Lab Code: 200167-0

FCC PART 15.247

INDUSTRY CANADA RSS-210, ISSUE 7, JUNE 2007

MEASUREMENT AND TEST REPORT

For

Wi2Wi, Inc.

2107 N. First Street, Ste. 540
San Jose, CA 95131, USA

FCC ID: U9R-W2SW0001
IC ID: 7089A-W2SW0001
Model: W2SW0001

Report Type: ☒ Original Report	**Product Type:** 802.11b/g Module
Test Engineer(s):	James Ma
Report Number:	R0708036
Report Date:	2007-09-26
Reviewed By:	RF Engineering Lead: Daniel Deng
Prepared By: (J8)	Bay Area Compliance Laboratories Corp. (BACL) 1274 Anvilwood Ave. Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Wi2Wi, Inc.* product, *FCC ID: U9R-W2SW0001, IC: 7089A-W2SW0001, model: W2SW0001*, or the "EUT" as referred to in this report, is an 802.11b/g module. W2SW0001 is a complete system-in-package of Marvell 88W8686 802.11b/g. It includes all the components to operate WiFi radio.

1.2 Mechanical Description of EUT

The *Wi2Wi, Inc.* product, *model: W2SW0001*, measures approximately 12mmL x 12mmW x 1.4mmH, and weighs approximately *0.05 g*.

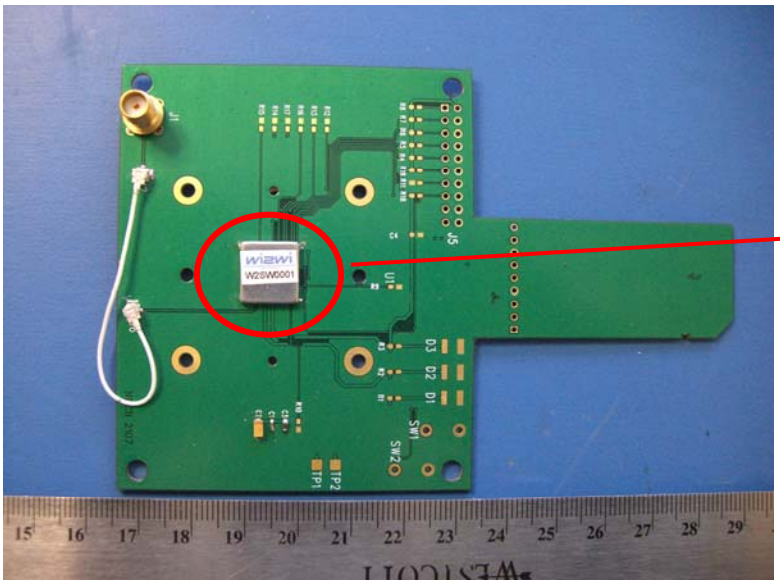
**The test data gathered are from production sample, serial number: A3-0728, provided by the manufacturer.*

1.3 Antenna Description

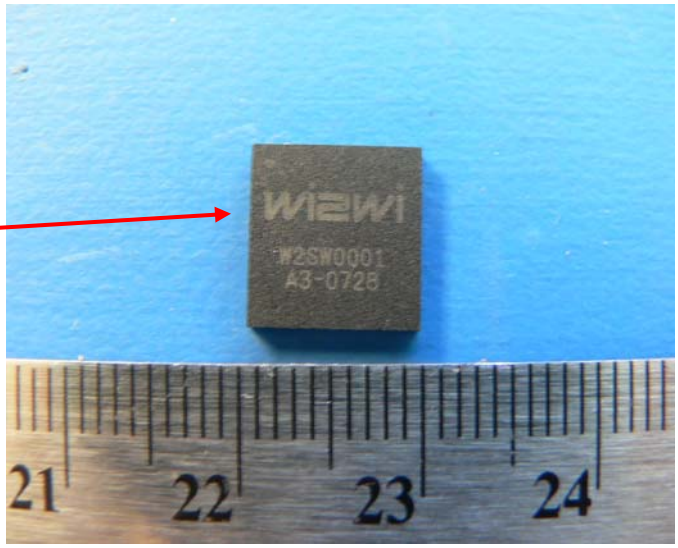
The antenna used is portable, center fed, whip antenna. It is a coaxial sleeve design with an omni-directional pattern.

Number	Model/Type	
Antenna 1.	Model number:	HG2403RD-RSF
	Manufacturer:	HyperLink Technologies, Inc.
	Frequency Range:	2400-2500 MHz
	Connector Type/ Maximum Gain	Reverse Polarity SMA Plug/ 3 dBi
	Antenna Type/ Pattern:	Monopole/omni-directional
	Measurement:	Length: 13 mmD x 137 mmL; Weight: 23 g

1.4 EUT Photograph



EUT built on the support board



EUT

Please refer to Exhibit C for more EUT photographs.

1.5 Objective

This type approval report is prepared on behalf of *Wi2Wi Inc.* 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, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.6 Related Submittal(s)/Grant(s)

N/A

1.7 Test Methodology

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

1.8 Measurement Uncertainty

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

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

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

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

1.9 Test Facility

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

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: R-2463 and C-2698. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm.

2 SYSTEM TEST CONFIGURATION

2.1 Justification

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

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

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

2.2 EUT Exercise Software

The EUT is programmed with the following data rate settings that were used during testing:

Channel	2412 MHz	2437 MHz	2462 MHz
802.11b Data rate	11Mbps	11Mbps	11Mbps
802.11g Data rate	54Mbps	54Mbps	54Mbps

2.3 Special Accessories

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

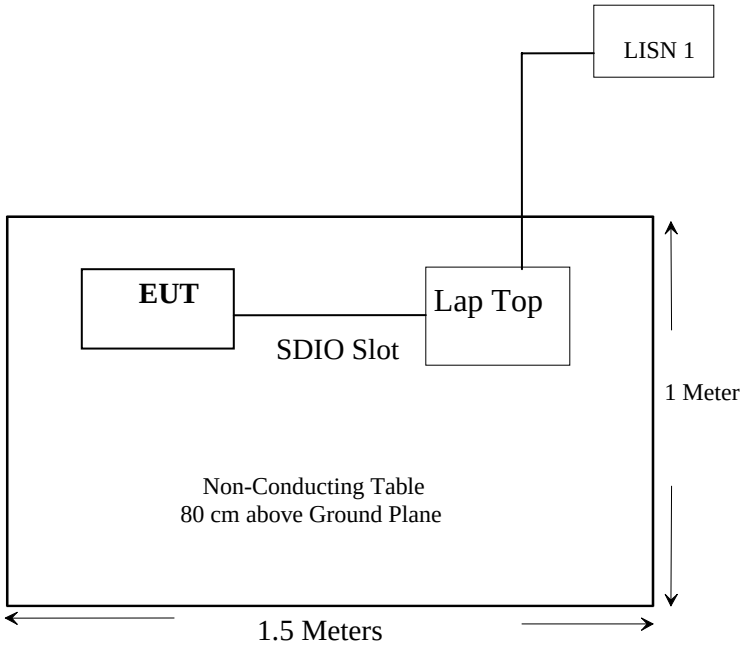
No modifications were made to the EUT.

2.5 Local Support Equipment List and Details

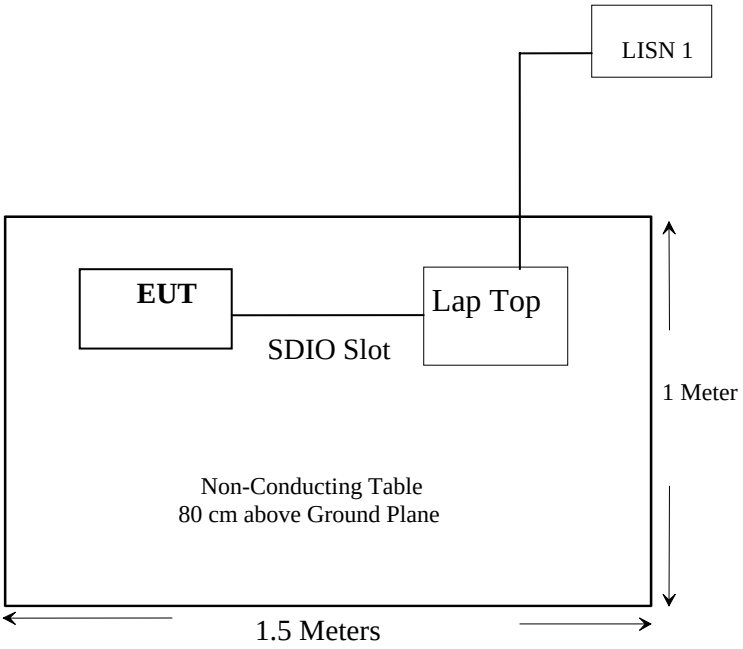
Manufacturer	Description	Model	Serial Number
Toshiba	Laptop	Satellite R15-S829	Y5040228H

2.6 Test Setup Block Diagrams

Conducted Emissions



Radiated Emissions



3 SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC & RSS-210 Rules	Description of Test	Result	Note
FCC §15.247 (i) and §2.1091, IC RSS-Gen 5.5 & RSS-102	RF Exposure	Compliant	-
FCC §15.203, IC RSS-Gen §7.1.4	Antenna Requirement	Compliant	-
FCC §15.207, IC RSS-Gen §7.2.2	Conducted Emissions	Compliant	-
FCC §2.1051 & §15.247(d), RSS210 § A8.5 § RSS-Gen §7.2	Spurious Emissions at Antenna Port	Compliant	-
FCC §15.109, §15.205, §15.209 & §15.247(c), IC RSS-Gen §4.9	Radiated Spurious Emissions	Compliant	-
FCC §15.205	Restricted Band	Compliant	-
RSS-Gen §6(a)	Receiver Spurious Emissions	Compliant	-
§15.247 (a)(2), RSS-210 §A8.2 (a)	6 dB Bandwidth & 99% Bandwidth	Compliant	-
§15.247 (b)(3), RSS210 § A8.4	Maximum Peak Output Power	Compliant	-
§ 15.247 (d), RSS210 § A8.5	100 kHz Bandwidth of Frequency Band Edge	Compliant	-
§15.247 (e), RSS-210 §A8.2 (b)	Power Spectral Density	Compliant	-

4 FCC §15.247 (i) and §2.1091, IC RSS-Gen 5.5 & RSS-102 - RF EXPOSURE

4.1 Applicable Standard

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

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

Limits for General Population/Uncontrolled Exposure

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

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

4.2 MPE Prediction

Prediction 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 (dBm):	14.77
Maximum peak output power at antenna input terminal (mW):	29.991
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	3.0
Maximum Antenna Gain (numeric):	1.995
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0119
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

4.3 Test Result

The power density level at 20 cm is 0.0119 mW/cm^2, which is below the uncontrolled exposure limit of 1.0mW/cm^2 at 2437 MHz.

According to RSS-102 Issue 2, November 2005 §2.5.2 exception from Routine Evaluation Limits- RF Exposure Evaluation:

RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm, except when the device operates:

1) below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W;
2) at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.

RF limits for device used by the general public is provided hereinafter table:

Frequency Range (MHZ)	Electric Field (V/M rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Time Averaging (min)
0.003 – 1	280	2.19	-	6
1 – 10	280 / f	2.19 / f	-	6
10 – 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 - 1500	$1.585\ f^{0.5}$	$0.0042\ f^{0.5}$	f / 150	6
1500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	$616000 / f^{1.2}$
150 000 – 300 000	$f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000 / f^{1.2}$

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

4.4 Result

The power of this device is 14.77 dBm (29.991 mW) and the antenna gain used for evaluation was 3.0 dBi (representing the worst case), according to RSS-102 section 2.5.2, this device exempt the RF exposure evaluation is.

5 FCC §15.203, IC RSS-Gen §7.1.4 – ANTENNA REQUIREMENT

5.1 Applicable Standard

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

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

As per IC RSS-Gen §7.1.4: Transmitter Antenna, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

5.2 Result

The antenna, model: HG2403RD-RSF for this device is a center fed monopole whip antennae with a maximum gain of 3 dBi that will only provided by Wi2Wi, Inc. It features a reverse polarity connection type to ensure that non-OEM antennae cannot be implemented by the end user.

☒ **Compliant** ☐ **N/A**

Please refer to the following antenna photo for details.

Antenna photo

6 FCC §15.207, IC RSS-Gen §7.2.2 - CONDUCTED EMISSIONS

6.1 Section 15.207 & RSS-Gen 7.2.2 Conducted limits:

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

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

** Decreases with the logarithm of the frequency.*

6.2 Test Setup

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

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

The EUT was powered via connection to AC/DC adapter which was plugged into the LISN.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics	LISN	9252-R-24-BNC	511205	2007-07-07
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100338	2007-04-05

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

6.4 Test Procedure

During the conducted emissions test, the power cord of the system was connected to the main outlet of the LISN-1.

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

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

6.5 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

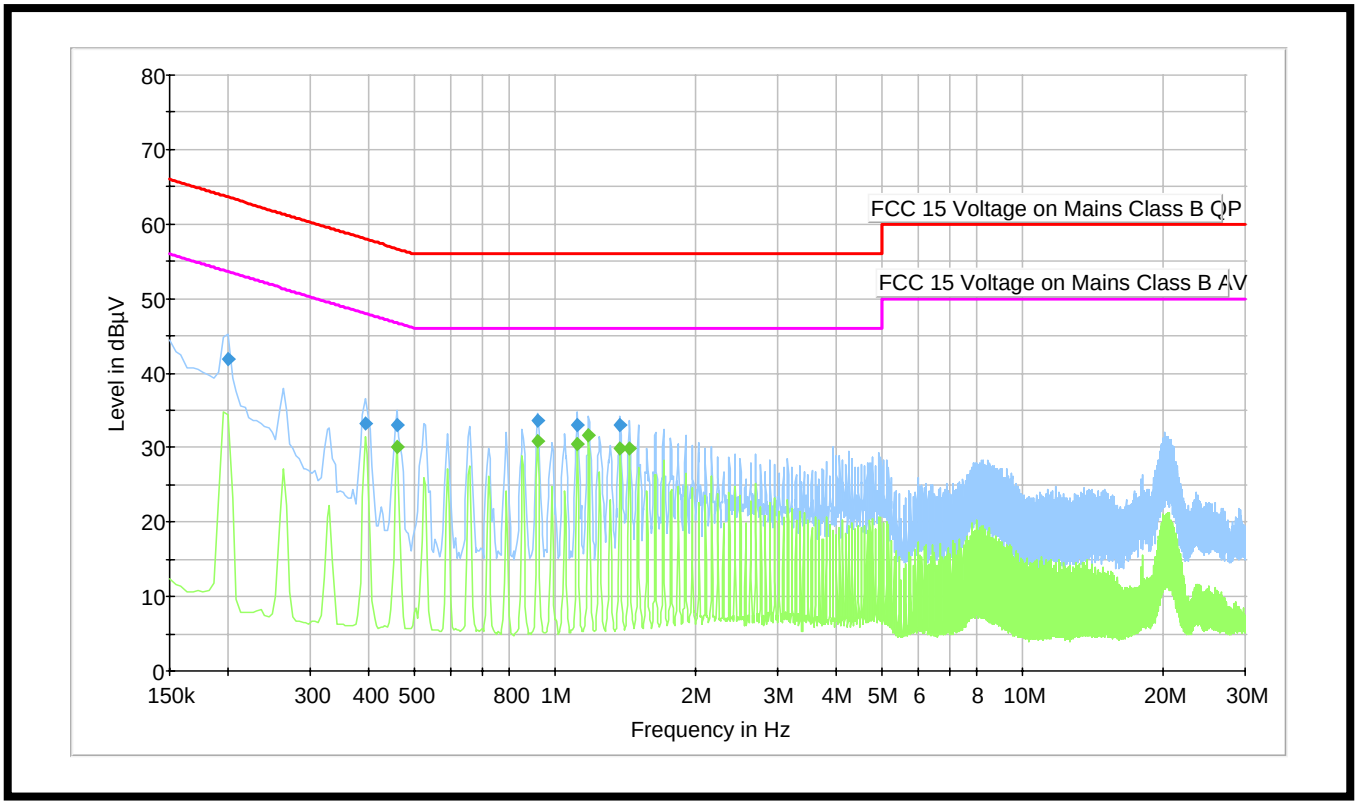
**The testing was performed by James Ma from 2007-09-04.*

6.6 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC & IC standard's conducted emissions limits for Class B devices, with the *worst* margin reading of:

Connection: AC/DC Adapter			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Range (MHz)**
-13.7	1.117500	Neutral	0.150 MHz to 30 MHz

120V/60 Hz Hot:



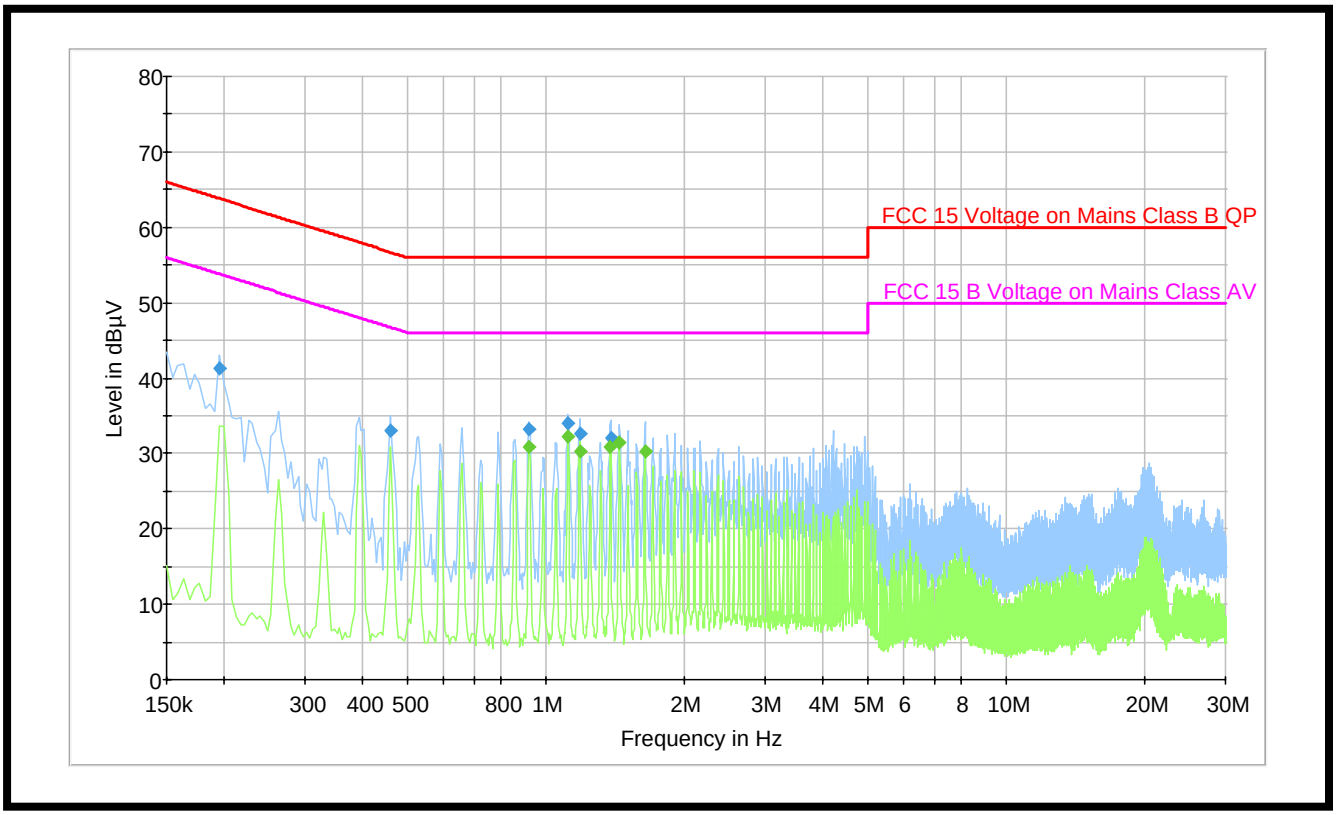
Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (H/N)	Limit (dBµV)	Margin (dB)
0.199500	41.8	H	63.6	-21.8
0.919500	33.6	H	56.0	-22.4
1.117500	33.1	H	56.0	-22.9
1.378500	32.9	H	56.0	-23.1
0.460500	33.0	H	56.7	-23.7
0.393000	33.3	H	58.0	-24.7

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (H/N)	Limit (dBµV)	Margin (dB)
1.180500	31.6	H	46.0	-14.4
0.919500	30.8	H	46.0	-15.2
1.117500	30.5	H	46.0	-15.5
1.446000	30.0	H	46.0	-16.0
1.378500	29.8	H	46.0	-16.2
0.460500	30.1	H	46.7	-16.6

120V/60 Hz Neutral:



Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (H/N)	Limit (dBµV)	Margin (dB)
1.117500	33.9	N	56.0	-22.1
0.195000	41.4	N	63.8	-22.5
0.919500	33.2	N	56.0	-22.8
1.185000	32.5	N	56.0	-23.5
0.460500	33.1	N	56.7	-23.6
1.383000	32.1	N	56.0	-23.9

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (H/N)	Limit (dBµV)	Margin (dB)
1.117500	32.3	N	46.0	-13.7
1.446000	31.4	N	46.0	-14.6
0.919500	30.8	N	46.0	-15.2
1.378500	30.8	N	46.0	-15.2
1.185000	30.4	N	46.0	-15.6
1.644000	30.2	N	46.0	-15.8

7 FCC §2.1051 & §15.247(d), RSS-210 § A8.5 & RSS-Gen 7.2 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Applicable Standard

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

Requirements: CFR 47, §2.1051.

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

7.2 Measurement Procedure

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

7.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

7.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

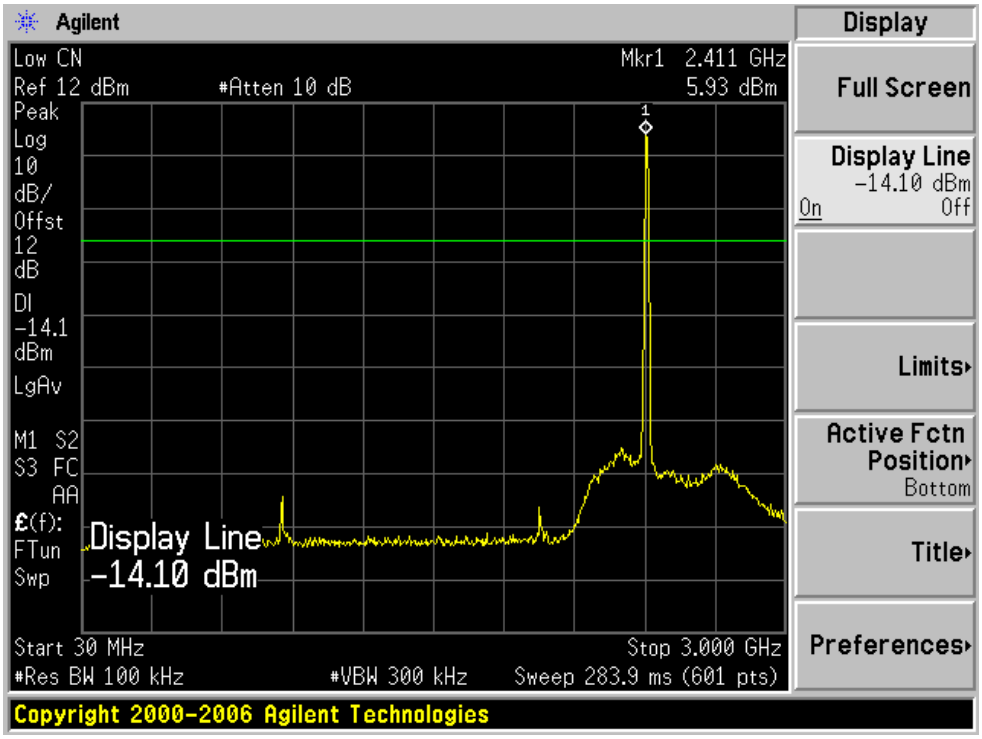
**The testing was performed by James Ma from 2007-09-04.*

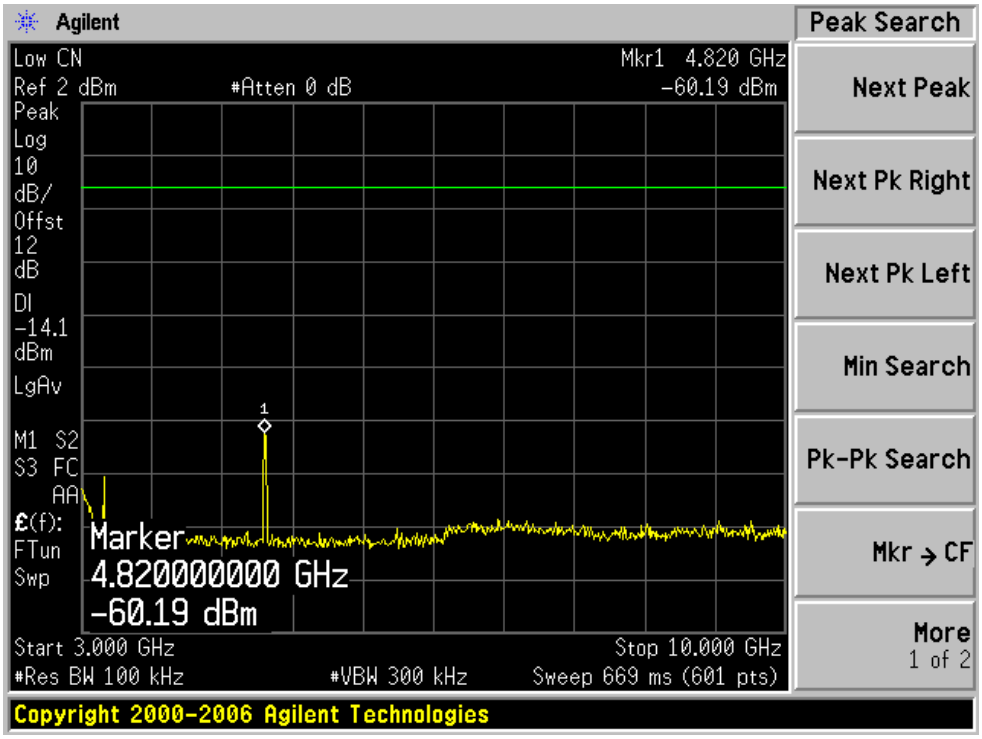
7.5 Measurement Result:

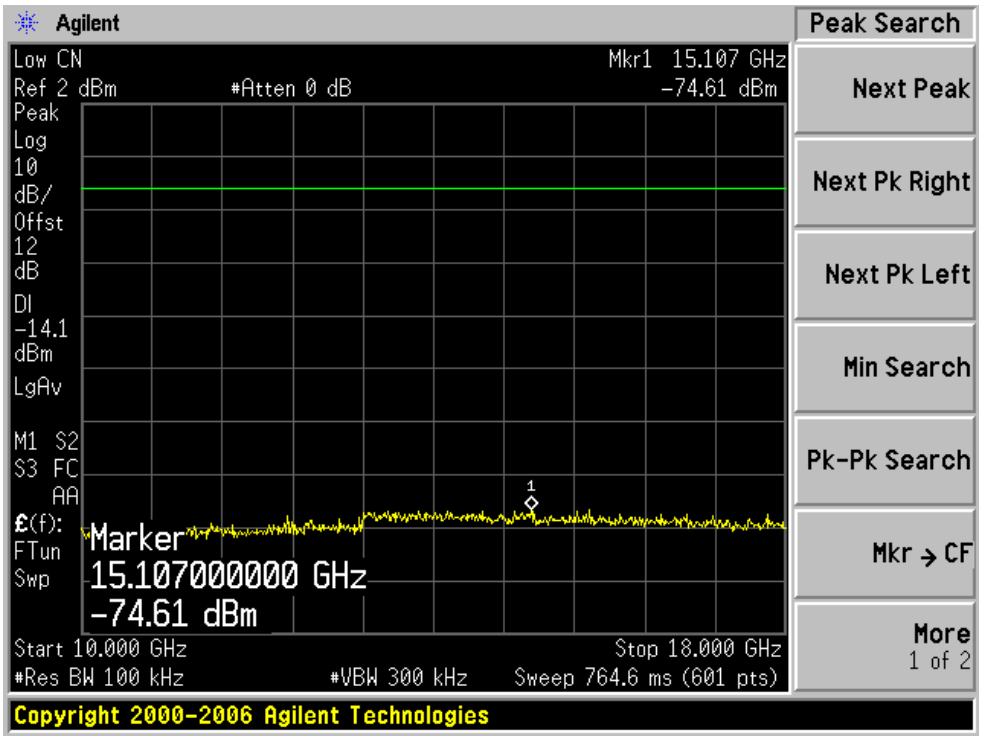
Please refer to following pages for plots of spurious emissions.

