FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

Ruckus Wireless

883 North Shoreline Blvd, Suite A-100
CA 94043, USA

FCC ID: S9GMF2201

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

Test Engineer:	Snell Leong
Report No.:	R0601241.doc
Report Date:	2006-02-14
Reviewed By:	James Ma
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 1274 Anvilwood Ave. Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732 9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Ruckus Wireless* product, *FCC ID: S9GMF2201,* or the "EUT" as referred to this report is a 2.4GHz 802.11b/g Access Point, which measures approximately 140mmL x 120mmW x 70mmH and the EUT operates at the frequency range of 2412~2462MHz.

** The test data gathered are from typical production sample, serial number: V20000851 provided by the manufacturer.*

Objective

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

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

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. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

Test site used by BACL to collect radiated and conducted emission measurement data is located in the chamber of the building at 1274 Anvilwood Ave., Sunnyvale, California 94089, USA with registration number: 90464.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports 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 and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL 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

ART is using for testing, and the following power setting was used during the testing:

	2412MHz	2437MHz	2462MHz	Data rate
802.11b	24dBm	23 .5dBm	23dBm	ALL
802.11g	20dBm	20dBm	20dBm	54Mbps
	21dBm	21dBm	20.5dBm	48Mbps
	23dBm	23dBm	22.5dBm	Others

Special Accessories

As shown in following test 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.

Power Supply

Manufacturer	Description	Model	Serial Number	FCC ID
DVE	ADC Power Supply	DSA-0131F-12 US 12	N/A	N/A

Local Support Equipment

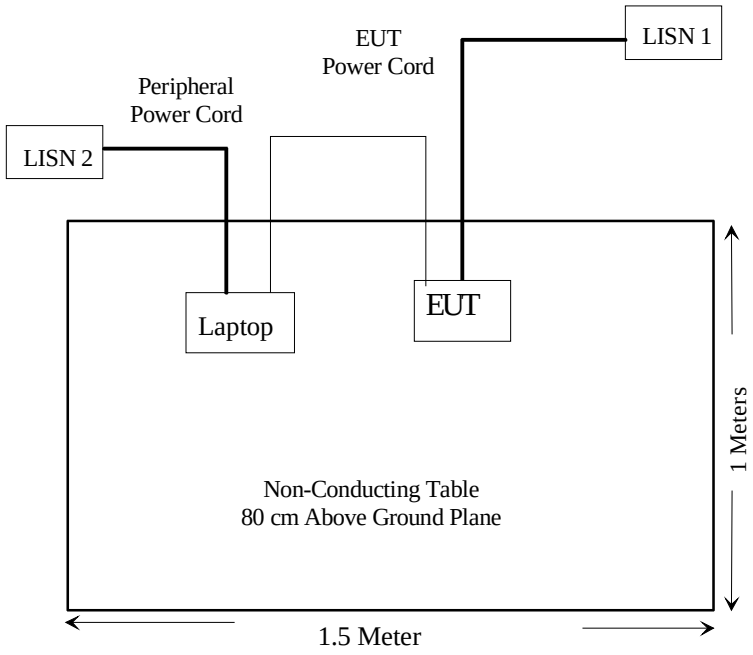
Manufacturer	Description	Model	Serial Number	FCC ID
IBM	Laptop PC	2662	N/A	N/A

Interface Ports and Cabling

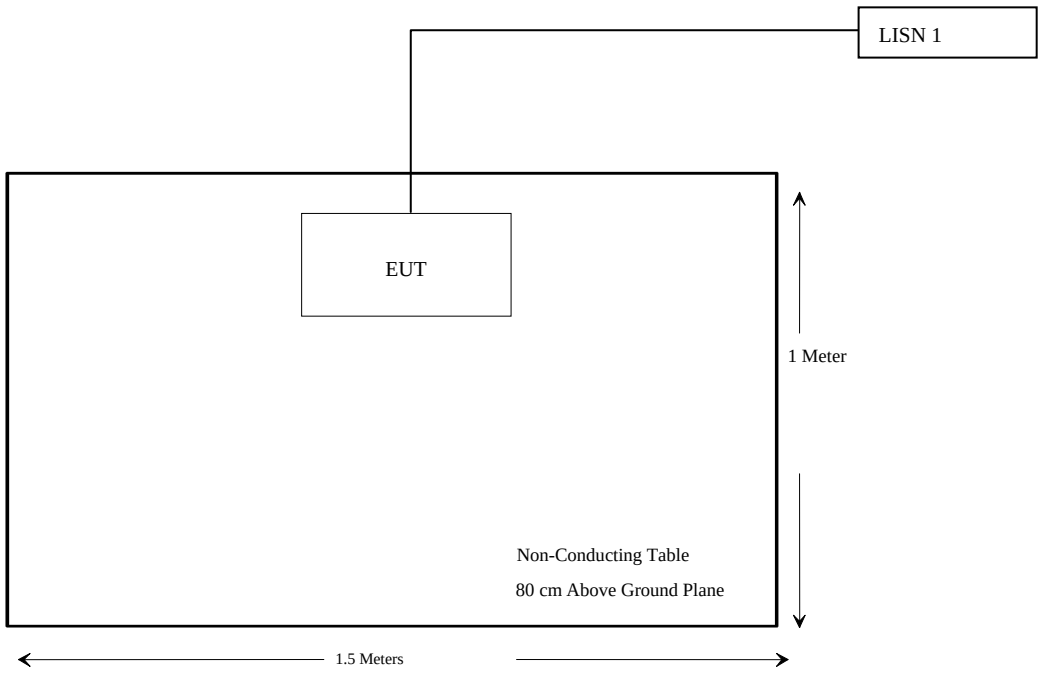
Cable Description	Length (M)	From	To
Ethernet Cable	2.0	Ethernet port / EUT	Ethernet Port / PC

Test Setup Block Diagram

Conducted Emission



Radiated Emission



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091	RF Exposure	Pass
§15.203	Antenna Requirement	Pass
§ 15.207 (a)	Conducted Emissions	Pass
§2.1051 & §15.247(d)	Spurious Emission at Antenna Port	Pass
§15.205	Restricted Band	Pass
§15.209 (a) & §15.247(d)	Radiated Emission	Pass
§15.247 (a)(2)	6 dB Bandwidth	Pass
§15.247 (b)(3)	Maximum Peak Output Power	Pass
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Pass
§15.247 (e)	Peak Power Spectral Density	Pass

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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

The antenna for this device is an integral antenna with gain of 3.3 dBi.

§15.207 (a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, 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.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

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

The EUT was connected with LISN-1.

Receiver Setup

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	2005-09-15
R&S	Artificial Mains Network	ESH2-Z5	871884/039	2005-08-16

*** 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 EUT was connected to the mains outlet of the LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2006-01-26.*

Summary of Test Results

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

-7.8 dB at **0.190 MHz** in the **Neutral** conductor

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBµV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBµV	Margin dB
0.190	46.2	Ave	Neutral	54.04	-7.8
0.255	41.8	Ave	Line	51.59	-9.8
0.485	35.2	Ave	Line	46.25	-11.1
0.190	52.200	QP	Neutral	64.04	-11.8
0.960	33.1	Ave	Line	46.00	-12.9
0.255	47.2	QP	Line	61.59	-14.4
0.485	40.5	QP	Line	56.25	-15.8
0.960	39.2	QP	Line	56.00	-16.8
0.385	38.830	QP	Neutral	58.17	-19.3
0.385	27.0	Ave	Neutral	48.17	-21.2
0.770	33.600	QP	Neutral	56.00	-22.4
0.770	23.6	Ave	Neutral	46.00	-22.4

Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Laboratory Corp 26. Jan 06 09:39

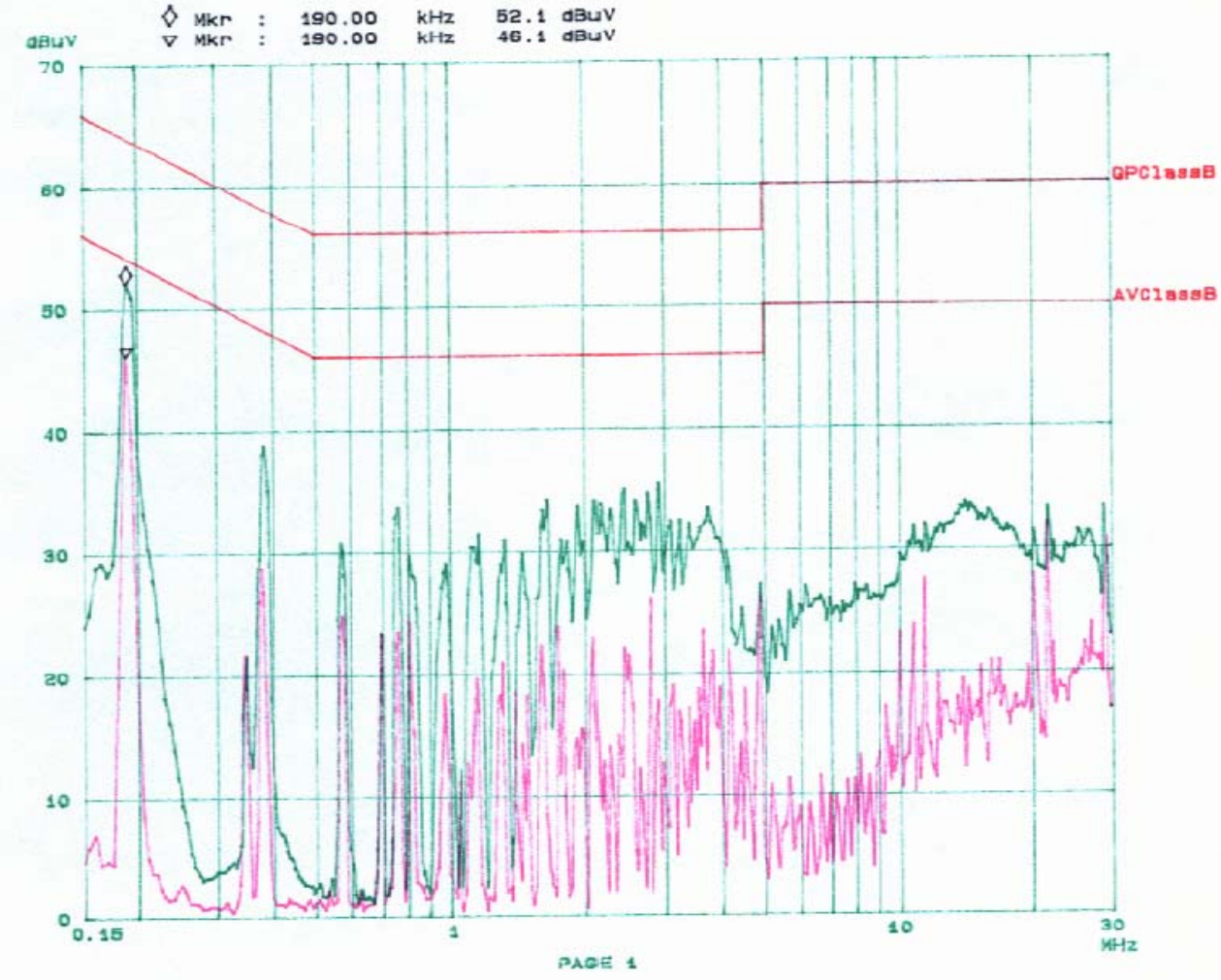
Class B

Jan 26 2006

EUT: AP MF2201
Manuf: Ruckus Wireless
Op Cond: Normal
Operator: sneil
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



Bay Area Compliance Laboratory Corp 25. Jan 06 21:33

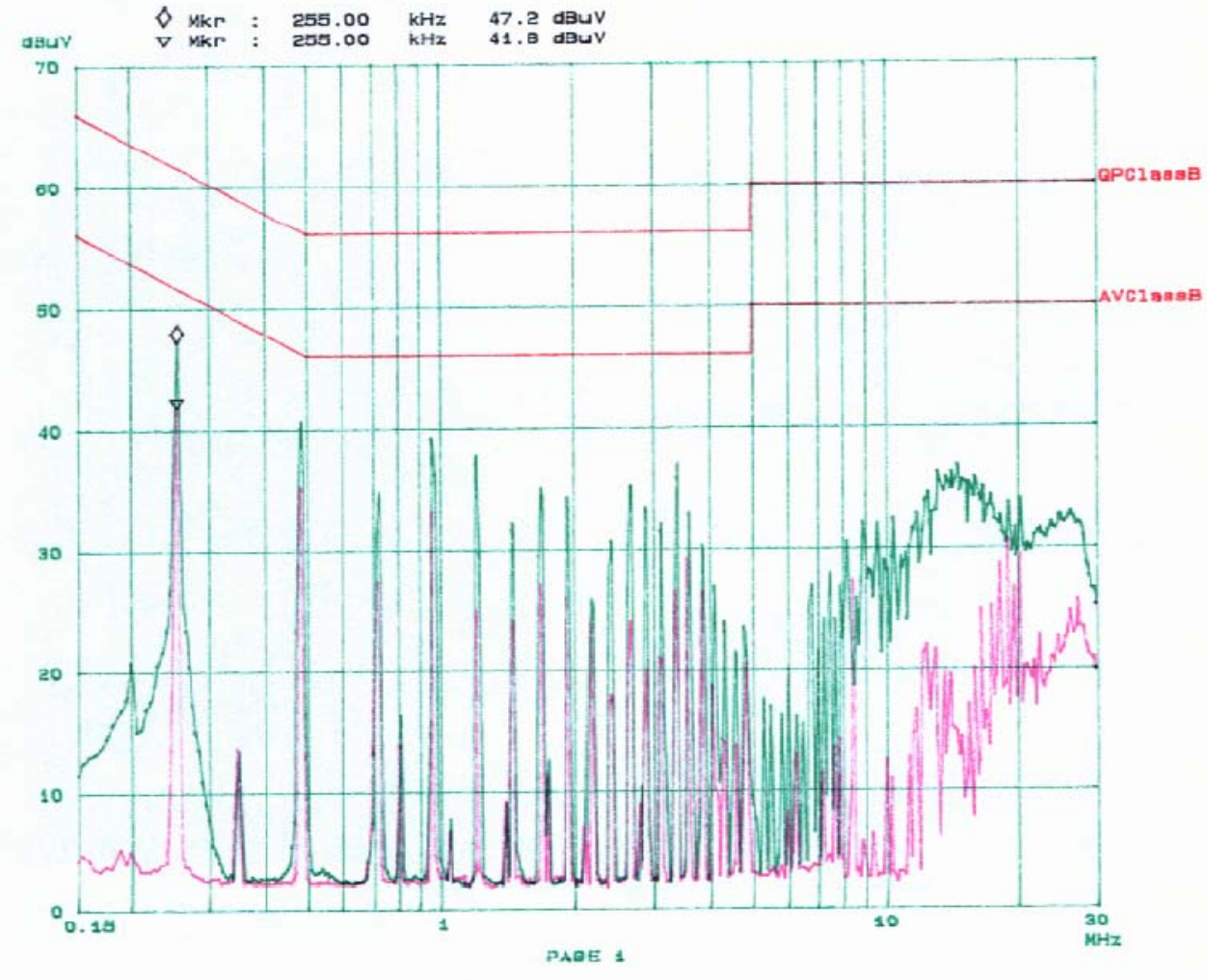
Class B

Jan 25 2006
Snell

EUT: AP MF2201
Manuf: Ruckus Wireless
Op Cond: Normal
Operator: snell
Comment: L
120VAC
File name: NVIDIA.RES

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 & §15.247(d) - 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 10^{th} harmonic.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2005

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

Measurement Result

Please refer to following pages for plots of spurious emission.

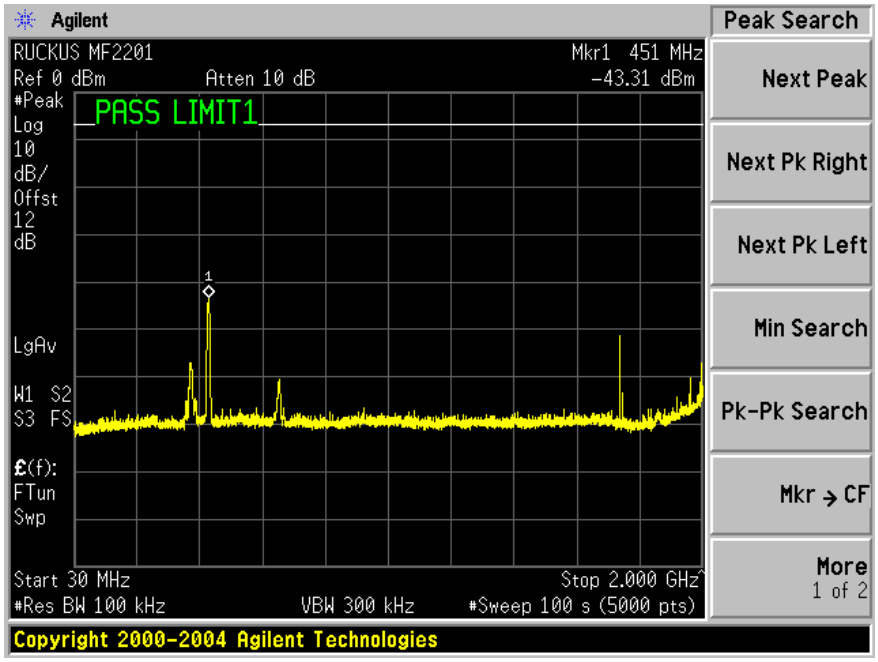
Environmental Conditions

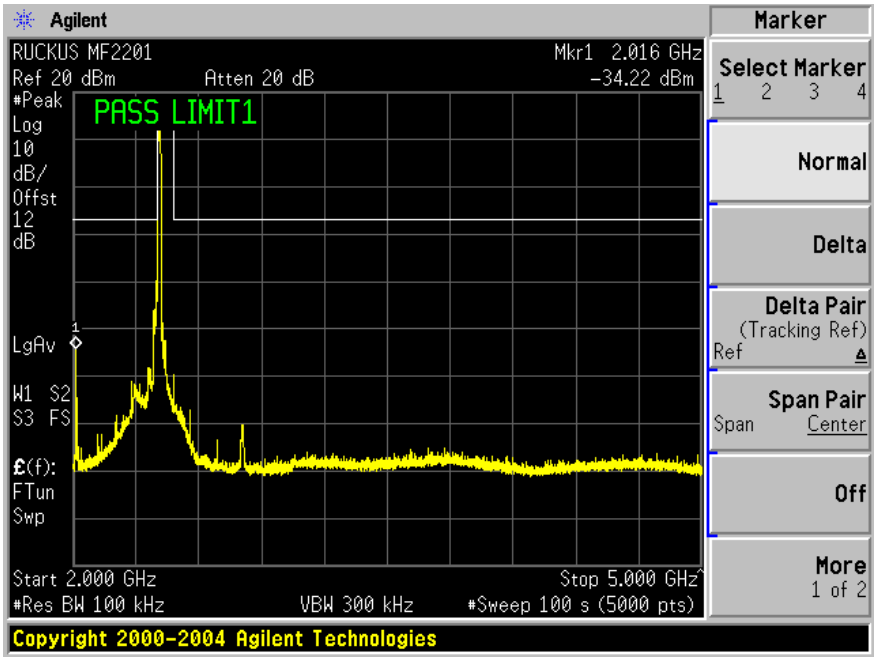
Temperature:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

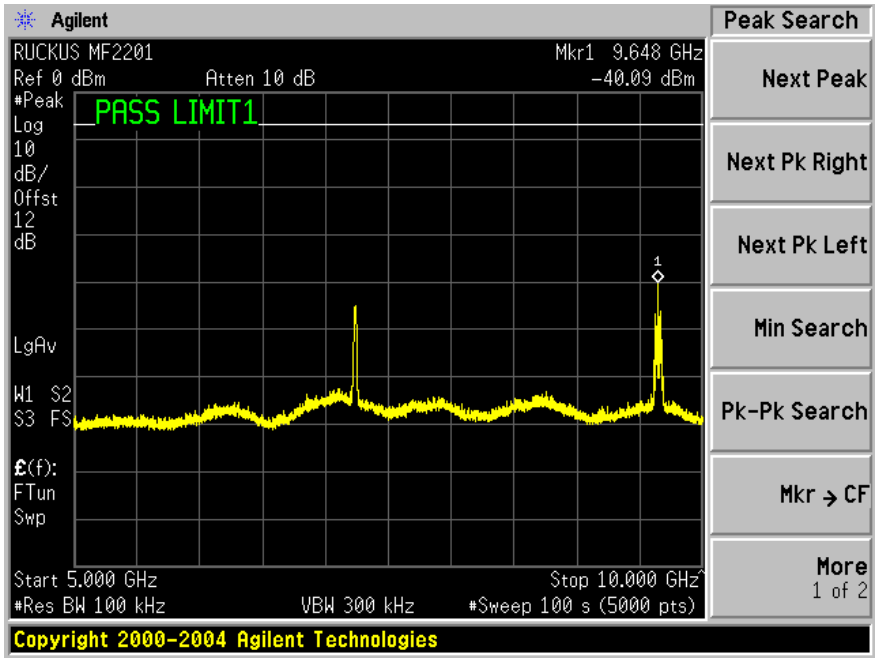
**The testing was performed by Snell Leong on 2006-01-24.*

802.11b:

Low Channel






Agilent
RUCKUS MF2201
Ref 0 dBm
Atten 10 dB
Mkr1 9.648 GHz
-40.09 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 5.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 10.000 GHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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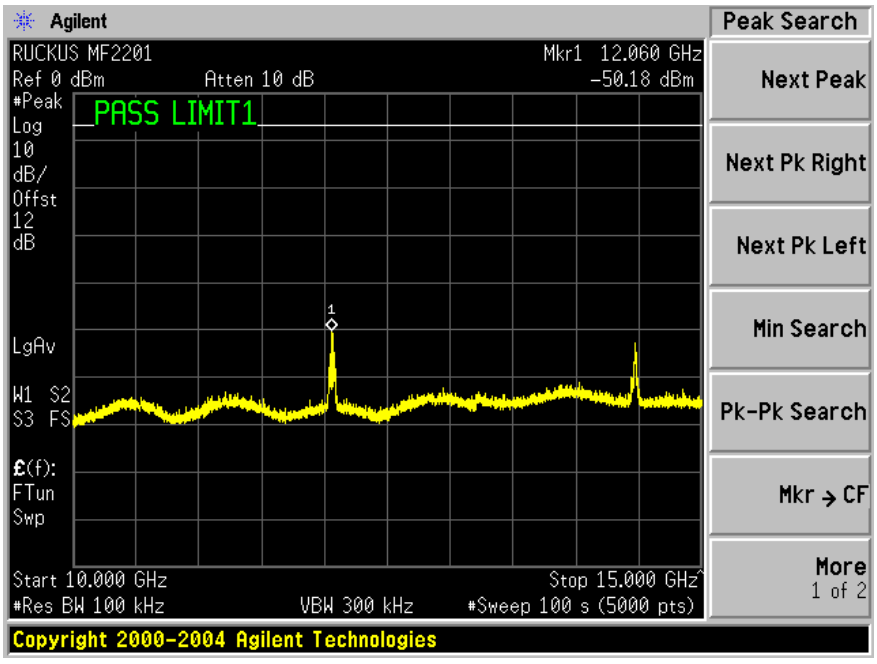
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RUCKUS MF2201
Ref 0 dBm
Atten 10 dB
Mkr1 12.060 GHz
-50.18 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 10.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 15.000 GHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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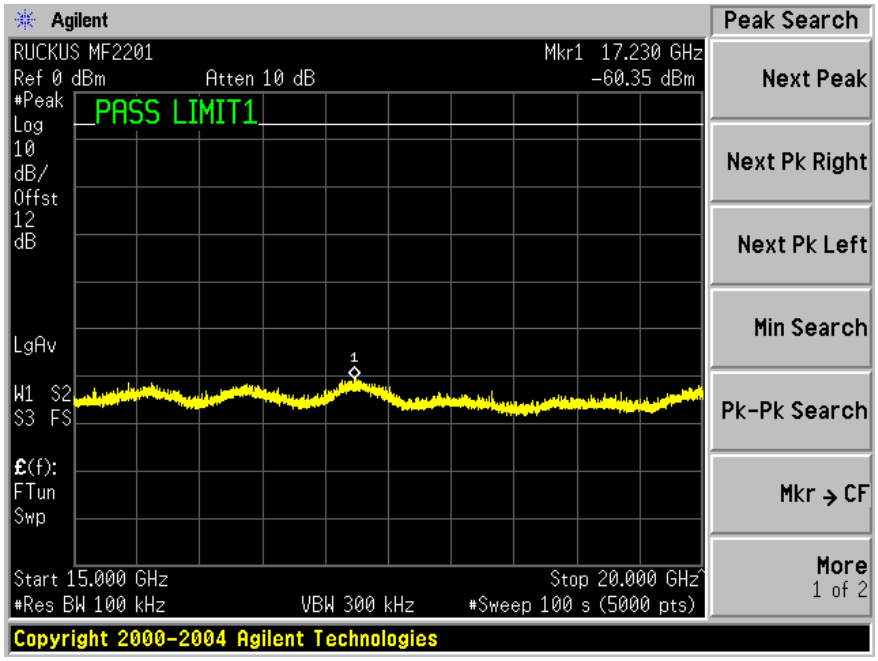
Agilent
Peak Search
RUCKUS MF2201
Mkr1 17.230 GHz
Ref 0 dBm
Atten 10 dB
-60.35 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 15.000 GHz
Stop 20.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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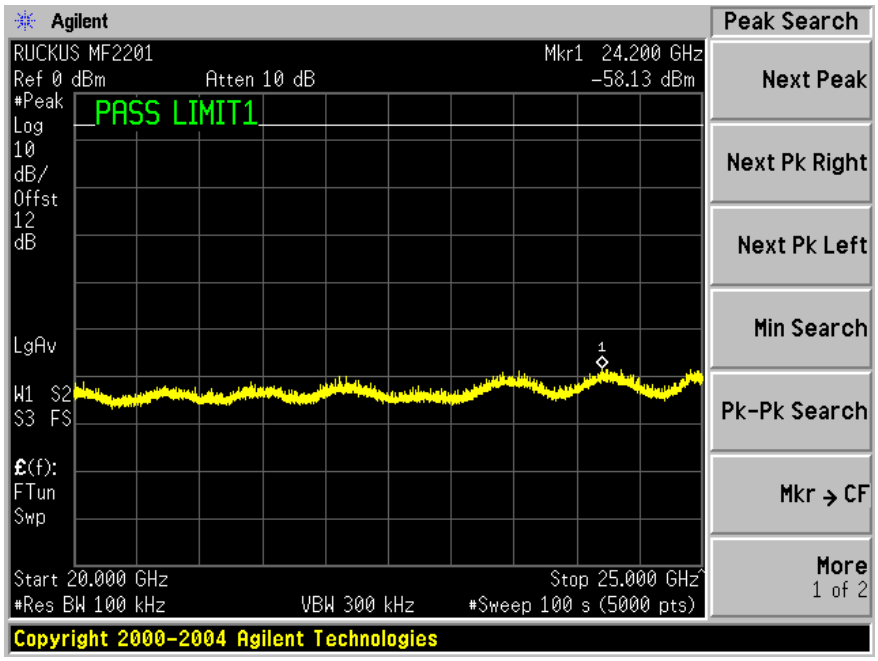
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Peak Search
RUCKUS MF2201
Mkr1 24.200 GHz
Ref 0 dBm
Atten 10 dB
-58.13 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 20.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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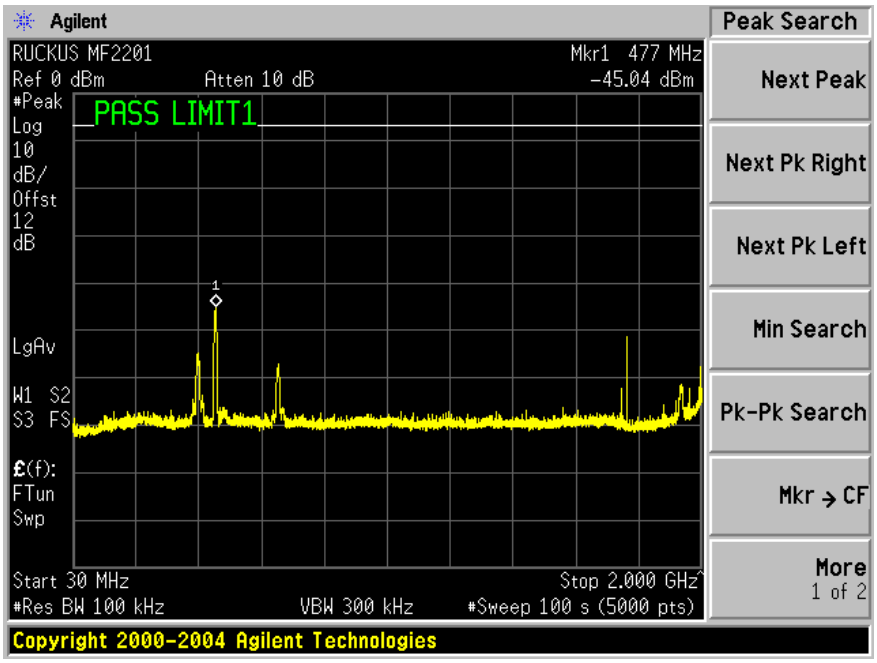
Mid Channel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RUCKUS MF2201
Ref 0 dBm
Atten 10 dB
Mkr1 477 MHz
-45.04 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 30 MHz
#Res BW 100 kHz
VBW 300 kHz
Stop 2.000 GHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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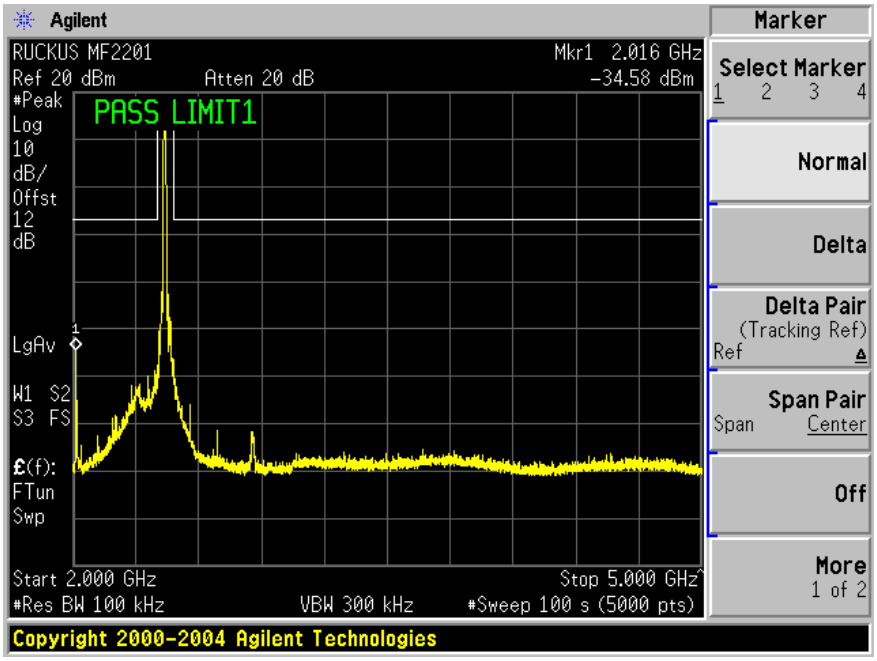
Agilent
RUCKUS MF2201
Ref 20 dBm
Atten 20 dB
Mkr1 2.016 GHz
-34.58 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 2.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 5.000 GHz
#Sweep 100 s (5000 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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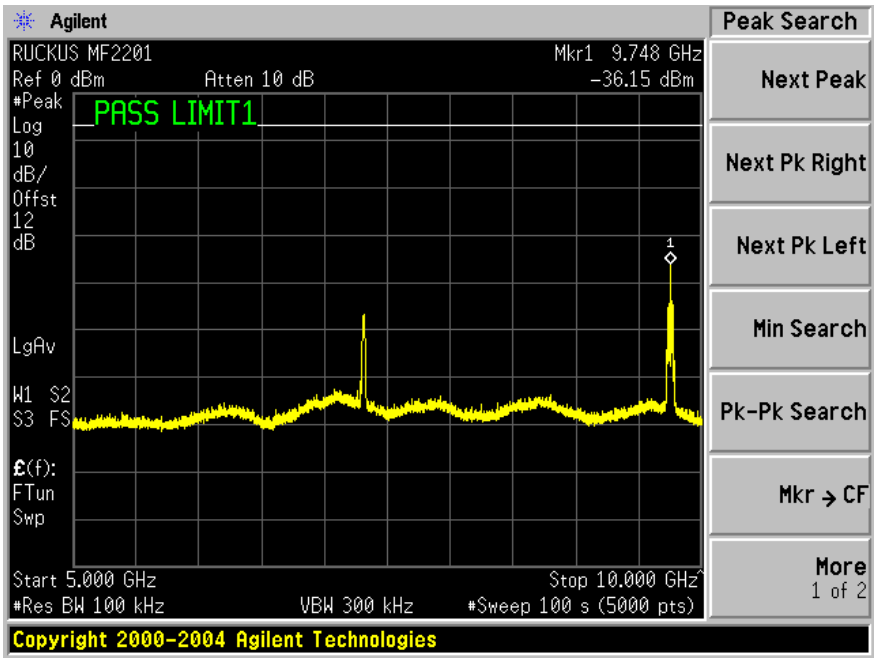
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Peak Search
RUCKUS MF2201
Mkr1 9.748 GHz
Ref 0 dBm
Atten 10 dB
-36.15 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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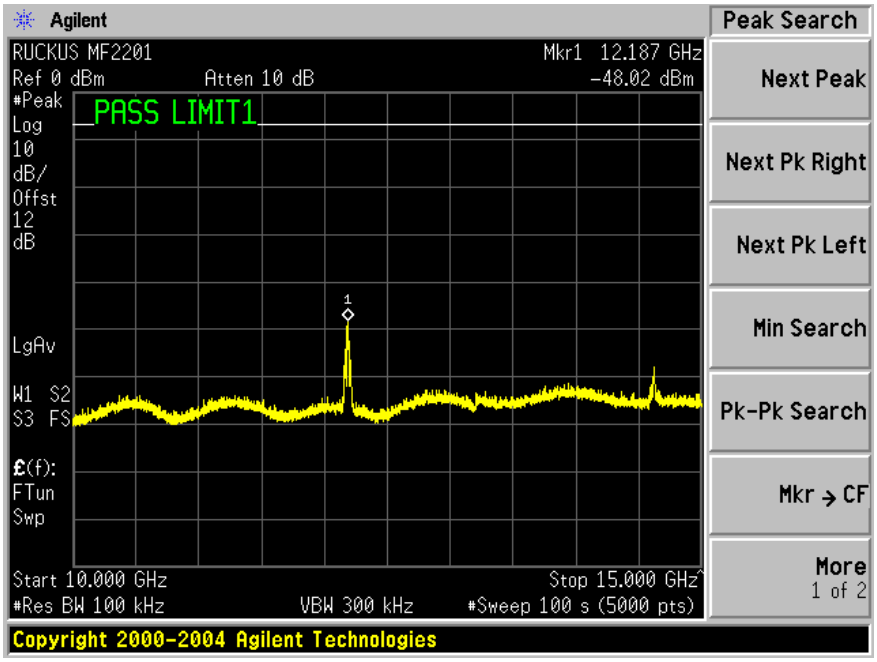
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Peak Search
RUCKUS MF2201
Mkr1 12.187 GHz
Ref 0 dBm
Atten 10 dB
-48.02 dBm
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Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 10.000 GHz
Stop 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
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Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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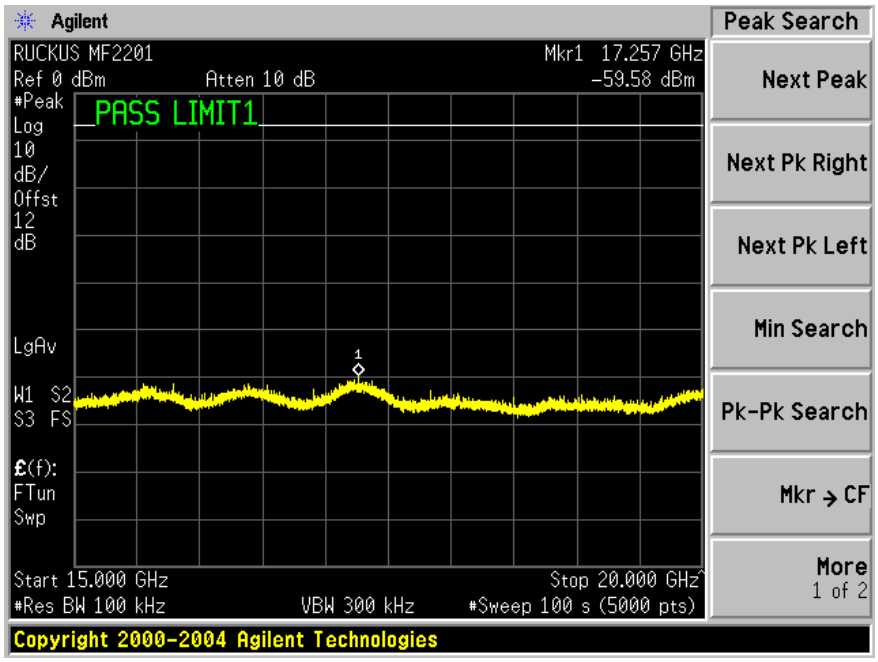
Agilent
Peak Search
RUCKUS MF2201
Mkr1 17.257 GHz
Ref 0 dBm
Atten 10 dB
-59.58 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 15.000 GHz
Stop 20.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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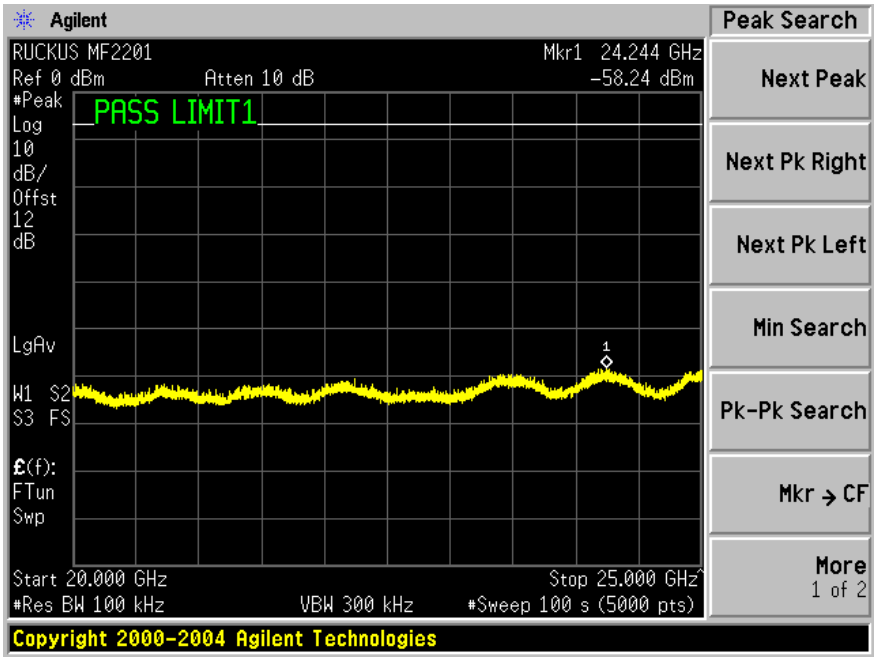
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Peak Search
RUCKUS MF2201
Mkr1 24.244 GHz
Ref 0 dBm
Atten 10 dB
-58.24 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 20.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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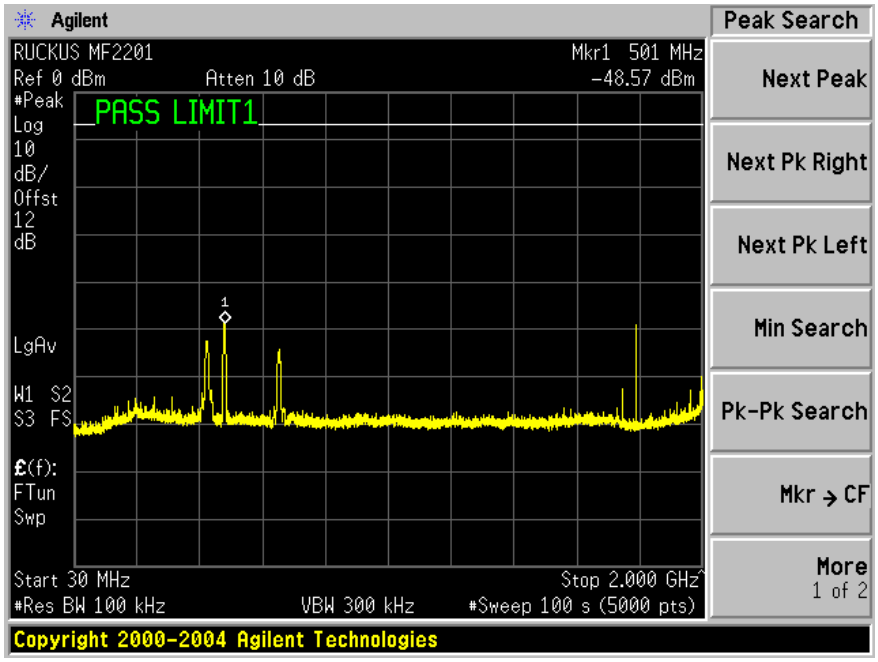
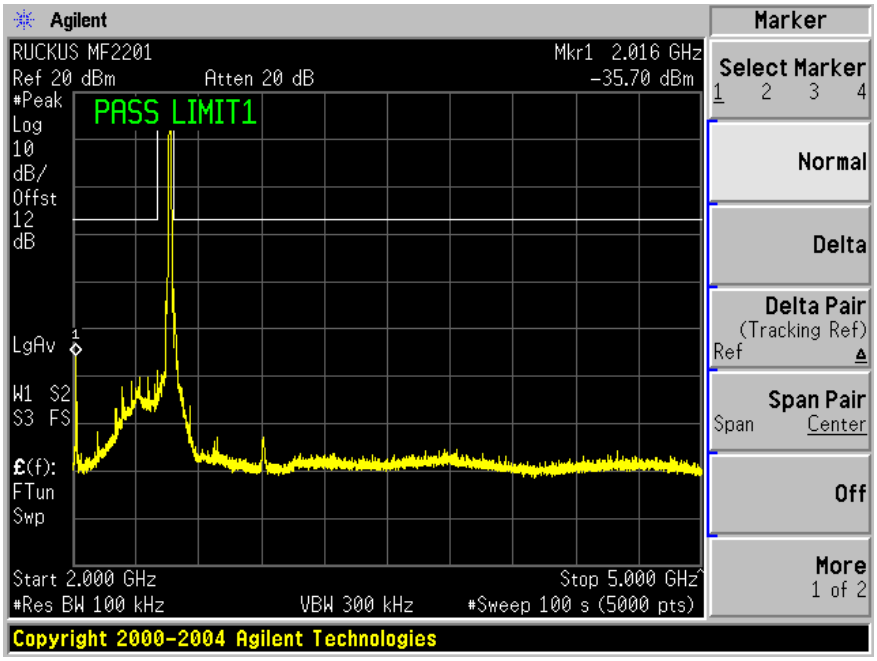
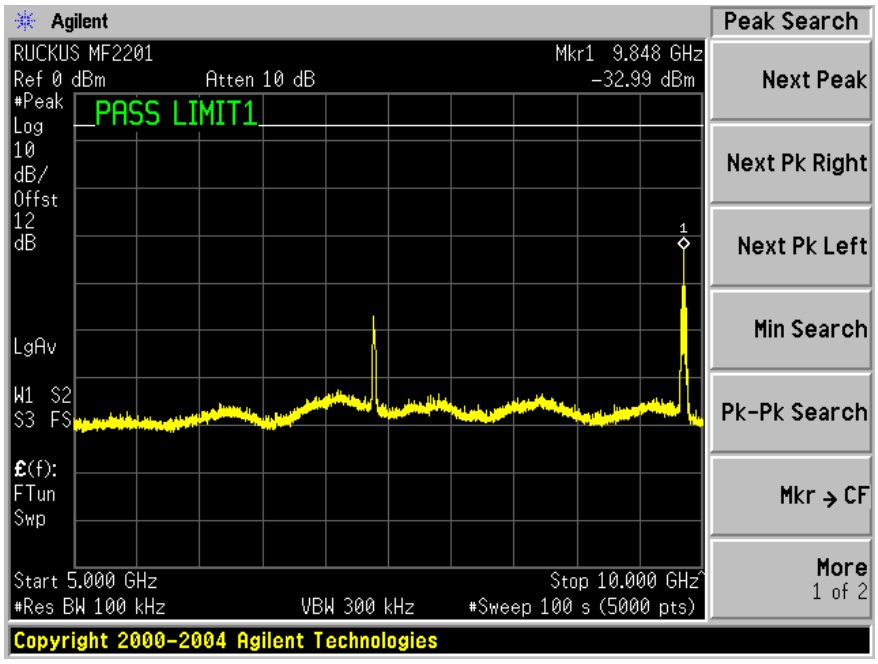
High Channel






