	107.63	-	-	Peak
5510	71.76	302	100	V	33.97	4.57	0	110.3	-	-	Peak
5510	56.64	198	100	H	33.97	4.57	0	95.18	-	-	Avg
5510	59.06	302	100	V	33.97	4.57	0	97.6	-	-	Avg
11020	35.71	143	142	H	38.15	6.23	26.98	53.11	74	-20.89	Peak
11020	32.37	131	100	V	38.15	6.23	26.98	49.77	74	-24.23	Peak
11020	18.73	143	142	H	38.15	6.23	26.98	36.13	54	-17.87	Avg
11020	17.49	131	100	V	38.15	6.23	26.98	34.89	54	-19.11	Avg
16530	37.56	149	100	H	37.93	8.1	26.1	57.49	74	-16.51	Peak
16530	33.42	193	100	V	37.93	8.1	26.1	53.35	74	-20.65	Peak
16530	20.52	149	100	H	37.93	8.1	26.1	40.45	54	-13.55	Avg
16530	18.54	193	100	V	37.93	8.1	26.1	38.47	54	-15.53	Avg
22040	31.82	0	100	H	34.9	9.55	29.1	47.17	74	-26.83	Peak
22040	31.69	0	100	V	34.9	9.55	29.1	47.04	74	-26.96	Peak
22040	17.12	0	100	H	34.9	9.55	29.1	32.47	54	-21.53	Avg
22040	17.21	0	100	V	34.9	9.55	29.1	32.56	54	-21.44	Avg
11020	35.71	143	142	H	38.15	6.23	26.98	53.11	74	-20.89	Peak
11020	32.37	131	100	V	38.15	6.23	26.98	49.77	74	-24.23	Peak
11020	18.73	143	142	H	38.15	6.23	26.98	36.13	54	-17.87	Avg
11020	17.49	131	100	V	38.15	6.23	26.98	34.89	54	-19.11	Avg
334.13	17.36	189	118	H	13.8	11.8	10.5	32.46	46	-13.54	QP

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 5550 MHz, measured at 3 meters											
5550	70.04	203	100	H	34	4.57	0	108.61	-	-	Peak
5550	72.49	302	119	V	34	4.57	0	111.06	-	-	Peak
5550	57.39	203	100	H	34	4.57	0	95.96	-	-	Avg
5550	59.61	302	119	V	34	4.57	0	98.18	-	-	Avg
11100	38.26	149	149	H	38.66	6.23	26.94	56.21	74	-17.79	Peak
11100	36.81	114	130	V	38.66	6.23	26.94	54.76	74	-19.24	Peak
11100	19.4	149	149	H	38.66	6.23	26.94	37.35	54	-16.65	Avg
11100	18.92	114	130	V	38.66	6.23	26.94	36.87	54	-17.13	Avg
16650	37.67	159	100	H	38.88	8.31	26.12	58.74	74	-15.26	Peak
16650	36.05	111	99	V	38.88	8.31	26.12	57.12	74	-16.88	Peak
16650	20.36	159	100	H	38.88	8.31	26.12	41.43	54	-12.57	Avg
16650	19.49	111	99	V	38.88	8.31	26.12	40.56	54	-13.44	Avg
22200	31.56	0	100	H	35	9.6	29.1	47.06	74	-26.94	Peak
22200	31.48	0	100	V	35	9.6	29.1	46.98	74	-27.02	Peak
22200	17.36	0	100	H	35	9.6	29.1	32.86	54	-21.14	Avg
22200	17.16	0	100	V	35	9.6	29.1	32.66	54	-21.34	Avg
333.77	18.41	188	117	H	13.8	11.8	10.5	33.51	46	-12.49	QP

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBμV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
High Channel 5670 MHz, measured at 3 meters											
5670	69.37	162	100	H	34.08	4.62	0	108.07	-	-	Peak
5670	70.7	354	100	V	34.08	4.62	0	109.4	-	-	Peak
5670	56.46	162	100	H	34.08	4.62	0	95.16	-	-	Avg
5670	57.74	354	100	V	34.08	4.62	0	96.44	-	-	Avg
11340	42.35	148	141	H	39.09	6.2	27	60.64	74	-13.36	Peak
11340	35.2	60	100	V	39.09	6.2	27	53.49	74	-20.51	Peak
11340	23.45	148	141	H	39.09	6.2	27	41.74	54	-12.26	Avg
11340	18.86	60	100	V	39.09	6.2	27	37.15	54	-16.85	Avg
17010	32.51	0	100	H	44.85	8.31	26.03	59.64	74	-14.36	Peak
17010	32.27	0	100	V	44.85	8.31	26.03	59.4	74	-14.6	Peak
17010	17.57	0	100	H	44.85	8.31	26.03	44.7	54	-9.3	Avg
17010	17.46	0	100	V	44.85	8.31	26.03	44.59	54	-9.41	Avg
22680	31.93	0	100	H	35.4	9.74	29	48.07	74	-25.93	Peak
22680	31.88	0	100	V	35.4	9.74	29	48.02	74	-25.98	Peak
22680	17.04	0	100	H	35.4	9.74	29	33.18	54	-20.82	Avg
22680	17.08	0	100	V	35.4	9.74	29	33.22	54	-20.78	Avg
11340	42.35	148	141	H	39.09	6.2	27	60.64	74	-13.36	Peak
11340	35.2	60	100	V	39.09	6.2	27	53.49	74	-20.51	Peak
11340	23.45	148	141	H	39.09	6.2	27	41.74	54	-12.26	Avg
11340	18.86	60	100	V	39.09	6.2	27	37.15	54	-16.85	Avg
333.79	18.04	186	119	H	13.8	11.8	10.5	33.14	46	-12.86	QP

Co-location with 2.4 GHz and 5 GHz

Worst Case: 2.4 GHz: 802.11b mode 2412 MHz; 5.3 GHz: 802.11a mode 5260 MHz



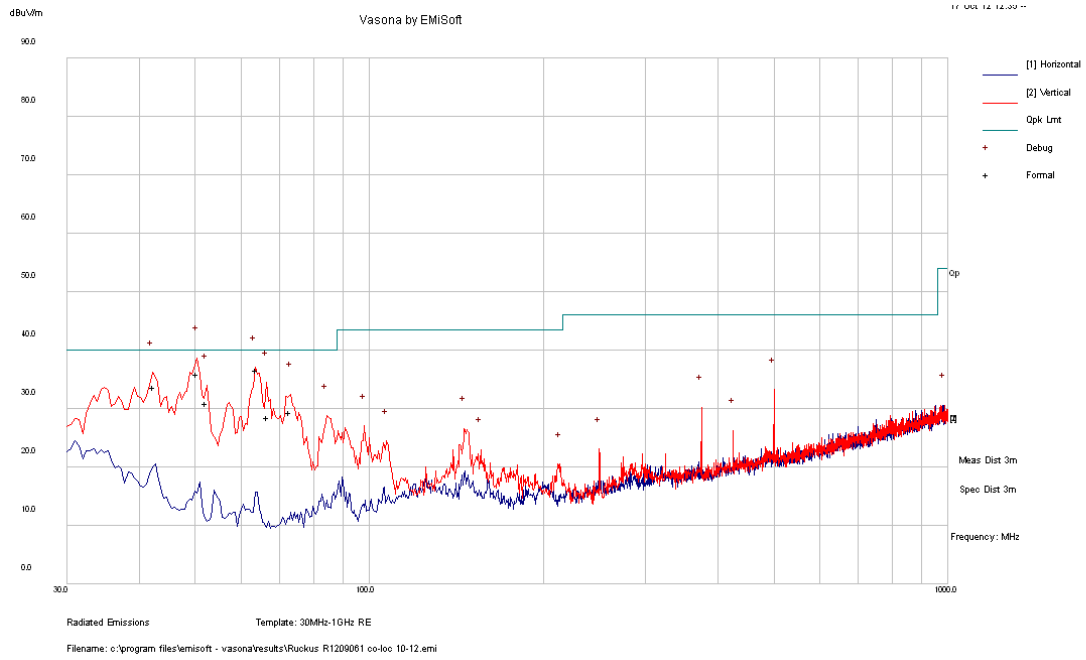
30-1000 MHz:

Frequency (MHz)	Corrected Amplitude (dBµ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµ V/m)	Margin (dB)
35.1635	26.33	201	V	233	40	-13.67
63.75175	35.65	149	V	25	40	-4.35
72.69825	26.74	200	V	92	40	-13.26
84.527	24.31	158	V	308	40	-15.69
145.808	23.79	108	V	12	43.5	-19.71
500.0135	33.22	100	V	42	46	-12.78

Above 1 GHz:

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
4824	44.14	121	123	V	32.7	4.56	27.70	53.711	74	-20.289	Peak
4824	43.35	52	111	H	32.7	4.56	27.70	52.921	74	-21.079	Peak
4824	41.25	121	123	V	32.7	4.56	27.70	50.821	54	-3.179	Ave
4824	41.06	52	111	H	32.7	4.56	27.70	50.631	54	-3.369	Ave
7236	38.93	261	122	V	36.2	5.49	27.6	53.086	74	-20.914	Peak
7236	40.4	332	118	H	36.2	5.49	27.6	54.556	74	-19.444	Peak
7236	29.87	261	122	V	36.2	5.49	27.6	44.026	54	-9.974	Ave
7236	33.61	332	118	H	36.2	5.49	27.6	47.766	54	-6.234	Ave
10520	35.33	267	141	V	37.9	7.60	26.90	53.959	74	-20.04	Peak
10520	42.7	98	126	H	37.9	7.60	26.90	61.329	74	-12.67	Peak
10520	19.86	267	141	V	37.9	7.60	26.90	38.489	54	-15.51	Ave
10520	25.68	98	126	H	37.9	7.60	26.90	44.309	54	-9.69	Ave

2.4 GHz: b mode 2412 MHz; 5.6 GHz: a mode 5700 MHz



30-1000 MHz:

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBμV/m)	Margin (dB)
42.4345	33.73	115	V	210	40	-6.27
50.339	35.93	100	V	183	40	-4.07
52.2345	30.9	111	V	264	40	-9.1
63.74975	36.64	100	V	251	40	-3.36
66.603	28.48	121	V	0	40	-11.52
73.0065	29.47	133	V	325	40	-10.53

Above 1 GHz:

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
4824	45.95	123	126	V	32.7	4.56	27.70	55.521	74	-18.479	Peak
4824	42.98	59	129	H	32.7	4.56	27.70	52.551	74	-21.449	Peak
4824	43.09	123	126	V	32.7	4.56	27.70	52.661	54	-1.339	Ave
4824	38.97	59	129	H	32.7	4.56	27.70	48.541	54	-5.459	Ave
7236	37.78	262	120	V	36.2	5.49	27.6	51.936	74	-22.064	Peak
7236	40.56	335	121	H	36.2	5.49	27.6	54.716	74	-19.284	Peak
7236	29.98	262	120	V	36.2	5.49	27.6	44.136	54	-9.864	Ave
7236	33.04	335	121	H	36.2	5.49	27.6	47.196	54	-6.804	Ave
11400	38.4	134	184	V	39.2	7.57	26.90	58.241	74	-15.76	Peak
11400	41.52	99	134	H	39.2	7.57	26.90	61.361	74	-12.64	Peak
11400	22.97	134	184	V	39.2	7.57	26.90	42.811	54	-11.19	Ave
11400	25.18	99	134	H	39.2	7.57	26.90	45.021	54	-8.98	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

Manufacturers	Description	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	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:	43 %
ATM Pressure:	101.3 kPa

The testing was performed by Jeffrey Wu on 2012-10-19 in RF site.

8.5 Test Results**5250-5350 MHz Band**

802.11a mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Results
Chain J0					
Low	5260	25.381	16.9747	> 500	Compliant
Middle	5280	24.333	16.9395	> 500	Compliant
High	5320	23.446	16.9126	> 500	Compliant
Chain J1					
Low	5260	24.261	17.1046	> 500	Compliant
Middle	5280	25.565	17.2105	> 500	Compliant
High	5320	24.657	17.0986	> 500	Compliant

802.11n HT20 mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Results
Chain J0					
Low	5260	24.669	18.0415	> 500	Compliant
Middle	5280	25.018	18.0661	> 500	Compliant
High	5320	25.037	18.0577	> 500	Compliant
Chain J1					
Low	5260	25.116	18.2242	> 500	Compliant
Middle	5280	24.884	18.1565	> 500	Compliant
High	5320	24.768	18.1477	> 500	Compliant

802.11n HT40 mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Results
Chain J0					
Low	5270	50.569	37.0269	> 500	Compliant
High	5310	51.442	37.0234	> 500	Compliant
Chain J1					
Low	5270	55.802	37.4940	> 500	Compliant
High	5310	51.484	37.3386	> 500	Compliant

5470-5725 MHz Band:

802.11a mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Results
Chain J0					
Low	5500	28.428	17.0367	> 500	Compliant
Middle	5580	25.493	16.9888	> 500	Compliant
High	5700	27.854	17.0765	> 500	Compliant
Chain J1					
Low	5500	27.683	17.1796	> 500	Compliant
Middle	5580	25.982	17.1786	> 500	Compliant
High	5700	25.018	17.1417	> 500	Compliant

802.11n HT20 mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Results
Chain J0					
Low	5500	28.714	18.4100	> 500	Compliant
Middle	5580	27.463	18.1748	> 500	Compliant
High	5700	27.504	18.1858	> 500	Compliant
Chain J1					
Low	5500	25.439	18.1912	> 500	Compliant
Middle	5580	26.585	18.2141	> 500	Compliant
High	5700	25.435	18.1722	> 500	Compliant

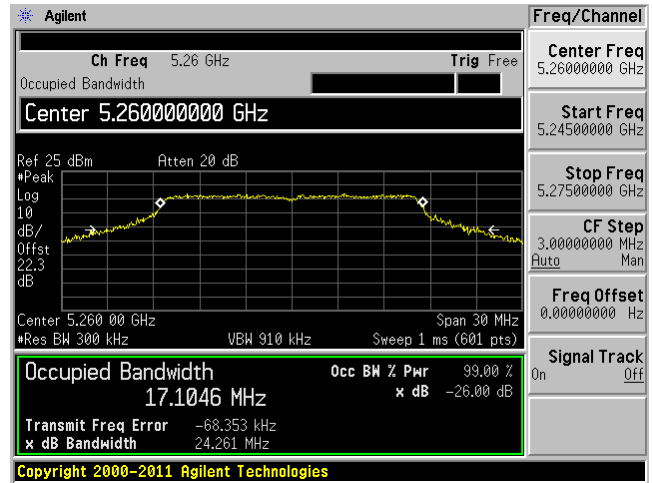
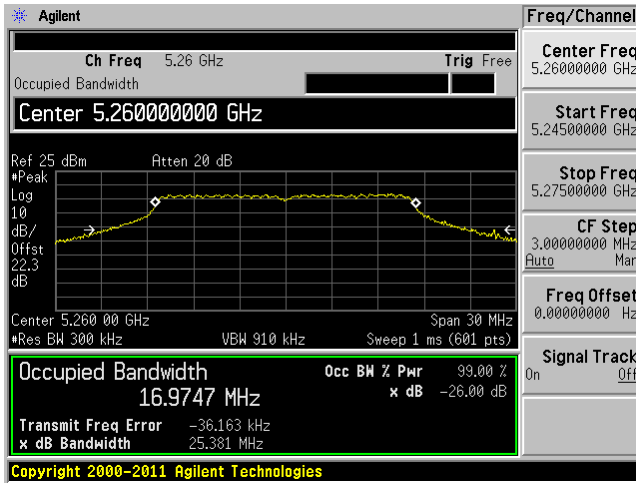
802.11n HT40 mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)	Results
Chain J0					
Low	5510	56.494	37.1508	> 500	Compliant
Middle	5550	54.825	37.1391	> 500	Compliant
High	5670	55.101	37.0208	> 500	Compliant
Chain J1					
Low	5510	55.804	37.5931	> 500	Compliant
Middle	5550	54.161	37.2179	> 500	Compliant
High	5670	55.101	37.0208	> 500	Compliant

5250-5350 MHz

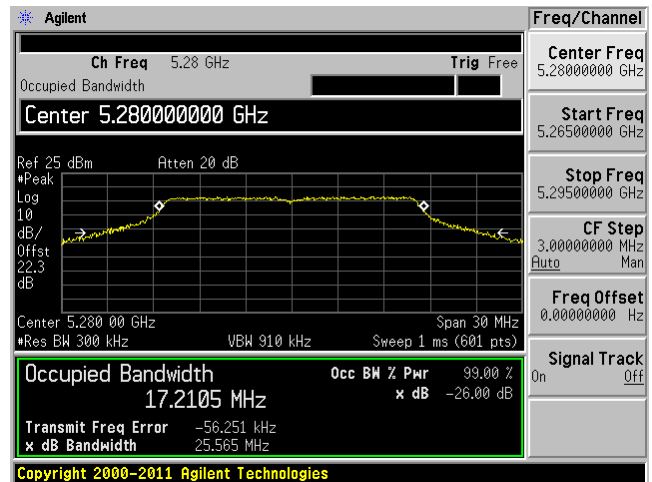
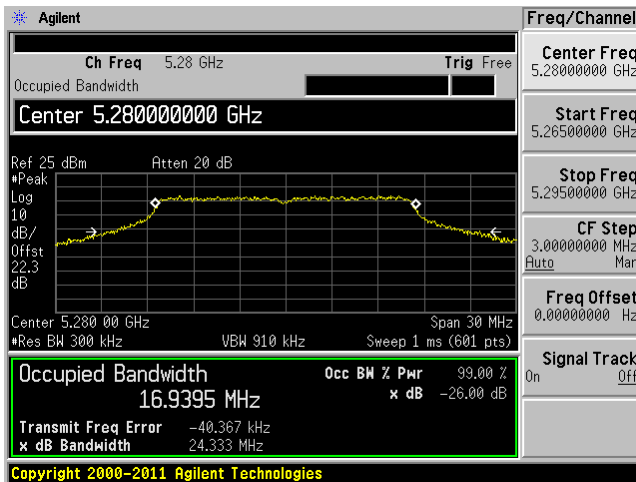
802.11a mode, 5260 MHz, Chain J0

802.11a mode, 5260 MHz, Chain J1



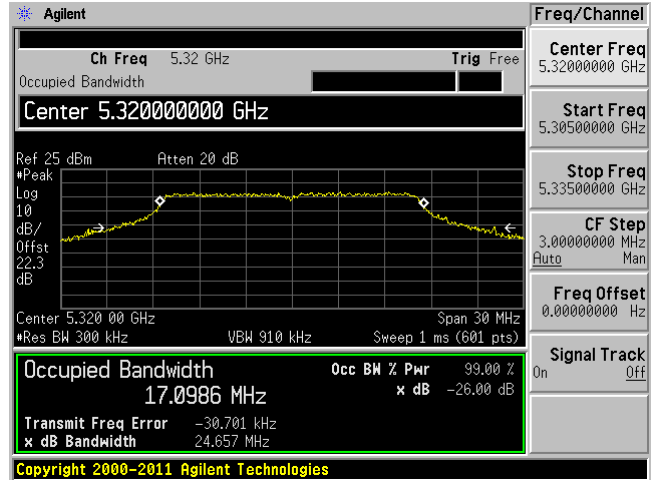
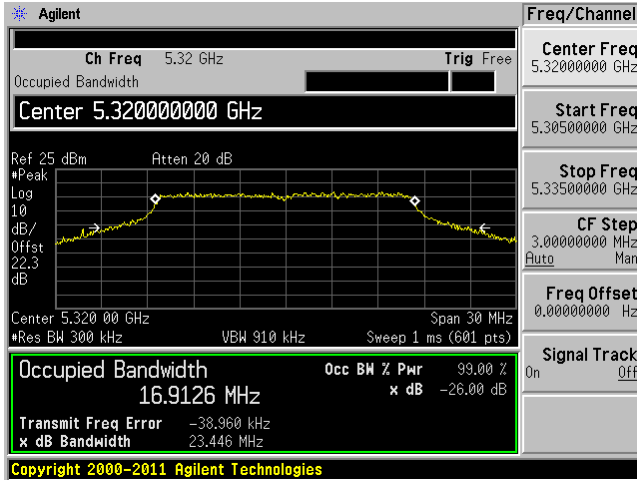
802.11a mode, 5280 MHz, Chain J0

802.11a mode, 5280 MHz, Chain J1



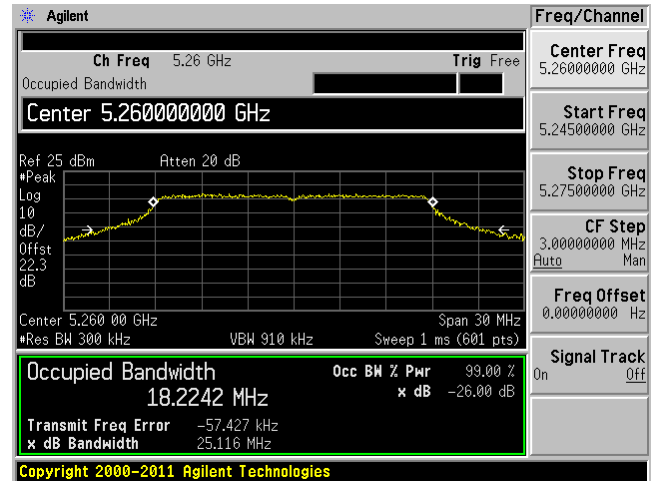
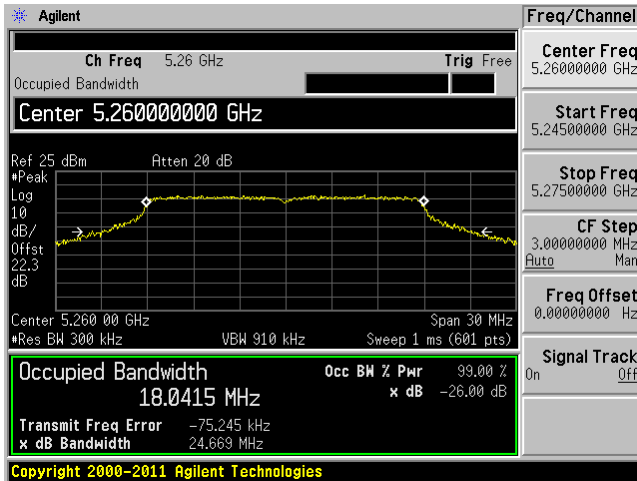
802.11a mode, 5320 MHz, Chain J0

802.11a mode, 5320 MHz, Chain J1



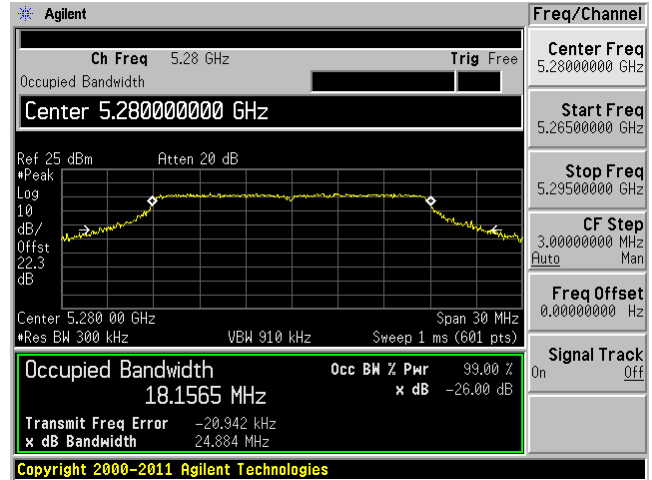
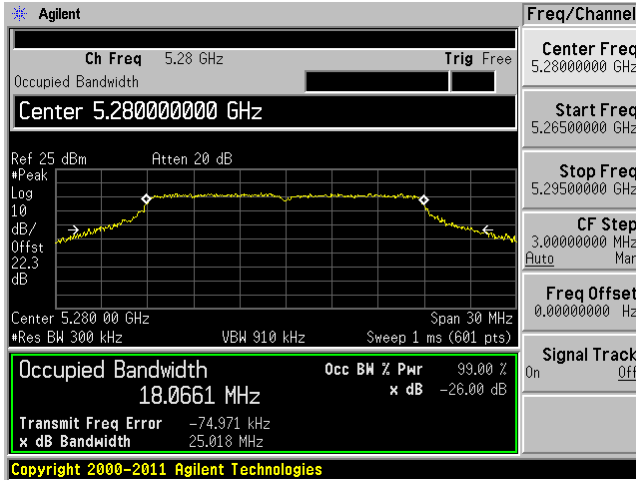
802.11n HT20 mode, 5260 MHz, Chain J0

802.11n HT20 mode, 5260 MHz, Chain J1



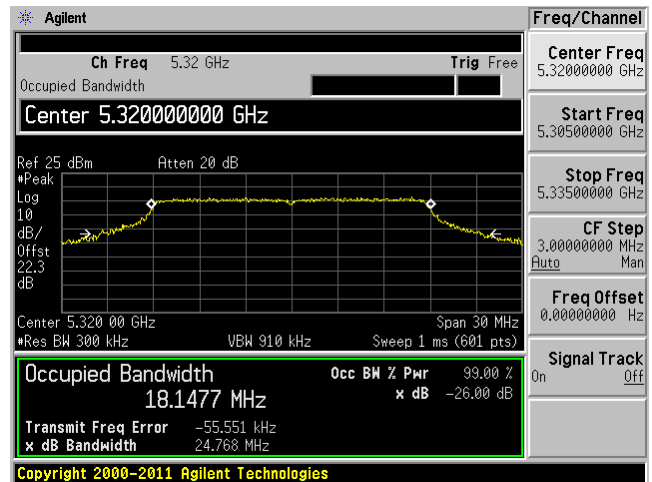
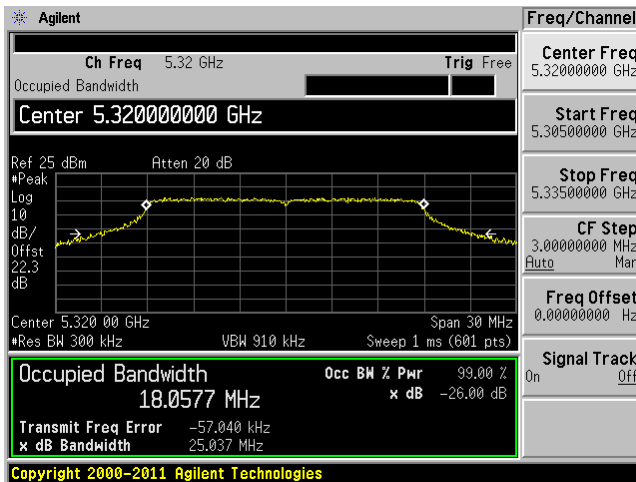
802.11n HT20 mode, 5280 MHz, Chain J0

802.11n HT20 mode, 5280 MHz, Chain J1

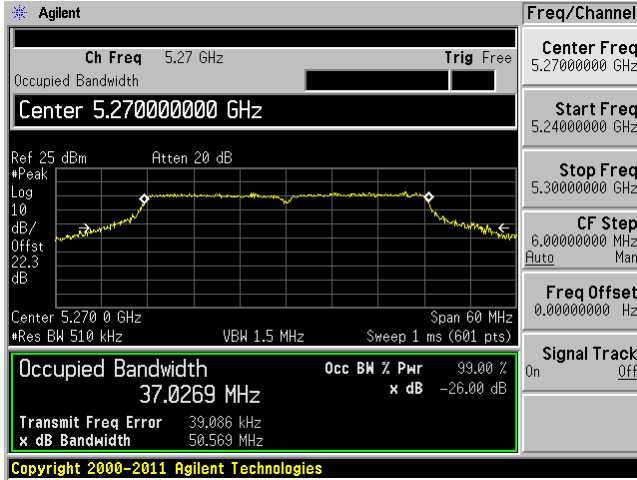


802.11n HT20 mode, 5320 MHz, Chain J0

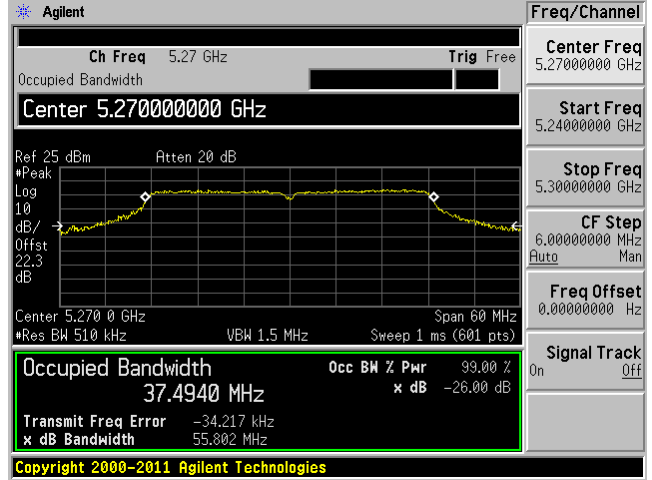
802.11n HT20 mode, 5320 MHz, Chain J1



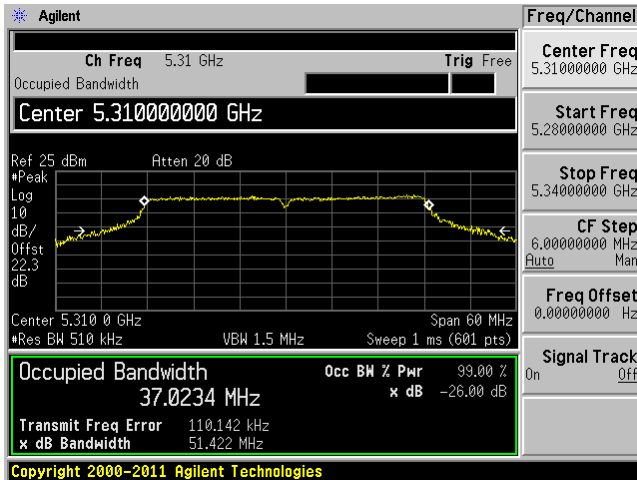
802.11n HT40 mode, 5270 MHz, Chain J0



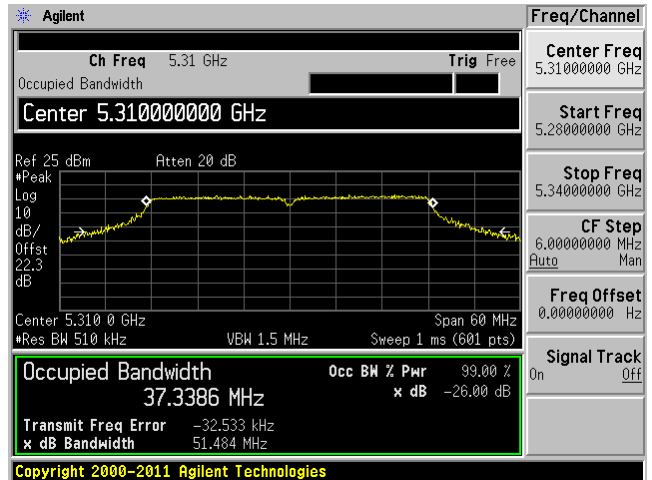
802.11n HT40 mode, 5270 MHz, Chain J1



802.11n HT40 mode, 5310 MHz, Chain J0

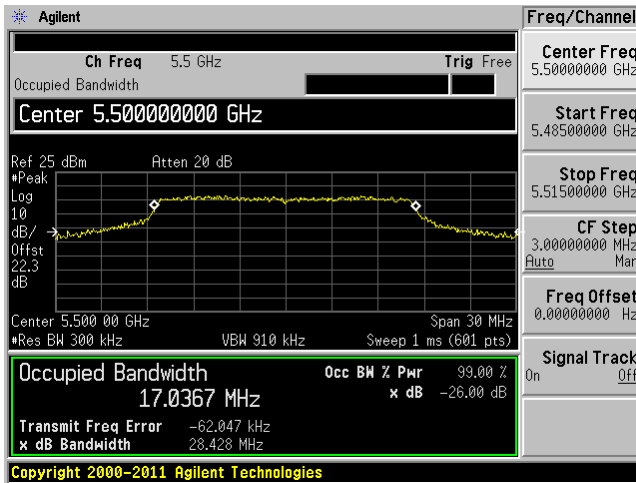


802.11n HT40 mode, 5310 MHz, Chain J1

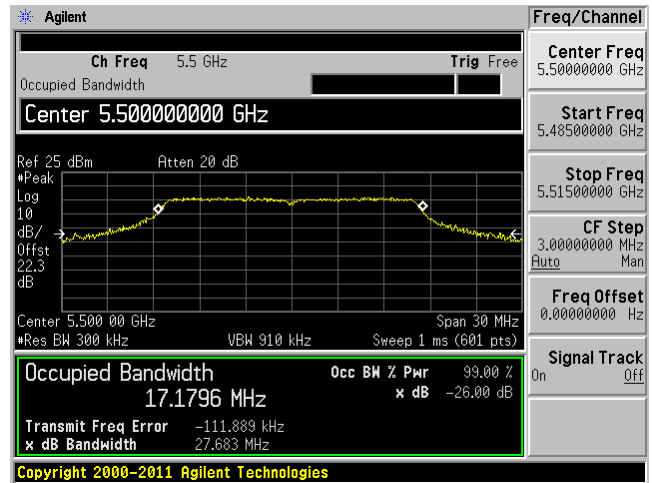


5470-5725 MHz

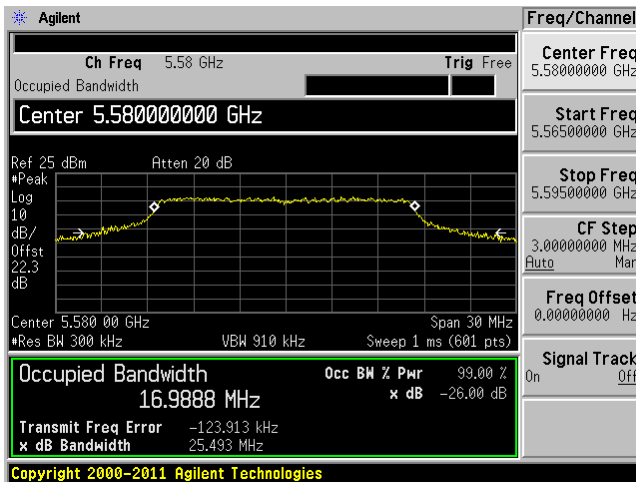
802.11a mode, 5500 MHz, Chain J0



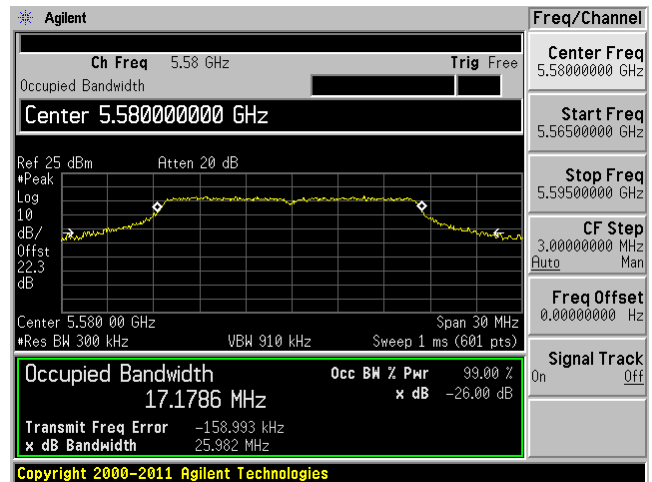
802.11a mode, 5500 MHz, Chain J1



802.11a mode, 5580 MHz, Chain J0

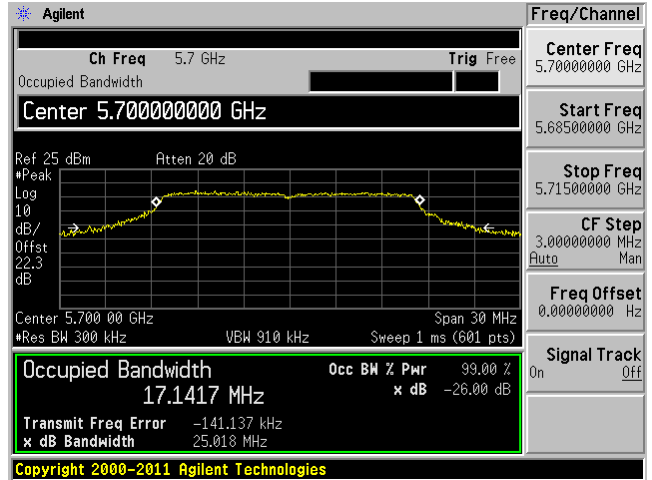
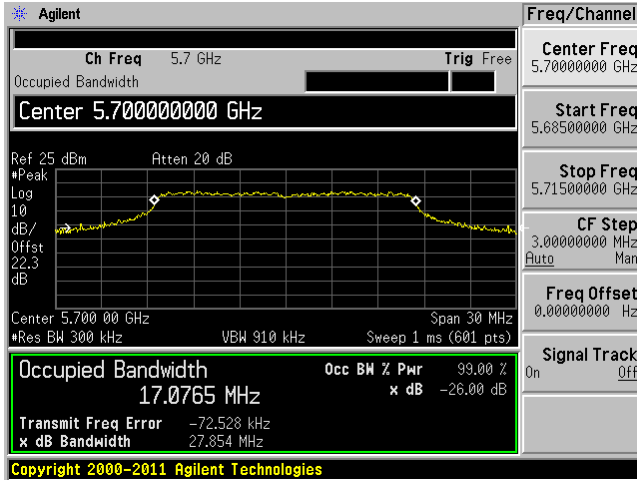


