FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

802.11b/g Mini PCI Card

Model: WLC-101GA

Trade Name: N/A

Prepared for

CHUNG NAM ELECTRONICS CO., LTD
12/F, Chung Nam Building, NO. 1 Lockhart Road,
Wanchai, Hong Kong

Issued by:

COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.
(aka Compliance Engineering Service (China))
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Issued Date: December 25, 2008

Testing Laboratory
0363

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1. TEST RESULT CERTIFICATION

Applicant:	CHUNG NAM ELECTRONICS CO., LTD 12/F, Chung Nam Building, No. 1 Lockhart Road, Wanchai, Hong Kong
Manufacturer:	CHUNG NAM ELECTRONICS CO., LTD 12/F, Chung Nam Building, No. 1 Lockhart Road, Wanchai, Hong Kong
Equipment Under Test:	802.11b/g Mini PCI Card
Trade Name:	N/A
Model:	WLC-101GA
Date of Test:	December 15-25,2008

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services (Shenzhen) 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:

Clinton Kao
Manager
Compliance Certification Service Inc.

Reviewed by:

Vincent Yao
Assistant manager
Compliance Certification Service Inc.

2. EUT DESCRIPTION

Product	802.11b/g Mini PCI Card
Trade Name	N/A
Model Number	WLC-101GA
Model Difference	N/A
Power Supply	Powered by the notebook
Frequency Range	IEEE 802.11b mode: 2412 ~ 2462 MHz IEEE 802.11g mode: 2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b mode: 17.73dBm IEEE 802.11g mode: 17.56dBm
Modulation Technique	802.11b: DSSS (CCK; DQPSK; DBPSK) 802.11g: OFDM
Transmit Data Rate	802.11b: 11Mbps(CCK) with fall back rates of 5.5, 2, and 1Mbps 802.11g: 54Mbps with fall back rates of 48/36/24/18/12/9/6 Mbps (OFDM)
Number of Channels	IEEE 802.11b/g :11 Channels
Antenna Specification	Dipole antenna Gain: 1.80 dBi (Max)

Note: *This submittal(s) (test report) is intended for FCC ID: Q72WLC101GA 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: 2003 and FCC CFR47 15.207, 15.209 and 15.247.

3.1 EUT 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.

3.2 EUT 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.

3.3 GENERAL 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 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.

3.4 FCC 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
2. 17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
2. 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.

3.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1Mbps highest data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6Mbps data rate (the worst case) are chosen for the final testing.

All emissions tests were made with the worst-case data rates.
Remark: EUT have two antenna connector, which are identical with each other, and can choose anyone of them to work normally, but they can't work at the same time.
After the preliminary scan, this connector(please see the setup photo) was found to produce the highest emission level for all final test items.

4. 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.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

No. 5, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4: 2003 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.”

5.3 LABORATORY ACCREDITATIONS AND LISTING

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	**TAF**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI**
Canada	**INDUSTRY CANADA**
Taiwan	**BSMI**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsemc.com.tw

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
Notebook	IBM	2672	DoC	992F2VG	N/A	Unshielded 1.8m
Mini PCI Card Connector	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

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

7.1 6dB BANDWIDTH

LIMIT

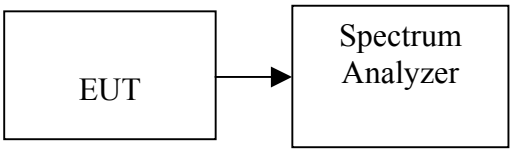
According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 -928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

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 = 100kHz, VBW ≥RBW, Span = 25MHz, 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

Test Data

IEEE 802.11b mode

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	12040	>500	PASS
Mid	2437	12540		PASS
High	2462	12080		PASS

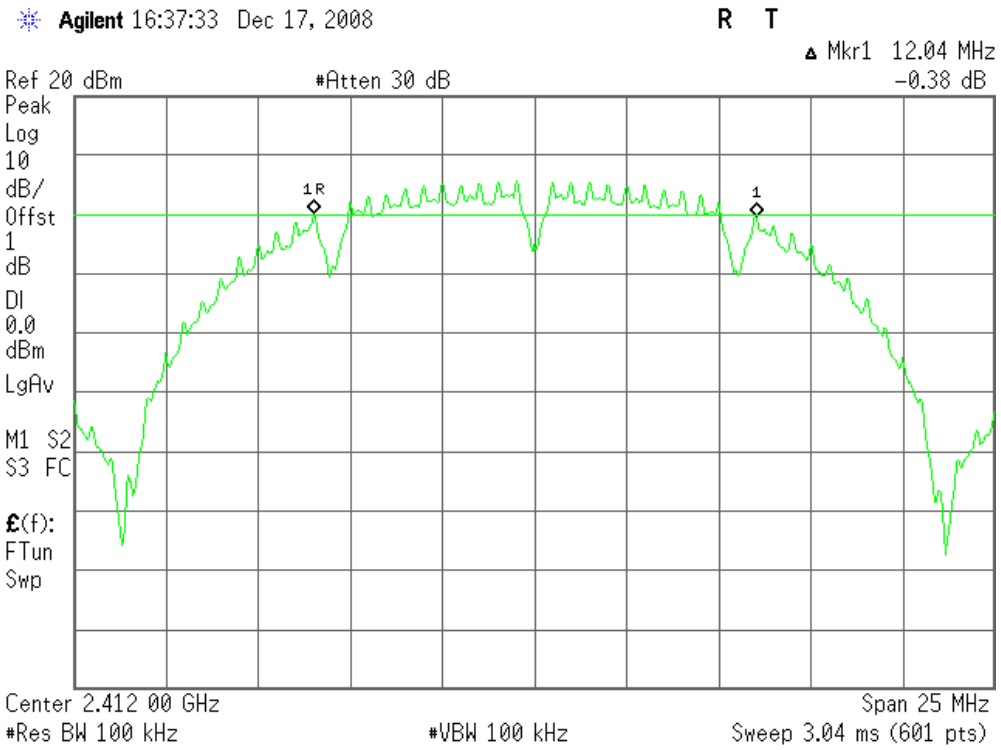
IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	16380	>500	PASS
Mid	2437	16420		PASS
High	2462	16420		PASS

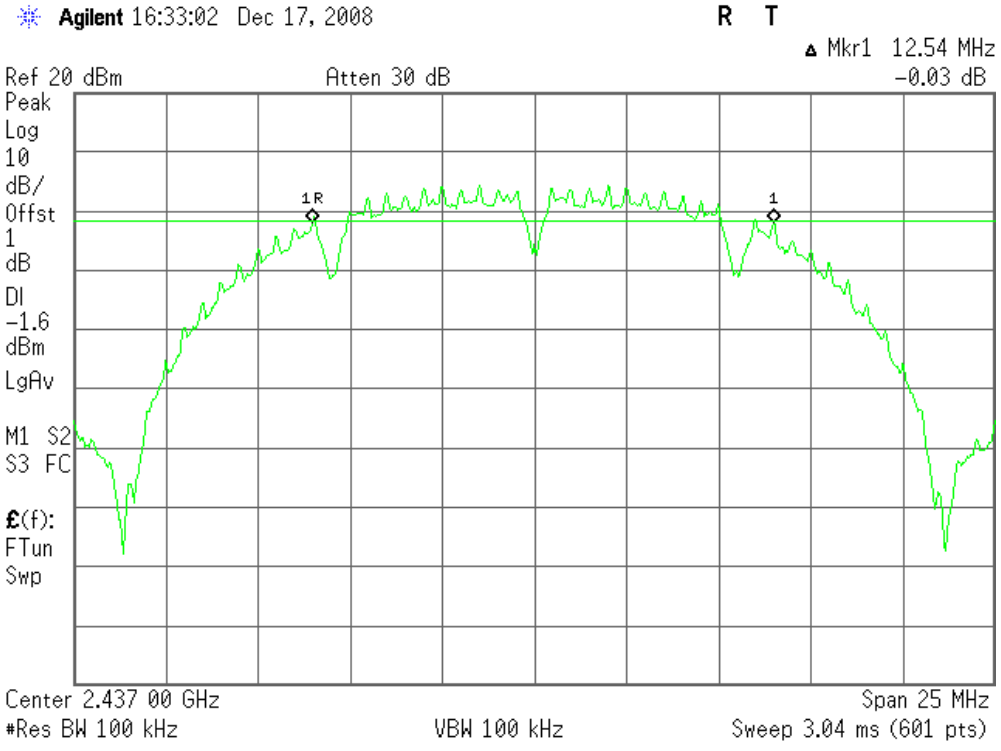
Test Plot

IEEE 802.11b mode

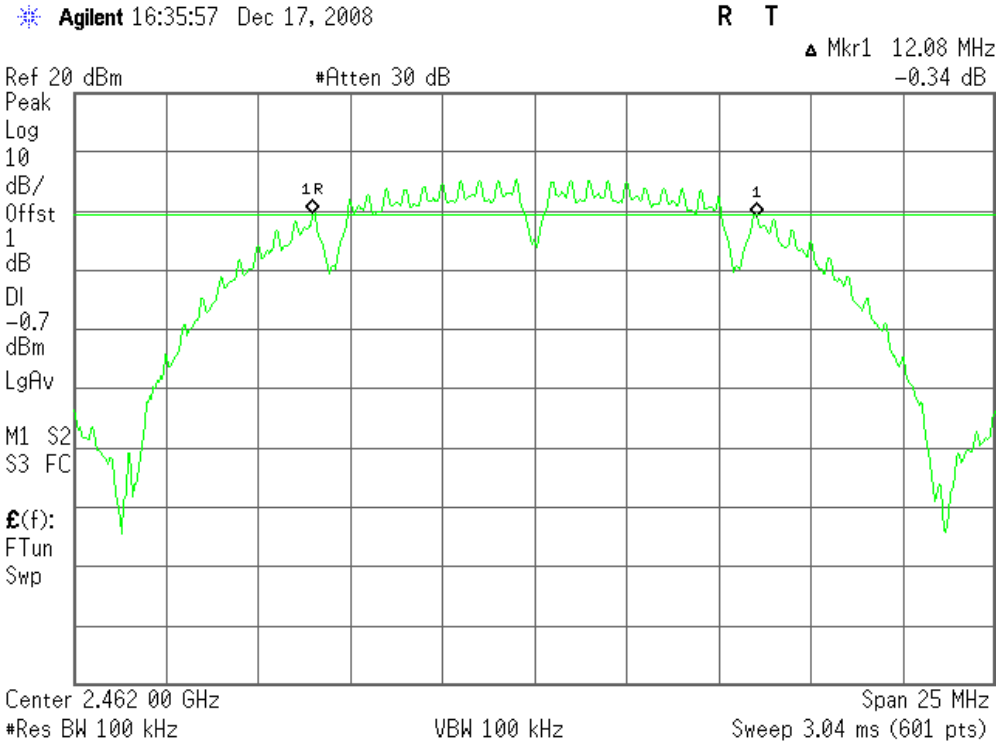
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)

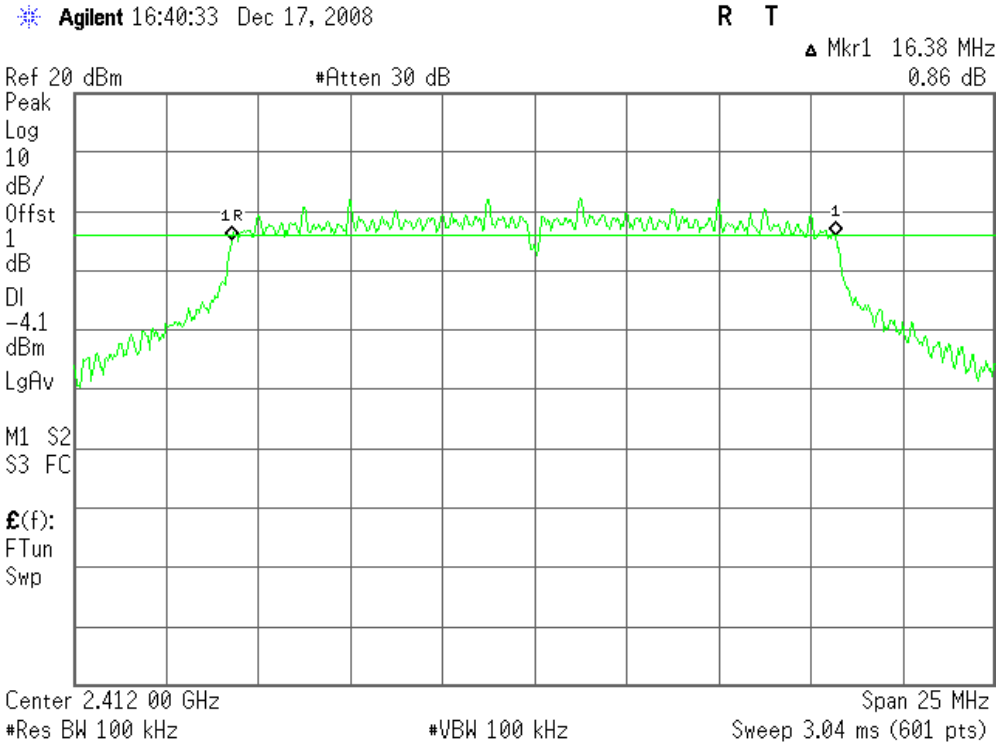


6dB Bandwidth (CH High)

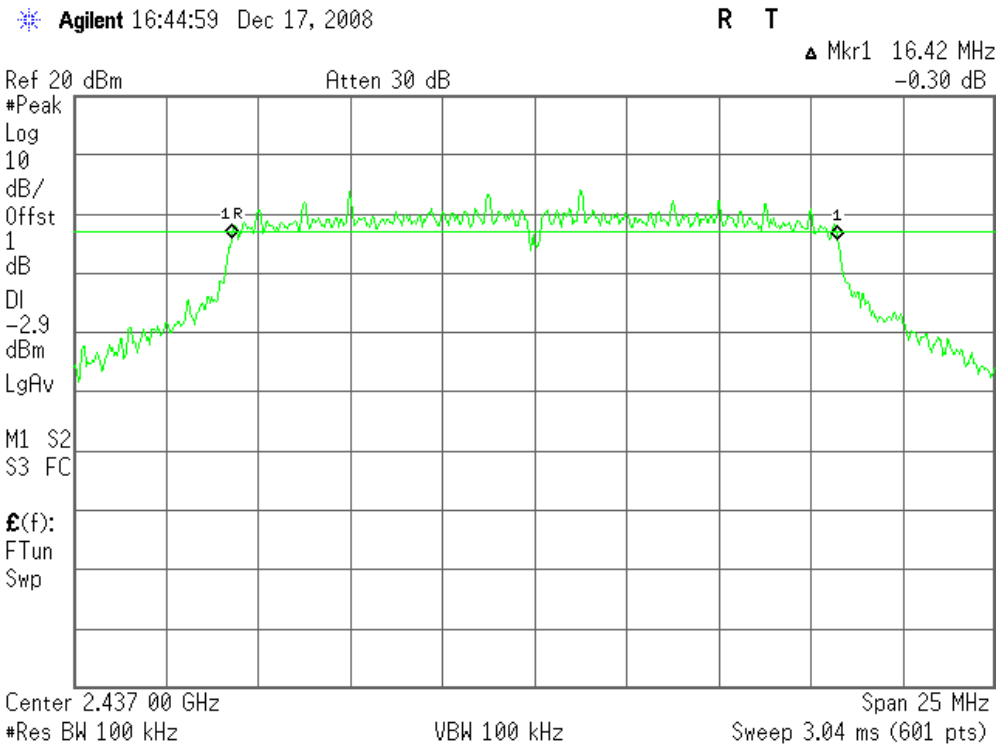


IEEE 802.11g mode

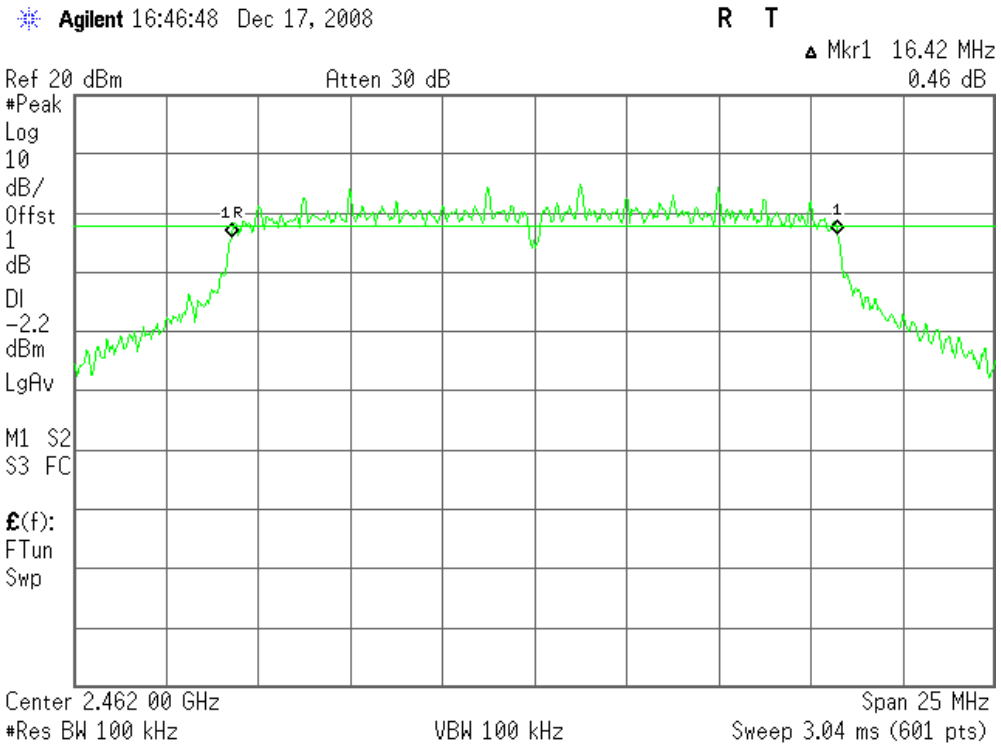
6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)



