FCC CFR47 PART 15 SUBPART C
CERTIFICATION TEST REPORT

FOR

Smart Cellular Telephone with CDMA 1xRTT/CDMA 1xEVDO Rev. A, Bluetooth and WiFi 802.11 b,g,n

MODEL NUMBER: A1349

FCC ID: BCG-E2422B

REPORT NUMBER: 10U13473-4, REVISION A

ISSUE DATE: JANUARY 10, 2011

Prepared for
APPLE INC.
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CUPERTINO, CA. 95014, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/23/10	Initial Issue	T. Chan
A	01/10/11	Addressed TCB Questions	C. Pang

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.
EUT DESCRIPTION:	Smart Cellular Telephone with CDMA 1xRTT/CDMA 1xEVDO Rev. A, Bluetooth and WiFi 802.11 b,g,n
MODEL:	A1349
SERIAL NUMBER:	C8QDH002DHP3
DATE TESTED:	NOVEMBER 10~18, 2010

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

Compliance Certification Services (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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.

Approved & Released For UL CCS By:

THU CHAN
ENGINEERING MANAGER
UL CCS

Tested By:

TOM CHEN
EMC ENGINEER
UL CCS

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.

UL 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 Apple iPhone, Model A1349 is a smart phone with iPod functions (music, application support, and video), CDMA 1xRTT/CDMA 1xEVDO Release A, 802.11b/g/n, and Bluetooth 2.1+EDR. This device measures 115.2 mm (4.5 inches) tall x 58.6 mm (2.31 inches) and 9.3 mm (0.37 inches) thick and weighs 137 grams (4.8 oz.) The rechargeable battery is not user accessible.

The WLAN module is manufactured by Semco.

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	19.60	91.20
2412 - 2462	802.11g	25.26	335.74
2412 - 2462	802.11n HT20 SISO	25.30	338.84

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -1.2 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 0.6.13_21

The EUT software installed during testing was 8E5074b.

The test utility software used during testing was Broadcom WL tool 4.219 RC46.13.

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 final tests in the 802.11b mode were made at 1 Mb/s.
All final tests in the 802.11g mode were made at 6 Mb/s.
All final tests in the 802.11n HT20 SISO mode were made at MCS0.
The worst-position was the EUT with highest emissions. To determine the worst-case, the EUT was investigated for X, Y, and Z-Positions, and the worst position among X, Y, and Z with AC/DC adapter. After the investigations X-position with AC/DC adapter turns out to be the worst-case.

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

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Apple	Mac book Pro	PT389295	DoC
Laptop AC Adapter	Apple	A52	Y5629012TLYDVT	DoC
Jig Card	Apple	N/A	N/A	N/A
Earphone	Apple	MB770	N/A	N/A
AC Adapter	Apple	A1205	1X009142X8QZ	N/A

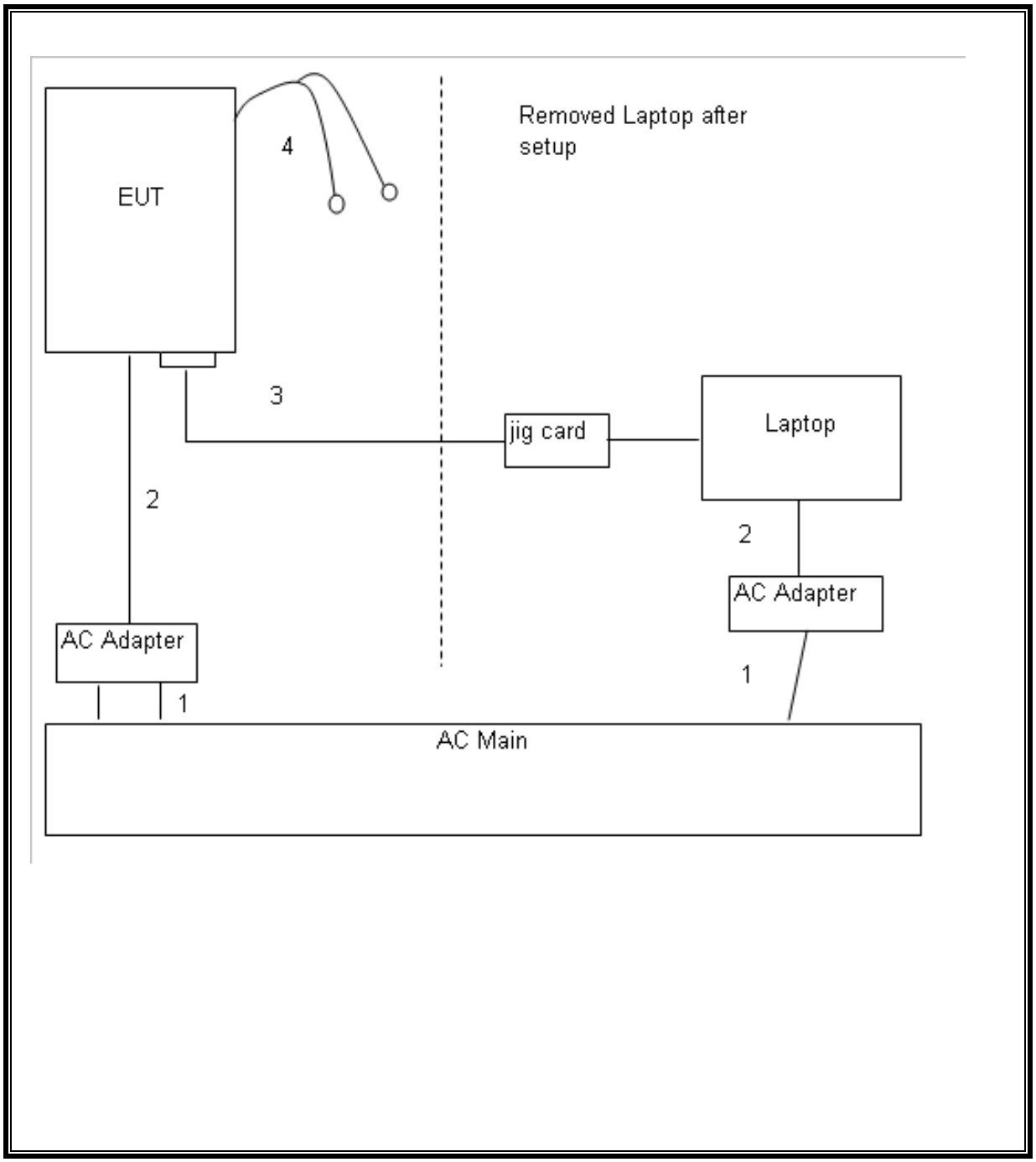
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	N/A
2	DC	1	DC	Un-shielded	2m	N/A
3	USB	1	USB	Shielded	1m	Connect to Laptop for setup only
4	Out	1	Jack	Un-shielded	1.2m	N/A

TEST SETUP

The EUT is stand alone unit 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**	**Asset**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/11
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	09/03/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/14/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/14/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	07/06/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/10/11
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	01/07/12
Peak Power Meter	Agilent / HP	E4416A	C00963	12/04/11
Peak Power Meter	Boonton	4541	C01189	02/26/11
Peak Power Sensor	Boonton	57318	C01202	02/23/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR

7. ANTENNA PORT TEST RESULTS

7.1. 802.11b MODE IN THE 2.4 GHz BAND

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

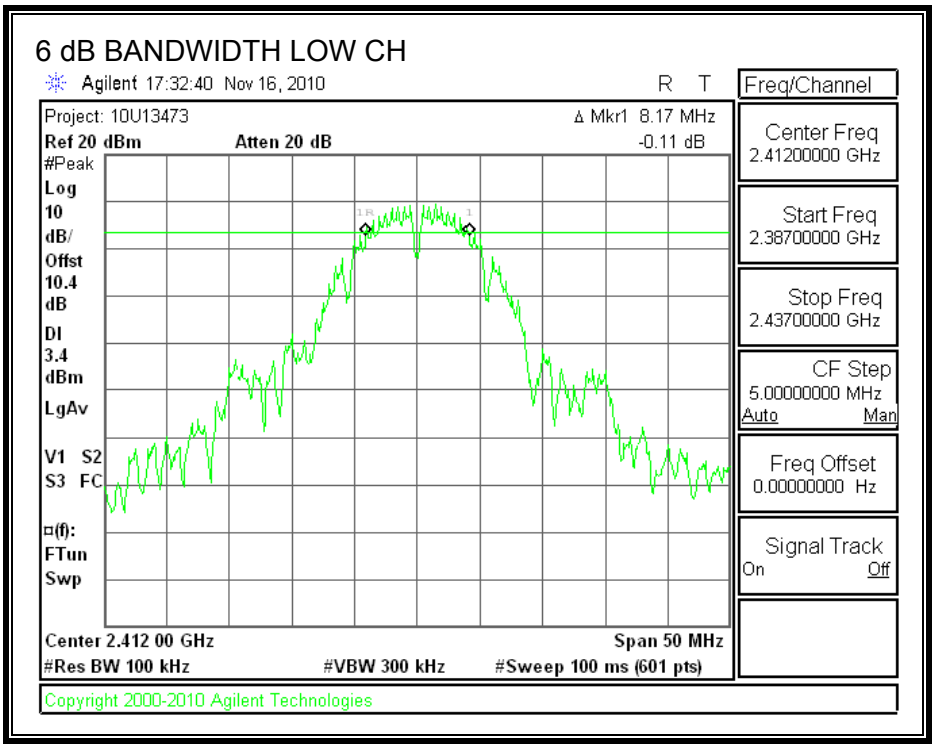
TEST PROCEDURE

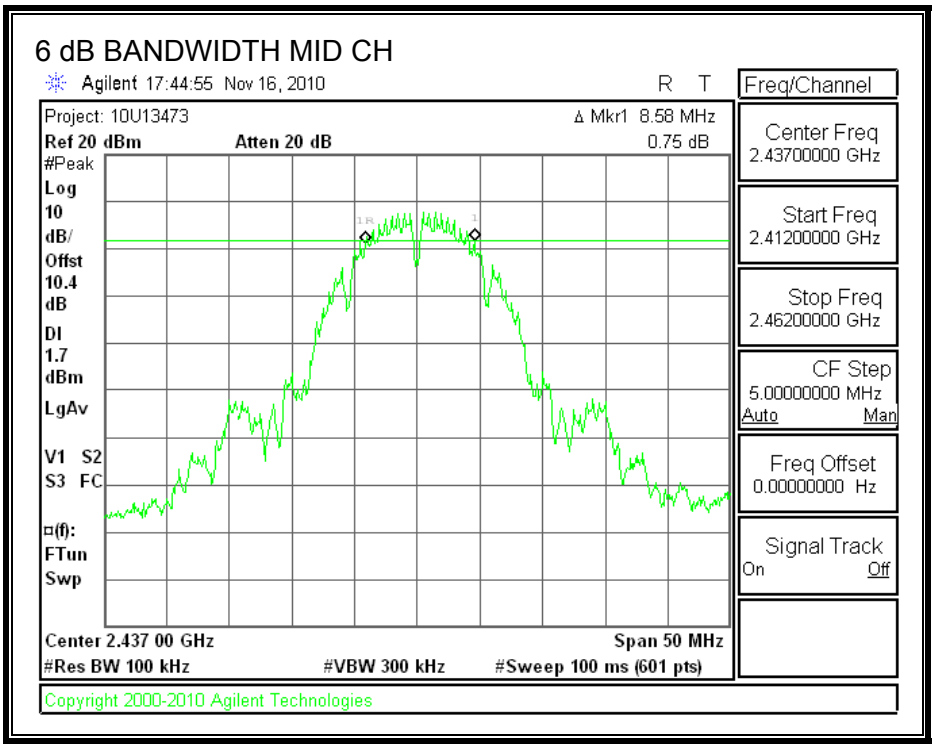
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

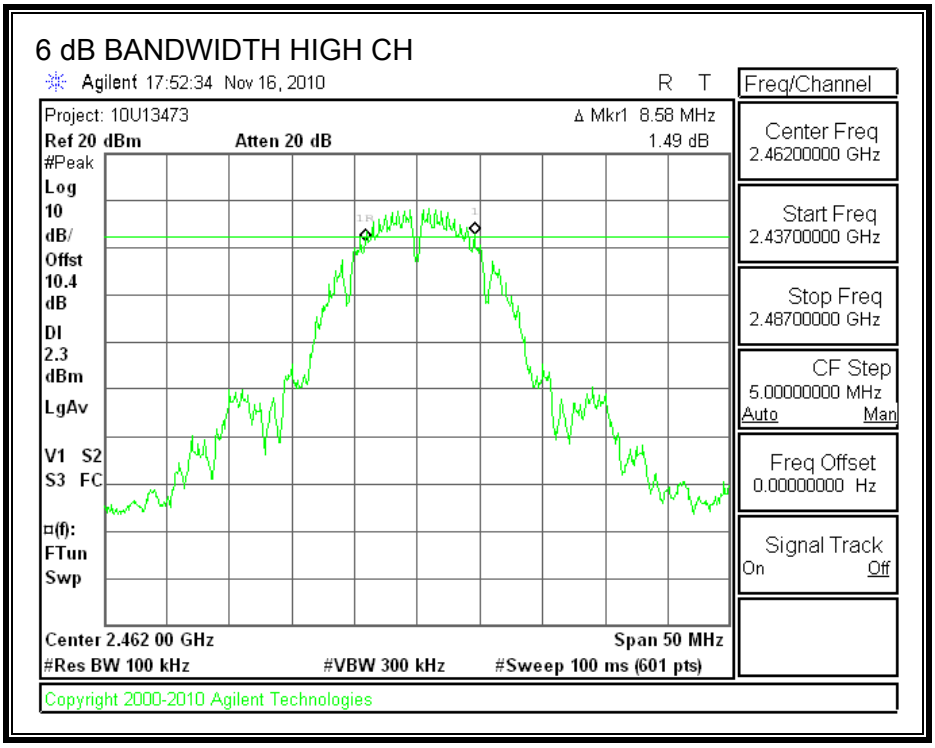
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.1667	0.5
Middle	2437	8.5833	0.5
High	2462	8.5833	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

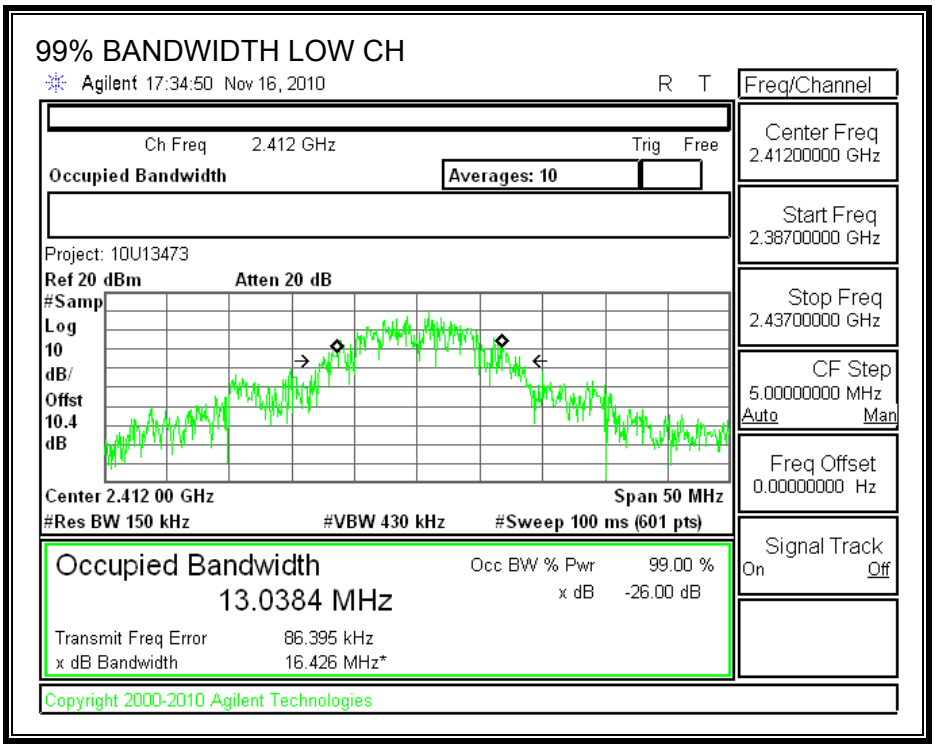
TEST PROCEDURE

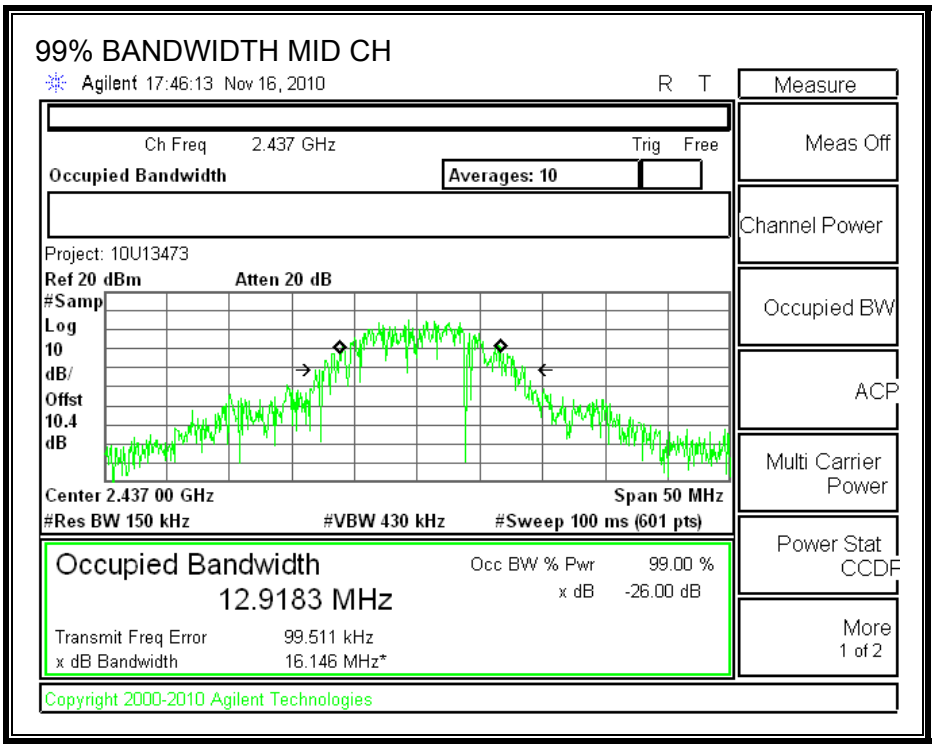
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

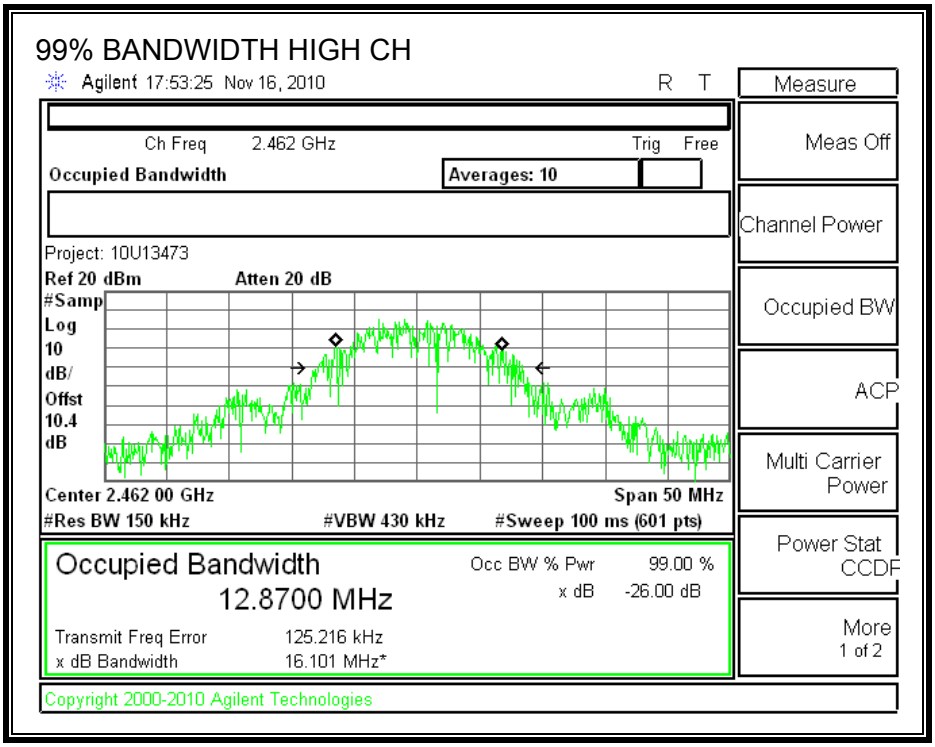
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	13.0384
Middle	2437	12.9183
High	2462	12.8700

99% BANDWIDTH







7.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	7.65	10.4	18.05	30	-11.96
Middle	2437	8.60	10.4	19.00	30	-11.00
High	2462	9.20	10.4	19.60	30	-10.40

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 10.4 dB (including 10 dB pad and 0.4 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	16.60
Middle	2437	16.60
High	2462	16.60

7.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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.

