FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Wi-Fi WIN CARD

MODEL NUMBER: 0201JVA

FCC ID: EW4-0201JVA

REPORT NUMBER: 10J13061-1, Revision B

ISSUE DATE: MARCH 08, 2010

Prepared for
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ATSUGI-SHI
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/17/2010	Initial Issue	T. Chan
A	03/02/2010	Removed IC ID / RSS standard	T. Chan
B	03/08/2010	Changed EUT Description and revised FCC ID	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MITSUMI ELECTRIC CO., LTD.
1601, SAKAI
ATSUGI-SHI
KANAGAWA, JAPAN, 243-8533

EUT DESCRIPTION: Wi-Fi WIN CARD

MODEL: 0201JVA

SERIAL NUMBER: 001

DATE TESTED: FEBRUARY 09 – 10, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.
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Approved & Released For CCS By:

THU CHAN
EMC MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

THANH NGUYEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, 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.

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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Wi-Fi WIN CARD.

The radio module is manufactured by Atheros.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	20.53	112.98
2412 - 2462	802.11g	20.01	100.23

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the mono-pole antenna with maximum gain is 1.84dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was ART 6000 Revision 2.3, Build # 21, V 53_Mecury, Customer Version ANWI BUILD.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on input from the manufacturer of the radio.

All emissions tests were made with following data rates:

- 802.11b mode, 20 MHz Channel Bandwidth, 11 Mb/s, CCK Modulation.
- 802.11g mode, 20 MHz Channel Bandwidth, 6 Mb/s, OFDM Modulation.

For radiated emissions below 1 GHz the worst-case configuration is determined to be the mode and channel with the highest output power.

5.6. DESCRIPTION OF TEST SETUP

5.6.1. Radiated Emissions

SUPPORT EQUIPMENT (N/A)

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Evaluation Board	Mitsumi	DWM-J021	N/A

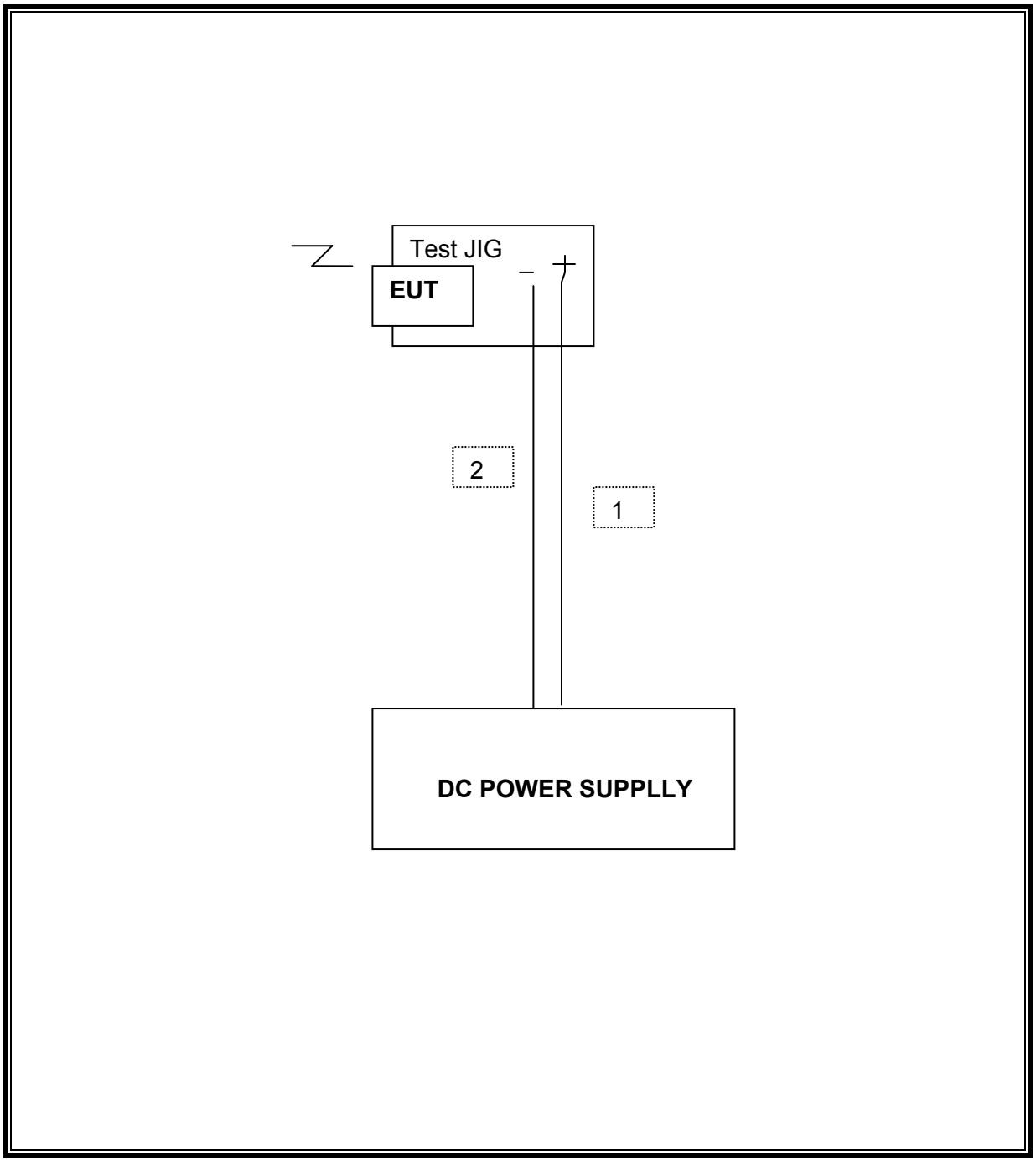
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	DC	1	Clip	26 AWG	.3m	Postive
2	DC	1	Clip	26 AWG	.3m	Negative

TEST SETUP

For radiated emissions test, the EUT is inserted into a JIG evaluation board and powered by the DC power supply. Test software exercised the radio card. Laptop was used to setup the EUT in accordance to the test requirements.

SETUP DIAGRAM FOR RADIATED EMISSIONS TEST



5.6.2. Line Conducted Emissions

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop Latitude D430	Dell	PA-10	Mitsumi P000010233	DoC
AC/DC Adapter	Dell	PA-1650-05D	CN05U092-71615-519-3395	DoC
Evaluation Board	Mitsumi	DWM-J021	N/A	N/A

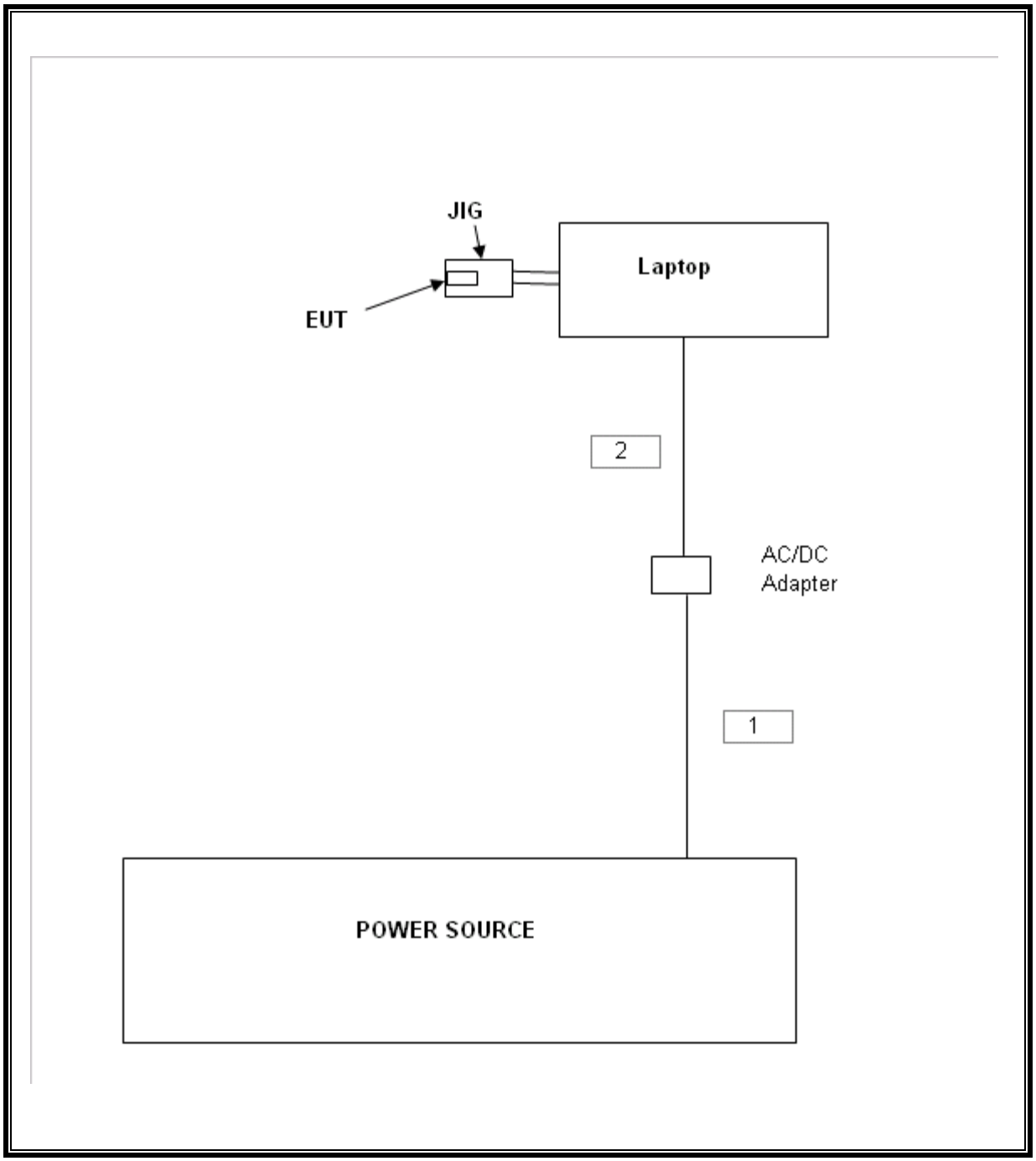
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US115V	Unshielded	1m	N/A
2	DC	1	DC Plug in	Unshielded	1.5m	N/A
3	INPUT	1	PCB	Flat Ribbon	.3 m	Insert to laptop

TEST SETUP

The EUT is inserted to the JIG test board then plug in the support laptop during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR LINE CONDUCTED EMISSIONS TEST



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**	**Asset**	**Cal Due**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	02/04/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	01/14/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	12/16/10
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	04/20/10
Antenna, Horn, 18 GHz	EMCO	3115	C00872	04/22/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/10
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/10
Peak Power Meter	Boonton	4541	N/A	01/15/11
Peak / Average Power Sensor	Boonton	57318	N/A	02/02/11

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

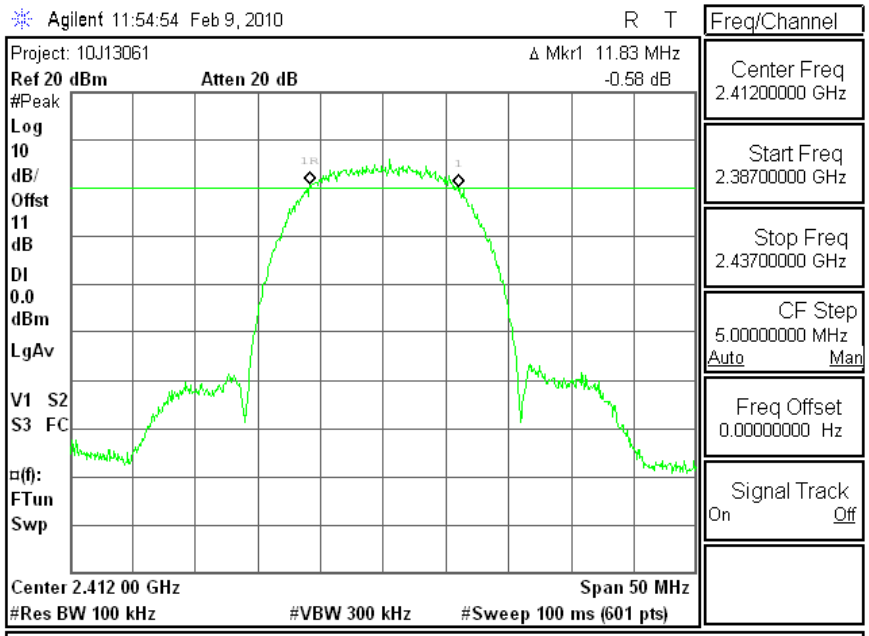
TEST PROCEDURE

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.

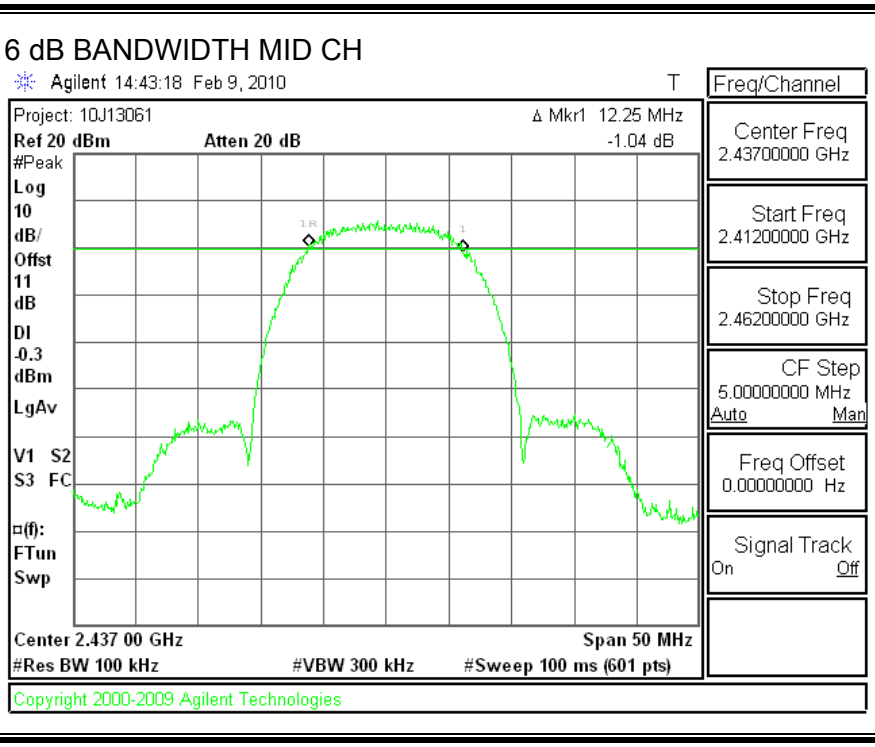
RESULTS

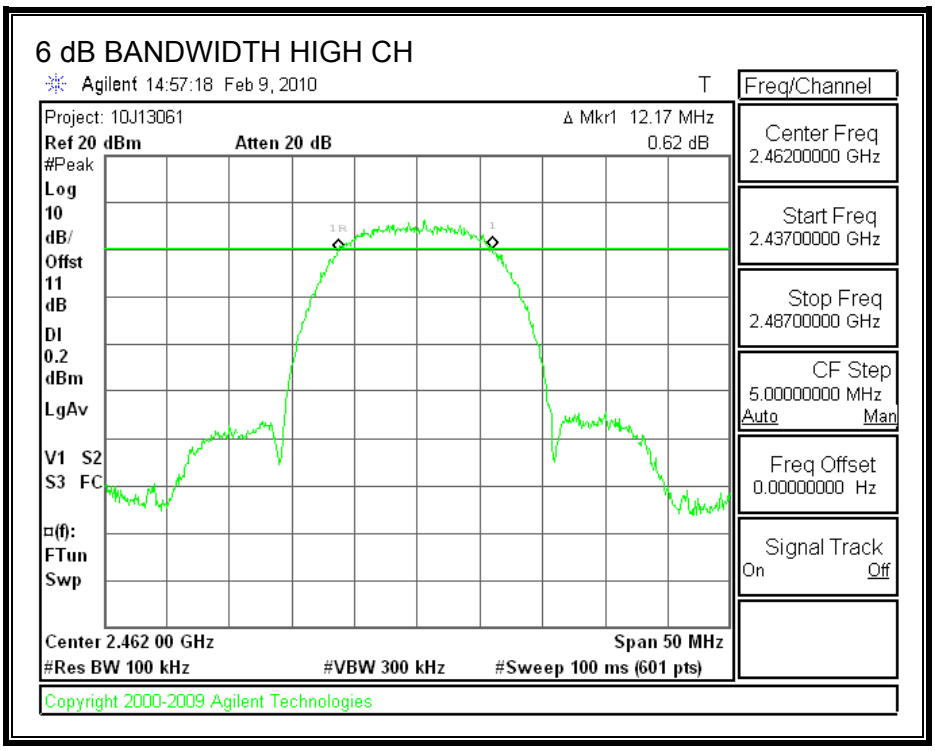
Channel	Frequency (MHz)	6 dB BW (MHz)	Minimum Limit (MHz)
Low	2412	11.83	0.5
Middle	2437	12.25	0.5
High	2462	12.17	0.5