Agilent
RUCKUS MF2201
Ref 0 dBm
Atten 10 dB
Mkr1 9.848 GHz
-32.99 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 5.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 10.000 GHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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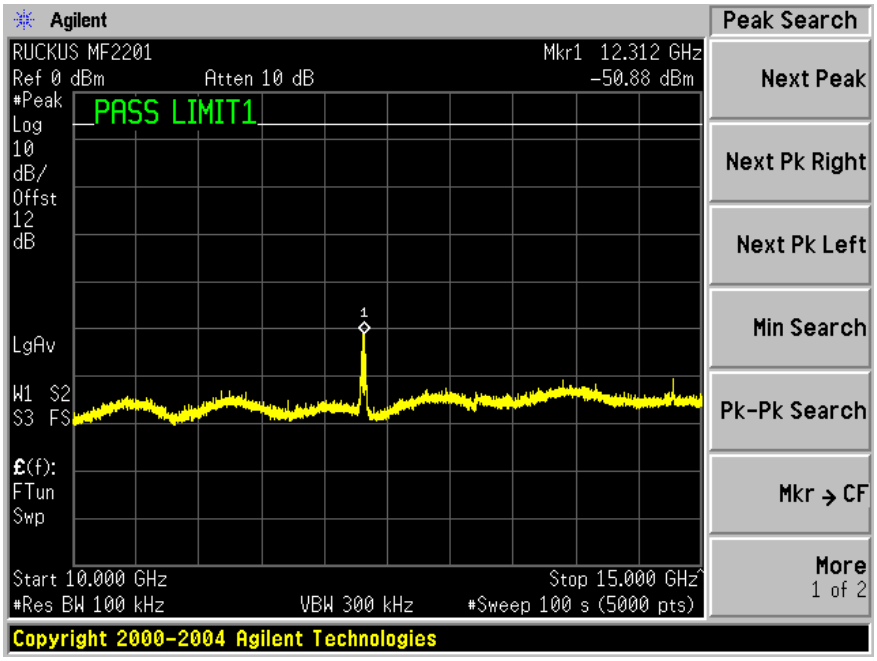
Agilent
RUCKUS MF2201
Ref 0 dBm
Atten 10 dB
Mkr1 12.312 GHz
-50.88 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 10.000 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 15.000 GHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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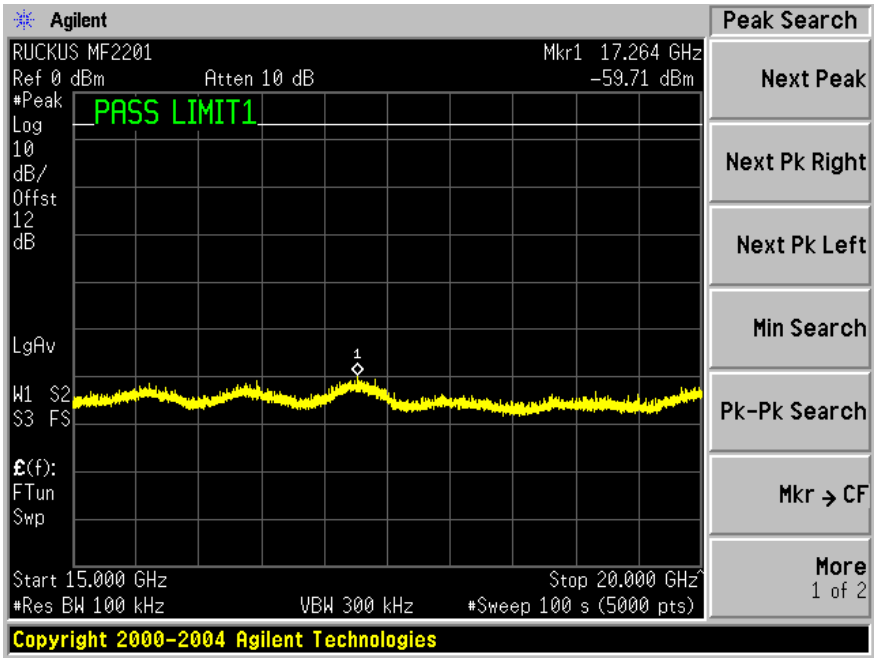
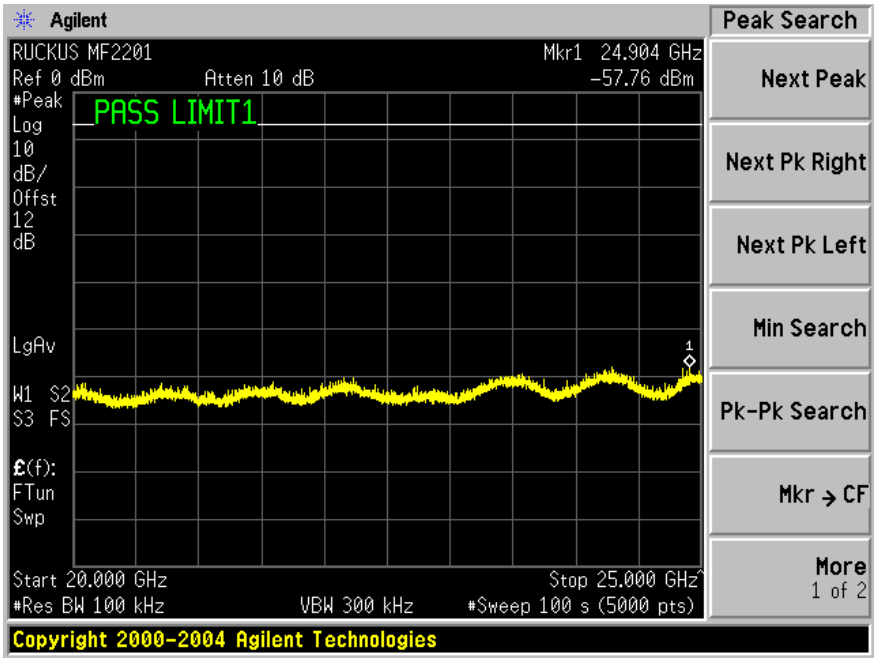

Agilent
RUCKUS MF2201
Mkr1 17.264 GHz
Ref 0 dBm
Atten 10 dB
-59.71 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 15.000 GHz
Stop 20.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2004 Agilent Technologies


Agilent
RUCKUS MF2201
Mkr1 24.904 GHz
Ref 0 dBm
Atten 10 dB
-57.76 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 20.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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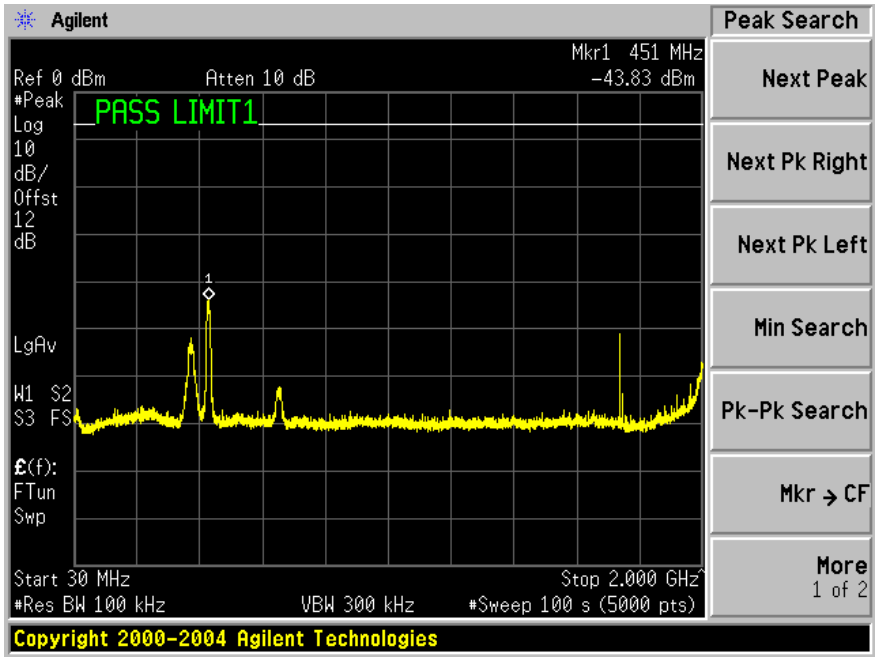
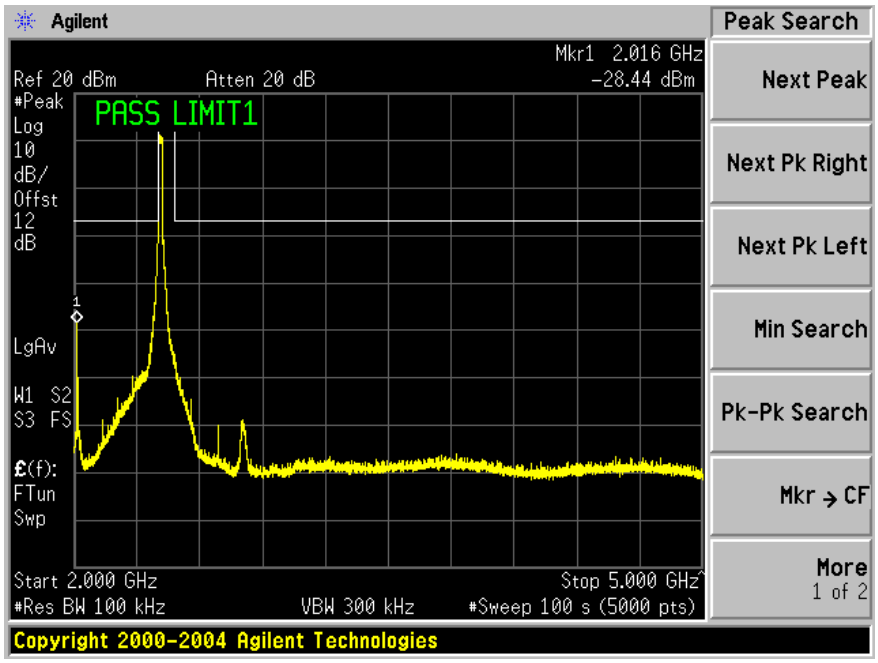
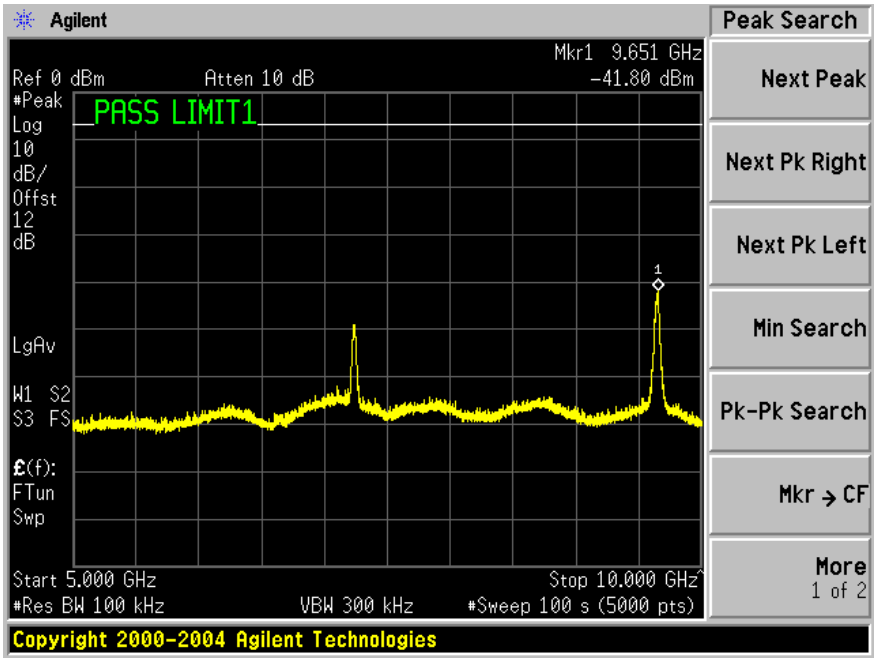
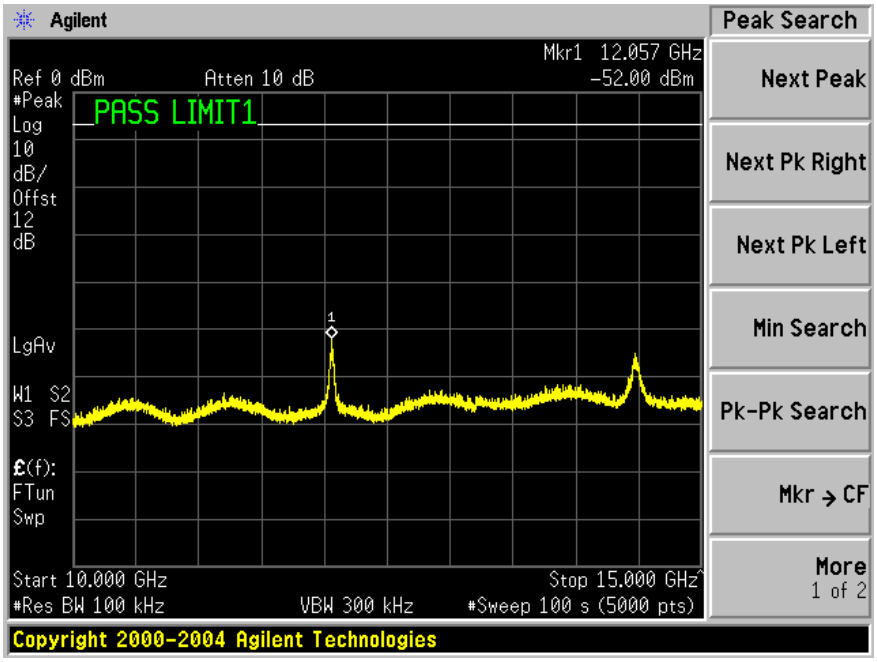
802.11g:

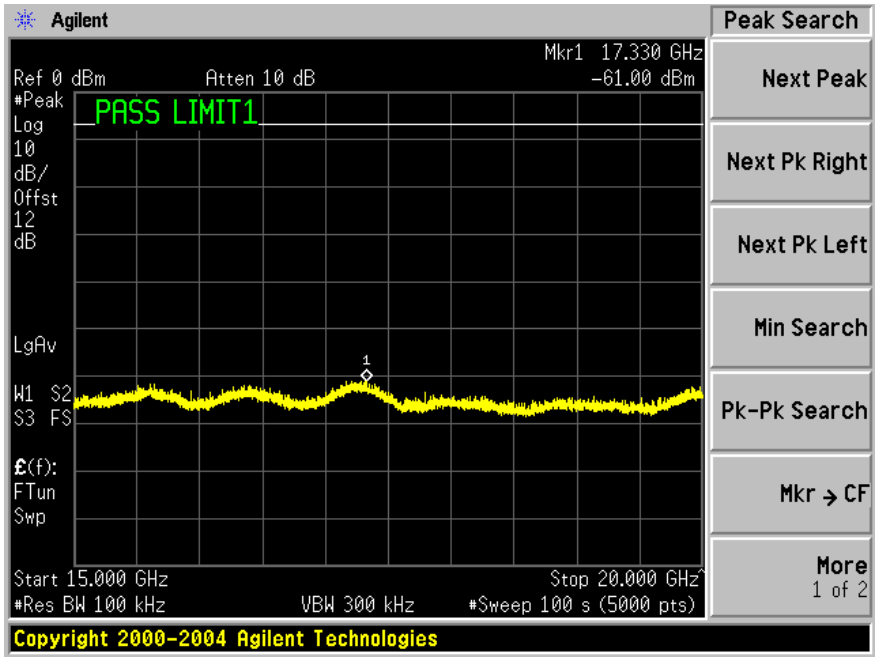
Low Channel

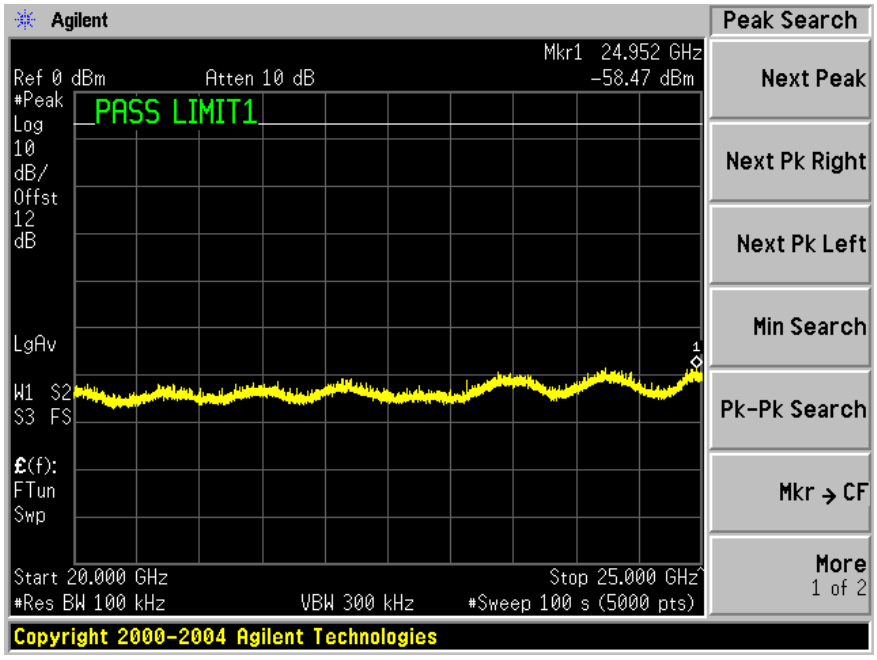





Agilent
Peak Search
Mkr1 9.651 GHz
Ref 0 dBm
Atten 10 dB
-41.80 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 12.057 GHz
Ref 0 dBm
Atten 10 dB
-52.00 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 10.000 GHz
Stop 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 17.330 GHz
Ref 0 dBm
Atten 10 dB
-61.00 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 15.000 GHz
Stop 20.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 24.952 GHz
Ref 0 dBm
Atten 10 dB
-58.47 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 20.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
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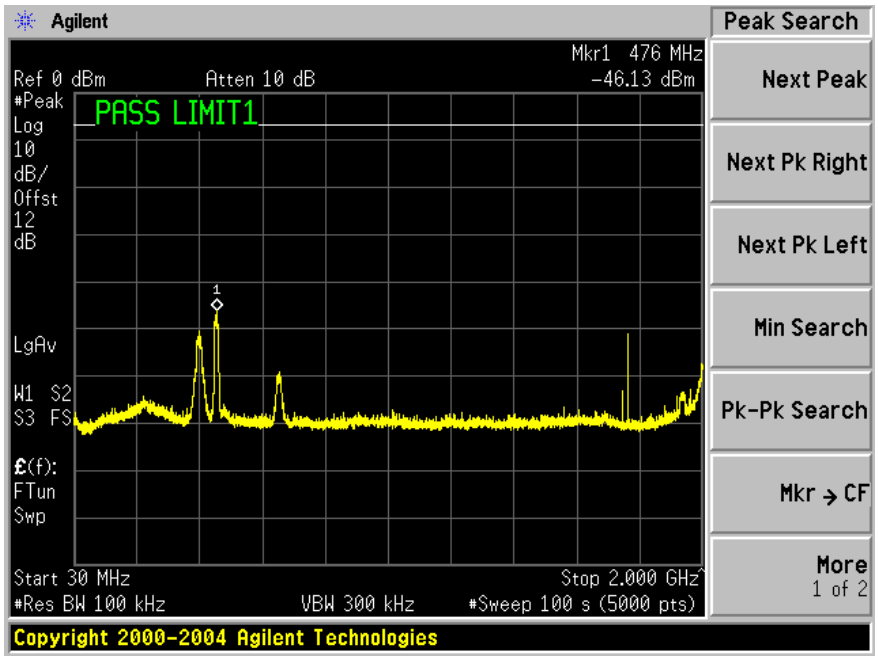
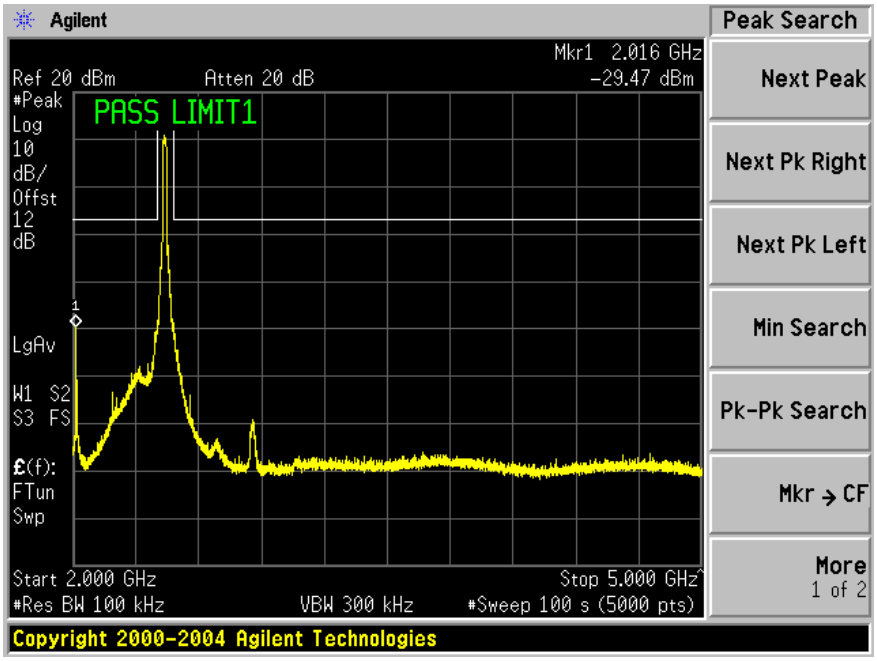
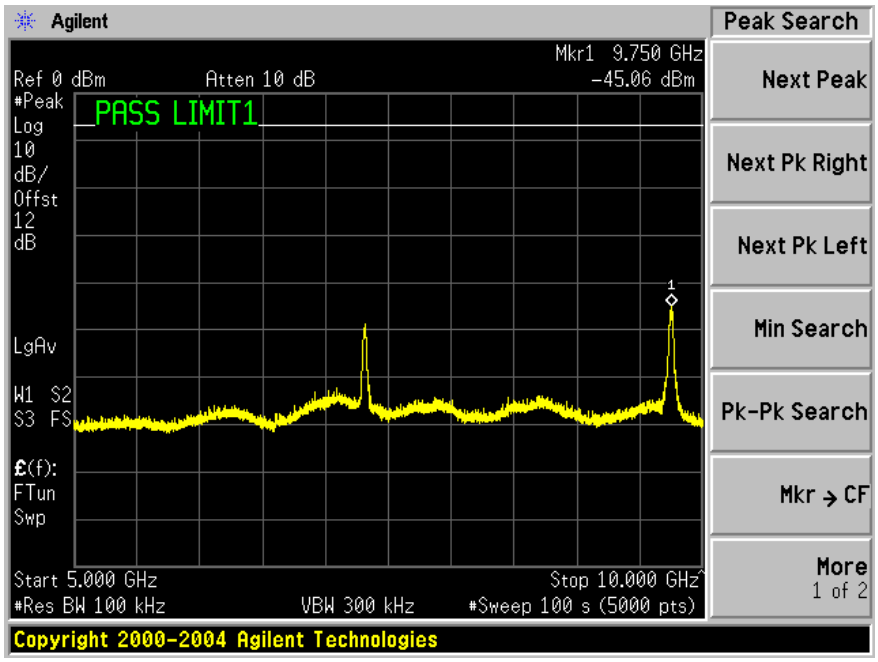
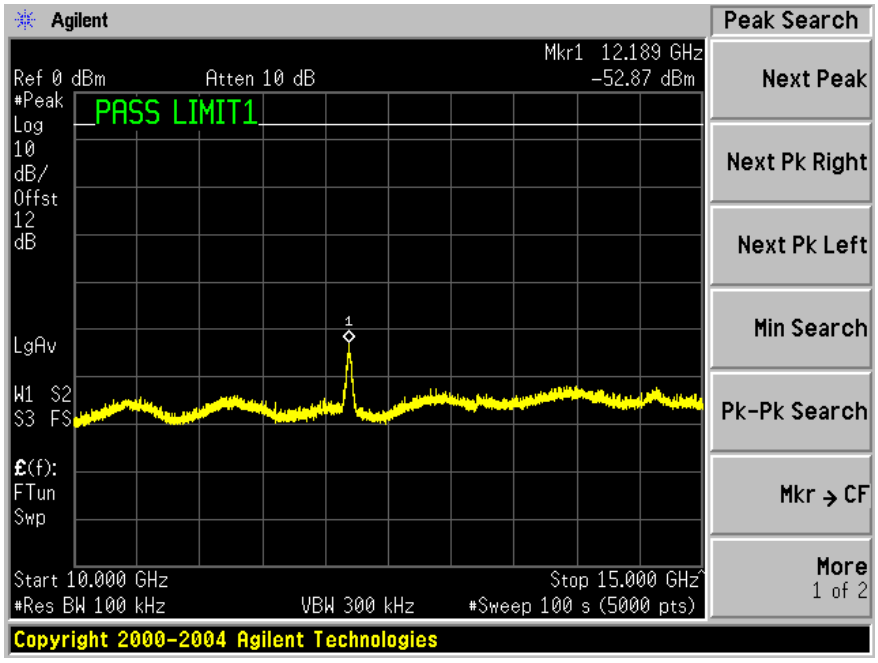
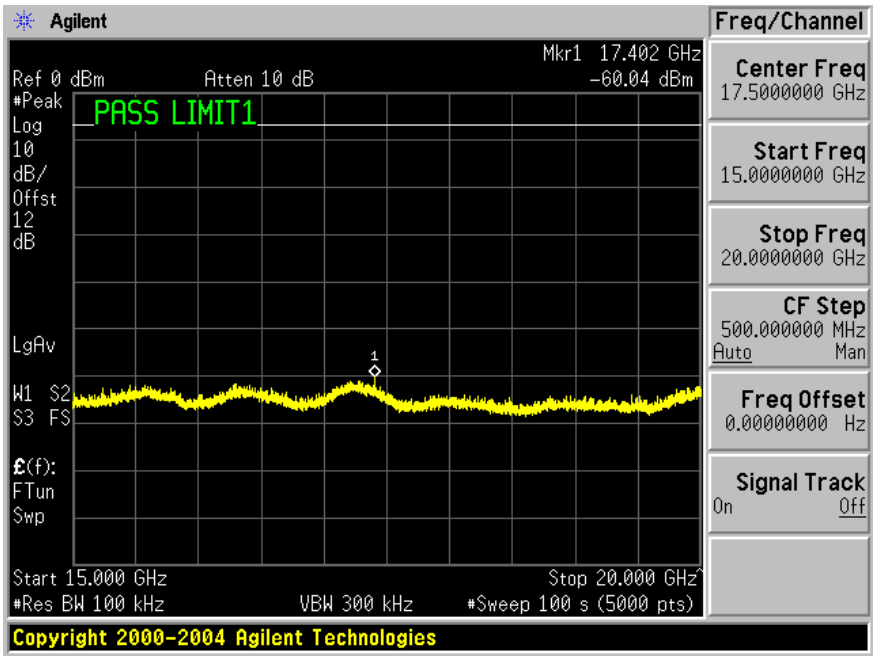
Mid Channel