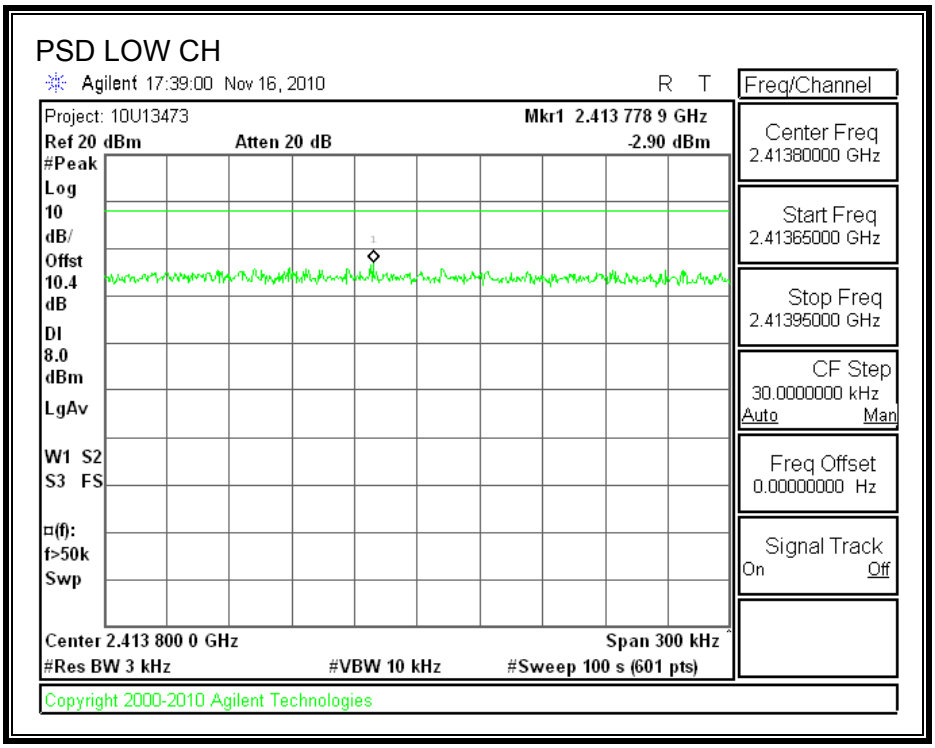
TEST PROCEDURE

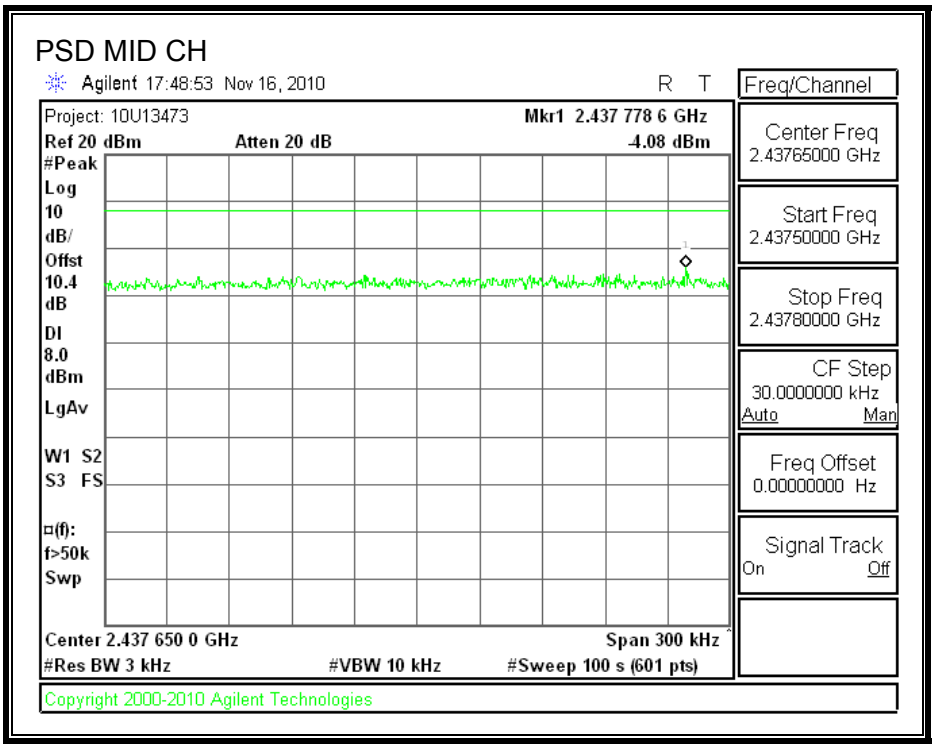
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

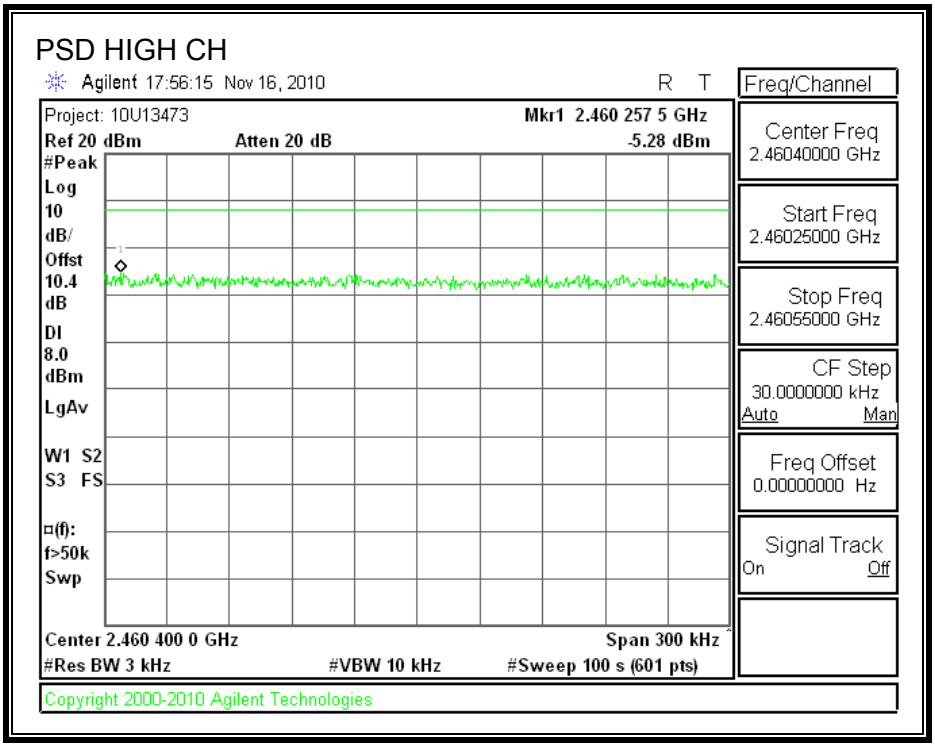
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-2.90	8	-10.90
Middle	2437	-4.08	8	-12.08
High	2462	-5.28	8	-13.28

POWER SPECTRAL DENSITY







7.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

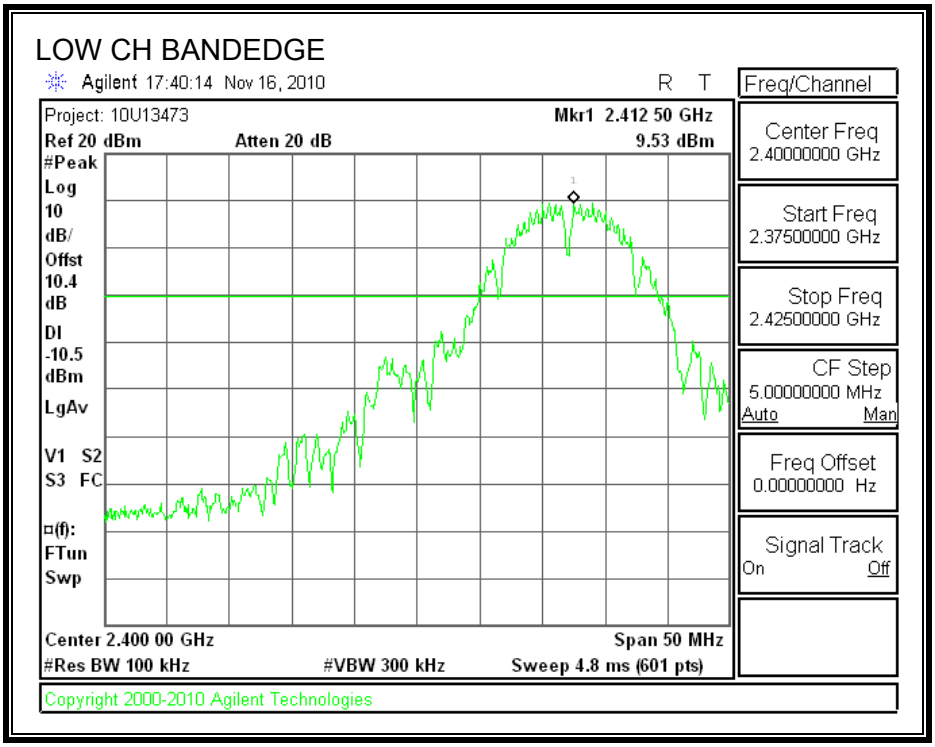
TEST PROCEDURE

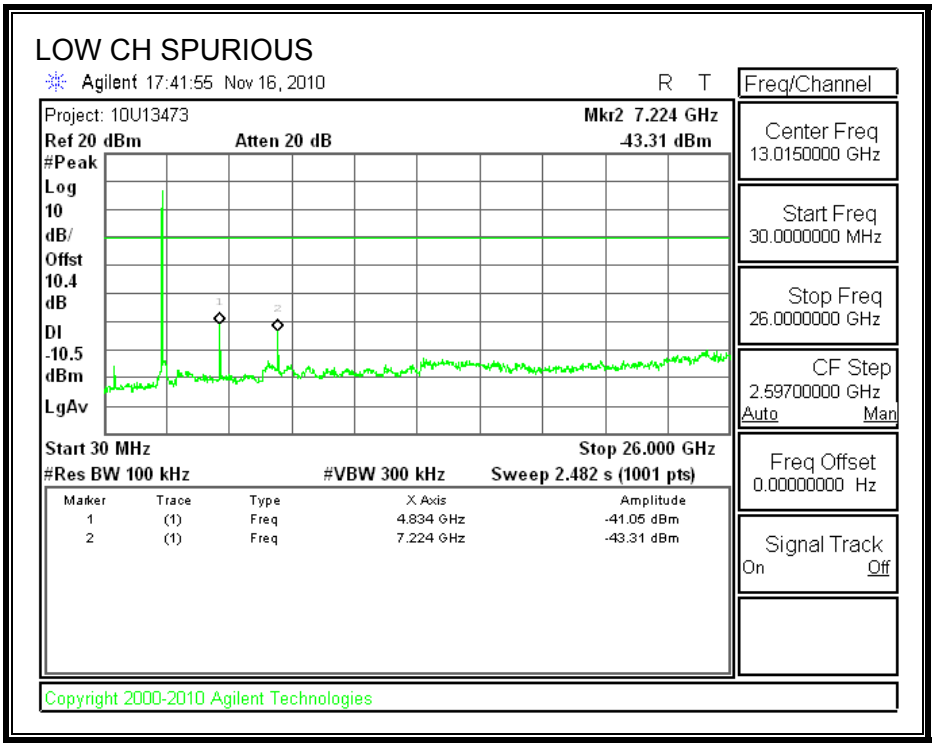
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

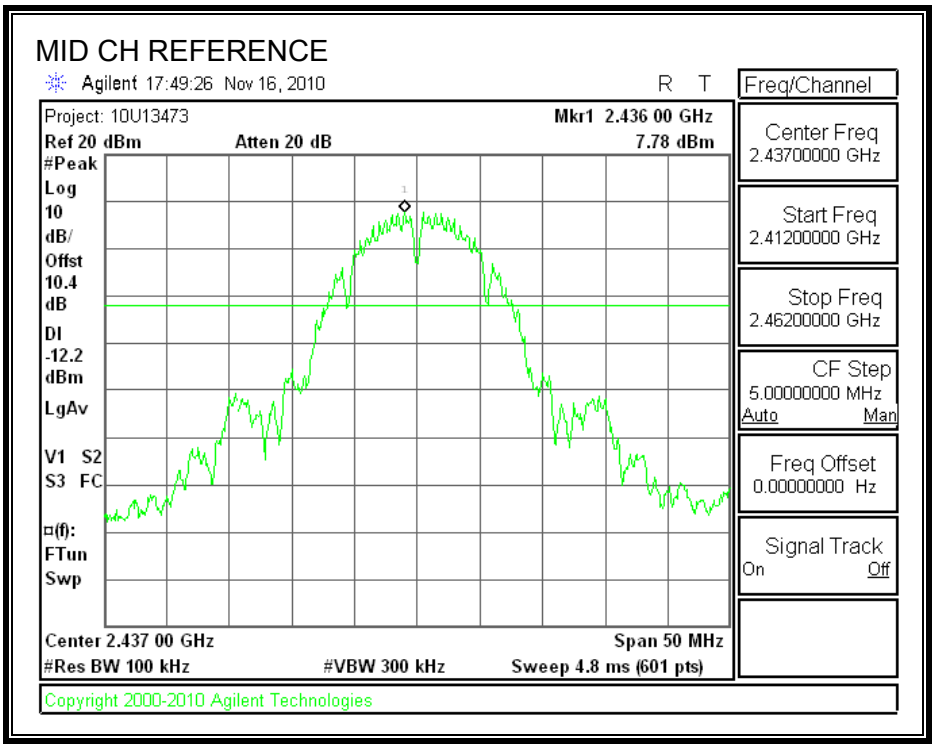
RESULTS

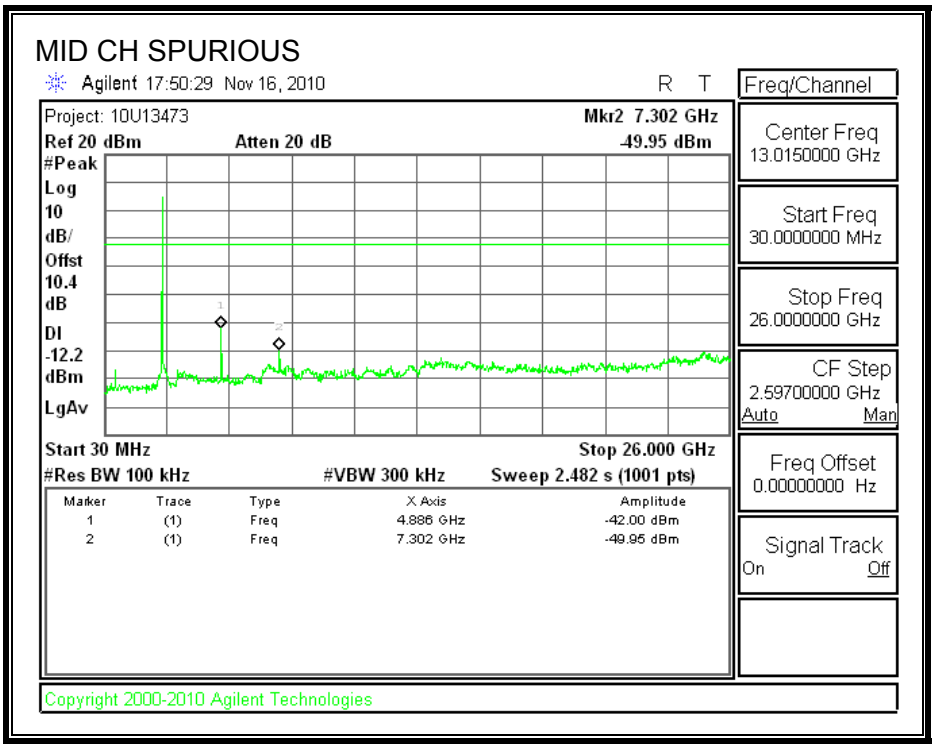
SPURIOUS EMISSIONS, LOW CHANNEL



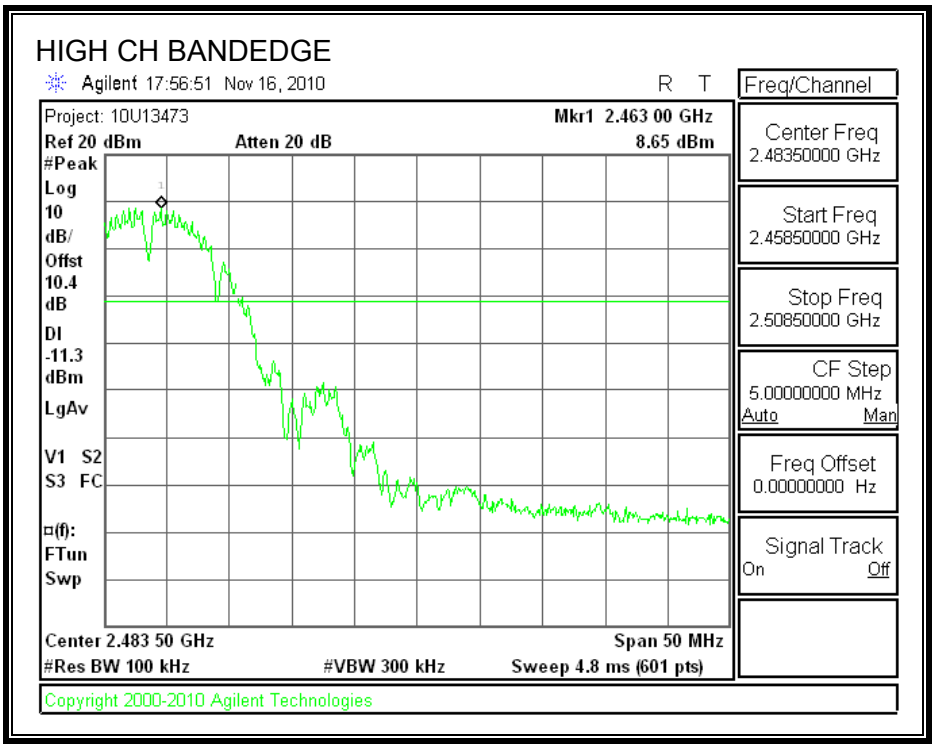


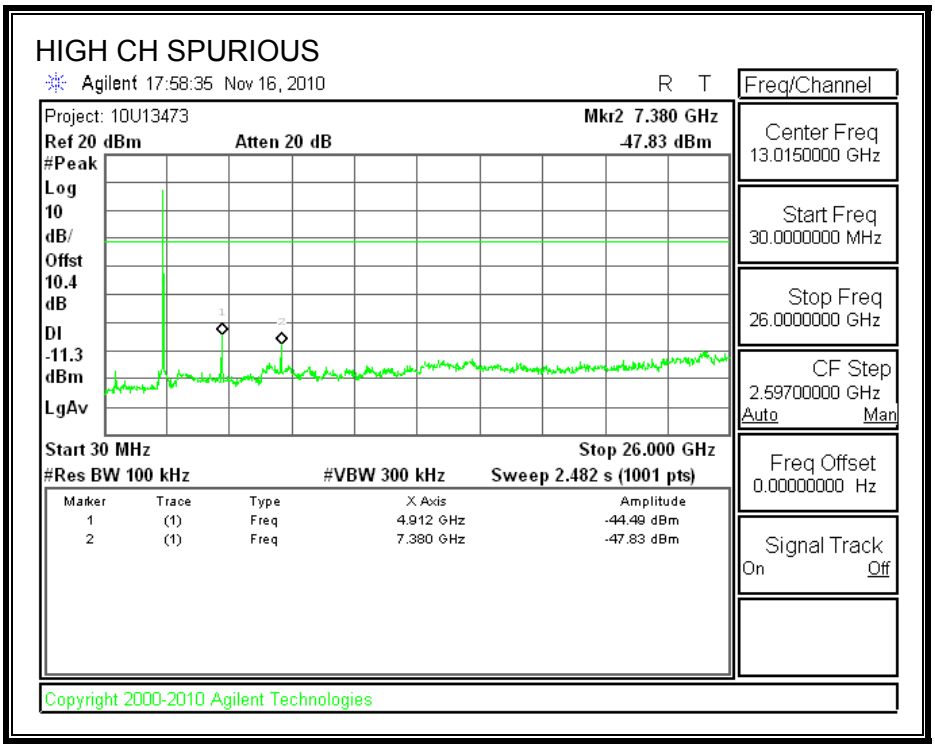
SPURIOUS EMISSIONS, MID CHANNEL





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)

IC RSS-210 A8.2 (a)

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

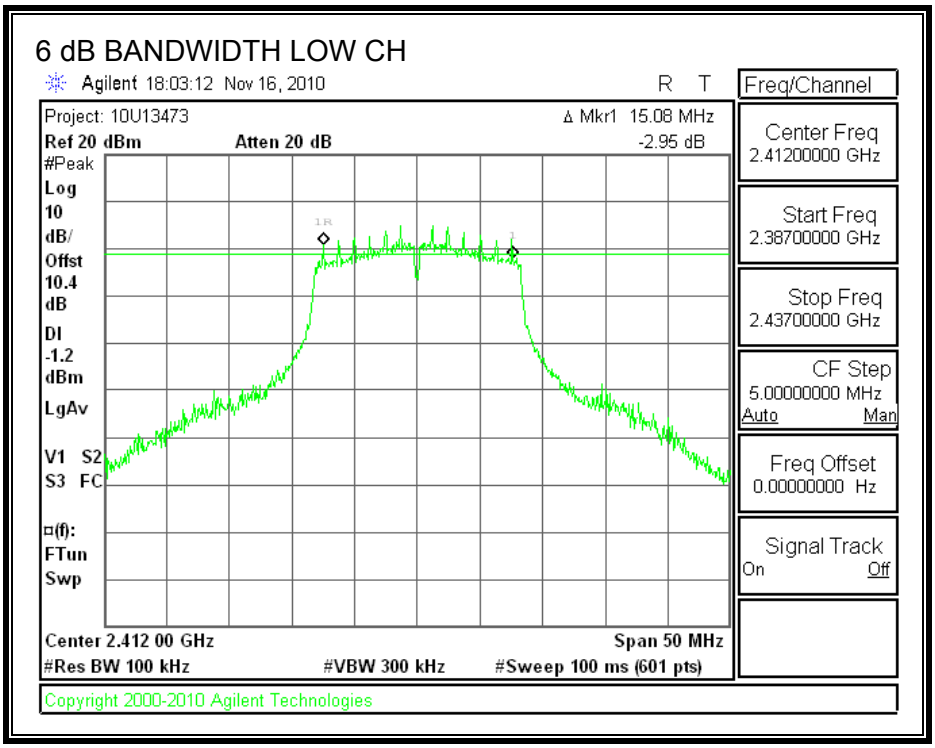
TEST PROCEDURE

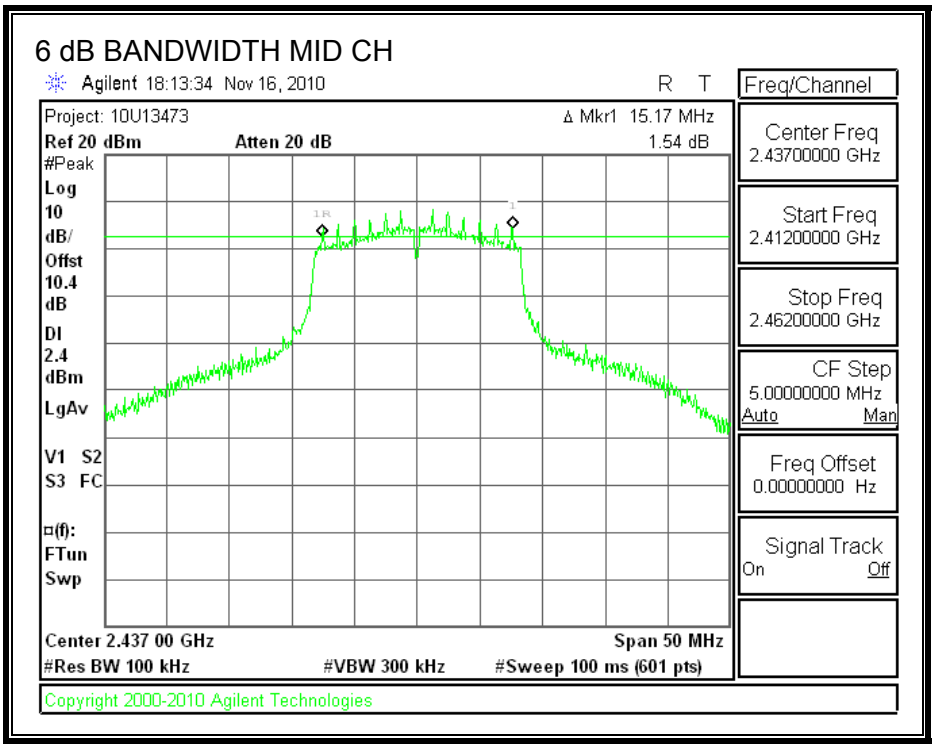
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