802.11b mode

Low Channel






Agilent
Peak Search
Low CN
Ref 2 dBm
#Atten 0 dB
Mkr1 15.107 GHz
-74.61 dBm
Peak
Log
10
dB/
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12
dB
Dl
-14.1
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LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
15.107000000 GHz
-74.61 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 18.000 GHz
Sweep 764.6 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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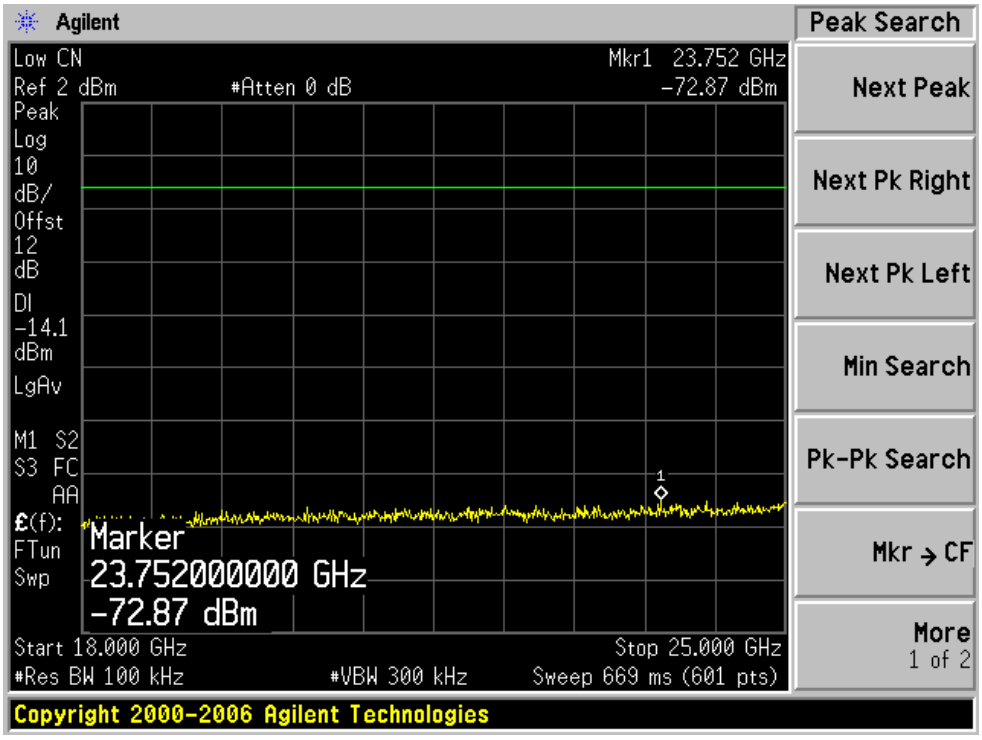
Agilent
Peak Search
Low CN
Ref 2 dBm
#Atten 0 dB
Mkr1 23.752 GHz
-72.87 dBm
Peak
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10
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Offst
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S3 FC
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23.752000000 GHz
-72.87 dBm
Start 18.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 669 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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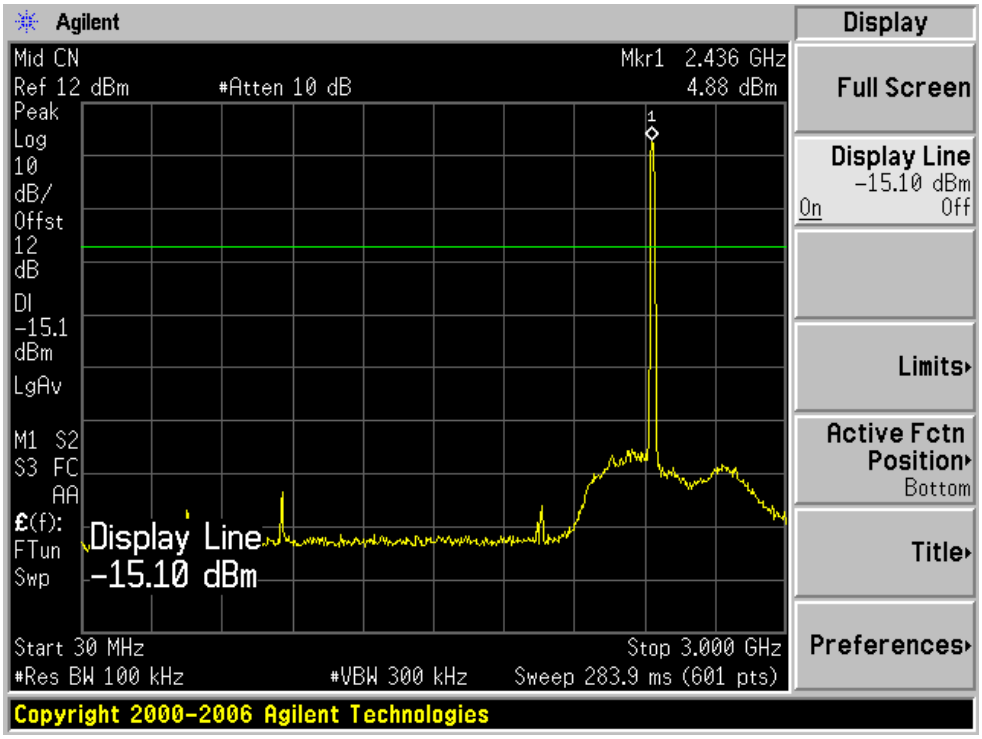
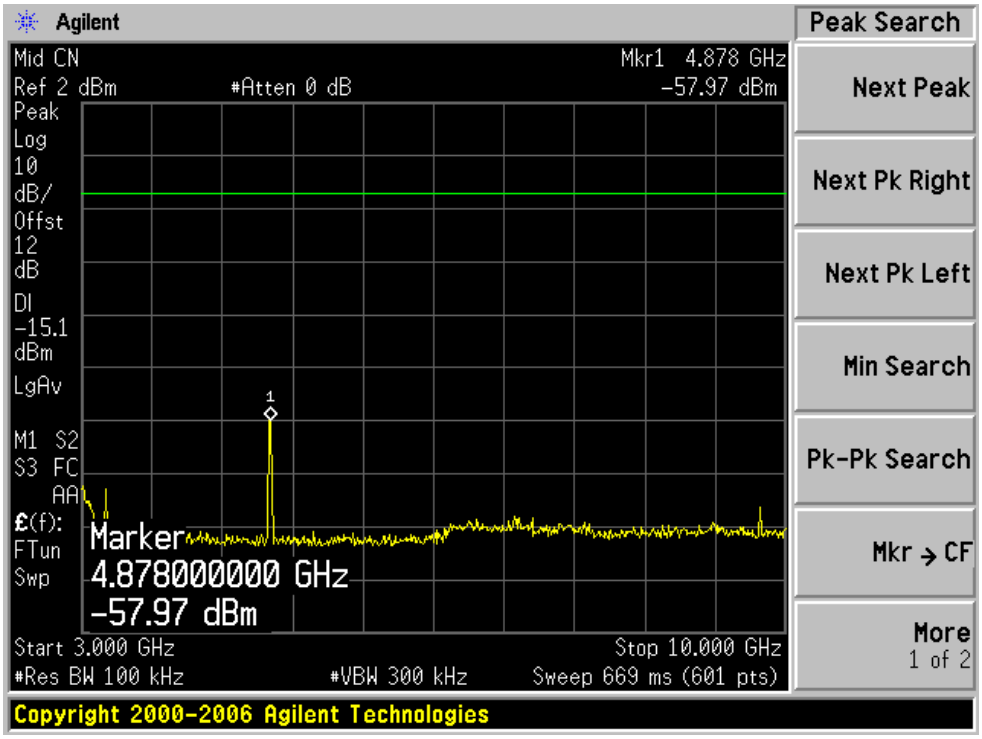
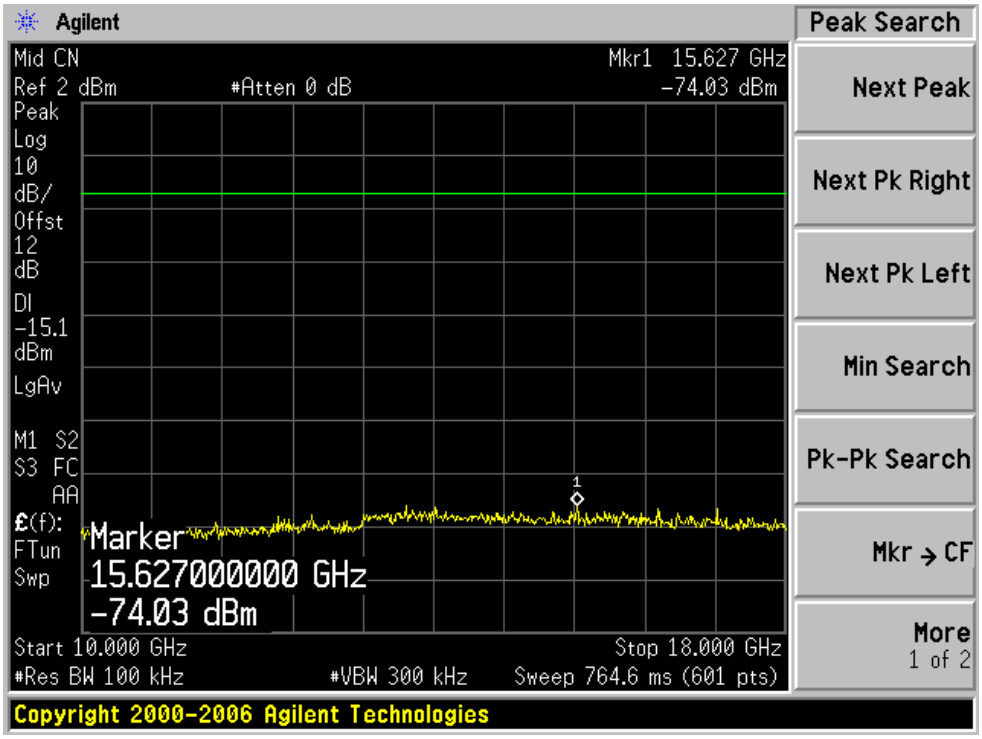
Middle Channel






Agilent
Peak Search
Mid CN
Ref 2 dBm
#Atten 0 dB
Mkr1 15.627 GHz
-74.03 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-15.1
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
15.627000000 GHz
-74.03 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 18.000 GHz
Sweep 764.6 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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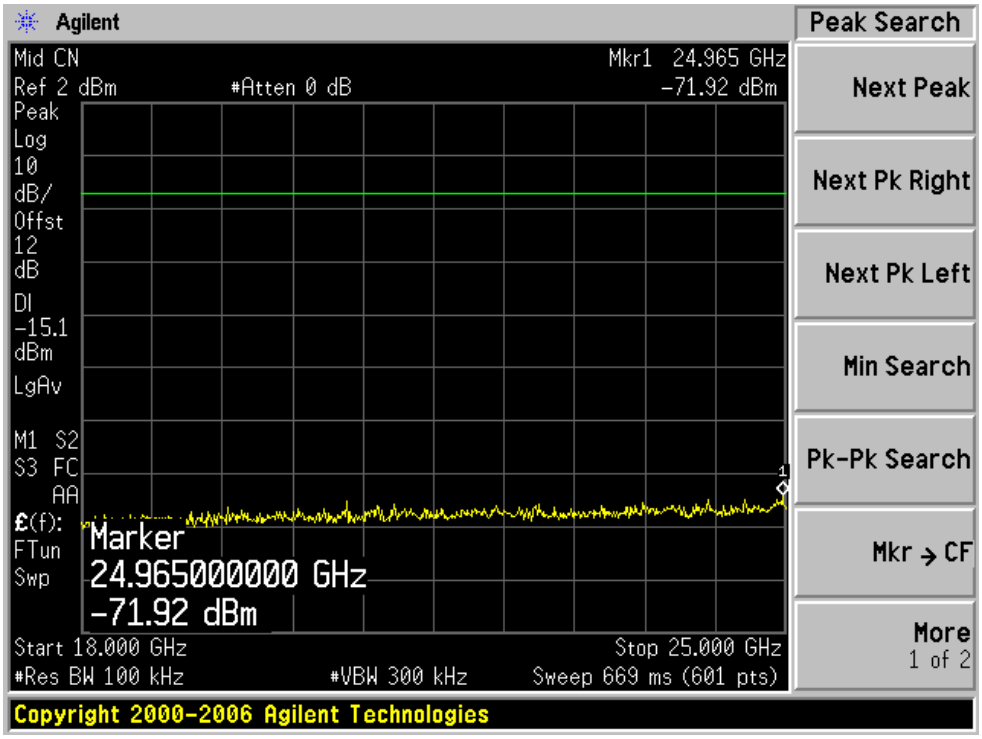
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Peak Search
Mid CN
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Mkr1 24.965 GHz
-71.92 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-15.1
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
24.965000000 GHz
-71.92 dBm
Start 18.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 669 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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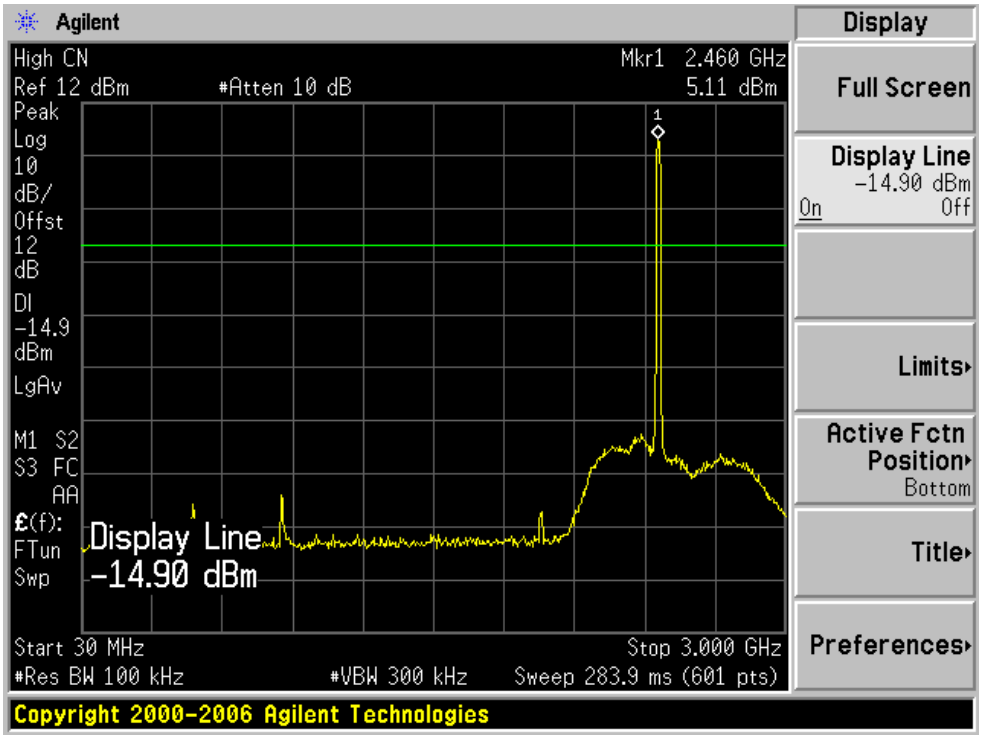
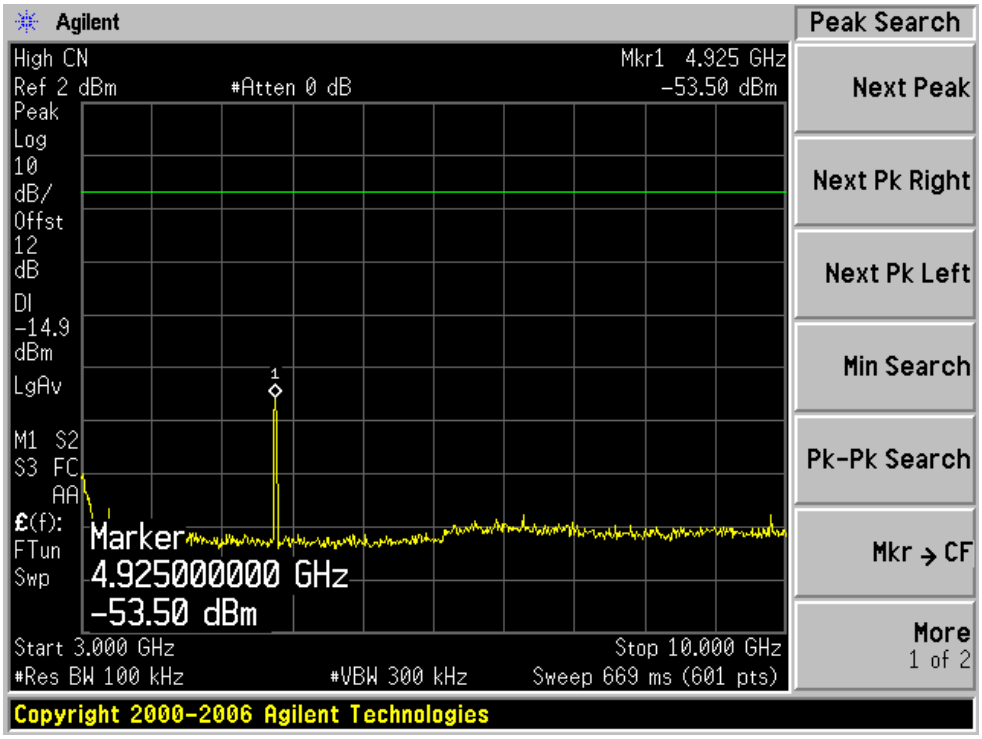
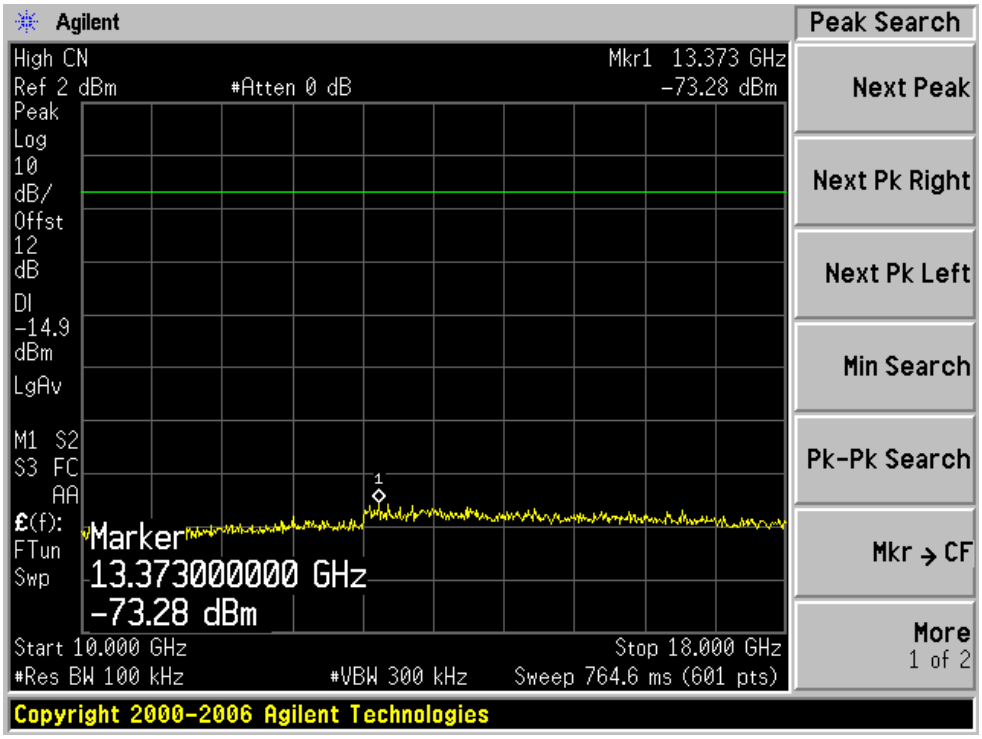
High Channel