6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH





7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

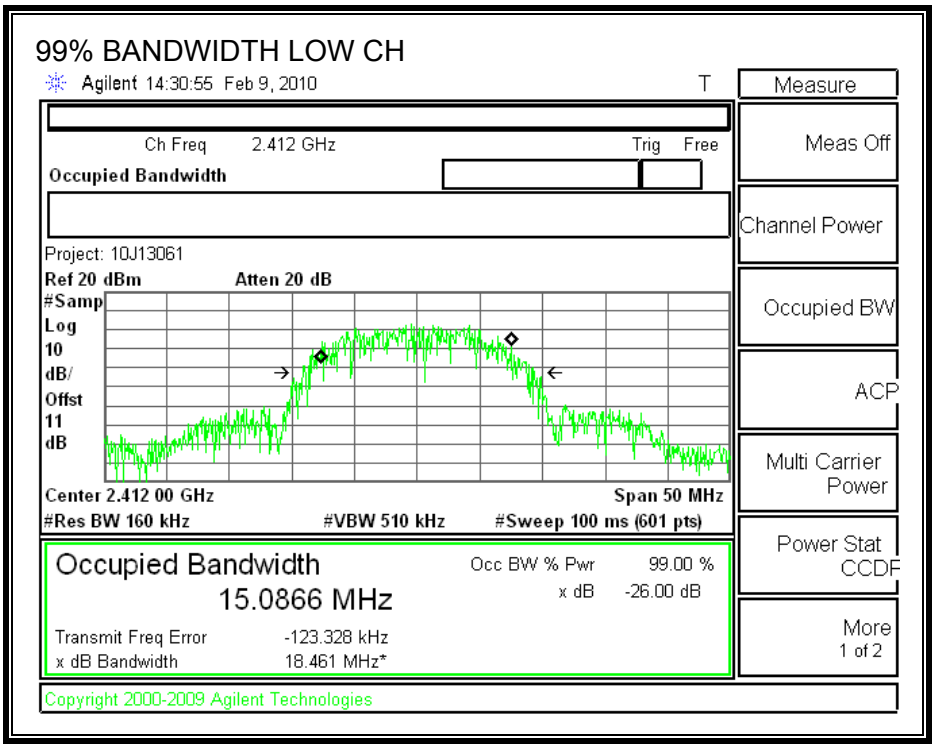
TEST PROCEDURE

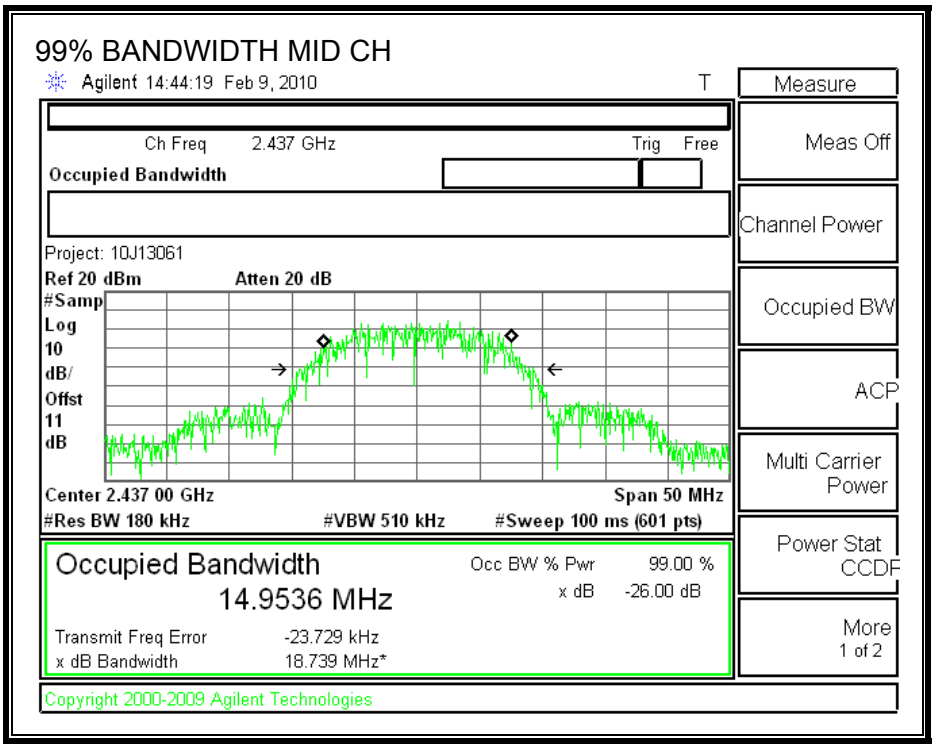
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

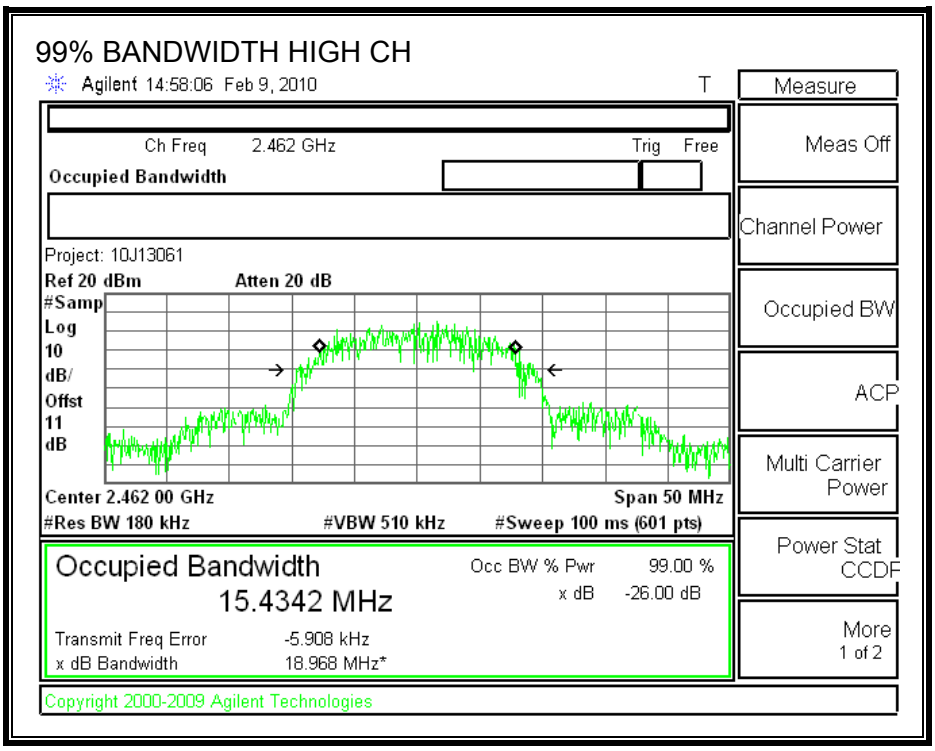
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.0866
Middle	2437	14.9536
High	2462	15.4342

99% BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

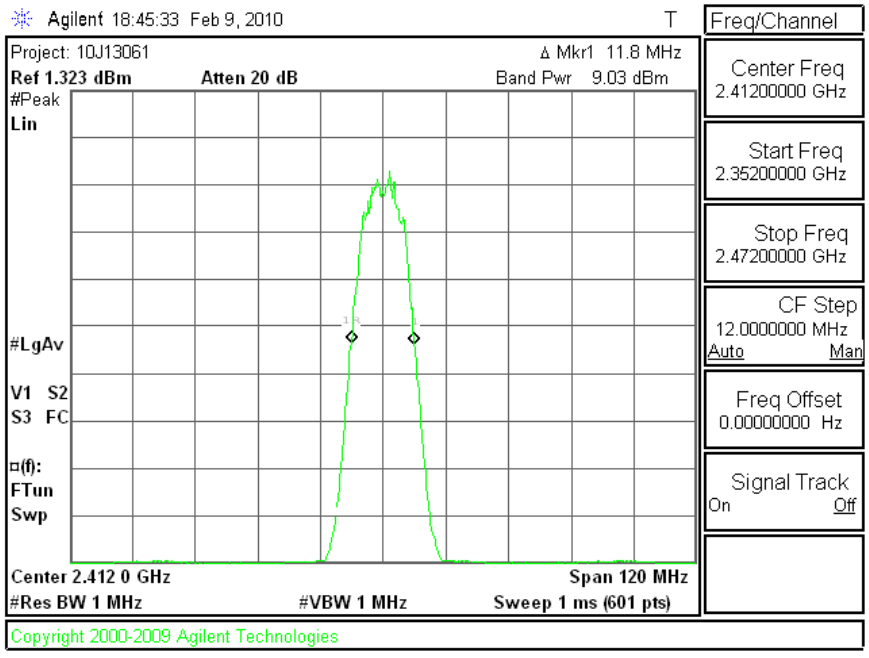
Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

RESULTS

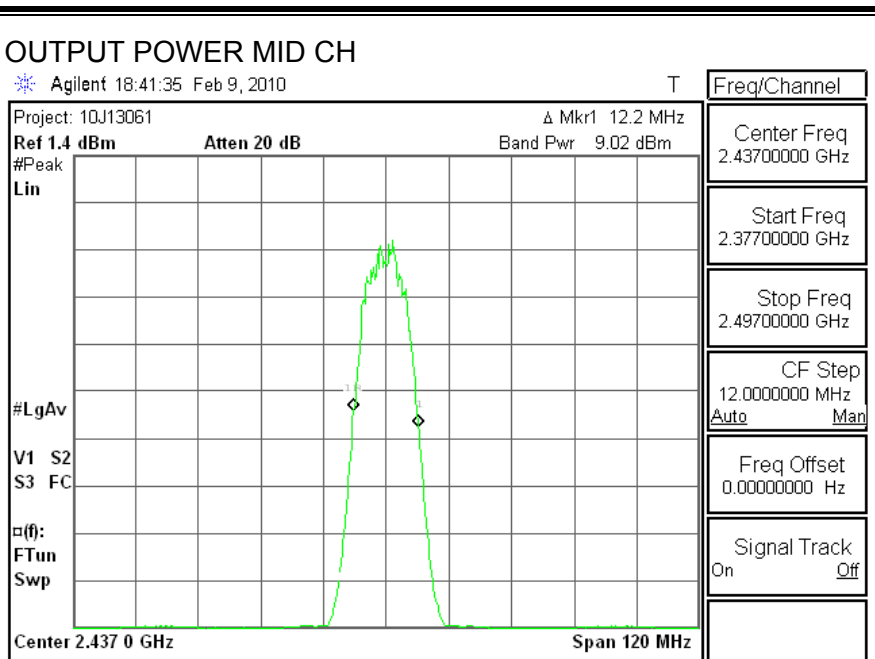
Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	9.03	11.5	20.53	30	-9.47
Middle	2437	9.02	11.5	20.52	30	-9.48
High	2462	8.7	11.5	20.20	30	-9.80

OUTPUT POWER

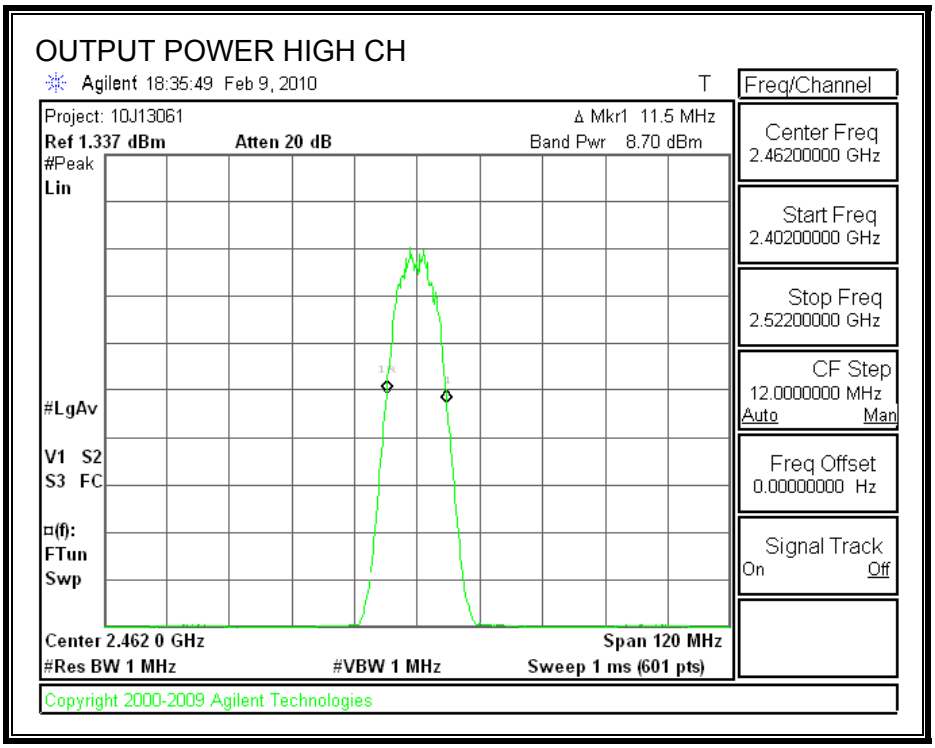
OUTPUT POWER LOW CH

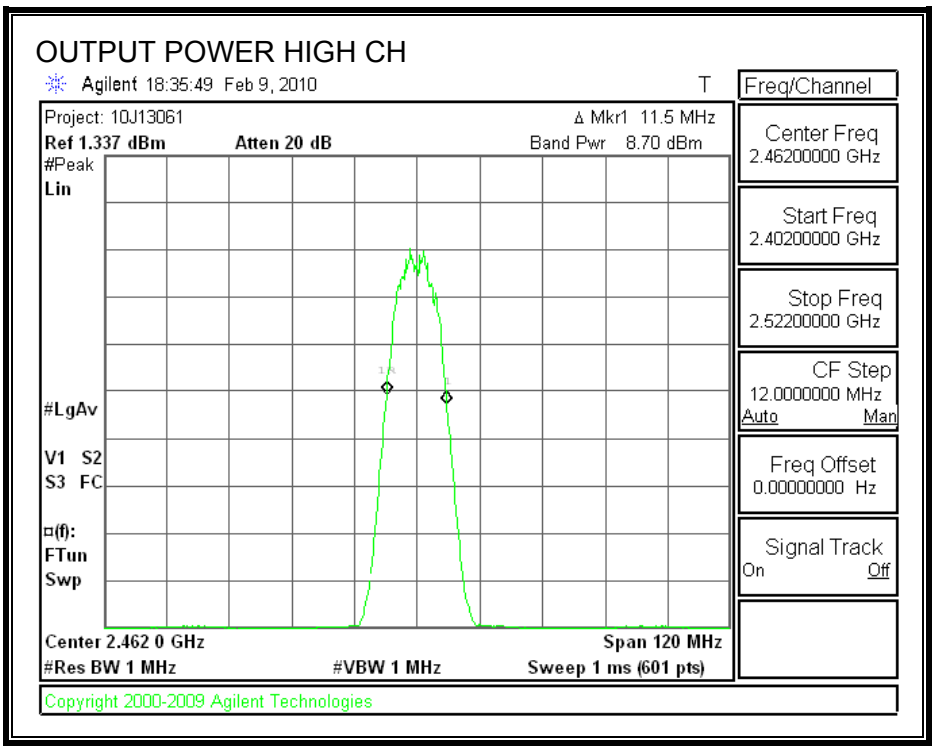


OUTPUT POWER MID CH



OUTPUT POWER HIGH CH





7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	14.10
Middle	2437	13.32
High	2462	13.51

7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

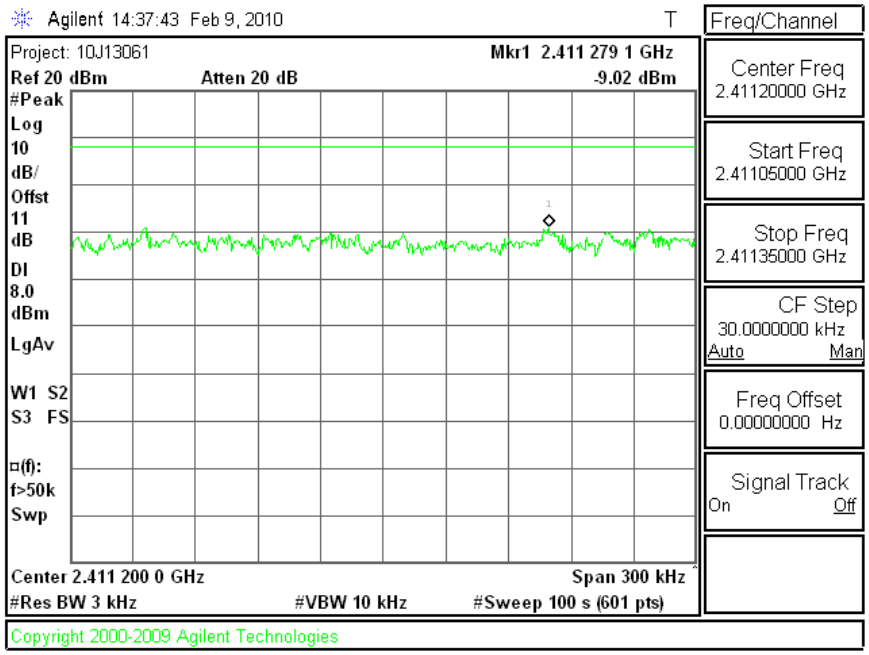
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

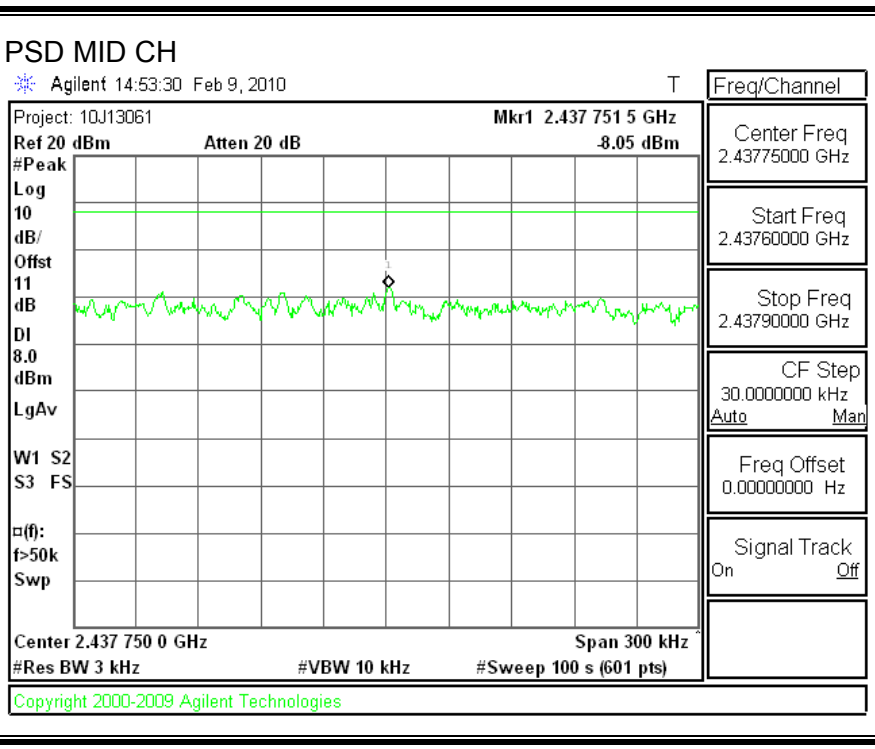
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.02	8	-17.02
Middle	2437	-8.05	8	-16.05
High	2462	-6.60	8	-14.60

POWER SPECTRAL DENSITY

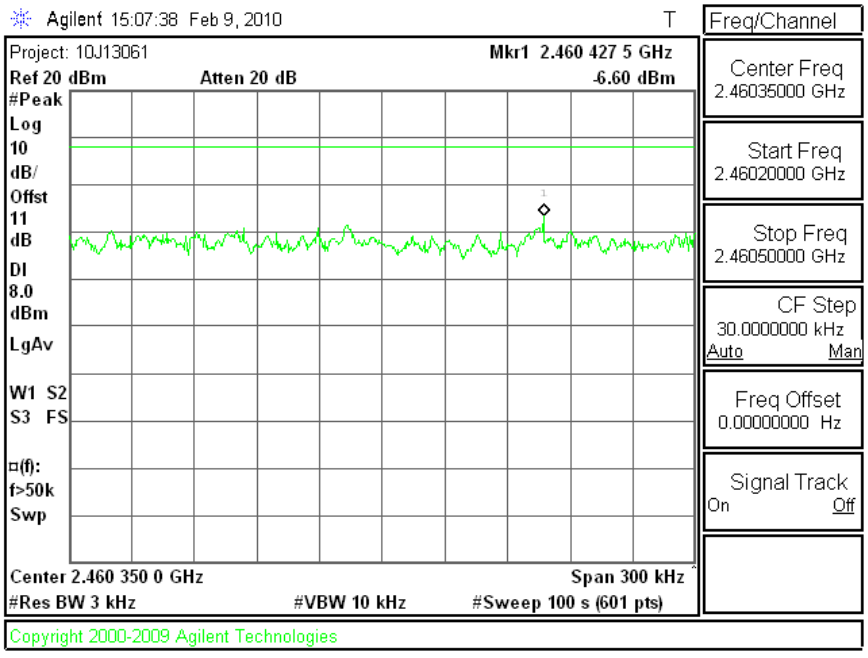
PSD LOW CH



PSD MID CH



PSD HIGH CH



7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

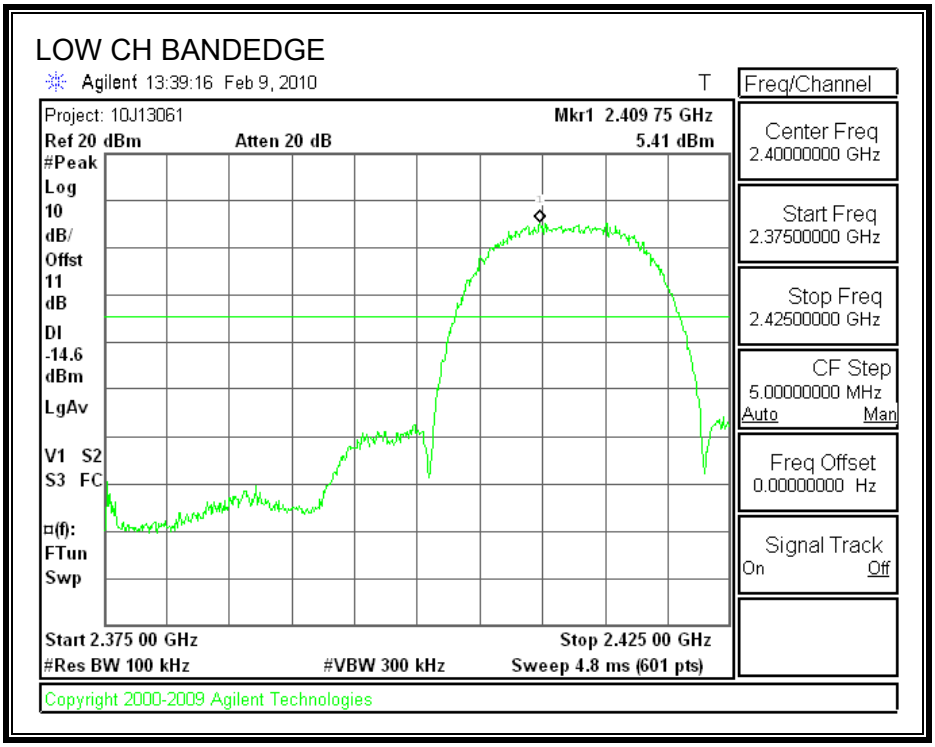
TEST PROCEDURE

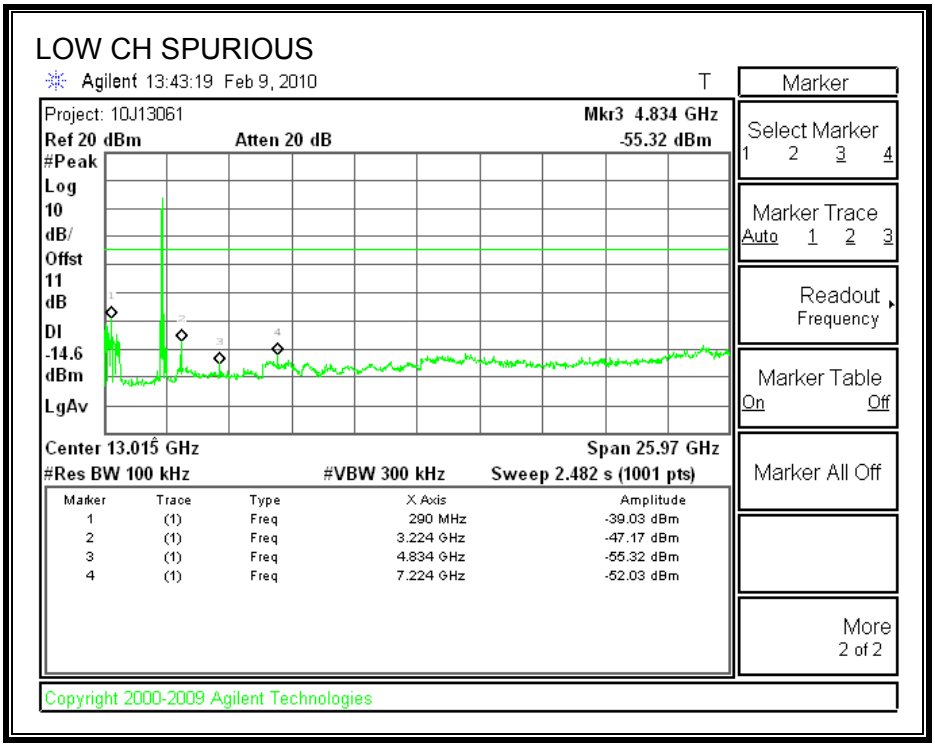
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

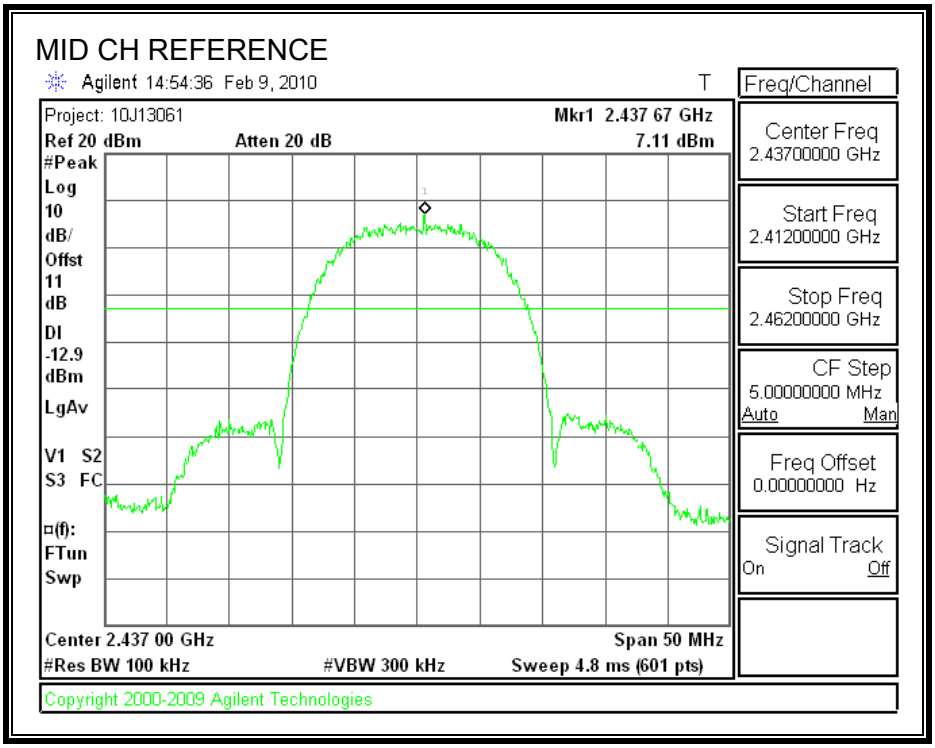
RESULTS

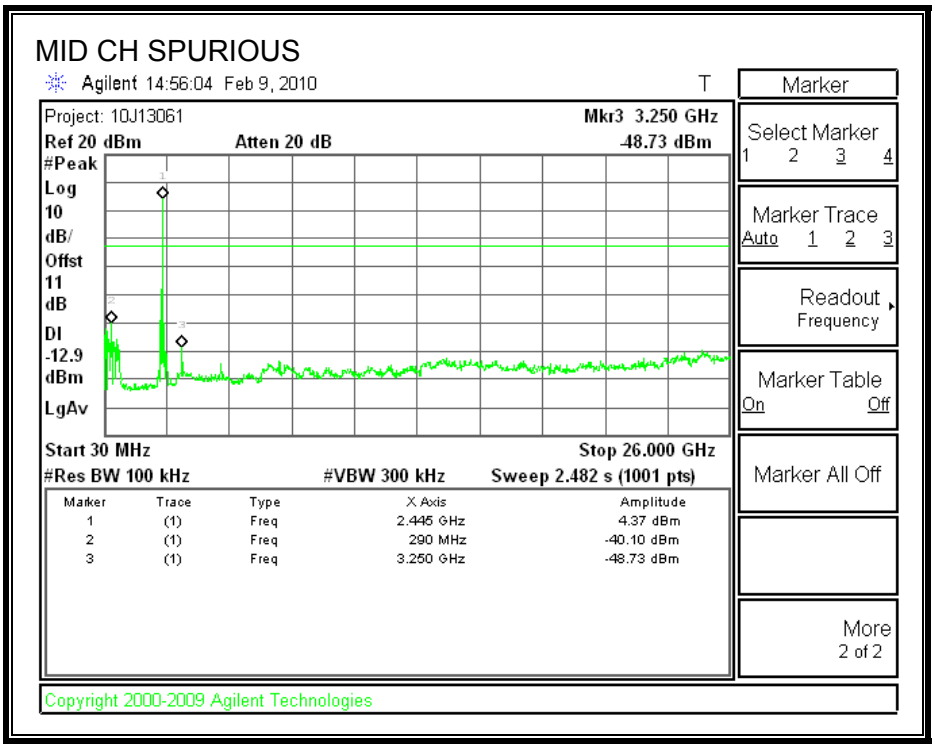
SPURIOUS EMISSIONS, LOW CHANNEL



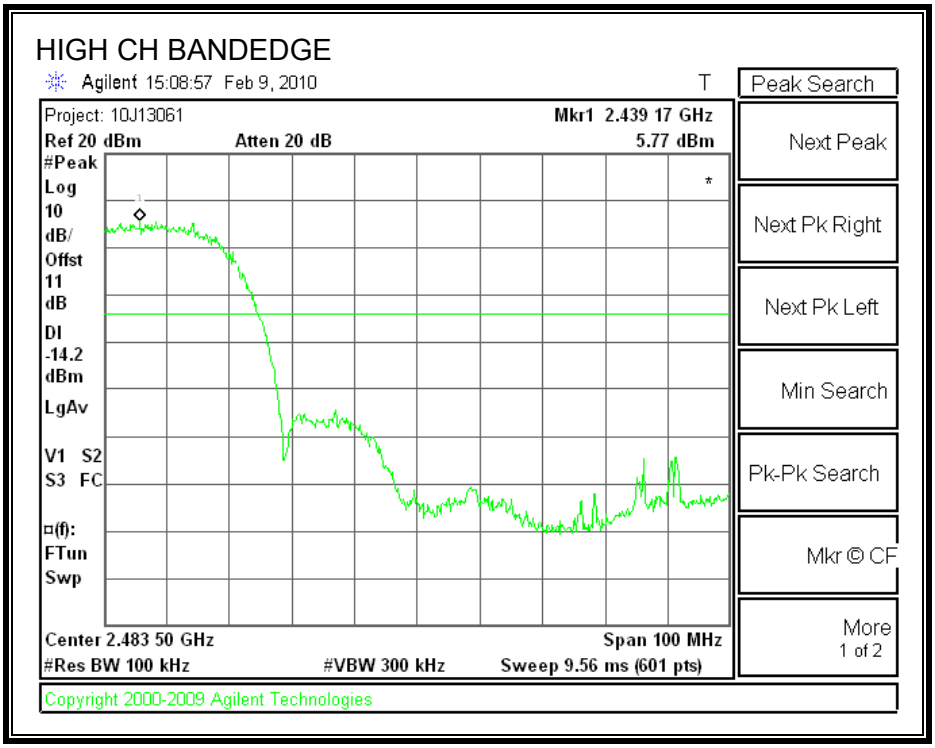


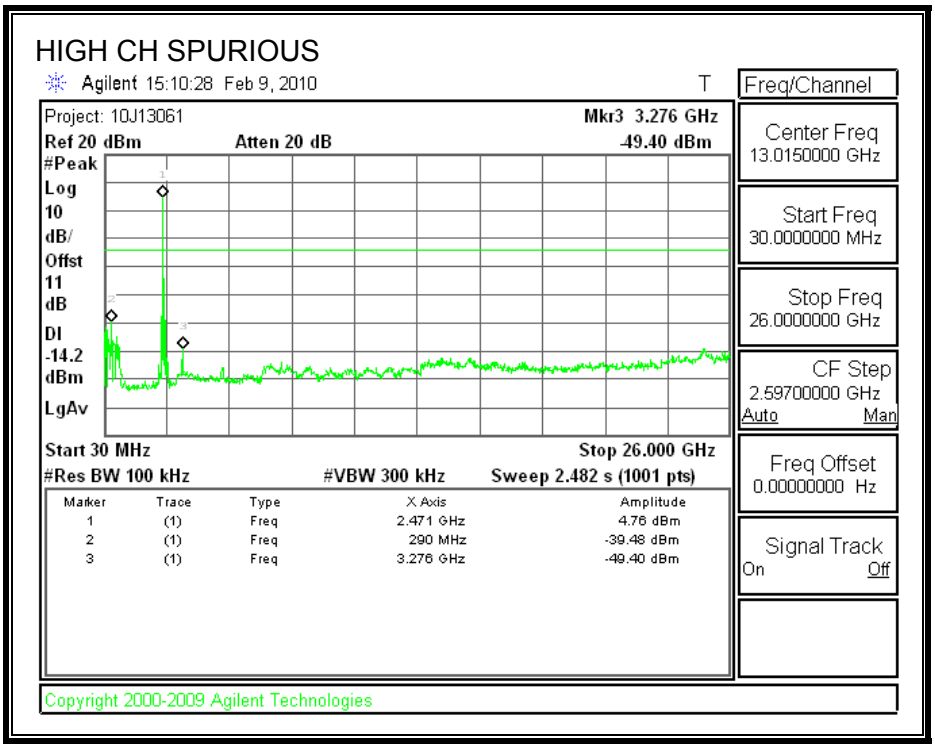
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.2. 802.11g MODE IN THE 2.4 GHz BAND

7.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

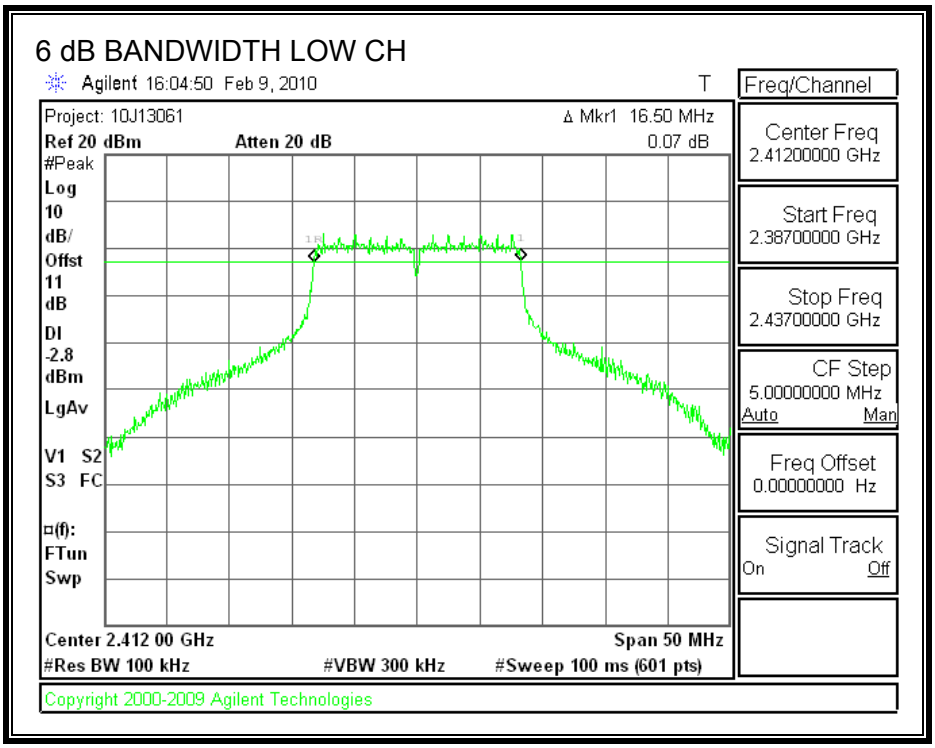
TEST PROCEDURE

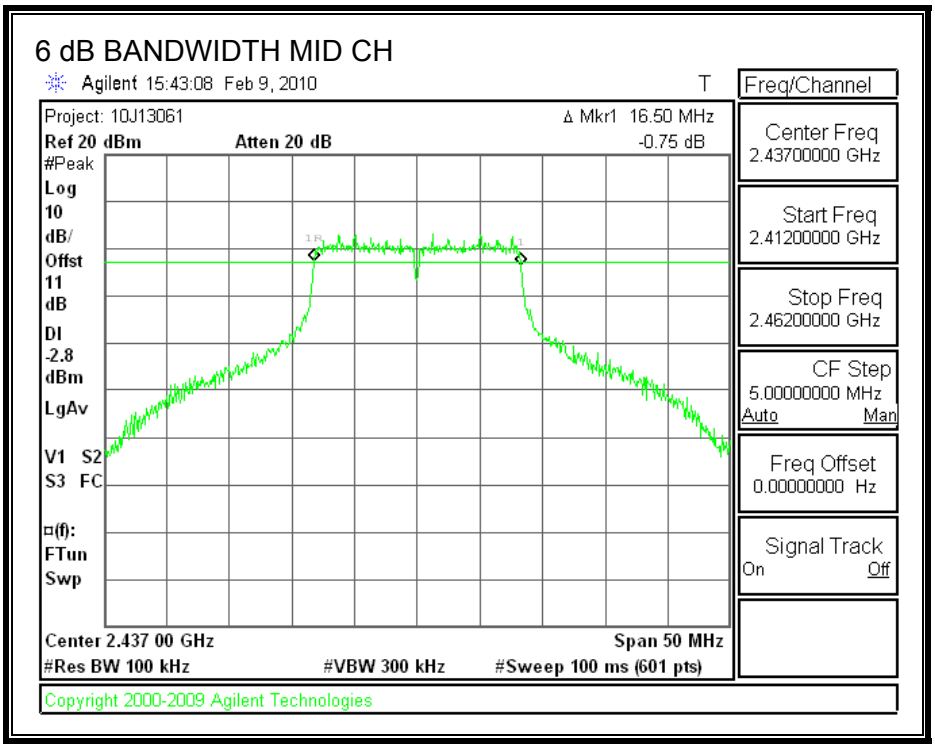
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