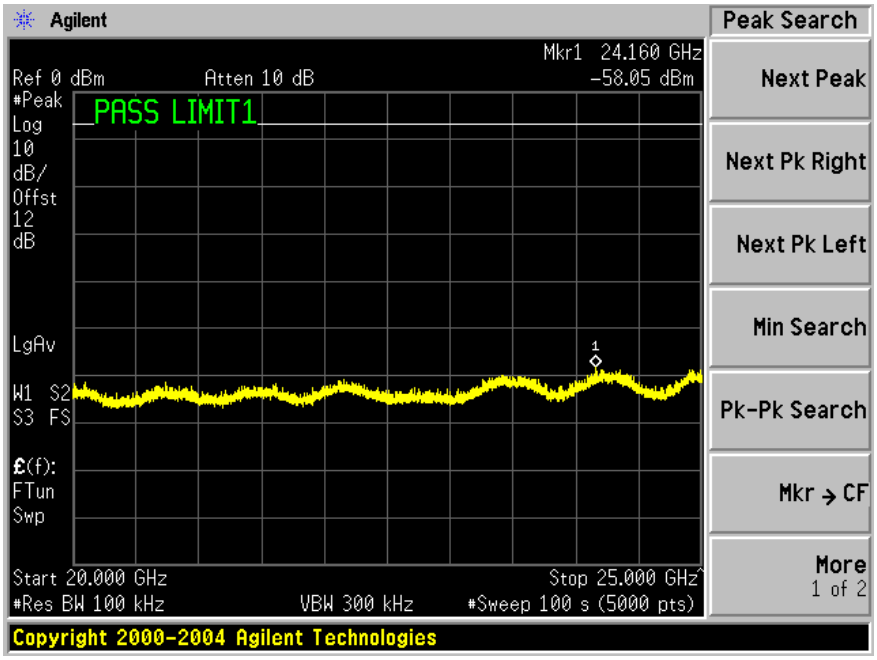

Agilent
Peak Search
Mkr1 476 MHz
Ref 0 dBm
Atten 10 dB
-46.13 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30 MHz
Stop 2.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 2.016 GHz
Ref 20 dBm
Atten 20 dB
-29.47 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 2.000 GHz
Stop 5.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies

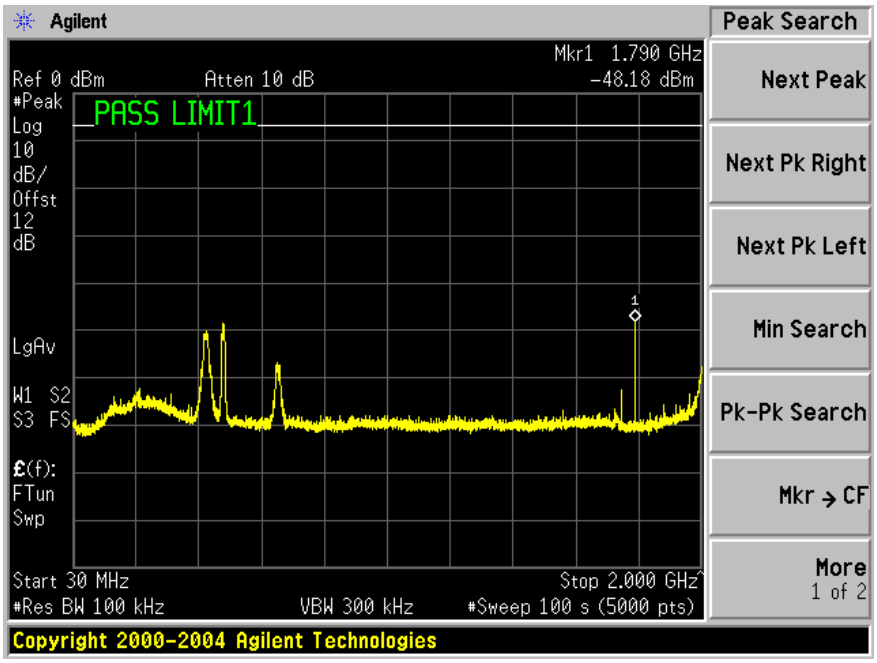

Agilent
Peak Search
Mkr1 9.750 GHz
Ref 0 dBm
Atten 10 dB
-45.06 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies

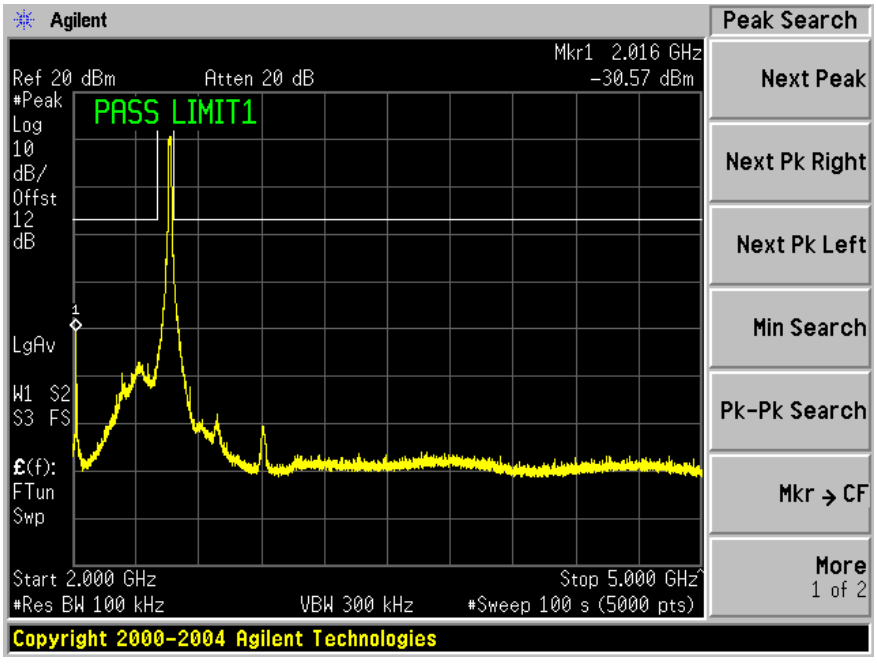

Agilent
Peak Search
Mkr1 12.189 GHz
Ref 0 dBm
Atten 10 dB
-52.87 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 10.000 GHz
Stop 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies

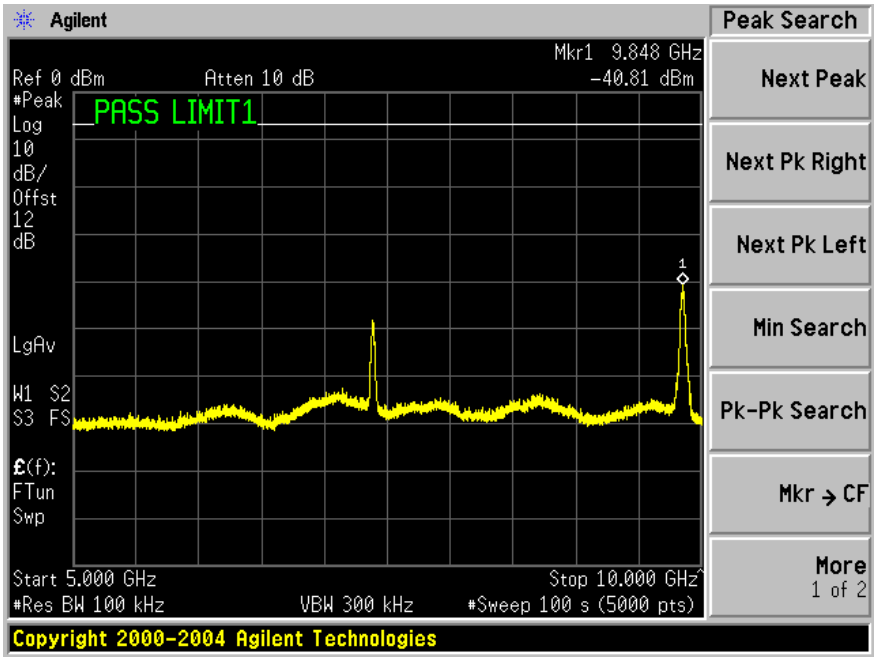

Agilent
Freq/Channel
Mkr1 17.402 GHz
Ref 0 dBm
Atten 10 dB
-60.04 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 15.000 GHz
Stop 20.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Center Freq
17.5000000 GHz
Start Freq
15.0000000 GHz
Stop Freq
20.0000000 GHz
CF Step
500.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2004 Agilent Technologies

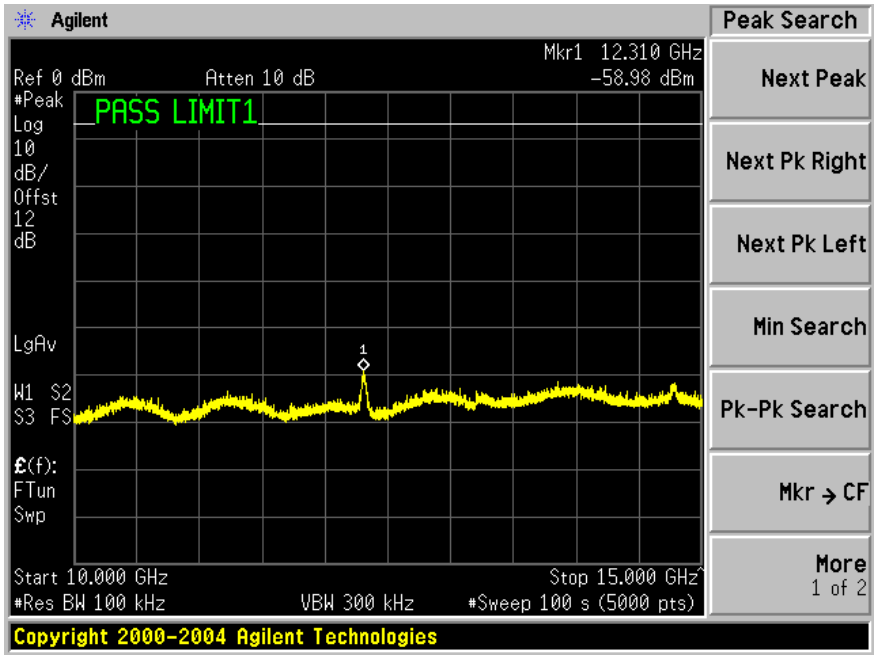

Agilent
Peak Search
Mkr1 24.160 GHz
Ref 0 dBm
Atten 10 dB
-58.05 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Start 20.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2004 Agilent Technologies

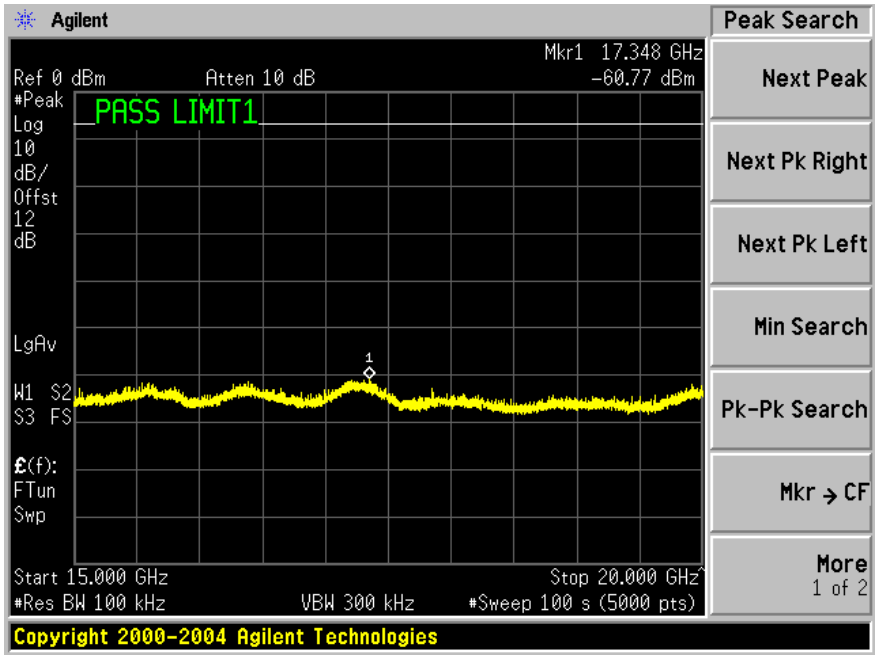
High Channel

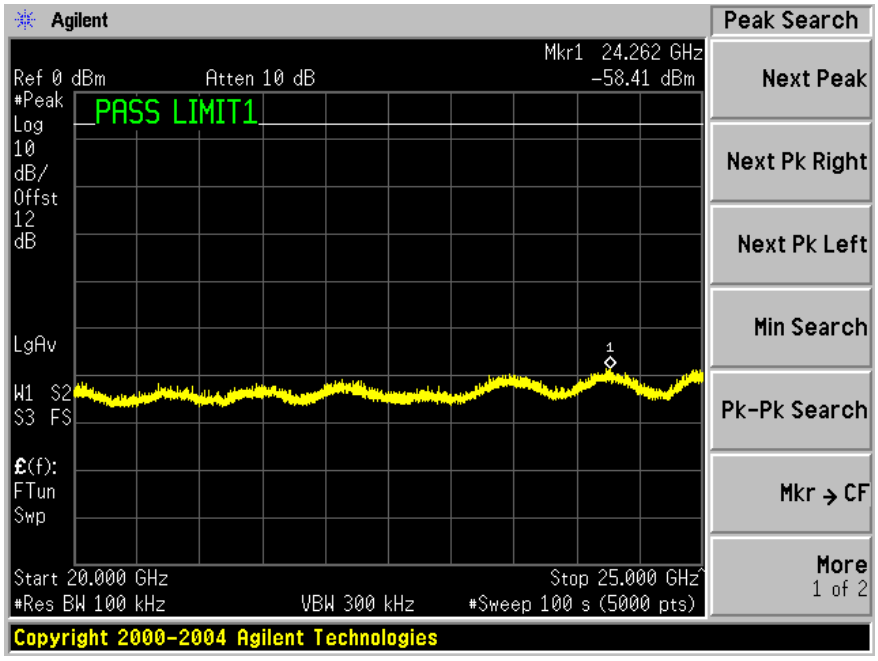





Agilent
Peak Search
Mkr1 9.848 GHz
Ref 0 dBm
Atten 10 dB
-40.81 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 12.310 GHz
Ref 0 dBm
Atten 10 dB
-58.98 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 10.000 GHz
Stop 15.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 17.348 GHz
Ref 0 dBm
Atten 10 dB
-60.77 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 15.000 GHz
Stop 20.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 24.262 GHz
Ref 0 dBm
Atten 10 dB
-58.41 dBm
#Peak
Log
10
dB/
Offst
12
dB
PASS LIMIT1
LgAv
W1 S2
S3 FS
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 20.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
VBW 300 kHz
#Sweep 100 s (5000 pts)
Copyright 2000-2004 Agilent Technologies

§15.205 & §15.209 & §15.247(c) - 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)	(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 using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 limits.

The spacing between the peripherals was 10 centimeters.

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

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the frequency was investigated from 30 to 25000 MHz.

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

For Average measurement: RBW = 1MHz, VBW = 10Hz (above 1000MHz)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Pre (.1 ~1300MHz)	8447D	2944A10198	08/17/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2005
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	04/20/2005
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	03/14/2005
Sunol Science	30MHz – 2 GHz Antenna	JB1	A03105-3	02/11/2005

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

Test Procedure

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

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

All data was recorded in the peak detection mode. Quasi-peak readings 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.

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.
The equation for margin calculation is as follows:

Margin = Corr. Ampl. - FCC 15.247 Limit

Environmental Conditions

Temperature:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2006-01-24.*

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, and had the worst margin of:

802.11b:

-10.0 dB at **9648.00 MHz** in the **Vertical** polarization, Low Channel

-8.7 dB at **9748.00 MHz** in the **Vertical** polarization, Middle Channel

-9.1 dB at **9848.00 MHz** in the **Vertical** polarization, High Channel

-10.4 dB at **840.00 MHz** in the **Horizontal** polarization, Unintentional Emission

802.11g:

-12.1 dB at **9648.00 MHz** in the **Vertical** polarization, Low Channel

-11.7 dB at **9748.00 MHz** in the **Vertical** polarization, Middle Channel

-12.7 dB at **9848.00 MHz** in the **Vertical** polarization, High Channel

-10.4 dB at **840.00 MHz** in the **Horizontal** polarization, Unintentional Emission

Radiated Emission Test Result @ 3 meter

802.11b:

Note: test was conducted at data rate which has highest output power

For Low Channel 2412MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance factor dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Condition Mode/Distance
2412.0000	101.2	90	1.0	v	28.7	2.0	35.8	10.0	86.0			Fund/Peak	CW / 1
2412.0000	114.8	0	1.2	h	28.7	2.0	35.8	10.0	99.7			Fund/Peak	CW / 1
2412.0000	92.9	180	1.2	v	28.7	2.0	35.8	10.0	77.8			Ave	CW / 1
2412.0000	106.7	0	1.2	h	28.7	2.0	35.8	10.0	91.5			Ave	CW / 1
9648.0000	34.6	180	2.0	v	38.1	5.5	34.2	0.0	44.0	54	-10.0	Ave	CW / 3
9648.0000	33.0	90	2.0	h	38.1	5.5	34.2	0.0	42.4	54	-11.6	Ave	CW / 3
7236.0000	34.0	180	2.0	v	36.7	4.3	34.7	0.0	40.3	54	-13.7	Ave	CW / 3
7236.0000	33.6	90	2.0	h	36.7	4.3	34.7	0.0	39.9	54	-14.1	Ave	CW / 3
9648.0000	46.6	90	2.0	v	38.1	5.5	34.2	0.0	56.0	74	-18.0	Peak	CW / 3
9648.0000	46.4	180	2.0	h	38.1	5.5	34.2	0.0	55.8	74	-18.2	Peak	CW / 3
7236.0000	48.0	90	2.0	v	36.7	4.3	34.7	0.0	54.3	74	-19.7	Peak	CW / 3
7236.0000	47.5	180	2.0	h	36.7	4.3	34.7	0.0	53.8	74	-20.2	Peak	CW / 3
4824.0000	31.4	180	2.3	h	32.5	3.1	34.8	0.0	32.2	54	-21.8	Ave	CW / 3
4824.0000	30.6	270	2.4	v	32.5	3.1	34.8	0.0	31.4	54	-22.6	Ave	CW / 3
4824.0000	46.4	180	2.3	h	32.5	3.1	34.8	0.0	47.2	74	-26.8	Peak	CW / 3
4824.0000	44.7	270	2.4	v	32.5	3.1	34.8	0.0	45.5	74	-28.5	Peak	CW / 3

For Mid Channel 2437MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance factor dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Condition Mode/Distance
2437.0000	111.1	180	1.3	v	28.7	2.0	35.8	10.0	95.9			Fund/Peak	CW / 1
2437.0000	122.7	180	1.2	h	28.7	2.0	35.8	10.0	107.5			Fund/Peak	CW / 1
2437.0000	100.0	180	1.3	v	28.7	2.0	35.8	10.0	84.8			Ave	CW / 1
2437.0000	113.0	180	1.2	h	28.7	2.0	35.8	10.0	97.8			Ave	CW / 1
9748.0000	35.9	180	2.0	v	38.1	5.5	34.2	0.0	45.3	54	-8.7	Ave	CW / 3
9748.0000	34.3	90	2.0	h	38.1	5.5	34.2	0.0	43.7	54	-10.3	Ave	CW / 3
7311.0000	35.3	270	2.4	v	36.7	4.3	34.7	0.0	41.6	54	-12.4	Ave	CW / 3
7311.0000	34.9	180	2.1	h	36.7	4.3	34.7	0.0	41.2	54	-12.8	Ave	CW / 3
9748.0000	47.7	90	2.0	v	38.1	5.5	34.2	0.0	57.1	74	-16.9	Peak	CW / 3
9748.0000	47.5	180	2.0	h	38.1	5.5	34.2	0.0	56.9	74	-17.1	Peak	CW / 3
7311.0000	49.0	270	2.4	v	36.7	4.3	34.7	0.0	55.3	74	-18.7	Peak	CW / 3
7311.0000	48.6	180	2.3	h	36.7	4.3	34.7	0.0	54.9	74	-19.1	Peak	CW / 3
4874.0000	32.8	180	2.2	h	32.5	3.1	34.8	0.0	33.6	54	-20.4	Ave	CW / 3
4874.0000	32.0	270	2.4	v	32.5	3.1	34.8	0.0	32.8	54	-21.2	Ave	CW / 3
4874.0000	47.5	180	2.2	h	32.5	3.1	34.8	0.0	48.3	74	-25.7	Peak	CW / 3
4874.0000	44.5	270	2.4	v	32.5	3.1	34.8	0.0	45.3	74	-28.7	Peak	CW / 3

For High Channel 2462MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance factor dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Condition Mode/Distance
2462.0000	114.8	180	1.3	v	28.7	2.0	35.8	10.0	99.7			Fund/Peak	CW / 1
2462.0000	123.1	180	1.2	h	28.7	2.0	35.8	10.0	107.9			Fund/Peak	CW / 1
2462.0000	106.2	180	1.3	v	28.7	2.0	35.8	10.0	91.0			Ave	CW / 1
2462.0000	114.4	180	1.2	h	28.7	2.0	35.8	10.0	99.2			Ave	CW / 1
9848.0000	35.5	180	2.0	v	38.1	5.5	34.2	0.0	44.9	54	-9.1	Ave	CW / 3
9848.0000	34.0	90	2.0	h	38.1	5.5	34.2	0.0	43.4	54	-10.6	Ave	CW / 3
7386.0000	34.9	270	2.4	v	36.7	4.3	34.7	0.0	41.2	54	-12.8	Ave	CW / 3
7386.0000	34.2	90	2.1	h	36.7	4.3	34.7	0.0	40.5	54	-13.5	Ave	CW / 3
9848.0000	47.2	90	2.0	v	38.1	5.5	34.2	0.0	56.6	74	-17.4	Peak	CW / 3
9848.0000	47.0	180	2.0	h	38.1	5.5	34.2	0.0	56.4	74	-17.6	Peak	CW / 3
7386.0000	48.5	270	2.4	v	36.7	4.3	34.7	0.0	54.8	74	-19.2	Peak	CW / 3
7386.0000	48.1	90	2.1	h	36.7	4.3	34.7	0.0	54.4	74	-19.6	Peak	CW / 3
4924.0000	32.5	90	2.1	h	32.5	3.1	34.8	0.0	33.3	54	-20.7	Ave	CW / 3
4924.0000	31.7	270	2.4	v	32.5	3.1	34.8	0.0	32.5	54	-21.5	Ave	CW / 3
4924.0000	47.0	90	2.1	h	32.5	3.1	34.8	0.0	47.8	74	-26.2	Peak	CW / 3
4924.0000	44.1	270	2.4	v	32.5	3.1	34.8	0.0	44.9	74	-29.1	Peak	CW / 3

Unintentional Emission @ 3 Meter

30MHz – 1GHz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Distance factor	Correction Factor	15B	15B	Comments
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dB	dBuV/m	Limit	Margin	
840.00	46.2	270	2.1	H	20.9	6.4	27.9	10.0	35.6	46	-10.4	Peak
1000.00	48.1	280	2.8	H	22.8	7.1	26.9	10.0	41.1	54	-12.9	Peak
840.00	43.3	330	1.2	V	20.9	6.4	27.9	10.0	32.7	46	-13.3	Peak
367.70	50.0	270	3.2	H	14.8	4.1	27.8	10.0	31.1	46	-14.9	Peak
367.70	46.5	75	1.8	V	14.8	4.1	27.8	10.0	27.6	46	-18.4	Peak
1000.00	41.5	250	1.0	V	22.8	7.1	26.9	10.0	34.5	54	-19.5	Peak

* Test distance = 1 meter
AVG = average

802.11g

Note: test was conducted at data rate which has highest output power

For Low Channel 2412MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance factor dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Codition Mode/Distance
2412.0000	104.9	90	1.0	v	28.7	2.0	35.8	10.0	89.7			Fund/Peak	CW / 1
2412.0000	113.9	0	1.2	h	28.7	2.0	35.8	10.0	98.8			Fund/Peak	CW / 1
2412.0000	92.5	180	1.2	v	28.7	2.0	35.8	10.0	77.4			Ave	CW / 1
2412.0000	103.3	0	1.2	h	28.7	2.0	35.8	10.0	88.1			Ave	CW / 1
9648.0000	32.5	180	2.0	v	38.1	5.5	34.2	0.0	41.9	54	-12.1	Ave	CW / 3
4824.0000	41.0	180	2.3	h	32.5	3.1	34.8	0.0	41.8	54	-12.2	Ave	CW / 3
9648.0000	32.4	90	2.0	h	38.1	5.5	34.2	0.0	41.8	54	-12.2	Ave	CW / 3
7236.0000	33.9	180	2.0	v	36.7	4.3	34.7	0.0	40.2	54	-13.8	Ave	CW / 3
7236.0000	33.7	90	2.0	h	36.7	4.3	34.7	0.0	40.0	54	-14.0	Ave	CW / 3
4824.0000	58.5	180	2.3	h	32.5	3.1	34.8	0.0	59.3	74	-14.7	Peak	CW / 3
9648.0000	46.8	180	2.0	h	38.1	5.5	34.2	0.0	56.2	74	-17.8	Peak	CW / 3
9648.0000	46.2	90	2.0	v	38.1	5.5	34.2	0.0	55.6	74	-18.4	Peak	CW / 3
7236.0000	48.1	90	2.0	v	36.7	4.3	34.7	0.0	54.4	74	-19.6	Peak	CW / 3
7236.0000	46.7	180	2.0	h	36.7	4.3	34.7	0.0	53.0	74	-21.0	Peak	CW / 3
4824.0000	31.6	270	2.4	v	32.5	3.1	34.8	0.0	32.4	54	-21.6	Ave	CW / 3
4824.0000	47.1	270	2.4	v	32.5	3.1	34.8	0.0	47.9	74	-26.1	Peak	CW / 3

For Mid Channel 2437MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance factor dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Codition Mode/Distance
2437.0000	109.5	270	1.5	v	28.7	2.0	35.8	10.0	94.4			Fund/Peak	CW / 1
2437.0000	121.8	270	1.3	h	28.7	2.0	35.8	10.0	106.6			Fund/Peak	CW / 1
2437.0000	99.5	270	1.5	v	28.7	2.0	35.8	10.0	84.3			Ave	CW / 1
2437.0000	113.4	270	1.3	h	28.7	2.0	35.8	10.0	98.2			Ave	CW / 1
9748.0000	32.9	180	2.0	v	38.1	5.5	34.2	0.0	42.3	54	-11.7	Ave	CW / 3
9748.0000	32.8	90	2.0	h	38.1	5.5	34.2	0.0	42.2	54	-11.8	Ave	CW / 3
4874.0000	41.2	180	2.2	h	32.5	3.1	34.8	0.0	42.0	54	-12.0	Ave	CW / 3
7311.0000	34.2	270	2.4	v	36.7	4.3	34.7	0.0	40.5	54	-13.5	Ave	CW / 3
7311.0000	34.0	180	2.1	h	36.7	4.3	34.7	0.0	40.3	54	-13.7	Ave	CW / 3
4874.0000	58.3	180	2.2	h	32.5	3.1	34.8	0.0	59.1	74	-14.9	Peak	CW / 3
9748.0000	46.9	180	2.0	h	38.1	5.5	34.2	0.0	56.3	74	-17.7	Peak	CW / 3
9748.0000	46.3	90	2.0	v	38.1	5.5	34.2	0.0	55.7	74	-18.3	Peak	CW / 3
7311.0000	48.1	270	2.4	v	36.7	4.3	34.7	0.0	54.4	74	-19.6	Peak	CW / 3
7311.0000	46.8	180	2.3	h	36.7	4.3	34.7	0.0	53.1	74	-20.9	Peak	CW / 3
4874.0000	31.9	270	2.4	v	32.5	3.1	34.8	0.0	32.7	54	-21.3	Ave	CW / 3
4874.0000	47.2	270	2.4	v	32.5	3.1	34.8	0.0	48.0	74	-26.0	Peak	CW / 3

For High Channel 2462MHz, 1-25GHz

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance factor dB	Correction Factor dBuV/m	15.247 Limit (dBuV/m)	15.247 Margin	Comments	Testing Codition Mode/Distance
2462.0000	111.1	270	1.5	v	28.7	2.0	35.8	10.0	95.9			Fund/Peak	CW / 1
2462.0000	119.1	270	1.3	h	28.7	2.0	35.8	10.0	103.9			Fund/Peak	CW / 1
2462.0000	99.6	270	1.5	v	28.7	2.0	35.8	10.0	84.5			Ave	CW / 1
2462.0000	108.2	270	1.3	h	28.7	2.0	35.8	10.0	93.0			Ave	CW / 1
9848.0000	31.9	270	2.4	v	38.1	5.5	34.2	0.0	41.3	54	-12.7	Ave	CW / 3
9848.0000	31.8	90	2.1	h	38.1	5.5	34.2	0.0	41.2	54	-12.8	Ave	CW / 3
4924.0000	40.0	90	2.1	h	32.5	3.1	34.8	0.0	40.8	54	-13.2	Ave	CW / 3
7386.0000	33.2	270	2.4	v	36.7	4.3	34.7	0.0	39.5	54	-14.5	Ave	CW / 3
7386.0000	33.0	90	2.1	h	36.7	4.3	34.7	0.0	39.3	54	-14.7	Ave	CW / 3
4924.0000	56.6	90	2.1	h	32.5	3.1	34.8	0.0	57.4	74	-16.6	Peak	CW / 3
9848.0000	45.5	90	2.1	h	38.1	5.5	34.2	0.0	54.9	74	-19.1	Peak	CW / 3
9848.0000	44.9	270	2.4	v	38.1	5.5	34.2	0.0	54.3	74	-19.7	Peak	CW / 3
7386.0000	46.7	270	2.4	v	36.7	4.3	34.7	0.0	53.0	74	-21.0	Peak	CW / 3
4924.0000	30.9	270	2.4	v	32.5	3.1	34.8	0.0	31.7	54	-22.3	Ave	CW / 3
7386.0000	45.4	90	2.1	h	36.7	4.3	34.7	0.0	51.7	74	-22.3	Peak	CW / 3
4924.0000	45.8	270	2.4	v	32.5	3.1	34.8	0.0	46.6	74	-27.4	Peak	CW / 3

Unintentional Emission @ 1 Meter

30MHz – 1GHz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Distance factor	Correction Factor	15B	15B	Comments
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dB	dBuV/m	Limit	Margin	Peak
840.00	46.2	270	2.1	H	20.9	6.4	27.9	10.0	35.6	46	-10.4	Peak
1000.00	48.1	280	2.8	H	22.8	7.1	26.9	10.0	41.1	54	-12.9	Peak
840.00	43.3	330	1.2	V	20.9	6.4	27.9	10.0	32.7	46	-13.3	Peak
367.70	50.0	270	3.2	H	14.8	4.1	27.8	10.0	31.1	46	-14.9	Peak
367.70	46.5	75	1.8	V	14.8	4.1	27.8	10.0	27.6	46	-18.4	Peak
1000.00	41.5	250	1.0	V	22.8	7.1	26.9	10.0	34.5	54	-19.5	Peak

§15.247(a)(2) – 6 dB BANDWIDTH

Standard Applicable

According to §15.247(a)(2), for digital modulation techniques, the minimum 6dB bandwidth shall be at least 500 kHz.

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. Repeat above procedures until all frequencies measured were complete.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2005

*** 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:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2006-01-24.*

Test Result

802.11b:

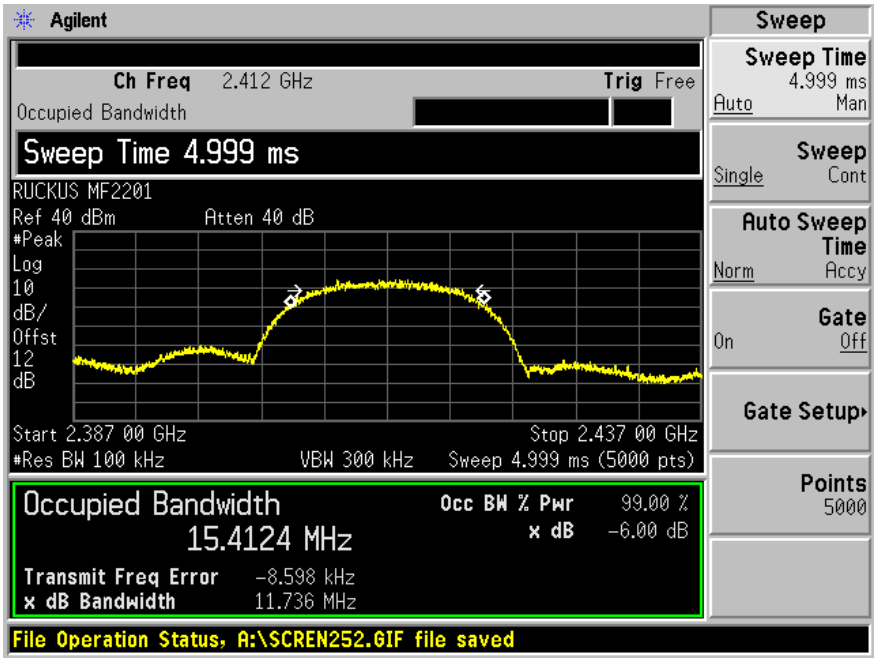
Channel	Frequency MHz	Channel Bandwidth (KHz)	Limit KHz
Low	2412	11736	>500
Mid	2437	11789	>500
High	2462	12222	>500

802.11g:

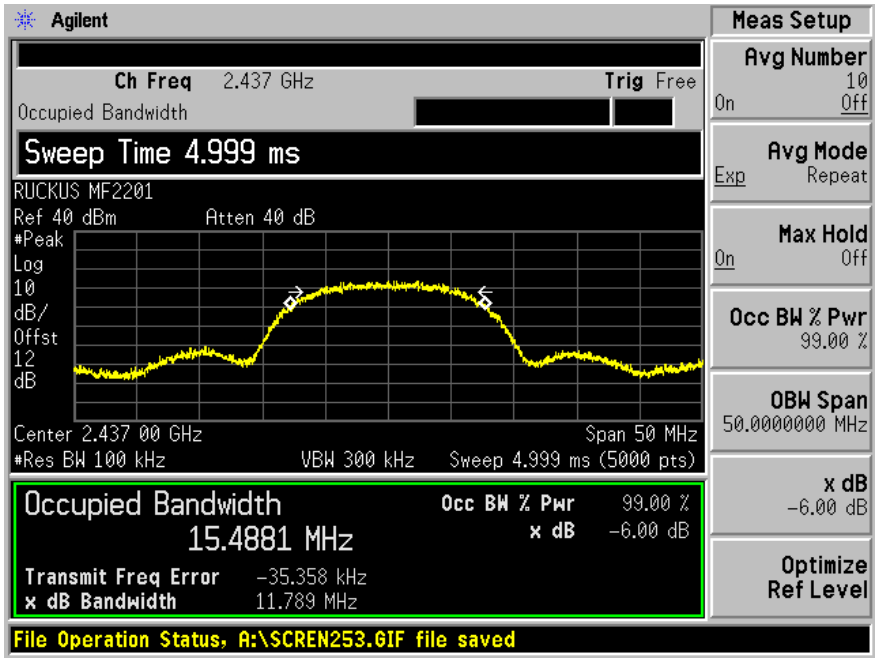
Channel	Frequency MHz	Channel Bandwidth (KHz)			Limit KHz
		54Mbps	48Mbps	36Mbps	
Low	2412	16550	16458	16508	>500
Mid	2437	16497	16527	16535	>500
High	2462	16482	16517	16464	>500

802.11b:

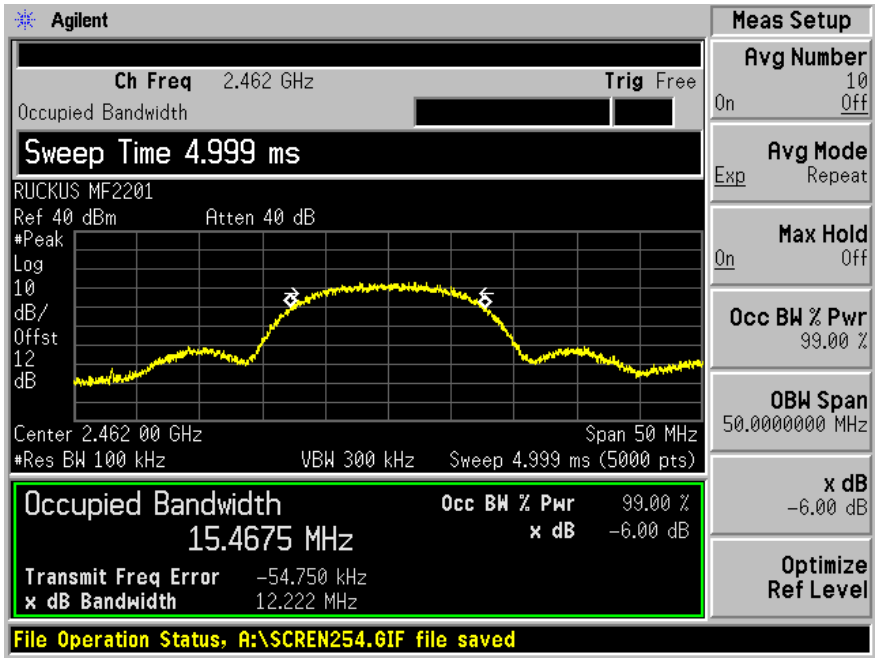
Low Channel



Mid. Channel

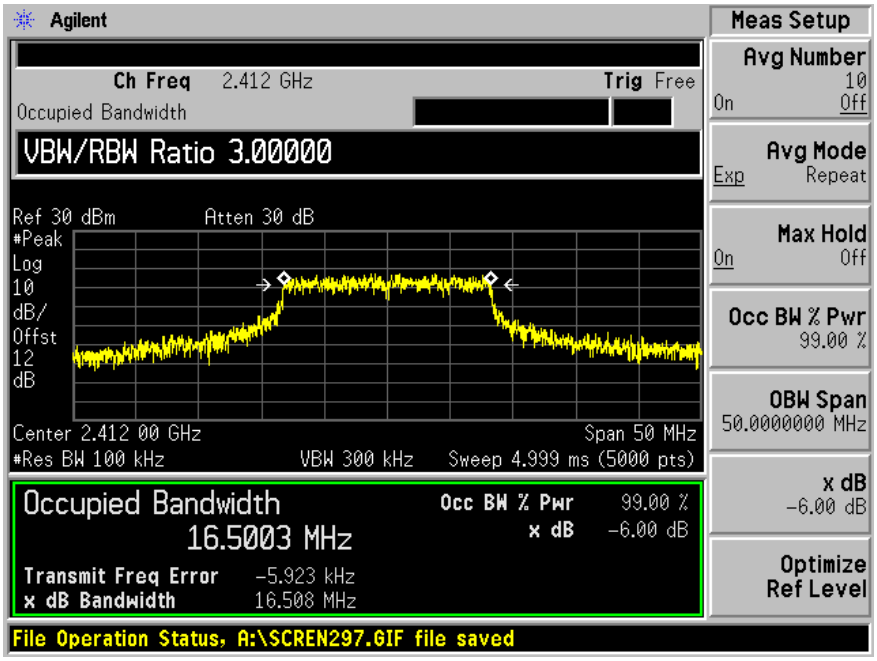


High Channel

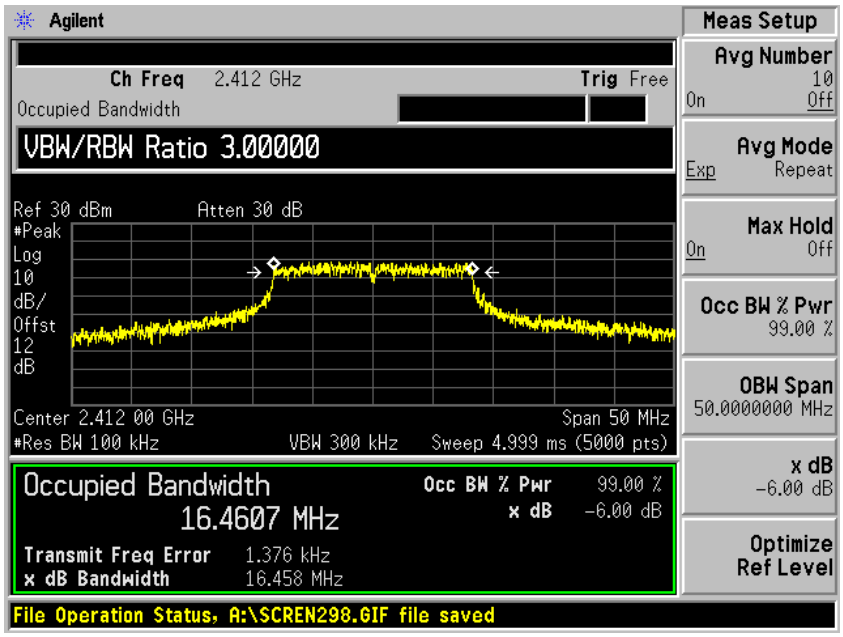


802.11g:

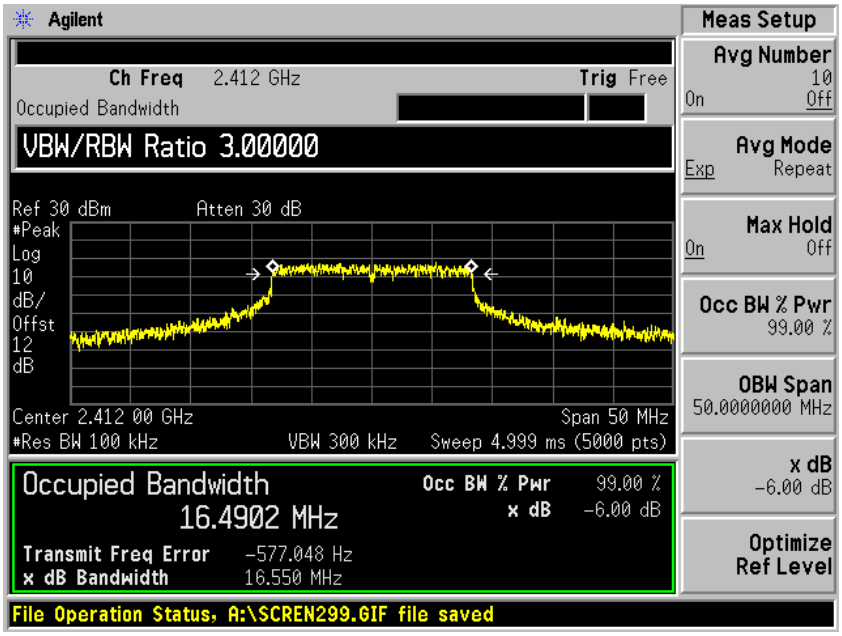
Low Channel, 36Mbps



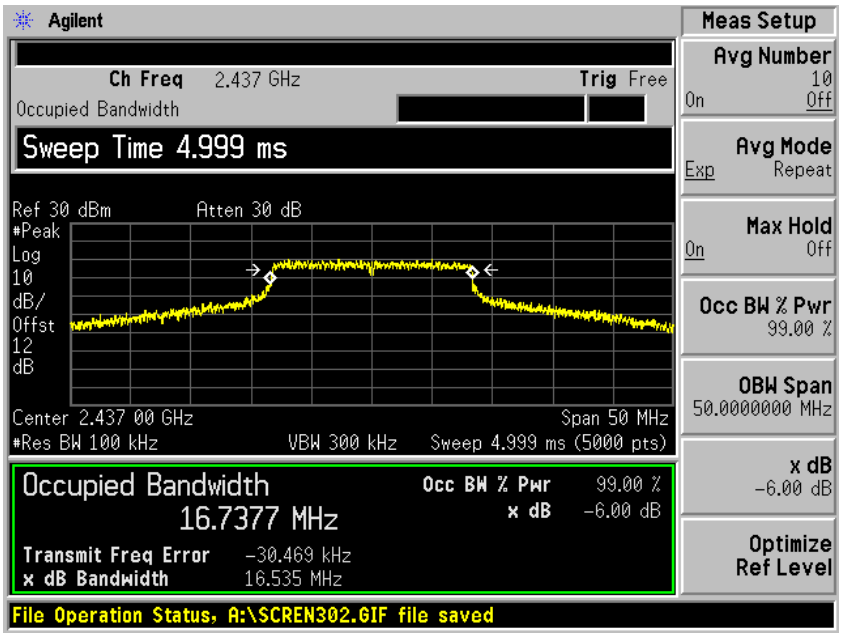
Low Channel, 48Mbps



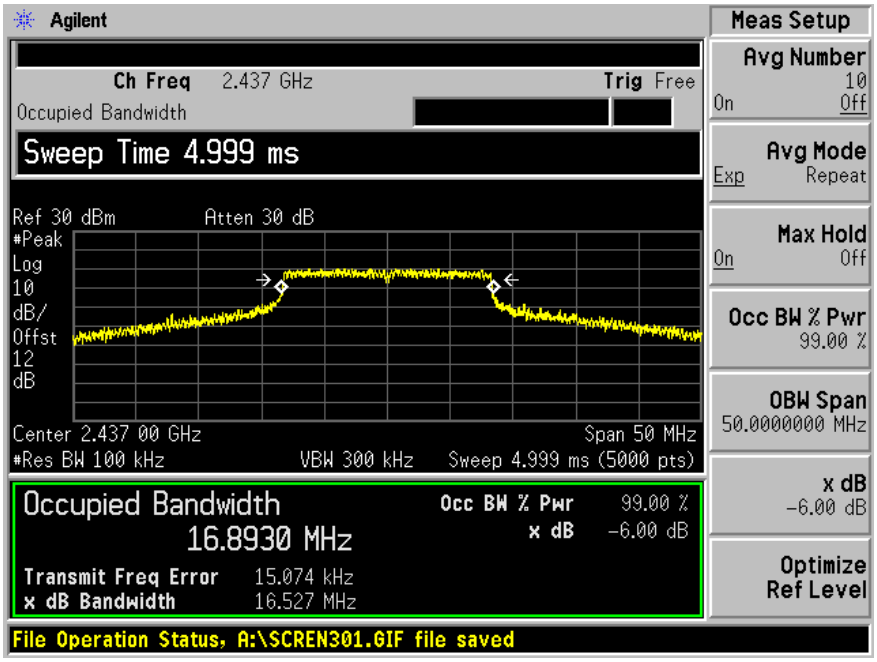
Low Channel, 54Mbps



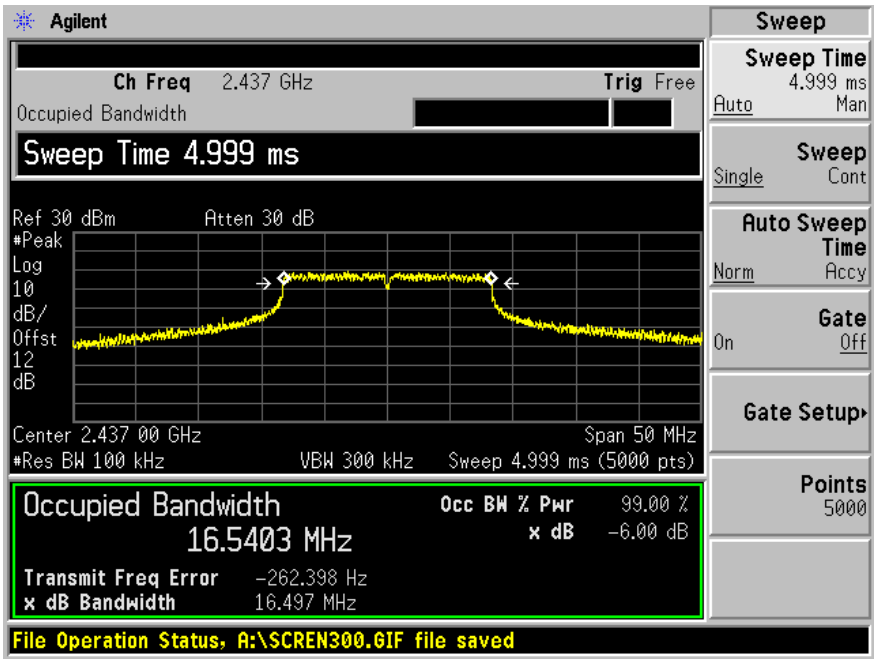
Mid. Channel, 36Mbps



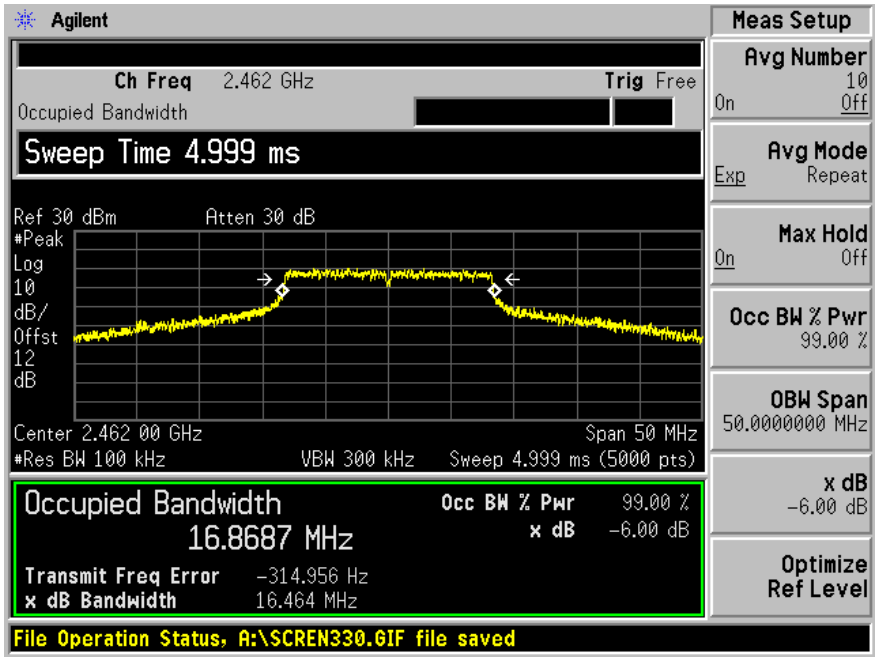
Mid. Channel, 48Mbps



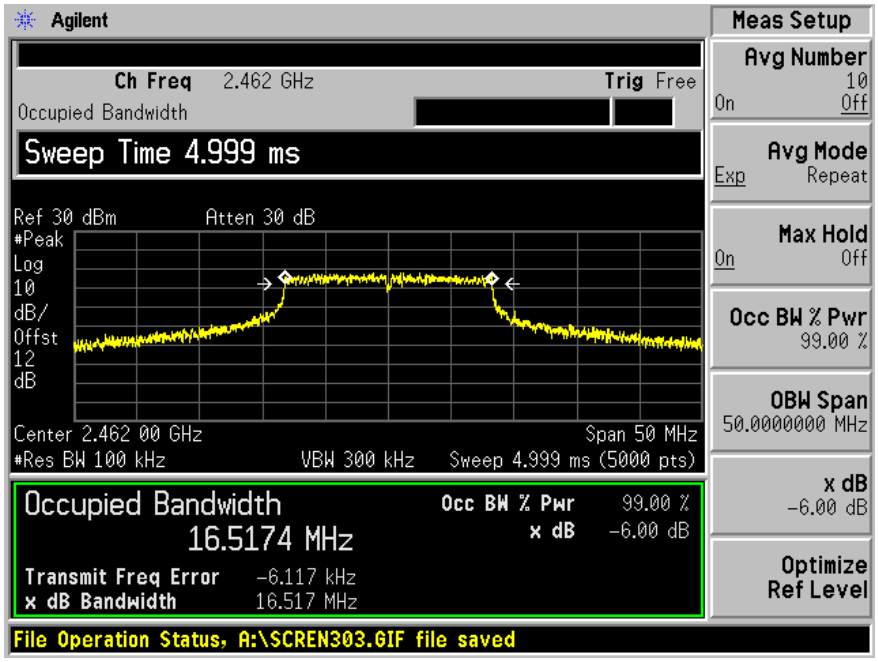
Mid. Channel, 54Mbps



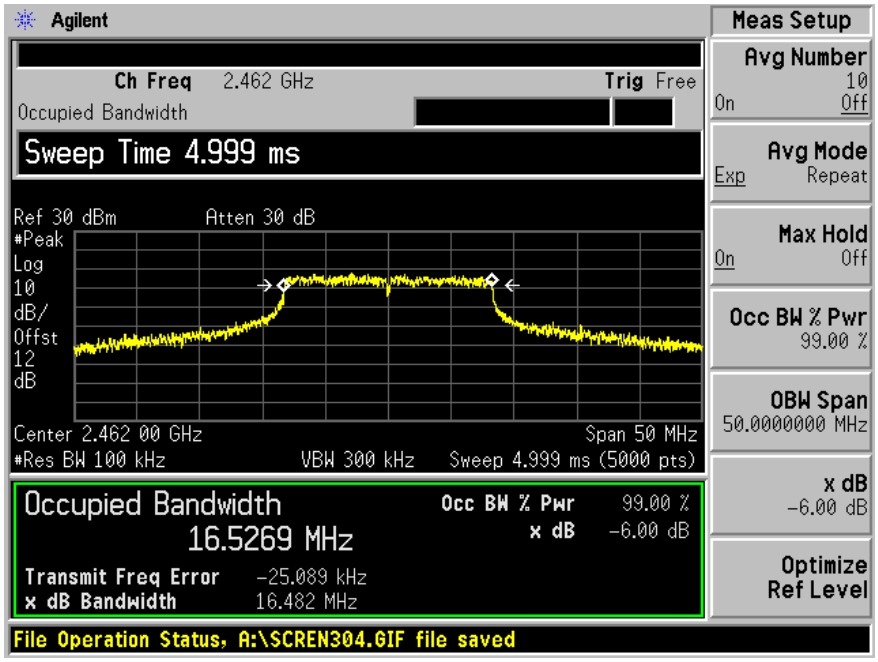
High Channel, 36Mbps



High Channel, 48Mbps



High Channel, 54Mbps



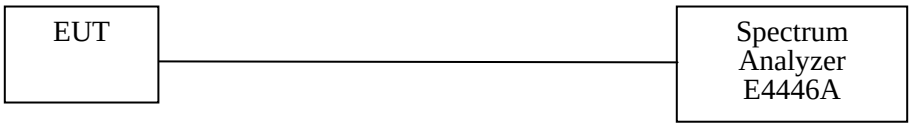
§15.247(b)(3) - PEAK OUTPUT POWER MEASUREMENT

Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz: 1 Watt

Measurement Procedure

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



Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2005

*** 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:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2006-01-24.*

RF Output Power

802.11b:

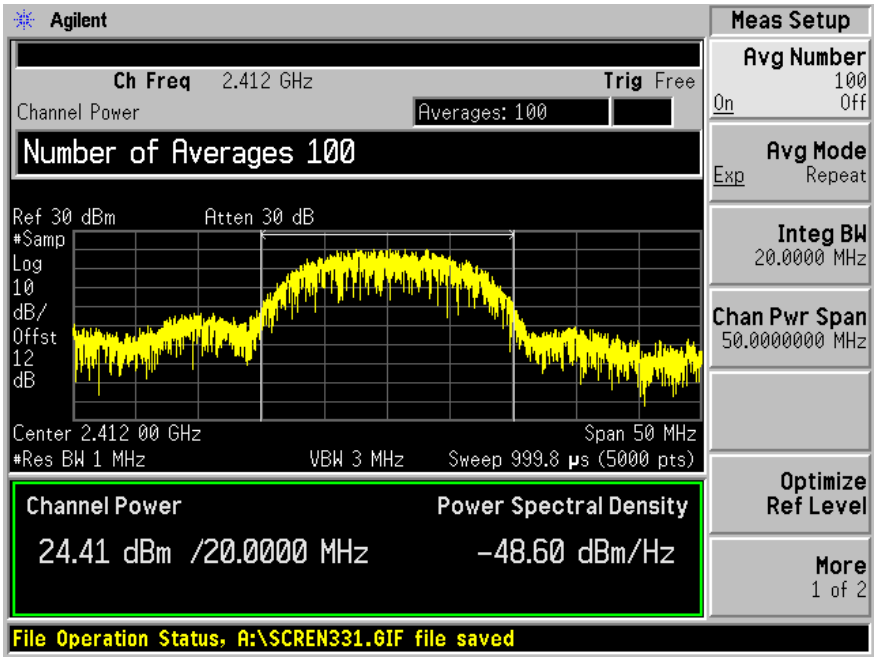
Channel	Frequency MHz	Max Peak Output Power (dBm)	(mW)	Limit (dBm)	Result
Low	2412	24.41	276.06	30	pass
Mid	2437	24.47	279.90	30	pass
High	2462	23.67	232.81	30	pass

802.11g:

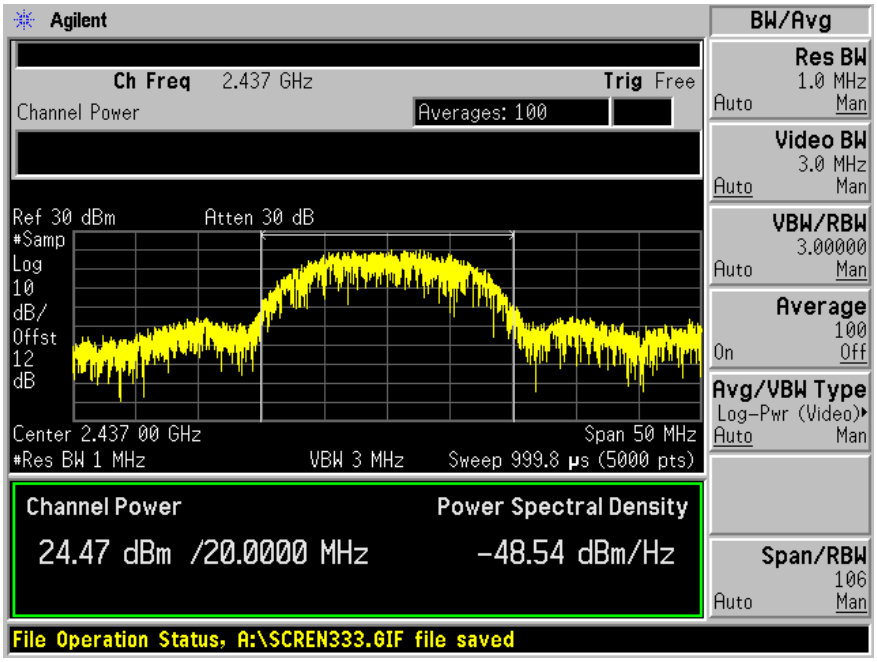
Channel	Frequency MHz	Max Peak Output Power (dBm)(54Mbps)	(dBm)(48Mbps)	(dBm)(36Mbps)	Limit (dBm)	Result
Low	2412	21.42	22.37	23.60	30	pass
Mid	2437	21.16	22.10	23.35	30	pass
High	2462	20.26	20.83	23.51	30	pass

802.11b:

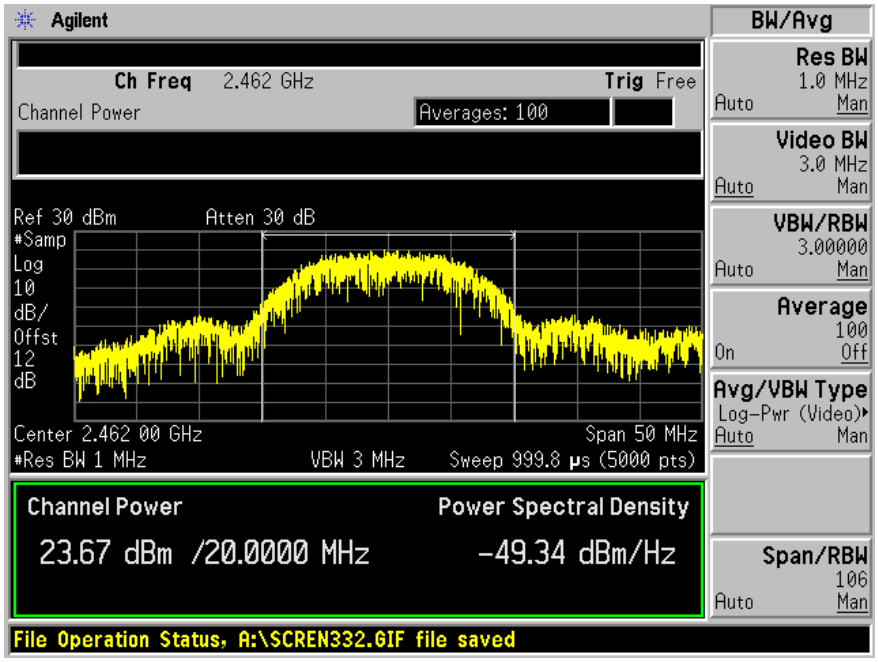
Low Channel



Mid. Channel

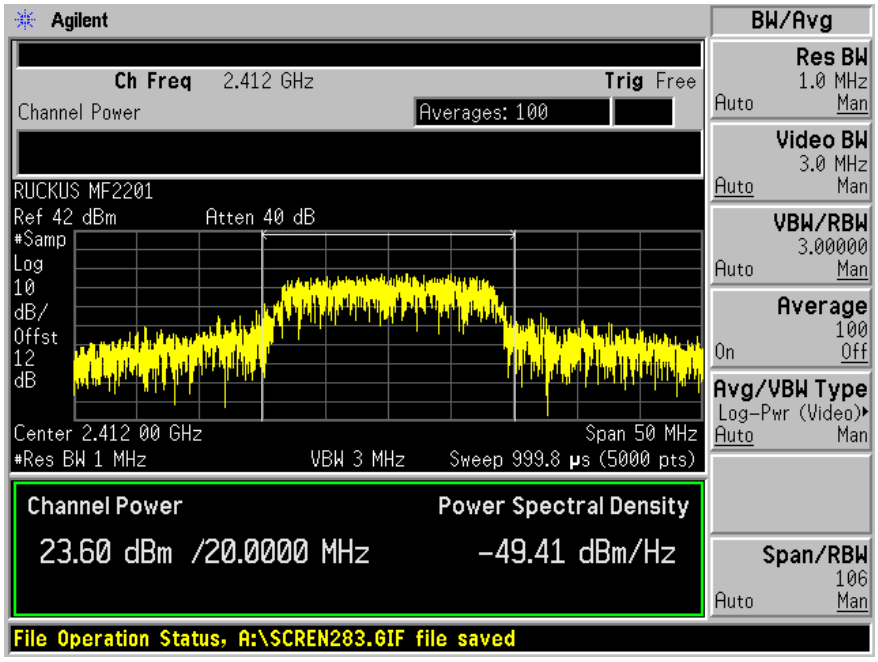


High Channel

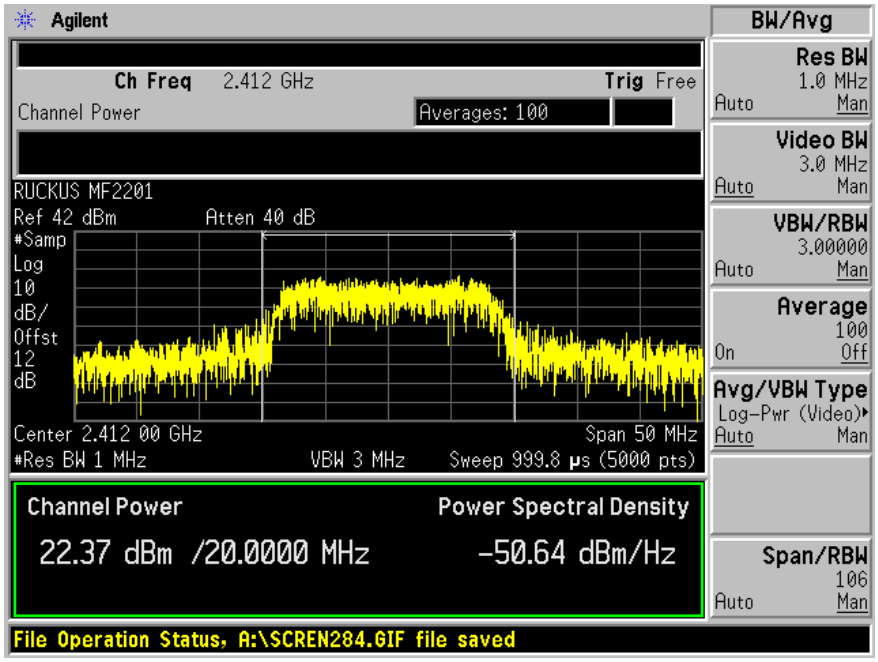


802.11g:

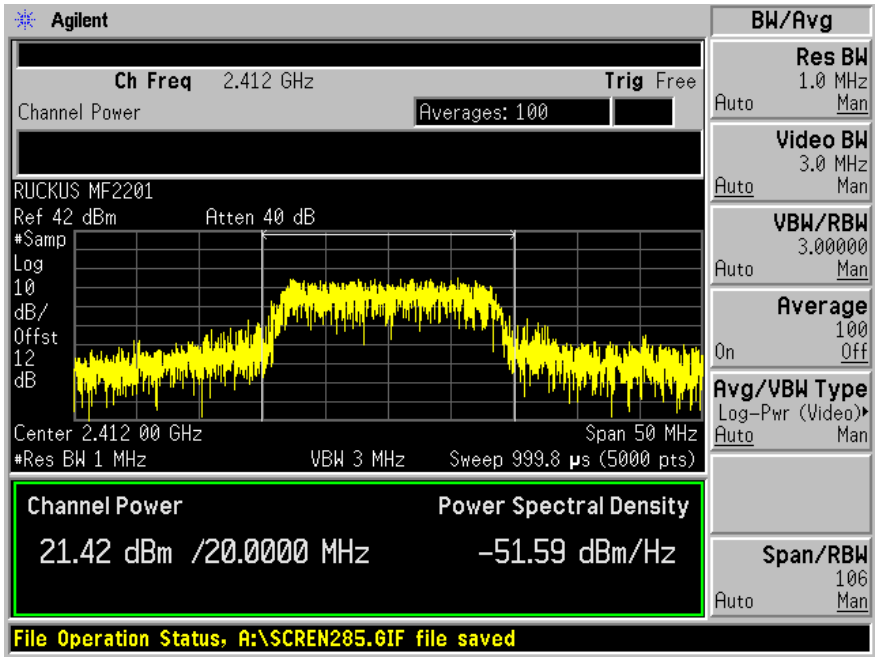
Low Channel, 36Mbps



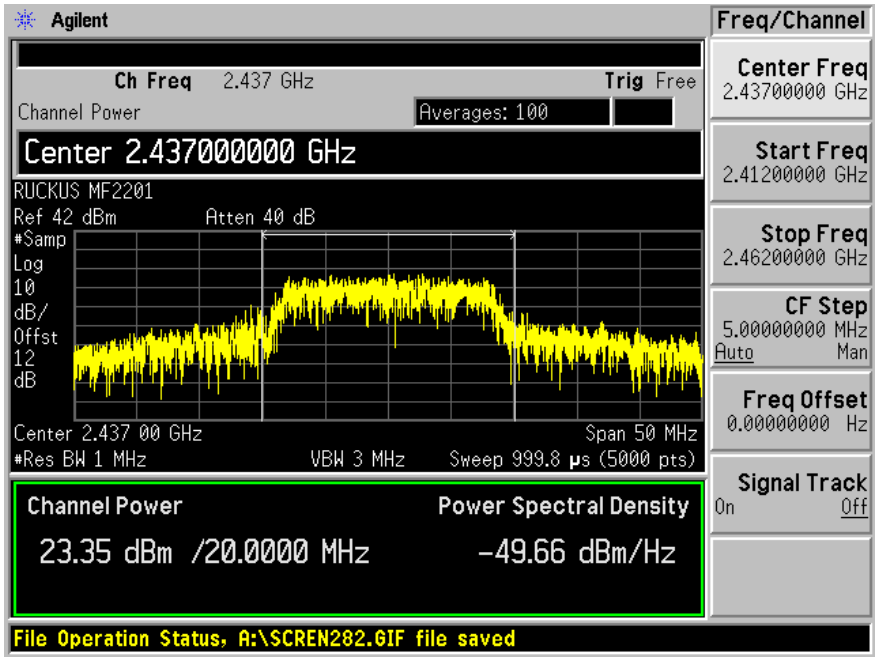
Low Channel, 48Mbps



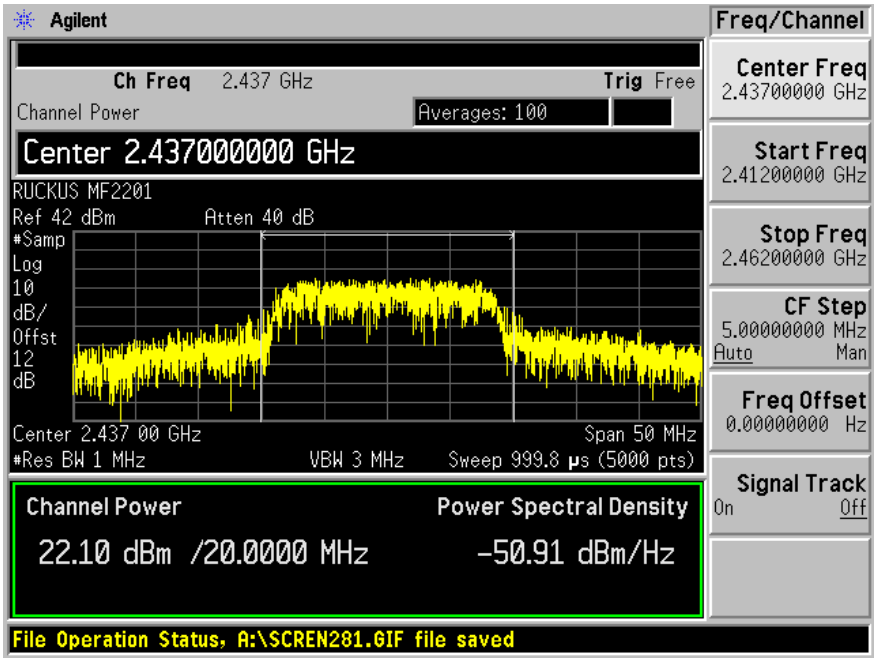
Low Channel, 54Mbps



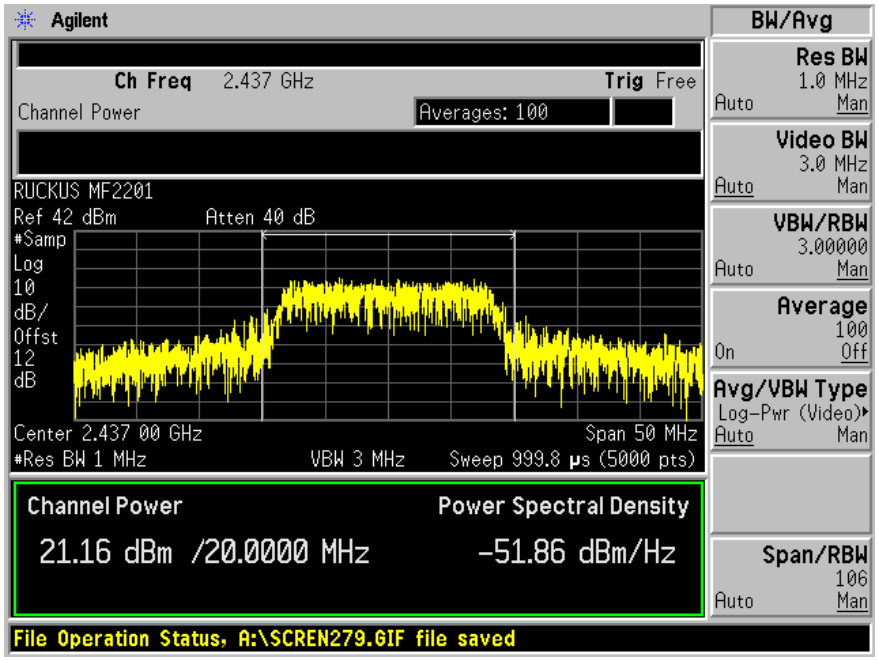
Mid. Channel, 36Mbps



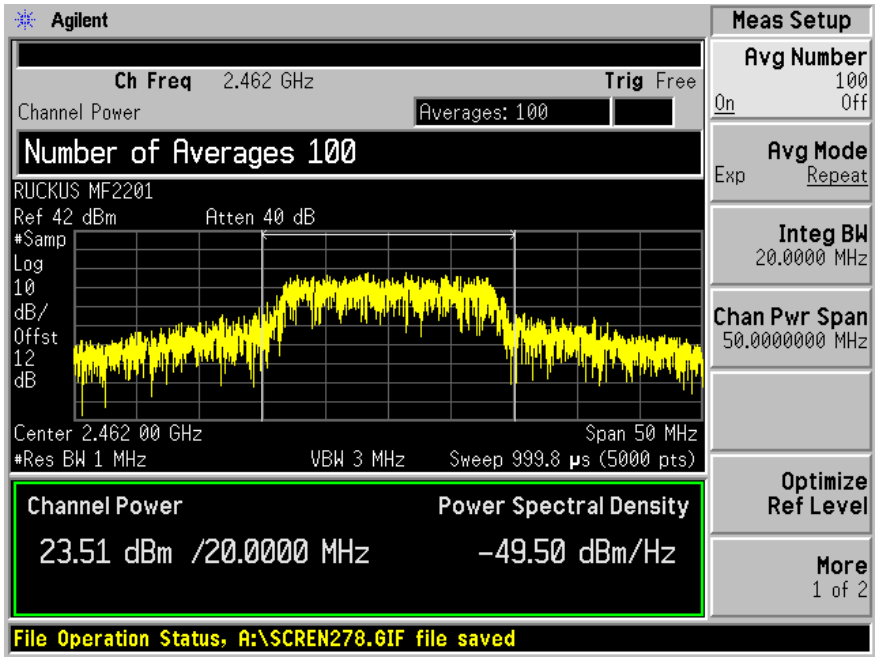
Mid. Channel, 48Mbps



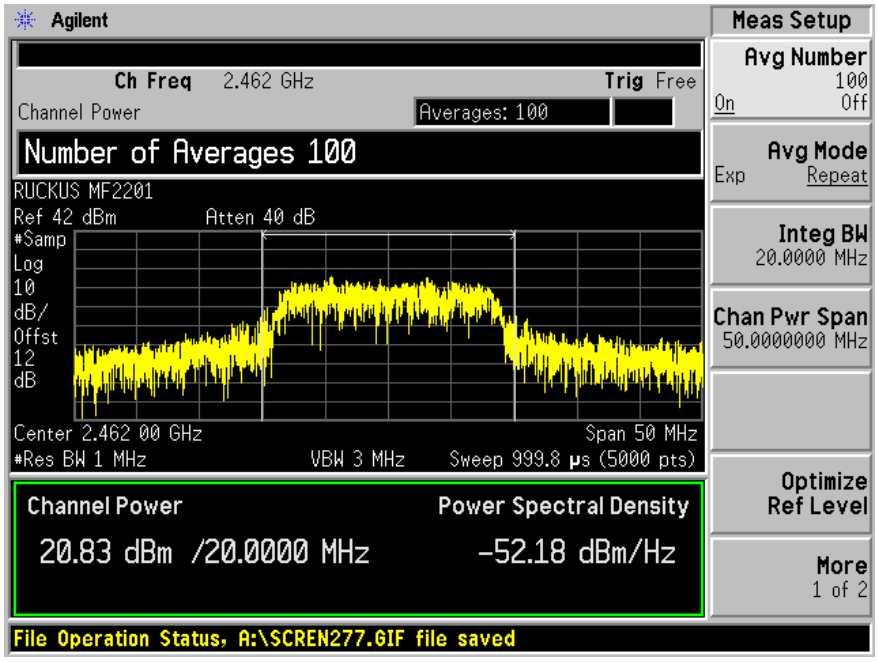
Mid. Channel, 54Mbps



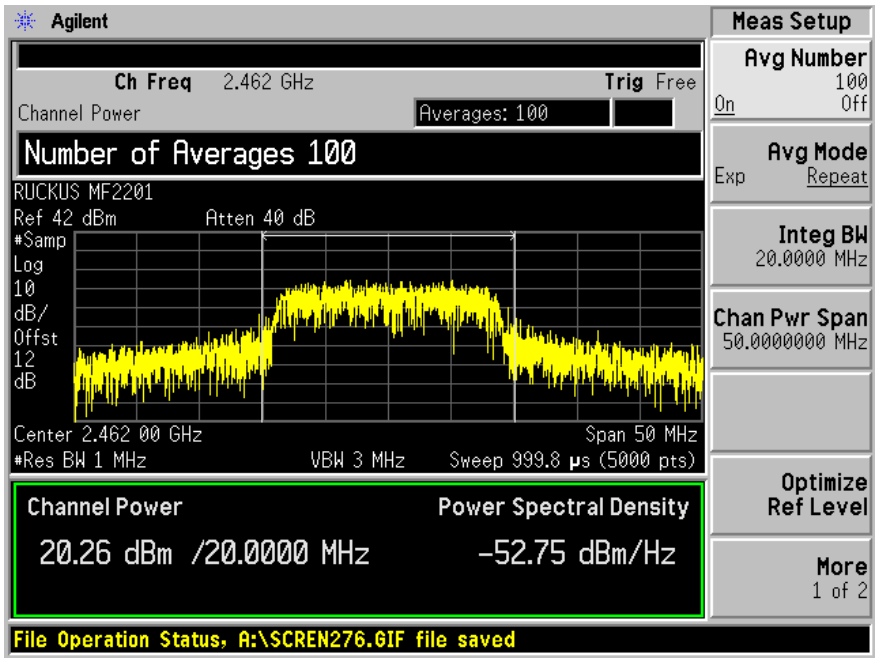
High Channel, 36Mbps



High Channel, 48Mbps



High Channel, 54Mbps



§15.247(c) - 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	Analyzer, Spectrum	E4446A	US44300386	11/10/2005

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

Measurement Result

Environmental Conditions

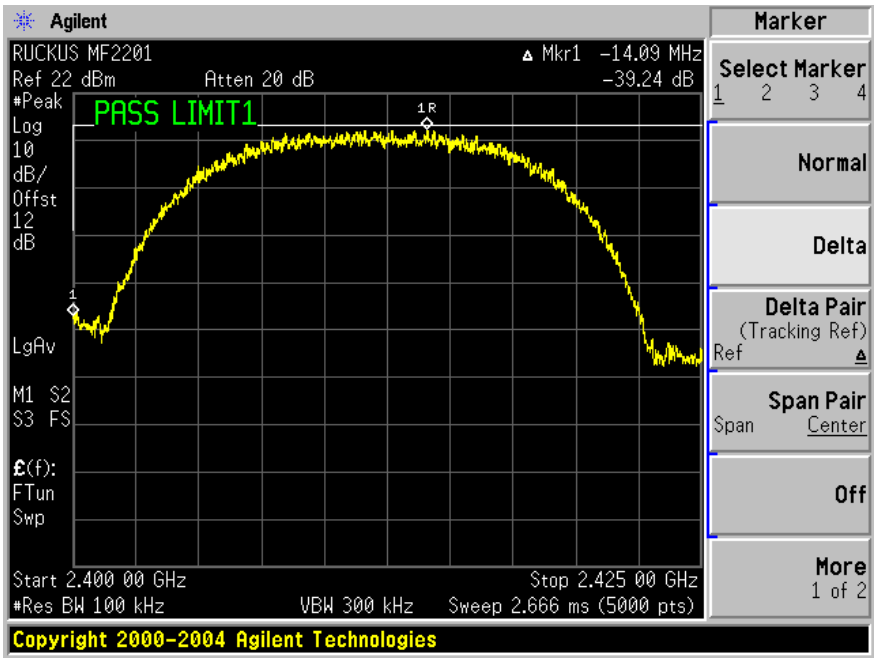
Temperature:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2006-01-24.*

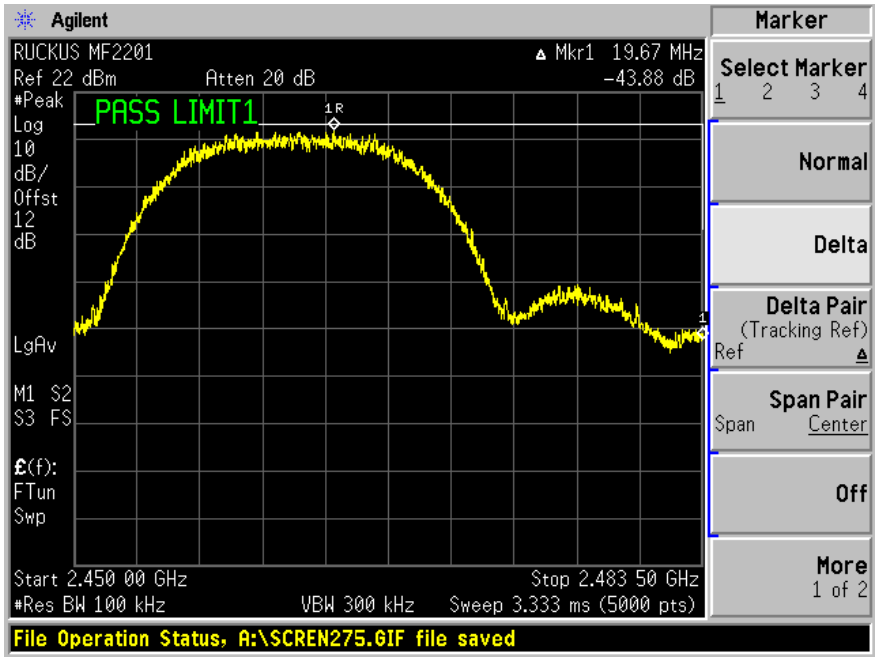
Please refer to following pages for plots of band edge.

802.11b:

Low Channel

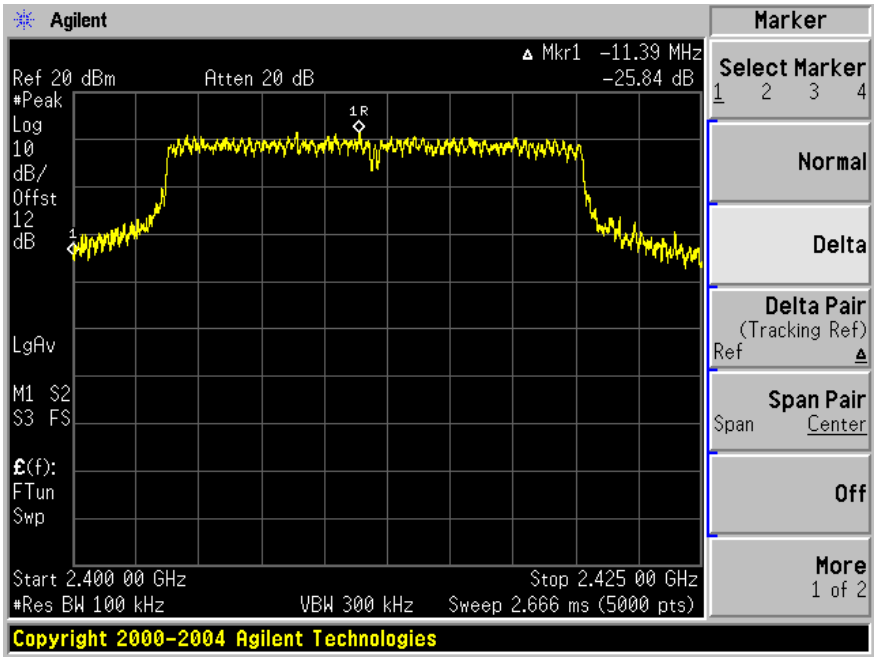


High Channel

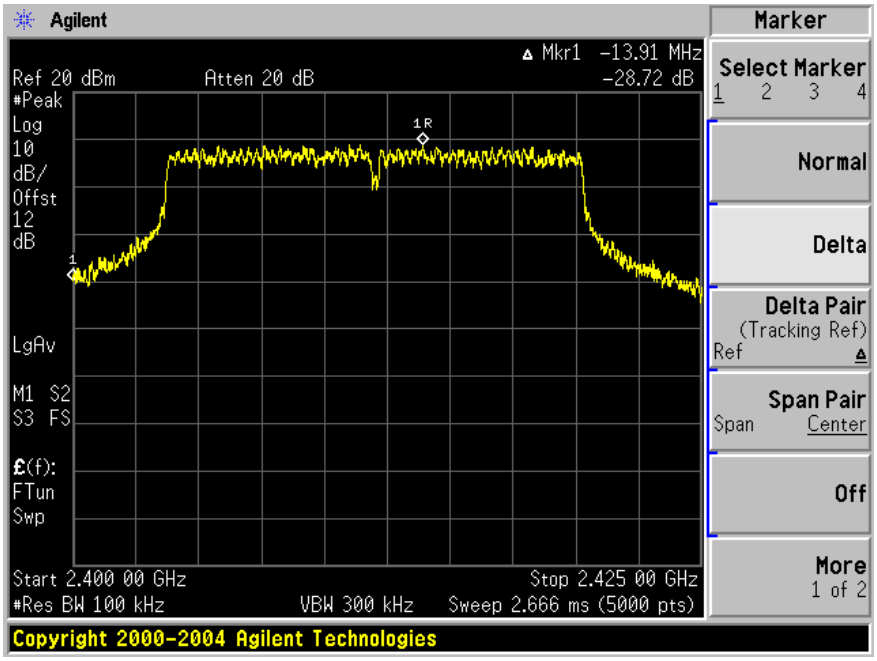


802.11g:

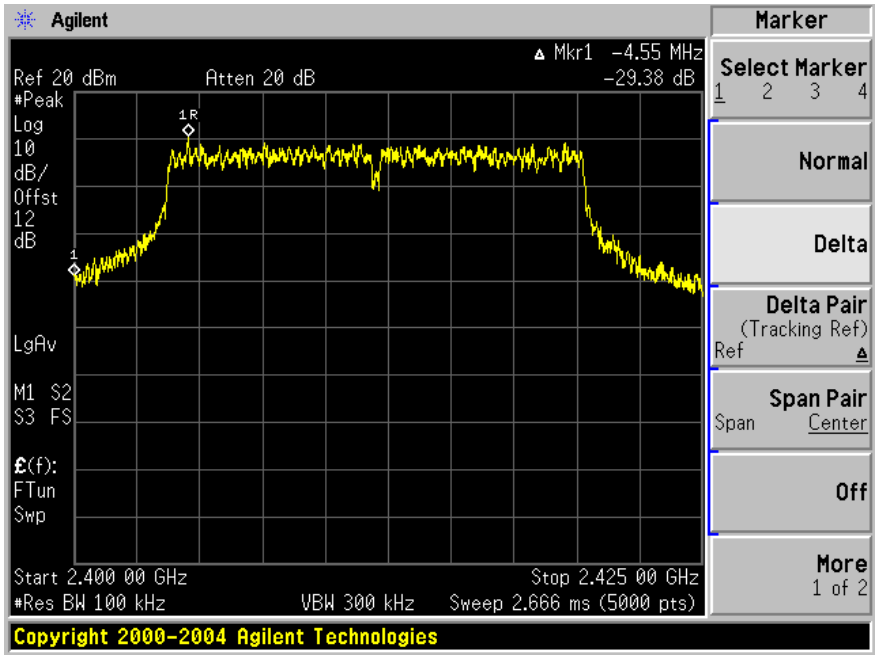
Low Channel, 36Mbps



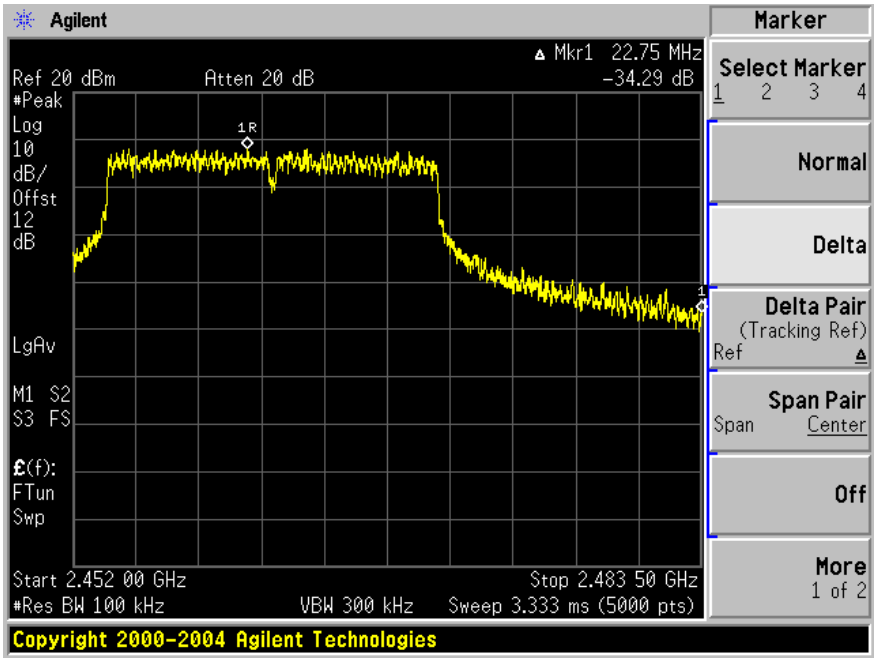
Low Channel, 48Mbps



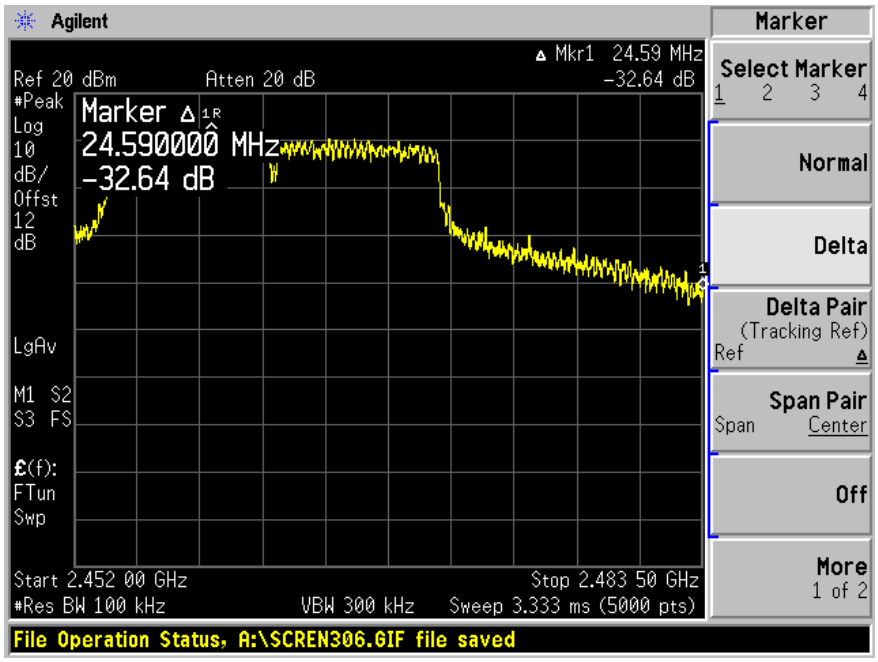
Low Channel, 54Mbps



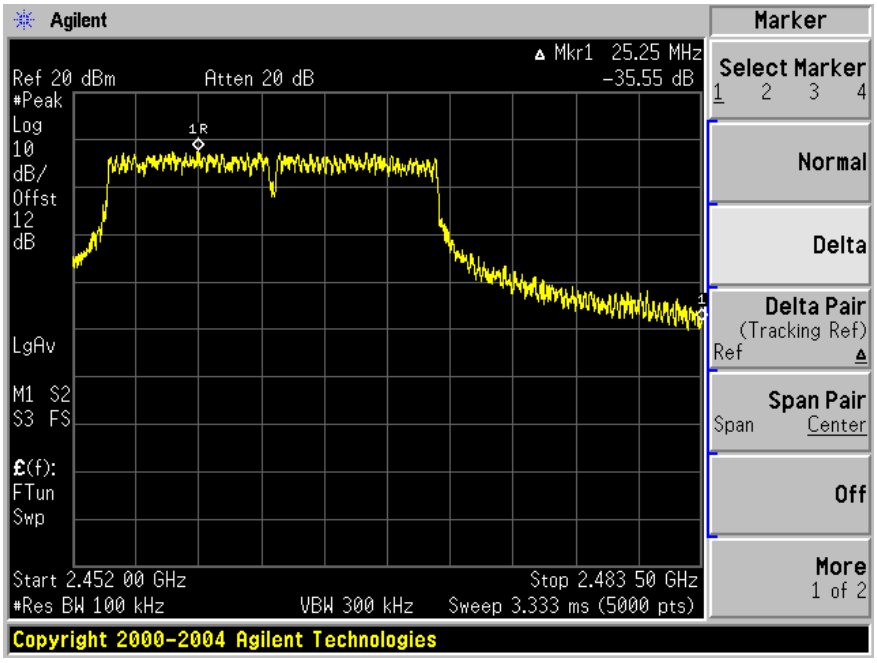
High Channel, 36Mbps



High Channel, 48Mbps



High Channel, 54Mbps



§15.247(d) - 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.

Measurement Procedure

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

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2005

*** 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:	21° C
Relative Humidity:	67%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2006-01-24.*

Test Result

802.11b:

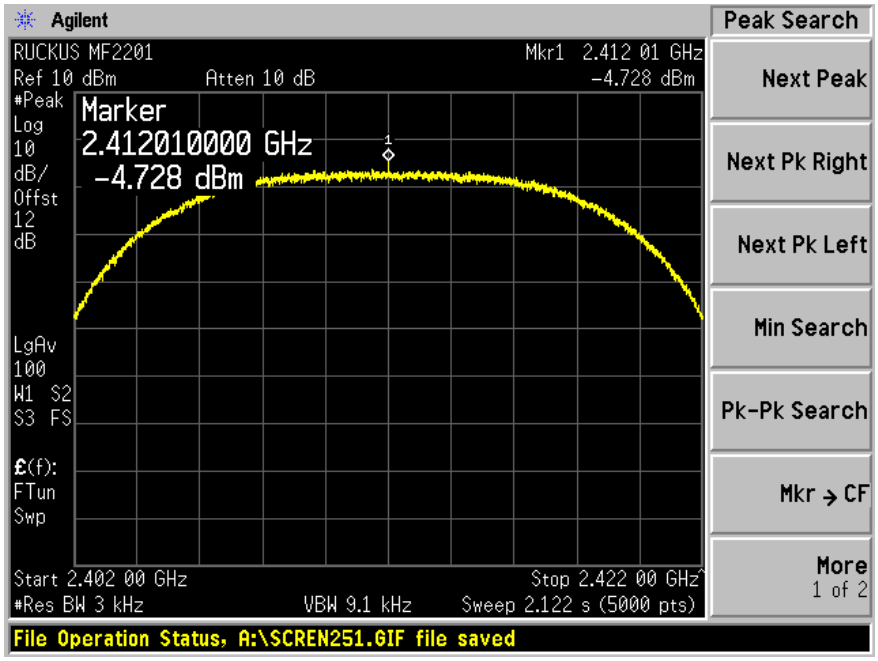
Channel	Frequency MHz	PSD dBm/3KHZ	Limit dBm /3KHZ
Low	2412	-4.728	8
Mid	2437	-5.583	8
High	2462	-5.32	8

802.11g:

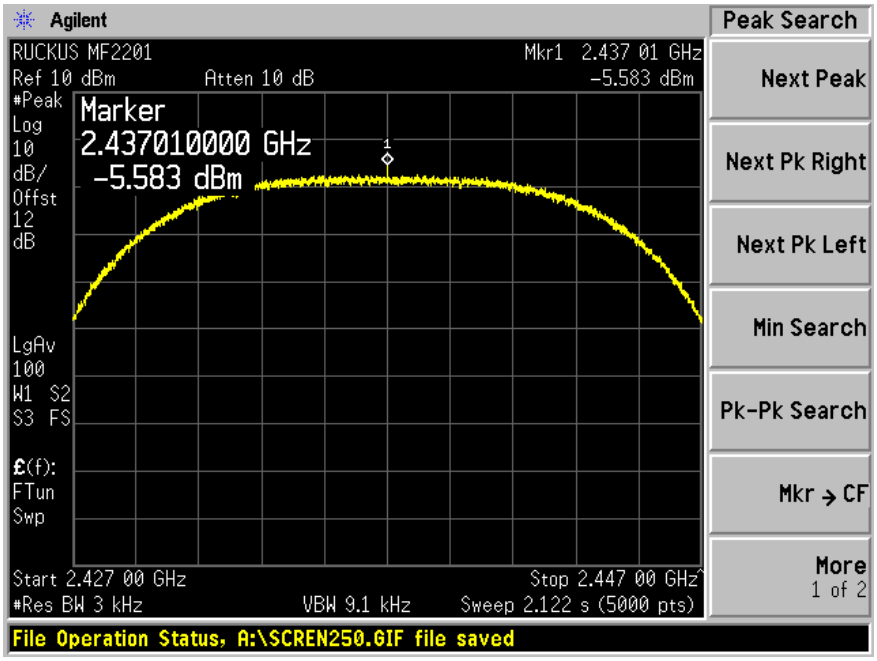
Channel	Frequency MHz	PSD (dBm/3KHz)			Limit dBm/3KHz
		54Mbps	48Mbps	36Mbps	
Low	2412	-4.974	-4.571	4.201	8
Mid	2437	-5.529	-3.717	-4.565	8
High	2462	-6.392	-5.326	4.16	8

802.11b:

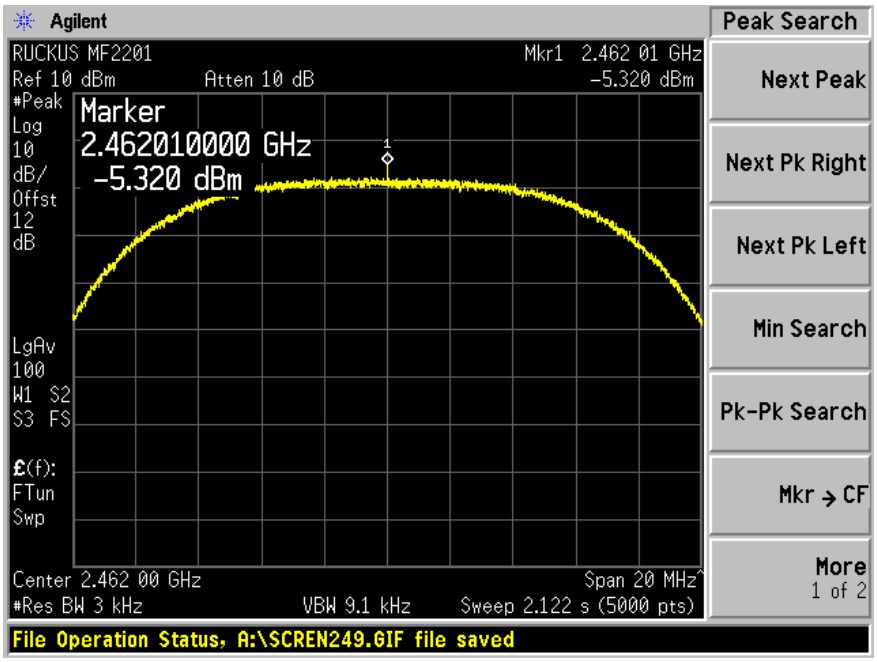
Low Channel



Mid. Channel

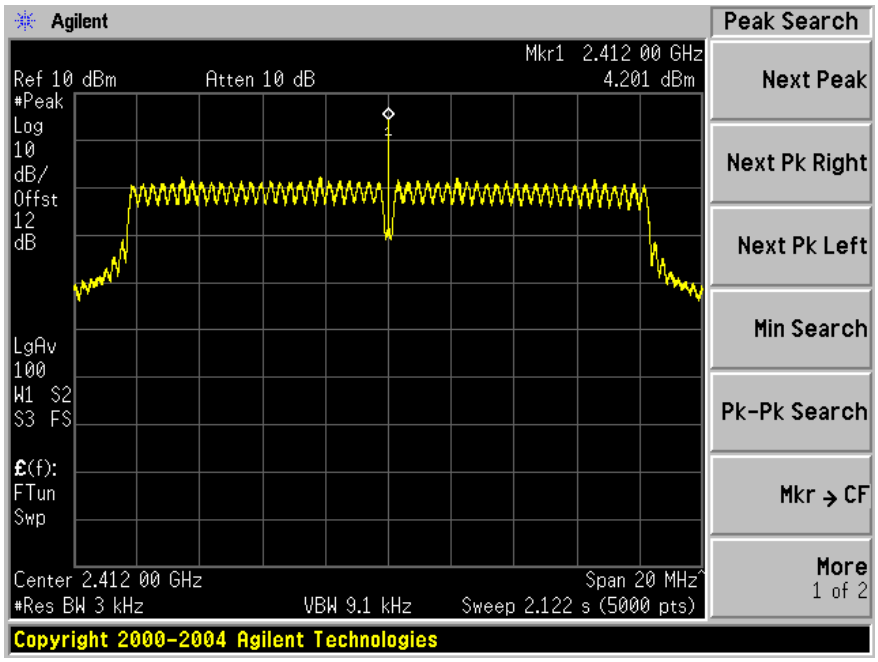


High Channel

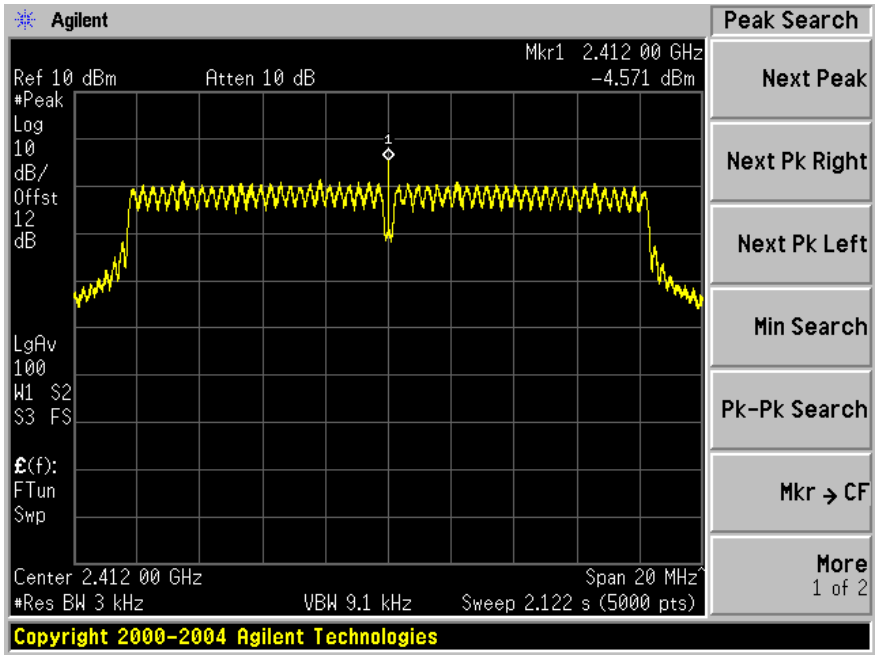


802.11g:

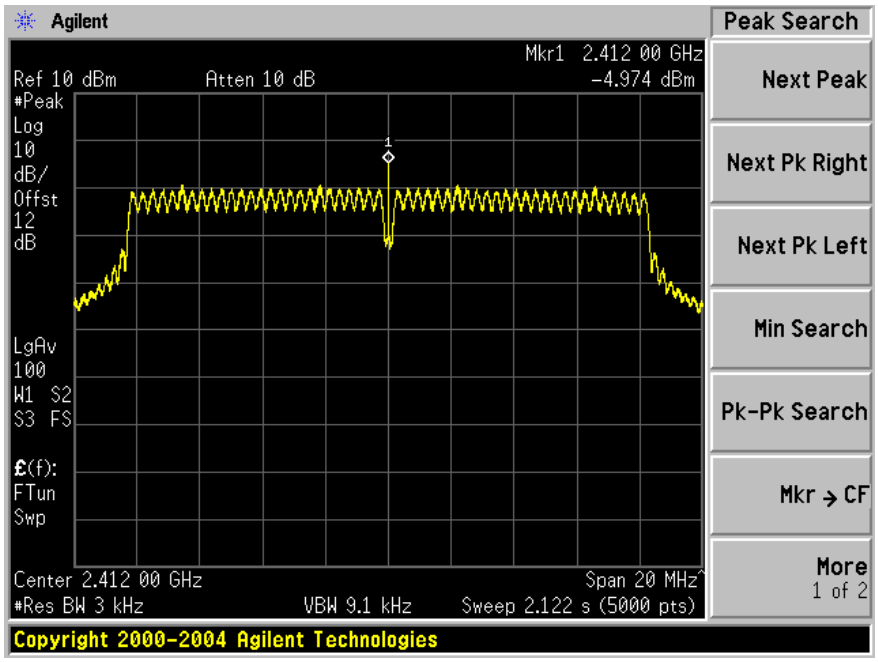
Low Channel, 36Mbps



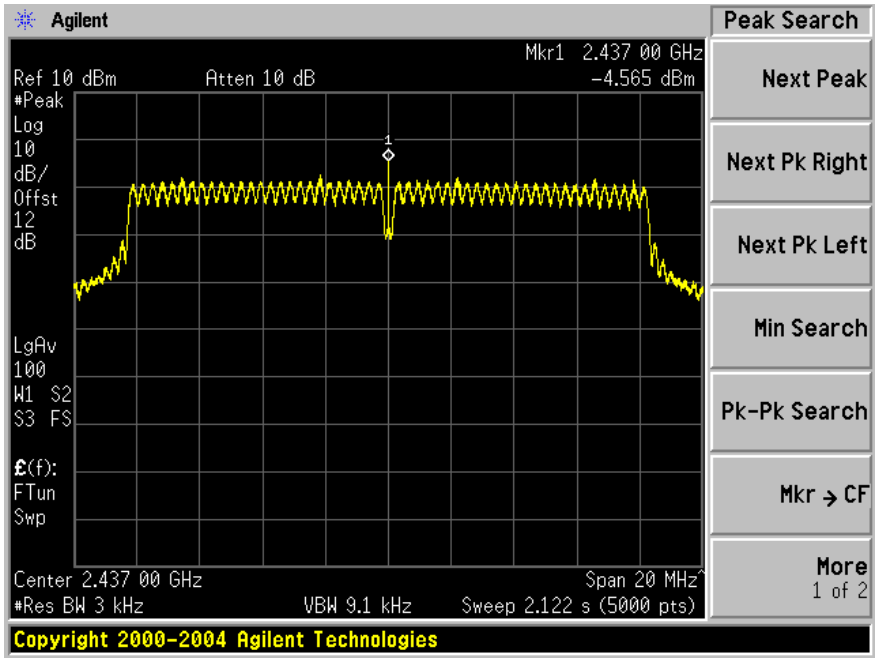
Low Channel, 48Mbps



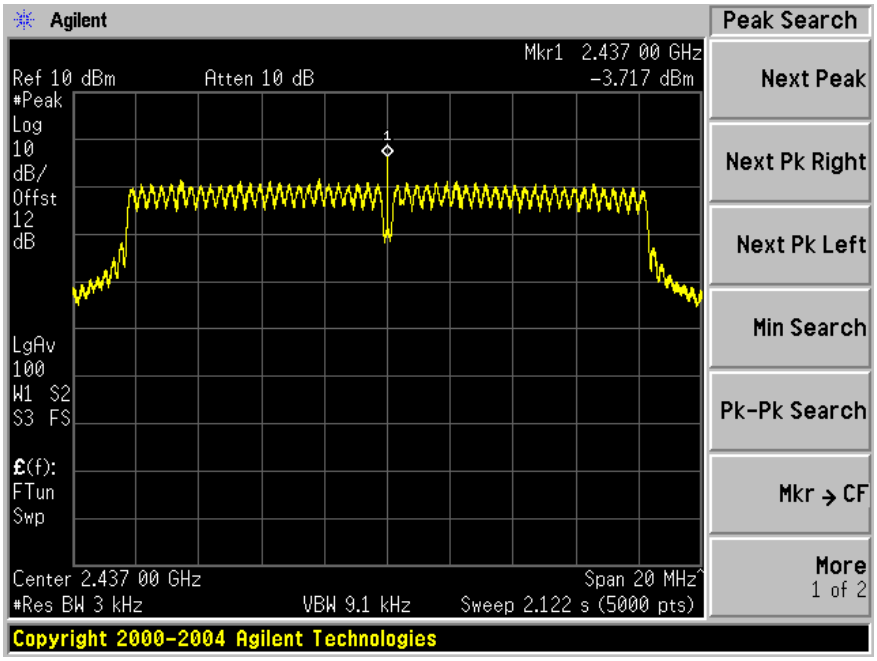
Low Channel, 54Mbps



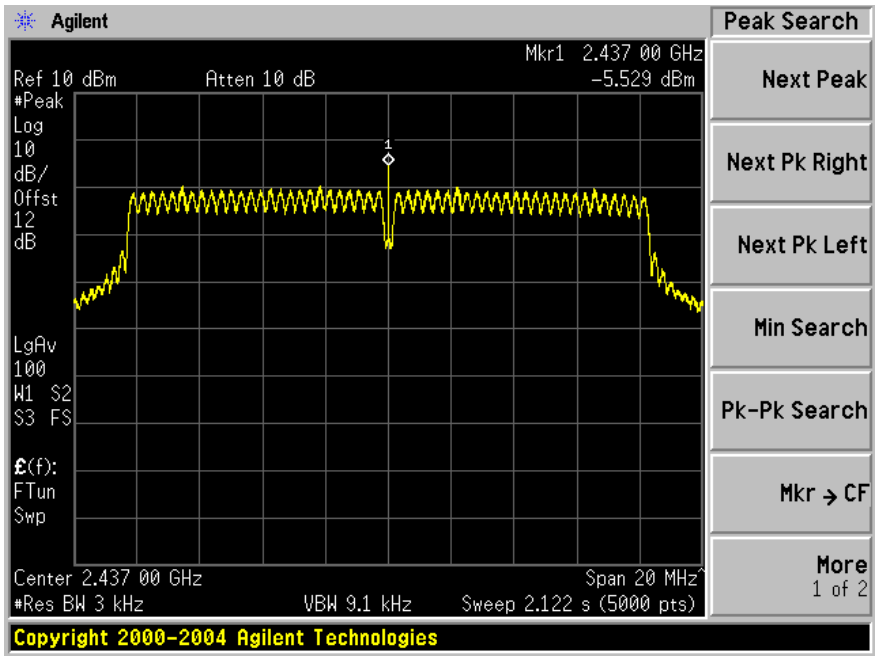
Mid Channel, 36Mbps



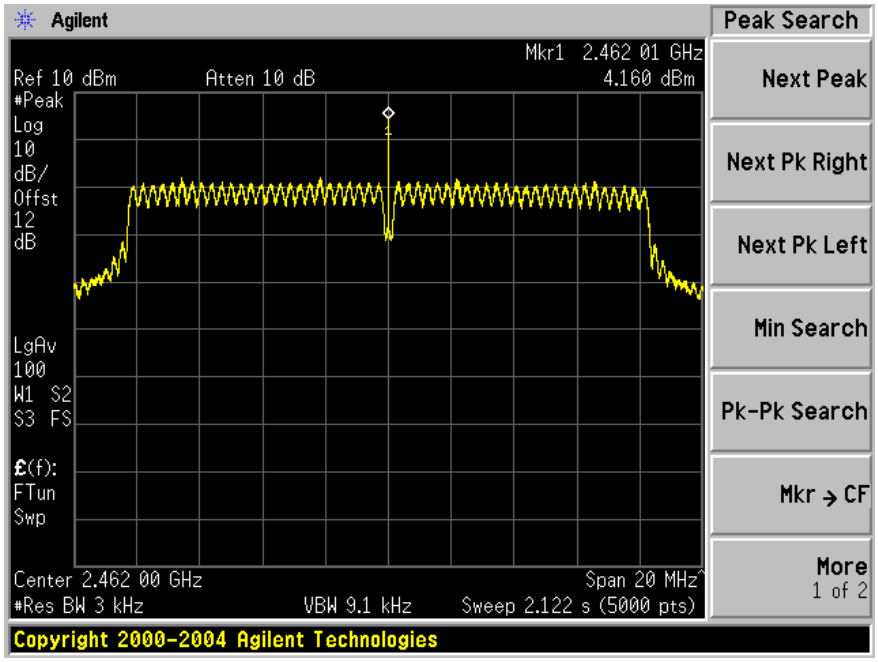
Mid Channel, 48Mbps



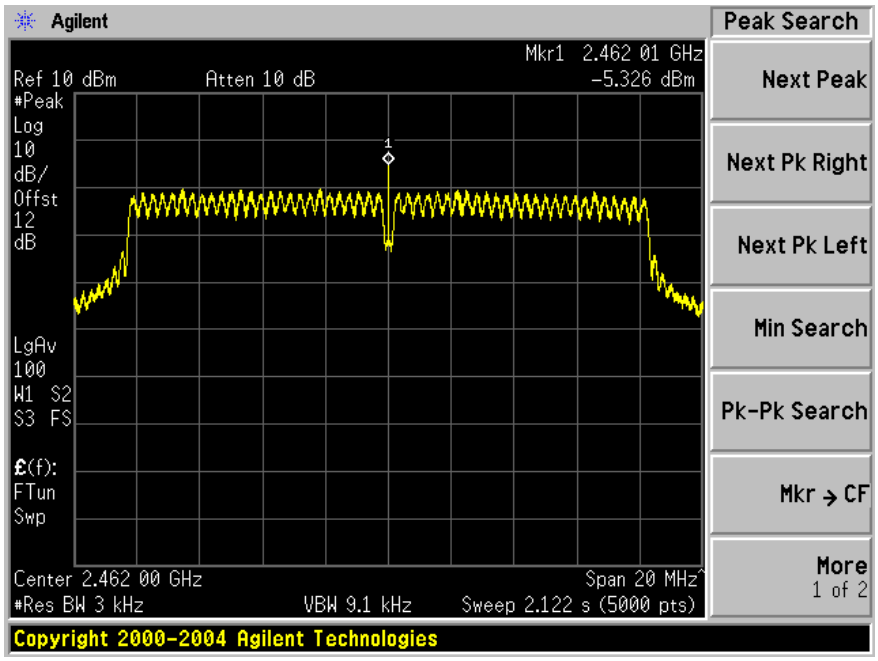
Mid Channel, 54Mbps



High Channel, 36Mbps



High Channel, 48Mbps



High Channel, 54Mbps