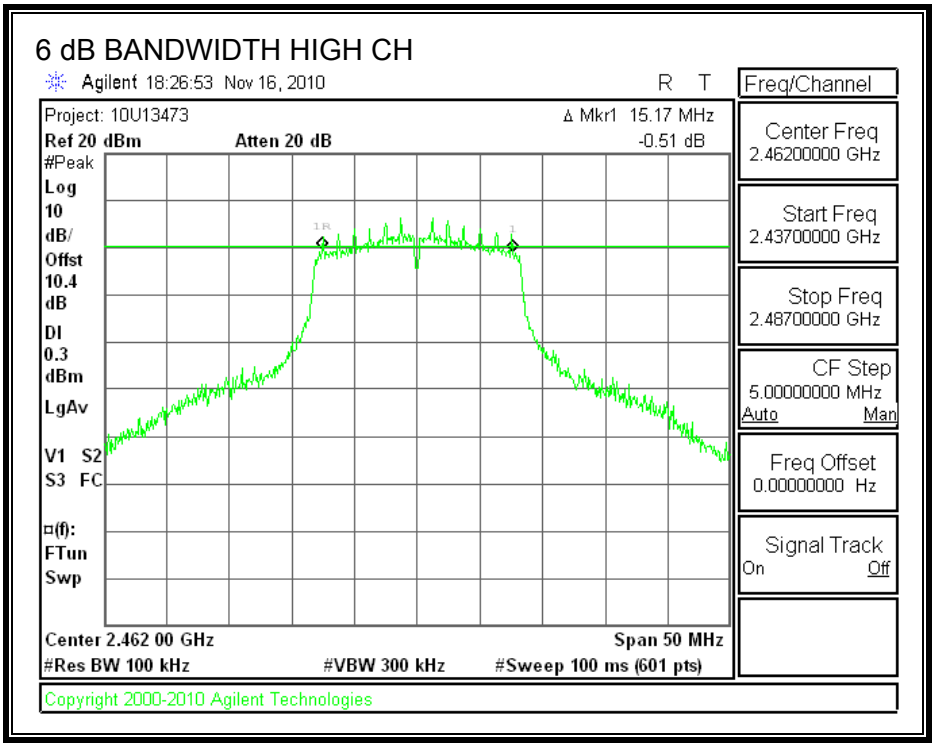
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.08	0.5
Middle	2437	15.17	0.5
High	2462	15.17	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

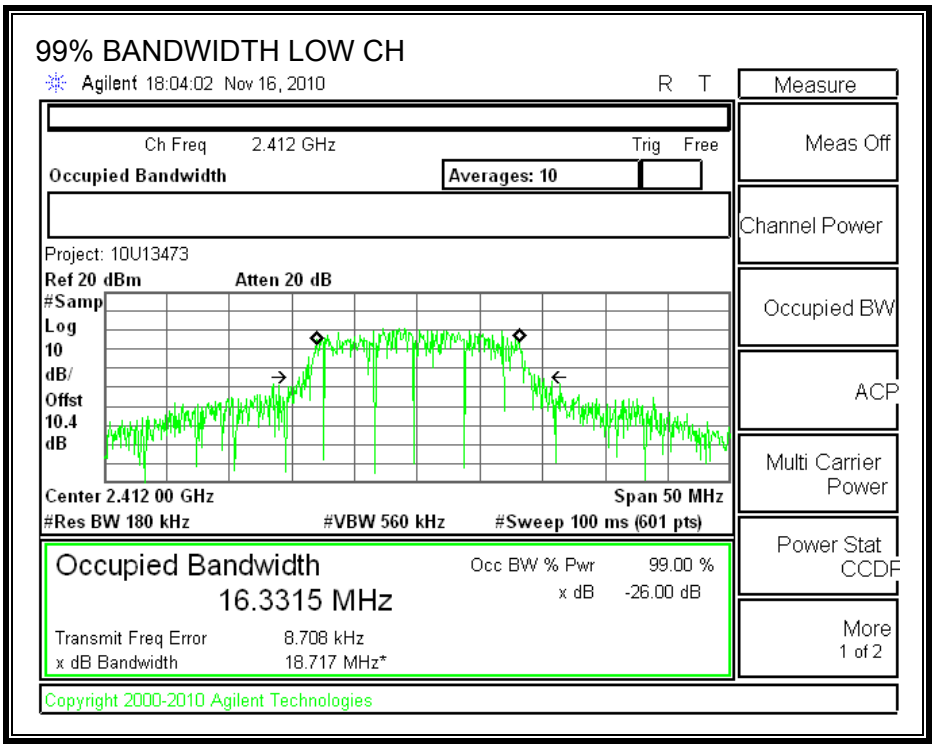
TEST PROCEDURE

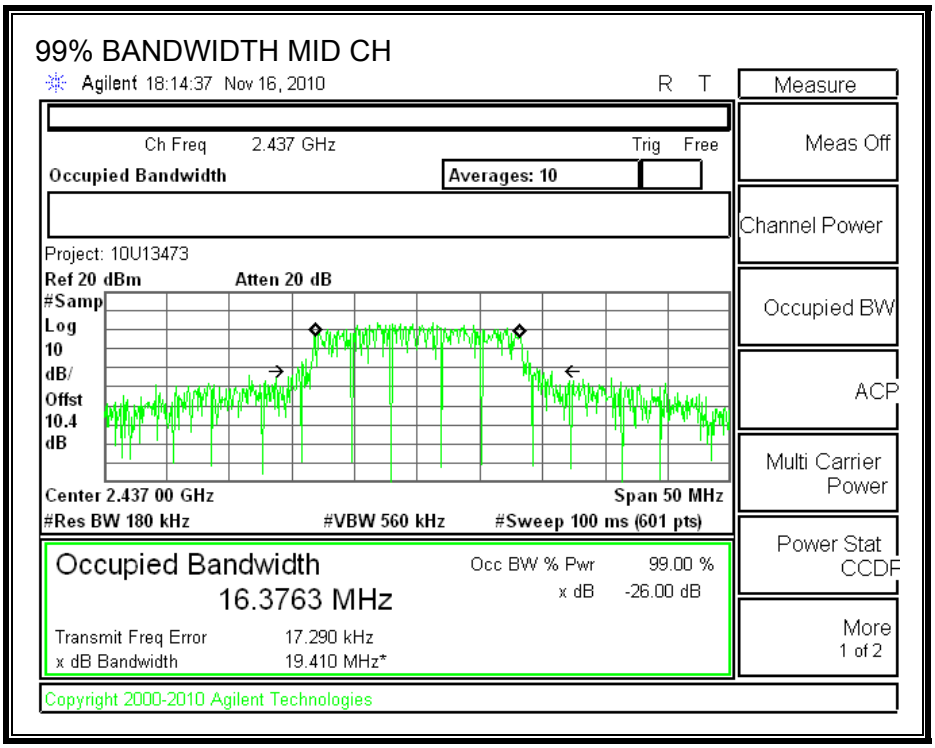
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

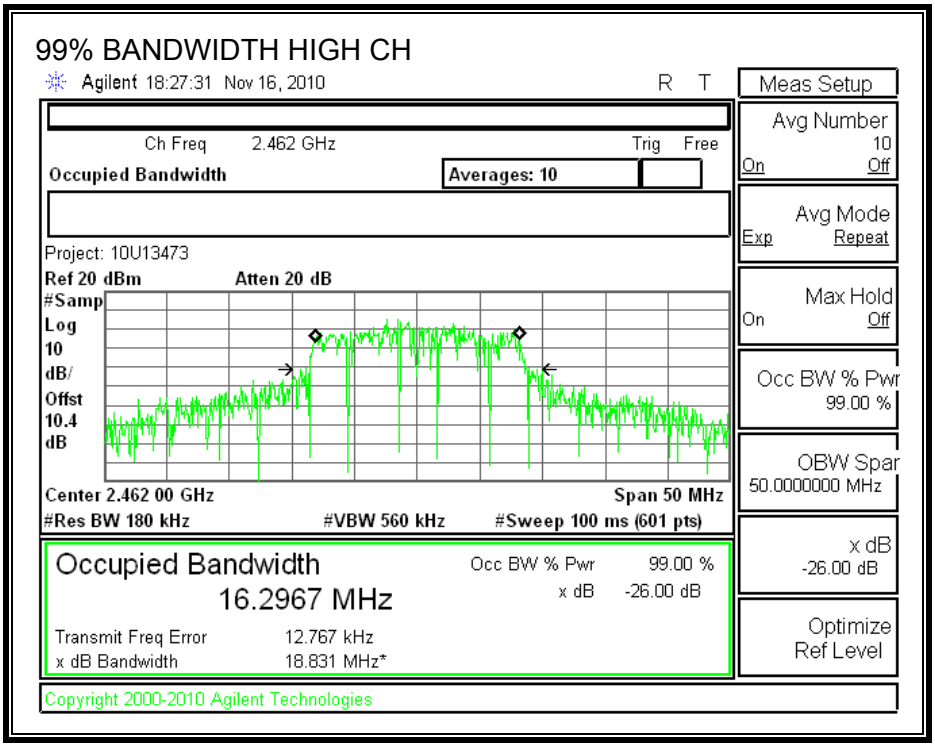
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.3315
Middle	2437	16.3763
High	2462	16.2967

99% BANDWIDTH







7.2.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13.80	10.4	24.20	30	-5.80
Middle	2437	14.86	10.4	25.26	30	-4.74
High	2462	13.88	10.4	24.28	30	-5.72

7.2.4. 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 10.4 dB (including 10 dB pad and 0.4 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	14.00
Middle	2437	16.70
High	2462	13.90

7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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.

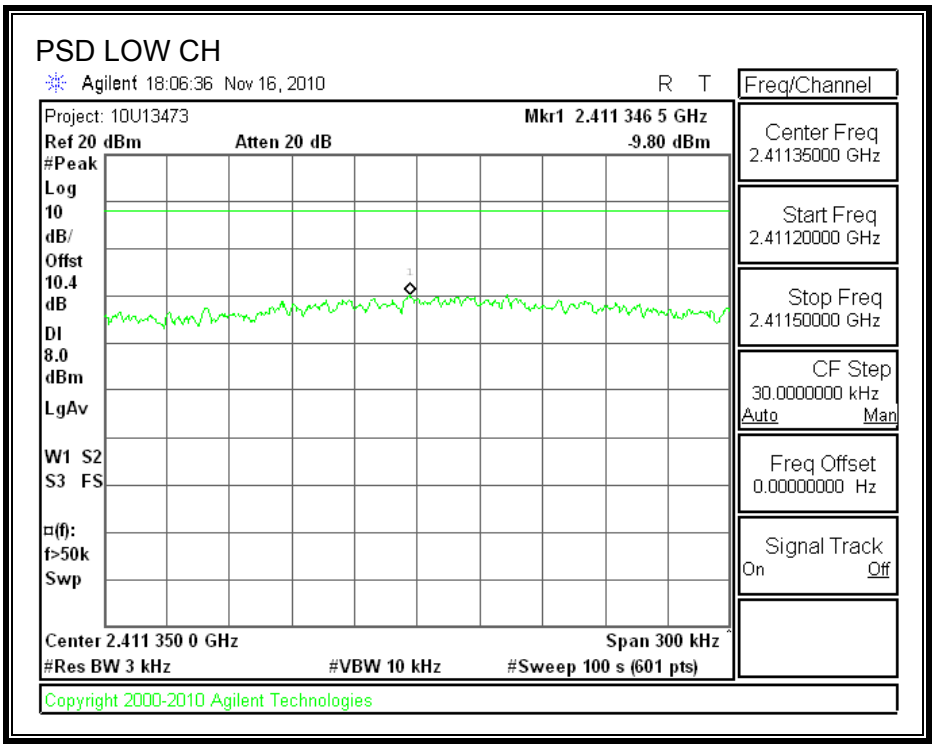
TEST PROCEDURE

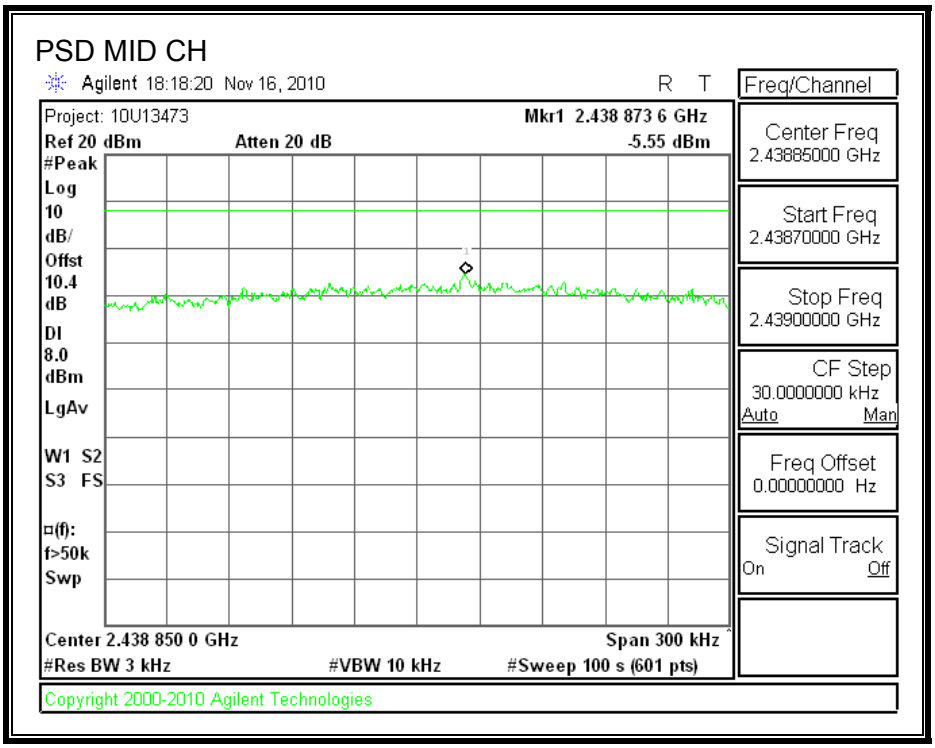
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

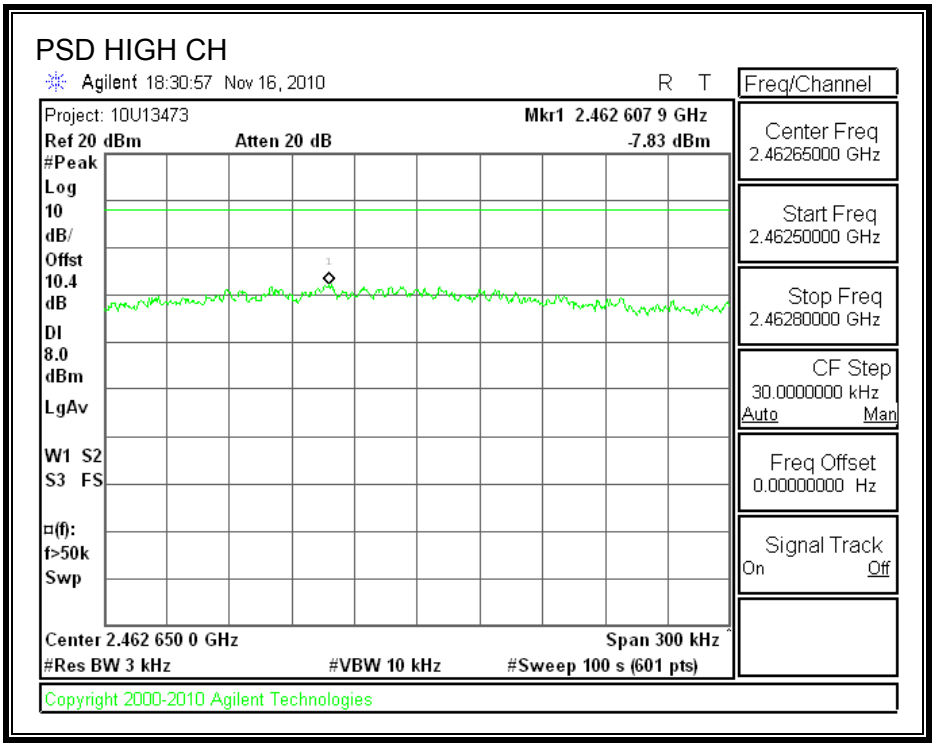
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.80	8	-17.80
Middle	2437	-5.55	8	-13.55
High	2462	-7.83	8	-15.83

POWER SPECTRAL DENSITY







7.2.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

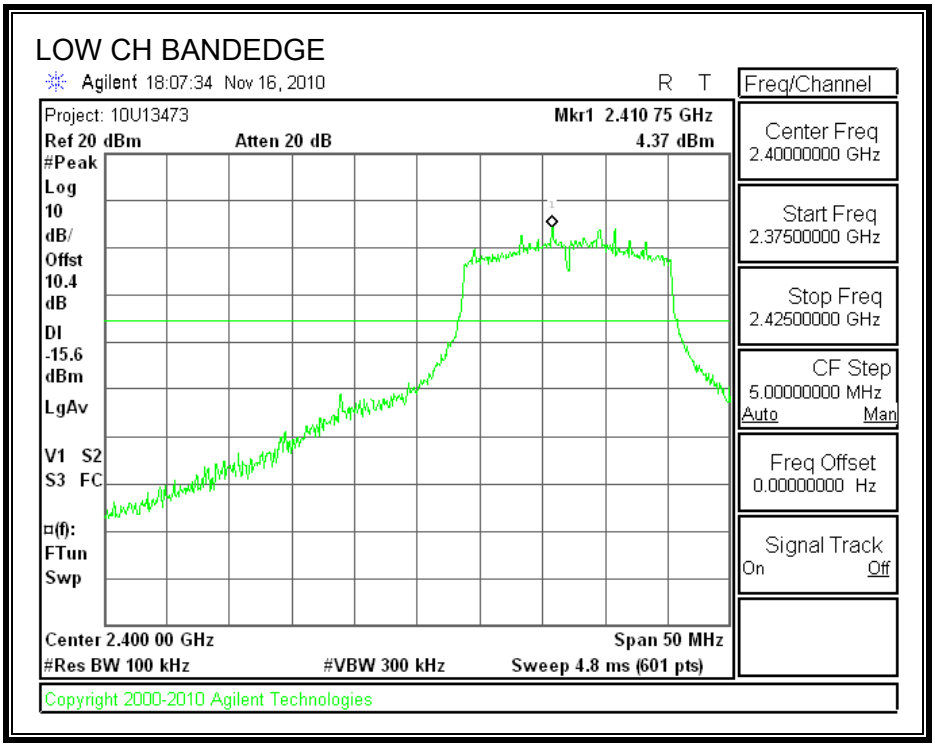
TEST PROCEDURE

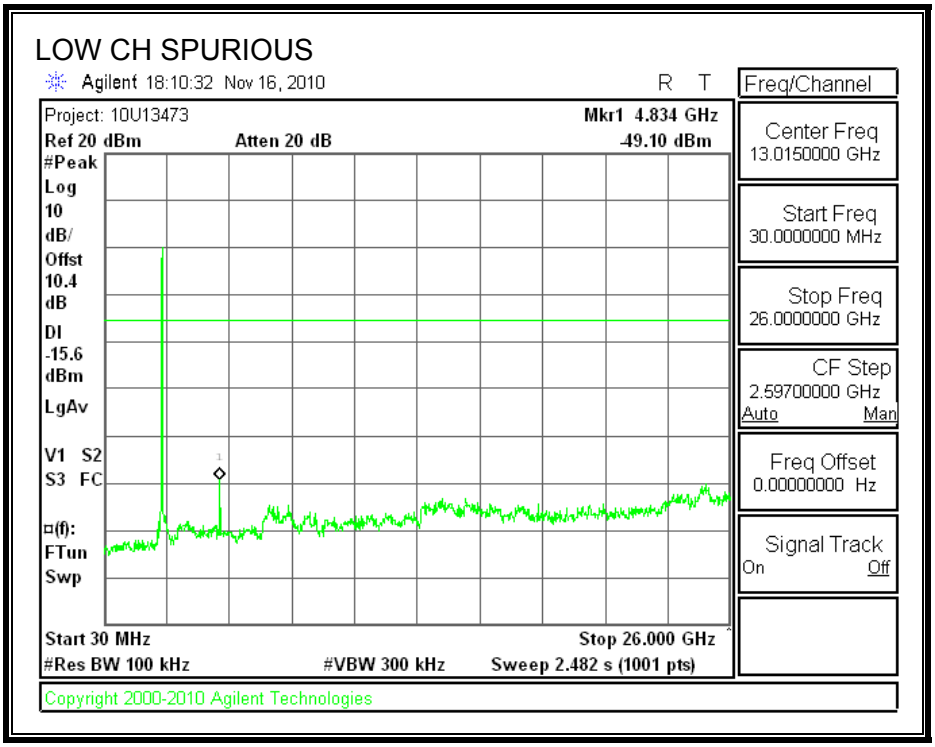
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