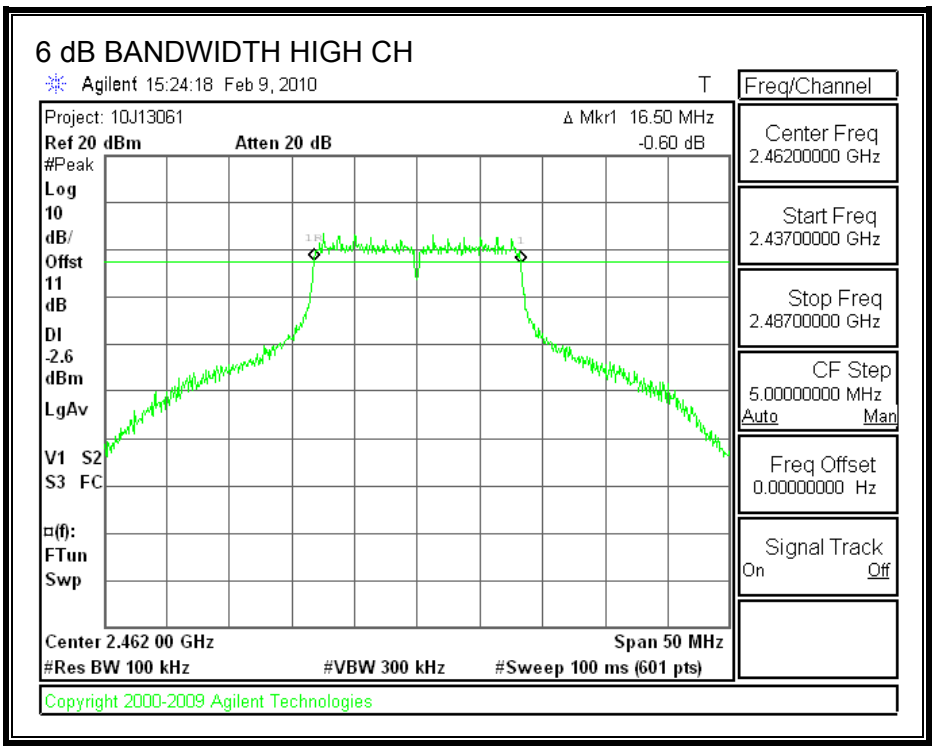
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.5	0.5
Middle	2437	16.5	0.5
High	2462	16.5	0.5

6 dB BANDWIDTH







7.2.2. OUTPUT POWER

LIMITS

FCC §15.247 (b)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

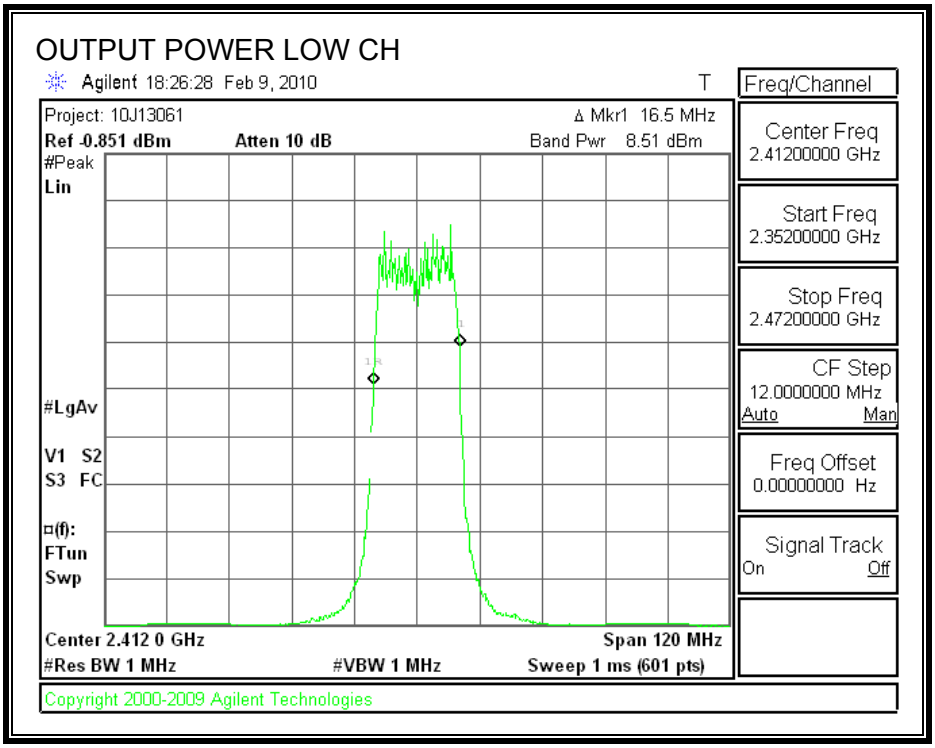
TEST PROCEDURE

Peak power is measured using the Channel bandwidth Alternative peak output power procedure specified in "TCB Training for Devices covered under Scopes A1 - A4" by Joe Dichoso, May 2003.

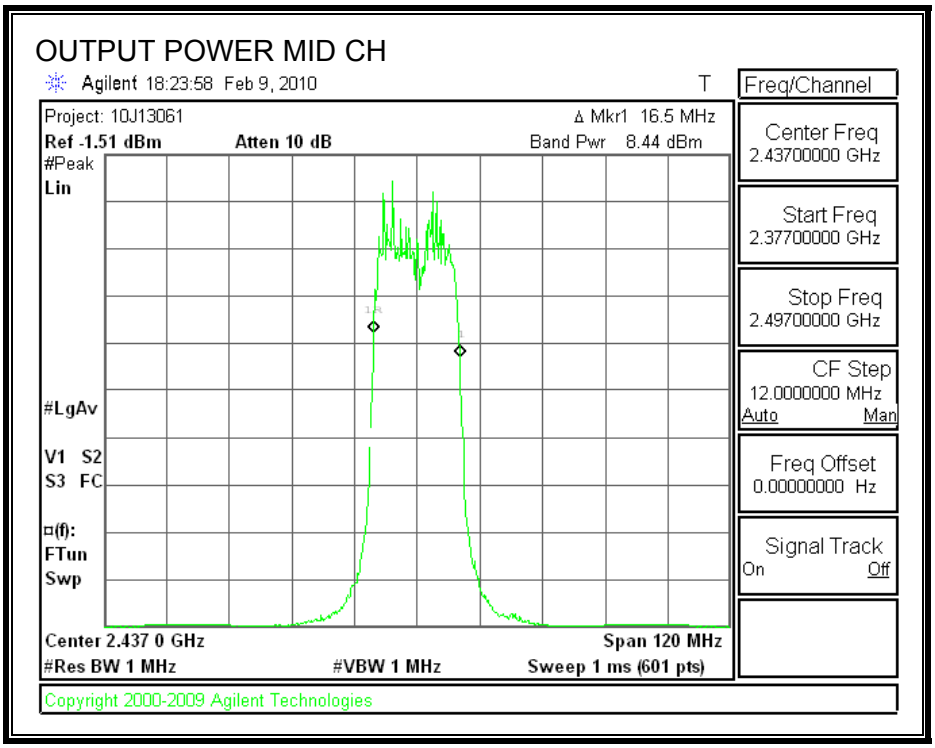
RESULTS

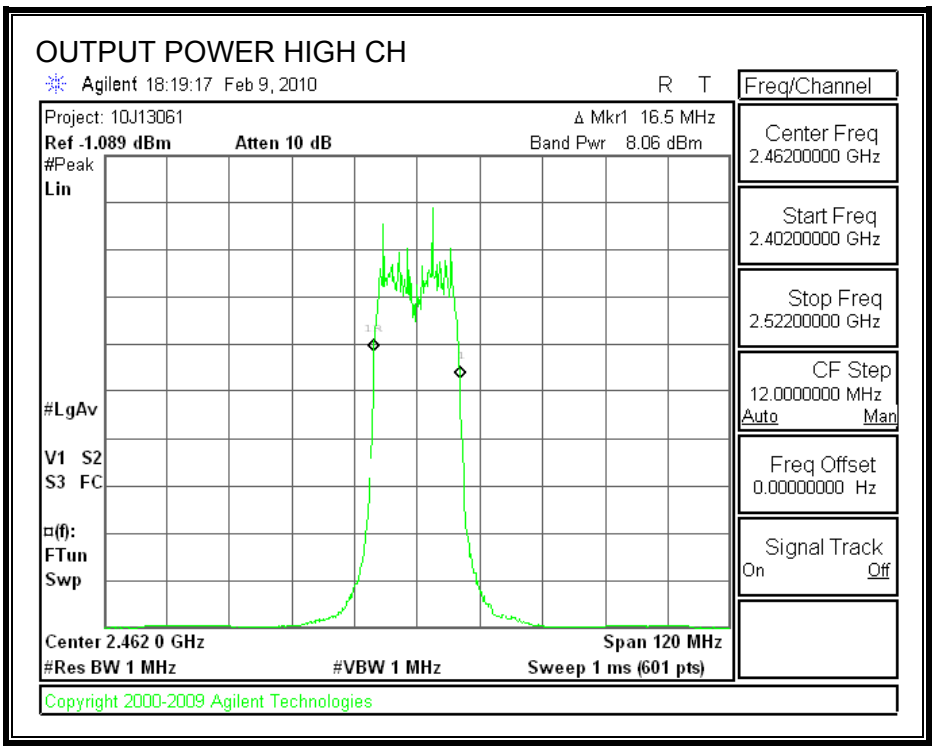
Channel	Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	8.51	11.5	20.01	30	-9.99
Middle	2437	8.44	11.5	19.94	30	-10.06
High	2462	8.06	11.5	19.56	30	-10.44

OUTPUT POWER



OUTPUT POWER MID CH





7.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.20
Middle	2437	11.88
High	2462	11.80

7.2.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

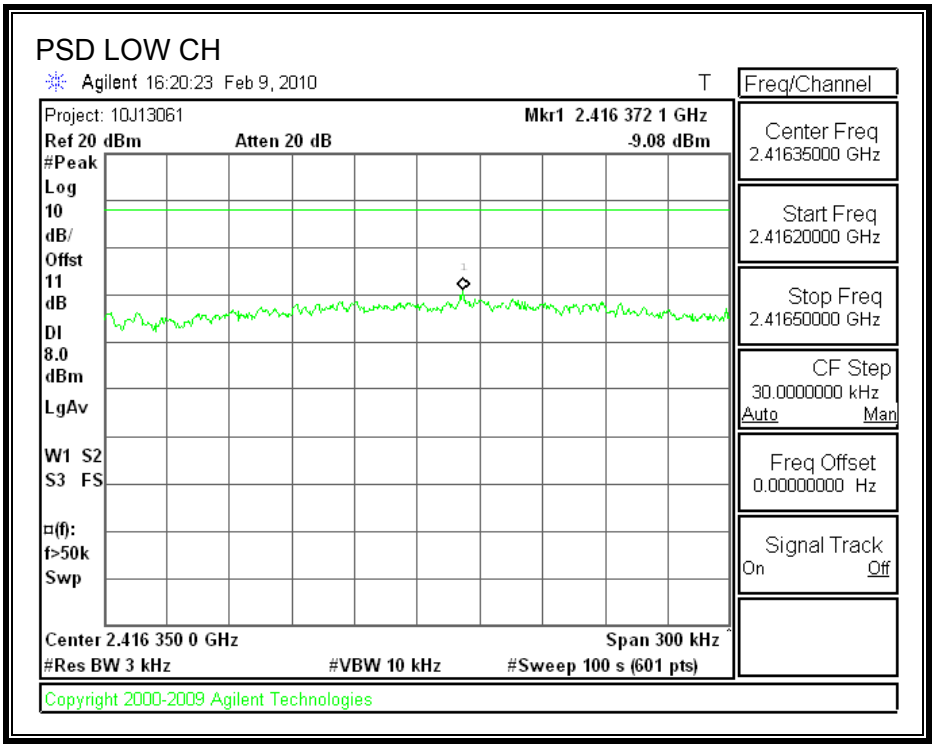
TEST PROCEDURE

Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

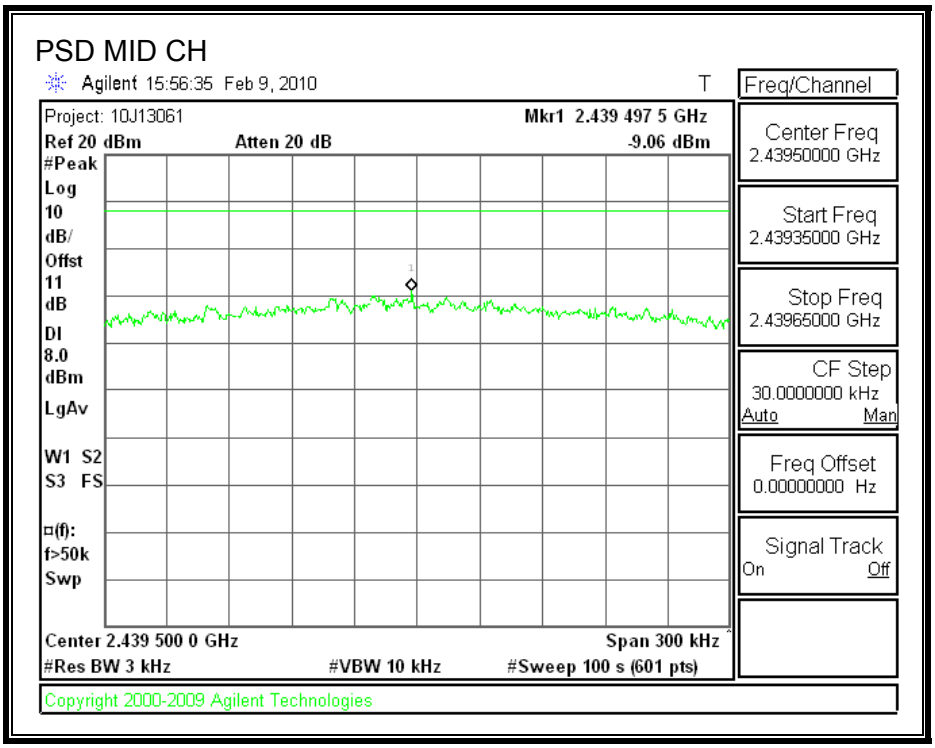
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.08	8	-17.08
Middle	2437	-9.06	8	-17.06
High	2462	-9.70	8	-17.70

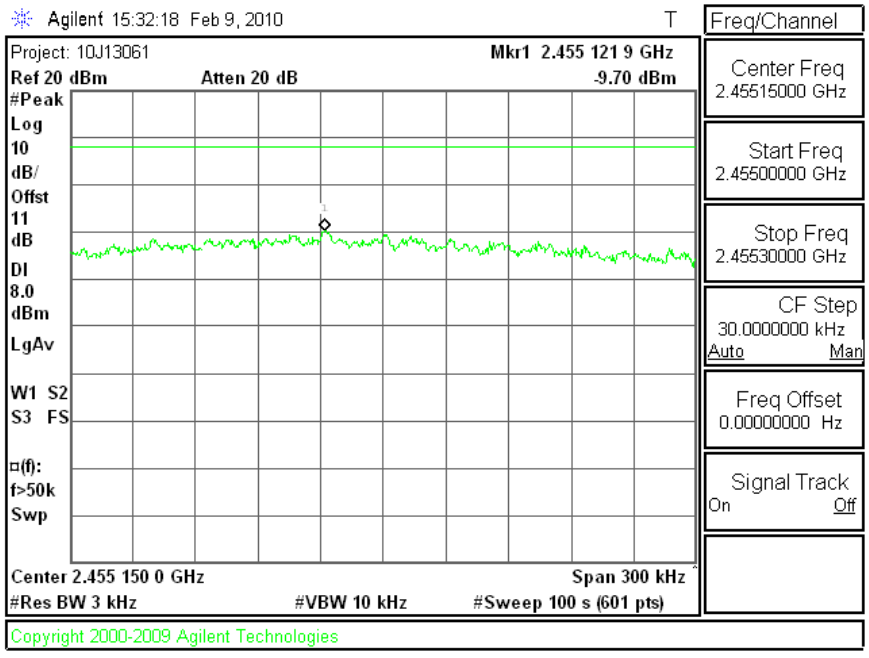
POWER SPECTRAL DENSITY



PSD MID CH



PSD HIGH CH



7.2.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

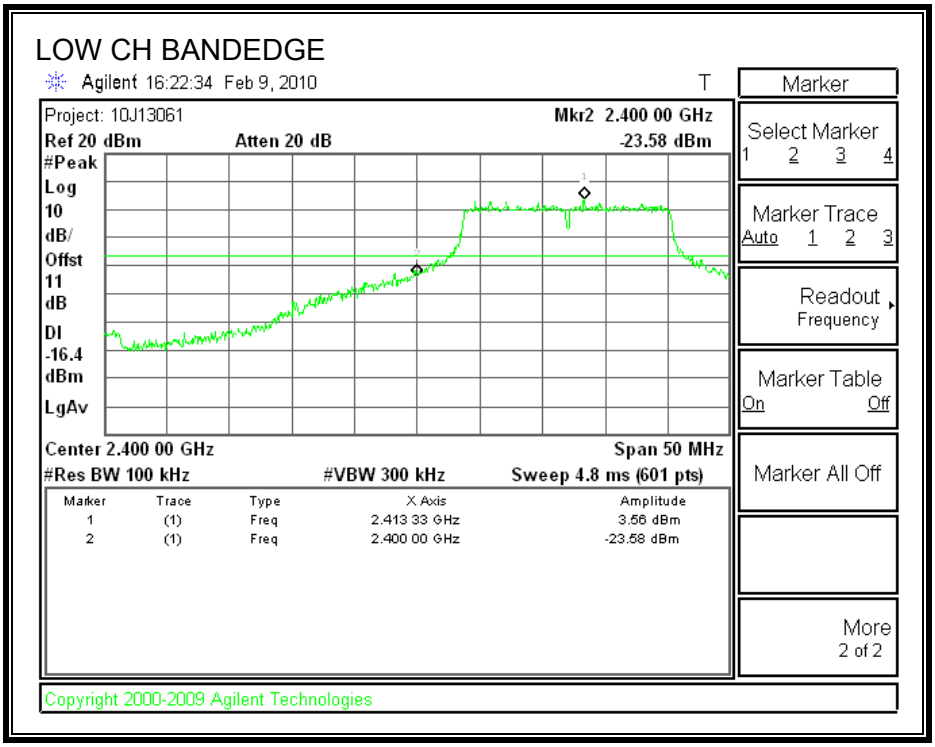
TEST PROCEDURE

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.