802.11a mode, 5580 MHz, Chain J1



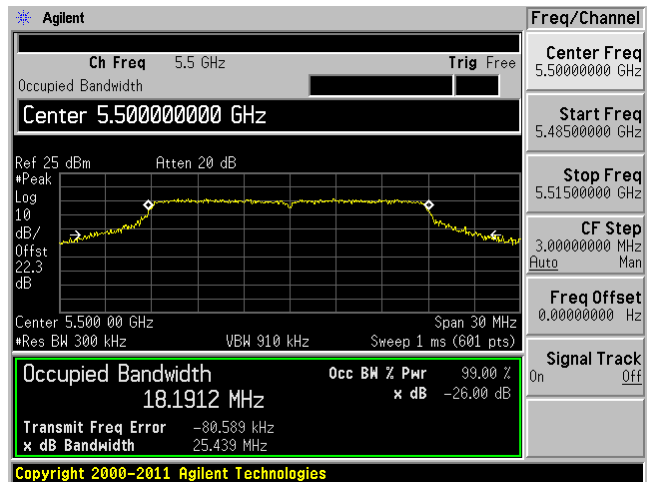
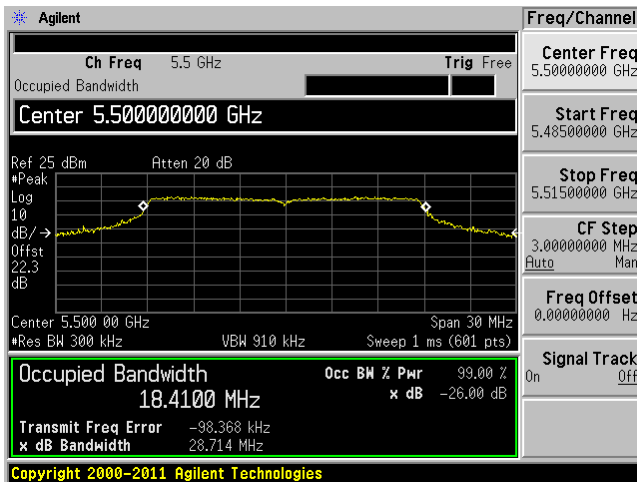
802.11a mode, 5700 MHz, Chain J0

802.11a mode, 5700 MHz, Chain J1



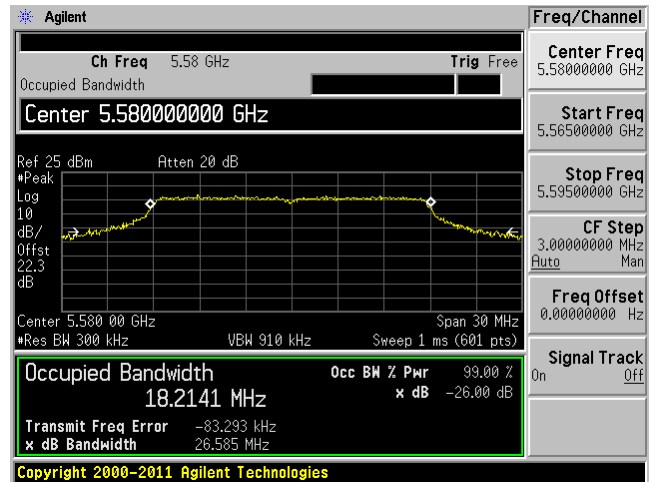
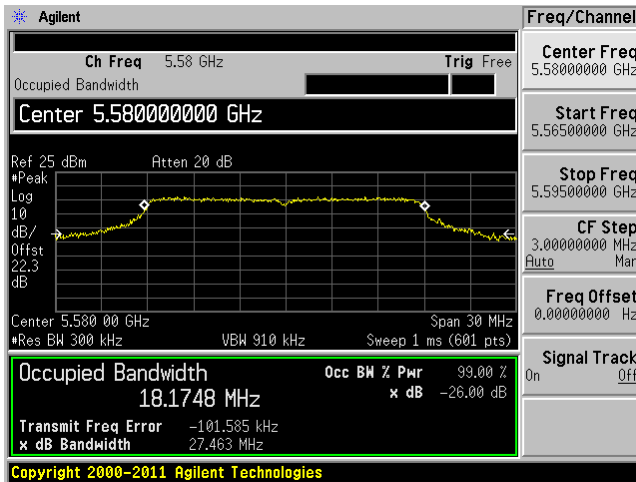
802.11n HT20 mode, 5500 MHz, Chain J0

802.11n HT20 mode, 5500 MHz, Chain J1



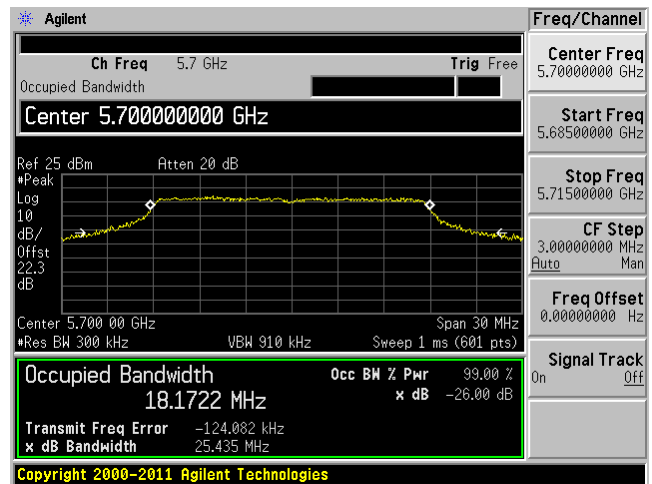
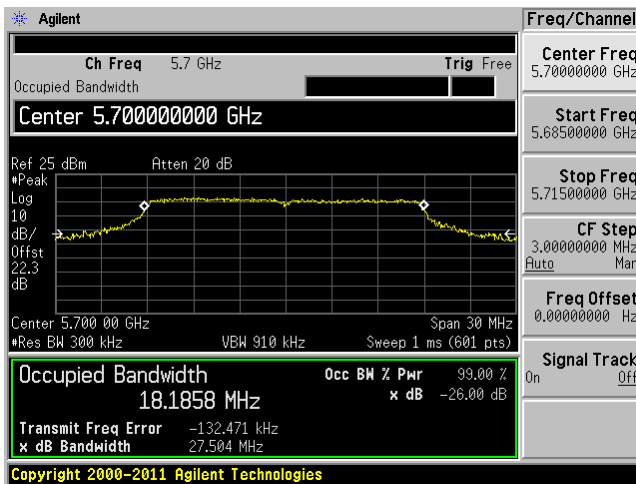
802.11n HT20 mode, 5580 MHz, Chain J0

802.11n HT20 mode, 5580 MHz, Chain J1

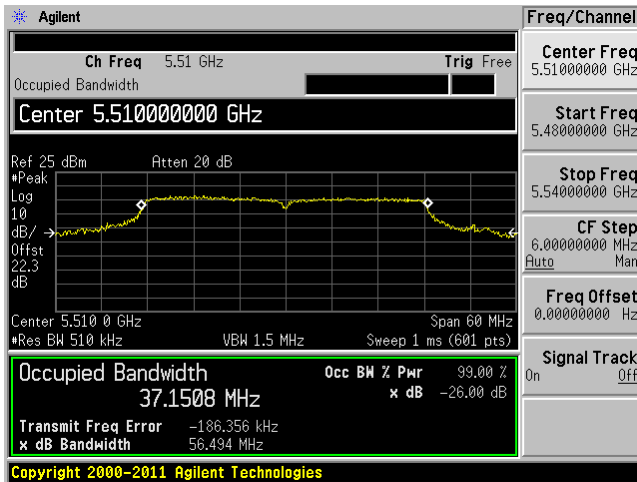


802.11n HT20 mode, 5700 MHz, Chain J0

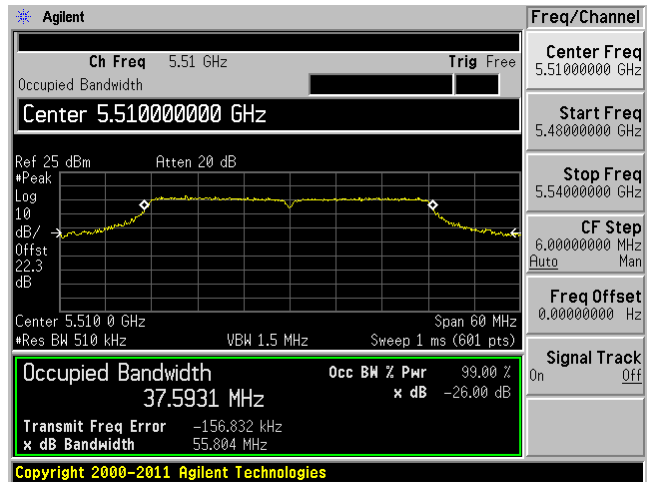
802.11n HT20 mode, 5700 MHz, Chain J1



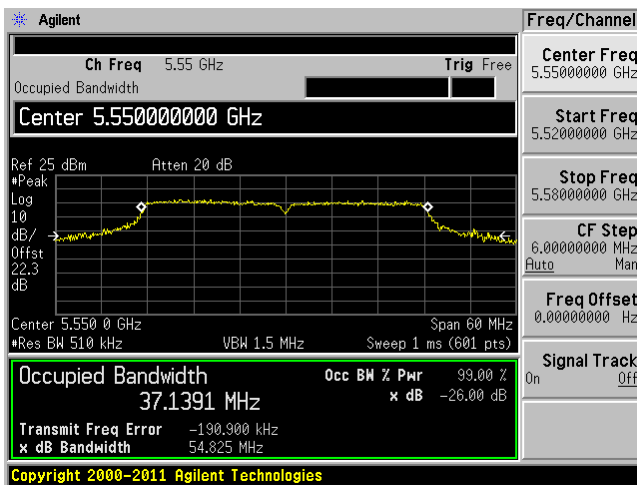
802.11n HT40 mode, 5510 MHz, Chain J0



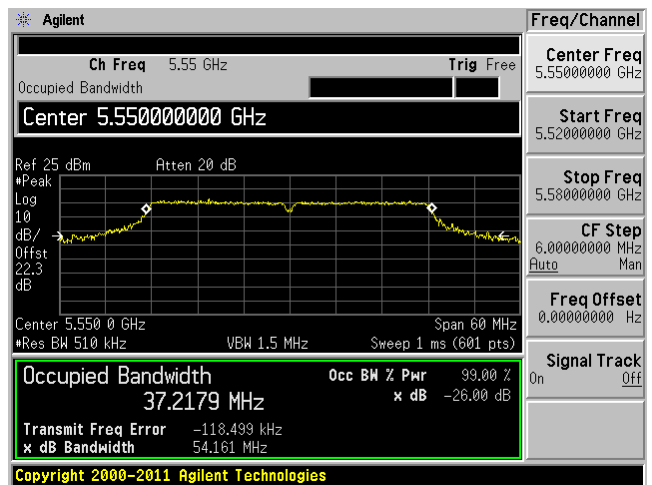
802.11n HT40 mode, 5510 MHz, Chain J1



802.11n HT40 mode, 5550 MHz, Chain J0

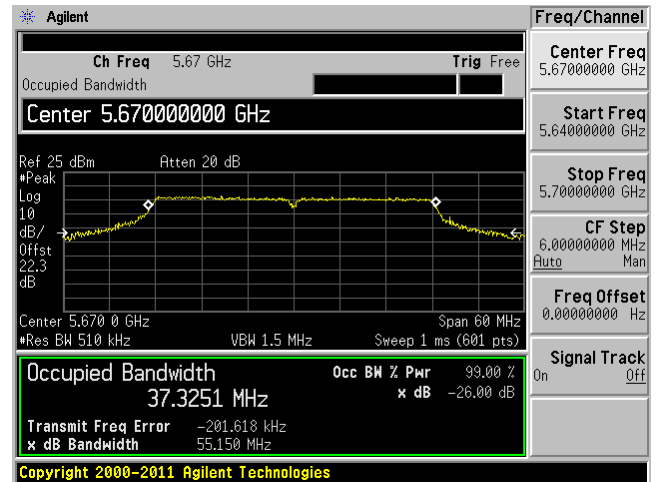
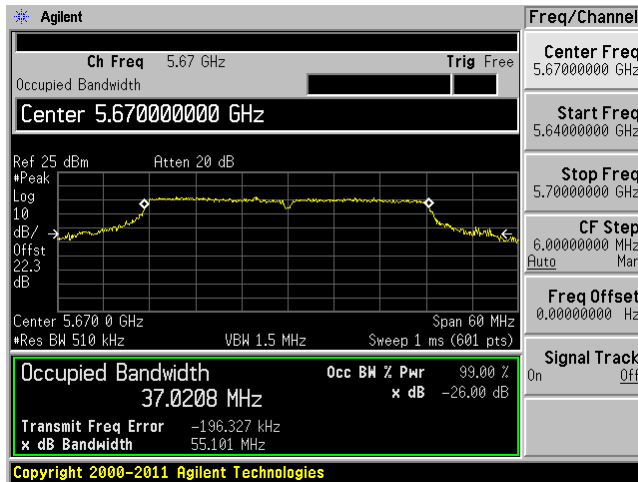


802.11n HT40 mode, 5550 MHz, Chain J1



802.11n HT40 mode, 5670 MHz, Chain J0

802.11n HT40 mode, 5670 MHz, Chain J1



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 5.15–5.35 GHz, 5.47–5.6 GHz, and 5.650–5.725 GHz bands, the maximum conducted output power shall not exceed 250 mW or 11 dBm + 10 log B, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1 megahertz band. The maximum e.i.r.p shall not exceed 1.0W or 17 + 10 log B, dbm, whichever is less. B is the 99% emission bandwidth in MHz.

9.2 Measurement Procedure

- (i) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- (ii) Set RBW = 1 MHz.
- (iii) Set VBW \geq 3 MHz.
- (iv) Number of points in sweep \geq 2 Span / RBW. (This ensures that bin-to-bin spacing is \leq 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 \geq 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.

9.3 Test Equipment List and Details

Manufacturers	Description	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	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:	43 %
ATM Pressure:	101.3 kPa

The testing was performed by Jeffrey Wu on 2012-10-19 in RF site.

9.5 Test Results

5250-5350 MHz Band:

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	17.63	18.75	21.24	24	-2.76	22
Middle	5280	17.68	17.76	20.73	24	-3.27	22
High	5320	17.62	17.87	20.76	24	-3.24	22

802.11n HT20 mode:

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	17.49	18.69	21.14	24	-2.86	22
Middle	5280	17.74	18.05	20.90	24	-3.10	22
High	5320	17.46	17.63	20.56	24	-3.44	22

802.11n HT40 mode:

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5270	17.86	18.86	21.40	24	-2.60	22
High	5310	17.86	18.01	20.95	24	-3.05	22

5470-5725 MHz Band :

802.11a mode

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	16.57	15.78	19.20	24	-4.80	22
Middle	5580	16.13	16.78	19.48	24	-4.52	22
High	5700	16.72	17.59	20.19	24	-3.81	22

802.11n HT20 mode:

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	16.47	14.69	18.68	24	-5.32	22
Middle	5580	16.24	16.85	19.57	24	-4.43	22
High	5700	16.84	17.6	20.25	24	-3.75	22

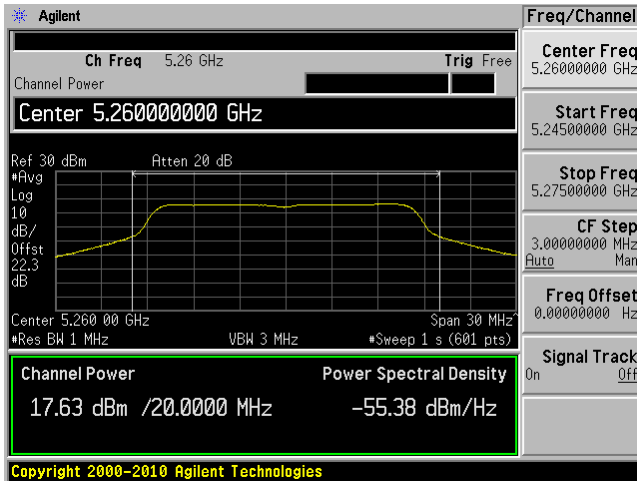
802.11n HT40 mode:

Channel	Frequency (MHz)	TX Chain J0 Power (dBm)	TX Chain J1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5510	16.34	15.69	19.04	24	-4.96	22
Middle	5550	16.08	16.5	19.31	24	-4.69	22
High	5670	16.05	16.93	19.52	24	-4.48	22

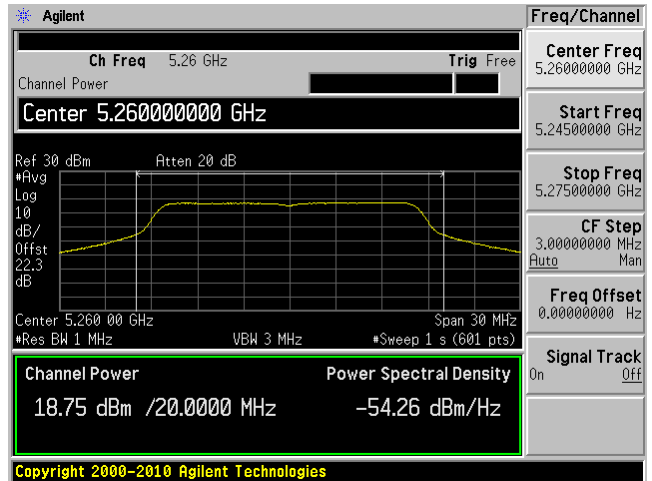
5250-5350 MHz Band

802.11 a mode

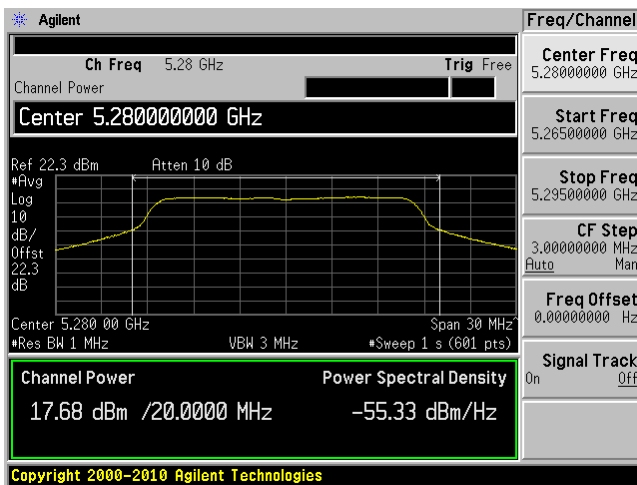
802.11a mode, 5260 MHz, Chain J0



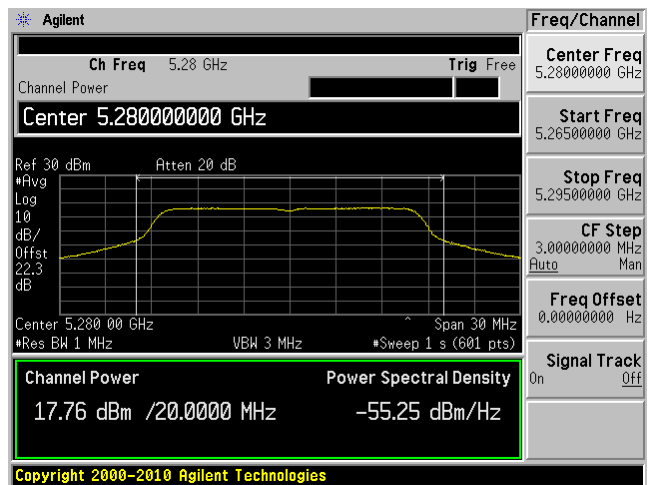
802.11a mode, 5260 MHz, Chain J1



802.11a mode, 5280 MHz, Chain J0

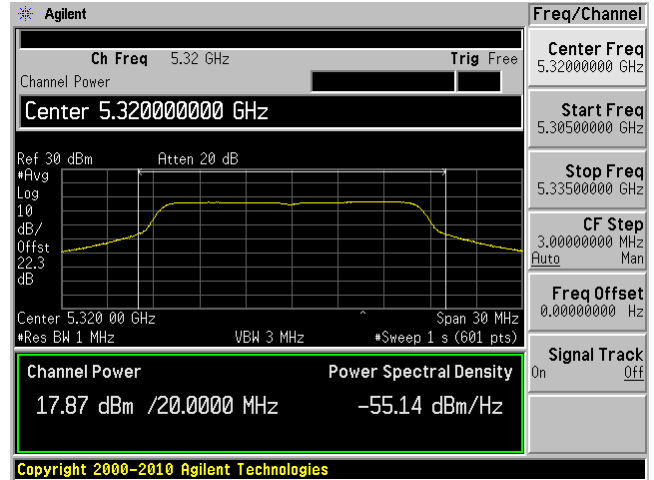
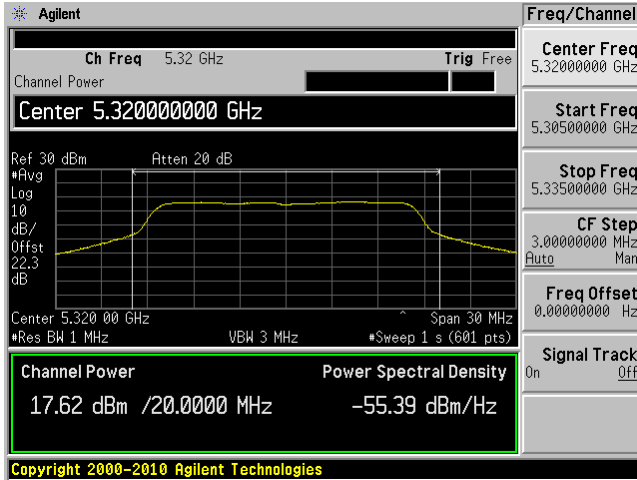


802.11a mode, 5280 MHz, Chain J1



802.11a mode, 5320 MHz, Chain J0

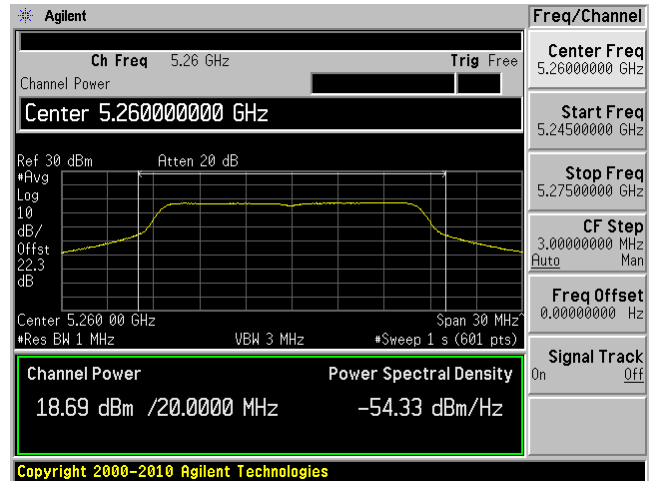
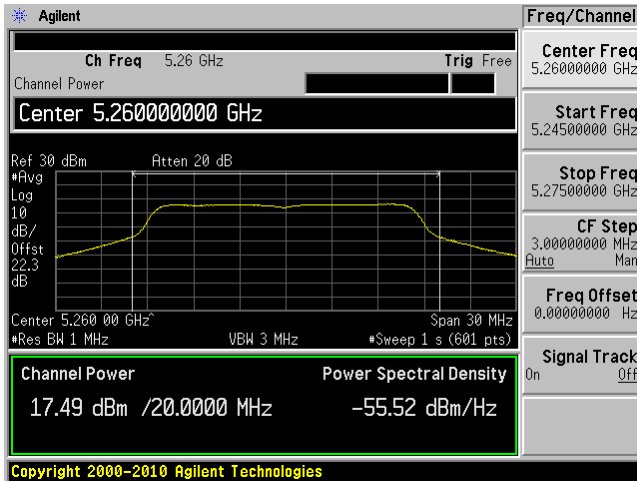
802.11a mode, 5320 MHz, Chain J1



802.11n HT20 mode

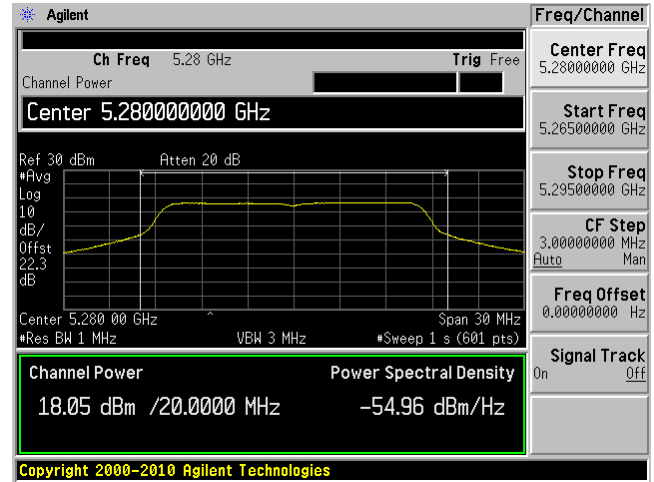
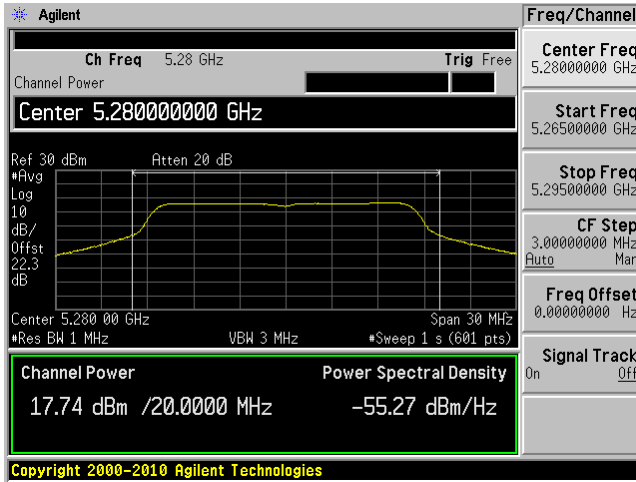
802.11n HT20 mode, 5260 MHz, Chain J0

802.11n HT20 mode, 5260 MHz, Chain J1



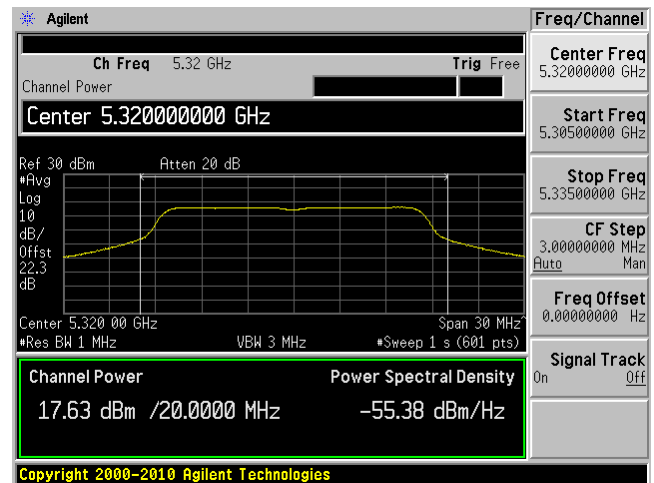
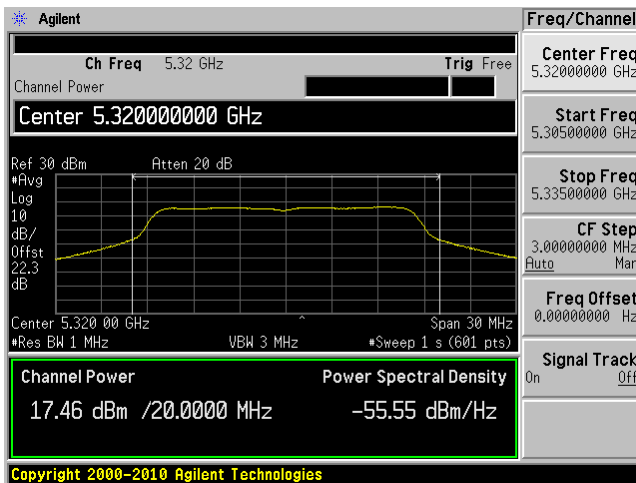
802.11n HT20 mode, 5280 MHz, Chain J0