6dB Bandwidth (CH High)



7.2 PEAK POWER

LIMIT

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

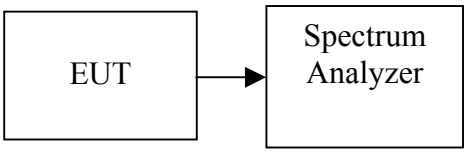
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

Test Configurations



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 run".
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

IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	17.73	0.05929	1	PASS
Mid	2437	16.97	0.04977		PASS
High	2462	17.24	0.05297		PASS

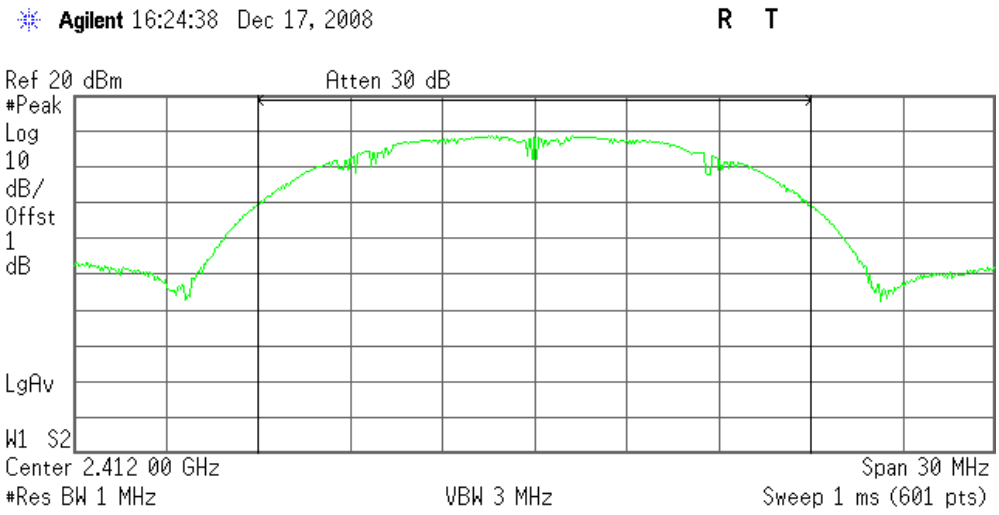
IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	15.26	0.03357	1	PASS
Mid	2437	16.62	0.04592		PASS
High	2462	17.56	0.05702		PASS

Test Plot

IEEE 802.11b mode

Peak power (CH Low)



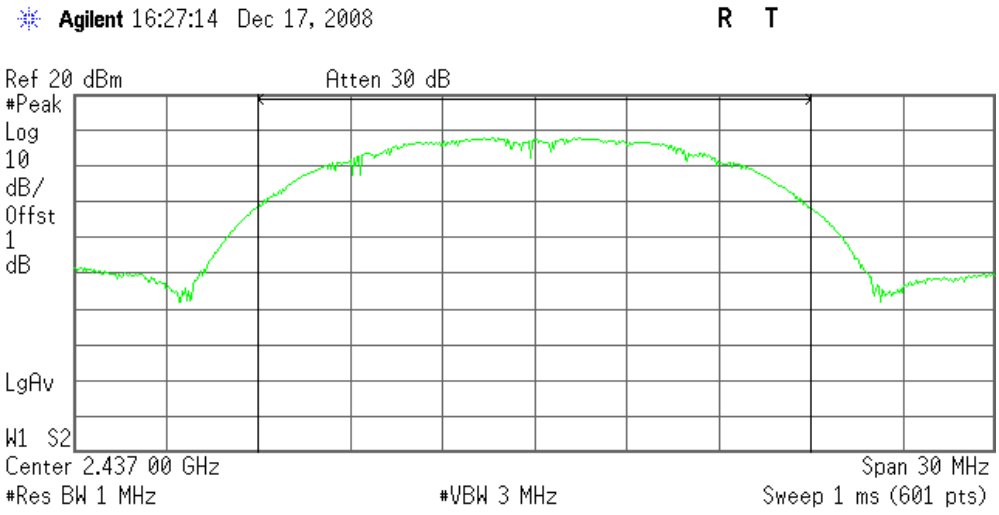
Channel Power

17.73 dBm /18.0000 MHz

Power Spectral Density

-54.82 dBm/Hz

Peak power (CH Mid)



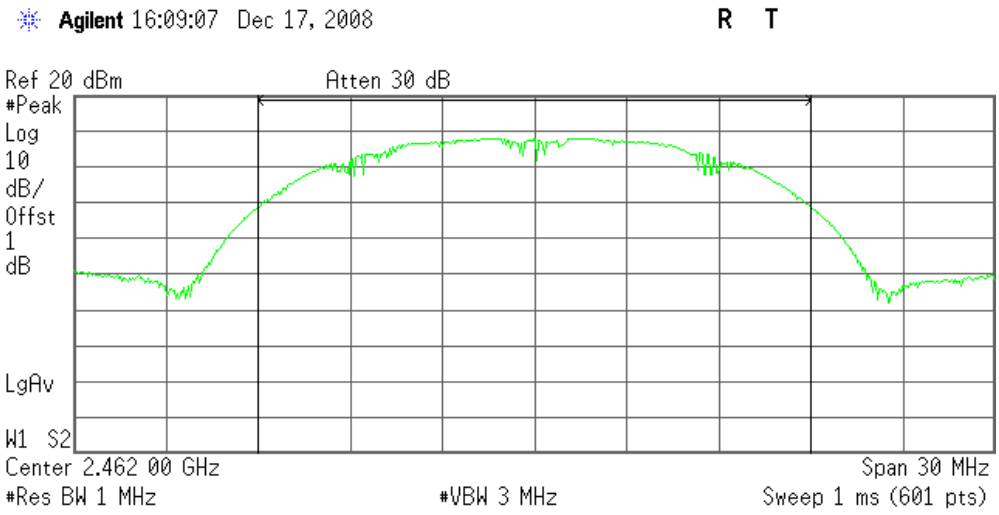
Channel Power

16.97 dBm /18.0000 MHz

Power Spectral Density

-55.58 dBm/Hz

Peak power (CH High)



Channel Power

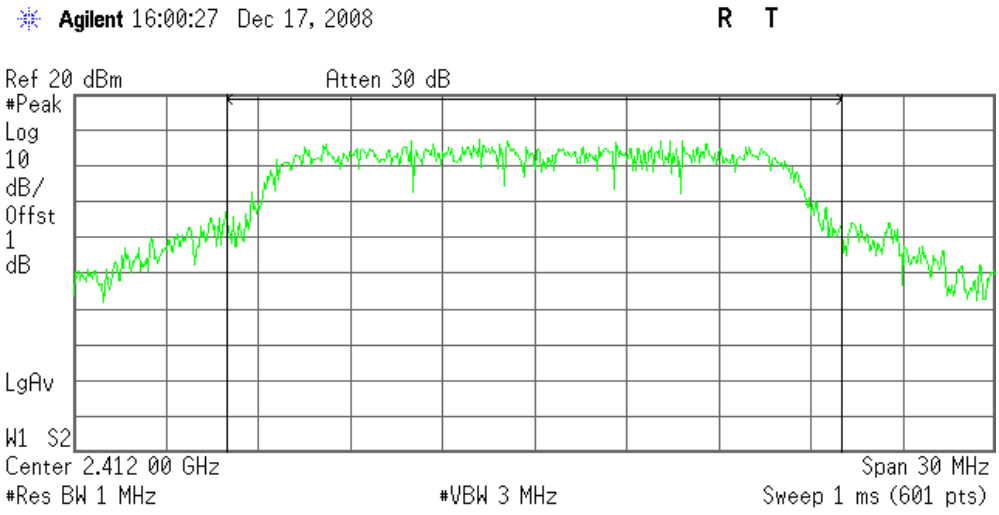
17.24 dBm /18.0000 MHz

Power Spectral Density

-55.31 dBm/Hz

IEEE 802.11g mode

Peak power (CH Low)



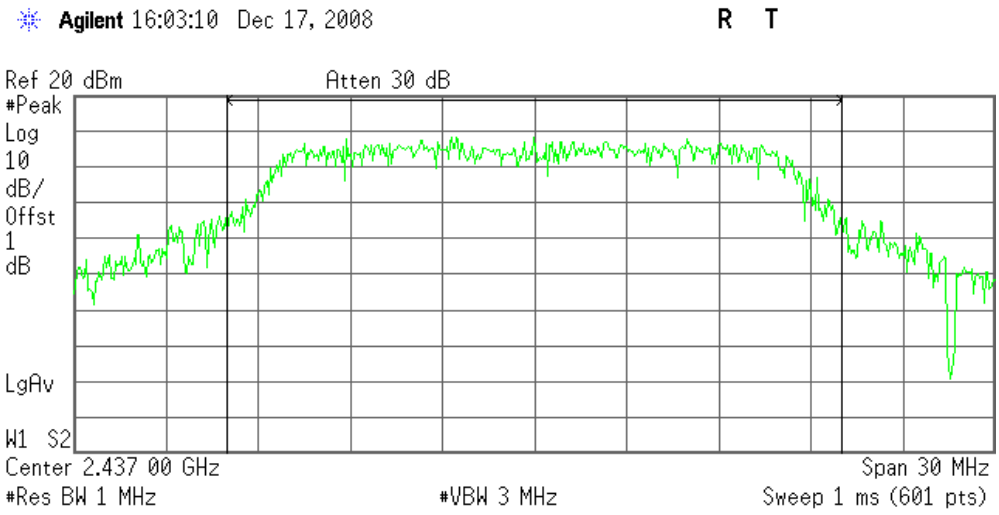
Channel Power

15.26 dBm /20.0000 MHz

Power Spectral Density

-57.75 dBm/Hz

Peak power (CH Mid)



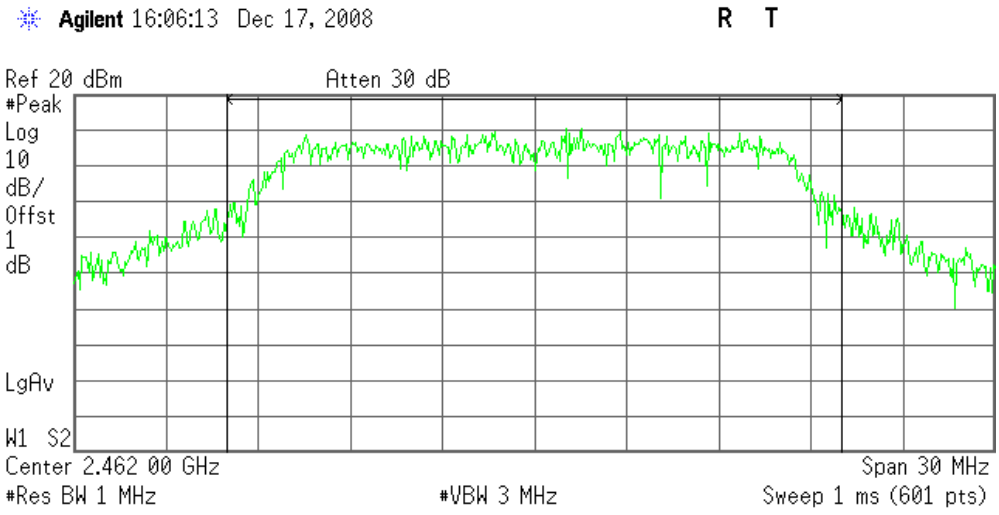
Channel Power

16.62 dBm /20.0000 MHz

Power Spectral Density

-56.39 dBm/Hz

Peak power (CH High)



Channel Power

17.56 dBm /20.0000 MHz

Power Spectral Density

-55.45 dBm/Hz

7.3 BAND EDGES MEASUREMENT

LIMIT

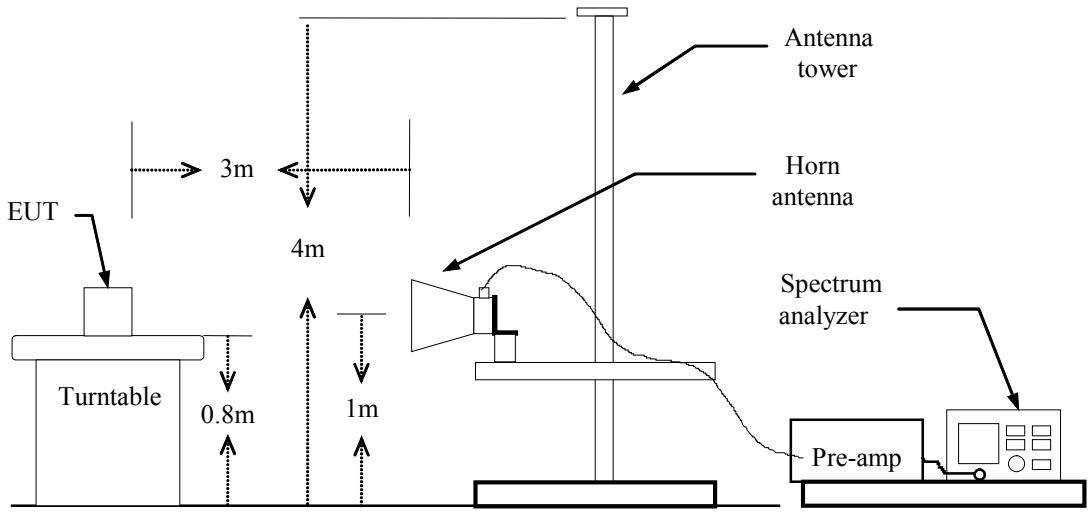
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2009
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	02/14/2009
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2009
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
High Noise Amplifier	Agilent	89842	N/A	06/09/2009
Site NSA	C&C	N/A	N/A	06/09/2009
Horn Antenna	TRC	N/A	N/A	03/04/2009
Signal Generator	Anritsu	MG3694A	#050125	02/24/2009