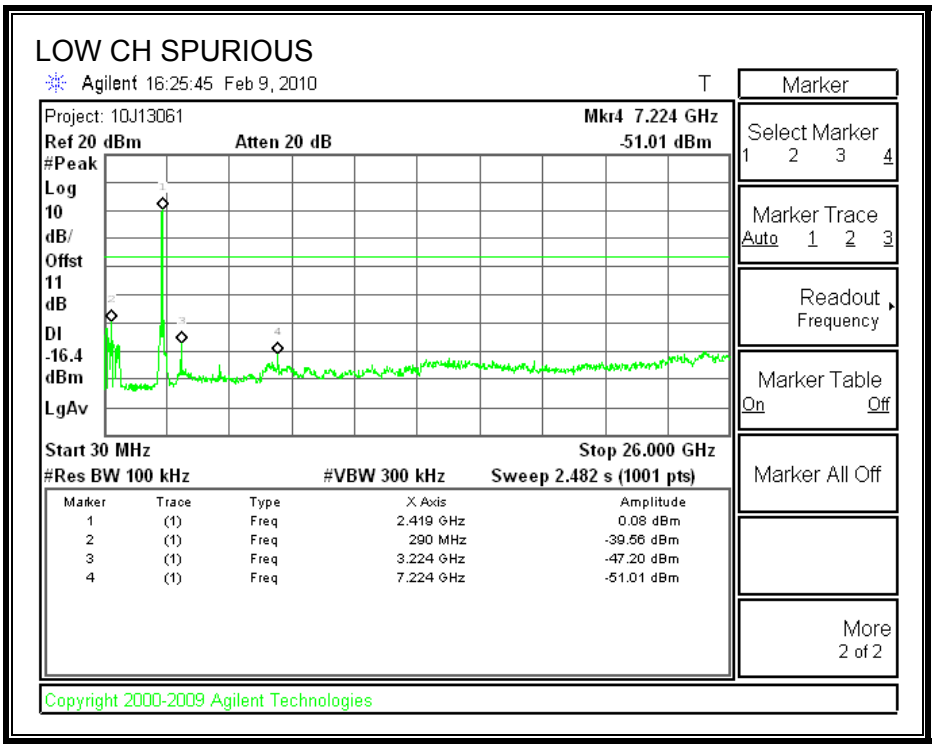
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

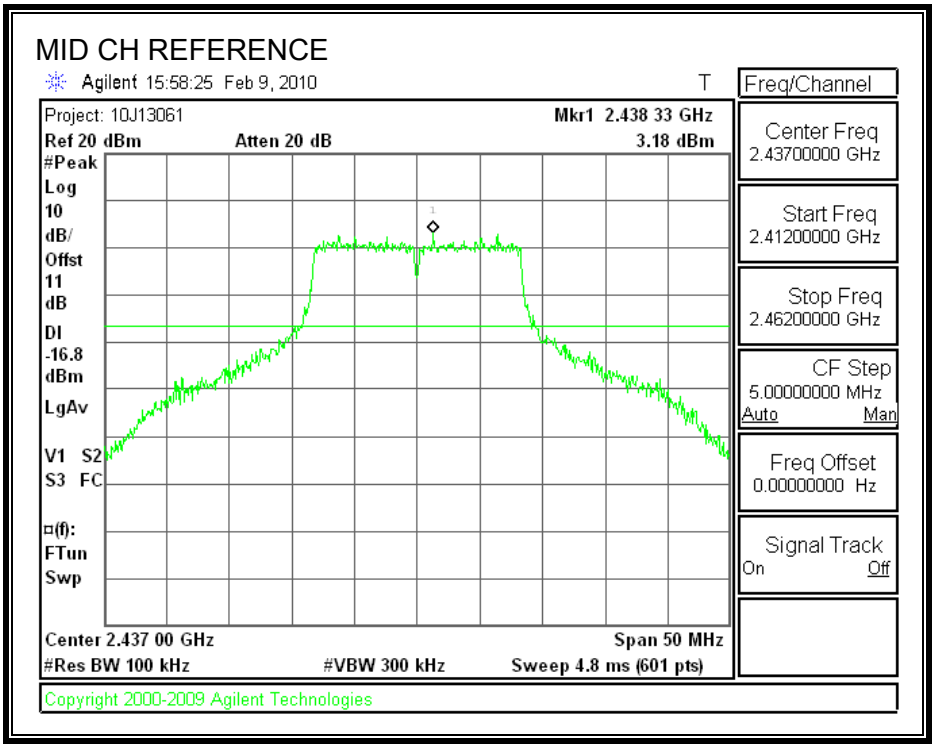
SPURIOUS EMISSIONS, LOW CHANNEL

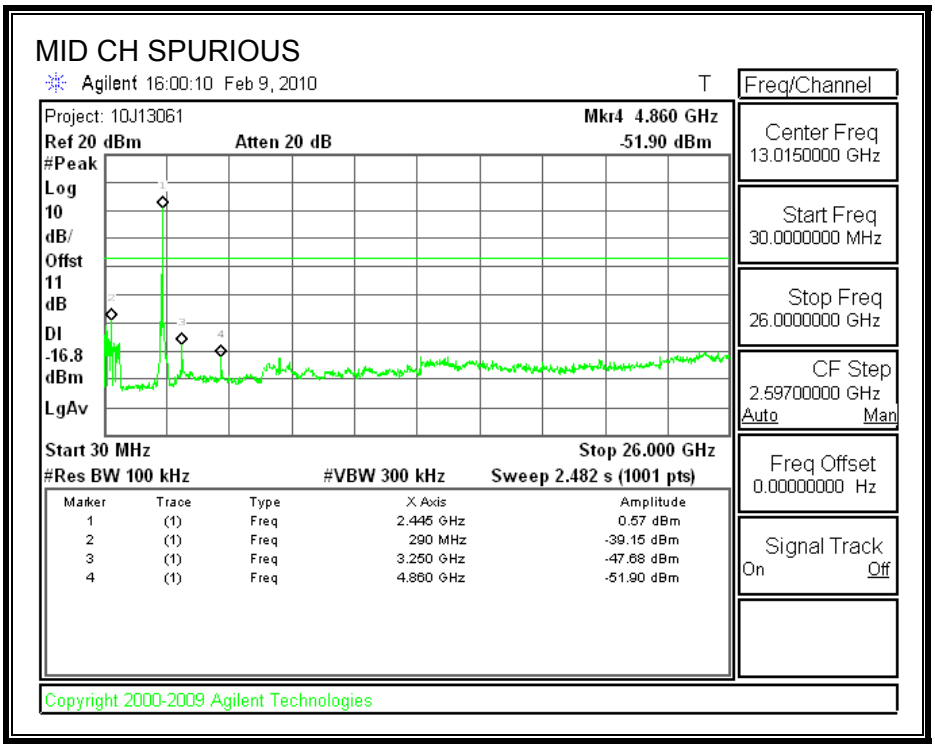


LOW CH SPURIOUS

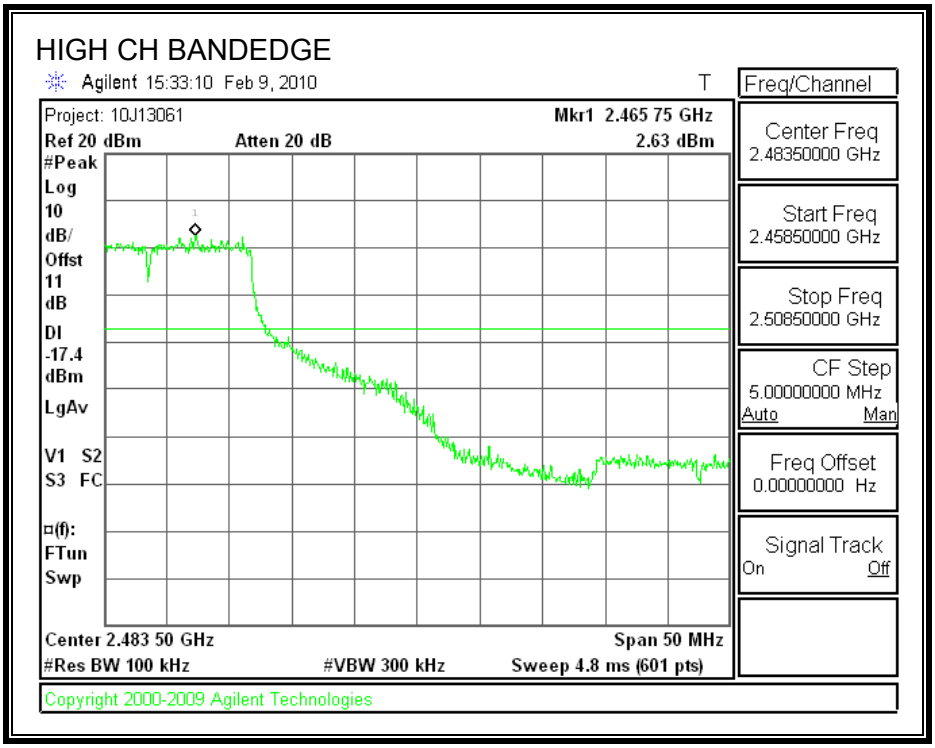


SPURIOUS EMISSIONS, MID CHANNEL

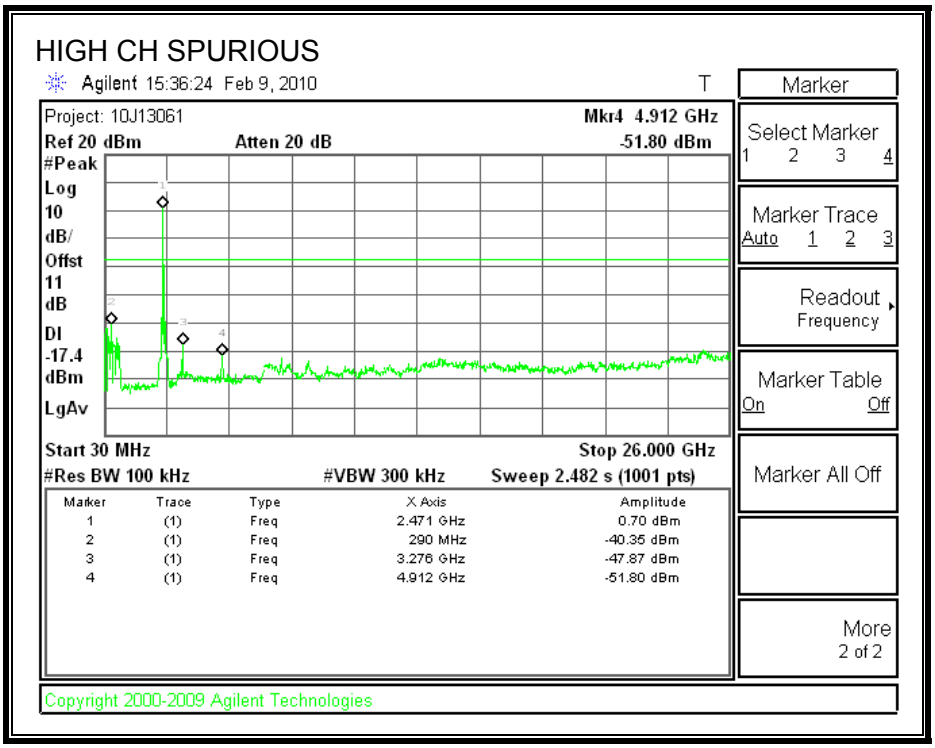




SPURIOUS EMISSIONS, HIGH CHANNEL



HIGH CH SPURIOUS



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

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.

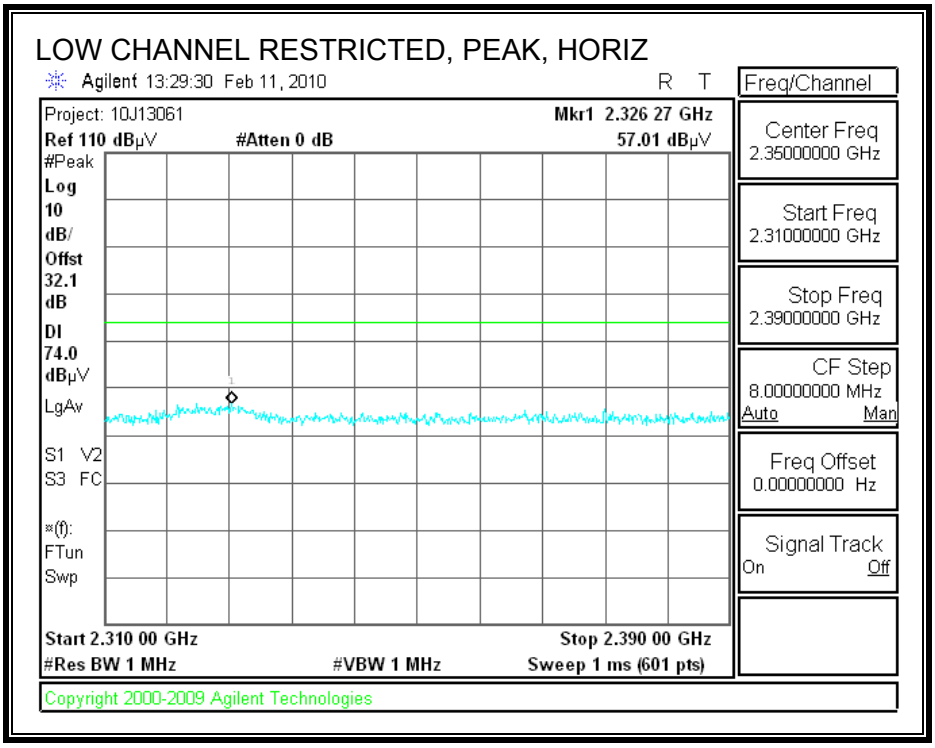
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

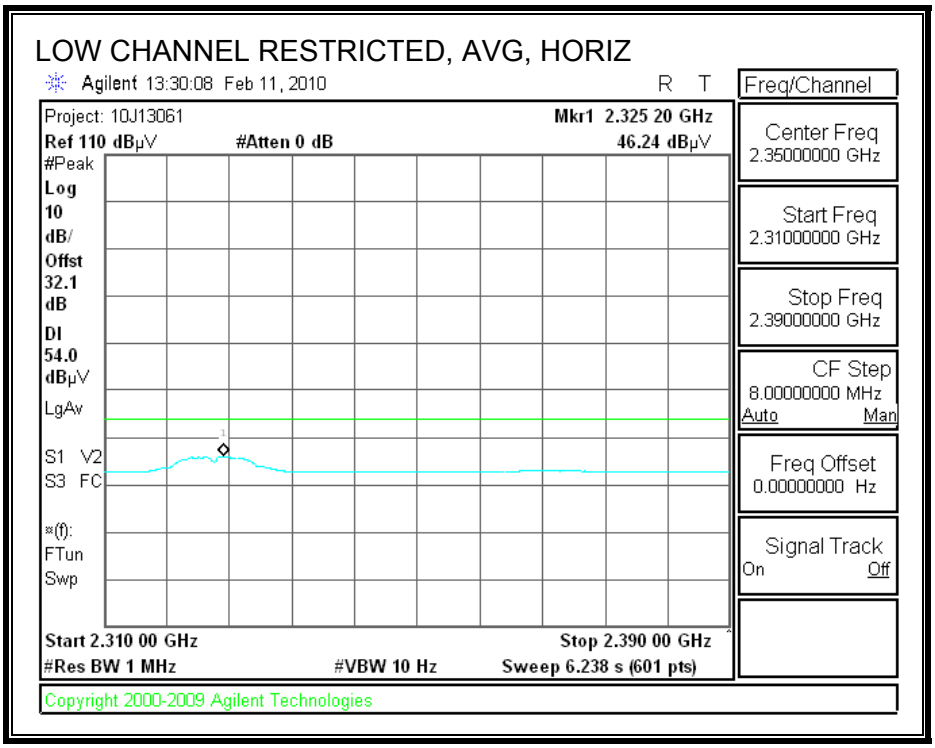
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.1.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

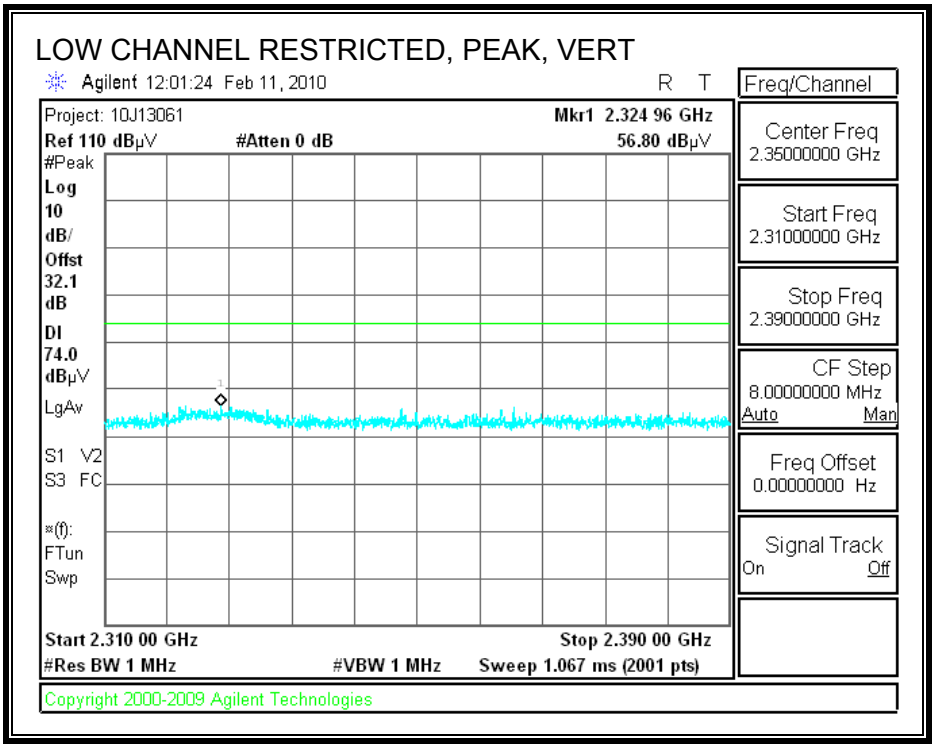
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



