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

For

Exalt Communications, Inc.

580 Division Street,

Campbell, CA 95008, USA

FCC ID: TTM-105P25U
IC: 6254A-105P25U

Report Type:	**Product Type:**
Original Report	802.11 WLAN Module

Test Engineers: Jeffrey Wu

Report Number: R1202222-407

Report Date: 2013-06-17

Reviewed By: Quinn Jiang, Test Engineer

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

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1302222-407	Original Report	2013-06-17

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Exalt Communications, Inc*., and their product, FCC: TTM-105P25U and IC: 6254A-105P25U, model: eMIMO, which will henceforth be referred to as the EUT "Equipment Under Test." The EUT is an 802.11 WLAN module and operates on 4940-4990 MHz, 5250-5350 MHz, 5470-5725 MHz, 5725-5825 MHz UNII bands, and 5725-5850 MHz ISM band. 5 and 10 MHz mode of 4940-4990 MHz cannot transmit both chains simultaneously and will not operate on 5725-5825 MHz UNII band.

1.2 Mechanical Description of EUT

The EUT measures approximately 12.7 cm (L) x 11.4 cm (W) x 1.6 cm (H) and weighs 102.0g.

The test data gathered are from a production sample provided by the manufacturer, Serial Number: PE15139027, assigned by BACL.

1.3 Objective

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

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

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS with FCC ID: TTM-105P25U; IC: 6254A-105P25U
FCC Part 90 TNB with FCC ID: TTM-105P25U; IC: 6254A-105P25U

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 CISPR16-4-2:2007, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

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

1.7 Test Facility

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

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

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

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

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

2 EUT Test Configuration

2.1 Justification

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

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

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

2.2 EUT Exercise Software

The test utility used was cart.exe, was provided by Exalt Communications, Inc, and was verified by 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 Details

N/A, EUT is a module. Please refer to section 1.2 for serial number

2.7 Interface Ports and Cables

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

2.8 Power Supply List and Details

Manufacturer	Description	Model	Part Number
PowerDsine	POE Adapter	PD-3501G/AC	-

3 Summary of Test Results

FCC & IC Rules	Description of Test	Result (s)
FCC §15.407(f), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207 IC RSS-Gen §7.2.4	AC Power Line Conducted Emissions	Compliant
FCC §15.209(a), 15.407(b) IC RSS-210 §A9.2	Spurious Radiated Emissions	Compliant
FCC §15.407(a) IC RSS-210 §A9.2	26 dB and 99% Emission Bandwidth	Compliant
FCC §407(a)(1) IC RSS-210 §A9.2	Peak Output Power Measurement	Compliant
FCC §2.1051, §15.407(b) IC RSS-210 §A9.2	Out of Band Emissions	Compliant
FCC §15.407(a)(1) IC RSS-210 §A9.2	Power Spectral Density	Compliant
FCC §15.407(a)(6)	Peak Excursion Ratio	Compliant
IC RSS-210 §2.3 IC RSS-Gen §6.1	Receiver Spurious Radiated Emissions	Compliant
FCC §2.1051, §15.407(b) IC RSS-210 §A9.2	Spurious Emissions at Antenna Terminals	Compliant

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

4.1 Applicable Standard

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

Limits for General Population/Uncontrolled Exposure

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

f = frequency in MHz
* = Plane-wave equivalent power density

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

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

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

Note: *f* is frequency in MHz
* = Power density limit is applicable at frequencies greater than 100 MHz

4.2 MPE Prediction

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

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

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

Low Power High Gain

Maximum peak output power at antenna input terminal (dBm):	1.38
Maximum peak output power at antenna input terminal (mW):	1.37
Prediction distance (cm):	20
Prediction frequency (MHz):	5745
Maximum Antenna Gain, typical (dBi):	28
Maximum Antenna Gain (numeric):	630.96
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.172
Power density of prediction frequency at 20.0 cm (W/m^2):	1.72
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

High Power Low Gain

Maximum peak output power at antenna input terminal (dBm):	27.80
Maximum peak output power at antenna input terminal (mW):	602.56
Prediction distance (cm):	20
Prediction frequency (MHz):	5785
Maximum Antenna Gain, typical (dBi):	9
Maximum Antenna Gain (numeric):	7.94
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.952
Power density of prediction frequency at 20.0 cm (W/m^2):	9.52
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

Note: the maximum effective gain is 28 dBi (antenna gain + cable loss)

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.952 mW/cm^2 (9.52W/m^2). Limit is 1.0 mW/cm^2 (10 W/m^2).

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

5.1 Applicable Standard

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

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

The EUT consists of non-standard antenna connectors, and antenna gain varies from 5 dBi to 37.9 dBi. Manufacture will control the effective gain (antenna + cable loss) be equal or less than 9 dBi and 28 dBi, which depends on the point to point or point to multiple point operation output power. Professional installation is needed to ensure the product complies with legal restrictions; therefore, it complies with the antenna requirement

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. Please see attached antenna list for detail information.

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

6.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.4 Conducted limits:

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

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 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

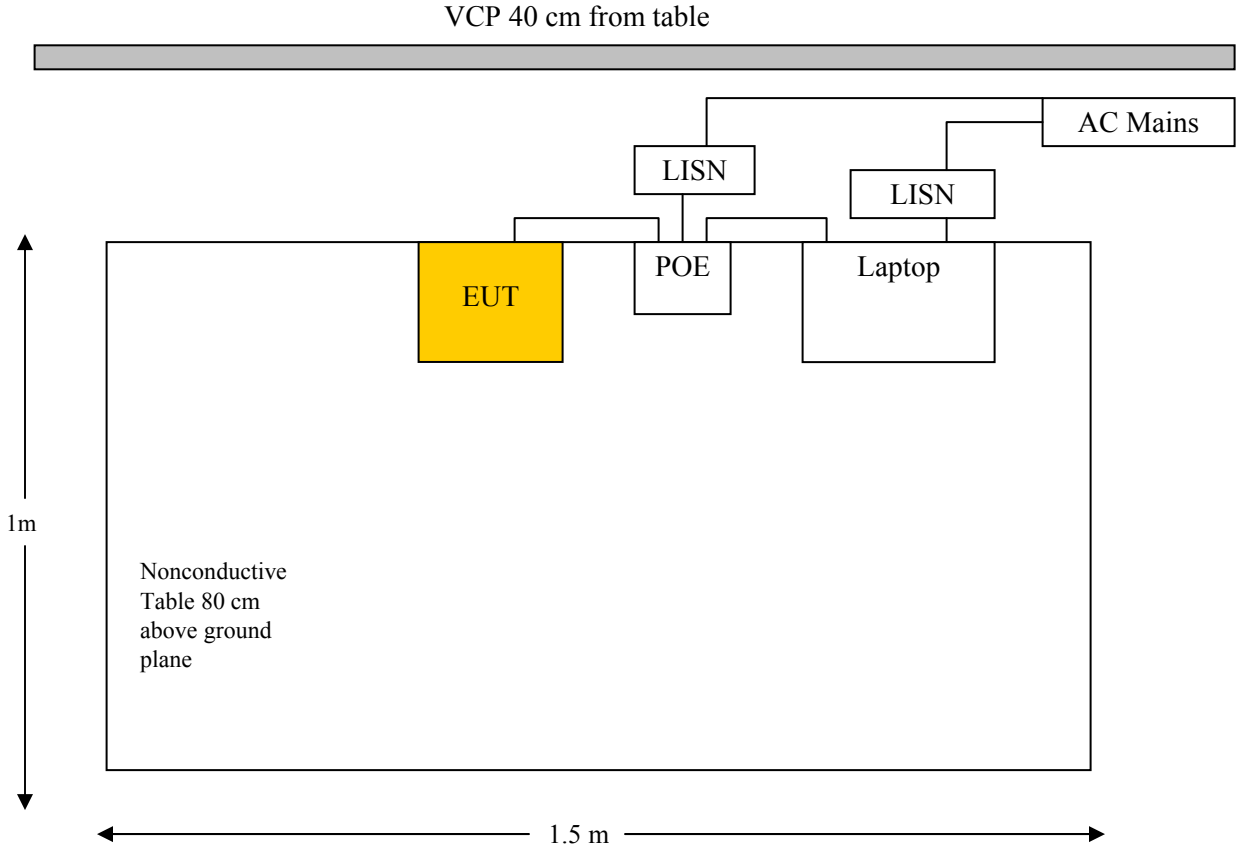
During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

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

POE



6.5 Corrected Amplitude & Margin Calculation

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

CA = Ai + CL + Atten

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

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

Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2013-03-28	1 year
Solar Electronics	LISN	9252-50-R-24-N	511205	2012-06-25	1 year
TTE	Filter, High Pass	H962-150k-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:	22ºC
Relative Humidity:	38%
ATM Pressure:	102.1 kPa

The testing was performed by Jeffrey Wu on 2013-03-13 in 5 m chamber3.

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:

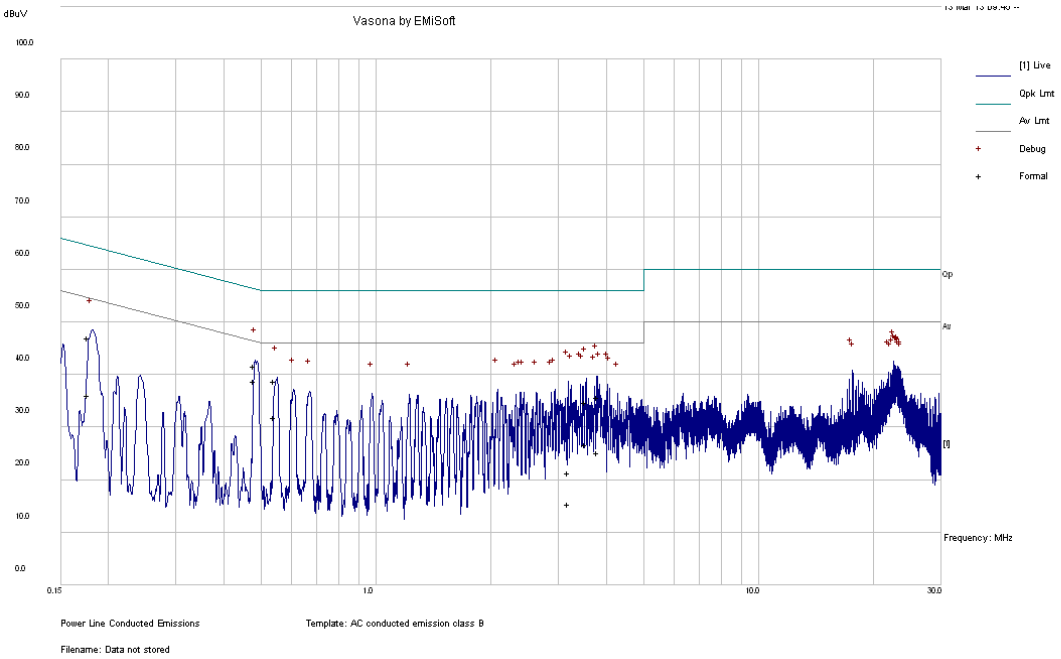
Transmitting Mode:

Connection: 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor (Line/Neutral)**	**Range (MHz)**
-7.60	0.480345	Line	0.15-30

6.9 Conducted Emissions Test Plots and Data

Transmitting Mode

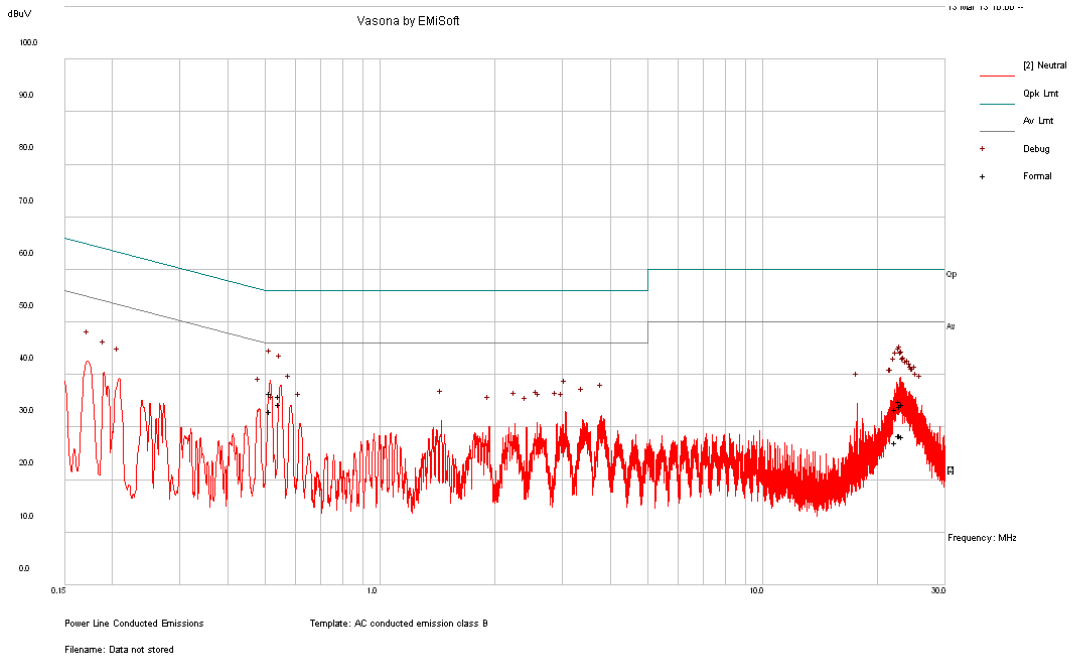
120 V, 60 Hz – Line, POE Adaptor



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.480345	41.75	Line	56.33	-14.58	QP
0.544638	38.71	Line	56	-17.29	QP
0.176775	47.05	Line	64.64	-17.59	QP
3.795921	35.75	Line	56	-20.25	QP
3.539424	34.75	Line	56	-21.25	QP
3.190614	21.41	Line	56	-34.59	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.480345	38.73	Line	46.33	-7.60	Ave.
0.544638	31.84	Line	46	-14.16	Ave.
0.176775	36.16	Line	54.64	-18.48	Ave.
3.539424	26.66	Line	46	-19.34	Ave.
3.795921	25.24	Line	46	-20.76	Ave.
3.190614	15.43	Line	46	-30.57	Ave.

120 V, 60 Hz – Neutral, POE Adaptor



Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.517875	36.5	Neutral	56	-19.50	QP
0.545955	35.95	Neutral	56	-20.05	QP
22.77151	34.89	Neutral	60	-25.11	QP
23.25104	34.35	Neutral	60	-25.65	QP
22.9323	34.10	Neutral	60	-25.90	QP
22.35332	33.48	Neutral	60	-26.52	QP

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)	Detector (QP/Ave.)
0.545955	34.31	Neutral	46	-11.69	Ave.
0.517875	33.14	Neutral	46	-12.86	Ave.
22.77151	28.55	Neutral	50	-21.45	Ave.
22.9323	28.36	Neutral	50	-21.64	Ave.
23.25104	28.21	Neutral	50	-21.79	Ave.
22.35332	27.16	Neutral	50	-22.84	Ave.

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

7.1 Applicable Standard

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

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

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

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

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

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

As per FCC §15.407(b)(4) and IC RSS-210 §A9.2, For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C/15E and IC RSS-210/RSS-Gen limits.

The spacing between the peripherals was 10 centimeters.

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

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude & Margin Calculation

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

CA = Ai + CL + Atten

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

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

Margin = Corrected Amplitude - Limit

7.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2012-06-18	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2012-06-09	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2013-05-09	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-10-16	1 year
EMCO	Horn Antenna	3115	9511-4627	2012-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

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

7.6 Test Environmental Conditions

Temperature:	22°C
Relative Humidity:	44%
ATM Pressure:	101.6kPa

The testing was performed by Jeffrey Wu from 2013-05-24 at 5 meter 3.
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7.7 Summary of Test Results

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

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range, Mode, Antenna**
-0.43	30.61575	Vertical	30 MHz to 1 GHz,
-*	-*	-*	1 GHz to 40 GHz,

* Note: all emissions are in the level of noise floor.

7.8 Radiated Emissions Test Result Data

1) Radiated Emission 30 MHz -1 GHz at 3 meters (Termination Method was used)

802.11a Mode

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
802.11a Mode, Low Channel							
37.518	38.27	100	V	35	40	-1.73	QP
77.20125	30.62	247	V	55	40	-9.38	QP
144.715	30.06	113	V	146	43.5	-13.44	QP
68.98525	26.30	363	V	123	40	-13.70	QP
202.2508	27.46	148	H	105	43.5	-16.04	QP
174.6495	16.75	111	H	360	43.5	-26.75	QP
802.11a Mode, Middle Channel							
37.52375	38.92	123	V	80	40	-1.08	QP
143.253	33.43	100	V	214	43.5	-10.07	QP
68.4545	28.54	342	V	217	40	-11.46	QP
77.20325	21.93	250	V	232	40	-18.07	QP
206.776	24.12	145	H	0	43.5	-19.38	QP
174.7328	15.44	192	V	168	43.5	-28.06	QP
802.11a Mode, High Channel							
37.531	39.07	104	V	7	40	-0.93	QP
77.20425	30.29	272	V	121	40	-9.71	QP
141.2083	31.00	109	V	177	43.5	-12.50	QP
202.2165	29.97	109	H	101	43.5	-13.53	QP
69.10425	25.09	121	V	306	40	-14.91	QP
174.5928	18.84	118	V	187	43.5	-24.66	QP

802.11n HT20 Mode

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
802.11n HT20 Mode, Low Channel							
30.61575	39.57	161	V	209	40	-0.43	QP
37.52325	39.44	102	V	80	40	-0.56	QP
53.86275	36.30	171	V	308	40	-3.70	QP
143.2393	31.94	100	V	227	43.5	-11.56	QP
68.4775	28.00	352	V	212	40	-12.00	QP
77.213	24.76	216	V	207	40	-15.24	QP
802.11n HT20 Mode, Middle Channel							
37.393	38.67	100	V	109	40	-1.33	QP
44.39575	38.07	105	V	23	40	-1.93	QP
53.5645	36.56	158	V	47	40	-3.44	QP
143.251	31.33	100	V	233	43.5	-12.17	QP
70.81675	24.83	173	V	268	40	-15.17	QP
201.5155	27.36	148	H	112	43.5	-16.14	QP
802.11n HT20 Mode, High Channel							
43.86075	39.56	177	V	49	40	-0.43	QP
37.4095	38.41	100	V	26	40	-0.59	QP
174.886	30.94	135	H	306	43.5	-12.56	QP
143.2508	30.80	109	V	239	43.5	-12.70	QP
190.7833	29.65	145	H	112	43.5	-13.85	QP
206.7153	26.60	125	V	241	43.5	-16.90	QP

2) Radiated Emission 1GHz -40 GHz at 3 meters (Termination Method was used)

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 5745 MHz, measured at 3 meters											
11490	31.57	0	100	V	39.0	6.20	26.94	49.877	74	-24.123	Peak
11490	31.84	0	100	H	39.0	6.20	26.94	50.147	74	-23.853	Peak
11490	16.95	0	100	V	39.0	6.20	26.94	35.257	54	-18.743	Ave
11490	16.78	0	100	H	39.0	6.20	26.94	35.087	54	-18.913	Ave
17235	32.58	0	100	V	44.1	8.31	25.9	59.043	74	-14.957	Peak
17235	31.55	0	100	H	44.1	8.31	25.9	58.013	74	-15.987	Peak
17235	16.91	0	100	V	44.1	8.31	25.9	43.373	54	-10.627	Ave
17235	16.96	0	100	H	44.1	8.31	25.9	43.423	54	-10.577	Ave
Middle Channel 5785 MHz, measured at 3 meters											
11570	31.82	0	100	V	39.2	6.20	27.0	50.233	74	-23.767	Peak
11570	32.29	0	100	H	39.2	6.20	27.0	50.703	74	-23.297	Peak
11570	16.37	0	100	V	39.2	6.20	27.0	34.783	54	-19.217	Ave
11570	16.29	0	100	H	39.2	6.20	27.0	34.703	54	-19.297	Ave
17355	32.27	0	100	V	45.3	8.49	25.9	60.211	74	-13.789	Peak
17355	32.74	0	100	H	45.3	8.49	25.9	60.681	74	-13.319	Peak
17355	16.29	0	100	V	45.3	8.49	25.9	44.231	54	-9.769	Ave
17355	16.37	0	100	H	45.3	8.49	25.9	44.311	54	-9.689	Ave
High Channel 5805 MHz, measured at 3 meters											
11610	32.76	0	100	V	39.3	6.20	27.0	51.274	74	-22.726	Peak
11610	32.51	0	100	H	39.3	6.20	27.0	51.024	74	-22.976	Peak
11610	16.87	0	100	V	39.3	6.20	27.0	35.384	54	-18.616	Ave
11610	16.54	0	100	H	39.3	6.20	27.0	35.054	54	-18.946	Ave
17415	32.42	0	100	V	46.8	8.49	25.7	61.962	74	-12.038	Peak
17415	32.67	0	100	H	46.8	8.49	25.7	62.212	74	-11.788	Peak
17415	16.86	0	100	V	46.8	8.49	25.7	46.402	54	-7.598	Ave
17415	16.91	0	100	H	46.8	8.49	25.7	46.452	54	-7.548	Ave

802.11n HT20 Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
11490	31.98	0	100	V	39.0	6.20	26.94	50.287	74	-23.713	Peak
11490	32.54	0	100	H	39.0	6.20	26.94	50.847	74	-23.153	Peak
11490	17.34	0	100	V	39.0	6.20	26.94	35.647	54	-18.353	Ave
11490	16.49	0	100	H	39.0	6.20	26.94	34.797	54	-19.203	Ave
17235	32.09	0	100	V	44.1	8.31	25.9	58.553	74	-15.447	Peak
17235	32.17	0	100	H	44.1	8.31	25.9	58.633	74	-15.367	Peak
17235	16.94	0	100	V	44.1	8.31	25.9	43.403	54	-10.597	Ave
17235	16.52	0	100	H	44.1	8.31	25.9	42.983	54	-11.017	Ave
Middle Channel 5785 MHz, measured at 3 meters											
11570	32.28	0	100	V	39.2	6.20	27.0	50.693	74	-23.307	Peak
11570	31.43	0	100	H	39.2	6.20	27.0	49.843	74	-24.157	Peak
11570	17.24	0	100	V	39.2	6.20	27.0	35.653	54	-18.347	Ave
11570	16.97	0	100	H	39.2	6.20	27.0	35.383	54	-18.617	Ave
17355	32.51	0	100	V	45.3	8.49	25.9	60.451	74	-13.549	Peak
17355	32.19	0	100	H	45.3	8.49	25.9	60.131	74	-13.869	Peak
17355	17.16	0	100	V	45.3	8.49	25.9	45.101	54	-8.899	Ave
17355	16.86	0	100	H	45.3	8.49	25.9	44.801	54	-9.199	Ave
High Channel 5805 MHz, measured at 3 meters											
11610	32.74	0	100	V	39.3	6.20	27.0	51.254	74	-22.746	Peak
11610	32.18	0	100	H	39.3	6.20	27.0	50.694	74	-23.306	Peak
11610	17.24	0	100	V	39.3	6.20	27.0	35.754	54	-18.246	Ave
11610	16.27	0	100	H	39.3	6.20	27.0	34.784	54	-19.216	Ave
17415	32.49	0	100	V	46.8	8.49	25.7	62.032	74	-11.968	Peak
17415	32.38	0	100	H	46.8	8.49	25.7	61.922	74	-12.078	Peak
17415	16.76	0	100	V	46.8	8.49	25.7	46.302	54	-7.698	Ave
17415	16.28	0	100	H	46.8	8.49	25.7	45.822	54	-8.178	Ave

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

8.1 Applicable Standard

FCC §15.407(a) and IC RSS-210 §A9.2.

8.2 Measurement Procedure

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

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

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

8.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	39 %
ATM Pressure:	101.4 kPa

The testing was performed by Jeffrey Wu on 2013-05-20 in RF site.

8.5 Test Results

802.11a mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)	
		J0	J1	J0	J1
Low	5745	16.9495	16.5497	24.163	21.174
Middle	5785	16.8657	16.6113	25.377	22.466
High	5805	16.8888	16.7919	22.678	23.766

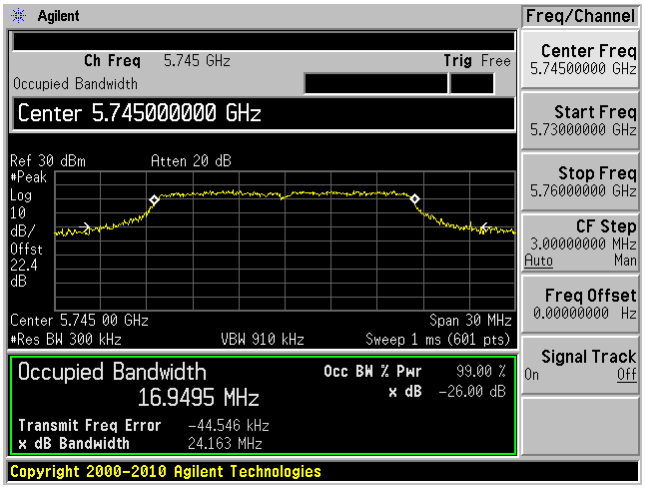
802.11n HT20 mode

Channel	Frequency (MHz)	26 dB Emission Bandwidth (MHz)		99% Emission Bandwidth (MHz)	
		J0	J1	J0	J1
Low	5745	17.9203	17.6566	24.338	21.909
Middle	5785	17.8974	17.6814	25.528	22.877
High	5805	17.9859	17.9851	26.100	25.368

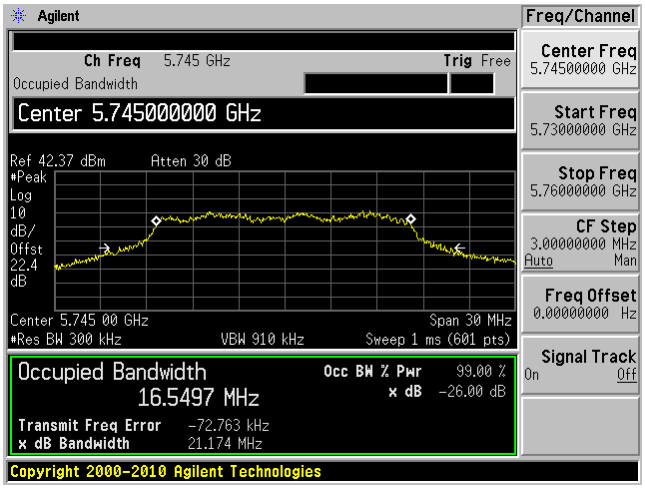
Please refer to the following plots.