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

Test Configuration



TEST PROCEDURE

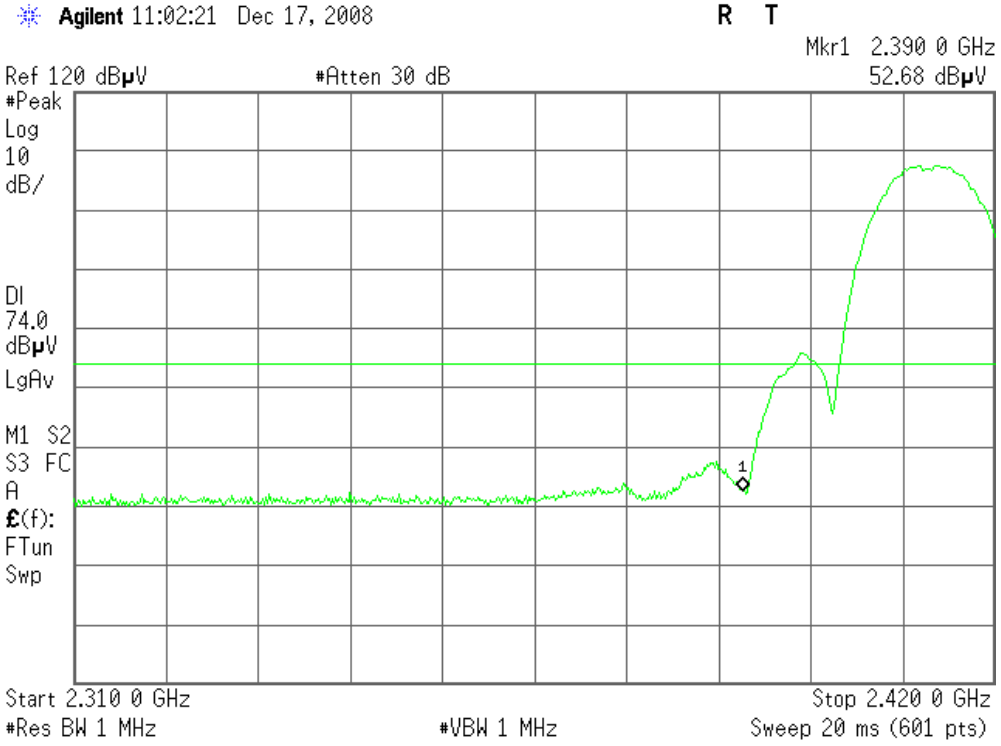
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the 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

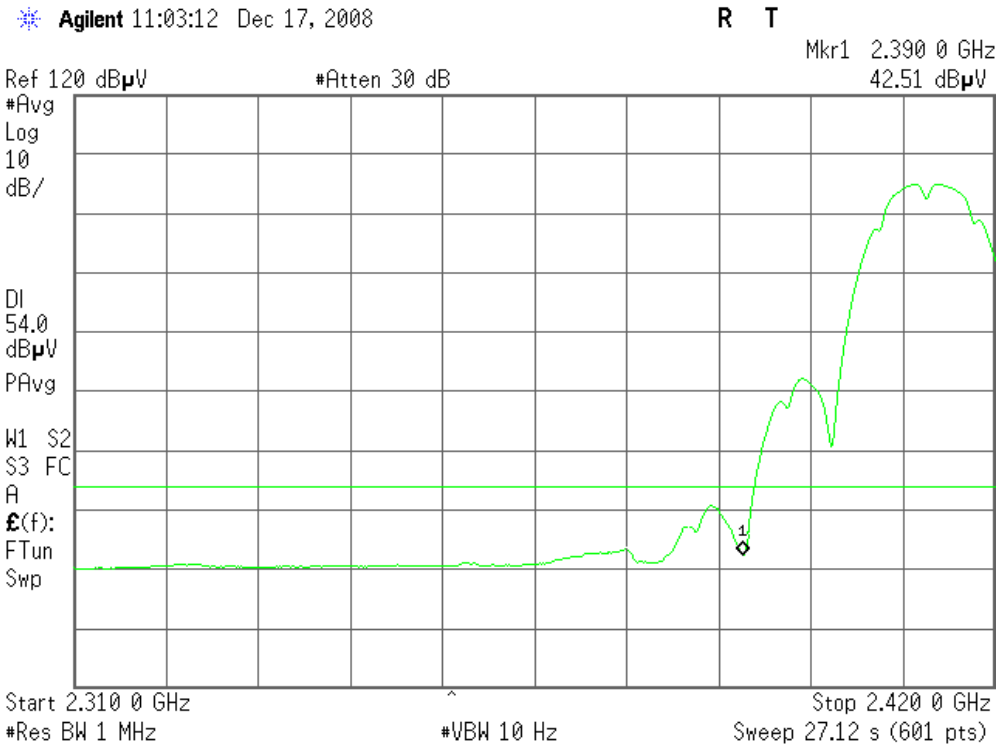
Refer to attach spectrum analyzer data chart.

Band Edges (IEEE 802.11b mode / CH Low)

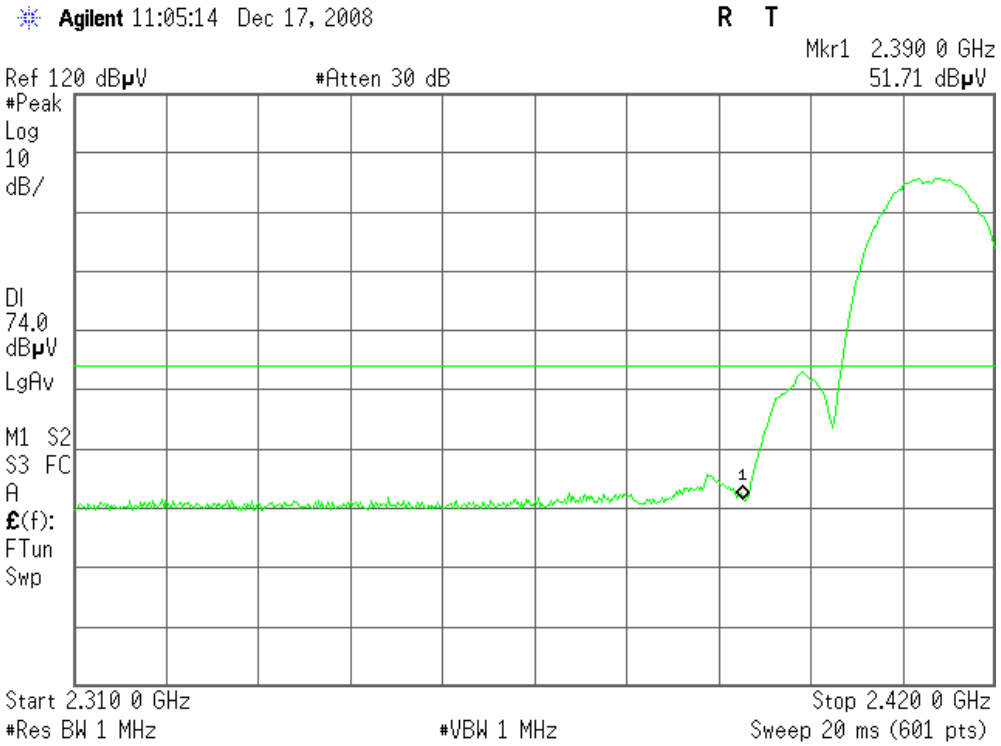
Detector mode: Peak **Polarity: Vertical**



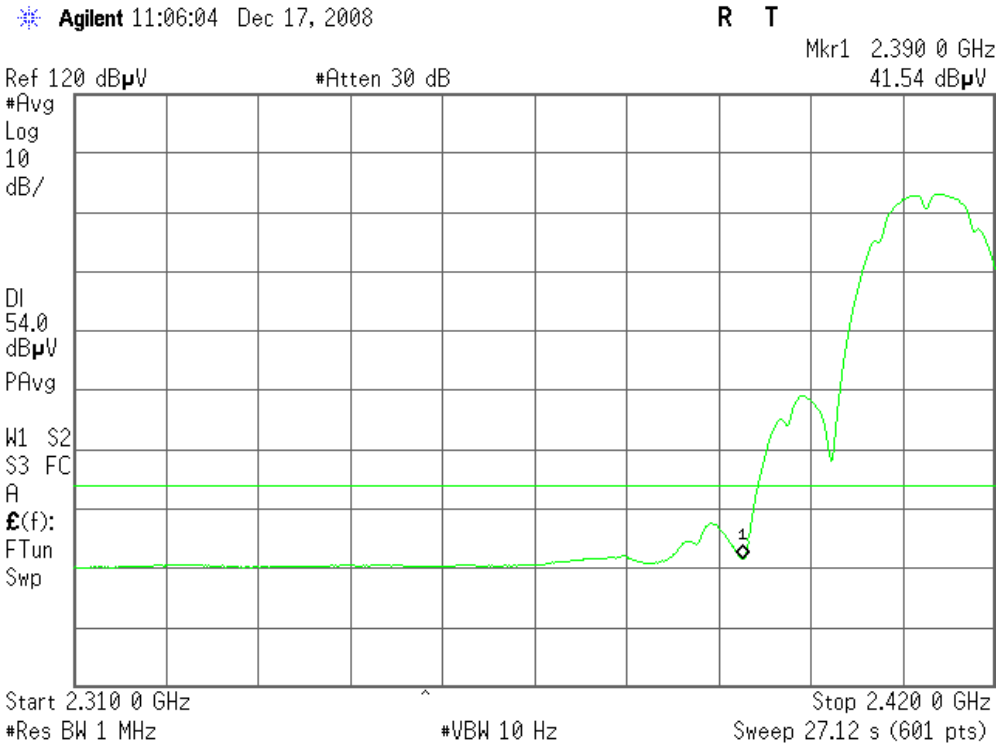
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

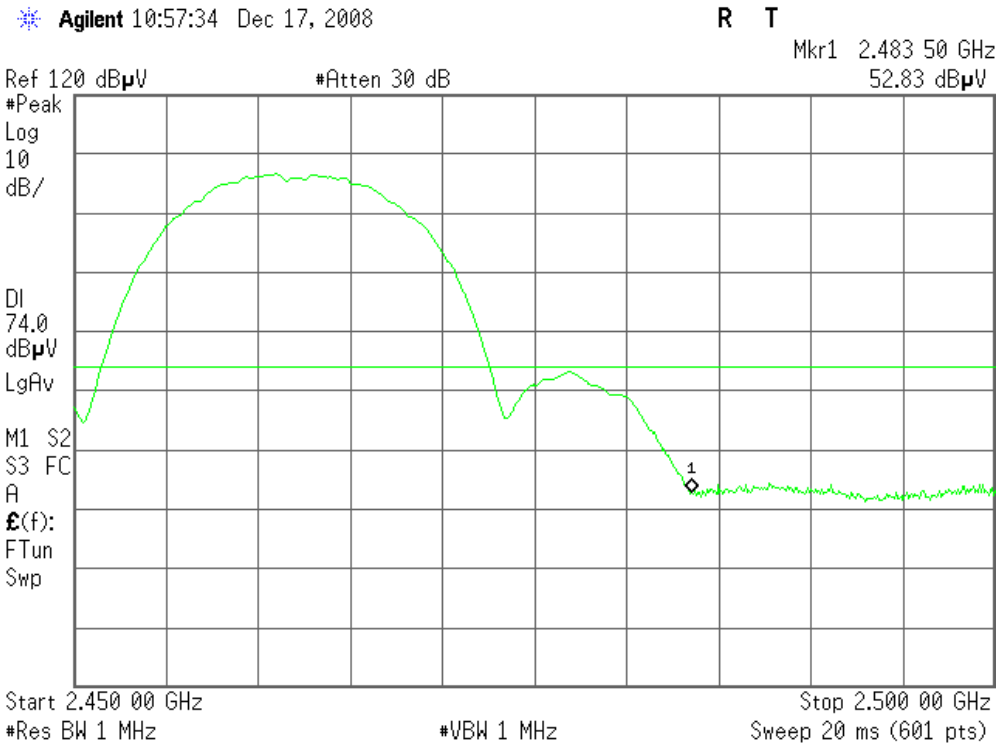


Detector mode: Average **Polarity: Horizontal**

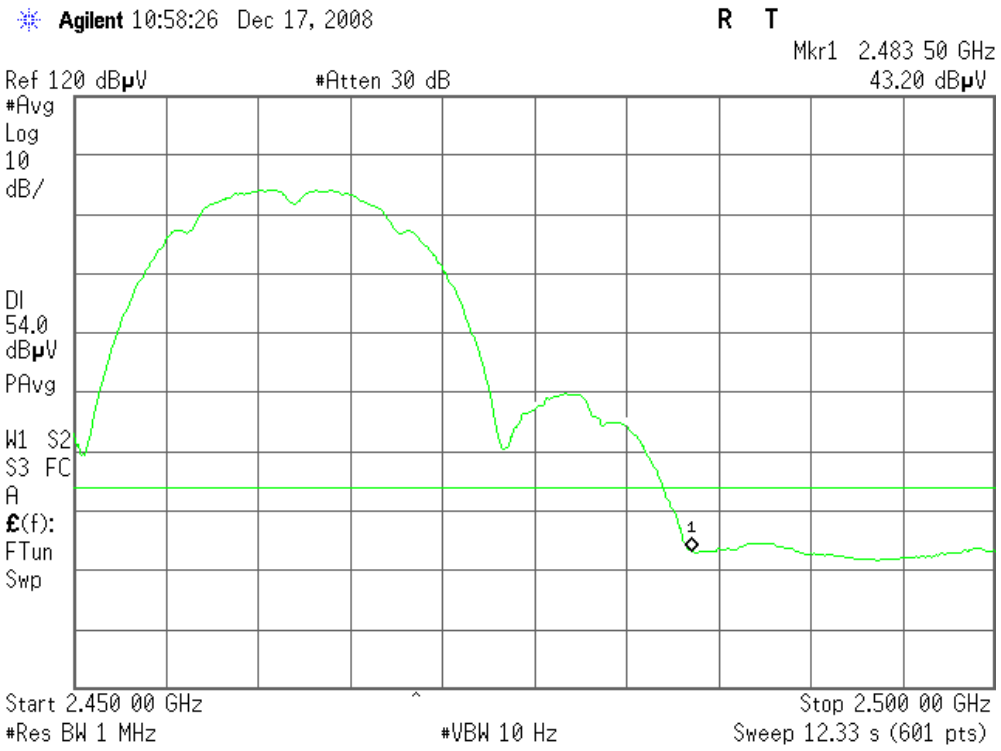


Band Edges (IEEE 802.11b mode/ CH High)

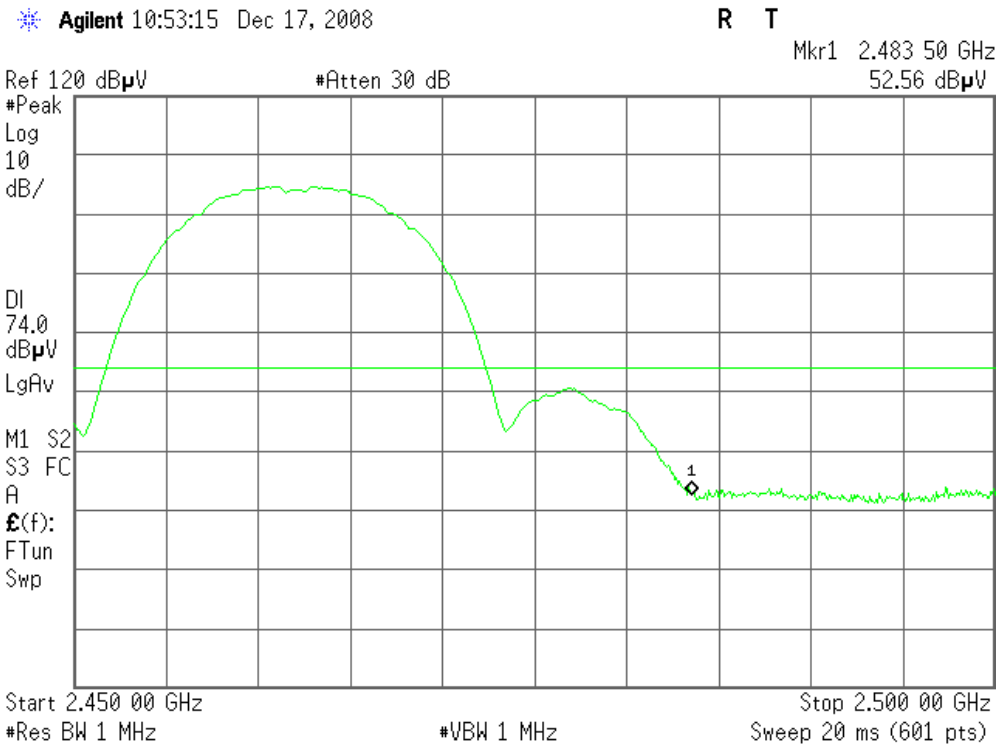
Detector mode: Peak **Polarity: Vertical**



