FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

2.4GHz 11b/g PicoStation AP

Model:
AL002XO, AL002XI,
AL00XXO, AL00XXI

Trade Name: Emitech

Issued to

Emitech Corporation
No.156-5A, Chenggong 1st., Jhubei City,
Hsinchu County 302 Taiwan(R.O.C.)

Issued by

Compliance Certification Services Inc.
No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan (R.O.C.)
http://www.ccsemc.com.tw
service@ccsrf.com

Testing Laboratory
1309

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1. TEST RESULT CERTIFICATION

Applicant:	Emitech Corporation No.156-5A, Chenggong 1st., Jhubei City, Hsinchu County 302 Taiwan(R.O.C.)
Equipment Under Test:	2.4GHz 11b/g PicoStation AP
Trade Name:	Emitech
Model:	AL002XO, AL002XI, AL00XXO, AL00XXI
Date of Test:	April 10, ~ May 4, 2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
Deviation from Applicable Standard	
None	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.4: 2003** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Gina Lo
Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

<table>
<tr><td>Product</td><td>2.4GHz 11b/g PicoStation AP</td></tr>
<tr><td>Trade Name</td><td>Emitech</td></tr>
<tr><td>Model Number</td><td>AL002XO, AL002XI,
AL00XXO, AL00XXI</td></tr>
<tr><td>Model Discrepancy</td><td>
<table>
<tr><th>Model</th><th>Model Discrepancy</th></tr>
<tr><td>AL002XO</td><td>9.55dBi Antenna (Blue plank)</td></tr>
<tr><td>AL002XI</td><td>2dBi Antenna (Blue plank)</td></tr>
<tr><td>AL00XXO</td><td>9.55dBi Antenna (Red plank)</td></tr>
<tr><td>AL00XXI</td><td>2dBi Antenna (Red plank)</td></tr>
</table>
</td></tr>
<tr><td>Power Supply</td><td>DVE / DSA-12G-12 AUS 120120
I/P: 100-120VAC, 50-60Hz, 0.3A
O/P: 12V, 1A
SEC / SSW-1587
I/P: 100-240VAC, 50-60Hz, 0.6A
O/P: 12V, 2A</td></tr>
<tr><td>Frequency Range</td><td>2412 ~ 2462 MHz</td></tr>
<tr><td>Transmit Power</td><td>For AL002XO
IEEE 802.11b: 15.31 dBm
IEEE 802.11g: 15.23 dBm
For AL00XXI
IEEE 802.11b: 18.18 dBm
IEEE 802.11g: 19.49 dBm</td></tr>
<tr><td>Modulation Technique</td><td>IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) +
OFDM (QPSK, BPSK, 16-QAM, 64-QAM)</td></tr>
<tr><td>Transmit Data Rate</td><td>IEEE 802.11b Mode: 11, 5.5, 2, 1 Mbps
IEEE 802.11g Mode: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1Mbps</td></tr>
<tr><td>Number of Channels</td><td>11 Channels</td></tr>
<tr><td>Antenna Specification</td><td>Dipole Antenna / Gain: 2dBi
Patch Antenna / Gain: 9.55 dBi</td></tr>
</table>

Remark:

1. *The sample selected for test was production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **V8IETC-AL00X** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 Part 15.207, 15.209 and 15.247.

3.1EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.

3.4FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) 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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 - 13.41	322 - 335.4		

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

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field 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 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, 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.

3.5DESCRIPTION OF TEST MODES

The EUT (model: AL002XO) comes with two types of adapter for sale. After the preliminary test, the EUT with adapter (Model: DSA-12G-12 AUS 120120) was found to emit the worst emissions and therefore had been tested under operating condition.

The EUT (model: AL00XXI) comes with two types of adapter for sale. After the preliminary test, the EUT with adapter (Model: SSW-1587) was found to emit the worst emissions and therefore had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

IEEE 802.11b mode:
Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1Mbps data rate were chosen for the final testing.

IEEE 802.11g mode:
Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6Mbps data rate were chosen for the final testing.

4. INSTRUMENT CALIBRATION

4.1MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY43360131	02/23/2010

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde&Schwarz	ESCI	100064	11/30/2009
Switch Controller	TRC	Switch Controller	SC94050010	05/02/2010
4 Port Switch	TRC	4 Port Switch	SC94050020	05/02/2010
Loop Antenna	EMCO	6502	8905/2356	05/29/2009
Horn-Antenna	TRC	HA-0502	06	06/04/2009
Horn-Antenna	TRC	HA-0801	04	06/18/2009
Horn-Antenna	TRC	HA-1201A	01	10/15/2009
Horn-Antenna	TRC	HA-1301A	01	10/15/2009
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/27/2010
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC MRA: TW1039 IC: IC 2324G-1/-2	10/17/2010 11/04/2010
Test S/W	LABVIEW (V 6.1)			

Powerline Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI TEST RECEIVER 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	11/18/2009
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/11/2009
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/08/2010
Test S/W	LABVIEW (V 6.1)			

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 2.81
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	+/-3.7046
3M Semi Anechoic Chamber / Above 1GHz	+/-3.0958

***Remark**: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	TAF Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	Canada IC 2324G-1 IC 2324G-2

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

6. SETUP OF EQUIPMENT UNDER TEST

6.1SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	DELL	PP19L	GK102 A00	QDS-BRCM1021	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	Notebook PC (Remote)	IBM	2672 (X31)	99KPZYN	WLAN: ANO20030400LEG Bluetooth: ANO20020100MTN	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

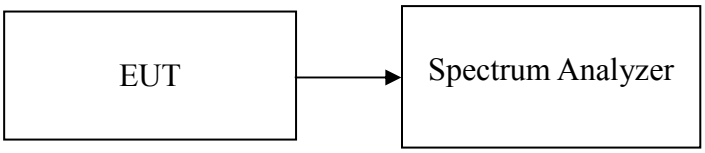
7. FCC PART 15.247 REQUIREMENTS

7.16DB BANDWIDTH

LIMIT

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

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = 100 kHz, Span = 50MHz, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted.

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	11170	>500	PASS
Mid	2437	10170		PASS
High	2462	10080		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	16580	>500	PASS
Mid	2437	16500		PASS
High	2462	16500		PASS

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	12580	>500	PASS
Mid	2437	11170		PASS
High	2462	10170		PASS

Test mode: IEEE 802.11g

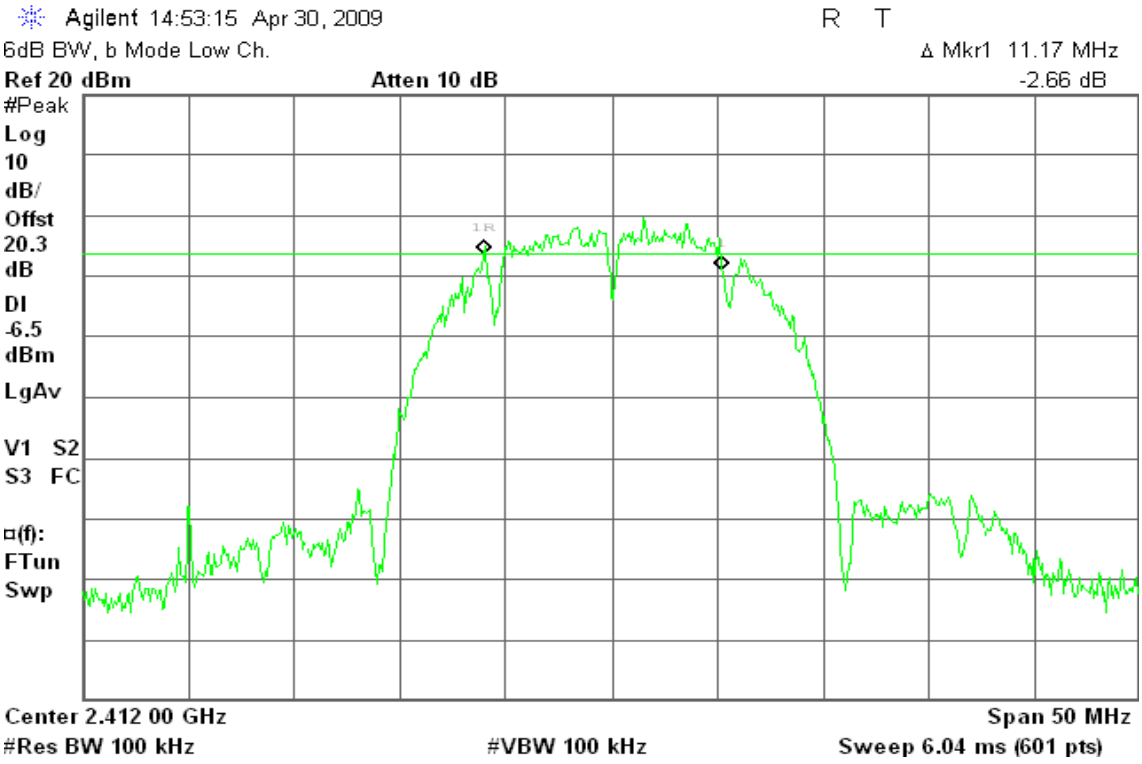
Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low	2412	16420	>500	PASS
Mid	2437	16420		PASS
High	2462	16500		PASS

Test Plot

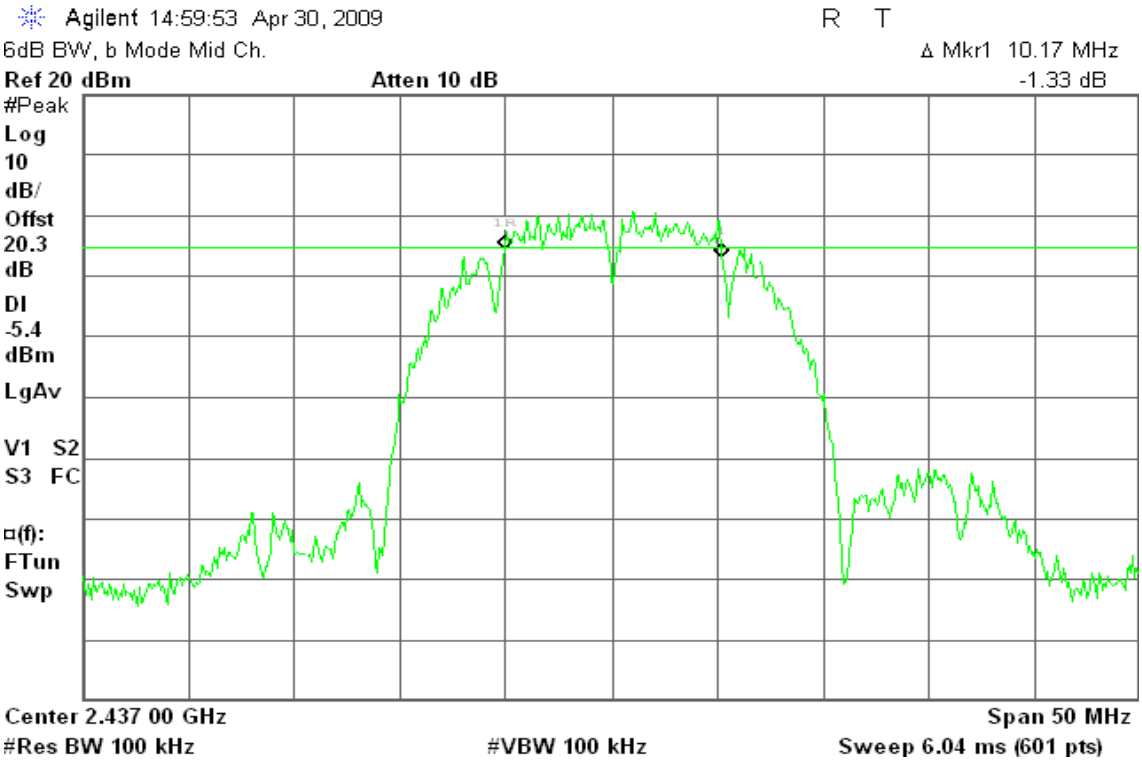
For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

IEEE 802.11b

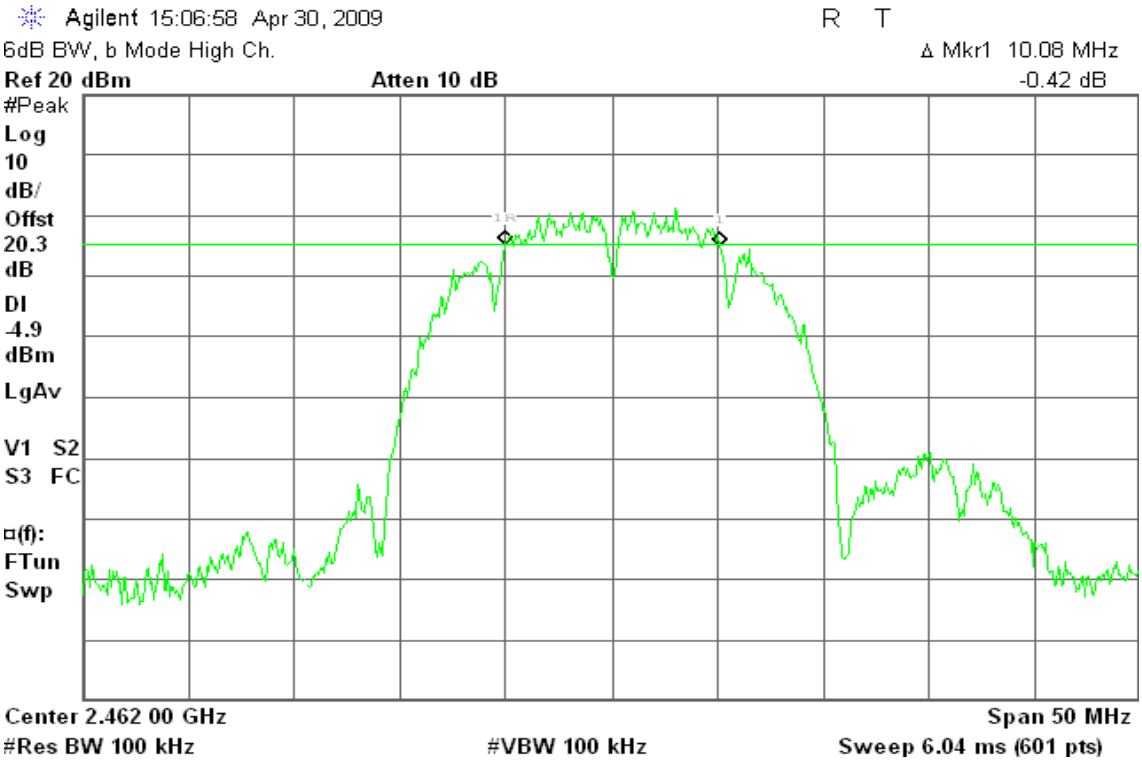
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

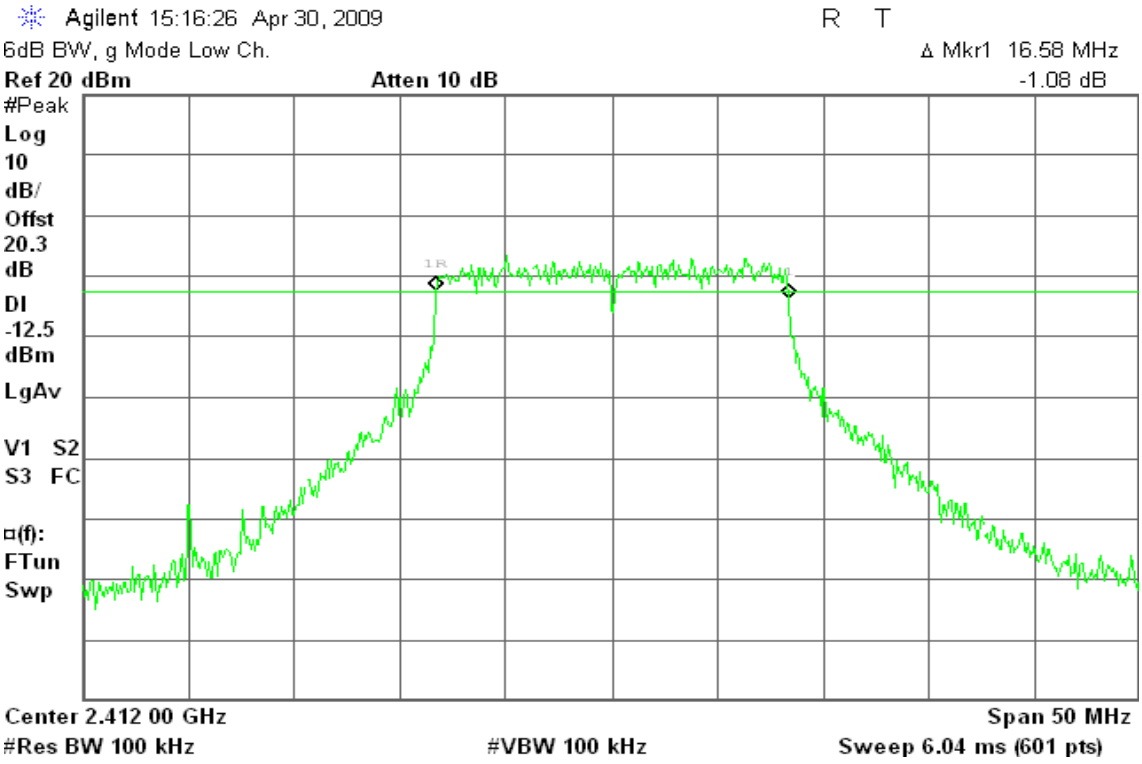


6dB Bandwidth (CH High)

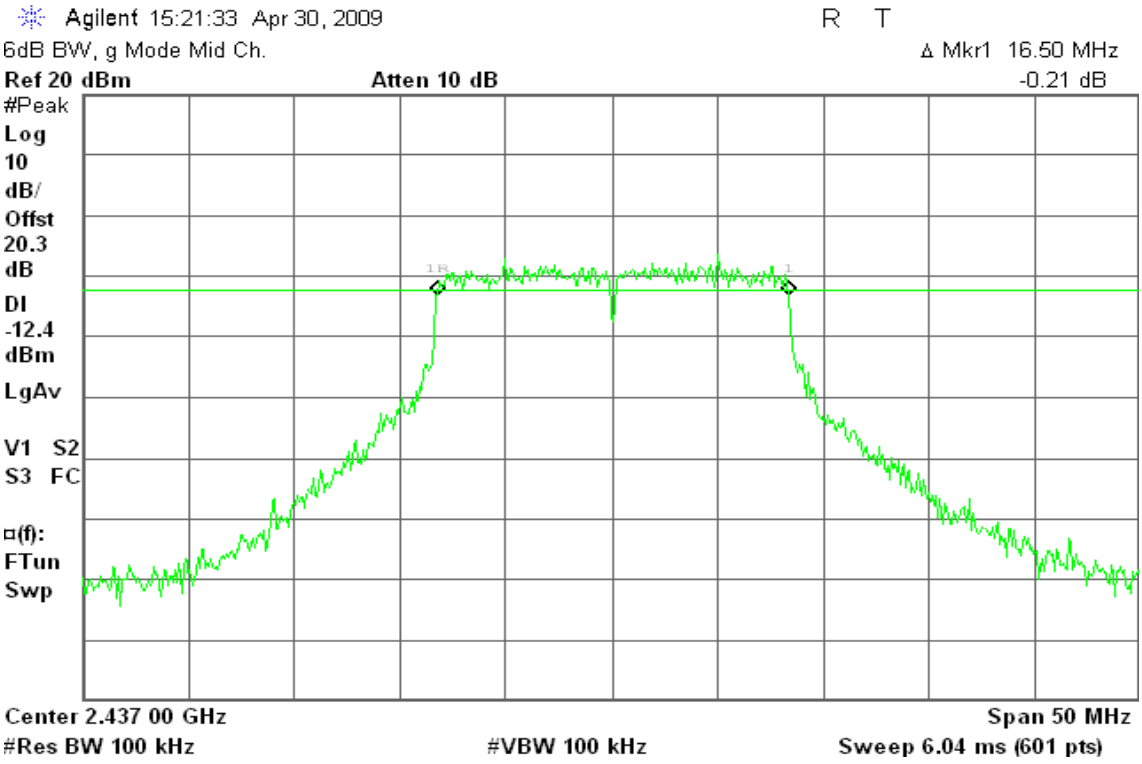


IEEE 802.11g

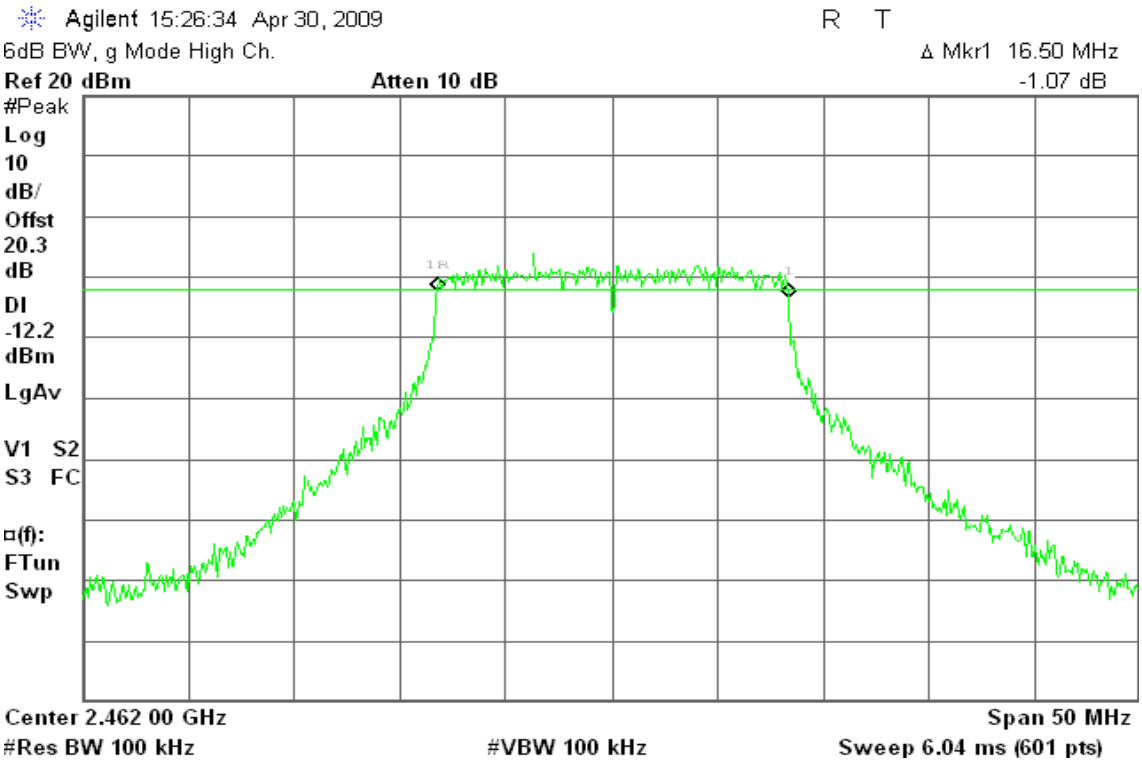
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



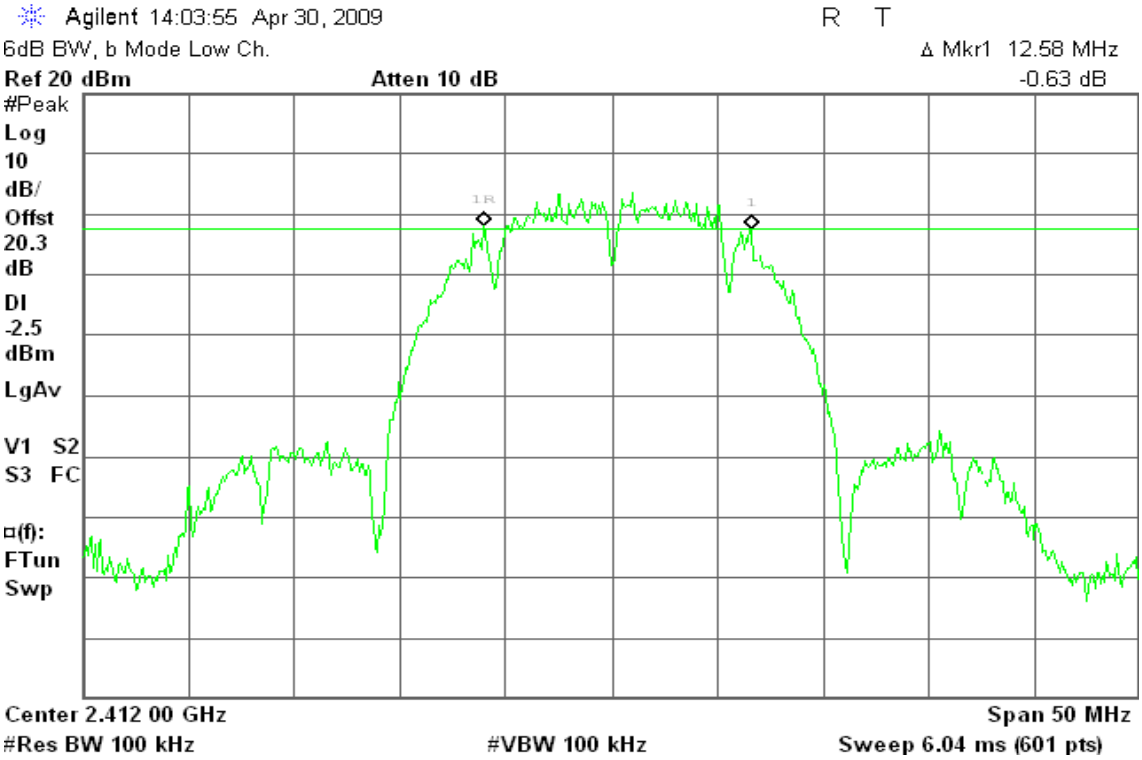
6dB Bandwidth (CH High)



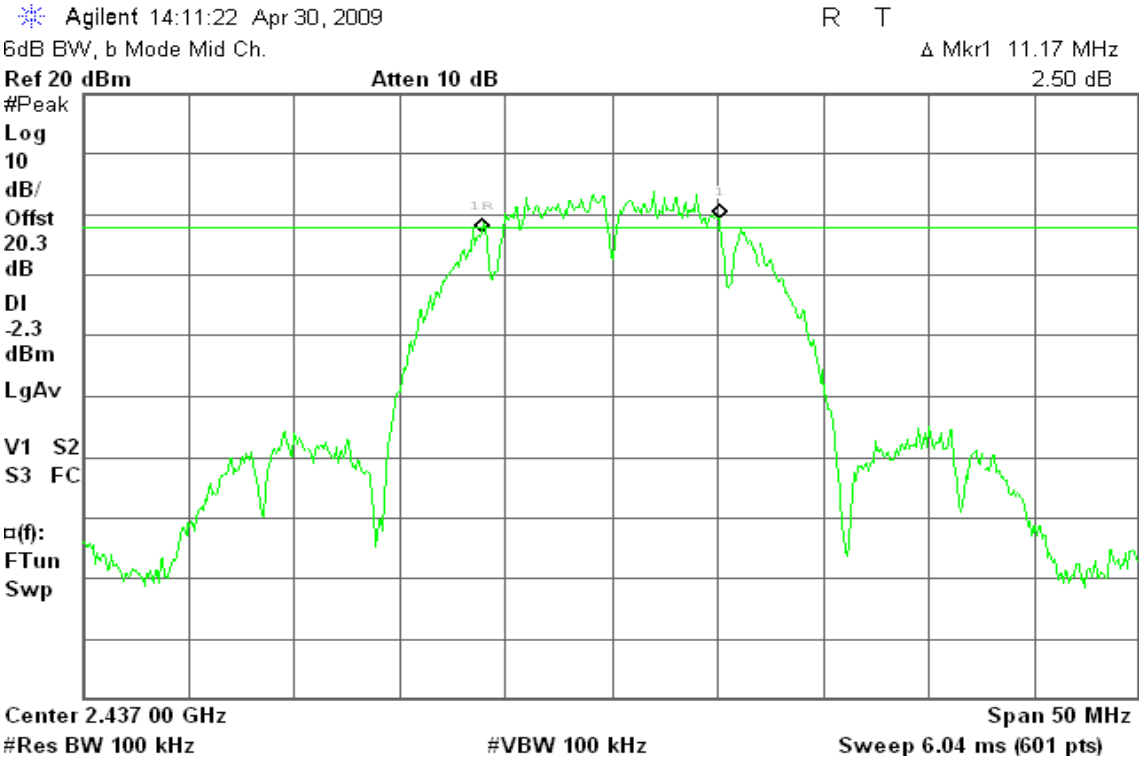
For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

IEEE 802.11b

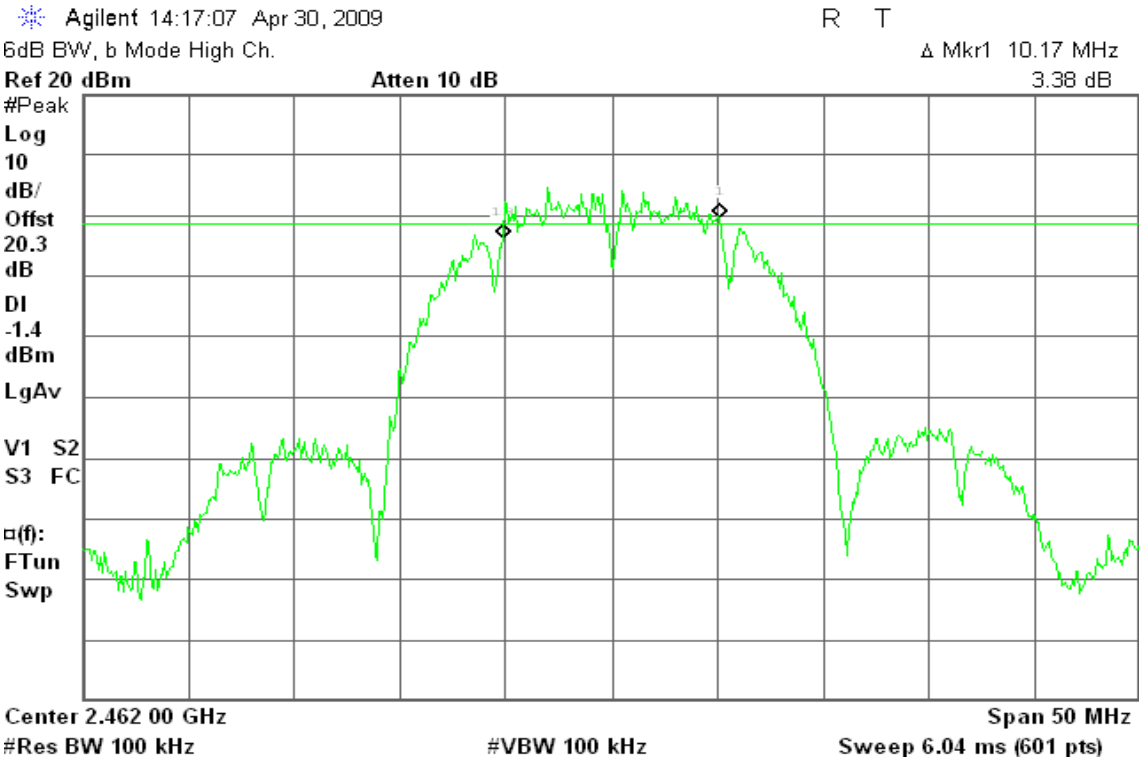
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

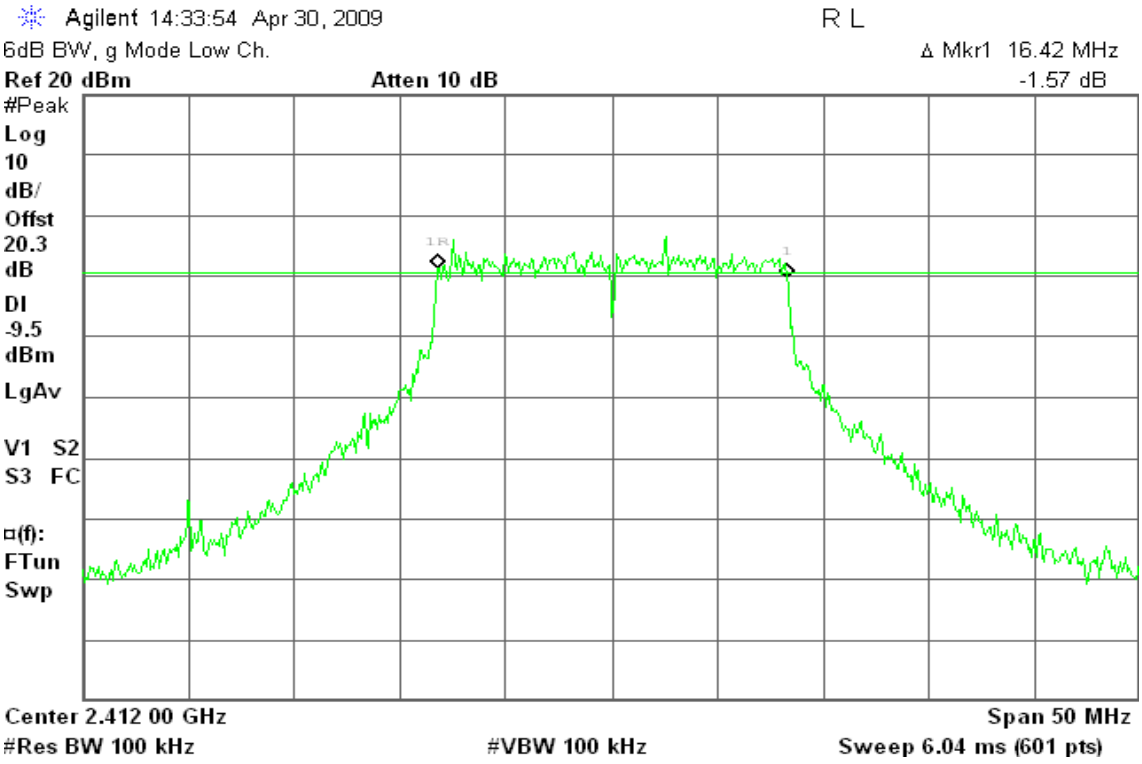


6dB Bandwidth (CH High)

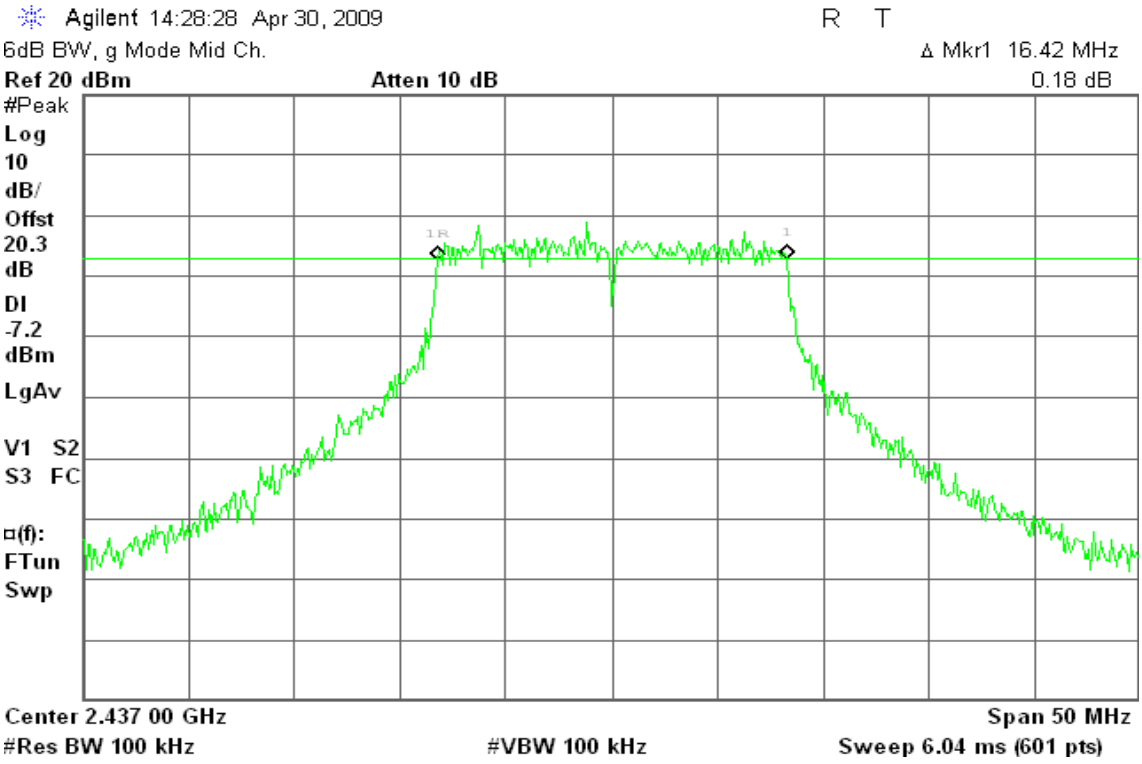


IEEE 802.11g

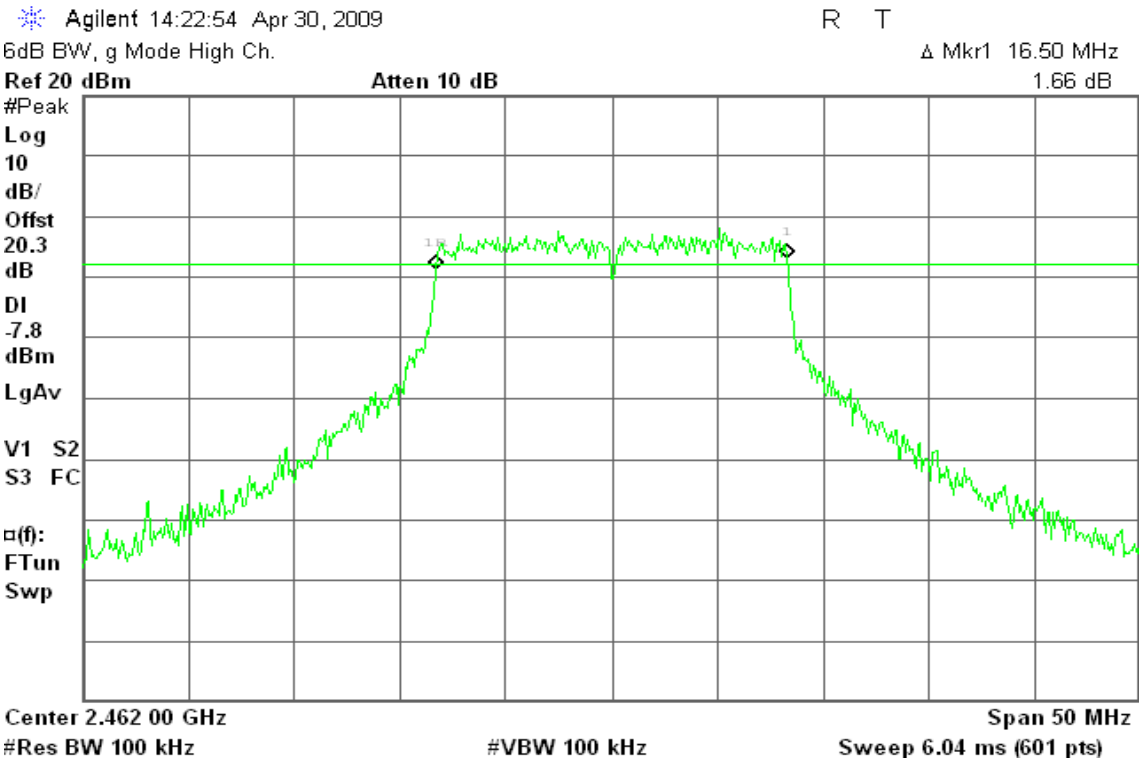
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



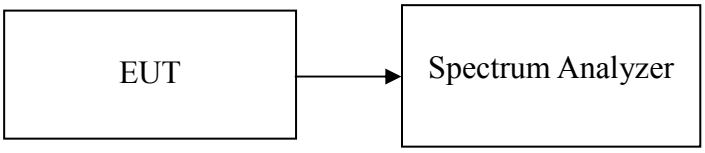
7.2PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set VBW ≥ 3 MHz.
4. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
5. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to free runich.
6. Trace average 100 traces in power averaging mode.
7. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’ s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted.

Test Data

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	13.61	0.02296	0.442	PASS
Mid	2437	14.90	0.03090		PASS
High	2462	15.31	0.03396		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	15.23	0.03334	0.442	PASS
Mid	2437	14.09	0.02564		PASS
High	2462	14.17	0.02612		PASS

Remark: The maximum antenna gain is 9.55dBi; therefore the reduction due to antenna gain is 3.55dB, so the limit is 26.45dBm.

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.44	0.05546	1.00	PASS
Mid	2437	17.88	0.06138		PASS
High	2462	18.18	0.06577		PASS

Test mode: IEEE 802.11g

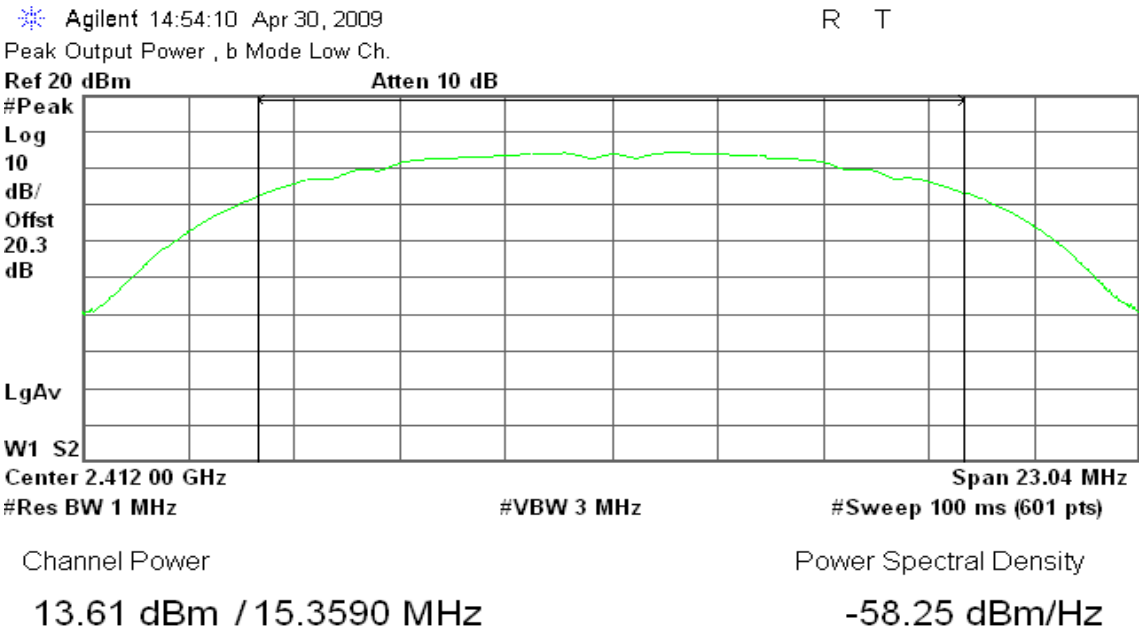
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.06	0.04036	1.00	PASS
Mid	2437	18.67	0.07362		PASS
High	2462	19.49	0.08892		PASS

Test Plot

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

IEEE 802.11b

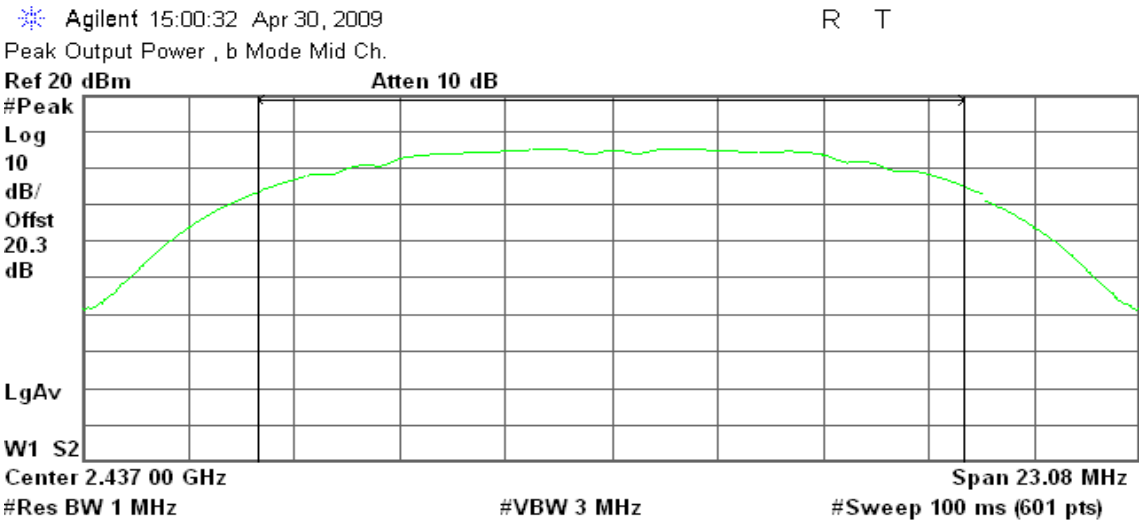
Peak Power (CH Low)



Channel Power
13.61 dBm / 15.3590 MHz

Power Spectral Density
-58.25 dBm/Hz

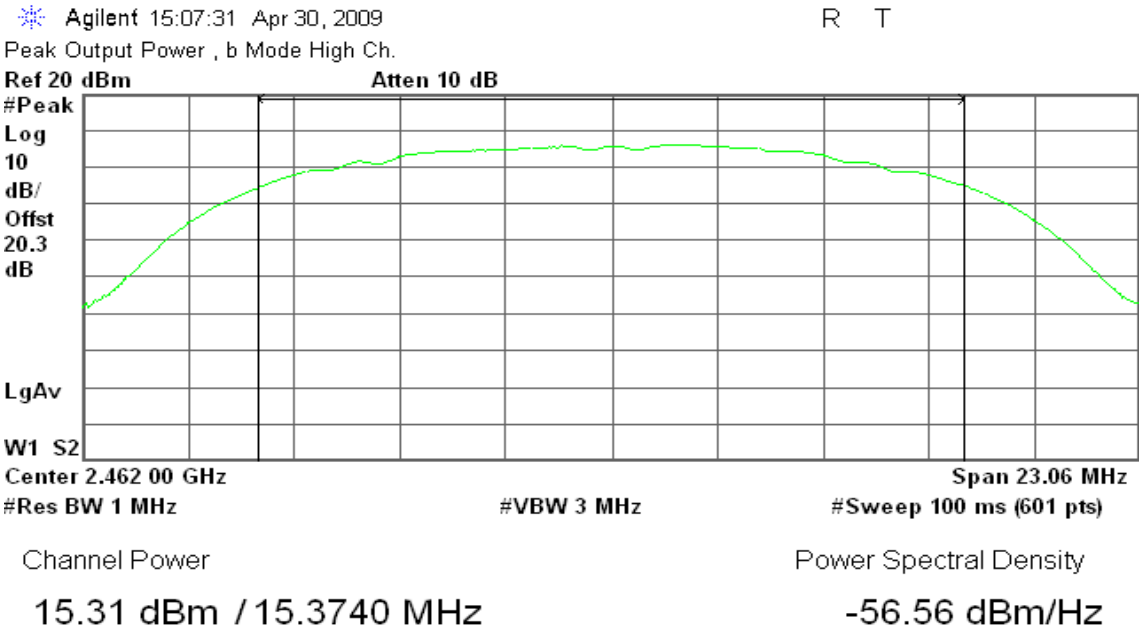
Peak Power (CH Mid)



Channel Power
14.90 dBm / 15.3850 MHz

Power Spectral Density
-56.97 dBm/Hz

Peak Power (CH High)

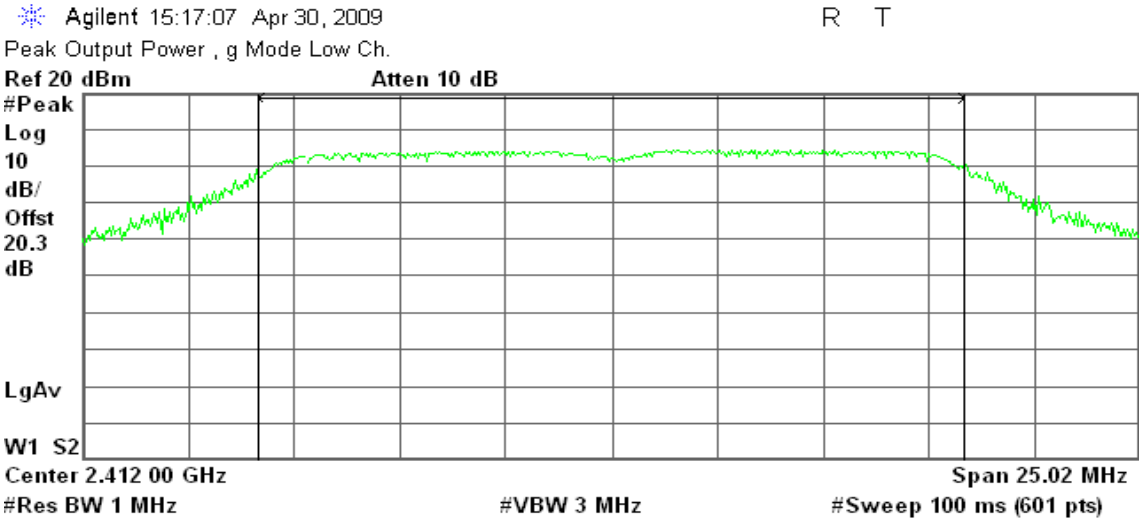


Channel Power
15.31 dBm / 15.3740 MHz

Power Spectral Density
-56.56 dBm/Hz

IEEE 802.11g

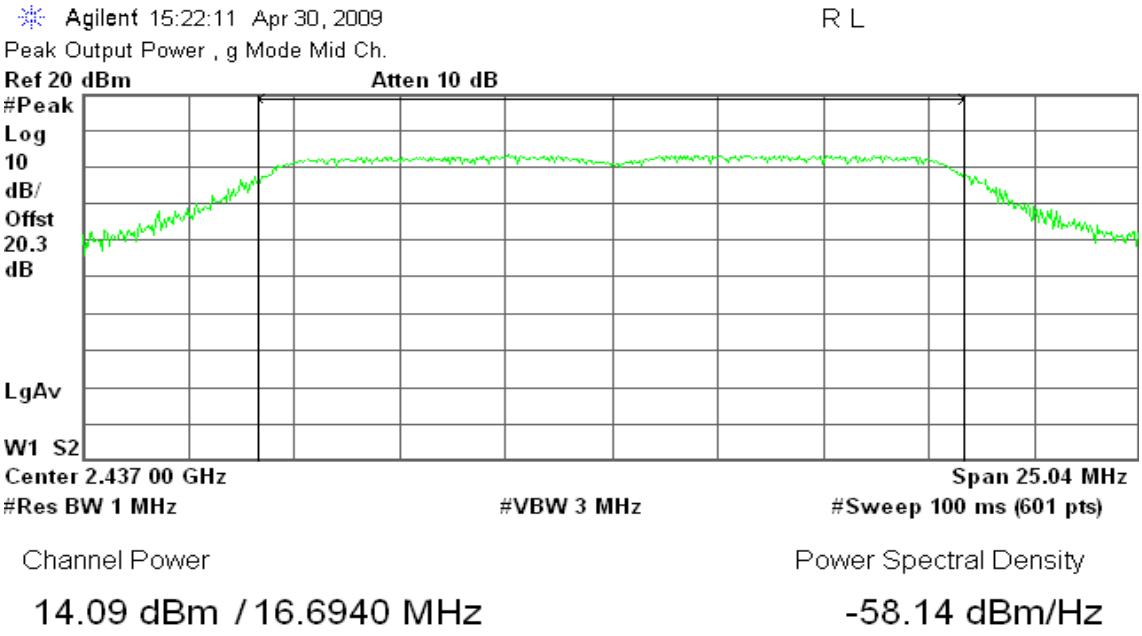
Peak Power (CH Low)



Channel Power
15.23 dBm / 16.6770 MHz

Power Spectral Density
-56.99 dBm/Hz

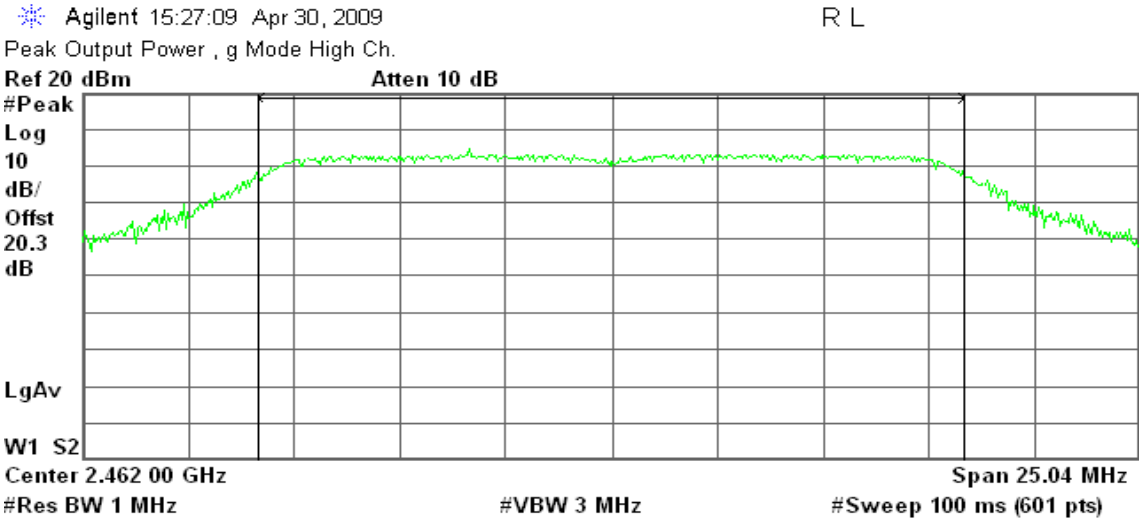
Peak Power (CH Mid)



Channel Power
14.09 dBm / 16.6940 MHz

Power Spectral Density
-58.14 dBm/Hz

Peak Power (CH High)



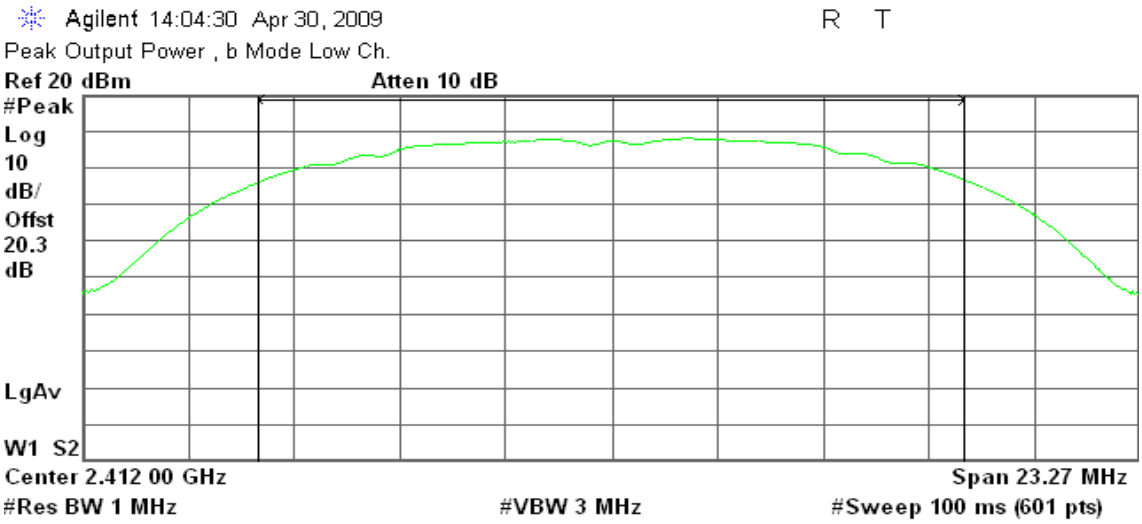
Channel Power
14.17 dBm / 16.6900 MHz

Power Spectral Density
-58.05 dBm/Hz

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

IEEE 802.11b

Peak Power (CH Low)



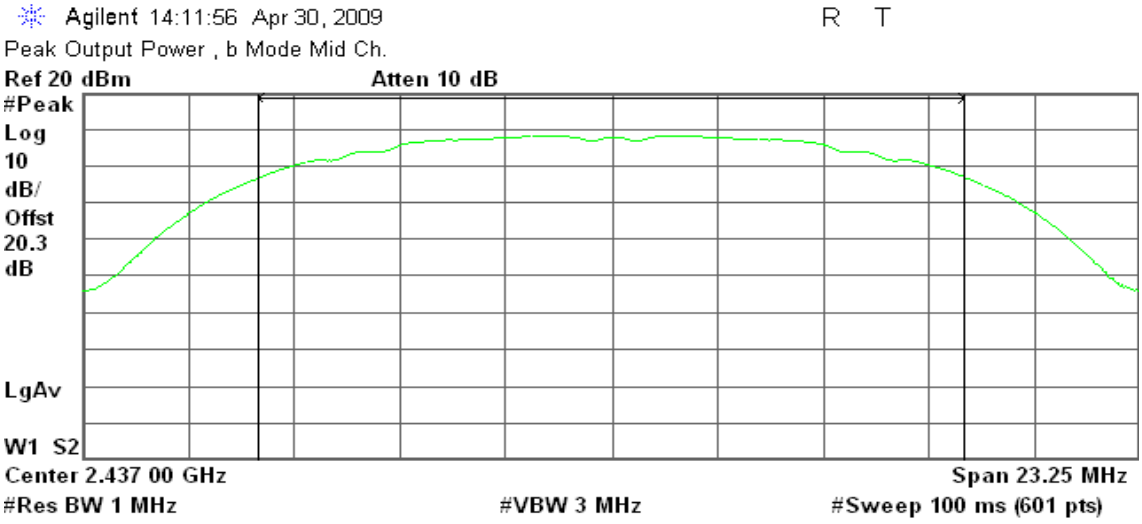
Channel Power

17.44 dBm / 15.5130 MHz

Power Spectral Density

-54.47 dBm/Hz

Peak Power (CH Mid)



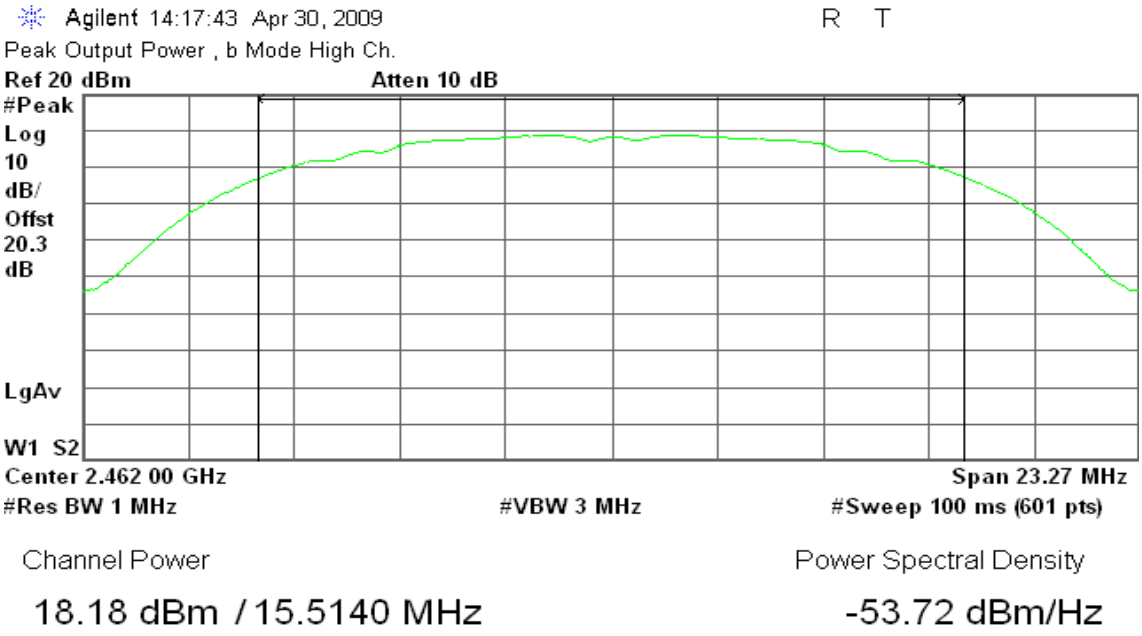
Channel Power

17.88 dBm / 15.4980 MHz

Power Spectral Density

-54.02 dBm/Hz

Peak Power (CH High)

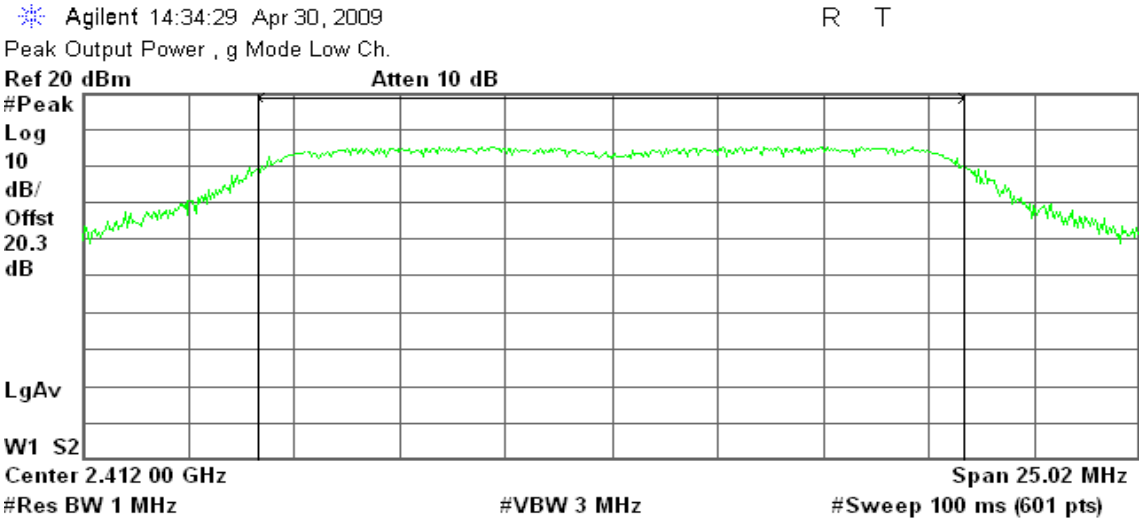


Channel Power
18.18 dBm / 15.5140 MHz

Power Spectral Density
-53.72 dBm/Hz

IEEE 802.11g

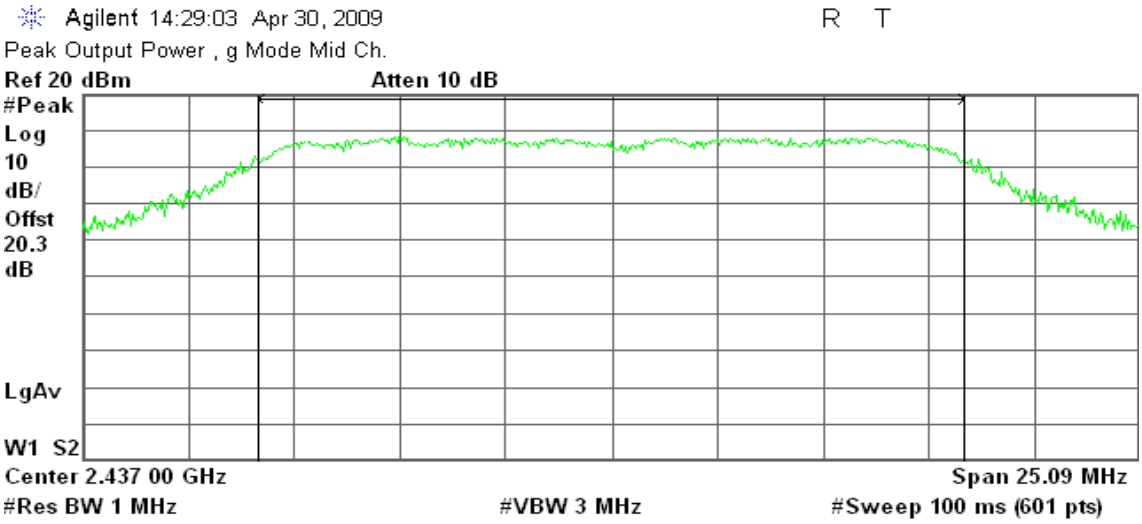
Peak Power (CH Low)



Channel Power
16.06 dBm / 16.6770 MHz

Power Spectral Density
-56.16 dBm/Hz

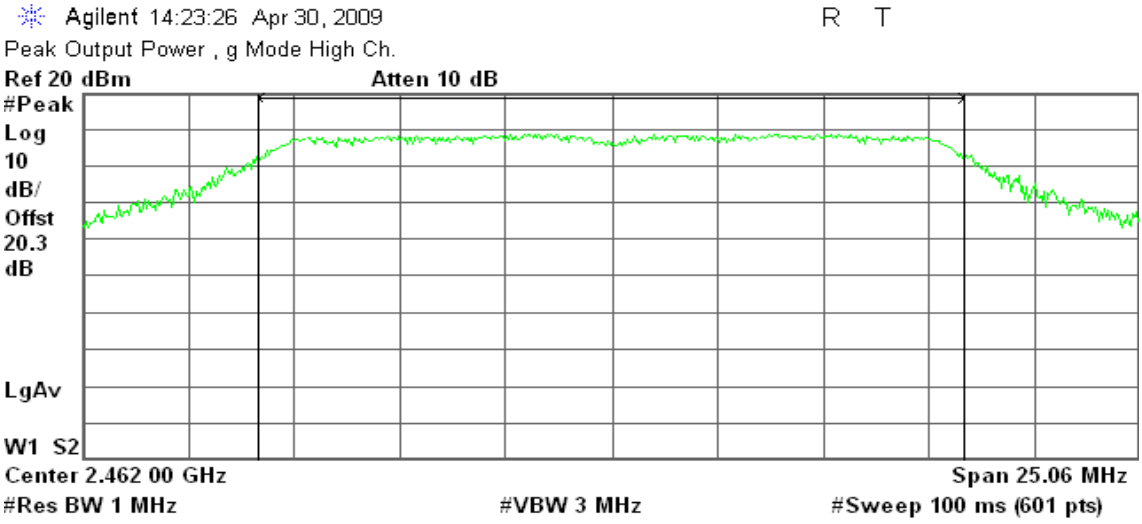
Peak Power (CH Mid)



Channel Power
18.67 dBm / 16.7300 MHz

Power Spectral Density
-53.56 dBm/Hz

Peak Power (CH High)



Channel Power
19.49 dBm / 16.7050 MHz

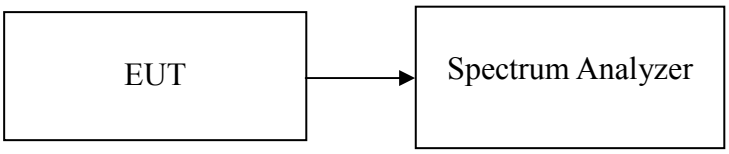
Power Spectral Density
-52.74 dBm/Hz

7.3AVERAGE POWER

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the average power detection.

TEST RESULTS

No non-compliance noted.

Test Data

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	10.75	0.01189
Mid	2437	12.10	0.01622
High	2462	12.56	0.01803

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	7.94	0.00622
Mid	2437	6.88	0.00488
High	2462	7.03	0.00505

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	15.23	0.03334
Mid	2437	14.96	0.03133
High	2462	15.33	0.03412

Test mode: IEEE 802.11g mode

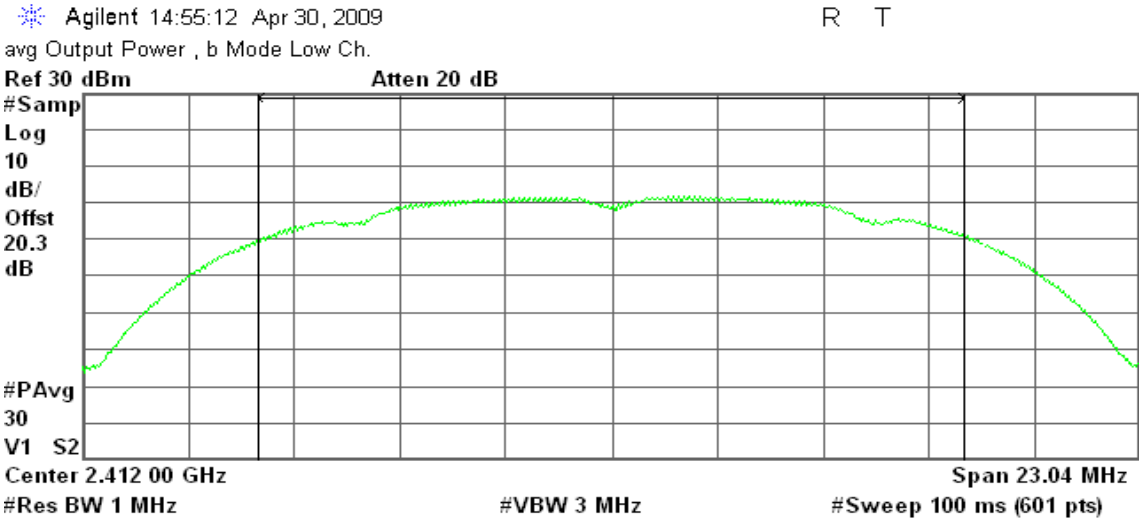
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	8.80	0.00759
Mid	2437	11.21	0.01321
High	2462	12.33	0.01710

Test Plot

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

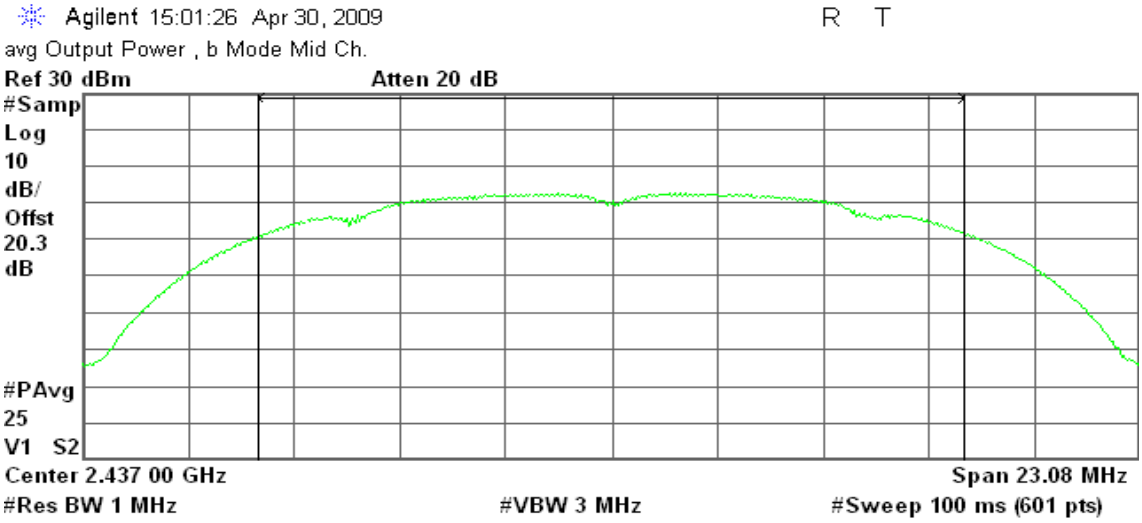
IEEE 802.11b

Average Power (CH Low)



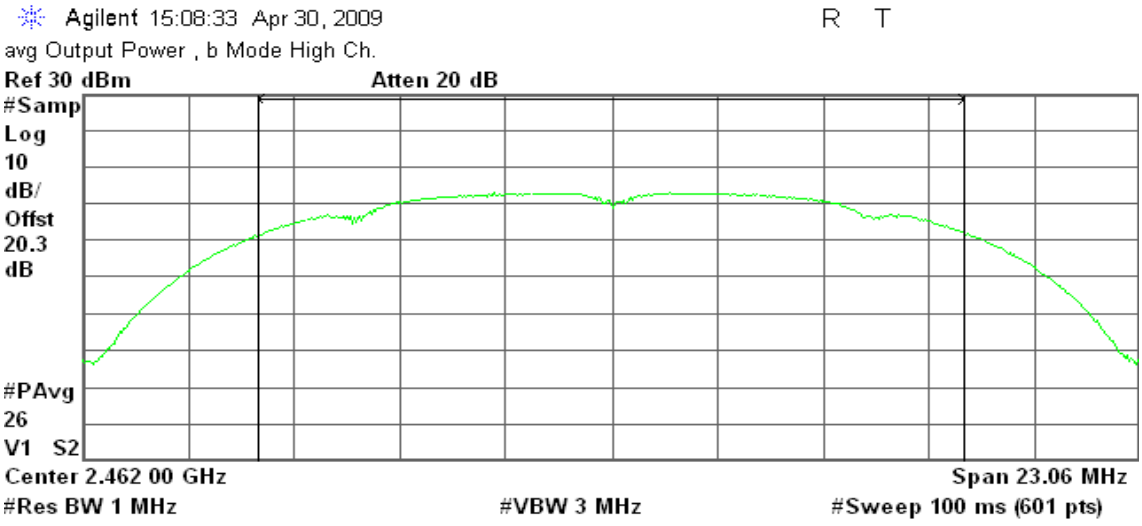
Channel Power	Power Spectral Density
10.75 dBm / 15.3590 MHz	-61.11 dBm/Hz

Average Power (CH Mid)



Channel Power	Power Spectral Density
12.10 dBm / 15.3850 MHz	-59.77 dBm/Hz

Average Power (CH High)

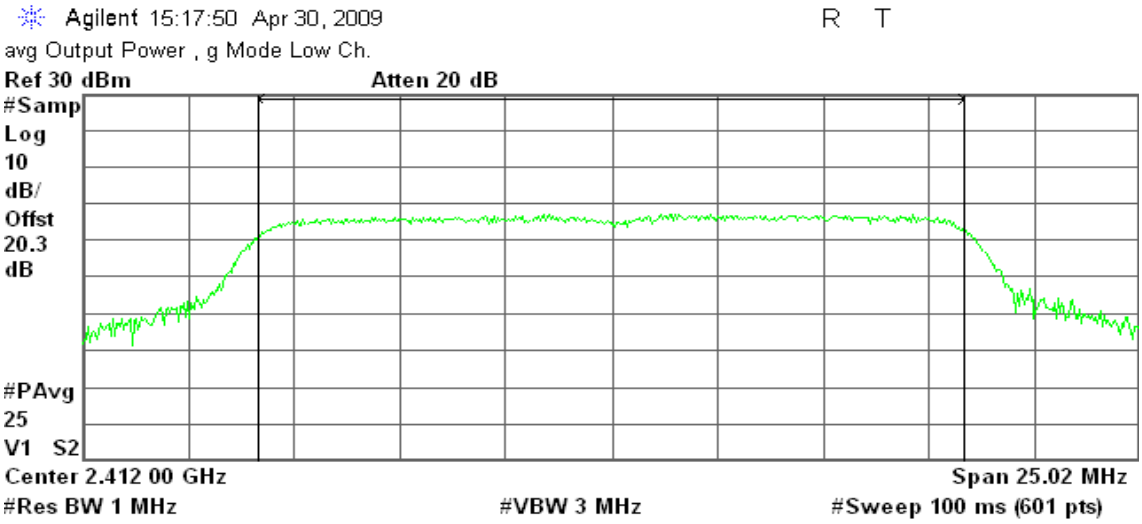


Channel Power
12.56 dBm / 15.3740 MHz

Power Spectral Density
-59.30 dBm/Hz

IEEE 802.11g

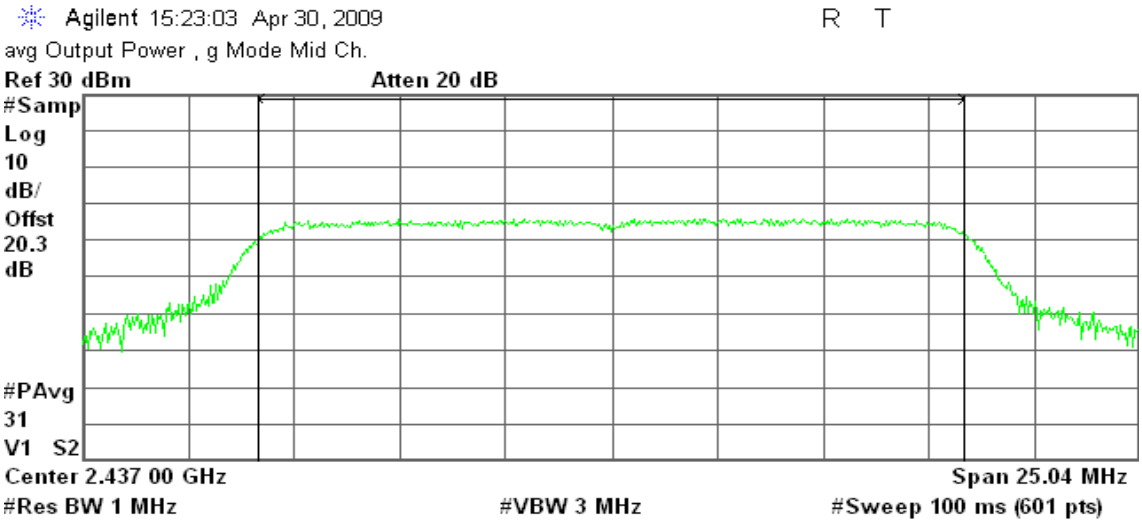
Average Power (CH Low)



Channel Power
7.94 dBm / 16.6770 MHz

Power Spectral Density
-64.28 dBm/Hz

Average Power (CH Mid)



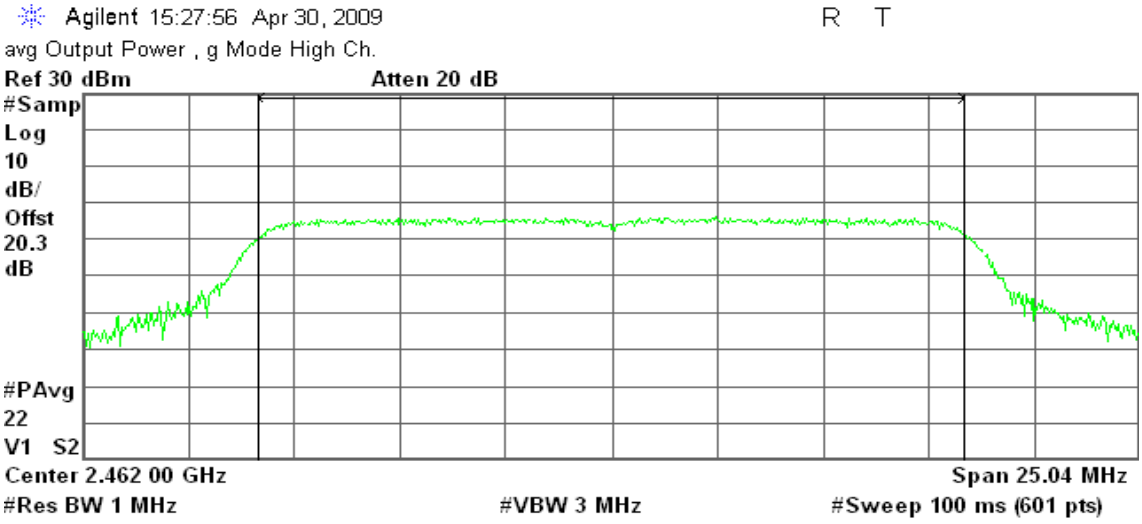
Channel Power

6.88 dBm /16.6940 MHz

Power Spectral Density

-65.34 dBm/Hz

Average Power (CH High)



Channel Power

7.03 dBm /16.6900 MHz

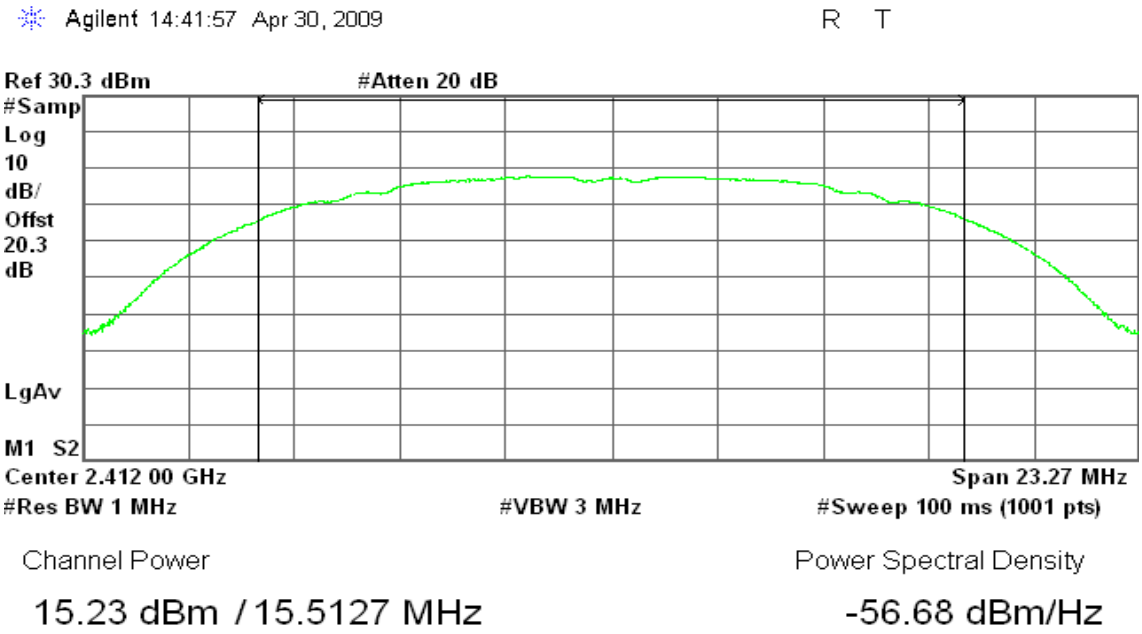
Power Spectral Density

-65.19 dBm/Hz

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

IEEE 802.11b

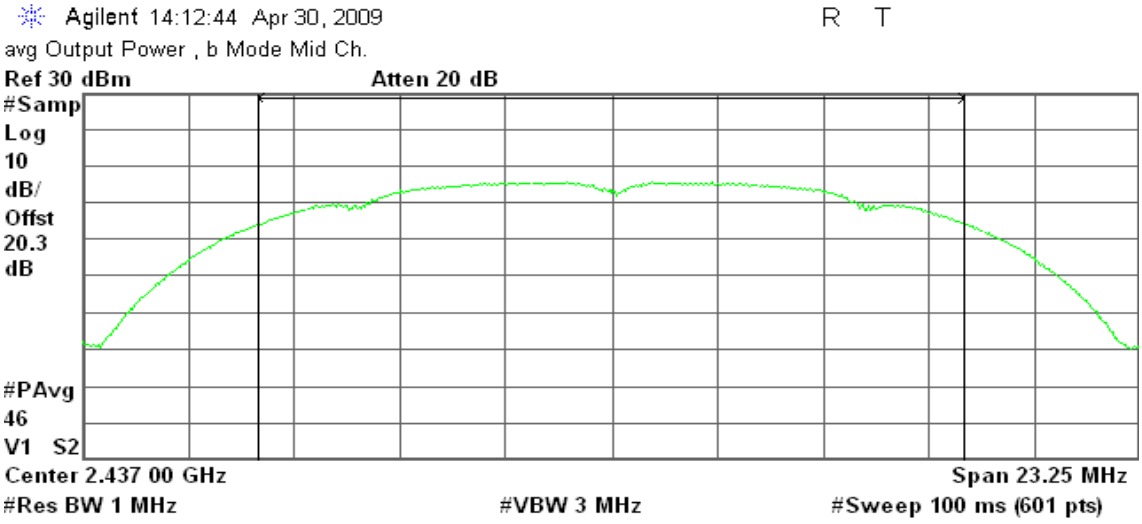
Average Power (CH Low)



Channel Power
15.23 dBm / 15.5127 MHz

Power Spectral Density
-56.68 dBm/Hz

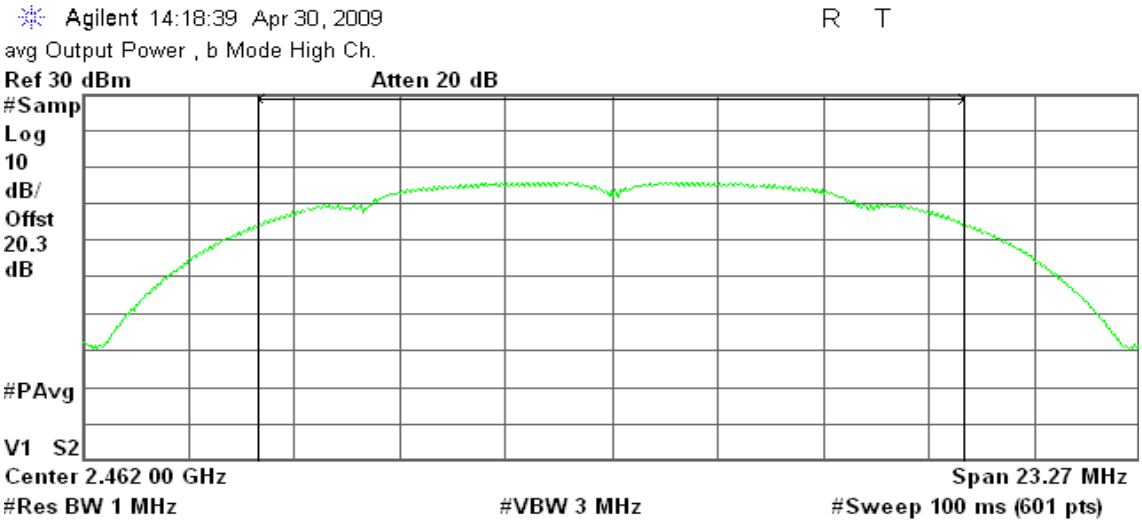
Average Power (CH Mid)



Channel Power
14.96 dBm / 15.4980 MHz

Power Spectral Density
-56.94 dBm/Hz

Average Power (CH High)

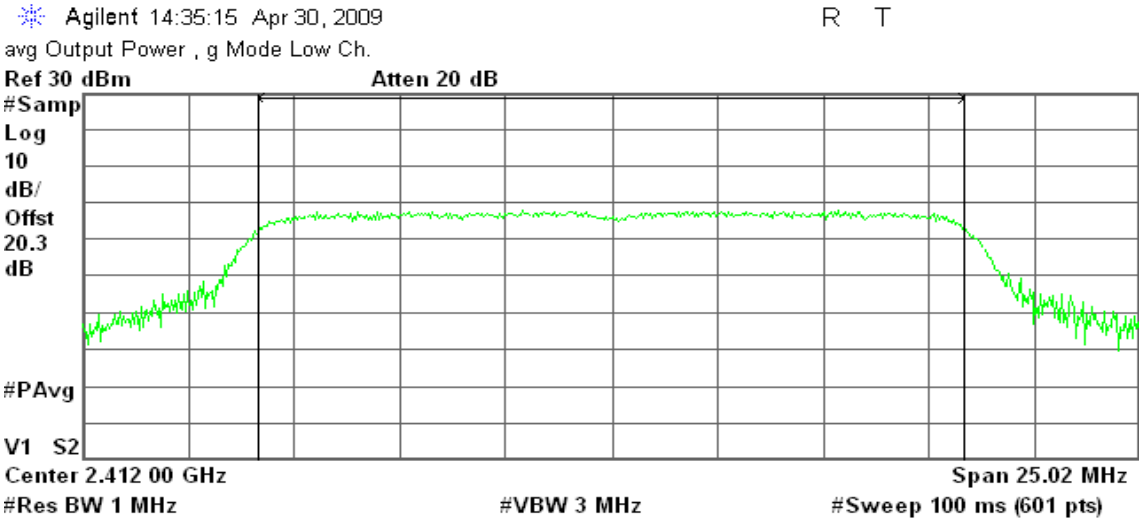


Channel Power
15.33 dBm / 15.5140 MHz

Power Spectral Density
-56.57 dBm/Hz

IEEE 802.11g

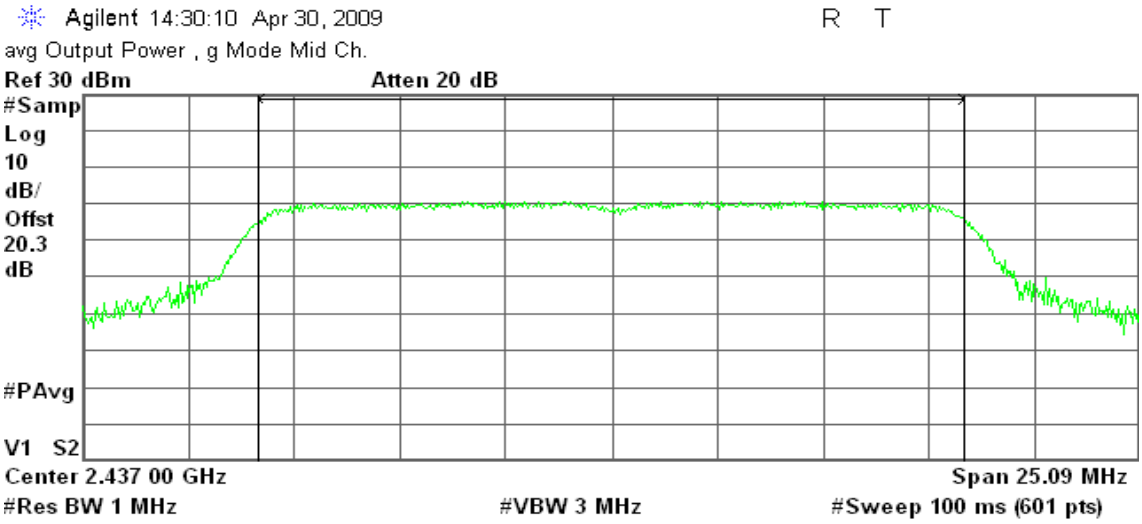
Average Power (CH Low)



Channel Power
8.80 dBm / 16.6770 MHz

Power Spectral Density
-63.43 dBm/Hz

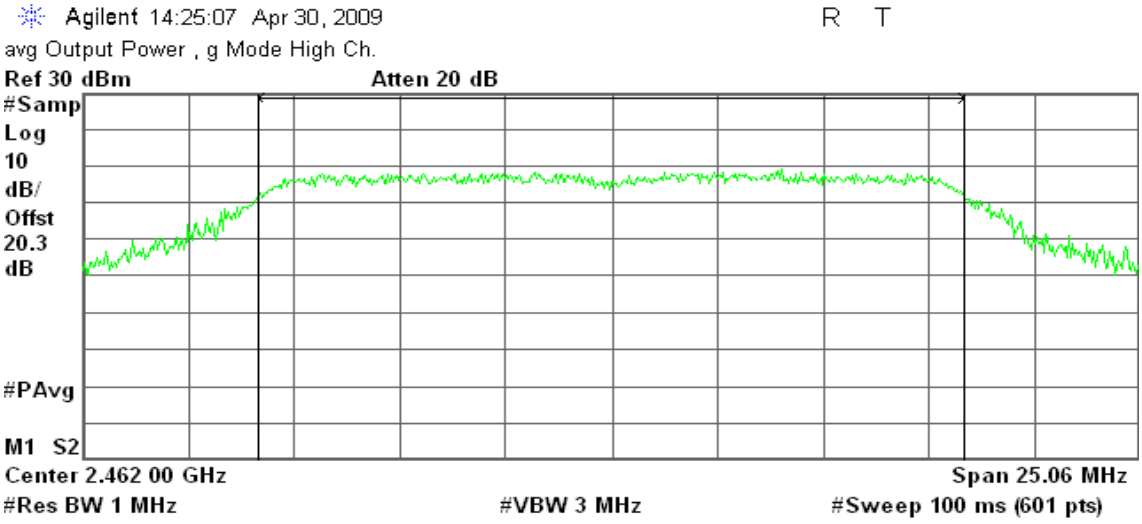
Average Power (CH Mid)



Channel Power
11.21 dBm / 16.7300 MHz

Power Spectral Density
-61.03 dBm/Hz

Average Power (CH High)



Channel Power
12.33 dBm / 16.7050 MHz

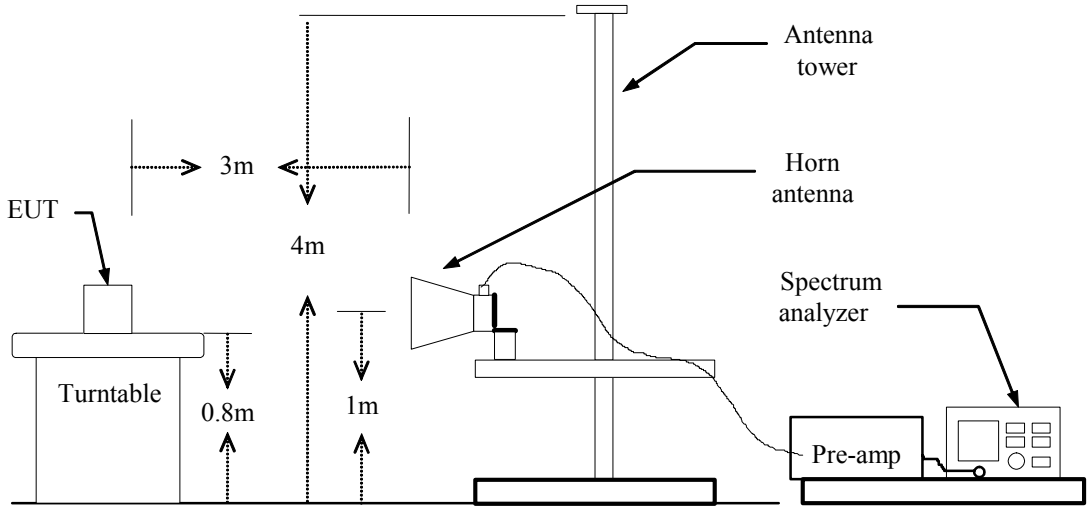
Power Spectral Density
-59.90 dBm/Hz

7.4BAND EDGES MEASUREMENT

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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. 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 Section 15.205(c)).

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

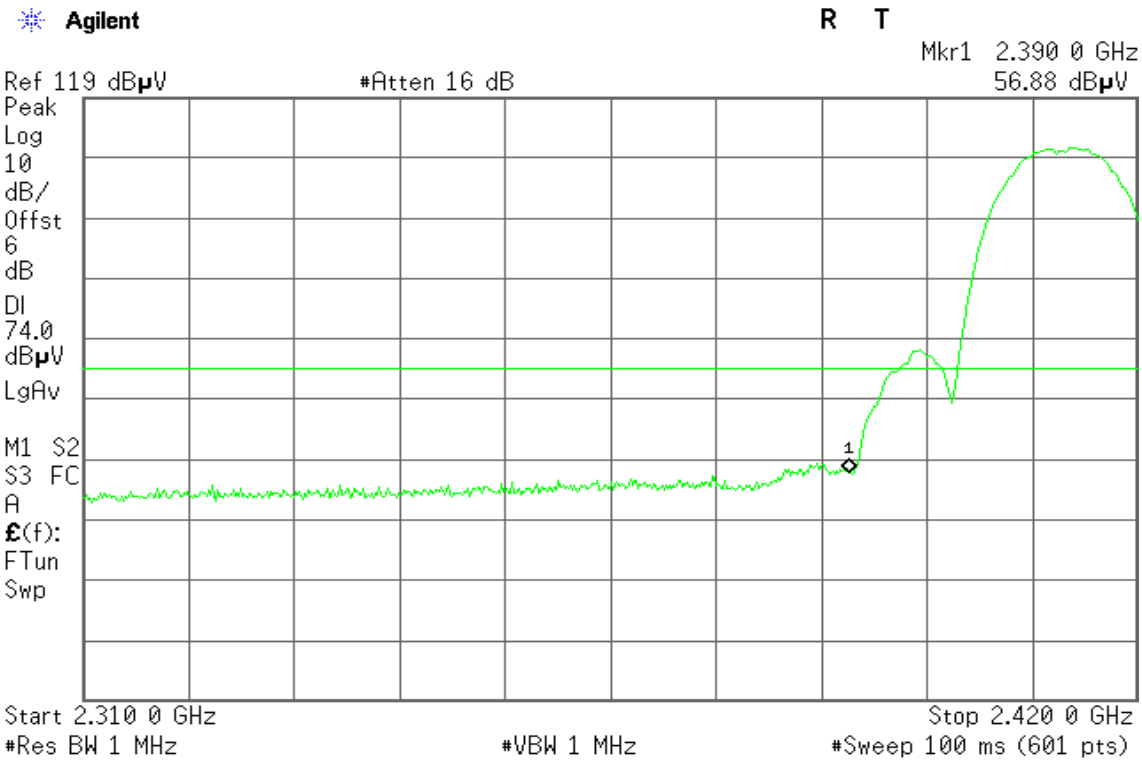
TEST RESULTS

Refer to attach spectrum analyzer data chart.

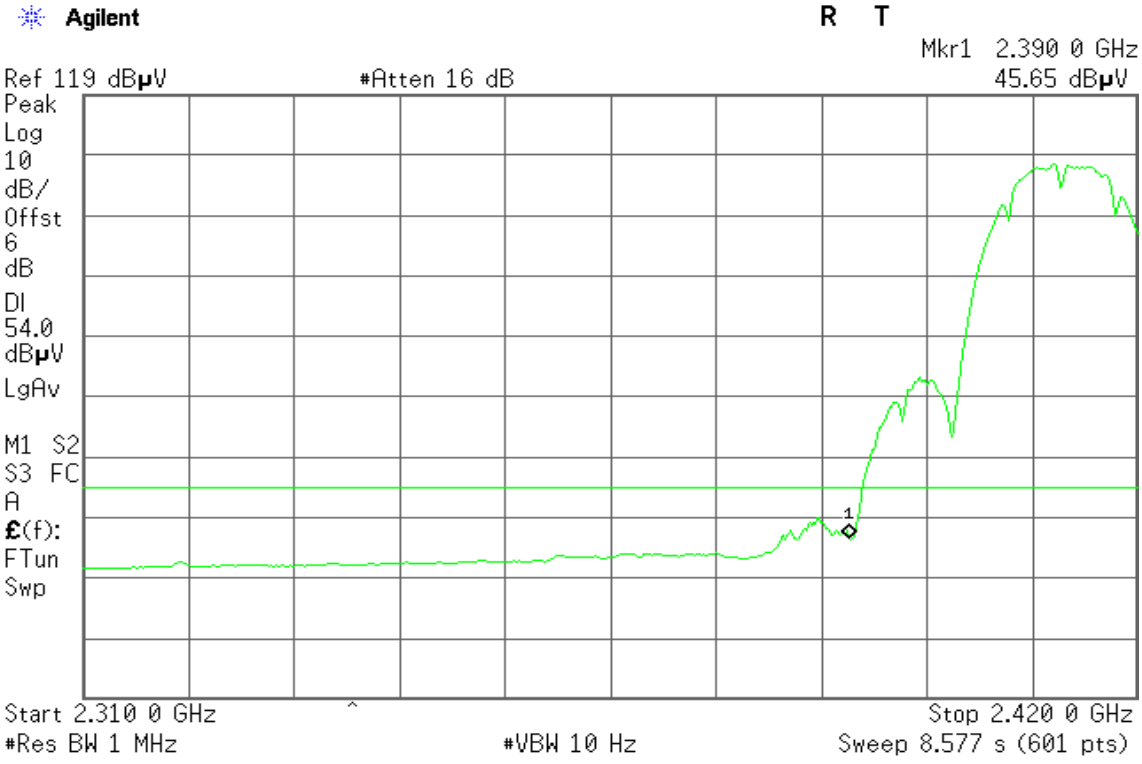
For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Band Edges (IEEE 802.11b / CH Low)

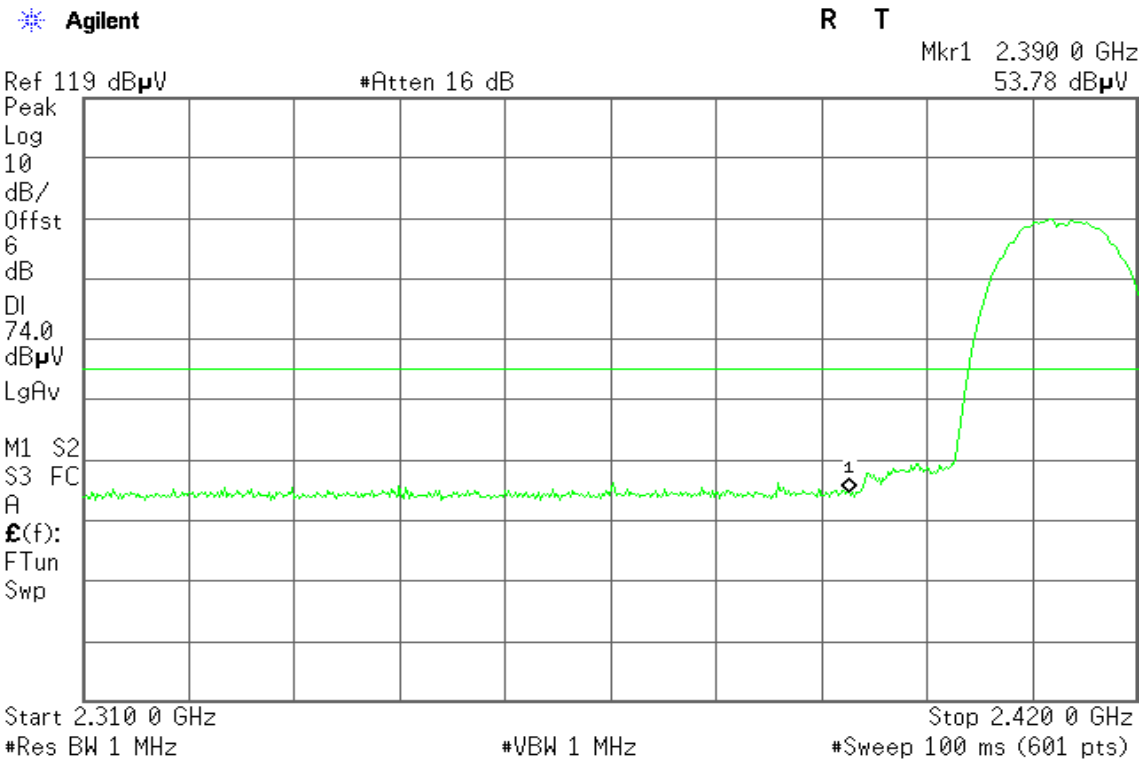
Detector mode: Peak **Polarity: Vertical**



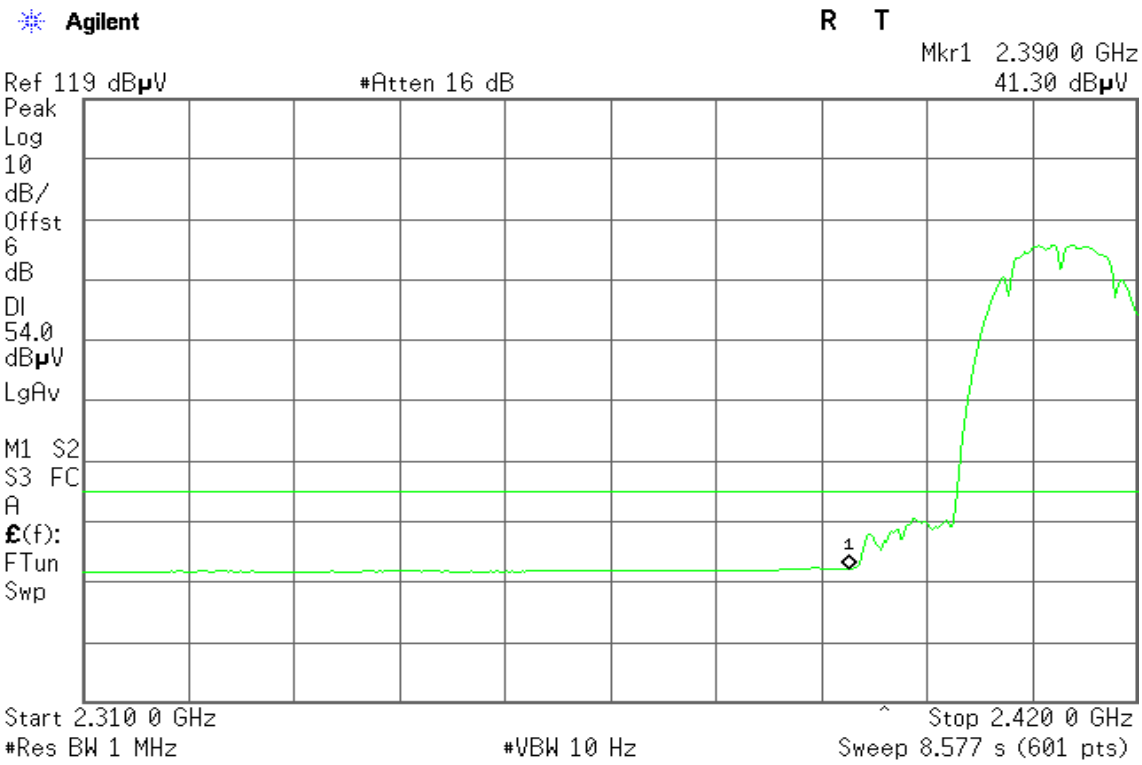
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

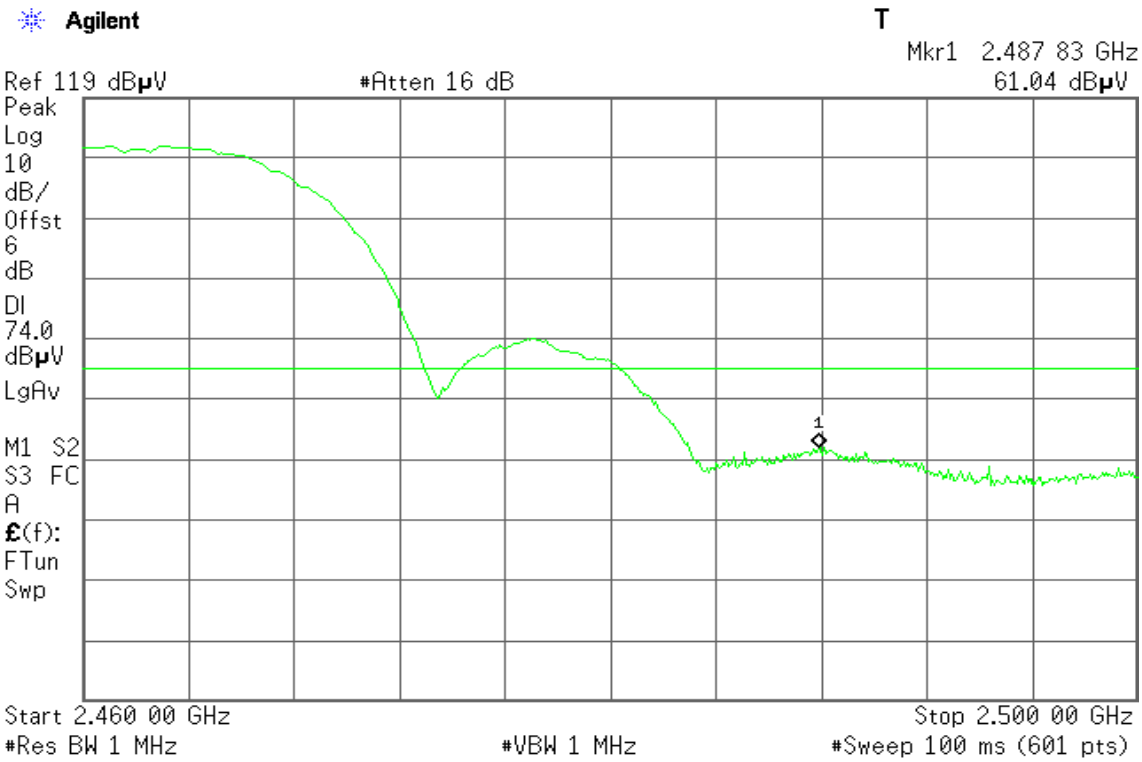


Detector mode: Average **Polarity: Horizontal**

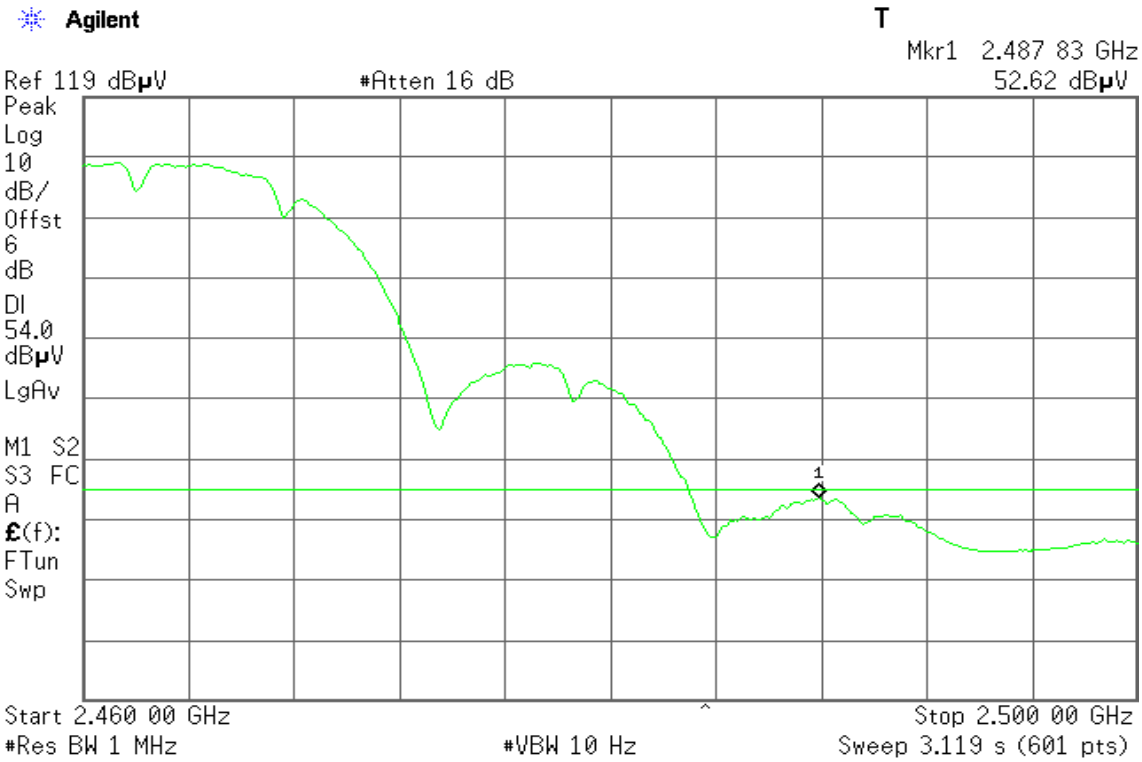


Band Edges (IEEE 802.11b / CH High)

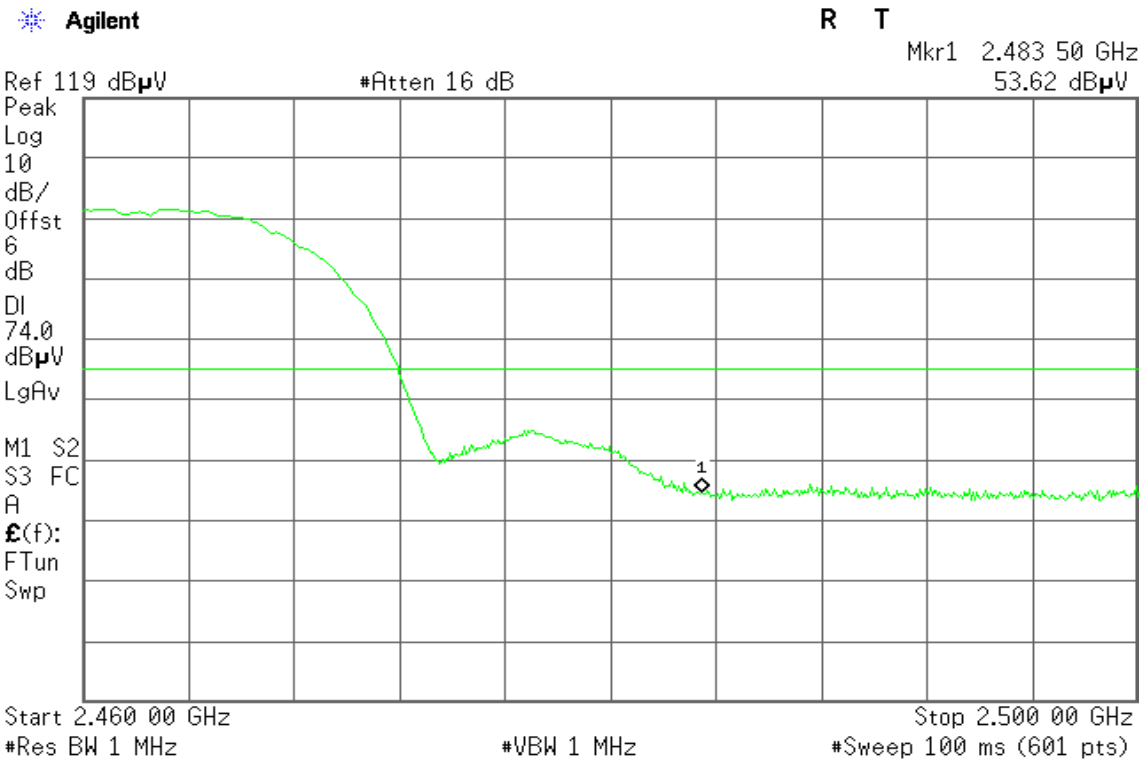
Detector mode: Peak Polarity: Vertical



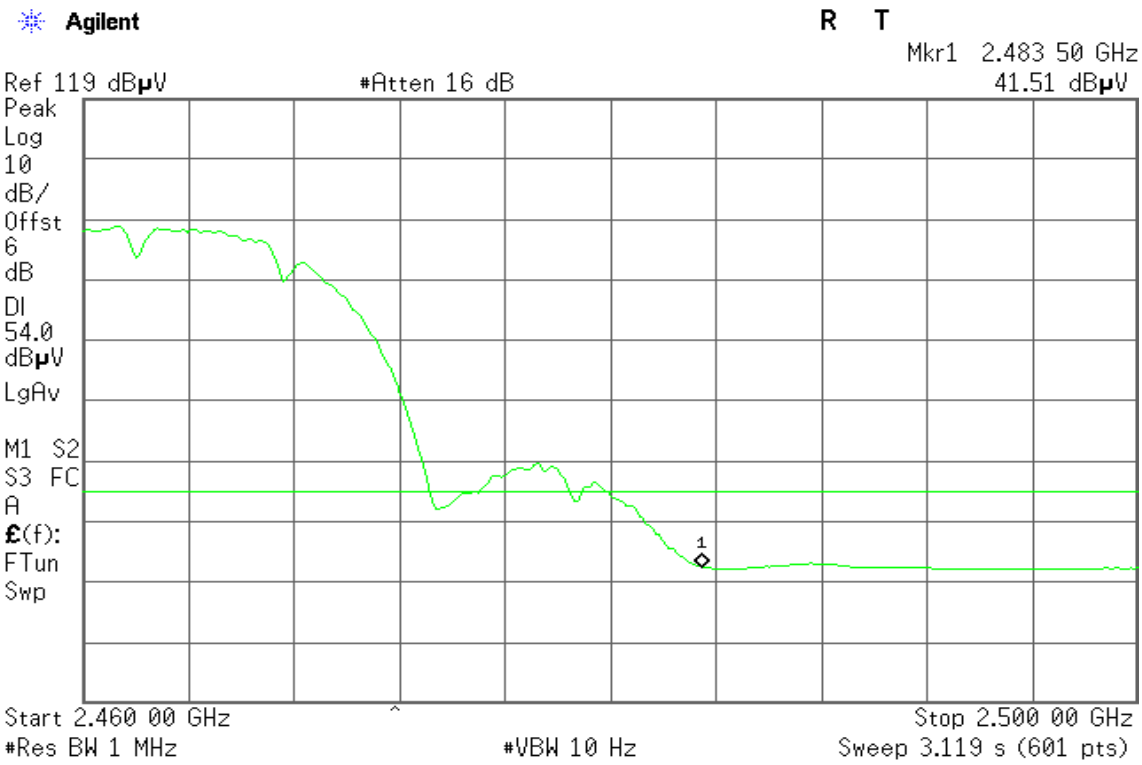
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**

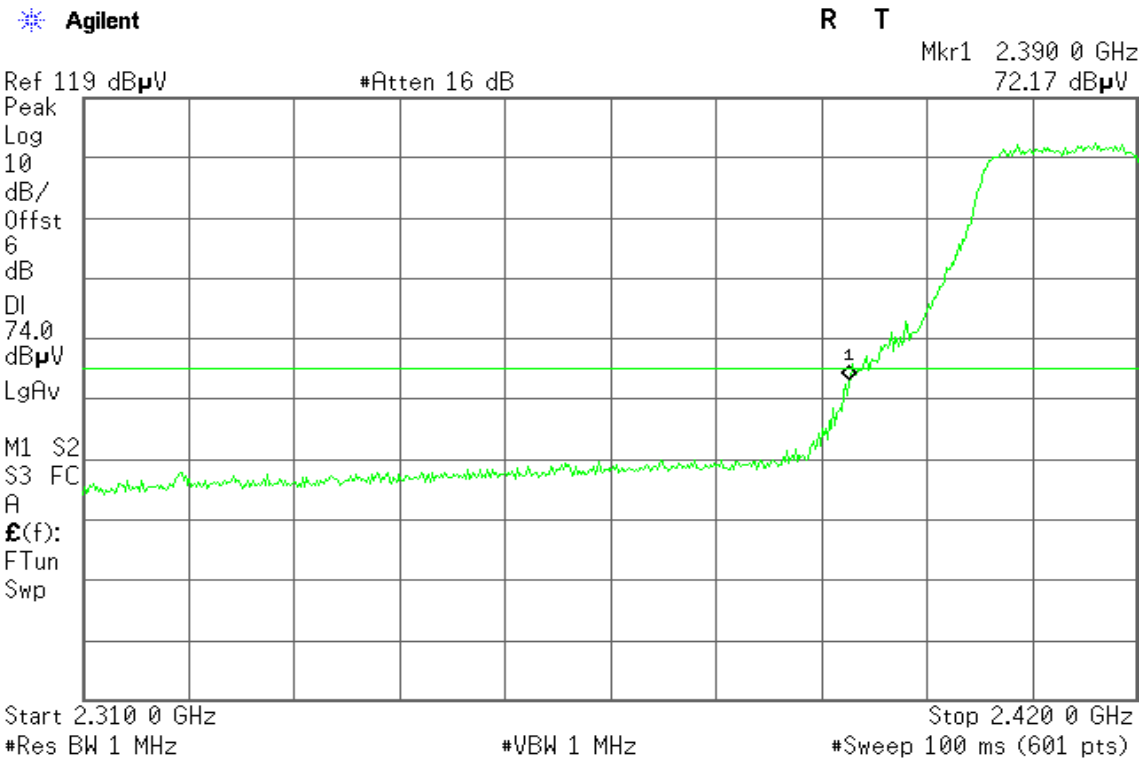


Detector mode: Average **Polarity: Horizontal**

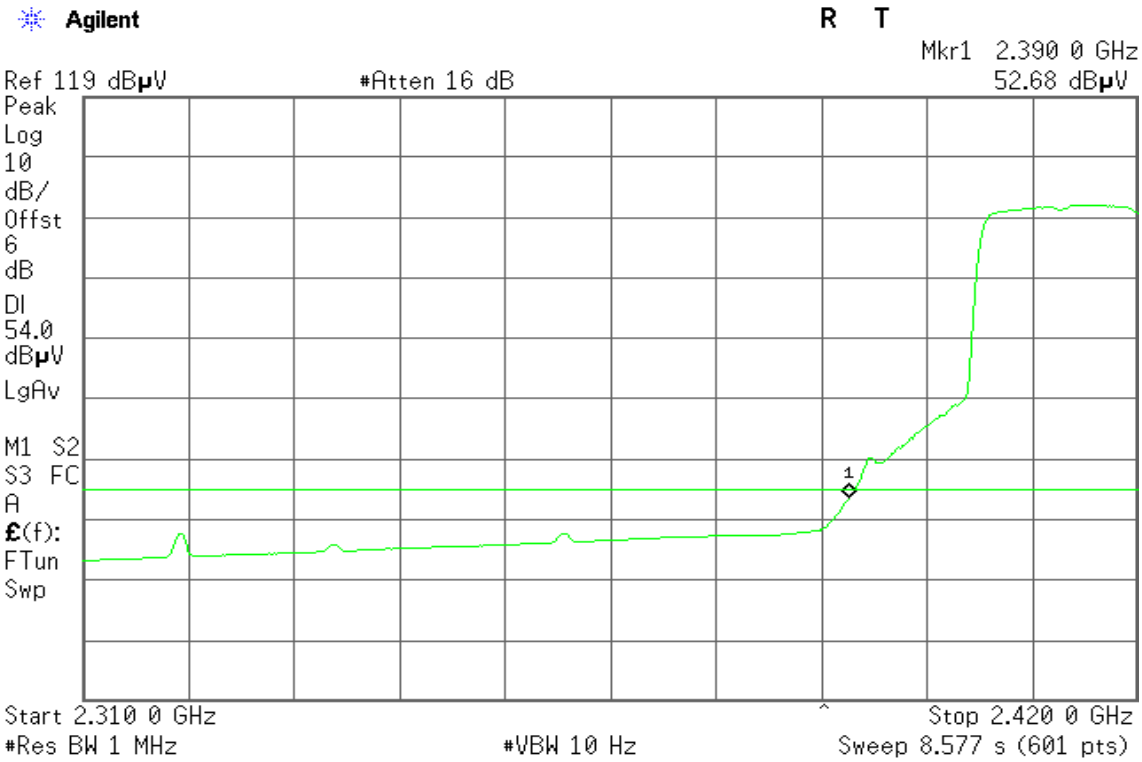


Band Edges (IEEE 802.11g / CH Low)

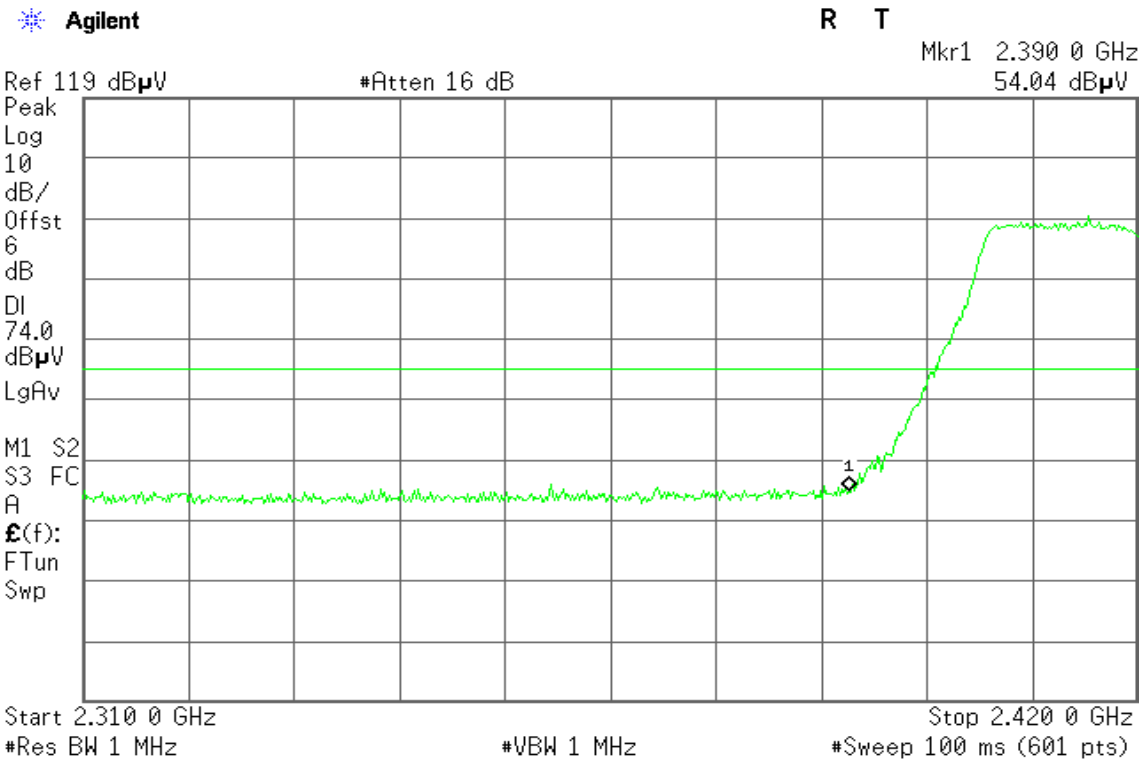
Detector mode: Peak **Polarity: Vertical**



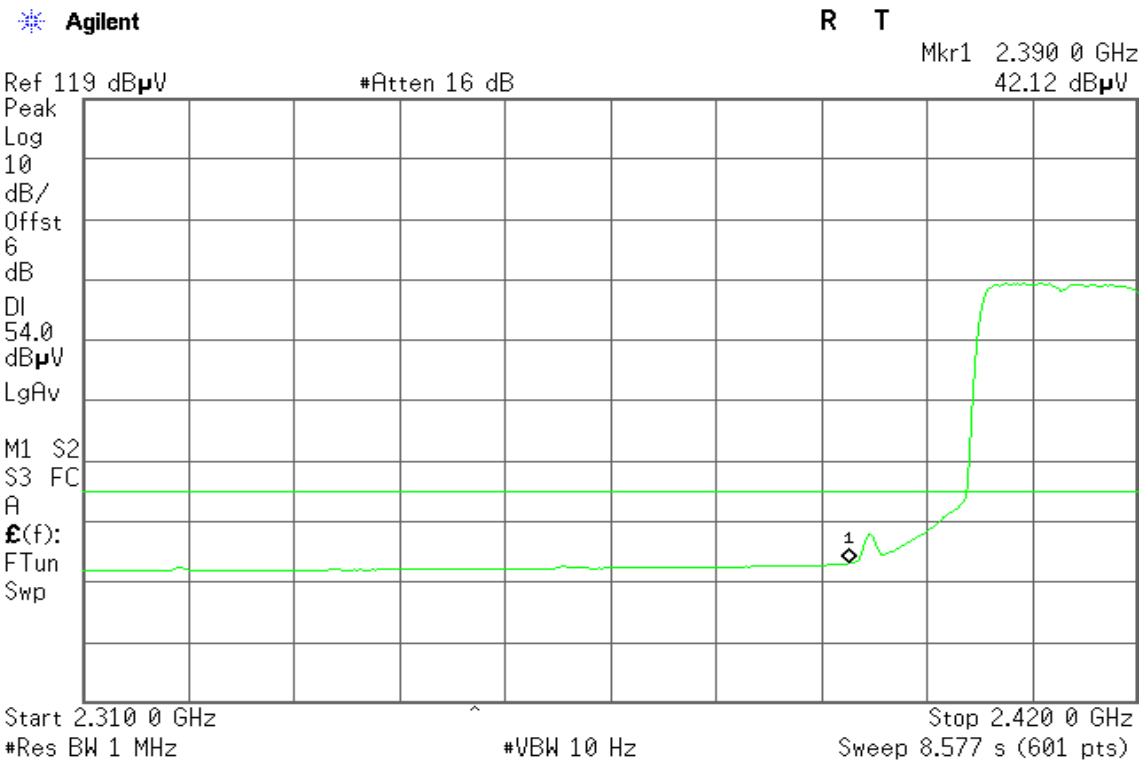
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

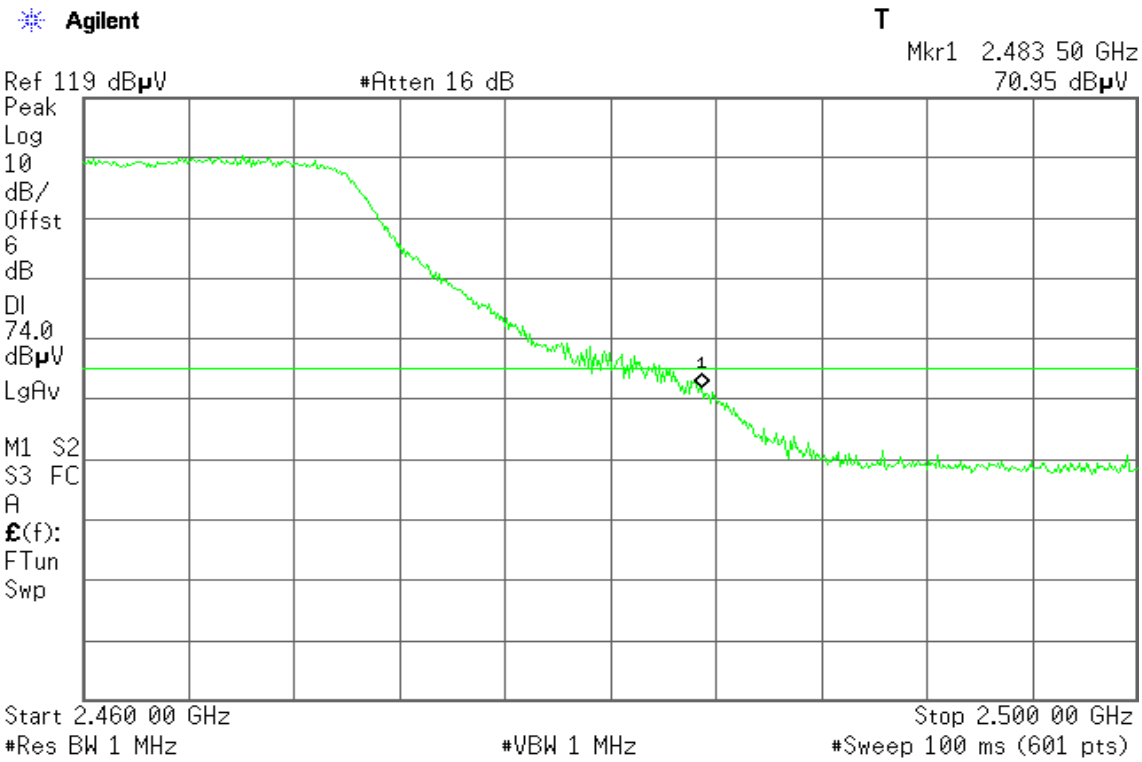


Detector mode: Average **Polarity: Horizontal**

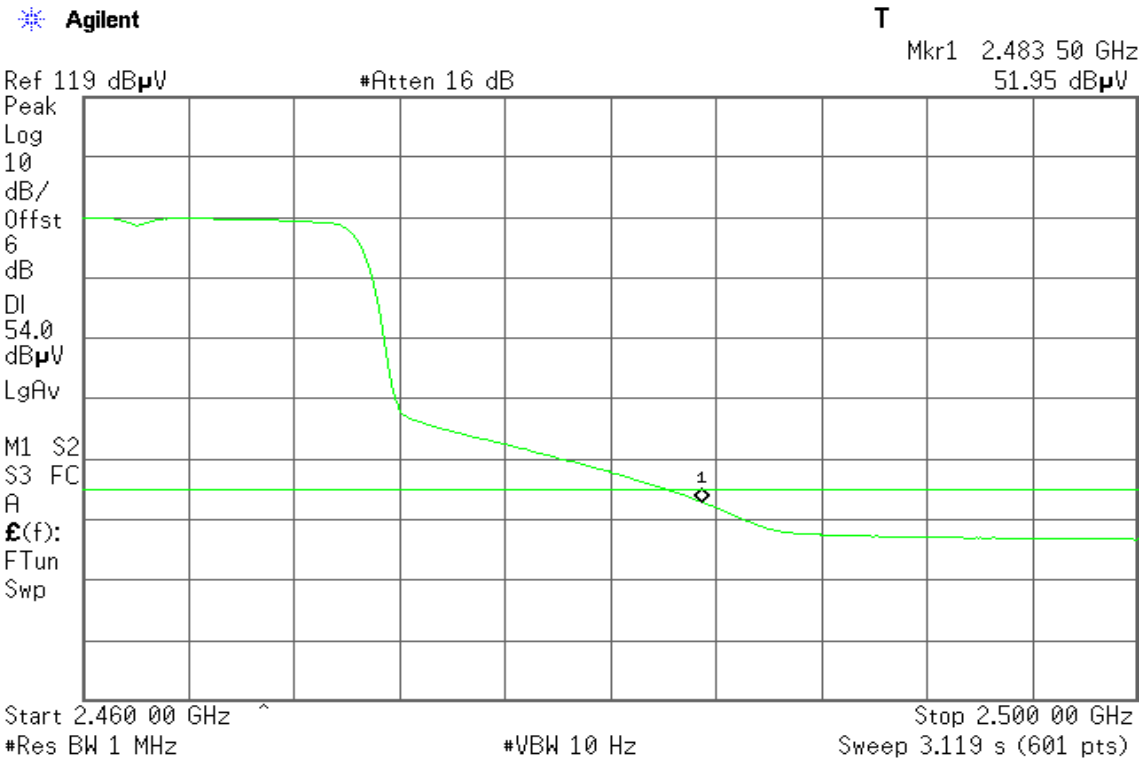


Band Edges (IEEE 802.11g / CH High)

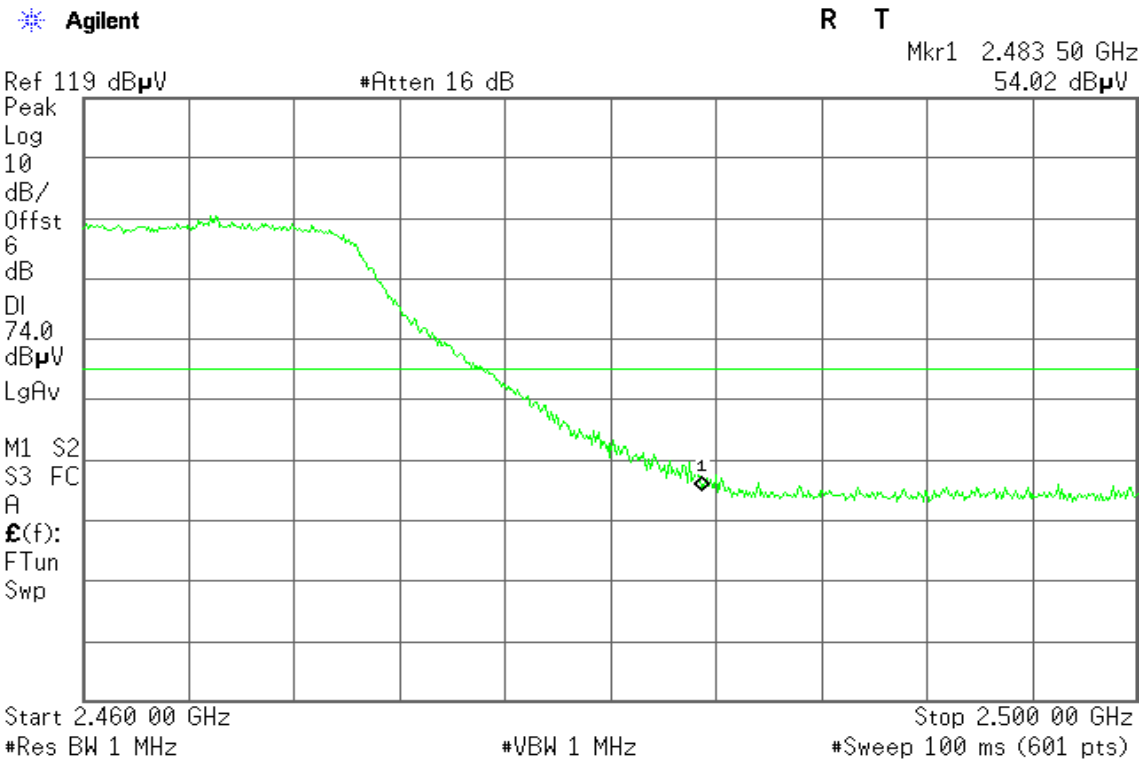
Detector mode: Peak Polarity: Vertical



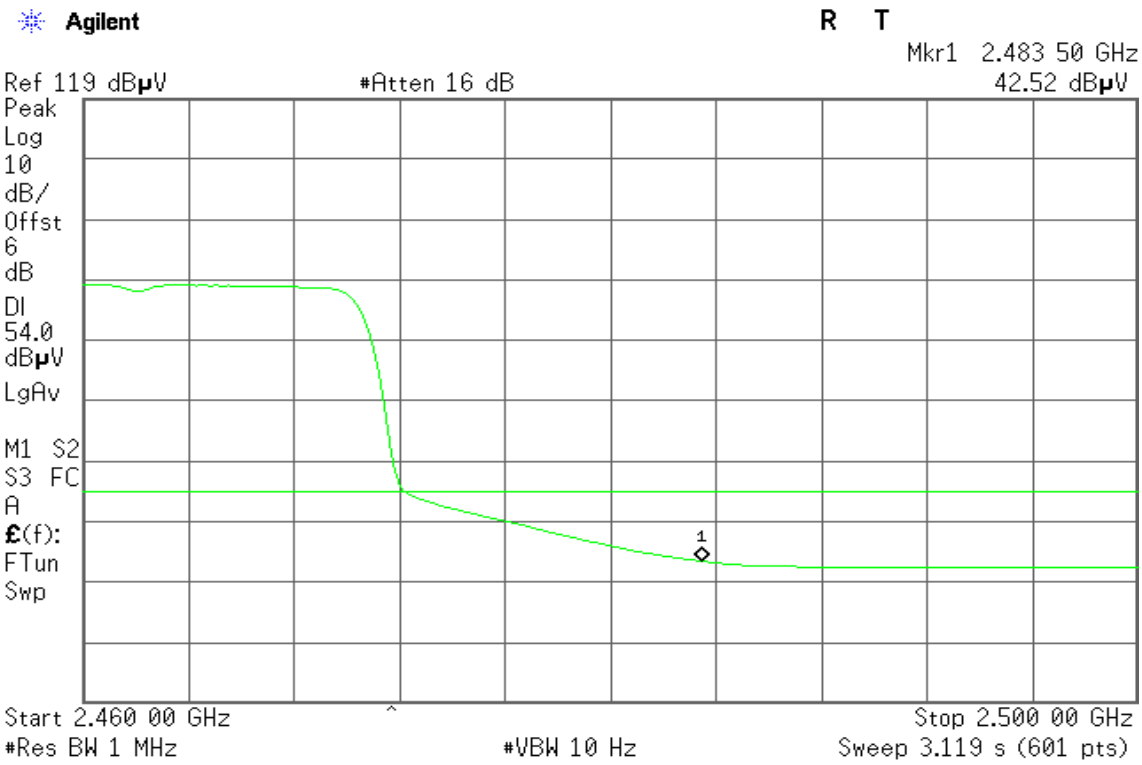
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**



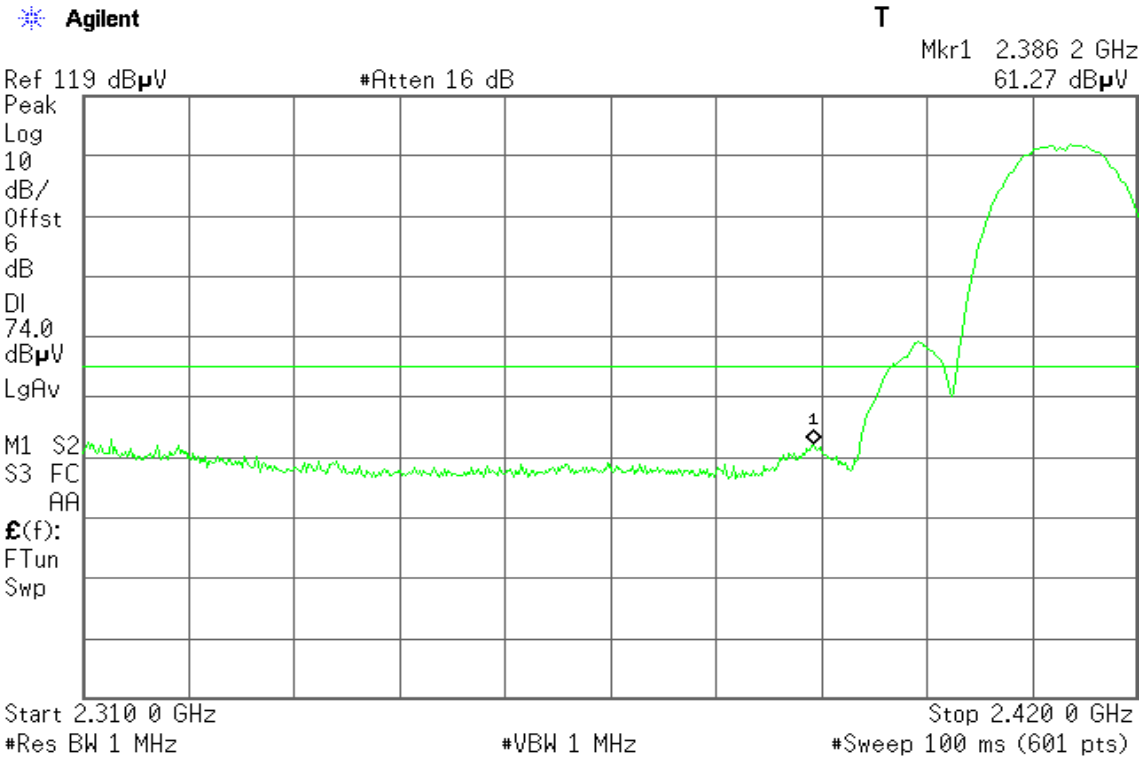
Detector mode: Average **Polarity: Horizontal**



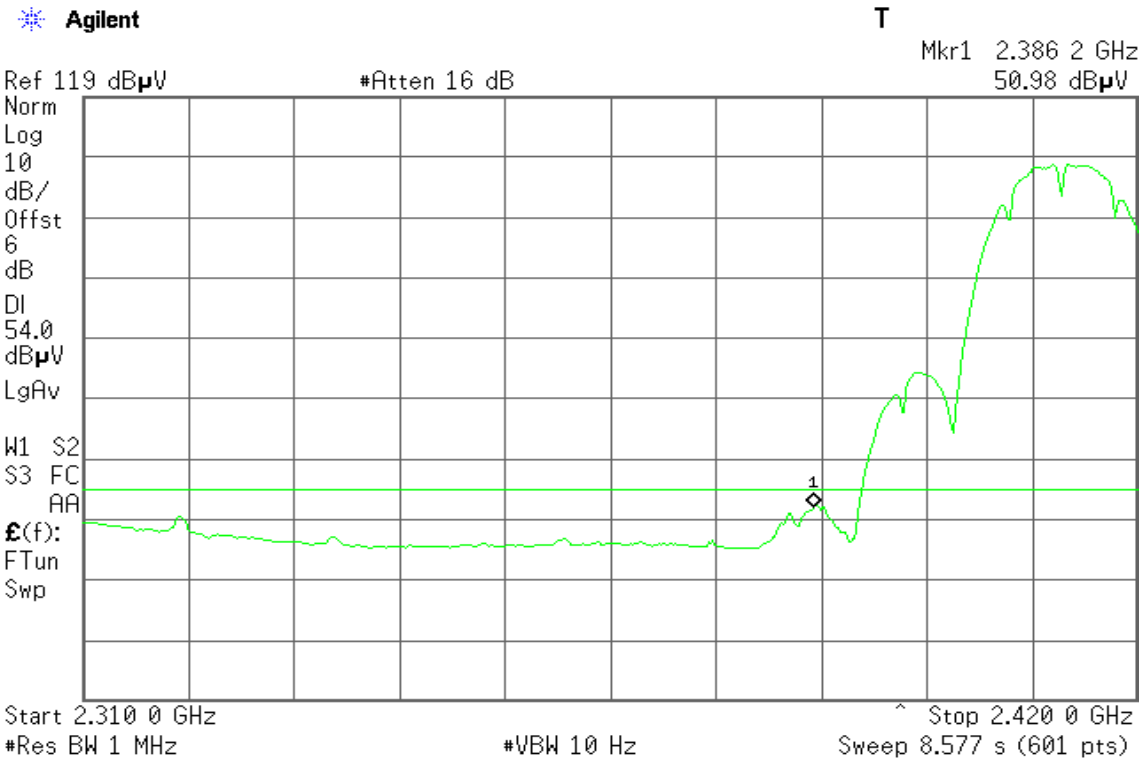
For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Band Edges (IEEE 802.11b / CH Low)

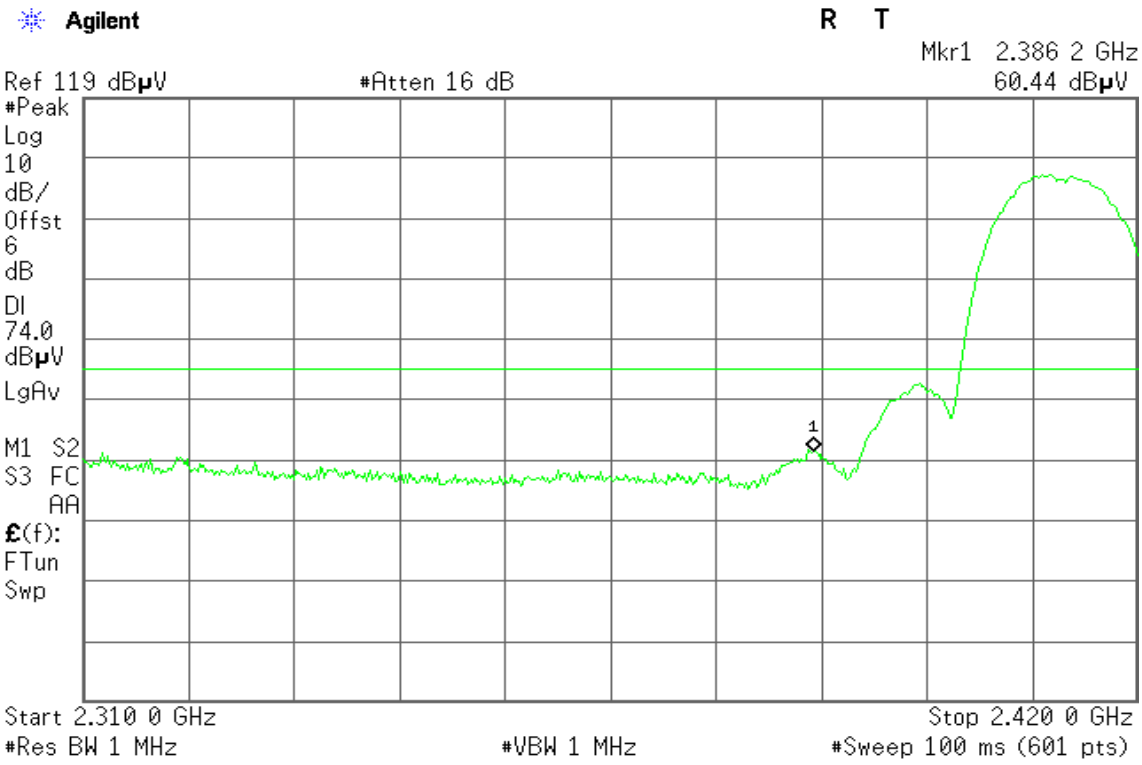
Detector mode: Peak **Polarity: Vertical**



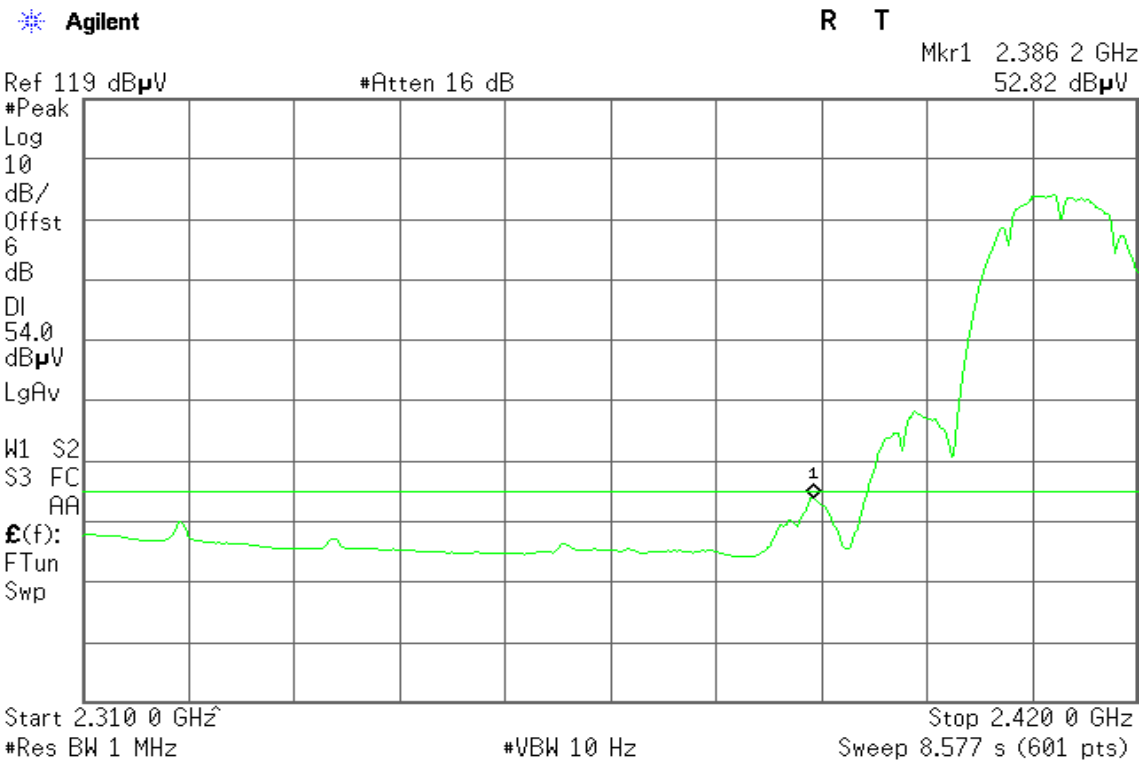
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

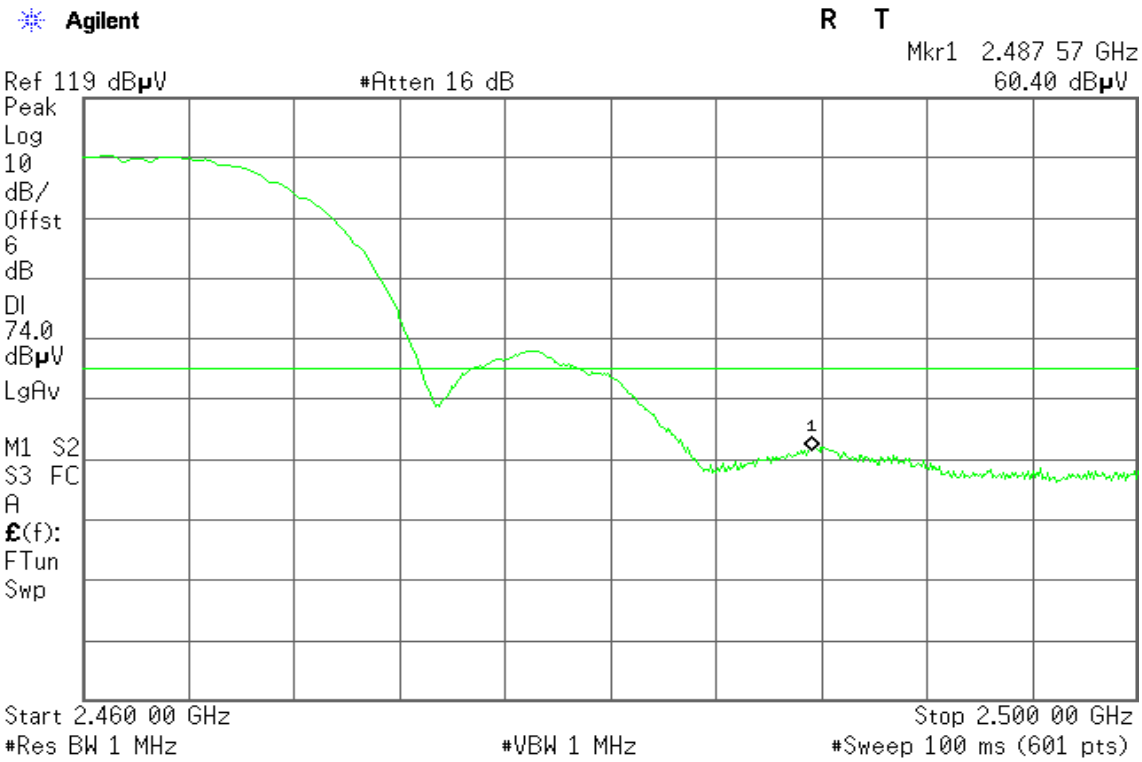


Detector mode: Average **Polarity: Horizontal**

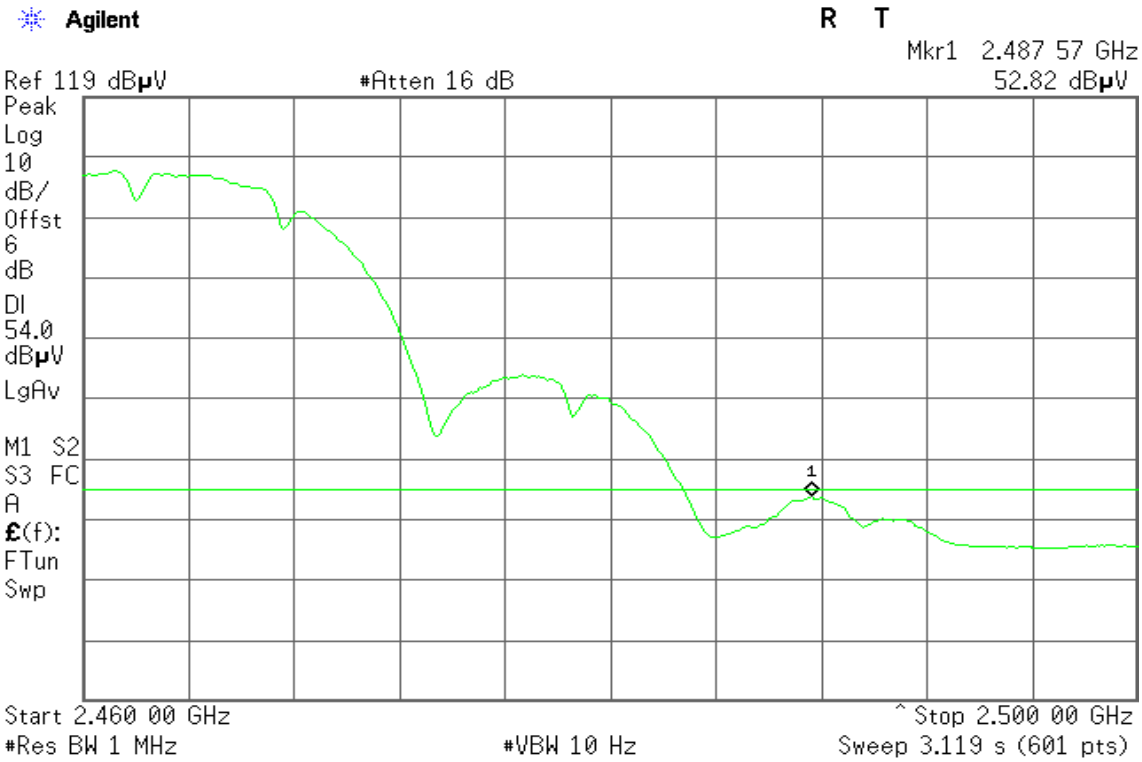


Band Edges (IEEE 802.11b / CH High)

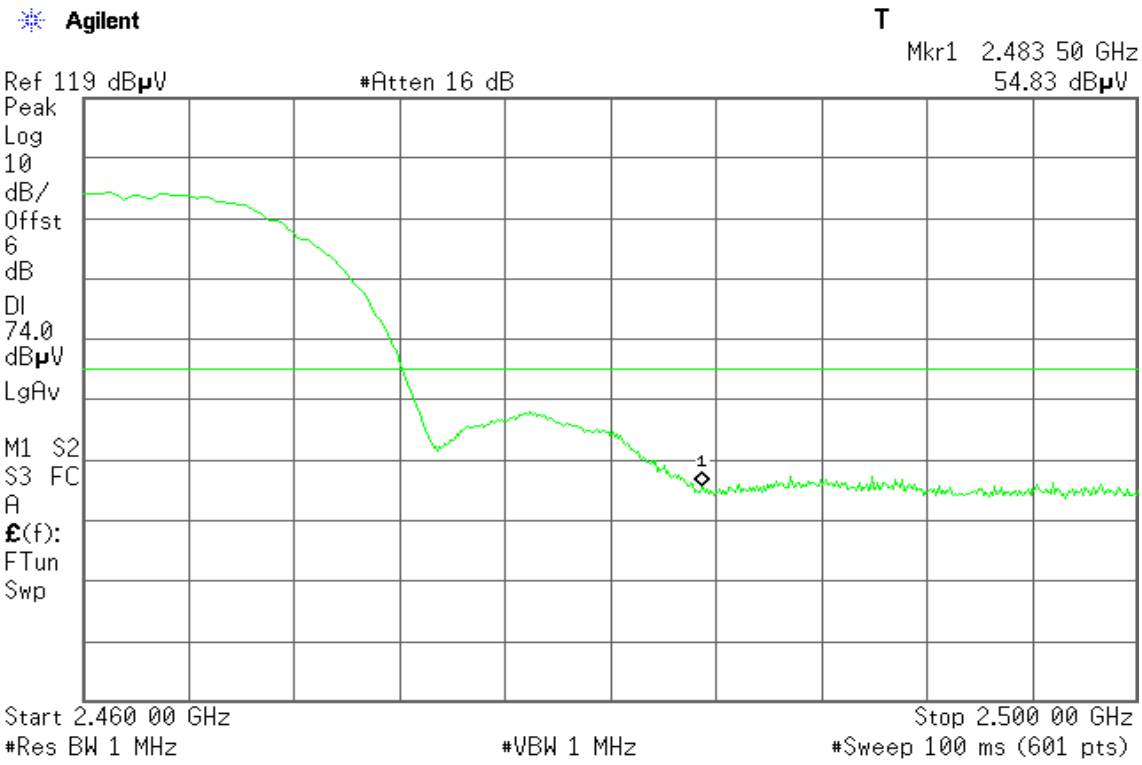
Detector mode: Peak Polarity: Vertical



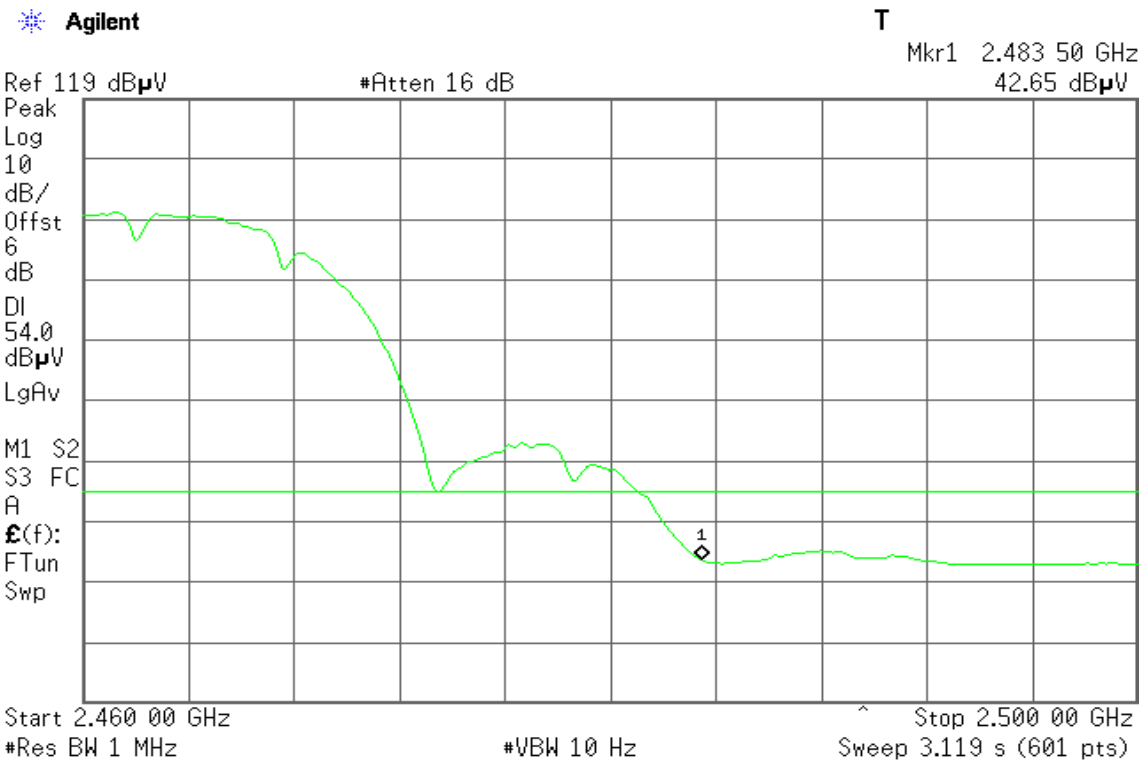
Detector mode: Average Polarity: Vertical



Detector mode: Peak **Polarity: Horizontal**

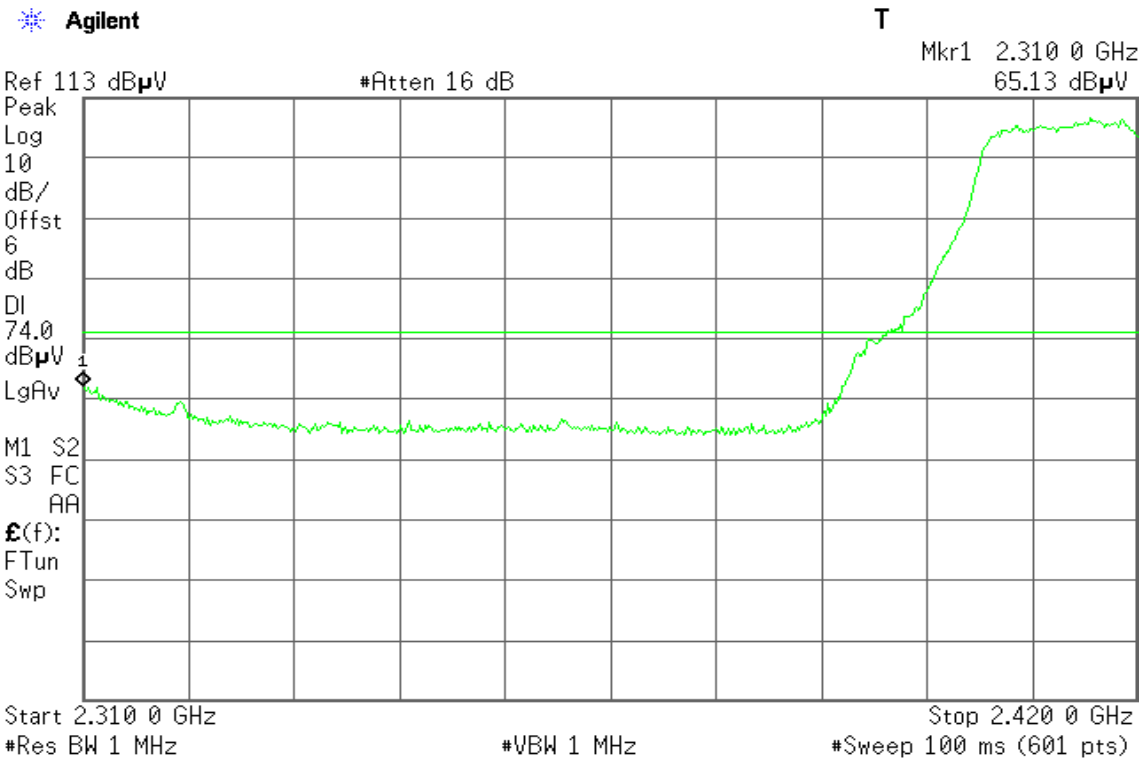


Detector mode: Average **Polarity: Horizontal**

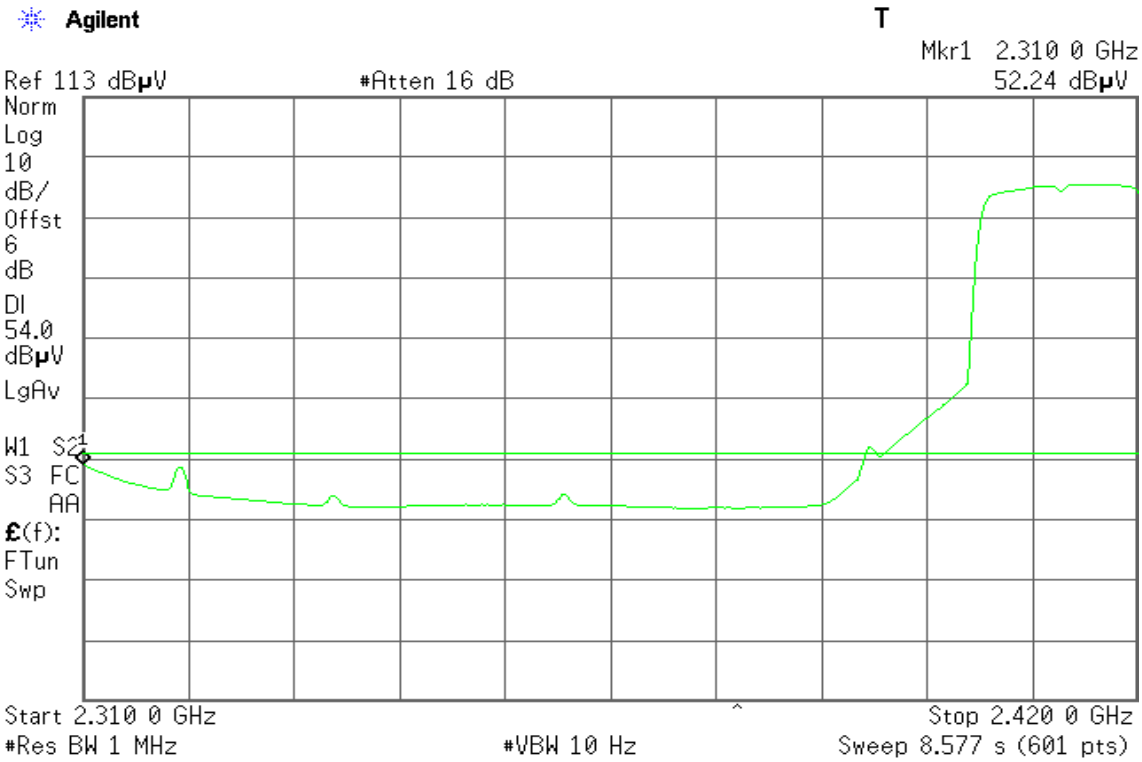


Band Edges (IEEE 802.11g / CH Low)

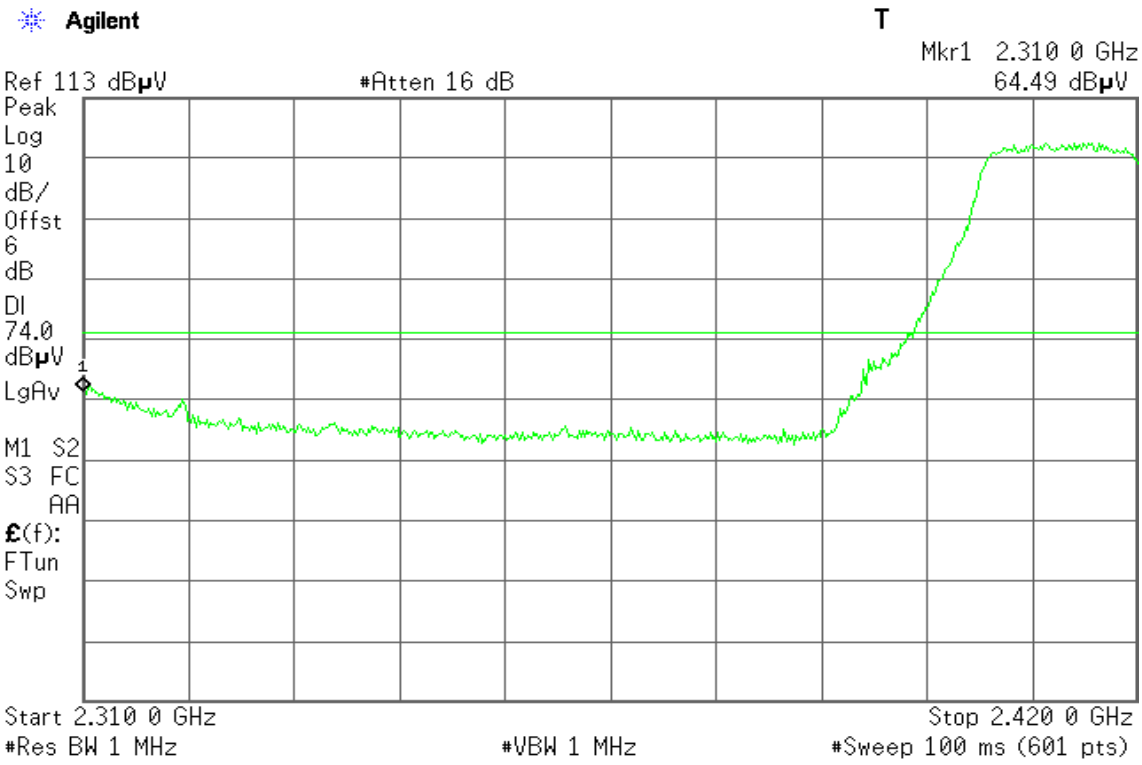
Detector mode: Peak **Polarity: Vertical**



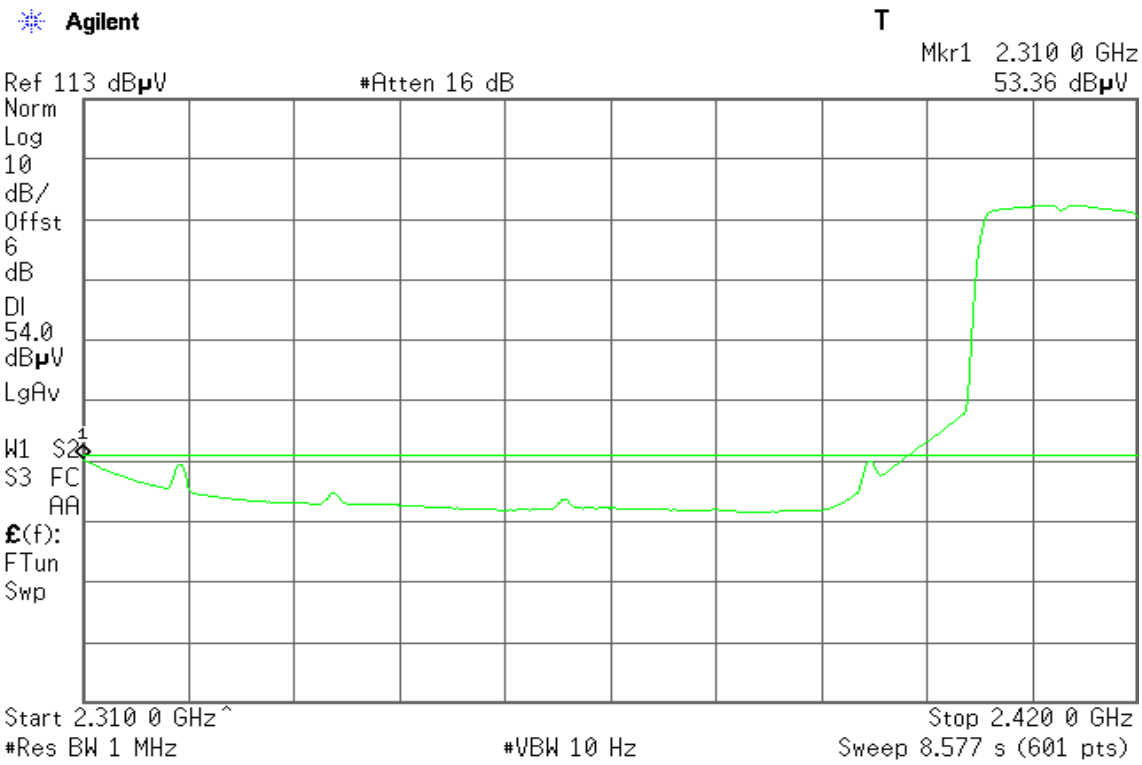
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

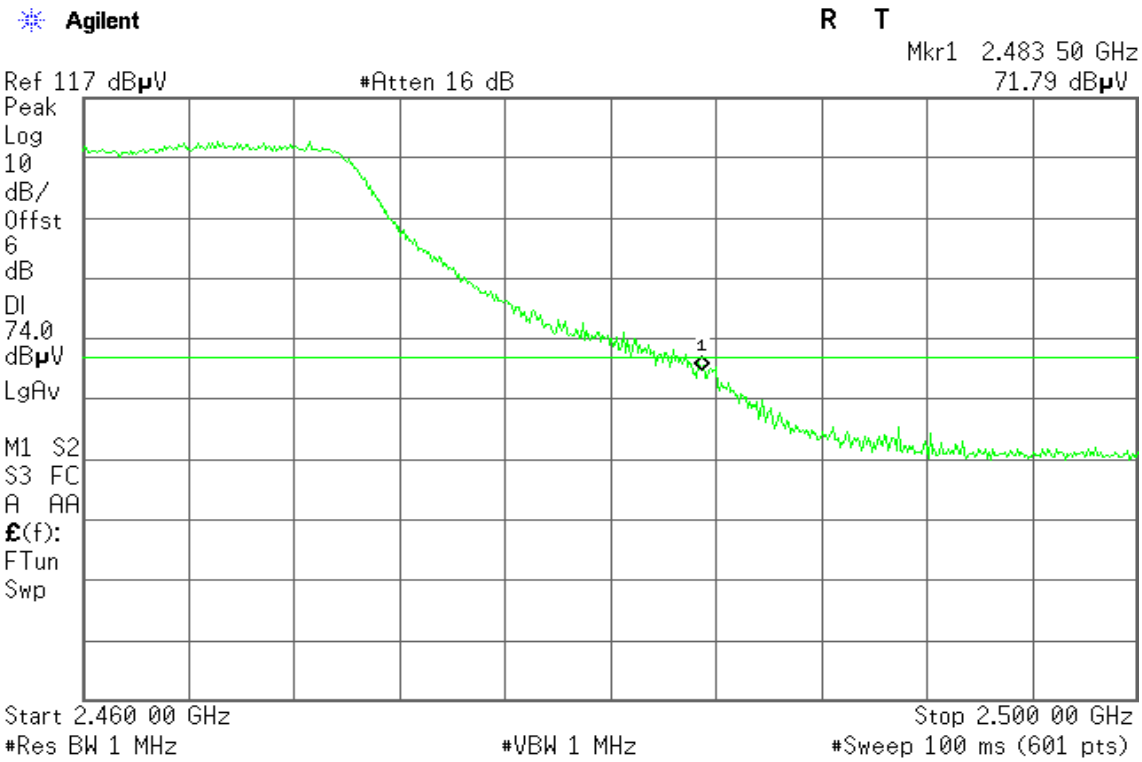


Detector mode: Average **Polarity: Horizontal**

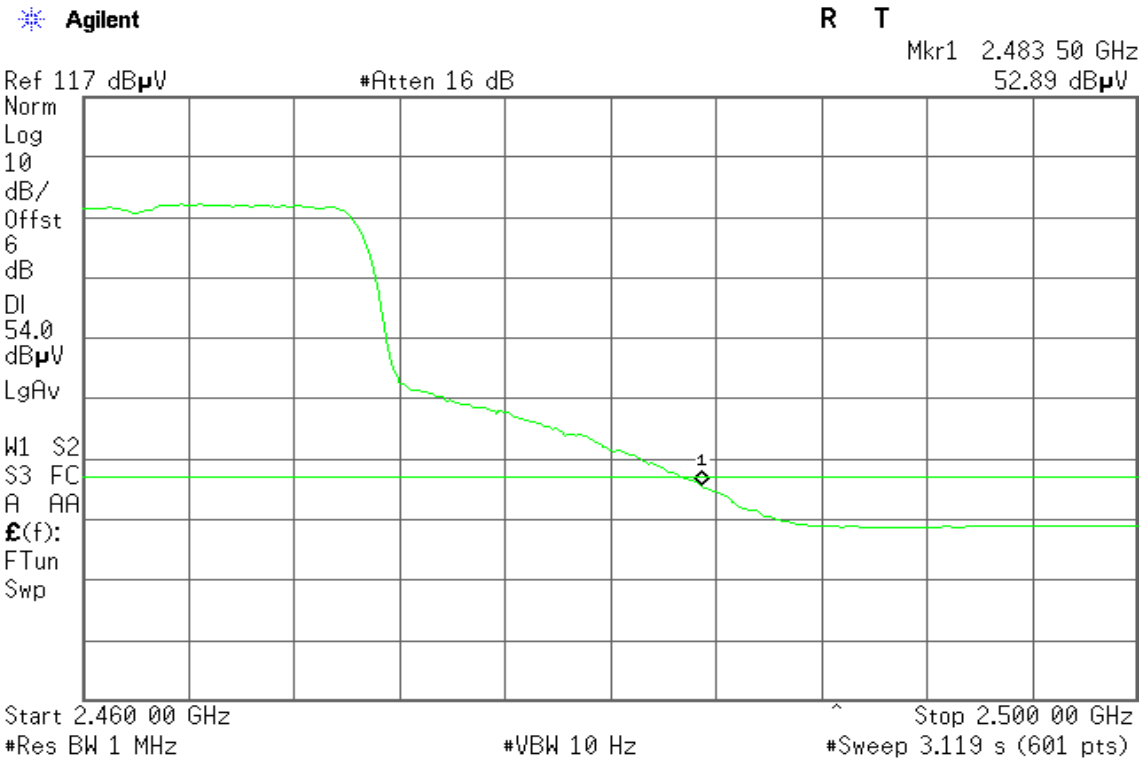


Band Edges (IEEE 802.11g / CH High)

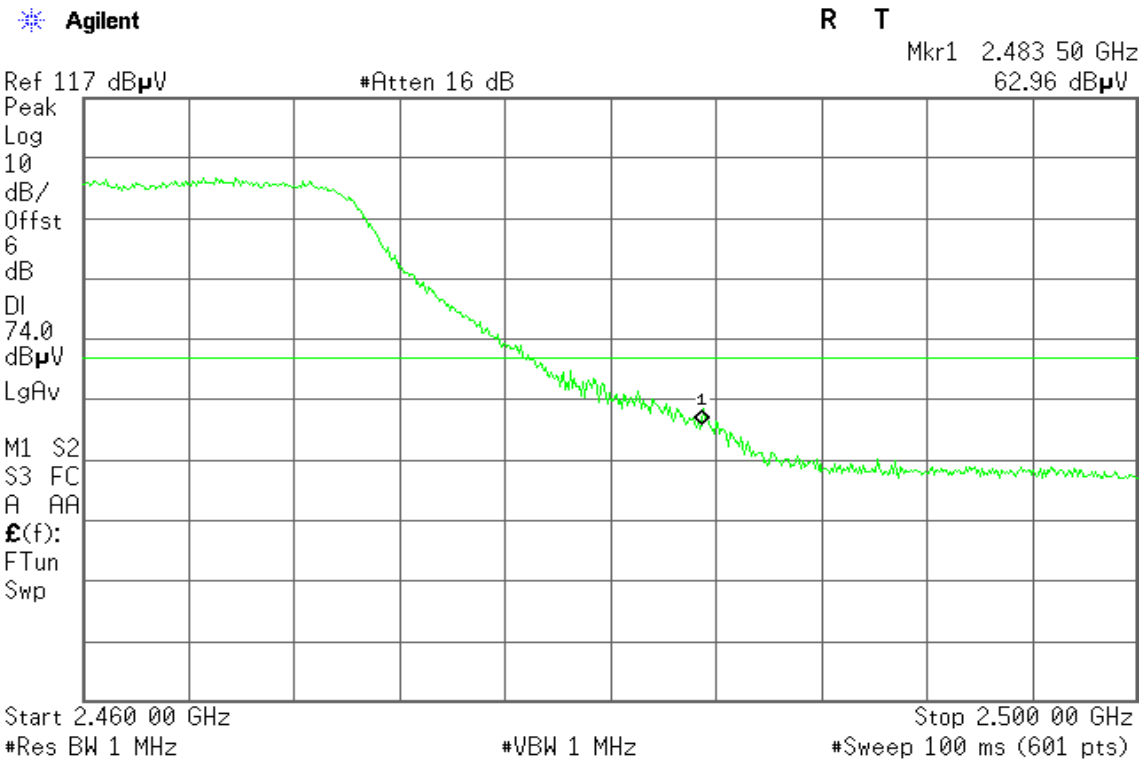
Detector mode: Peak **Polarity: Vertical**



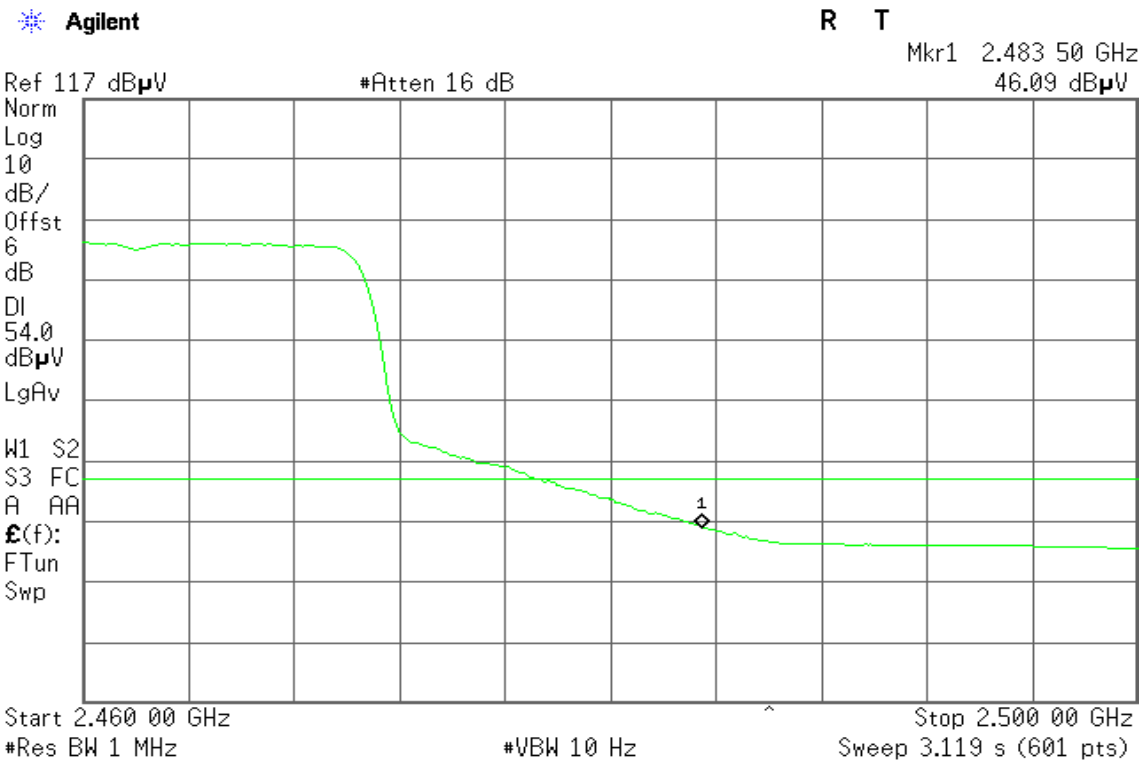
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**

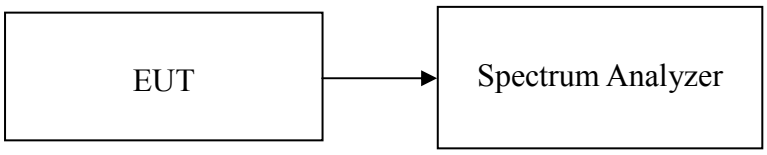


7.5PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted.

Test Data

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-12.47	4.45	PASS
Mid	2437	-11.65		PASS
High	2462	-10.54		PASS

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-17.31	4.45	PASS
Mid	2437	-18.21		PASS
High	2462	-18.25		PASS

Remark: The maximum antenna gain is 9.55dBi; therefore the reduction due to antenna gain is 3.55dB, so the limit is 4.45dBm.

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-8.32	8.00	PASS
Mid	2437	-10.05		PASS
High	2462	-9.03		PASS

Test mode: IEEE 802.11g

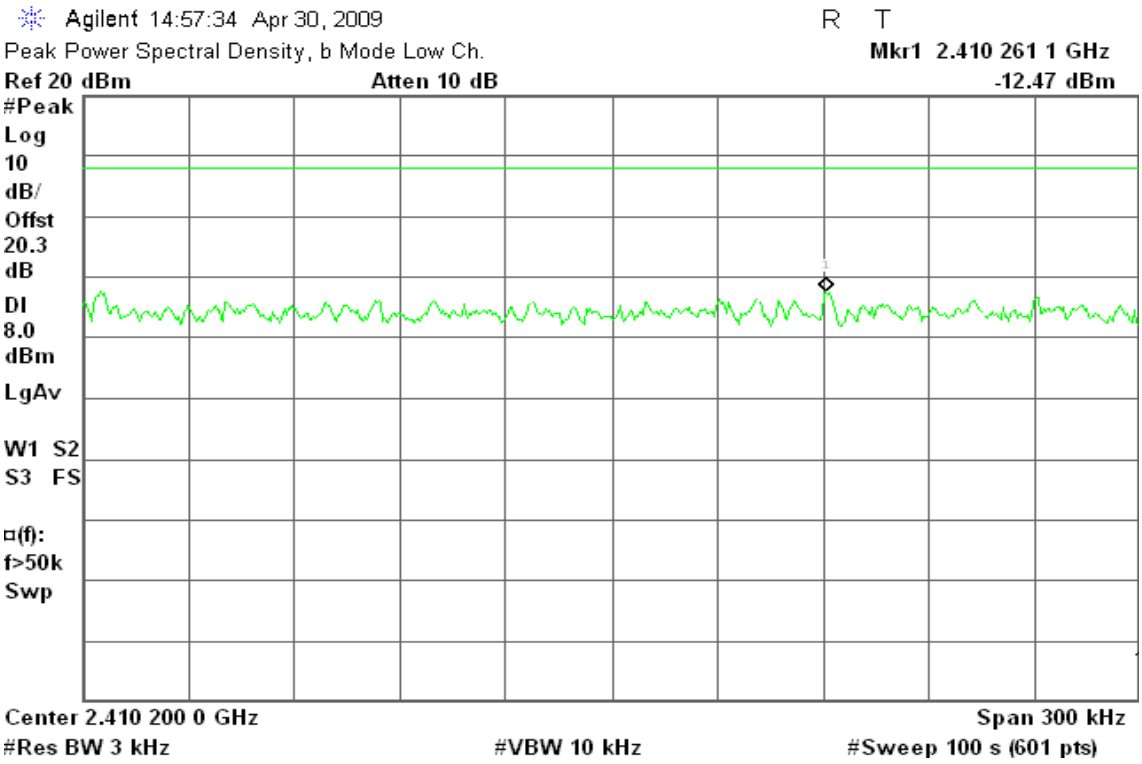
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-15.06	8.00	PASS
Mid	2437	-12.04		PASS
High	2462	-12.53		PASS

Test Plot

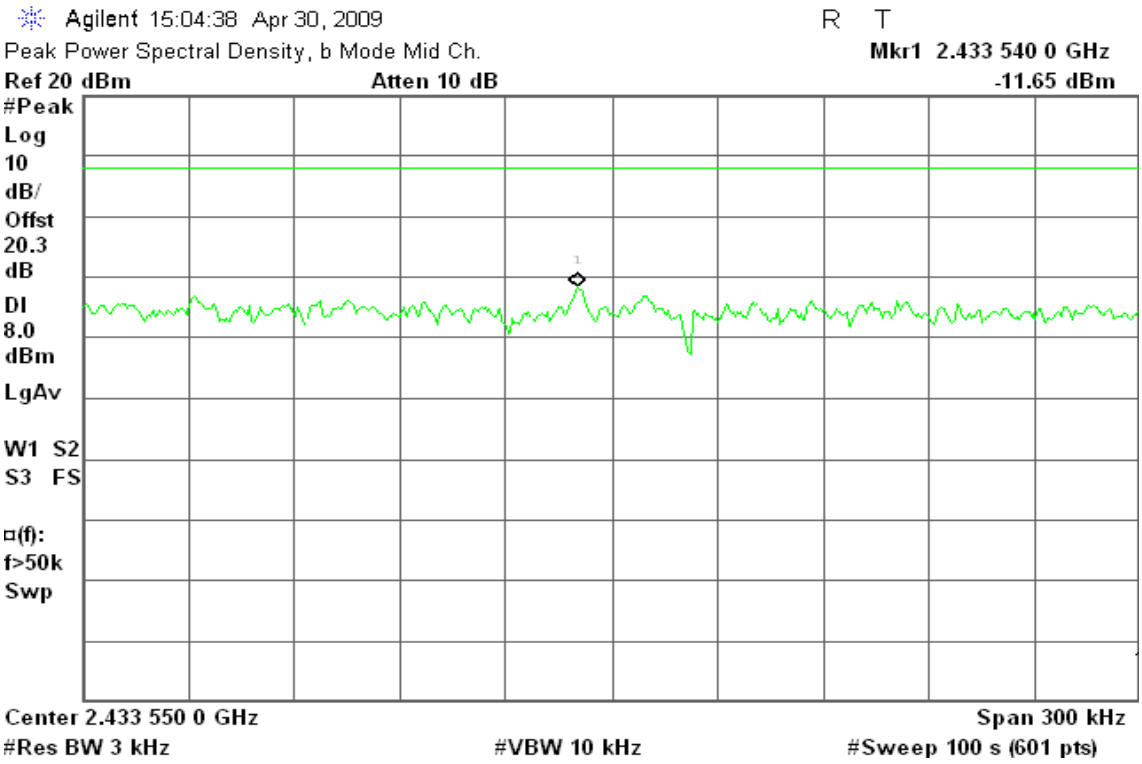
For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

IEEE 802.11b

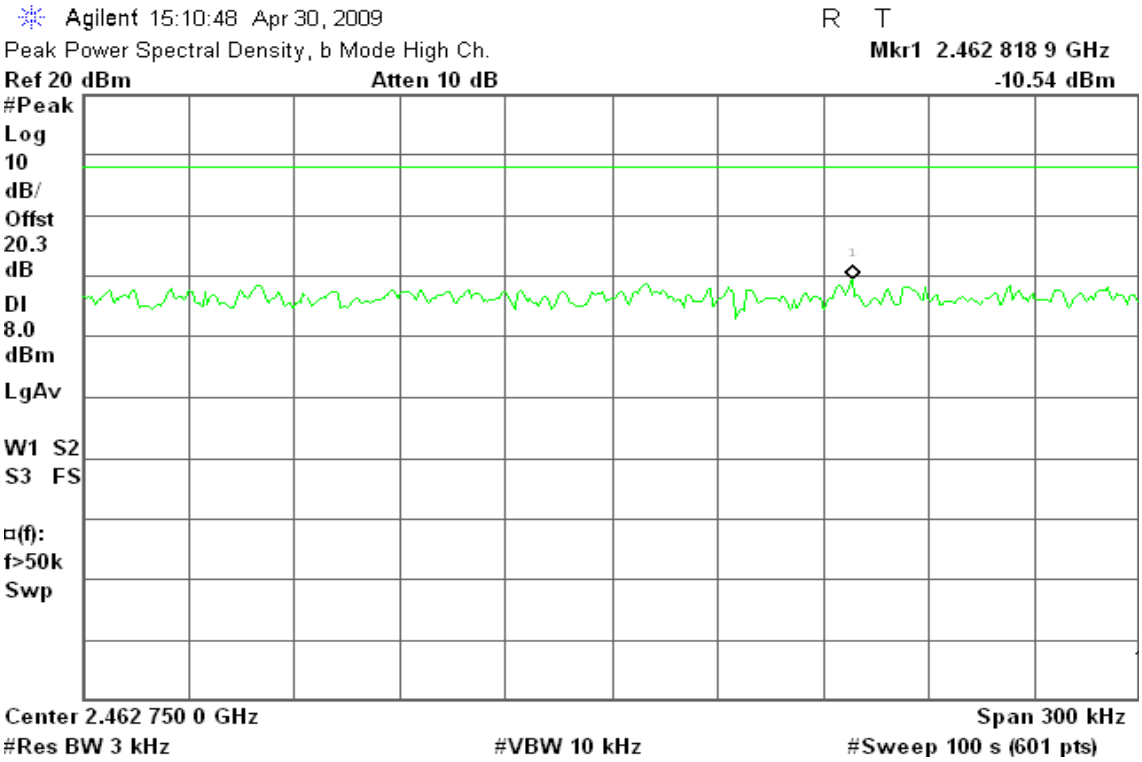
PPSD (CH Low)



PPSD (CH Mid)

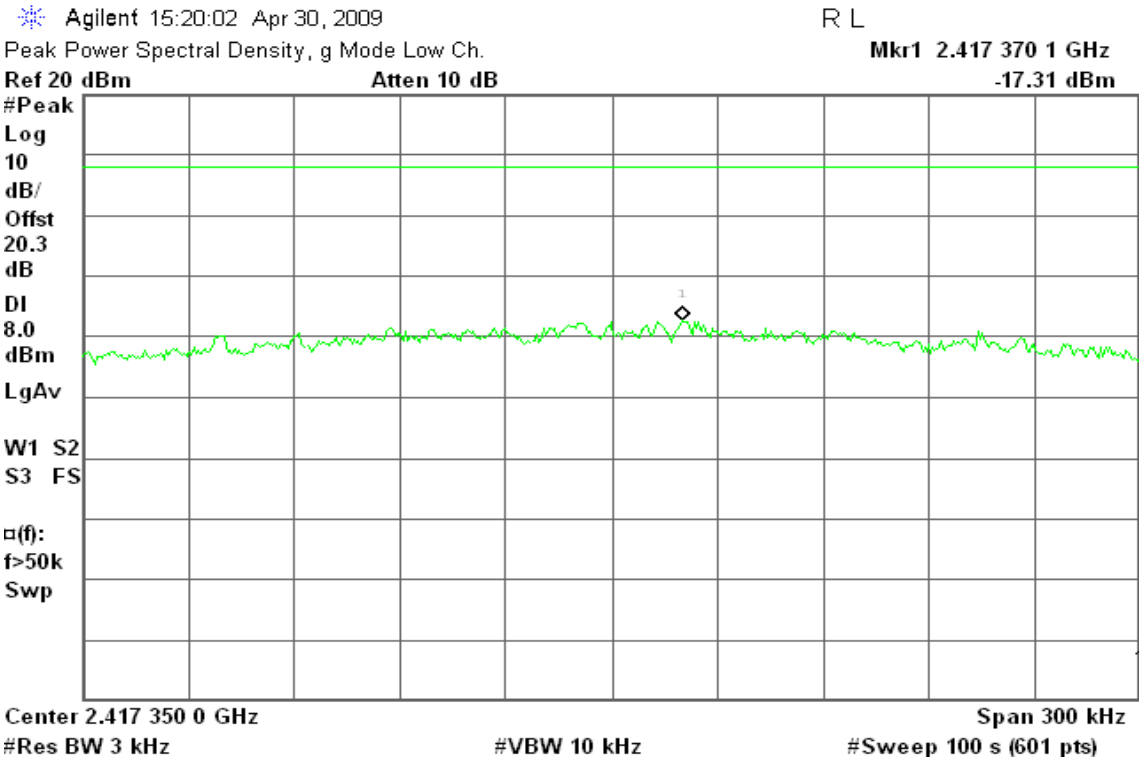


PPSD (CH High)

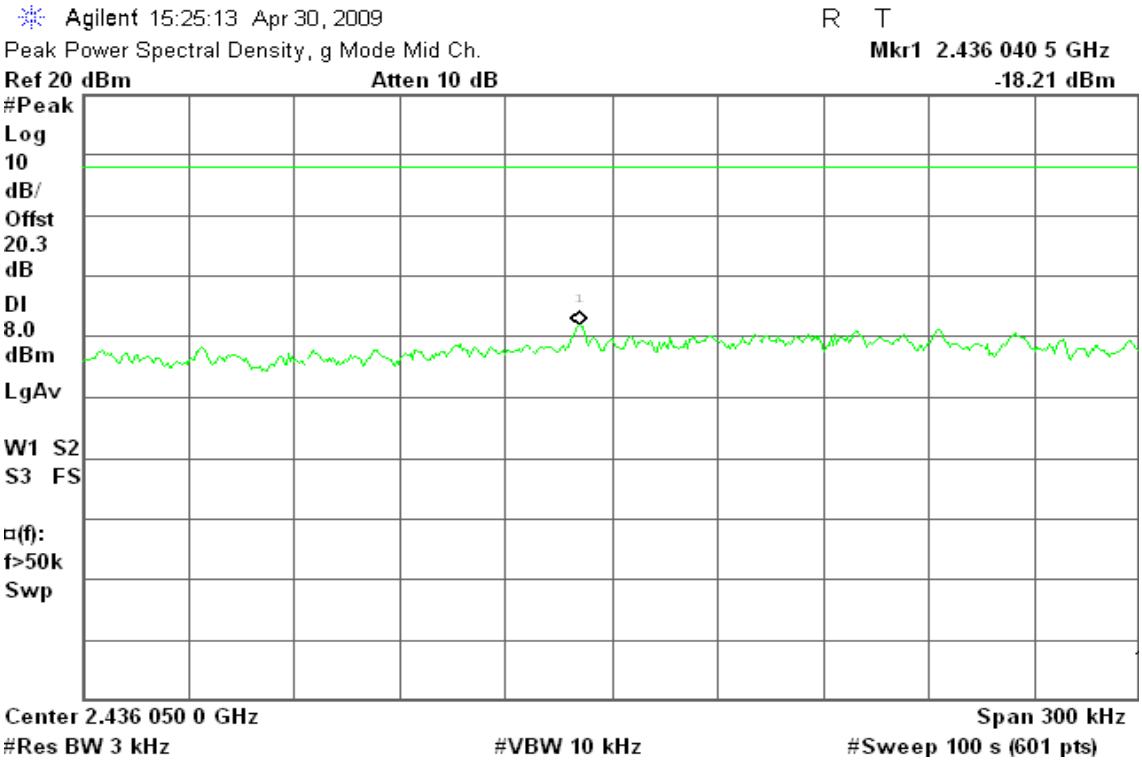


IEEE 802.11g

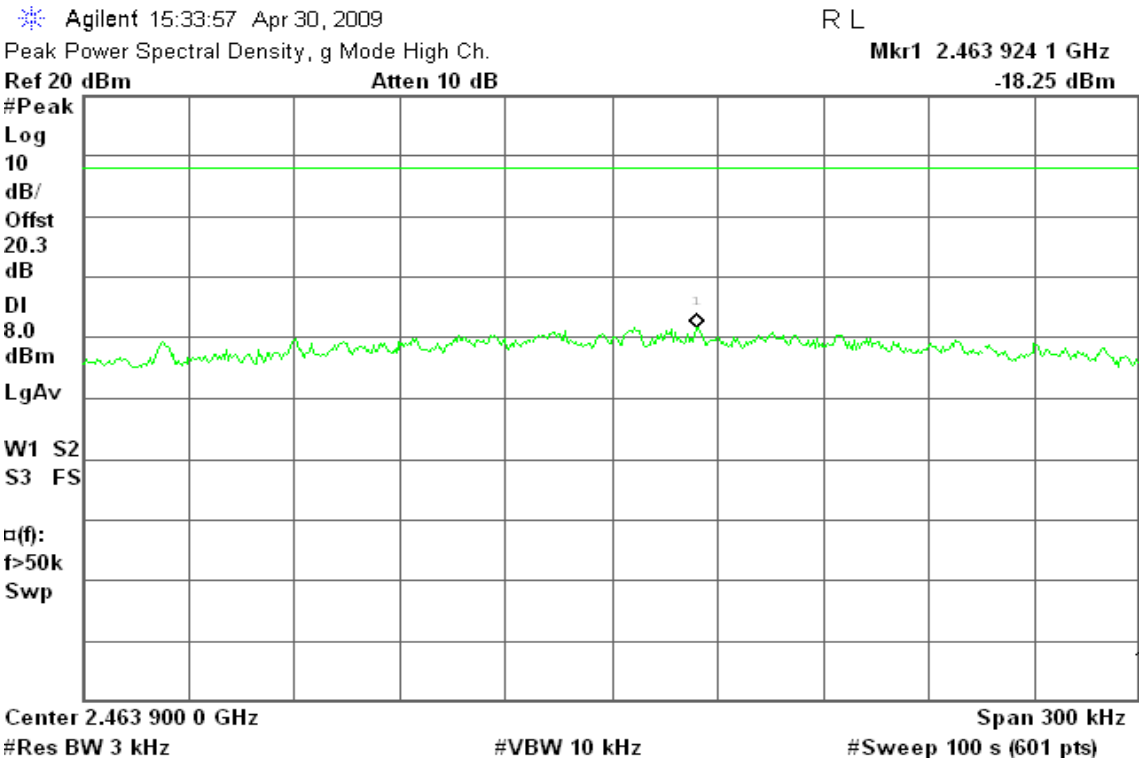
PPSD (CH Low)



PPSD (CH Mid)



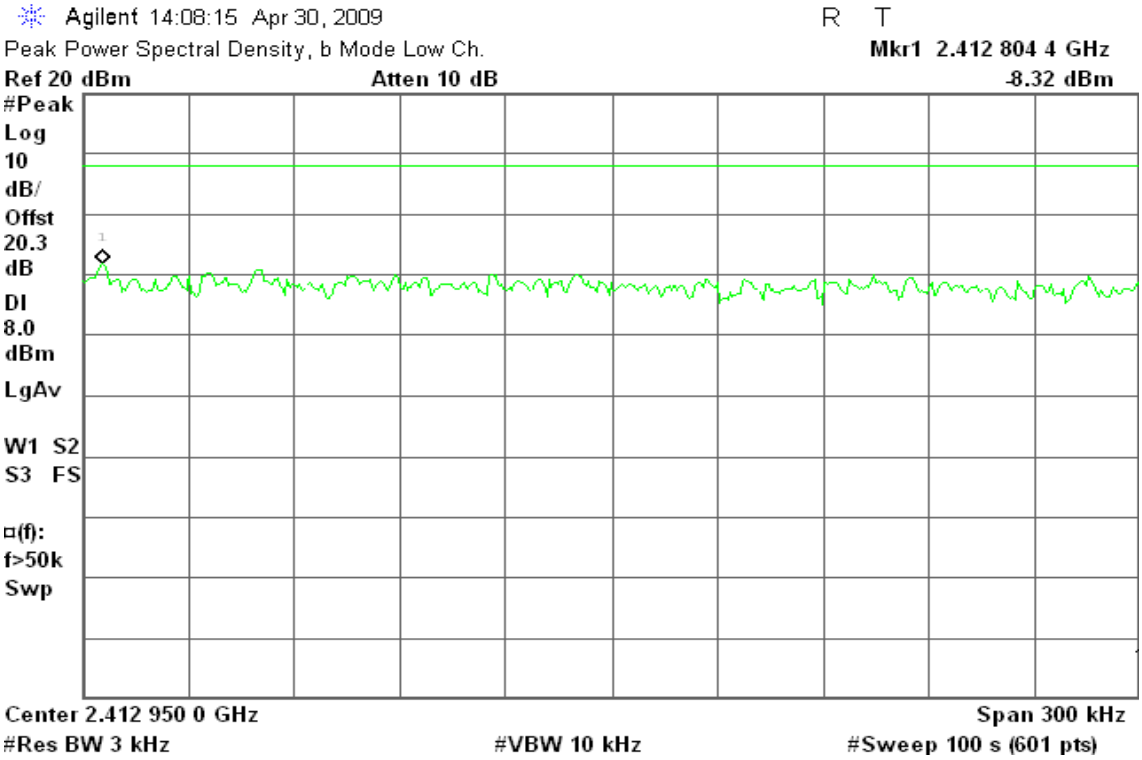
PPSD (CH High)



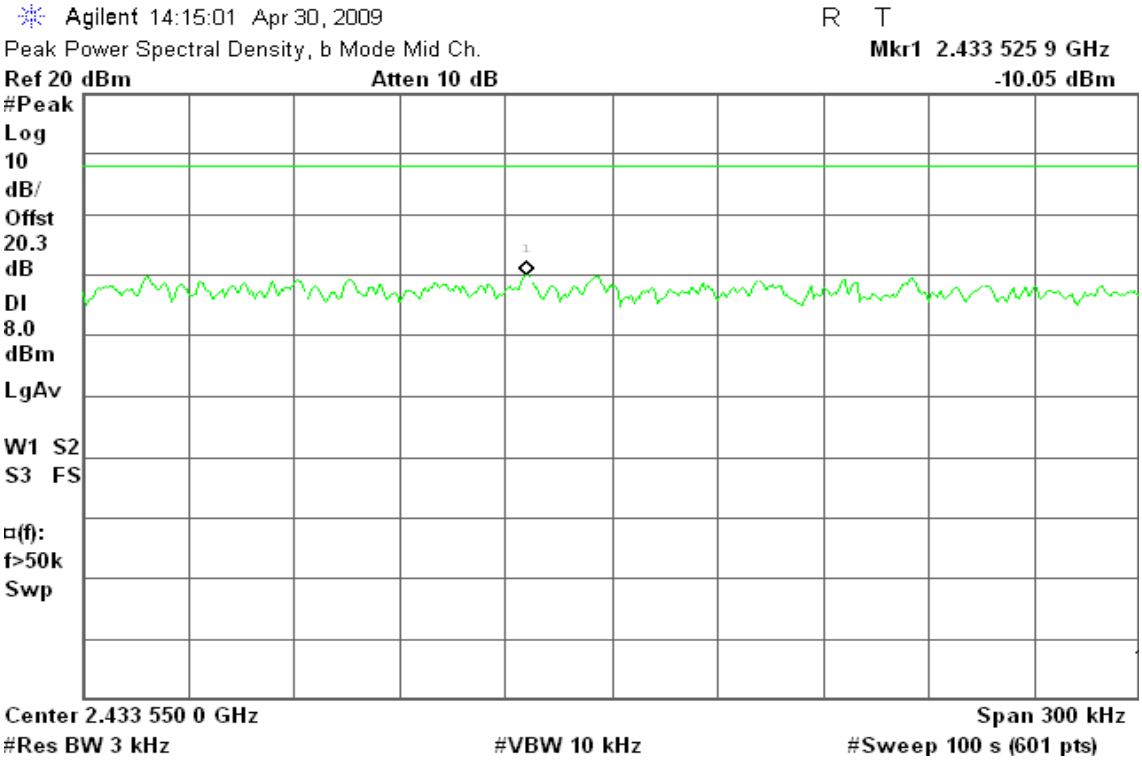
For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