Agilent
Peak Search
High CN
Mkr1 13.373 GHz
Ref 2 dBm
#Atten 0 dB
-73.28 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-14.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
13.373000000 GHz
-73.28 dBm
Start 10.000 GHz
Stop 18.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 764.6 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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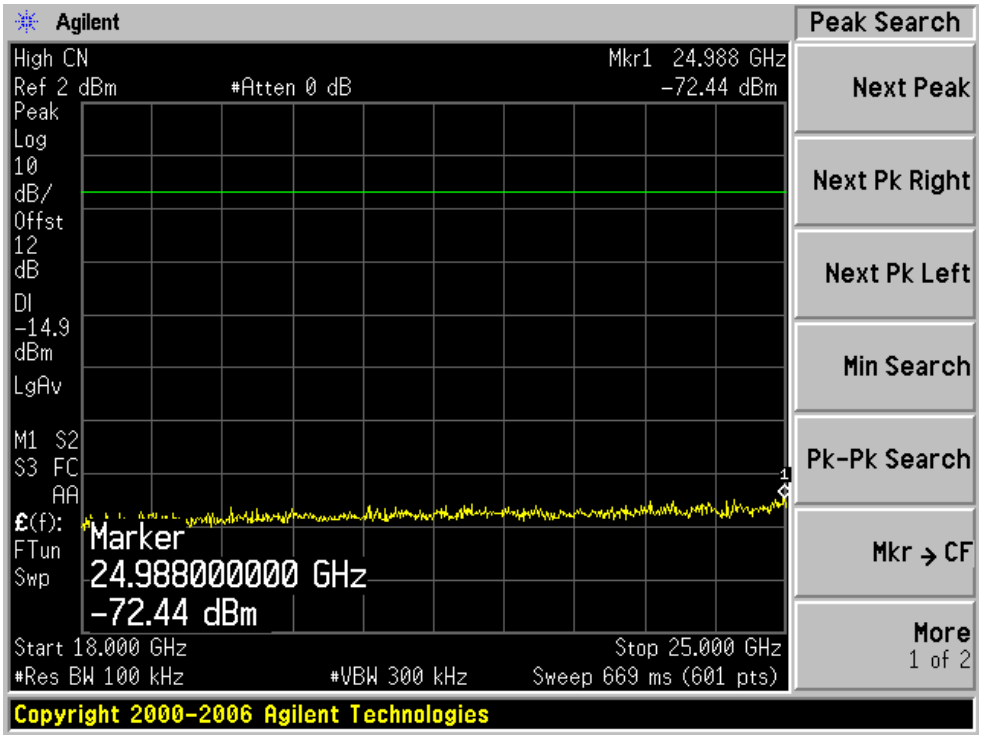
Agilent
Peak Search
High CN
Mkr1 24.988 GHz
Ref 2 dBm
#Atten 0 dB
-72.44 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-14.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
24.988000000 GHz
-72.44 dBm
Start 18.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 669 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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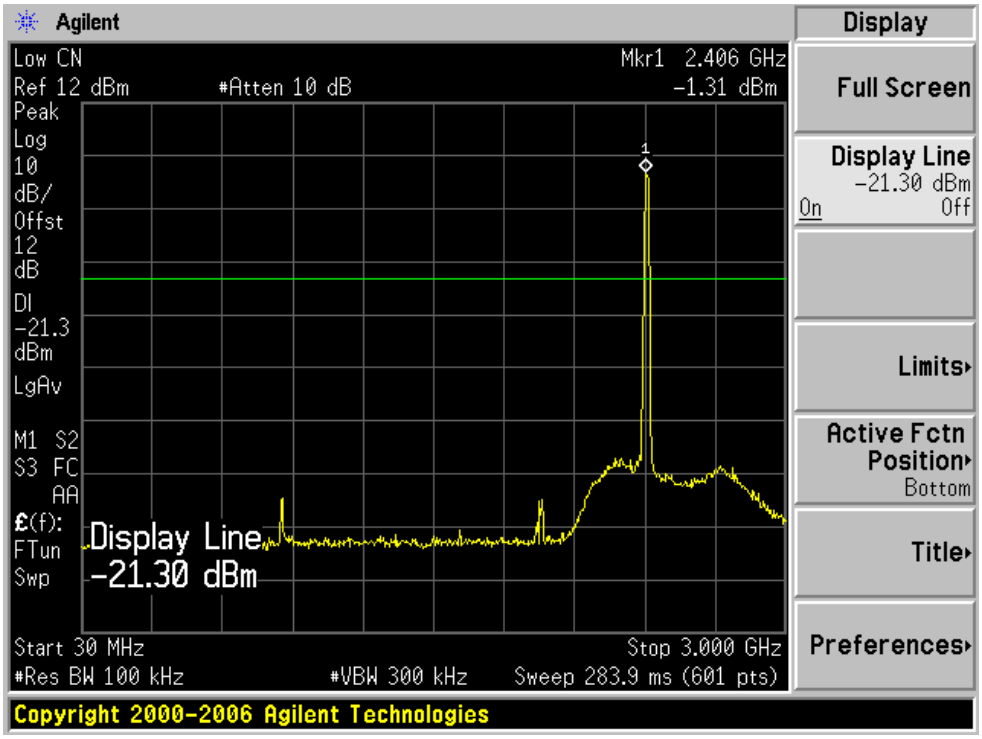
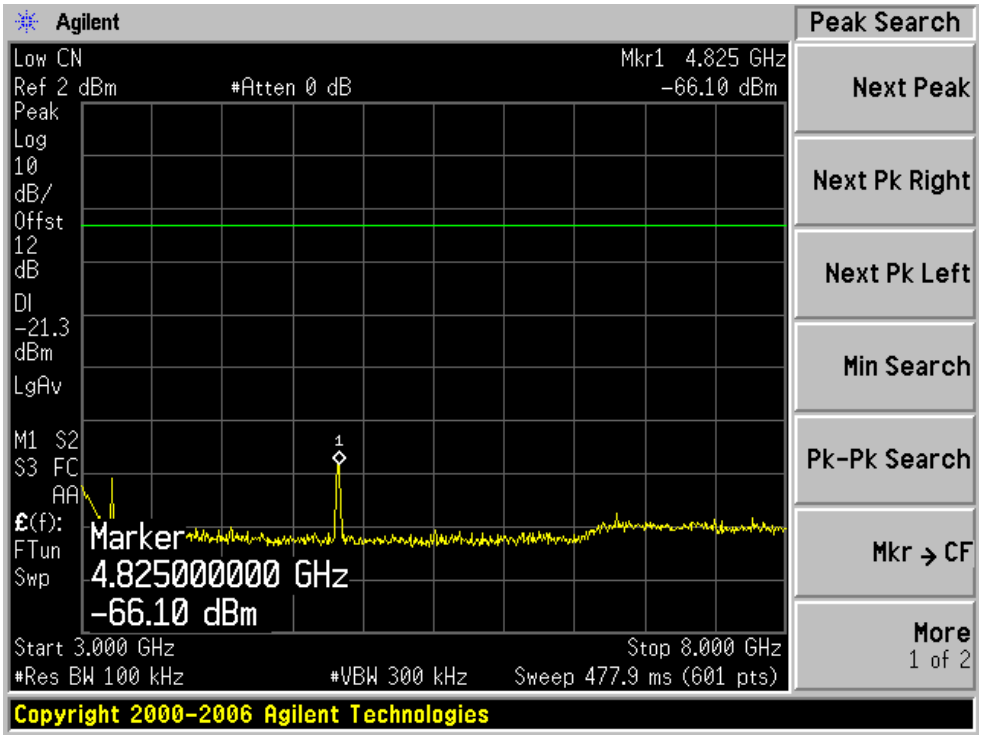
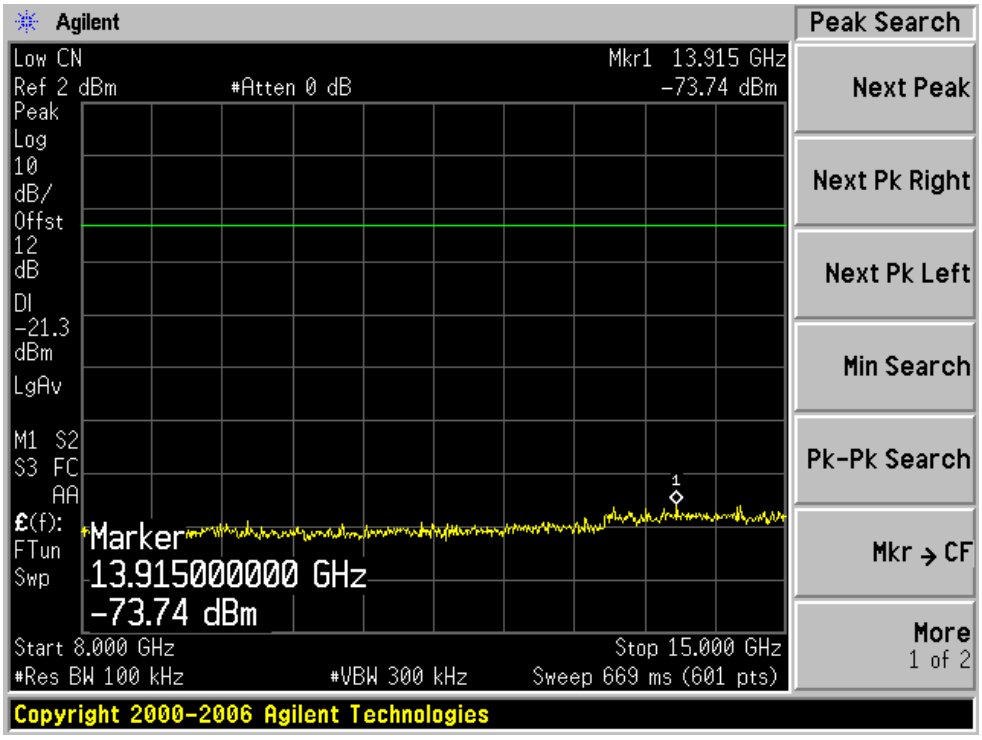
802.11g mode

Low Channel






Agilent
Peak Search
Low CN
Ref 2 dBm
#Atten 0 dB
Mkr1 13.915 GHz
-73.74 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-21.3
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
13.915000000 GHz
-73.74 dBm
Start 8.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 669 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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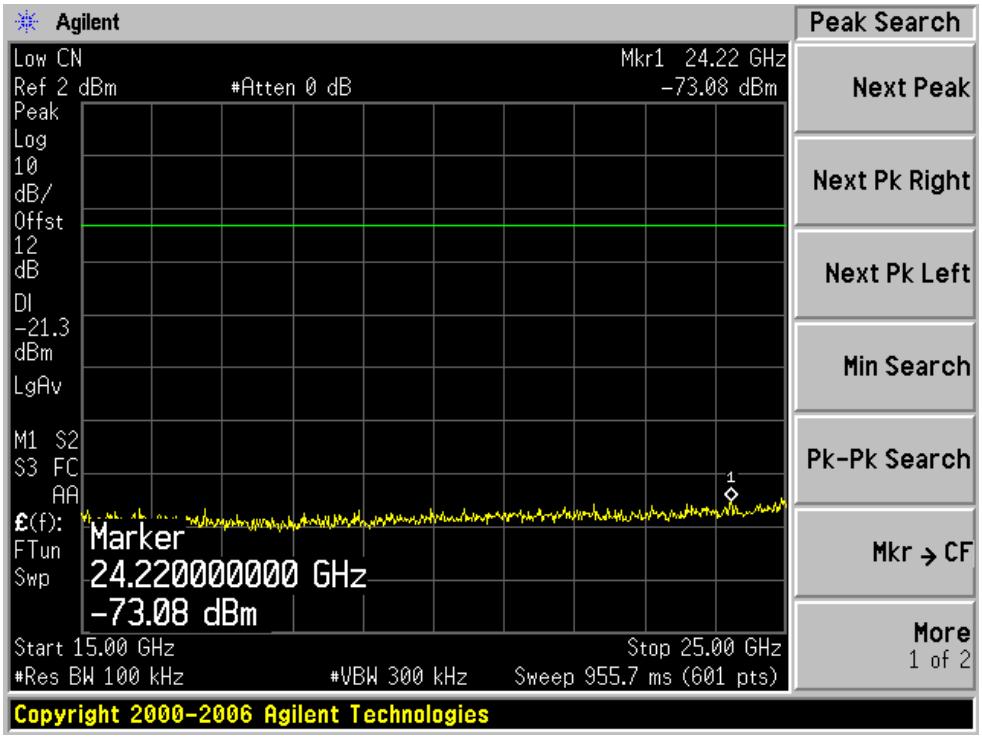
Agilent
Peak Search
Low CN
Ref 2 dBm
#Atten 0 dB
Mkr1 24.22 GHz
-73.08 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-21.3
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
24.220000000 GHz
-73.08 dBm
Start 15.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 955.7 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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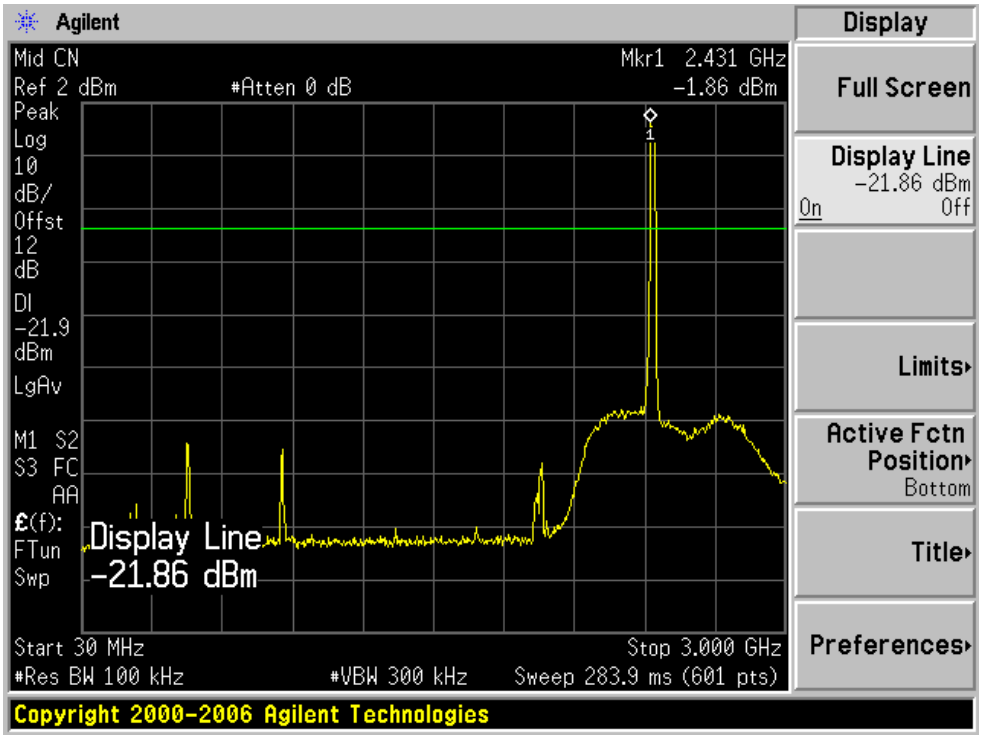
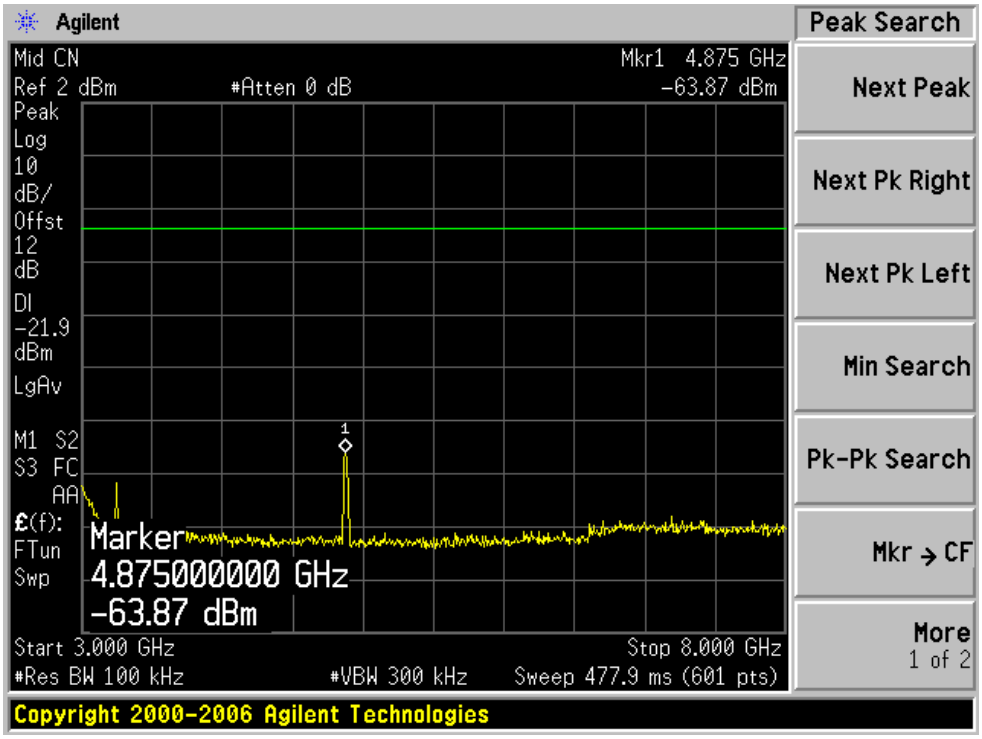
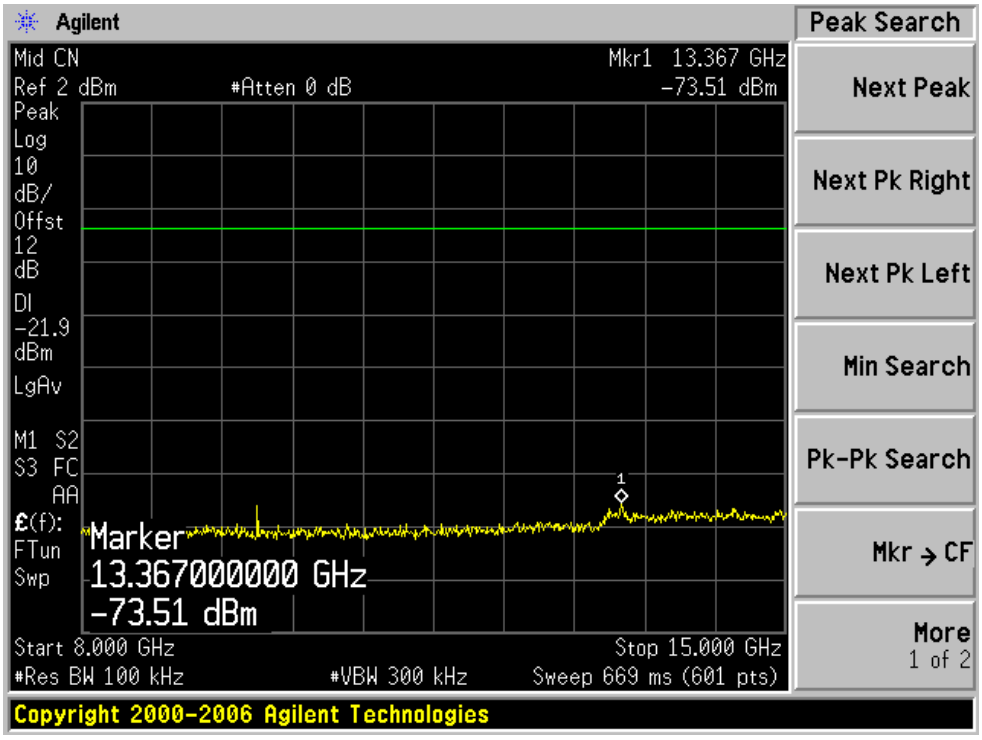
Mid Channel


Agilent
Display
Mid CN
Ref 2 dBm
#Atten 0 dB
Mkr1 2.431 GHz
-1.86 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-21.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Display Line
-21.86 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 3.000 GHz
Sweep 283.9 ms (601 pts)
Full Screen
Display Line
-21.86 dBm
On Off
Limits
Active Fctn
Position
Bottom
Title
Preferences
Copyright 2000-2006 Agilent Technologies


Agilent
Peak Search
Mid CN
Ref 2 dBm
#Atten 0 dB
Mkr1 4.875 GHz
-63.87 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-21.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
4.875000000 GHz
-63.87 dBm
Start 3.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 8.000 GHz
Sweep 477.9 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2006 Agilent Technologies


Agilent
Peak Search
Mid CN
Ref 2 dBm
#Atten 0 dB
Mkr1 13.367 GHz
-73.51 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-21.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
13.367000000 GHz
-73.51 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 8.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 15.000 GHz
Sweep 669 ms (601 pts)
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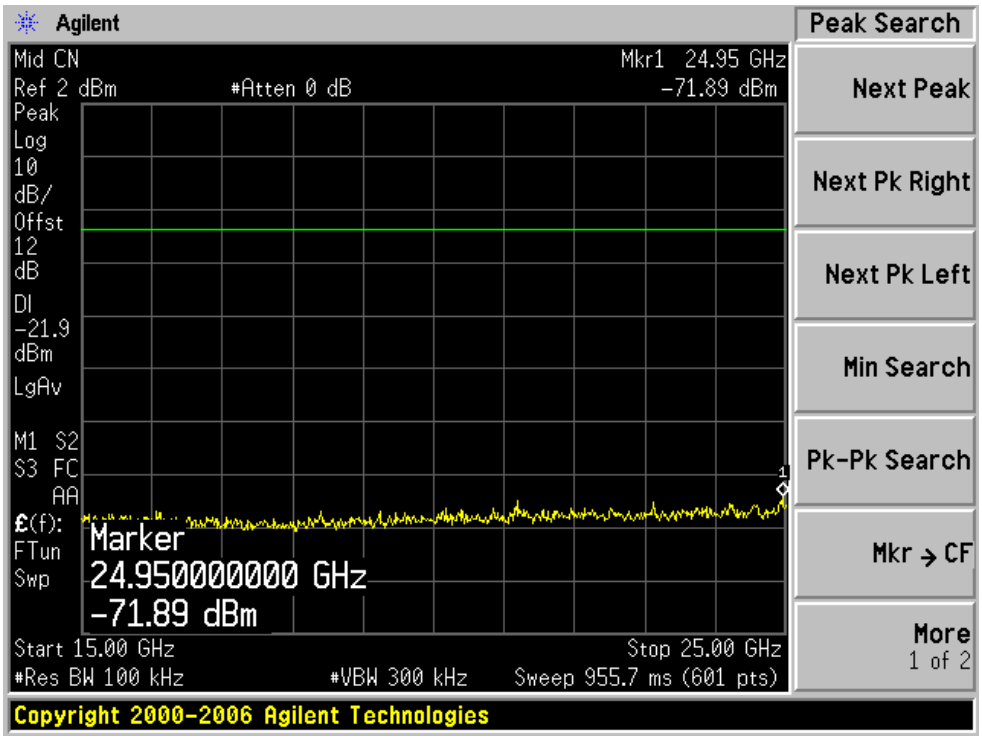
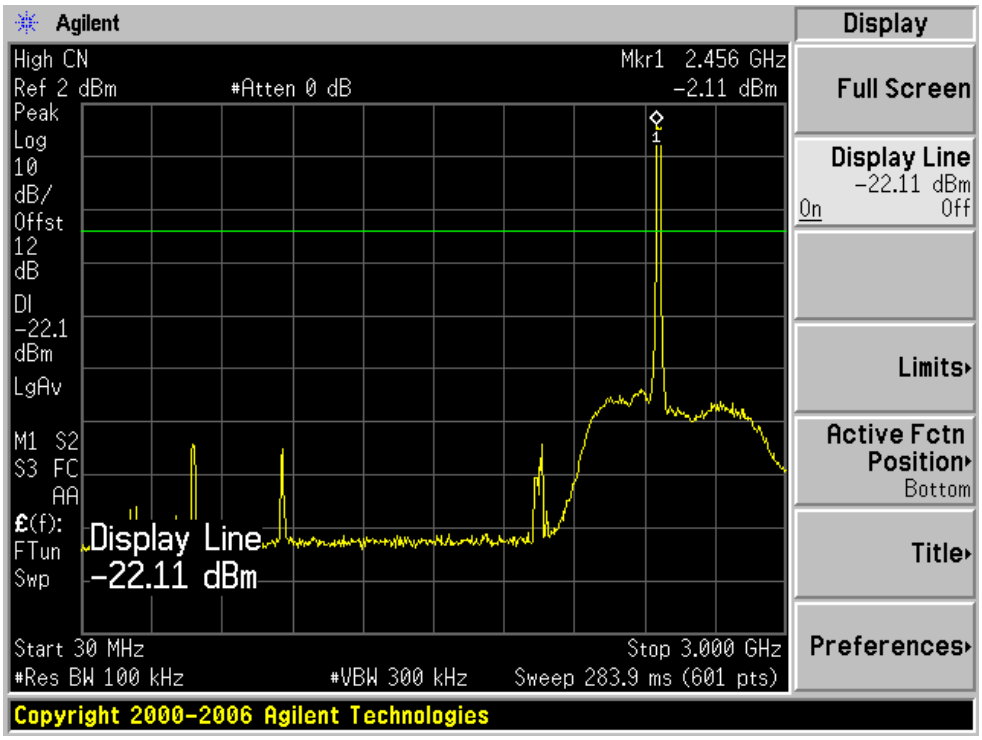
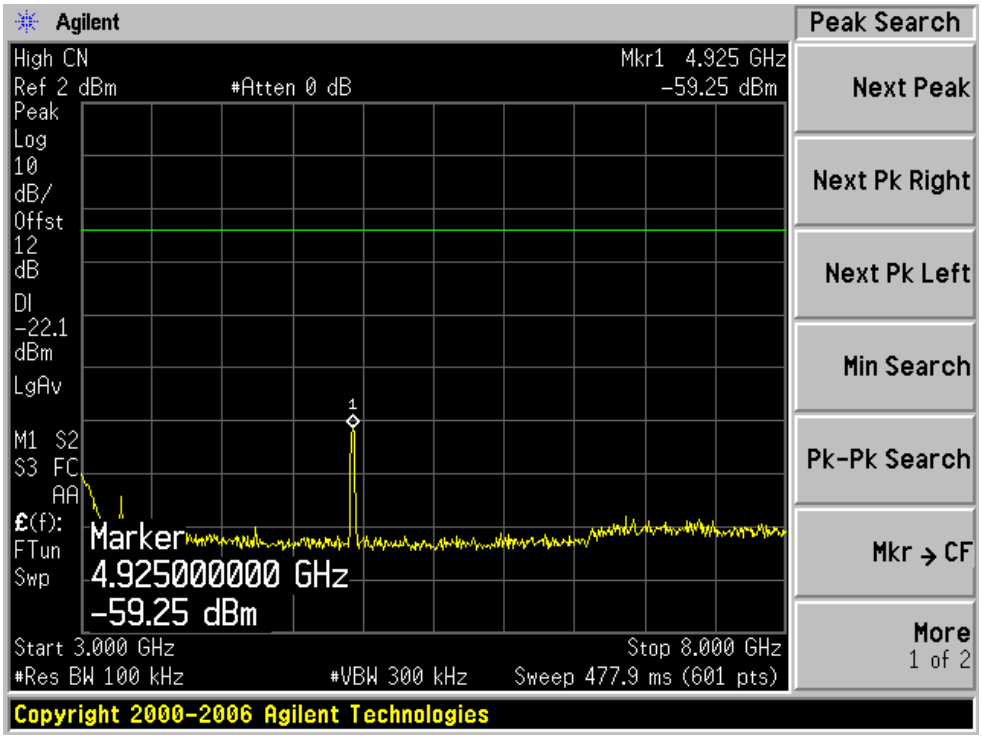
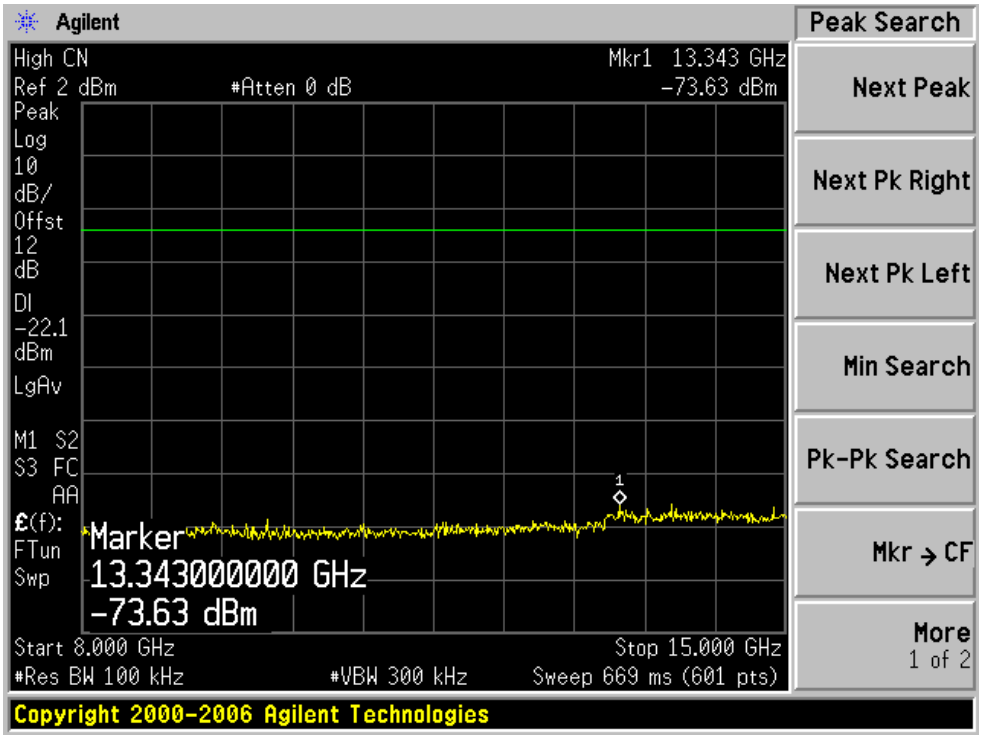
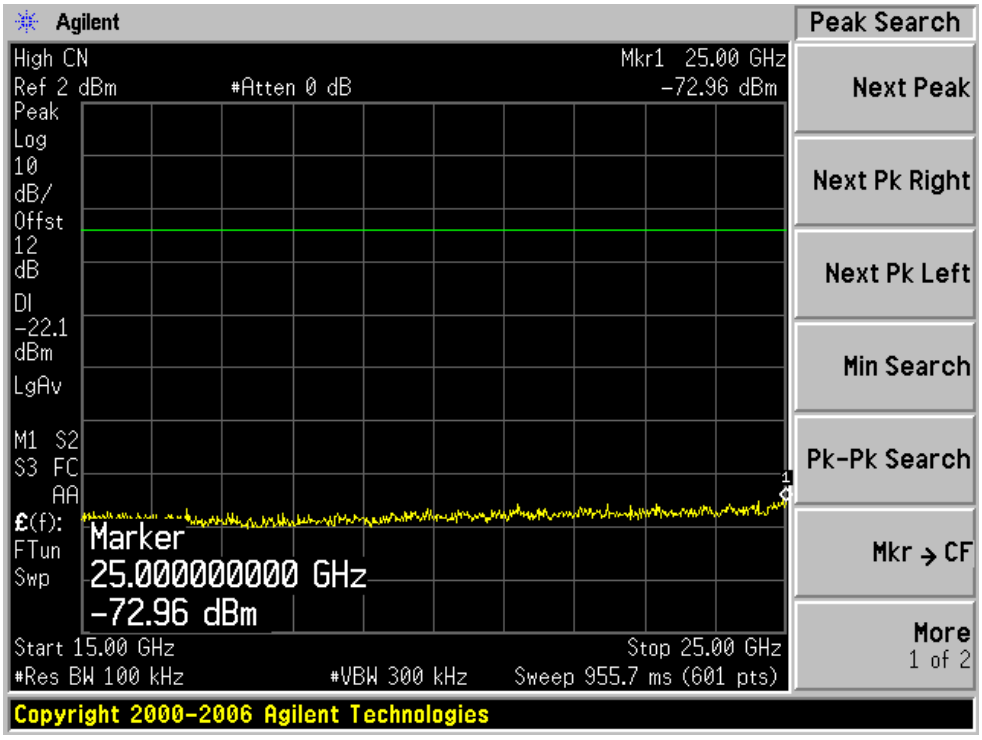

Agilent
Peak Search
Mid CN
Ref 2 dBm
#Atten 0 dB
Mkr1 24.95 GHz
-71.89 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-21.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
24.950000000 GHz
-71.89 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 15.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 955.7 ms (601 pts)
Copyright 2000-2006 Agilent Technologies

High Channel






Agilent
Peak Search
High CN
Mkr1 13.343 GHz
Ref 2 dBm
#Atten 0 dB
-73.63 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-22.1
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
13.343000000 GHz
-73.63 dBm
Start 8.000 GHz
Stop 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 669 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2006 Agilent Technologies


Agilent
Peak Search
High CN
Mkr1 25.00 GHz
Ref 2 dBm
#Atten 0 dB
-72.96 dBm
Peak
Log
10
dB/
Offst
12
dB
Dl
-22.1
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Marker
25.000000000 GHz
-72.96 dBm
Start 15.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 955.7 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
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8 FCC §15.109, §15.205, §15.209 & §15.247(c), IC RSS-Gen §4.9 - SPURIOUS RADIATED EMISSIONS

8.1 Applicable Standard

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

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

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

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

As per FCC §15.247(c)(1)(i): Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted 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.

