Lab Code: 200167-0

Bay Area Compliance Labs Corp.

FCC PART 15 SUBPART C

TEST AND MEASUREMENT REPORT

For

Actiontec Electronics, Inc.

760 N. Mary Ave.
Sunnyvale, CA 94085, USA

FCC ID: LNQC1000A
Model: C1000A

Report Type: Original Report	**Product Type:** Wireless 11n VDSL2/GigE Modem Gateway
Test Engineer:	Lionel Lara
Report Number:	R1202143-247
Report Date:	2012-04-20
Reviewed By:	Victor Zhang RF/EMC Lead
Prepared By: **(SP)**	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1202143-247	Original Report	2012-04-20

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Actiontec Electronics, Inc.* and their product, model: C1000A, FCC ID: LNQC1000A or the “EUT” as referred to in this report. The EUT is a Wireless 11n VDSL2/GigE Modem Gateway.

The EUT has three series with different transformer:
1. with transformer: TDK Model: TRTEP13S-U636B017. Here after mentioned as TDK in this report.
2. with transformer: UMEC Model: SCEH (UT20A59S-A). Here after mentioned as UMEC in this report.
3. with transformer: Magnetic Communication Model: VTP301S. Here after mentioned as MAGCOM in this report.
Please refer to the DOS for more detail information.

1.2 Mechanical Description of EUT

The EUT measures approximately 22.5cm L x 14.5cm W x 4cm H and weighs approximately 398g.

The test data gathered are from production sample: TDK S/N: GC40043B003EC1202133213000096; UMEC SN: GC40043B003EC120213321300049 and MAGCOM SN: GC40043B003EC120153311100003 provided by the manufacturer.

1.3 Objective

This report is prepared on behalf of *Actiontec Electronics, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15.247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

N/A.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, 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 the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

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

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.: R-3729, C-4176, G-469, and T-1206. 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 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 C63.4-2003.

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

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

2.2 EUT Exercise Software

The software is provided by customer. The EUT exercise program used during radiated testing was designed to exercise the system components.

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

Radio Mode	Bandwidth (MHz)	Frequency		
		Low CH (MHz)	Middle CH (MHz)	High CH (MHz)
802.11b mimo	20	2412	2437	2462
802.11g mimo	20	2412	2437	2462
802.11n HT20 mimo	20	2412	2437	2462

2.3 Special Accessories

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 D600	CX-0X2034-48643-3A6-8307
Lenovo	Laptop	0679	CB08585694

2.6 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Actiontec Electronics, Inc.	AC/DC Power Adaptor	MU18-D120150-A1	-

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF Cable	<1	EUT	Spectrum Analyzer
Ethernet Cable	<1	EUT	Laptop

2.8 EUT Internal Configuration Details

MAGCOM:

Manufacturer	Description	Model	Serial Number
Actiontec Electronics, Inc.	Main Board	C1000A	GC40043B003EC1201 53311100003

UMEC:

Manufacturer	Description	Model	Serial Number
Actiontec Electronics, Inc.	Main Board	C1000A	GC40043B003EC1202 13321300049

TDK:

Manufacturer	Description	Model	Serial Number
Actiontec Electronics, Inc.	Main Board	C1000A	GC40043B003EC1202 133213000096

3 Summary of Test Results

FCC & IC Rules	Description of Test	Results
FCC §15.247(i)	RF Exposure	Compliant
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207	Conducted Emissions	Compliant
FCC §15.247(d)	Spurious Emissions at Antenna Port	Compliant
FCC §15.205, §15.209, §15.247(d)	Radiated Spurious Emissions including Restricted Band	Compliant
FCC §15.247(a)(2)	6 dB Bandwidth	Compliant
FCC §15.247(b)(3)	Maximum Peak Output Power	Compliant
FCC §15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e)	Power Spectral Density	Compliant

Note: All test result is base on the TDK unit, the alternate transformer does not effect the RF part and RF performance, and the digital portion result was reported in the different report under FCC part 15B.

4 FCC §15.247 (i), §2.1091 - 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

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

2.4GHz band:

Maximum peak output power at antenna input terminal (dBm):	25.65
Maximum peak output power at antenna input terminal (mW):	367.28
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	4.5
Maximum Antenna Gain (numeric):	2.82
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.2061
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure.

5 FCC §15.203 – Antenna Description

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.

5.2 Antenna Connector Construction

The EUT has two Transmitter/Receiver antennas which are both embedded antennas. The Transmitter antenna has a max gain of 4.5 dBi which fulfills the requirements of FCC rule 15.203.

6 FCC §15.207 - Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 Conducted limits:

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

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 in a shielded room. The test setup and measurement procedure was per ANSI C63.4-2003. The specification limits were in accordance with FCC §15.207.

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

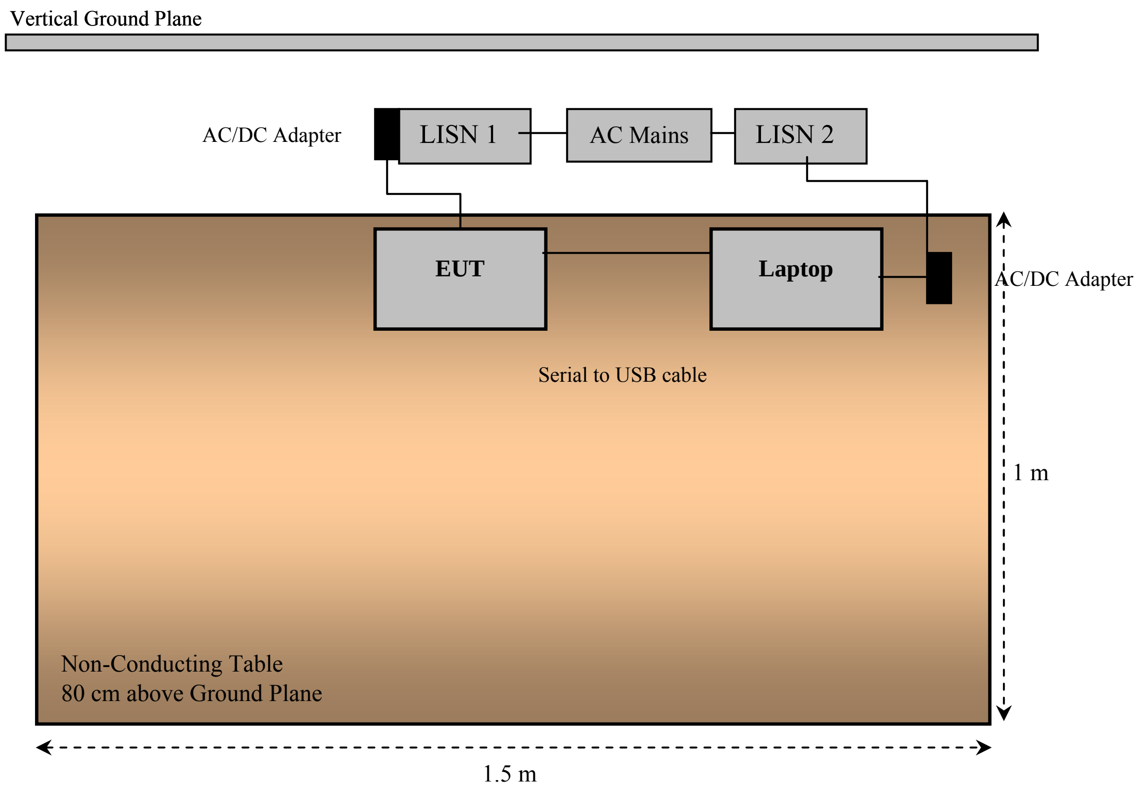
The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2012-03-22
Solar Electronics	LISN	9252-R-24-BNC	511205	2011-06-25
Solar Electronics	LISN	9252-R-24-BNC	511213	2011-06-28
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.*

6.4 Test Setup Block Diagram



6.5 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1. The supporting equipment 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”.

6.6 Test Environmental Conditions

Temperature:	20 °C
Relative Humidity:	50%
ATM Pressure:	101.3kPa

The testing was performed by Lionel Lara on 2012-04-16 at 5meter chamber3.

6.7 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding 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 + CL + Atten – Ga

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

6.8 Summary of Test Results

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

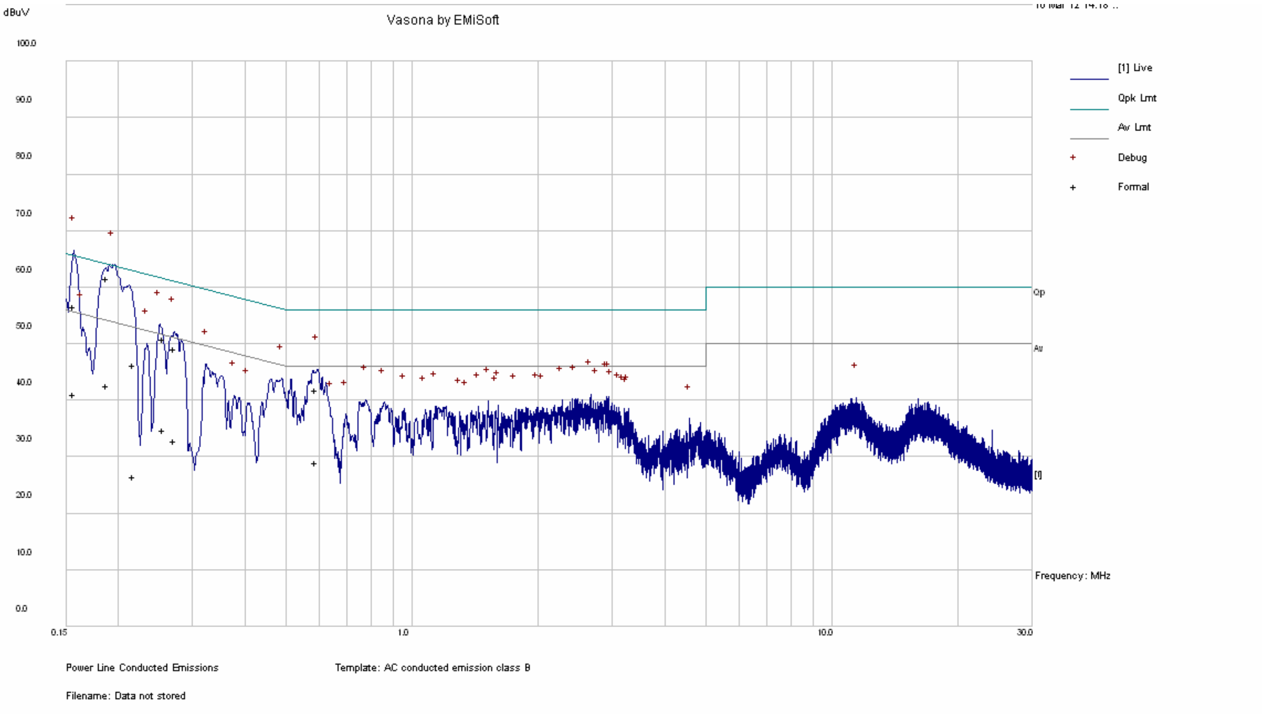
Transceiver Mode Worst case 802.11b Middle channel

2.4 GHz:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-2.49	0.188505	Line	0.15 to 30

6.9 Conducted Emissions Test Plots and Data

2.4 GHz Mode: 120 V, 60 Hz – Line



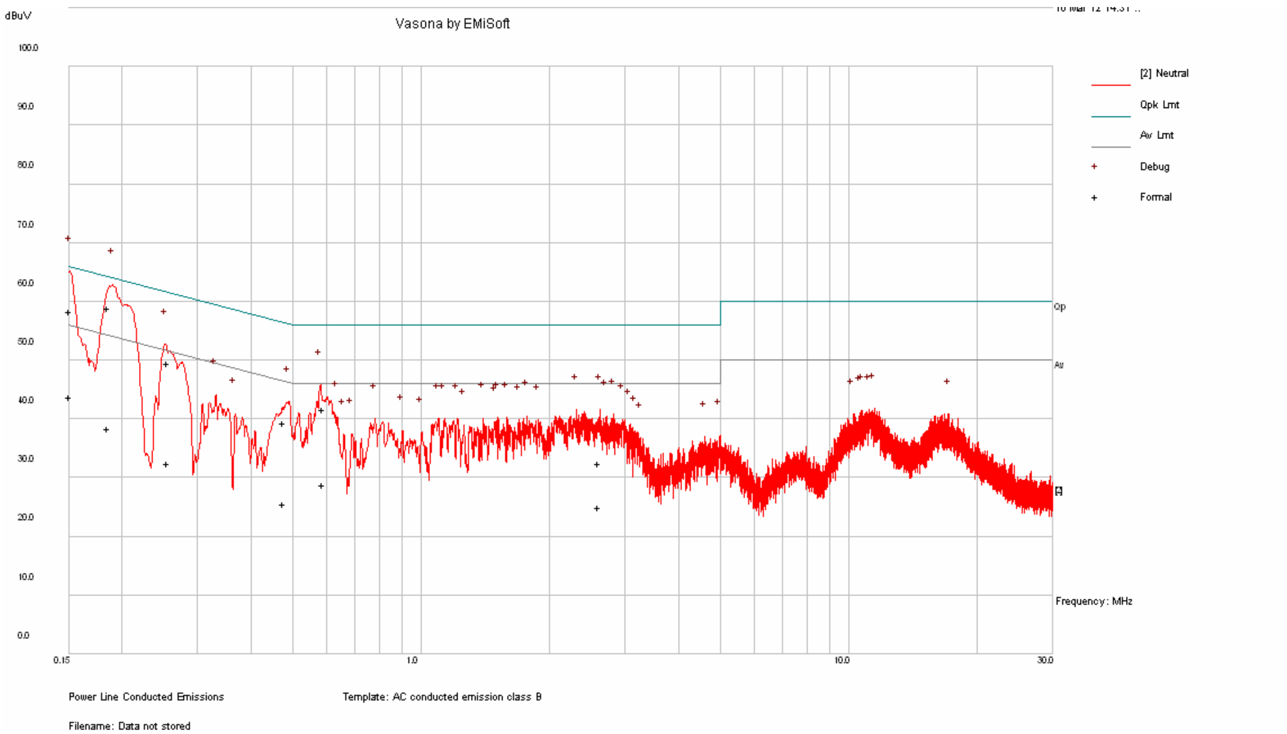
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.188505	61.61	Line	64.1	-2.49
0.156639	56.58	Line	65.64	-9.06
0.25566	50.86	Line	61.57	-10.71
0.271686	49.09	Line	61.07	-11.98
0.589872	41.88	Line	56	-14.12
0.21741	46.21	Line	62.92	-16.7

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.188505	42.65	Line	54.1	-11.46
0.156639	41.16	Line	55.64	-14.48
0.25566	34.76	Line	51.57	-16.81
0.589872	28.98	Line	46	-17.02
0.271686	32.9	Line	51.07	-18.16
0.21741	26.51	Line	52.92	-26.41

2.4 GHz Mode: 120 V, 60 Hz – Neutral



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.185961	44.72	Neutral	58.94	-5.28
0.150969	35.82	Neutral	58.39	-7.55
0.255816	38.88	Neutral	49.55	-12.02
0.59082	31.66	Neutral	41.6	-14.4
0.479223	29.45	Neutral	39.4	-16.95
2.615893	22.5	Neutral	32.57	-23.43

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150969	43.74	Neutral	55.95	-12.2
0.185961	38.43	Neutral	54.22	-15.79
0.59082	28.82	Neutral	46	-17.18
0.255816	32.5	Neutral	51.57	-19.07
0.479223	25.59	Neutral	46.35	-20.76
2.615893	24.92	Neutral	46	-21.08

7 FCC §15.247(d) - Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For 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.

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	E4446A	US44300386	2011-08-11

***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:	21 °C
Relative Humidity:	58%
ATM Pressure:	101.3kPa

The testing was performed by Lionel Lara on 2012-04-16 at the RF Test Site.

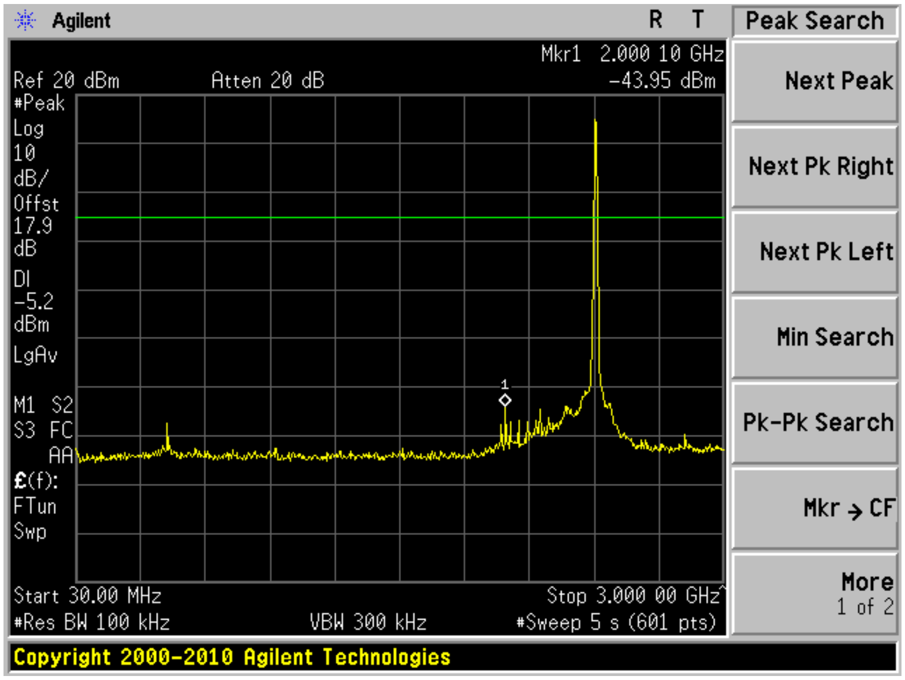
7.5 Test Results

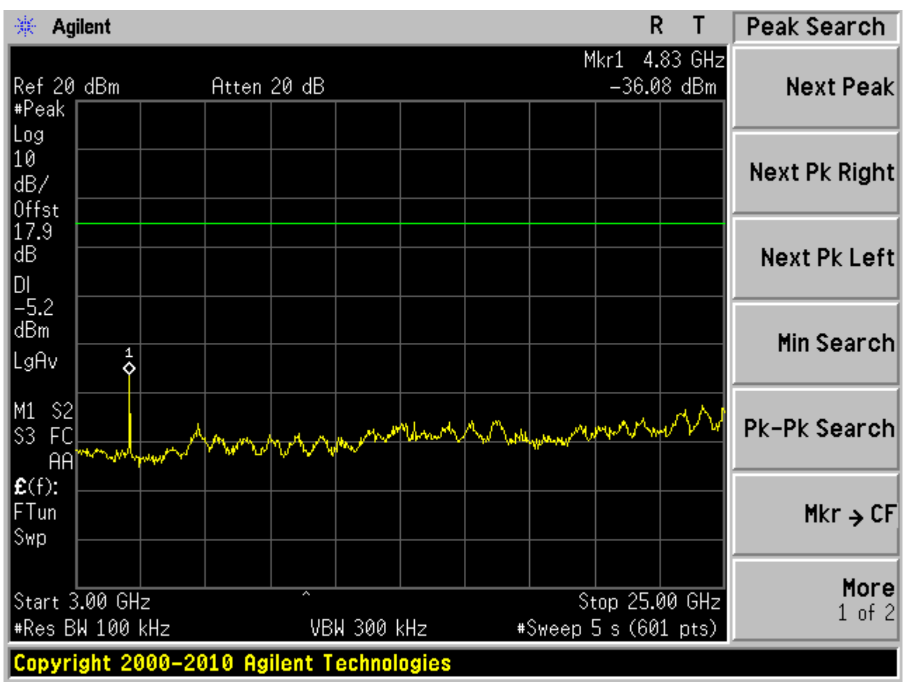
Please refer to following plots.

