



**FCC CFR47 PART 15 SUBPART C
CERTIFICATION TEST REPORT**

FOR

VoIP PHONE WITH AN 802.11a/b/g RADIO

MODEL NUMBER: CA5090

FCC ID: H9PCA5090

REPORT NUMBER: 07U10908-1

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Prepared for
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NVLAP LAB CODE 200065-0

Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SYMBOL TECHNOLOGIES, INC.
ONE SYMBOL PLAZA
HOLTSVILLE, NY 11742, USA

EUT DESCRIPTION: VoIP PHONE WITH AN 802.11a/b/g RADIO

MODEL: CA5090

SERIAL NUMBER: MXA2RH88 FOR RF CONDUCTED TEST &
MXA2RH78 FOR RADIATED EMISSION TEST

DATE TESTED: MARCH 26 - 30, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



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EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

THANH NGUYEN
EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Radiated Emission, Above 2000 MHz	+/- 4.3 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a VoIP device that operates in 802.11a/b/g modes and manufactured by Symbol Technologies Inc.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	16.54	45.08
2412 - 2462	802.11g	23.30	213.80

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	20.72	118.03

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Planar inverted F antenna with a gain of 3.3 dBi for 2.4 GHz band, and 0.4 dBi for 5.8 GHz band.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was “Remote Terminal Regulatory Tool”, Version 1.0.2.1 “fusion”.

ActiveSync Version 4.5.0 (Build 5096) was used to establish a connection between the EUT and a laptop PC.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2437 MHz for 11b & g modes and 5825 MHz for 11a mode.

The worst-case data rates for these channels are determined to be 1Mb/s for 11b, 6Mhbps for 11g & 11a modes, based on previous experience with 802.11a/b/g WLAN product design architectures.

Thus all emissions tests were made in the 802.11b mode, 2437 MHz, 1 Mb/s, the 802.11g mode, 2437 MHz, 6 Mb/s, and the 802.11b mode, 5825 MHz, 6 Mb/s,

The EUT has been investigated at X, Y, Z and with battery charger cradle configuration. The worst case is determined to be with EUT with battery charger cradle @ Y-position by comparing the fundamental output power on both 2.4GHz and 5GHz Band.

DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMEN

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	Unshielded	2.2m	N/A
2	DC	2	DC	Unshielded	1.8m	ferite on the cable (EUT side)
3	USB	1	USB	Unshielded	1.5m	N/A
4	Audio	1	Audio	Unshielded	0.5m	ferite on the cable (EUT side)

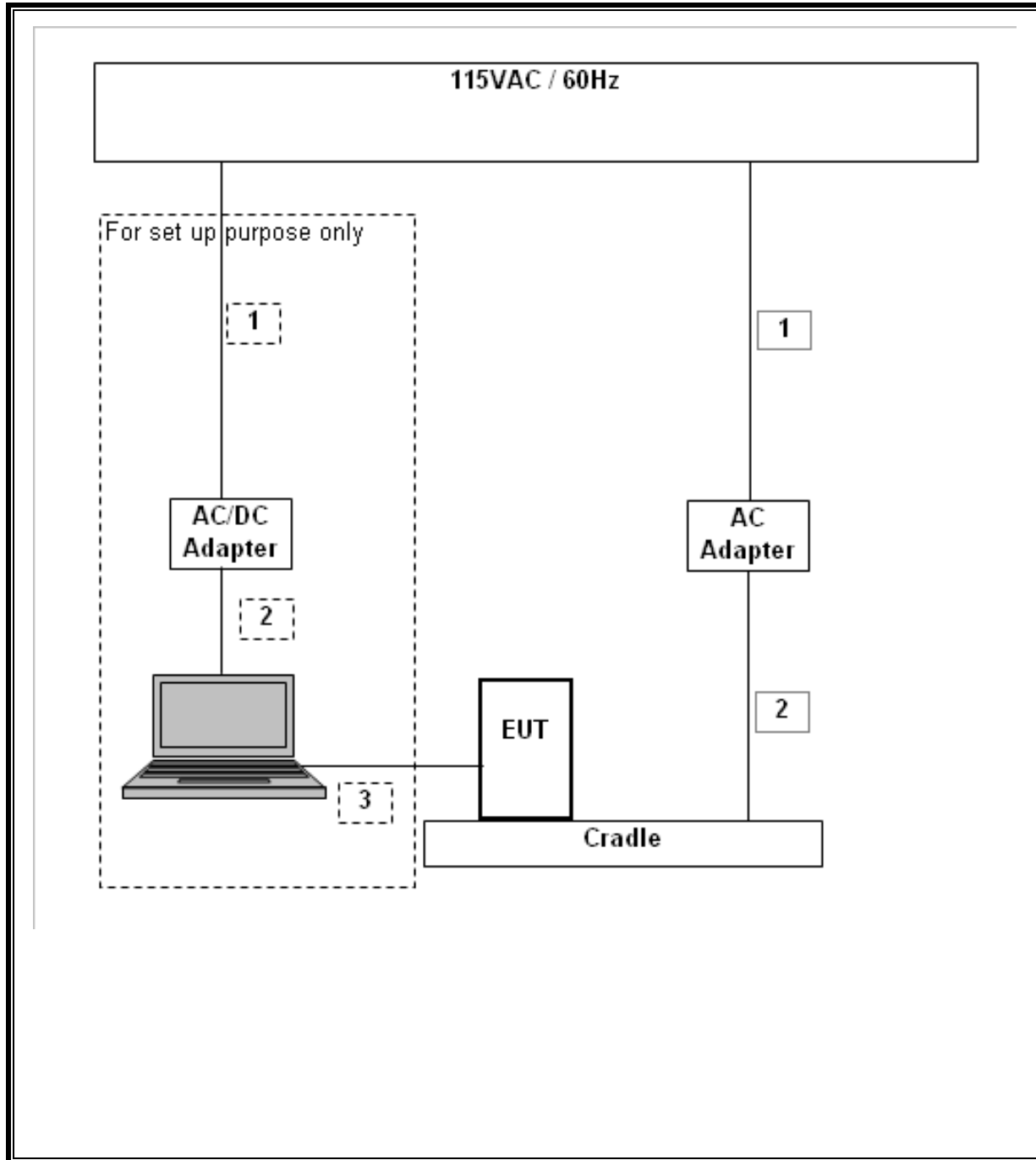
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	Unshielded	2.2m	N/A
2	DC	2	DC	Unshielded	1.8m	ferite on the cable (EUT side)
3	USB	1	USB	Unshielded	1.5m	N/A

TEST SETUP

The EUT is connected to a host laptop computer via an USB cable, and its connection can be removed after the channel and power are set. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	MY43360112	03/28/08
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29301	04/22/08
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	08/17/07
Band Reject Filter	MicroTronics	BRC13190	002	C.N.R
Band Reject Filter	MicroTronics	BRC13191	001	C.N.R
Power Meter	HP	438A	2822A05684	06/20/08
Power Sensor	HP	8481A	2349A36506	04/22/08
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	01/23/08
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A0022704	09/03/07
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	08/30/07
EMI Test Receiver	R & S	ESHS 20	827129/006	11/03/07
Quasi-Peak Adaptor	Agilent / HP	85650A	3145A01654	01/21/08
SA Display Section 2	Agilent / HP	85662A	2816A16696	04/07/08
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	01/07/08
4.0 GHz Highpass Filter	Micro-Tronics	HPM13351	2	CNR
7.6 GHz Highpass Filter	Micro-Tronics	HPM13195	1	CNR

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

7.1.1. 6 dB BANDWIDTH

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

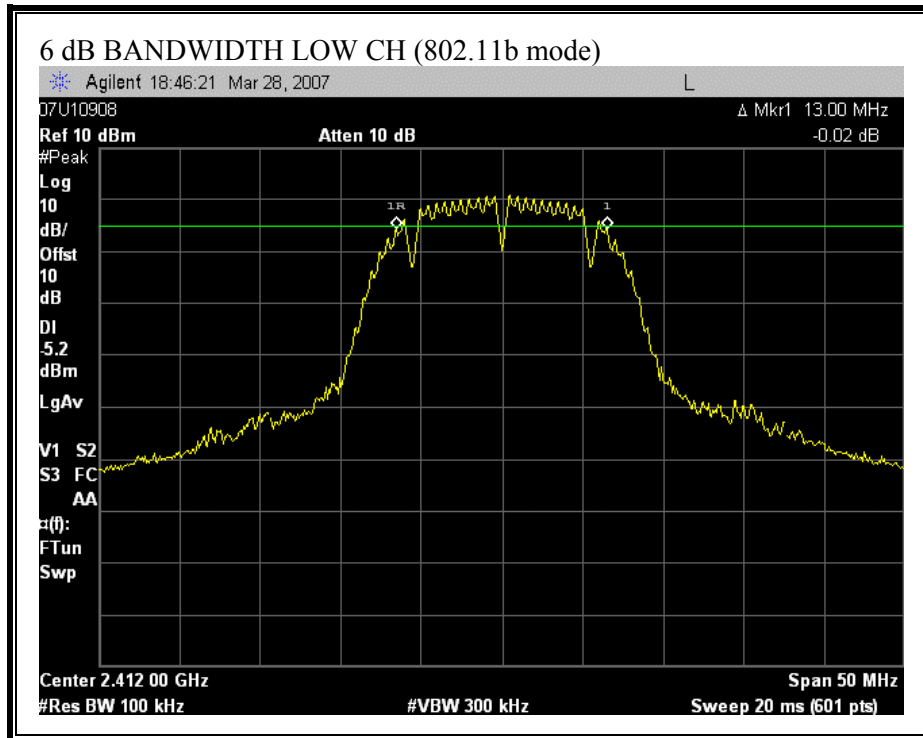
802.11b Mode

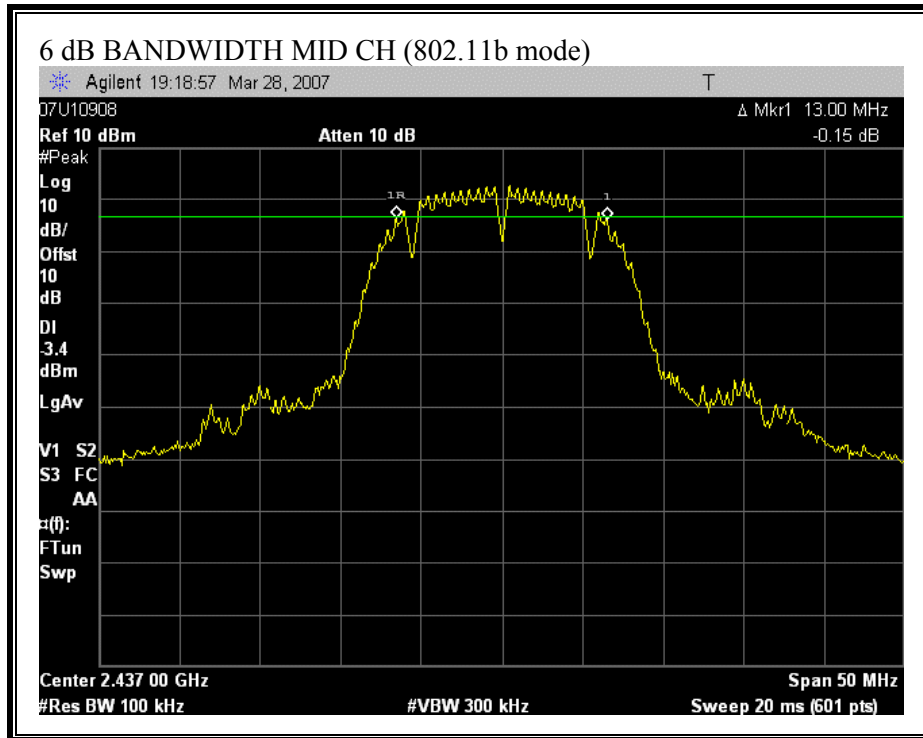
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	13000	500	12500
Middle	2437	13000	500	12500
High	2462	13000	500	12500

802.11g Mode

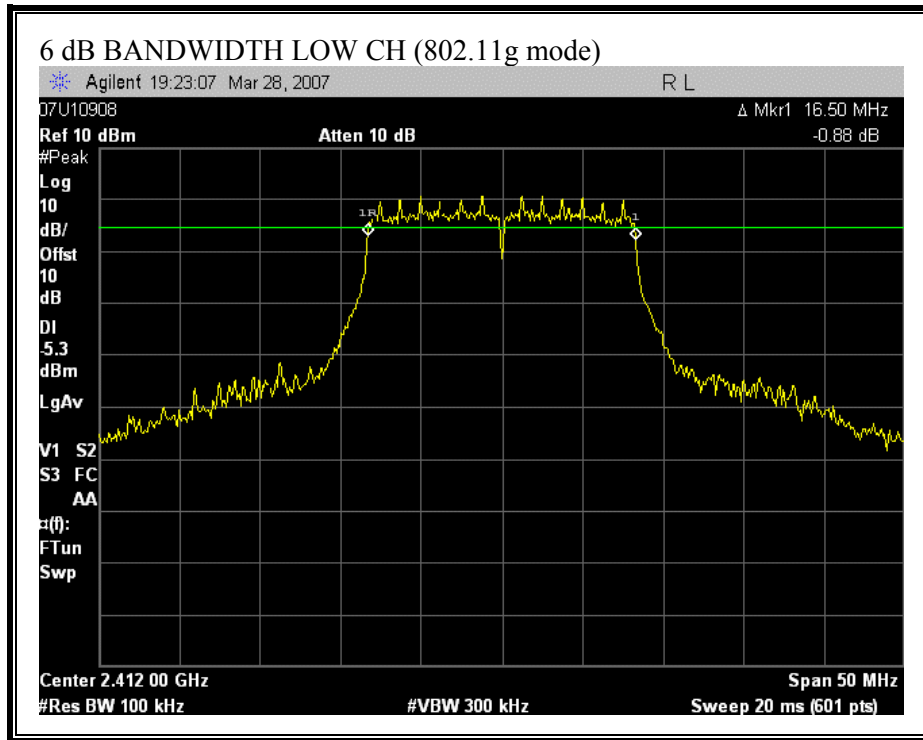
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	16500	500	16000
Middle	2437	16420	500	15920
High	2462	16500	500	16000

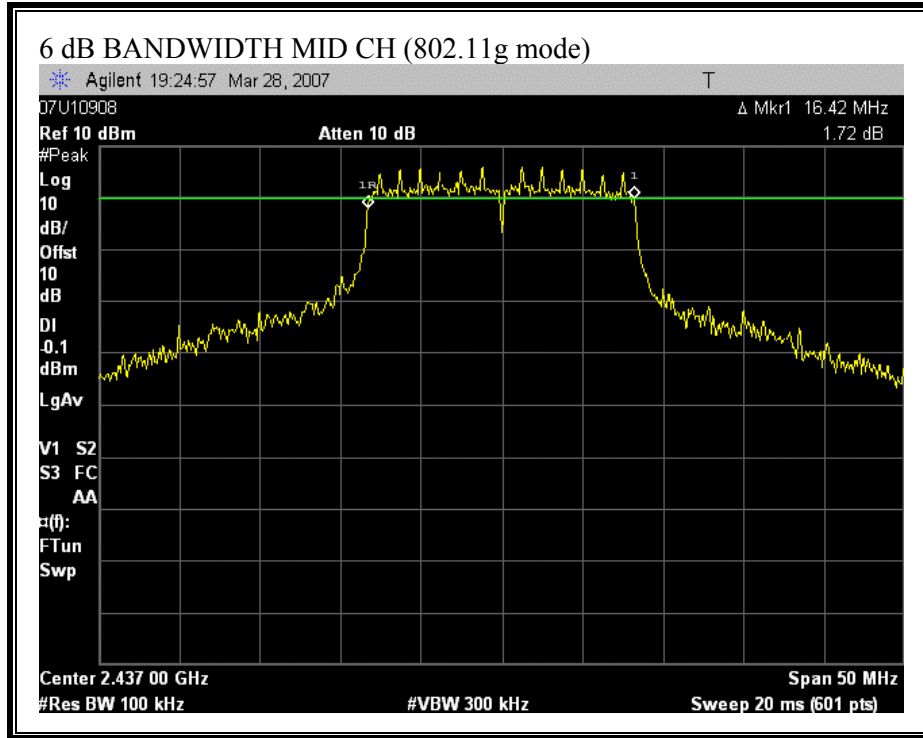
6 dB BANDWIDTH (802.11b MODE)

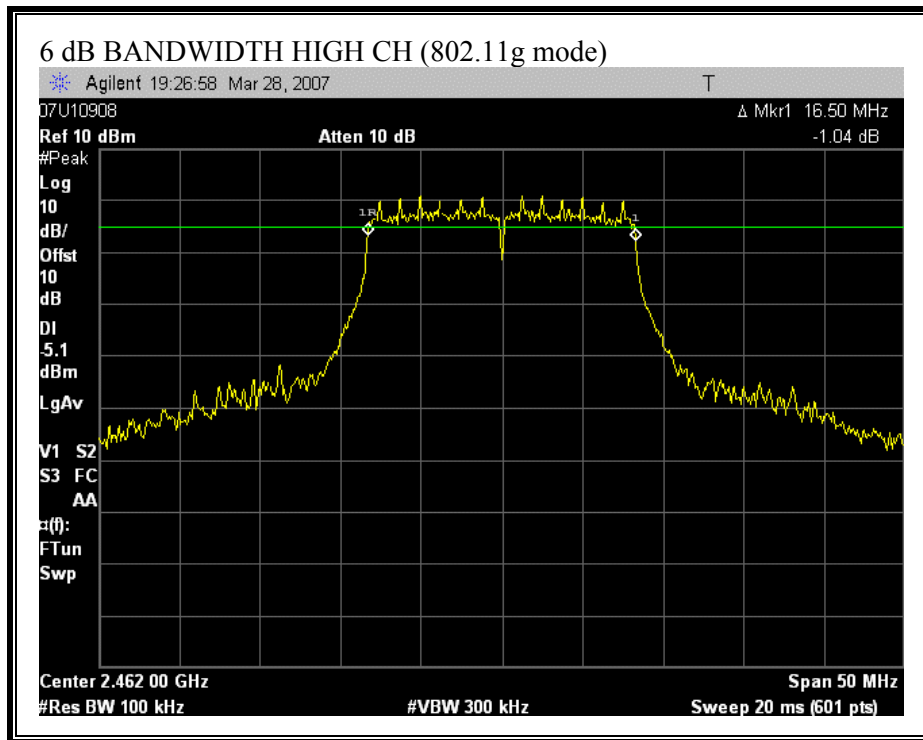




6 dB BANDWIDTH (802.11g MODE)







7.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

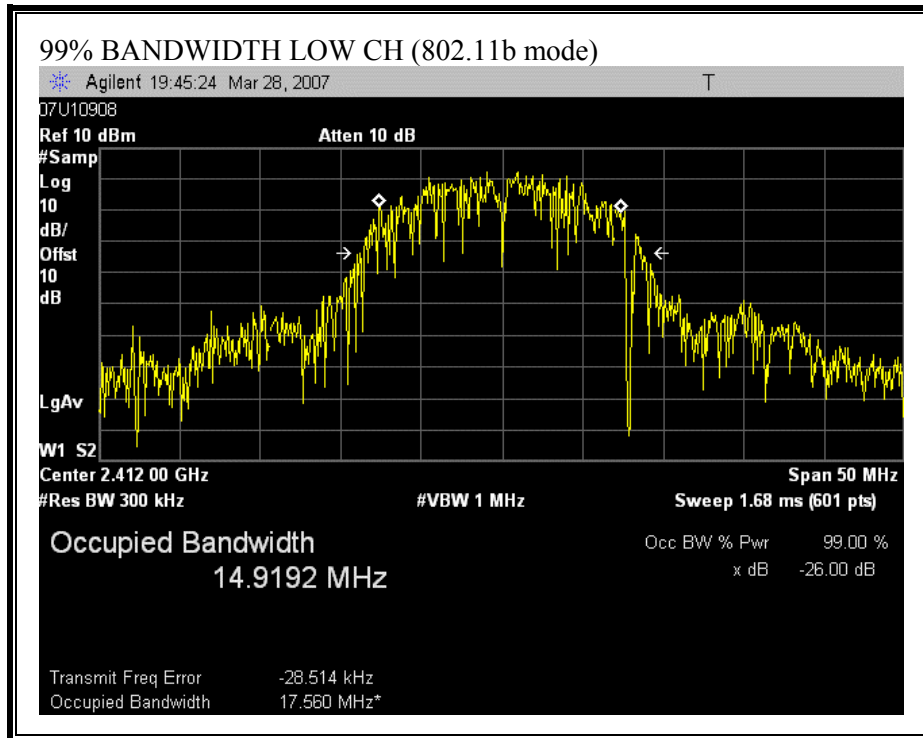
802.11b Mode

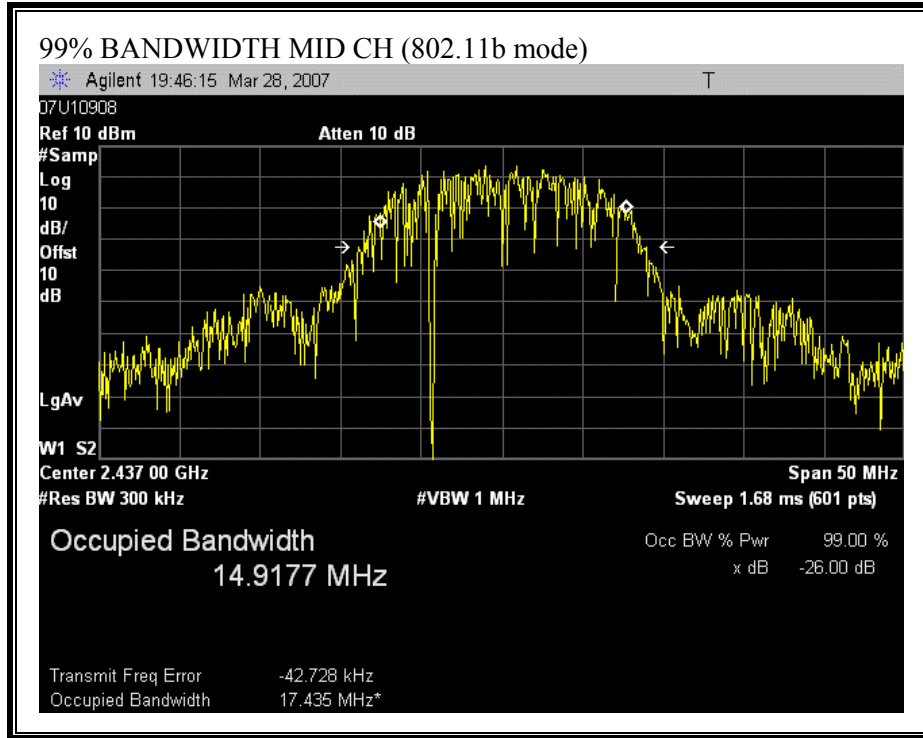
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	14.9192
Middle	2437	14.9177
High	2462	14.8954

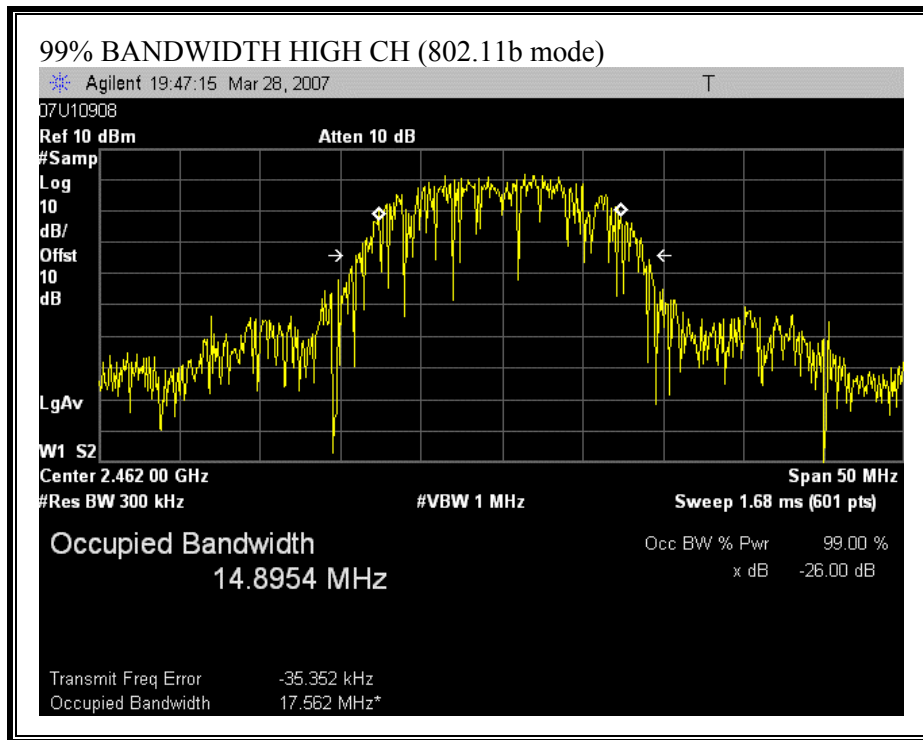
802.11g Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4542
Middle	2437	16.4944
High	2462	16.4403

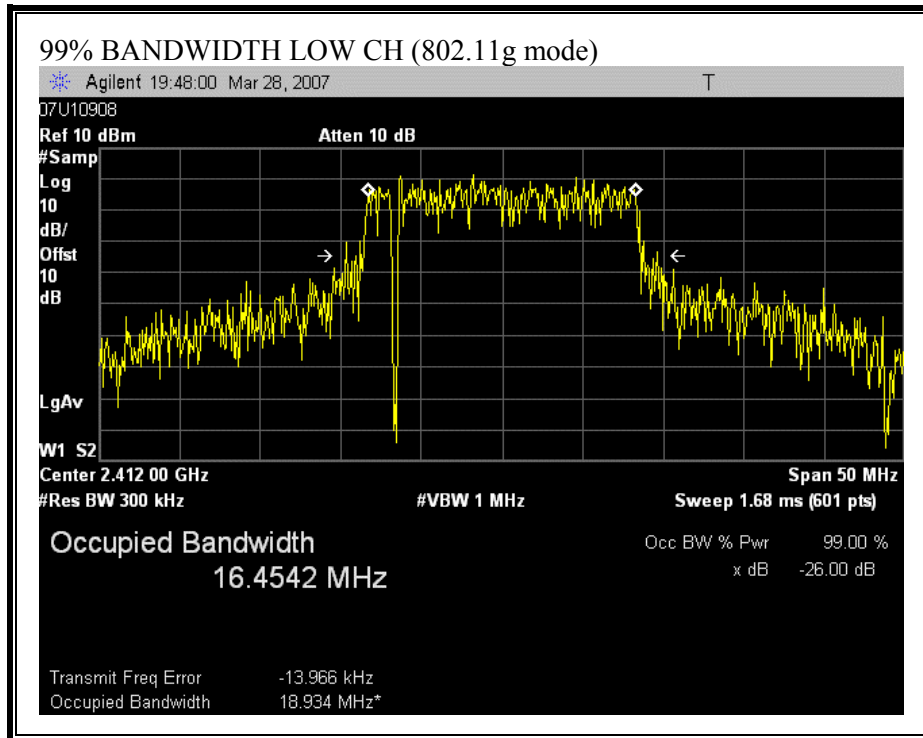
99% BANDWIDTH (802.11b MODE)