802.11n HT20 mode, 5280 MHz, Chain J1



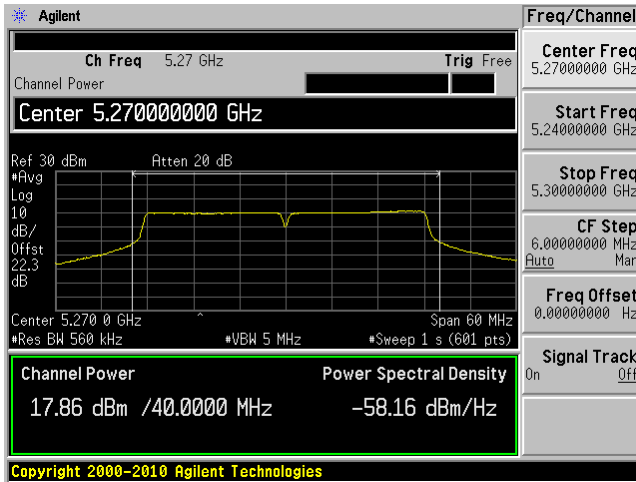
802.11n HT20 mode, 5320 MHz, Chain J0

802.11n HT20 mode, 5320 MHz, Chain J1

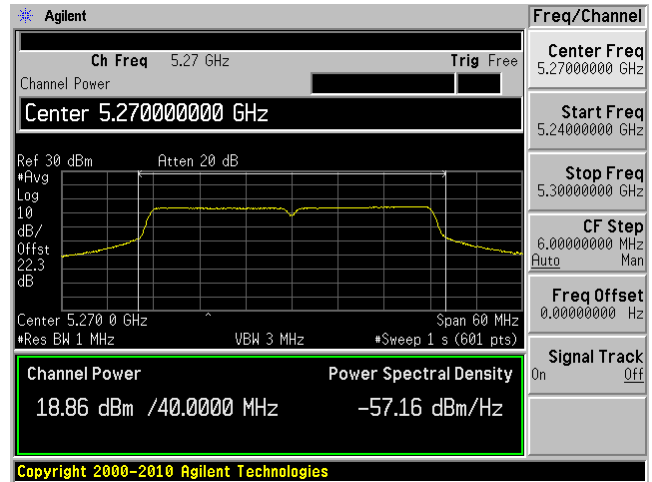


802.11n HT40 mode

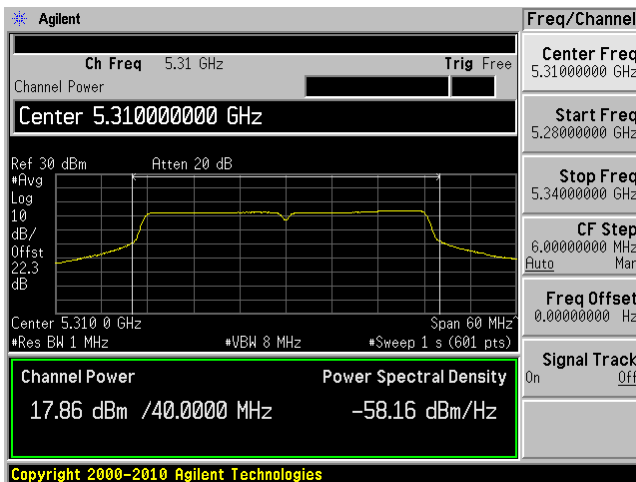
802.11n HT40 mode, 5270 MHz, Chain J0



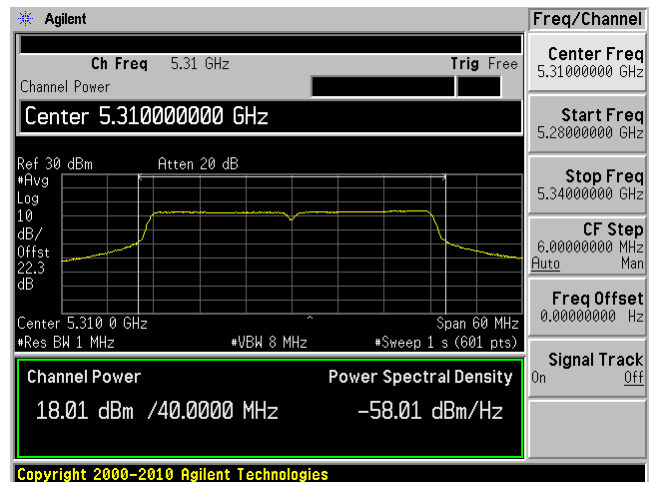
802.11n HT40 mode, 5270 MHz, Chain J1



802.11n HT40 mode, 5310 MHz, Chain J0



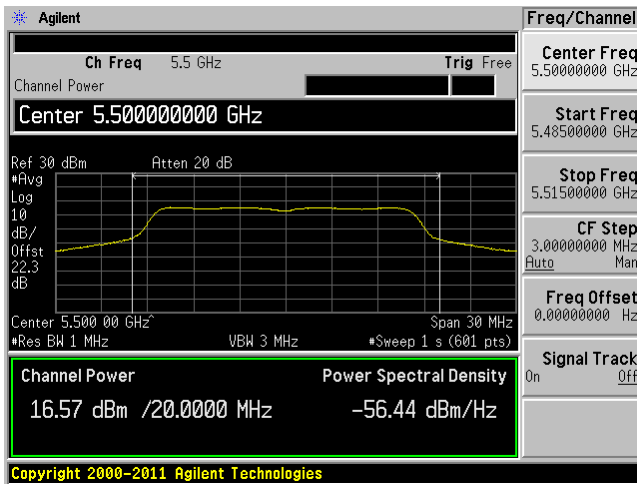
802.11n HT40 mode, 5310 MHz, Chain J1



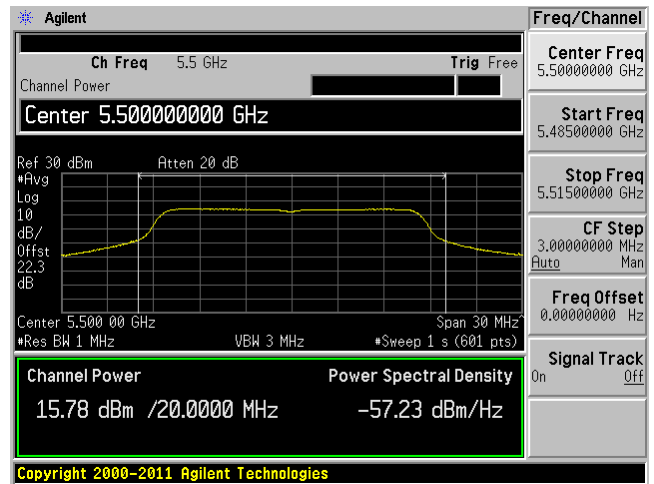
5470-5725 MHz Band

802.11a mode

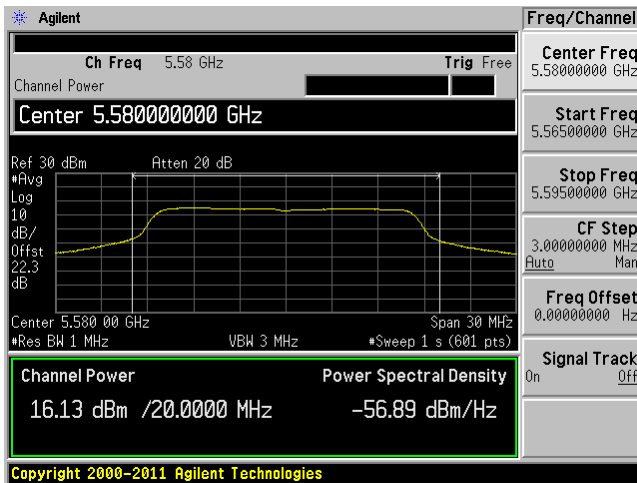
802.11a mode, 5500 MHz, Chain J0



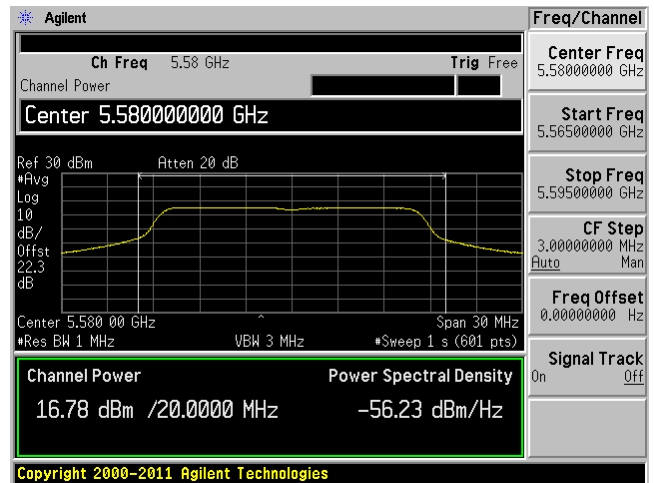
802.11a mode, 5500 MHz, Chain J1



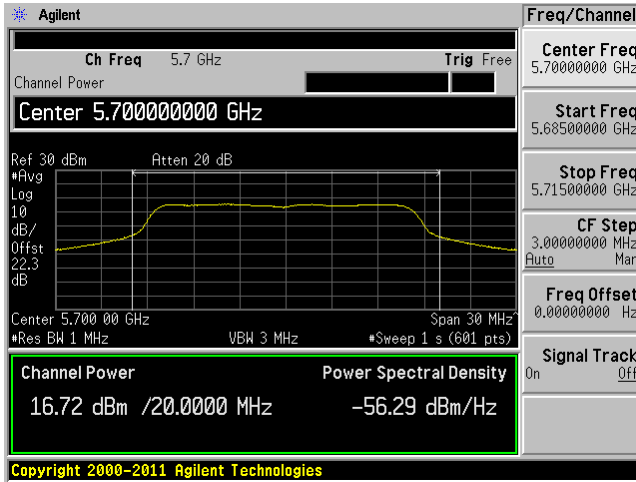
802.11a mode, 5580 MHz, Chain J0



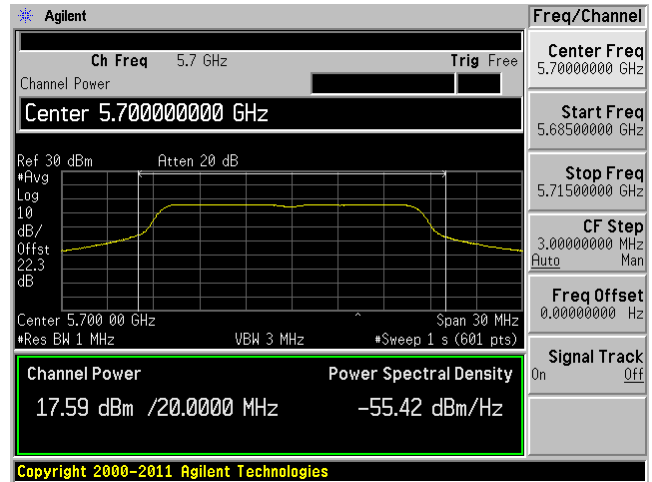
802.11a mode, 5580 MHz, Chain J1



802.11a mode, 5700 MHz, Chain J0

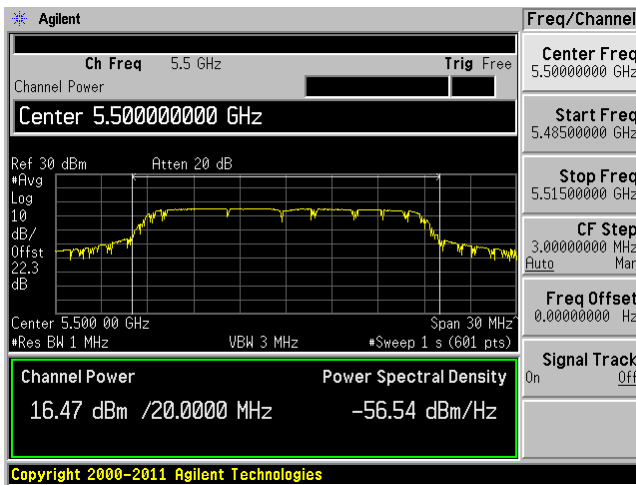


802.11a mode, 5700 MHz, Chain J1

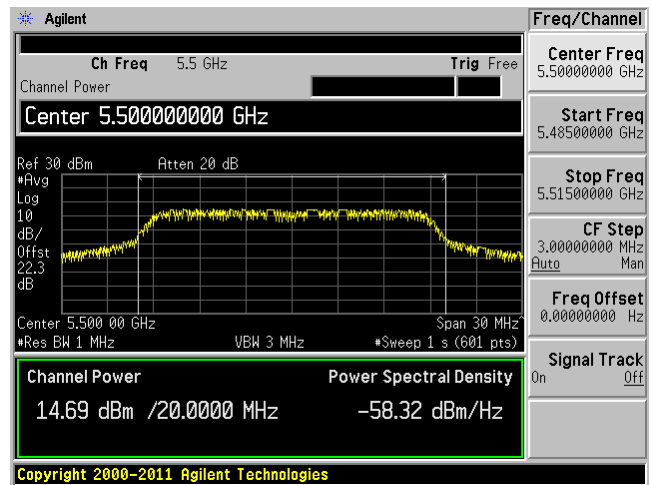


802.11n HT20 mode

802.11n HT20 mode, 5500 MHz, Chain J0

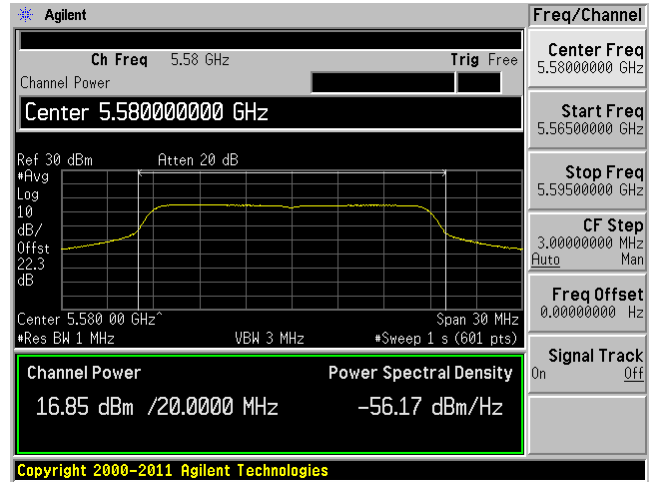
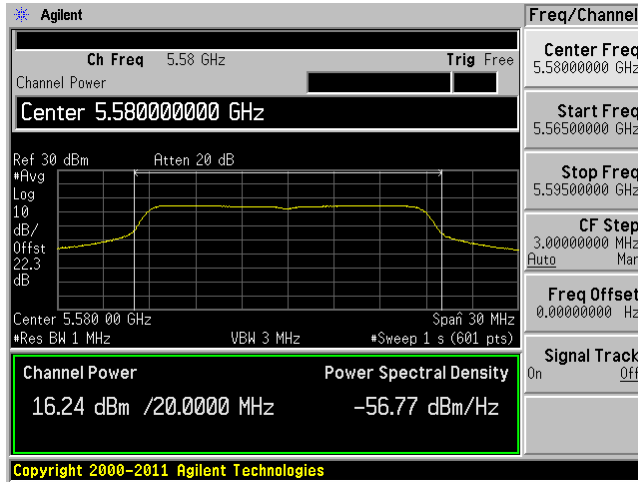


802.11n HT20 mode, 5500 MHz, Chain J1



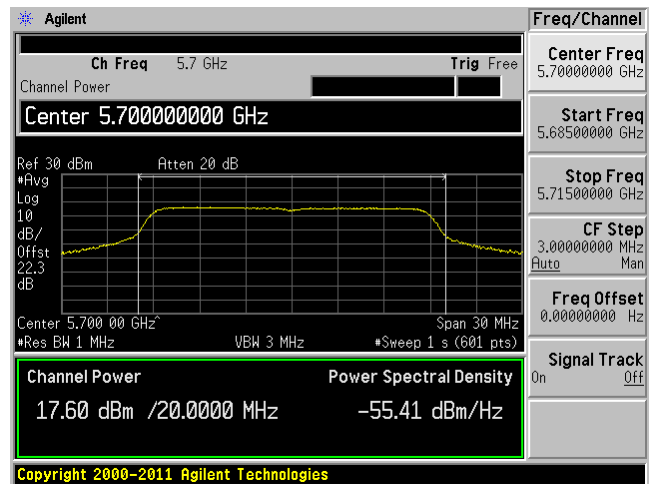
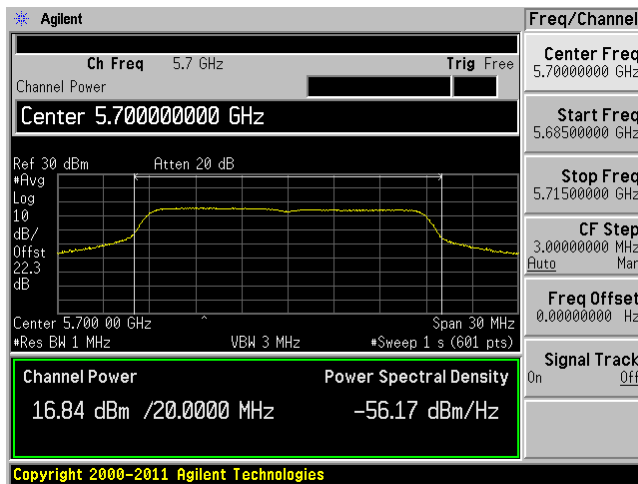
802.11n HT20 mode, 5580 MHz, Chain J0

802.11n HT20 mode, 5580 MHz, Chain J1



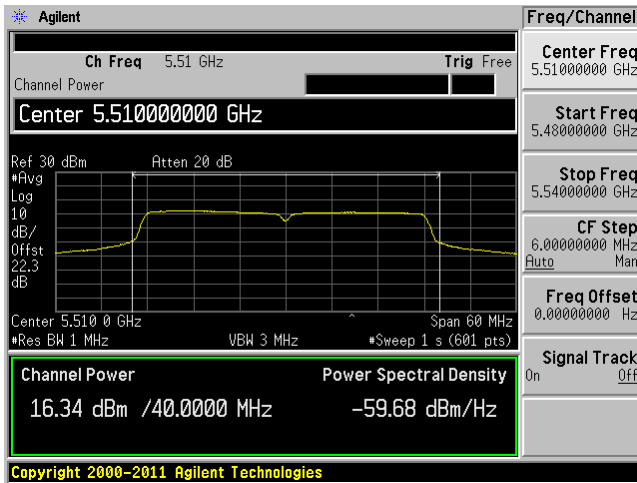
802.11n HT20 mode, 5700 MHz, Chain J0

802.11n HT20 mode, 5700 MHz, Chain J1

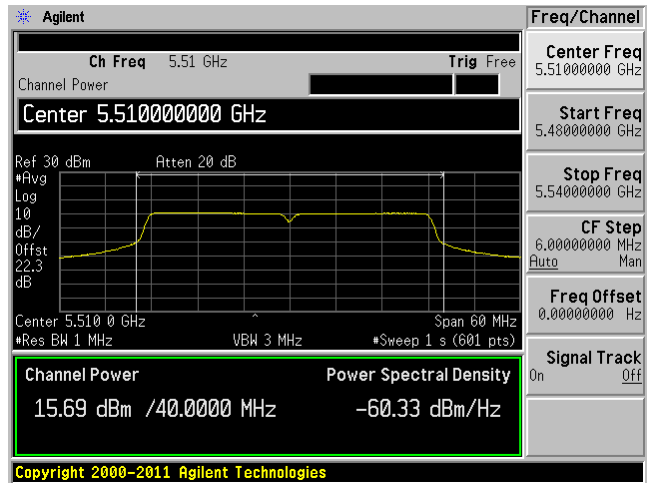


802.11n HT40 mode

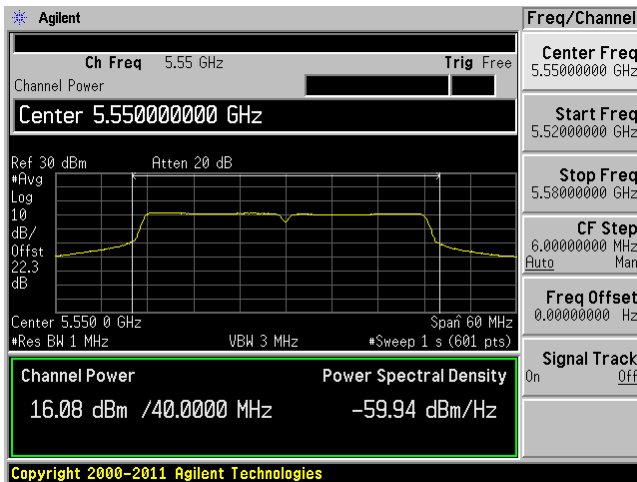
802.11n HT40 mode, 5510 MHz, Chain J0



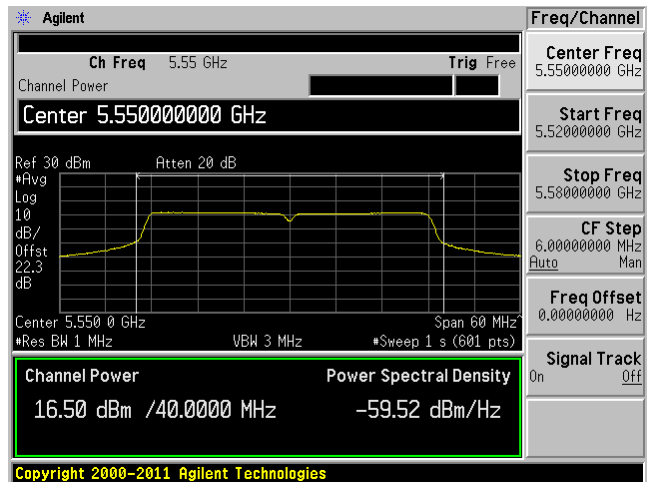
802.11n HT40 mode, 5510 MHz, Chain J1



802.11n HT40 mode, 5550 MHz, Chain J0

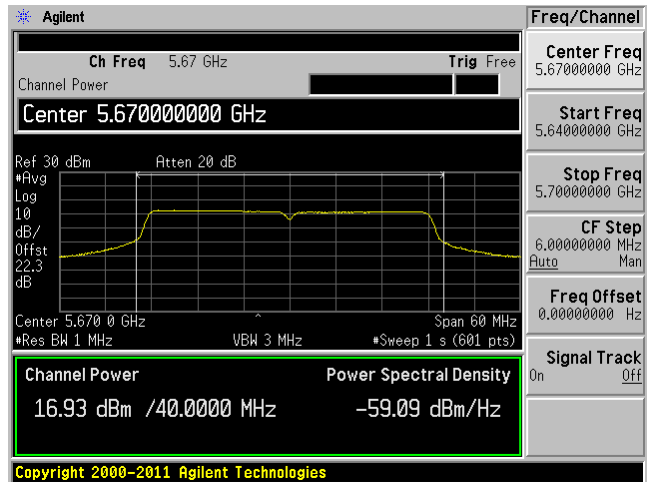
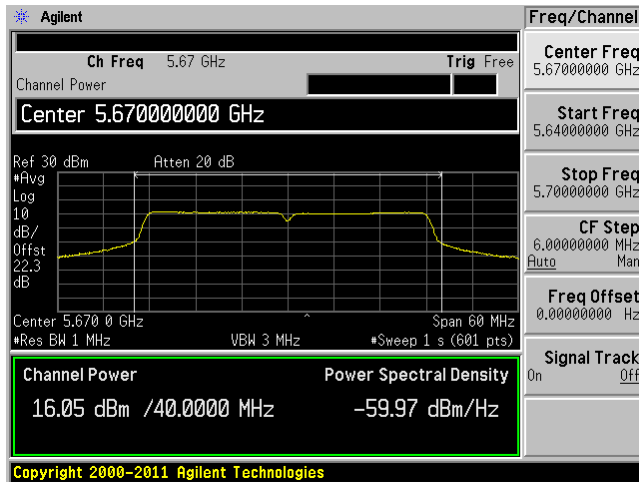


802.11n HT40 mode, 5550 MHz, Chain J1



802.11n HT40 mode, 5670 MHz, Chain J0

802.11n HT40 mode, 5670 MHz, Chain J1



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

10.1 Applicable Standard

According to FCC §15.407(b)

For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15–5.25 GHz band. For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz.

For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz

According to RSS-210 §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

Manufacturers	Description	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	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:	24 °C
Relative Humidity:	45 %
ATM Pressure:	101.1 kPa

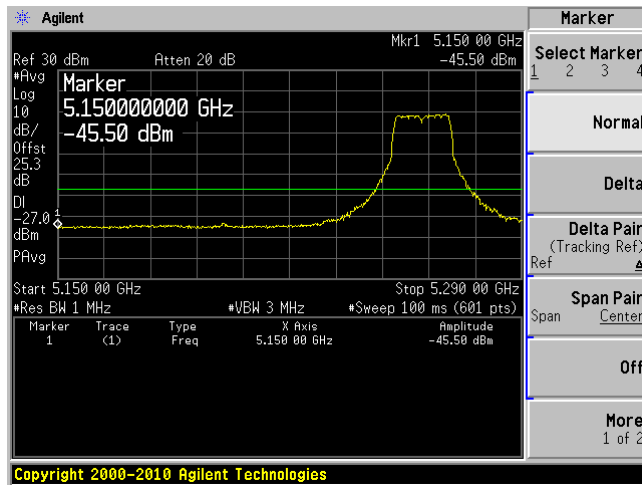
The testing was performed by Jeffrey Wu on 2012-10-22 in RF site.

10.5 Test Results

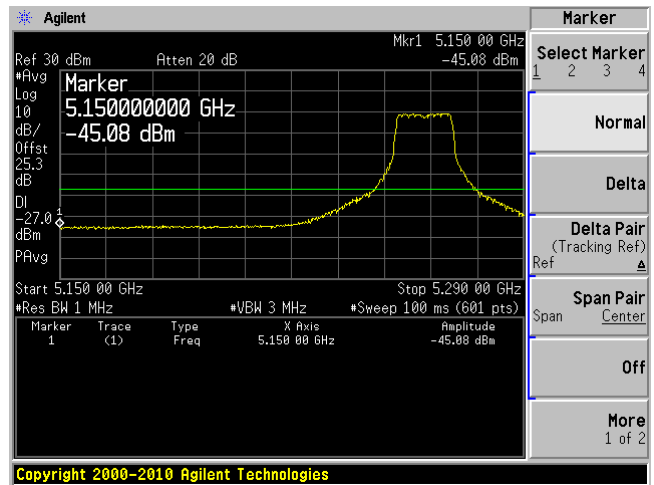
Please refer to following pages for plots of band edge.

5250-5350 MHz Band

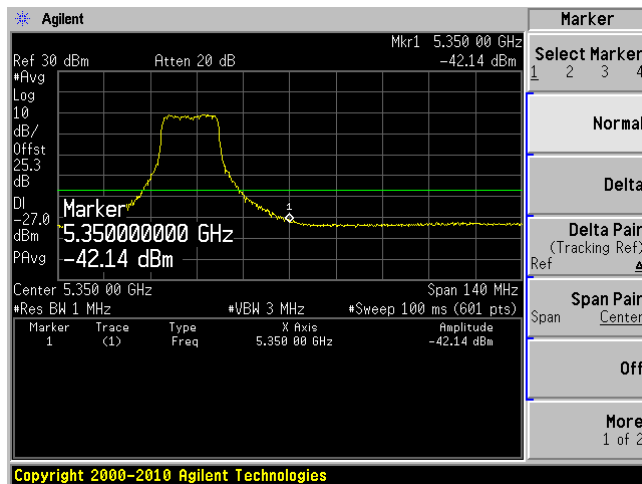
802.11a mode, Lowest Channel, Chain J0



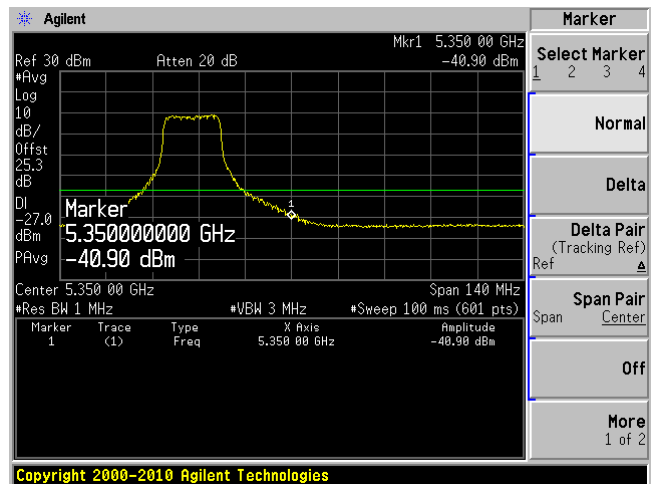
802.11a mode, Lowest Channel, Chain J1



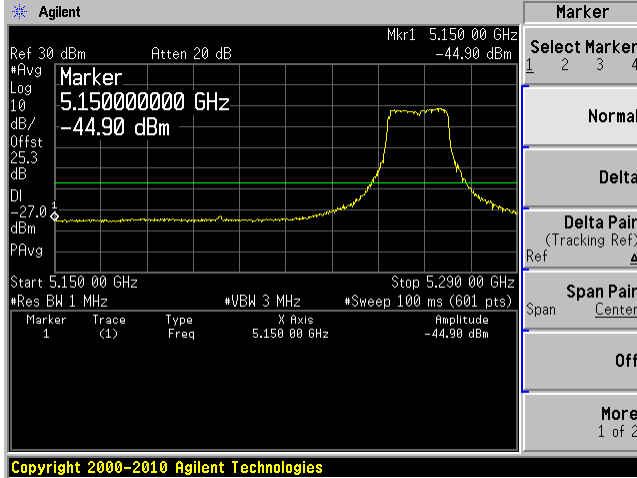
802.11a mode, Highest Channel, Chain J10



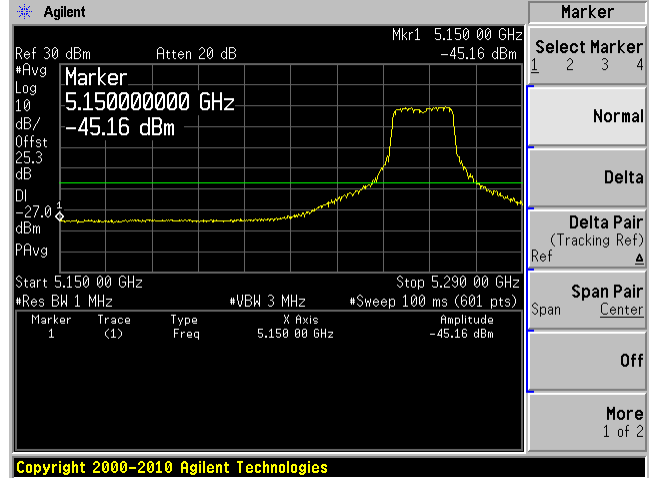
802.11a mode, Highest Channel, Chain J8



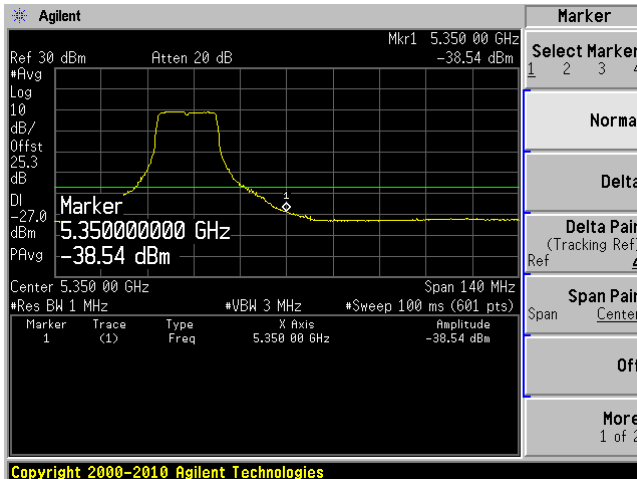
802.11n HT20 mode, Lowest Channel, Chain J0



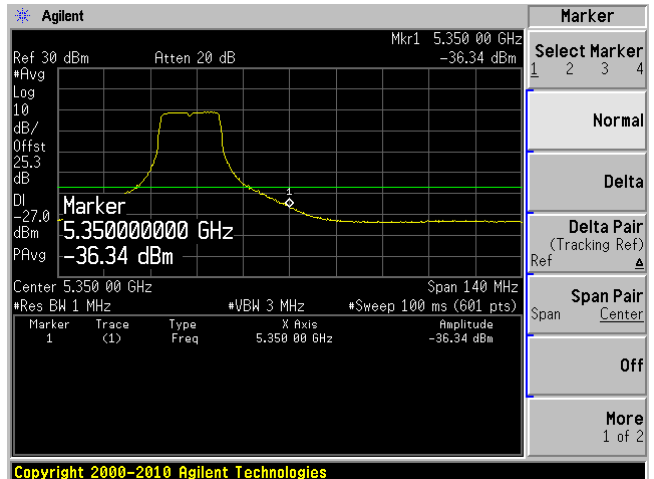
802.11n HT20 mode, Lowest Channel, Chain J1



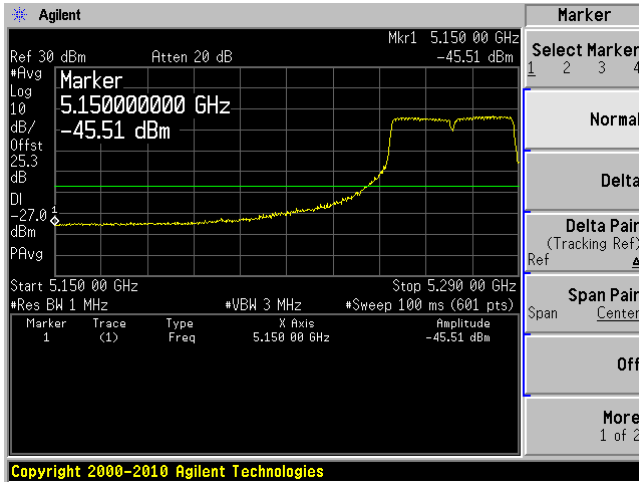
802.11n HT20 mode, Highest Channel, Chain J0



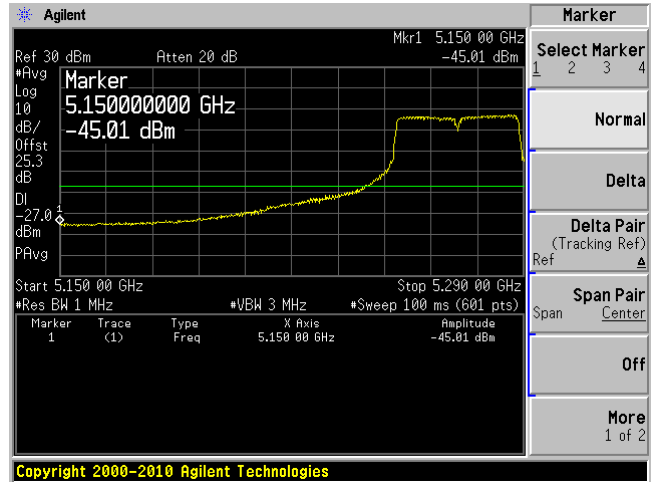
802.11n HT20 mode, Highest Channel, Chain J1



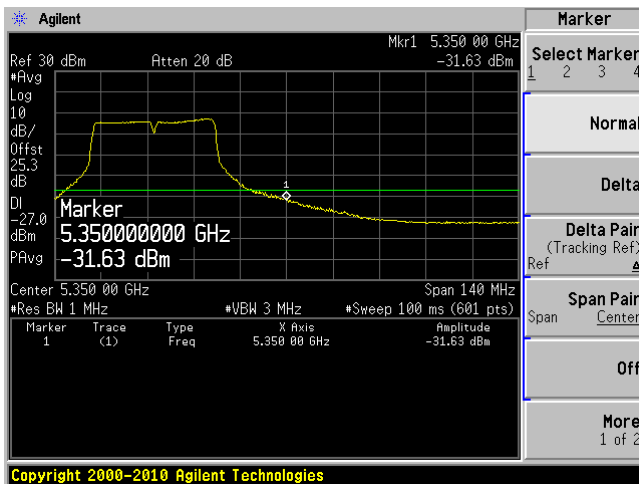
802.11n HT40 mode, Lowest Channel, Chain J0



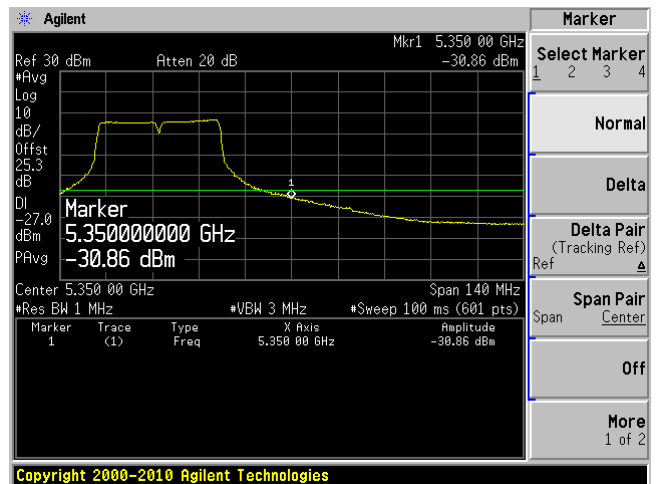
802.11n HT40 mode, Lowest Channel, Chain J1