802.11a Mode, Low Channel

Low Channel, 5745 MHz, J0

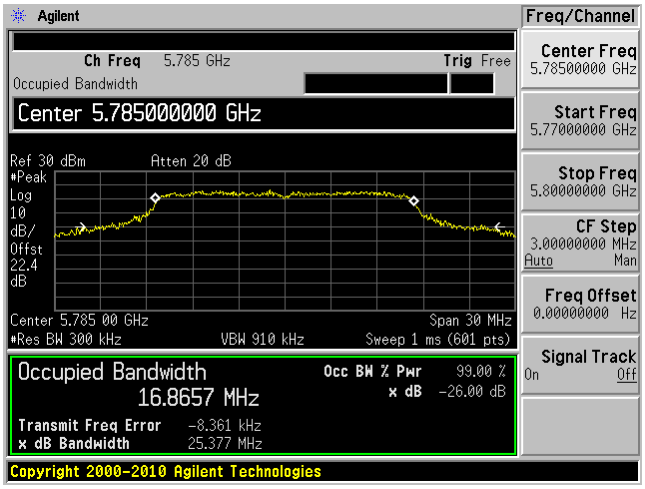


Low Channel, 5745 MHz, J1

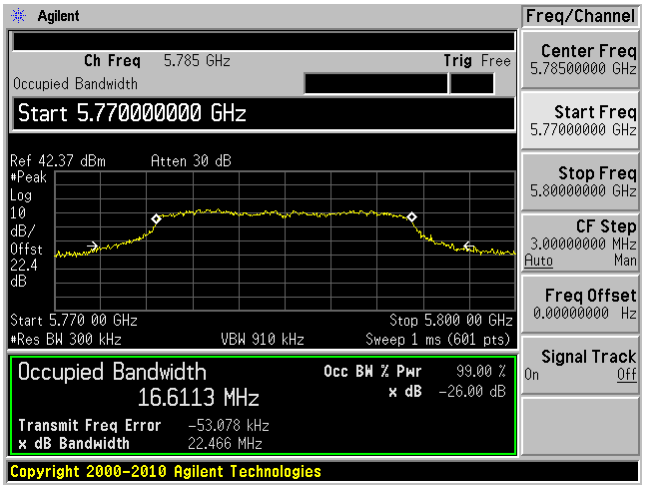


802.11a Mode, Middle Channel

Middle Channel, 5785 MHz, J0

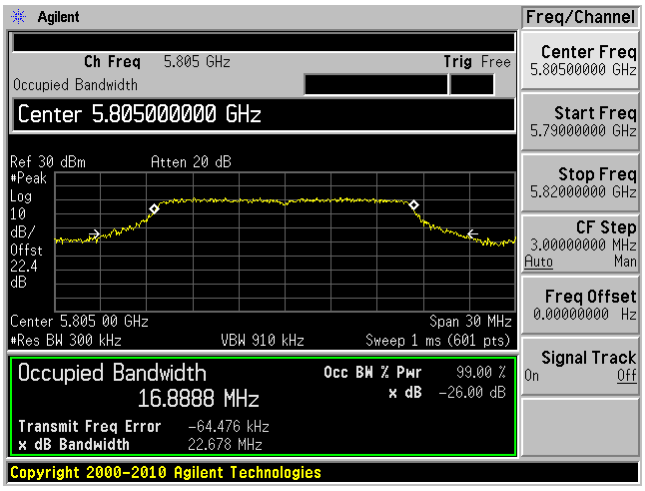


Middle Channel, 5785 MHz, J1

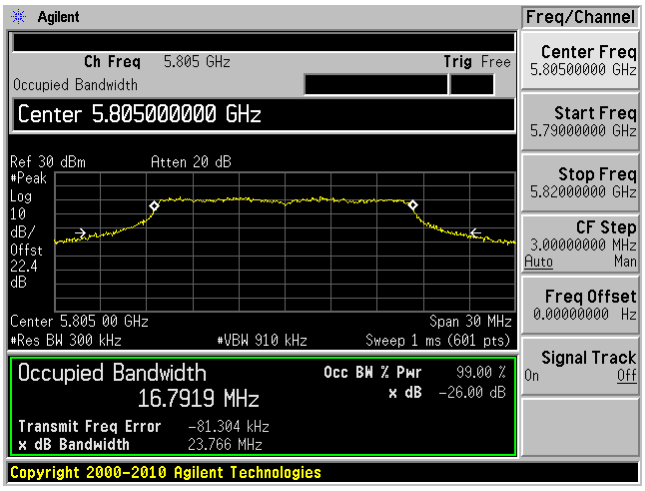


802.11a Mode, High Channel

High Channel, 5785 MHz, J0

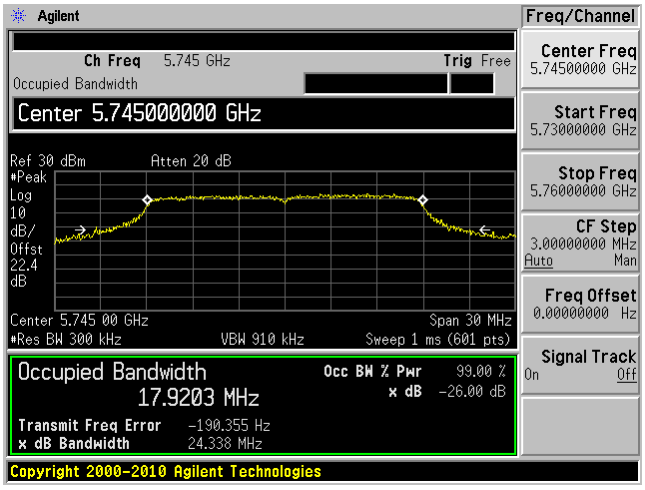


High Channel, 5785 MHz, J1

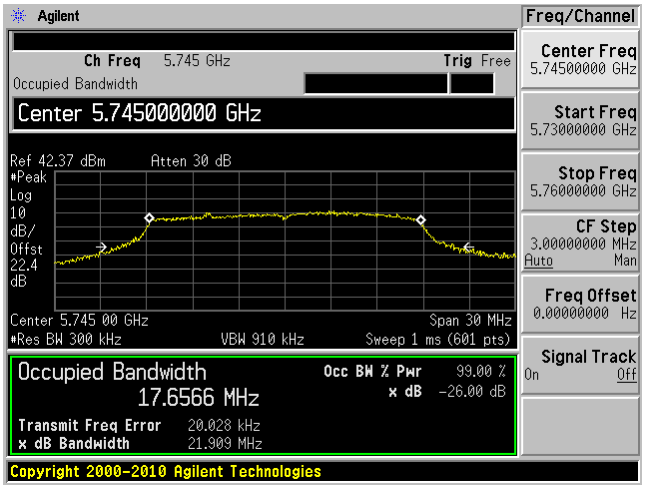


802.11n HT20 Mode, Low Channel

Low Channel, 5745 MHz, J0

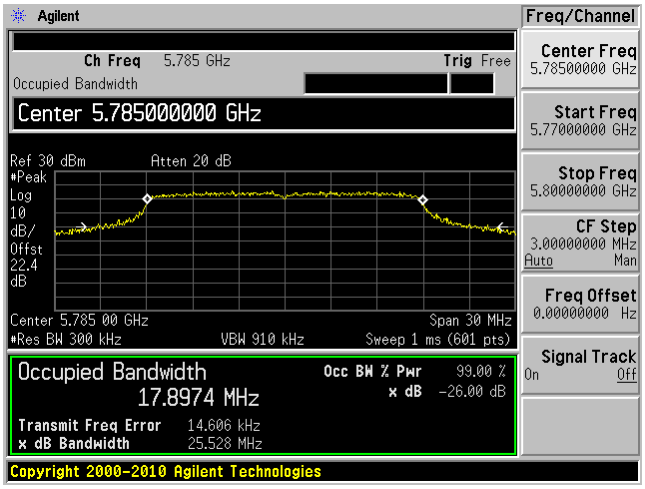


Low Channel, 5745 MHz, J1

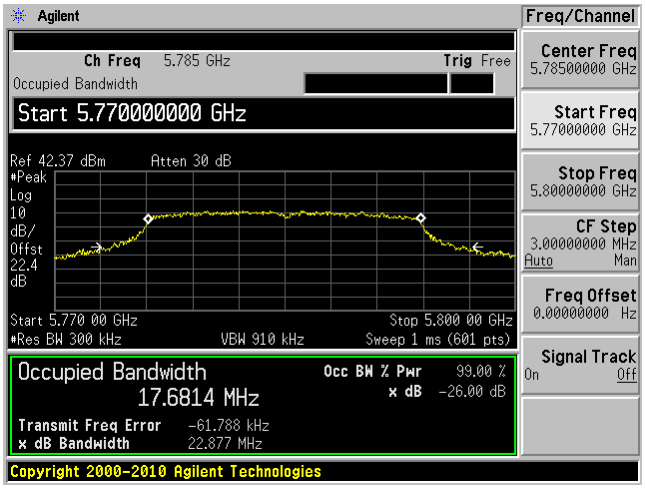


802.11n HT20 Mode, Middle Channel

Middle Channel, 5785 MHz, J0

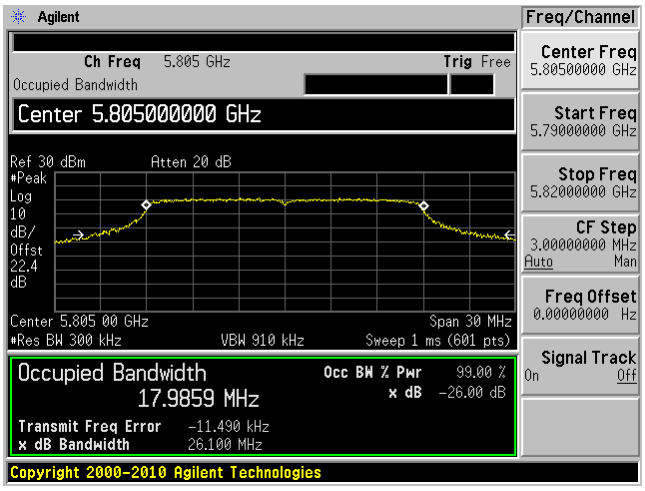


Middle Channel, 5785 MHz, J1

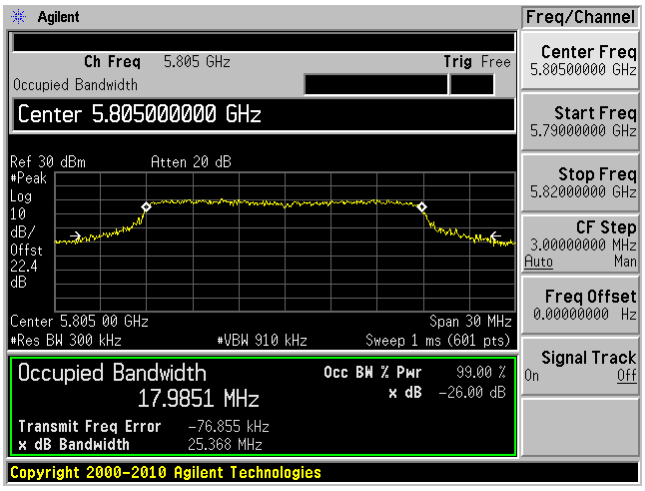


802.11n HT20 Mode, High Channel

High Channel, 5805 MHz, J0



High Channel, 5805 MHz, 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)(3)

For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

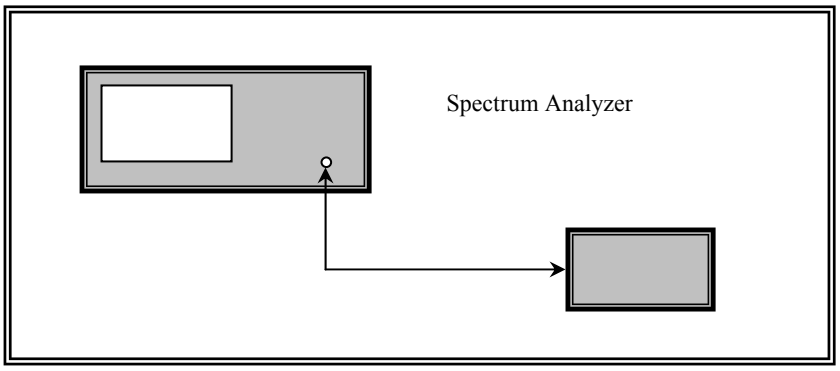
According to IC RSS-210 §A9.4:

For the 5.725-5.825 GHz bands, the maximum conducted output power shoall not exceed 1.0 W or 17 + 10 log B, whichever power is less. The Power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log B,dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omnidirectional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4 W e.i.r.p. under the same conditions as for point-to-point systems.

9.2 Measurement Procedure

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



9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

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

9.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	39 %
ATM Pressure:	101.4 kPa

The testing was performed by Jeffery Wu on 2013-05-20 at the RF site.

9.5 Test Results

** Note: For point to point operation, the effective antenna gain (actual gain + cable loss) is controlled below or equal to 9 dBi and 28 dBi, and ensures the unit complies with local regulations. Since the FCC 15.407 regulations states that systems operating in the 5725-5825 MHz band that are used exclusive for fixed, point-to point operations may employ transmitting antennas with directional gain greater up to 23 dBi without any corresponding reduction in transmitter peak output power. For fixed, point –to point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in exceess of 23 dBi would be required. In this case, the peak output power limit is 25 dBm for 28 dBi effective gain antenna, and 30 dBi for 9 dbi effective gain antenna. The product will be installed by professional and sets proper output power with antennas with different gain to meet local regulations.

Point to Point, with 28 dBi Antenna

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Power (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	-1.37	-1.90	1.38	25	-23.62
Middle	5785	3.70	3.97	6.85	25	-18.15
High	5805	3.40	3.93	6.68	25	-18.32
802.11n HT20 mode						
Low	5745	-1.35	-1.86	1.41	25	-23.59
Middle	5785	3.91	3.97	6.95	25	-18.05
High	5805	3.45	3.95	6.72	25	-18.28

Point to Point, with 9 dBi Antenna

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Power (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	11.4	11.58	14.50	30	-15.50
Middle	5785	24.60	24.93	27.78	30	-2.22
High	5805	14.38	13.93	17.17	30	-12.83
802.11n HT20 mode						
Low	5745	14.59	14.31	17.46	30	-12.54
Middle	5785	24.93	24.65	27.80	30	-2.20
High	5805	14.38	13.56	17.00	30	-13.00

** Note: For point to multiple point operation, the effective antenna gain (actual gain + cable loss) is controlled below or equal to 9 dBi and 28 dBi, and ensures the unit complies with local regulations. Since the FCC 15.407 regulations state that systems operating in the 5725-5825 MHz band that the transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted ouput 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. In this case, the peak output power limit is 8 dBm for 28 dBi effective gain antenna, and 27 dBi for 9 dbi effective gain antenna. The product will be installed by professional and sets proper output power with antennas with different gain to meet local regulations.

Point to Multiple Point, with 28 dBi Antenna

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Power (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	-1.37	-1.9	1.38	8	-6.62
Middle	5785	2.87	2.85	5.87	8	-2.13
High	5805	2.93	2.97	5.96	8	-2.04
802.11n HT20 mode						
Low	5745	-1.35	-1.86	1.41	8	-6.59
Middle	5785	2.71	2.95	5.84	8	-2.16
High	5805	2.87	2.97	5.93	8	-2.07

Point to Multiple Point, with 9 dBi Antenna

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Total Power (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	11.40	11.58	14.50	27	-12.50
Middle	5785	21.28	20.99	24.15	27	-2.85
High	5805	14.38	13.93	17.17	27	-9.83
802.11n HT20 mode						
Low	5745	14.59	14.31	17.46	27	-9.54
Middle	5785	21.20	21.44	24.33	27	-2.67
High	5805	14.38	13.56	17.00	27	-10.00

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 5.725-5.825 GHz band: For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

According to RSS-210 §A9.4, emissions within the frequency rang from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p.

For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27 dBm/MHz.

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 both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

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

10.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	49%
ATM Pressure:	101.4 kPa

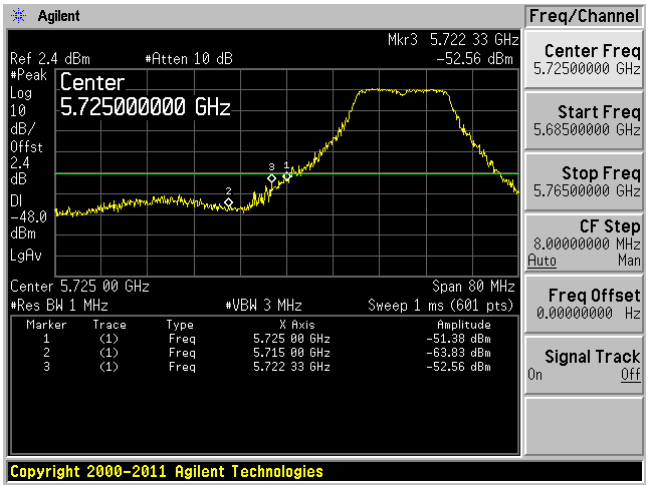
The testing was performed by Jeffrey Wu on 2013-05-28 in RF site.

10.5 Test Results

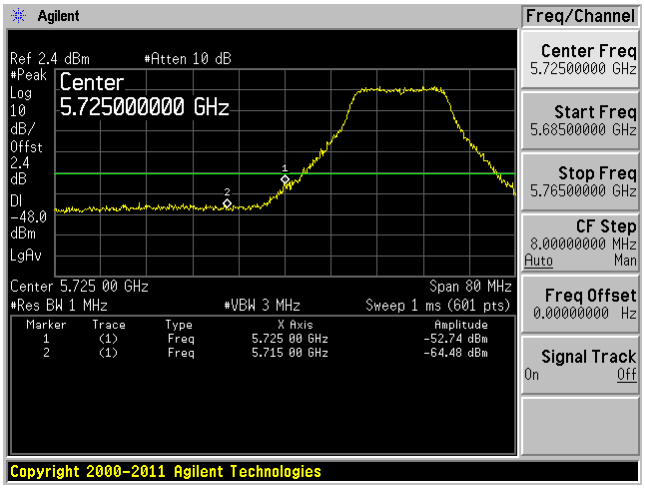
Please refer to following pages for plots of band edge.

Low Power High Gain (28 dBi)

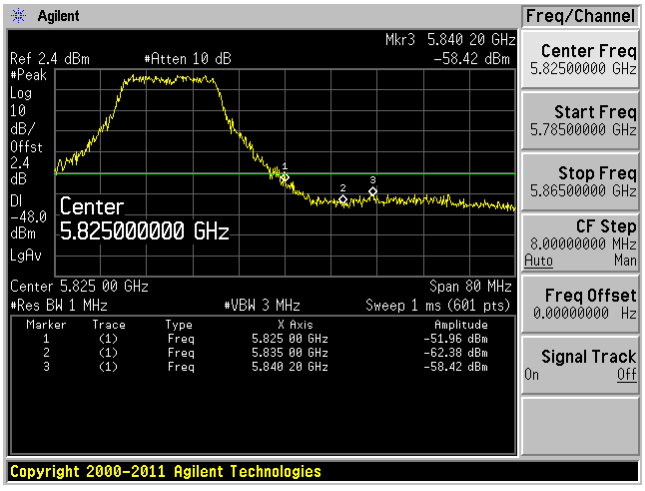
802.11a mode, Lowest Channel J0



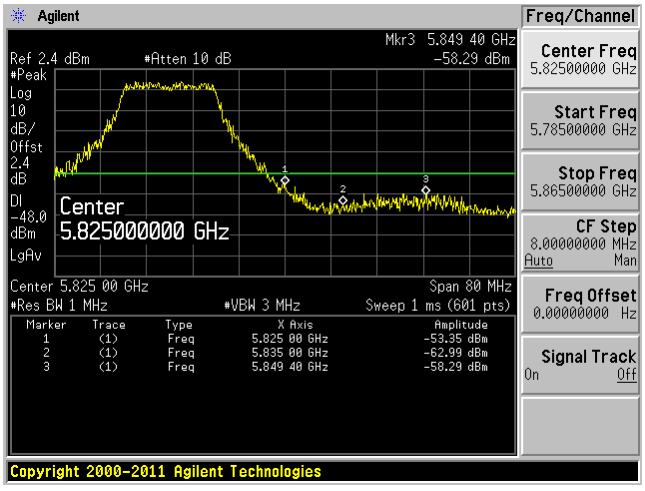
802.11a mode, Lowest Channel J1



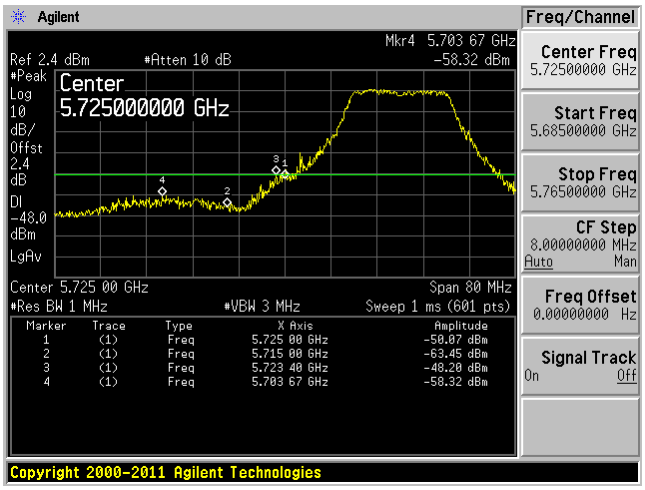
802.11a mode, Highest Channel J0



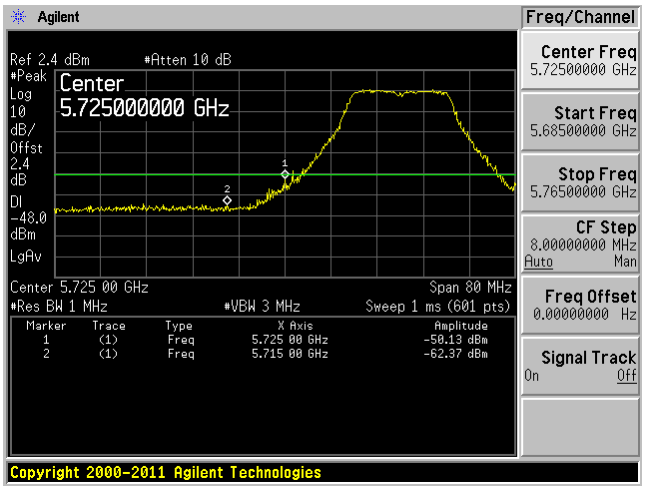
802.11a mode, Highest Channel J1



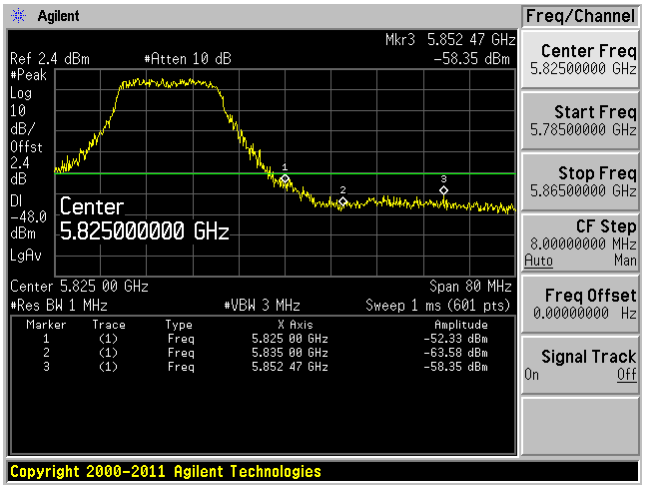
802.11n HT20 mode, Lowest Channel J0



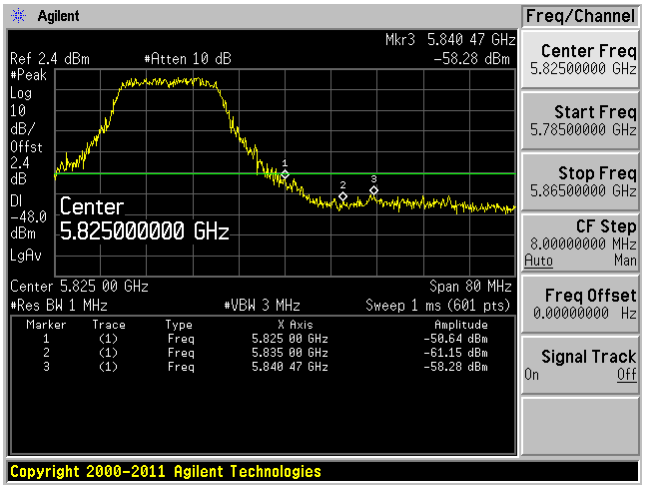
802.11n HT20 mode, Lowest Channel J1



802.11n HT20 mode, Highest Channel J0

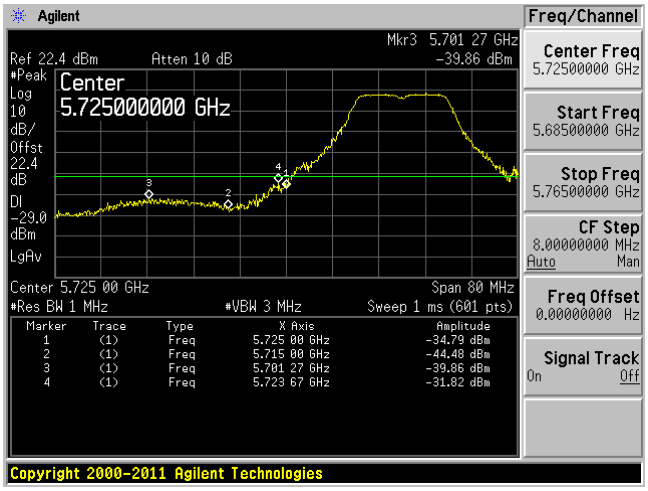


802.11n HT20 mode, Highest Channel J1

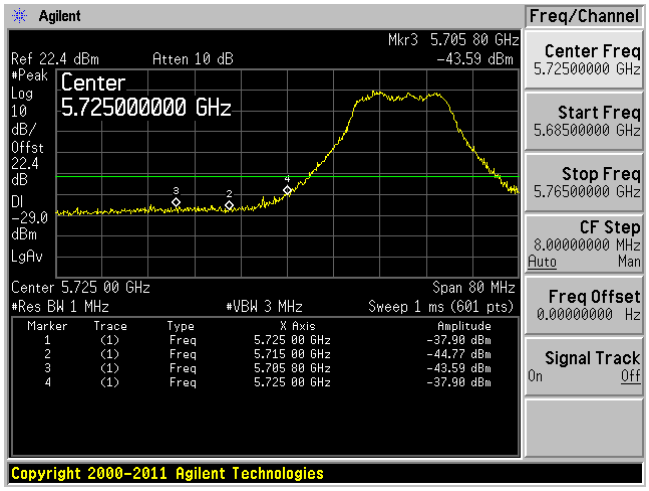


High Power Low Gain (9 dBi)

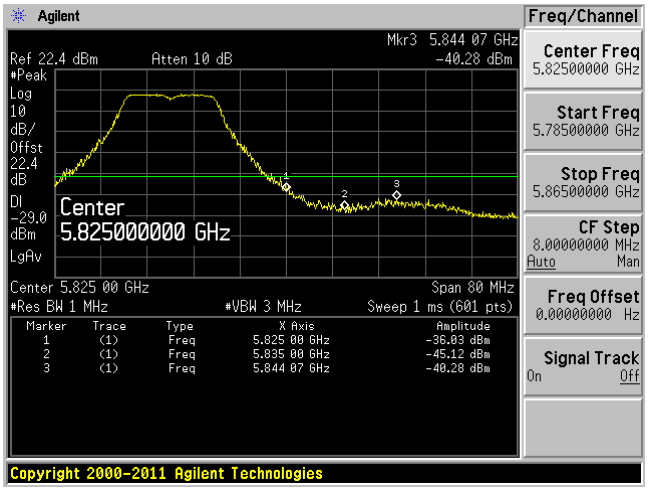
802.11a mode, Lowest Channel J0



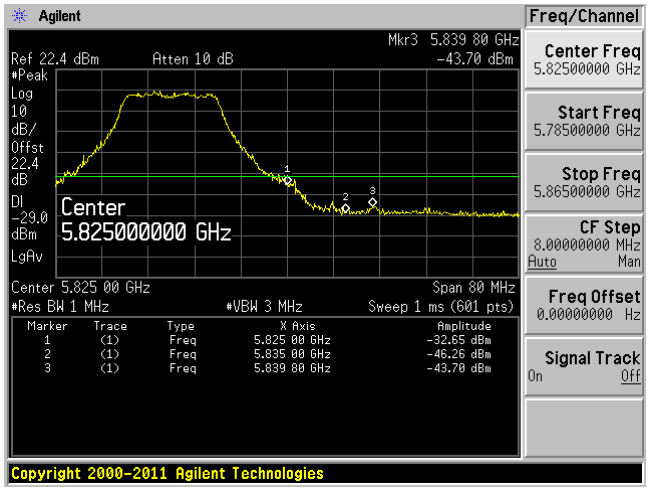
802.11a mode, Lowest Channel J1



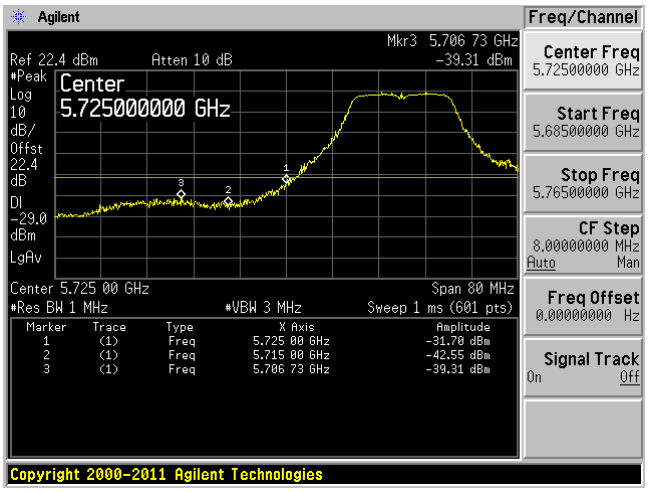
802.11a mode, Highest Channel J0



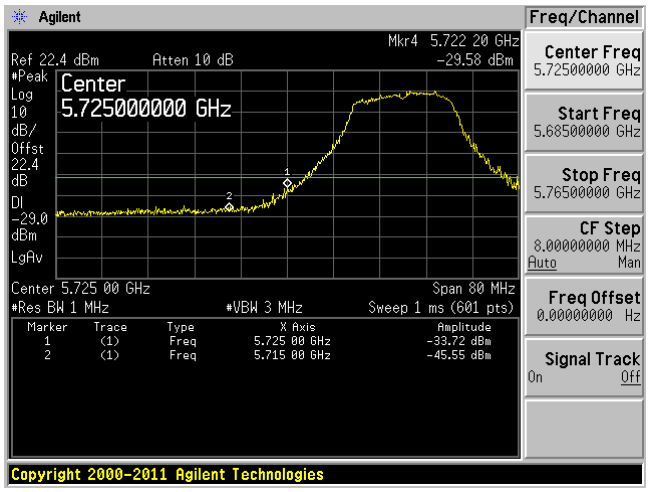
802.11a mode, Highest Channel J1



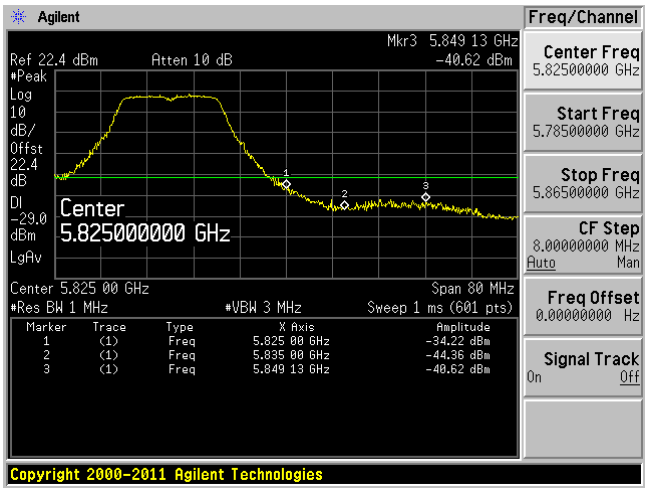
802.11n HT20 mode, Lowest Channel J0



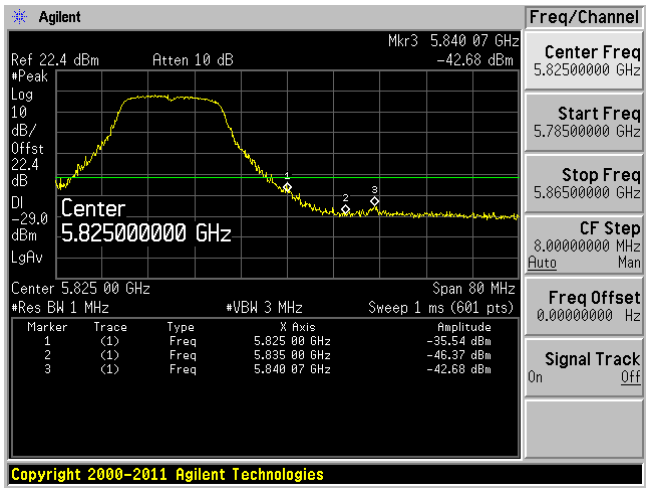
802.11n HT20 mode, Lowest Channel J1



802.11n HT20 mode, Highest Channel J0



802.11n HT20 mode, Highest Channel 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 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to IC RSS-210 §A9.2:

The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log10 B, dBm, whichever power 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

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

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

11.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	49%
ATM Pressure:	101.4 kPa

The testing was performed by Jeffrey Wu on 2013-05-28 in RF site

11.5 Test Results

** Note: For point to point operation, the effective antenna gain (actual gain + cable loss) is controlled below or equal to 9 dBi and 28 dBi, and ensures the unit complies with local regulations. Since the FCC 15.407 regulations state that systems operating in the 5725-5825 MHz band that are used exclusively for fixed, point-to point operations may employ transmitting antennas with directional gain greater up to 23 dBi without any corresponding reduction in transmitter peak output power. For fixed, point –to point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in exceess of 23 dBi would be required. In this case, the peak power spectral density limit is 12 dBm for 28 dBi effective gain antenna, and 17 dBi for 9 dbi effective gain antenna.