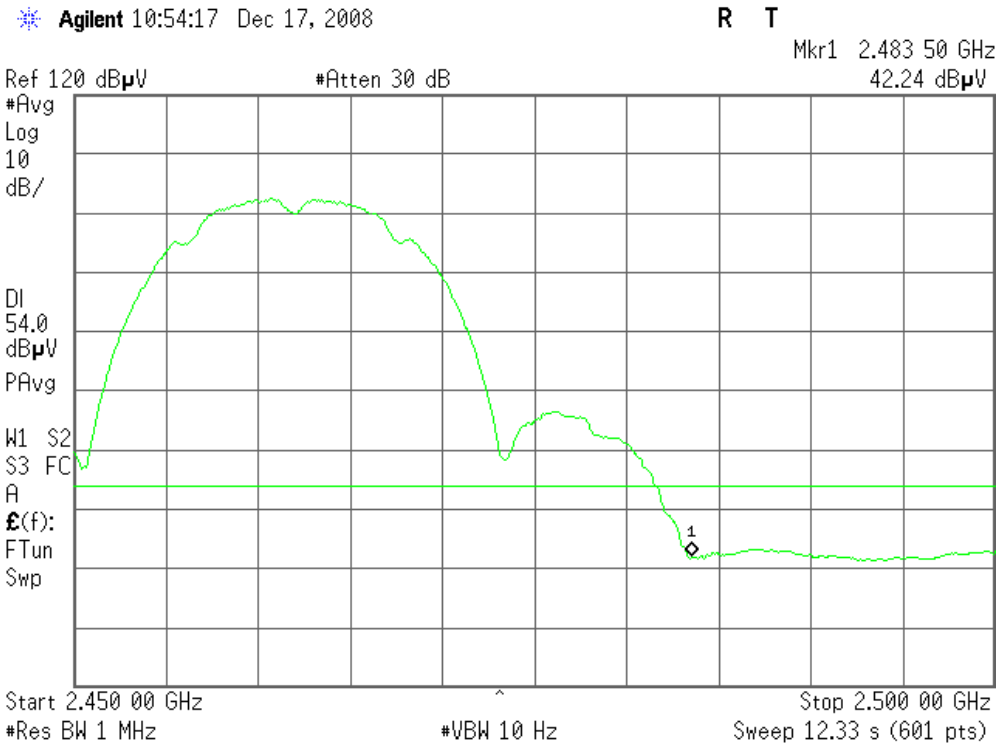
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

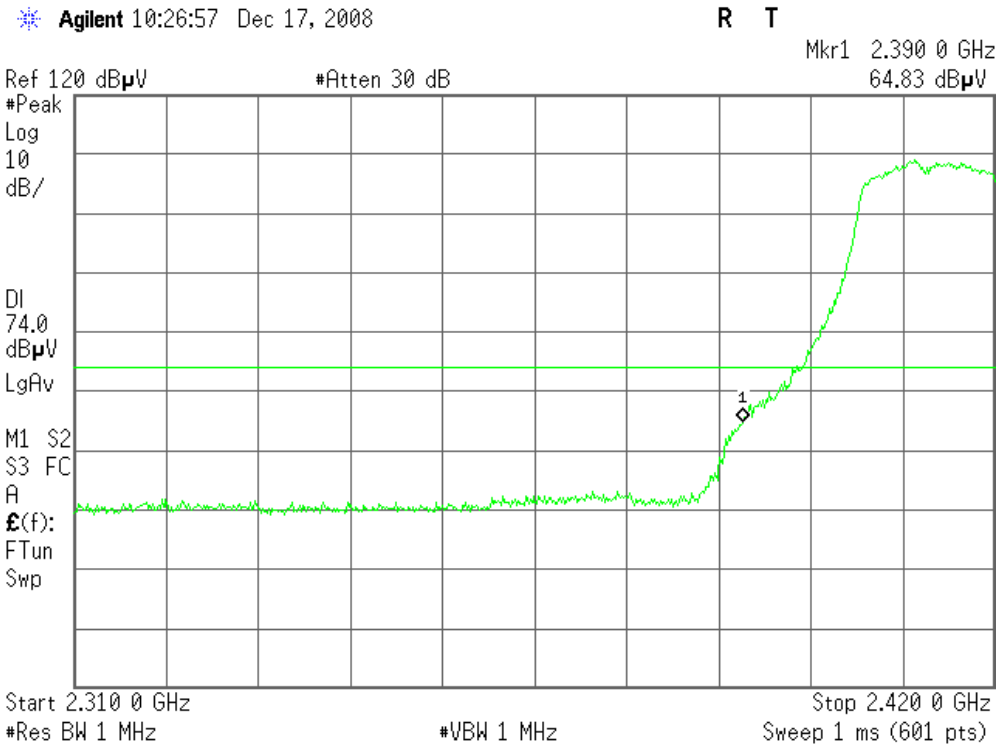


Detector mode: Average **Polarity: Horizontal**

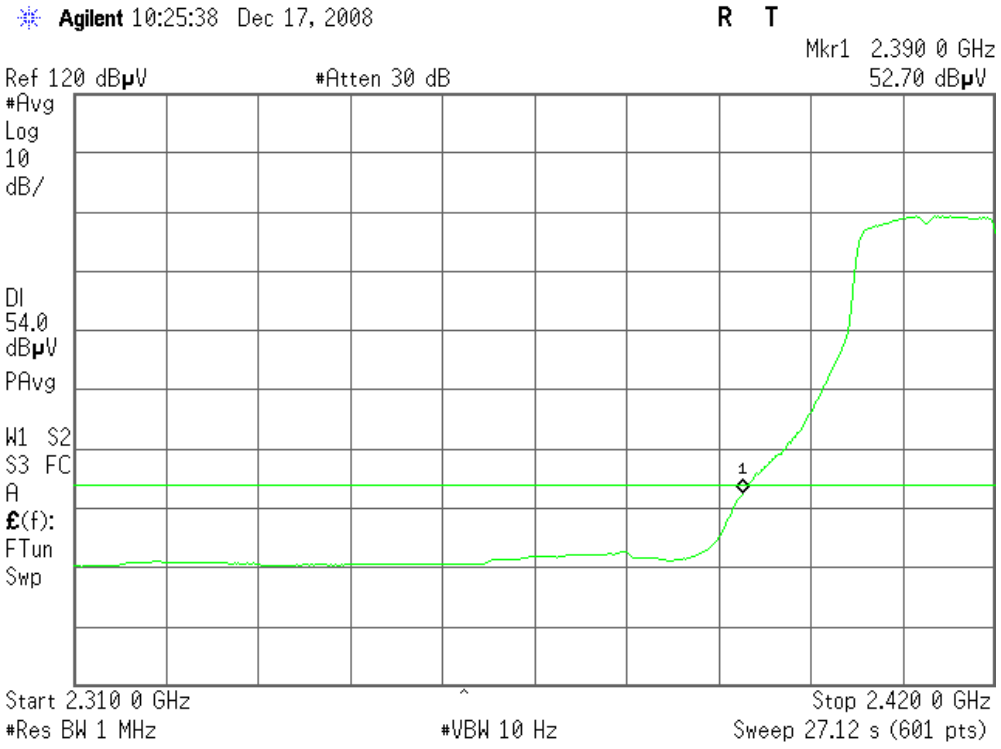


Band Edges (IEEE 802.11g mode / CH Low)

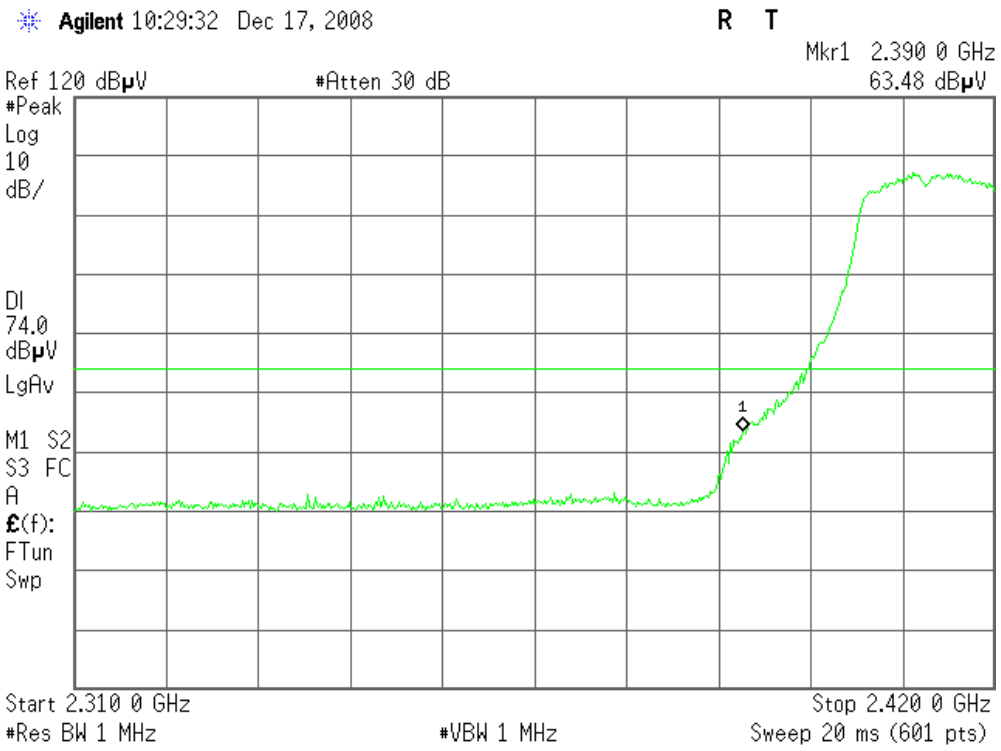
Detector mode: Peak **Polarity: Vertical**



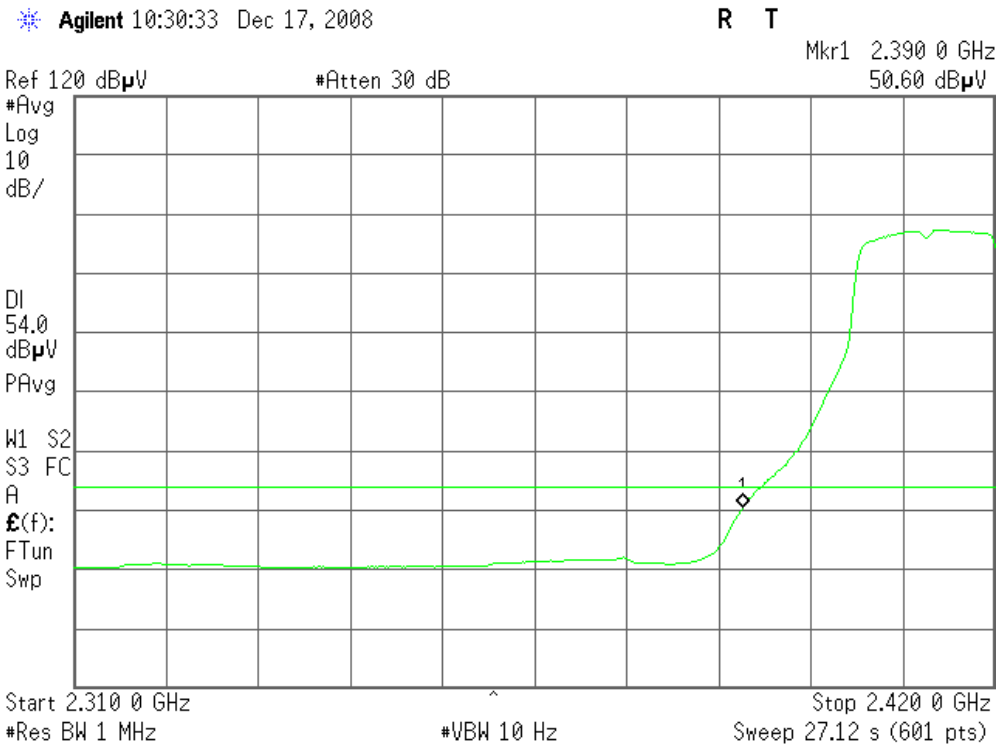
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

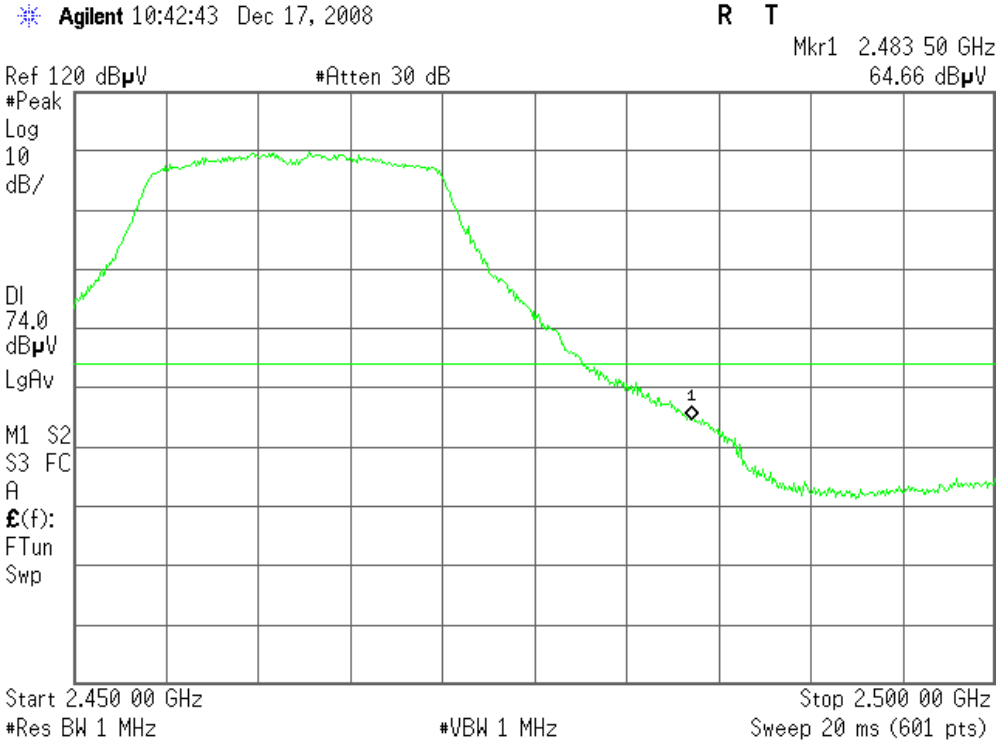


Detector mode: Average **Polarity: Horizontal**

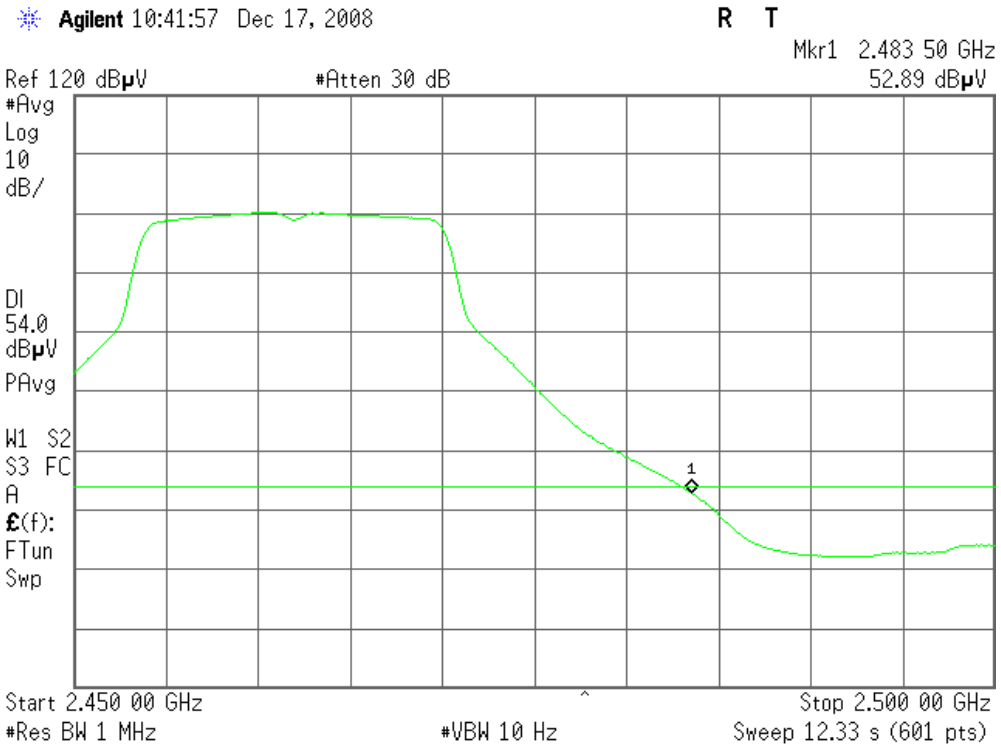


Band Edges (IEEE 802.11g mode / CH High)