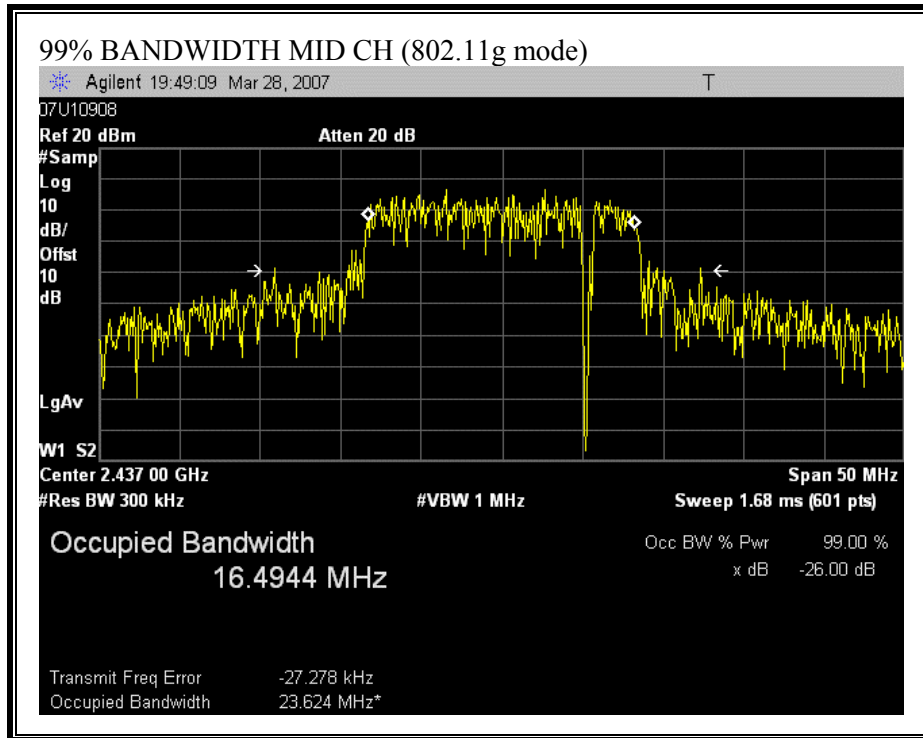


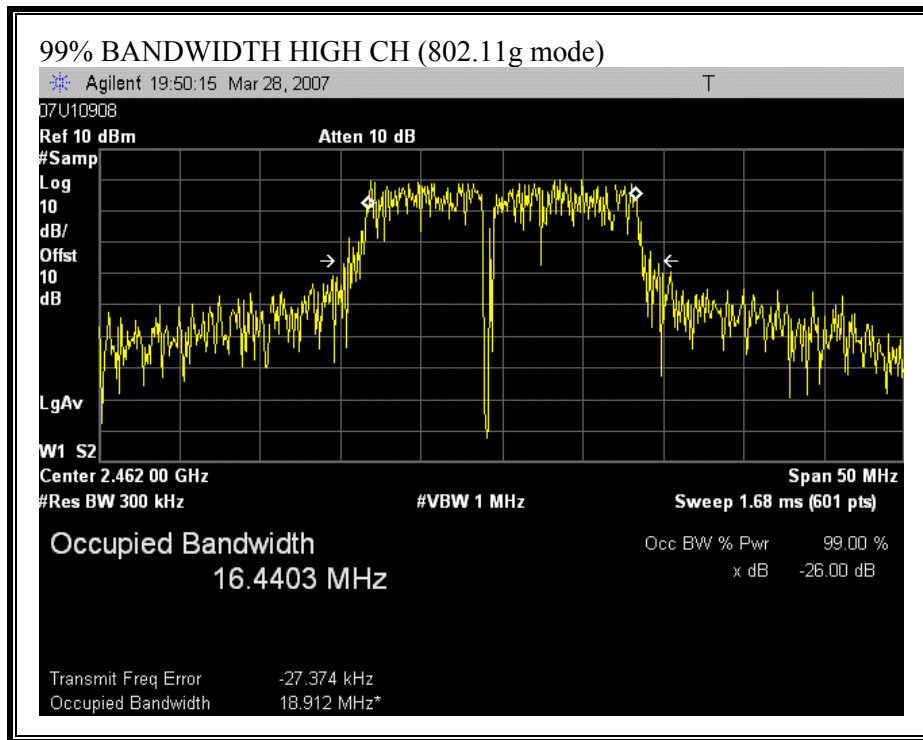




99% BANDWIDTH (802.11g MODE)







7.1.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

§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) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

The test is performed in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously, therefore; Power Output Option 2, Method # 1 is used.

RESULTS

The maximum antenna gain is 3.3 dBi exclusively for fixed, point-to-point operations; therefore the limit is 30 dBm.

No non-compliance noted:

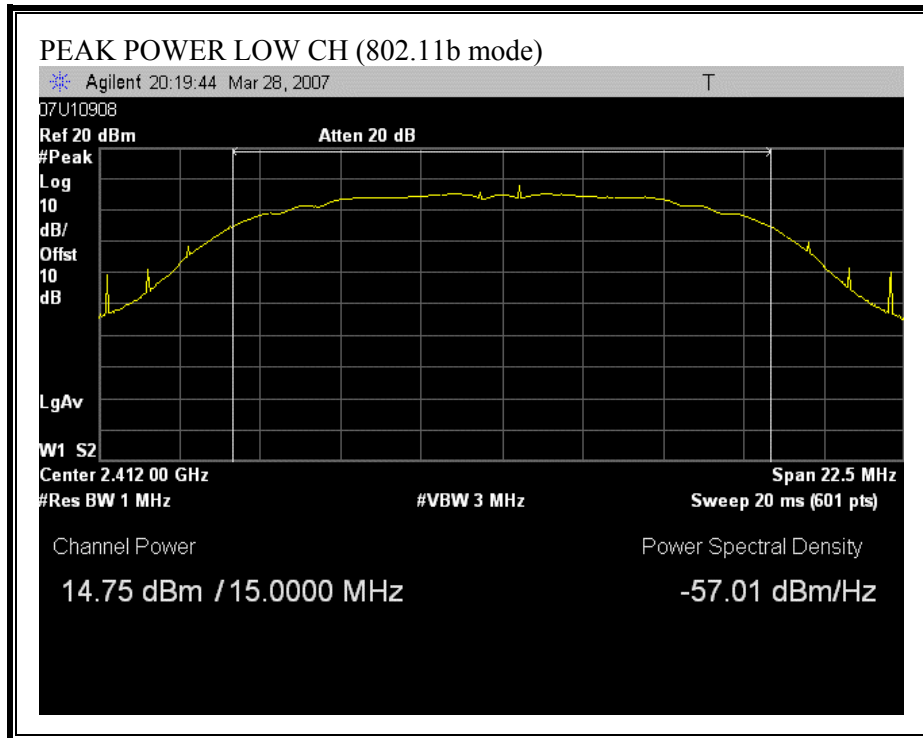
802.11b Mode

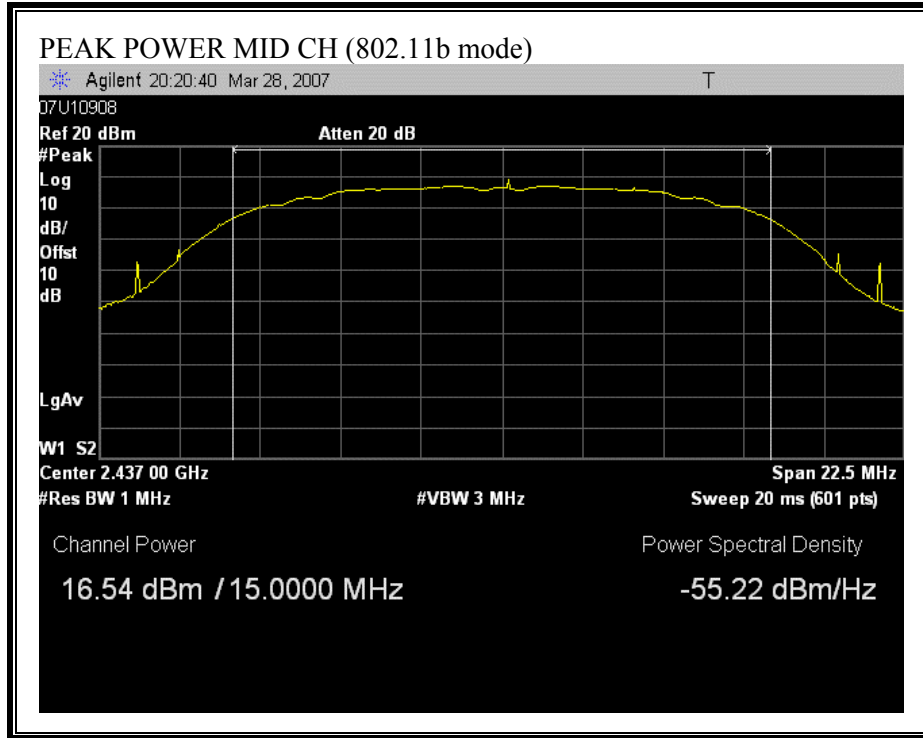
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	14.75	30	-15.25
Middle	2437	16.54	30	-13.46
High	2462	14.98	30	-15.02

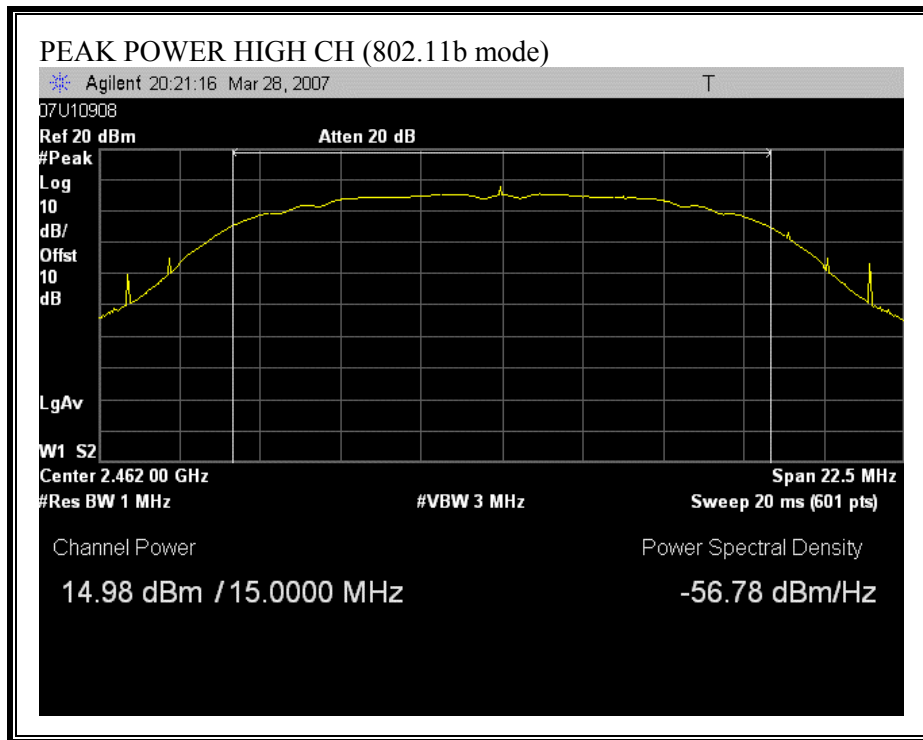
802.11g Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.74	30	-11.26
Middle	2437	23.30	30	-6.70
High	2462	19.01	30	-10.99

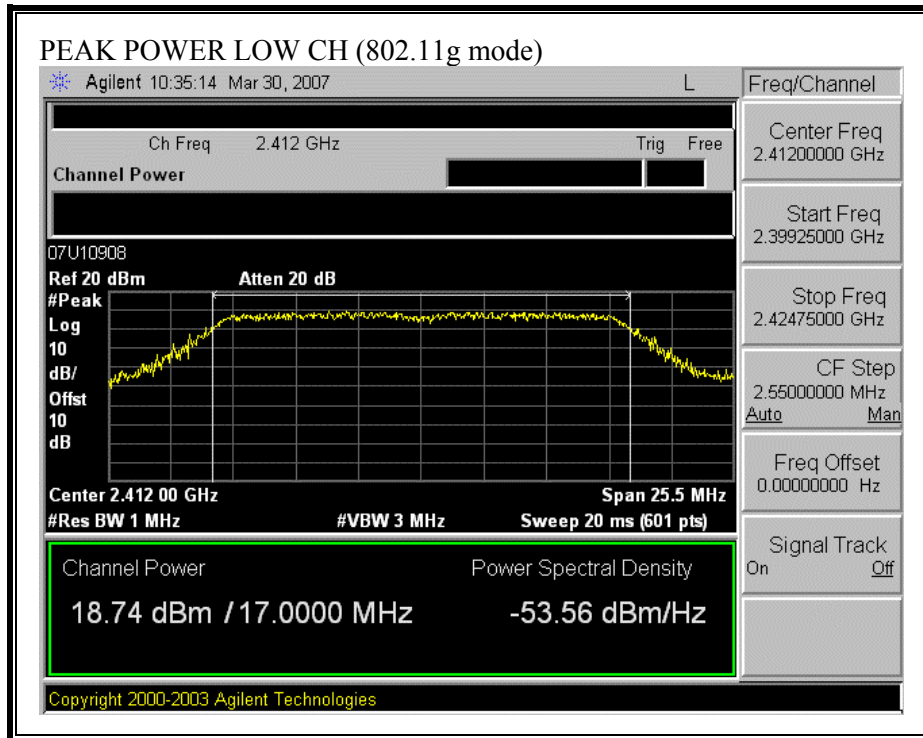
OUTPUT POWER (802.11b MODE)

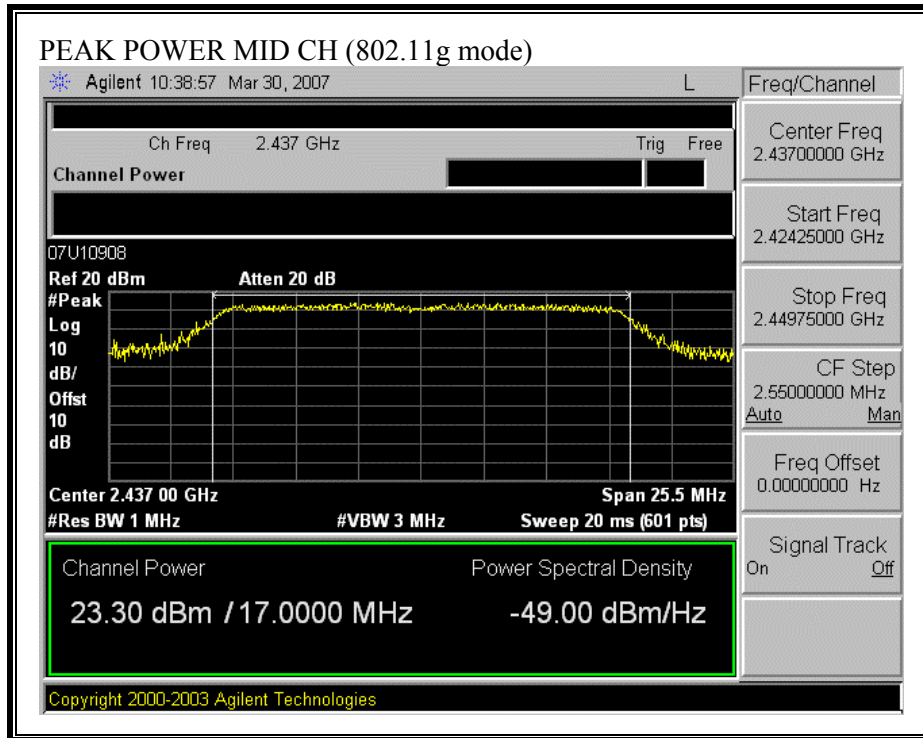


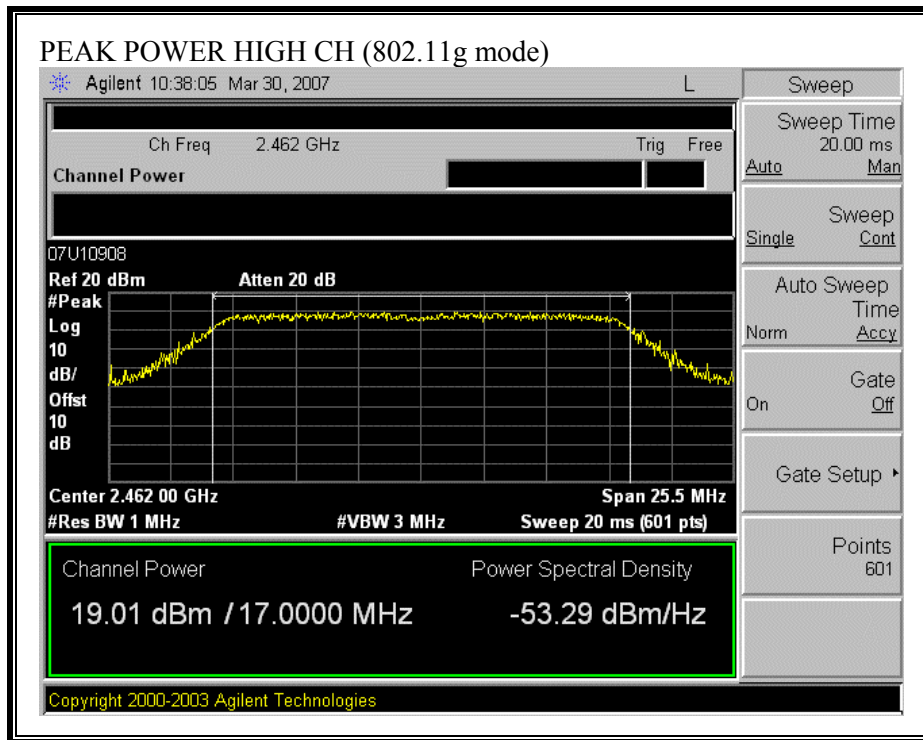




OUTPUT POWER (802.11g MODE)







7.1.4. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

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 rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of Power to mW and Distance to cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Rearranging terms to calculate the power density at a specific distance yields

$$S = 0.0795 * 10^{((P + G) / 10)} / (d^2)$$

LIMITS

From §1.1310 Table 1 (B), the maximum value of $S = 1.0 \text{ mW/cm}^2$

RESULTS

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm²)
802.11b	20.0	16.54	3.30	0.02
802.11g	20.0	23.30	3.30	0.09

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.5. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 10.15 dB (including 10 dB pad and 0.15 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	11.90
Middle	2437	13.64
High	2462	12.15

802.11g Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.27
Middle	2437	16.67
High	2462	12.55

7.1.6. PEAK POWER SPECTRAL DENSITY

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

No non-compliance noted:

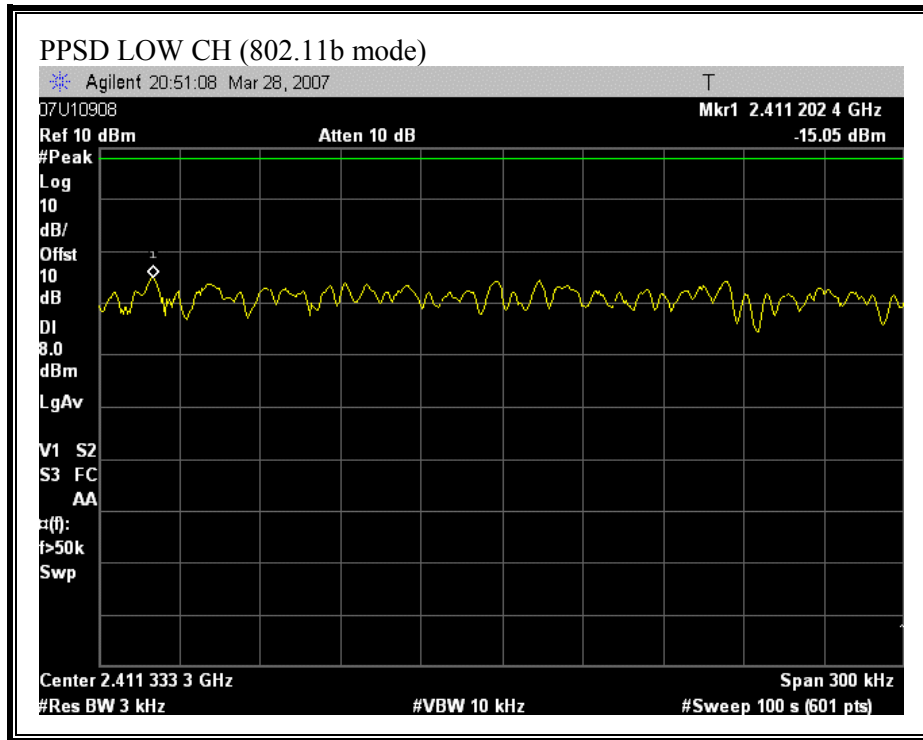
802.11b Mode

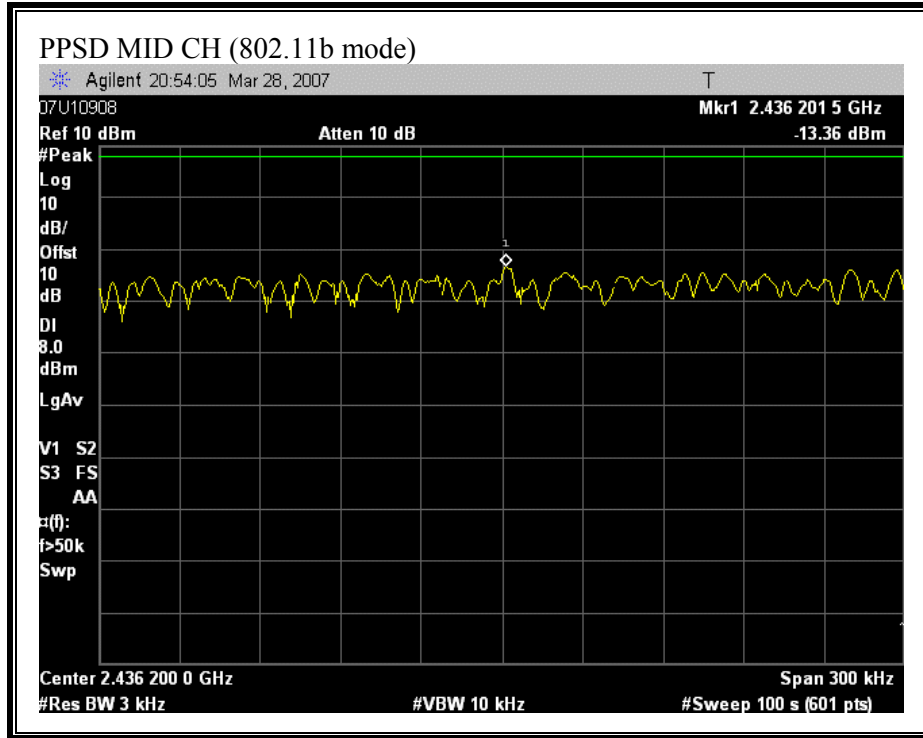
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-15.05	8	-23.05
Middle	2437	-13.36	8	-21.36
High	2462	-14.95	8	-22.95

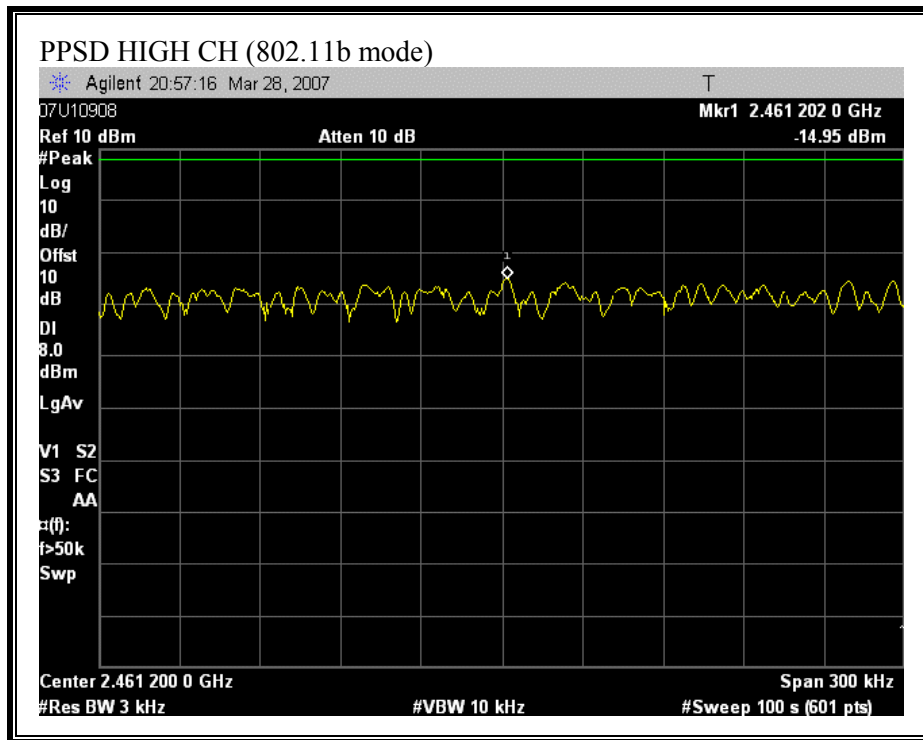
802.11g Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-15.16	8	-23.16
Middle	2437	-10.11	8	-18.11
High	2462	-14.85	8	-22.85

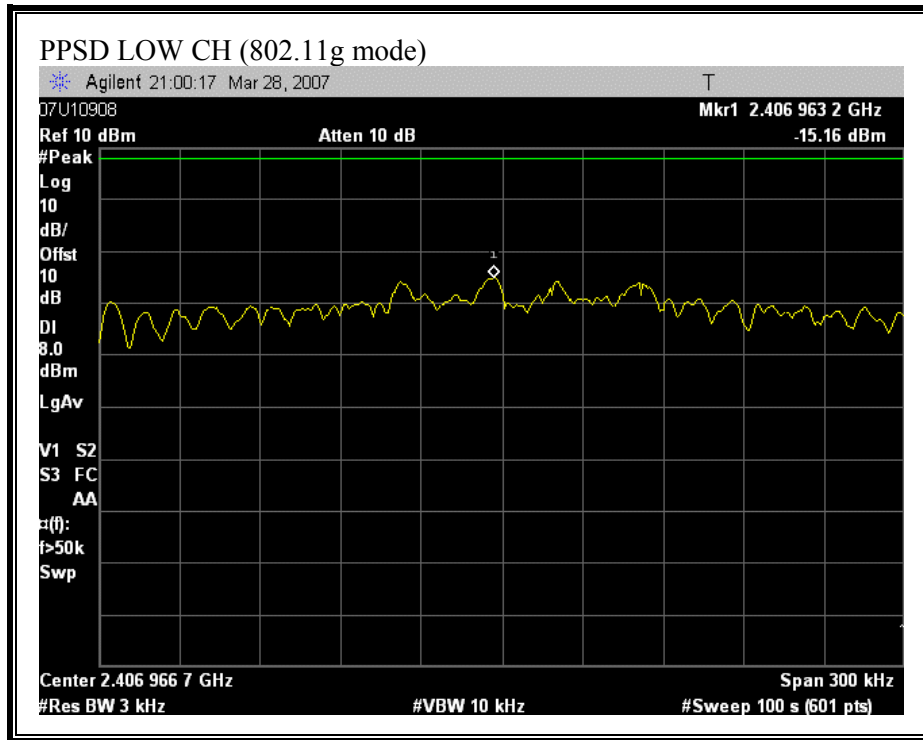
PEAK POWER SPECTRAL DENSITY (802.11b MODE)