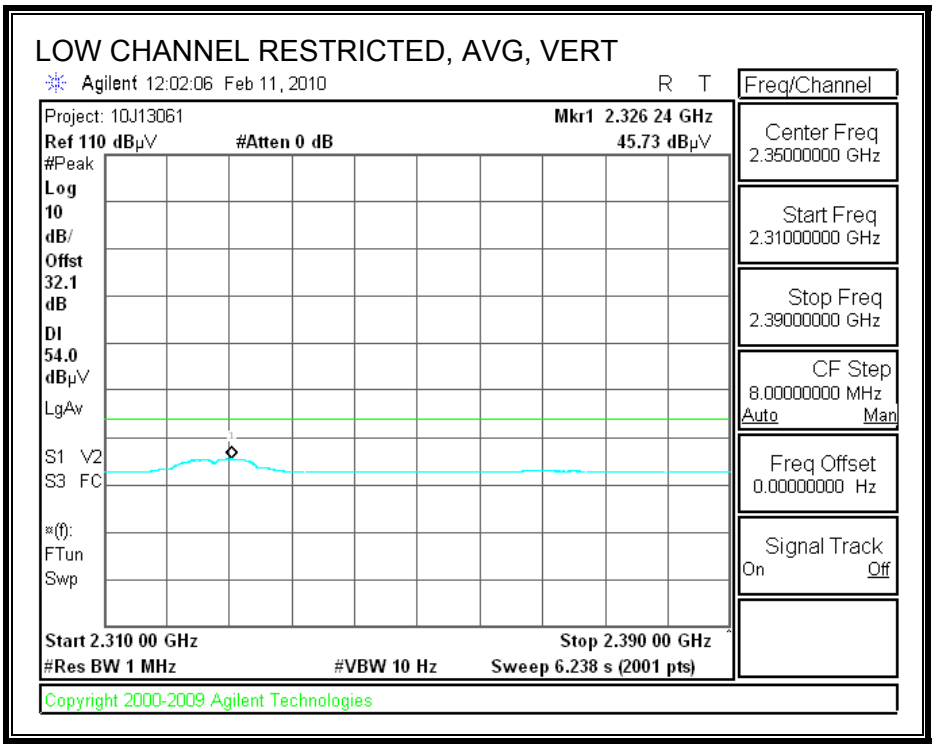
LOW CHANNEL RESTRICTED, AVG, HORIZ



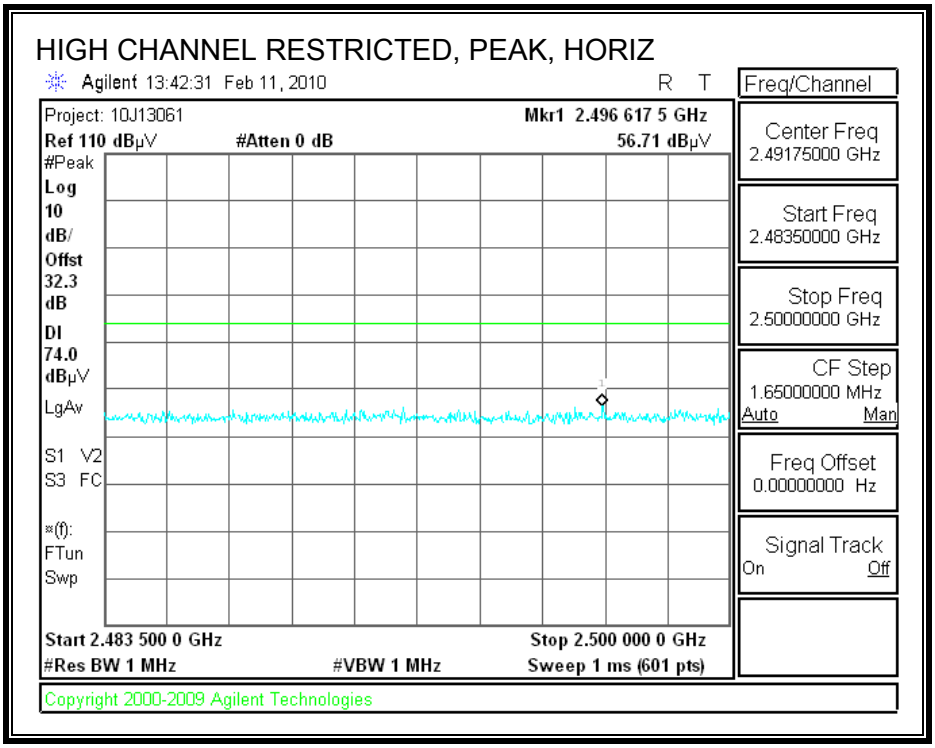
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



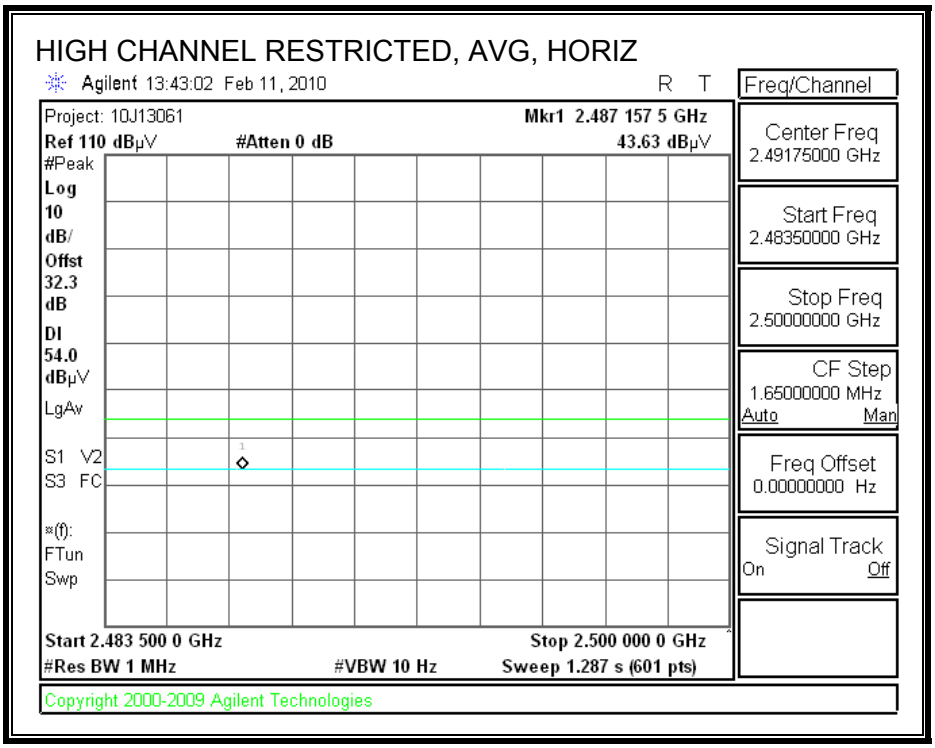
LOW CHANNEL RESTRICTED, AVG, VERT



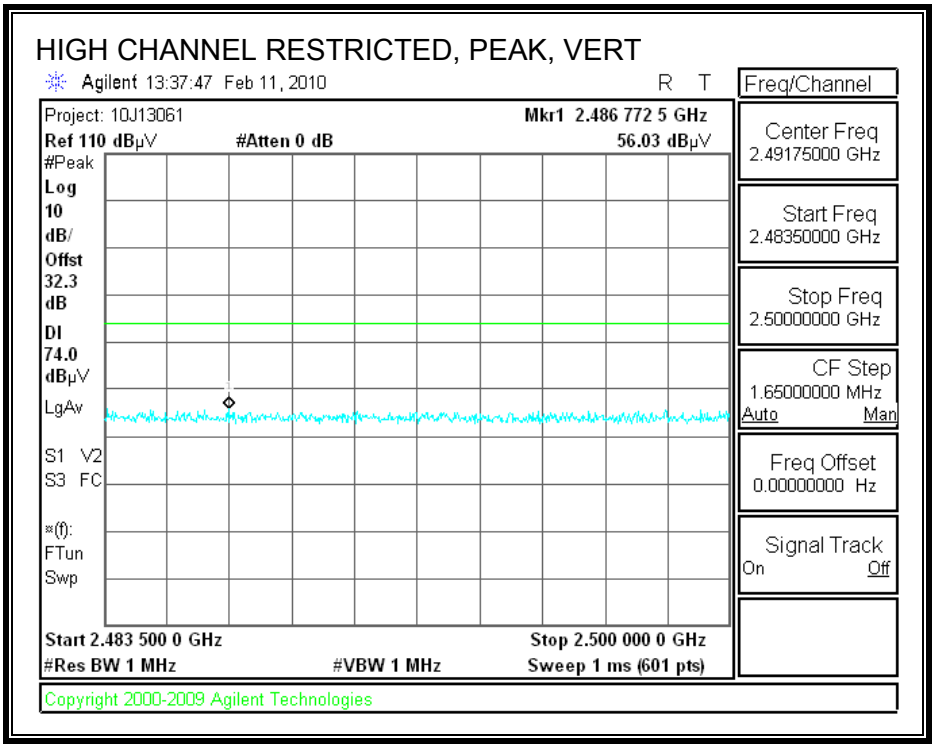
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



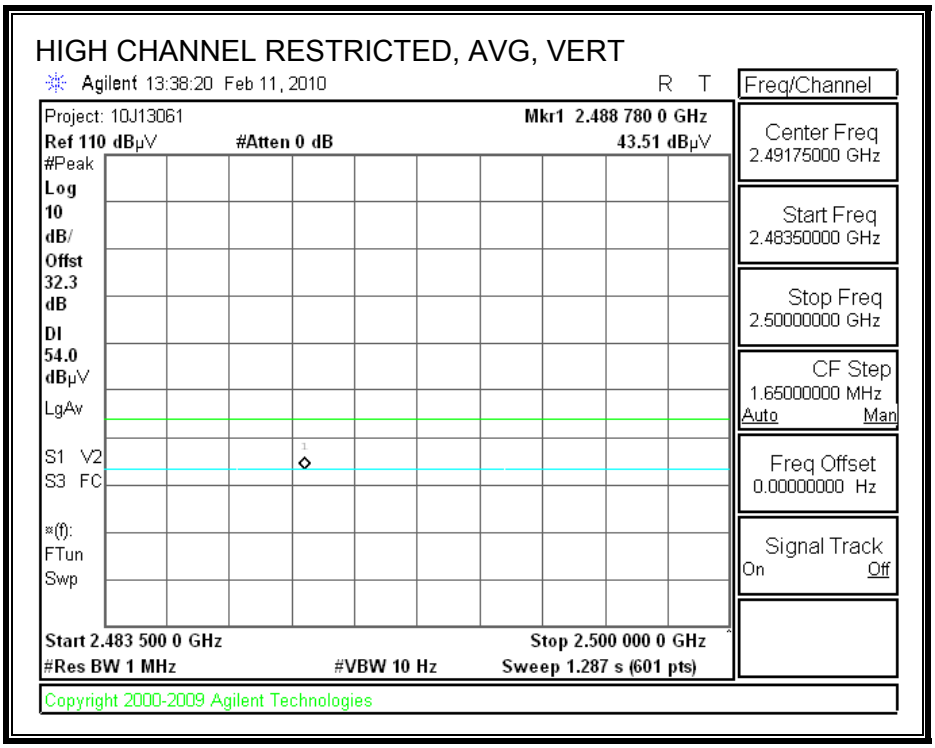
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: MITSUMI
Project #: 10J13061
Date: 2/11/10
Test Engineer: Thanh Nguyen
Configuration: EUT, Test JIG, Support Laptop
Mode: Transmit b mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements RBW=VBW=1MHz
Average Measurements RBW=1MHz ; VBW=10Hz

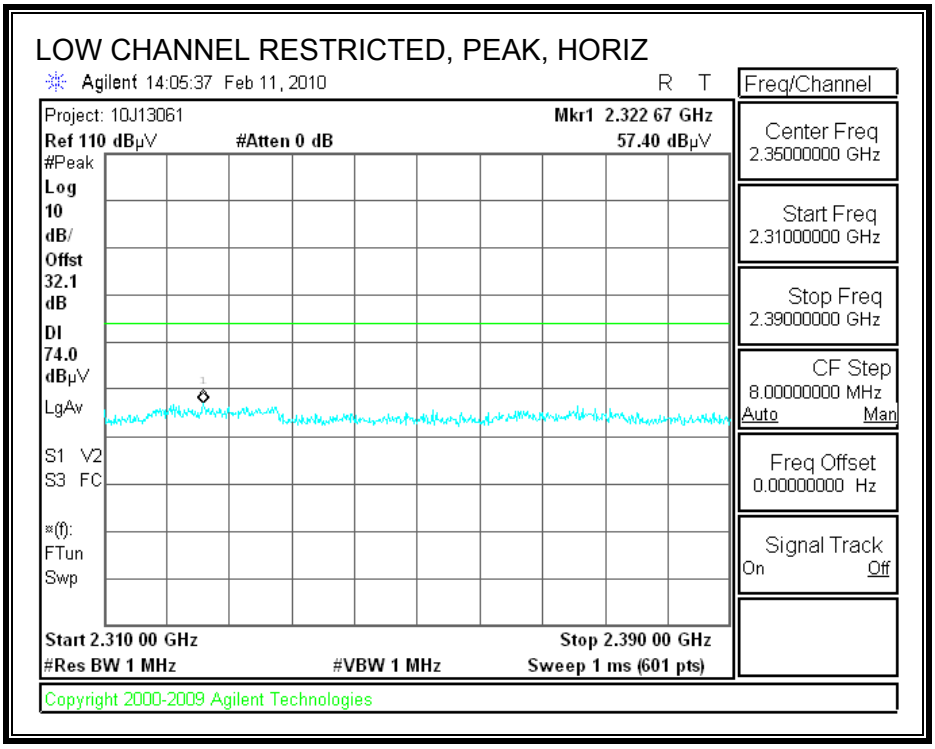
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Harmonics Spurious															
Low Ch															
4.824	3.0	46.3	41.6	32.8	5.8	-34.8	0.0	0.0	50.1	45.4	74	54	-23.9	-8.6	V
7.263	3.0	42.6	33.1	35.1	7.2	-34.7	0.0	0.0	50.3	40.8	74	54	-23.7	-13.2	V
9.648	3.0	39.4	30.0	37.1	8.5	-35.0	0.0	0.0	50.0	40.7	74	54	-24.0	-13.3	V
12.060	3.0	35.6	22.3	38.5	9.8	-32.4	0.0	0.0	51.4	38.2	74	54	-22.6	-15.8	Noise Floor
4.824	3.0	44.2	39.1	32.8	5.8	-34.8	0.0	0.0	47.9	42.8	74	54	-26.1	-11.2	H
7.263	3.0	41.3	31.2	35.1	7.2	-34.7	0.0	0.0	49.0	38.9	74	54	-25.0	-15.1	H
9.648	3.0	40.8	32.5	37.1	8.5	-35.0	0.0	0.0	51.4	43.1	74	54	-22.6	-10.9	H
12.060	3.0	35.2	22.2	38.5	9.8	-32.4	0.0	0.0	51.1	38.0	74	54	-22.9	-16.0	Noise Floor
Mid Ch															
4.874	3.0	46.1	42.7	32.8	5.8	-34.9	0.0	0.0	49.9	46.5	74	54	-24.1	-7.5	V
7.311	3.0	40.8	31.8	35.2	7.3	-34.7	0.0	0.0	48.6	39.6	74	54	-25.4	-14.4	V
9.748	3.0	35.8	25.1	37.2	8.6	-35.0	0.0	0.0	46.5	35.8	74	54	-27.5	-18.2	Noise Floor
4.874	3.0	43.0	36.6	32.8	5.8	-34.9	0.0	0.0	46.8	40.4	74	54	-27.2	-13.6	H
7.311	3.0	41.5	29.4	35.2	7.3	-34.7	0.0	0.0	49.3	37.2	74	54	-24.7	-16.8	H
9.748	3.0	36.8	26.6	37.2	8.6	-35.0	0.0	0.0	47.5	37.3	74	54	-26.5	-16.7	Noise Floor
High Ch															
4.924	3.0	45.5	41.9	32.8	5.9	-34.9	0.0	0.0	49.4	45.7	74	54	-24.6	-8.3	V
7.386	3.0	42.6	31.5	35.3	7.3	-34.6	0.0	0.0	50.6	39.4	74	54	-23.4	-14.6	V
9.848	3.0	38.6	26.4	37.2	8.7	-35.1	0.0	0.0	49.4	37.2	74	54	-24.6	-16.8	V
12.310	3.0	36.0	22.1	38.7	9.9	-32.4	0.0	0.0	52.1	38.2	74	54	-21.9	-15.8	Noise Floor
4.924	3.0	44.5	38.1	32.8	5.9	-34.9	0.0	0.0	48.4	42.0	74	54	-25.6	-12.0	H
7.386	3.0	40.8	32.0	35.3	7.3	-34.6	0.0	0.0	48.7	40.0	74	54	-25.3	-14.0	H
9.848	3.0	38.3	24.0	37.2	8.7	-35.1	0.0	0.0	49.1	34.8	74	54	-24.9	-19.2	H
12.310	3.0	34.8	21.8	38.7	9.9	-32.4	0.0	0.0	51.0	38.0	74	54	-23.0	-16.0	Noise Floor
Spurious Emissions															
1.161	3.0	56.5	31.7	24.5	2.6	-36.0	0.0	0.0	47.5	22.8	74	54	-26.5	-31.2	V
1.593	3.0	54.0	35.2	26.1	3.0	-35.7	0.0	0.0	47.5	28.6	74	54	-26.5	-25.4	V
1.862	3.0	49.7	33.6	27.1	3.3	-35.5	0.0	0.0	44.6	28.5	74	54	-29.4	-25.5	V
2.323	3.0	50.5	43.9	28.1	3.8	-35.1	0.0	0.0	47.2	40.6	74	54	-26.8	-13.4	V
1.009	3.0	51.8	34.5	24.0	2.4	-36.1	0.0	0.0	42.0	24.7	74	54	-32.0	-29.3	H
No other emissions above system noise floor.															

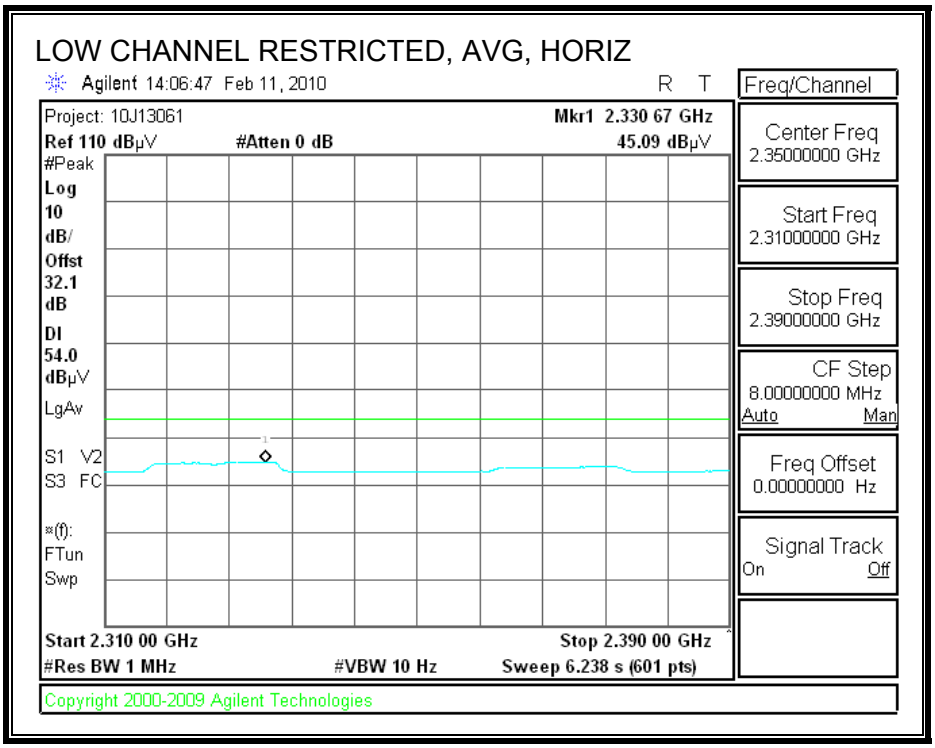
Rev. 11.10.08

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		

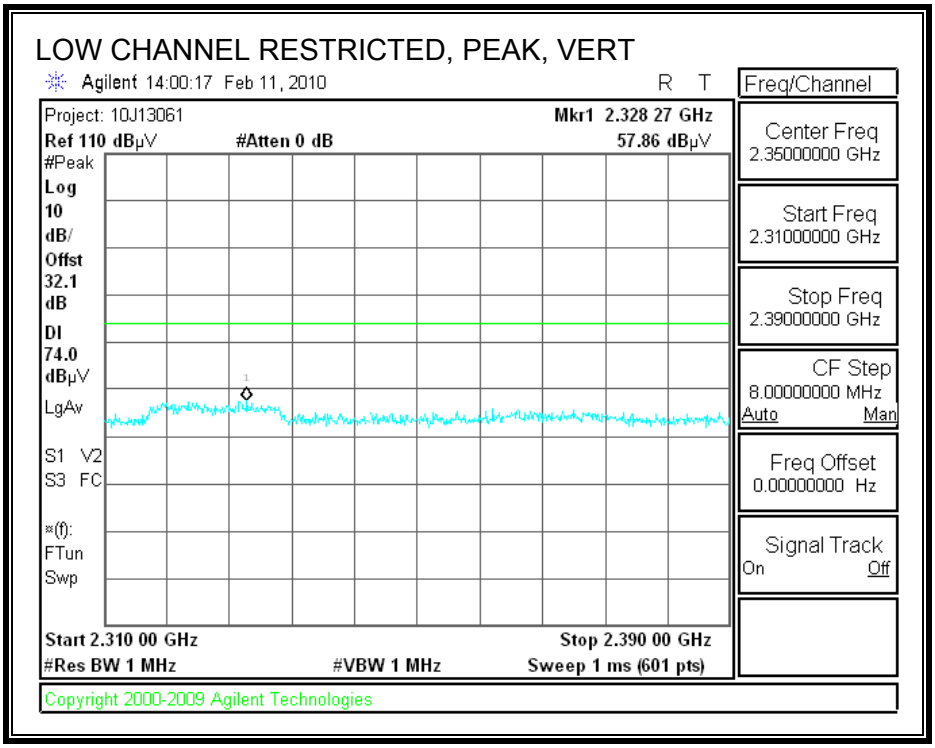
8.1.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