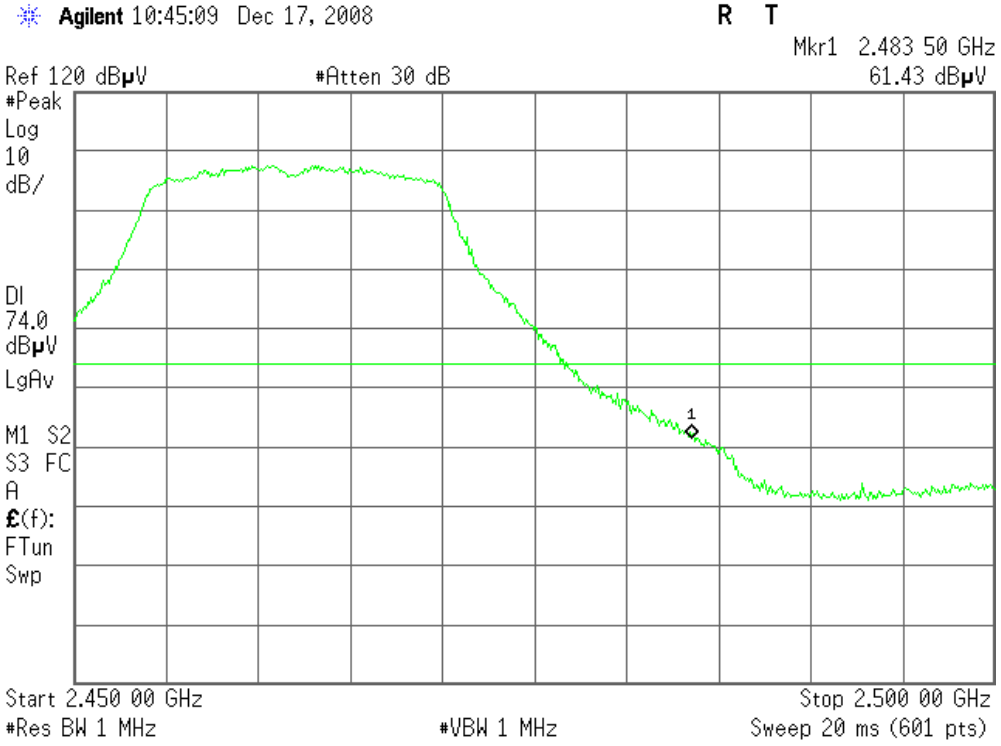
Detector mode: Peak **Polarity: Vertical**



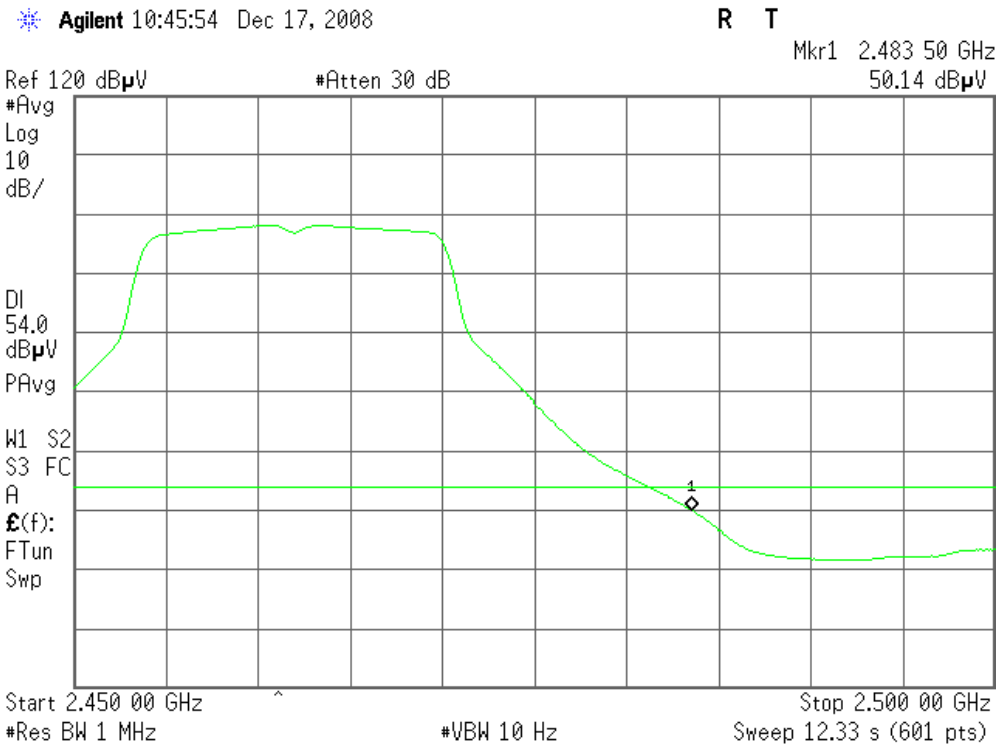
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

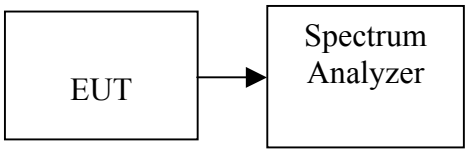
1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation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

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

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=auto.
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

IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD Total (dBm)	Limit (dBm)	Result
Low	2412	-15.83	8.00	PASS
Mid	2437	-16.50		PASS
High	2462	-15.73		PASS

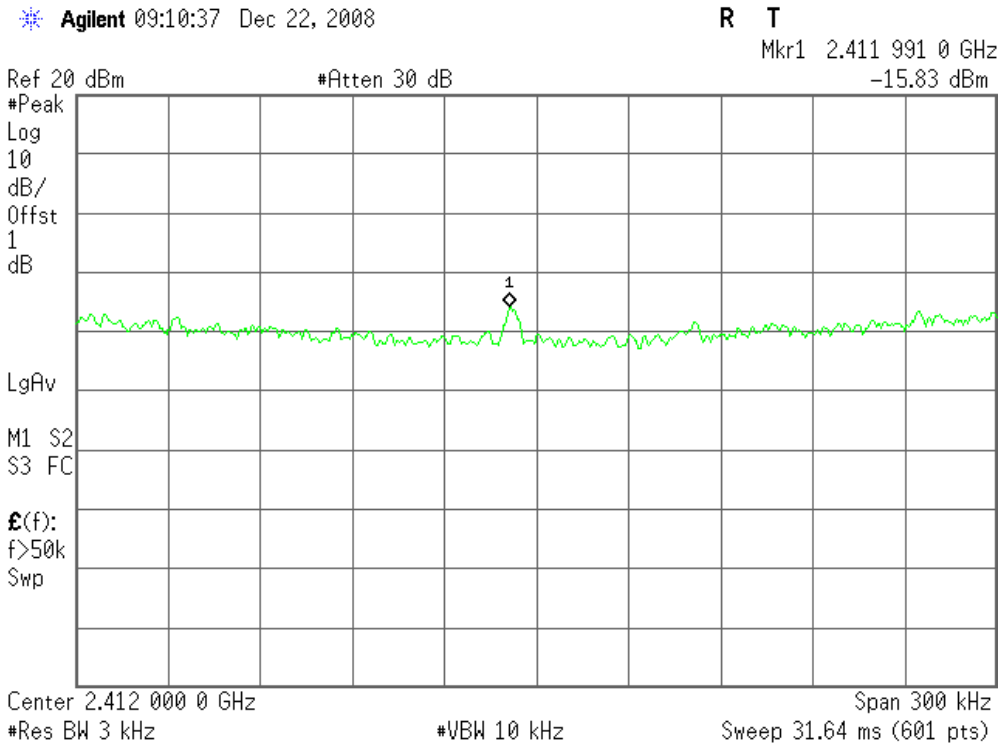
IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD Total (dBm)	Limit (dBm)	Result
Low	2412	-17.02	8.00	PASS
Mid	2437	-16.49		PASS
High	2462	-15.35		PASS

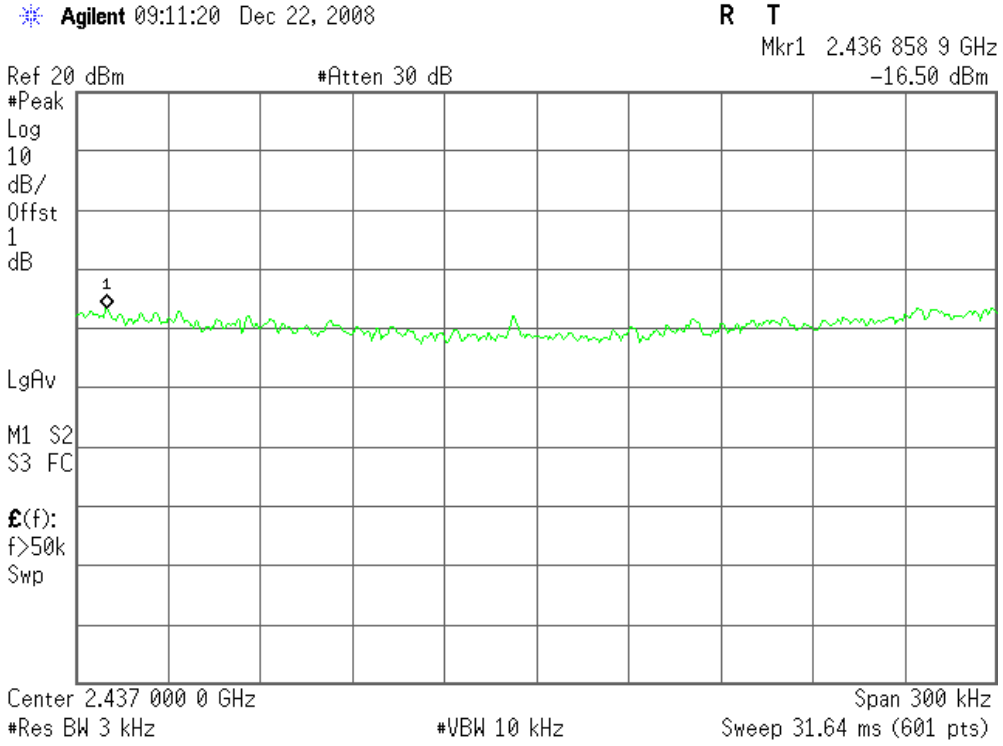
Test Plot

IEEE 802.11b mode

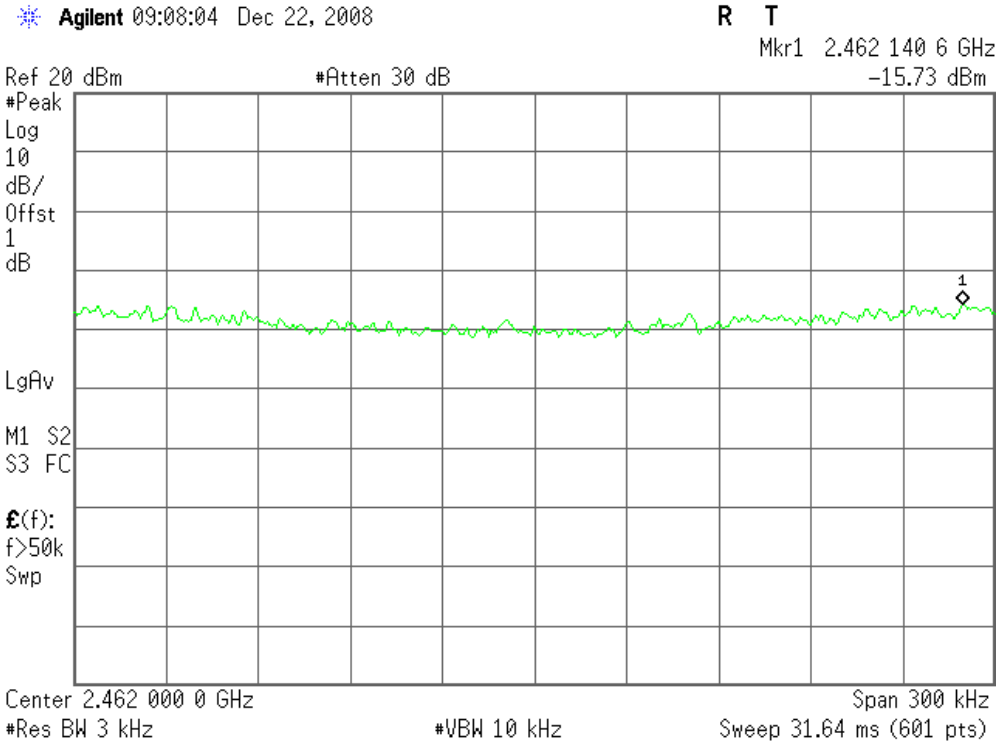
PPSD (CH Low)



PPSD (CH Mid)

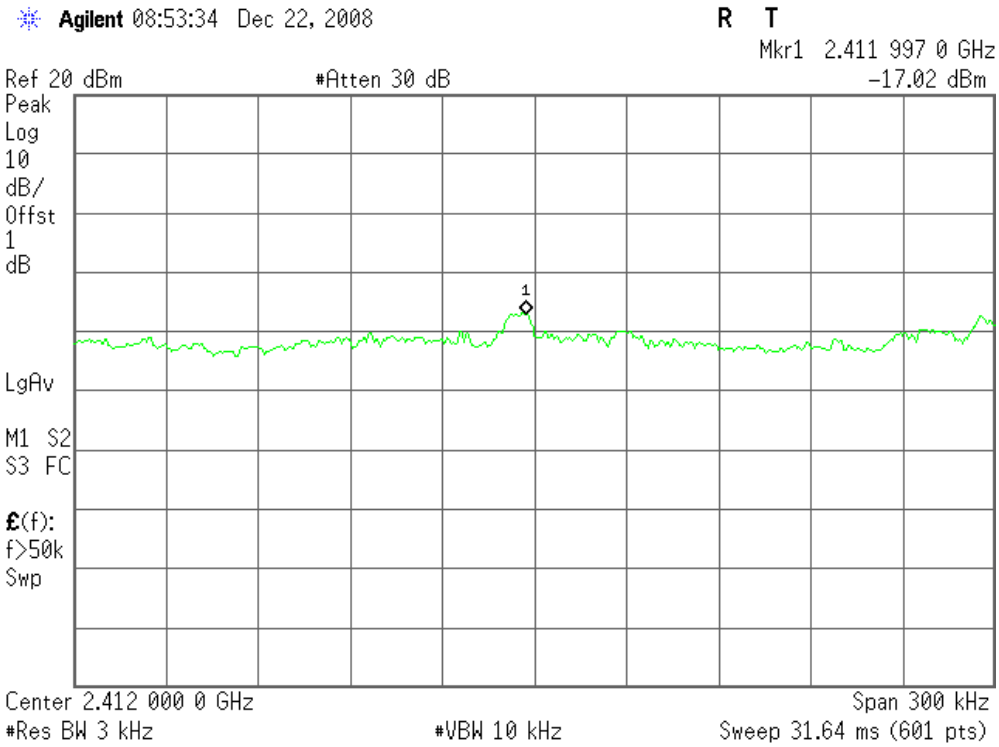


PPSD (CH High)

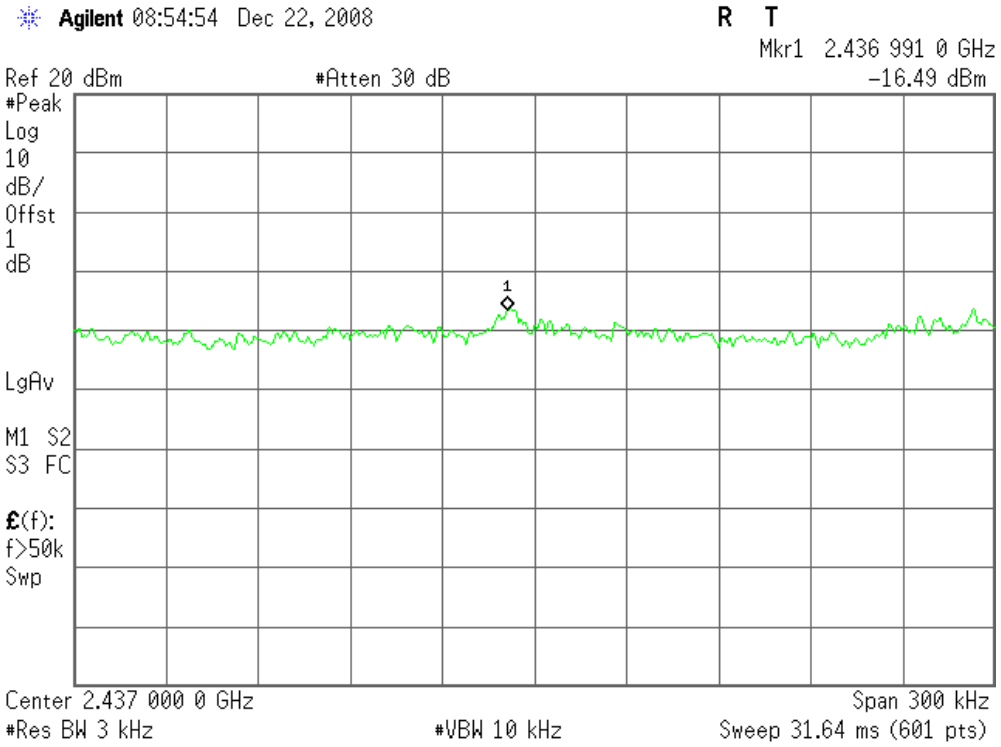


IEEE 802.11g mode

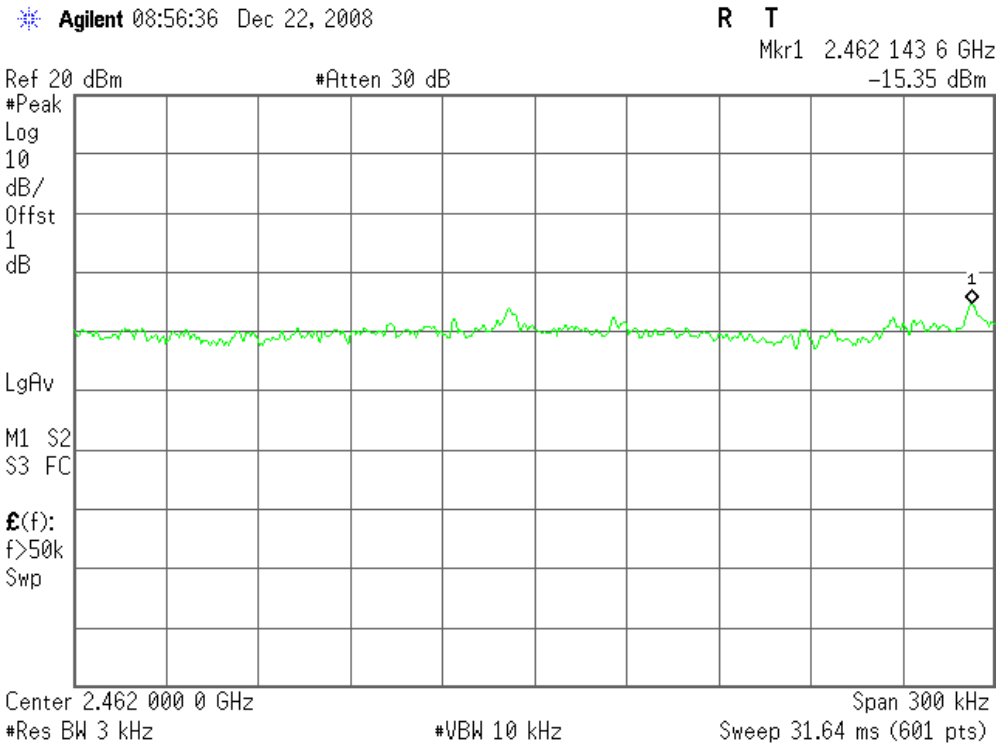
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)



7.5 SPURIOUS EMISSIONS

7.5.1 Conducted Measurement

LIMIT

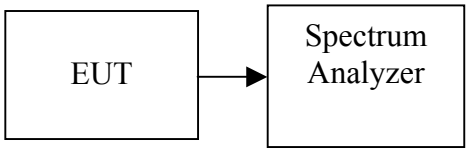
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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)).

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

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.

