Lab Code: 200167-0

FCC PART 15.247

TEST AND MEASUREMENT REPORT

For

OPTION NV

Gaston Geenslaan 14, P.O. Box 3001, Leuven, Belgium

FCC ID: NCMOGS1001

Report Type:	**Product Type:**
Original Report	Wi-Fi Cradle for 3G USB Modem

Test Engineers:	Victor Zhang
Report Number:	R0904283-247
Report Date:	2009-08-03
Reviewed By:	Boni Baniqued Sr. RF Engineer
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R0904283-247	Original	2009-08-03

1 General Information

1.1 Product Description for Equipment Under Test (EUT)

The *OPTION NV* product, model: *GS1001, FCC ID: NCMOGS1001; Model: GS1001* or the "EUT" as referred to in this report, is a High speed Wi-Fi router cradle for all major USB modems. The EUT is powered by an AC/DC Adapter.

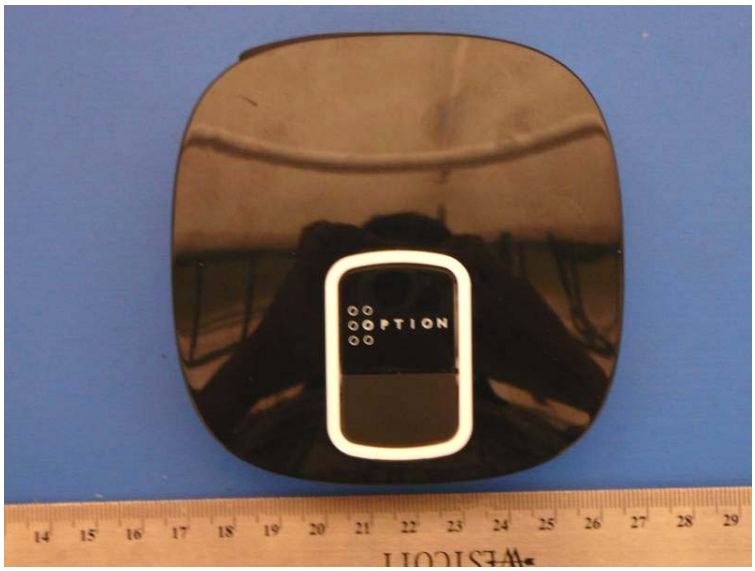
Adapter: SWITCHING POWER SUPPLY
Model: PSA15R-050P;
Input: AC 100-240V~50/60Hz, 0.5A;
Output: DC 5V, 3A.

1.2 Mechanical Description of EUT

The EUT measures approximately *9.4 cm L x 9.4 cm W x 2.2 cm H and* weighs approximately *120 g*.

**All measurement and test data in this report was gathered from production sample serial number: 000CE368AF77.*

1.3 EUT Photo



Please refer to Exhibit C for more EUT photographs.

1.4 Objective

This original measurement and test report is prepared on behalf of *OPTION NV* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC standards, rules and limits for this device including:

- RF Exposure
- Antenna Requirement
- Conducted Emissions
- Spurious Emissions at Antenna Port
- Radiated Spurious Emissions
- Restricted Band
- Receiver Spurious Emissions
- 6 dB Bandwidth & 99% Bandwidth
- Maximum Peak Output Power
- 100 kHz Bandwidth of Frequency Band Edge
- Power Spectral Density

1.5 Related Submittal(s)/Grant(s)

No Related Submittals.

1.6 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.

1.7 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 $\pm$2.0 for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

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.

1.8 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 C63.4-2003.

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: C-2463 and R-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 C63.4-2003.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test with the host model: Q1000.

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

Firmware Vision: 210.124.1, The EUT had been tested with the following data rate settings (worst case):

Radio Mode	Bandwidth (MHz)	Frequency/Data rate		
		Low Channel (MHz/Mbps)	Middle Channel (MHz/Mbps)	High Channel (MHz)
802.11b	20	2412/1	2437/1	2462/1
802.11g	20	2412/6	2437/6	2462/6
802.11n	20	2412/6.5	2437/6.5	2462/6.5
802.11n	40	2422/13	2437/13	2452/13

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 EUT Internal Configuration Details

Manufacturers	Descriptions	Models	Serial Numbers
Aztech System Ltd.	PCB Board	T970 030 6152K-A	-

2.5 Local Support Equipment

Manufacturers	Descriptions	Models	Serial Numbers
IBM	Laptop	T41	-

2.6 Power Supply

Manufacturers	Descriptions	Models	Serial Numbers
PHIHONG	AC/DC Power Adapter	PSA15R-050P	P81900184A3

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
Unshielded CAT5 cable	1	EUT	Laptop
RF cable	< 3m	Output/ EUT	Spectrum Analyzer

2.8 Special Accessories

Manufacturer	Description	Model	FCC ID
OPTION NV	3G Network Modem	ICON451	NCMOGI0451
OPTION NV	3G Network Modem	GI0431	NCMOGI0411

Both models are quad band GSM/GPRS/EGPRS/UMTS USB modem.

According to the FCC report (FCC ID: NCMOGI0411 & FCC ID: NCMOGI0451), the USB modem has the ERP/EIRP for GSM/GPRS/EGPRS/UMTS as followed:

Model: ICON451, FCC ID: NCMOGI0451

850 MHz Band, ERP

GSM/GPRS/EGPRS:

Channel	Frequency (MHz)	GSM	GPRS	EGPRS
Low	824.2	29.5	26.7	24.2
Mid	836.6	30.1	27.2	25.3
High	848.8	**30.1**	27.3	25.4

HSDPA:

Channel	Frequency (MHz)	HSDPA Sub-test 1	HSDPA Sub-test 2	HSDPA Sub-test 3	HSDPA Sub-test 4	RMS 12.2 kbps
Low	824.4	23.8	24.0	24.0	24.1	24.1
Mid	836.4	22.1	22.6	22.7	22.9	23.1
High	848.6	22.6	23.2	23.4	23.3	24.1

HSUPA:

Channel	Frequency (MHz)	HSUPA Sub-test 1	HSUPA Sub-test 2	HSUPA Sub-test 3	HSUPA Sub-test 4	HSUPA Sub-test 5
Low	826.4	24.5	24.1	24.2	23.7	24.4
Mid	836.4	23.5	23.0	22.9	23.1	22.2
High	846.6	**24.7**	24.1	24.2	24.1	24.3

Model: GI0431, FCC ID: NCMOGI0411

1900 MHz Band, EIRP

GSM/GPRS/EGPRS:

Channel	Frequency (MHz)	GSM	GPRS	EGPRS
Low	1850.2	-	28.09	28.30
Mid	1879.8	-	28.10	**28.32**
High	1909.8	-	28.09	28.30

HSDPA:

Channel	Frequency (MHz)	HSDPA Sub-test 1	HSDPA Sub-test 2	HSDPA Sub-test 3	HSDPA Sub-test 4	RMS 12.2 kbps
Low	1852.4	22.60	23.21	23.45	23.21	23.21
Mid	1880	22.78	23.51	23.70	23.42	23.33
High	1907.5	**23.96**	23.30	23.51	23.33	23.33

HSUPA

Channel	Frequency (MHz)	HSUPA Sub-test 1	HSUPA Sub-test 2	HSUPA Sub-test 3	HSUPA Sub-test 4	HSUPA Sub-test 5
Low	1852.4	23.36	23.21	23.54	22.72	23.57
Mid	1880	23.57	23.63	23.91	22.96	24.00
High	1907.5	23.42	23.42	23.76	22.50	23.70

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & RSS-210 Rules	Description of Test	Result	Note
FCC §15.247 (i) and §2.1091	RF Exposure	Compliant	-
FCC §15.203	Antenna Requirement	Compliant	-
FCC §15.207	Conducted Emissions	Compliant	-
FCC §2.1051 & §15.247(d)	Spurious Emissions at Antenna Port	Compliant	-
FCC §15.109, §15.205, §15.209 & §15.247(c)	Radiated Spurious Emissions	Compliant	-
FCC §15.205	Restricted Band	Compliant	-
§15.109, 15.209 (a) & §15.247(d)	Spurious Emissions	Compliant	-
§15.247 (a)(2)	6 dB Bandwidth & 99% Bandwidth	Compliant	-
§15.247 (b)(3)	Maximum Peak Output Power	Compliant	-
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliant	-
§15.247 (e)	Power Spectral Density	Compliant	-

4 FCC §15.247(i), § 2.1091 - RF Exposure

4.1 Applicable Standard

According to §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.

According to §1.1310 and §2.1091 RF exposure is calculated.

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 page 18 of 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

Mode	Frequency Band	Predicted Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mw/cm^2)	Result
802.11b/g	2.4 GHz	20	16.29	2.43	0.0148	Compliance
802.11n	2.4 GHz	20	16.26	5.43	0.0293	Compliance

The MAX predicted power density level at 20 cm is 0.0293 mw/cm^2 for FCC which is below the uncontrolled exposure limit of 1.0 mW/cm2. The EUT is used at least 20 cm away from user's body. It is determined as mobile equipment and complies with the MPE limit.

5 FCC §15.203 - Antenna Requirement

5.1 Applicable Standard

According to § 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 § 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

EUT has two Transmitter/Receiver antennae which are both internal chip antenna. The Transmitter antenna has a max gain of 2.43 dBi which fulfills the requirements of FCC rules.

Frequency Band	Antenna 0 Gain (dBi)	Antenna 1 Gain (dBi)	Maximum Effective Gain (dBi)
2.4 ~ 2.5 GHz	2.43	2.43	5.43

5.3 Antenna Detail Photo

Antenna A

Antenna B

6 FCC §15.207 - Conducted Emissions

6.1 Applicable Standard

Section 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 at shield room, using the setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC limits.

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

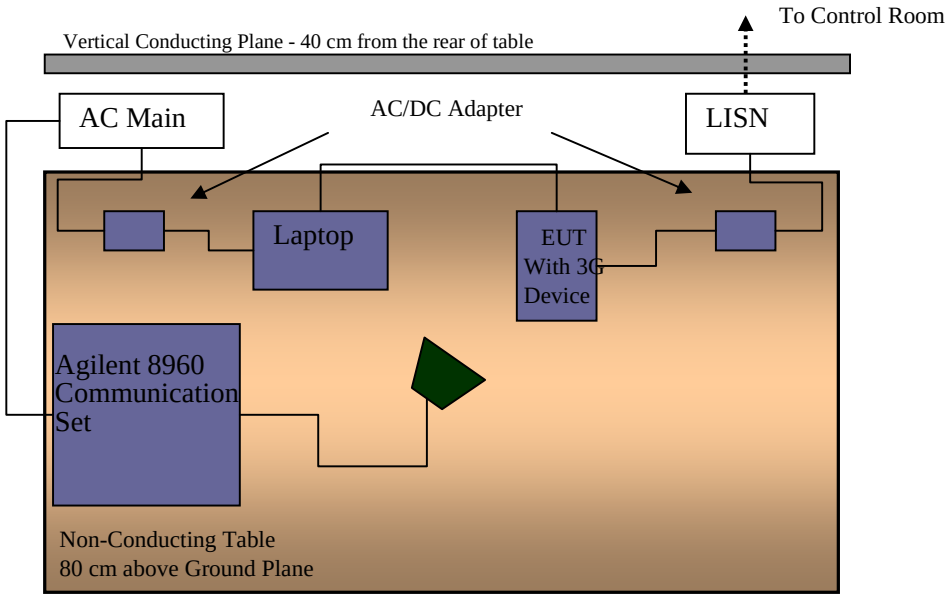
The host AC/DC power adapter was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics	LISN	9252-50-R-24-N	511205	2009-06-09
Agilent	Communication Analyzer	E5515C	GB44051221	2009-04-23
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2009-02-28

*** 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-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:	22-24º C
Relative Humidity:	35-45%
ATM Pressure:	101.1-102.5kPa

***Testing was performed by Victor Zhang from 2009-07-03 to 2009-07-27 in 5 meter chamber #3.*

6.7 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 *worst* margin reading of:

WLAN Only

Worst Case: 802.11b mode, Middle Channel, 2437 MHz.

Mode: 120V/60 Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-15.45	0.152847	Neutral	0.15-30

Co-Location

Worst Case: 802.11b Middle Channel 2437 MHz, 1Mbps, Channel #6
With FCCID: NCMOGI0411 GSM 1900 MHz, Low Channel 1850.2 MHz

Mode: 120V/60 Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-16.34	0.180513	Neutral	0.15-30

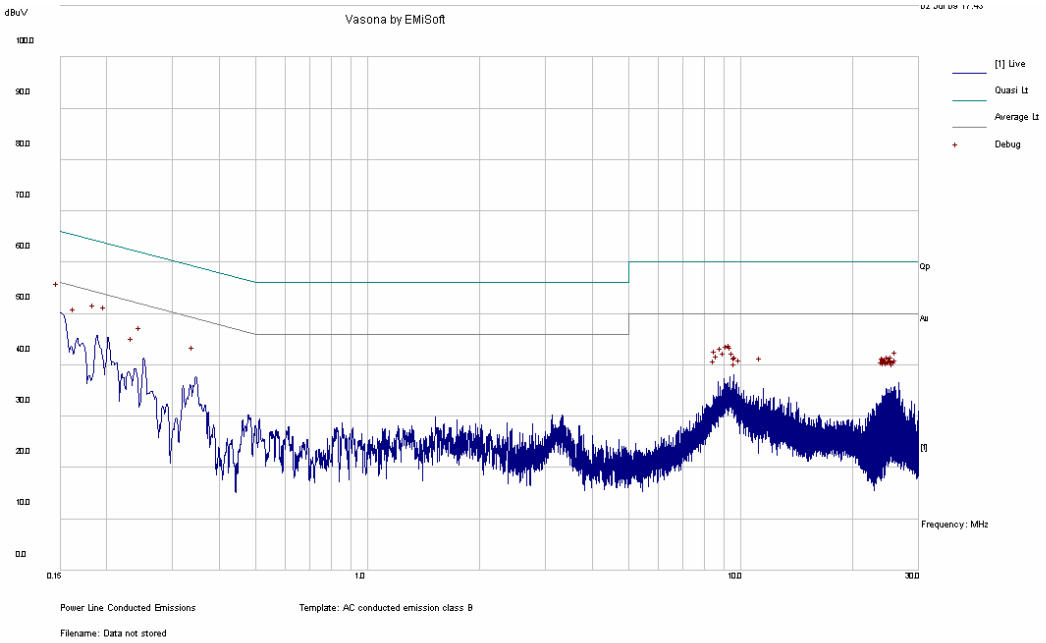
6.8 Conducted Emissions Test Plots and Data

Please refer to the following plots and data.

WLAN Only

Worst Case, 802.11b, Middle Channel

120V/60 Hz, Line



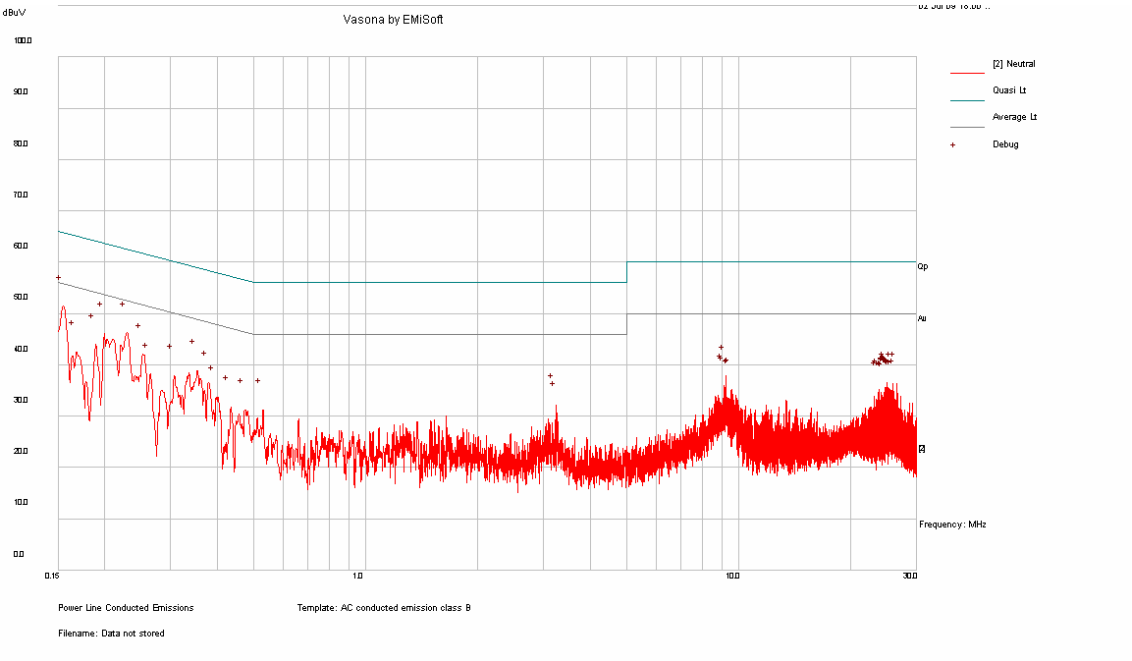
Quasi-Peak Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.151080	49.57	Quasi-Peak	L	65.94	-16.37
0.150155	49.04	Quasi-Peak	L	65.99	-16.96
0.172917	46.73	Quasi-Peak	L	64.82	-18.09
0.184557	41.64	Quasi-Peak	L	64.28	-22.64
0.232764	39.38	Quasi-Peak	L	62.35	-22.97
0.335361	34.83	Quasi-Peak	L	59.32	-24.49

Average Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.151080	31.53	Average	L	55.94	-24.41
0.150155	30.69	Average	L	55.99	-25.3
0.335361	23.81	Average	L	49.32	-25.51
0.232764	25.70	Average	L	52.35	-26.65
0.172917	26.88	Average	L	54.82	-27.94
0.184557	21.62	Average	L	54.28	-32.66

120V/60 Hz, Neutral



Quasi-Peak Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.152847	50.39	Quasi-Peak	N	65.84	-15.45
0.213195	42.90	Quasi-Peak	N	63.08	-20.18
0.187191	42.97	Quasi-Peak	N	64.16	-21.19
0.185478	42.65	Quasi-Peak	N	64.24	-21.58
0.345780	35.72	Quasi-Peak	N	59.06	-23.34
0.244962	37.33	Quasi-Peak	N	61.93	-24.60

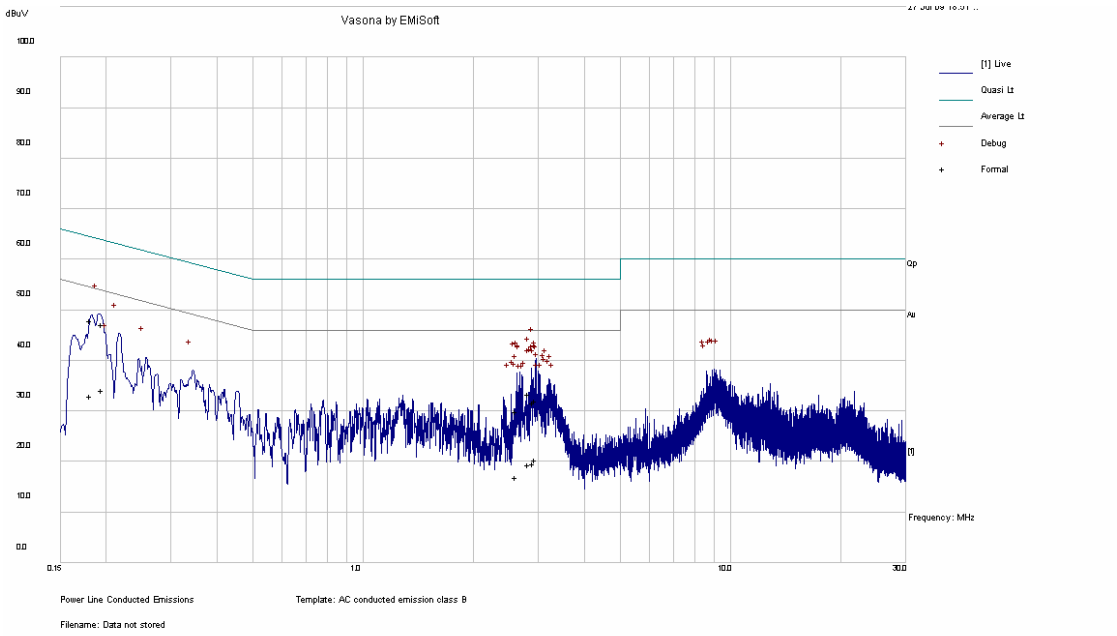
Average Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.345780	24.51	Average	N	49.06	-24.55
0.152847	28.99	Average	N	55.84	-26.86
0.213195	25.87	Average	N	53.08	-27.21
0.244962	21.55	Average	N	51.93	-30.37
0.187191	23.71	Average	N	54.16	-30.45
0.185478	21.43	Average	N	54.24	-32.81

Co-Location (WLAN & 3G)

Worst Case: 802.11b Middle Channel 2437 MHz, 1Mbps, Channel #6
With FCCID: NCMOGI0411 GSM 1900 MHz, Low Channel 1850.2 MHz

120V/60 Hz, Line



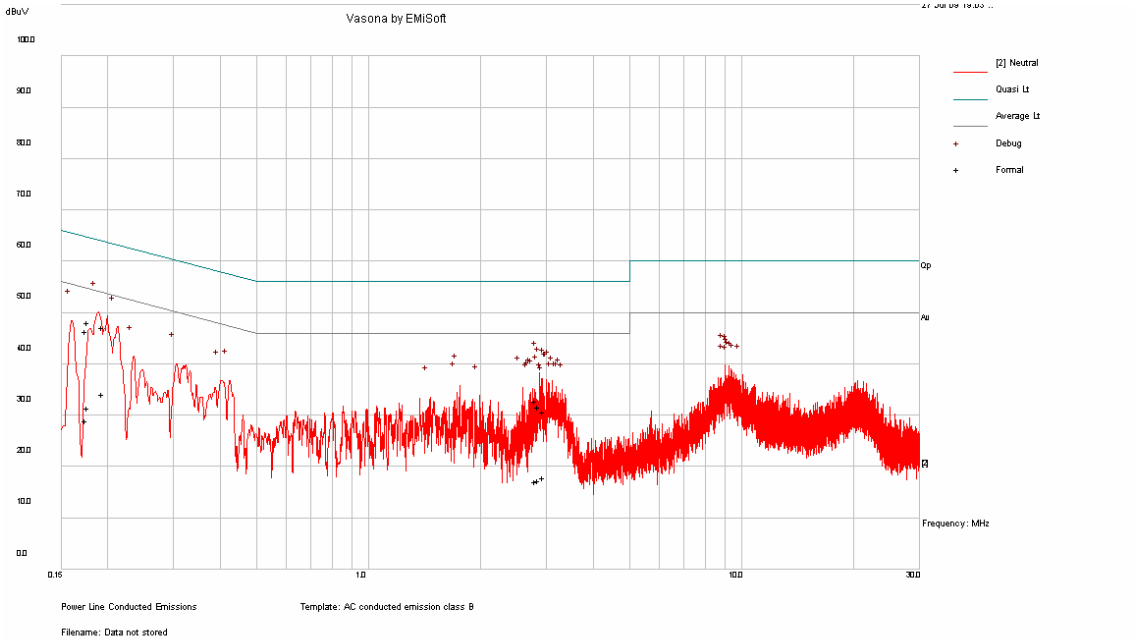
Quasi-Peak Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.185328	47.82	Quasi-Peak	L	64.24	-16.42
0.198603	47.20	Quasi-Peak	L	63.67	-16.47
2.877950	33.31	Quasi-Peak	L	56.00	-22.69
3.006422	32.06	Quasi-Peak	L	56.00	-23.94
2.956129	31.62	Quasi-Peak	L	56.00	-24.38
2.657983	29.85	Quasi-Peak	L	56.00	-26.15

Average Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.198603	34.05	Average	L	53.67	-19.61
0.185328	32.89	Average	L	54.24	-21.35
3.006422	20.37	Average	L	46.00	-25.63
2.956129	19.60	Average	L	46.00	-26.40
2.877950	19.37	Average	L	46.00	-26.63
0.198603	34.05	Average	L	53.67	-19.61

120V/60 Hz, Neutral



Quasi-Peak Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.180513	48.12	Quasi-Peak	N	64.46	-16.34
0.197574	47.18	Quasi-Peak	N	63.71	-16.54
0.178263	46.34	Quasi-Peak	N	64.57	-18.22
2.865410	32.78	Quasi-Peak	N	56.00	-23.22
2.909580	31.68	Quasi-Peak	N	56.00	-24.32
3.003712	30.75	Quasi-Peak	N	56.00	-25.25

Average Measurement

Frequency (MHz)	Corrected Reading (dBuV)	Measurement Type	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.197574	34.12	Average	N	53.71	-19.59
0.180513	31.42	Average	N	54.46	-23.04
0.178263	28.98	Average	N	54.57	-25.58
3.003712	17.85	Average	N	46.00	-28.15
2.909580	17.26	Average	N	46.00	-28.74
2.865410	17.04	Average	N	46.00	-28.96

7 FCC §2.1051 & §15.247(d) - Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For §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.

Requirements: CFR 47, §2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1057.

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	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27

*** 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

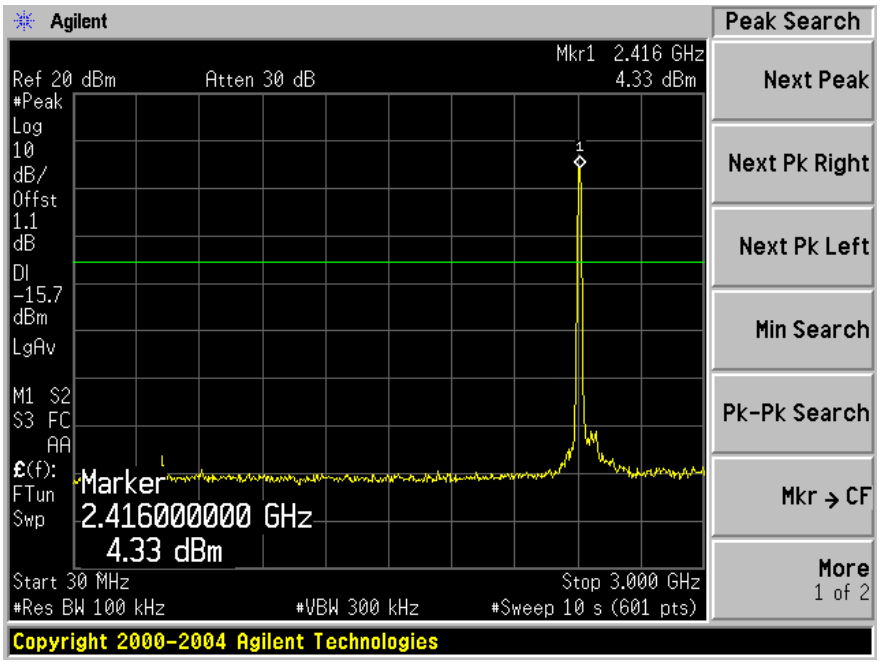
Temperature:	18-22 °C
Relative Humidity:	40-44 %
ATM Pressure:	101-103kPa

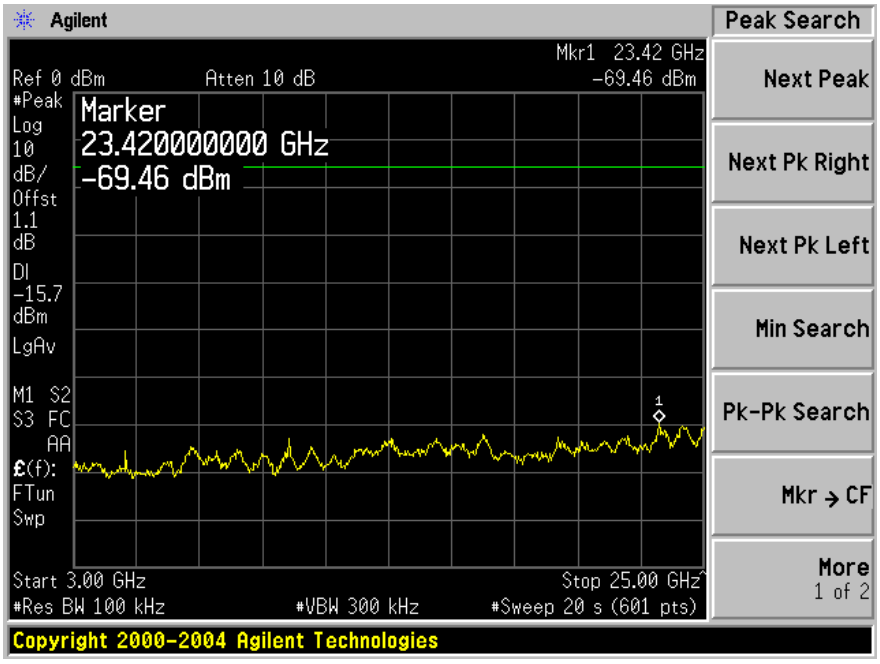
**The testing was performed by Victor Zhang from 2009-07-17 to 2009-07-24 at RF Site.*

7.5 Measurement Result

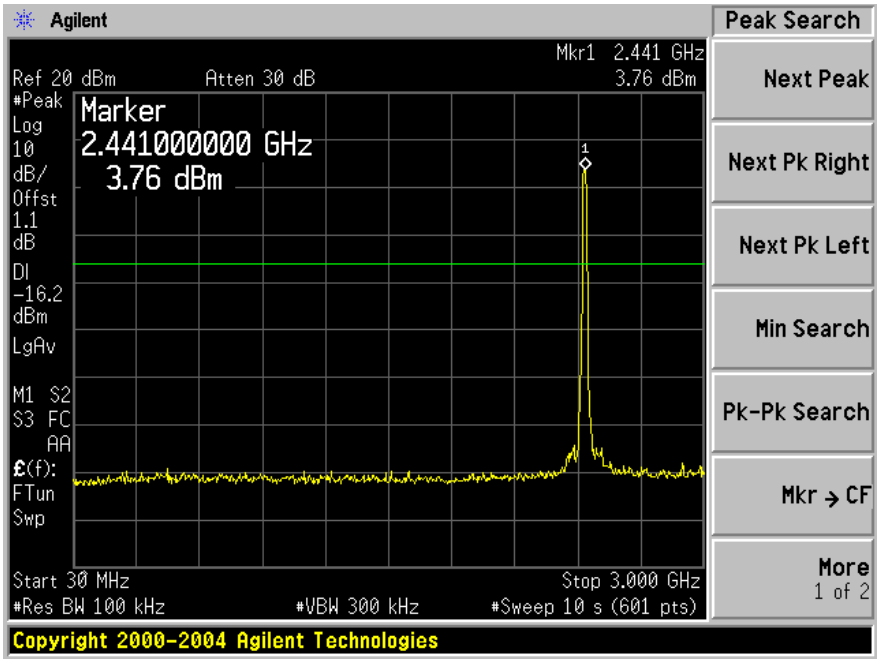
Please refer to following plots of spurious emissions.