Antenna 0 + Antenna 1

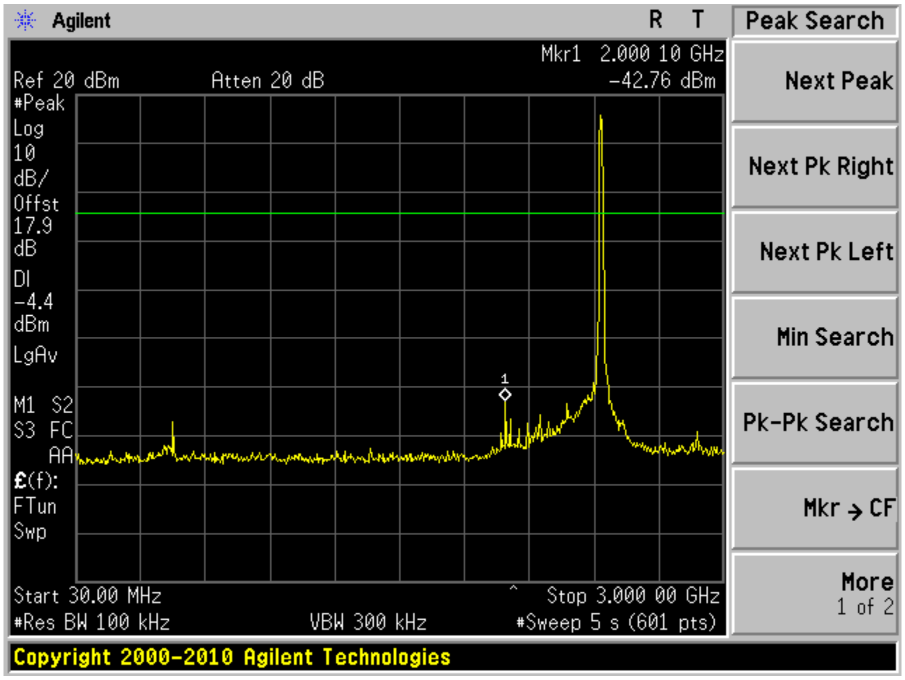
2.4 GHz: 802.11b

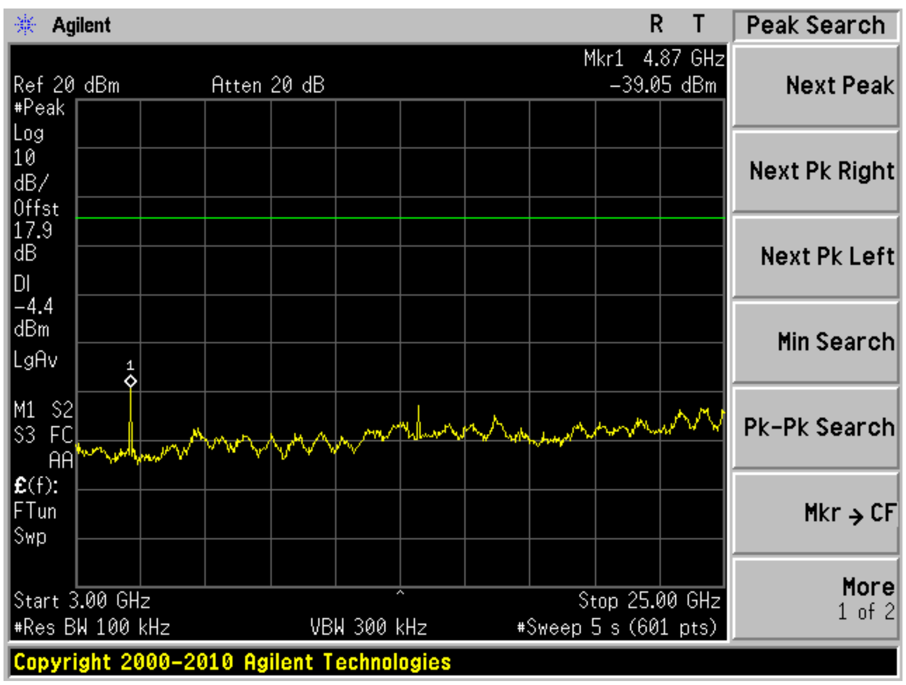
Low Channel 2412 MHz



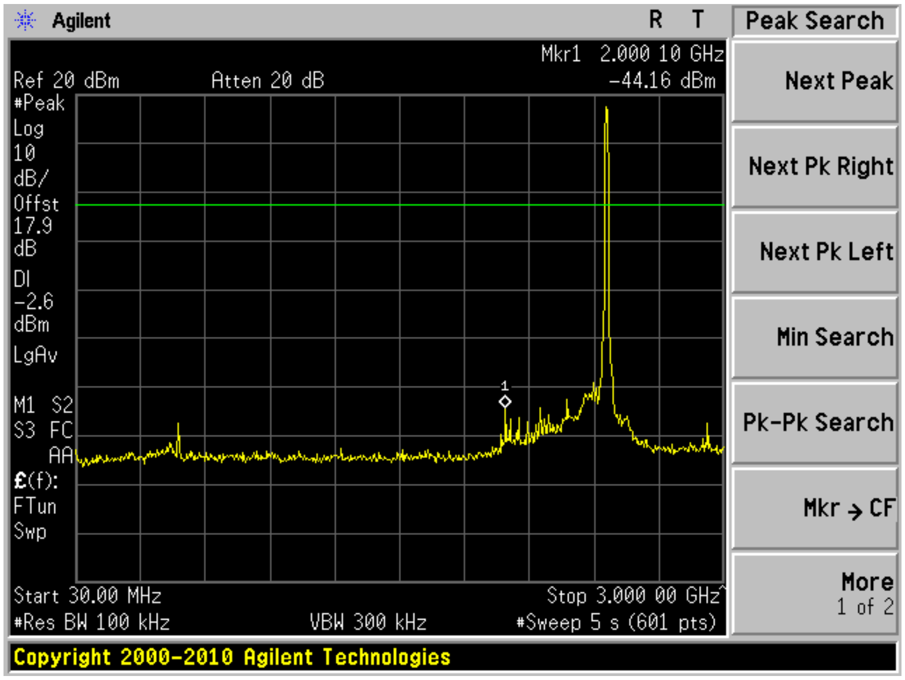


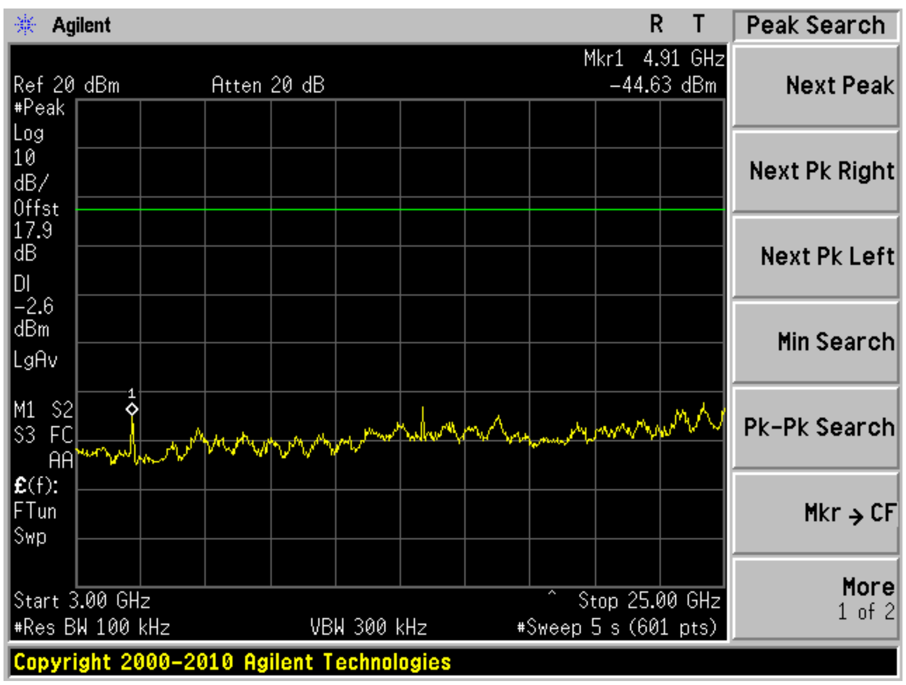
Middle Channel 2437 MHz





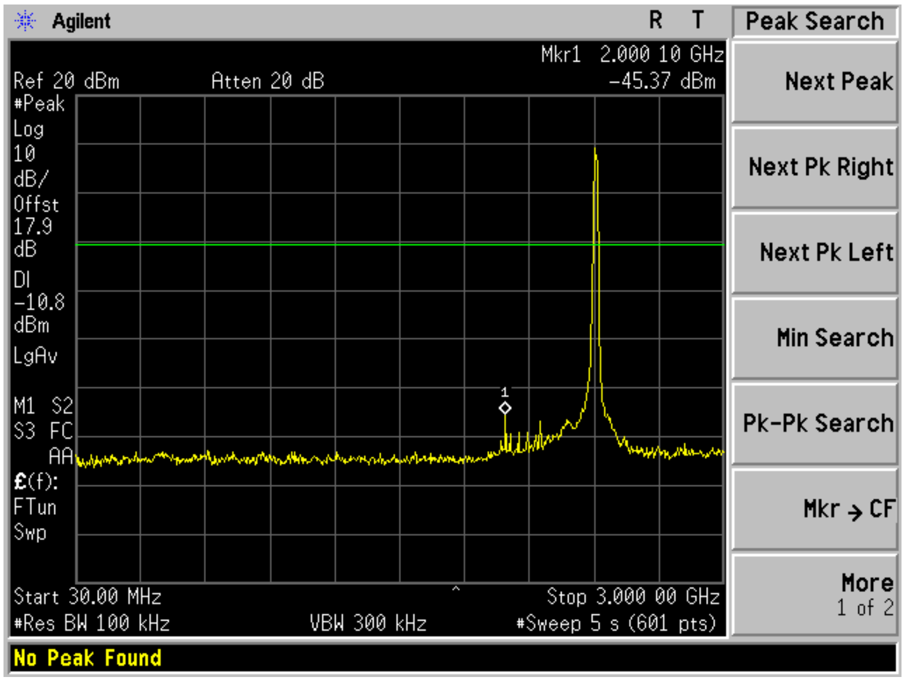
High Channel 2462 MHz

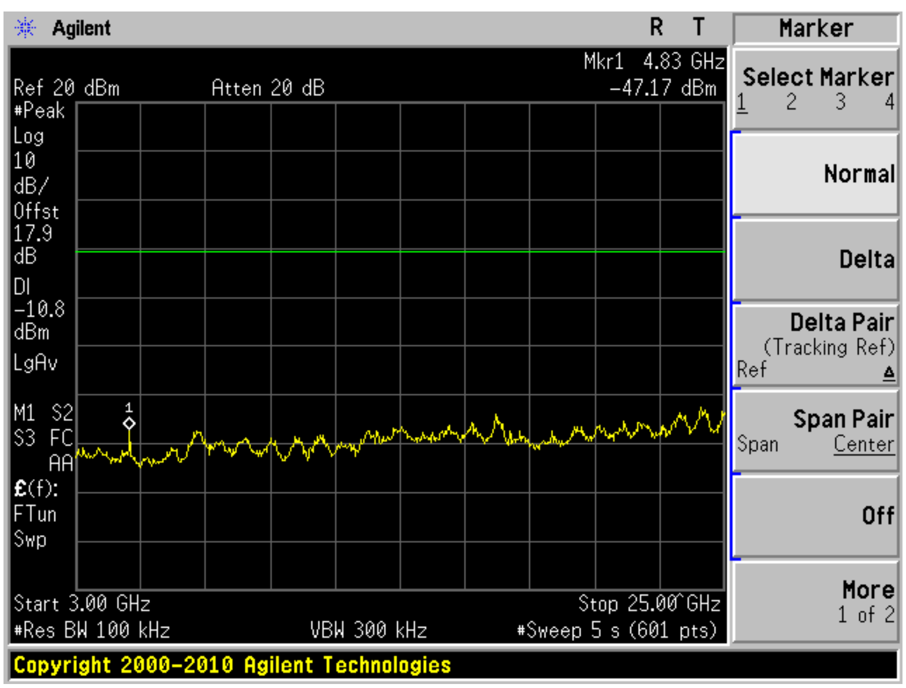




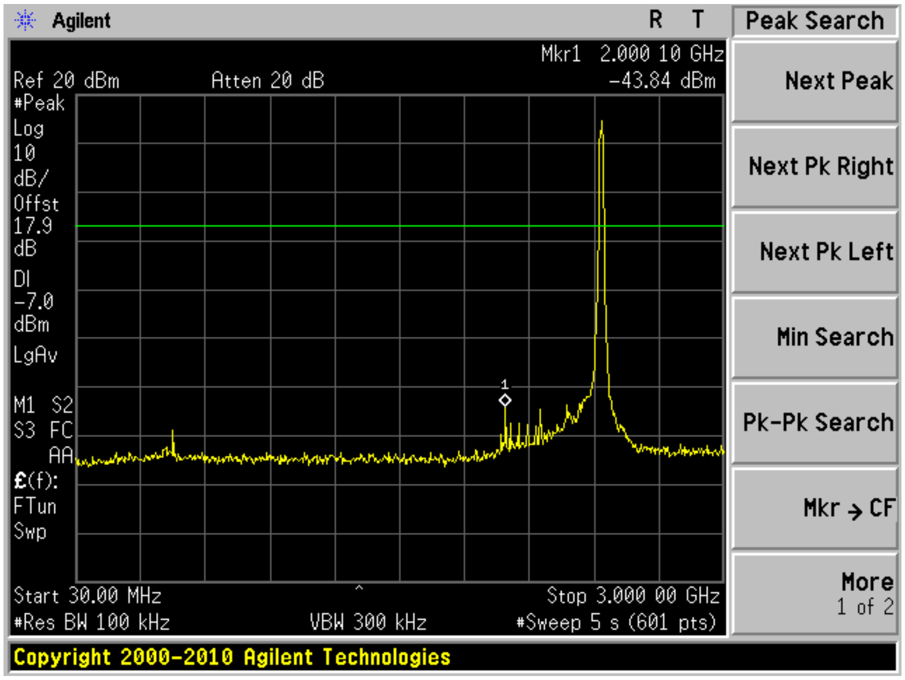
2.4 GHz: 802.11g

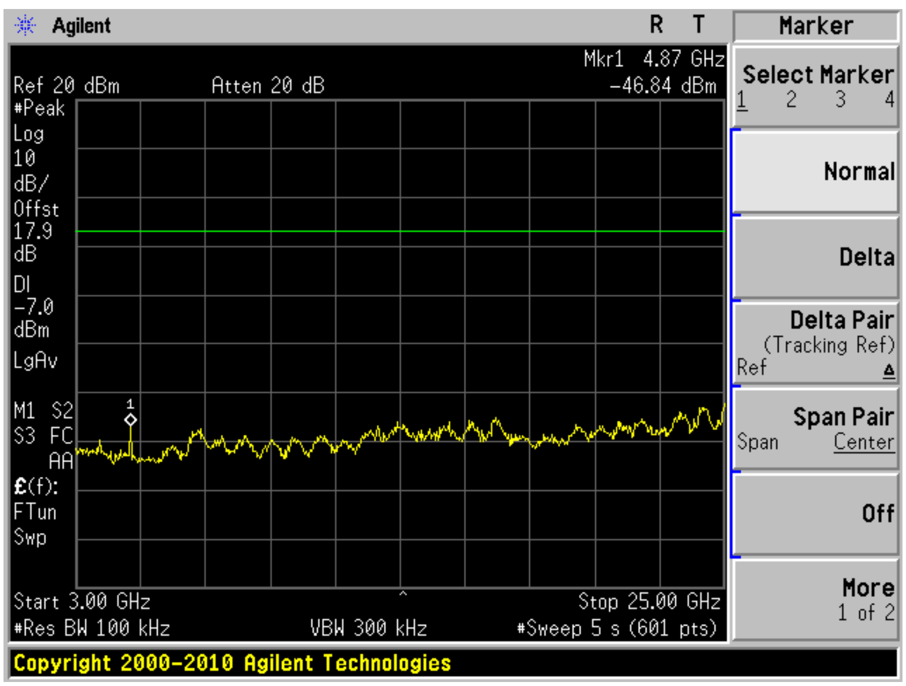
Low Channel 2412 MHz



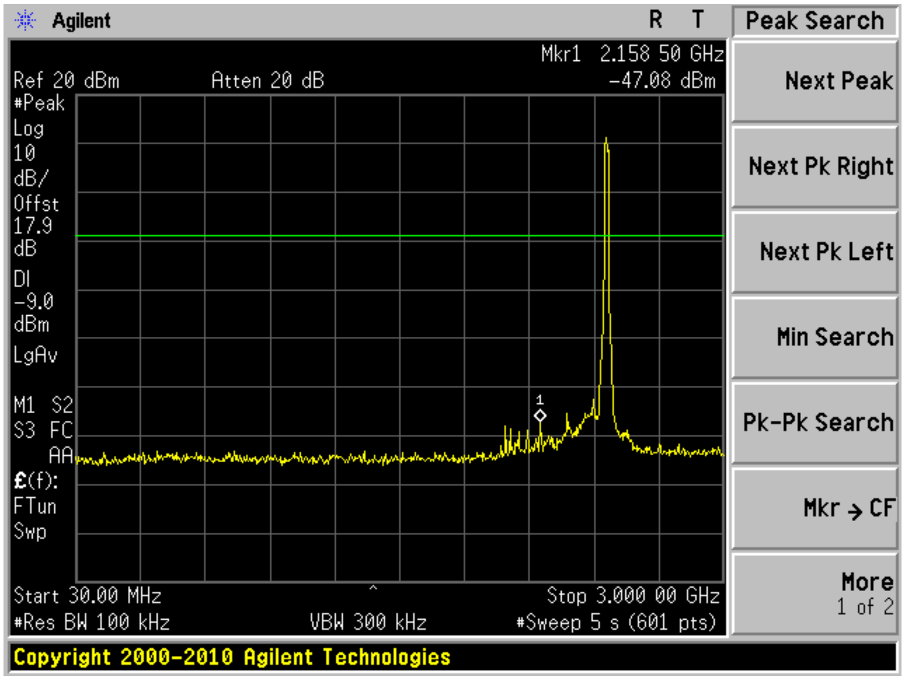


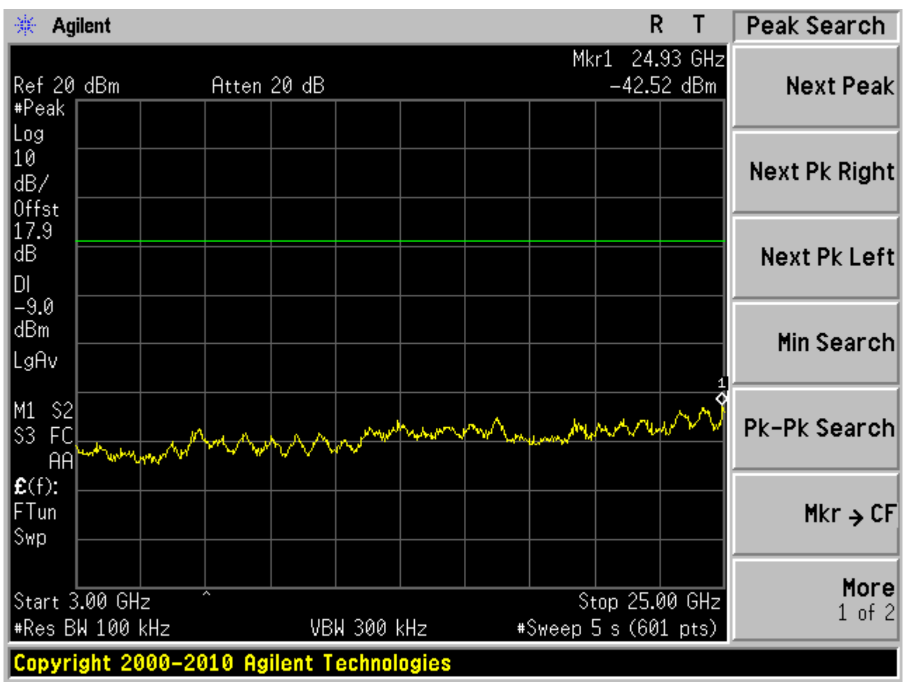
Middle Channel 2437 MHz





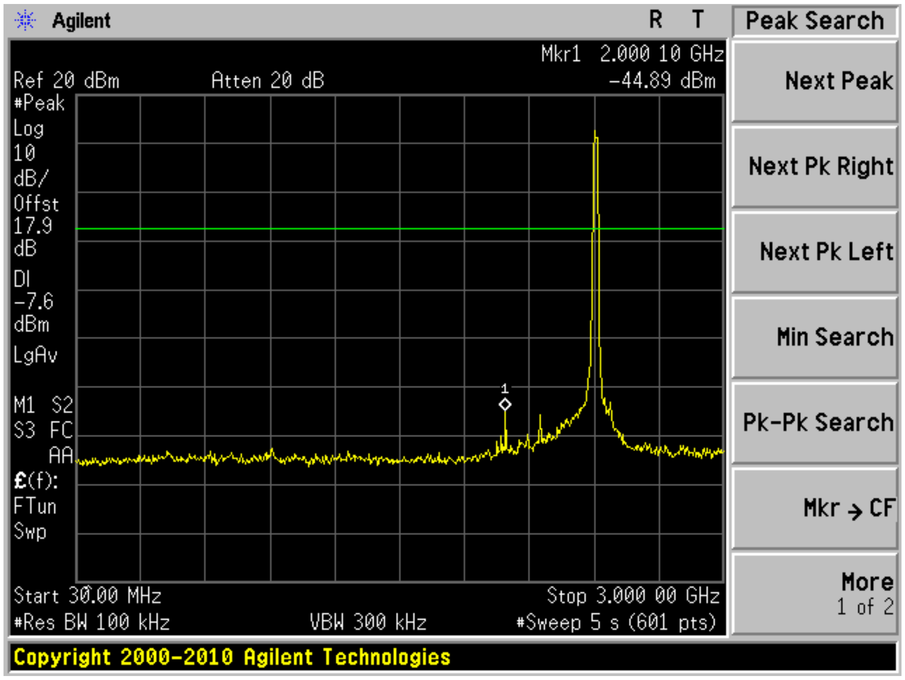
High Channel 2462 MHz

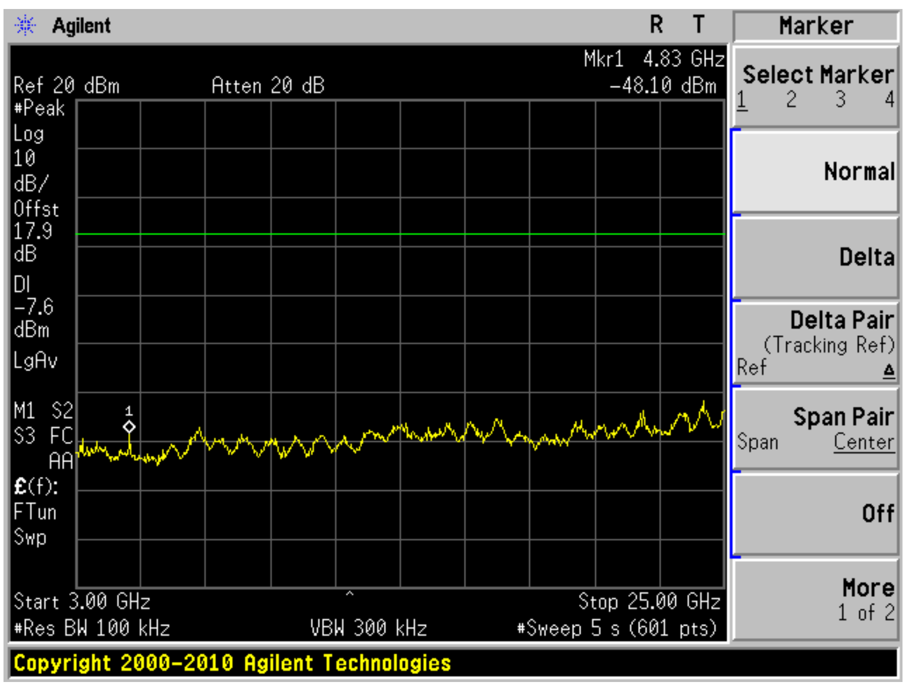




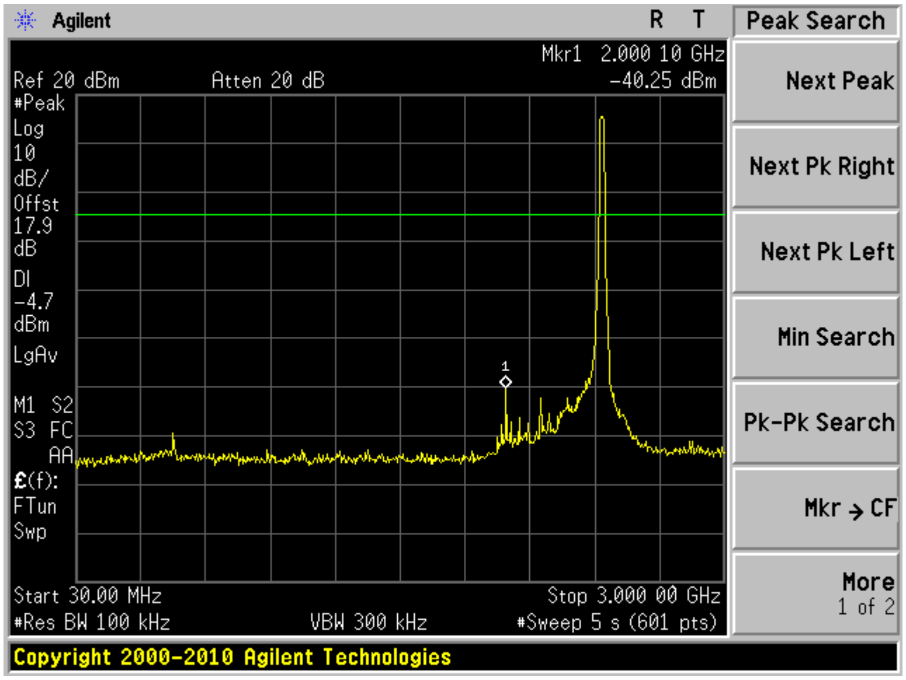
2.4 GHz: 802.11n

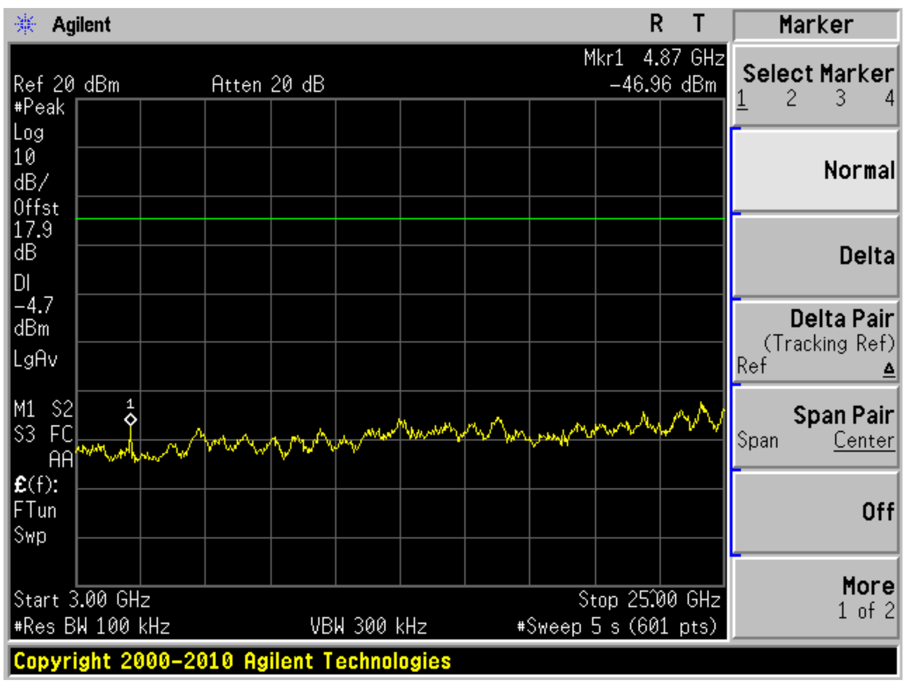
Low Channel 2412 MHz



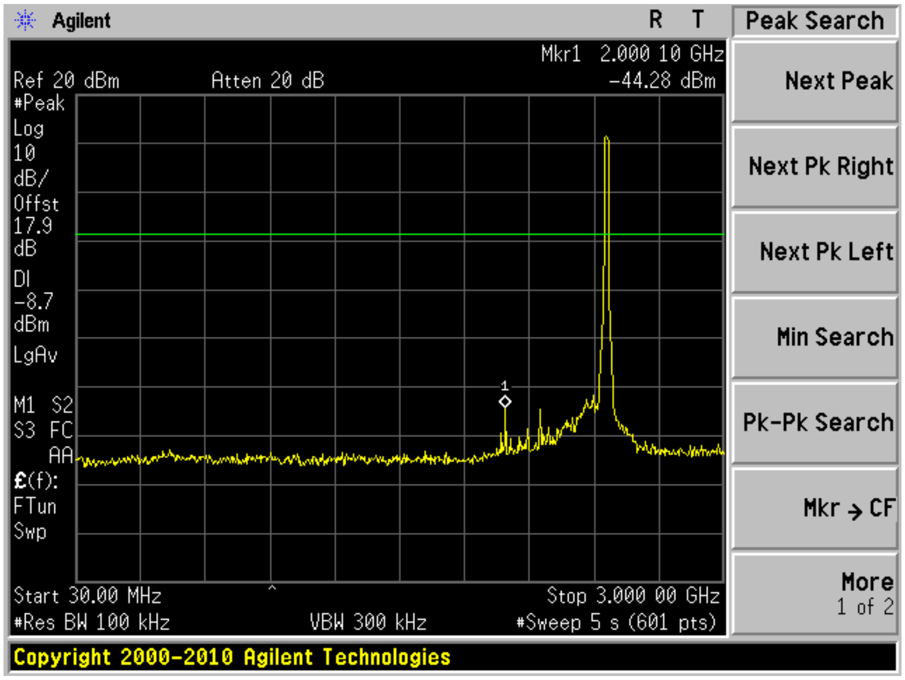


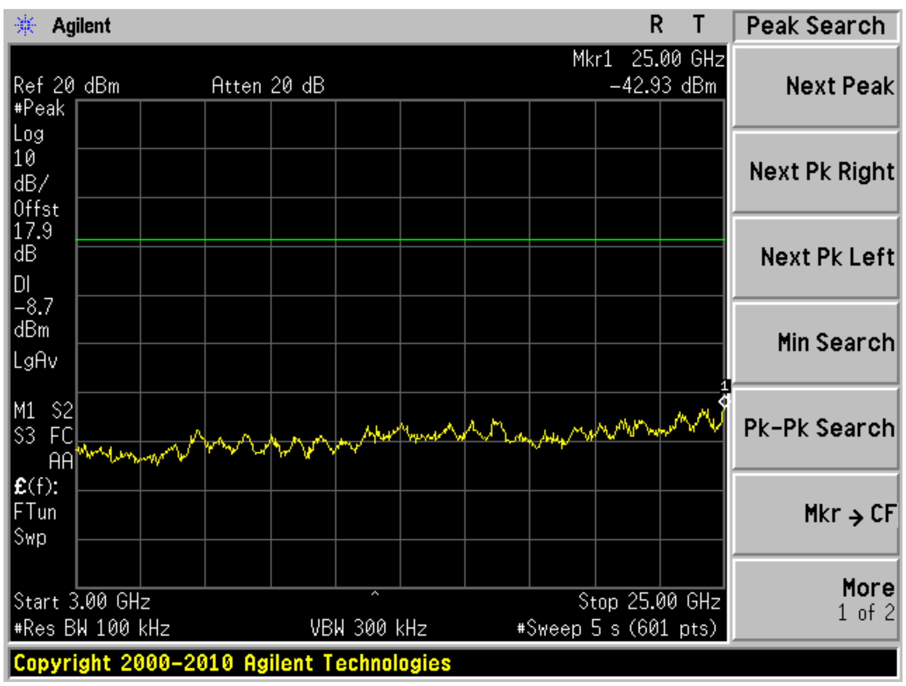
Middle Channel 2437 MHz





High Channel 2462 MHz





8 FCC §15.205, §15.209 & §15.247(d) - 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): 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 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

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 C63.4-2003. The specification limits were in accordance with FCC 15 Subpart C.

8.3 EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15C 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.

8.4 Test Equipment List and Details

Manufacturers	Descriptions	Model No.	Serial No.	Calibration Dates
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2012-03-22
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2011-08-10
EMCO	Horn antenna	3115	9511-4627	2011-10-03
Hewlett Packard	Pre amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre Amplifier	ZVA-183-S	667400960	2011-05-08

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

