FCC PART 15.247 & 15.407

EMI MEASUREMENT AND TEST REPORT

For

Aruba Networks

1322 Crossman Avenue
Sunnyvale, CA 94089

FCC ID: Q9DAP65

This Report Concerns:	**Equipment Type:**
☒ Original Report	802.11a/b/g Access Point

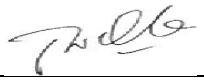
Test Engineer:	Daniel Deng 
Report No.:	R0508183
Report Date:	2005-09-08
Reviewed By:	Richard Lee 
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Aruba Networks's product*, FCC ID: *Q9DAP65*, model number: *AP65* or the "EUT" as referred to in this report is an 802.11a/b/g Access Point. The EUT is a composite device of DTS and UNII. For the DTS part (802.11a/b/g), the frequency range is 2412.00 – 2462.00 MHz (for 802.11b/g), maximum output power is 95.50mW, emission designator is 16M5G7D & 5725.00 – 5850.00 MHz (for 802.11a), maximum output power is 93.97mW, emission designator is 16M7G7D. For the UNII part (802.11a), the frequency range is 5150.00 – 5250.00 MHz, maximum output power is 45.71mW, emission designator is 16M5G7D & 5250.00 – 5350.00 MHz, maximum output power is 85.90mW, emission designator is 16M5G7D.

** The test data gathered are from production sample, serial number: A70001112, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *Aruba Networks* in accordance with Part 2, Subpart J, Part 15, Subparts A, C, and E of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth and 26 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Out of Band Emission, Spurious Emission, Conducted and Spurious Radiated Emission, Discontinue Transmitting with Absence of Data or Operational Failure, Peak Excursion to Average Ratio and Frequency Stability.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted 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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp.

Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA with registration number:90464.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC), Industry Canada (IC), 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 file 31040/SIT 1300F2, IC registration number: 3062A, and VCCI Registration No.: C-1298 and R-1234. 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/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

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

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

EUT Exercise Software

The EUT operates in normal operation mode during radiated and conducted testing.

Special Accessories

As shown in following test setup block diagram, all interface cables used for compliance testing are shielded.

Schematics / Block Diagram

Please refer to Appendix A.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Laptop PC	PP01L	OF926A02	DOC

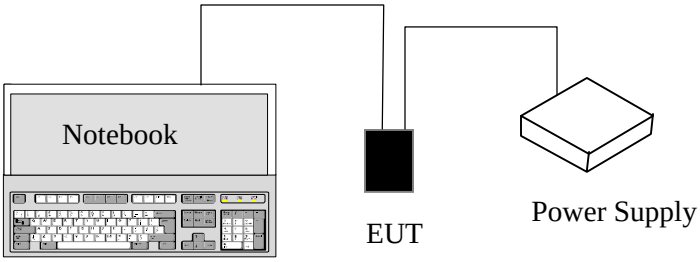
Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
CUI Inc.	AC Adapter	A1-15S05	R00042200434	None

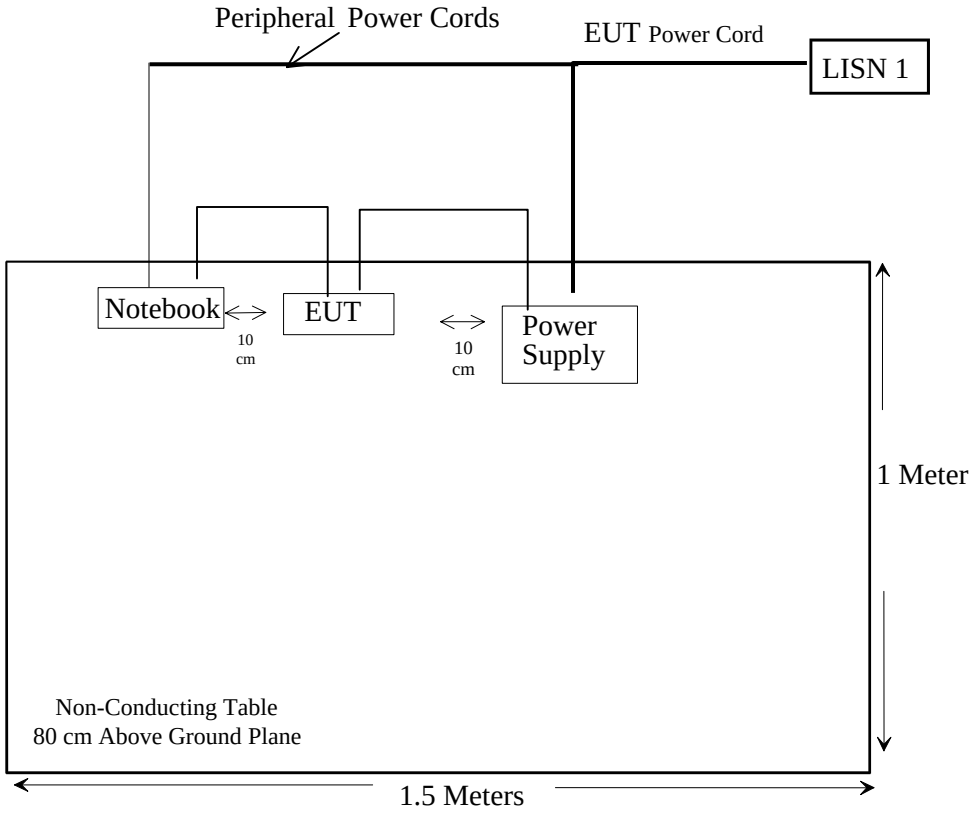
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded RJ45 Cable	2	EUT	RJ45 Port/Laptop PC
Power Cable	2	Adapter	EUT

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091, §15.247(b)(4), §15.407 (f)	RF Exposure Requirement	Compliant
§15.203	Antenna Requirement	Compliant
§ 15.205, §15.209(a), §15.407(b)(5), §15.407(b)(6)	Restricted Bands, Radiated Emission	Compliant*
§ 15.207(a)	AC Line Conduction	Compliant
§15.247(a)(2), §15.407	6 dB Bandwidth & 26 dB Bandwidth	Compliant
§15.247(b)(3), §15.407(a)(2)	RF Output Power	Compliant
§ 15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e), §15.407(a)(2)	Peak Power Spectral Density	Compliant
§15.407(a)(6)	Peak Excursion	Compliant
§15.407(b)	Out of Band Emission	Compliant
§15.407(c)	Discontinue Transmitting with Absence of Data or Operational Failure	Compliant
§ 15.407(g)	Frequency Stability	Compliant

*: Within Measurement Uncertainty

§1.1307(b)(1) & §2.1091 - RF EXPOSURE

According to §15.247(b)(4) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

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

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
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

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

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

Maximum peak output power at antenna input terminal: 19.80(dBm)
Maximum peak output power at antenna input terminal: 95.50 (mW)
Predication frequency: 2400 (MHz)
Antenna Gain (typical): 2.2 (dBi)
antenna gain: 1.66 (numeric)
Prediction distance: 20(cm)
Power density at predication frequency at 20 cm: 0.03 (mW/cm^2)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

Test Result

The EUT is a mobile device. The power density levels at 20 cm for the maximum output power is 0.03 mW/cm, which is below the uncontrolled limit of 1.0mW/cm^2.

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), 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.

The antenna used with the EUT is an internal antenna, Omni pattern, typical gain 2.2dBi.

§15.205, §15.209(a), §15.407(b)(5), §15.407(b)(6) - SPURIOUS RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties. 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 best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

According to §15.205, except as shown 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	399.9 – 410	4.5 – 5.15
[1]0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	([2])

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510MHz
[2] Above 38.6

Except as provided in paragraph (d) and (e), the filed strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

According to §15.209, the device shall meet radiated emission general requirements.

Except for Class A device, the filed strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (Microvolts/meter)	dB (dBμV/meter)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

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

The EUT was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC CFR 47, Section 15.31, the EUT was tested to 25GHz for 15.247 and 40GHz for 15.407.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
ETS	Antenna, Log-Periodic	3148	4-1155	12/14/2004
ETS	Antenna, Biconical	3110B	9603-2315	12/14/2004
HP	Amplifier, Pre	8447D	2944A10198	8/20/2005
HP	Amplifier, Pre, Microwave	8449B	3147A00400	6/14/2005
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	4/20/2005
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	9/29/2004
Sunol Sciences	Antenna	JB1	A013105-3	2/11/2005

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

Test Procedure

For the radiated emissions test, the PC system power cord was connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.

For average measurement, the spectrum analyzer was set as RBW = 1MHz, VBW = 10Hz.

Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corr. Ampl. – Subpart C Limit

Summary of Test Results

Environmental Conditions

Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1018 mbar

The testing was performed by Daniel Deng & Jerry Wang on 2005-08-22.

According to the data in following tables, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.247, and had the worst margin of:

802.11b, 15.247

-11.8 dB at **4824.00 MHz** in the **Vertical** polarization, Low Channel

-8.5 dB at **4884.00 MHz** in the **Vertical** polarization, Middle Channel

-11.6 dB at **7386.00MHz** in the **Vertical** polarization, High Channel

802.11g, 15.247

-11.3 dB at **7236.00 MHz** in the **Vertical** polarization, Low Channel

-10.8 dB at **7326.00 MHz** in the **Vertical** polarization, Middle Channel

-8.6 dB at **7386.00 MHz** in the **Vertical** polarization, High Channel

802.11a, High Band 15.247

-3.6 dB at **17235.00 MHz** in the **Vertical** polarization, Low Channel *

-4.2 dB at **17355.00 MHz** in the **Vertical** polarization, Middle Channel *

-3.8 dB at **17475.00 MHz** in the **Horizontal** polarization, High Channel *

802.11a, Low Band, 15.407

-21.1 dB at **10360.00 MHz** in the **Vertical** polarization, Low Channel

-21.8 dB at **10400.00 MHz** in the **Vertical** polarization, Middle Channel

-21.2 dB at **10480.00 MHz** in the **Vertical** polarization, High Channel

802.11a, Mid Band, 15.407

-14.1 dB at **10520.00 MHz** in the **Vertical** polarization, Low Channel

-18.9 dB at **10600.00 MHz** in the **Vertical** polarization, Middle Channel

-15.7 dB at **10640.00 MHz** in the **Vertical** polarization, High Channel

Unwanted Emission:
-1.8 dB at **600.00MHz** in the **Horizontal** polarization *

**: Test data are within the measurement uncertainty ±4.0dB*

802.11b

Run # 1- 1 :Primary scan 1GHz -25GHz , (Lowest channel. : 2412 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
4824.0000	41.4	90	1.2	v	32.5	3.1	34.8	42.2	54	-11.8	Ave
7236.0000	35.8	270	1.2	v	36.7	4.3	34.7	42.1	54	-11.9	Ave
4824.0000	38.3	180	1.4	h	32.5	3.1	34.8	39.1	54	-14.9	Ave
7236.0000	32.5	30	1.1	h	36.7	4.3	34.7	38.8	54	-15.2	Ave
7236.0000	47.9	270	1.2	v	36.7	4.3	34.7	54.2	74	-19.8	Peak
1537.0000	43.4	90	1.2	v	24.8	1.9	36.3	33.7	54	-20.3	Ave
7236.0000	45.0	30	1.1	h	36.7	4.3	34.7	51.3	74	-22.7	Peak
1537.0000	39.1	180	1.5	h	24.8	1.9	36.3	29.4	54	-24.6	Ave
4824.0000	46.8	90	1.2	v	32.5	3.1	34.8	47.6	74	-26.4	Peak
4824.0000	46.7	180	1.4	h	32.5	3.1	34.8	47.5	74	-26.5	Peak
1537.0000	55.6	90	1.2	v	24.8	1.9	36.3	45.9	74	-28.1	Peak
1537.0000	54.9	180	1.5	h	24.8	1.9	36.3	45.2	74	-28.8	Peak

Run # 1- 2 :Primary scan 1GHz -25GHz , (Middle channel. : 2442 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
4884.0000	44.7	180	1.5	v	32.5	3.1	34.8	45.5	54	-8.5	Ave
4884.0000	41.3	180	1.5	h	32.5	3.1	34.8	42.1	54	-11.9	Ave
7326.0000	32.7	270	2.4	v	36.7	4.3	34.7	39.0	54	-15.0	Ave
7326.0000	32.1	180	2.1	h	36.7	4.3	34.7	38.4	54	-15.6	Ave
7326.0000	45.3	270	2.4	v	36.7	4.3	34.7	51.7	74	-22.3	Peak
7326.0000	44.6	180	2.3	h	36.7	4.3	34.7	50.9	74	-23.1	Peak
4884.0000	49.7	180	1.5	v	32.5	3.1	34.8	50.5	74	-23.5	Peak
4884.0000	48.3	180	1.5	h	32.5	3.1	34.8	49.1	74	-24.9	Peak

Run # 1- 3 :Primary scan 1GHz -25GHz , (Highest channel. : 2462 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
7386.0000	36.1	180	1.3	v	36.7	4.3	34.7	42.4	54	-11.6	Ave
4924.0000	41.5	180	1.2	v	32.5	3.1	34.8	42.3	54	-11.7	Ave
7386.0000	35.8	180	1.2	h	36.7	4.3	34.7	42.1	54	-11.9	Ave
4924.0000	41.1	180	1.3	h	32.5	3.1	34.8	41.9	54	-12.1	Ave
3453.3000	37.5	180	1.1	v	29.8	2.5	35.2	34.7	54	-19.3	Ave
7386.0000	46.3	180	1.3	v	36.7	4.3	34.7	52.6	74	-21.4	Peak
7386.0000	45.7	180	1.2	h	36.7	4.3	34.7	52.0	74	-22.0	Peak
3453.3000	33.1	180	1.2	h	29.8	2.5	35.2	30.3	54	-23.7	Ave
4924.0000	48.6	180	1.2	v	32.5	3.1	34.8	49.4	74	-24.6	Peak
4924.0000	48.3	180	1.3	h	32.5	3.1	34.8	49.1	74	-24.9	Peak
3453.3000	46.9	180	1.1	v	29.8	2.5	35.2	44.1	74	-29.9	Peak
3453.3000	45.6	180	1.2	h	29.8	2.5	35.2	42.8	74	-31.2	Peak

802.11g (15.247)

Run # 1- 1 :Primary scan 1GHz -25GHz , (Lowest channel. : 2412 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
7236.0000	36.4	180	1.3	v	36.7	4.3	34.7	42.7	54	-11.3	Ave
7236.0000	35.6	180	1.1	h	36.7	4.3	34.7	41.9	54	-12.1	Ave
7236.0000	52.3	180	1.3	v	36.7	4.3	34.7	58.6	74	-15.4	Peak
7236.0000	51.6	180	1.1	h	36.7	4.3	34.7	57.9	74	-16.1	Peak
4824.0000	32.2	180	1.2	v	32.5	3.1	34.8	33.0	54	-21.0	Ave
4824.0000	32.1	180	1.2	h	32.5	3.1	34.8	32.9	54	-21.1	Ave
1519.7000	40.1	180	1.3	v	24.8	1.9	36.3	30.4	54	-23.6	Ave
1519.7000	39.5	180	1.4	h	24.8	1.9	36.3	29.8	54	-24.2	Ave
4824.0000	44.7	180	1.2	v	32.5	3.1	34.8	45.5	74	-28.5	Peak
4824.0000	44.5	180	1.2	h	32.5	3.1	34.8	45.3	74	-28.7	Peak
1519.7000	49.6	180	1.3	v	24.8	1.9	36.3	39.9	74	-34.1	Peak
1519.7000	48.7	180	1.4	h	24.8	1.9	36.3	39.0	74	-35.0	Peak

Run # 1- 2 :Primary scan 1GHz -25GHz , (Middle channel. : 2442 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
7326.0000	36.9	180	1.4	v	36.7	4.3	34.7	43.2	54	-10.8	Ave
7326.0000	36.4	180	1.3	h	36.7	4.3	34.7	42.7	54	-11.3	Ave
7326.0000	54.7	180	1.4	v	36.7	4.3	34.7	61.0	74	-13.0	Peak
7326.0000	54.1	180	1.3	h	36.7	4.3	34.7	60.4	74	-13.6	Peak
4884.0000	31.7	180	1.5	v	32.5	3.1	34.8	32.5	54	-21.5	Ave
4884.0000	31.5	180	1.4	h	32.5	3.1	34.8	32.3	54	-21.7	Ave
1560.0000	36.7	180	1.2	v	24.8	1.9	36.3	27.0	54	-27.0	Ave
1560.0000	36.3	180	1.3	h	24.8	1.9	36.3	26.6	54	-27.4	Ave
4884.0000	45.8	180	1.5	v	32.5	3.1	34.8	46.6	74	-27.4	Peak
4884.0000	45.5	180	1.4	h	32.5	3.1	34.8	46.3	74	-27.7	Peak
1560.0000	48.9	180	1.2	v	24.8	1.9	36.3	39.2	74	-34.8	Peak
1560.0000	48.2	180	1.3	h	24.8	1.9	36.3	38.5	74	-35.5	Peak

Run # 1- 3 :Primary scan 1GHz -25GHz , (Highest channel. : 2462 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
7386.0000	39.1	270	1.6	v	36.7	4.3	34.7	45.4	54	-8.6	Ave
7386.0000	38.3	270	1.4	h	36.7	4.3	34.7	44.6	54	-9.4	Ave
7386.0000	58.1	270	1.6	v	36.7	4.3	34.7	64.4	74	-9.6	Peak
7386.0000	57.6	270	1.4	h	36.7	4.3	34.7	63.9	74	-10.1	Peak
4924.0000	31.3	180	1.3	v	32.5	3.1	34.8	32.1	54	-21.9	Ave
4924.0000	31.2	180	1.3	h	32.5	3.1	34.8	32.0	54	-22.0	Ave
3469.0000	33.1	180	1.4	v	29.8	2.5	35.2	30.3	54	-23.7	Ave
3469.0000	32.9	180	1.3	h	29.8	2.5	35.2	30.1	54	-23.9	Ave
4924.0000	44.3	180	1.3	v	32.5	3.1	34.8	45.1	74	-28.9	Peak
4924.0000	44.1	180	1.3	h	32.5	3.1	34.8	44.9	74	-29.1	Peak
3469.0000	47.2	30	1.4	v	29.8	2.5	35.2	44.4	74	-29.6	Peak
3469.0000	46.8	180	1.3	h	29.8	2.5	35.2	44.0	74	-30.0	Peak

802.11a High band, 5725-5850MHZ (15.247)

Run # 1- 1 :Primary scan 1GHz -40GHz , (Lowest channel. : 5745 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
17235.0000	30.7	180	1.0	v	43.6	7.1	31.0	50.4	54	-3.6	Ave
17235.0000	30.5	180	1.2	h	43.6	7.1	31.0	50.2	54	-3.8	Ave
11490.0000	37.6	180	1.0	v	39.3	5.6	33.0	49.5	54	-4.5	Ave
11490.0000	36.5	180	1.2	h	39.3	5.6	33.0	48.4	54	-5.6	Ave
17235.0000	44.4	180	1.0	v	43.6	7.1	31.0	64.2	74	-9.8	Peak
17235.0000	43.8	180	1.2	h	43.6	7.1	31.0	63.5	74	-10.5	Peak
11490.0000	51.0	180	1.0	v	39.3	5.6	33.0	62.9	74	-11.2	Peak
11490.0000	49.6	180	1.2	h	39.3	5.6	33.0	61.5	74	-12.5	Peak
1520.0000	43.3	180	1.1	v	24.8	1.9	36.3	33.7	54	-20.4	Ave
1520.0000	38.9	180	1.2	h	24.8	1.9	36.3	29.2	54	-24.8	Ave
1520.0000	50.4	180	1.1	v	24.8	1.9	36.3	40.7	74	-33.3	Peak
1520.0000	48.8	180	1.2	h	24.8	1.9	36.3	39.1	74	-34.9	Peak

Run # 1- 2 :Primary scan 1GHz -40GHz , (Middle channel. : 5785 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
17355.0000	30.1	90	1.4	v	43.6	7.1	31.0	49.8	54	-4.2	Ave
17355.0000	30.0	180	1.2	h	43.6	7.1	31.0	49.7	54	-4.3	Ave
11570.0000	35.5	180	1.1	v	39.5	5.4	32.2	48.3	54	-5.7	Ave
11570.0000	31.3	180	1.4	h	39.5	5.4	32.2	44.1	54	-9.9	Ave
17355.0000	43.2	90	1.4	v	43.6	7.1	31.0	62.9	74	-11.1	Peak
17355.0000	43.0	180	1.2	h	43.6	7.1	31.0	62.7	74	-11.3	Peak
11570.0000	49.7	180	1.1	v	39.5	5.4	32.2	62.5	74	-11.5	Peak
11570.0000	45.2	180	1.4	h	39.5	5.4	32.2	58.0	74	-16.0	Peak
1520.1000	39.2	180	1.5	v	24.8	1.9	36.3	29.5	54	-24.5	Ave
1520.1000	36.7	180	1.4	h	24.8	1.9	36.3	27.0	54	-27.0	Ave
1520.1000	49.8	180	1.5	v	24.8	1.9	36.3	40.1	74	-33.9	Peak
1520.1000	47.7	90	1.4	h	24.8	1.9	36.3	38.0	74	-36.0	Peak

Run # 1- 3 :Primary scan 1GHz -40GHz , (Highest channel. : 5825 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments
17475.0000	30.5	30	1.1	h	43.6	7.1	31.0	50.2	54	-3.8	Ave
17475.0000	30.2	90	1.2	v	43.6	7.1	31.0	49.9	54	-4.1	Ave
11650.0000	33.9	0	1.1	v	39.5	5.4	32.2	46.6	54	-7.4	Ave
11650.0000	31.1	270	1.4	h	39.5	5.4	32.2	43.9	54	-10.1	Ave
17475.0000	43.9	30	1.1	h	43.6	7.1	31.0	63.6	74	-10.4	Peak
17475.0000	43.5	90	1.2	v	43.6	7.1	31.0	63.2	74	-10.8	Peak
11650.0000	48.2	0	1.1	v	39.5	5.4	32.2	60.9	74	-13.1	Peak
11650.0000	44.0	270	1.4	h	39.5	5.4	32.2	56.7	74	-17.3	Peak
1520.3000	35.7	270	1.2	h	24.8	1.9	36.3	26.0	54	-28.0	Ave
1520.3000	35.2	150	1.4	v	24.8	1.9	36.3	25.5	54	-28.5	Ave
1520.3000	49.2	150	1.4	v	24.8	1.9	36.3	39.5	74	-34.5	Peak
1520.3000	47.9	270	1.2	h	24.8	1.9	36.3	38.2	74	-35.8	Peak

802.11a, Low Band, 5150-5250 MHZ (15.407)

Run # 1- 1 :Primary scan 1GHz -40GHz , (Lowest channel. : 5180 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.407 Limit (dBuV/m)	15.407 Margin	Comments
10360.0000	37.6	180	1.3	v	38.0	5.4	33.8	47.2	68.3	-21.1	Ave
15540.0000	31.1	180	1.2	v	40.4	7.0	31.8	46.6	68.3	-21.7	Ave
10360.0000	36.9	180	1.4	h	38.0	5.4	33.8	46.5	68.3	-21.8	Ave
15540.0000	31.0	180	1.3	h	40.4	7.0	31.8	46.5	68.3	-21.8	Ave
10360.0000	52.3	180	1.3	v	38.0	5.4	33.8	61.9	88.3	-26.4	Peak
10360.0000	51.9	180	1.4	h	38.0	5.4	33.8	61.5	88.3	-26.8	Peak
15540.0000	43.5	180	1.2	v	40.4	7.0	31.8	59.0	88.3	-29.3	Peak
15540.0000	42.8	180	1.3	h	40.4	7.0	31.8	58.3	88.3	-30.0	Peak

Run # 1- 2 :Primary scan 1GHz -40GHz , (Middle channel. : 5200MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.407 Limit (dBuV/m)	15.407 Margin	Comments
10400.0000	36.9	180	1.0	v	38.0	5.4	33.8	46.5	68.3	-21.8	Ave
10400.0000	36.4	180	1.2	h	38.0	5.4	33.8	46.0	68.3	-22.3	Ave
15600.0000	30.5	180	1.3	v	40.4	7.0	31.8	46.0	68.3	-22.3	Ave
15600.0000	30.3	180	1.1	h	40.4	7.0	31.8	45.8	68.3	-22.5	Ave
10400.0000	51.6	180	1.0	v	38.0	5.4	33.8	61.2	88.3	-27.1	Peak
10400.0000	51.2	180	1.2	h	38.0	5.4	33.8	60.8	88.3	-27.5	Peak
15600.0000	41.7	180	1.3	v	40.4	7.0	31.8	57.2	88.3	-31.1	Peak
15600.0000	41.3	180	1.1	h	40.4	7.0	31.8	56.8	88.3	-31.5	Peak

Run # 1- 3 :Primary scan 1GHz -40GHz , (Highest channel. : 5240 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.407 Limit (dBuV/m)	15.407 Margin	Comments
10480.0000	37.5	180	1.2	v	38.0	5.4	33.8	47.1	68.3	-21.2	Ave
15720.0000	31.5	180	1.1	v	40.4	7.0	31.8	47.0	68.3	-21.3	Ave
15720.0000	31.2	180	1.2	h	40.4	7.0	31.8	46.7	68.3	-21.6	Ave
10480.0000	36.9	180	1.3	h	38.0	5.4	33.8	46.5	68.3	-21.8	Ave
10480.0000	52.1	180	1.2	v	38.0	5.4	33.8	61.7	88.3	-26.6	Peak
10480.0000	51.9	180	1.3	h	38.0	5.4	33.8	61.5	88.3	-26.8	Peak
15720.0000	44.1	180	1.1	v	40.4	7.0	31.8	59.6	88.3	-28.7	Peak
15720.0000	43.5	180	1.2	h	40.4	7.0	31.8	59.0	88.3	-29.3	Peak

802.11a, Mid Band, 5250-5350 MHZ (15.407)

Run # 1- 1 :Primary scan 1GHz -40GHz , (Lowest channel. : 5260 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.407 Limit (dBuV/m)	15.407 Margin	Comments
10520.0000	43.2	180	1.4	v	38.7	5.4	33.2	54.2	68.3	-14.1	Ave
10520.0000	42.3	180	1.3	h	38.7	5.4	33.2	53.3	68.3	-15.0	Ave
10520.0000	58.4	180	1.4	v	38.7	5.4	33.2	69.4	88.3	-18.9	Peak
10520.0000	57.6	180	1.3	h	38.7	5.4	33.2	68.6	88.3	-19.7	Peak
15780.0000	32.6	90	1.2	v	40.4	7.0	31.8	48.1	68.3	-20.2	Ave
15780.0000	32.2	0	1.2	h	40.4	7.0	31.8	47.7	68.3	-20.6	Ave
15780.0000	46.5	90	1.2	v	40.4	7.0	31.8	62.0	88.3	-26.3	Peak
15780.0000	45.9	0	1.1	h	40.4	7.0	31.8	61.4	88.3	-26.9	Peak

Run # 1- 2 :Primary scan 1GHz -40GHz , (Middle channel. : 5300 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.407 Limit (dBuV/m)	15.407 Margin	Comments
10600.0000	38.4	180	1.3	v	38.7	5.4	33.2	49.4	68.3	-18.9	Ave
10600.0000	38.2	180	1.4	h	38.7	5.4	33.2	49.2	68.3	-19.1	Ave
15900.0000	31.3	180	1.3	v	40.4	7.0	31.8	46.8	68.3	-21.5	Ave
15900.0000	31.0	180	1.2	h	40.4	7.0	31.8	46.5	68.3	-21.8	Ave
10600.0000	53.3	180	1.3	v	38.7	5.4	33.2	64.3	88.3	-24.0	Peak
10600.0000	53.2	180	1.4	h	38.7	5.4	33.2	64.2	88.3	-24.1	Peak
15900.0000	43.2	180	1.3	v	40.4	7.0	31.8	58.7	88.3	-29.6	Peak
15900.0000	43.1	180	1.2	h	40.4	7.0	31.8	58.6	88.3	-29.7	Peak

Run # 1- 3 :Primary scan 1GHz -40GHz , (Highest channel. : 5320 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.407 Limit (dBuV/m)	15.407 Margin	Comments
10640.0000	41.6	180	1.2	v	38.7	5.4	33.2	52.6	68.3	-15.7	Ave
10640.0000	41.5	180	1.3	h	38.7	5.4	33.2	52.5	68.3	-15.8	Ave
15960.0000	32.3	90	1.3	v	40.4	7.0	31.8	47.8	68.3	-20.5	Ave
15960.0000	31.9	90	1.2	h	40.4	7.0	31.8	47.4	68.3	-20.9	Ave
10640.0000	55.8	180	1.2	v	38.7	5.4	33.2	66.8	88.3	-21.5	Peak
10640.0000	55.6	180	1.3	h	38.7	5.4	33.2	66.6	88.3	-21.7	Peak
15960.0000	45.7	90	1.3	v	40.4	7.0	31.8	61.2	88.3	-27.1	Peak
15960.0000	45.1	90	1.2	h	40.4	7.0	31.8	60.6	88.3	-27.7	Peak

Unwanted Emission

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifer	Correction Factor	FCC B	FCC B
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit(dBuV/m)	Margin(dB)
600	47.9	200	1	H	19.5	5.4	28.6	44.2	46	-1.8
640	45.8	180	1.2	V	20	5.7	28.4	43.1	46	-2.9
600	46.6	200	1	H	19.5	5.4	28.6	42.9	46	-3.1
600	43.54	300	1.2	V	19.5	5.4	28.6	39.84	46	-6.2
720	39.6	200	1.2	V	20.8	6	28.2	38.2	46	-7.8
480	41.3	200	1.2	V	18	4.8	28.6	35.5	46	-10.5
125	43.4	100	1.2	V	14.5	2.3	28.2	32	43.5	-11.5
75	46.3	200	1.2	V	8.6	1.8	28.4	28.3	40	-11.7
720	35.2	180	1.5	H	20.8	6	28.2	33.8	46	-12.2
240	44.7	300	1.5	H	12.3	3.3	27.5	32.8	46	-13.2
150	42.7	200	1.2	V	13	2.5	28	30.2	43.5	-13.3
320	41.8	200	1.6	H	14.5	3.8	27.5	32.6	46	-13.4
240	44.3	180	1.2	V	12.3	3.3	27.5	32.4	46	-13.6
480	37.96	200	1.5	H	18	4.8	28.6	32.16	46	-13.8
400	39.2	200	1.2	V	16.2	4.6	28.1	31.9	46	-14.1
250	43.2	200	1	H	12.4	3.4	27.4	31.6	46	-14.4
225	43.2	200	1.2	V	11.8	3.1	27.6	30.5	46	-15.5
400	37.8	180	1.5	H	16.2	4.6	28.1	30.5	46	-15.5
375	37.2	180	1.2	V	15.9	4.1	27.9	29.3	46	-16.7
125	38.2	200	1.2	H	14.5	2.3	28.2	26.8	43.5	-16.7
160	38.5	180	1.5	H	12.7	2.5	28	25.7	43.5	-17.8
160	38.2	180	1.2	V	12.7	2.5	28	25.4	43.5	-18.1
320	36.2	200	1.2	V	14.5	3.8	27.5	27	46	-19.0

§15.207(a) - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Subpart B limits.

The spacing between the peripherals was 10 centimeters.

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

The notebook PC was connected with 120Vac/60Hz power source.

Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30Mhz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15

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

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

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

Summary of Test Results

According to the data in following table, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-8.0 dB at 0.150 MHz in the Neutral conductor mode

Conducted Emissions Test Data

Environmental Conditions

Temperature:	23° C
Relative Humidity:	42%
ATM Pressure:	1018 mbar

The testing was performed by Daniel Deng on 2005-08-24.

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.150	48.0	Ave	Neutral	56.00	-8.0
0.150	56.4	QP	Line	66.00	-9.6
0.200	53.9	QP	Neutral	63.61	-9.7
0.200	53.7	QP	Line	63.61	-9.9
0.250	50.8	QP	Line	61.76	-11.0
0.150	45.0	Ave	Line	56.00	-11.0
0.250	49.7	QP	Neutral	61.76	-12.1
0.150	53.7	QP	Neutral	66.00	-12.3
0.200	40.9	Ave	Neutral	53.61	-12.7
0.200	39.7	Ave	Line	53.61	-13.9
0.250	37.9	Ave	Line	51.76	-13.9
0.250	37.6	Ave	Neutral	51.76	-14.2

Plot of Conducted Emissions Test Data

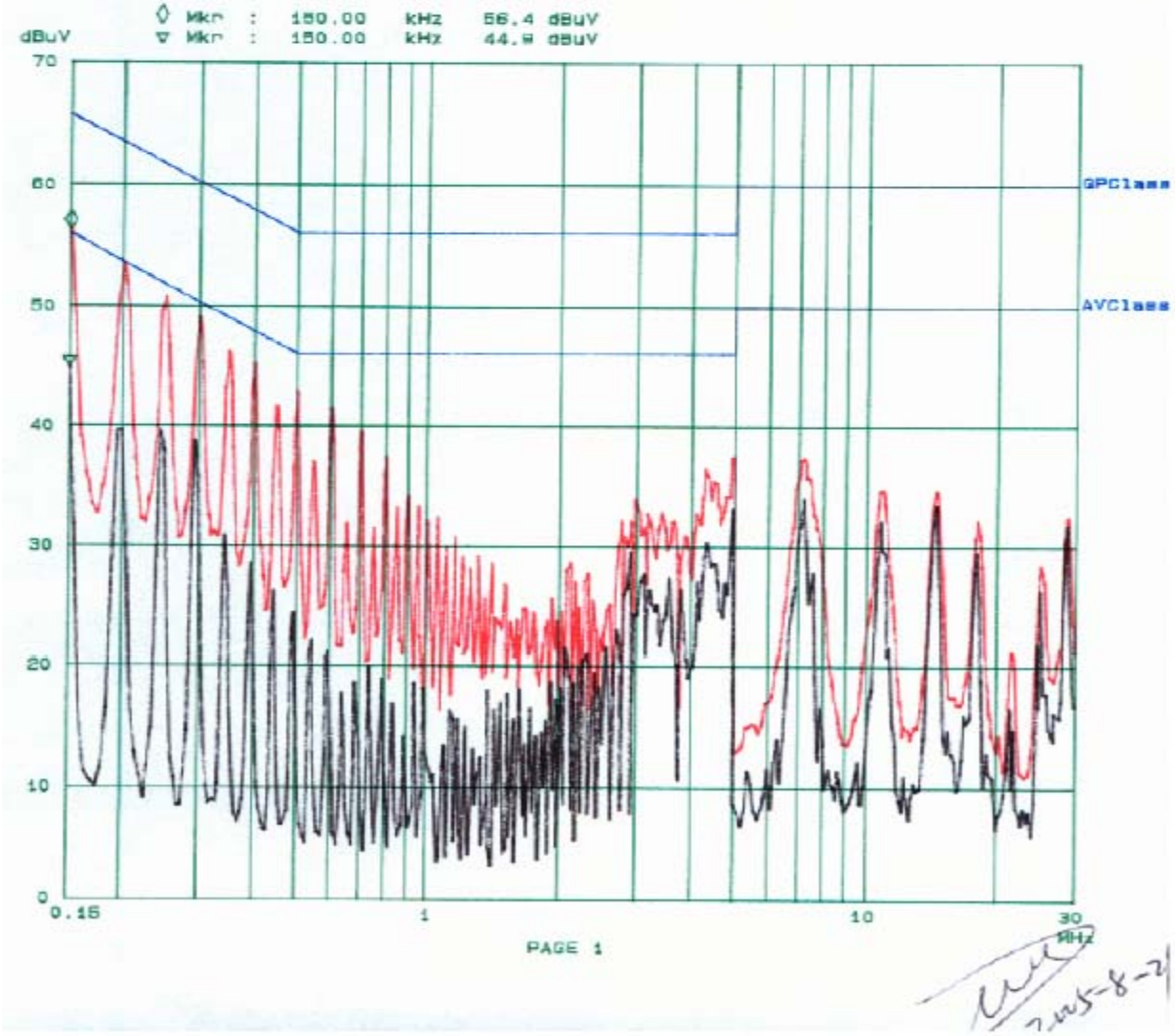
Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

Bay Area Compliance Laboratory Corp 24. Aug 05 12:50
Class B

EUT: AP
Manuf: Aruba Wireless
Op Cond: Normal
Operator: Daniel
Comment: L
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



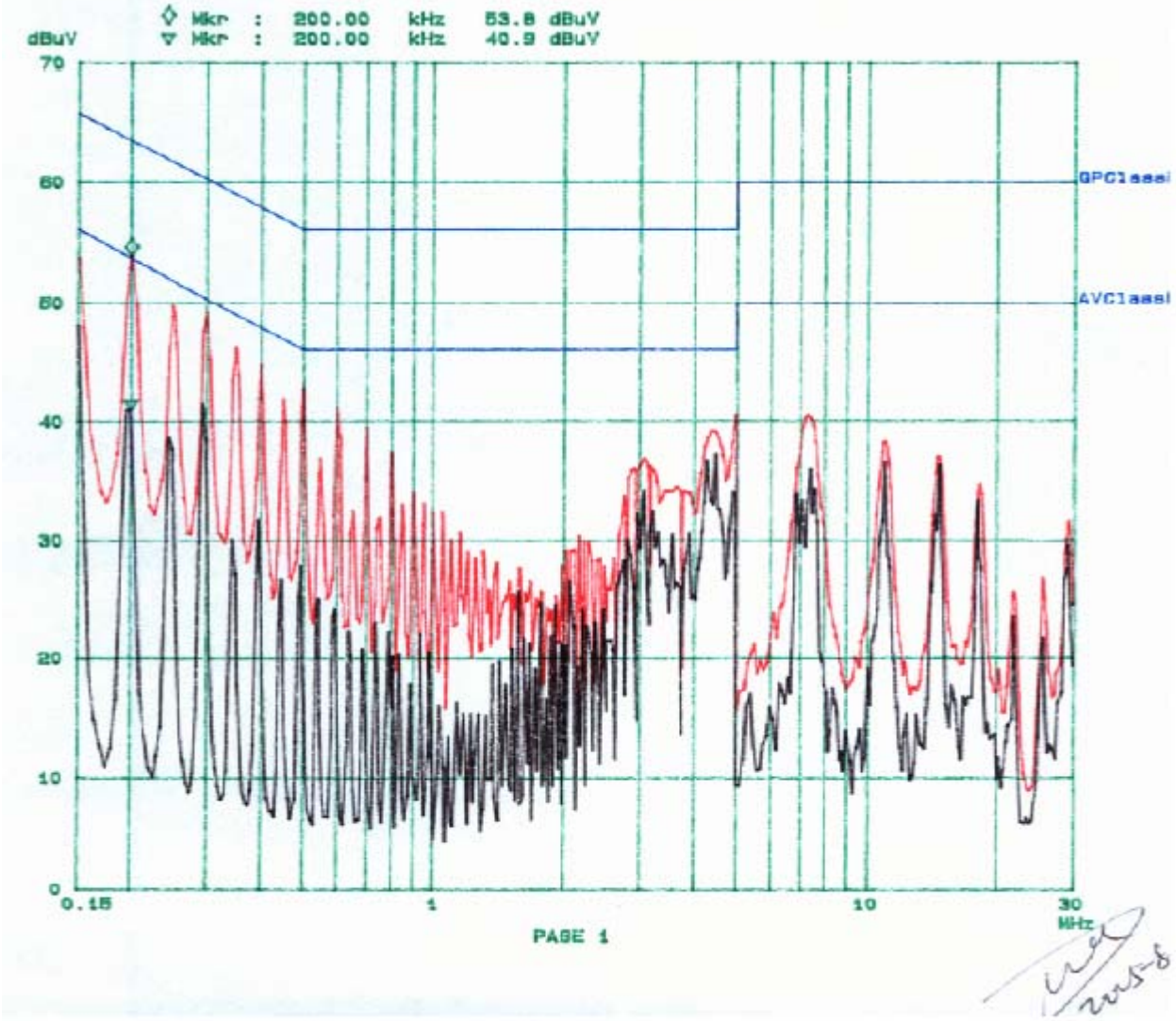
Bay Area Compliance Laboratory Corp 24. Aug 05 12:32

Class B

EUT: AP
Manuf: Aruba Wireless
Op Cond: Normal
Operator: Daniel
Comment: N
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



§2.1051 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard Applicable

Requirements: CFR 47, § 2.1051.

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

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.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

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

Measurement Result

Environmental Conditions

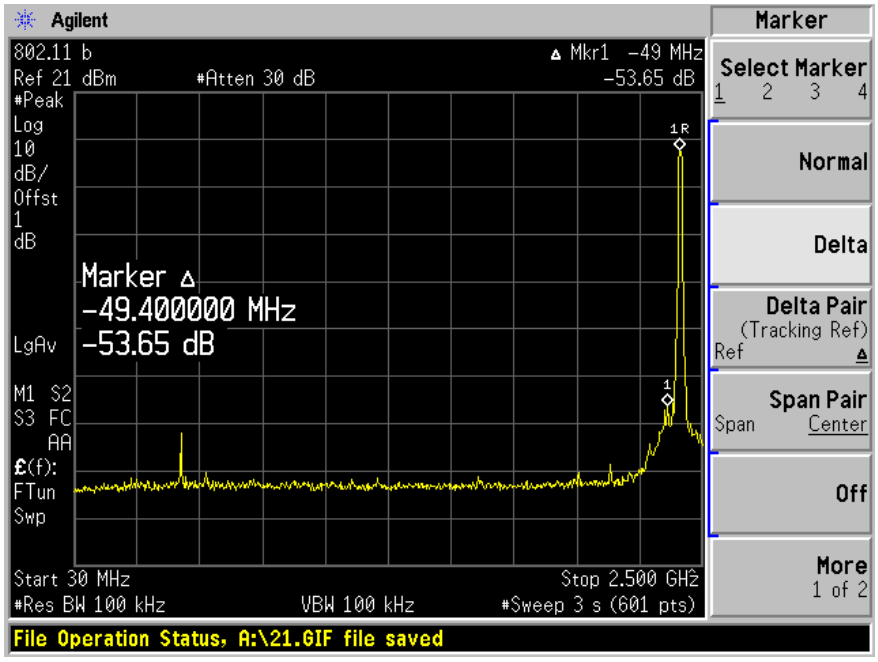
Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

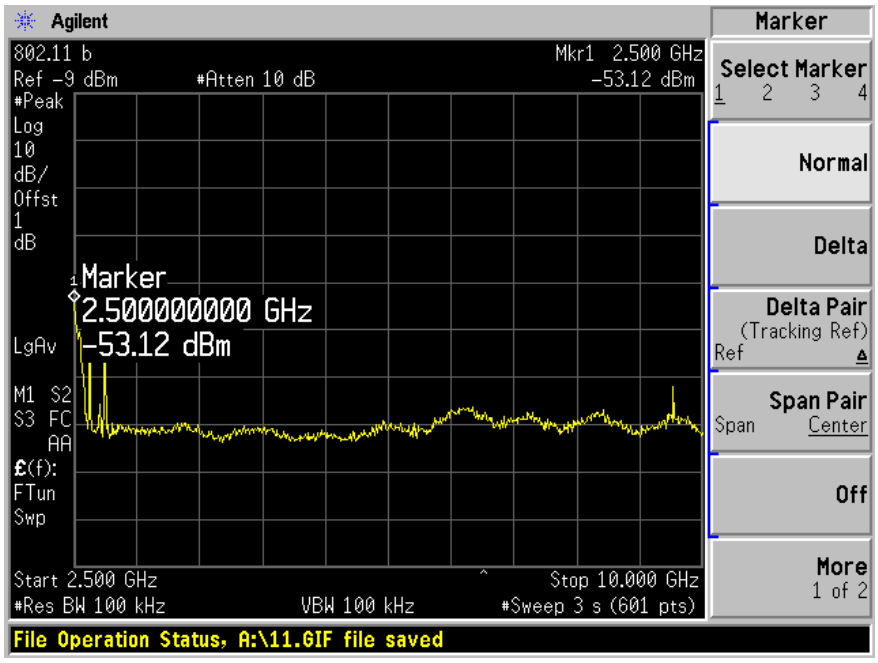
The testing was performed by Daniel Deng on 2005-07-07.

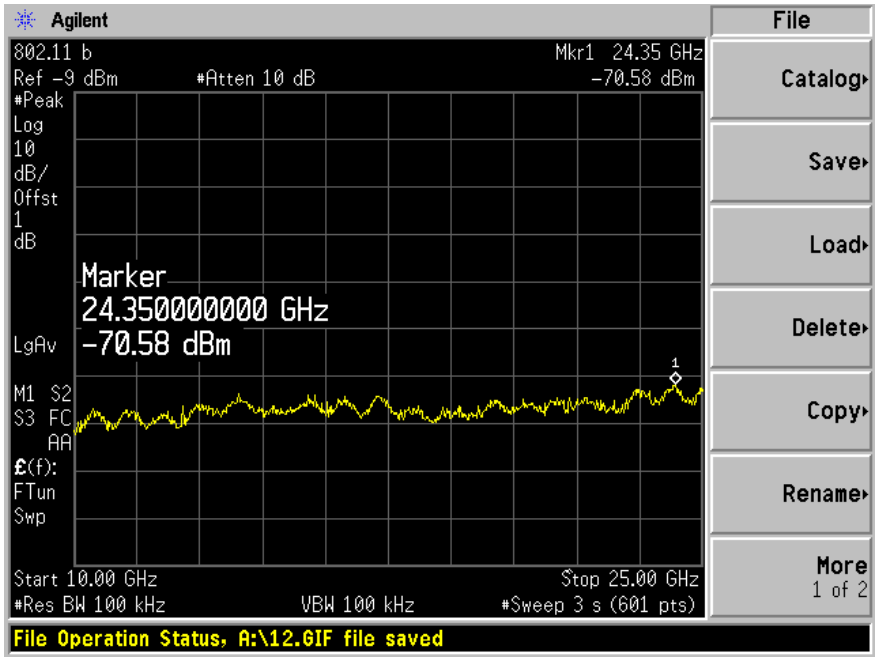
Please refer to following pages for plots of spurious emission.

802.11b (15.247)

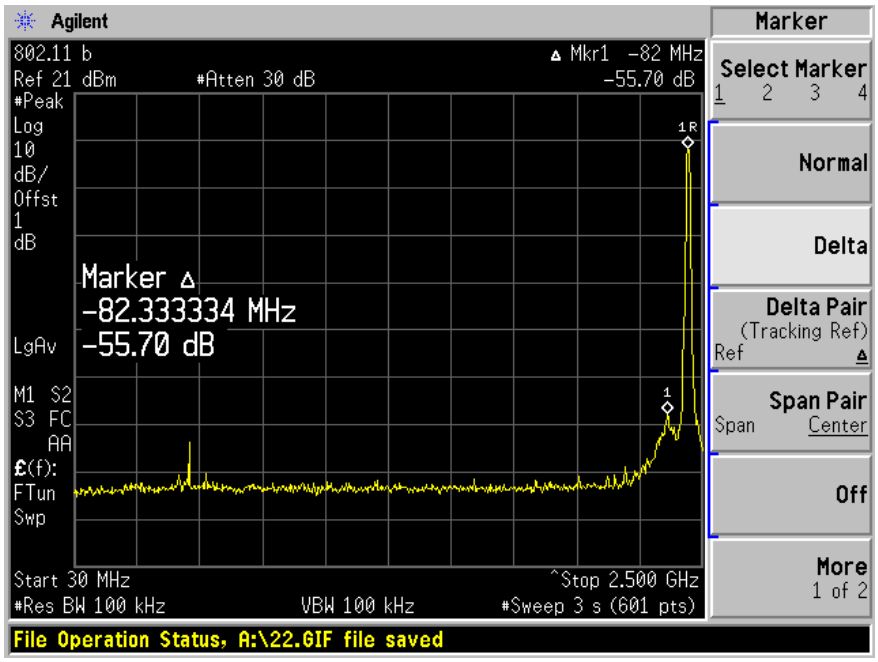
Low Channel

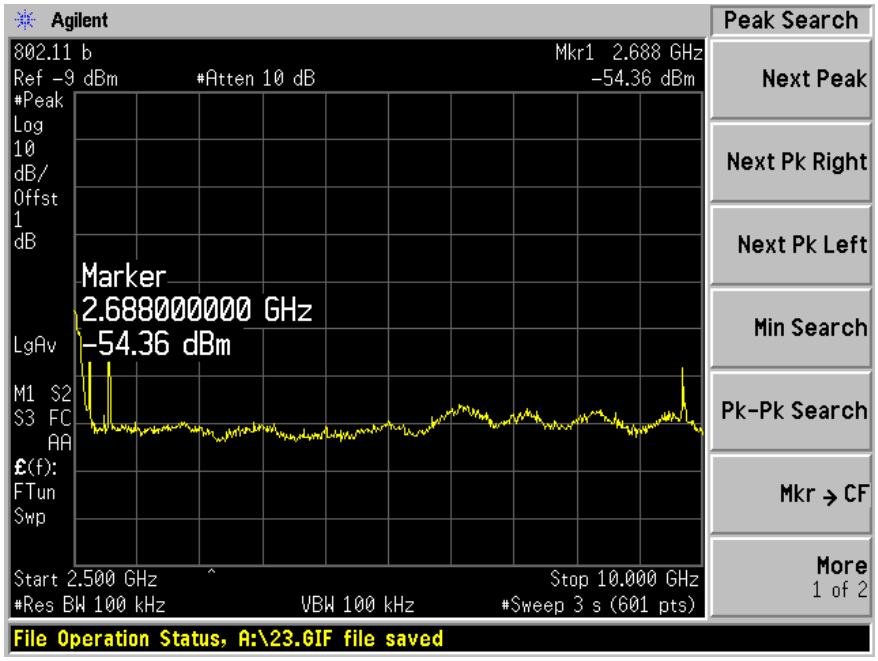


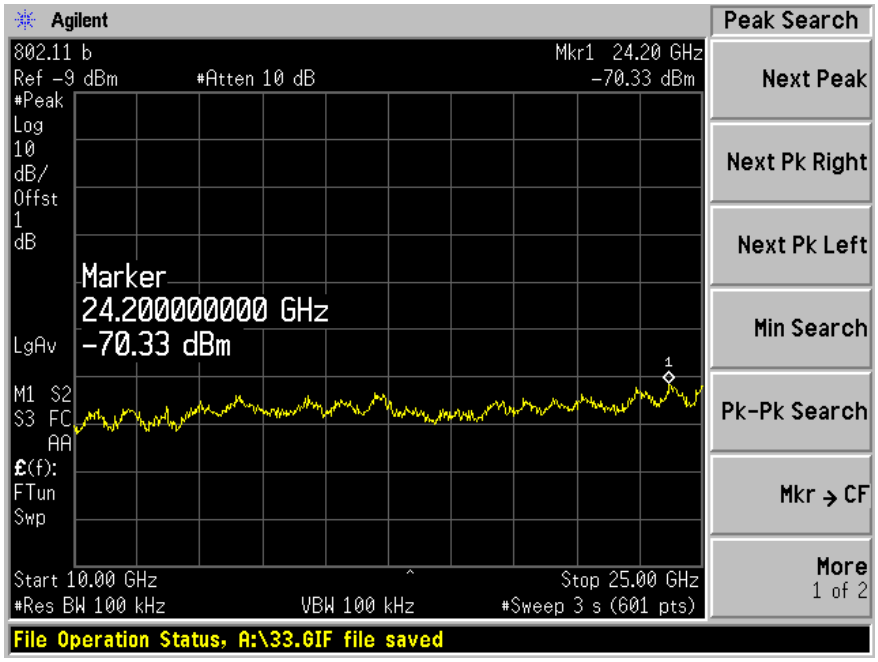



Agilent
File
802.11 b
Mkr1 24.35 GHz
Ref -9 dBm
#Atten 10 dB
-70.58 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
24.350000000 GHz
-70.58 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 3 s (601 pts)
Catalog
Save
Load
Delete
Copy
Rename
More
1 of 2
File Operation Status, A:\12.GIF file saved

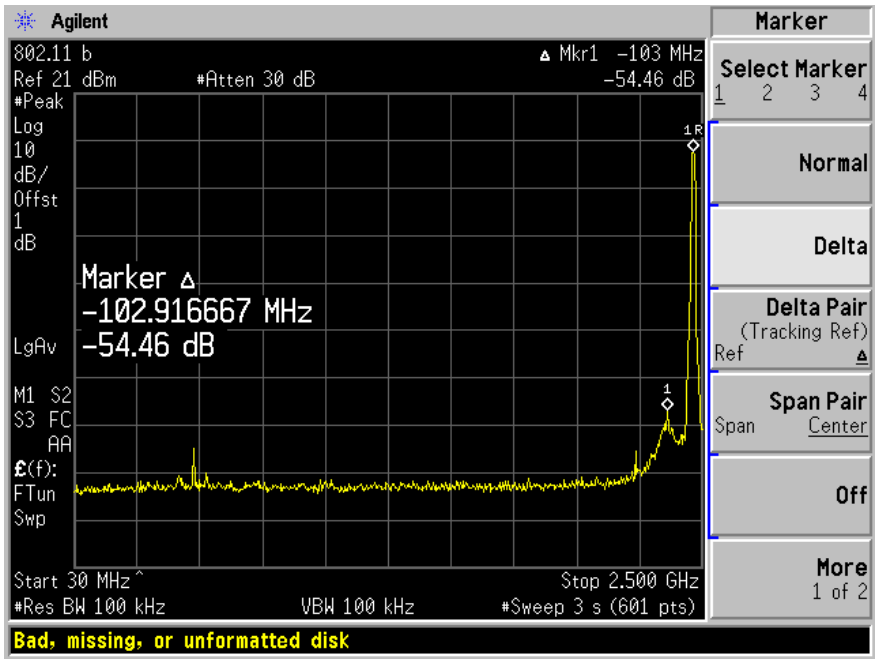
Mid Channel

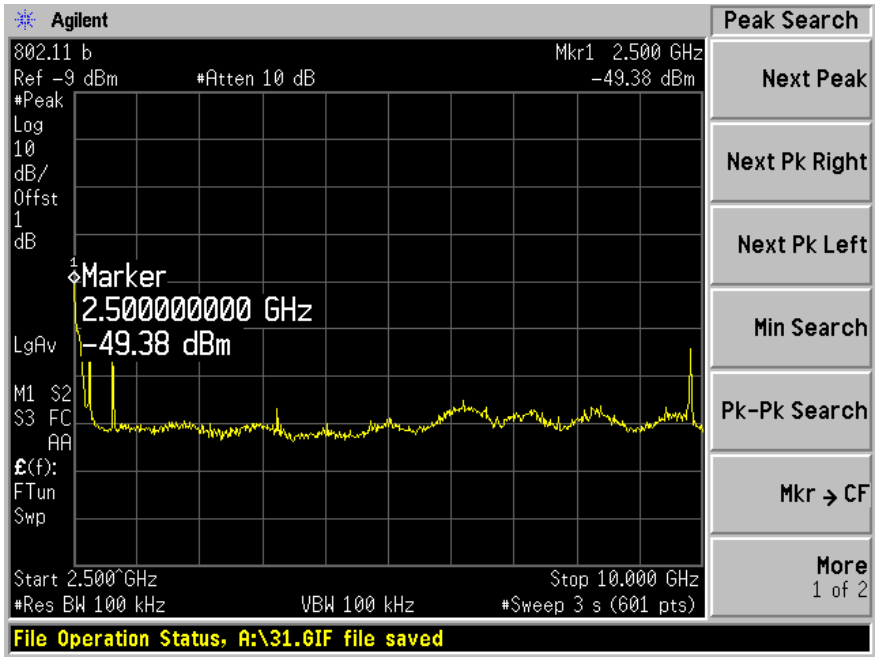

Agilent
Marker
802.11 b
Δ Mkr1 -82 MHz
Ref 21 dBm
#Atten 30 dB
-55.70 dB
#Peak
Log
10
dB/
Offst
1
dB
Marker Δ
-82.333334 MHz
-55.70 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 30 MHz
^Stop 2.500 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 3 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span
Center
Off
More
1 of 2
File Operation Status, A:\22.GIF file saved

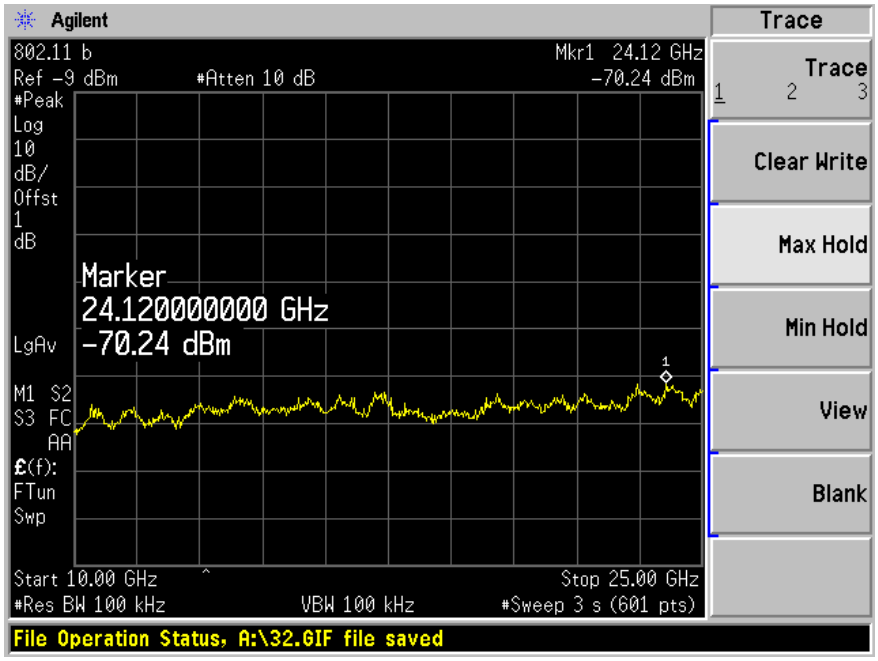

Agilent
802.11 b
Ref -9 dBm
#Atten 10 dB
Mkr1 2.688 GHz
-54.36 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.688000000 GHz
-54.36 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.500 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 10.000 GHz
#Sweep 3 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\23.GIF file saved


Agilent
802.11 b
Ref -9 dBm
#Atten 10 dB
Mkr1 24.20 GHz
-70.33 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
24.200000000 GHz
-70.33 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 25.00 GHz
#Sweep 3 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\33.GIF file saved

High Channel

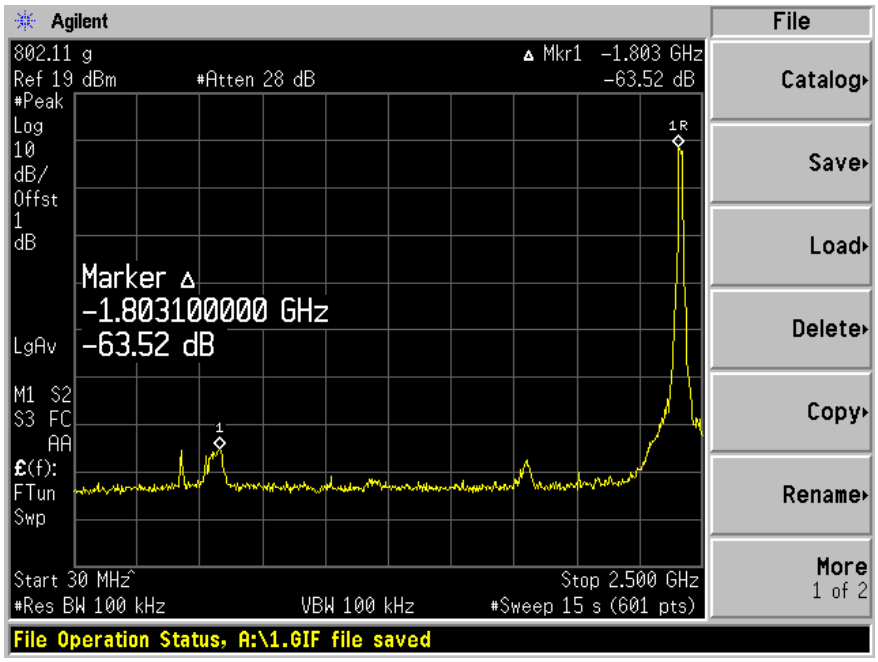


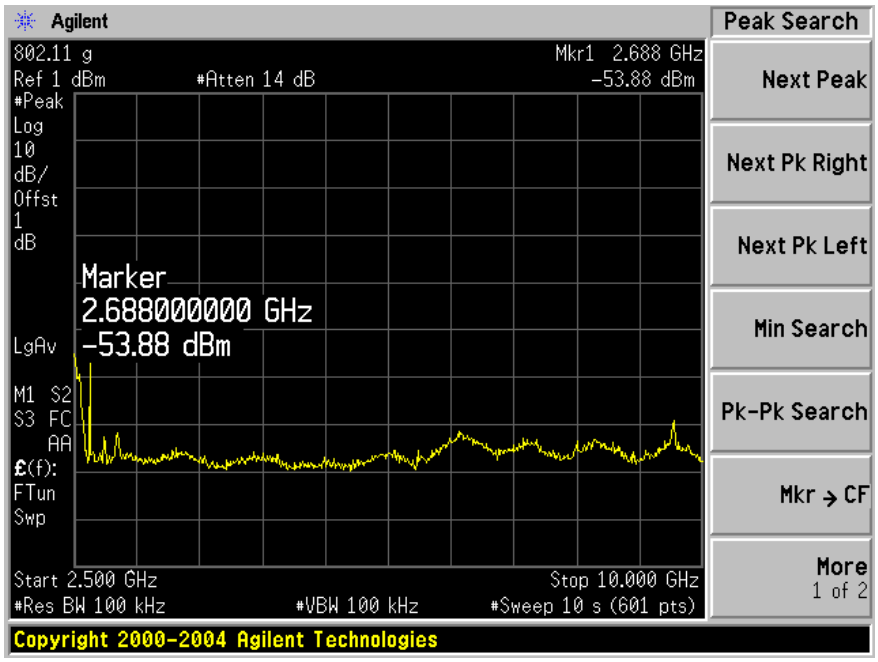


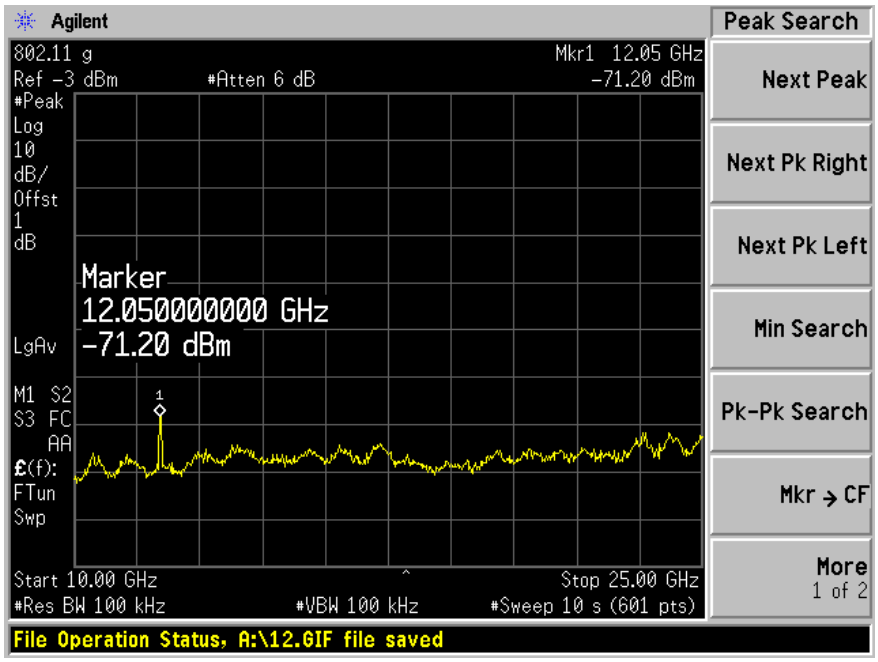


802.11g (15.247)

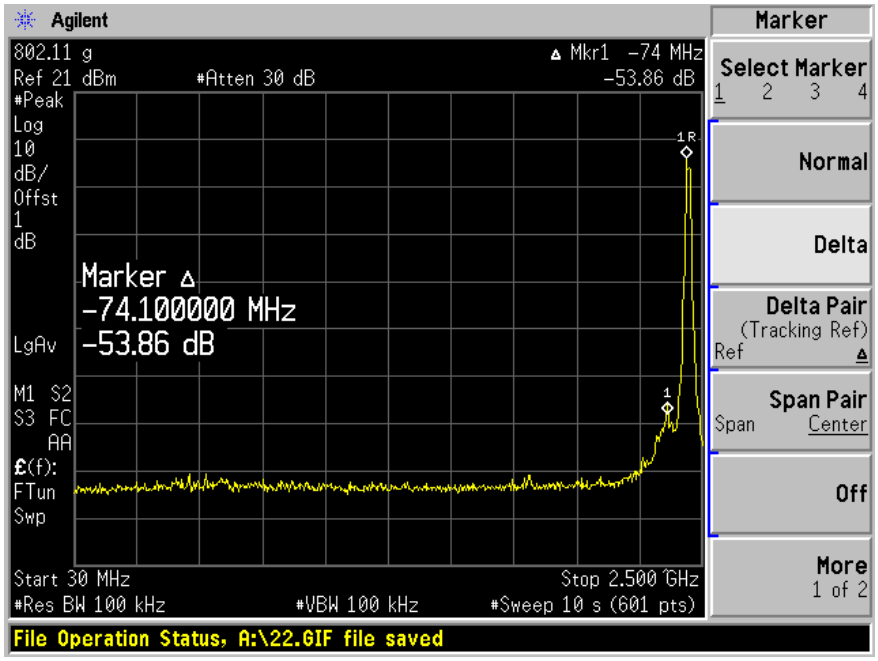
Low Channel

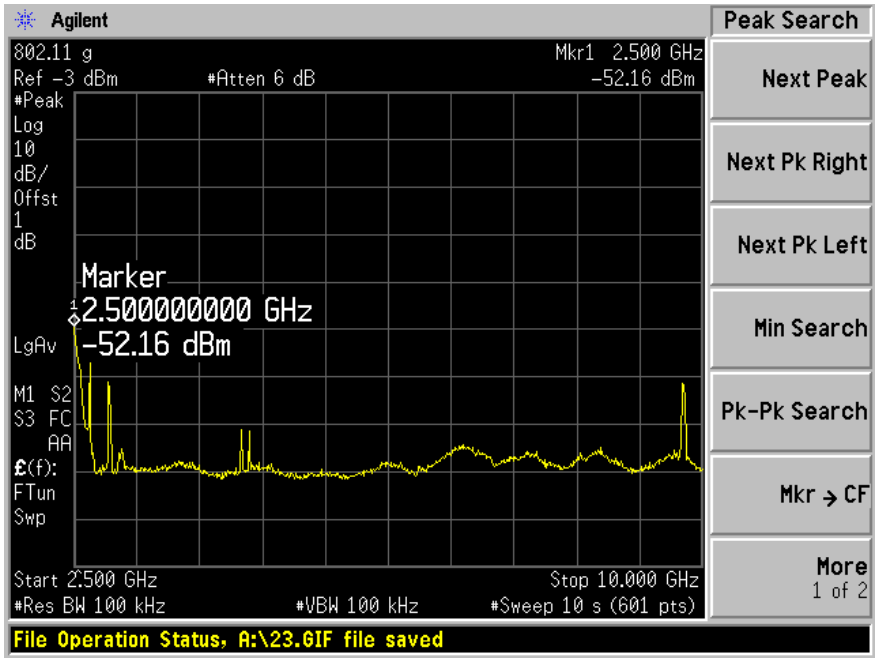


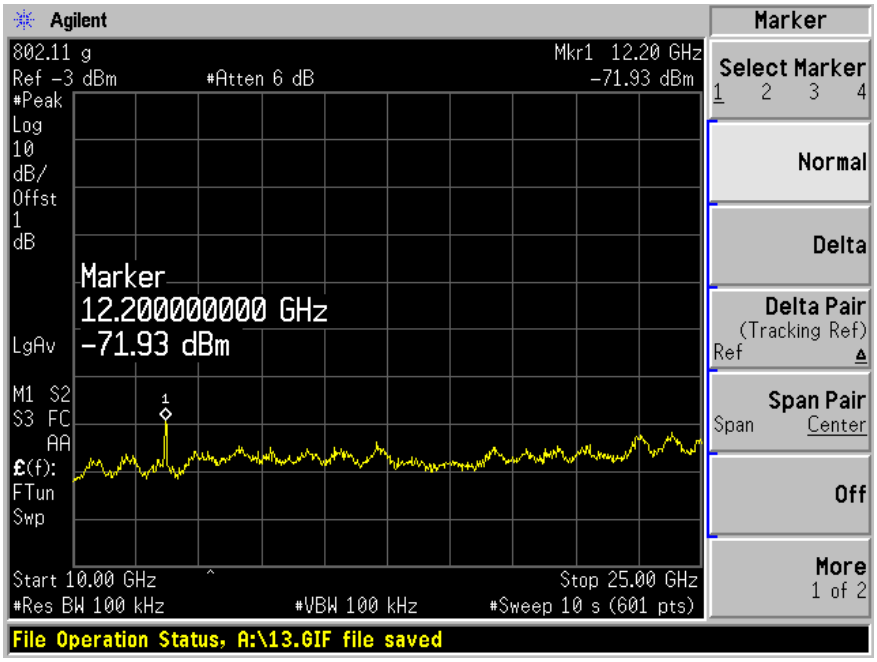

Agilent
Peak Search
802.11 g
Mkr1 2.688 GHz
Ref 1 dBm
#Atten 14 dB
-53.88 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.688000000 GHz
-53.88 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.500 GHz
Stop 10.000 GHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 10 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
802.11 g
Mkr1 12.05 GHz
Ref -3 dBm
#Atten 6 dB
-71.20 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
12.050000000 GHz
-71.20 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 10 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\12.GIF file saved