802.11n HT40 mode, Highest Channel, Chain J0

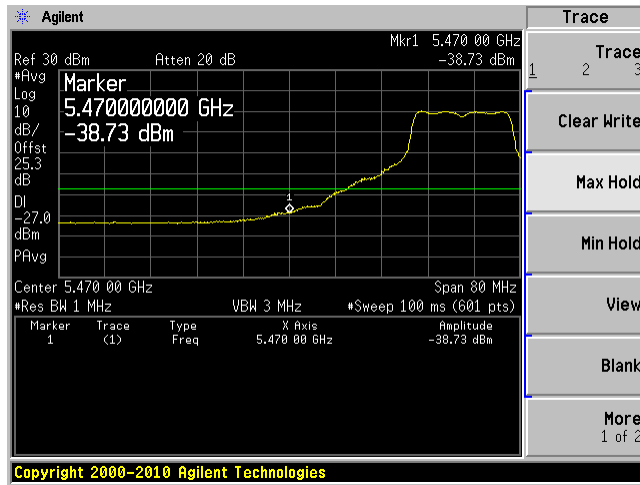


802.11n HT40 mode, Highest Channel, Chain J1

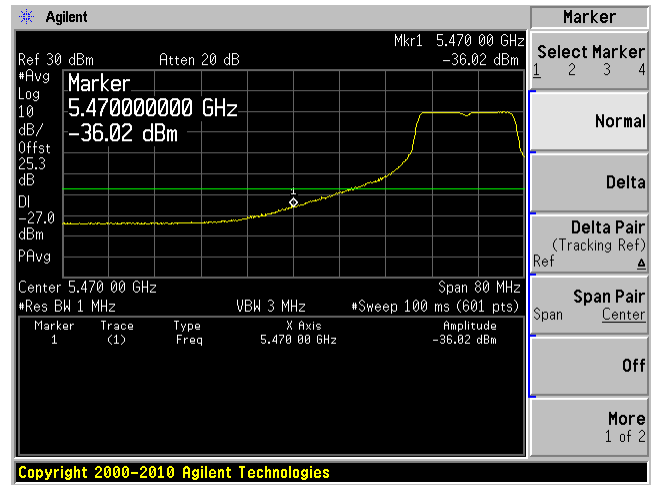


5470-5725 MHz Band

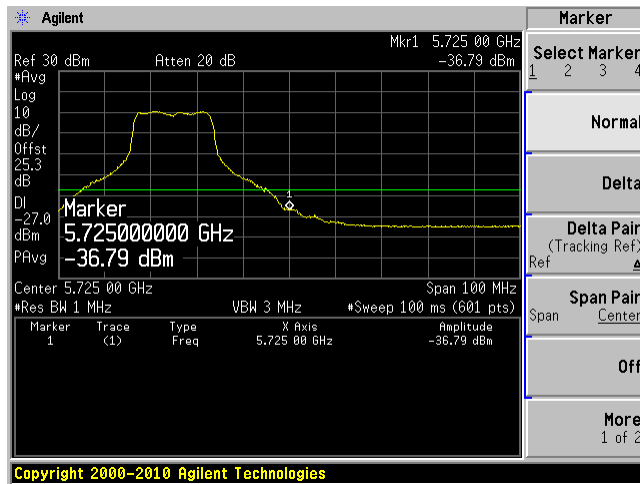
802.11a mode, Lowest Channel, Chain J0



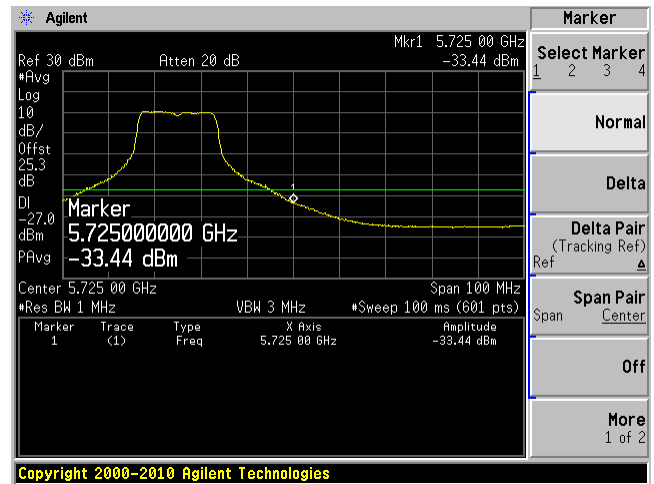
802.11a mode, Lowest Channel, Chain J1



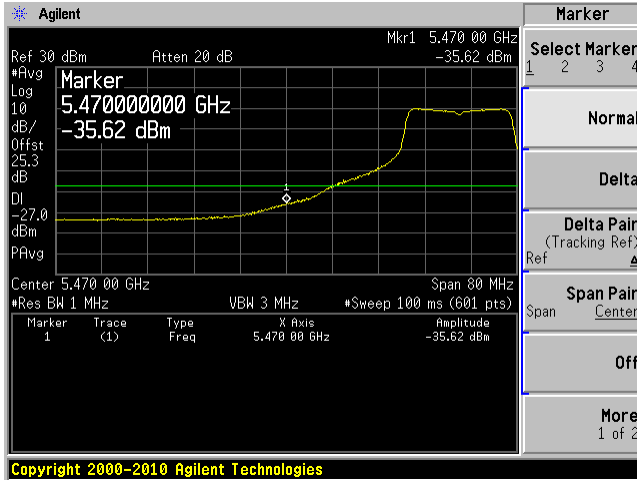
802.11a mode, Highest Channel, Chain J0



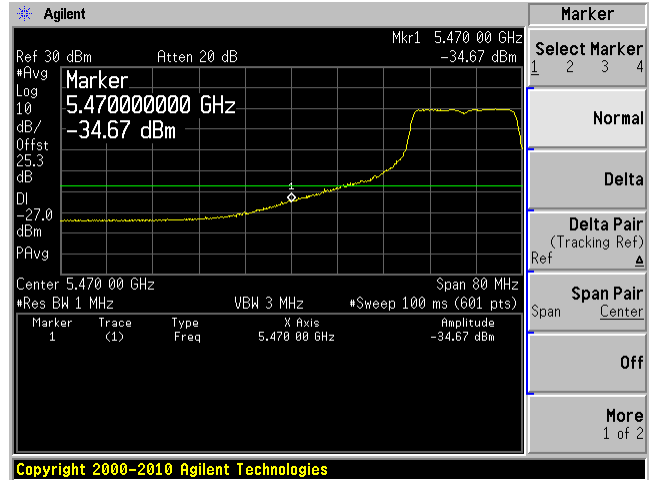
802.11a mode, Highest Channel, Chain J1



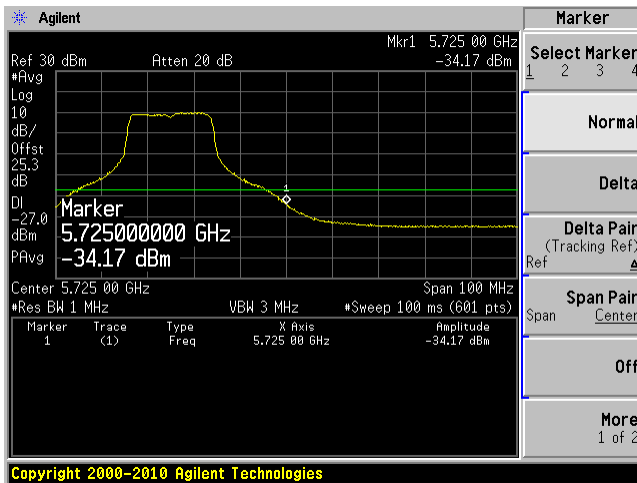
802.11n HT20 mode, Lowest Channel, Chain J0



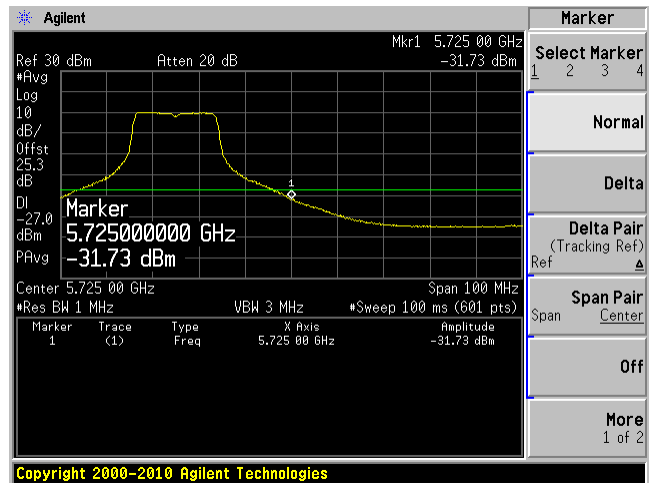
802.11n HT20 mode, Lowest Channel, Chain J1



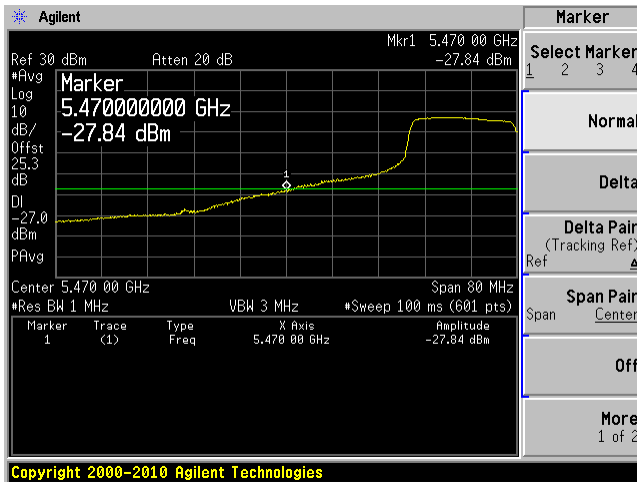
802.11n HT20 mode, Highest Channel, Chain J0



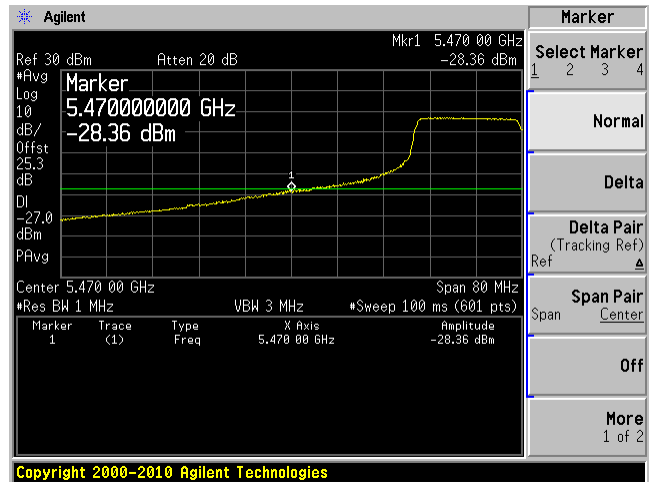
802.11n HT20 mode, Highest Channel, Chain J1



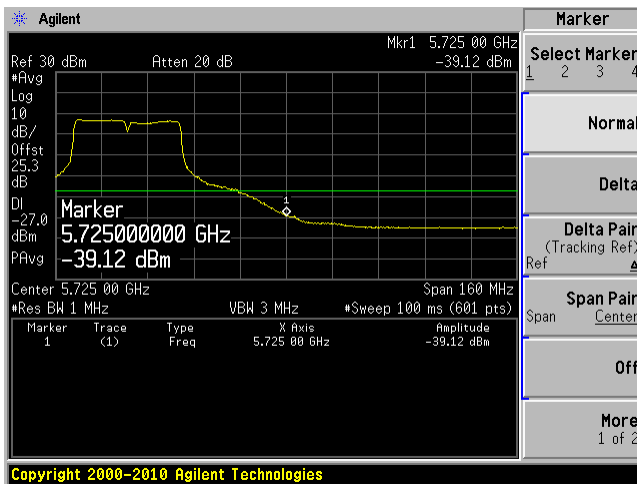
802.11n HT40 mode, Lowest Channel, Chain J0



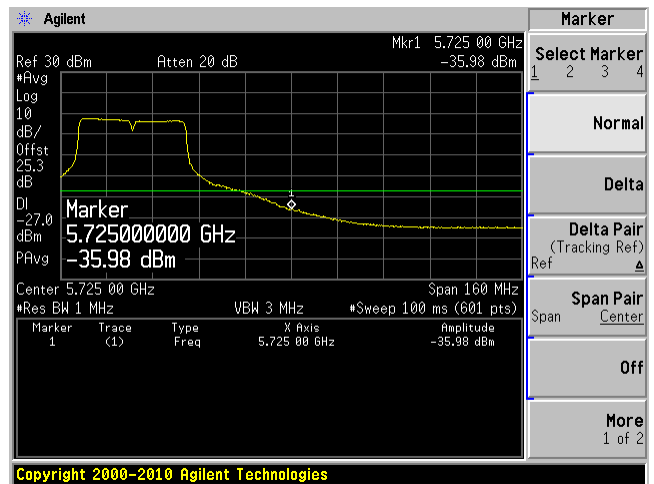
802.11n HT40 mode, Lowest Channel, Chain J1



802.11n HT40 mode, Highest Channel, Chain J0



802.11n HT40 mode, Highest Channel, Chain J1



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

11.1 Applicable Standard

According to FCC §15.407(a)(1)

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

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:

5150-5250 MHz 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.

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

11.2 Measurement Procedure

- (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

Manufacturers	Description	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	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:	43 %
ATM Pressure:	101.3 kPa

The testing was performed by Jeffrey Wu on 2012-10-19 in RF site.

11.5 Test Results

5250-5350 MHz

802.11a mode:

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	6.461	7.499	10.02	11	-0.98	22
Middle	5280	6.518	6.526	9.53	11	-1.47	22
High	5320	6.36	6.616	9.50	11	-1.50	22

802.11n HT20 mode:

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5260	6.416	7.117	9.79	11	-1.21	22
Middle	5280	6.988	6.855	9.93	11	-1.07	22
High	5320	6.54	6.592	9.58	11	-1.42	22

802.11n HT40 mode:

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5270	3.604	4.569	7.12	11	-3.88	22
High	5310	3.697	3.448	6.58	11	-4.42	22

5470-5725 MHz

802.11a mode:

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5550	5.513	4.661	8.12	11	-2.88	22
Middle	5580	5.002	5.268	8.15	11	-2.85	22
High	5700	5.651	6.252	8.97	11	-2.03	22

802.11n HT20 mode:

Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5500	5.512	4.576	8.08	11	-2.92	22
Middle	5580	4.649	5.107	7.89	11	-3.11	22
High	5700	5.936	6.326	9.15	11	-1.85	22

802.11n HT40 mode:

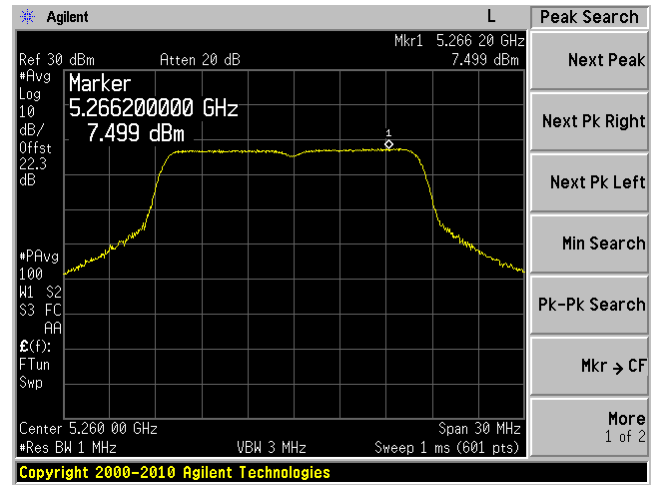
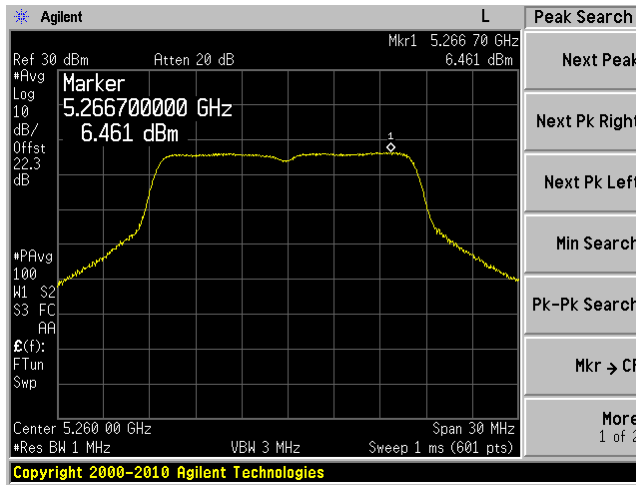
Channel	Frequency (MHz)	TX Chain J0 PSD (dBm)	TX Chain J1 PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)	Power Setting
Low	5510	2.449	1.261	4.91	11	-6.09	22
Middle	5550	1.906	2.111	5.02	11	-5.98	22
High	5670	1.699	2.563	5.16	11	-5.84	22

Please refer to the following plots.

5250-5350 MHz Band

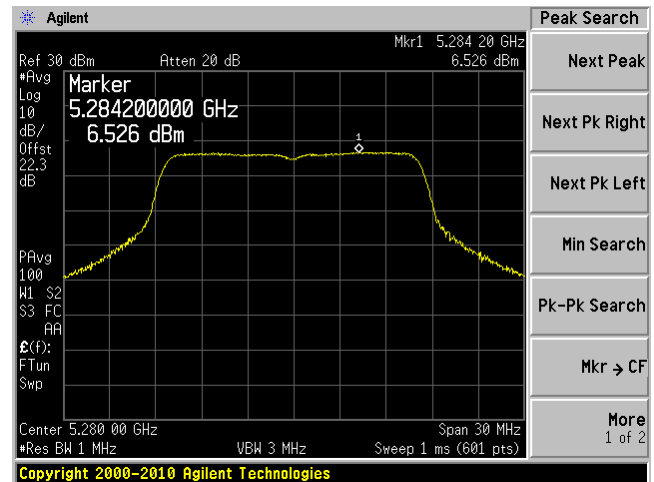
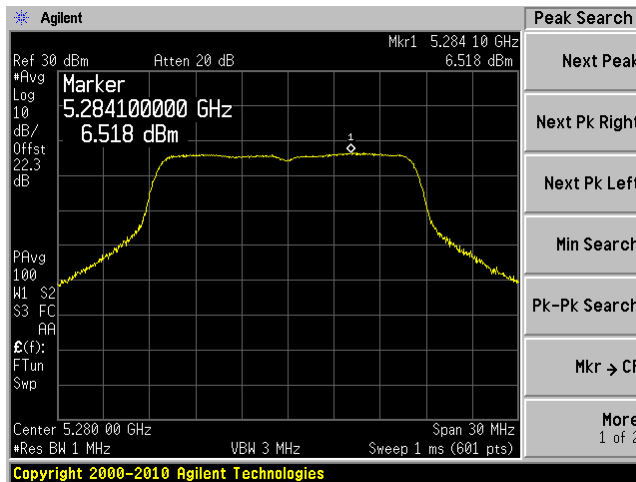
802.11a mode, 5260 MHz, Chain J0

802.11a mode, 5260 MHz, Chain J1



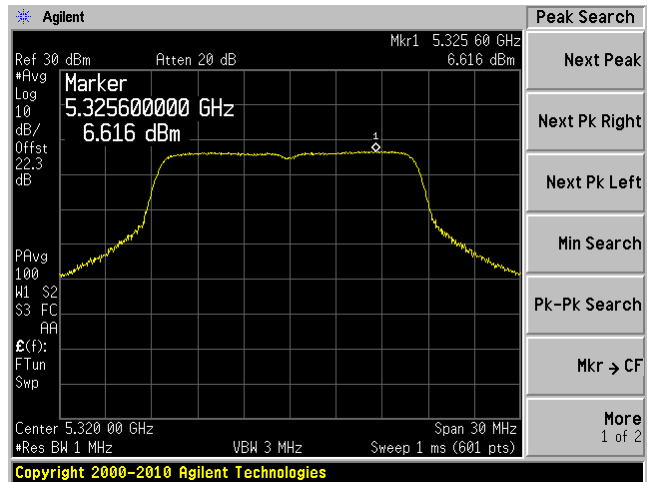
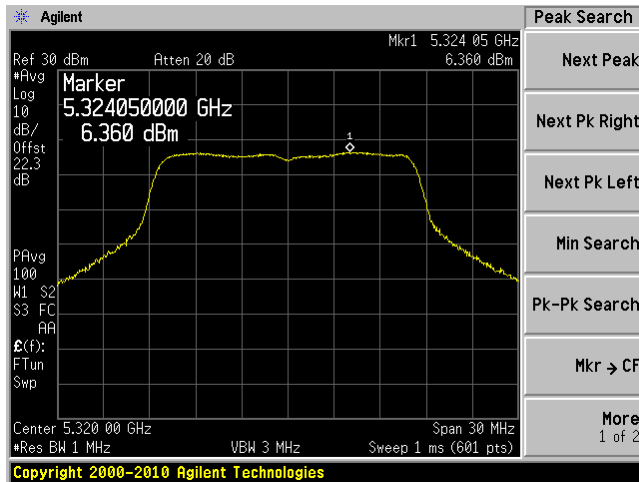
802.11a mode, 5280 MHz, Chain J0

802.11a mode, 5280 MHz, Chain J1



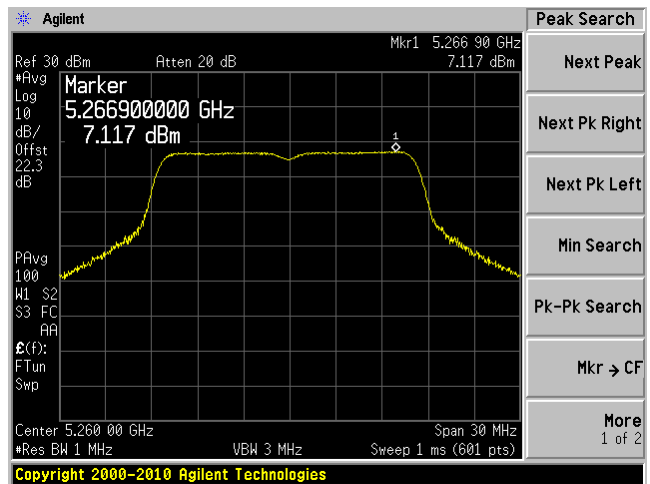
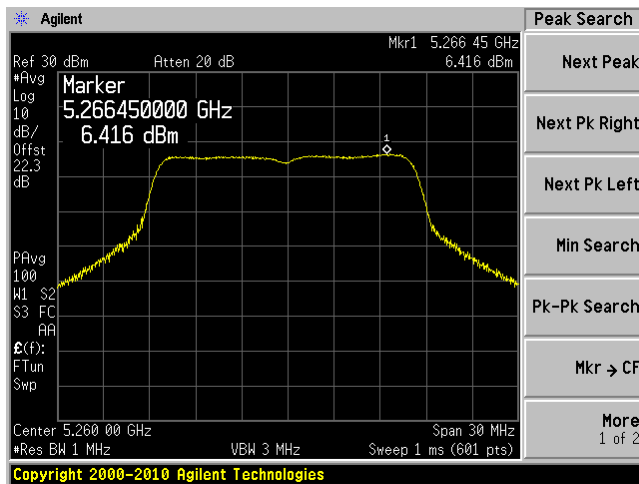
802.11a mode, 5320 MHz, Chain J0

802.11a mode, 5320 MHz, Chain J1

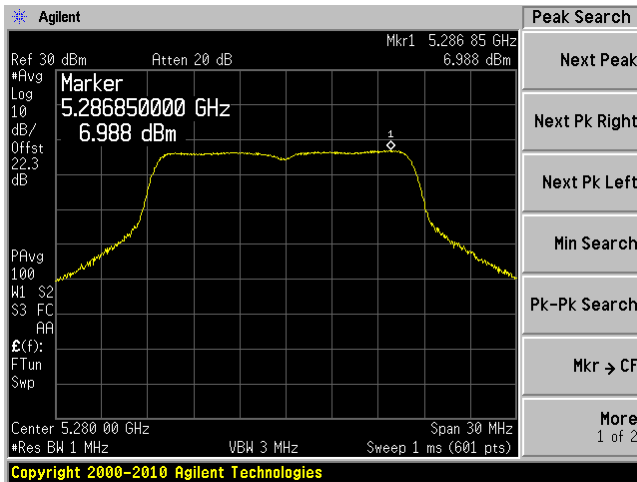


802.11n HT20 mode, 5260 MHz, Chain J0

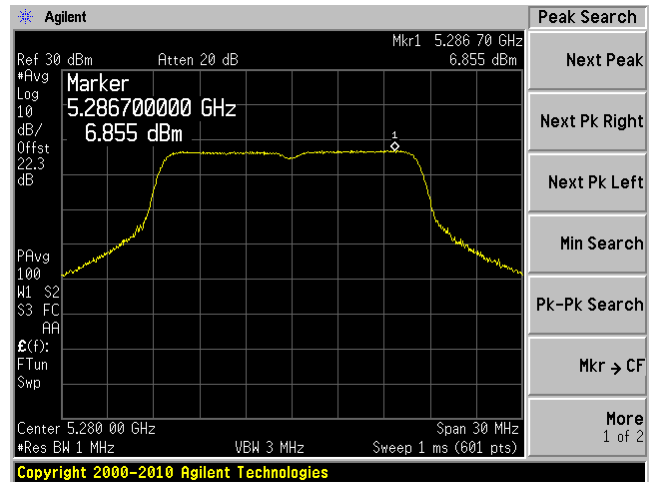
802.11n HT20 mode, 5260 MHz, Chain J1



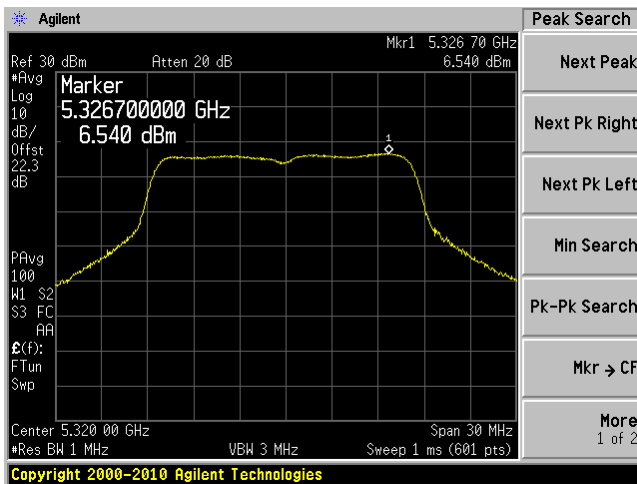
802.11n HT20 mode, 5280 MHz, Chain J0



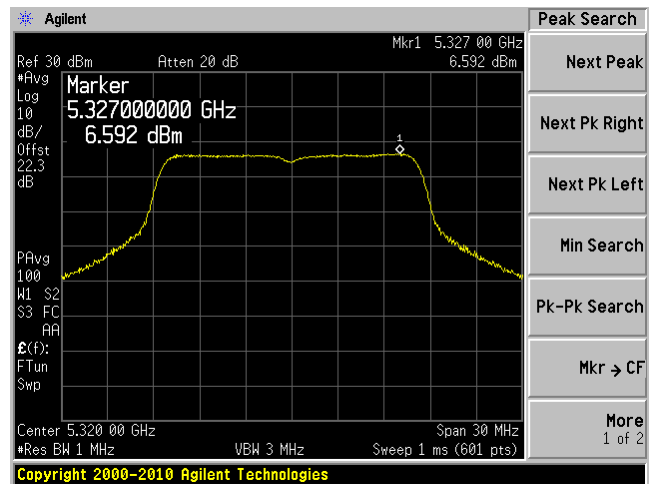
802.11n HT20 mode, 5280 MHz, Chain J1



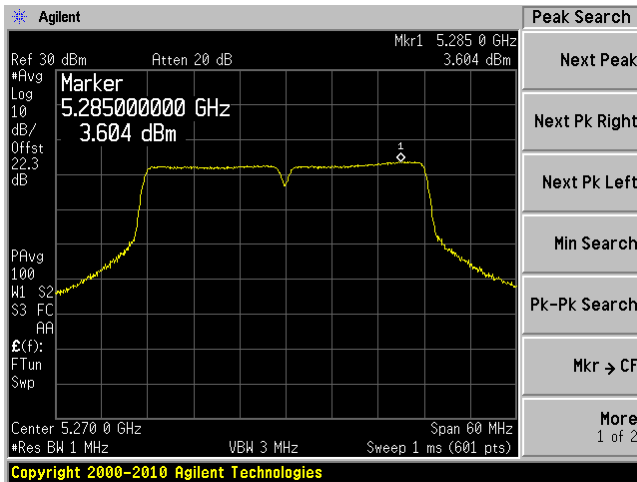
802.11n HT20 mode, 5320 MHz, Chain J0



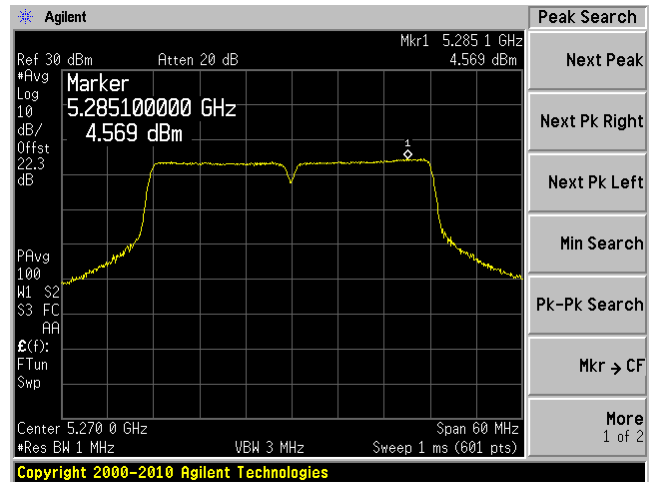
802.11n HT20 mode, 5320 MHz, Chain J1



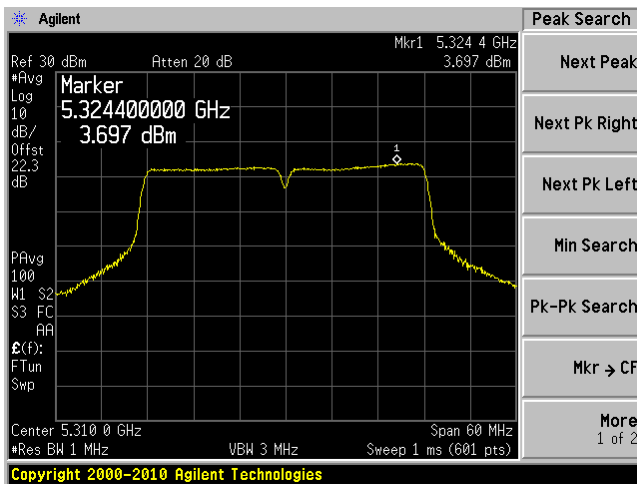
802.11n HT40 mode, 5270 MHz, Chain J0



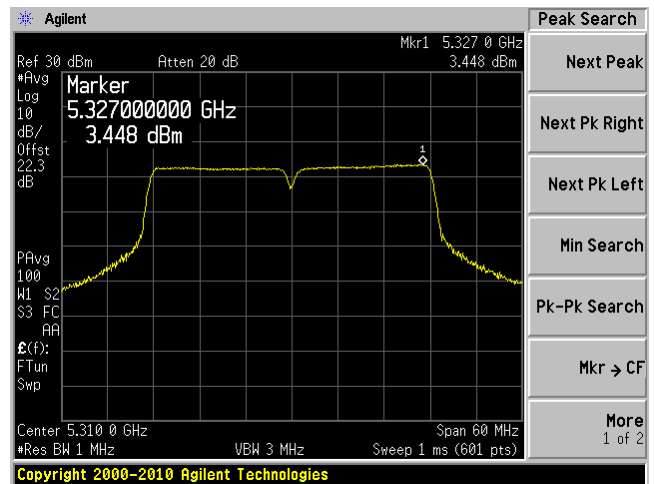
802.11n HT40 mode, 5270 MHz, Chain J1



802.11n HT40 mode, 5310 MHz, Chain J0

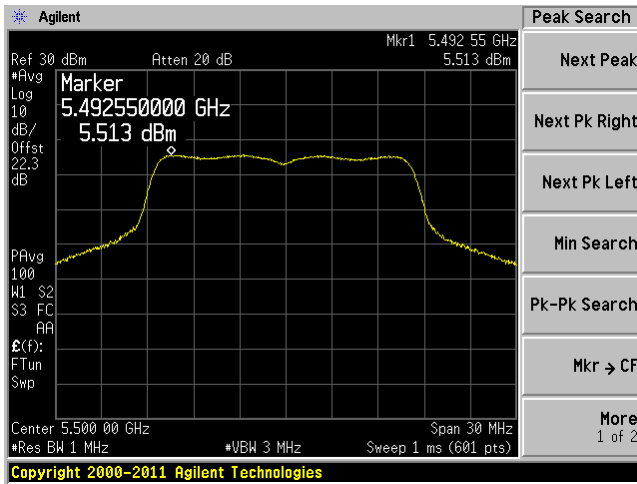


802.11n HT40 mode, 5310 MHz, Chain J1

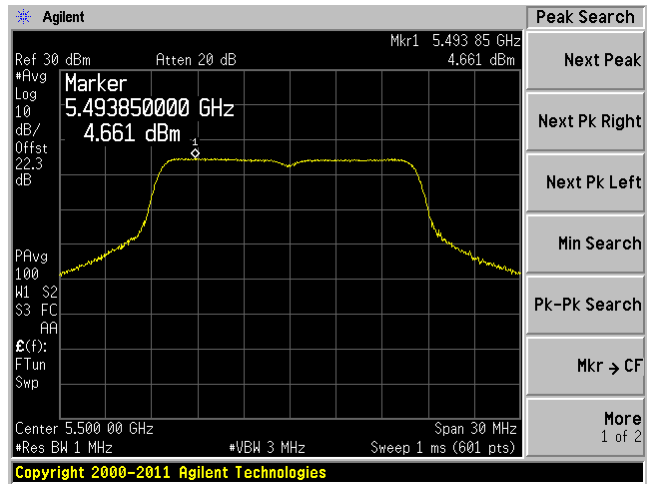


5470-5725 MHz Band

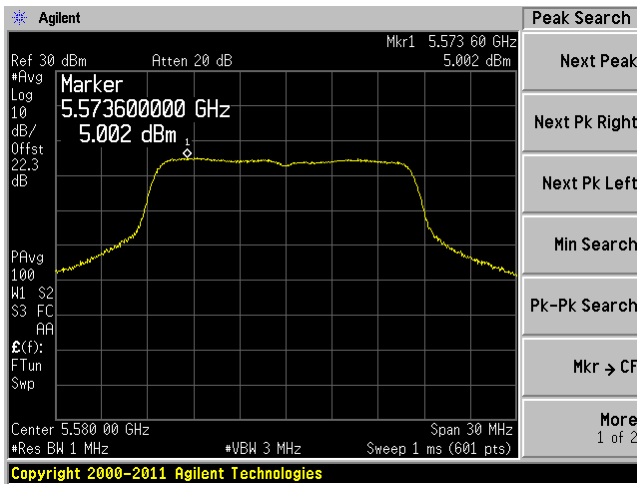
802.11a mode, 5500 MHz, Chain J0



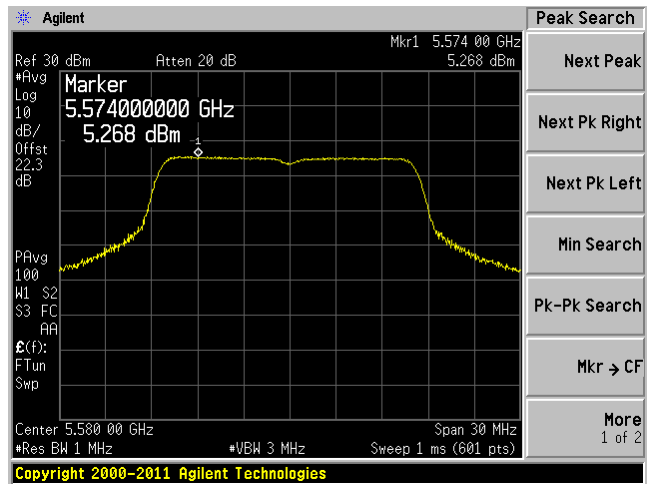
802.11a mode, 5500 MHz, Chain J1



802.11a mode, 5580 MHz, Chain J0

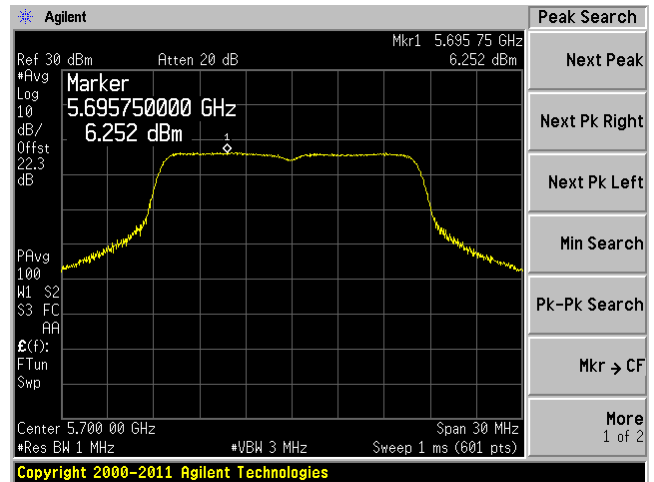
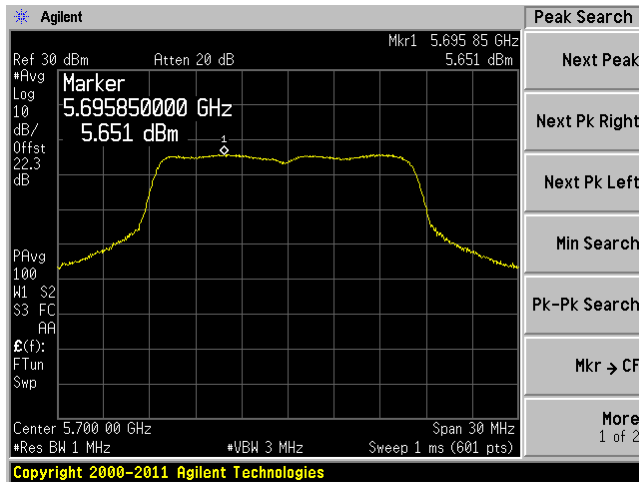


802.11a mode, 5580 MHz, Chain J1



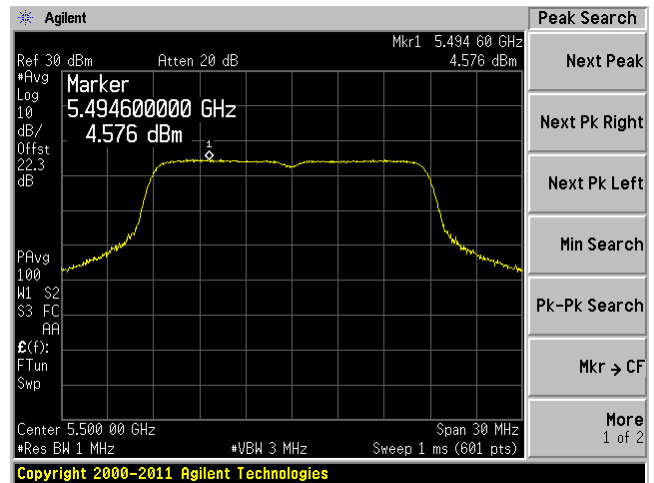
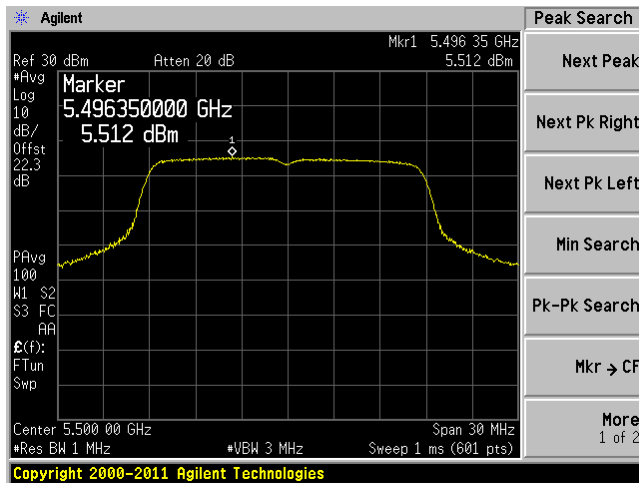
802.11a mode, 5700 MHz, Chain J0

802.11a mode, 5700 MHz, Chain J1

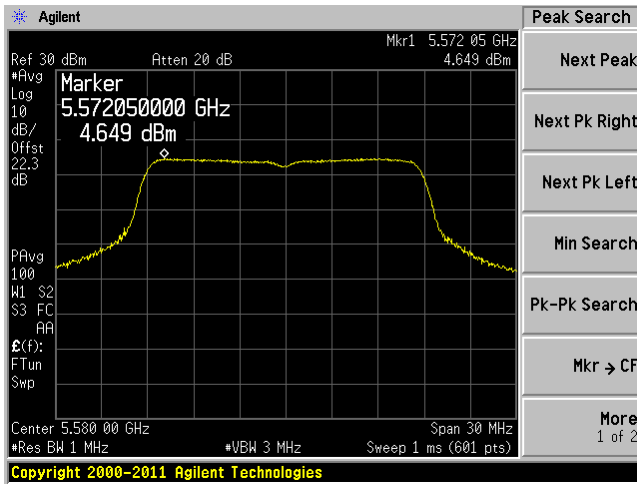


802.11n HT20 mode, 5500 MHz, Chain J0

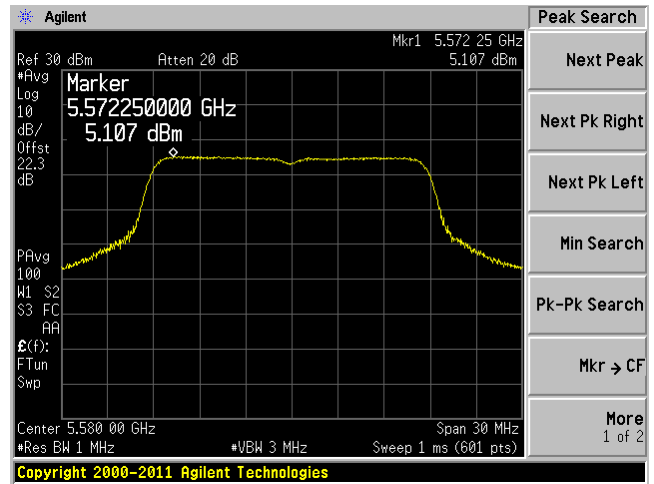
802.11n HT20 mode, 5500 MHz, Chain J1



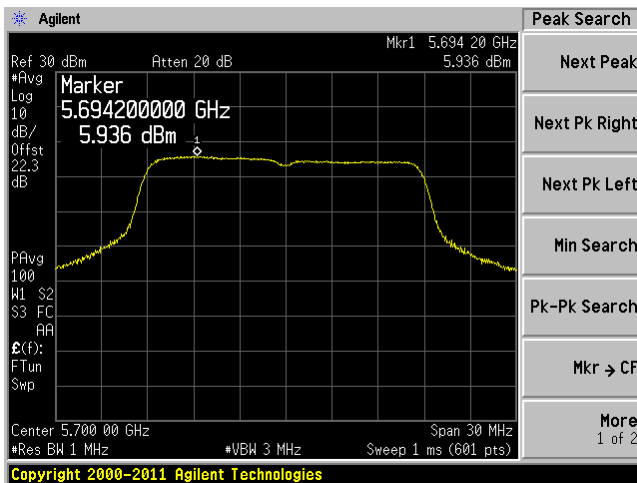
802.11n HT20 mode, 5580 MHz, Chain J0



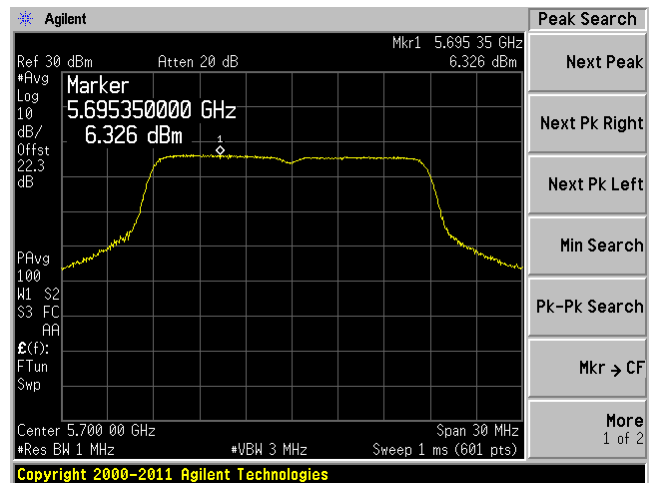
802.11n HT20 mode, 5580 MHz, Chain J1



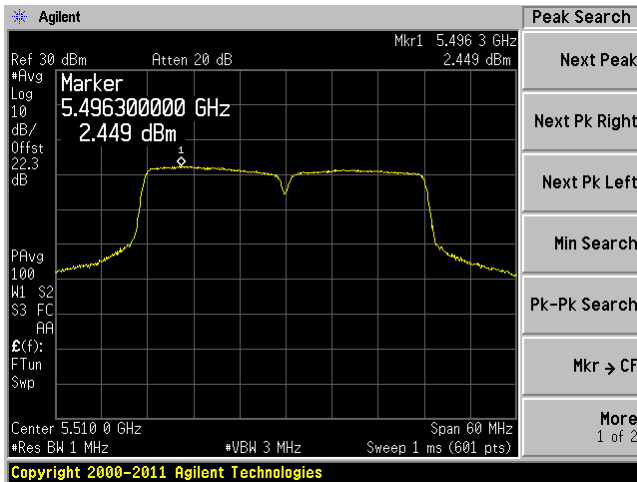
802.11n HT20 mode, 5700 MHz, Chain J0



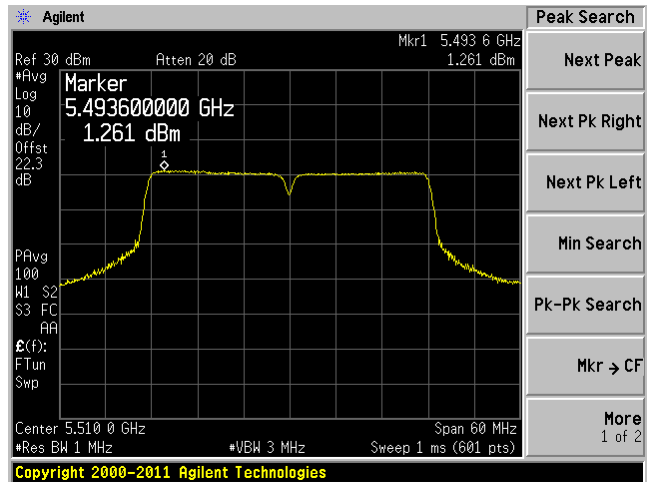
802.11n HT20 mode, 5700 MHz, Chain J1



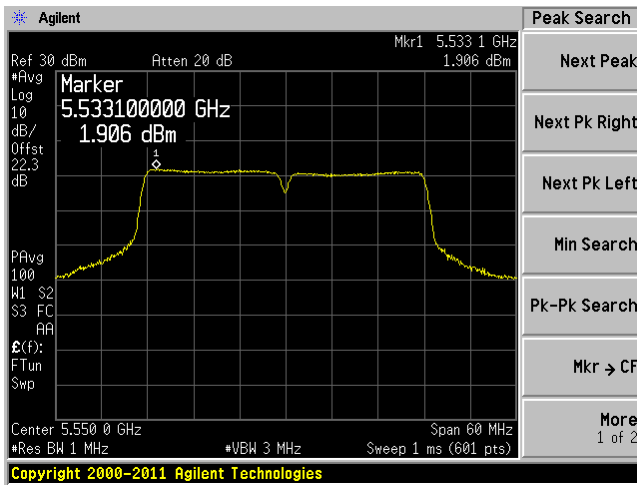
802.11n HT40 mode, 5510 MHz, Chain J0



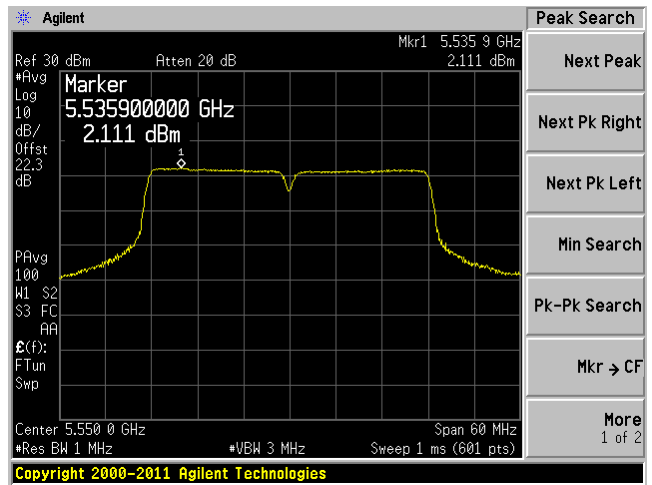
802.11n HT40 mode, 5510 MHz, Chain J1



802.11n HT40 mode, 5550 MHz, Chain J0

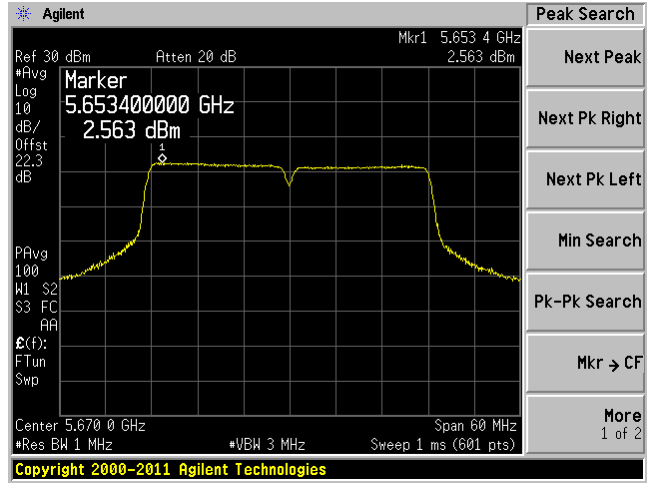
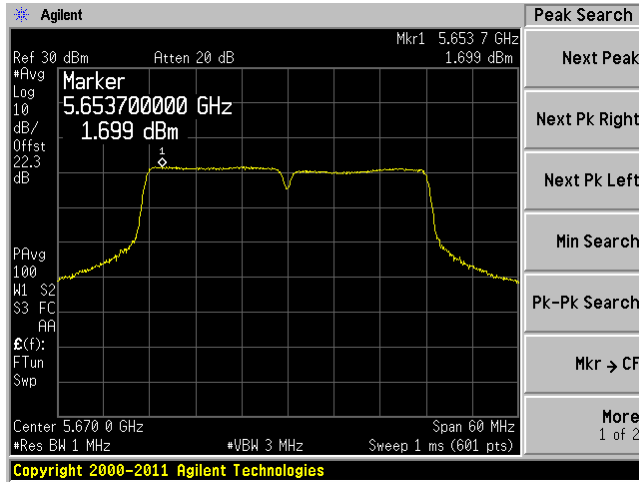


802.11n HT40 mode, 5550 MHz, Chain J1



802.11n HT40 mode, 5670 MHz, Chain J0

802.11n HT40 mode, 5670 MHz, Chain J1



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

Old:

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 section “FCC §15.407(a)(1)(2) – CONDUCTED TRANSMITTER OUTPUT POWER”.

New:

(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 \leq 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.

12.3 Test Equipment List and Details

Manufacturers	Description	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	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:	24 °C
Relative Humidity:	45 %
ATM Pressure:	101.1kPa

The testing was performed by Jeffrey Wu on 2012-10-22 in RF site.

12.5 Test Results

5250-5350 MHz Band

Channel	Frequency (MHz)	TX Chain J0 PER (dB)	TX Chain J1 PER (dB)	Limit (dB)
802.11a mode				
Low	5260	9.765	9.046	13
Middle	5280	10.659	8.742	
High	5320	8.325	8.340	
802.11n HT20 mode				
Low	5260	9.414	8.653	13
Middle	5280	9.278	9.123	
High	5320	8.770	8.847	
802.11n HT40 mode				
Low	5270	9.657	8.230	13
High	5310	10.070	9.167	

5470-5725 MHz Band

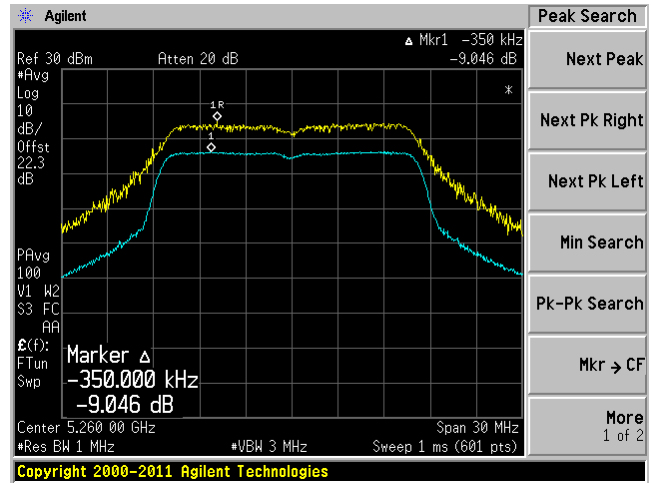
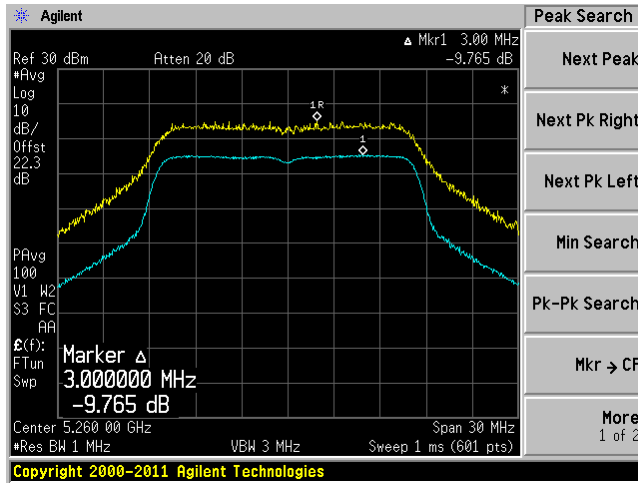
Channel	Frequency (MHz)	TX Chain J10 PER (dB)	TX Chain J8 PER (dB)	Limit (dB)
802.11a mode				
Low	5500	9.356	8.953	13
Middle	5580	8.948	8.305	
High	5700	10.107	8.237	
802.11n HT20 mode				
Low	5500	7.919	8.375	13
Middle	5580	8.261	8.687	
High	5700	8.451	8.802	
802.11n HT40 mode				
Low	5510	8.555	8.653	13
Middle	5550	8.776	8.858	
High	5670	8.606	8.231	

Please refer to the following plots for detailed test results:

5250-5350 MHz Band

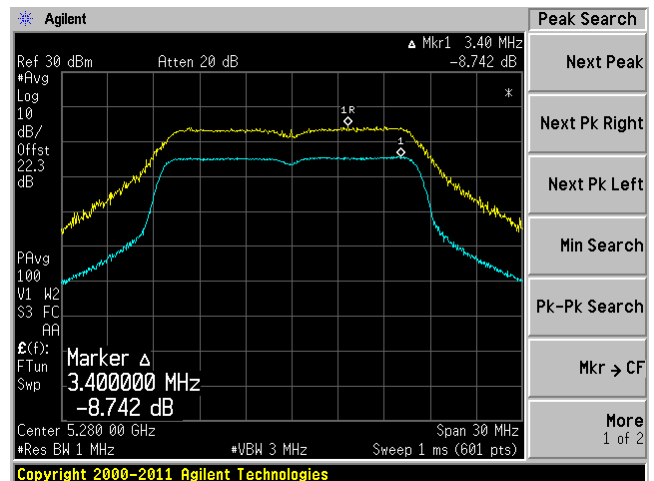
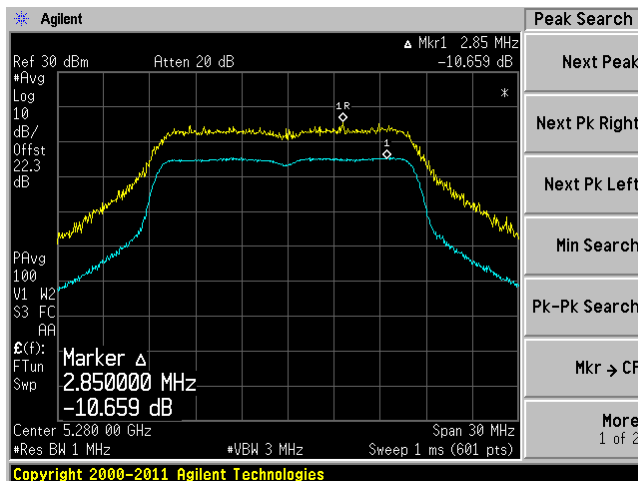
802.11a mode, 5260 MHz, Chain J0

802.11a mode, 5260 MHz, Chain J1

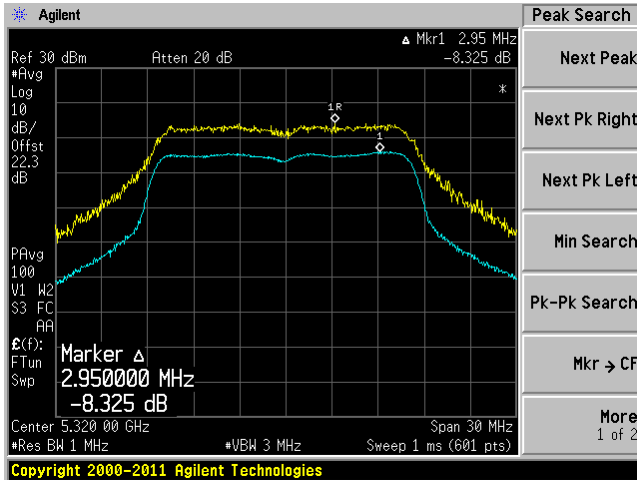


802.11a mode, 5280 MHz, Chain J0

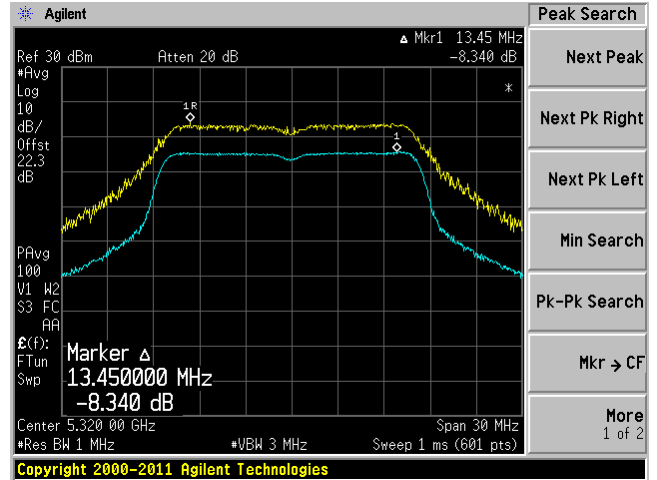
802.11a mode, 5280 MHz, Chain J1



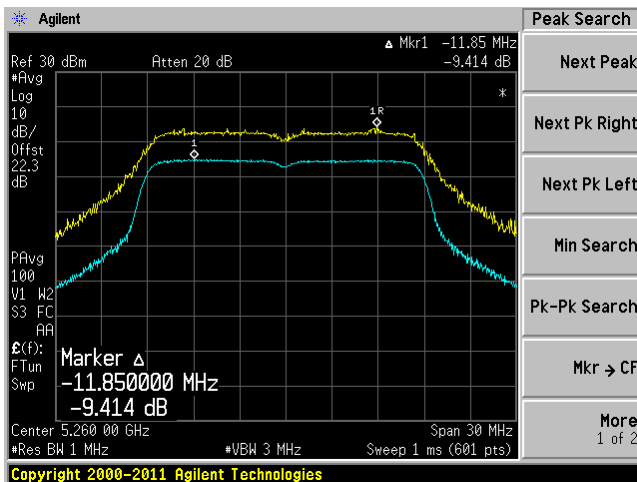
802.11a mode, 5320 MHz, Chain J0



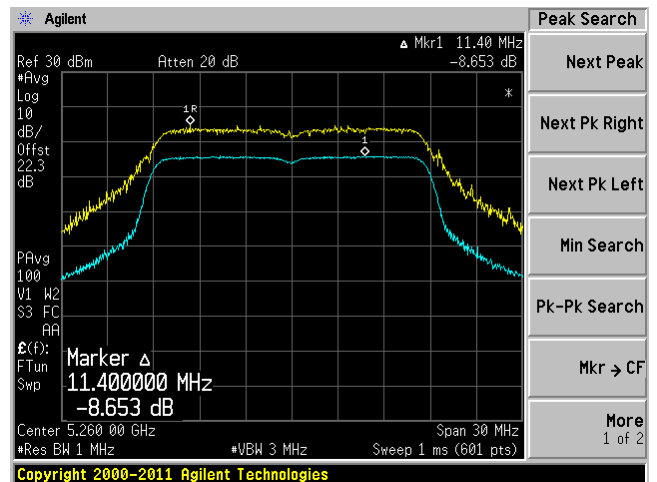
802.11a mode, 5320 MHz, Chain J1



802.11n HT20 mode, 5260 MHz, Chain J0

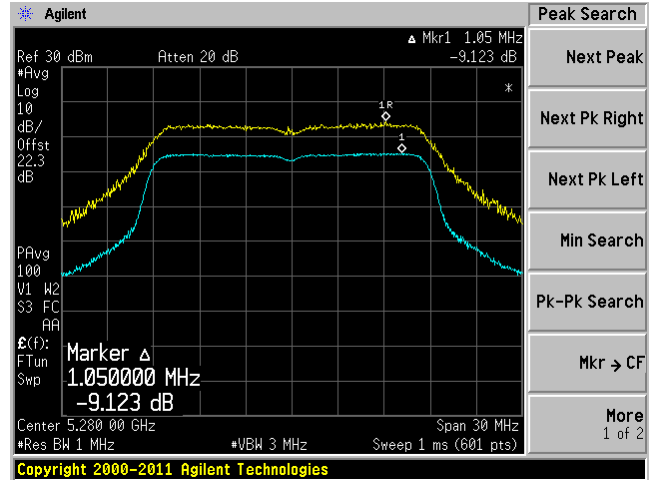
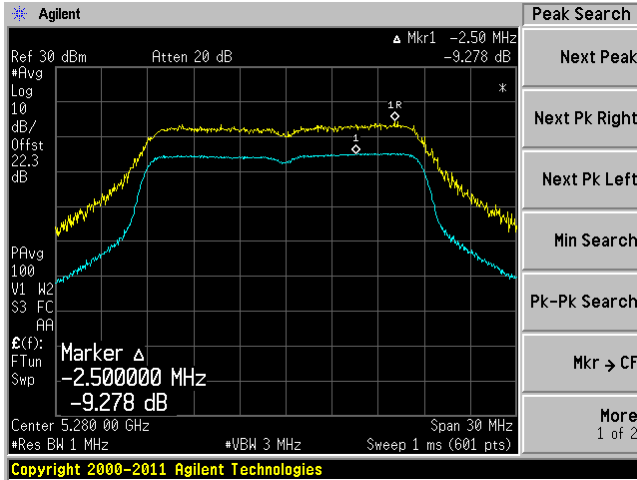


802.11n HT20 mode, 5260 MHz, Chain J1



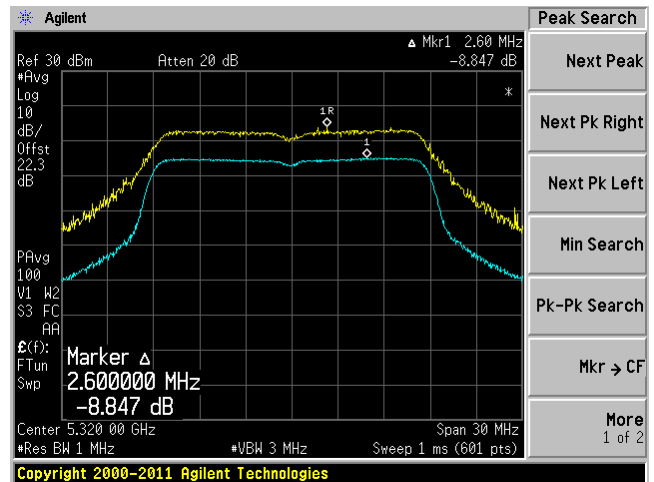
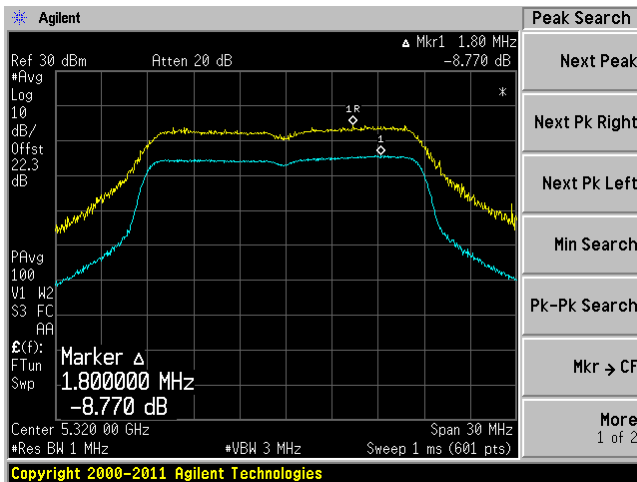
802.11n HT20 mode, 5280 MHz, Chain J0

802.11n HT20 mode, 5280 MHz, Chain J1

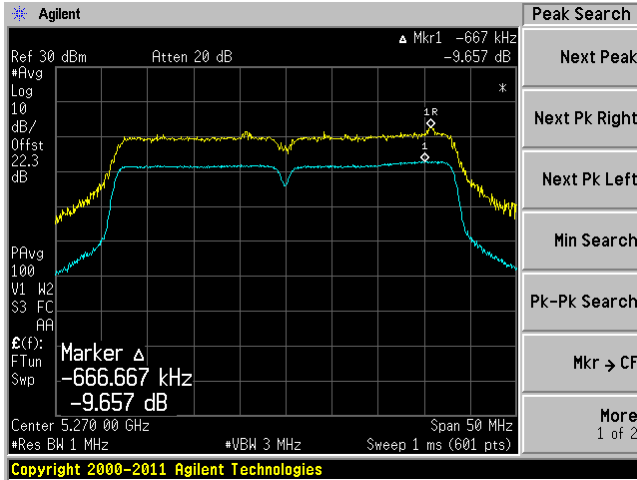


802.11n HT20 mode, 5320 MHz, Chain J0

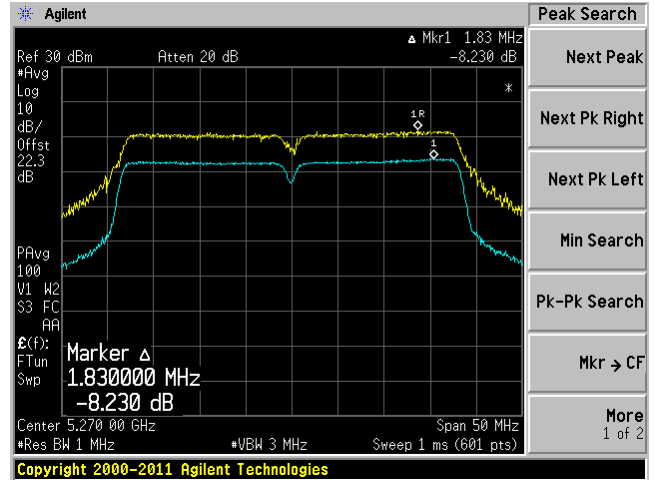
802.11n HT20 mode, 5320 MHz, Chain J1



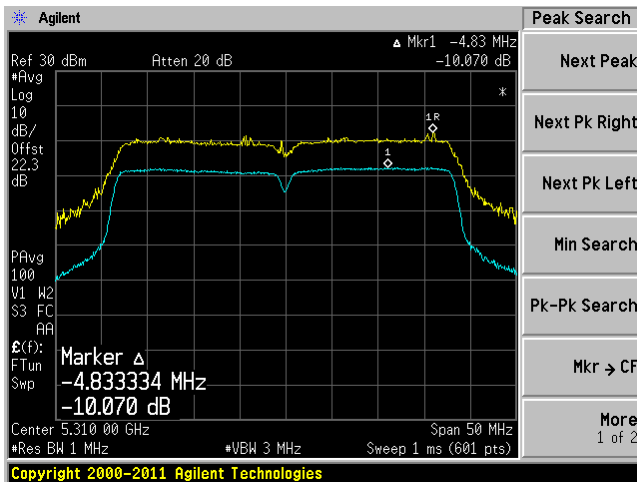
802.11n HT40 mode, 5270 MHz, Chain J0



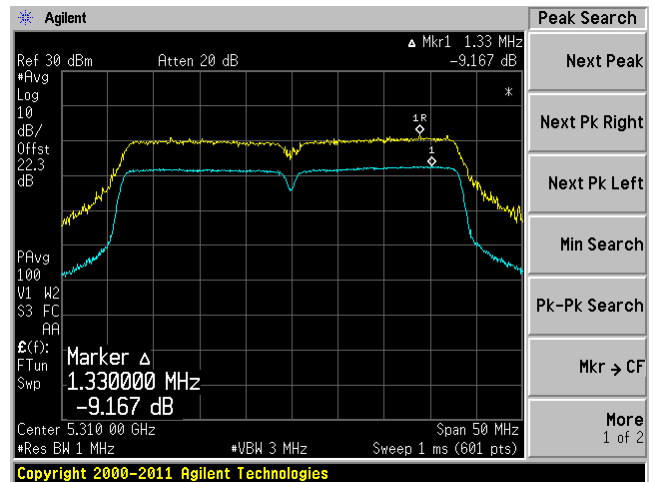
802.11n HT40 mode, 5270 MHz, Chain J1



802.11n HT40 mode, 5310 MHz, Chain J0



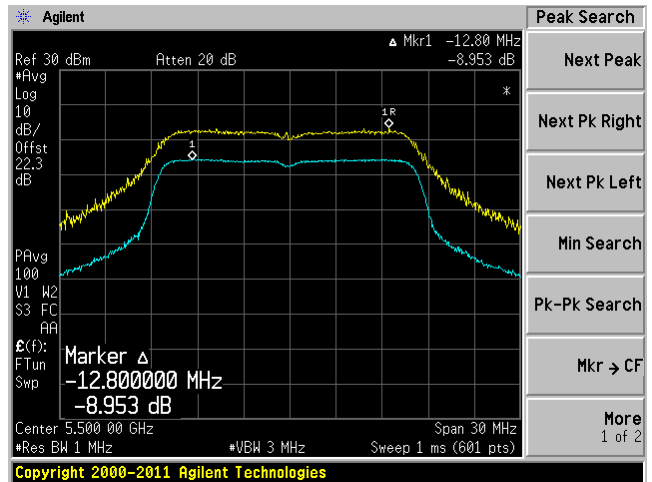
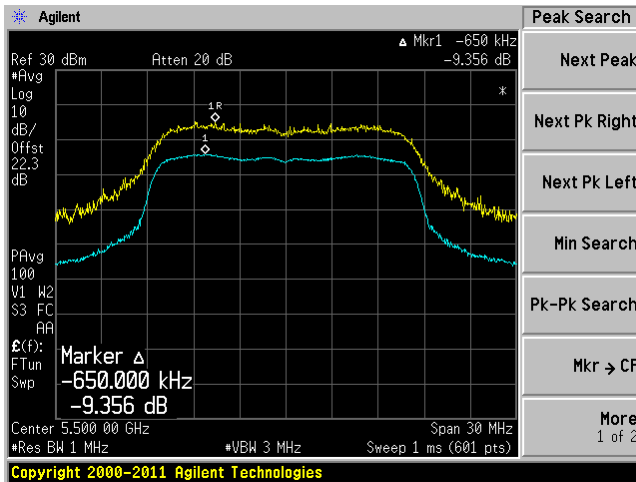
802.11n HT40 mode, 5310 MHz, Chain J1



5470-5725 MHz Band

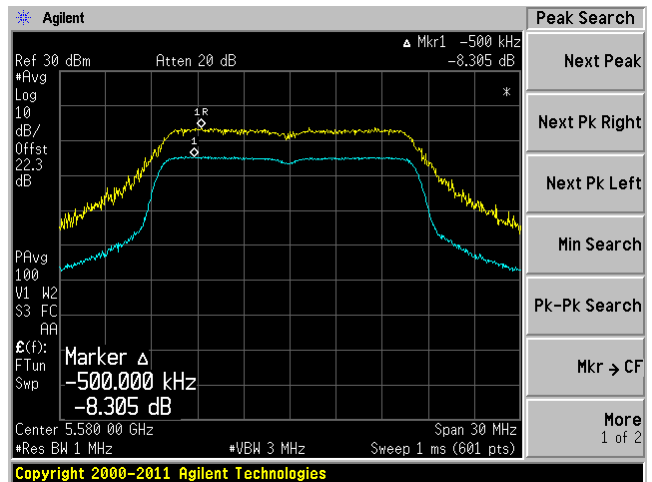
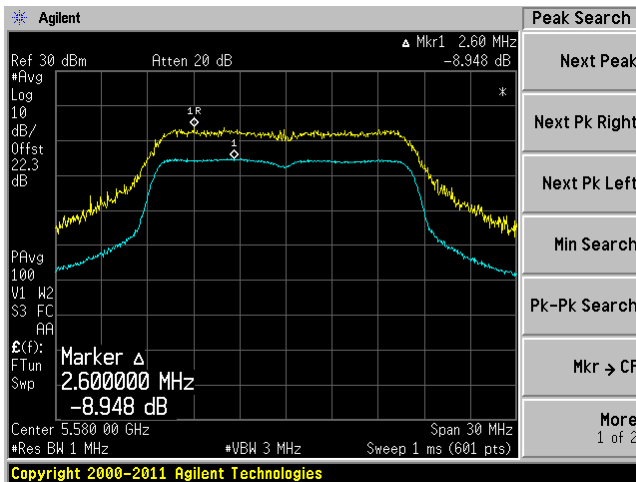
802.11a mode, 5500 MHz, Chain J0

802.11a mode, 5500 MHz, Chain J1

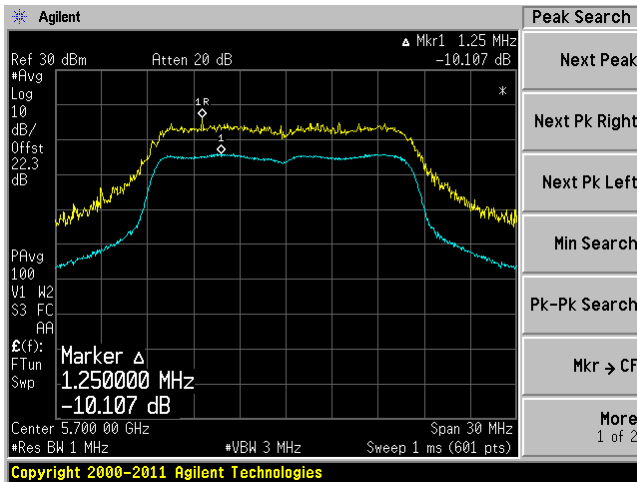


802.11a mode, 5580 MHz, Chain J0

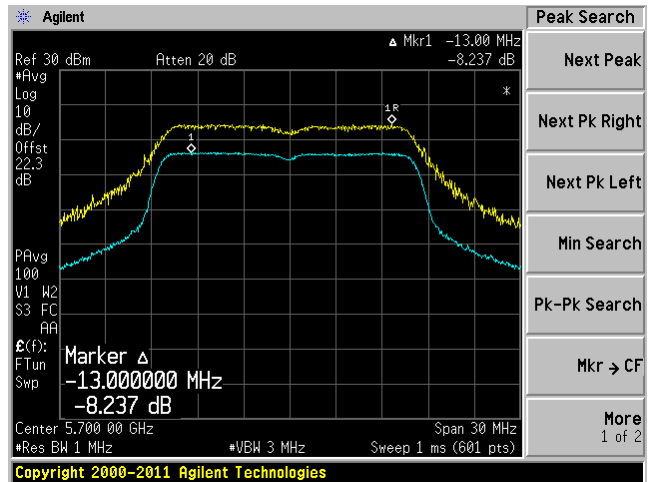
802.11a mode, 5580 MHz, Chain J1



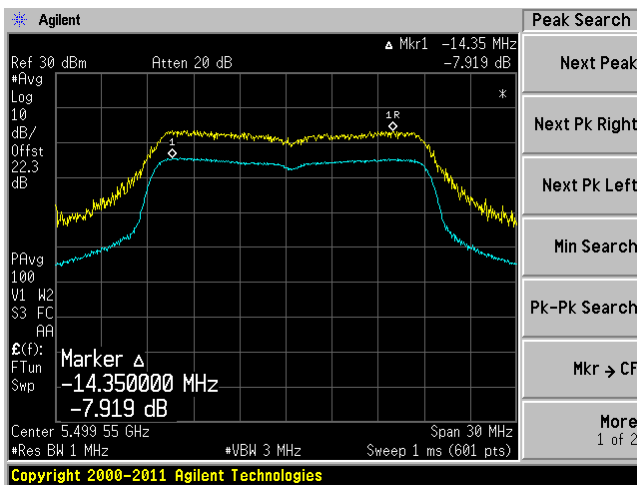
802.11a mode, 5700 MHz, Chain J0



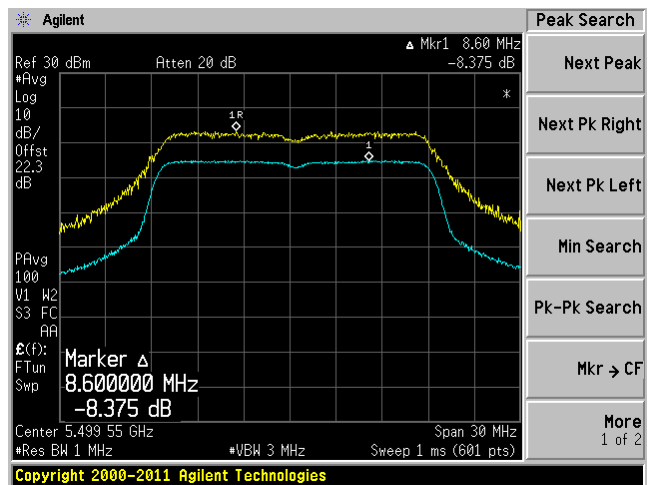
802.11a mode, 5700 MHz, Chain J1



802.11n HT20 mode, 5500 MHz, Chain J0

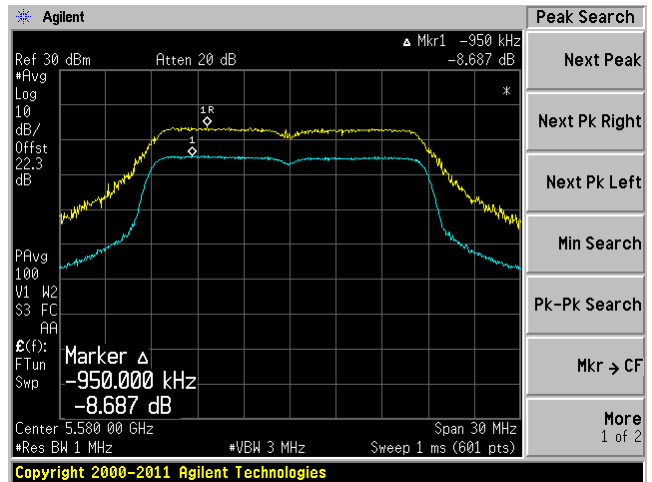
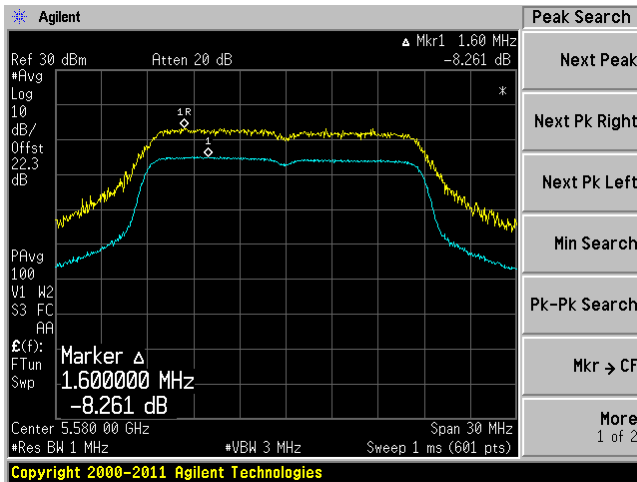


802.11n HT20 mode, 5500 MHz, Chain J1



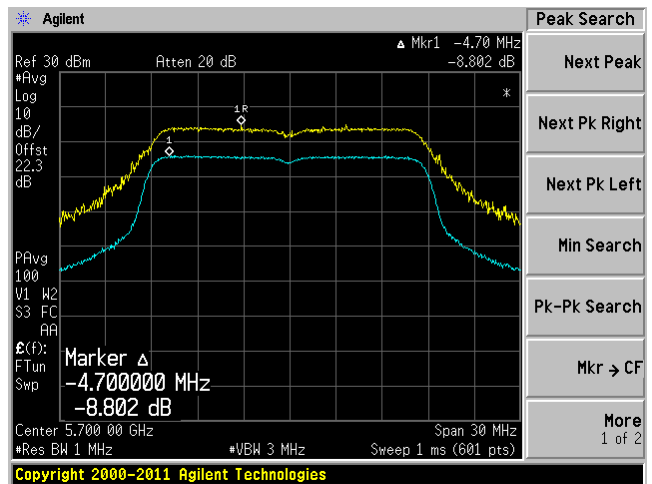
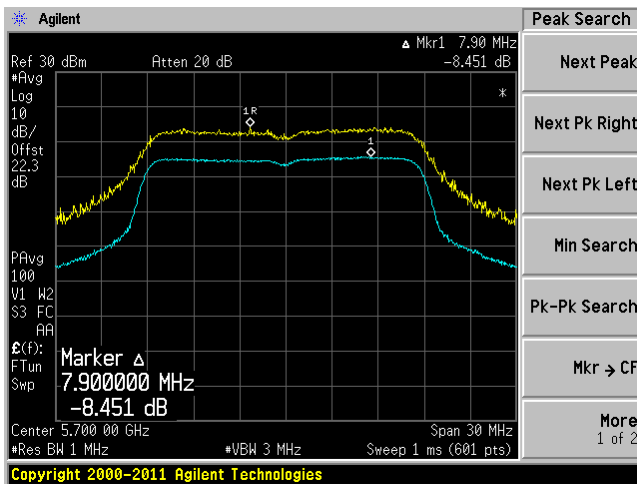
802.11n HT20 mode, 5580 MHz, Chain J0

802.11n HT20 mode, 5580 MHz, Chain J1



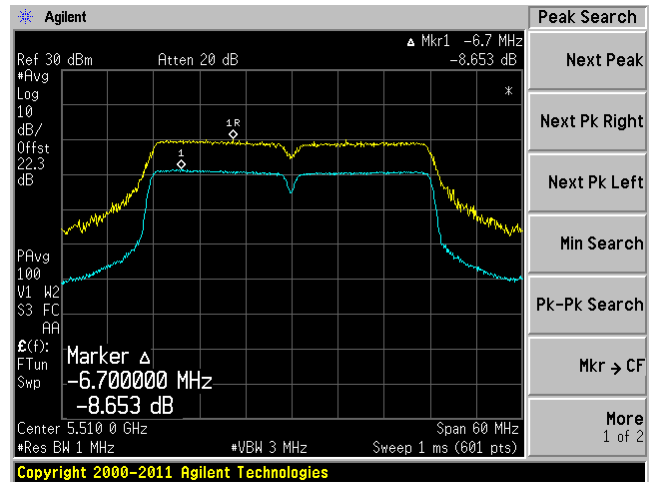
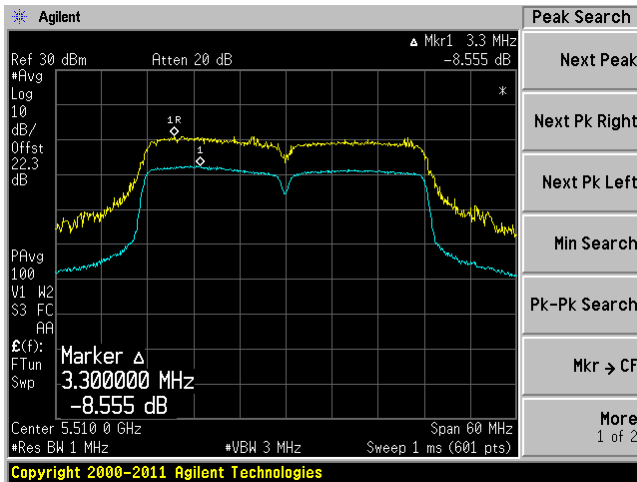
802.11n HT20 mode, 5700 MHz, Chain J0

802.11n HT20 mode, 5700 MHz, Chain J1



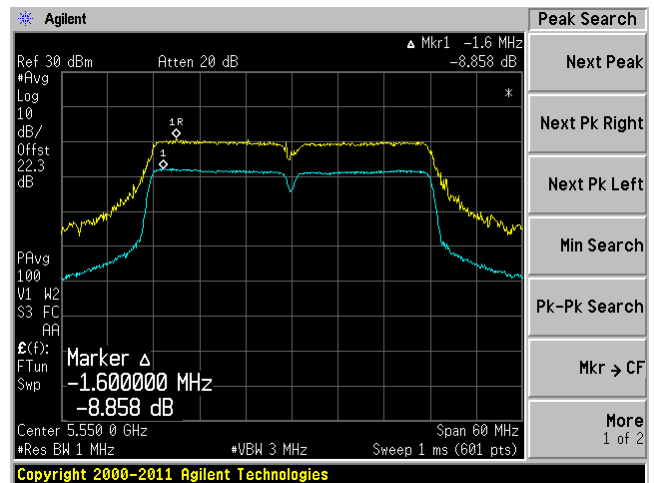
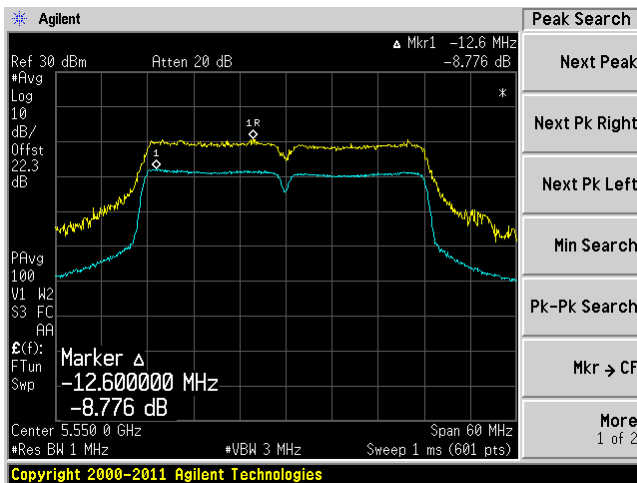
802.11n HT40 mode, 5510 MHz, Chain J0

802.11n HT40 mode, 5510 MHz, Chain J1



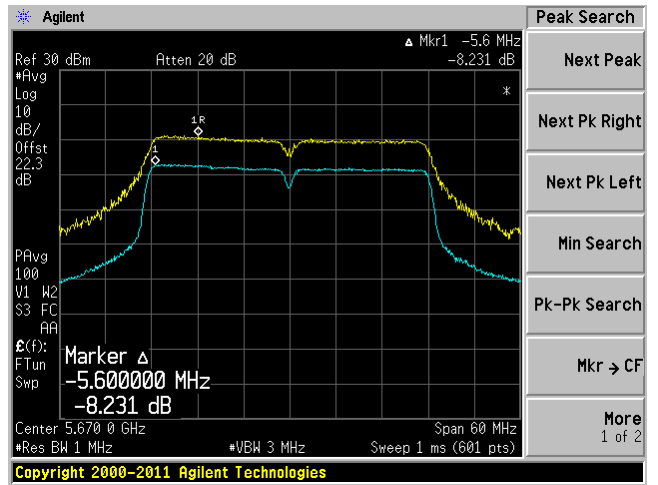
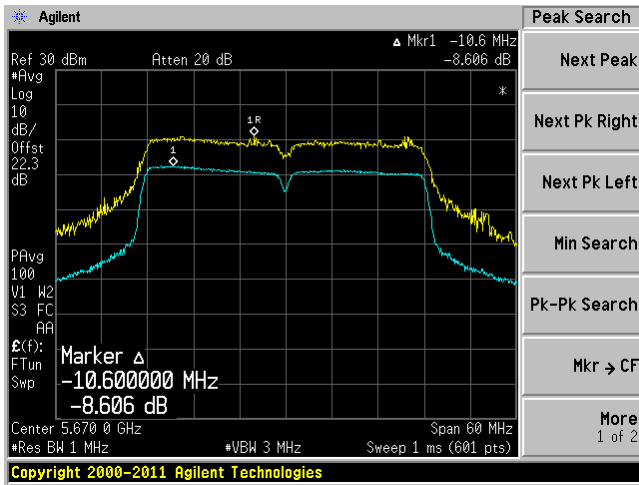
802.11n HT40 mode, 5550 MHz, Chain J0

802.11n HT40 mode, 5550 MHz, Chain J1



802.11n HT40 mode, 5670 MHz, Chain J0

802.11n HT40 mode, 5670 MHz, Chain J1



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

13.1 Applicable Standard

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

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

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

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

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

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

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

13.2 EUT Setup

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

13.3 Test Procedure

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

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

13.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + AF + CL + Atten - Ga$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

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

13.5 Test Equipment Lists and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2012-08-15	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	E4440A	US42221851	2012-02-28	1 year
Sunol Science Corp	Horn Antenna	DHR-118	A052704	2012-02-24	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2012-03-22	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:	23°C
Relative Humidity:	44 %
ATM Pressure:	101.2kPa

The testing was performed by Jeffrey Wu on 2012-10-16 at 5 meter 3.

13.7 Summary of Test Results

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

Unwanted Emissions and Receiving Spurious Emission, (30MHz - 18 GHz):

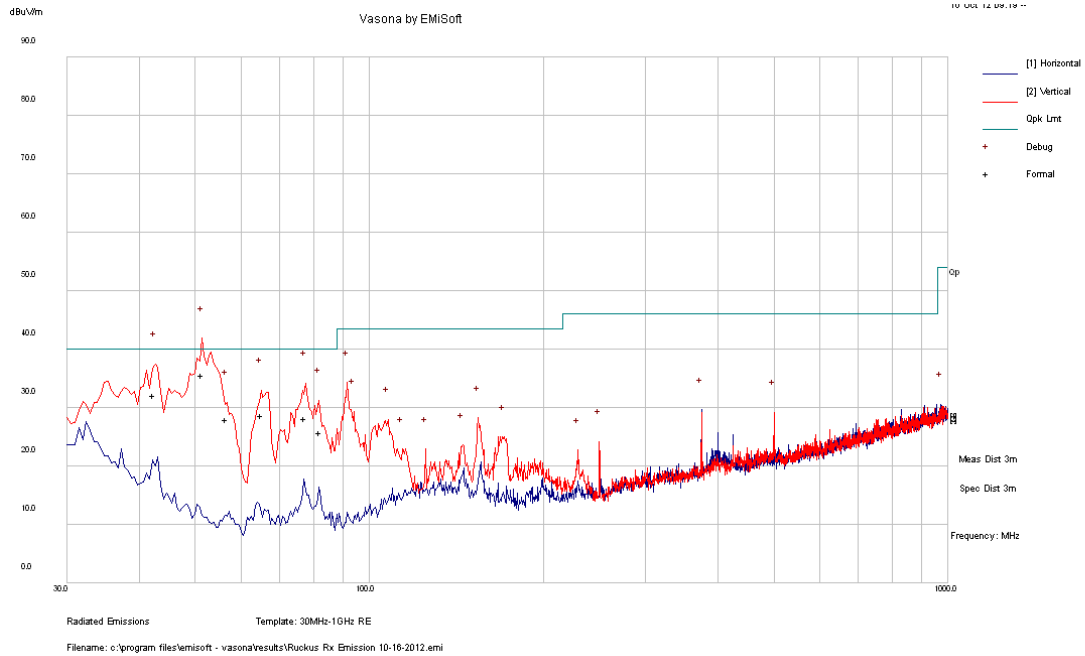
Mode: Receiving			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range (MHz)
-4.44	51.42024	Vertical	30-18000

Note: Both 2.4GHz and 5GHz radios were under receiver mode.

13.8 Radiated Emissions Test Result Data

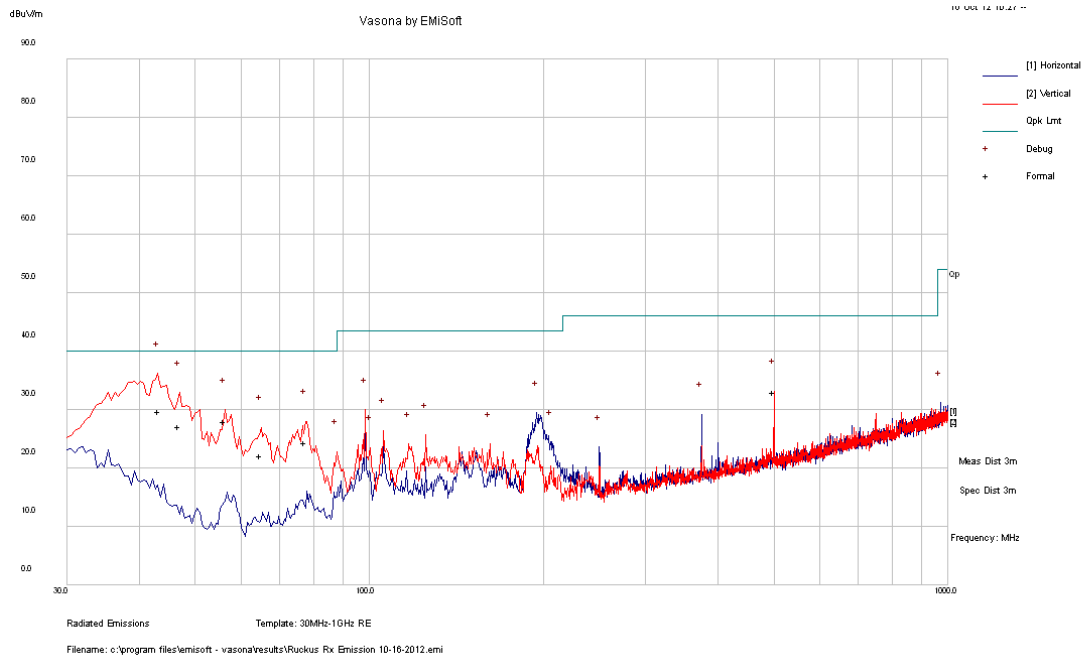
(1) Radiated Emission at 3 meters, 30 MHz – 1 GHz

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)
42.442	32.12	170	V	344	40	-7.88	QP
51.42025	35.56	100	V	105	40	-4.44	QP
56.61875	27.99	107	V	8	40	-12.01	QP
65.07825	28.78	119	V	59	40	-11.22	QP
77.4055	28.16	192	V	341	40	-11.84	QP
82.05875	25.87	175	V	336	40	-14.13	QP

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)
43.33925	29.81	177	V	249	40	-10.19	QP
46.80575	27.16	100	V	17	40	-12.84	QP
56.093	27.95	136	V	33	40	-12.05	QP
64.89475	22.22	259	V	239	40	-17.78	QP
77.50725	24.37	99	V	92	40	-15.63	QP
500.0055	33	107	V	111	46	-13.00	QP

(2) Radiated Emission at 3 meters, above 1 GHz**AC/DC Adaptor**

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dB μ V/m)	Margin (dB)	Detector (Peak/Ave)
2211	40.670	100	V	164	74	-33.330	Peak
2211	39.160	100	H	349	74	-34.840	Peak
2211	25.890	100	V	164	54	-28.110	Ave
2211	25.900	100	H	349	54	-28.100	Ave
2779	41.506	100	V	175	74	-32.494	Peak
2779	41.786	102	H	350	74	-32.214	Peak
2779	26.726	100	V	175	54	-27.274	Ave
2779	26.706	102	H	350	54	-27.294	Ave
12349	52.103	103	V	230	74	-21.897	Peak
12349	52.883	100	H	165	74	-21.117	Peak
12349	37.793	103	V	230	54	-16.207	Ave
12349	37.843	100	H	165	54	-16.157	Ave

POE

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dB μ V/m)	Margin (dB)	Detector (Peak/Ave)
1125	38.066	100	V	198	74	-35.934	Peak
1125	37.946	100	H	318	74	-36.054	Peak
1125	27.176	100	V	198	54	-26.824	Ave
1125	25.526	100	H	318	54	-28.474	Ave
1921	39.887	100	V	200	74	-34.113	Peak
1921	39.837	100	H	320	74	-34.163	Peak
1921	25.007	100	V	200	54	-28.993	Ave
1921	25.117	100	H	320	54	-28.883	Ave
3149	41.687	100	V	0	74	-32.313	Peak
3149	44.407	115	H	216	74	-29.593	Peak
3149	27.137	100	V	0	54	-26.863	Ave
3149	31.647	115	H	216	54	-22.353	Ave

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

14.1 Applicable Standard

According to FCC §15.407(b)

For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15–5.25 GHz band. For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz.

For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27 dBm/MHz

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

Old version:

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

New version:

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.

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 \geq 3 MHz.
 - (iii) Detector = RMS, if span/(# of points in sweep) \leq 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 is $10 \log(1/x)$, 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

Manufacturers	Description	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2AL requirements, traceable to the NIST.

14.4 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	45 %
ATM Pressure:	101.1 kPa

The testing was performed by Jeffrey Wu on 2012-10-22 in RF site.

14.5 Test Results

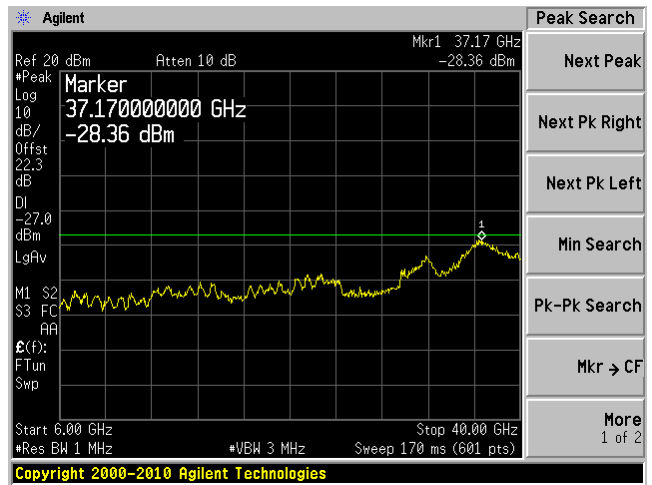
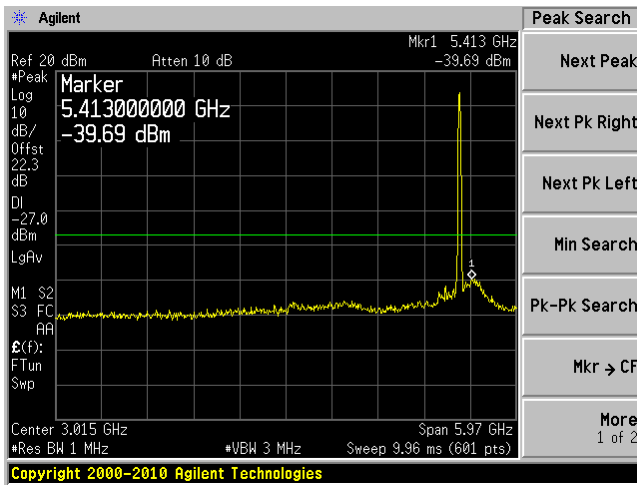
Please refer to following plots of spurious emissions.

