FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4:2003 TEST REPORT

For

IP Cam

Model : F3105

Trade Name : ZAVIO

Issued for

ZAVIO Inc.

B3, 1F, NO. 1, Lising 1st Rd., Science-Based Industrial Park, Hsinchu, Taiwan

Issued by

Compliance Certification Services Inc.
Hsinchu Lab.
NO. 989-1 Wen Shan Rd., Shang Shan Village,
Qionglin Shiang Hsinchu County 30741, Taiwan, R.O.C
TEL: +886-3-5921698
FAX: +886-3-5921108

http://www.ccsrf.com
E-Mail : service@ccsrf.com

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	01/18/2010	Initial Issue	All Page 67	Winnie Chen

TABLE OF CONTENTS

TITLE PAGE NO.

1. TEST REPORT CERTIFICATION

Applicant	：	ZAVIO Inc.
Address	：	B3, 1F, NO. 1, Lising 1st Rd., Science-Based Industrial Park, Hsinchu, Taiwan
Equipment Under Test	：	IP Cam
Model	：	F3105
Trade Name	：	ZAVIO
Tested Date	：	December 17, 2009 ~ January 12, 2010

APPLICABLE STANDARD	
Standard	**Test Result**
FCC Part 15 Subpart C AND ANSI C63.4:2003	PASS

WE HEREBY CERTIFY THAT: The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:	***Reviewed by:***
Alan Fan Section Manager	Gundam Lin Team Leader

2. EUT DESCRIPTION

2.1 DESCRIPTION OF EUT & POWER

Product Name	IP Cam
Model Number	F3105
Frequency Range	IEEE 802.11b/g : 2412MHz ~ 2462MHz
Transmit Power	IEEE 802.11b : 14.83dBm (0.0304W) IEEE 802.11g : 17.47dBm (0.0558W)
Channel Spacing	IEEE 802.11b/g : 5MHz
Channel Number	IEEE 802.11b/g : 11 Channels
Transmit Data Rate	IEEE 802.11b : 11, 5.5, 2, 1 Mbps IEEE 802.11g : 54, 48, 36, 24, 18, 12, 9, 6 Mbps
Type of Modulation	IEEE 802.11b : DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	Dipole Antenna , Antenna Gain 2dBi Connector : SMA-Male-RP
Power Source	12VDC, 1.25A (From Power Adapter)
I/O Port	LAN (RJ-45) port × 1, Speaker port × 1, Power port × 1

Power Adapter :

No.	Manufacturer	Model No.	Power Input	Power Output
1	FAIRWAY	WRG15F-120A	100-240VAC, 1.0A max, 50/60Hz	12V, 1.25A

Remark :

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *For more details, please refer to the User's manual of the EUT.*
3. *This submittal(s) (test report) is intended for FCC ID: WOR-5013F filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

3. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode : 1Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11g mode : 6Mbps data rate (worst case) were chosen for full testing.

4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 : 2003 and FCC CFR 47, 15.207, 15.209 and 15.247.

5. FACILITIES AND ACCREDITATION

5.1 FACILITIES

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

NO. 989-1 Wen Shan Rd., Shang Shan Village,
Qionglin Shiang Hsinchu County 30741, Taiwan, R.O.C

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 preselectors 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 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	FCC MRA: TW1027
Taiwan	TAF	FCC Method-47 CFR Part 15 Subpart B/C/D/E, FCC Method-47 CFR Part 18, FCC Subpart 27 Sub-Part M, FCC Subpart 90 Sub-Part Z, RSS-192/193/210/310, ICES-003, IDA TS SSS, TS 12.1/2.2, ETSI EN 300 220-1/2/3, ETSI EN 300 440-1/2, ETSI EN 300 328, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17, EN 55011, EN 55013, EN 55014-1, EN 55022, EN 55024, EN 61000-3-2/3, EN 61000-4-2/3/4/5/6/8/11, IEC 61000-3-2/3, IEC 61000-4-2/3/4/5/6/8/11 AS/NZS 4268, AS/NZS CISPR 22, CISPR 11, CISPR 13, CISPR 14-1, CISPR 24, PLMN 09, IS 2045-0, LP0002, CNS 13022-3, CNS 13438, CNS 13439, CNS 13783-1, CNS 13803, CNS 14676-2/3/4/5/6	
Taiwan	BSMI	CNS 13803, CNS 13438, CNS 13439, CNS 13783-1	SL2-IS-E-0002 SL2-IN-E-0002 SL2-A1-E-0002 SL2-R1/R2-E-0002

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

6. CALIBRATION AND UNCERTAINTY

6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.2 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4.

PARAMETER	UNCERTAINTY
Semi Anechoic Chamber (966 Chamber) / Radiated Emission, 30 to 200 MHz	+/- 3.6878
Semi Anechoic Chamber (966 Chamber) / Radiated Emission, 200 to 1000 MHz	+/- 3.0885
Semi Anechoic Chamber (966 Chamber) / Radiated Emission, 1 to 26.5GHz	+/- 3.2000
Power Line Conducted Emission	+/- 1.7468

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

7. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	DELL	Latitude D610	CN-0C4708-48643-625-5565	E2K24BNHM
2	Notebook PC	HP	nx6130	CNU543274R	CNTWM3B2200BGA
3	Headset/Microphone	ERGOTECH	ET-E203	4719405008042	-----
4	Wireless Gigabit Router	D-Link	DI-724GU	-----	-----

No.	Signal Cable Description
1	Unshielded RJ-45 cable, 12m ×1

SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

EUT OPERATING CONDITION

RF Mode

1. Set up whole system for test as shown on diagram.
2. pc a fixed ip, into the Network Neighborhood to confirm EUT obtained ip
3. perform putty.exe
4. Key into the analytes of IP Address
5. debugerofzavio<enter>
6. admin<enter>
7. su<enter>

iwpriv ra0 set ATE=STASTOP
iwpriv ra0 set ATEDA=00:11:22:33:44:55
iwpriv ra0 set ATESA=00:aa:bb:cc:dd:ee
iwpriv ra0 set ATEBSSID=00:11:22:33:44:55
iwpriv ra0 set ATETXRATE=XX (range 0~11)
iwpriv ra0 set ATECHANNEL=XX (range 1~14)
iwpriv ra0 set ATETXLEN=1024
iwpriv ra0 set ATETXPOW=XX (range 0~31)
iwpriv ra0 set ATETXCNT=XX (range 1~XX…X)
iwpriv ra0 set ATE=TXFRAME<enter>

TX Mode:

- ⇨ Tx Data Rate:1Mbps (IEEE 802.11b mode)
  6Mbps (IEEE 802.11g mode)
- ⇨ Power control mode:

Power Set: IEEE 802.11b

Channel Low (2412MHz) = 14
Channel Middle (2437MHz) = 16
Channel High (2462MHz) = 19

Power Set: IEEE 802.11g

Channel Low (2412MHz) = 27
Channel Middle (2437MHz) = 29
Channel High (2462MHz) = 27

8. All of the function are under run.
9. Start test.

Normal Mode

1. Setup whole system for test as shown on diagram
2. Wireless Router to provide IP to the EUT.
3. Notebook PC (1) ping 192.168.1.212 to EUT.
4. Notebook PC (2) ping 192.168.0.151 to EUT.
5. Audio In/Out link Headset/Microphone.
6. All of the function are under run.
7. Start test.

8. FCC PART 15.247 REQUIREMENTS

8.1 6dB BANDWIDTH

LIMITS

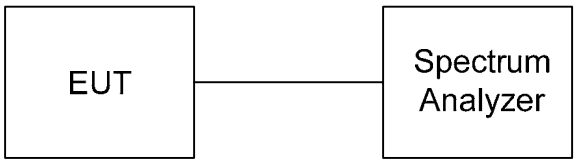
§ 15.247(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/09/2010
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/26/2010

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

TEST SETUP



TEST PROCEDURE

The transmitter output was connected to a spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

TEST RESULTS

IEEE 802.11b Mode

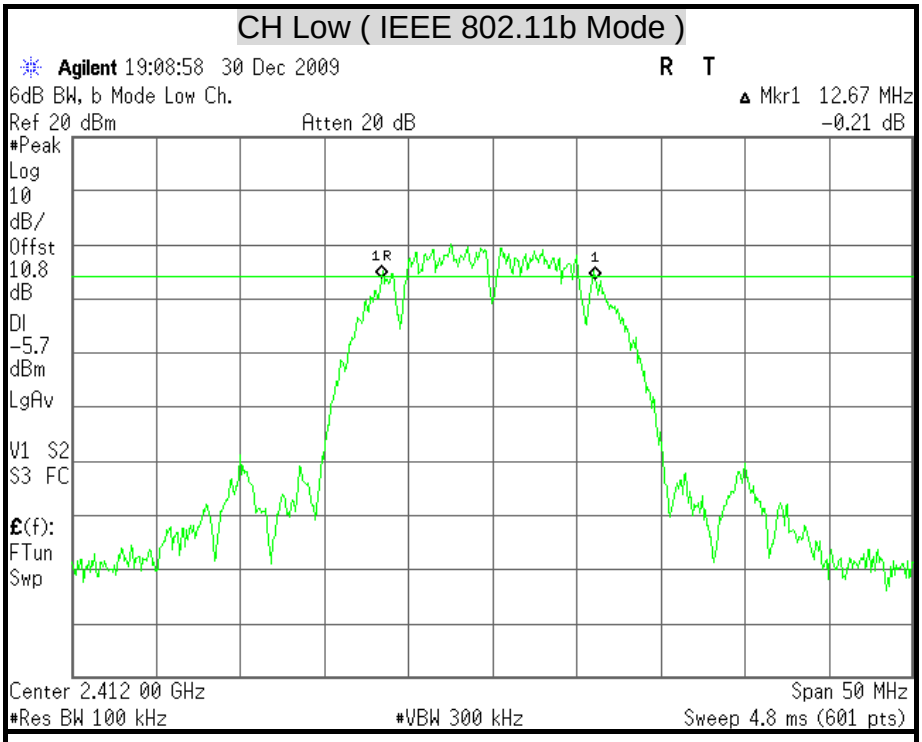
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	12.67	500	PASS
Middle	2437	12.25	500	PASS
High	2462	12.75	500	PASS

IEEE 802.11g Mode

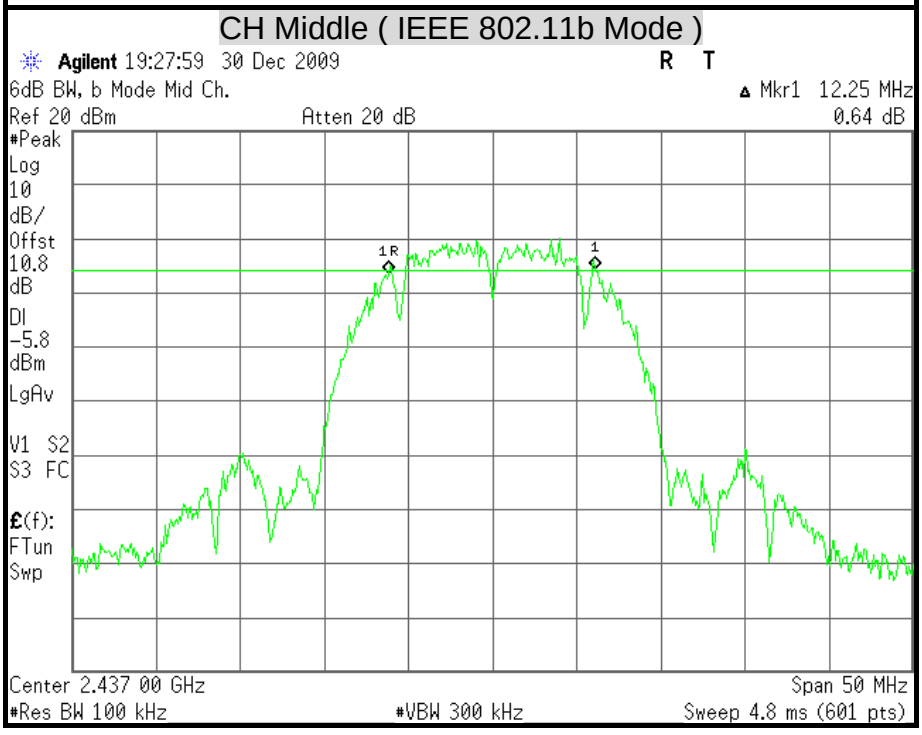
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	15.67	500	PASS
Middle	2437	16.50	500	PASS
High	2462	16.50	500	PASS

6dB BANDWIDTH (IEEE 802.11b Mode)

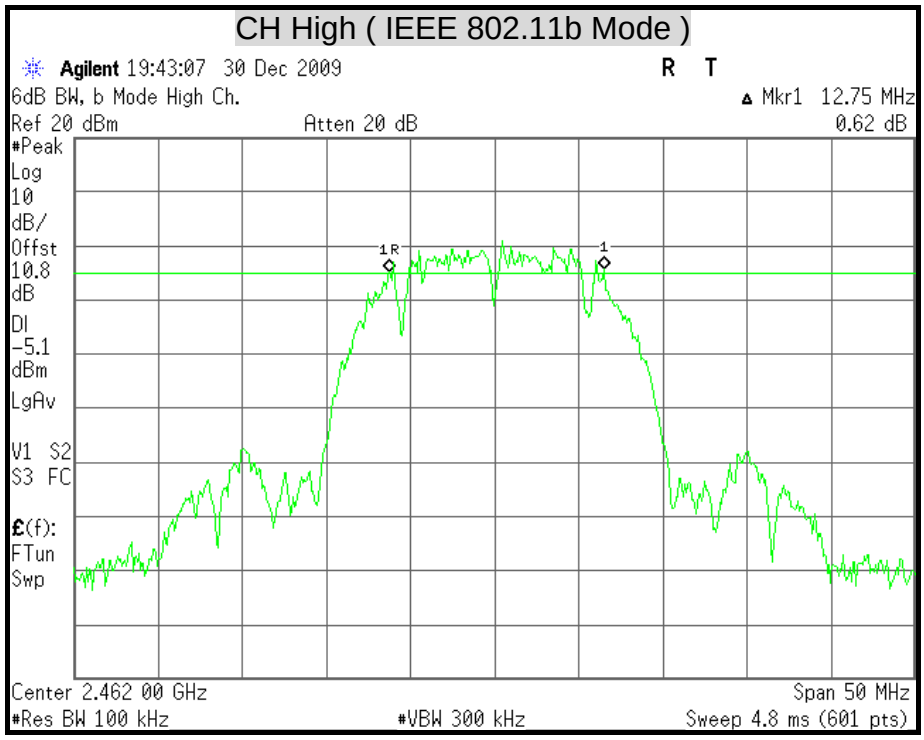
CH Low (IEEE 802.11b Mode)



CH Middle (IEEE 802.11b Mode)

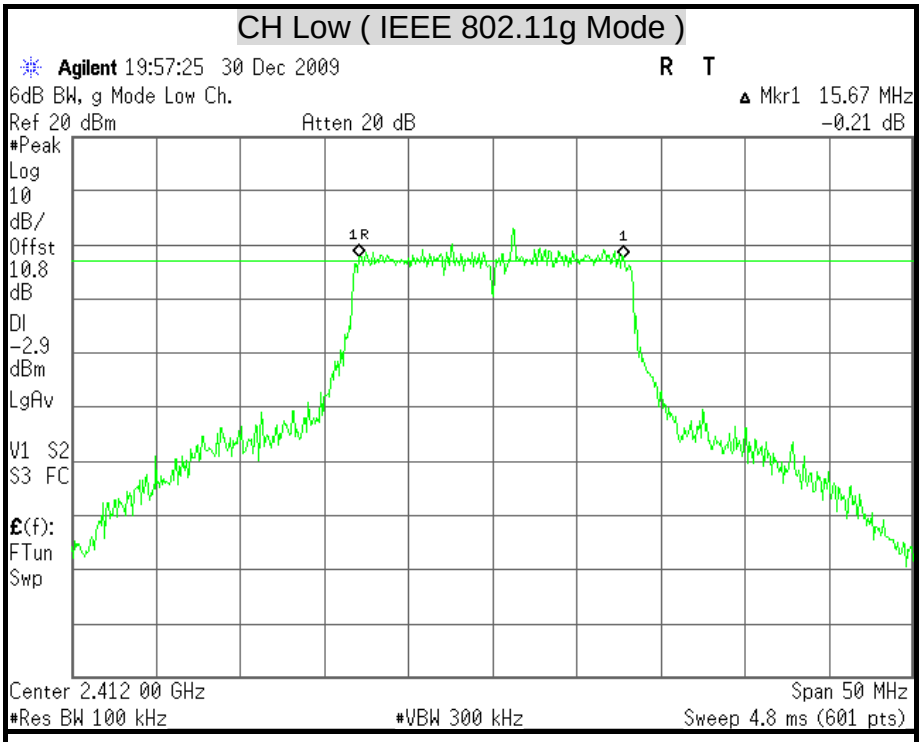


CH High (IEEE 802.11b Mode)