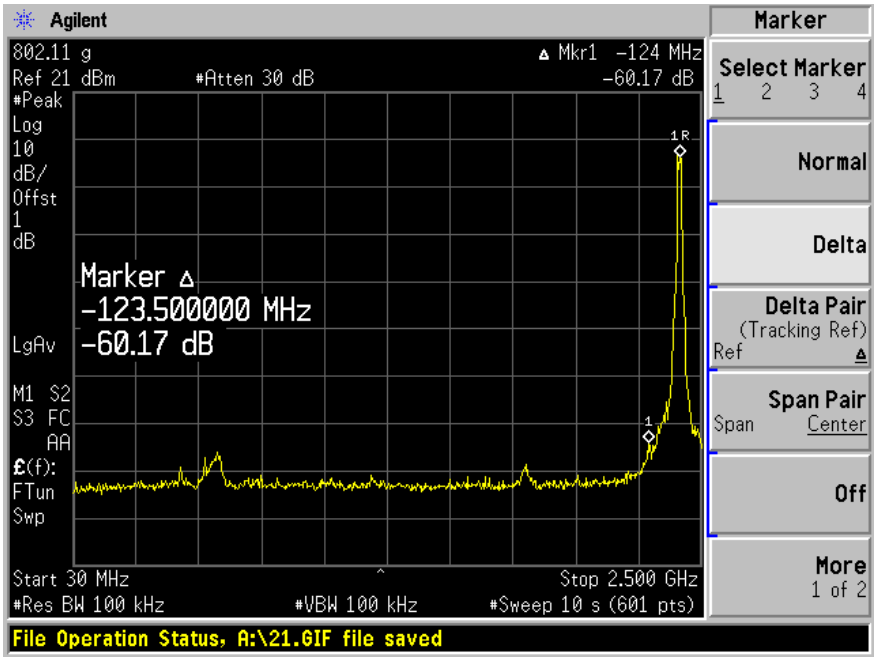
Mid Channel

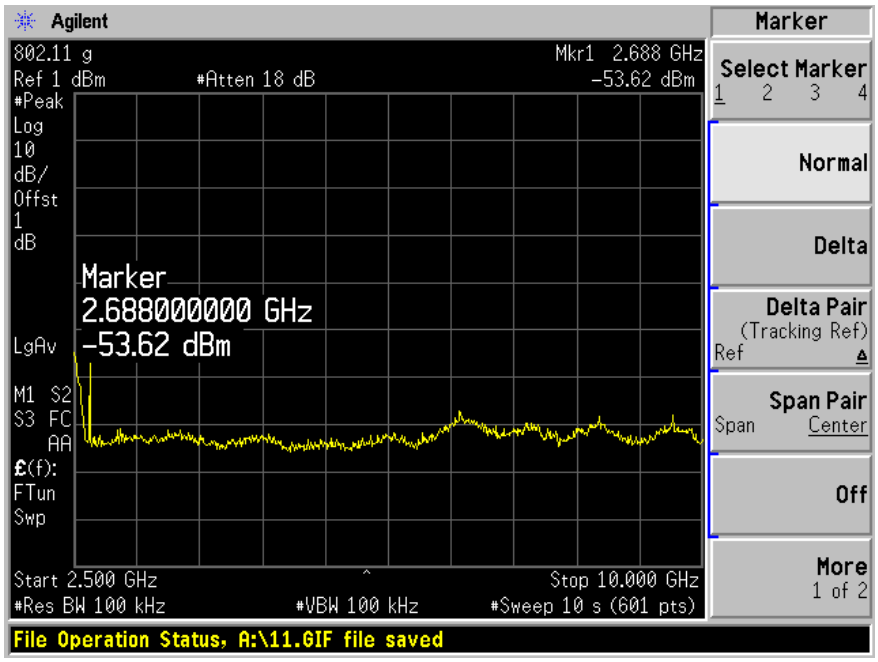

Agilent
802.11 g
Ref 21 dBm
#Atten 30 dB
Mkr1 -74 MHz
-53.86 dB
#Peak
Log
10
dB/
Offst
1
dB
Marker Δ
-74.100000 MHz
-53.86 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 2.500 GHz
#Sweep 10 s (601 pts)
File Operation Status, A:\22.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2

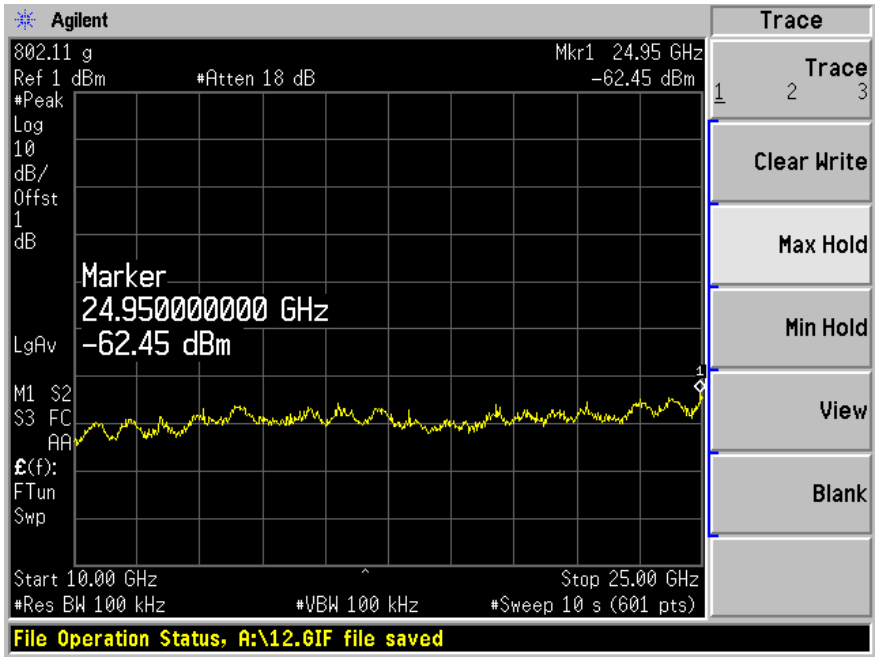

Agilent
802.11 g
Ref -3 dBm
#Atten 6 dB
Mkr1 2.500 GHz
-52.16 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.500000000 GHz
-52.16 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.500 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 10.000 GHz
#Sweep 10 s (601 pts)
File Operation Status, A:\23.GIF file saved
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2



High Channel

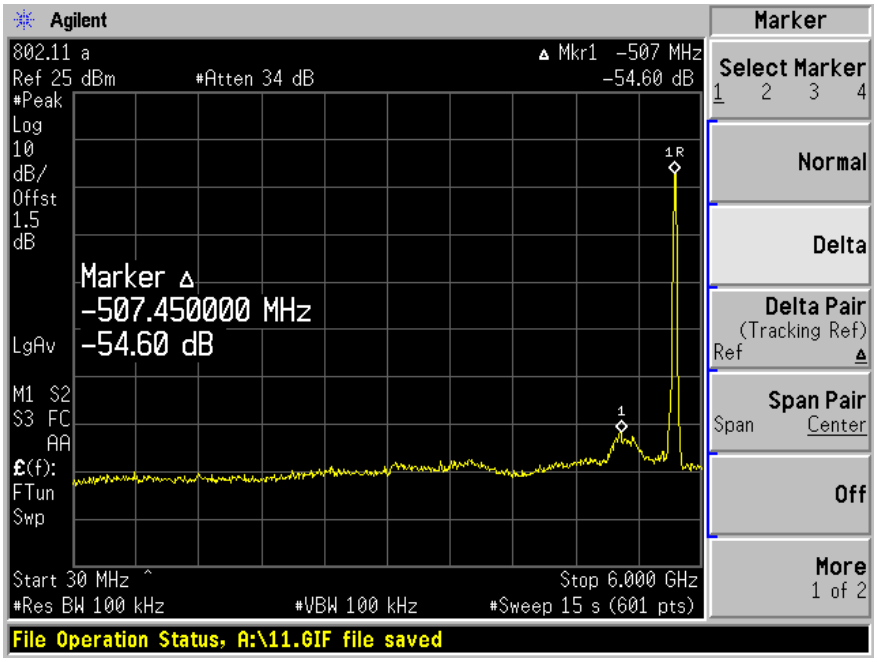


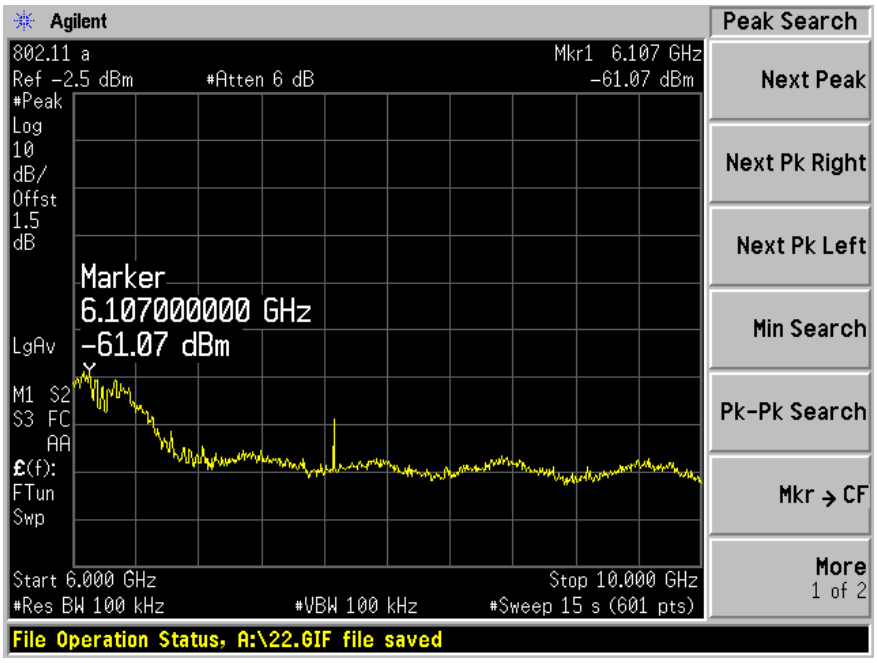

Agilent
802.11 g
Ref 1 dBm
#Atten 18 dB
Mkr1 2.688 GHz
-53.62 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.688000000 GHz
-53.62 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.500 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 10.000 GHz
#Sweep 10 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\11.GIF file saved

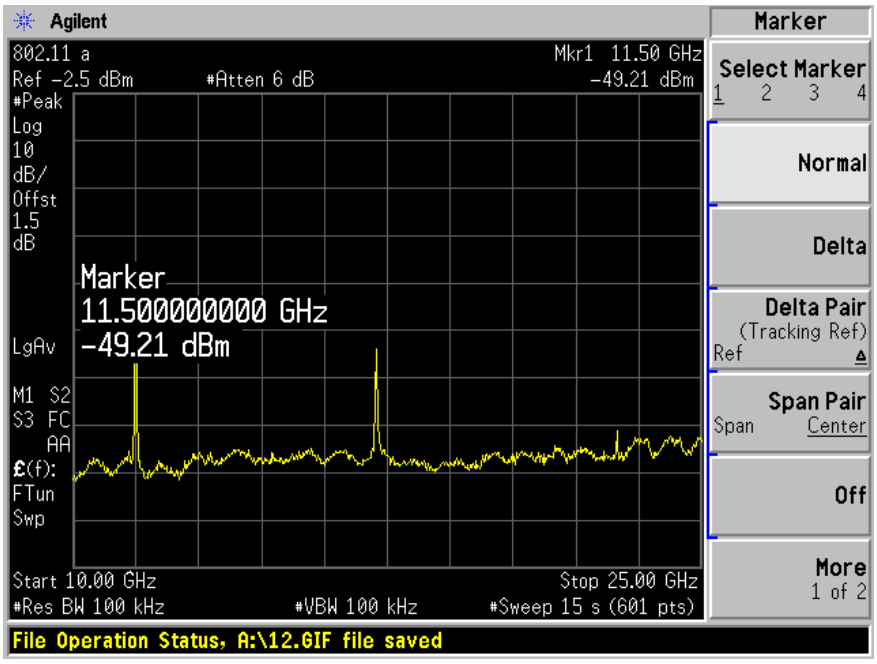

Agilent
802.11 g
Ref 1 dBm
#Atten 18 dB
Mkr1 24.95 GHz
-62.45 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
24.950000000 GHz
-62.45 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 10 s (601 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\12.GIF file saved

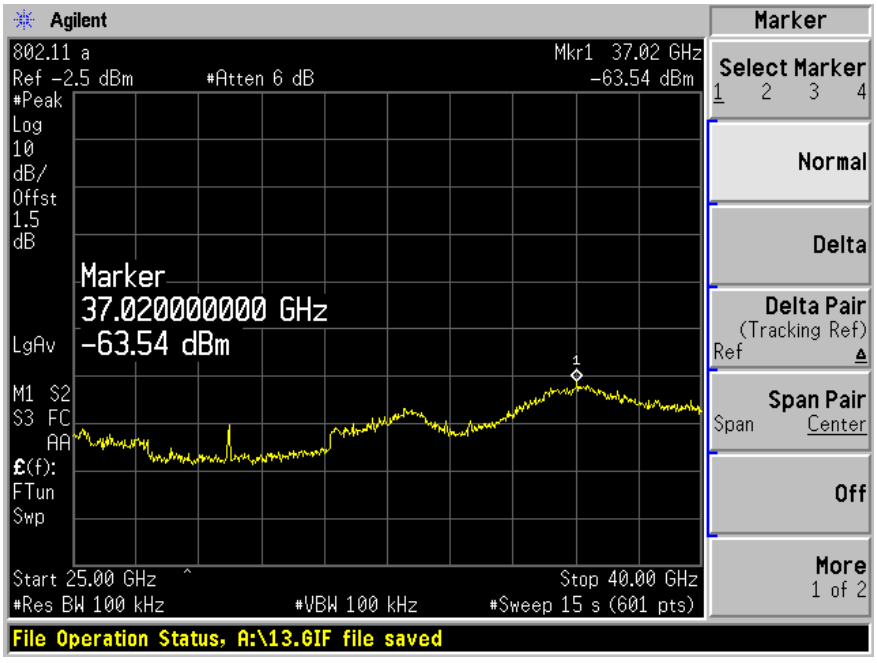
802.11a High Band (15.247):

Low Channel

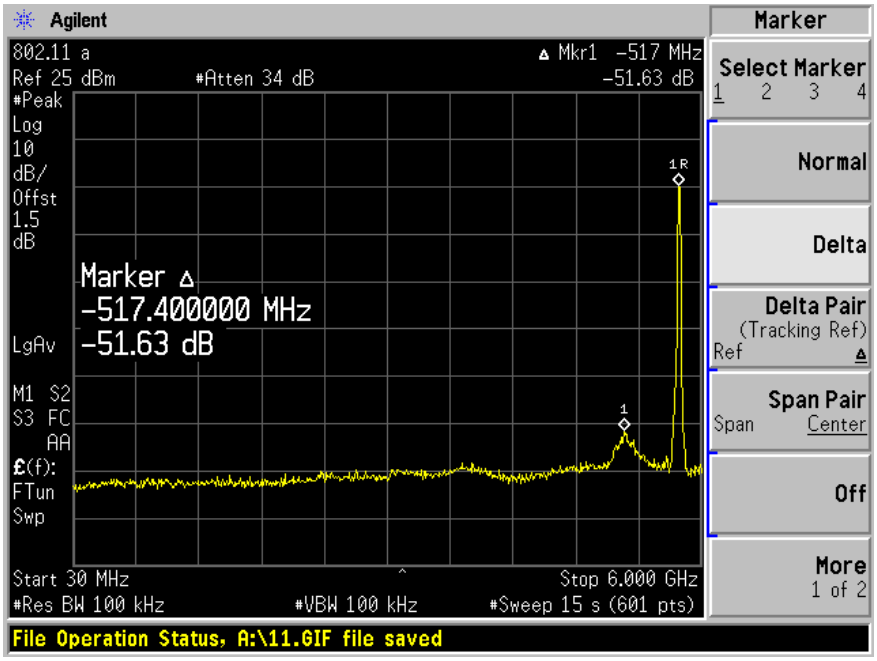


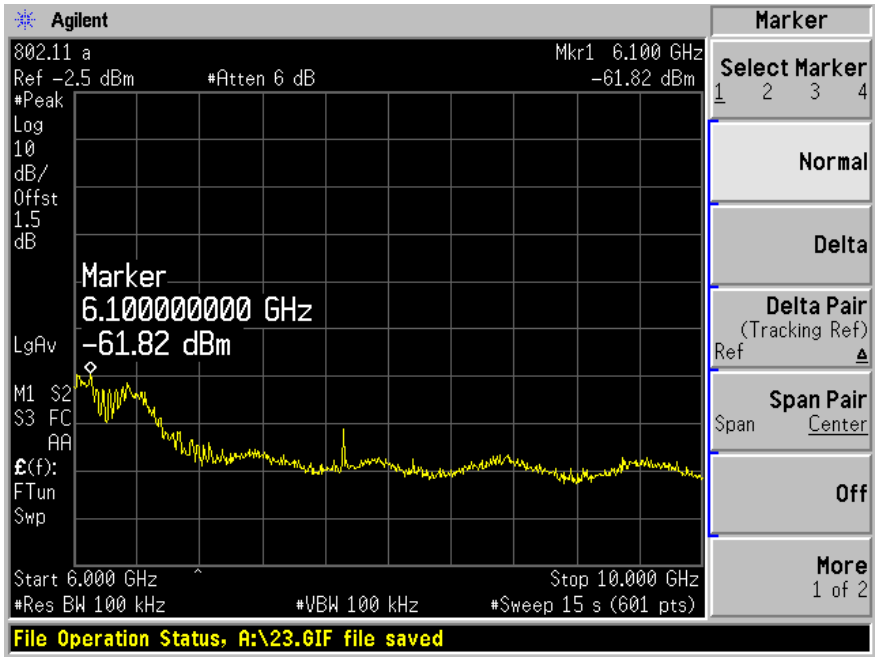


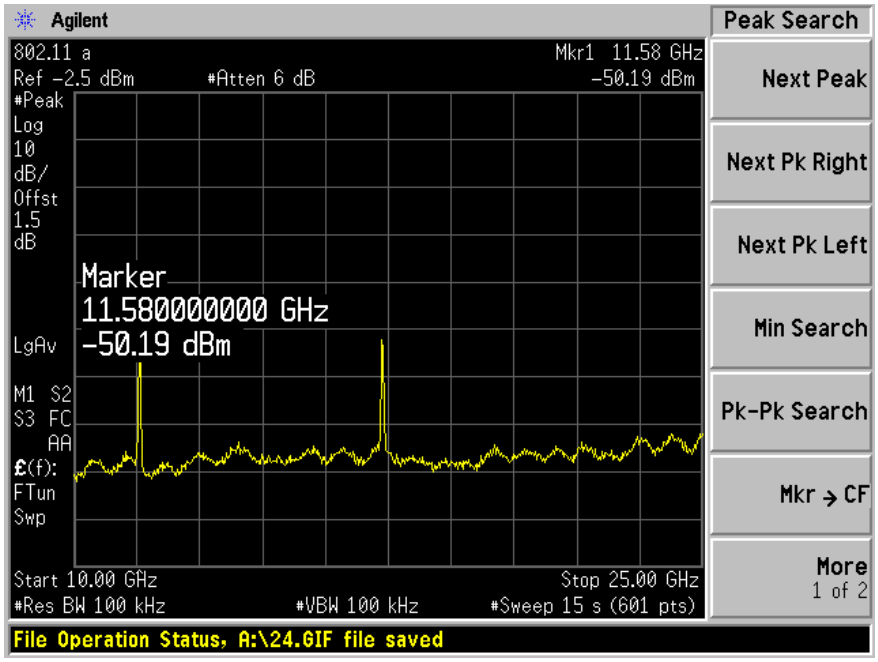

Agilent
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 11.50 GHz
-49.21 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
11.500000000 GHz
-49.21 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 15 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\12.GIF file saved

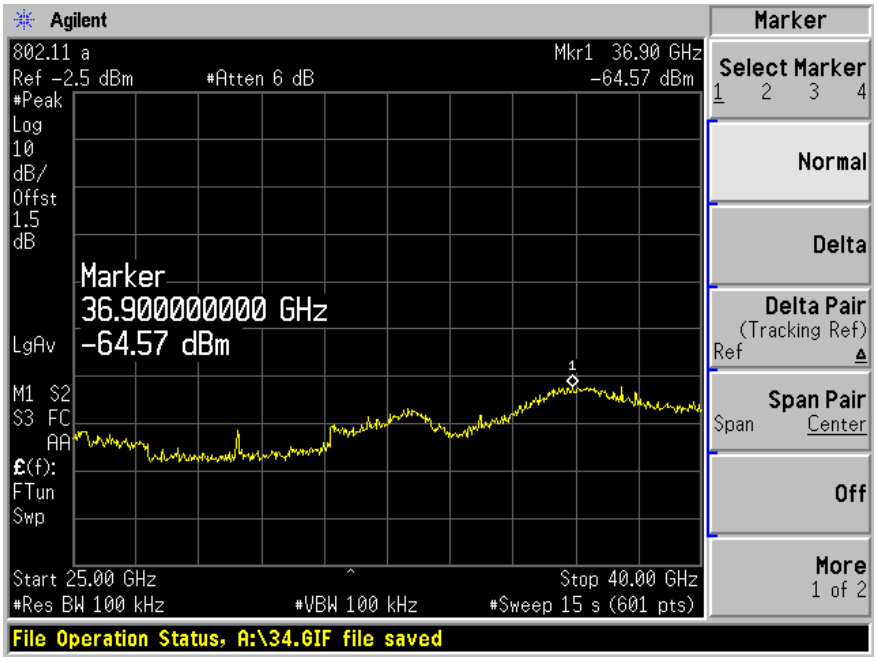

Agilent
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 37.02 GHz
-63.54 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
37.020000000 GHz
-63.54 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 25.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 40.00 GHz
#Sweep 15 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\13.GIF file saved

Mid Channel

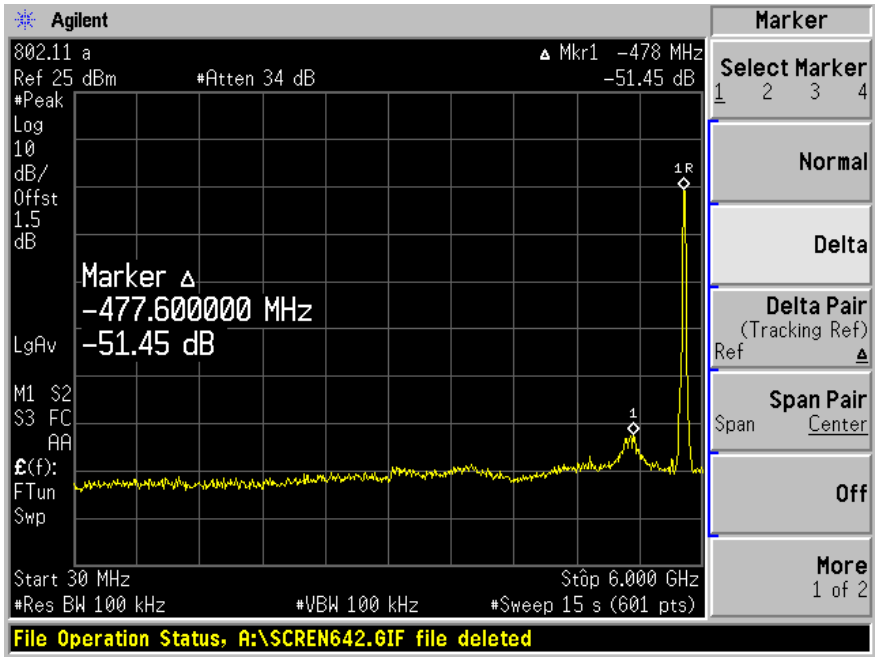

Agilent
Marker
802.11 a
Ref 25 dBm
#Atten 34 dB
Mkr1 -517 MHz
-51.63 dB
#Peak
Log
10
dB/
Offst
1.5
dB
1R
Marker Δ
-517.400000 MHz
-51.63 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 6.000 GHz
#Sweep 15 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\11.GIF file saved

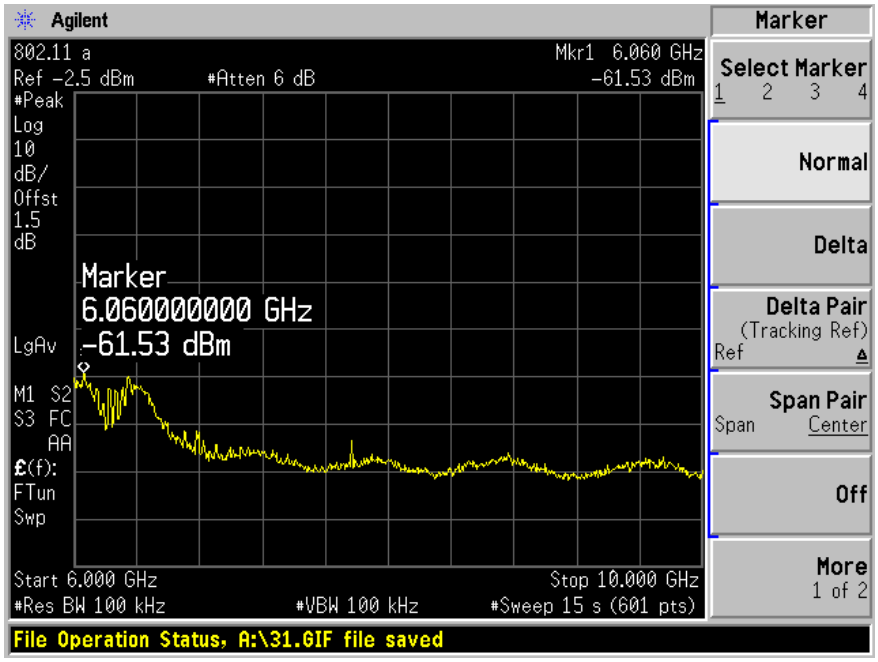

Agilent
Marker
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 6.100 GHz
-61.82 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
6.100000000 GHz
-61.82 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 6.000 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 10.000 GHz
#Sweep 15 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\23.GIF file saved

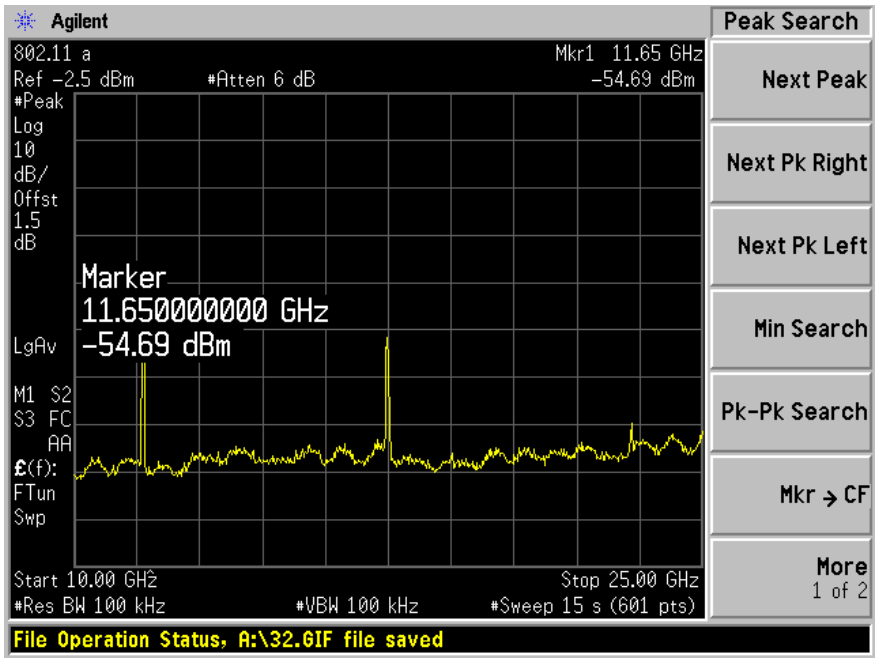

Agilent
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 11.58 GHz
-50.19 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
11.580000000 GHz
-50.19 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 15 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\24.GIF file saved

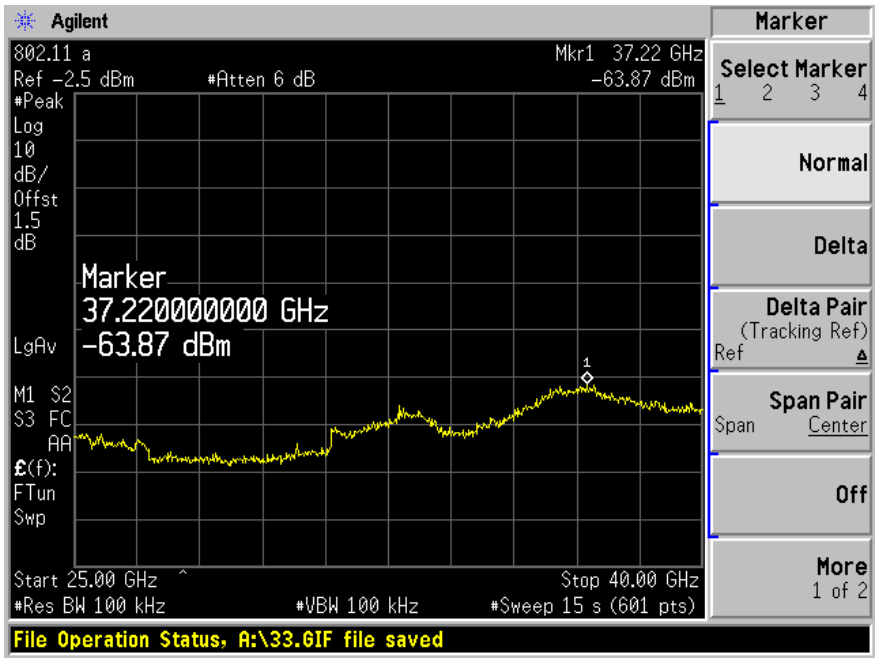

Agilent
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 36.90 GHz
-64.57 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
36.900000000 GHz
-64.57 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 25.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 40.00 GHz
#Sweep 15 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\34.GIF file saved

High Channel:



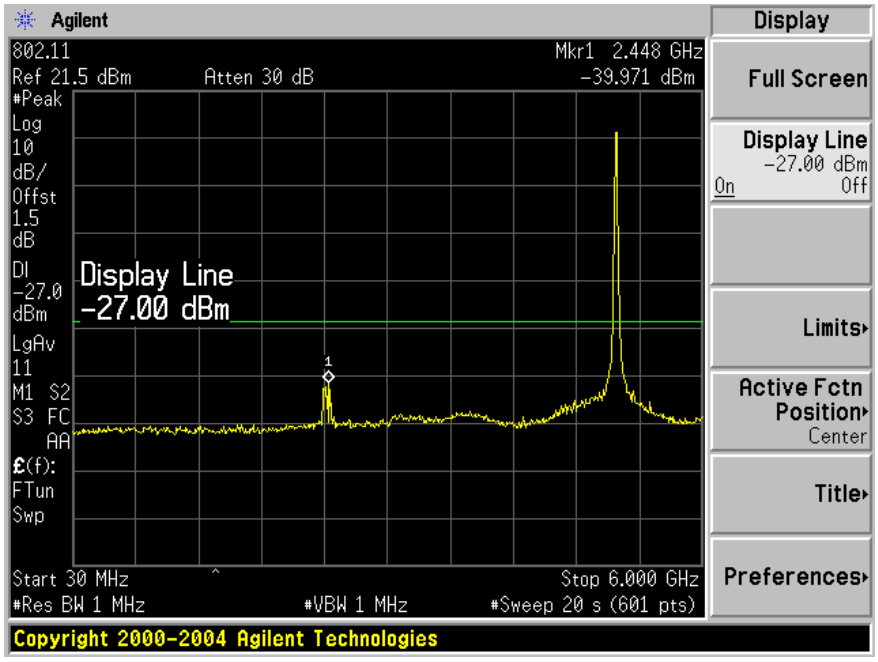


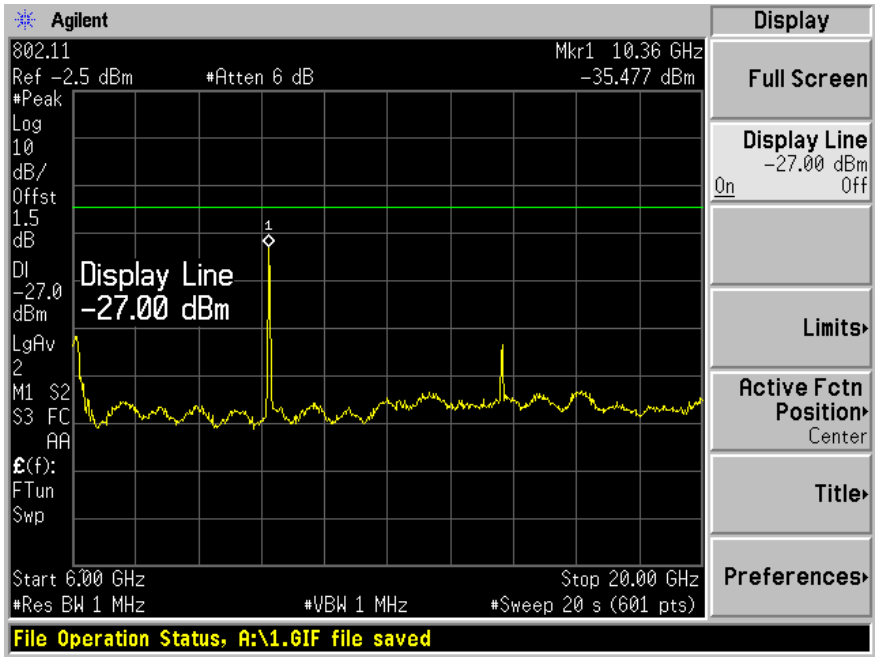

Agilent
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 11.65 GHz
-54.69 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
11.650000000 GHz
-54.69 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 15 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\32.GIF file saved