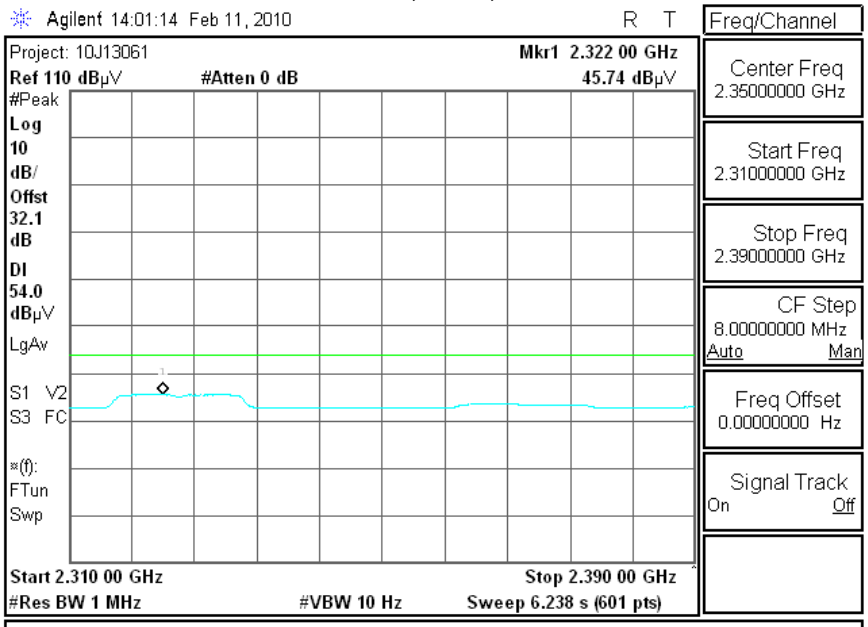




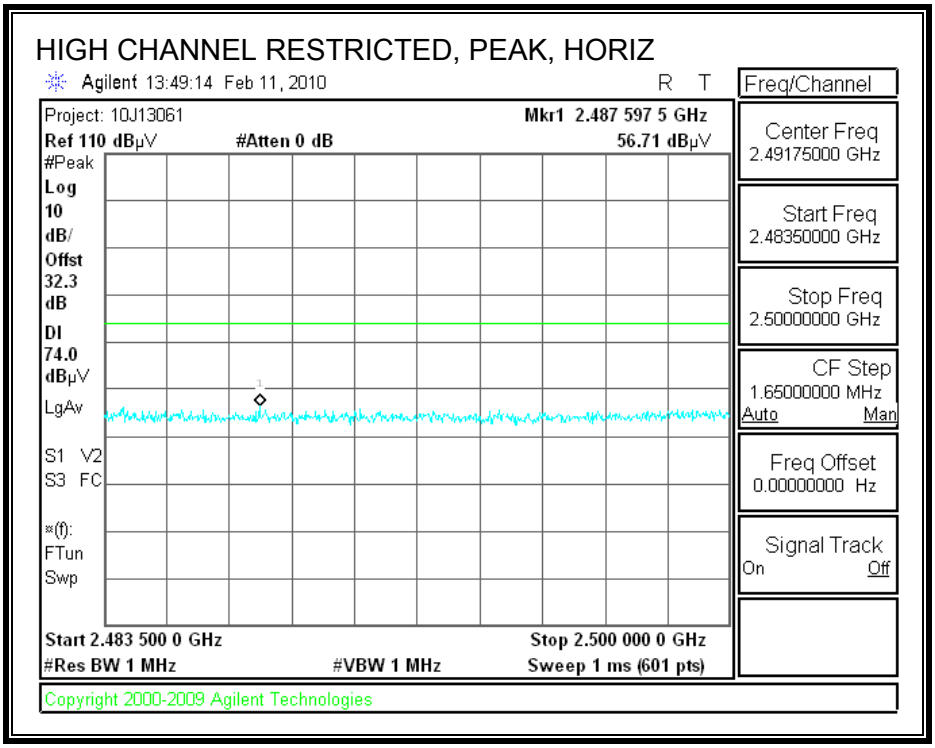
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



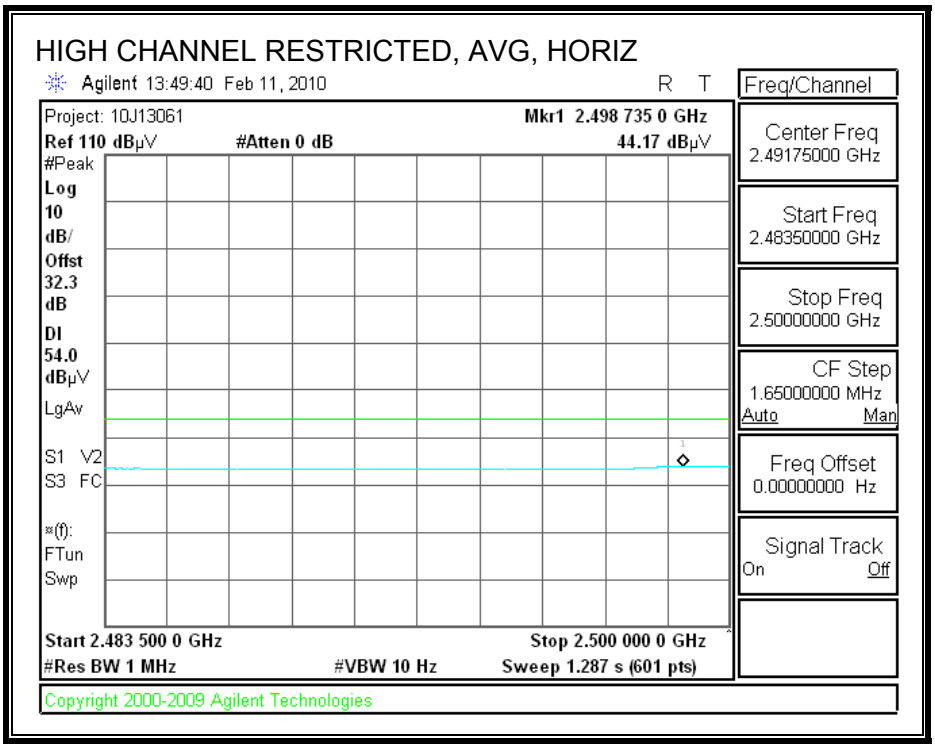
LOW CHANNEL RESTRICTED, AVG, VERT



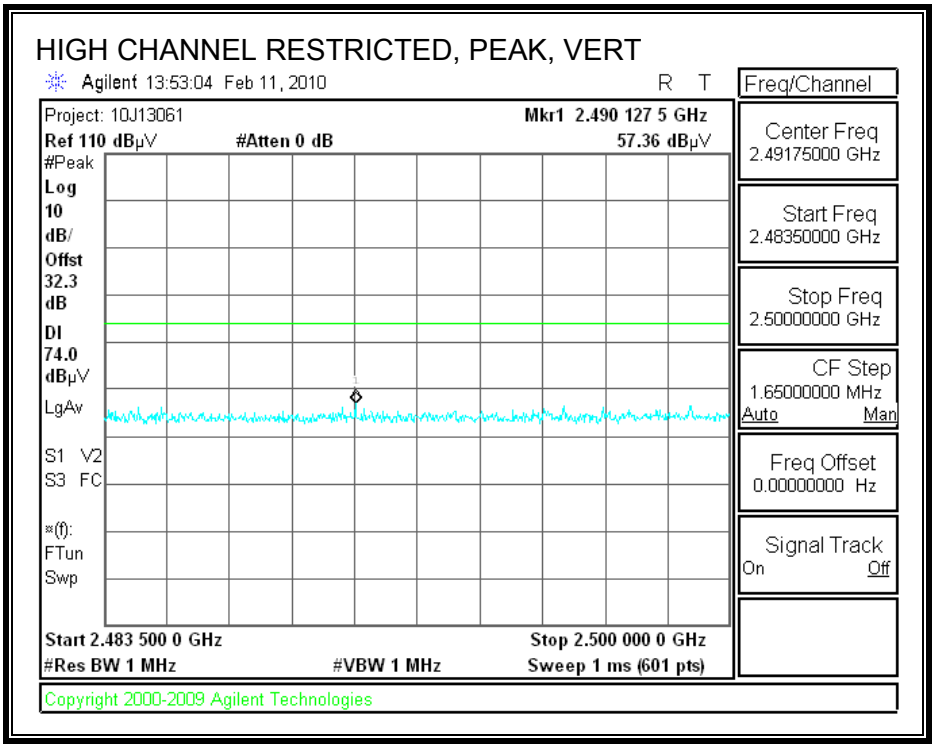
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

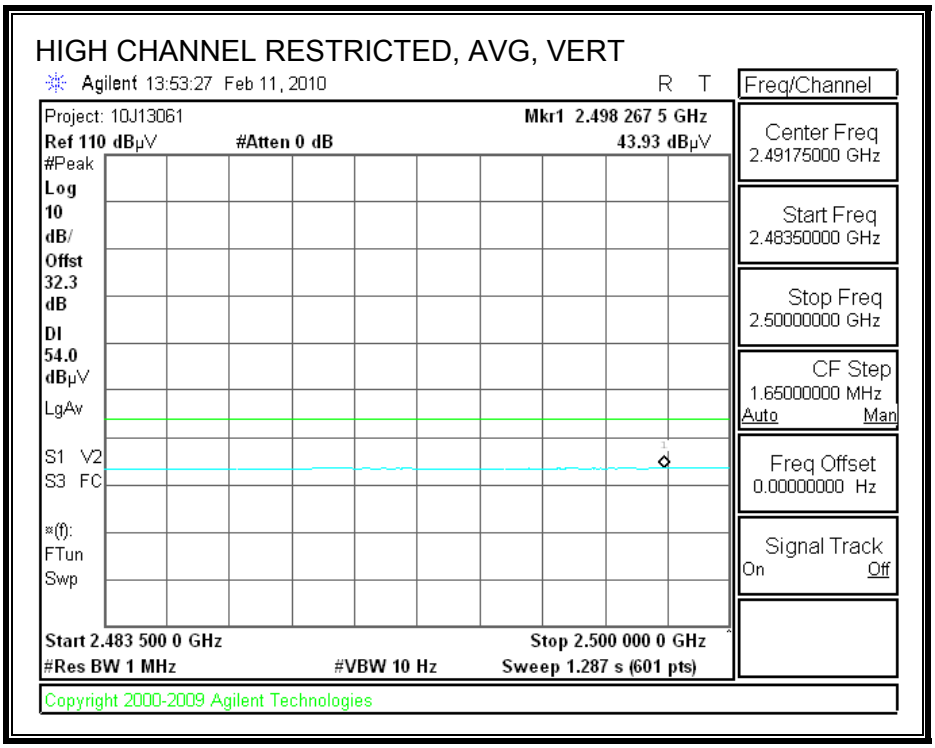


HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: MITSUMI
Project #: 10J13061
Date: 2/11/10
Test Engineer: Thanh Nguyen
Configuration: EUT, Test JIG, Support Laptop
Mode: Transmit g mode

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A0056			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		R_001

Peak Measurements
RBW=VBW=1MHz
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	Fltr 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 Spurious															
Low Ch															
4.824	3.0	44.5	29.3	32.8	5.8	-34.8	0.0	0.0	48.2	33.1	74	54	-25.8	-20.9	V
7.263	3.0	42.7	27.6	35.1	7.2	-34.7	0.0	0.0	50.4	35.3	74	54	-23.6	-18.7	Noise Floor
4.824	3.0	41.0	26.9	32.8	5.8	-34.8	0.0	0.0	44.7	30.6	74	54	-29.3	-23.4	H
7.263	3.0	38.2	25.1	35.1	7.2	-34.7	0.0	0.0	45.9	32.8	74	54	-28.1	-21.2	Noise Floor
Mid Ch															
4.874	3.0	43.1	26.8	32.8	5.8	-34.9	0.0	0.0	46.9	30.6	74	54	-27.1	-23.4	V
7.311	3.0	44.4	28.6	35.2	7.3	-34.7	0.0	0.0	52.2	36.4	74	54	-21.8	-17.6	Noise Floor
4.874	3.0	43.0	26.0	32.8	5.8	-34.9	0.0	0.0	46.8	29.8	74	54	-27.2	-24.2	H
7.311	3.0	41.5	26.9	35.2	7.3	-34.7	0.0	0.0	49.3	34.7	74	54	-24.7	-19.3	Noise Floor
High Ch															
4.924	3.0	41.4	27.1	32.8	5.9	-34.9	0.0	0.0	45.3	31.0	74	54	-28.7	-23.0	V
7.386	3.0	43.7	28.3	35.3	7.3	-34.6	0.0	0.0	51.7	36.3	74	54	-22.3	-17.7	V
9.848	3.0	36.7	23.8	37.2	8.7	-35.1	0.0	0.0	47.5	34.6	74	54	-26.5	-19.4	Noise Floor
4.924	3.0	43.5	29.0	32.8	5.9	-34.9	0.0	0.0	47.4	32.9	74	54	-26.6	-21.1	H
7.386	3.0	39.7	27.4	35.3	7.3	-34.6	0.0	0.0	47.7	35.3	74	54	-26.3	-18.7	H
9.848	3.0	36.3	23.9	37.2	8.7	-35.1	0.0	0.0	47.1	34.7	74	54	-26.9	-19.3	Noise Floor
No other emissions above noise floor.															

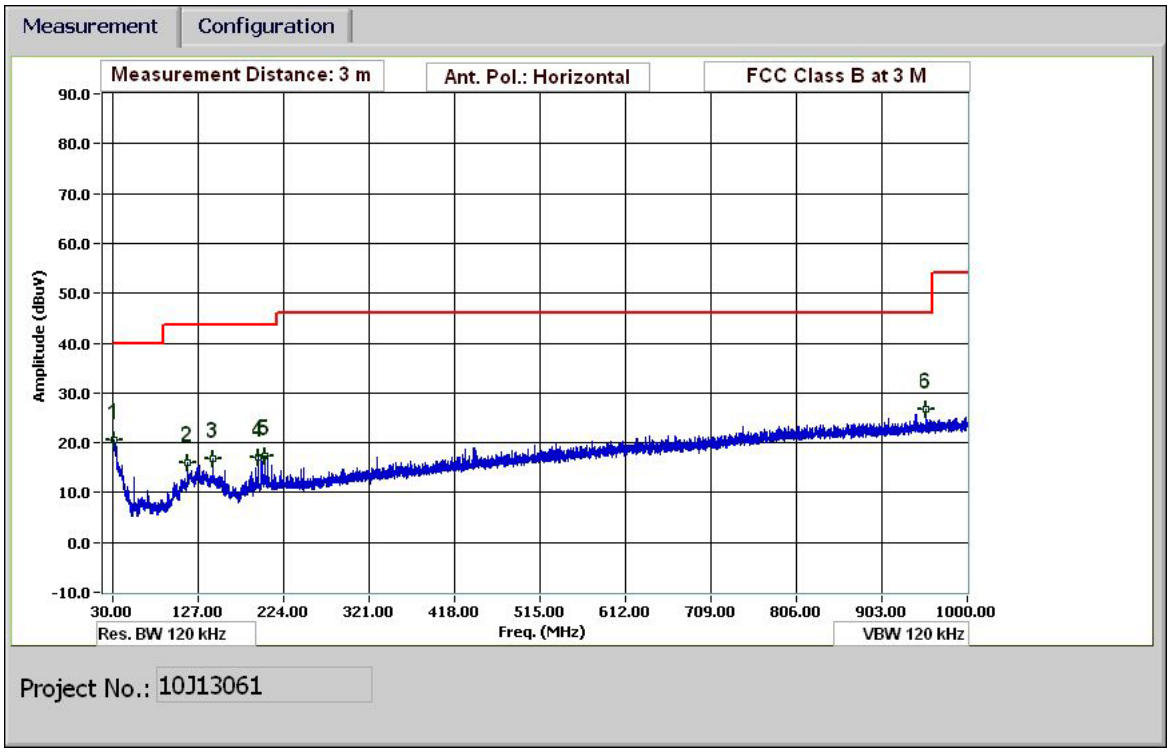
Rev. 11.10.08

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		

8.2. WORST-CASE BELOW 1 GHz

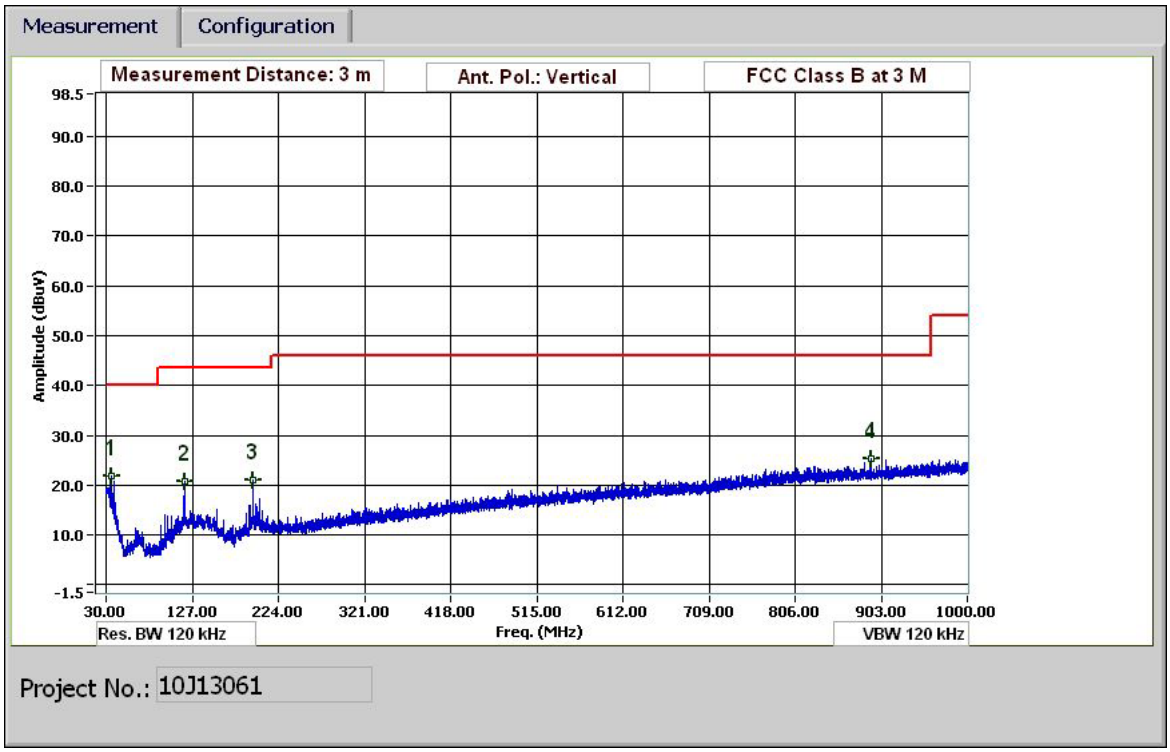
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 02/12/09
Project #: 10J13061
Company: MITSUMI
Test Target: FCC.15 247
Mode Oper: Transmit worst case