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

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

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

IC RSS-GEN §4.9 the measurement method shall be described in the test report. The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements. The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

8.2 Test Setup

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

8.3 EUT Setup

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

The spacing between the peripherals was 10 centimeters.

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

8.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sonoma Instruments	Pre amplifier	317	260407	2007-04-26
HP	Pre amplifier	8449B	3147A00400	2007-06-27
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3	2007-03-05
A.R.A	Antenna Horn	DRG-118/A	1132	2007-06-18
Rohde & Schwarz	Receiver	ESCI	100337	2007-03-08
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

8.5 Test Procedure

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

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

The EUT is set 3 meters away from the testing antenna, which is varied from 1-4 meters, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

8.6 Corrected Amplitude & Margin Calculation

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

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

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

Margin = Corrected Amplitude - Limit

8.7 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-09-04.*

8.8 Summary of Test Results

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

Unintentional Emissions, (30-1000 MHz):

Mode: Receiver			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-0.4	71.992500	Horizontal	30 MHz to 1000 MHz

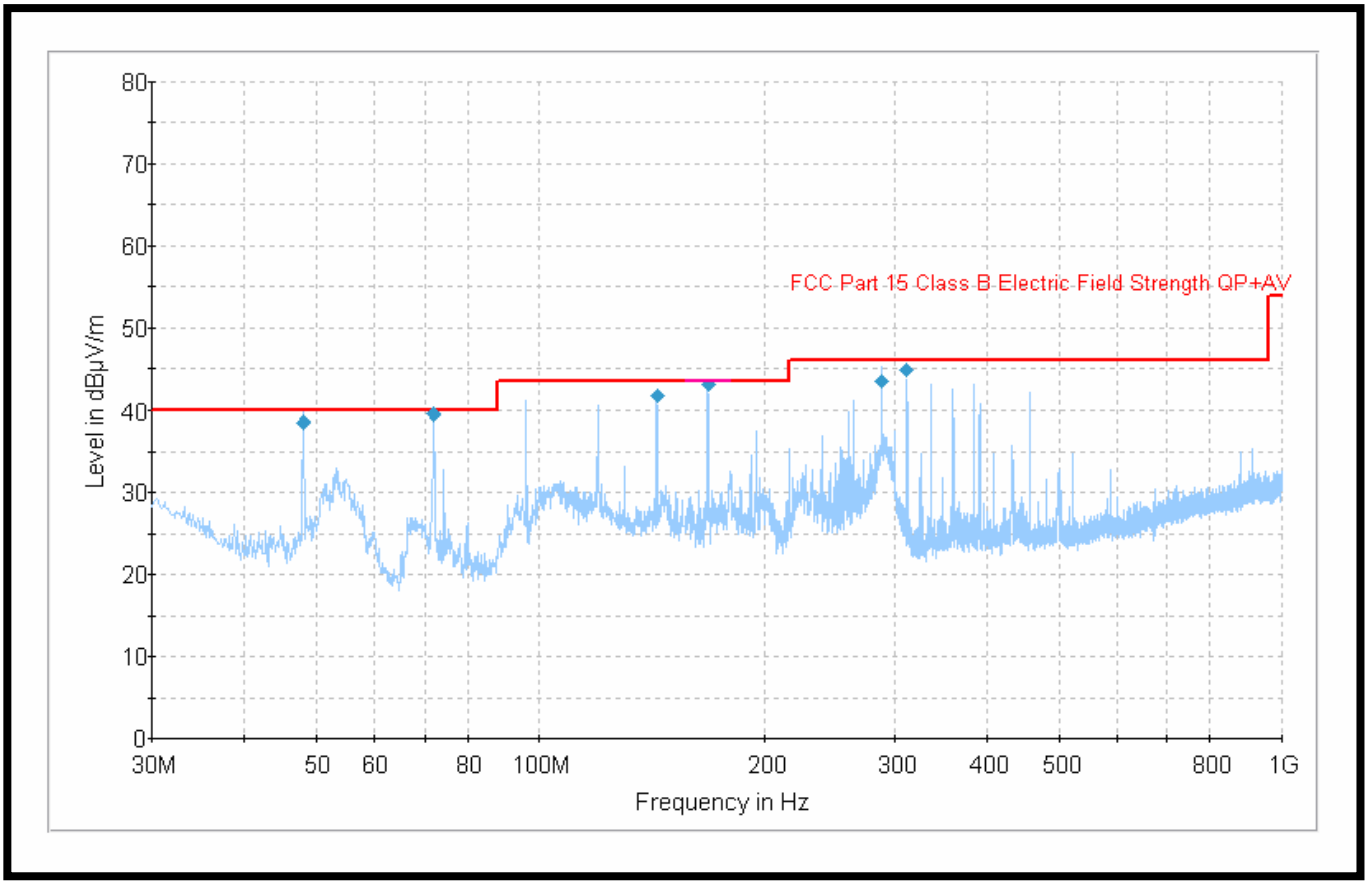
Out of Band Emissions:

Mode: Regular Antenna 802.11b (2412-2462 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range (GHz)**
-13.2	7236.0000	Vertical	Low, 1 GHz – 25GHz
-13.3	7311.0000	Vertical	Middle, 1 GHz – 25GHz
-13.0	7386.0000	Vertical	High, 1 GHz – 25GHz

Mode: Regular Antenna 802.11g (2412-2462 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range (GHz)**
-12.9	4824.0000	Vertical	Low, 1 GHz – 25GHz
-13.3	7311.0000	Vertical	Middle, 1 GHz – 25GHz
-13.7	7386.0000	Vertical	High, 1 GHz – 25GHz

8.9 Radiated Emissions Test plot & data:

30MHz -1GHz



Frequency (MHz)	Quasi-Peak (dBµV/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
71.992500	39.6	397.0	H	228.0	-6.6	40.0	-0.4
167.982500	42.8	162.0	H	31.0	-2.6	43.5	-0.7
311.987500	44.9	99.0	H	143.0	-0.3	46.0	-1.1
47.985000	38.5	100.0	V	256.0	-6.1	40.0	-1.5
144.015000	41.7	201.0	H	336.0	-1.7	43.5	-1.8
287.980000	43.5	114.0	H	26.0	-0.5	46.0	-2.5

8.10 Radiated Spurious Emissions Test Data

Regular Antenna (3.0 dBi)

802.11b, 2412 - 2462 MHz, Measured at 3 meters, 1 GHz – 25 GHz

Low channel 2412 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2412.00	108.2	220	1.5	V	28.2	4.4	36.2	104.6			Fund/Peak
2412.00	98.2	320	1.5	H	28.2	4.4	36.2	94.6			Fund/Peak
2412.00	103.6	220	1.8	V	28.2	4.4	36.2	100.0			Ave
2412.00	92.0	320	1.5	H	28.2	4.4	36.2	88.4			Ave
7236.00	27.8	90	2.0	V	37.6	12.3	36.9	40.8	54	-13.2	Ave
7236.00	27.0	200	1.0	H	37.6	12.3	36.9	40.0	54	-14.0	Ave
4824.00	35.2	260	1.2	V	32.1	6.0	34.4	38.9	54	-15.1	Ave
4824.00	28.3	180	2.3	H	32.1	6.0	34.4	32.0	54	-22.0	Ave
7236.00	35.5	90	2.0	V	37.6	12.3	36.9	48.5	74	-25.5	Peak
4824.00	44.6	260	1.2	V	32.1	6.0	34.4	48.3	74	-25.7	Peak
7236.00	34.1	200	1.0	H	37.6	12.3	36.9	47.1	74	-26.9	Peak
4824.00	37.1	70	1.7	H	32.1	6.0	34.4	40.8	74	-33.2	Peak

Middle channel 2437 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2437.00	107.4	45	1.0	V	28.2	4.4	36.2	103.8			Fund/Peak
2437.00	98.5	45	1.2	H	28.2	4.4	36.2	94.9			Fund/Peak
2437.00	104.2	45	1.0	V	28.2	4.4	36.2	100.6			Ave
2437.00	93.2	45	1.2	H	28.2	4.4	36.2	89.6			Ave
7311.00	27.7	30	1.3	V	37.6	12.3	36.9	40.7	54	-13.3	Ave
7311.00	27.3	180	1.0	H	37.6	12.3	36.9	40.3	54	-13.7	Ave
4874.00	32.8	300	1.3	V	32.1	6.0	34.4	36.5	54	-17.5	Ave
4874.00	28.4	160	2.2	H	32.1	6.0	34.4	32.1	54	-21.9	Ave
7311.00	35.5	30	1.3	V	37.6	12.3	36.9	48.5	74	-25.5	Peak
7311.00	34.7	180	1.0	H	37.6	12.3	36.9	47.7	74	-26.3	Peak
4874.00	42.3	300	1.3	V	32.1	6.0	34.4	46.0	74	-28.0	Peak
4874.00	34.7	160	2.2	H	32.1	6.0	34.4	38.4	74	-35.6	Peak

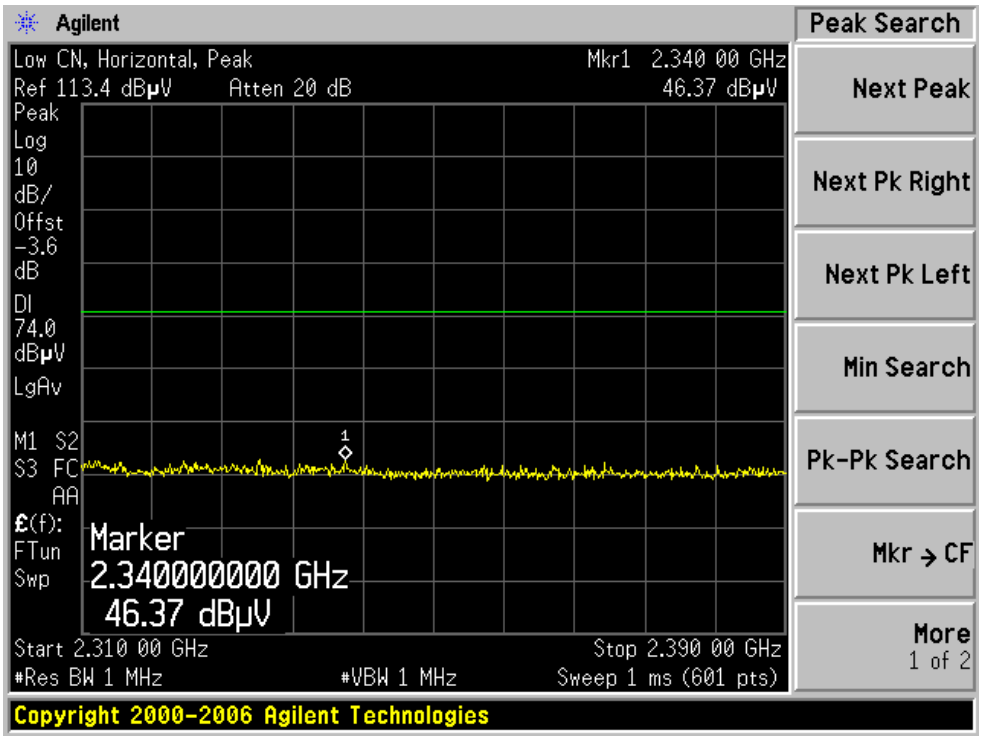
High channel 2462 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2462.00	107.6	40	1.3	V	28.2	4.4	36.2	104.0			Fund/Peak
2462.00	98.4	180	1.2	H	28.2	4.4	36.2	94.8			Fund/Peak
2462.00	103.5	40	1.3	V	28.2	4.4	36.2	99.9			Ave
2462.00	92.0	180	1.2	H	28.2	4.4	36.2	88.4			Ave
7386.00	28.0	270	2.4	V	37.6	12.3	36.9	41.0	54	-13.0	Ave
7386.00	27.5	180	1.2	H	37.6	12.3	36.9	40.5	54	-13.5	Ave
4924.00	33.0	60	2.0	V	32.1	6.0	34.4	36.7	54	-17.3	Ave
4924.00	29.1	90	2.1	H	32.1	6.0	34.4	32.8	54	-21.2	Ave
7386.00	36.0	270	2.4	V	37.6	12.3	36.9	49.0	74	-25.0	Peak
7386.00	34.5	180	1.2	H	37.6	12.3	36.9	47.5	74	-26.5	Peak
4924.00	43.4	60	2.0	V	32.1	6.0	34.4	47.1	74	-26.9	Peak
4924.00	35.6	90	2.1	H	32.1	6.0	34.4	39.3	74	-34.7	Peak