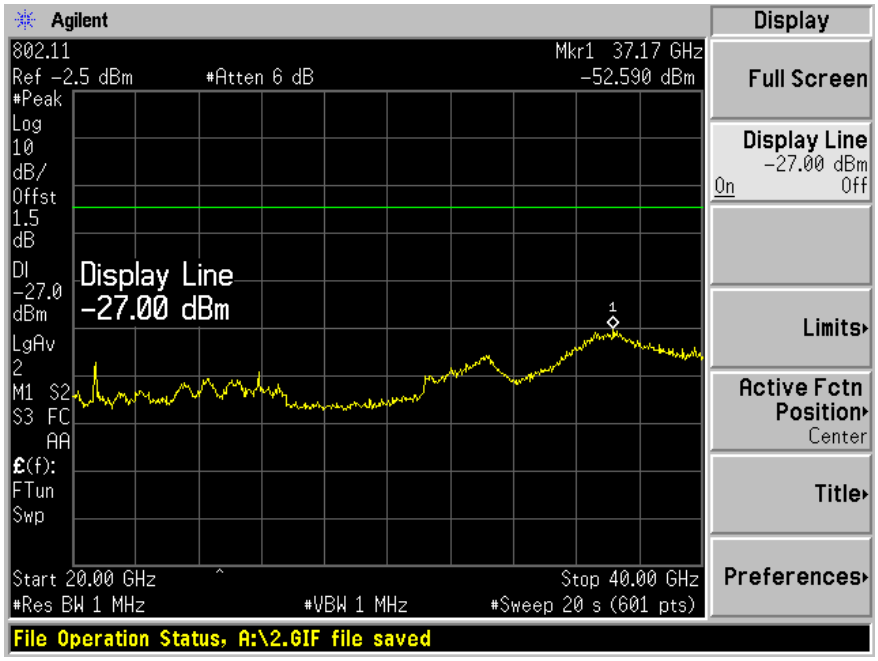

Agilent
802.11 a
Ref -2.5 dBm
#Atten 6 dB
Mkr1 37.22 GHz
-63.87 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
37.220000000 GHz
-63.87 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 25.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 40.00 GHz
#Sweep 15 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\33.GIF file saved

802.11a Low Band (15.407)

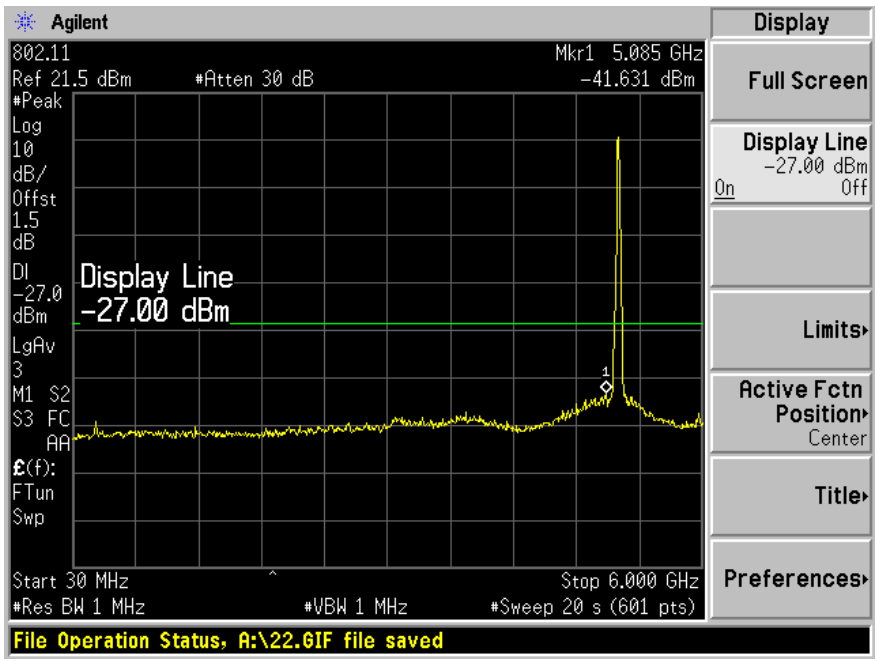
Low Channel

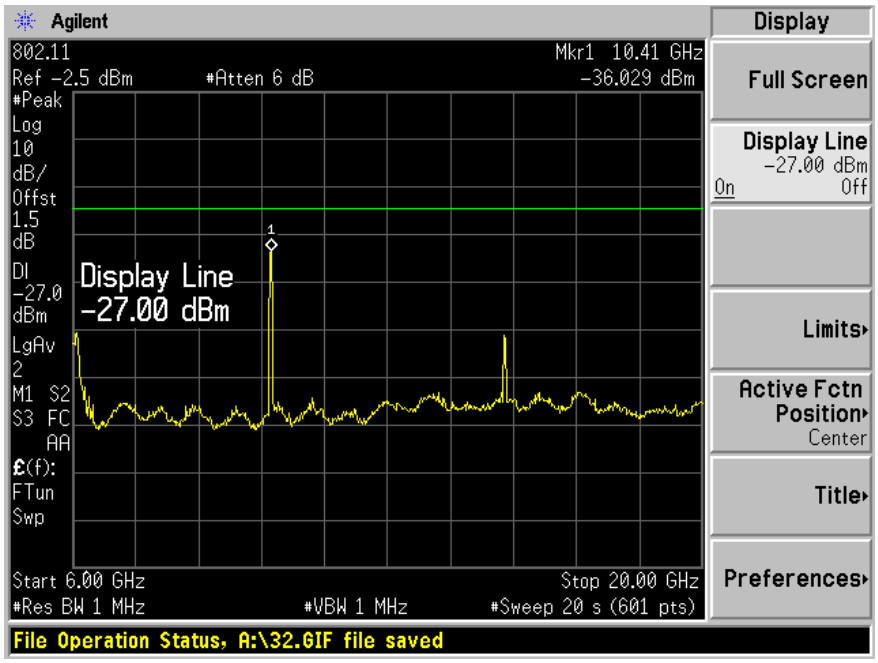


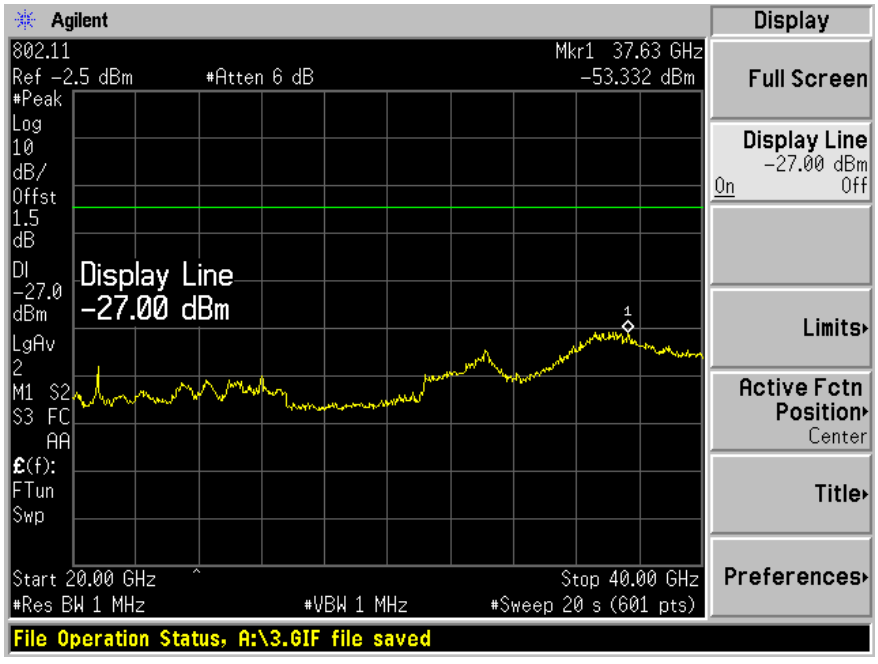



Agilent
802.11
Ref -2.5 dBm
#Atten 6 dB
Mkr1 37.17 GHz
-52.590 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Dl
-27.0
dBm
LgAv
2
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Display Line
-27.00 dBm
Start 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 40.00 GHz
#Sweep 20 s (601 pts)
Display
Full Screen
Display Line
-27.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\2.GIF file saved

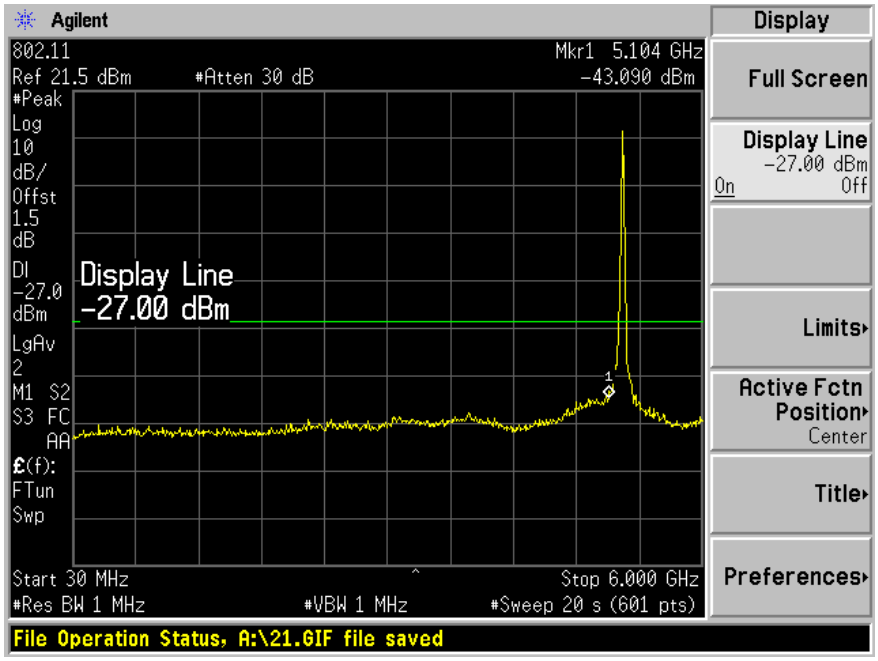
Mid Channel

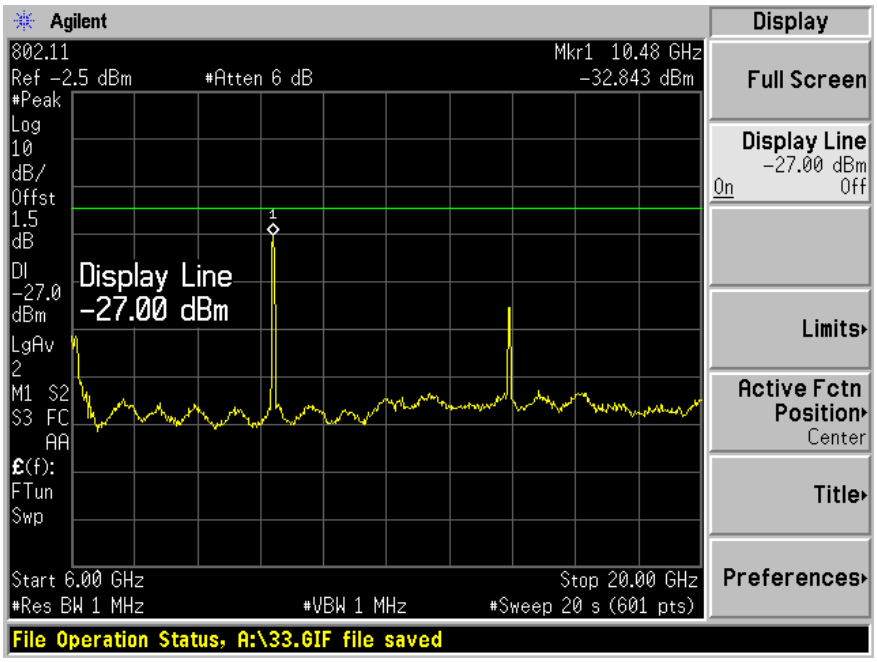

Agilent
802.11
Ref 21.5 dBm
#Atten 30 dB
Mkr1 5.085 GHz
-41.631 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Dl
-27.0
dBm
LgAv
3
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Display Line
-27.00 dBm
Start 30 MHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 6.000 GHz
#Sweep 20 s (601 pts)
Display
Full Screen
Display Line
-27.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\22.GIF file saved

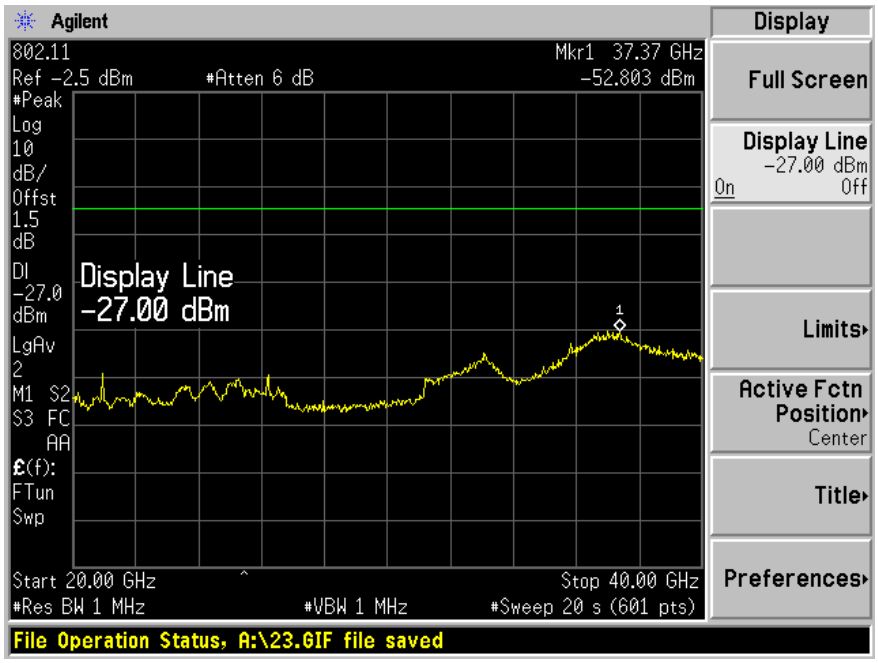

Agilent
802.11
Ref -2.5 dBm
#Atten 6 dB
Mkr1 10.41 GHz
-36.029 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Dl
-27.0
dBm
LgAv
2
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Display Line
-27.00 dBm
Start 6.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 20.00 GHz
#Sweep 20 s (601 pts)
File Operation Status, A:\32.GIF file saved
Display
Full Screen
Display Line
-27.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences


Agilent
802.11
Ref -2.5 dBm
#Atten 6 dB
Mkr1 37.63 GHz
-53.332 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Dl
-27.0
dBm
LgAv
2
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Display Line
-27.00 dBm
Start 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 40.00 GHz
#Sweep 20 s (601 pts)
File Operation Status, A:\3.GIF file saved
Display
Full Screen
Display Line
-27.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences

High Channel

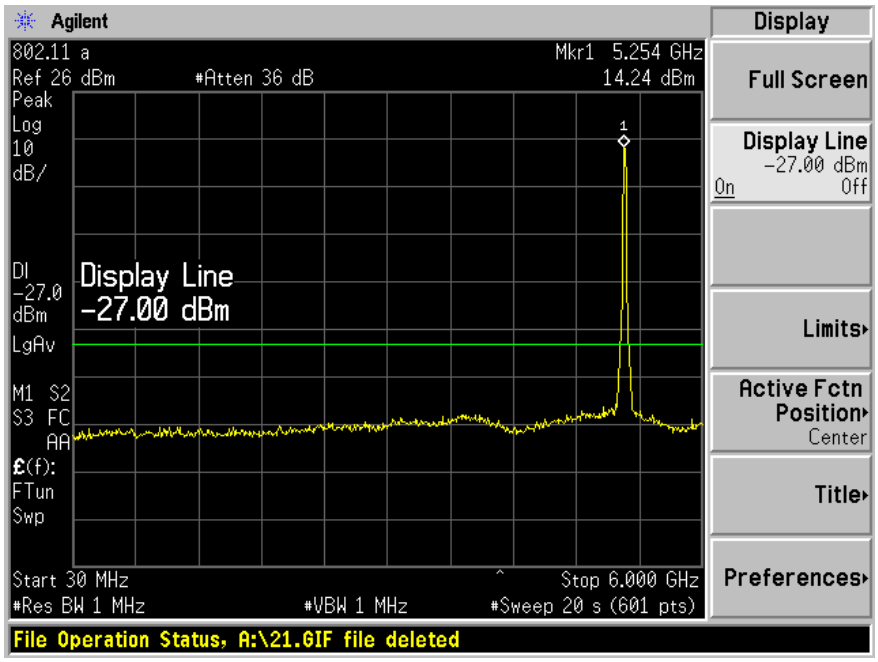


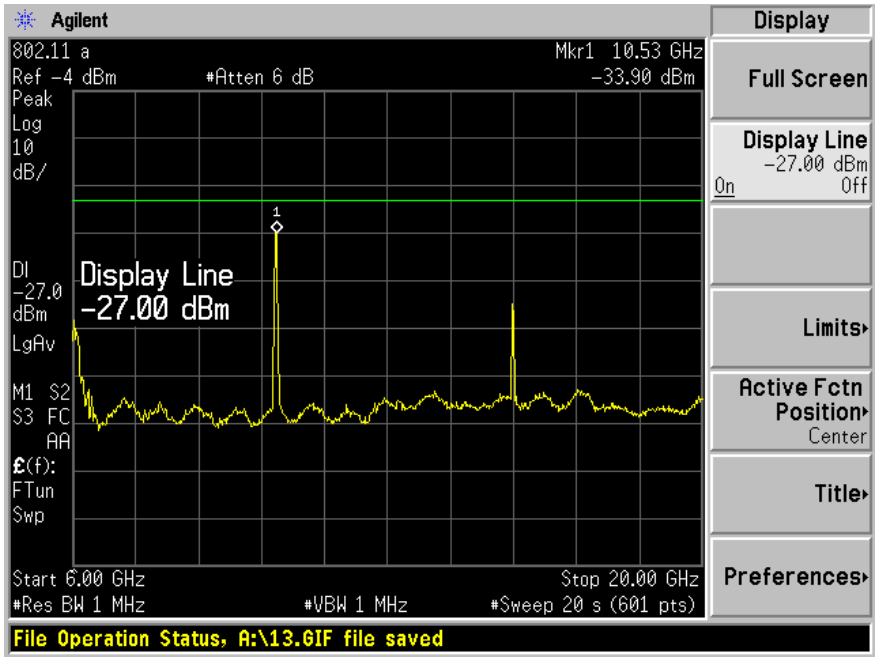


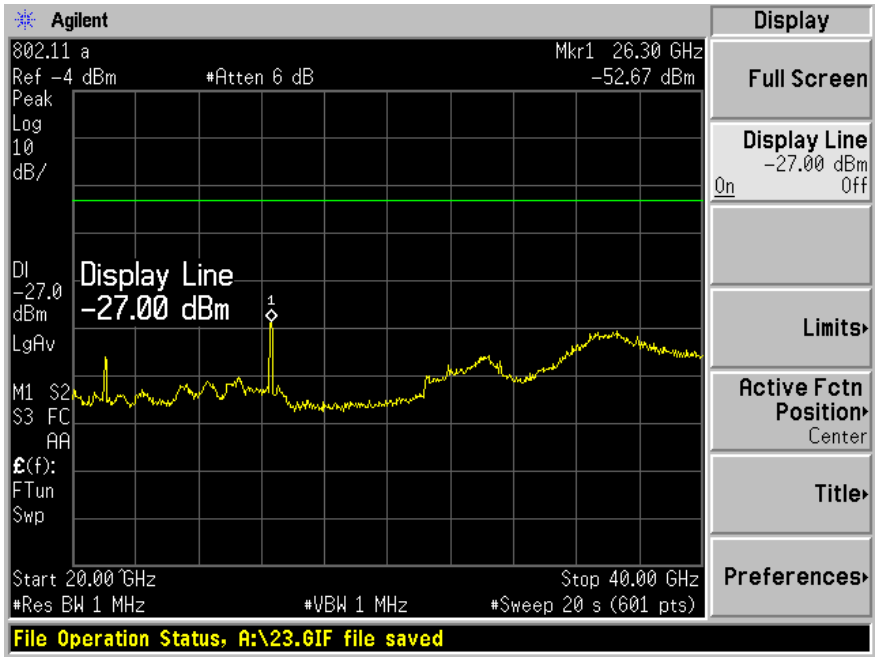


802.11a Mid Band (15.407)

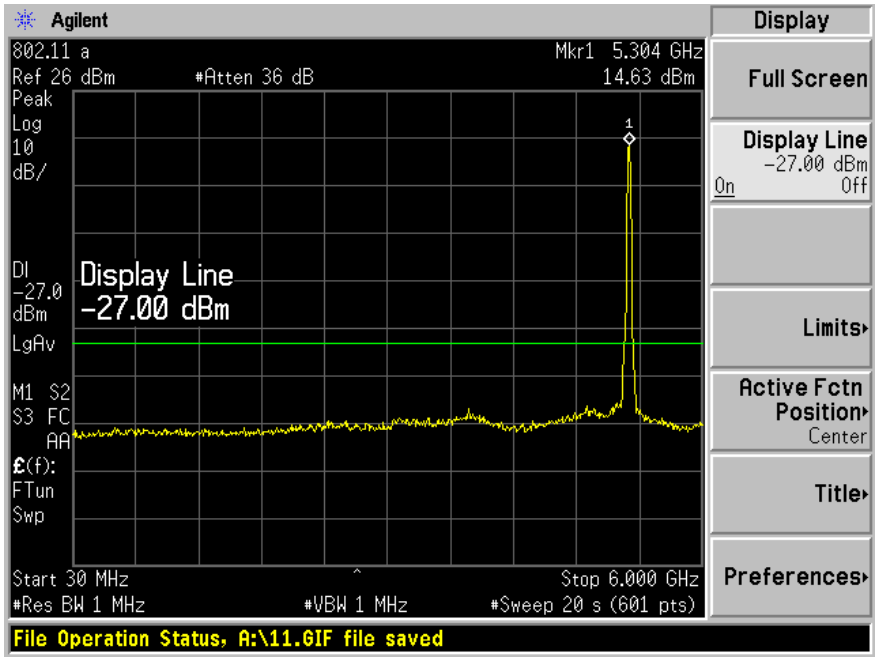
Low Channel

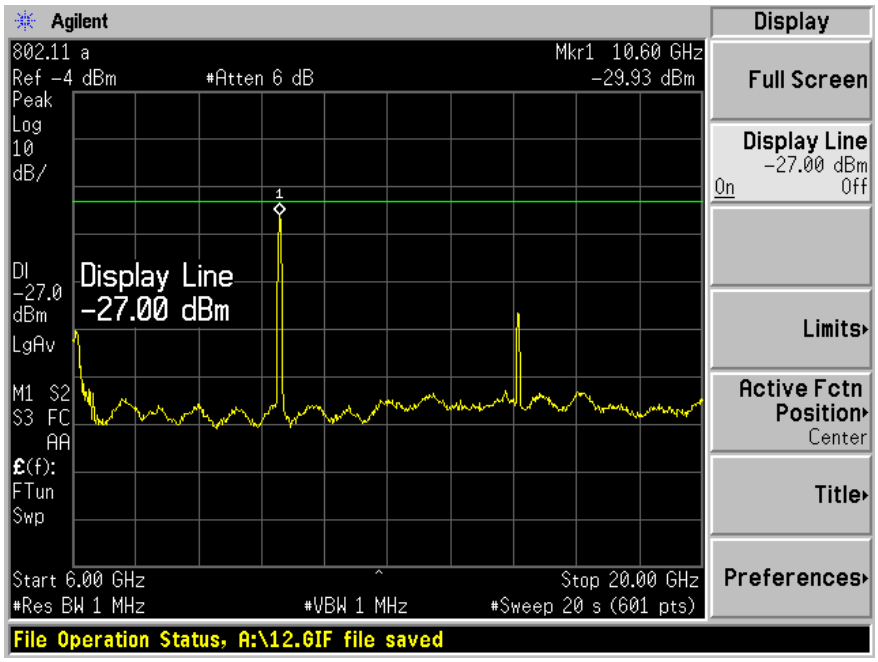


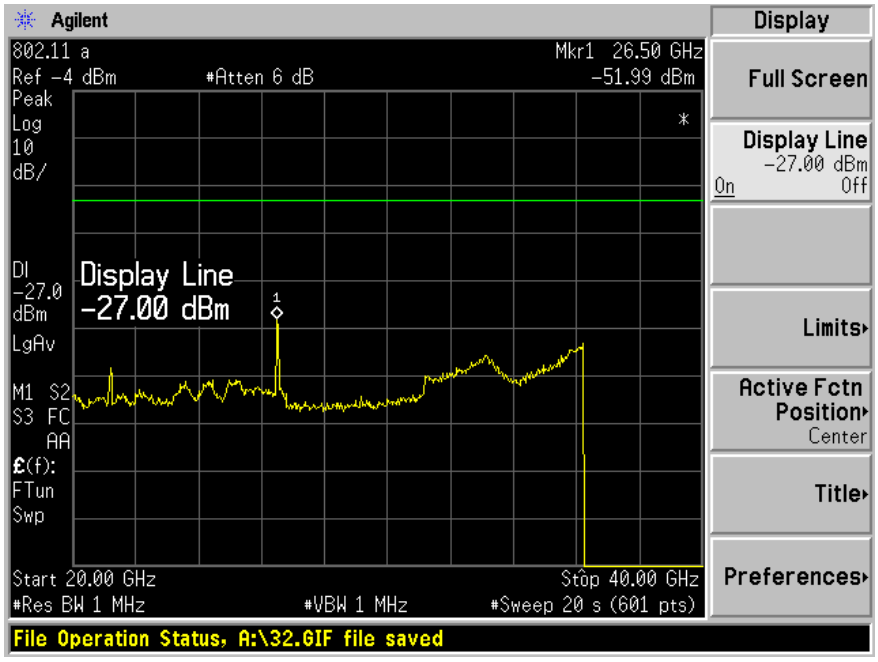

Agilent
802.11 a
Ref -4 dBm
#Atten 6 dB
Mkr1 10.53 GHz
-33.90 dBm
Peak
Log
10
dB/
Display Line
-27.00 dBm
DI
-27.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 6.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 20.00 GHz
#Sweep 20 s (601 pts)
Display
Full Screen
Display Line
-27.00 dBm
On
Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\13.GIF file saved


Agilent
802.11 a
Ref -4 dBm
#Atten 6 dB
Mkr1 26.30 GHz
-52.67 dBm
Peak
Log
10
dB/
Display Line
-27.00 dBm
DI
-27.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 40.00 GHz
#Sweep 20 s (601 pts)
Display
Full Screen
Display Line
-27.00 dBm
On
Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\23.GIF file saved

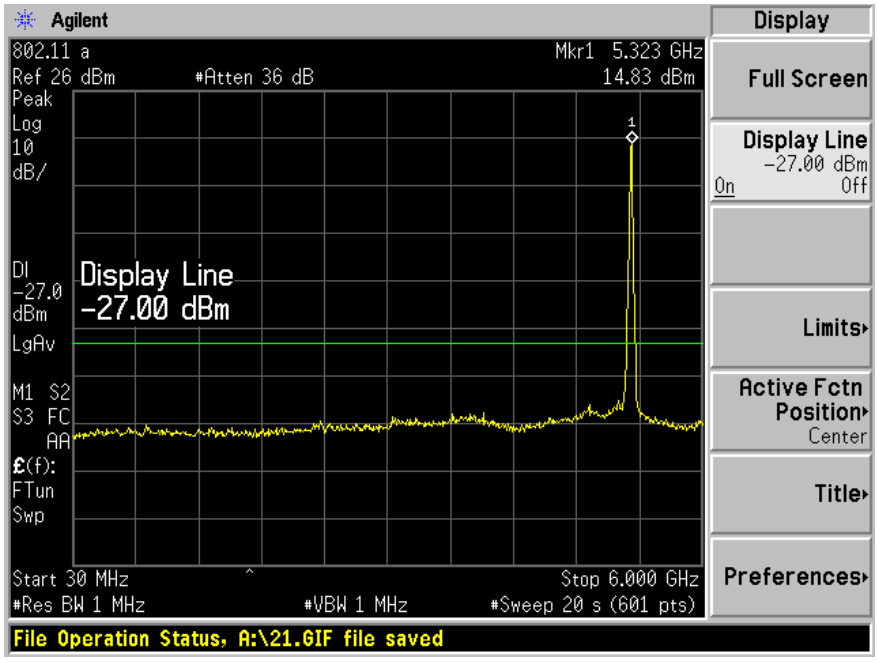
Mid Channel

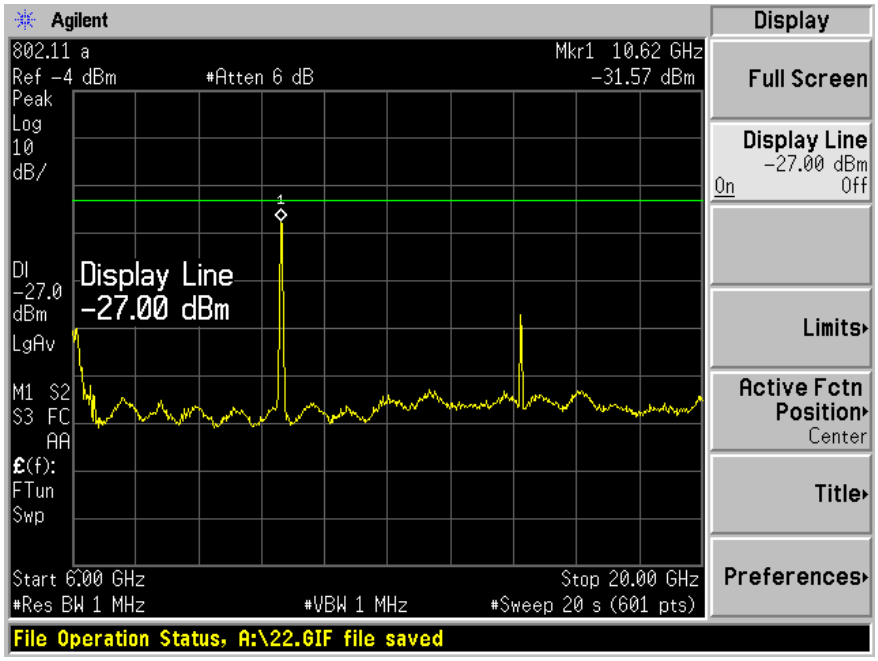

Agilent
Display
802.11 a
Mkr1 5.304 GHz
Ref 26 dBm
#Atten 36 dB
14.63 dBm
Peak
Log
10
dB/
Display Line
-27.00 dBm
DI
-27.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 30 MHz
Stop 6.000 GHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 20 s (601 pts)
Full Screen
Display Line
-27.00 dBm
On
Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\11.GIF file saved

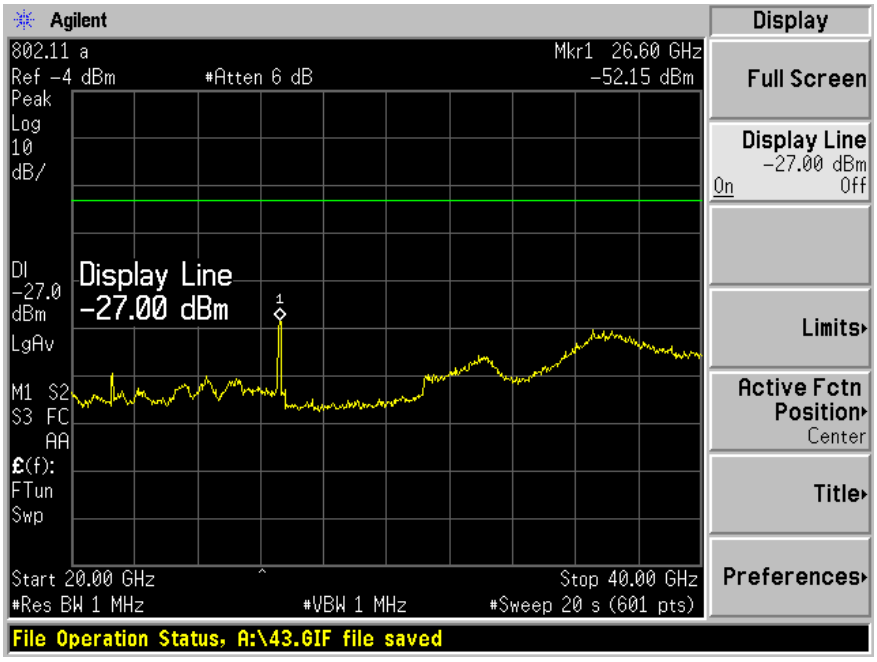

Agilent
Display
802.11 a
Mkr1 10.60 GHz
Ref -4 dBm
#Atten 6 dB
-29.93 dBm
Peak
Log
10
dB/
Display Line
-27.00 dBm
DI
-27.0
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 6.00 GHz
Stop 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 20 s (601 pts)
Full Screen
Display Line
-27.00 dBm
On
Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\12.GIF file saved



High Channel




Agilent
802.11 a
Ref -4 dBm
#Atten 6 dB
Mkr1 10.62 GHz
-31.57 dBm
Peak
Log
10
dB/
Display Line
-27.00 dBm
Start 6.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 20.00 GHz
#Sweep 20 s (601 pts)
Display
Full Screen
Display Line
-27.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\22.GIF file saved


Agilent
802.11 a
Ref -4 dBm
#Atten 6 dB
Mkr1 26.60 GHz
-52.15 dBm
Peak
Log
10
dB/
Display Line
-27.00 dBm
Start 20.00 GHz
#Res BW 1 MHz
#VBW 1 MHz
Stop 40.00 GHz
#Sweep 20 s (601 pts)
Display
Full Screen
Display Line
-27.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\43.GIF file saved

§15.247(a)(2) & §15.407 – 6 dB BANDWIDTH and 26 dB BANDWIDTH

Standard Applicable

According to §15.247(a)(2), for direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz. According to §15.407, 26dB Bandwidth should be shown.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth. (6 dB bandwidth for DTS)
4. Same as (3) except 26 dB. (26dB bandwidth for UNII)
5. Repeat above procedures until all frequencies measured were complete.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

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

Measurement Result

Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

The testing was performed by Daniel Deng on 2005-08-25.

Test Result for 802.11b (15.247) (6dB BW)

Channel	Frequency MHz	Channel Bandwidth (MHz)	Limit KHz
Low	2412	11.120	>500
Mid	2442	11.360	>500
High	2462	11.387	>500

Test Result for 802.11g (15.247) (6dB BW)

Channel	Frequency MHz	Channel Bandwidth (MHz)	Limit KHz
Low	2412	16.151	>500
Mid	2442	16.273	>500
High	2462	16.278	>500

Test Result for 802.11a High Band (15.247) (6dB BW)

Channel	Frequency MHz	Channel Bandwidth (MHz)	Limit KHz
Low	5745	16.397	>500
Mid	5785	16.458	>500
High	5825	16.429	>500

Test Result for 802.11a (26dB BW)

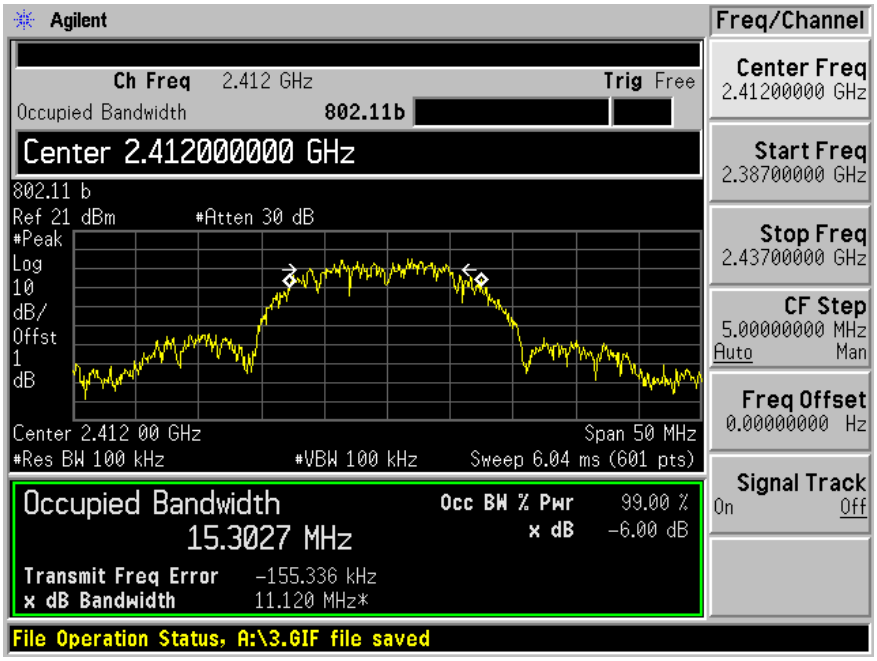
Low Band

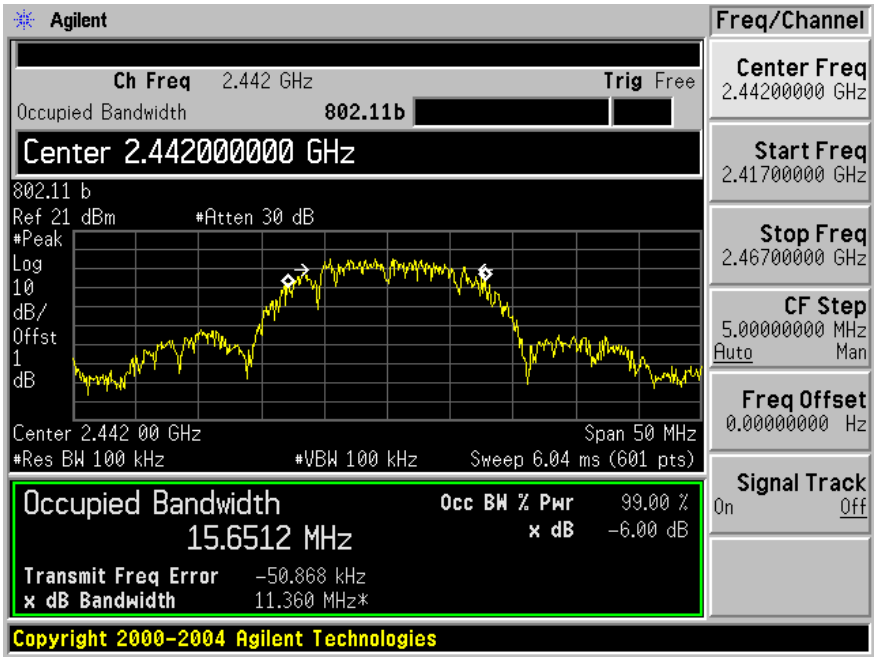
Channel	Frequency MHz	Channel 26dB Bandwidth (MHz)
Low	5180	23.450
Mid	5200	23.293
High	5240	23.390

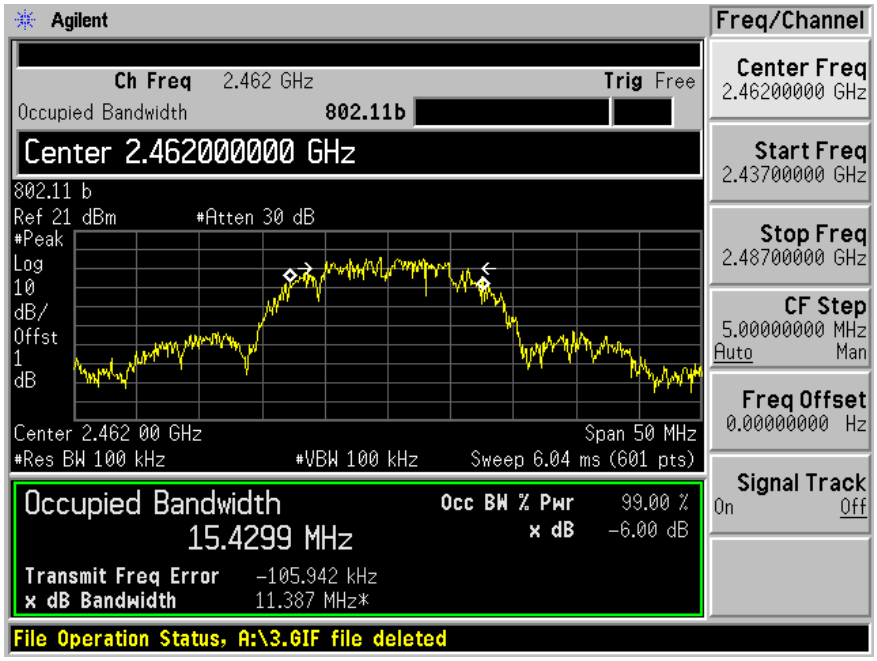
Mid Band

Channel	Frequency MHz	Channel 26dB Bandwidth (MHz)
Low	5260	25.816
Mid	5300	25.441
High	5320	23.912

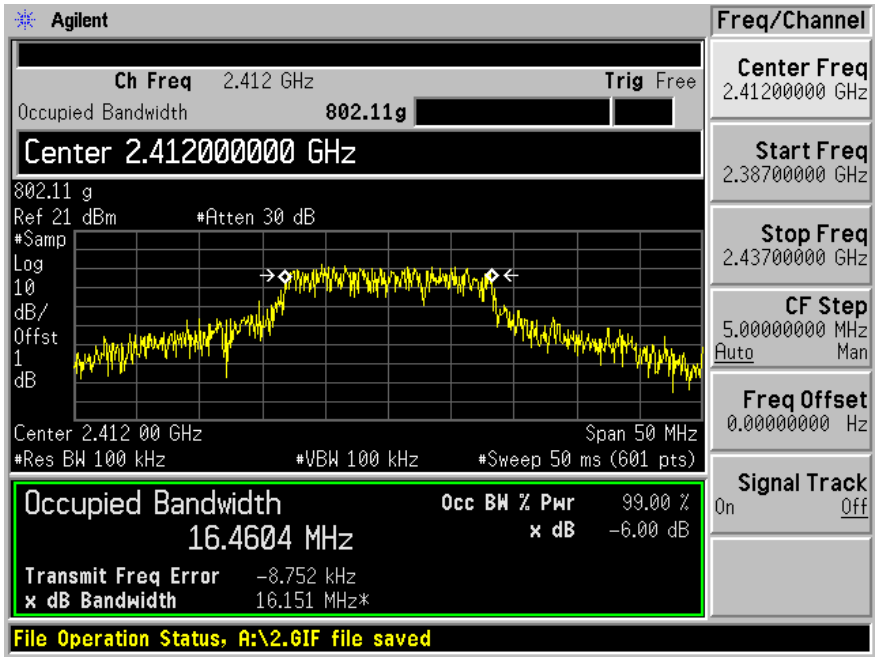
802.11b

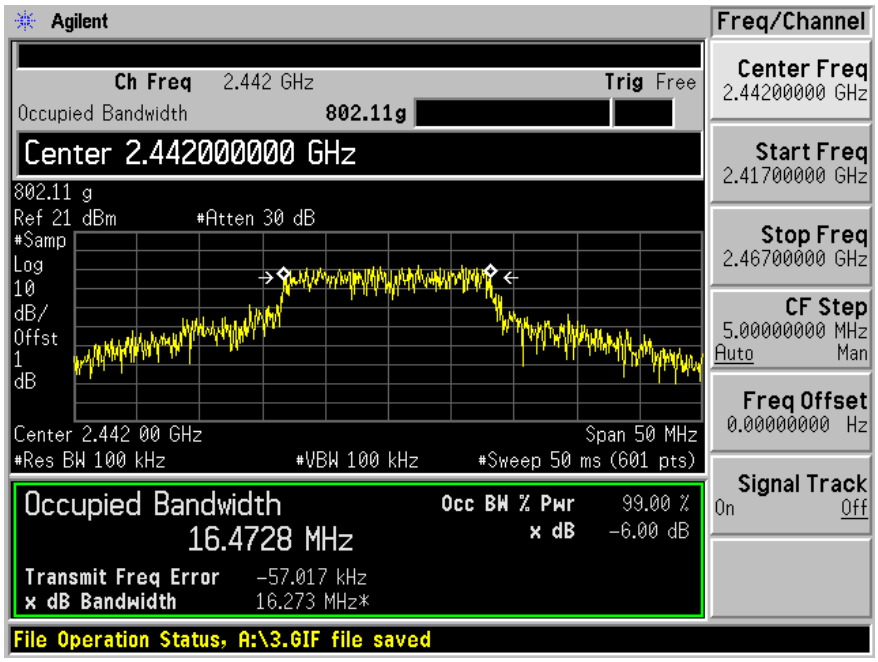

Agilent
Freq/Channel
Ch Freq 2.412 GHz
Trig Free
Occupied Bandwidth
802.11b
Center 2.412000000 GHz
802.11 b
Ref 21 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
1
dB
Center 2.412 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 6.04 ms (601 pts)
Occupied Bandwidth
15.3027 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -155.336 kHz
x dB Bandwidth 11.120 MHz*
Center Freq
2.41200000 GHz
Start Freq
2.38700000 GHz
Stop Freq
2.43700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, A:\3.GIF file saved

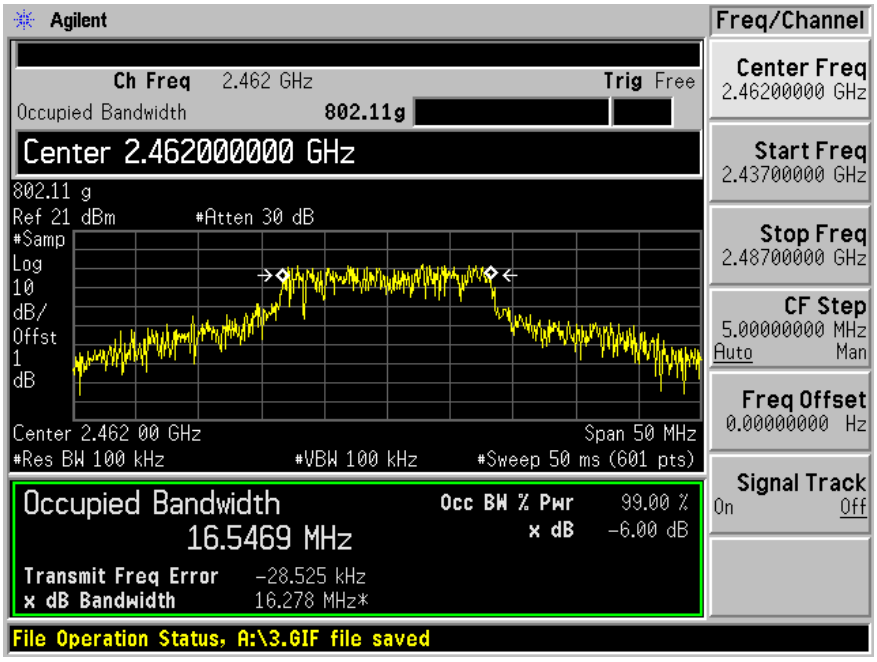

Agilent
Freq/Channel
Ch Freq 2.442 GHz
Trig Free
Occupied Bandwidth
802.11b
Center 2.442000000 GHz
802.11 b
Ref 21 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
1
dB
Center 2.442 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 6.04 ms (601 pts)
Occupied Bandwidth
15.6512 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -50.868 kHz
x dB Bandwidth 11.360 MHz*
Center Freq
2.44200000 GHz
Start Freq
2.41700000 GHz
Stop Freq
2.46700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2004 Agilent Technologies


Agilent
Freq/Channel
Ch Freq 2.462 GHz
Trig Free
Occupied Bandwidth
802.11b
Center 2.462000000 GHz
802.11 b
Ref 21 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
1
dB
Center 2.462 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 6.04 ms (601 pts)
Occupied Bandwidth
15.4299 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -105.942 kHz
x dB Bandwidth 11.387 MHz*
File Operation Status, A:\3.GIF file deleted
Center Freq
2.46200000 GHz
Start Freq
2.43700000 GHz
Stop Freq
2.48700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

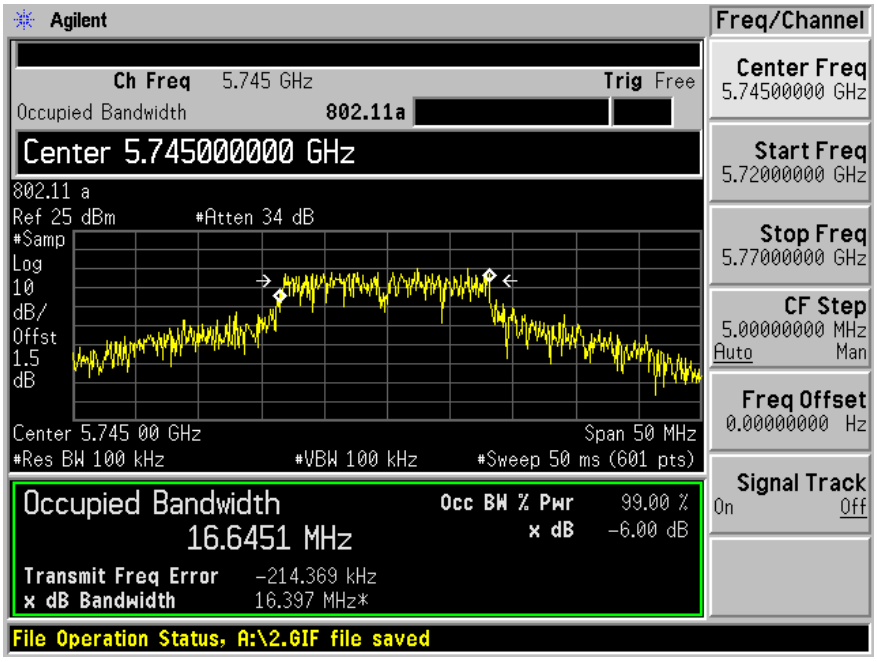
802.11g

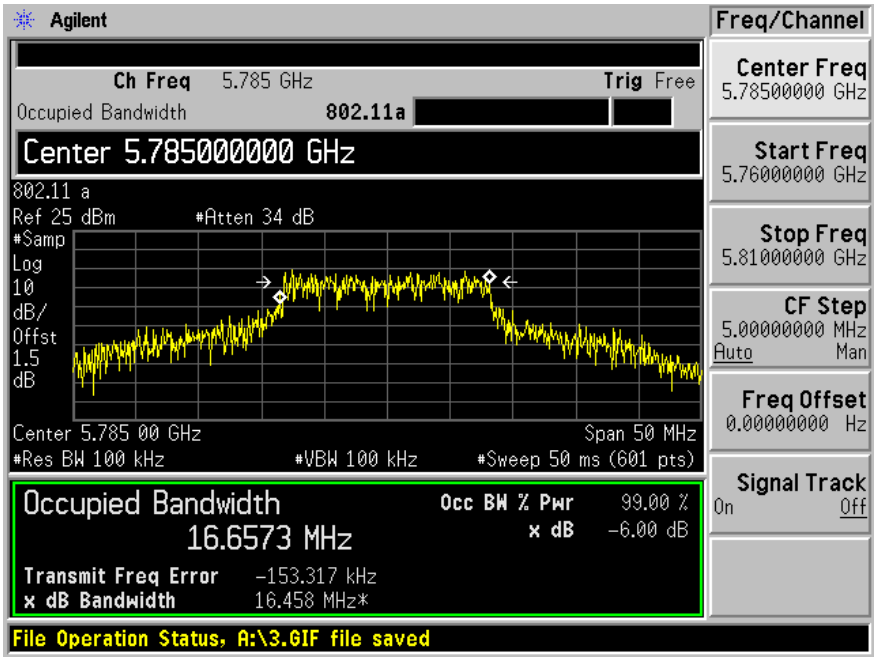

Agilent
Freq/Channel
Ch Freq 2.412 GHz
Trig Free
Occupied Bandwidth
802.11g
Center 2.412000000 GHz
802.11 g
Ref 21 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1
dB
Center 2.412 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 50 ms (601 pts)
Occupied Bandwidth
16.4604 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -8.752 kHz
x dB Bandwidth 16.151 MHz*
File Operation Status, A:\2.GIF file saved
Center Freq
2.41200000 GHz
Start Freq
2.38700000 GHz
Stop Freq
2.43700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

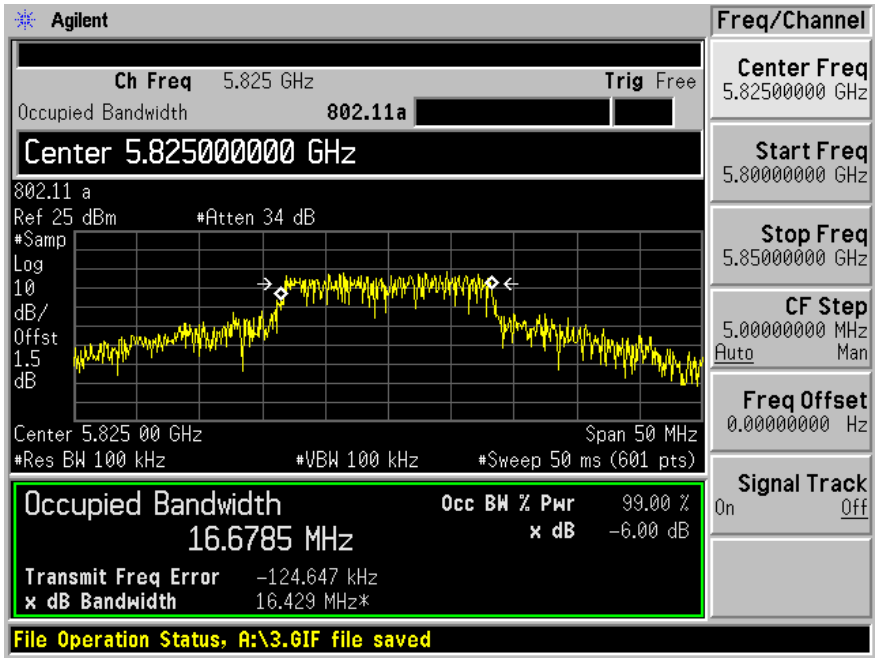

Agilent
Freq/Channel
Ch Freq 2.442 GHz
Trig Free
Occupied Bandwidth
802.11g
Center 2.442000000 GHz
802.11 g
Ref 21 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1
dB
Center 2.442 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 50 ms (601 pts)
Occupied Bandwidth
16.4728 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -57.017 kHz
x dB Bandwidth 16.273 MHz*
File Operation Status, A:\3.GIF file saved
Center Freq
2.44200000 GHz
Start Freq
2.41700000 GHz
Stop Freq
2.46700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off


Agilent
Freq/Channel
Ch Freq 2.462 GHz
Trig Free
Occupied Bandwidth
802.11g
Center 2.462000000 GHz
802.11 g
Ref 21 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1
dB
Center 2.462 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 50 ms (601 pts)
Occupied Bandwidth
16.5469 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -28.525 kHz
x dB Bandwidth 16.278 MHz*
File Operation Status, A:\3.GIF file saved
Center Freq
2.46200000 GHz
Start Freq
2.43700000 GHz
Stop Freq
2.48700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

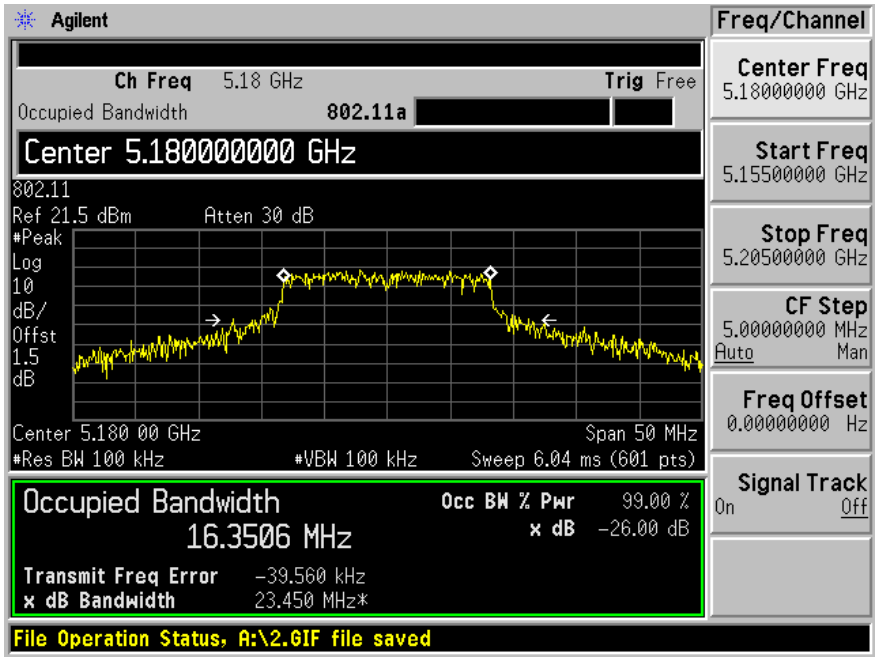
802.11a High Band

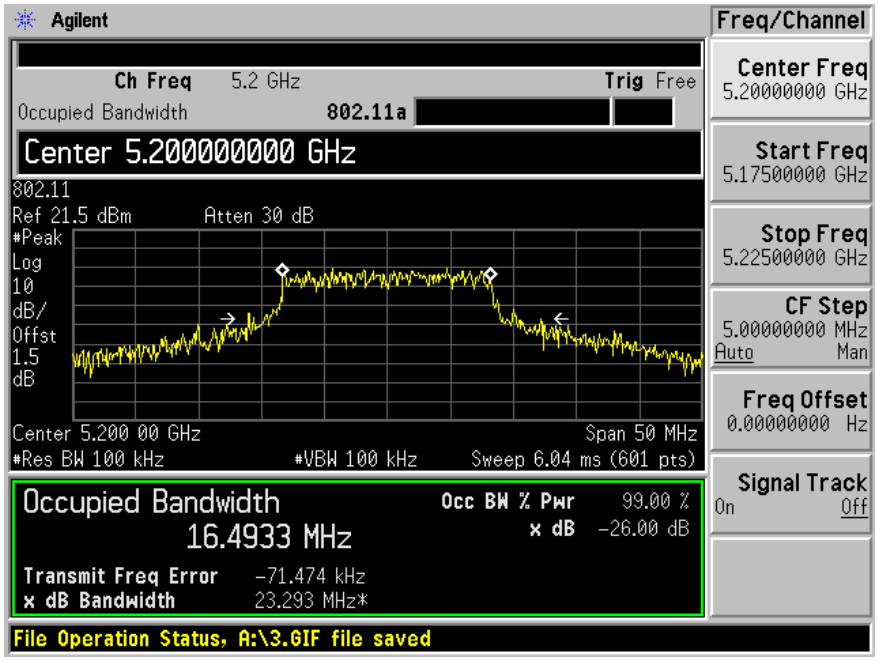


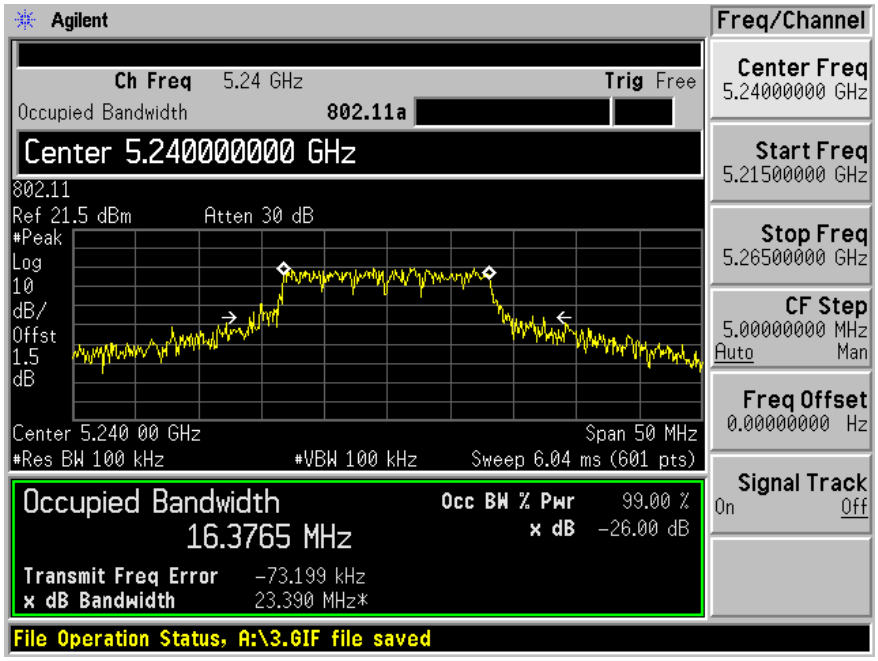




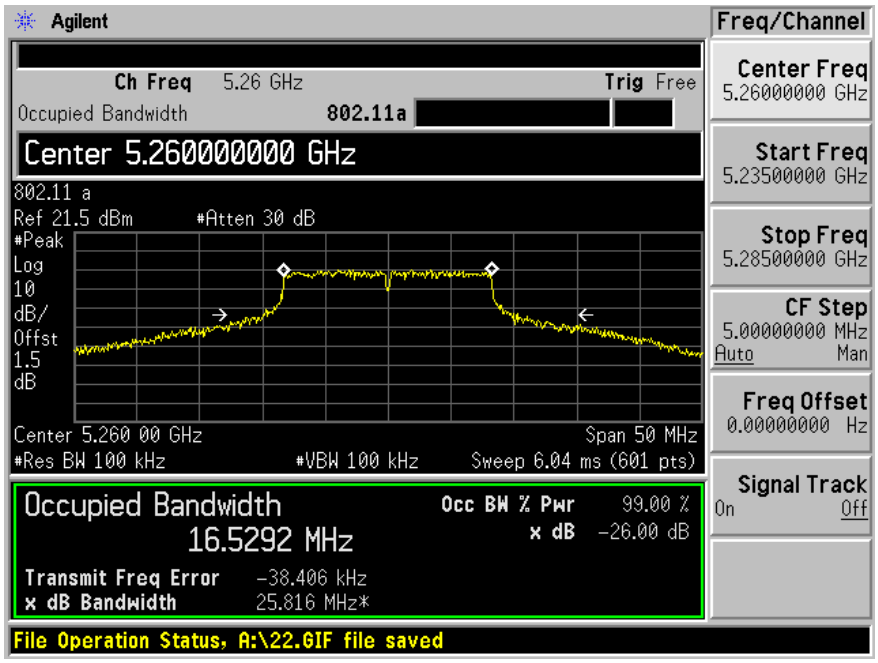
802.11a Low Band

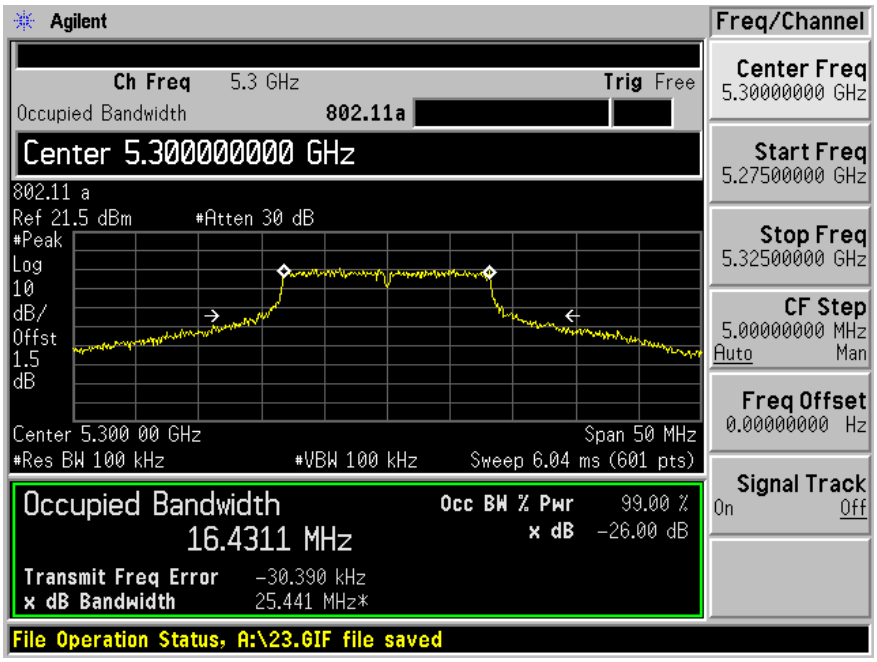


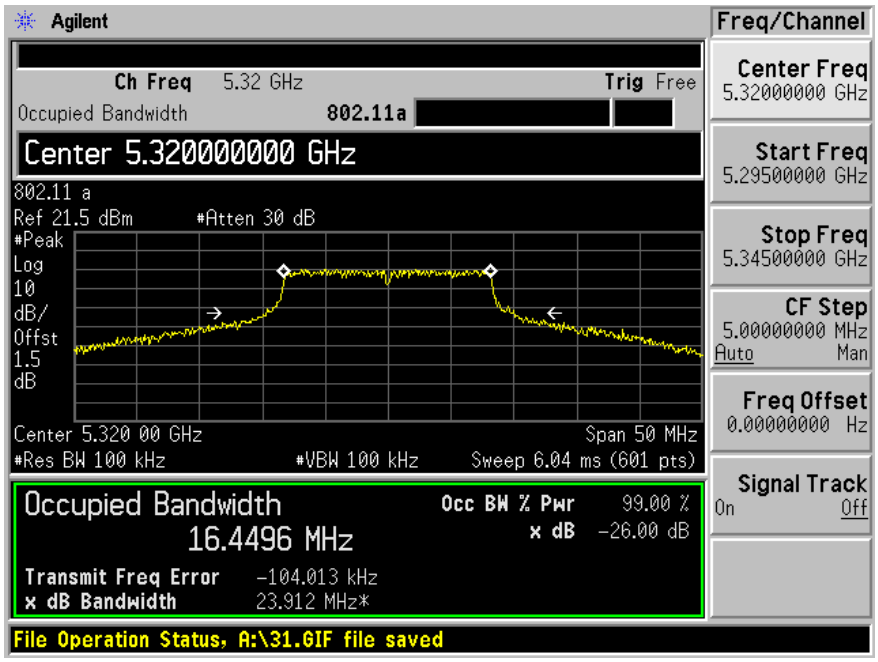

Agilent
Freq/Channel
Ch Freq 5.2 GHz
Trig Free
Occupied Bandwidth
802.11a
Center 5.200000000 GHz
802.11
Ref 21.5 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
1.5
dB
Center 5.200 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 6.04 ms (601 pts)
Occupied Bandwidth
16.4933 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -71.474 kHz
x dB Bandwidth 23.293 MHz*
Center Freq
5.20000000 GHz
Start Freq
5.17500000 GHz
Stop Freq
5.22500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, A:\3.GIF file saved


Agilent
Freq/Channel
Ch Freq 5.24 GHz
Trig Free
Occupied Bandwidth
802.11a
Center 5.240000000 GHz
802.11
Ref 21.5 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
1.5
dB
Center 5.240 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 6.04 ms (601 pts)
Occupied Bandwidth
16.3765 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -73.199 kHz
x dB Bandwidth 23.390 MHz*
Center Freq
5.24000000 GHz
Start Freq
5.21500000 GHz
Stop Freq
5.26500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, A:\3.GIF file saved

802.11a Mid Band






Agilent
Freq/Channel
Ch Freq 5.32 GHz
Trig Free
Occupied Bandwidth
802.11a
Center 5.320000000 GHz
802.11 a
Ref 21.5 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
1.5
dB
Center 5.320 00 GHz
Span 50 MHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 6.04 ms (601 pts)
Occupied Bandwidth
16.4496 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -104.013 kHz
x dB Bandwidth 23.912 MHz*
File Operation Status, A:\31.GIF file saved
Center Freq
5.32000000 GHz
Start Freq
5.29500000 GHz
Stop Freq
5.34500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

§15.247(b)(3), §15.407(a)(2) - PEAK OUTPUT POWER MEASUREMENT

Standard Applicable

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

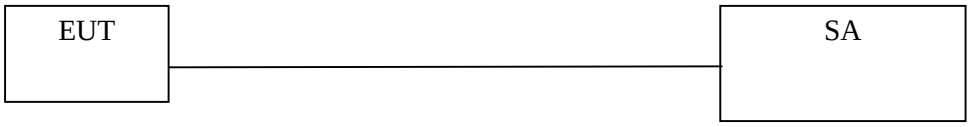
According to §15.407(a)(1), for the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10logB, where B is the 26-dB emission bandwidth in MHz.

According to §15.407(a)(2), For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

According to §15.407(a)(3), for the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10logB, where B is the 26-dB emission bandwidth in MHz.

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.



Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
Agilent	Sensor, Power	E9301A	MY41497252	5/6/2005
Agilent	Meter, Power	E4419B	G13405 13421	6/24/05

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

Measurement Result

Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

The testing was performed by Daniel Deng on 2005-08-25

802.11b

Channel	Frequency MHz	Max Peak Output Power (dBm)	(mW)	Limit (mW)	Result
Low	2412	19.42	87.50	1000	pass
Mid	2437	19.80	95.50	1000	pass
High	2462	19.64	92.04	1000	pass

Offset = 1 dB (cable loss + connector)

802.11g

Channel	Frequency MHz	Max Peak Output Power (dBm)	(mW)	Limit (mW)	Result
Low	2412	19.32	85.51	1000	pass
Mid	2437	19.69	93.11	1000	pass
High	2462	19.55	90.16	1000	pass

Offset = 1 dB (cable loss + connector)

802.11a, High Band

Channel	Frequency MHz	Max Peak Output Power (dBm)	(mW)	Limit (mW)	Result
Low	5745	19.43	87.70	1000	pass
Mid	5785	19.73	93.97	1000	pass
High	5825	19.20	83.18	1000	pass

Offset = 1.5 dB (cable loss + connector)

802.11a, Low Band

Channel	Frequency	Max Peak Output Power		Limit	Result
	MHz	(dBm)	(mW)	(mW)	
Low	5180	15.91	38.99	50	pass
Mid	5200	15.76	37.67	50	pass
High	5240	16.60	45.71	50	pass

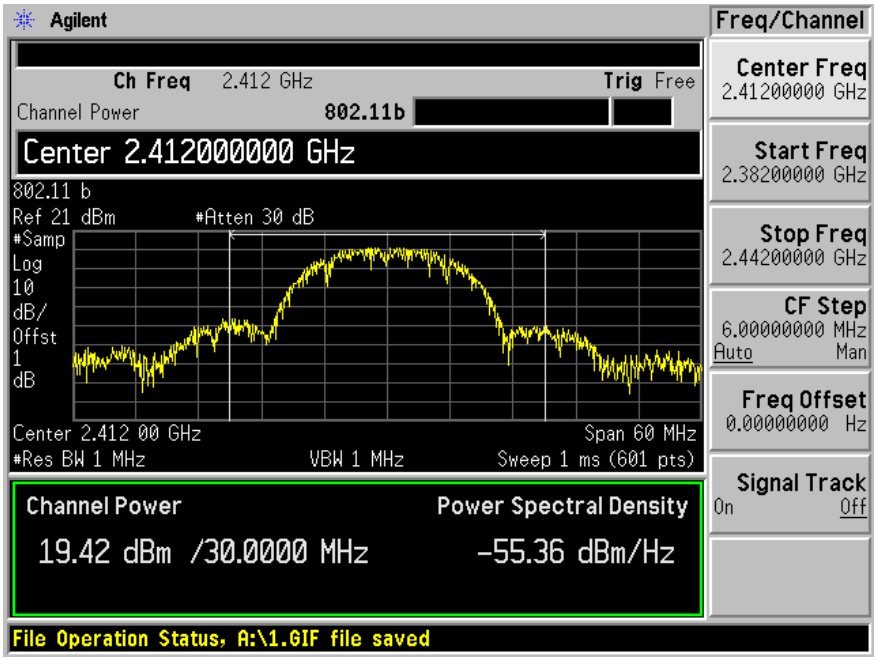
Offset = 1.5 dB (cable loss + connector)

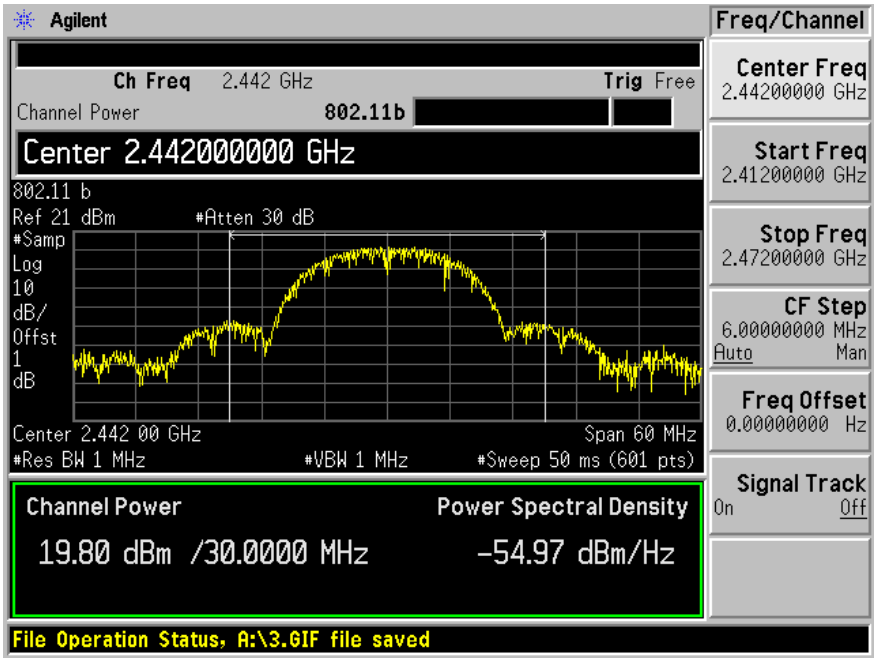
802.11a, Mid Band

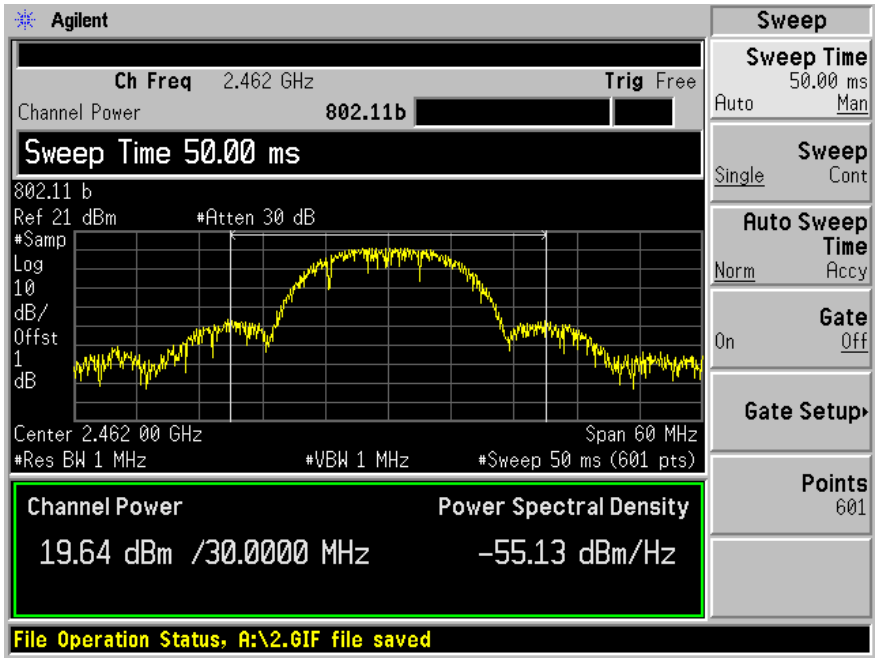
Channel	Frequency	Max Peak Output Power		Limit	Result
	MHz	(dBm)	(mW)	(mW)	
Low	5260	19.34	85.90	1000	pass
Mid	5300	19.30	85.11	1000	pass
High	5320	19.18	82.79	1000	pass

Offset = 1.5 dB (cable loss + connector)

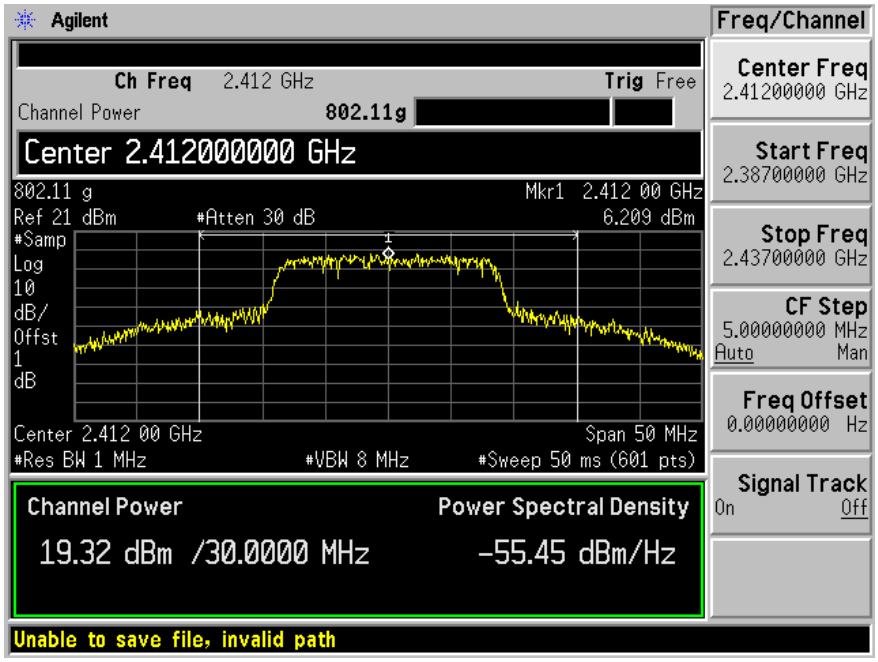
802.11b

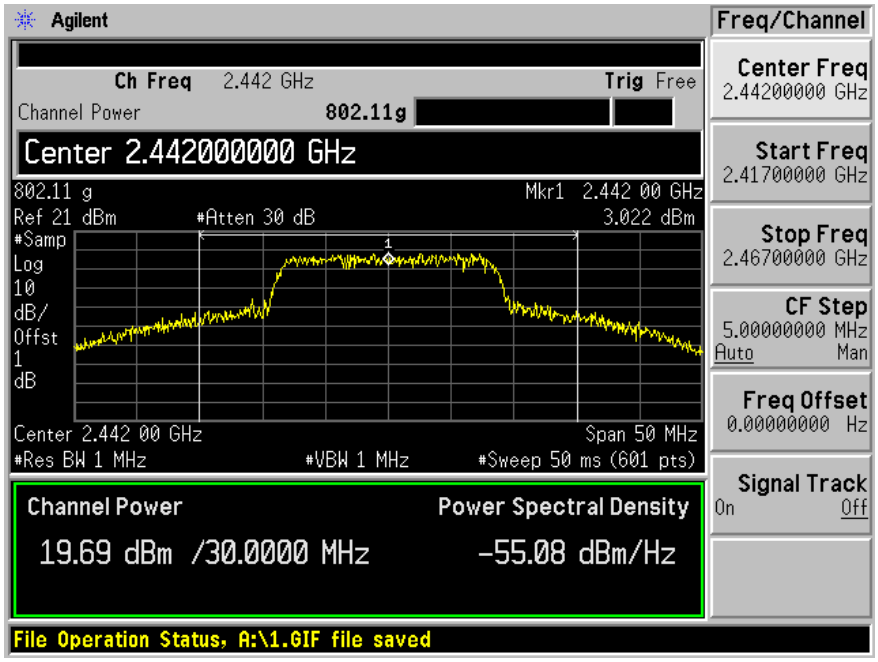

Agilent
Freq/Channel
Ch Freq 2.412 GHz
Trig Free
Channel Power
802.11b
Center 2.412000000 GHz
802.11 b
Ref 21 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1
dB
Center 2.412 00 GHz
Span 60 MHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 1 ms (601 pts)
Channel Power
19.42 dBm /30.0000 MHz
Power Spectral Density
-55.36 dBm/Hz
File Operation Status, A:\1.GIF file saved
Center Freq
2.41200000 GHz
Start Freq
2.38200000 GHz
Stop Freq
2.44200000 GHz
CF Step
6.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

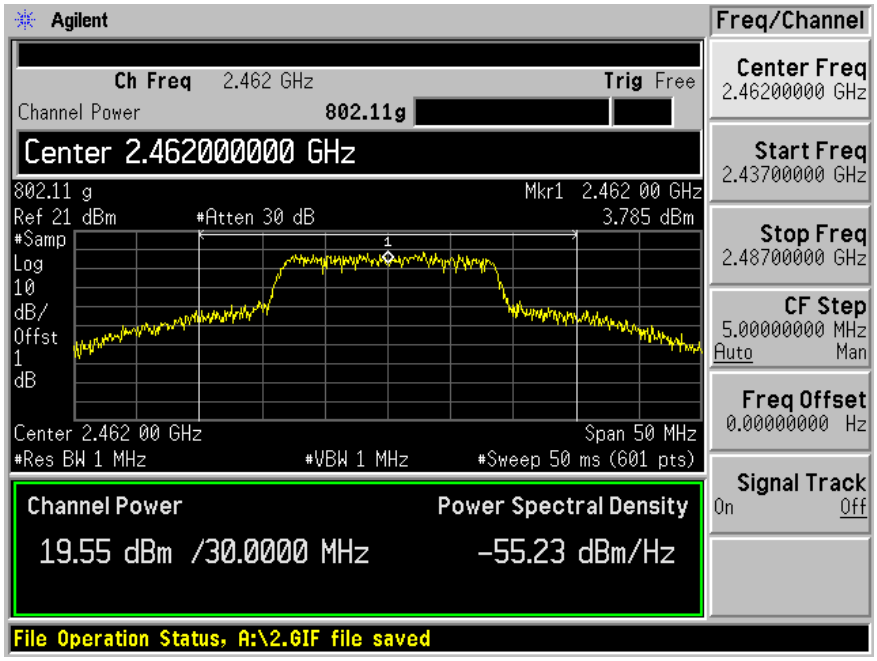

Agilent
Freq/Channel
Ch Freq 2.442 GHz
Trig Free
Channel Power
802.11b
Center 2.442000000 GHz
802.11 b
Ref 21 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1
dB
Center 2.442 00 GHz
Span 60 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 50 ms (601 pts)
Channel Power
19.80 dBm /30.0000 MHz
Power Spectral Density
-54.97 dBm/Hz
File Operation Status, A:\3.GIF file saved
Center Freq
2.44200000 GHz
Start Freq
2.41200000 GHz
Stop Freq
2.47200000 GHz
CF Step
6.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off


Agilent
Sweep
Ch Freq 2.462 GHz
Trig Free
Channel Power
802.11b
Sweep Time 50.00 ms
802.11 b
Ref 21 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1
dB
Center 2.462 00 GHz
Span 60 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 50 ms (601 pts)
Channel Power
19.64 dBm /30.0000 MHz
Power Spectral Density
-55.13 dBm/Hz
File Operation Status, A:\2.GIF file saved
Sweep Time
50.00 ms
Auto Man
Sweep
Single Cont
Auto Sweep Time
Norm Accy
Gate
On Off
Gate Setup
Points
601

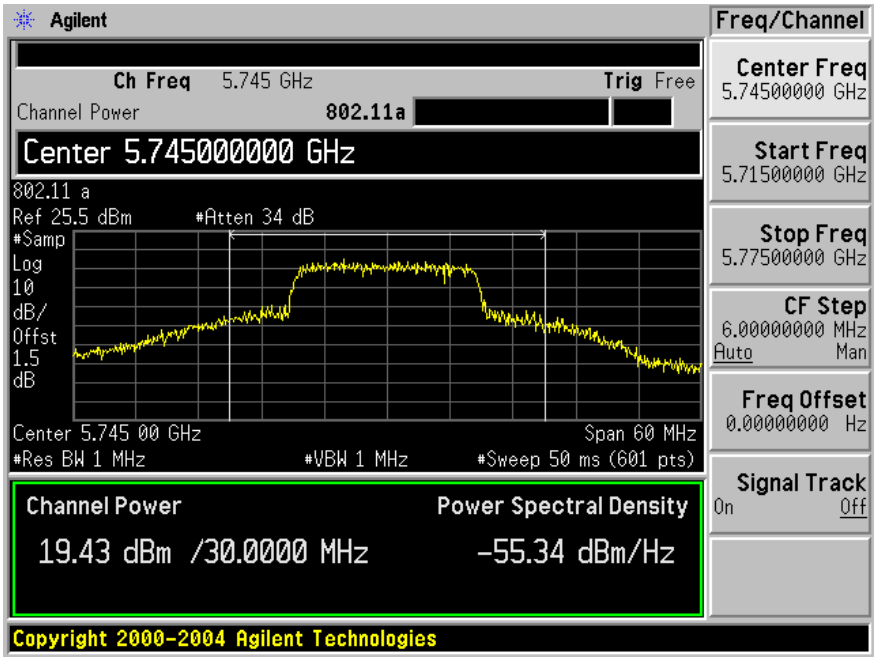
802.11g

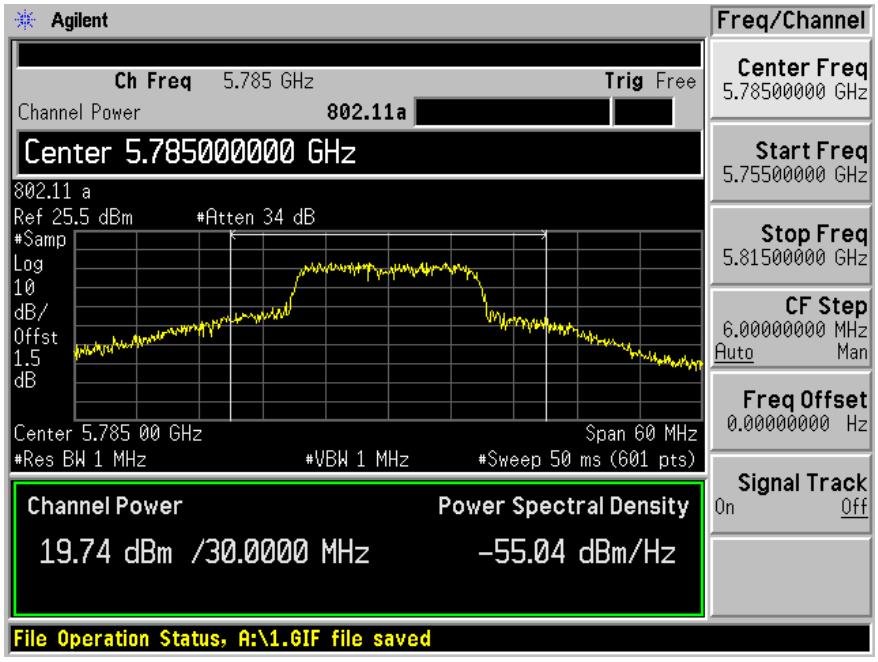

Agilent
Freq/Channel
Ch Freq 2.412 GHz
Trig Free
Channel Power
802.11g
Center 2.412000000 GHz
802.11 g
Mkr1 2.412 00 GHz
Ref 21 dBm
#Atten 30 dB
6.209 dBm
#Samp
Log
10
dB/
Offst
1
dB
Center 2.412 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 8 MHz
#Sweep 50 ms (601 pts)
Channel Power
19.32 dBm /30.0000 MHz
Power Spectral Density
-55.45 dBm/Hz
Unable to save file, invalid path
Center Freq
2.41200000 GHz
Start Freq
2.38700000 GHz
Stop Freq
2.43700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

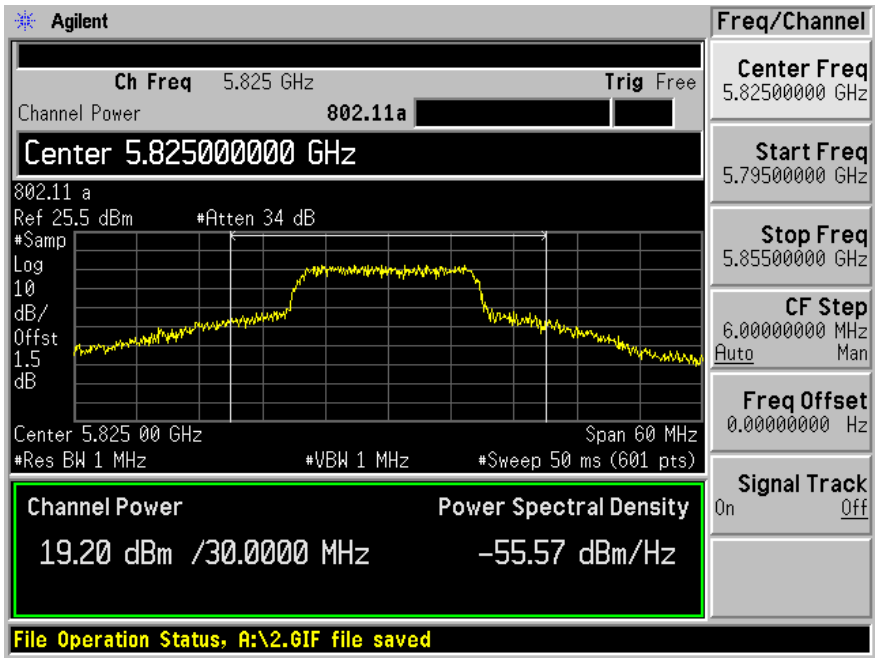

Agilent
Freq/Channel
Ch Freq 2.442 GHz
Trig Free
Channel Power
802.11g
Center 2.442000000 GHz
802.11 g
Mkr1 2.442 00 GHz
Ref 21 dBm
#Atten 30 dB
3.022 dBm
#Samp
Log
10
dB/
Offst
1
dB
Center 2.442 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 50 ms (601 pts)
Channel Power
19.69 dBm /30.0000 MHz
Power Spectral Density
-55.08 dBm/Hz
Center Freq
2.44200000 GHz
Start Freq
2.41700000 GHz
Stop Freq
2.46700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, A:\1.GIF file saved


Agilent
Freq/Channel
Ch Freq 2.462 GHz
Trig Free
Channel Power
802.11g
Center 2.462000000 GHz
802.11 g
Mkr1 2.462 00 GHz
Ref 21 dBm
#Atten 30 dB
3.785 dBm
#Samp
Log
10
dB/
Offst
1
dB
Center 2.462 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 50 ms (601 pts)
Channel Power
19.55 dBm /30.0000 MHz
Power Spectral Density
-55.23 dBm/Hz
Center Freq
2.46200000 GHz
Start Freq
2.43700000 GHz
Stop Freq
2.48700000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, A:\2.GIF file saved

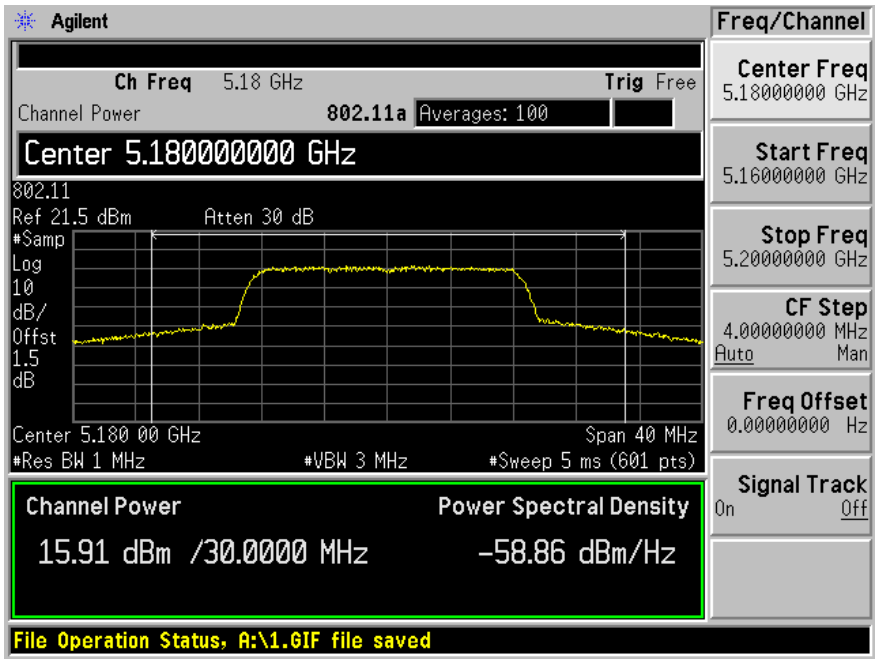
802.11a High Band

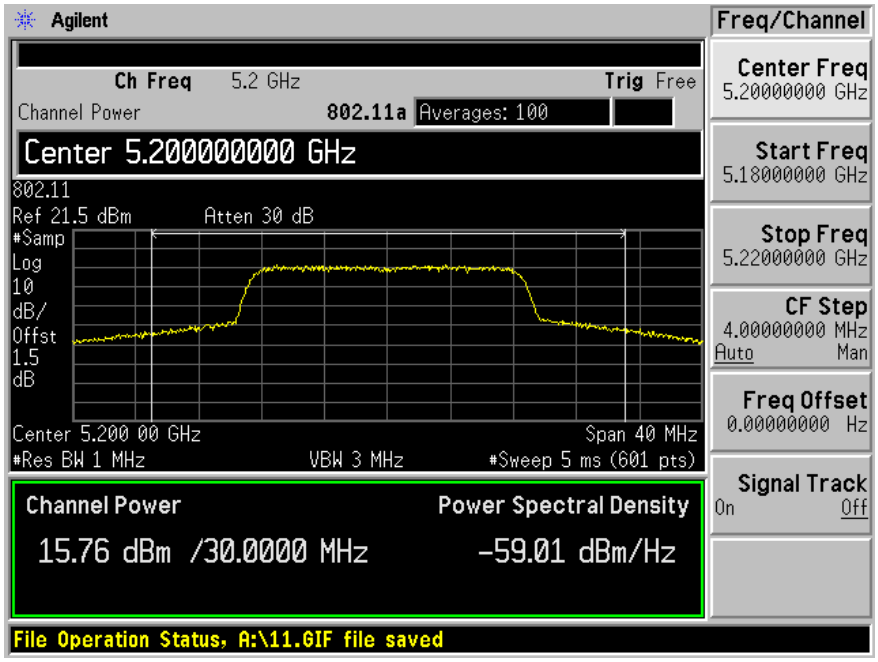


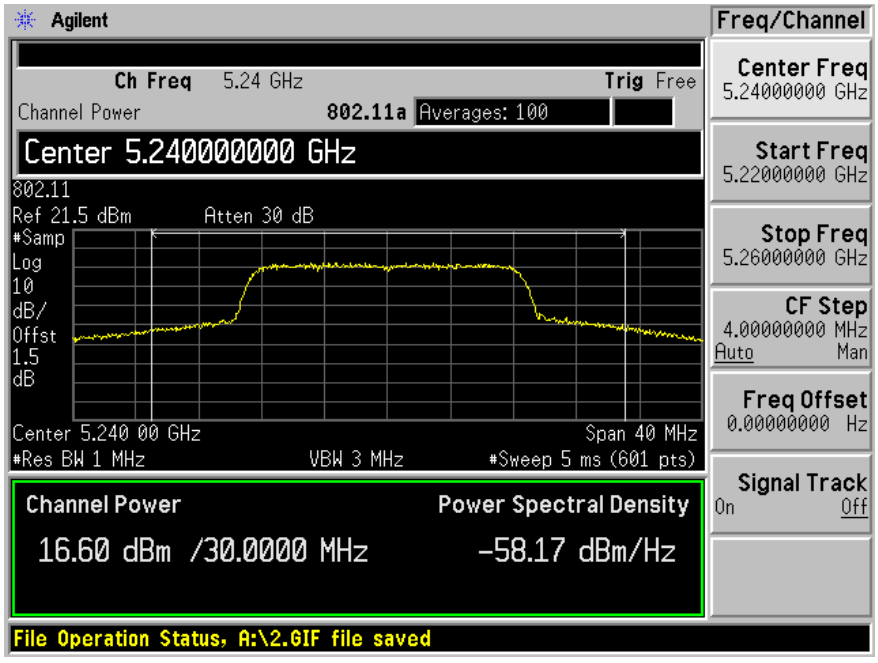




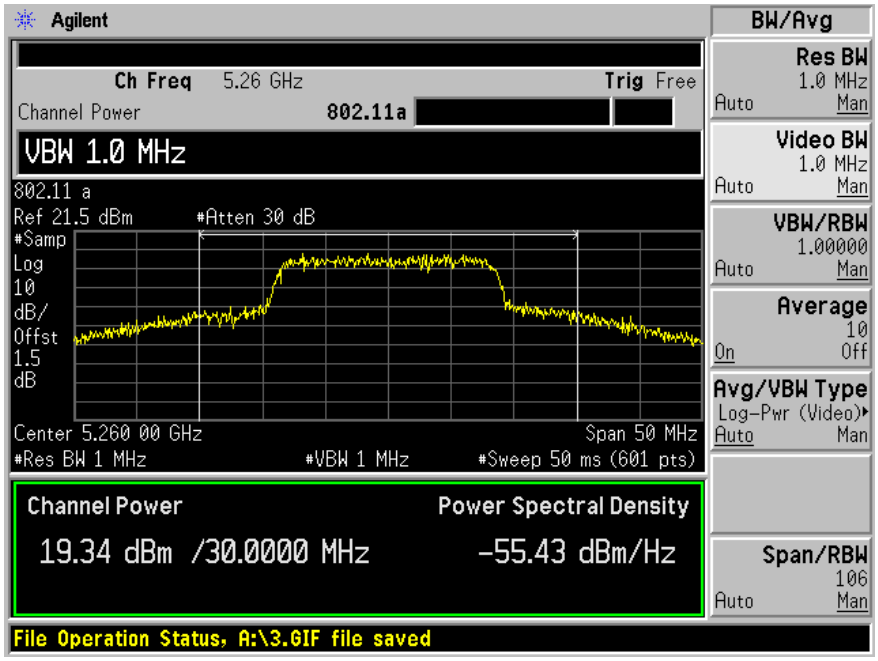
802.11a Low Band

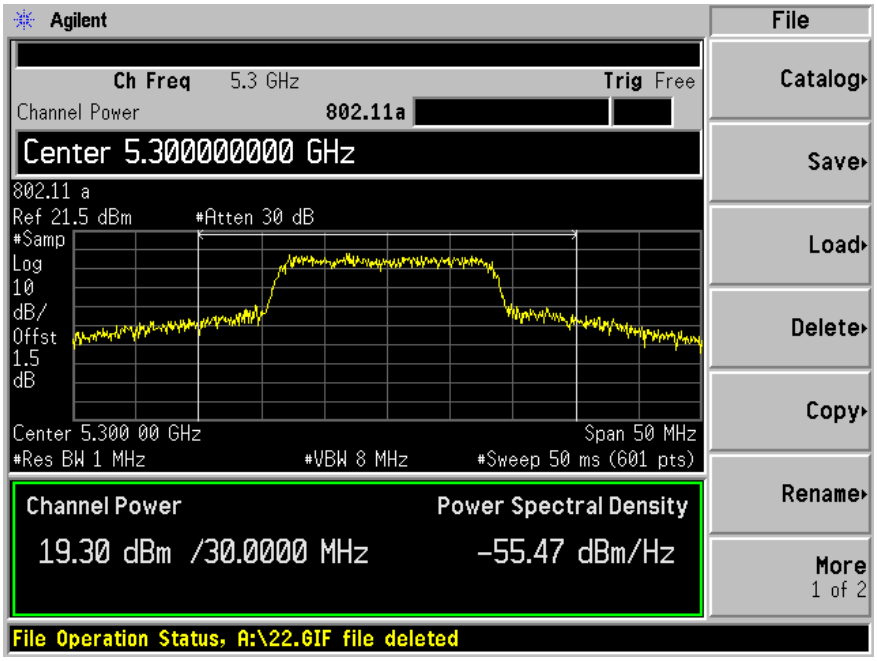


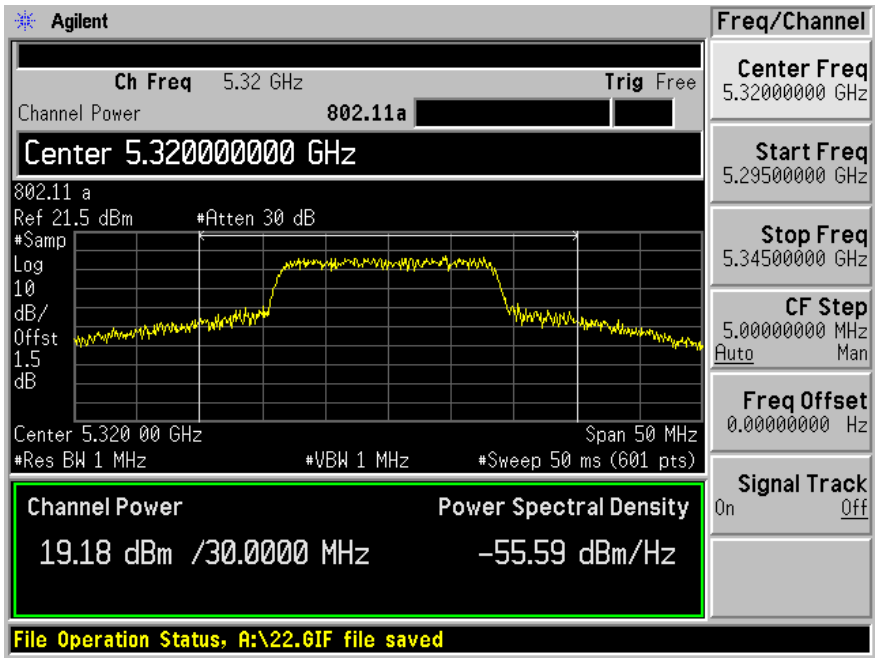

Agilent
Freq/Channel
Ch Freq 5.2 GHz
Trig Free
Channel Power
802.11a
Averages: 100
Center 5.200000000 GHz
802.11
Ref 21.5 dBm
Atten 30 dB
#Samp
Log
10
dB/
Offst
1.5
dB
Center 5.200 00 GHz
Span 40 MHz
#Res BW 1 MHz
VBW 3 MHz
#Sweep 5 ms (601 pts)
Channel Power
15.76 dBm /30.0000 MHz
Power Spectral Density
-59.01 dBm/Hz
File Operation Status, A:\11.GIF file saved
Center Freq
5.20000000 GHz
Start Freq
5.18000000 GHz
Stop Freq
5.22000000 GHz
CF Step
4.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off


Agilent
Freq/Channel
Ch Freq 5.24 GHz
Trig Free
Channel Power
802.11a
Averages: 100
Center 5.240000000 GHz
802.11
Ref 21.5 dBm
Atten 30 dB
#Samp
Log
10
dB/
Offst
1.5
dB
Center 5.240 00 GHz
Span 40 MHz
#Res BW 1 MHz
VBW 3 MHz
#Sweep 5 ms (601 pts)
Channel Power
16.60 dBm /30.0000 MHz
Power Spectral Density
-58.17 dBm/Hz
File Operation Status, A:\2.GIF file saved
Center Freq
5.24000000 GHz
Start Freq
5.22000000 GHz
Stop Freq
5.26000000 GHz
CF Step
4.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

802.11a Mid Band






Agilent
Freq/Channel
Ch Freq 5.32 GHz
Trig Free
Channel Power
802.11a
Center 5.320000000 GHz
802.11 a
Ref 21.5 dBm
#Atten 30 dB
#Samp
Log
10
dB/
Offst
1.5
dB
Center 5.320 00 GHz
Span 50 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 50 ms (601 pts)
Channel Power
19.18 dBm /30.0000 MHz
Power Spectral Density
-55.59 dBm/Hz
File Operation Status, A:\22.GIF file saved
Center Freq
5.32000000 GHz
Start Freq
5.29500000 GHz
Stop Freq
5.34500000 GHz
CF Step
5.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

§15.247(d) - 100 KHZ BANDWIDTH OF BAND EDGES

Standard Applicable

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

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 100kHz 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.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

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

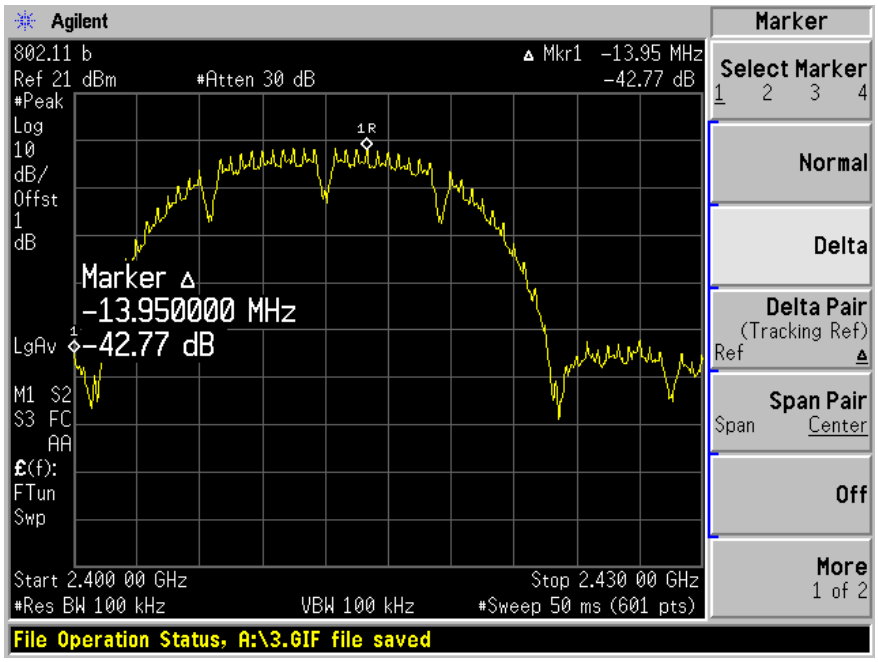
Measurement Result

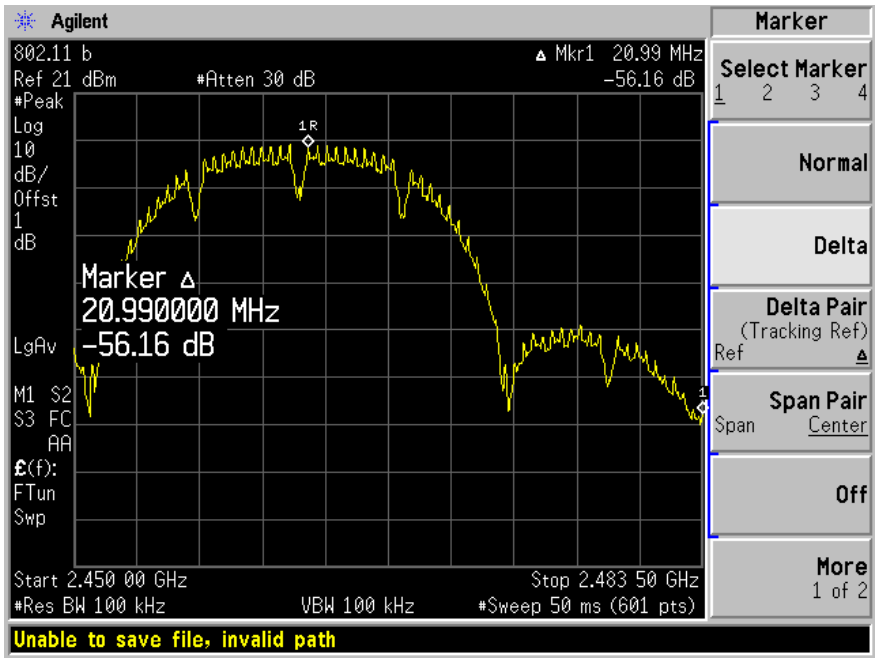
Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

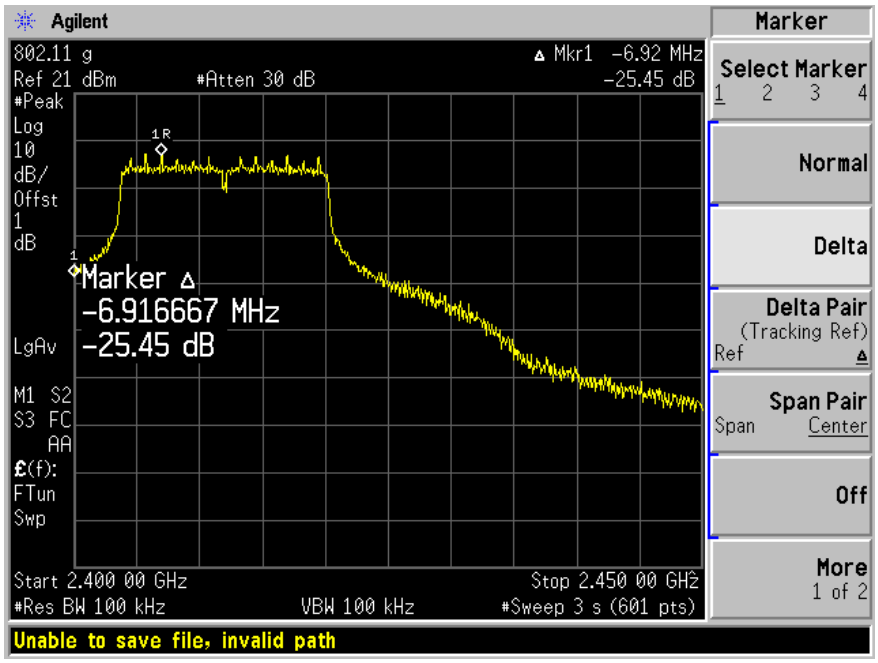
The testing was performed by Daniel Deng on 2005-08-26

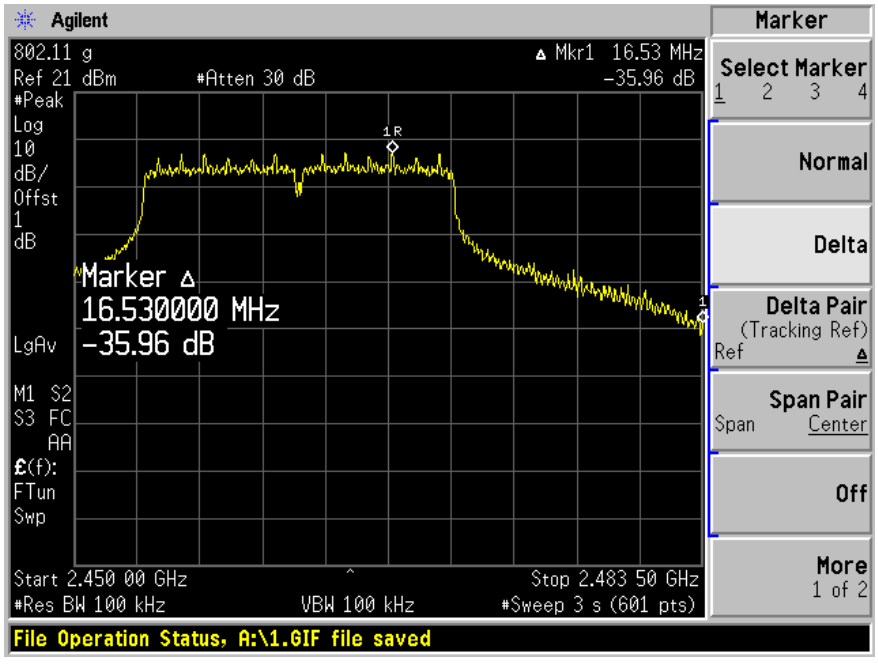
802.11b


Agilent
802.11 b
Ref 21 dBm
#Atten 30 dB
Mkr1 -13.95 MHz
-42.77 dB
#Peak
Log
10
dB/
Offst
1
dB
1R
Marker Δ
-13.950000 MHz
-42.77 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.400 00 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 2.430 00 GHz
#Sweep 50 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\3.GIF file saved

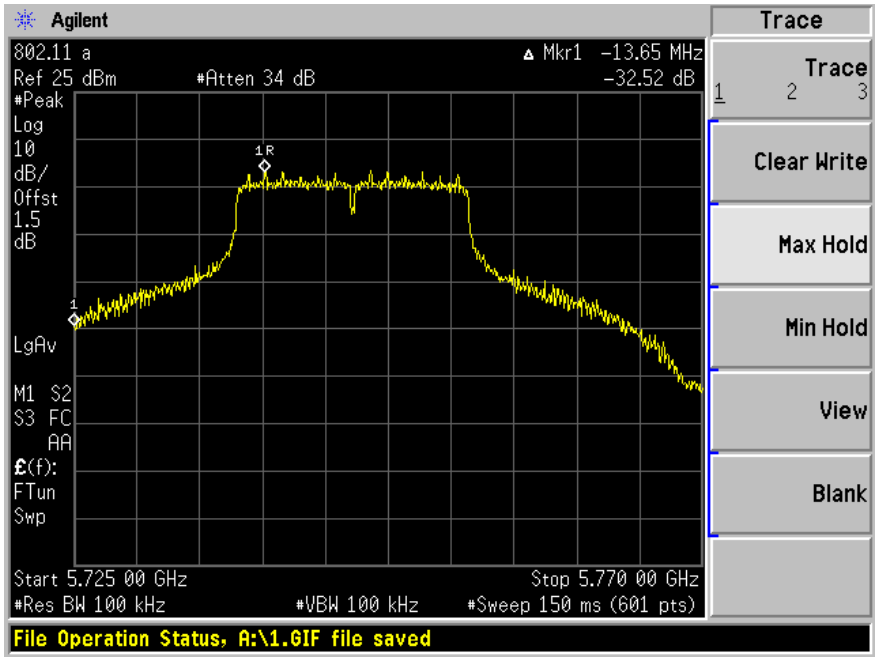

Agilent
802.11 b
Ref 21 dBm
#Atten 30 dB
Mkr1 20.99 MHz
-56.16 dB
#Peak
Log
10
dB/
Offst
1
dB
1R
Marker Δ
20.990000 MHz
-56.16 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.450 00 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 2.483 50 GHz
#Sweep 50 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Unable to save file, invalid path

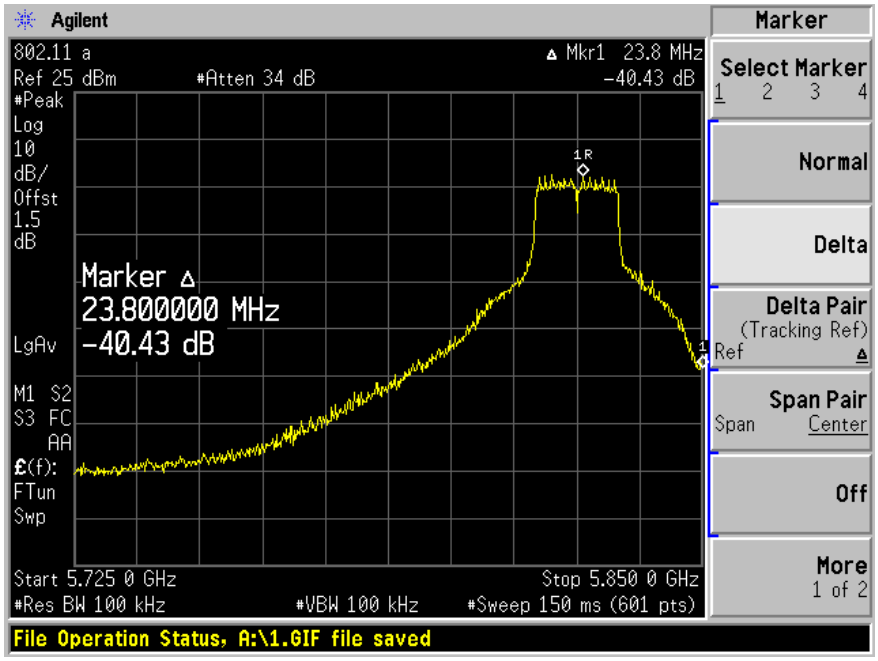
802.11g


Agilent
Marker
802.11 g
Ref 21 dBm
#Atten 30 dB
Mkr1 -6.92 MHz
-25.45 dB
#Peak
Log
10
dB/
Offst
1
dB
1R
Marker Δ
-6.916667 MHz
-25.45 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.400 00 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 2.450 00 GHz
#Sweep 3 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Unable to save file, invalid path


Agilent
Marker
802.11 g
Ref 21 dBm
#Atten 30 dB
Mkr1 16.53 MHz
-35.96 dB
#Peak
Log
10
dB/
Offst
1
dB
1R
Marker Δ
16.530000 MHz
-35.96 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.450 00 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 2.483 50 GHz
#Sweep 3 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\1.GIF file saved

802.11a High Band





§15.247(e) & §15.407(a)(2) - POWER SPECTRAL DENSITY

Standard Applicable

According to §15.247 (d), for direct sequence systems, the peak 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.

According to §15.407(a) (1), for the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a) (2), for the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

According to §15.407(a) (3), for the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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 6MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Adjust the center frequency of SA on any frequency be measured and set SA to 50MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (UNII)
5. Repeat above procedures until all frequencies measured were complete.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

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

Measurement Result

Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

The testing was performed by Daniel Deng on 2005-08-26

Test Result for 802.11b (15.247)

Channel	Frequency MHz	PSD dBm/MHz	Limit dBm/MHz
Low	2412	-3.71	8
Mid	2437	-3.60	8
High	2462	-3.84	8

Test Result for 802.11g (15.247)

Channel	Frequency MHz	PSD dBm/MHz	Limit dBm/MHz
Low	2412	-3.33	8
Mid	2437	-2.13	8
High	2462	-2.95	8

Test Result for 802.11a High band (15.247)

Channel	Frequency MHz	PSD dBm/MHz	Limit dBm/MHz
Low	5745	-5.09	8
Mid	5785	-5.53	8
High	5825	-5.74	8

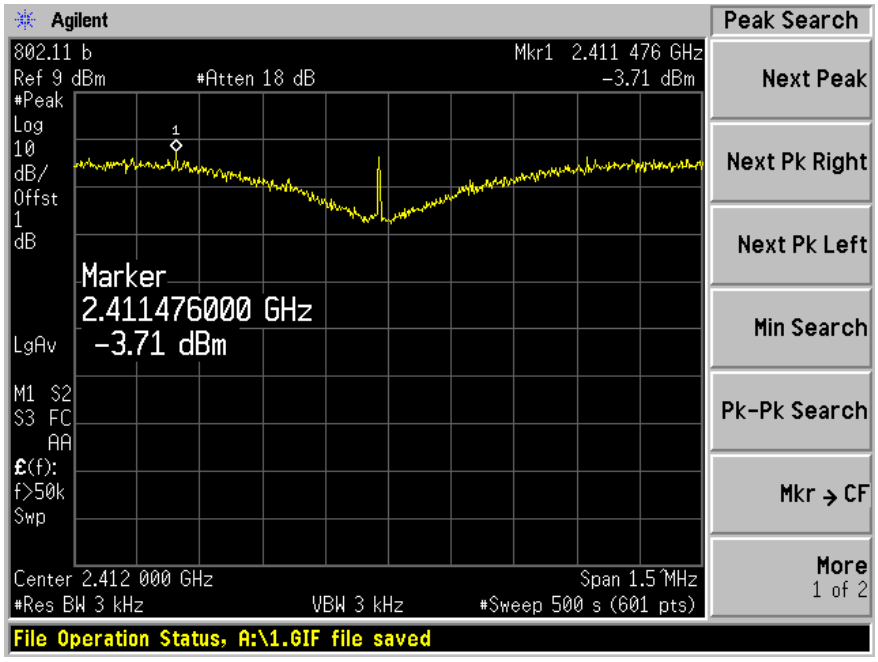
Test Result for 802.11a, Low Band (15.407)

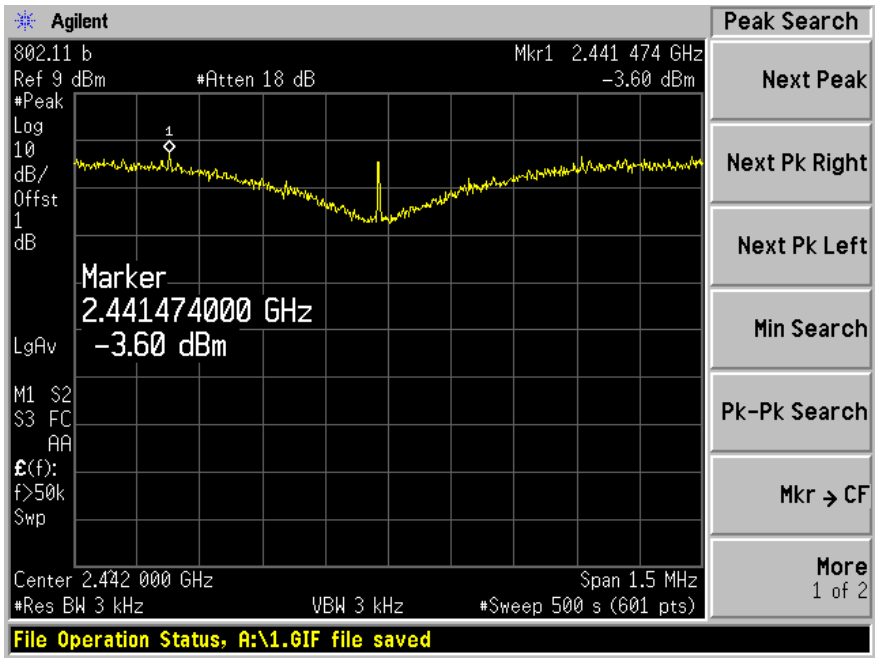
Channel	Frequency MHz	PSD dBm/MHz	Limit dBm/MHz
Low	5180	3.040	4
Mid	5220	2.785	4
High	5240	3.229	4

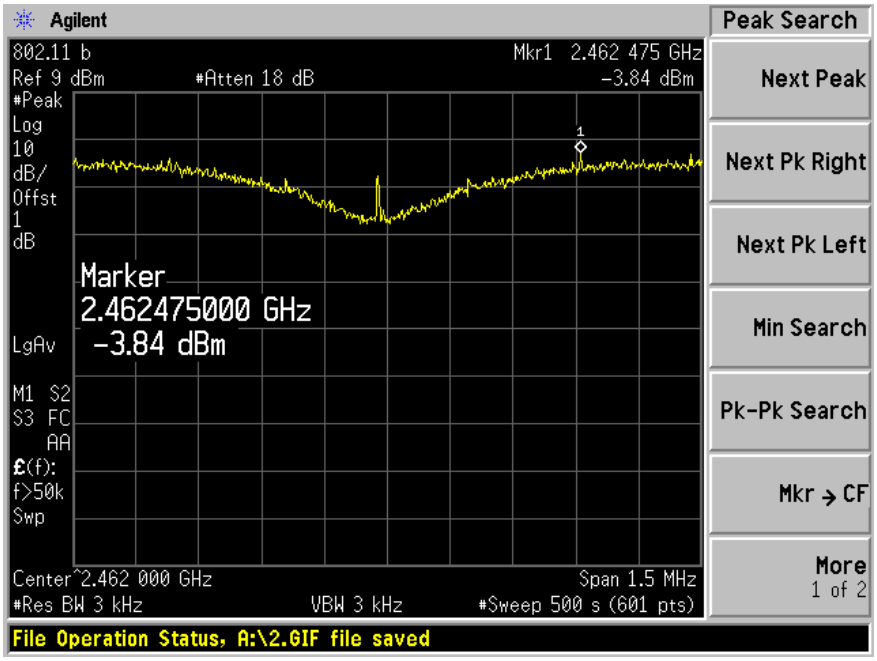
Test Result for 802.11a, Mid Band (15.407)

Channel	Frequency MHz	PSD dBm/MHz	Limit dBm/MHz
Low	5280	6.959	11
Mid	5300	6.568	11
High	5320	6.726	11

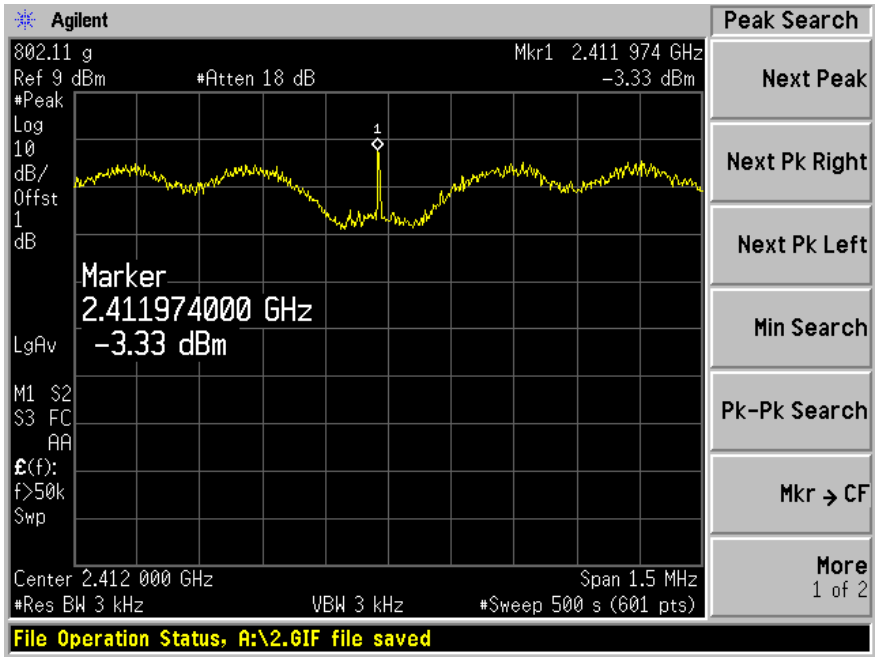
802.11b

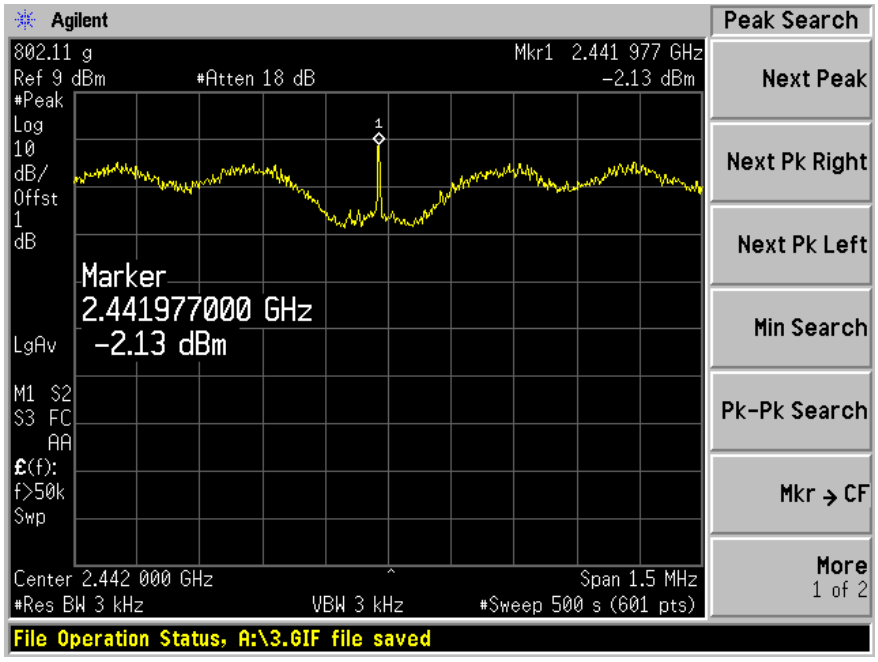

Agilent
Peak Search
802.11 b
Mkr1 2.411 476 GHz
Ref 9 dBm
#Atten 18 dB
-3.71 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.411476000 GHz
-3.71 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.412 000 GHz
Span 1.5 MHz
#Res BW 3 kHz
VBW 3 kHz
#Sweep 500 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\1.GIF file saved

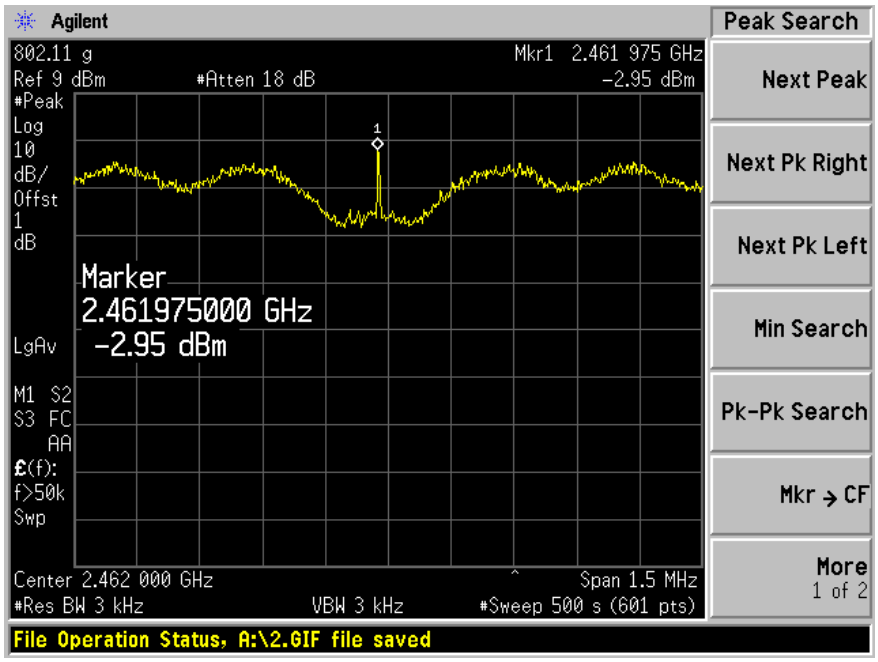

Agilent
Peak Search
802.11 b
Mkr1 2.441 474 GHz
Ref 9 dBm
#Atten 18 dB
-3.60 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.441474000 GHz
-3.60 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.442 000 GHz
Span 1.5 MHz
#Res BW 3 kHz
VBW 3 kHz
#Sweep 500 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\1.GIF file saved


Agilent
802.11 b
Ref 9 dBm
#Atten 18 dB
Mkr1 2.462 475 GHz
-3.84 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.462475000 GHz
-3.84 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.462 000 GHz
#Res BW 3 kHz
VBW 3 kHz
Span 1.5 MHz
#Sweep 500 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\2.GIF file saved

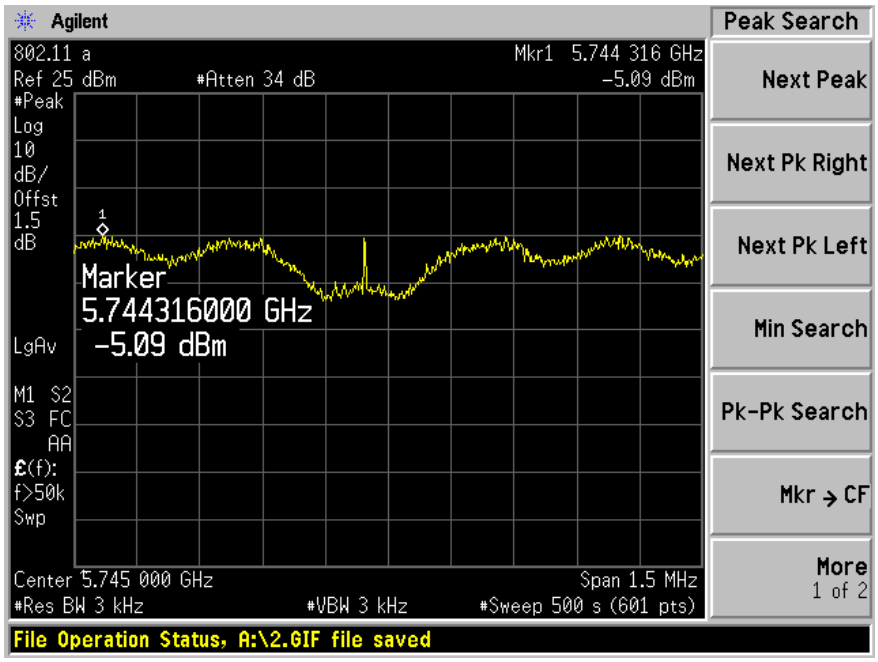
802.11g

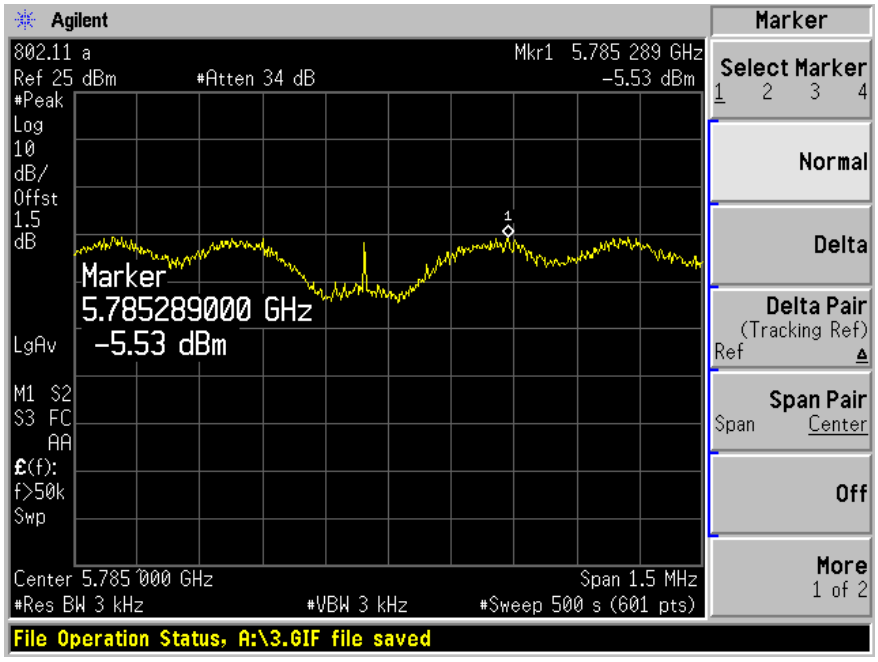

Agilent
802.11 g
Ref 9 dBm
#Atten 18 dB
Mkr1 2.411 974 GHz
-3.33 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.411974000 GHz
-3.33 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.412 000 GHz
#Res BW 3 kHz
VBW 3 kHz
Span 1.5 MHz
#Sweep 500 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\2.GIF file saved

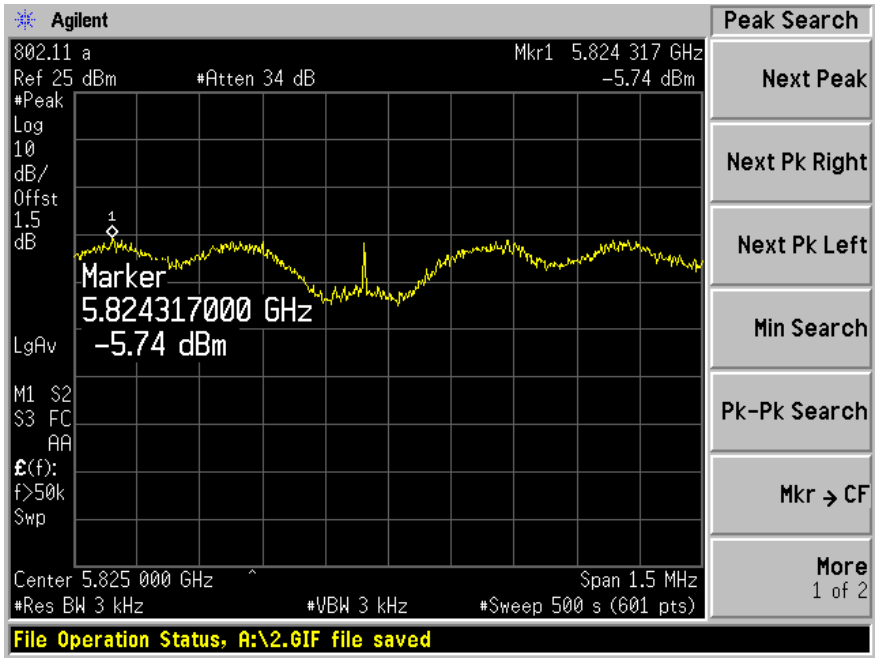

Agilent
802.11 g
Ref 9 dBm
#Atten 18 dB
Mkr1 2.441 977 GHz
-2.13 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.441977000 GHz
-2.13 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.442 000 GHz
#Res BW 3 kHz
VBW 3 kHz
Span 1.5 MHz
#Sweep 500 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\3.GIF file saved


Agilent
802.11 g
Ref 9 dBm
#Atten 18 dB
Mkr1 2.461 975 GHz
-2.95 dBm
#Peak
Log
10
dB/
Offst
1
dB
Marker
2.461975000 GHz
-2.95 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.462 000 GHz
#Res BW 3 kHz
VBW 3 kHz
Span 1.5 MHz
#Sweep 500 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\2.GIF file saved

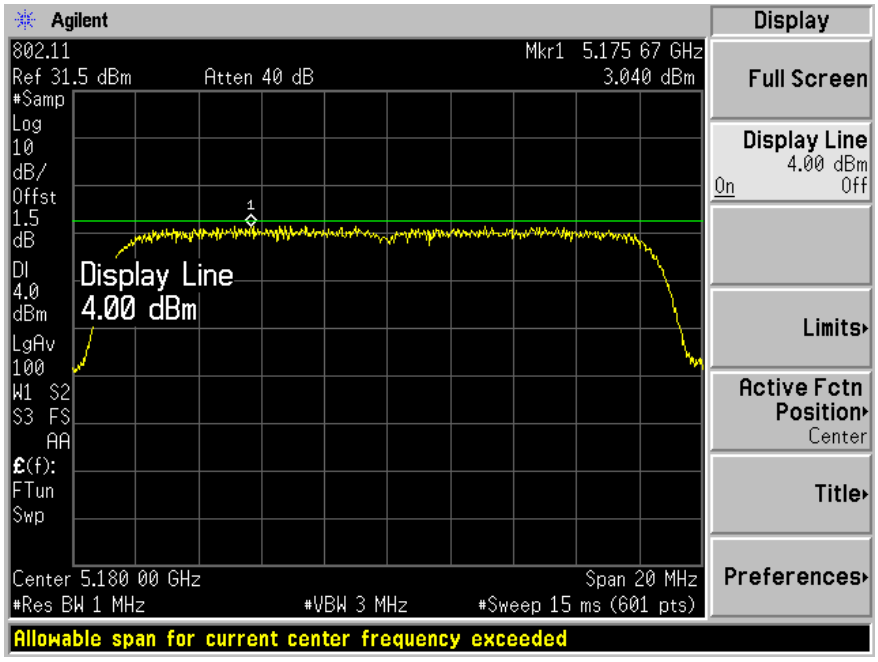
802.11a High Band

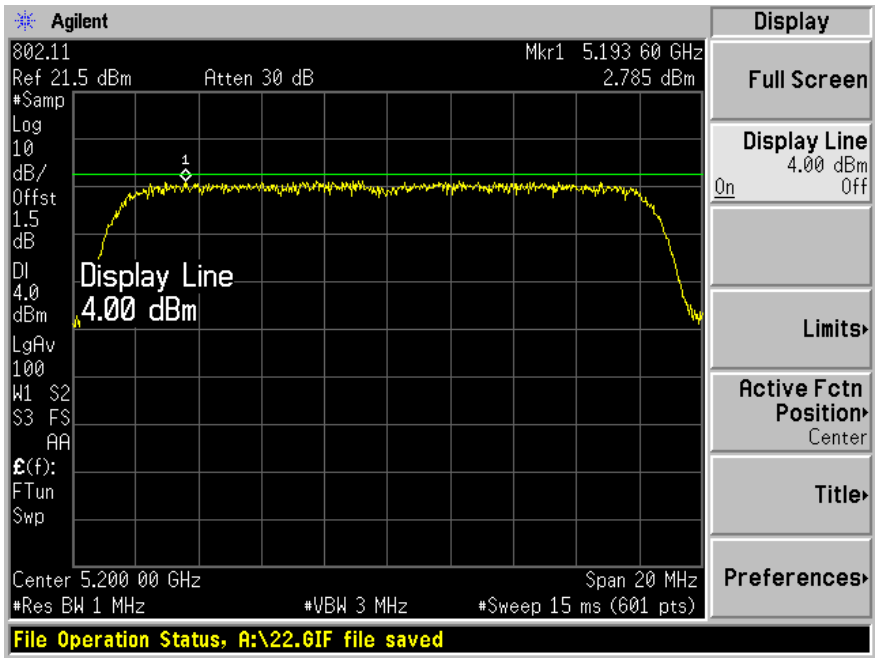


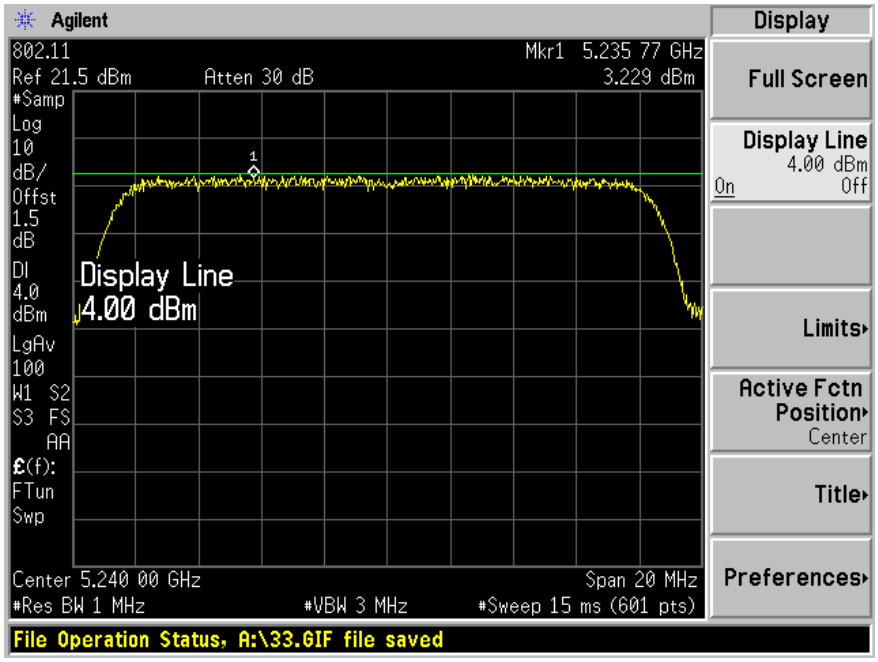



Agilent
802.11 a
Ref 25 dBm
#Atten 34 dB
Mkr1 5.824 317 GHz
-5.74 dBm
#Peak
Log
10
dB/
Offst
1.5
dB
Marker
5.824317000 GHz
-5.74 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 5.825 000 GHz
#Res BW 3 kHz
#VBW 3 kHz
Span 1.5 MHz
#Sweep 500 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\2.GIF file saved

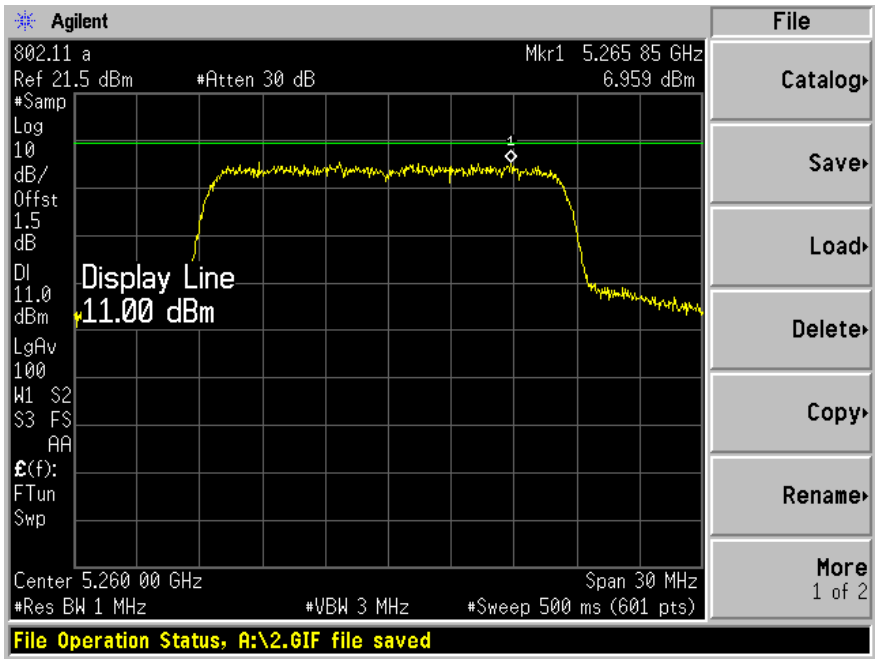
802.11a Low Band

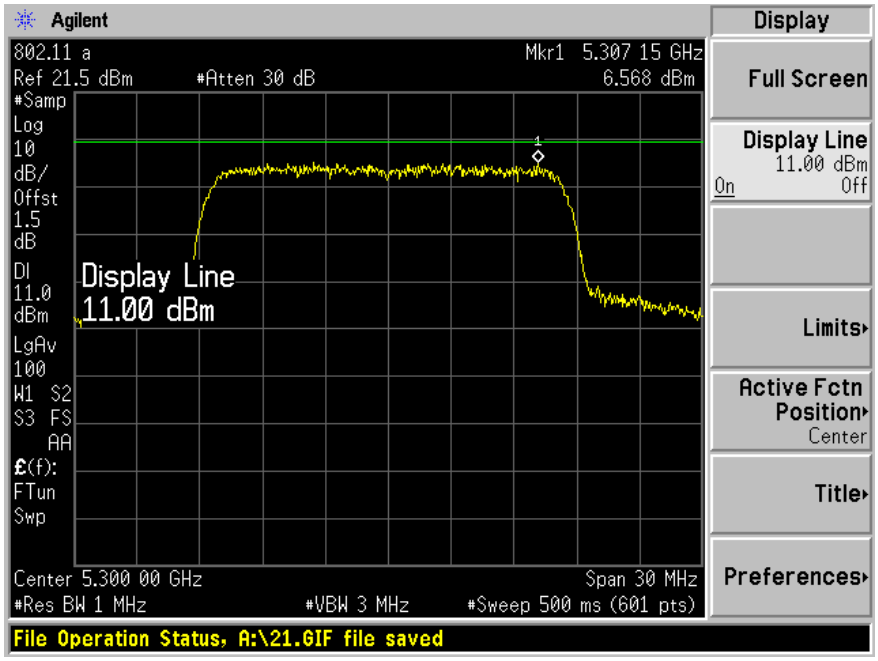


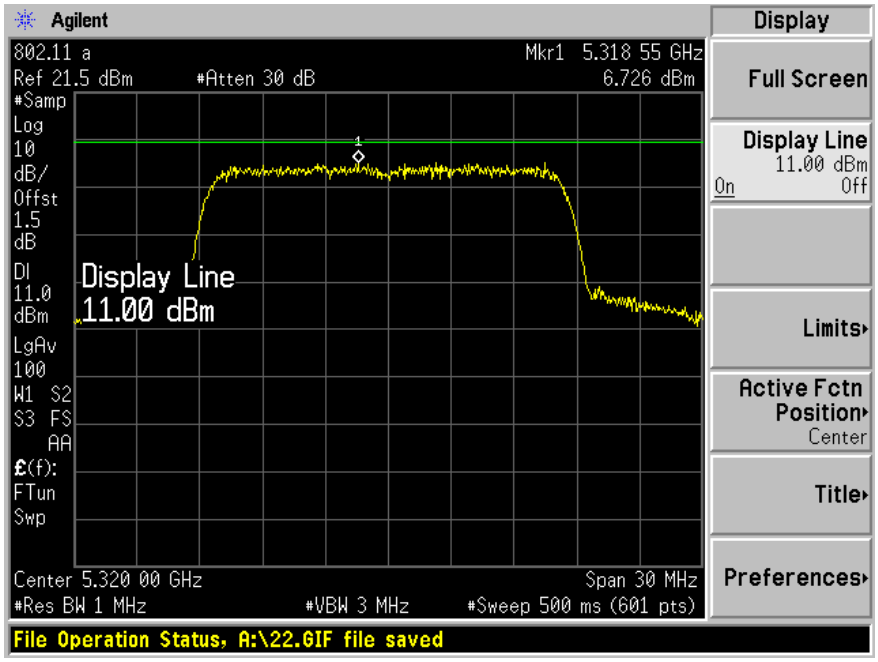




802.11a Mid Band




Agilent
802.11 a
Ref 21.5 dBm
#Atten 30 dB
Mkr1 5.307 15 GHz
6.568 dBm
#Samp
Log
10
dB/
Offst
1.5
dB
Dl
11.0
dBm
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Display Line
11.00 dBm
Center 5.300 00 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 30 MHz
#Sweep 500 ms (601 pts)
Display
Full Screen
Display Line
11.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\21.GIF file saved


Agilent
802.11 a
Ref 21.5 dBm
#Atten 30 dB
Mkr1 5.318 55 GHz
6.726 dBm
#Samp
Log
10
dB/
Offst
1.5
dB
Dl
11.0
dBm
LgAv
100
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Display Line
11.00 dBm
Center 5.320 00 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 30 MHz
#Sweep 500 ms (601 pts)
Display
Full Screen
Display Line
11.00 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\22.GIF file saved

§15.407(a)(6) - Peak Excursion To Average Ratio

Standard Applicable

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

Test Procedure

For this test, the EUT's antenna was removed and replaced with a SMA jack to UMP2.0 plug test cable, so output power levels were calculated from conducted emission levels.

The analyzer center frequency was set to the EUT carrier frequency. For the peak value trace A, the analyzer resolution and video bandwidth were set to 1MHz. Do a MAX HOLD, then VIEW. For the average value trace B, the analyzer resolution bandwidth was set to 1MHz, the video bandwidth was set to 30kHz. MAX HOLD then VIEW trace B also.

The delta from the peak value trace and the Average should not exceed 13dBm across any 1MHz bandwidth.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

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

Measurement Result

Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

The testing was performed by Daniel Deng on 2005-08-26.

802.11a Low Band

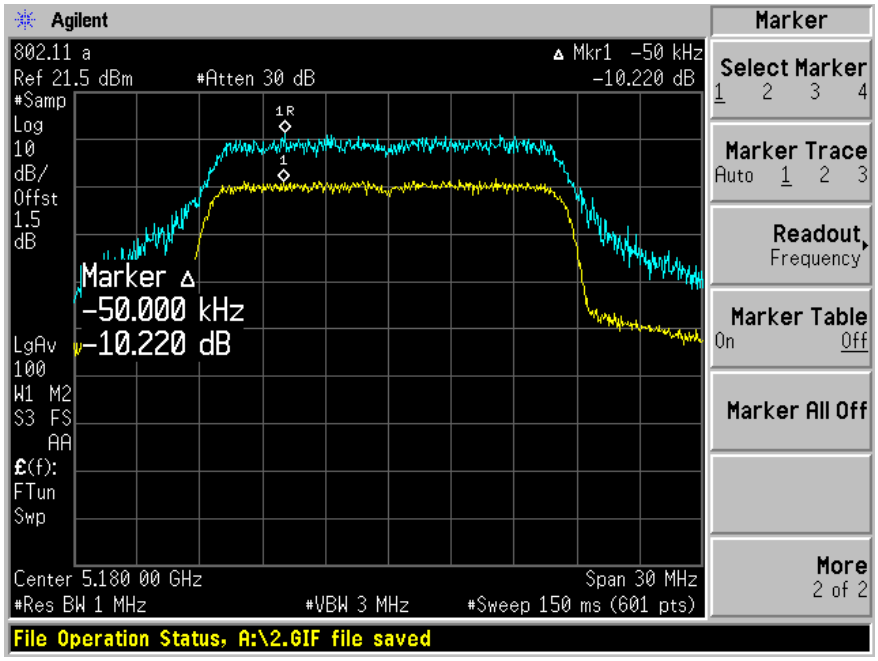
Channel	Frequency MHz	Measured dB	Limit
Low	5180	10.220	<13dB
Mid	5200	11.312	<13dB
High	5240	11.163	<13dB

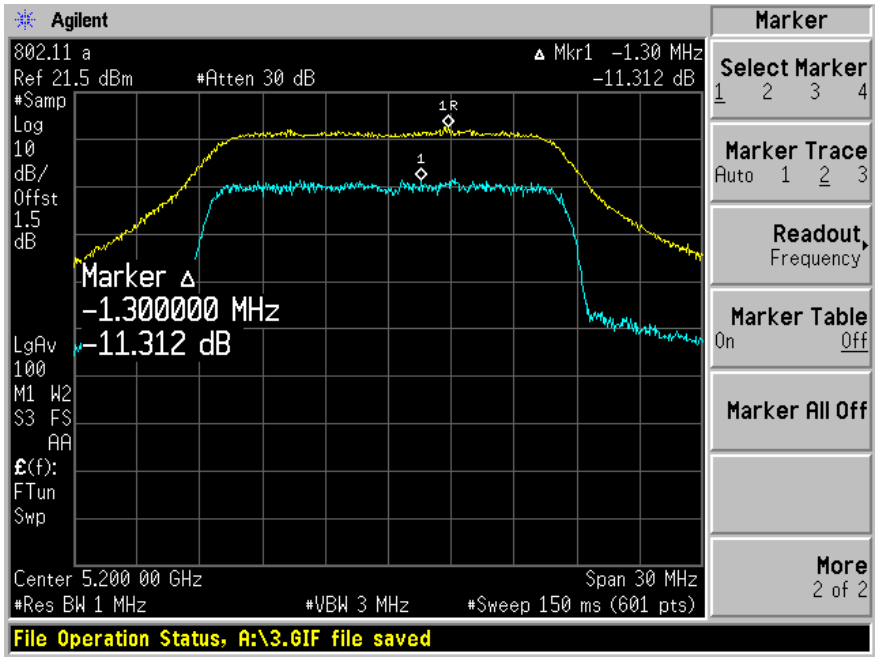
802.11a Mid Band

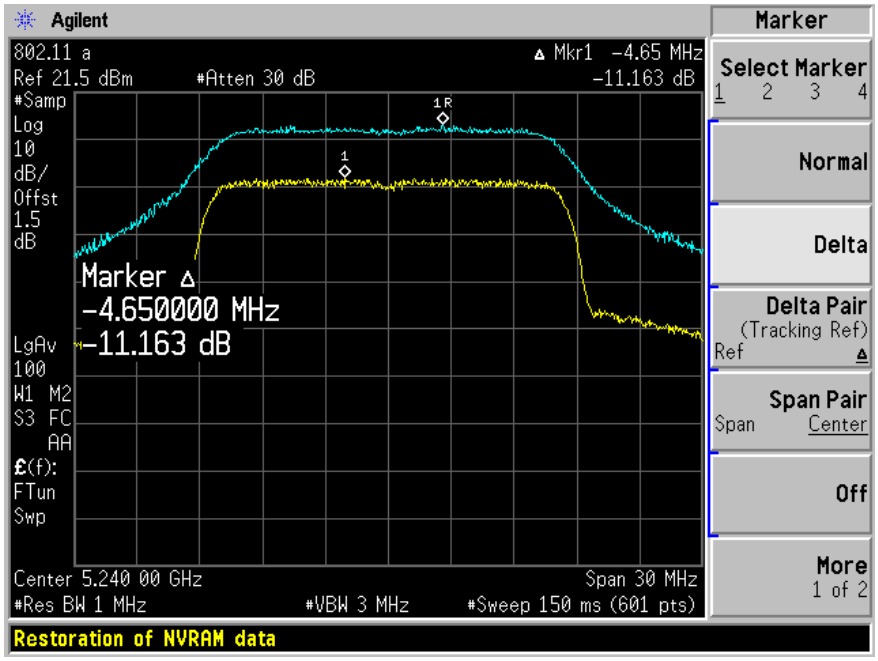
Channel	Frequency MHz	Measured dB	Limit
Low	5260	11.286	<13dB
Mid	5300	10.080	<13dB
High	5320	11.446	<13dB

Please see the hereinafter plots for more detail.

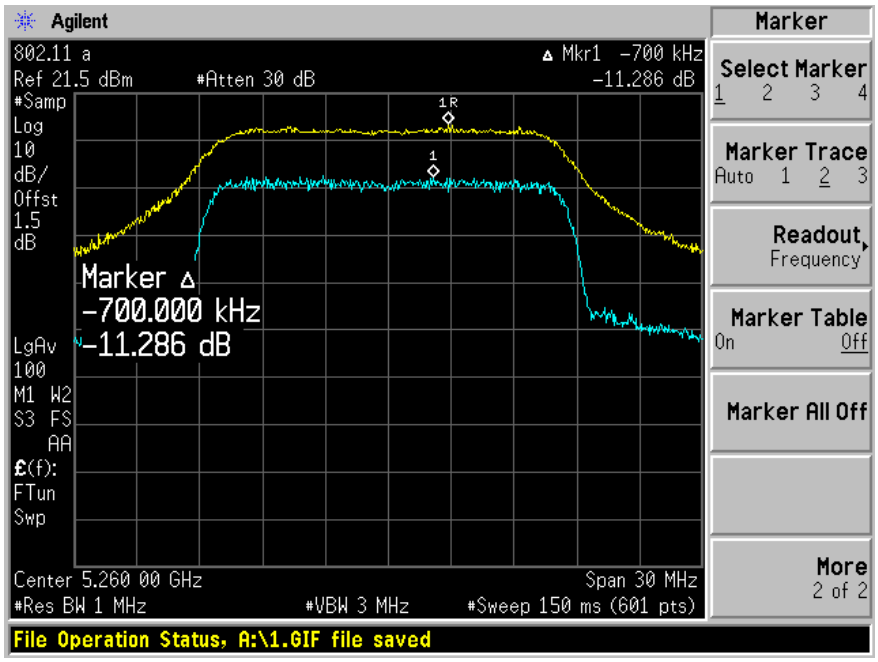
802.11a Low Band

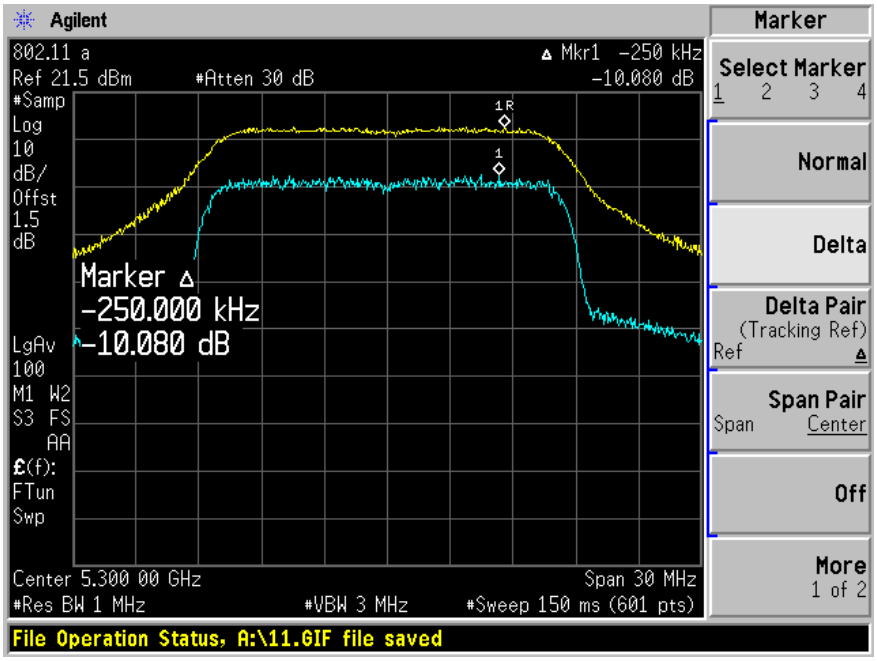


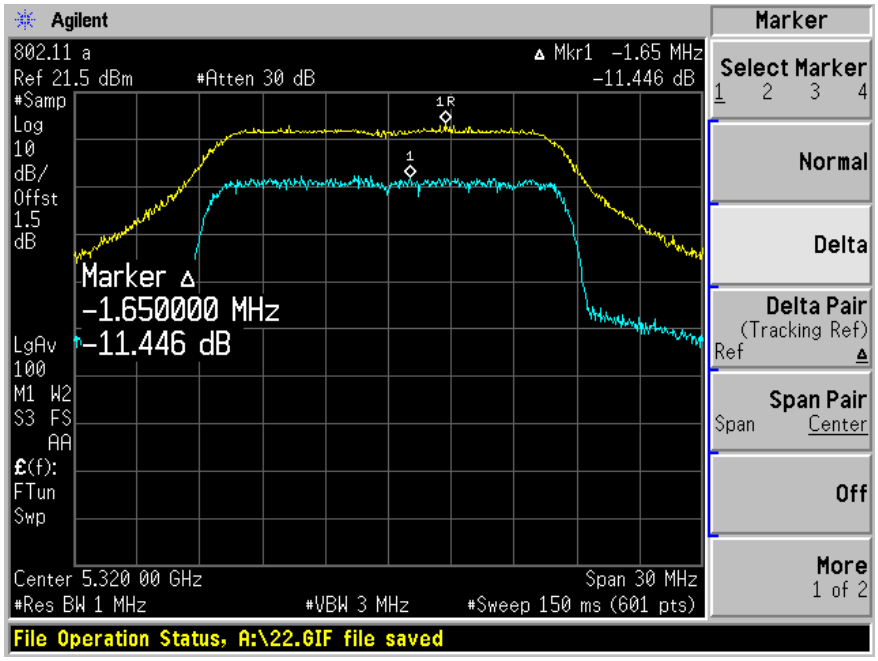




802.11a Mid Band




Agilent
802.11 a
Ref 21.5 dBm
#Atten 30 dB
Mkr1 -250 kHz
-10.080 dB
#Samp
Log
10
dB/
Offst
1.5
dB
Marker Δ
-250.000 kHz
-10.080 dB
LgAv
100
M1 W2
S3 FS
AA
£(f):
FTun
Swp
Center 5.300 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 150 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\11.GIF file saved


Agilent
802.11 a
Ref 21.5 dBm
#Atten 30 dB
Mkr1 -1.65 MHz
-11.446 dB
#Samp
Log
10
dB/
Offst
1.5
dB
Marker Δ
-1.650000 MHz
-11.446 dB
LgAv
100
M1 W2
S3 FS
AA
£(f):
FTun
Swp
Center 5.320 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 150 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\22.GIF file saved

§15.407(b) - Out Of Band Emission

Standard Applicable

§15.407 (b), undesirable emission limits: except as shown in paragraph (b)(6) of this section, the peak emission outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

§15.407 (b)(2), for transmitters operating in the 5.25 – 5.35 GHz & 5.4 – 5.725 GHz band: all emissions outside of the 5.15 – 5.25 GHz band shall not exceed an EIRP of –27 dBm/MHz. Devices operating in the 5.25 – 5.35 GHz band that generate emissions in the 5.15 – 5.25 GHz band must meet all applicable technical requirements for operation in the 5.15 – 5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27 dBm/MHz in the 5.15 – 5.25 GHz band.

Test Procedure

For this test, the EUT's antenna was removed and replaced with a low loss cable, so output power levels were calculated from conducted emission levels.

The analyzer center frequency was set to the EUT carrier frequency. The analyzer resolution and video bandwidth were set to 1MHz. The entire band from 30kHz to 40GHz was investigated.

Every suspected signal was also investigated through radiated emission. Refer to section 15.205 restricted bands of operation.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

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

Measurement Result

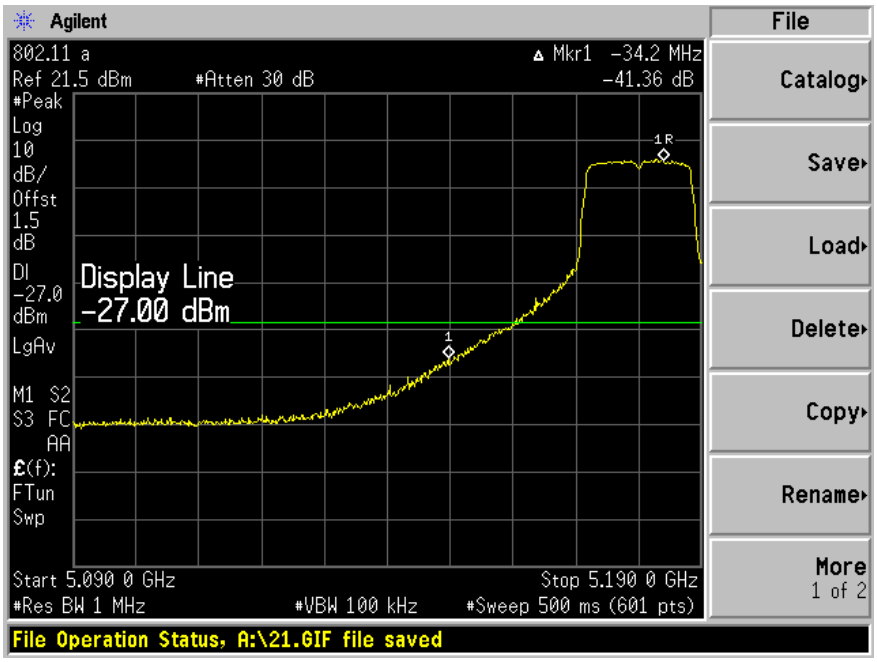
Environmental Conditions

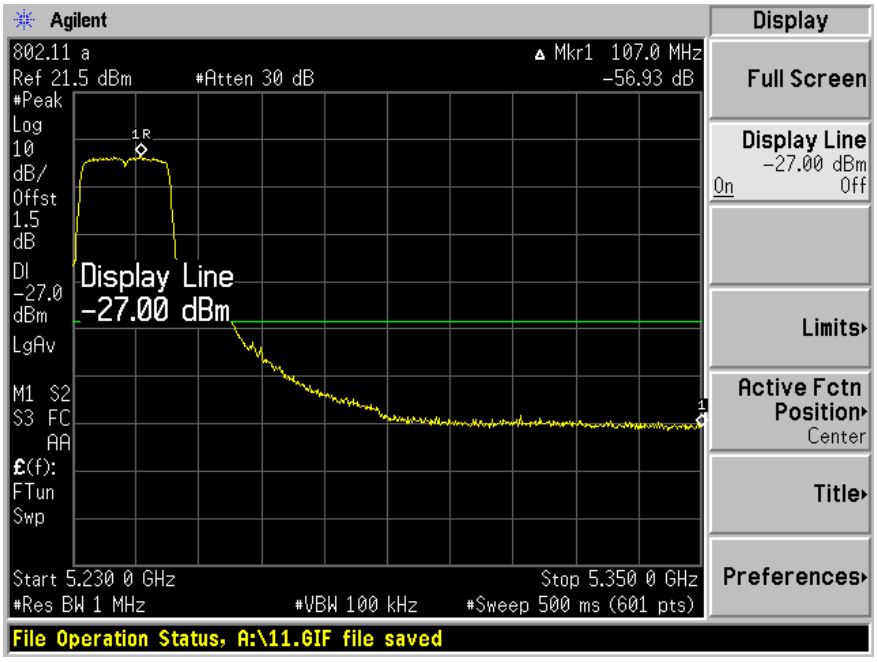
Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

The testing was performed by Daniel Deng on 2005-08-26.

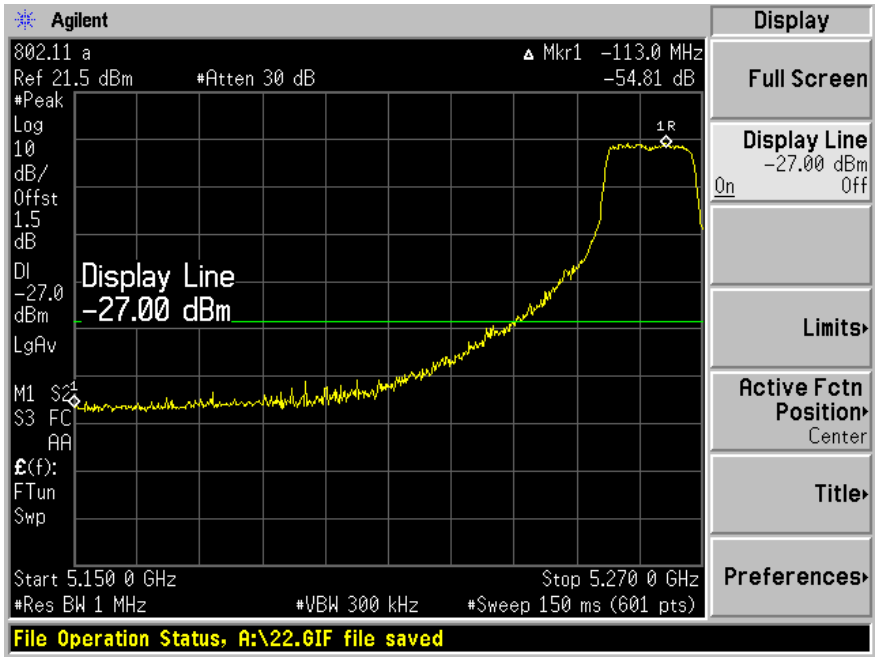
Please refer to the following plots.

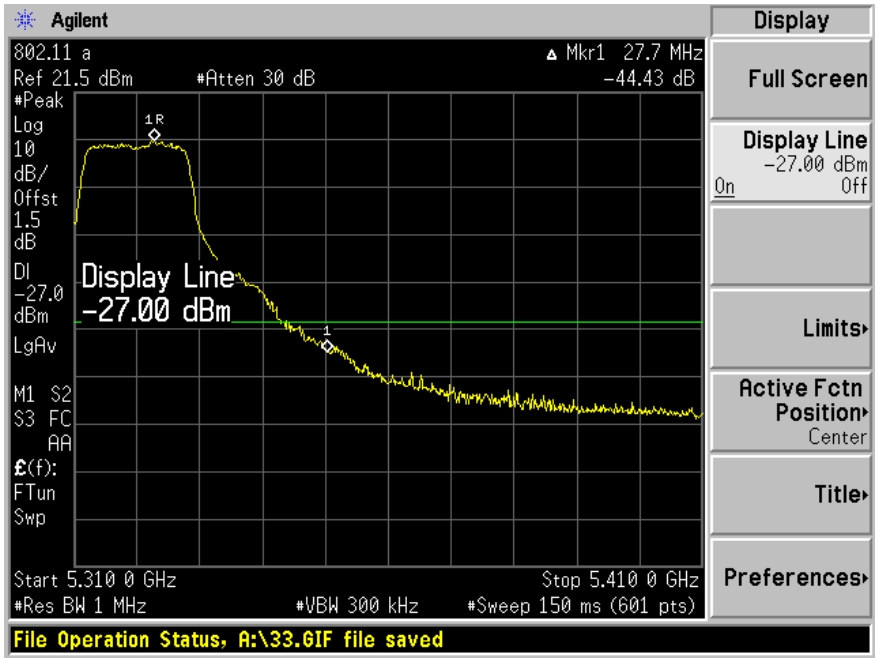
802.11a Low Band





802.11a Mid Band





15.407(c) - Discontinue Transmitting With Absence Of Data Or Operational Failure

According to § 15.407 (c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the user of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application a description of how this requirement is met.

Please refer to the compliance statement provided by the manufacturer.

§15.407(g) - Frequency Stability

Standard Applicable

According to §15.407 (g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation .

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10
Tenney	Oven, Temperature	VersaTenn	12222-193	2005-06-27

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

Measurement Result

Environmental Conditions

Temperature:	23° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

The testing was performed by Daniel Deng on 2005-07-07.

802.11a Low Band (5150-5250 MHZ)

Reference Frequency: 5200MHz			
Enviorment Temperature(C)	Power Supply (V)	Measured Freq (MHz)	ppm
50	110	5199.999160	-0.162
40	110	5199.999450	-0.106
30	110	5199.999380	-0.119
20	110	5199.999140	-0.165
10	110	5199.999150	-0.163
0	110	5199.999110	-0.171
-10	110	5199.999130	-0.167
-20	110	5199.998170	-0.352
-30	110	5199.998150	-0.356

Frequency Stability vs Extrema Voltage

Reference Frequency: 5200MHz			
Power Supply (V)	Enviorment Temperature(C)	Measured Freq (MHz)	ppm
126.5	20	5199.998780	-0.235
110	20	5199.999100	-0.173
93.5	20	5199.998980	-0.196

802.11a Mid Band (5250-5350 MHZ)

Reference Frequency: 5300MHz			
Enviorment Temperature(C)	Power Supply (V)	Measured Freq (MHz)	ppm
50	110	5299.996340	-0.691
40	110	5299.995840	-0.785
30	110	5299.994420	-1.053
20	110	5299.989330	-2.013
10	110	5299.989900	-1.906
0	110	5299.999100	-0.170
-10	110	5299.998870	-0.213
-20	110	5299.998800	-0.226
-30	110	5299.999100	-0.170

Frequency Stability vs Extrema Voltage

Reference Frequency: 5300MHz			
Power Supply (V)	Enviorment Temperature(C)	Measured Freq (MHz)	ppm
126.5	20	5299.989900	-1.906
110	20	5299.989330	-2.013
93.5	20	5299.989450	-1.991