Lab Code: 200167-0

FCC PART 15 SUBPART C
IC RSS-210, ISSUE 8, DECEMBER 2010

TEST AND MEASUREMENT REPORT

For

Tely Labs, Inc.

535 Middlefield Road, Suite 180,

Menlo Park, CA 94025, USA

FCC ID: A2OTELY001
IC: 10030A-TELY001

Report Type:	**Product Type:**
Original Report	Video Conference Device

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1111163-247	Original Report	2011-12-02

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Tely Labs, Inc*, and their product FCC ID: A2OTELY001, IC: 10030A-TELY001, model: *TelyHD* which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a Wireless Video Conference Device using 802.11 b/g/n technologies.

1.2 Mechanical Description of EUT

The "EUT" measures *272mm (L) x 103mm (W) x 75 mm (H)*, and weighs approximately *388*g.

The test data gathered are from typical production sample with s/n: 54201800034 for Conducted Test.
The test data gathered are from typical production sample with s/n: 54201800020 for Radiated Test.

1.3 Objective

This report is prepared on behalf of *Tely Labs, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules and IC RSS-210 Issue 8, Dec 2010.

The objective is to determine compliance with FCC Part 15.247 and IC RSS-210 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

No Related Submittals.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from +2.0 for Conducted Emissions tests and +4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

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 sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has 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 facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: R-2463 and C-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2001670.htm

2 System 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.

The EUT had been tested with the following data rate settings (worst case):

Radio Mode	Bandwidth (MHz)	Frequency/Data Rate		
		Low CH (MHz/Mbps)	Mid CH (MHz/Mbps)	High CH (MHz)
802.11b	20	2412/1	2437/1	2462/1
802.11g	20	2412/6	2437/6	2462/6
802.11n HT20	20	2412/MCS0	2437/MCS0	2462/MCS0

2.2 EUT Exercise Software

The test utility software used wl command was provided by client and was verified by Victor Zhang to comply with the standard requirements being tested against.

2.3 Special Equipment

N/A

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
Dell	Laptop	Latitude E6400	00144-363-585-815

2.6 Power Supply List and Details

Manufacturer	Description	Model No.	Serial No.
Tely Labs	AC/DC Adapter	18k0503000UE 11-PWR-01-01	1130

2.7 EUT Internal Configuration Details

For Conducted: s/n 542018000034

Manufacturers	Description	Model No.	Serial No.
Tely Labs	PCB Board	10-00001, Rev C	542018000034

For Radiated: s/n 542018000020

Manufacturers	Description	Model No.	Serial No.
Tely Labs	PCB Board	10-00001, Rev C	542018000020

2.8 External I/O Cabling List and AC Cord

Cable Description	Length (m)	From	To
RF cable	< 1m	EUT	PSA

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & IC Rules	Description of Test	Results
FCC §15.247(i), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.4	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.2	AC Line Conducted Emissions	Compliant
FCC §15.209 IC RSS-210 §2.6	Spurious Emissions at Antenna Port	Compliant
FCC §15.205 IC RSS-210 §2.2	Restricted Bands	Compliant
FCC §15.209, §15.247 IC RSS-210 §2.6	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) IC RSS-210 §A8.2	6 dB Emission Bandwidth	Compliant
FCC §15.247(b)(3) IC RSS-210 §A8.4	Maximum Peak Output Power	Compliant
FCC §15.247(d) IC RSS-210 §A8.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e) IC RSS-210 §A8.2(b)	Power Spectral Density	Compliant
IC RSS-210 §2.6 & RSS-Gen §4.10	Receiver Spurious Emission	Compliant

4 FCC §15.247 (i), §2.1091 & IC RSS-102 - RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i) 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

Maximum peak output power at antenna input terminal (dBm):	15.59
Maximum peak output power at antenna input terminal (mW):	36.22
Prediction distance (cm):	20
Prediction frequency (MHz):	2412
Maximum Antenna Gain, typical (dBi):	2.0
Maximum Antenna Gain (numeric):	1.58
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0114
Power density of prediction frequency at 20.0 cm (W/m^2):	0.114
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0114 mW/cm^2 (0.114 W/m^2).Limit is 1.0 mW/cm^2 (10 W/m^2).

5 FCC §15.203 & IC RSS-Gen §7.1.4 – 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.

According to IC RSS-Gen §7.1.4: Transmitter Antenna

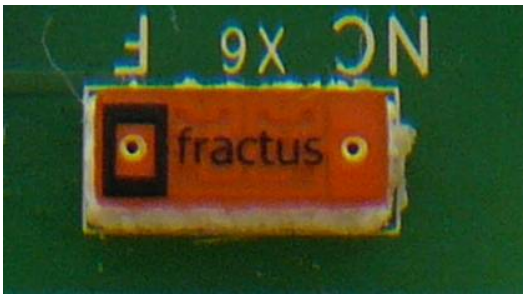
A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of 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 mW or less. For devices of output powers greater than 10 mW, 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 Connector Construction

The radio utilizes two integral antennas which share the same antenna terminal; it will have one antenna work at a time. Both Antennas are identical with the Max antenna gain of 2.0 dBi on 2400-2500 MHz range, which fulfilled the antenna requirement.

5.3 Antenna Photo



6 FCC §15.207 & IC RSS-Gen §7.2.2 – AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.2 Conducted limits:

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

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

**Decreases with the logarithm of the frequency.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC §15.207 and IC RSS-Gen §7.2.2 limits.

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

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

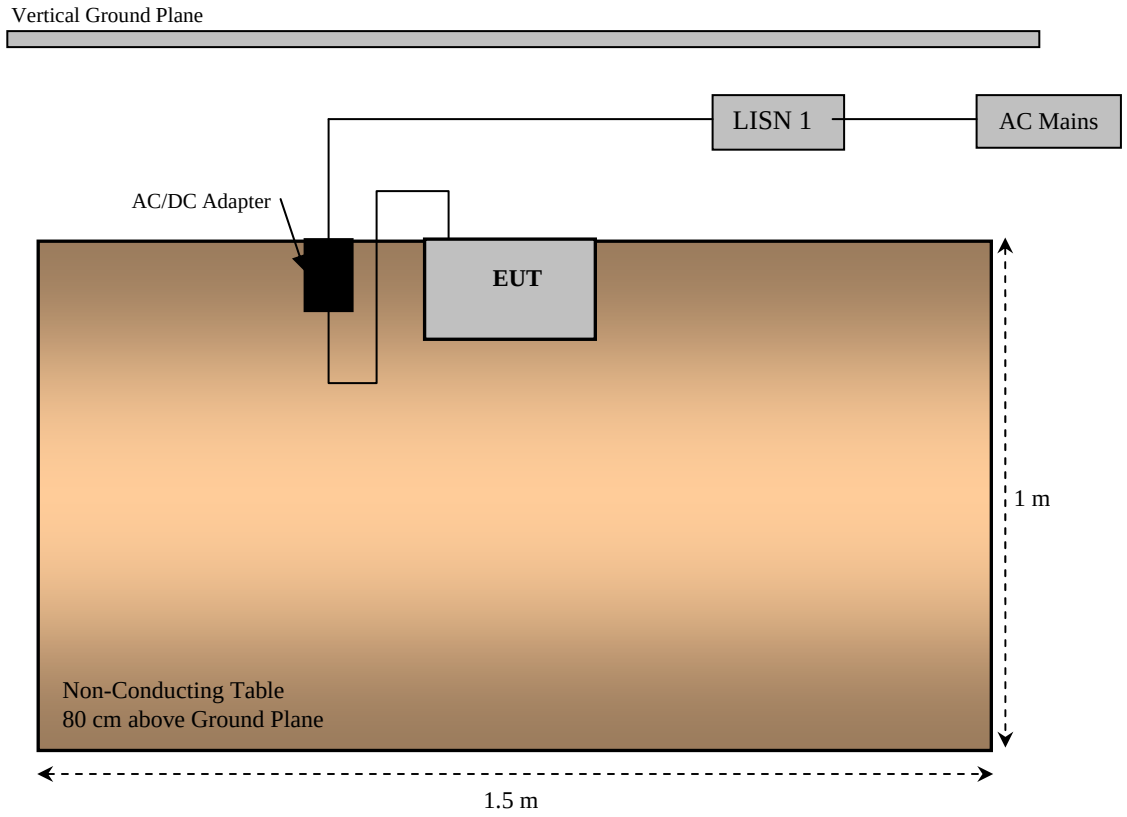
6.3 Test Procedure

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



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
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2011-04-14
Solar Electronics	LISN	9252-R-24-BNC	511205	2011-06-25
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2011-06-10

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

6.7 Test Environmental Conditions

Temperature:	17 °C
Relative Humidity:	49%
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-23 at 5meter chamber2.

6.8 Summary of Test Results

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

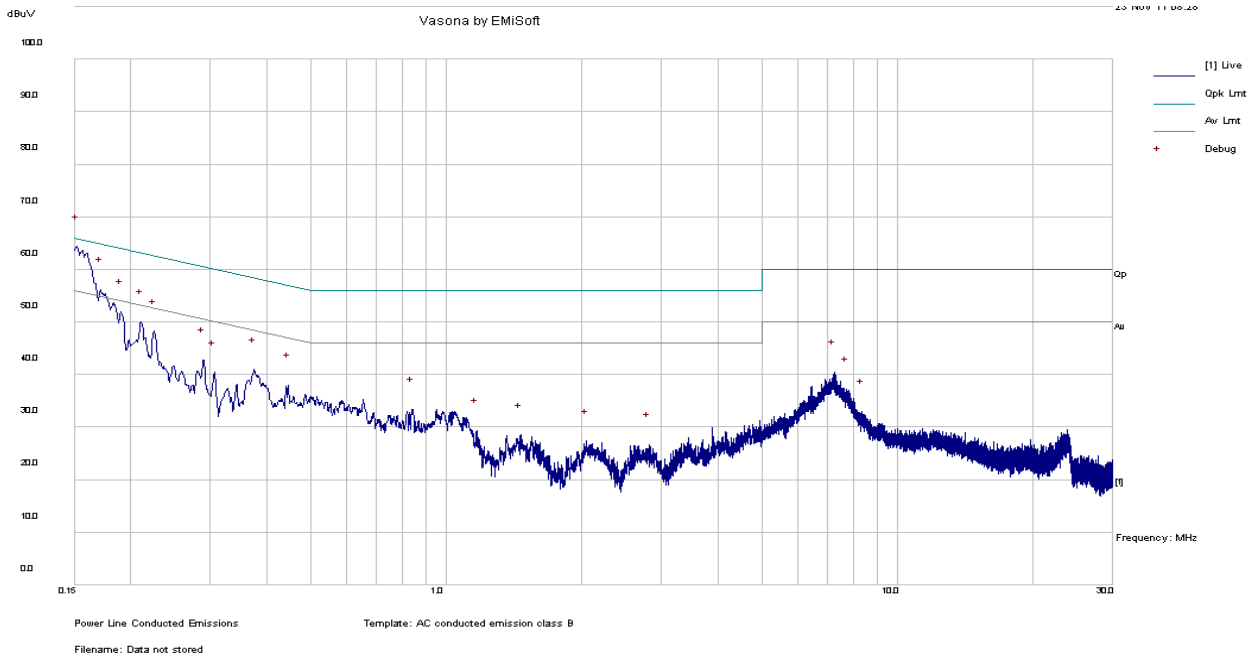
Transmitting Mode the Worst Case: 802.11 b Middle channel

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-3.62	0.150228	Line	0.15 to 30

6.9 Conducted Emissions Test Plots and Data

Transmitting Mode the Worst Case: 802.11 b Middle channel

120 V, 60 Hz – Line



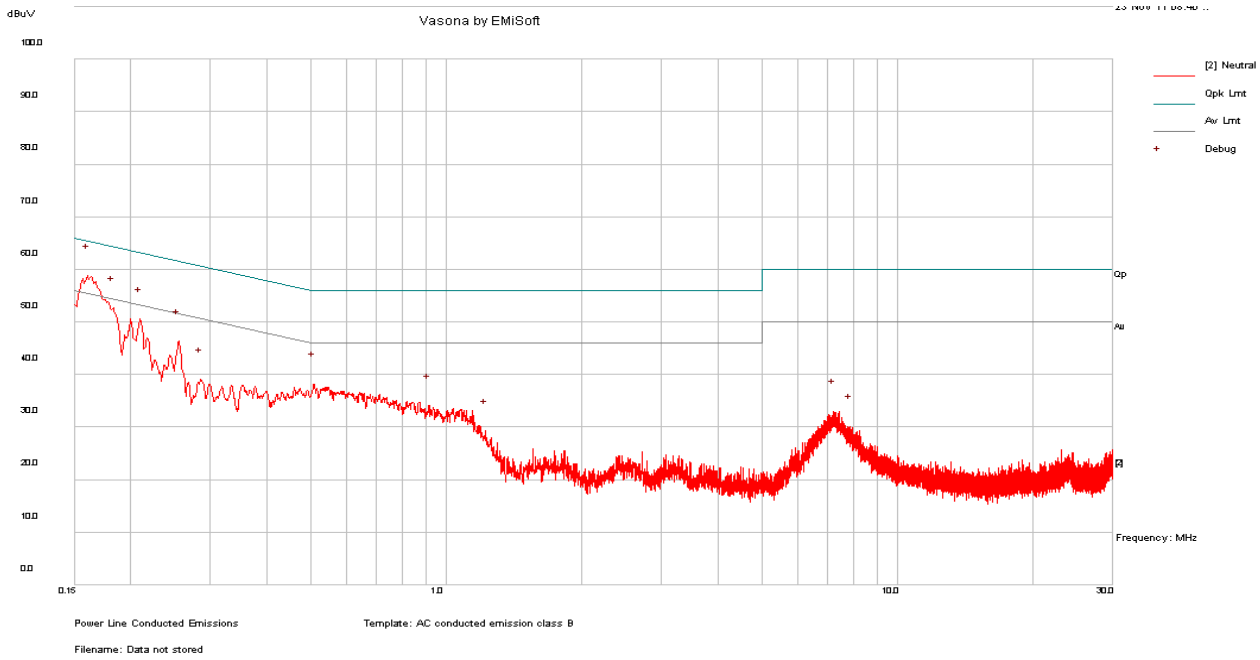
Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150228	62.37	Line	65.99	-3.62
0.153963	60.96	Line	65.78	-4.82
0.172893	52.97	Line	64.82	-11.85
0.193419	45.88	Line	63.89	-18.00
0.208707	42.11	Line	63.26	-21.14
0.360849	31.62	Line	58.71	-27.08

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150228	43.44	Line	55.99	-12.54
0.153963	42.26	Line	55.78	-13.53
0.172893	36.01	Line	54.82	-18.81
0.193419	30.15	Line	53.89	-23.74
0.208707	28.09	Line	53.26	-25.16
0.360849	23.4	Line	48.71	-25.31

120 V, 60 Hz – Neutral



Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.152541	59.45	Neutral	65.86	-6.41
0.164781	54.92	Neutral	65.22	-10.30
0.198336	43.99	Neutral	63.68	-19.69
0.502113	34.89	Neutral	56	-21.11
0.248787	37.84	Neutral	61.8	-23.96
0.275475	34.53	Neutral	60.95	-26.42

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.152541	41.52	Neutral	55.86	-14.34
0.164781	40.5	Neutral	55.22	-14.72
0.502113	28.2	Neutral	46	-17.80
0.198336	31.59	Neutral	53.68	-22.09
0.248787	28.22	Neutral	51.8	-23.58
0.275475	25.27	Neutral	50.95	-25.68

7 FCC §2.1051, §15.247(d) & IC RSS-210 §A8.5 - Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For FCC §15.247(d) and IC RSS-210 §A8.5 in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

7.2 Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

7.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10

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

7.4 Test Environmental Conditions

Temperature:	22.2 °C
Relative Humidity:	34 %
ATM Pressure:	102.3kPa

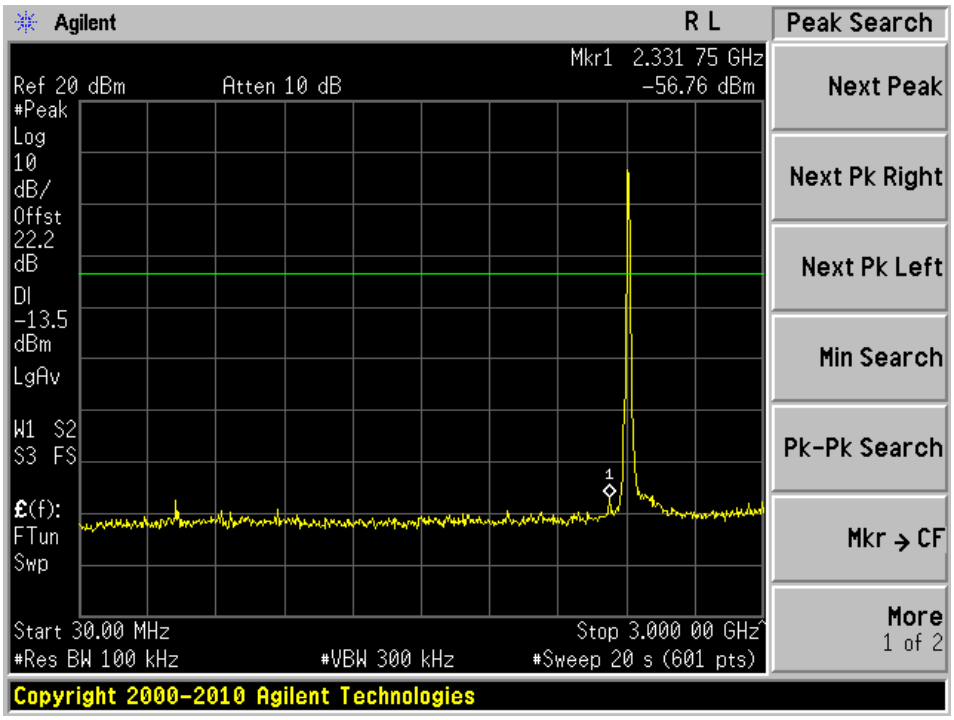
The testing was performed by Victor Zhang on 2011-11-17 at RF Site.

7.5 Measurement Results

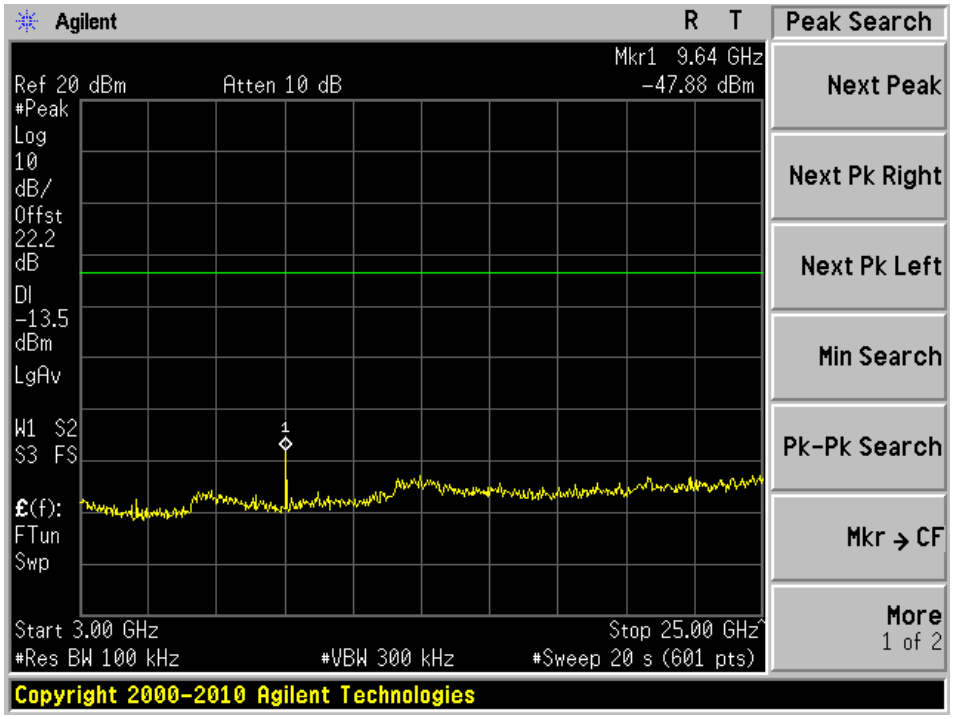
Please refer to following plots of spurious emissions.