For point to multiple point operation, the effective antenna gain (actual gain + cable loss) is controlled below or equal to 9 dBi and 28 dBi, and ensures the unit complies with local regulations. Since the FCC 15.407 regulations state that systems operating in the 5725-5825 MHz band that the transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted ouput 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. In this case, the peak power spectral density limit is -5 dBm for 28 dBi effective gain antenna, and 14 dBi for 9 dbi effective gain antenna. The product will be installed by professional and sets proper output power with antennas with different gain to meet local regulations.

Point to Point and Point to Multiple Point

Low Power High Gain (28 dBi)

Channel	Frequency (MHz)	PSD (dBm)		Total PDS (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	-12.647	-12.529	-9.58	-5	-4.58
Middle	5785	-9.354	-9.313	-6.32	-5	-1.32
High	5805	-12.771	-12.312	-9.53	-5	-4.53
802.11n HT20 mode						
Low	5745	-13.209	-13.396	-10.29	-5	-5.29
Middle	5785	-9.361	-9.32	-6.33	-5	-1.33
High	5805	-10.159	-10.116	-7.13	-5	-2.13

** Note: The EUT was configured to transmit at the maximum output power of PTP and PTMP modes with 28 dBi effective antenna gain. Thus, the device is compliant with both PTP and PTMP modes.

Point to Point

High Power Low Gain (9 dBi)

Channel	Frequency (MHz)	PSD (dBm)		Total PDS (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	2.676	3.546	6.14	17	-10.86
Middle	5785	12.724	12.251	15.50	17	-1.50
High	5805	2.331	2.148	5.25	17	-11.75
802.11n HT20 mode						
Low	5745	2.981	3.405	6.21	17	-10.79
Middle	5785	12.639	11.967	15.33	17	-1.67
High	5805	1.828	1.672	4.76	17	-12.24

Point to Multiple Point

High Power Low Gain (9 dBi)

Channel	Frequency (MHz)	PSD (dBm)		Total PDS (dBm)	Limit (dB)	Margin (dB)
		J0	J1			
802.11a mode						
Low	5745	2.676	3.546	6.14	14	-7.86
Middle	5785	4.780	4.288	7.55	14	-6.45
High	5805	2.331	2.148	5.25	14	-8.75
802.11n HT20 mode						
Low	5745	2.981	3.405	6.21	14	-7.79
Middle	5785	3.665	3.932	6.81	14	-7.19
High	5805	1.828	1.672	4.76	14	-9.24

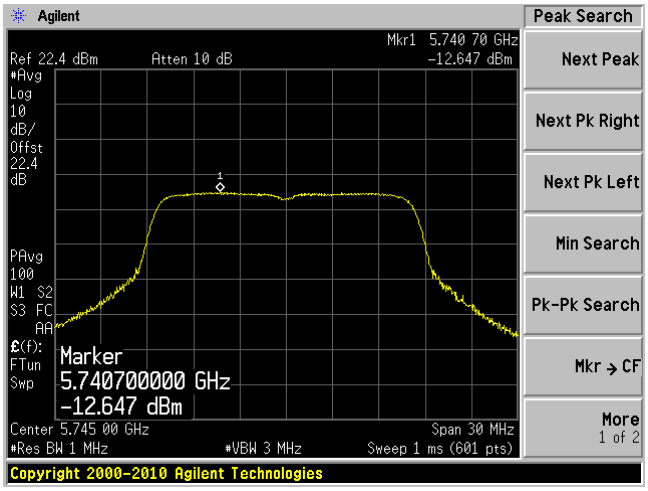
Please refer to the following plots.

Point to Point and Point to Multiple Point

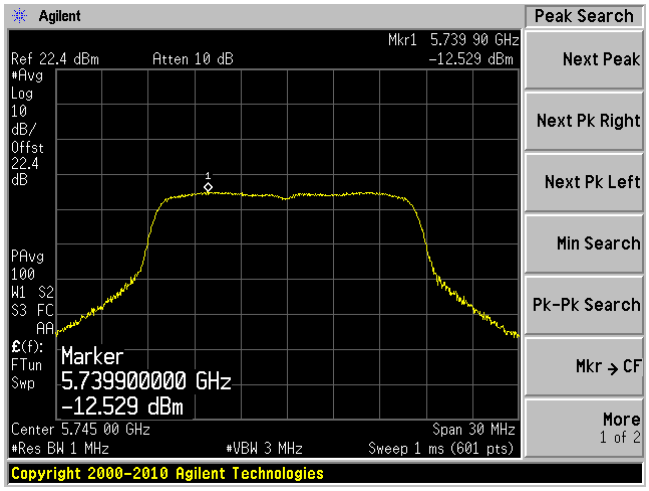
Low Power High Gain (28 dBi)

802.11a mode

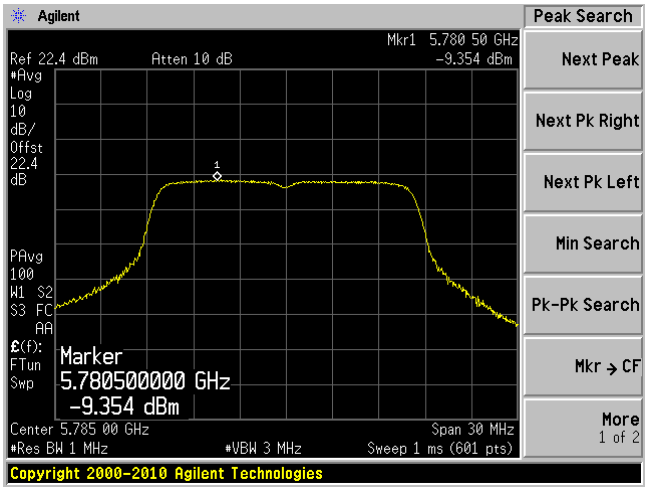
802.11a mode, 5745 MHz J0



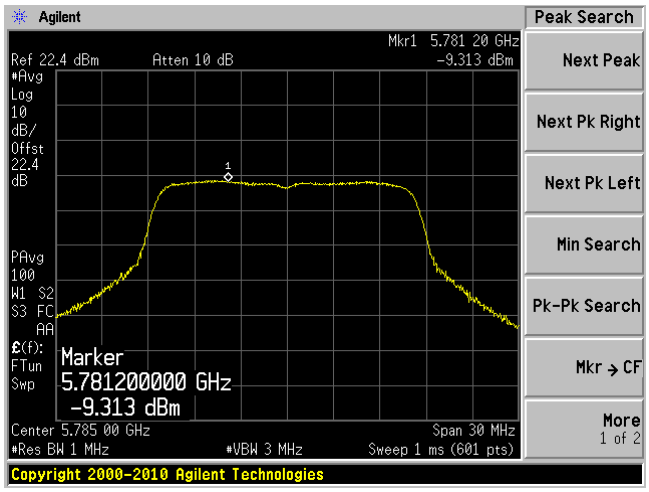
802.11a mode, 5745 MHz J1



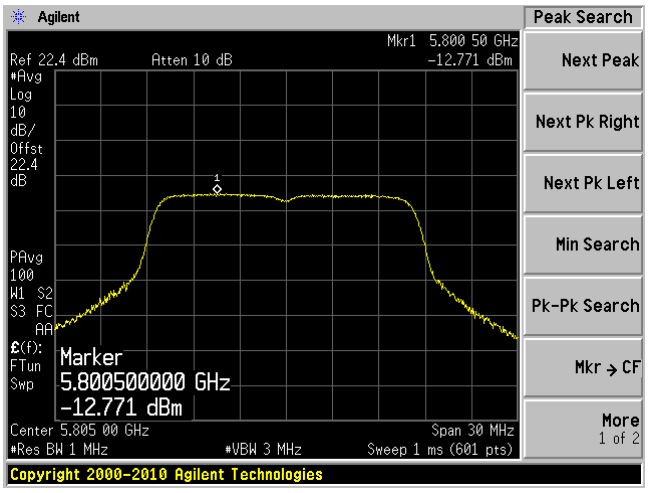
802.11a mode, 5785 MHz J0



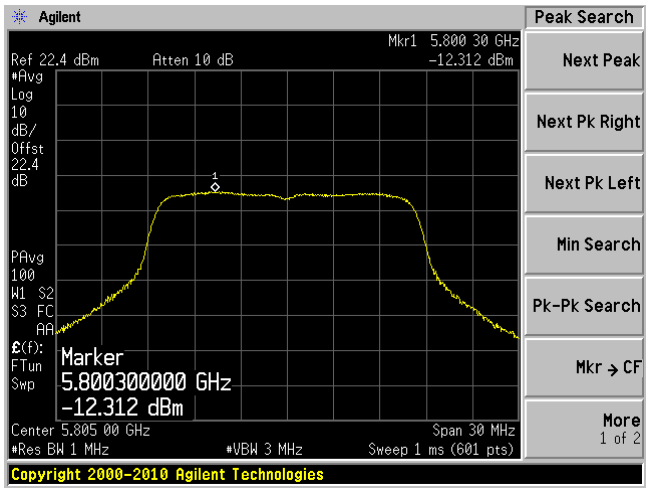
802.11a mode, 5785 MHz J1



802.11a mode, 5805 MHz J0

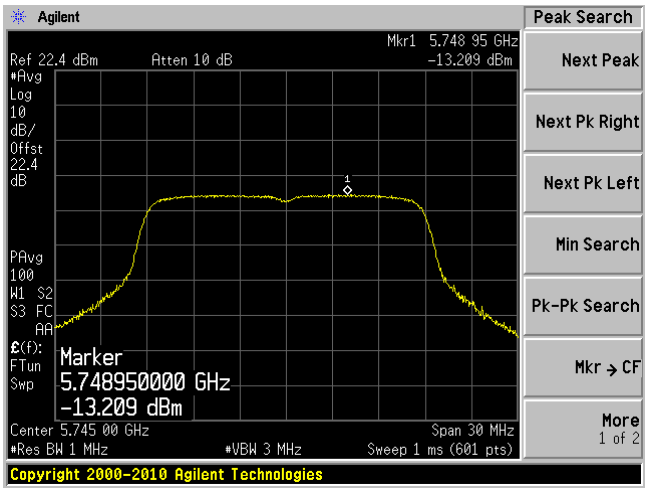


802.11a mode, 5805 MHz J1

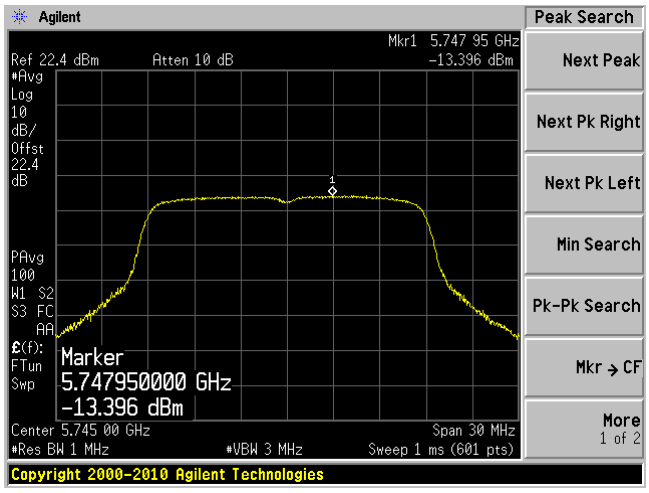


802.11n HT20 mode

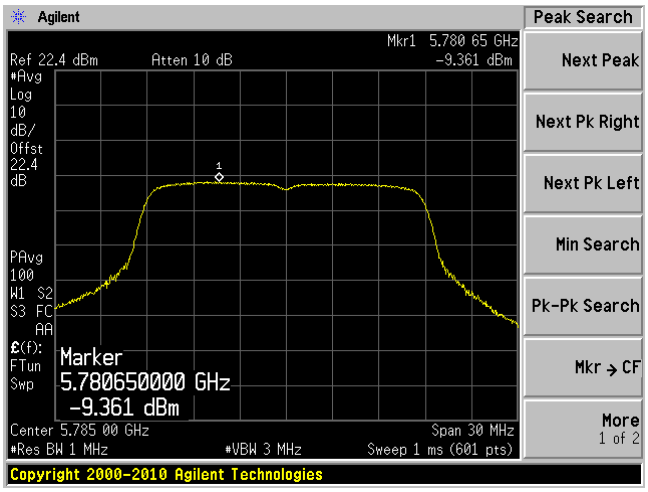
802.11n HT20 mode, 5745MHz



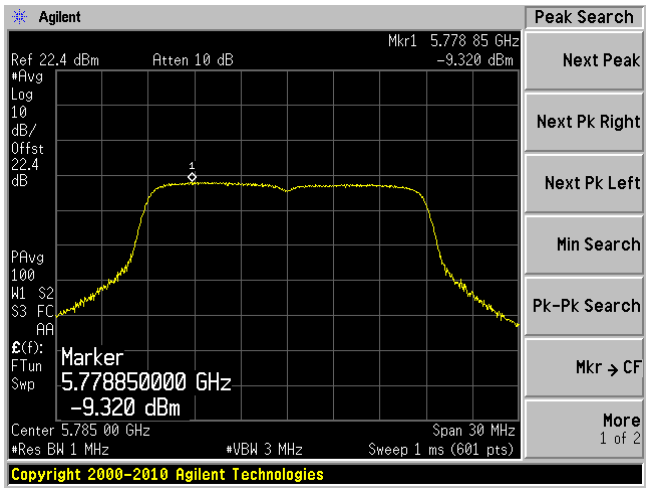
802.11n HT20 mode, 5745MHz



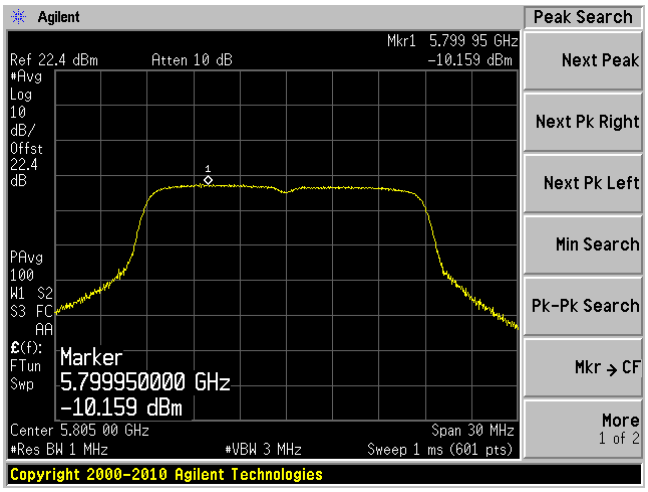
802.11n HT20 mode, 5785MHz



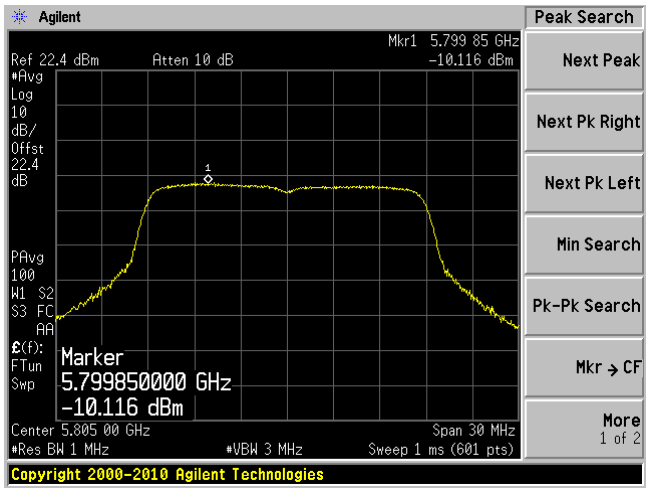
802.11n HT20 mode, 5785MHz



802.11n HT20 mode, 5805MHz



802.11n HT20 mode, 5805MHz

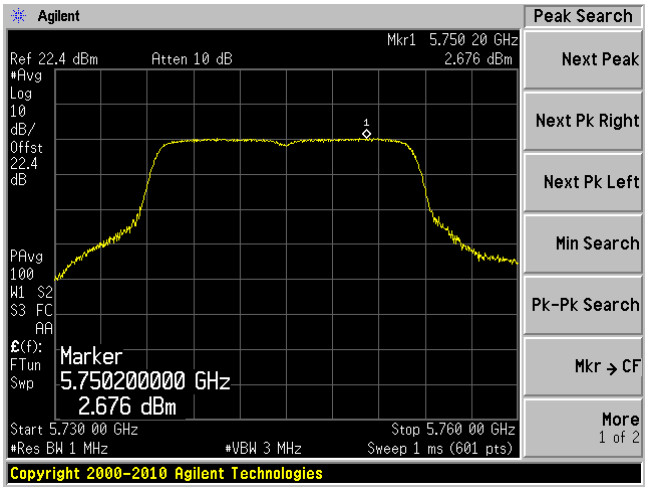


Point to Point

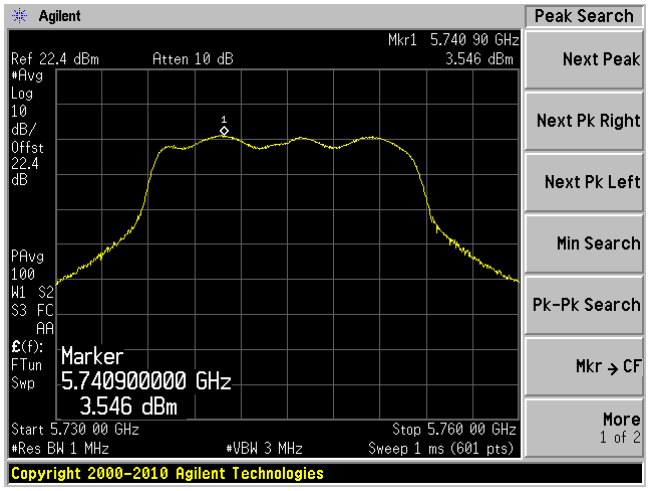
High Power Low Gain (9 dBi)

802.11a mode

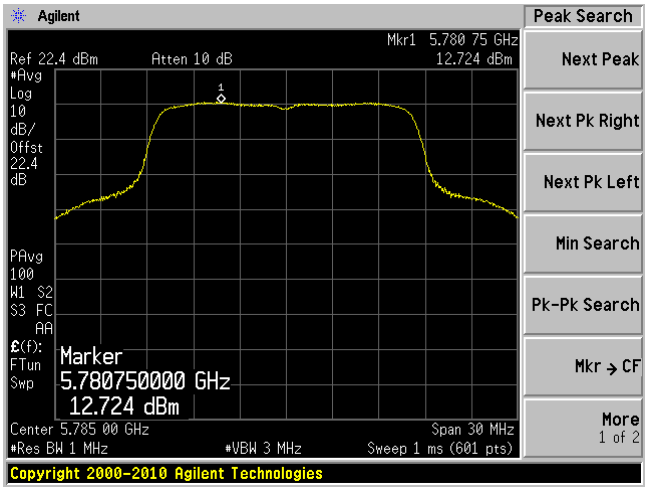
802.11a mode, 5745 MHz J0



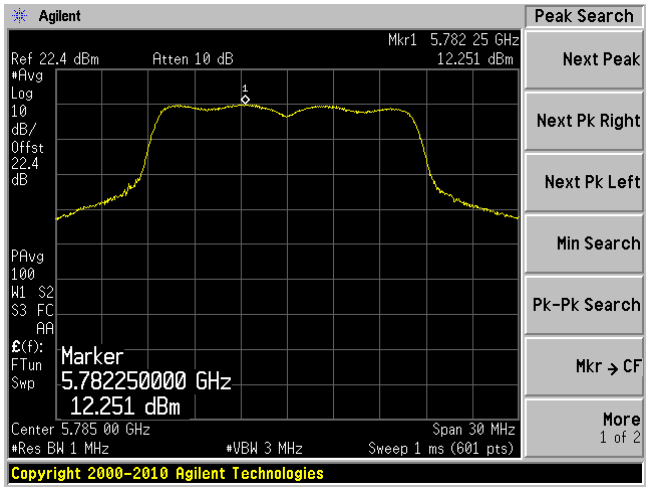
802.11a mode, 5745 MHz J1



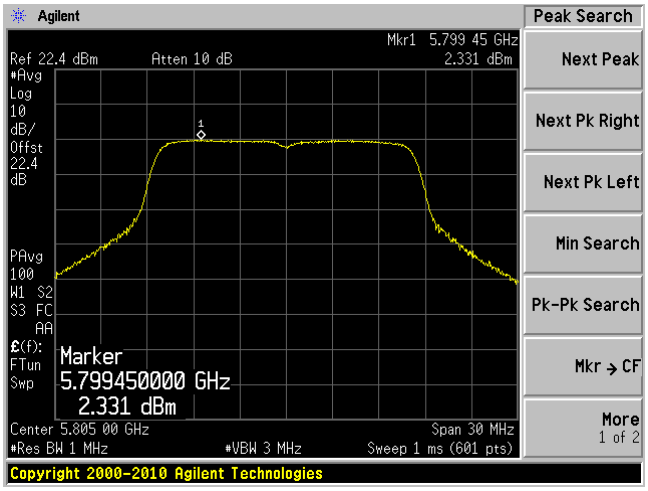
802.11a mode, 5785 MHz J0



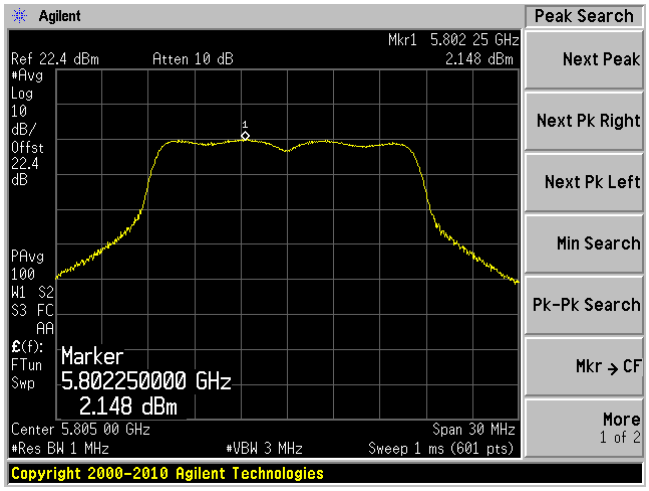
802.11a mode, 5785 MHz J1



802.11a mode, 5805 MHz J0

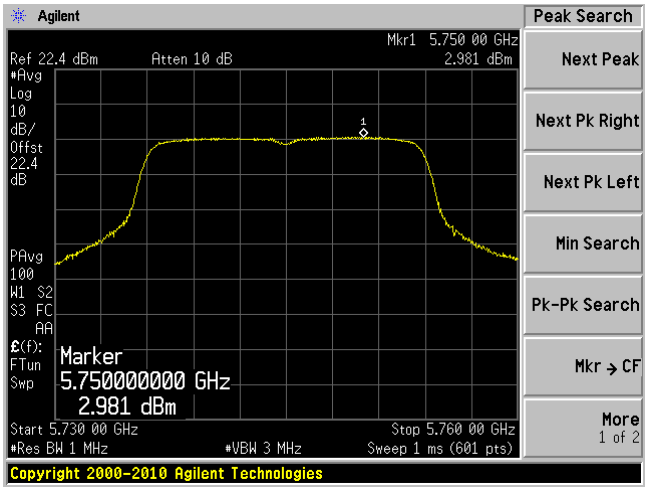


802.11a mode, 5805 MHz J1

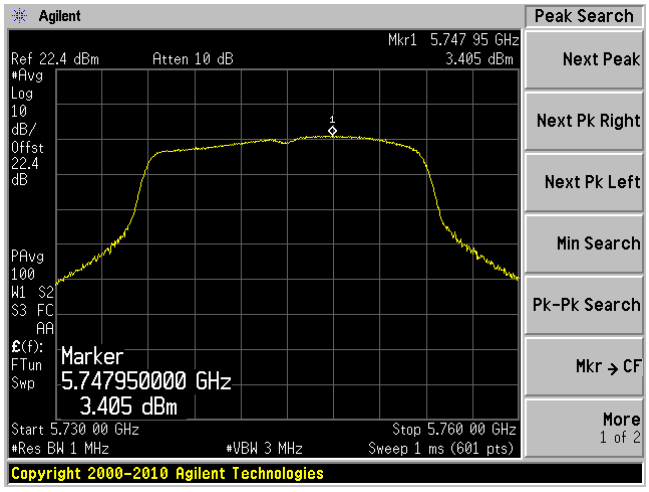


802.11n HT20 mode

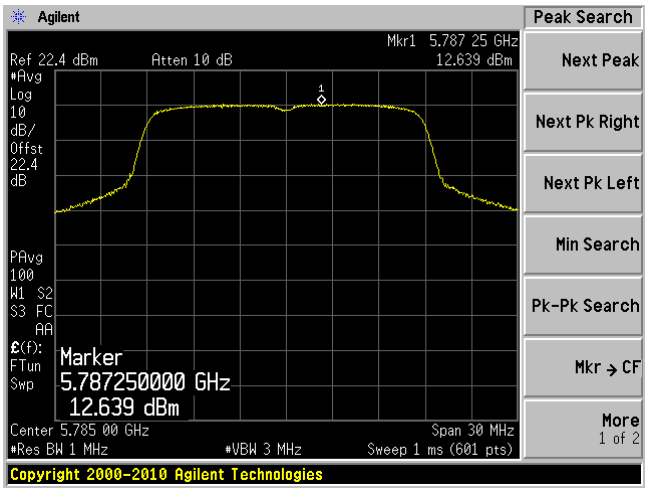
802.11n HT20 mode, 5745 MHz



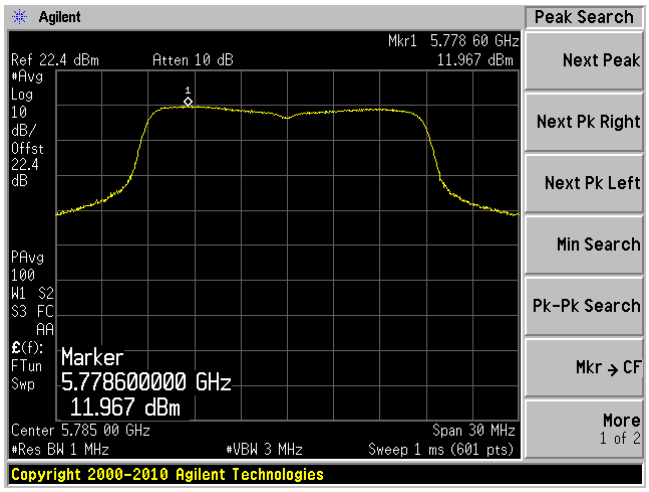
802.11n HT20 mode, 5745 MHz



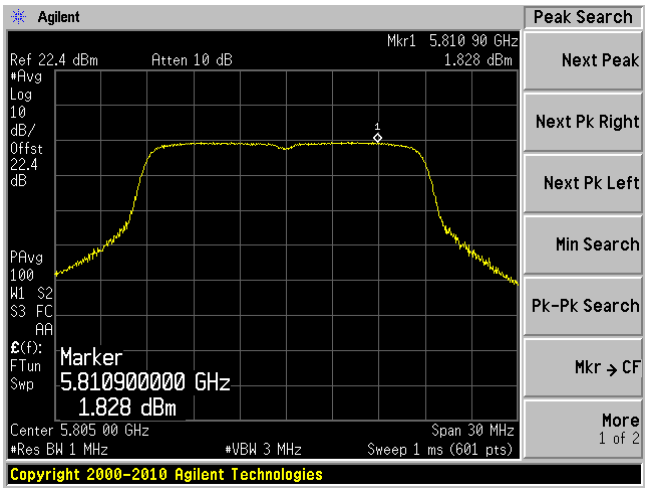
802.11n HT20 mode, 5785 MHz



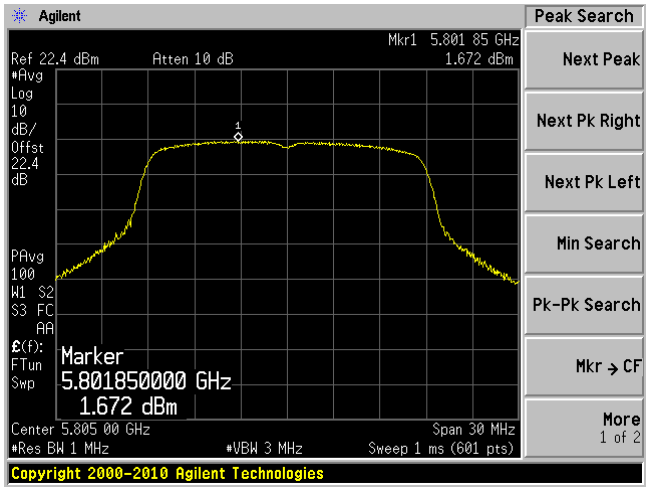
802.11n HT20 mode, 5785 MHz



802.11n HT20 mode, 5805 MHz



802.11n HT20 mode, 5805 MHz

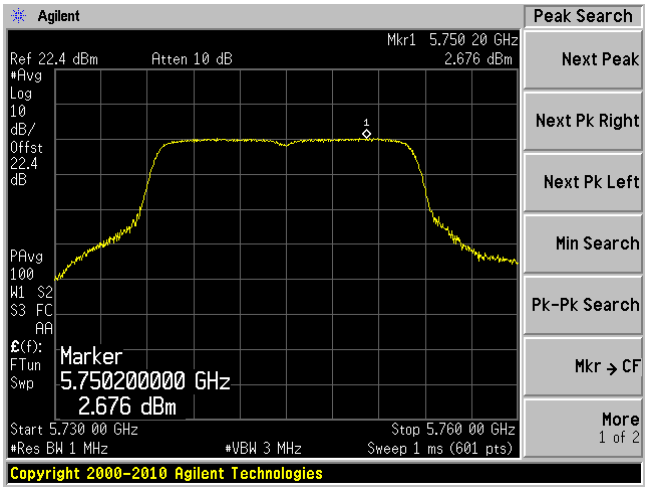


Point to Multiple Point

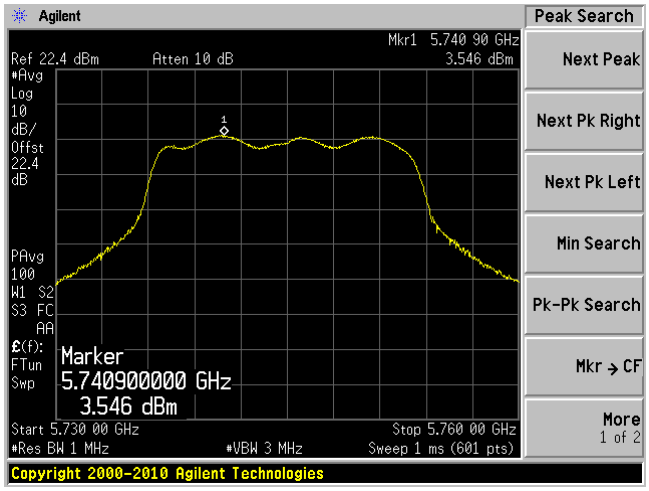
High Power Low Gain (9 dBi)

802.11a mode

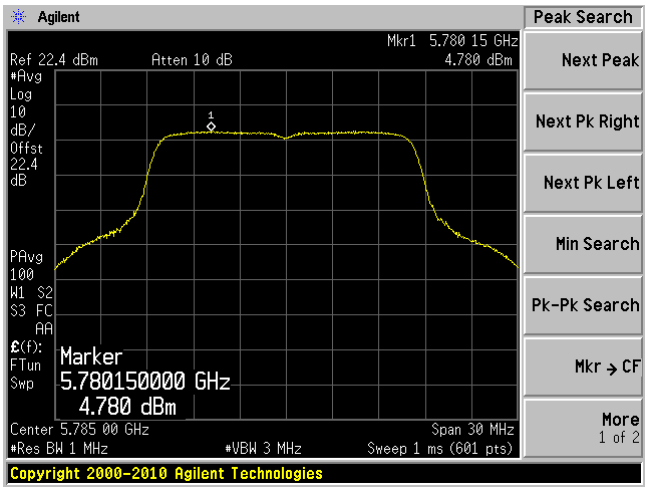
802.11a mode, 5745 MHz J0



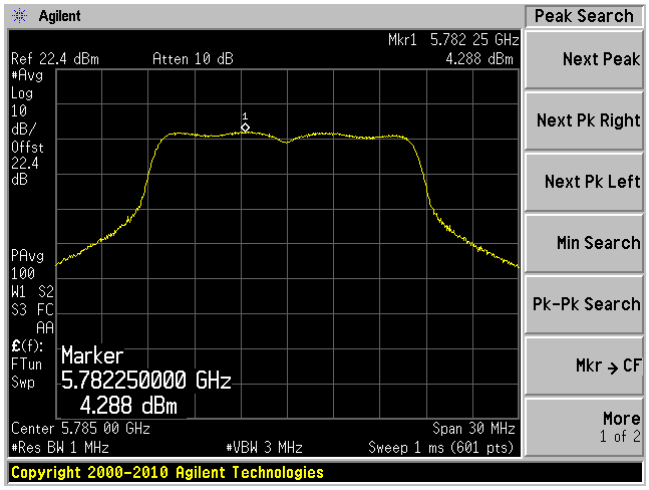
802.11a mode, 5745 MHz J1



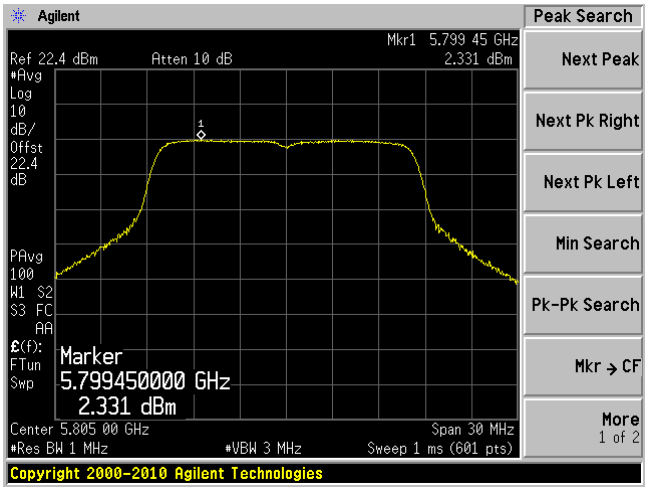
802.11a mode, 5785 MHz J0



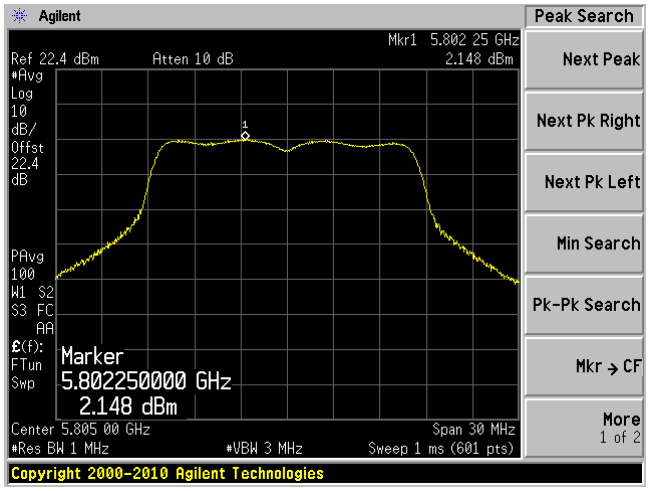
802.11a mode, 5785 MHz J1



802.11a mode, 5805 MHz J0

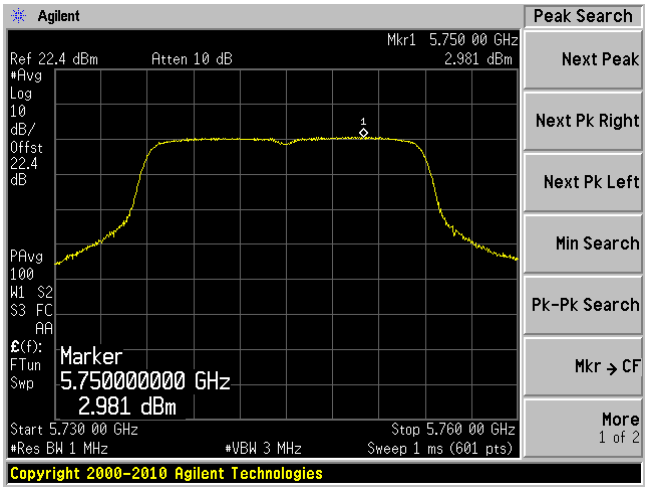


802.11a mode, 5805 MHz J1

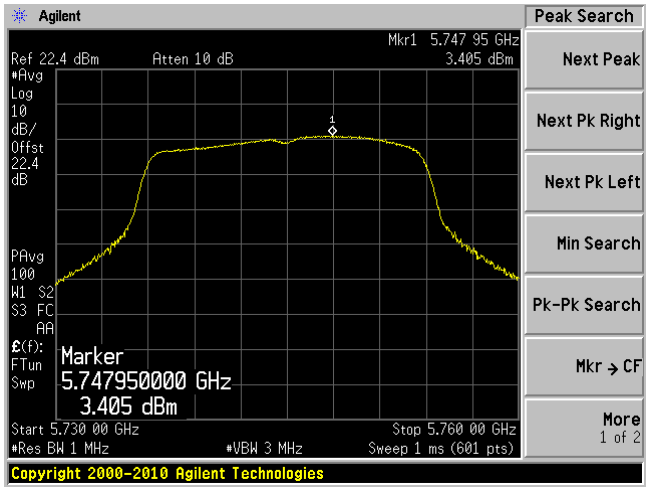


802.11n HT20 mode

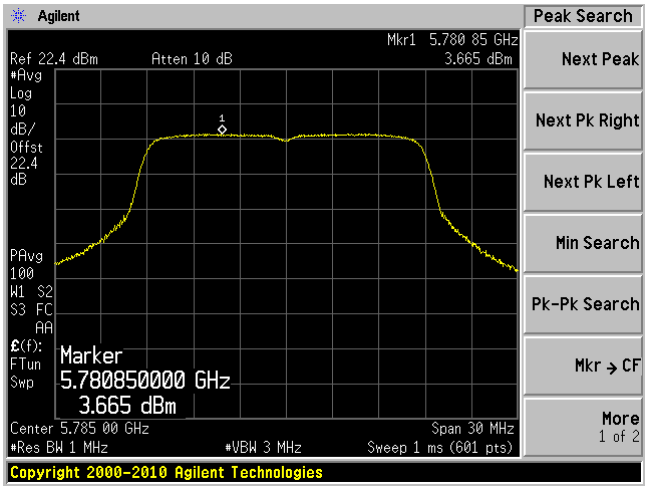
802.11n HT20 mode, 5745 MHz



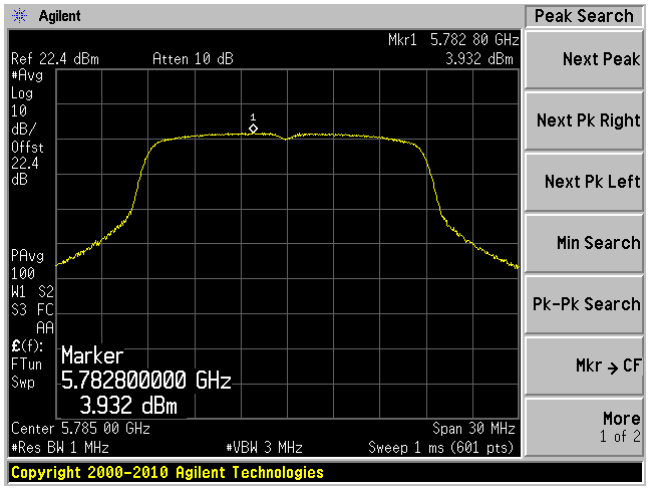
802.11n HT20 mode, 5745 MHz



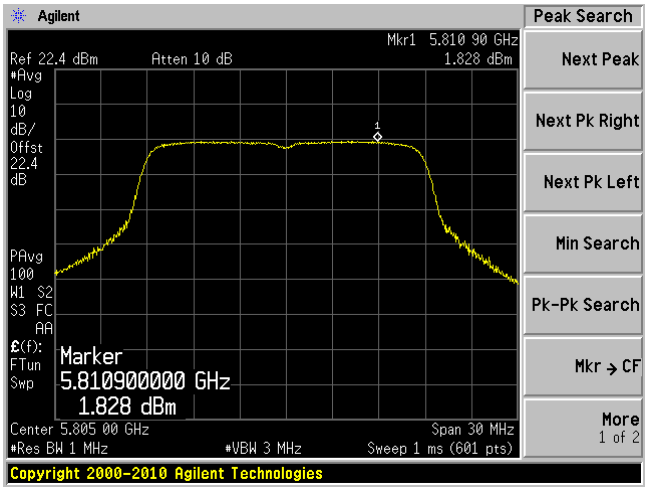
802.11n HT20 mode, 5785 MHz



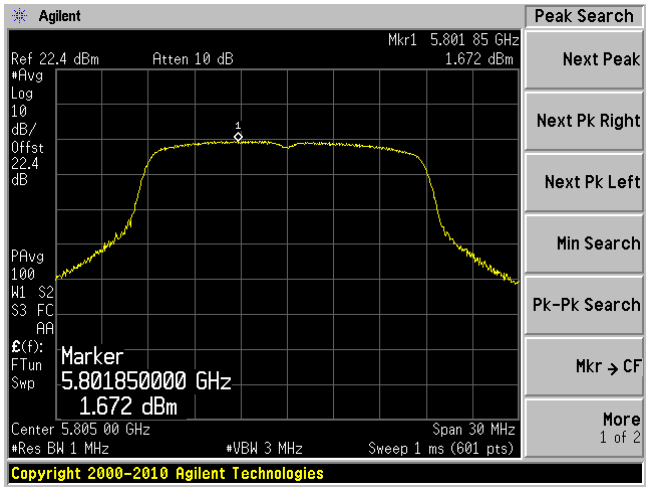
802.11n HT20 mode, 5785 MHz



802.11n HT20 mode, 5805 MHz



802.11n HT20 mode, 5805 MHz



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

12.1 Applicable Standard

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

12.2 Test Procedure

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

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

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

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

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

12.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	39%
ATM Pressure:	101.4 kPa

The testing was performed by Jeffrey Wu on 2013-05-20 in RF site.

12.5 Test Results

802.11a mode

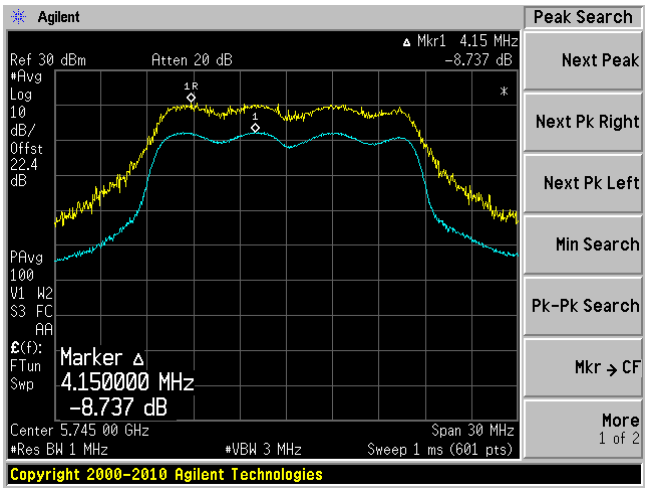
Channel	Frequency (MHz)	Results (dB)		Limit (dB)
		J0	J1	
Low	5745	8.737	7.709	13
Middle	5785	8.055	8.801	
High	5805	7.790	8.848	

802.11n HT20 mode

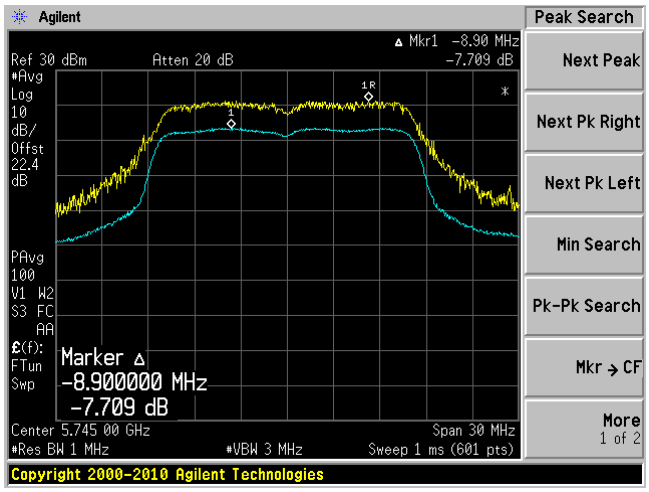
Channel	Frequency (MHz)	Results (dB)		Limit (dB)
		J0	J1	
Low	5745	8.697	8.353	13
Middle	5785	9.017	8.413	
High	5805	8.005	8.441	

Please refer to the following plots for detailed test results:

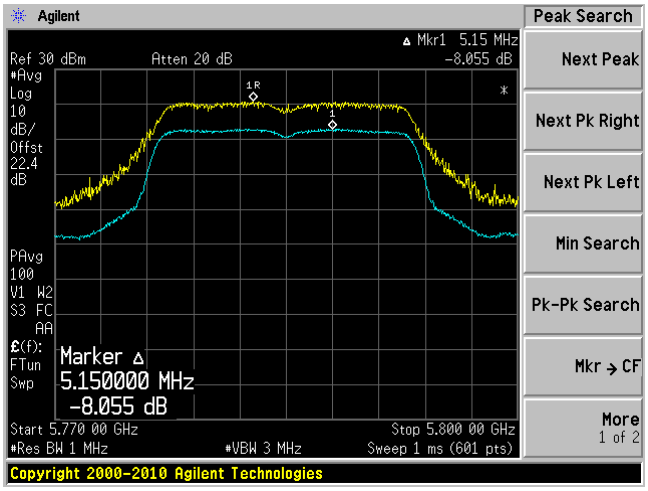
802.11a mode, 5745 MHz J0



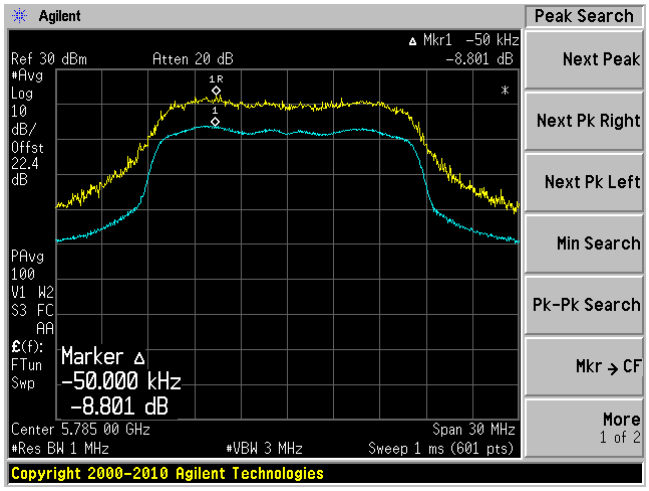
802.11a mode, 5745 MHz J1



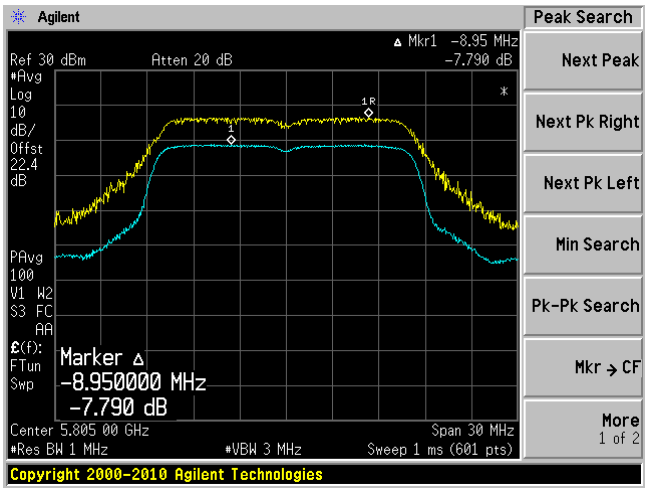
802.11a mode, 5785 MHz J0



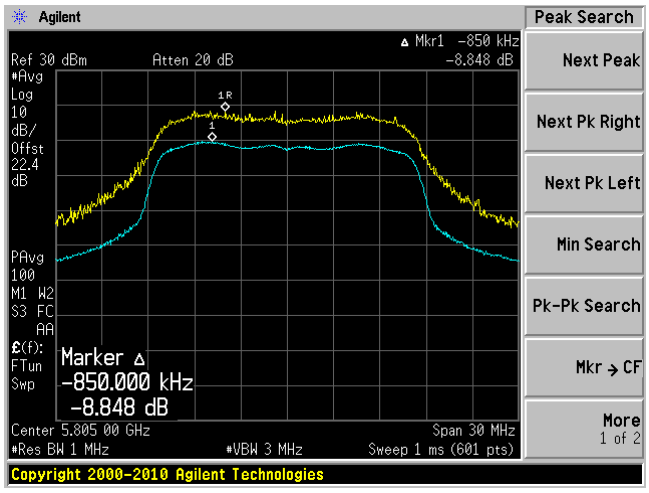
802.11a mode, 5785 MHz J1



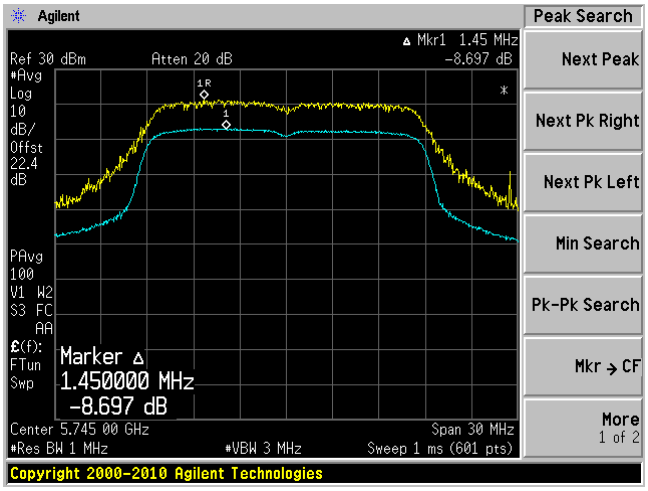
802.11a mode, 5805 MHz J0



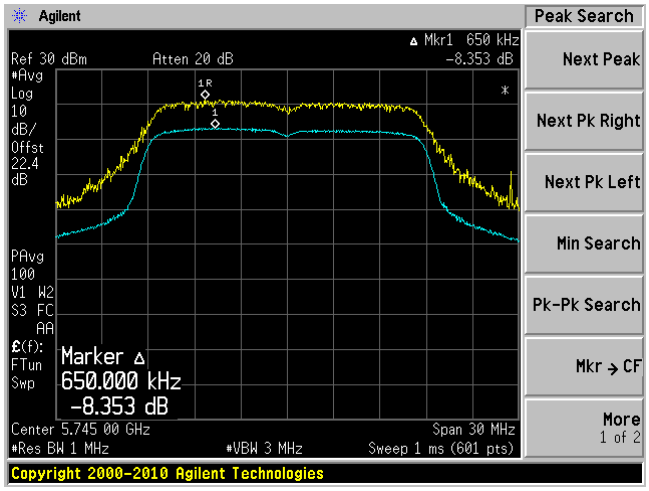
802.11a mode, 5805 MHz J1



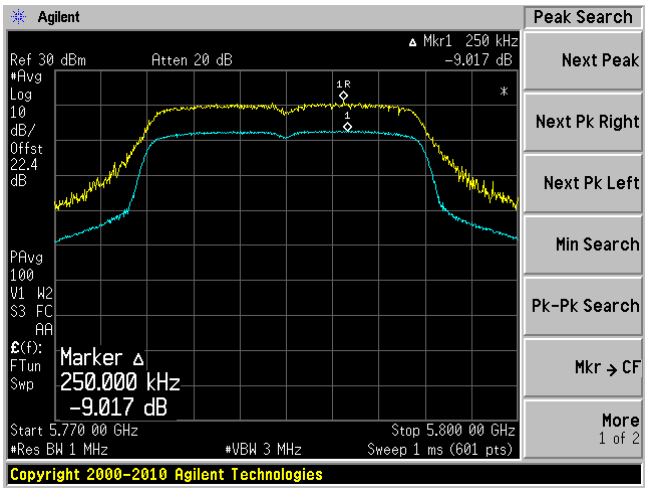
802.11n HT20 mode, 5745 MHz J0



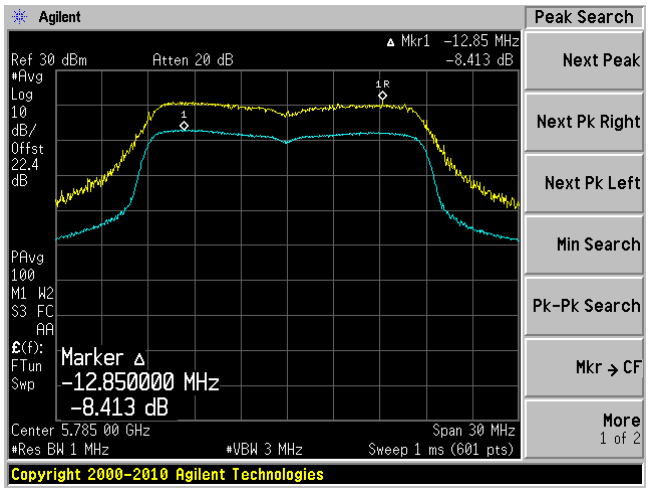
802.11n HT20 mode, 5745 MHz J1



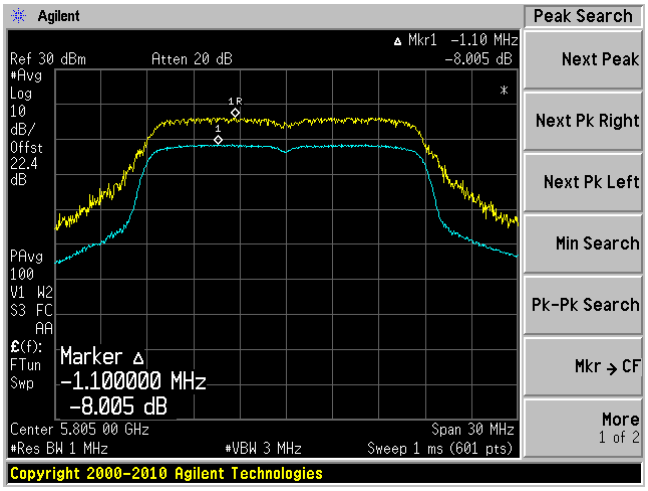
802.11n HT20 mode, 5785 MHz J0



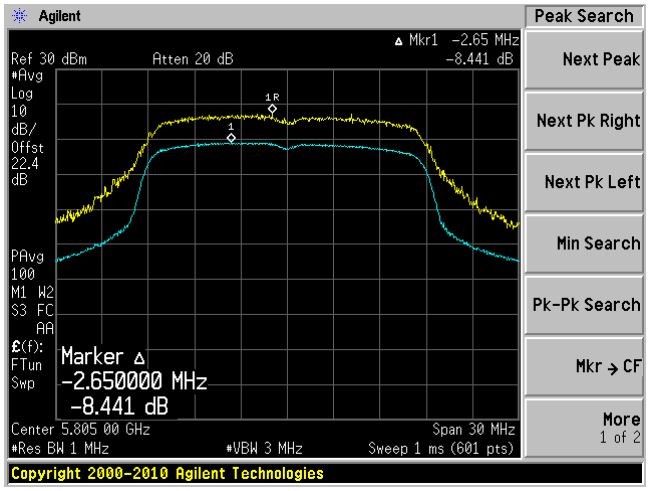
802.11n HT20 mode, 5785 MHz J1



802.11n HT20 mode, 5805 MHz J0



802.11n HT20 mode, 5805 MHz J1



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

13.1 Applicable Standard

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

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

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

13.2 EUT Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2009.

13.3 Test Procedure

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

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

13.4 Corrected Amplitude & Margin Calculation

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

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

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

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

$$Margin = Corrected\ Amplitude - Limit$$

13.5 Test Equipment Lists and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	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	2013-03-05	1 year
EMCO	Horn Antenna	3115	9511-4627	2012-10-17	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2013-03-28	1 year

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

13.6 Test Environmental Conditions

Temperature:	21°C
Relative Humidity:	45 %
ATM Pressure:	101.2kPa

The testing was performed by Jeffrey Wu on 2012-03-13 at 5 meter 3.