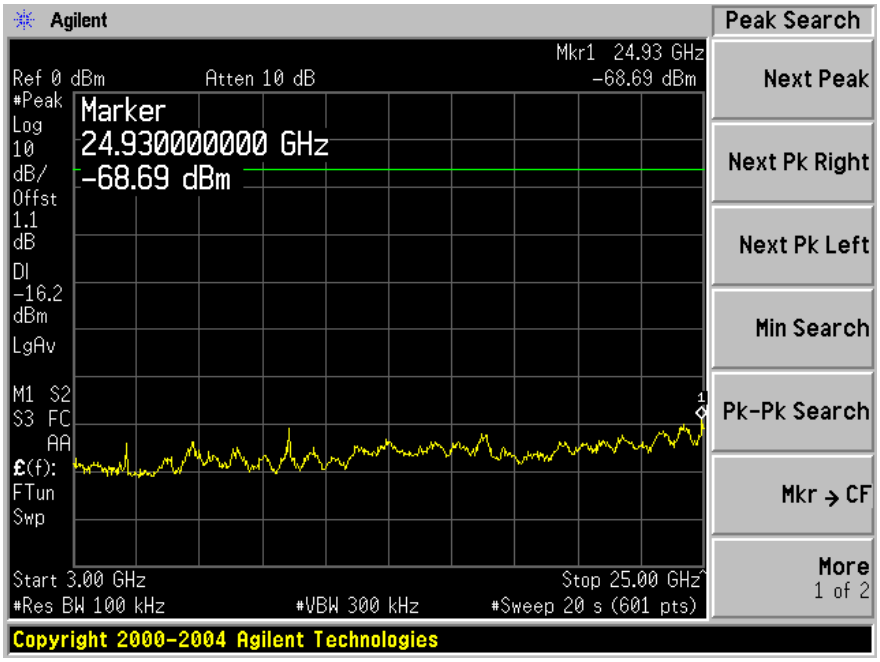
802.11 b, Low Channel 2412 MHz



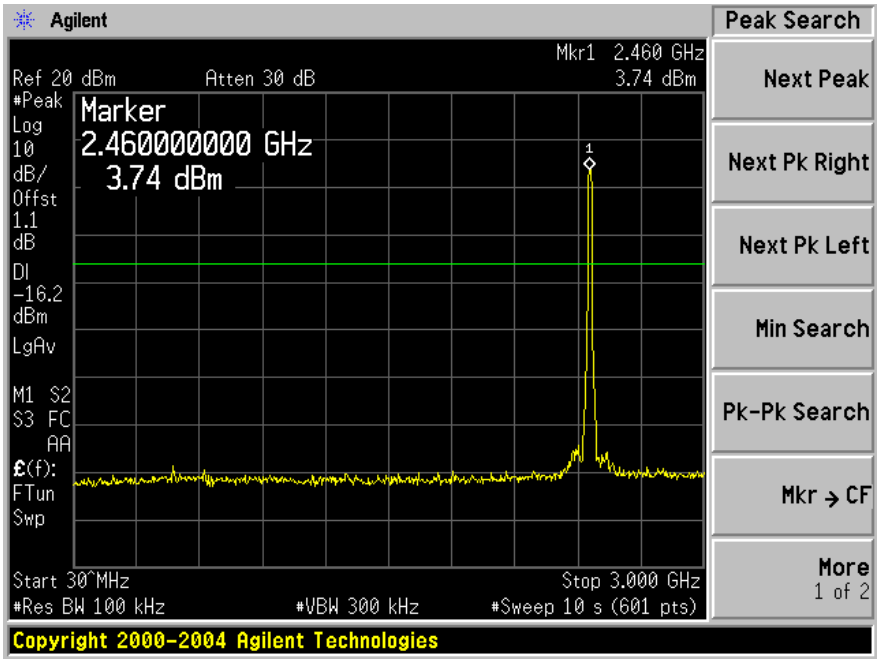


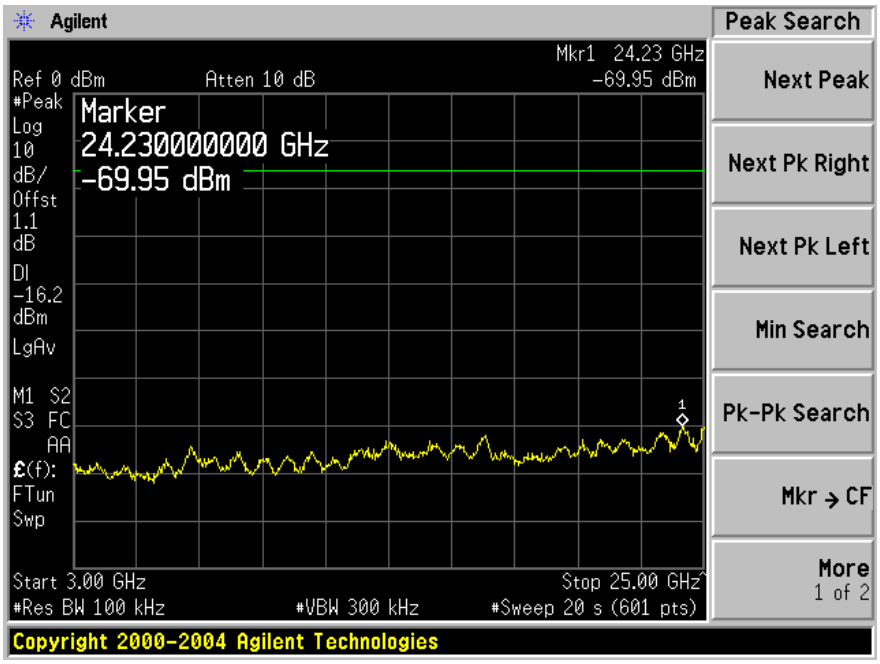
802.11 b, Middle Channel 2437 MHz



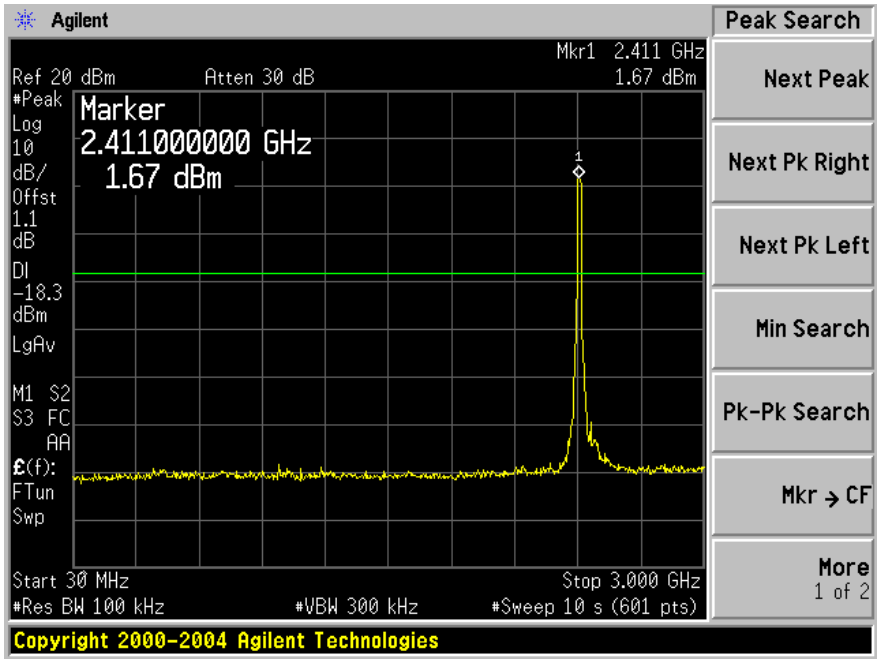


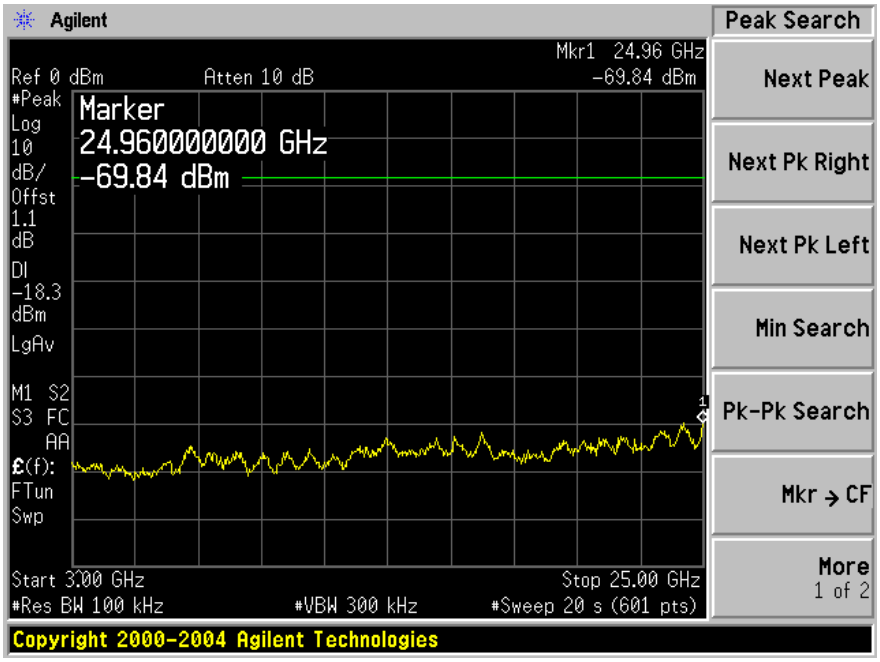
802.11 b, High Channel 2462 MHz



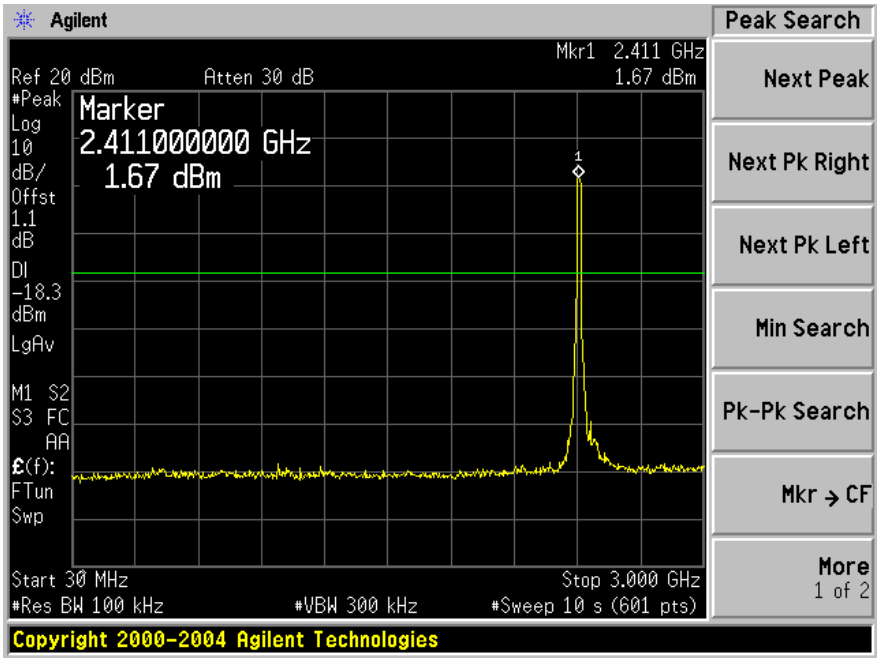


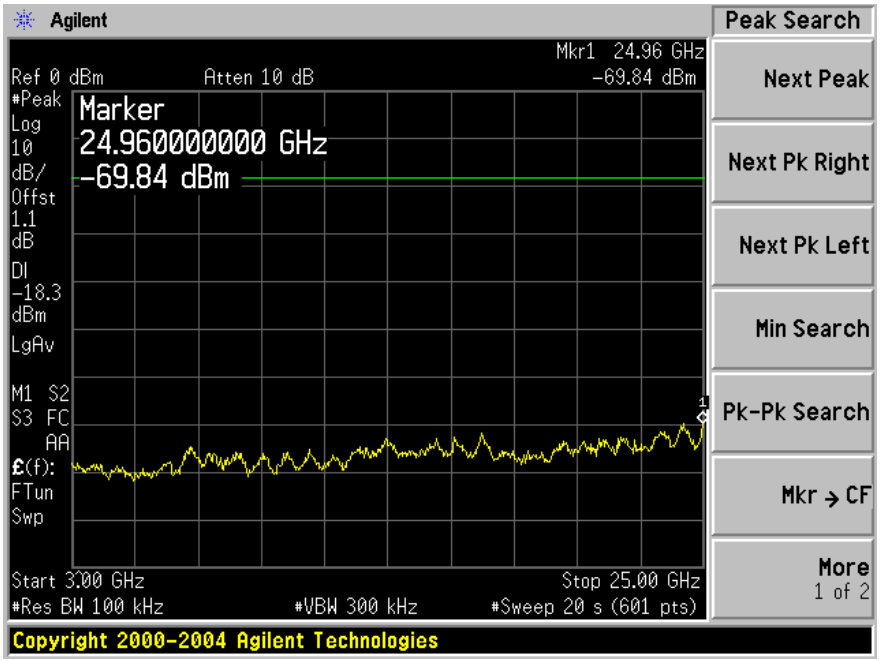
802.11 g, Low Channel 2412 MHz



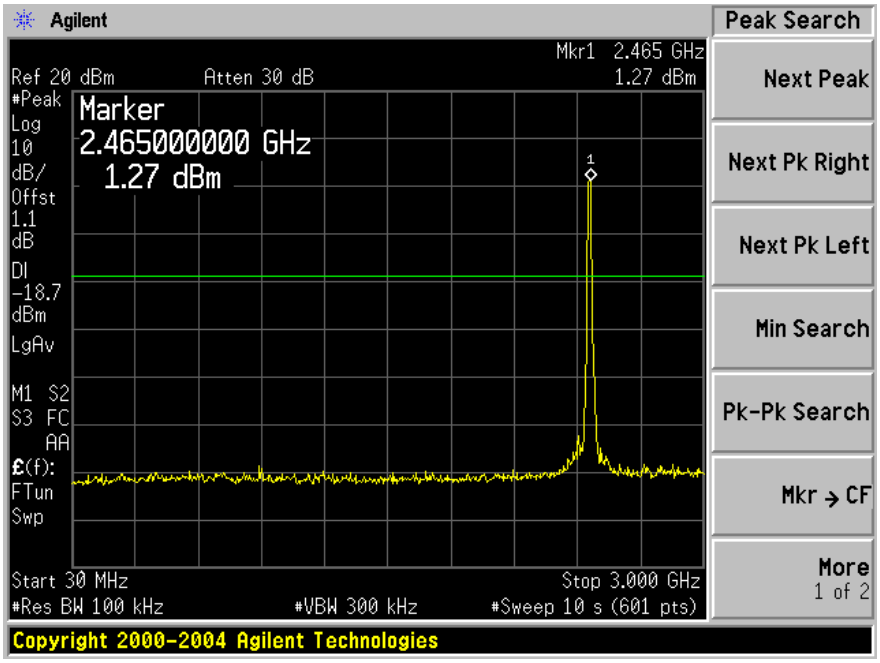


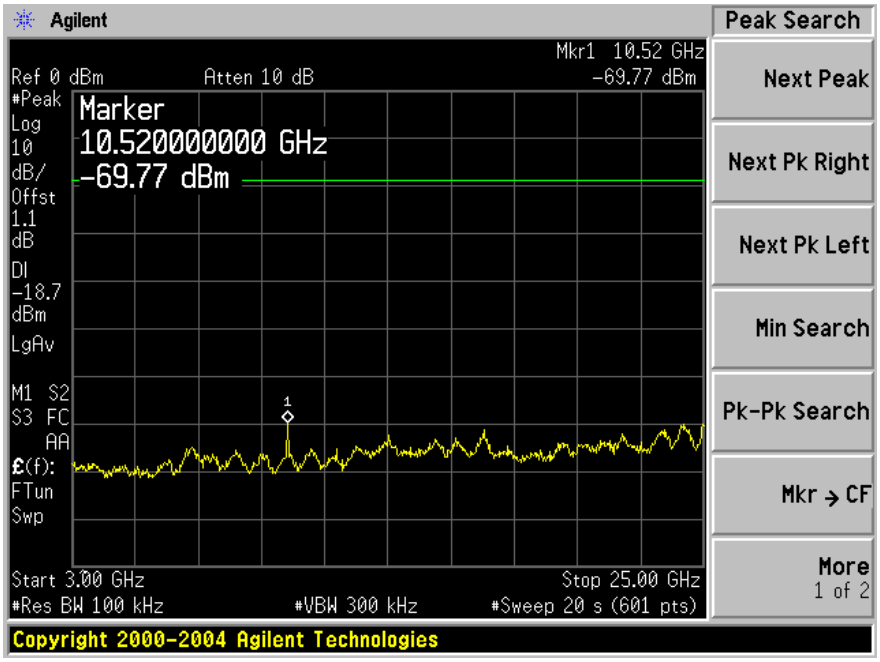
802.11 g, Middle Channel 2437 MHz



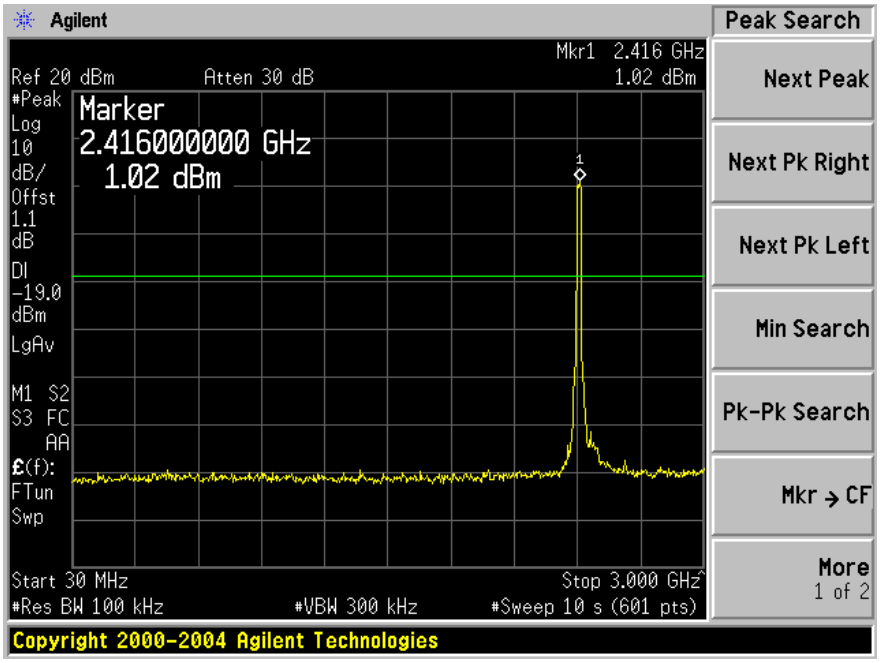


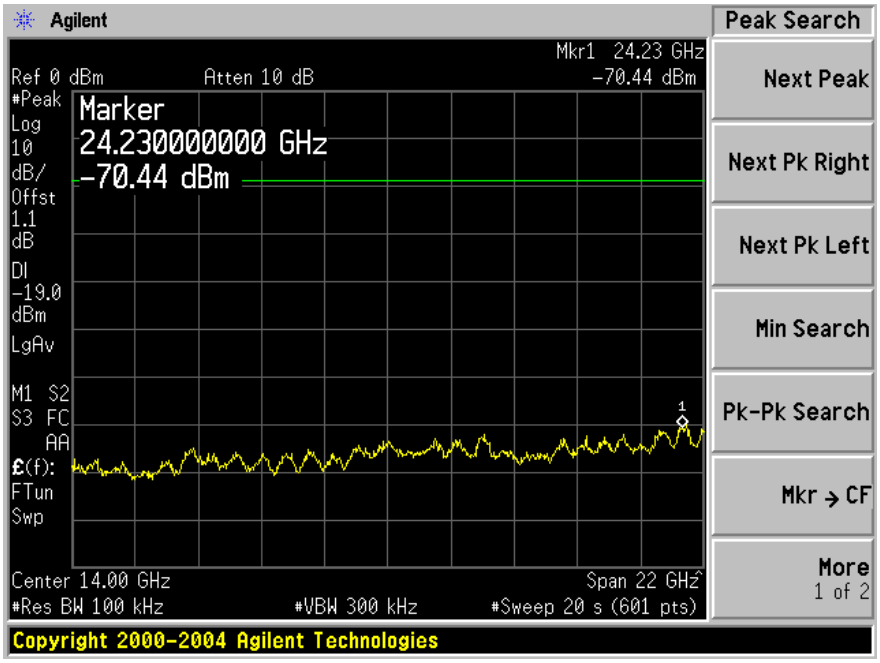
802.11 g, High Channel 2462 MHz



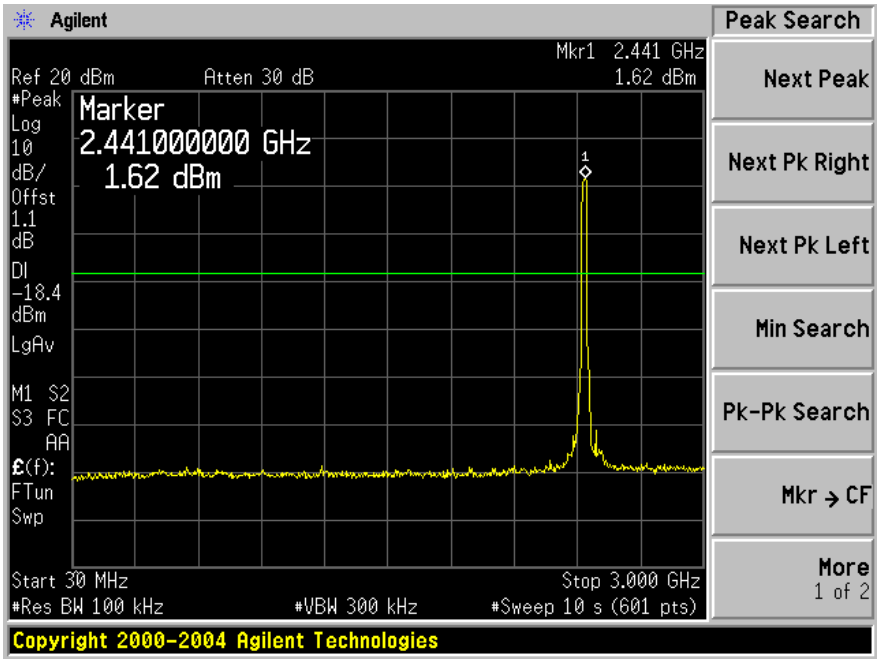


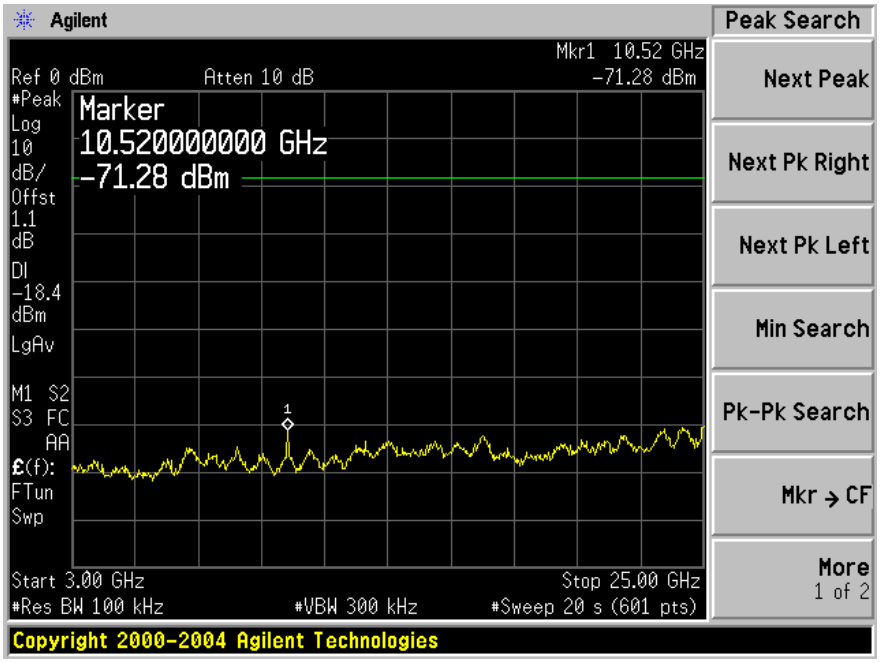
802.11 n 20 MHz (Chain #0), Low Channel 2412 MHz



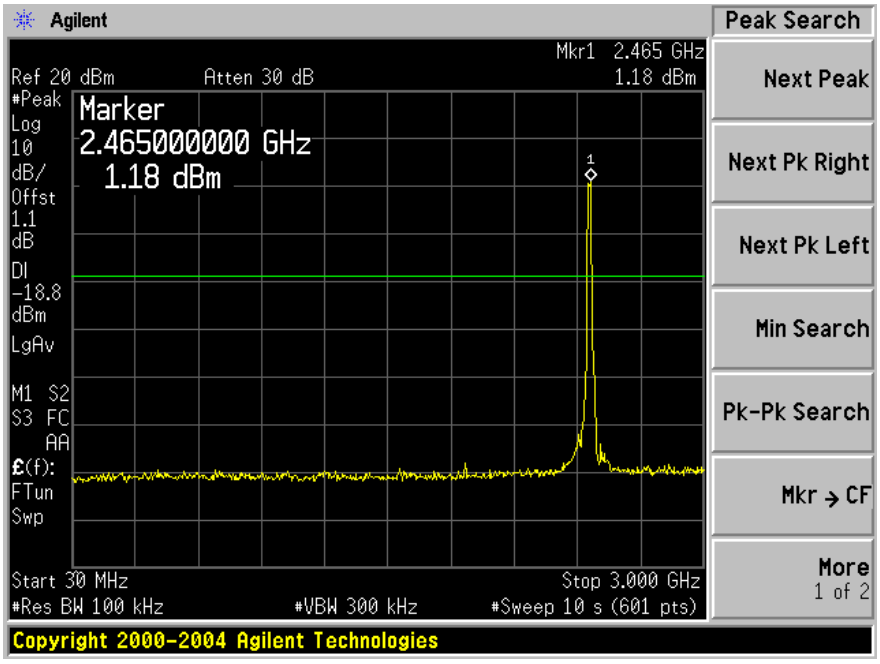


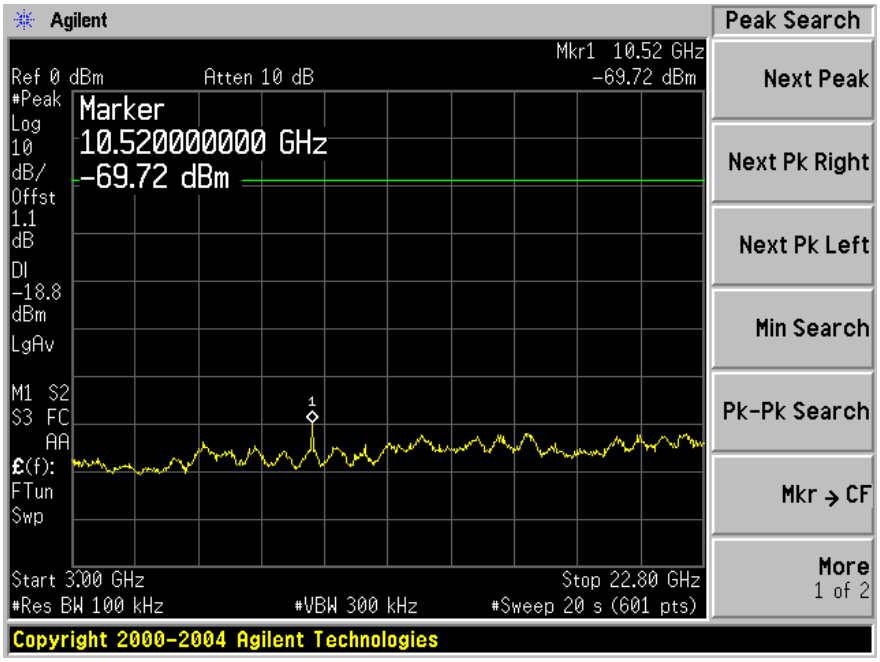
802.11 n 20 MHz (Chain #0), Middle Channel 2437 MHz



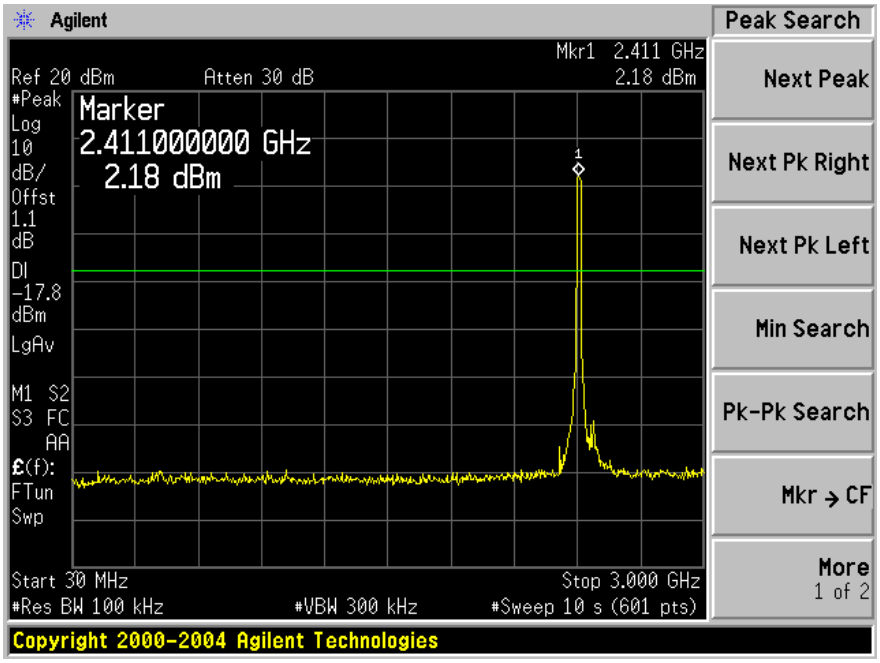


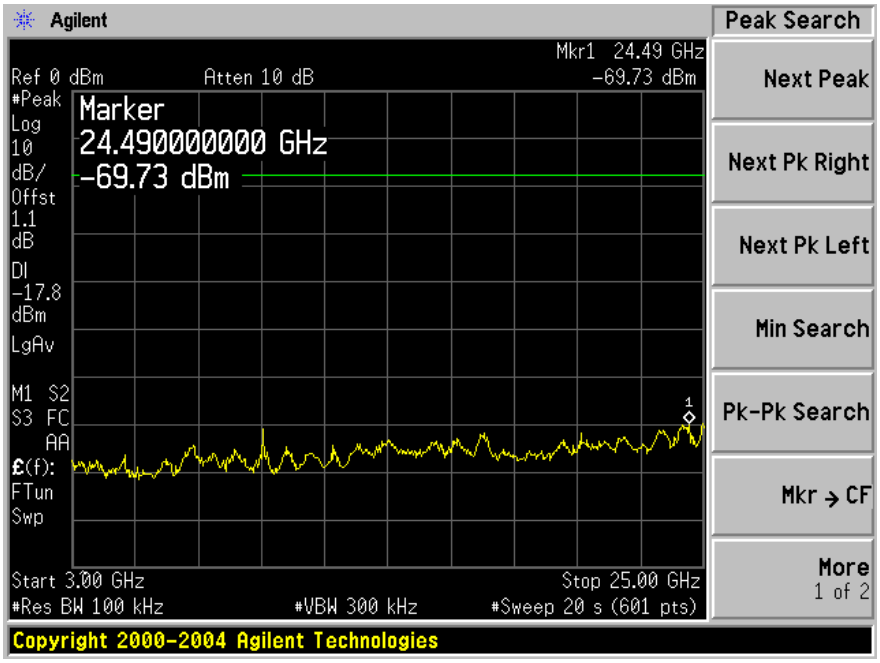
802.11 n 20 MHz (Chain #0), High Channel 2462 MHz



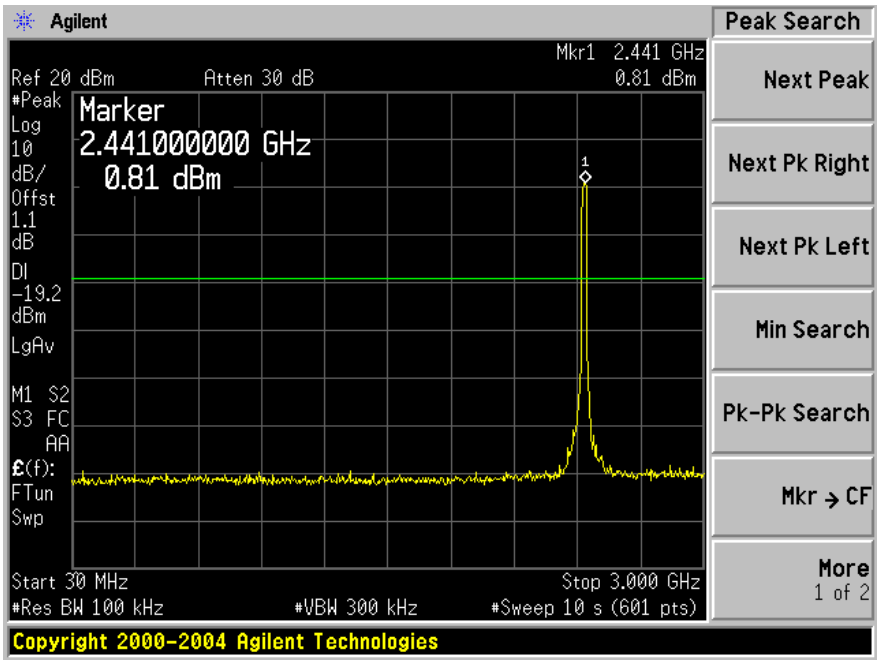


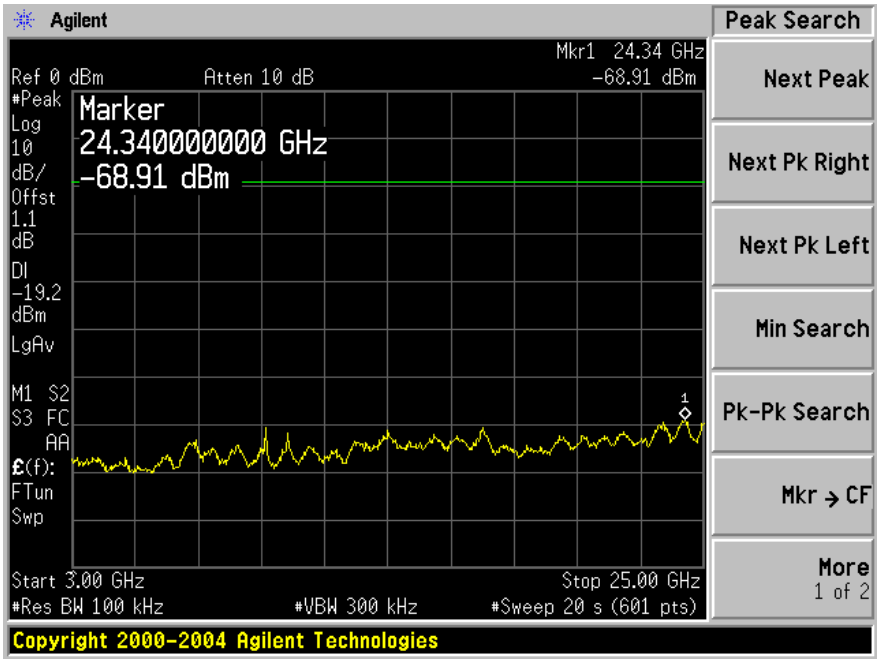
802.11 n 20 MHz (Chain #1), Low Channel 2412 MHz



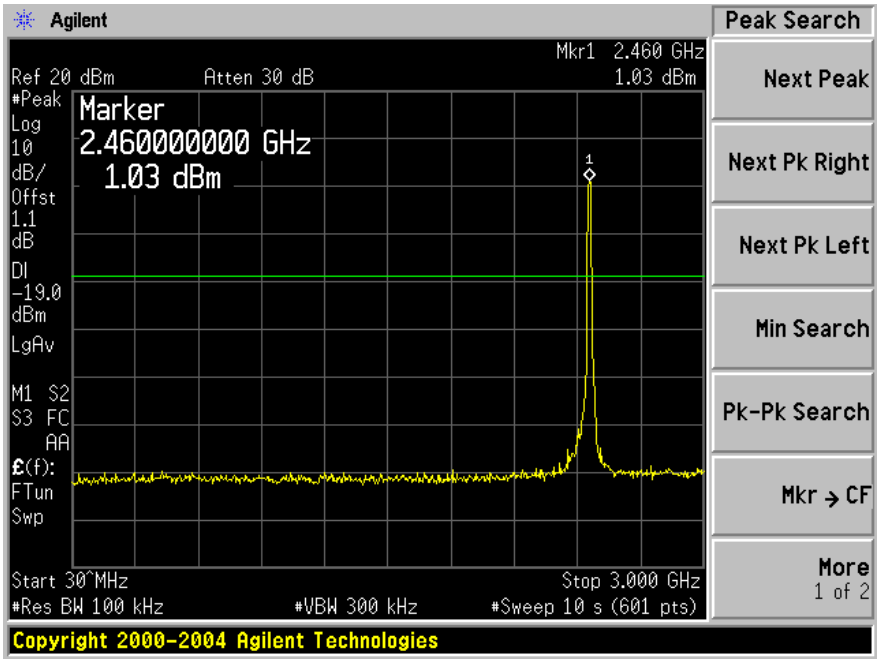


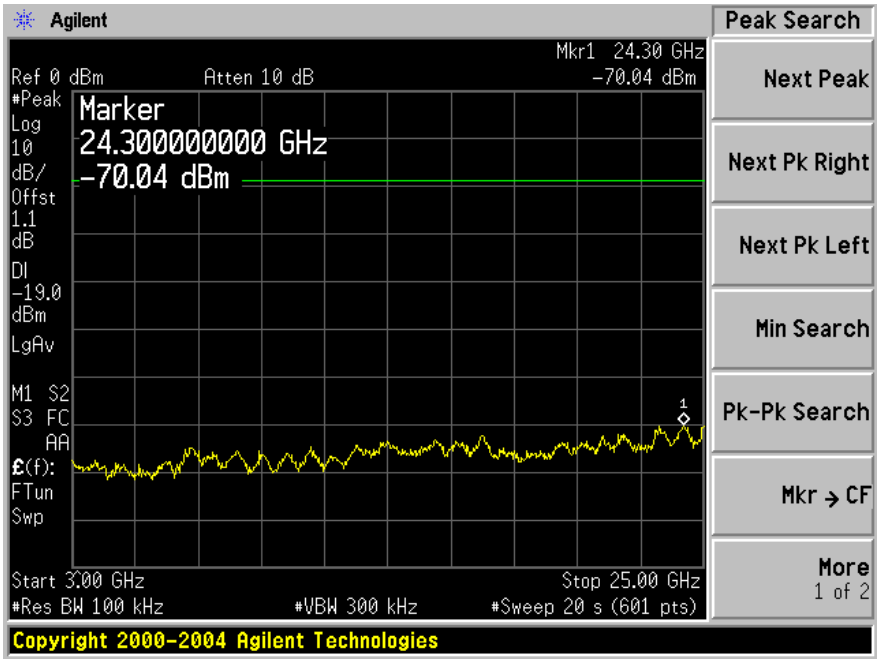
802.11 n 20 MHz (Chain #1), Middle Channel 2437 MHz



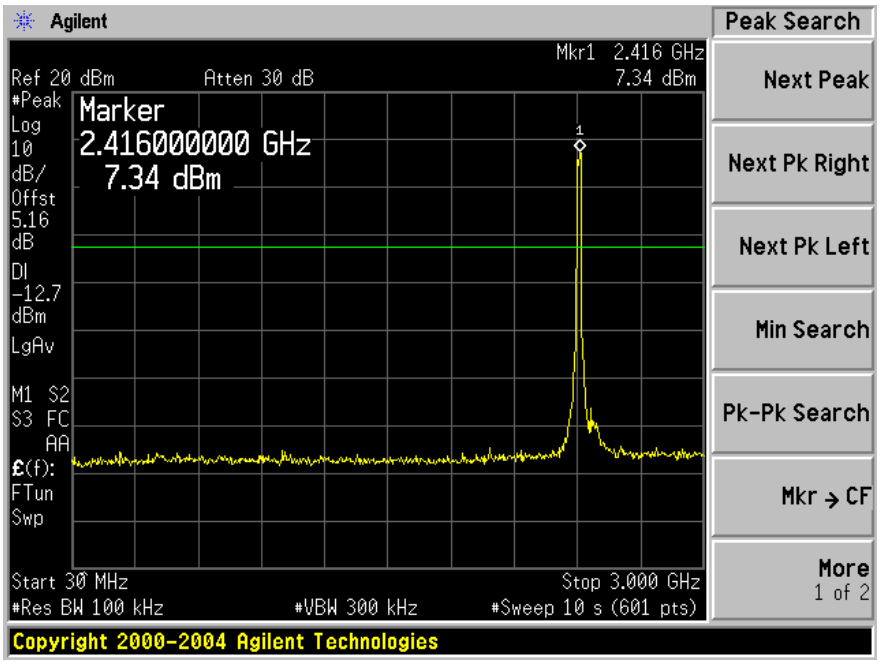


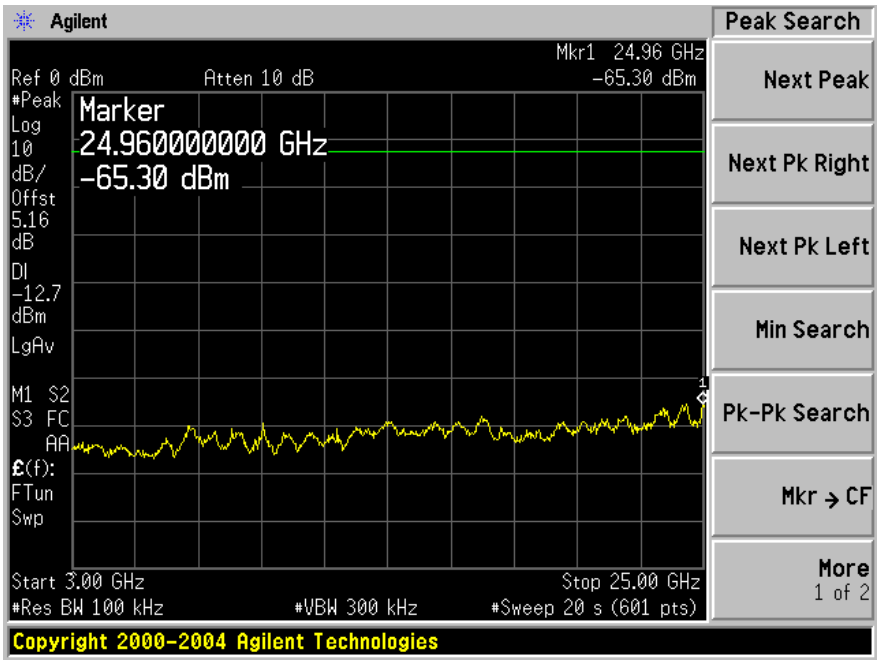
802.11 n 20 MHz (Chain #1), High Channel 2462 MHz



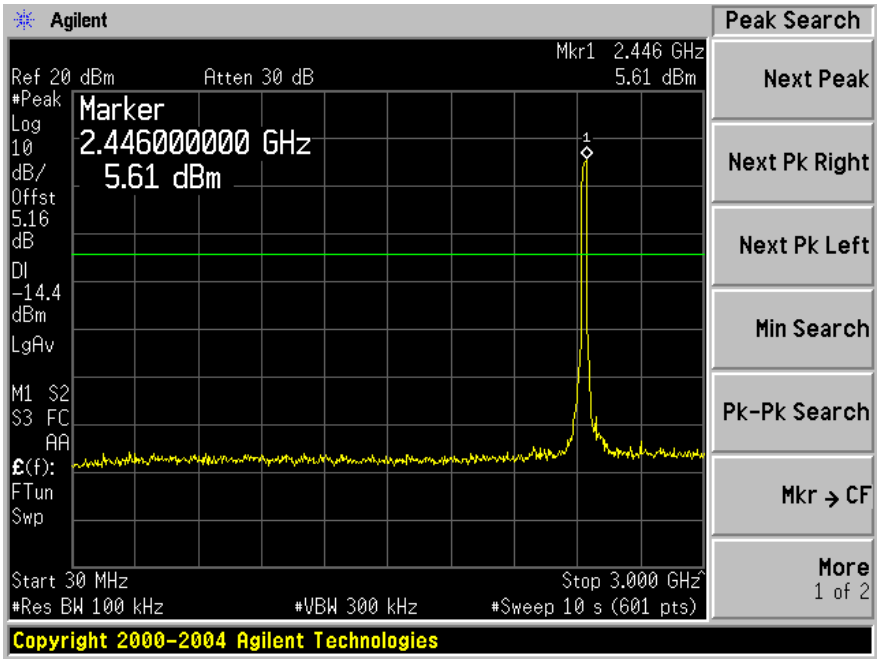


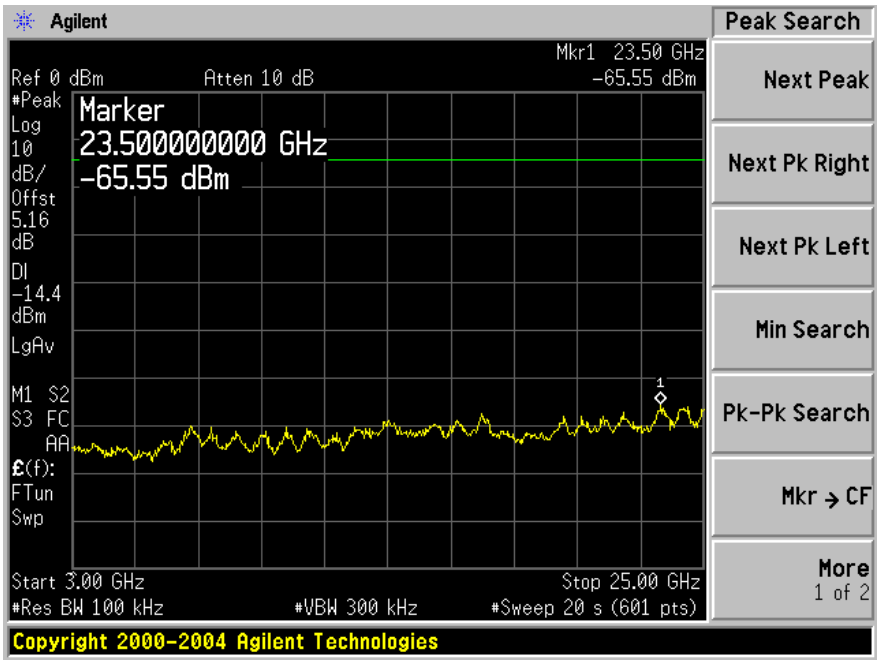
802.11 n 20 MHz (Chain#0+#1, Combiner), Low Channel 2412 MHz



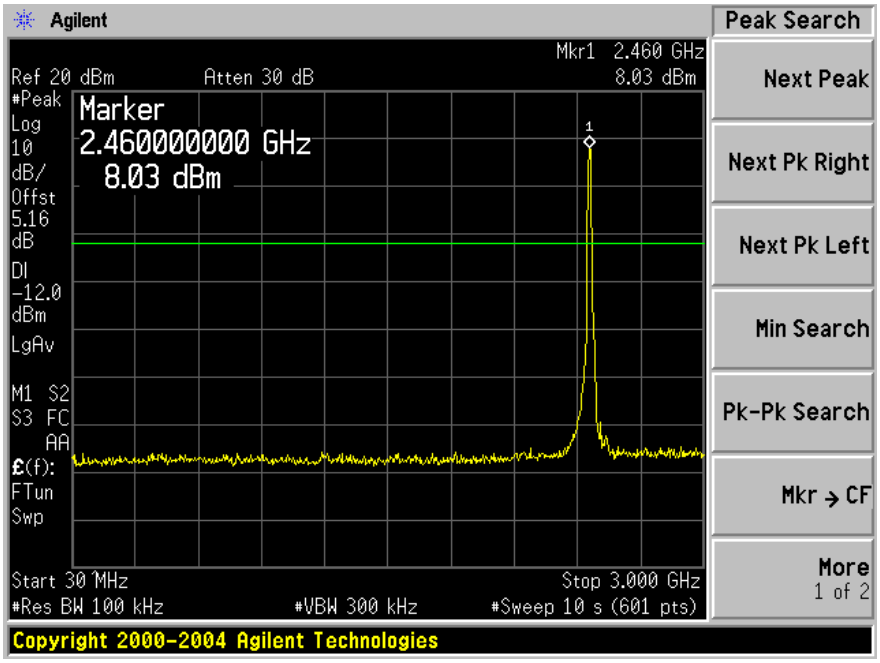


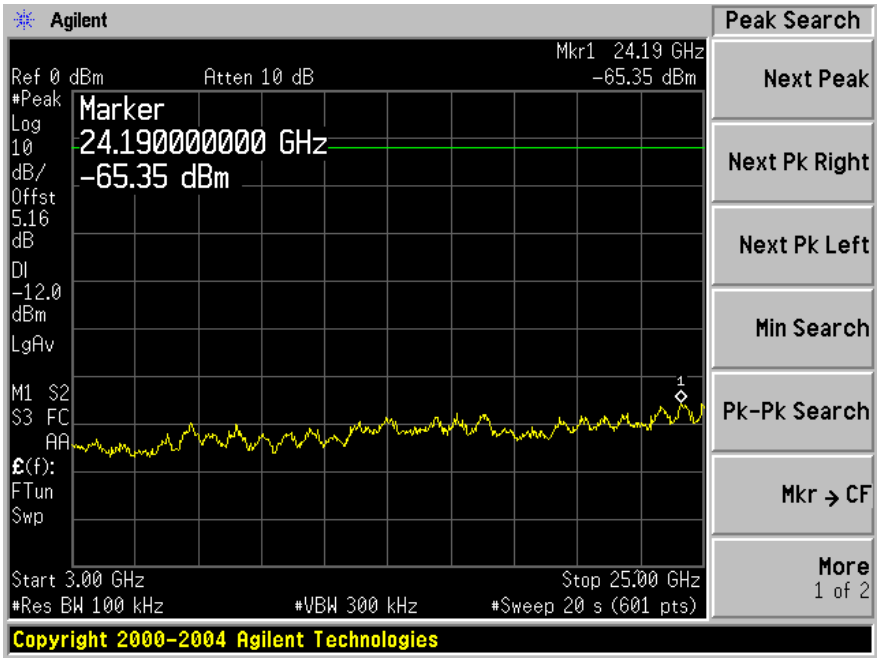
802.11 n 20 MHz (Chain#0+#1, Combiner), Middle Channel 2437 MHz



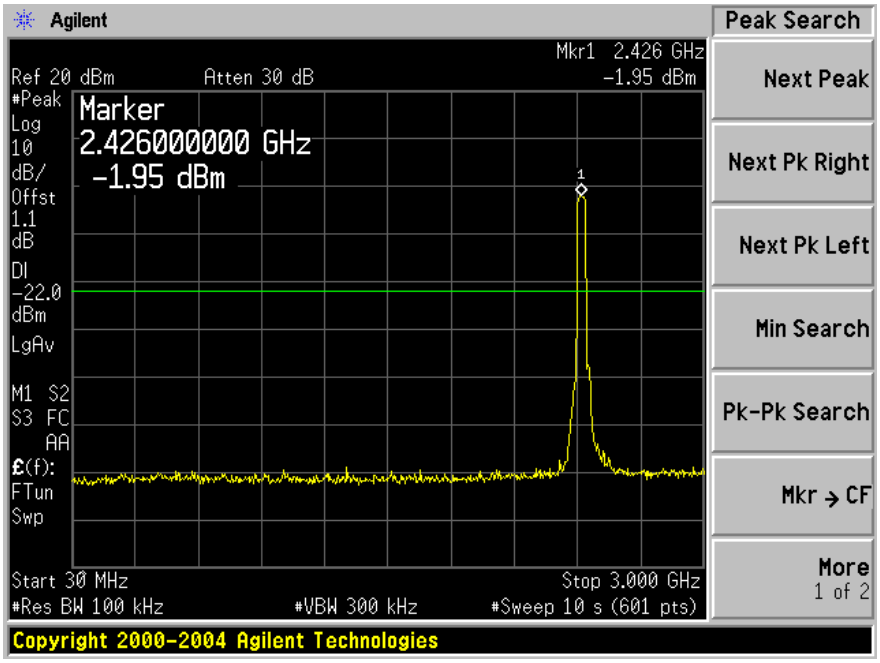


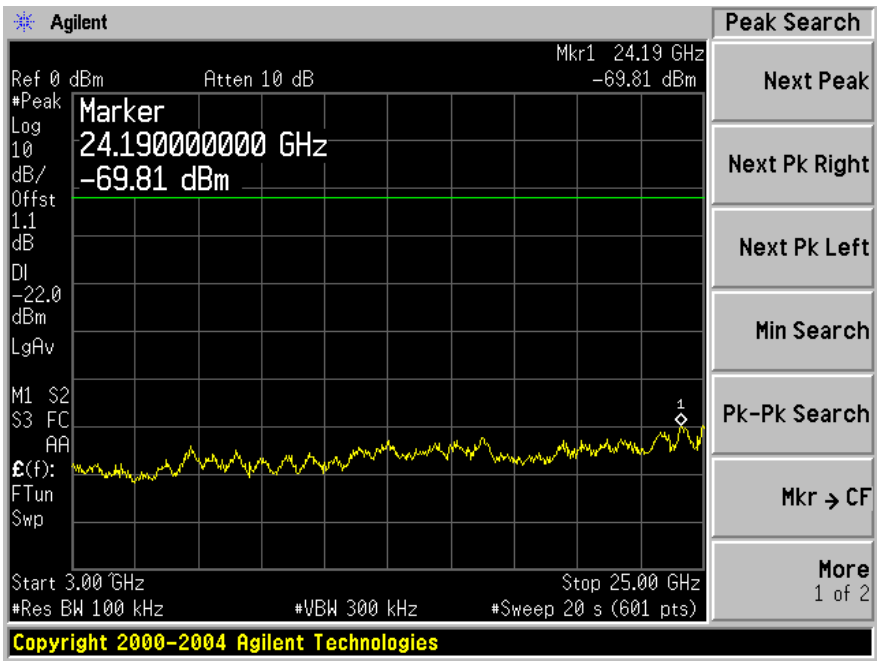
802.11 n 20 MHz (Chain#0+#1, Combiner), High Channel 2462 MHz