IEEE 802.11b

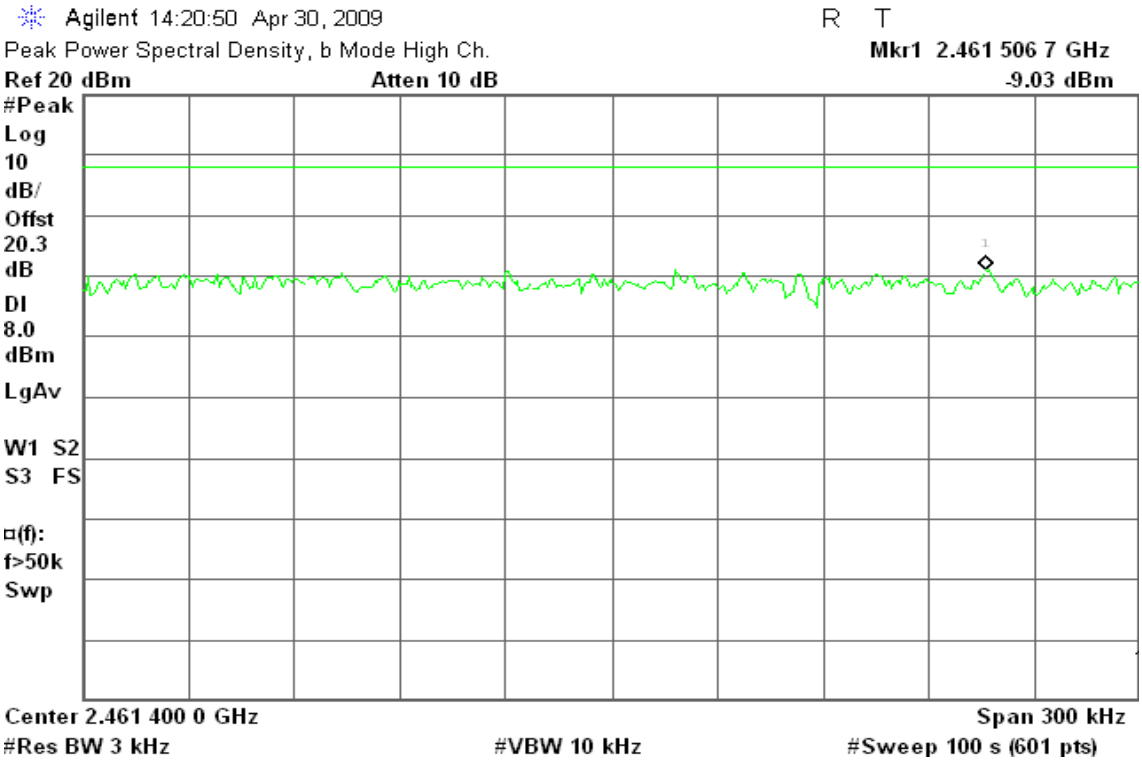
PPSD (CH Low)



PPSD (CH Mid)

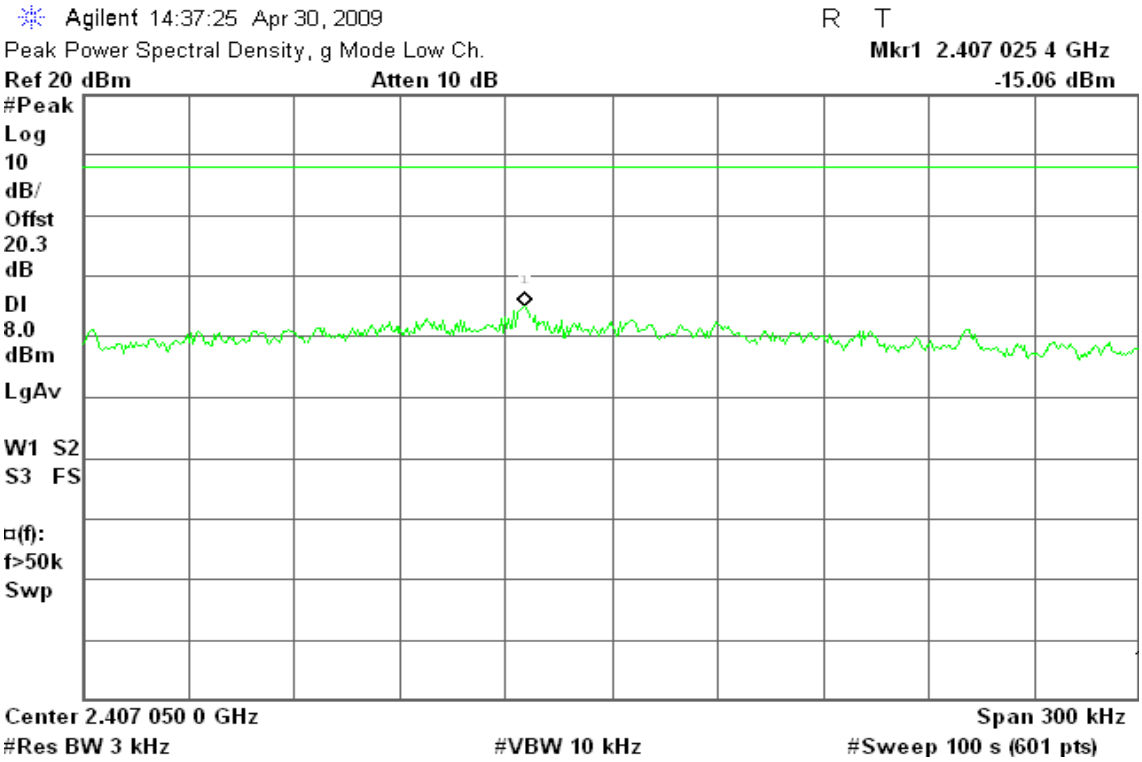


PPSD (CH High)

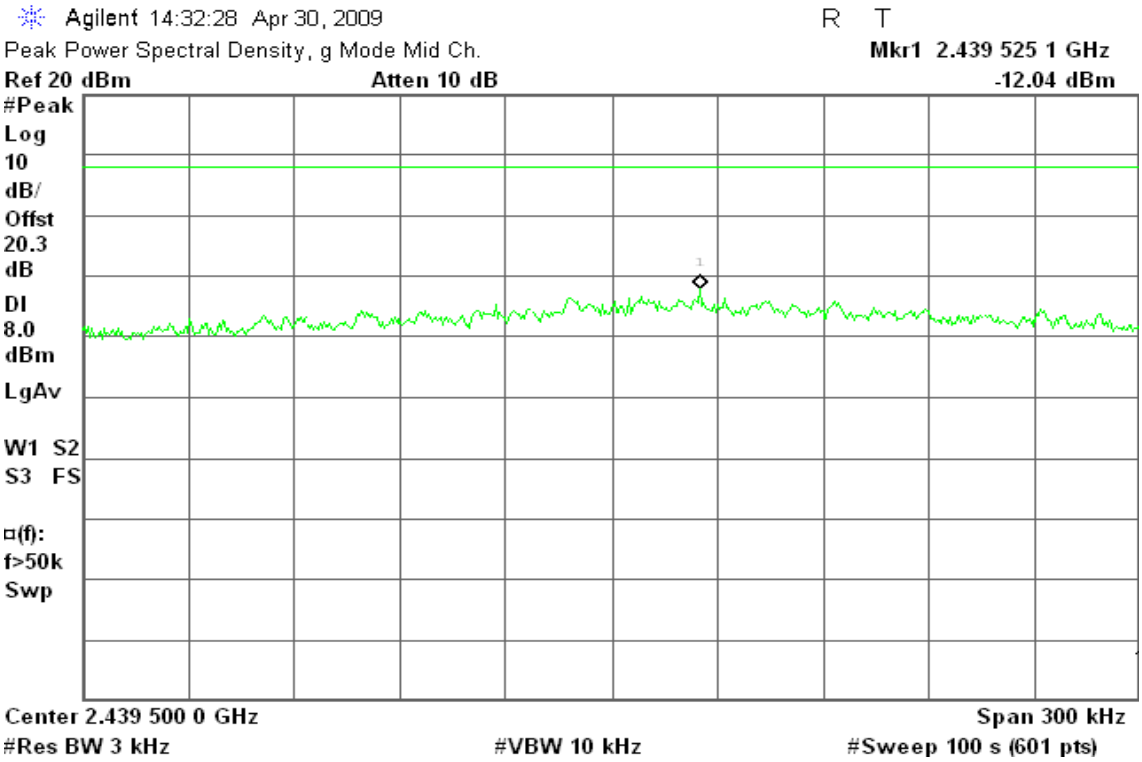


IEEE 802.11g

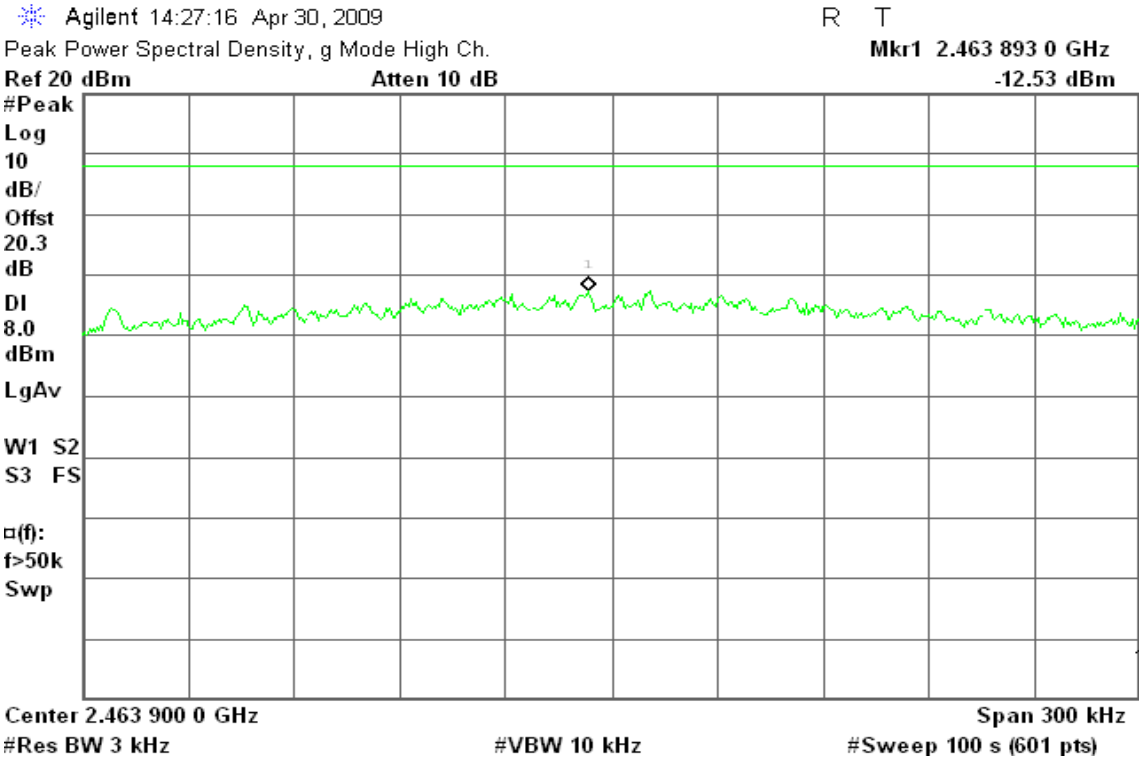
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



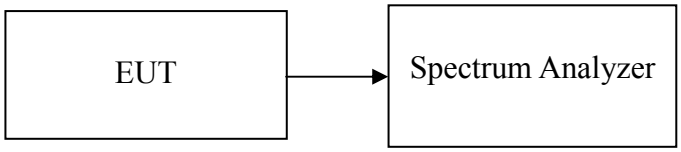
7.6SPURIOUS EMISSIONS

7.6.1 Conducted Measurement

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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. 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 Section 15.205(c)).

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

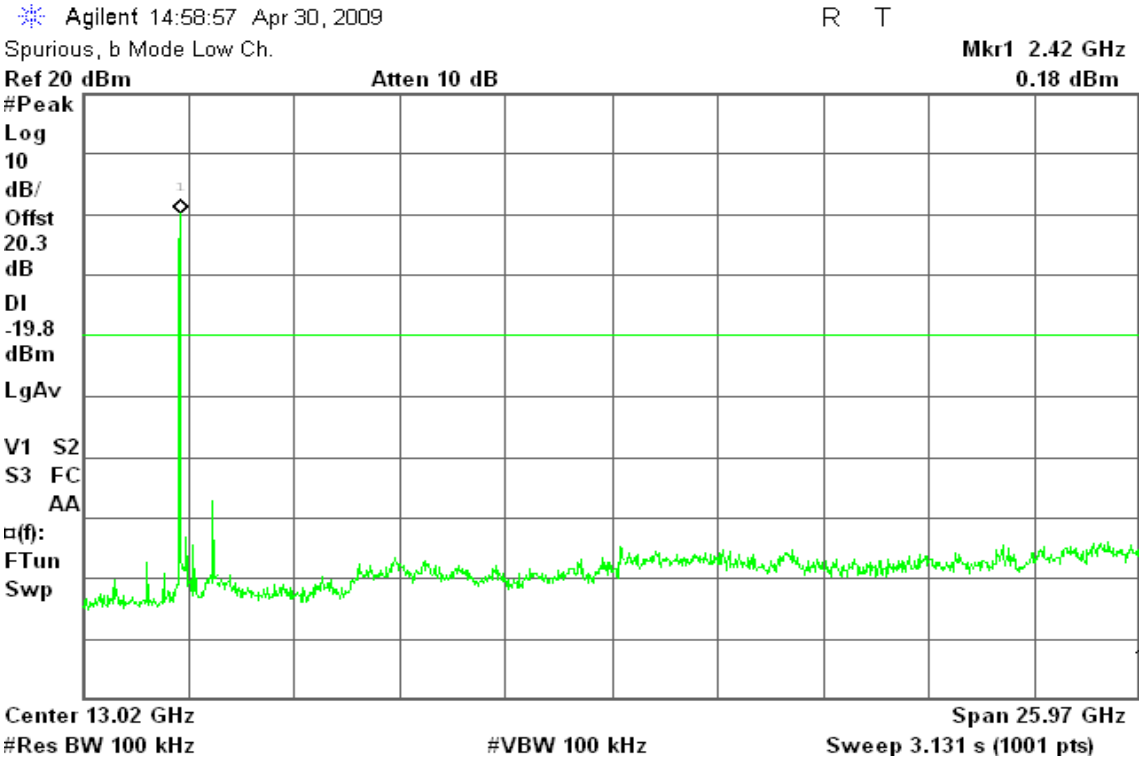
No non-compliance noted.

Test Plot

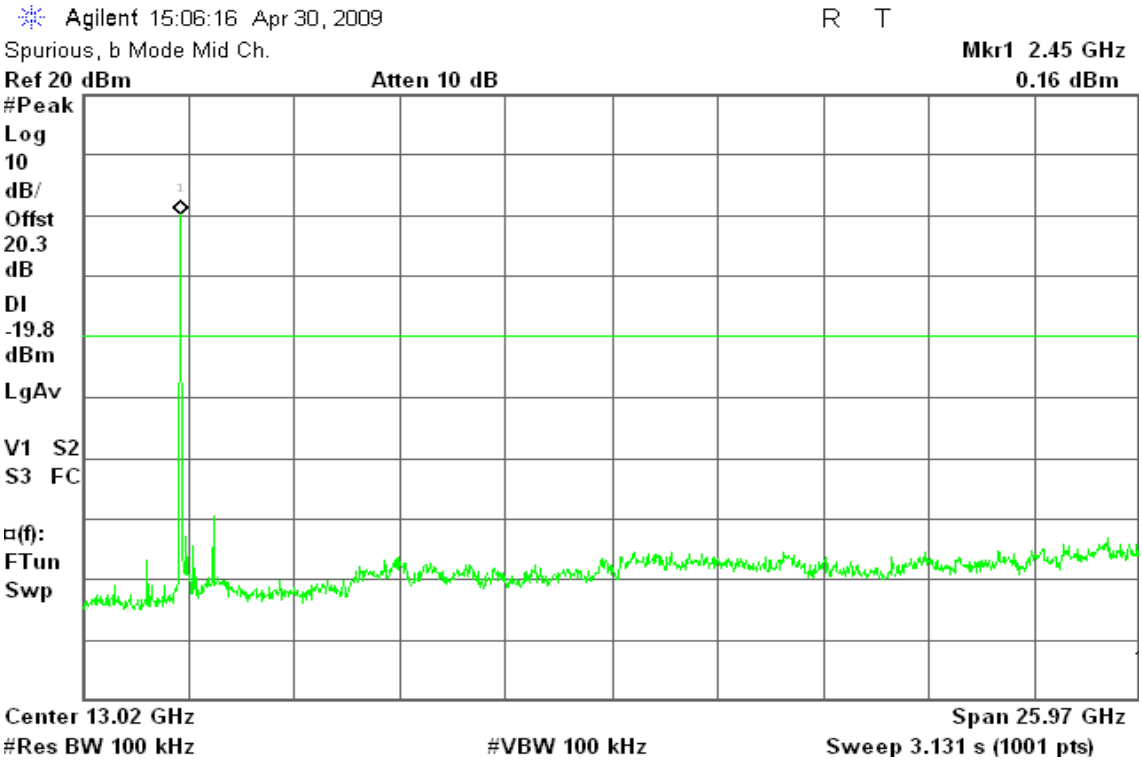
For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

IEEE 802.11b

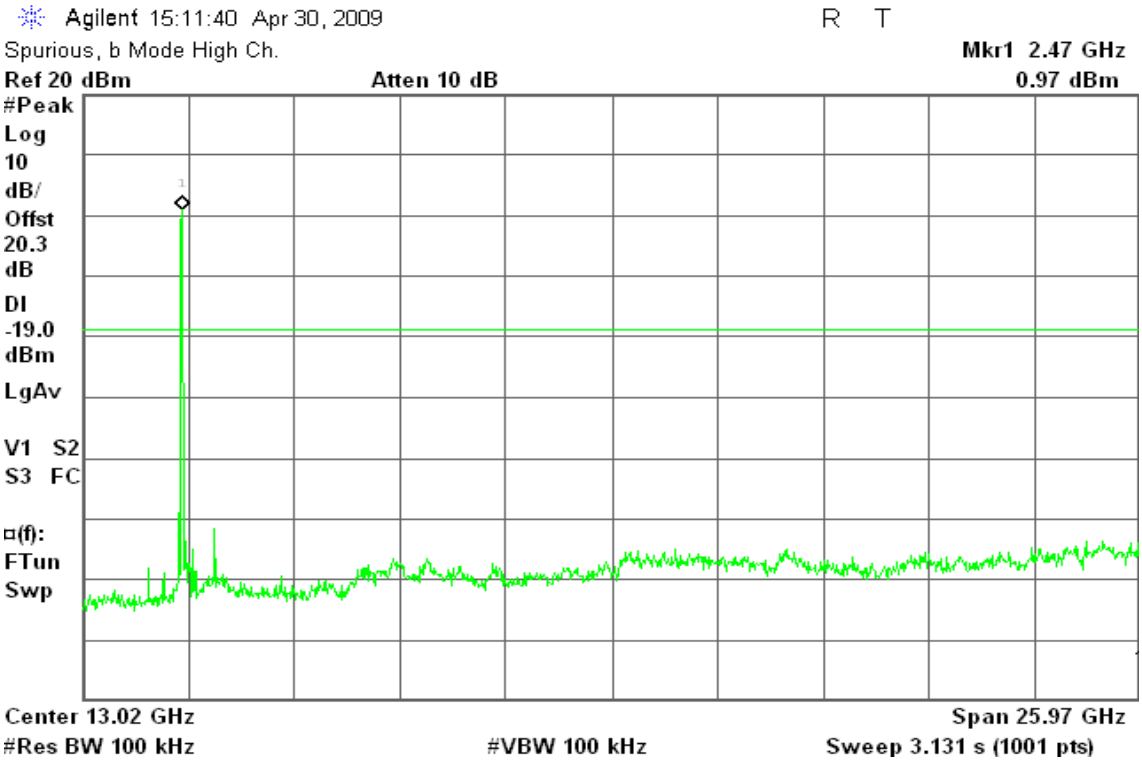
CH Low



CH Mid

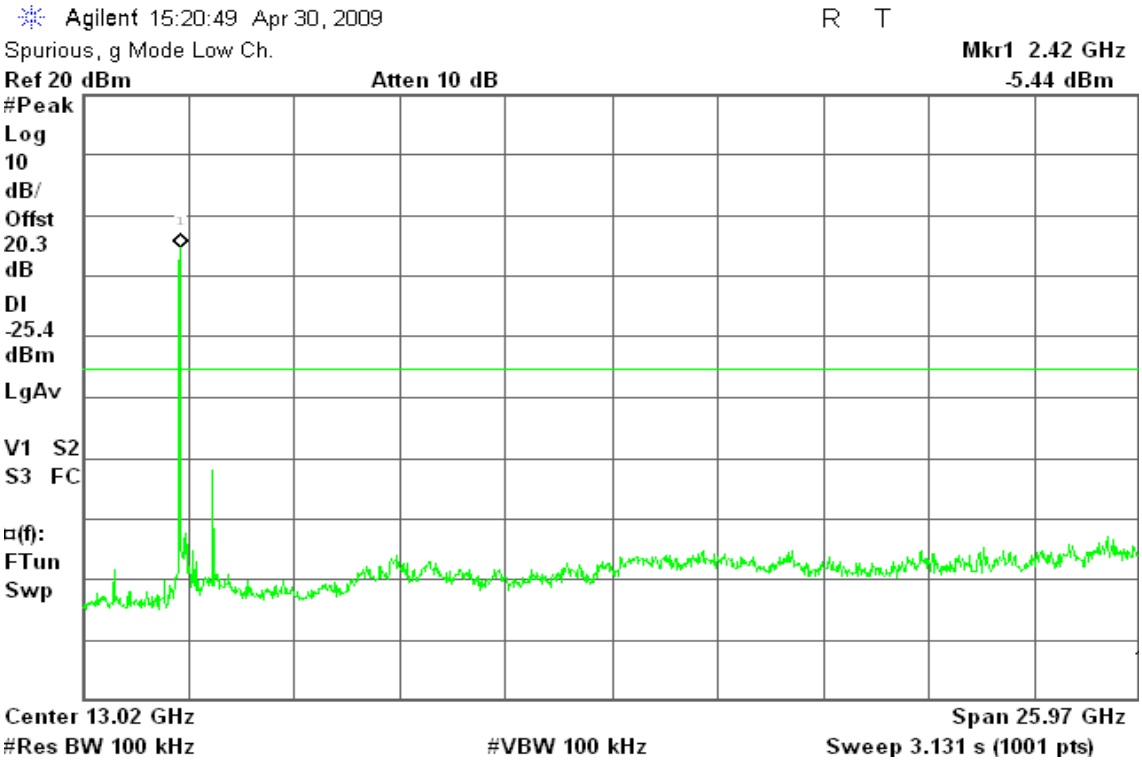


CH High

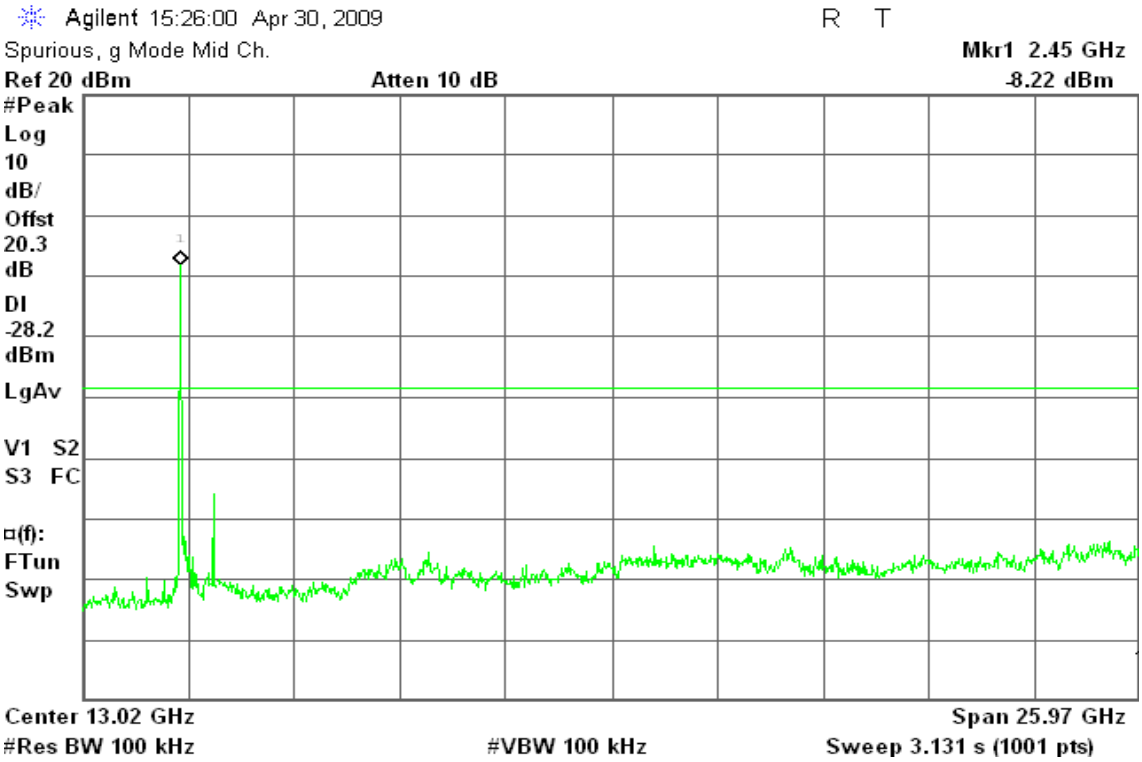


IEEE 802.11g

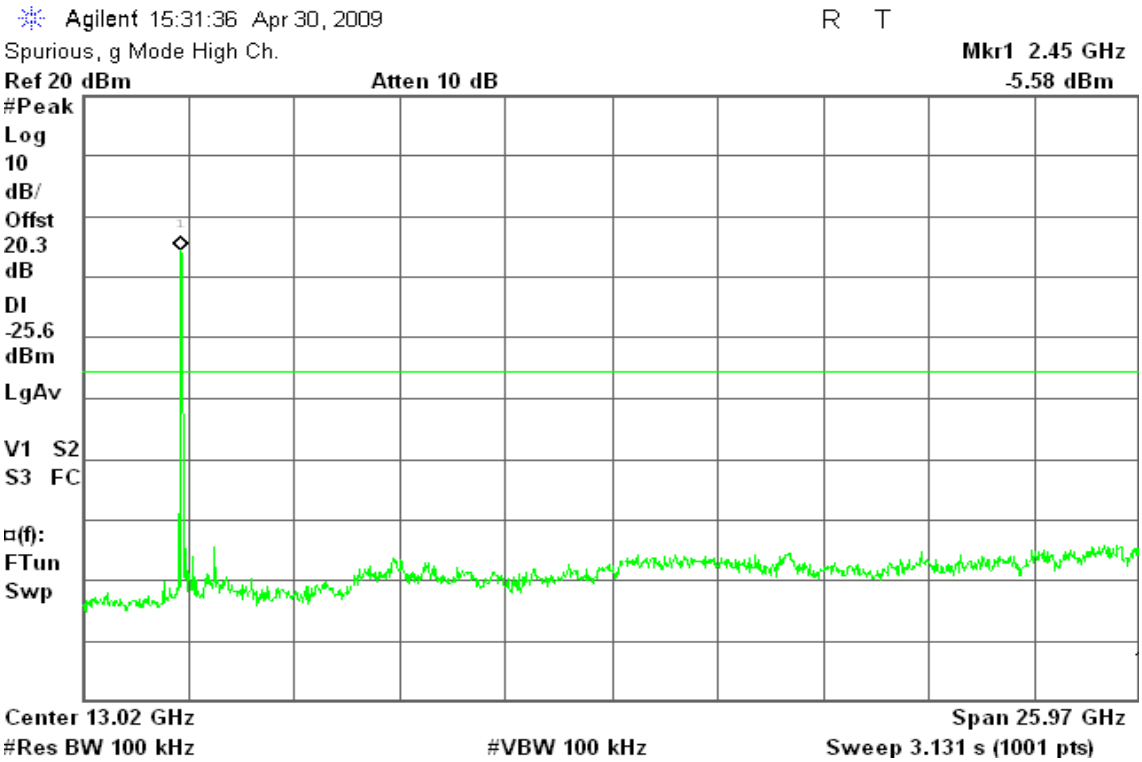
CH Low



CH Mid



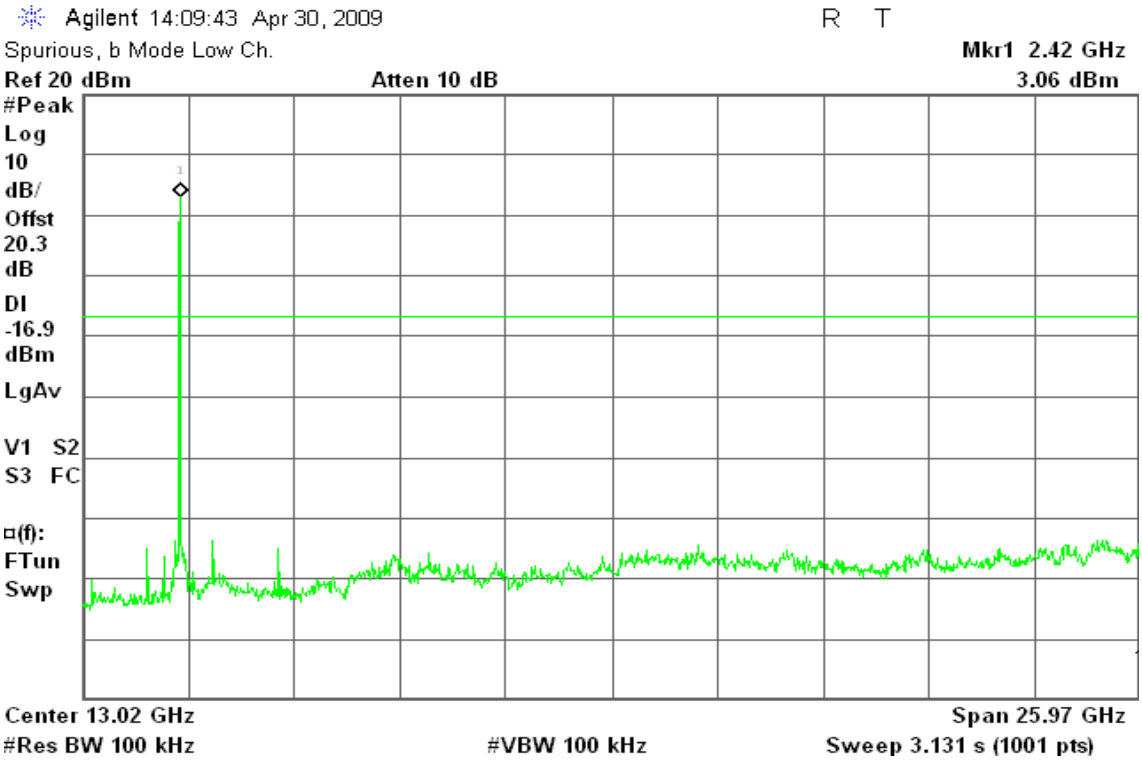
CH High



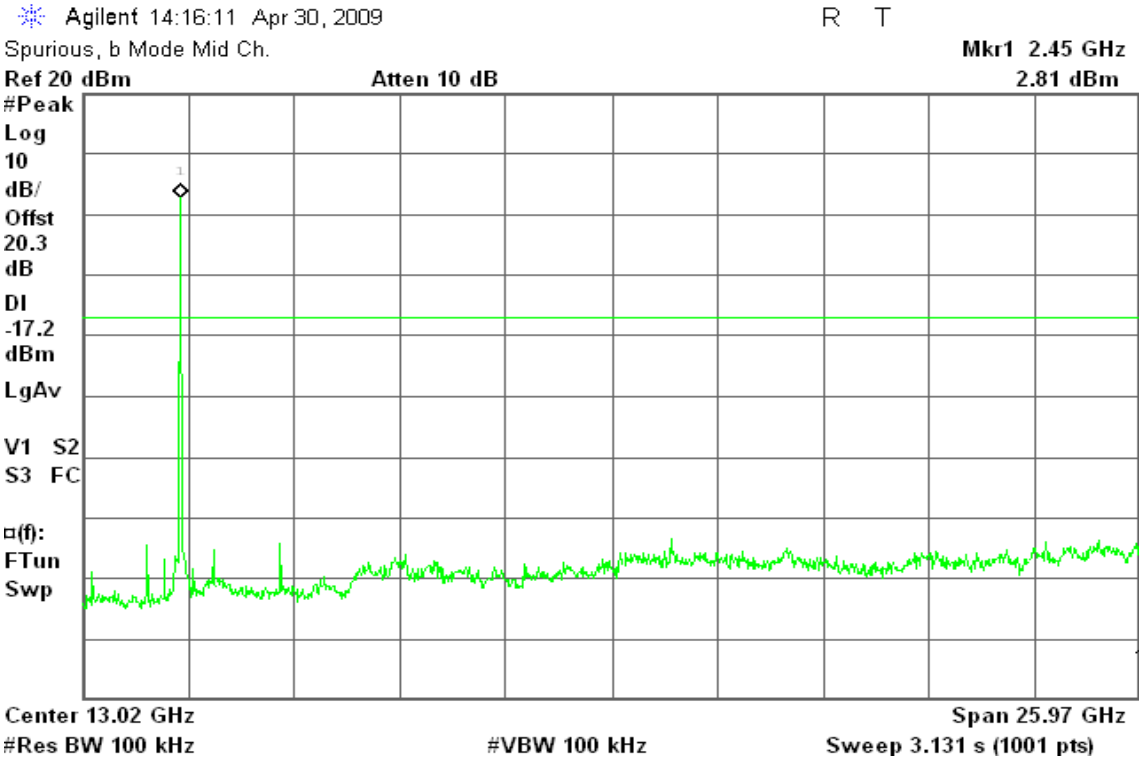
For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