802.11b, Low Channel, 2412 MHz

Plot: 30 MHz – 3 GHz

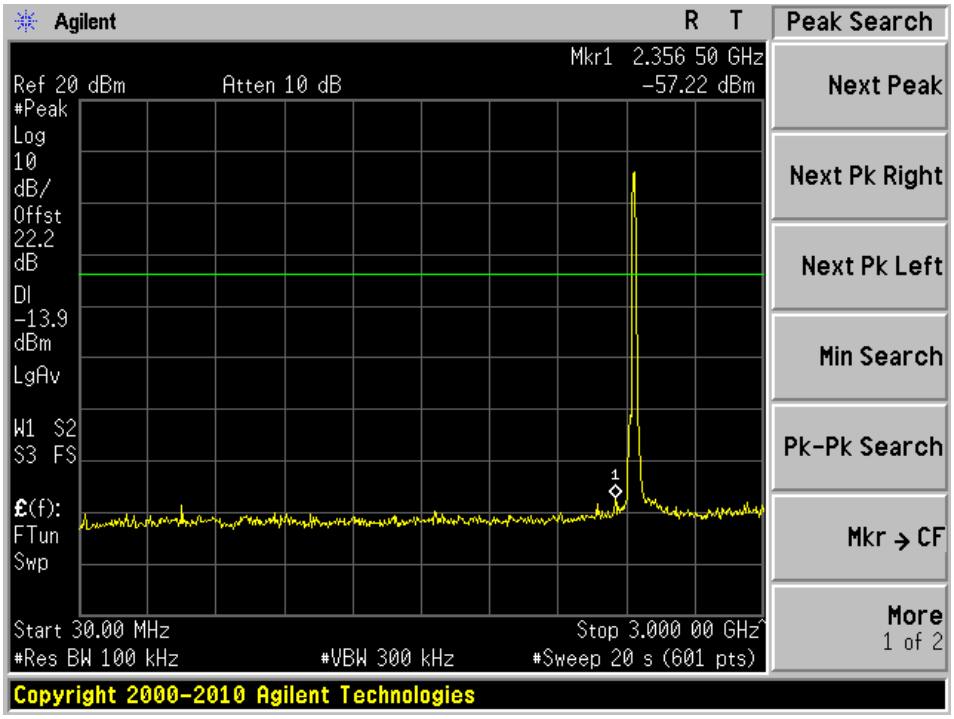


Plot: 3 GHz – 25 GHz

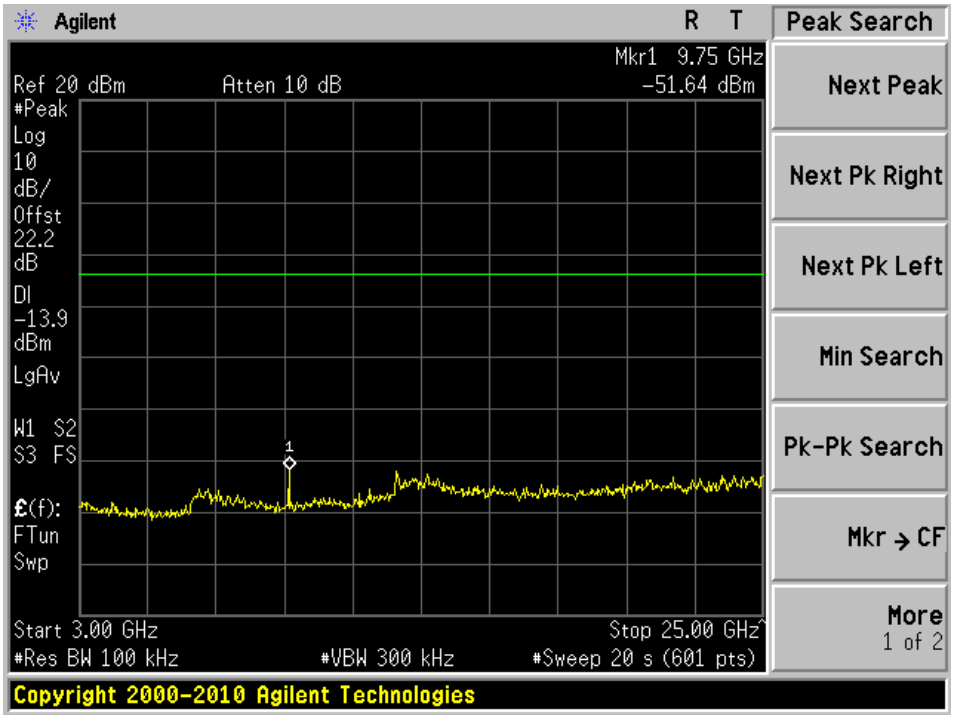


802.11b, Middle Channel, 2437 MHz

Plot: 30 MHz – 3 GHz

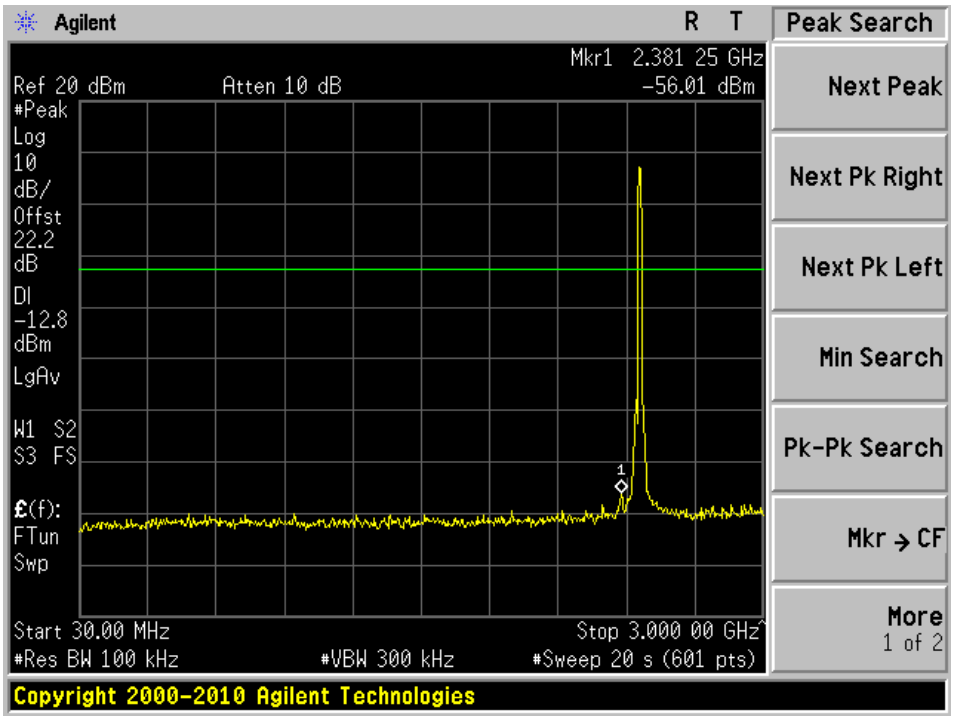


Plot: 3 GHz – 25 GHz

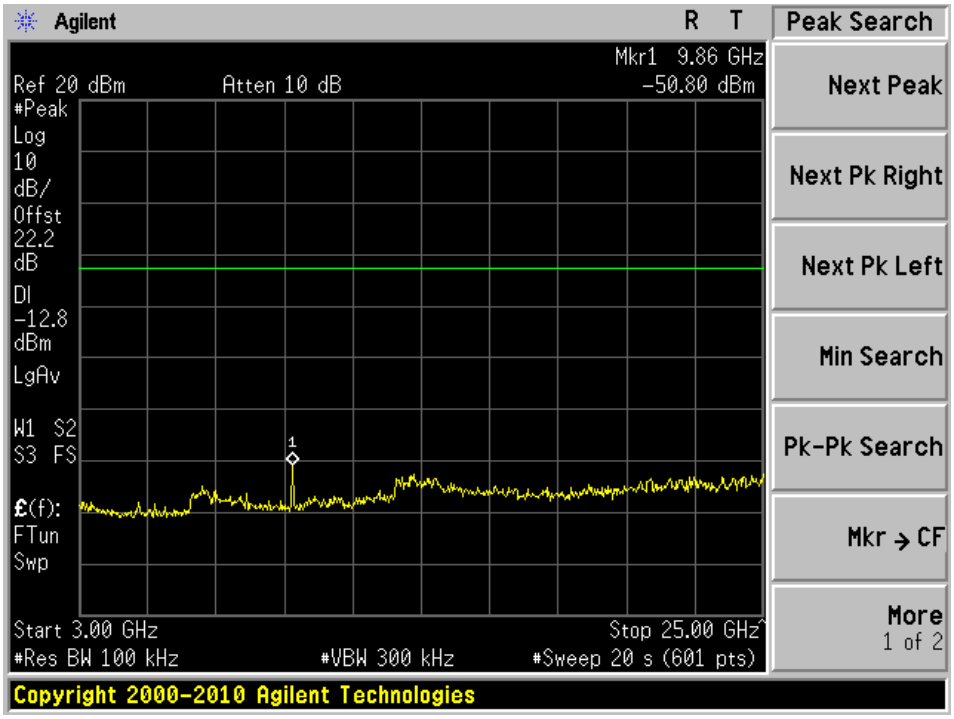


802.11b, High Channel, 2462 MHz

Plot: 30 MHz – 3 GHz

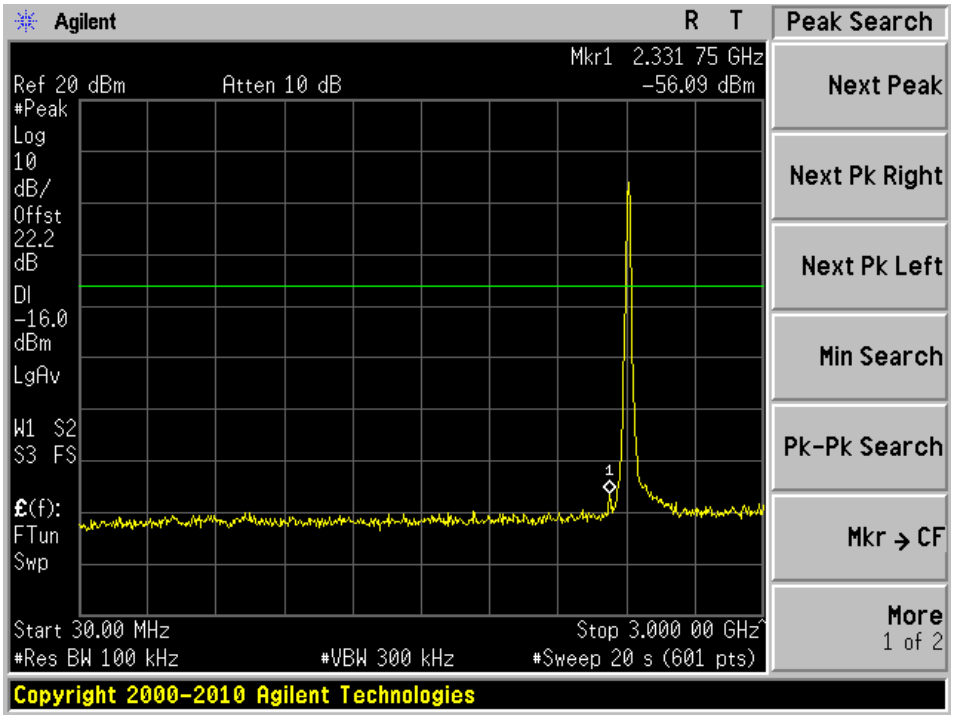


Plot: 3 GHz – 25 GHz

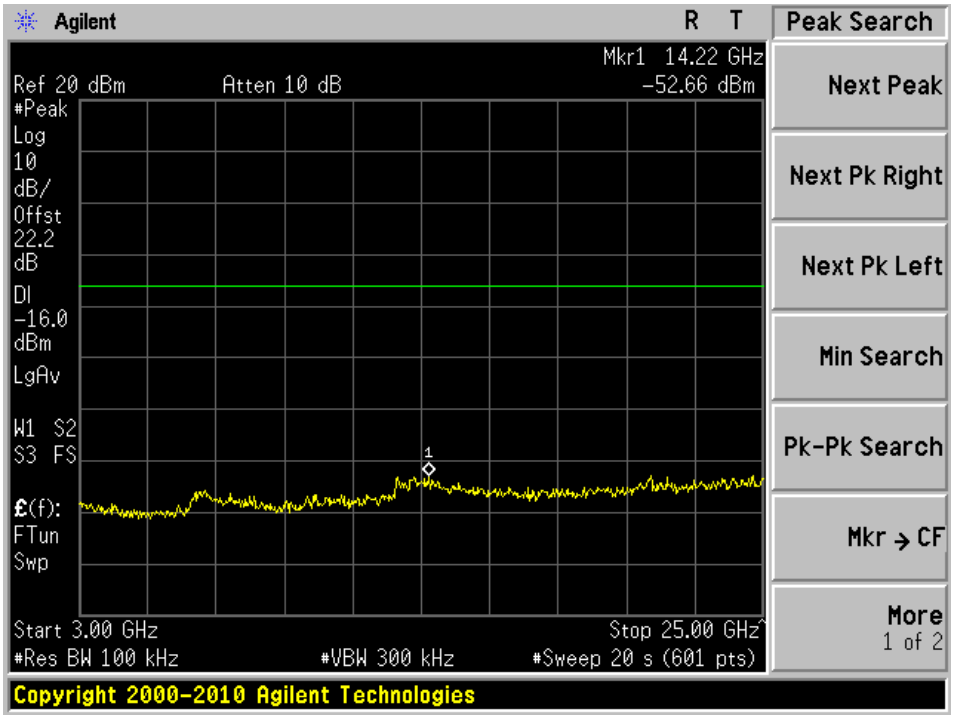


802.11g, Low Channel 2412 MHz

Plot: 30 MHz – 3 GHz

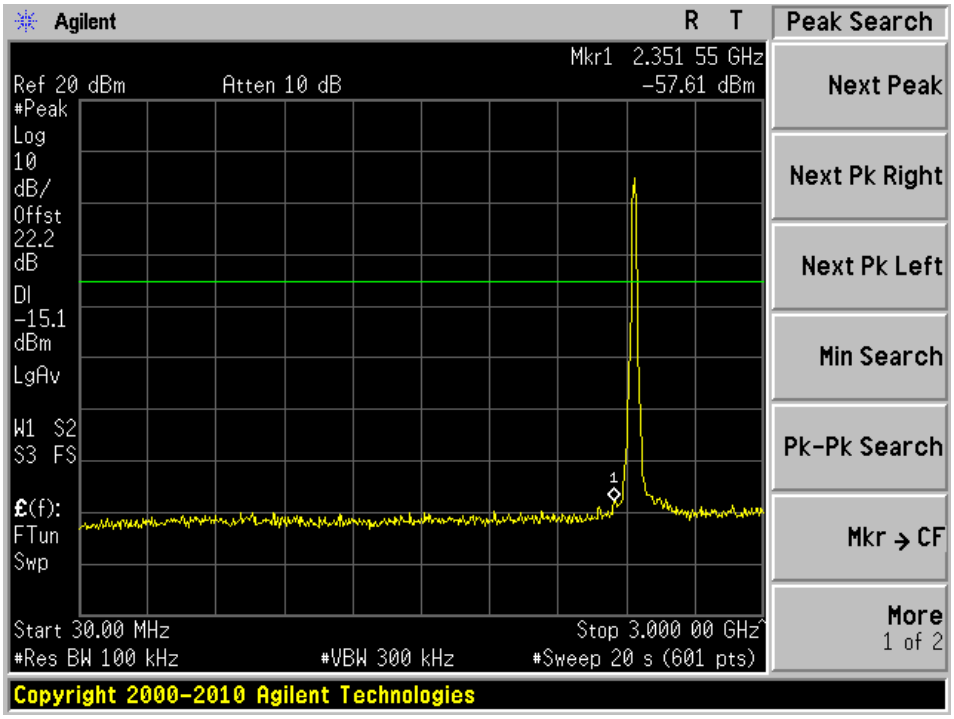


Plot: 3 GHz – 25 GHz

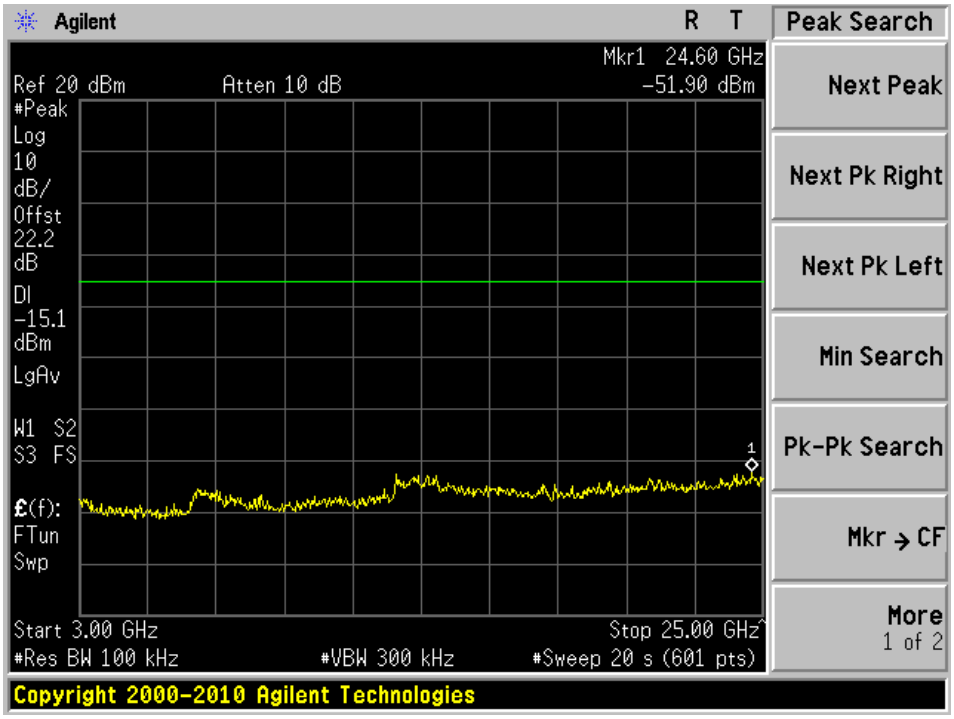


802.11g, Middle Channel 2437 MHz

Plot: 30 MHz – 3 GHz

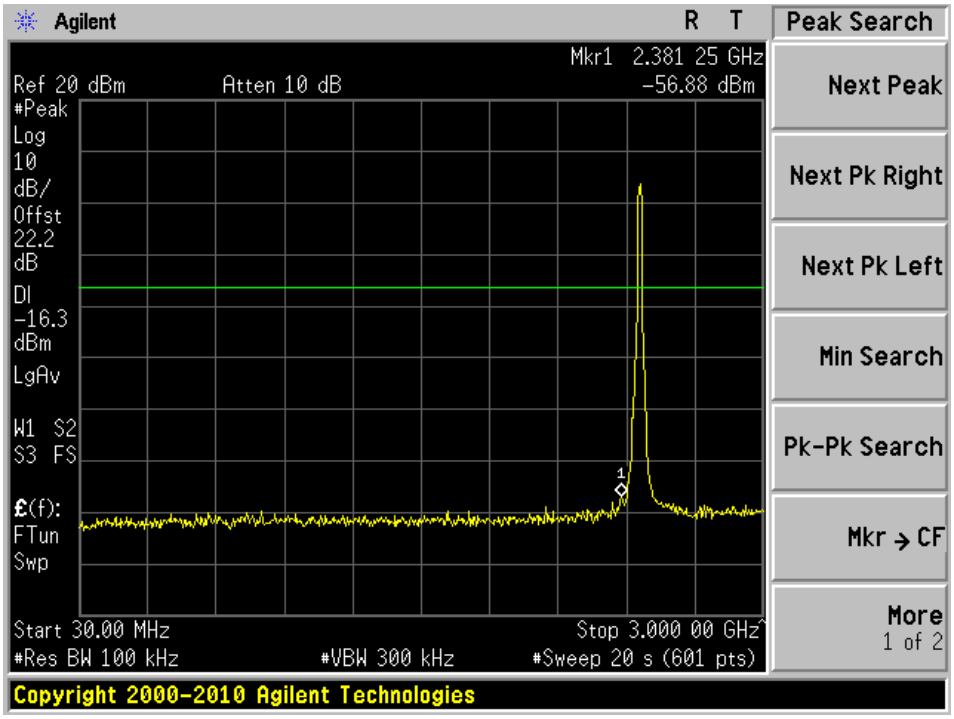


Plot: 3 GHz – 25 GHz

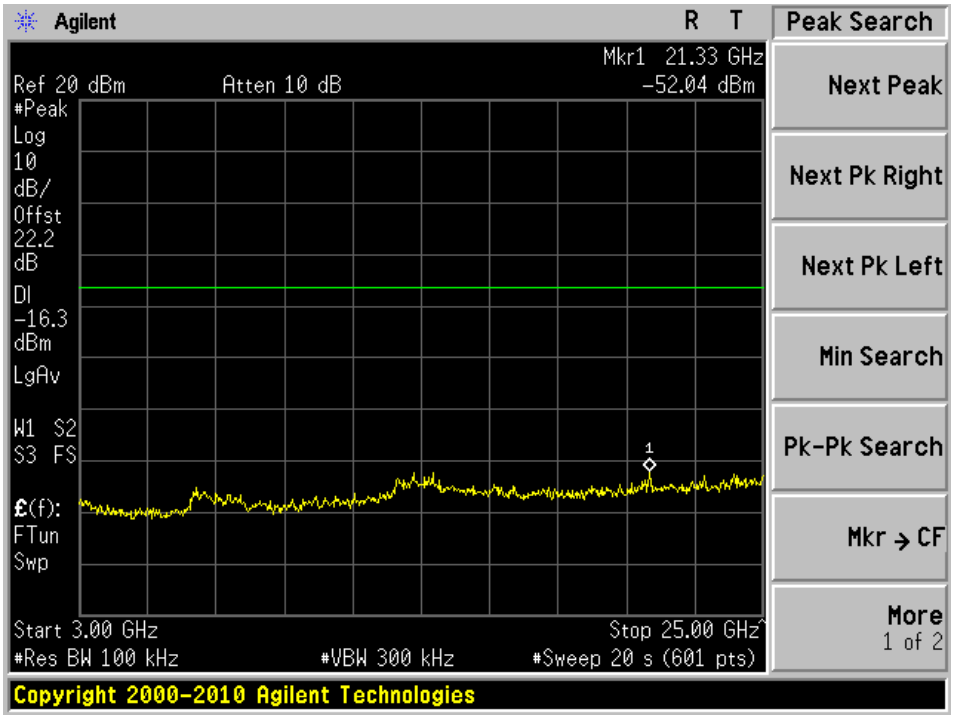


802.11g, High Channel 2462 MHz

Plot: 30 MHz – 3 GHz

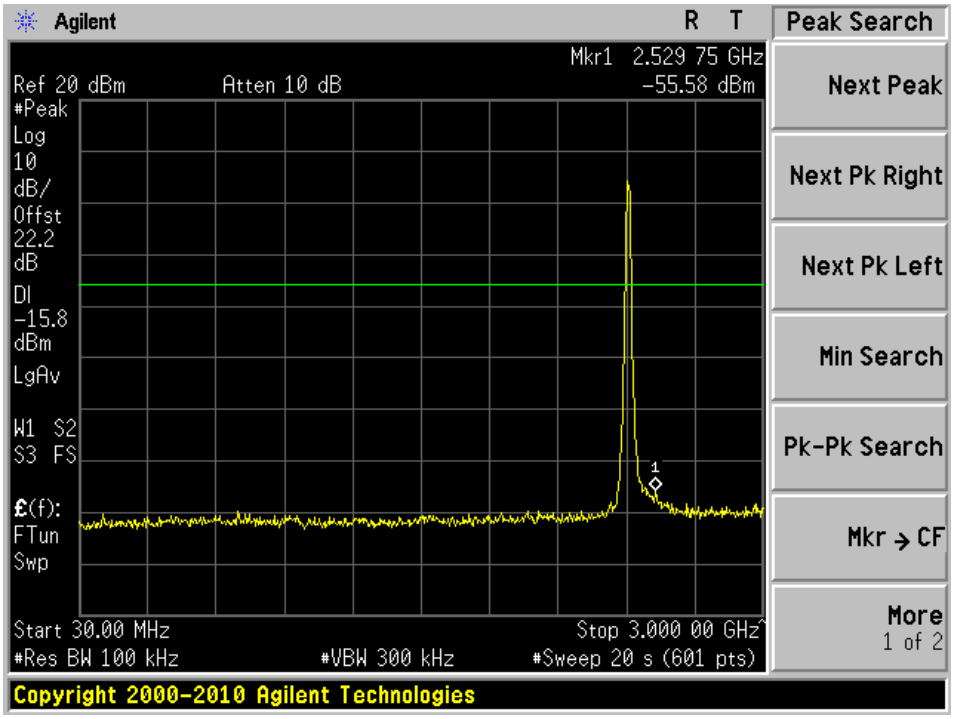


Plot: 3 GHz – 25 GHz

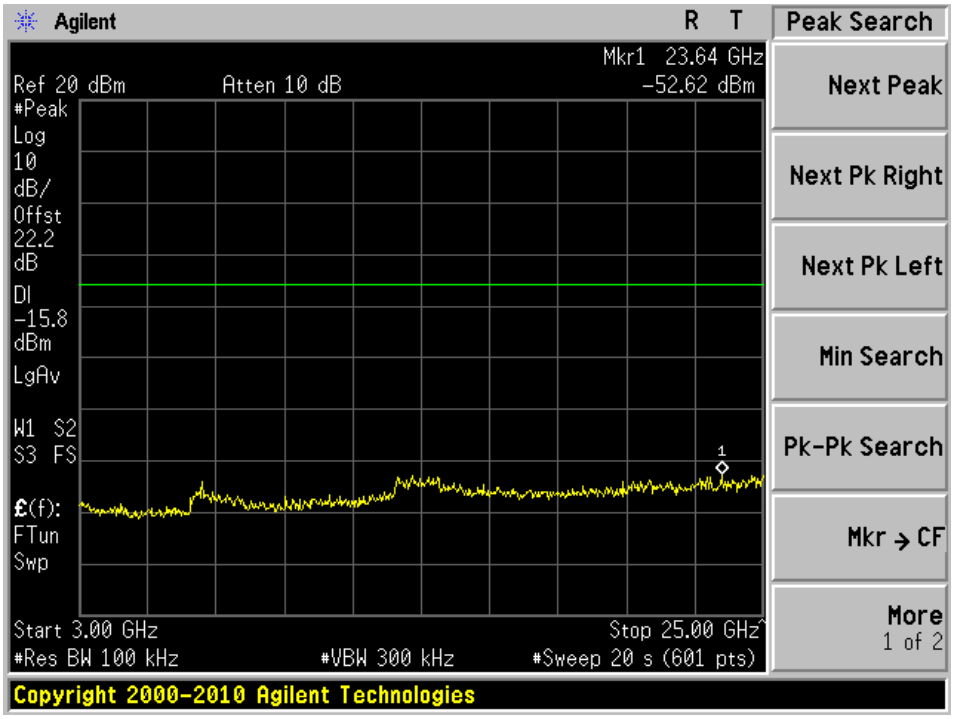


802.11n HT20, Low Channel 2412 MHz

Plot: 30 MHz – 3 GHz

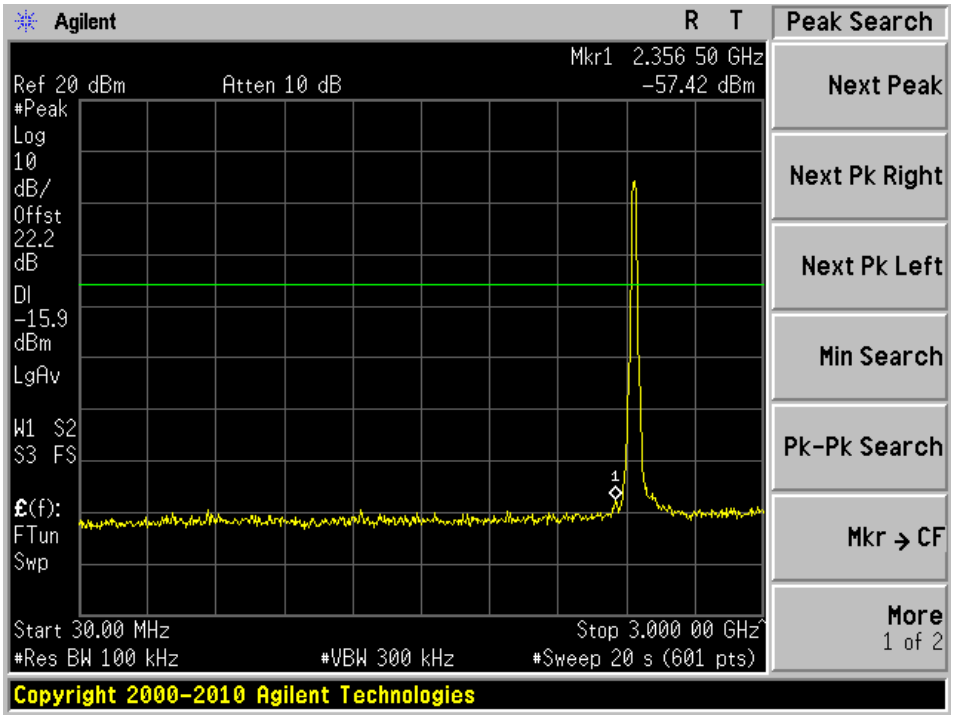


Plot: 3 GHz – 25 GHz

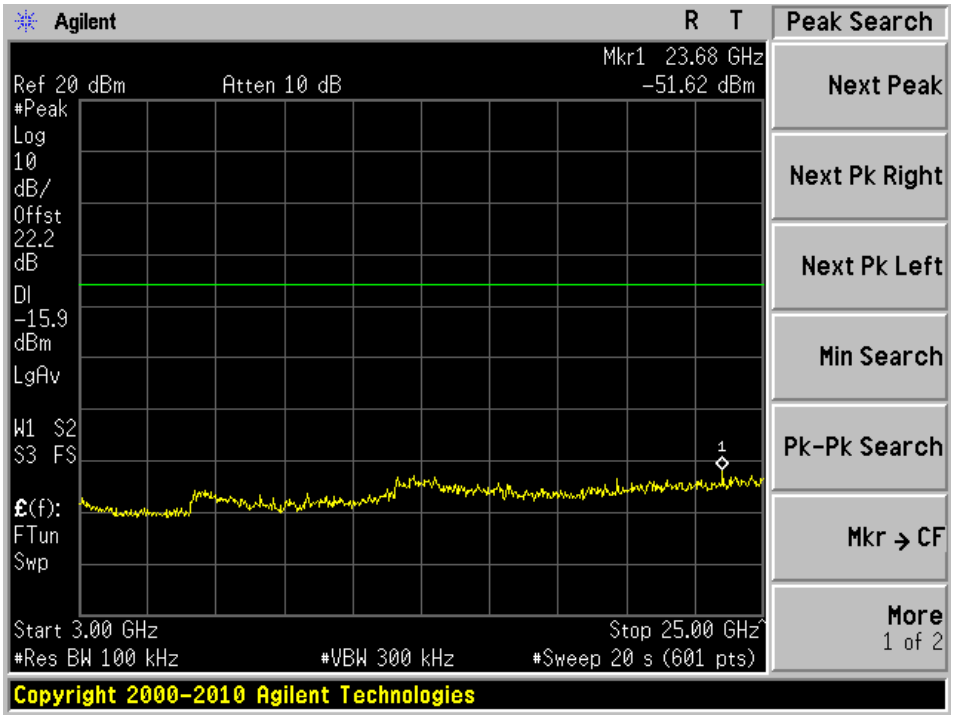


802.11n HT20, Middle Channel 2437 MHz

Plot: 30 MHz – 3 GHz

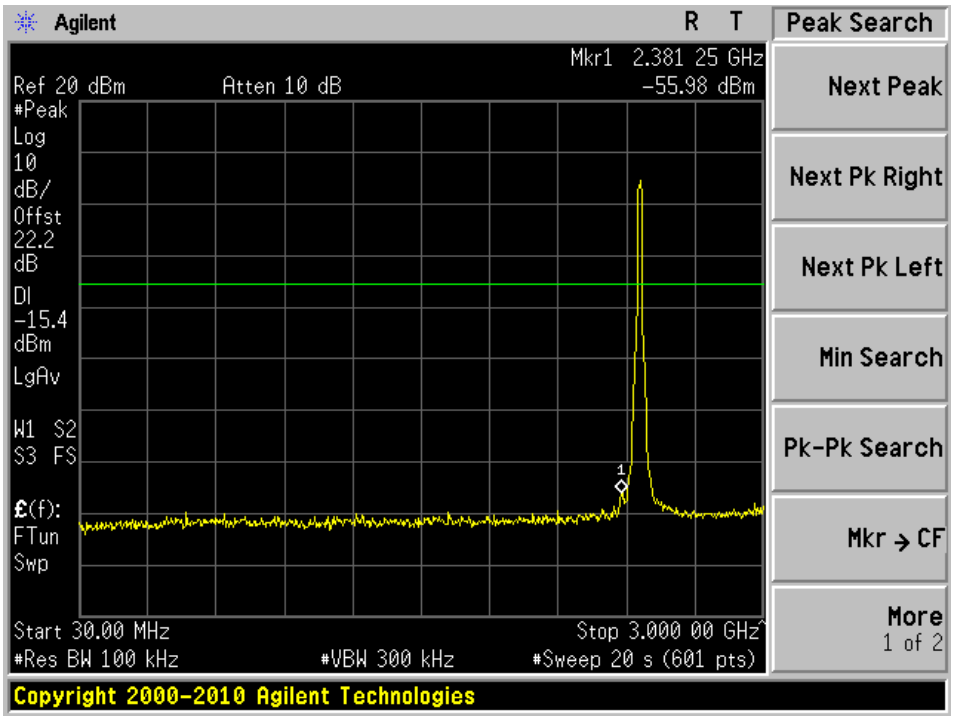


Plot: 3 GHz – 25 GHz

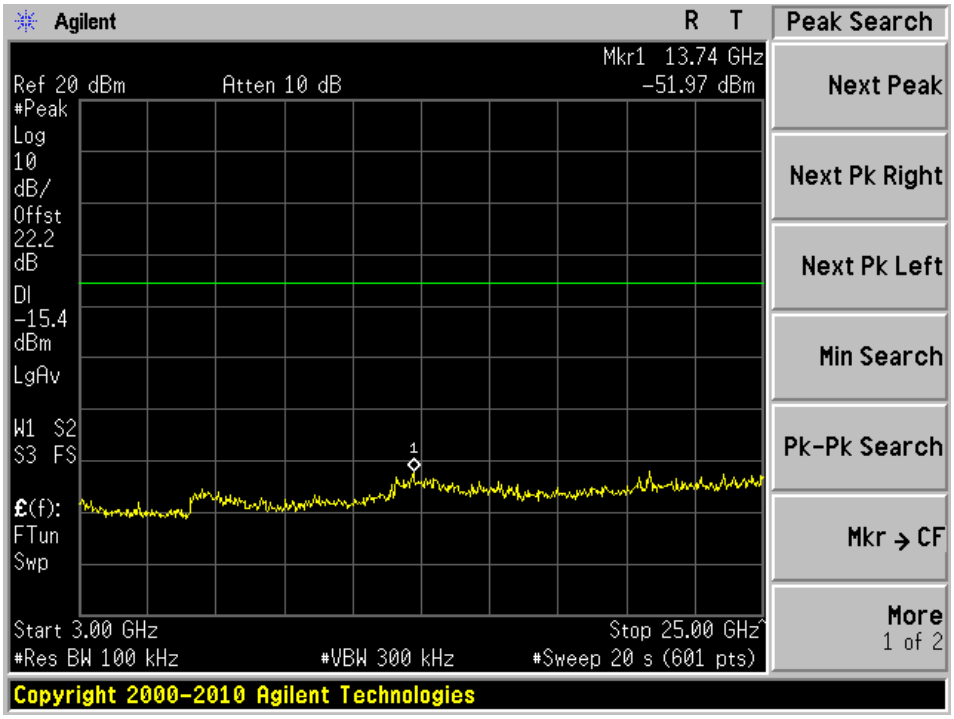


802.11n HT20, High Channel 2462 MHz

Plot: 30 MHz – 3 GHz



Plot: 3 GHz – 25 GHz



8 FCC §15.205, §15.209 & §15.247(c) & IC RSS-210 §A8.5 - Spurious Radiated Emissions

8.1 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 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**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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 §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

8.2 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 15 Subpart C and IC RSS-210 limits.

The spacing between the peripherals was 3 centimeters.

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

8.3 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

8.4 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

8.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2011-03-21
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2011-06-29
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-11-29
Hewlett Packard	Pre amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2011-05-09

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

8.6 Test Environmental Conditions

2011-11-21

Temperature:	18 °C
Relative Humidity:	53 %
ATM Pressure:	102.1kPa

2011-11-23

Temperature:	17 °C
Relative Humidity:	49 %
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-21 and 2011-11-23 in 5 meter chamber #2.

8.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C and IC RSS-210 standard's radiated emissions limits, and had the worst margin of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel, Range**
-1.03	665.9873	Horizontal	802.11b, Middle, 30-1000 MHz

1 – 25 GHz:

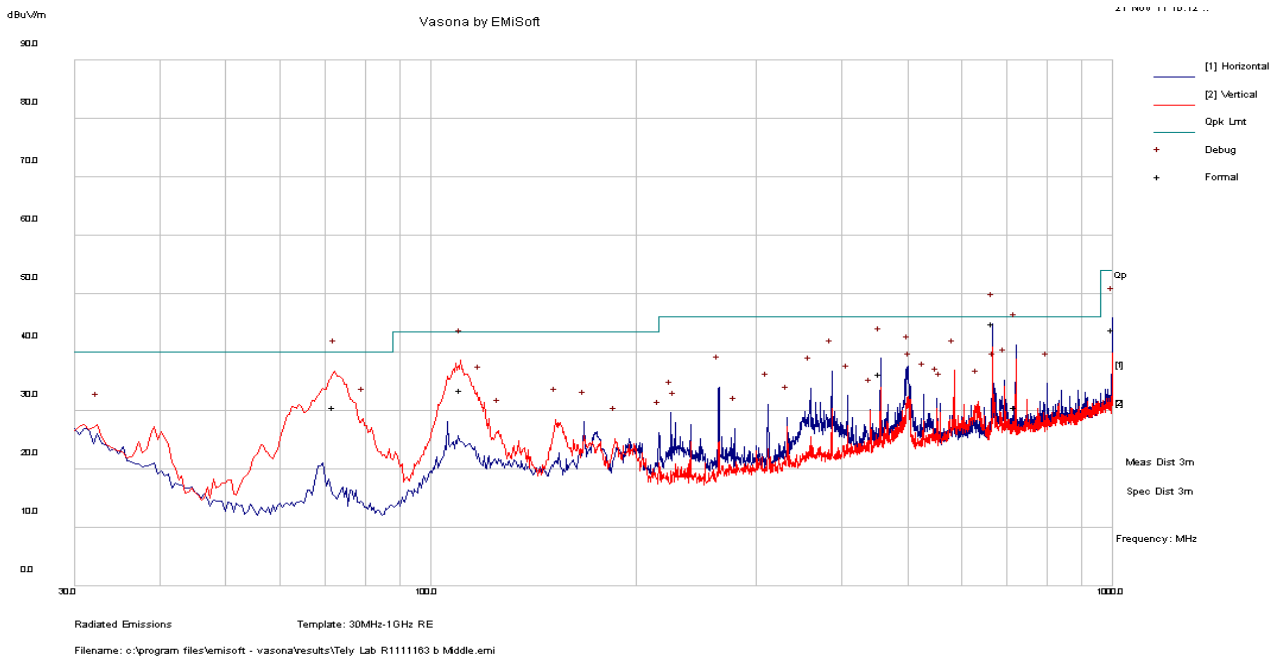
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel, Range**
-1.57	4824	Horizontal	802.11b Low, 1GHz – 25GHz

Please refer to the following table and plots for specific test result details

8.8 Radiated Emissions Test Data and Plots

1) 30 MHz – 1 GHz, Measured at 3 meters

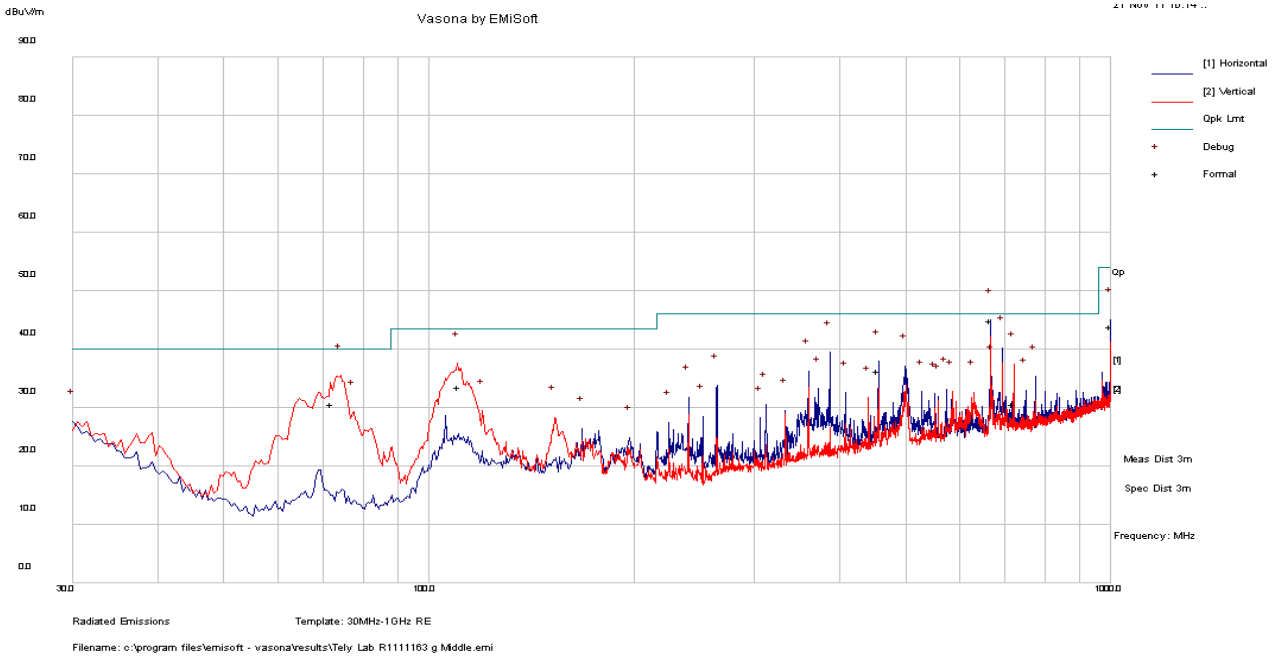
802.11b Mode, Worst Channel Middle channel (2437 MHz)



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
665.9873	44.97	108	H	35	46	-1.03
71.9675	30.62	135	V	349	40	-9.38
455.958	36.31	100	H	28	46	-9.69
110.6835	33.59	100	V	3	43.5	-9.91
998.975	43.94	100	H	30	54	-10.06
719.9983	30.66	124	H	162	46	-15.34

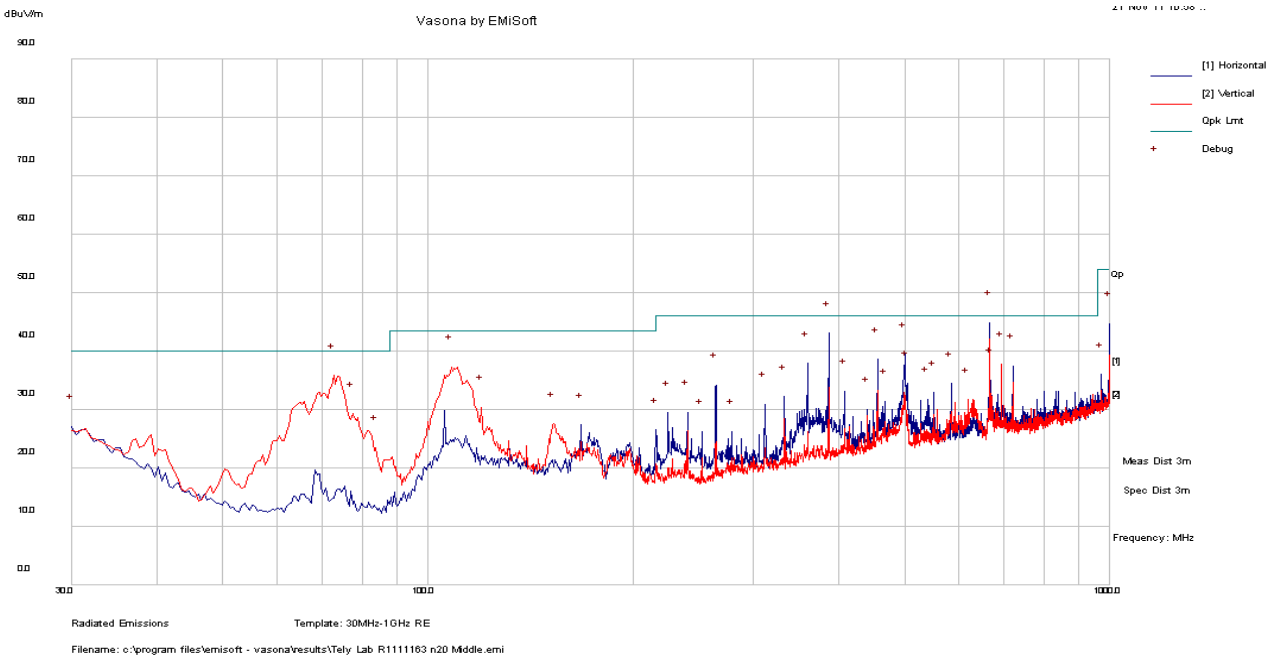
802.11g Mode, Worst Channel Middle channel (2437 MHz)



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
665.9838	43.82	101	H	46	46	-2.18
692.9725	37.74	131	H	42	46	-8.26
456.0228	36.61	100	H	25	46	-9.39
73.9485	30.38	159	V	164	40	-9.62
110.143	33.77	102	V	292	43.5	-9.73
386.9938	31.09	263	H	349	46	-14.91

802.11n HT20 Mode, Worst Channel Middle channel (2437 MHz)



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
665.9415	42.36	111	H	46	46	-3.64
455.9928	37.17	100	H	27	46	-8.83
108.316	33.42	110	H	30	43.5	-10.08
72.47075	26.84	225	V	148	40	-13.16
500.2463	32.5	196	V	40	46	-13.50
386.9608	24.99	223	H	214	46	-21.01

2) 1–25 GHz, Measured at 3 meters

802.11b 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 2412 MHz, measured at 3 meters											
2412	79.3	268	131	V	28.16	3.12	0	110.58	Fund	-	peak
2412	77.18	295	158	H	28.16	3.12	0	108.46	Fund	-	peak
2412	75.83	268	131	V	28.16	3.12	0	107.11	Fund	-	Ave
2412	73.56	295	158	H	28.16	3.12	0	104.84	Fund	-	Ave
4824	39.18	243	170	V	32.63	4.56	27.71	48.66	74	-25.34	peak
4824	45.68	206	105	H	32.63	4.56	27.71	55.16	74	-18.84	peak
4824	34.12	243	170	V	32.63	4.56	27.71	43.6	54	-10.4	Ave
4824	42.95	206	105	H	32.63	4.56	27.71	52.43	54	-1.57	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	78.82	262	129	V	28.16	3.25	0	110.23	Fund	-	peak
2437	74.9	300	131	H	28.16	3.25	0	106.31	Fund	-	peak
2437	75.21	262	129	V	28.16	3.25	0	106.62	Fund	-	Ave
2437	70.85	300	131	H	28.16	3.25	0	102.26	Fund	-	Ave
4874	38.39	222	145	V	32.73	4.52	27.71	47.93	74	-26.07	peak
4874	41.11	157	108	H	32.73	4.52	27.71	50.65	74	-23.35	peak
4874	33.82	222	145	V	32.73	4.52	27.71	43.36	54	-10.64	Ave
4874	37.94	157	108	H	32.73	4.52	27.71	47.48	54	-6.52	Ave
High Channel 2462 MHz, measured at 3 meters											
2462	77.86	265	107	V	28.27	3.25	0	109.38	Fund	-	peak
2462	75.08	293	161	H	28.27	3.25	0	106.6	Fund	-	peak
2462	73.51	265	107	V	28.27	3.25	0	105.03	Fund	-	Ave
2462	71.29	293	161	H	28.27	3.25	0	102.81	Fund	-	Ave
4924	39.3	24	142	V	32.97	4.57	27.51	49.33	74	-24.67	peak
4924	40.77	200	129	H	32.97	4.57	27.51	50.8	74	-23.2	peak
4924	35.38	24	142	V	32.97	4.57	27.51	45.41	54	-8.59	Ave
4924	37.11	200	129	H	32.97	4.57	27.51	47.14	54	-6.86	Ave

802.11g 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 2412 MHz, measured at 3 meters											
2412	80.33	265	102	V	28.16	3.12	0	111.61	Fund	-	peak
2412	76.77	292	165	H	28.16	3.12	0	108.05	Fund	-	peak
2412	63.71	265	102	V	28.16	3.12	0	94.99	Fund	-	Ave
2412	60.91	292	165	H	28.16	3.12	0	92.19	Fund	-	Ave
4824	41.43	245	174	V	32.63	4.56	27.71	50.91	74	-23.09	peak
4824	44.68	199	104	H	32.63	4.56	27.71	54.16	74	-19.84	peak
4824	24.83	245	174	V	32.63	4.56	27.71	34.31	54	-19.69	Ave
4824	28.87	199	104	H	32.63	4.56	27.71	38.35	54	-15.65	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	81.41	266	123	V	28.16	3.25	0	112.82	Fund	-	peak
2437	78.38	295	155	H	28.16	3.25	0	109.79	Fund	-	peak
2437	64.43	266	123	V	28.16	3.25	0	95.84	Fund	-	Ave
2437	61.94	295	155	H	28.16	3.25	0	93.35	Fund	-	Ave
4874	40.51	264	152	V	32.73	4.52	27.71	50.05	74	-23.95	peak
4874	42.84	201	120	H	32.73	4.52	27.71	52.38	74	-21.62	peak
4874	23.36	264	152	V	32.73	4.52	27.71	32.9	54	-21.1	Ave
4874	27.21	201	120	H	32.73	4.52	27.71	36.75	54	-17.25	Ave
High Channel 2462 MHz, measured at 3 meters											
2462	79.46	257	100	V	28.27	3.25	0	110.98	Fund	-	peak
2462	77.87	295	158	H	28.27	3.25	0	109.39	Fund	-	peak
2462	62.6	257	100	V	28.27	3.25	0	94.12	Fund	-	Ave
2462	61.66	295	158	H	28.27	3.25	0	93.18	Fund	-	Ave
4924	38.97	222	142	V	32.97	4.57	27.51	49	74	-25	peak
4924	40.87	210	164	H	32.97	4.57	27.51	50.9	74	-23.1	peak
4924	21.93	222	142	V	32.97	4.57	27.51	31.96	54	-22.04	Ave
4924	23.25	210	164	H	32.97	4.57	27.51	33.28	54	-20.72	Ave

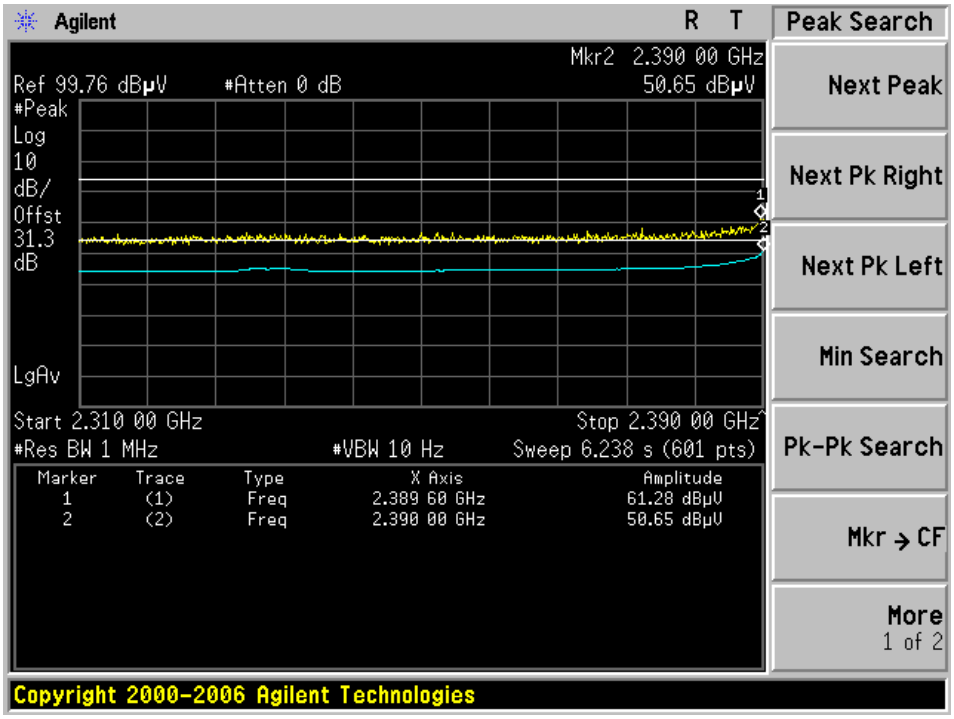
802.11n HT20 mode

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 2412 MHz, measured at 3 meters											
2412	80.36	267	121	V	28.16	3.12	0	111.64	Fund	-	peak
2412	77.7	294	166	H	28.16	3.12	0	108.98	Fund	-	peak
2412	62.74	267	121	V	28.16	3.12	0	94.02	Fund	-	Ave
2412	60.62	294	166	H	28.16	3.12	0	91.9	Fund	-	Ave
4824	42.24	267	159	V	32.63	4.56	27.71	51.72	74	-22.28	peak
4824	43.54	195	159	H	32.63	4.56	27.71	53.02	74	-20.98	peak
4824	29.9	267	159	V	32.63	4.56	27.71	39.38	54	-14.62	Ave
4824	27.27	195	159	H	32.63	4.56	27.71	36.75	54	-17.25	Ave
Middle Channel 2437 MHz, measured at 3 meters											
2437	80.3	267	128	V	28.16	3.25	0	111.71	Fund	-	peak
2437	77.76	295	164	H	28.16	3.25	0	109.17	Fund	-	peak
2437	63.46	267	128	V	28.16	3.25	0	94.87	Fund	-	Ave
2437	61.18	295	164	H	28.16	3.25	0	92.59	Fund	-	Ave
4874	41.59	265	159	V	32.73	4.52	27.71	51.13	74	-22.87	peak
4874	42.47	195	139	H	32.73	4.52	27.71	52.01	74	-21.99	peak
4874	23.54	265	159	V	32.73	4.52	27.71	33.08	54	-20.92	Ave
4874	25.56	195	139	H	32.73	4.52	27.71	35.1	54	-18.9	Ave
High Channel 2462 MHz, measured at 3 meters											
2462	80.07	267	132	V	28.27	3.25	0	111.59	Fund	-	peak
2462	77.06	296	129	H	28.27	3.25	0	108.58	Fund	-	peak
2462	63.36	267	132	V	28.27	3.25	0	94.88	Fund	-	Ave
2462	60.34	296	129	H	28.27	3.25	0	91.86	Fund	-	Ave
4924	41.37	265	148	V	32.97	4.57	27.51	51.4	74	-22.6	peak
4924	41.91	198	116	H	32.97	4.57	27.51	51.94	74	-22.06	peak
4924	22.92	265	148	V	32.97	4.57	27.51	32.95	54	-21.05	Ave
4924	24.37	198	116	H	32.97	4.57	27.51	34.4	54	-19.6	Ave

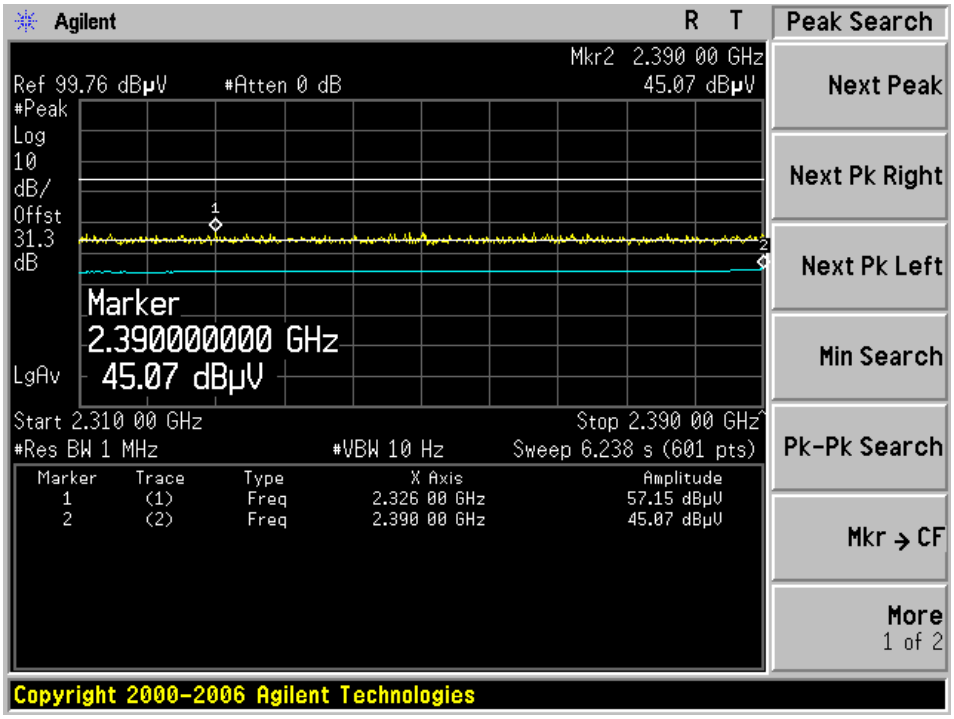
3) Restricted Band Edge

802.11b, Lower Edge with Lowest Channel

Vertical

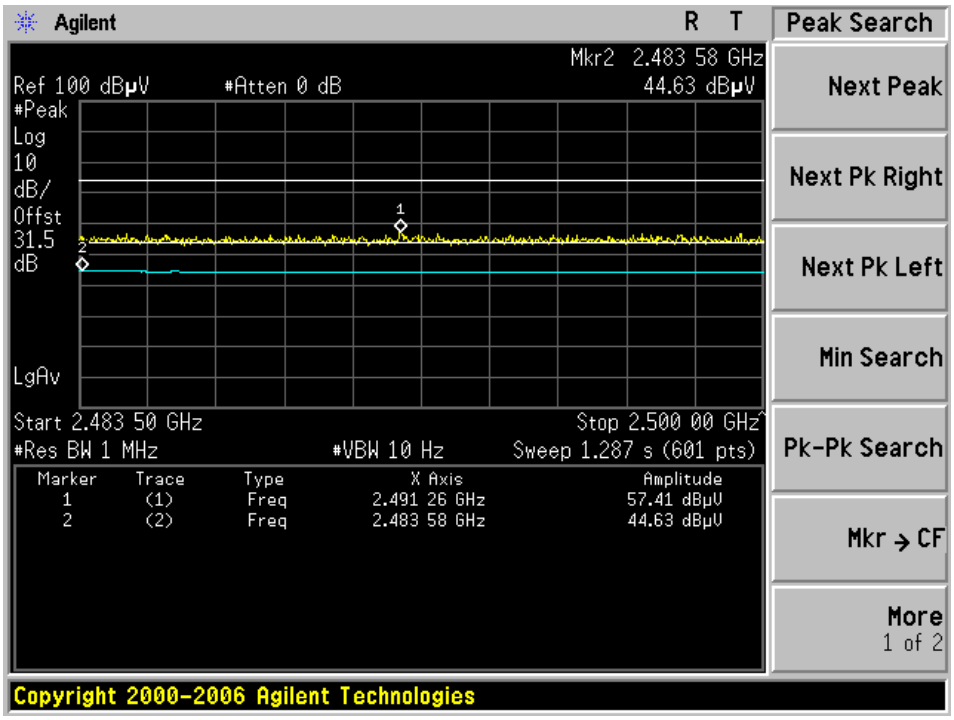


Horizontal

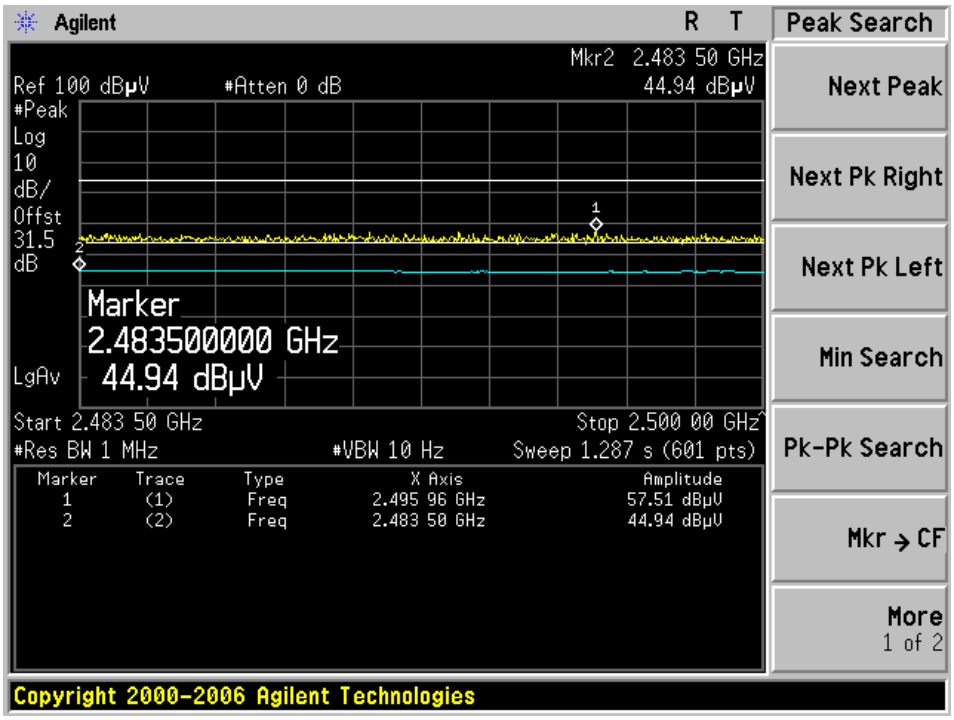


802.11b mode, Higher Edge with Highest Channel

Vertical

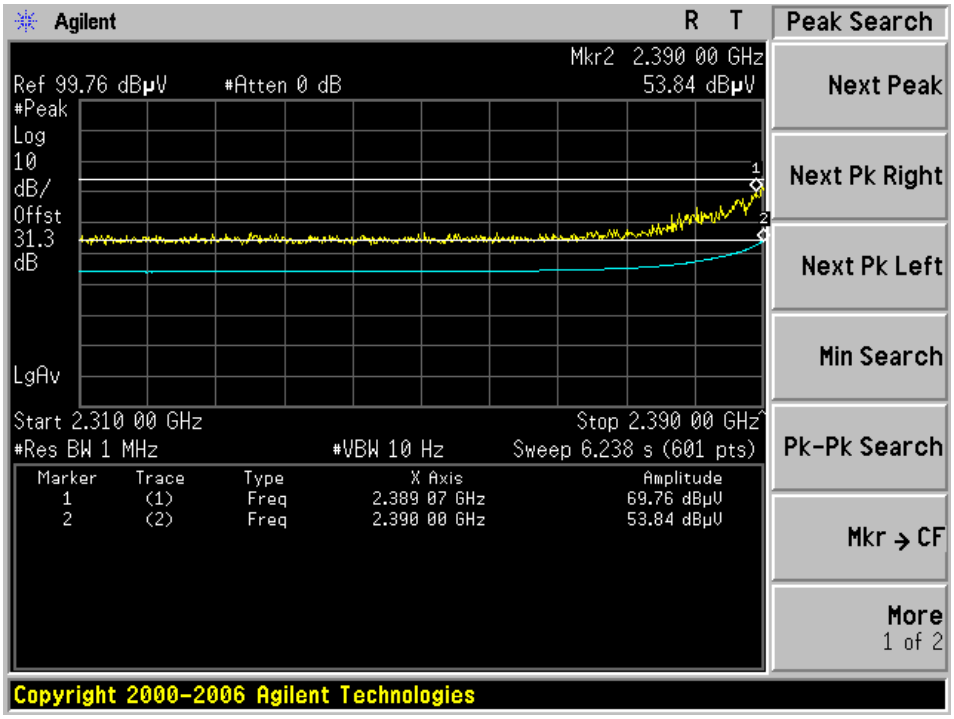


Horizontal

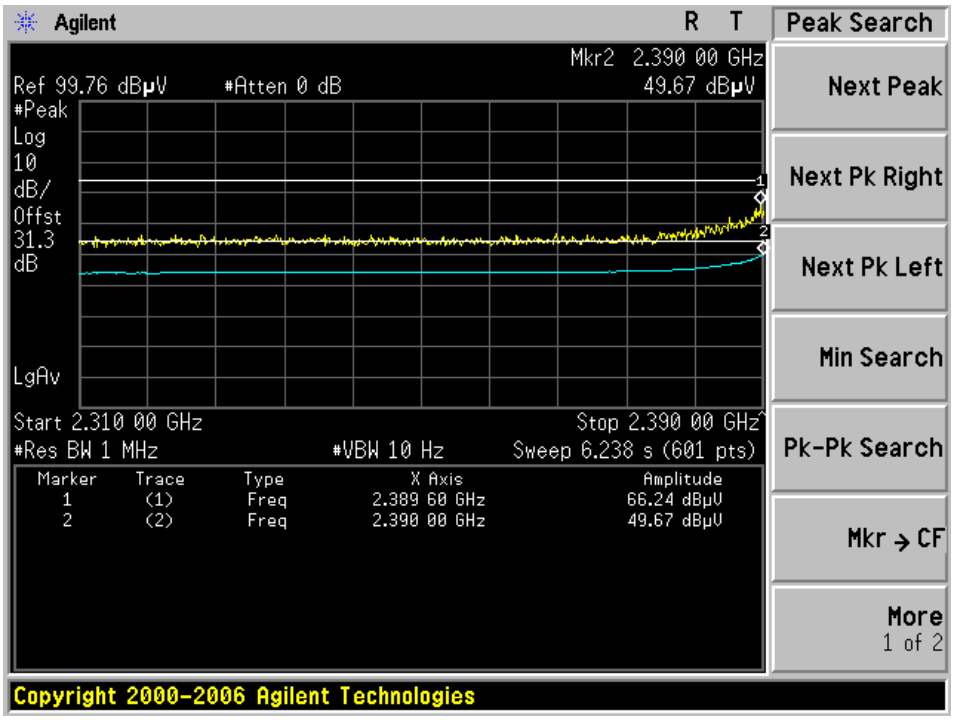


802.11g mode, Lower Edge with Lowest Channel

Vertical

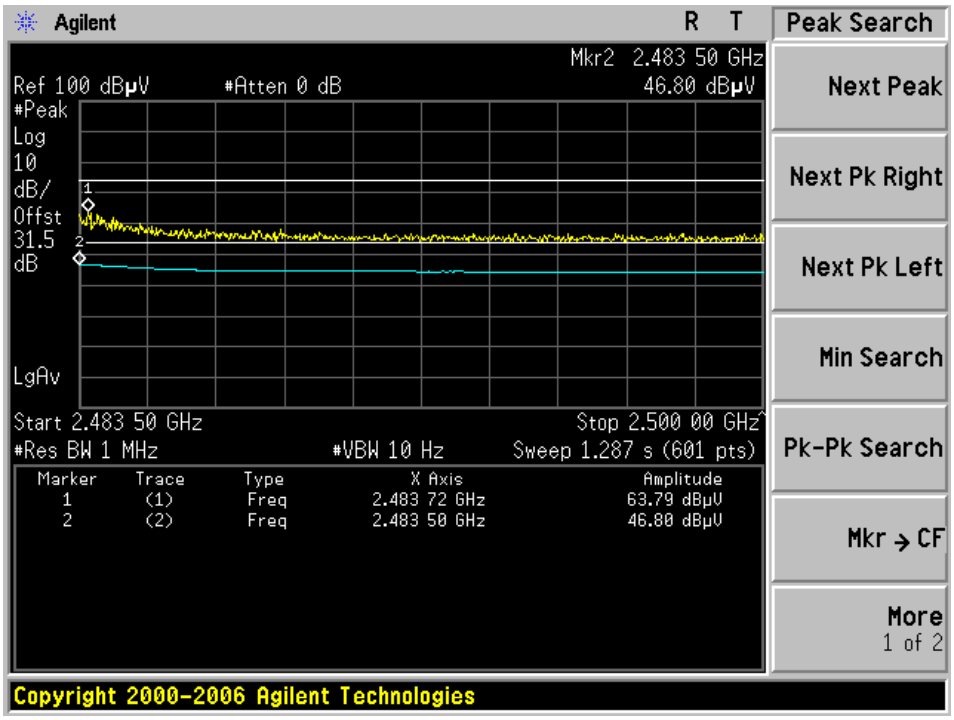


Horizontal

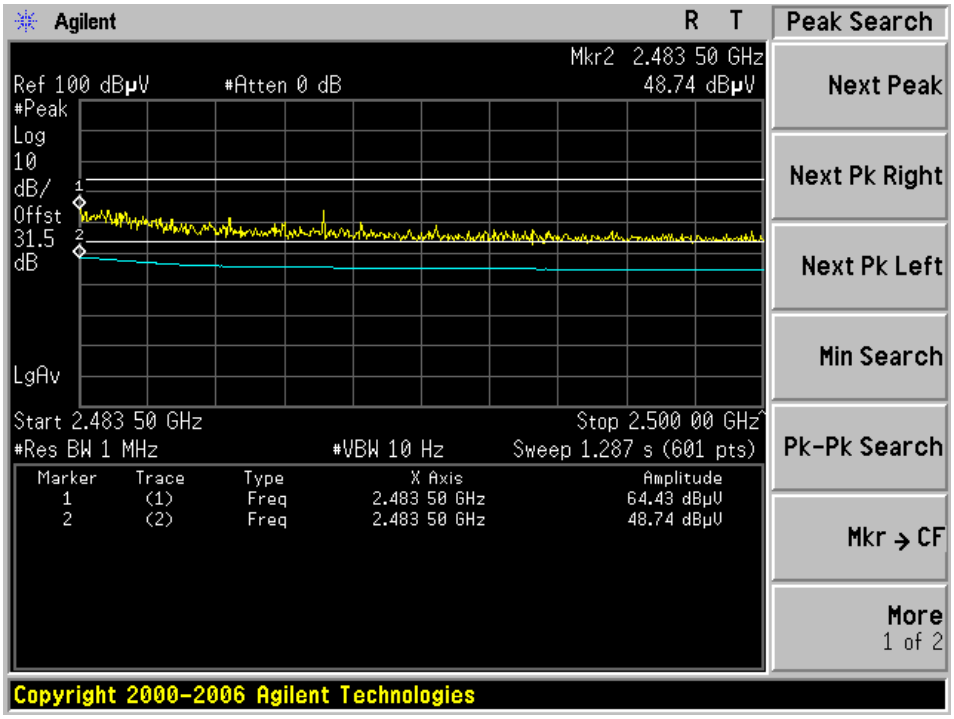


802.11g mode, Higher Edge with Highest Channel

Vertical

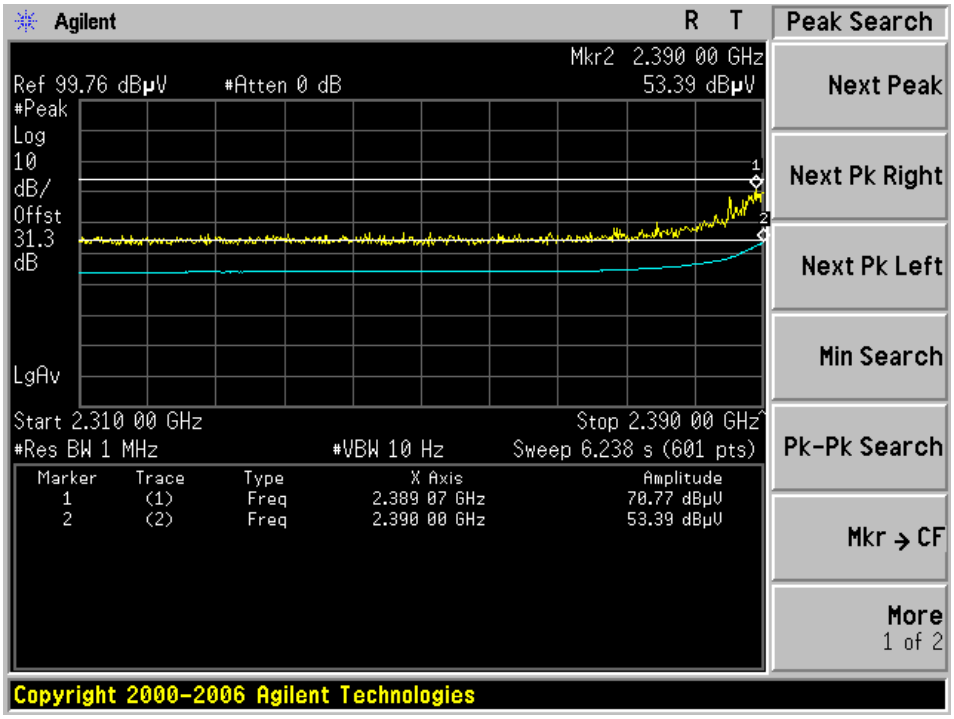


Horizontal

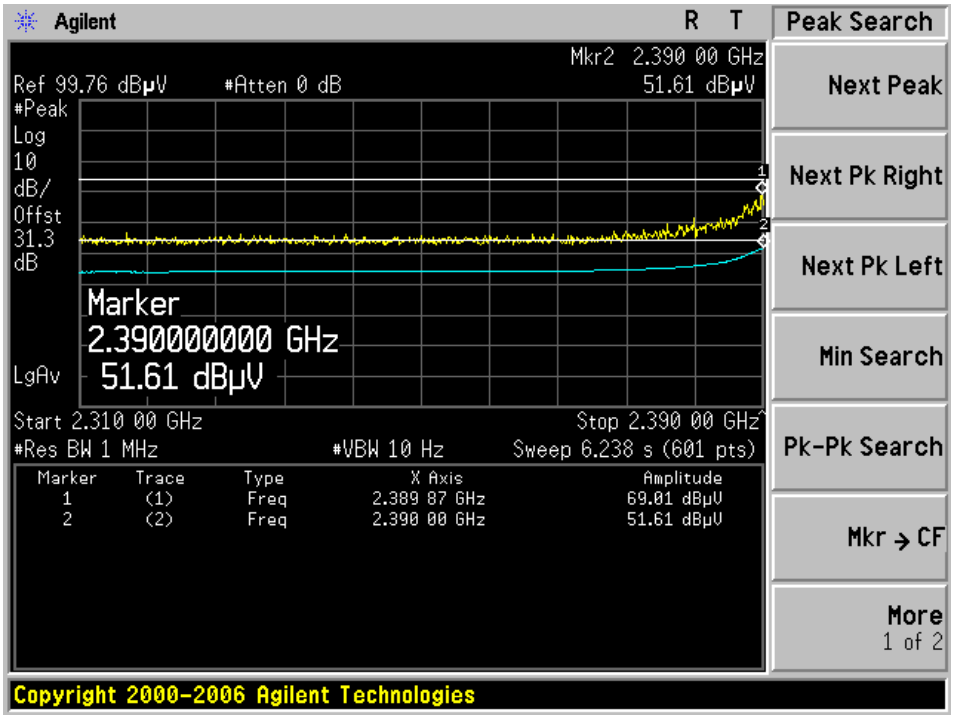


802.11n HT20 mode, Lower Edge with Lowest Channel

Vertical

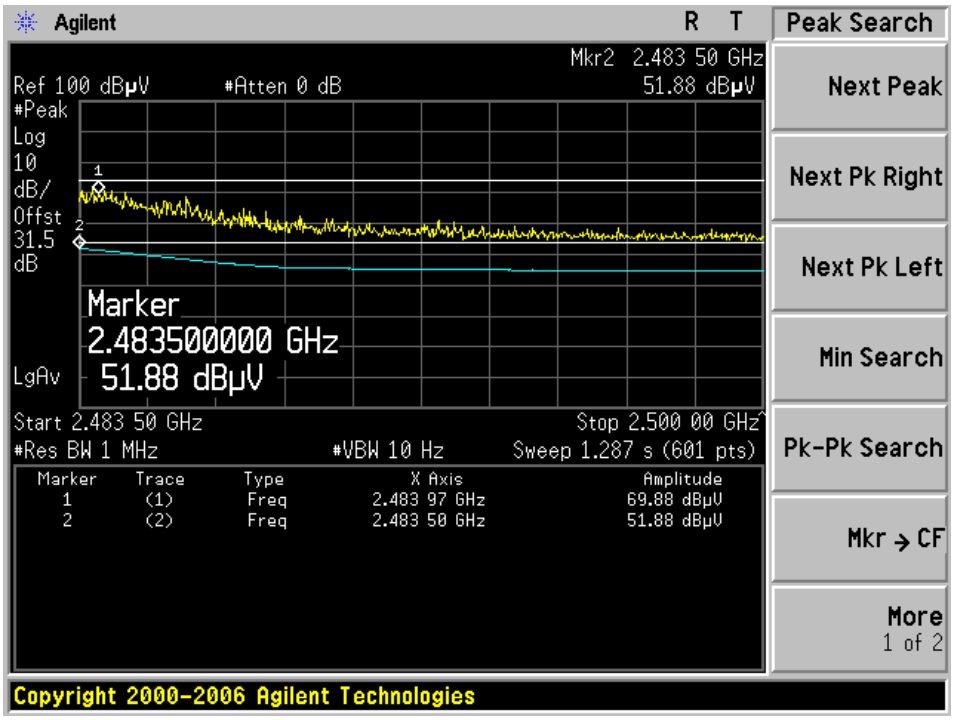


Horizontal

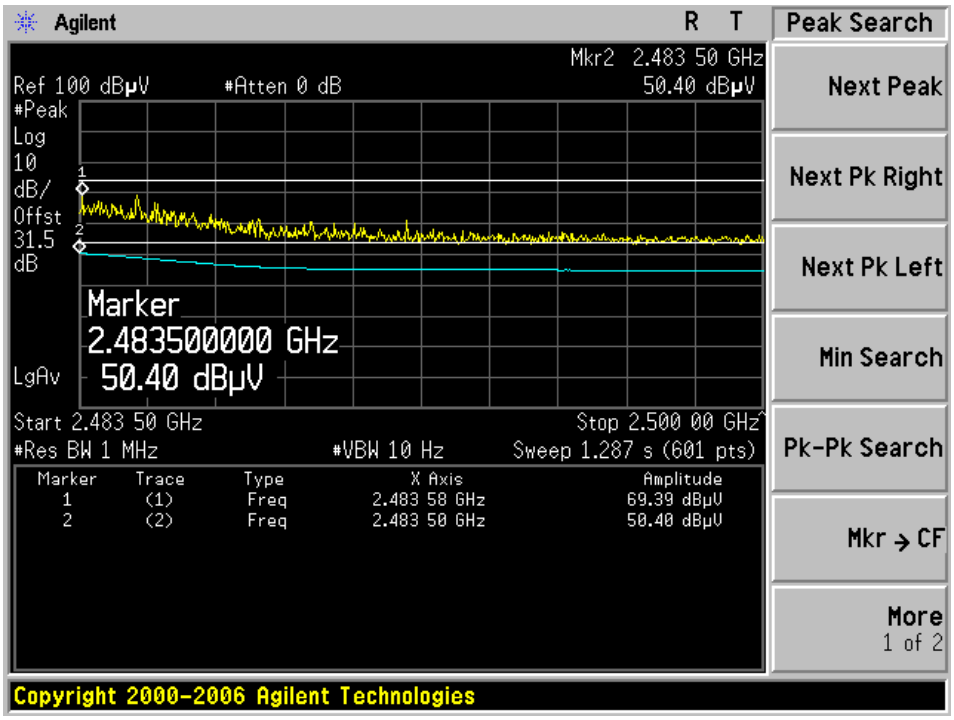


802.11n HT20 mode, Higher Edge with Highest Channel

Vertical



Horizontal



9 FCC§15.247(a)(2) & IC RSS-210§A8.2– 6 dB & 99% Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2) and IC RSS-210 A8.2 (a), systems using digital modulation techniques may operate in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

9.2 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 6 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10

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

9.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	34 %
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-17 at RF Site.

9.5 Summary of Test Results

802.11 b mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (MHz)	Results
Low	2412	7.440	10.825	> 0.5	Compliant
Middle	2437	7.219	10.504	> 0.5	Compliant
High	2462	7.565	10.622	> 0.5	Compliant

802.11 g mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (MHz)	Results
Low	2412	16.357	16.313	> 0.5	Compliant
Middle	2437	16.379	16.318	> 0.5	Compliant
High	2462	16.384	16.324	> 0.5	Compliant

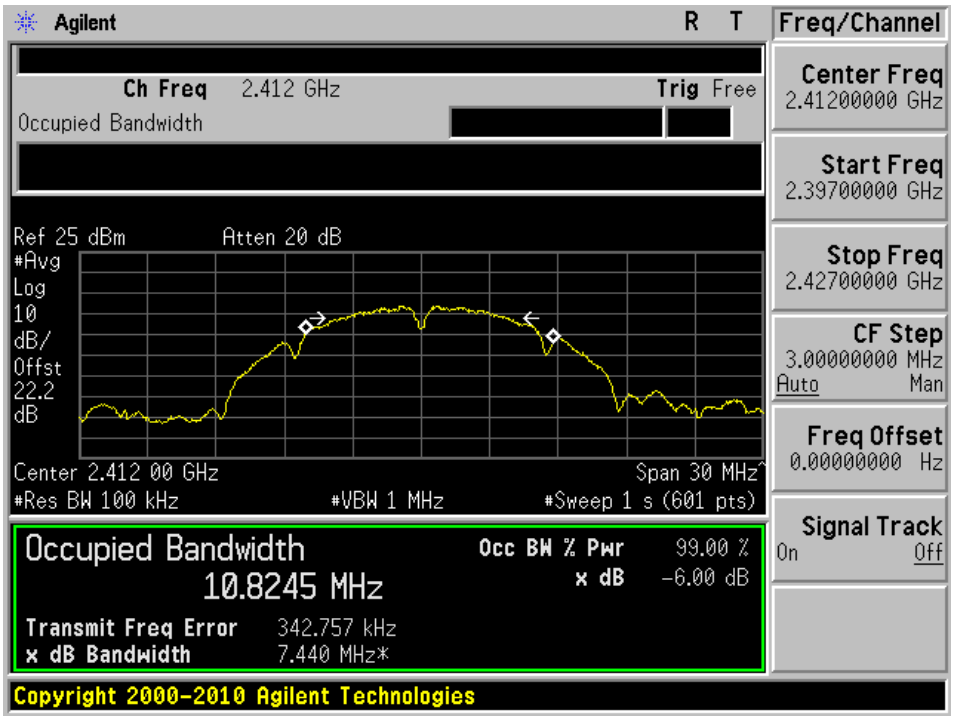
802.11 n HT20 mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (MHz)	Results
Low	2412	16.362	16.312	> 0.5	Compliant
Middle	2437	16.382	16.317	> 0.5	Compliant
High	2462	16.381	16.320	> 0.5	Compliant

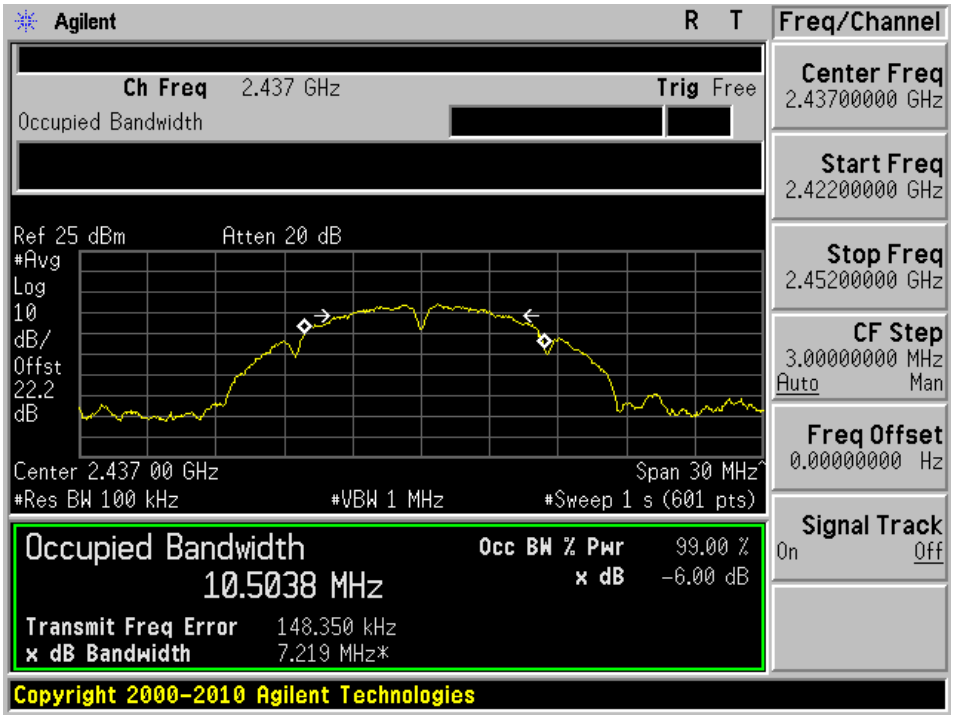
Please refer to the following plots for detailed test results

802.11 b mode

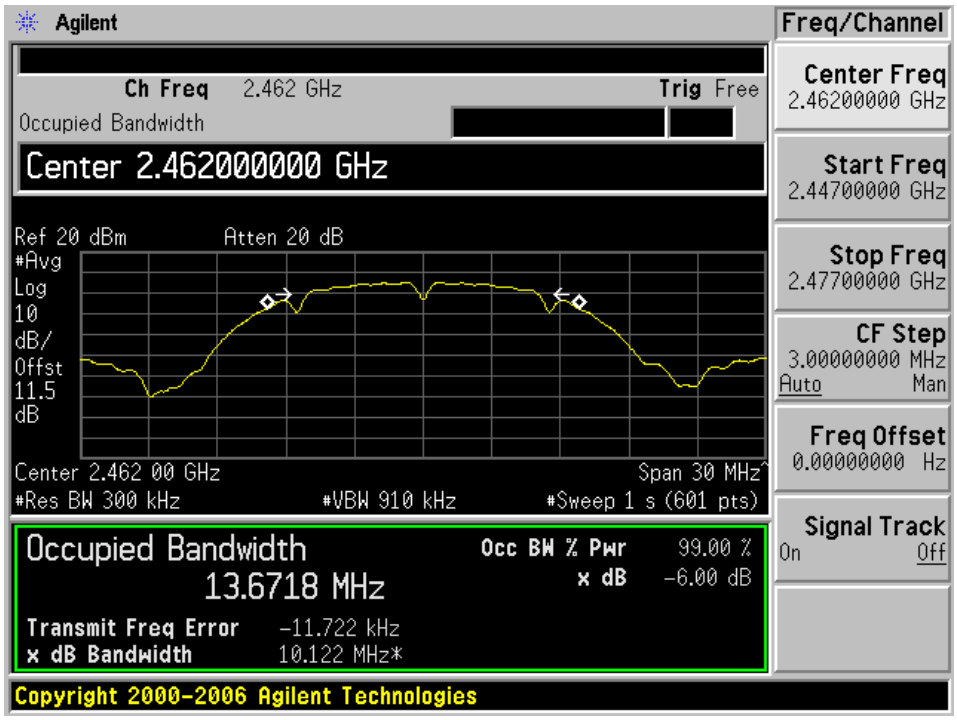
Low channel: 2412 MHz



Middle channel: 2437 MHz

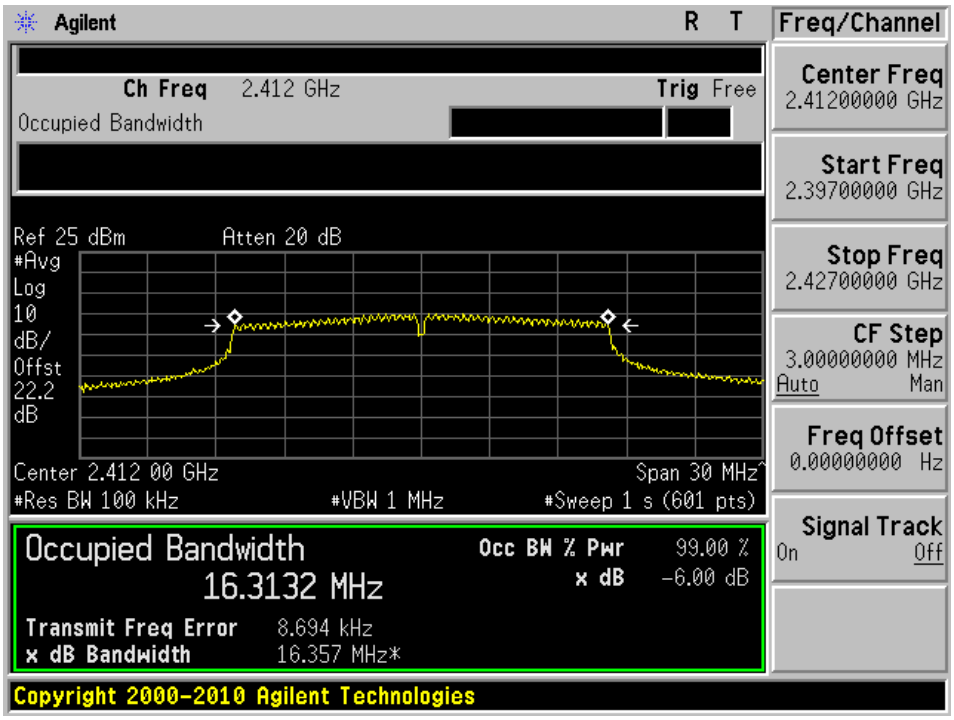


High channel: 2462 MHz

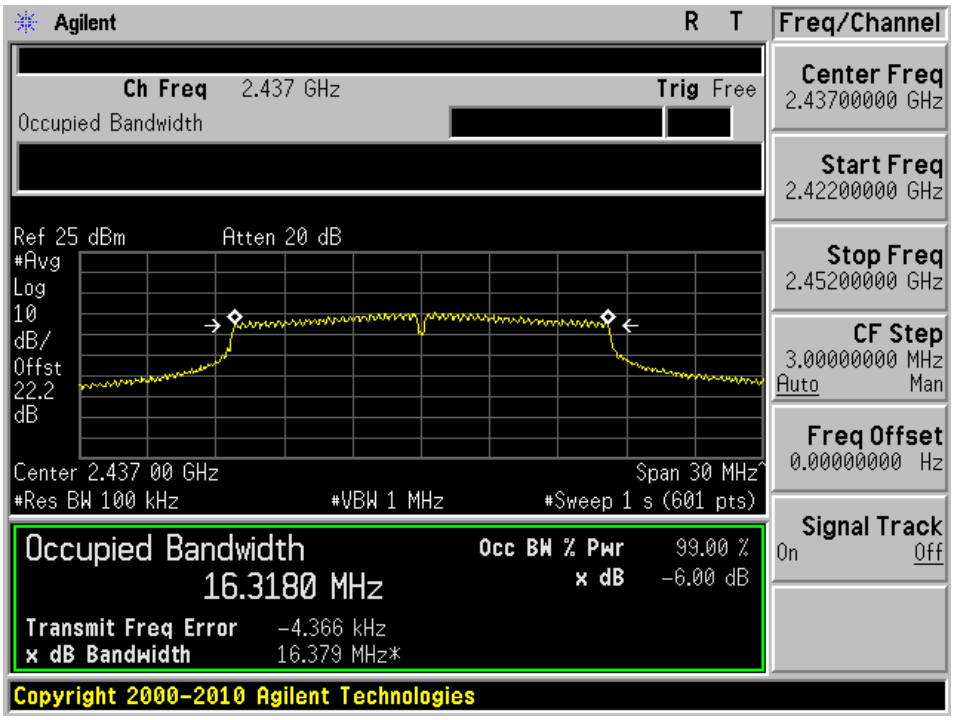


802.11 g mode

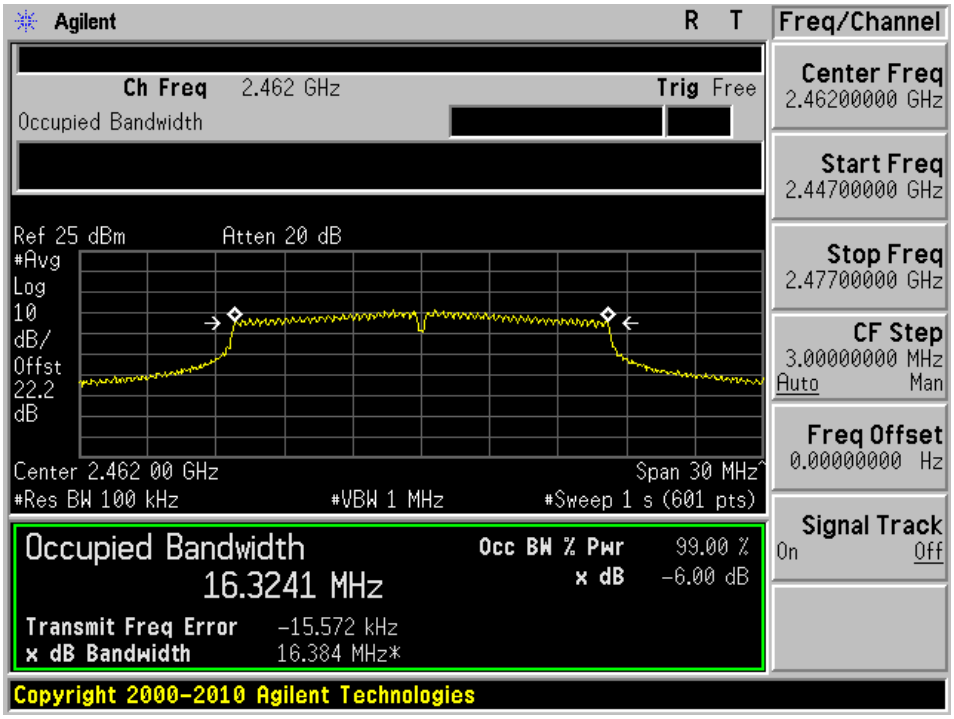
Low channel: 2412 MHz



Middle channel: 2437 MHz

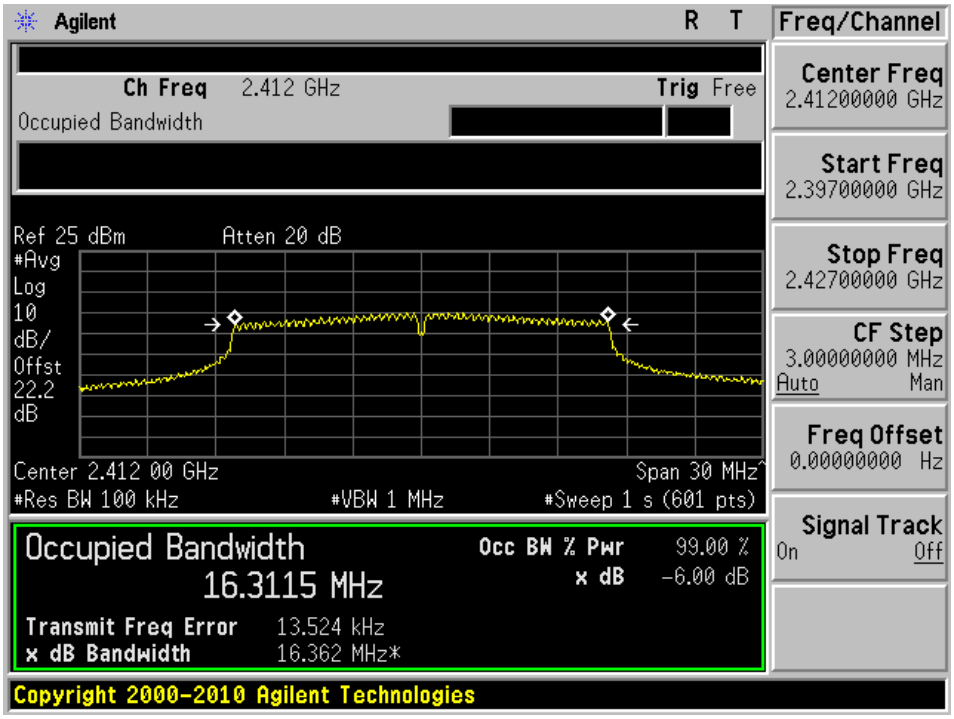


High channel: 2462 MHz

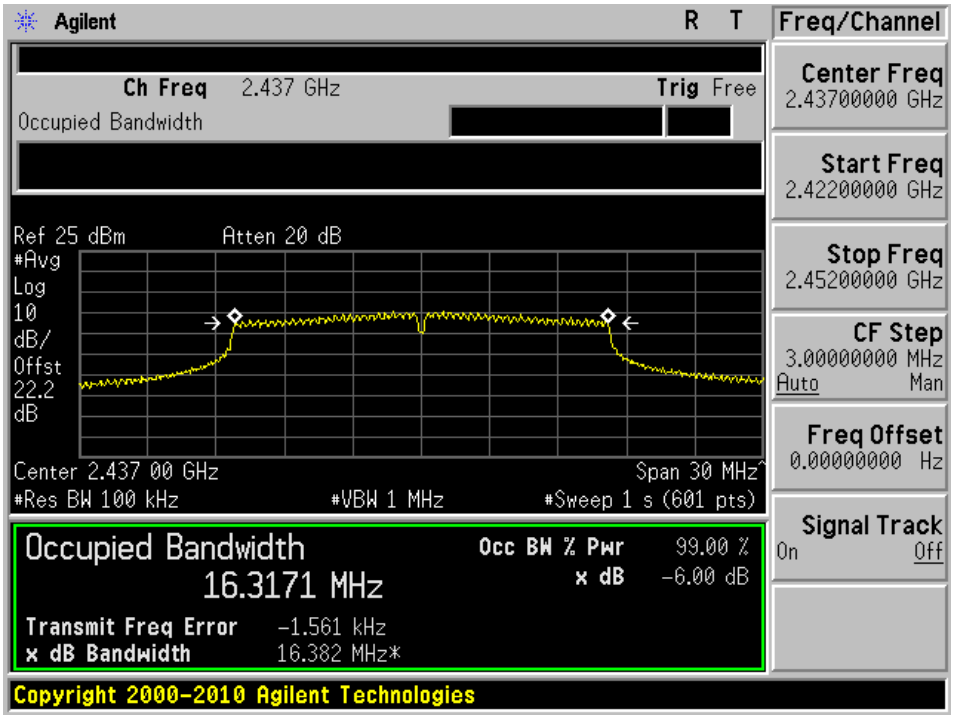


802.11 n HT20 mode

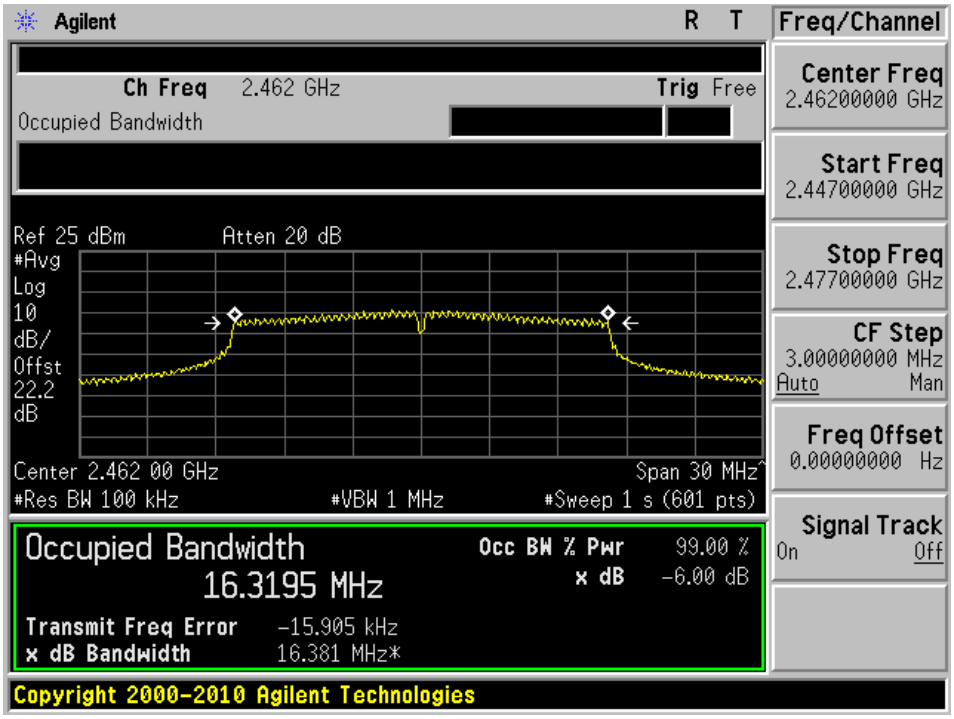
Low channel: 2412 MHz



Middle channel: 2437 MHz



High channel: 2462 MHz



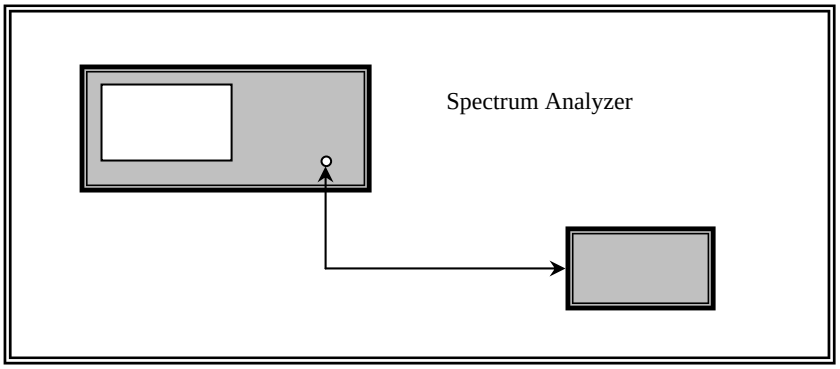
10 FCC §15.247(b) & IC RSS-210§A8.4 - Peak Output Power Measurement

10.1 Applicable Standard

According to FCC §15.247(b) and IC RSS-210 §A8.4 (4) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

10.2 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.



10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10

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

10.4 Test Environmental Conditions

Temperature:	22.2 °C
Relative Humidity:	34 %
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-17 at RF Site.

10.5 Test Results

802.11 b mode

Channel	Frequency (MHz)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	Margin (dB)
Low	2412	14.980	30	-15.020
Middle	2437	15.230	30	-14.770
High	2462	15.590	30	-14.410

802.11 g mode:

Channel	Frequency (MHz)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	Margin (dB)
Low	2412	13.610	30	-16.390
Middle	2437	14.030	30	-15.970
High	2462	14.530	30	-15.470

802.11 n HT20 mode:

Channel	Frequency (MHz)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	Margin (dB)
Low	2412	13.130	30	-16.870
Middle	2437	13.480	30	-16.520
High	2462	13.960	30	-16.040

11 FCC §15.247(d) & IC RSS-210§A8.5 - 100 kHz Bandwidth of Band Edges

11.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

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

11.2 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.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10

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

11.4 Test Environmental Conditions

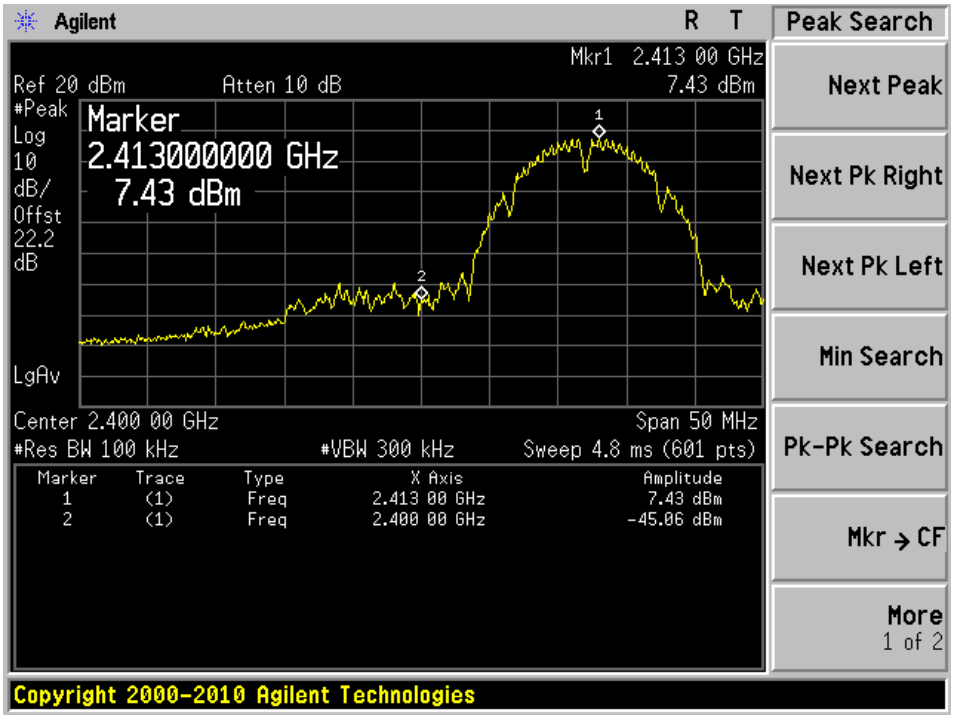
Temperature:	22.2 °C
Relative Humidity:	34 %
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-17 at RF Site.

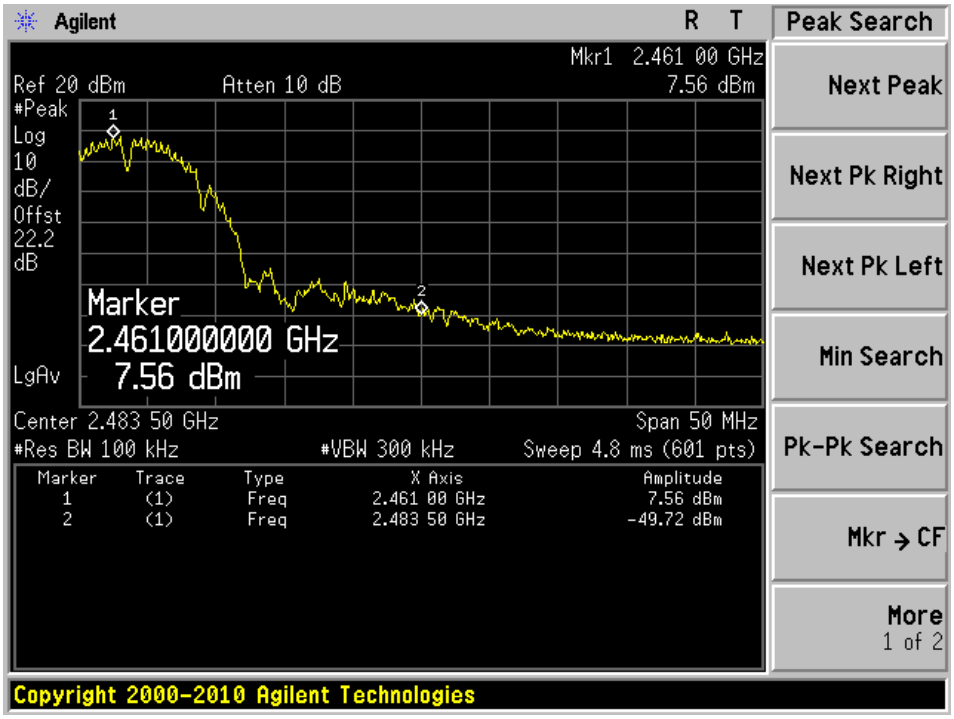
11.5 Measurement Results

Please refer to following pages for plots of band edge.

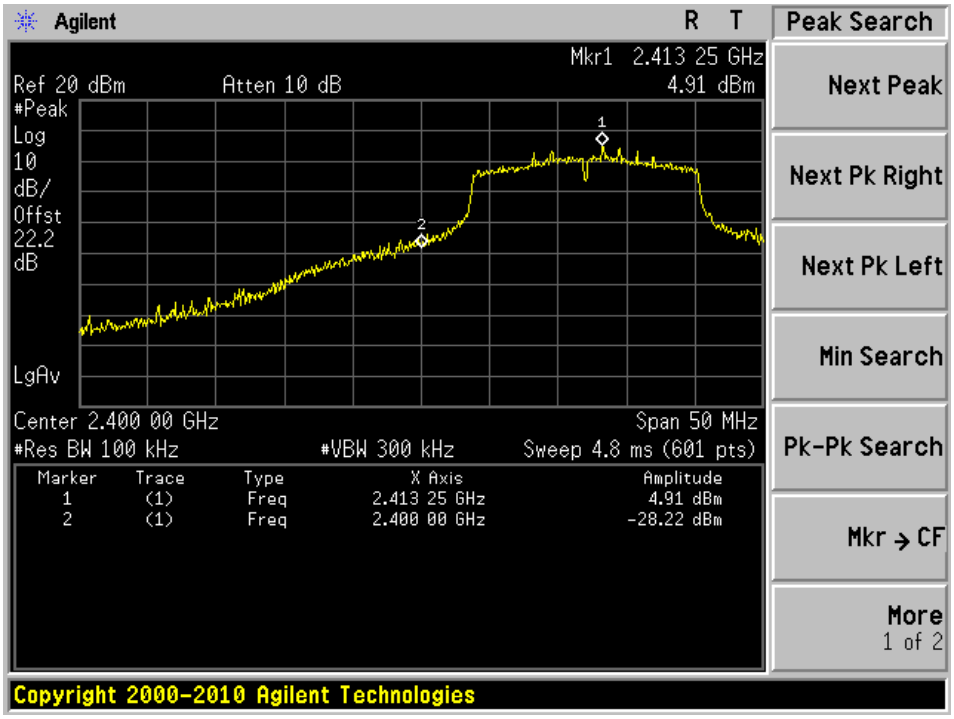
802.11b, Low Band Edge



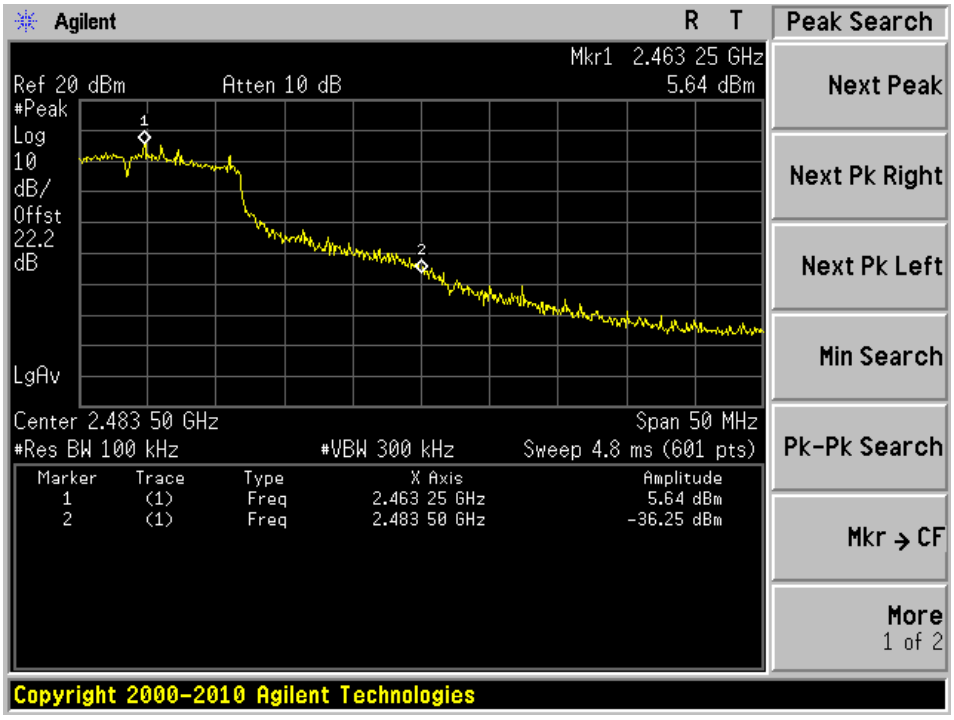
802.11b, High Band Edge



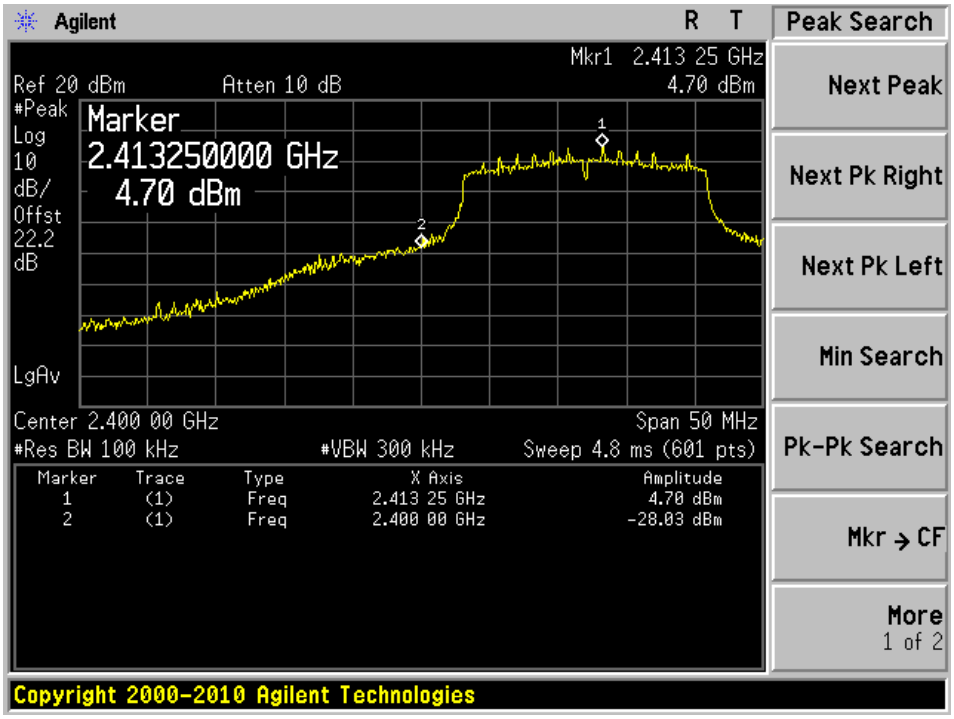
802.11g, Low Band Edge



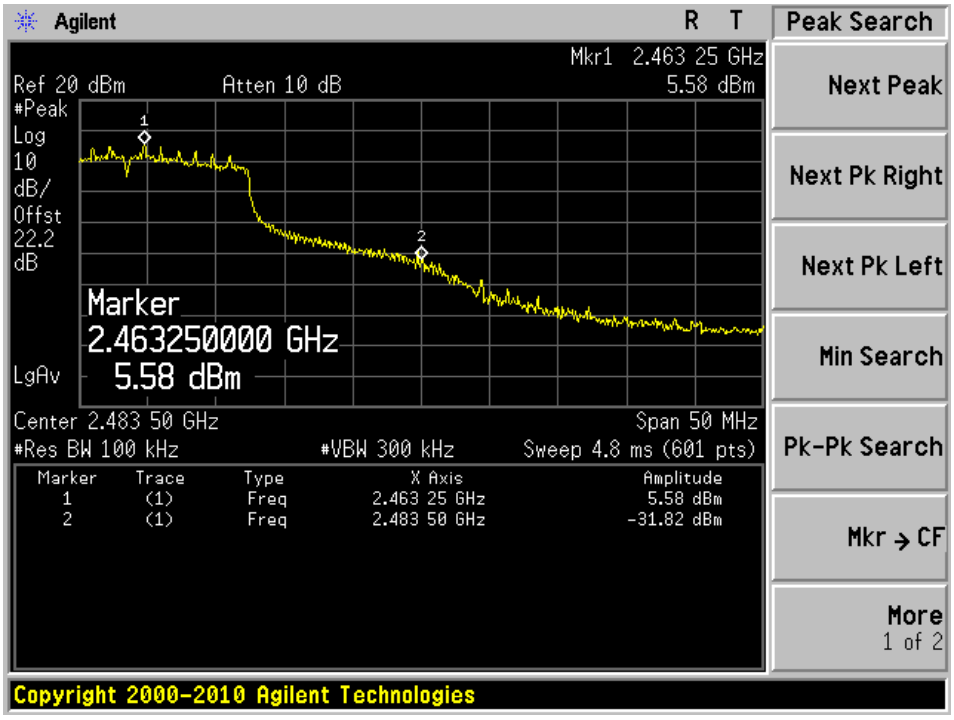
802.11g, High Band Edge



802.11n HT20, Low Band Edge



802.11n HT20, High Band Edge



12 FCC §15.247(e) & IC RSS-210 §A8.2 (b) - Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e) and RSS-210 §A8.2 (b) , for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 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 was set 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. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10

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

12.4 Test Environmental Conditions

Temperature:	22.2 °C
Relative Humidity:	34 %
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-17 at RF Site.