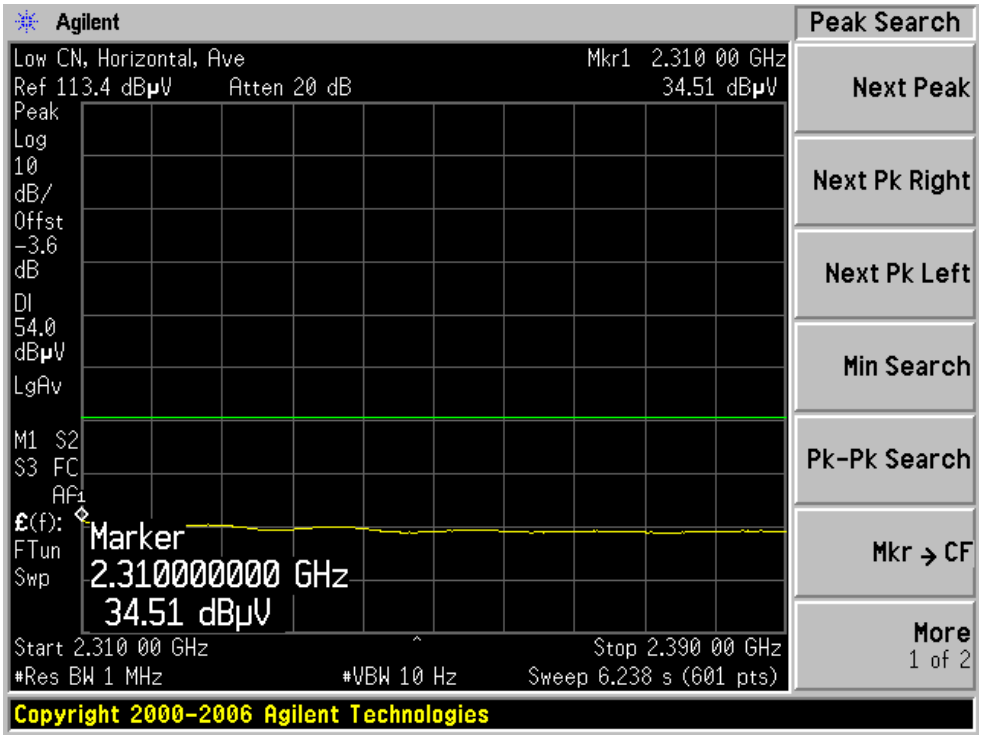
Restricted Band Edge

Low Channel

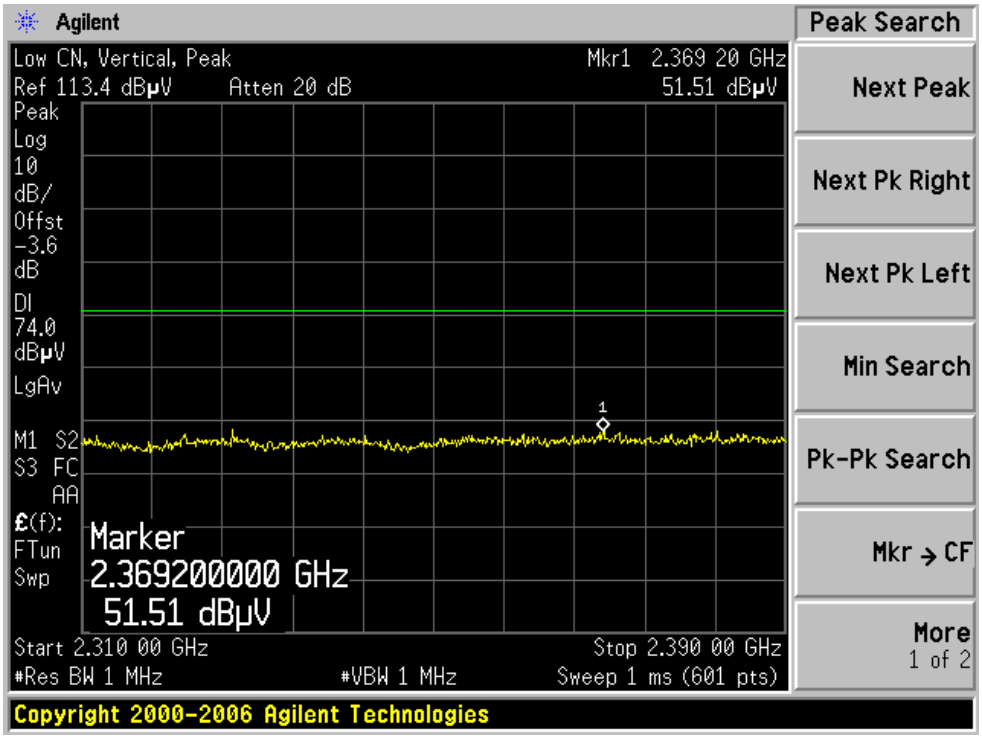
Peak, Horizontal



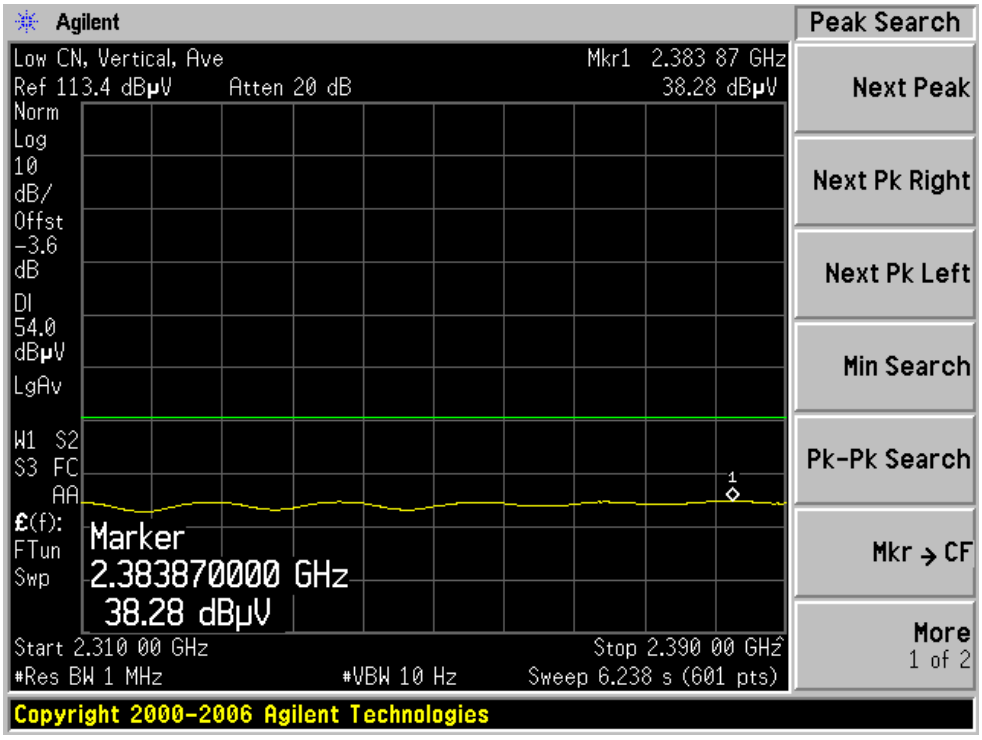
Average, Horizontal



Peak, Vertical

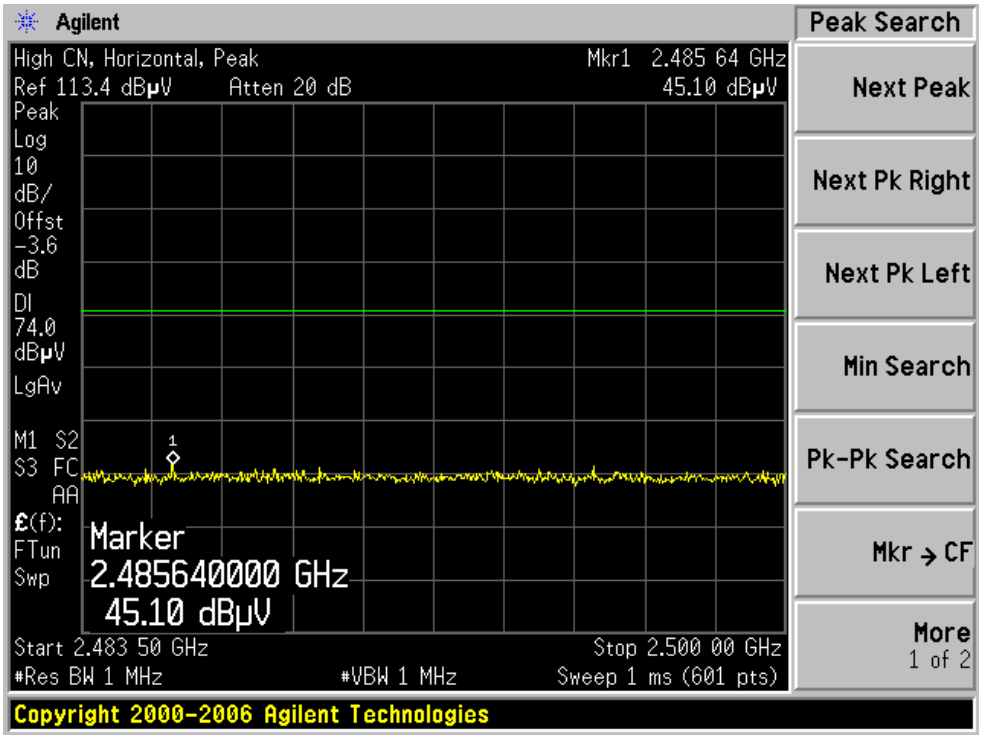


Average, Vertical

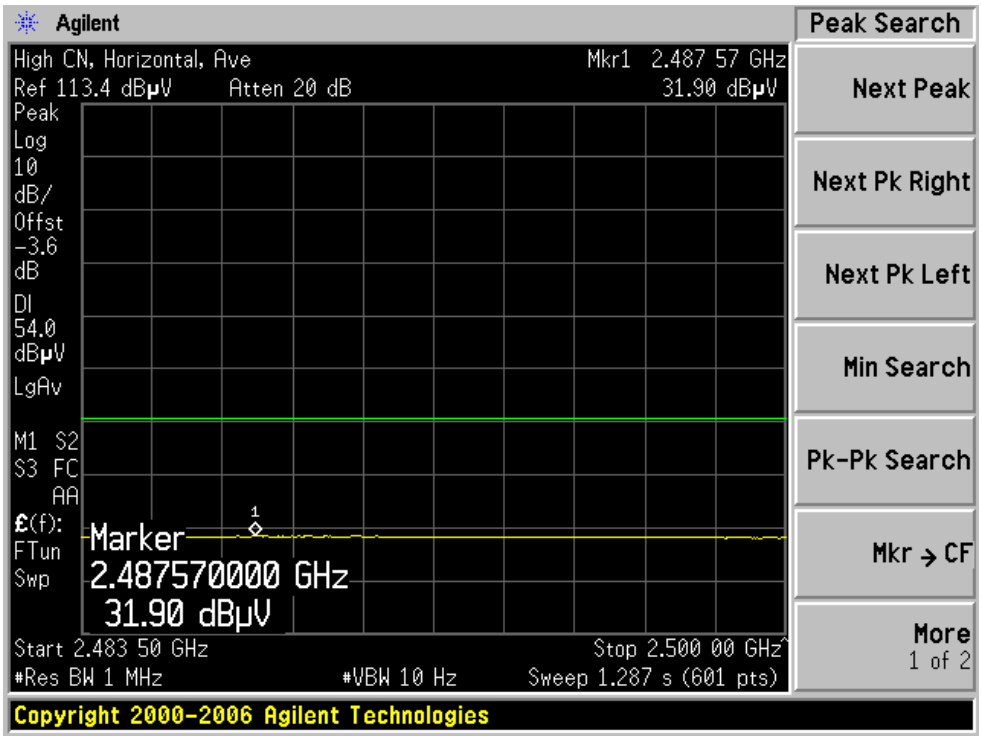


High Channel

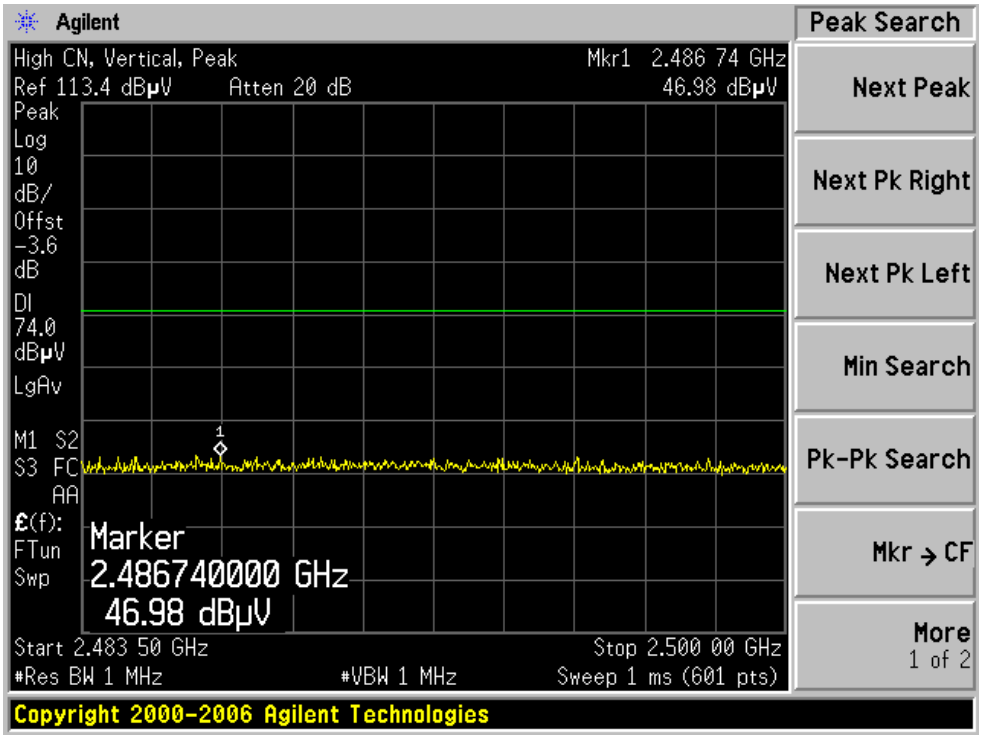
Peak, Horizontal



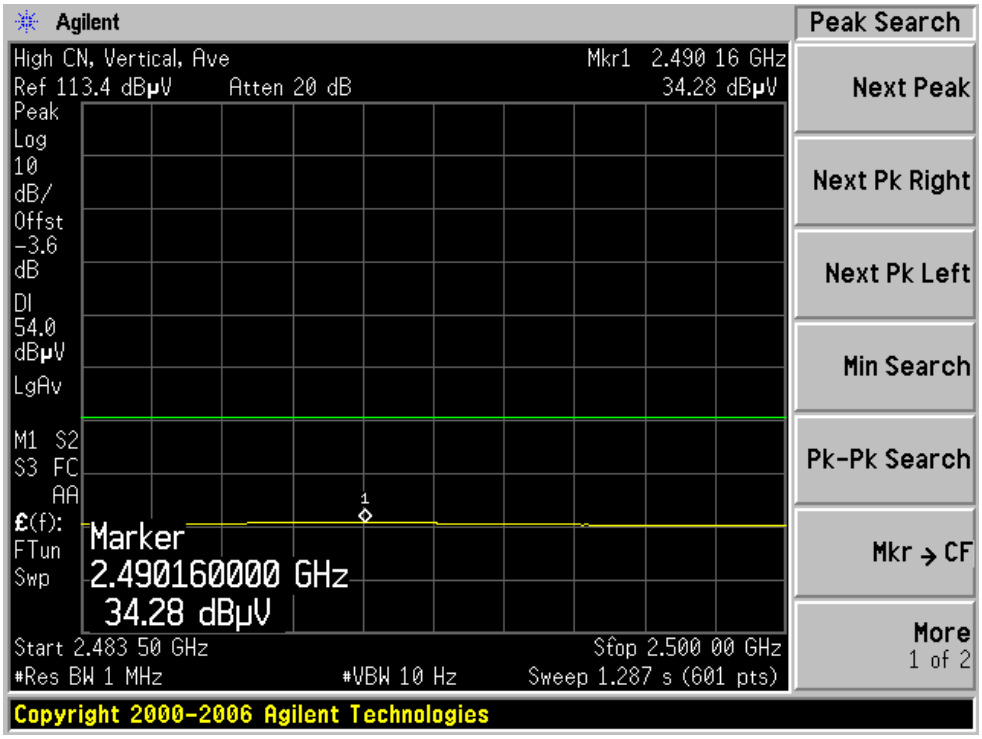
Average, Horizontal



Peak, Vertical



Average, Vertical



Regular Antenna (3.0 dBi)

802.11g, 2412 - 2462 MHz, Measured at 3 meters, 1 GHz – 25 GHz

Low channel 2412 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2412.00	104.7	50	1.5	V	28.2	4.4	36.2	101.1			Fund/Peak
2412.00	94.2	60	1.5	H	28.2	4.4	36.2	90.6			Fund/Peak
2412.00	99.8	50	1.8	V	28.2	4.4	36.2	96.2			Ave
2412.00	87.0	60	1.5	H	28.2	4.4	36.2	83.4			Ave
4824.00	37.4	300	1.3	V	32.1	6.0	34.4	41.1	54	-12.9	Ave
7236.00	28.1	90	2.0	V	37.6	12.3	36.9	41.1	54	-12.9	Ave
7236.00	27.0	200	1.0	H	37.6	12.3	36.9	40.0	54	-14.0	Ave
4824.00	32.5	0	2.0	H	32.1	6.0	34.4	36.2	54	-17.8	Ave
4824.00	46.5	300	1.3	V	32.1	6.0	34.4	50.2	74	-23.8	Peak
7236.00	35.4	90	2.0	V	37.6	12.3	36.9	48.4	74	-25.6	Peak
7236.00	34.7	200	1.0	H	37.6	12.3	36.9	47.7	74	-26.3	Peak
4824.00	43.2	0	2.0	H	32.1	6.0	34.4	46.9	74	-27.1	Peak

Middle channel 2437 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2437.00	103.2	45	1.0	V	28.2	4.4	36.2	99.6			Fund/Peak
2437.00	94.5	45	1.2	H	28.2	4.4	36.2	90.9			Fund/Peak
2437.00	99.6	45	1.0	V	28.2	4.4	36.2	96.0			Ave
2437.00	87.9	45	1.2	H	28.2	4.4	36.2	84.3			Ave
7311.00	27.7	30	1.3	V	37.6	12.3	36.9	40.7	54	-13.3	Ave
7311.00	27.2	180	1.0	H	37.6	12.3	36.9	40.2	54	-13.8	Ave
4874.00	31.8	35	1.5	V	32.1	6.0	34.4	35.5	54	-18.5	Ave
4874.00	28.0	160	2.2	H	32.1	6.0	34.4	31.7	54	-22.3	Ave
4874.00	44.2	35	1.5	V	32.1	6.0	34.4	47.9	74	-26.1	Peak
7311.00	34.8	30	1.3	V	37.6	12.3	36.9	47.8	74	-26.2	Peak
7311.00	34.0	180	1.0	H	37.6	12.3	36.9	47.0	74	-27.0	Peak
4874.00	40.3	160	2.2	H	32.1	6.0	34.4	44.0	74	-30.0	Peak

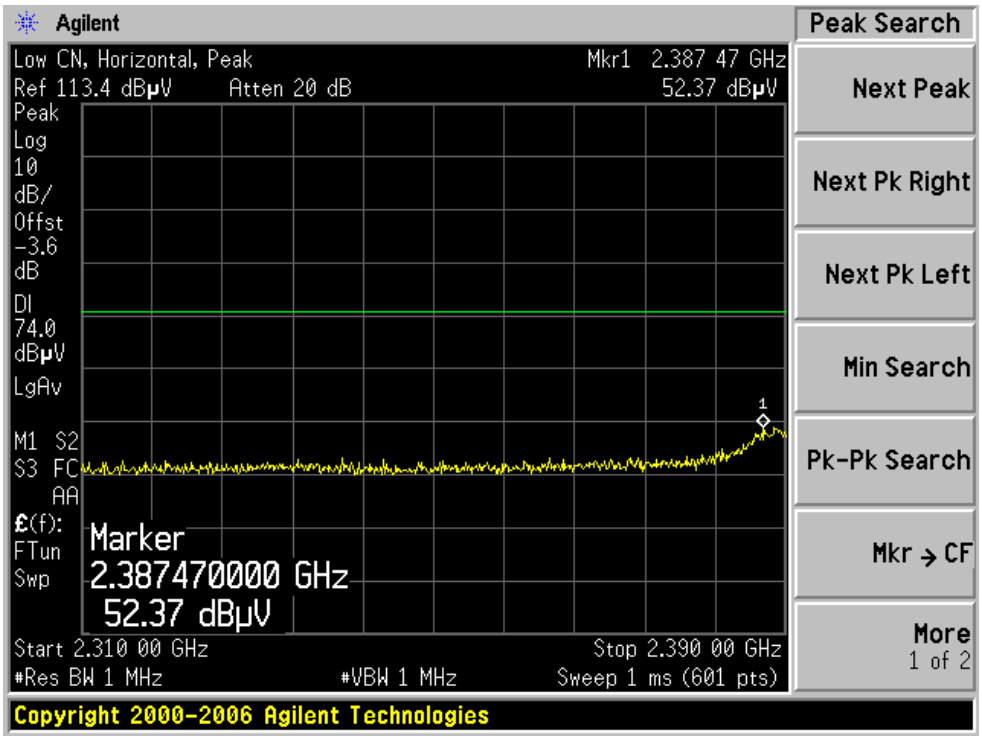
High channel 2462 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2462.00	102.9	60	1.3	V	28.2	4.4	36.2	99.3			Fund/Peak
2462.00	95.7	180	1.2	H	28.2	4.4	36.2	92.1			Fund/Peak
2462.00	98.1	60	1.3	V	28.2	4.4	36.2	94.5			Ave
2462.00	88.6	180	1.2	H	28.2	4.4	36.2	85.0			Ave
7386.00	27.3	270	2.4	V	37.6	12.3	36.9	40.3	54	-13.7	Ave
7386.00	27.0	180	1.2	H	37.6	12.3	36.9	40.0	54	-14.0	Ave
4924.00	33.6	60	2.0	V	32.1	6.0	34.4	37.3	54	-16.7	Ave
4924.00	31.8	90	2.1	H	32.1	6.0	34.4	35.5	54	-18.5	Ave
4924.00	45.3	60	2.0	V	32.1	6.0	34.4	49.0	74	-25.0	Peak
7386.00	33.5	270	2.4	V	37.6	12.3	36.9	46.5	74	-27.5	Peak
4924.00	41.9	90	2.1	H	32.1	6.0	34.4	45.6	74	-28.4	Peak
7386.00	32.4	180	1.2	H	37.6	12.3	36.9	45.4	74	-28.6	Peak

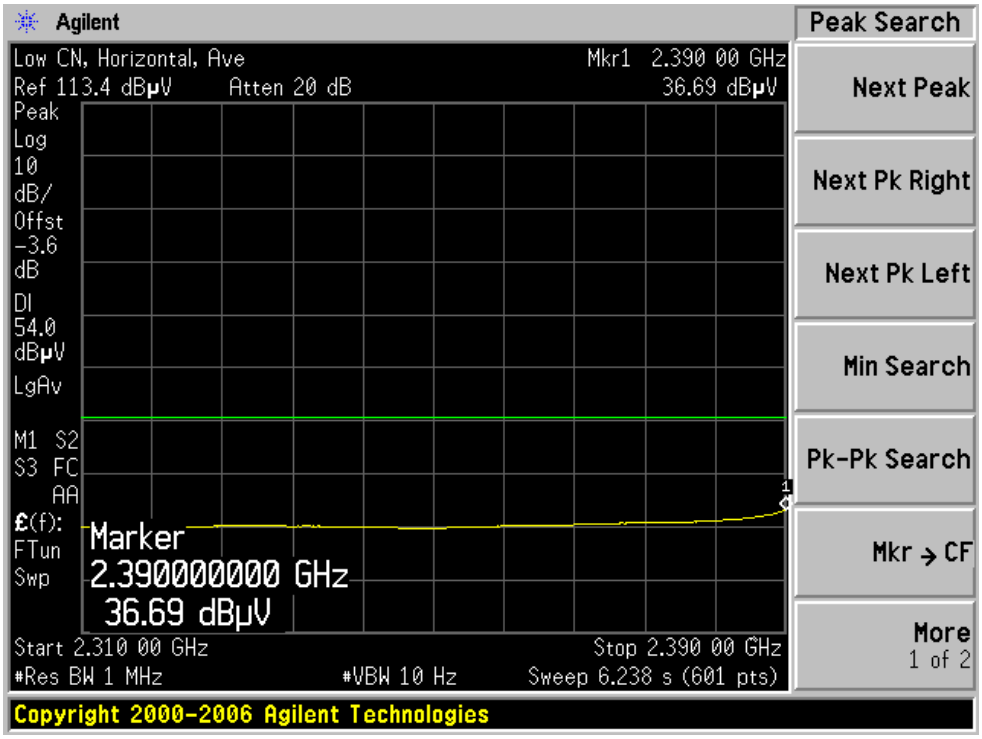
Restricted Band Edge

Low Channel

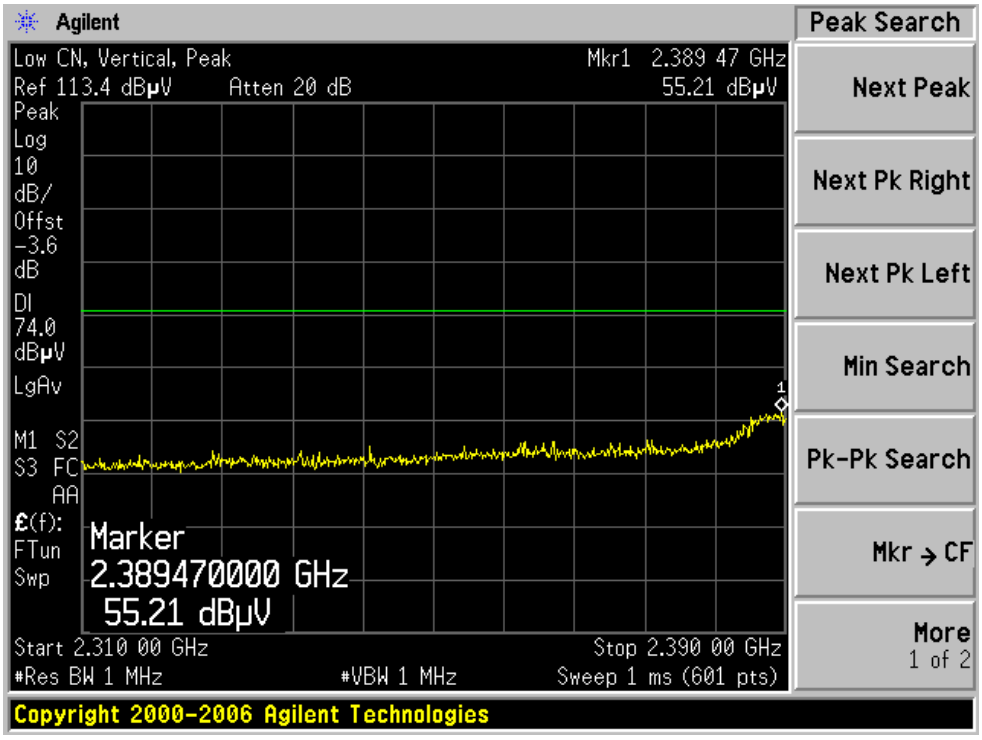
Peak, Horizontal



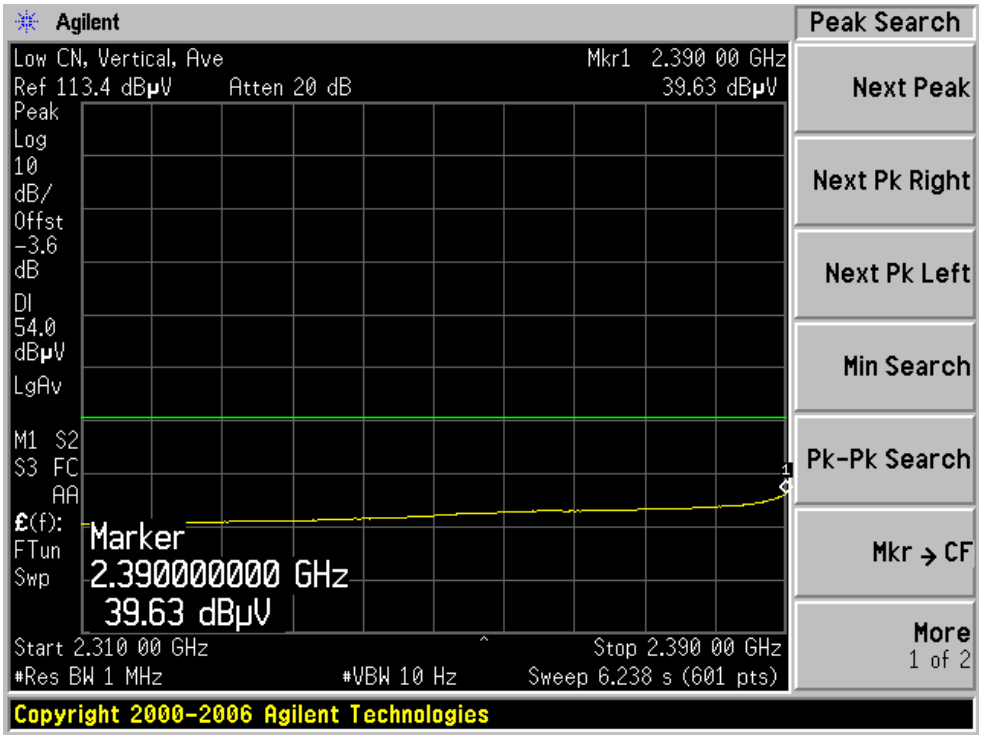
Average, Horizontal



Peak, Vertical

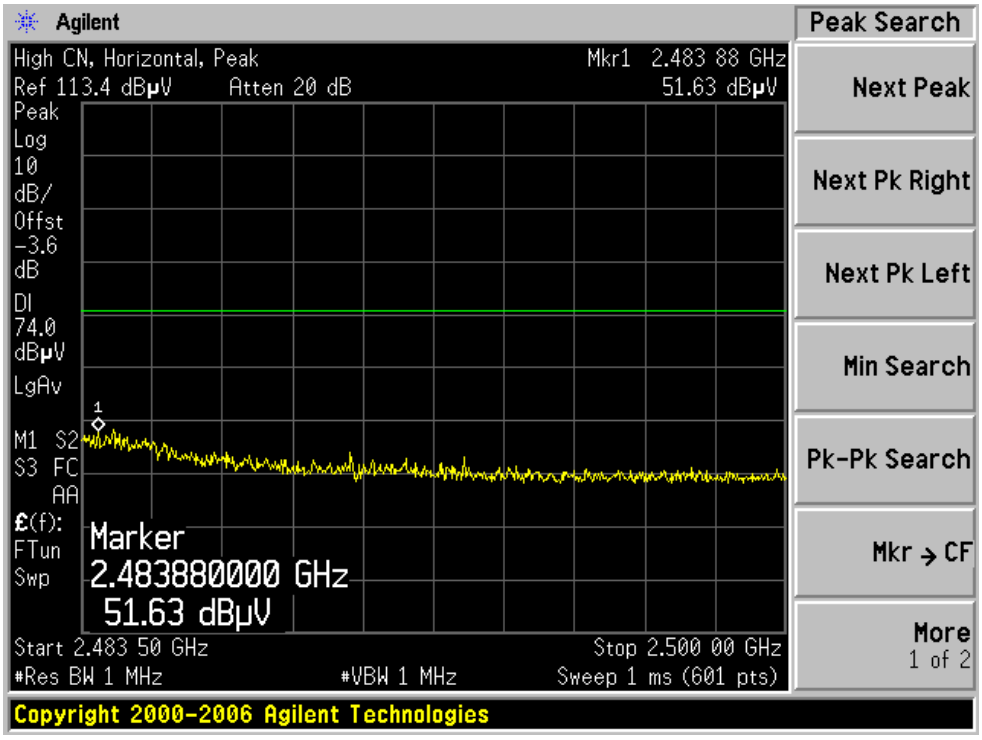


Average, Vertical

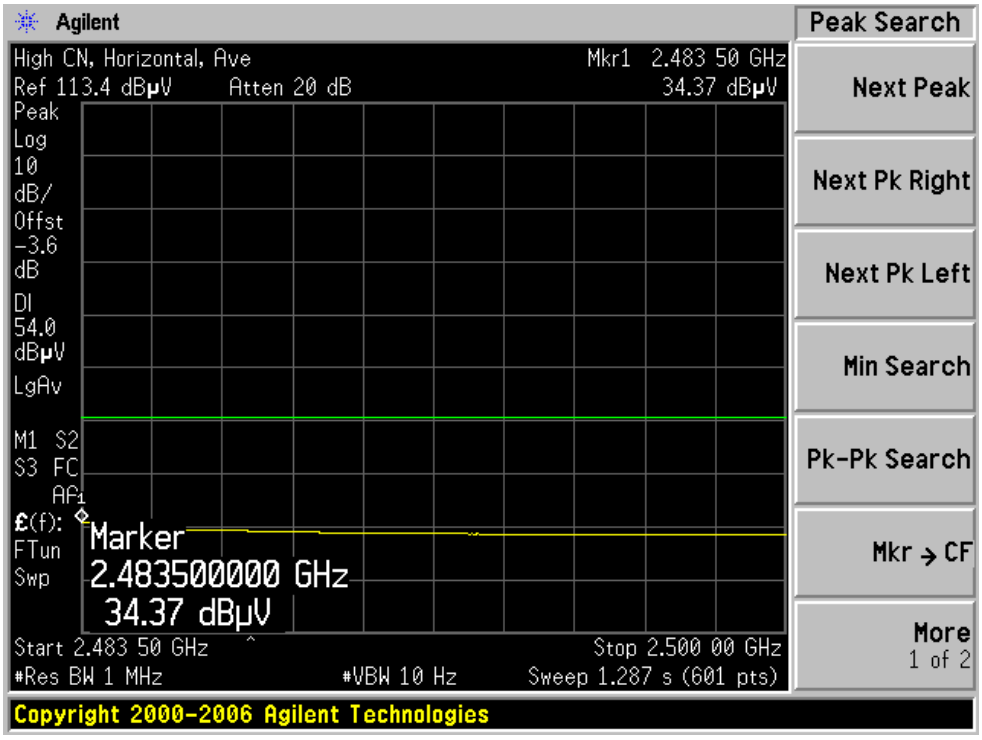


High Channel

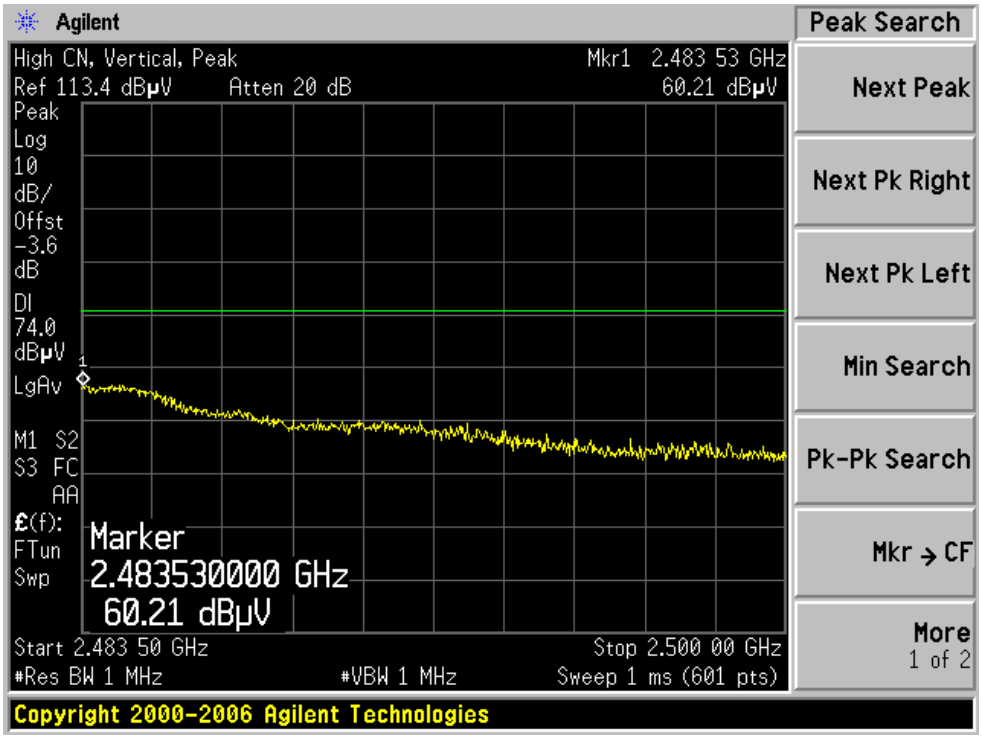
Peak, Horizontal



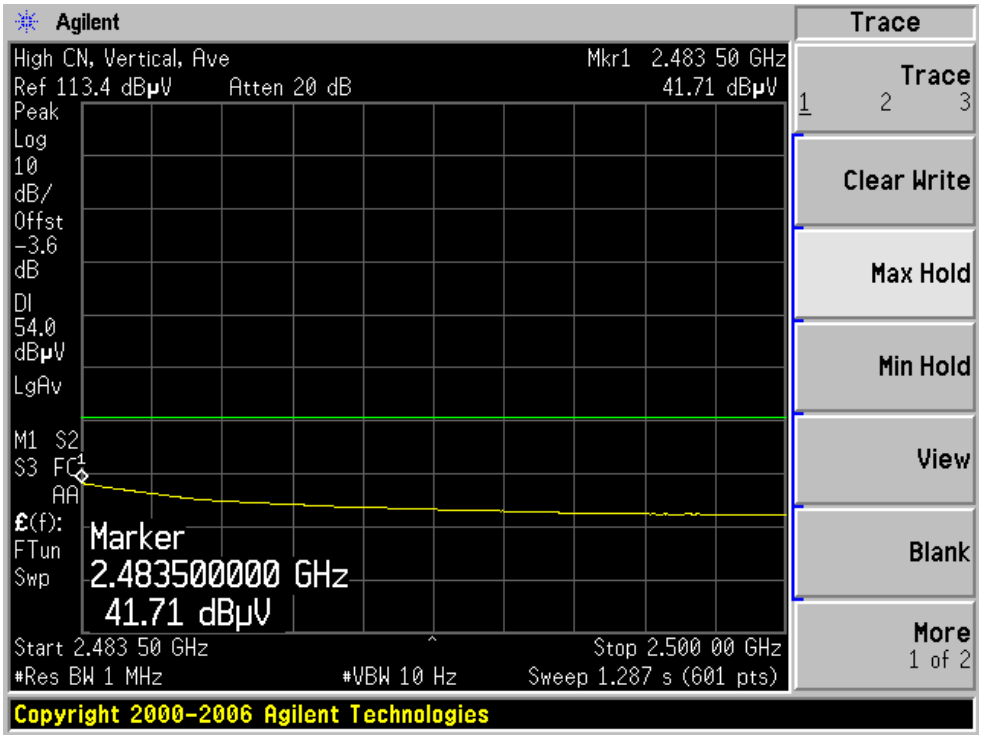
Average, Horizontal



Peak, Vertical



Average, Vertical



9 FCC §15.247(a) (2), RSS-210 § A8.2 (a) – 6 dB BANDWIDTH & OCCUPIED BANDWIDTH

9.1 Applicable Standard

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

9.2 Measurement Procedure

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

9.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

9.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-09-05.*

9.5 Summary of Test Results

802.11b

Channel	Frequency (MHz)	6 dB BW (kHz)	Limit (kHz)	Result
Low	2412	9592	>500	Compliant
Middle	2437	9592	>500	Compliant
High	2462	9589	>500	Compliant