IEEE 802.11b

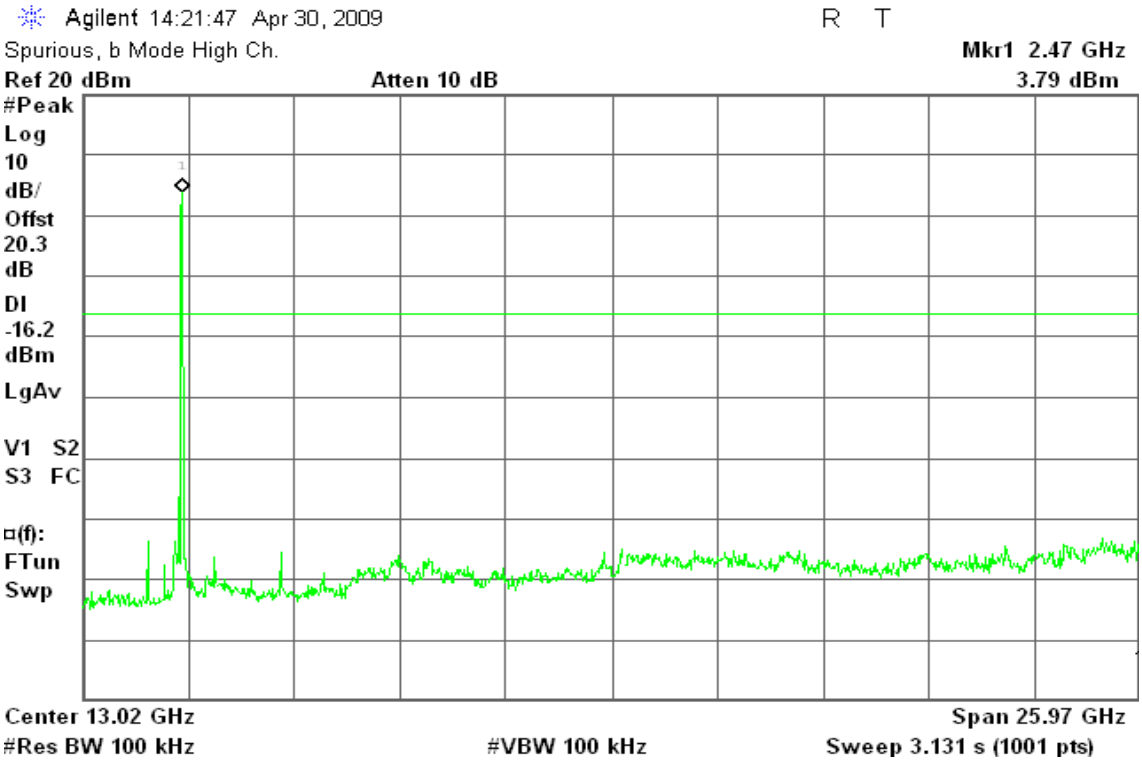
CH Low



CH Mid

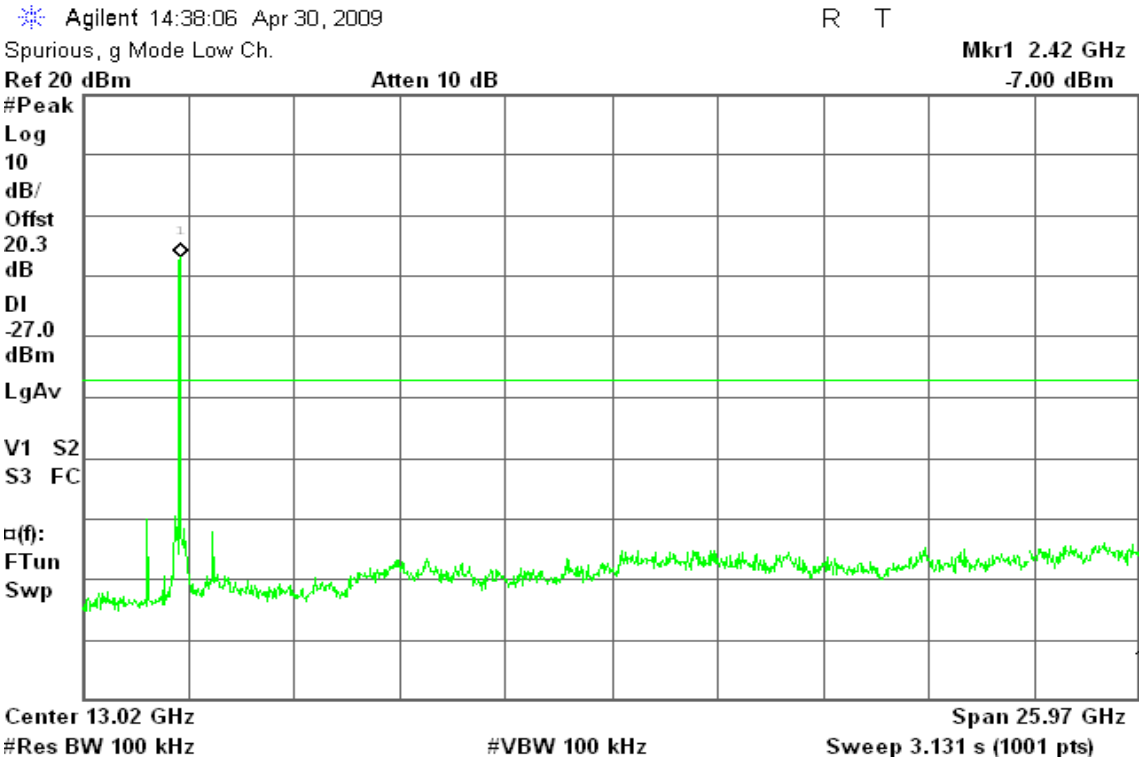


CH High

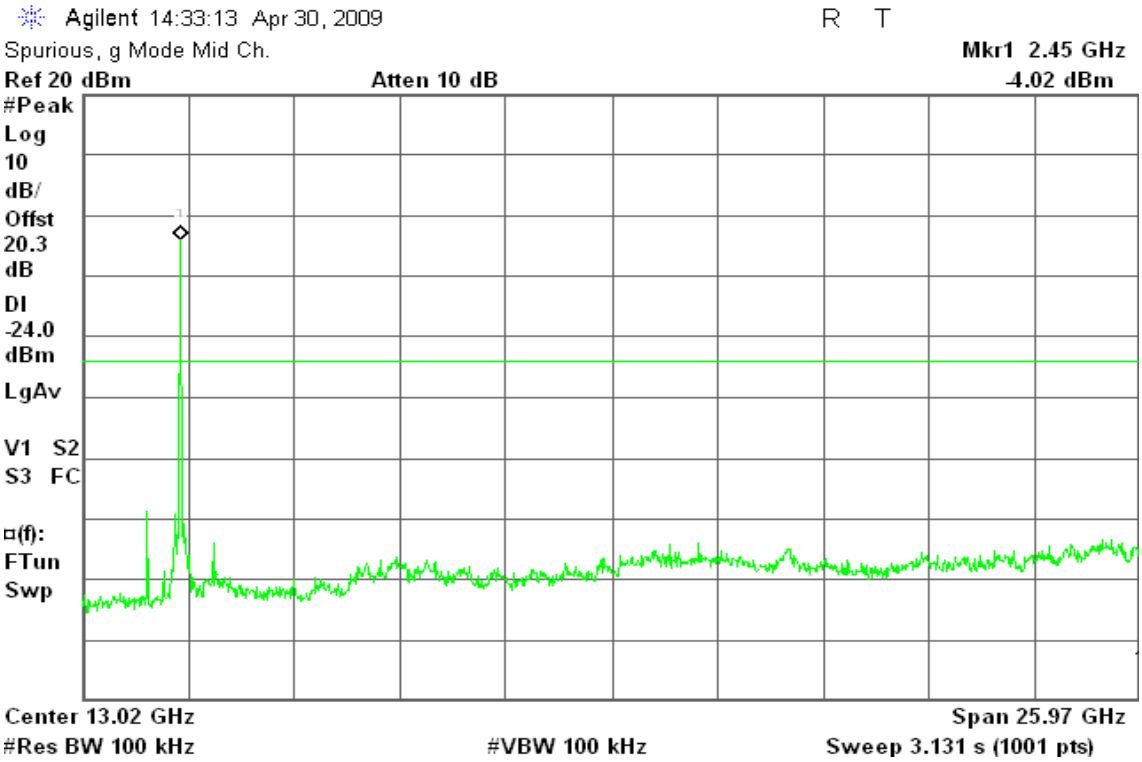


IEEE 802.11g

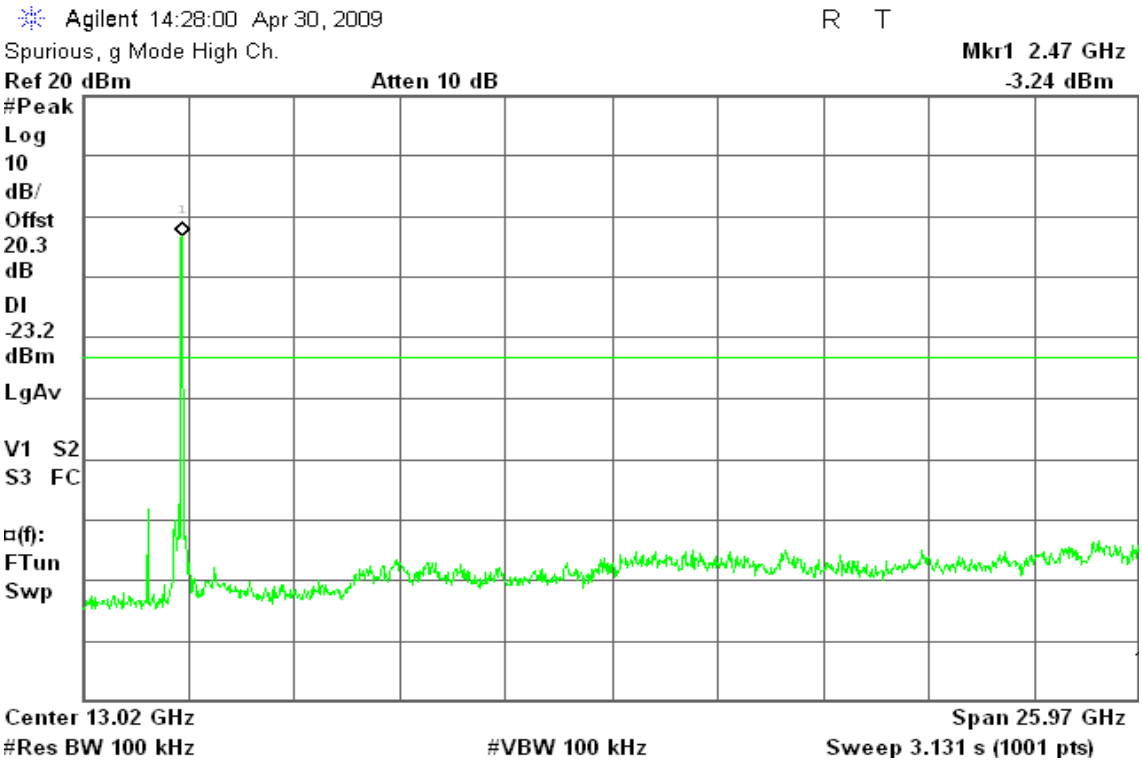
CH Low



CH Mid



CH High



7.6.2 Radiated Emissions

LIMIT

1. According to §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 (μV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

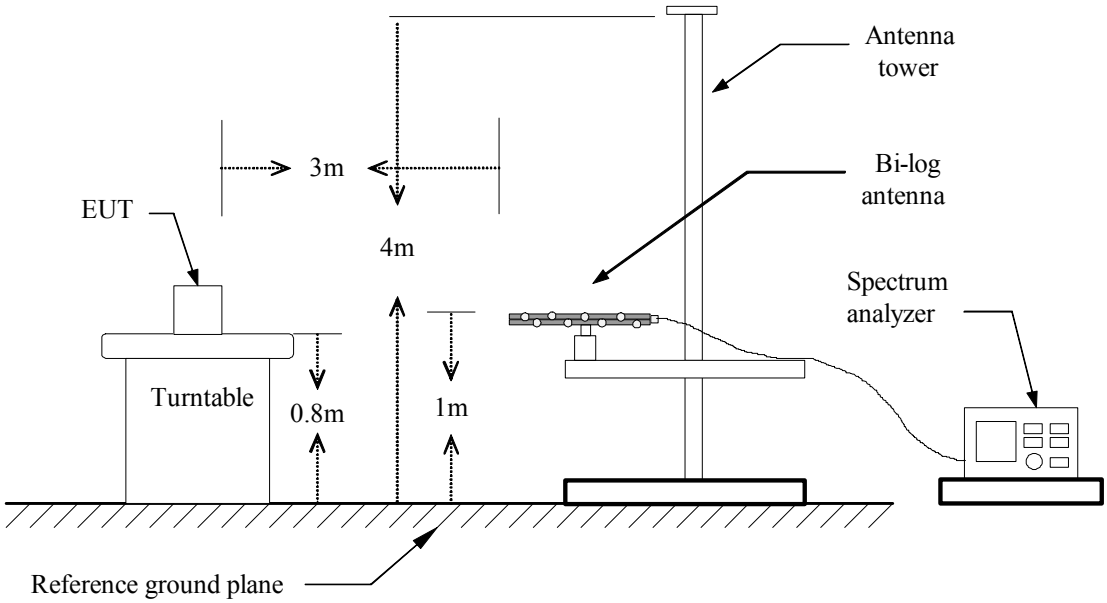
Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

2. In the emission table above, the tighter limit applies at the band edges.

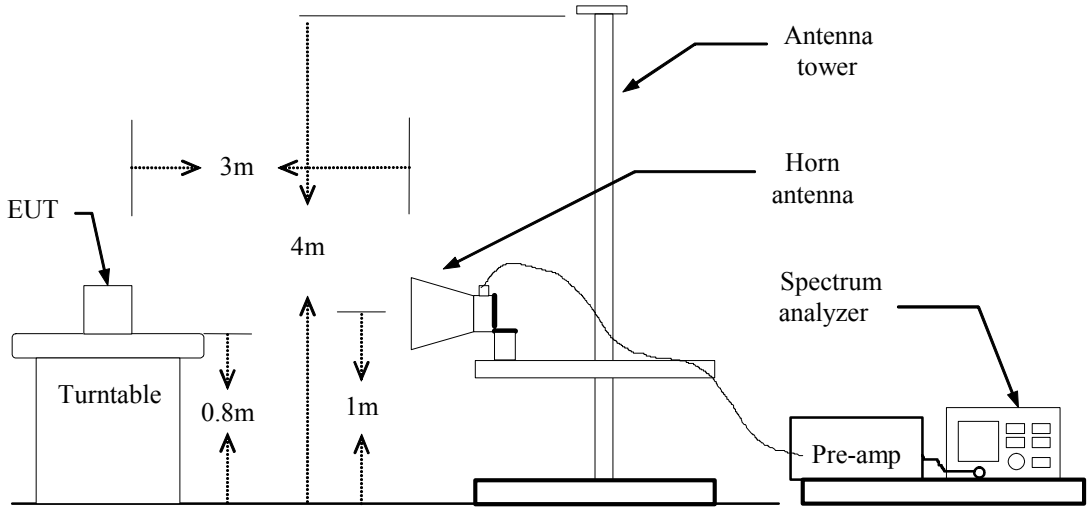
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Test Configuration

Below 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

   Below 1GHz:

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

   Above 1GHz:

   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

   (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

Below 1 GHz

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Operation Mode: Normal Link **Test Date:** May 4, 2009

Temperature: 25°C **Tested by:** Ryan Chen

Humidity: 50 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
39.70	V	46.43	-7.67	38.76	40.00	-1.24	QP
68.80	V	48.24	-14.80	33.44	40.00	-6.56	Peak
296.75	V	35.79	-8.53	27.26	46.00	-18.74	Peak
405.07	V	33.99	-6.02	27.97	46.00	-18.03	Peak
647.57	V	31.34	-2.30	29.03	46.00	-16.97	Peak
880.37	V	37.78	0.49	38.27	46.00	-7.73	QP
39.70	H	40.01	-7.67	32.34	40.00	-7.66	Peak
80.12	H	28.76	-15.80	12.96	40.00	-27.04	Peak
177.12	H	24.88	-10.99	13.89	43.50	-29.61	Peak
194.90	H	27.21	-9.54	17.68	43.50	-25.82	Peak
296.75	H	25.76	-8.53	17.23	46.00	-28.77	Peak
880.37	H	35.61	0.49	36.10	46.00	-9.90	Peak

Remark:

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Operation Mode: Normal Link **Test Date:** April 27, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
46.17	V	46.19	-11.69	34.50	40.00	-5.50	Peak
65.57	V	48.88	-14.82	34.06	40.00	-5.94	Peak
88.20	V	49.67	-15.61	34.06	43.50	-9.44	Peak
109.22	V	49.14	-11.28	37.86	43.50	-5.64	Peak
148.02	V	45.92	-9.61	36.31	43.50	-7.19	Peak
183.58	V	46.54	-10.72	35.83	43.50	-7.67	Peak
275.73	H	43.38	-8.95	34.43	46.00	-11.57	Peak
552.18	H	38.37	-2.85	35.53	46.00	-10.47	Peak
624.93	H	35.95	-2.41	33.54	46.00	-12.46	Peak
749.42	H	37.33	-0.33	37.00	46.00	-9.00	Peak
804.38	H	35.15	0.22	35.37	46.00	-10.63	Peak
875.52	H	38.45	0.46	38.91	46.00	-7.09	Peak

Remark:

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

Above 1 GHz

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Operation Mode: IEEE 802.11b / TX / CH Low **Test Date:** April 21, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1363.33	V	56.43	---	-7.28	49.14	---	74.00	54.00	-4.86	Peak
4825.00	V	53.39	50.81	1.04	54.43	51.85	74.00	54.00	-2.15	AVG
N/A										
1353.33	H	56.85	---	-7.30	49.55	---	74.00	54.00	-4.45	Peak
3216.67	H	51.50	---	-0.19	51.31	---	74.00	54.00	-2.69	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11b / TX / CH Mid **Test Date:** April 21, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2393.33	V	62.33	58.16	-1.60	60.73	56.56	89.9	87.22	-29.17	Peak
4875.00	V	55.33	51.34	1.02	56.35	52.36	74.00	54.00	-1.64	AVG
N/A										
1306.67	H	55.77	---	-7.39	48.38	---	74.00	54.00	-5.62	Peak
3250.00	H	50.90	---	-0.15	50.75	---	74.00	54.00	-3.25	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11b / TX / CH High **Test Date:** April 21, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2393.33	V	63.53	58.45	-1.60	61.93	56.85	89.61	86.23	-27.68	Peak
4925.00	V	55.33	51.33	1.01	56.34	52.34	74.00	54.00	-1.66	AVG
N/A										
1266.67	H	55.88	---	-7.46	48.41	---	74.00	54.00	-5.59	Peak
3283.33	H	50.97	---	-0.11	50.86	---	74.00	54.00	-3.14	Peak
4925.00	H	50.18	---	1.01	51.19	---	74.00	54.00	-2.81	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11g / TX / CH Low **Test Date:** April 21, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1366.67	V	56.45	---	-7.28	49.17	---	74.00	54.00	-4.83	Peak
3216.67	V	55.20	52.87	-0.19	55.01	52.68	74.00	54.00	-1.32	AVG
N/A										
1273.33	H	56.07	---	-7.45	48.62	---	74.00	54.00	-5.38	Peak
3216.67	H	56.91	53.24	-0.19	56.73	53.05	74.00	54.00	-0.95	AVG
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11g / TX / CH Mid **Test Date:** April 21, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2393.33	V	62.94	57.37	-1.60	61.35	55.77	88.22	78.58	-22.81	AVG
3250.00	V	51.50	---	-0.15	51.35	---	74.00	54.00	-2.65	Peak
N/A										
1300.00	H	56.26	---	-7.40	48.86	---	74.00	54.00	-5.14	Peak
3250.00	H	51.24	---	-0.15	51.09	---	74.00	54.00	-2.91	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11g / TX / CH High **Test Date:** April 21, 2009

Temperature: 23°C **Tested by:** Mimic Yang

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2393.33	V	61.77	57.42	-1.60	60.17	55.82	88.69	78.82	-23.00	AVG
3283.33	V	50.77	---	-0.11	50.66	---	74.00	54.00	-3.34	Peak
N/A										
1376.67	H	56.98	---	-7.26	49.72	---	74.00	54.00	-4.28	Peak
3283.33	H	51.07	---	-0.11	50.96	---	74.00	54.00	-3.04	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Operation Mode: IEEE 802.11b / TX / CH Low **Test Date:** April 15, 2009

Temperature: 23°C **Tested by:** Ryan Chen

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2310.00	V	56.09	50.95	-1.74	54.36	49.21	74.00	54.00	-4.79	AVG
N/A										
1566.67	H	53.44	---	-6.39	47.04	---	74.00	54.00	-6.96	Peak
2306.67	H	54.50	---	-1.74	52.76	---	74.00	54.00	-1.24	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11b / TX / CH Mid **Test Date:** April 15, 2009

Temperature: 23°C **Tested by:** Ryan Chen

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2310.00	V	55.58	---	-1.74	53.84	---	74.00	54.00	-0.16	Peak
N/A										
1656.67	H	53.50	---	-5.53	47.97	---	74.00	54.00	-6.03	Peak
2310.00	H	53.76	---	-1.74	52.02	---	74.00	54.00	-1.98	Peak
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11b / TX / CH High **Test Date:** April 15, 2009

Temperature: 23°C **Tested by:** Ryan Chen

Humidity: 53 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2306.67	V	60.51	48.36	-1.74	58.77	46.62	74.00	54.00	-7.38	AVG
2393.33	V	62.24	53.62	-1.60	60.64	52.02	74.00	54.00	-1.98	AVG
2303.33	H	58.98	47.04	-1.75	57.23	45.29	74.00	54.00	-8.71	AVG
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11g / TX / CH Low **Test Date:** April 15, 2009

Temperature: 25°C **Tested by:** Ryan Chen

Humidity: 50 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1606.67	V	52.01	---	-6.01	46.00	---	74.00	54.00	-8.00	Peak
2303.33	V	64.60	54.70	-1.75	62.85	52.95	74.00	54.00	-1.05	AVG
N/A										
1606.67	H	52.60	---	-6.01	46.59	---	74.00	54.00	-7.41	Peak
2303.33	H	64.00	53.96	-1.75	62.25	52.21	74.00	54.00	-1.79	AVG
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11g / TX / CH Mid **Test Date:** April 15, 2009

Temperature: 25°C **Tested by:** Ryan Chen

Humidity: 50 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1623.33	V	53.04	---	-5.85	47.19	---	74.00	54.00	-6.81	Peak
2303.33	V	62.80	53.19	-1.75	61.06	51.44	74.00	54.00	-2.56	AVG
N/A										
1623.33	H	54.47	---	-5.85	48.62	---	74.00	54.00	-5.38	Peak
2306.67	H	63.66	54.58	-1.74	61.91	52.84	74.00	54.00	-1.16	AVG
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Operation Mode: IEEE 802.11g / TX / CH High **Test Date:** April 15, 2009

Temperature: 25°C **Tested by:** Ryan Chen

Humidity: 50 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1623.33	V	53.04	---	-5.85	47.19	---	74.00	54.00	-6.81	Peak
2303.33	V	62.80	53.19	-1.75	61.06	51.44	74.00	54.00	-2.56	AVG
N/A										
1623.33	H	54.47	---	-5.85	48.62	---	74.00	54.00	-5.38	Peak
2306.67	H	63.66	54.58	-1.74	61.91	52.84	74.00	54.00	-1.16	AVG
N/A										

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit or as required by the applicant.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

7.7POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, 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 frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

Test Configuration

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

For Model: AL002XO / Patch Antenna / Gain: 9.55 dBi

Operation Mode:	Normal Link	**Test Date:**	April 28, 2009
Temperature:	22°C	**Tested by:**	Ryan Cheng
Humidity:	45% RH		

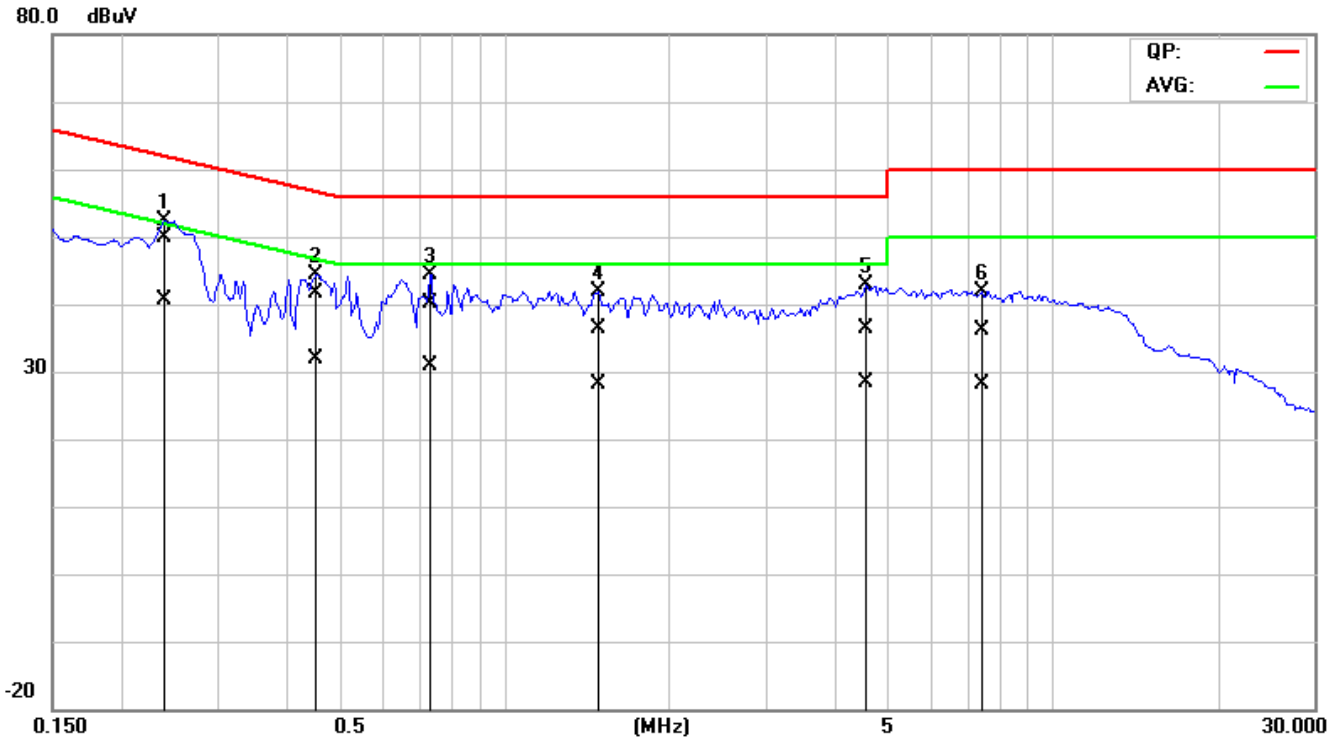
Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.2400	49.67	40.57	0.13	49.80	40.70	62.10	52.10	-12.30	-11.40	L1
0.4550	41.65	31.75	0.05	41.70	31.80	56.78	46.78	-15.08	-14.98	L1
0.7350	40.17	30.77	0.03	40.20	30.80	56.00	46.00	-15.80	-15.20	L1
1.4900	36.37	28.17	0.03	36.40	28.20	56.00	46.00	-19.60	-17.80	L1
4.5600	36.29	28.29	0.21	36.50	28.50	56.00	46.00	-19.50	-17.50	L1
7.4500	35.80	27.80	0.40	36.20	28.20	60.00	50.00	-23.80	-21.80	L1
0.2450	46.07	36.67	0.13	46.20	36.80	61.92	51.92	-15.72	-15.12	L2
0.4500	37.85	26.35	0.05	37.90	26.40	56.88	46.88	-18.98	-20.48	L2
0.7200	37.77	25.17	0.03	37.80	25.20	56.00	46.00	-18.20	-20.80	L2
0.8550	36.07	23.77	0.03	36.10	23.80	56.00	46.00	-19.90	-22.20	L2
1.4950	32.77	20.57	0.03	32.80	20.60	56.00	46.00	-23.20	-25.40	L2
5.0500	34.46	25.16	0.24	34.70	25.40	60.00	50.00	-25.30	-24.60	L2

Remark:

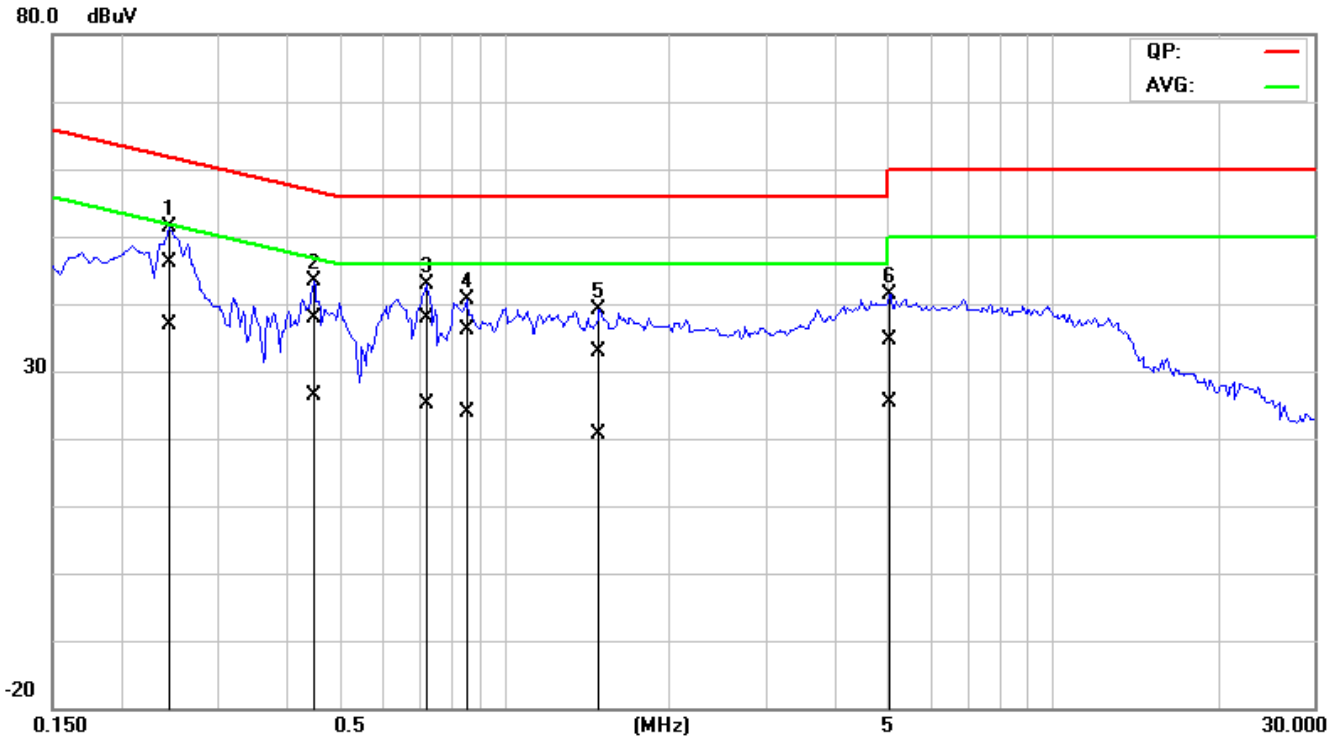
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*
5. *"-" means Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.*

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)



For Model: AL00XXI / Dipole Antenna / Gain: 2dBi

Operation Mode:	Normal Link	**Test Date:**	April 28, 2009
Temperature:	22°C	**Tested by:**	Ryan Cheng
Humidity:	45% RH		

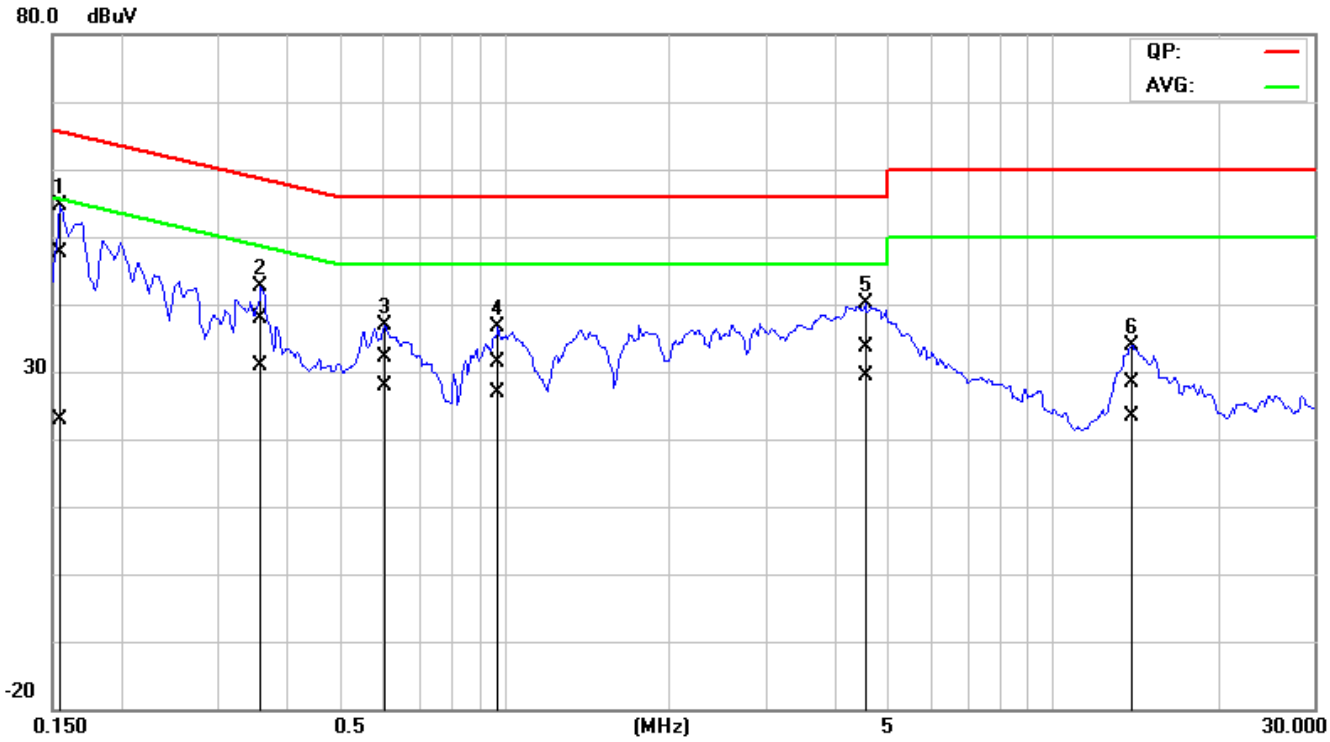
Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1550	47.41	22.81	0.19	47.60	23.00	65.73	55.73	-18.13	-32.73	L1
0.3600	37.71	30.81	0.09	37.80	30.90	58.73	48.73	-20.93	-17.83	L1
0.6050	32.07	27.97	0.03	32.10	28.00	56.00	46.00	-23.90	-18.00	L1
0.9750	31.27	26.97	0.03	31.30	27.00	56.00	46.00	-24.70	-19.00	L1
4.5700	33.49	29.29	0.21	33.70	29.50	56.00	46.00	-22.30	-16.50	L1
13.9250	27.86	22.86	0.64	28.50	23.50	60.00	50.00	-31.50	-26.50	L1
0.1650	49.92	34.02	0.18	50.10	34.20	65.21	55.21	-15.11	-21.01	L2
0.3600	37.81	31.61	0.09	37.90	31.70	58.73	48.73	-20.83	-17.03	L2
0.9400	29.97	26.67	0.03	30.00	26.70	56.00	46.00	-26.00	-19.30	L2
2.4200	26.94	17.14	0.06	27.00	17.20	56.00	46.00	-29.00	-28.80	L2
4.5650	35.39	30.39	0.21	35.60	30.60	56.00	46.00	-20.40	-15.40	L2
14.0000	24.96	20.36	0.64	25.60	21.00	60.00	50.00	-34.40	-29.00	L2

Remark:

1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*
5. *"-" means Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.*

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)