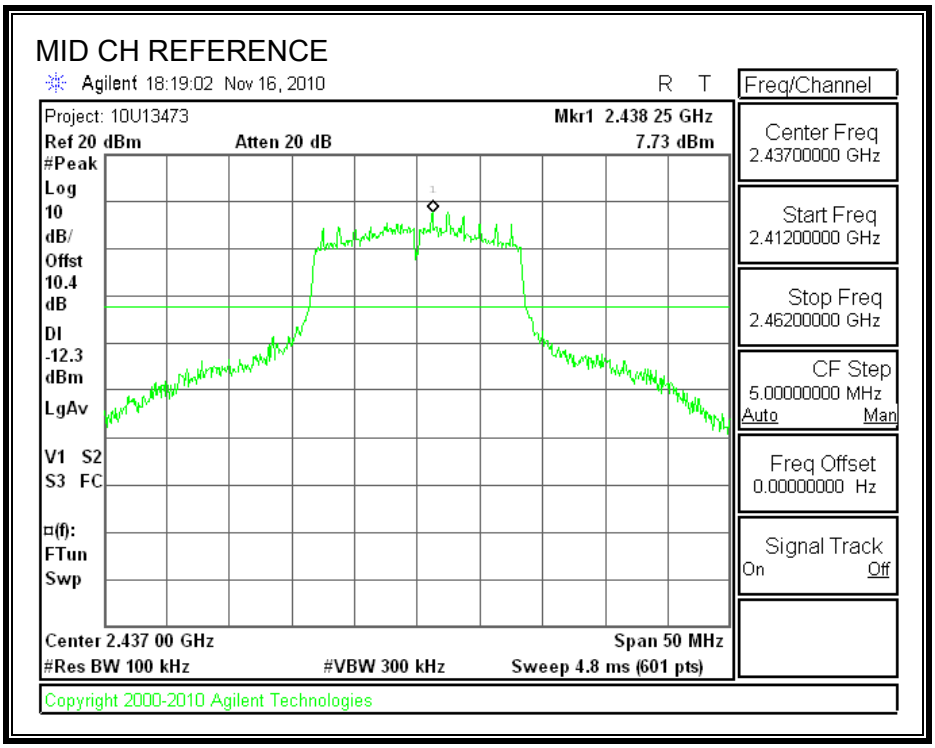
RESULTS

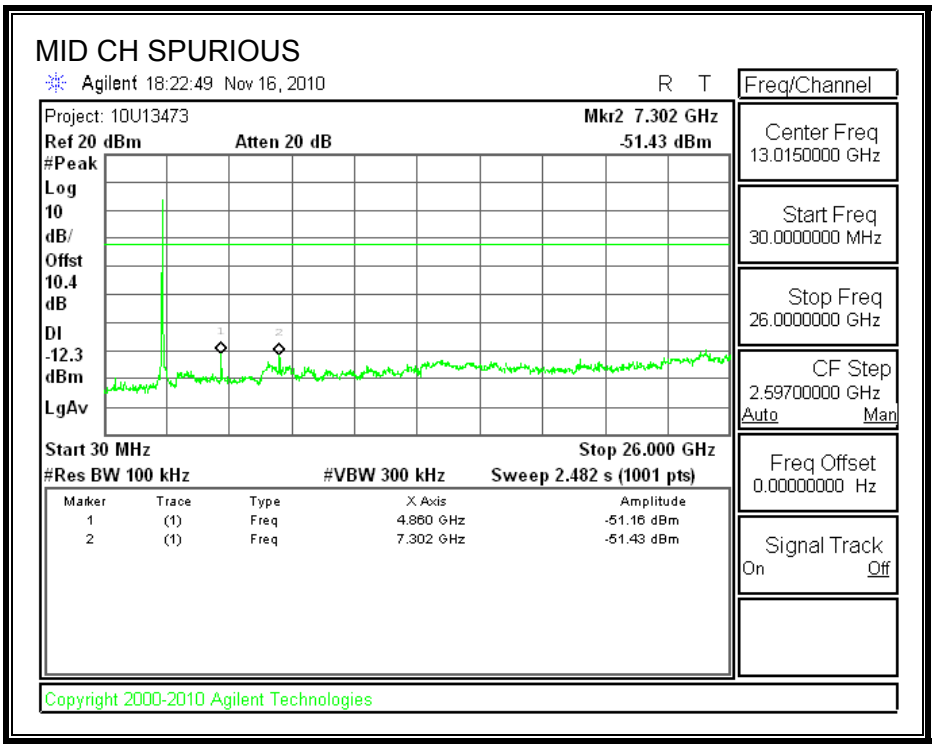
SPURIOUS EMISSIONS, LOW CHANNEL



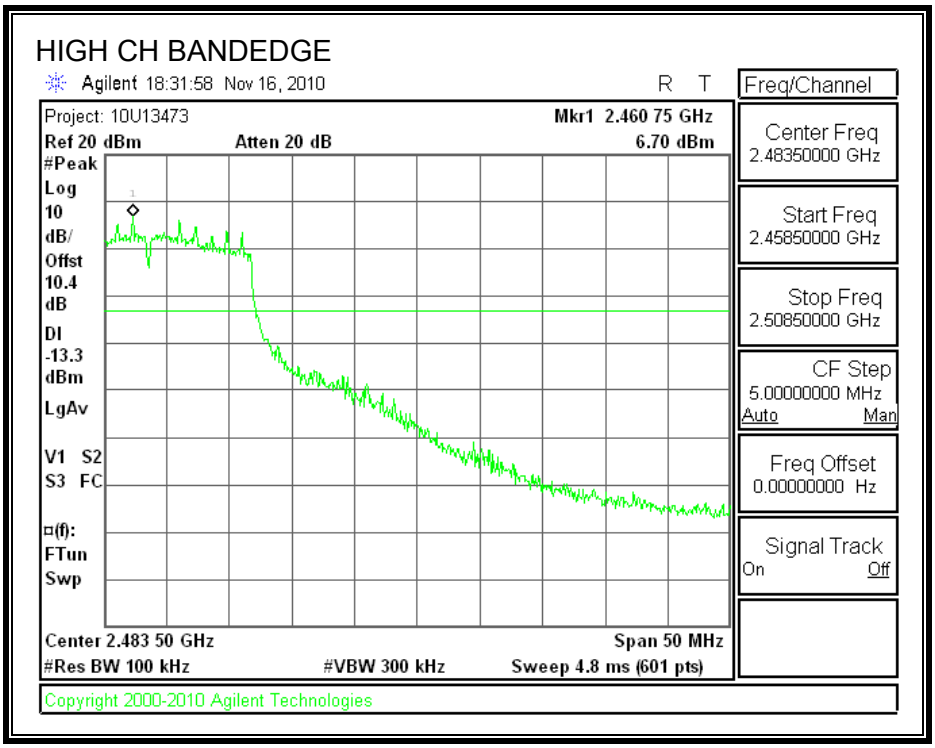


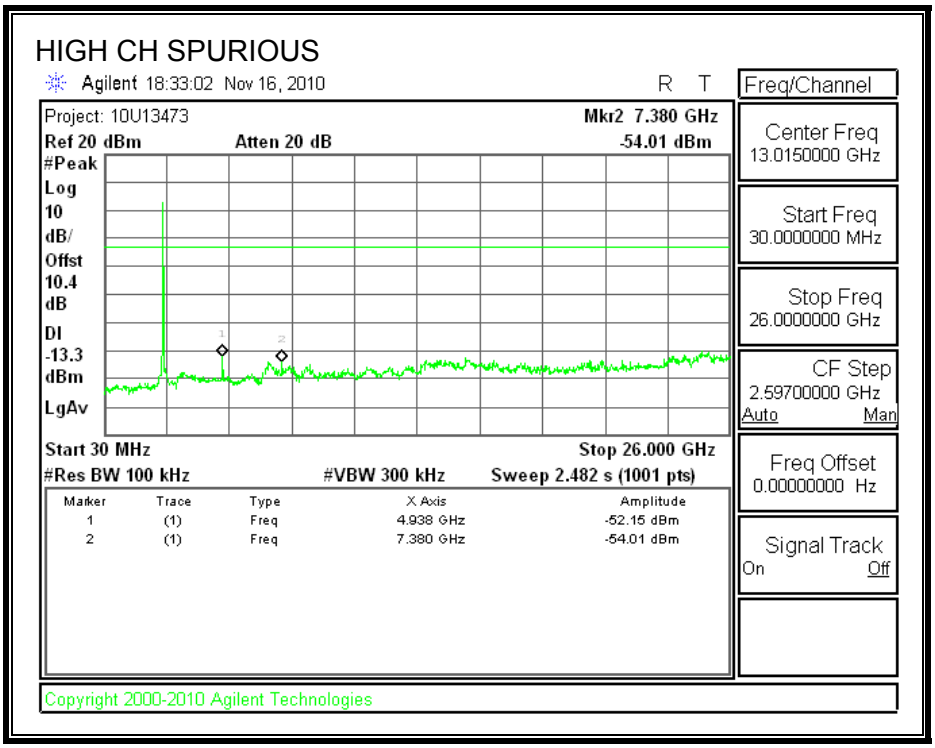
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 SISO MODE IN THE 2.4 GHz BAND

7.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

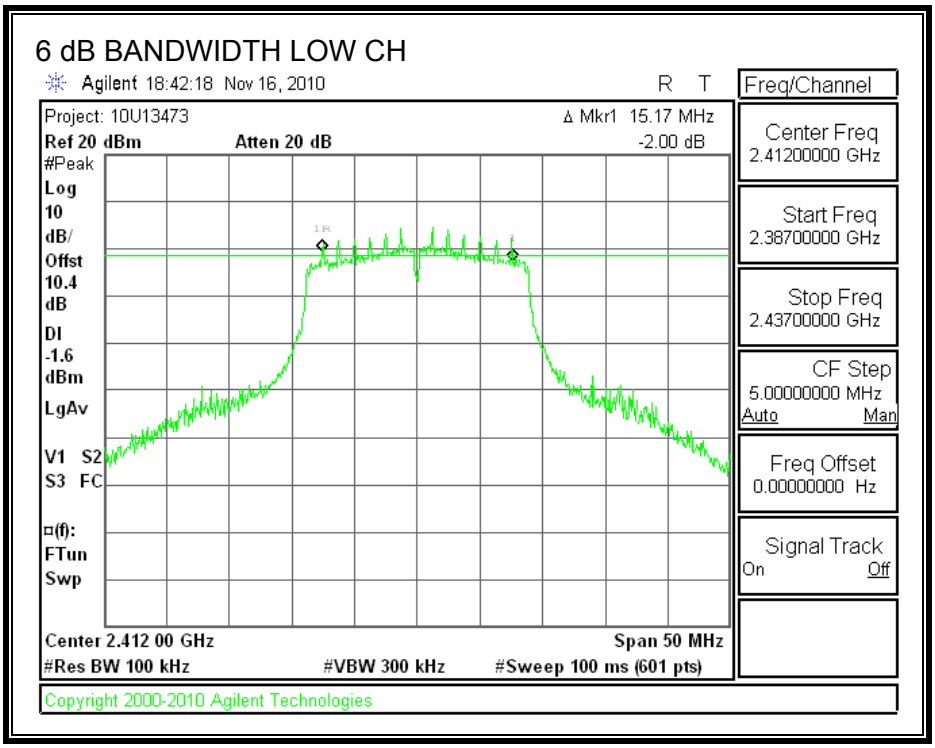
TEST PROCEDURE

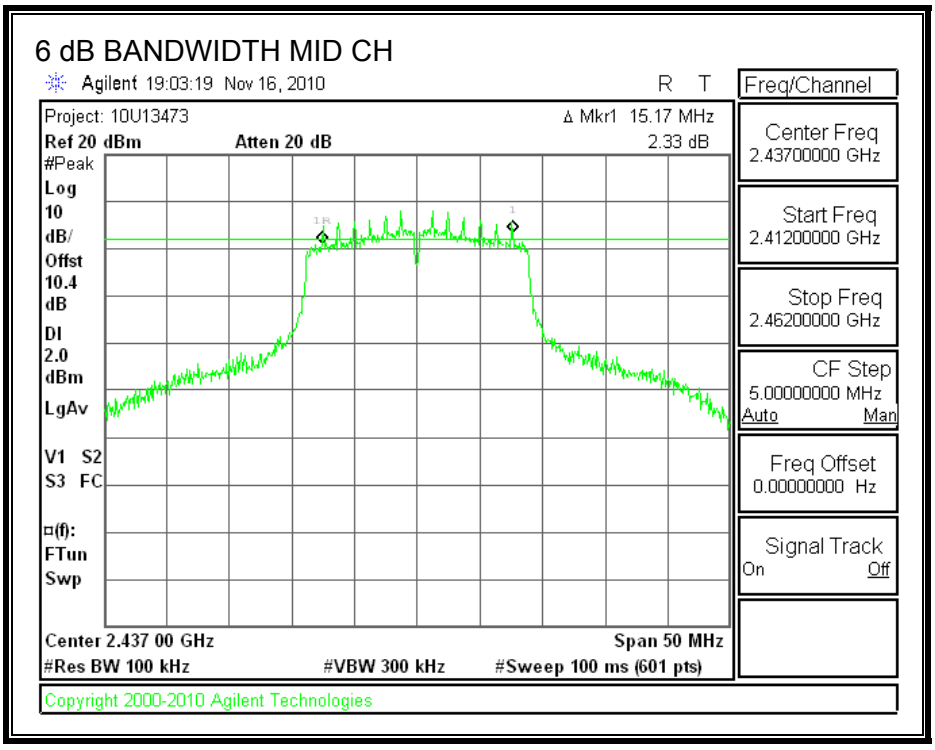
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

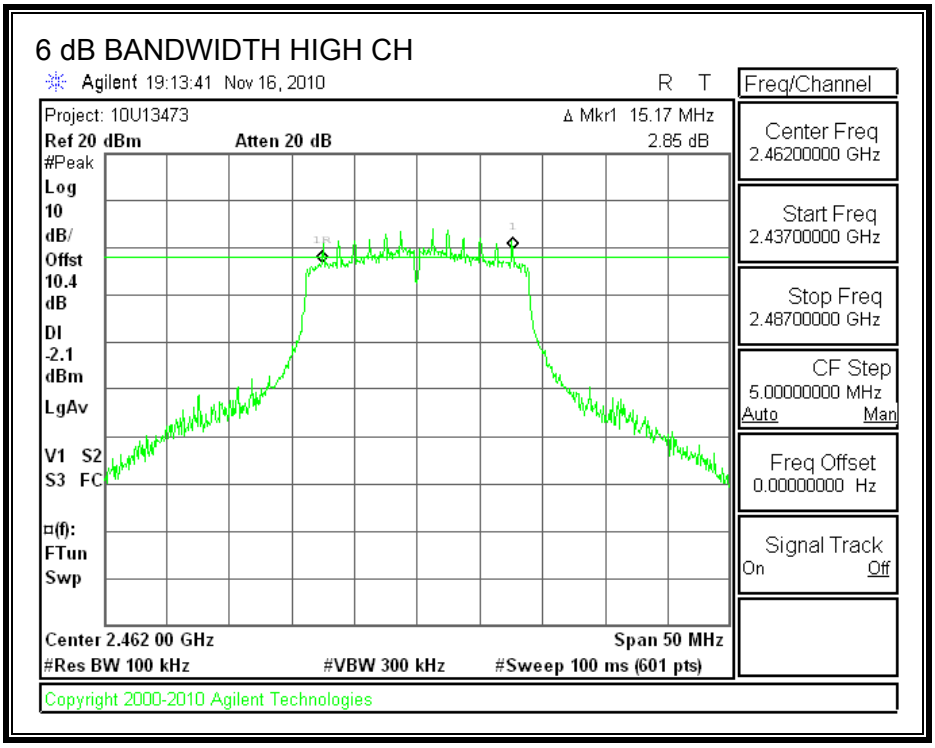
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.17	0.5
Middle	2437	15.17	0.5
High	2462	15.17	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

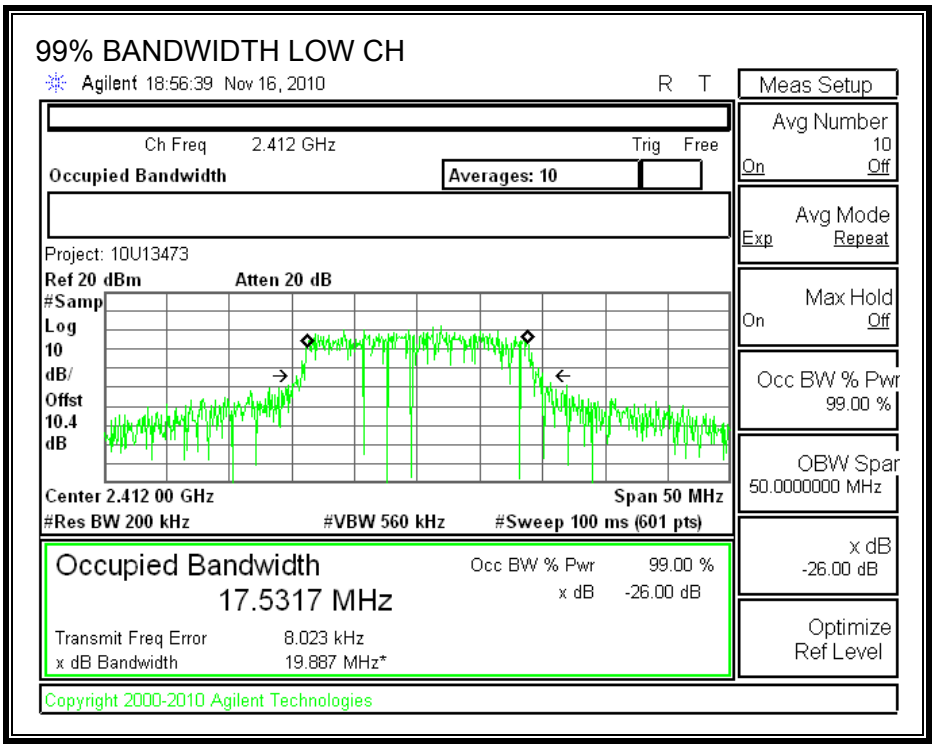
TEST PROCEDURE

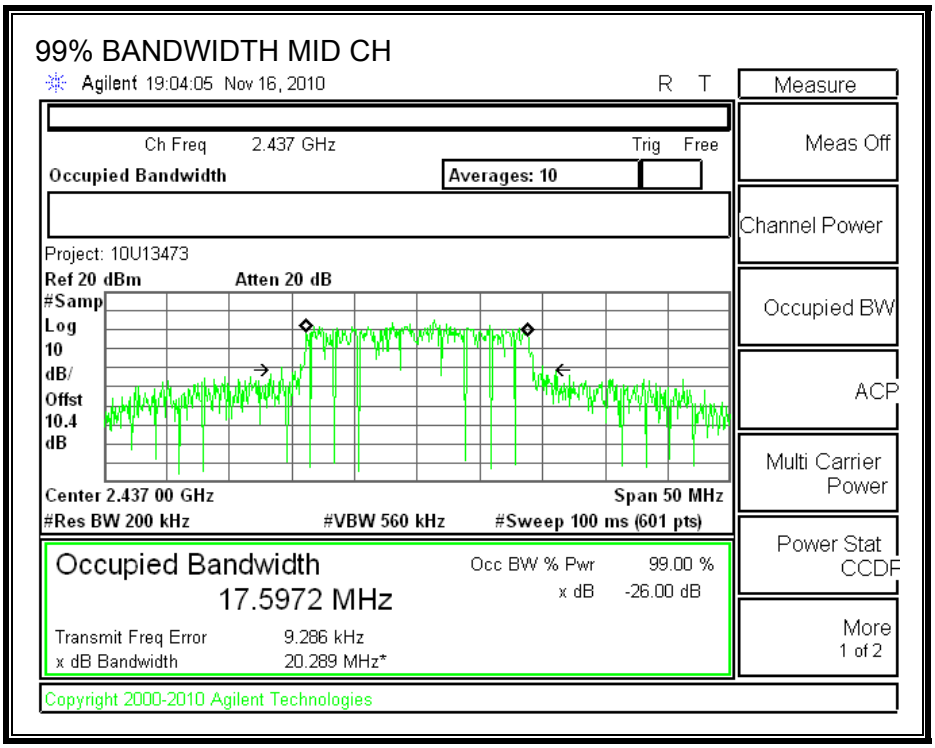
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

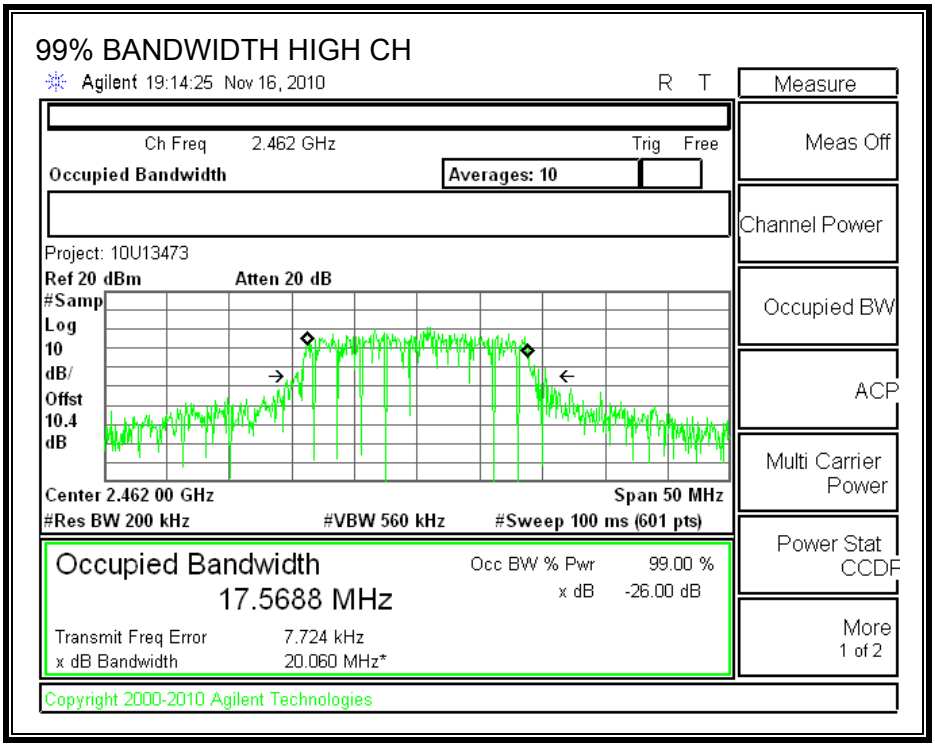
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.5317
Middle	2437	17.5972
High	2462	17.5688

99% BANDWIDTH







7.3.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13.58	10.4	23.98	30	-6.02
Middle	2437	14.9	10.4	25.30	30	-4.70
High	2462	13.7	10.4	24.10	30	-5.90

7.3.4. 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 10.4 dB (including 10 dB pad and 0.4 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	13.20
Middle	2437	16.50
High	2462	13.20

7.3.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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.