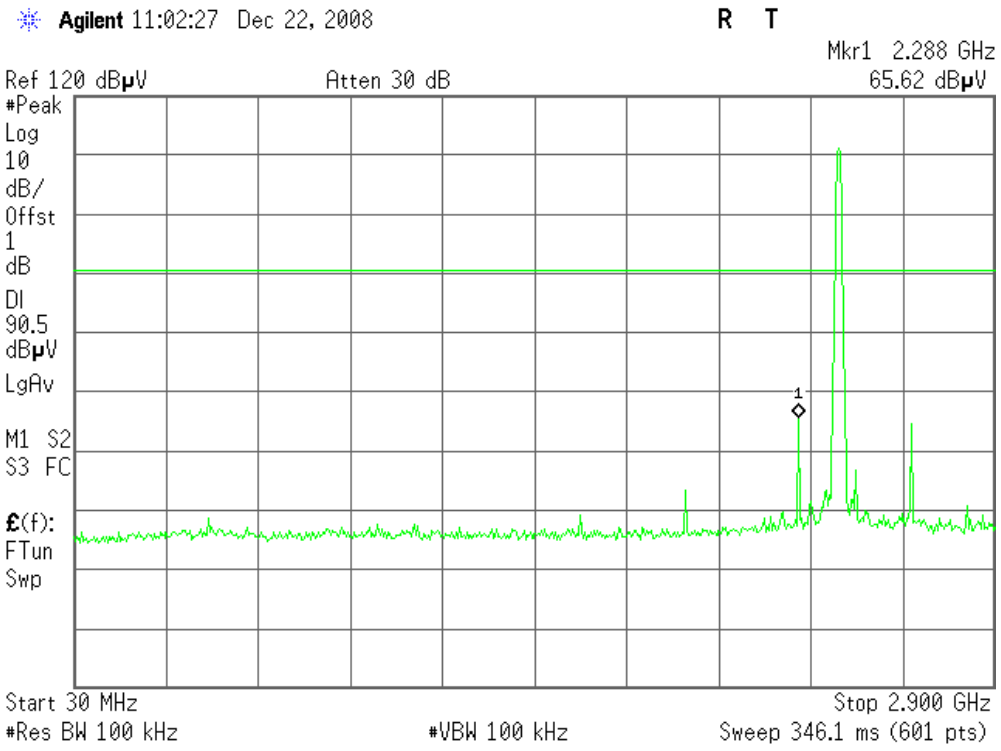
TEST RESULTS

No non-compliance noted

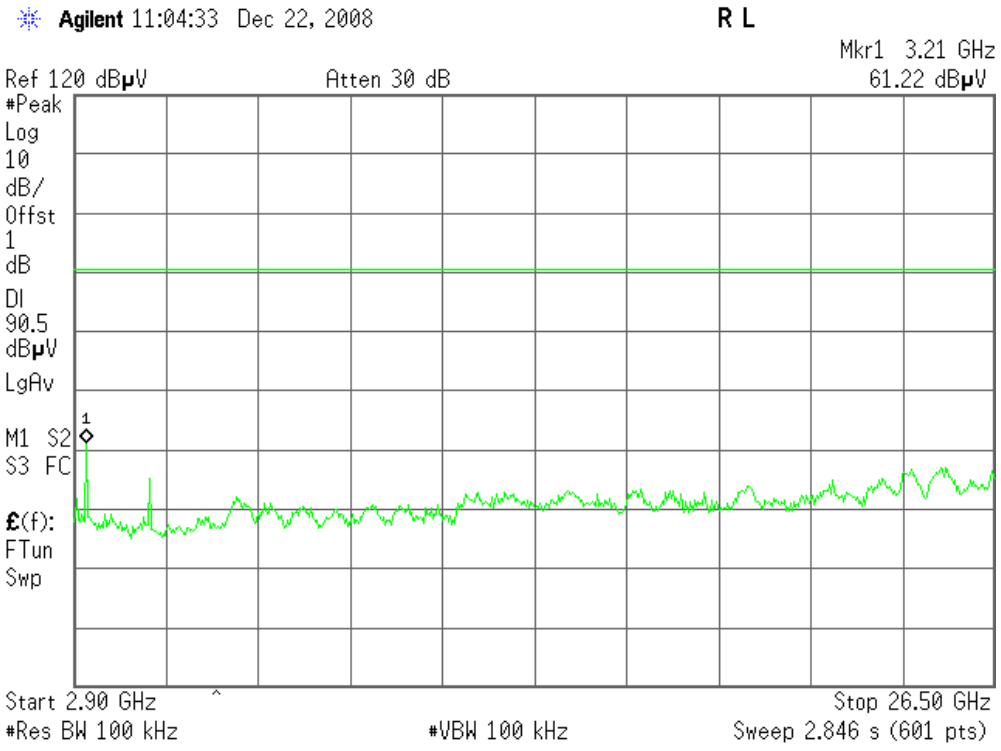
Test Plot

IEEE 802.11b mode / CH Low

30MHz ~ 2.9GHz

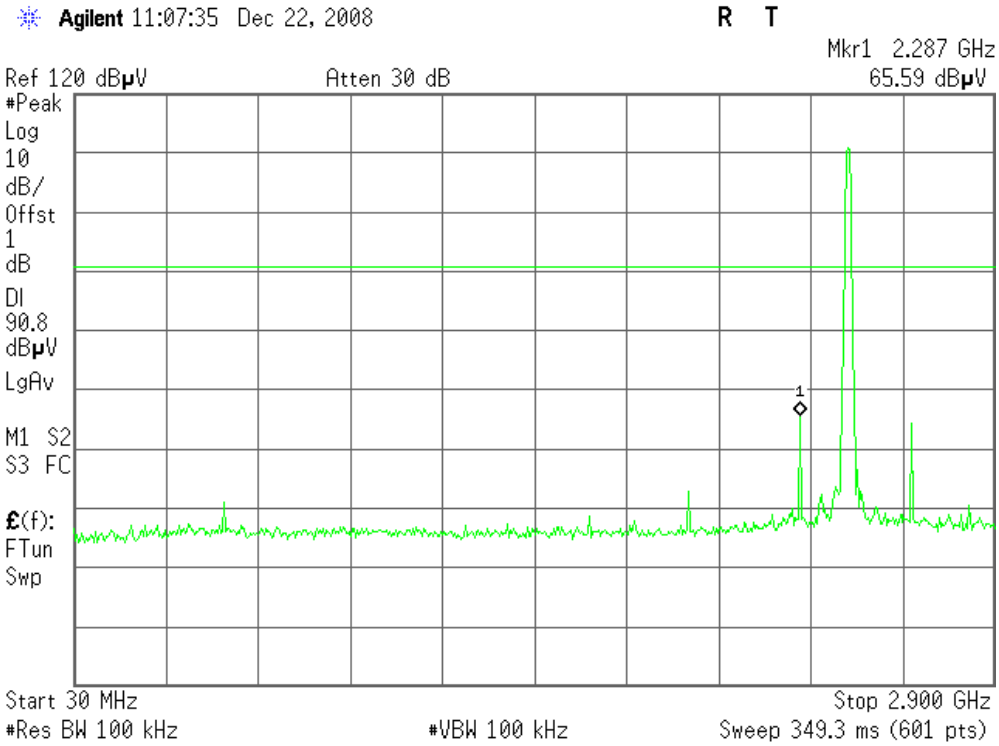


2.9GHz ~ 26.5GHz

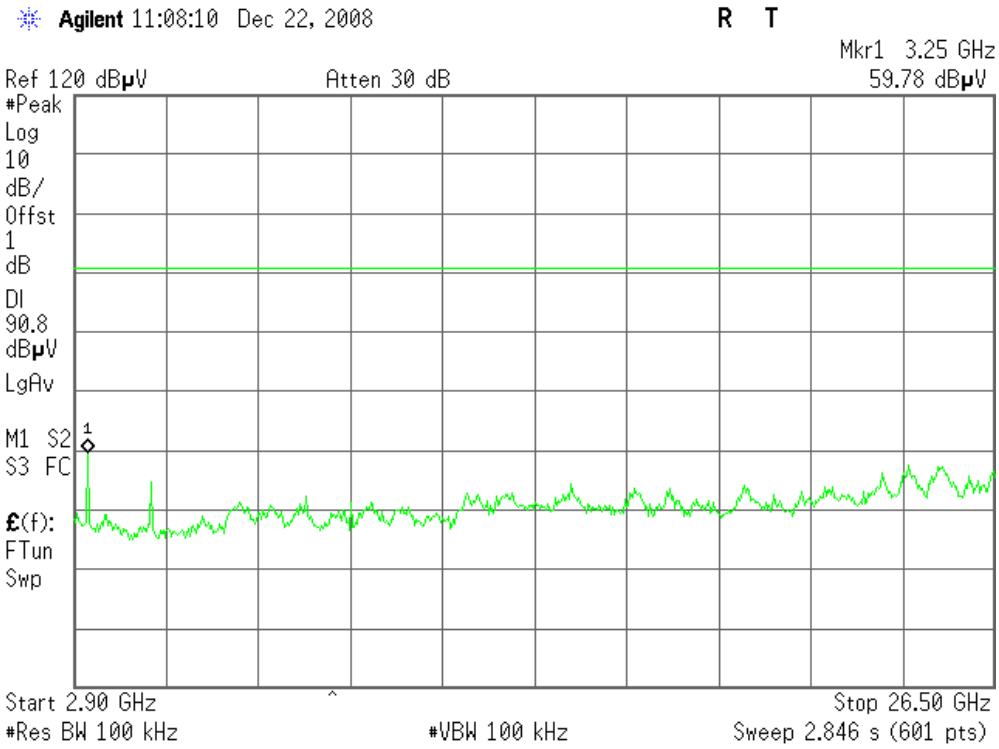


IEEE 802.11b mode / CH Mid

30MHz ~ 2.9GHz

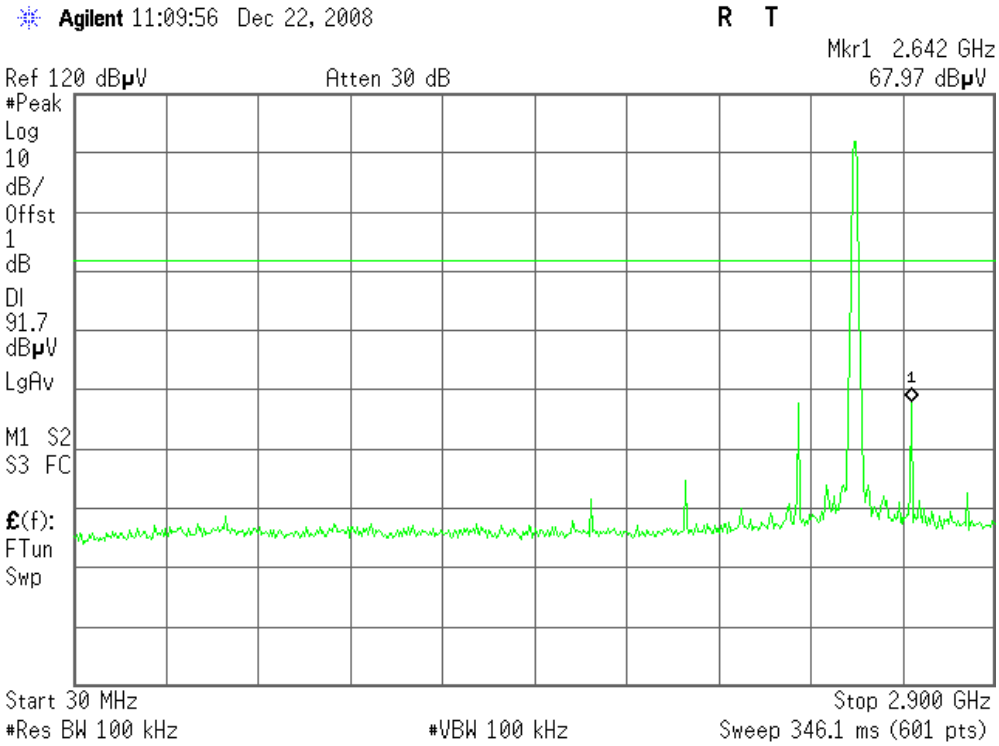


2.9GHz ~ 26.5GHz

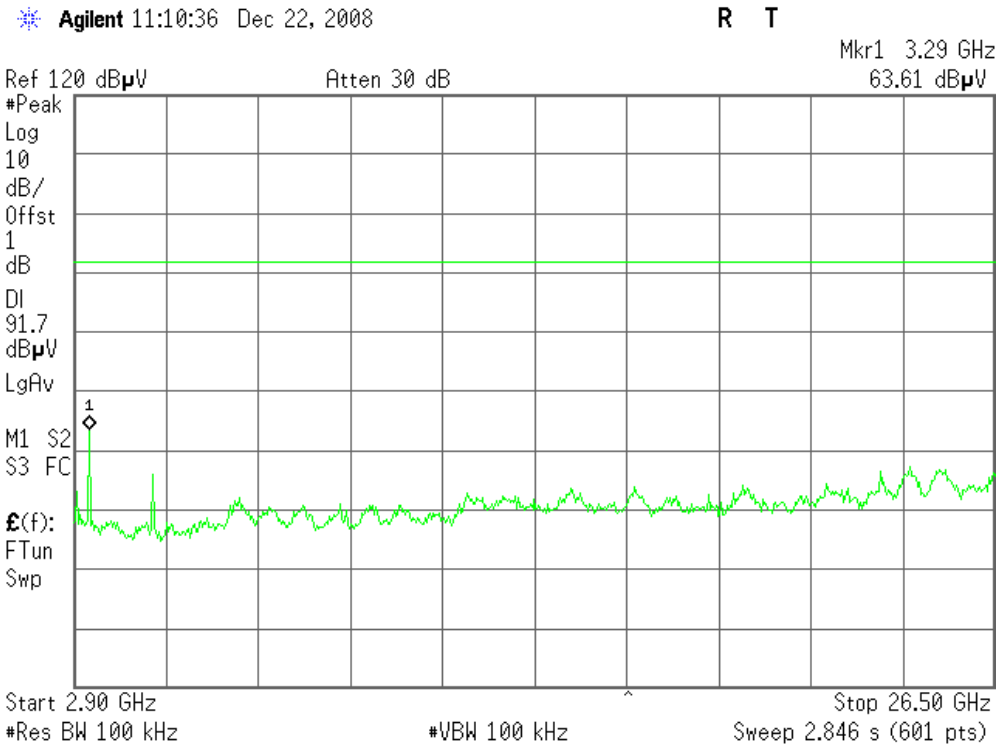


IEEE 802.11b mode / CH High

30MHz ~ 2.9GHz

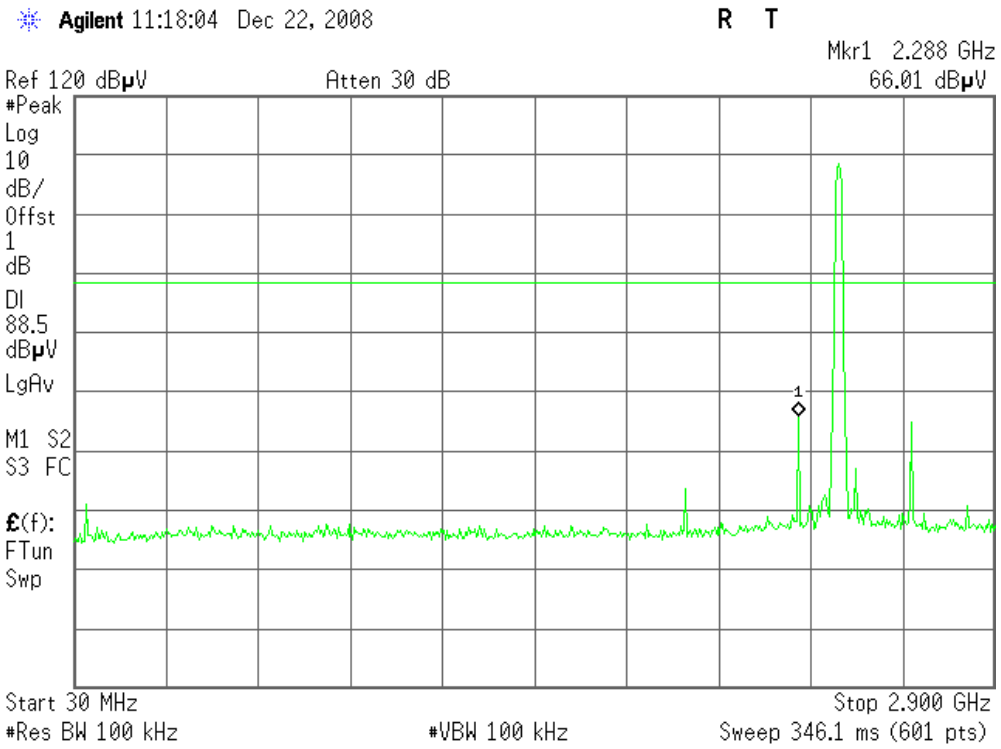


2.9GHz ~ 26.5GHz

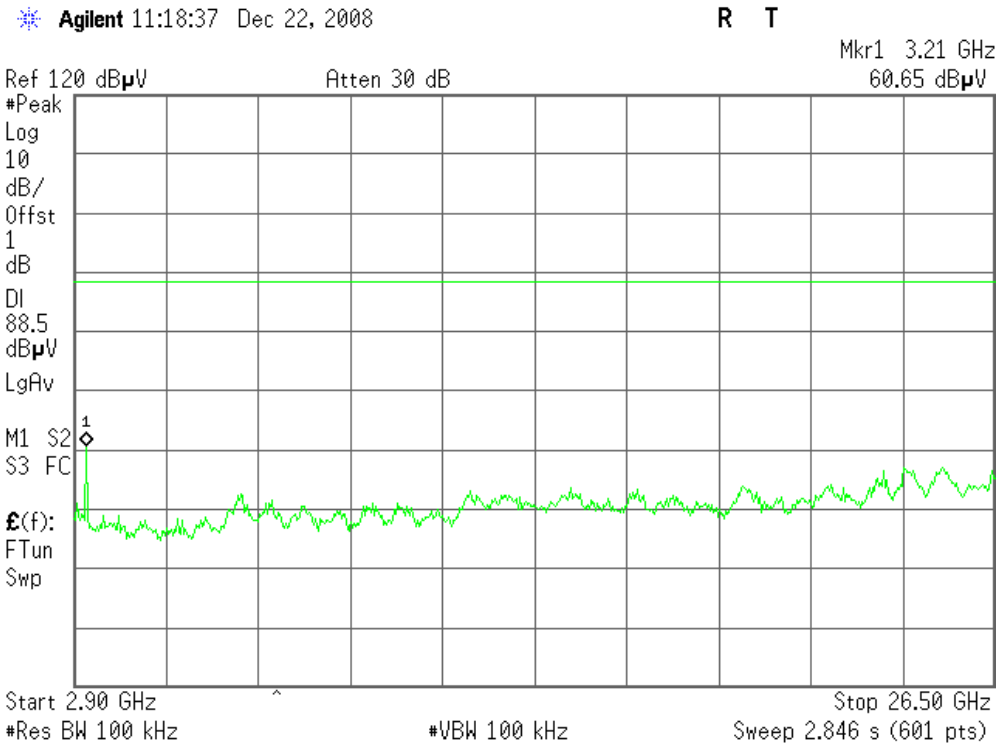


IEEE 802.11g mode/ CH Low

30MHz ~ 2.9GHz

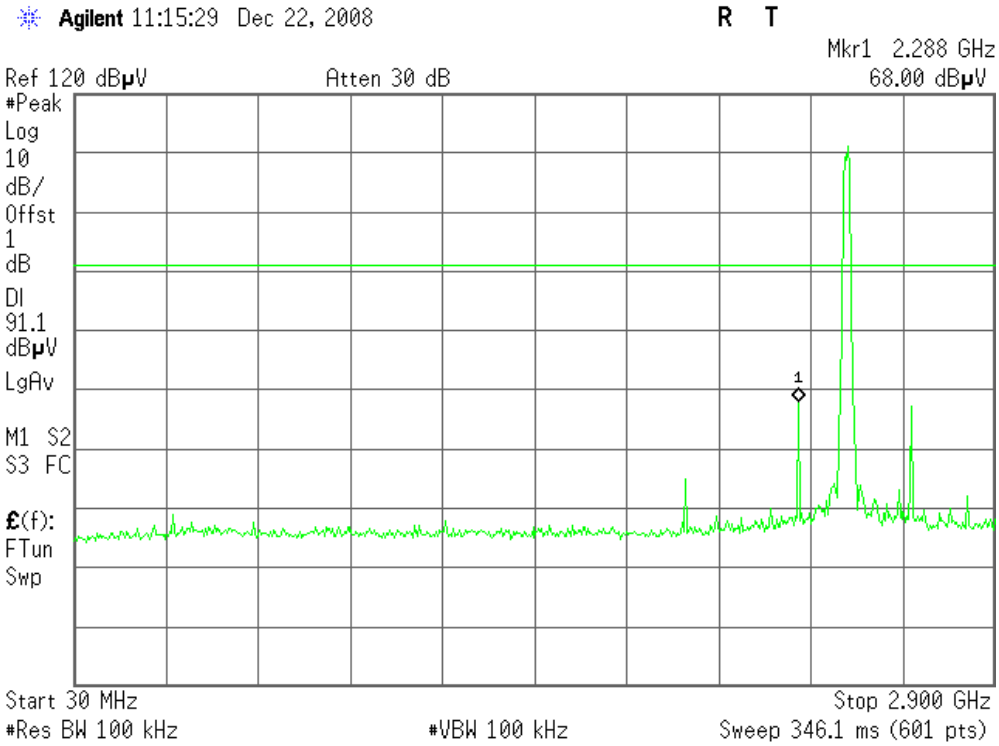


2.9GHz ~ 26.5GHz

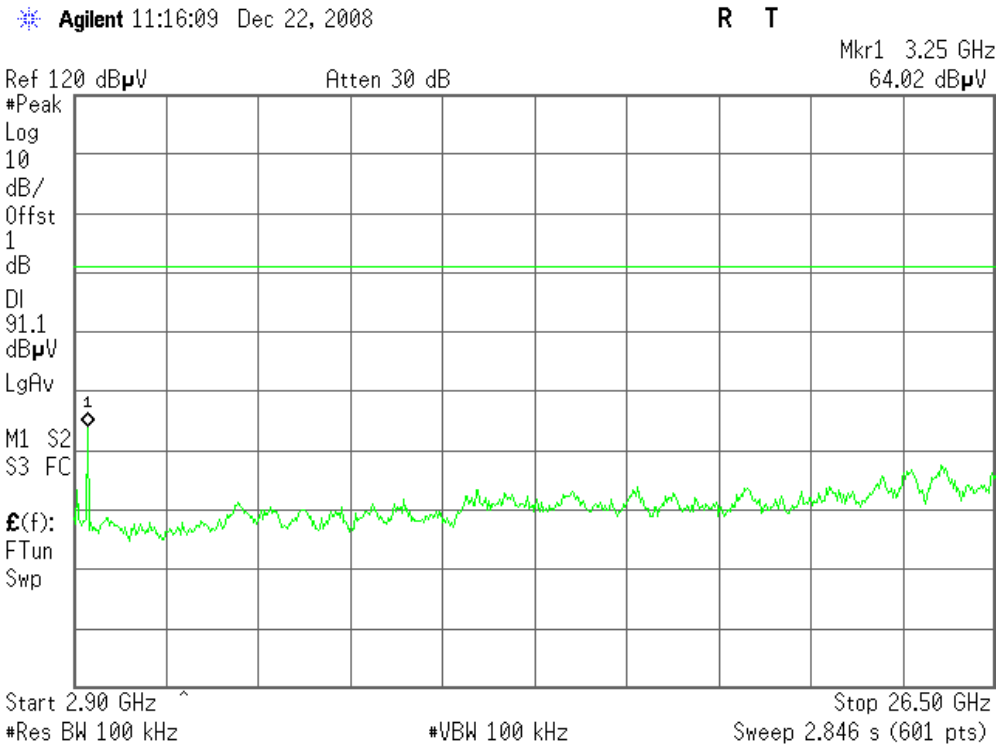


IEEE 802.11g / CH Mid

30MHz ~ 2.9GHz

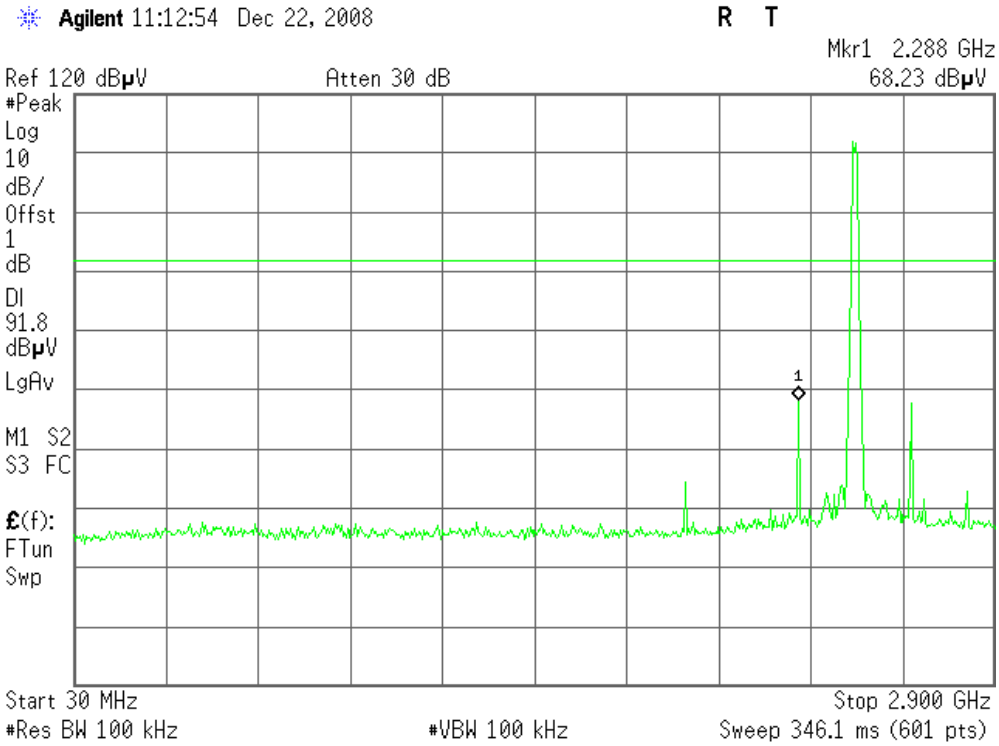


2.9GHz ~ 26.5GHz

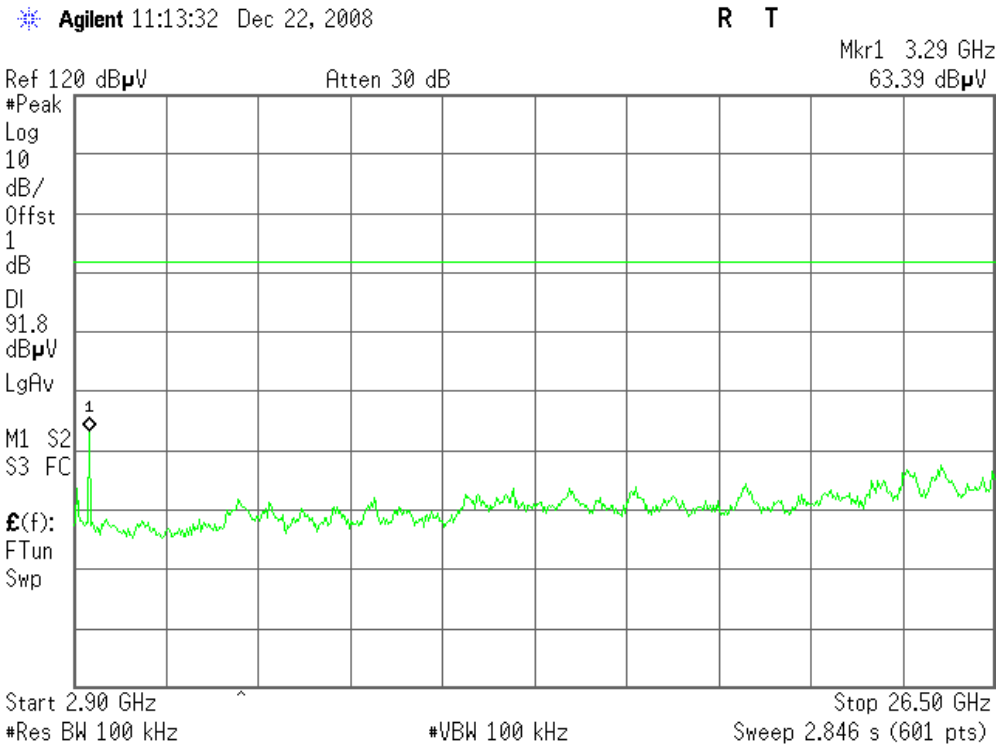


IEEE 802.11g / CH High

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz



7.5.2 Radiated Emissions

LIMIT

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

Note: *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 above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	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