Channel	Frequency (MHz)	99% Occupied BW (kHz)
Low	2412	13605
Middle	2437	13620
High	2462	13627

802.11g

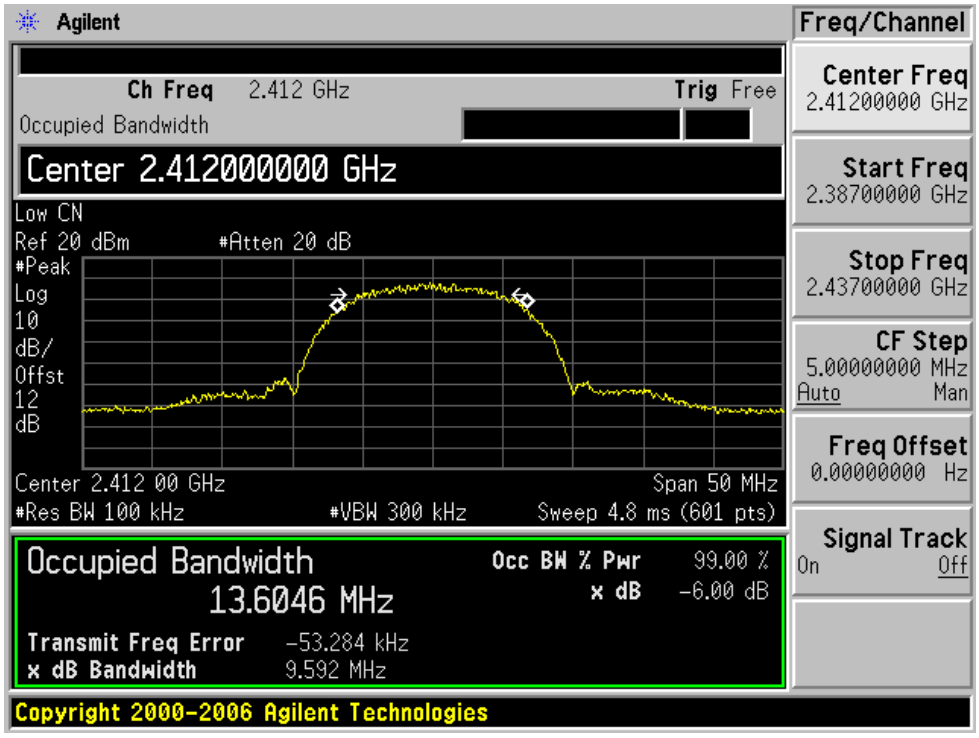
Channel	Frequency (MHz)	6 dB BW (kHz)	Limit (kHz)	Result
Low	2412	16610	>500	Compliant
Middle	2437	16560	>500	Compliant
High	2462	16594	>500	Compliant

Channel	Frequency (MHz)	99% Occupied BW (kHz)
Low	2412	16494
Middle	2437	16469
High	2462	16491

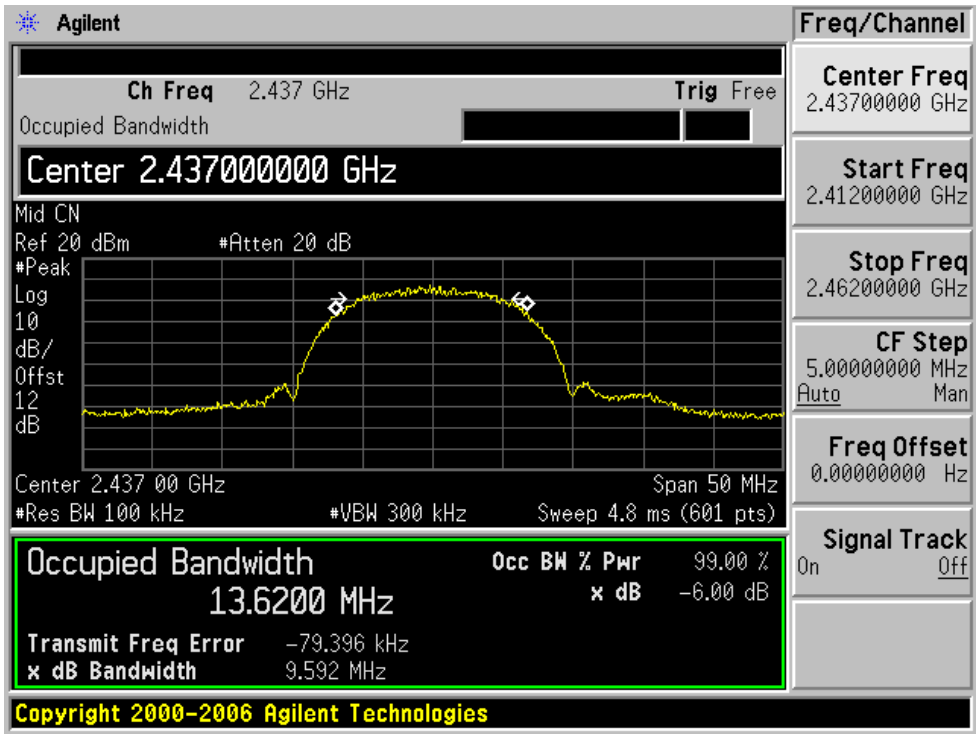
Please refer to the following plots for detailed test results

802.11b

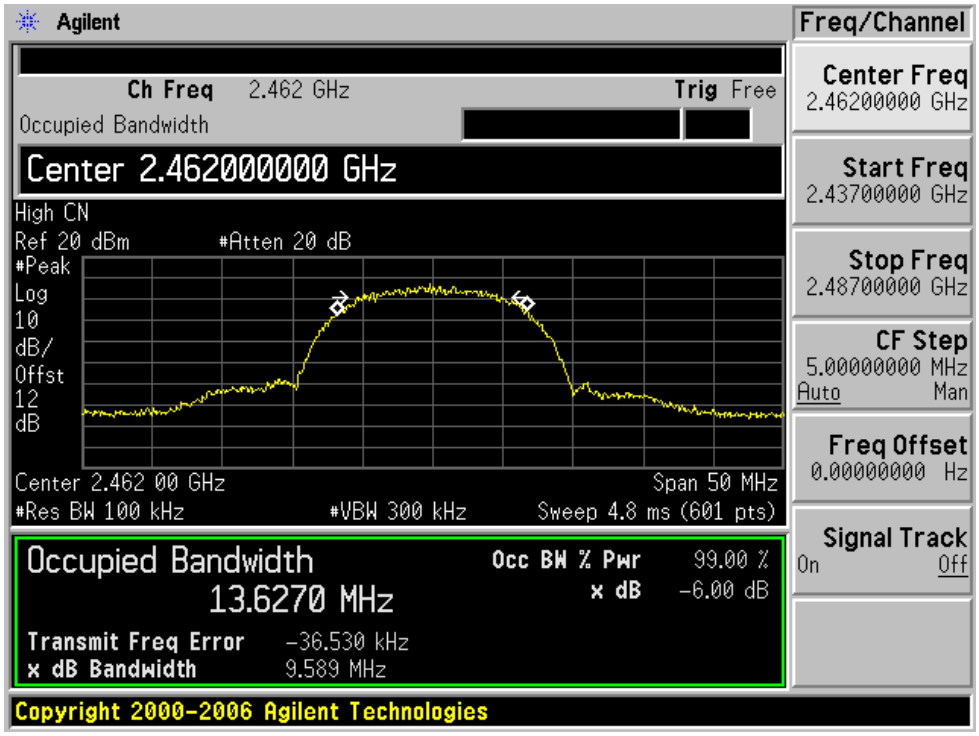
Low Channel



Mid Channel

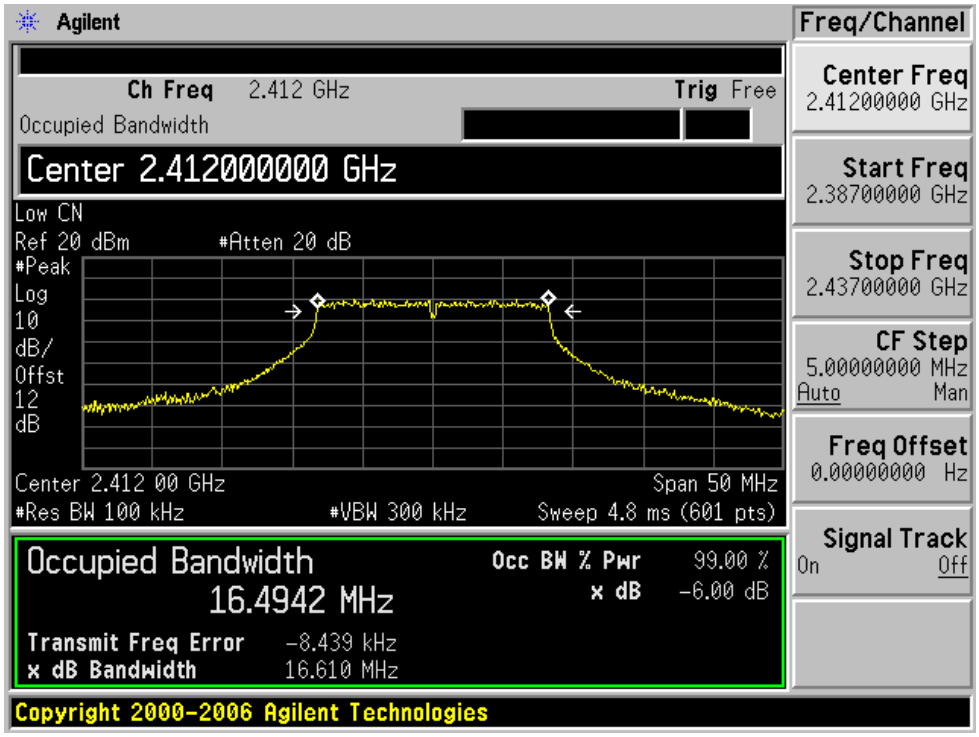


High Channel

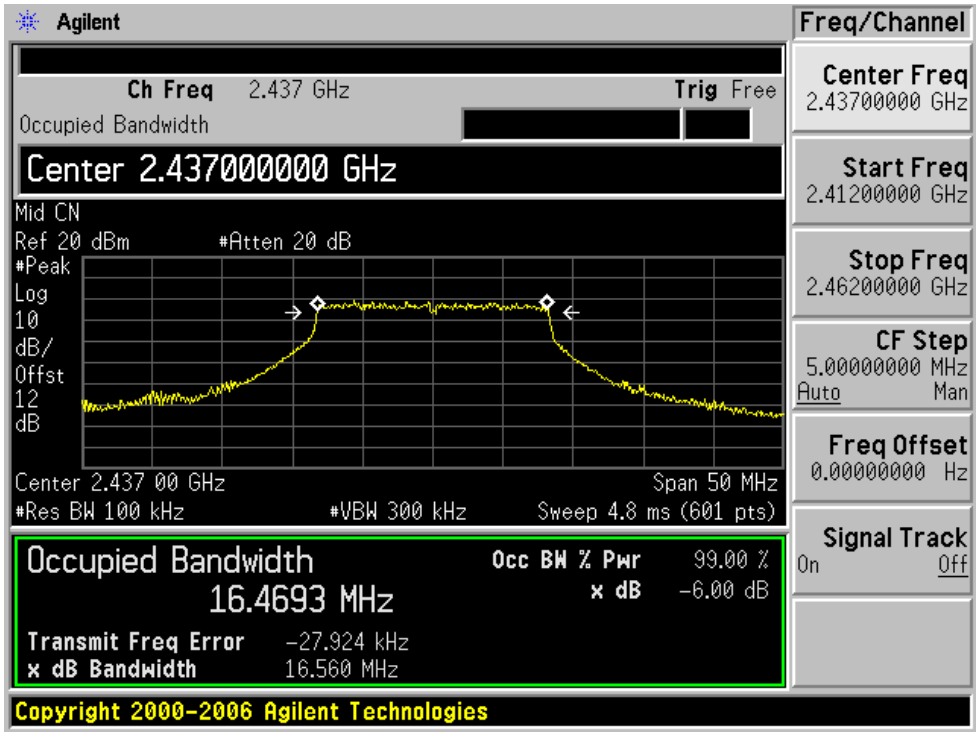


802.11g

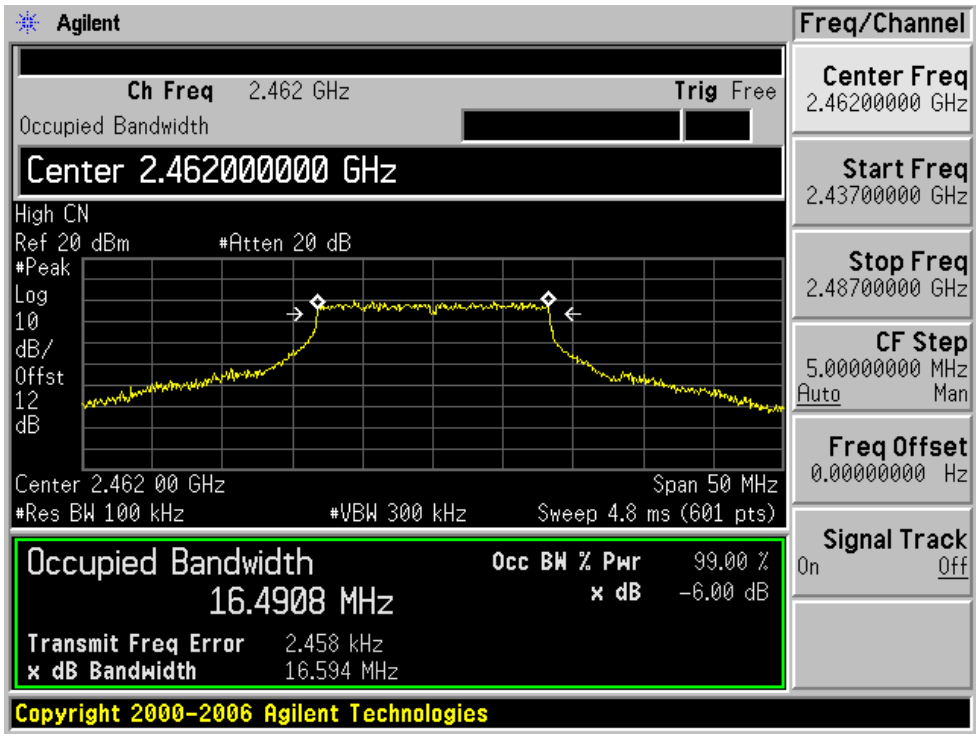
Low Channel



Mid Channel



High Channel



10 FCC §15.247(b), RSS210 § A8.4 - PEAK OUTPUT POWER MEASUREMENT

10.1 Applicable Standard

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

§15.247(b) (3) and RSS210 § A8.4 (4) for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

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

10.2 Measurement Procedure

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

10.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

10.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-07-09-05.*

10.5 Summary of Test Results

802.11b

Channel	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Limit (mW)	Result
Low	2412	14.71	29.58	1000	Compliant
Mid	2437	14.77	29.99	1000	Compliant
High	2462	14.69	29.44	1000	Compliant

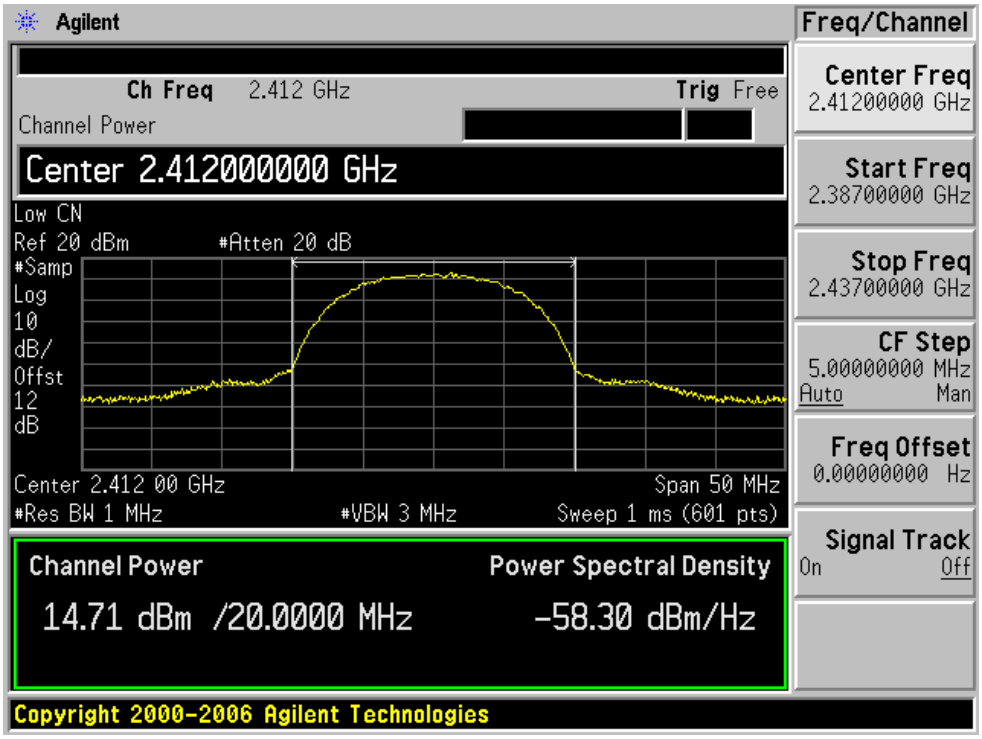
802.11g

Channel	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Limit (mW)	Result
Low	2412	12.24	16.75	1000	Compliant
Mid	2437	12.27	16.87	1000	Compliant
High	2462	12.40	17.38	1000	Compliant