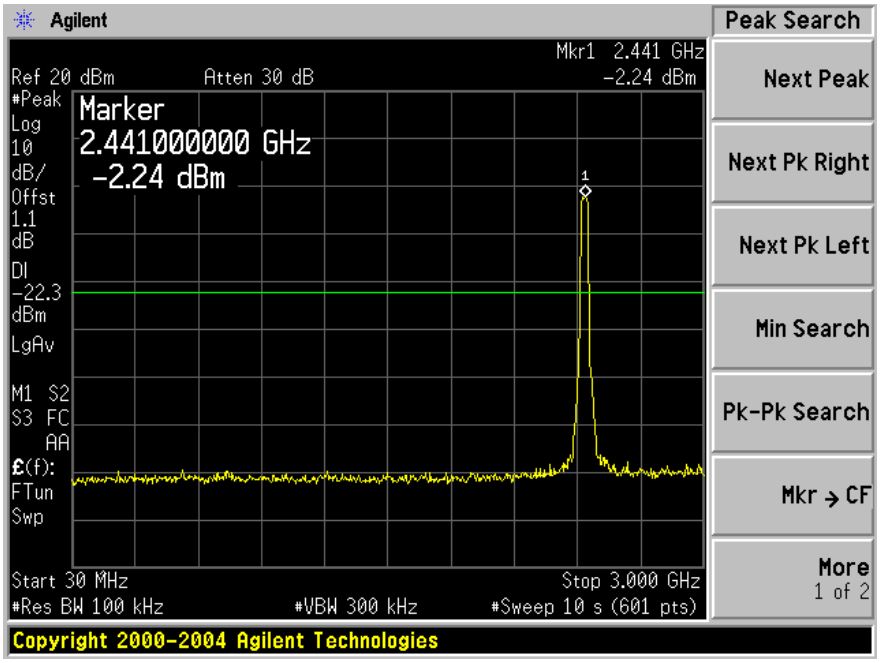


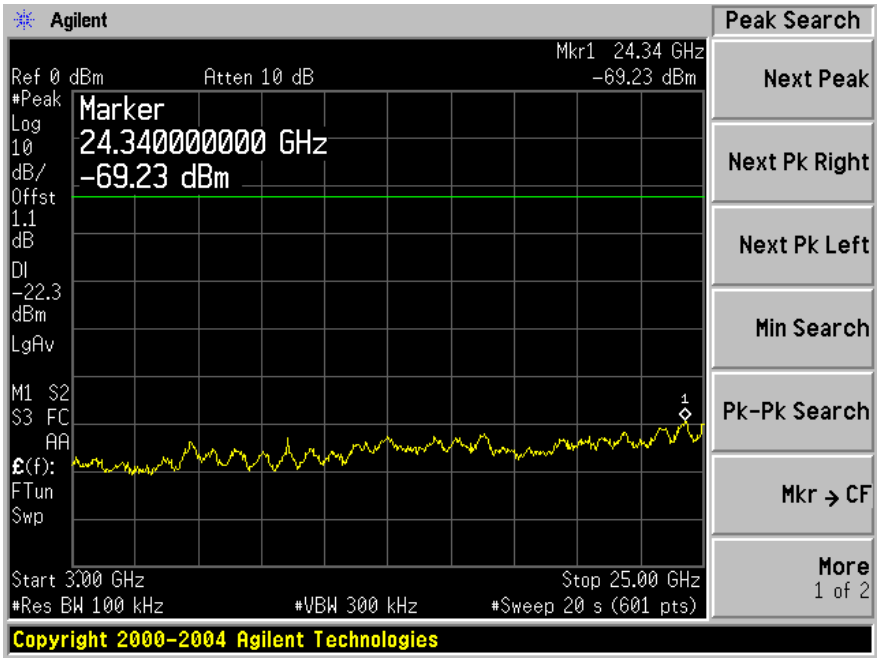
802.11 n 40 MHz (Chain #0), Low Channel 2422 MHz



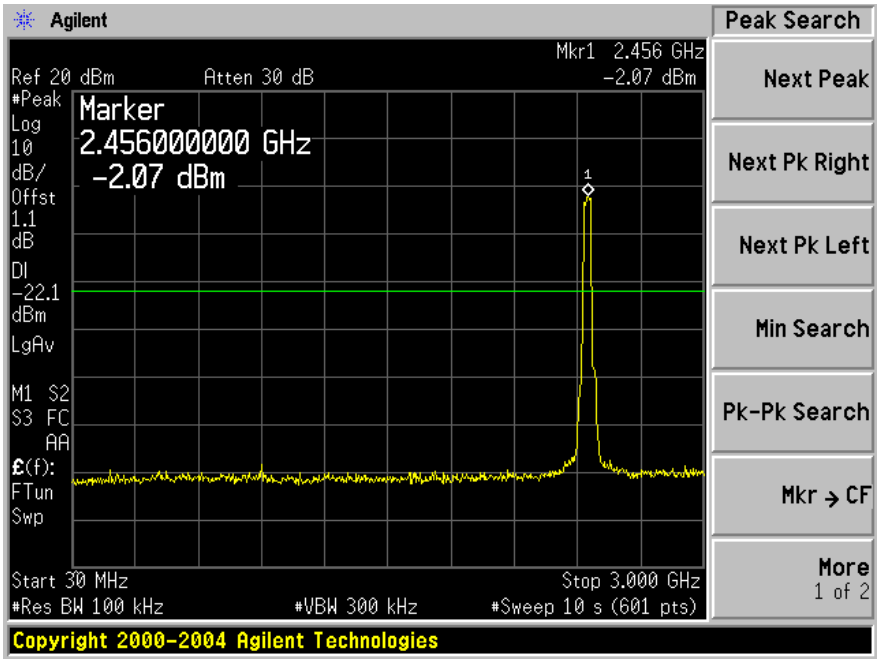


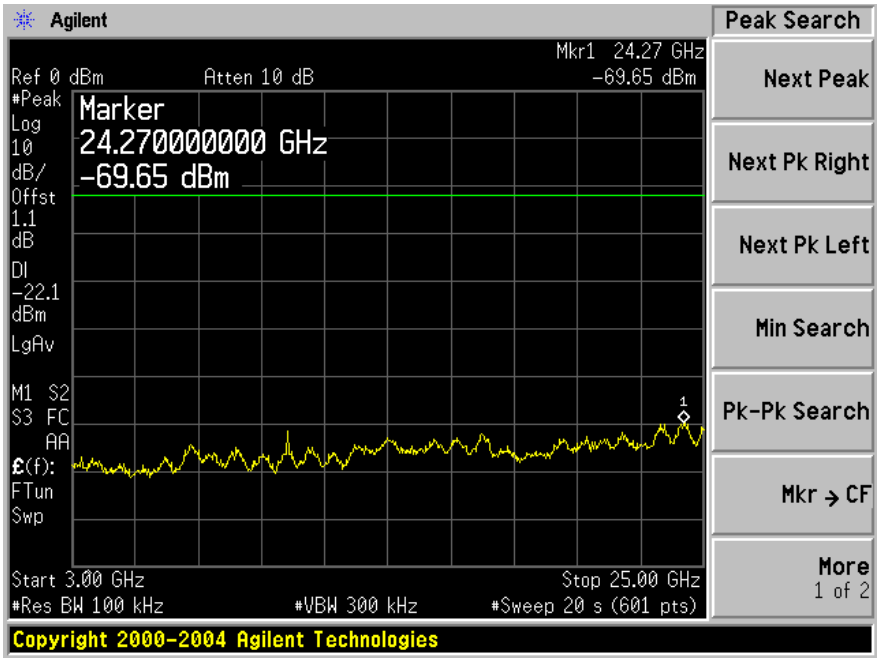
802.11 n 40 MHz (Chain #0), Middle Channel 2437 MHz



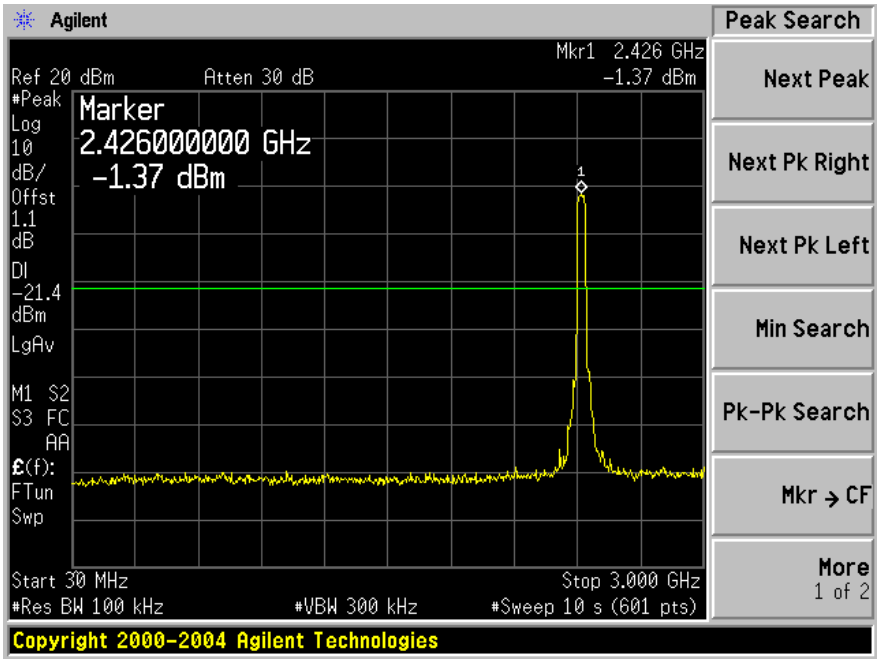


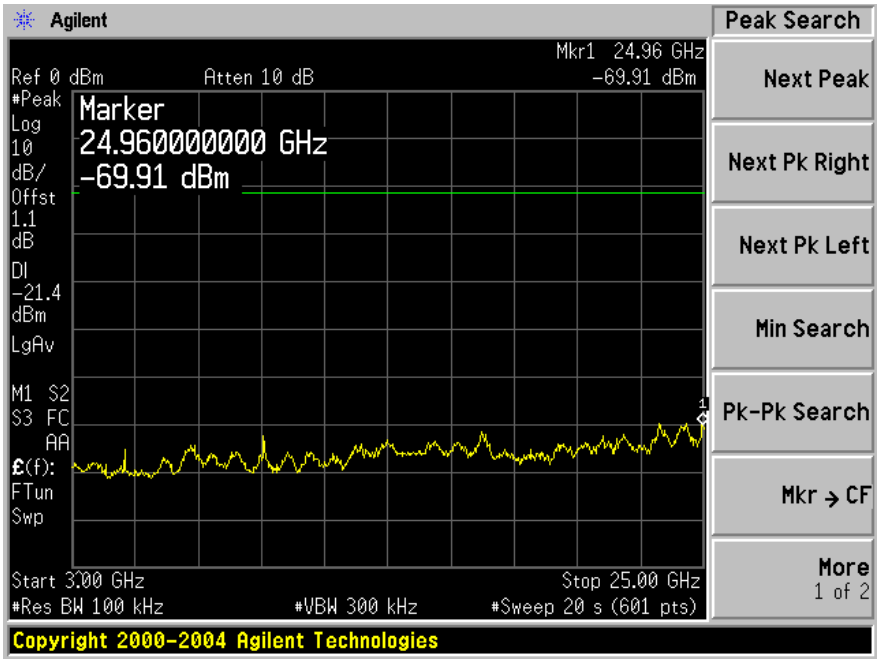
802.11 n 40 MHz (Chain #0), High Channel 2452 MHz



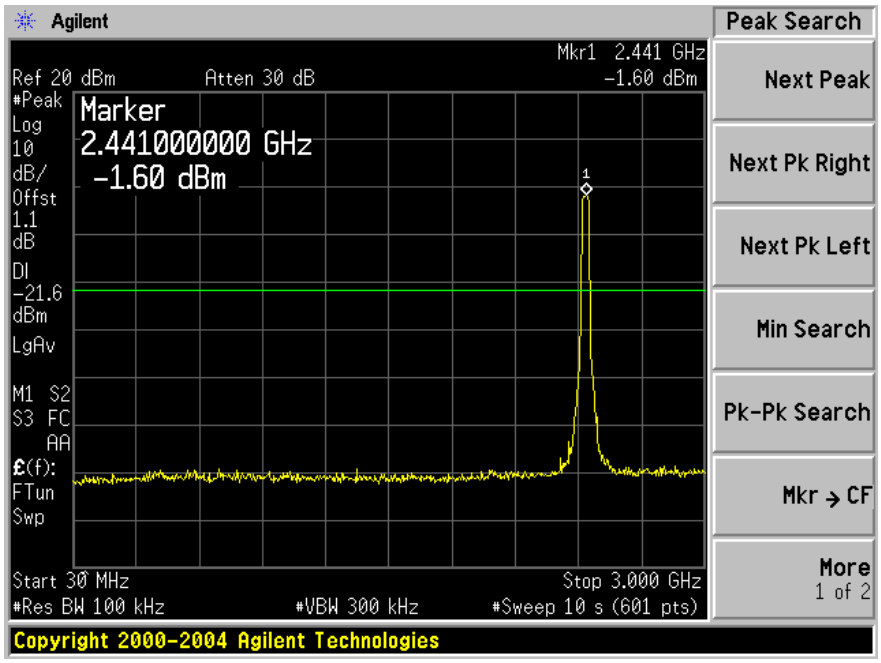


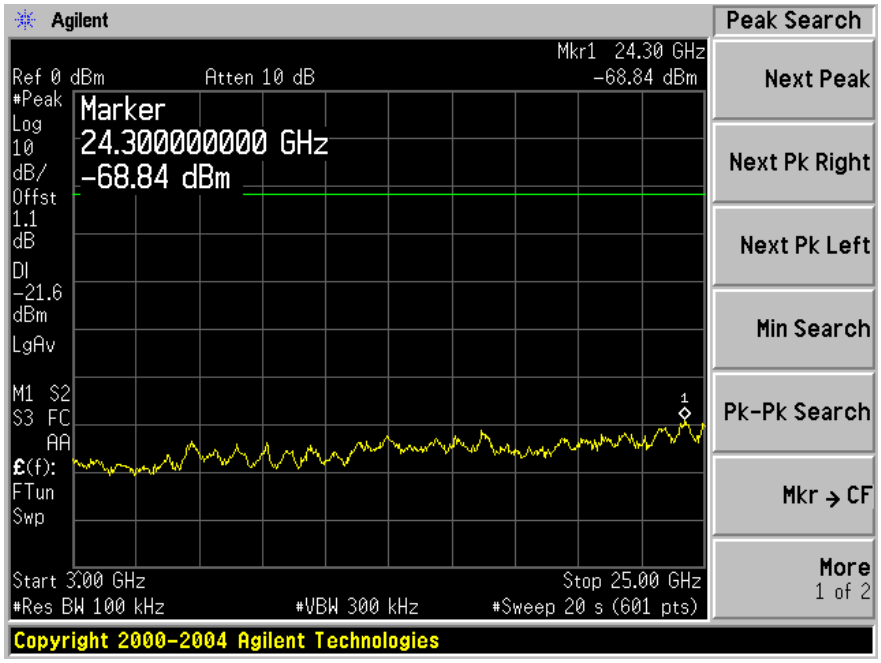
802.11 n 40 MHz (Chain #1), Low Channel 2422 MHz



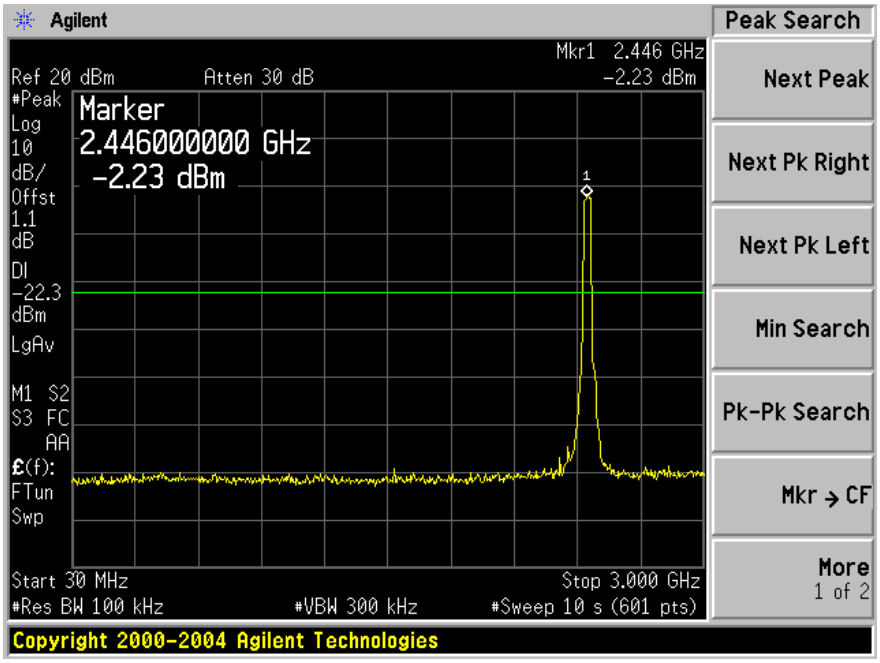


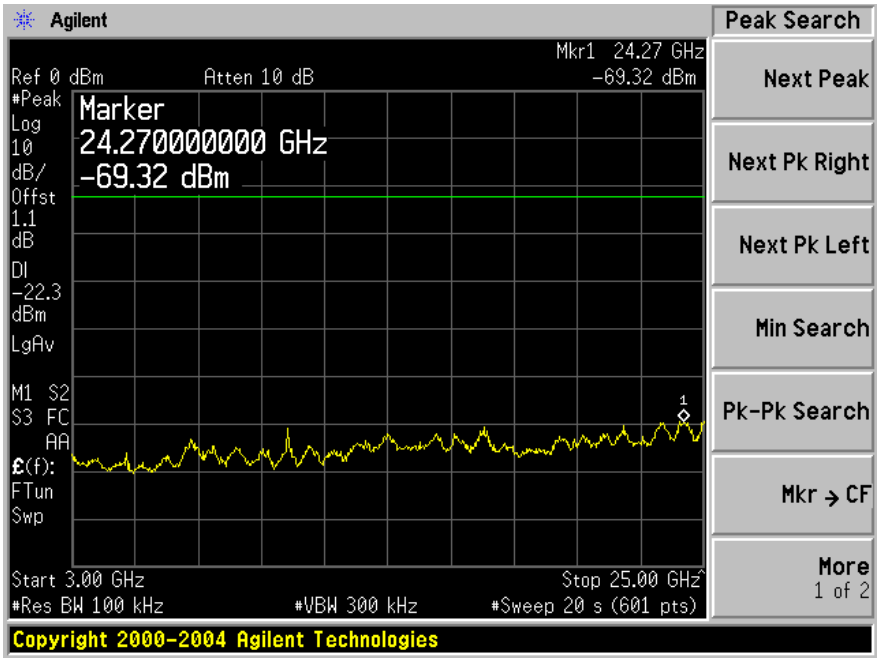
802.11 n 40 MHz (Chain #1), Middle Channel 2437 MHz



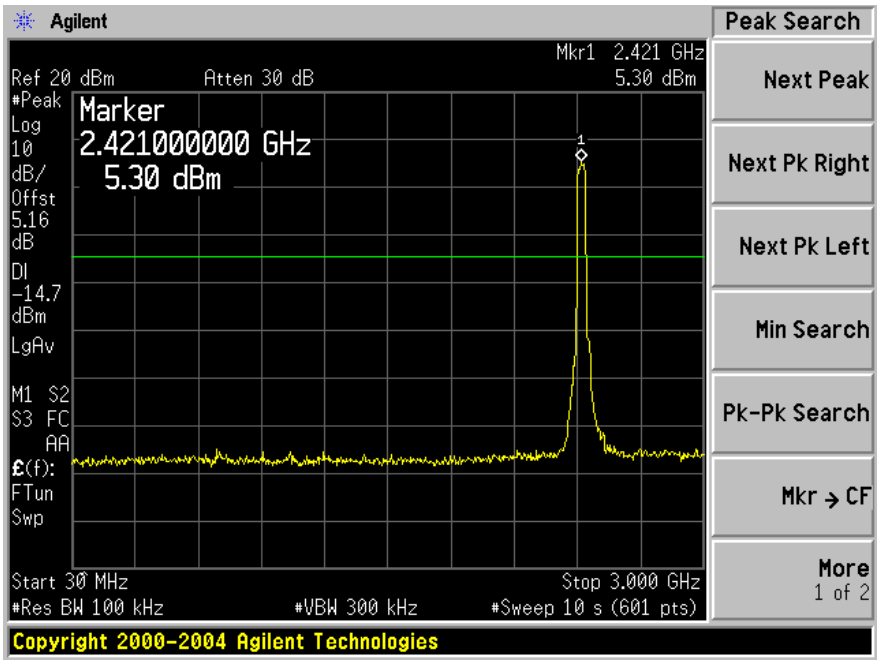


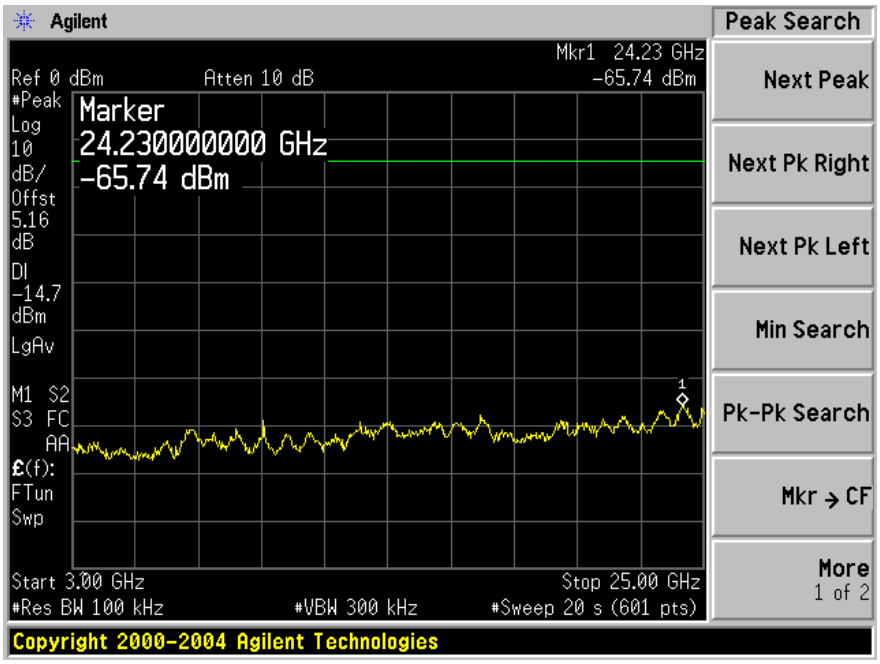
802.11 n 40 MHz (Chain #1), High Channel 2452 MHz



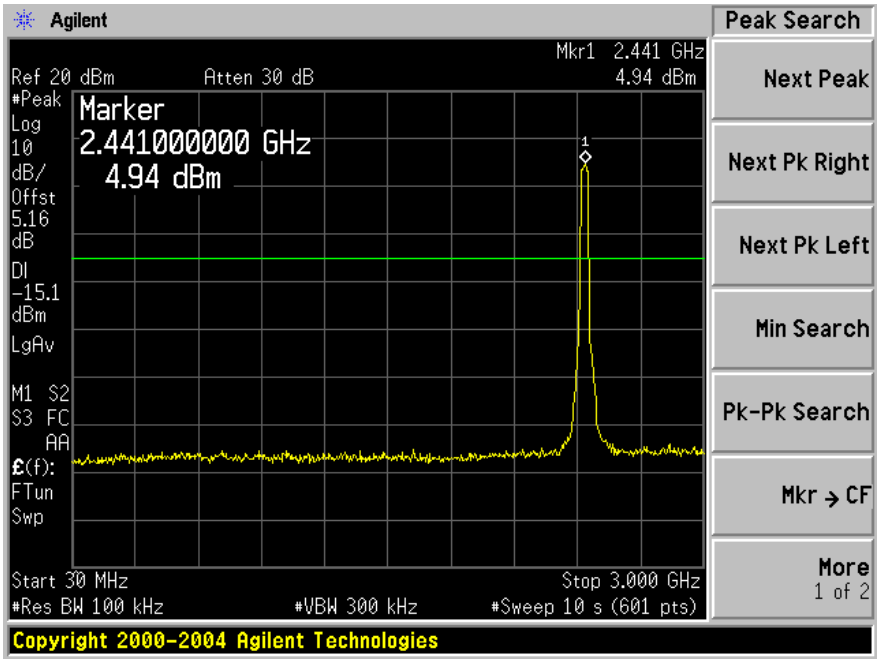


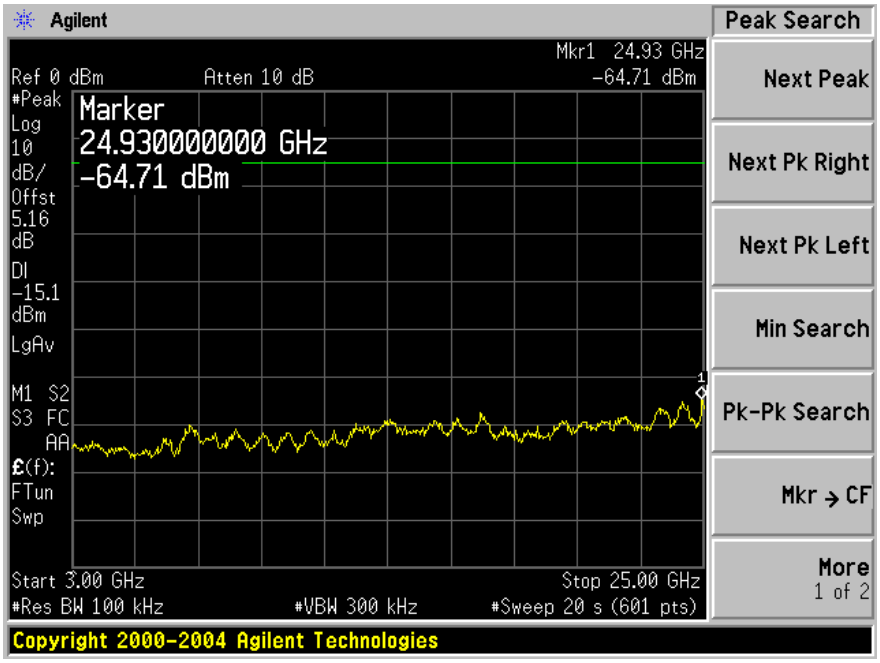
802.11 n 40 MHz (Chain#0+#1, Combiner), Low Channel 2422 MHz



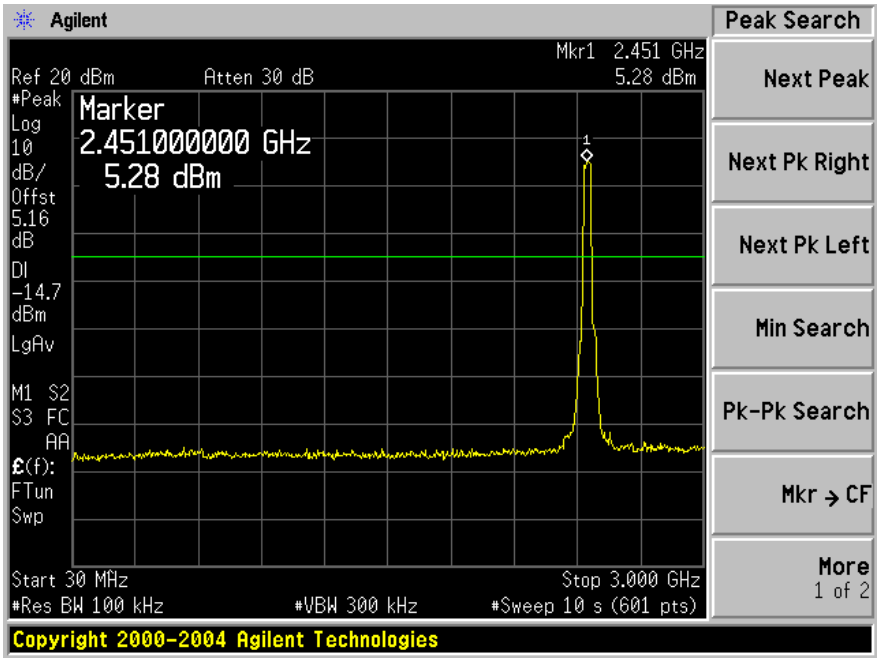


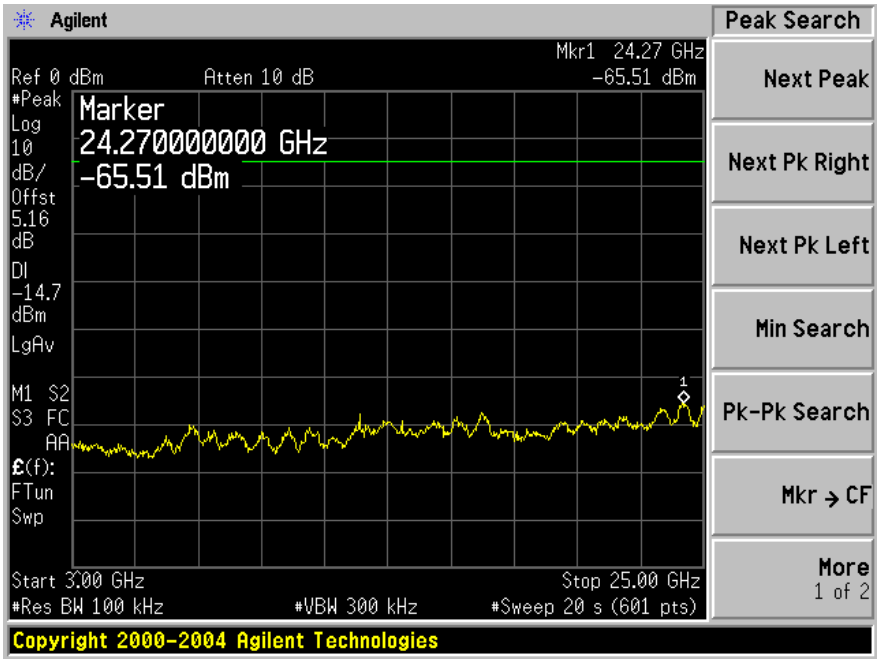
802.11 n 40 MHz (Chain#0+#1, Combiner), Middle Channel 2437 MHz





802.11 n 40 MHz (Chain#0+#1, Combiner), High Channel 2452 MHz





8 FCC §15.205, §15.209 & §15.247(d) - Spurious Radiated Emissions

8.1 Applicable Standard

As per 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 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 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:

f (MHz)	f (MHz)	f (MHz)	f (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 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 using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC limits.

The spacing between the peripherals was 10 centimeters.

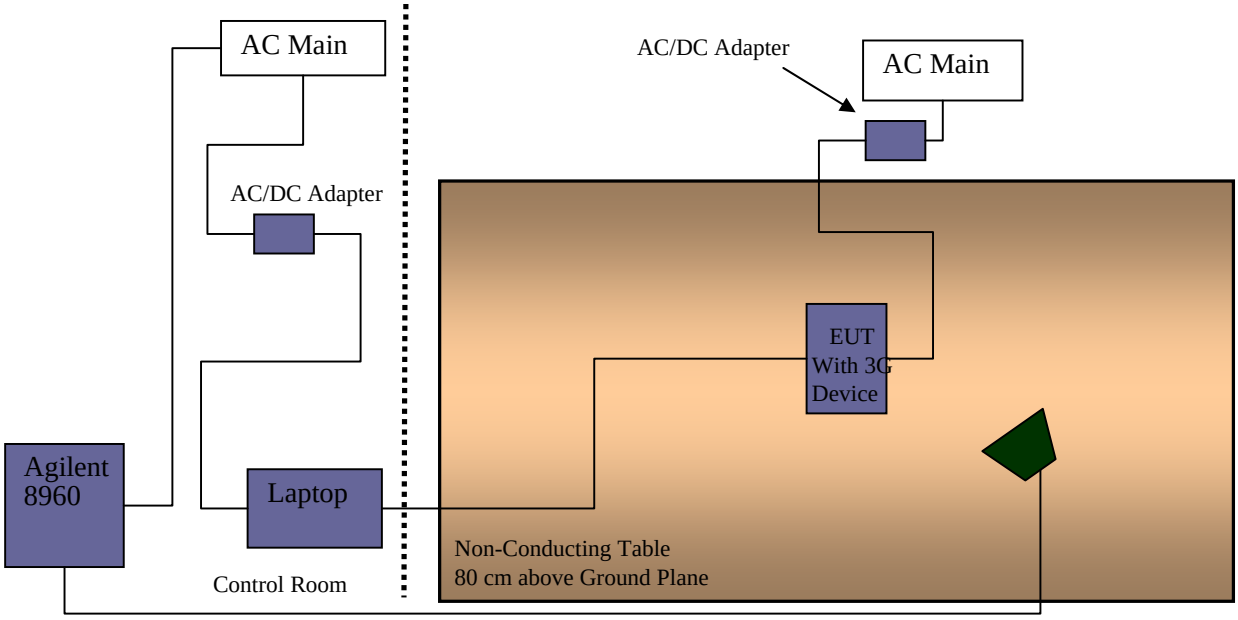
External I/O cables were draped along the edge of the test table and bundle when necessary.

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Mini-Circuits	Pre amplifier	ZKL-2	7786100643	2009-03-03
HP	Pre amplifier	8449B	3147A00400	2008-10-22
Sunol Science Corp	Combination Antenna	JB1 Antenna	A013105-3	2009-03-25
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2008-07-01
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	Communication Analyzer	E5515C	GB44051221	2009-04-23
A.R.A.	Antenna, Horn	DRG-118/A	1132	2008-07-28

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

8.4 Test Setup Block Diagram



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 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

8.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corrected Amplitude – FCC Limit

8.7 Test Environmental Conditions

Temperature:	22-24º C
Relative Humidity:	35-45%
ATM Pressure:	101.1-102.5kPa

***Testing was performed by Victor Zhang from 2009-07-03 to 2009-07-27 in 5 meter chamber #3.*

8.8 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC requirements, and had the worst margin of:

WLAN Only:

802.11 b Mode

30-1000 MHz

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-3.45	53.88476	Vertical	Mid, 30 MHz – 1GHz

Above 1 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-11	4824	Horizontal	Low, 1GHz – 25GHz
-12.02	4874	Horizontal	Mid, 1GHz – 25GHz
-10.98	4927	Horizontal	High, 1GHz – 25GHz

802.11 g Mode

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-1.68	53.55596	Vertical	Mid, 30 MHz – 1GHz

Above 1 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-13.2	4824	Horizontal	Low, 1GHz – 25GHz
-13.98	4874	Horizontal	Mid, 1GHz – 25GHz
-13.18	4927	Horizontal	High, 1GHz – 25GHz

802.11 n 20 MHz Mode

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-3.1	88.4966	Vertical	Mid, 30 MHz – 1GHz

Above 1 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-14.36	4824	Horizontal	Low, 1GHz – 25GHz
-15.21	4874	Vertical	Mid, 1GHz – 25GHz
-14.12	4927	Horizontal	High, 1GHz – 25GHz

802.11 n 40 MHz Mode

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-2.95	88.5026	Vertical	Mid, 30 MHz – 1GHz

Above 1 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-15.03	4844	Horizontal	Low, 1GHz – 25GHz
-14.14	4874	Horizontal	Mid, 1GHz – 25GHz
-16.57	4904	Vertical	High, 1GHz – 25GHz

Co-Location (WLAN & GSM/GPRS/EGPRS):

Worst Case WLAN & GSM/GPRS/EGPRS

WLAN 20 MHz with FCC ID: NCMOGI0411, EGPRS 1900 MHz Band

Worst Mode: WLAN 802.11b Low Channel (Channel#1, 2412 MHz) with EGPRS Middle Channel (1880 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-10.8	4824	Vertical	30MHz – 25GHz

WLAN 40 MHz with FCC ID: NCMOGI0411, EGPRS 1900 MHz Band

Worst Mode: WLAN 802.11n 40 MHz, Low Channel (Channel#3, 2422 MHz) with EGPRS Middle Channel (1880 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-12.05	3760	Vertical	30MHz – 25GHz

WLAN 20 MHz with FCC ID: NCMOGI0451, GSM 850 MHz Band

Worst Mode: WLAN 802.11b Low Channel (Channel#1, 2412 MHz) with GSM High Channel (848.8 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-11.1	4824	Horizontal	30MHz – 25GHz

WLAN 40 MHz with FCC ID: NCMOGI0451, GSM 850 MHz Band

Worst Mode: WLAN 802.11n 40 MHz Low Channel (Channel#3, 2422 MHz) with GSM High Channel (848.8 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-15.1	4844	Horizontal	30MHz – 25GHz*

WLAN & HSPA

WLAN 20 MHz with FCC ID: NCMOGI0411, HSPA 1900 MHz Band

Worst Mode: WLAN 802.11b Low Channel (Channel#1, 2412 MHz) with HSDPA Sub-test 1 1900 Band High Channel (1907.5 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-8.19	4319.5	Horizontal	30MHz – 25GHz

WLAN 40 MHz with FCC ID: NCMOGI0411, HSPA 1900 MHz Band

Worst Mode: WLAN 802.11n 40 Low Channel (Channel#3, 2422 MHz) with HSDPA Sub-test 1 1900 Band High Channel (1907.5 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-11.07	3815	Vertical	30MHz – 25GHz

WLAN 20 MHz with FCC ID: NCMOGI0451, HSPA 850 MHz Band

Worst Mode: WLAN 802.11n 40 Low Channel (Channel#3, 2422 MHz) with HSUPA Sub-test 1 850 Band High Channel (846.6 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-10.96	4824	Horizontal	30MHz – 25GHz

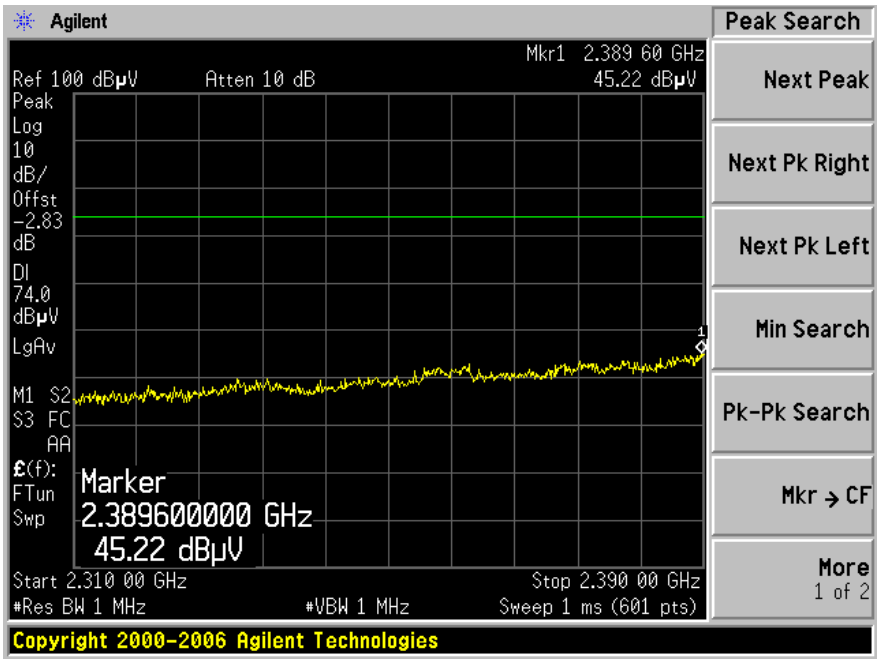
WLAN 40 MHz with FCC ID: NCMOGI0451, HSPA 850 MHz Band

Worst Mode: WLAN 802.11n 40 Low Channel (Channel#3, 2422 MHz) with HSUPA Sub-test 1 850 Band High Channel (846.6 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-15.05	4844	Horizontal	30MHz – 25GHz

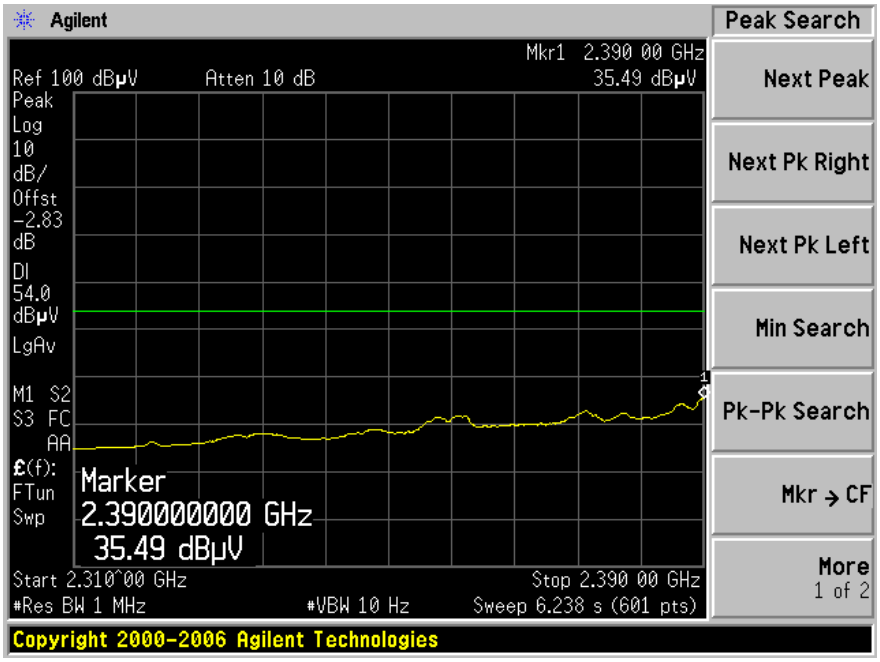
8.9 Band Edge Emissions Plots

802.11 b Mode:

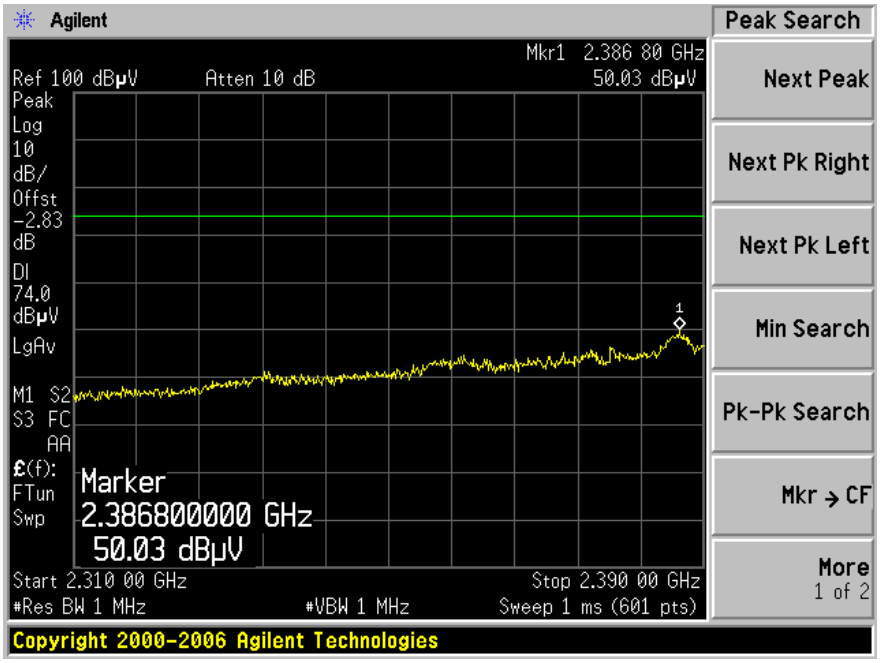
Lowest Channel at Horizontal, Peak



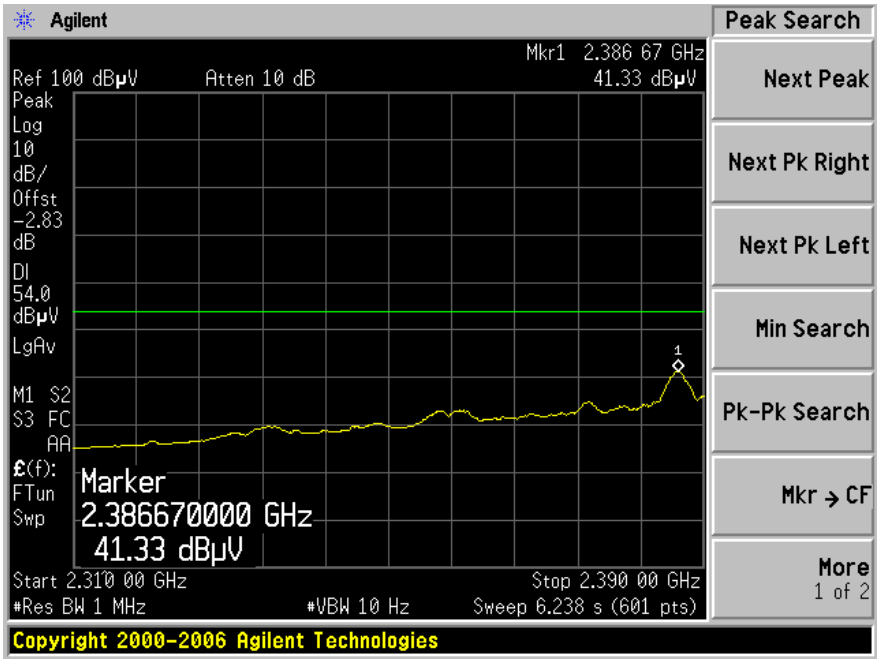
Lowest Channel at Horizontal, Average



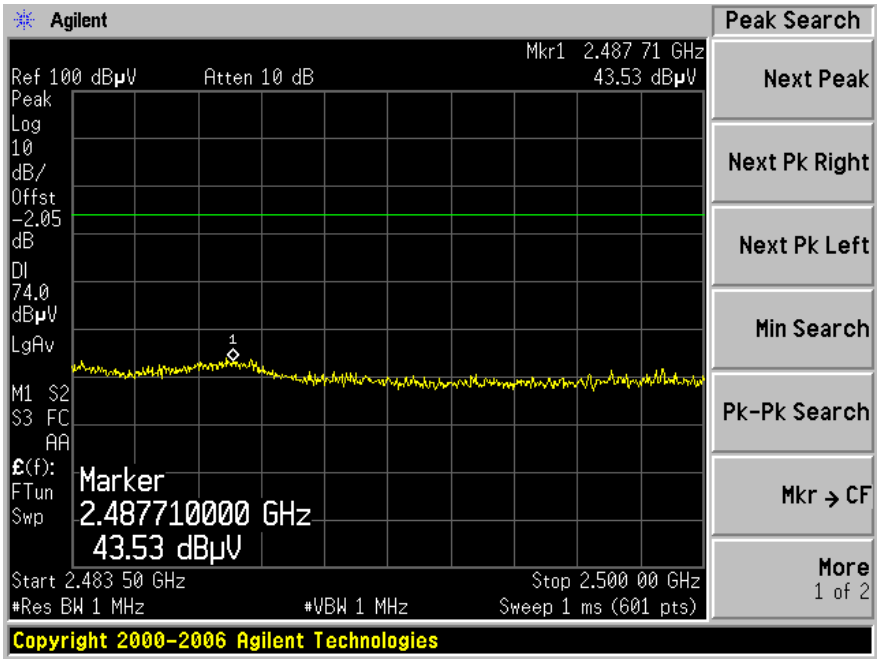
Lowest Channel at Vertical, Peak



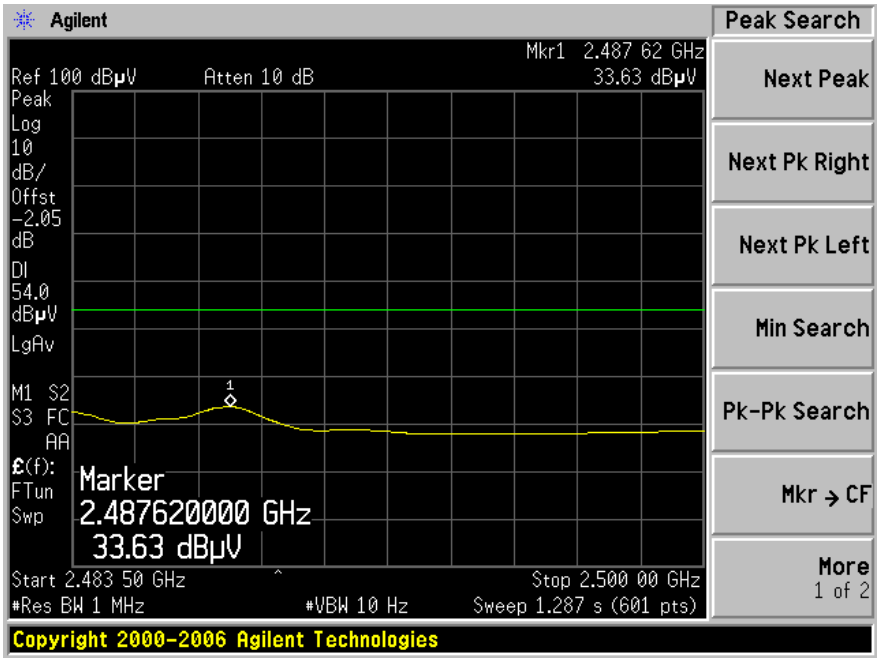
Lowest Channel at Vertical, Average



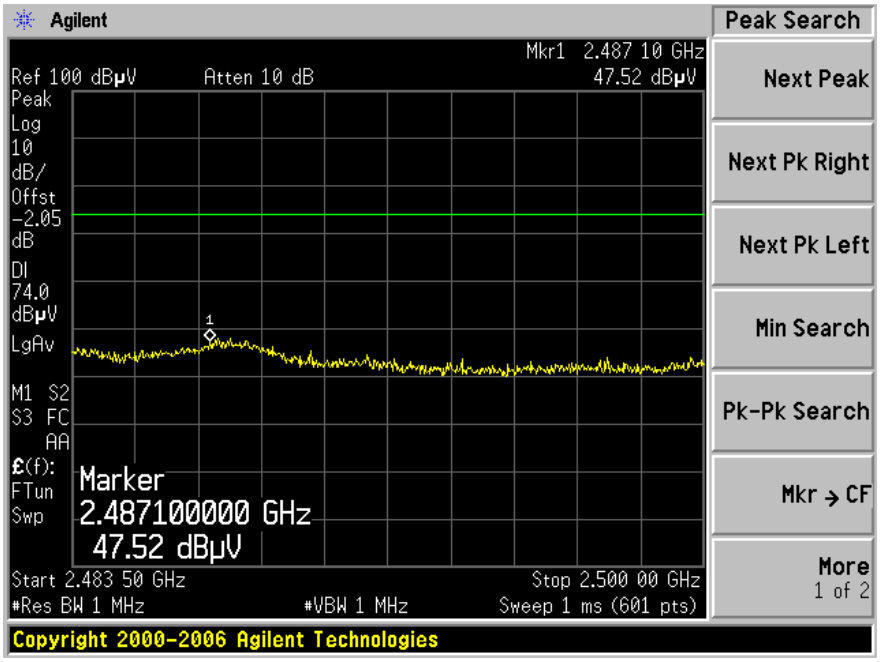
Highest Channel at Horizontal, Peak



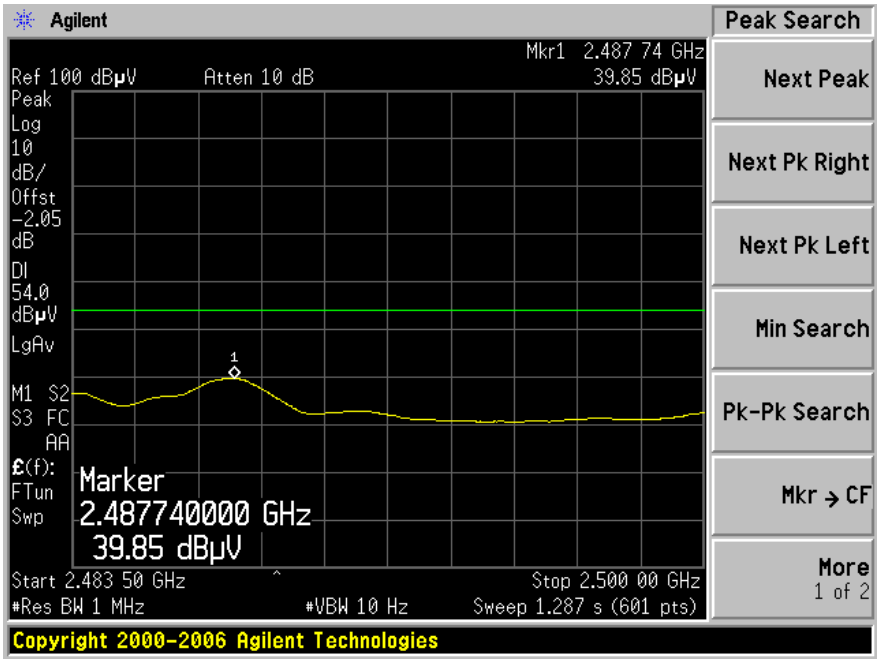
Highest Channel at Horizontal, Average



Highest Channel at Vertical, Peak

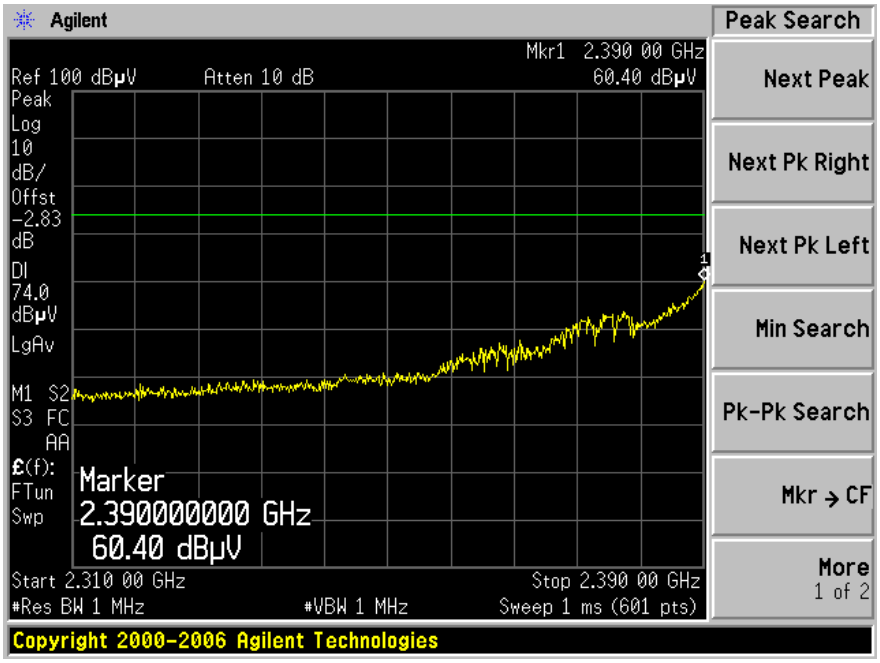


Highest Channel at Vertical, Average

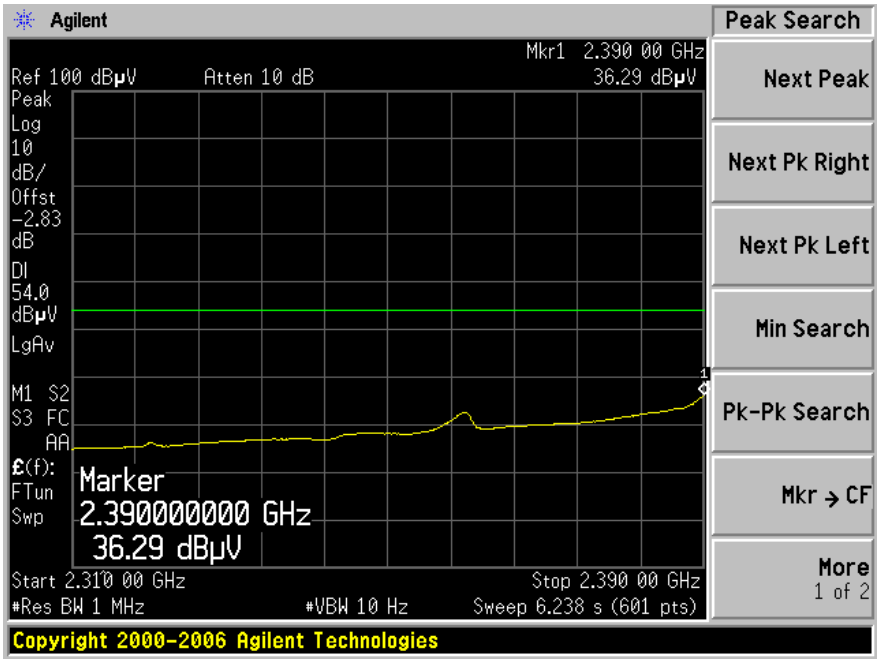


802.11 g Mode:

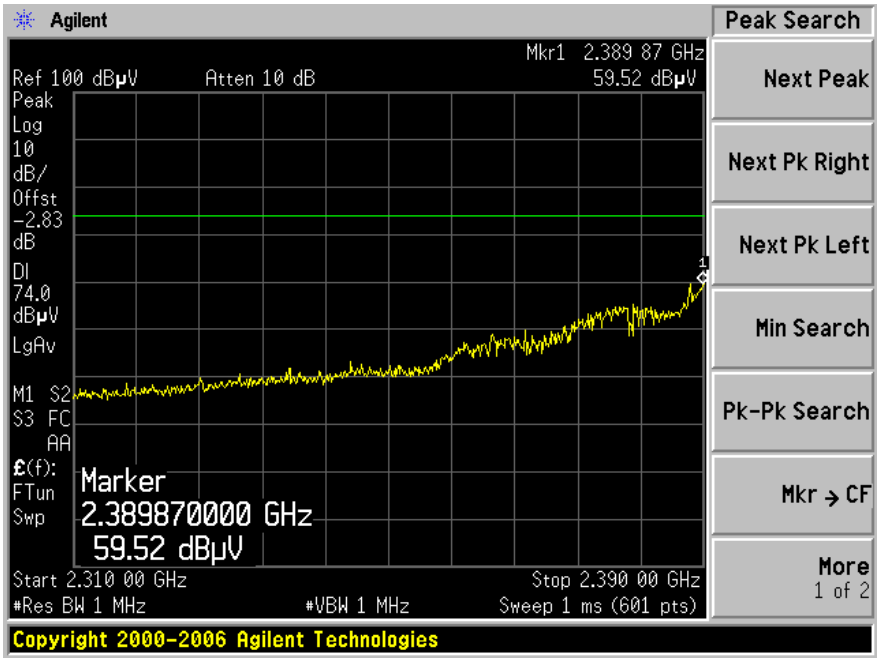
Lowest Channel at Horizontal, Peak



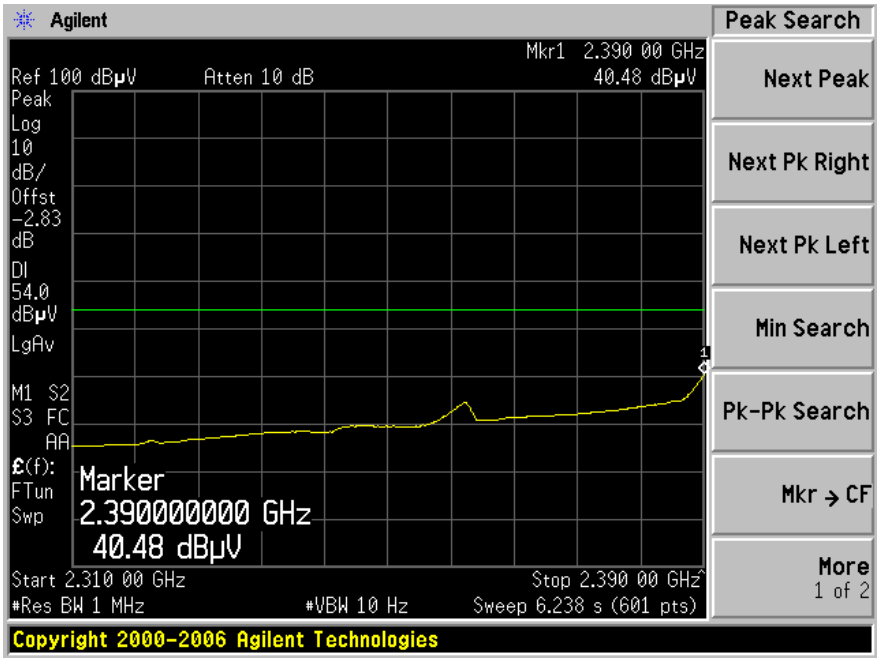
Lowest Channel at Horizontal, Average



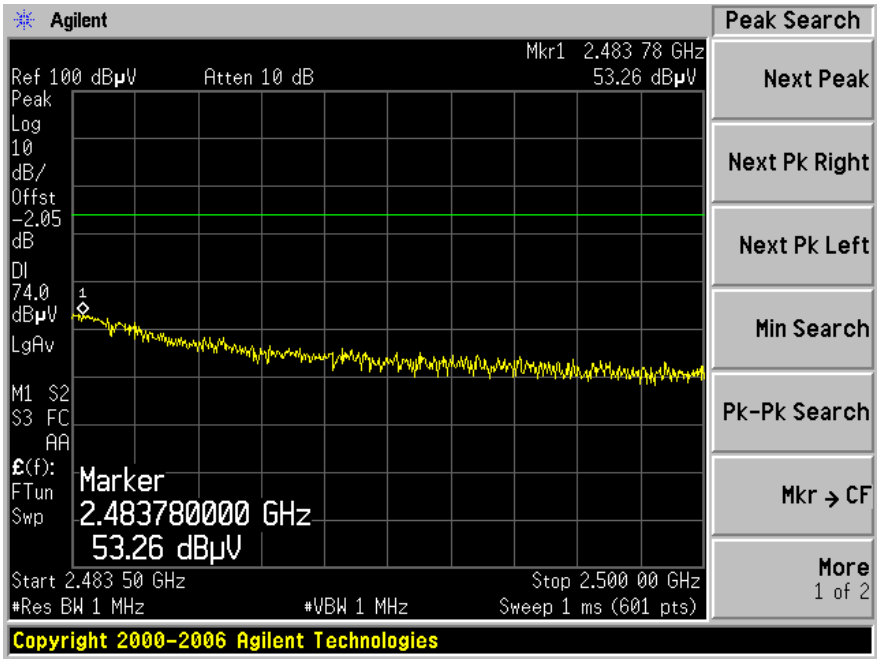
Lowest Channel at Vertical, Peak



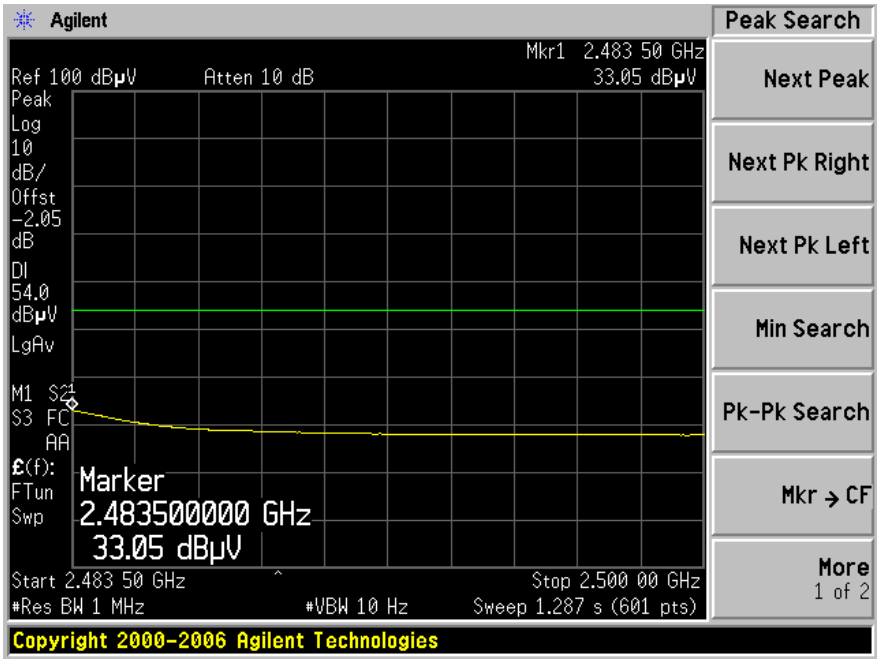
Lowest Channel at Vertical, Average



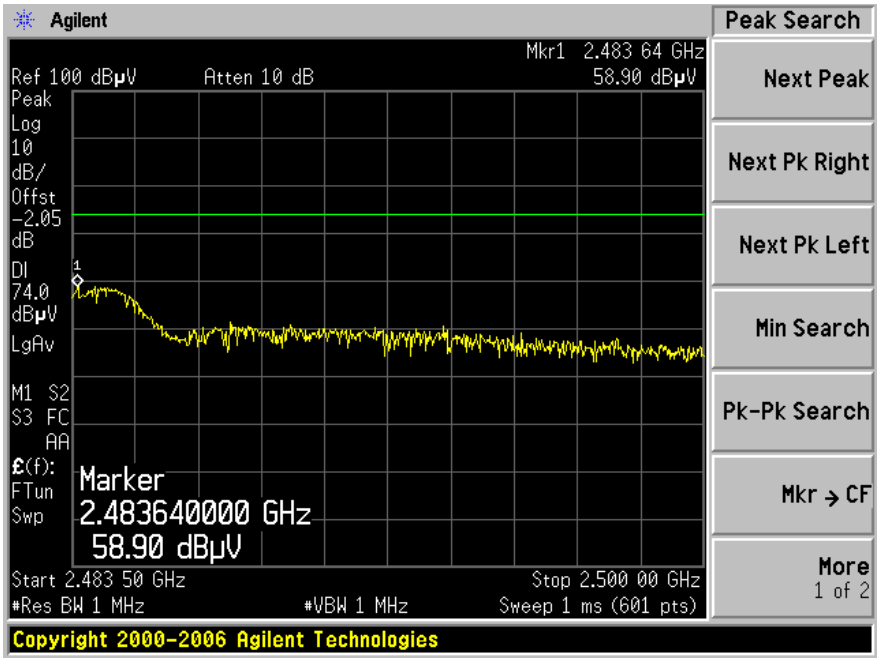
Highest Channel at Horizontal, Peak



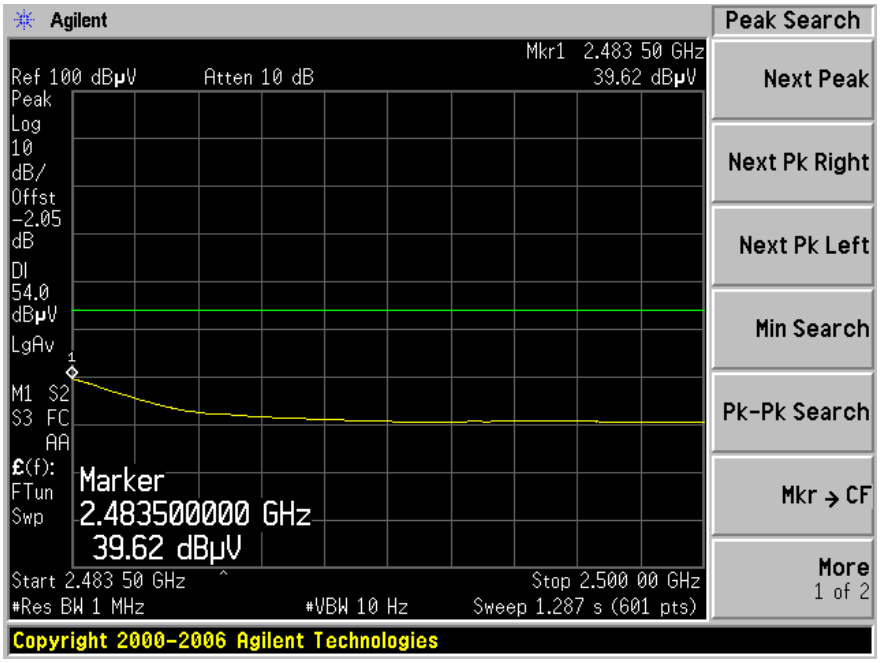
Highest Channel at Horizontal, Average



Highest Channel at Vertical, Peak

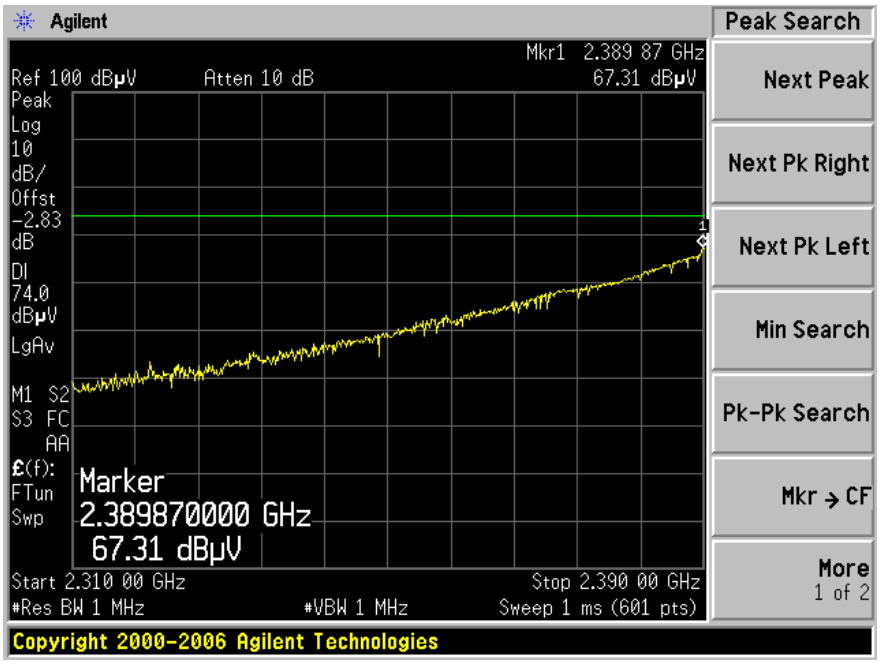


Highest Channel at Vertical, Average

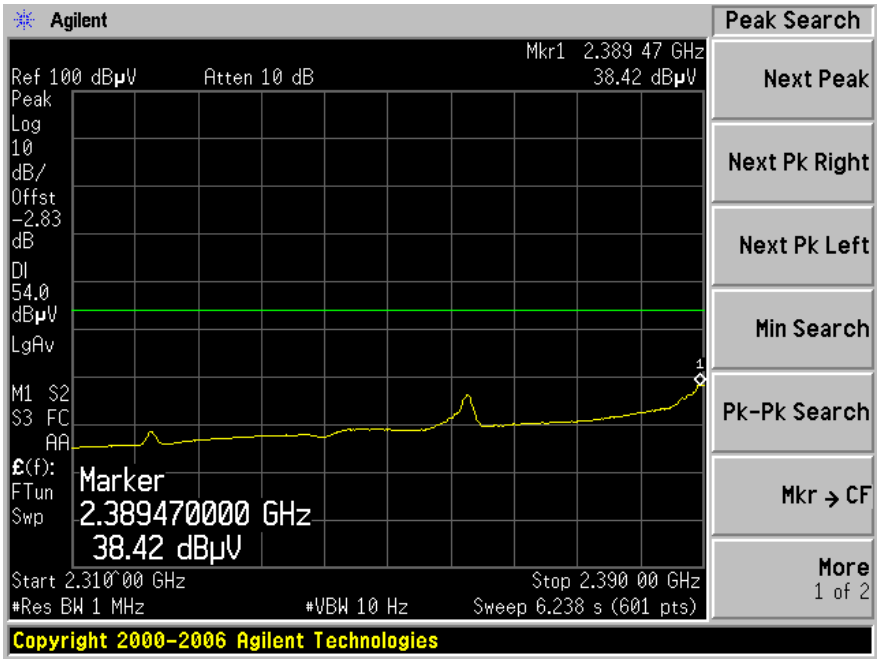


802.11 n 20 MHz Mode:

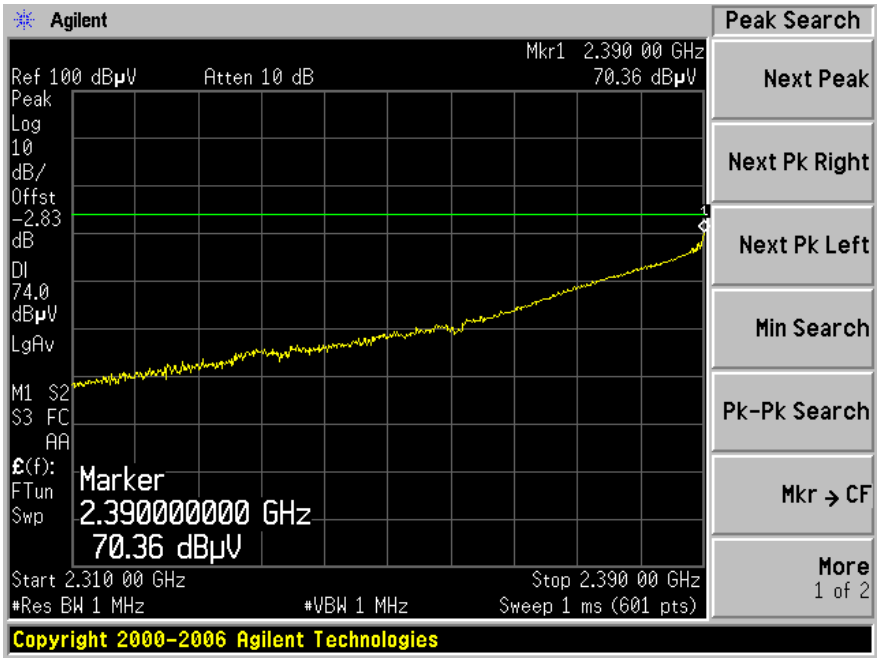
Lowest Channel at Horizontal, Peak



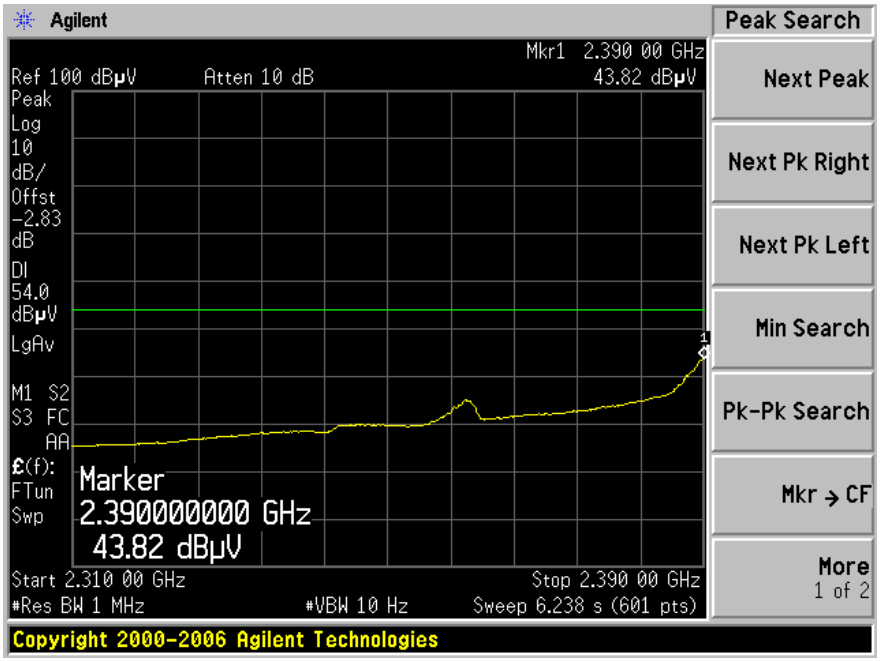
Lowest Channel at Horizontal, Average



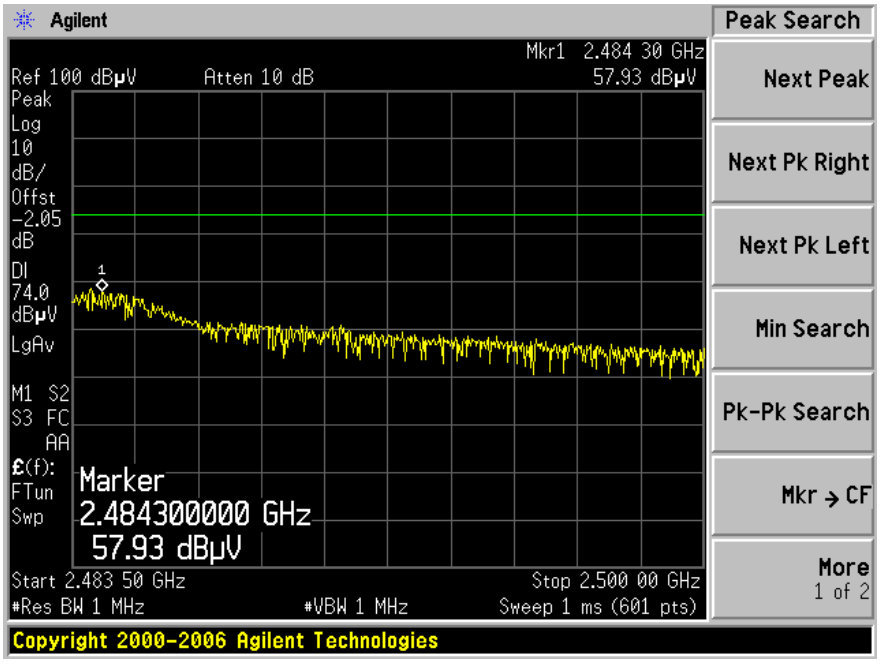
Lowest Channel at Vertical, Peak



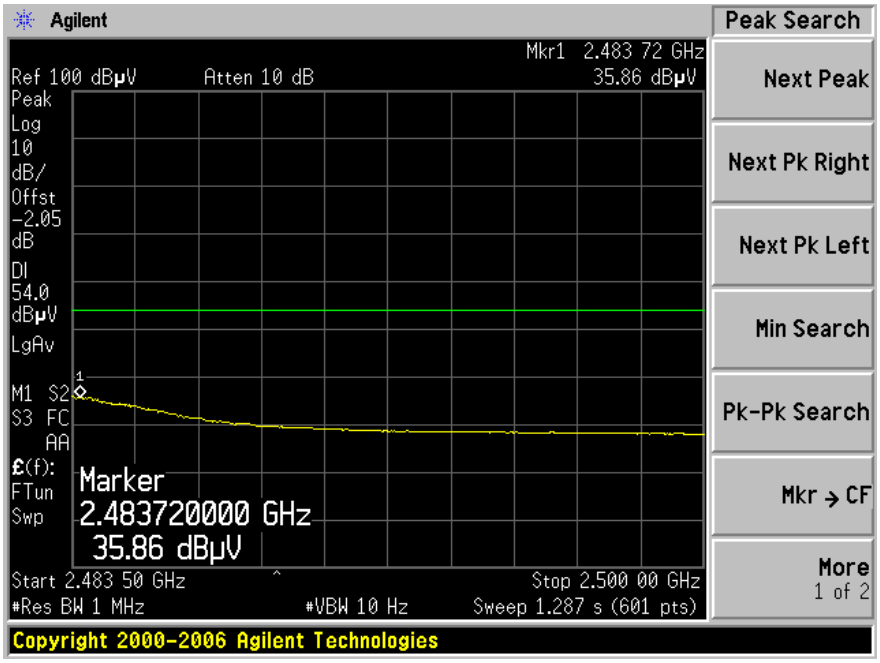
Lowest Channel at Vertical, Average



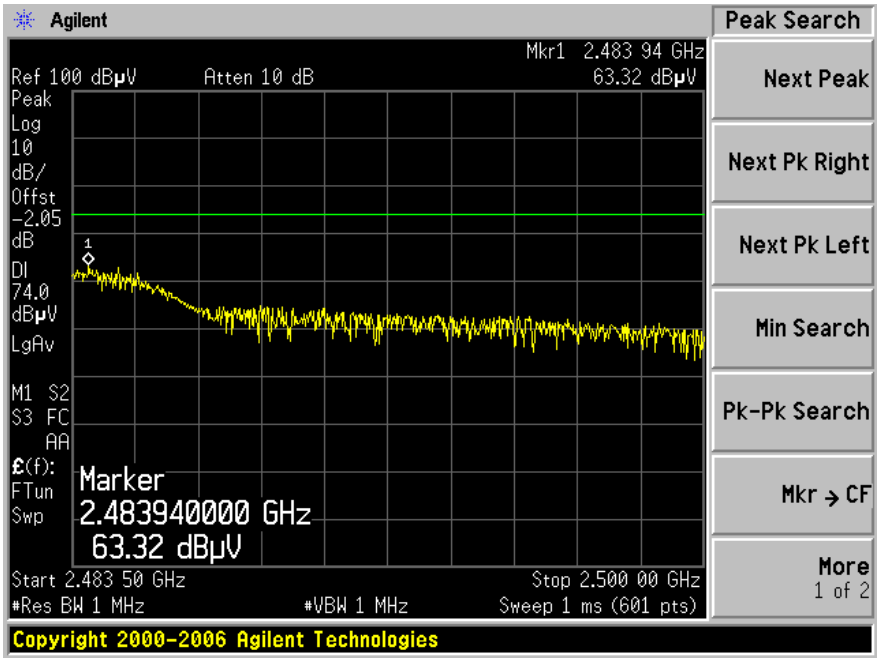
Highest Channel at Horizontal, Peak



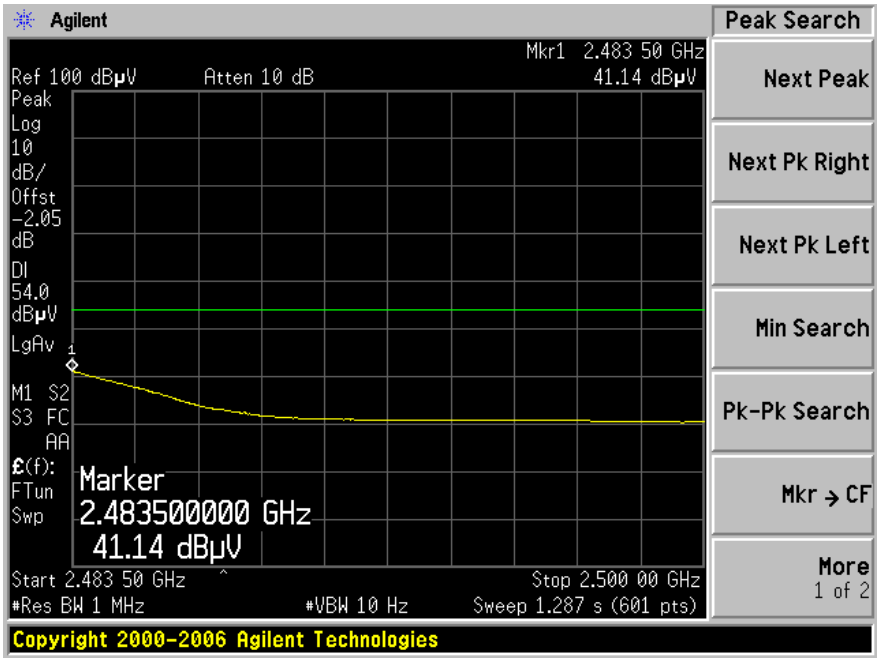
Highest Channel at Horizontal, Average



Highest Channel at Vertical, Peak

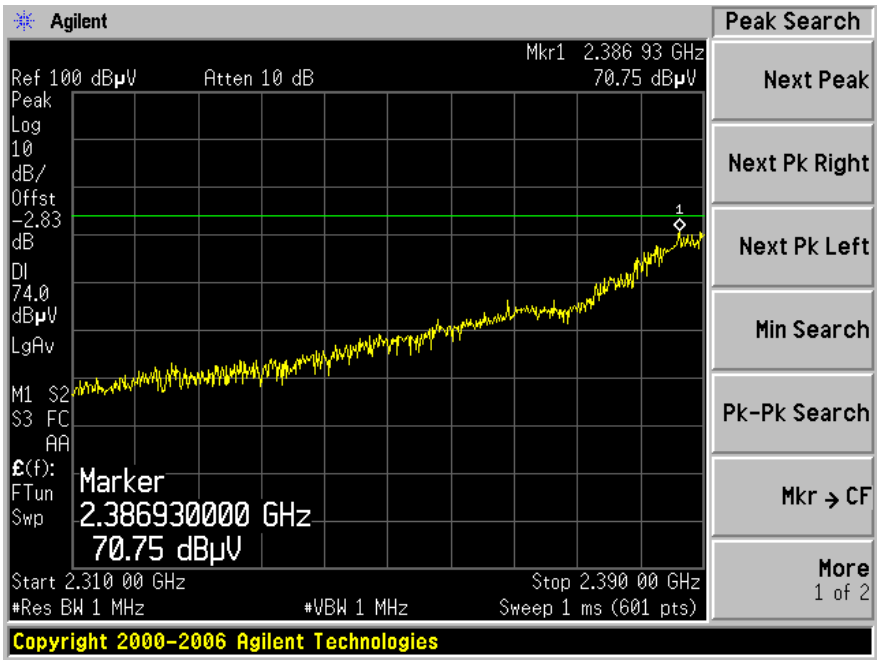


Highest Channel at Vertical, Average

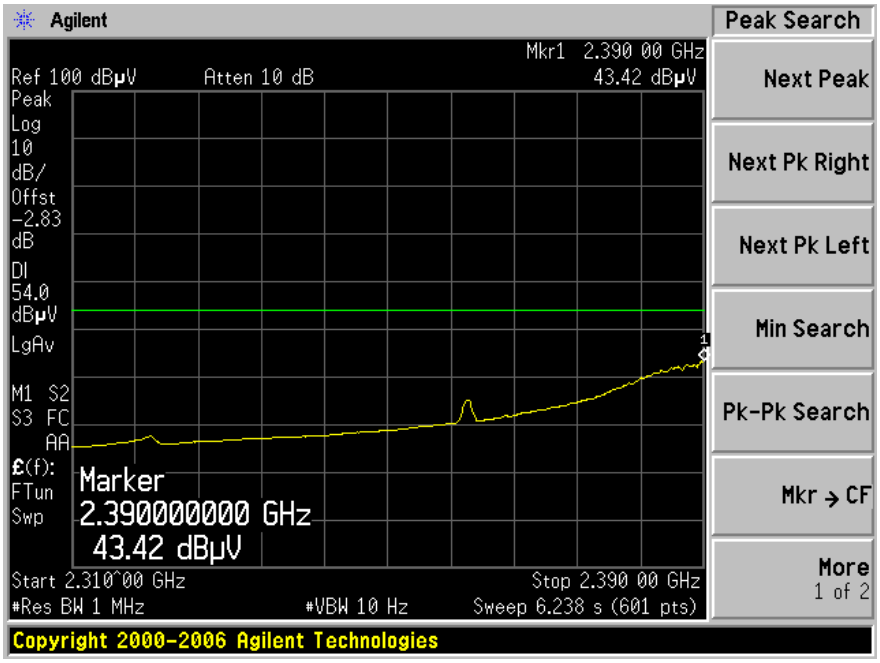


802.11 n 40 MHz Mode:

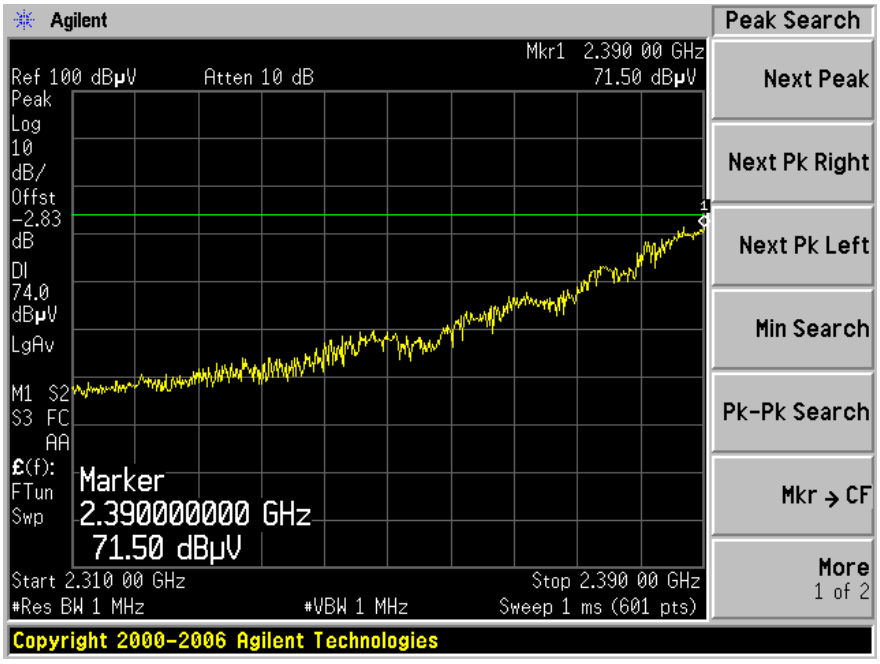
Lowest Channel at Horizontal, Peak



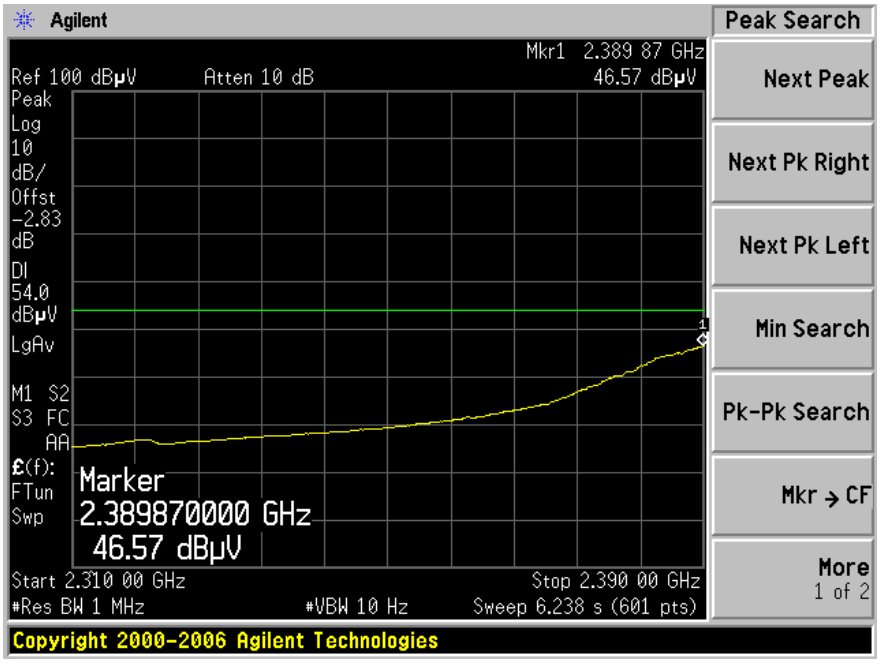
Lowest Channel at Horizontal, Average



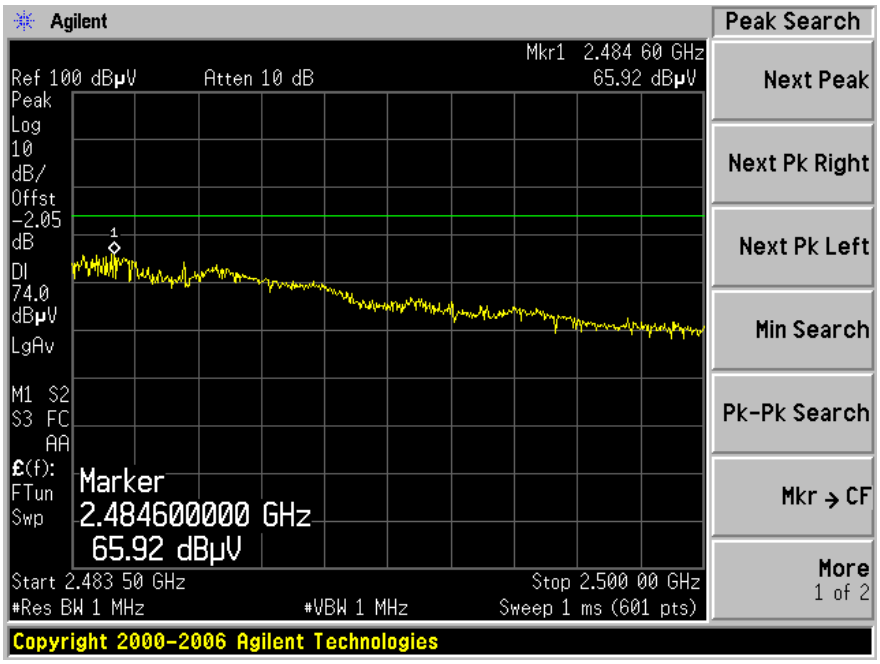
Lowest Channel at Vertical, Peak



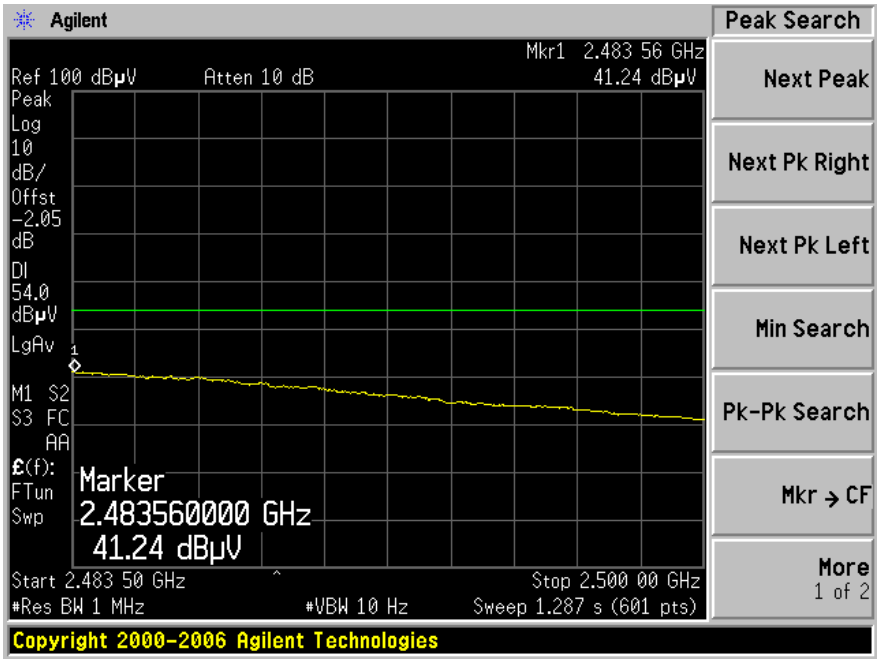
Lowest Channel at Vertical, Average



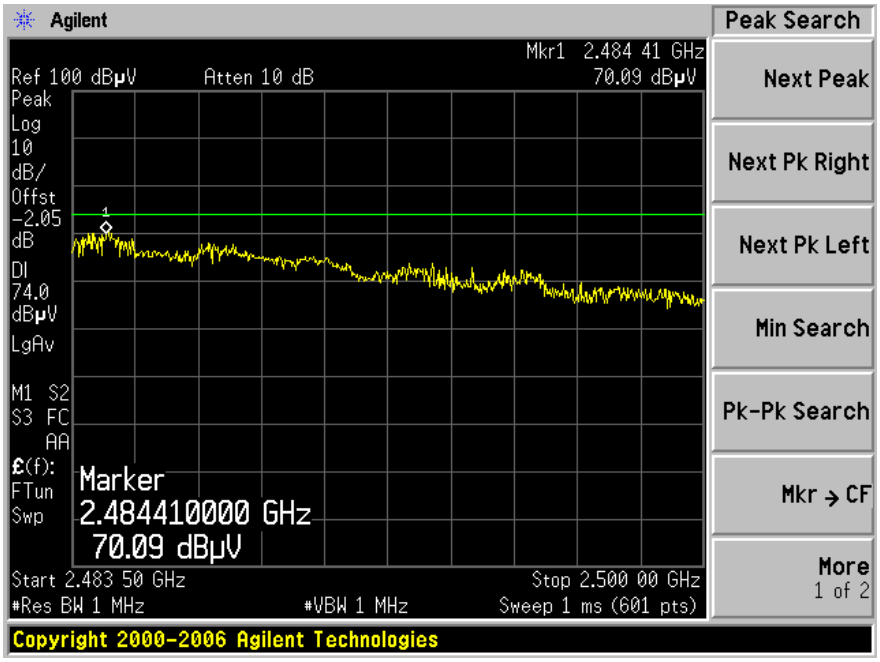
Highest Channel at Horizontal, Peak



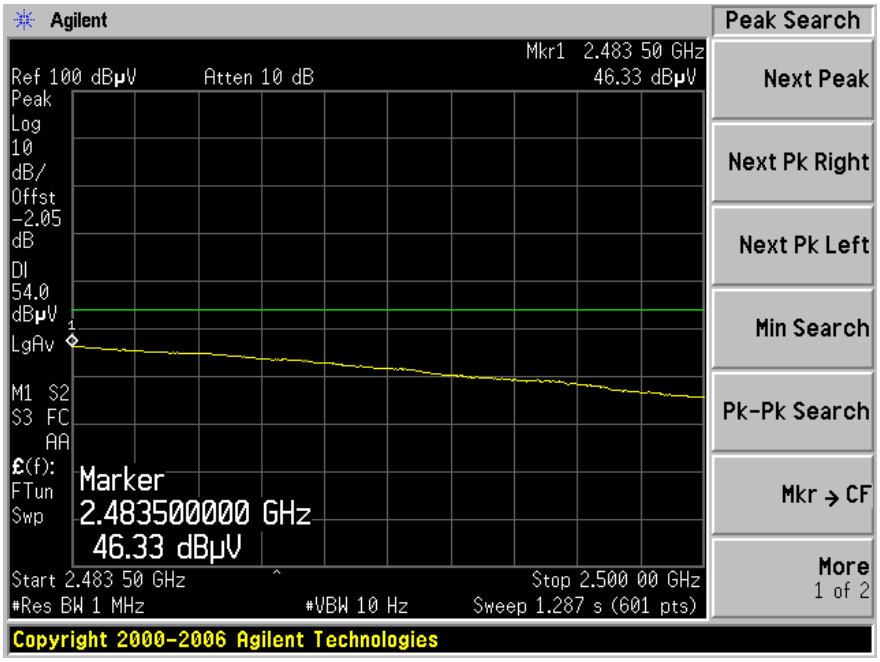
Highest Channel at Horizontal, Average



Highest Channel at Vertical, Peak



Highest Channel at Vertical, Average



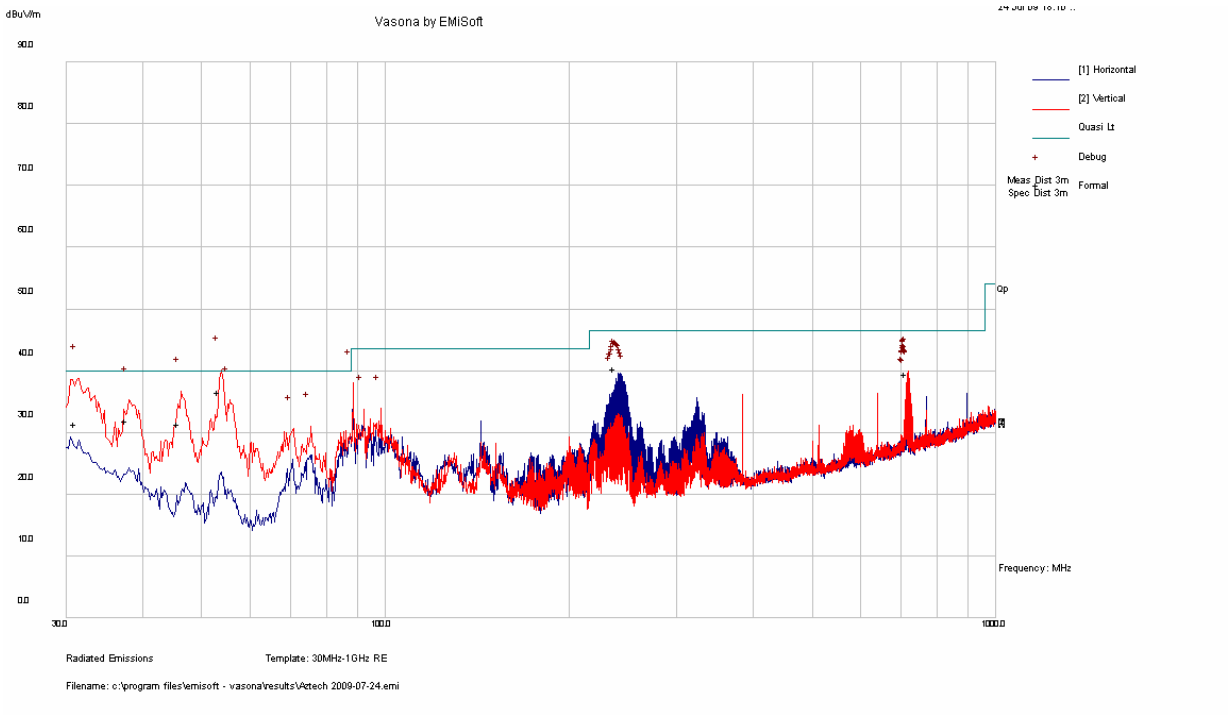
8.10 Radiated Emissions Test plot & data

WLAN only

802.11b Mode

30 MHz – 1000 MHz:

Worst Case, Middle Channel 2437 MHz, measured at 3 meters



Frequency (MHz)	Corrected Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degree)	Limit (dBµV/m)	Margin (dB)
53.88476	36.55	109	V	2	40.0	-3.45
240.0036	40.33	139	H	123	46.5	-6.17
718.4935	39.44	100	V	206	46.5	-7.06
38.0625	31.96	112	V	350	40.0	-8.04
46.2679	31.46	110	V	10	40.0	-8.54
31.40748	31.44	194	V	360	40.0	-8.56

Above 1 GHz:

802.11 b, Low Channel 2412 MHz, measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4824	37.01	0	1.2	H	33.1	9.79	36.9	43	54	-11.00	Ave
4824	36.35	184	1.25	V	33.1	9.79	36.9	42.34	54	-11.66	Ave
4824	44.71	0	1.2	H	33.1	9.79	36.9	50.7	74	-23.30	Peak
4824	44.08	184	1.25	V	33.1	9.79	36.9	50.07	74	-23.93	Peak

802.11 b, Middle channel 2437 MHz, measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4874	36.13	2	1.25	H	33.1	9.75	37	41.98	54	-12.02	Ave
4872	35.21	183	1.0	V	33.1	9.75	37	41.06	54	-12.94	Ave
4874	43.86	2	1.25	H	33.1	9.75	37	49.71	74	-24.29	Peak
4874	42.70	183	1.0	V	33.1	9.75	37	48.55	74	-25.45	Peak

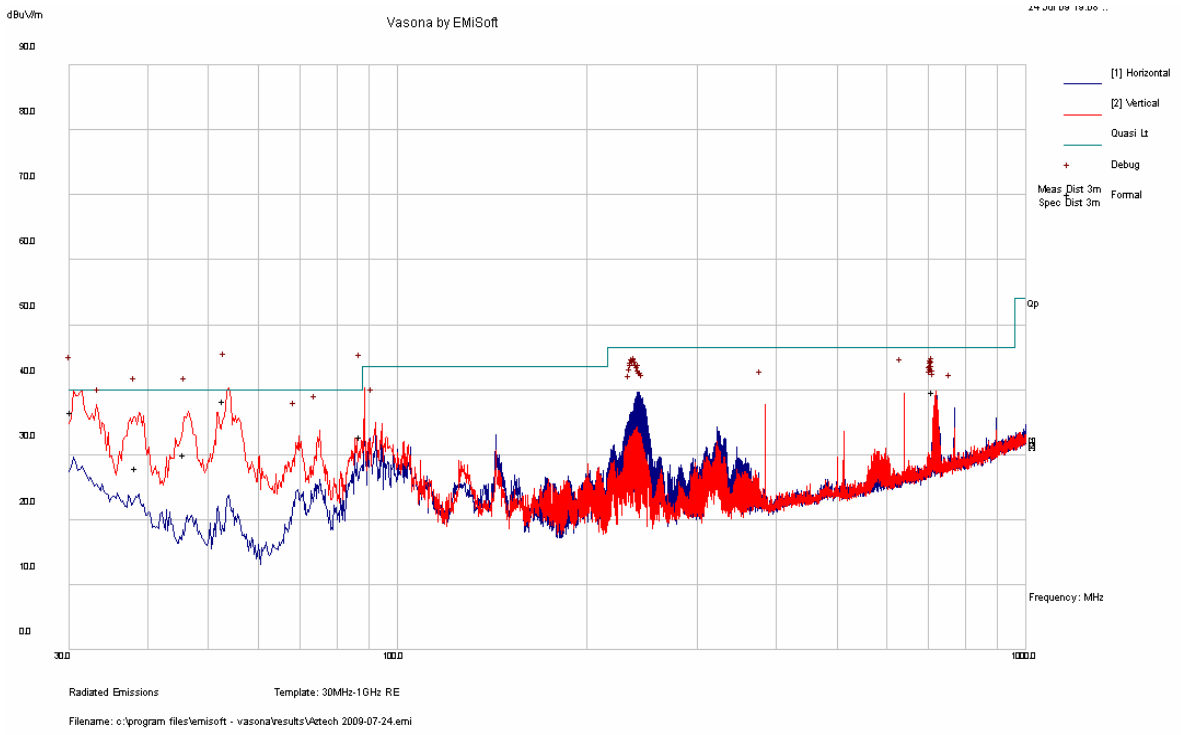
802.11 b, High channel 2462 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4924	36.71	0	1.0	H	33.6	9.71	37	43.02	54	-10.98	Ave
4924	36.21	182	1.0	V	33.6	9.71	37	42.52	54	-11.48	Ave
4924	44.12	0	1.0	H	33.6	9.71	37	50.43	74	-23.57	Peak
4924	43.71	182	1.0	V	33.6	9.71	37	50.02	74	-23.98	Peak

802.11 g Mode:

30 MHz – 1000 MHz:

Worst Case, Middle Channel 2437 MHz, measured at 3 meters



Frequency (MHz)	Corrected Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Azimuth (degree)	Limit (dBµV/m)	Margin (dB)
53.55596	38.32	100	V	18	40.0	-1.68
30.65756	36.53	100	V	198	40.0	-3.47
719.2364	39.72	100	V	159	46.5	-6.78
46.26872	30.07	100	V	308	40.0	-9.93
88.49074	32.73	157	V	0	43.5	-10.77
38.85384	27.97	179	V	155	40.0	-12.03

Above 1 GHz:

802.11 g, Low Channel 2412 MHz, measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4824	34.81	0	1.2	H	33.1	9.79	36.9	40.8	54	-13.2	Ave
4824	33.67	180	1.2	V	33.1	9.79	36.9	39.66	54	-14.34	Ave
4824	44.02	0	1.2	H	33.1	9.79	36.9	50.01	74	-23.99	Peak
4824	43.06	180	1.2	V	33.1	9.79	36.9	49.05	74	-24.95	Peak

802.11 g, Middle channel 2437 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4874	34.17	0	1.25	H	33.1	9.75	37	40.02	54	-13.98	Ave
4872	33.13	181	1.2	V	33.1	9.75	37	38.98	54	-15.02	Ave
4874	43.01	0	1.25	H	33.1	9.75	37	48.86	74	-25.14	Peak
4874	42.16	181	1.2	V	33.1	9.75	37	48.01	74	-25.99	Peak

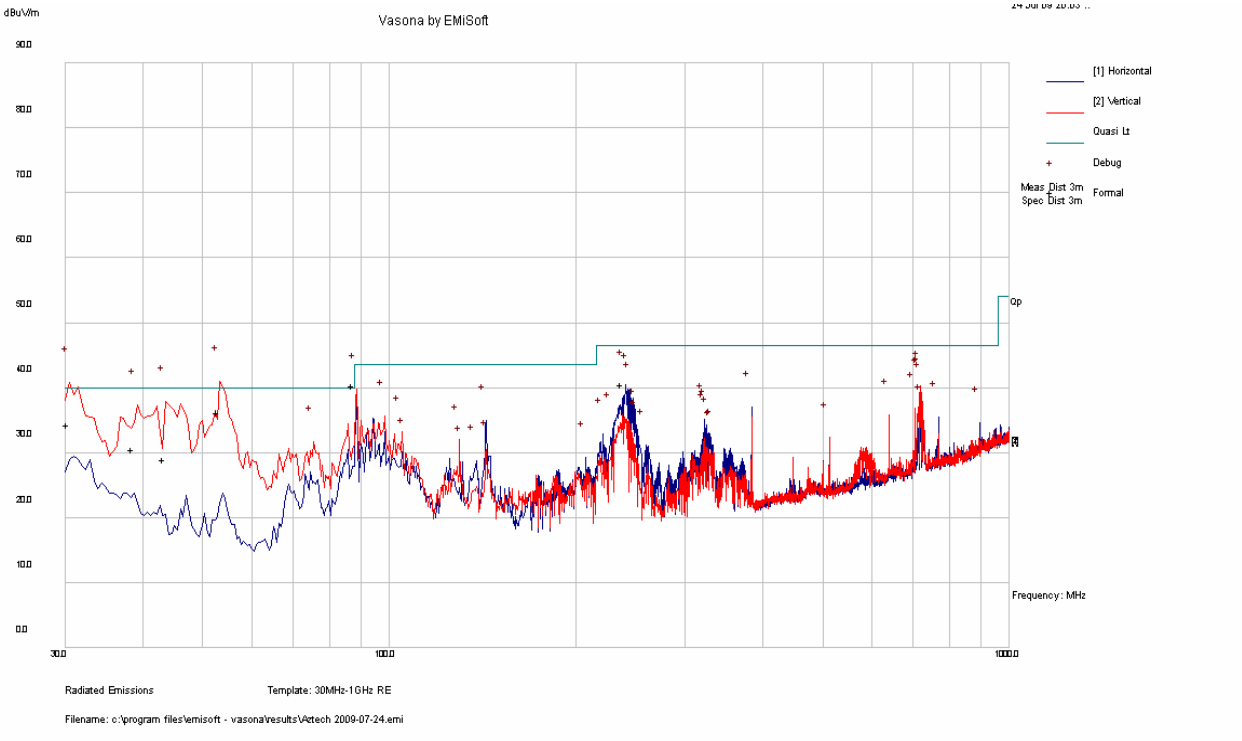
802.11 g, High channel 2462 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4924	34.51	0	1	H	33.6	9.71	37	40.82	54	-13.18	Ave
4924	34.01	180	1	V	33.6	9.71	37	40.32	54	-13.68	Ave
4924	42.57	0	1	H	33.6	9.71	37	48.88	74	-25.12	Peak
4924	42.16	180	1	V	33.6	9.71	37	48.47	74	-25.53	Peak

802.11 n 20 MHz Mode:

30 MHz – 1000 MHz:

Worst Case, Middle Channel 2437 MHz, measured at 3 meters



Frequency (MHz)	Corrected Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Azimuth (degree)	Limit (dBµV/m)	Margin (dB)
88.4966	40.4	107	V	192	43.5	-3.1
53.50848	36.25	102	V	24	40	-3.75
30.65396	34.26	155	V	358	40	-5.74
239.9932	40.44	104	H	126	46.5	-6.06
38.97956	30.58	101	V	76	40	-9.42
43.772	29.05	120	V	38	40	-10.95

Above 1 GHz:

802.11 n 20 MHz, Low Channel 2412 MHz, measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4824	33.65	2	1.0	H	33.1	9.79	36.9	39.64	54	-14.36	Ave
4824	33.13	175	1.2	V	33.1	9.79	36.9	39.12	54	-14.88	Ave
4824	41.7	2	1.0	H	33.1	9.79	36.9	47.69	74	-26.31	Peak
4824	41.25	175	1.2	V	33.1	9.79	36.9	47.24	74	-26.76	Peak

802.11 n 20 MHz, Middle channel 2437 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4872	32.94	179	1.1	V	33.1	9.75	37	38.79	54	-15.21	Ave
4874	32.79	0	1.0	H	33.1	9.75	37	38.64	54	-15.36	Ave
4874	41.05	179	1.1	V	33.1	9.75	37	46.9	74	-27.1	Peak
4874	40.97	0	1.0	H	33.1	9.75	37	46.82	74	-27.18	Peak

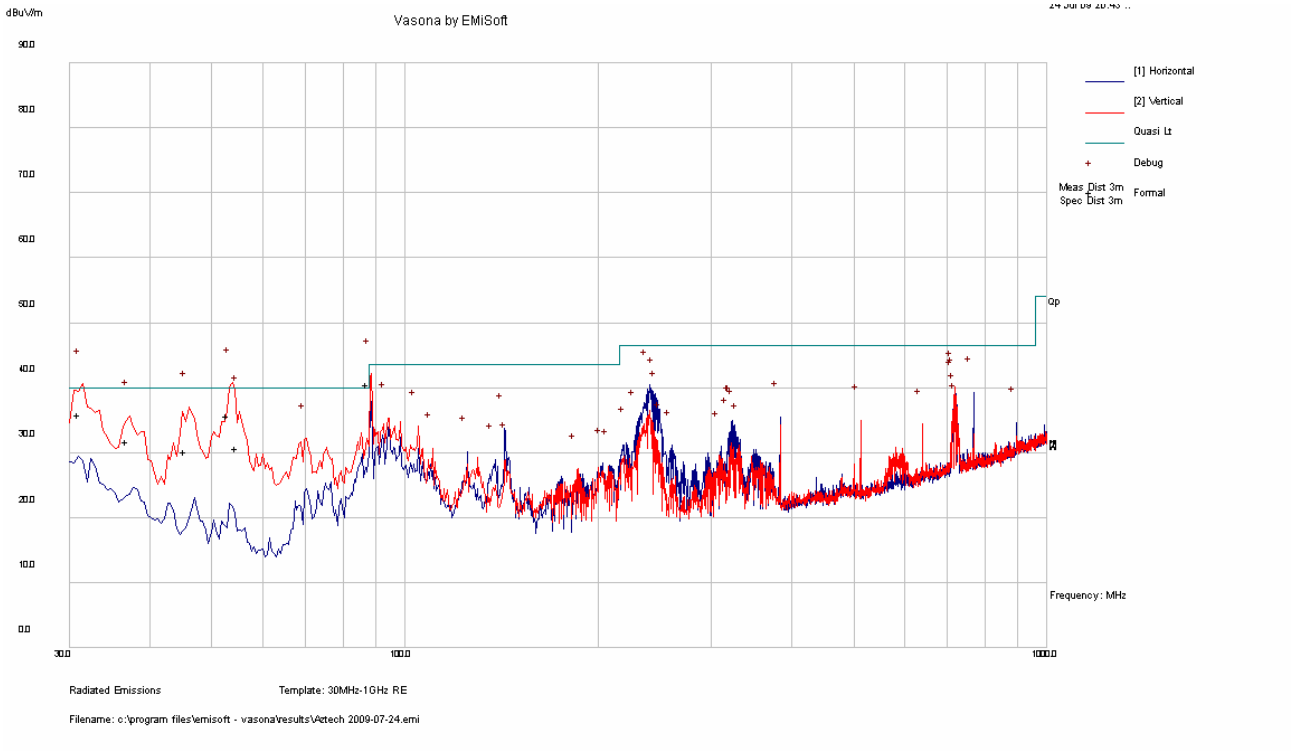
802.11 n 20 MHz, High channel 2462 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4924	33.57	5	1.0	H	33.6	9.71	37	39.88	54	-14.12	Ave
4924	32.76	172	1.0	V	33.6	9.71	37	39.07	54	-14.93	Ave
4924	41.12	5	1.0	H	33.6	9.71	37	47.43	74	-26.57	Peak
4924	40.98	172	1.0	V	33.6	9.71	37	47.29	74	-26.71	Peak

802.11 n 40 MHz Mode:

30 MHz – 1000 MHz:

Worst Case, Middle Channel 2437 MHz, measured at 3 meters



Frequency (MHz)	Corrected Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Azimuth (degree)	Limit (dBµV/m)	Margin (dB)
88.5026	40.55	110	V	196	43.5	-2.95
31.41972	35.93	100	V	246	40	-4.07
53.55788	35.78	130	V	212	40	-4.22
37.37556	31.77	113	V	326	40	-8.23
55.34768	30.75	105	V	64	40	-9.25
45.93276	30.25	150	V	285	40	-9.75

Above 1 GHz:

802.11 n 40 MHz, Low Channel 2422 MHz, measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4844	32.98	0	1	H	33.1	9.79	36.9	38.97	54	-15.03	Ave
4844	32.57	175	1	V	33.1	9.79	36.9	38.56	54	-15.44	Ave
4844	41.35	0	1	H	33.1	9.79	36.9	47.34	74	-26.66	Peak
4844	40.12	175	1	V	33.1	9.79	36.9	46.11	74	-27.89	Peak

802.11 n 40 MHz, Middle channel 2437 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4874	34.01	0	1	H	33.1	9.75	37	39.86	54	-14.14	Ave
4872	33.57	180	1	V	33.1	9.75	37	39.42	54	-14.58	Ave
4874	40.24	0	1	H	33.1	9.75	37	46.09	74	-27.91	Peak
4874	40.17	180	1	V	33.1	9.75	37	46.02	74	-27.98	Peak

802.11 n 40 MHz, High channel 2452 MHz measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4904	31.12	172	1	V	33.6	9.71	37	37.43	54	-16.57	Ave
4904	30.11	0	1	H	33.6	9.71	37	36.42	54	-17.58	Ave
4904	40	172	1	V	33.6	9.71	37	46.31	74	-27.69	Peak
4904	39.97	0	1	H	33.6	9.71	37	46.28	74	-27.72	Peak

Co-Location (WLAN & GSM/GPRS/EGPRS)

WLAN 20 MHz with FCC ID: NCMOGI0411, GSM/GPRS/EGPRS 1900 MHz Band

WLAN 20 MHz Worst Case: 802.11B Low Channel: 2412 MHz
GSM/GPRS/EGPRS 1900 Band Worst Case: EGPRS Middle Channel: 1880 MHz

Scan from 30 MHz to 25 GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4824	37.21	183	1.25	V	33.1	9.79	36.9	43.2	54	-10.8	Ave
4824	36.95	0	1.2	H	33.1	9.79	36.9	42.94	54	-11.06	Ave
3760	62.03	193	1.18	V	30.9	6.91	37.3	62.54	74	-11.46	Peak
4292	54.79	351	1.12	H	32.1	9.71	37.1	59.5	74	-14.5	Peak
4292	53.03	154	1.15	V	32.1	9.71	37.1	57.74	74	-16.26	Peak
3760	56.01	173	1.1	H	30.9	6.91	37.3	56.52	74	-17.48	Peak
5640	27.37	320	1.29	V	34.6	9.91	36.7	35.18	54	-18.82	Ave
5640	27.25	283	1.37	H	34.6	9.91	36.7	35.06	54	-18.94	Ave
5640	47	320	1.29	V	34.6	9.91	36.7	54.81	74	-19.19	Peak
5640	46.57	283	1.37	H	34.6	9.91	36.7	54.38	74	-19.62	Peak
4292	29.15	351	1.12	H	32.1	9.71	37.1	33.86	54	-20.14	Ave
4292	28.82	154	1.15	V	32.1	9.71	37.1	33.53	54	-20.47	Ave
3760	31.18	193	1.18	V	30.9	6.91	37.3	31.69	54	-22.31	Ave
4824	44.83	0	1.2	H	33.1	9.79	36.9	50.82	74	-23.18	Peak
3760	30.15	173	1.1	H	30.9	6.91	37.3	30.66	54	-23.34	Ave
4824	44.02	184	1.25	V	33.1	9.79	36.9	50.01	74	-23.99	Peak

WLAN 40 MHz with FCC ID: NCMOGI0411, GSM/GPRS/EGPRS 1900MHz Band

WLAN 40 MHz Worst Case: 802.11N40 Low Channel: 2422 MHz
GSM/GPRS/EGPRS 1900 Band Worst Case: EGPRS Middle Channel: 1880 MHz

Scan from 30 MHz to 25 GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
3760	61.44	193	1.18	V	30.9	6.91	37.3	61.95	74	-12.05	Peak
4844	32.97	0	1	H	33.1	9.79	36.9	38.96	54	-15.04	Ave
4844	32.51	177	1	V	33.1	9.79	36.9	38.5	54	-15.5	Ave
4302	51.51	167	1.21	V	32.1	9.71	37.1	56.22	74	-17.78	Peak
4302	51.45	243	1.37	H	32.1	9.71	37.1	56.16	74	-17.84	Peak
3760	55.19	173	1.12	H	30.9	6.91	37.3	55.7	74	-18.3	Peak
5640	27.32	325	1.28	V	34.6	9.91	36.7	35.13	54	-18.87	Ave
5640	27.25	282	1.36	H	34.6	9.91	36.7	35.06	54	-18.94	Ave
5640	47.06	325	1.28	V	34.6	9.91	36.7	54.87	74	-19.13	Peak
5640	46.5	282	1.36	H	34.6	9.91	36.7	54.31	74	-19.69	Peak
4302	27.35	167	1.21	V	32.1	9.71	37.1	32.06	54	-21.94	Ave
4302	27.28	243	1.37	H	32.1	9.71	37.1	31.99	54	-22.01	Ave
3760	31.15	193	1.18	V	30.9	6.91	37.3	31.66	54	-22.34	Ave
3760	30.13	173	1.12	H	30.9	6.91	37.3	30.64	54	-23.36	Ave
4844	41.23	0	1	H	33.1	9.79	36.9	47.22	74	-26.78	Peak
4844	40.71	177	1	V	33.1	9.79	36.9	46.7	74	-27.3	Peak

WLAN 20 MHz with FCC ID: NCMOGI0451, GSM/GPRS/EGPRS 850MHz Band

WLAN 20 MHz Worst Case: 802.11B Low Channel: 2412 MHz
GSM/GPRS/EGPRS 850 Band Worst Case: GSM High Channel: 848.8 MHz

Scan from 30MHz to 25GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4824	36.91	0	1.2	H	33.1	9.79	36.9	42.9	54	-11.1	Ave
4824	35.99	182	1.25	V	33.1	9.79	36.9	41.98	54	-12.02	Ave
4244	29.18	338	1.55	H	31.9	9.71	37.1	33.69	54	-20.31	Ave
1697.6	60.64	211	1.08	V	25.5	5.08	38.4	52.82	74	-21.18	Peak
4244	28.25	287	1.13	V	31.9	9.71	37.1	32.76	54	-21.24	Ave
4244	48.08	338	1.55	H	31.9	9.71	37.1	52.59	74	-21.41	Peak
4244	47.83	287	1.13	V	31.9	9.71	37.1	52.34	74	-21.66	Peak
4824	44.61	0	1.2	H	33.1	9.79	36.9	50.6	74	-23.4	Peak
4824	43.85	182	1.25	V	33.1	9.79	36.9	49.84	74	-24.16	Peak
1697.6	56.88	318	1.02	H	25.5	5.08	38.4	49.06	74	-24.94	Peak
1697.6	33.23	211	1.08	V	25.5	5.08	38.4	25.41	54	-28.59	Ave
1697.6	32.35	318	1.02	H	25.5	5.08	38.4	24.53	54	-29.47	Ave

WLAN 40 MHz with FCC ID: NCMOGI0411, GSM/GPRS/EGPRS 850 MHz Band

WLAN 40 MHz Worst Case: 802.11N40 Low Channel: 2422 MHz
GSM/GPRS/EGPRS 850 Band Worst Case: GSM High Channel: 848.8 MHz

Scan from 30 MHz to 25 GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4844	32.91	0	1.0	H	33.1	9.79	36.9	38.9	54	-15.1	Ave
4844	32.71	179	1.0	V	33.1	9.79	36.9	38.7	54	-15.3	Ave
4244	30.01	330	1.5	H	31.9	9.71	37.1	34.52	54	-19.48	Ave
4244	28.2	230	1.1	V	31.9	9.71	37.1	32.71	54	-21.29	Ave
4244	48.13	330	1.5	H	31.9	9.71	37.1	52.64	74	-21.36	Peak
1697.6	59.92	210	1.08	V	25.5	5.08	38.4	52.1	74	-21.9	Peak
4244	46.81	230	1.1	V	31.9	9.71	37.1	51.32	74	-22.68	Peak
1697.6	55.87	320	1.02	H	25.5	5.08	38.4	48.05	74	-25.95	Peak
4844	41.35	0	1.0	H	33.1	9.79	36.9	47.34	74	-26.66	Peak
4844	40.61	179	1.	V	33.1	9.79	36.9	46.6	74	-27.4	Peak
1697.6	33.01	210	1.08	V	25.5	5.08	38.4	25.19	54	-28.81	Ave
1697.6	32.21	320	1.02	H	25.5	5.08	38.4	24.39	54	-29.61	Ave

WLAN 20 MHz with FCC ID: NCMOGI0411 HSPA 1900 MHz Band

WLAN 20 MHz Worst Case: 802.11B Low Channel: 2412 MHz
HSPA 1900 MHz Band Worst Case: HSDPA Sub-test 1 High Channel: 1907.5 MHz

Scan from 30 MHz to 25 GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4319.5	41.1	337	1.0	H	32.1	9.71	37.1	45.81	54	-8.19	Ave
3815	42.67	153	1.2	V	30.9	6.91	37.3	43.18	54	-10.82	Ave
4319.5	38.45	231	1.35	V	32.1	9.71	37.1	43.16	54	-10.84	Ave
4824	36.87	5	1.1	H	33.1	9.79	36.9	42.86	54	-11.14	Ave
4824	36.25	180	1.15	V	33.1	9.79	36.9	42.24	54	-11.76	Ave
3815	39.61	151	1.18	H	30.9	6.91	37.3	40.12	54	-13.88	Ave
4319.5	50.83	337	1.0	H	32.1	9.71	37.1	55.54	74	-18.46	Peak
4319.5	50.18	231	1.35	V	32.1	9.71	37.1	54.89	74	-19.11	Peak
3815	52.91	153	1.2	V	30.9	6.91	37.3	53.42	74	-20.58	Peak
3815	50.6	151	1.18	H	30.9	6.91	37.3	51.11	74	-22.89	Peak
4824	44.61	5	1.1	H	33.1	9.79	36.9	50.6	74	-23.4	Peak
4824	43.98	180	1.15	V	33.1	9.79	36.9	49.97	74	-24.03	Peak

WLAN 40 MHz with FCC ID: NCMOGI0411, HSPA 1900 MHz Band

WLAN 40 MHz Worst Case: 802.11N40 Low Channel: 2422 MHz
HSPA 1900 MHz Band Worst Case: HSDPA Sub-test 1 High Channel: 1907.5 MHz

Scan from 30 MHz to 25 GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
3815	42.42	152	1.2	V	30.9	6.91	37.3	42.93	54	-11.07	Ave
3815	38.37	150	1.21	H	30.9	6.91	37.3	38.88	54	-15.12	Ave
4844	32.78	0	1.0	H	33.1	9.79	36.9	38.77	54	-15.23	Ave
4844	32.56	180	1.0	V	33.1	9.79	36.9	38.55	54	-15.45	Ave
4329.5	33.4	337	1.0	H	32.1	9.71	37.1	38.11	54	-15.89	Ave
4329.5	32.51	232	1.4	V	32.1	9.71	37.1	37.22	54	-16.78	Ave
4329.5	49.68	337	1.0	H	32.1	9.71	37.1	54.39	74	-19.61	Peak
3815	52.65	152	1.2	V	30.9	6.91	37.3	53.16	74	-20.84	Peak
4329.5	48.06	232	1.4	V	32.1	9.71	37.1	52.77	74	-21.23	Peak
3815	49.56	150	1.21	H	30.9	6.91	37.3	50.07	74	-23.93	Peak
4844	41.32	0	1.0	H	33.1	9.79	36.9	47.31	74	-26.69	Peak
4844	40.15	180	1.0	V	33.1	9.79	36.9	46.14	74	-27.86	Peak

WLAN 20 MHz with FCC ID: NCMOGI0451, HSPA 850 MHz Band

WLAN 20 MHz Worst Case: 802.11B Low Channel: 2412 MHz
HSPA 850 MHz Band Worst Case: HSUPA Sub-test 1 High Channel: 846.6 MHz

Scan from 30 MHz to 25 GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4824	37.05	0	1.2	H	33.1	9.79	36.9	43.04	54	-10.96	Ave
4824	36.37	184	1.25	V	33.1	9.79	36.9	42.36	54	-11.64	Ave
4824	44.61	0	1.2	H	33.1	9.79	36.9	50.6	74	-23.4	Peak
4824	44.01	184	1.25	V	33.1	9.79	36.9	50	74	-24	Peak

WLAN 40 MHz with FCC ID: NCMOGI0451, HSPA 850 MHz Band

WLAN 40 MHz Worst Case: 802.11N40 Low Channel: 2422 MHz
HSPA 850 MHz Band Worst Case: HSUPA Sub-test 1 High Channel: 846.6 MHz

Scan from 30MHz to 25GHz at 3 Meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
4844	32.96	0	1	H	33.1	9.79	36.9	38.95	54	-15.05	Ave
4844	32.55	175	1	V	33.1	9.79	36.9	38.54	54	-15.46	Ave
4844	41.33	0	1	H	33.1	9.79	36.9	47.32	74	-26.68	Peak
4844	40.18	175	1	V	33.1	9.79	36.9	46.17	74	-27.83	Peak

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

9.1 Applicable Standard

According to §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 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	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27

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

9.4 Environmental Conditions

Temperature:	18-22 °C
Relative Humidity:	40-44 %
ATM Pressure:	101-103kPa

**The testing was performed by Victor Zhang from 2009-07-17 to 2009-07-24 at RF Site.*

9.5 Summary of Test Results

802.11 b Mode:

Channel	Frequency (MHz)	6 dB Channel Bandwidth (kHz)	99% Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	12164	14.9704	> 500	Compliant
Middle	2437	12146	15.0119	> 500	Compliant
High	2462	12169	15.0092	> 500	Compliant

802.11 g Mode:

Channel	Frequency (MHz)	6 dB Channel Bandwidth (kHz)	99% Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16324	16.3972	> 500	Compliant
Middle	2437	16247	16.4129	> 500	Compliant
High	2462	16327	16.3671	> 500	Compliant

802.11 n 20 MHz Mode:

Chain #0

Channel	Frequency (MHz)	6 dB Channel Bandwidth (kHz)	99% Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	17021	17.3680	> 500	Compliant
Middle	2437	17276	17.3460	> 500	Compliant
High	2462	17197	17.3781	> 500	Compliant

Chain #1

Channel	Frequency (MHz)	6 dB Channel Bandwidth (kHz)	99% Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	17043	17.3491	> 500	Compliant
Middle	2437	17273	17.3907	> 500	Compliant
High	2462	17308	17.3666	> 500	Compliant

802.11 n 40 MHz Mode:

Chain #0

Channel	Frequency (MHz)	6 dB Channel Bandwidth (kHz)	99% Bandwidth (MHz)	Limit (kHz)	Results
Low	2422	35875	35.8284	> 500	Compliant
Middle	2437	35802	35.8282	> 500	Compliant
High	2452	35768	35.8172	> 500	Compliant

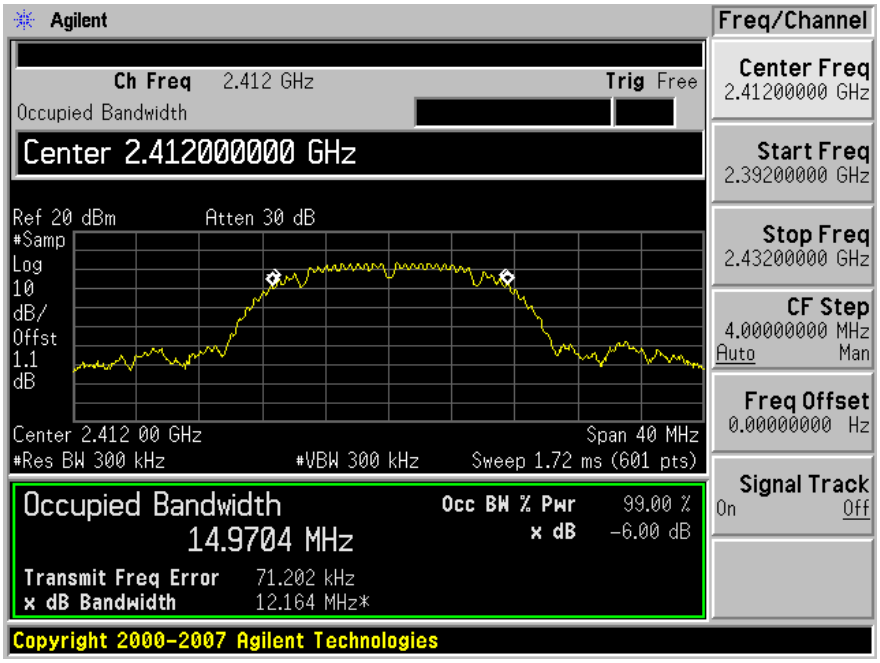
Chain #1

Channel	Frequency (MHz)	6 dB Channel Bandwidth (kHz)	99% Bandwidth (MHz)	Limit (kHz)	Results
Low	2422	35884	35.8048	> 500	Compliant
Middle	2437	35737	35.8151	> 500	Compliant
High	2452	36008	35.8765	> 500	Compliant

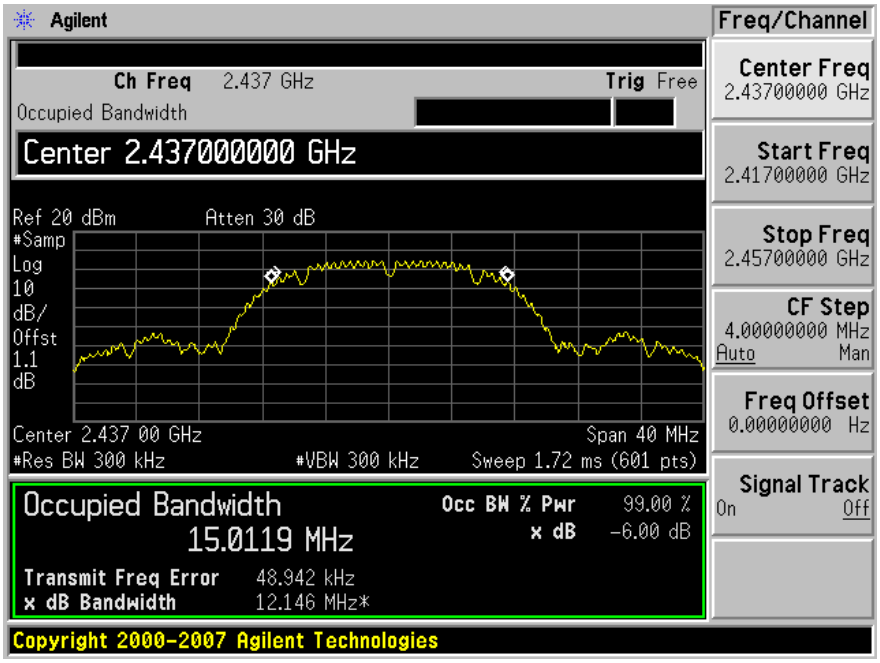
Please refer to the following plots for detailed test results

802.11 b Mode:

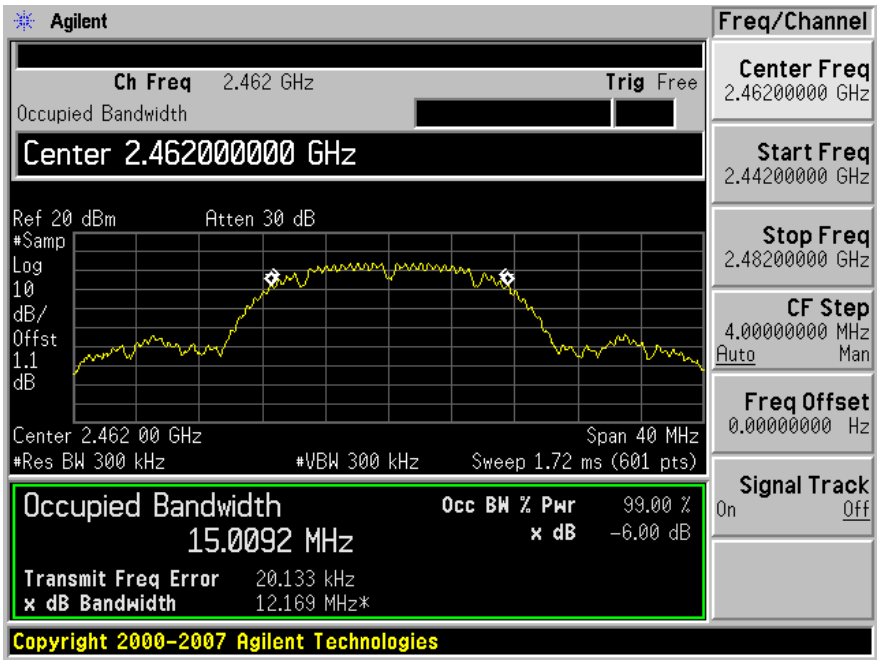
Low Channel 2412 MHz



Middle Channel 2437 MHz

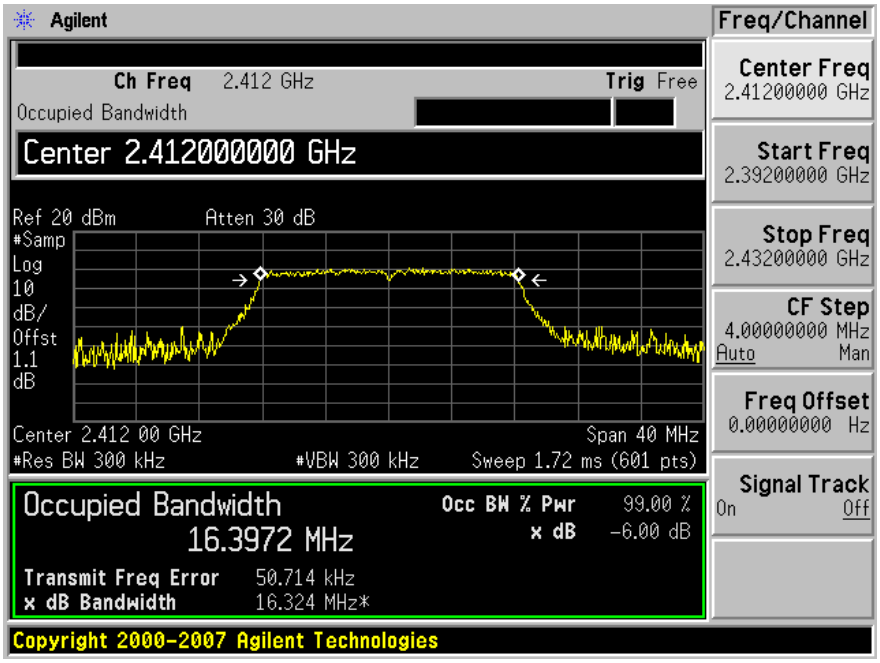


High Channel 2462 MHz

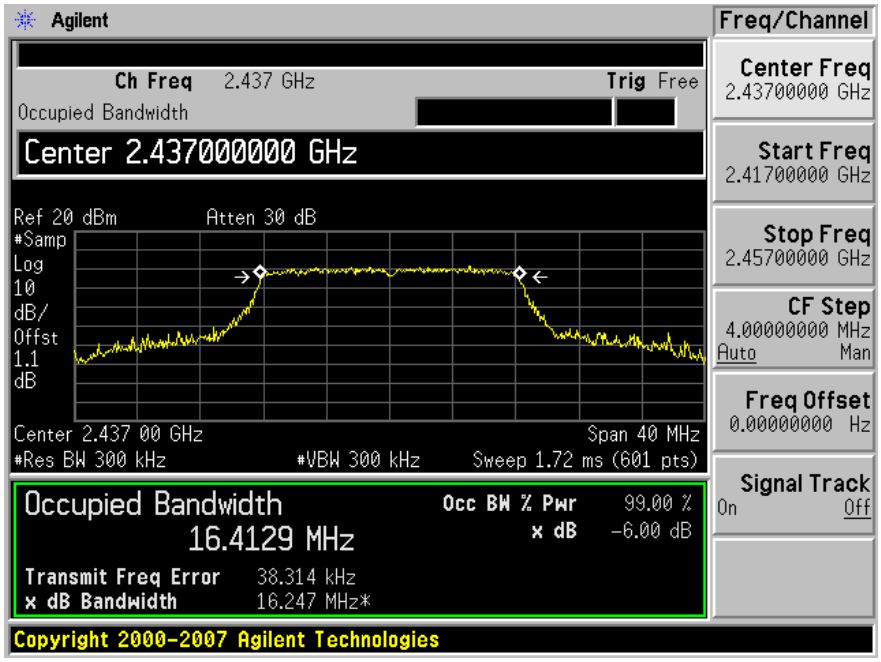


802.11 g Mode:

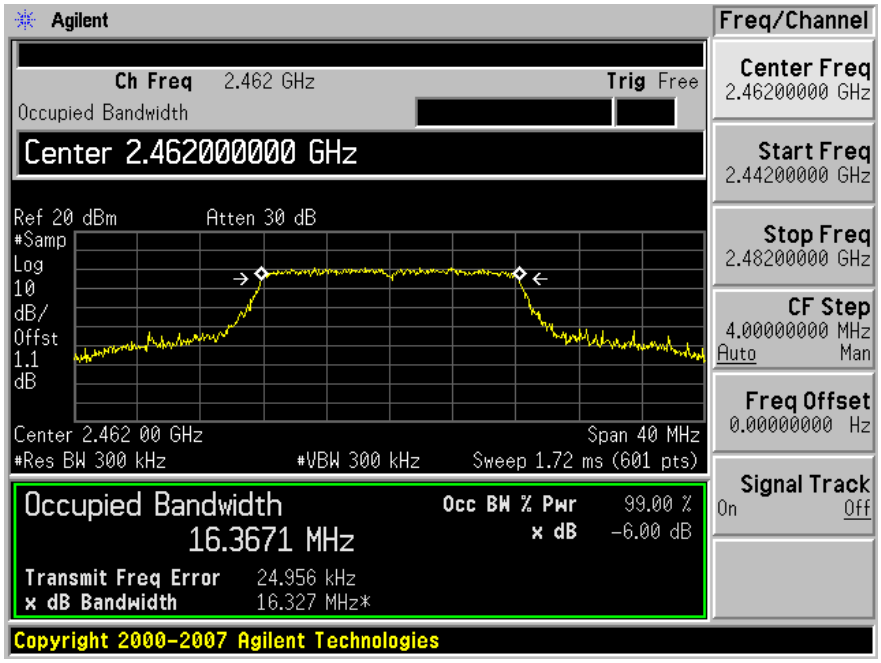
Low Channel 2412 MHz



Middle Channel 2437 MHz

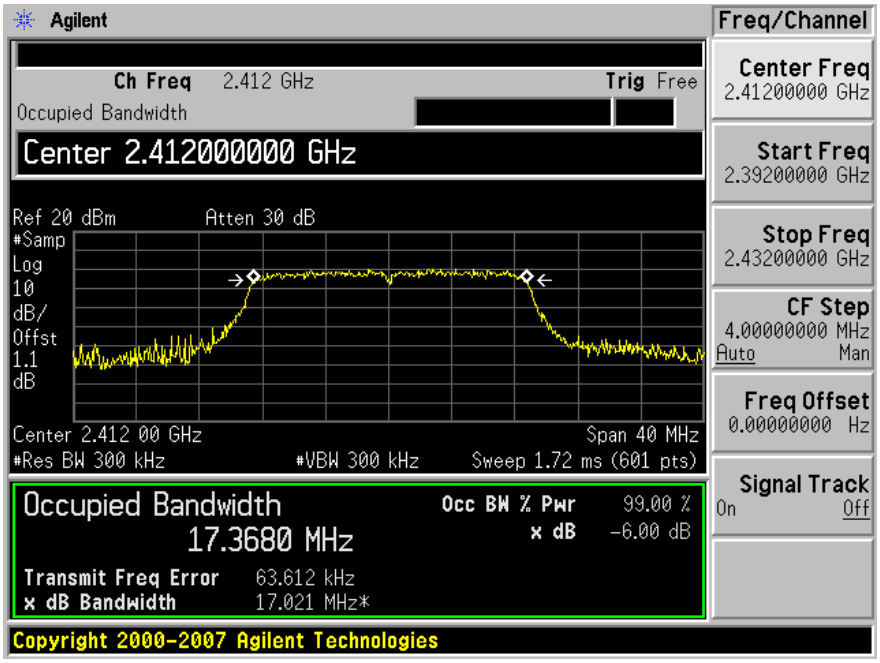


High Channel 2462 MHz

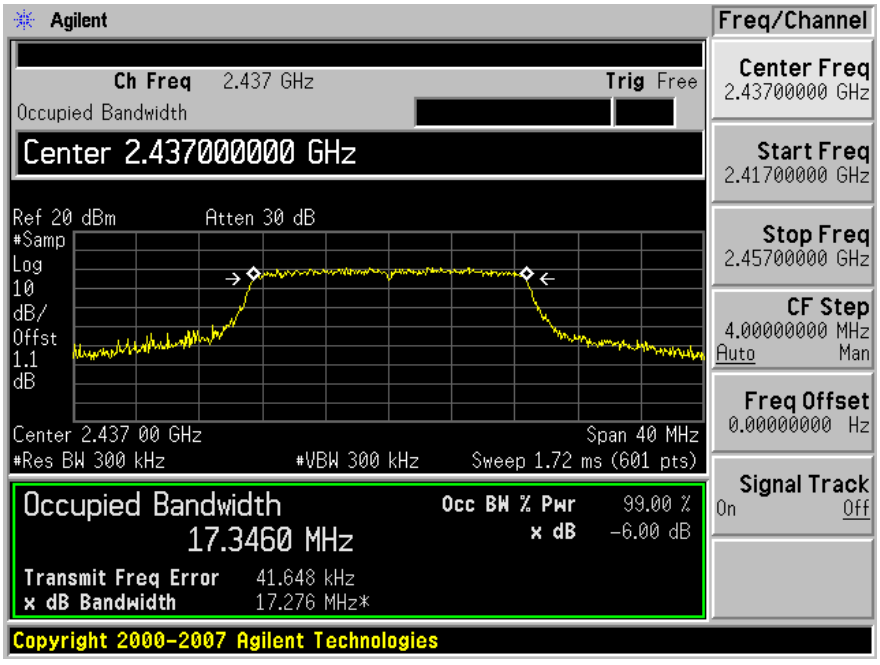


802.11 n 20 MHz (Chain #0)

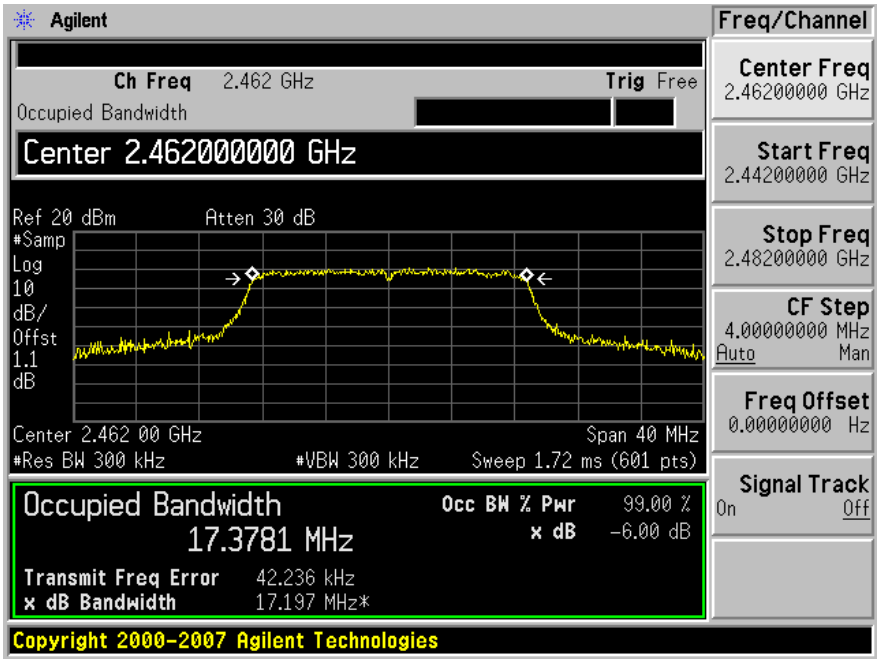
Low Channel 2412 MHz



Middle Channel 2437 MHz

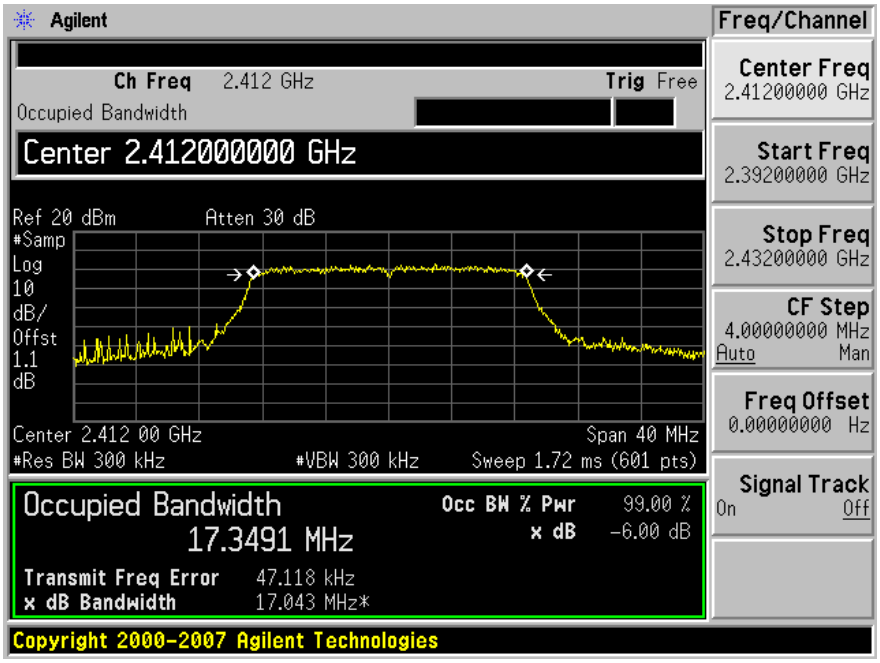


High Channel 2462 MHz

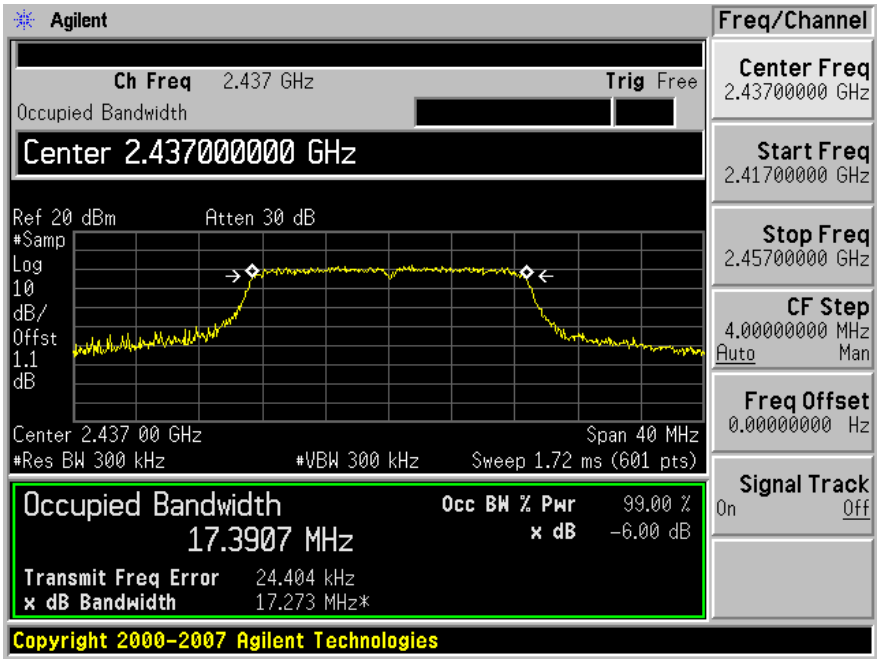


802.11 n 20 MHz (Chain #1)

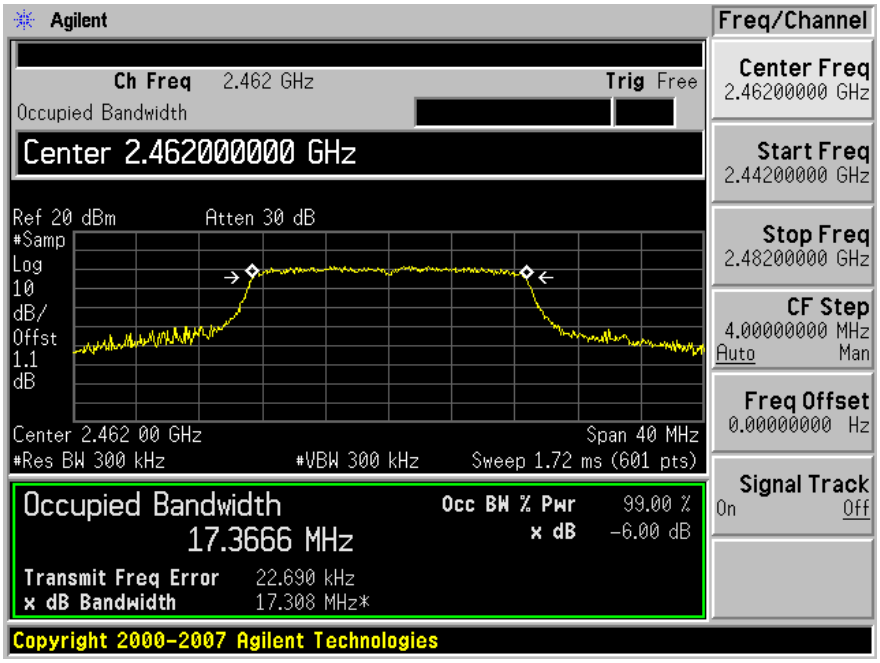
Low Channel 2412 MHz



Middle Channel 2437 MHz

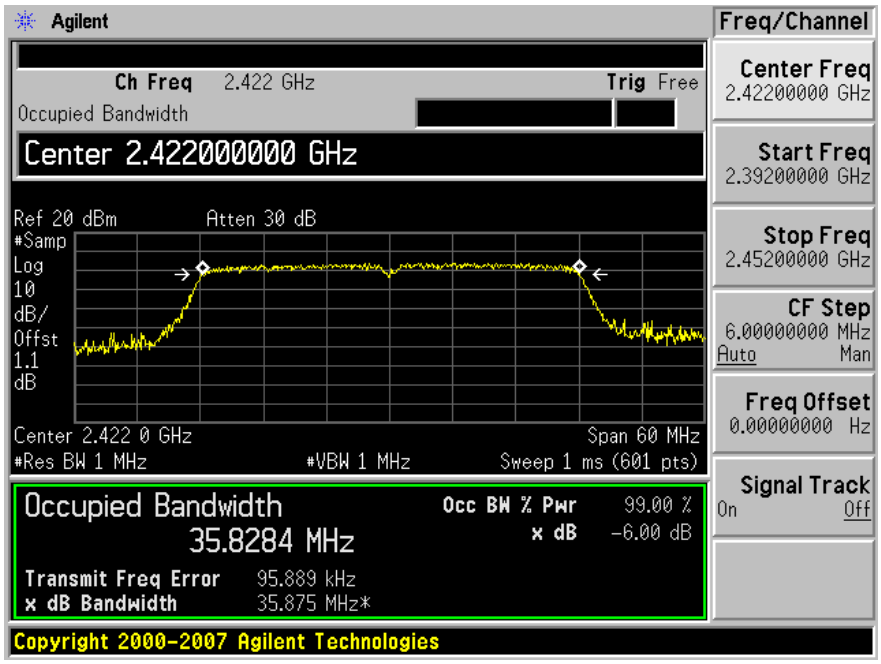


High Channel 2462 MHz

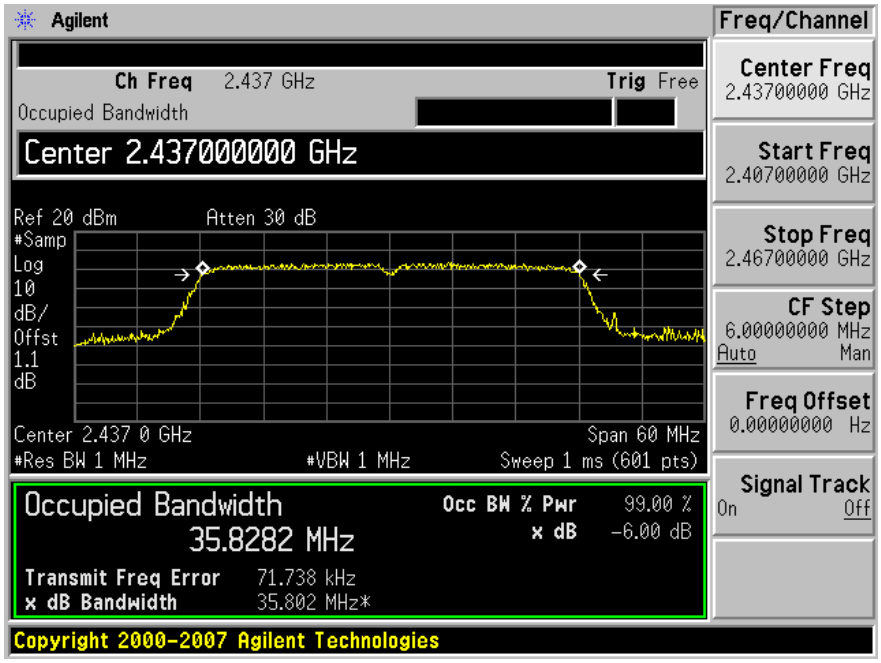


802.11 n 40 MHz (Chain #0)

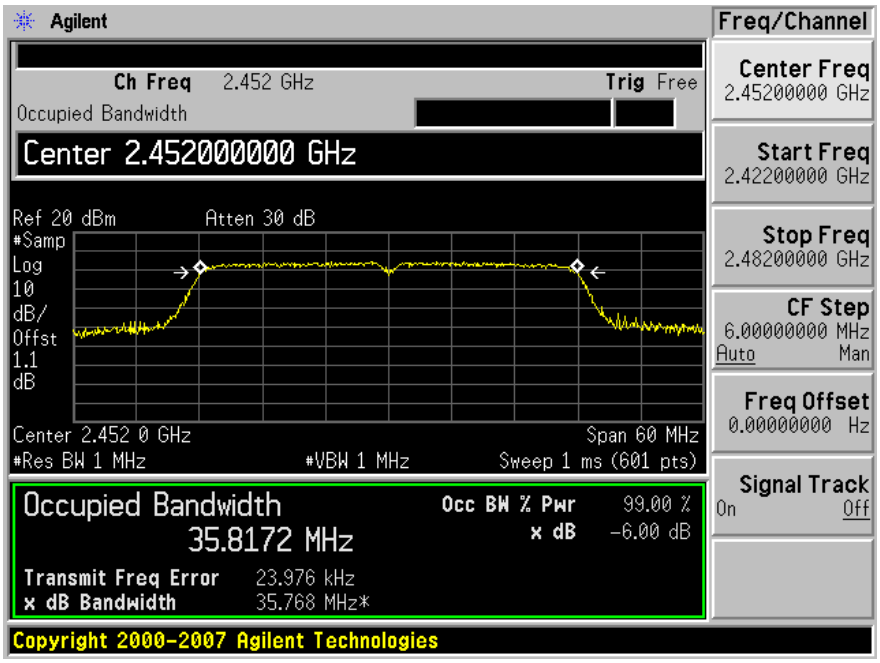
Low Channel 2422 MHz



Middle Channel 2437 MHz

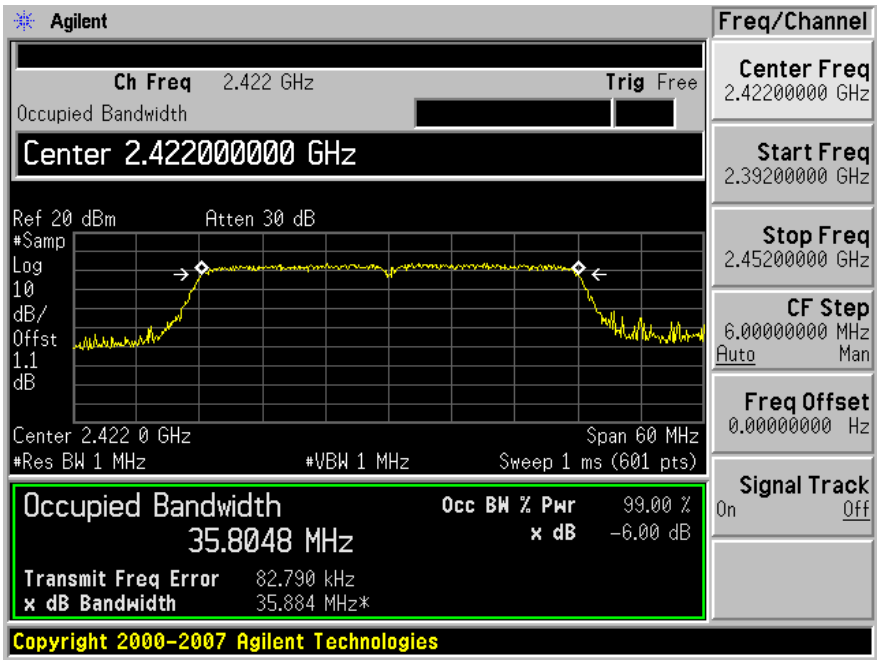


High Channel 2452 MHz

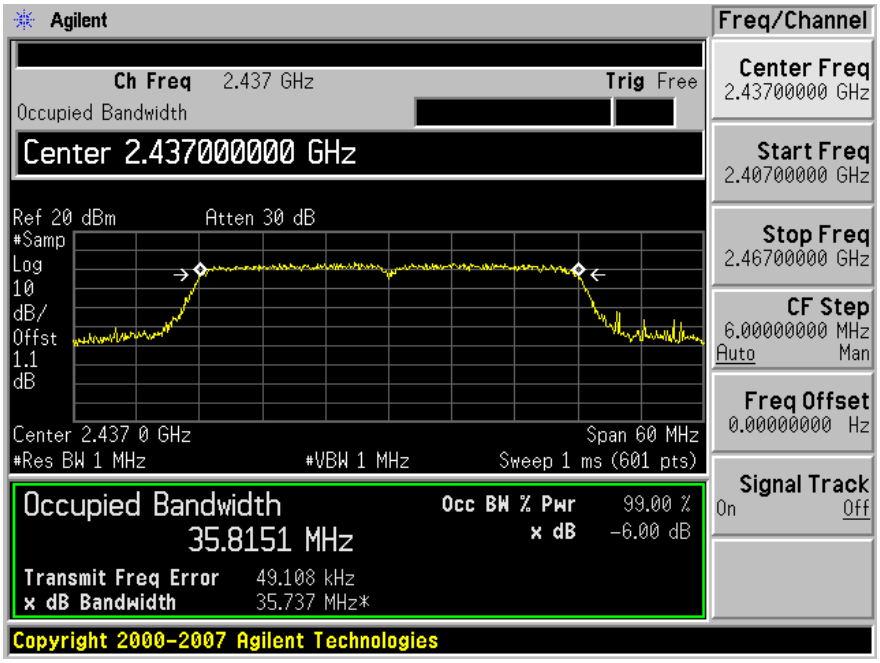


802.11 n 40MHz (Chain #1)

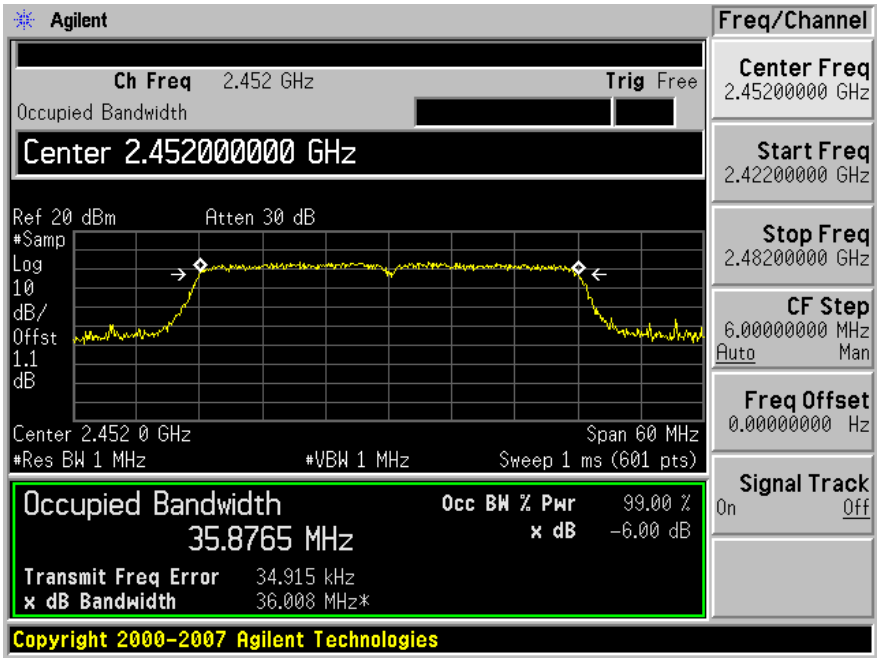
Low Channel 2422 MHz



Middle Channel 2437 MHz



High Channel 2452 MHz



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

10.1 Applicable Standard

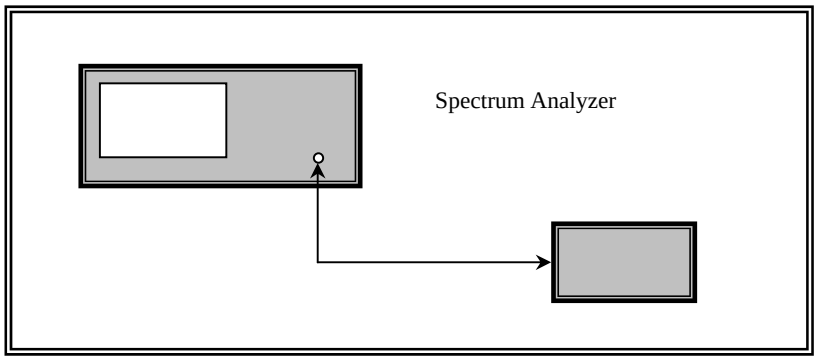
§15.247(b) the maximum peak output power of the intentional radiator shall not exceed the following:

§15.247(b) (3) for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

§15.247(b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

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	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27

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

10.4 Environmental Conditions

Temperature:	18-22 °C
Relative Humidity:	40-44 %
ATM Pressure:	101-103kPa

**The testing was performed by Victor Zhang from 2009-07-17 to 2009-07-24 at RF Site.*

10.5 Summary of Test Results

802.11 b Mode:

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	16.29	30	-13.71
Mid	2437	16.21	30	-13.79
High	2462	16.03	30	-13.97

802.11 g Mode:

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13.82	30	-16.18
Mid	2437	13.75	30	-16.25
High	2462	13.63	30	-16.37

802.11 n 20 MHz Mode:

Channel	Frequency (MHz)	Output Power Chain #0 (dBm)	Output Power Chain #1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13.74	12.67	16.25	30	-13.75
Mid	2437	13.68	12.53	16.15	30	-13.85
High	2462	13.52	12.51	16.05	30	-13.95

802.11 n 40 MHz Mode:

Channel	Frequency (MHz)	Output Power Chain #0 (dBm)	Output Power Chain #1 (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	13.86	12.54	16.26	30	-13.75
Mid	2437	13.6	12.62	16.15	30	-13.85
High	2452	13.61	12.59	16.14	30	-13.95

Note: The maximum antenna gain is 2.43 dBi, antenna number is 2
The effective gain of antenna is 2.43 + 10log 2 = 5.43 dBi which is not over 6 dBi, therefore the limit is 30 dBm

11 FCC §15.247(d) - 100 kHz Bandwidth of Band Edges

11.1 Applicable Standard

According to §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	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27

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

11.4 Environmental Conditions

Temperature:	18-22 °C
Relative Humidity:	40-44 %
ATM Pressure:	101-103kPa

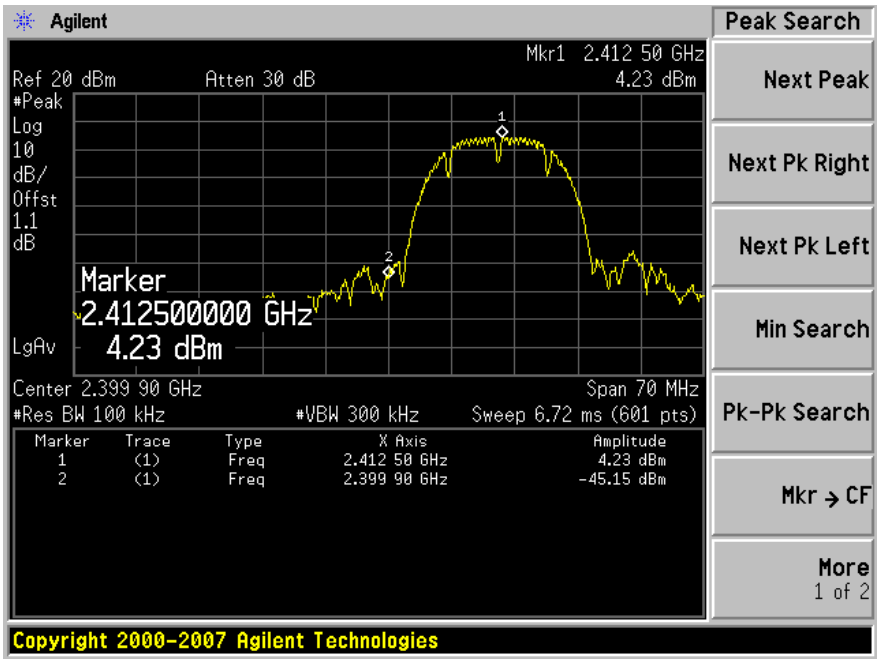
**The testing was performed by Victor Zhang from 2009-07-17 to 2009-07-24 at RF Site.*

11.5 Measurement Results

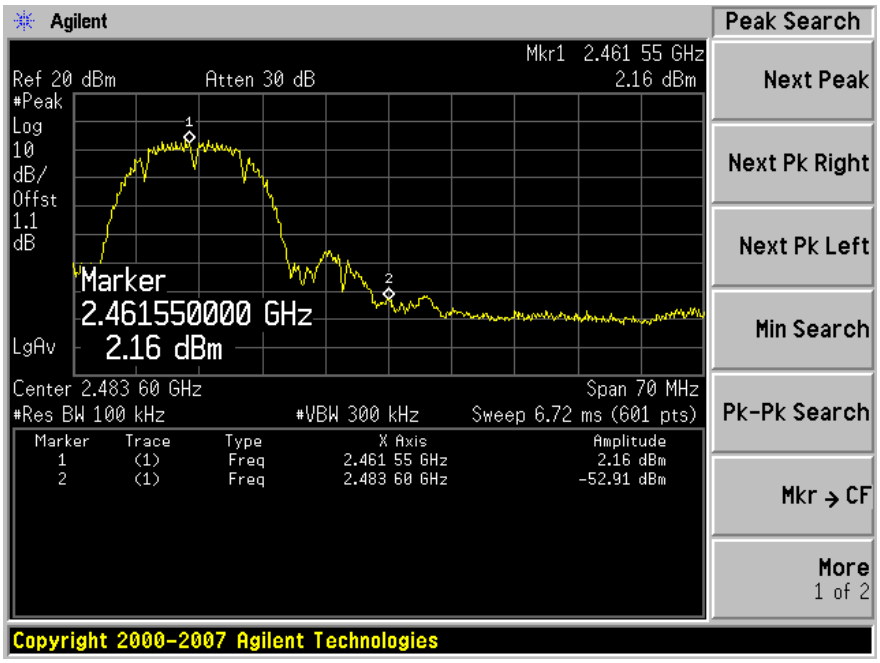
Please refer to following pages for plots of band edge.