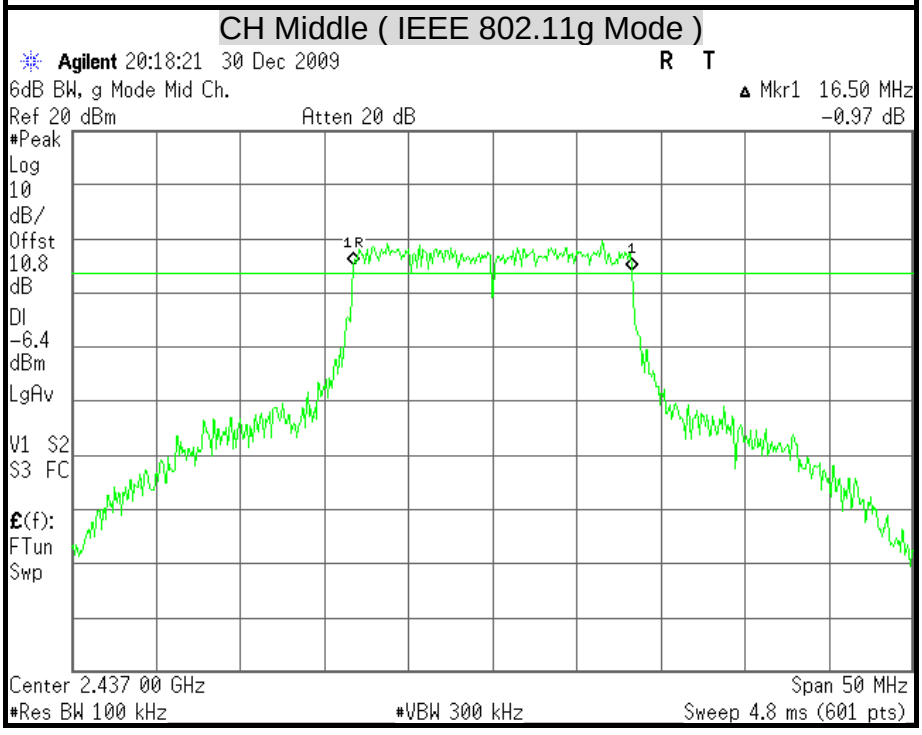


6dB BANDWIDTH (IEEE 802.11g Mode)

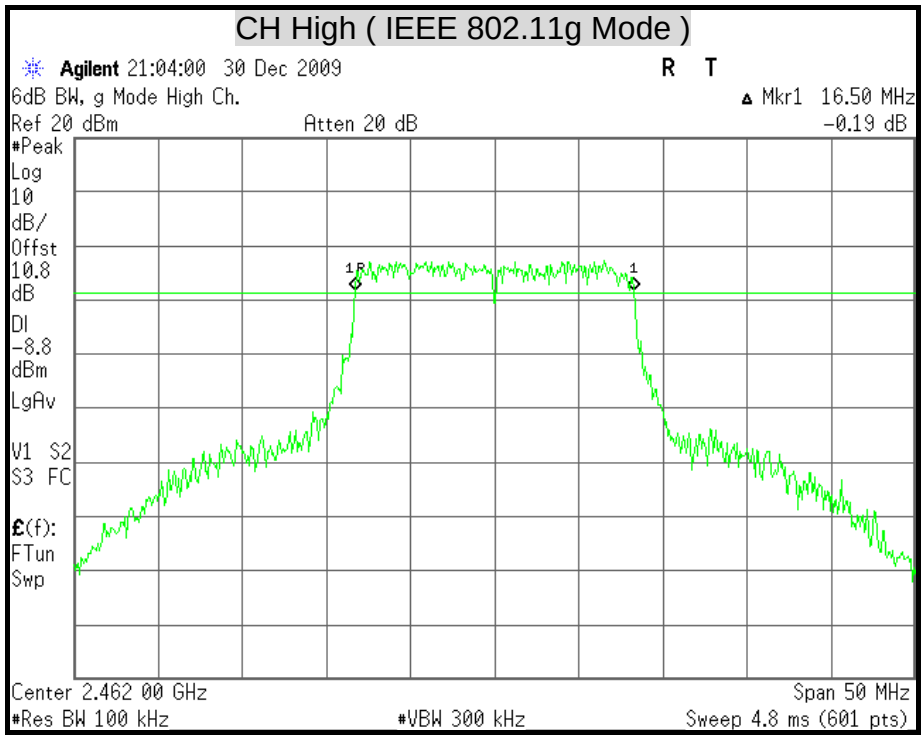
CH Low (IEEE 802.11g Mode)



CH Middle (IEEE 802.11g Mode)



CH High (IEEE 802.11g Mode)



8.2 MAXIMUM PEAK OUTPUT POWER

LIMITS

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.
§ 15.247(b) (4) Except as shown in paragraphs (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (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 EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/09/2010
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/26/2010

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

TEST SETUP

TEST PROCEDURE

1. The spectrum shall be set as follows :
   Span : 1.5 times channel integration bandwidth.
   RBW : 1MHz
   VBW : 3MHz
   Detector : Peak
   Sweep : Single trace
2. Compute the combined power of all signal responses contained in the trace by covering all the data points.
3. The peak output power is the channel power integrated over 26% bandwidth.

TEST RESULTS

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power (W)	Peak Power Limit		Pass / Fail
				(dBm)	(W)	
Low	2412	14.17	0.0261	30	1	PASS
Middle	2437	14.38	0.0274	30	1	PASS
High	2462	14.83	0.0304	30	1	PASS

Remark:

1. At finial test to get the worst-case emission at 1Mbps.

2. The cable assembly insertion loss of 10.8dB (including 10 dB pad and 0.8 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power (W)	Peak Power Limit		Pass / Fail
				(dBm)	(W)	
Low	2412	17.47	0.0558	30	1	PASS
Middle	2437	17.43	0.0553	30	1	PASS
High	2462	15.85	0.0384	30	1	PASS

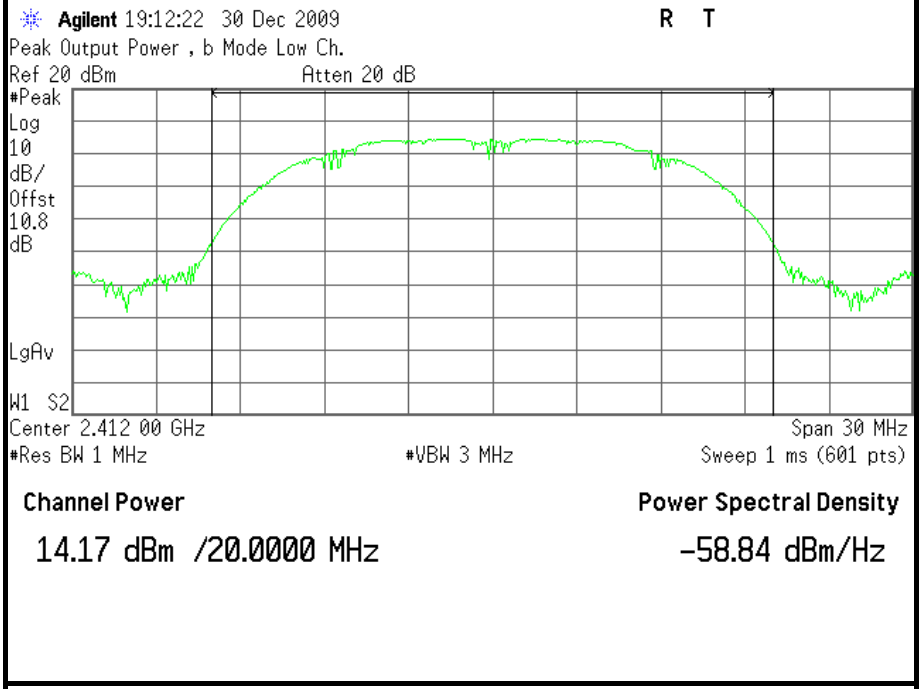
Remark:

1. At finial test to get the worst-case emission at 6Mbps.

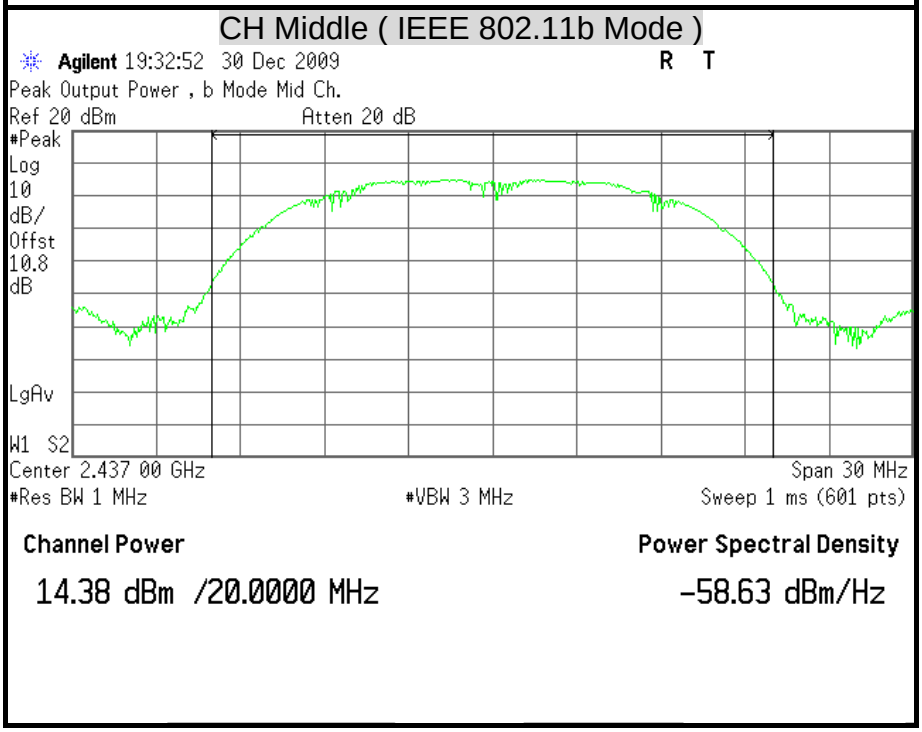
2. The cable assembly insertion loss of 10.8dB (including 10 dB pad and 0.8 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

MAXIMUM PEAK OUTPUT POWER (IEEE 802.11b Mode)

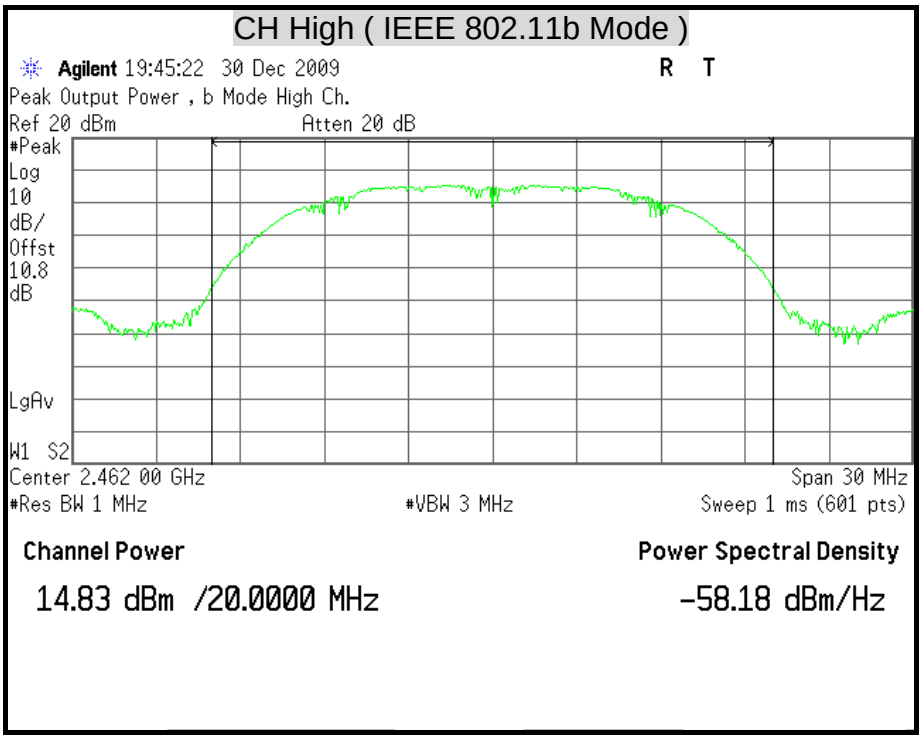
CH Low (IEEE 802.11b Mode)



CH Middle (IEEE 802.11b Mode)

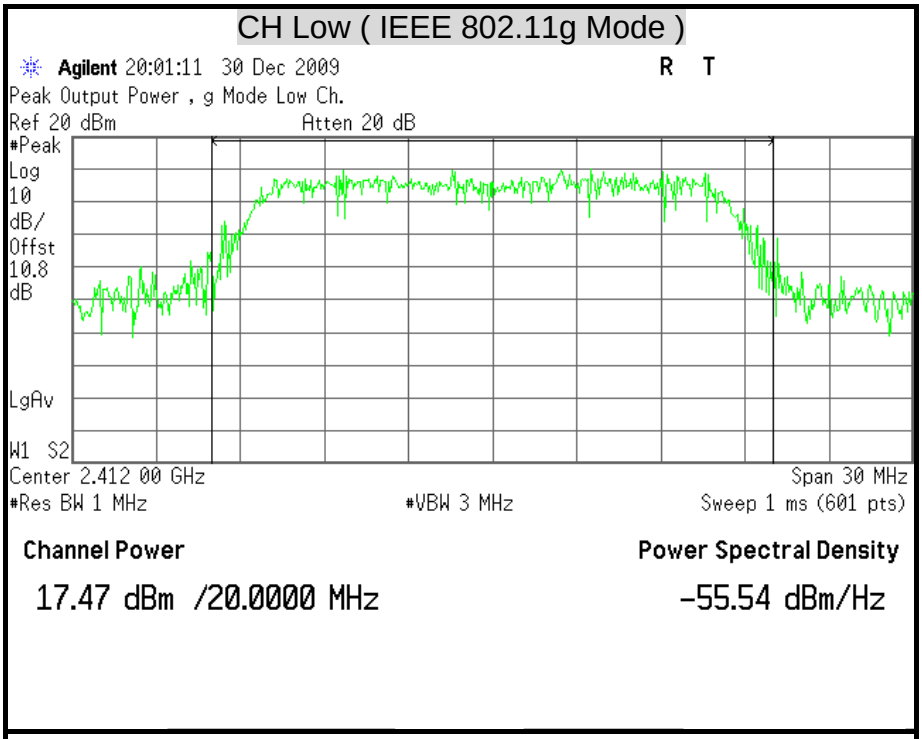


CH High (IEEE 802.11b Mode)

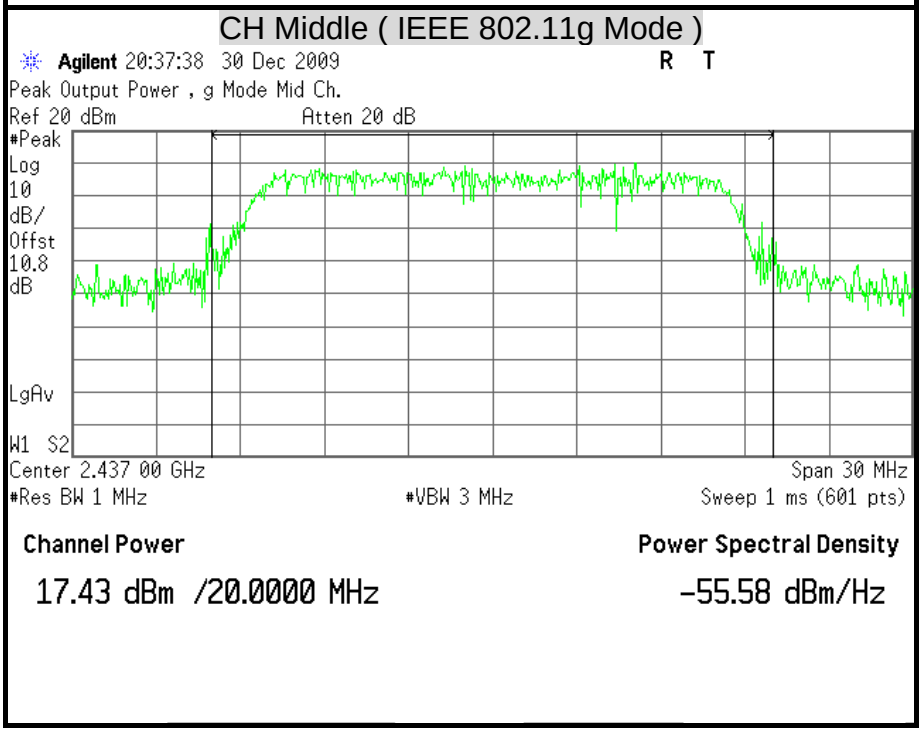


MAXIMUM PEAK OUTPUT POWER (IEEE 802.11g Mode)