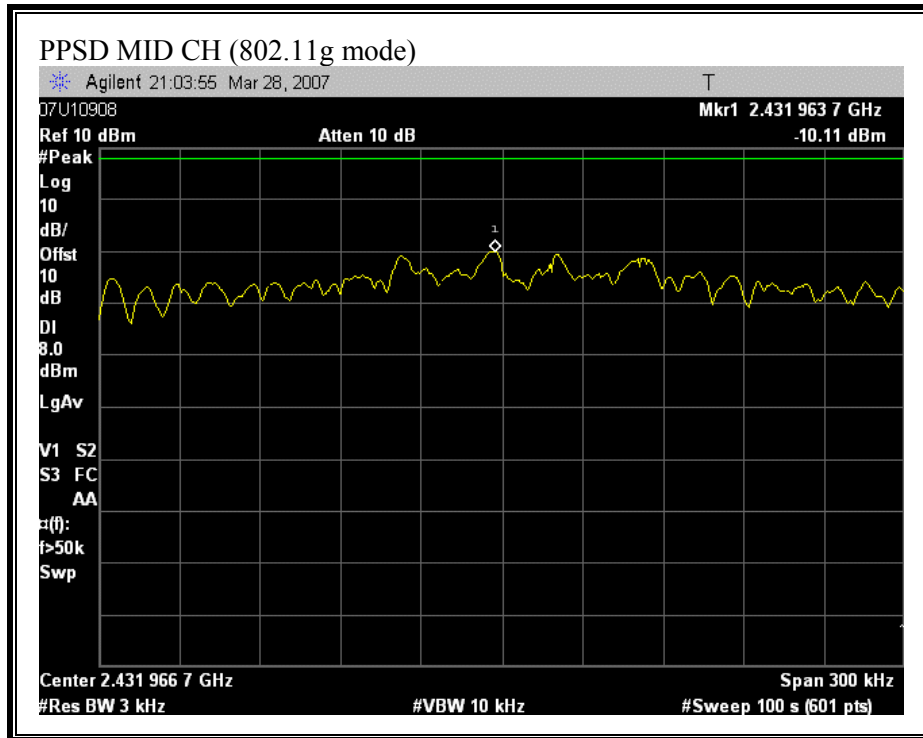


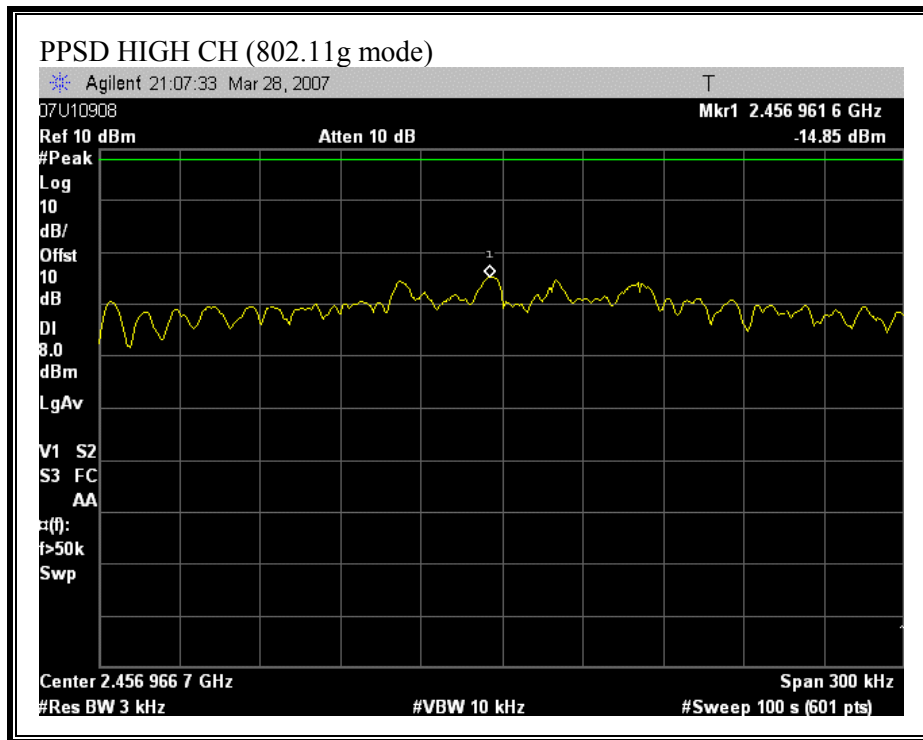




PEAK POWER SPECTRAL DENSITY (802.11g MODE)







7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) 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 band 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 PROCEDURE

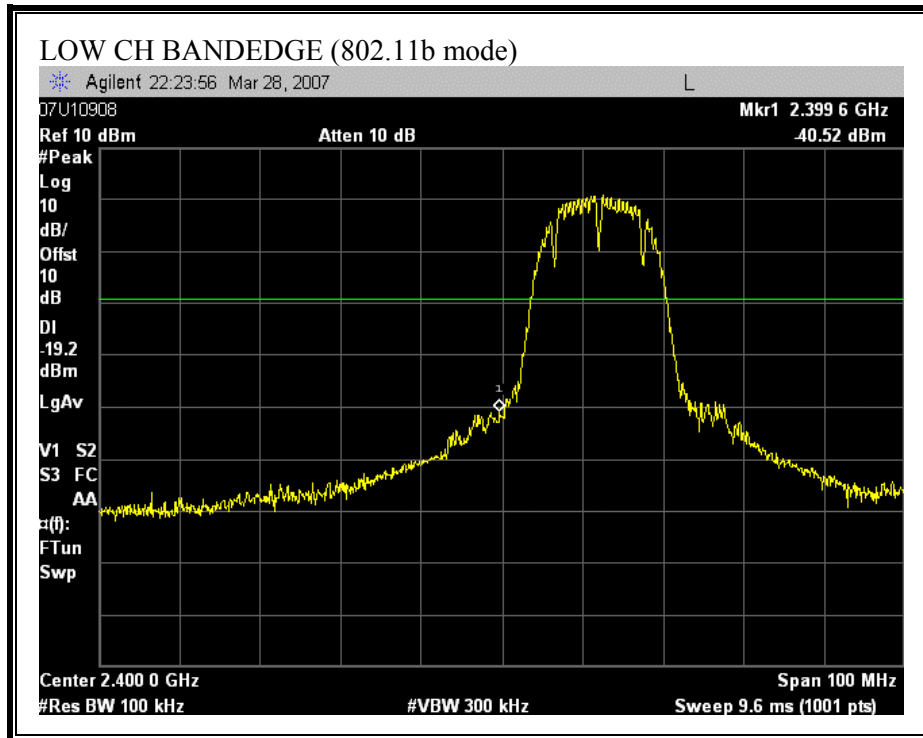
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

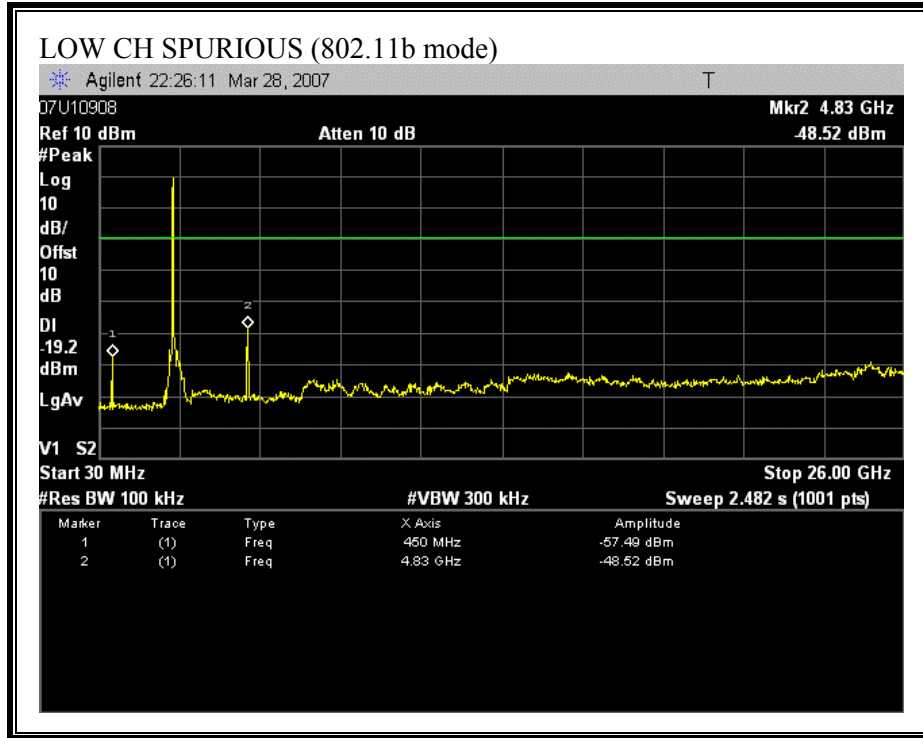
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

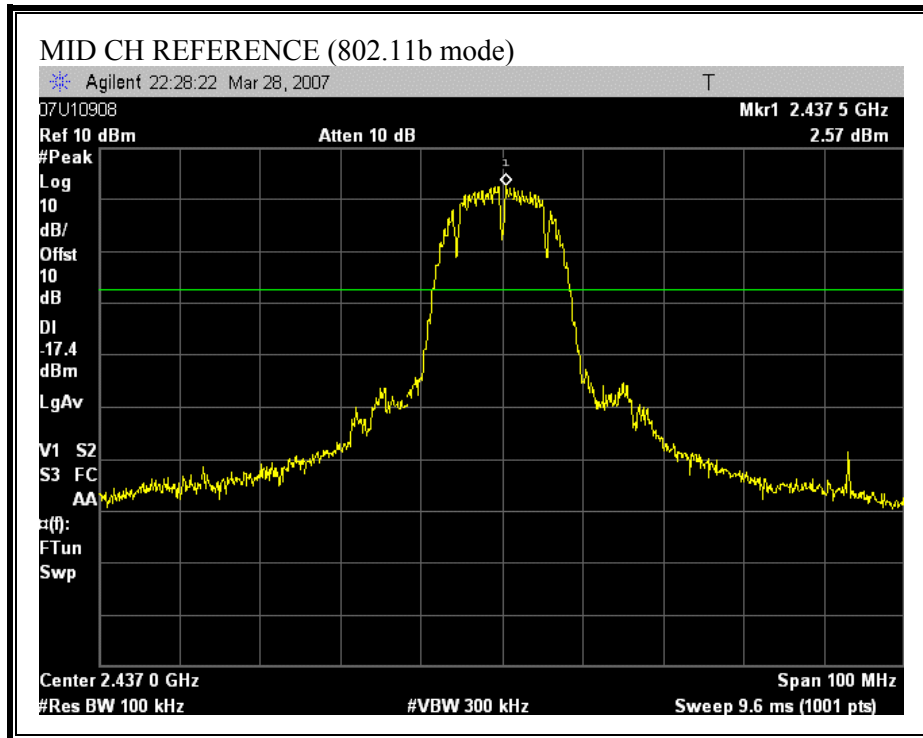
No non-compliance noted:

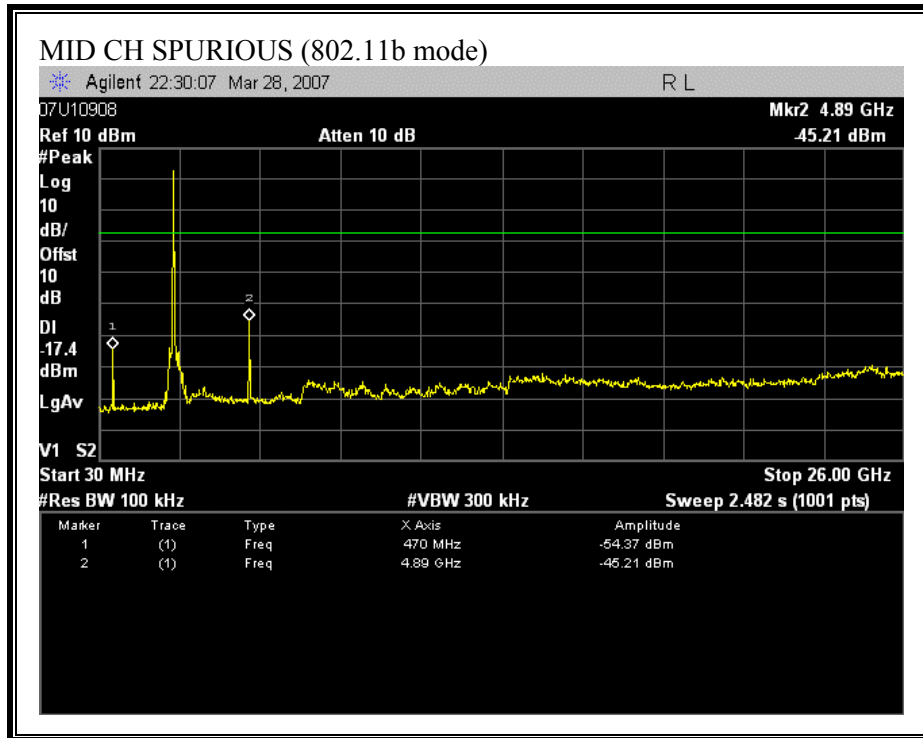
SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)



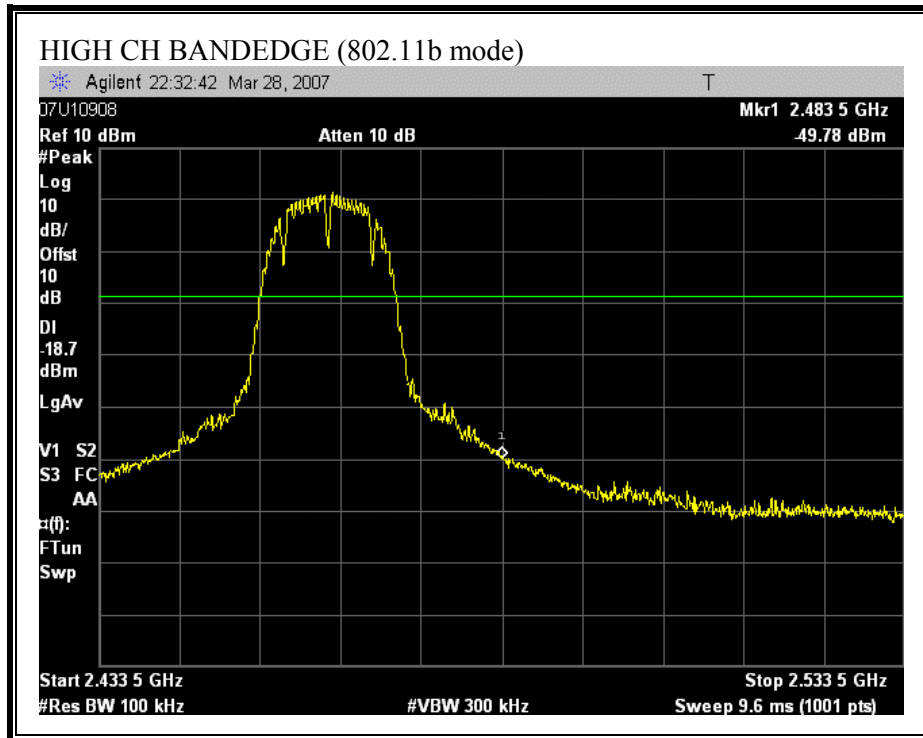


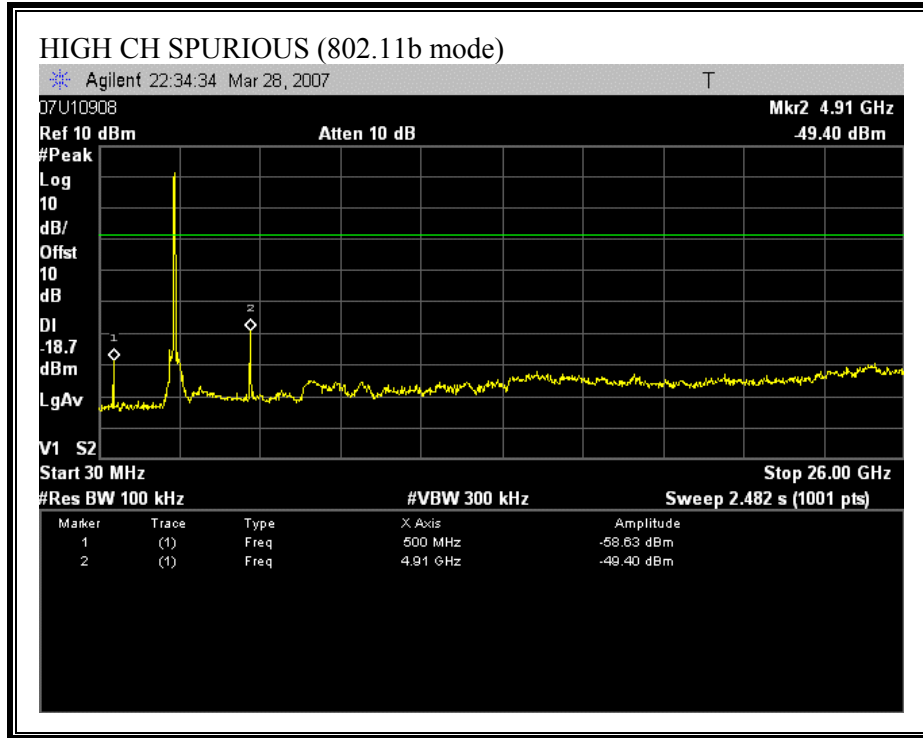
SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)



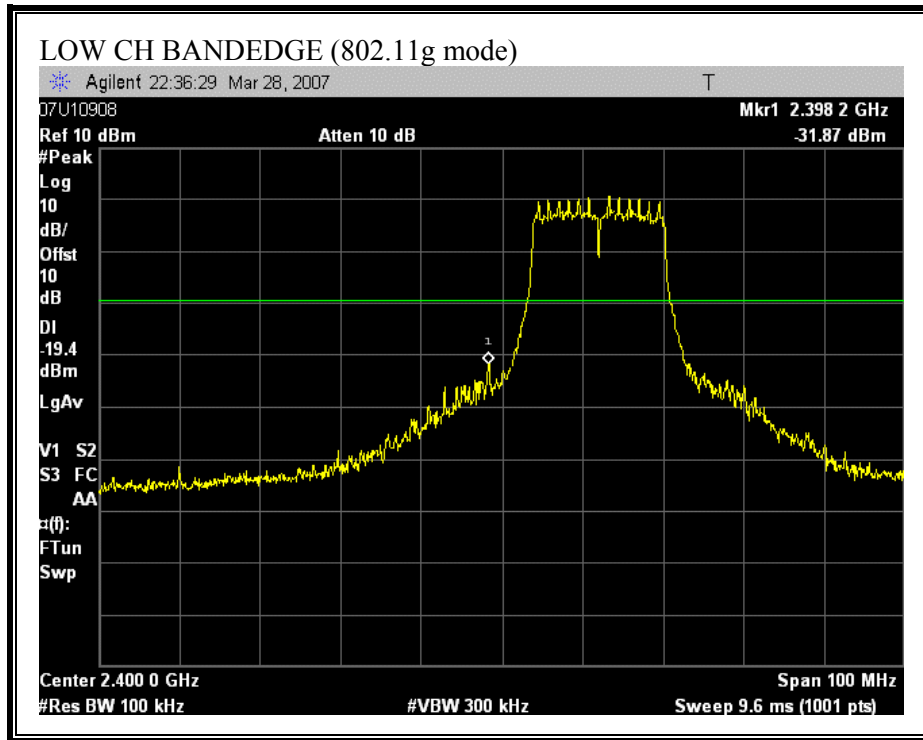


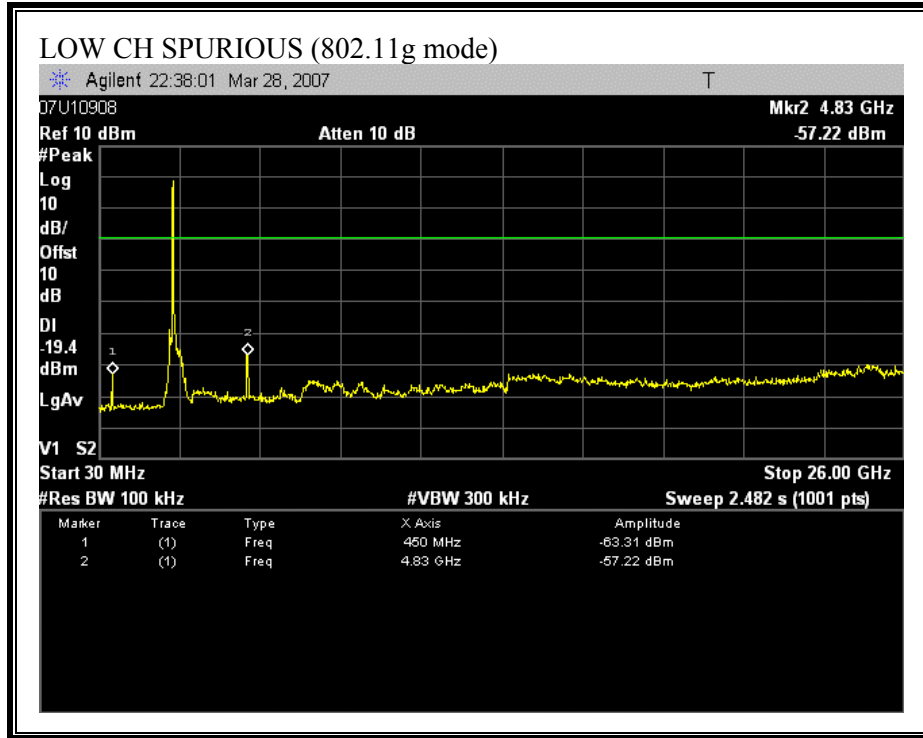
SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)



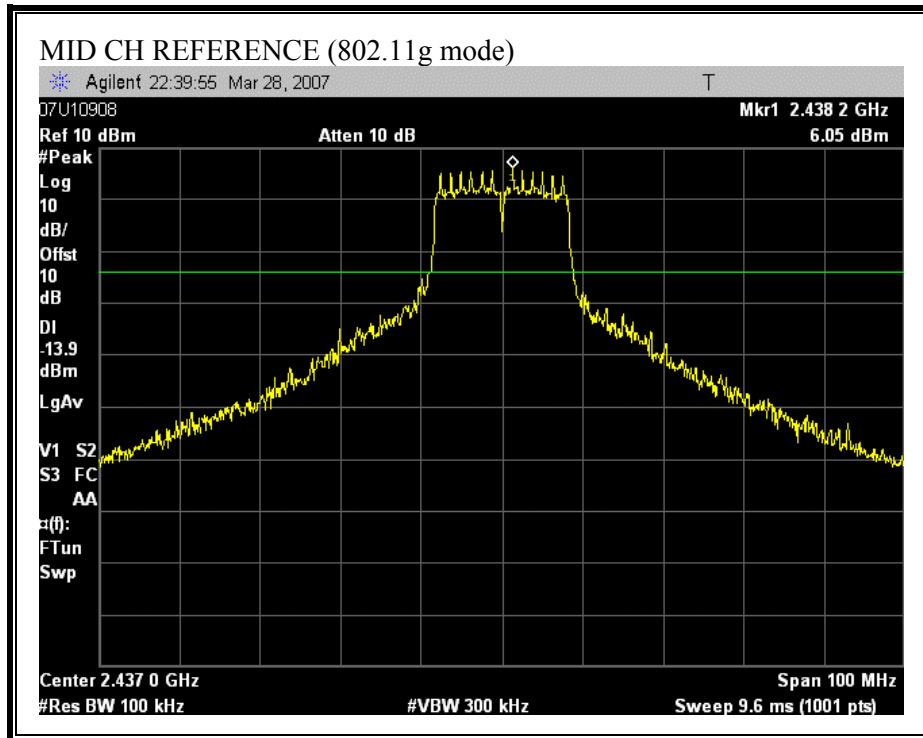


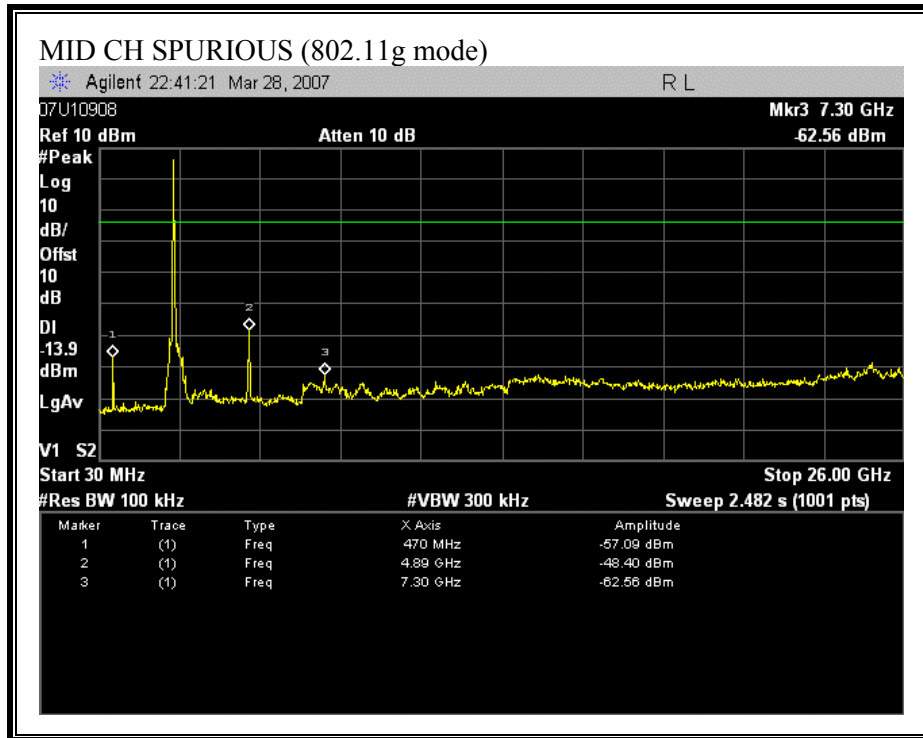
SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE)