802.11 b Mode:

Low Band Edge

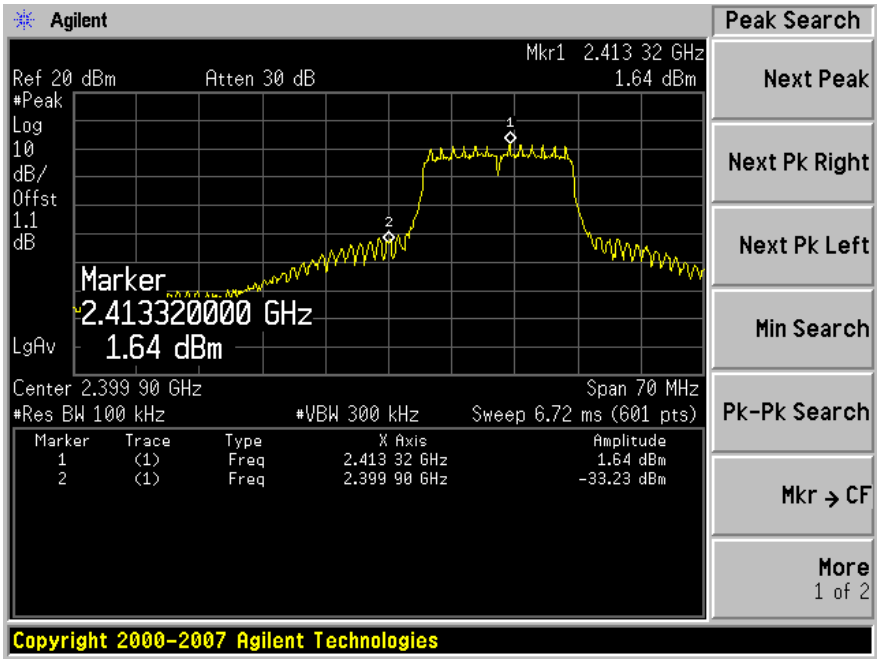


High Band Edge

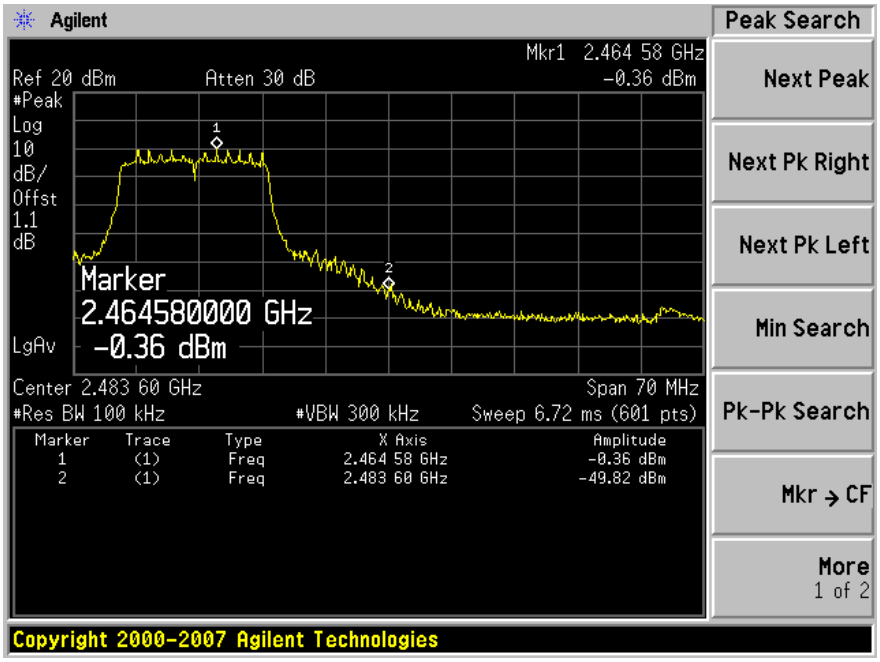


802.11 g Mode:

Low Band Edge

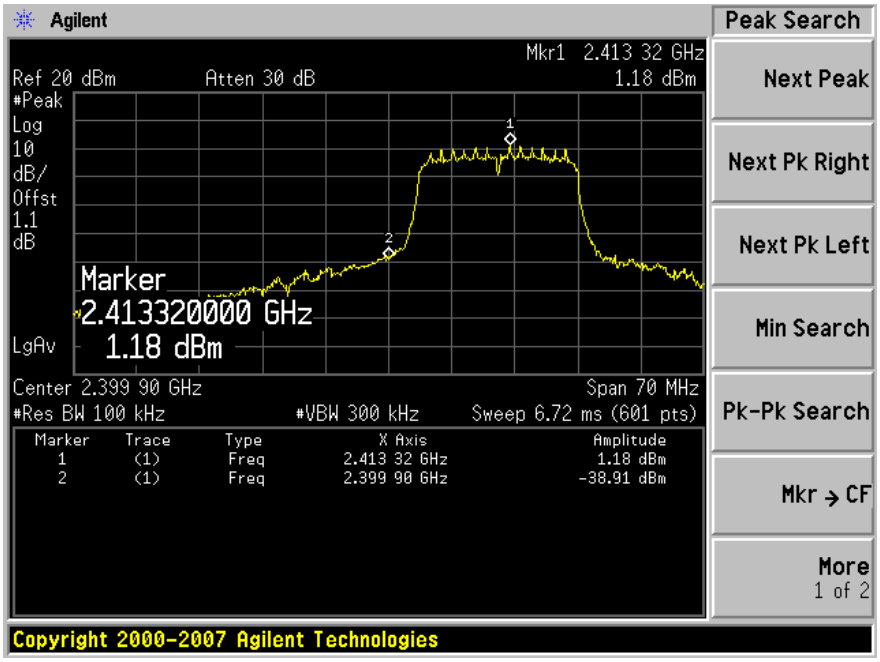


High Band Edge

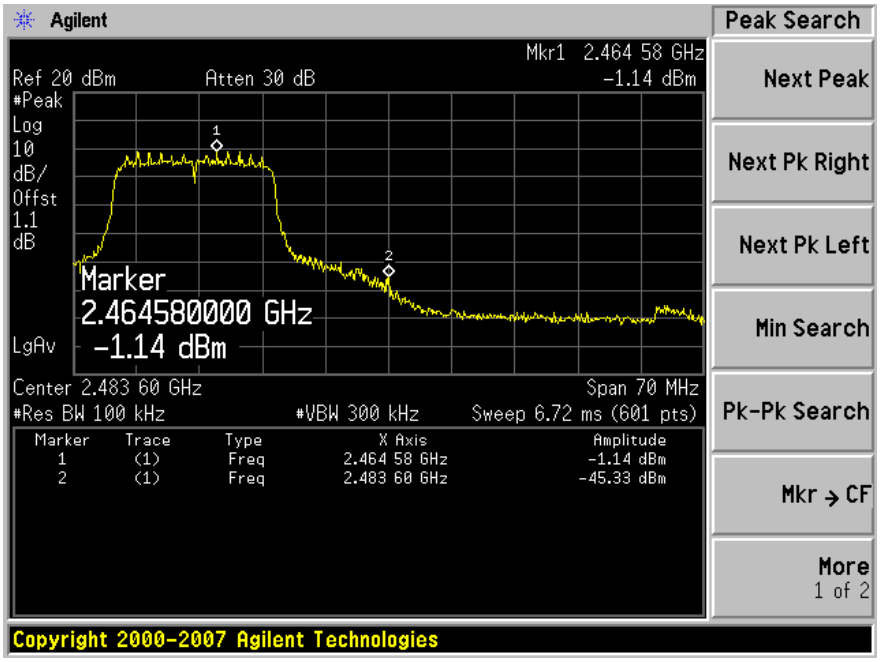


802.11 n 20 MHz – Chain #0

Low Band Edge

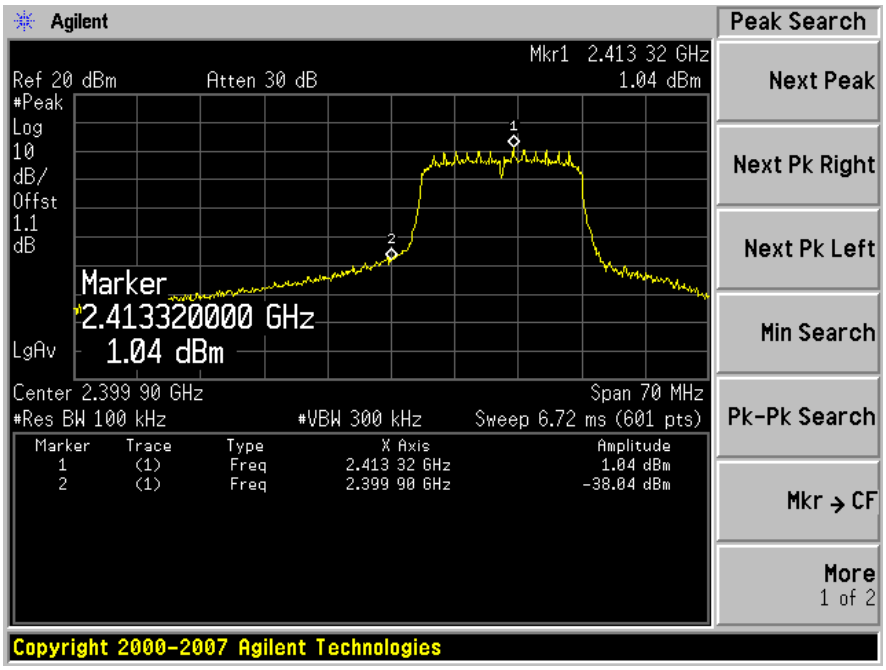


High Band Edge

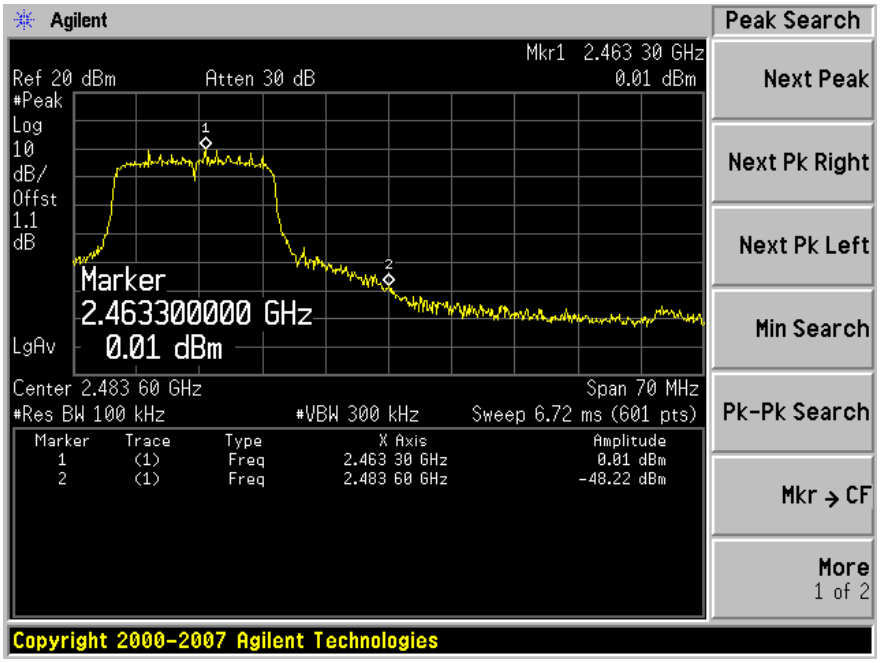


802.11 n 20 MHz – Chain #1

Low Band Edge

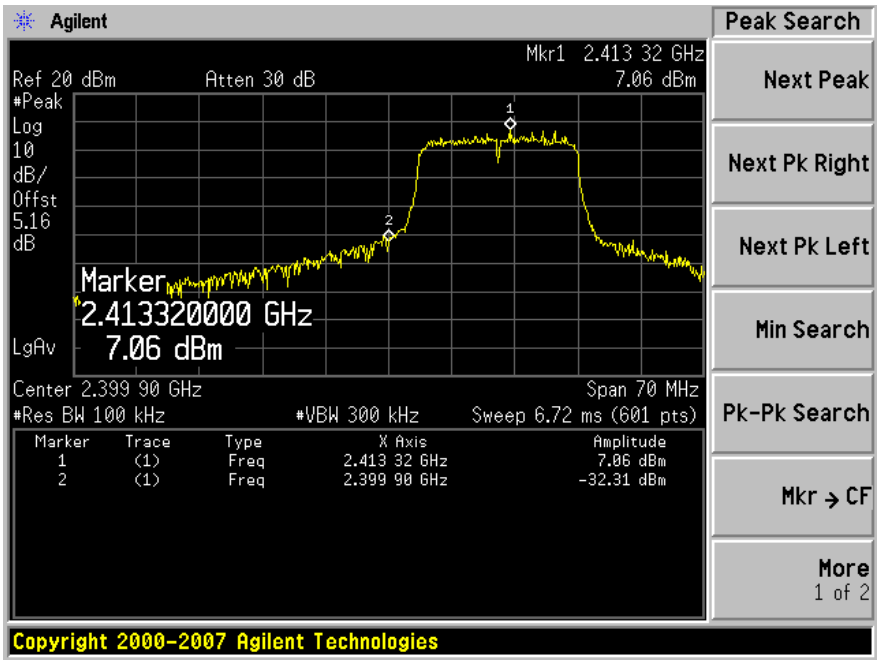


High Band Edge

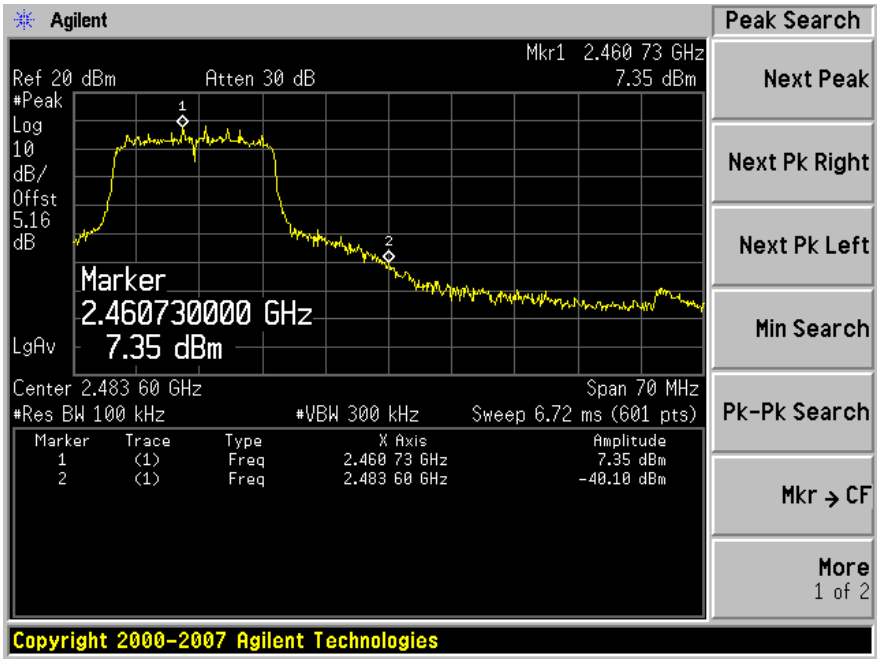


802.11 n 20 MHz – Chain #0 + Chain #1

Low Band Edge

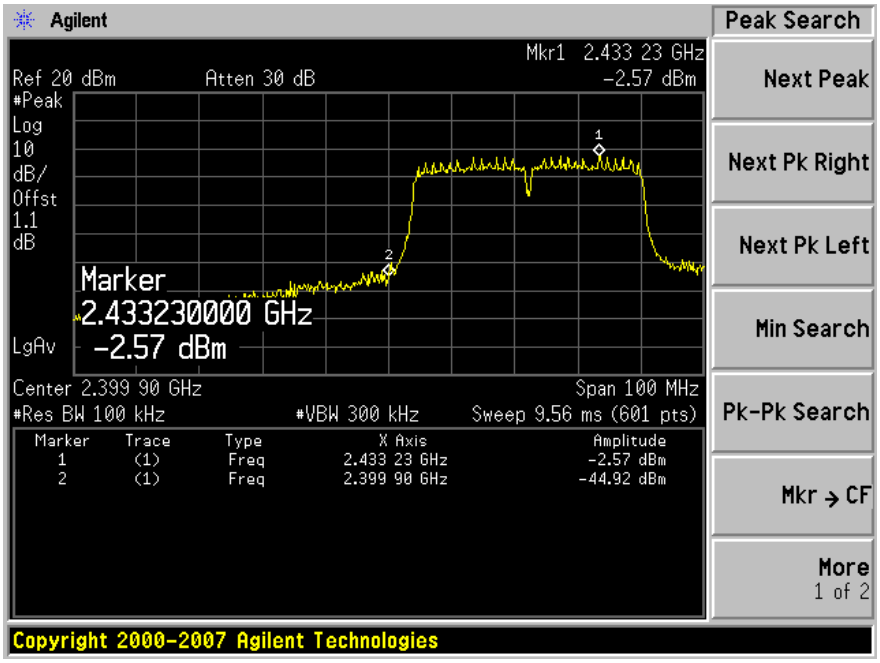


High Band Edge

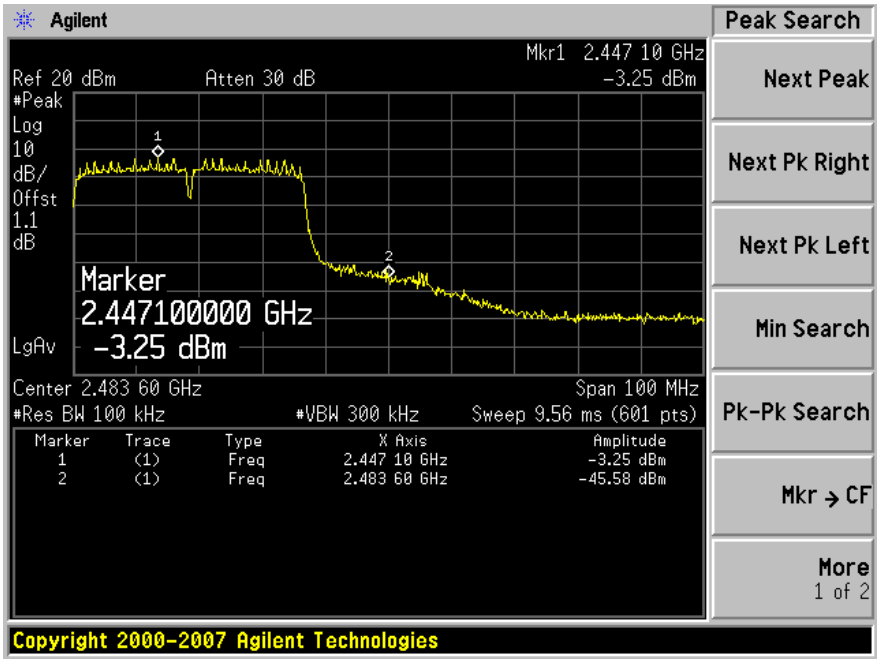


802.11 n 40 MHz – Chain #0

Low Band Edge

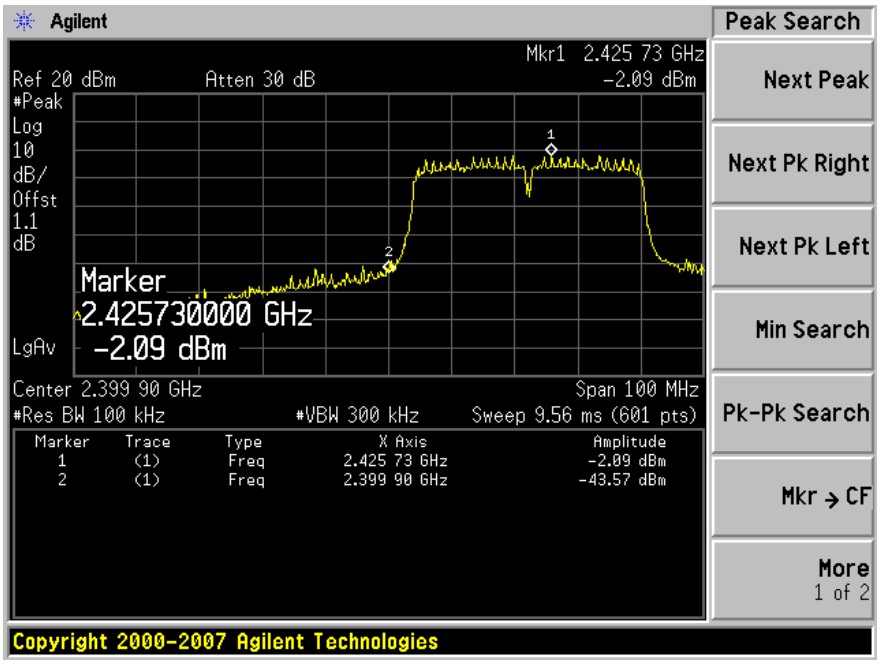


High Band Edge

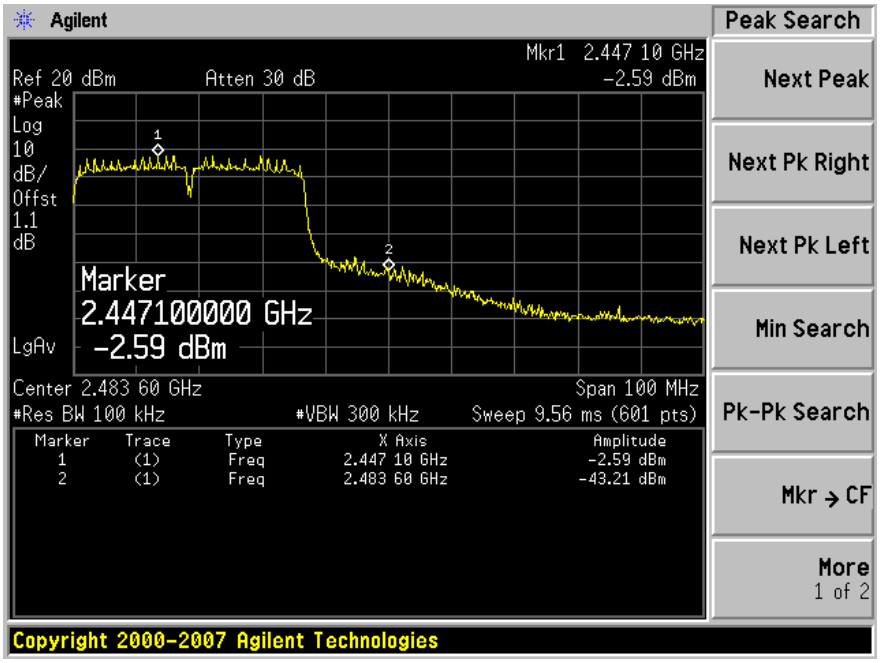


802.11 n 40 MHz – Chain #1

Low Band Edge

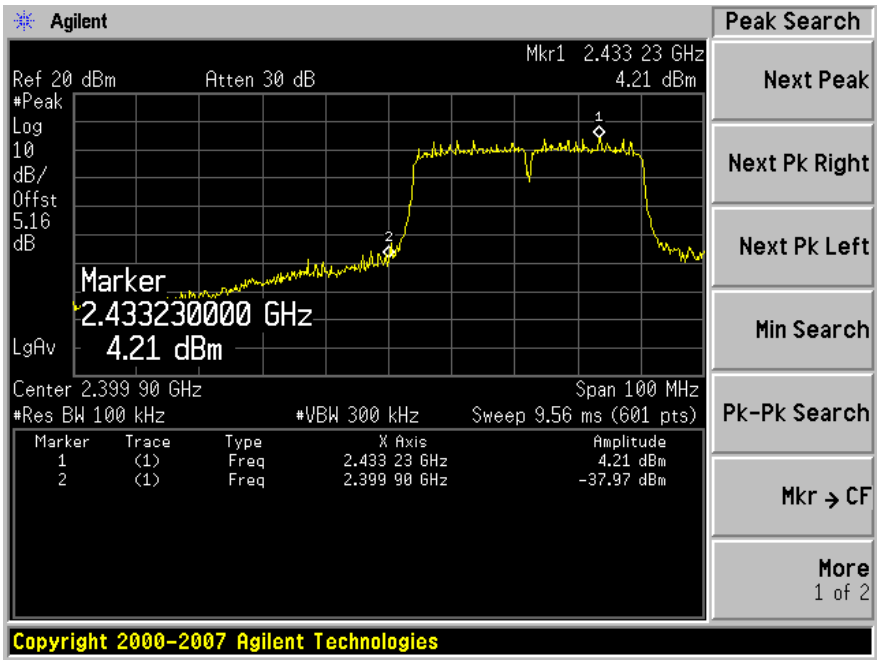


High Band Edge

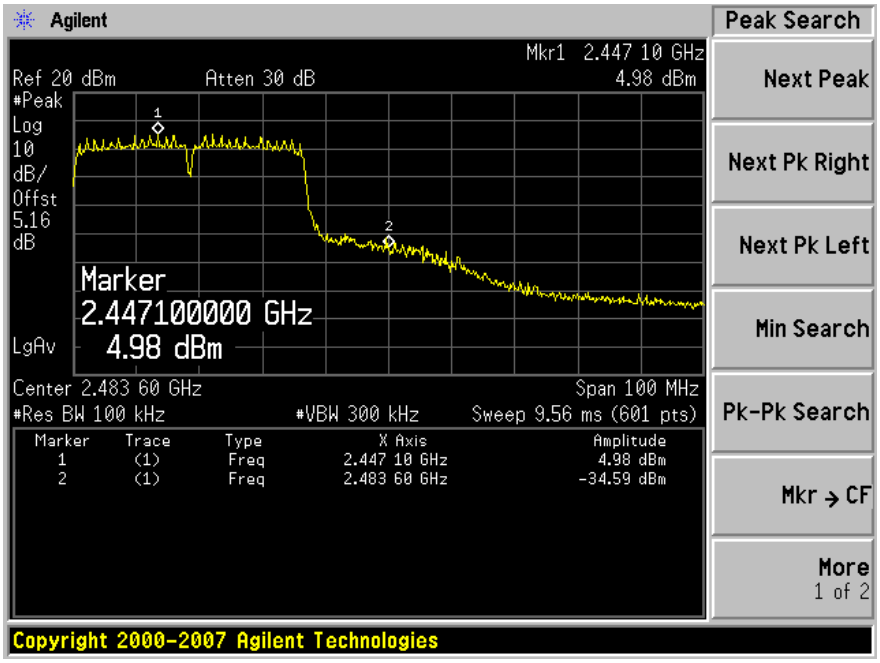


802.11 n 40 MHz – Chain #0 + Chain #1

Low Band Edge



High Band Edge



12 FCC §15.247(e) - Power Spectral Density

12.1 Applicable Standard

According to §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. 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	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27

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

12.4 Environmental Conditions

Temperature:	18-22 °C
Relative Humidity:	40-44 %
ATM Pressure:	101-103kPa

**The testing was performed by Victor Zhang from 2009-07-17 to 2009-07-24 at RF Site.*

12.5 Summary of Test Results

802.11 b Mode:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm/3kHz)	Results
Low	2412	-19.70	8	Compliant
Mid	2437	-18.84	8	Compliant
High	2462	-18.63	8	Compliant

802.11 g Mode:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm/3kHz)	Results
Low	2412	-20.03	8	Compliant
Mid	2437	-20.17	8	Compliant
High	2462	-20.32	8	Compliant

802.11 n 20 MHz Mode:

Channel	Frequency (MHz)	PPSD Chain #0 (dBm)	PPSD Chain #1 (dBm)	PPSD Total (dBm)	Limit (dBm/3kHz)	Results
Low	2412	-19.89	-16.93	-15.15	8	Compliant
Mid	2437	-19.93	-18.77	-16.30	8	Compliant
High	2462	-20.23	-19.13	-16.63	8	Compliant

Chain #0 + Chain #1 combined mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm/3kHz)	Results
Low	2412	-13.73	8	Compliant
Mid	2437	-13.19	8	Compliant
High	2462	-13.88	8	Compliant

802.11 n 40 MHz Mode:

Channel	Frequency (MHz)	PPSD Chain #0 (dBm)	PPSD Chain #1 (dBm)	PPSD Total (dBm)	Limit (dBm/3kHz)	Results
Low	2422	-24.25	-18.04	-17.11	8	Compliant
Mid	2437	-27.30	-20.96	-20.05	8	Compliant
High	2452	-27.49	-21.73	-20.71	8	Compliant

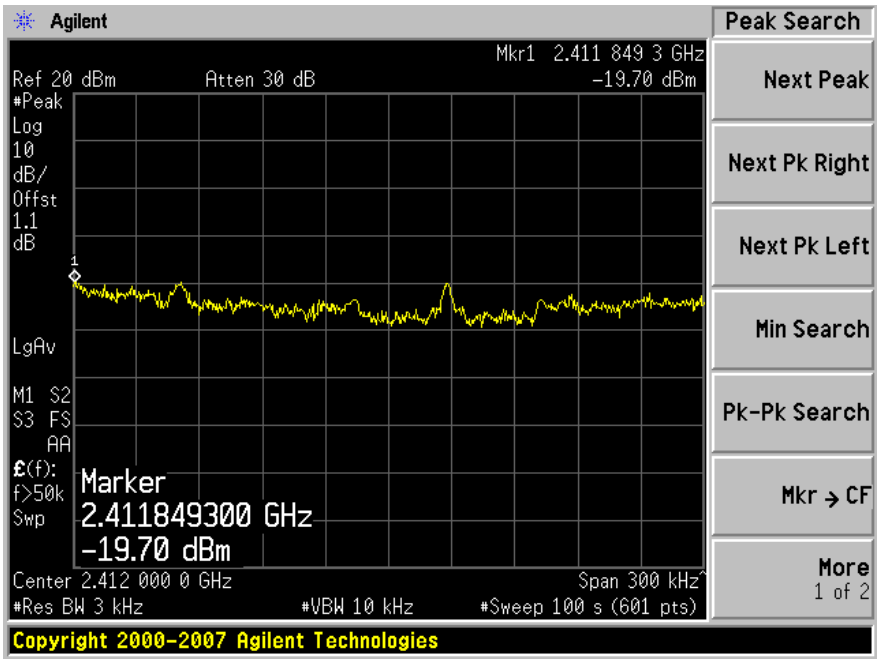
Chain #0 + Chain #1 combined mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm/3kHz)	Results
Low	2422	-14.81	8	Compliant
Mid	2437	-17.76	8	Compliant
High	2452	-17.66	8	Compliant

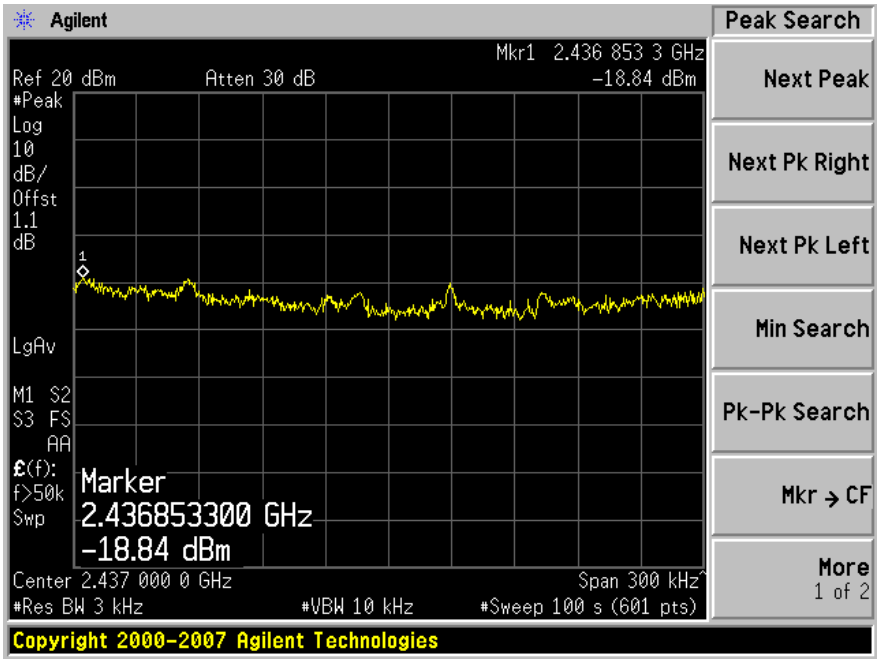
Please refer to the following plots for detailed test results

802.11 b Mode:

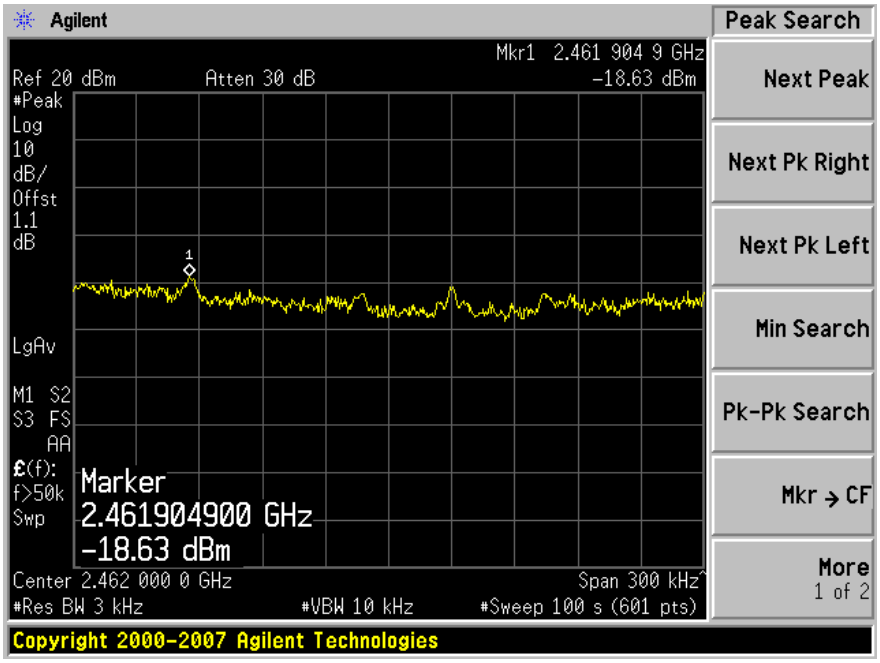
Low Channel 2412 MHz



Middle Channel 2437 MHz

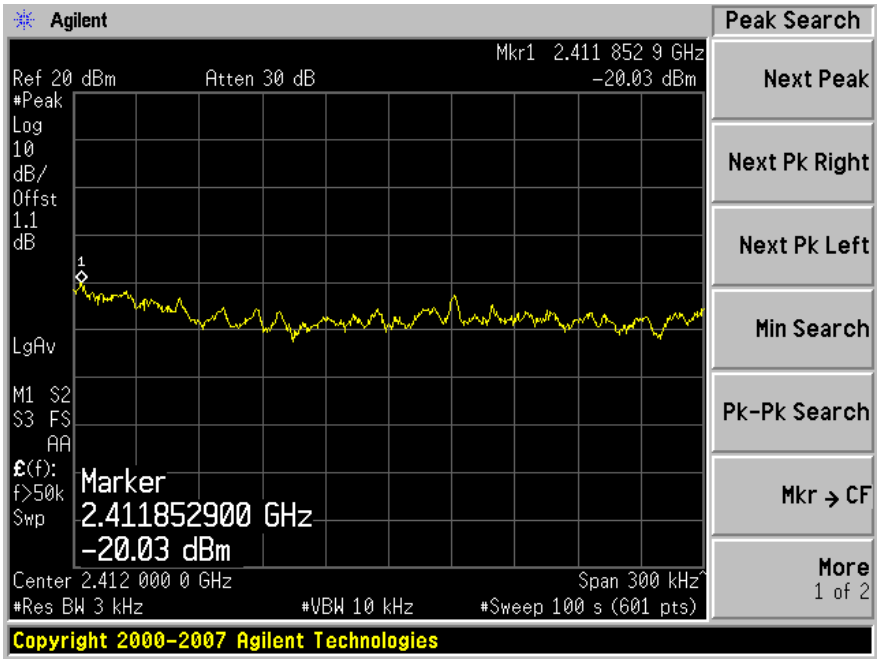


High Channel 2462 MHz

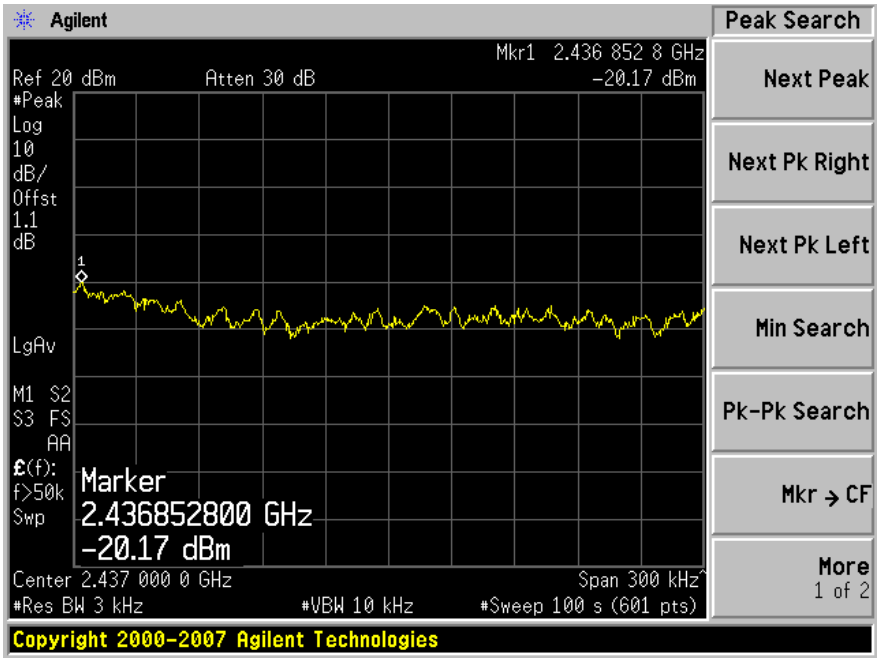


802.11 g Mode:

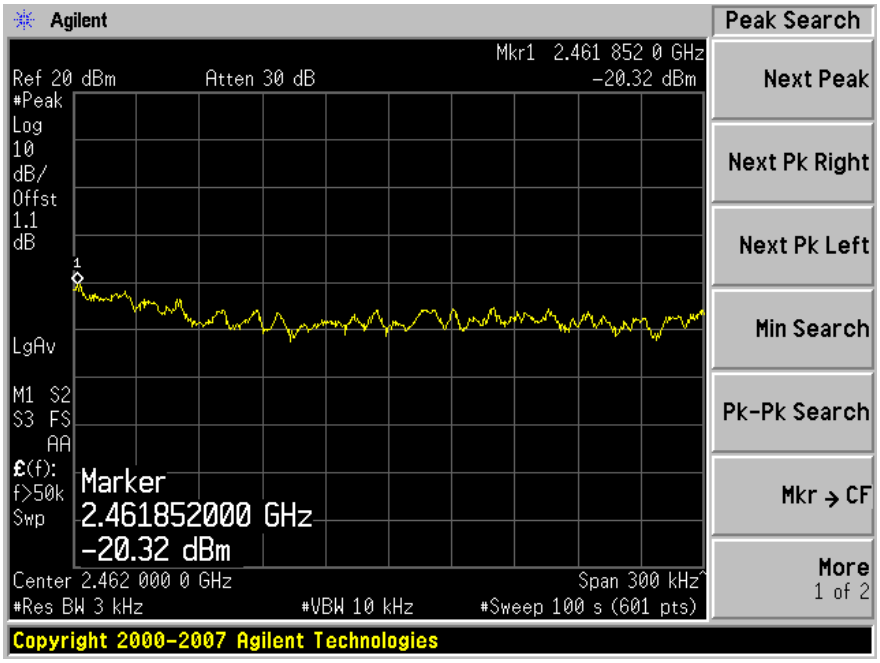
Low Channel 2412 MHz



Middle Channel 2437 MHz

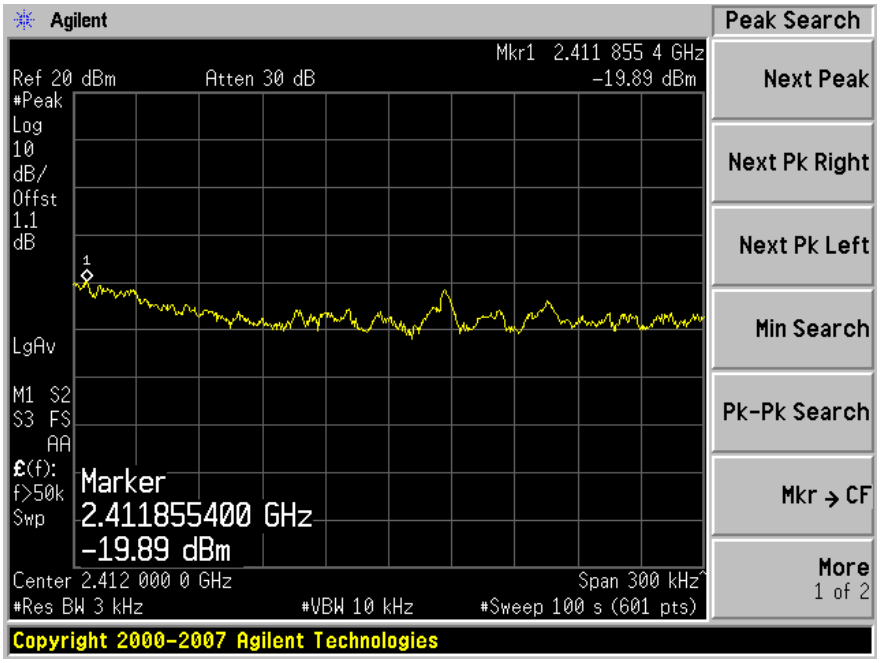


High Channel 2462 MHz

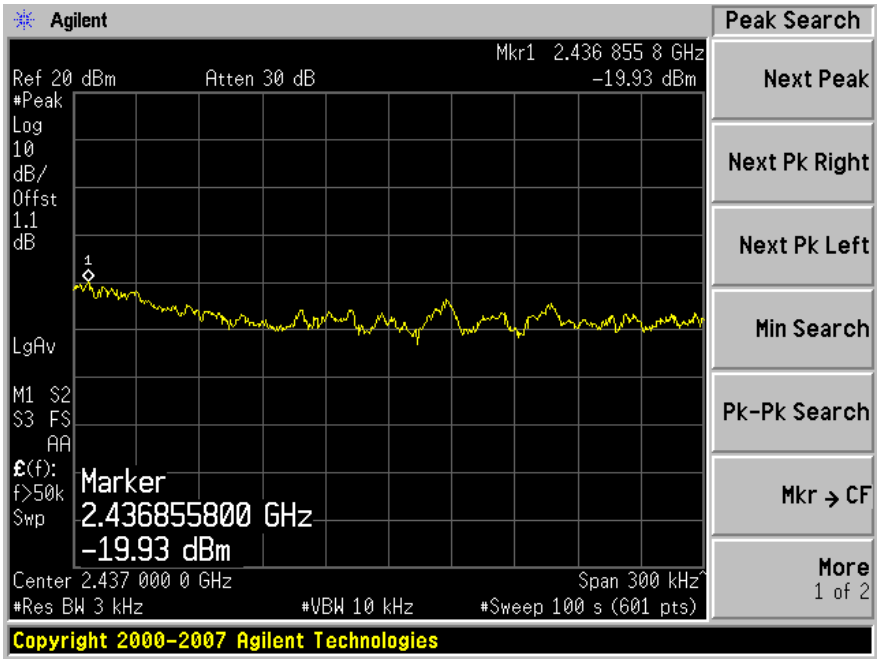


802.11 n 20 MHz (Chain #0)

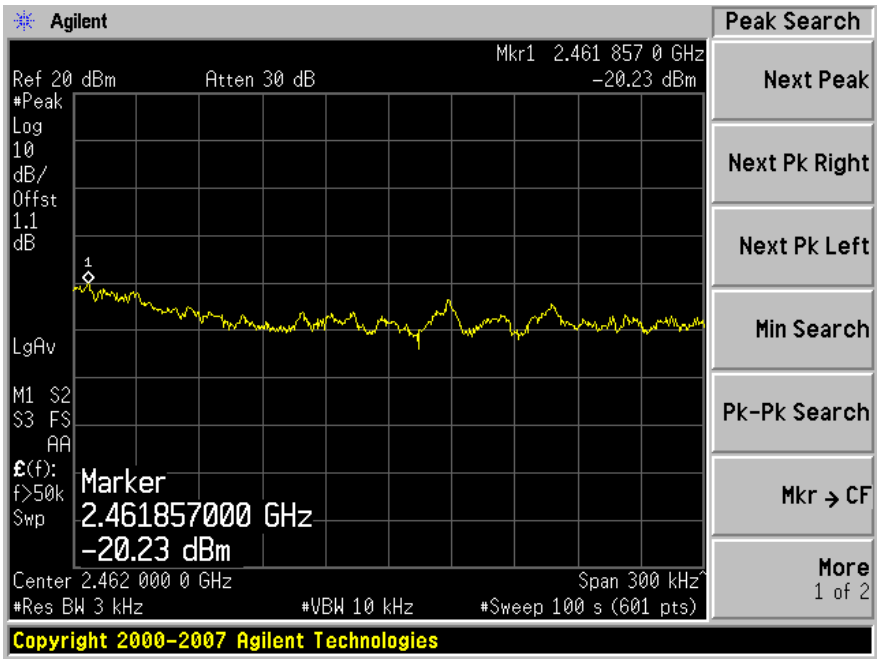
Low Channel 2412 MHz



Middle Channel 2437 MHz

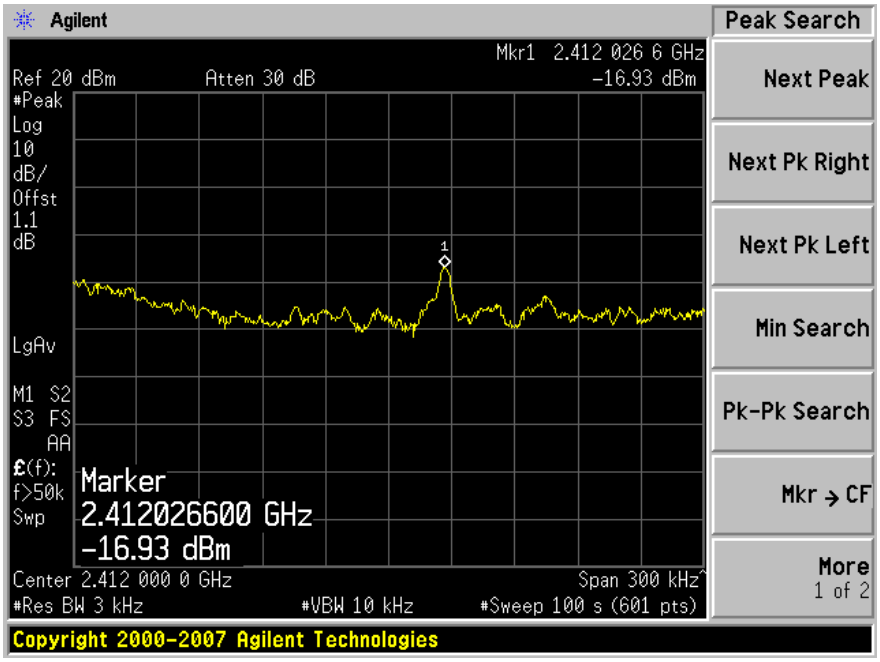


High Channel 2462 MHz

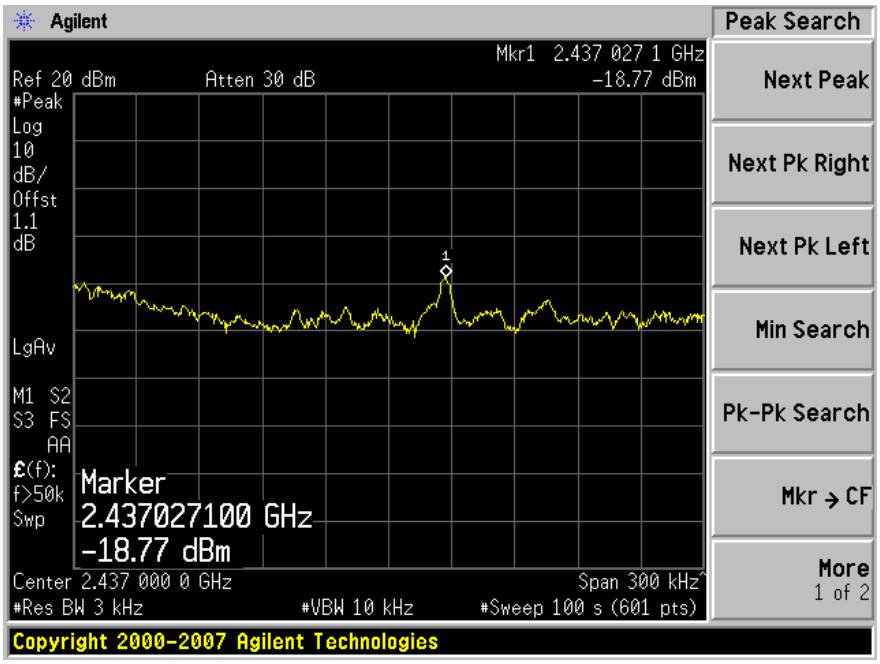


802.11 n 20 MHz (Chain #1)

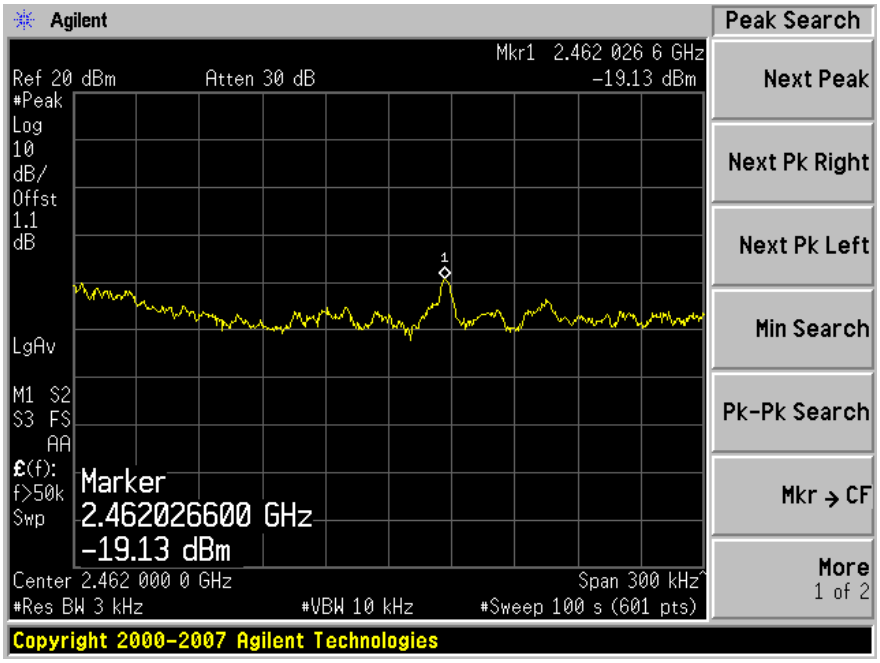
Low Channel 2412 MHz



Middle Channel 2437 MHz

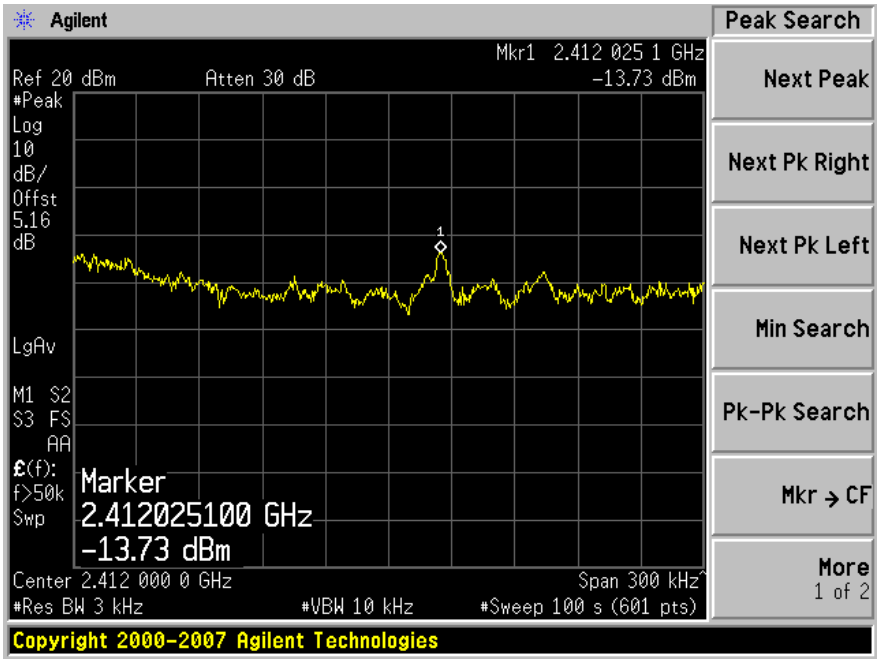


High Channel 2462 MHz

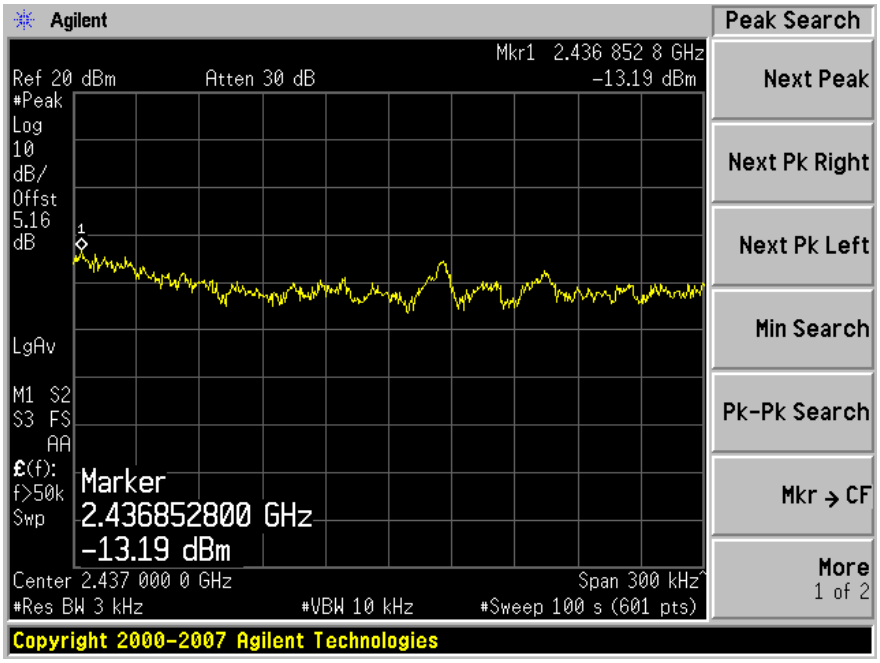


802.11 n 20 MHz (Chain #0+Chain #1, combined)

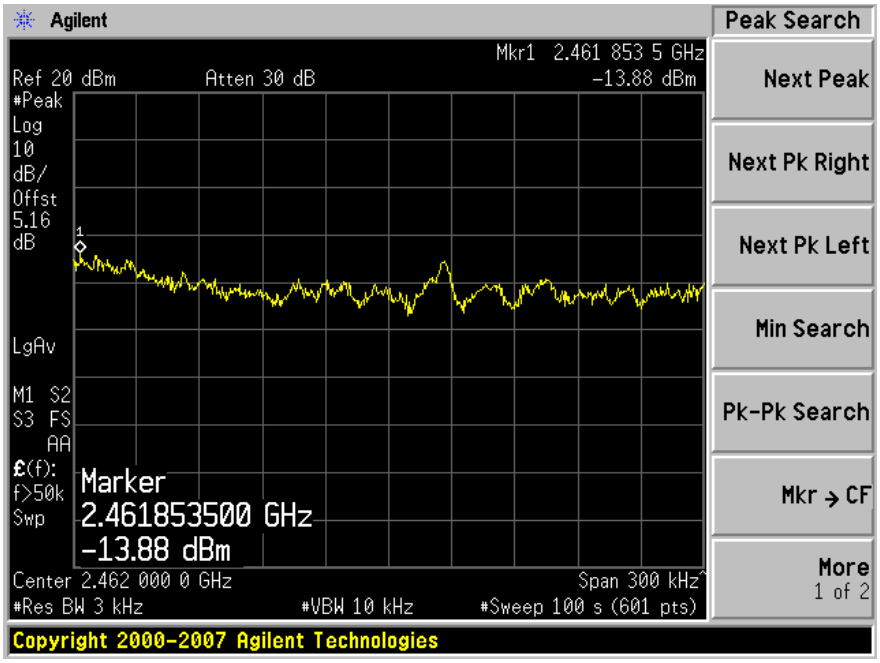
Low Channel 2412 MHz



Middle Channel 2437 MHz

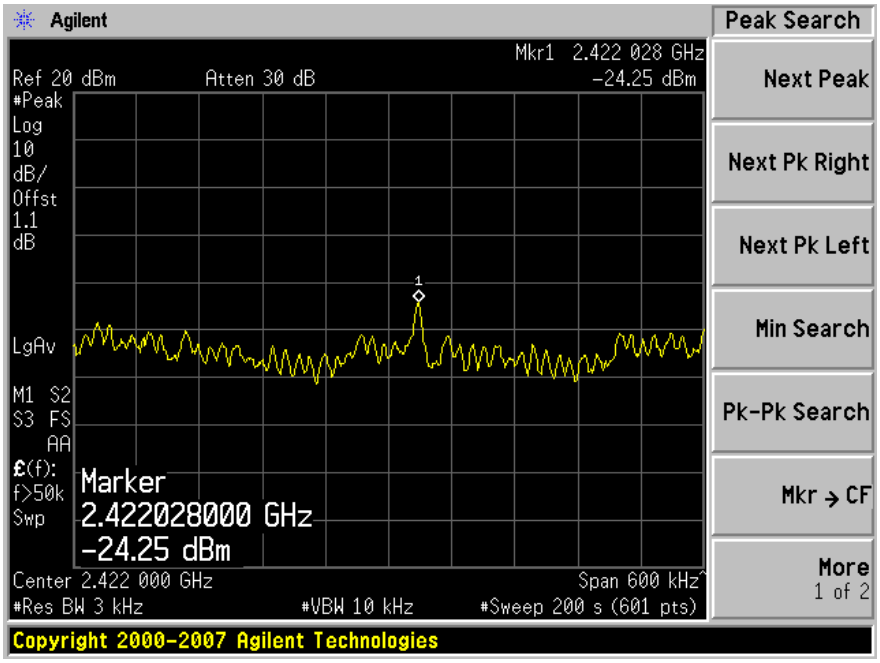


High Channel 2462 MHz

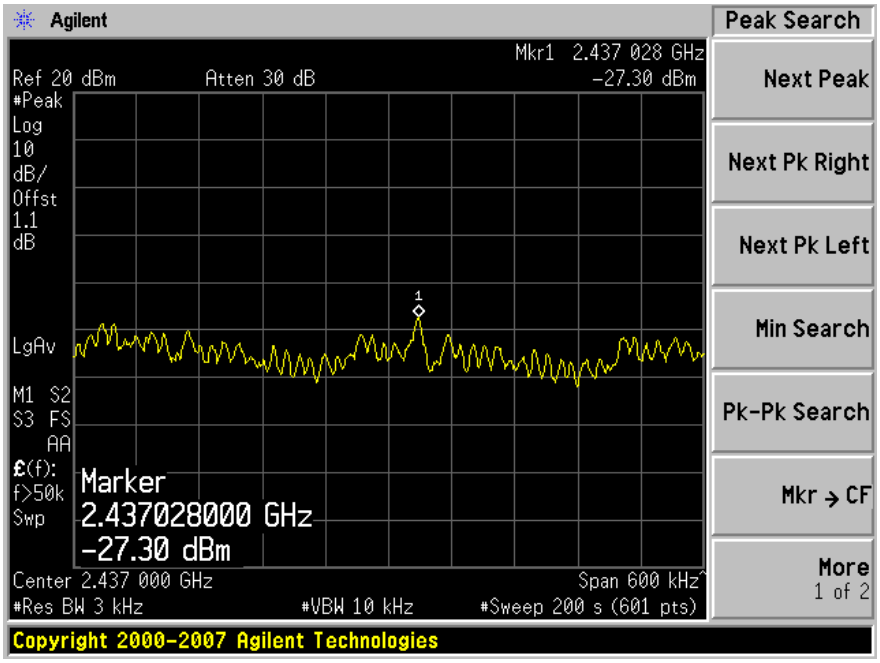


802.11 n 40 MHz (Chain #0)

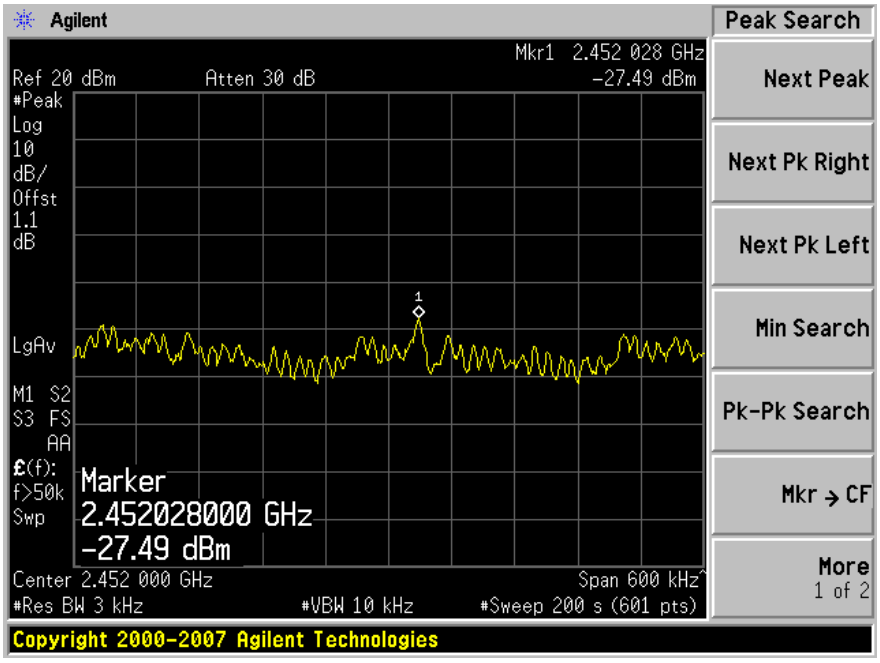
Low Channel 2422 MHz



Middle Channel 2437 MHz

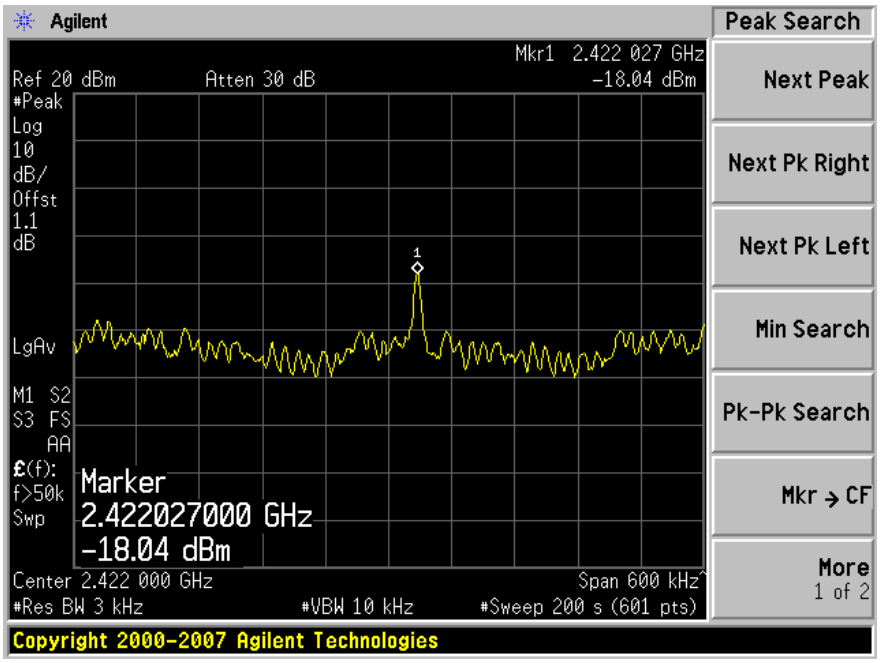


High Channel 2452 MHz

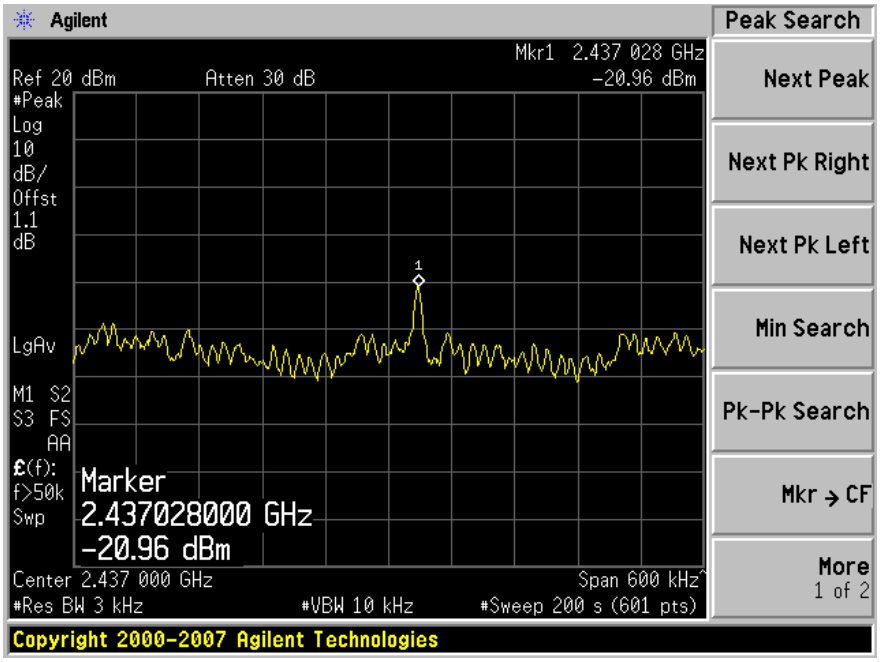


802.11 n 40 MHz (Chain #1)

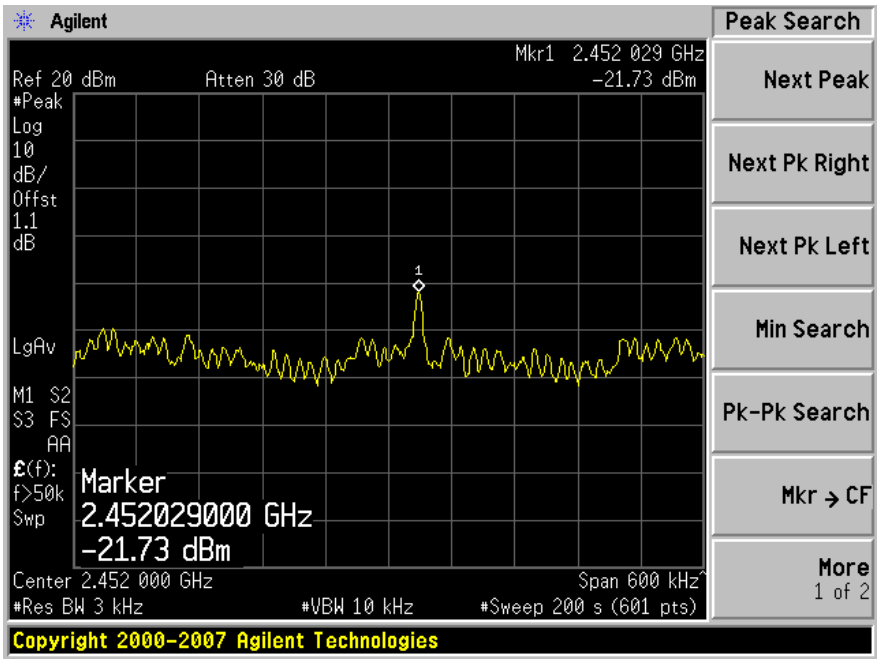
Low Channel 2422 MHz



Middle Channel 2437 MHz

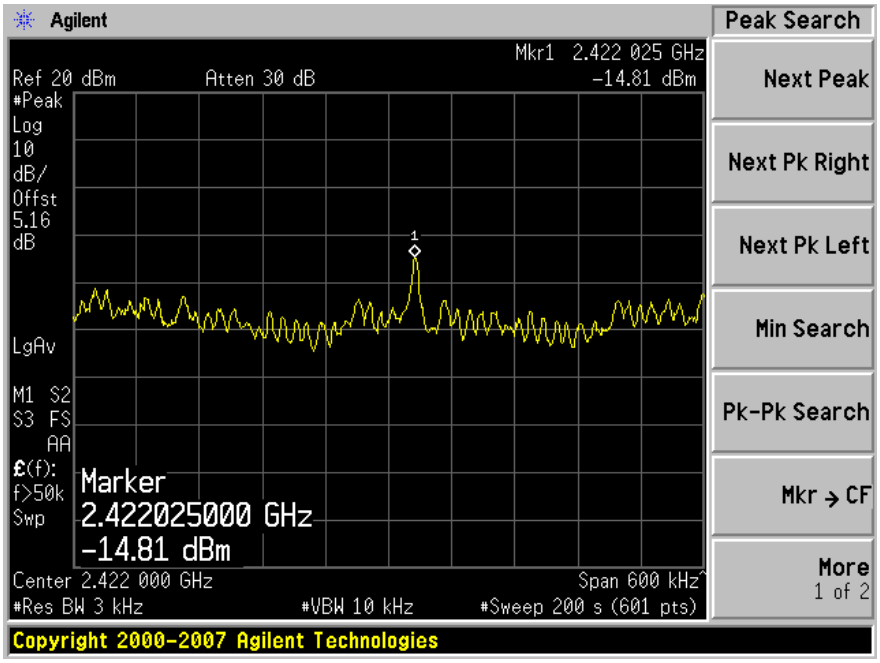


High Channel 2452 MHz

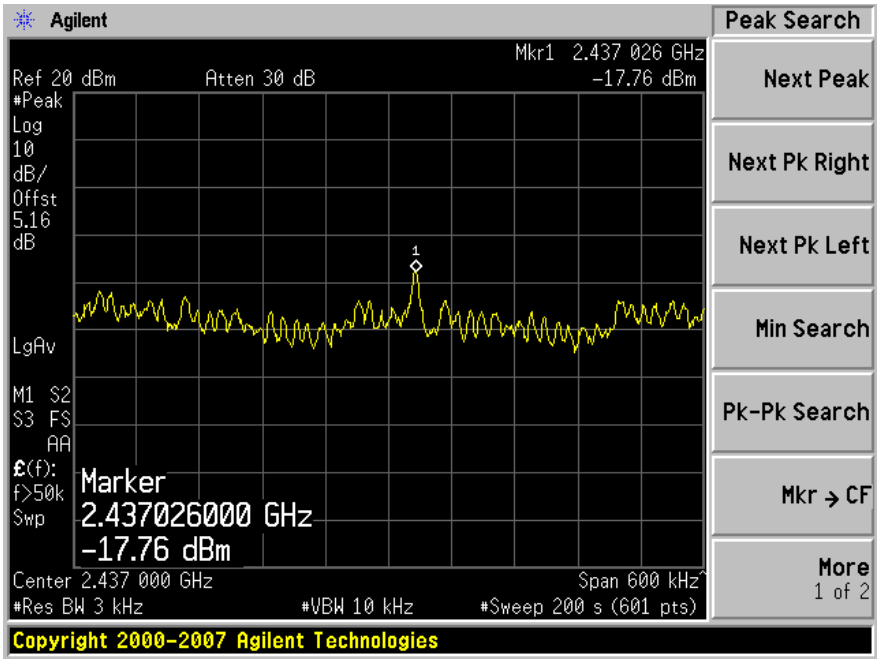


802.11 n 40 MHz (Chain #0+Chain #1, combined)

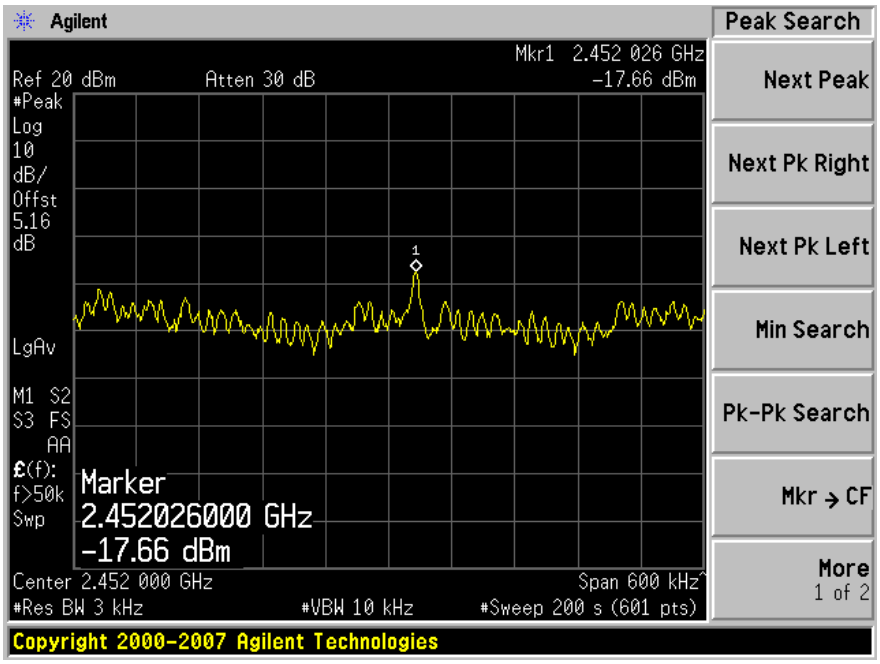
Low Channel 2412 MHz



Middle Channel 2437 MHz



High Channel 2452 MHz



13 FCC §15.109 – Unwanted Spurious Emissions, Receiver Spurious Emissions

13.1 Applicable Standard

FCC Part 15.109

Frequency of Emission (MHz)	Field strength (microvolt/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

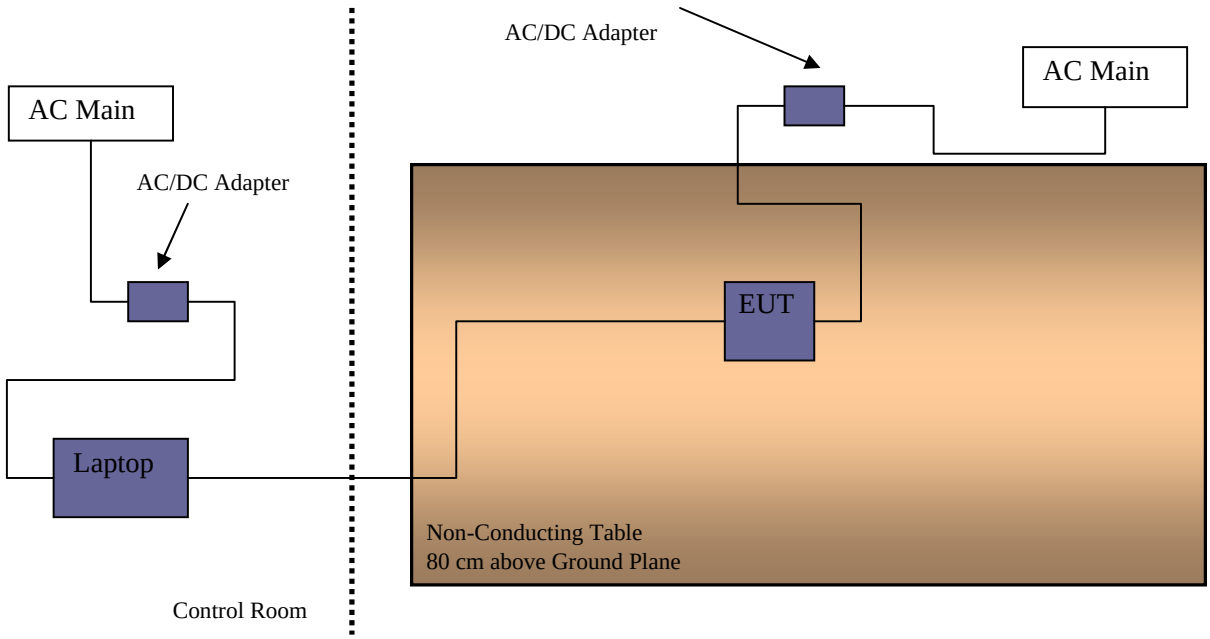
13.2 Test Setup

The radiated emissions tests were performed in the 10-meter test chamber, using the setup in accordance with ANSI C63.4-2003 measurement procedures. The specifications used were in accordance with CISPR 22 §6 Standard, Class A limits for frequencies between 30 MHz and 1 GHz, and FCC Part 15 Standard, Class B limits for frequencies above 1 GHz.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

13.3 Test Setup Block Diagram



13.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Pre-Amplifier	8447D	2944A06639	2009-06-05
Sunol Science	Broadband Antenna	JB1 Antenna	A020106-1	2009-04-17
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	112005-1	2009-02-01
Sunol Science	System Controller	SC99V	011003-1	N/R

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

13.5 Test Procedure

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

All data was recorded in the peak detection mode. Quasi-peak readings were performed only when an emission was found to be marginal (within -4 dB of specification limits).

13.6 Environmental Conditions

Temperature:	23.2º C
Relative Humidity:	37%
ATM Pressure:	102.1kPa

**Testing was performed by Victor Zhang on 2009-07-03 in 5 meter chamber #3.*

13.7 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor, and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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 for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – FCC Limit

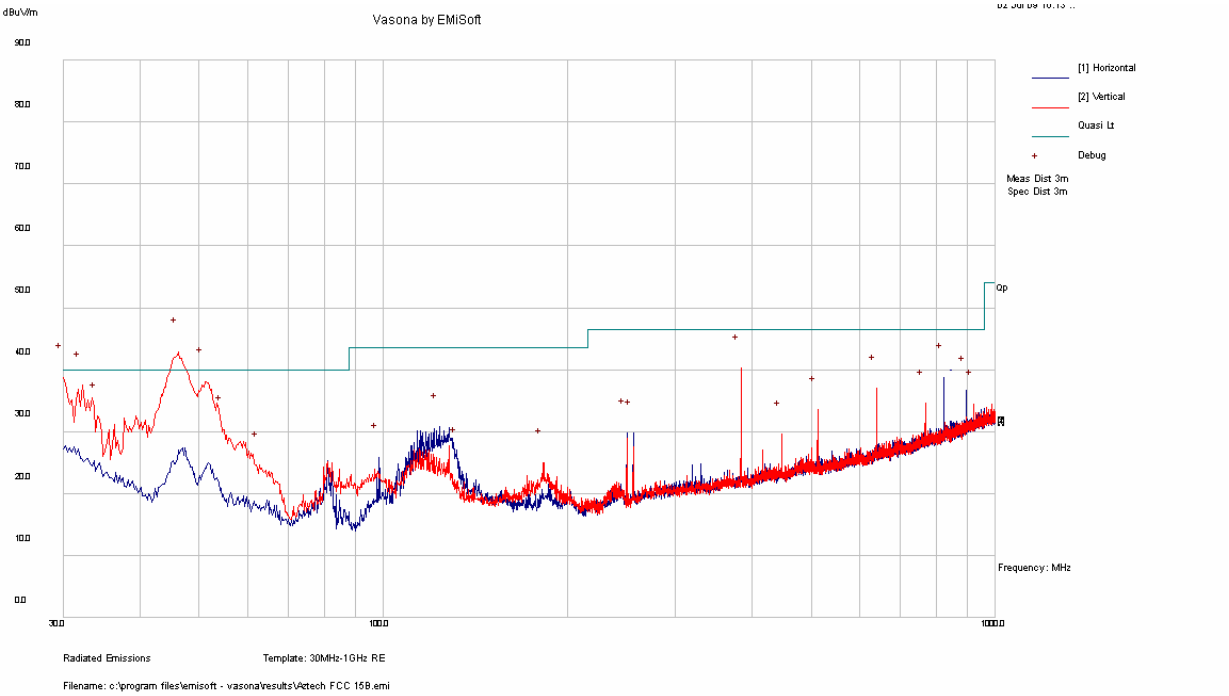
13.8 Summary of Test Results

According to the recorded data, the EUT complied with FCC limits, and had the worst margin reading – when calculated using CISPR 22 §6 Standard, Class B limits – of:

Mode: Receiving Mode			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range**
-4.64	46.44694	Vertical	30 to 25GHz

13.9 Radiated Emissions Test Plots and Data

30 MHz – 1 GHz at 3 Meter Distance



Frequency (MHz)	Corrected Quasi-Peak (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (degrees)	Limit (dBµV/m)	Margin (dB)
46.44694	35.36	134	V	188	40.0	-4.64
51.29886	33.32	102	V	347	40.0	-6.68
384.0248	36.72	119	V	246	46.5	-9.78
30.00000	28.53	127	V	64	40.0	-11.47
33.91826	19.80	115	V	92	40.0	-20.2
32.21778	17.20	272	V	26	40.0	-22.8

Above 1 GHz at 3 Meter Distance:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Amp. (dBµV/m)	Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
-	-	-	-	-	-	-	-	-	74	-	Peak*
-	-	-	-	-	-	-	-	-	54	-	Ave*

*Note: *All Emissions are 20 dB below the Limits.*