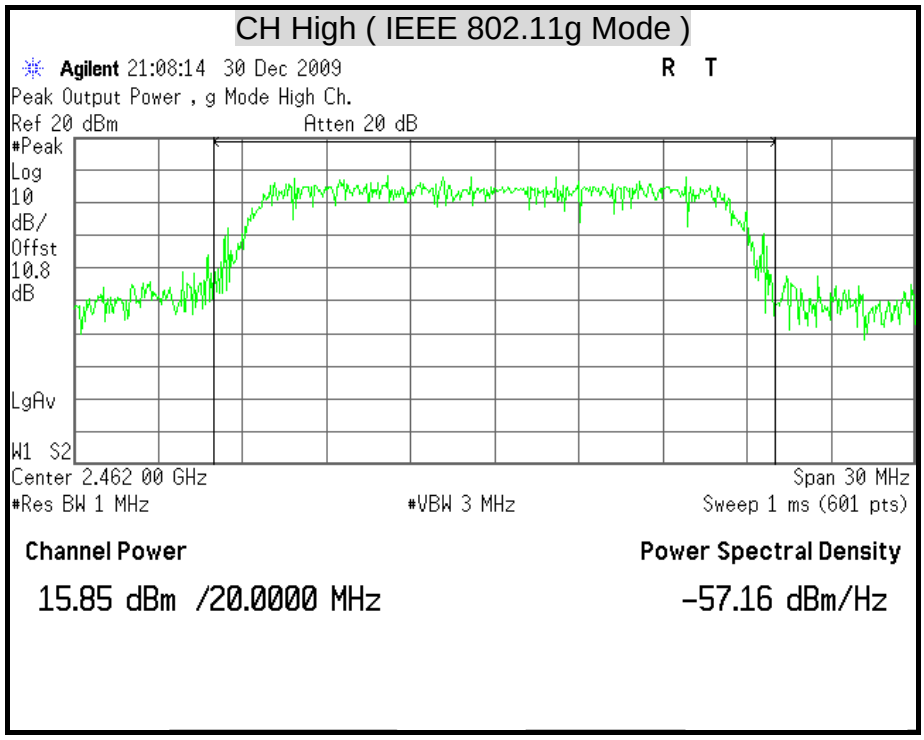
CH Low (IEEE 802.11g Mode)



CH Middle (IEEE 802.11g Mode)



CH High (IEEE 802.11g Mode)



8.3 AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/09/2010
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/26/2010

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

TEST SETUP

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

TEST RESULTS

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Average Power Output (dBm)
Low	2412	11.45
Middle	2437	11.68
High	2462	12.26

Remark:

1. At finial test to get the worst-case emission at 1Mbps.

2. The cable assembly insertion loss of 10.8dB (including 10 dB pad and 0.8 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g Mode

Channel	Channel Frequency (MHz)	Average Power Output (dBm)
Low	2412	13.81
Middle	2437	14.68
High	2462	12.91

Remark:

1. At finial test to get the worst-case emission at 6Mbps.

2. The cable assembly insertion loss of 10.8dB (including 10 dB pad and 0.8 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

8.4 POWER SPECTRAL DENSITY

LIMITS

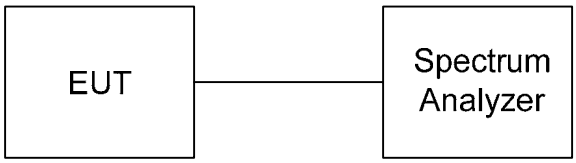
§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/09/2010
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/26/2010

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

TEST SETUP



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW＝3KHz and VBW≧RBW, set sweep time＝span / 3KHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

TEST RESULTS

IEEE 802.11b Mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Minimum Limit (dBm)	Pass / Fail
Low	2412	-15.49	8	PASS
Middle	2437	-14.93	8	PASS
High	2462	-15.62	8	PASS

Remark:

1. *At finial test to get the worst-case emission at 1Mbps.*
2. *The cable assembly insertion loss of 10.8dB (including 10 dB pad and 0.8 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

IEEE 802.11g Mode

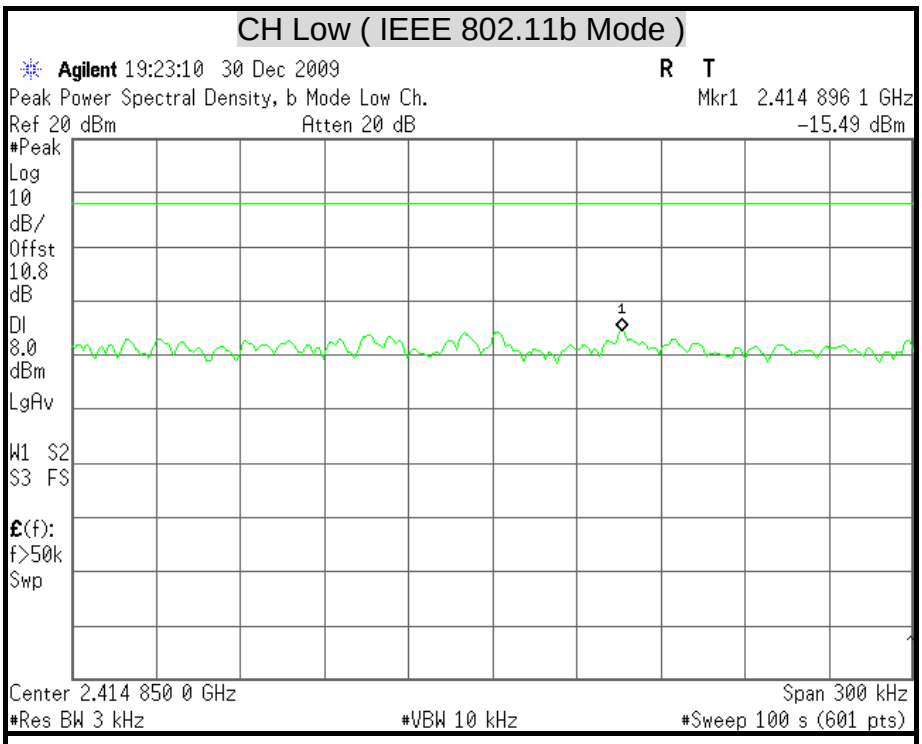
Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Minimum Limit (dBm)	Pass / Fail
Low	2412	-12.57	8	PASS
Middle	2437	-12.83	8	PASS
High	2462	-13.65	8	PASS

Remark:

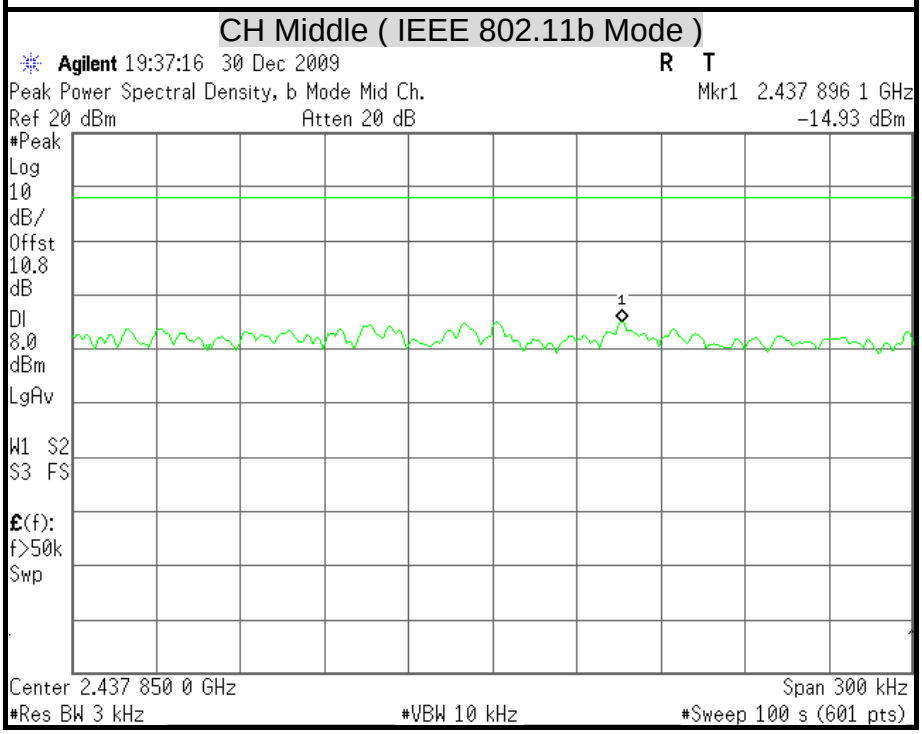
1. *At finial test to get the worst-case emission at 6Mbps.*
2. *The cable assembly insertion loss of 10.8dB (including 10 dB pad and 0.8 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.*

POWER SPECTRAL DENSITY (IEEE 802.11b Mode)

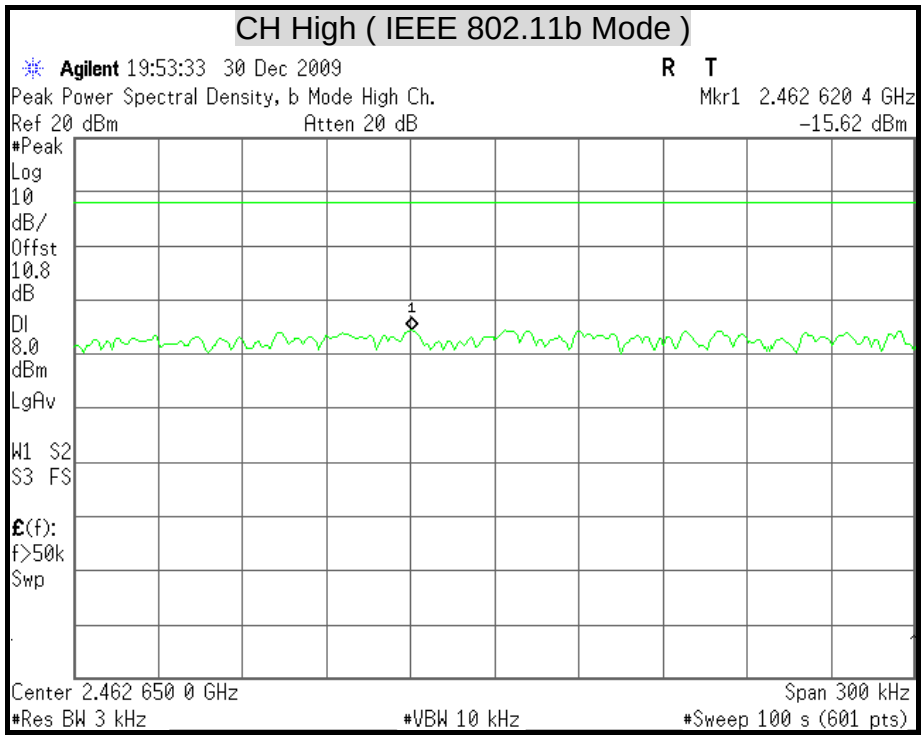
CH Low (IEEE 802.11b Mode)



CH Middle (IEEE 802.11b Mode)

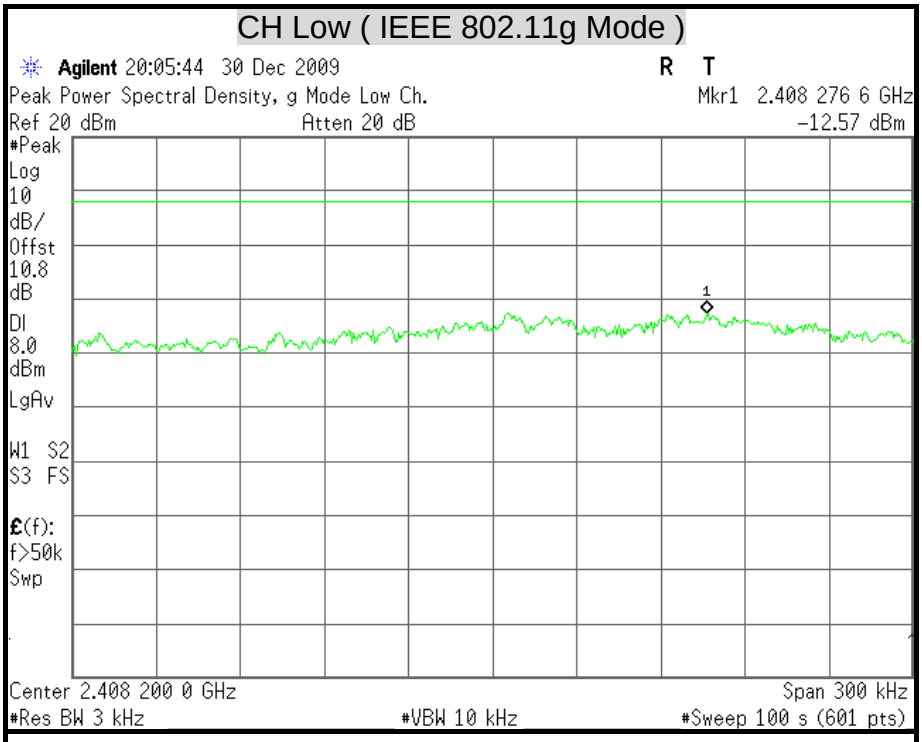


CH High (IEEE 802.11b Mode)

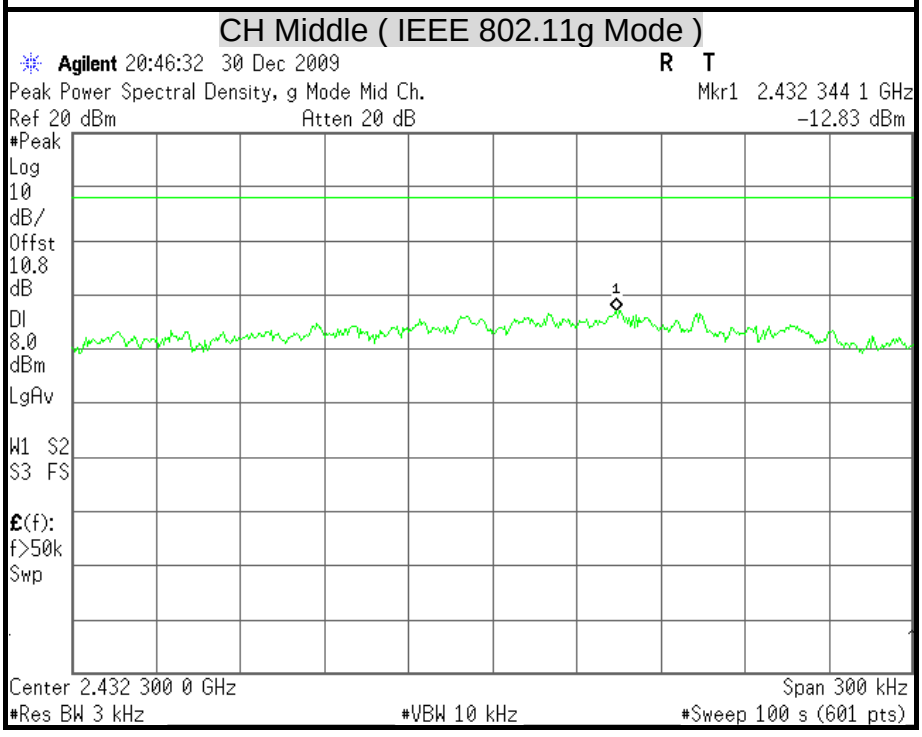


POWER SPECTRAL DENSITY (IEEE 802.11g Mode)

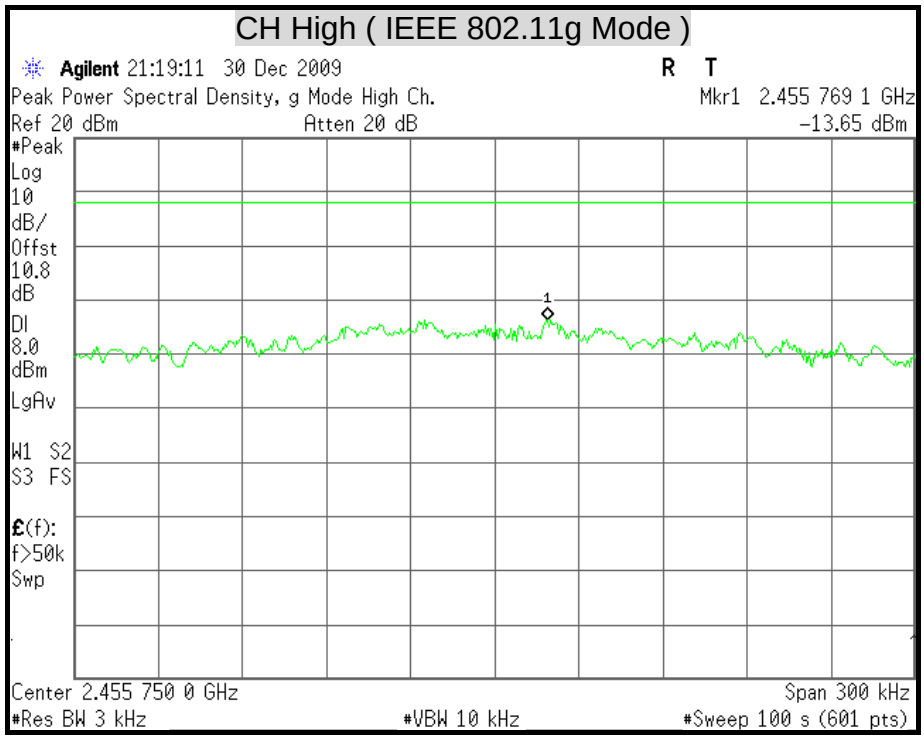
CH Low (IEEE 802.11g Mode)



CH Middle (IEEE 802.11g Mode)



CH High (IEEE 802.11g Mode)



8.5 CONDUCTED SPURIOUS EMISSION

LIMITS

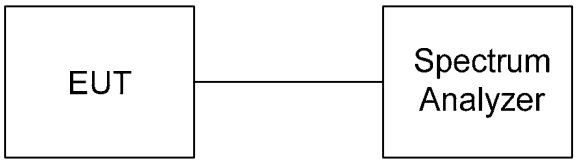
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/09/2010
Spectrum Analyzer	AGILENT	E4446A	MY46180323	05/26/2010

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

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

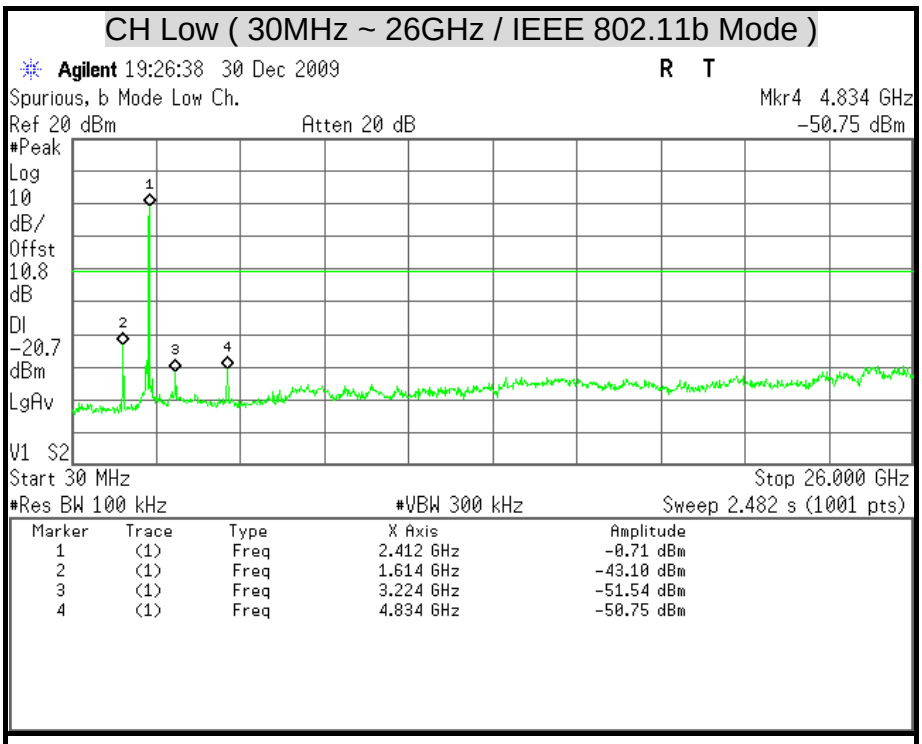
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

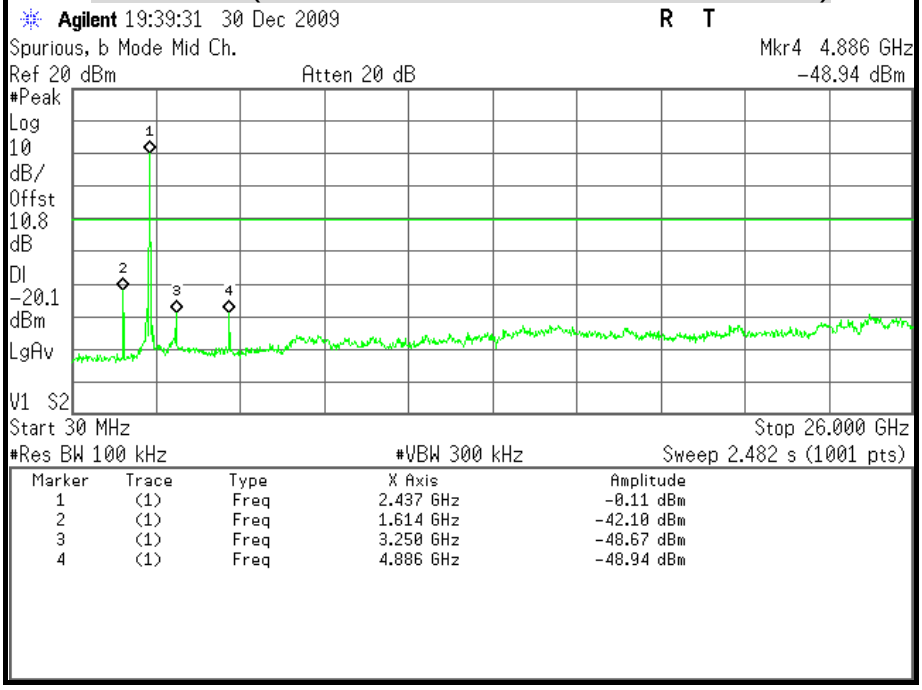
(IEEE 802.11b Mode)

CH Low (30MHz ~ 26GHz / IEEE 802.11b Mode)



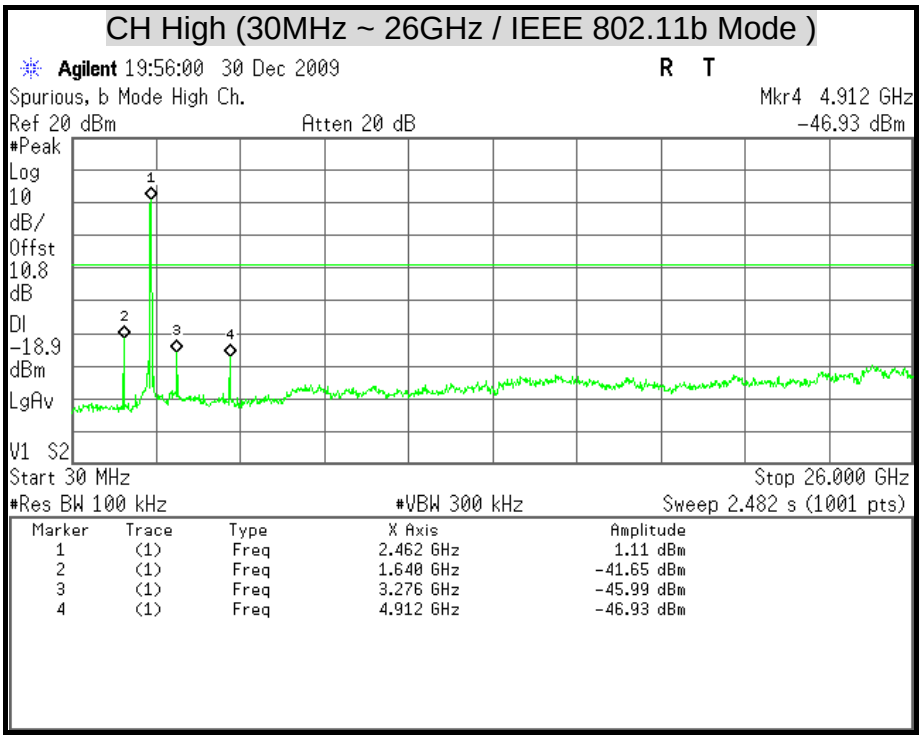
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 GHz	-0.71 dBm
2	(1)	Freq	1.614 GHz	-43.10 dBm
3	(1)	Freq	3.224 GHz	-51.54 dBm
4	(1)	Freq	4.834 GHz	-50.75 dBm

CH Middle (30MHz ~ 26GHz / IEEE 802.11b Mode)



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.437 GHz	-0.11 dBm
2	(1)	Freq	1.614 GHz	-42.10 dBm
3	(1)	Freq	3.250 GHz	-48.67 dBm
4	(1)	Freq	4.886 GHz	-48.94 dBm

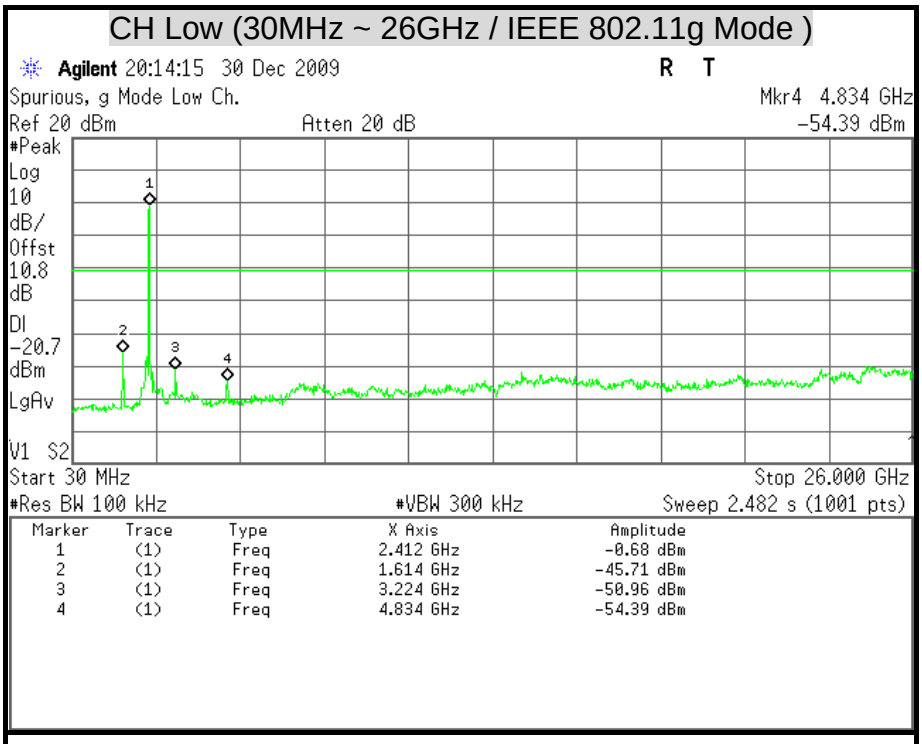
CH High (30MHz ~ 26GHz / IEEE 802.11b Mode)



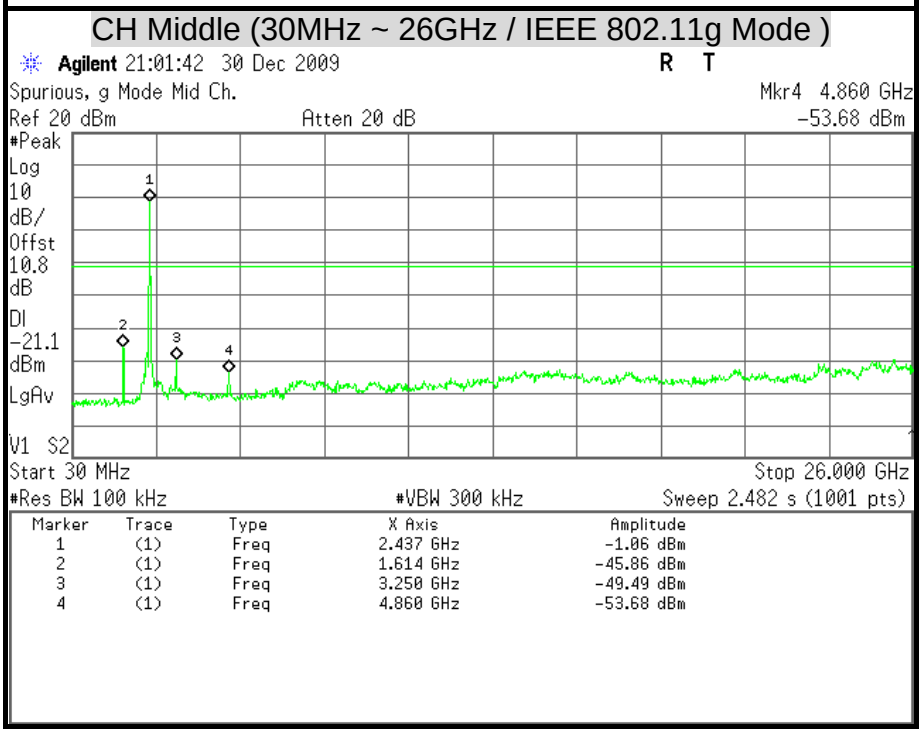
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

(IEEE 802.11g Mode)

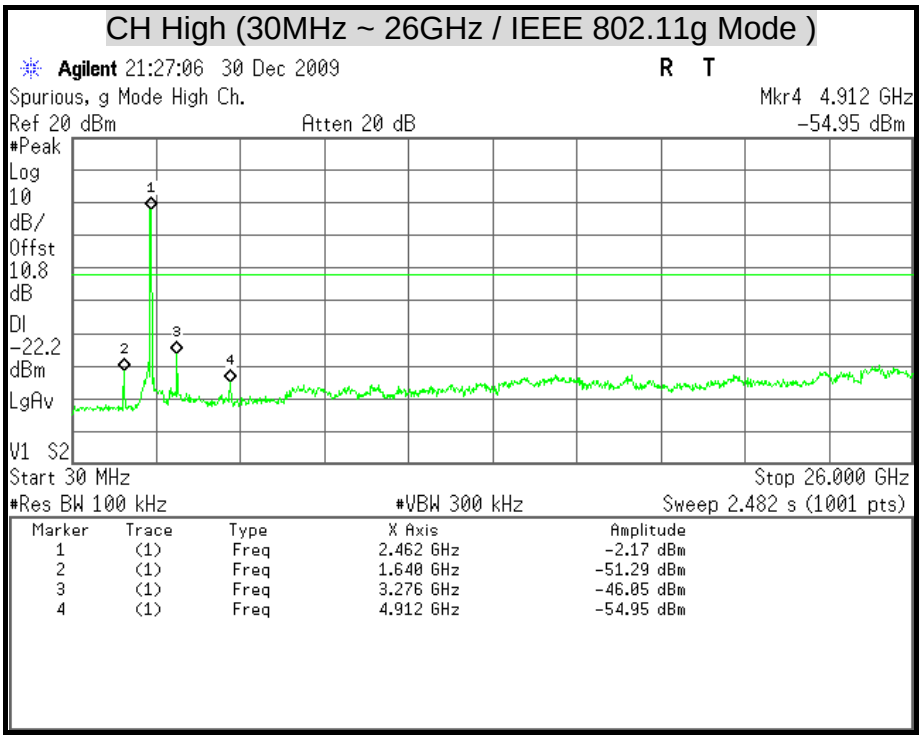
CH Low (30MHz ~ 26GHz / IEEE 802.11g Mode)



CH Middle (30MHz ~ 26GHz / IEEE 802.11g Mode)



CH High (30MHz ~ 26GHz / IEEE 802.11g Mode)



8.6 RADIATED EMISSION

LIMITS

(1) § 15.205 (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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

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

(2) § 15.205 (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 is 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) 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 (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

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.*

(4) According to § 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST EQUIPMENT

966Chamber_A

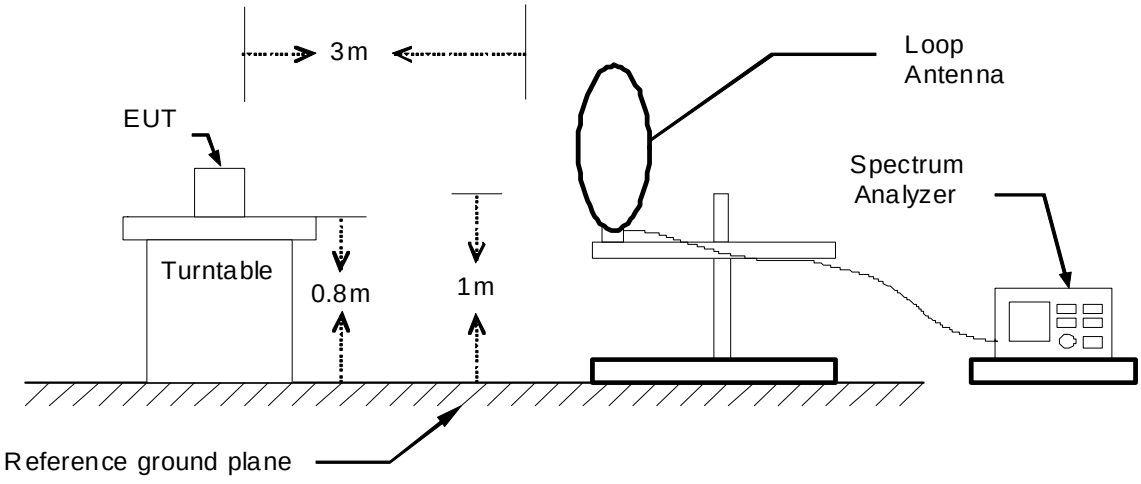
Name of Equipment	Manufacture	Model	Serial Number	Calibration Due
Spectrum Analyzer	AGILENT	E4446A	MY43360132	06/09/2010
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100221	05/17/2010
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-249	11/12/2010
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00078732	06/30/2010
Pre-Amplifier	AGILENT	8449B	3008A01471	08/02/2010
Pre-Amplifier	HP	8447F	2944A03748	09/24/2010
RF Coaxial Cable	HUBERSUHNER	SUCOFLEX 104PEA	SN31347	07/21/2010
RF Coaxial Cable	HUBERSUHNER	SUCOFLEX 104PEA	SN31350	07/21/2010
RF Coaxial Cable	HUBERSUHNER	SUCOFLEX 104PEA	SN31355	07/21/2010
LOOP ANTENNA	EMCO	6502	2356	05/28/2010
Notch Filters Band Reject	Micro-Tronics	BRM05702-01	009	N.C.R

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

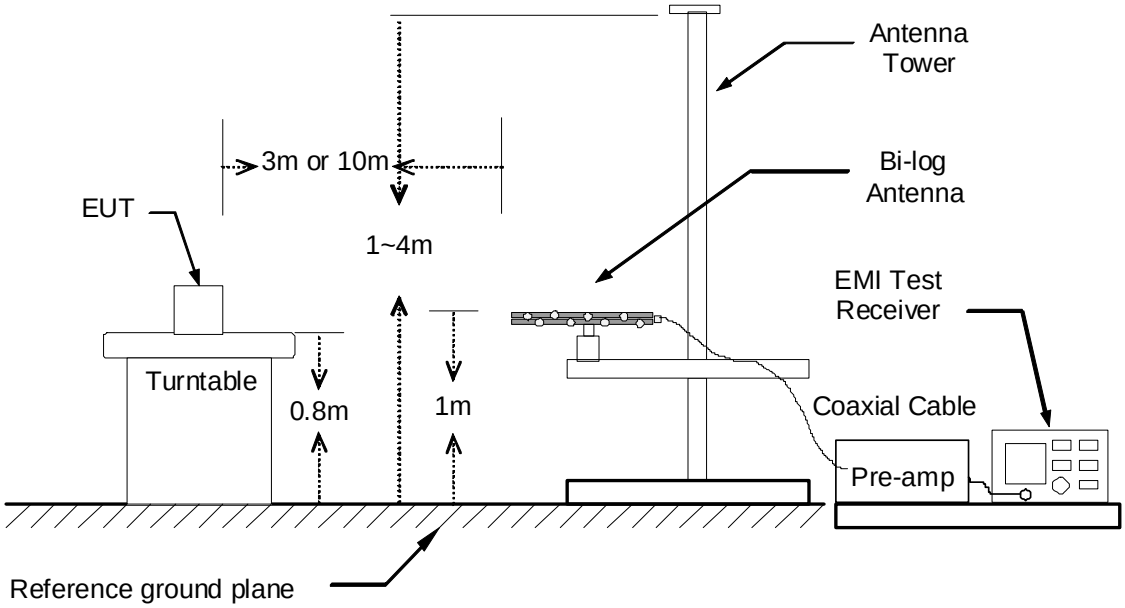
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

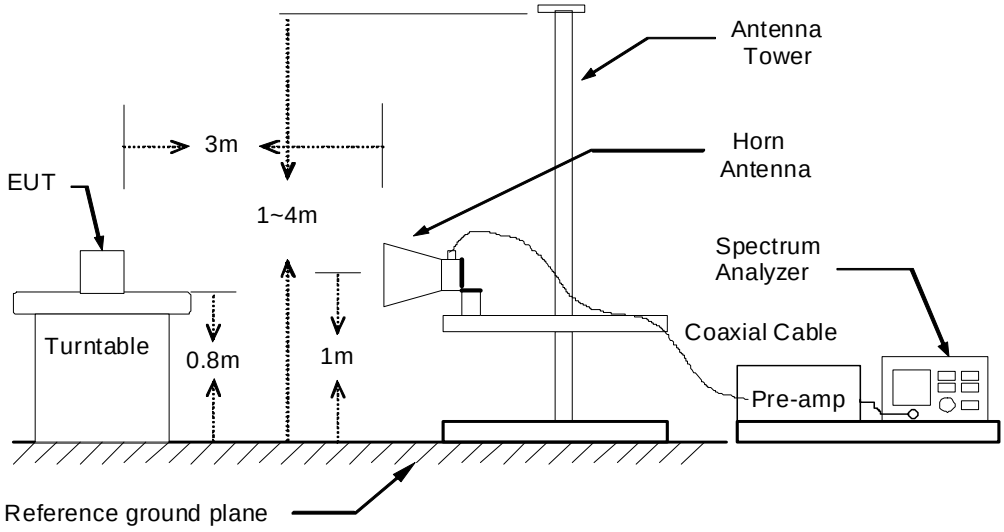
9kHz ~ 30MHz



30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. White measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Remark：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

TEST RESULTS

Below 1 GHz (9kHz ~ 30MHz)

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

Below 1 GHz (30MHz ~ 1GHz)

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/18
Test Mode	Normal operating (worst-case)	TEMP & Humidity	18.1°C, 56%

966 Chamber_A at 3Meter / Horizontal						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
275.41	51.70	-9.65	42.04	46.00	-3.96	Peak
350.10	49.26	-7.42	41.84	46.00	-4.16	Peak
415.09	45.30	-5.48	39.82	46.00	-6.18	QP
540.22	46.53	-2.87	43.66	46.00	-2.34	Peak
624.61	42.41	-1.23	41.18	46.00	-4.82	Peak
702.21	43.60	0.16	43.76	46.00	-2.24	QP
749.74	37.97	1.33	39.30	46.00	-6.70	Peak
834.13	37.26	2.56	39.82	46.00	-6.18	Peak

966 Chamber_A at 3Meter / Vertical						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
250.19	52.81	-10.60	42.22	46.00	-3.78	Peak
332.64	50.30	-7.92	42.38	46.00	-3.62	QP
375.32	50.40	-6.65	43.75	46.00	-2.25	QP
500.45	45.90	-3.71	42.19	46.00	-3.81	QP
540.22	45.60	-2.87	42.73	46.00	-3.27	QP
624.61	44.92	-1.23	43.69	46.00	-2.31	Peak
700.27	43.60	0.11	43.71	46.00	-2.29	Peak
825.40	39.13	2.40	41.53	46.00	-4.47	Peak

Remark:

1. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
2. *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.*
3. *Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)*
4. *Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)*
5. *Margin (dB) = Remark result (dBuV/m) - Quasi-peak limit (dBuV/m).*

Above 1 GHz

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/29
Test Mode	IEEE 802.11b TX / CH Low	TEMP & Humidity	18.4°C, 58%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1414.00	54.16	---	-3.37	50.79	---	74.00	54.00	-3.21	Peak
2334.00	56.91	46.26	2.19	59.10	48.45	74.00	54.00	-5.55	AVG
2414.00	95.99	---	2.31	98.30	---	---	---	---	Carrier
3217.50	43.82	---	3.76	47.59	---	74.00	54.00	-6.41	Peak
4852.50	41.55	---	7.10	48.65	---	74.00	54.00	-5.35	Peak
5910.00	40.94	---	9.09	50.03	---	74.00	54.00	-3.97	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
2330.00	58.39	49.42	2.18	60.57	51.60	74.00	54.00	-2.40	AVG
2412.00	102.38	---	2.30	104.69	---	---	---	---	Carrier
2490.00	57.24	46.61	2.42	59.66	49.03	74.00	54.00	-4.97	AVG
3217.50	51.28	47.32	3.76	55.04	51.08	74.00	54.00	-2.92	AVG
3847.50	42.31	---	4.86	47.17	---	74.00	54.00	-6.83	Peak
4822.50	43.17	---	7.08	50.26	---	74.00	54.00	-3.74	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
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. *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. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/29
Test Mode	IEEE 802.11b TX / CH Middle	TEMP & Humidity	18.4°C, 58%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1418.00	54.37	---	-3.35	51.02	---	74.00	54.00	-2.98	Peak
2362.00	57.02	46.59	2.23	59.25	48.82	74.00	54.00	-5.18	AVG
2434.00	95.77	---	2.34	98.11	---	---	---	---	Carrier
3247.50	50.77	45.00	3.82	54.59	48.82	74.00	54.00	-5.18	AVG
4395.00	40.81	---	6.54	47.35	---	74.00	54.00	-6.65	Peak
5032.50	41.95	---	7.26	49.21	---	74.00	54.00	-4.79	Peak

966 Chamber_A at 3Meter / Vertical

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
2356.00	59.50	51.09	2.22	61.72	53.31	74.00	54.00	-0.69	AVG
2434.00	101.77	---	2.34	104.10	---	---	---	---	Carrier
2516.00	56.92	46.53	2.46	59.38	48.99	74.00	54.00	-5.01	AVG
3247.50	51.21	47.60	3.82	55.03	51.42	74.00	54.00	-2.58	AVG
4012.50	41.78	---	5.16	46.94	---	74.00	54.00	-7.06	Peak
4875.00	49.34	45.44	7.11	56.45	52.55	74.00	54.00	-1.45	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
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. *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. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/29
Test Mode	IEEE 802.11b TX / CH High	TEMP & Humidity	18.4°C, 58%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1120.00	55.65	---	-4.36	51.28	---	74.00	54.00	-2.72	Peak
1552.00	53.88	---	-2.58	51.30	---	74.00	54.00	-2.70	Peak
2464.00	95.70	---	2.38	98.08	---	---	---	---	Carrier
3285.00	47.09	---	3.89	50.98	---	74.00	54.00	-3.02	Peak
4927.50	40.98	---	7.14	48.12	---	74.00	54.00	-5.88	Peak
5647.50	42.06	---	8.63	50.69	---	74.00	54.00	-3.31	Peak

966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
2384.00	59.93	51.15	2.26	62.19	53.41	74.00	54.00	-0.59	AVG
2458.00	103.50	---	2.37	105.87	---	---	---	---	Carrier
2540.00	57.49	47.65	2.51	60.00	50.16	74.00	54.00	-3.84	AVG
3285.00	47.17	---	3.89	51.06	---	74.00	54.00	-2.94	Peak
4417.50	41.19	---	6.62	47.81	---	74.00	54.00	-6.19	Peak
4927.50	49.71	46.09	7.14	56.85	53.23	74.00	54.00	-0.77	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
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. *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. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/29
Test Mode	IEEE 802.11g TX / CH Low	TEMP & Humidity	18.4°C, 58%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1494.00	54.35	---	-3.09	51.26	---	74.00	54.00	-2.74	Peak
2336.00	58.42	45.83	2.19	60.61	48.02	74.00	54.00	-5.98	AVG
2414.00	100.83	---	2.31	103.14	---	---	---	---	Carrier
3217.50	45.00	---	3.76	48.76	---	74.00	54.00	-5.24	Peak
4117.50	41.77	---	5.54	47.31	---	74.00	54.00	-6.69	Peak
4942.50	41.98	---	7.15	49.13	---	74.00	54.00	-4.87	Peak

966 Chamber_A at 3Meter / Vertical

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1606.00	57.87	44.54	-2.06	55.81	42.48	74.00	54.00	-11.52	AVG
2338.00	61.12	49.82	2.20	63.32	52.02	74.00	54.00	-1.98	AVG
2418.00	106.87	---	2.31	109.19	---	---	---	---	Carrier
2492.00	59.56	46.89	2.42	61.98	49.31	74.00	54.00	-4.69	AVG
3217.50	51.14	46.66	3.76	54.90	50.42	74.00	54.00	-3.58	AVG
4012.50	41.49	---	5.16	46.66	---	74.00	54.00	-7.34	Peak
4822.50	42.31	---	7.08	49.40	---	74.00	54.00	-4.60	Peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
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. *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. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/29
Test Mode	IEEE 802.11g TX / CH Middle	TEMP & Humidity	18.4°C, 58%

966 Chamber_A at 3Meter / Horizontal

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1492.00	53.88	---	-3.10	50.78	---	74.00	54.00	-3.22	Peak
2362.00	59.31	46.80	2.23	61.54	49.03	74.00	54.00	-4.97	AVG
2430.00	100.29	---	2.33	102.62	---	---	---	---	Carrier
3247.50	50.27	45.15	3.82	54.09	48.97	74.00	54.00	-5.03	AVG
4260.00	41.65	---	6.05	47.70	---	74.00	54.00	-6.30	Peak
4830.00	41.99	---	7.09	49.08	---	74.00	54.00	-4.92	Peak

966 Chamber_A at 3Meter / Vertical

Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1624.00	59.07	46.47	-1.89	57.18	44.58	74.00	54.00	-9.42	AVG
2354.00	63.26	51.09	2.22	65.48	53.31	74.00	54.00	-0.69	AVG
2432.00	107.31	---	2.33	109.64	---	---	---	---	Carrier
2522.00	59.08	46.59	2.47	61.55	49.06	74.00	54.00	-4.94	AVG
3247.50	51.66	47.46	3.82	55.48	51.28	74.00	54.00	-2.72	AVG
4132.50	41.97	---	5.59	47.56	---	74.00	54.00	-6.44	Peak
4875.00	49.16	34.96	7.11	56.27	42.07	74.00	54.00	-11.93	AVG

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
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. *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. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Product Name	IP Cam	Test By	Rueyyan Lin
Model	F3105	Test Date	2009/12/29
Test Mode	IEEE 802.11g TX / CH High	TEMP & Humidity	18.4°C, 58%

966 Chamber_A at 3Meter / Horizontal									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
1300.00	53.52	---	-3.75	49.77	---	74.00	54.00	-4.23	Peak
1510.00	54.48	---	-2.98	51.51	---	74.00	54.00	-2.49	Peak
2466.00	98.84	---	2.38	101.22	---	---	---	---	Carrier
3285.00	50.15	45.89	3.89	54.04	49.78	74.00	54.00	-4.22	AVG
4170.00	41.08	---	5.73	46.81	---	74.00	54.00	-7.19	Peak
4852.50	41.78	---	7.10	48.88	---	74.00	54.00	-5.12	Peak

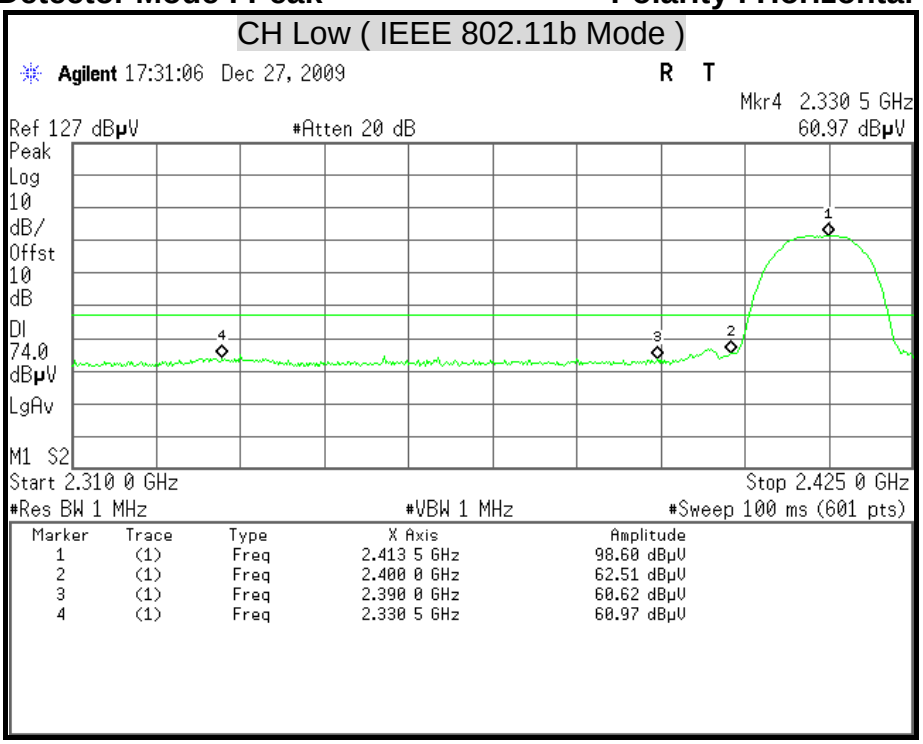
966 Chamber_A at 3Meter / Vertical									
Frequency (MHz)	Reading-PK (dBuV)	Reading-AV (dBuV)	Correction Factor (dB/m)	Result-PK (dBuV/m)	Result-AV (dBuV/m)	Limit-PK (dBuV/m)	Limit-AV (dBuV/m)	Margin (dB)	Remark
2376.00	60.85	48.61	2.25	63.10	50.86	74.00	54.00	-3.14	AVG
2466.00	106.04	---	2.38	108.42	---	---	---	---	Carrier
2536.00	58.35	45.30	2.50	60.85	47.80	74.00	54.00	-6.20	AVG
3285.00	52.80	49.10	3.89	56.69	52.99	74.00	54.00	-1.01	AVG
4282.50	41.65	---	6.13	47.79	---	74.00	54.00	-6.21	Peak
4927.50	42.37	---	7.14	49.52	---	74.00	54.00	-4.48	Peak

Remark:

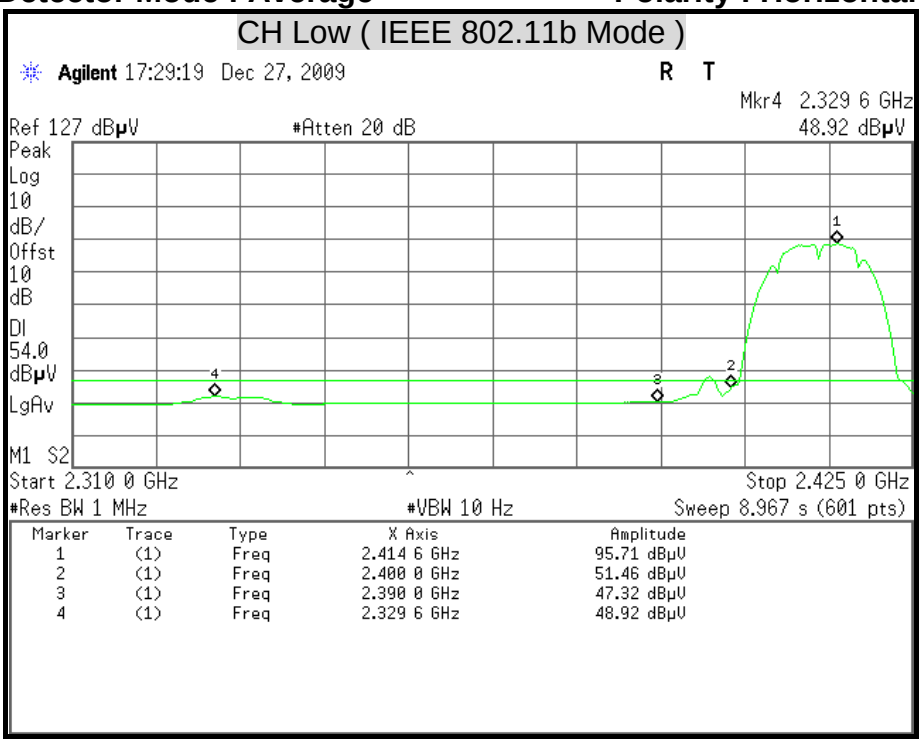
1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Average test would be performed if the peak result were greater than the average limit.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
4. *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. *In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.*
6. *Result = Reading + Correction Factor*
   Margin = Result – Limit
   Remark Peak = Result(PK) – Limit(AV)
   Remark AVG = Result(AV) – Limit(AV)

Restricted Band Edges

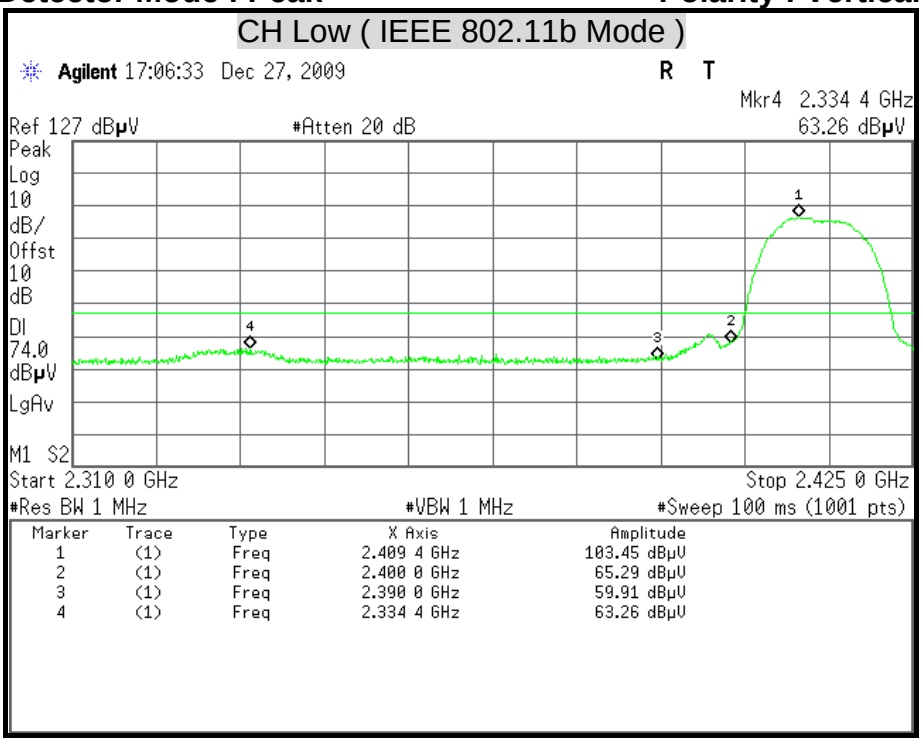
Detector Mode : Peak **Polarity : Horizontal**



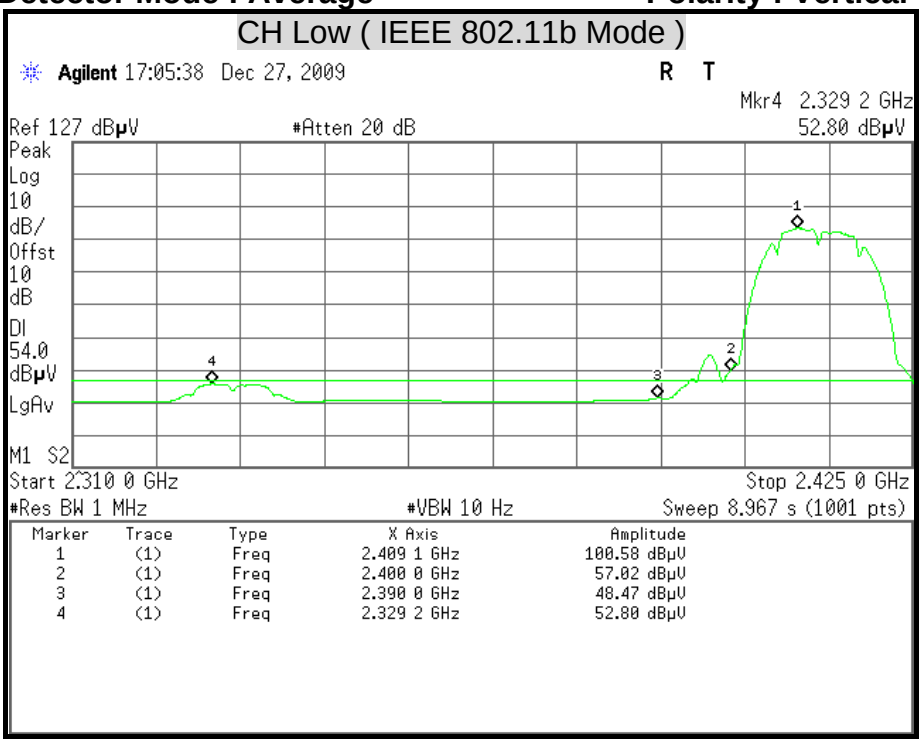
Detector Mode : Average **Polarity : Horizontal**



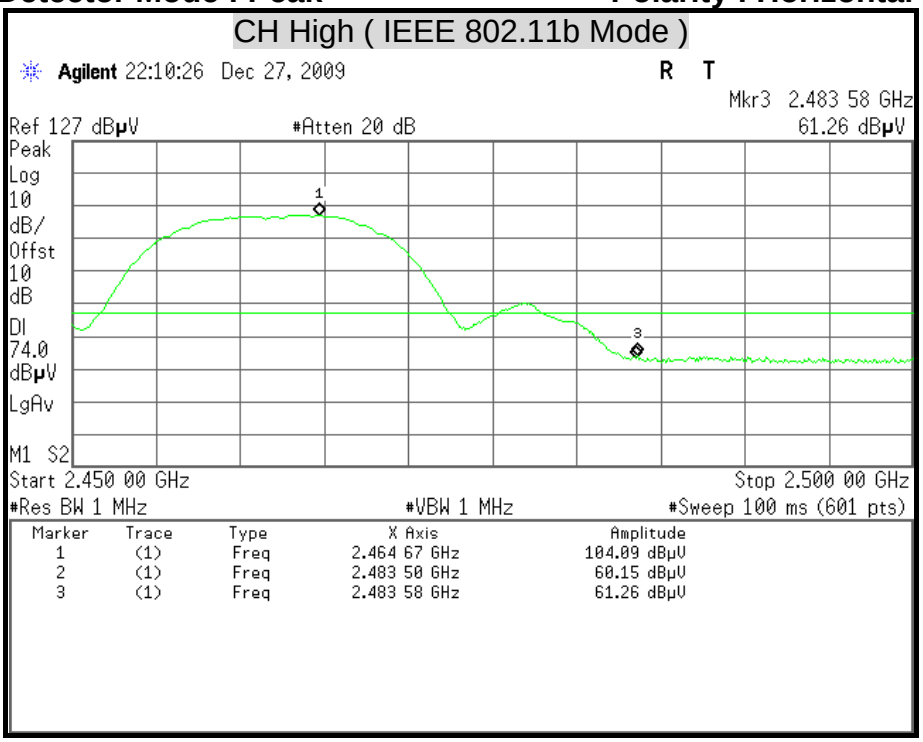
Detector Mode : Peak **Polarity : Vertical**



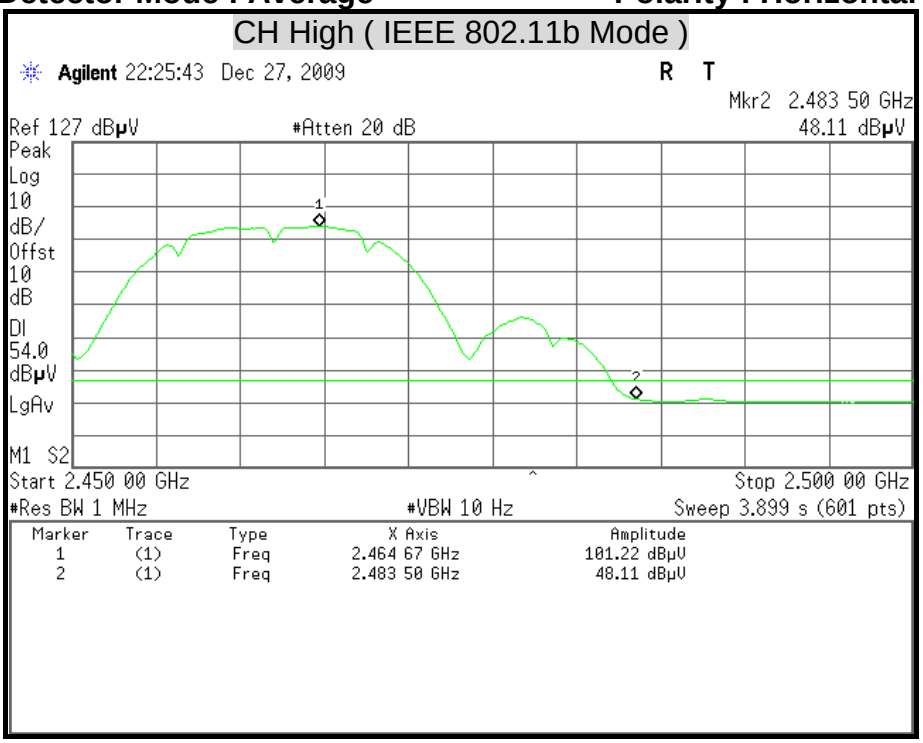
Detector Mode : Average **Polarity : Vertical**



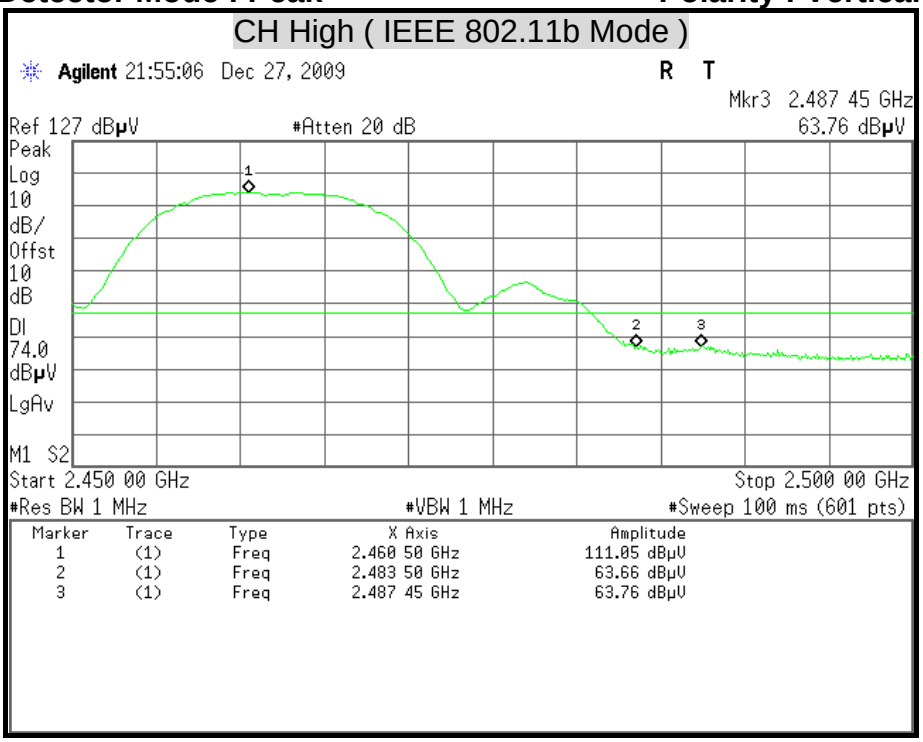
Detector Mode : Peak **Polarity : Horizontal**