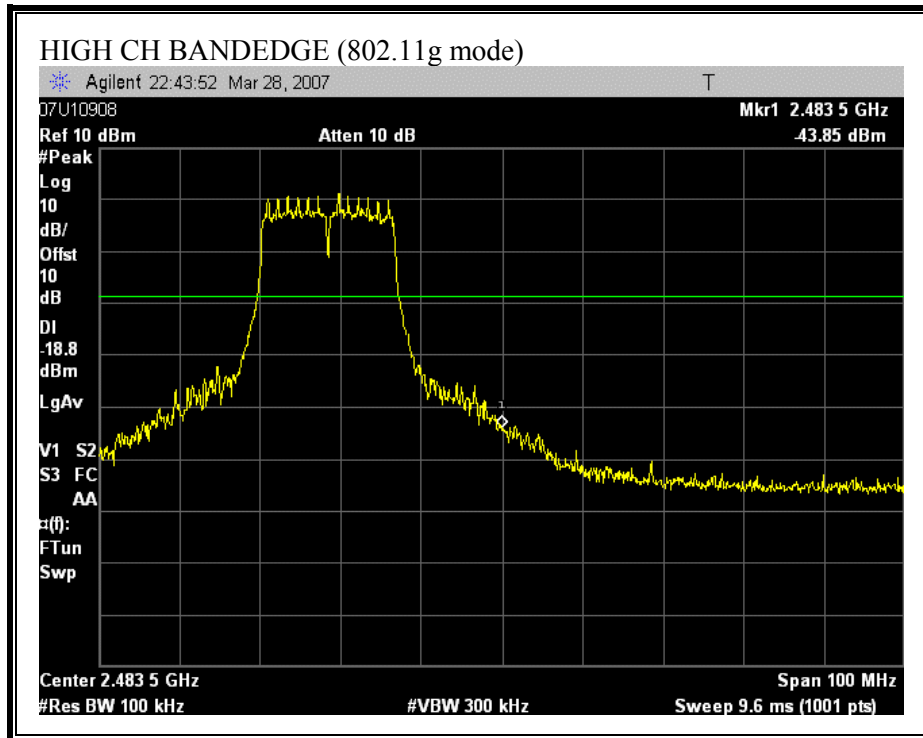


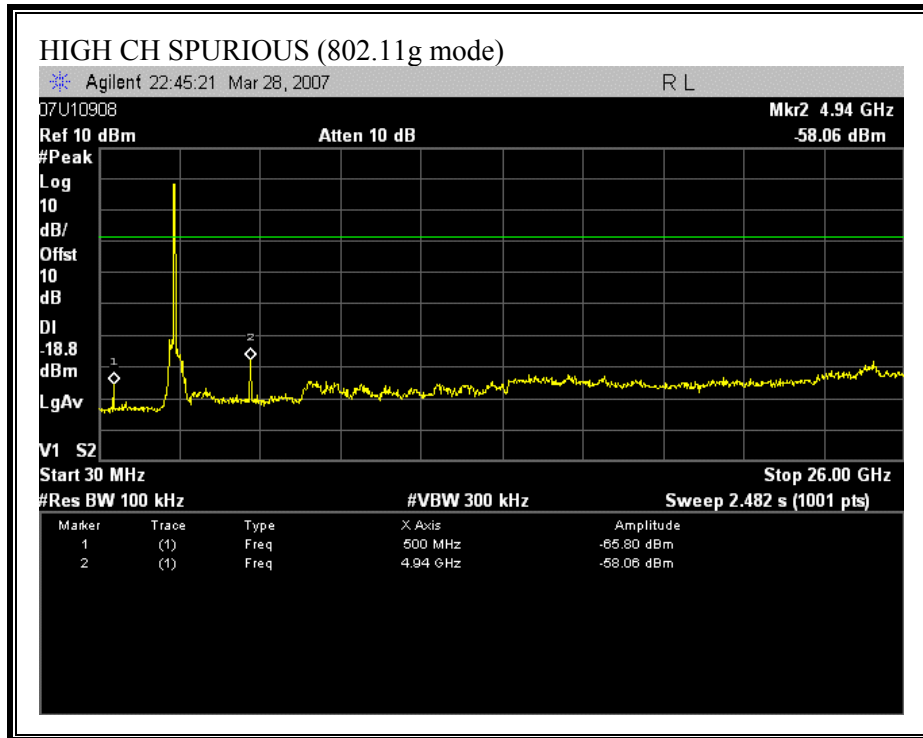
SPURIOUS EMISSIONS, MID CHANNEL (802.11g MODE)





SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE)





7.2. CHANNEL TESTS FOR THE 5725 TO 5850 MHz BAND

7.2.1. 6 dB BANDWIDTH

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

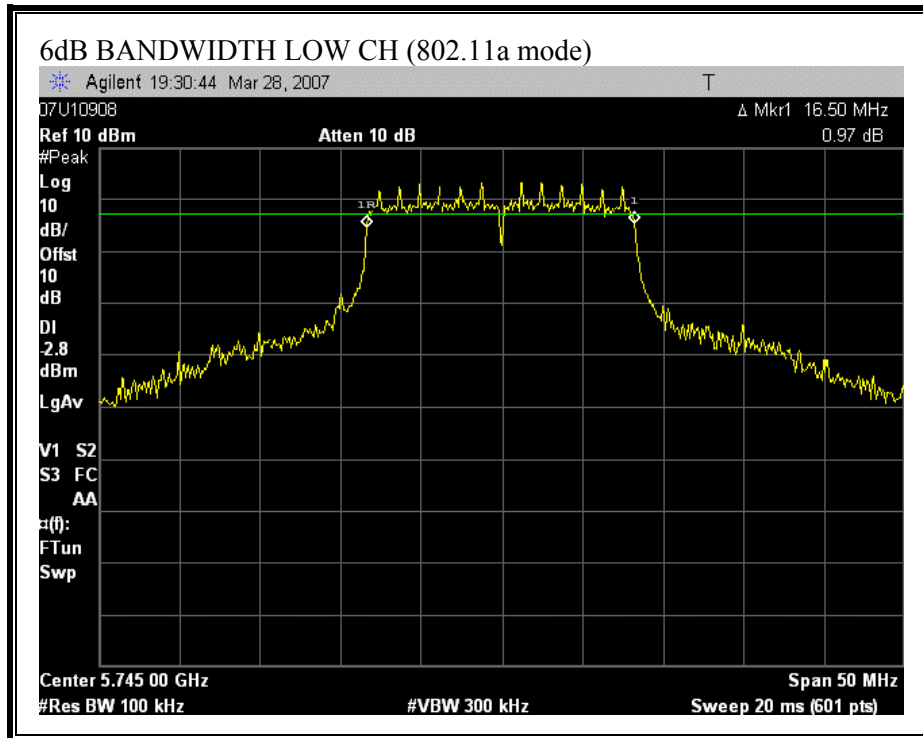
RESULTS

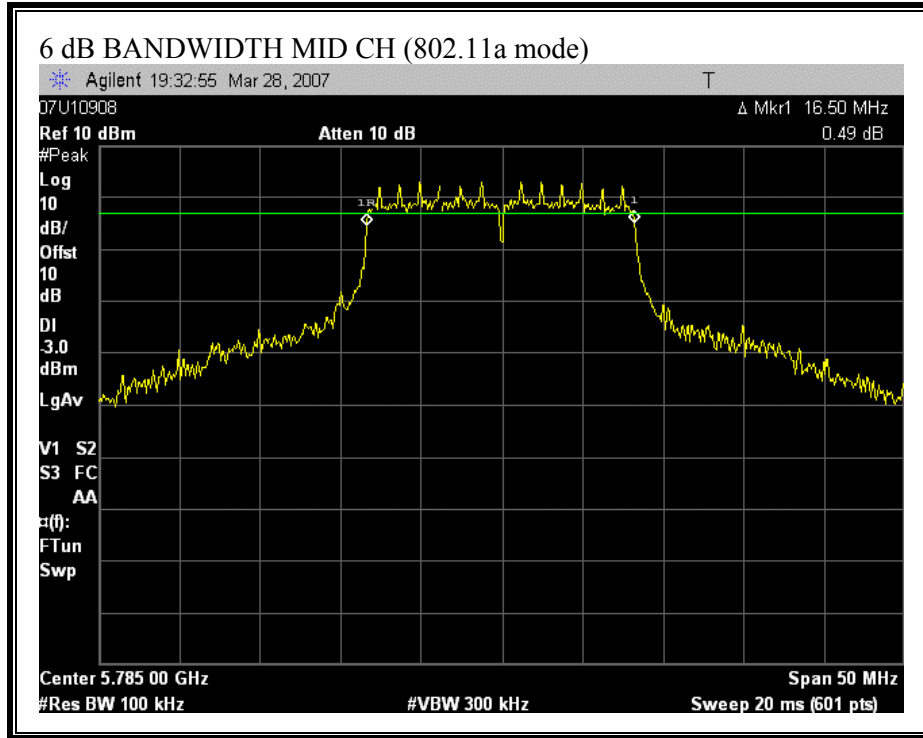
No non-compliance noted:

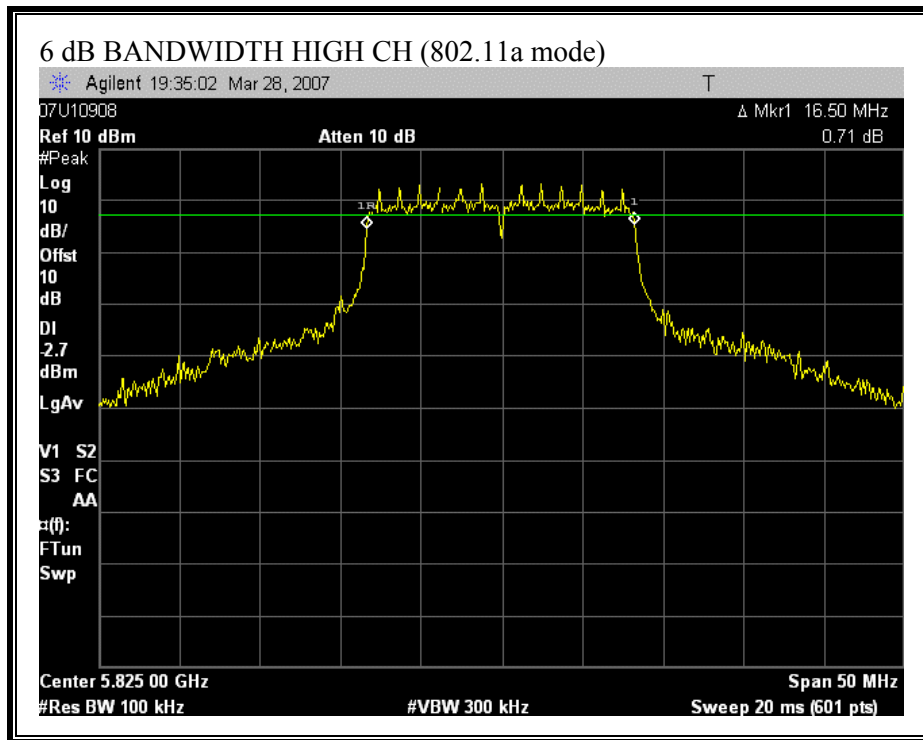
802.11a Mode

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	5745	16500	500	16000
Middle	5785	16500	500	16000
High	5825	16500	500	16000

6 dB BANDWIDTH (802.11a MODE)







7.2.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

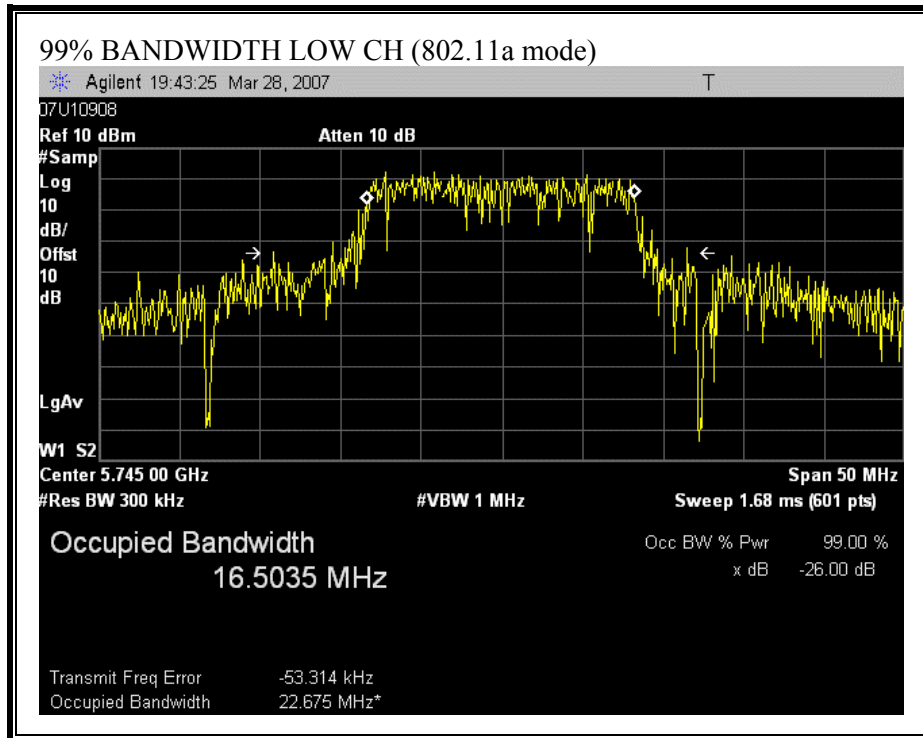
RESULTS

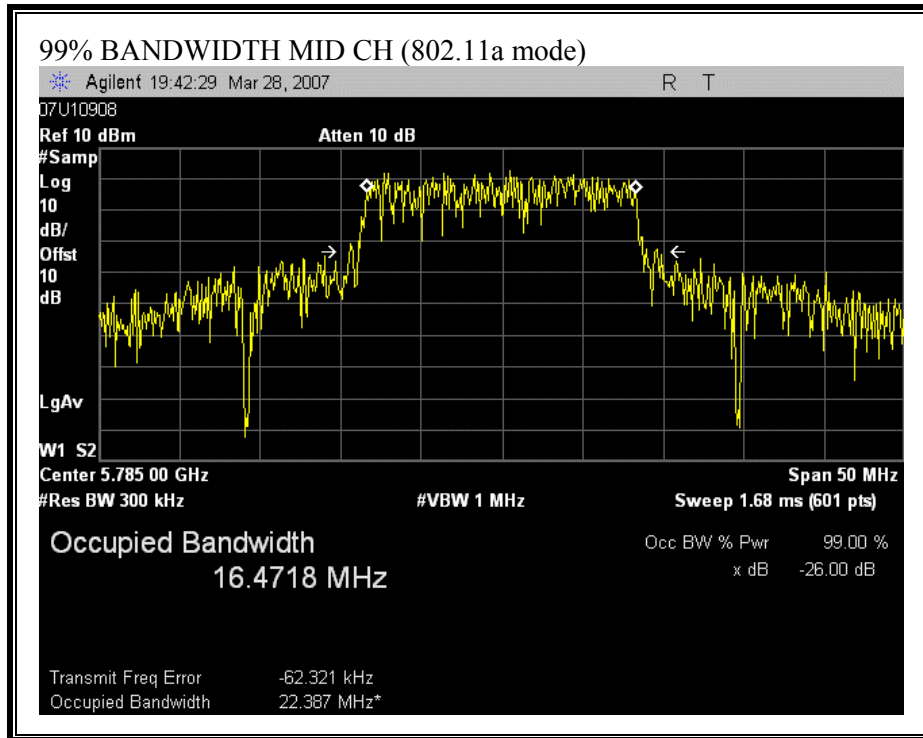
No non-compliance noted:

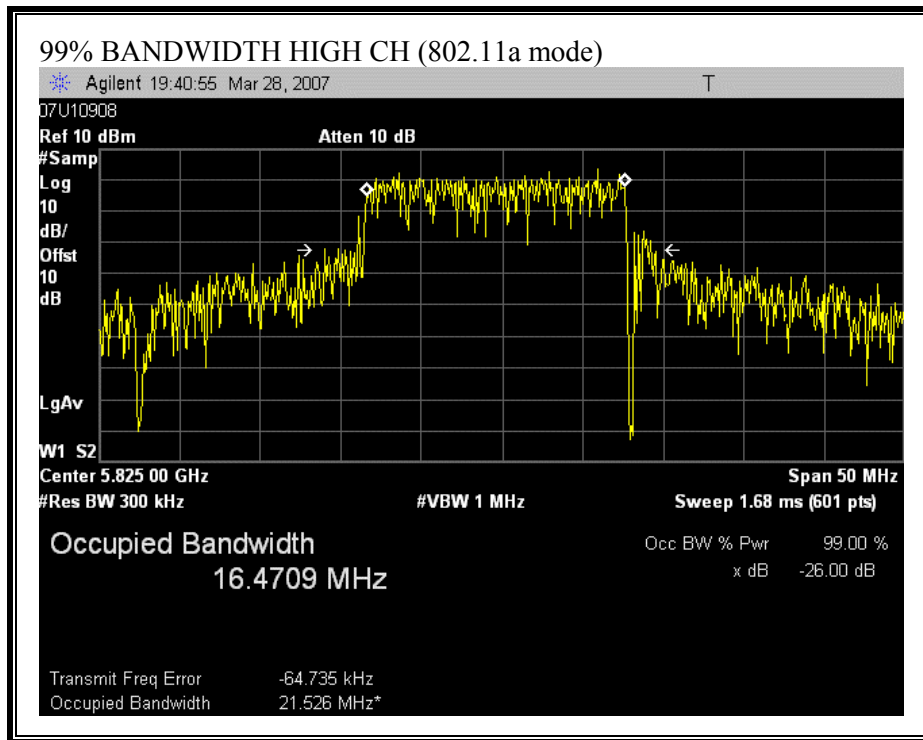
802.11a Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.5035
Middle	5785	16.4718
High	5825	16.4709

99% BANDWIDTH (802.11a MODE)







7.2.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

§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 (b)(3) (i), (ii) and (iii) 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) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

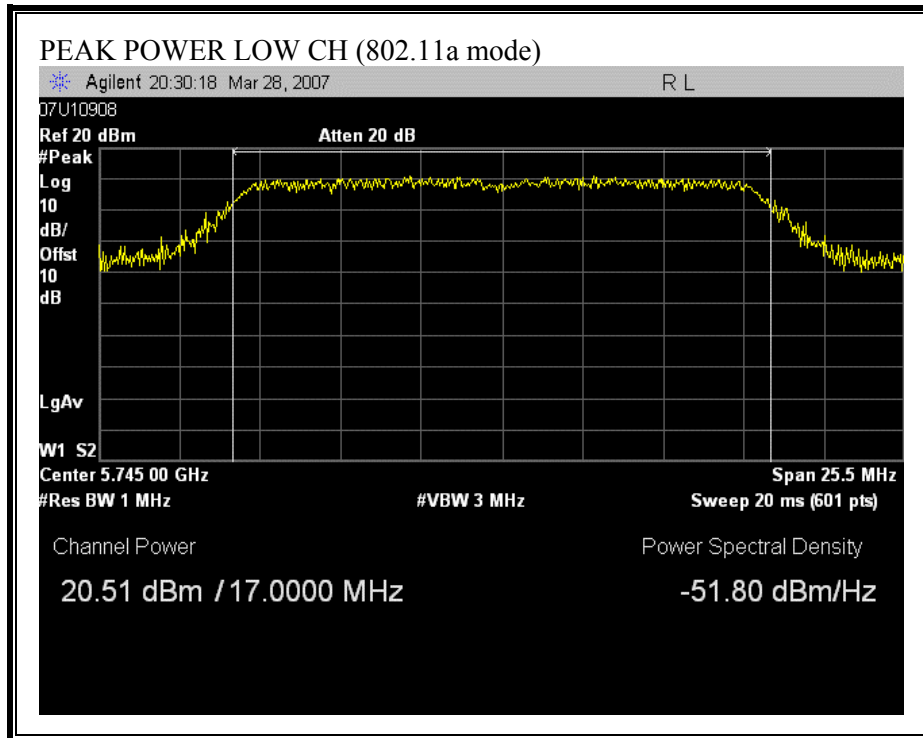
The maximum antenna gain in this band is 0.4 dBi exclusively for fixed, point-to-point operations; therefore the limit is 30 dBm.

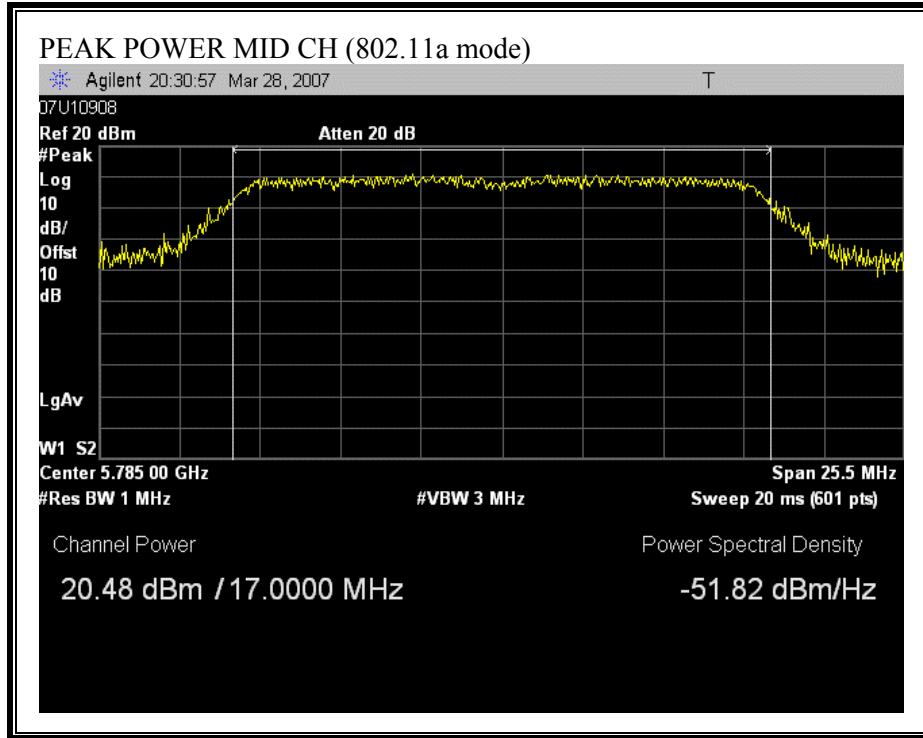
No non-compliance noted:

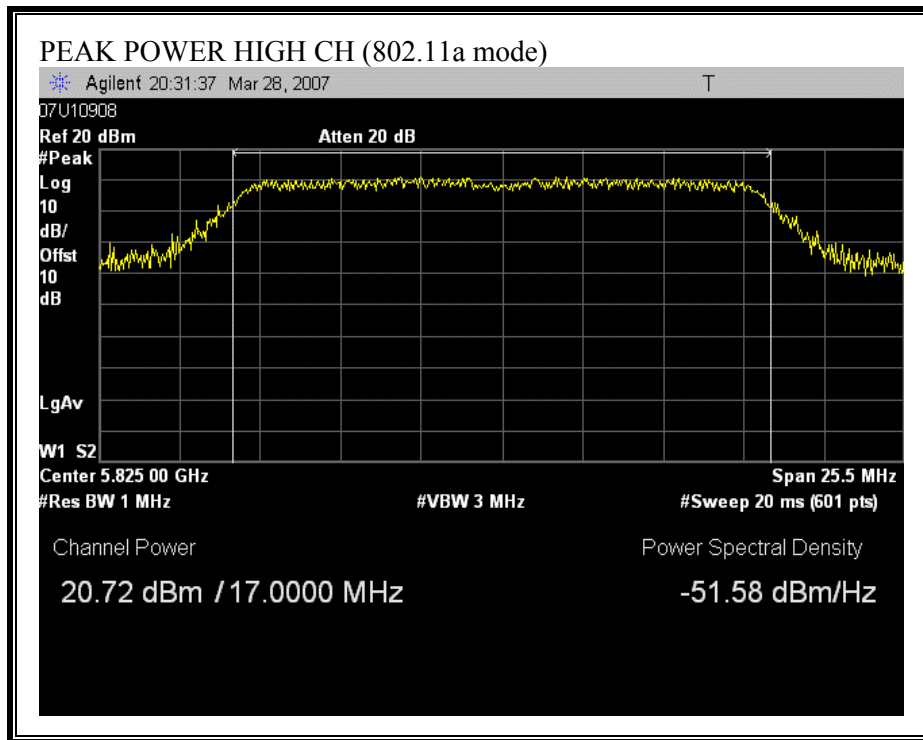
802.11a Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	20.51	30	-9.49
Middle	5785	20.48	30	-9.52
High	5825	20.72	30	-9.28

OUTPUT POWER (802.11a MODE)







7.2.4. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

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 rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of Power to mW and Distance to cm, using:

$$P \text{ (mW)} = 1000 * P \text{ (W)} \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Rearranging terms to calculate the power density at a specific distance yields

$$S = 0.0795 * 10^{((P + G) / 10)} / (d^2)$$

LIMITS

From §1.1310 Table 1 (B), the maximum value of $S = 1.0 \text{ mW/cm}^2$

RESULTS

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm²)
802.11a	20.0	20.72	0.40	0.03

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.2.5. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 10.3 dB (including 10 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5745	14.00
Middle	5785	14.00
High	5825	14.10

7.2.6. PEAK POWER SPECTRAL DENSITY

LIMIT

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

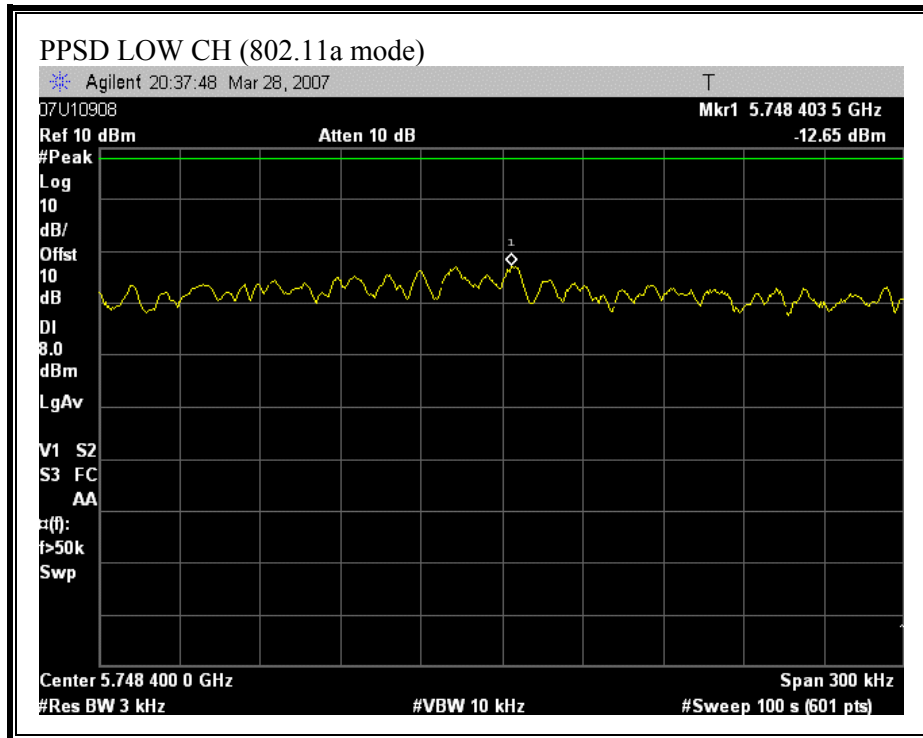
RESULTS

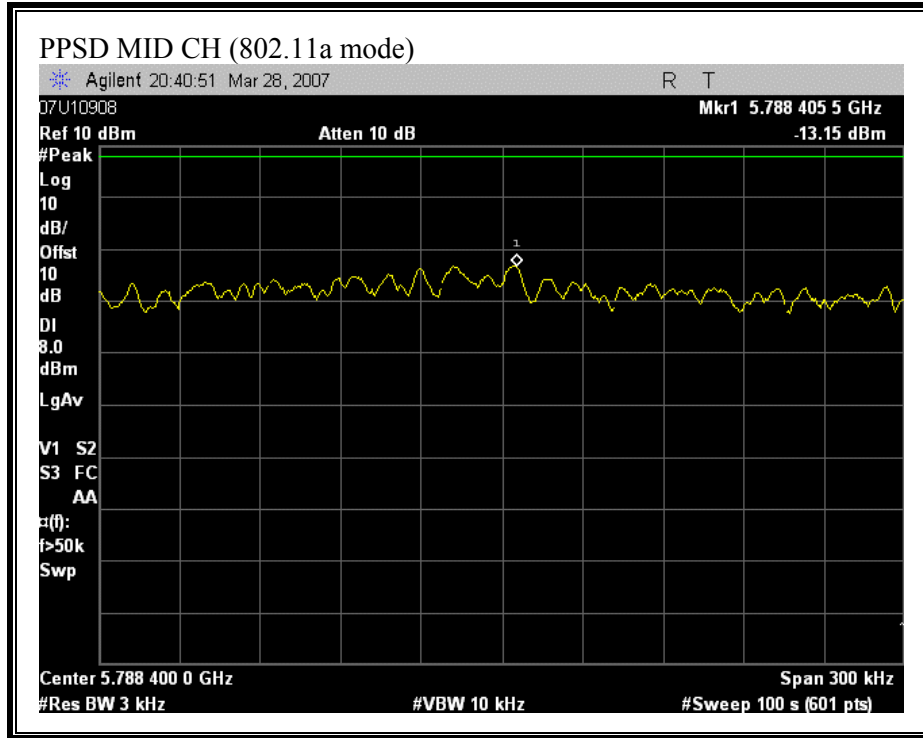
No non-compliance noted:

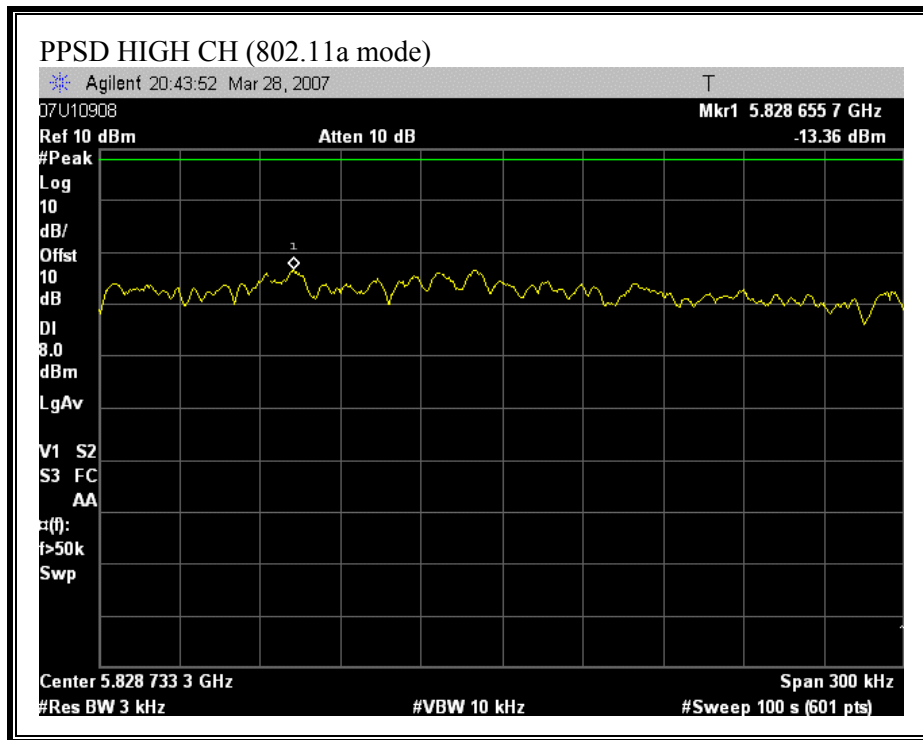
802.11a Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-12.65	8	-20.65
Middle	5785	-13.15	8	-21.15
High	5825	-13.36	8	-21.36

PEAK POWER SPECTRAL DENSITY (802.11a MODE)







7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) 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 band 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 PROCEDURE

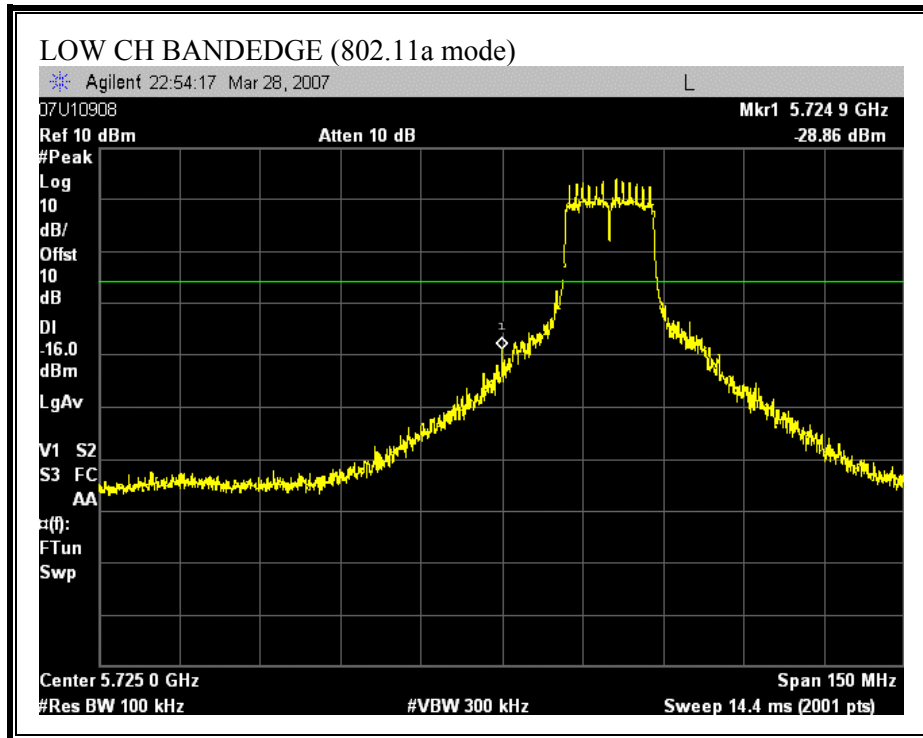
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

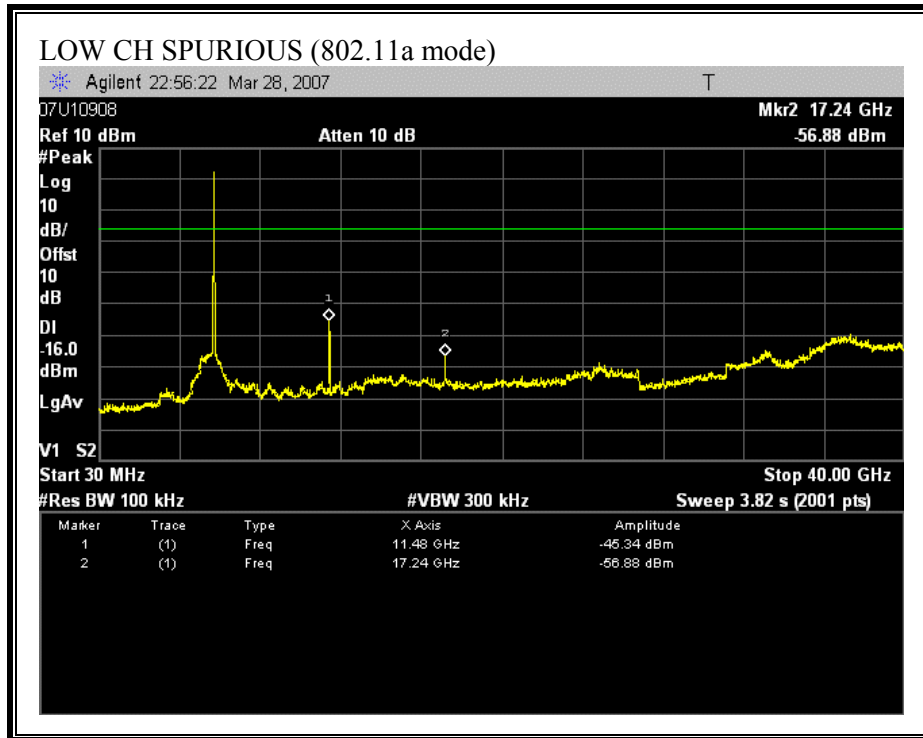
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

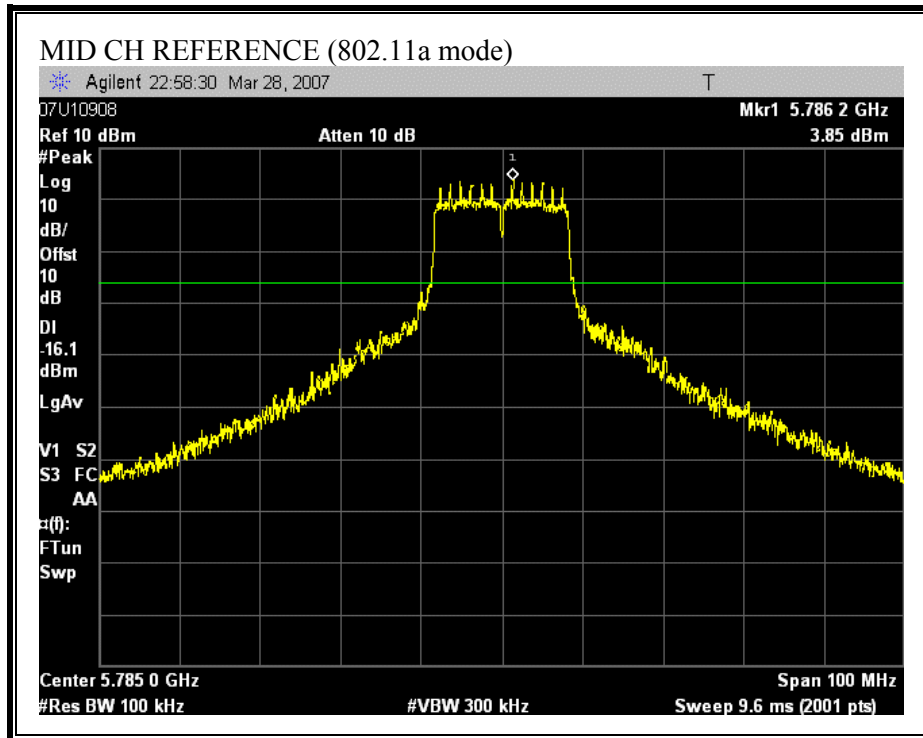
No non-compliance noted:

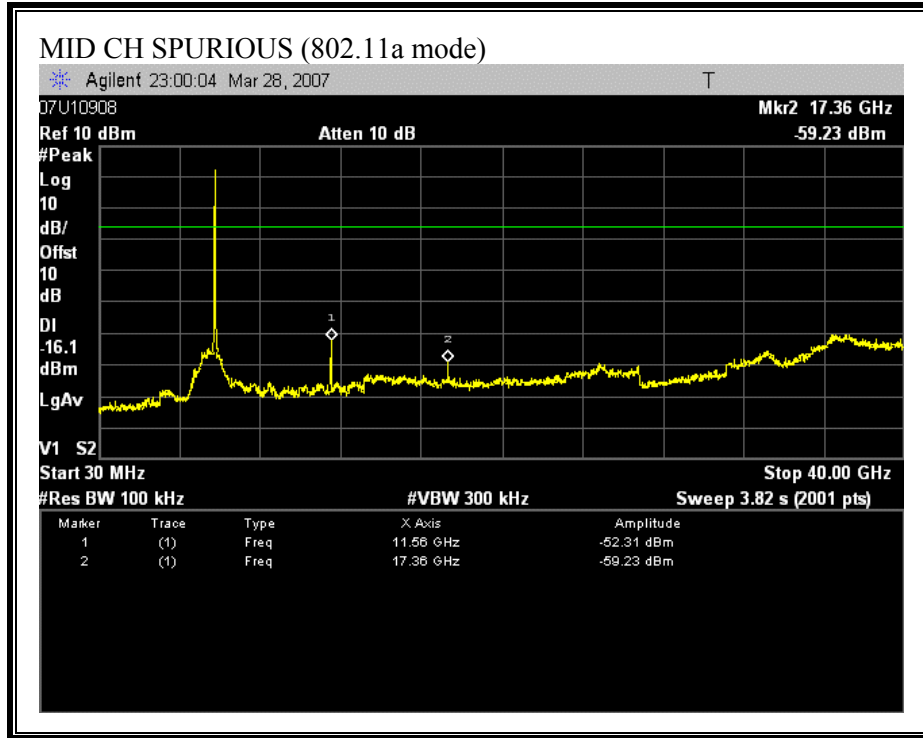
SPURIOUS EMISSIONS, LOW CHANNEL (802.11a MODE)



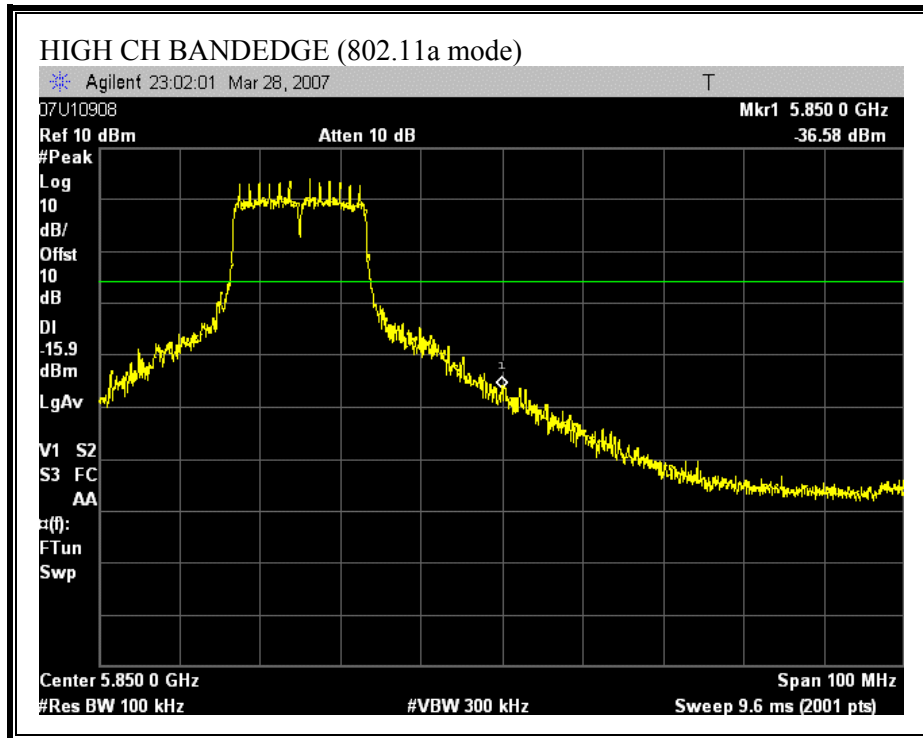


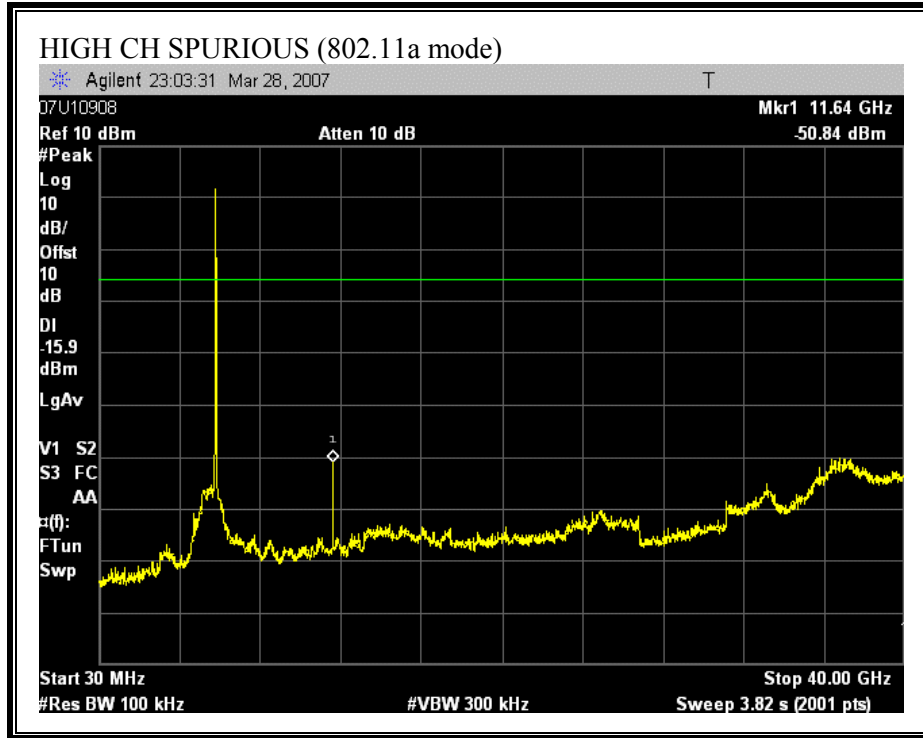
SPURIOUS EMISSIONS, MID CHANNEL (802.11a MODE)





SPURIOUS EMISSIONS, HIGH CHANNEL (802.11a MODE)





7.3. RADIATED EMISSIONS

7.3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§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 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

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

² Above 38.6

§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 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.

§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)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

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

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

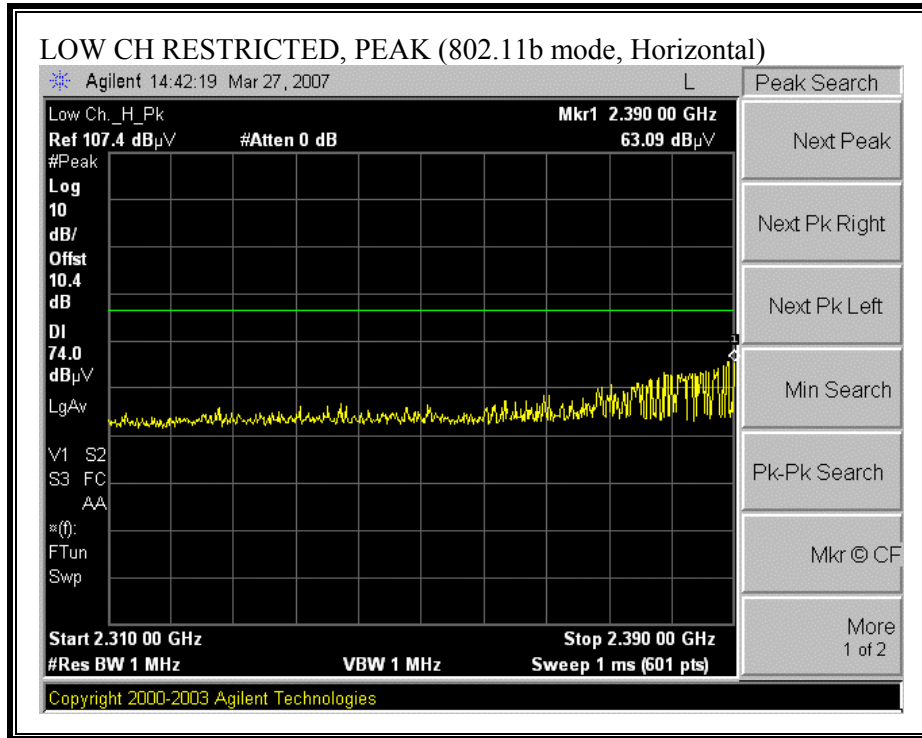
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

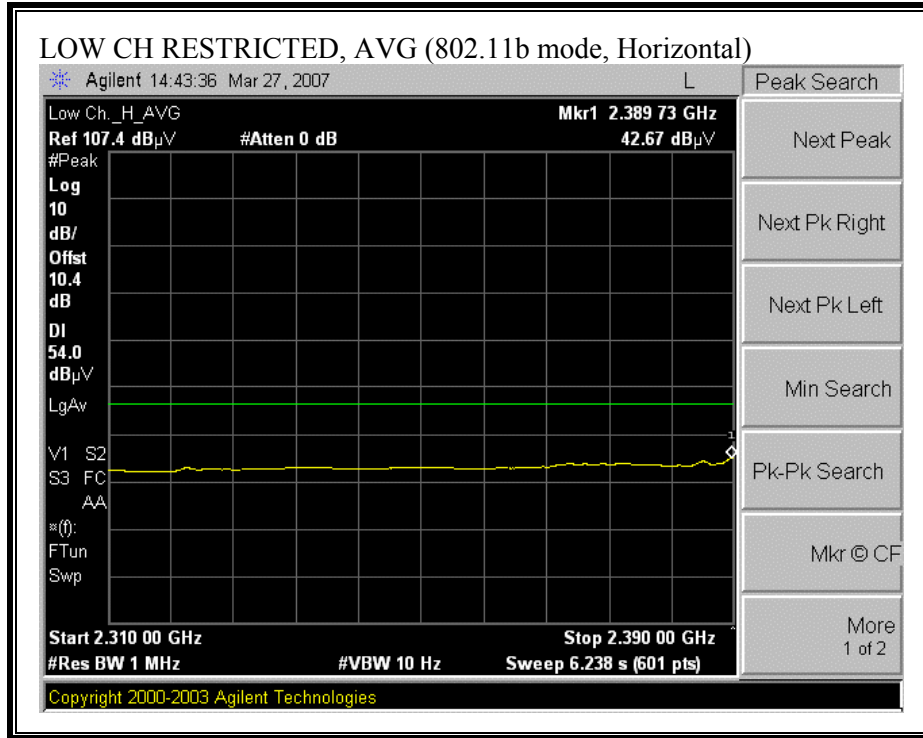
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

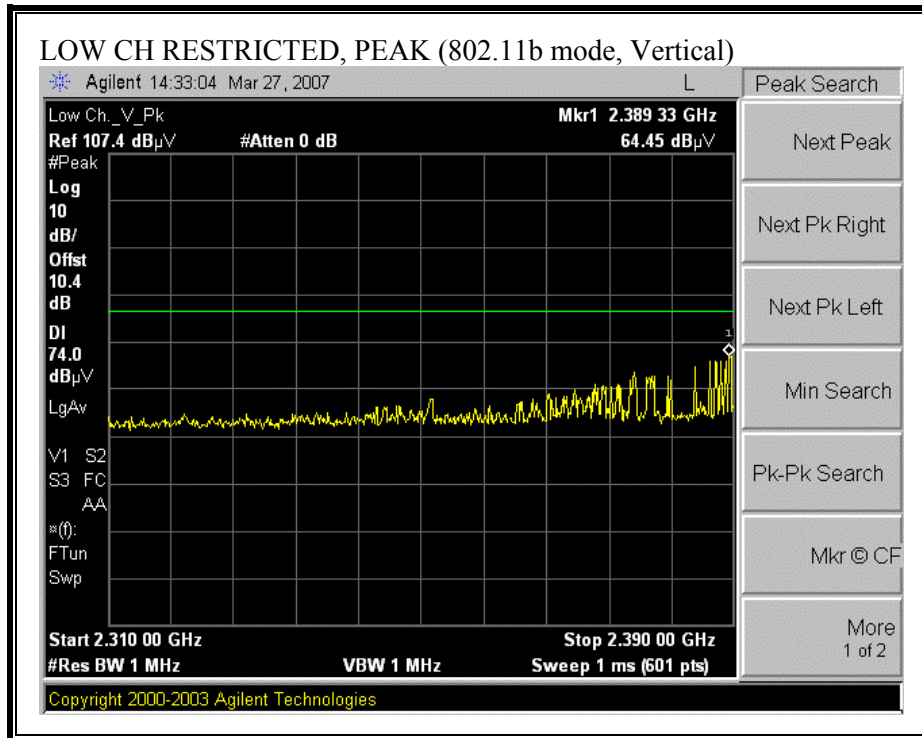
7.3.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

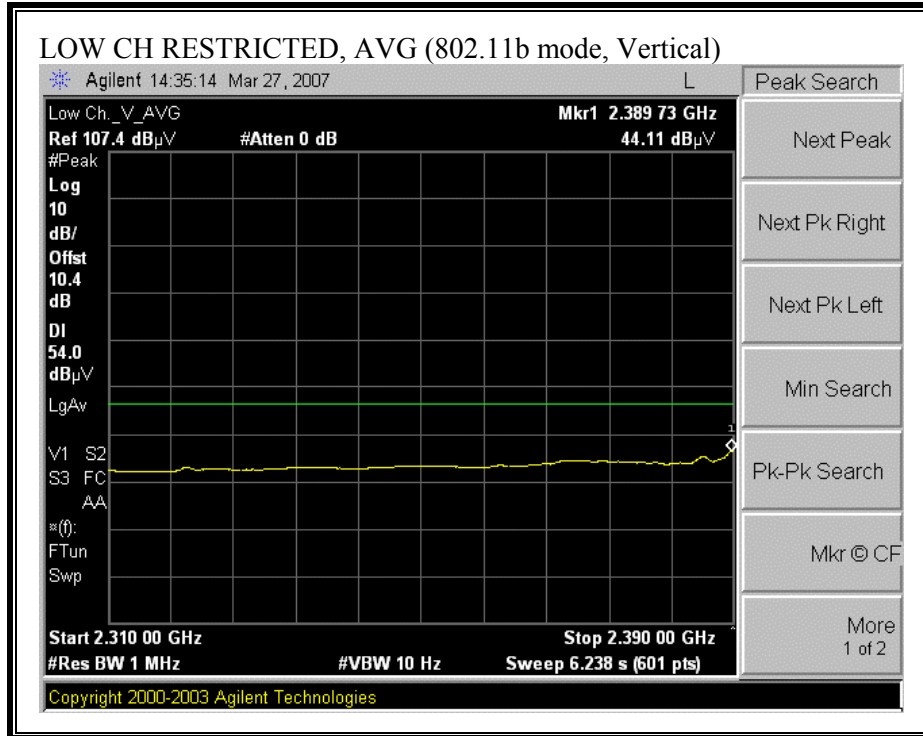
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



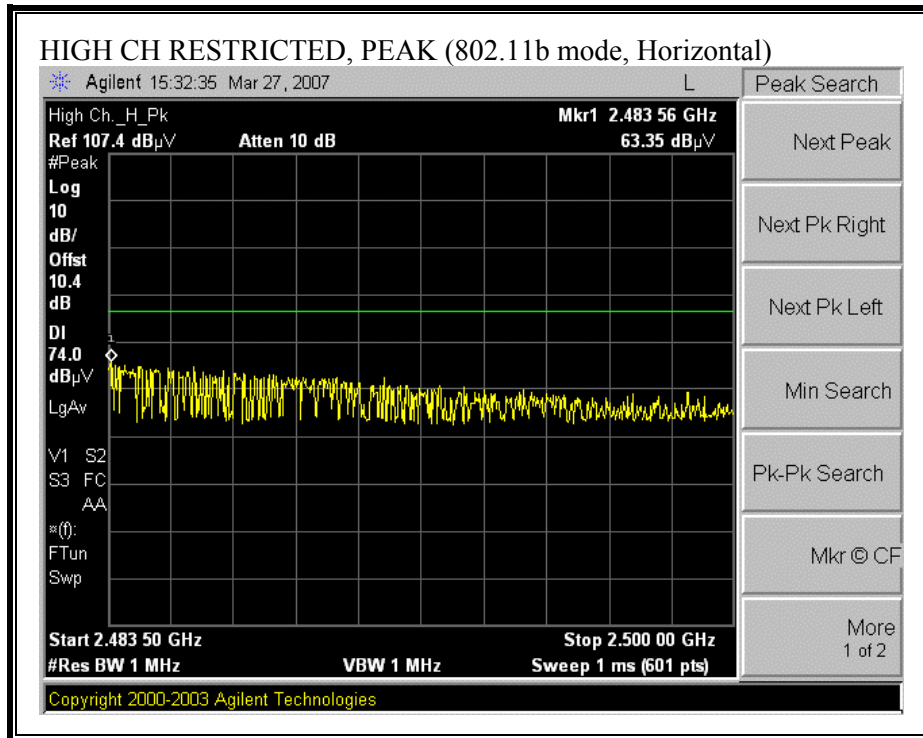


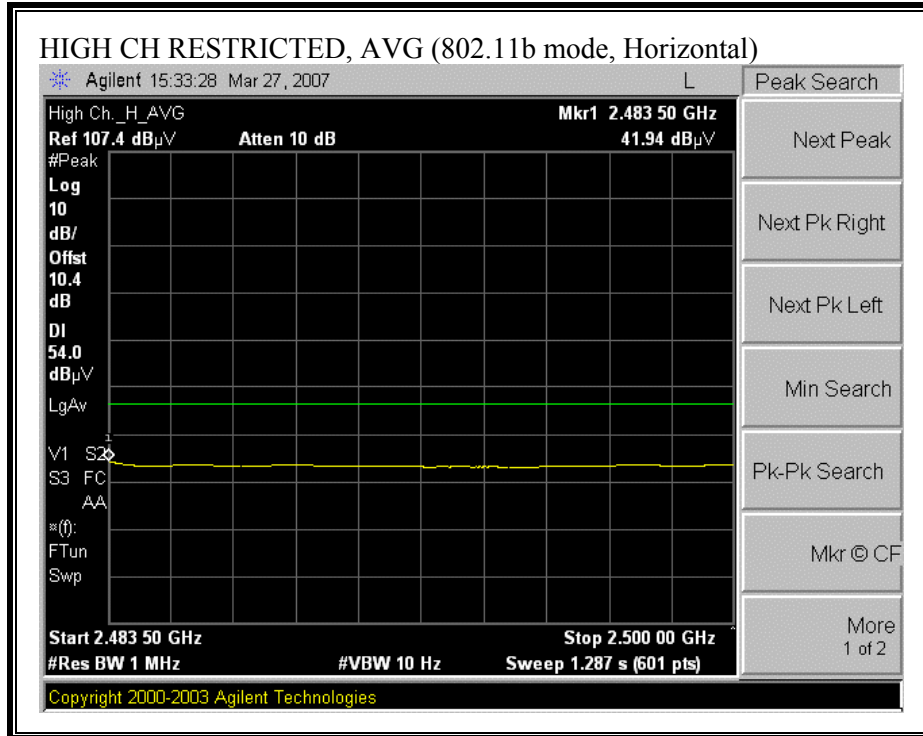
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)



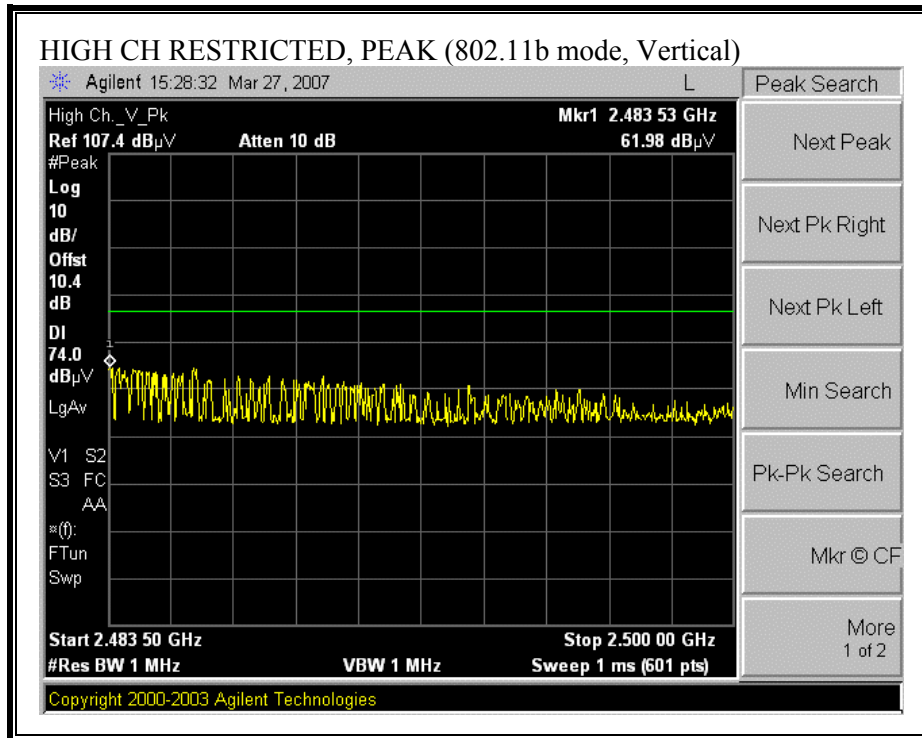


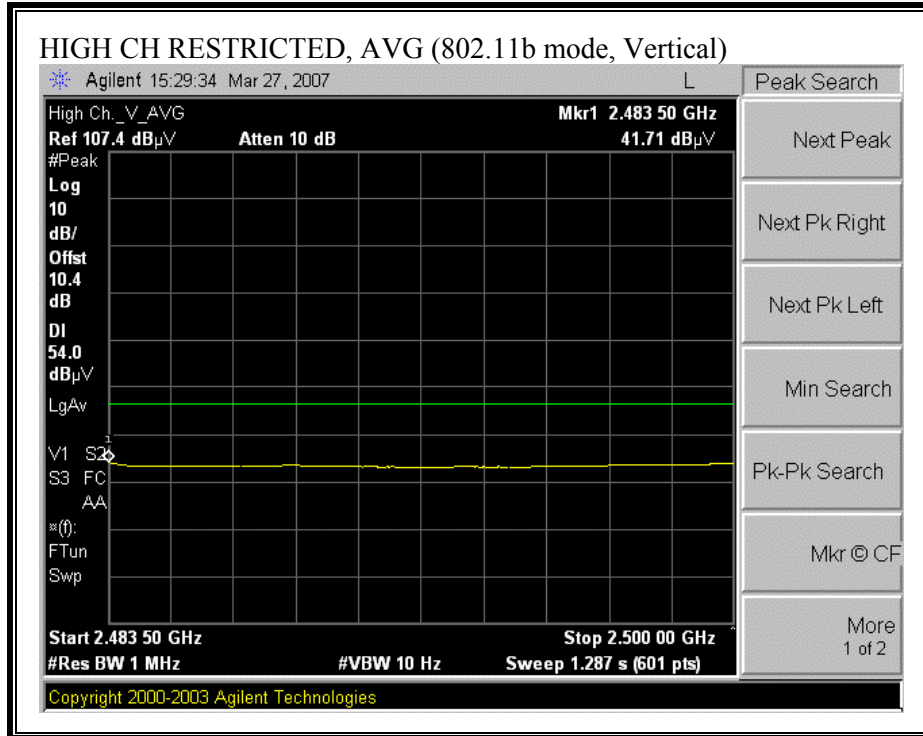
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (b MODE)

High Frequency Measurement
 Compliance Certification Services, Fremont, A-5m Chamber

Company: SYMBOL Technologies Inc.
 Project #: 07U10908
 Date: 03/27/2007
 Test Engineer: thanh Nguyen
 Configuration: EUT at worst position
 Mode: Transmit b Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.209

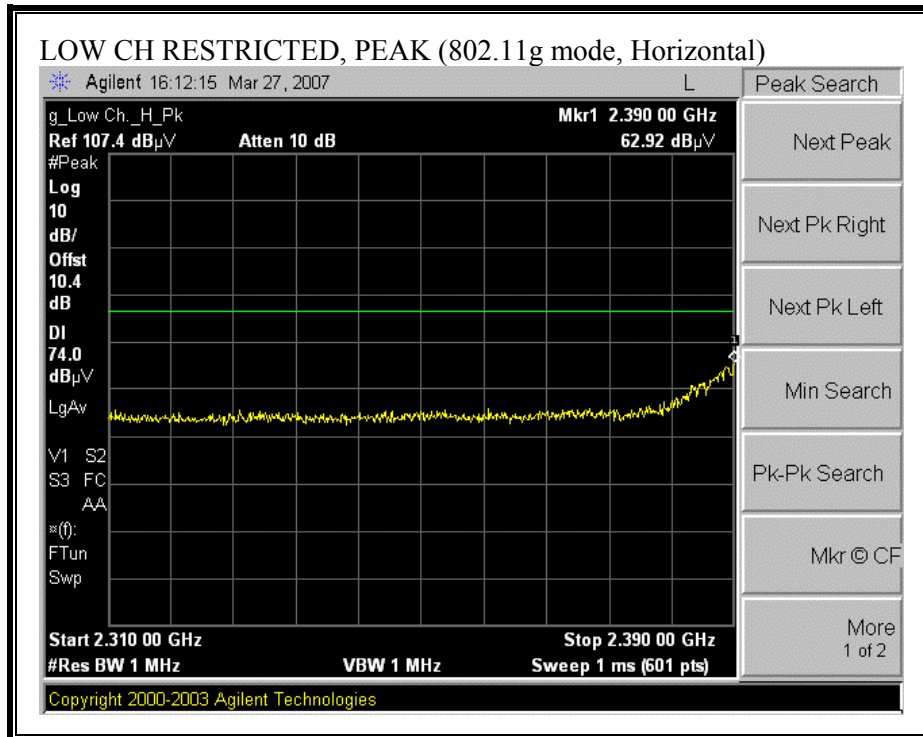
Hi Frequency Cables

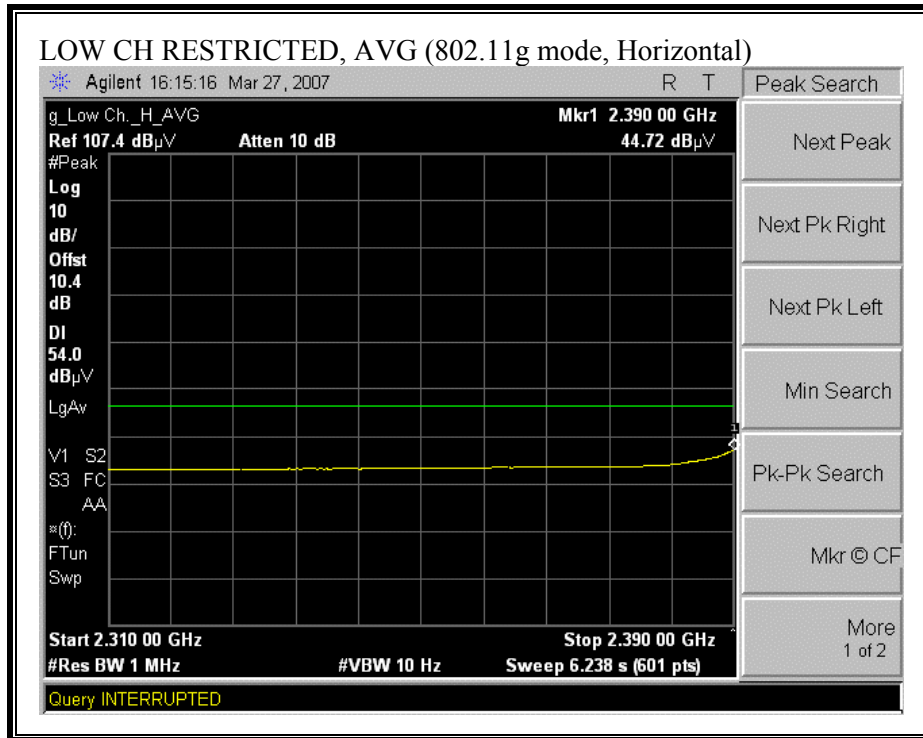
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
		Gordon 203134001			Average Measurements RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltn dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Harmonics Spur															
Low Ch															
4.824	3.0	40.0	27.7	33.7	6.9	-34.8	0.0	0.0	45.8	33.5	74	54	-28.2	-20.5	H
4.824	3.0	42.6	31.0	33.7	6.9	-34.8	0.0	0.0	48.3	36.7	74	54	-25.7	-17.3	V
7.236	3.0	37.0	24.7	35.2	8.4	-34.1	0.0	10.0	56.4	44.1	74	54	-17.6	-9.9	Noise floor
Mid ch															
4.874	3.0	42.6	36.8	33.7	6.9	-34.8	0.0	0.0	48.4	42.6	74	54	-25.6	-11.4	V
7.311	3.0	36.0	24.4	35.2	8.4	-34.1	0.0	0.0	45.5	33.8	74	54	-28.5	-20.2	Noise floor
4.874	3.0	41.6	34.5	33.7	6.9	-34.8	0.0	0.0	47.4	40.3	74	54	-26.6	-13.7	H
7.311	3.0	37.0	24.5	35.2	8.4	-34.1	0.0	0.0	46.5	34.0	74	54	-27.5	-20.0	Noise floor
High Ch															
4.924	3.0	40.0	30.3	33.8	7.0	-34.8	0.0	0.0	45.9	36.2	74	54	-28.1	-17.8	H
7.386	3.0	36.5	24.1	35.2	8.4	-34.1	0.0	0.0	46.0	33.7	74	54	-28.0	-20.3	Noise floor
4.924	3.0	40.2	33.3	33.8	7.0	-34.8	0.0	0.0	46.1	39.2	74	54	-27.9	-14.8	V
7.386	3.0	36.9	24.1	35.2	8.4	-34.1	0.0	0.0	46.4	33.6	74	54	-27.6	-20.4	Noise floor

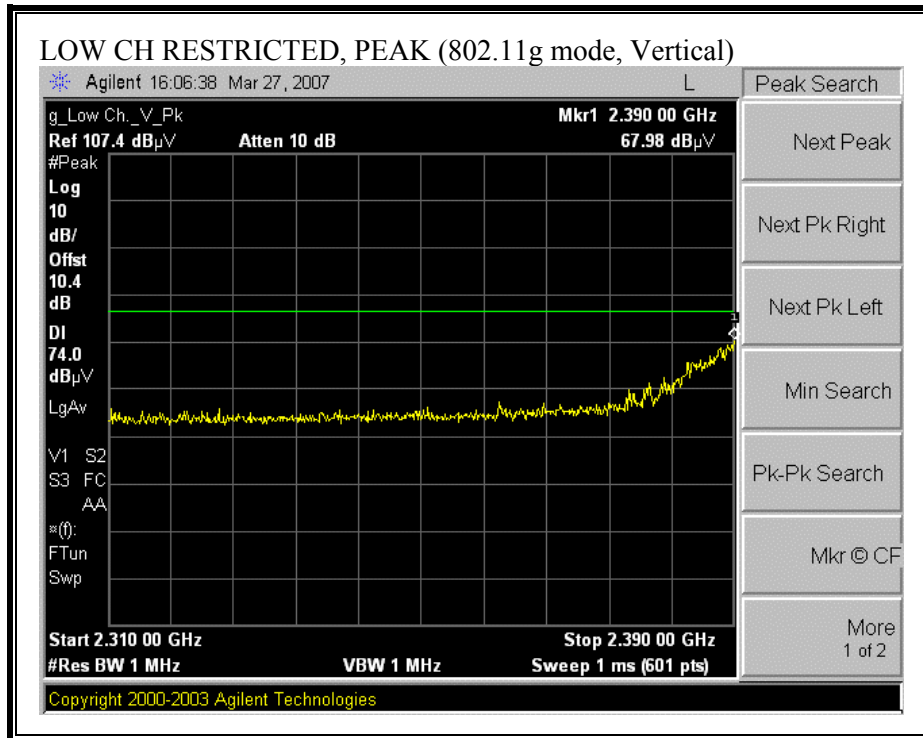
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

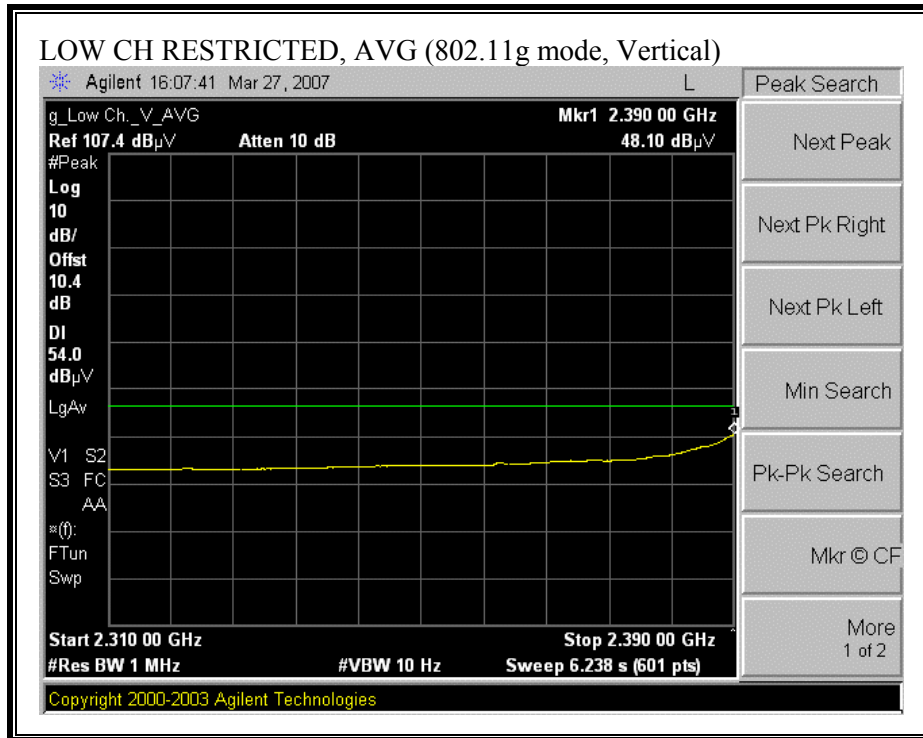
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)



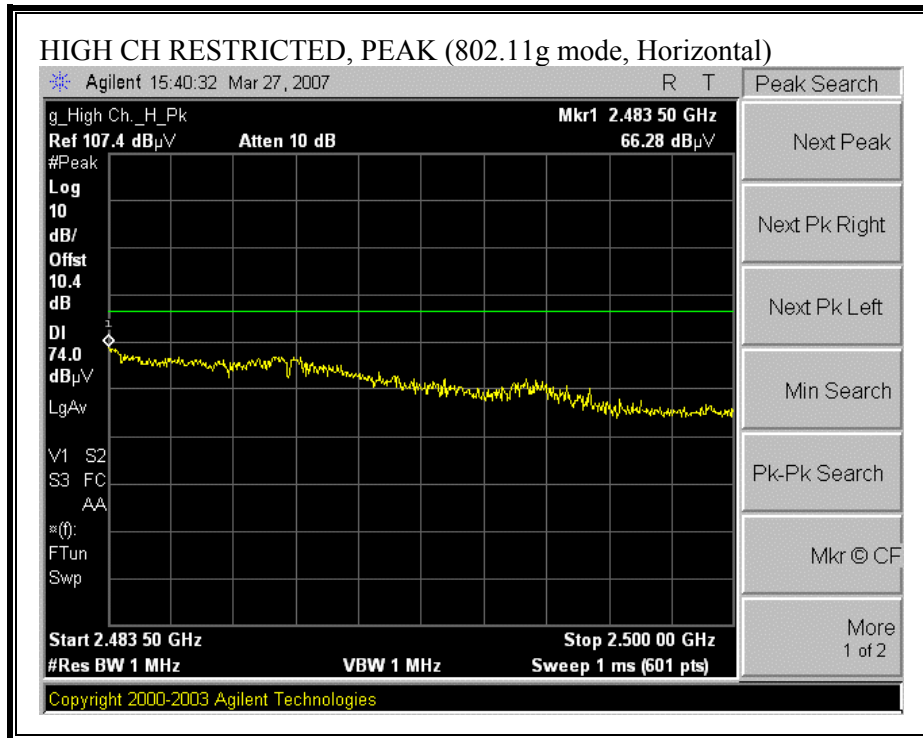


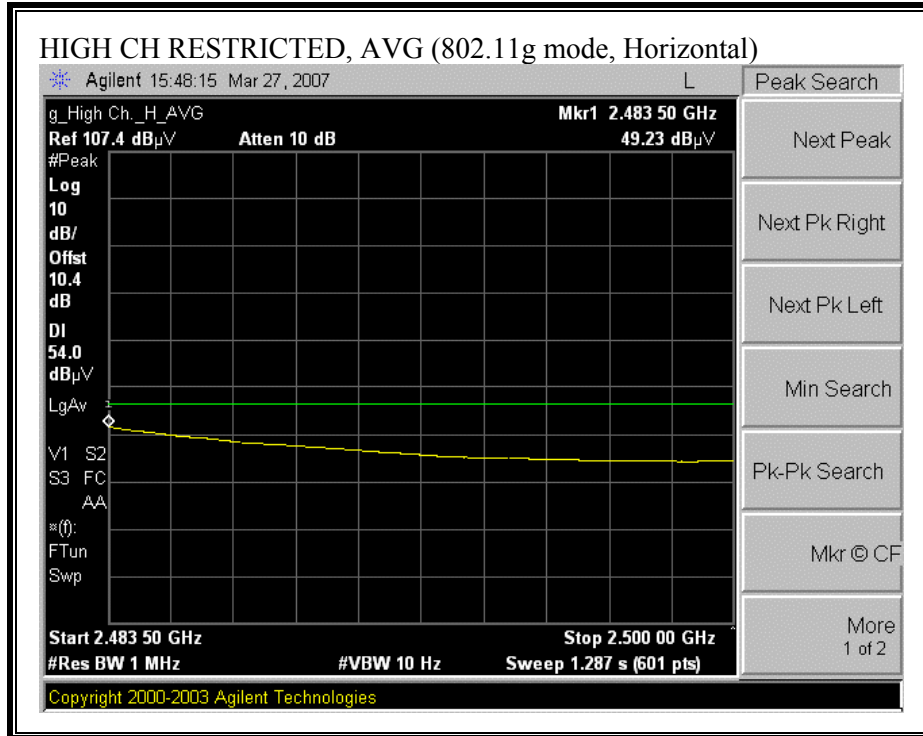
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)



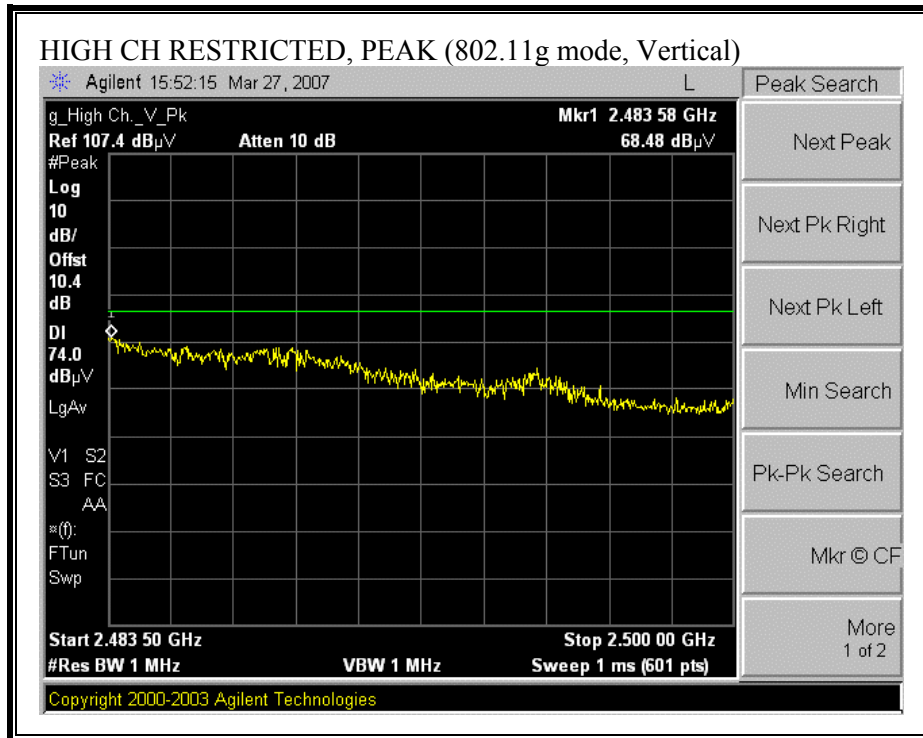


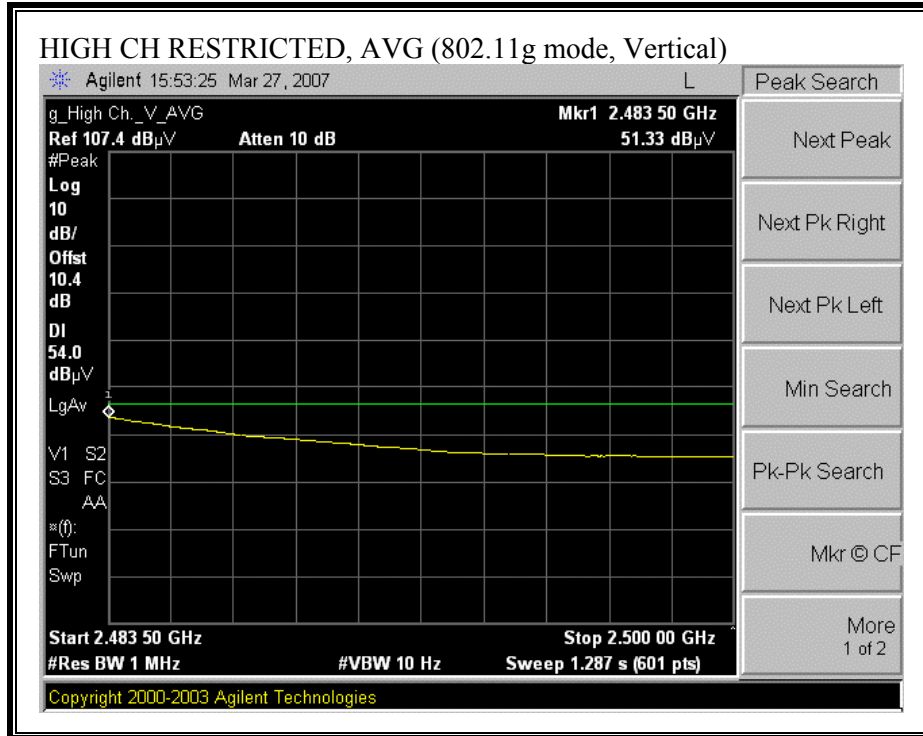
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (g MODE)

High Frequency Measurement
 Compliance Certification Services, Fremont, A-5m Chamber

Company: SYMBOL Technologies Inc.
 Project #: 07U10908
 Date: 03/27/2007
 Test Engineer: thanh Nguyen
 Configuration: EUT at worst position
 Mode: Transmit g Mode

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements REW=VBW=1MHz
		Gordon 203134001	HPF_4.0GHz		Average Measurements RBW=1MHz; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fln dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Harmonics Spur															
Low Ch															
4.824	3.0	40.2	25.8	33.7	6.9	-34.8	0.0	0.6	46.6	32.2	74	54	-27.4	-21.8	H
7.236	3.0	36.9	24.8	35.2	8.4	-34.1	0.0	10.0	56.3	44.2	74	54	-17.7	-9.8	Noise floor
4.824	3.0	38.5	26.7	33.7	6.9	-34.8	0.0	0.6	44.9	33.1	74	54	-29.1	-20.9	V
7.236	3.0	36.8	24.8	35.2	8.4	-34.1	0.0	10.0	56.2	44.2	74	54	-17.8	-9.8	Noise floor
Mid ch															
4.874	3.0	53.1	39.9	33.7	6.9	-34.8	0.0	0.6	59.5	46.4	74	54	-14.5	-7.6	V
7.311	3.0	36.5	25.8	35.2	8.4	-34.1	0.0	0.6	46.6	35.9	74	54	-27.4	-18.1	Noise floor
4.874	3.0	46.9	33.9	33.7	6.9	-34.8	0.0	0.6	53.3	40.4	74	54	-20.7	-13.6	H
7.311	3.0	37.6	25.1	35.2	8.4	-34.1	0.0	0.6	47.7	35.2	74	54	-26.3	-18.8	Noise floor
High Ch															
4.924	3.0	44.3	29.6	33.8	7.0	-34.8	0.0	0.6	50.8	36.2	74	54	-23.2	-17.8	H
7.386	3.0	36.1	24.5	35.2	8.4	-34.1	0.0	0.6	46.3	34.7	74	54	-27.7	-19.3	Noise floor
4.924	3.0	42.6	28.4	33.8	7.0	-34.8	0.0	0.6	49.1	34.9	74	54	-24.9	-19.1	V
7.386	3.0	36.3	23.9	35.2	8.4	-34.1	0.0	0.6	46.4	34.0	74	54	-27.6	-20.0	Noise floor

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.3.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
 Compliance Certification Services, Fremont, A-5m Chamber

Company: Symbol
 Project #: 07U10908
 Date: 03/28/07
 Test Engineer: Vien Tran
 Configuration: Stand-alone EUT
 Mode: TX ON, 6 Mbps OFDM, Modulation ON, Scrambling ON, closed loop (calibrated).
 S/N: MXA2RH78

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T119; S/N: 29301 @3m	T34 HP 8449B			FCC 15.205

Hi Frequency Cables

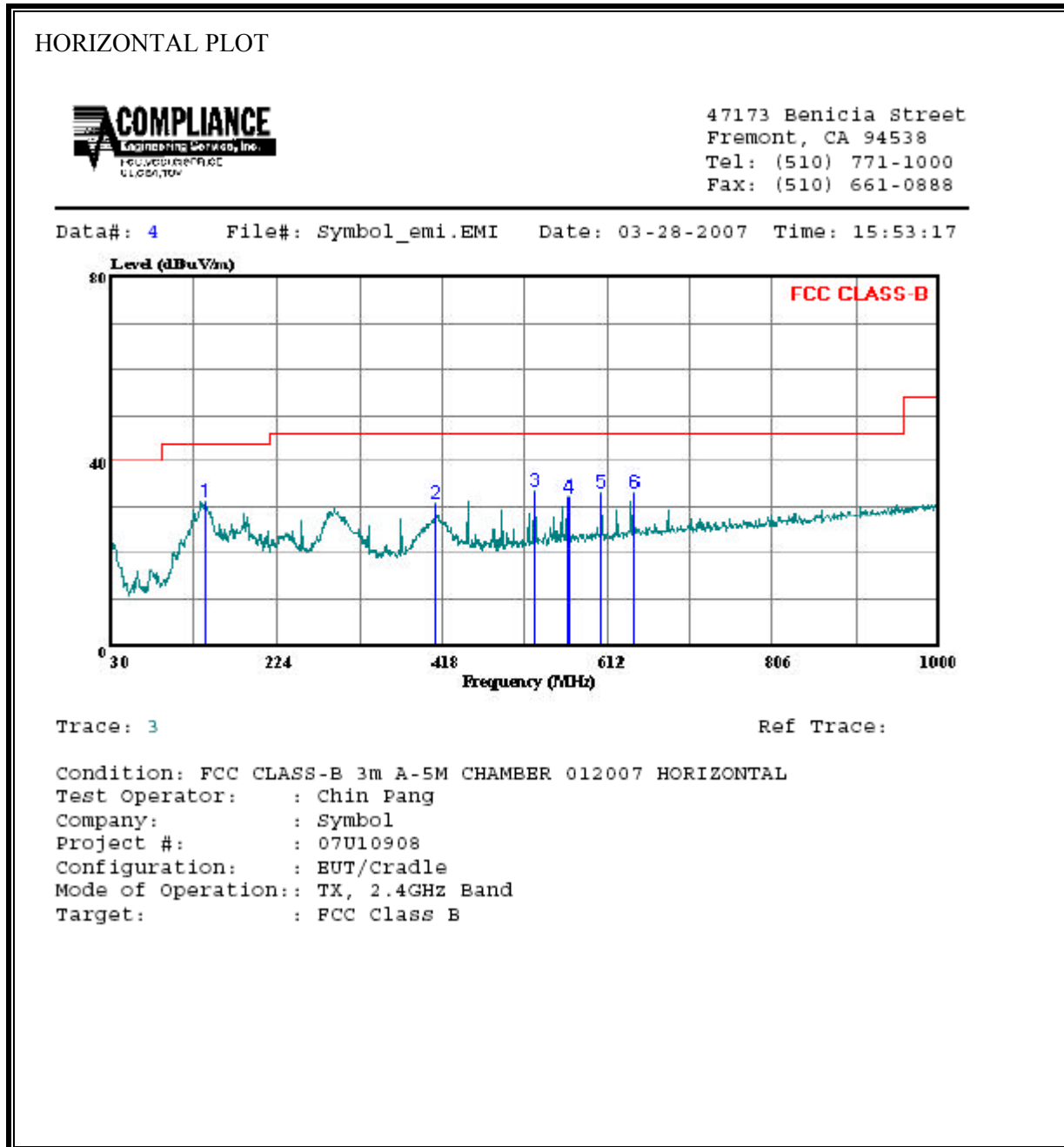
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	
		Gordon 203134001	HPF_7.6GHz		<u>Peak Measurements</u> RBW=VBW=1MHz <u>Average Measurements</u> RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH, 5745 MHz															
11.490	3.0	46.6	34.9	37.2	11.6	-32.5	0.0	0.7	63.6	51.8	74	54	-10.4	-2.2	H
11.490	3.0	44.0	30.7	37.2	11.6	-32.5	0.0	0.7	61.0	47.7	74	54	-13.0	-6.3	V
MID CH, 5785 MHz															
11.570	3.0	45.5	34.1	37.2	11.7	-32.5	0.0	0.7	62.6	51.2	74	54	-11.4	-2.8	H
11.570	3.0	43.2	30.1	37.2	11.7	-32.5	0.0	0.7	60.3	47.2	74	54	-13.7	-6.8	V
HI CH, 5825 MHz															
11.650	3.0	46.7	34.4	37.2	11.8	-32.5	0.0	0.7	63.9	51.6	74	54	-10.1	-2.4	H
11.650	3.0	44.0	30.7	37.2	11.8	-32.5	0.0	0.7	61.2	47.9	74	54	-12.8	-6.1	V
No other emissions were detected above system noise floor															

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.3.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (2.4GHz BAND, WITH CRADLE, HORIZONTAL)



HORIZONTAL DATA

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	140.580	48.10	13.67	1.23	31.72	31.28	43.50	-12.22	Peak
2	409.270	44.10	16.19	2.19	31.58	30.89	46.00	-15.11	Peak
3	526.640	44.80	18.36	2.45	31.85	33.76	46.00	-12.24	Peak
4	565.440	42.70	18.85	2.61	31.86	32.30	46.00	-13.70	Peak
5	604.240	43.30	19.33	2.73	31.95	33.41	46.00	-12.59	Peak
6	643.040	42.50	19.86	2.81	31.97	33.20	46.00	-12.80	Peak

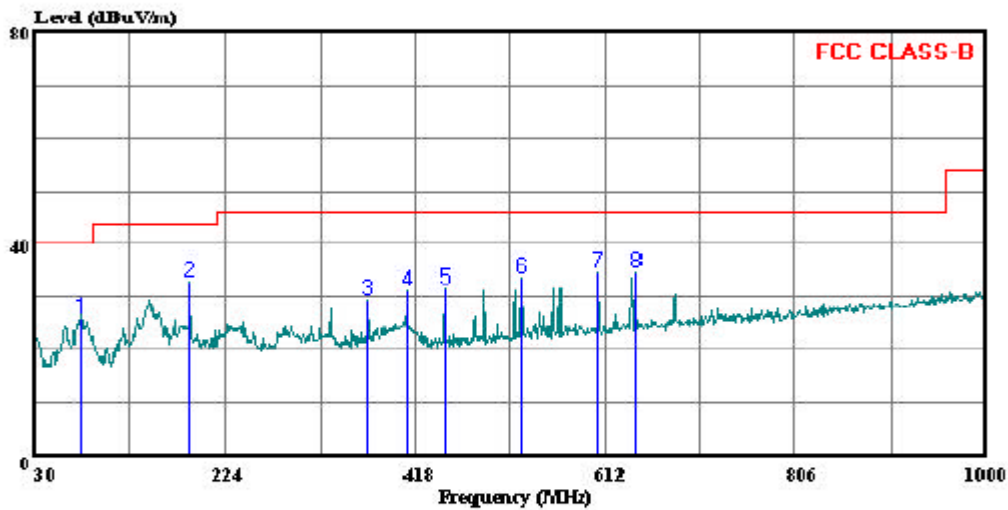
SPURIOUS EMISSIONS 30 TO 1000 MHz (2.4GHz BAND, WITH CRADLE, VERTICAL)

VERTICAL PLOT



47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 2 File#: Symbol_emi.EMI Date: 03-28-2007 Time: 15:48:42



Trace: 1

Ref Trace:

Condition: FCC CLASS-B 3m A-5M CHAMBER 012007 VERTICAL
Test Operator: : Chin Pang
Company: : Symbol
Project #: : 07U10908
Configuration: : BUT/Cradle
Mode of Operation: : TX, 2.4GHz Band
Target: : FCC Class B

VERTICAL DATA

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	76.560	48.55	8.18	0.88	31.76	25.85	40.00	-14.15	Peak
2	187.140	51.40	11.86	1.44	31.77	32.93	43.50	-10.57	Peak
3	369.500	43.40	15.40	2.07	31.56	29.31	46.00	-16.69	Peak
4	409.270	44.30	16.19	2.19	31.58	31.09	46.00	-14.91	Peak
5	448.070	43.90	17.00	2.32	31.71	31.50	46.00	-14.50	Peak
6	526.640	44.60	18.36	2.45	31.85	33.56	46.00	-12.44	Peak
7	604.240	44.60	19.33	2.73	31.95	34.71	46.00	-11.29	Peak
8	643.040	44.10	19.86	2.81	31.97	34.80	46.00	-11.20	Peak

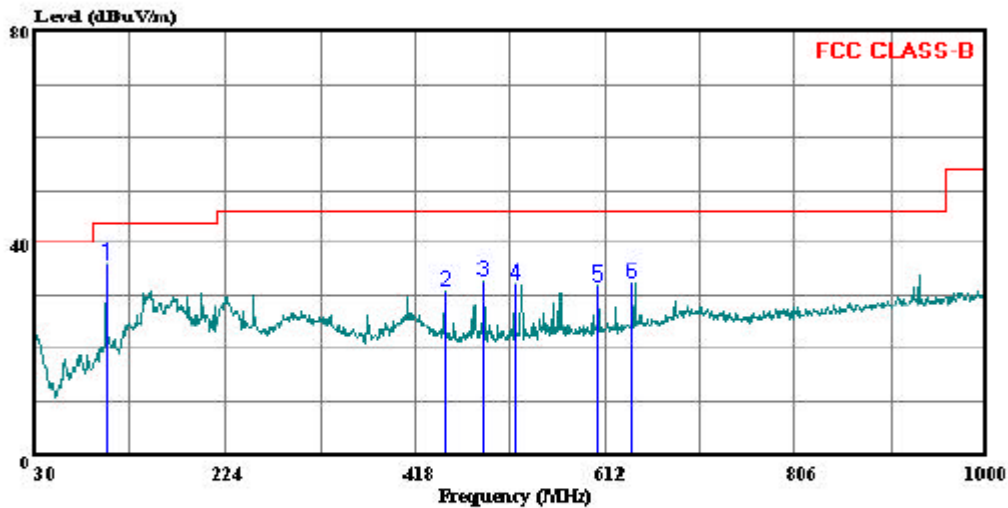
SPURIOUS EMISSIONS 30 TO 1000 MHz (5.8GHz BAND, WITH CRADLE, HORIZONTAL)

HORIZONTAL PLOT



47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 12 File#: Symbol_emi.EMI Date: 03-28-2007 Time: 16:21:36



Trace: 11

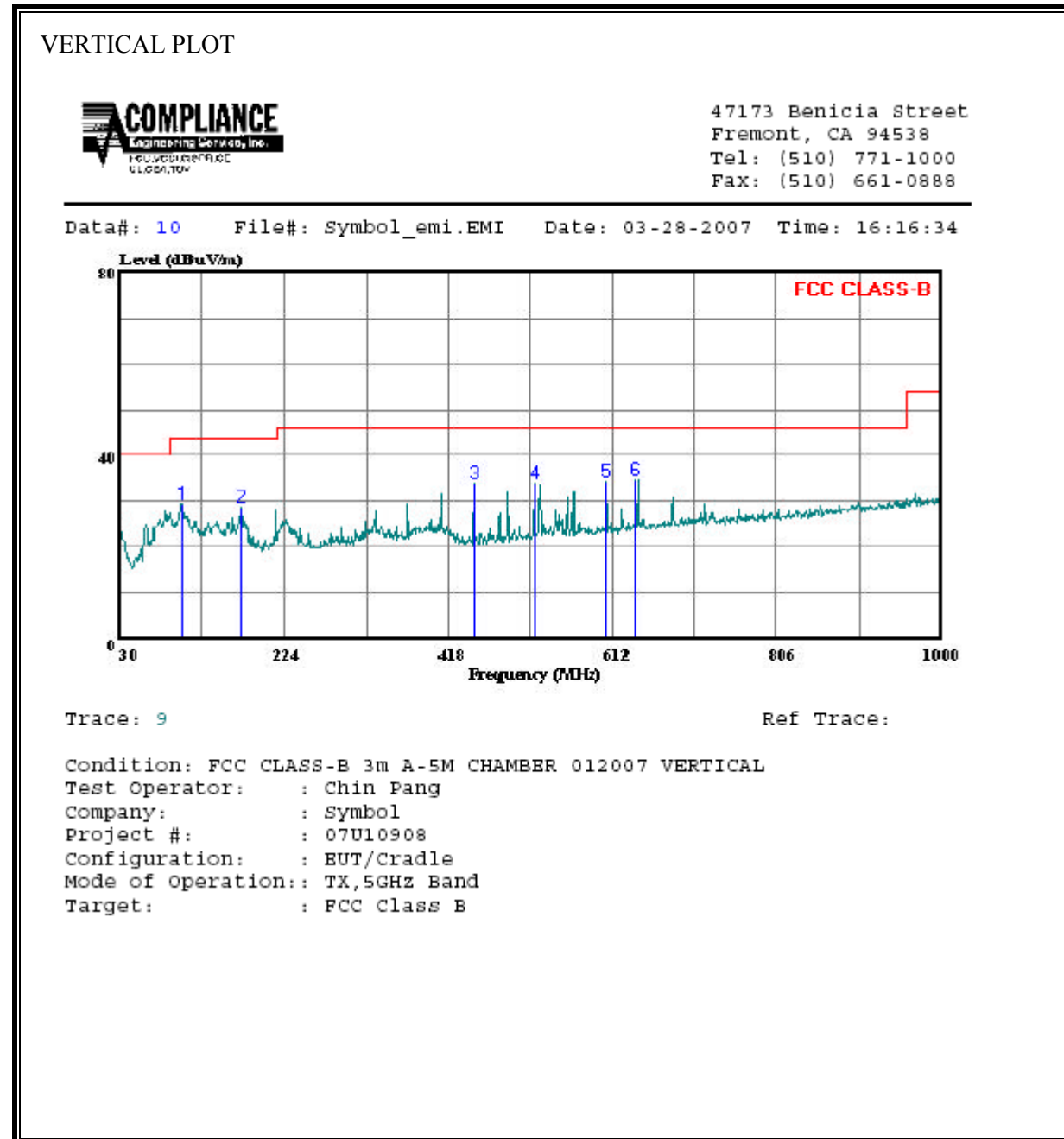
Ref Trace:

Condition: FCC CLASS-B 3m A-5M CHAMBER 012007 HORIZONTAL
Test Operator: : Chin Pang
Company: : Symbol
Project #: : 07U10908
Configuration: : EUT/Cradle
Mode of Operation: : TX, 5GHz Band
Target: : FCC Class B

HORIZONTAL DATA

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	102.750	56.10	10.61	1.07	31.70	36.08	43.50	-7.42	Peak
2	448.070	43.20	17.00	2.32	31.71	30.80	46.00	-15.20	Peak
3	486.870	44.50	17.76	2.44	31.67	33.03	46.00	-12.97	Peak
4	519.850	43.10	18.26	2.52	31.81	32.07	46.00	-13.93	Peak
5	604.240	41.60	19.33	2.73	31.95	31.71	46.00	-14.29	Peak
6	640.130	41.90	19.81	2.81	31.99	32.53	46.00	-13.47	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (5.8GHz BAND, WITH CRADLE, VERTICAL)



VERTICAL DATA

	Freq	Read Level	Probe Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	102.750	49.50	10.61	1.07	31.70	29.48	43.50	-14.02	Peak
2	171.620	46.90	12.08	1.38	31.66	28.70	43.50	-14.80	Peak
3	448.070	46.20	17.00	2.32	31.71	33.80	46.00	-12.20	Peak
4	519.850	44.90	18.26	2.52	31.81	33.87	46.00	-12.13	Peak
5	604.240	44.00	19.33	2.73	31.95	34.11	46.00	-11.89	Peak
6	640.130	43.90	19.81	2.81	31.99	34.53	46.00	-11.47	Peak

7.4. POWERLINE CONDUCTED EMISSIONS

LIMIT

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

2.4 GHz BAND

6 WORST EMISSIONS (EUT WITH CRADLE)

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit QP	EN B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.21	47.08	--	36.53	0.00	63.37	53.37	-16.29	-16.84	L1
0.31	39.19	--	28.52	0.00	59.97	49.97	-20.78	-21.45	L1
0.41	38.69	--	33.18	0.00	57.59	47.59	-18.90	-14.41	L1
0.21	48.26	--	36.19	0.00	63.37	53.37	-15.11	-17.18	L2
0.41	37.60	--	31.45	0.00	57.59	47.59	-19.99	-16.14	L2
0.41	36.72	--	30.92	0.00	57.59	47.59	-20.87	-16.67	L2
6 Worst Data									

6 WORST EMISSIONS (EUT IN USB)

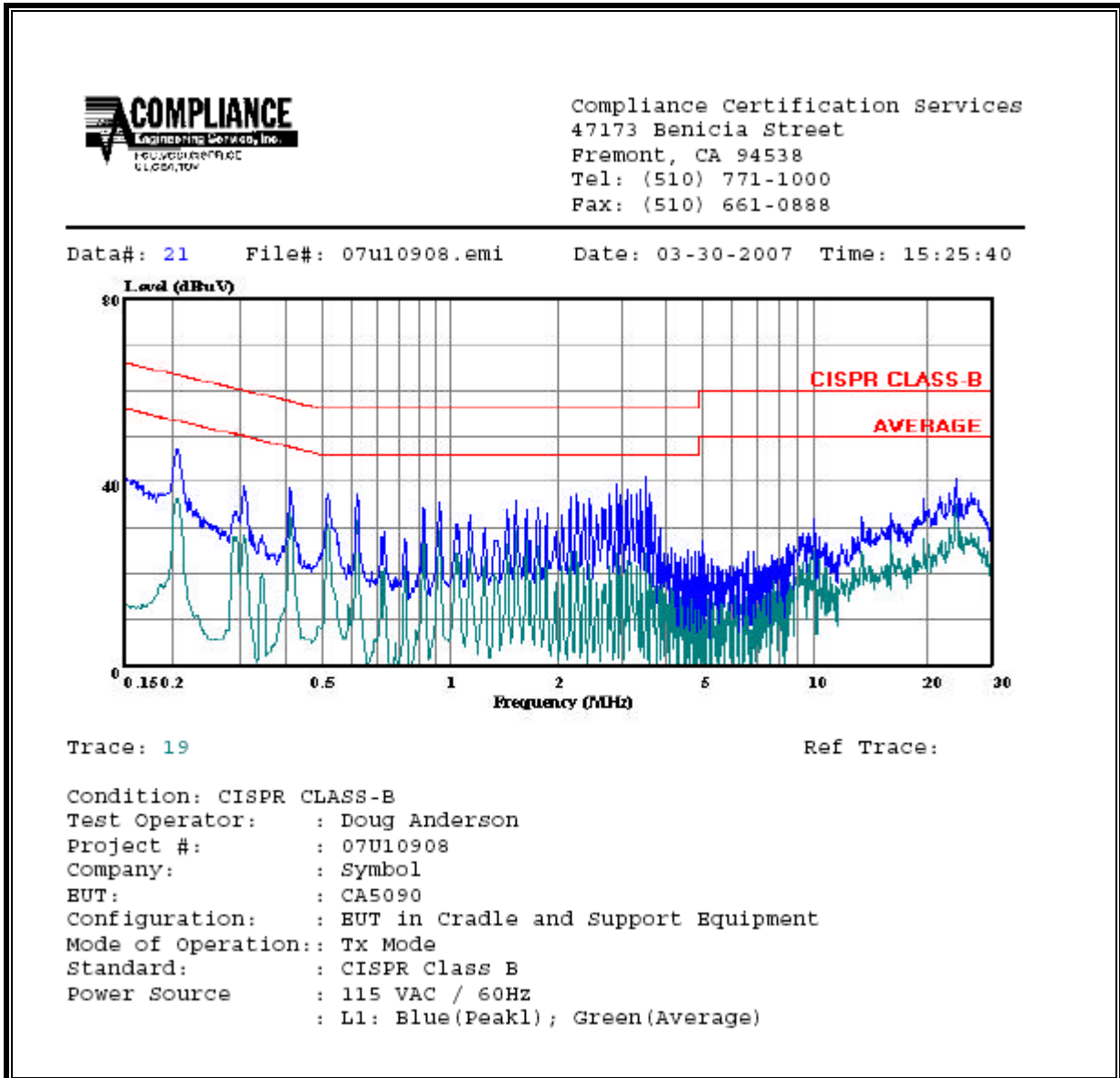
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit QP	EN B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.18	50.86	--	35.37	0.00	64.63	54.63	-13.77	-19.26	L1
0.24	44.21	--	29.64	0.00	62.20	52.20	-17.99	-22.56	L1
29.06	39.29	--	34.32	0.00	60.00	50.00	-20.71	-15.68	L1
0.18	50.94	--	36.32	0.00	64.63	54.63	-13.69	-18.31	L2
19.74	4.42	--	32.24	0.00	60.00	50.00	-55.58	-17.76	L2
29.06	37.83	--	31.77	0.00	60.00	50.00	-22.17	-18.23	L2
6 Worst Data									

6 WORST EMISSIONS (BATTERY CHARGER)

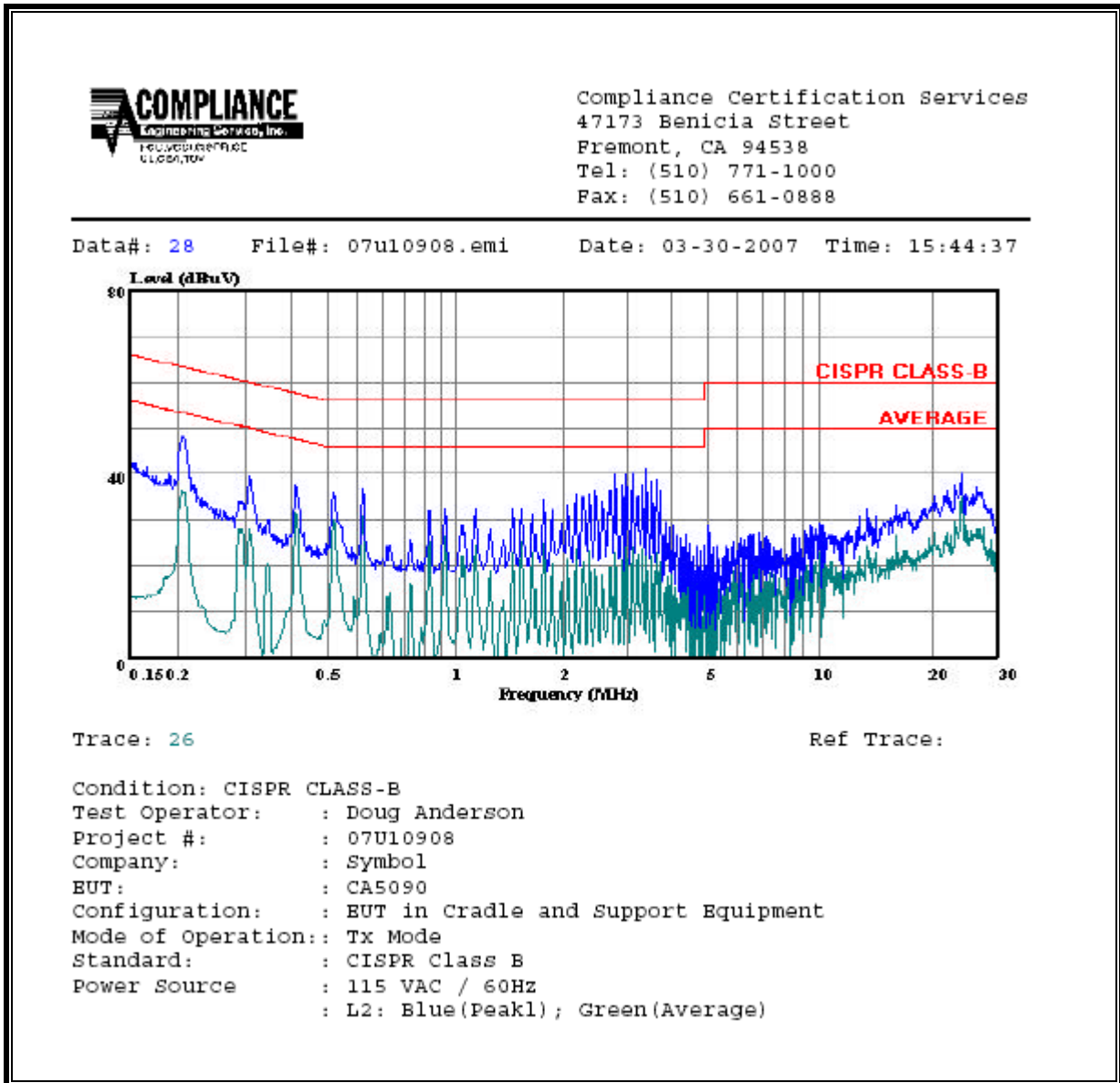
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	50.78	--	42.40	0.00	63.53	53.53	-12.75	-11.13	L1
0.31	41.74	--	31.78	0.00	60.11	50.11	-18.37	-18.33	L1
24.66	33.67	--	29.79	0.00	60.00	50.00	-26.33	-20.21	L1
0.20	48.95	--	42.41	0.00	63.49	53.49	-14.54	-11.08	L2
0.71	32.92	--	31.11	0.00	56.00	46.00	-23.08	-14.89	L2
12.45	34.21	--	25.44	0.00	60.00	50.00	-25.79	-24.56	L2
6 Worst Data									

EUT WITH CRADLE

LINE 1 RESULTS

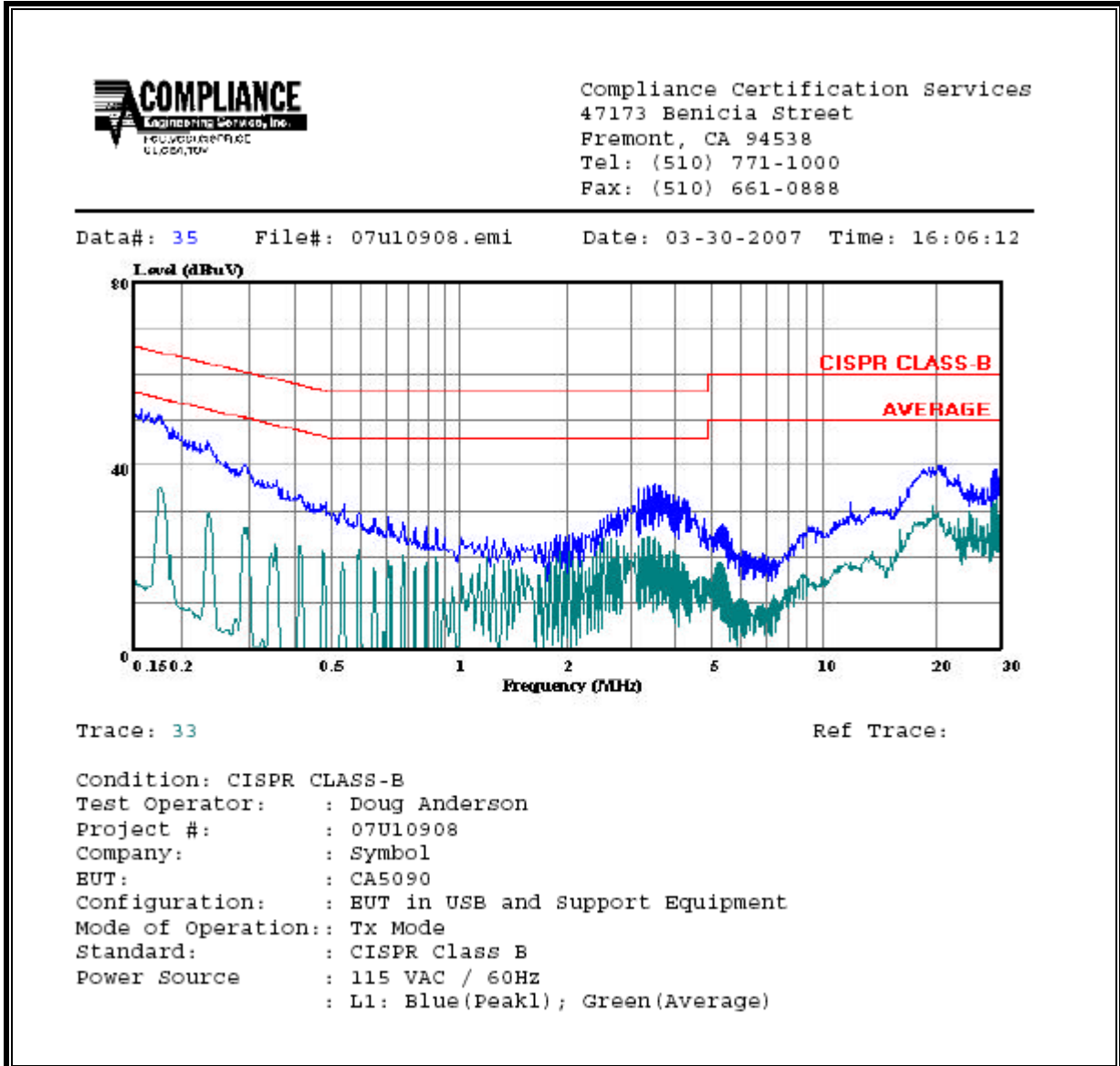


LINE 2 RESULTS

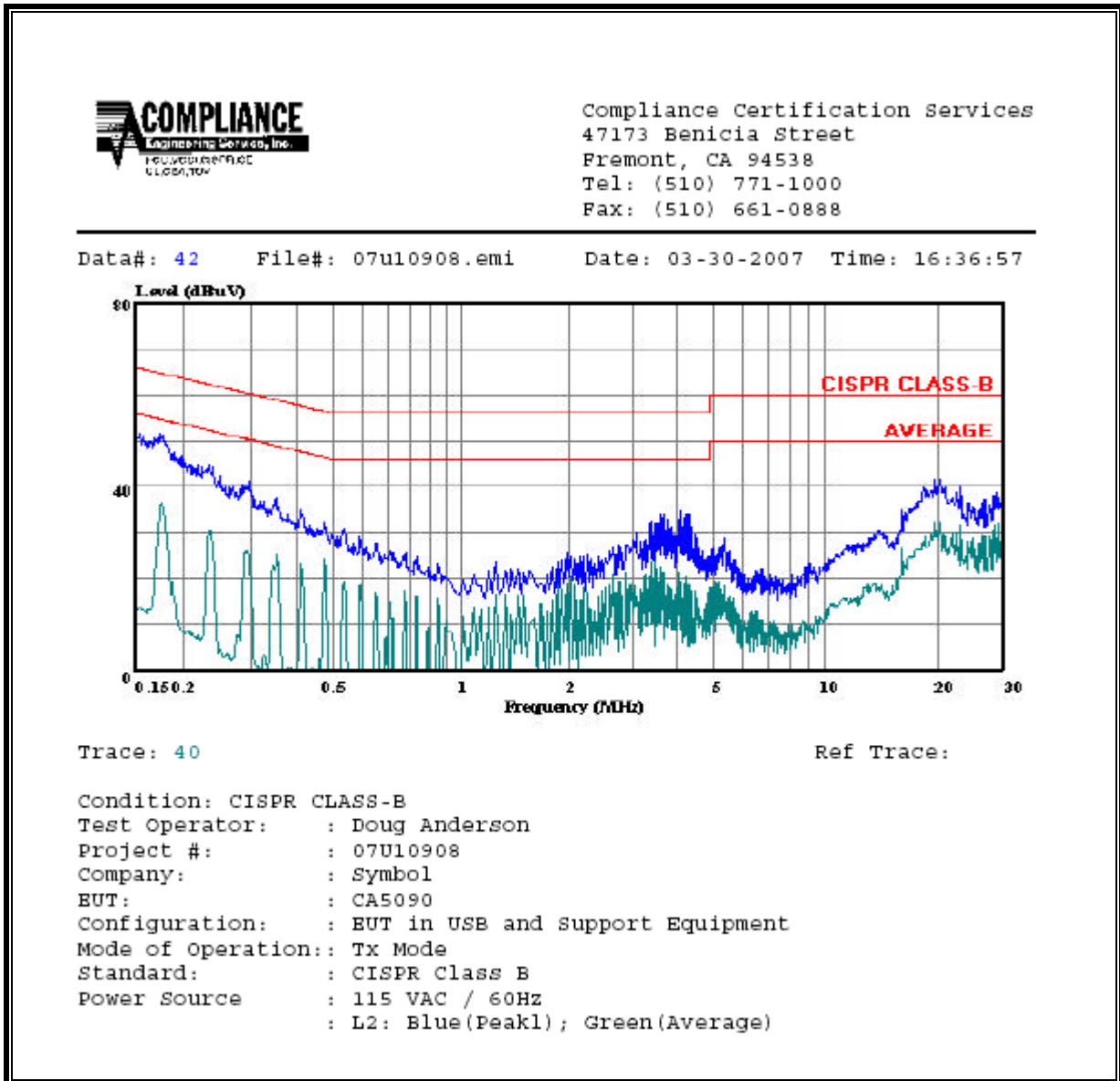


EUT IN USB

LINE 1 RESULTS

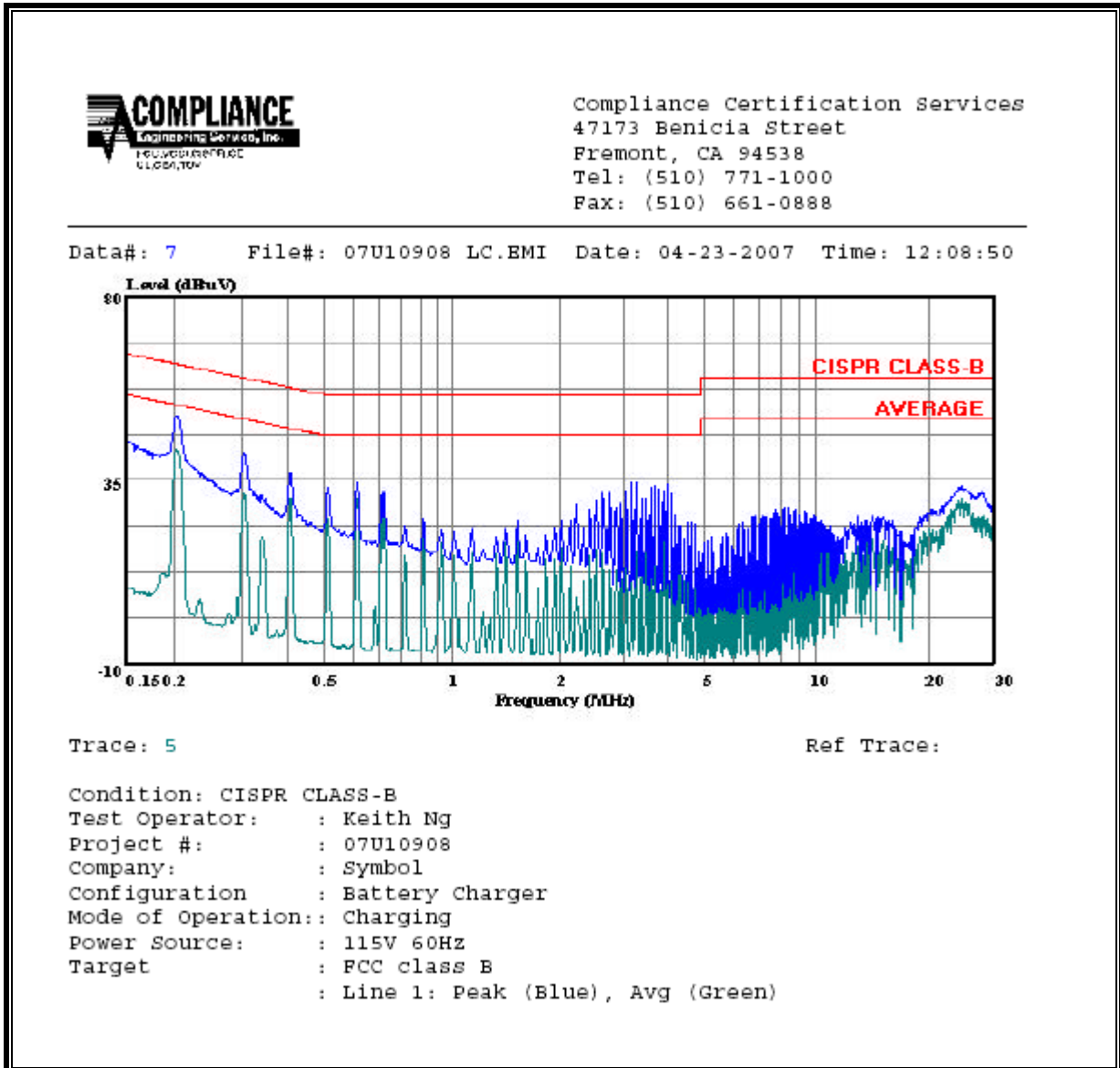


LINE 2 RESULTS

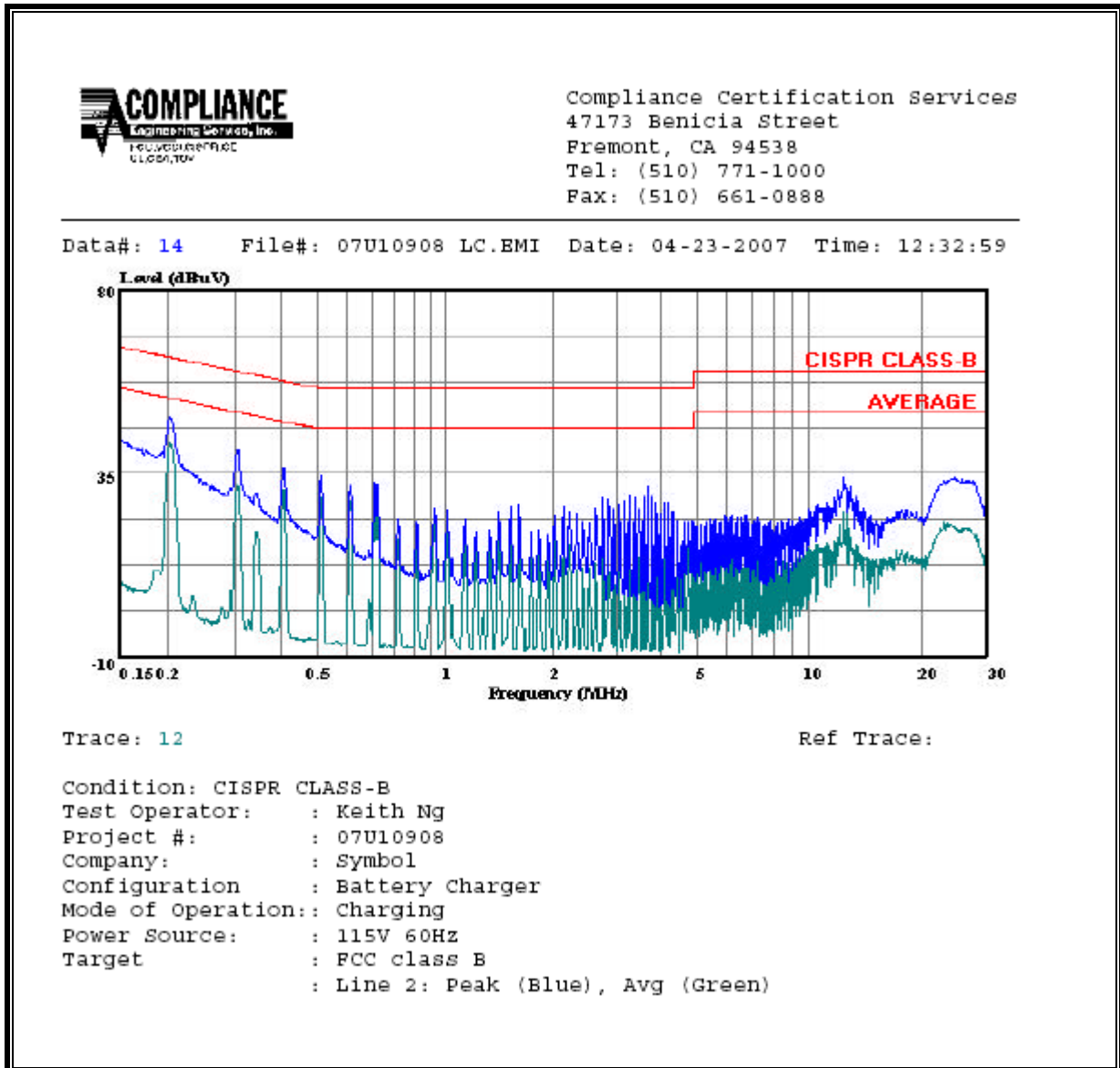


BATTERY CHARGER

LINE 1 RESULTS

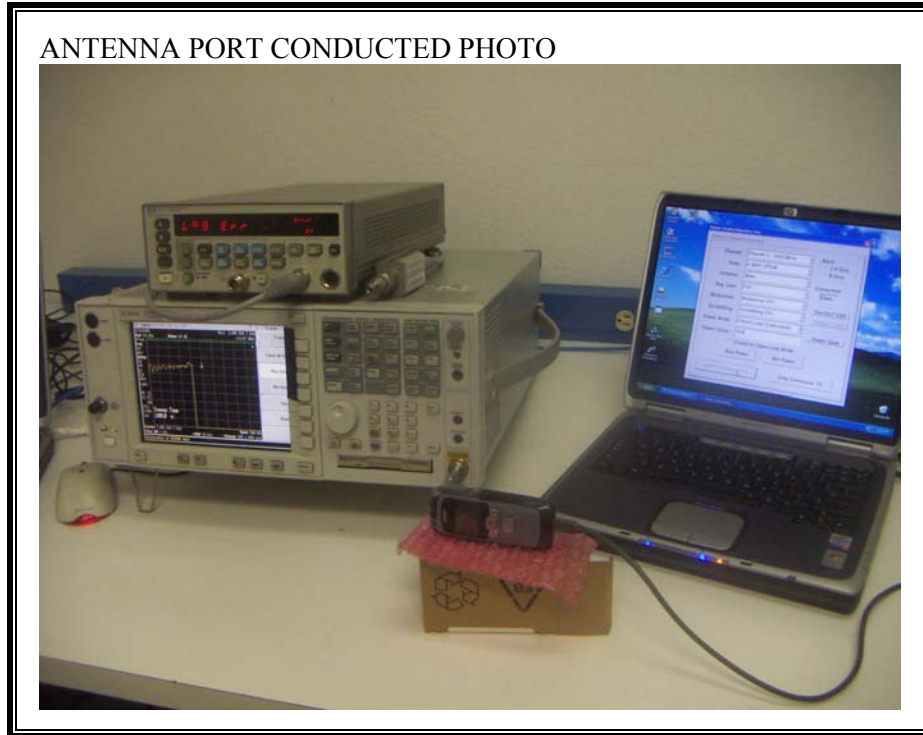


LINE 2 RESULTS



8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION



Y-AXIS PHOTO



Z-AXIS PHOTO

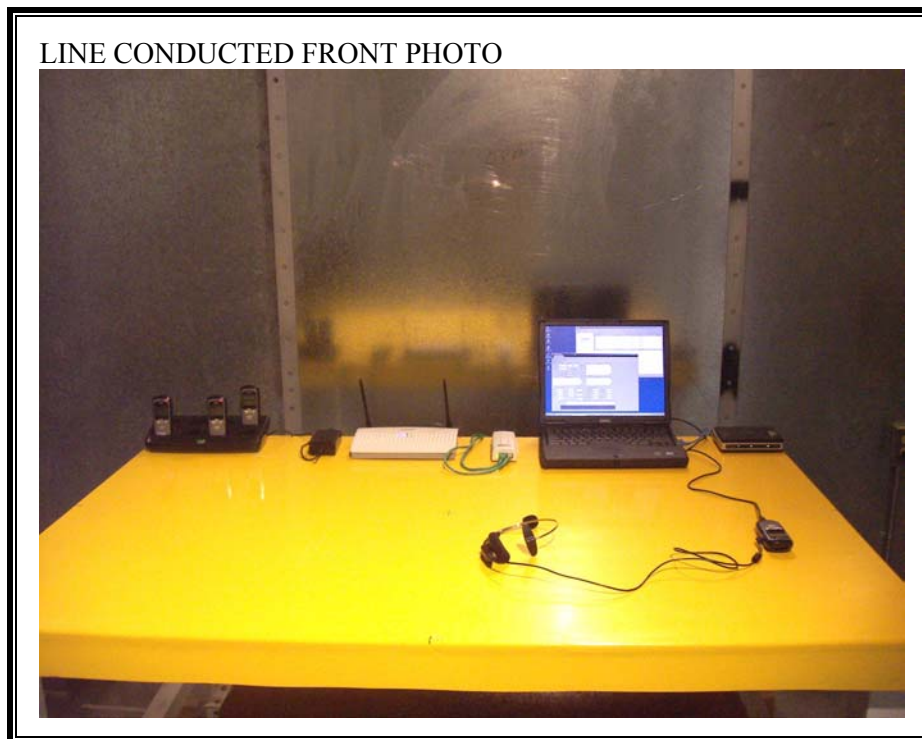




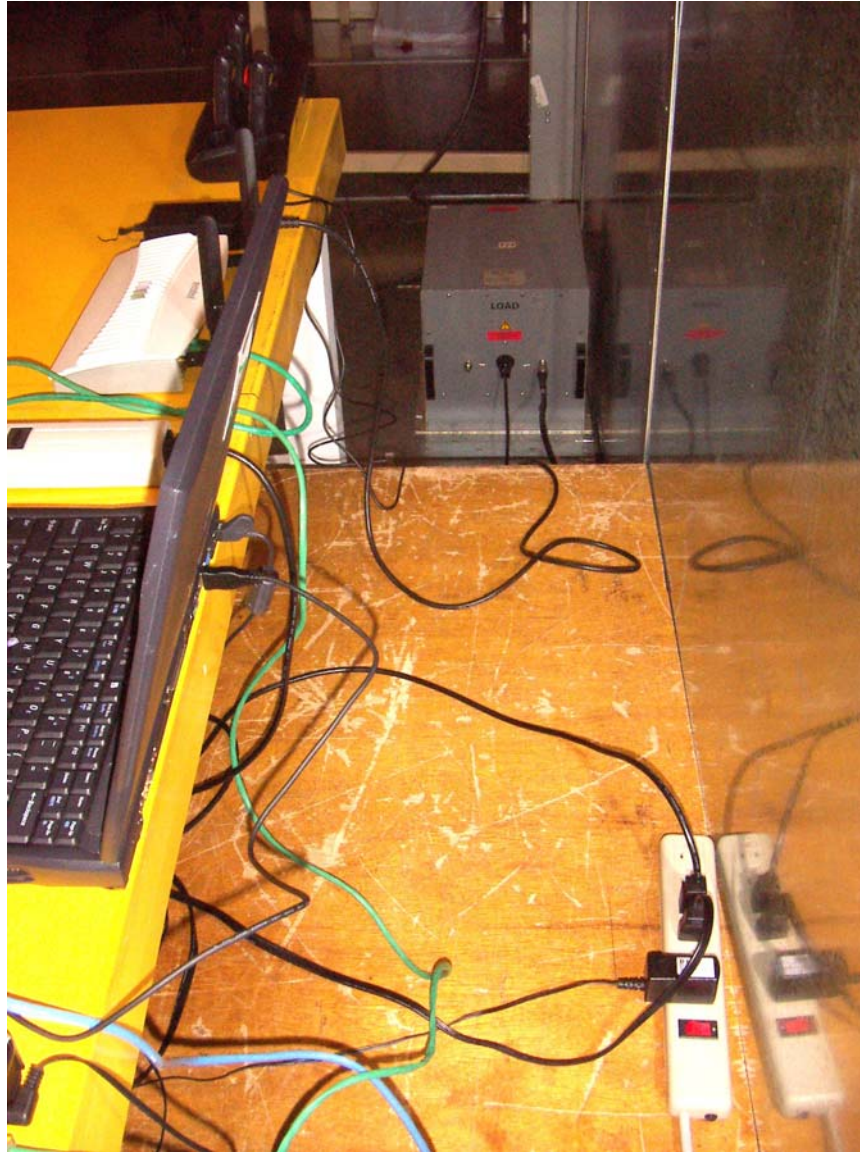


POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

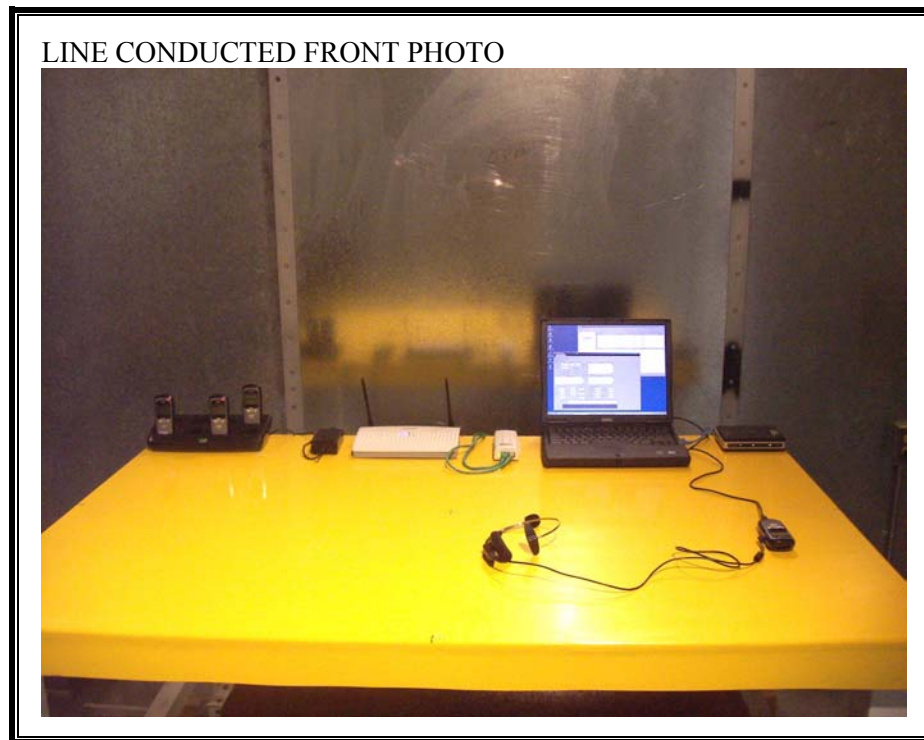
EUT WITH CRADLE

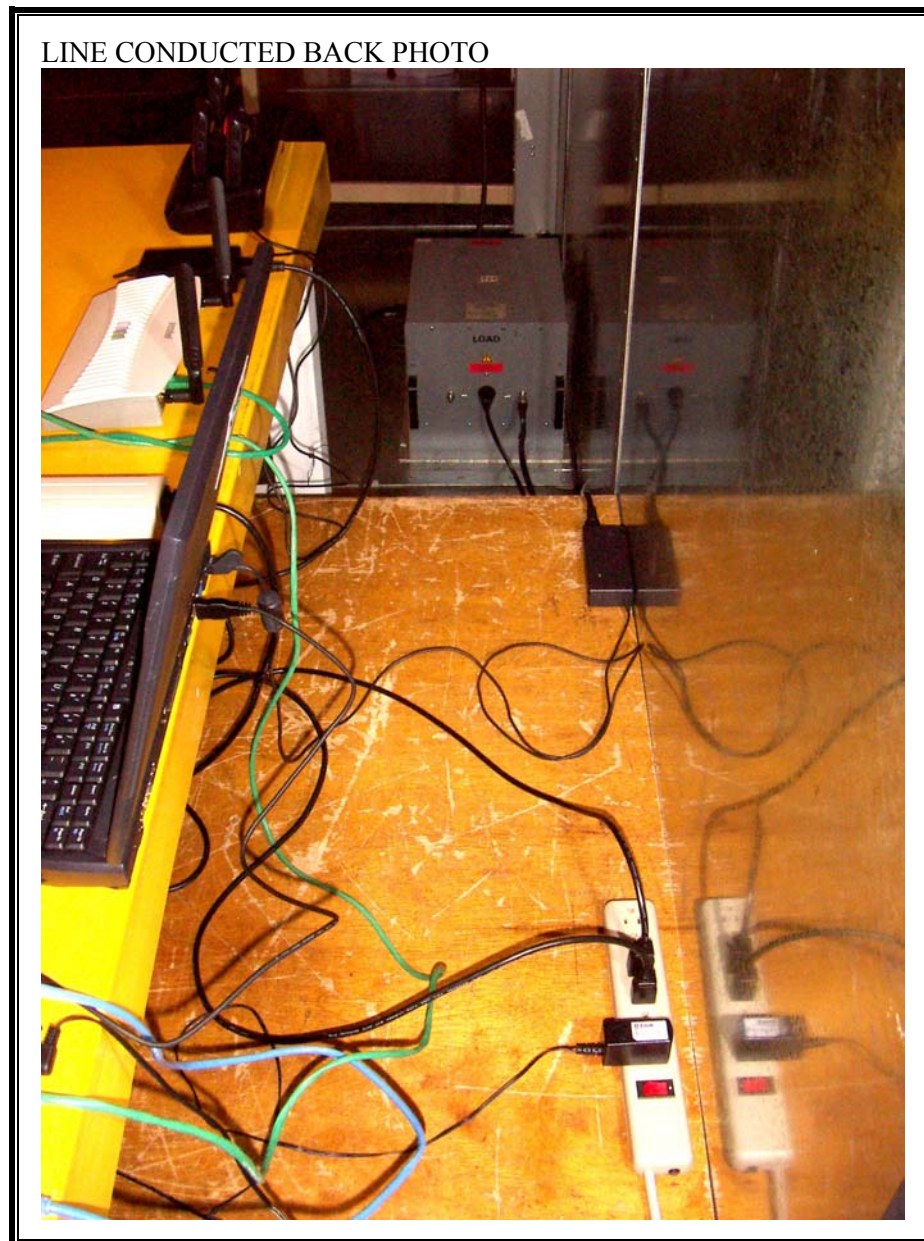


LINE CONDUCTED BACK PHOTO



EUT IN USE





END OF REPORT