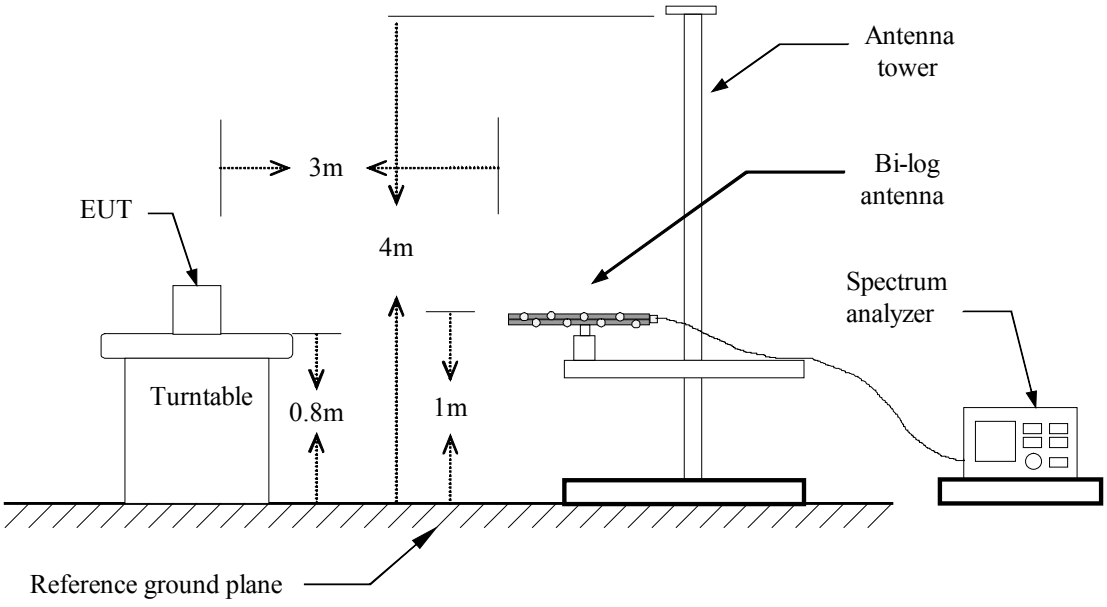
MEASUREMENT EQUIPMENT USED

966 RF CHAMBER 2				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2009
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	02/14/2009
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2009
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
High Noise Amplifier	Agilent	89842	N/A	06/09/2009
Site NSA	C&C	N/A	N/A	06/09/2009
Horn Antenna	TRC	N/A	N/A	03/04/2009
Signal Generator	Anritsu	MG3694A	#050125	02/24/2009
Loop Antenna	ARA	PLA-1030/B	1029	02/24/2009

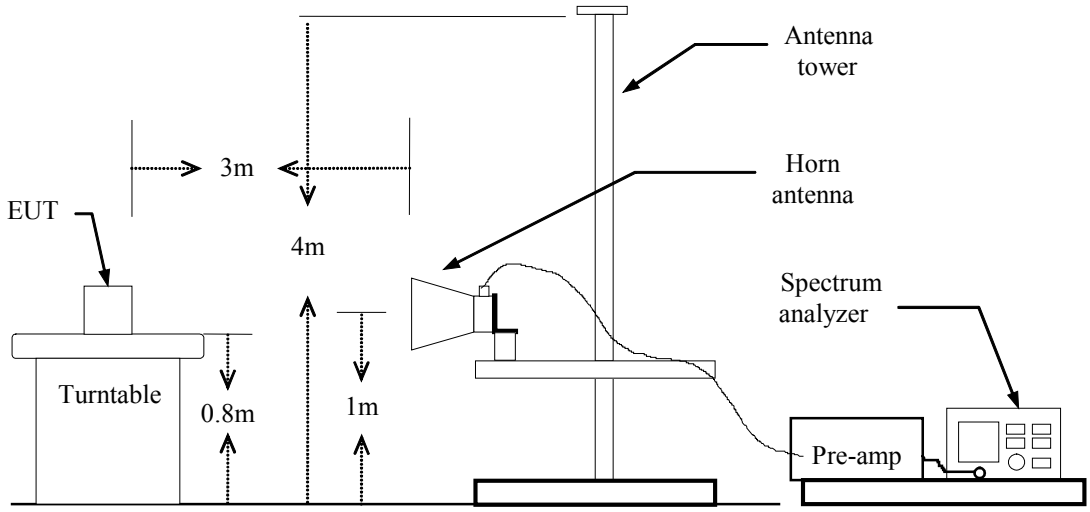
Remark: *Each piece of equipment is scheduled for calibration once a year.*

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. Repeat above procedures until the measurements for all frequencies are complete.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal link
Test Date: December 17, 2008
Temperature: 25°C
Tested by: Breeze Jiang
Humidity: 55 % RH
Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
53.266	V	Peak	41.89	-19.38	22.51	40.00	-17.49
85.190	V	Peak	43.96	-20.10	23.86	40.00	-16.14
162.565	V	Peak	43.88	-18.92	24.96	43.50	-18.54
360.320	V	Peak	36.92	-12.97	23.95	46.00	-22.05
502.004	V	Peak	41.15	-9.22	31.93	46.00	-14.07
704.008	V	Peak	38.38	-4.88	33.50	46.00	-12.50
36.750	H	Peak	51.26	-23.59	27.67	40.00	-12.33
46.200	H	Peak	47.94	-27.41	20.53	40.00	-19.47
66.450	H	Peak	42.59	-25.48	17.11	40.00	-22.89
104.250	H	Peak	44.14	-21.86	22.28	43.50	-21.22
140.025	H	Peak	52.86	-23.35	29.51	43.50	-13.99
170.400	H	Peak	55.77	-22.11	33.66	43.50	-9.84

****Remark:** No emission found between lowest internal used/generated frequency to 30 MHz.

Notes:

1. Measuring frequencies from 9kHz to the 1GHz.

2. Radiated emissions measured in frequency range from 30MHz to 1GHz were made with an instrument using Peak/Quasi-peak detector mode.

3. 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.

4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

Above 1 GHz

Operation Mode: TX / IEEE 802.11b / CH Low
Test Date: December 17, 2008
Temperature: 25°C
Tested by: Breeze Jiang
Humidity: 55 % RH
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1153.33	V	58.16	---	-11.33	46.83	---	74.00	54.00	-7.17	Peak
1406.66	V	55.57	---	-9.93	45.64	---	74.00	54.00	-8.36	Peak
3508.33	V	56.18	52.61	-0.93	55.25	51.68	74.00	54.00	-2.32	AVG
4825.00	V	78.84	48.67	2.68	81.52	51.35	74.00	54.00	-2.65	AVG
N/A										
1226.66	H	55.98	---	-10.70	45.28	---	74.00	54.00	-8.72	Peak
1453.33	H	55.22	---	-9.68	45.54	---	74.00	54.00	-8.46	Peak
3508.33	H	55.96	53.37	-2.98	52.98	50.39	74.00	54.00	-3.61	AVG
4825.00	H	80.61	48.60	2.68	83.29	51.28	74.00	54.00	-2.72	AVG
N/A										

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX / IEEE 802.11b/ CH Mid
Test Date: December 17, 2008
Temperature: 25°C
Tested by: Breeze Jiang
Humidity: 55 % RH
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1173.33	V	58.48	---	-11.22	47.26	---	74.00	54.00	-6.74	Peak
1656.66	V	56.18	---	-8.18	48.00	---	74.00	54.00	-6.00	Peak
3525.00	V	56.07	52.52	-0.84	55.23	51.68	74.00	54.00	-2.32	AVG
4875.00	V	72.16	48.26	2.77	74.93	51.03	74.00	54.00	-2.97	AVG
N/A										
1276.66	H	55.33	---	-10.65	44.68	---	74.00	54.00	-9.32	Peak
1433.33	H	55.26	---	-9.79	45.47	---	74.00	54.00	-8.53	Peak
3466.66	H	55.77	53.77	-2.91	52.86	50.86	74.00	54.00	-3.14	AVG
4875.00	H	74.69	48.97	2.77	77.46	51.74	74.00	54.00	-2.26	AVG
N/A										

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX / IEEE 802.11b/ CH High
Temperature: 25°C
Humidity: 55 % RH
Test Date: December 17, 2008
Tested by: Breeze Jiang
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1133.33	V	58.42	---	-11.44	46.98	---	74.00	54.00	-7.02	Peak
1290.00	V	56.11	---	-10.57	45.54	---	74.00	54.00	-8.46	Peak
3516.66	V	55.80	51.57	-0.88	54.92	50.69	74.00	54.00	-3.31	AVG
4925.00	V	73.78	48.47	2.85	76.63	51.32	74.00	54.00	-2.68	AVG
N/A										
1306.66	H	55.80	---	-10.48	45.32	---	74.00	54.00	-8.68	Peak
1453.33	H	55.69	---	-9.68	46.01	---	74.00	54.00	-7.99	Peak
3441.66	H	55.82	54.73	-2.87	52.95	51.86	74.00	54.00	-2.14	AVG
4925.00	H	76.32	47.86	2.85	79.17	50.71	74.00	54.00	-3.29	AVG
N/A										

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX / IEEE 802.11g/ CH Low
Test Date: December 17, 2008
Temperature: 25°C
Tested by: Breeze Jiang
Humidity: 55% RH
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1290.00	V	56.80	---	-10.57	46.23	---	74.00	54.00	-7.77	Peak
1433.33	V	55.97	---	-9.79	46.18	---	74.00	54.00	-7.82	Peak
3525.00	V	55.68	51.78	-0.84	54.84	50.94	74.00	54.00	-3.06	AVG
4825.00	V	67.95	48.63	2.68	70.63	51.31	74.00	54.00	-2.69	AVG
N/A										
1366.66	H	55.56	---	-10.15	45.41	---	74.00	54.00	-8.59	Peak
1490.00	H	56.93	---	-9.47	47.46	---	74.00	54.00	-6.54	Peak
3491.66	H	55.77	54.12	-2.96	52.81	51.16	74.00	54.00	-2.84	AVG
4825.00	H	70.28	54.52	-2.68	67.60	51.84	74.00	54.00	-2.16	AVG
N/A										

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX / IEEE 802.11g / CH Mid
Temperature: 25°C
Humidity: 55% RH
Test Date: December 17, 2008
Tested by: Breeze Jiang
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1290.00	V	56.78	---	-10.57	46.21	---	74.00	54.00	-7.79	Peak
1456.66	V	55.16	---	-9.66	45.50	---	74.00	54.00	-8.50	Peak
3458.33	V	55.94	50.81	-1.06	54.88	49.75	74.00	54.00	-4.25	AVG
4875.00	V	71.62	47.59	2.77	74.39	50.36	74.00	54.00	-3.64	AVG
N/A										
1323.33	H	55.59	---	-10.39	45.20	---	74.00	54.00	-8.80	Peak
1433.33	H	54.98	---	-9.79	45.19	---	74.00	54.00	-8.81	Peak
3466.66	H	55.63	53.80	-2.91	52.72	50.89	74.00	54.00	-3.11	AVG
4875.00	H	67.81	48.97	2.77	70.58	51.74	74.00	54.00	-2.26	AVG
N/A										

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX / IEEE 802.11g / CH High
Test Date: December 17, 2008
Temperature: 25°C
Tested by: Breeze Jiang
Humidity: 55 % RH
Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1170.00	V	57.60	---	-11.23	46.37	---	74.00	54.00	-7.63	Peak
1286.66	V	56.73	---	-10.59	46.14	---	74.00	54.00	-7.86	Peak
1433.33	V	56.85	51.88	-1.81	55.04	50.07	74.00	54.00	-3.93	AVG
4925.00	V	70.70	48.36	2.85	73.55	51.21	74.00	54.00	-2.79	AVG
N/A										
1036.66	H	56.08	---	-11.97	44.11	---	74.00	54.00	-9.89	Peak
1320.00	H	55.38	---	-10.41	44.97	---	74.00	54.00	-9.03	Peak
3500.00	H	55.56	51.25	-2.97	52.59	48.28	74.00	54.00	-5.72	AVG
4925.00	H	68.84	46.88	2.85	71.69	49.73	74.00	54.00	-4.27	AVG
N/A										

Notes:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser 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.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
   b. AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

7.6 POWERLINE 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

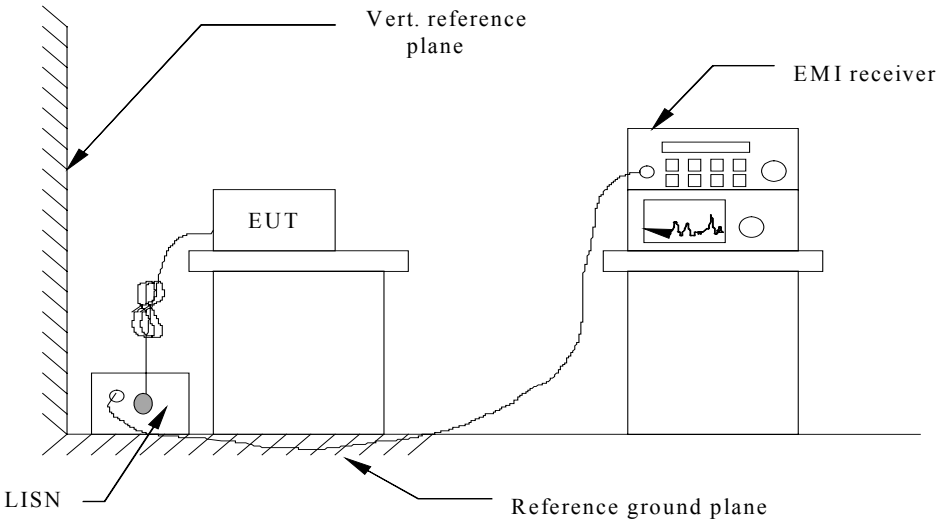
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power Line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site G				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESCI EMI TEST RECEIV.ESCI	ROHDE&SCHWARZ	1166.5950 03	100088	02/24/2009
LISN	EMCO	3825/2	1371	02/24/2009
LISN	EMCO	3825/2	8901-1459	02/24/2009

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

Test Configuration



See test photographs attached in Appendix 1 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

Test Mode: Normal Link	**Location:** Site G
Model Name: WLC-101GA	**Test Date:** December 17, 2008
Tested by: Breeze Jiang	**Test Results:** Passed

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.153	56.13	48.42	41.73	65.89	55.89	-17.47	-14.16	L1
0.201	50.03	---	---	64.52	54.52	---	-4.49	L1
0.238	46.44	---	---	63.46	53.46	---	-7.02	L1
0.561	30.67	---	---	56.00	46.00	---	-15.33	L1
3.114	27.66	---	---	56.00	46.00	---	-18.34	L1
5.478	28.76	---	---	60.00	50.00	---	-21.24	L1
0.187	51.06	---	---	64.94	54.94	---	-3.88	L2
0.213	50.21	---	---	64.20	54.20	---	-3.99	L2
0.361	38.60	---	---	59.96	49.96	---	-11.36	L2
1.128	31.19	---	---	56.00	46.00	---	-14.81	L2
2.505	29.16	---	---	56.00	46.00	---	-16.84	L2
12.898	34.86	---	---	60.00	50.00	---	-15.14	L2

Note: The chart above shows the highest readings taken from the final data.

Remark:

1. *The measuring frequencies range between 0.15 MHz and 30 MHz.*
2. *The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.*
3. *"---" denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.*
4. *The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.*
5. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

Note:

Freq. = Emission frequency in KHz

Factor (dB) = cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER (The TRANSIENT LIMITER included 10 dB ATTENUATION)

Amptd dBuV = Uncorrected Analyzer/Receiver reading + cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER,

if it > 0.5 dB

Limit dBuV = Limit stated in standard ; Margin dB= Reading in reference to limit

Calculation Formula

Margin (dB) = Amptd (dBuV) – Limit (dBuV)