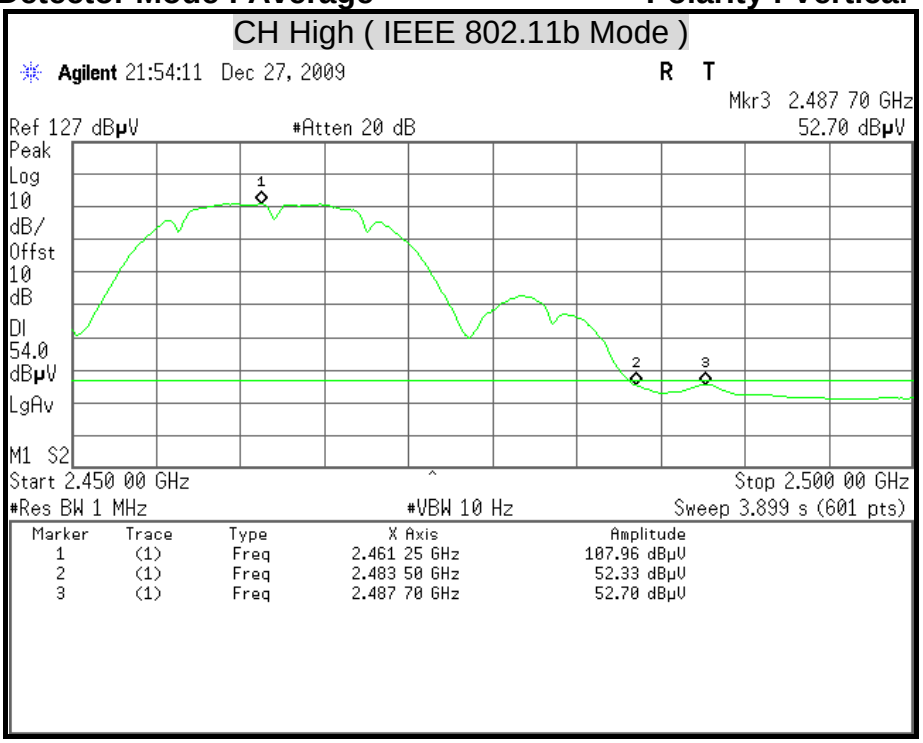
Detector Mode : Average **Polarity : Horizontal**



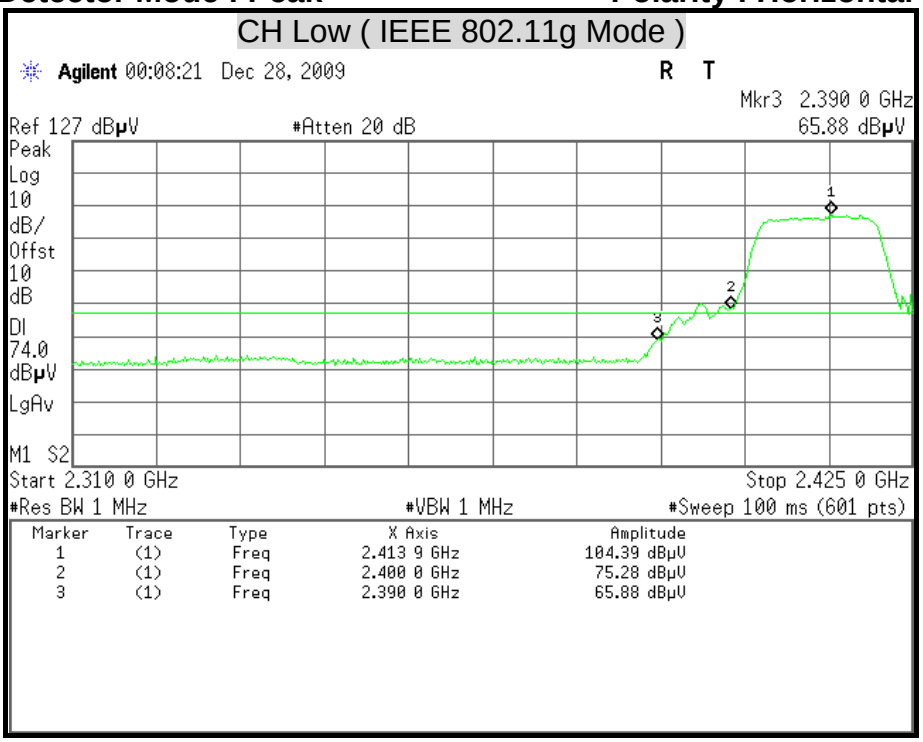
Detector Mode : Peak **Polarity : Vertical**



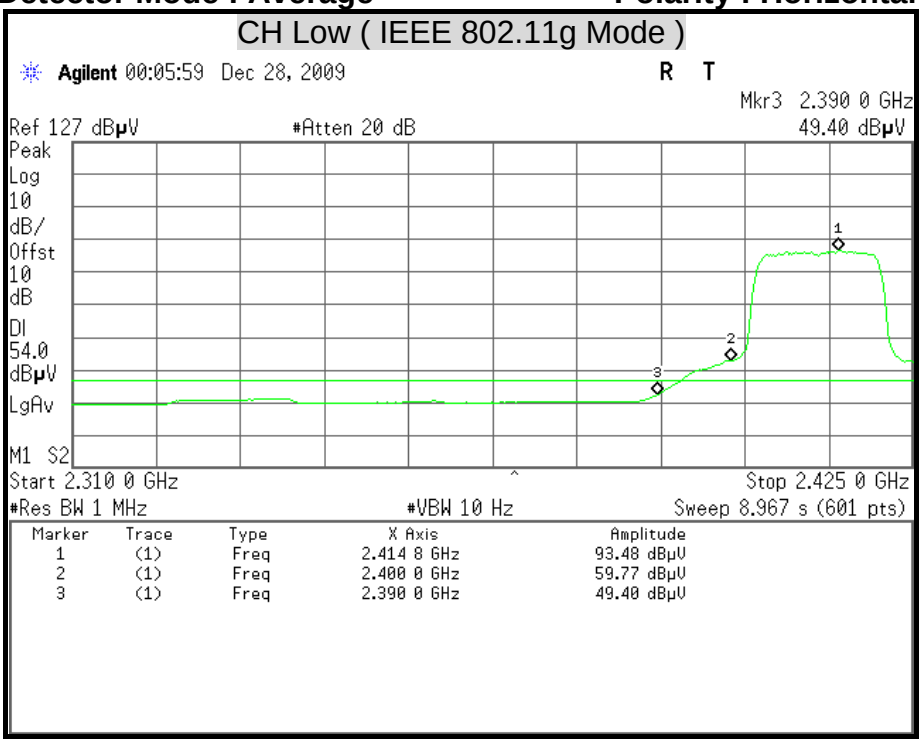
Detector Mode : Average **Polarity : Vertical**



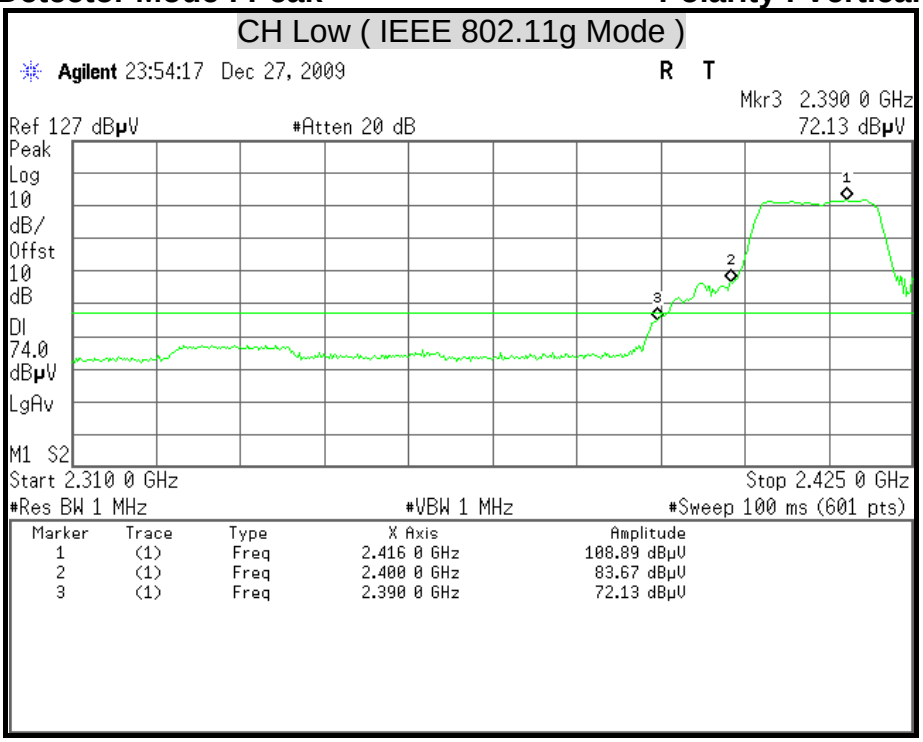
Detector Mode : Peak **Polarity : Horizontal**



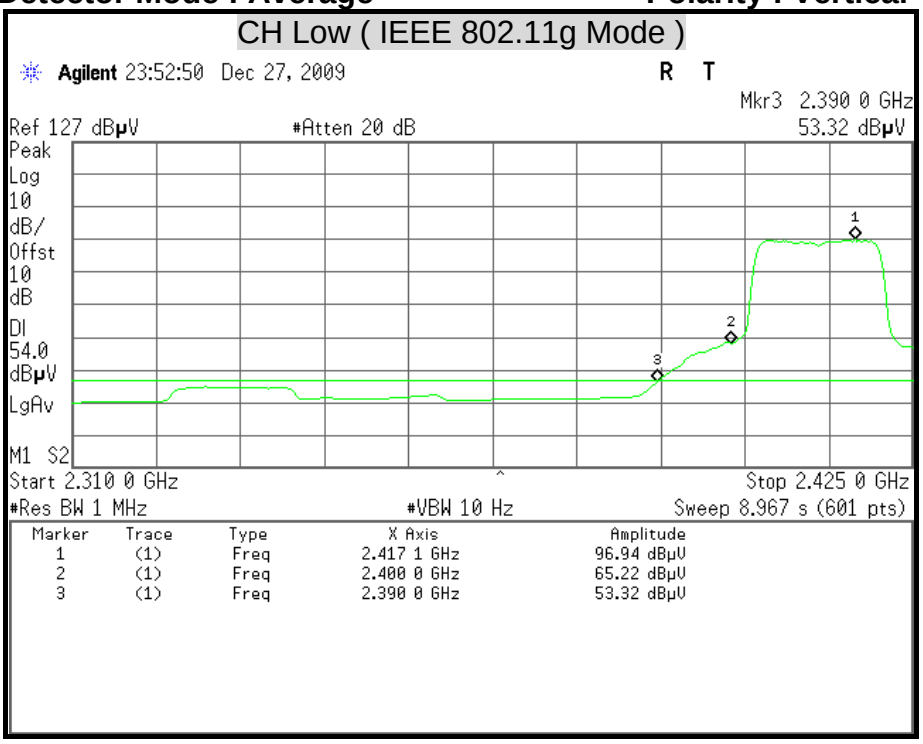
Detector Mode : Average **Polarity : Horizontal**



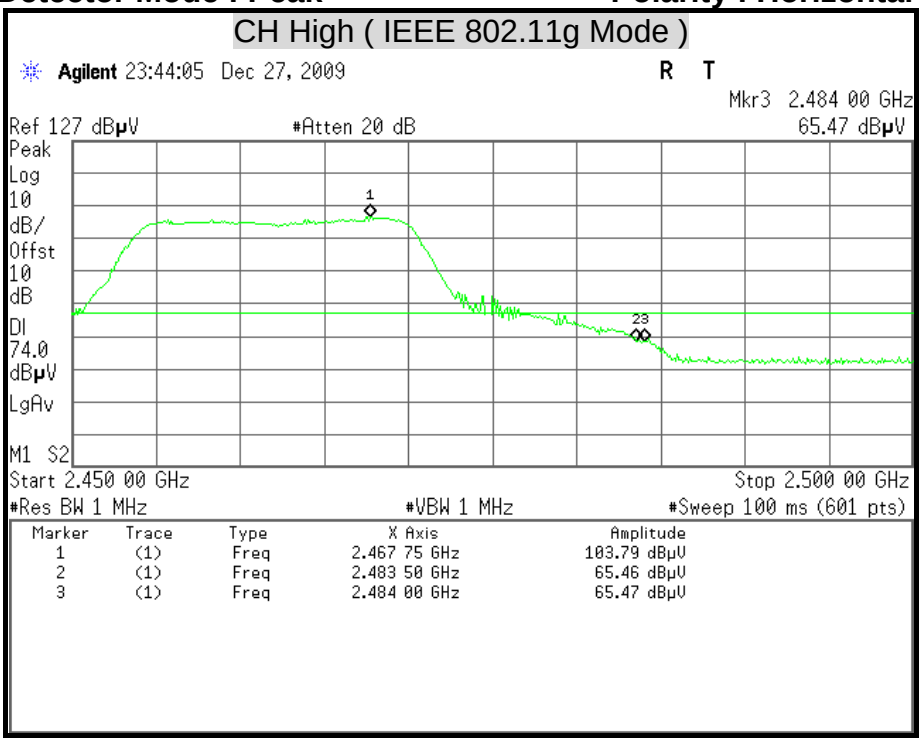
Detector Mode : Peak **Polarity : Vertical**



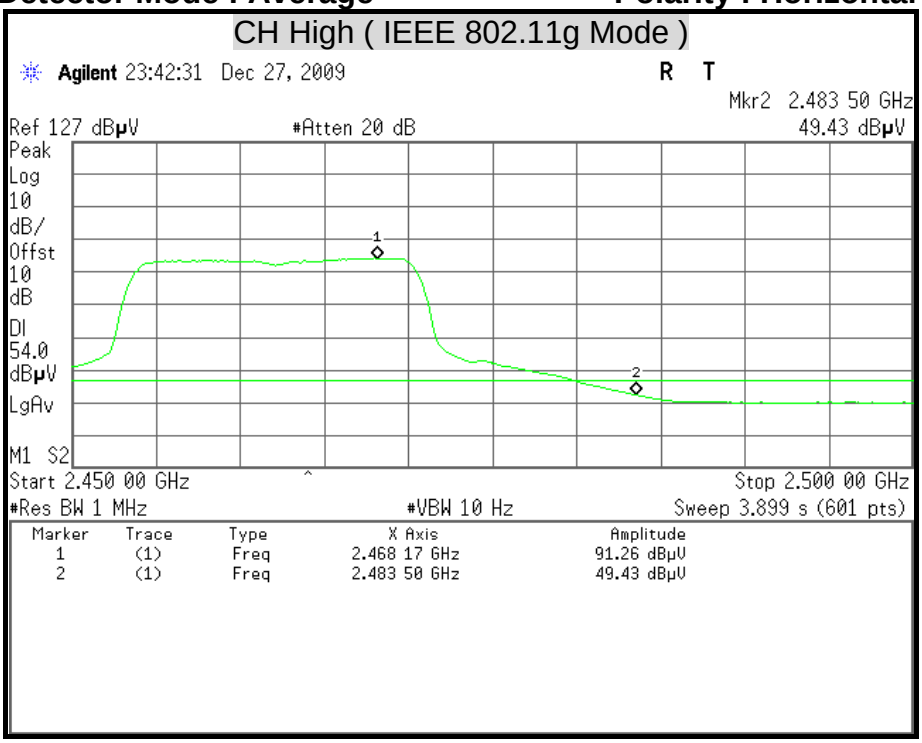
Detector Mode : Average **Polarity : Vertical**



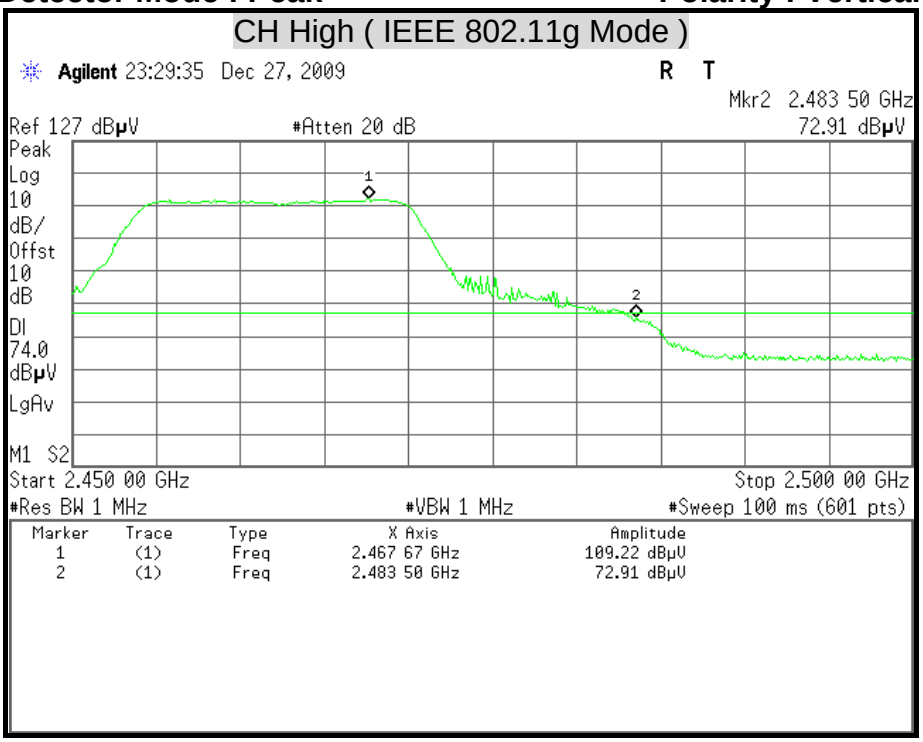
Detector Mode : Peak **Polarity : Horizontal**



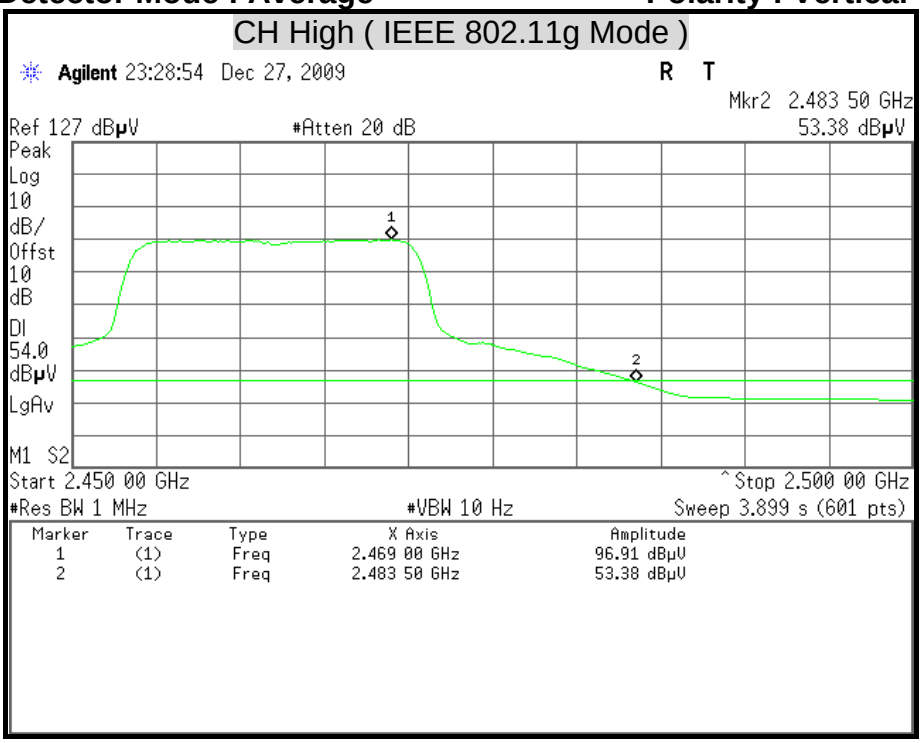
Detector Mode : Average **Polarity : Horizontal**



Detector Mode : Peak **Polarity : Vertical**



Detector Mode : Average **Polarity : Vertical**



8.7 POWERLINE CONDUCTED EMISSION

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) 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.

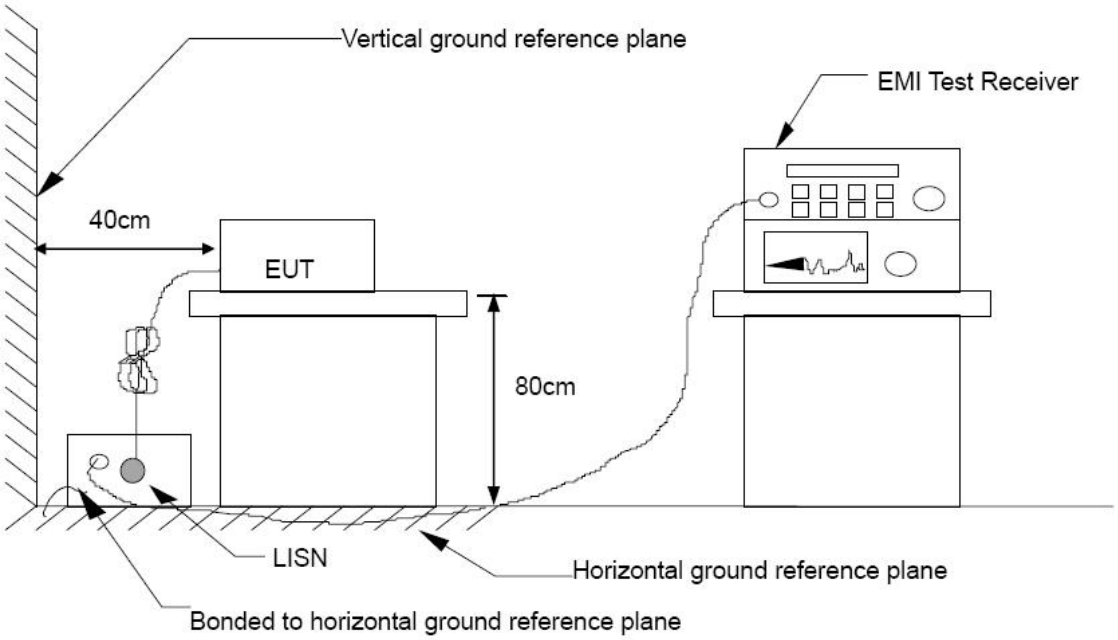
Frequency range (MHz)	Conducted limit (dBµv)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5.00	56	46
5.00 - 30.0	60	50

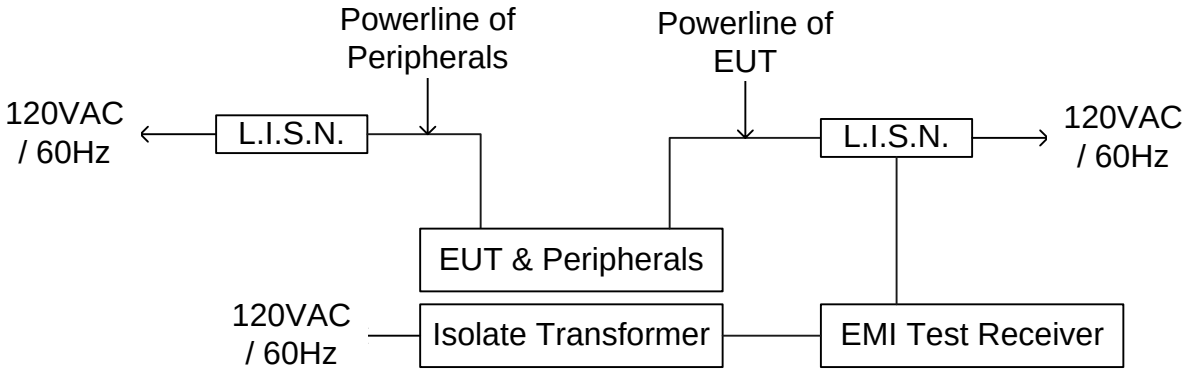
TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N	SCHWARZBECK	NSLK 8127	8127-465	08/13/2010
TEST RECEIVER	R & S	ESHS30	838550/003	02/02/2010
TEST RECEIVER	R & S	ESCS 30	826547/004	08/05/2010
PULSE LIMIT	R & S	ESH3-Z2	100117	09/17/2010
N Type Coaxial Cable	BELDEN	8268 M17/164	003	07/09/2010

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

TEST SETUP





TEST PROCEDURE

The basic test procedure was in accordance with ANSI C63.4:2003.

The test procedure is performed in a 4m × 3m × 2.4m (L×W×H) shielded room.

The EUT along with its peripherals were placed on a 1.0m (W) × 1.5m (L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

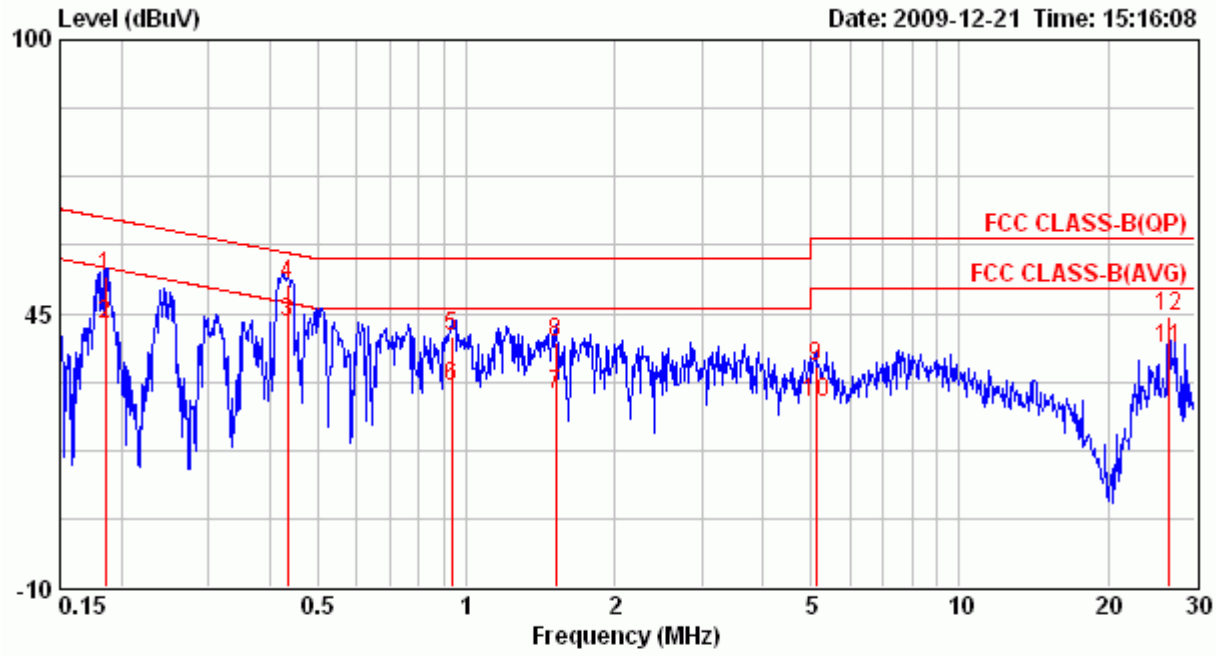
The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.

The EUT was located so that the distance between the boundary of the EUT and the closest surface of the LISN is 0.8 m. Where a mains flexible cord was provided by the manufacturer shall be 1 m long, or if in excess of 1 m, the excess cable was folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

TEST RESULTS

Product Name	IP Cam	Test By	Joe Peng
Model	F3105	Test Date	2009/12/21
Test Mode	Normal operating (worst-case)	TEMP & Humidity	20°C, 48%

LINE



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dBuV	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.19	0.09	52.39	42.64	52.48	42.73	64.24	54.24	-11.76	-11.51
0.44	0.12	50.88	43.07	51.00	43.19	57.16	47.16	-6.16	-3.97
0.93	0.17	40.23	30.17	40.40	30.34	56.00	46.00	-15.60	-15.66
1.52	0.20	39.04	28.54	39.24	28.74	56.00	46.00	-16.76	-17.26
5.11	0.34	33.94	26.63	34.28	26.97	60.00	50.00	-25.72	-23.03
26.61	0.87	43.39	37.16	44.26	38.03	60.00	50.00	-15.74	-11.97

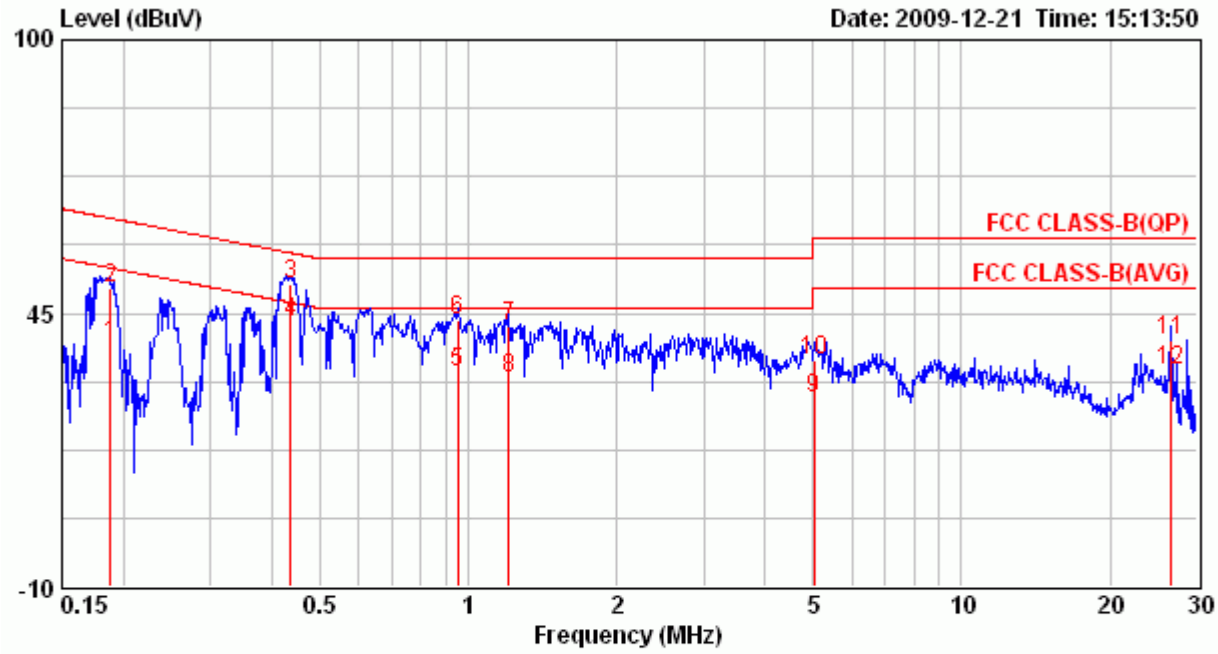
Remark:

1. Correction Factor = Insertion loss + cable loss

2. Margin value = Emission level – Limit value

Product Name	IP Cam	Test By	Joe Peng
Model	F3105	Test Date	2009/12/21
Test Mode	Normal operating (worst-case)	TEMP & Humidity	20°C, 48%

NEUTRAL



Freq.	Corr. Factor	Reading Value dBuV		Emission Level dBuV		Limit dBuV		Margin dBuV	
MHz	dB	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.19	0.01	49.92	38.69	49.93	38.70	64.11	54.11	-14.18	-15.41
0.44	0.10	50.62	42.99	50.72	43.09	57.13	47.13	-6.41	-4.04
0.95	0.15	43.47	33.05	43.62	33.20	56.00	46.00	-12.38	-12.80
1.21	0.16	42.25	31.78	42.41	31.94	56.00	46.00	-13.59	-14.06
5.03	0.28	35.33	27.61	35.61	27.89	60.00	50.00	-24.39	-22.11
26.55	0.77	38.95	32.69	39.72	33.46	60.00	50.00	-20.28	-16.54

Remark:

1. Correction Factor = Insertion loss + cable loss

2. Margin value = Emission level – Limit value

APPENDIX I MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate theenvironment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

CALCULATIONS

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and
d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm2

LIMIT

Power Density Limit, S=1.0mW/cm2

TEST RESULTS

Mode	Antenna Gain (dBi)	Minimum separation distance (cm)	Output Power (dBm)	Numeric antenna gain (dB)	Power Density Limit (mW/cm^2)	Power Density at 20cm (mW/cm^2)
IEEE 802.11b	2	20.0	14.83	1.58	1.00	0.009588
IEEE 802.11g	2	20.0	17.47	1.58	1.00	0.017608

Remark: *For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*