13.7 Summary of Test Results

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

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-3.69	45.2345	Vertical	30-18000

13.8 Test Results and Plots

1) 30-1000 MHz, Measured at 3 meters

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (QP/Ave.)
45.2345	36.31	124	V	265	40	-3.69	QP
106.714	39.06	113	V	285	43.5	-4.44	QP
39.4225	35.55	100	V	336	40	-4.45	QP
51.82275	35.51	109	V	34	40	-4.49	QP
74.57325	27.25	149	V	138	40	-12.75	QP

2) Above 1 GHz Measured at 3 meters

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
13312	48.985	104	V	38	54	-5.015	Ave
13312	48.975	100	H	0	54	-5.025	Ave
13312	63.795	104	V	38	74	-10.205	Peak
11520	43.647	102	V	108	54	-10.353	Ave
11520	43.647	104	H	26	54	-10.353	Ave
13312	63.625	100	H	0	74	-10.375	Peak
7750	40.370	102	V	125	54	-13.630	Ave
7750	40.350	101	H	34	54	-13.650	Ave
11520	58.307	104	H	26	74	-15.693	Peak
11520	58.287	102	V	108	74	-15.713	Peak
7750	55.634	101	H	34	74	-18.366	Peak
7750	55.074	103	V	125	74	-18.926	Peak

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

14.1 Applicable Standard

According to FCC §15.407(b)

For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz

According to RSS-210 §A9.2 For the band 5725-5825 MHz, emssions within the frequency range from the band edge to 10 MHz above or below the band edges shall not exceed -18 dBm/MHz e.i.r.p.

For frequencies more than 10 MHz above or below the band edges, emission shall not exceed -27 dBm/MHz.

14.2 Measurement Procedure

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

6) Procedures for Average Unwanted Emissions Measurements above 1000 MHz.
a) Follow the requirements in section G)3), "General Requirements for Unwanted Emissions Measurements".
b) Average emission levels shall be measured using one of the following two methods.
c) Method AD (Average Detection): Primary method
(i) RBW = 1 MHz.
(ii) VBW ≥ 3 MHz.
(iii) Detector = RMS, if span/(# of points in sweep) ≤ RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
(iv) Averaging type = power (i.e., RMS)
• As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
(v) Sweep time = auto.
(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces should be averaged.
(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
• If power averaging (RMS) mode was used in step (iv) above, the correction factor is10 log(1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
• If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log(1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.

14.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2012-09-29	1 year

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

14.4 Test Environmental Conditions

Temperature:	21-24 °C
Relative Humidity:	40-47 %
ATM Pressure:	101-103 kPa

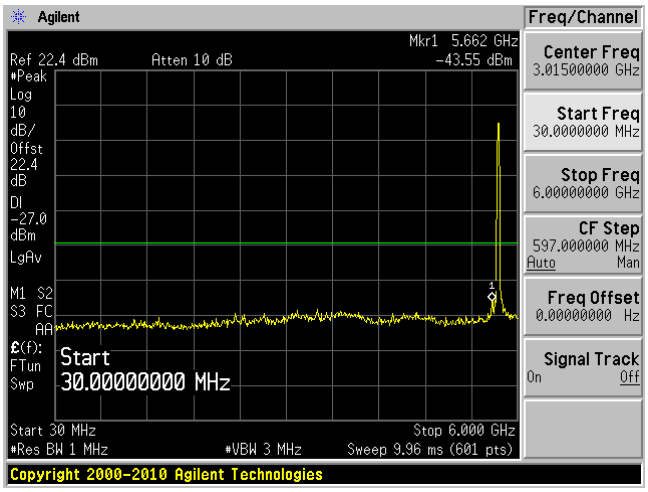
The testing was performed by Jeffrey Wu from 2013-05-28 to 2013-06-08 in RF site.

14.5 Test Results

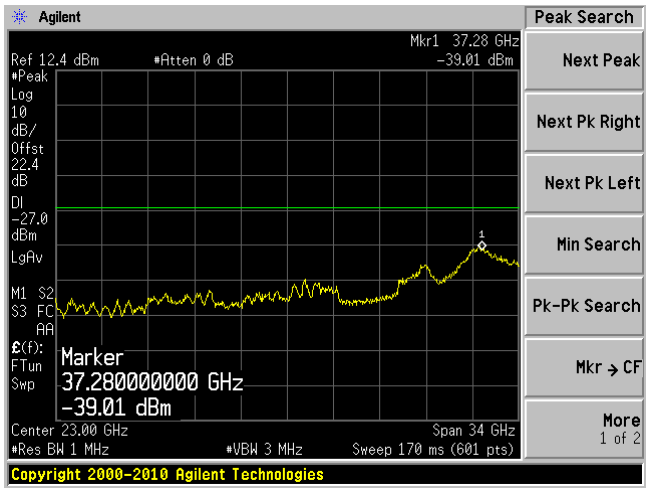
Please refer to the following plots of spurious emissions.

802.11a mode, Low Channel

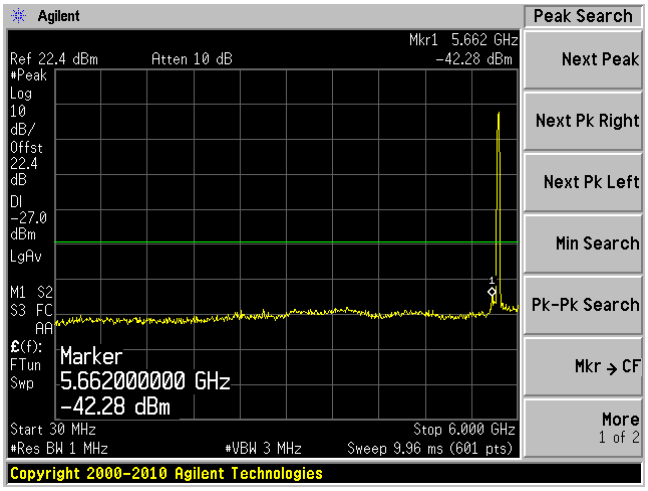
802.11a mode, 5745 MHz J0, 30 MHz – 6 GHz



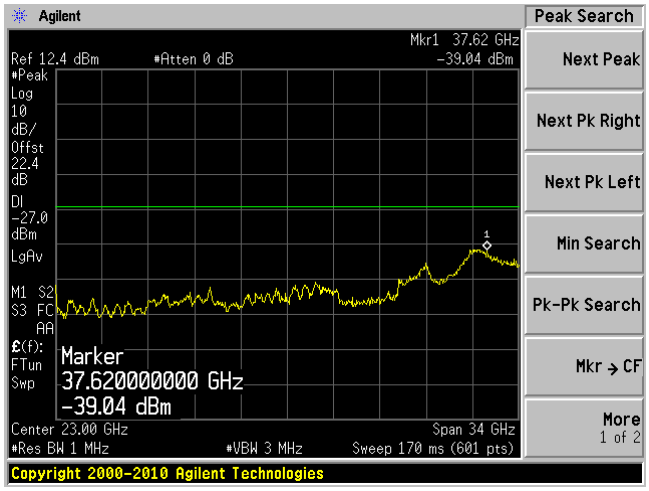
802.11a mode, 5745 MHz J0, 6 GHz – 40 GHz



802.11a mode, 5745 MHz J1, 30 MHz – 6 GHz

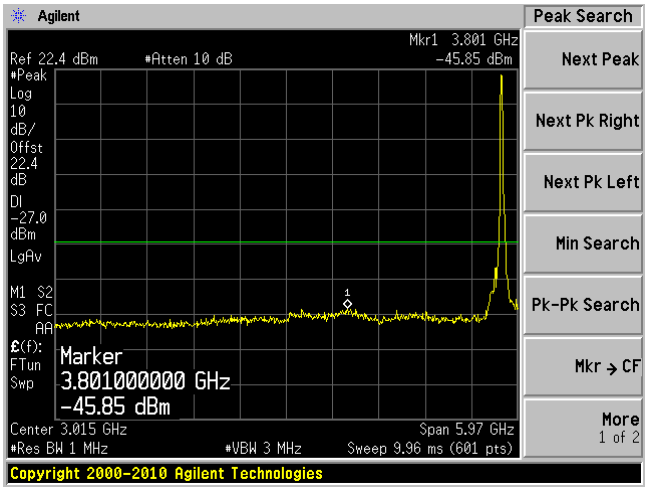


802.11a mode, 5745 MHz J1, 6 GHz – 40 GHz

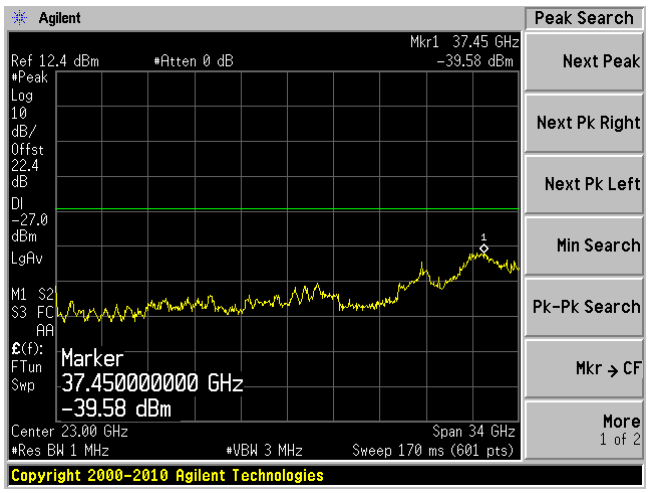


802.11a mode, Middle Channel

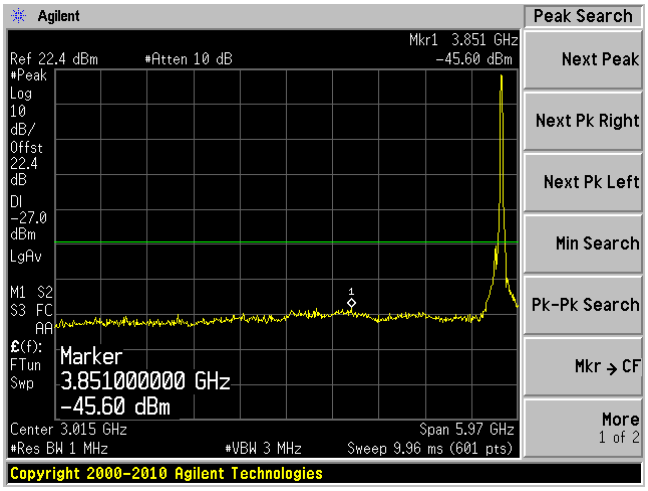
802.11a mode, 5785 MHz J0, 30 MHz – 6 GHz



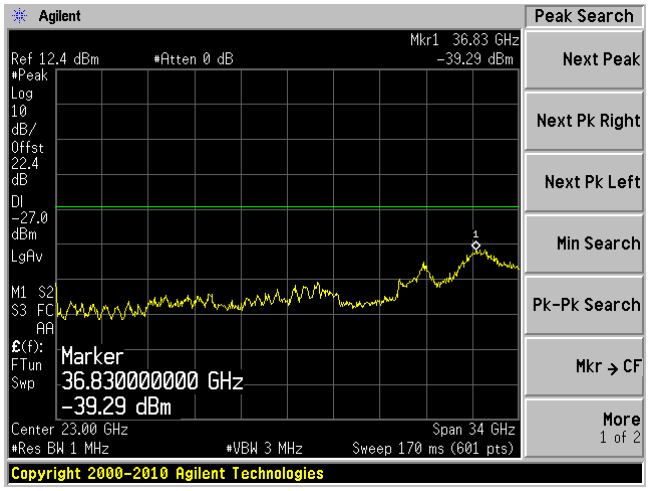
802.11a mode, 5785 MHz J0, 6 GHz – 40 GHz



802.11a mode, 5785 MHz J1, 30 MHz – 6 GHz

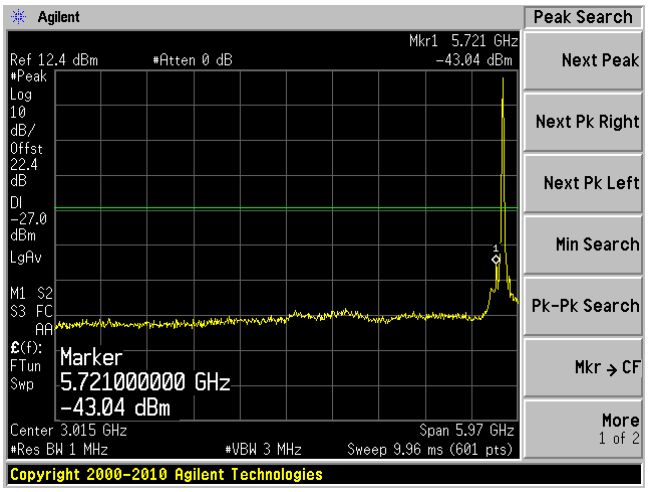


802.11a mode, 5785 MHz J1, 6 GHz – 40 GHz

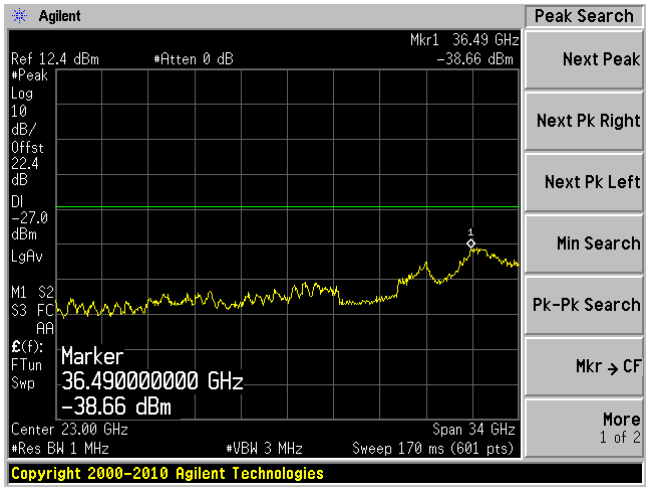


802.11a mode, High Channel

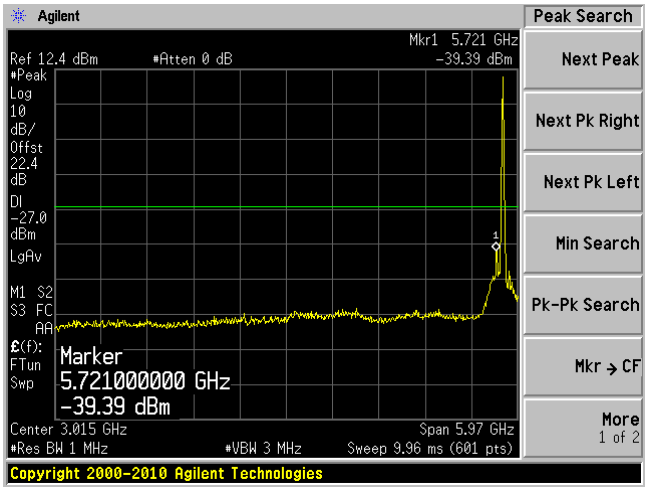
802.11a mode, 5805 MHz J0, 30 MHz – 6 GHz



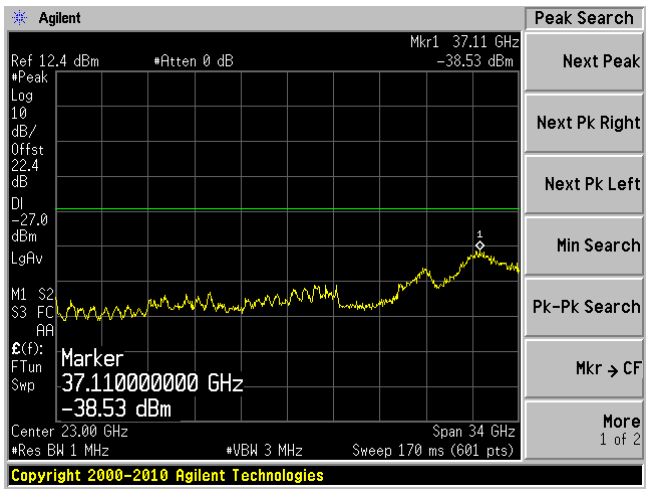
802.11a mode, 5805 MHz J0, 6 GHz – 40 GHz



802.11a mode, 5805 MHz J1, 30 MHz – 6 GHz

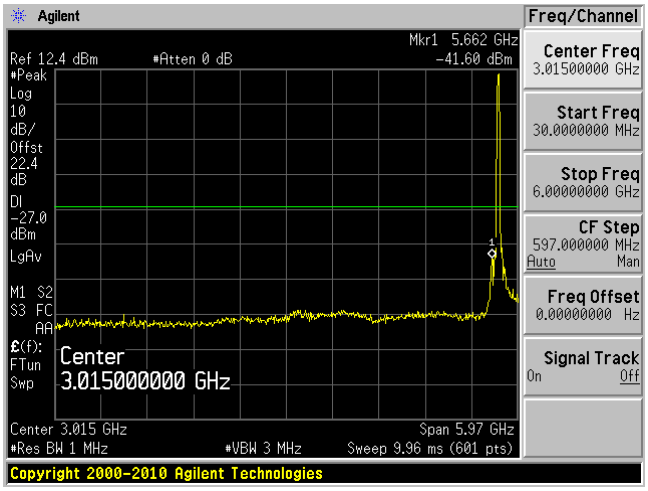


802.11a mode, 5805 MHz J1, 6 GHz – 40 GHz

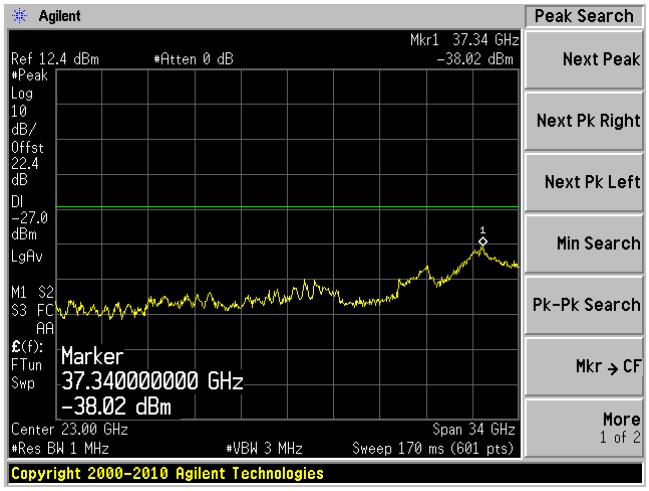


802.11n HT20 mode, Low Channel

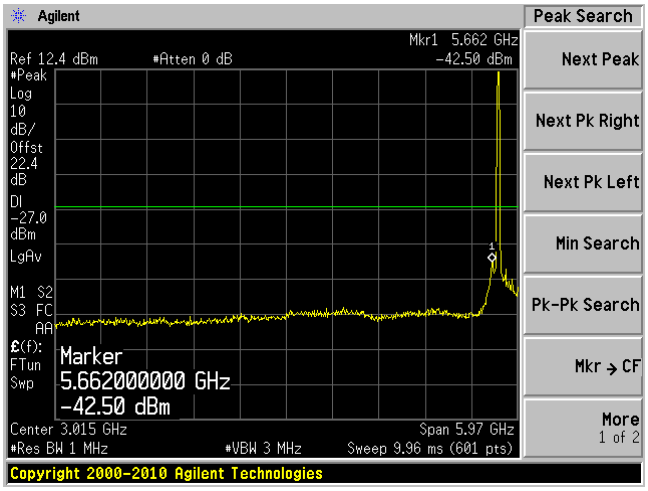
802.11n HT20 mode, 5745 MHz J0, 30 MHz – 6 GHz



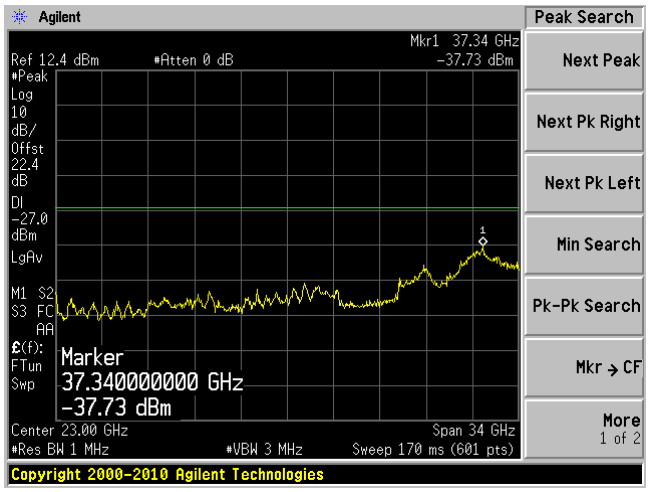
802.11 a mode, 5745 MHz J0, 6 GHz – 40 GHz



802.11n HT20 mode, 5745 MHz J1, 30 MHz – 6 GHz

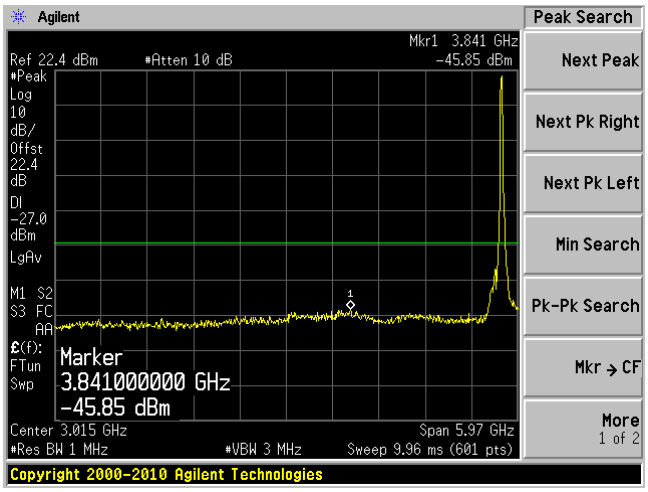


802.11 a mode, 5745 MHz J1, 6 GHz – 40 GHz

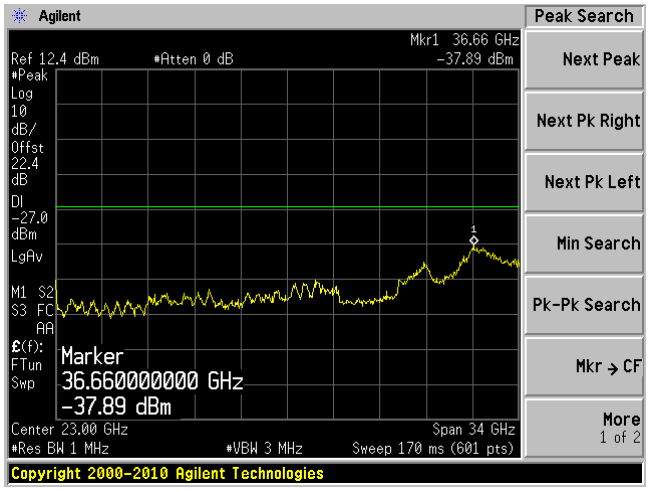


802.11n HT20 mode, Middle Channel

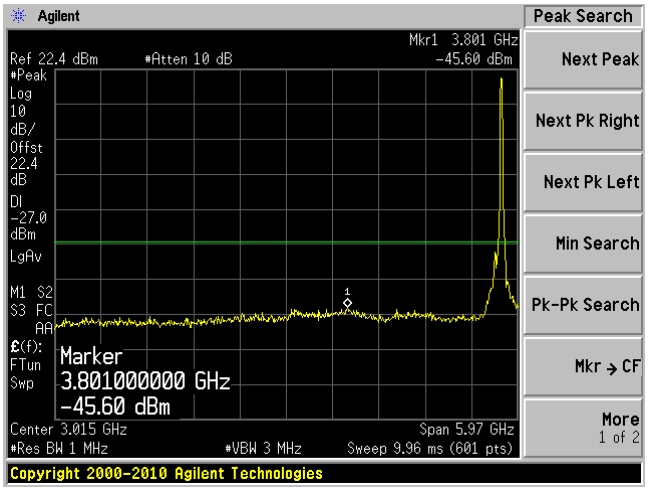
802.11n HT20 mode, 5785 MHz J0, 30 MHz – 6 GHz



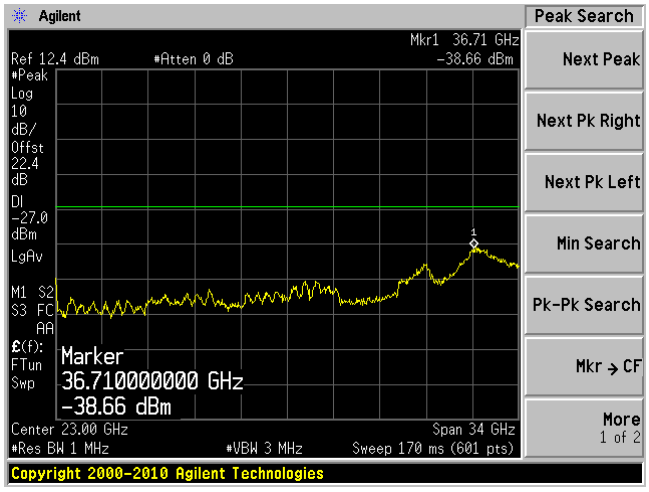
802.11 a mode, 5785 MHz J0, 6 GHz – 40 GHz



802.11n HT20 mode, 5785 MHz J0, 30 MHz – 6 GHz

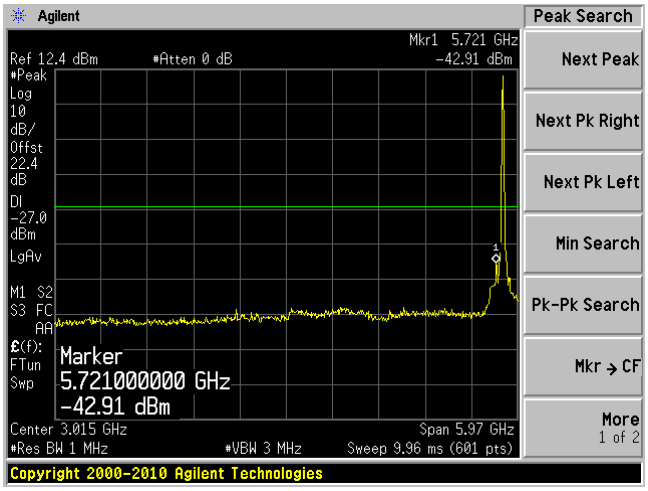


802.11 a mode, 5785 MHz J1, 6 GHz – 40 GHz

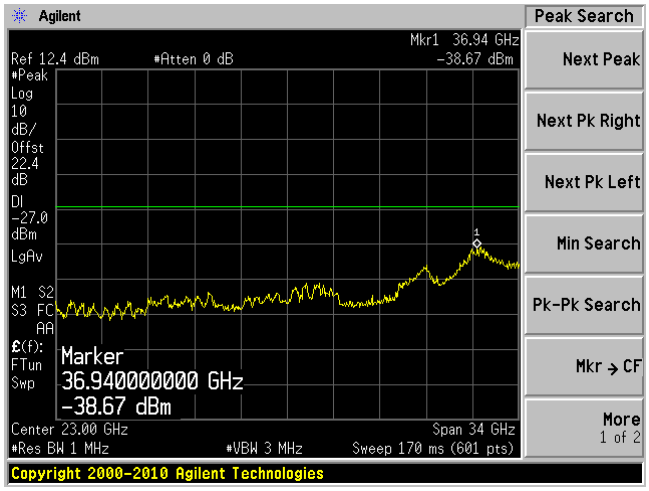


802.11n HT20 mode, High Channel

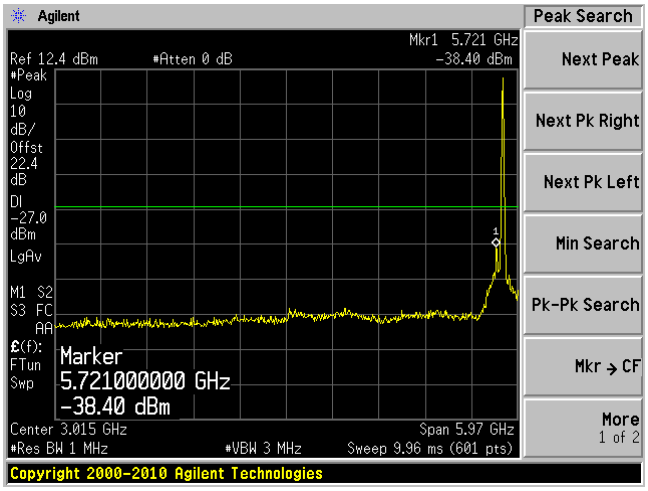
802.11n HT20 mode, 5805 MHz J0, 30 MHz – 6 GHz



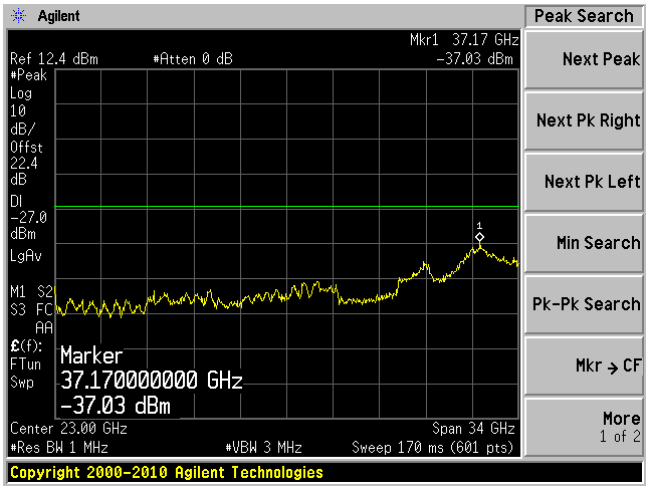
802.11 a mode, 5805 MHz J0, 6 GHz – 40 GHz



802.11n HT20 mode, 5805MHz J1, 30 MHz – 6 GHz



802.11n HT20 mode, 5805 MHz J1, 6 GHz – 40 GHz

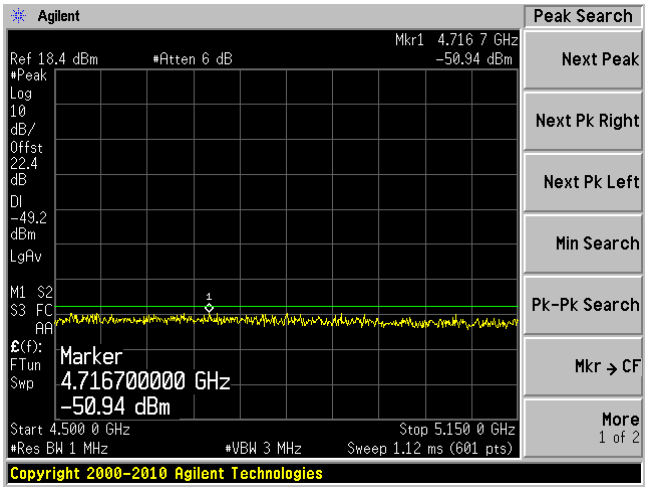


Restrict Band : 4500-5150 MHz, Peak Detector, High Gain (28 dBi), High Power

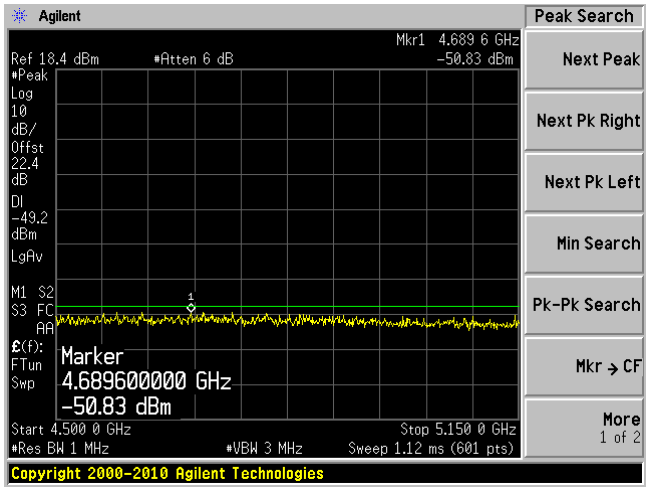
**Since the EUT passed the High Gain (28 dBi), High Power with Peak Detector; Low Power is also compliant.

802.11a mode, Low Channel

802.11 a mode, 5745MHz J0, 4500 MHz -5150 MHz

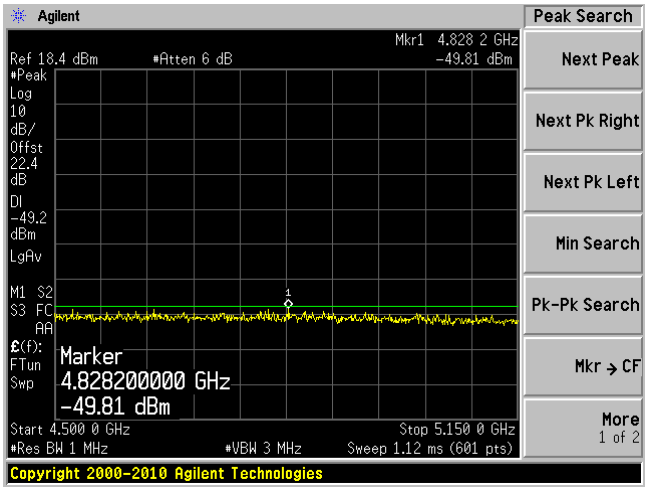


802.11 a mode, 5745MHz J1, 4500 MHz -5150 MHz

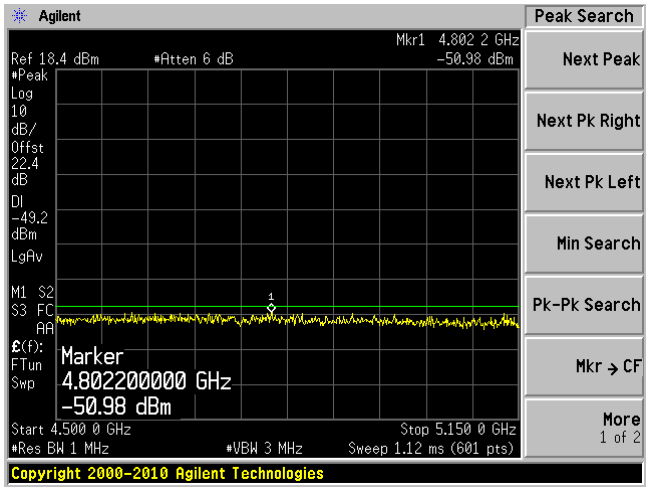


802.11a mode, Middle Channel

802.11 a mode, 5785MHz J0, 4500 MHz -5150 MHz

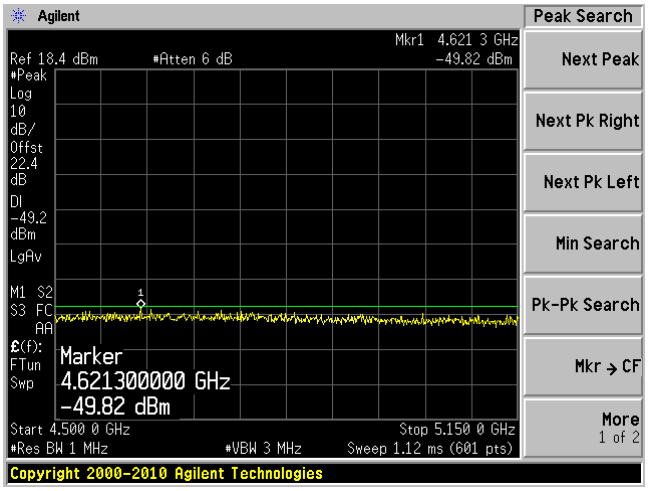


802.11 a mode, 5785MHz J1, 4500 MHz -5150 MHz

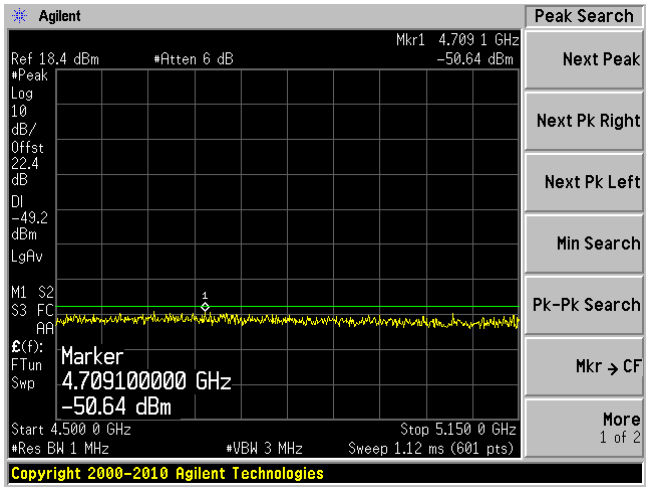


802.11a mode, High Channel

802.11 a mode, 5805MHz J0, 4500 MHz -5150 MHz

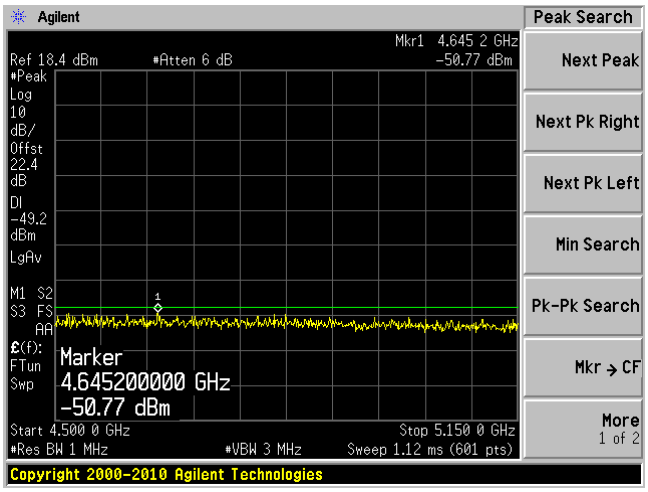


802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz

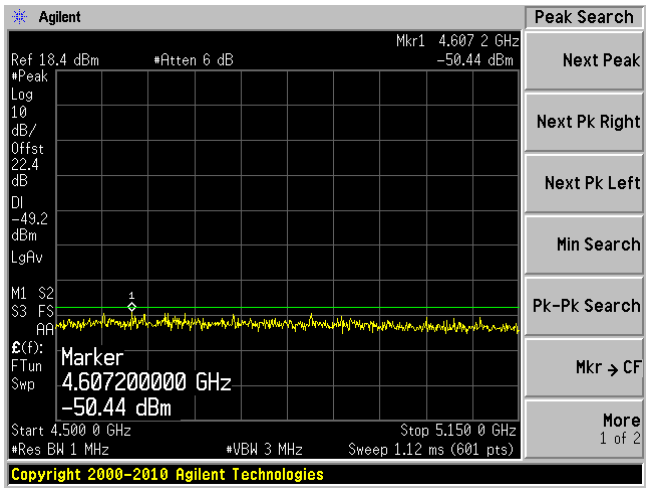


802.11n HT20 mode, Low channel

802.11 a mode, 5745 MHz J0, 4500 MHz -5150 MHz

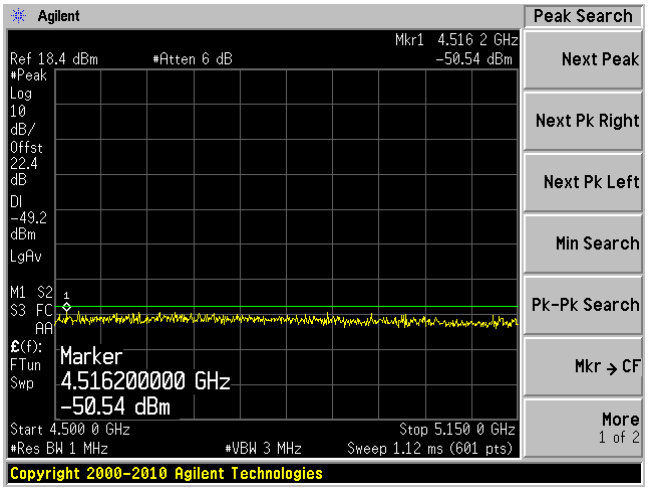


802.11 a mode, 5745 MHz J1, 4500 MHz -5150 MHz

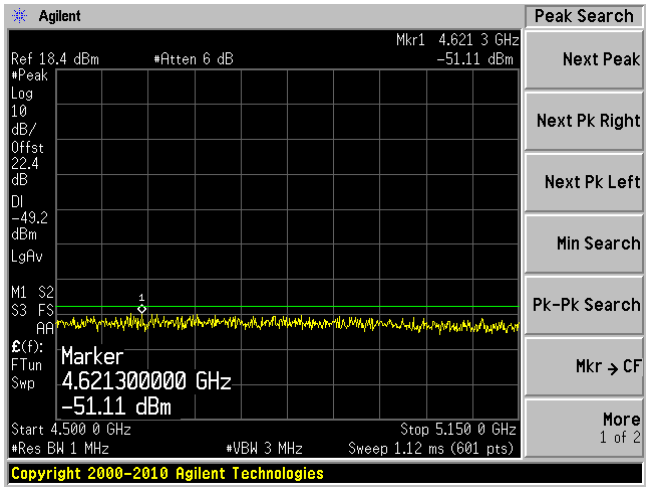


802.11n HT20 mode, Middle Channel

802.11 a mode, 5785 MHz J0, 4500 MHz -5150 MHz

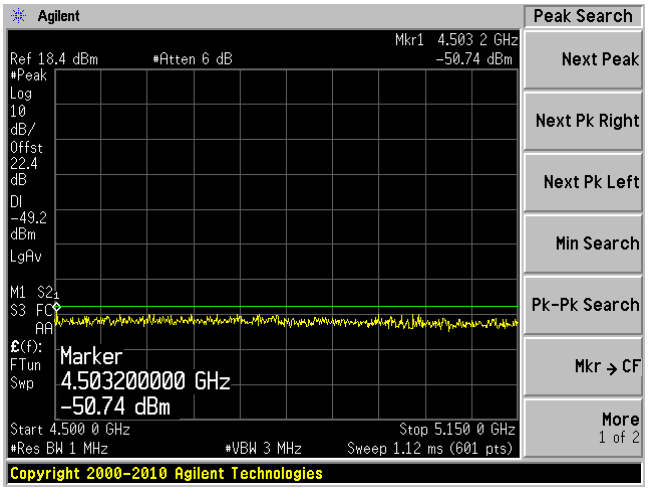


802.11 a mode, 5785 MHz J1, 4500 MHz -5150 MHz

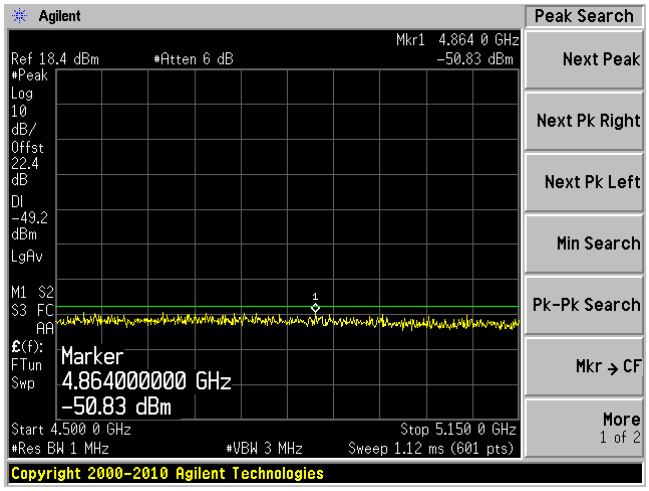


802.11n HT20 mode, High Channel

802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz



802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz

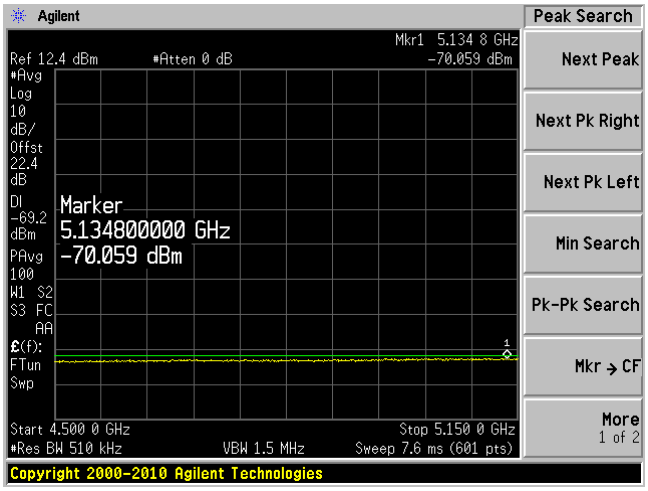


Restrict Band : 4500 MHz-5150 MHz, Average Detector, High Gain (28 dBi), Low Power

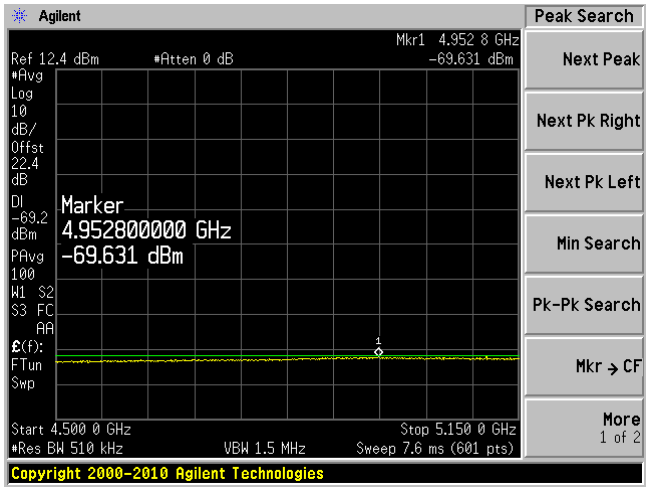
** The limited was set along with 28 dBi antenna gain. The noise floor was above the limit, therefore the RBW was reduced to show that no emissions are present.

802.11a mode, Low Channel

802.11 a mode, 5745MHz J0, 4500 MHz -5150 MHz

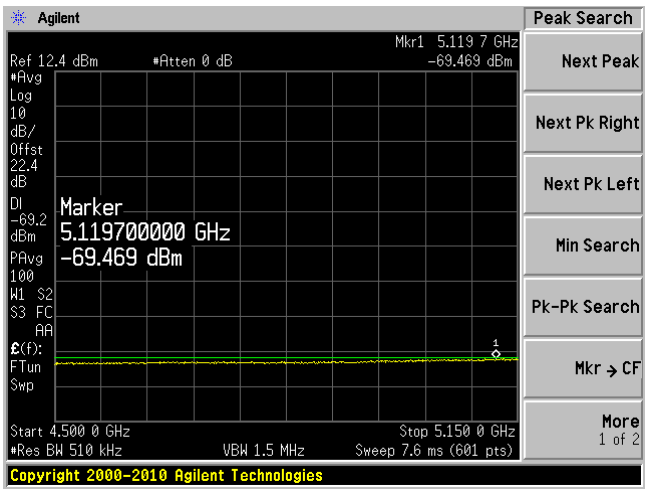


802.11 a mode, 5745MHz J1, 4500 MHz -5150 MHz

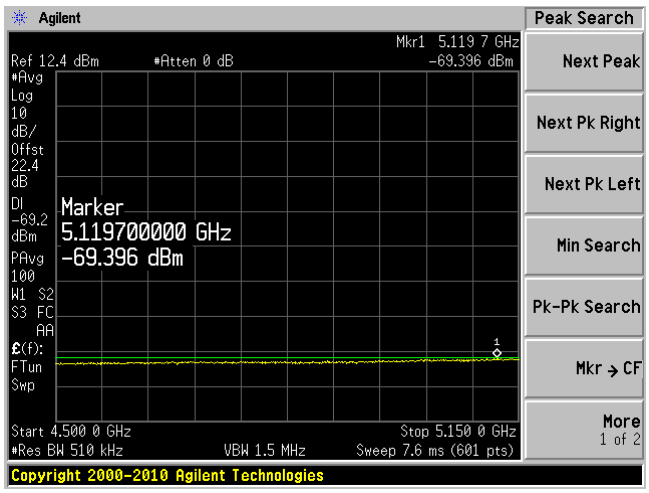


802.11a mode, Middle Channel

802.11 a mode, 5785MHz J0, 4500 MHz -5150 MHz

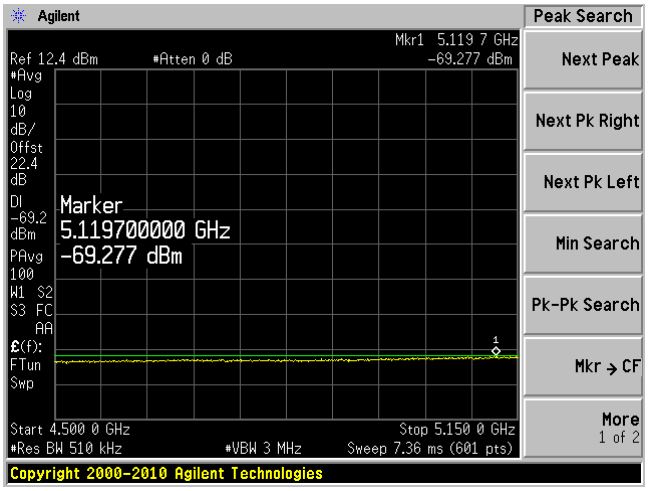


802.11 a mode, 5785MHz J1, 4500 MHz -5150 MHz

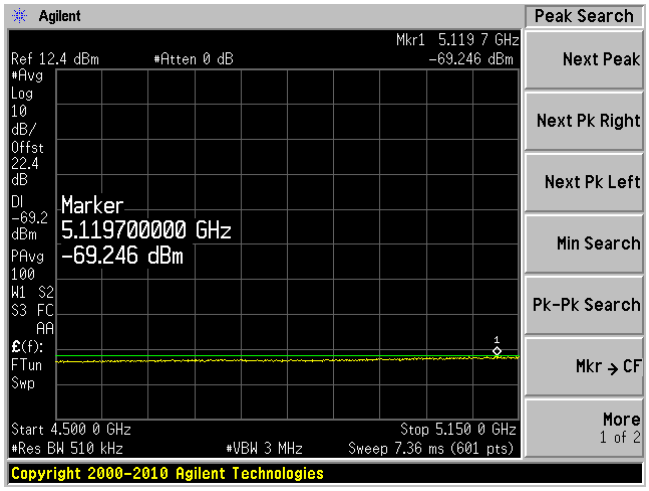


802.11a mode, High Channel

802.11 a mode, 5805MHz J0, 4500 MHz -5150 MHz

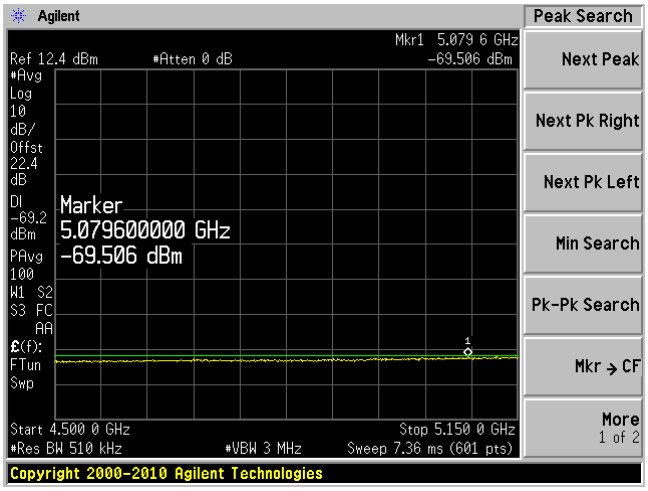


802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz

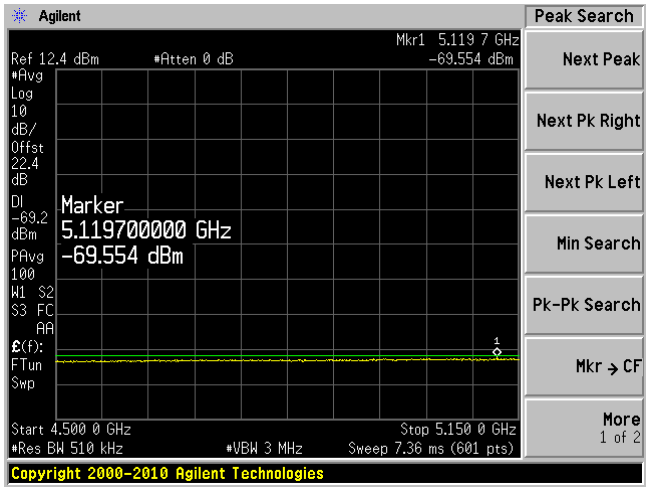


802.11n HT20 mode, Low channel

802.11 a mode, 5745 MHz J0, 4500 MHz -5150 MHz

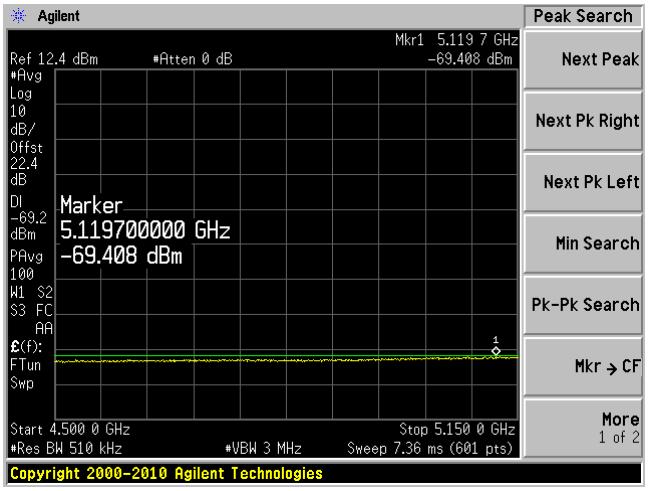


802.11 a mode, 5745 MHz J1, 4500 MHz -5150 MHz

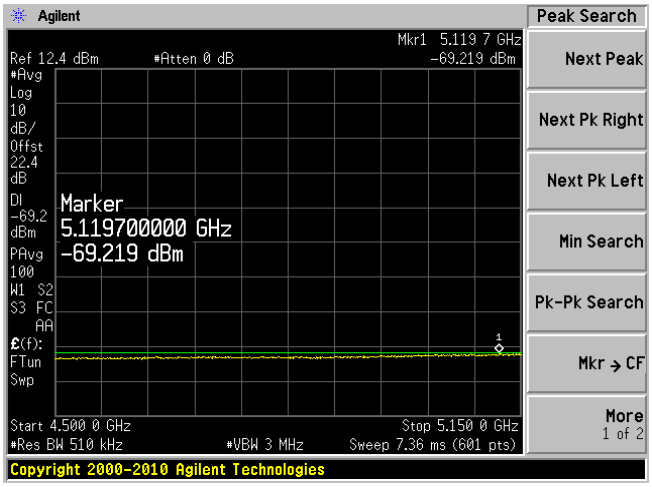


802.11n HT20 mode, Middle Channel

802.11 a mode, 5785 MHz J0, 4500 MHz -5150 MHz

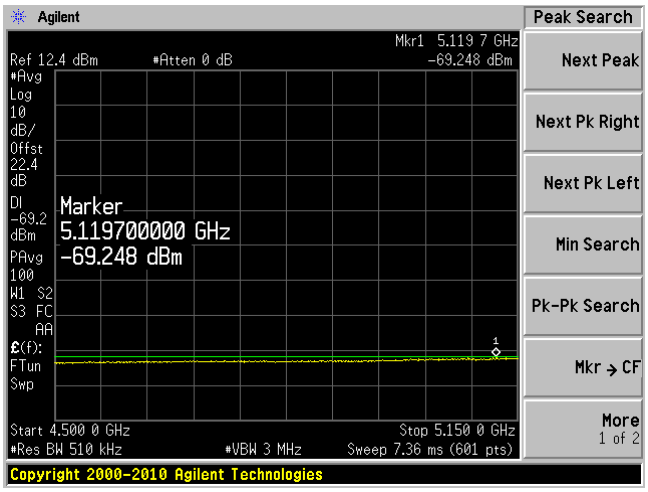


802.11 a mode, 5785 MHz J1, 4500 MHz -5150 MHz

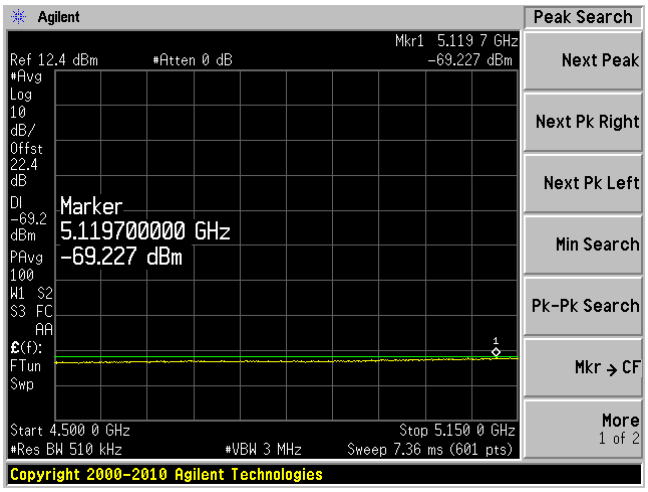


802.11n HT20 mode, High Channel

802.11 a mode, 5805 MHz J0, 4500 MHz -5150 MHz



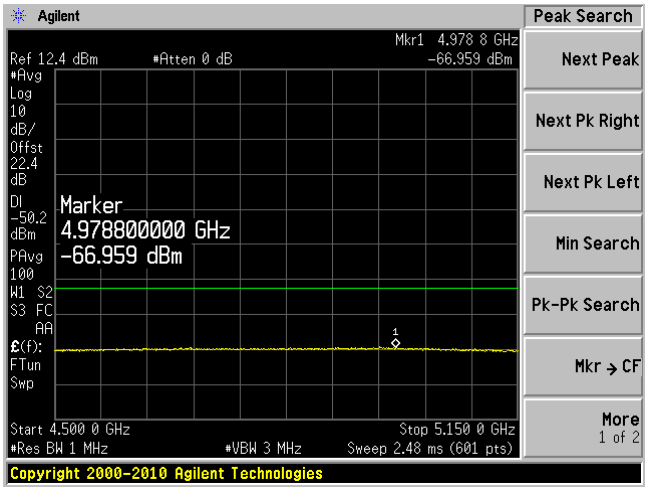
802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz



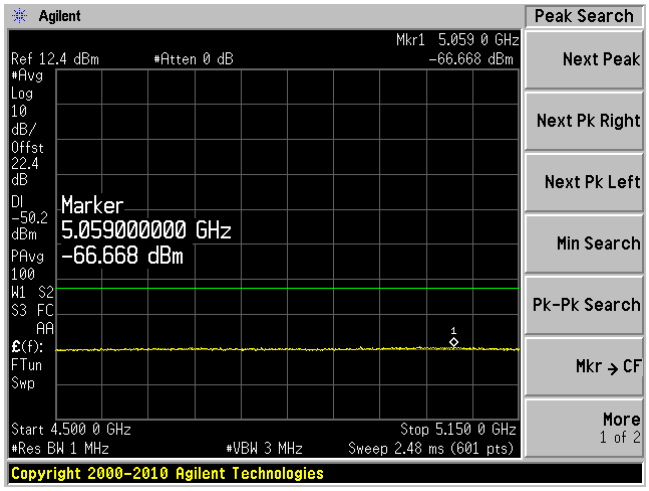
Restrict Band : 4500 MHz-5150 MHz, Average Detector, Low Gain (9 dBi), High Power

802.11a mode, Low Channel

802.11 a mode, 5745MHz J0, 4500 MHz -5150 MHz

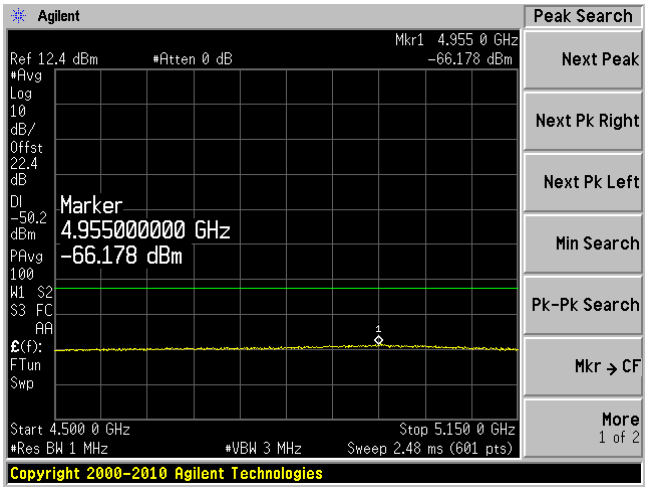


802.11 a mode, 5745MHz J1, 4500 MHz -5150 MHz

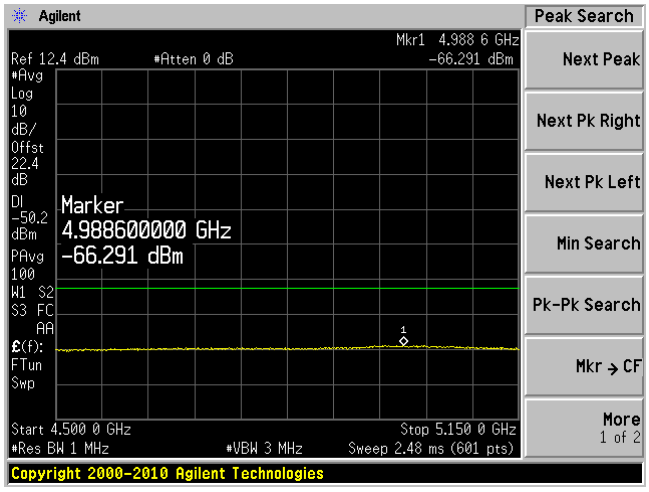


802.11a mode, Middle Channel

802.11 a mode, 5785MHz J0, 4500 MHz -5150 MHz

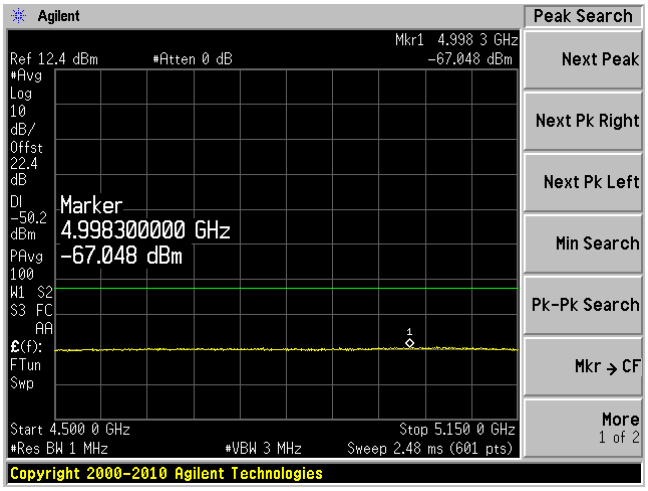


802.11 a mode, 5785MHz J1, 4500 MHz -5150 MHz

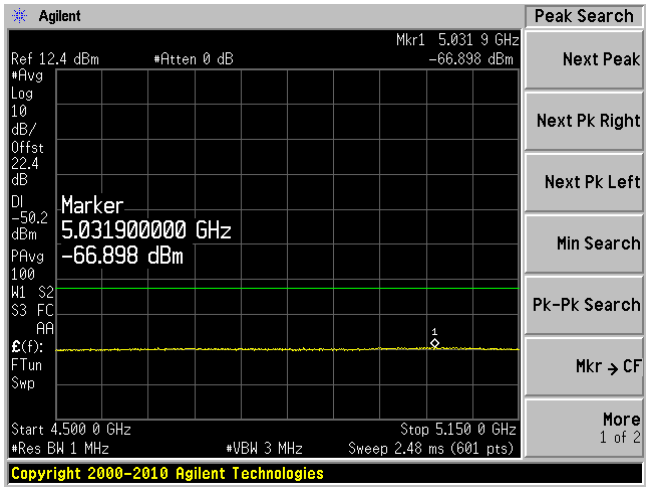


802.11a mode, High Channel

802.11 a mode, 5805MHz J0, 4500 MHz -5150 MHz

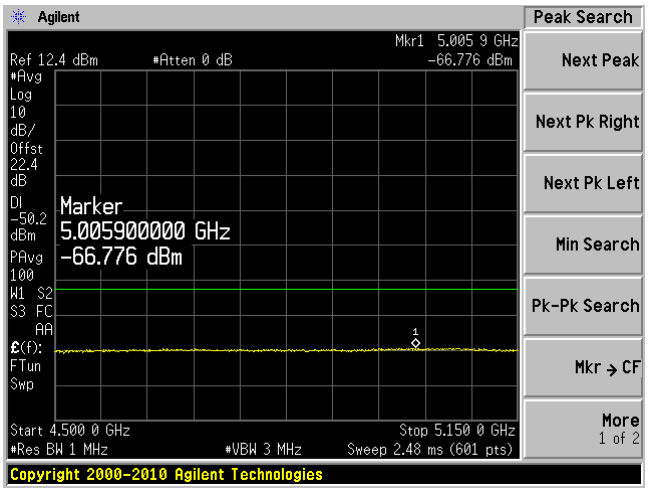


802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz

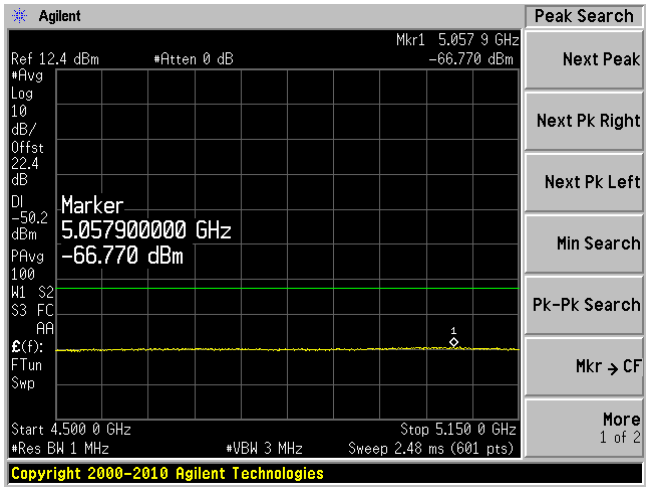


802.11n HT20 mode, Low channel

802.11 a mode, 5745 MHz J0, 4500 MHz -5150 MHz

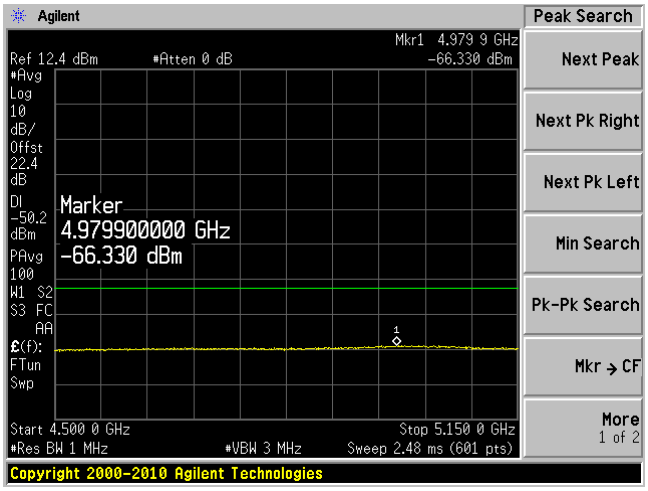


802.11 a mode, 5745 MHz J1, 4500 MHz -5150 MHz

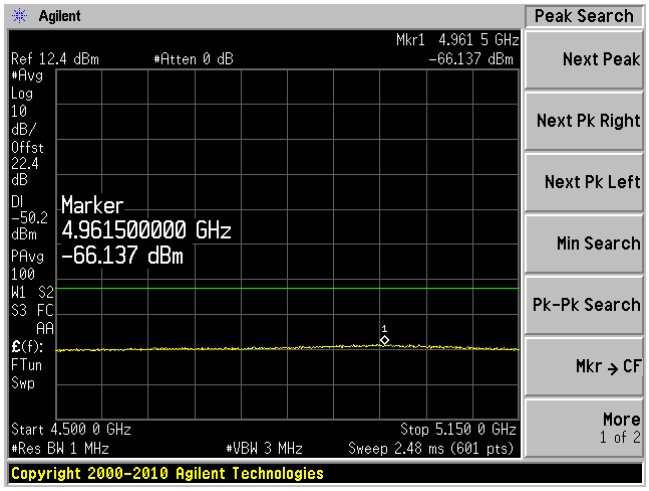


802.11n HT20 mode, Middle Channel

802.11 a mode, 5785 MHz J0, 4500 MHz -5150 MHz

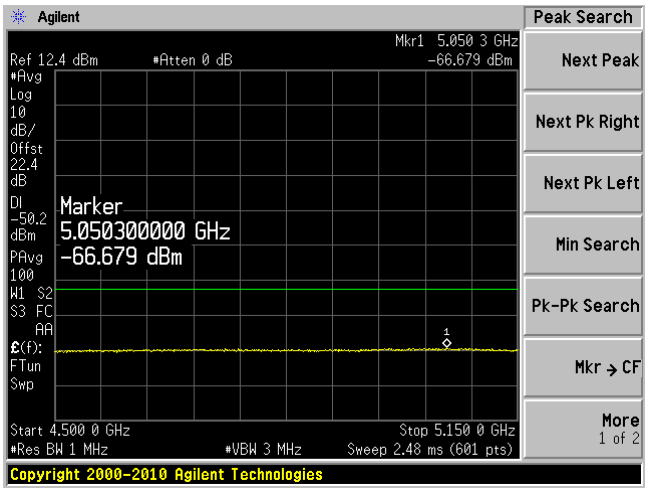


802.11 a mode, 5785 MHz J1, 4500 MHz -5150 MHz

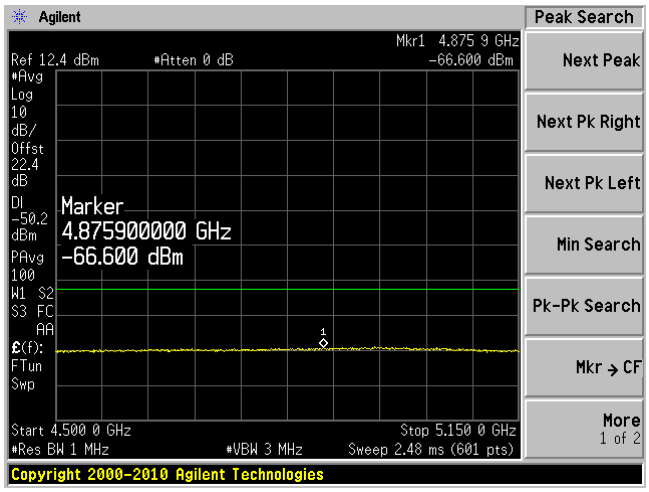


802.11n HT20 mode, High Channel

802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz



802.11 a mode, 5805 MHz J1, 4500 MHz -5150 MHz

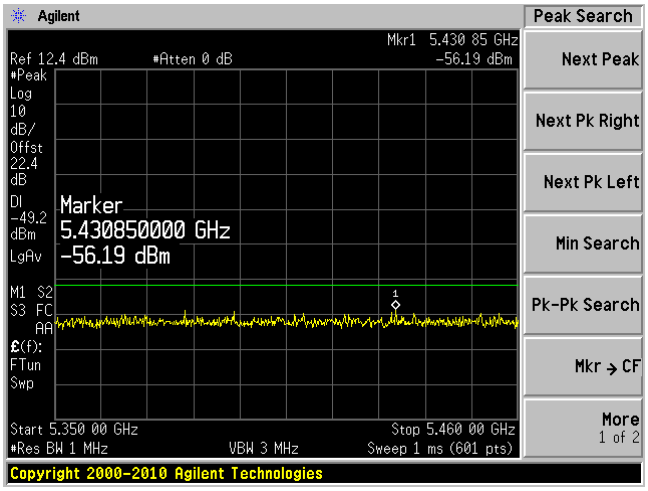


Restrict Band : 5350 MHz-5460 MHz, Peak Detector, High Gain (28 dBi), High Power

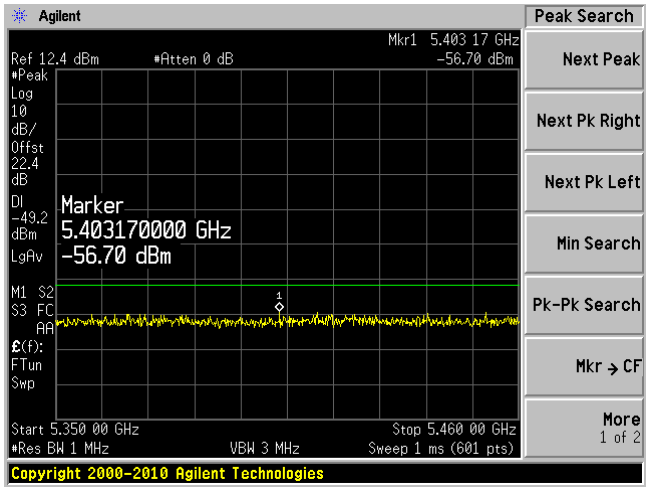
**Since the EUT pass the High Gain (28 dBi), High Power with Peak Dector, thus, Low Power is also compliant

802.11a mode, Low Channel

802.11 a mode, 5745MHz J0, 5350 MHz -5460 MHz

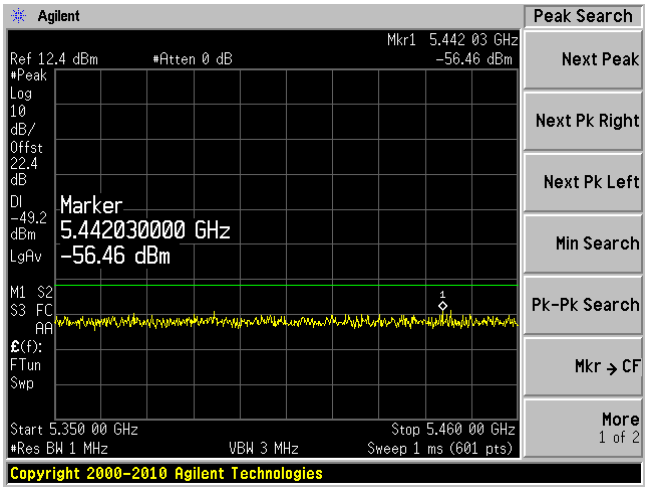


802.11 a mode, 5745MHz J1, 5350 MHz -5460 MHz

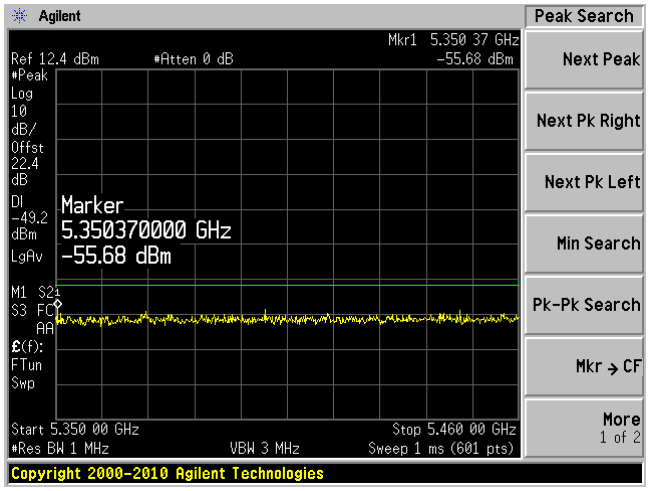


802.11a mode, Middle Channel

802.11 a mode, 5785MHz J0, 5350 MHz -5460 MHz

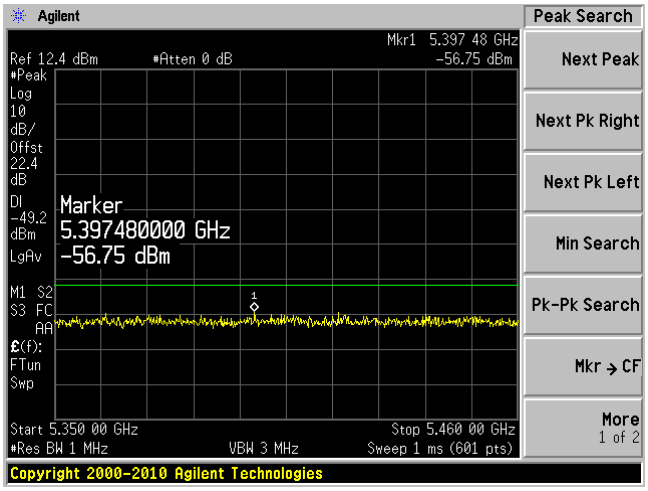


802.11 a mode, 5785MHz J1, 5350 MHz -5460 MHz

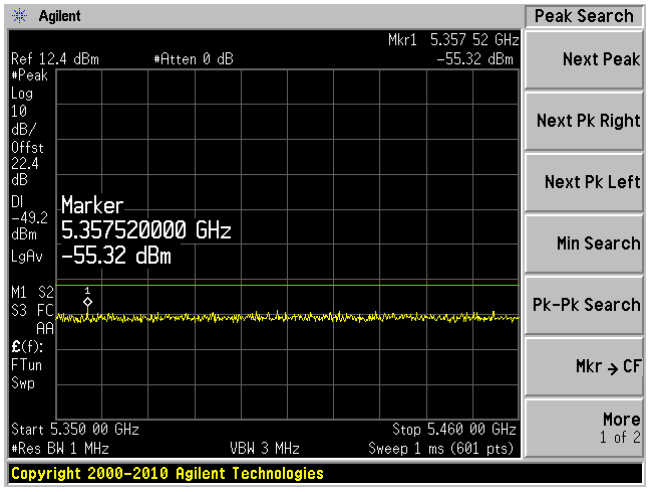


802.11a mode, High Channel

802.11 a mode, 5805MHz J0, 5350 MHz -5460 MHz

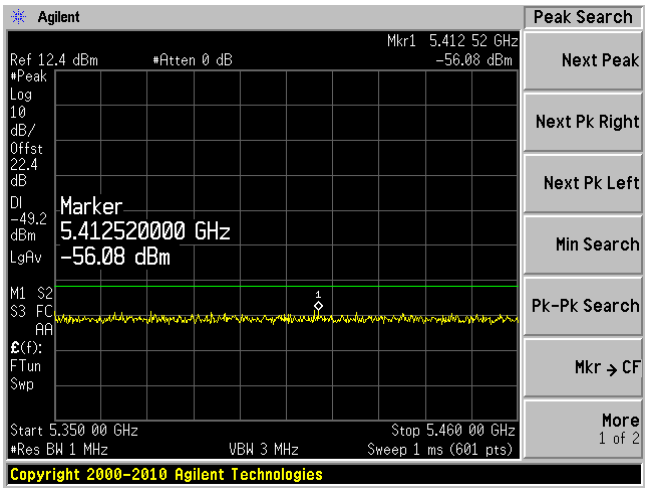


802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz z

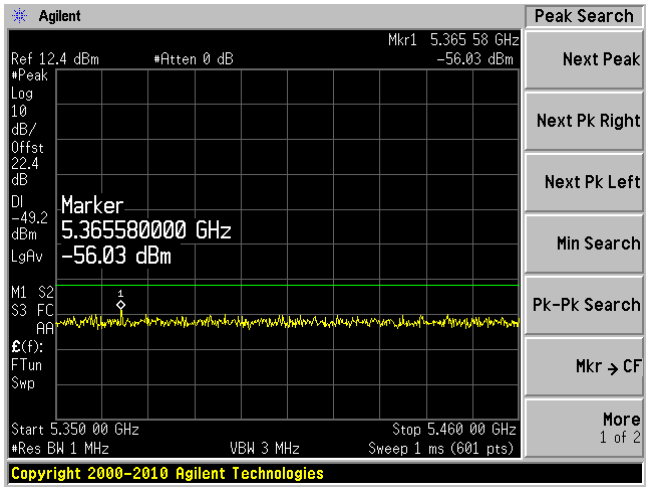


802.11n HT20 mode, Low channel

802.11 a mode, 5745 MHz J0, 5350 MHz -5460 MHz

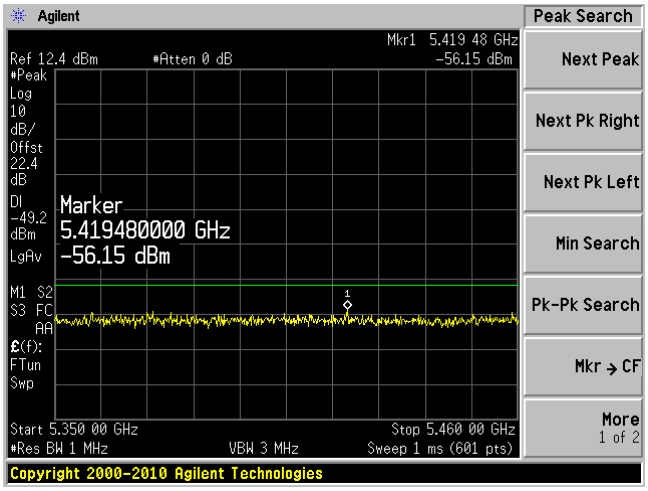


802.11 a mode, 5745 MHz J1, 5350 MHz -5460 MHz

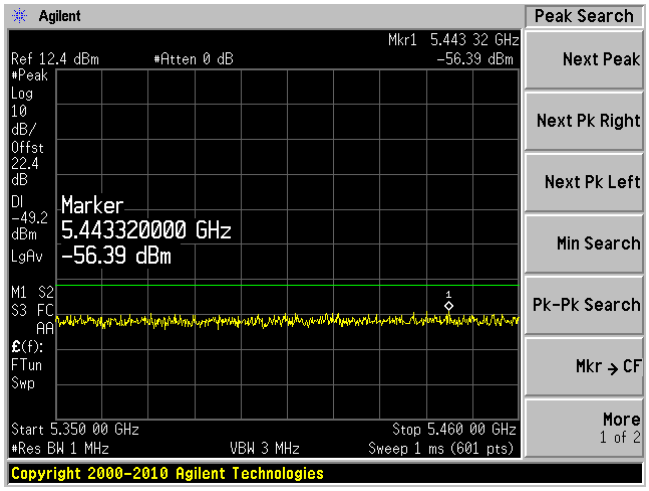


802.11n HT20 mode, Middle Channel

802.11 a mode, 5785 MHz J0, 5350 MHz -5460 MHz

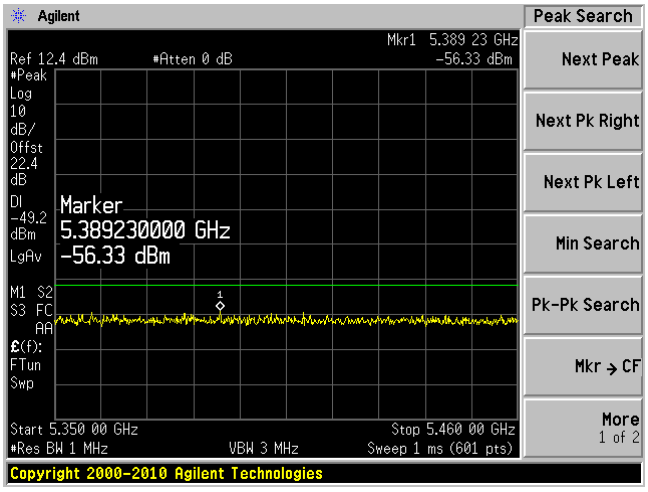


802.11 a mode, 5785 MHz J1, 5350 MHz -5460 MHz

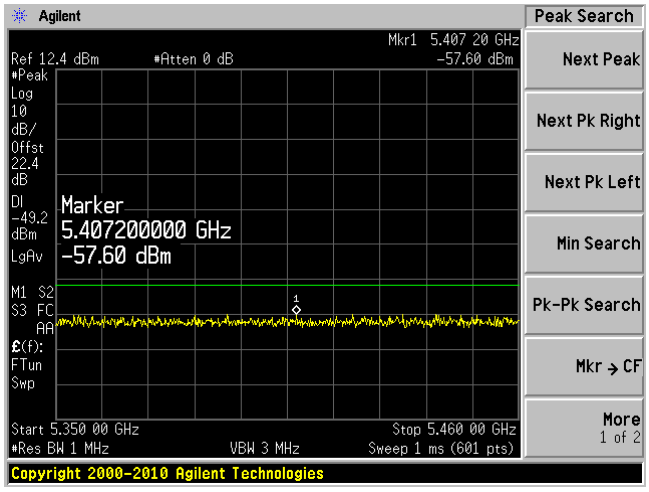


802.11n HT20 mode, High Channel

802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz



802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz

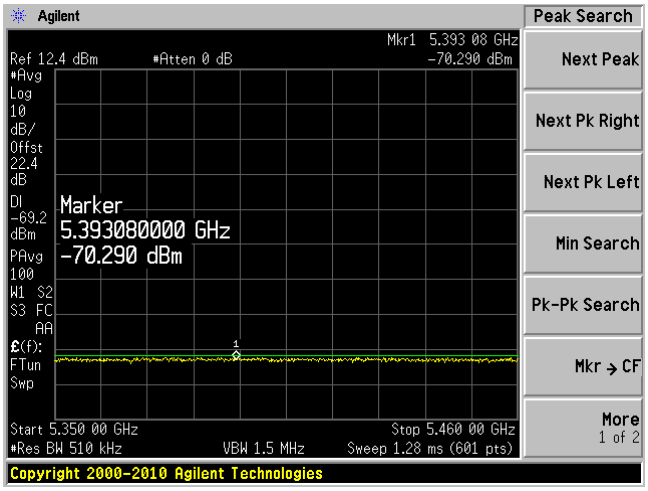


Restrict Band : 5350 MHz-5460 MHz, Average Detector, High Gain (28 dBi), Low Power