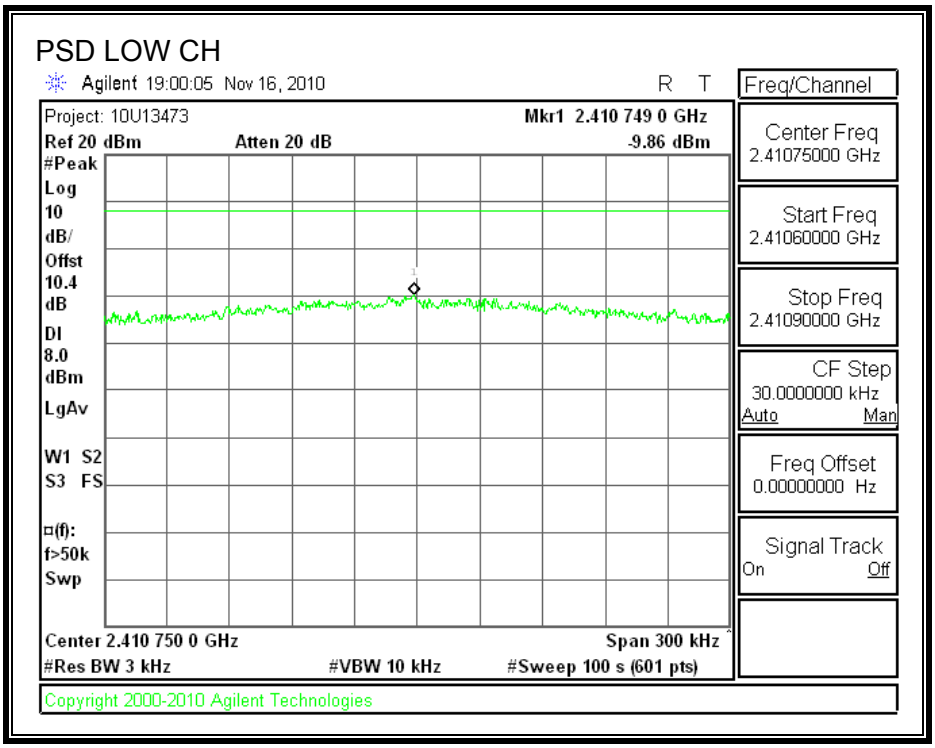
TEST PROCEDURE

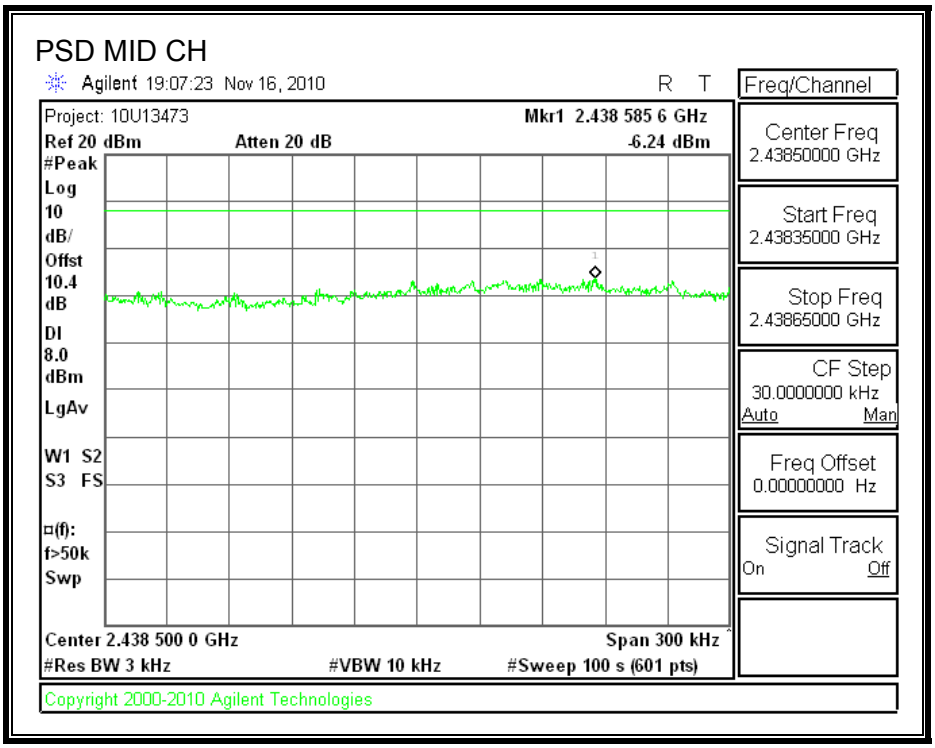
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

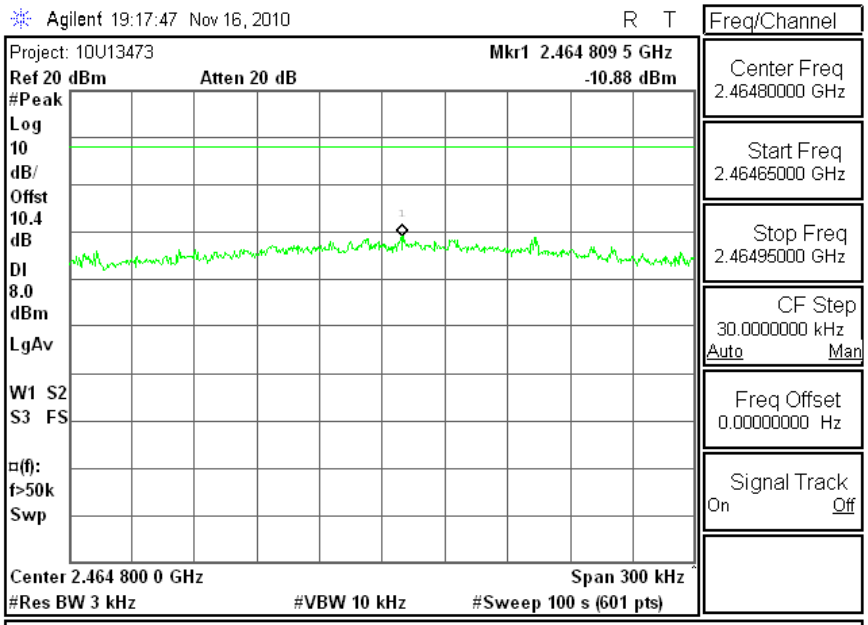
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.86	8	-17.86
Middle	2437	-6.24	8	-14.24
High	2462	-10.88	8	-18.88

POWER SPECTRAL DENSITY





PSD HIGH CH



7.3.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

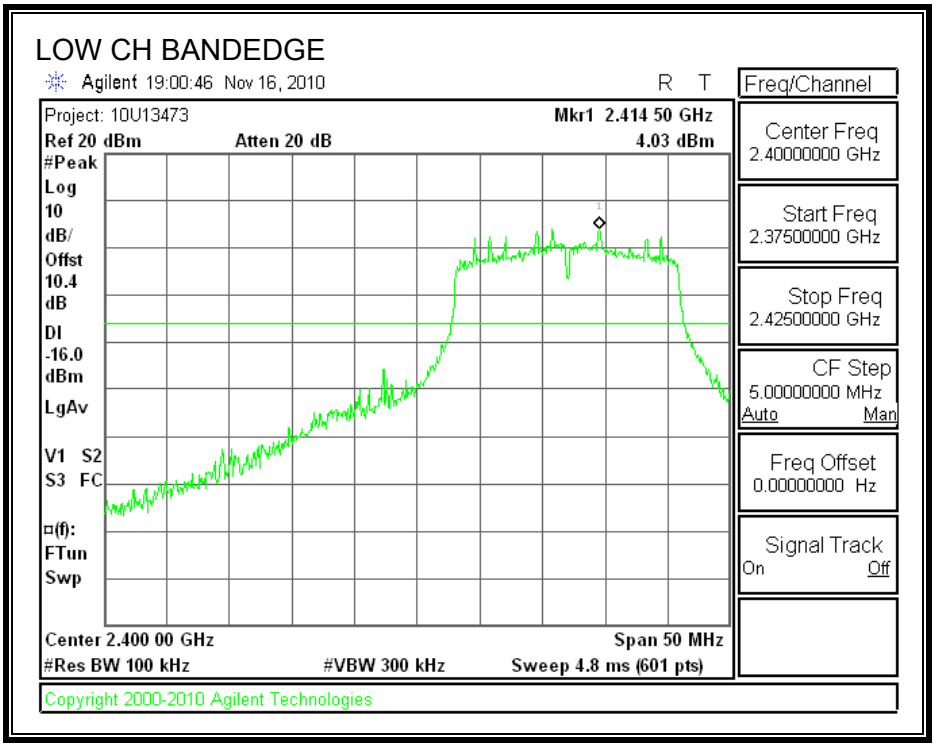
TEST PROCEDURE

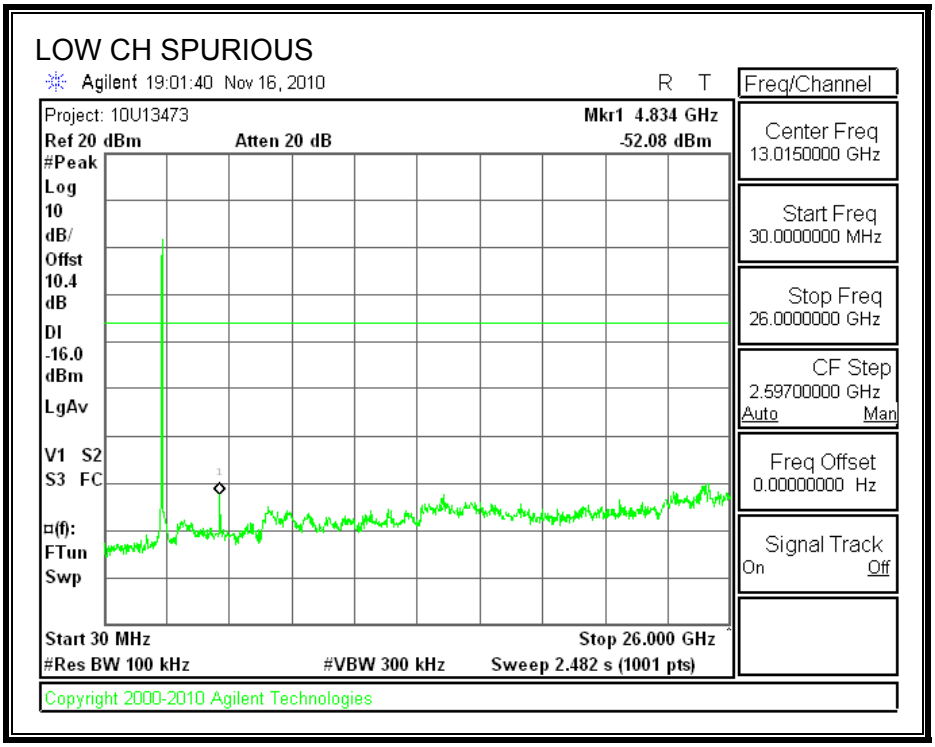
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

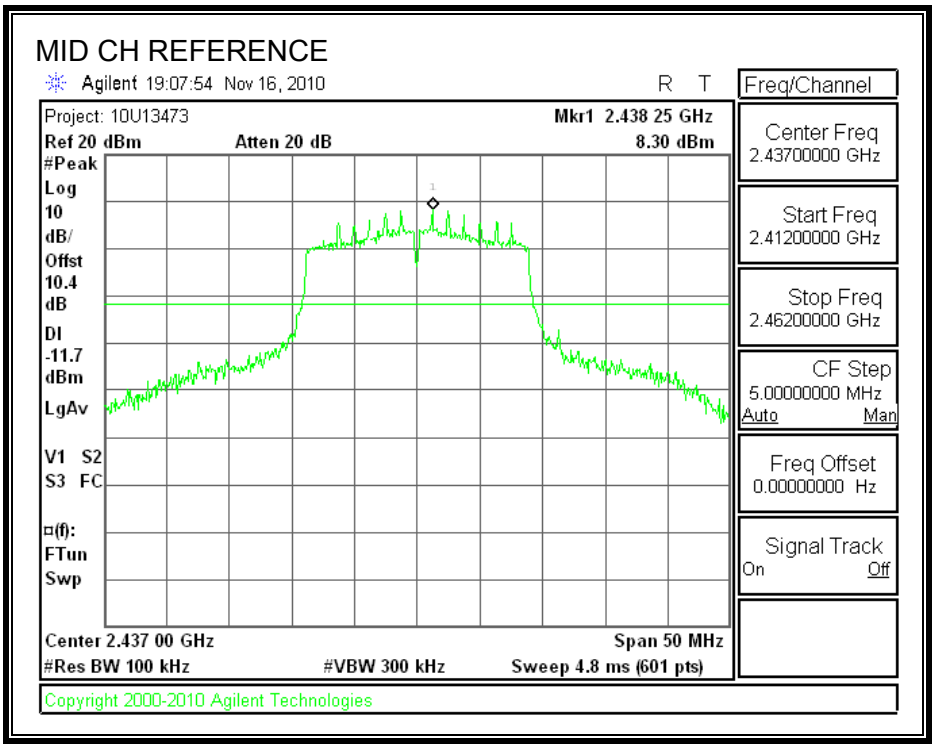
RESULTS

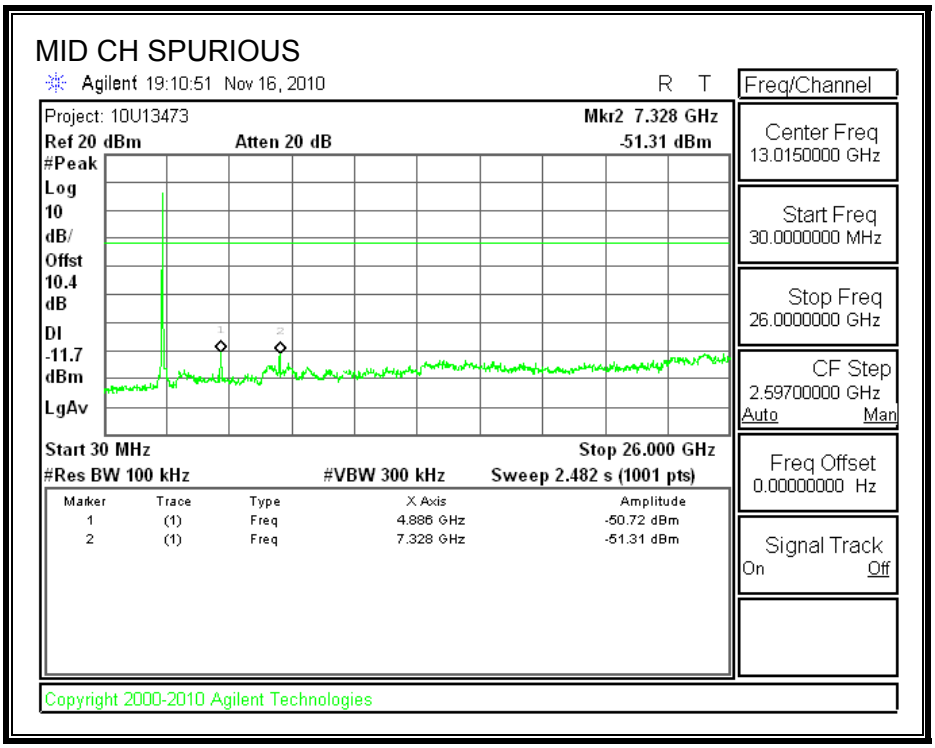
SPURIOUS EMISSIONS, LOW CHANNEL



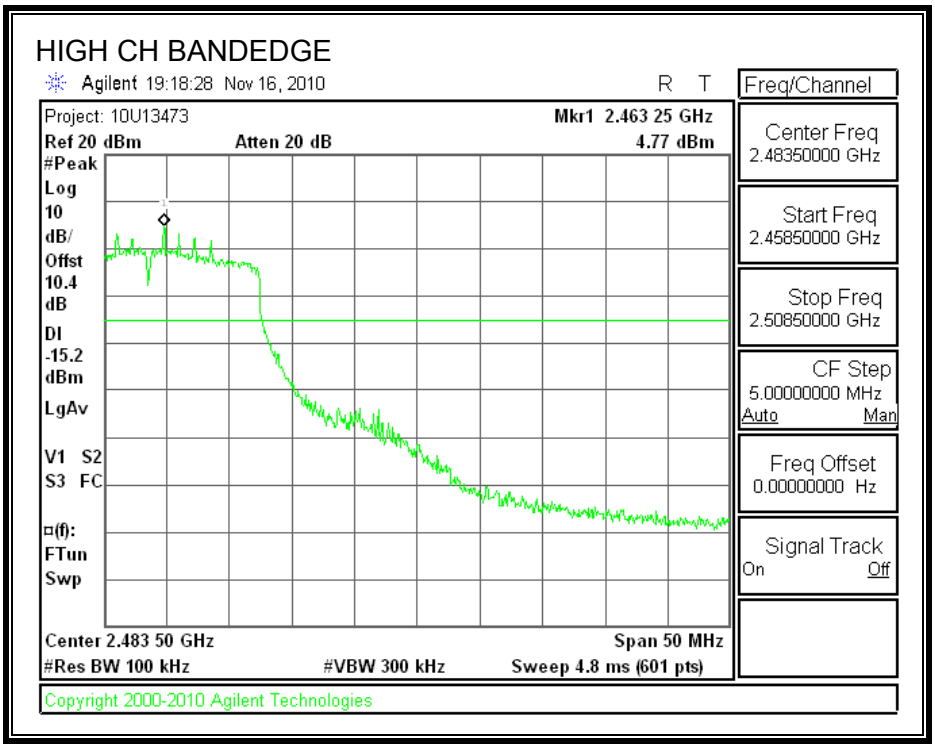


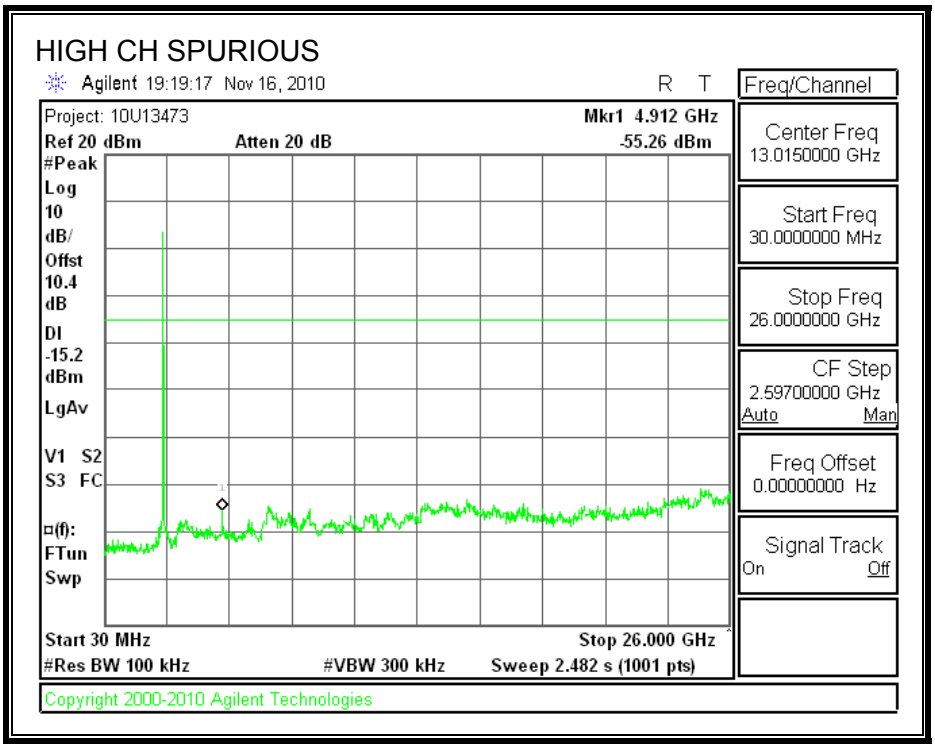
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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.

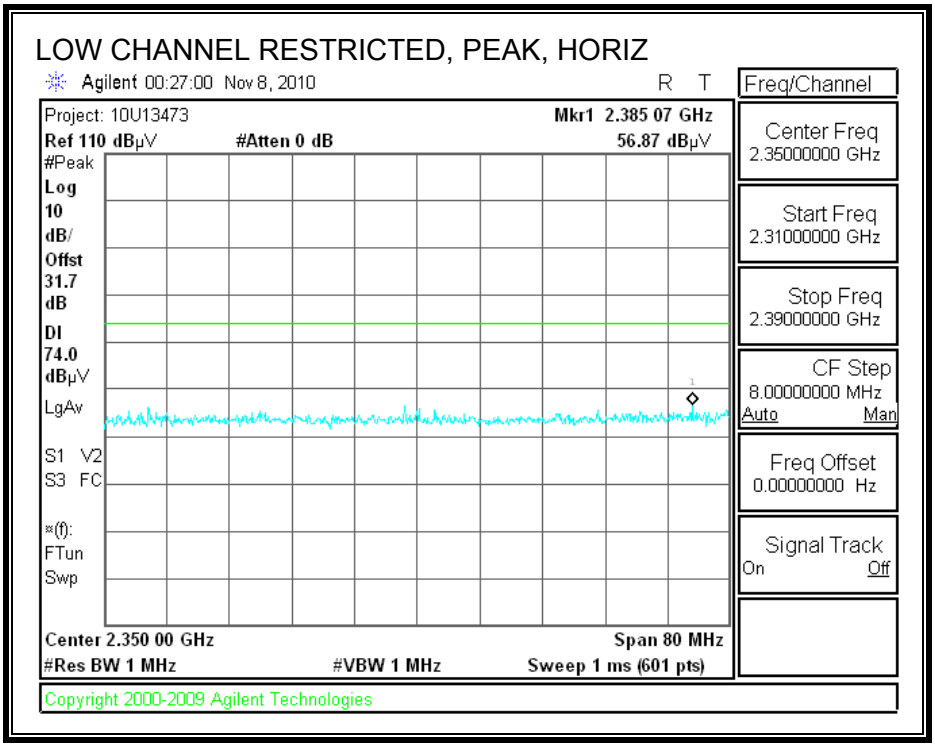
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each appplicable band.

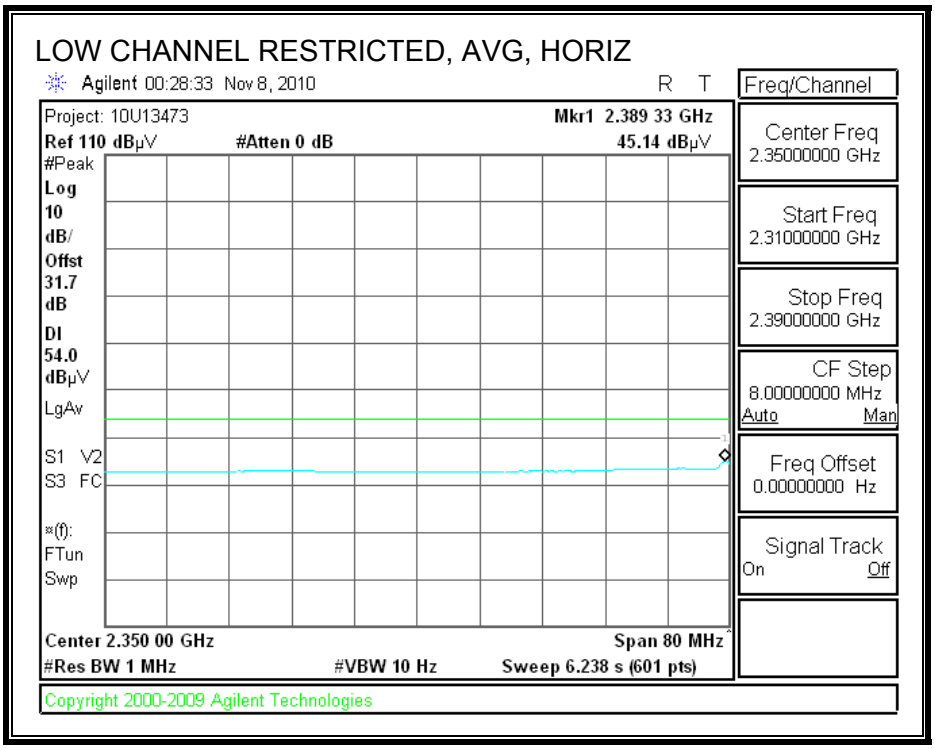
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

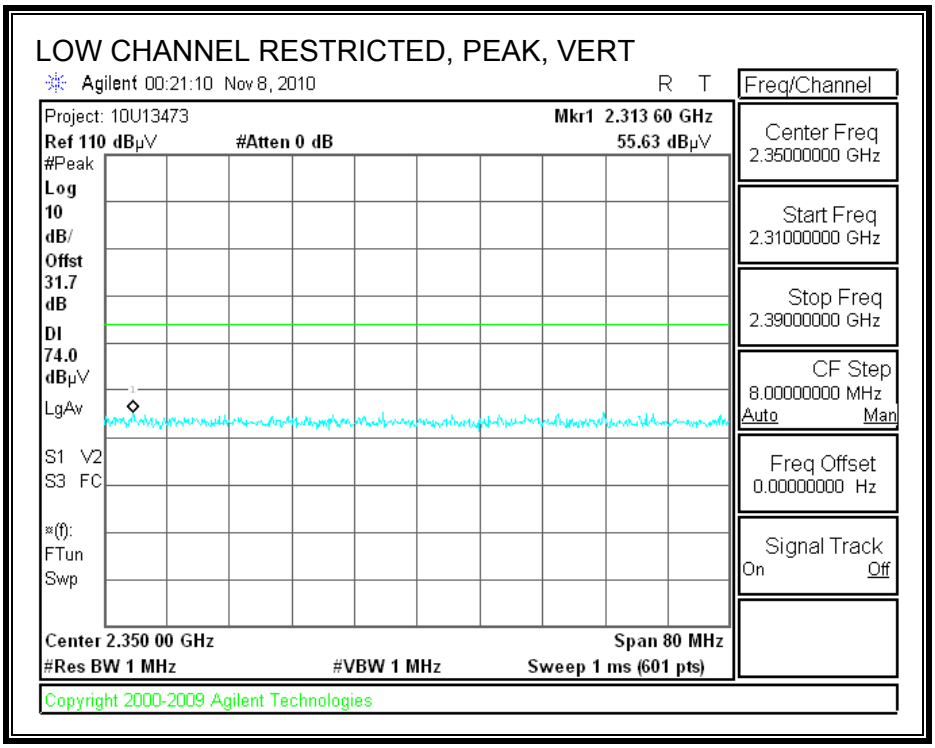
8.2.1. TRANSMITTER ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