5250-5350 MHz Band

802.11a mode, Low Channel

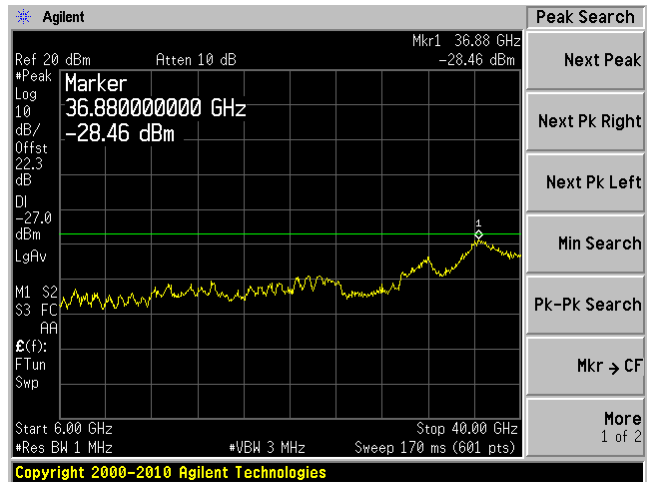
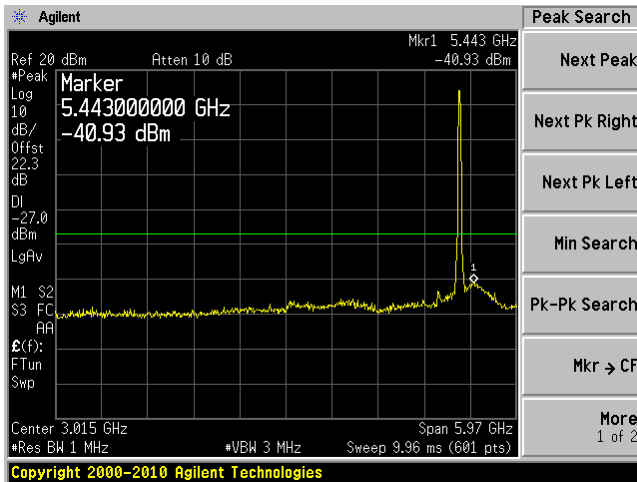
802.11 a mode, 5260 MHz, Chain J0 1

802.11 a mode, 5260 MHz, Chain J0 2



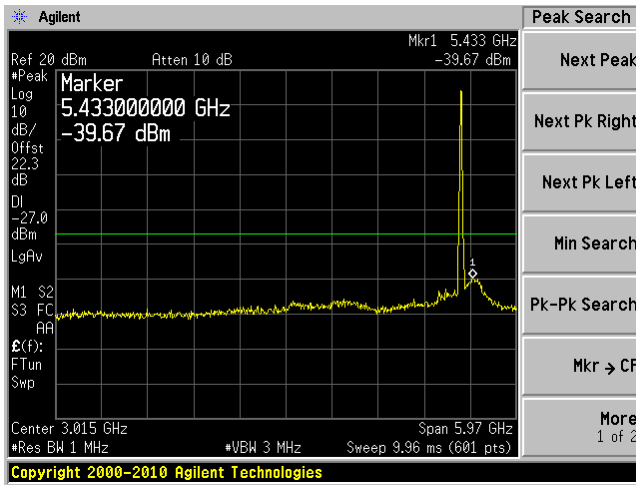
802.11a mode, 5260 MHz, Chain J1 1

802.11a mode, 5260 MHz, Chain J1 2

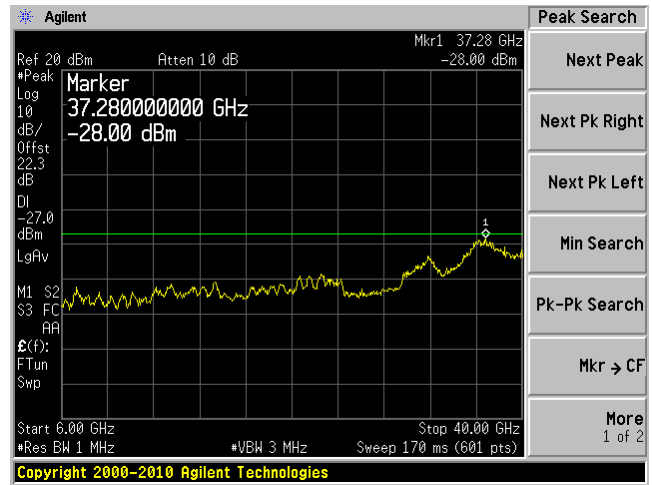


802.11a mode, Middle Channel

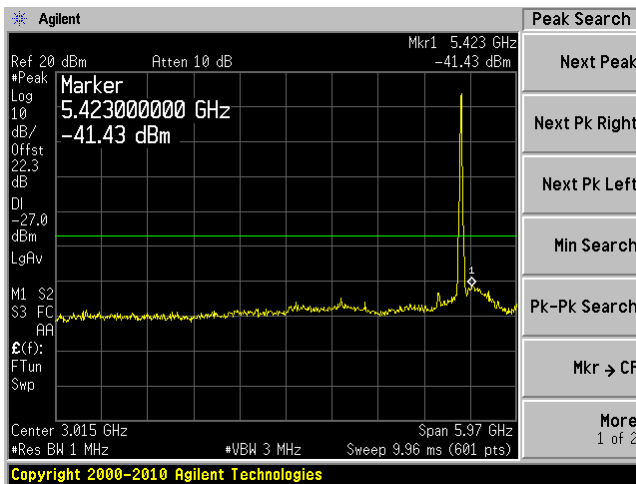
802.11a mode, 5280 MHz, Chain J0 1



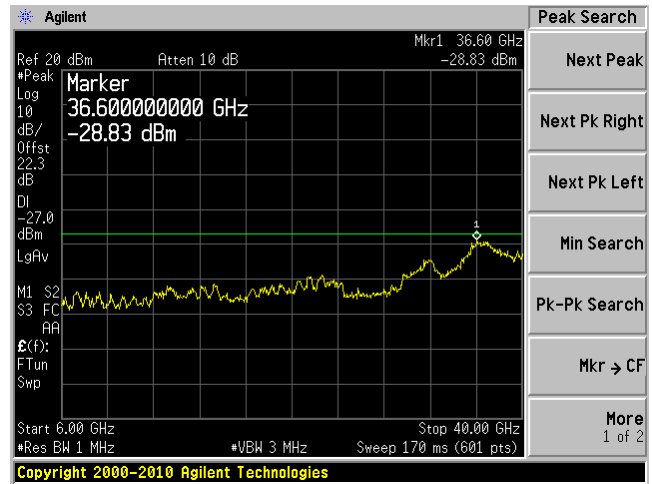
802.11a mode, 5280 MHz, Chain J0 2



802.11a mode, 5280 MHz, Chain J1 1



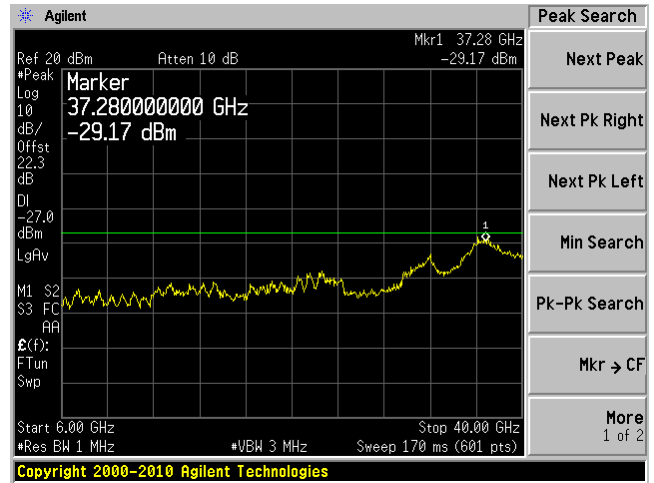
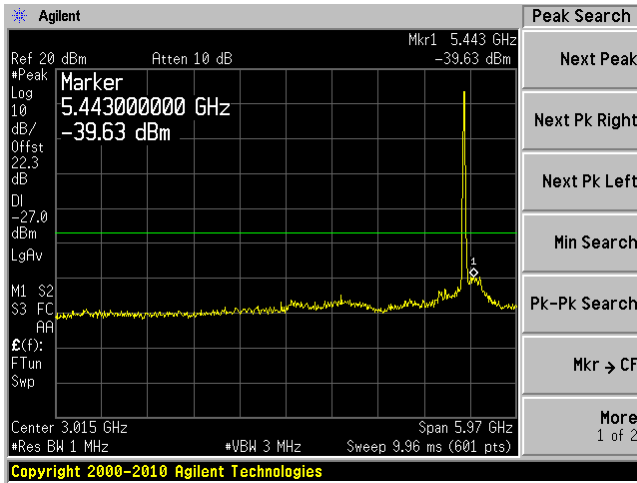
802.11a mode, 5280 MHz, Chain J1 2



802.11a mode, High Channel

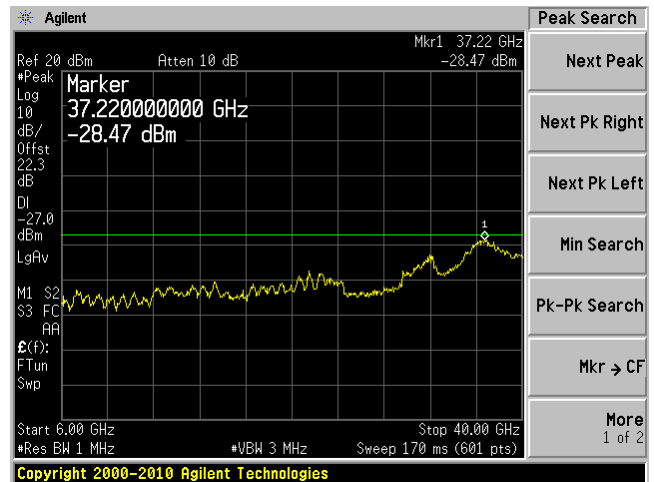
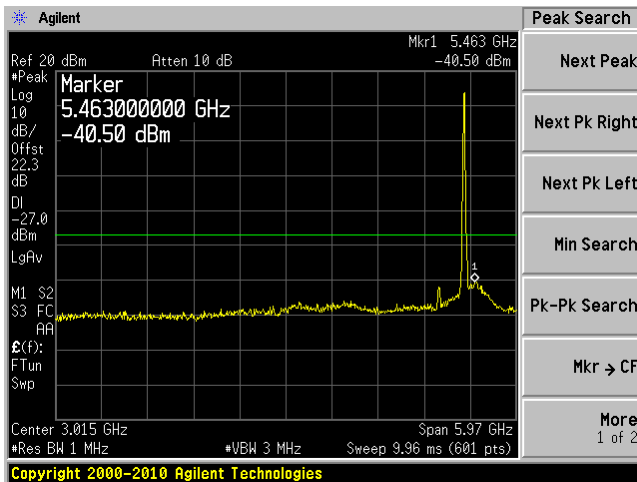
802.11 a mode, 5320 MHz, Chain J0 1

802.11a mode, 5320 MHz, Chain J0 2



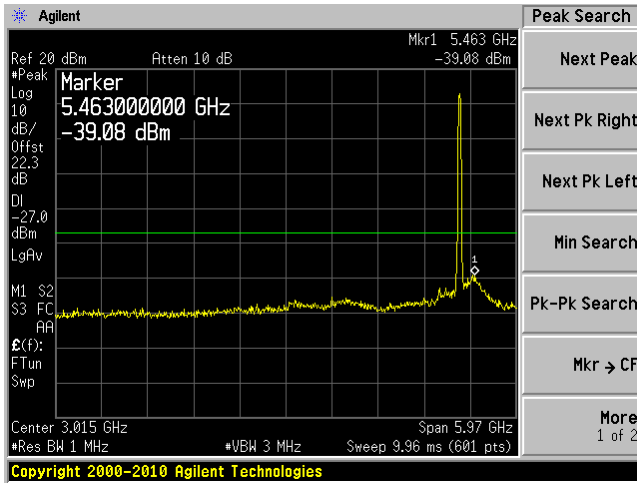
802.11a mode, 5320 MHz, Chain J1 1

802.11a mode, 5320 MHz, Chain J1 2

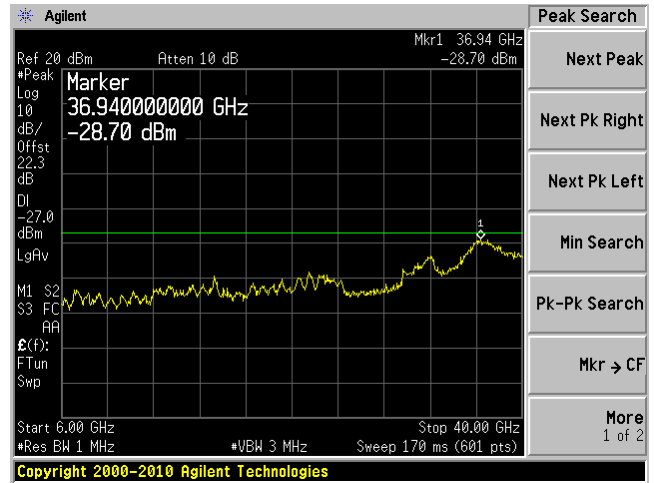


802.11n HT20 mode, Low channel

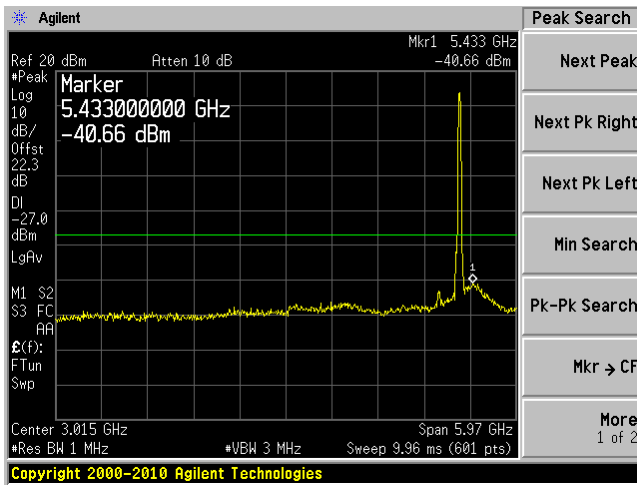
802.11n HT20 mode, 5260 MHz, Chain J0 1



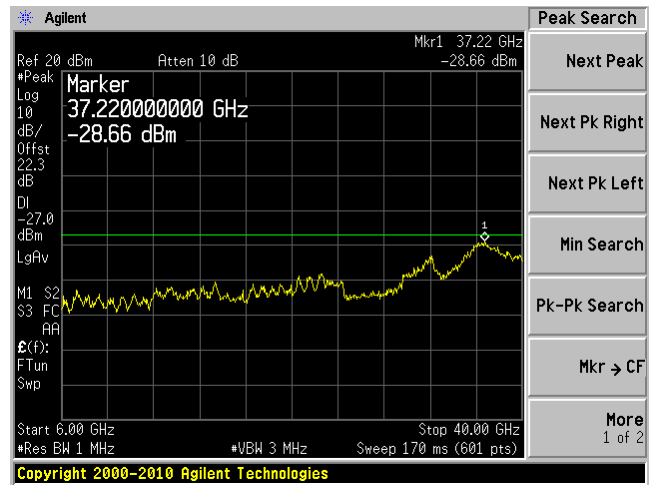
802.11n HT20 mode, 5260 MHz, Chain J0 2



802.11n HT20 mode, 5260 MHz, Chain J1 1

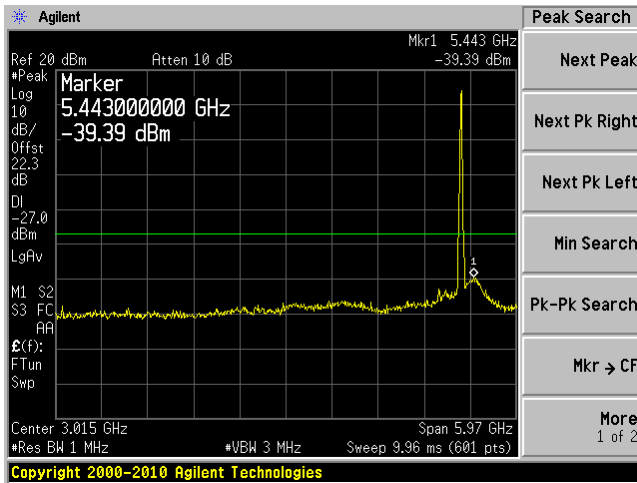


802.11n HT20 mode, 5260 MHz, Chain J1 2

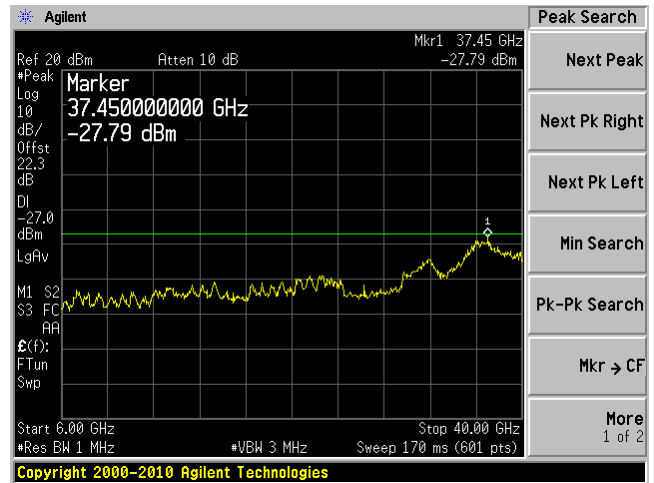


802.11n HT20 mode, Middle Channel

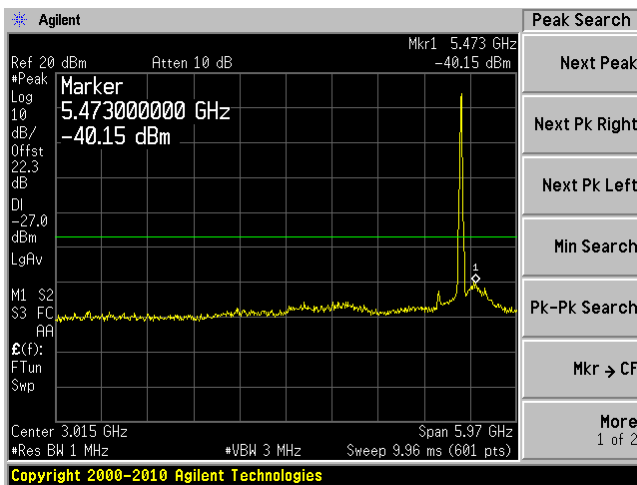
802.11n HT20 mode, 5280 MHz, Chain J0 1



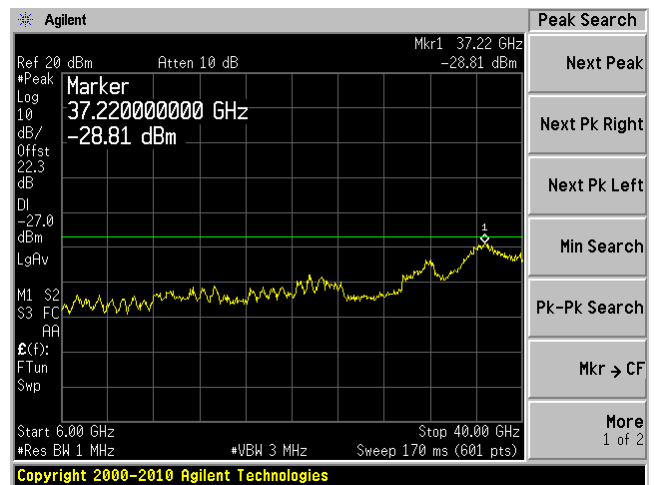
802.11n HT20 mode, 5280 MHz, Chain J0 2



802.11n HT20 mode, 5280 MHz, Chain J1 1

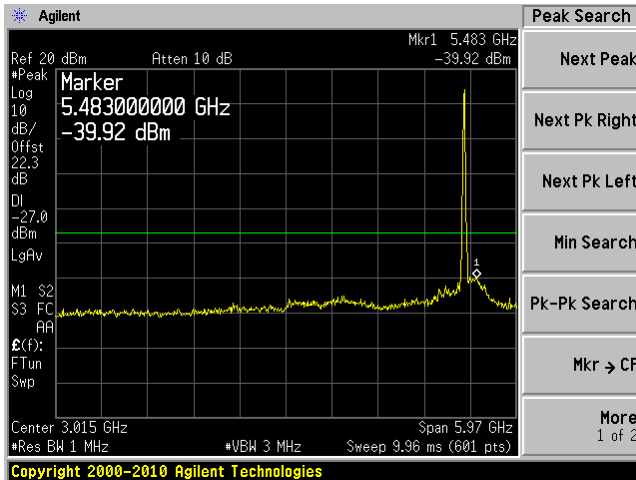


802.11n HT20 mode, 5280 MHz, Chain J1 2

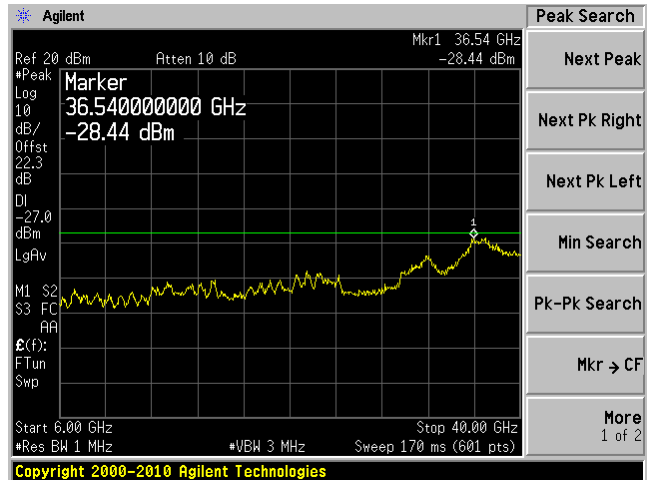


802.11n HT20 mode, High Channel

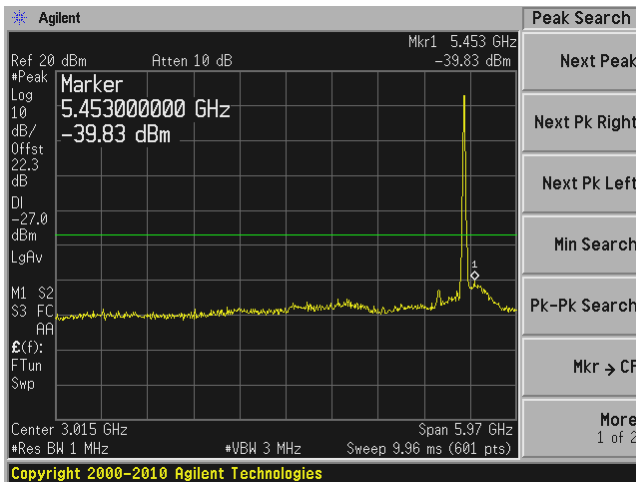
802.11n HT20 mode, 5320 MHz, Chain J0 1



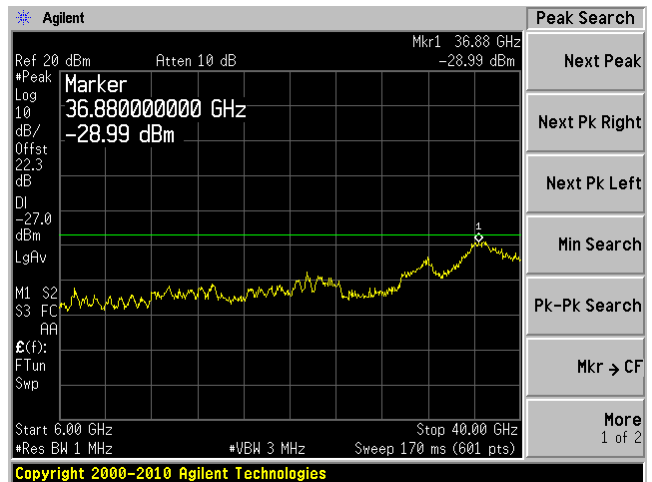
802.11n HT20 mode, 5320 MHz, Chain J0 2



802.11n HT20 mode, 5320 MHz, Chain J1 1



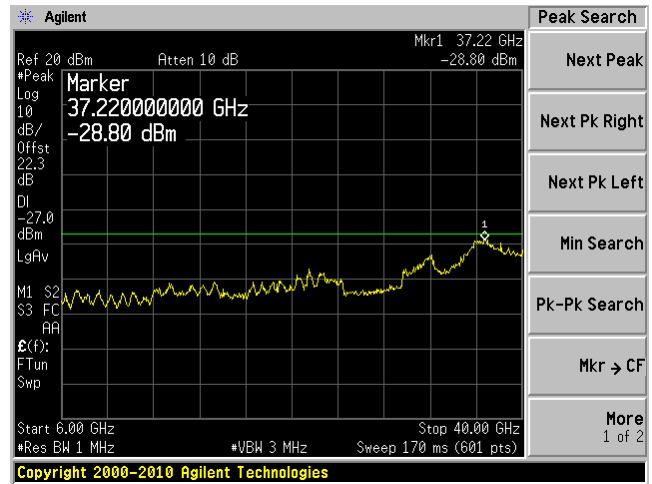
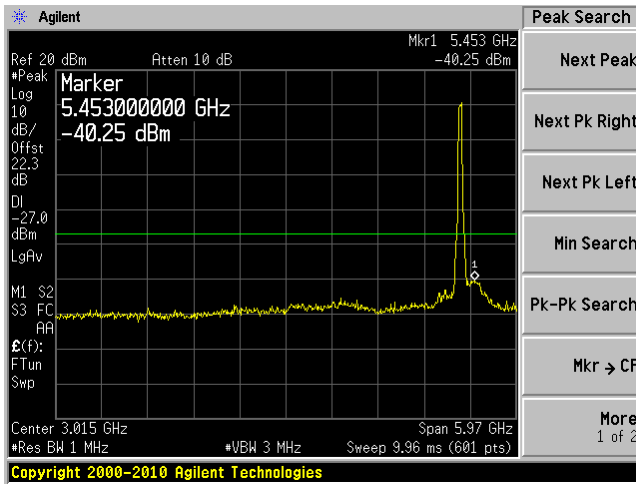
802.11n HT20 mode, 5320 MHz, Chain J1 2



802.11 n HT40 mode, Low channel

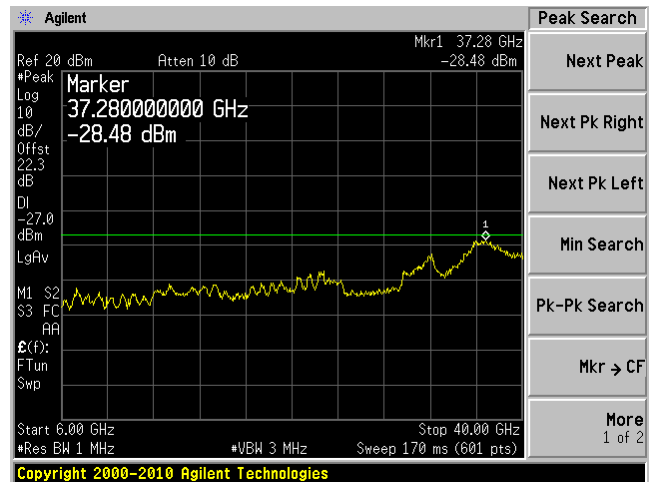
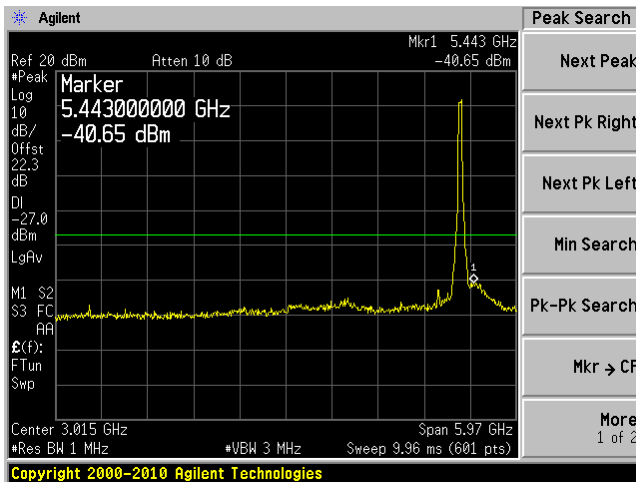
802.11n HT40 mode, 5270 MHz, Chain J0 1

802.11n HT40 mode, 5270 MHz, Chain J0 2



802.11n HT40 mode, 5270 MHz, Chain J1 1

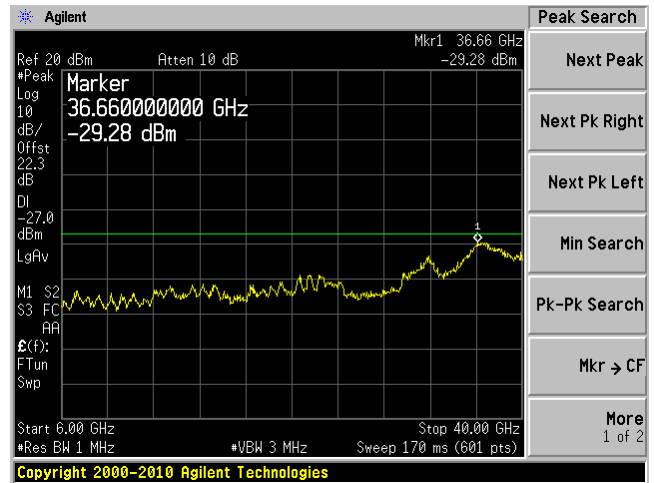
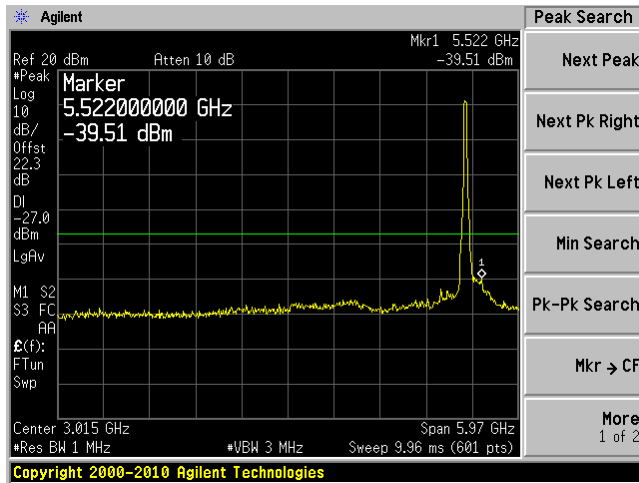
802.11n HT40 mode, 5270 MHz, Chain J1 2



802.11 n HT40 mode, High Channel

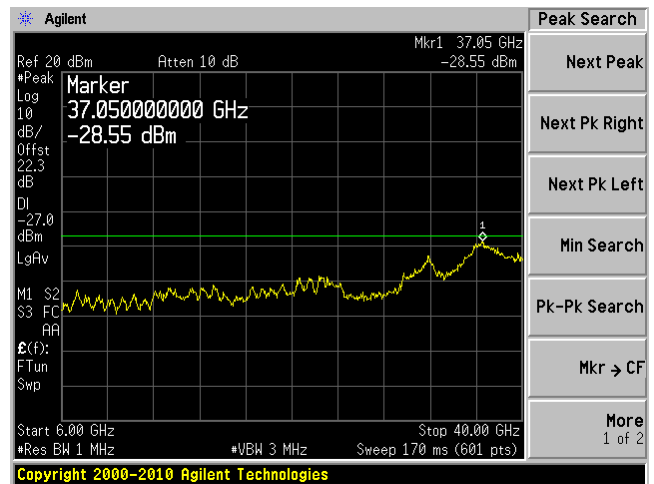
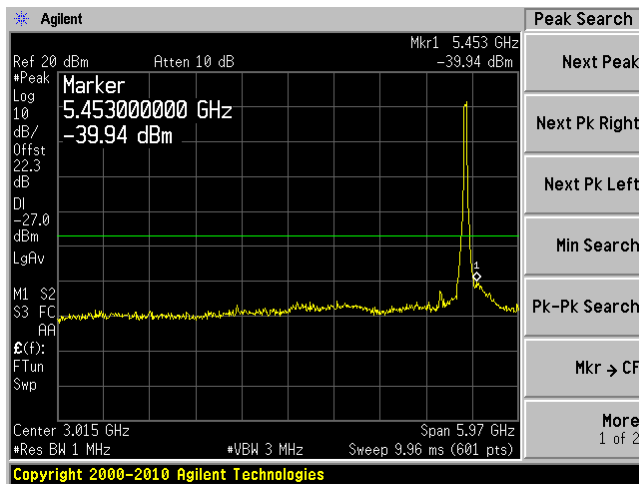
802.11n HT40 mode, 5310 MHz, Chain J0 1

802.11n HT40 mode, 5310 MHz, Chain J0 2



802.11n HT40 mode, 5310 MHz, Chain J1 1

802.11n HT40 mode, 5310 MHz, Chain J1 2

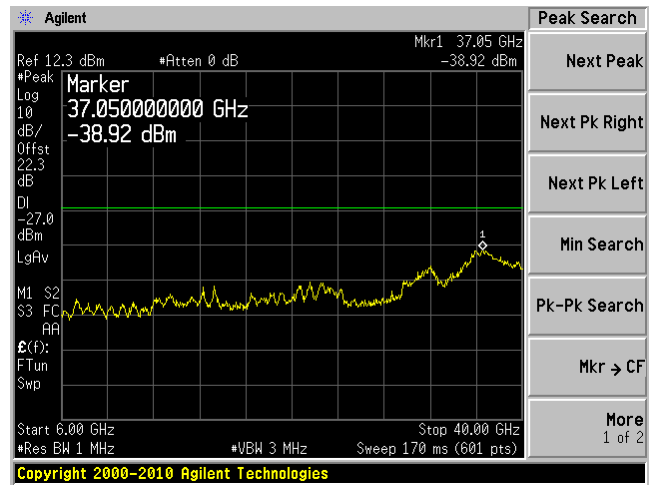
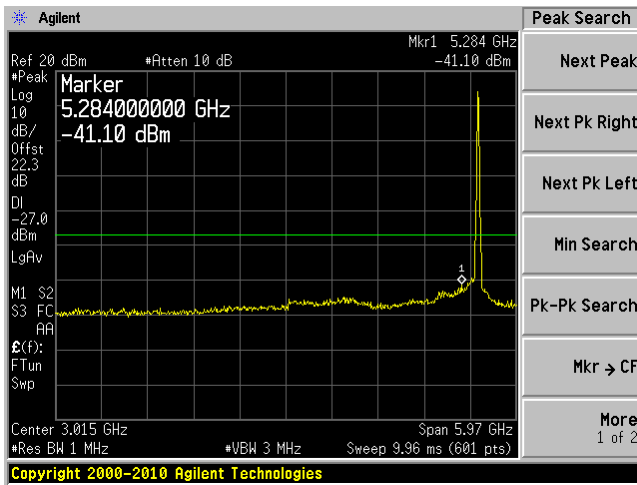


5470-5725 MHz Band

802.11a mode, Low Channel

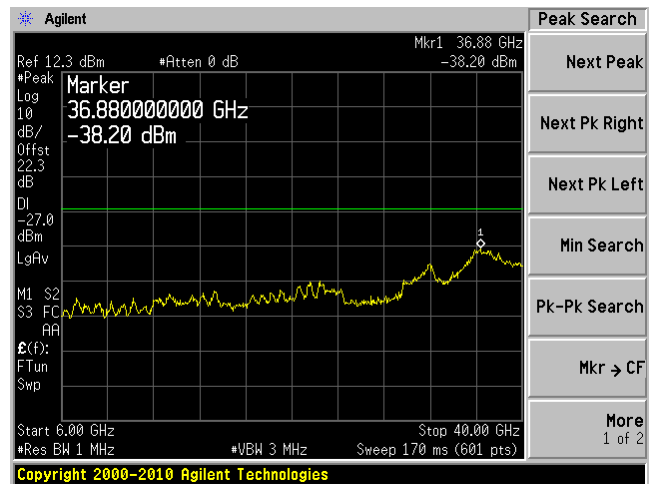
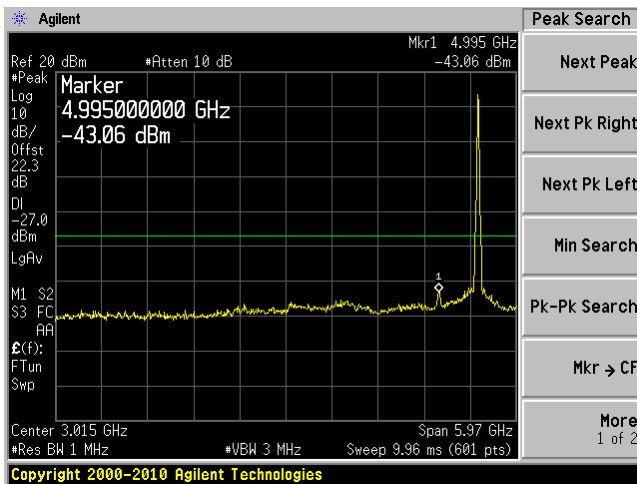
802.11a mode, 5500 MHz, Chain J0 1

802.11a mode, 5500 MHz, Chain J0 2



802.11a mode, 5500 MHz, Chain J1 1

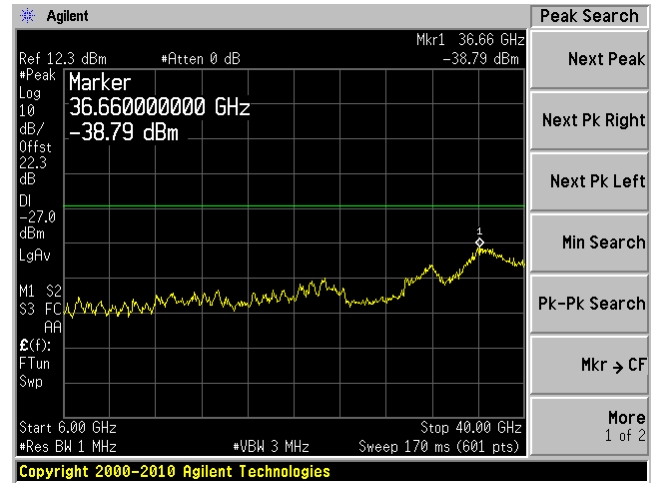
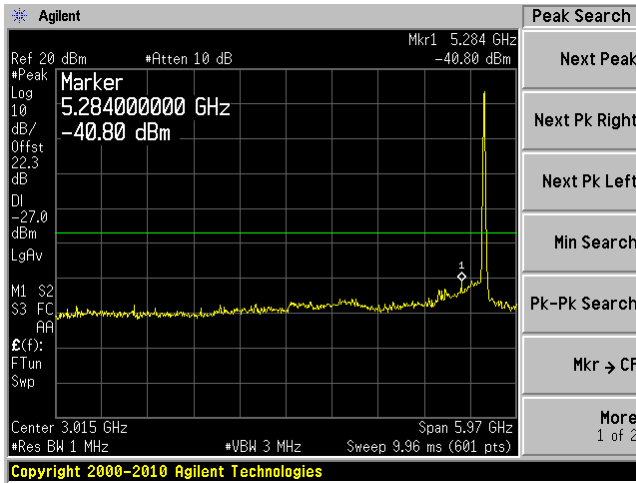
802.11a mode, 5500 MHz, Chain J1 2



802.11a mode, Middle Channel

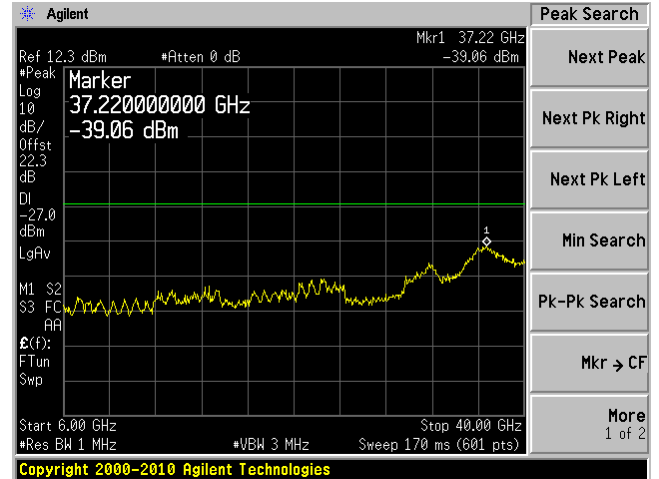
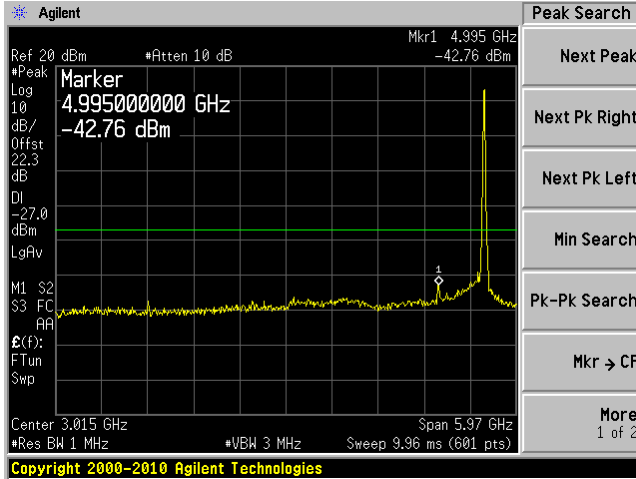
802.11 a mode, 5580 MHz, Chain J0 1

802.11n 20 mode, 5580 MHz, Chain J0 2



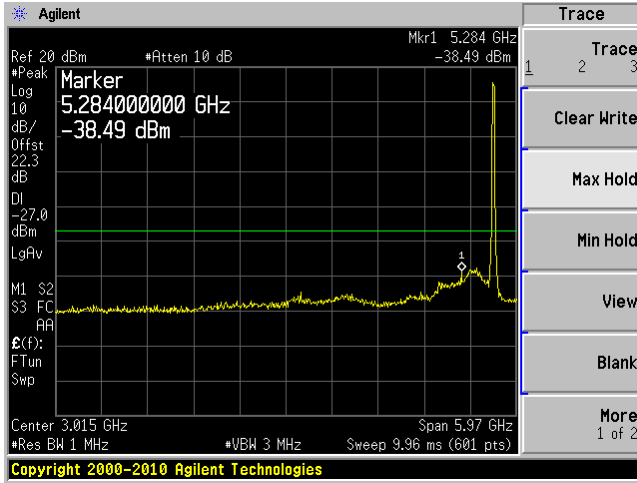
802.11a mode, 5580 MHz, Chain J1 1

802.11a mode, 5580 MHz, Chain J1 2

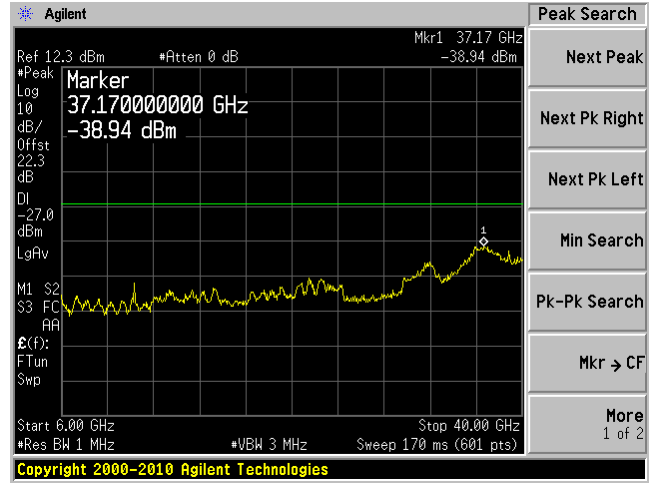


802.11a mode, High Channel

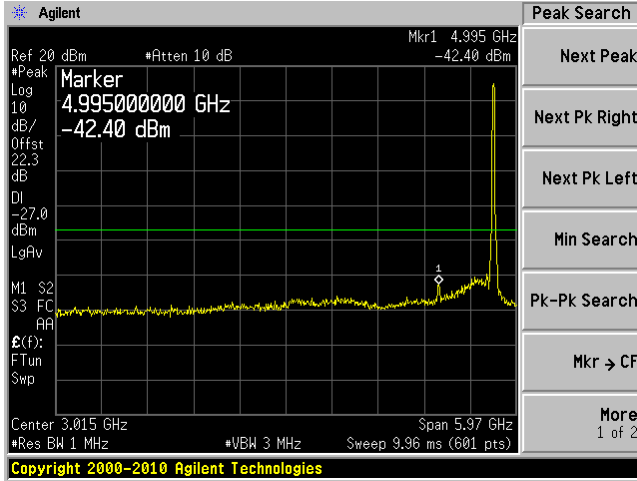
802.11 a mode, 5700 MHz, Chain J0 1



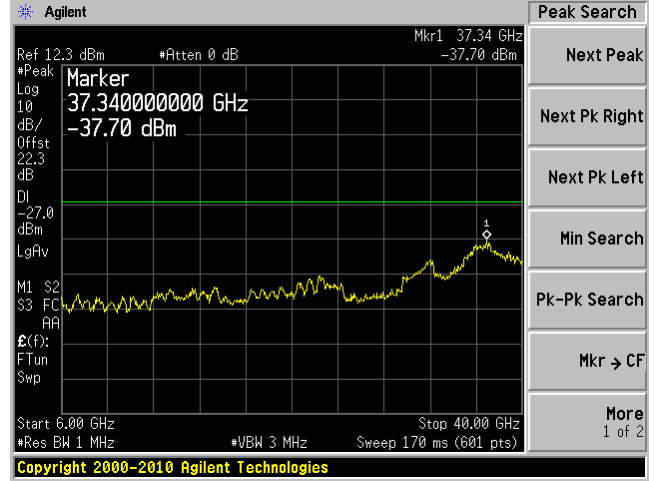
802.11n 20 mode, 5700 MHz, Chain J0 2



802.11a mode, 5700 MHz, Chain J1 1

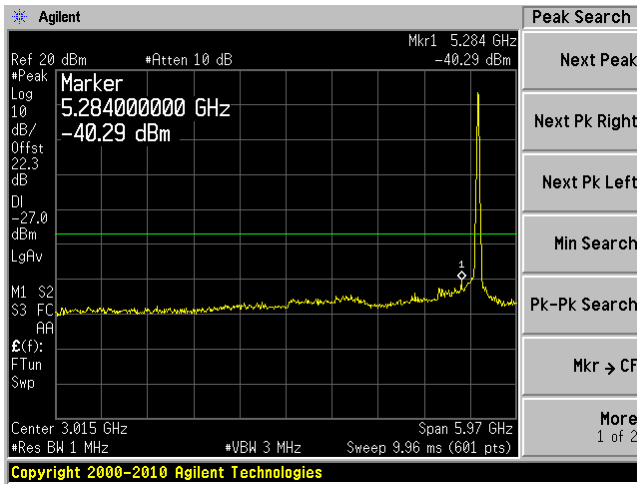


802.11a mode, 5700 MHz, Chain J1 2

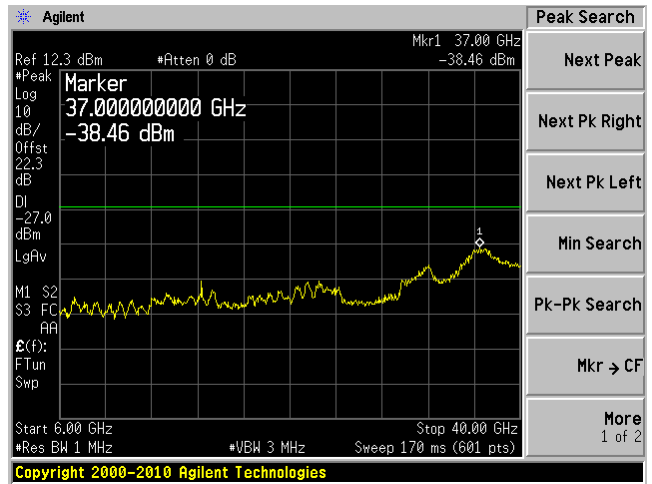


802.11n HT20 mode, Low Channel

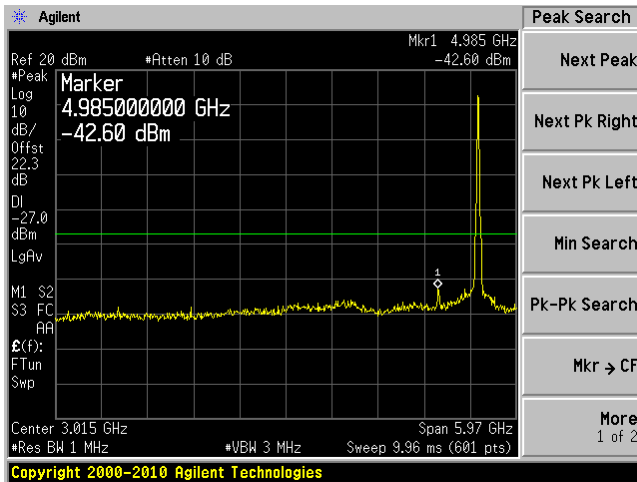
802.11n HT20 mode, 5500 MHz, Chain J0 1



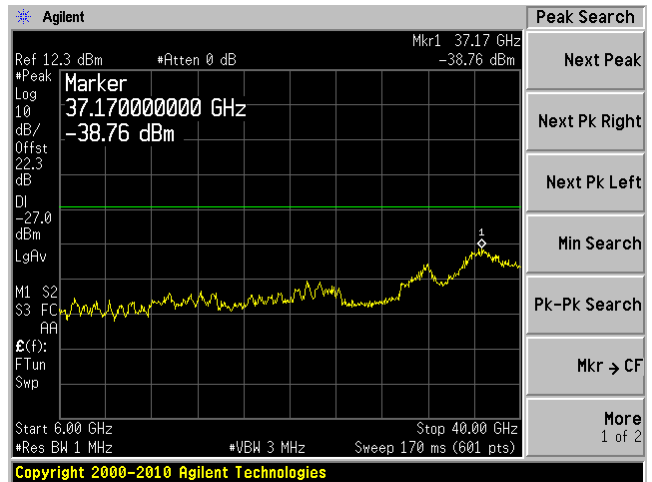
802.11n HT20 mode, 5500 MHz, Chain J0 2



802.11n HT20 mode, 5500 MHz, Chain J1 1



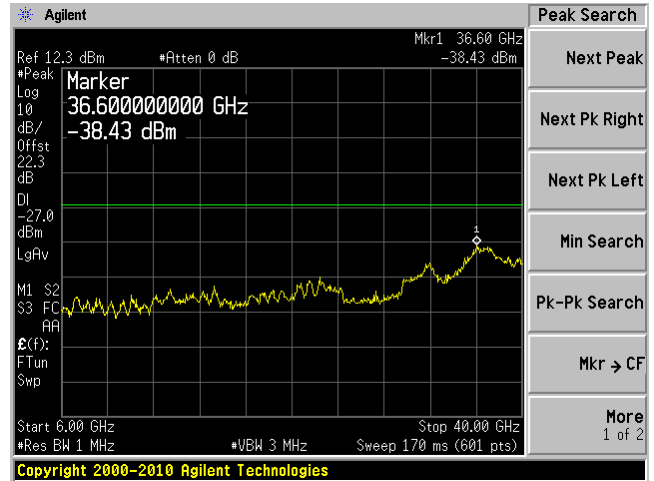
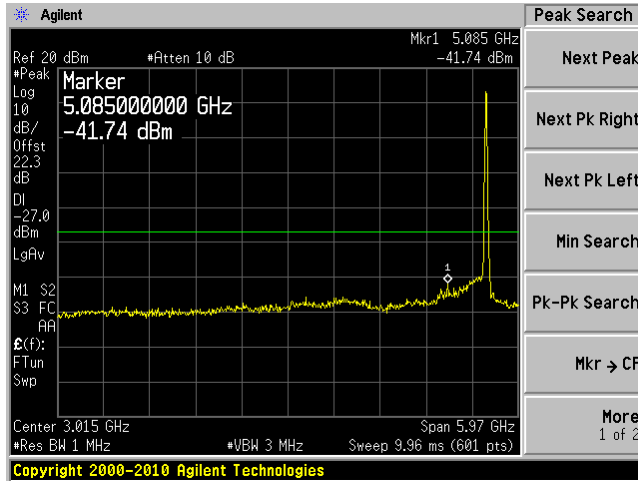
802.11n HT20 mode, 5500 MHz, Chain J1 2



802.11n HT20 mode, Middle Channel

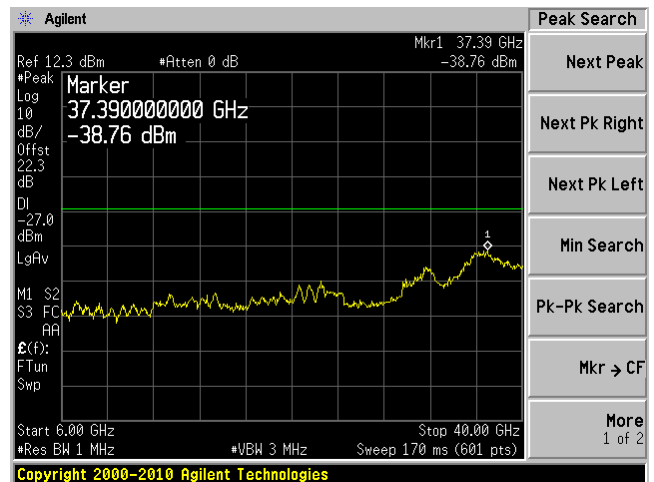
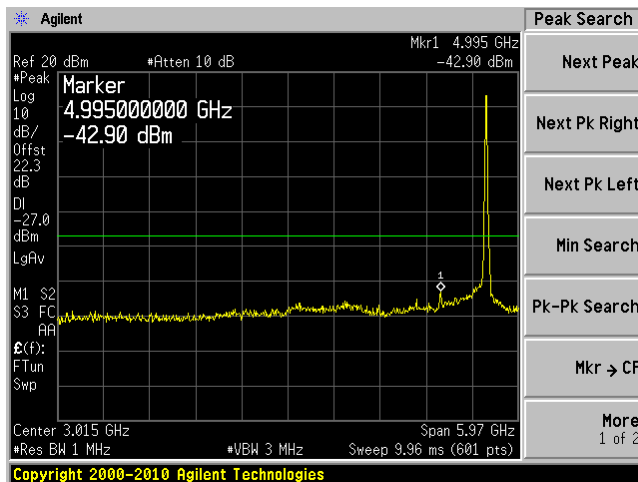
802.11n HT20 mode, 5580 MHz, Chain J0 1

802.11n HT20 mode, 5580 MHz, Chain J0 2



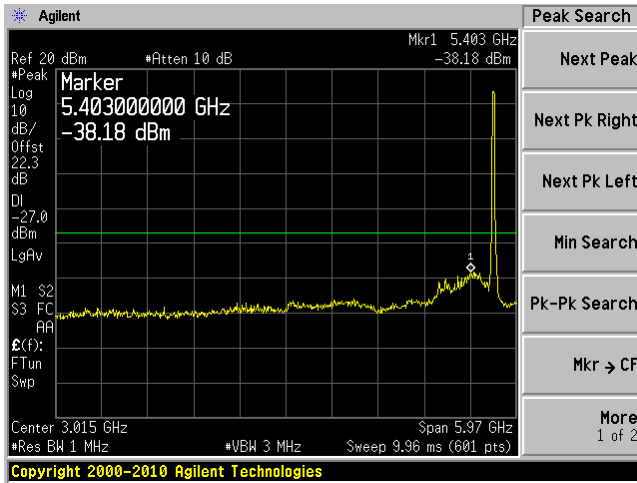
802.11n HT20 mode, 5580 MHz, Chain J1 1

802.11n HT20 mode, 5580 MHz, Chain J1 2

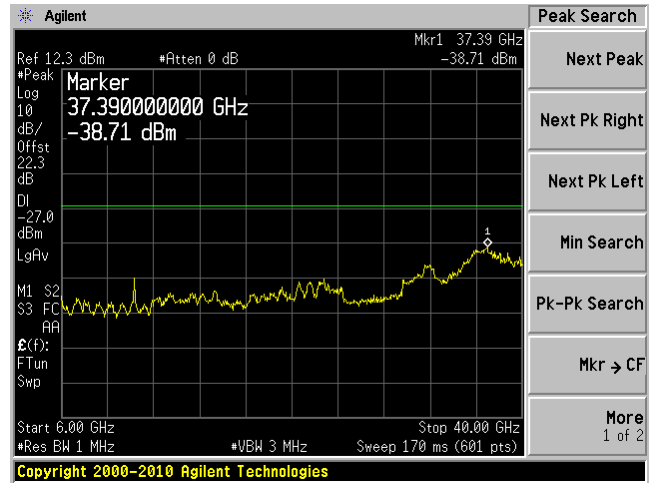


802.11n HT20 mode, High Channel

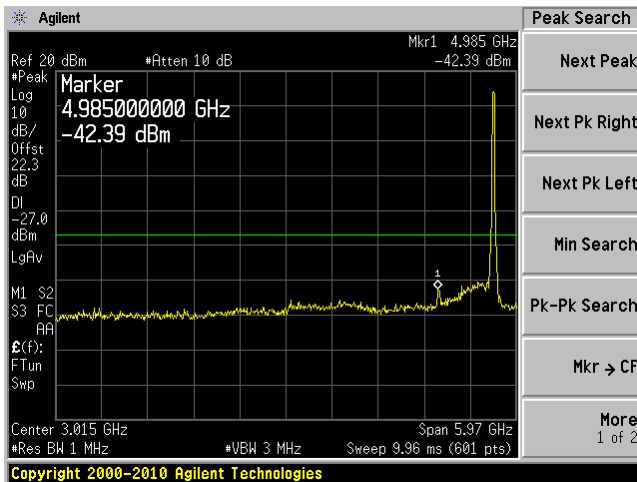
802.11n HT20 mode, 5700 MHz, Chain J0 1



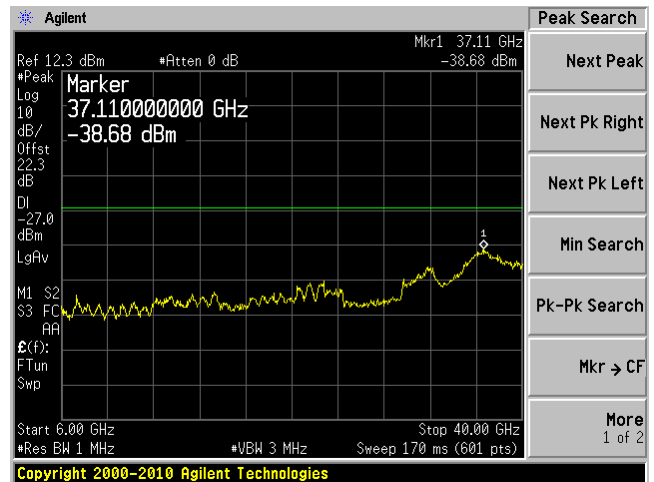
802.11n HT20 mode, 5700 MHz, Chain J0 2



802.11n HT20 mode, 5700 MHz, Chain J1 1

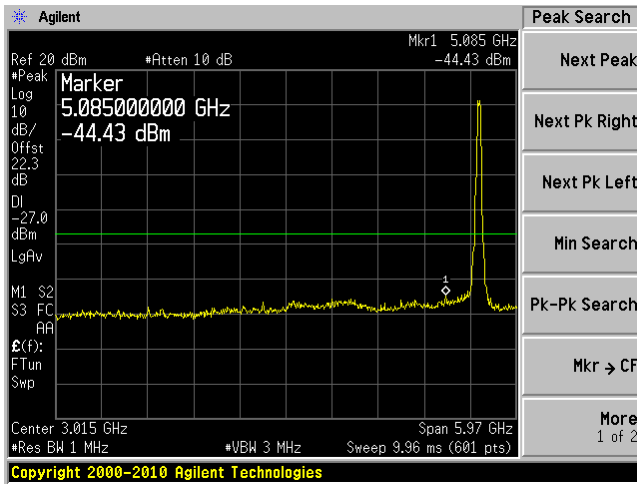


802.11n HT20 mode, 5700 MHz, Chain J1 2

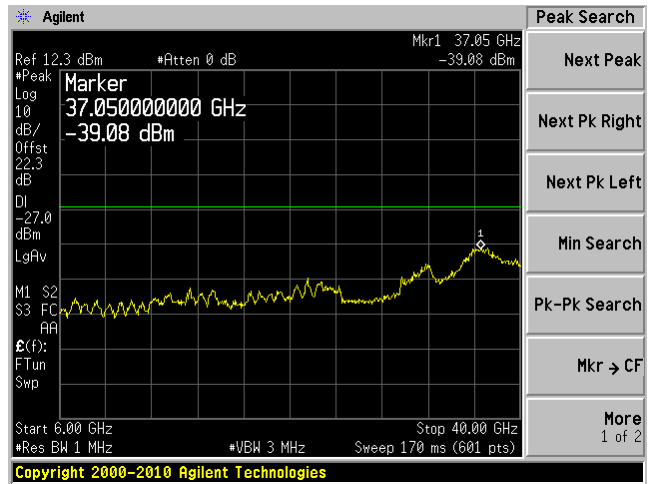


802.11n HT 40 mode, Low Channel

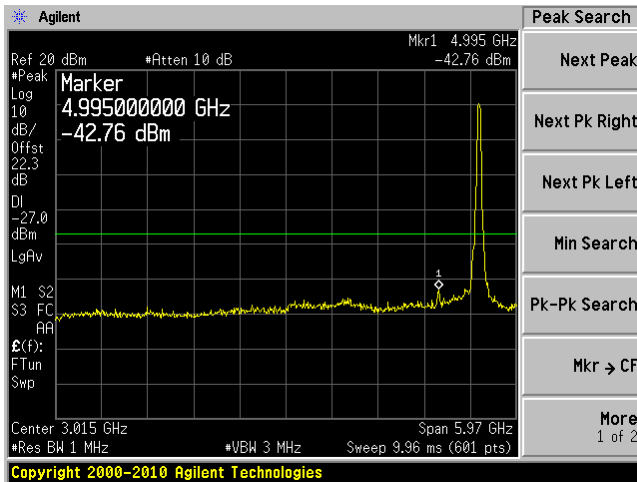
802.11n HT40 mode, 5510 MHz, Chain J0 1



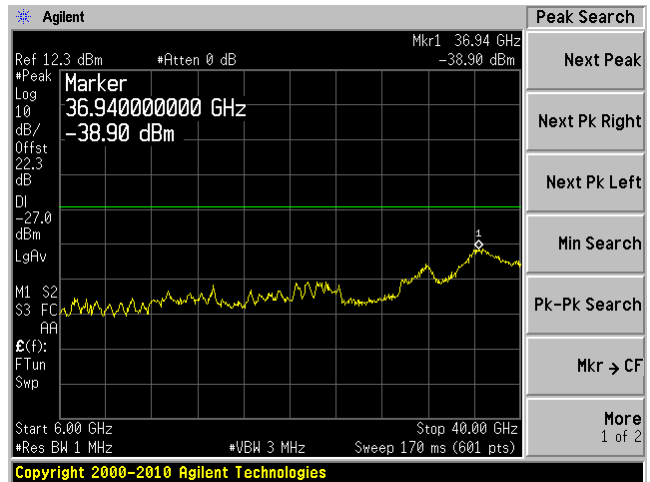
802.11n HT40 mode, 5510 MHz, Chain J1 2



802.11n HT40 mode, 5510 MHz, Chain J1 1



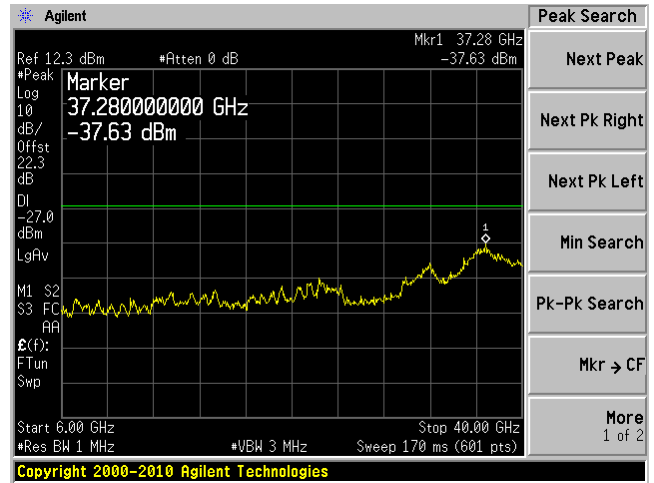
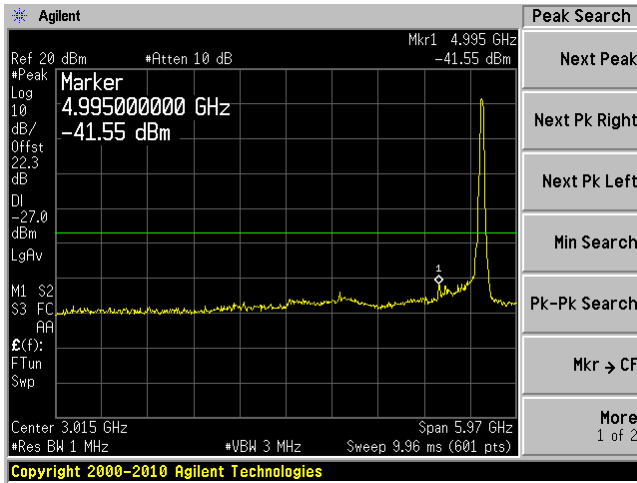
802.11n HT40 mode, 5510 MHz, Chain J1 2



802.11n HT 40 mode, Middle Channel

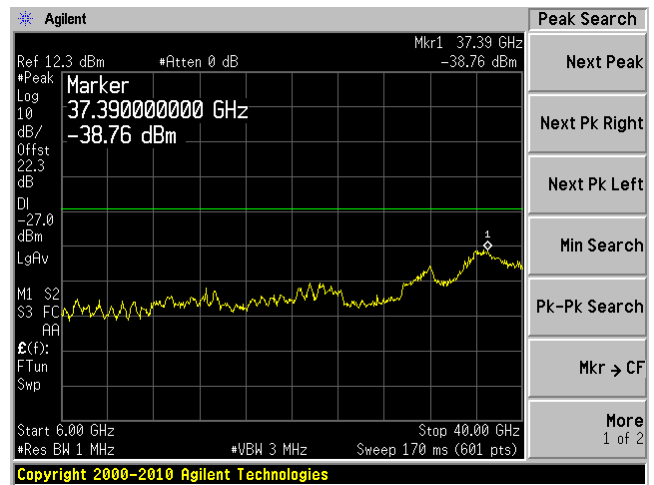
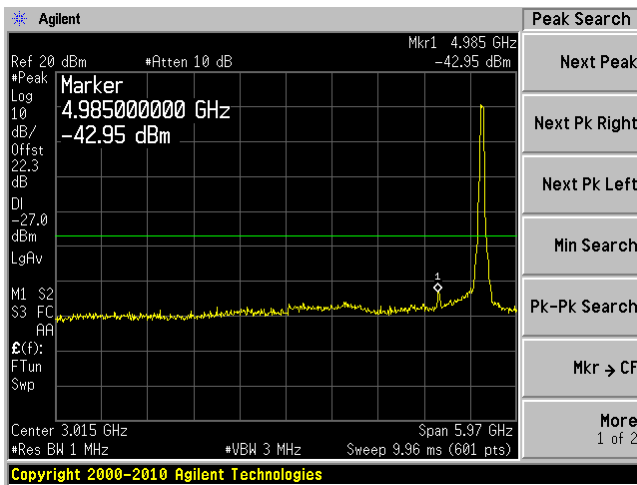
802.11n HT40 mode, 5550 MHz, Chain J0 1

802.11n HT40 mode, 5550 MHz, Chain J0 2



802.11n HT40 mode, 5550 MHz, Chain J1 1

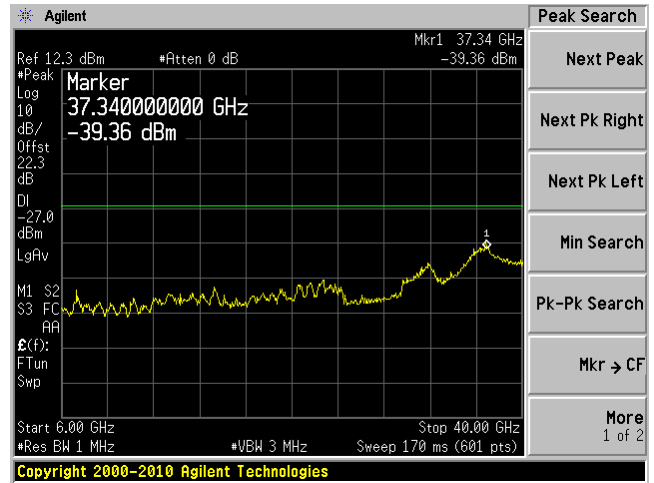
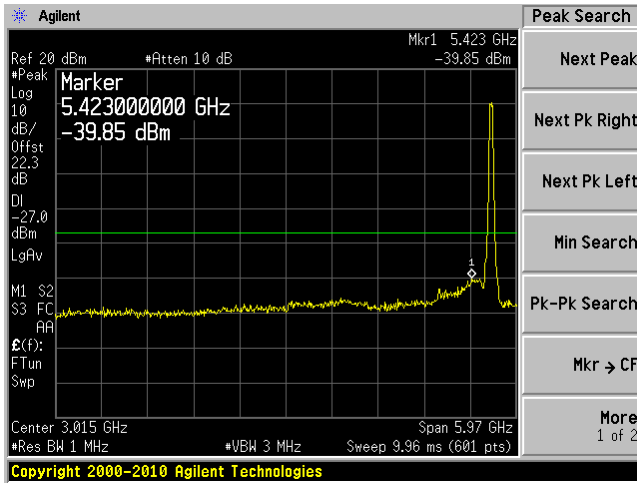
802.11n HT40 mode, 5550 MHz, Chain J1 2



802.11n HT 40 mode, High Channel

802.11n HT40 mode, 5670 MHz, Chain J0 1

802.11n HT40 mode, 5670 MHz, Chain J0 2



802.11n HT40 mode, 5670 MHz, Chain J1 1

802.11n HT40 mode, 5670 MHz, Chain J1 2