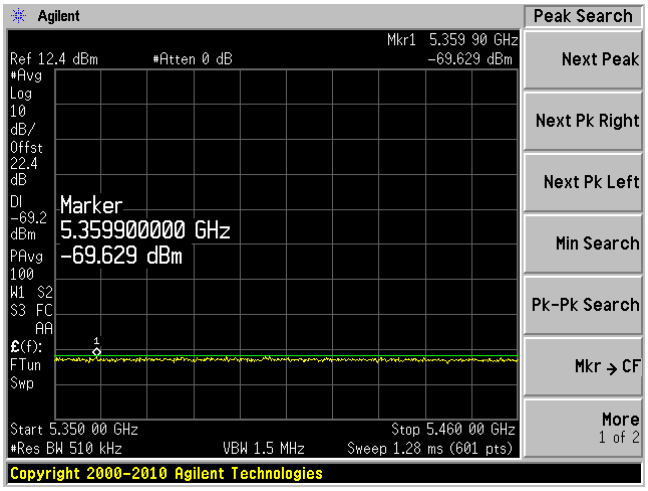
** The limited was set along with 28 dBi antenna gain. The noise floor was above the limit, therefore the RBW was reduced to show that no emissions are present.

802.11a mode, Low Channel

802.11 a mode, 5745MHz J0, 5350 MHz -5460 MHz

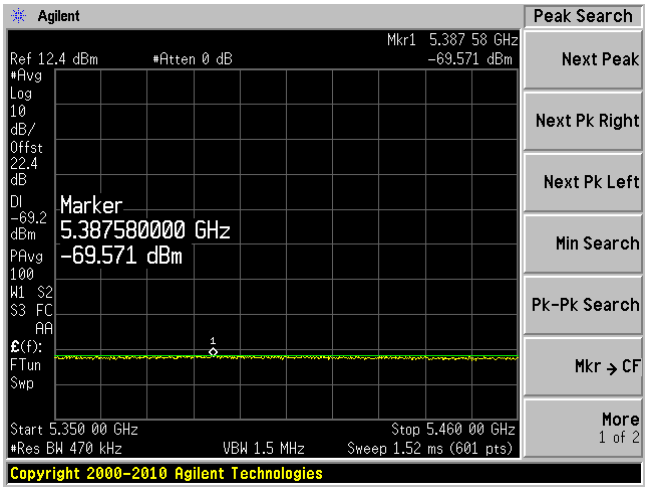


802.11 a mode, 5745MHz J1, 5350 MHz -5460 MHz

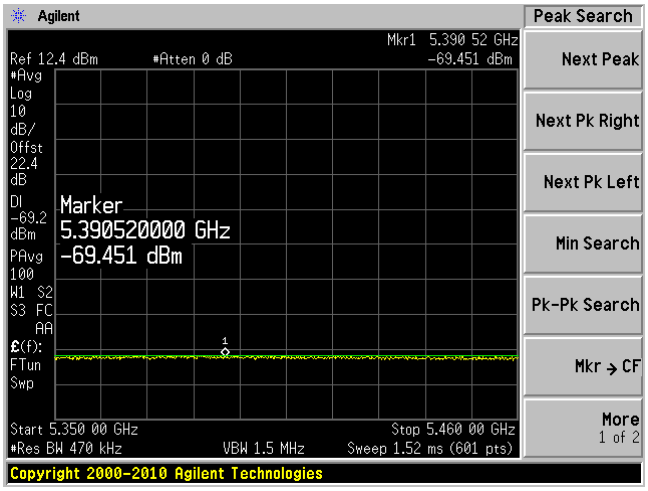


802.11a mode, Middle Channel

802.11 a mode, 5785MHz J0, 5350 MHz -5460 MHz

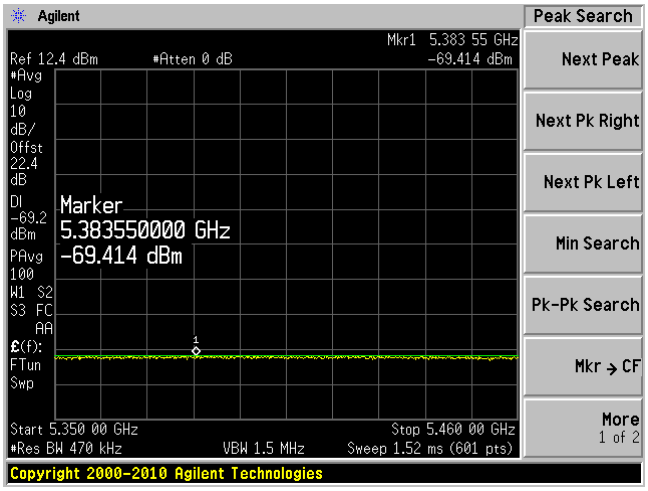


802.11 a mode, 5785MHz J0, 5350 MHz -5460 MHz

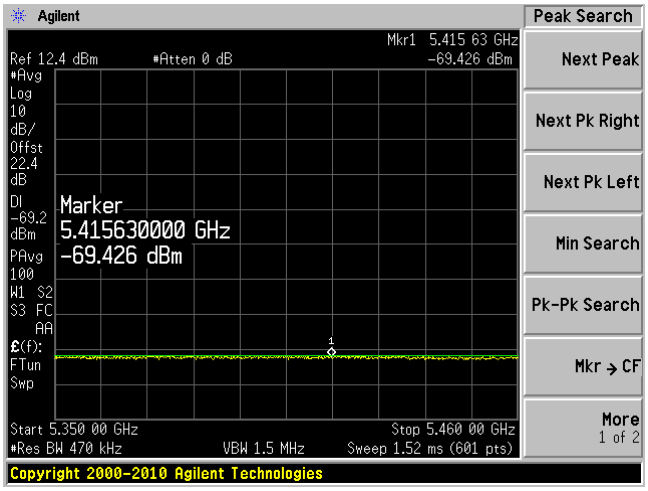


802.11a mode, High Channel

802.11 a mode, 5805MHz J0, 5350 MHz -5460 MHz

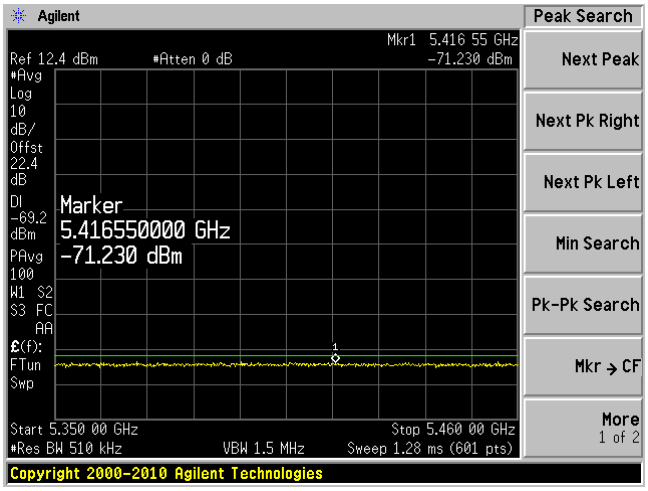


802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz

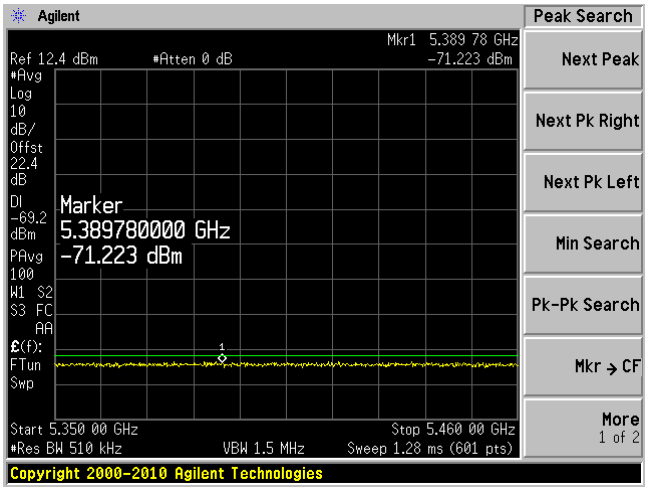


802.11n HT20 mode, Low channel

802.11 a mode, 5745 MHz J0, 5350 MHz -5460 MHz

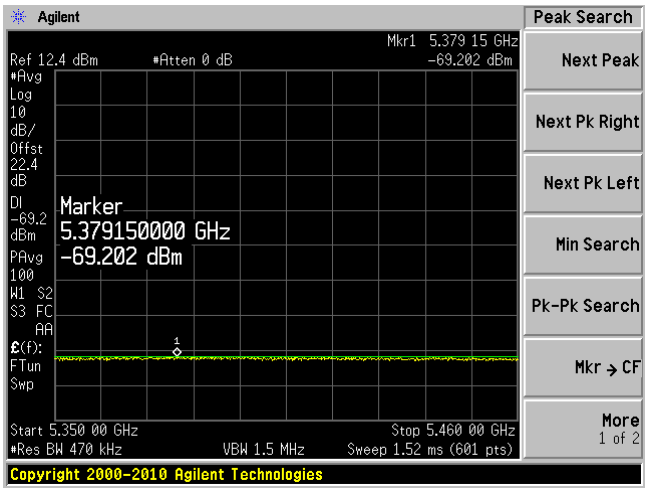


802.11 a mode, 5745 MHz J1, 5350 MHz -5460 MHz

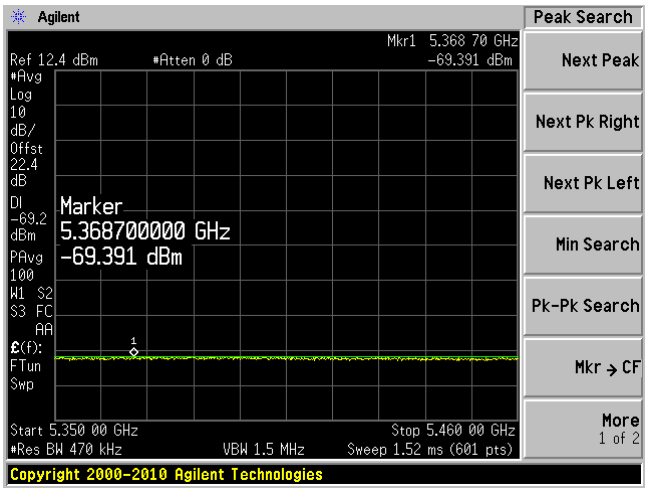


802.11n HT20 mode, Middle Channel

802.11 a mode, 5785 MHz J0, 5350 MHz -5460 MHz

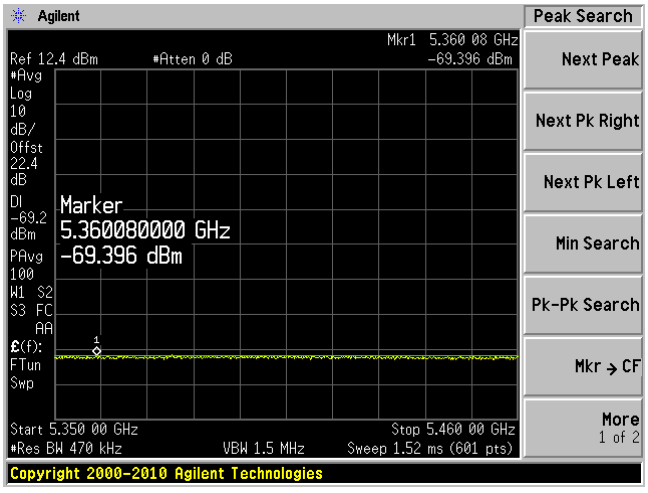


802.11 a mode, 5785 MHz J1, 5350 MHz -5460 MHz

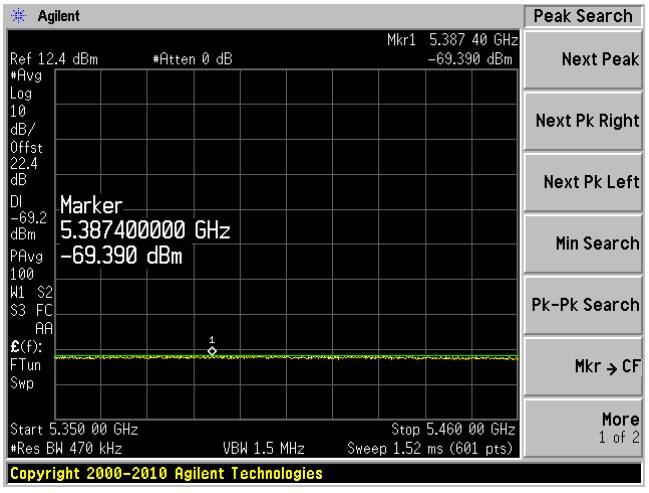


802.11n HT20 mode, High Channel

802.11 a mode, 5805 MHz J0, 5350 MHz -5460 MHz



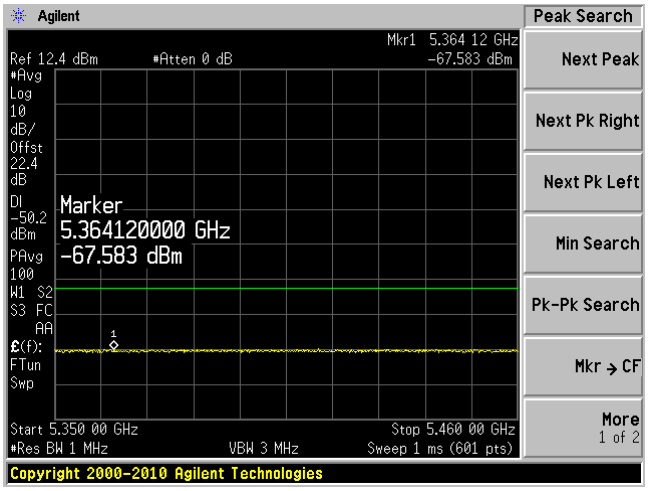
802.11 a mode, 5805 MHz J0, 5350 MHz -5460 MHz



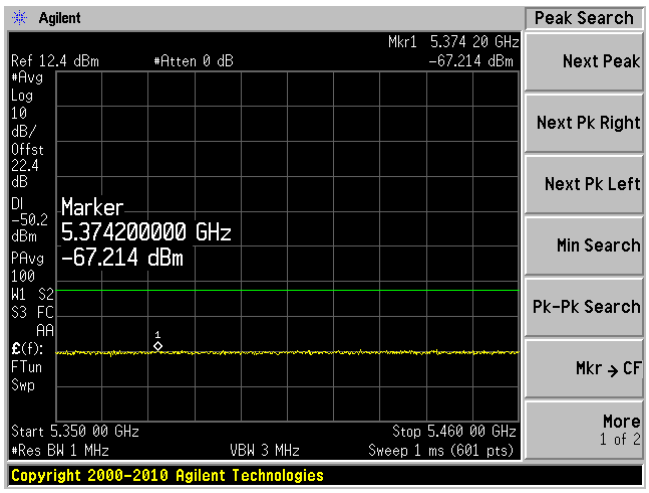
Restrict Band : 5350 MHz-5460 MHz, Average Detector, Low Gain (9 dBi), High Power

802.11a mode, Low Channel

802.11 a mode, 5745MHz J0, 5350 MHz -5460 MHz

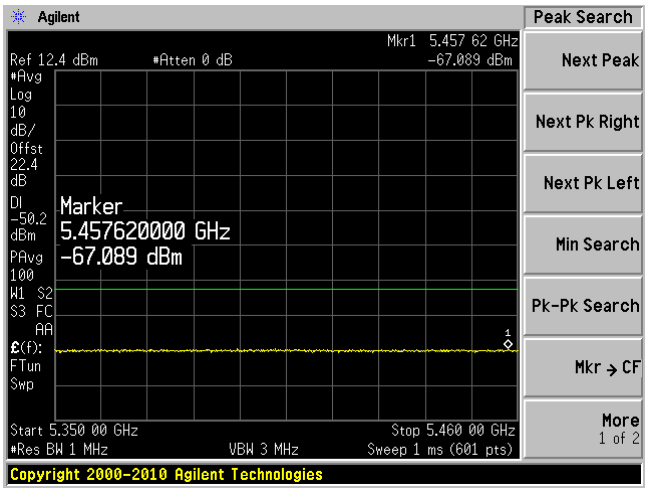


802.11 a mode, 5745MHz J1, 5350 MHz -5460 MHz

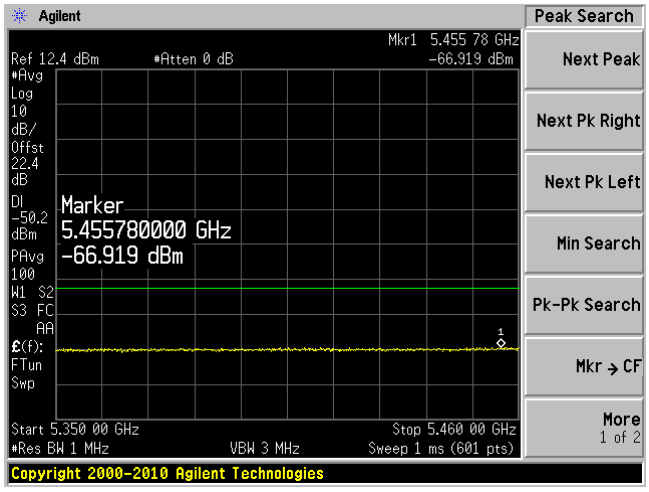


802.11a mode, Middle Channel

802.11 a mode, 5785MHz J0, 5350 MHz -5460 MHz

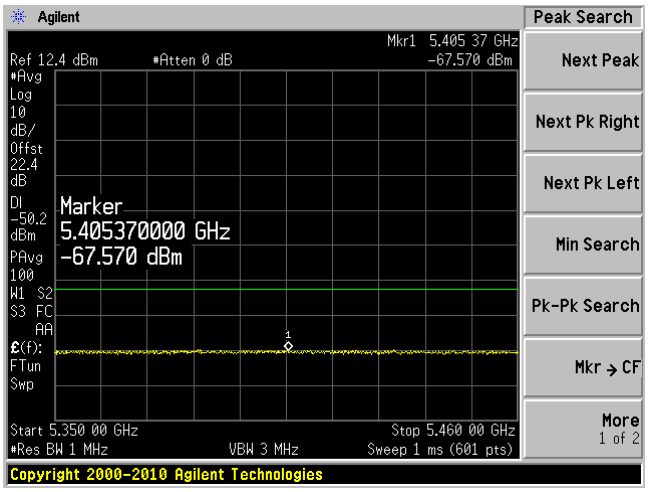


802.11 a mode, 5785MHz J1, 5350 MHz -5460 MHz

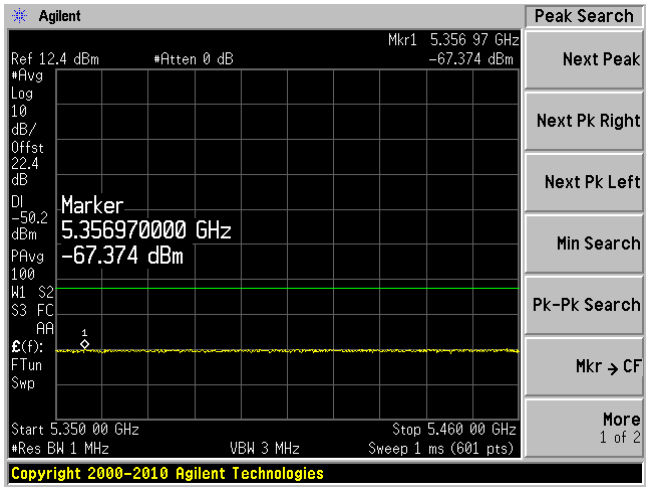


802.11a mode, High Channel

802.11 a mode, 5805MHz J0, 5350 MHz -5460 MHz

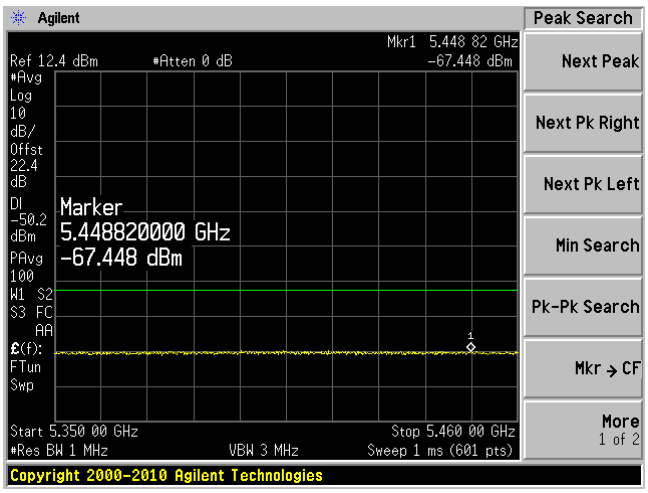


802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz z

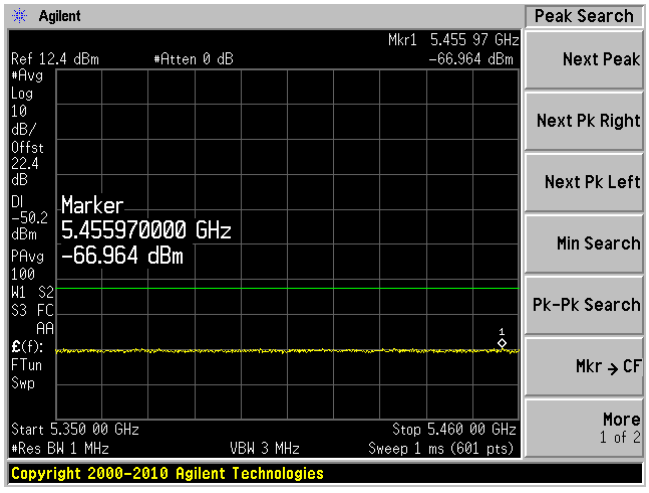


802.11n HT20 mode, Low channel

802.11 a mode, 5745 MHz J0, 5350 MHz -5460 MHz

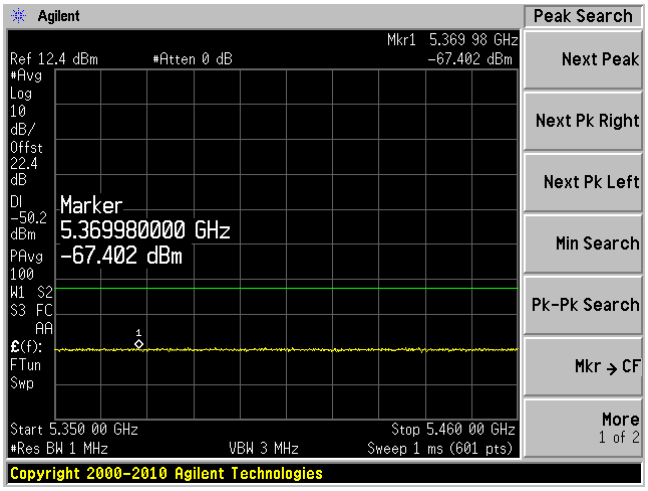


802.11 a mode, 5745 MHz J1, 5350 MHz -5460 MHz

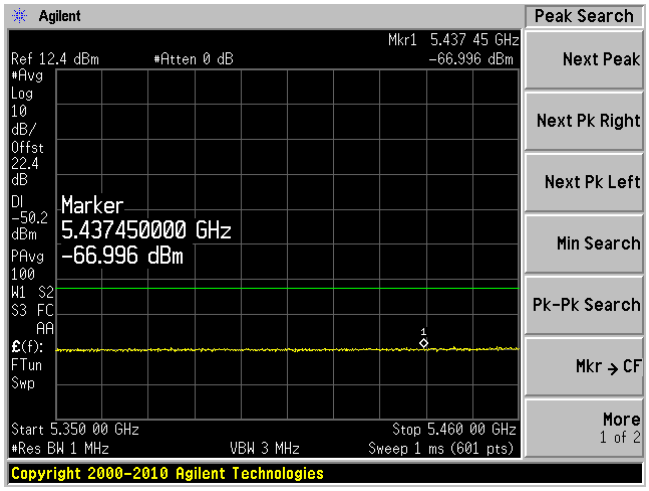


802.11n HT20 mode, Middle Channel

802.11 a mode, 5785 MHz J0, 5350 MHz -5460 MHz

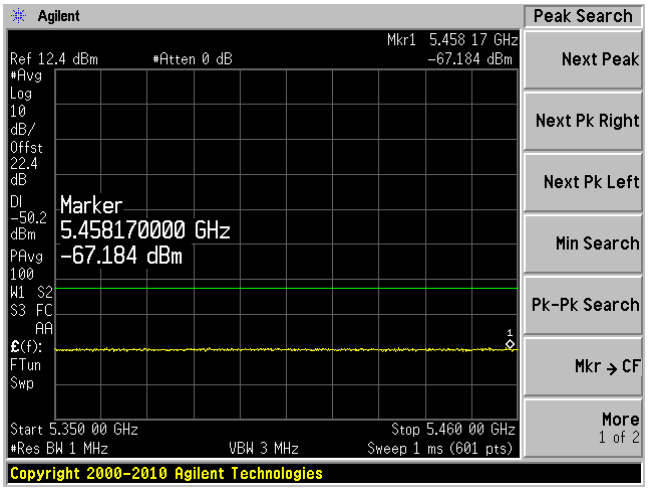


802.11 a mode, 5785 MHz J1, 5350 MHz -5460 MHz



802.11n HT20 mode, High Channel

802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz



802.11 a mode, 5805 MHz J1, 5350 MHz -5460 MHz