8.5 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 placed on a turntable, 0.8 meter above ground plane. The turntable shall be rotated 360 degrees to determine the highest emission with the antenna in both horizontal and vertical polarizations.

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

8.6 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

8.7 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	51-54%
ATM Pressure:	101-102kPa

The testing was performed by Lionel Lara on 2012-04-06 and 2012-04-11 at 5 meter chamber 3.

8.8 Summary of Test Results

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

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-4.77	38.94775	Vertical	802.11n Middle, 30-1000 MHz

Above 1 GHz:

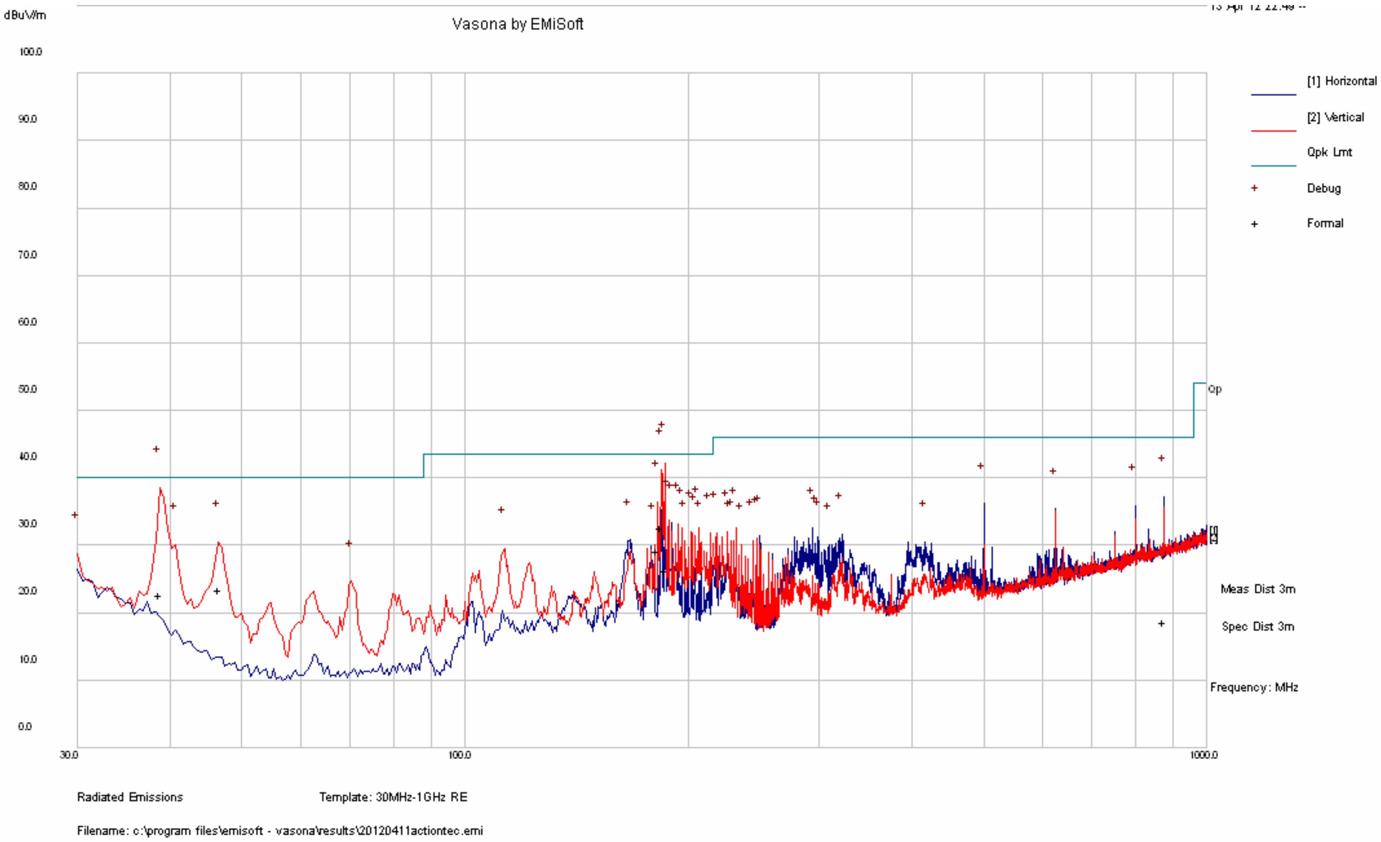
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-0.12	9648	Vertical	802.11b Low, 1GHz – 25GHz

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

8.9 Radiated Emissions Test Data and Plots

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

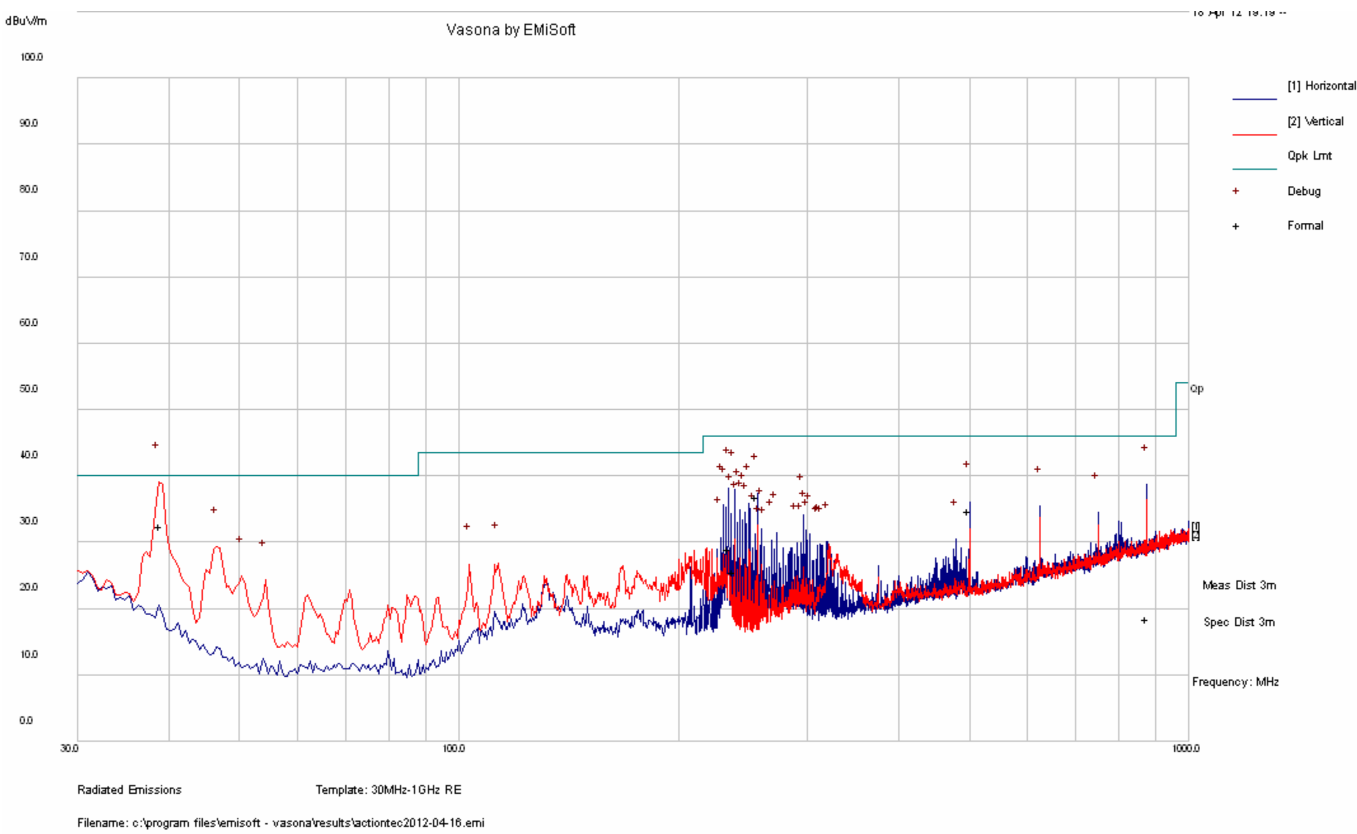
2.4 GHz, 802.11b Mode, Middle channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
183.99	32.68	99	V	290	43.5	-10.82
182.009	29.13	112	V	335	43.5	-14.37
46.658	23.51	111	V	144	40	-16.49
185.9328	26.39	103	V	105	43.5	-17.11
38.84475	22.65	108	V	101	40	-17.35
875.5198	18.76	111	H	314	46	-27.24

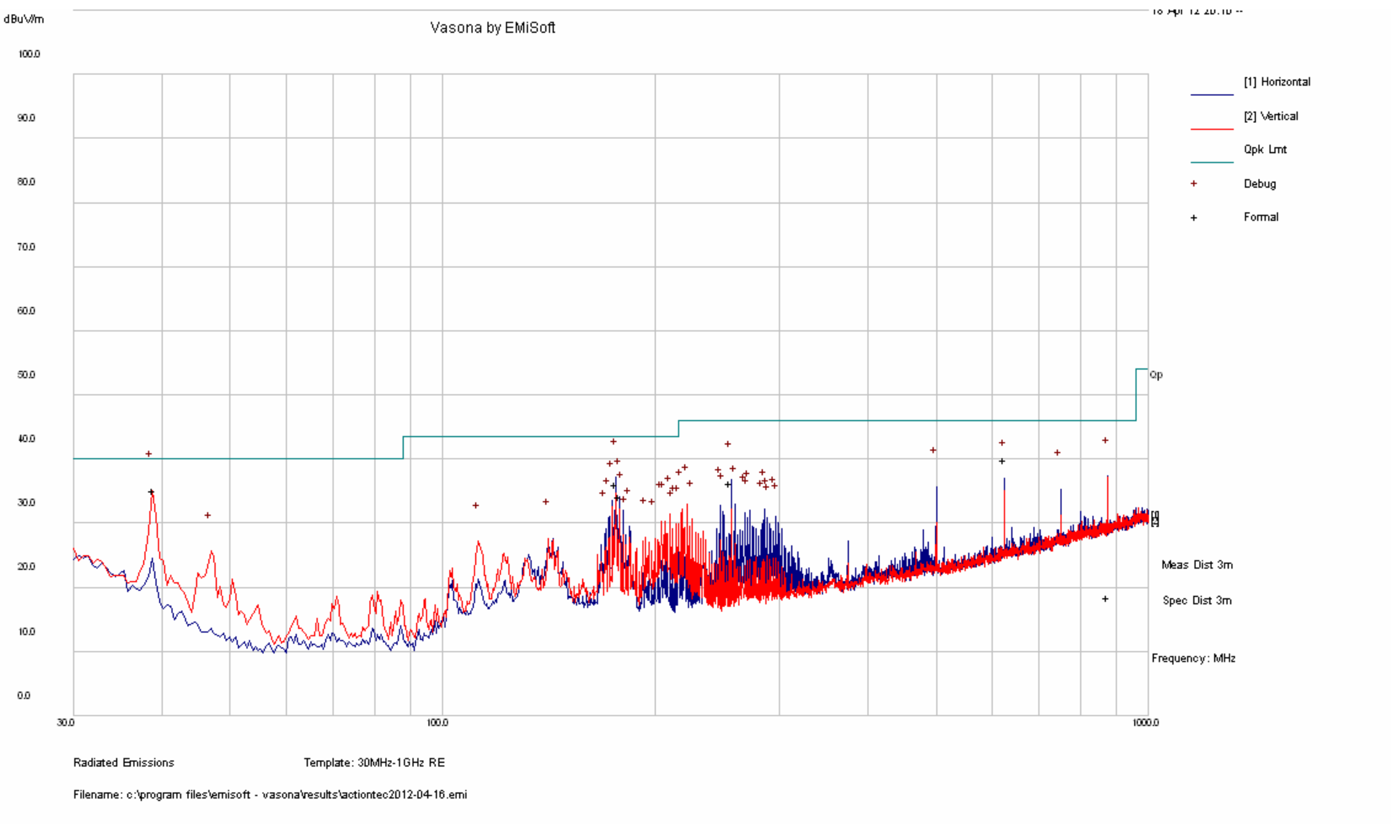
2.4 GHz, 802.11g Mode, Middle channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
38.9255	32.5	182	V	341	40	-7.5
255.9948	36.91	111	H	293	46	-9.09
500.023	34.81	206	H	177	46	-11.19
234.0055	28.96	151	H	117	46	-17.04
237.9855	25.49	117	H	122	46	-20.51
875.2365	18.5	223	H	269	46	-27.5

2.4 GHz, 802.11n Mode, Middle channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
38.94775	35.23	138	V	315	40	-4.77
624.9883	39.91	127	H	241	46	-6.09
176.011	36.17	142	H	128	43.5	-7.33
178.0053	34.16	178	H	117	43.5	-9.34
256.0178	36.28	129	H	282	46	-9.72
875.2703	18.56	99	H	21	46	-27.44

2) 1–25 GHz, Measured at 3 meters

2.4 GHz 802.11b mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
4824	47.11	224	168	H	33.48	4.06	27.77	56.88	74	-17.12	Peak
4824	47.57	329	100	V	33.59	4.06	27.77	57.45	74	-16.55	Peak
4824	44.13	224	168	H	33.48	4.06	27.77	53.9	54	-0.1	Avg
4824	44	329	100	V	33.59	4.06	27.77	53.88	54	-0.12	Avg
9648	38.63	210	100	H	38.54	5.82	27.71	55.28	74	-18.72	Peak
9648	41.47	276	144	V	38.54	5.82	27.71	58.12	74	-15.88	Peak
9648	27.09	210	100	H	38.54	5.82	27.71	43.74	54	-10.26	Avg
9648	36.79	276	144	V	38.54	5.82	27.71	53.44	54	-0.56	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
4874	45.93	291	152	H	32.8	4.1	27.81	55.02	74	-18.98	Peak
4874	43.27	327	123	V	32.73	4.1	27.81	52.29	74	-21.71	Peak
4874	42.74	291	152	H	32.8	4.1	27.81	51.83	54	-2.17	Avg
4874	39.14	327	123	V	32.73	4.1	27.81	48.16	54	-5.84	Avg
9748	33.88	101	124	H	37.75	5.74	27.8	49.57	74	-24.43	Peak
9748	40.95	88	107	V	38.39	5.74	27.8	57.28	74	-16.72	Peak
9748	26.43	101	124	H	37.75	5.74	27.8	42.12	54	-11.88	Avg
9748	36.82	88	107	V	38.39	5.74	27.8	53.15	54	-0.85	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
4924	43.35	80	161	H	32.8	4.1	27.71	52.54	74	-21.46	Peak
4924	42.31	327	153	V	32.73	4.1	27.71	51.43	74	-22.57	Peak
4924	40.64	80	161	H	32.8	4.1	27.71	49.83	54	-4.17	Avg
4924	39.52	327	153	V	32.73	4.1	27.71	48.64	54	-5.36	Avg
9848	34.94	291	184	H	38.06	5.77	27.6	51.17	74	-22.83	Peak
9848	35.72	79	130	V	38.15	5.77	27.6	52.04	74	-21.96	Peak
9848	28.32	291	184	H	38.06	5.77	27.6	44.55	54	-9.45	Avg
9848	30.2	79	130	V	38.15	5.77	27.6	46.52	54	-7.48	Avg

2.4 GHz 802.11g mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
4824	45.93	236	192	H	33.48	4.06	27.77	55.7	74	-18.3	Peak
4824	44.3	339	100	V	33.59	4.06	27.77	54.18	74	-19.82	Peak
4824	33.13	236	192	H	33.48	4.06	27.77	42.9	54	-11.1	Avg
4824	32.59	339	100	V	33.59	4.06	27.77	42.47	54	-11.53	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2380	64.13	276	173	H	28.16	2.94	27.9	67.33	74	-6.67	Peak
2379	61.93	89	113	V	28.12	2.94	27.9	65.09	74	-8.91	Peak
2380	41.11	276	173	H	28.16	2.94	27.9	44.31	54	-9.69	Avg
2379	40.81	89	113	V	28.12	2.94	27.9	43.97	54	-10.03	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
-[1]	-	-	-	-	-	-	-	-	-	-	-
-[1]	-	-	-	-	-	-	-	-	-	-	-

Note 1: Spurious emissions at noise floor level.

2.4 GHz 802.11n mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
4824	45.24	235	168	H	33.48	4.06	27.77	55.01	74	-18.99	Peak
4824	44.33	336	166	V	33.59	4.06	27.77	54.21	74	-19.79	Peak
4824	31.27	235	168	H	33.48	4.06	27.77	41.04	54	-12.96	Avg
4824	31.68	336	166	V	33.59	4.06	27.77	41.56	54	-12.44	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2381.9	64.46	284	172	H	28.16	2.94	27.9	67.66	74	-6.34	Peak
2381.9	63.15	203	100	V	28.12	2.94	27.9	66.31	74	-7.69	Peak
2381.9	43.61	284	172	H	28.16	2.94	27.9	46.81	54	-7.19	Avg
2381.9	43.68	203	100	V	28.12	2.94	27.9	46.84	54	-7.16	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
-[1]	-	-	-	-	-	-	-	-	-	-	-
-[1]	-	-	-	-	-	-	-	-	-	-	-

Note 1: Spurious emissions at noise floor level.

3) Restricted Band Emissions

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
802.11b, Lowest Channel											
2383.5	27.91	288	156	H	28.36	2.94	0	59.21	74	-14.79	Peak
2388.8	33.63	196	100	V	28.53	2.94	0	65.1	74	-8.9	Peak
2383.5	13.4	288	156	H	28.36	2.94	0	44.7	54	-9.3	Avg
2388.8	16.26	196	100	V	28.53	2.94	0	47.73	54	-6.27	Avg
802.11b, Highest Channel											
2483.55	34.91	77	169	H	28.42	3.01	0	66.34	74	-7.66	Peak
2483.6	36.66	31	100	V	29.12	3.01	0	68.79	74	-5.21	Peak
2483.55	16.44	77	169	H	28.42	3.01	0	47.87	54	-6.13	Avg
2483.6	18.08	31	100	V	29.12	3.01	0	50.21	54	-3.79	Avg

Frequency (MHz)	S.A. Reading (dBμV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBμV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	
802.11g, Lowest Channel											
2389.3	35.03	53	100	H	28.16	2.94	0	66.13	74	-7.87	Peak
2389.8	42.32	203	101	V	28.12	2.94	0	73.38	74	-0.62	Peak
2389.3	16.8	53	100	H	28.16	2.94	0	47.9	54	-6.1	Avg
2389.8	21.45	203	101	V	28.12	2.94	0	52.51	54	-1.49	Avg
802.11g, Highest Channel											
2483.6	40.36	161	101	H	28.42	3.01	0	71.79	74	-2.21	Peak
2483.8	42.41	338	144	V	28.27	3.01	0	73.69	74	-0.31	Peak
2483.6	16.85	161	101	H	28.42	3.01	0	48.28	54	-5.72	Avg
2483.8	18.87	338	144	V	28.27	3.01	0	50.15	54	-3.85	Avg

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	FCC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
802.11n 20 MHz BW, Lowest Channel											
2389.9	41.71	281	175	H	28.16	2.94	0	72.81	74	-1.19	Peak
2389.9	41.75	177	100	V	28.12	2.94	0	72.81	74	-1.19	Peak
2389.9	22.66	281	175	H	28.16	2.94	0	53.76	54	-0.24	Avg
2389.9	22.25	177	100	V	28.12	2.94	0	53.31	54	-0.69	Avg
802.11n 20 MHz BW, Highest Channel											
2483.5	42.17	283	171	H	28.42	3.01	0	73.6	74	-0.4	Peak
2483.6	41.11	22	178	V	28.27	3.01	0	72.39	74	-1.61	Peak
2483.5	18.62	283	171	H	28.42	3.01	0	50.05	54	-3.95	Avg
2483.6	17.39	22	178	V	28.27	3.01	0	48.67	54	-5.33	Avg

9 FCC §15.247(a)(2) – 6 dB & 99% Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2), 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 Test 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	E4446A	US44300386	2011-08-11

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:	21 °C
Relative Humidity:	58%
ATM Pressure:	101.3kPa

The testing was performed by Lionel Lara on 2012-04-16 at RF Test Site.

9.5 Test Results

2.4 GHz Band:

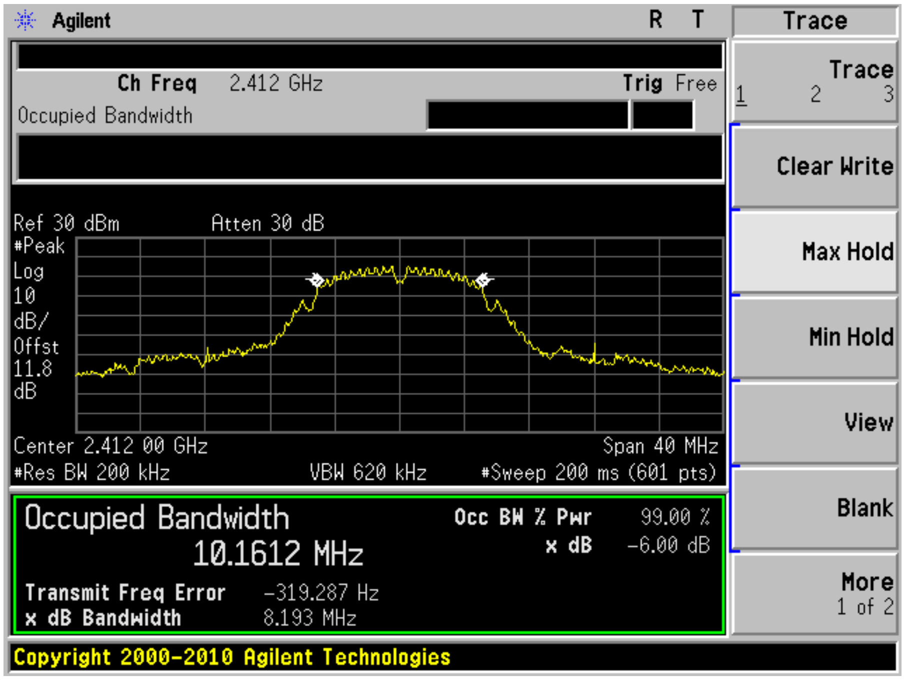
Antenna Port	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Results
802.11b mode						
Antenna 0	Low	2412	10.1612	8.193	> 500	Compliant
	Middle	2437	10.2334	8.202	> 500	Compliant
	High	2462	10.2567	8.188	> 500	Compliant
Antenna 1	Low	2412	10.1343	8.196	> 500	Compliant
	Middle	2437	10.2065	8.204	> 500	Compliant
	High	2462	10.2344	8.200	> 500	Compliant
802.11g mode						
Antenna 0	Low	2412	16.6924	16.190	> 500	Compliant
	Middle	2437	16.8265	16.524	> 500	Compliant
	High	2462	16.6867	16.173	> 500	Compliant
Antenna 1	Low	2412	16.7114	16.165	> 500	Compliant
	Middle	2437	16.8699	16.172	> 500	Compliant
	High	2462	16.7090	16.205	> 500	Compliant
802.11n mode						
Antenna 0	Low	2412	17.7205	17.390	> 500	Compliant
	Middle	2437	17.8497	17.379	> 500	Compliant
	High	2462	17.7439	17.336	> 500	Compliant
Antenna 1	Low	2412	17.7509	17.737	> 500	Compliant
	Middle	2437	17.8339	17.564	> 500	Compliant
	High	2462	17.7496	17.750	> 500	Compliant

Please refer to the following plots for detailed test results

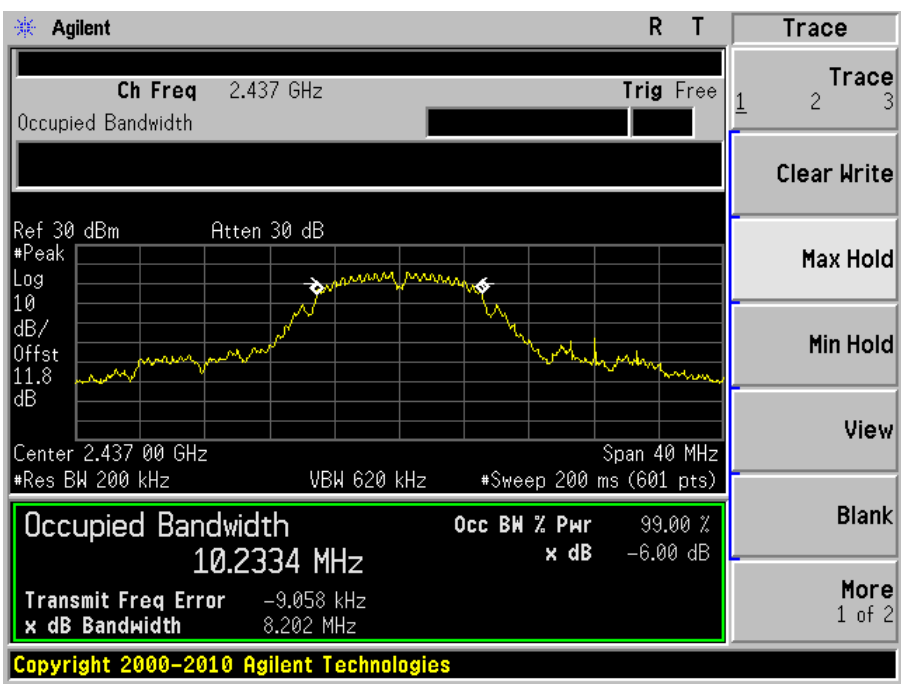
2.4 GHz 802.11b

Antenna 0

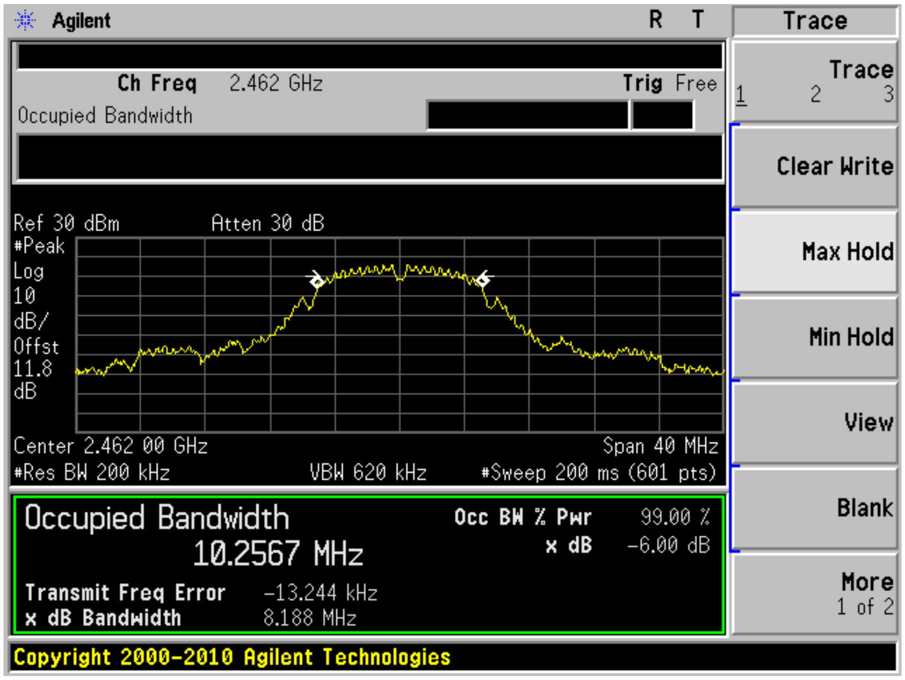
Low channel



Middle channel

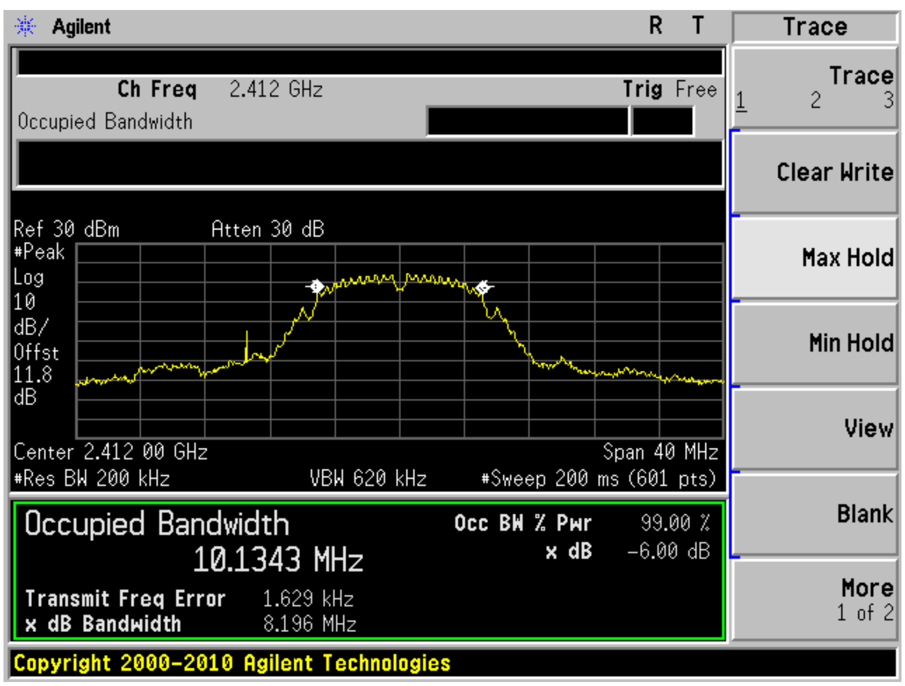


High channel

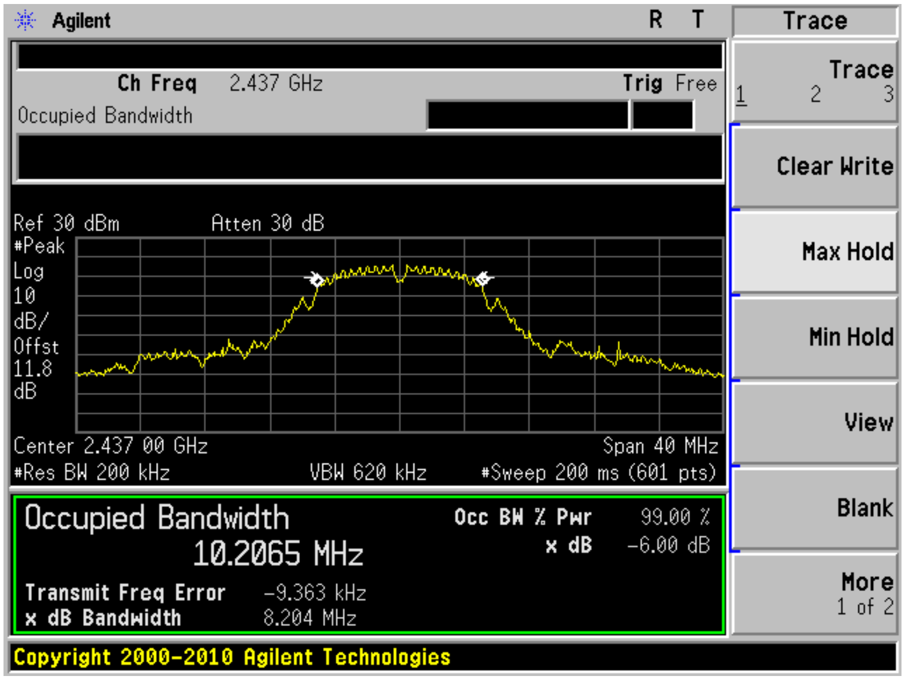


Antenna 1

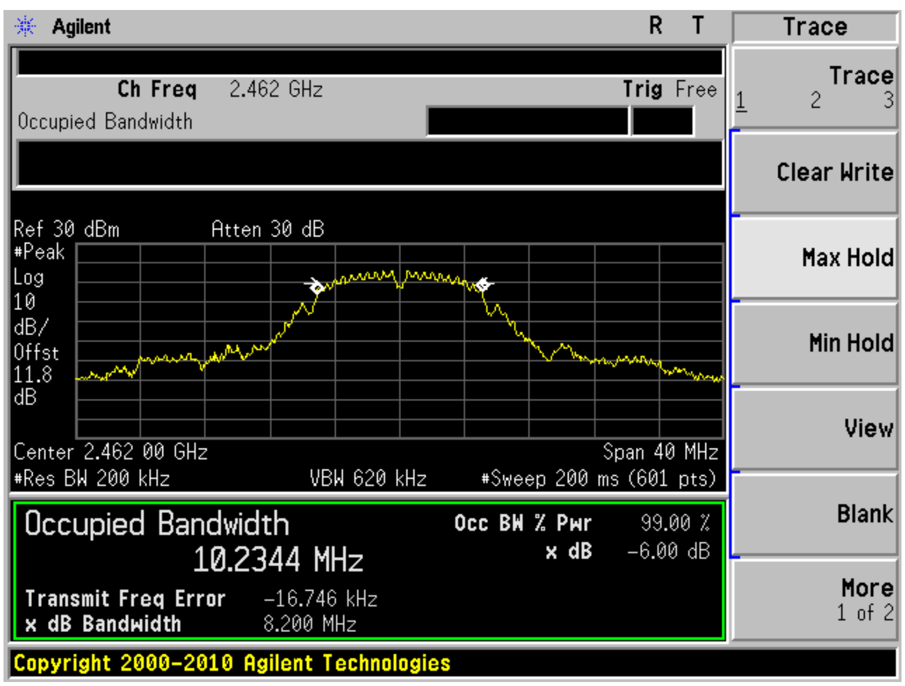
Low channel



Middle channel



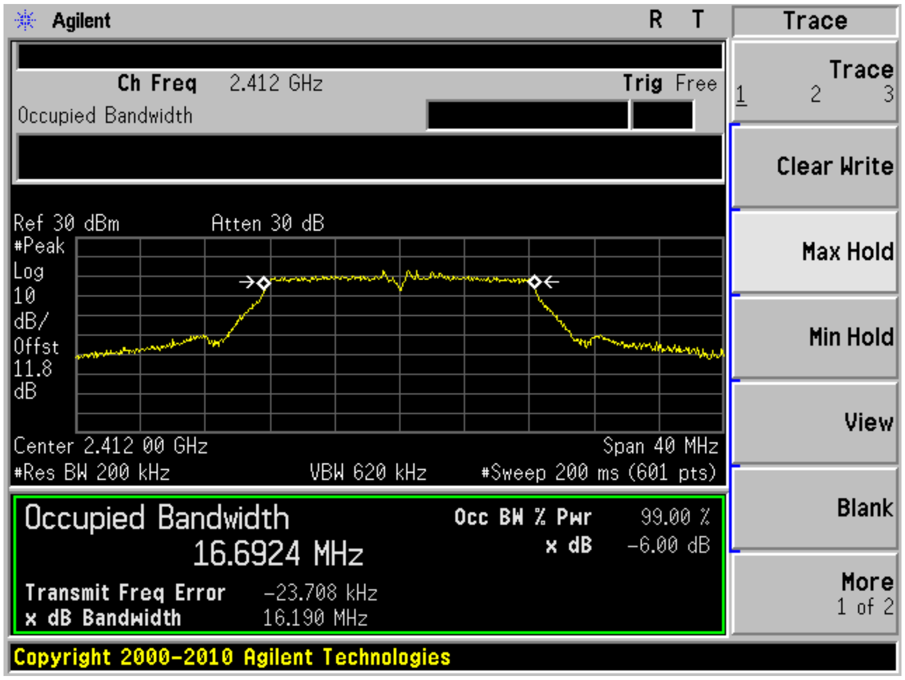
High channel



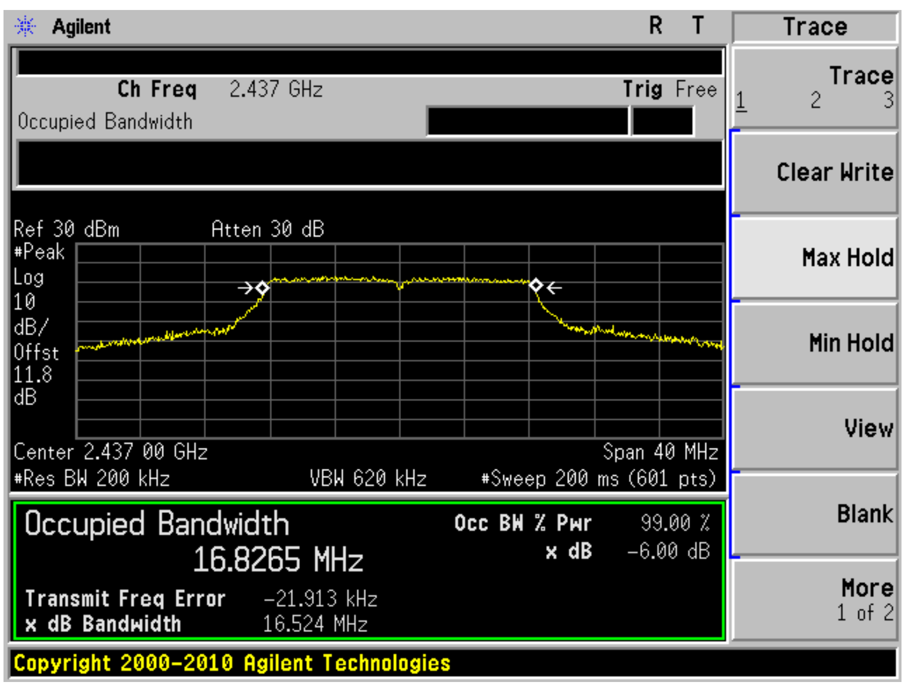
2.4 GHz 802.11g

Antenna 0

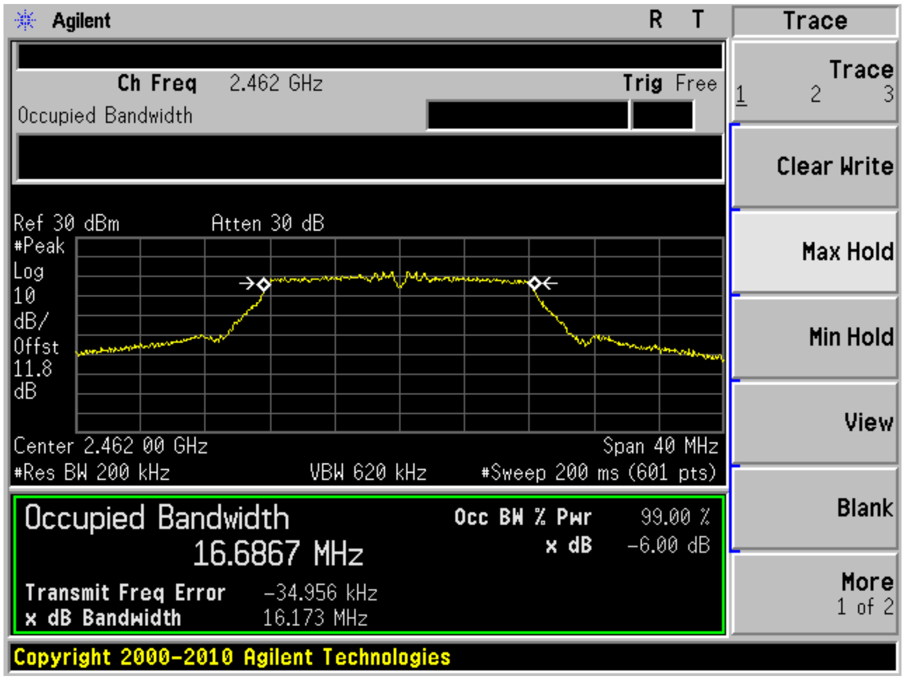
Low channel



Middle channel

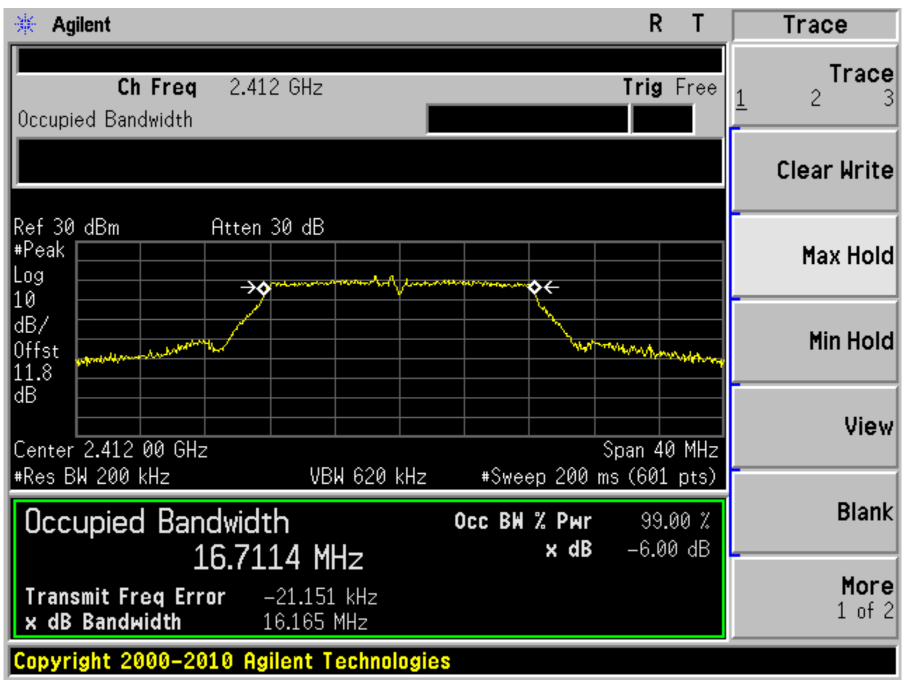


High channel

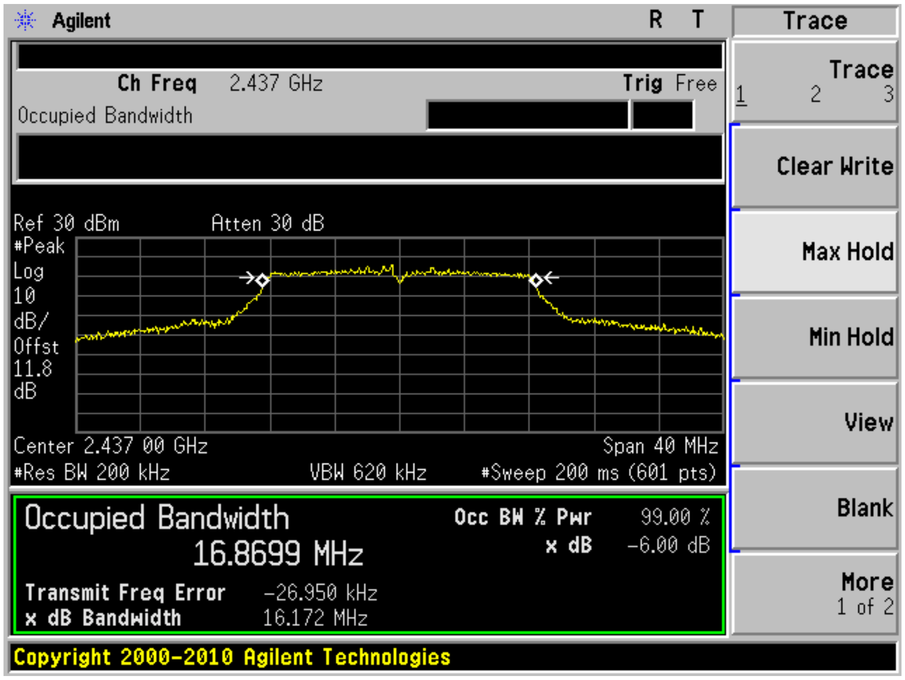


Antenna 1

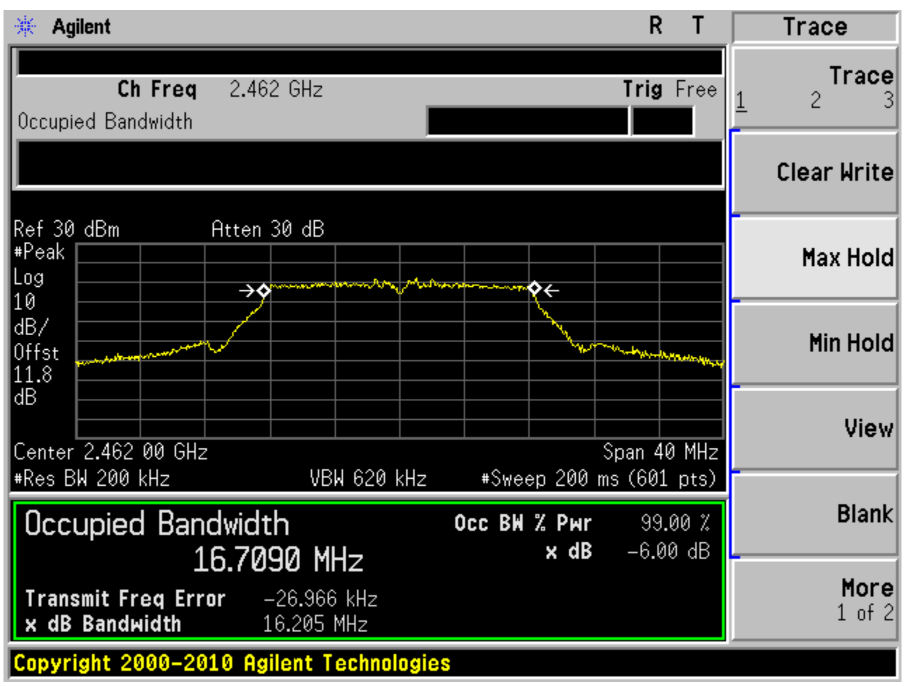
Low channel



Middle channel



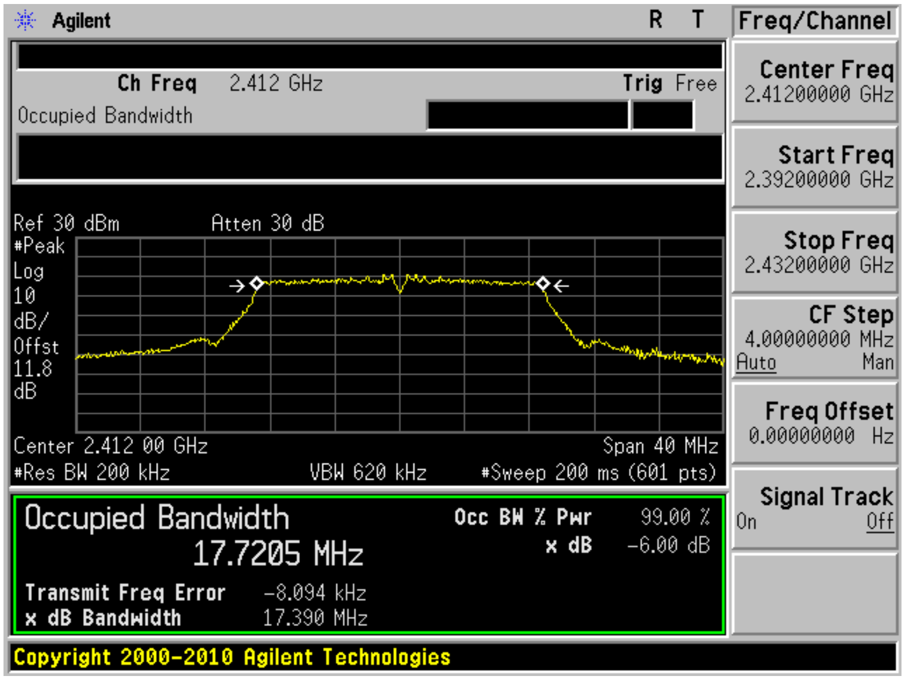
High channel



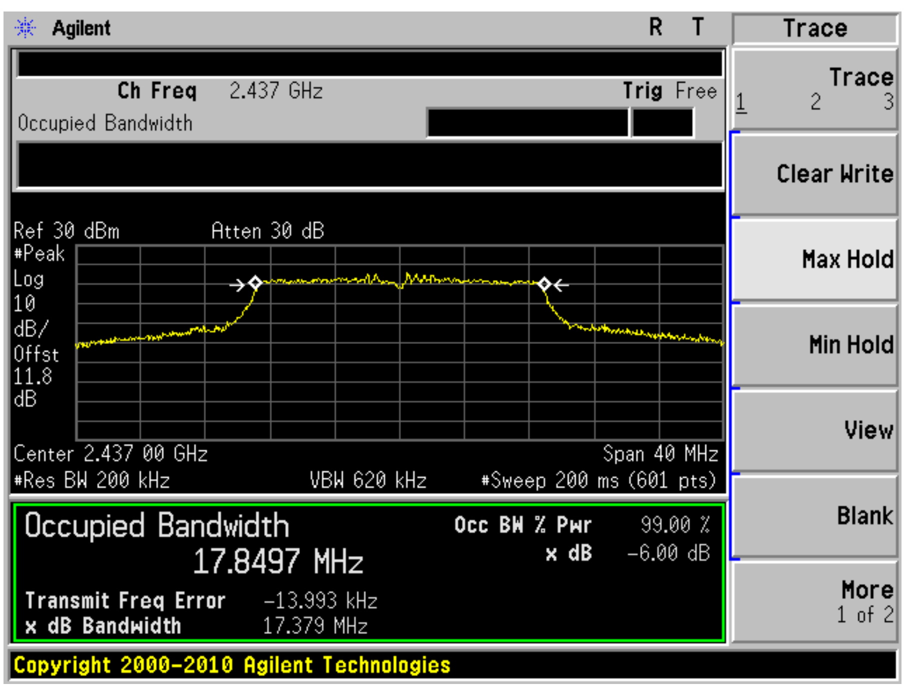
2.4 GHz 802.11n

Antenna 0

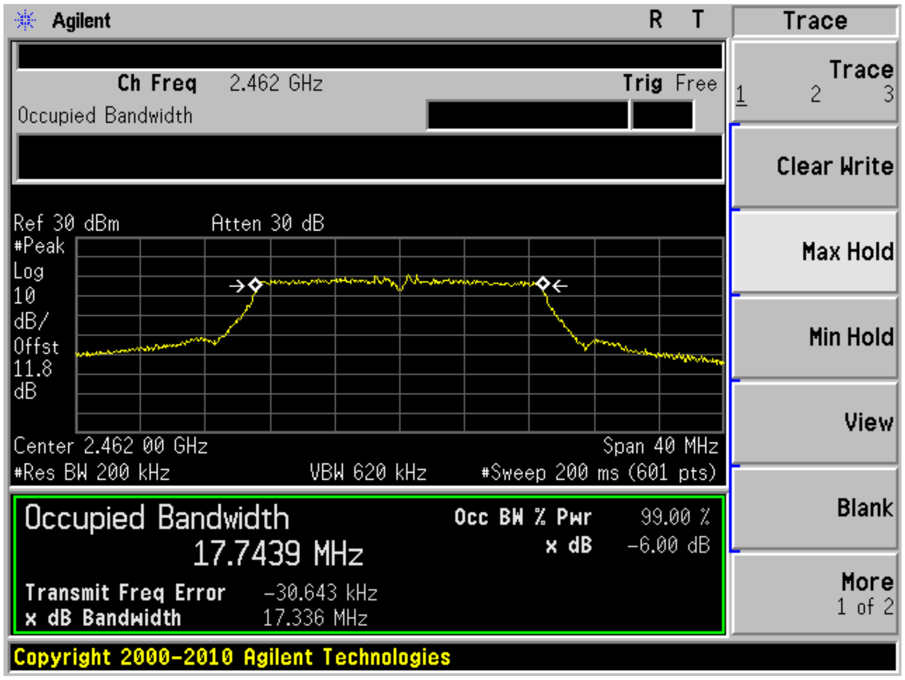
Low channel



Middle channel

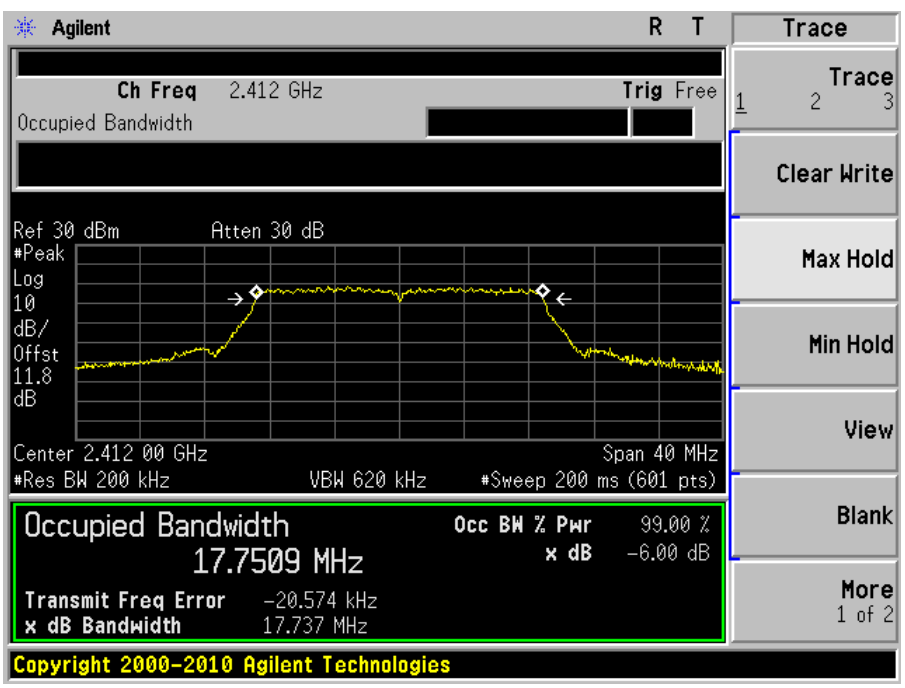


High channel

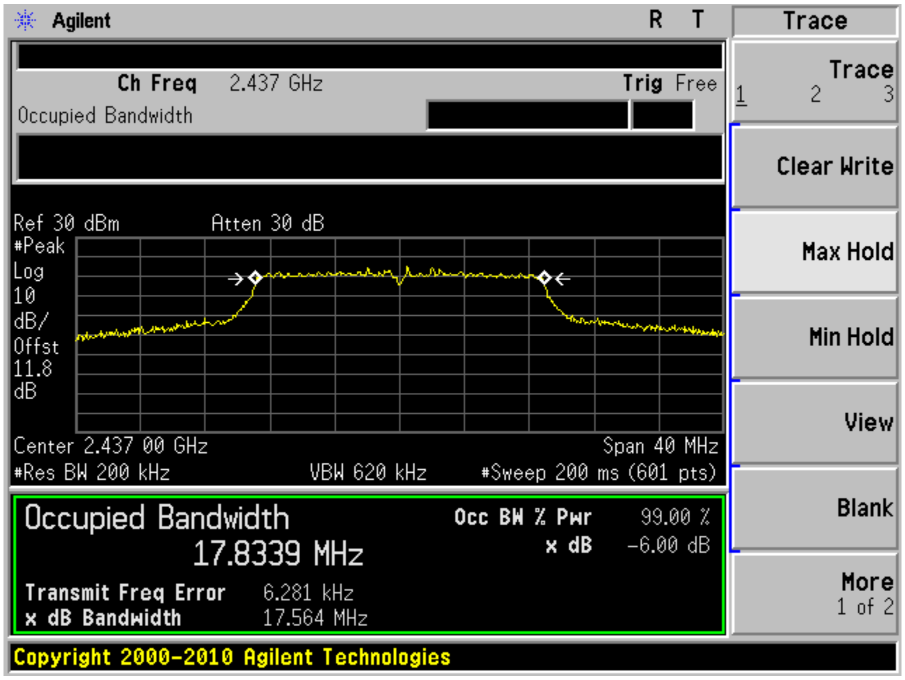


Antenna 1

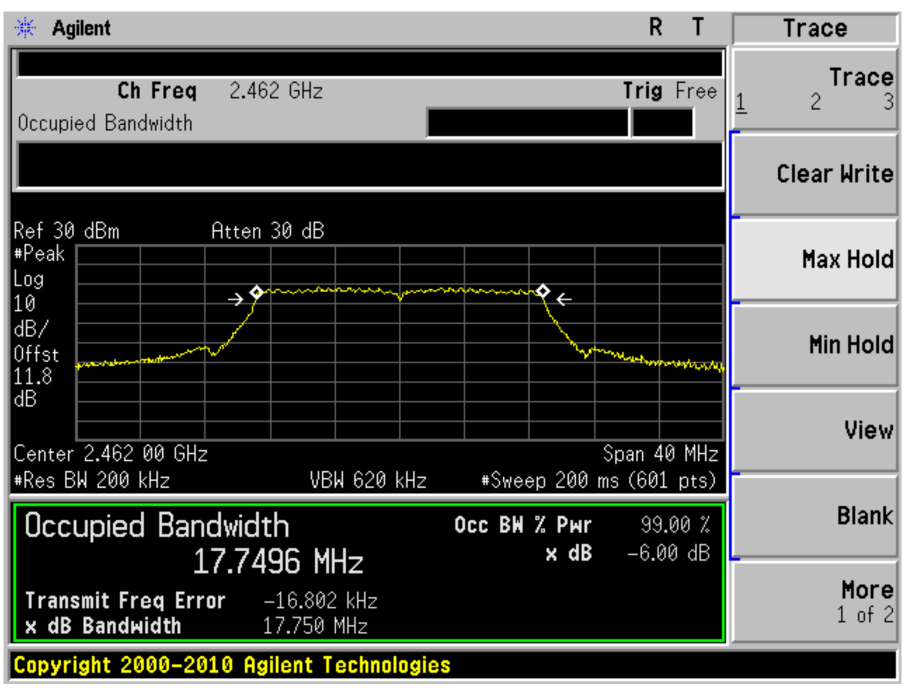
Low channel



Middle channel



High channel



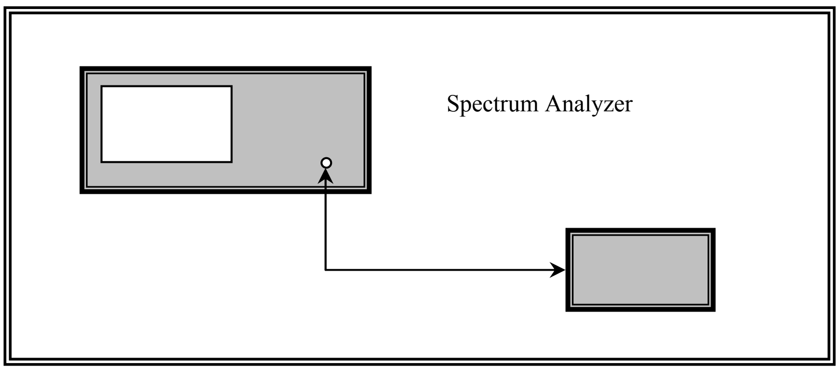
10 FCC §15.247(b) - Peak Output Power Measurement

10.1 Applicable Standard

According to FCC §15.247(b) 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	E4446A	US44300386	2011-08-11

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:	21 °C
Relative Humidity:	58%
ATM Pressure:	101.3kPa

The testing was performed by Lionel Lara on 2012-04-16 at RF Test Site.

10.5 Test Results

2.4 GHz Band:

Antenna Port	Channel	Frequency (MHz)	Conducted Output Power (dBm)
802.11b mode			
Antenna 0	Low	2412	21.2
	Middle	2437	22.52
	High	2462	22.4
Antenna 1	Low	2412	21.5
	Middle	2437	22.75
	High	2462	22.55
802.11g mode			
Antenna 0	Low	2412	20.02
	Middle	2437	22.6
	High	2462	19.56
Antenna 1	Low	2412	19.93
	Middle	2437	22.56
	High	2462	19.4
802.11n mode			
Antenna 0	Low	2412	18.72
	Middle	2437	22.74
	High	2462	18.44
Antenna 1	Low	2412	18.28
	Middle	2437	22.41
	High	2462	18.02

Ant 0 + Ant 1	Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
Combined b-mode	Low	2412	24.36	30	-5.64
	Middle	2437	25.65	30	-4.35
	High	2462	25.49	30	-4.51
Combined g-mode	Low	2412	22.99	30	-7.01
	Middle	2437	25.59	30	-4.41
	High	2462	22.49	30	-7.51
Combined n-mode	Low	2412	21.52	30	-8.48
	Middle	2437	25.59	30	-4.41
	High	2462	21.25	30	-8.75

11 FCC §15.247(d) - 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).

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	E4446A	US44300386	2011-08-11

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:	21 °C
Relative Humidity:	58%
ATM Pressure:	101.3kPa

The testing was performed by Lionel Lara on 2012-04-16 at RF Test Site.

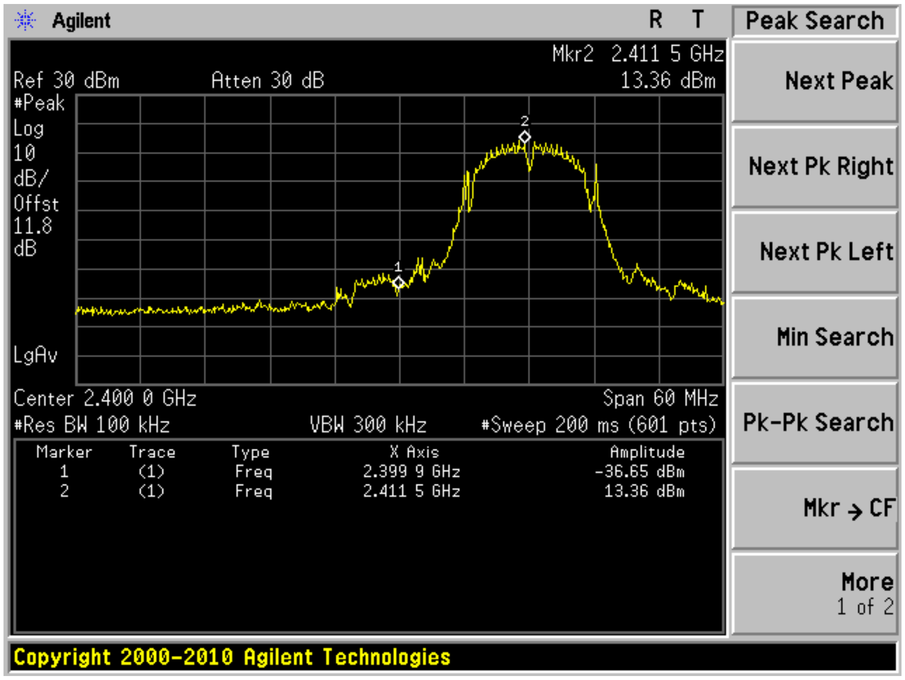
11.5 Test Results

Please refer to following pages for plots of band edge.

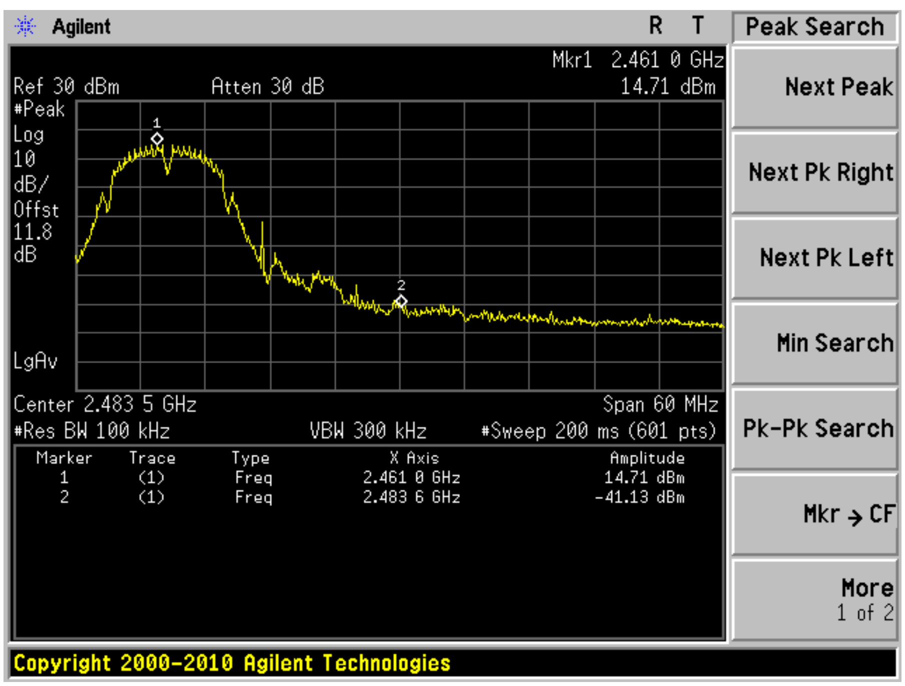
2.4 GHz 802.11b

Antenna 0

Low Band Edge

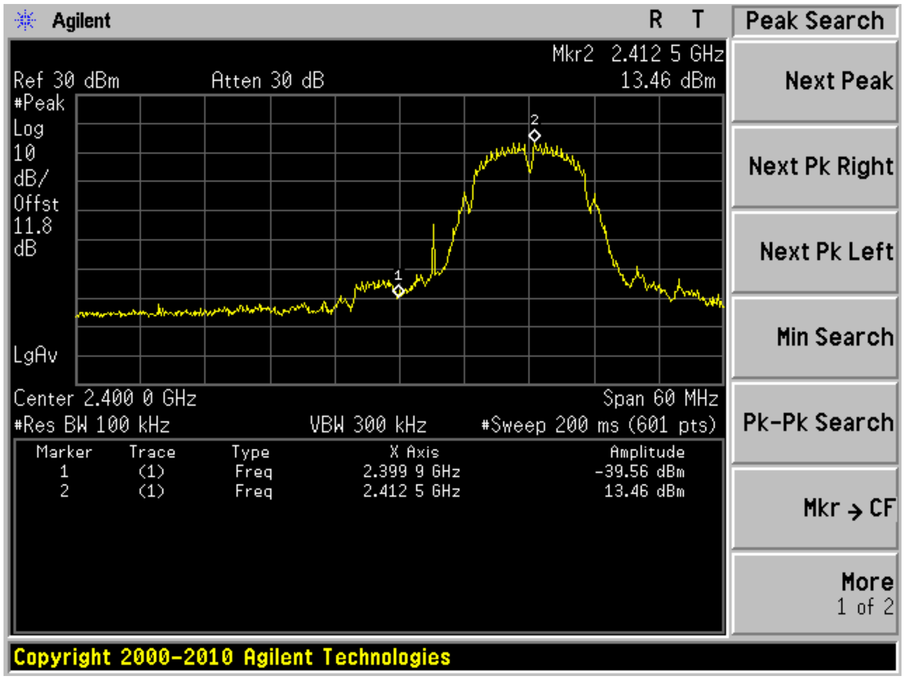


High Band Edge

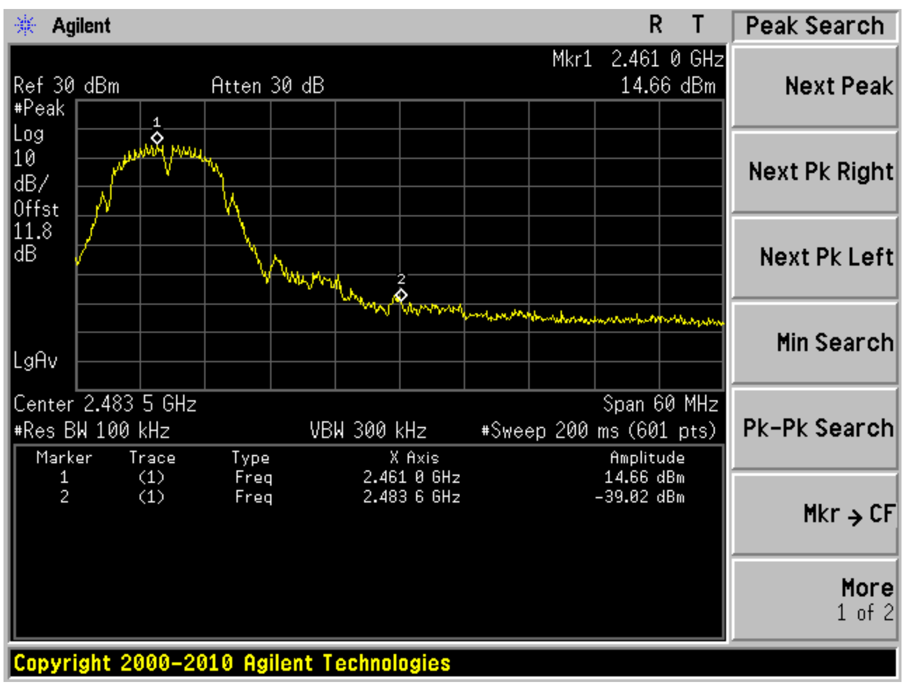


Antenna 1

Low Band Edge



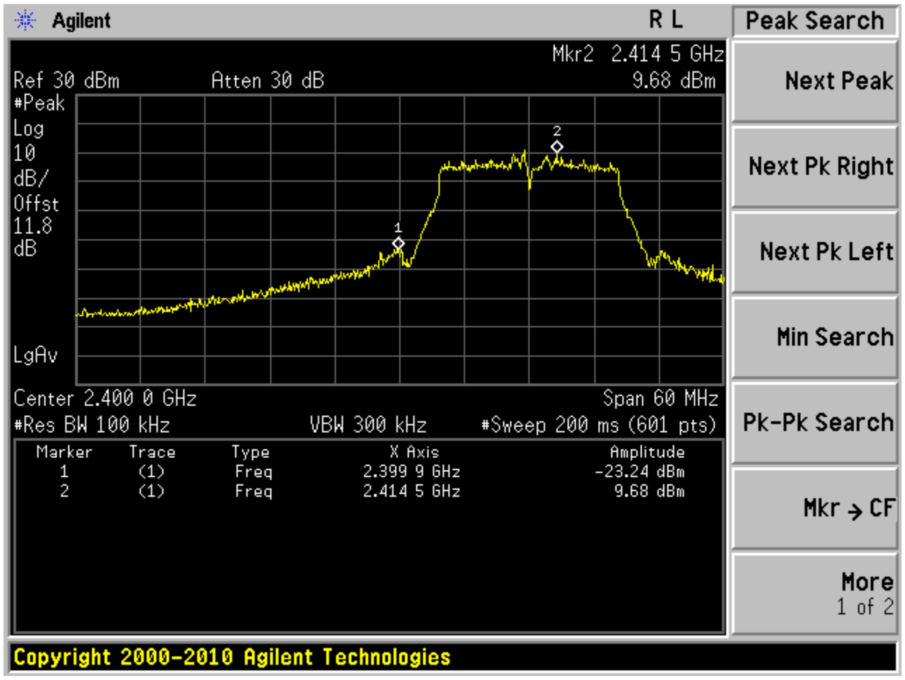
High Band Edge



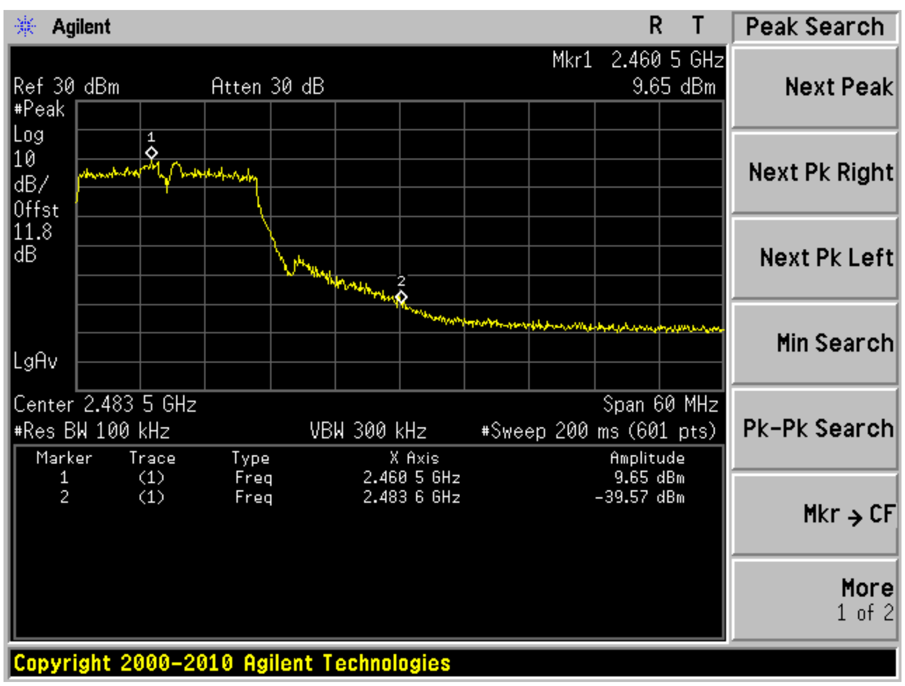
2.4 GHz 802.11g

Antenna 0

Low Band Edge

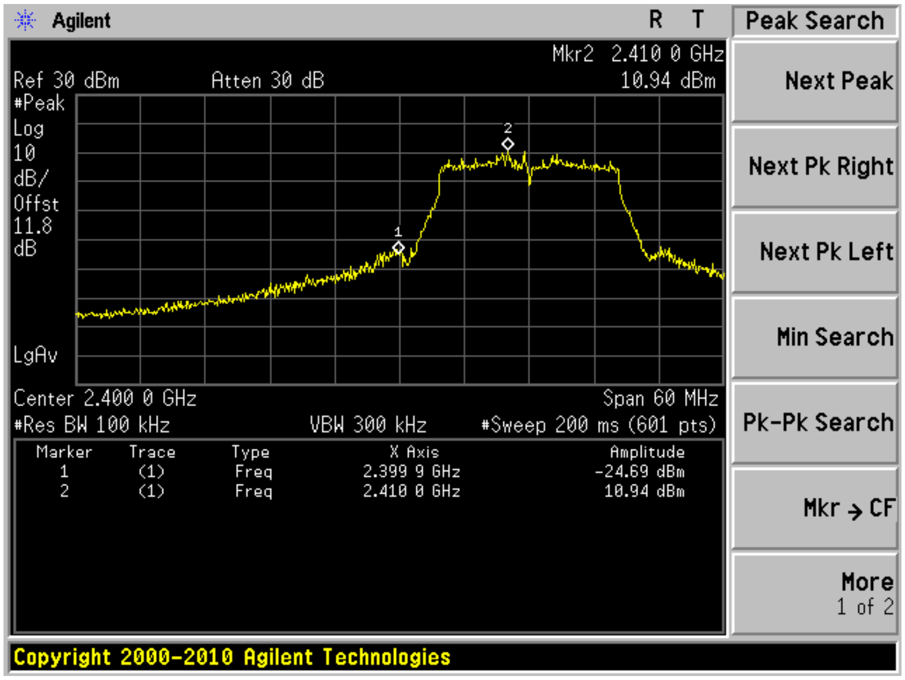


High Band Edge

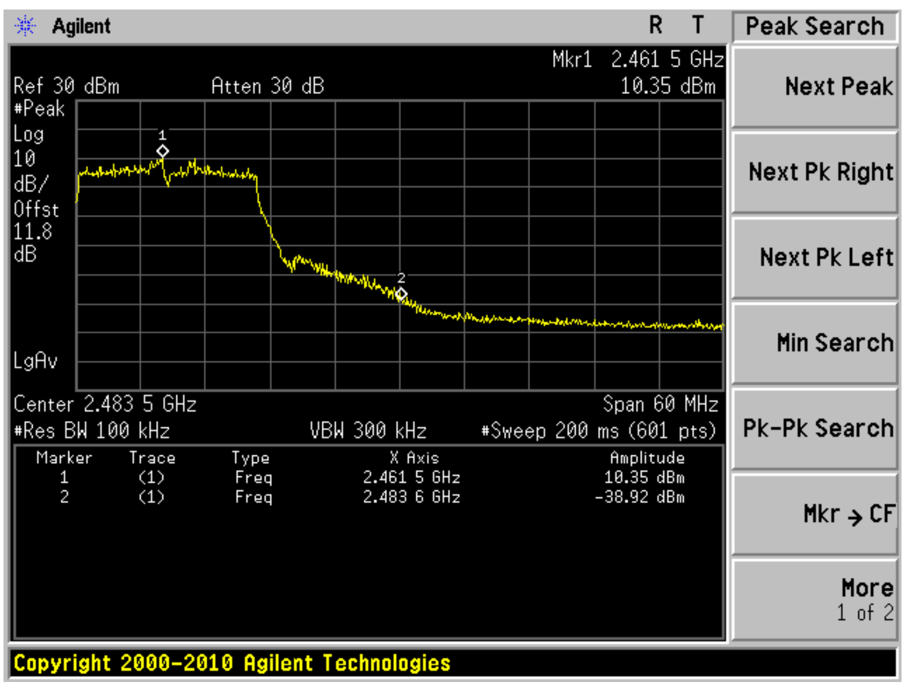


Antenna 1

Low Band Edge



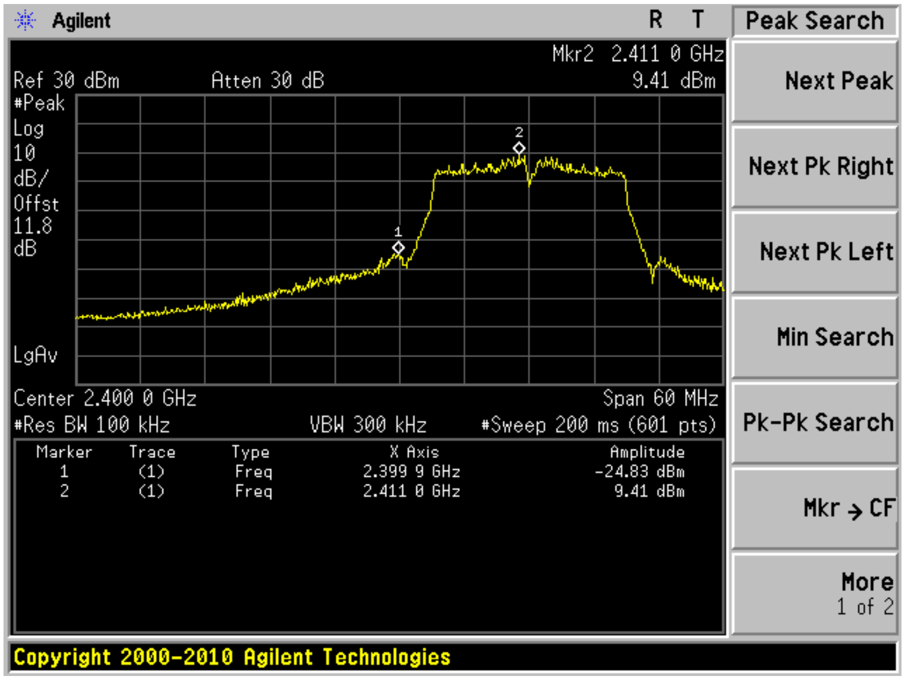
High Band Edge



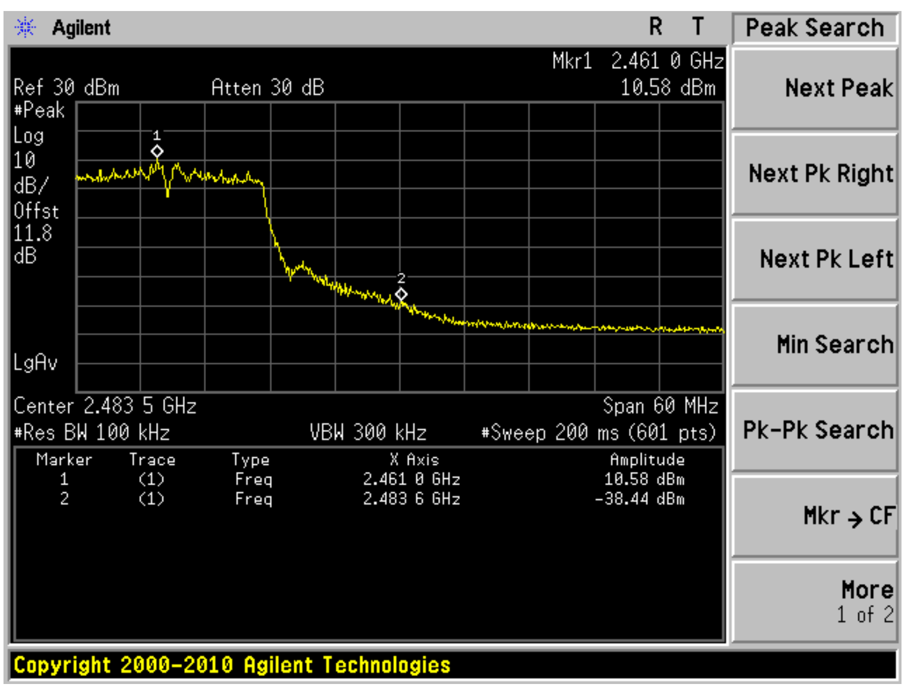
2.4 GHz 802.11n

Antenna 0

Low Band Edge

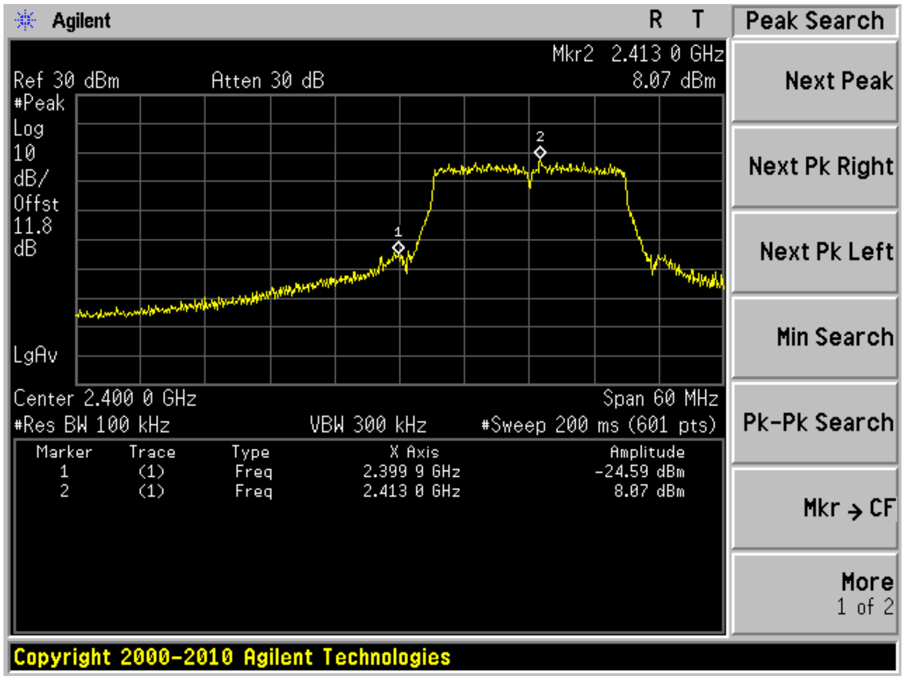


High Band Edge

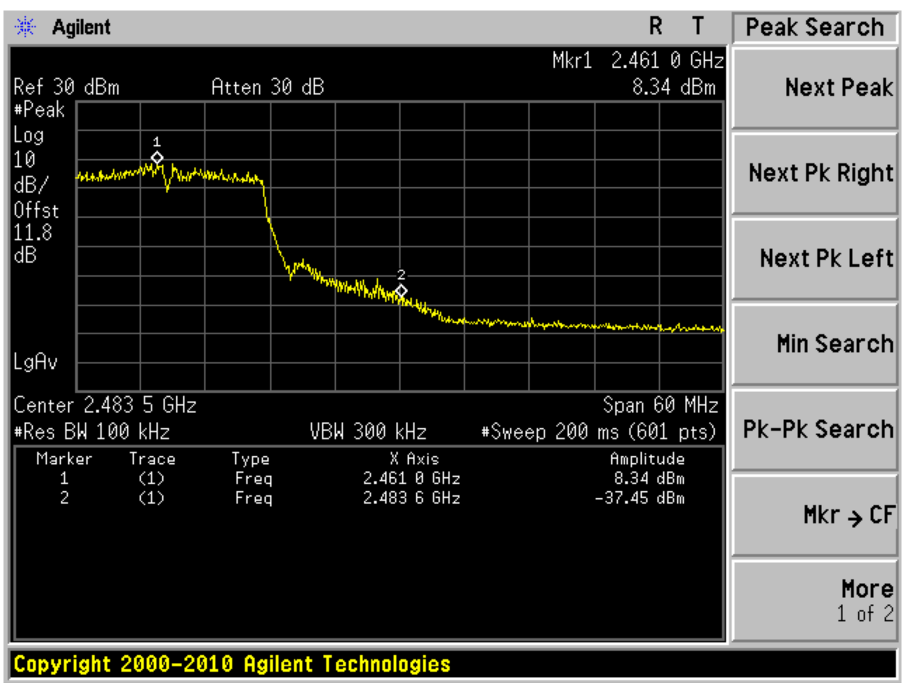


Antenna 1

Low Band Edge



High Band Edge



12 FCC §15.247(e) - Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e), 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. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (3 kHz/100 kHz = -15.2 dB).
11. The resulting peak PSD level must be ≤ 8 dBm.

12.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11

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:	21 °C
Relative Humidity:	58%
ATM Pressure:	101.3kPa

The testing was performed by Lionel Lara on 2012-04-16 at RF Test Site.

12.5 Test Results

2.4 GHz Band:

Antenna Port	Channel	Frequency (MHz)	Power Spectral Density (dBm/100kHz)	Corrected PSD (dBm/3kHz)
802.11b mode				
Antenna 0	Low	2412	13.49	-1.71
	Middle	2437	15.24	0.04
	High	2462	15.06	-0.14
Antenna 1	Low	2412	13.61	-1.59
	Middle	2437	14.73	-0.47
	High	2462	14.69	-0.51
802.11g mode				
Antenna 0	Low	2412	11.03	-4.17
	Middle	2437	14.13	-1.07
	High	2462	10.19	-5.01
Antenna 1	Low	2412	12.14	-3.06
	Middle	2437	14.70	-0.50
	High	2462	9.71	-5.49
802.11n mode				
Antenna 0	Low	2412	8.72	-6.48
	Middle	2437	14.33	-0.87
	High	2462	10.08	-5.12
Antenna 1	Low	2412	9.40	-5.80
	Middle	2437	14.11	-1.09
	High	2462	9.64	-5.56

*BWCF (Bandwidth Correction Factor) =10*log (3 kHz/100kHz) =-15.2dB*

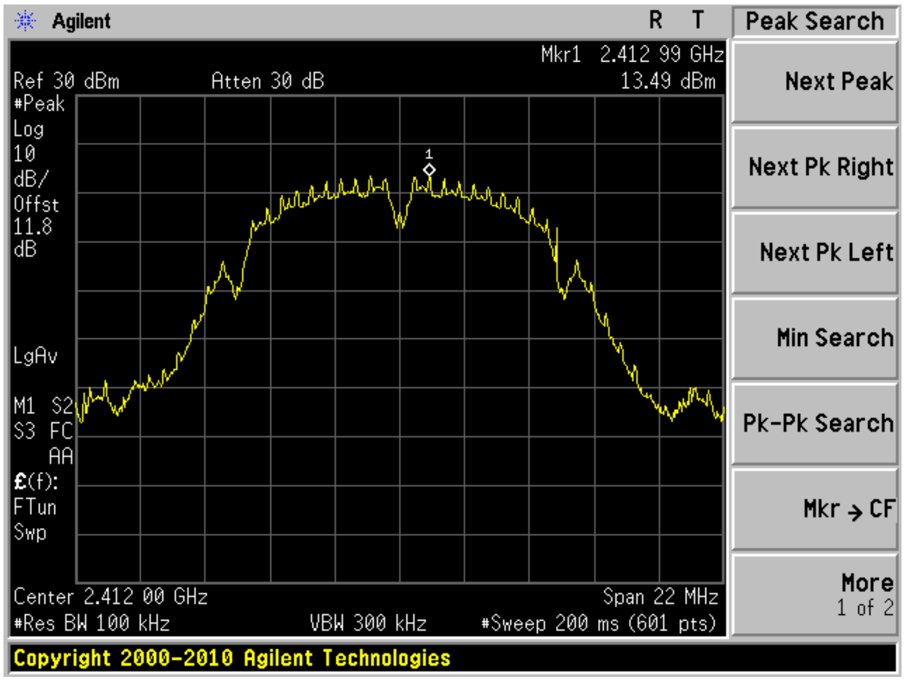
Ant 0 + Ant 1	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Results
Combined b-mode	Low	2412	1.36	8	Compliant
	Middle	2437	2.80	8	Compliant
	High	2462	2.69	8	Compliant
Combined g-mode	Low	2412	-0.57	8	Compliant
	Middle	2437	2.23	8	Compliant
	High	2462	-2.23	8	Compliant
Combined n-mode	Low	2412	-3.11	8	Compliant
	Middle	2437	2.03	8	Compliant
	High	2462	-2.32	8	Compliant

Please refer to the following plots for detailed test results:

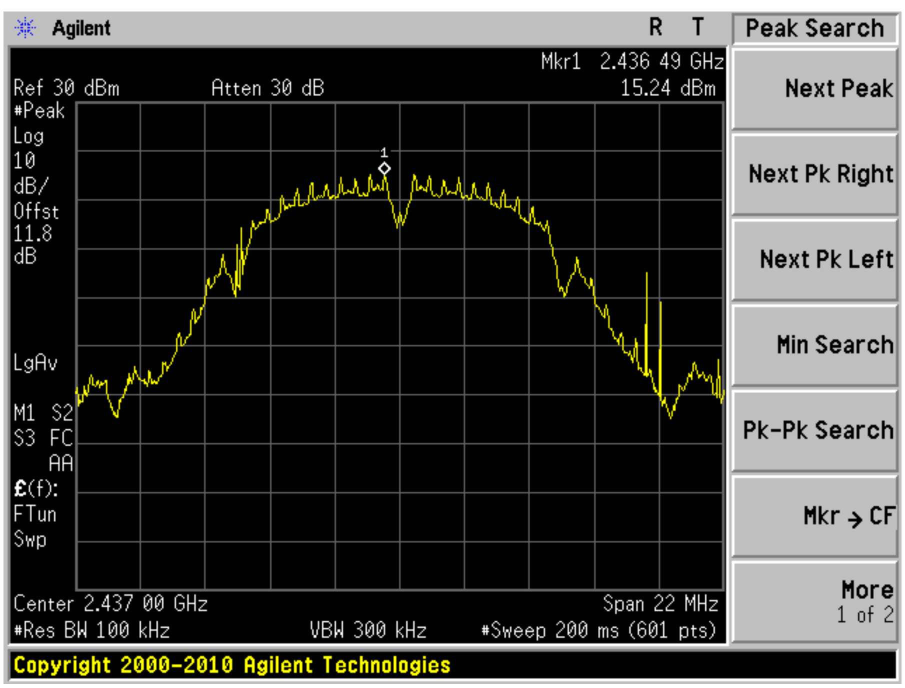
2.4 GHz 802.11b

Antenna 0

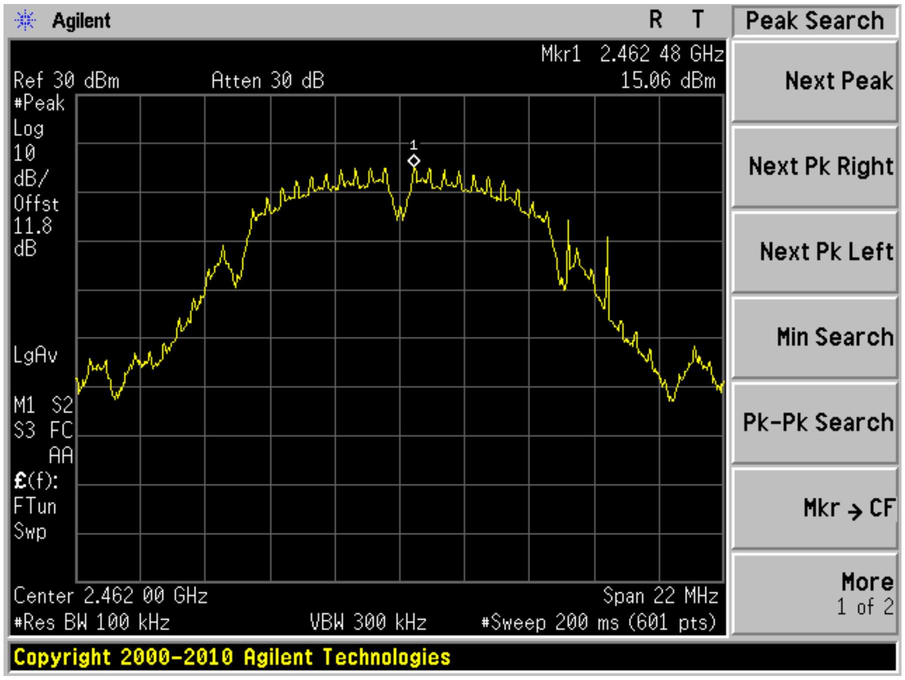
Low channel



Middle channel

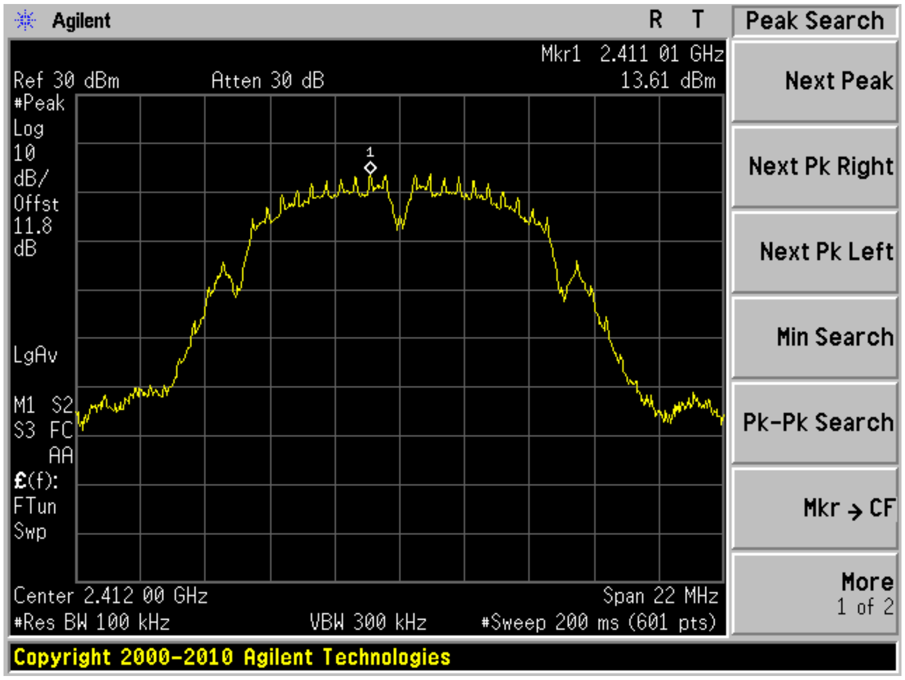


High channel

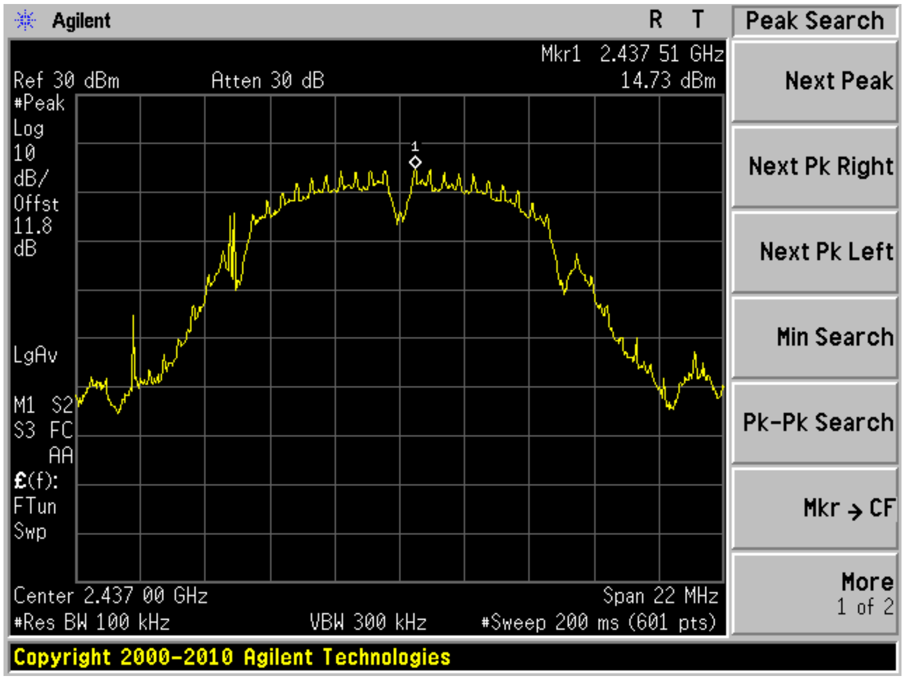


Antenna 1

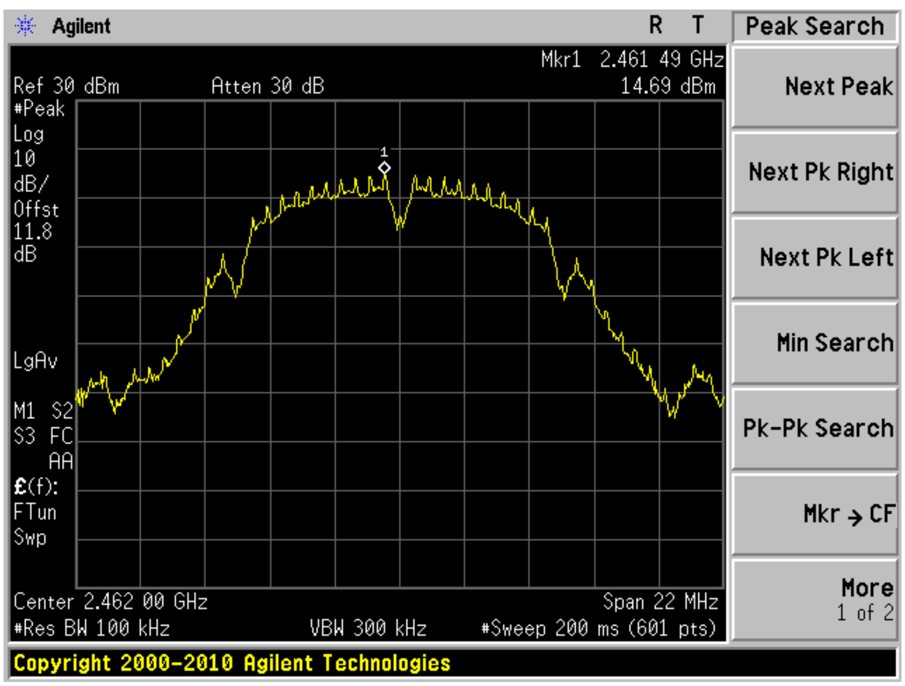
Low channel



Middle channel



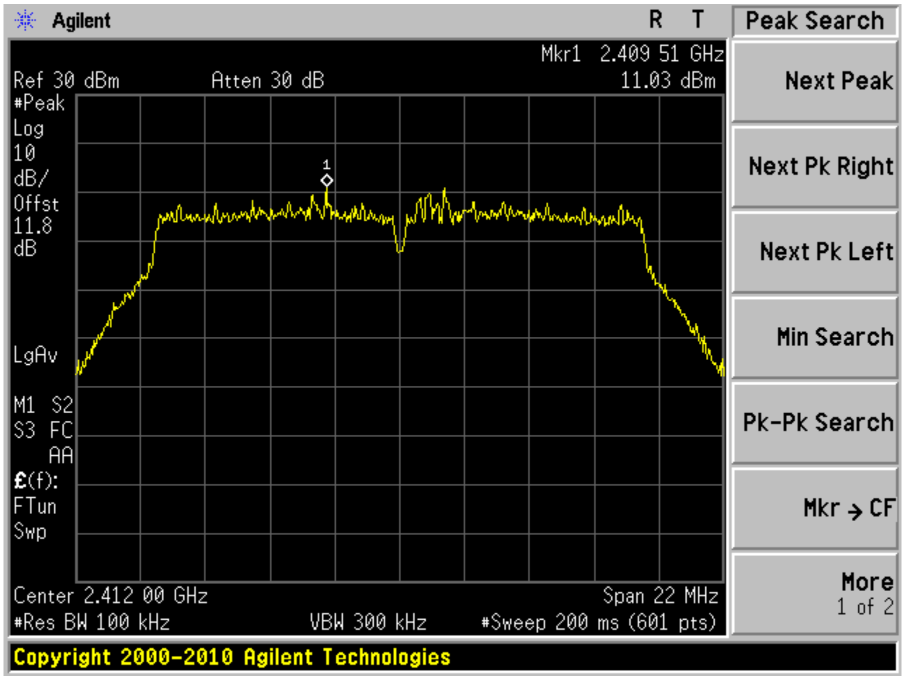
High channel



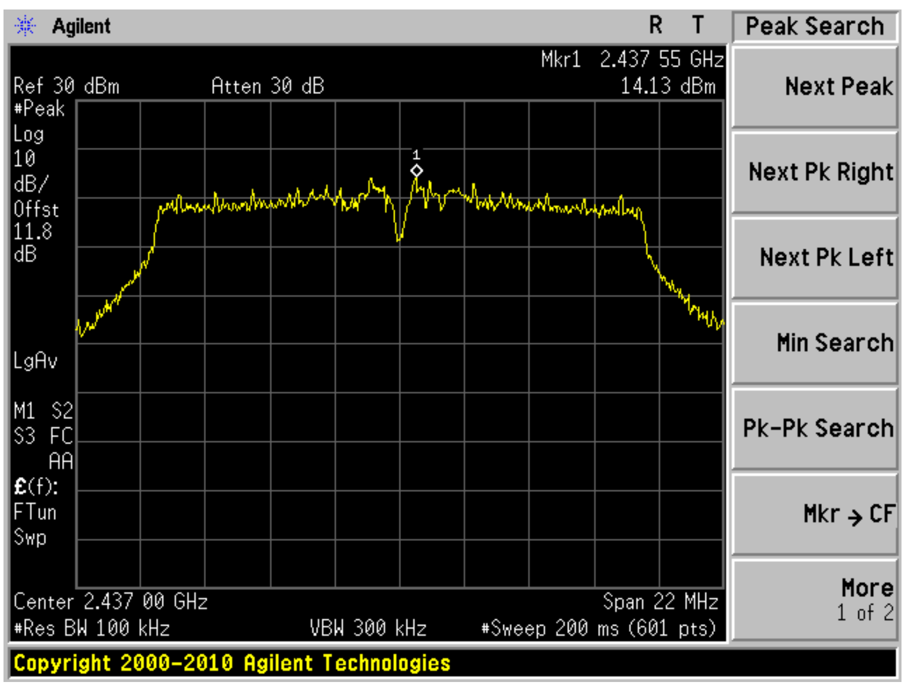
2.4 GHz 802.11g

Antenna 0

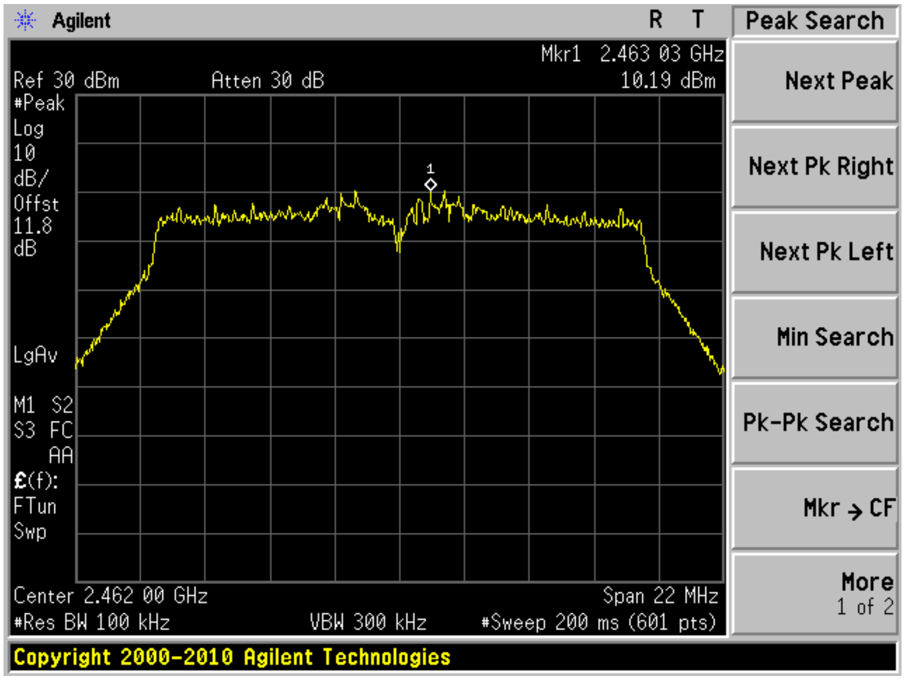
Low channel



Middle channel

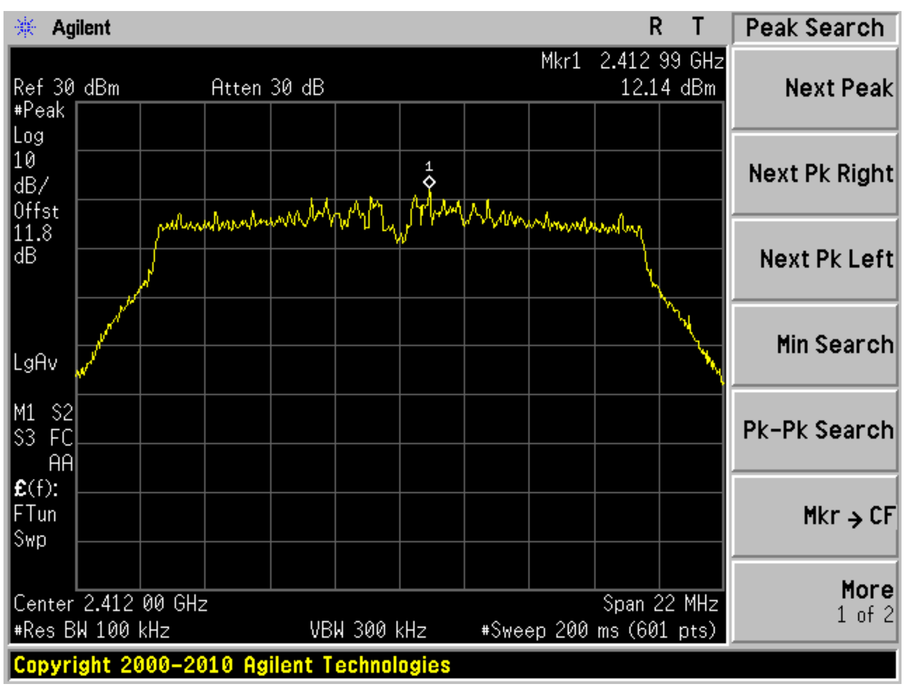


High channel

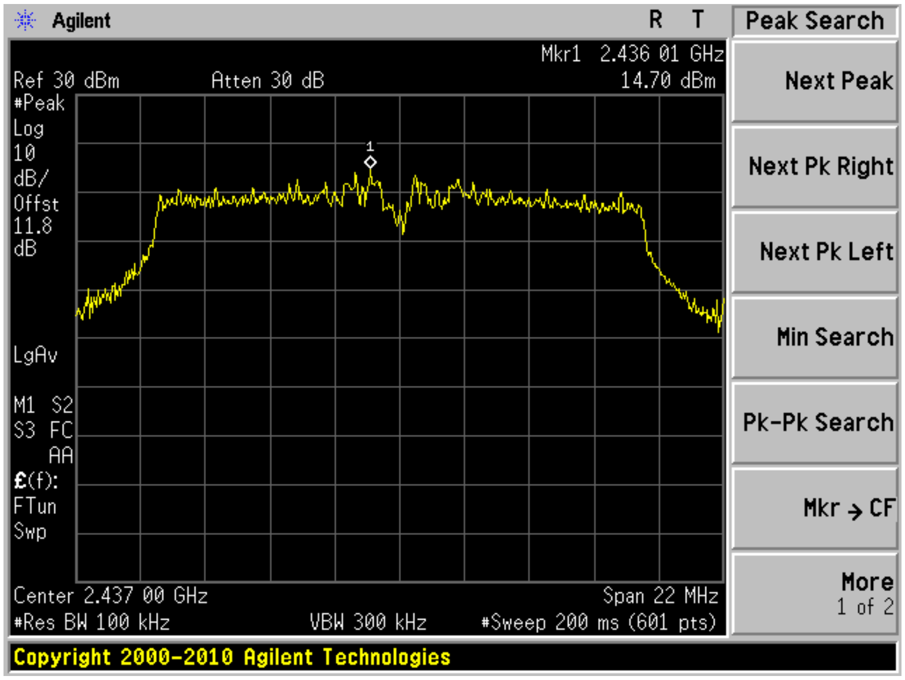


Antenna 1

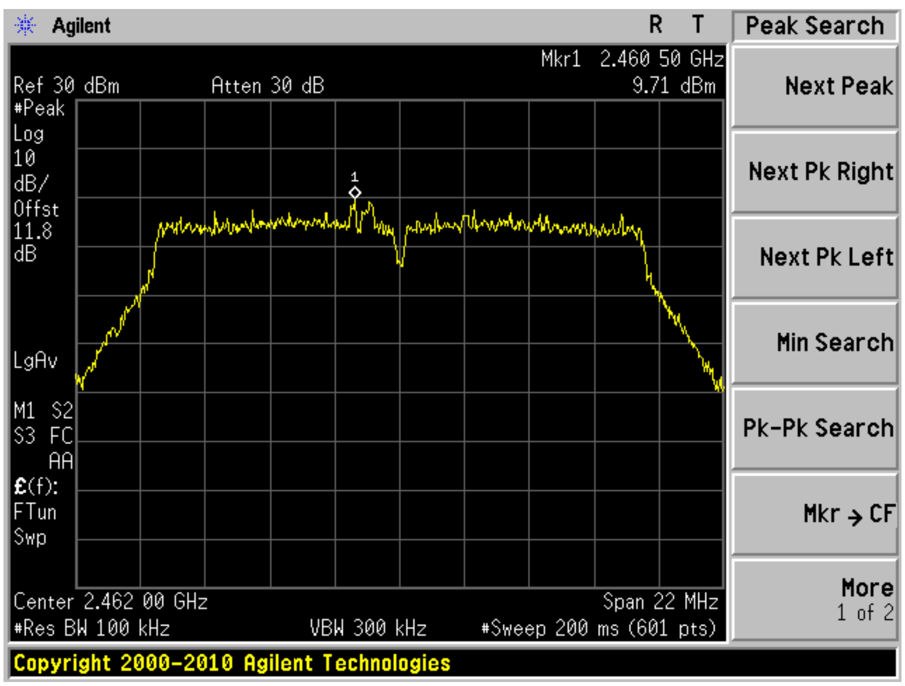
Low channel



Middle channel



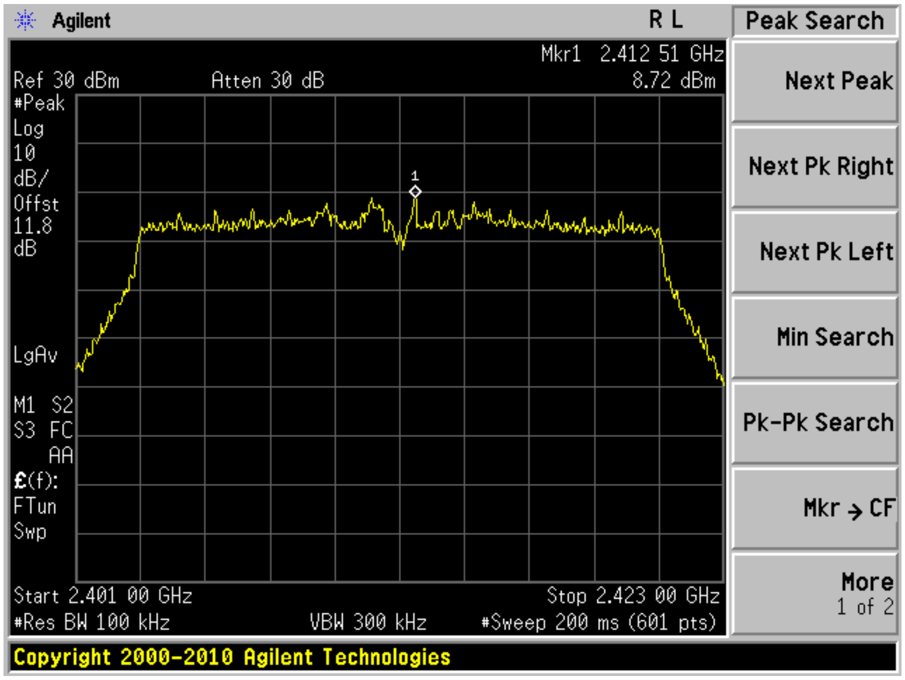
High channel



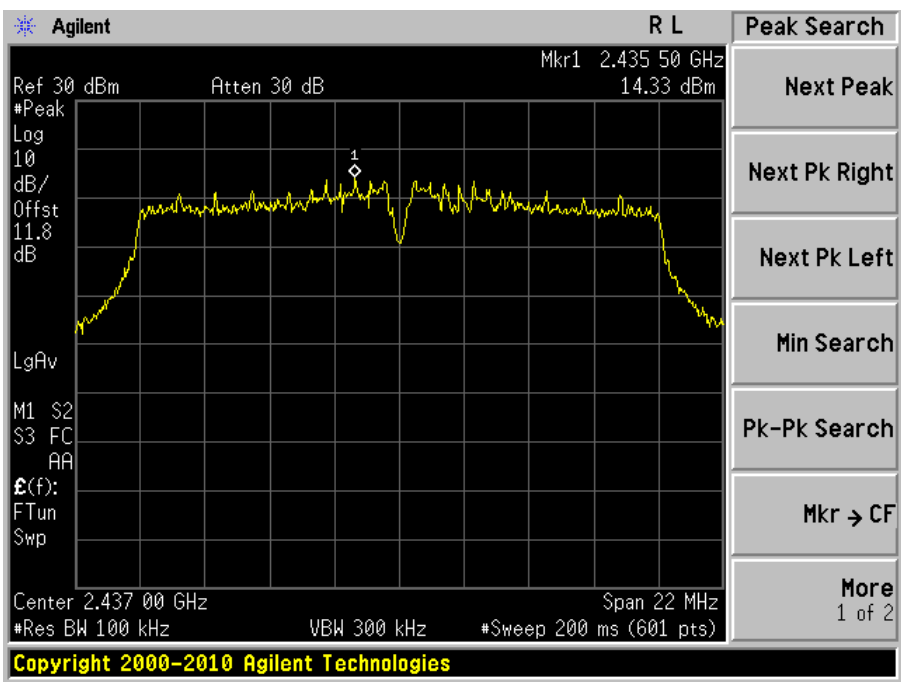
2.4 GHz 802.11n

Antenna 0

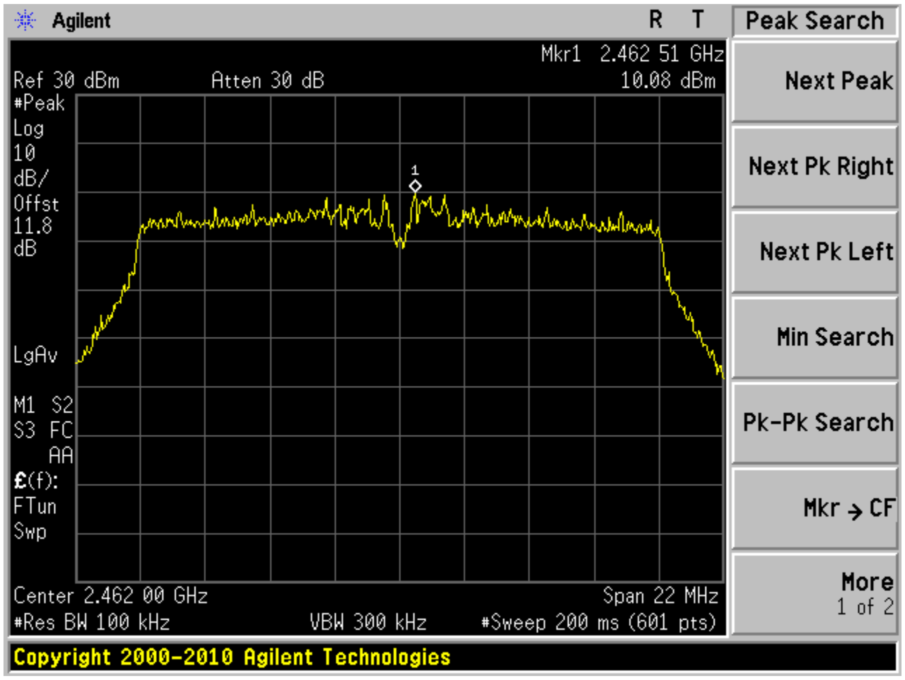
Low channel



Middle channel

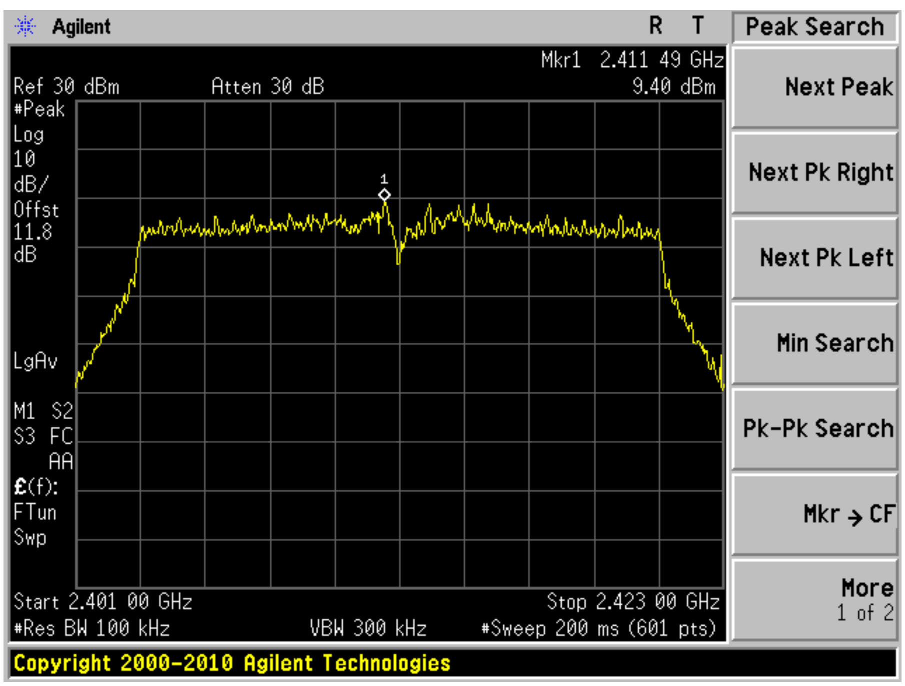


High channel

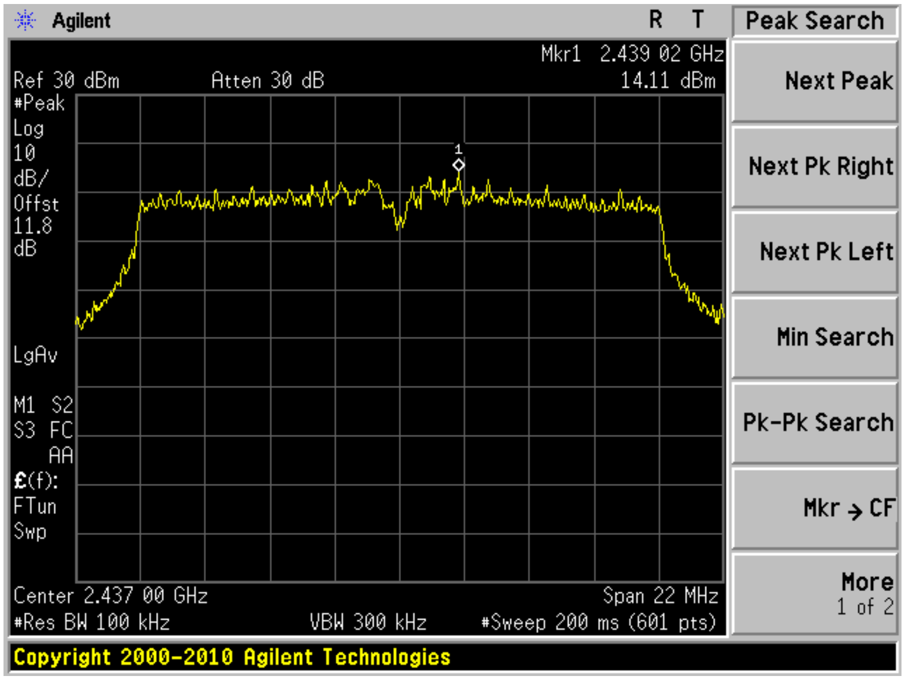


Antenna 1

Low channel



Middle channel



High channel