12.5 Summary of Test Results

802.11 b mode:

Channel	Frequency (MHz)	Power Spectral Density (dBm)	FCC/IC Limit (dBm)	Results
Low	2412	-4.300	8	Compliant
Mid	2437	-4.710	8	Compliant
High	2462	-4.490	8	Compliant

802.11 g mode:

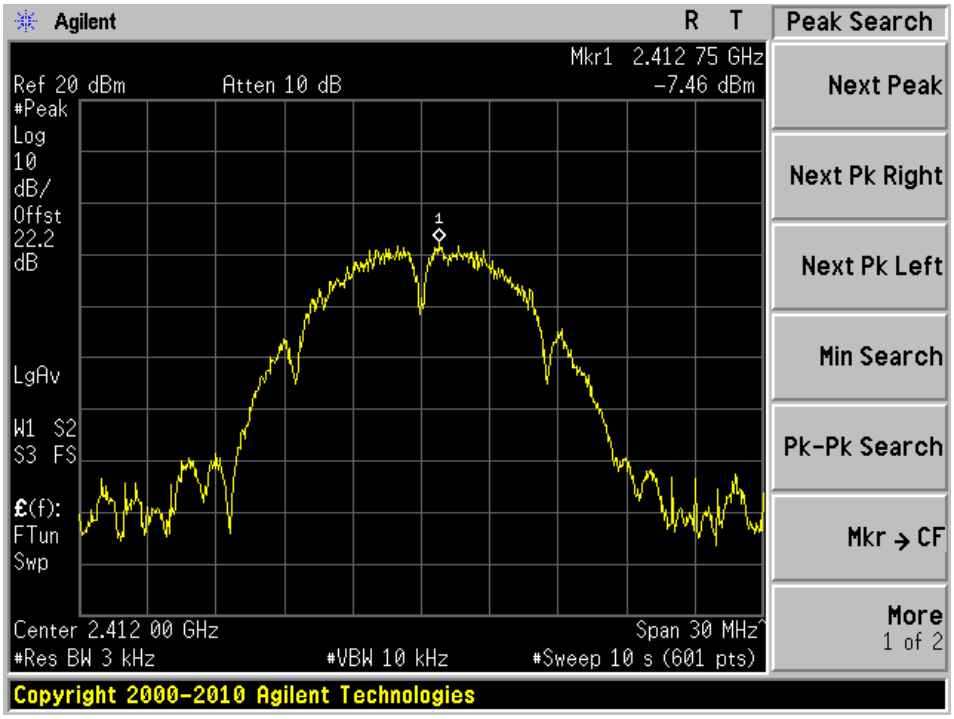
Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	FCC/IC Limit (dBm/3kHz)	Results
Low	2412	-8.970	8	Compliant
Mid	2437	-8.600	8	Compliant
High	2462	-8.770	8	Compliant

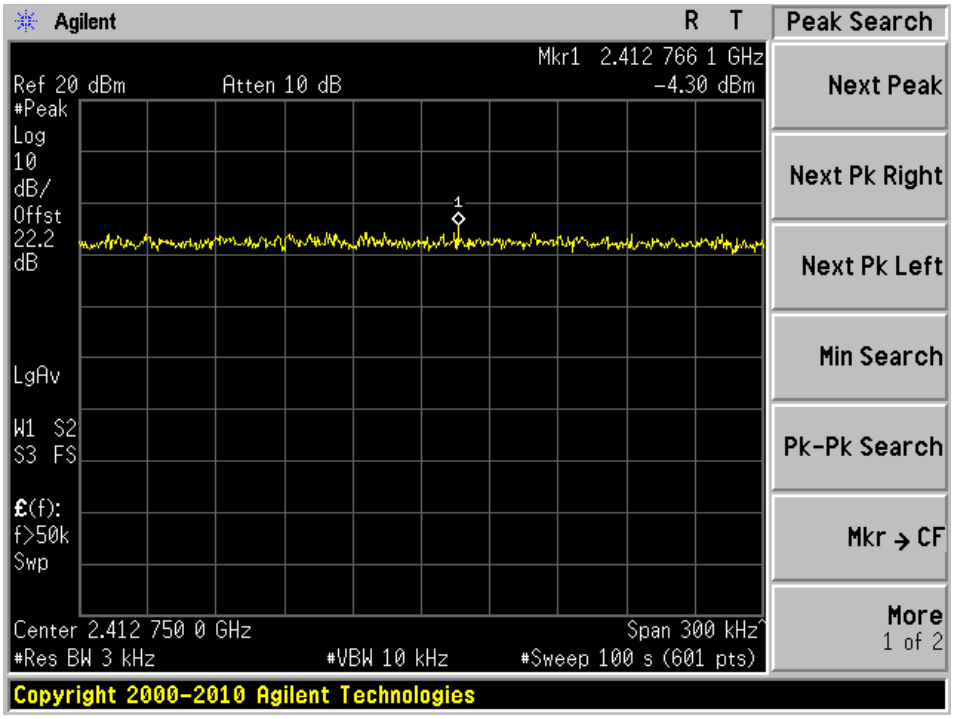
802.11 n HT20 mode:

Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	FCC/IC Limit (dBm/3kHz)	Results
Low	2412	-11.010	8	Compliant
Mid	2437	-9.220	8	Compliant
High	2462	-8.180	8	Compliant

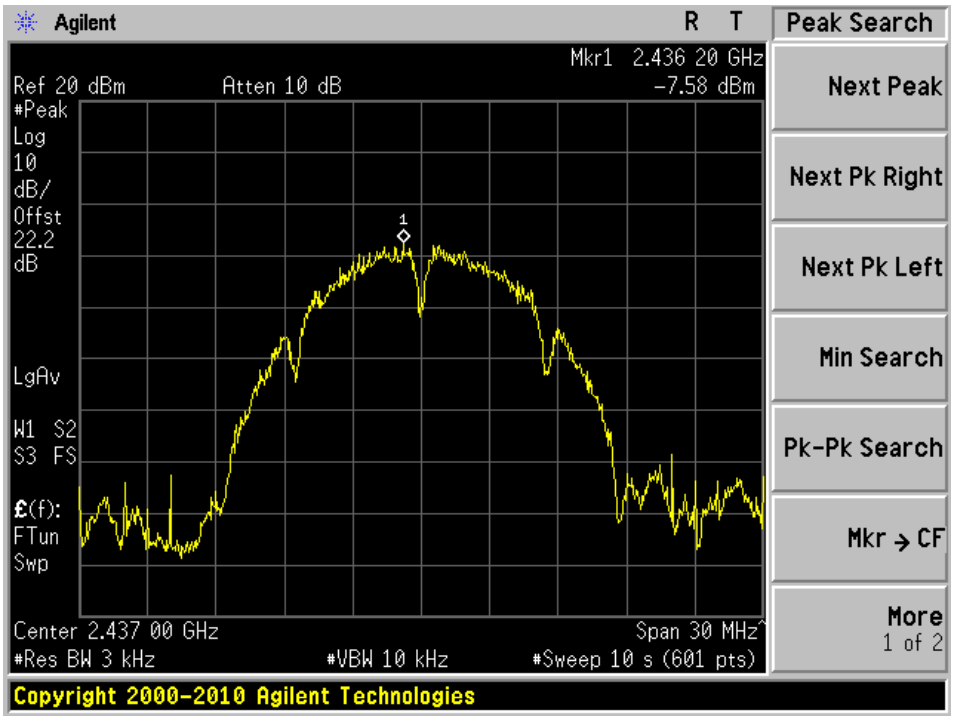
Please refer to the following plots for detailed test results:

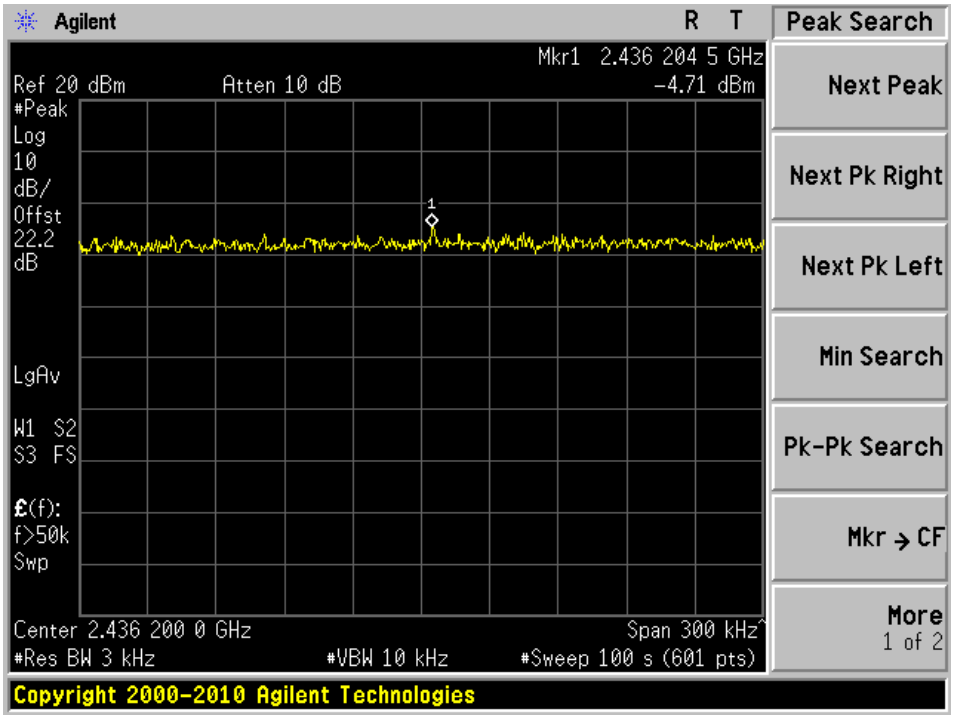
802.11b, Low channel: 2412 MHz



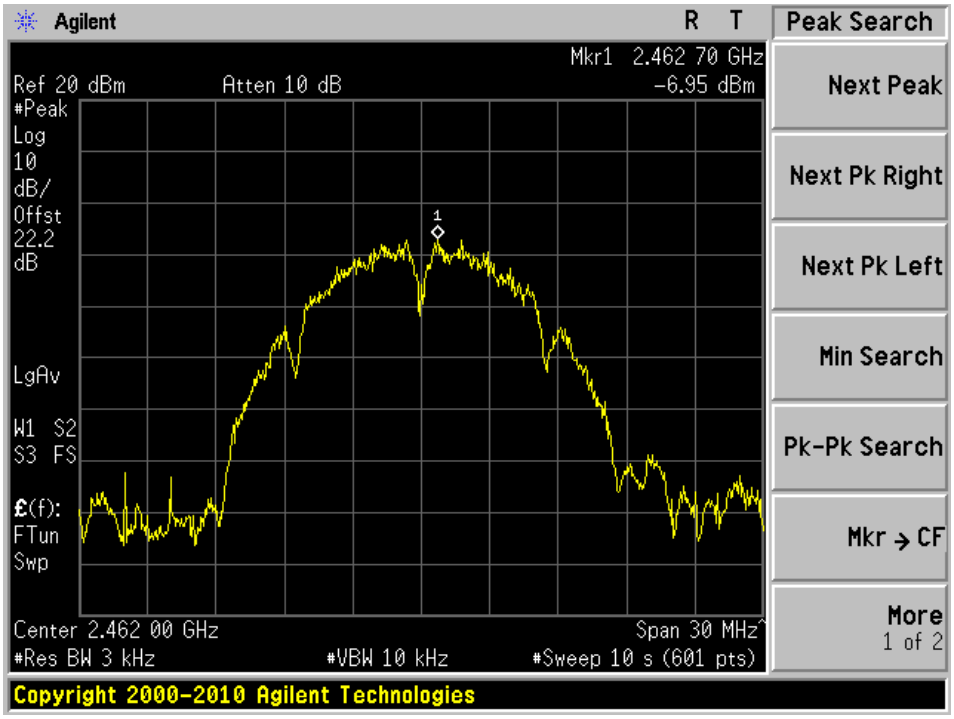


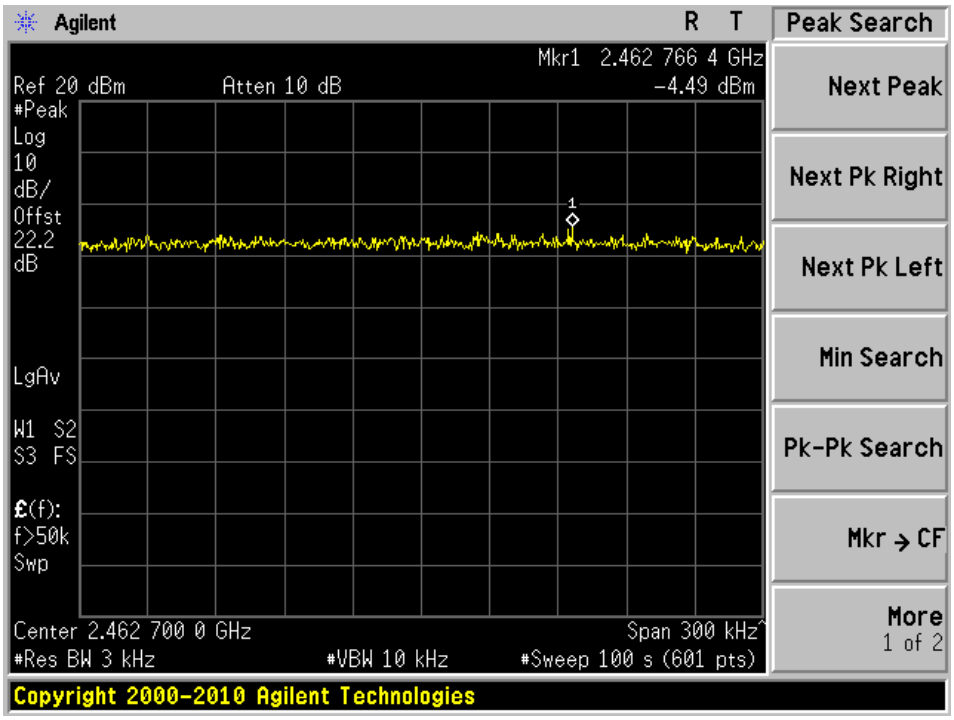
802.11b, Middle channel: 2437 MHz



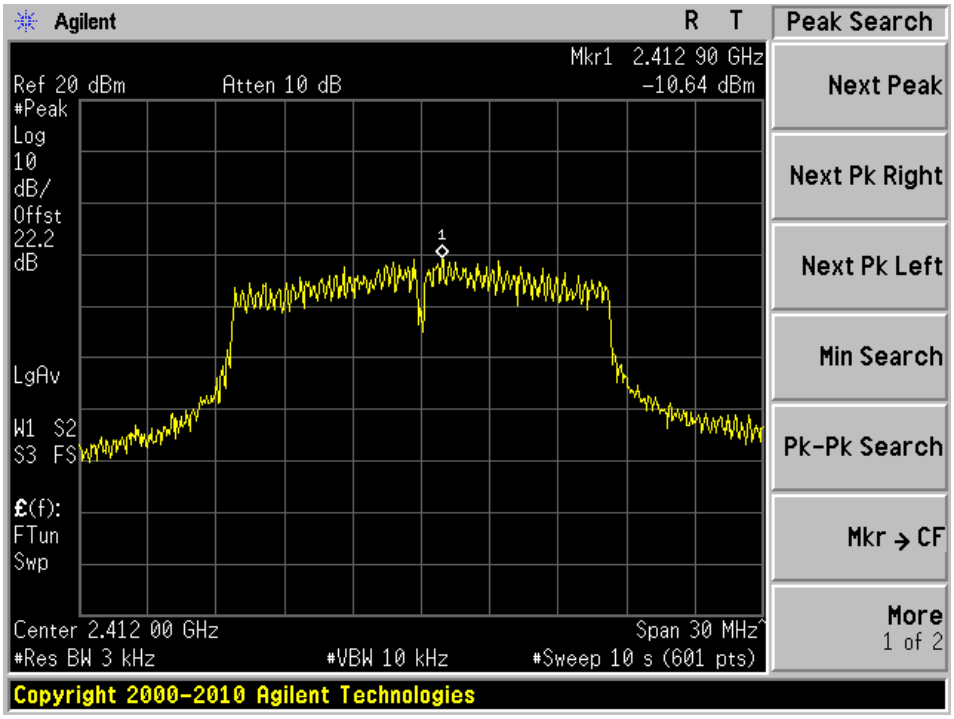


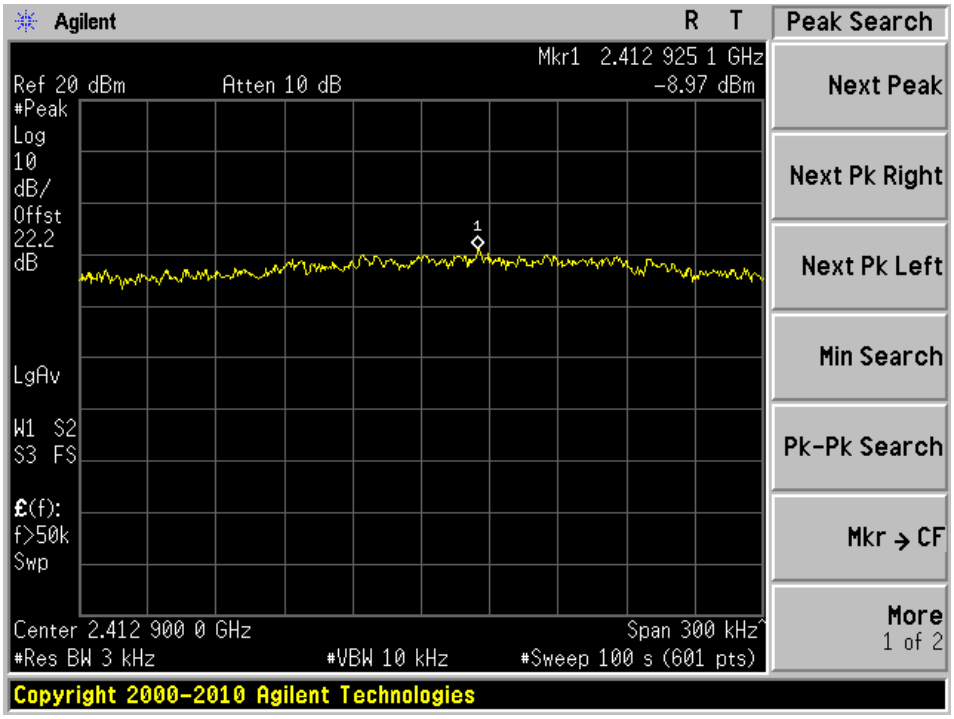
802.11b, High channel: 2462 MHz



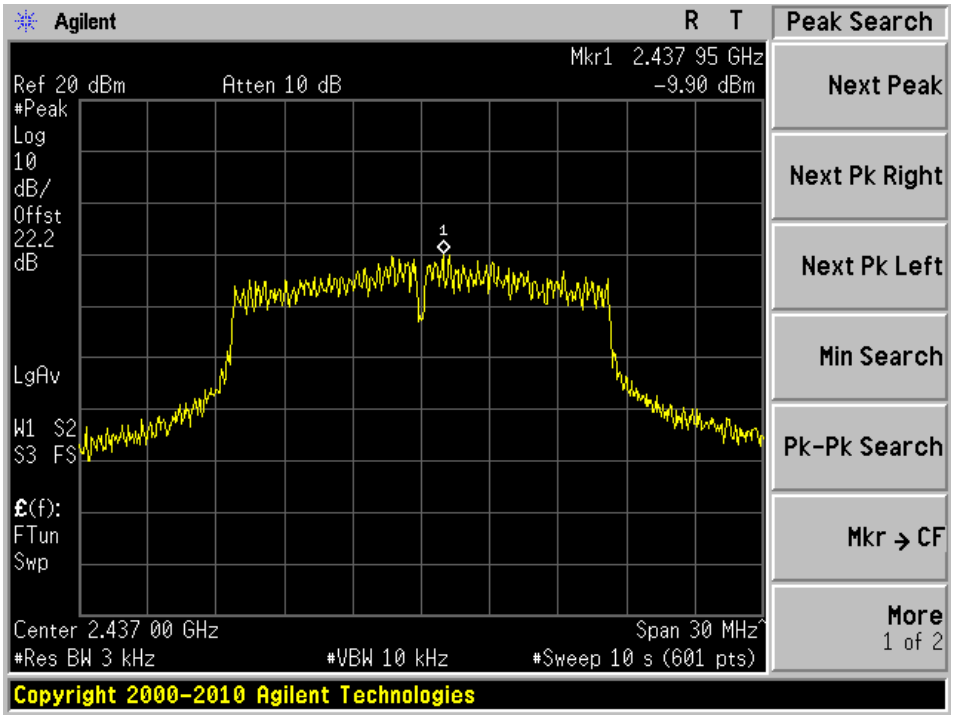


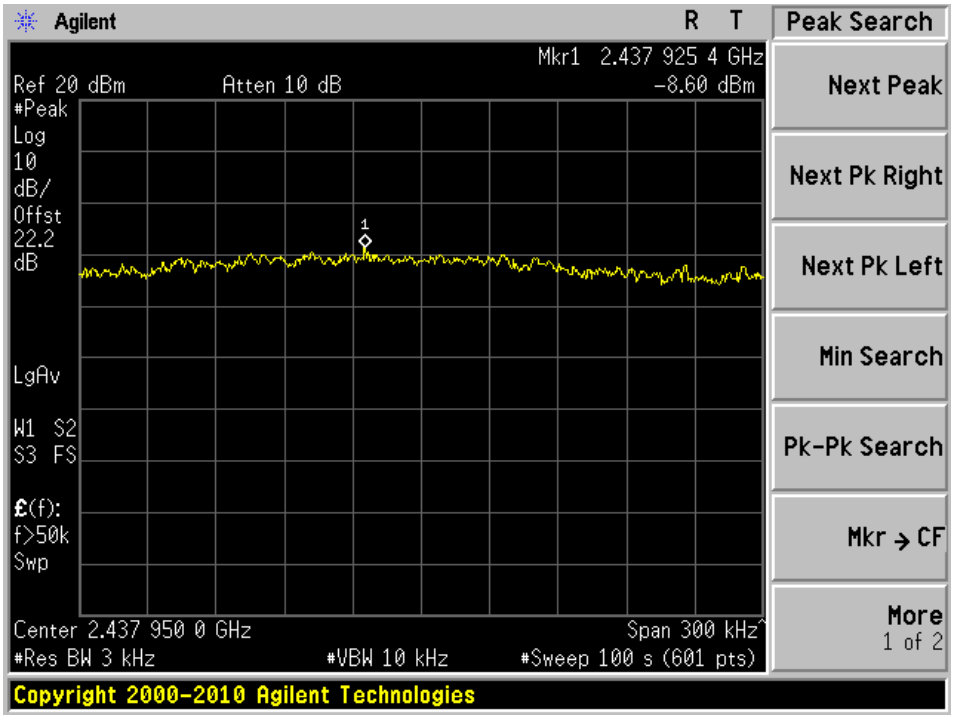
802.11g, Low channel: 2412 MHz



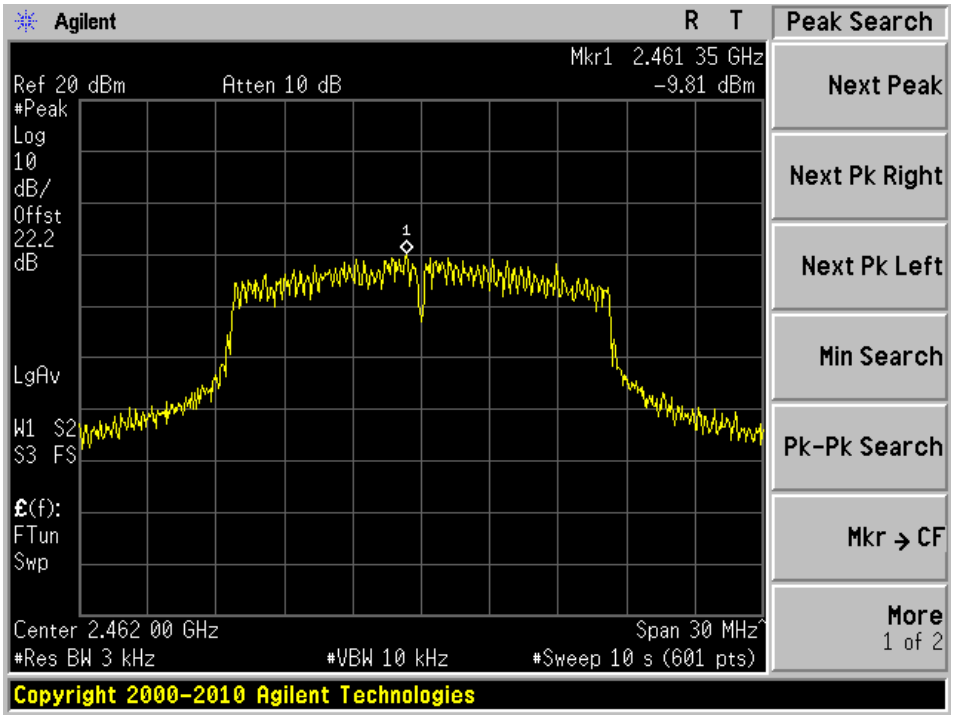


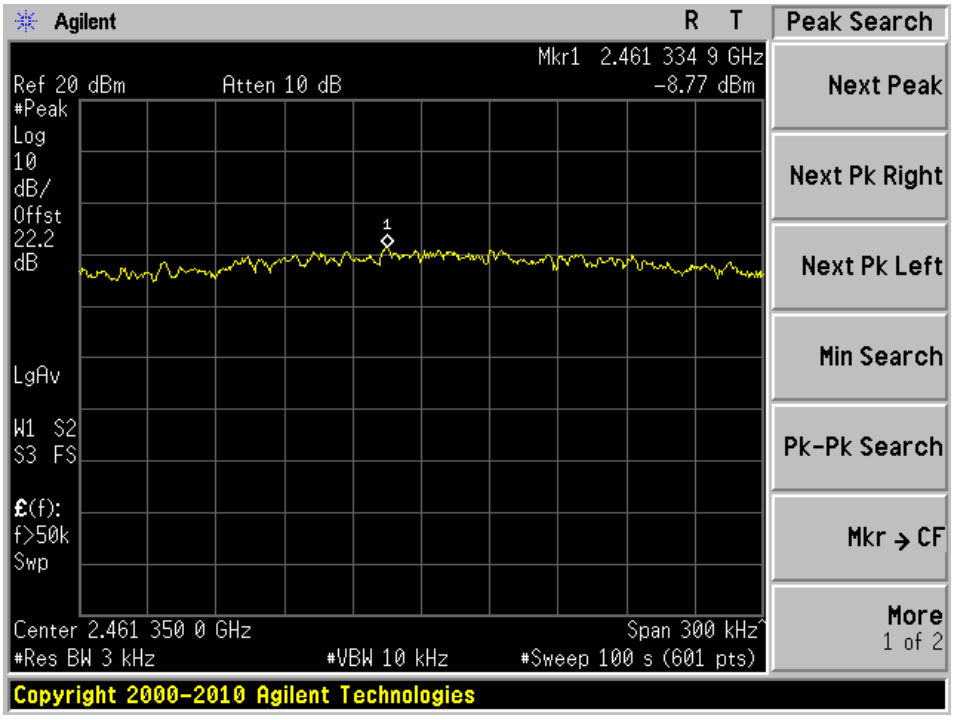
802.11g, Middle channel: 2437 MHz



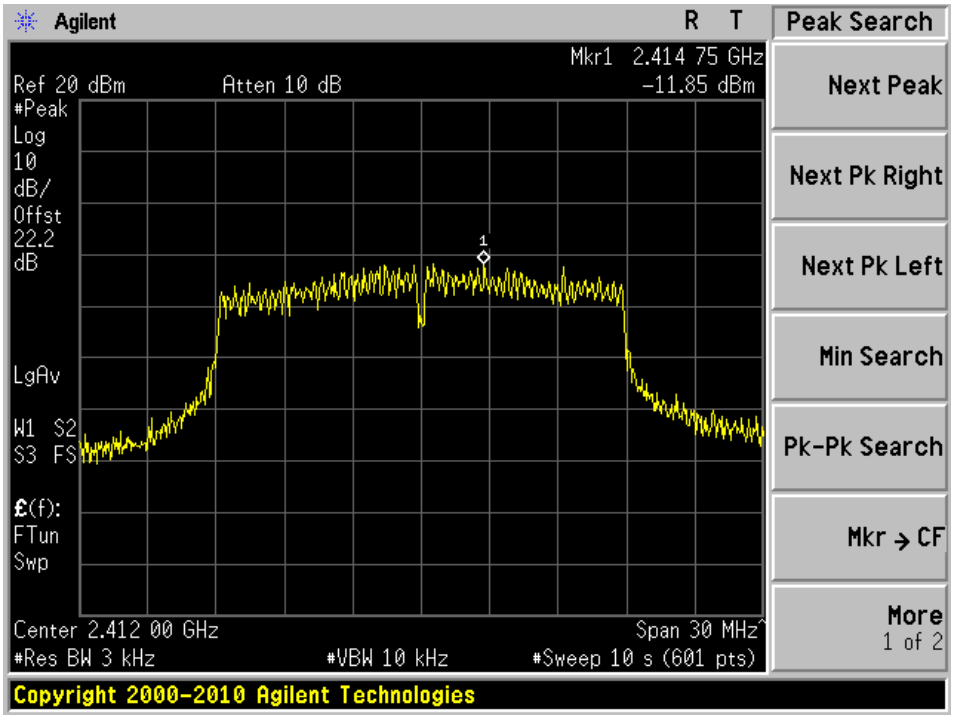


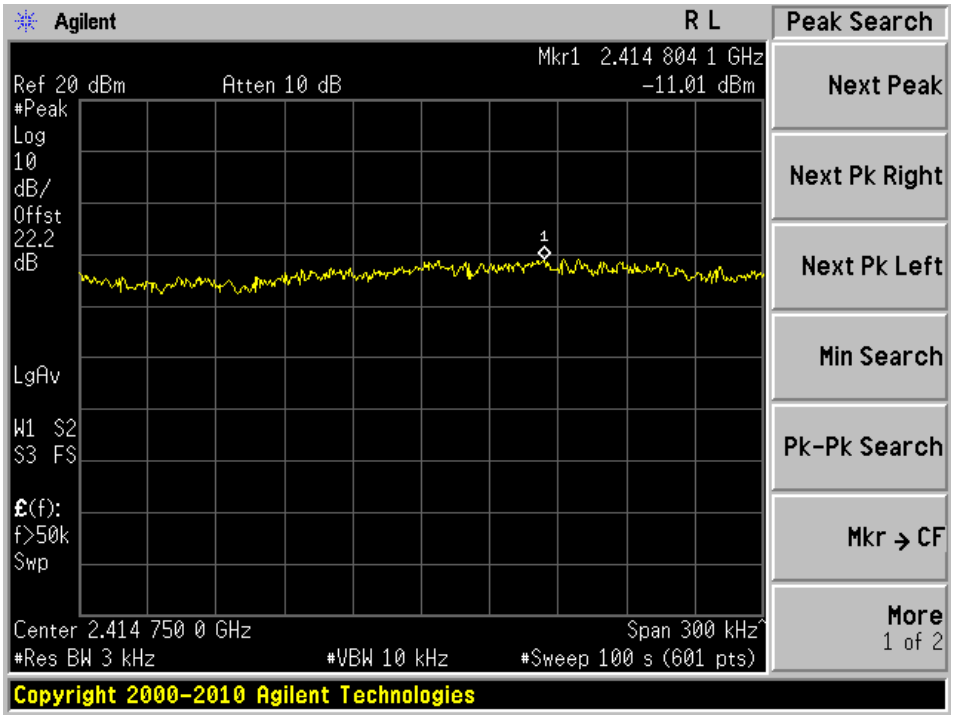
802.11g, High channel: 2462 MHz



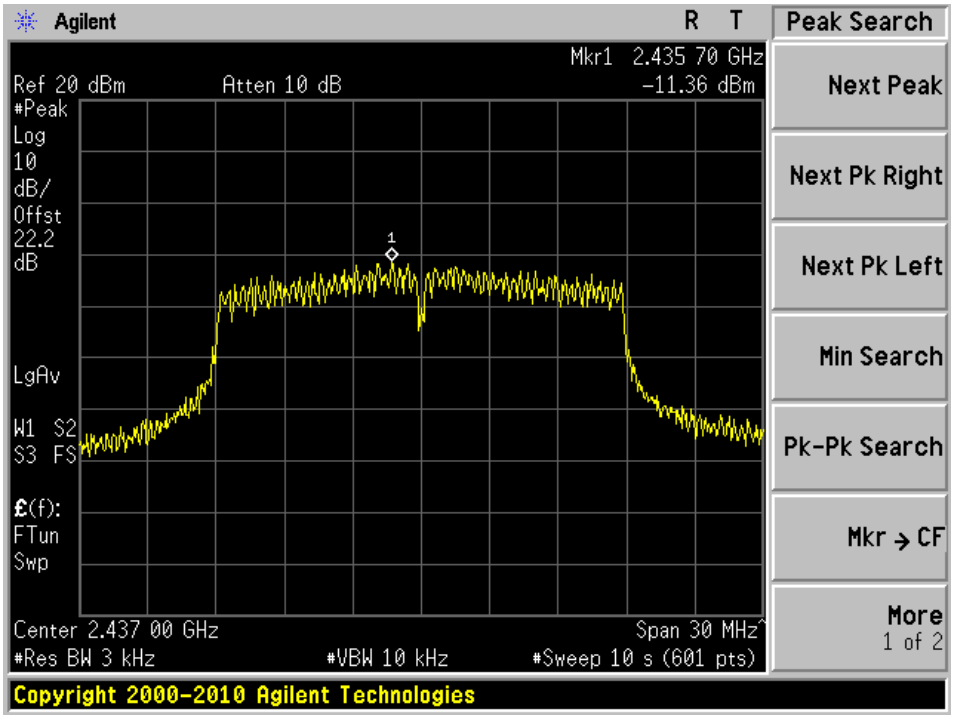


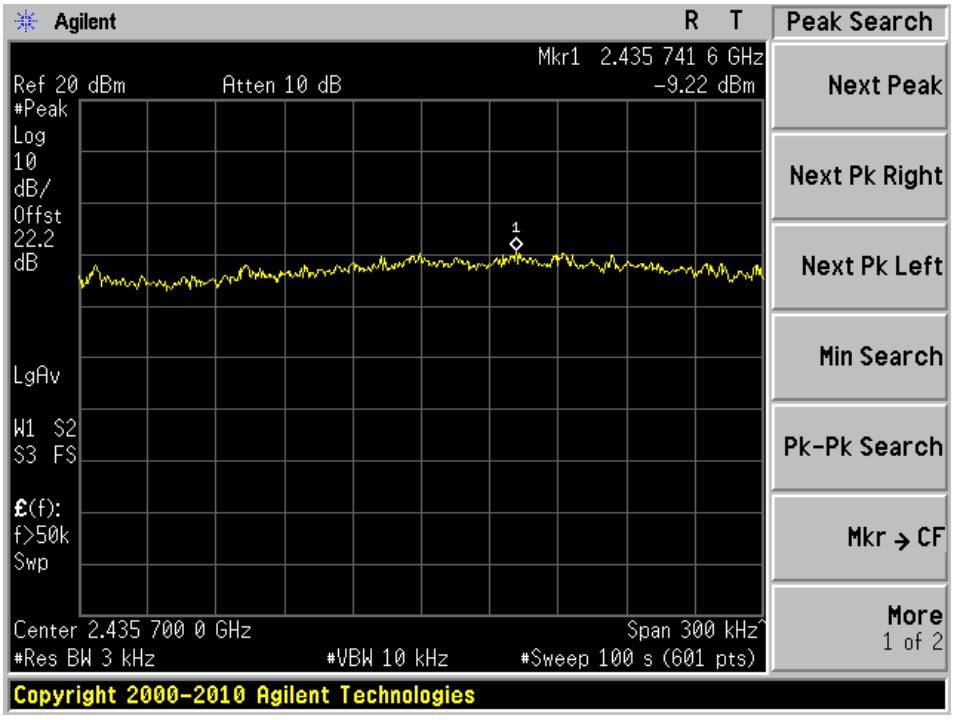
802.11n HT20, Low channel: 2412 MHz



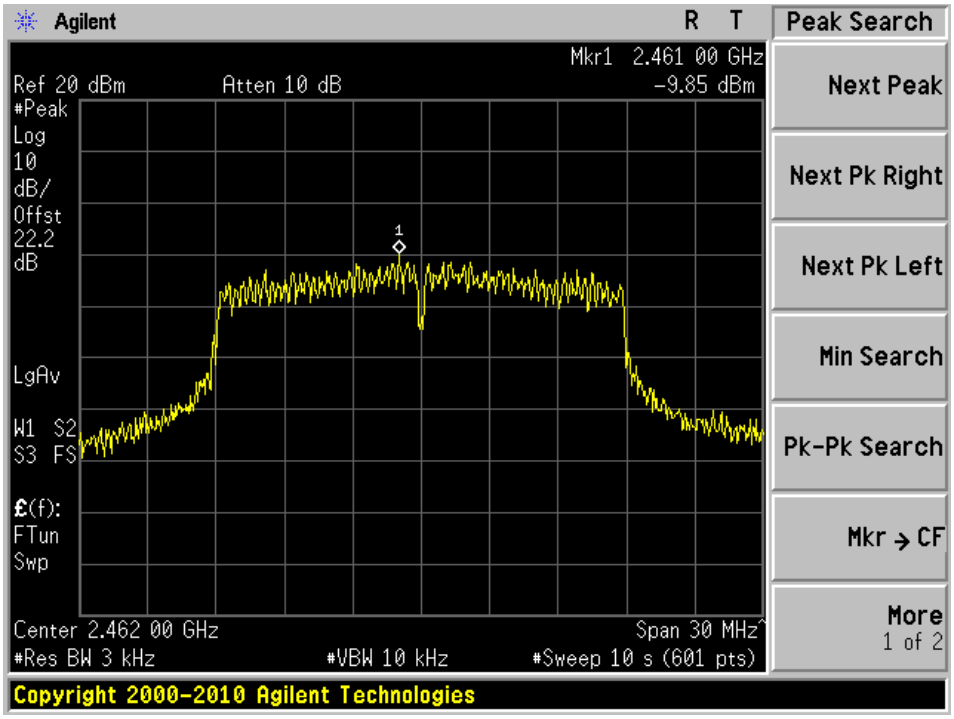


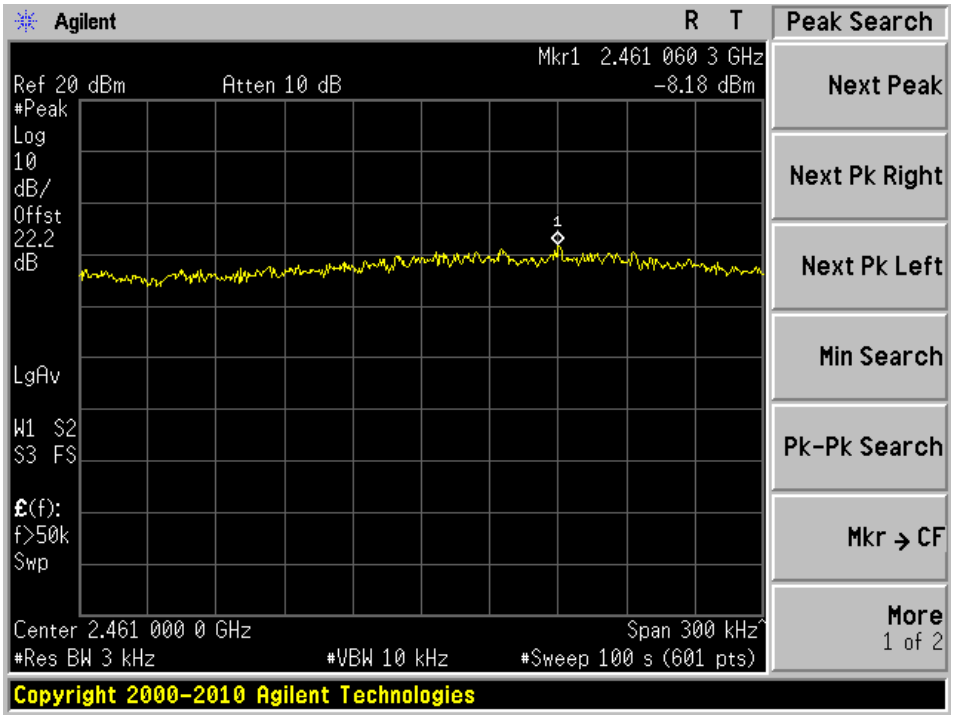
802.11n HT20, Middle channel: 2437 MHz





802.11n HT20, High channel: 2462 MHz





13 IC RSS-210 §2.6 & RSS-Gen §4.10 - Receiver Spurious Radiated Emissions

13.1 Applicable Standard

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

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

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

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

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

According to RSS-210 §2.6, Tables 2 and 3 show the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this RSS. Transmitters whose wanted emissions are also within the limits shown in Tables 2 and 3 may operate in any of the frequency bands of Tables 2 and 3, other than the restricted bands of Table 1 and the TV bands, and shall be certified under RSS-210.

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

Frequency (MHz)	Field Strength Microvolts/m at 3 meters (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

Note: Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

Table 3: General Field Strength Limits for Transmitters at Frequencies below 30 MHz (Transmit)

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

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 Number	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2011-03-21
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2011-06-29
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-11-29
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2011-05-09

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

13.6 Test Environmental Conditions

Temperature:	17 °C
Relative Humidity:	49 %
ATM Pressure:	102.3kPa

The testing was performed by Victor Zhang on 2011-11-23 in 5 meter chamber #2.

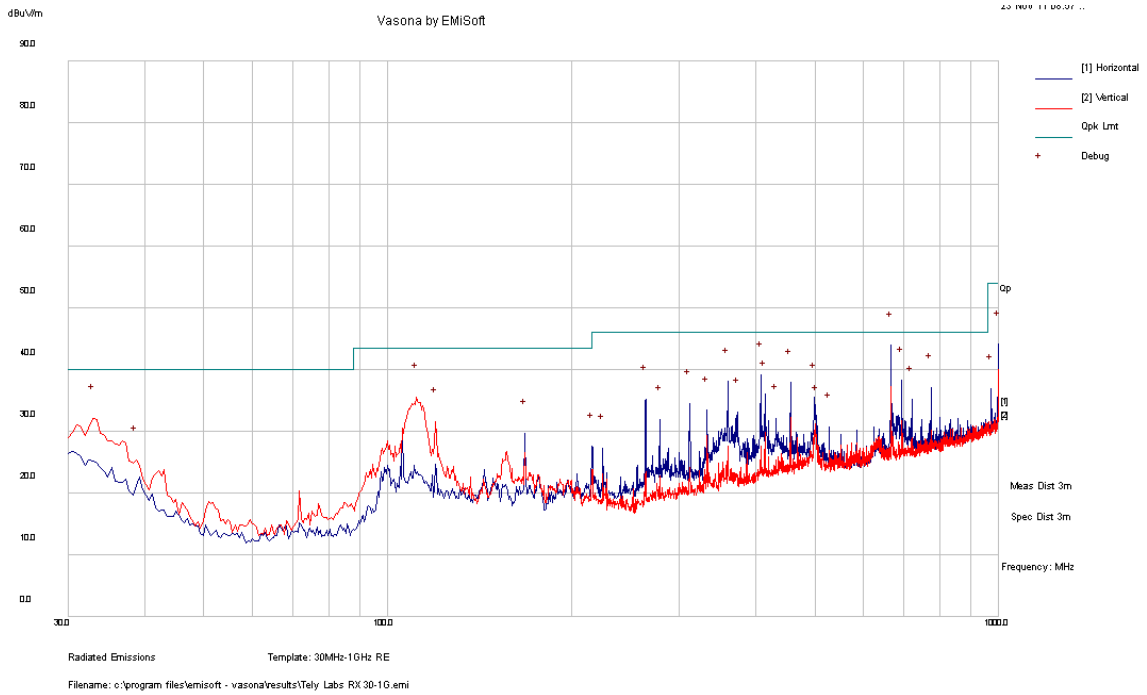
13.7 Summary of Test Results

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

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-1.74	666.0168	Horizontal	30 to 25000

13.8 Test data and Plots

1) 30-1000 MHz, Measured at 3 meters



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
666.0168	44.26	124	H	147	46	-1.74
692.9953	38.32	133	H	35	46	-7.68
360.0088	36.34	109	H	173	46	-9.66
408.0653	35.21	100	H	30	46	-10.79
111.251	30.91	128	V	276	43.5	-12.59
32.9235	23.46	109	V	155	40	-16.54

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
-	-	-	-	-	-	-*	Peak
-	-	-	-	-	-	-*	Ave.

*Note: * All Emissions are on/under noise floor level*