Lab Code: 200167-0

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

TEST AND MEASUREMENT REPORT

For

NVIDIA Corporation

2701 San Tomas Expressway,

Santa Clara, CA 95050, USA

FCC ID: VOB-NB099HA
IC: 7361A-NB099HA

Report Type:	**Product Type:**
Original Report	Wi-Fi and BT Combo Module

Test Engineer:	Lionel Lara
Report Number:	R1111165-247
Report Date:	2011-12-30
Reviewed By:	Victor Zhang RF/EMC Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1111165-247	Original Report	2011-12-30

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *NVIDIA Corporation* and their product, *model: NB099H, FCC ID: VOB-NB099HA, IC: 7361A-NB099HA* or the "EUT" as referred to this report. The EUT is Bluetooth and 802.11a/b/g/n Wi-Fi combo module.

1.2 Mechanical Description of EUT

The EUT measures approximately 30 mm **(L)** x 27 mm **(W)** x 3 mm **(H)** and weighs approximately 3.5 g.

The data gathered are from a typical production sample provided by the manufacturer with serial 112566 provide by the manufacture.

1.3 Objective

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

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

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.407, IC RSS-210 NII, FCC Part 15.247, IC RSS-210 DSS submissions with FCC ID: VOB-NB099HA, IC: 7361-NB099HA.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are: spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

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

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

1.7 Test Facility

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

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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: R-2463 and C-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

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

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2003.

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

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

2.2 EUT Exercise Software

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

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

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

2.3 Special Accessories

N/A.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
DELL	Laptop	Latitude D600	CX-0X2034-48643-3A6-8307
NVIDIA	Tablet PC Host	E1290	0412911036188

2.6 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
FSP Group Inc.	AC/DC Adapter	FSP025-DGAA1	H1191003035

2.7 Interface Ports and Cabling

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

2.8 Internal Parts List and Details

Manufacturers	Descriptions	Models	Serial Numbers
AzureWave	PCB Board	2099HV02	112566

3 Summary of Test Results

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

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

4.1 Applicable Standard

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

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

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

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

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

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

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

4.2 MPE Prediction

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

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

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

4.3 MPE Results

2.4GHz band:

Maximum peak output power at antenna input terminal (dBm):	15.89
Maximum peak output power at antenna input terminal (mW):	38.82
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	2.5
Maximum Antenna Gain (numeric):	1.78
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0137
Power density of prediction frequency at 20.0 cm (W/m^2):	0.137
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

5.8GHz band:

Maximum peak output power at antenna input terminal (dBm):	11.05
Maximum peak output power at antenna input terminal (mW):	12.74
Prediction distance (cm):	20
Prediction frequency (MHz):	5825
Maximum Antenna Gain, typical (dBi):	5.5
Maximum Antenna Gain (numeric):	3.55
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0090
Power density of prediction frequency at 20.0 cm (W/m^2):	0.090
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

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

5 FCC §15.203 & IC RSS-Gen §7.1.4 – Antenna Description

5.1 Applicable Standard

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

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

According to IC RSS-Gen §7.1.4: Transmitter Antenna

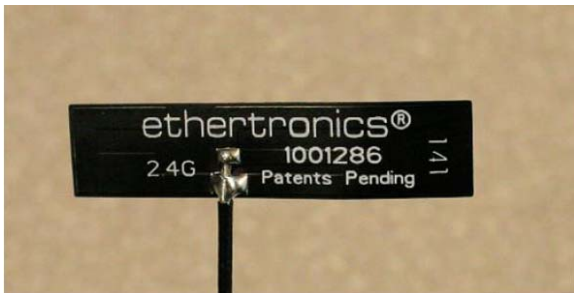
A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of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

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

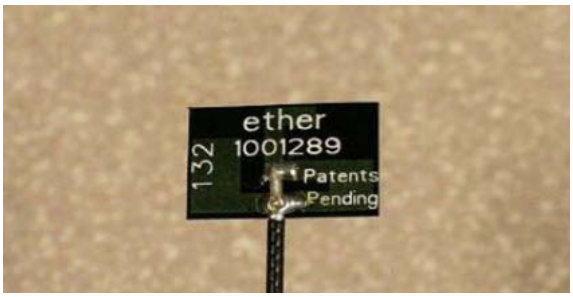
5.2 Antenna Connector Construction

The EUT has two antennas for 802.11 a/b/g/n, one is for 5 GHz only with 5.5 dBi Max antenna gain, one is for 2.4 GHz only with 2.5 dBi Max antenna gain. which in accordance to sections FCC Part 15.203 and IC RSS-Gen §7.1.4, is considered sufficient to comply with the provisions of these sections. Please refer to the EUT photos.

NB099H is 1x1 802.11n. It only supports SISO. The two antennas are for diversity. It will operate on only one antenna at a time.



2.4GHz Antenna



5GHz Antenna

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

6.1 Applicable Standards

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

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

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

**Decreases with the logarithm of the frequency.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC §15.207 and IC RSS-Gen §7.2.2 limits.

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

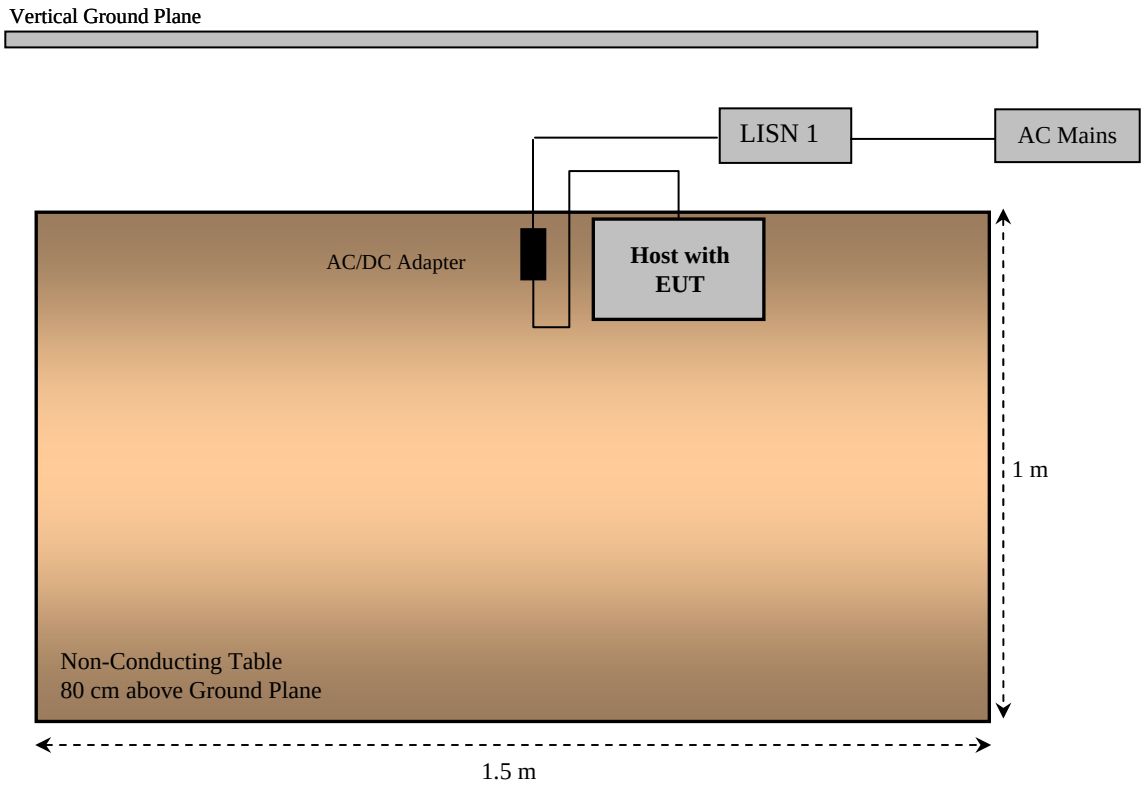
The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2011-04-14
Solar Electronics	LISN	9252-R-24-BNC	511205	2011-06-25
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2011-06-10

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

6.4 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:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Jerry Huang from 2011-12-18 to 2011-12-20 at 5meter chamber3.

6.7 Corrected Amplitude & Margin Calculation

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

CA = Ai + CL + Atten

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

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

Margin = Corrected Amplitude - Limit

6.8 Summary of Test Results

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

Transceiver Mode

2.4 GHz:

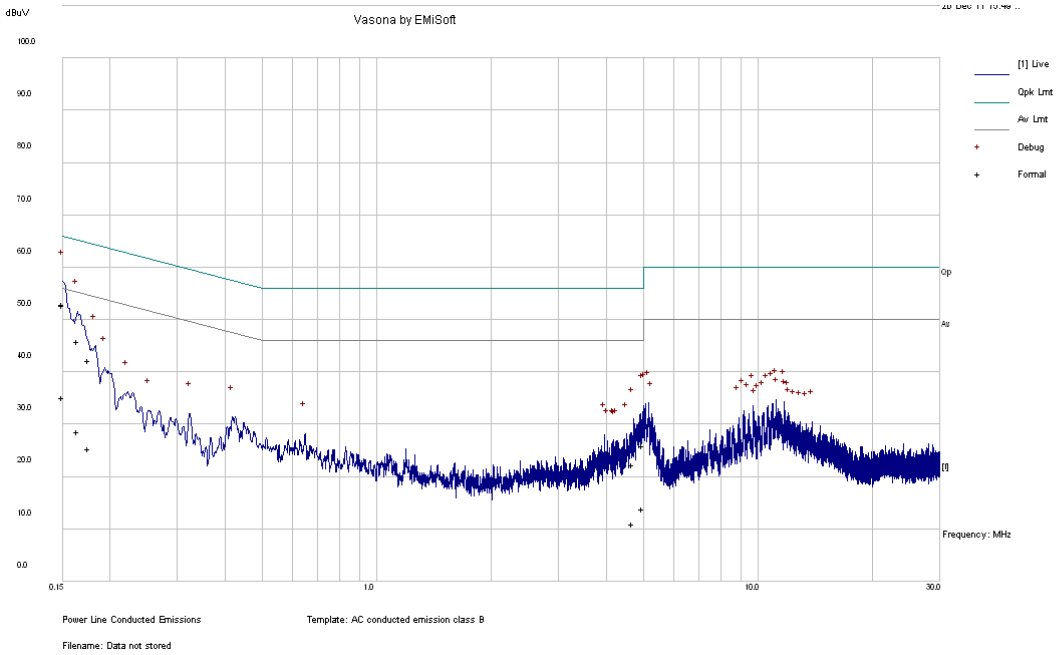
Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-9.03	0.152979	Neutral	0.15 to 30

5 GHz:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-14.98	0.150588	Neutral	0.15 to 30

6.9 Conducted Emissions Test Plots and Data

2.4 GHz Mode: 120 V, 60 Hz – Line



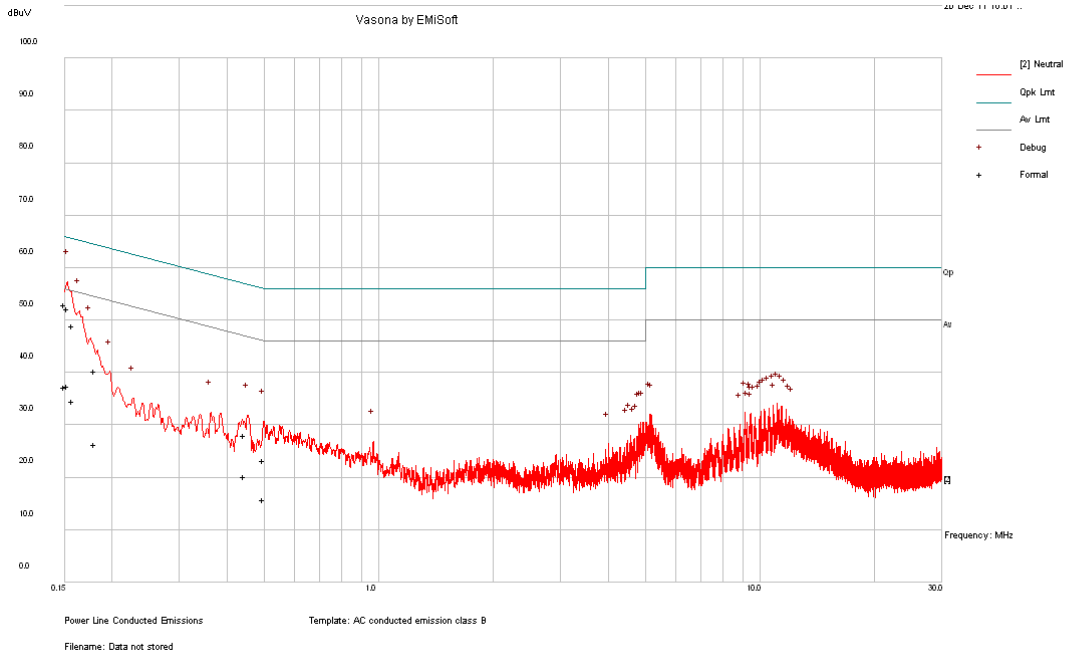
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150034	52.95	Line	66	-13.05
0.150729	52.71	Line	65.96	-13.25
0.164925	45.95	Line	65.21	-19.26
0.175851	42.16	Line	64.68	-22.52
4.982375	26.06	Line	56	-29.94
4.708484	22.38	Line	56	-33.62

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150034	35.24	Line	56	-20.76
0.150729	35.11	Line	55.96	-20.85
0.164925	28.7	Line	55.21	-26.51
0.175851	25.4	Line	54.68	-29.28
4.982375	13.91	Line	46	-32.09
4.708484	11.11	Line	46	-34.89

2.4 GHz Mode: 120 V, 60 Hz – Neutral



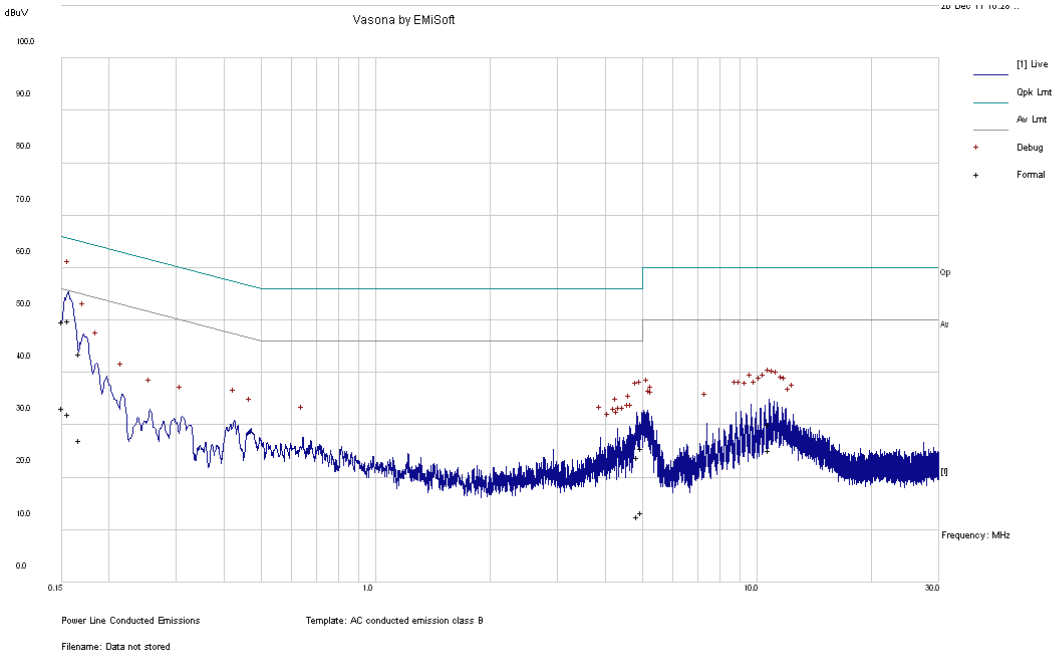
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150693	52.99	Neutral	65.96	-12.97
0.152979	52.18	Neutral	65.84	-13.66
0.157605	48.99	Neutral	65.59	-16.6
0.180285	40.42	Neutral	64.47	-24.05
0.443649	28.04	Neutral	56.99	-28.96
0.498615	23.26	Neutral	56.02	-32.76

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.152979	37.37	Neutral	55.84	-9.03
0.150693	37.35	Neutral	55.96	-17.62
0.157605	34.65	Neutral	55.59	-18.96
0.443649	20.29	Neutral	46.99	-24.44
0.180285	26.42	Neutral	54.47	-26.30
0.498615	15.73	Neutral	46.02	-28.12

5 GHz Mode: 120 V, 60 Hz – Line



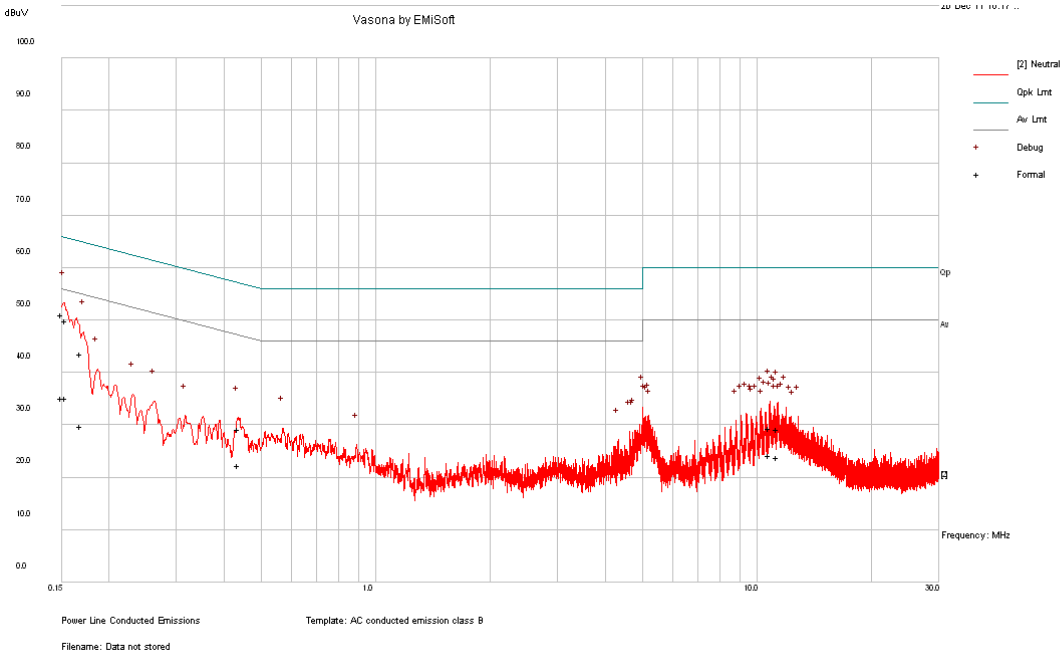
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.156753	49.92	Line	65.63	-15.72
0.151041	49.65	Line	65.94	-16.29
0.16749	43.58	Line	65.08	-21.5
10.76288	30.17	Line	60	-29.83
4.974932	25.5	Line	56	-30.5
4.858673	23.81	Line	56	-32.19

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.151041	33.28	Line	55.94	-22.66
0.156753	32.11	Line	55.63	-23.53
10.76288	25.24	Line	50	-24.76
0.16749	27.02	Line	55.08	-28.06
4.974932	13.28	Line	46	-32.72
4.858673	12.54	Line	46	-33.46

5 GHz Mode: 120 V, 60 Hz – Neutral



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.150588	50.99	Neutral	65.97	-14.98
0.154323	49.91	Neutral	65.76	-15.85
0.168801	43.59	Neutral	65.02	-21.43
0.437391	29.19	Neutral	57.11	-27.93
10.78062	29.39	Neutral	60	-30.61
11.3343	29.26	Neutral	60	-30.74

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.154323	35.17	Neutral	55.76	-20.59
0.150588	35.23	Neutral	55.97	-20.74
0.437391	22.35	Neutral	47.11	-24.76
0.168801	29.71	Neutral	55.02	-25.3
10.78062	24.25	Neutral	50	-25.75
11.3343	23.93	Neutral	50	-26.07

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

7.1 Applicable Standard

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

7.2 Measurement Procedure

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

7.3 Test Equipment List and Details

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

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

7.4 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Lionel Lara from 2011-12-18 to 2011-12-20 at RF Test Site.

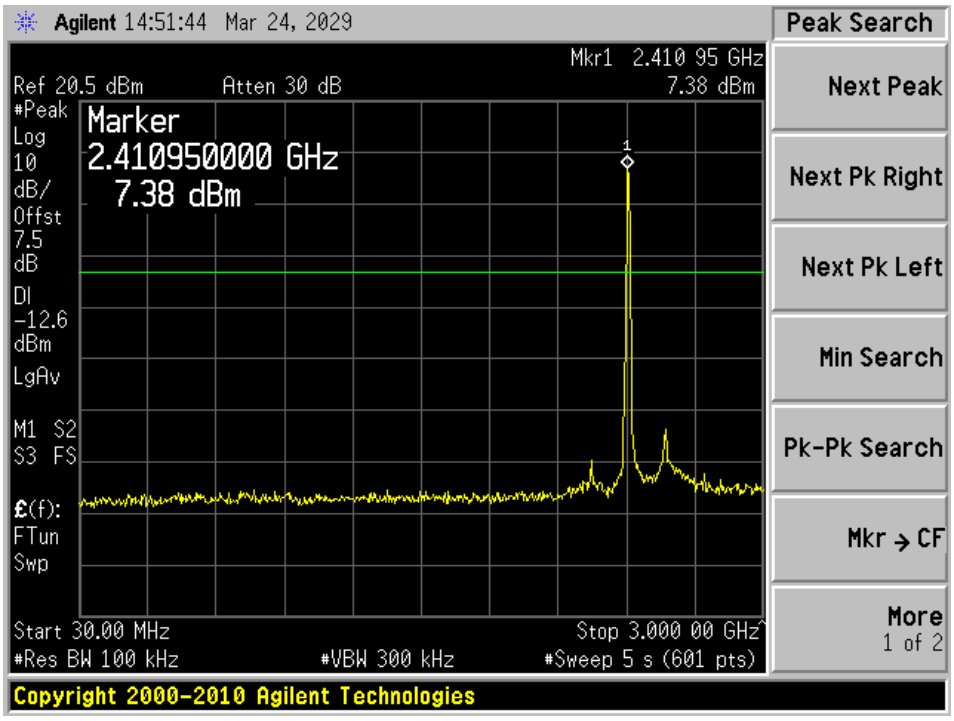
7.5 Test Results

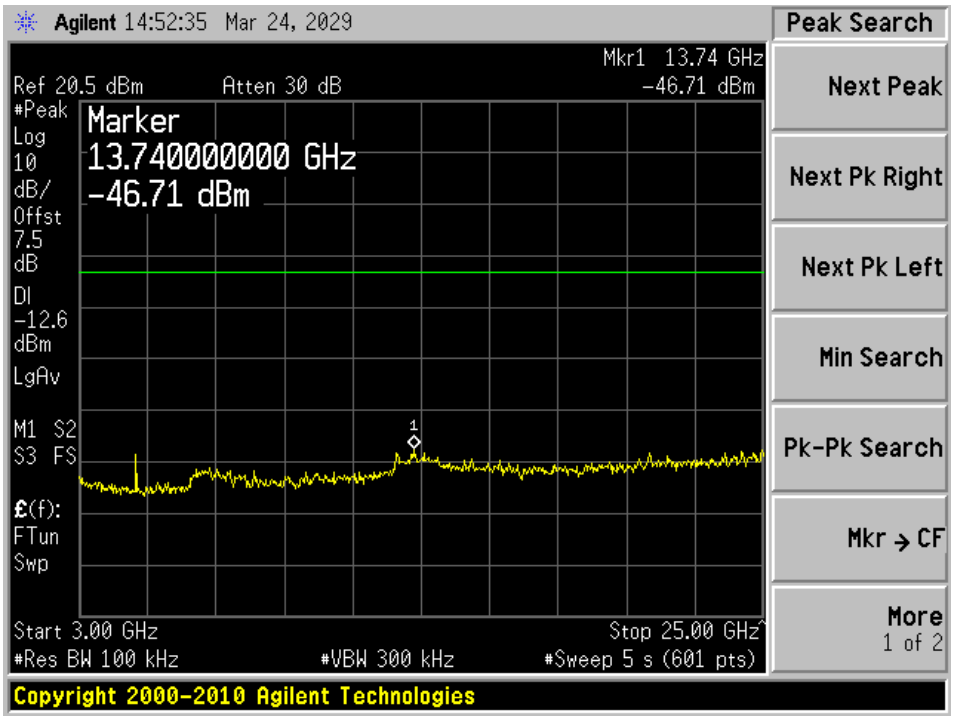
Please refer to following plots of spurious emissions.

Main Antenna

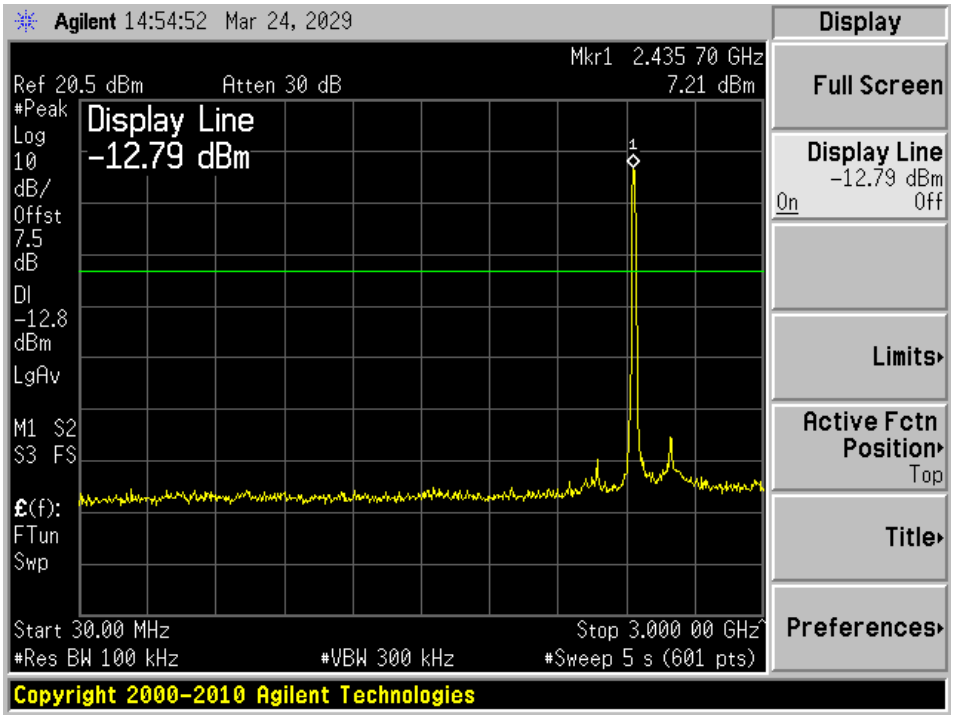
2.4 GHz: 802.11b

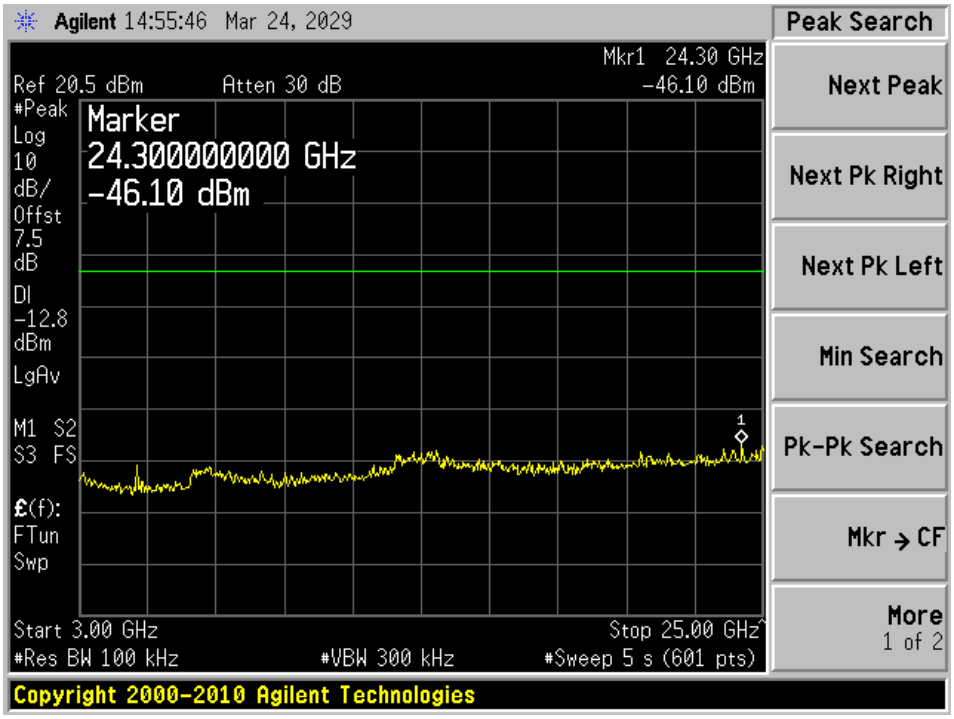
Low Channel 2412 MHz



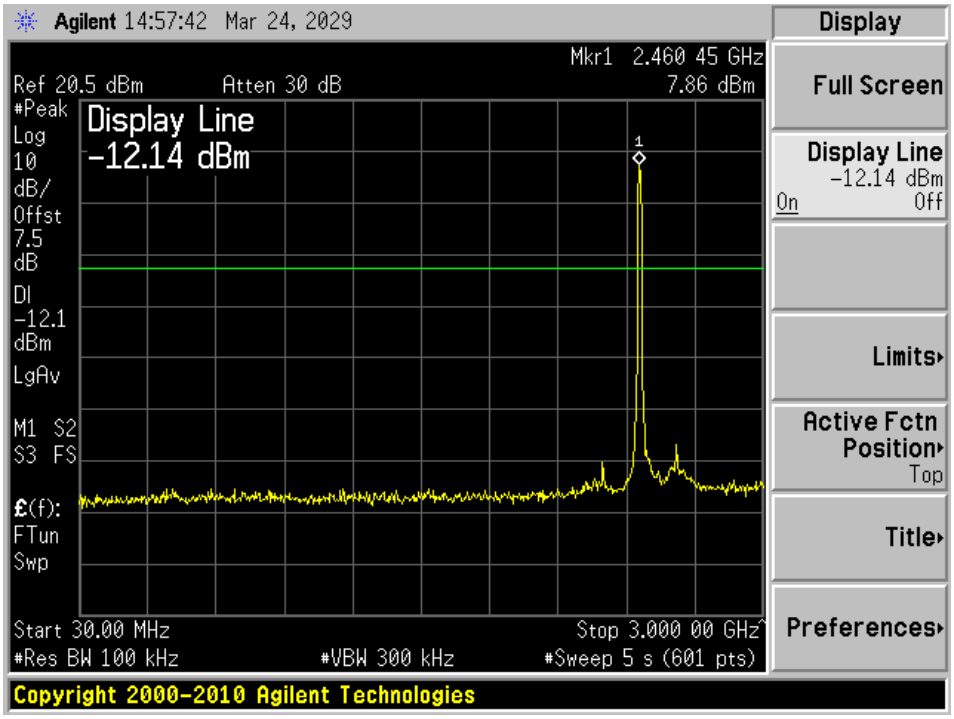


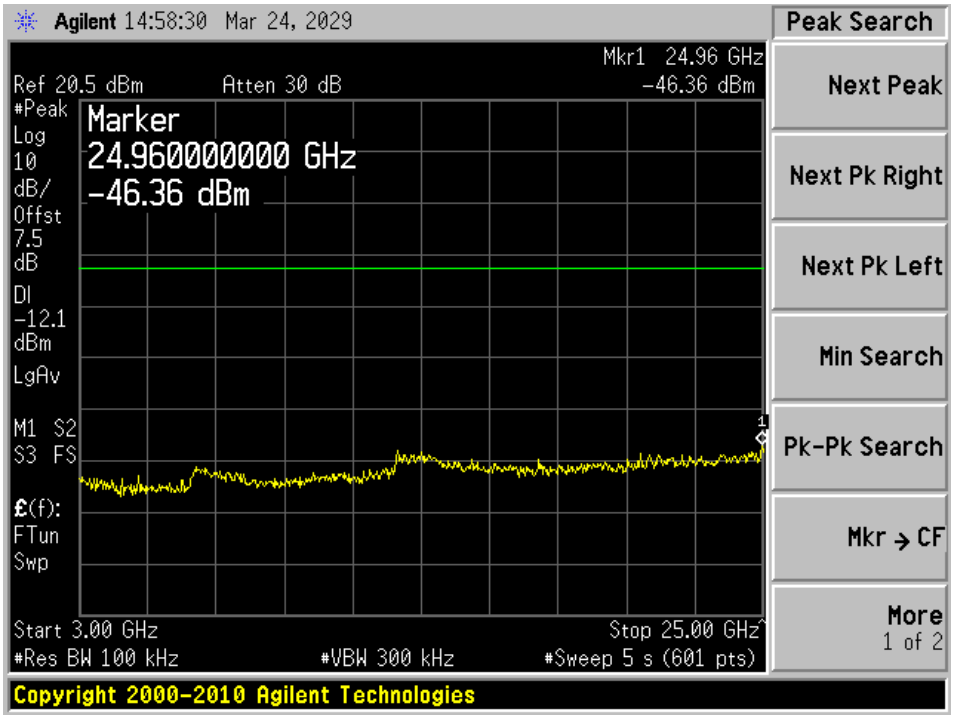
Middle Channel 2437 MHz





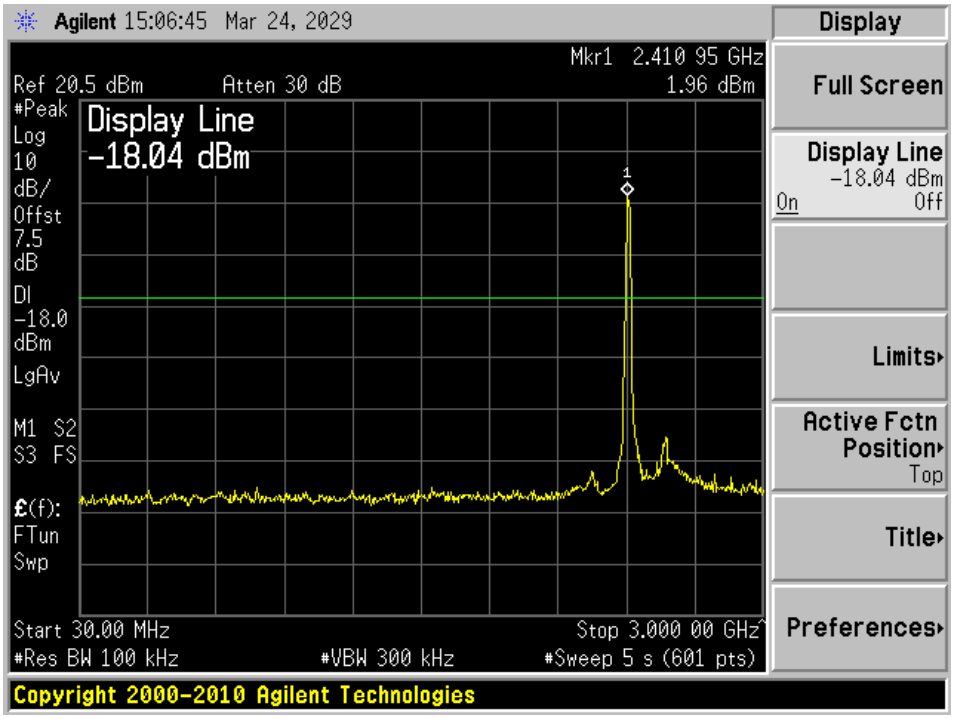
High Channel 2462 MHz

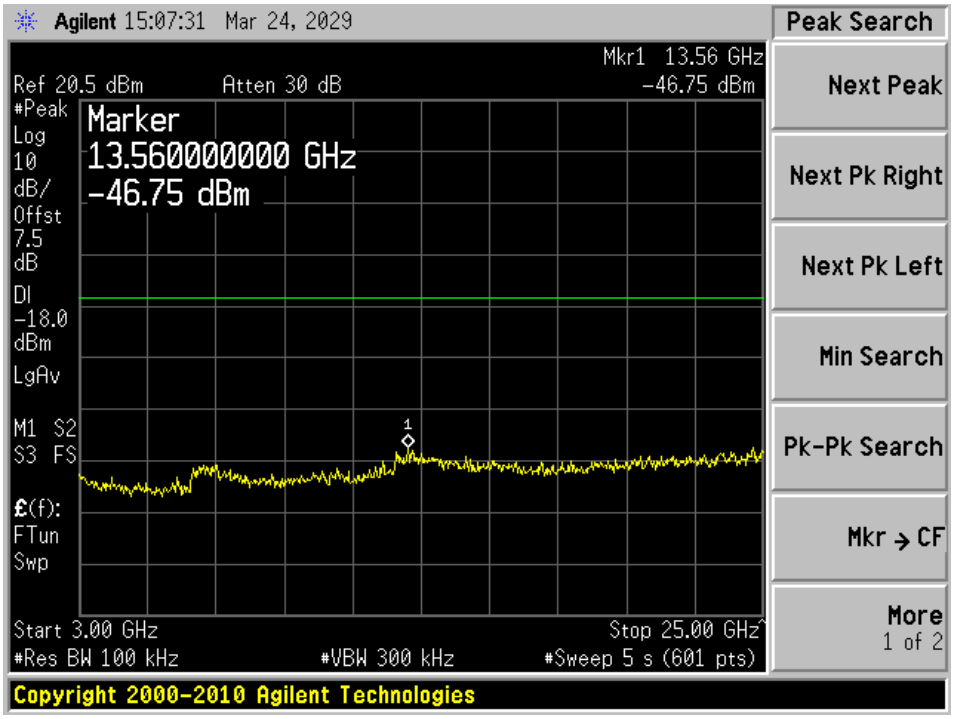




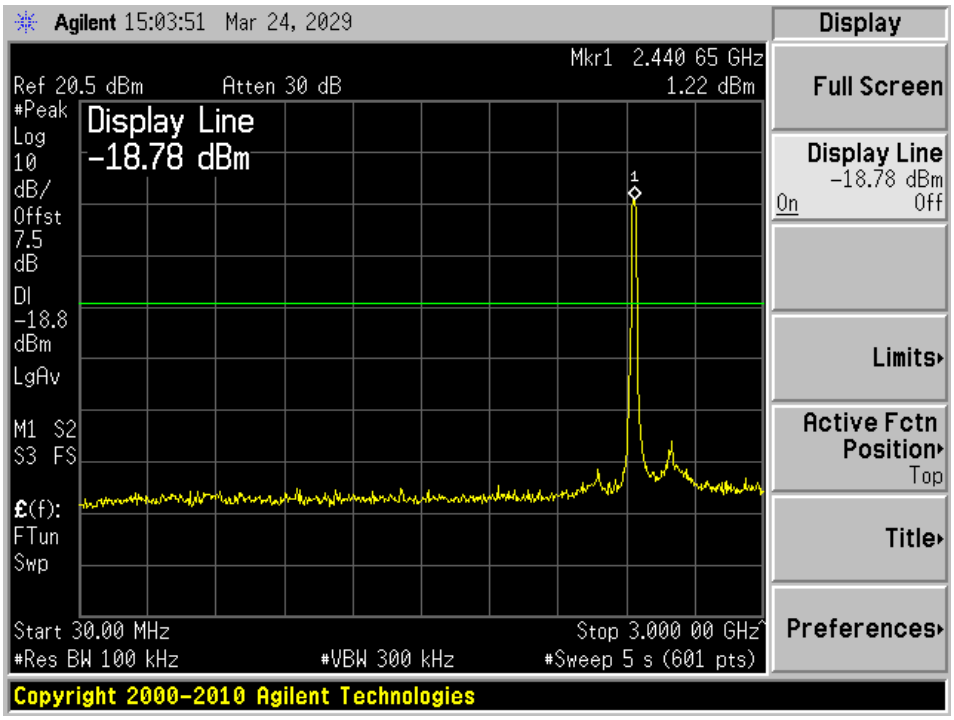
2.4 GHz: 802.11g

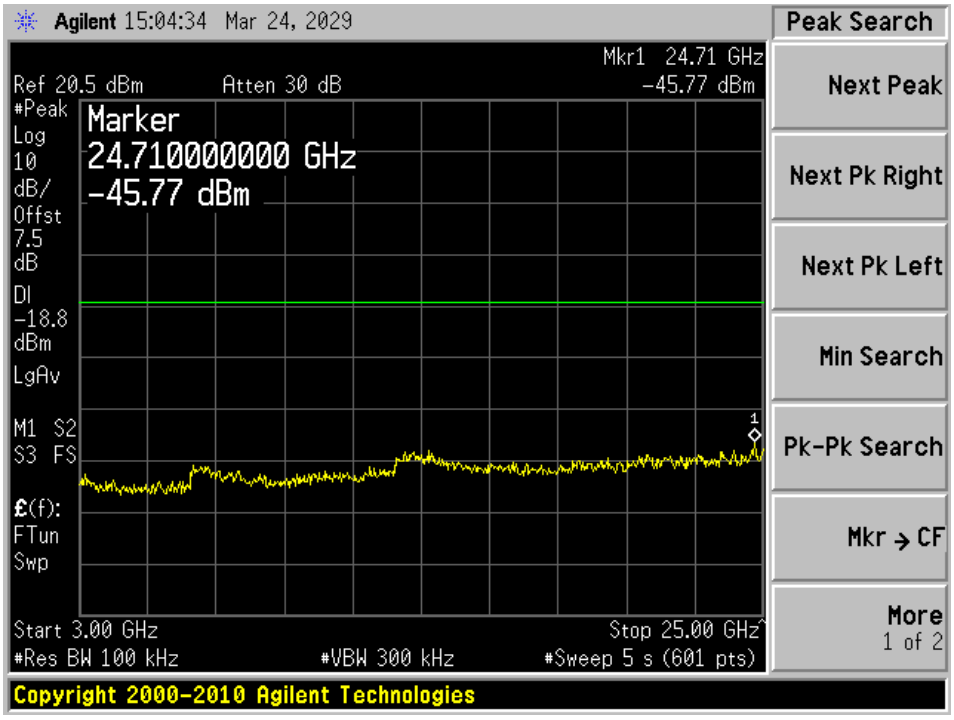
Low Channel 2412 MHz



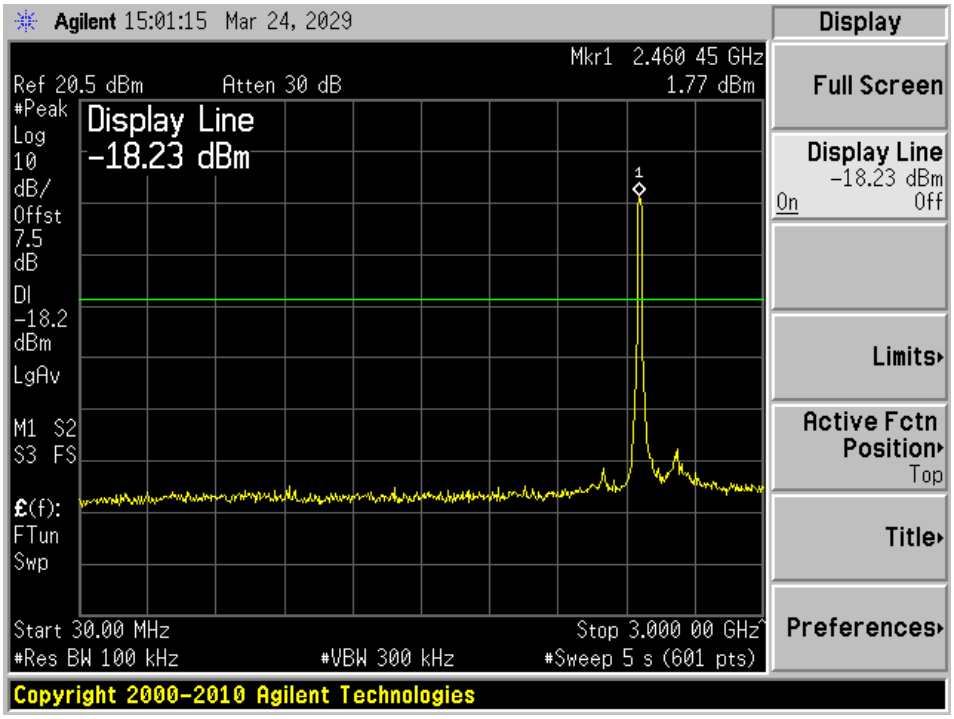


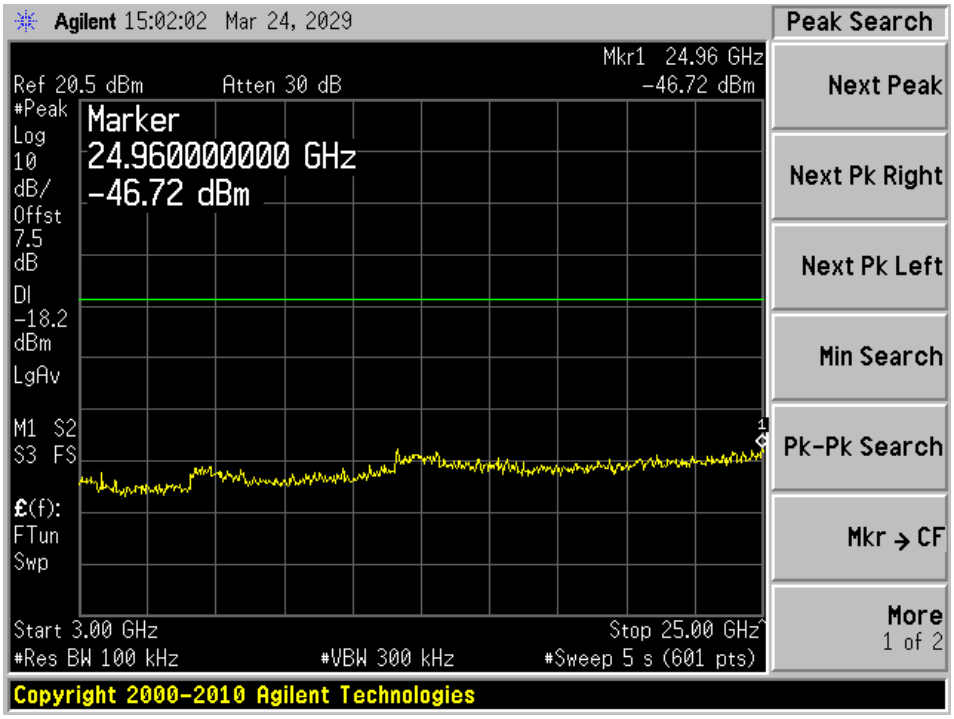
Middle Channel 2437 MHz





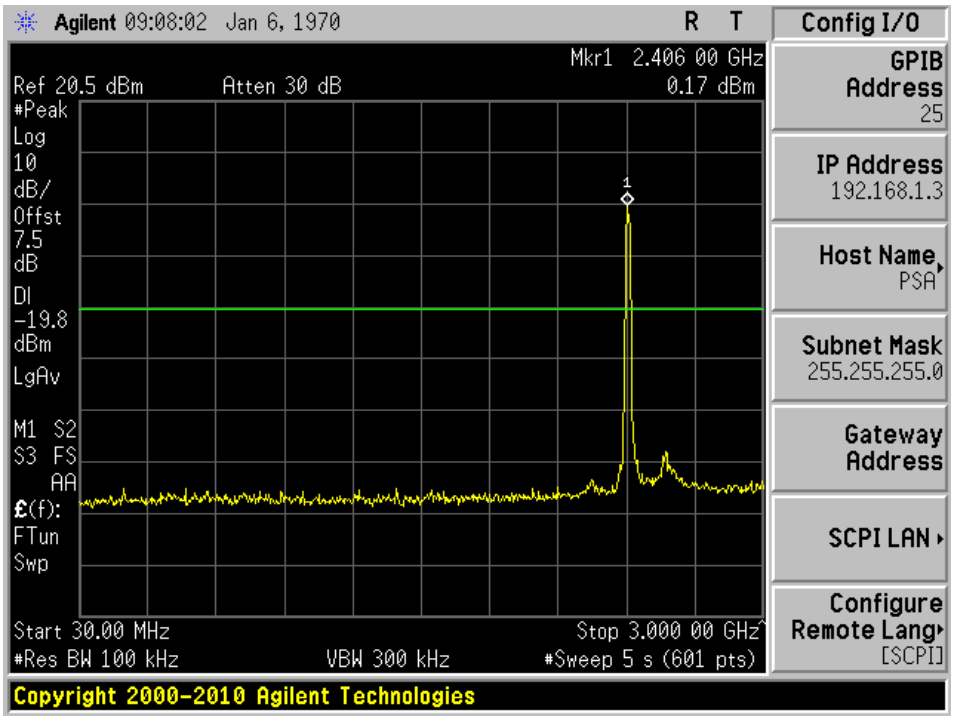
High Channel 2462 MHz

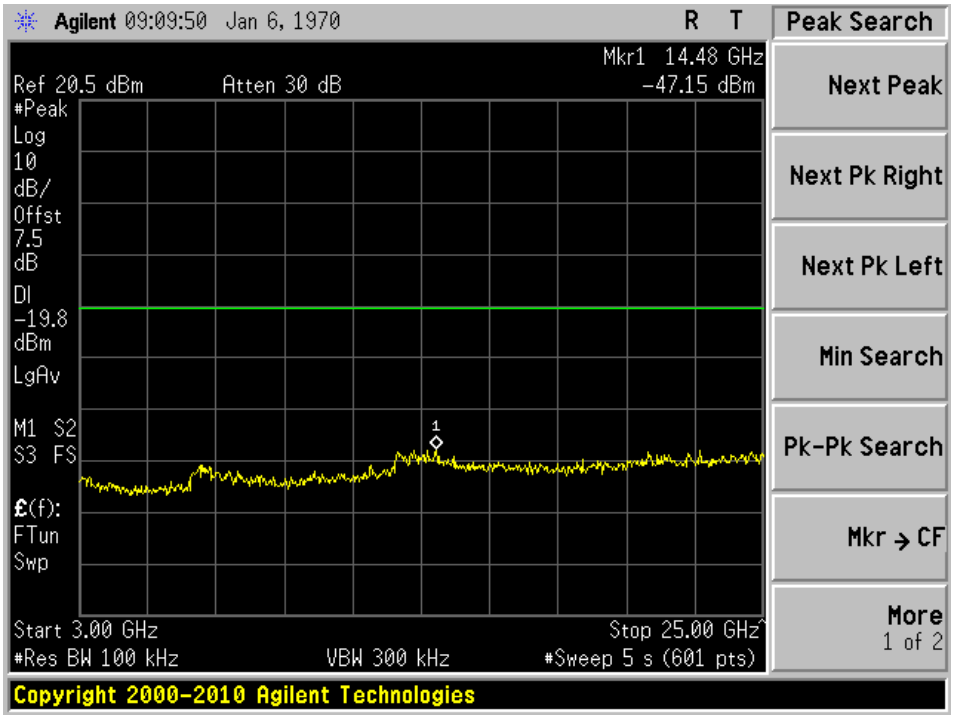




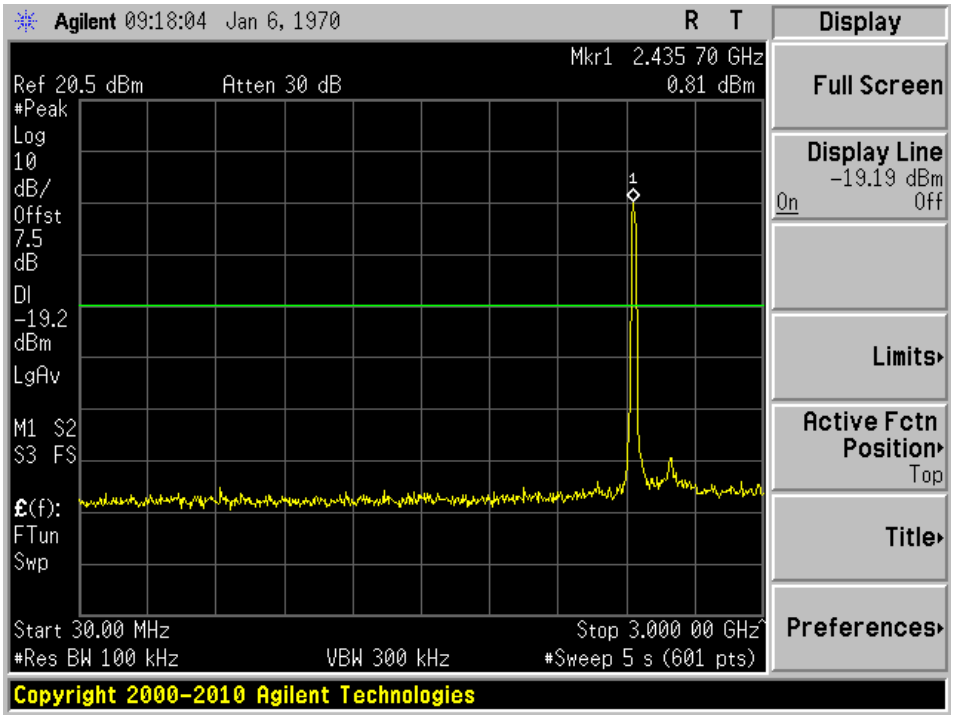
2.4 GHz: 802.11n

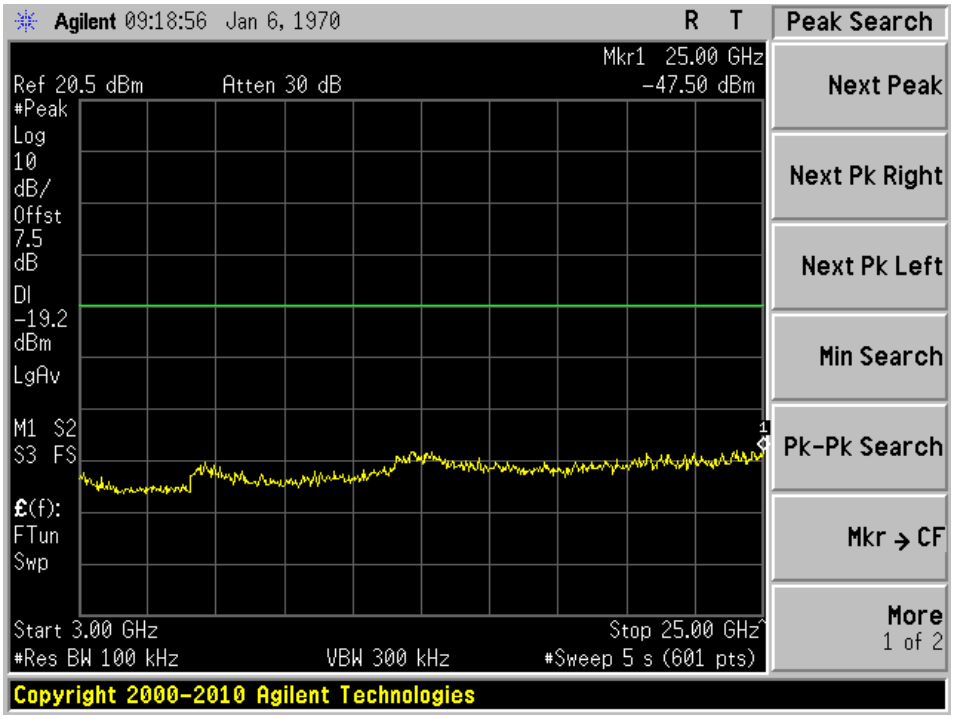
Low Channel 2412 MHz



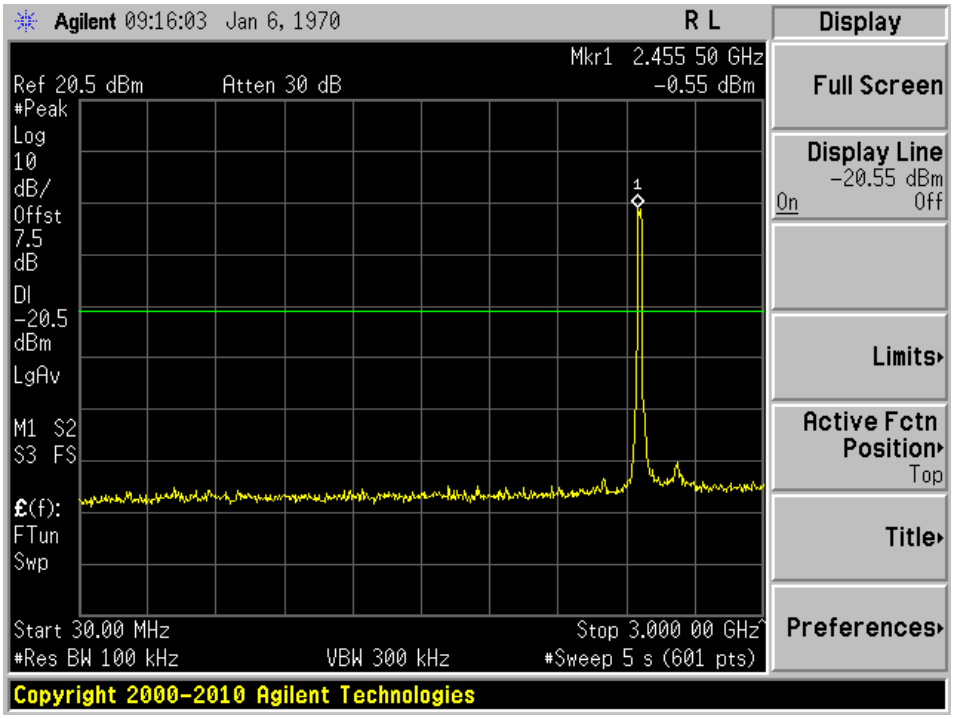


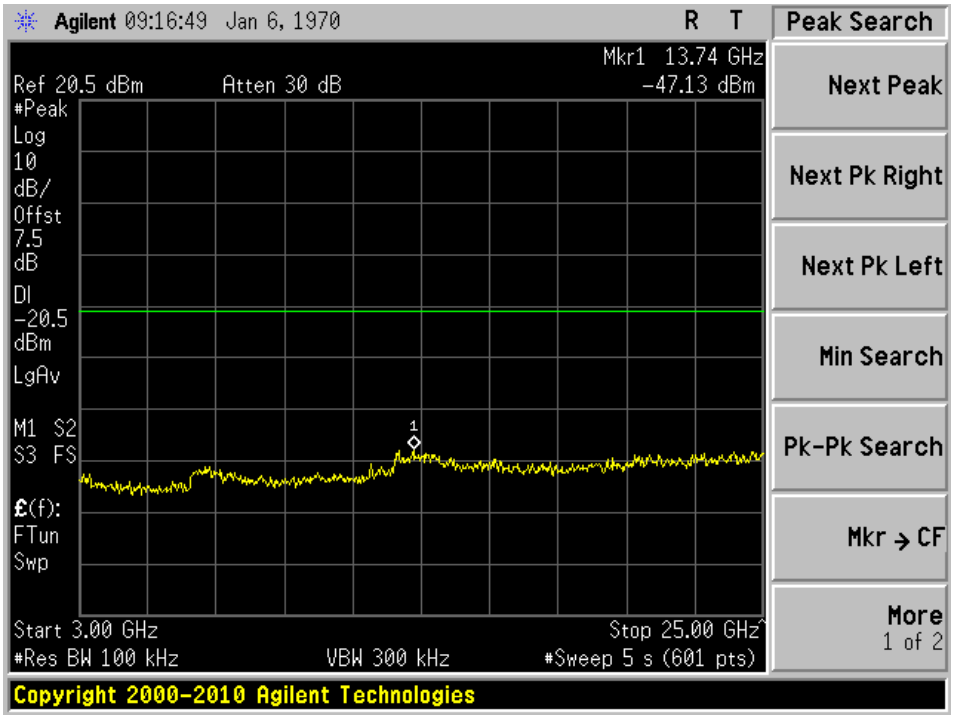
Middle Channel 2437 MHz





High Channel 2462 MHz

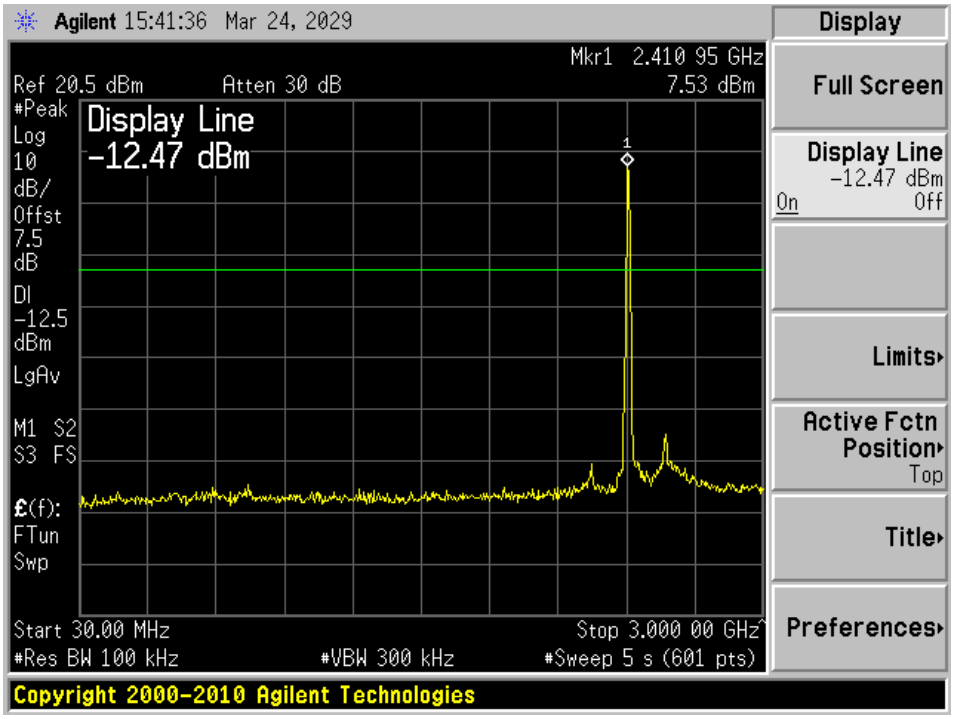


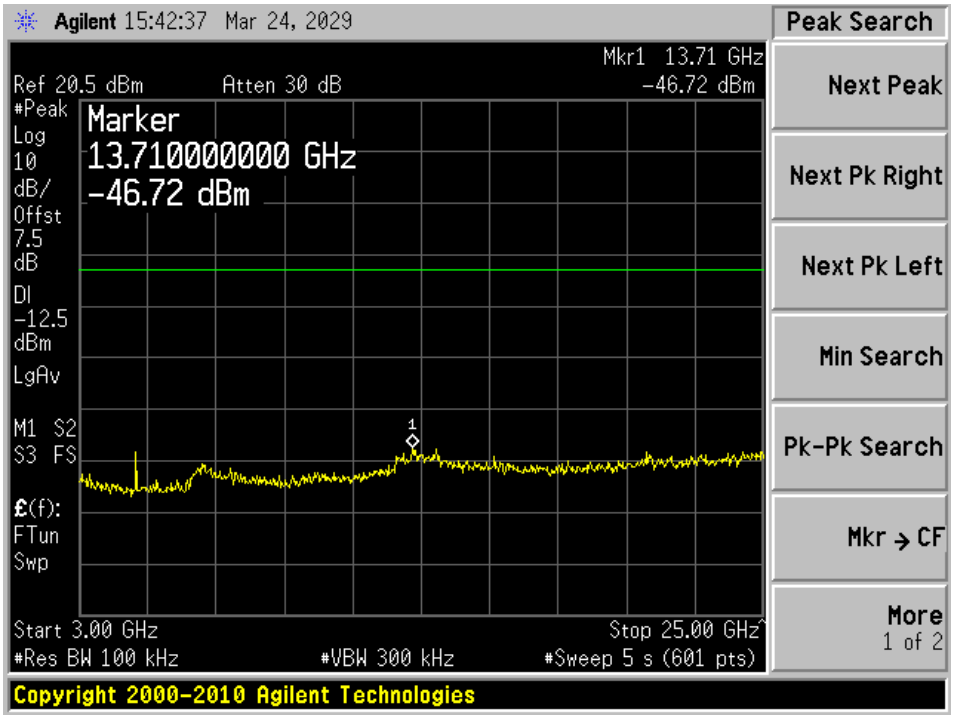


Aux Antenna

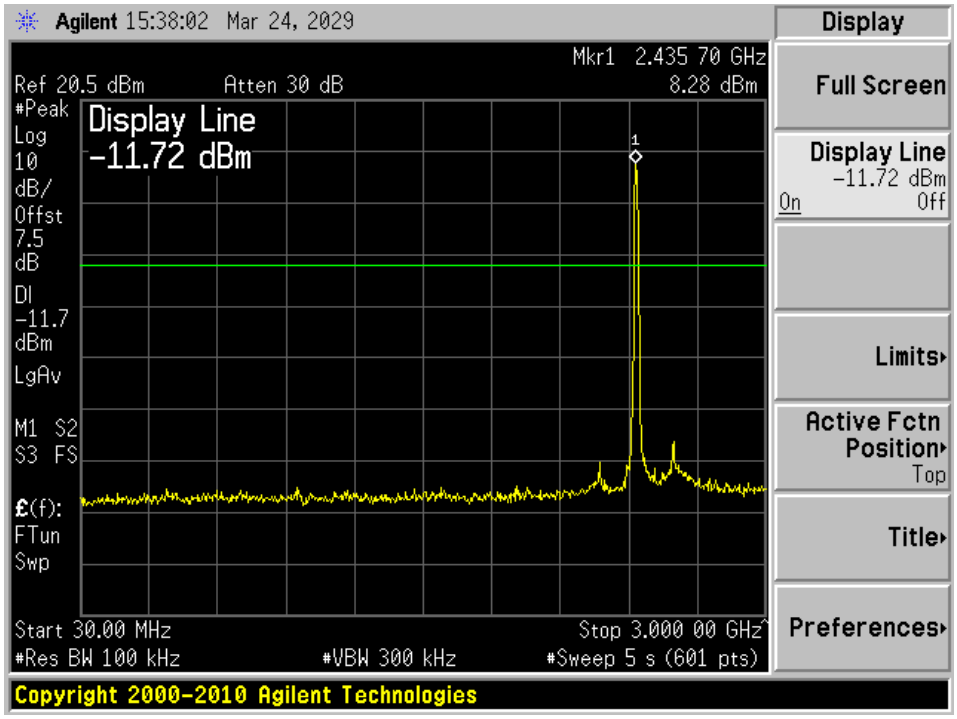
2.4 GHz: 802.11b

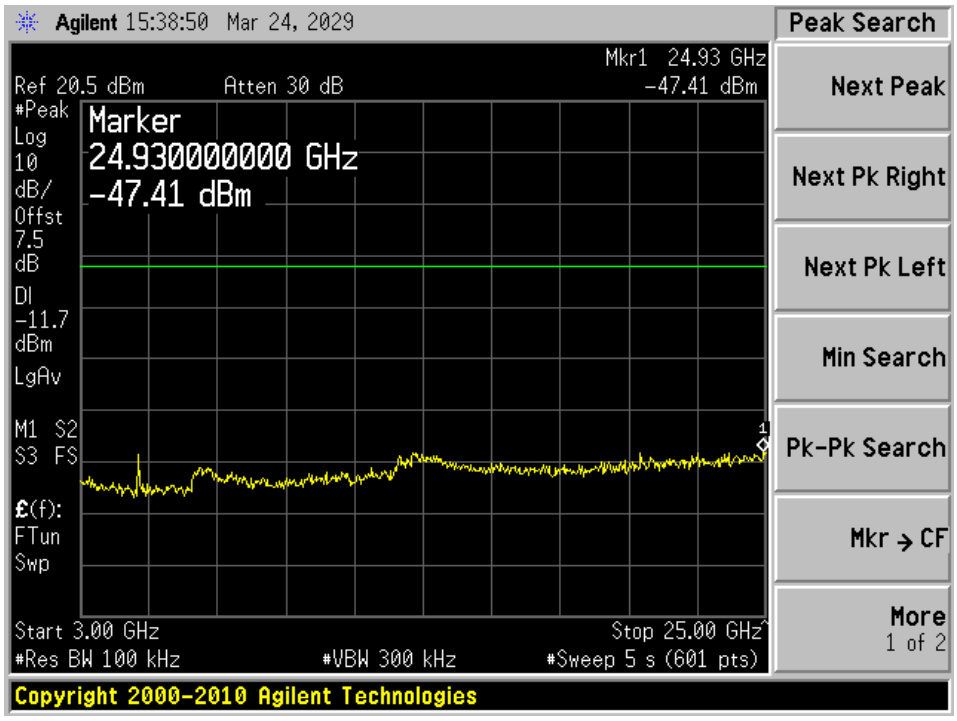
Low Channel 2412 MHz



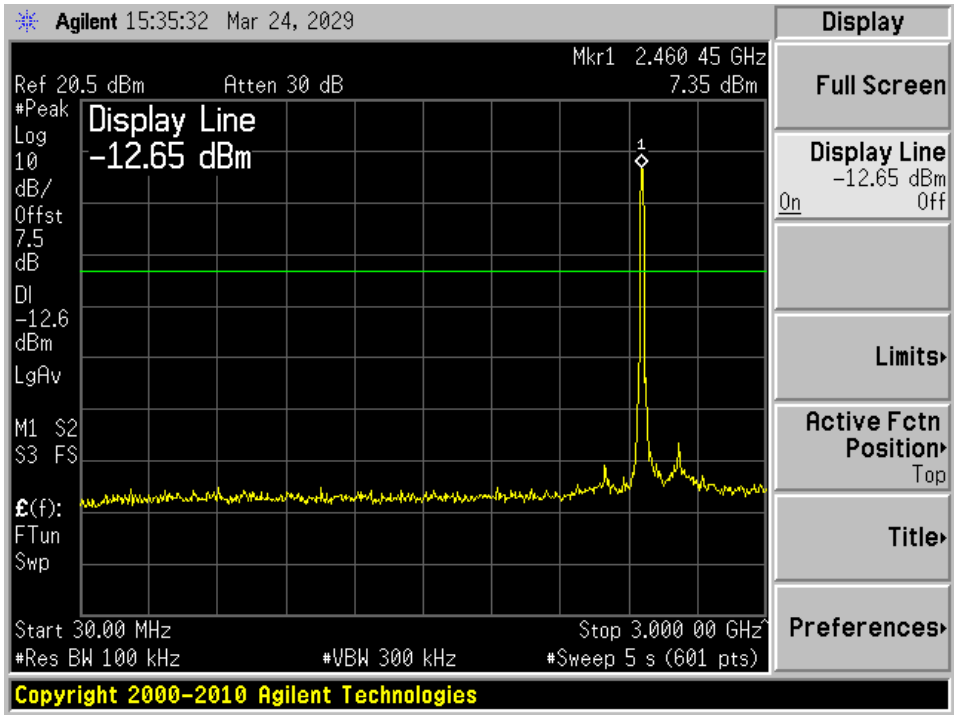


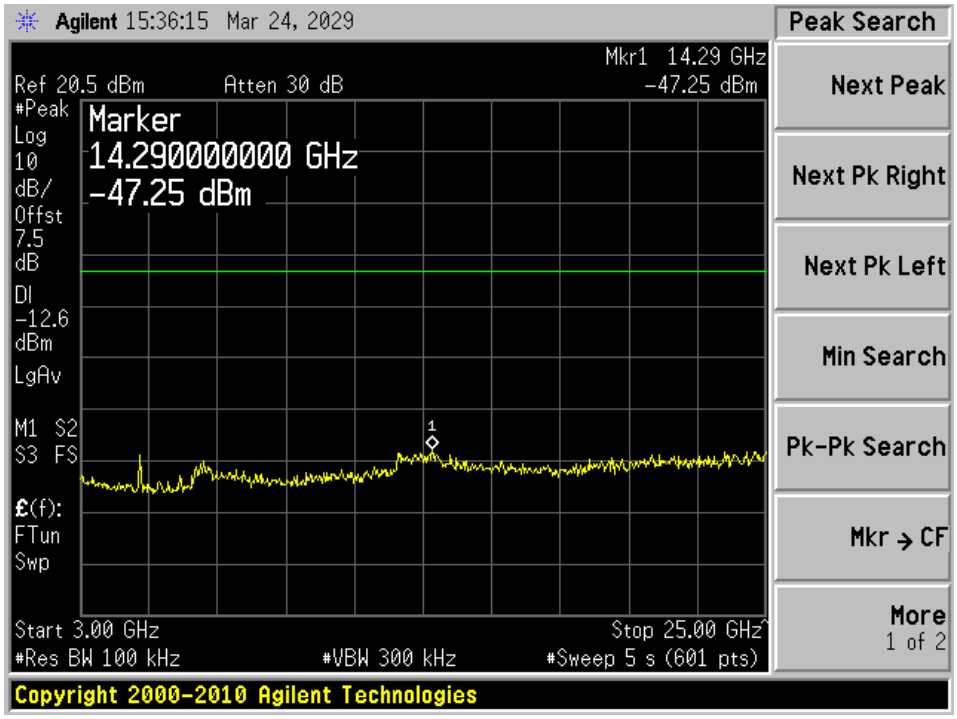
Middle Channel 2437 MHz





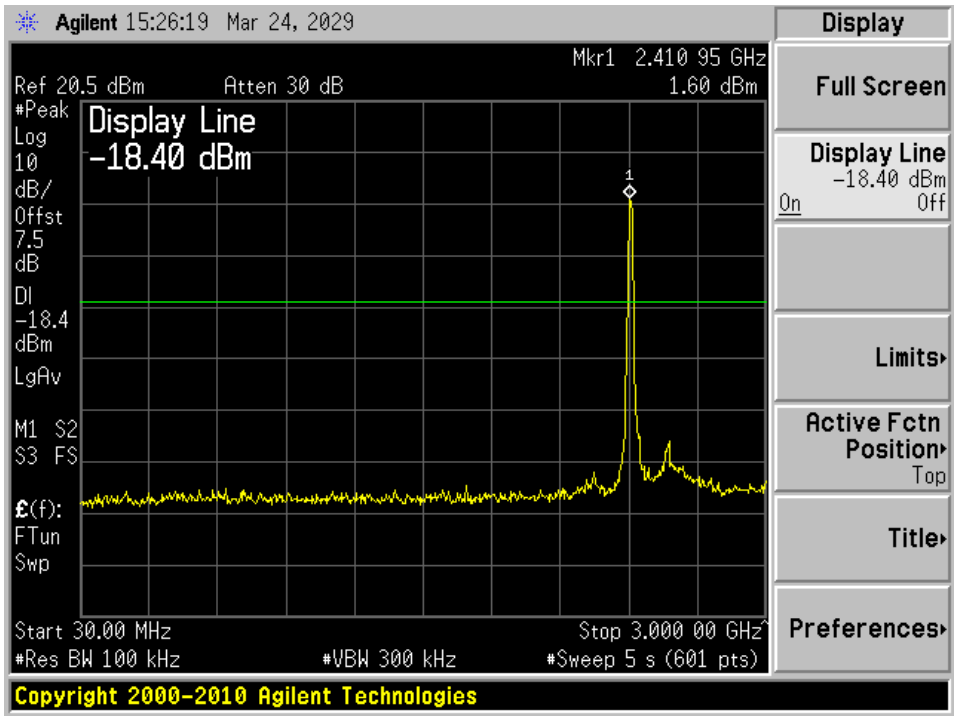
High Channel 2462 MHz

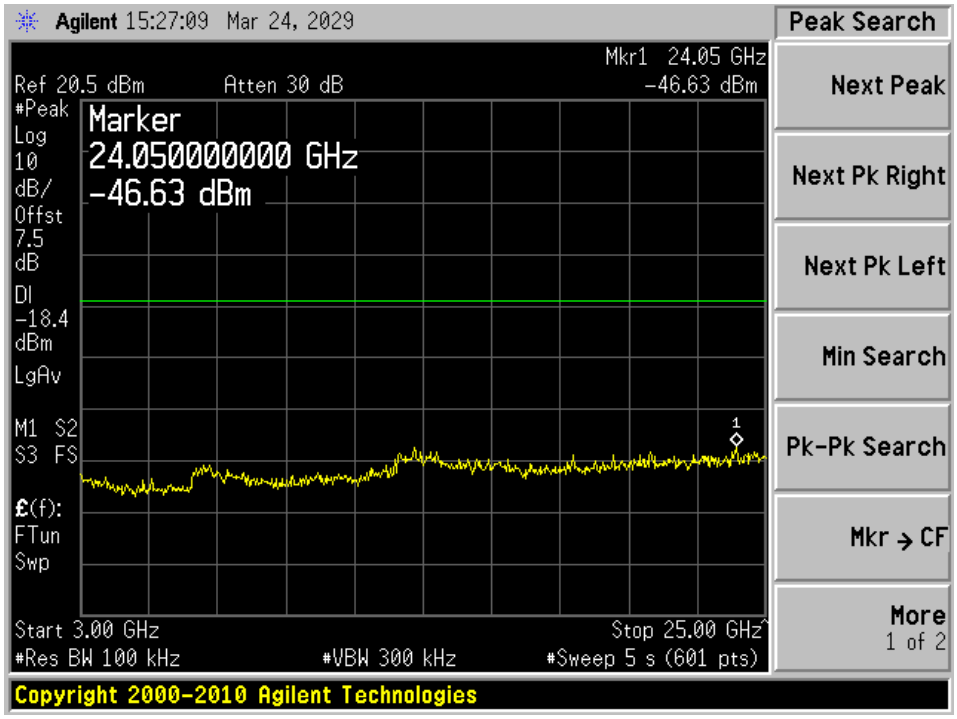




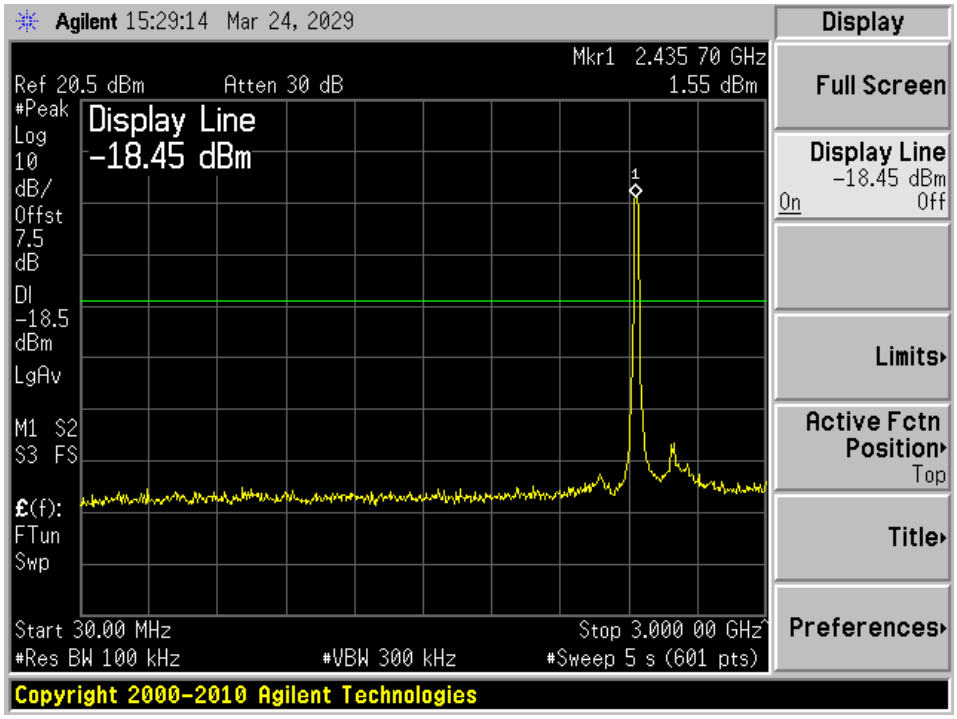
2.4 GHz: 802.11g

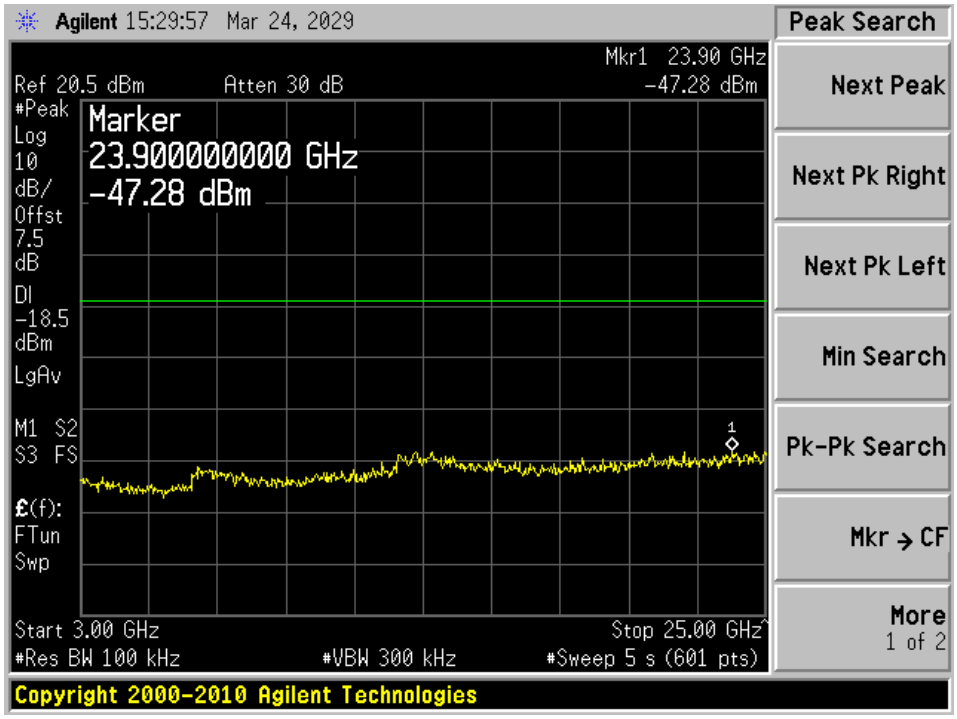
Low Channel 2412 MHz



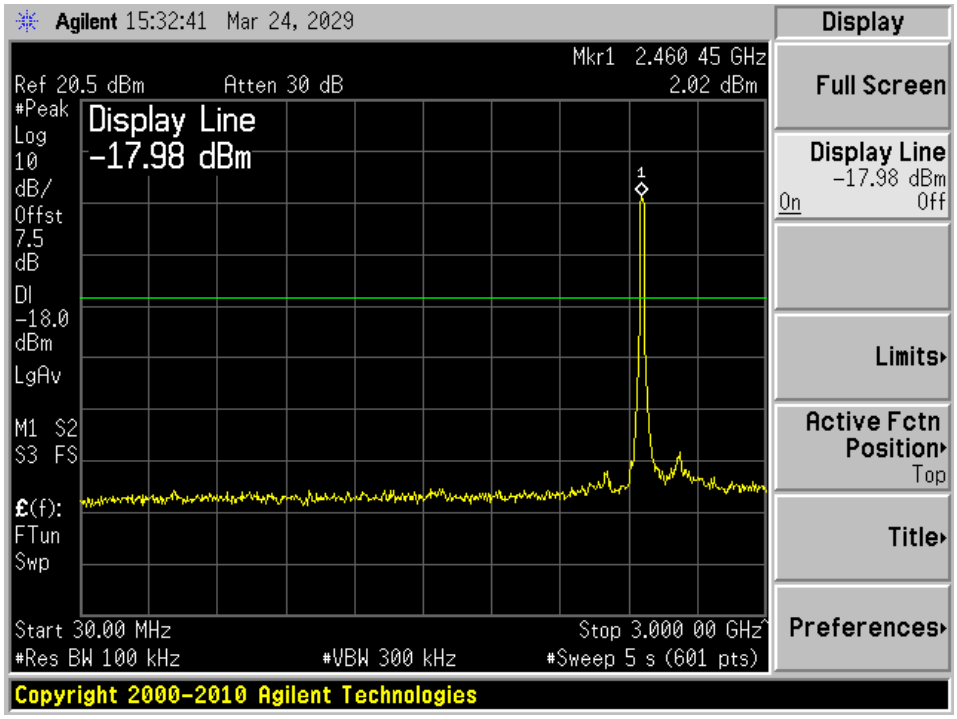


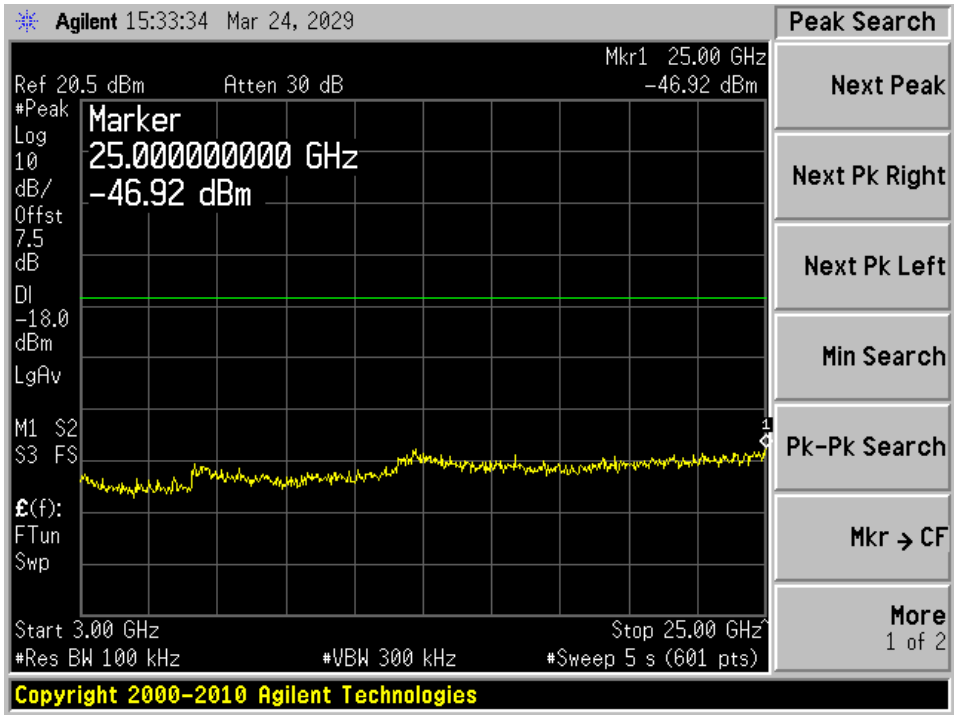
Middle Channel 2437 MHz





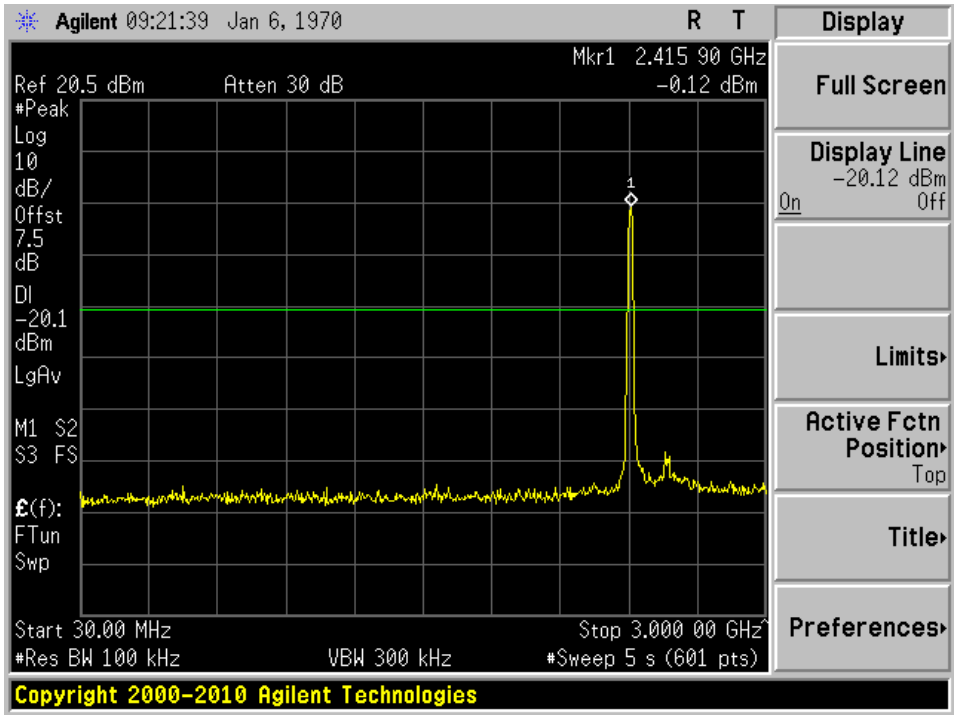
High Channel 2462 MHz

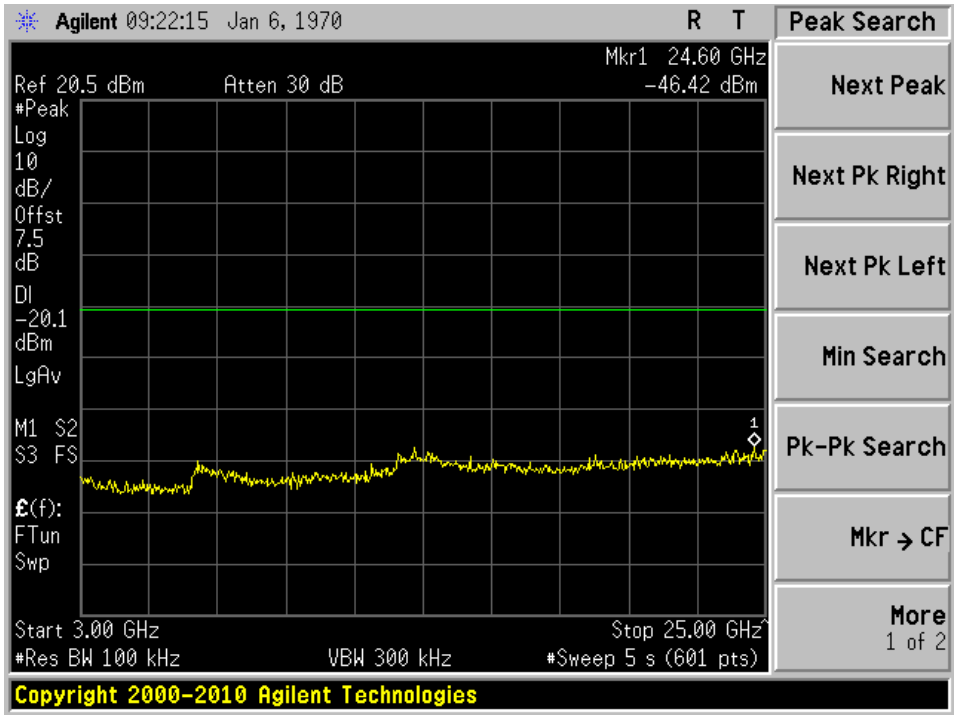




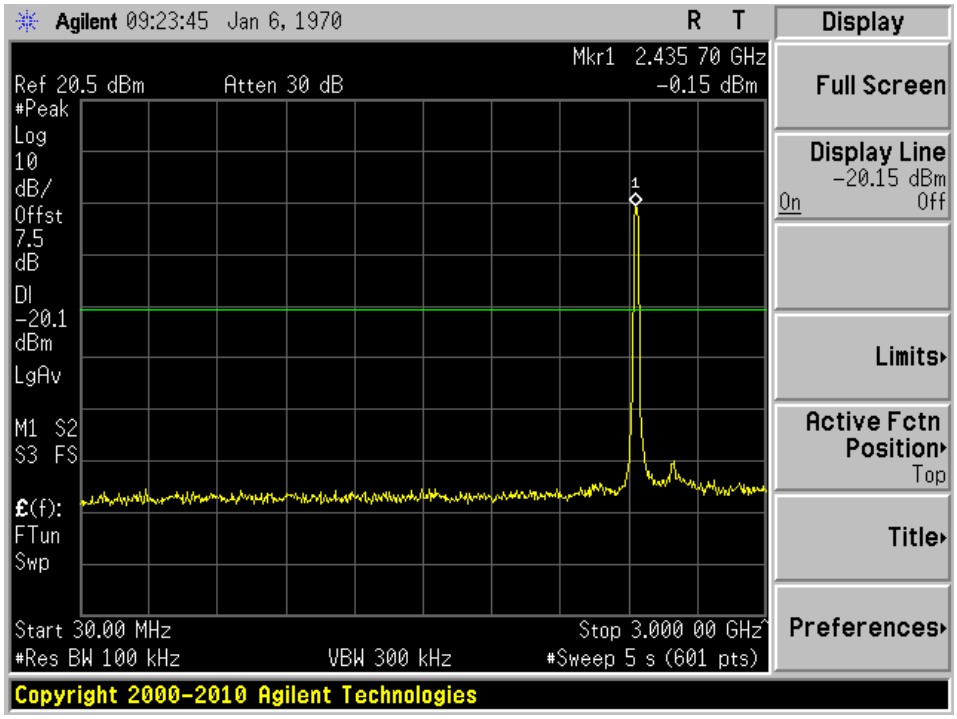
2.4 GHz: 802.11n

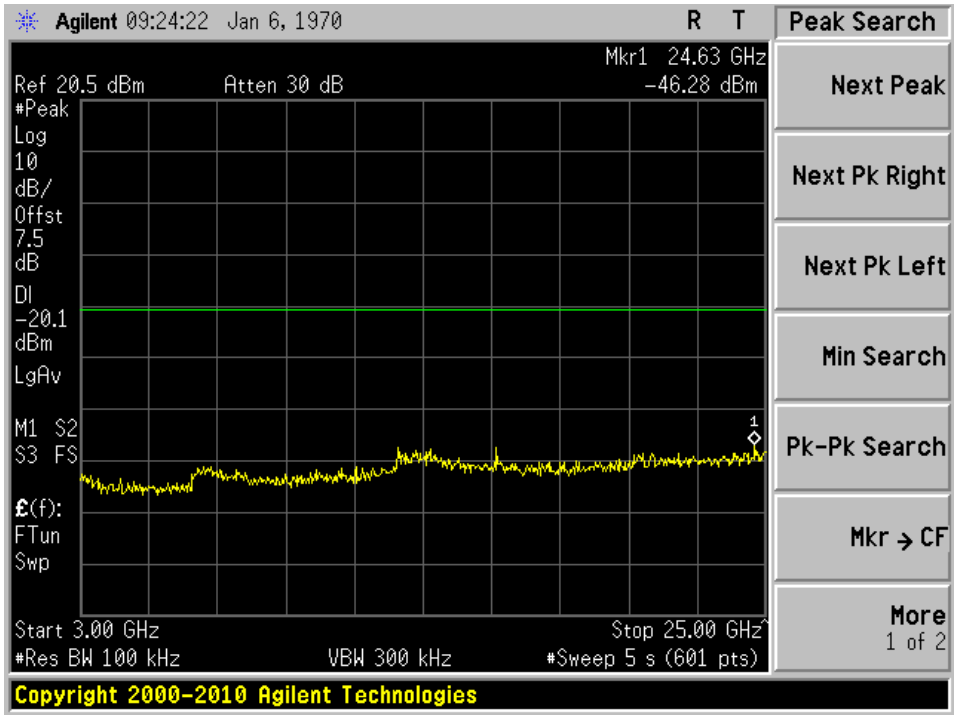
Low Channel 2412 MHz



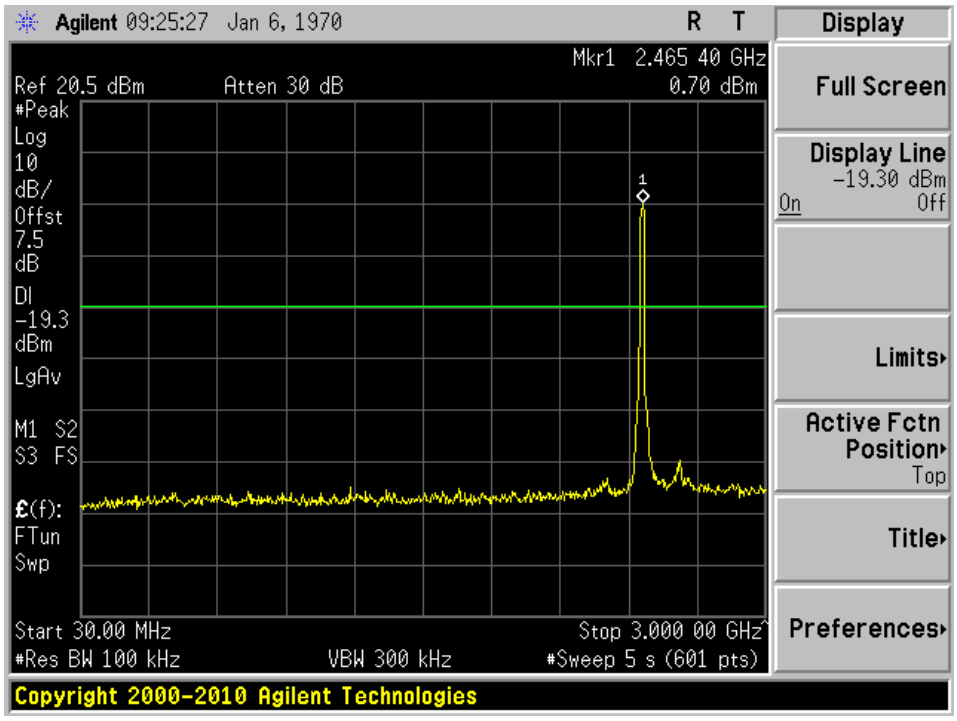


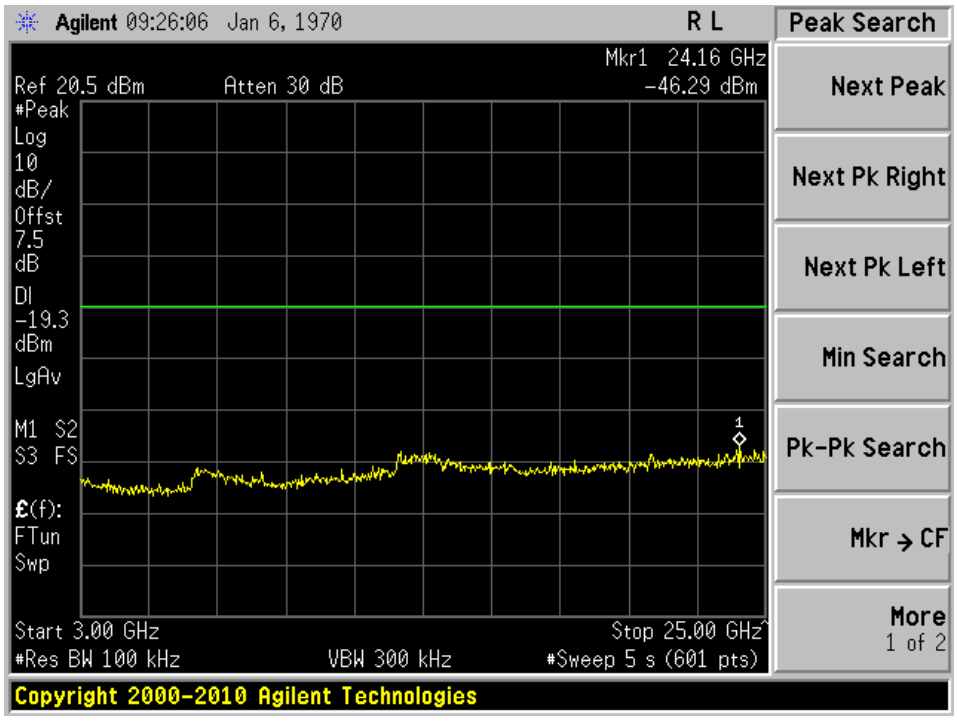
Middle Channel 2437 MHz





High Channel 2462 MHz

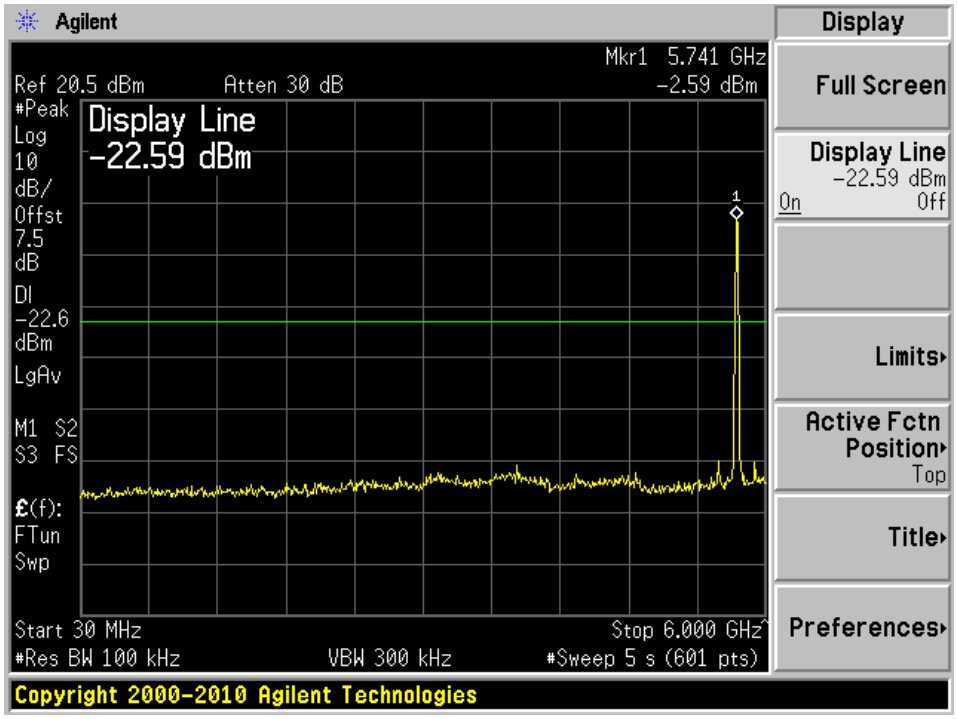


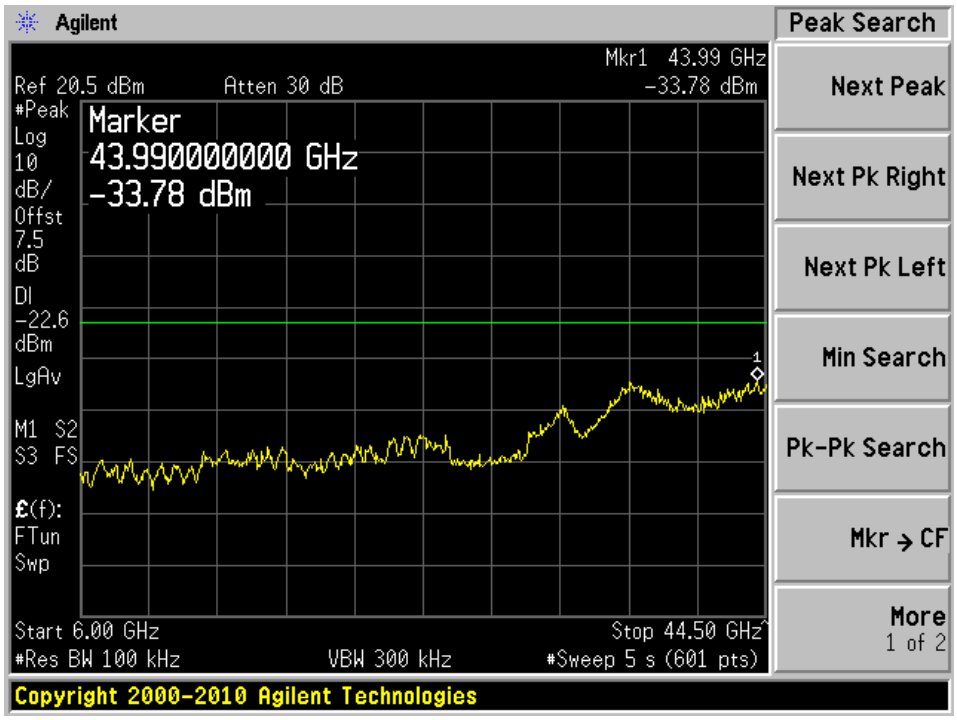


Main Antenna

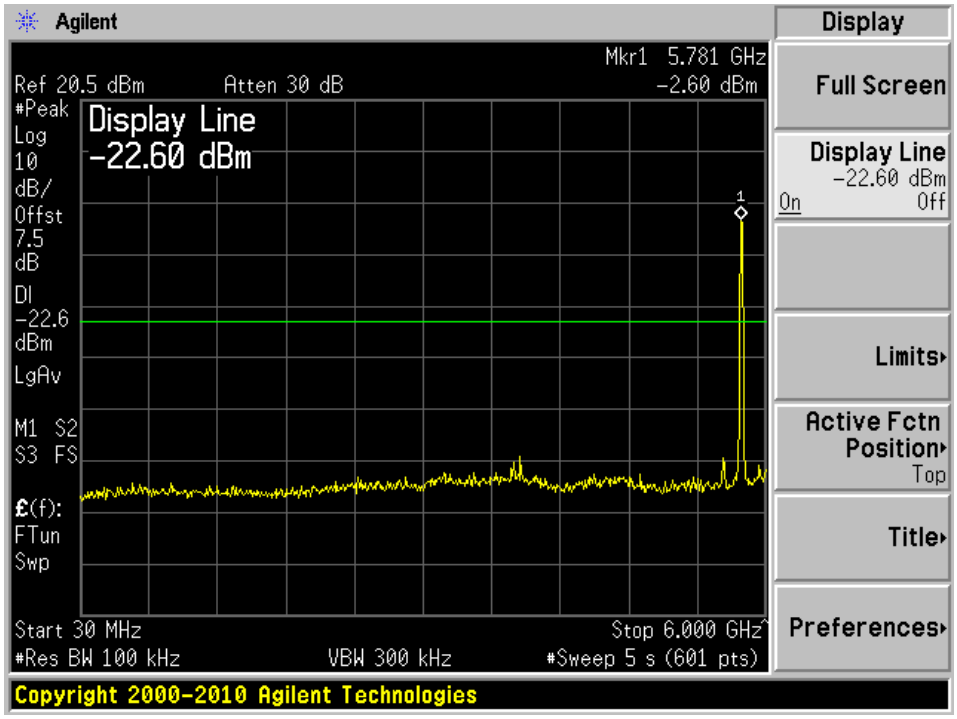
5.8 GHz: 802.11a

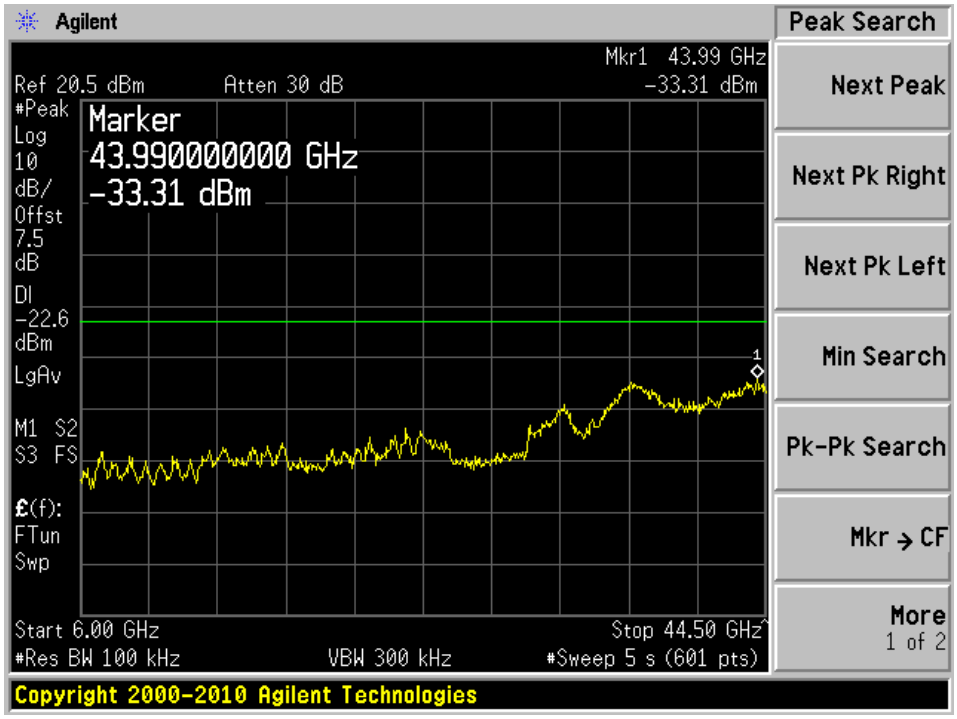
Low Channel 5745 MHz



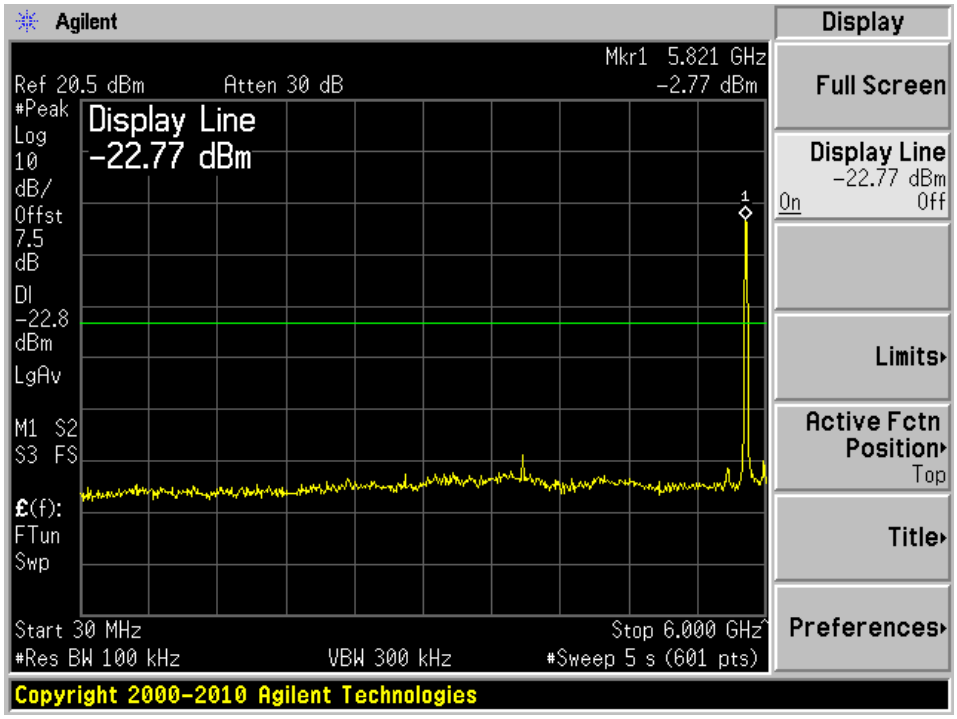


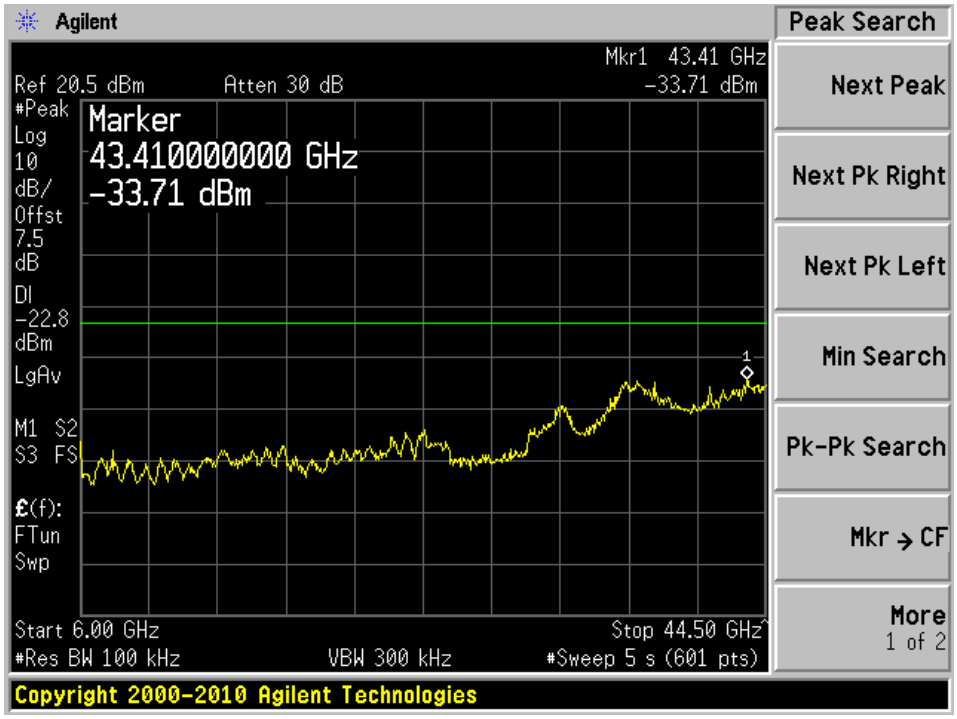
Middle Channel 5785 MHz





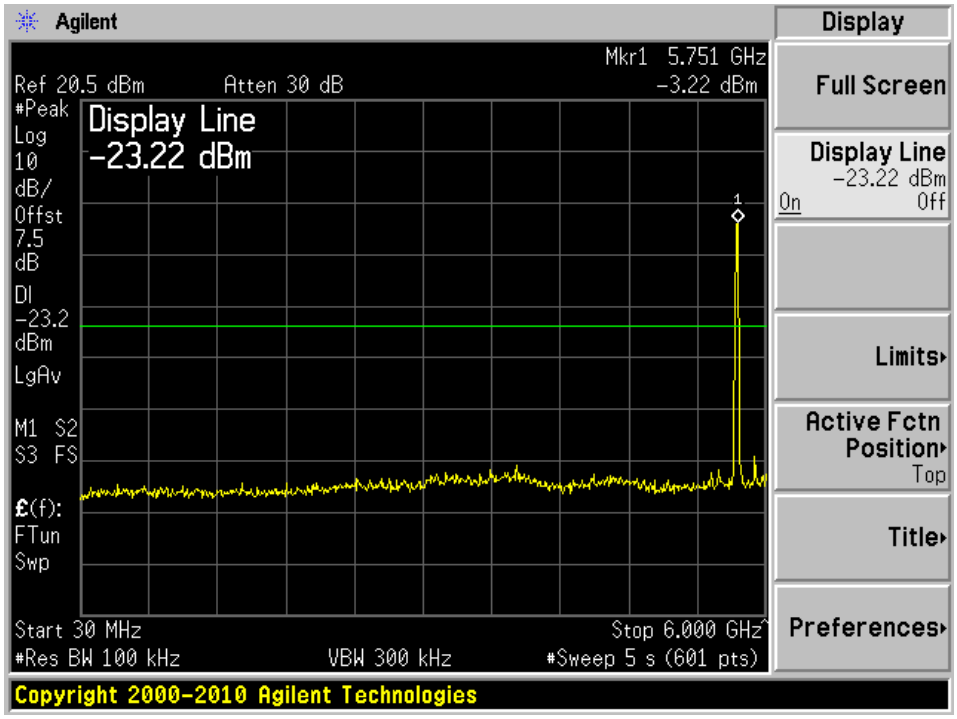
High Channel 5825 MHz

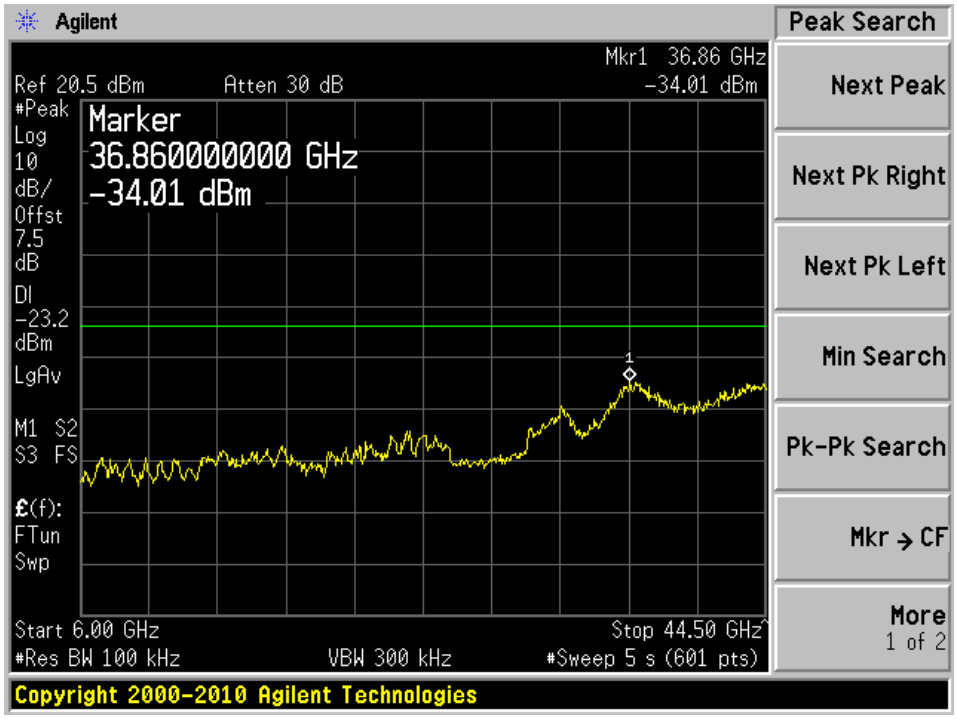




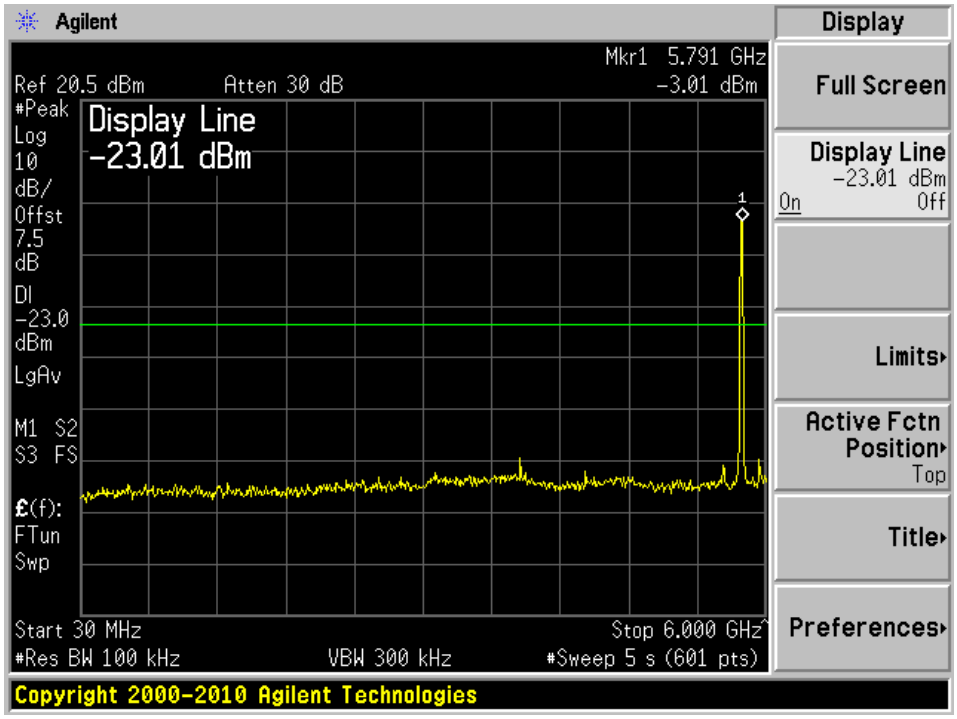
5.8 GHz: 802.11n

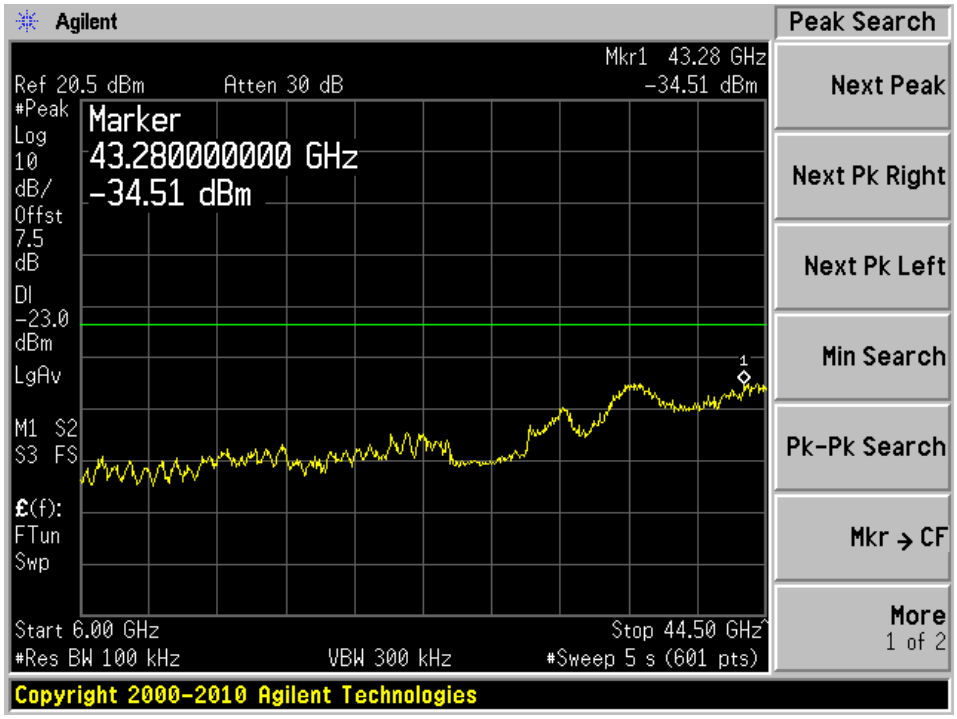
Low Channel 5745 MHz



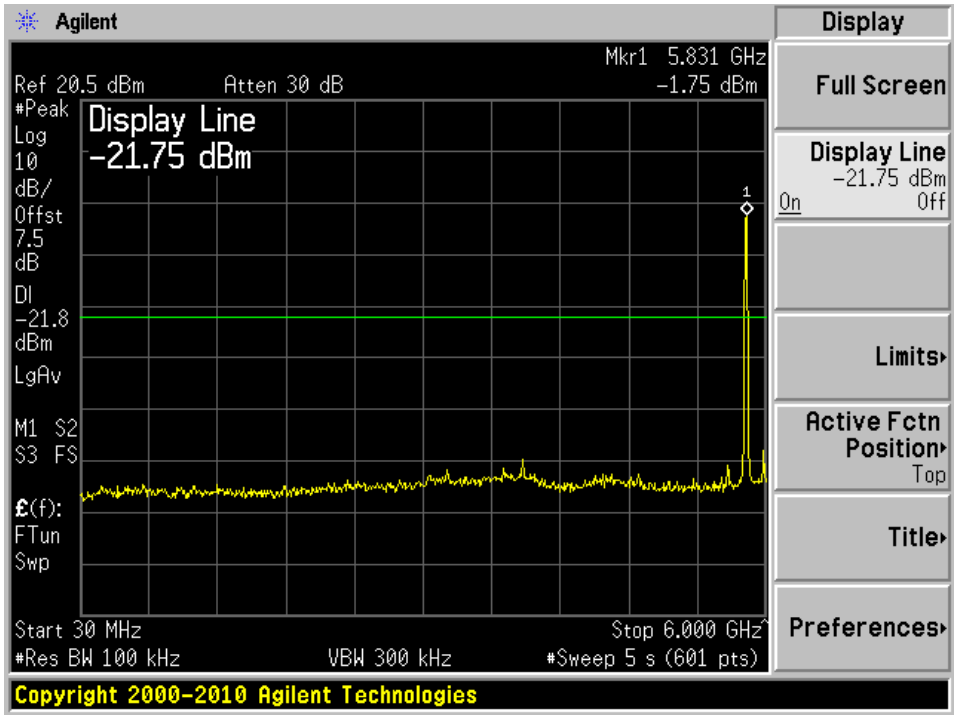


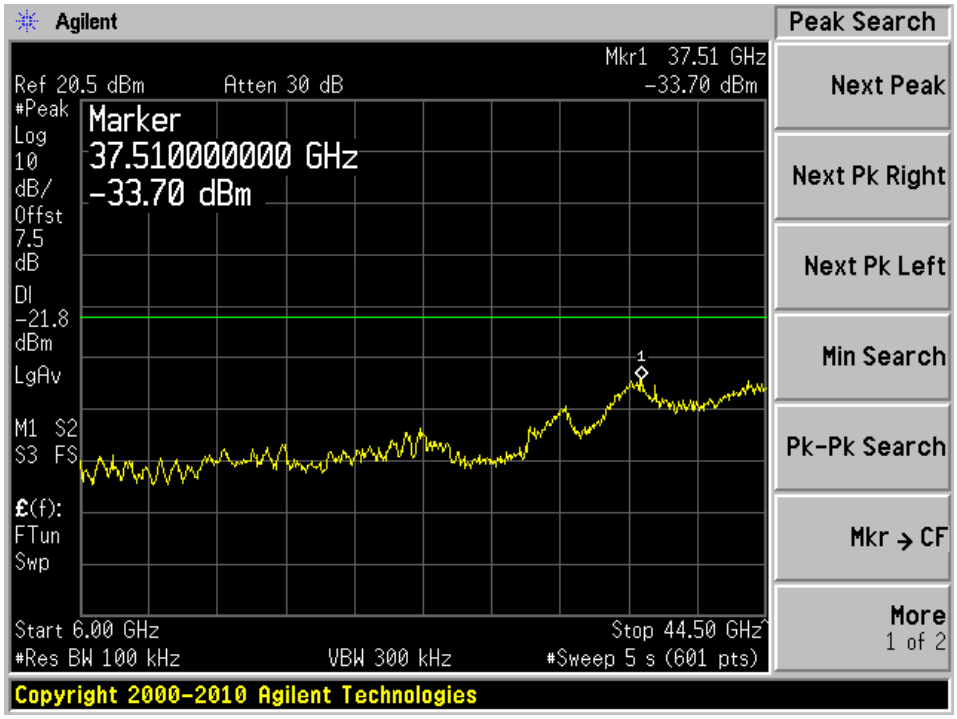
Middle Channel 5785 MHz





High Channel 5825 MHz

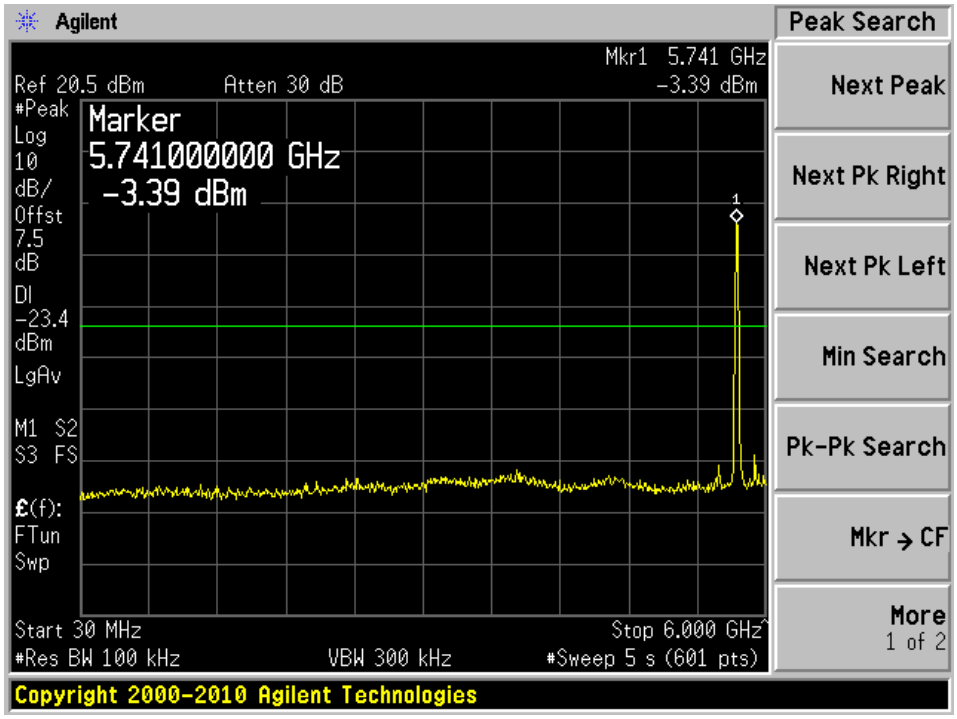


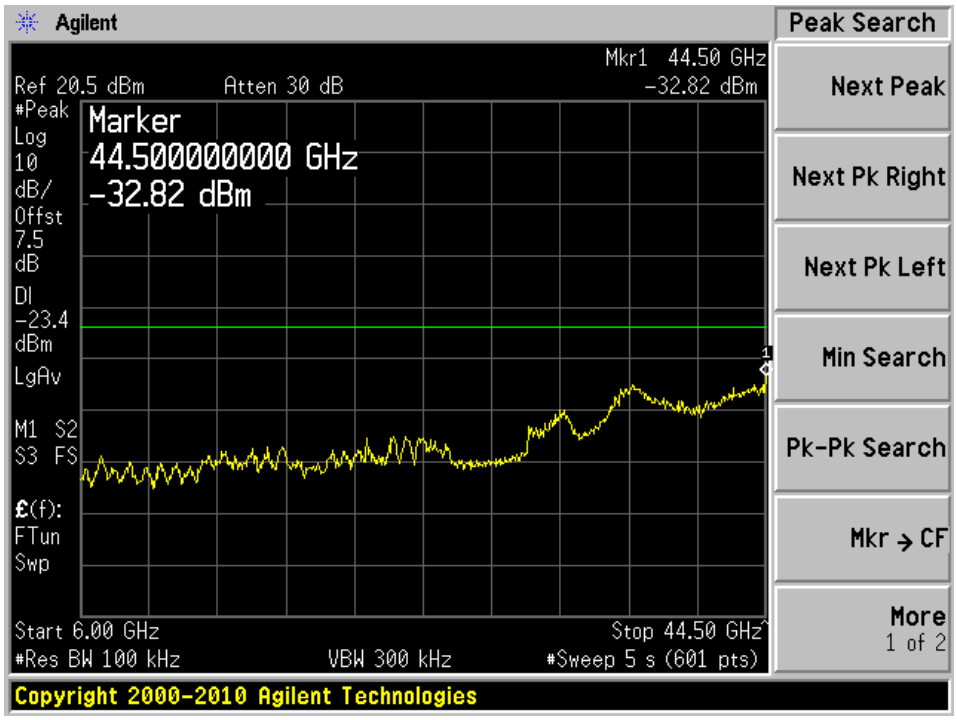


Aux Antenna

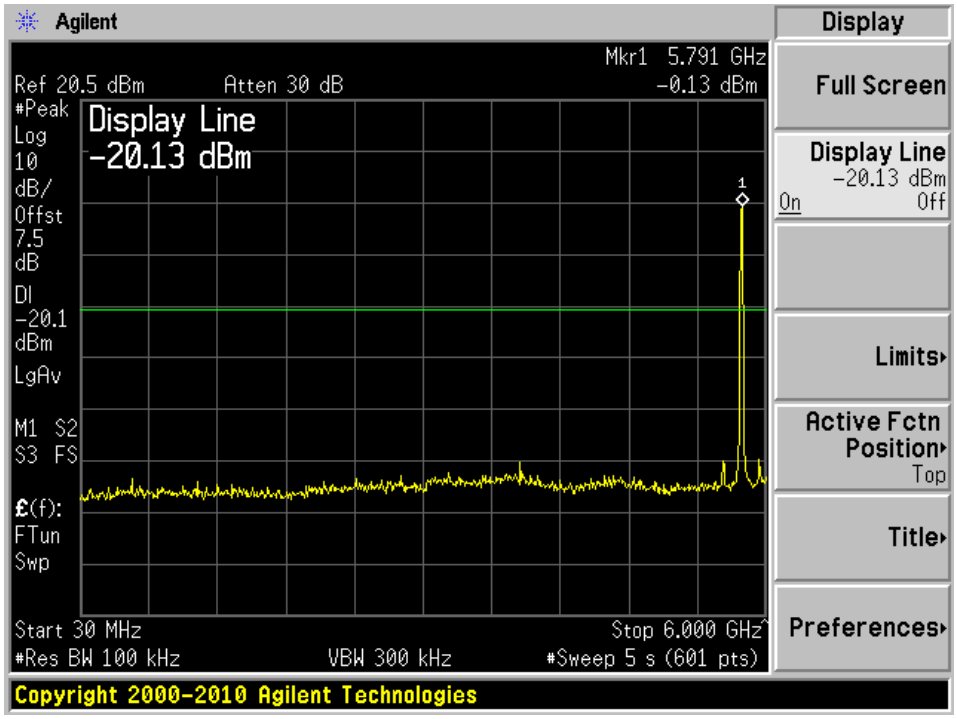
5.8GHz: 802.11a

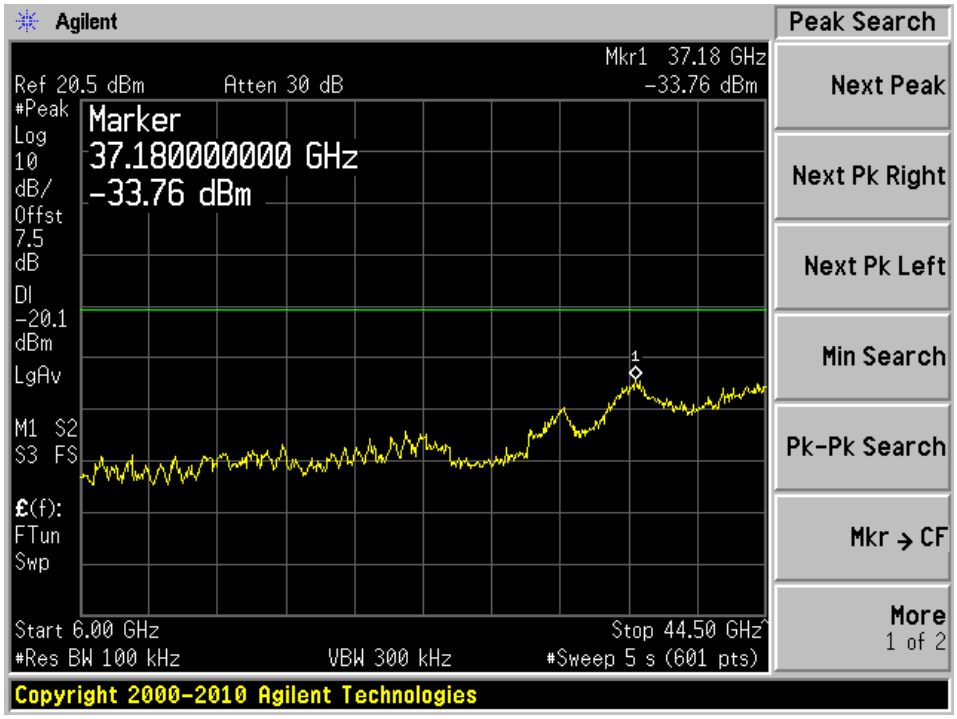
Low Channel 5745 MHz



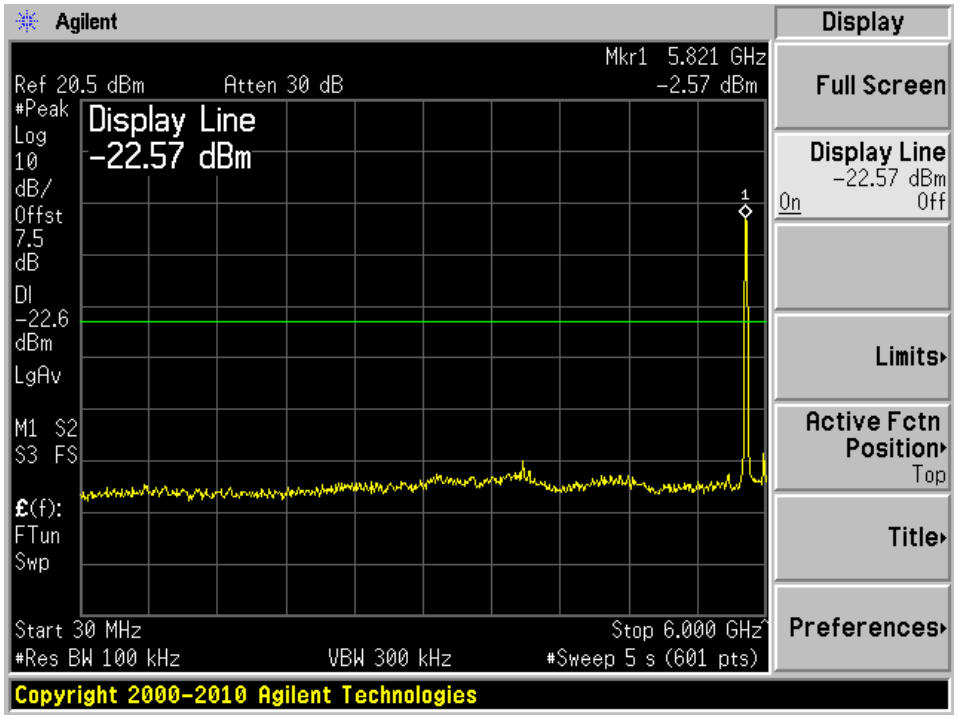


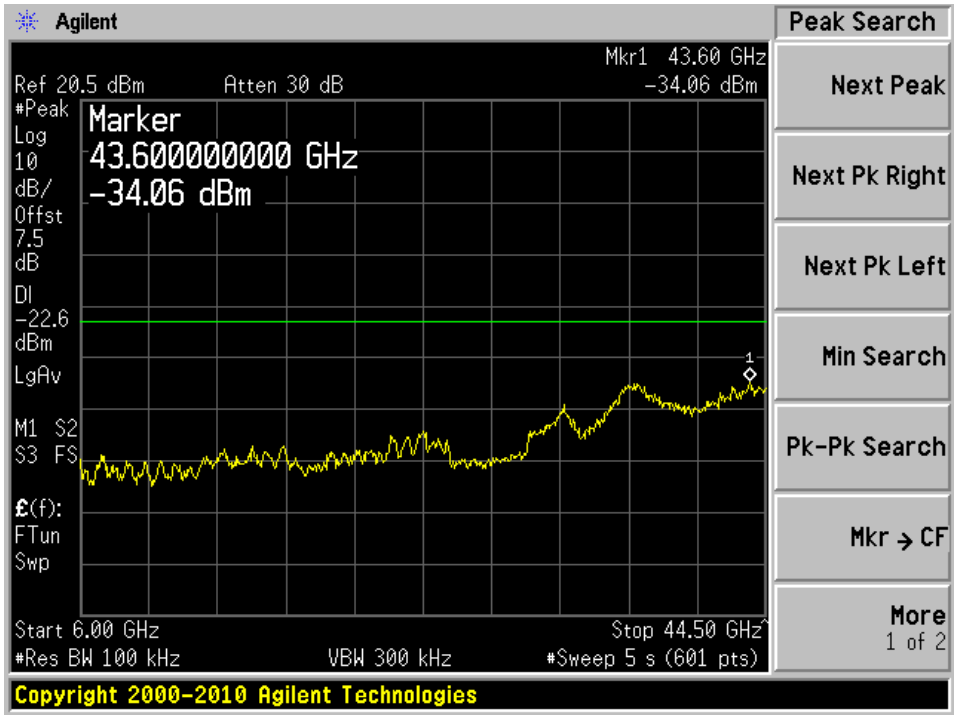
Middle Channel 5785 MHz





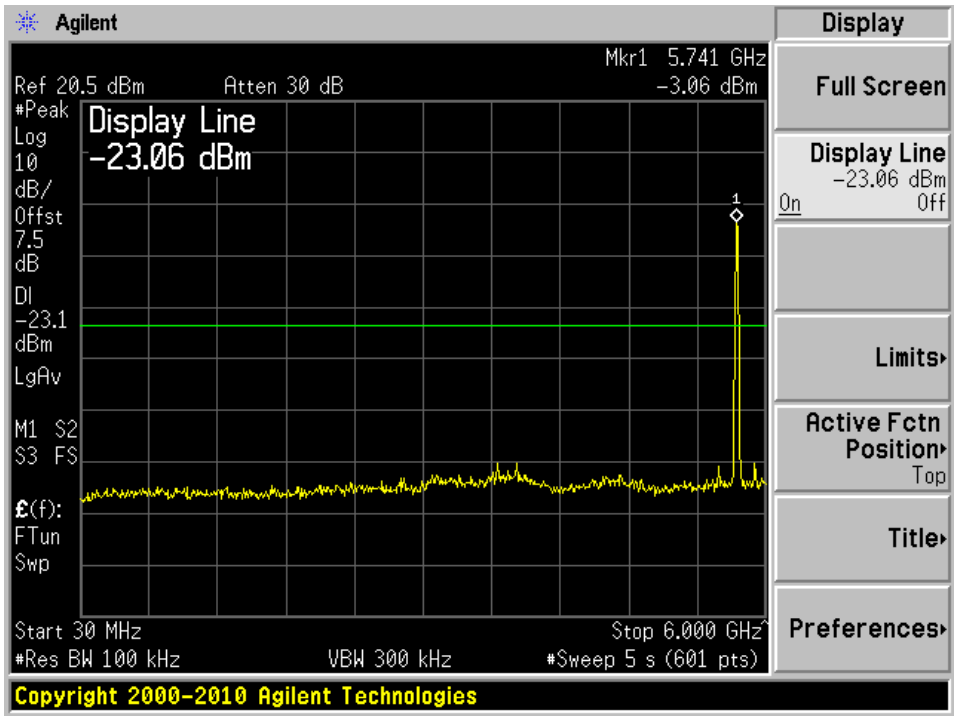
High Channel 5825 MHz

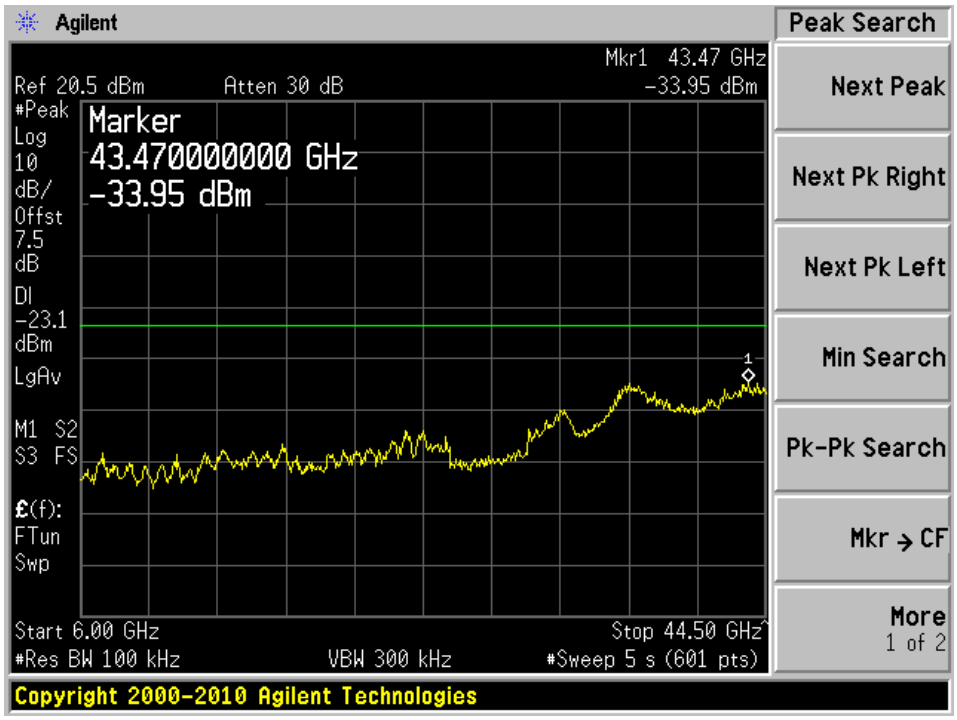




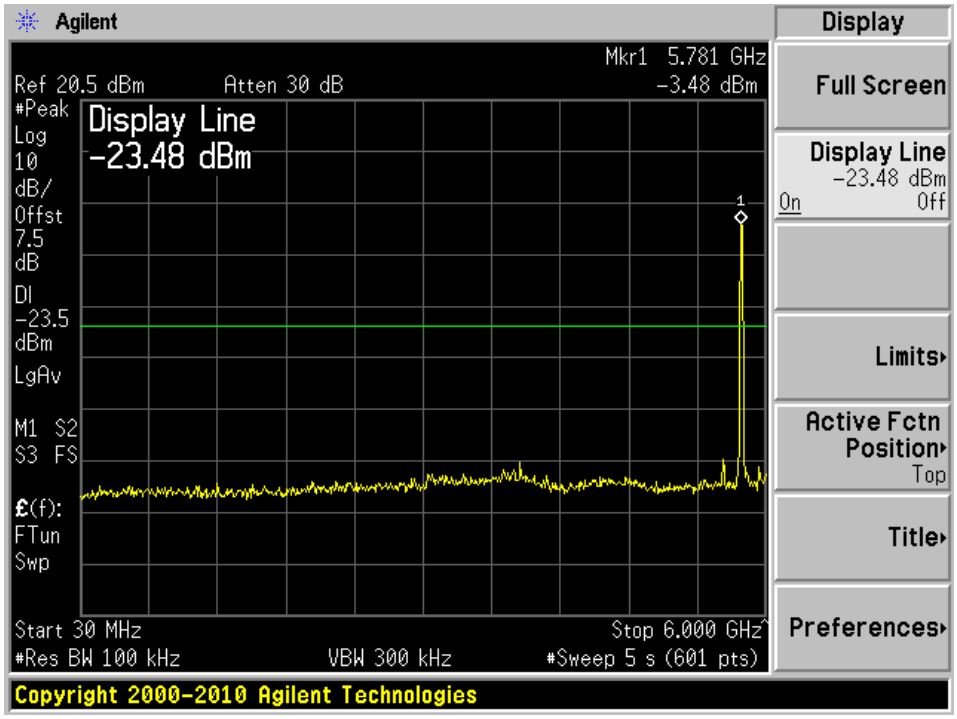
5.8 GHz: 802.11n

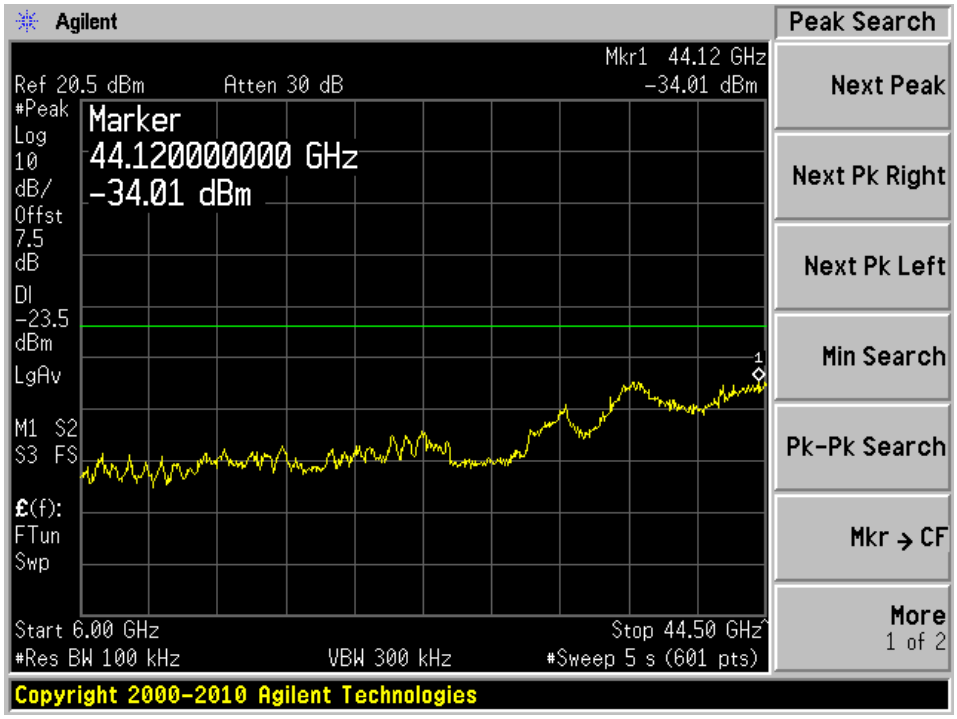
Low Channel 5745 MHz



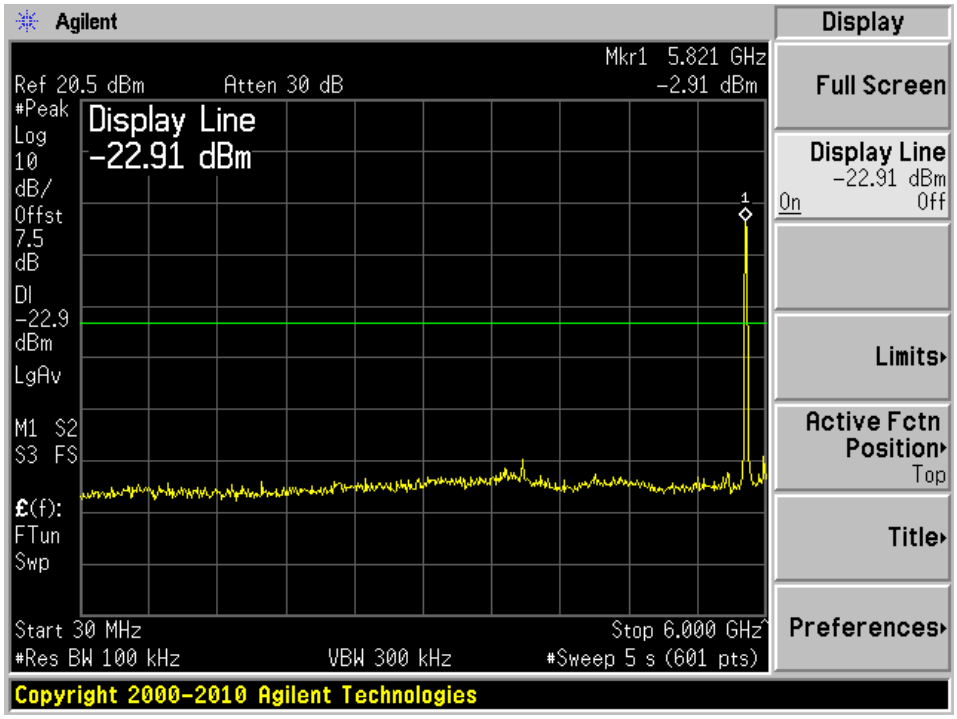


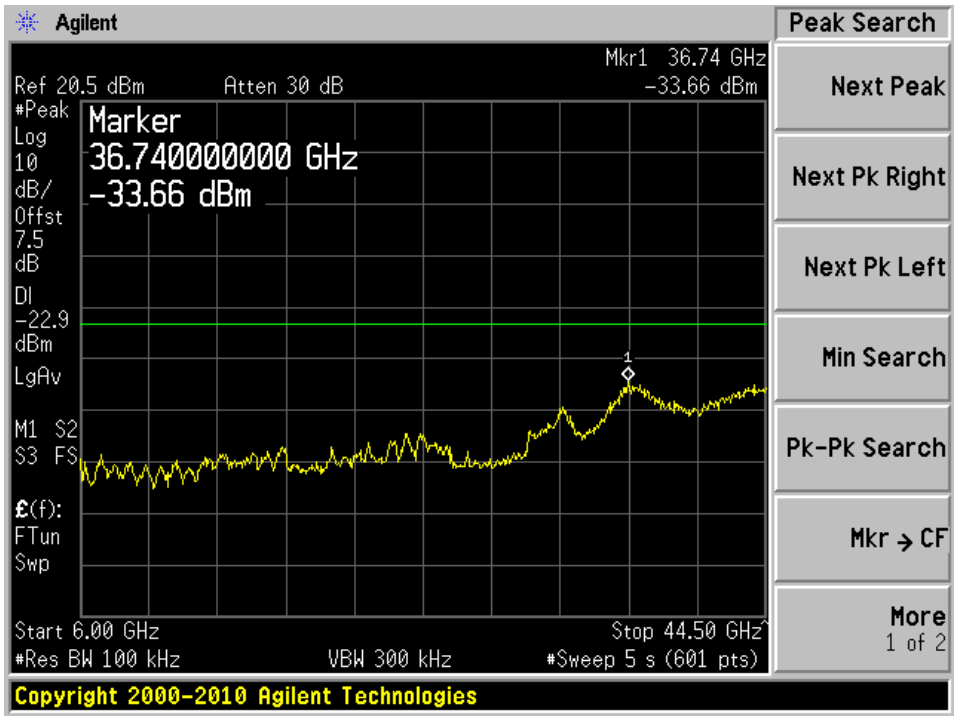
Middle Channel 5785 MHz





High Channel 5825 MHz





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

8.1 Applicable Standard

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

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

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

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

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

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

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

8.2 Test Setup

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

8.3 EUT Setup

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

The spacing between the peripherals was 3 centimeters.

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

8.4 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2011-09-14
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2011-08-10
EMCO	Horn antenna	3115	9511-4627	2011-10-03
Hewlett Packard	Pre amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre Amplifier	ZVA-183-S	667400960	2011-05-08

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

8.5 Test Procedure

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

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT 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 (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

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

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

Margin = Corrected Amplitude - Limit

8.7 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Jerry Huang from 2011-12-18 to 2011-12-20 at 5 meter chamber 3.

8.8 Summary of Test Results

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

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-3.34	249.955	Vertical	802.11n Worst, 30-1000 MHz

Above 1 GHz:

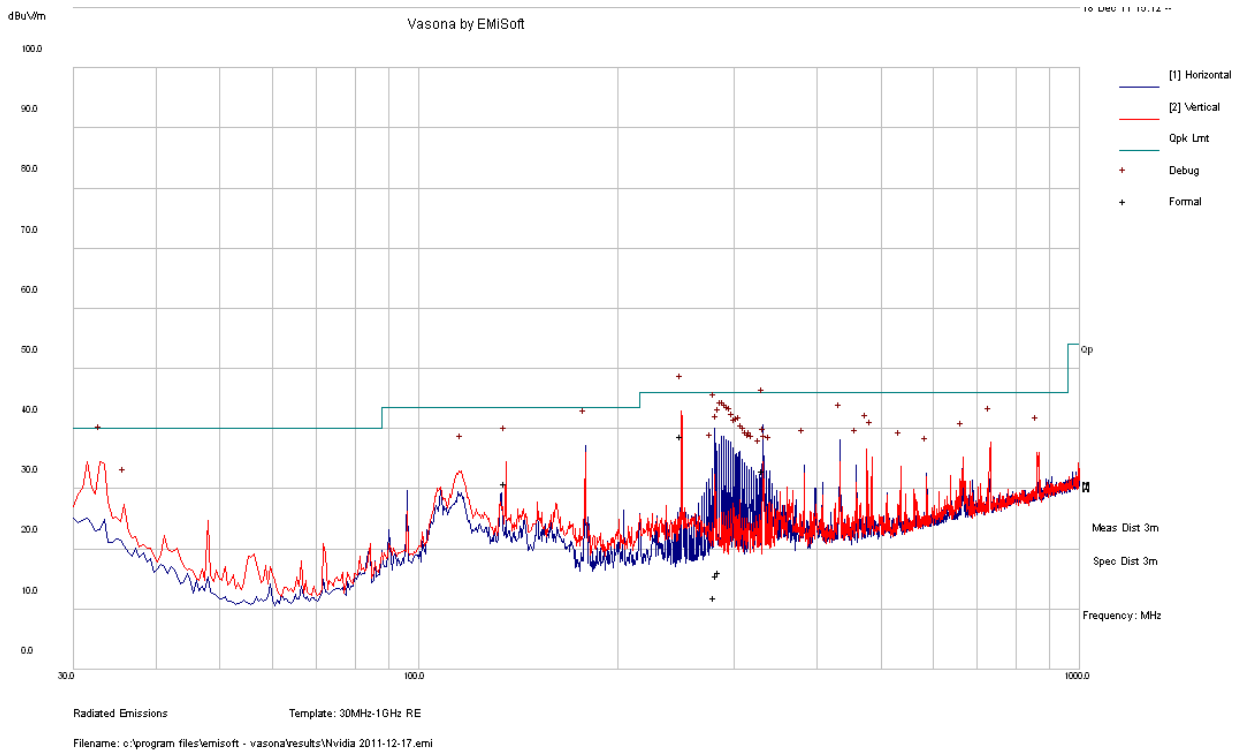
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-9.841	7760	Horizontal	802.11a High, 1GHz – 25GHz

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

8.9 Radiated Emissions Test Data and Plots

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

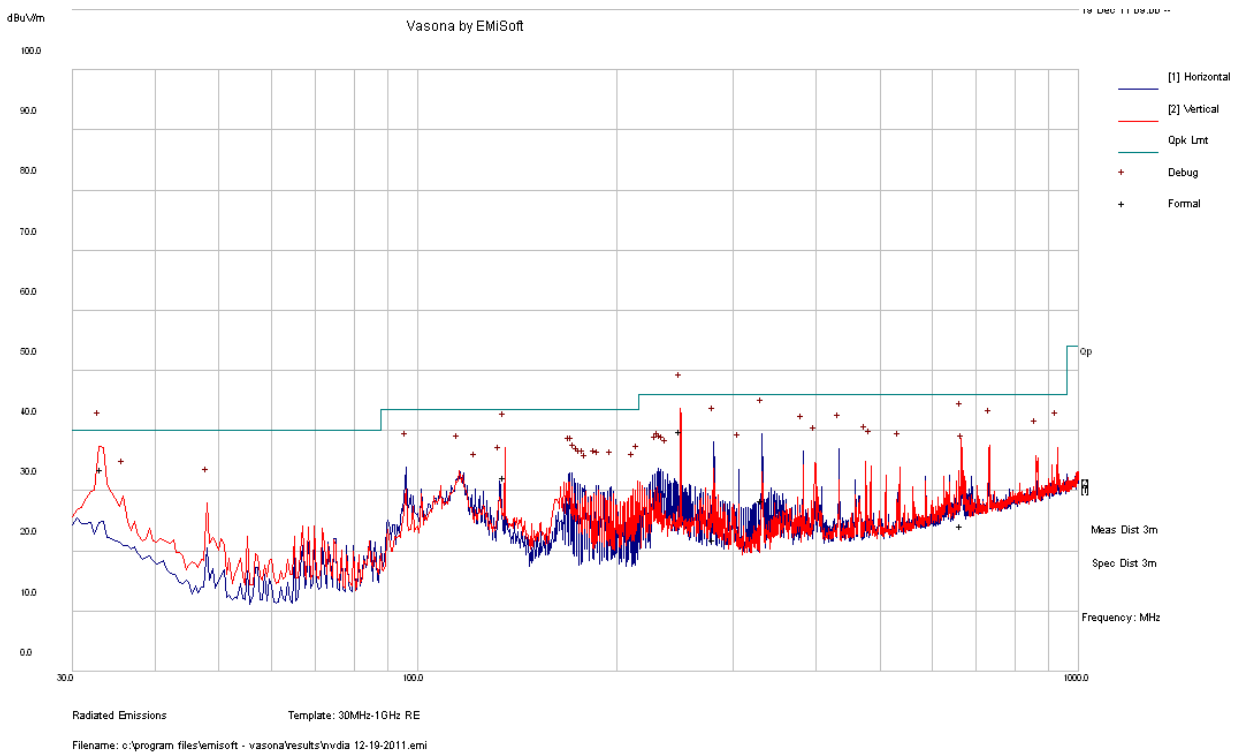
2.4 GHz, 802.11b Mode, Worst channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
249.9508	38.8	100	V	169	46	-7.2
135.3283	30.88	99	V	249	43.5	-12.62
331.4883	33.08	107	H	0	46	-12.92
284.7838	16.24	135	H	120	46	-29.76
282.2455	15.65	105	H	119	46	-30.35
280.5083	11.94	175	H	135	46	-34.06

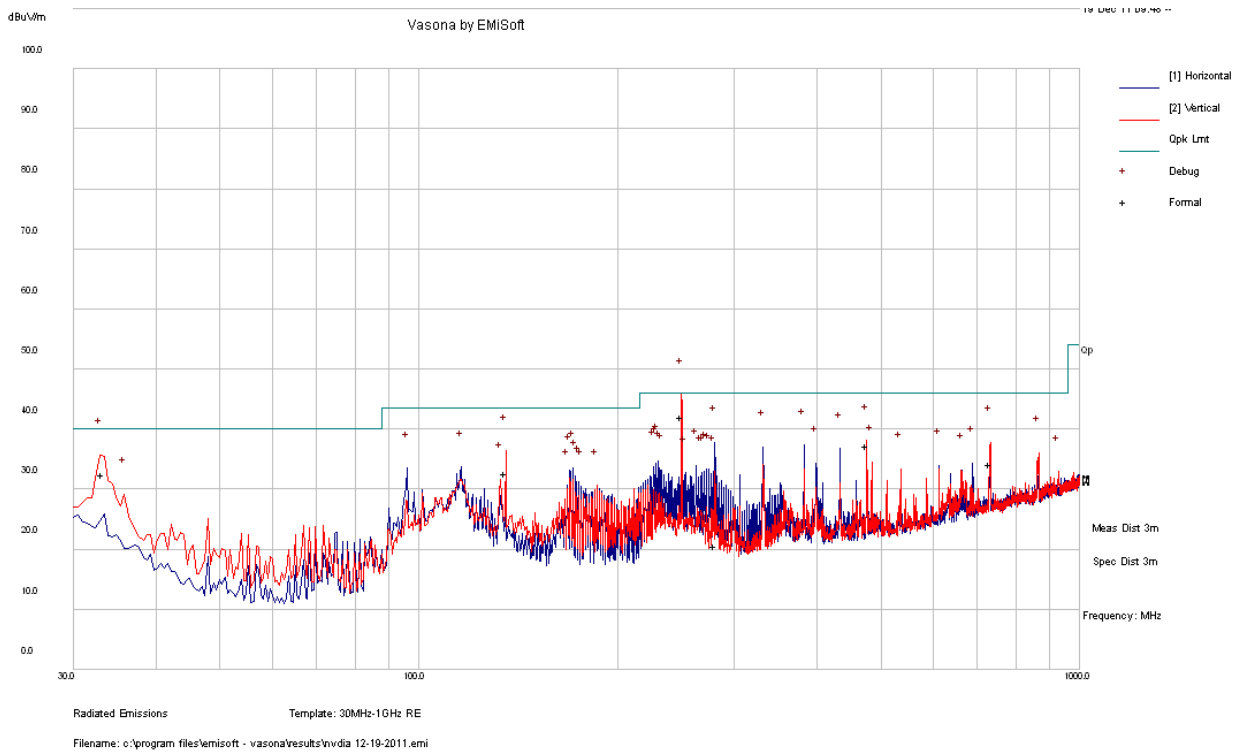
2.4 GHz, 802.11g Mode, Worst channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
249.955	39.97	99	V	180	46	-6.03
33.14425	33.56	102	V	124	40	-6.44
135.3433	32.2	107	V	288	43.5	-11.3
331.4495	28.46	102	H	168	46	-17.54
664.5158	24.21	116	V	132	46	-21.79
280.0698	21.88	114	H	104	46	-24.12

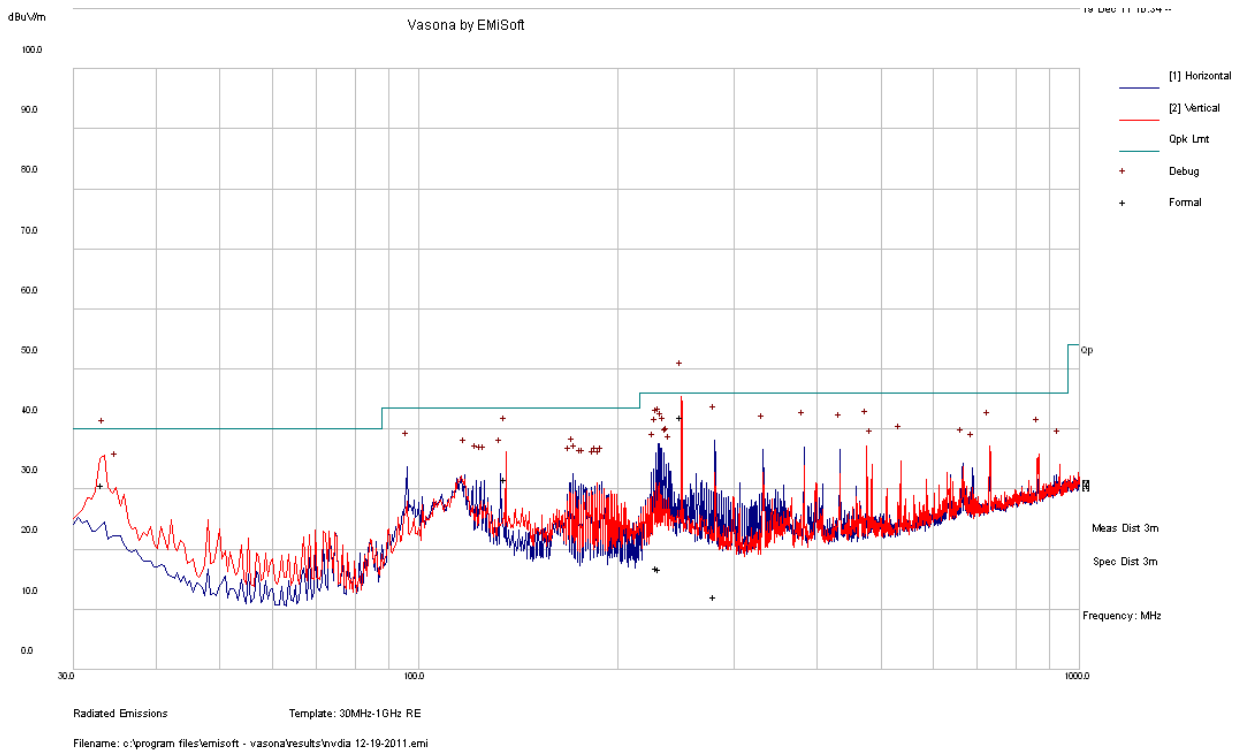
2.4 GHz, 802.11n Mode, Worst channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
249.9545	41.99	99	V	175	46	-4.01
33.157	32.56	111	V	212	40	-7.44
475.9595	37.29	118	V	200	46	-8.71
135.3418	32.72	101	V	282	43.5	-10.78
732.651	34.17	100	V	149	46	-11.83
280.0248	20.6	99	H	260	46	-25.4

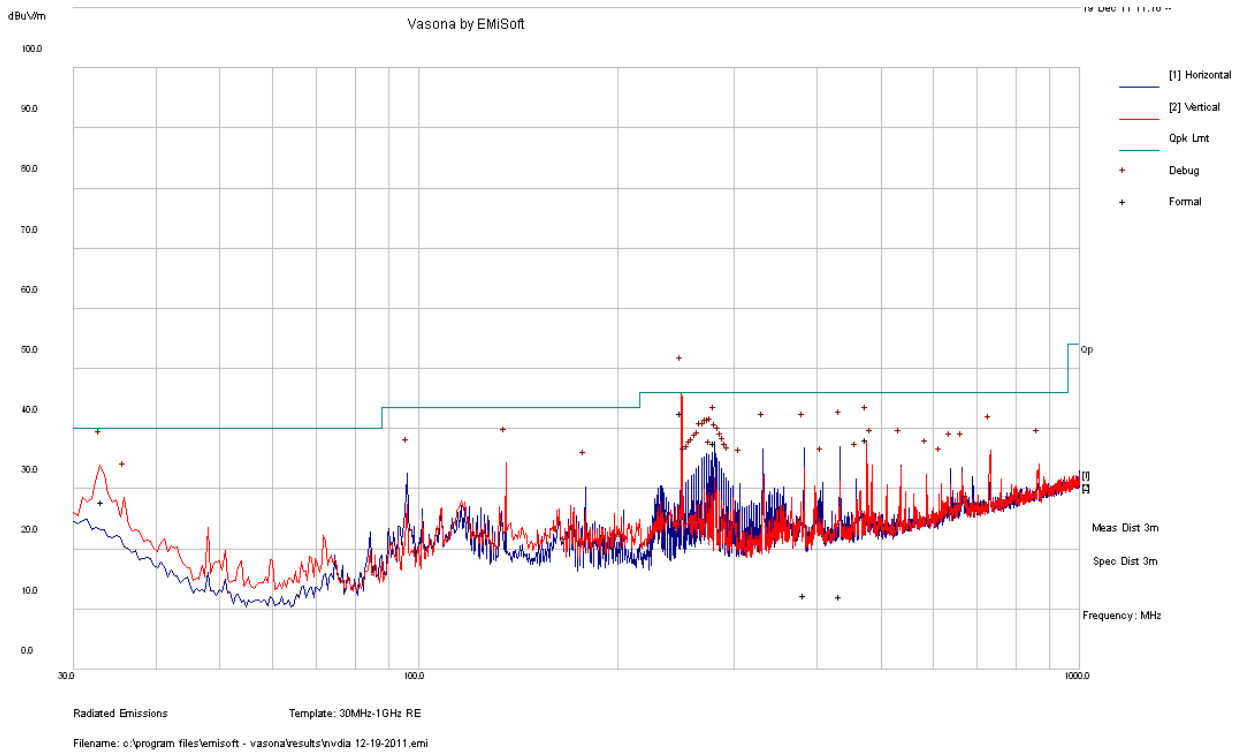
5.8 GHz 802.11a Mode, Worst channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
249.955	42.1	99	V	173	46	-3.9
33.24225	30.76	124	V	14	40	-9.24
135.343	31.75	113	V	283	43.5	-11.75
229.908	17.04	149	H	141	46	-28.96
231.4315	16.79	165	H	173	46	-29.21
280.4948	12.21	181	H	0	46	-33.79

5.8 GHz, 802.11n Mode, Worst channel



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
249.955	42.66	100	V	179	46	-3.34
476.0133	38.21	103	V	191	46	-7.79
280.4928	37.72	101	H	340	46	-8.28
33.155	27.94	99	V	172	40	-12.06
382.675	12.44	240	H	329	46	-33.56
433.6813	12.23	288	H	160	46	-33.77

2) 1–25 GHz, Measured at 3 meters

2.4 GHz 802.11b mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	64.91	273	120	V	28.159	3.12	0	96.189	Fund	-	peak
2412	70.36	208	130	H	28.159	3.12	0	101.639	Fund	-	peak
2412	62.26	273	120	V	28.159	3.12	0	93.539	Fund	-	Ave
2412	67.55	208	130	H	28.159	3.12	0	98.829	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	67.92	269	120	V	28.2	3.18	0	99.3	Fund	-	peak
2437	73.94	196	129	H	28.2	3.18	0	105.32	Fund	-	peak
2437	64.45	269	120	V	28.2	3.18	0	95.83	Fund	-	Ave
2437	71.19	196	129	H	28.2	3.18	0	102.57	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	68.37	227	118	V	28.3	3.25	0	99.92	Fund	-	peak
2462	76.87	196	127	H	28.3	3.25	0	108.42	Fund	-	peak
2462	65.66	227	118	V	28.3	3.25	0	97.21	Fund	-	Ave
2462	74.39	196	127	H	28.3	3.25	0	105.94	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

- **Note:** [1]*All spurious emissions are 20 dB below the limit or are on the noise floor level*

2.4 GHz 802.11g mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	68.81	270	120	V	28.159	3.12	0	100.089	Fund	-	peak
2412	73.33	202	133	H	28.159	3.12	0	104.609	Fund	-	peak
2412	56.54	270	120	V	28.159	3.12	0	87.819	Fund	-	Ave
2412	62.72	202	133	H	28.159	3.12	0	93.999	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	71.09	269	118	V	28.2	3.18	0	102.47	Fund	-	peak
2437	77.23	196	129	H	28.2	3.18	0	108.61	Fund	-	peak
2437	59.28	269	118	V	28.2	3.18	0	90.66	Fund	-	Ave
2437	65.47	196	129	H	28.2	3.18	0	96.85	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	71.67	227	118	V	28.3	3.25	0	103.22	Fund	-	peak
2462	80.1	181	129	H	28.3	3.25	0	111.65	Fund	-	peak
2462	60.03	227	118	V	28.3	3.25	0	91.58	Fund	-	Ave
2462	68.14	181	129	H	28.3	3.25	0	99.69	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

- **Note:** [1]*All spurious emissions are 20 dB below the limit or are on the noise floor level*

2.4 GHz 802.11n mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	65.45	170	120	V	28.159	3.12	0	96.729	Fund	-	peak
2412	71.88	202	133	H	28.159	3.12	0	103.159	Fund	-	peak
2412	54.25	270	120	V	28.159	3.12	0	85.529	Fund	-	Ave
2412	60.29	202	133	H	28.159	3.12	0	91.569	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	67.84	272	120	V	28.2	3.18	0	99.22	Fund	-	peak
2437	72.85	196	129	H	28.2	3.18	0	104.23	Fund	-	peak
2437	56.85	272	120	V	28.2	3.18	0	88.23	Fund	-	Ave
2437	62.4	196	129	H	28.2	3.18	0	93.78	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	70.07	270	116	V	28.3	3.25	0	101.62	Fund	-	peak
2462	77.19	181	130	H	28.3	3.25	0	108.74	Fund	-	peak
2462	58.78	270	116	V	28.3	3.25	0	90.33	Fund	-	Ave
2462	65.53	181	130	H	28.3	3.25	0	97.08	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

- **Note:** [1]*All spurious emissions are 20 dB below the limit or are on the noise floor level*

5.8 GHz 802.11a mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
5745	54.11	269	181	V	33.699	4.85	0	92.659	Fund	-	peak
5745	65.63	0	182	H	33.699	4.85	0	104.179	Fund	-	peak
5745	42.49	269	181	V	33.699	4.85	0	81.039	Fund	-	Ave
5745	53.89	0	182	H	33.699	4.85	0	92.439	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 5785 MHz, measured at 3 meters											
5785	62.63	295	186	V	33.525	4.82	0	100.975	Fund	-	peak
5785	60.79	0	182	H	33.525	4.82	0	99.135	Fund	-	peak
5785	50.63	295	186	V	33.525	4.82	0	88.975	Fund	-	Ave
5785	48.94	0	182	H	33.525	4.82	0	87.285	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 5825 MHz, measured at 3 meters											
5845	63.52	300	198	V	33.6	4.87	0	101.99	Fund	-	peak
5845	61.99	0	184	H	33.6	4.87	0	100.46	Fund	-	peak
5845	51.3	300	198	V	33.6	4.87	0	89.77	Fund	-	Ave
5845	50.07	0	184	H	33.6	4.87	0	88.54	Fund	-	Ave
7760	35.77	46	144	V	35.919	4.87	27.6	48.959	74	-25.041	peak
7760	37.85	321	100	H	35.919	4.87	27.6	51.039	74	-22.961	peak
7760	27.81	46	144	V	35.919	4.87	27.6	40.999	54	-13.001	Ave
7760	30.97	321	100	H	35.919	4.87	27.6	44.159	54	-9.841	Ave

- **Note:** [1]*All spurious emissions are 20 dB below the limit or are on the noise floor level*

5.8 GHz 802.11n mode:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 5745 MHz, measured at 3 meters											
5745	58.99	295	207	V	33.699	4.85	0	97.539	Fund	-	peak
5745	57.03	0	182	H	33.699	4.85	0	95.579	Fund	-	peak
5745	48.34	295	207	V	33.699	4.85	0	86.889	Fund	-	Ave
5745	46.45	0	182	H	33.699	4.85	0	84.999	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 5785 MHz, measured at 3 meters											
5785	60.57	295	190	V	33.525	4.82	0	98.915	Fund	-	peak
5785	59.28	0	188	H	33.525	4.82	0	97.625	Fund	-	peak
5785	49.56	295	190	V	33.525	4.82	0	87.905	Fund	-	Ave
5785	48.05	0	188	H	33.525	4.82	0	86.395	Fund	-	Ave
-	-	-	-	-	-	-	-	-	-	-	-[1]

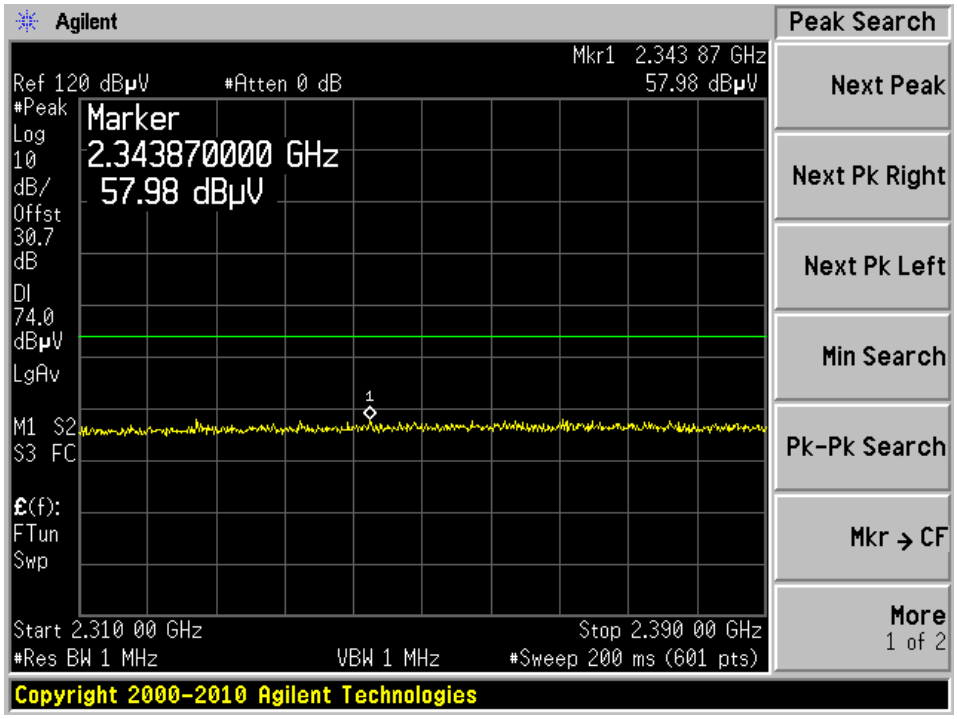
Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 5825 MHz, measured at 3 meters											
5845	60.87	294	187	V	33.6	4.87	0	99.34	Fund	-	peak
5845	59	0	180	H	33.6	4.87	0	97.47	Fund	-	peak
5845	49.71	294	187	V	33.6	4.87	0	88.18	Fund	-	Ave
5845	48.51	0	180	H	33.6	4.87	0	86.98	Fund	-	Ave
7760	34.58	50	140	V	35.919	4.87	27.6	47.769	74	-26.231	peak
7760	36.87	342	100	H	35.919	4.87	27.6	50.059	74	-23.941	peak
7760	26.98	50	140	V	35.919	4.87	27.6	40.169	54	-13.831	Ave
7760	30.03	342	100	H	35.919	4.87	27.6	43.219	54	-10.781	Ave

- **Note:** [1]*All spurious emissions are 20 dB below the limit or are on the noise floor level*

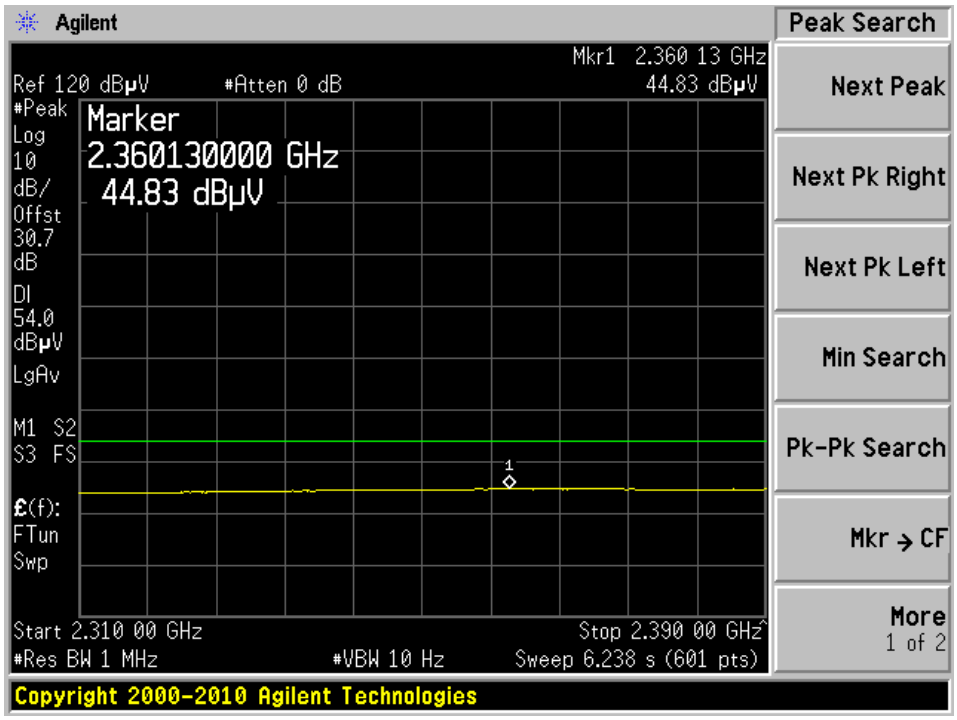
3) Restricted Band Emissions

2.4 GHz 802.11b mode:

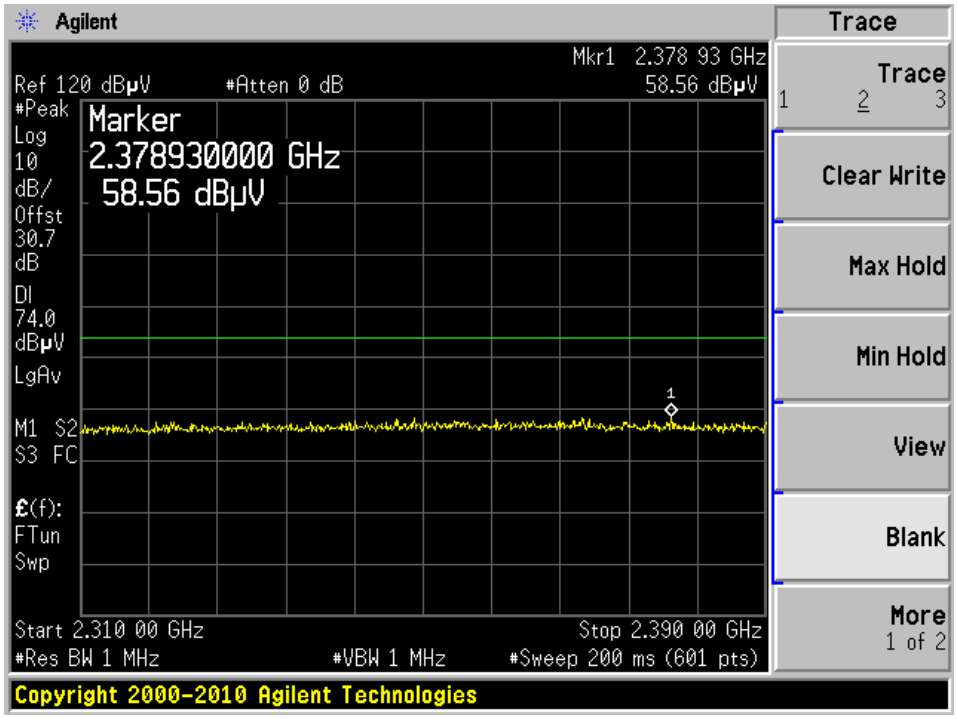
Low Channel-Peak (Horizontal)



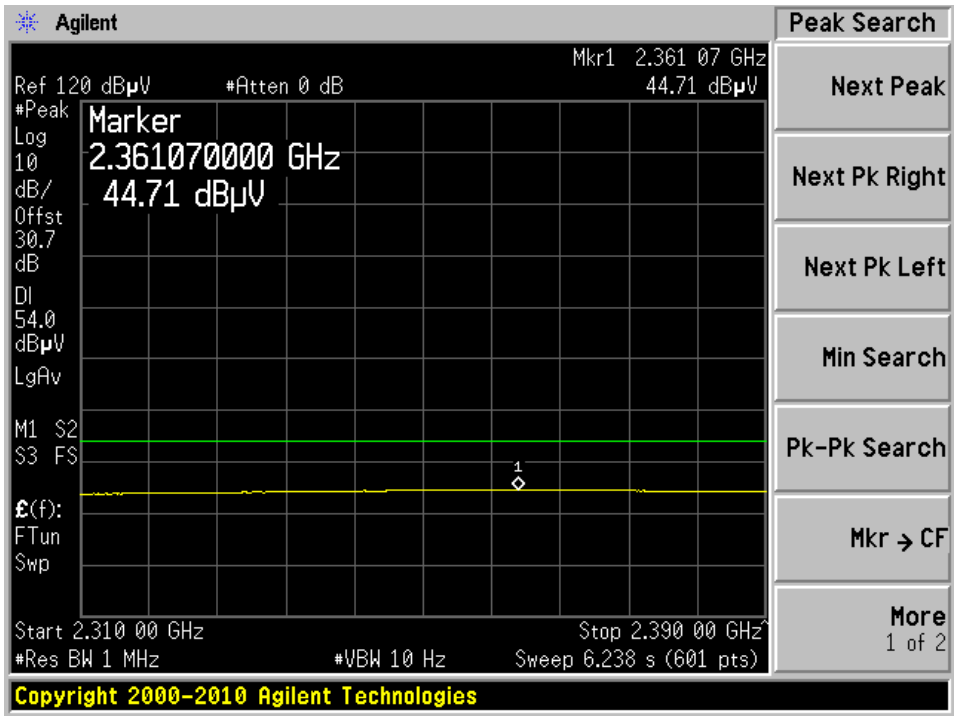
Low Channel-Average (Horizontal)



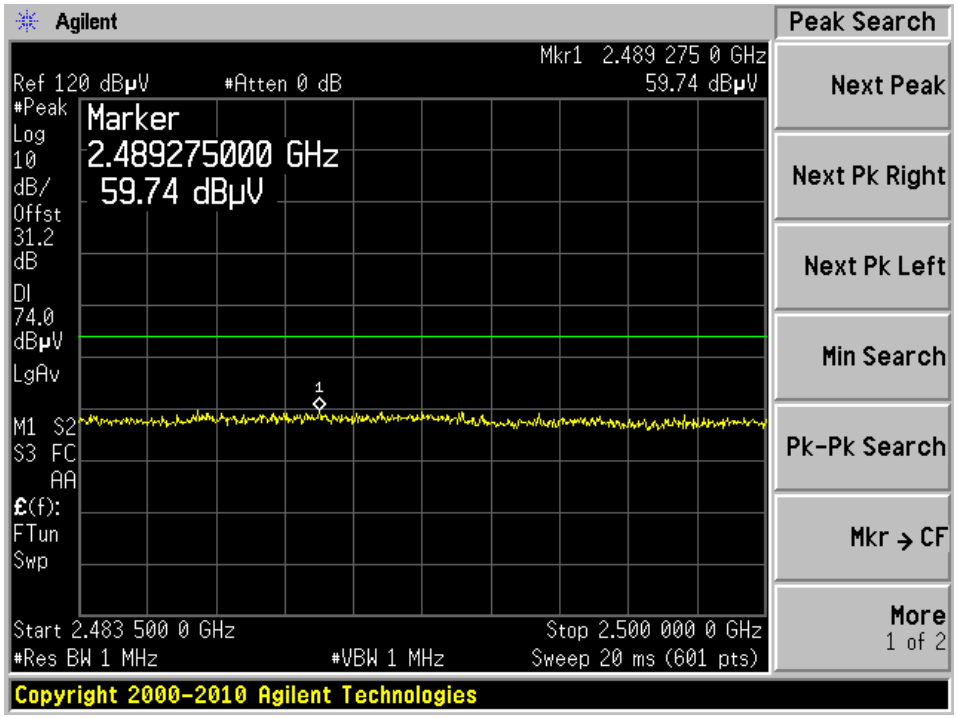
Low Channel-Peak (Vertical)



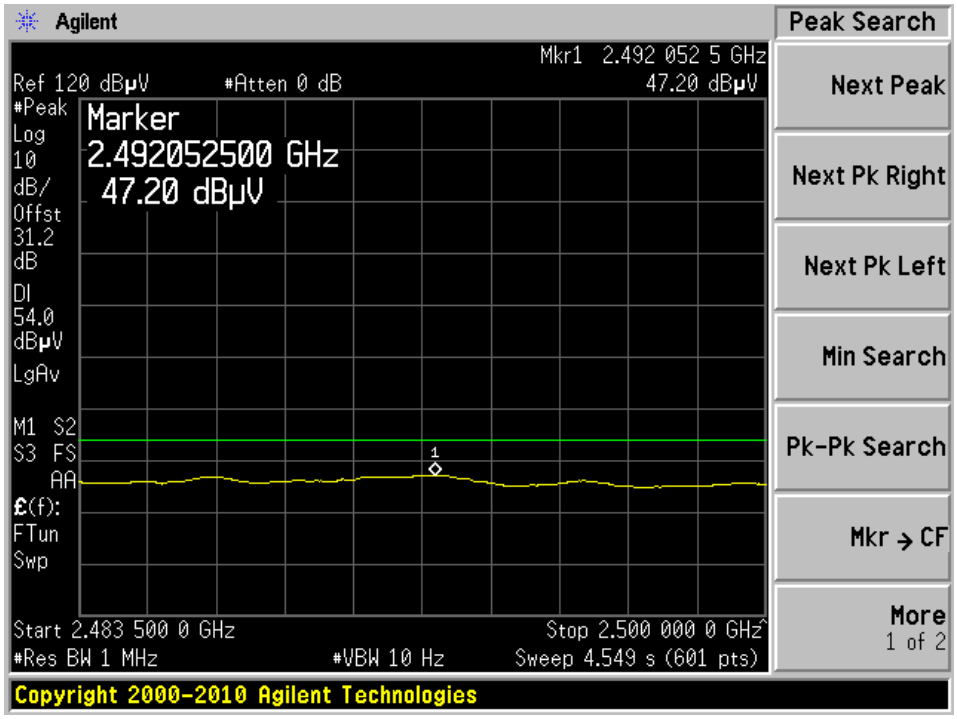
Low Channel-Average (Vertical)



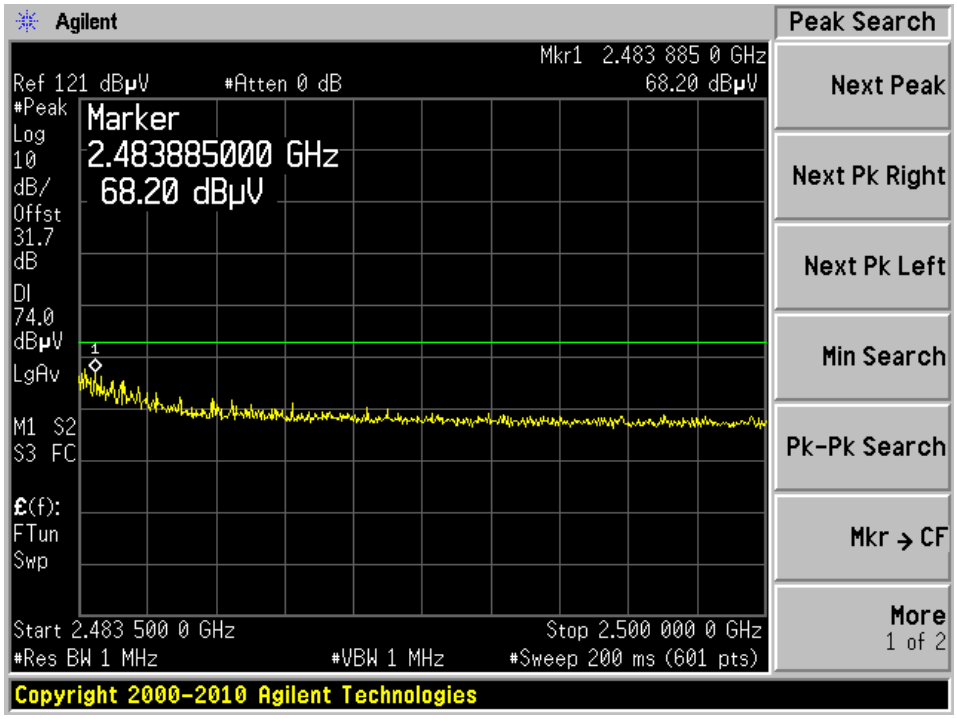
High Channel-Peak (Horizontal)



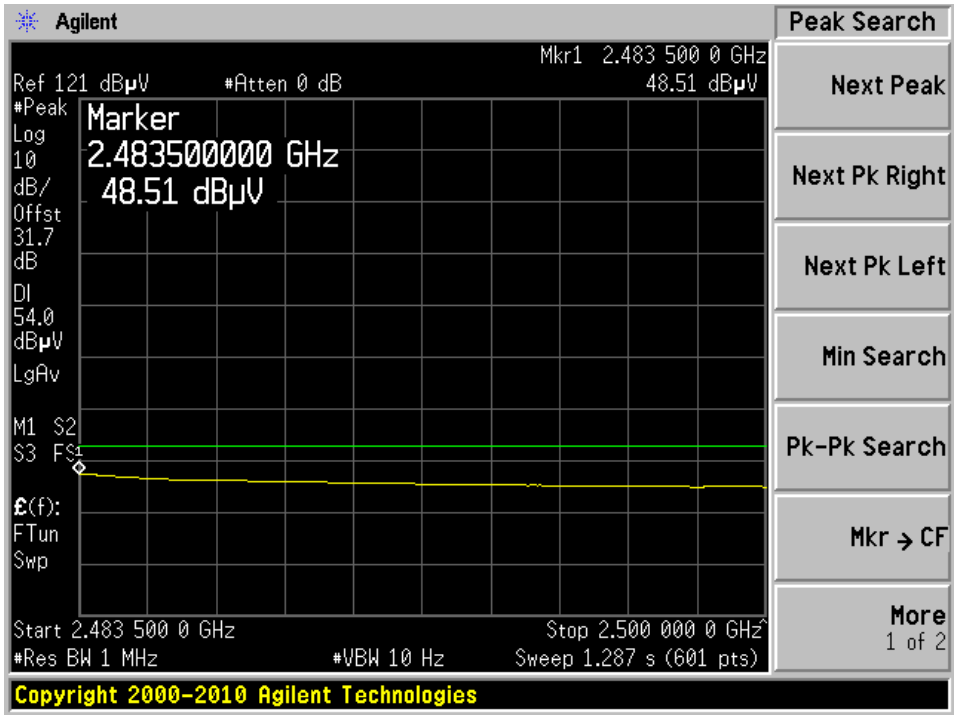
High Channel-Average (Horizontal)



High Channel-Peak (Vertical)

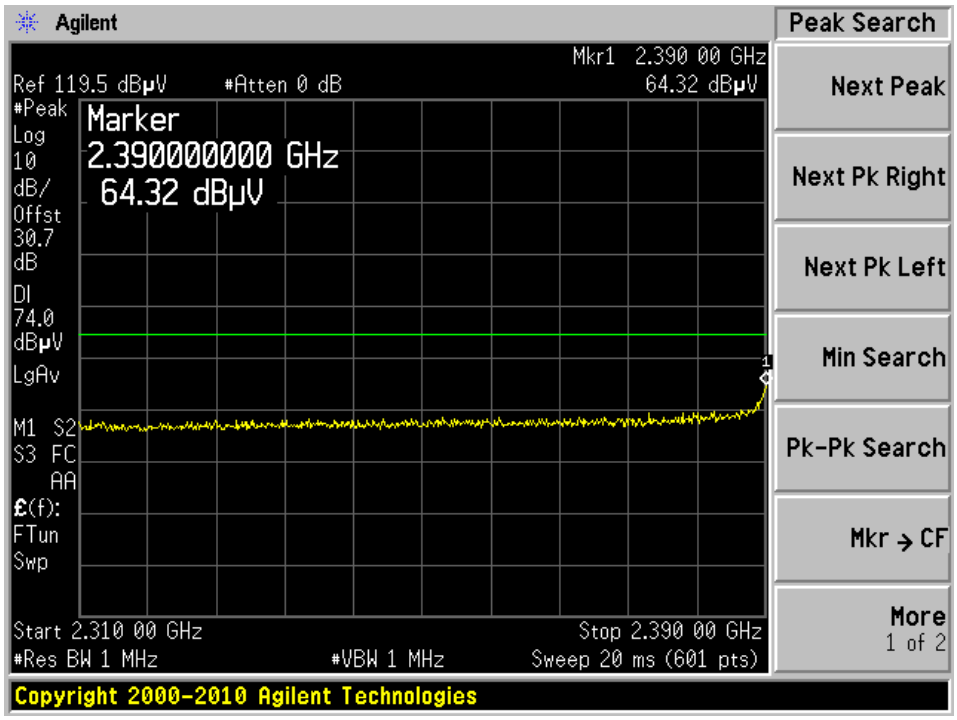


High Channel-Average (Vertical)

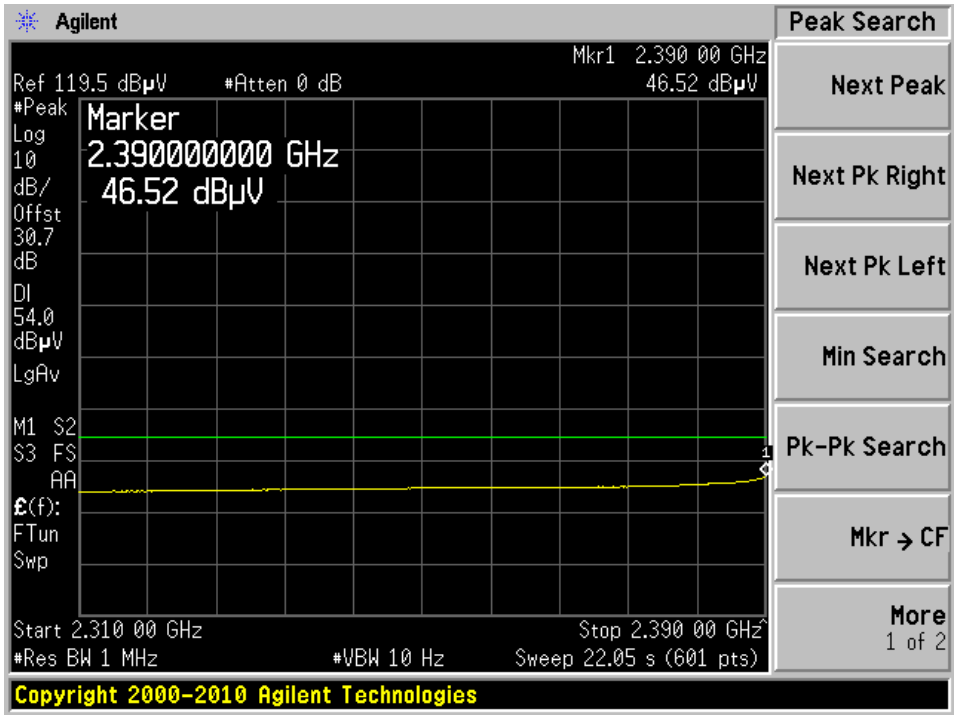


2.4 GHz 802.11g mode:

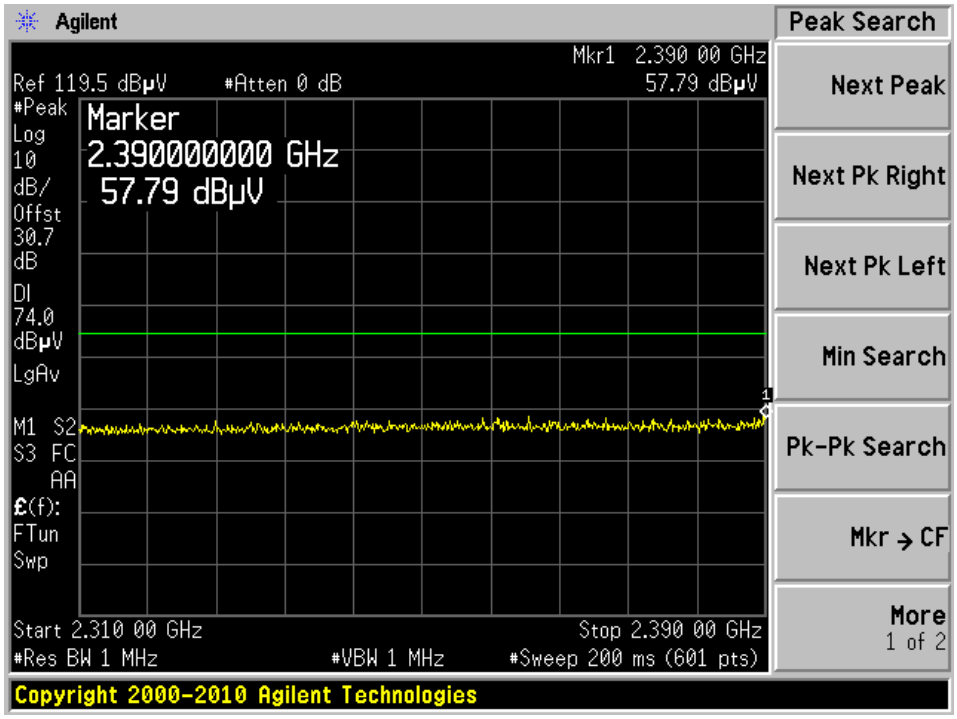
Low Channel-Peak (Horizontal)



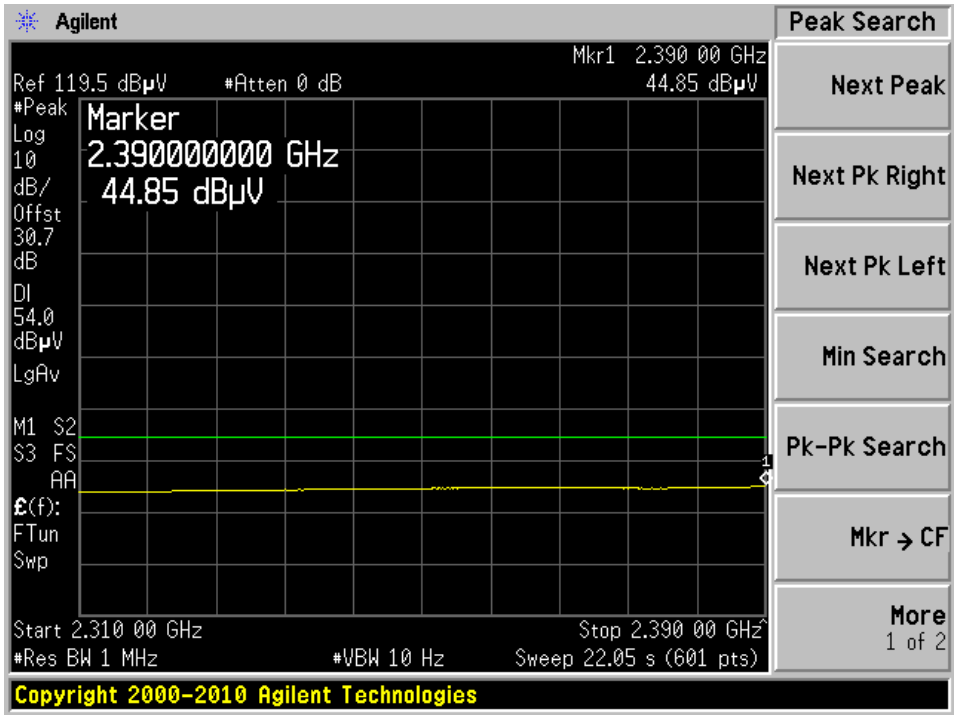
Low Channel-Average (Horizontal)



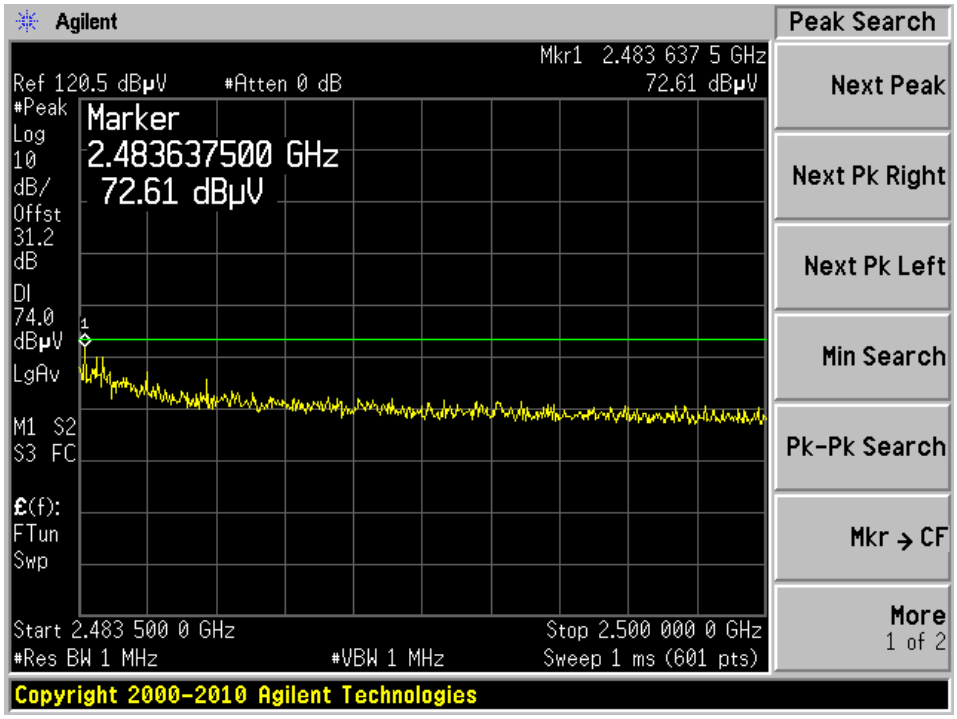
Low Channel-Peak (Vertical)



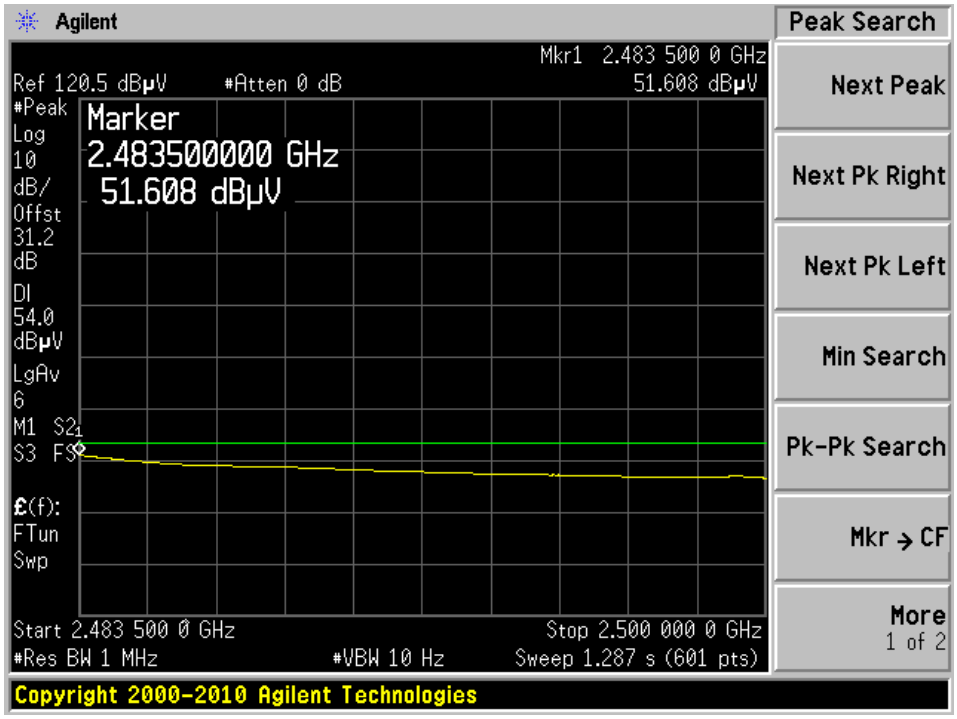
Low Channel-Average (Vertical)



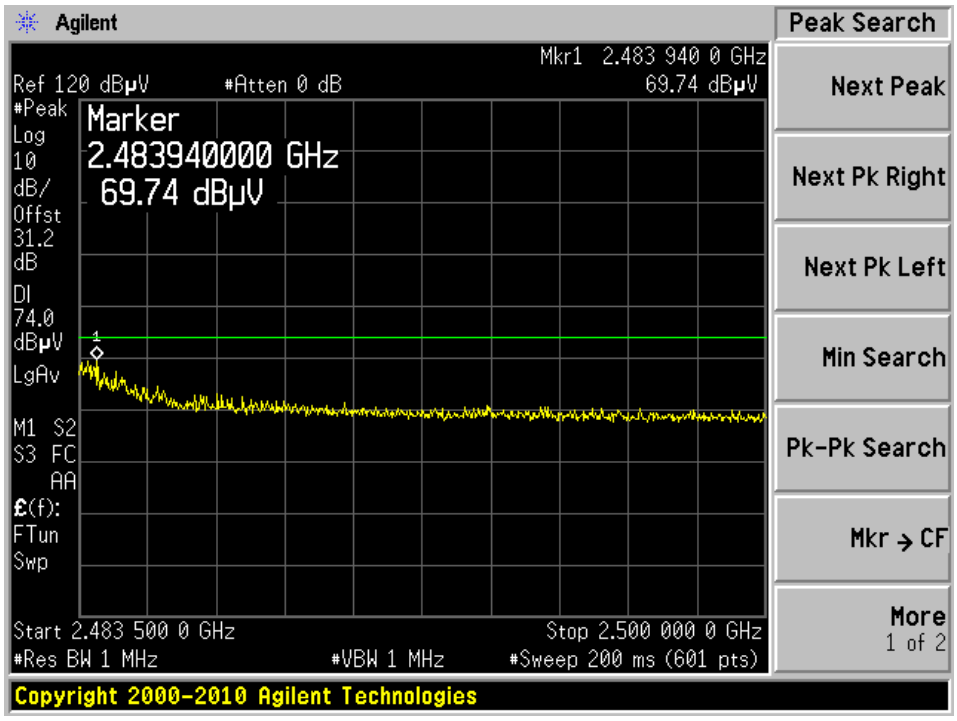
High Channel-Peak (Horizontal)



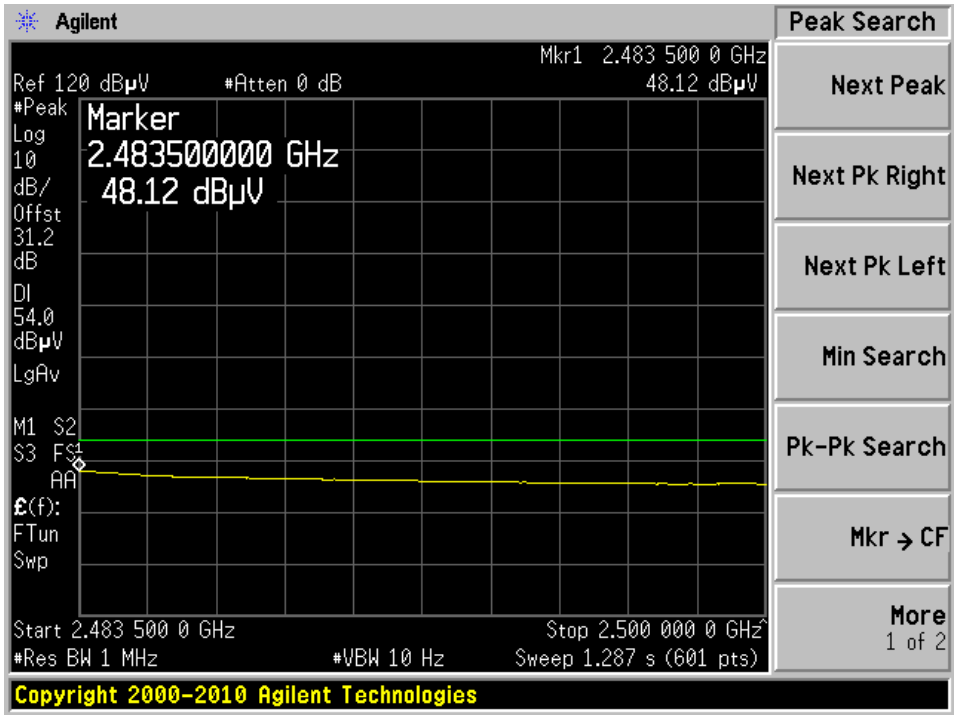
High Channel-Average (Horizontal)



High Channel-Peak (Vertical)

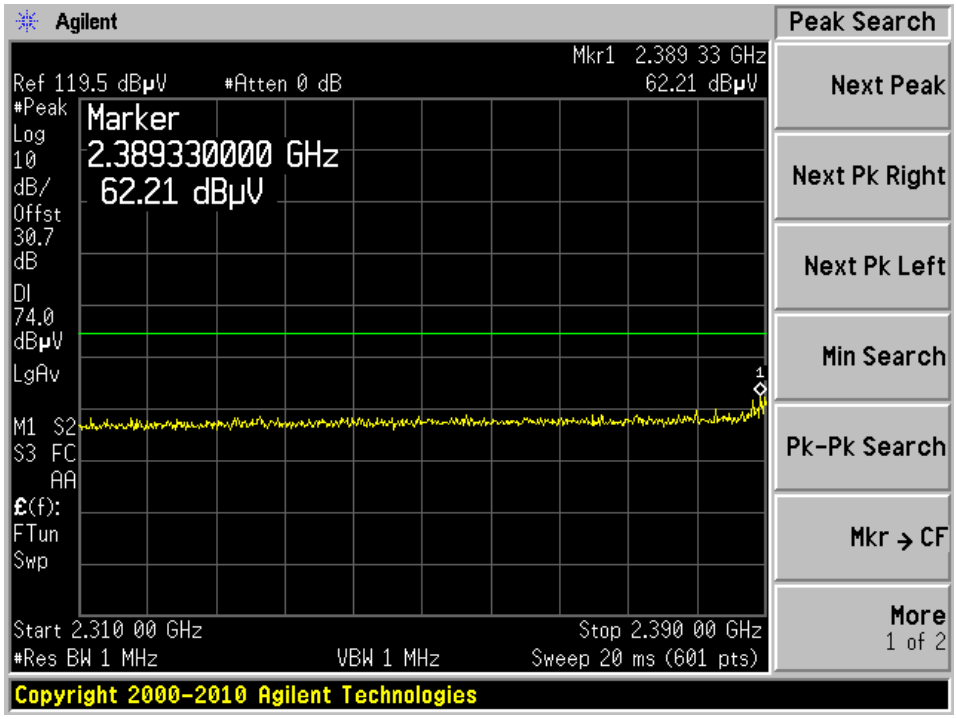


High Channel-Average (Vertical)

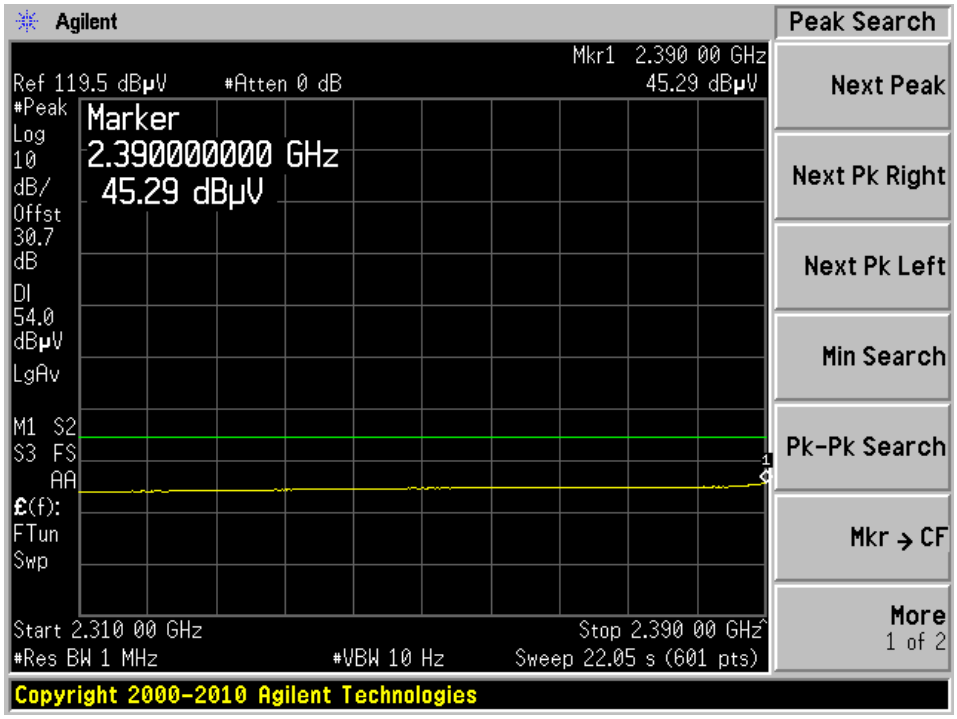


2.4 GHz 802.11n mode:

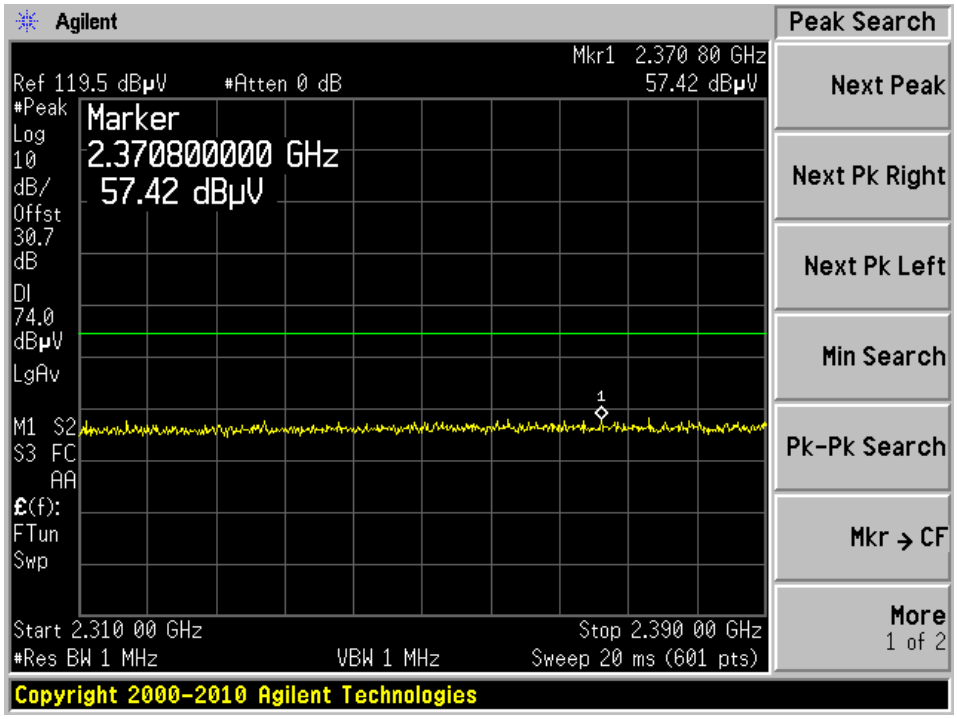
Low Channel-Peak (Horizontal)



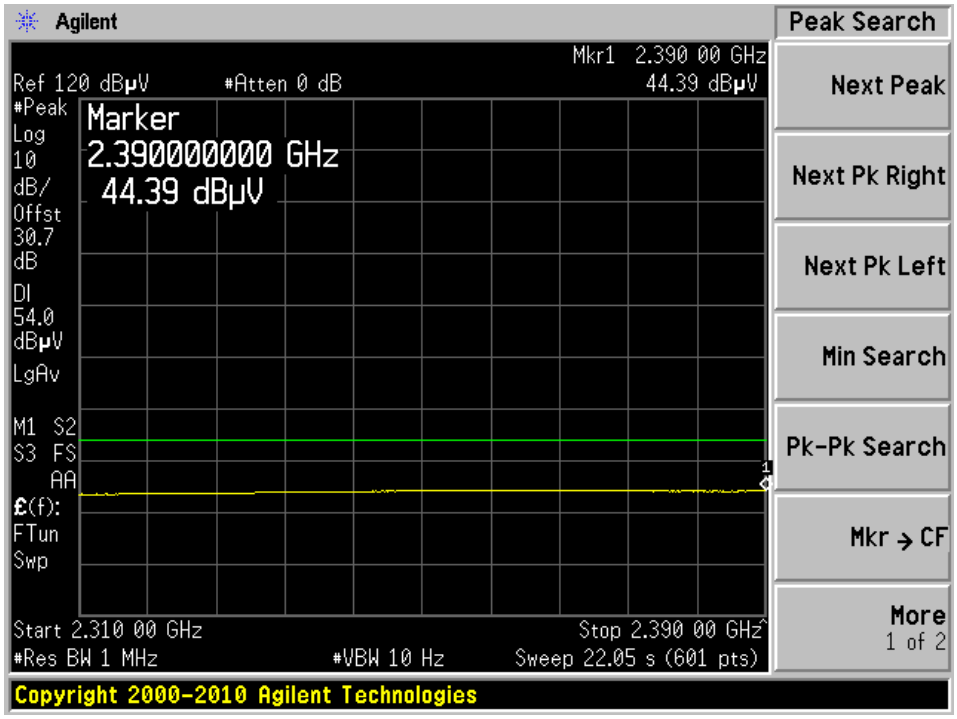
Low Channel-Average (Horizontal)



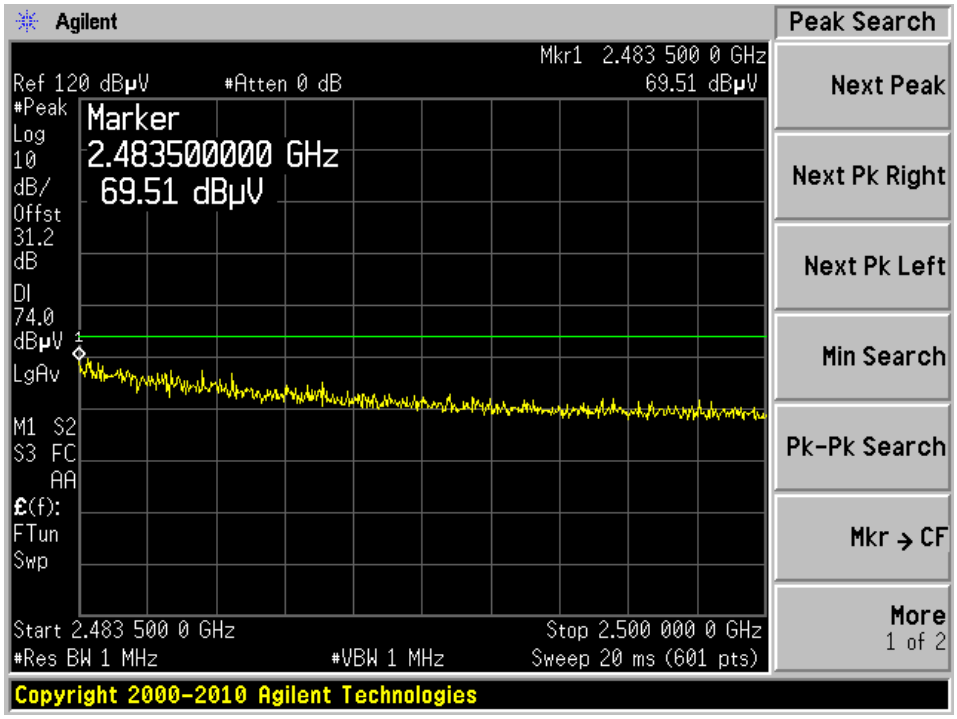
Low Channel-Peak (Vertical)



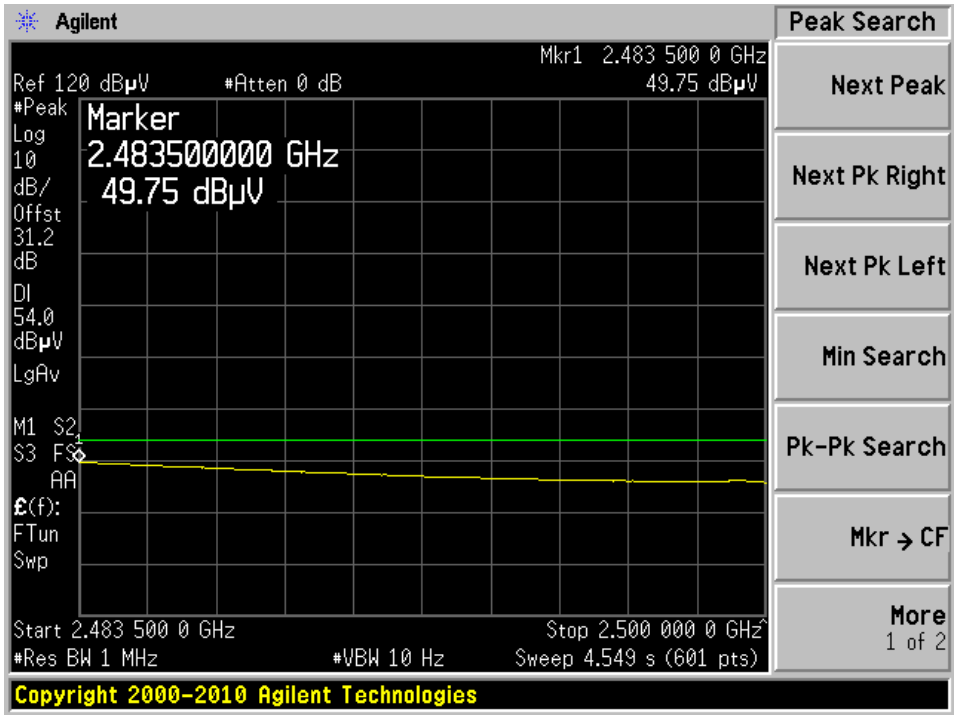
Low Channel-Average (Vertical)



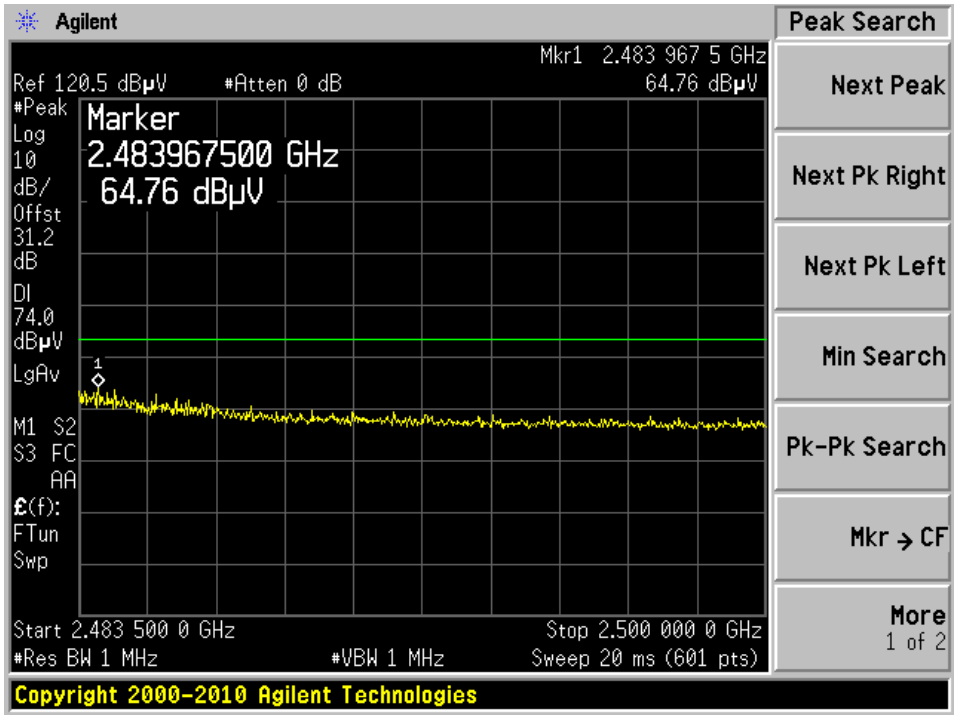
High Channel-Peak (Horizontal)



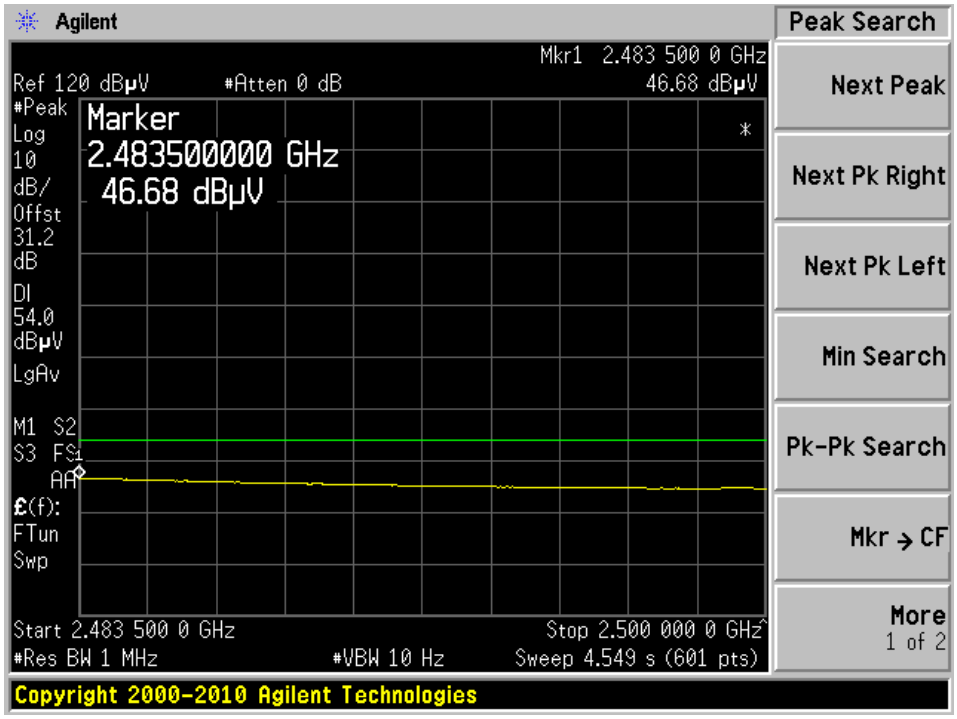
High Channel-Average (Horizontal)



High Channel-Peak (Vertical)

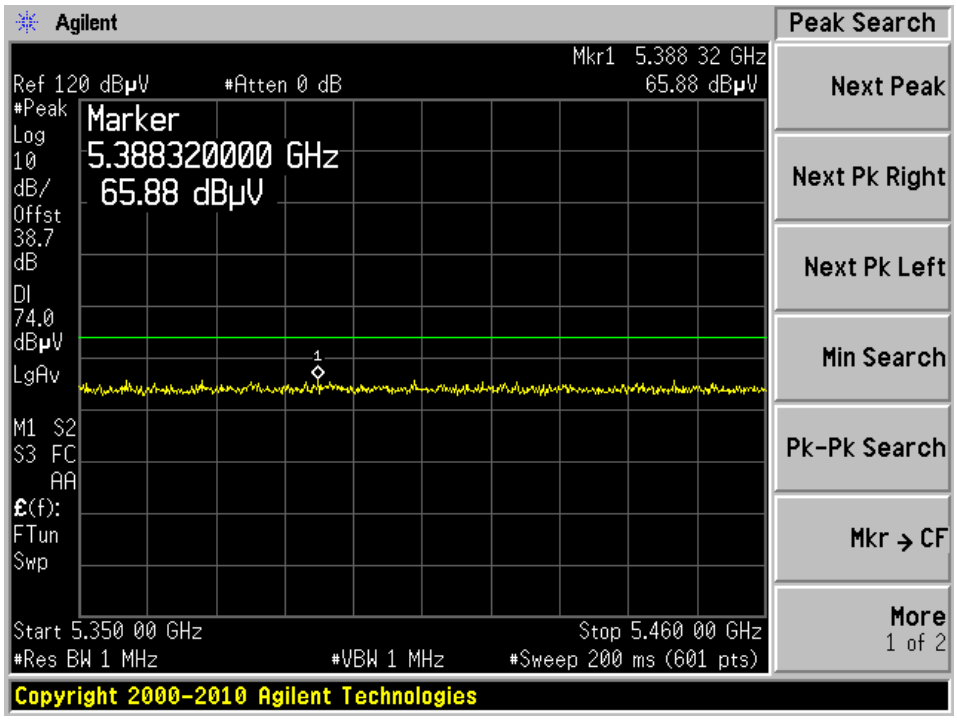


High Channel-Average (Vertical)

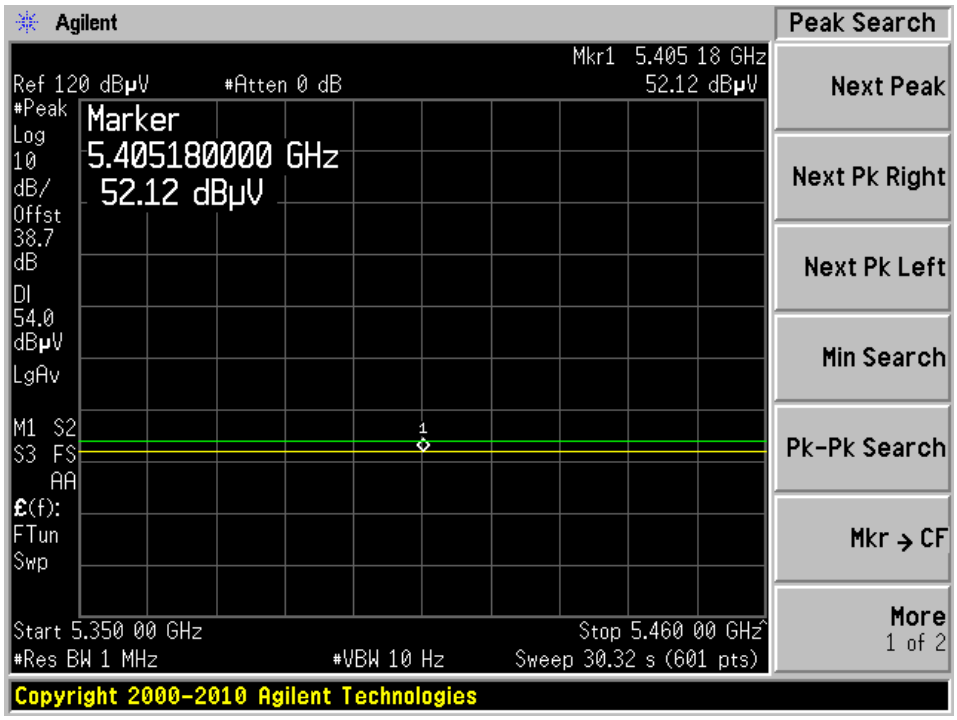


5.8 GHz 802.11a mode:

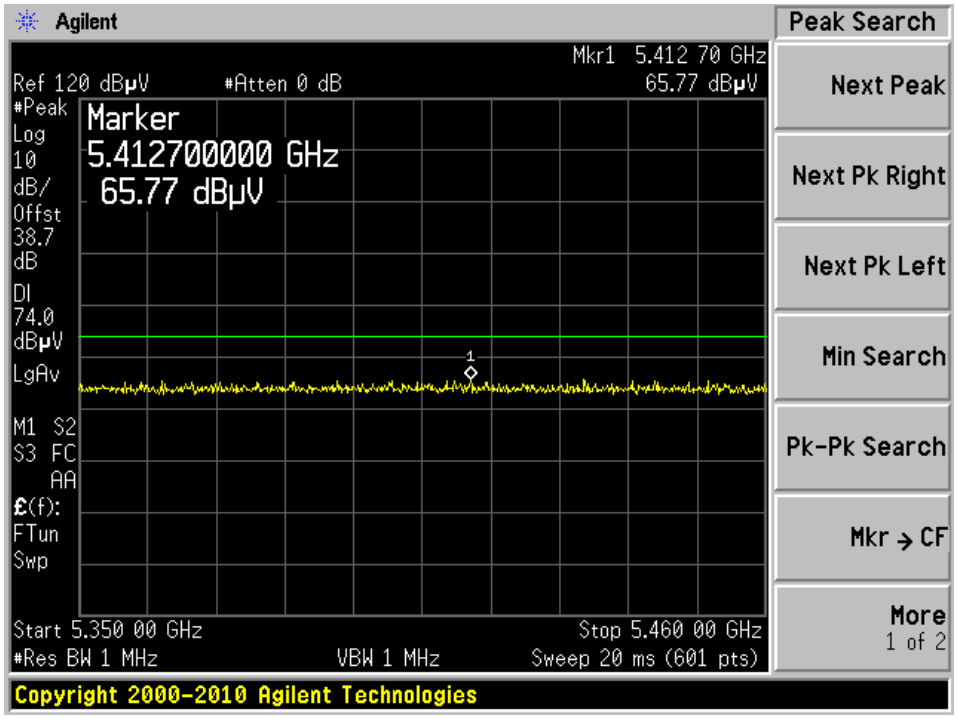
Low Channel-Peak (Horizontal)



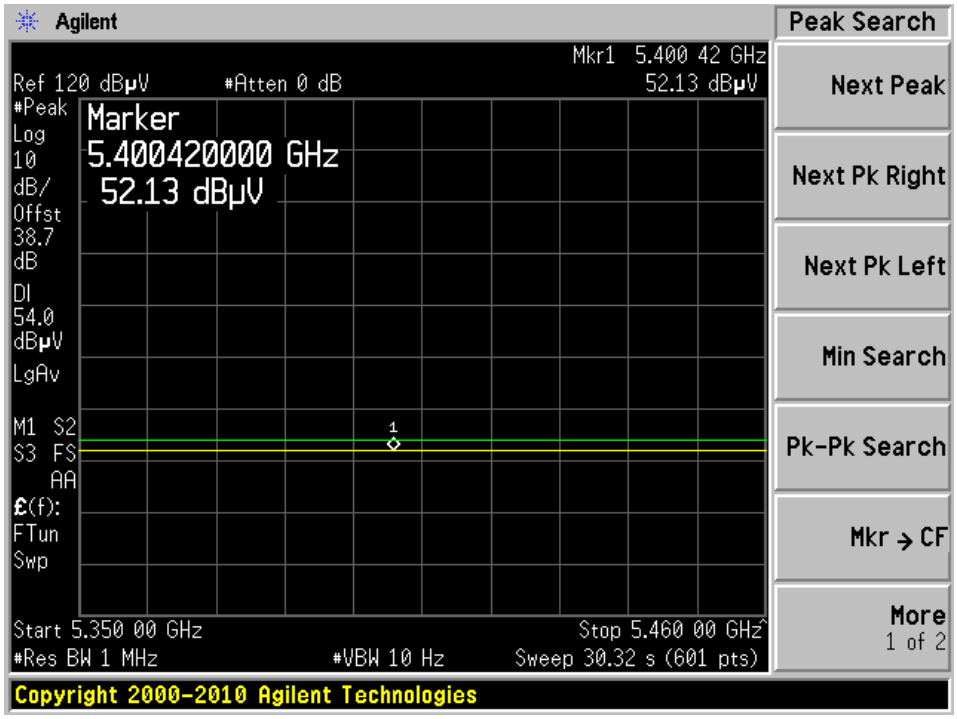
Low Channel-Average (Horizontal)



Low Channel-Peak (Vertical)

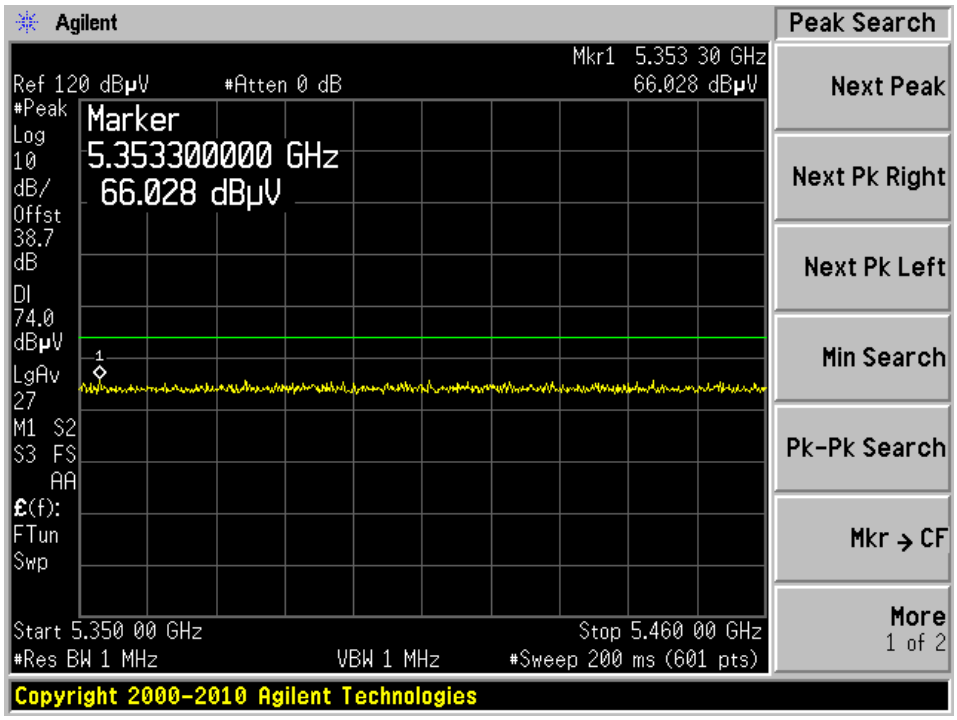


Low Channel-Average (Vertical)

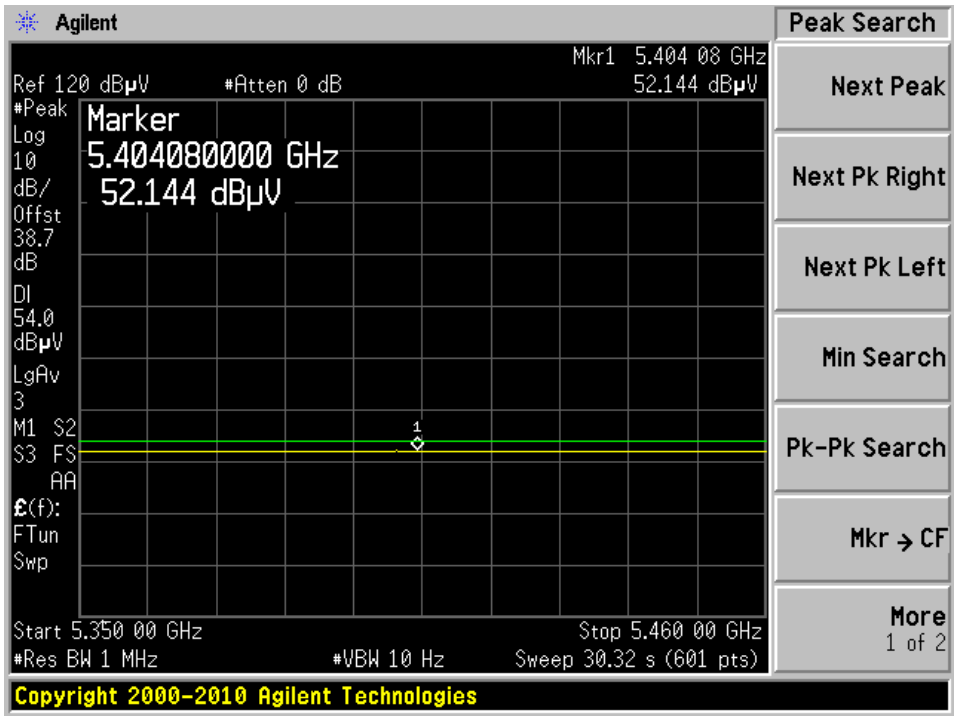


5.8 GHz 802.11n mode:

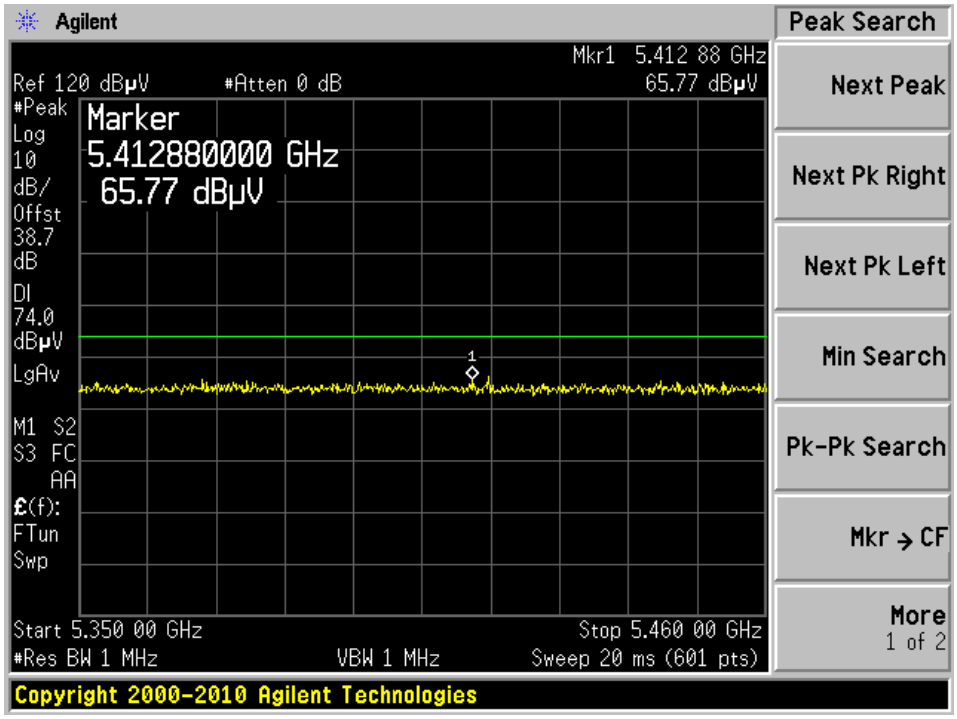
Low Channel-Peak (Horizontal)



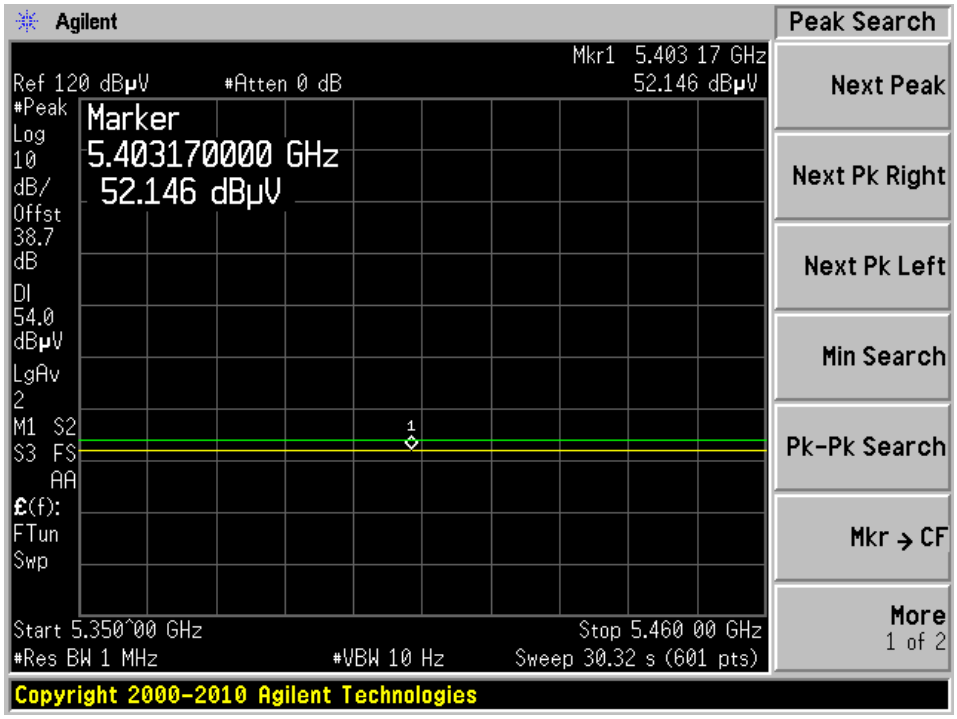
Low Channel-Average (Horizontal)



Low Channel-Peak (Vertical)



Low Channel-Average (Vertical)



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

9.1 Applicable Standard

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

9.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

9.3 Test Equipment List and Details

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

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

9.4 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Lionel Lara from 2011-12-18 to 2011-12-20 at RF Test Site.

9.5 Test Results

2.4 GHz Band:

Antenna Port	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Results
802.11b mode						
Main	Low	2412	12.316	7.486	> 500	Compliant
	Middle	2437	12.271	7.152	> 500	Compliant
	High	2462	12.264	7.301	> 500	Compliant
Aux	Low	2412	12.425	7.513	> 500	Compliant
	Middle	2437	12.370	7.512	> 500	Compliant
	High	2462	12.386	7.541	> 500	Compliant
802.11g mode						
Main	Low	2412	16.333	16.446	> 500	Compliant
	Middle	2437	16.325	16.445	> 500	Compliant
	High	2462	16.318	16.432	> 500	Compliant
Aux	Low	2412	16.336	16.441	> 500	Compliant
	Middle	2437	16.328	16.435	> 500	Compliant
	High	2462	16.323	16.448	> 500	Compliant
802.11n mode						
Main	Low	2412	17.501	17.665	> 500	Compliant
	Middle	2437	17.495	17.670	> 500	Compliant
	High	2462	17.503	17.672	> 500	Compliant
Aux	Low	2412	17.508	17.686	> 500	Compliant
	Middle	2437	17.500	17.679	> 500	Compliant
	High	2462	17.500	17.683	> 500	Compliant

5.8 GHz Band:

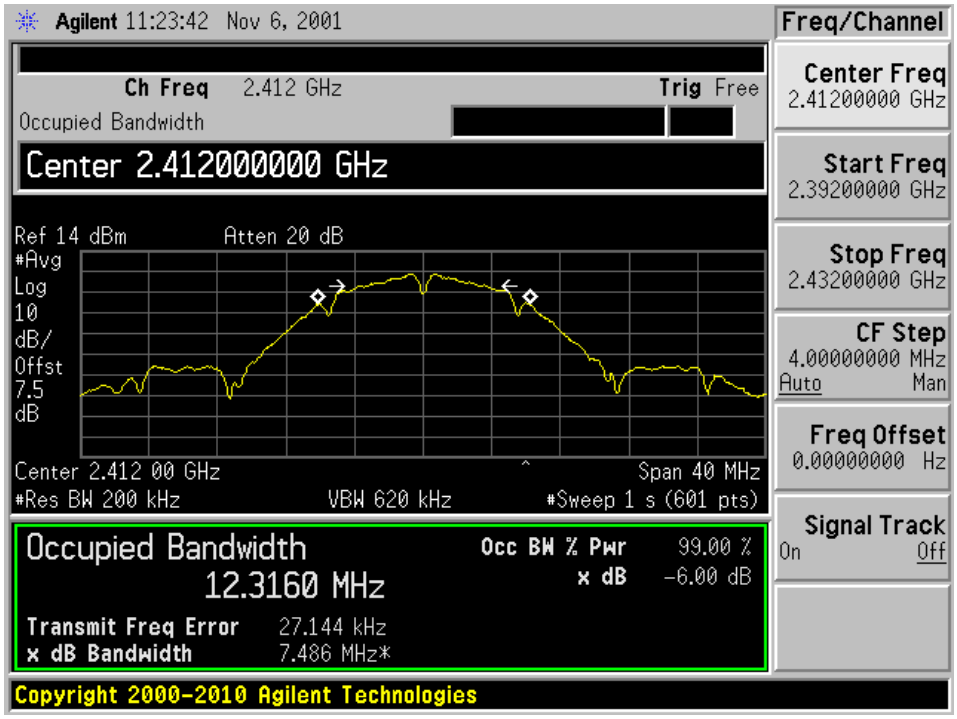
Antenna Port	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Results
802.11a mode						
Main	Low	5745	16.317	16.421	> 500	Compliant
	Middle	5785	16.324	16.445	> 500	Compliant
	High	5825	16.326	16.454	> 500	Compliant
Aux	Low	5745	16.322	16.466	> 500	Compliant
	Middle	5785	16.320	16.456	> 500	Compliant
	High	5825	16.313	16.424	> 500	Compliant
802.11n mode						
Main	Low	5745	17.500	17.680	> 500	Compliant
	Middle	5785	17.504	17.663	> 500	Compliant
	High	5825	17.508	17.688	> 500	Compliant
Aux	Low	5745	17.509	17.671	> 500	Compliant
	Middle	5785	17.507	17.675	> 500	Compliant
	High	5825	17.501	17.686	> 500	Compliant

Please refer to the following plots for detailed test results

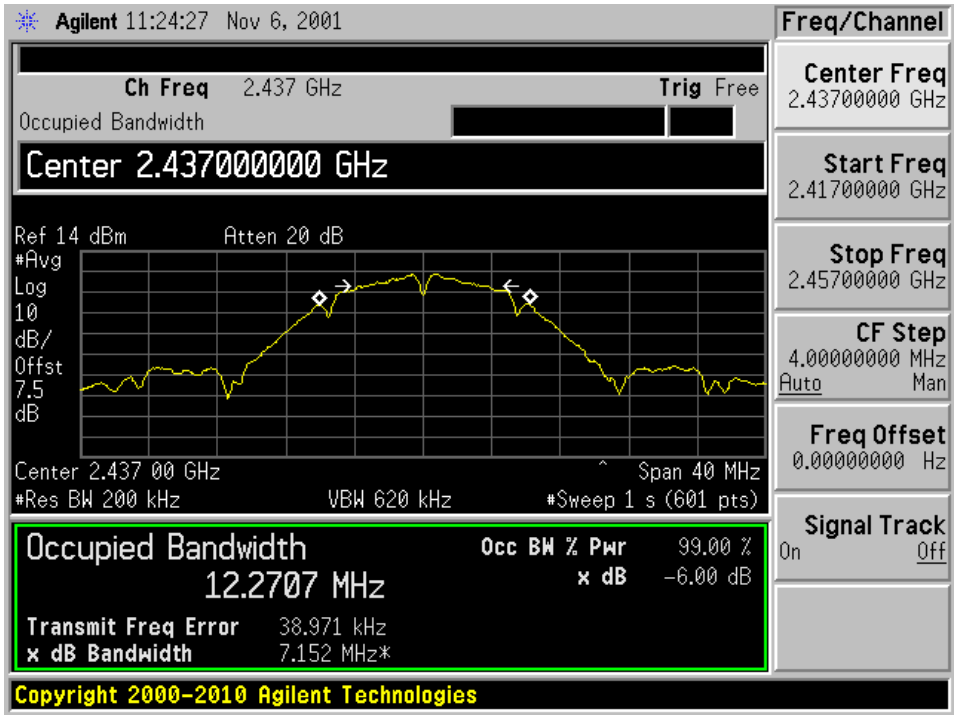
2.4 GHz 802.11b

Main Antenna Port

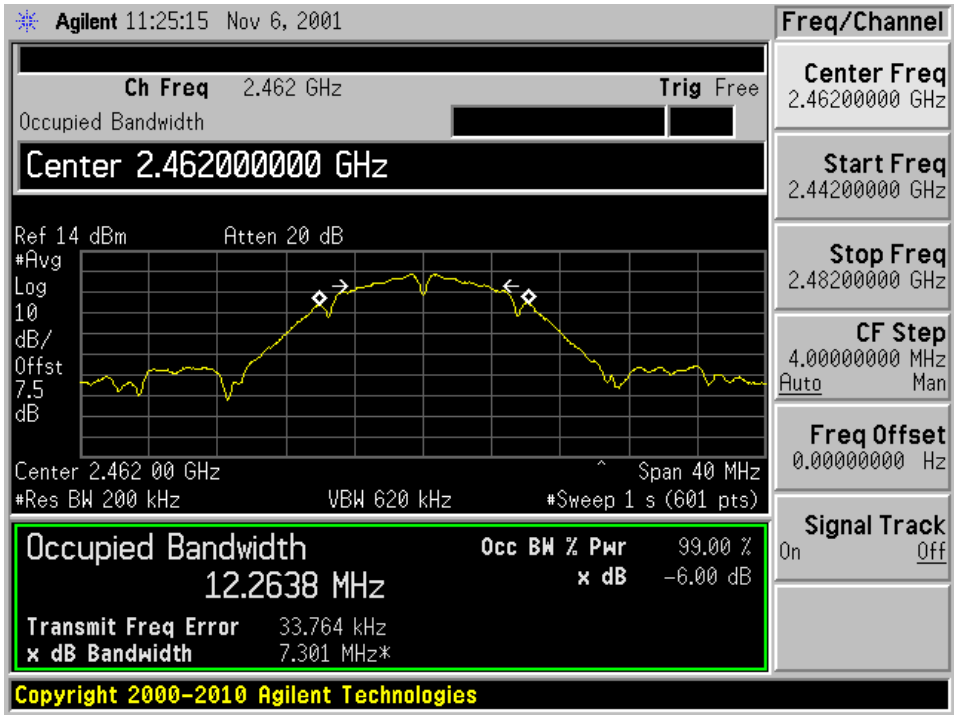
Low channel



Middle channel

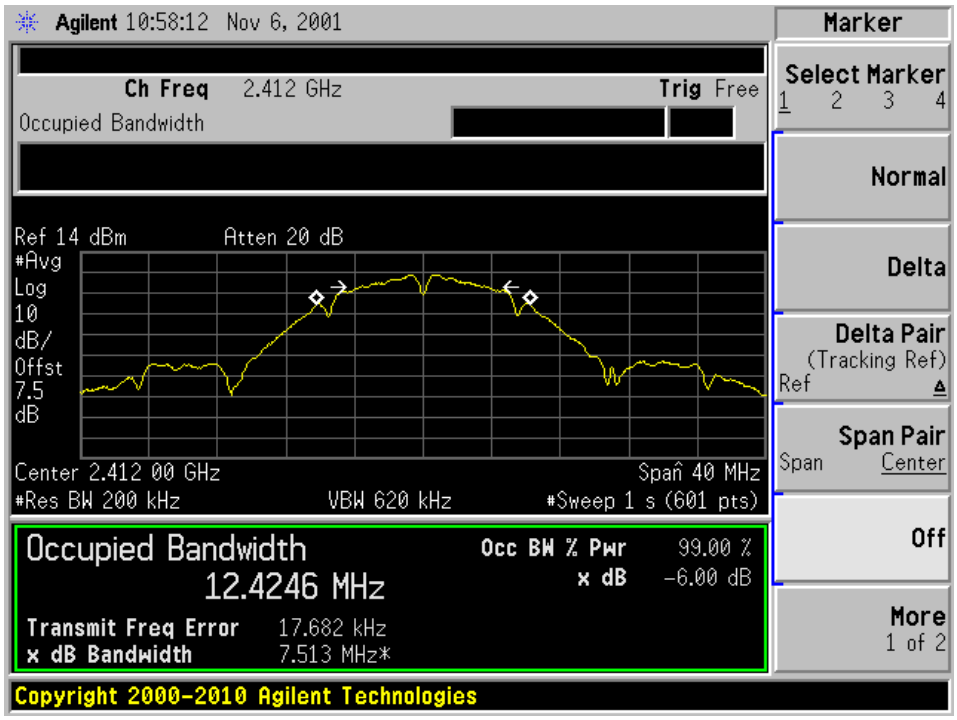


High channel

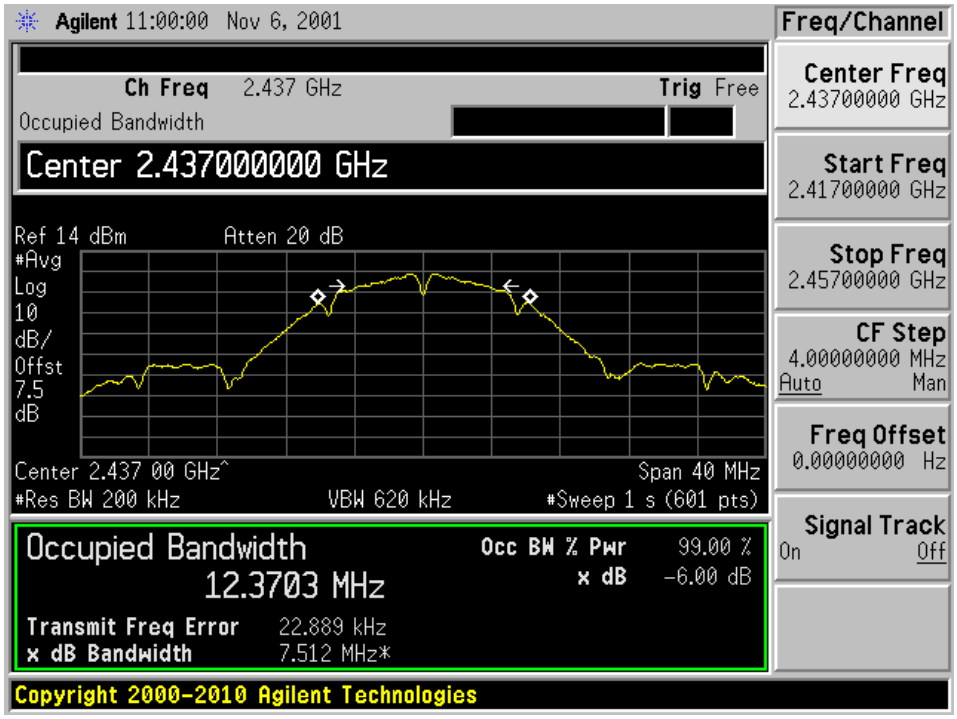


Aux Antenna Port

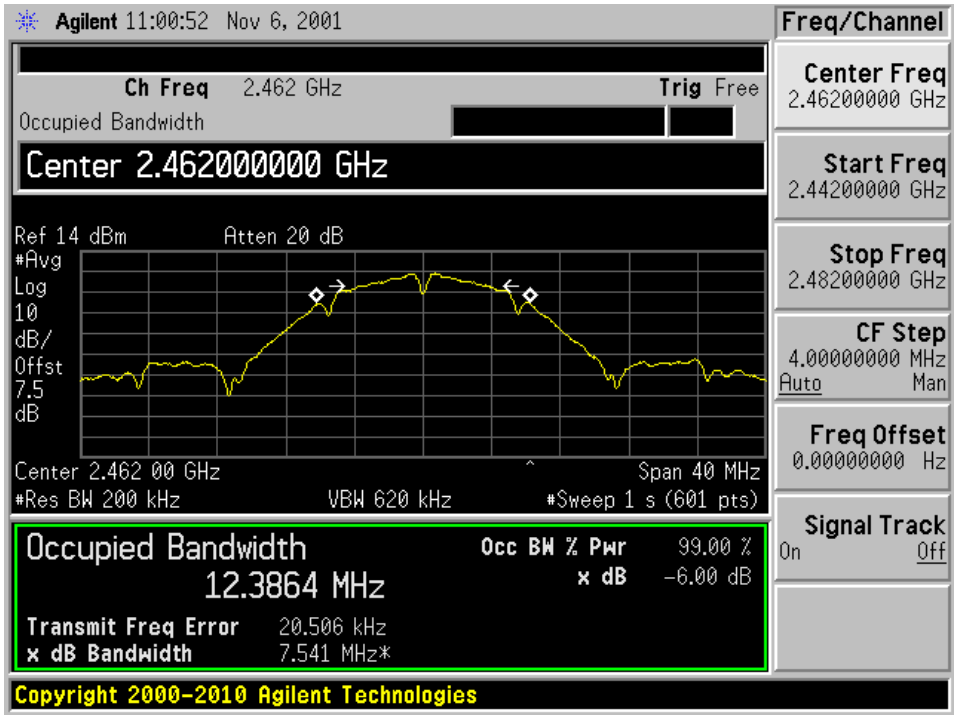
Low channel



Middle channel



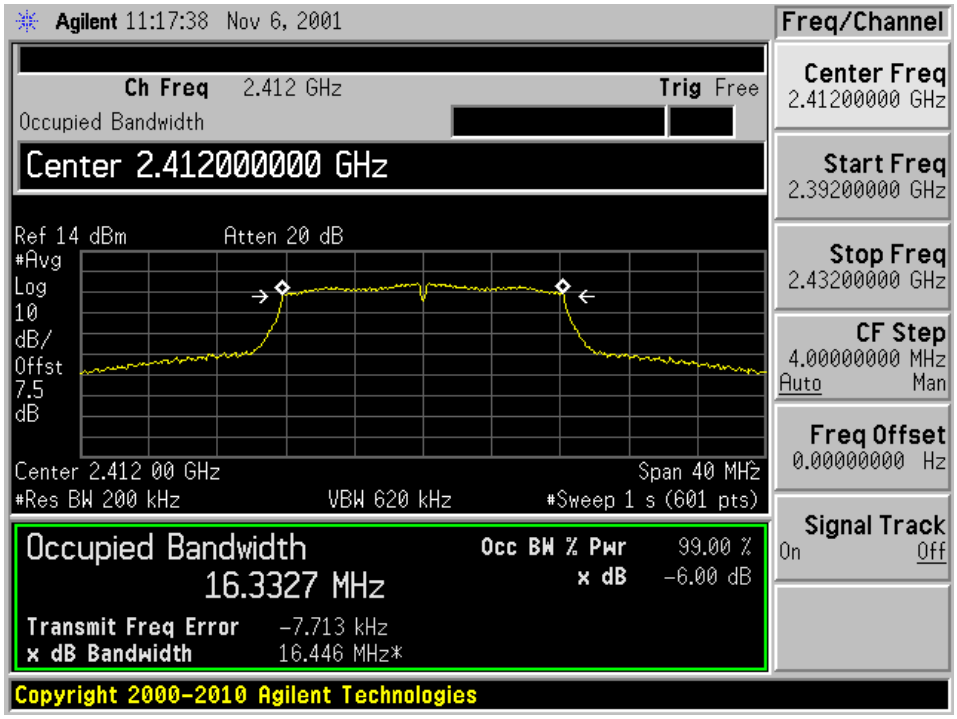
High channel



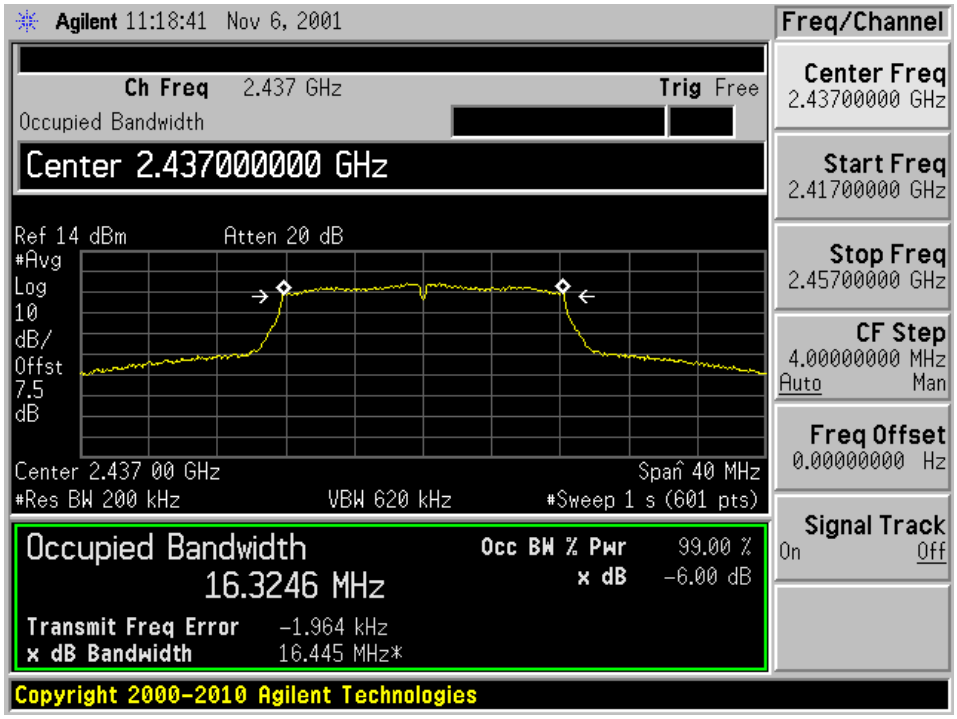
2.4 GHz 802.11g

Main Antenna Port

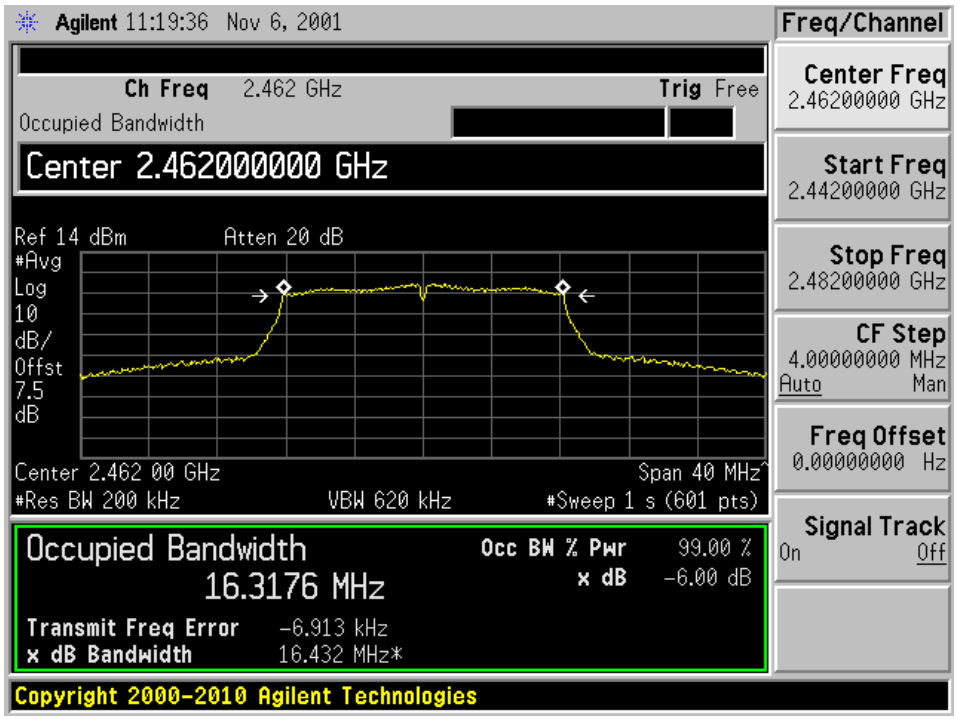
Low channel



Middle channel

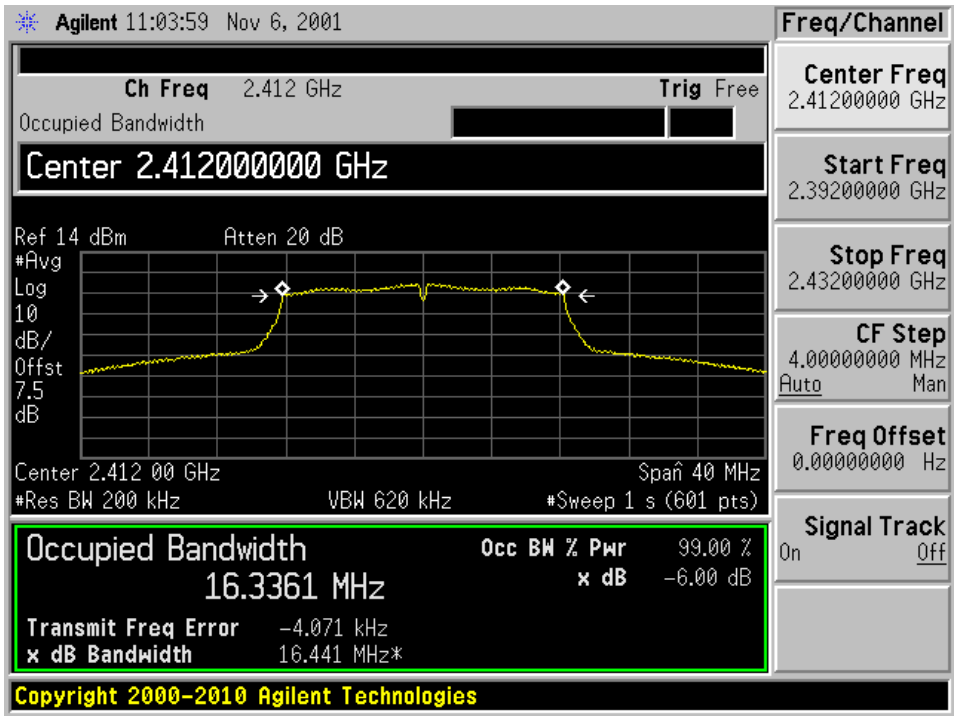


High channel

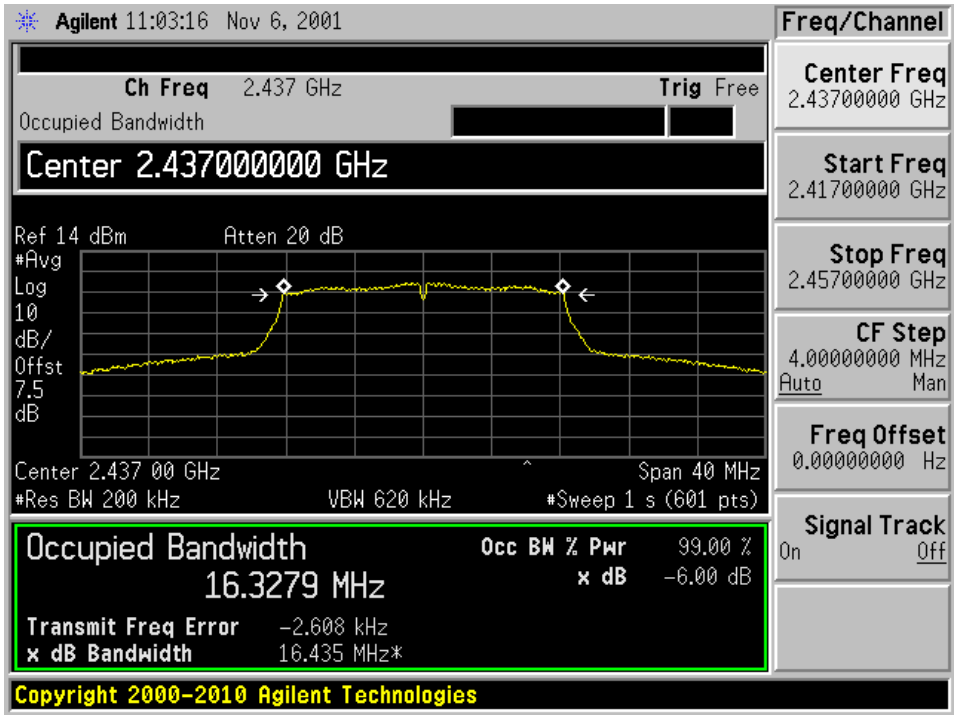


Aux Antenna Port

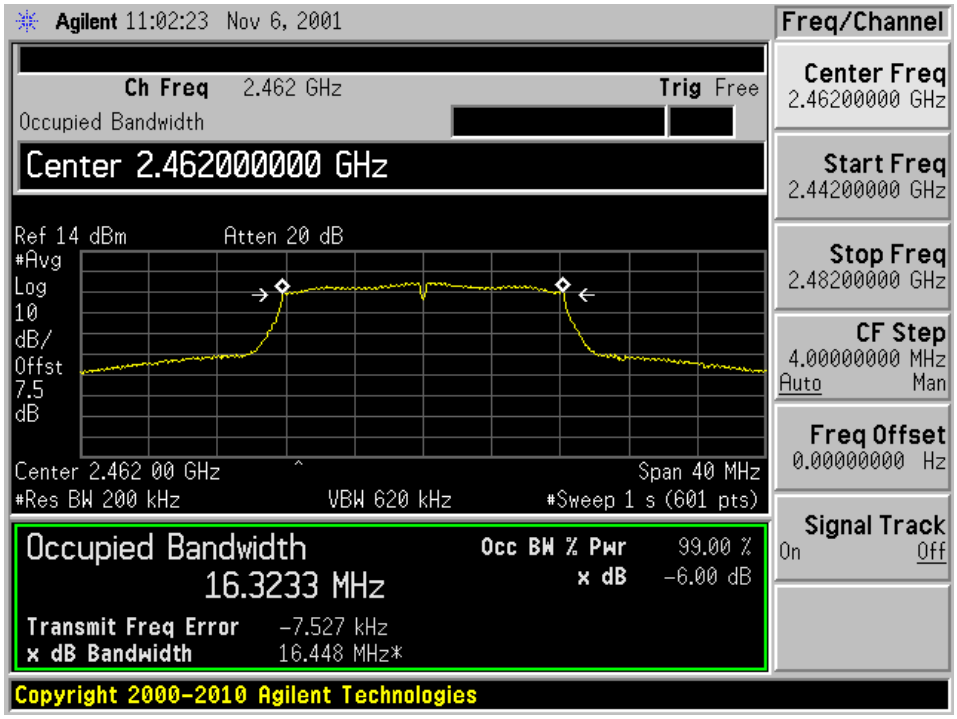
Low channel



Middle channel



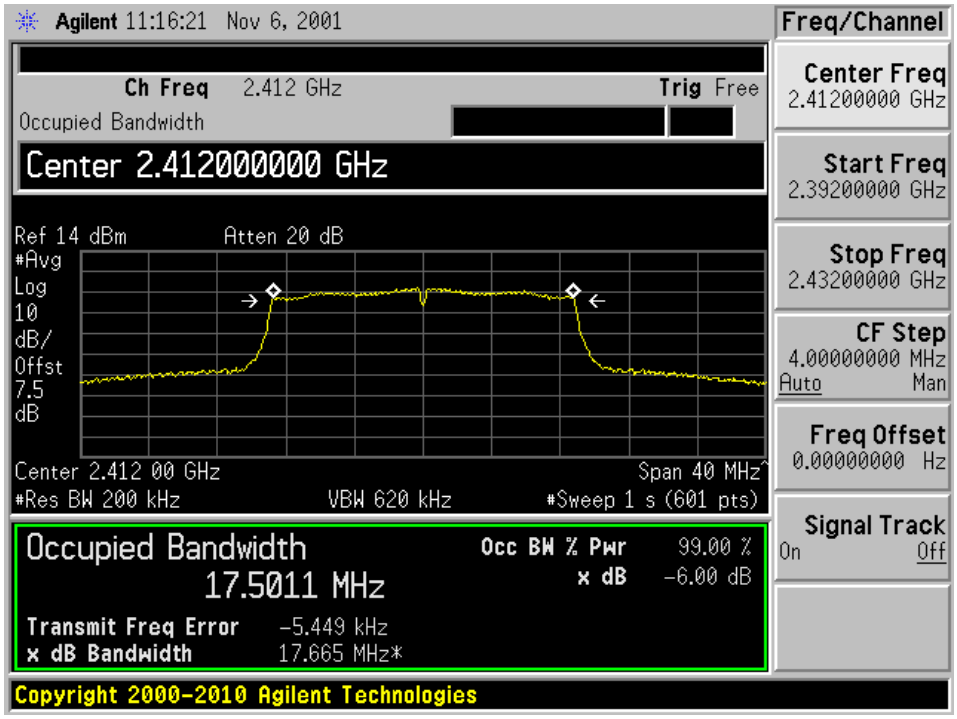
High channel



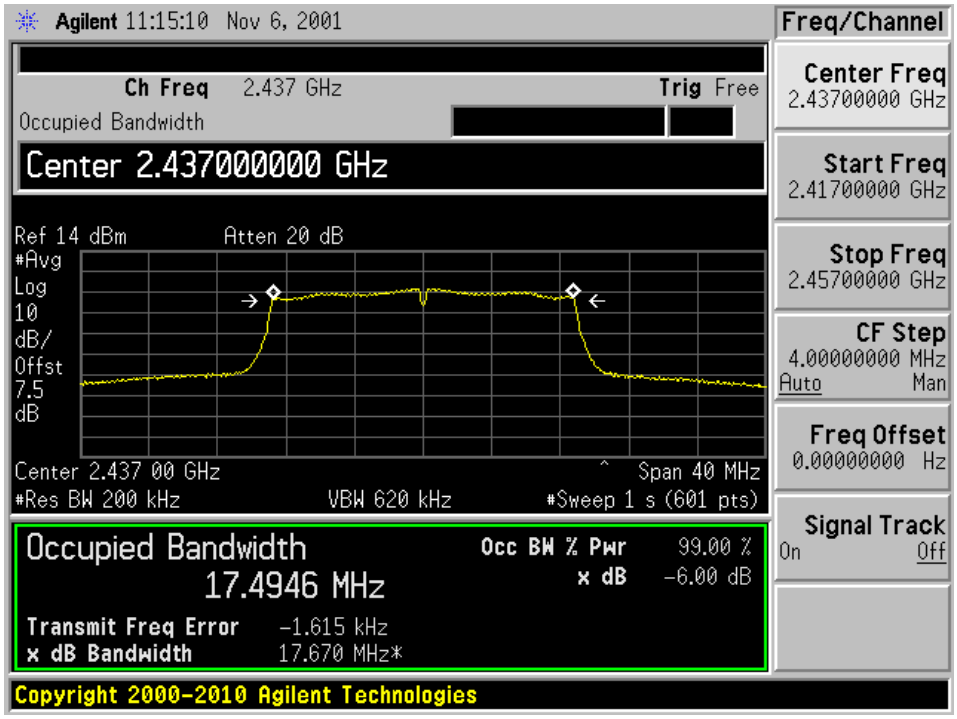
2.4 GHz 802.11n

Main Antenna Port

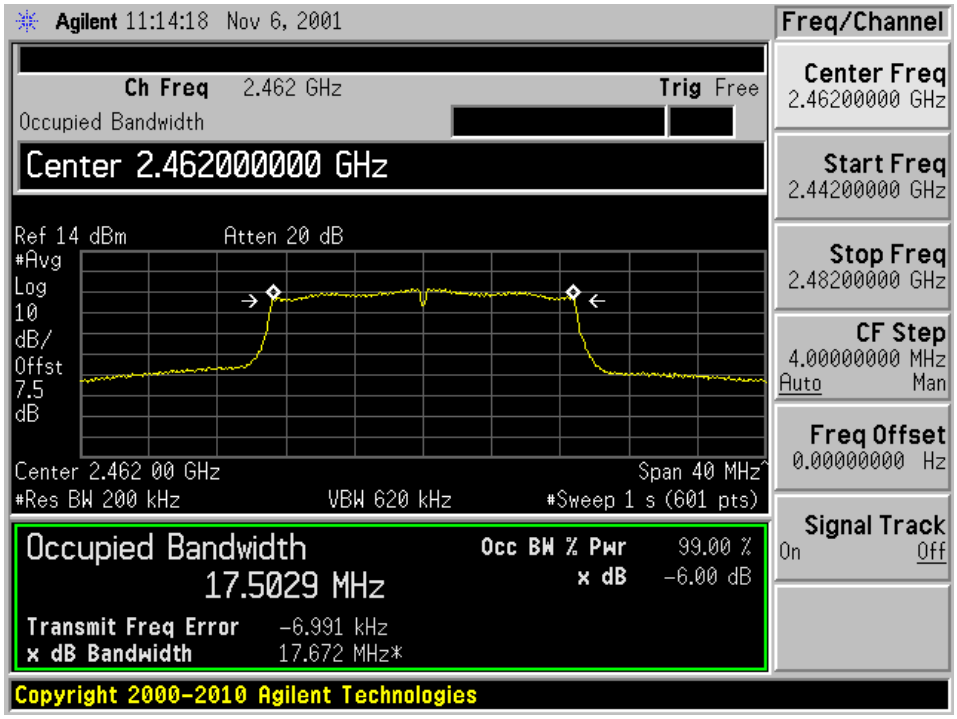
Low channel



Middle channel

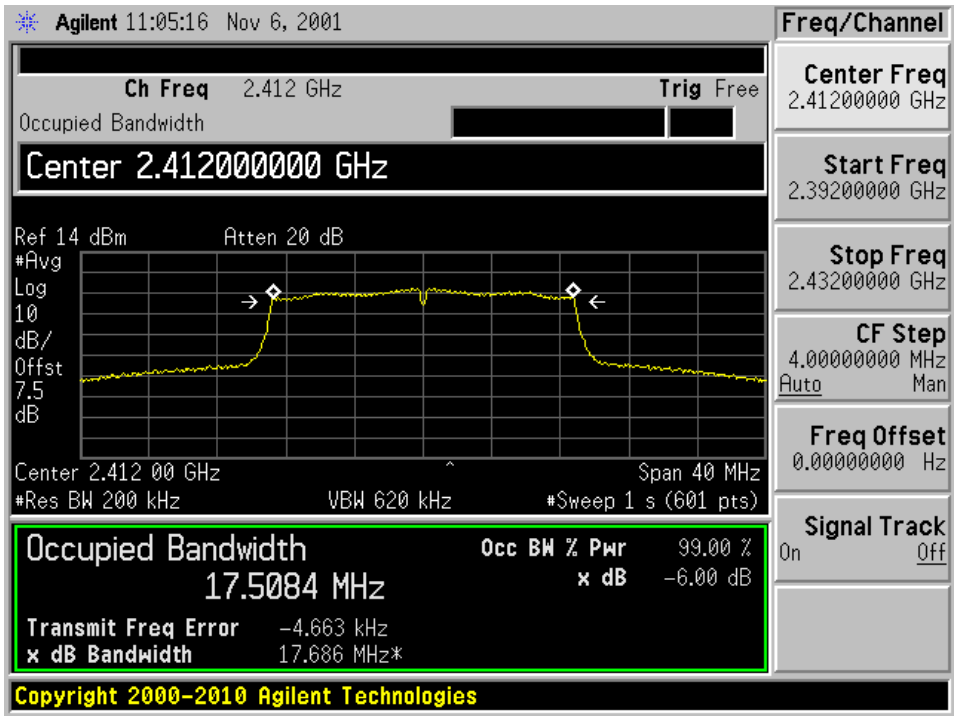


High channel

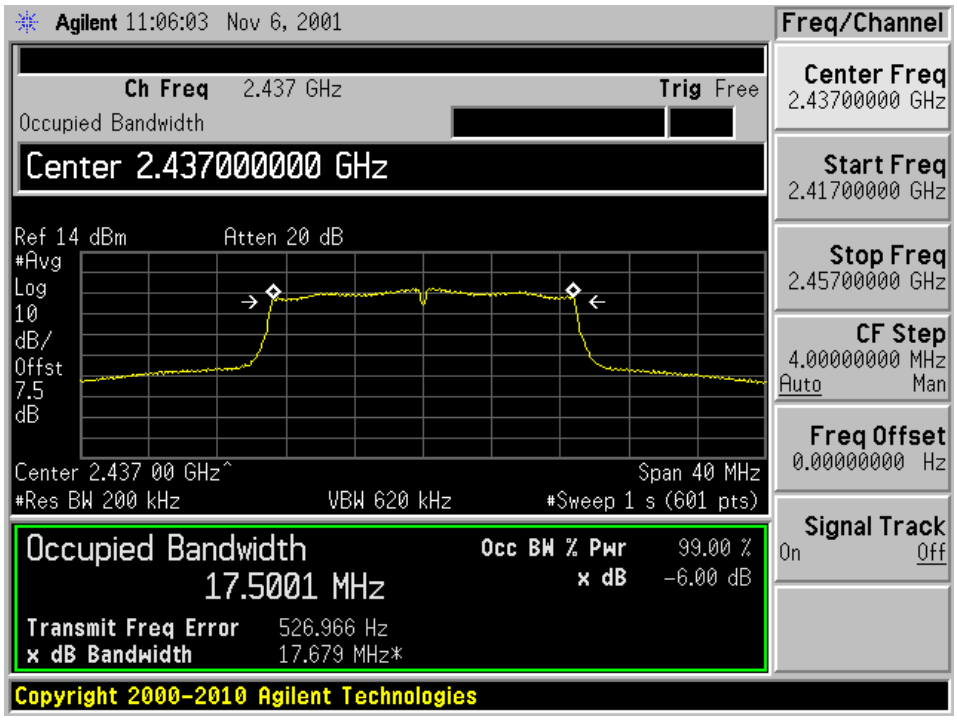


Aux Antenna Port

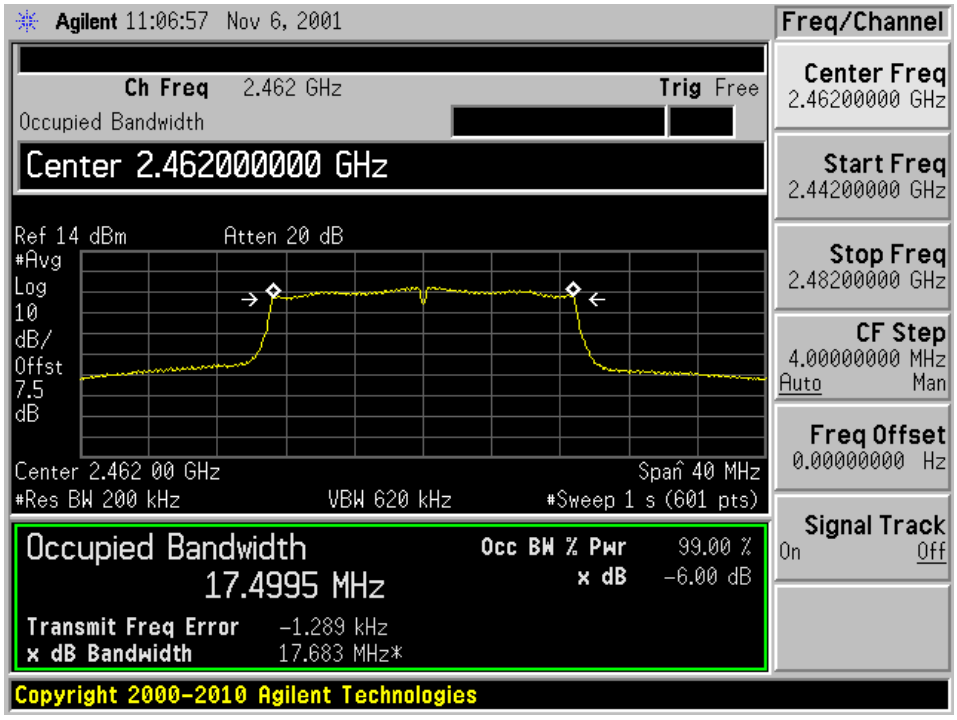
Low channel



Middle channel



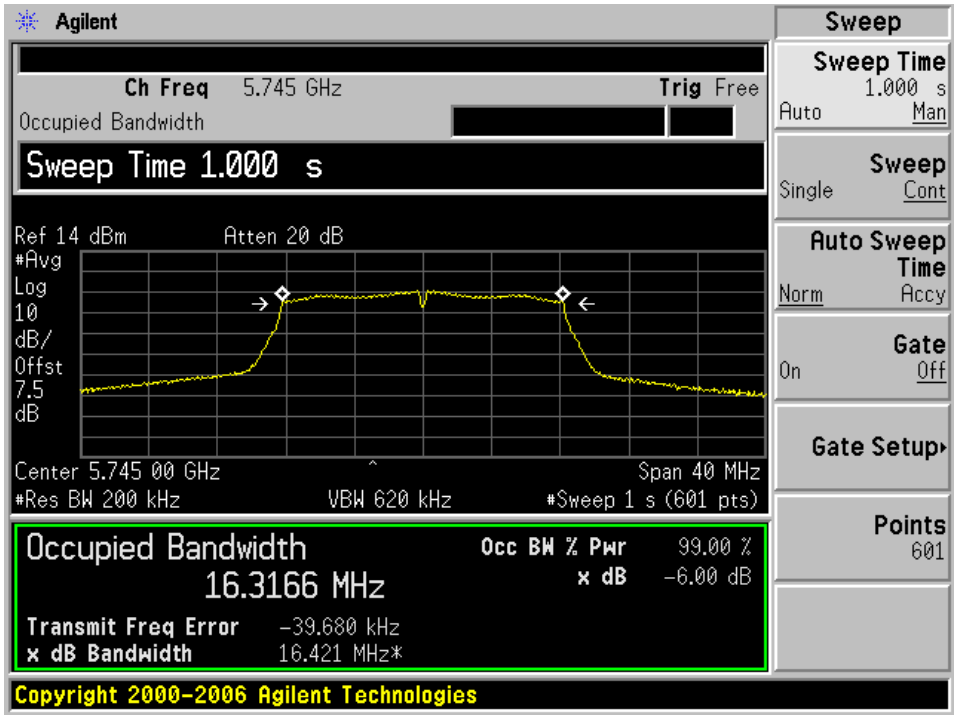
High channel



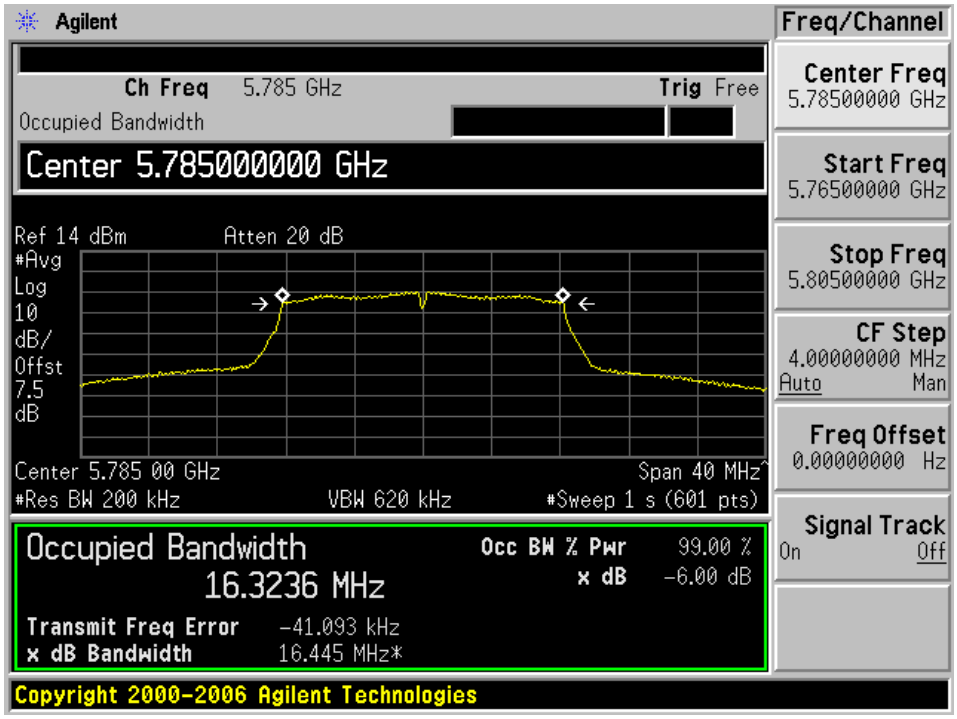
5.8 GHz 802.11a

Main Antenna Port

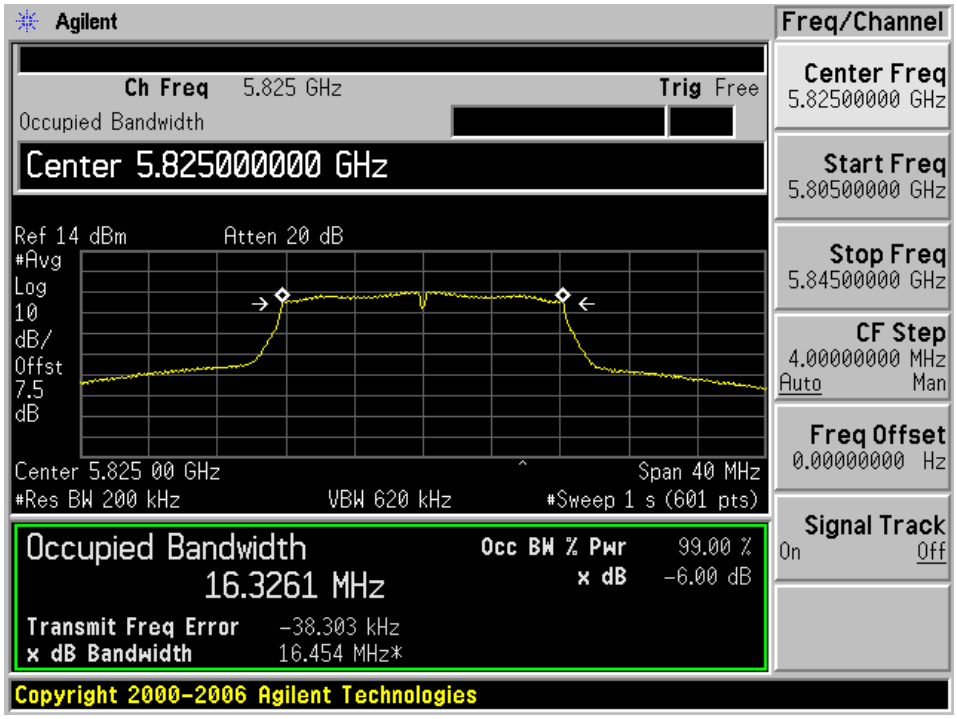
Low channel



Middle channel

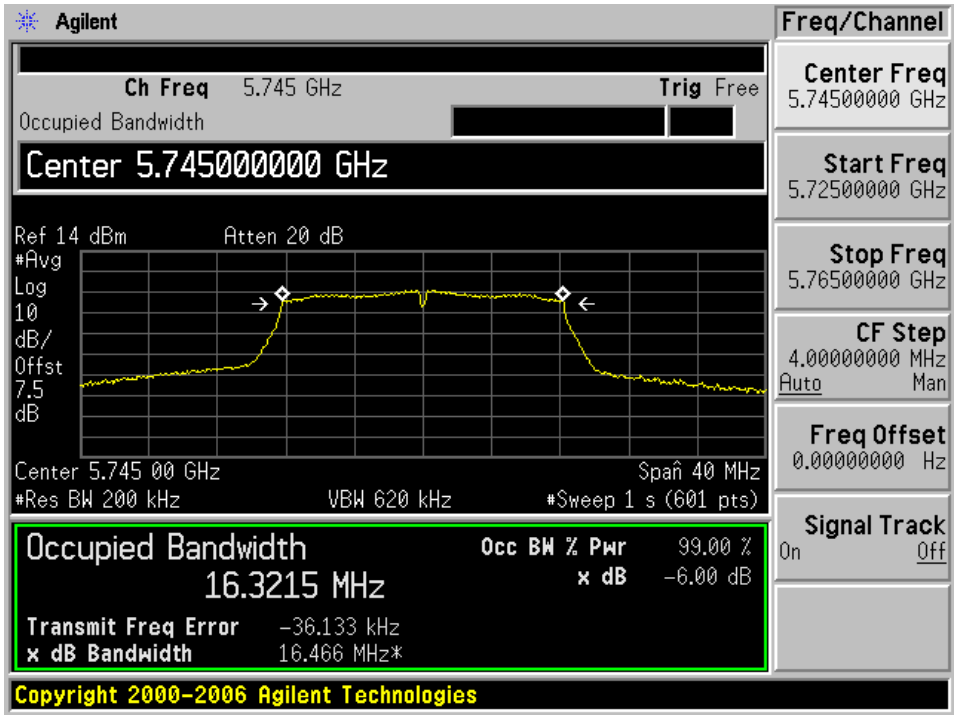


High channel

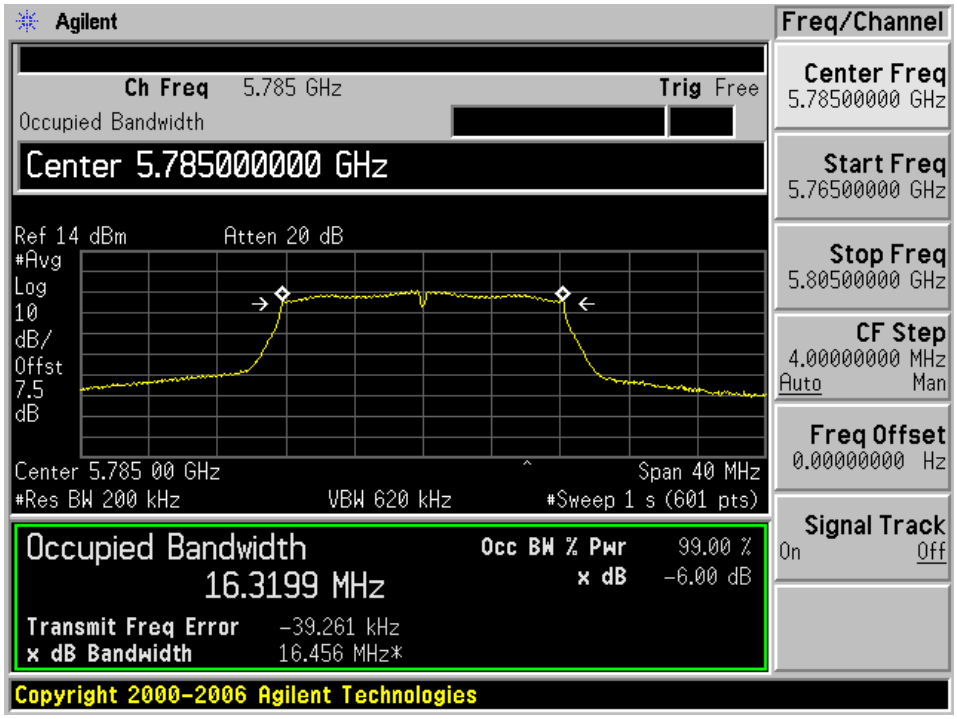


Aux Antenna Port

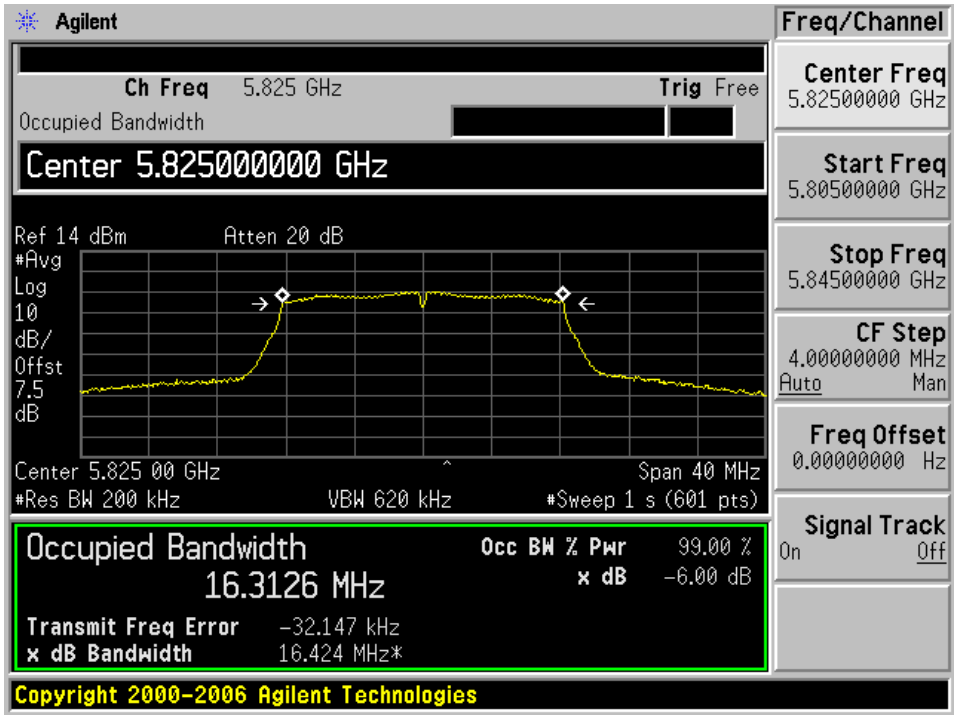
Low channel



Middle channel



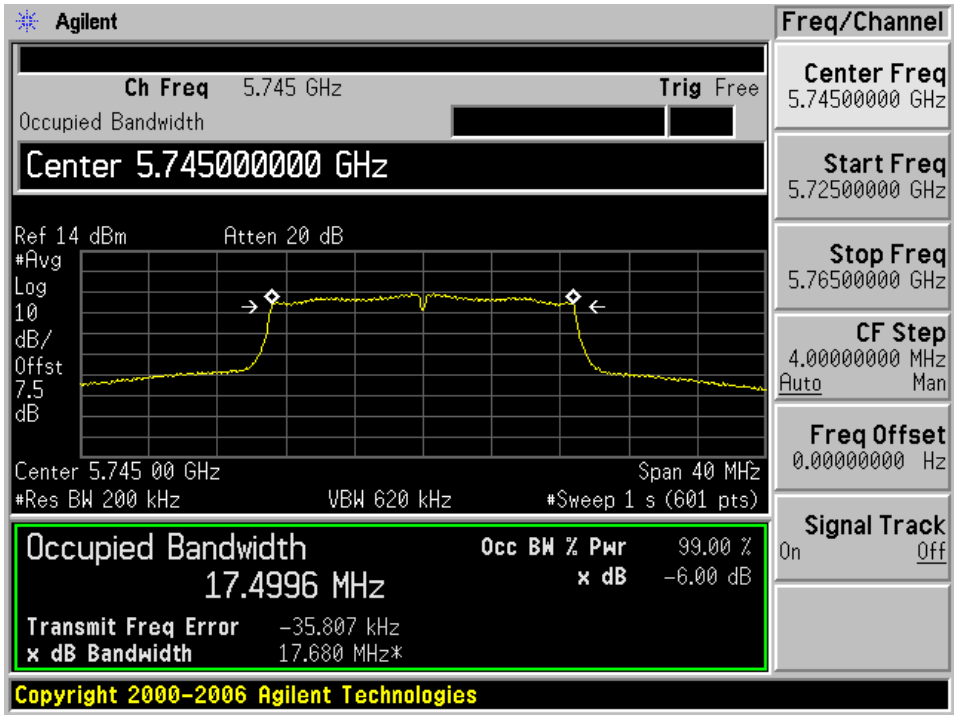
High channel



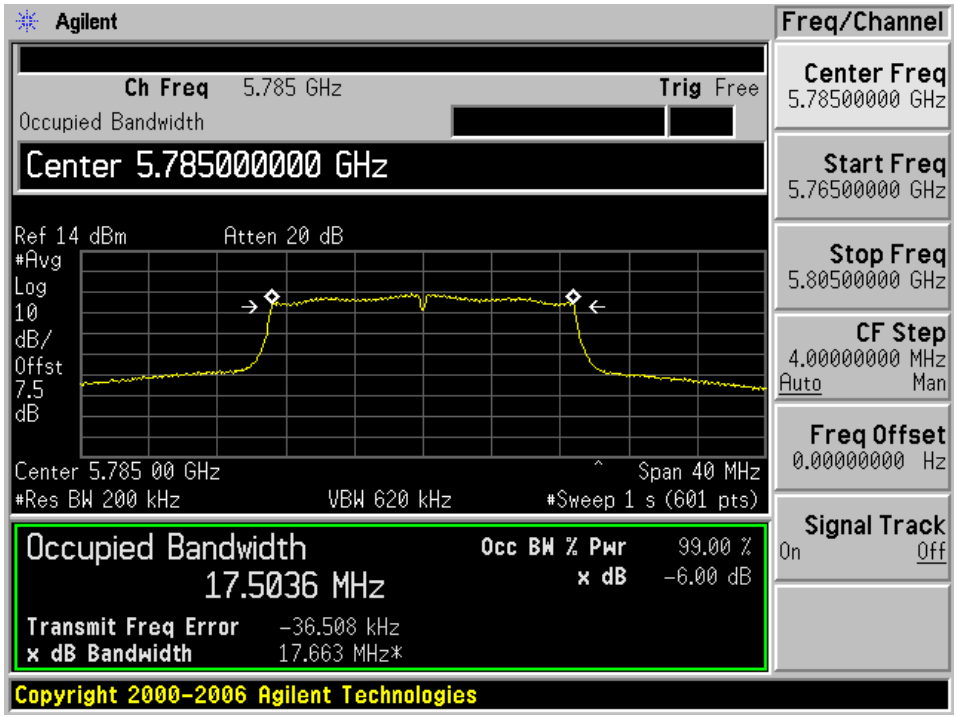
5.8 GHz 802.11n

Main Antenna Port

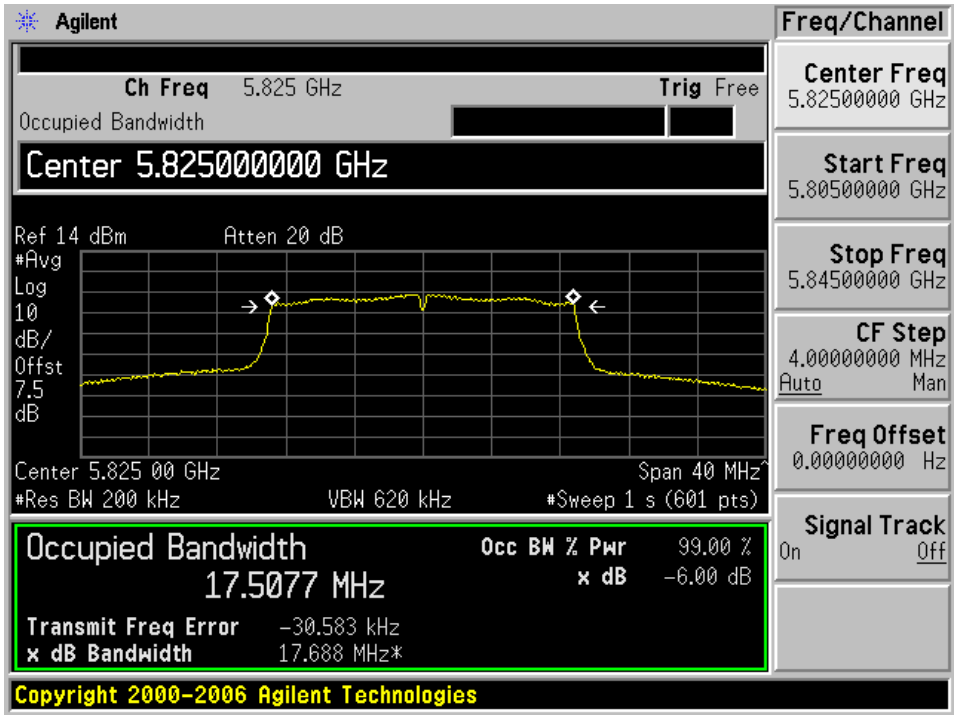
Low channel



Middle channel

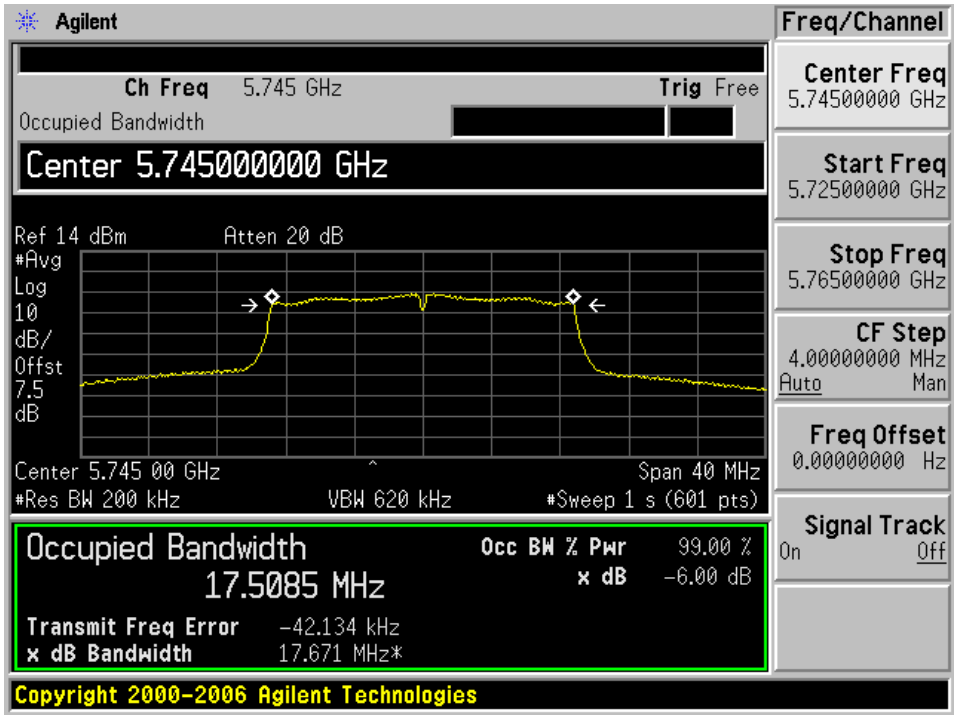


High channel

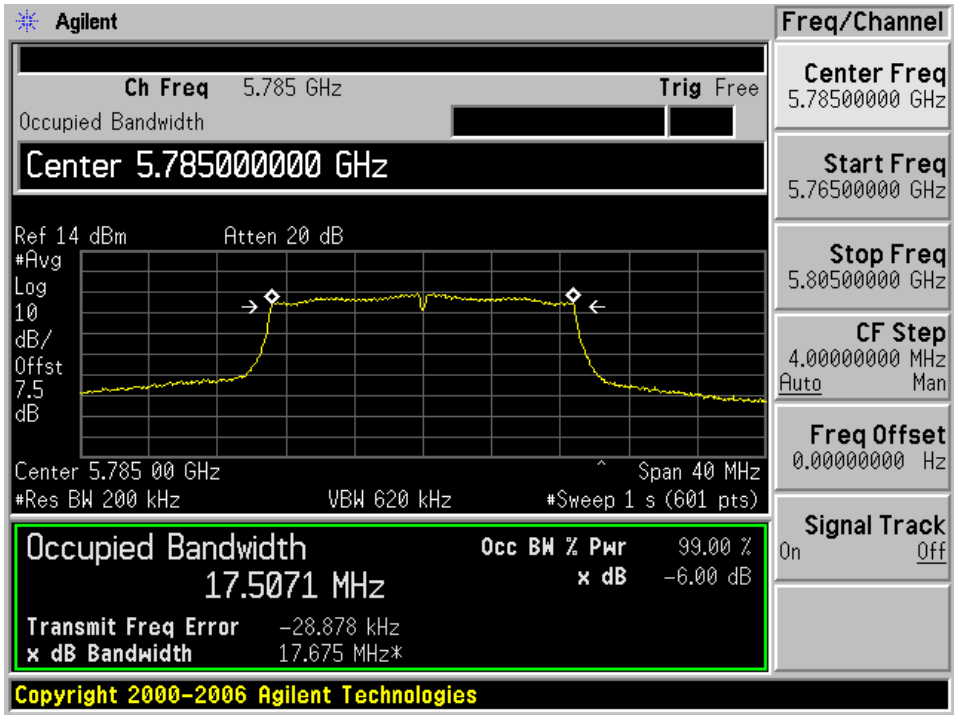


Aux Antenna Port

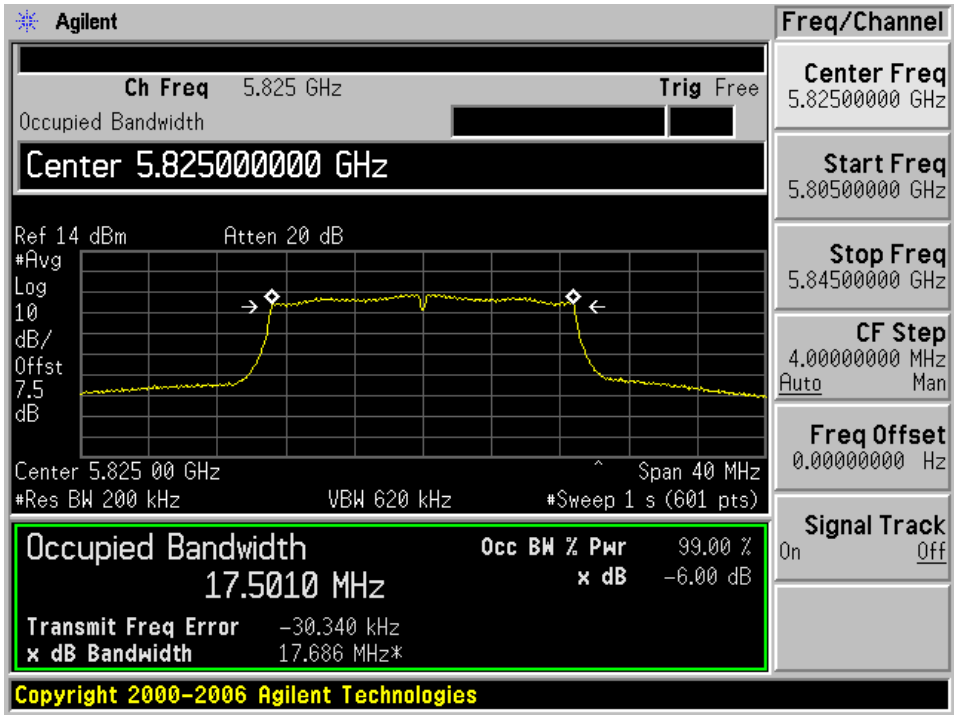
Low channel



Middle channel



High channel



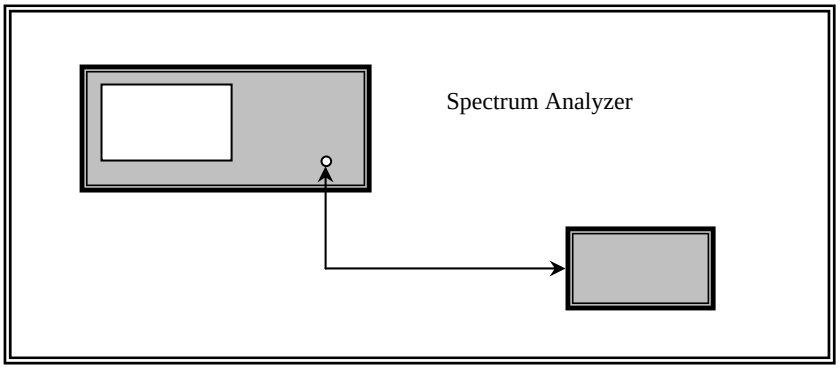
10 FCC §15.247(b) & IC RSS-210 §A8.4 - Peak Output Power Measurement

10.1 Applicable Standard

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

10.2 Measurement Procedure

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



10.3 Test Equipment List and Details

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

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

10.4 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Lionel Lara from 2011-12-18 to 2011-12-20 at RF Test Site.

10.5 Test Results

2.4 GHz Band:

Antenna Port	Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11b mode					
Main	Low	2412	15.89	30	-14.11
	Middle	2437	15.78	30	-14.22
	High	2462	15.75	30	-14.25
Aux.	Low	2412	15.85	30	-14.15
	Middle	2437	15.83	30	-14.17
	High	2462	15.95	30	-14.05
802.11g mode					
Main	Low	2412	14.51	30	-15.49
	Middle	2437	14.72	30	-15.28
	High	2462	14.70	30	-15.30
Aux.	Low	2412	14.41	30	-15.59
	Middle	2437	14.41	30	-15.59
	High	2462	14.50	30	-15.50
802.11n mode					
Main	Low	2412	12.70	30	-17.30
	Middle	2437	12.62	30	-17.38
	High	2462	12.65	30	-17.35
Aux.	Low	2412	12.46	30	-17.54
	Middle	2437	12.28	30	-17.72
	High	2462	12.49	30	-17.51

5.8 GHz Band:

Antenna Port	Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a mode					
Main	Low	5745	11.05	30	-18.95
	Middle	5785	10.90	30	-19.10
	High	5825	10.91	30	-19.09
Aux.	Low	5745	10.97	30	-19.03
	Middle	5785	10.96	30	-19.04
	High	5825	10.82	30	-19.18
802.11n mode					
Main	Low	5745	10.20	30	-19.80
	Middle	5785	9.72	30	-20.28
	High	5825	9.83	30	-20.17
Aux.	Low	5745	9.86	30	-20.14
	Middle	5785	9.60	30	-20.40
	High	5825	9.55	30	-20.45

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

11.1 Applicable Standard

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

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

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

11.3 Test Equipment List and Details

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

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

11.4 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Lionel Lara from 2011-12-18 to 2011-12-20 at RF Test Site.

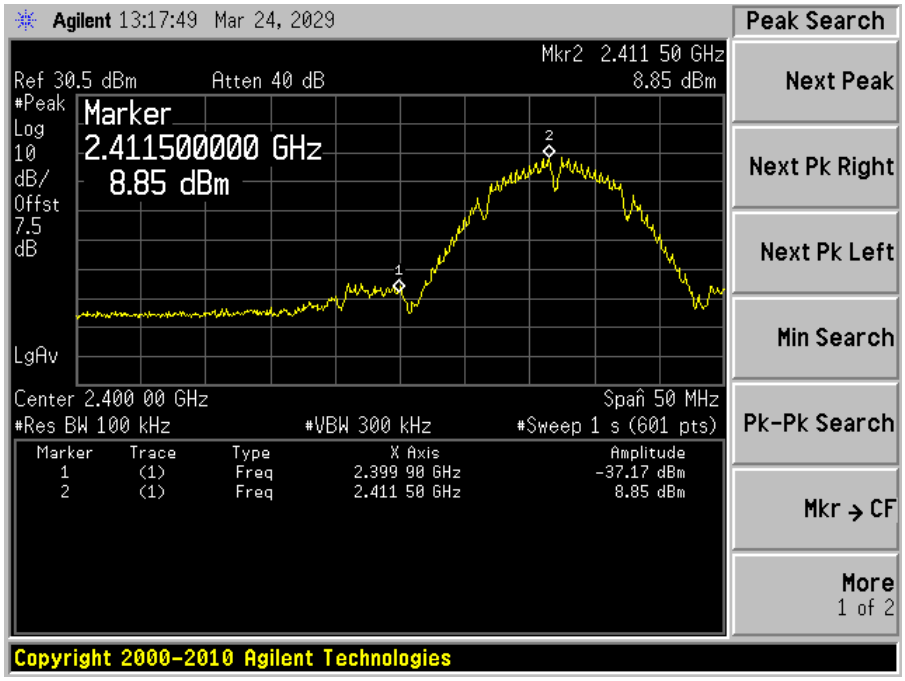
11.5 Test Results

Please refer to following pages for plots of band edge.

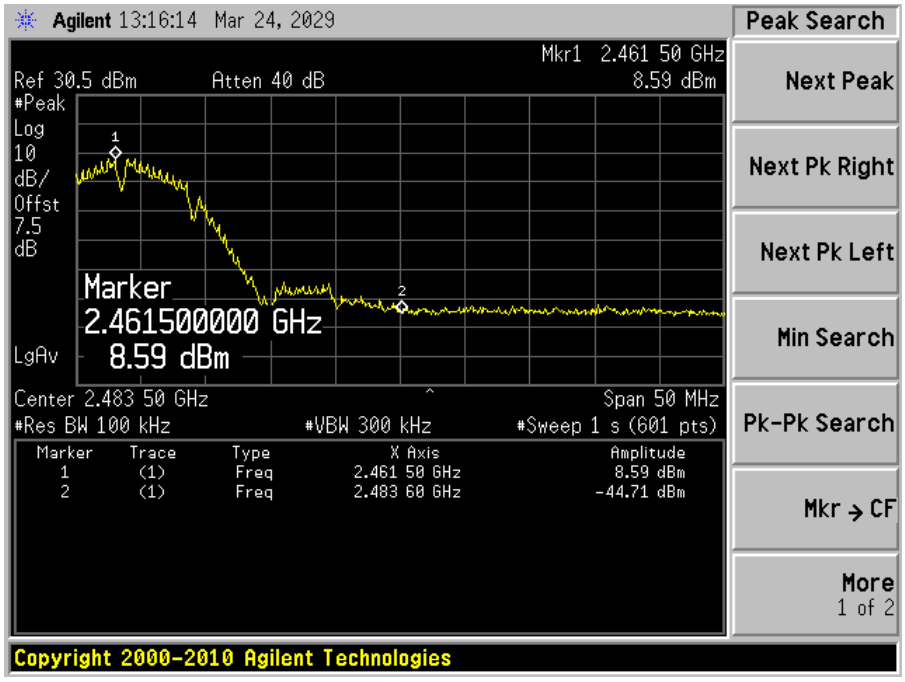
2.4 GHz 802.11b

Main Antenna

Low Band Edge

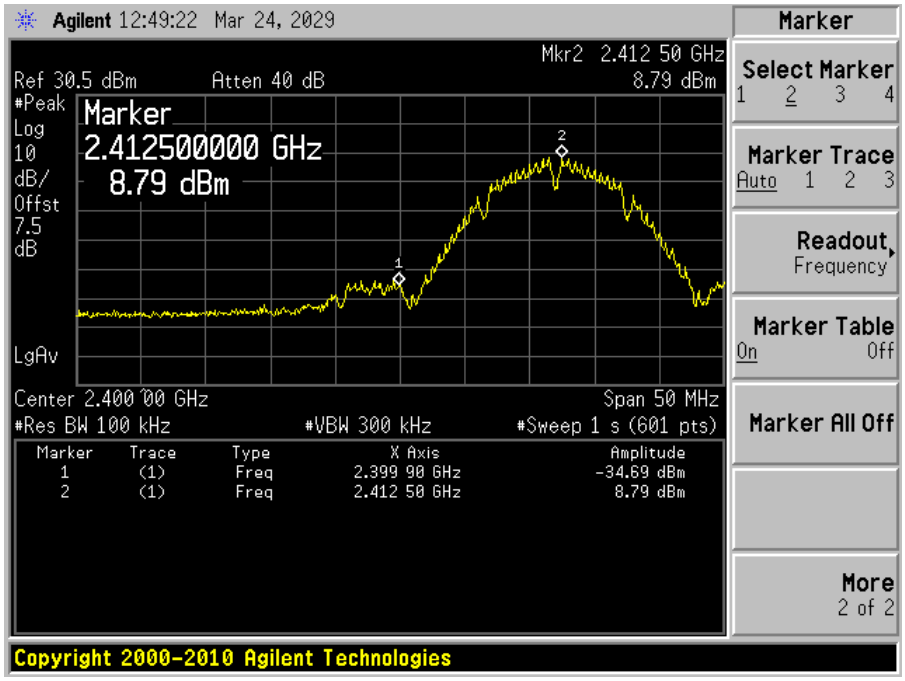


High Band Edge

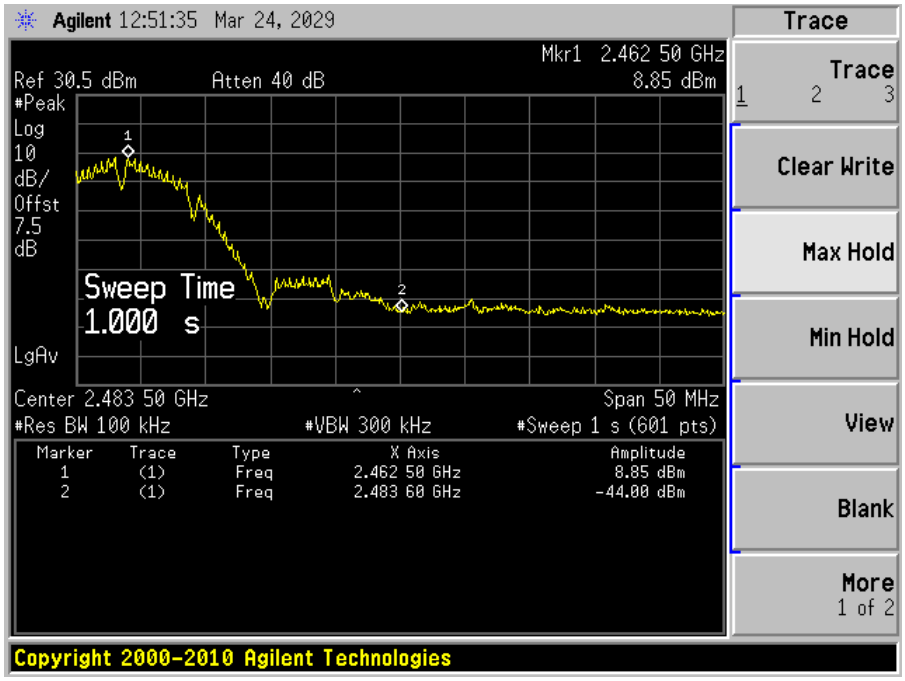


Aux Antenna

Low Band Edge



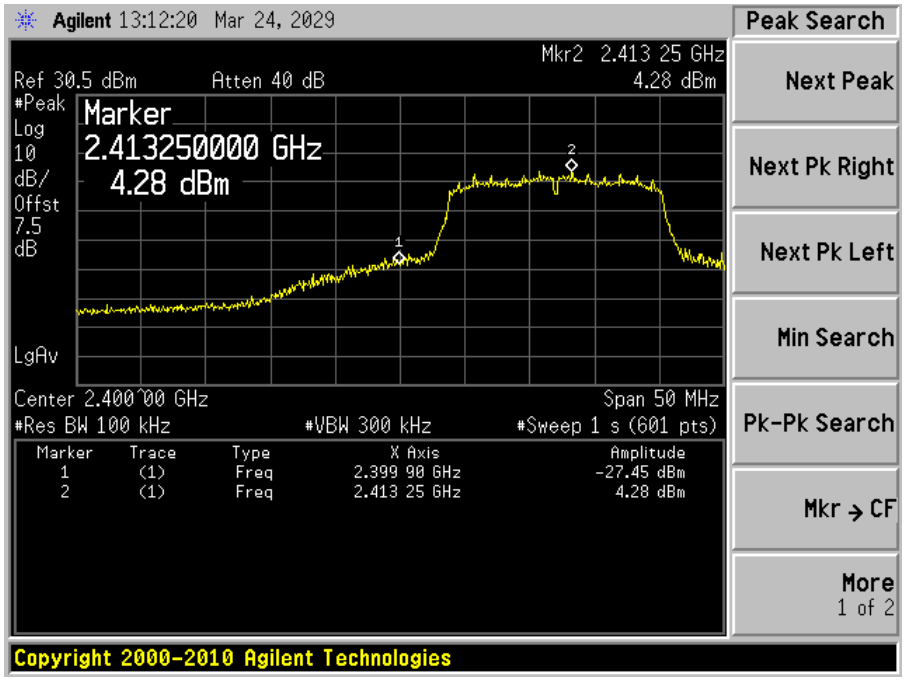
High Band Edge



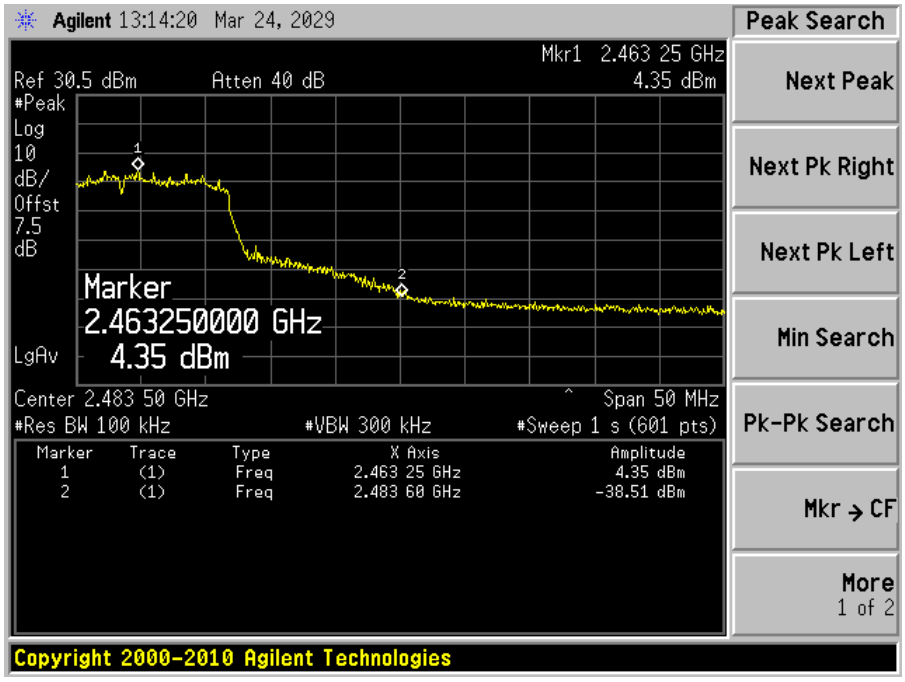
2.4 GHz 802.11g

Main Antenna

Low Band Edge

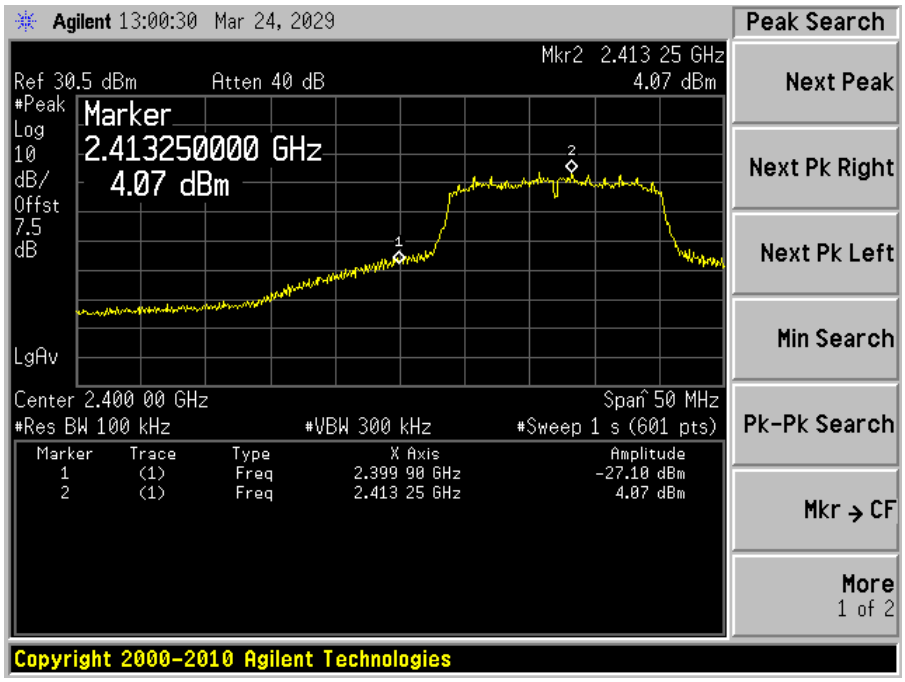


High Band Edge

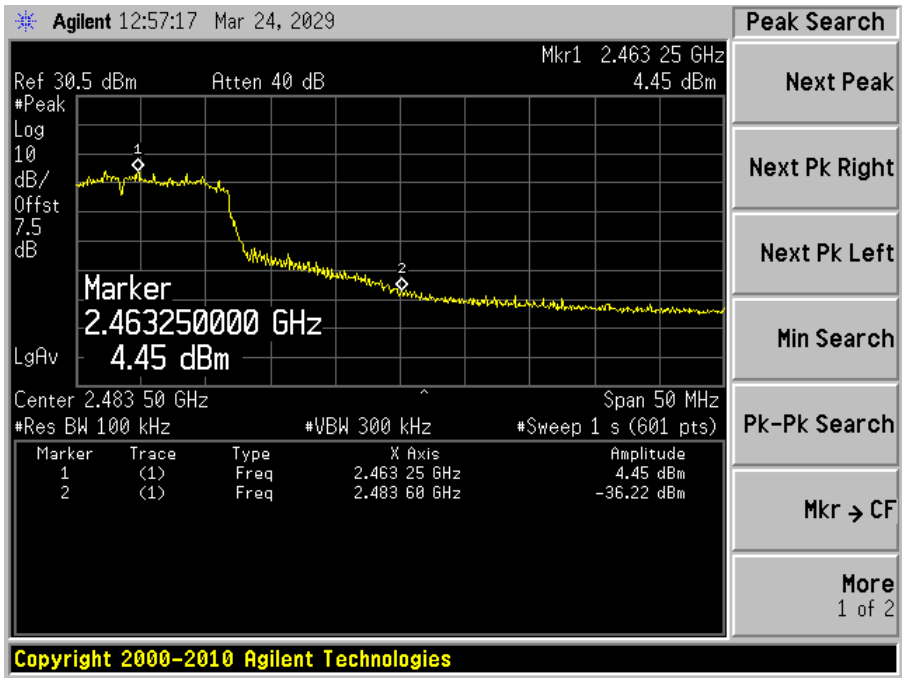


Aux Antenna

Low Band Edge



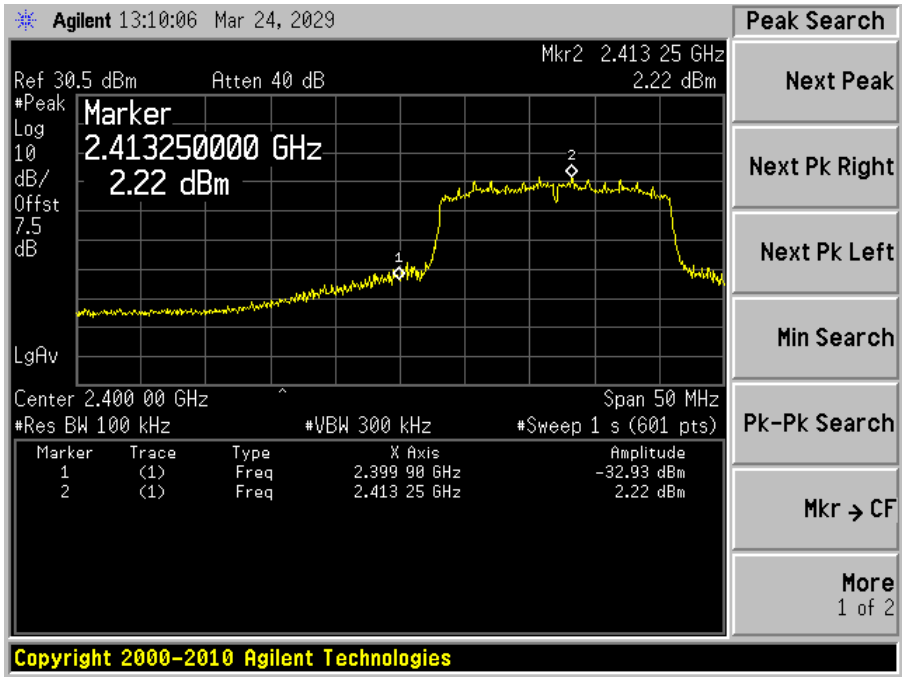
High Band Edge



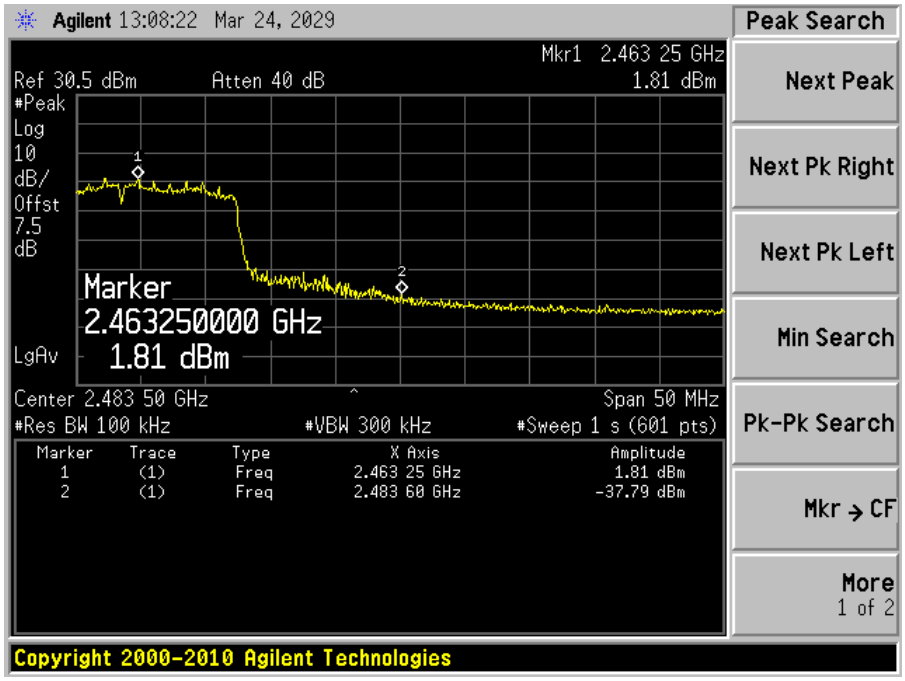
2.4 GHz 802.11n

Main Antenna

Low Band Edge

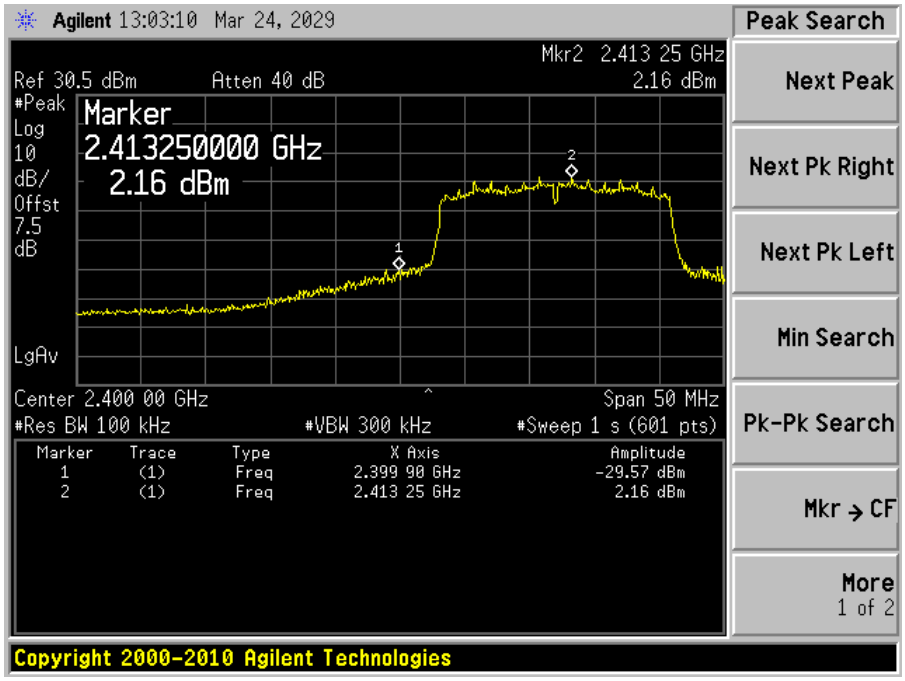


High Band Edge

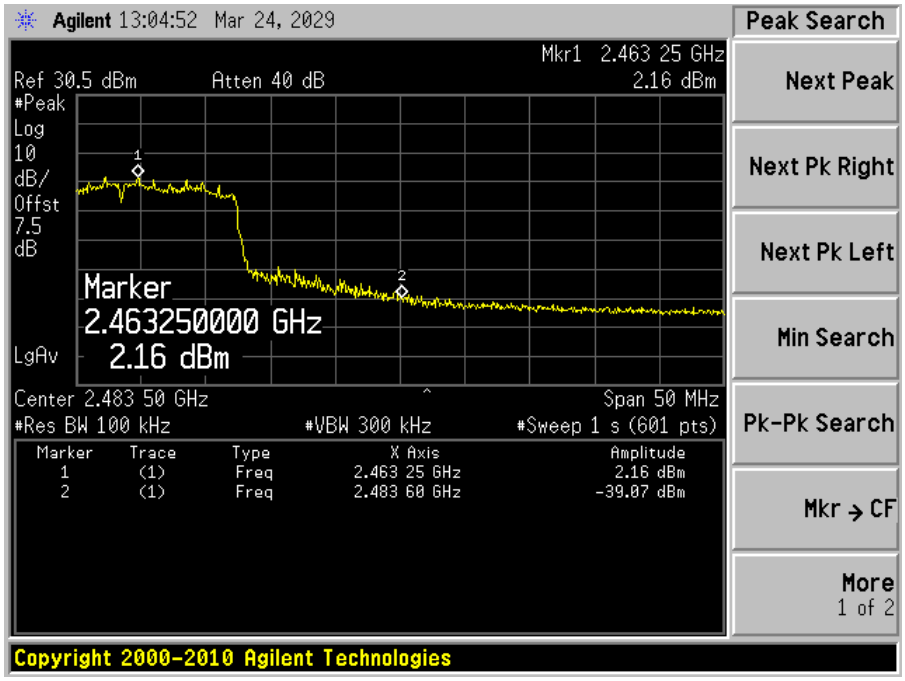


Aux Antenna

Low Band Edge



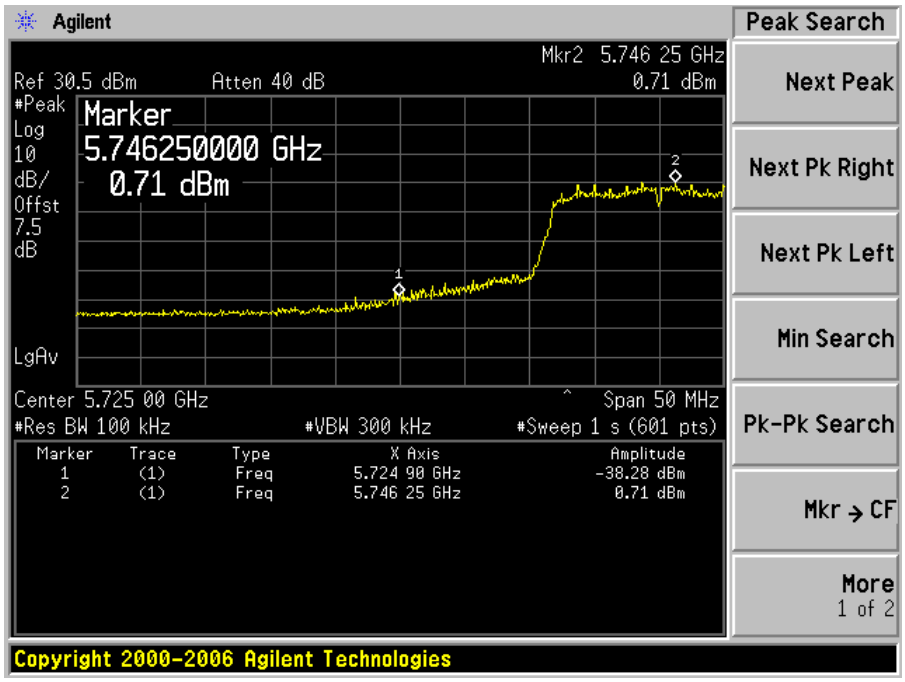
High Band Edge



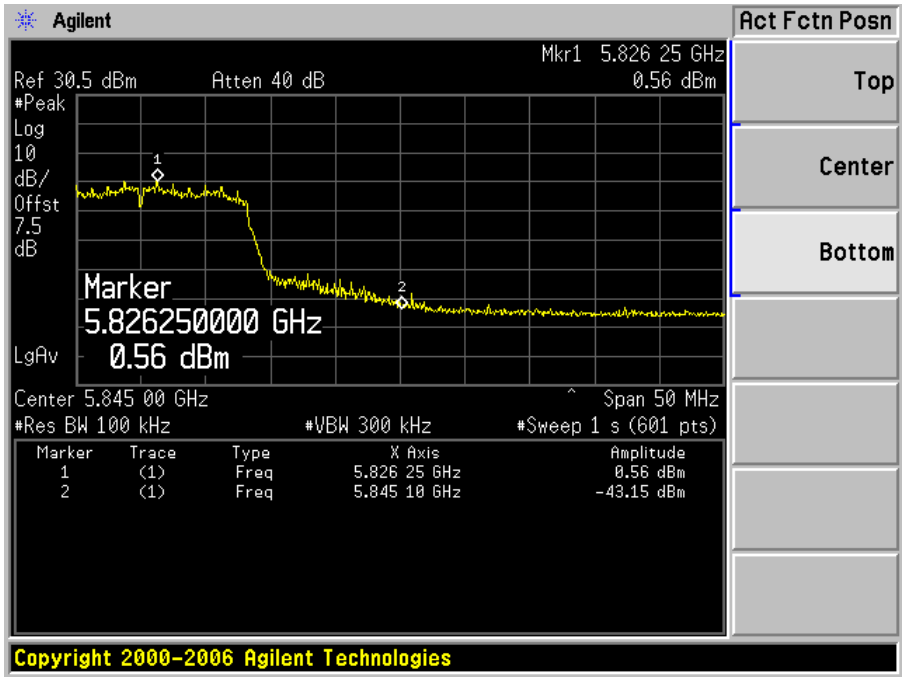
5.8 GHz 802.11a

Main Antenna

Low Band Edge

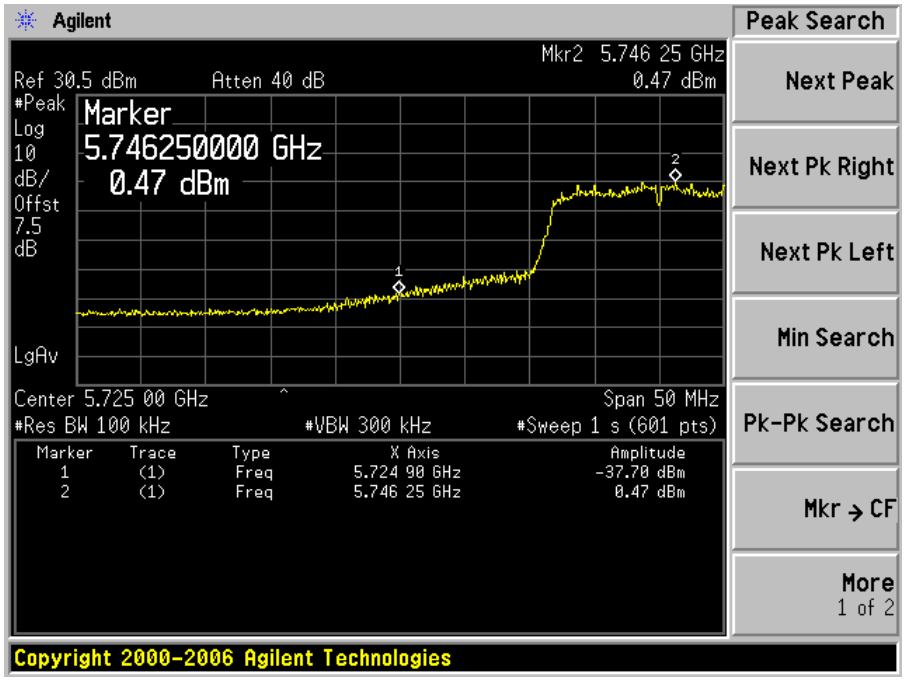


High Band Edge

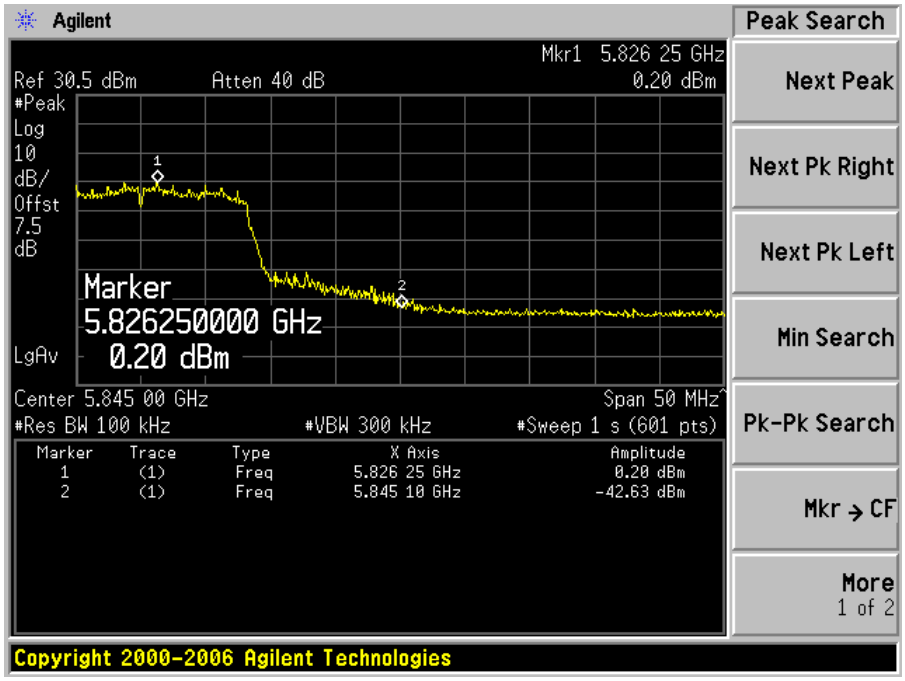


Aux Antenna

Low Band Edge



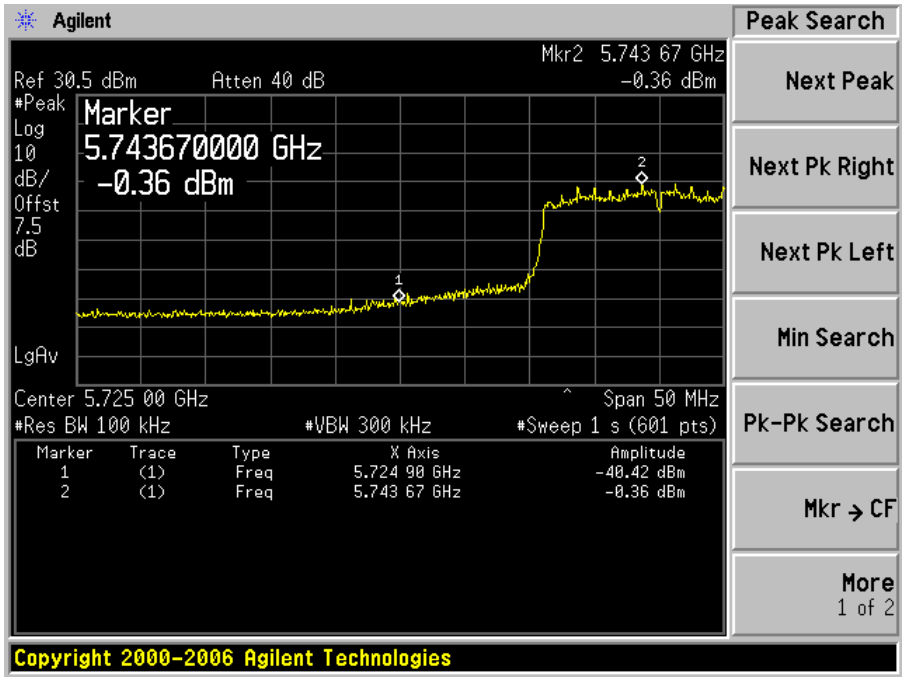
High Band Edge



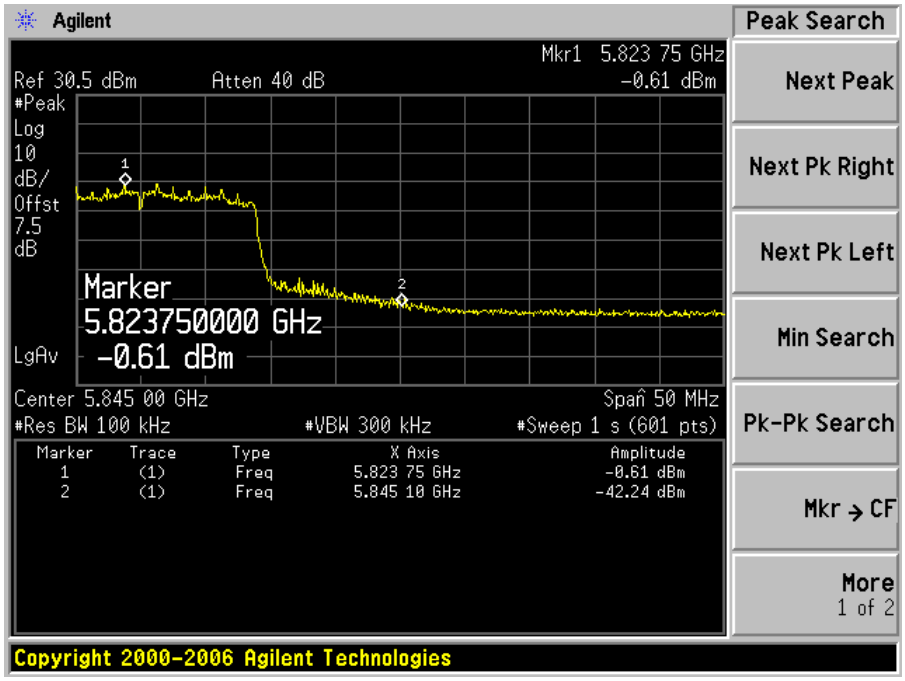
5.8 GHz 802.11n

Main Antenna

Low Band Edge

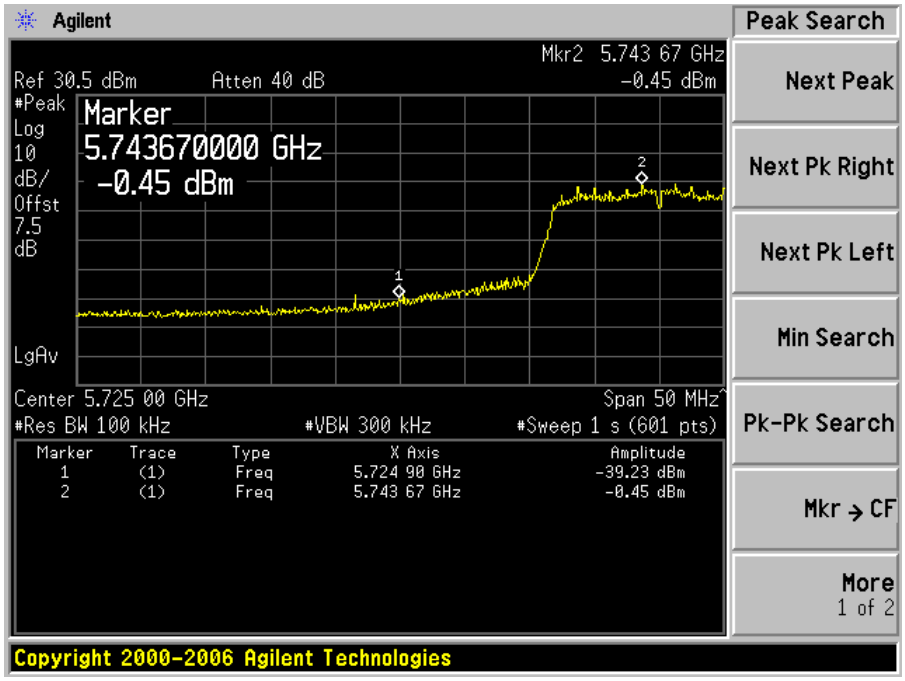


High Band Edge

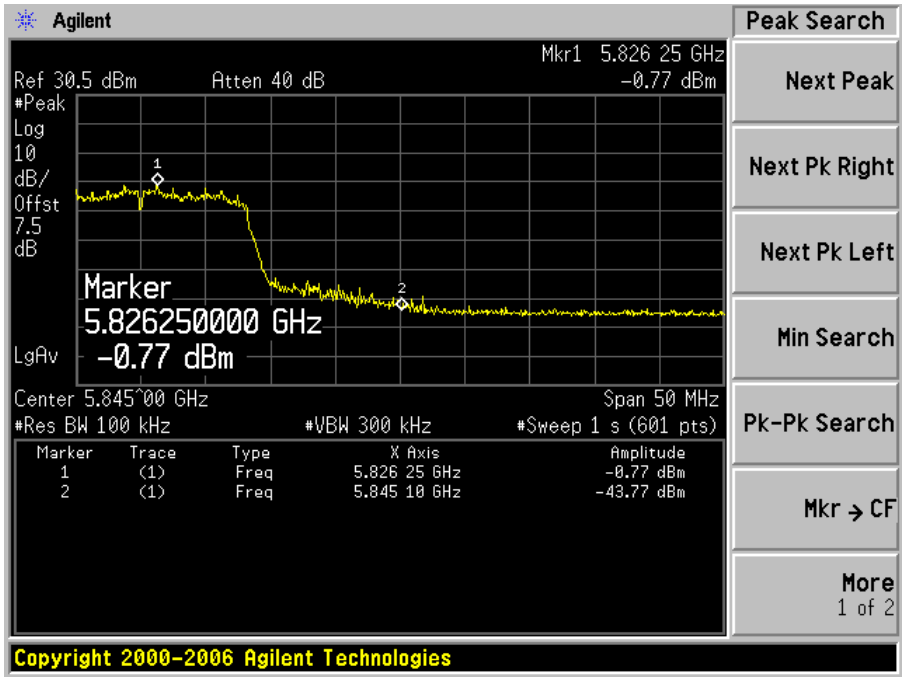


Aux Antenna

Low Band Edge



High Band Edge



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

12.1 Applicable Standard

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

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

12.3 Test Equipment List and Details

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

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

12.4 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Lionel Lara from 2011-12-18 to 2011-12-20 at RF Test Site.

12.5 Test Results

2.4 GHz Band:

Antenna Port	Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm/3kHz)	Results
802.11b mode					
Main	Low	2412	-12.24	8	Compliant
	Middle	2437	-12.80	8	Compliant
	High	2462	-12.59	8	Compliant
Aux.	Low	2412	-12.72	8	Compliant
	Middle	2437	-11.86	8	Compliant
	High	2462	-12.28	8	Compliant
802.11g mode					
Main	Low	2412	-14.77	8	Compliant
	Middle	2437	-14.76	8	Compliant
	High	2462	-14.79	8	Compliant
Aux.	Low	2412	-14.94	8	Compliant
	Middle	2437	-15.01	8	Compliant
	High	2462	-14.45	8	Compliant
802.11n mode					
Main	Low	2412	-17.48	8	Compliant
	Middle	2437	-17.47	8	Compliant
	High	2462	-17.52	8	Compliant
Aux.	Low	2412	-17.27	8	Compliant
	Middle	2437	-17.31	8	Compliant
	High	2462	-17.55	8	Compliant

5.8 GHz Band:

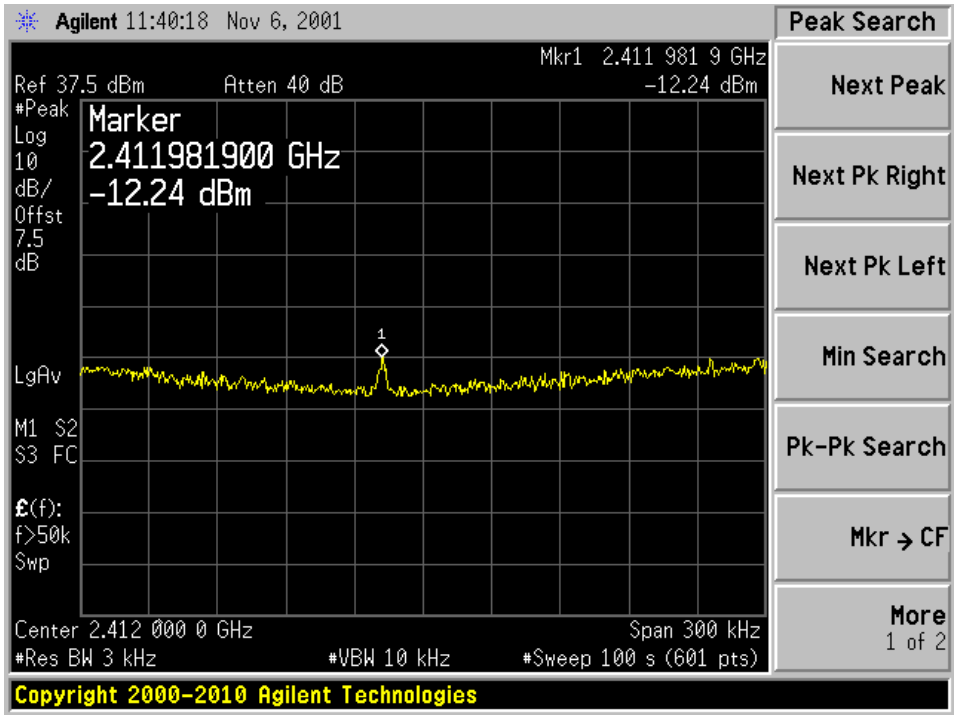
Antenna Port	Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm/3kHz)	Results
802.11a mode					
Main	Low	5745	-16.46	8	Compliant
	Middle	5785	-16.59	8	Compliant
	High	5825	-16.56	8	Compliant
Aux.	Low	5745	-16.29	8	Compliant
	Middle	5785	-16.78	8	Compliant
	High	5825	-16.88	8	Compliant
802.11n mode					
Main	Low	5745	-17.85	8	Compliant
	Middle	5785	-17.98	8	Compliant
	High	5825	-17.39	8	Compliant
Aux.	Low	5745	-18.08	8	Compliant
	Middle	5785	-18.51	8	Compliant
	High	5825	-18.53	8	Compliant

Please refer to the following plots for detailed test results:

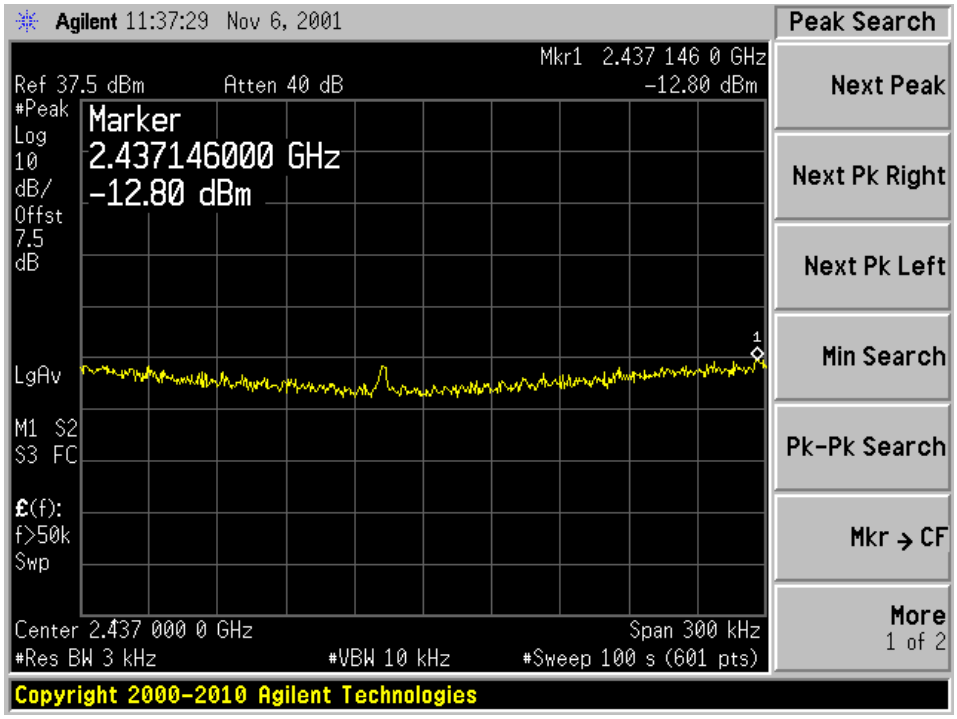
2.4 GHz 802.11b

Main Antenna

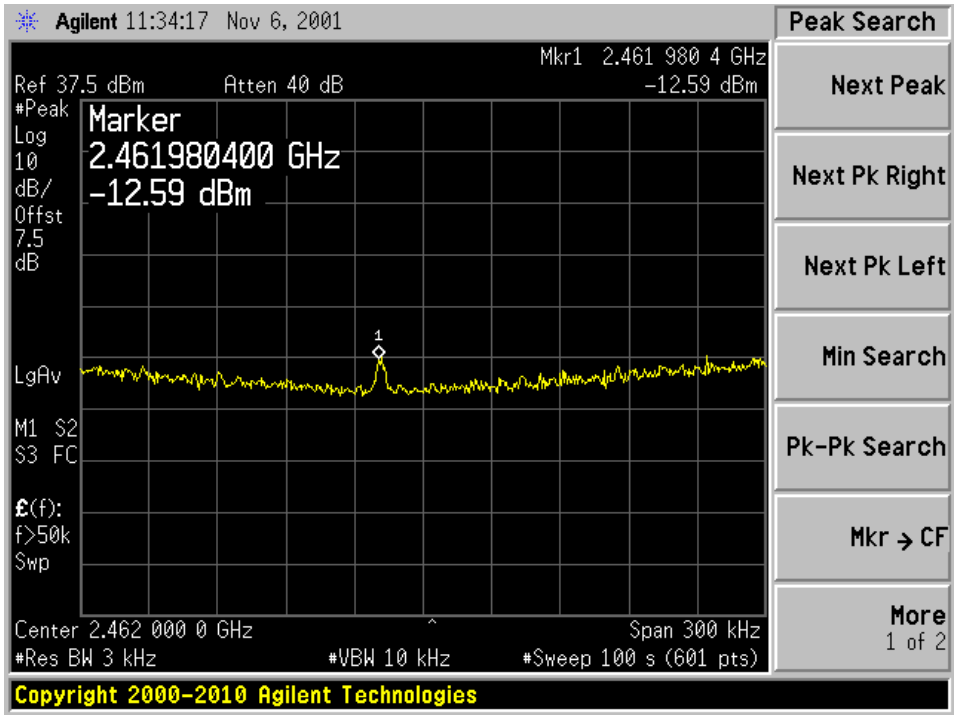
Low channel



Middle channel

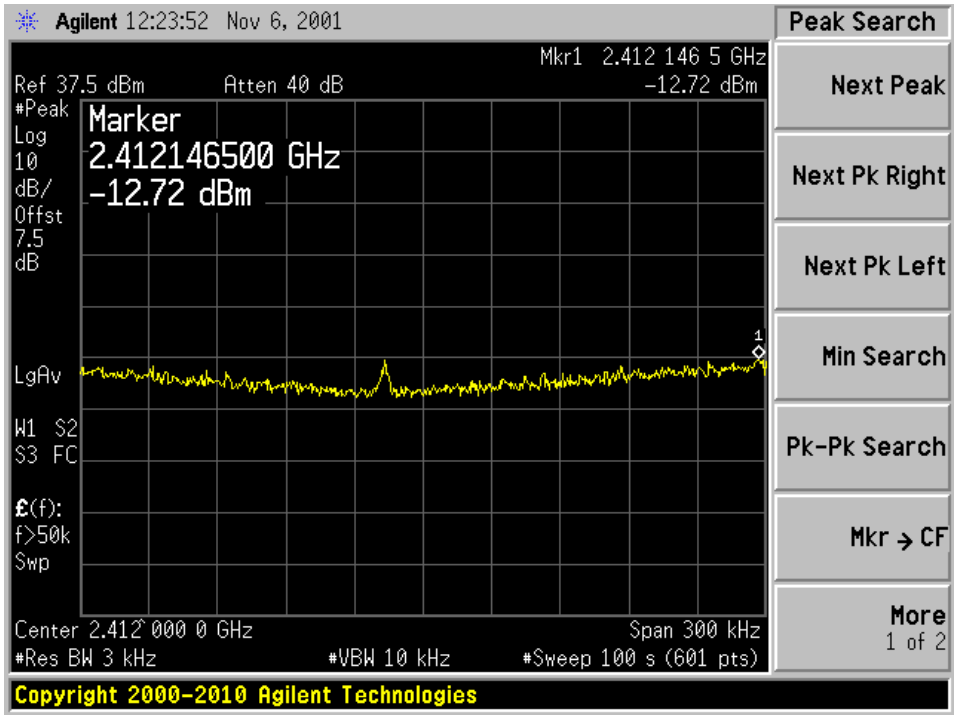


High channel

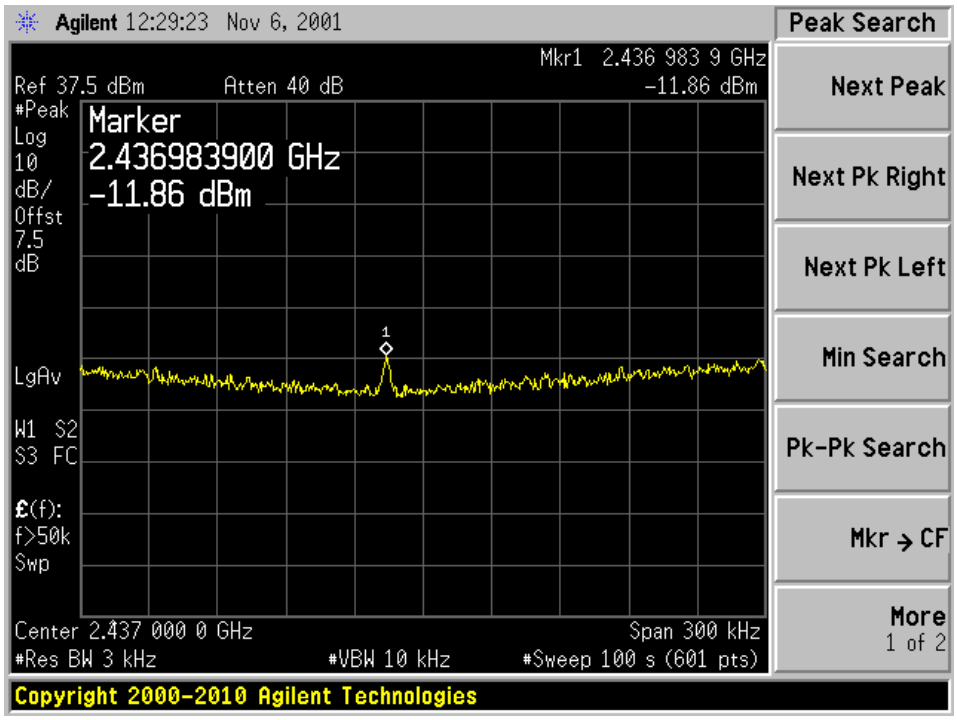


Aux Antenna

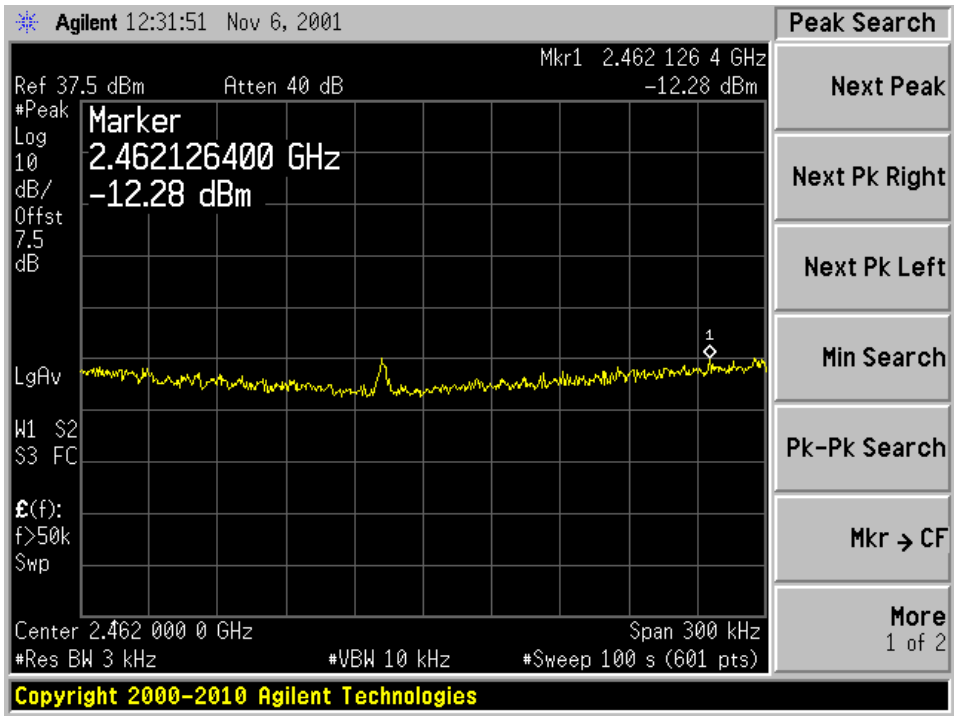
Low channel



Middle channel



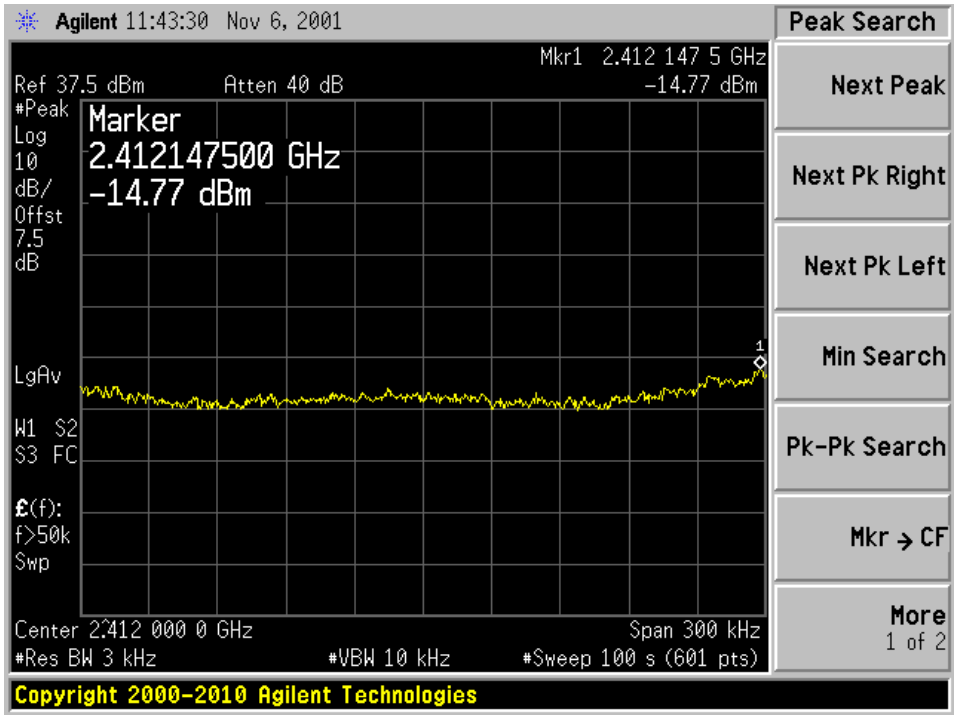
High channel



2.4 GHz 802.11g

Main Antenna

Low channel



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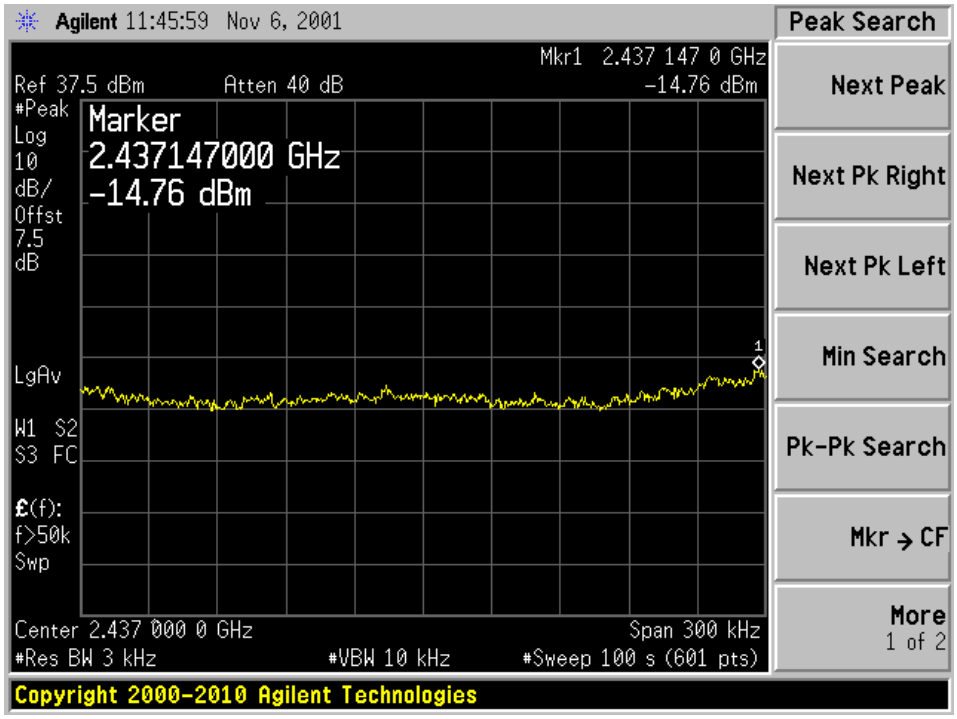

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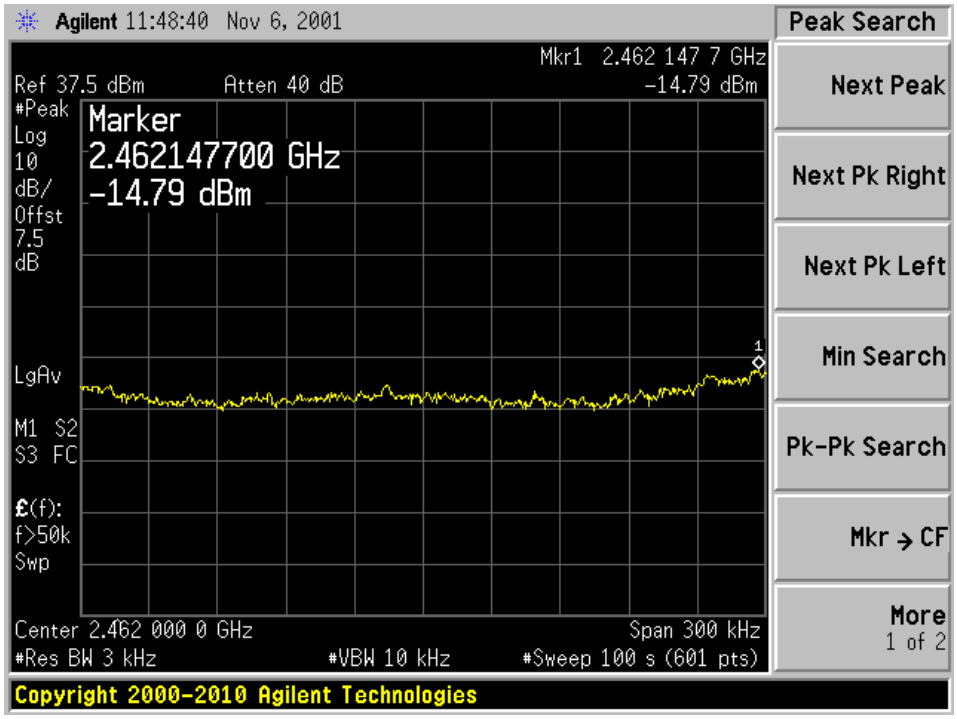
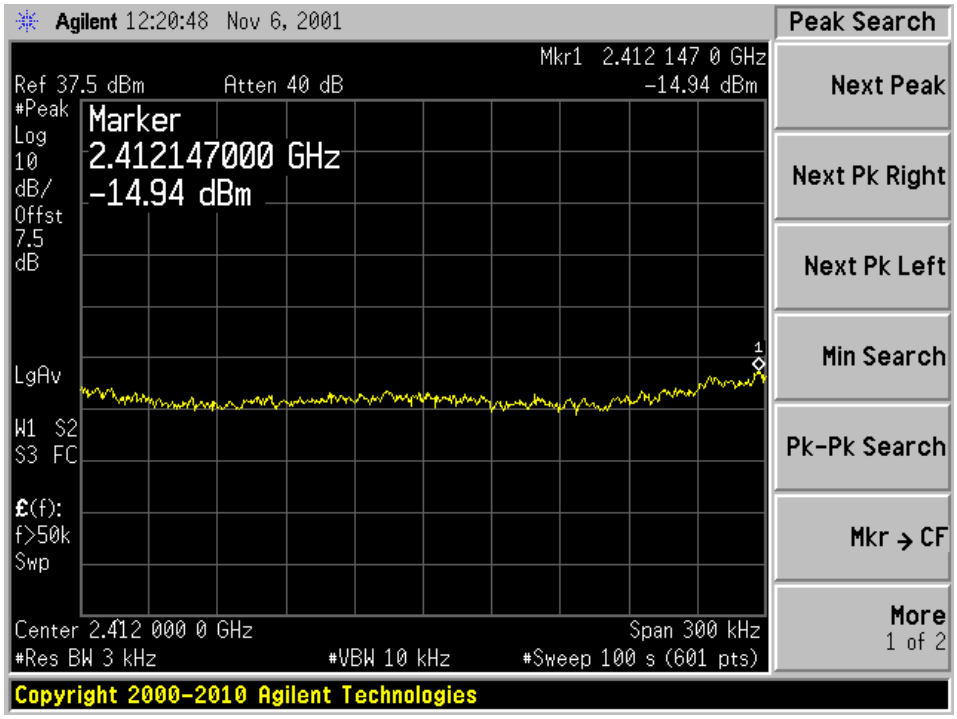


Aux Antenna

Low channel



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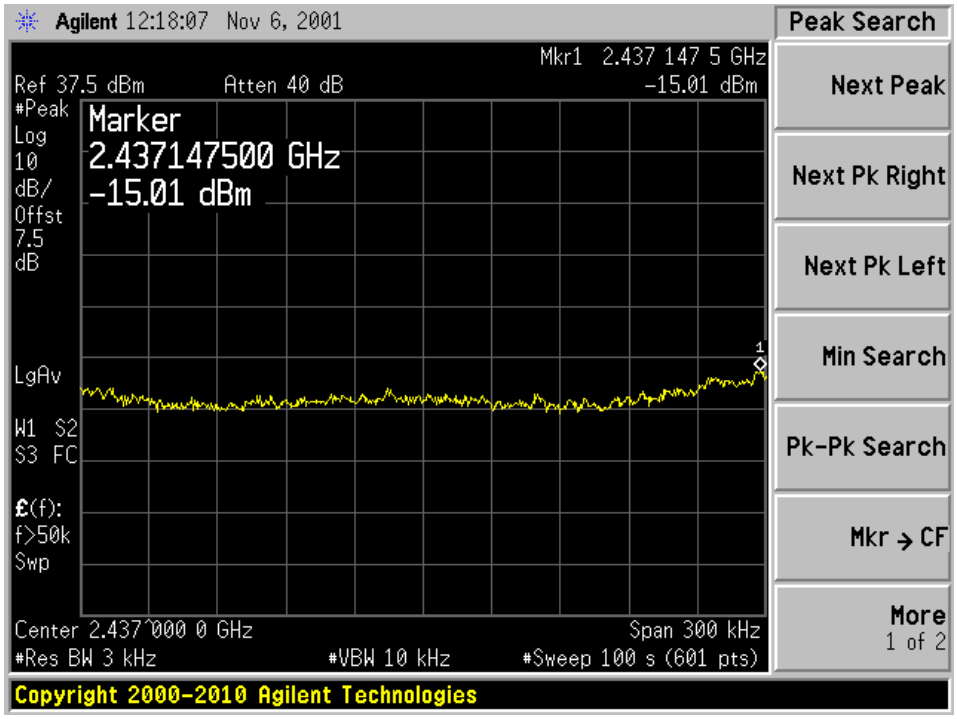
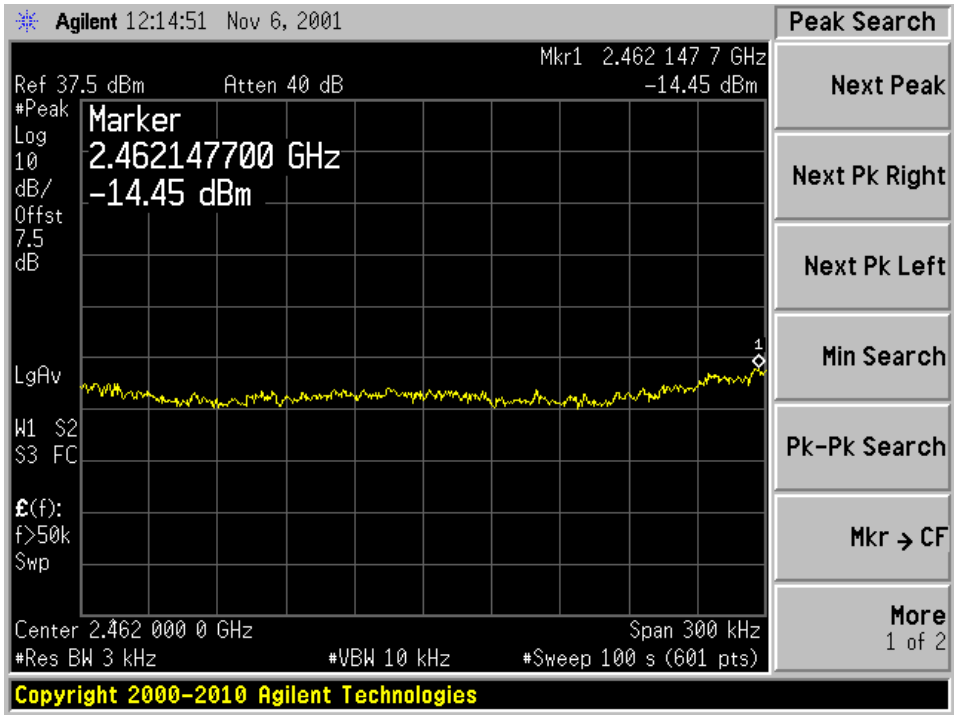


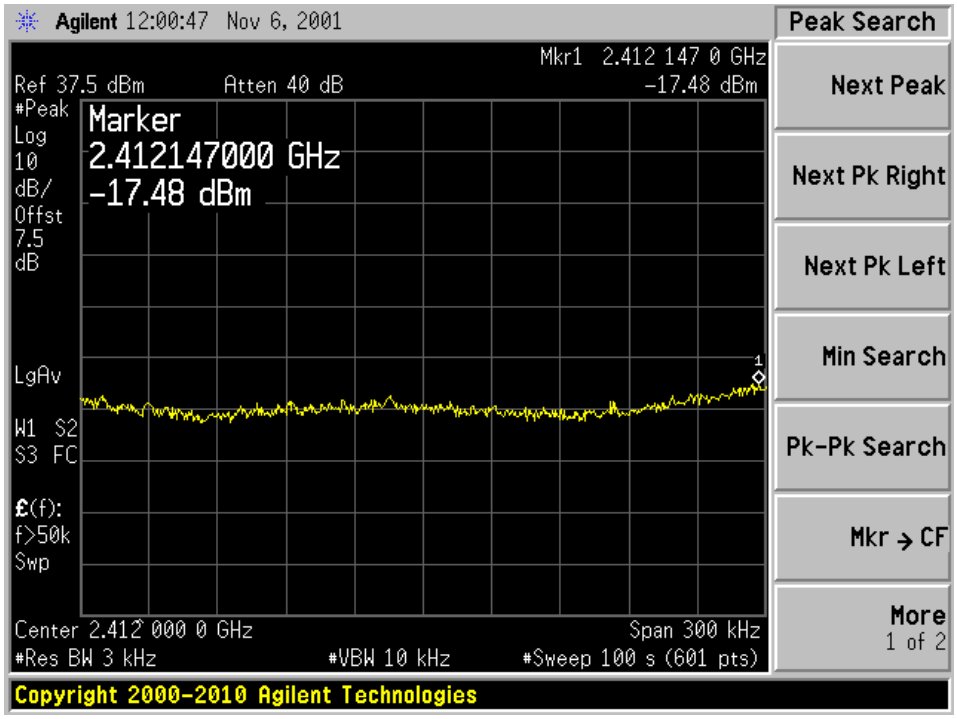
High channel



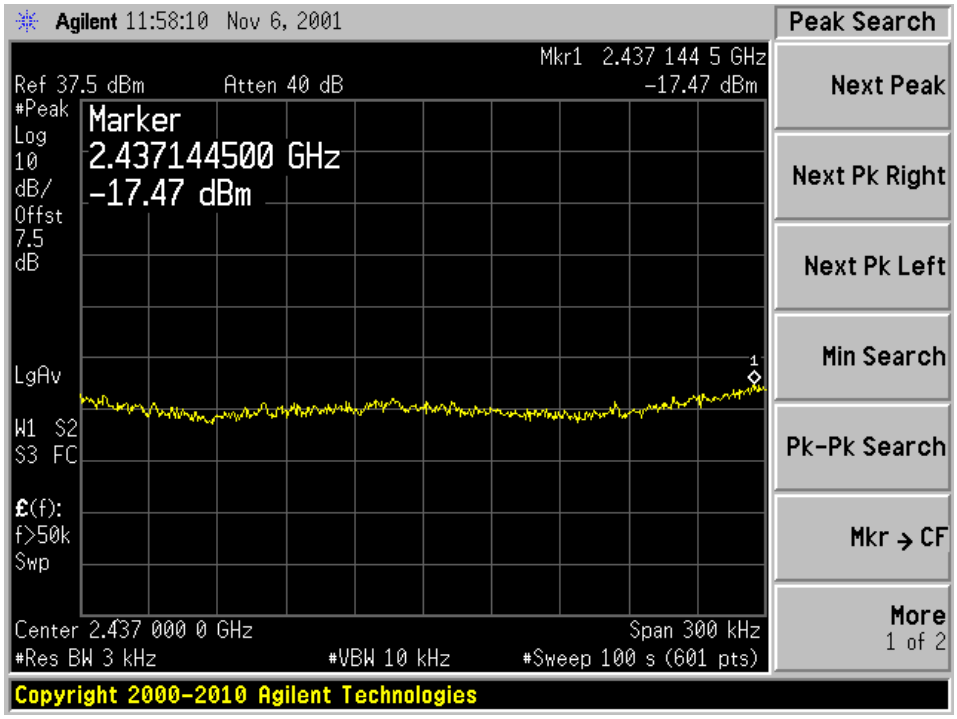
2.4 GHz 802.11n

Main Antenna

Low channel



Middle channel



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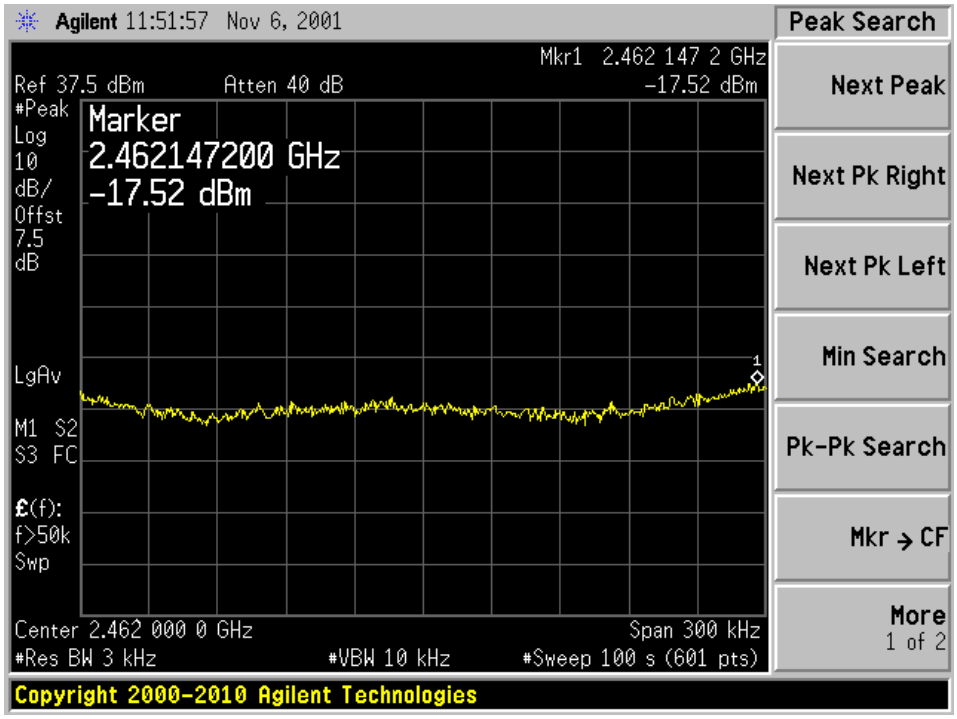
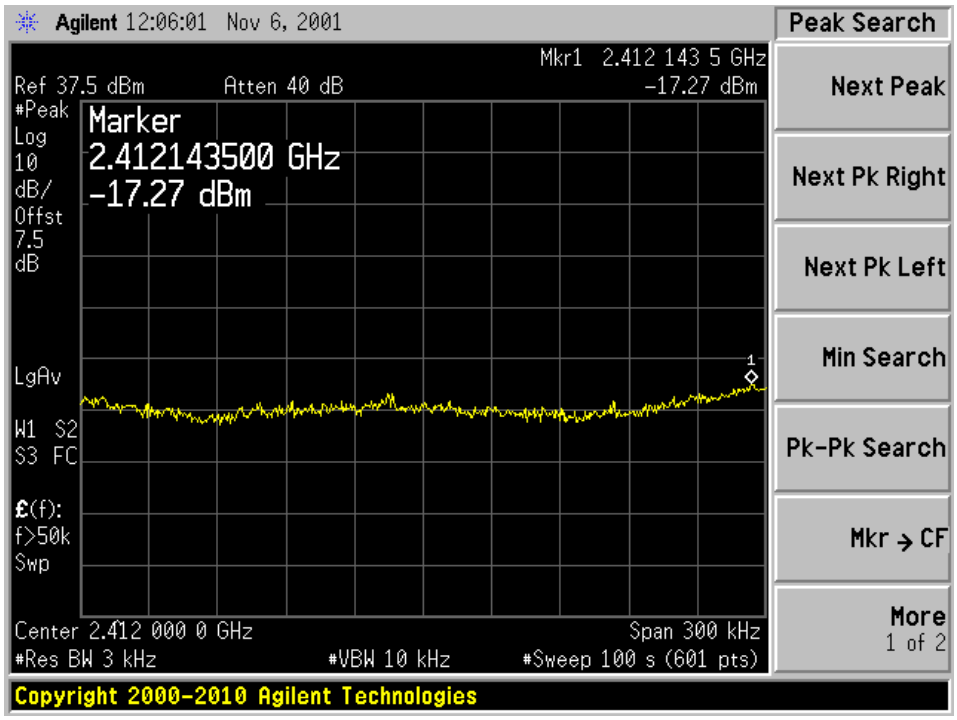
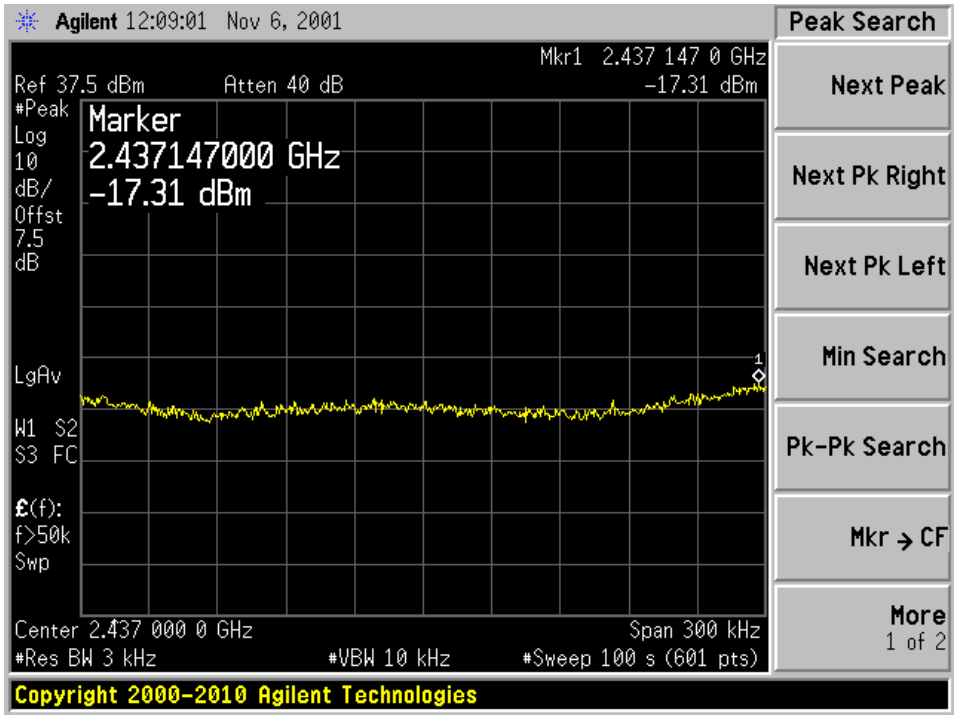


Aux Antenna

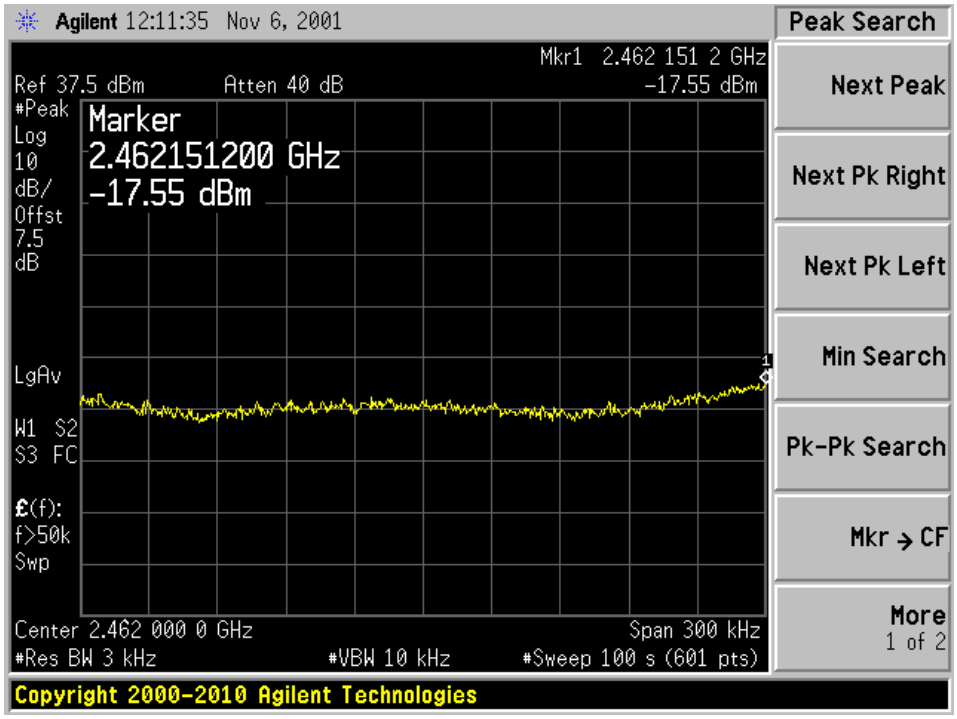
Low channel



Middle channel



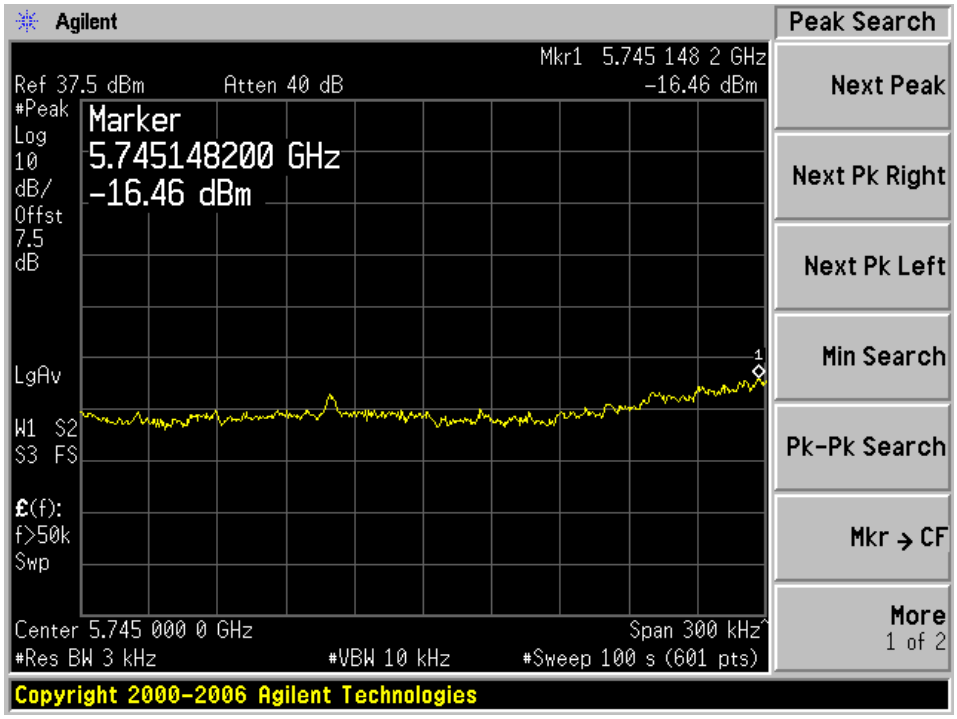
High channel



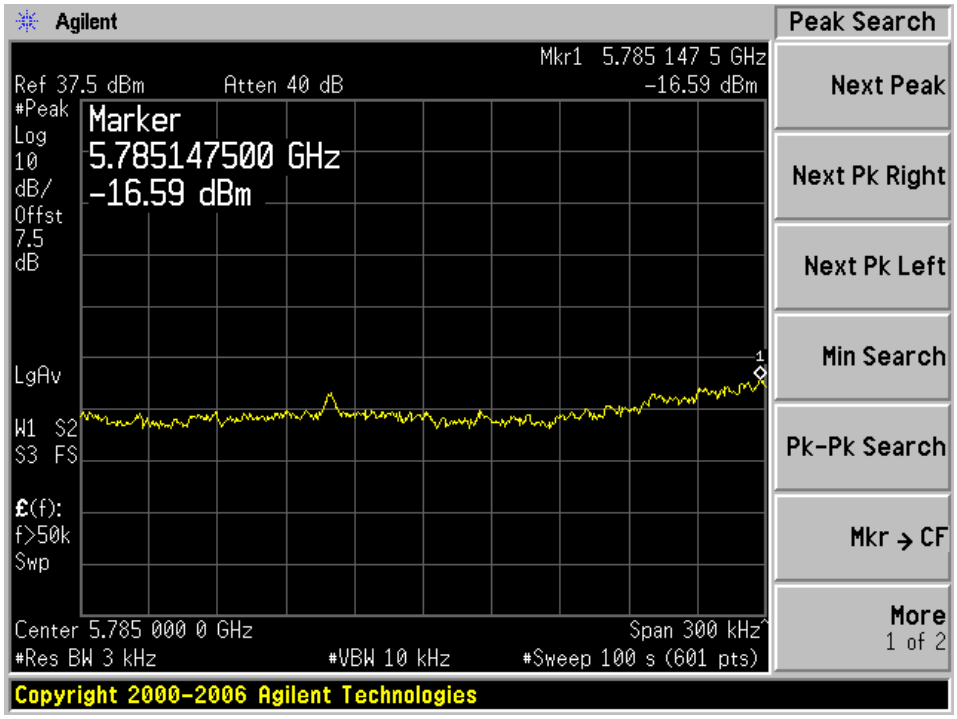
5.8 GHz 802.11a

Main Antenna

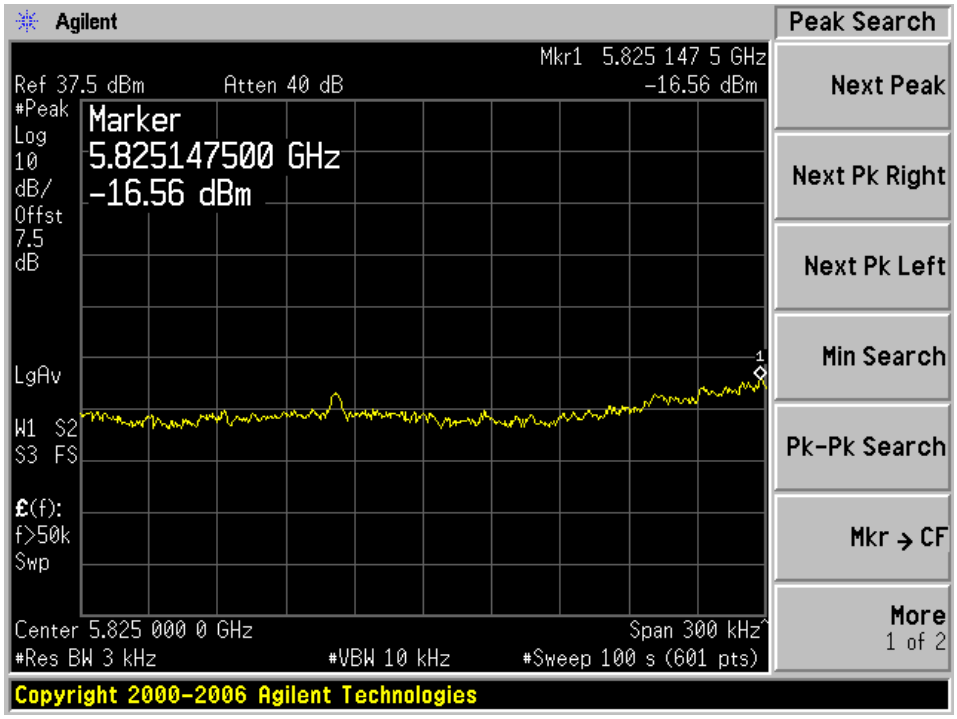
Low channel



Middle channel

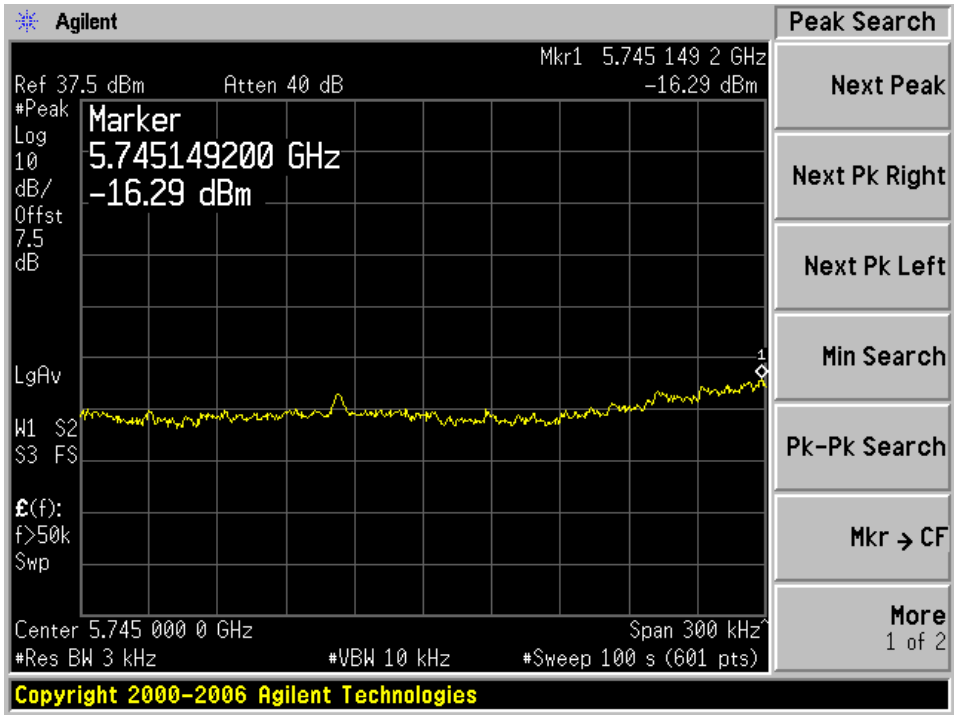


High channel

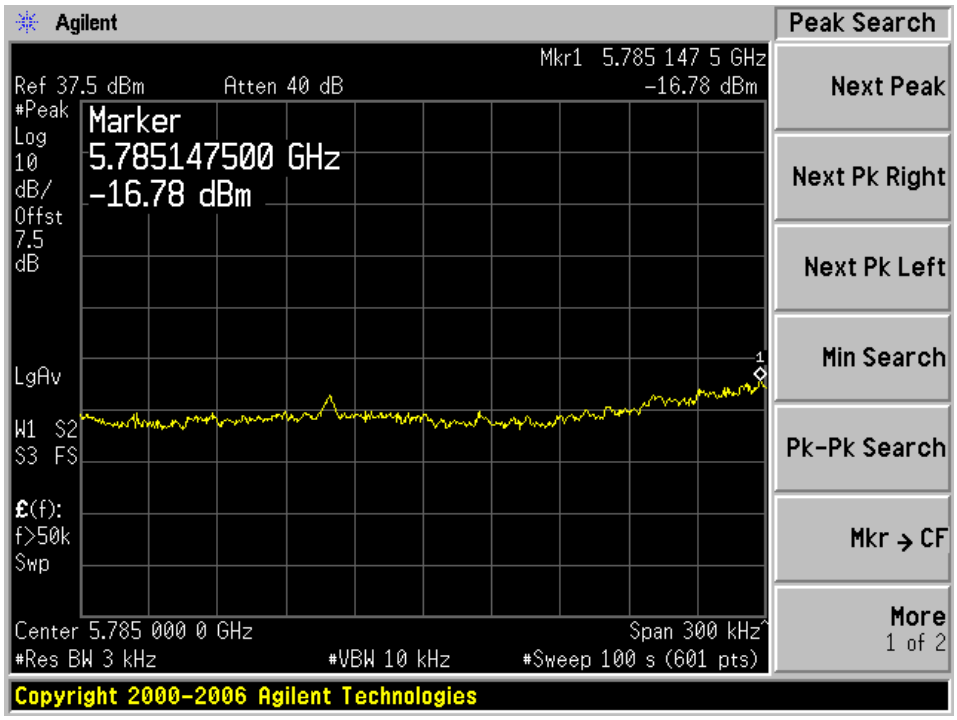


Aux Antenna

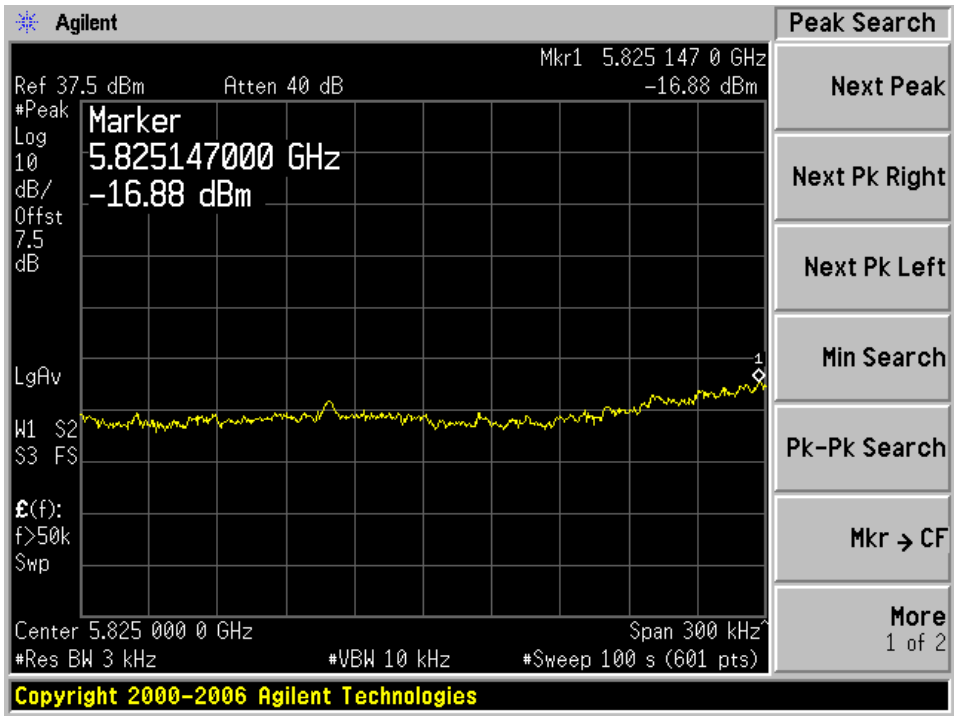
Low channel



Middle channel



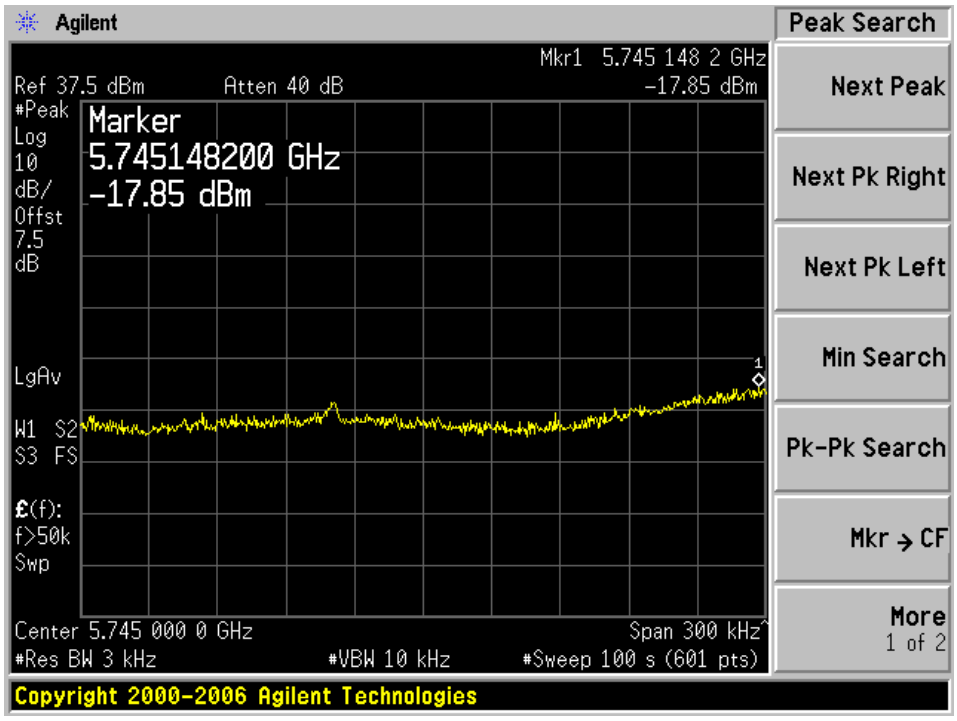
High channel



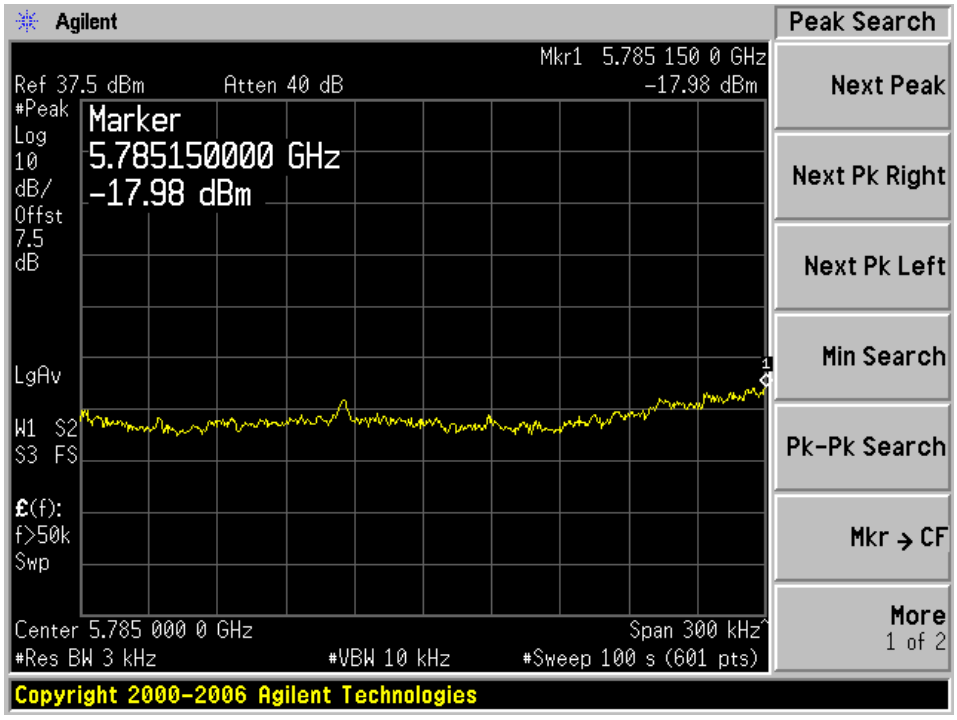
5.8 GHz 802.11n

Main Antenna

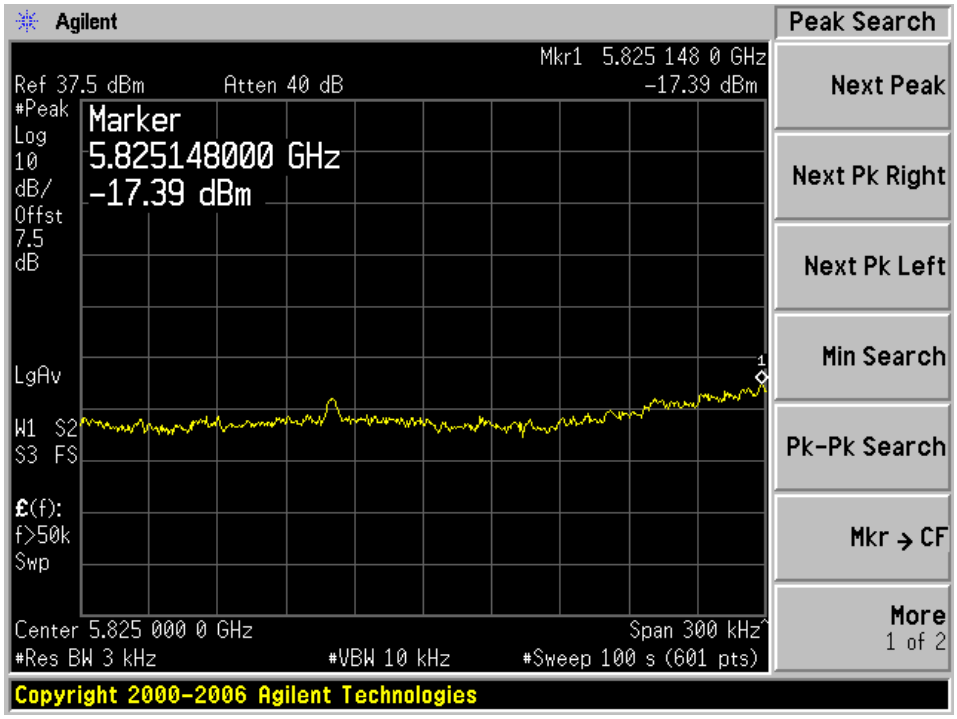
Low channel



Middle channel

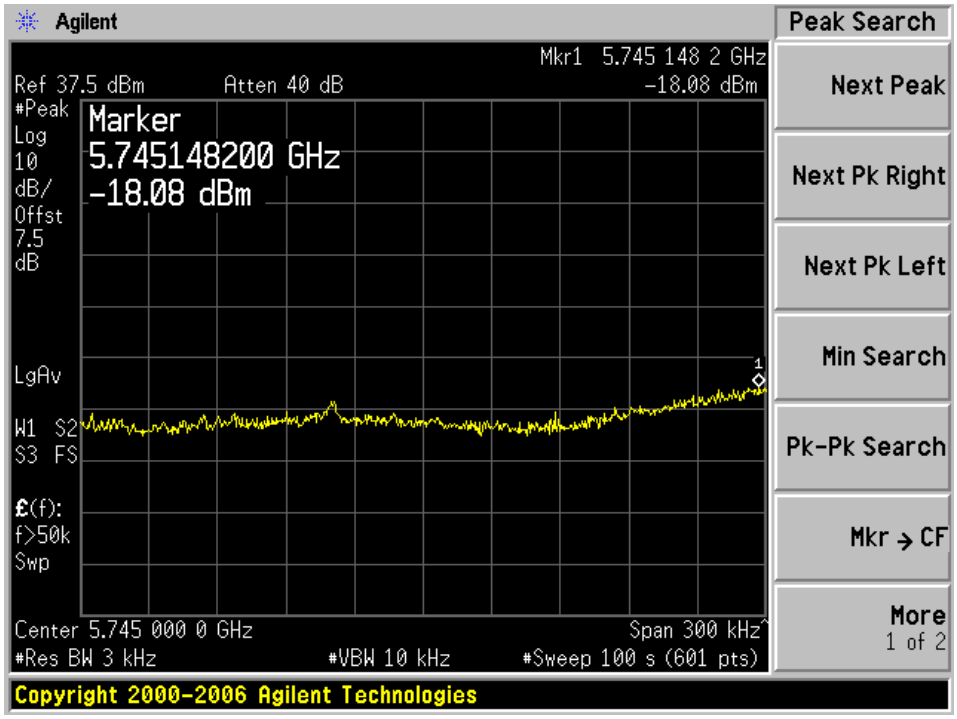


High channel



Aux Antenna

Low channel



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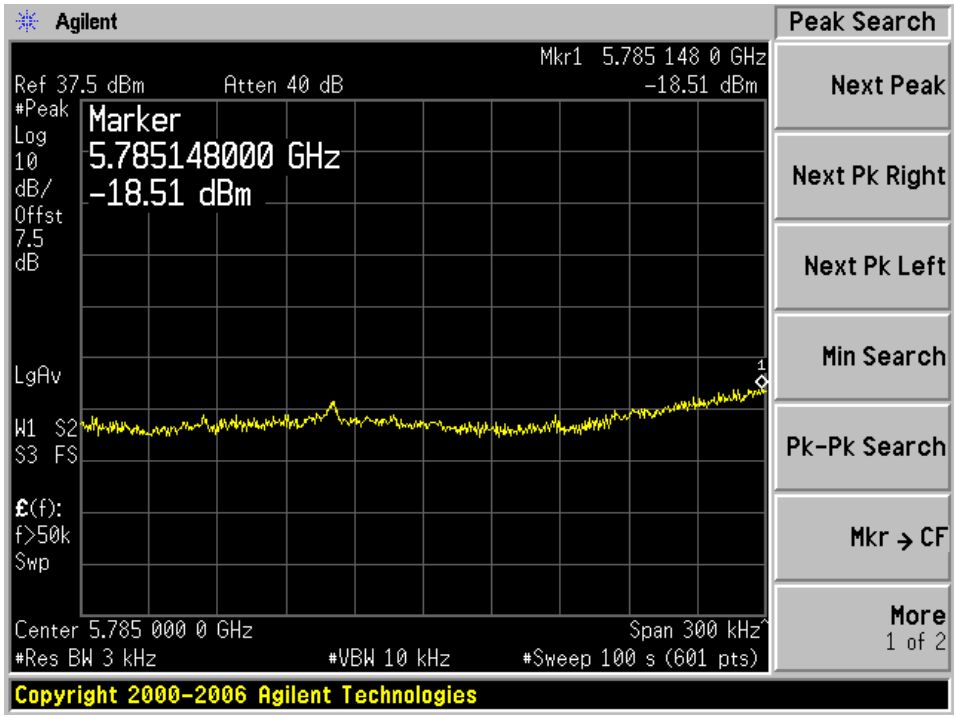
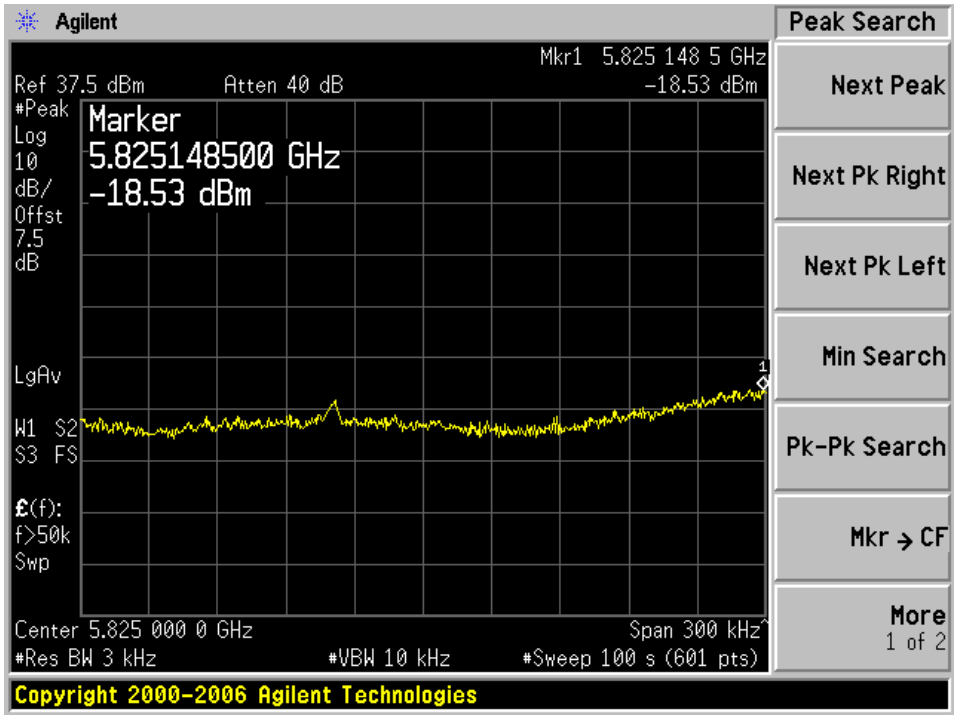


High channel



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

13.1 Applicable Standard

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

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

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

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

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

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

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

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

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

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

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

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

13.2 EUT Setup

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

13.3 Test Procedure

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

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

13.4 Corrected Amplitude & Margin Calculation

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

CA = Ai + AF + CL + Atten – Ga

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

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

Margin = Corrected Amplitude - Limit

13.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2011-09-14
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2011-08-10
EMCO	Horn antenna	3115	9511-4627	2011-10-03
Hewlett Packard	Pre amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre Amplifier	ZVA-183-S	667400960	2011-05-08

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

13.6 Test Environmental Conditions

Temperature:	20-22 °C
Relative Humidity:	35-45%
ATM Pressure:	101-102kPa

The testing was performed by Jerry Huang from 2011-12-18 to 2011-12-20 at 5 meter chamber 3.

13.7 Summary of Test Results

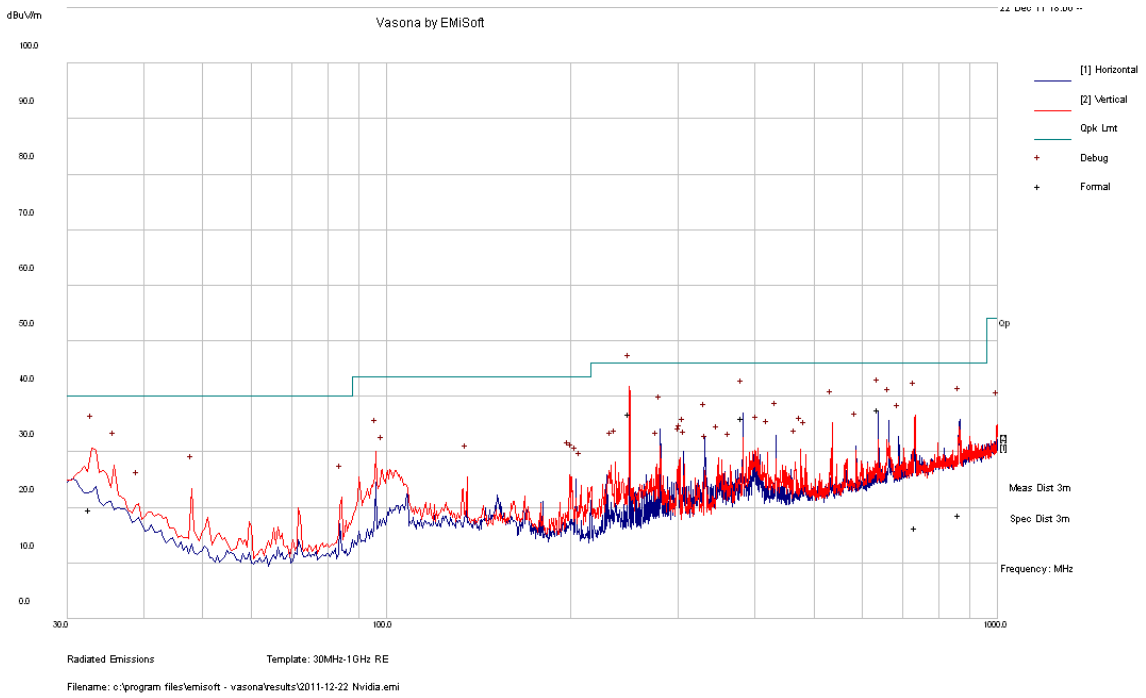
According to the test data, the EUT complied with IC RSS-210/RSS-Gen, with the closest margins from the limit listed below:

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-8.32	375.0303	Horizontal	30 to 25000

13.8 Test Data and Plots

1) 30-1000 MHz, Measured at 3 meters

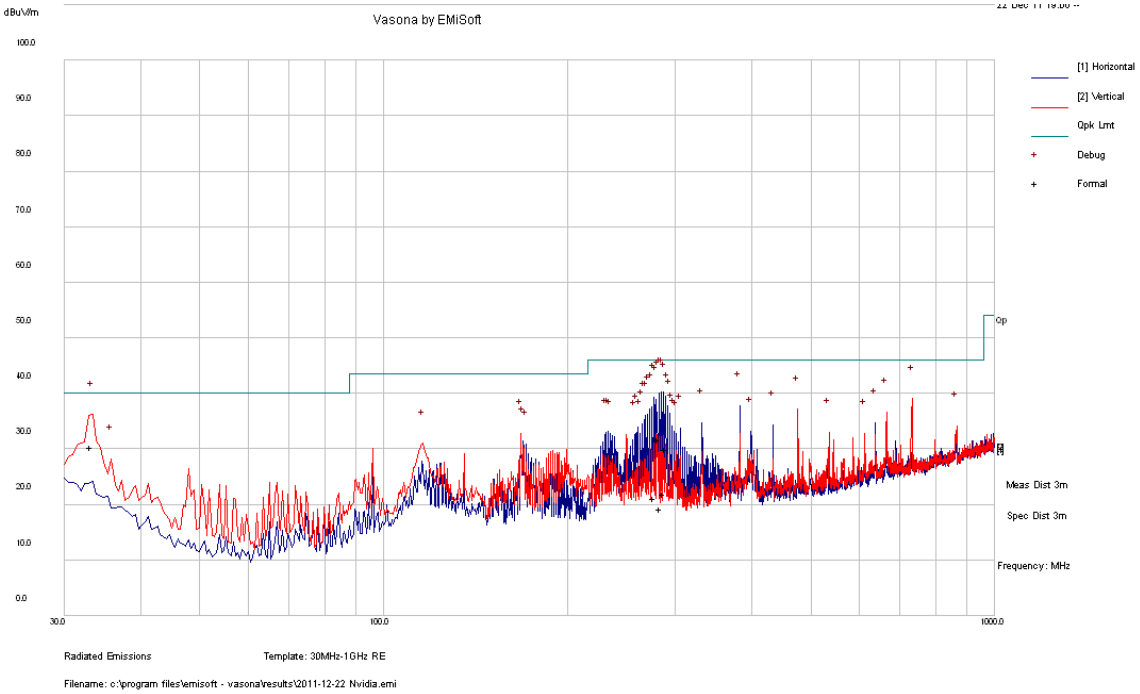
2.4 GHz Receiving Mode



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
375.0303	39.51	116	H	236	46	-8.32
249.955	37.33	100	V	185	46	-9.1
716.0595	34.23	99	H	36	46	-9.83
35.5735	27.22	99	V	2	40	-20.44
240.7053	32.93	201	H	270	46	-27.33
48.9565	23.48	147	V	124	46	-29.6

5 GHz Receiving Mode



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
33.1535	30.42	158	V	32	40	-9.58
281.9368	31.66	117	H	125	46	-14.34
289.176	29.93	99	H	308	46	-16.07
286.7825	21.85	182	H	298	46	-24.15
277.1073	21.22	100	H	59	46	-24.78
284.3165	19.29	138	H	214	46	-26.71

2) Above 1 GHz Measured at 3 meters

2.4 GHz Receiving Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC & IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
-	-	-	-	-	-	-	-	-	-	-	-

Note: All Emissions are under noise floor level.

5 GHz Receiving Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC & IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
-	-	-	-	-	-	-	-	-	-	-	-

Note: All Emissions are under noise floor level.