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes
EUT with DC power supply															
31.200	3.0	30.1	19.8	0.5	29.7	0.0	0.0	20.7	40.0	-19.3	H	P	100.0	0 - 360	Full Scan
114.603	3.0	31.8	12.7	1.0	29.5	0.0	0.0	16.0	43.5	-27.5	H	P	100.0	0 - 360	
143.165	3.0	32.2	13.0	1.1	29.3	0.0	0.0	16.9	43.5	-26.6	H	P	100.0	0 - 360	
195.367	3.0	33.2	11.6	1.3	28.9	0.0	0.0	17.2	43.5	-26.3	H	P	100.0	0 - 360	
202.807	3.0	33.0	12.0	1.3	28.9	0.0	0.0	17.4	43.5	-26.1	H	P	100.0	0 - 360	
952.598	3.0	30.0	22.1	3.1	28.5	0.0	0.0	26.8	46.0	-19.2	H	P	100.0	0 - 360	
35.760	3.0	33.6	17.4	0.5	29.6	0.0	0.0	21.9	40.0	-18.1	V	P	100.0	0 - 360	
119.404	3.0	35.6	13.6	1.0	29.5	0.0	0.0	20.7	43.5	-22.8	V	P	100.0	0 - 360	
195.367	3.0	37.2	11.6	1.3	28.9	0.0	0.0	21.1	43.5	-22.4	V	P	100.0	0 - 360	
891.876	3.0	29.6	21.5	3.0	28.6	0.0	0.0	25.4	46.0	-20.6	V	P	100.0	0 - 360	
No other emissions were detected above system noise floor															

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

ANSI C63.4

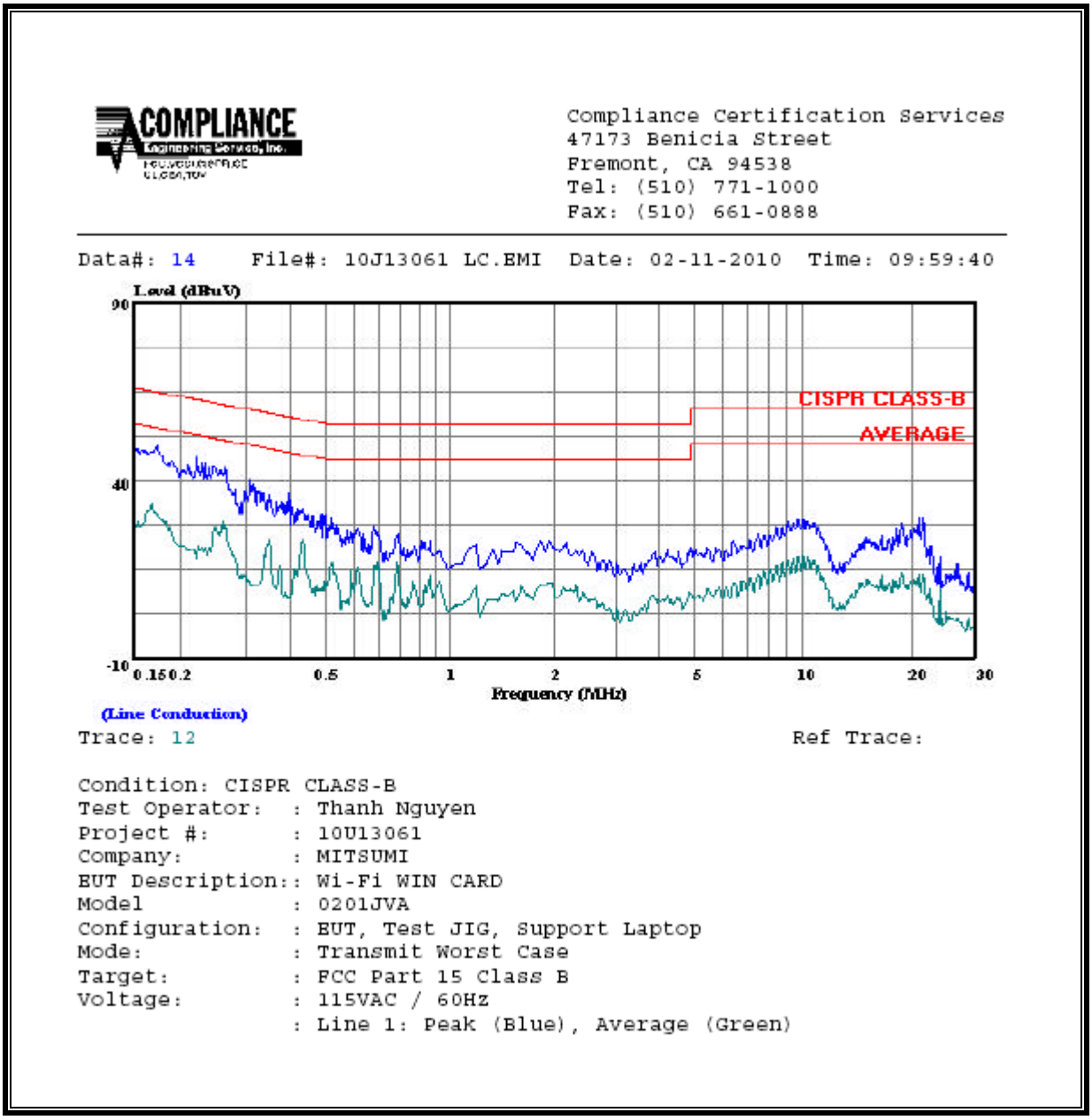
RESULTS

6 WORST EMISSIONS

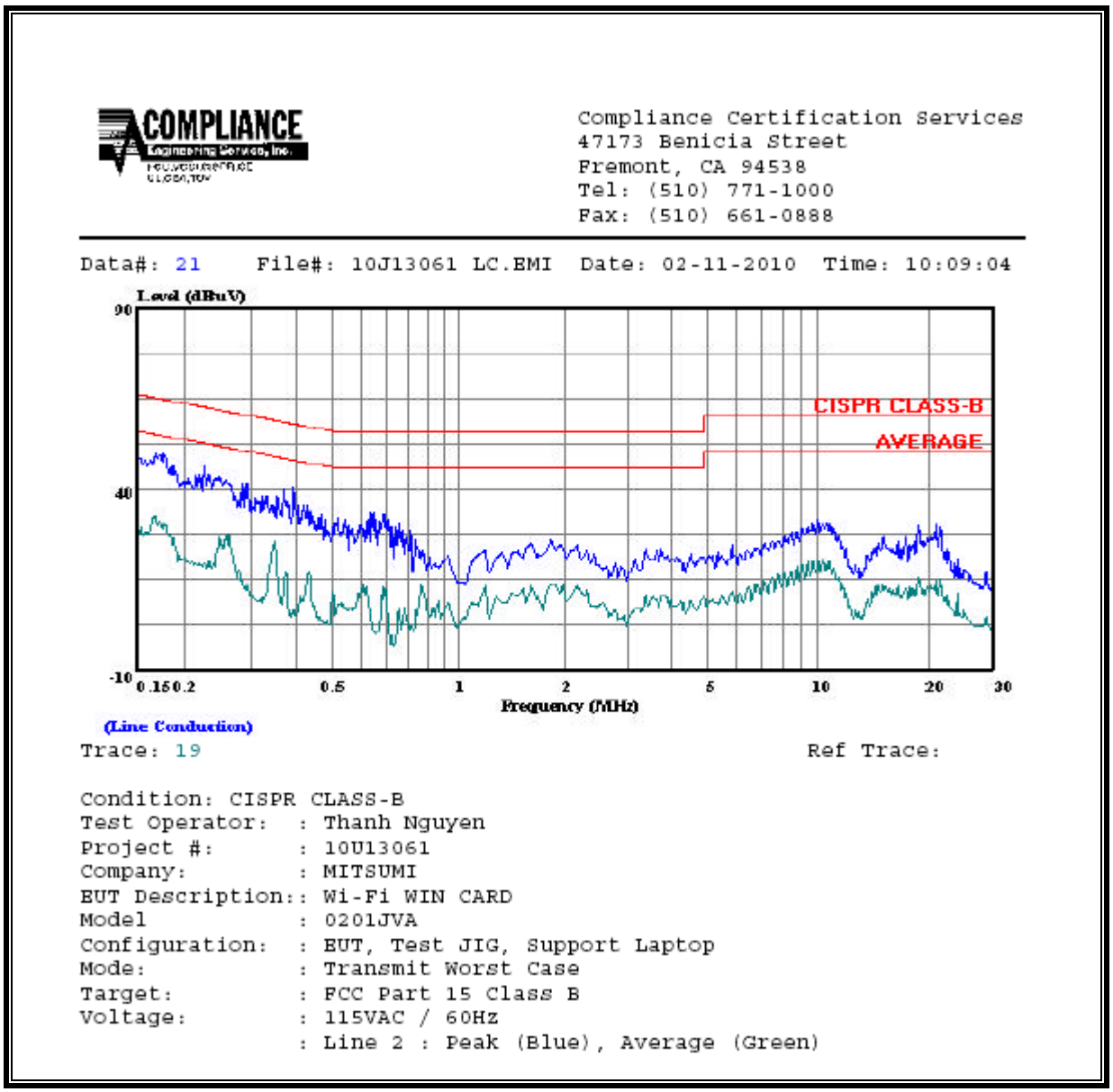
CONDUCTED EMISSIONS DATA (115VAC 60Hz)

Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	49.76	--	32.22	0.00	64.77	54.77	-15.01	-22.55	L1
0.22	46.72	--	28.33	0.00	62.74	52.74	-16.02	-24.41	L1
9.00	29.12	--	19.10	0.00	60.00	50.00	-30.88	-30.90	L1
0.17	49.16	--	32.49	0.00	65.01	55.01	-15.85	-22.52	L2
0.63	33.42	--	14.01	0.00	56.00	46.00	-22.58	-31.99	L2
10.13	31.37	--	20.51	0.00	60.00	50.00	-28.63	-29.49	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§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.

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

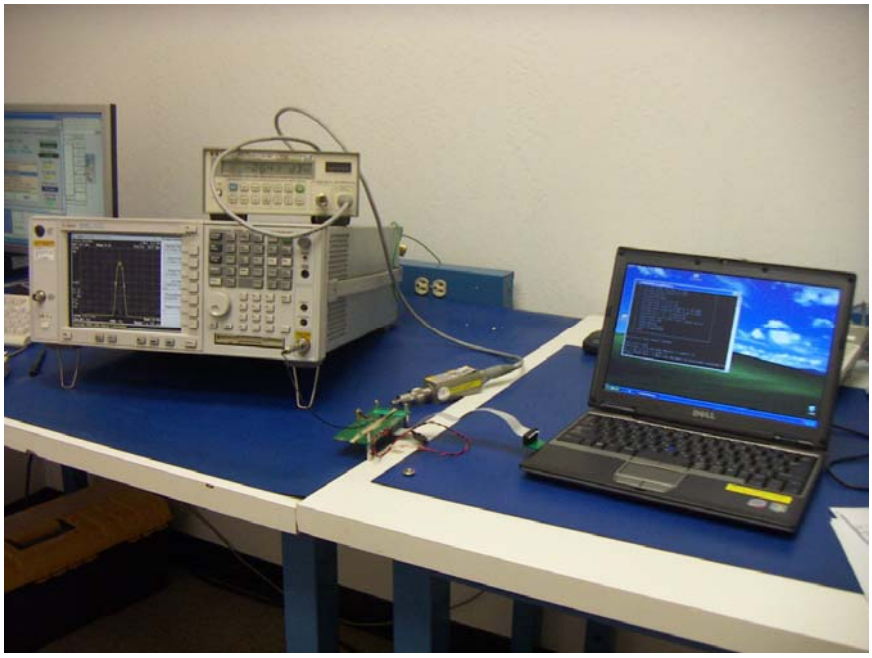
RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	b mode	0.20	20.53	1.84	0.34	0.034
2.4 GHz	g mode	0.20	20.01	1.84	0.30	0.030

11. SETUP PHOTOS

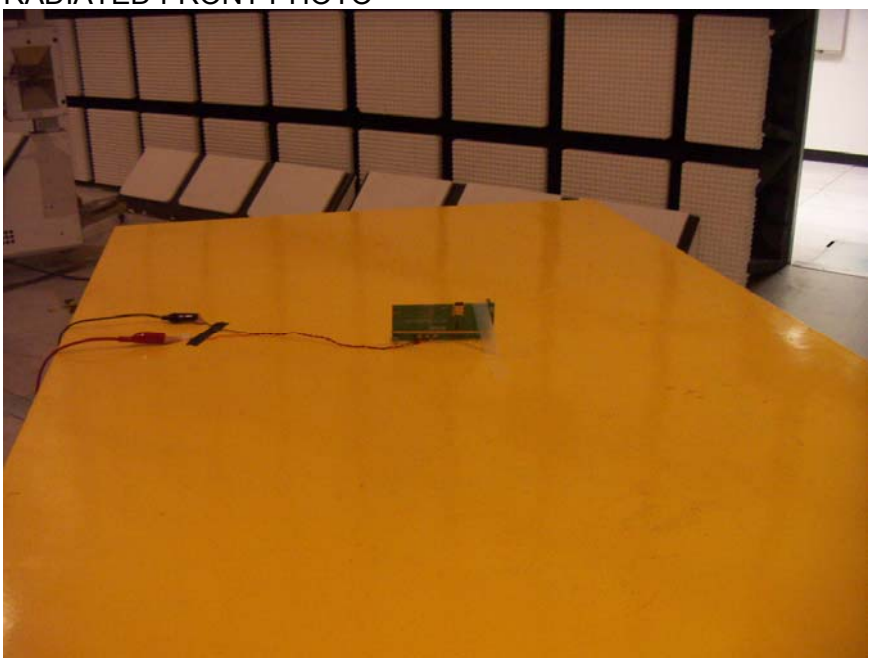
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

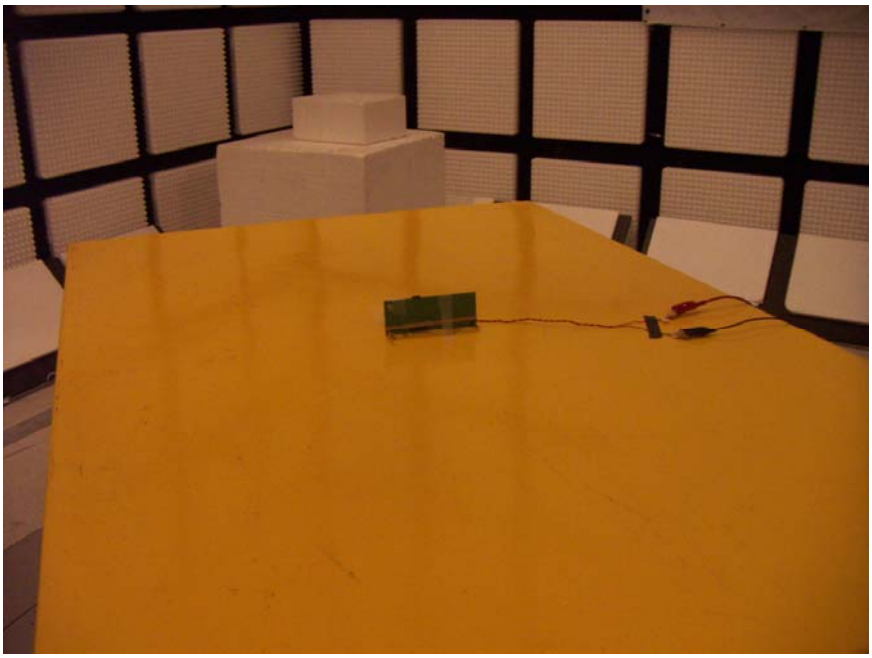


RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

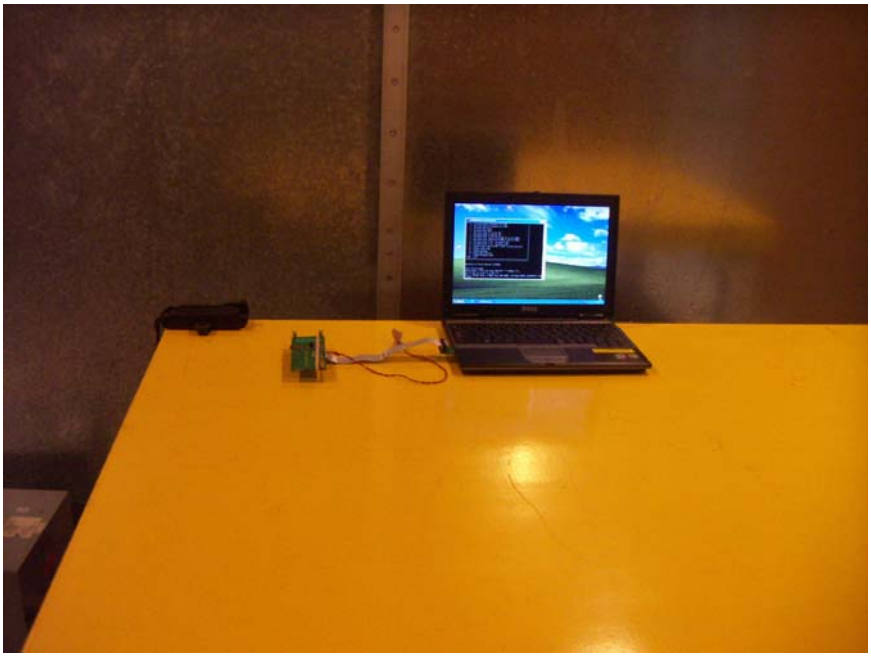


RADIATED BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO

END OF REPORT