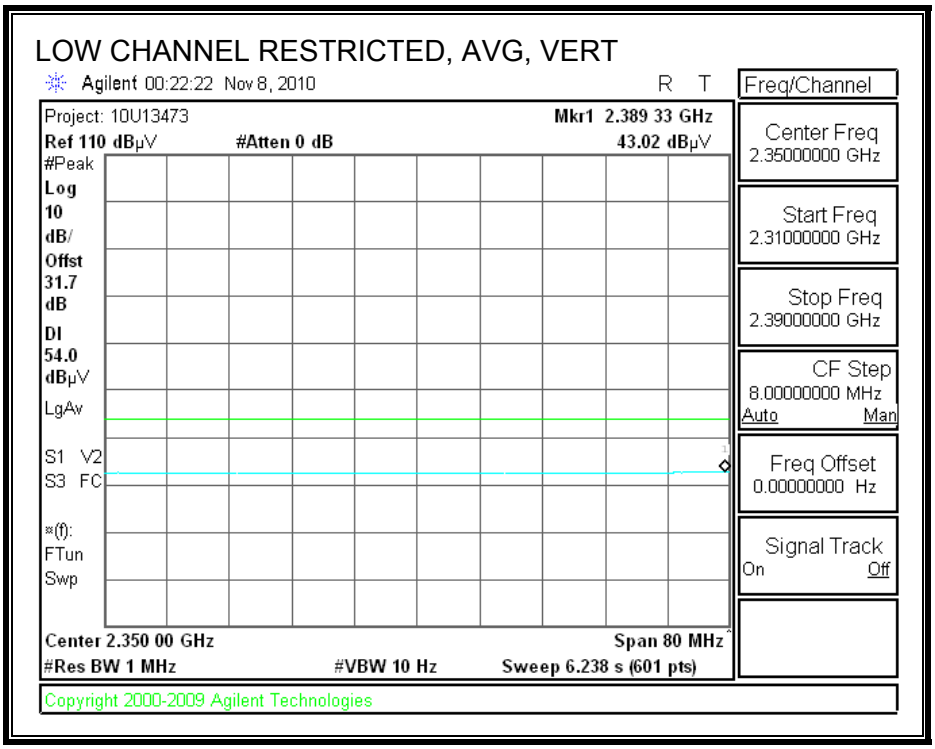
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



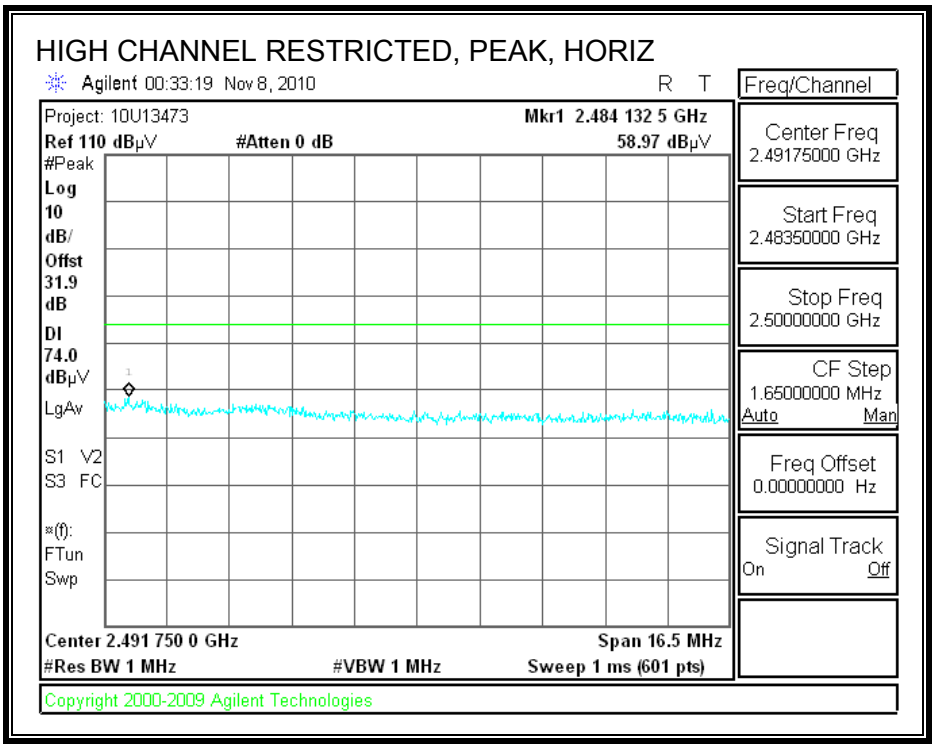


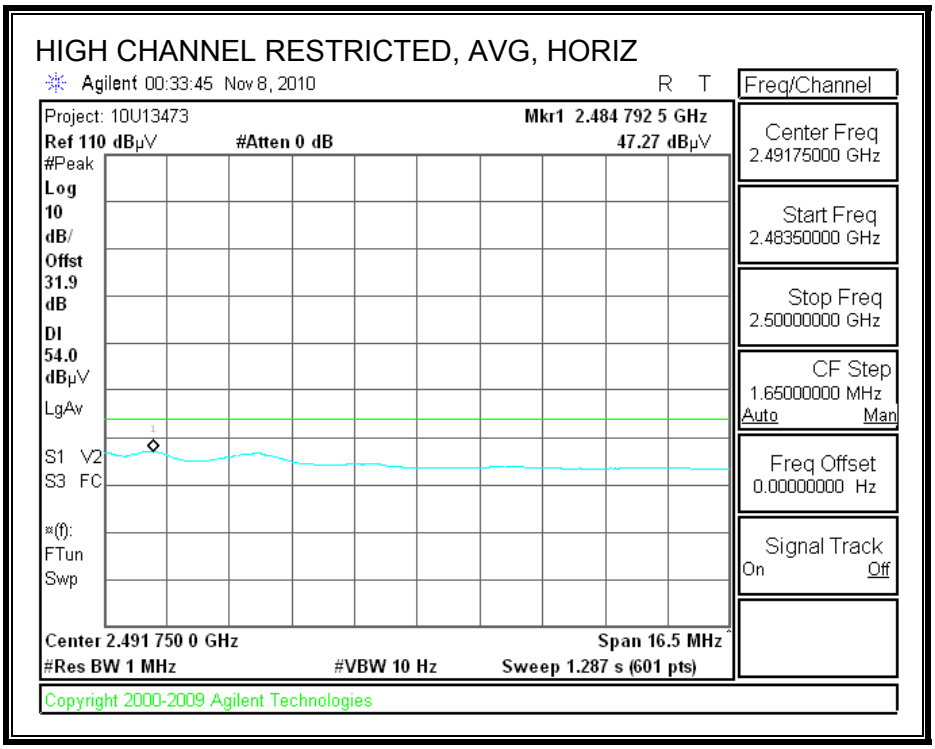
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



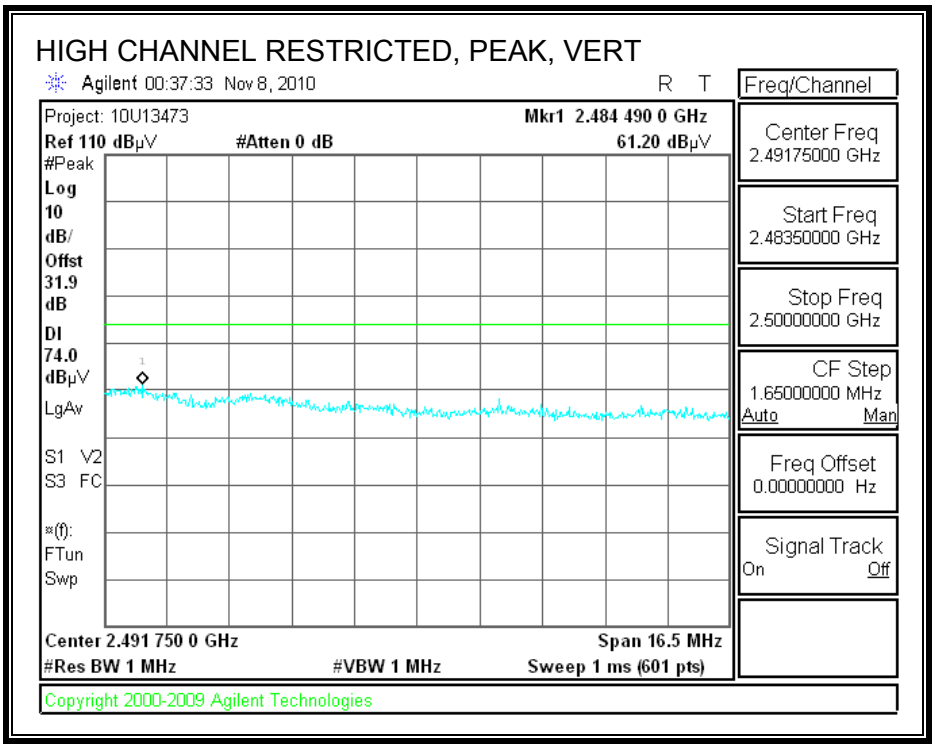


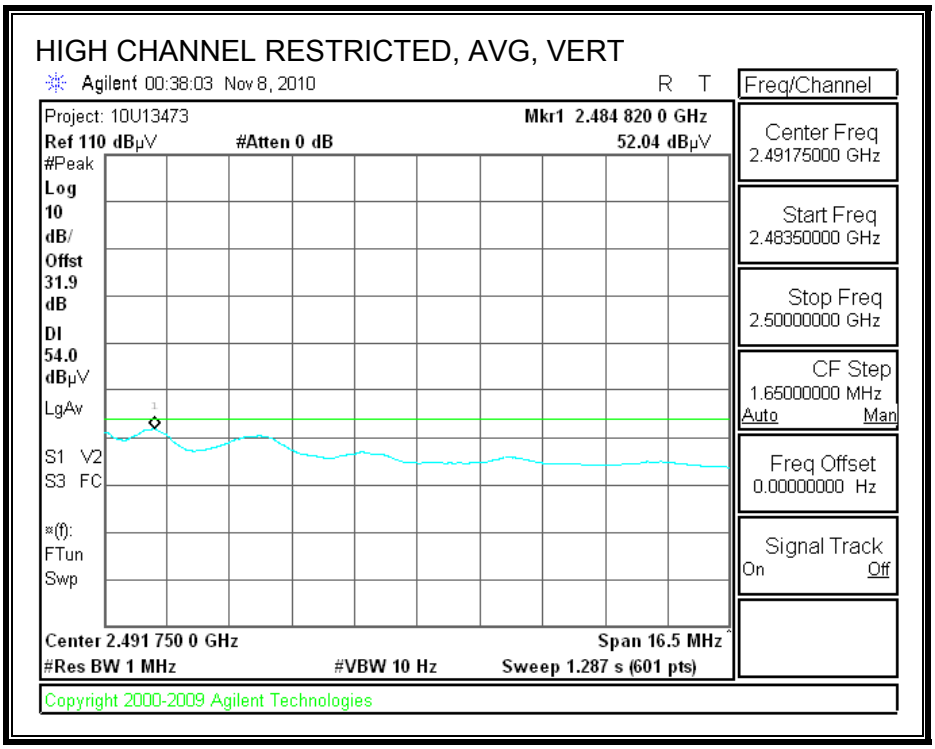
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/10
Project #: 10U13473
Test Target: FCC Class B
Mode Oper: 802.11b TX mode

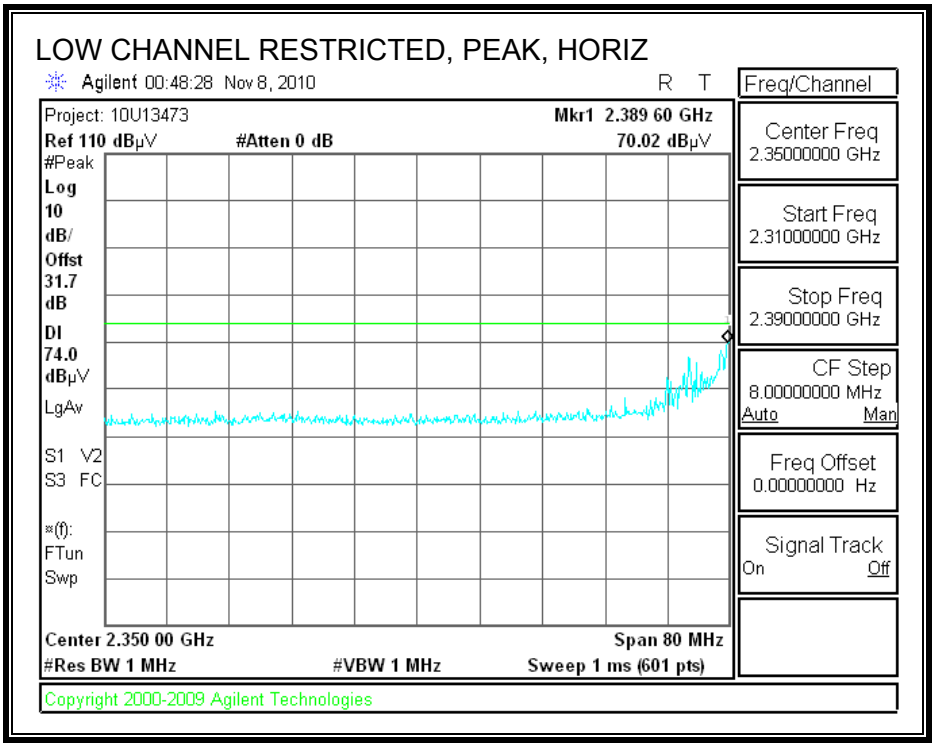
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

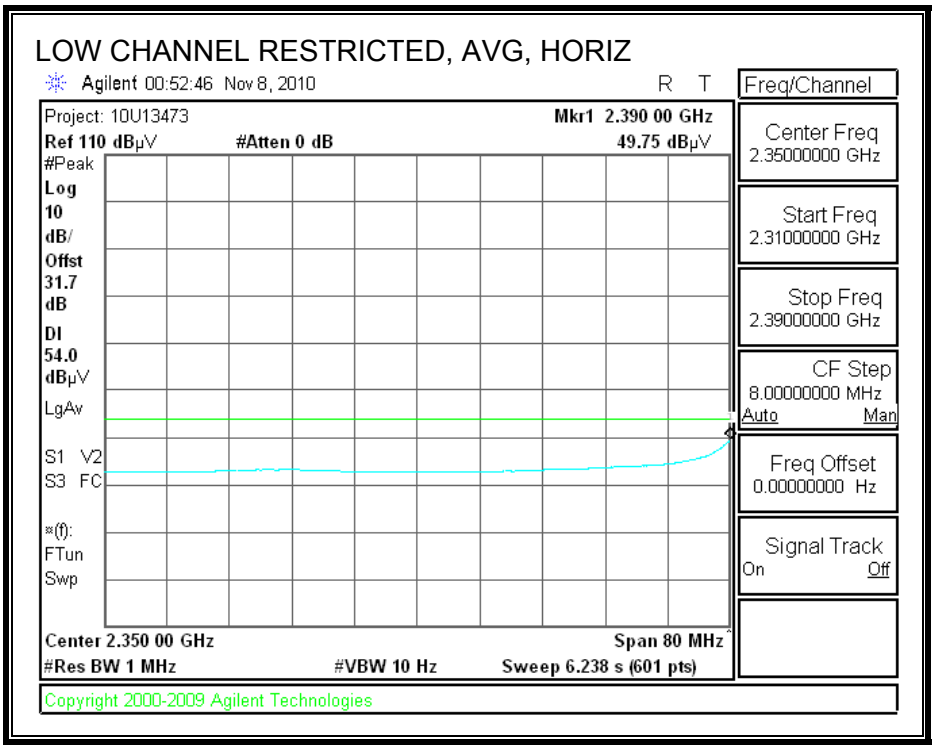
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH													
4.824	3.0	41.4	32.8	5.8	-34.8	0.0	0.0	45.2	74.0	-28.8	H	P	b mode
4.824	3.0	35.5	32.8	5.8	-34.8	0.0	0.0	39.2	54.0	-14.8	H	A	b mode
7.236	3.0	37.5	35.1	7.2	-34.7	0.0	0.0	45.1	74.0	-28.9	H	P	b mode
7.236	3.0	26.6	35.1	7.2	-34.7	0.0	0.0	34.2	54.0	-19.8	H	A	b mode
2412 MHz Low CH													
4.824	3.0	42.9	32.8	5.8	-34.8	0.0	0.0	46.6	74.0	-27.4	V	P	b mode
4.824	3.0	38.6	32.8	5.8	-34.8	0.0	0.0	42.3	54.0	-11.7	V	A	b mode
7.236	3.0	38.0	35.1	7.2	-34.7	0.0	0.0	45.6	74.0	-28.4	V	P	b mode
7.236	3.0	27.4	35.1	7.2	-34.7	0.0	0.0	35.0	54.0	-19.0	V	A	b mode
2437 MHz Mid CH													
4.874	3.0	38.0	32.8	5.8	-34.9	0.0	0.0	41.8	74.0	-32.2	V	P	b mode
4.874	3.0	25.4	32.8	5.8	-34.9	0.0	0.0	29.2	54.0	-24.8	V	A	b mode
7.311	3.0	39.1	35.2	7.3	-34.7	0.0	0.0	46.9	74.0	-27.1	V	P	b mode
7.311	3.0	28.8	35.2	7.3	-34.7	0.0	0.0	36.7	54.0	-17.4	V	A	b mode
2437 MHz Mid CH													
4.874	3.0	38.0	32.8	5.8	-34.9	0.0	0.0	41.8	74.0	-32.2	H	P	b mode
4.874	3.0	25.4	32.8	5.8	-34.9	0.0	0.0	29.2	54.0	-24.8	H	A	b mode
7.311	3.0	37.4	35.2	7.3	-34.7	0.0	0.0	45.2	74.0	-28.8	H	P	b mode
7.311	3.0	24.8	35.2	7.3	-34.7	0.0	0.0	32.6	54.0	-21.4	H	A	b mode
2462 MHz High CH													
4.924	3.0	37.7	32.8	5.9	-34.9	0.0	0.0	41.6	74.0	-32.4	H	P	b mode
4.924	3.0	25.4	32.8	5.9	-34.9	0.0	0.0	29.3	54.0	-24.7	H	A	b mode
7.386	3.0	38.5	35.3	7.3	-34.6	0.0	0.0	46.5	74.0	-27.5	H	P	b mode
7.386	3.0	27.6	35.3	7.3	-34.6	0.0	0.0	35.6	54.0	-18.4	H	A	b mode
2462 MHz High CH													
4.924	3.0	38.0	32.8	5.9	-34.9	0.0	0.0	41.8	74.0	-32.2	V	P	b mode
4.924	3.0	26.0	32.8	5.9	-34.9	0.0	0.0	29.9	54.0	-24.1	V	A	b mode
7.386	3.0	39.3	35.3	7.3	-34.6	0.0	0.0	47.2	74.0	-26.8	V	P	b mode
7.386	3.0	30.5	35.3	7.3	-34.6	0.0	0.0	38.5	54.0	-15.5	V	A	b mode

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

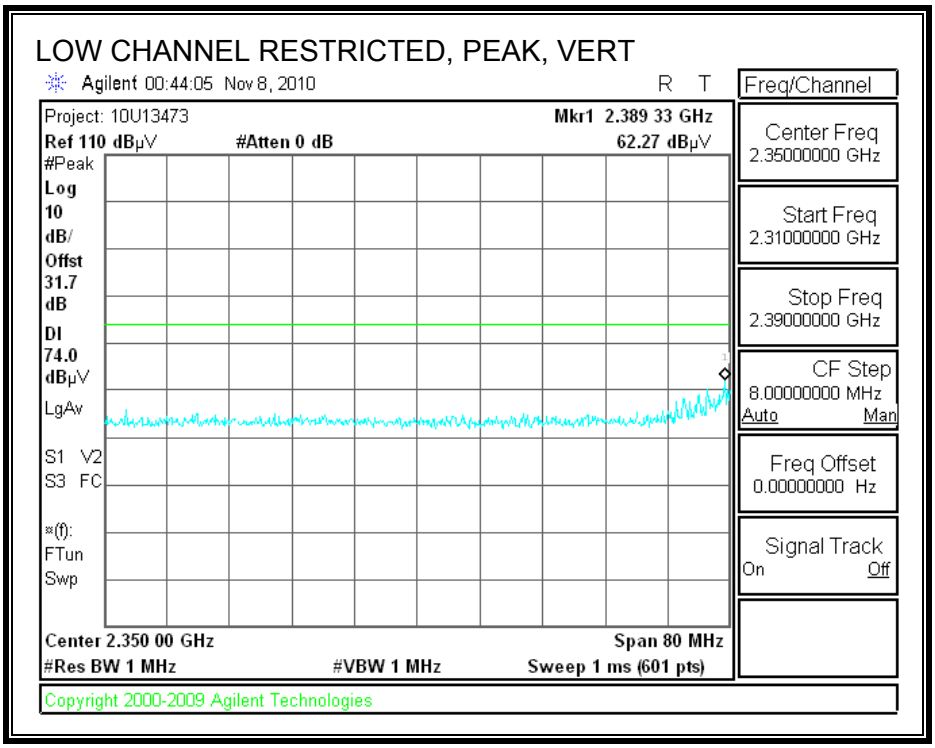
8.2.2. TRANSMITTER ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

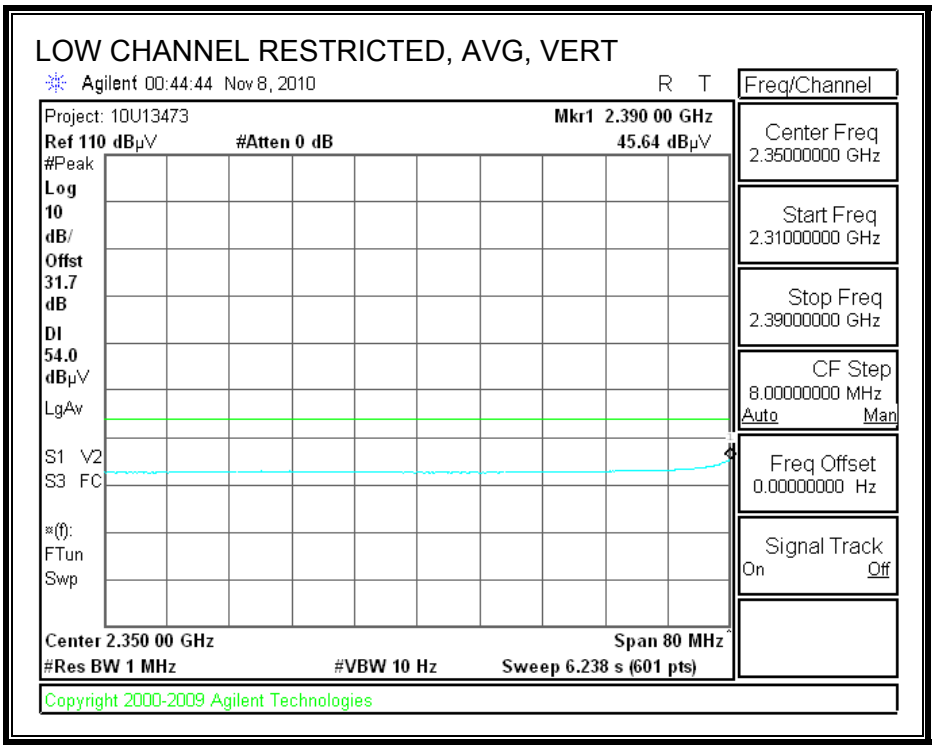
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