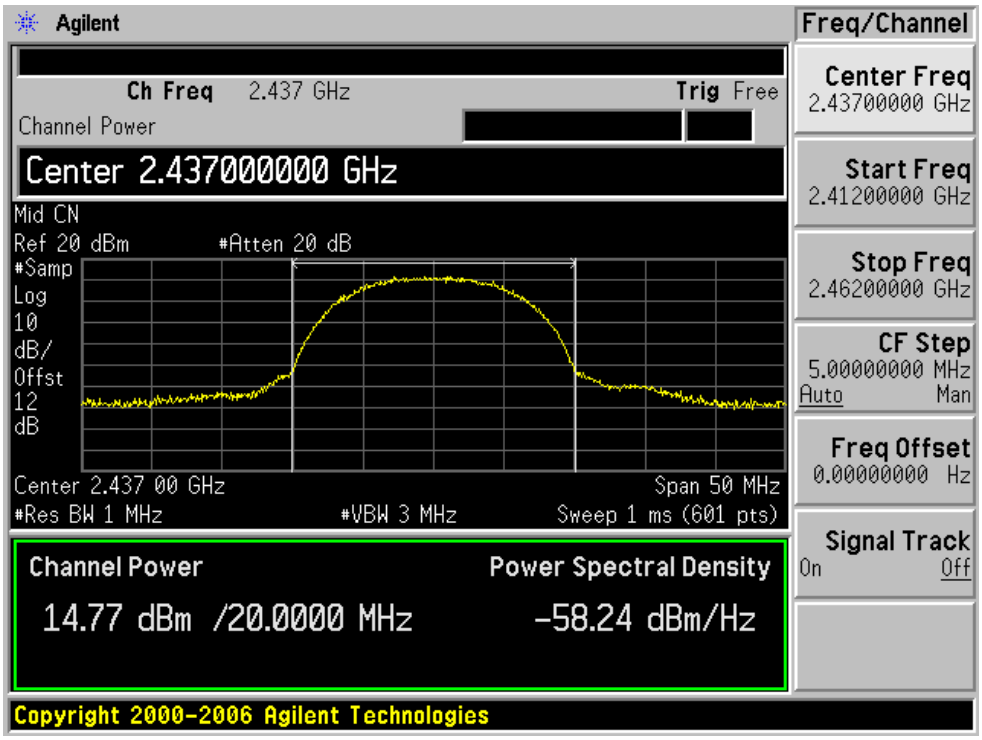
Please See the Following Plots

802.11b

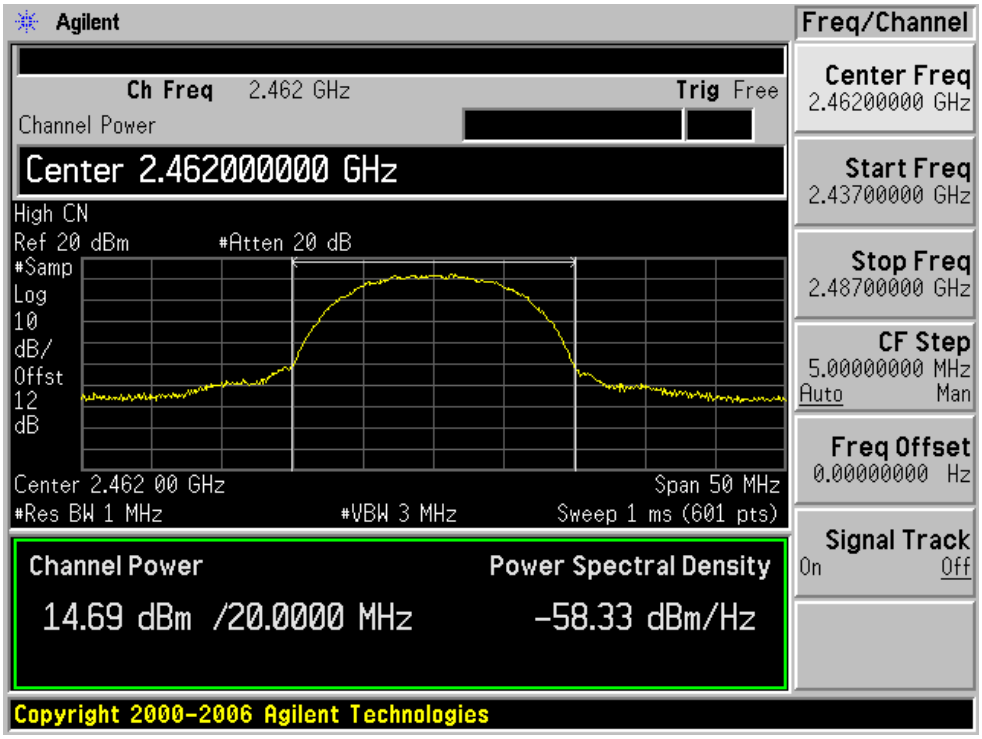
Low Channel



Mid Channel

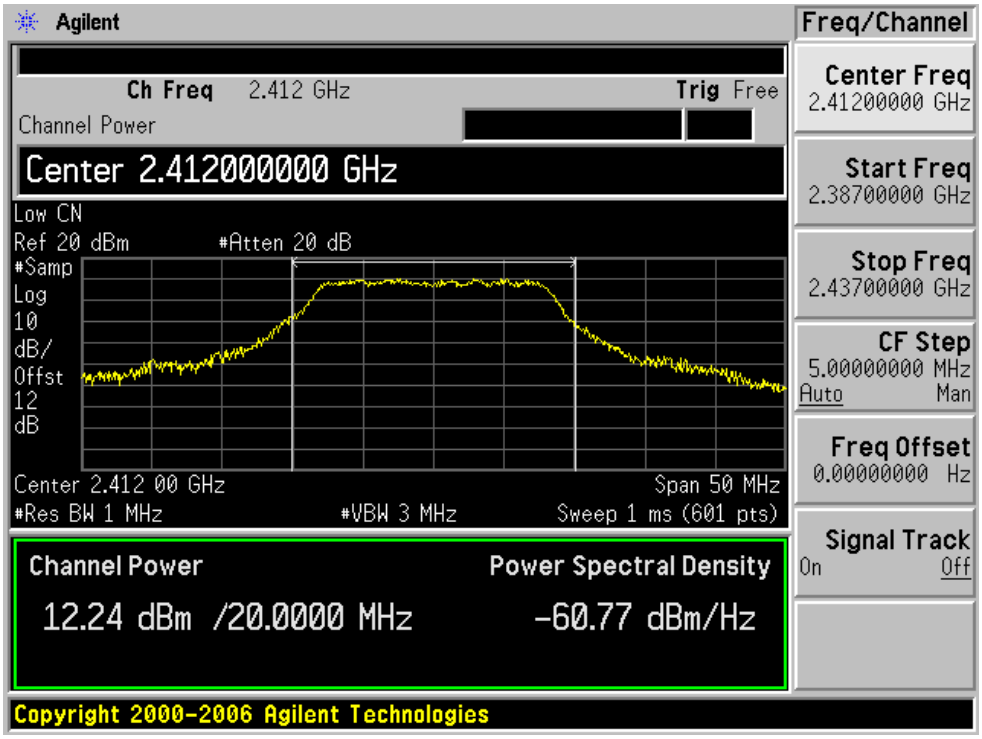


High Channel

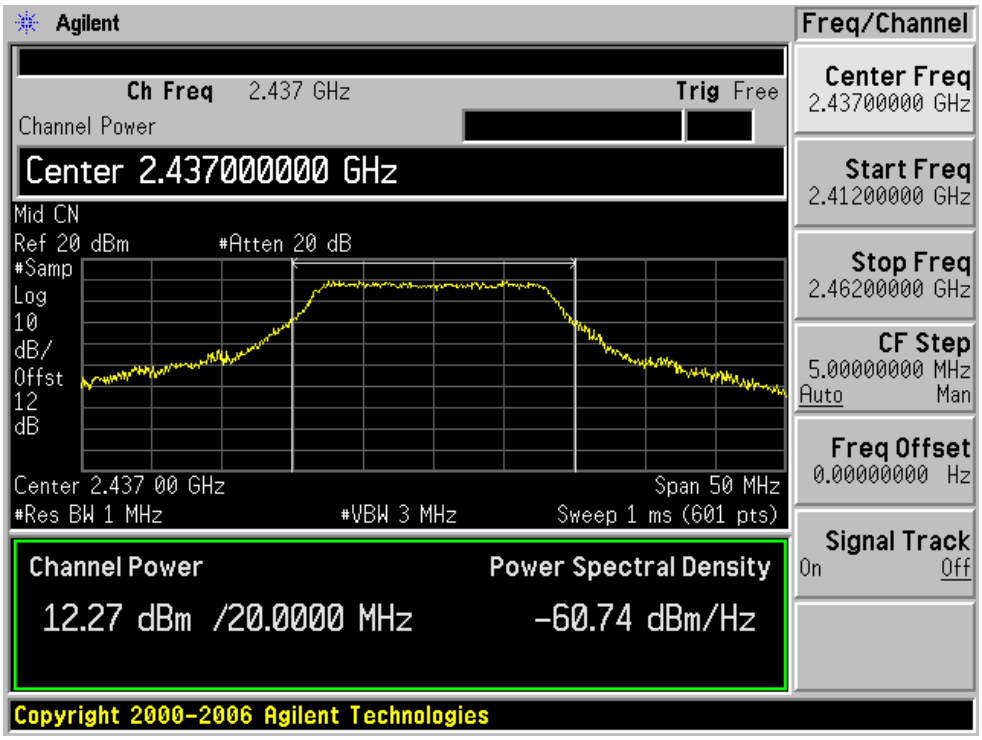


802.11g

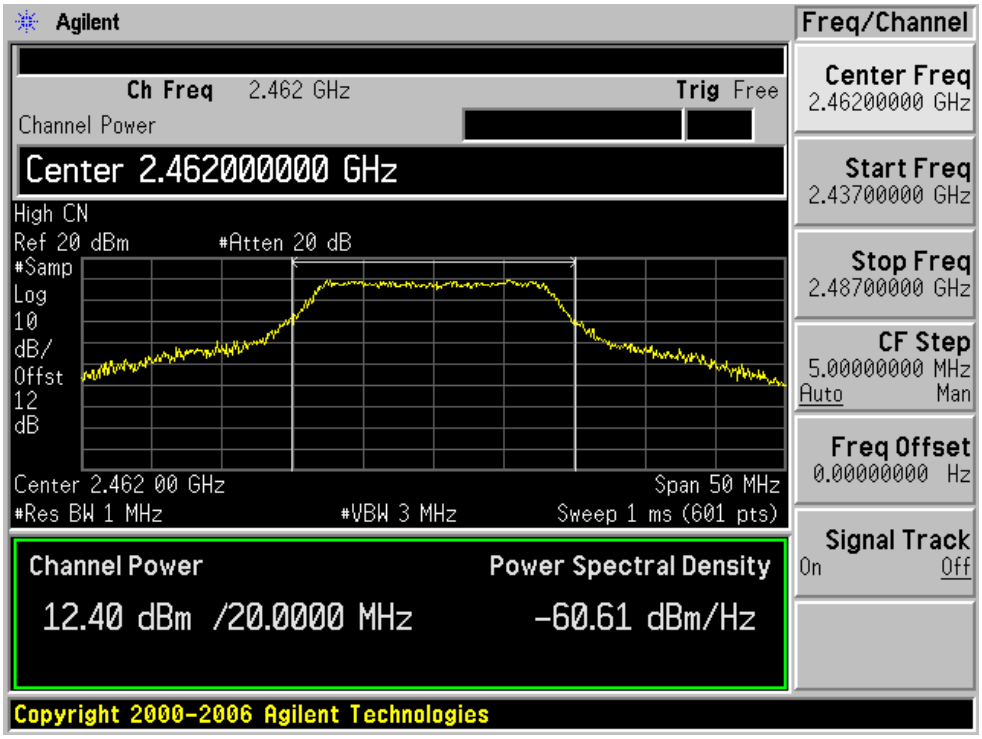
Low Channel



Mid Channel



High Channel



11 FCC §15.247(d), RSS-210 § A8.5 - 100 kHz BANDWIDTH OF BAND EDGES

11.1 Applicable Standard

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

RSS210§ A8.5: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emissions limits specified in Tables 2 and 3.

11.2 Measurement Procedure

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

11.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

11.4 Environmental Conditions

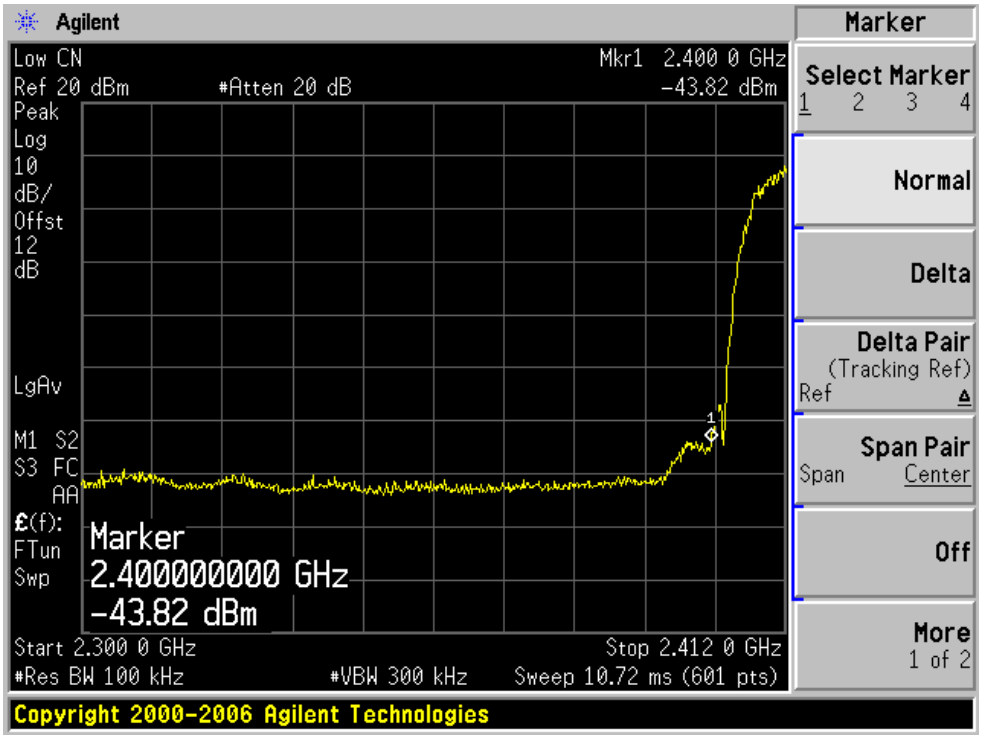
Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-09-05.*

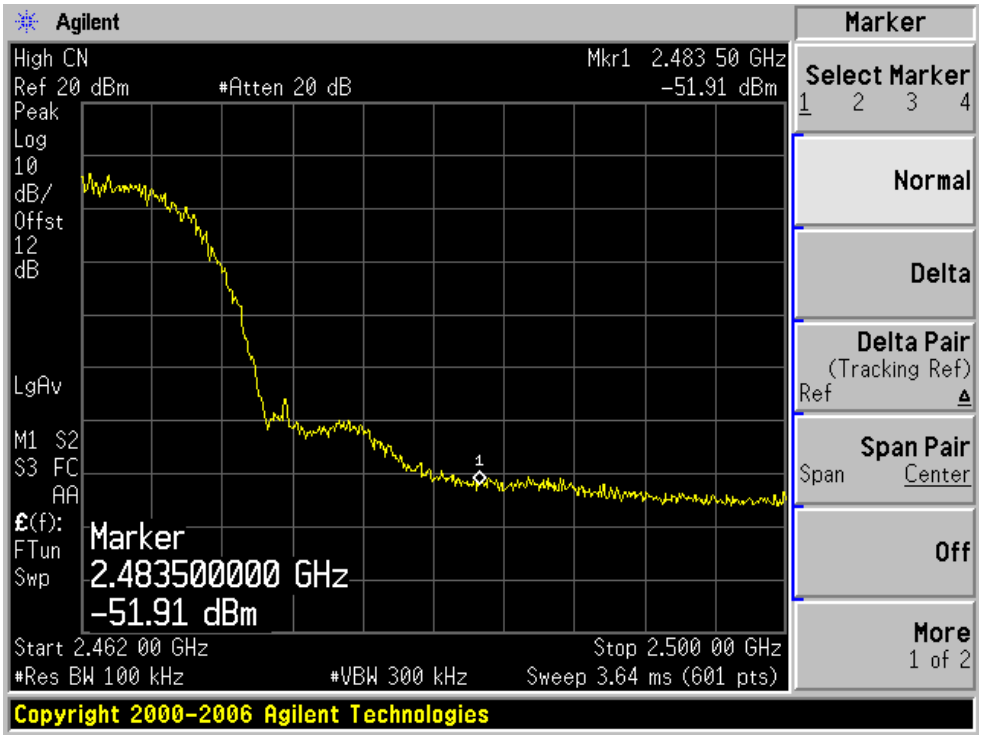
Please Refer to the Following Plots

802.11b

Low Channel

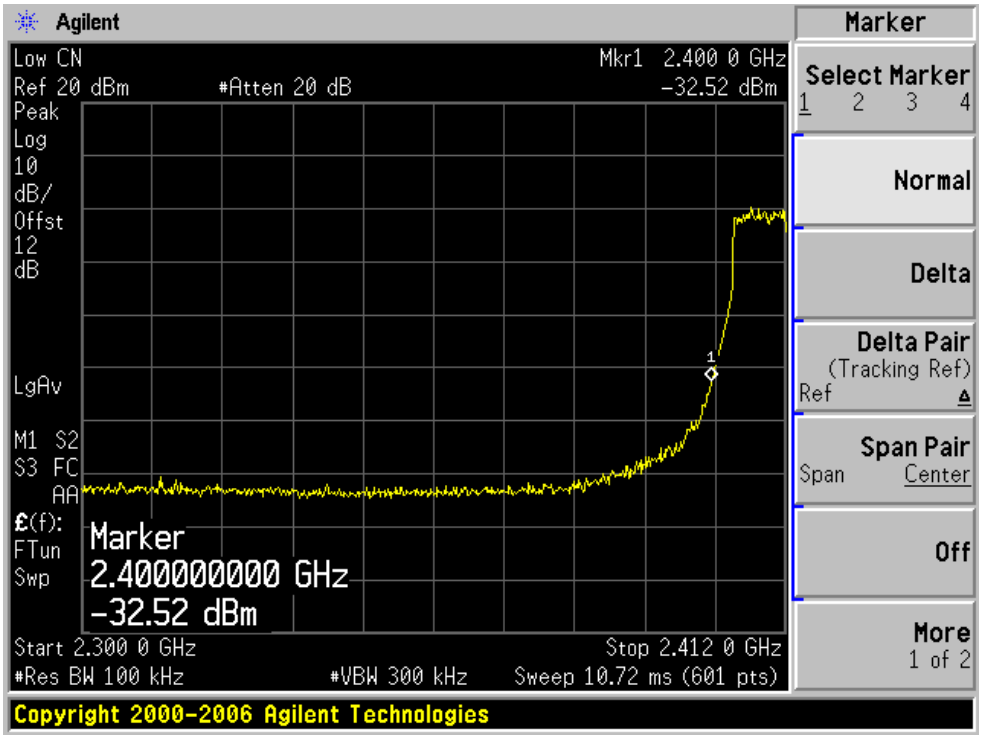


High Channel

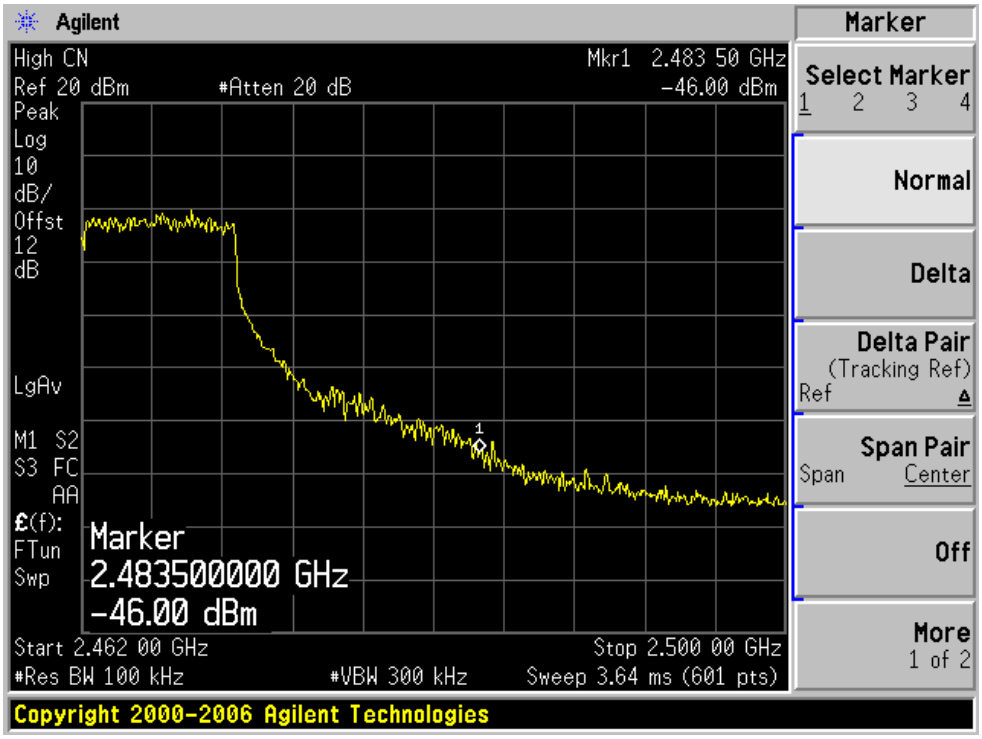


802.11g

Low Channel



High Channel



12 FCC §15.247(e), RSS-210 § A8.2 (b) - POWER SPECTRAL DENSITY

12.1 Applicable Standard

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

12.2 Measurement Procedure

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

12.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

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

12.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-09-05.*

12.5 Summary of Test Results

802.11b

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-8.78	8	Compliant
2437	-8.70	8	Compliant
2462	-10.31	8	Compliant

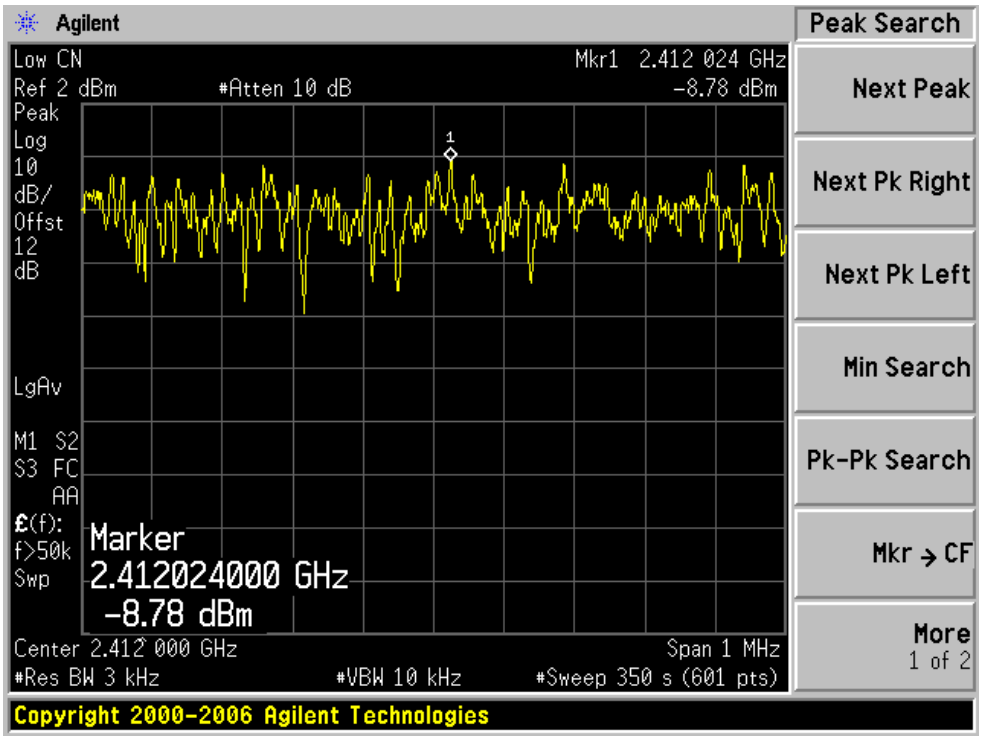
802.11g

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-14.67	8	Compliant
2437	-14.00	8	Compliant
2462	-11.12	8	Compliant

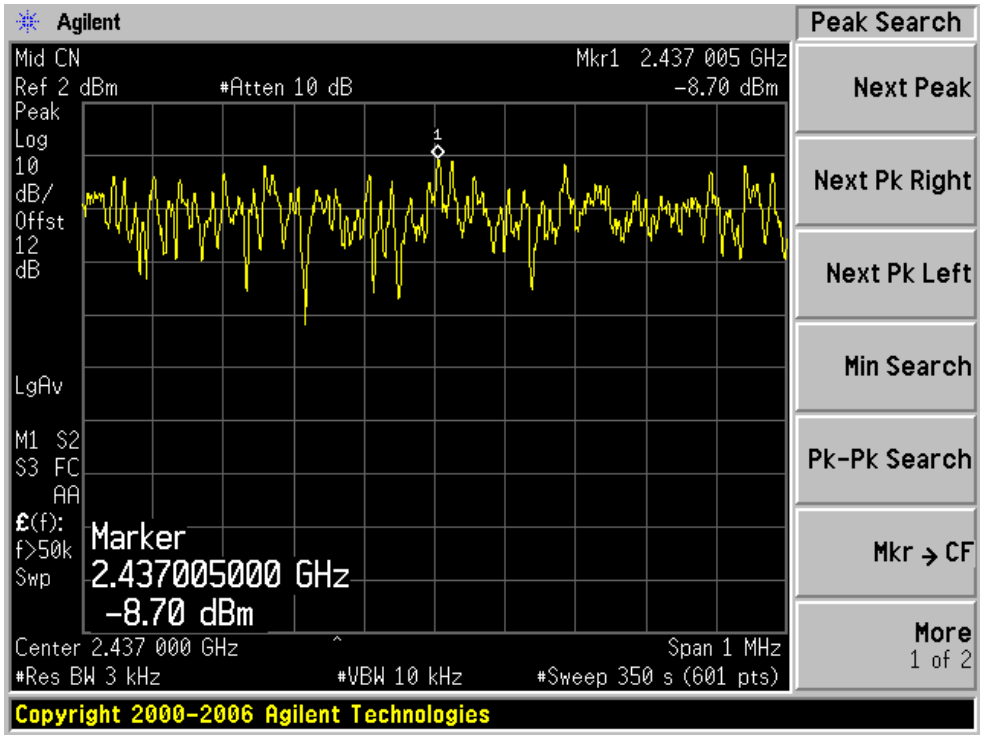
Please refer to the following plots for detailed test results

802.11b

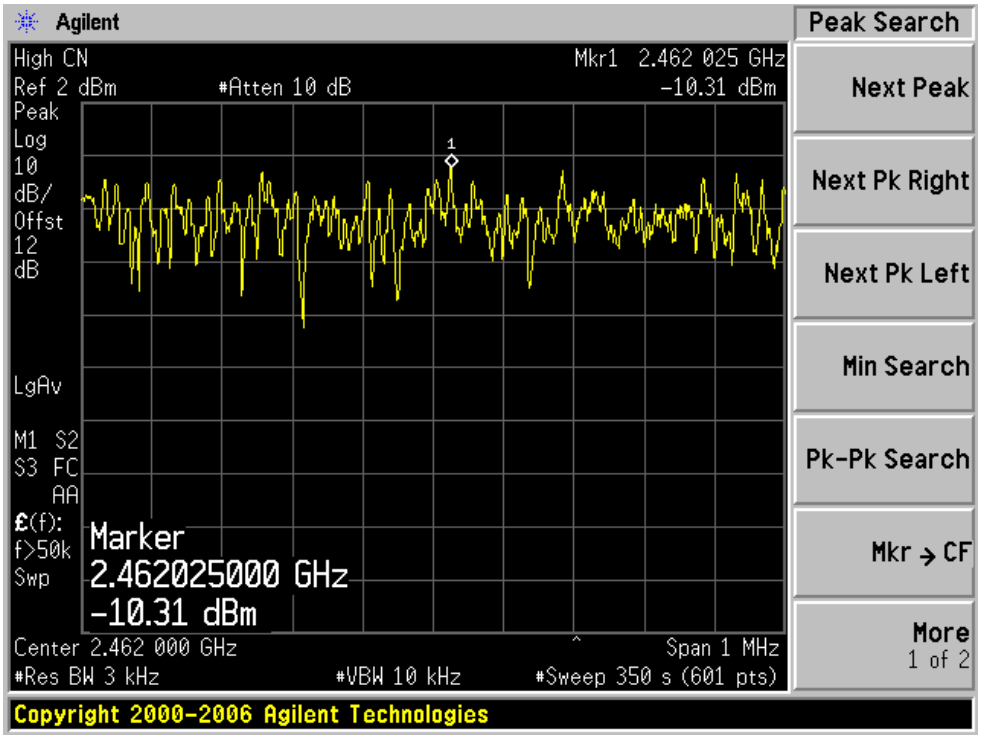
Low Channel



Mid Channel

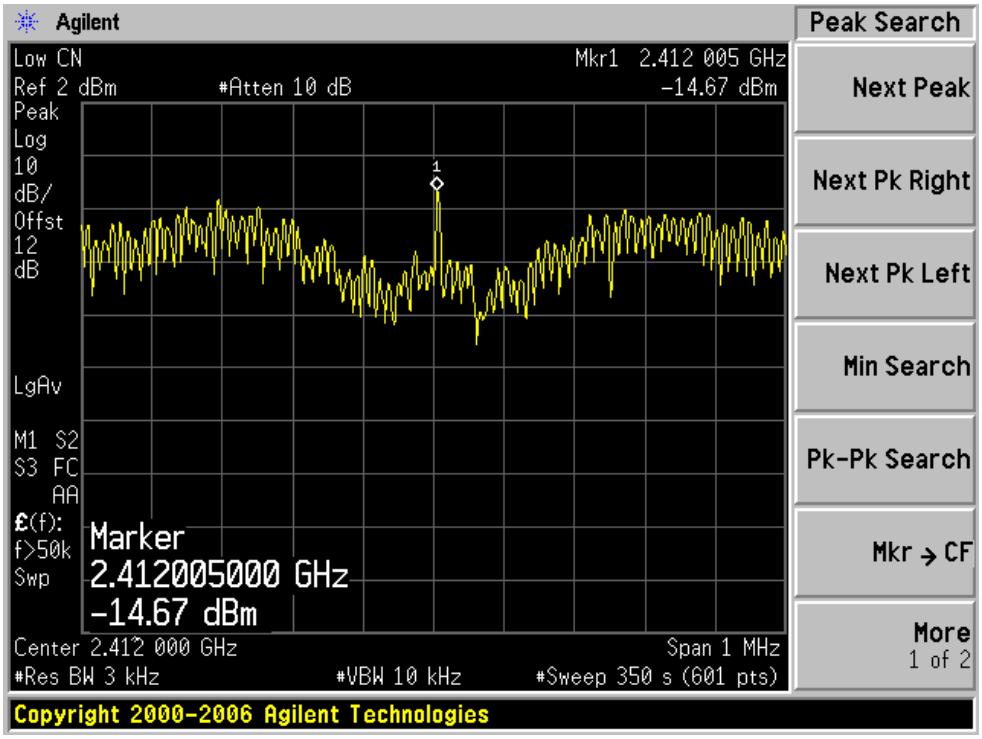


High Channel

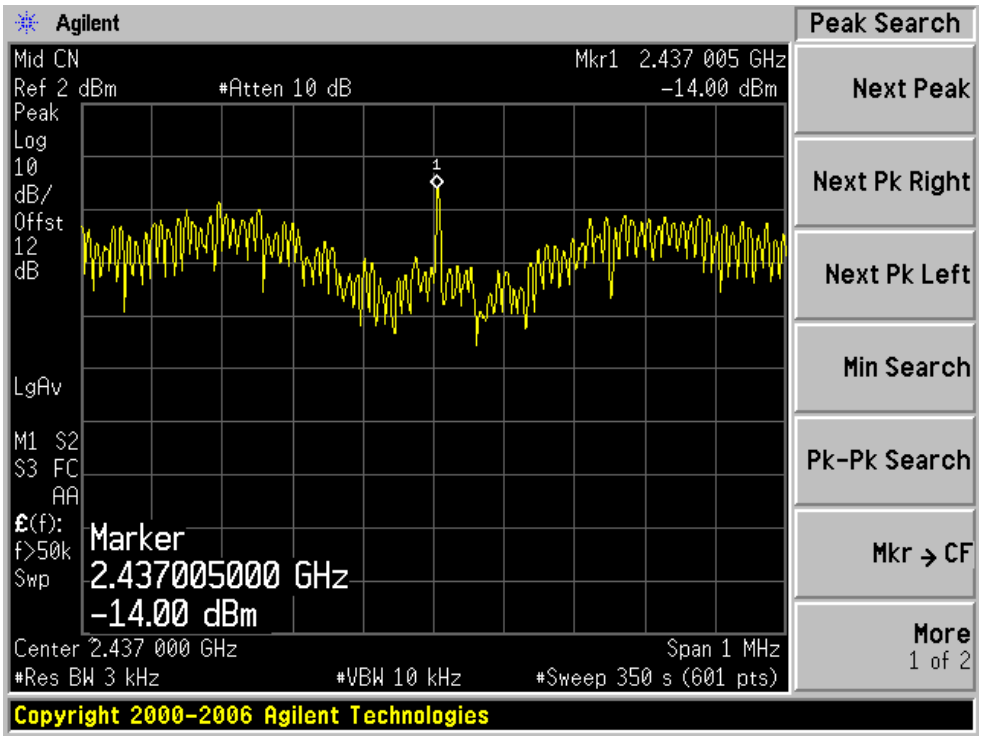


802.11g

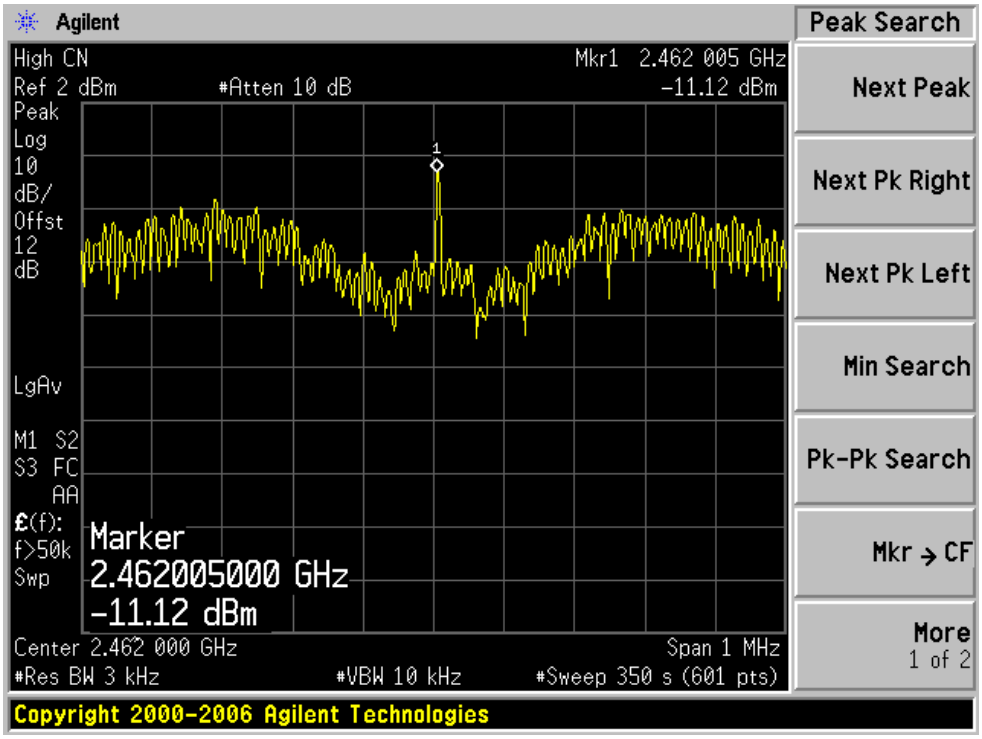
Low Channel



Mid Channel



High Channel



13 EXHIBIT A – FCC & IC EQUIPMENT LABELING REQUIREMENTS

13.1 FCC § 2.925 Identification of equipment

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term *FCC ID* in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID XXX123. XXX—Grantee Code 123—Equipment Product Code

13.2 FCC ID Labeling Requirements as per FCC § 15.19

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

(3) All other devices shall bear the following statement in a conspicuous location on the device:

> This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, “Contains FCC ID:XXXXXX”

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

IC: XXXXXX-YYYYYYYY Where:

- "XXXXXX-YYYYYYYY" is the certification number
- "XXXXXX" is the Certificate Holder Number (CHN), made of at most 6 alphanumeric characters (A-Z, 0-9), assigned by Industry Canada; and
- "YYYYYYYY" is the Unique Product Number (UPN), made of at most 8 alphanumeric characters (A-Z, 0-9) assigned by the applicant.
- Note 1: The term "IC" before the equipment certification number only signifies that the Industry Canada technical specifications were met.
- Note 2: Note 1 shall be conspicuously placed in the equipment user manual.
- Note 3: Permitted alphanumeric characters used in the CHN and UPN are limited to capital letters (A-Z) and digits (0-9). Other characters, such as "#", "/" or "-", shall not be used.

13.3 Specifications: As per RSS GEN 5.2 Equipment Labeling:

Equipment subject to certification under the applicable RSS, shall be permanently labeled on each item, or as an inseparable combination. The label must contain the following information for full compliance:
(a) The certification number, prefixed by the term "IC:";
(b) The manufacturer's name, trade name or brand name; and
(c) A model name or number.
Equipment for which a certificate has been issued is not considered certified if it is not properly labeled.
The information on the Canadian label can be combined with the manufacturer's other labeling requirements.
If the device size is too small to put a label, the label can be included in the user's manual, upon agreement with Industry Canada.

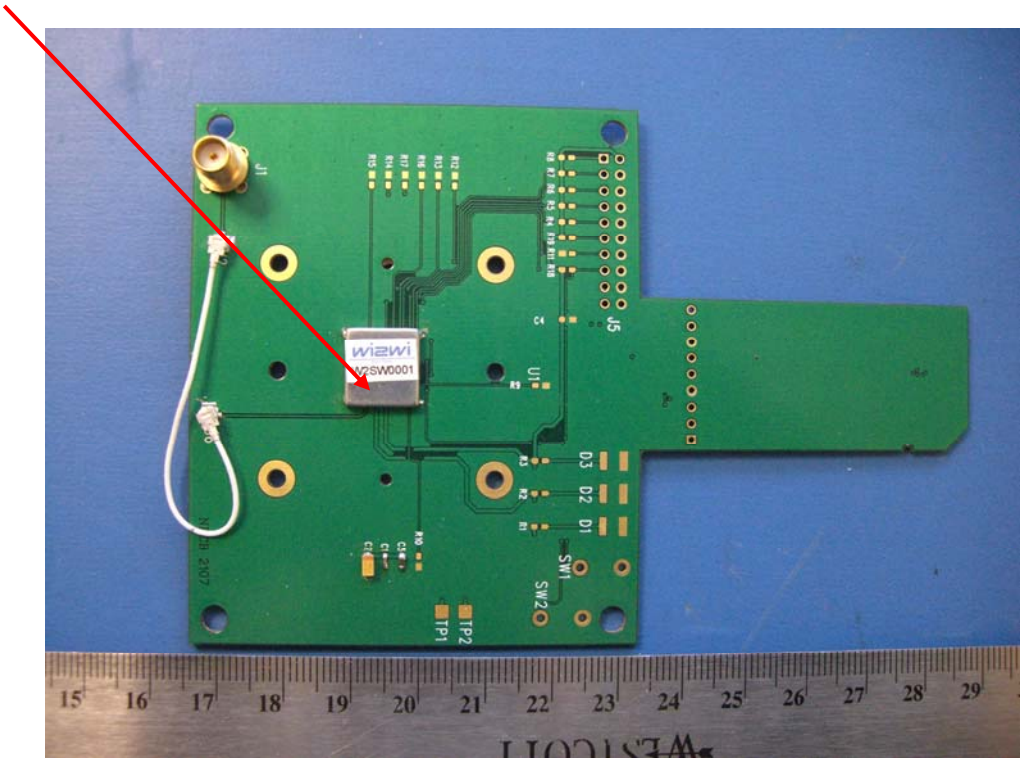
13.4 Suggested FCC ID & IC Label

Model: W2SW0001
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC ID: U9R-W2SW0001
IC: 7089A-W2SW0001

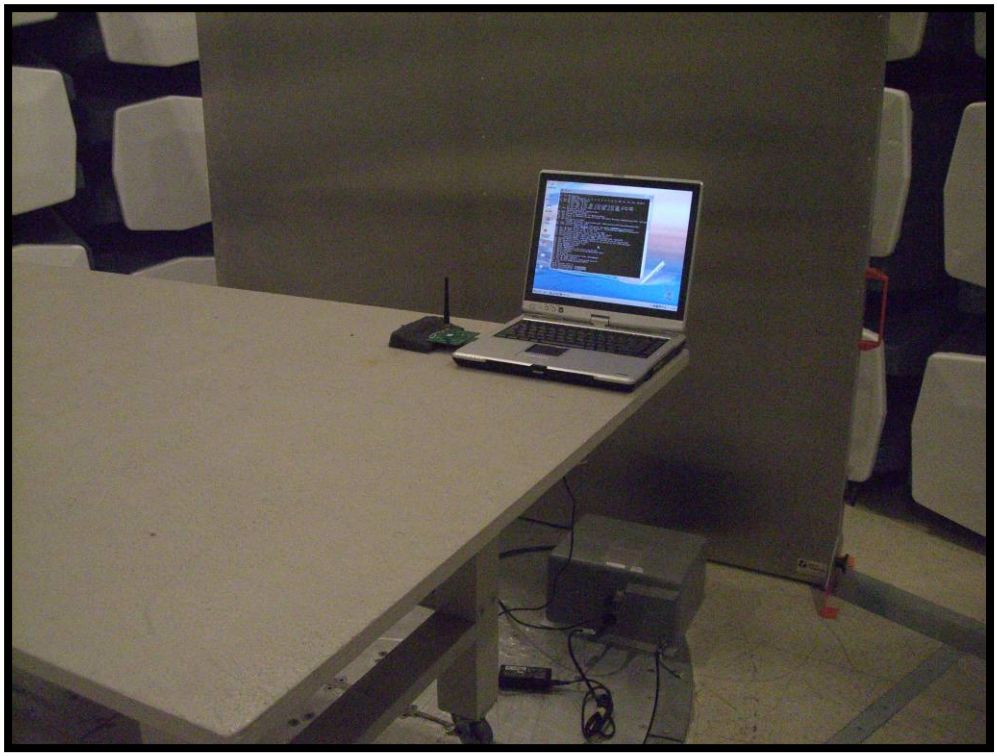
Wi2Wi, Inc.

13.5 Suggested Label Location

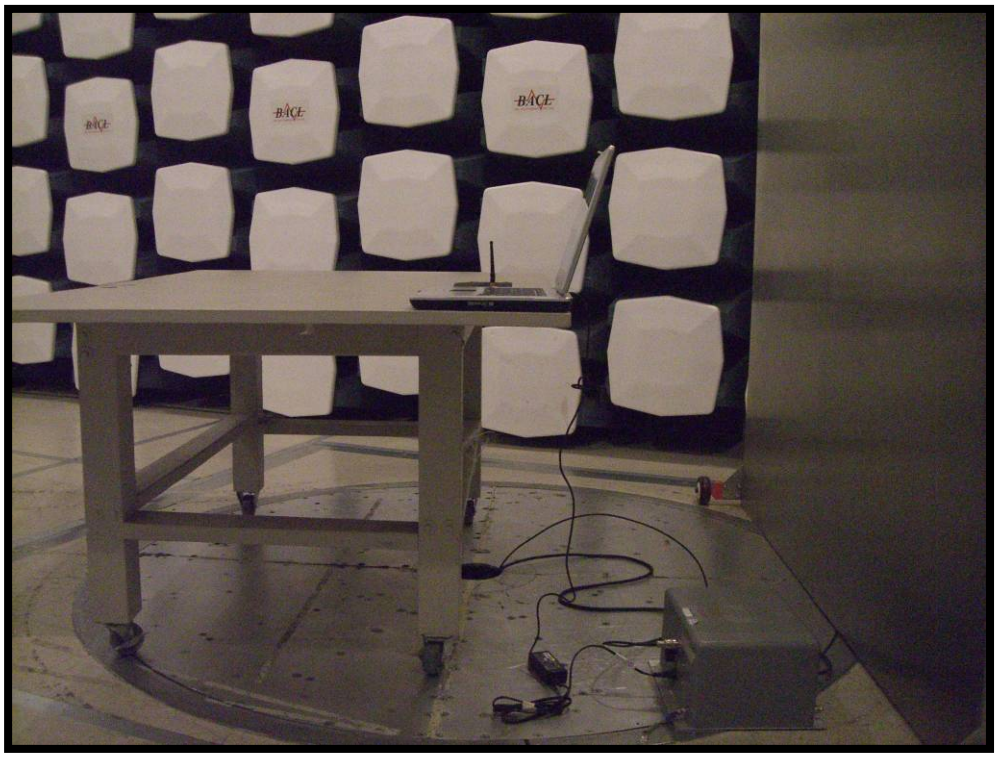


14 EXHIBIT B - TEST SETUP PHOTOGRAPHS

14.1 Conducted Emissions –Front View

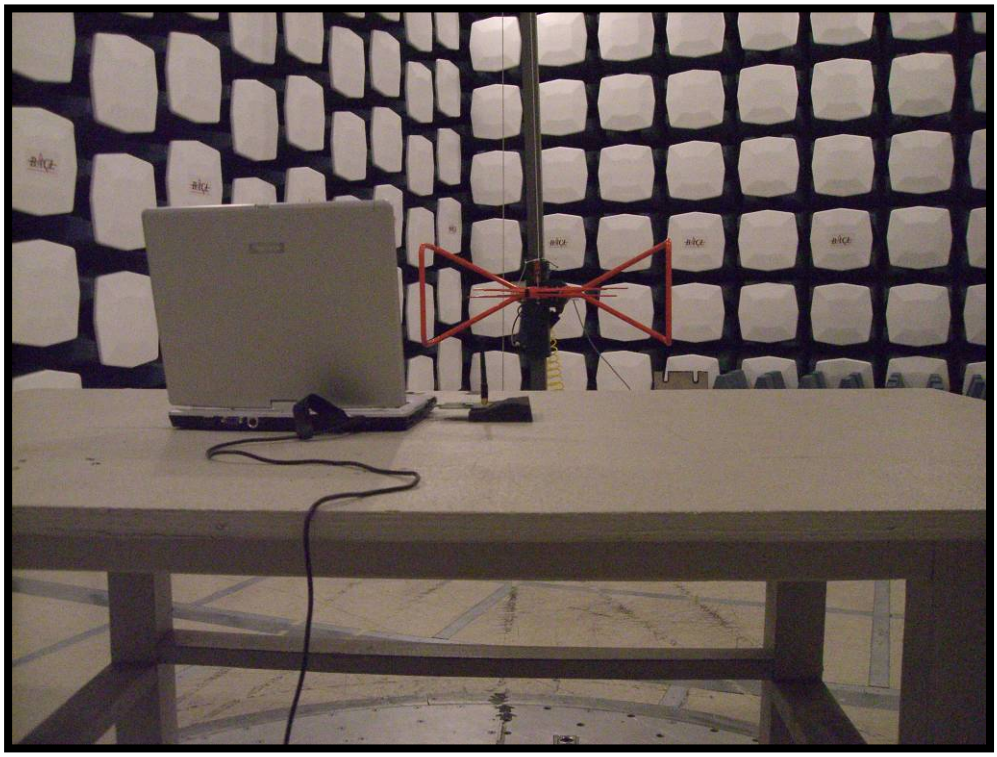


14.2 Conducted Emissions – Side View



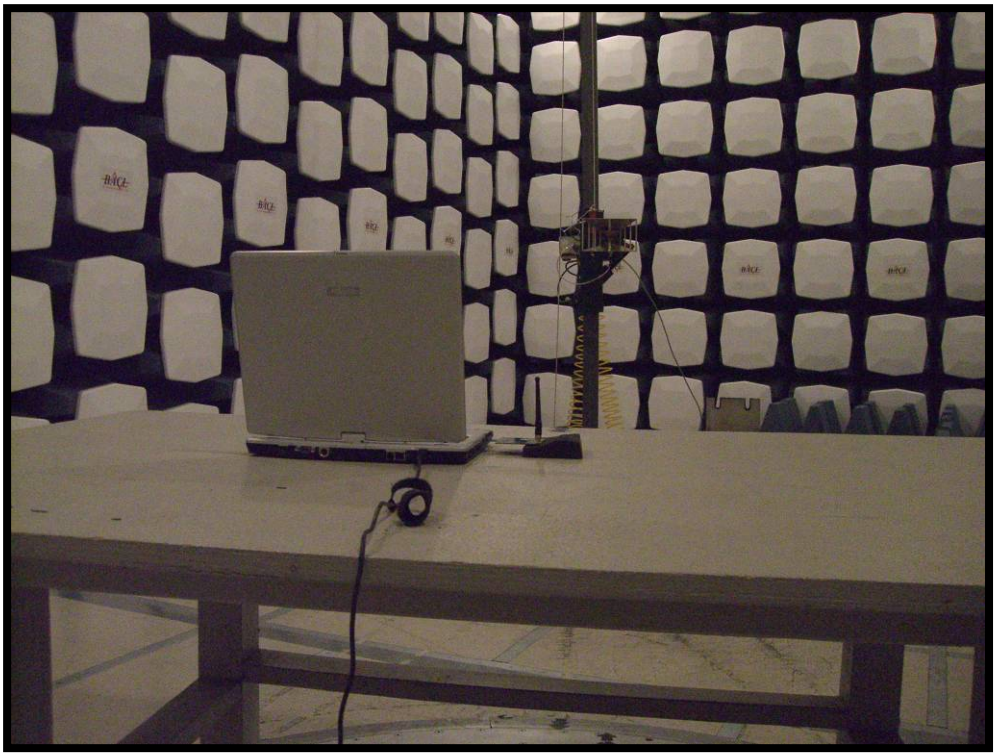
14.3 Receiver Radiated Emissions – Front View

14.4 Receiver Radiated Emissions – Rear View



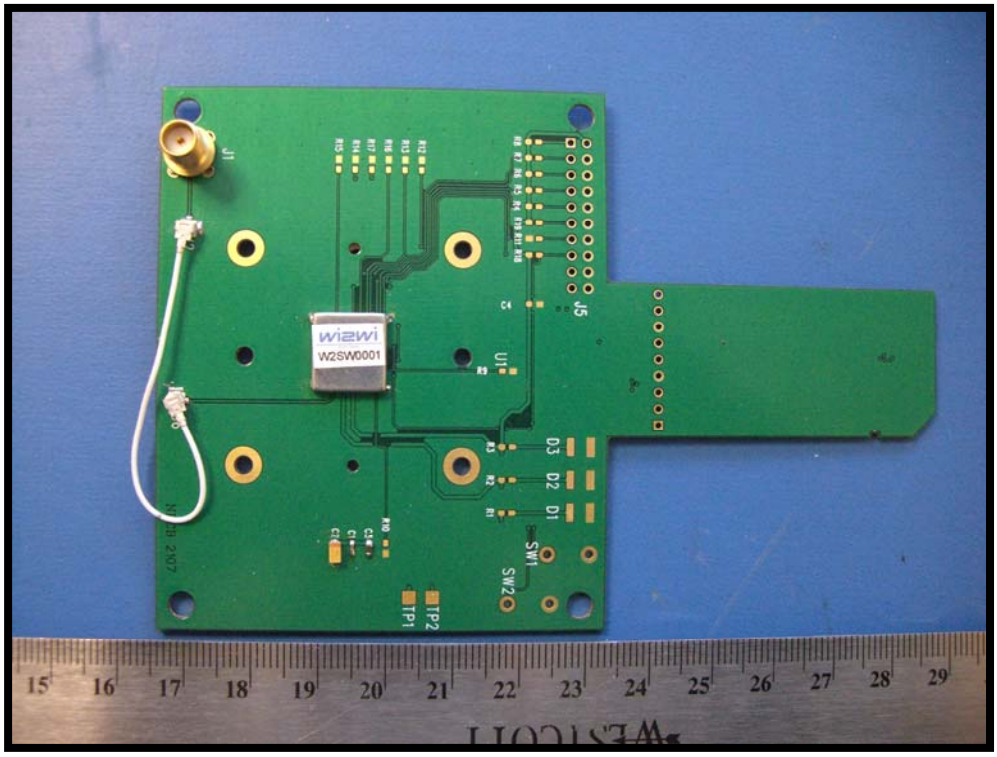
14.5 Transmitter Radiated Spurious Emissions – Front View

14.6 Transmitter Radiated Spurious Emissions – Rear View

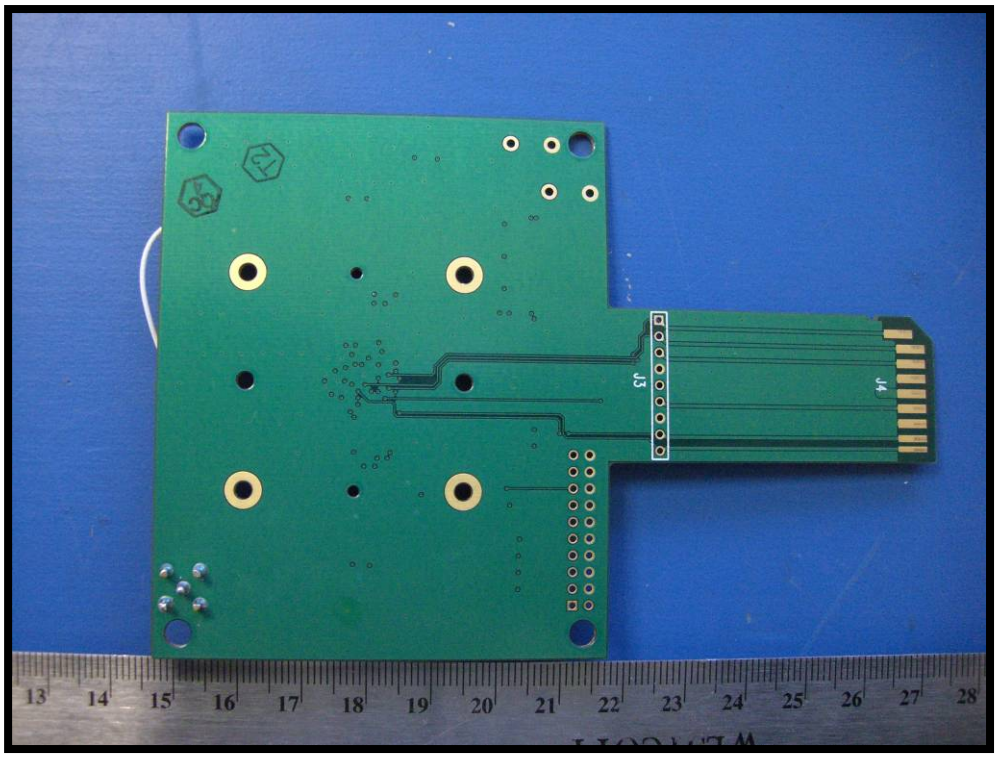


15 EXHIBIT C - EUT PHOTOGRAPHS

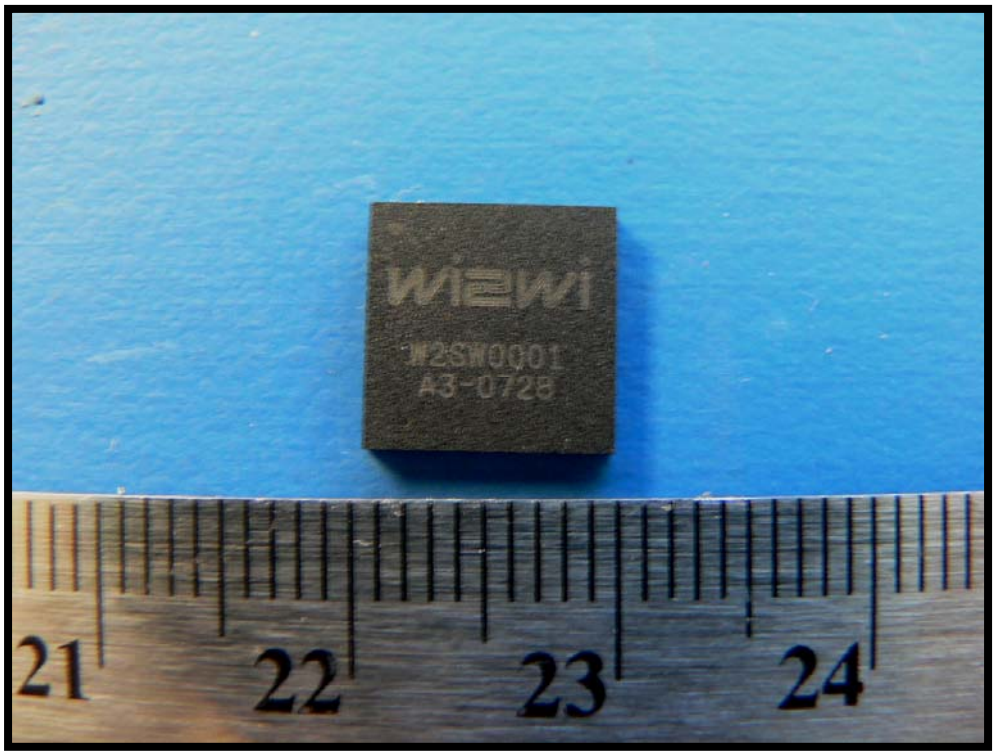
15.1 Test Board Front View



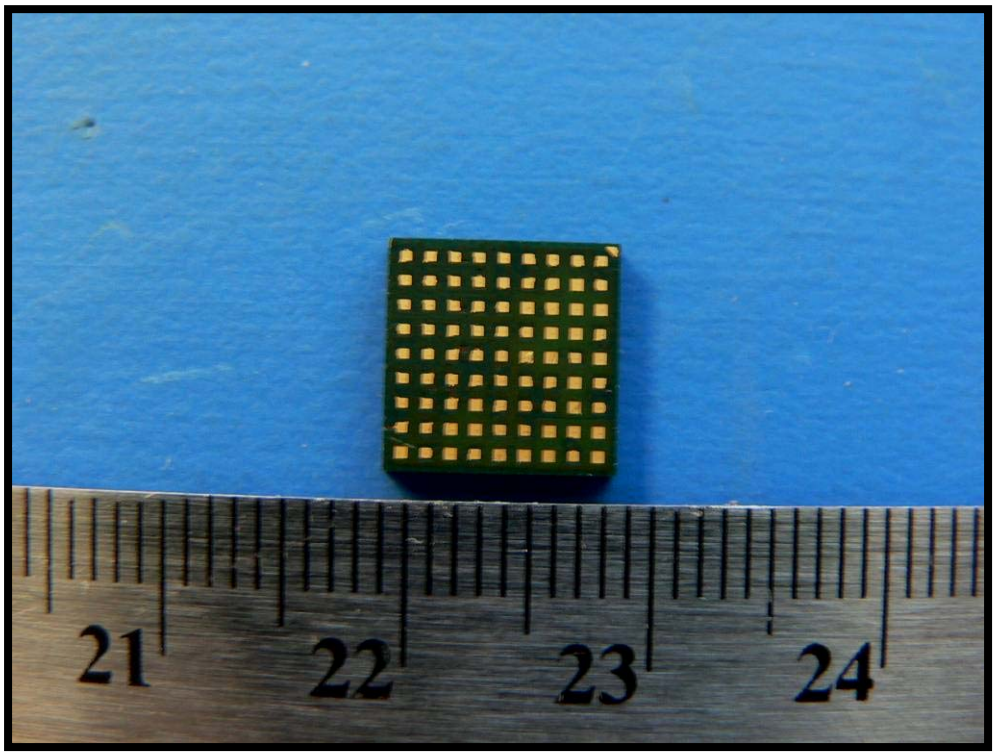
15.2 Test Board Back View



15.3 EUT Front View



15.4 EUT Back View



15.5 Antenna View

******* END OF REPORT *******