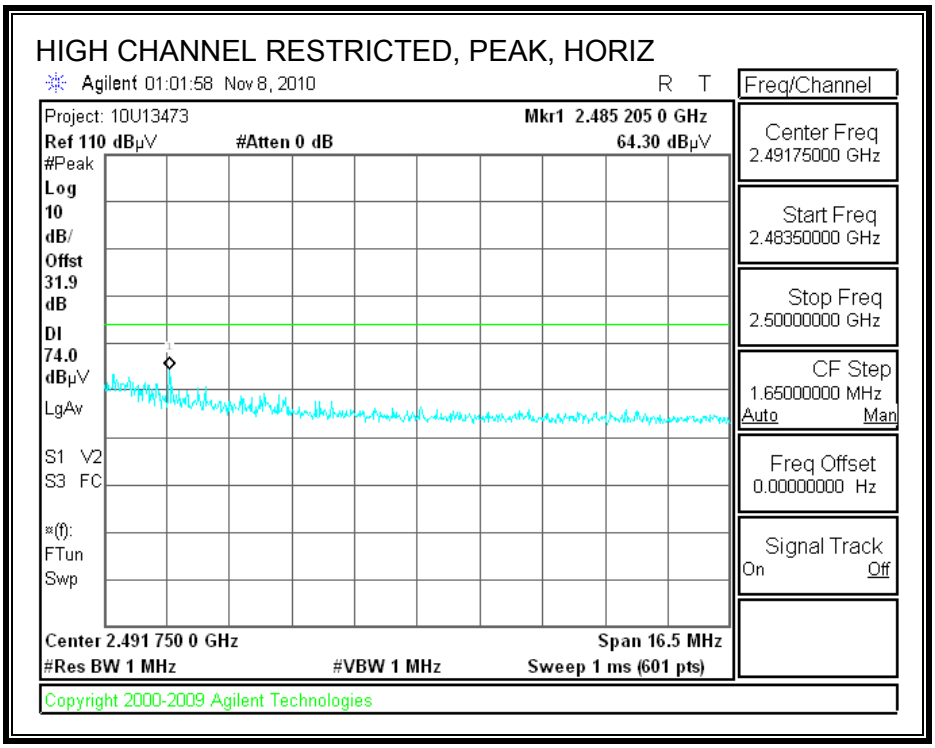


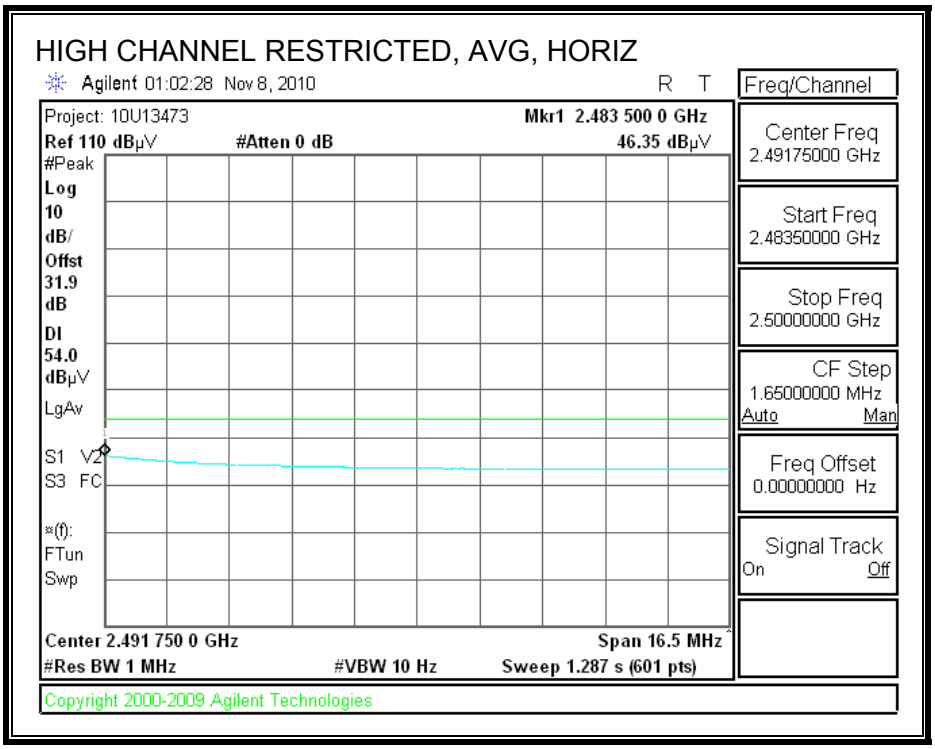
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



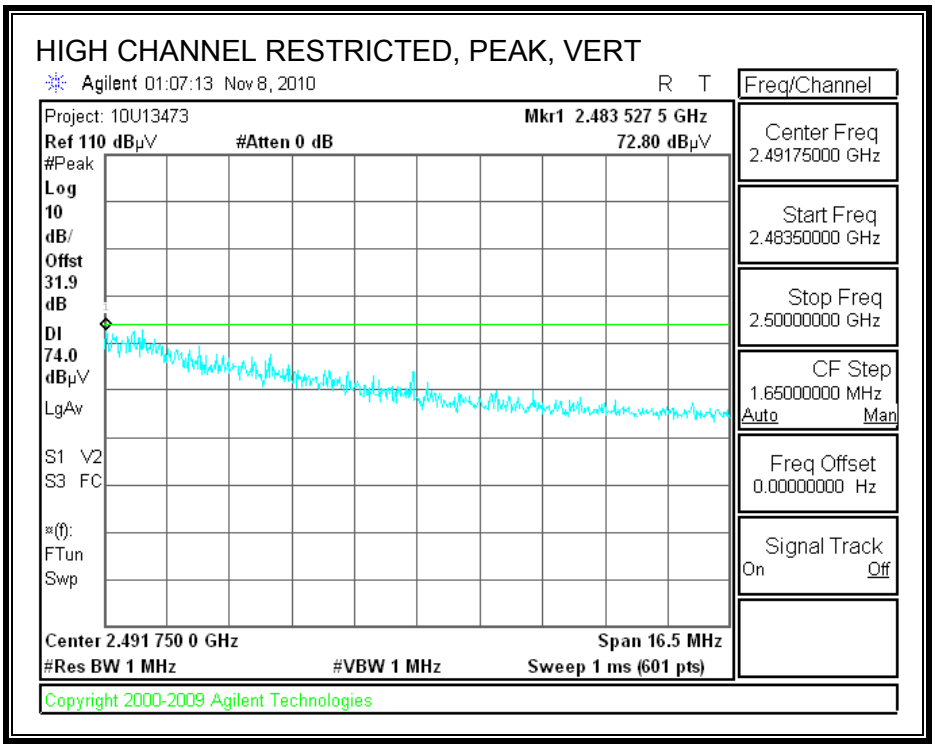


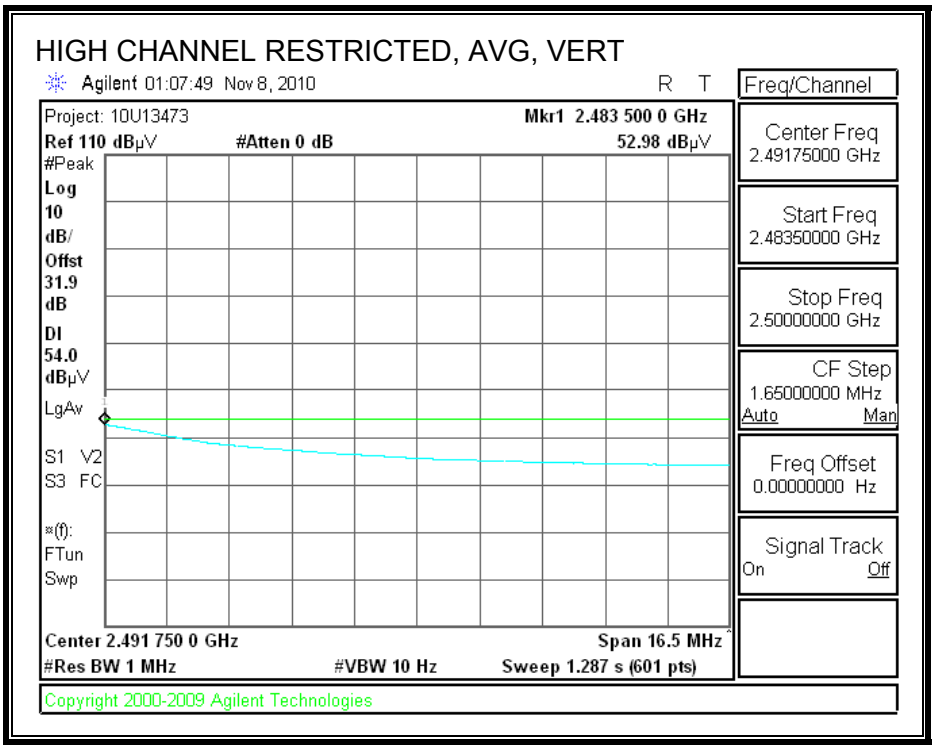
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/10
Project #: 10U13473
Test Target: FCC Class B
Mode Oper: 802.11g TX mode

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

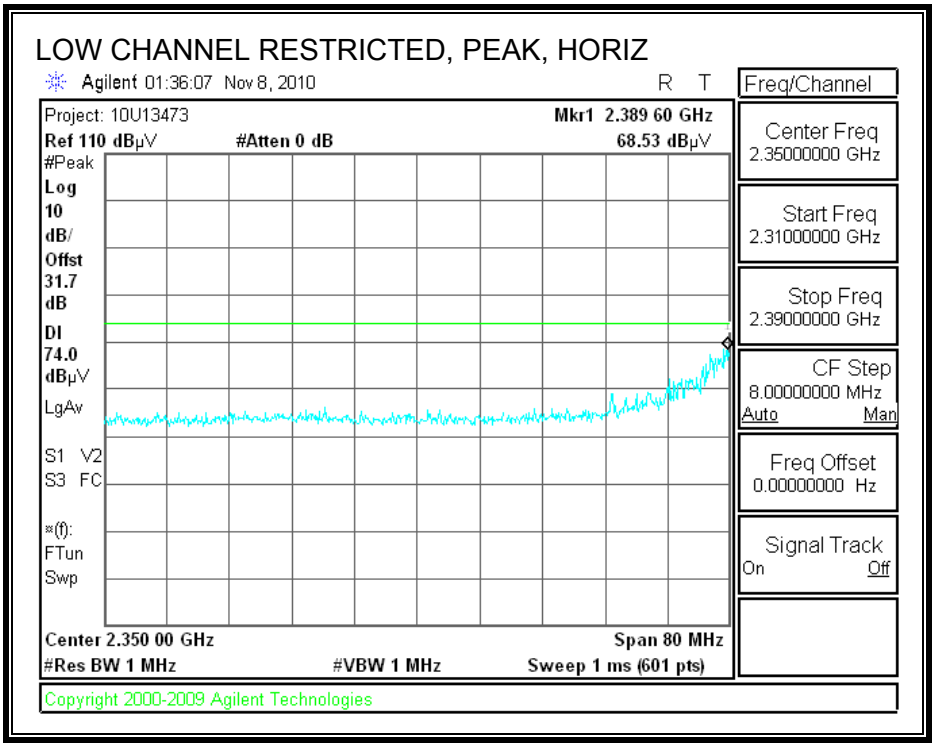
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

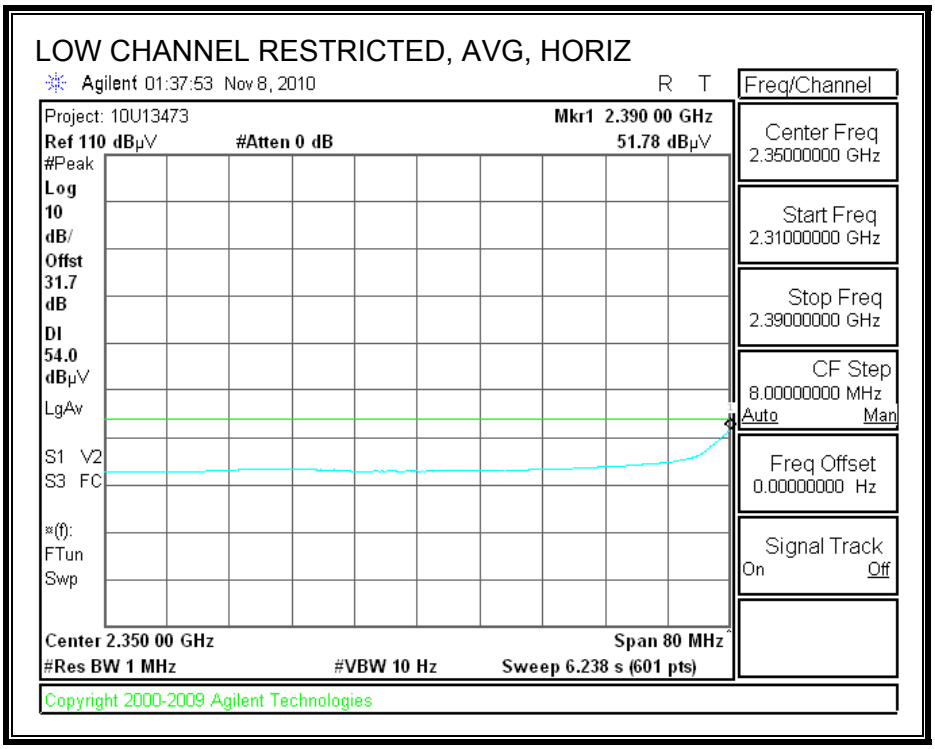
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH													
4.824	3.0	42.4	32.8	5.8	-34.8	0.0	0.0	46.1	74.0	-27.9	V	P	g mode
4.824	3.0	29.8	32.8	5.8	-34.8	0.0	0.0	33.5	54.0	-20.5	V	A	g mode
7.236	3.0	37.7	35.1	7.2	-34.7	0.0	0.0	45.4	74.0	-28.6	V	P	g mode
7.236	3.0	25.0	35.1	7.2	-34.7	0.0	0.0	32.6	54.0	-21.4	V	A	g mode
2412 MHz Low CH													
4.824	3.0	38.7	32.8	5.8	-34.8	0.0	0.0	42.4	74.0	-31.6	H	P	g mode
4.824	3.0	25.8	32.8	5.8	-34.8	0.0	0.0	29.5	54.0	-24.5	H	A	g mode
7.236	3.0	37.2	35.1	7.2	-34.7	0.0	0.0	44.8	74.0	-29.2	H	P	g mode
7.236	3.0	24.8	35.1	7.2	-34.7	0.0	0.0	32.5	54.0	-21.5	H	A	g mode
2437 MHz Mid CH													
4.874	3.0	37.8	32.8	5.8	-34.9	0.0	0.0	41.6	74.0	-32.4	H	P	g mode
4.874	3.0	25.4	32.8	5.8	-34.9	0.0	0.0	29.2	54.0	-24.8	H	A	g mode
7.311	3.0	41.6	35.2	7.3	-34.7	0.0	0.0	49.4	74.0	-24.6	H	P	g mode
7.311	3.0	28.1	35.2	7.3	-34.7	0.0	0.0	35.9	54.0	-18.1	H	A	g mode
2437 MHz Mid CH													
4.874	3.0	42.0	32.8	5.8	-34.9	0.0	0.0	45.8	74.0	-28.2	V	P	g mode
4.874	3.0	28.2	32.8	5.8	-34.9	0.0	0.0	32.0	54.0	-22.0	V	A	g mode
7.311	3.0	37.8	35.2	7.3	-34.7	0.0	0.0	45.7	74.0	-28.3	V	P	g mode
7.311	3.0	25.1	35.2	7.3	-34.7	0.0	0.0	32.9	54.0	-21.1	V	A	g mode
2462 MHz High CH													
4.924	3.0	38.7	32.8	5.9	-34.9	0.0	0.0	42.6	74.0	-31.4	V	P	g mode
4.924	3.0	25.8	32.8	5.9	-34.9	0.0	0.0	29.6	54.0	-24.4	V	A	g mode
7.386	3.0	38.1	35.3	7.3	-34.6	0.0	0.0	46.1	74.0	-27.9	V	P	g mode
7.386	3.0	25.2	35.3	7.3	-34.6	0.0	0.0	33.2	54.0	-20.8	V	A	g mode
2462 MHz High CH													
4.924	3.0	37.8	32.8	5.9	-34.9	0.0	0.0	41.7	74.0	-32.3	H	P	g mode
4.924	3.0	25.4	32.8	5.9	-34.9	0.0	0.0	29.3	54.0	-24.7	H	A	g mode
7.386	3.0	36.9	35.3	7.3	-34.6	0.0	0.0	44.8	74.0	-29.2	H	P	g mode
7.386	3.0	24.8	35.3	7.3	-34.6	0.0	0.0	32.8	54.0	-21.2	H	A	g mode

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

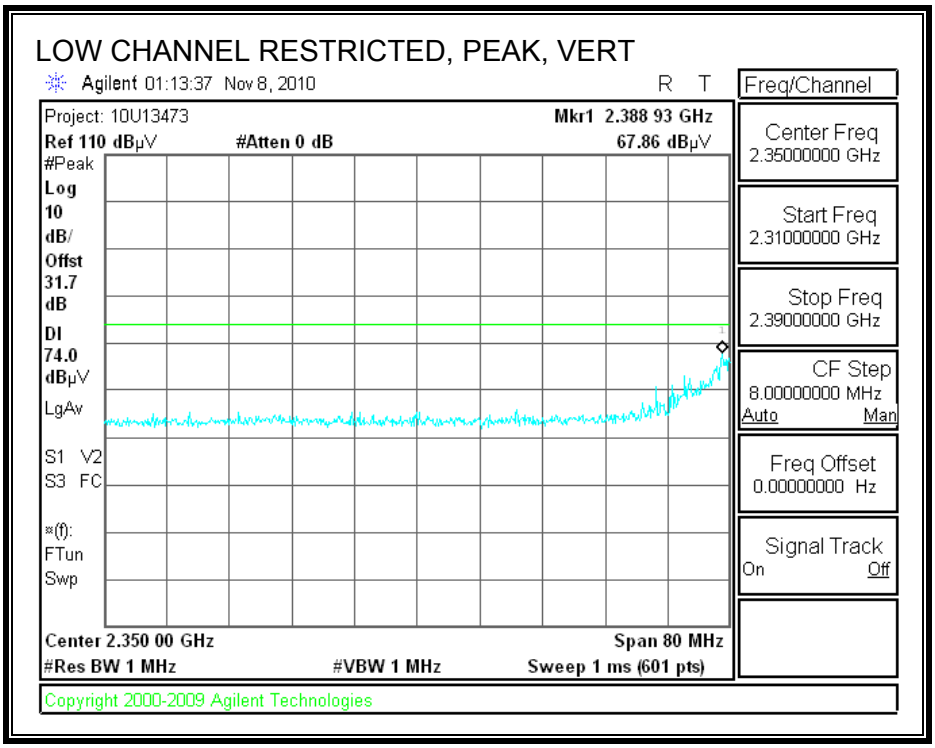
8.2.3. TRANSMITTER ABOVE 1 GHz FOR 802.11n HT20 SISO MODE IN THE 2.4 GHz BAND

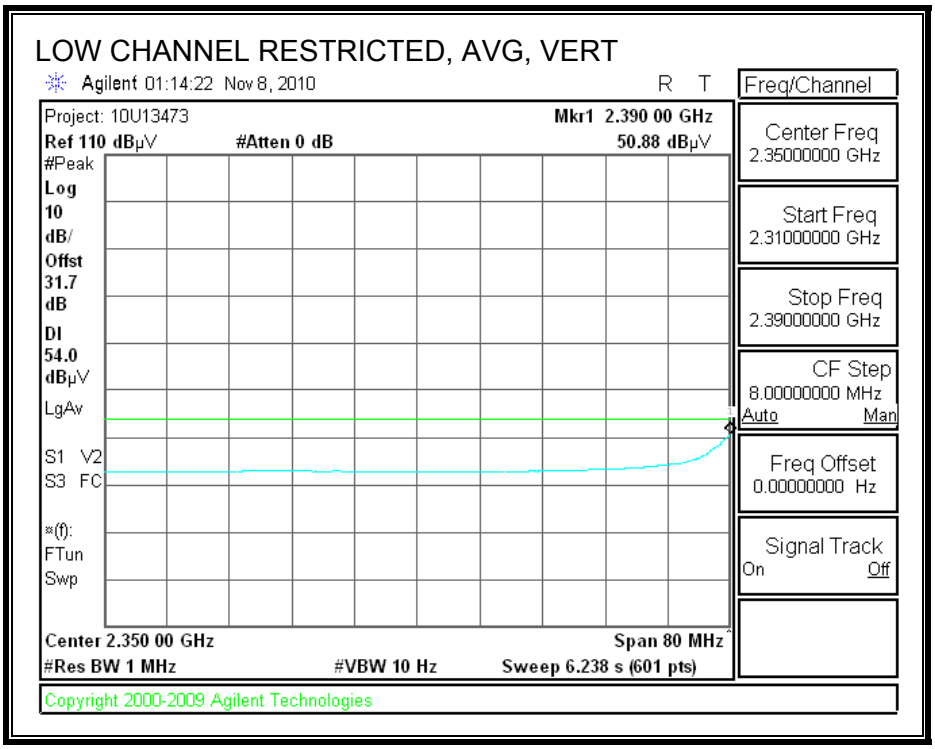
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



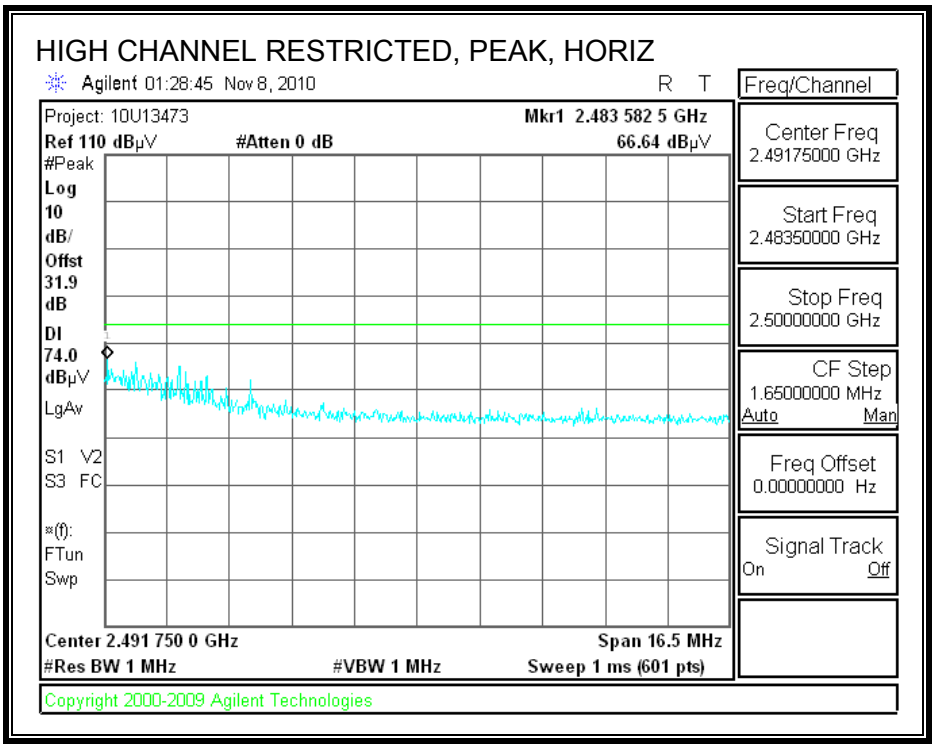


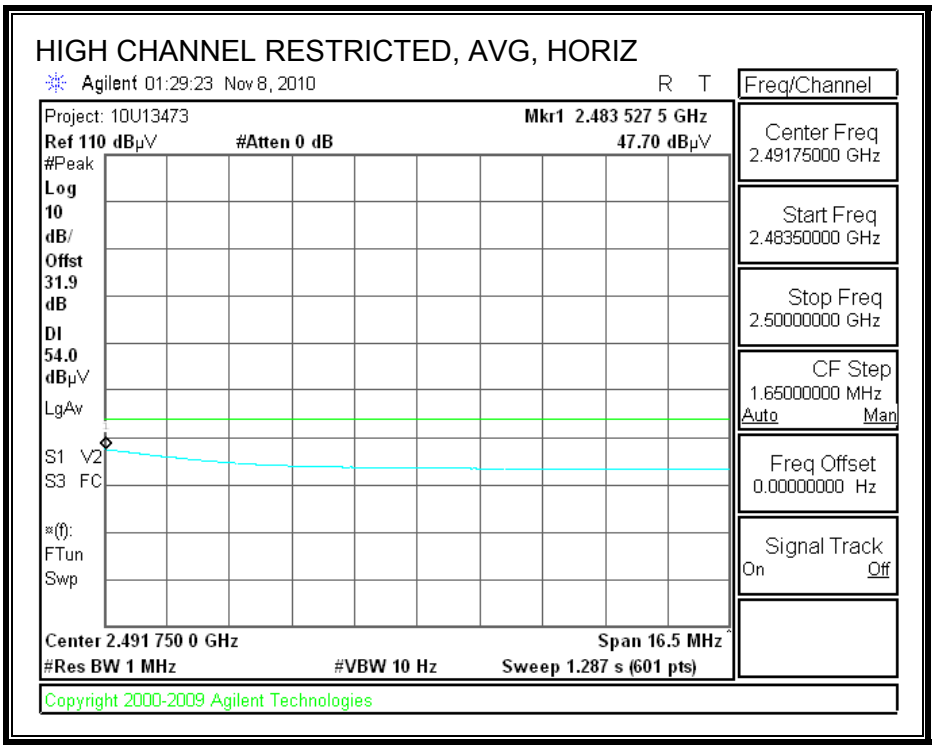
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



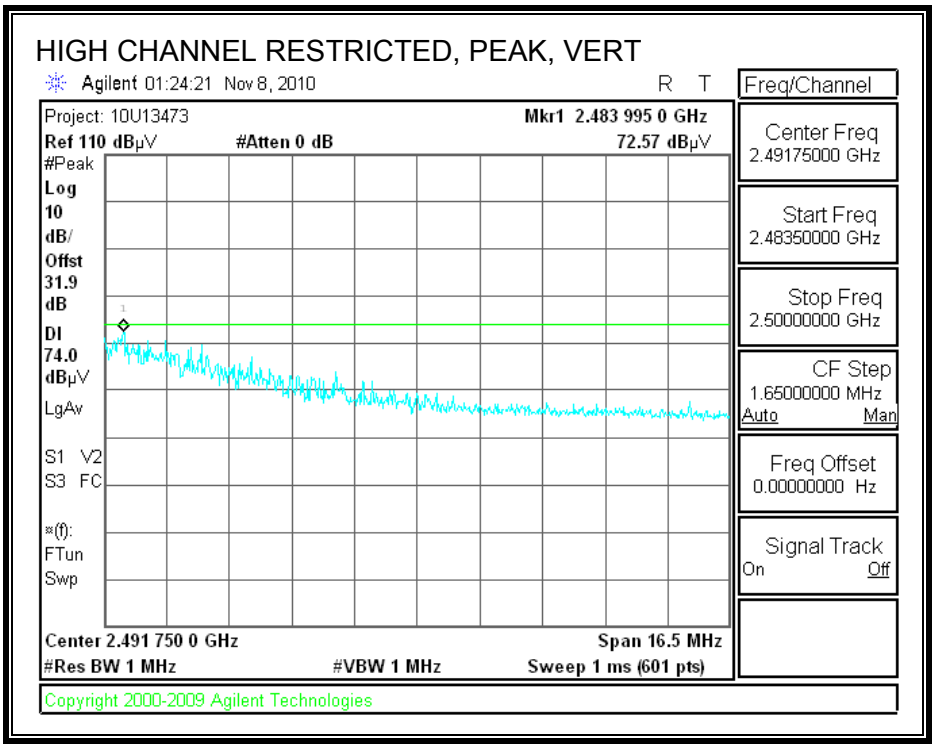


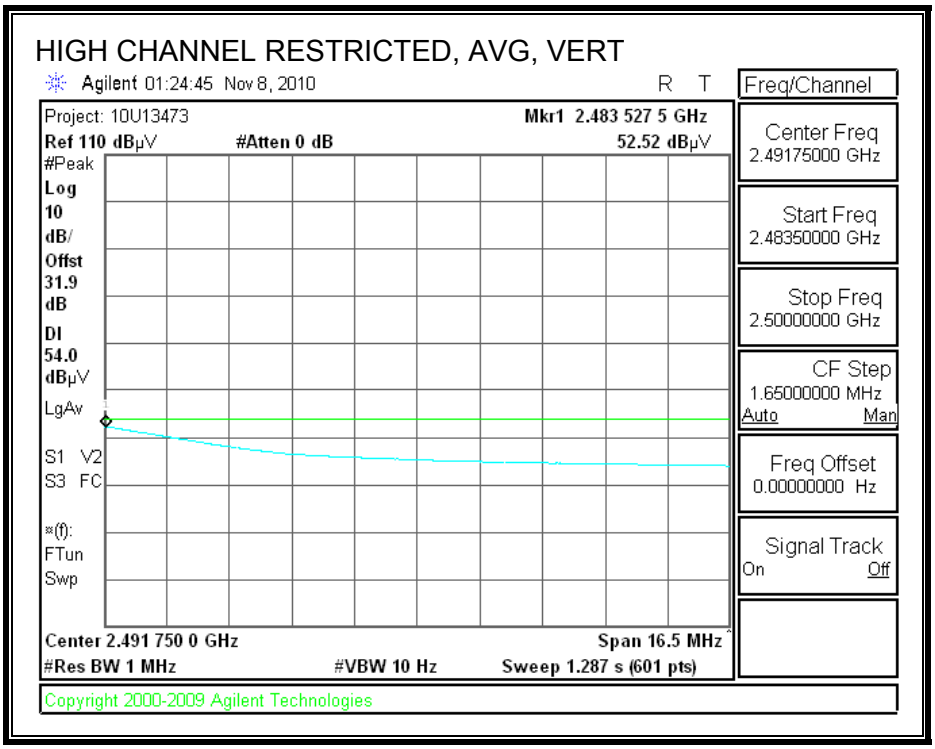
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Tom Chen
Date: 11/09/10
Project #: 10U13473
Test Target: FCC Class B
Mode Oper: 802.11n MCS0 TX mode

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

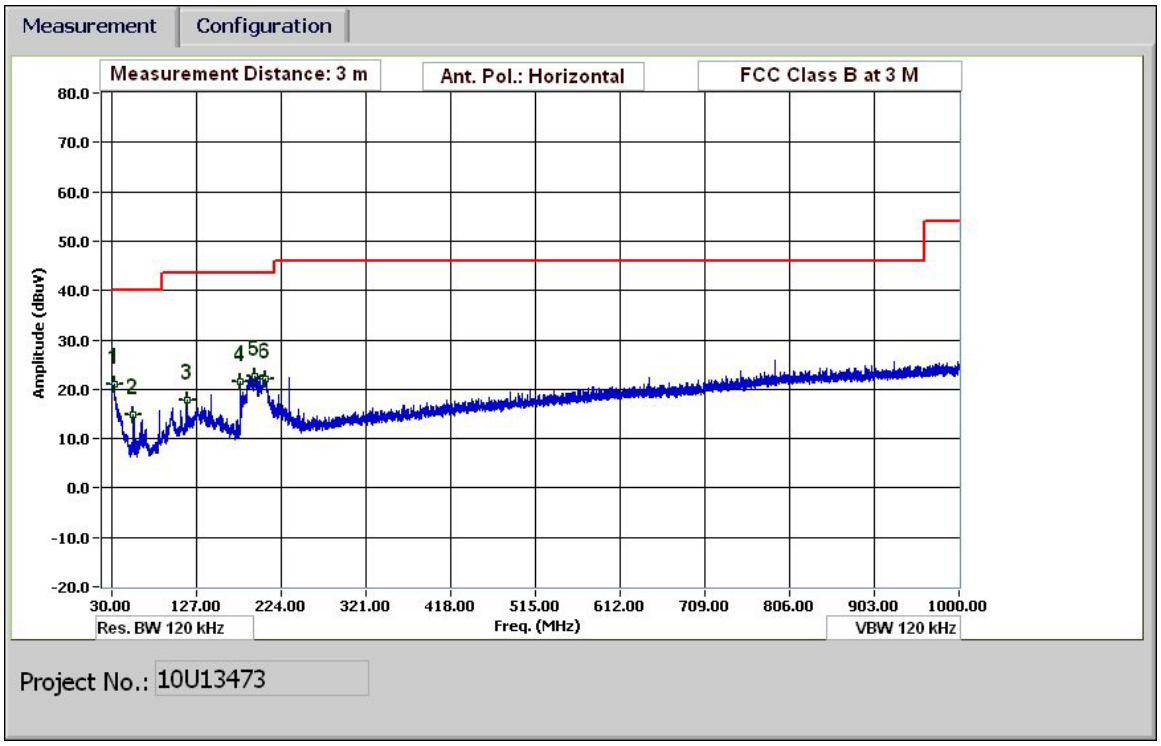
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
2412 MHz Low CH													
4.824	3.0	39.2	32.8	5.8	-34.8	0.0	0.0	42.9	74.0	-31.1	H	P	n mode
4.824	3.0	26.4	32.8	5.8	-34.8	0.0	0.0	30.1	54.0	-23.9	H	A	n mode
7.236	3.0	37.4	35.1	7.2	-34.7	0.0	0.0	45.0	74.0	-29.0	H	P	n mode
7.236	3.0	25.0	35.1	7.2	-34.7	0.0	0.0	32.7	54.0	-21.3	H	A	n mode
2412 MHz Low CH													
4.824	3.0	42.2	32.8	5.8	-34.8	0.0	0.0	45.9	74.0	-28.1	V	P	n mode
4.824	3.0	29.2	32.8	5.8	-34.8	0.0	0.0	32.9	54.0	-21.1	V	A	n mode
7.236	3.0	37.0	35.1	7.2	-34.7	0.0	0.0	44.6	74.0	-29.4	V	P	n mode
7.236	3.0	24.9	35.1	7.2	-34.7	0.0	0.0	32.5	54.0	-21.5	V	A	n mode
2437 MHz Mid CH													
4.874	3.0	41.1	32.8	5.8	-34.9	0.0	0.0	44.8	74.0	-29.2	V	P	n mode
4.874	3.0	28.6	32.8	5.8	-34.9	0.0	0.0	32.4	54.0	-21.6	V	A	n mode
7.311	3.0	40.2	35.2	7.3	-34.7	0.0	0.0	48.0	74.0	-26.0	V	P	n mode
7.311	3.0	27.2	35.2	7.3	-34.7	0.0	0.0	35.0	54.0	-19.0	V	A	n mode
2437 MHz Mid CH													
4.874	3.0	38.3	32.8	5.8	-34.9	0.0	0.0	42.1	74.0	-31.9	H	P	n mode
4.874	3.0	25.4	32.8	5.8	-34.9	0.0	0.0	29.2	54.0	-24.8	H	A	n mode
7.311	3.0	39.6	35.2	7.3	-34.7	0.0	0.0	47.4	74.0	-26.6	H	P	n mode
7.311	3.0	26.2	35.2	7.3	-34.7	0.0	0.0	34.0	54.0	-20.0	H	A	n mode
2462 MHz High CH													
4.924	3.0	37.5	32.8	5.9	-34.9	0.0	0.0	41.4	74.0	-32.6	H	P	n mode
4.924	3.0	25.5	32.8	5.9	-34.9	0.0	0.0	29.3	54.0	-24.7	H	A	n mode
7.386	3.0	37.0	35.3	7.3	-34.6	0.0	0.0	44.9	74.0	-29.1	H	P	n mode
7.386	3.0	24.8	35.3	7.3	-34.6	0.0	0.0	32.8	54.0	-21.2	H	A	n mode
2462 MHz High CH													
4.924	3.0	38.3	32.8	5.9	-34.9	0.0	0.0	42.1	74.0	-31.9	V	P	n mode
4.924	3.0	26.2	32.8	5.9	-34.9	0.0	0.0	30.1	54.0	-23.9	V	A	n mode
7.386	3.0	37.4	35.3	7.3	-34.6	0.0	0.0	45.4	74.0	-28.6	V	P	n mode
7.386	3.0	25.1	35.3	7.3	-34.6	0.0	0.0	33.1	54.0	-20.9	V	A	n mode

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

8.3. WORST-CASE BELOW 1 GHz

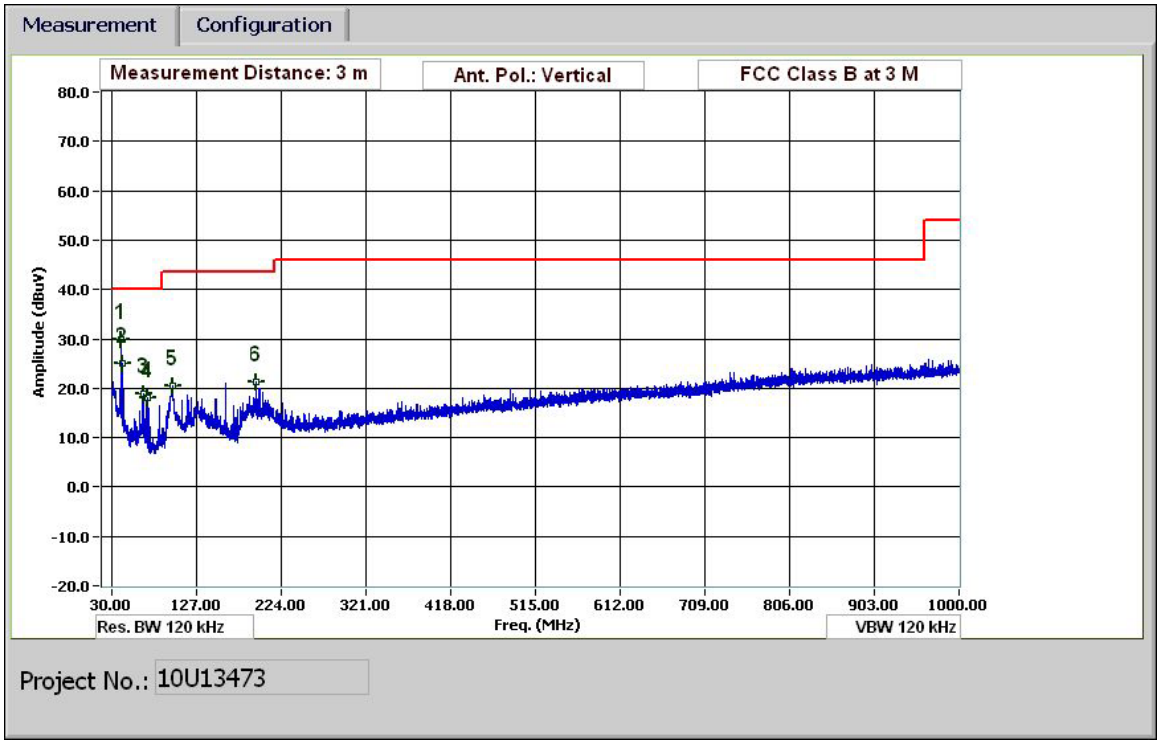
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



VERTICAL DATA

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

Test Engr: Tom Chen
Date: 11/15/10
Project #: 10U13473
Test Target: FCC Class B
Mode Oper: TX mode, worst case (SEMCO)

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	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Horizontal													
32.64	3.0	31.0	19.1	0.5	29.7	0.0	0.0	21.0	40.0	-19.0	H	P	
54.961	3.0	35.9	7.9	0.6	29.6	0.0	0.0	14.9	40.0	-25.1	H	P	
115.924	3.0	33.4	13.0	1.0	29.5	0.0	0.0	17.9	43.5	-25.6	H	P	
177.726	3.0	39.0	10.4	1.2	29.1	0.0	0.0	21.5	43.5	-22.0	H	P	
193.927	3.0	38.8	11.5	1.2	29.0	0.0	0.0	22.6	43.5	-20.9	H	P	
206.407	3.0	37.8	12.0	1.3	28.9	0.0	0.0	22.2	43.5	-21.3	H	P	
Vertical													
40.68	3.0	45.4	13.7	0.6	29.6	0.0	0.0	29.9	40.0	-10.1	V	P	
42.12	3.0	41.3	12.8	0.6	29.6	0.0	0.0	25.0	40.0	-15.0	V	P	
66.602	3.0	39.6	8.1	0.7	29.6	0.0	0.0	18.8	40.0	-21.2	V	P	
70.442	3.0	38.7	8.2	0.7	29.6	0.0	0.0	18.1	40.0	-21.9	V	P	
99.843	3.0	39.2	10.0	0.9	29.5	0.0	0.0	20.6	43.5	-22.9	V	P	
195.367	3.0	37.4	11.6	1.3	28.9	0.0	0.0	21.3	43.5	-22.2	V	P	

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)

RSS-Gen 7.2.2

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

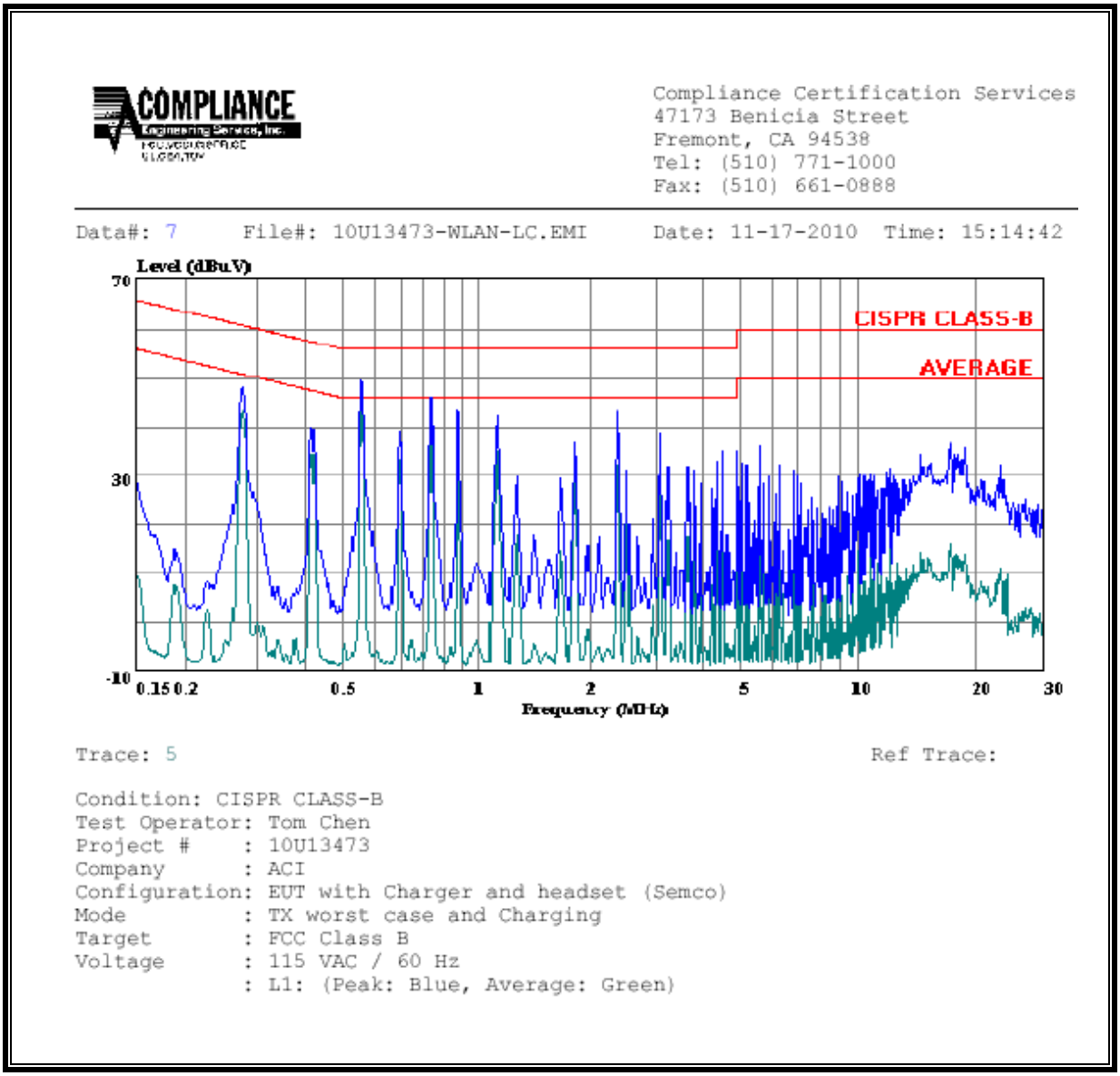
ANSI C63.4

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
0.28	48.13	--	43.35	0.00	60.91	50.91	-12.78	-7.56	L1
0.56	49.70	--	44.74	0.00	56.00	46.00	-6.30	-1.26	L1
0.84	46.21	--	41.07	0.00	56.00	46.00	-9.79	-4.93	L1
0.28	42.97	--	36.41	0.00	60.94	50.94	-17.97	-14.53	L2
0.56	42.43	--	37.67	0.00	56.00	46.00	-13.57	-8.33	L2
0.84	39.70	--	34.50	0.00	56.00	46.00	-16.30	-11.50	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS