



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

WIFI MODULE

MODEL NUMBER: DWM-W051

FCC ID: EW4DWMW051

IC: 420A-DWMW051

REPORT NUMBER: 12J14449-1, Revision A

ISSUE DATE: JULY 05, 2012

Prepared for
**MITSUMI ELECTRIC CO., LTD.
1601, SAKAI, ASUGI-SHI,
KANAGAWA, 243-8533 JAPAN**

Prepared by
**COMPLIANCE CERTIFICATION SERVICES (UL CCS)
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/05/2012	Initial Issue	T. Chan
A	07/10/2012	Revised Output Power Procedure on section 7.1.3, 7.2.3, and 7.3.3	T. Chan

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: WIFI MODULE

MODEL: DWM-W051

SERIAL NUMBER: 40F407309D81

DATE TESTED: JUNE 14 TO JUNE 29, 2012

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	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.

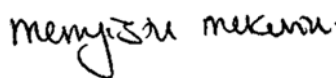
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this 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:

Tested By:



THU CHAN
EMC SUPERVISOR
UL CCS



MENGISTU MEKURIA
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, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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 WiFi Module with 802.11bgn(HT20).

The radio module is manufactured by Mitsumi Electric Co., Ltd.

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	19.49	88.92
2412 - 2462	802.11g	24.14	259.42
2412 - 2462	802.11n HT20	23.25	211.35

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for TX/RX diversity, with a maximum peak gain of 2.05dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT test utility software installed in the host computer during testing was Broadcom test program BCM43362SDGN6L version 5.90.153.37 WLTEST.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this 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.

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

To determine the worst-position of highest emissions, the EUT's antenna was investigated for X, Y, Z positions, and the worst position was turned out to be a Y-position with long ends at left side.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude E6400	19728586900	N/A
AC Adapter	Dell	FA90PE1-00	CN-0CM889-73245-91F-4706-A00	DoC
Adapter Board	Mitsumi	DWM-W051	N/A	N/A

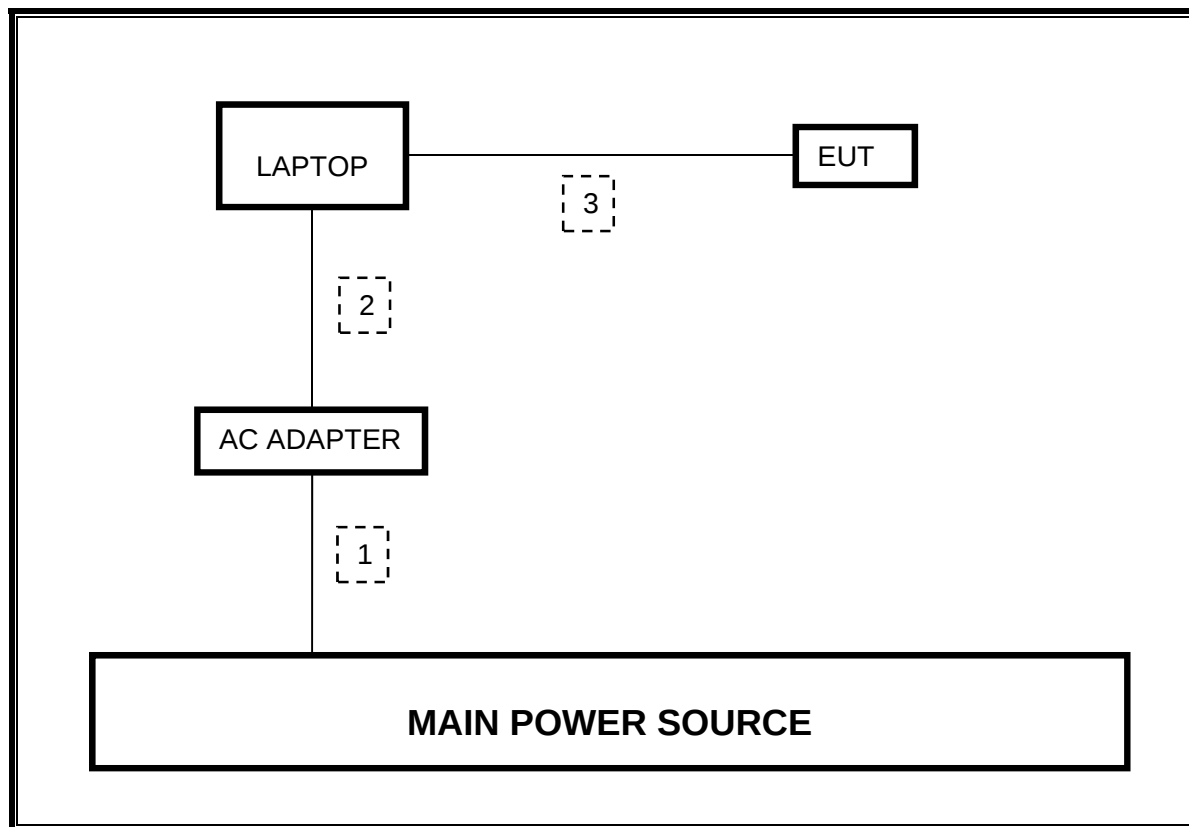
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	3-Pong AC	Un-Shielded	2.0m	N/A
2	DC	1	DC	Un-Shielded	2.0m	Ferrite Core one End
3	Data	1	20 Pins	Un-Shielded	0.2m	Ribbon Cable

TEST SETUP

The EUT is connected to the host laptop computer via ribbon cable and test jig board during the tests. 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	C01179	2013/2/16
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	2013/3/22
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	2013/5/11
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	2013/8/19
Power Meter	Agilent / HP	437B	N/A	2012/7/29
Power Sensor, 18 GHz	Agilent / HP	8481A	N/A	08/04/12
Preamp, 1000MHz	Sonoma	310N	N02891	2013/2/21
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	2012/7/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	2012/7/12
Antenna, Horn, 18 GHz	EMCO	3115	C00945	2012/10/6
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	2013/3/23
LISN, 30 MHz	FCC	50/250-25-2	C00626	2012/12/13
LISN, 10 kHz ~ 30 MHz	Solar	012-50-R-24-BN	N02481	2013/3/7
Horn Antenna, 26 GHz	ARA	MVH-1826/B	C00589	201/7/28

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.

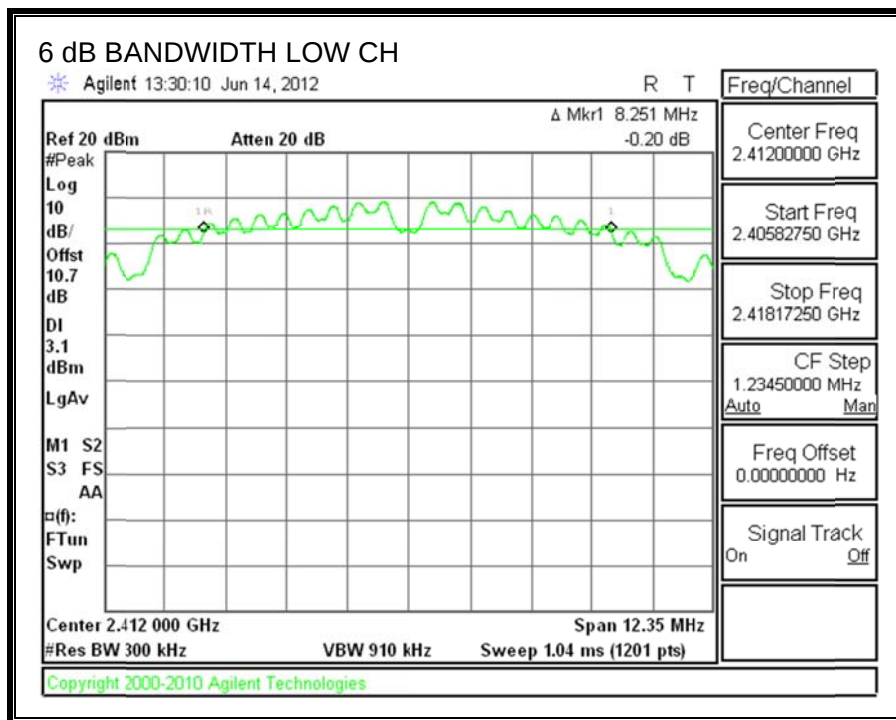
TEST PROCEDURE

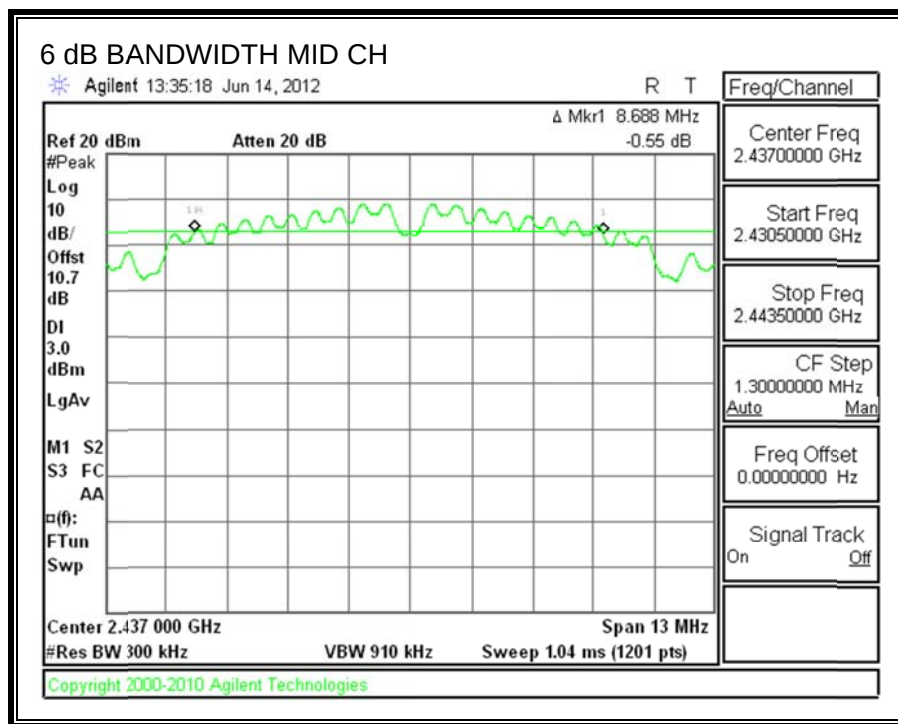
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

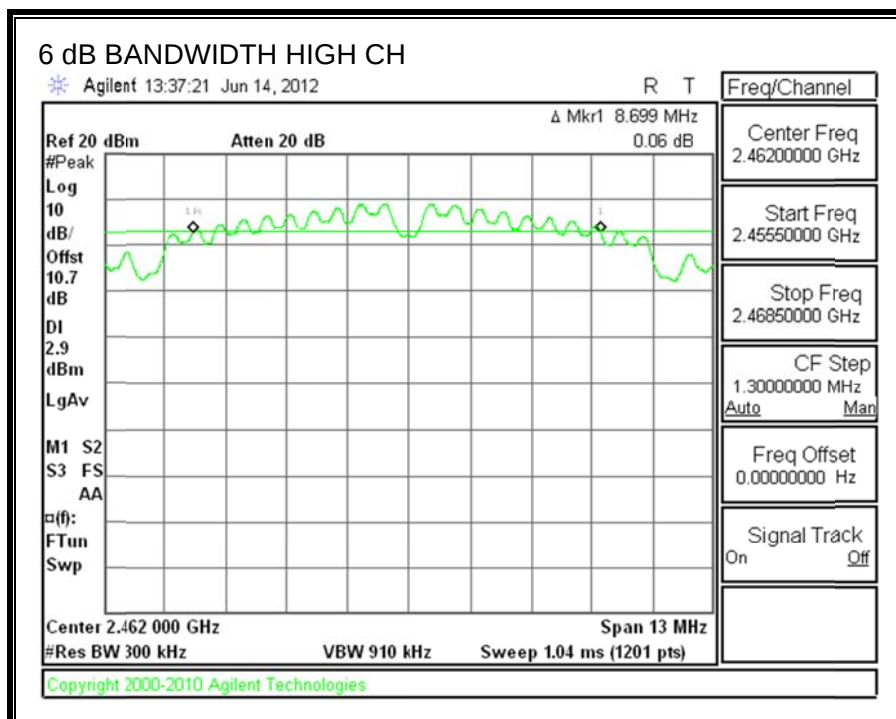
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.2510	0.5
Middle	2437	8.6880	0.5
High	2462	8.6990	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

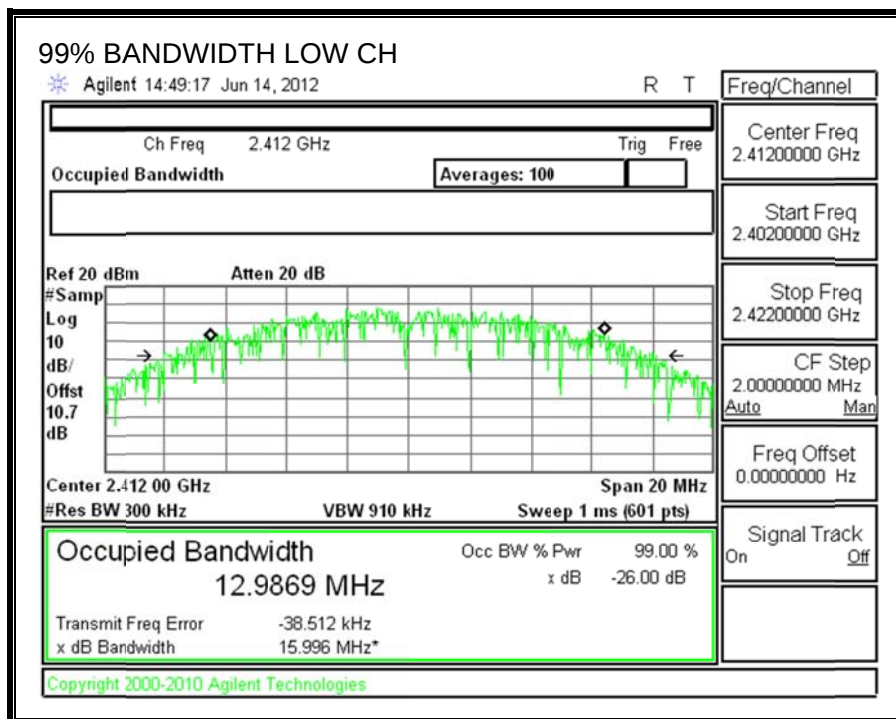
TEST PROCEDURE

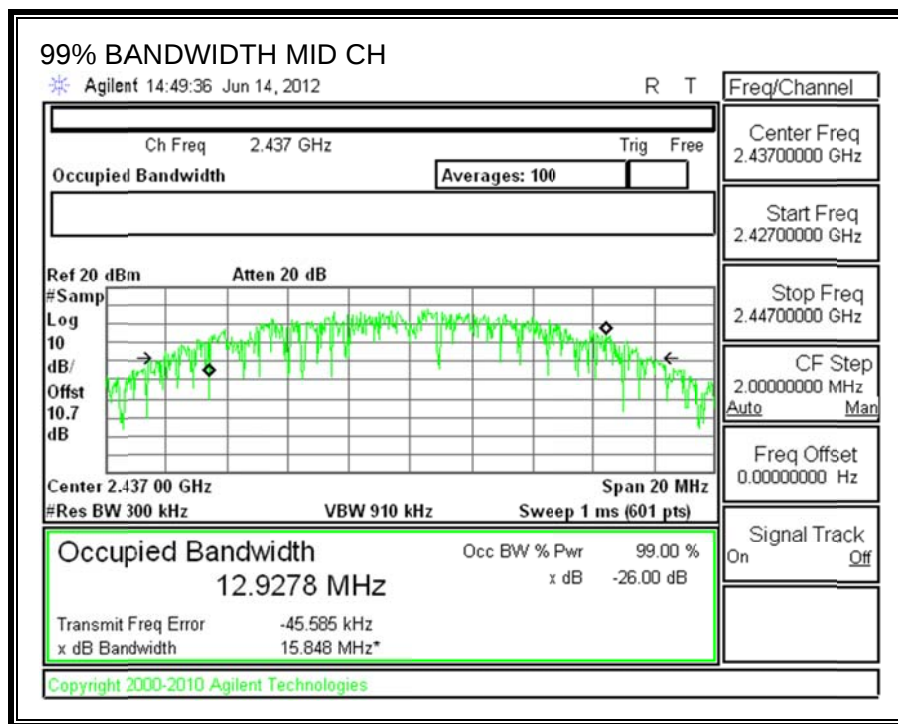
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

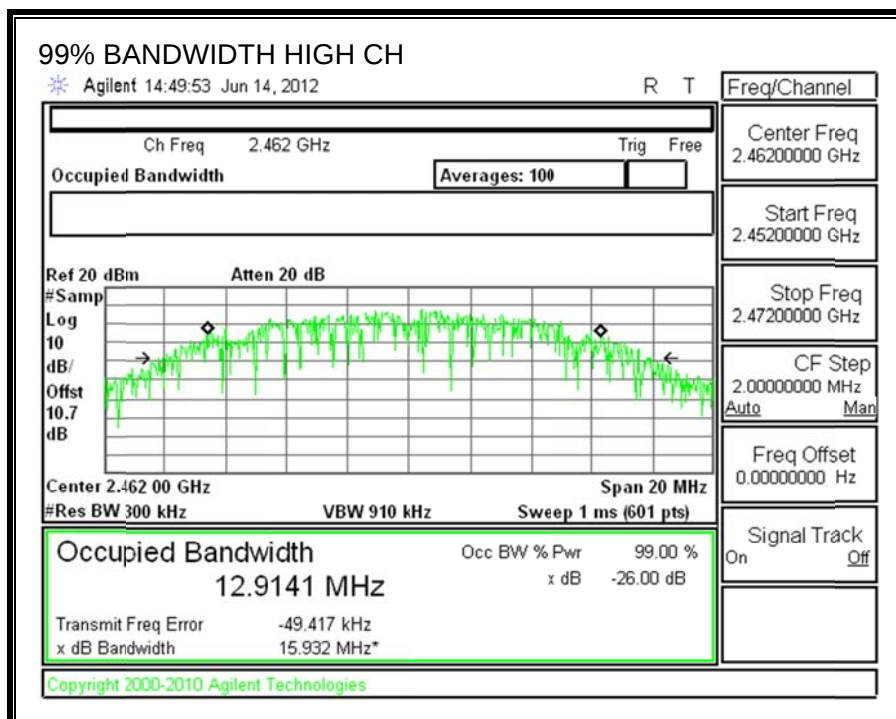
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	12.9869
Middle	2437	12.9278
High	2462	12.9141

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.

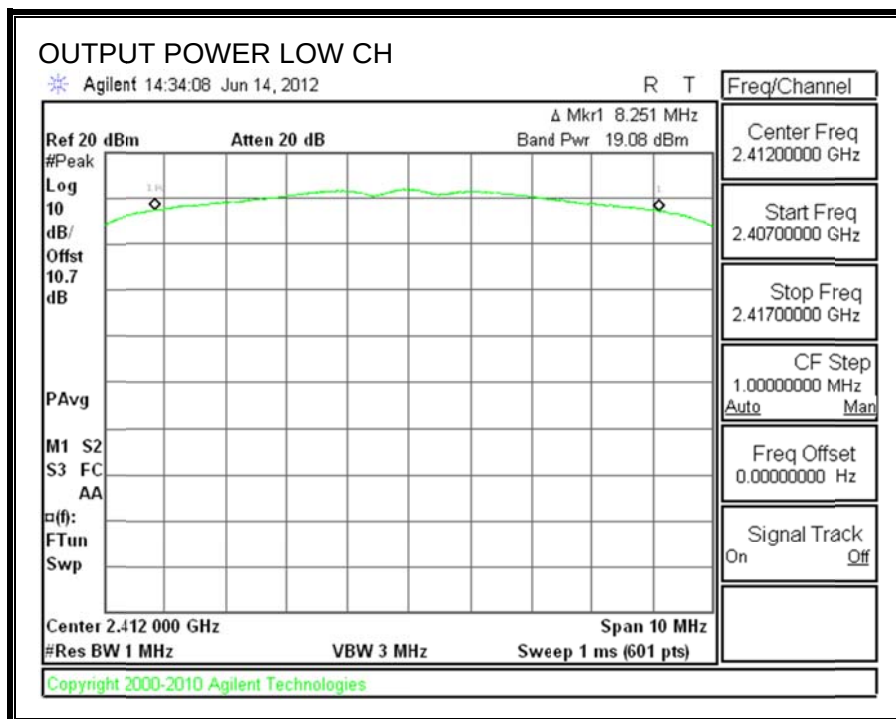
TEST PROCEDURE

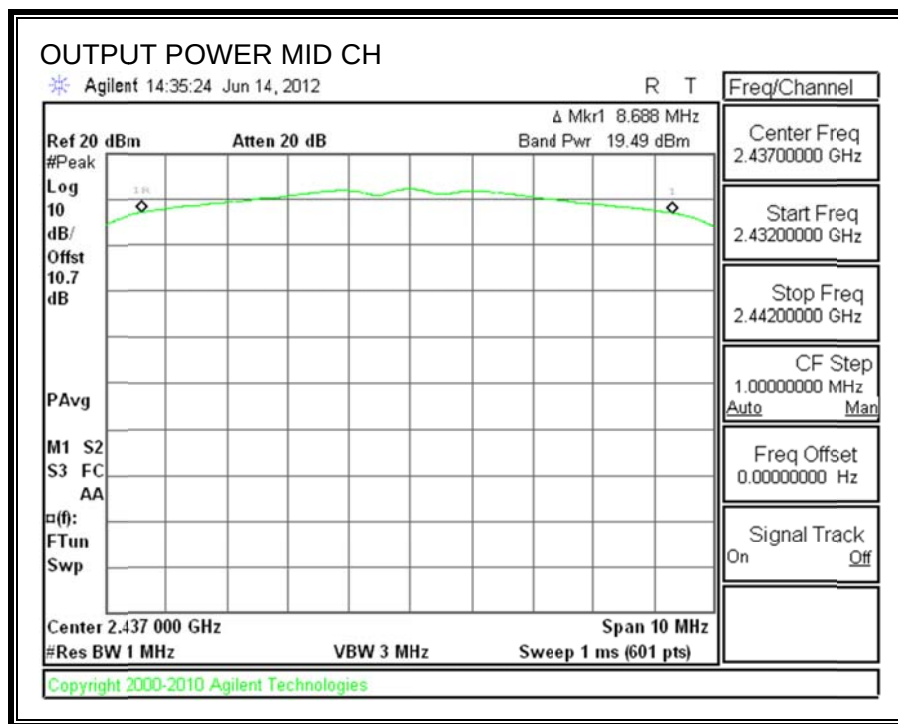
KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

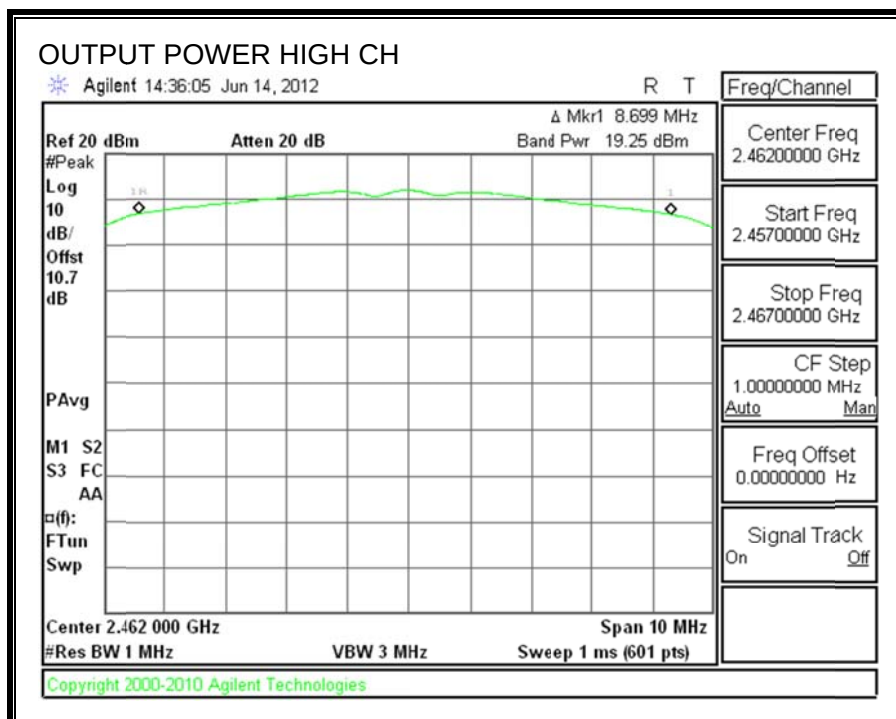
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.080	30	-10.920
Middle	2437	19.490	30	-10.510
High	2462	19.250	30	-10.750

OUTPUT POWER







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 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2412	15.81
Middle	2437	15.71
High	2462	15.81

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

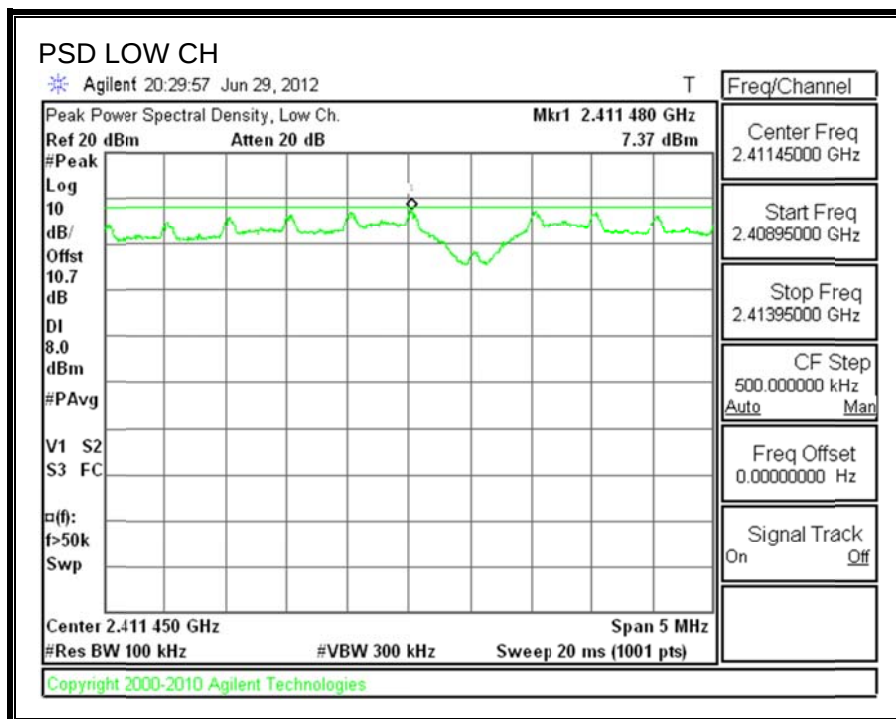
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

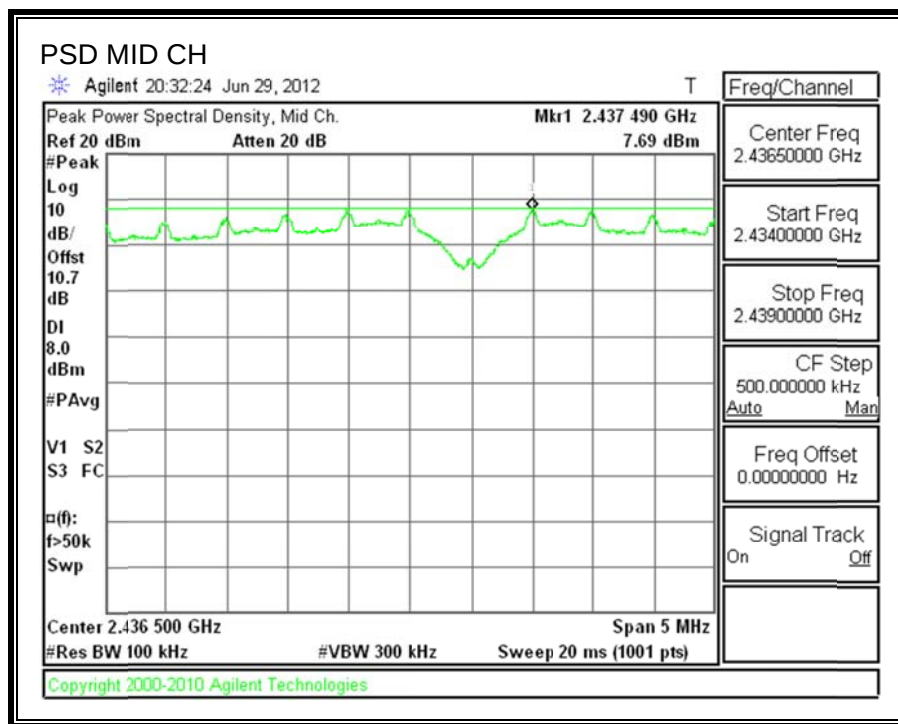
RESULTS

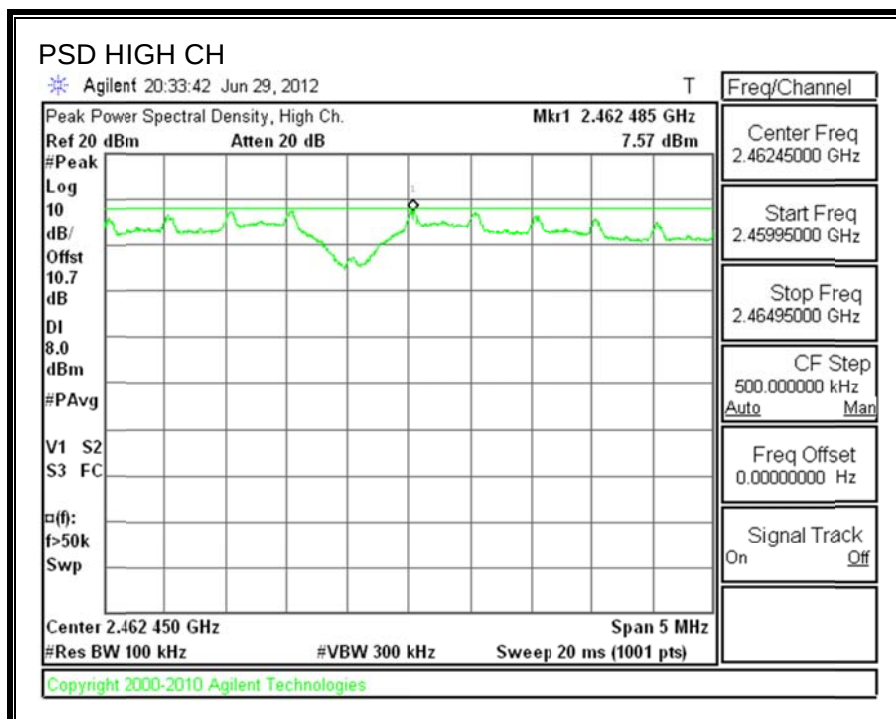
Channel	Frequency (MHz)	PSD/100kHz (dBm)	PSD/3kHz (dBm)	Limit (dBm)	Margin (dB)
Low	2412	7.37	-7.83	8	-15.83
Middle	2437	7.69	-7.51	8	-15.51
High	2462	7.57	-7.63	8	-15.63

Note: Conversion factor to an equivalent value in 3 kHz for comparison to the limit is;
 $10\log(3\text{kHz}/100\text{kHz}) = -15.2\text{dB}$

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.

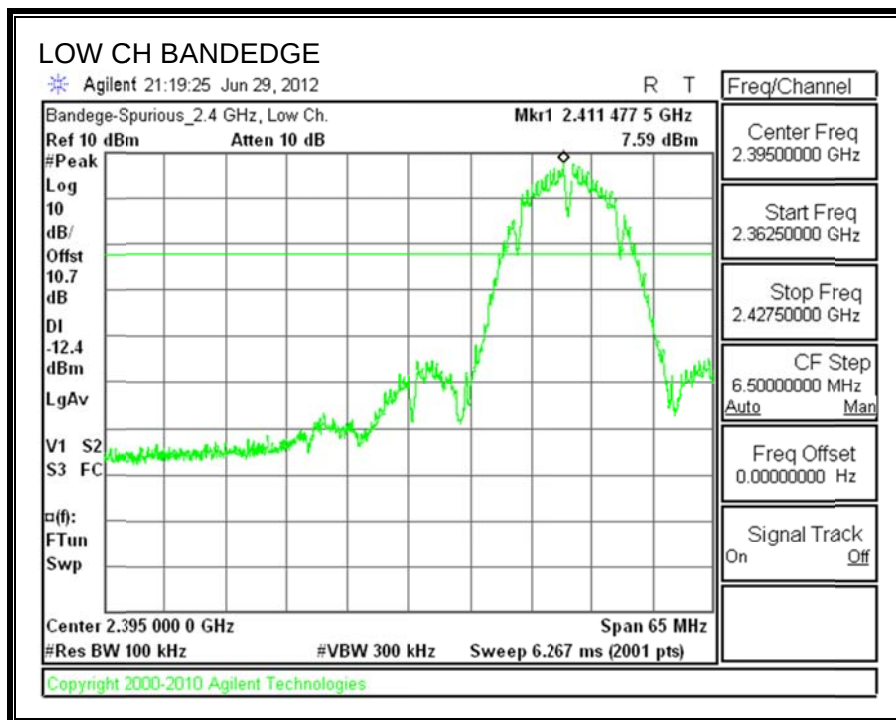
TEST PROCEDURE

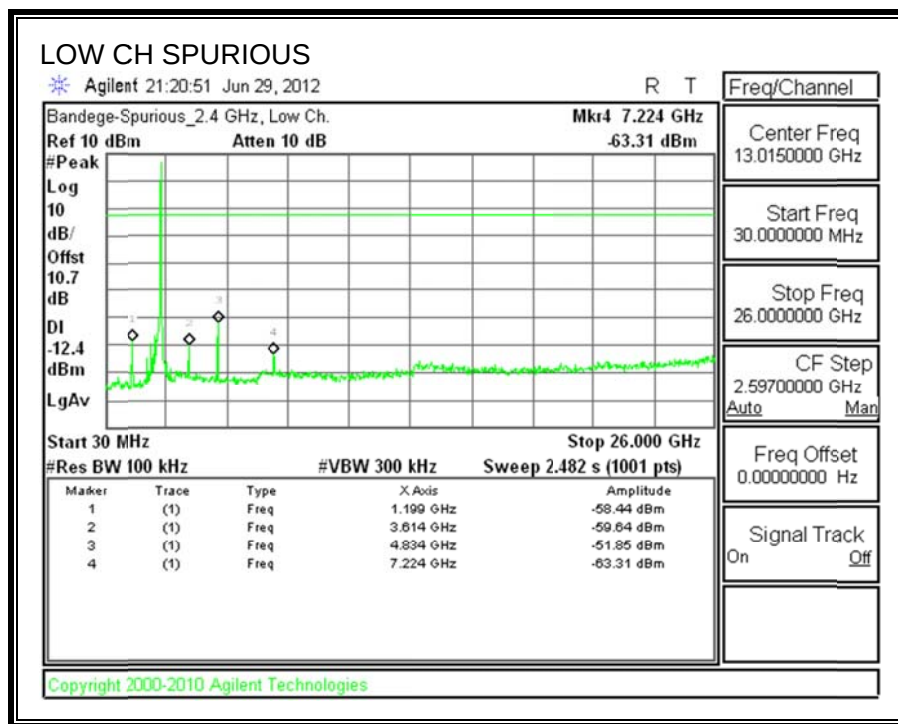
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

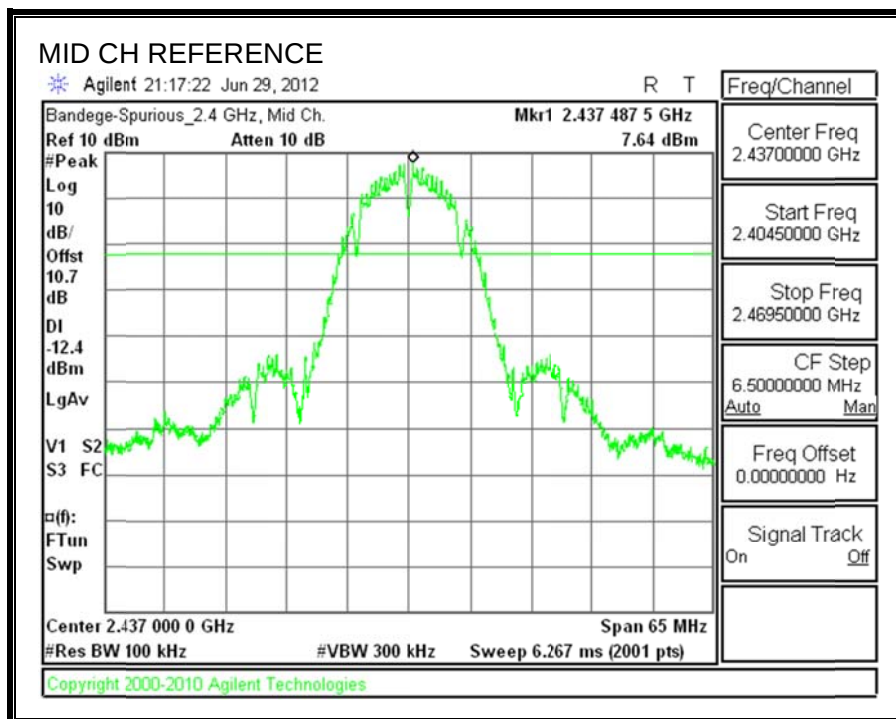
RESULTS

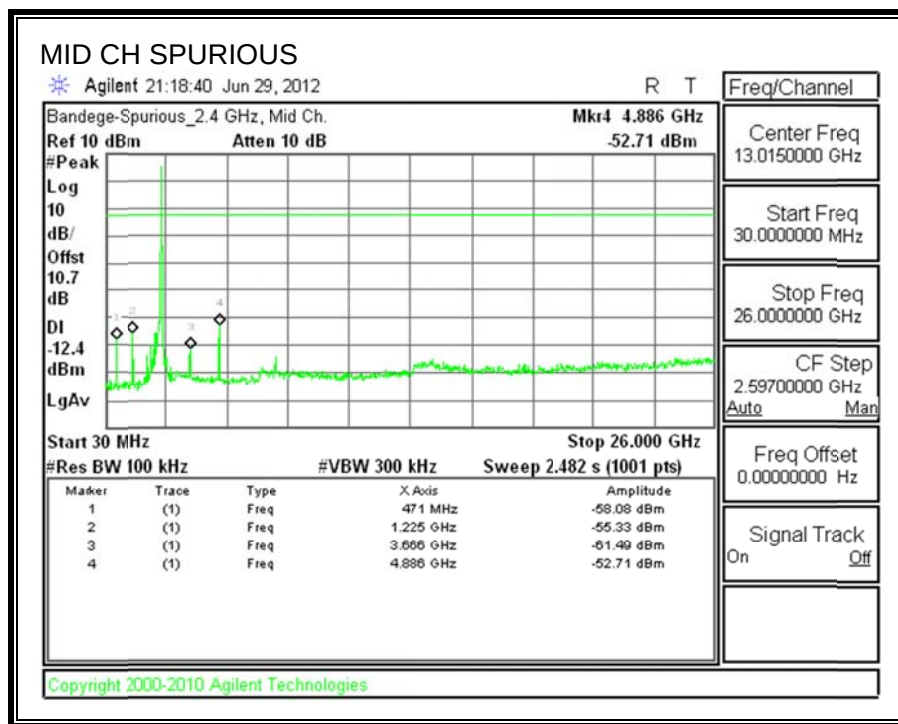
SPURIOUS EMISSIONS, LOW CHANNEL



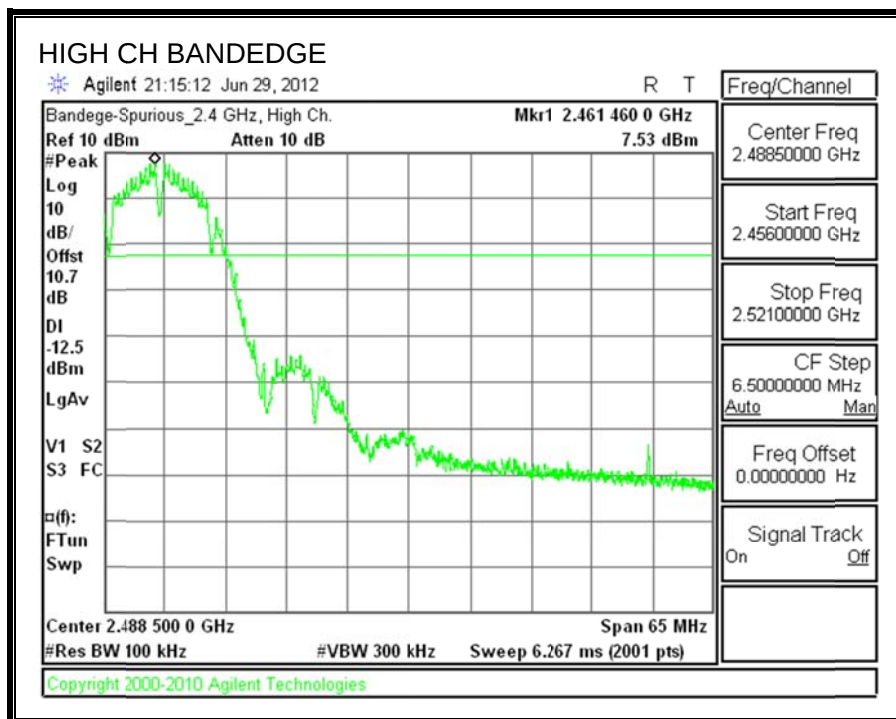


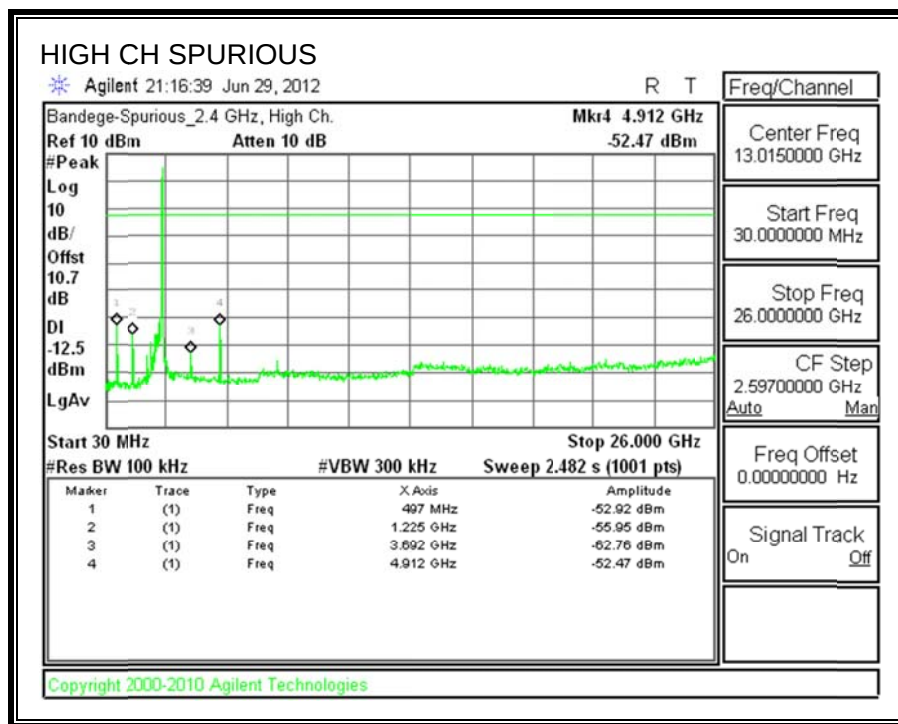
SPURIOUS EMISSIONS, MID CHANNEL





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.

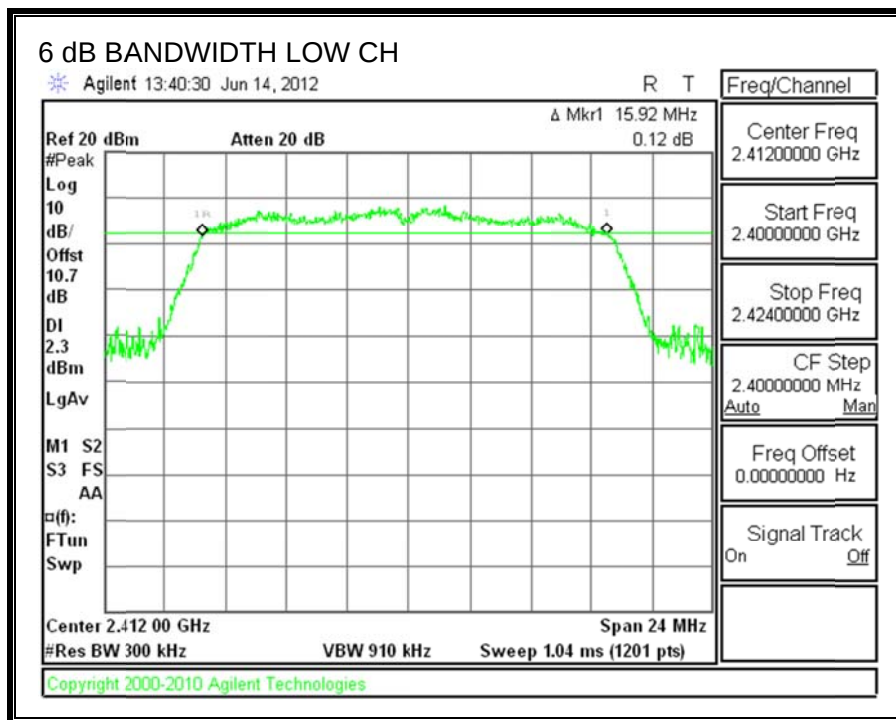
TEST PROCEDURE

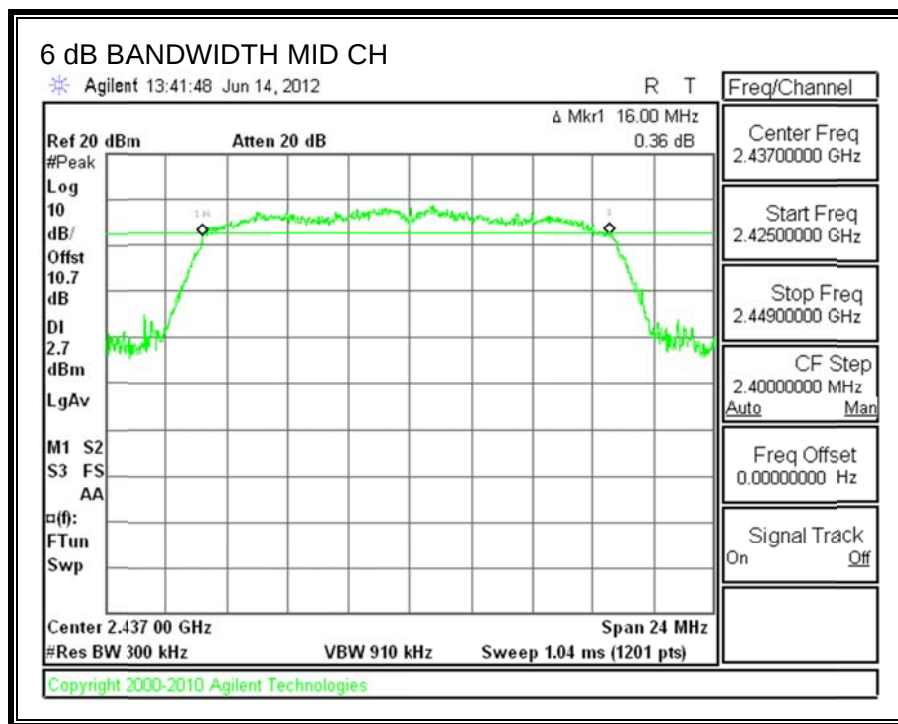
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

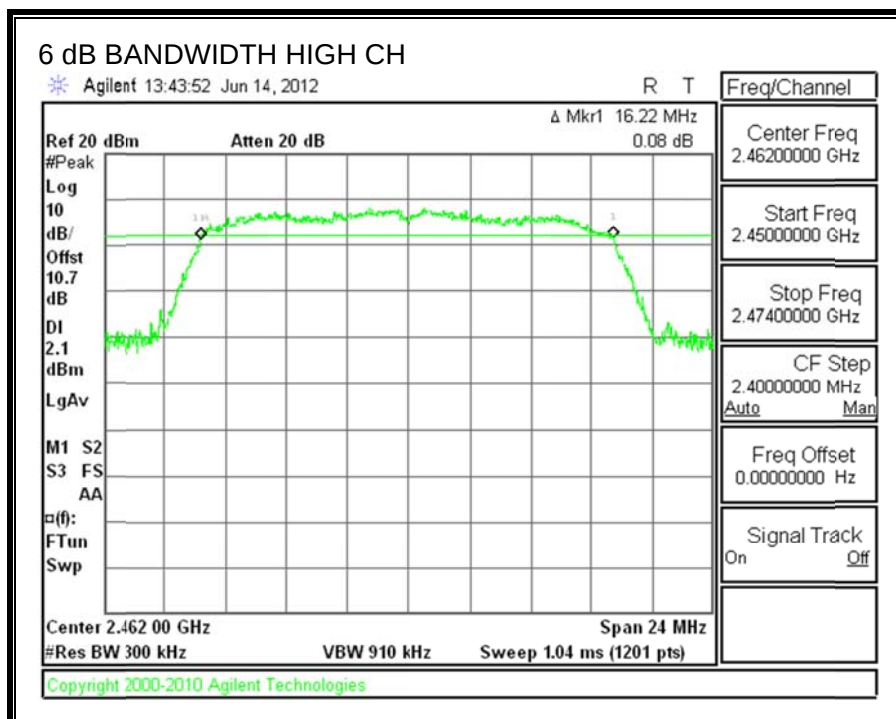
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.9200	0.5
Middle	2437	16.0000	0.5
High	2462	16.2200	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

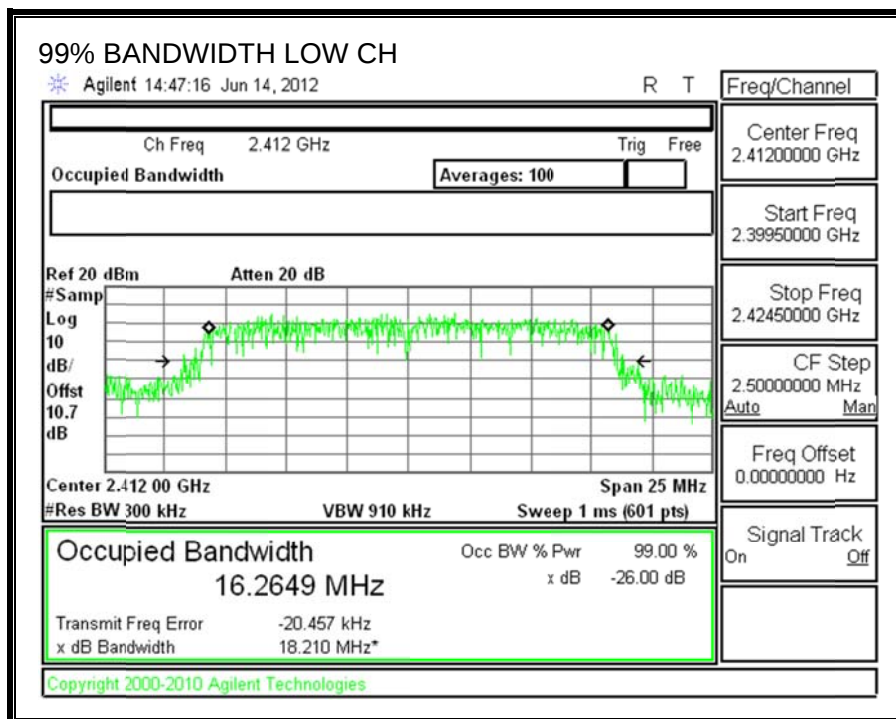
TEST PROCEDURE

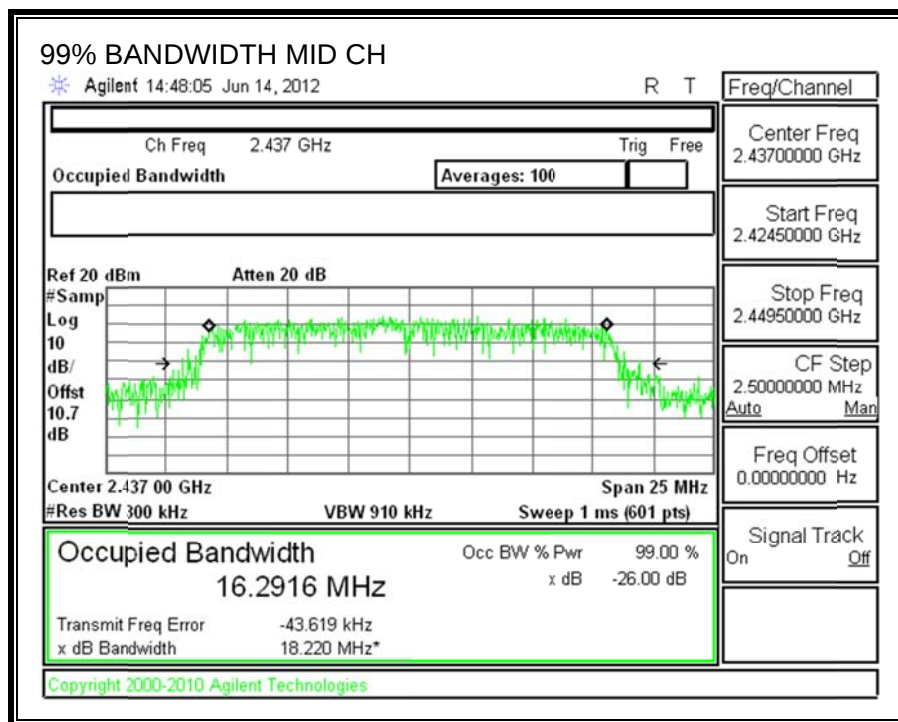
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

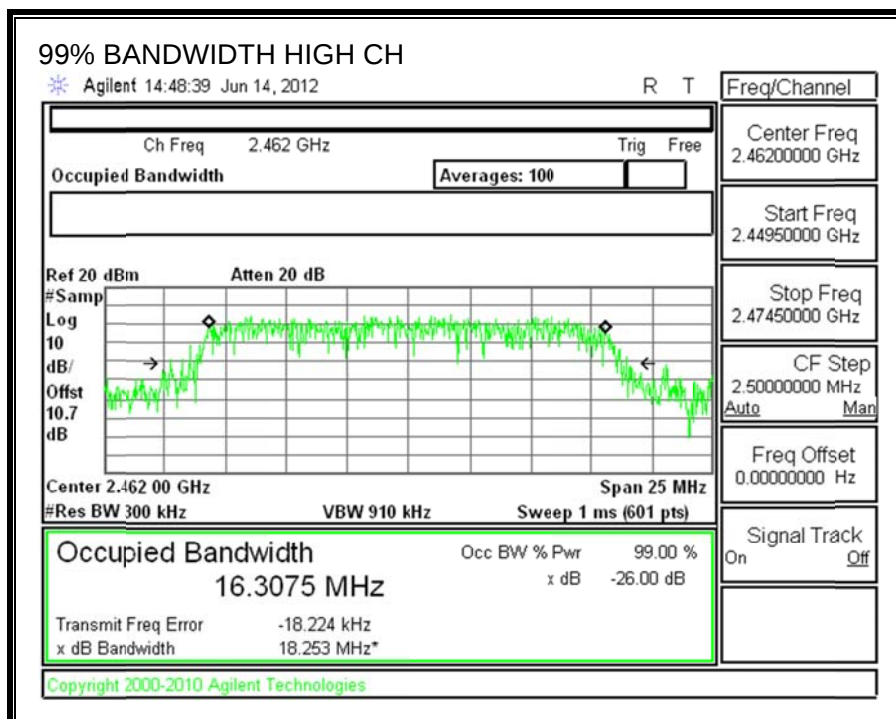
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.2649
Middle	2437	16.2916
High	2462	16.3075

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.

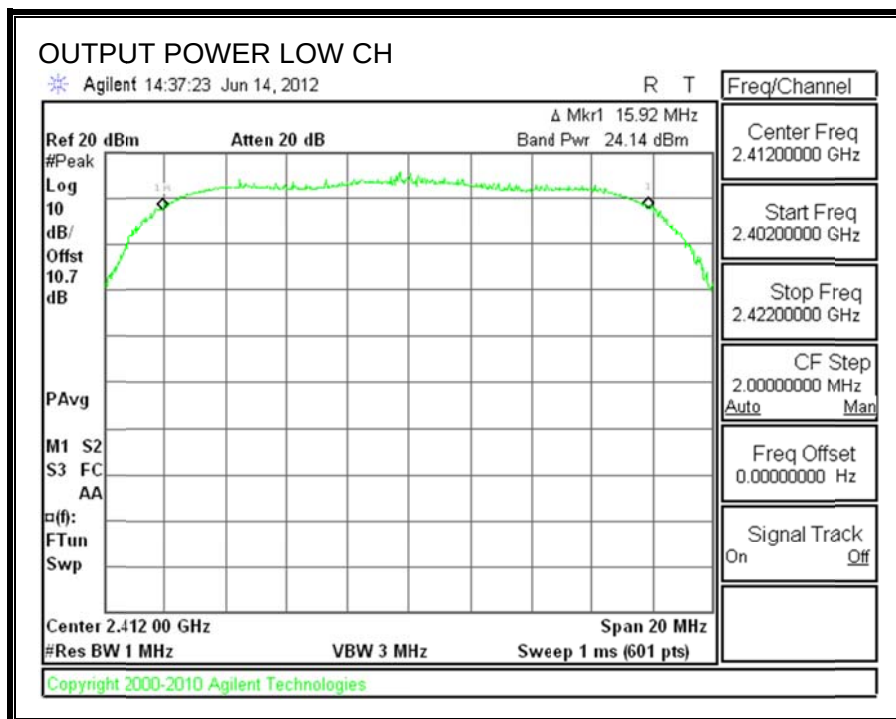
TEST PROCEDURE

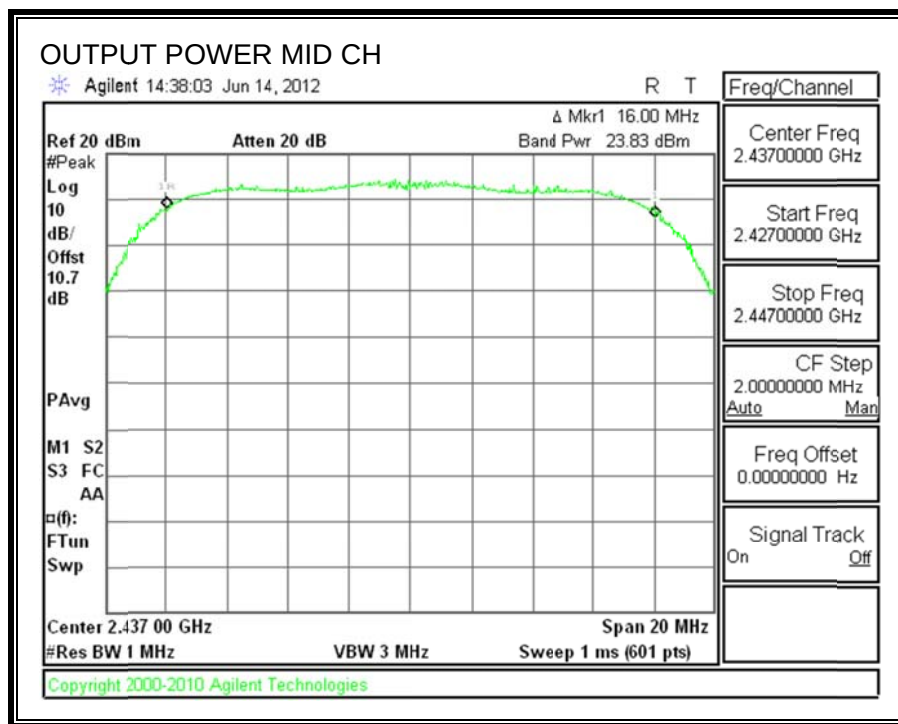
KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

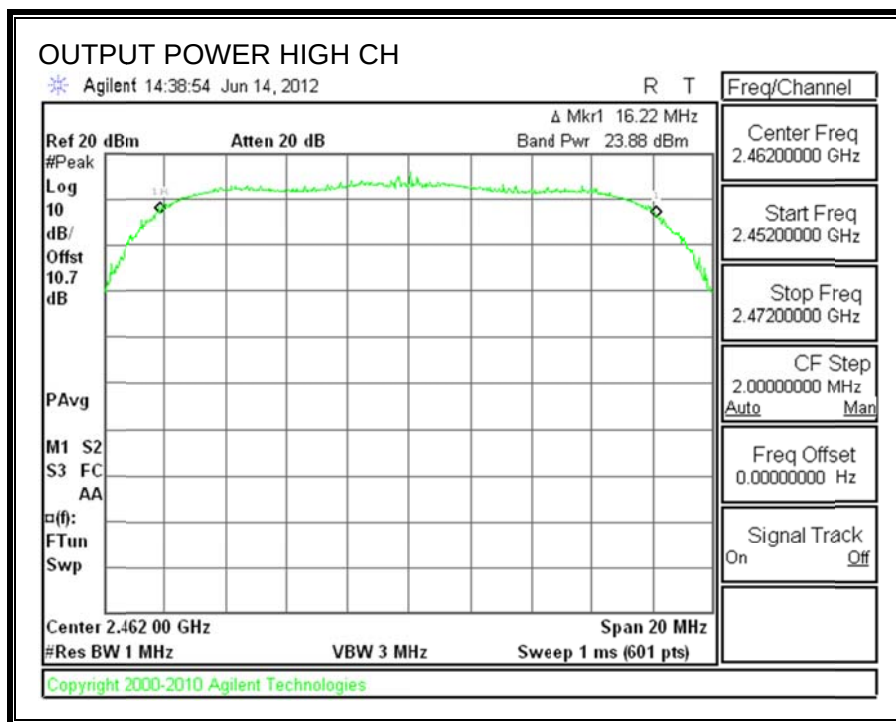
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	24.14	30	-5.86
Middle	2437	23.83	30	-6.17
High	2462	23.88	30	-6.12

OUTPUT POWER







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 10.7 dB (including 10 dB pad and 0.7 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	15.04
Middle	2437	14.97
High	2462	14.96

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

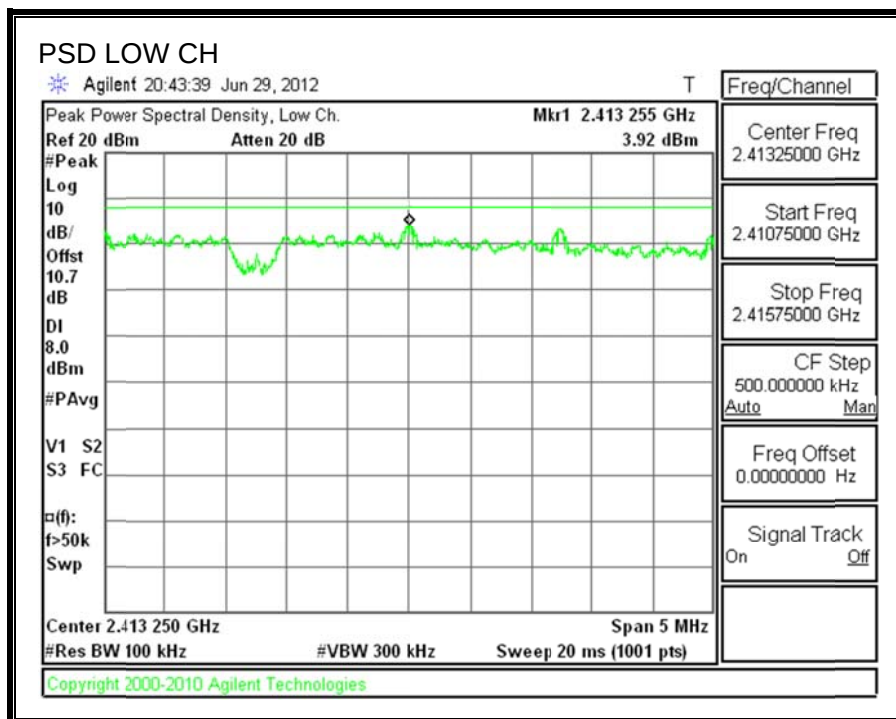
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

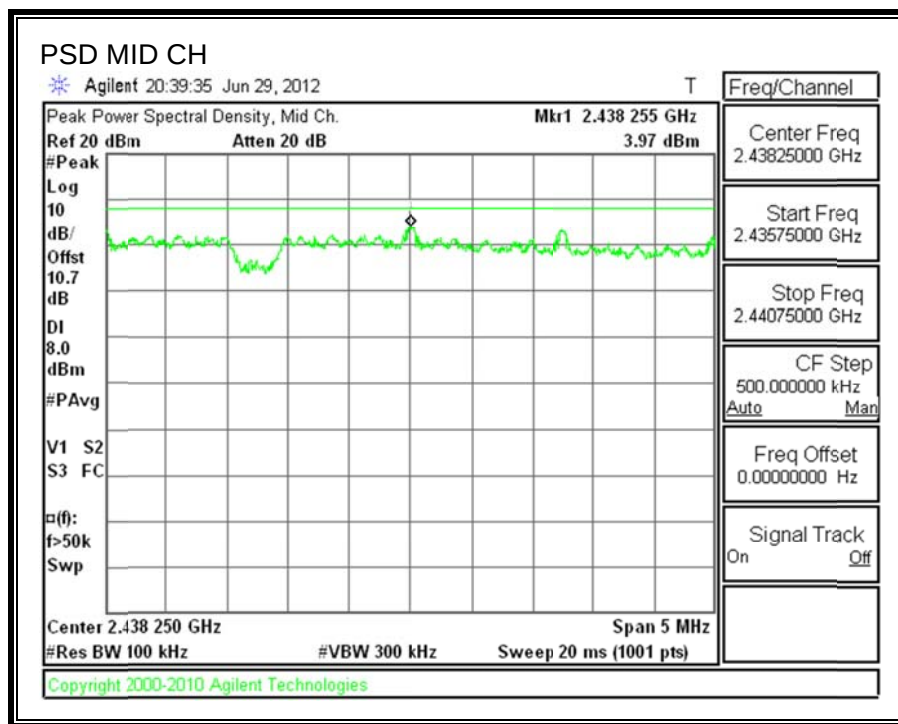
RESULTS

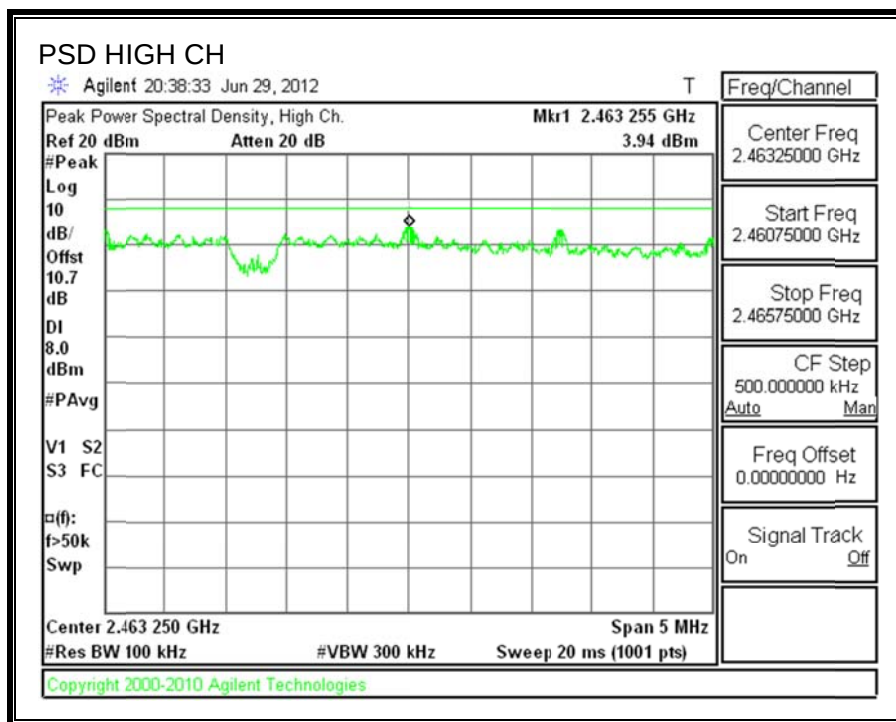
Channel	Frequency (MHz)	PSD/100kHz (dBm)	PSD/3kHz (dBm)	Limit (dBm)	Margin (dB)
Low	2412	3.92	-11.28	8	-19.28
Middle	2437	3.97	-11.23	8	-19.23
High	2462	3.94	-11.26	8	-19.26

Note: Conversion factor to an equivalent value in 3 kHz for comparison to the limit is;
 $10\log(3\text{kHz}/100\text{kHz}) = -15.2\text{dB}$

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.

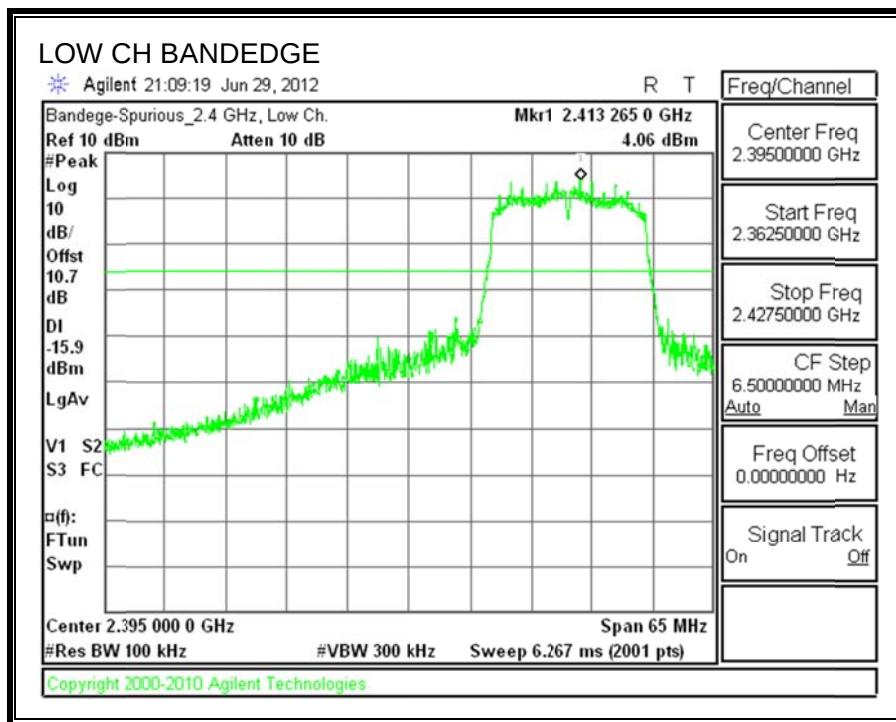
TEST PROCEDURE

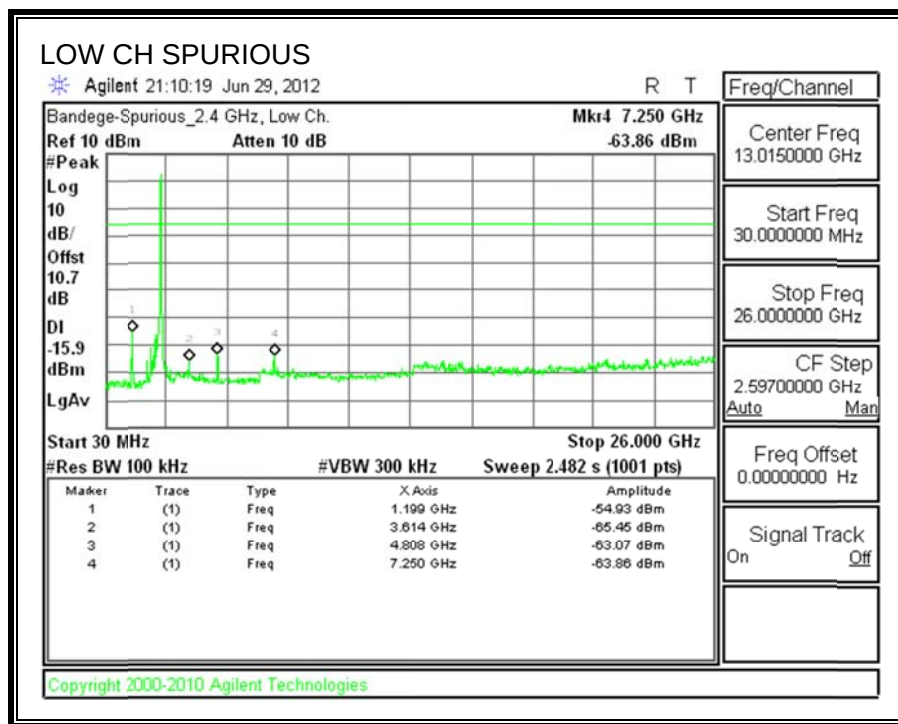
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

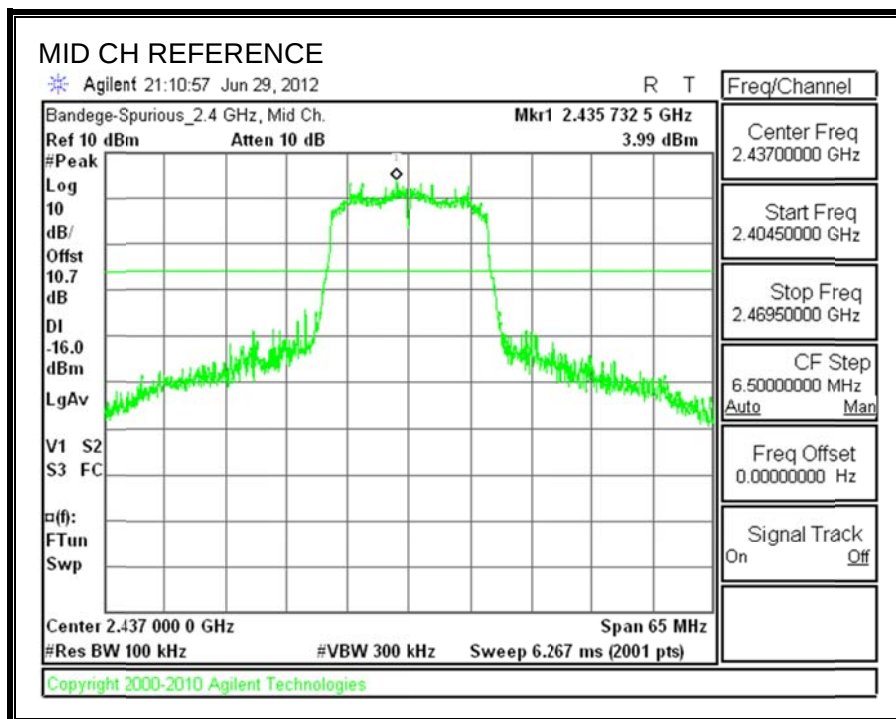
RESULTS

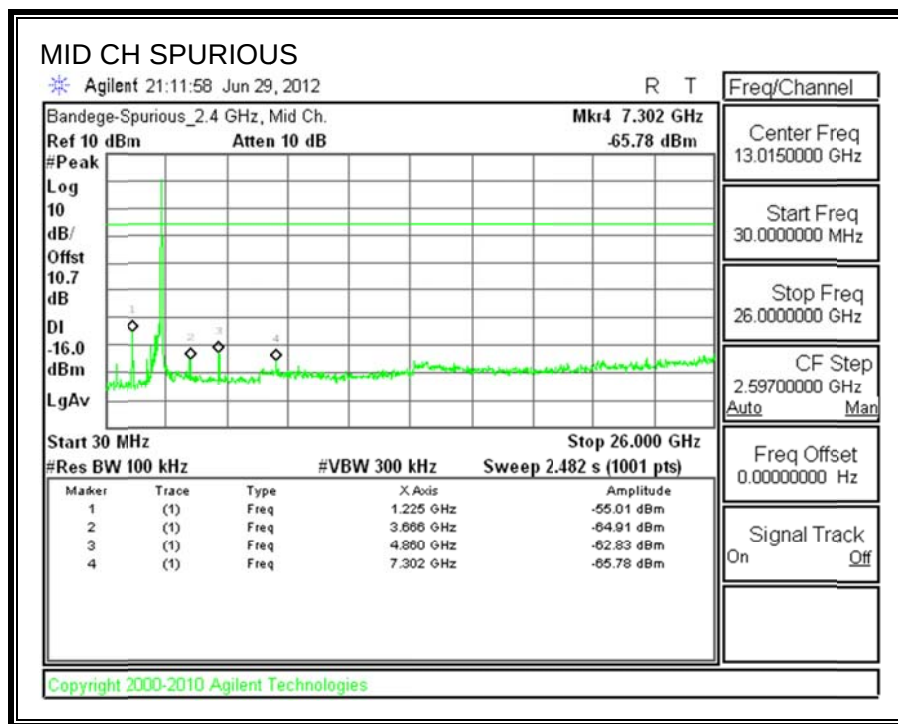
SPURIOUS EMISSIONS, LOW CHANNEL



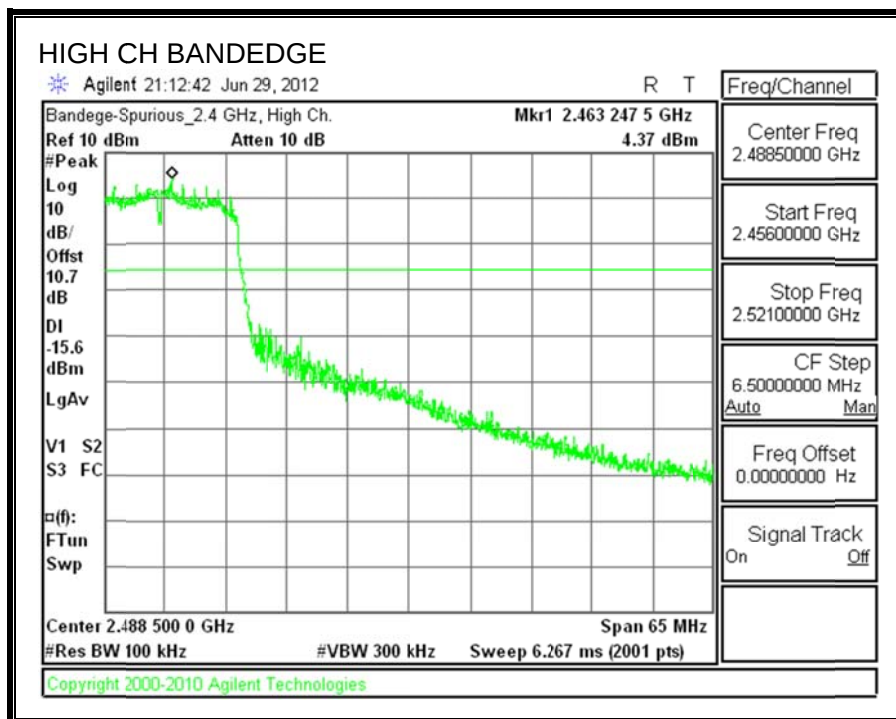


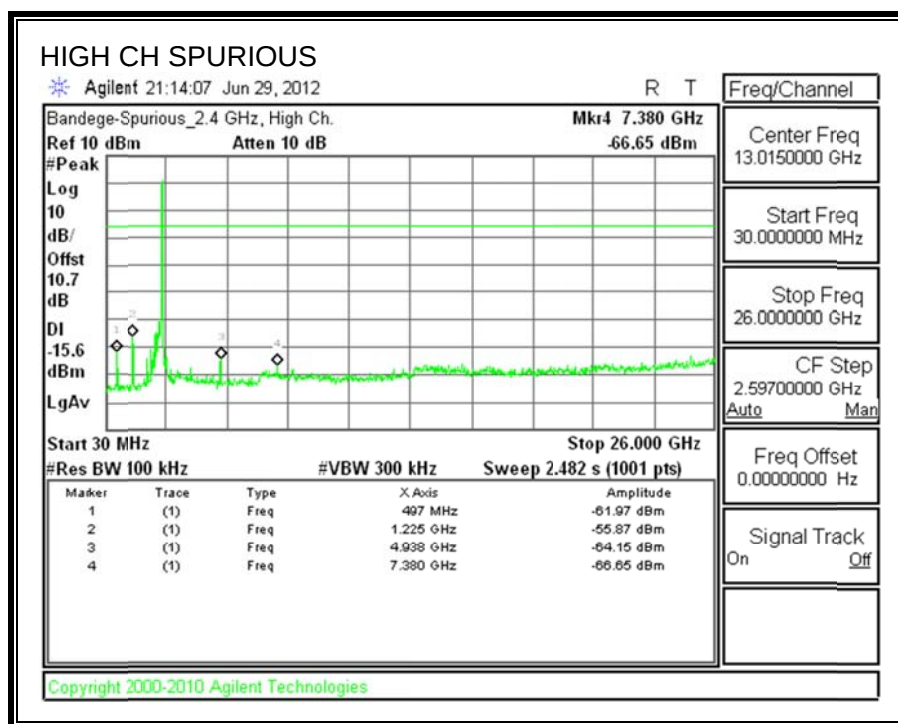
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





7.3. 802.11n HT20 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.

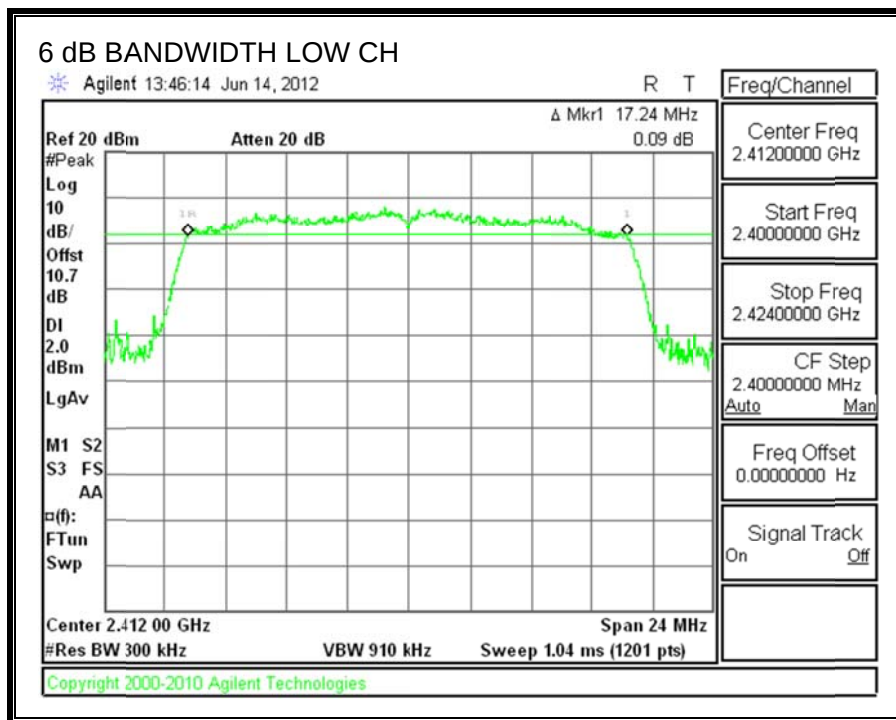
TEST PROCEDURE

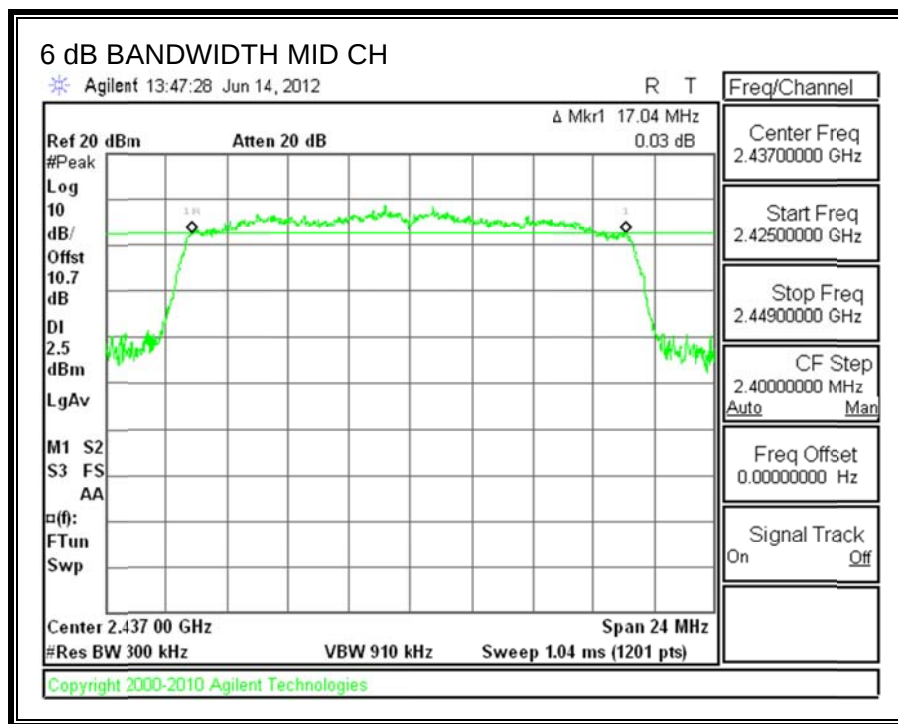
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

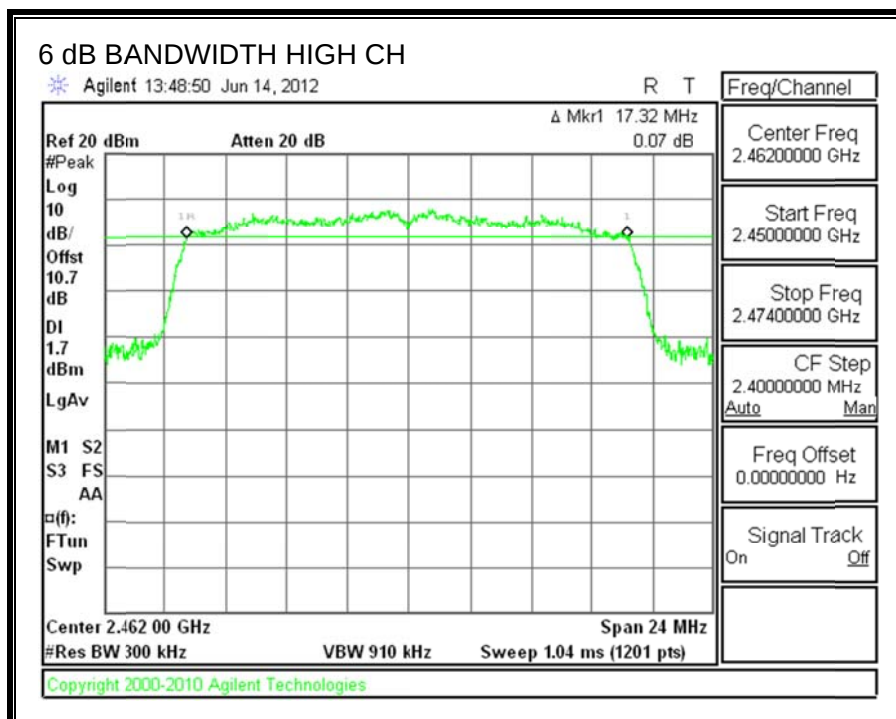
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	17.2400	0.5
Middle	2437	17.0400	0.5
High	2462	17.3200	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

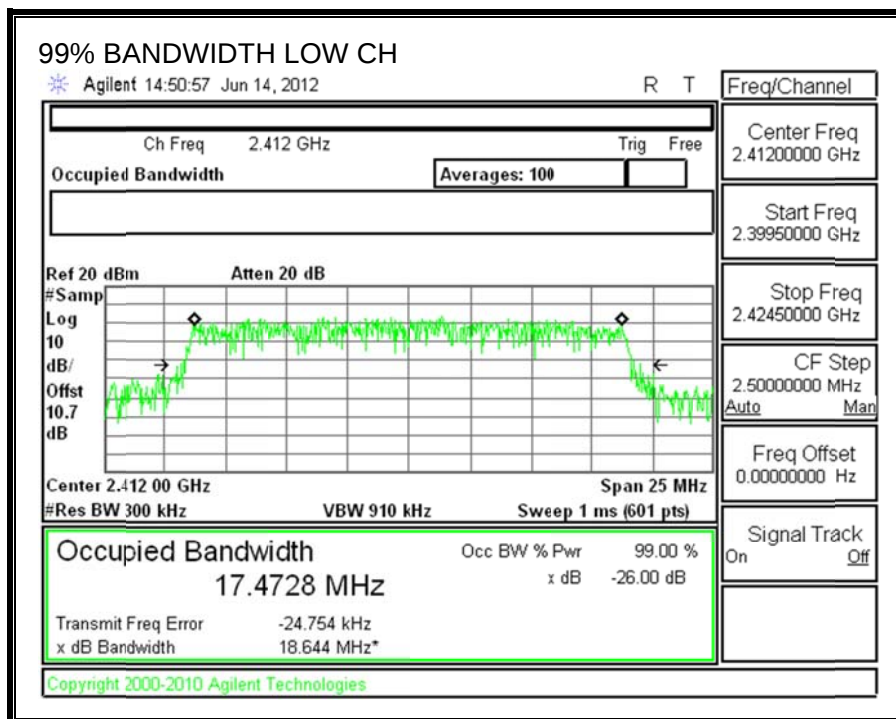
TEST PROCEDURE

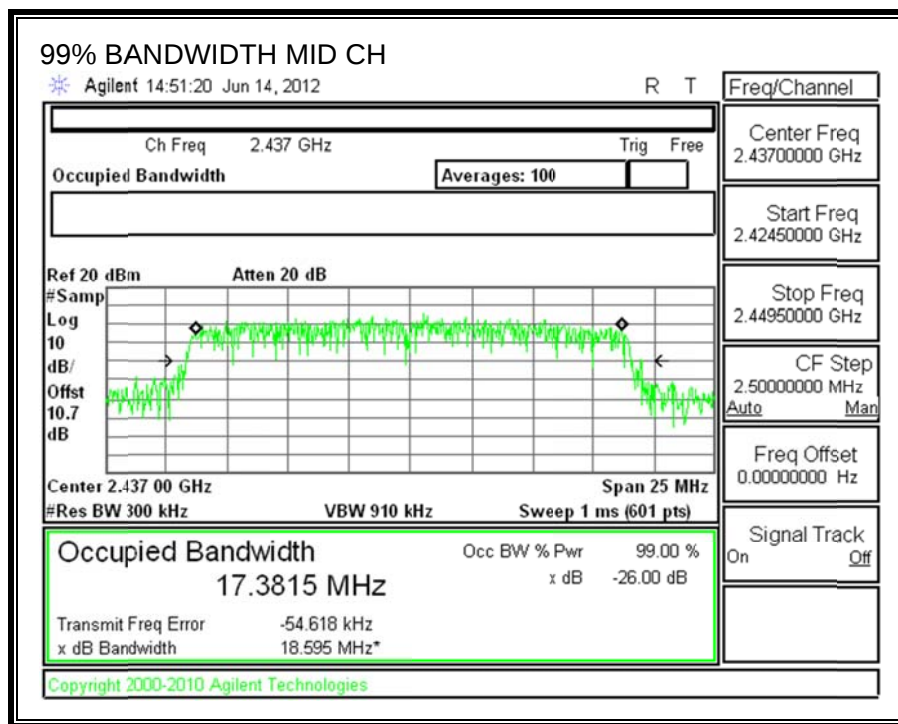
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

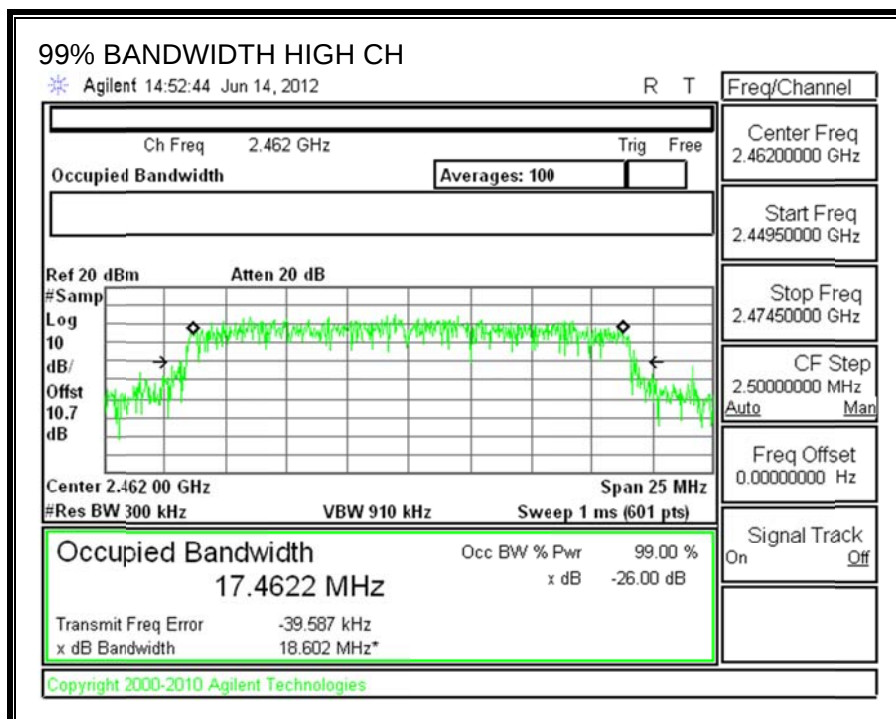
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.4728
Middle	2437	17.3815
High	2462	17.4622

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.

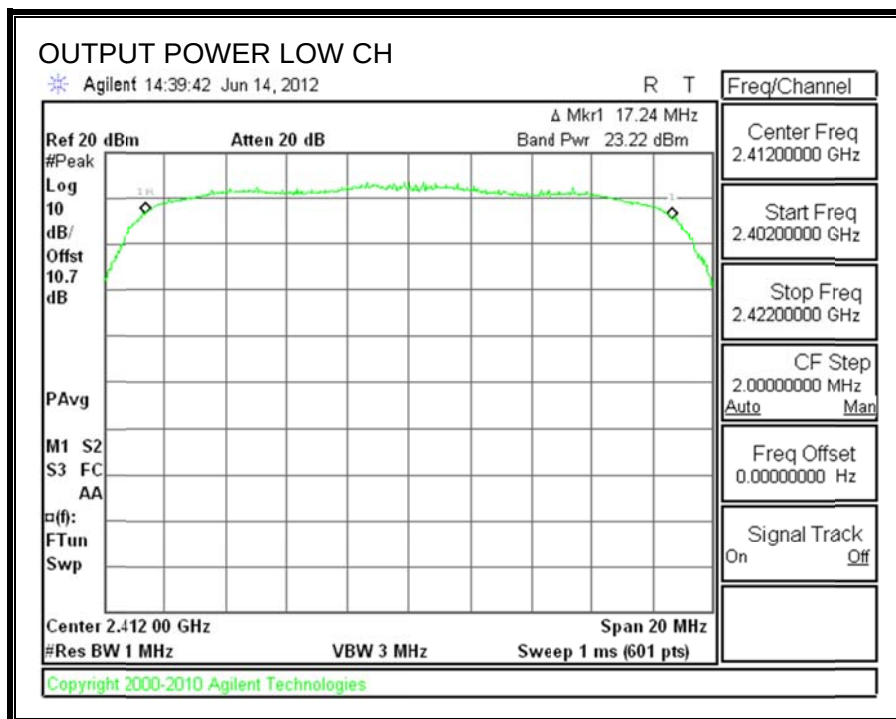
TEST PROCEDURE

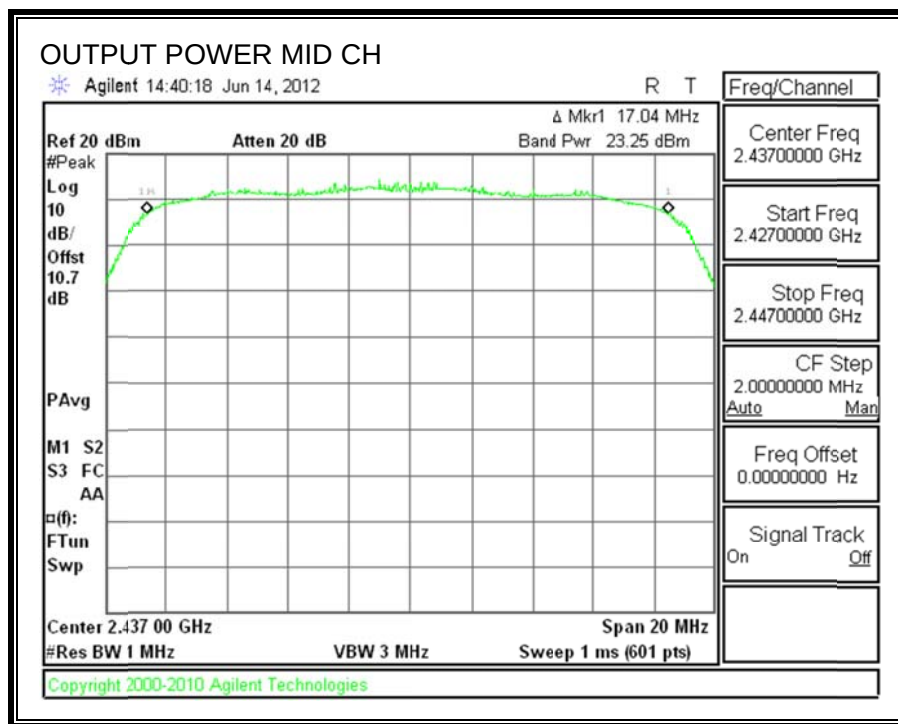
KDB 558074 D01 v01 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

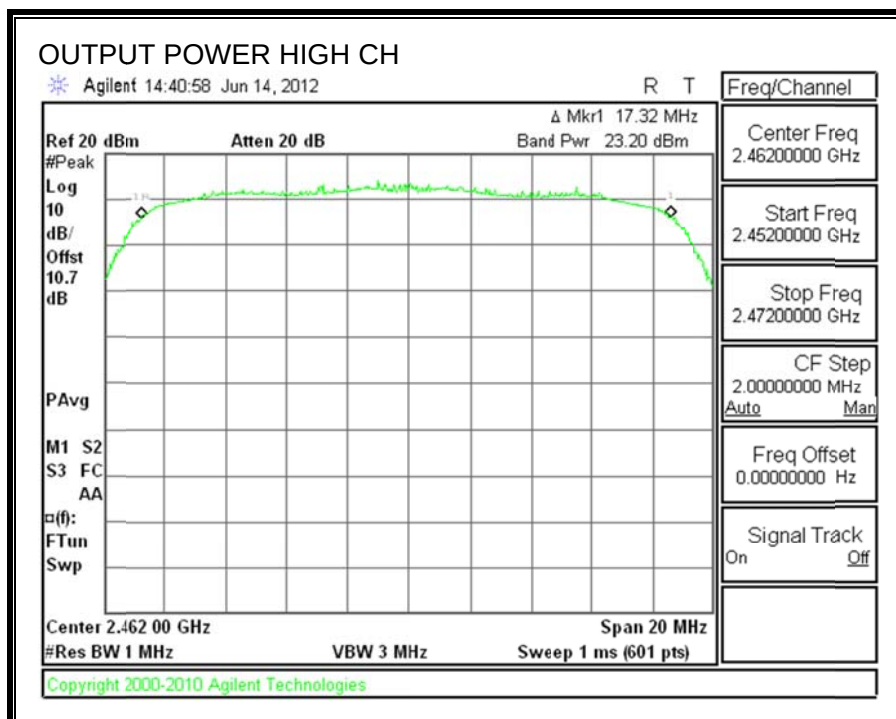
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2412	23.22	30	-6.78
Middle	2437	23.25	30	-6.75
High	2462	23.20	30	-6.80

OUTPUT POWER







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 10.7 dB (including 10 dB pad and 0.7 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	14.33
Middle	2437	14.32
High	2462	14.27

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

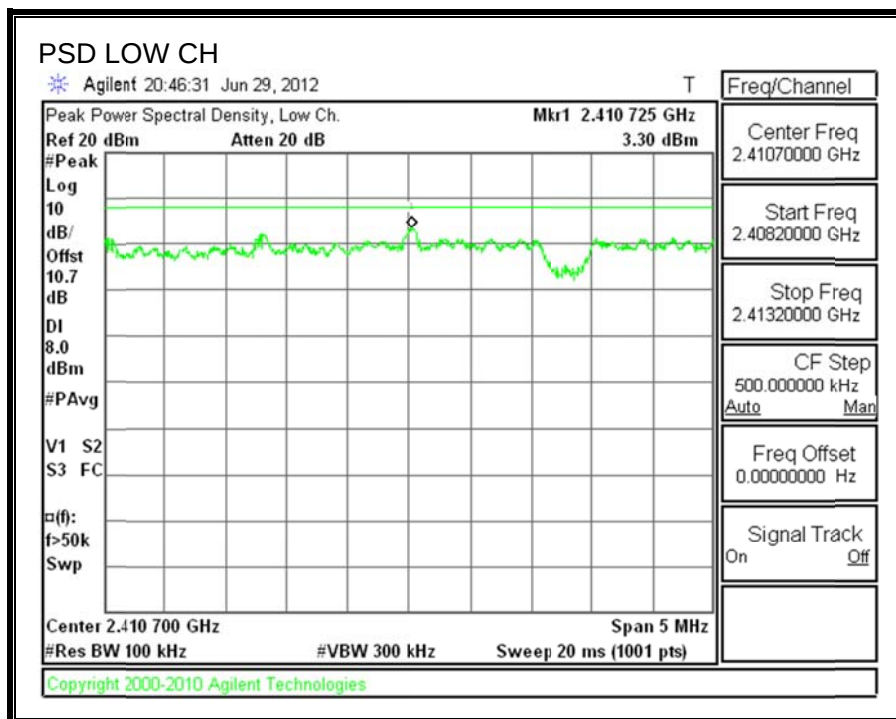
KDB 558074 D01 DTS Measurement Guidance V01 dated 01-18-12.

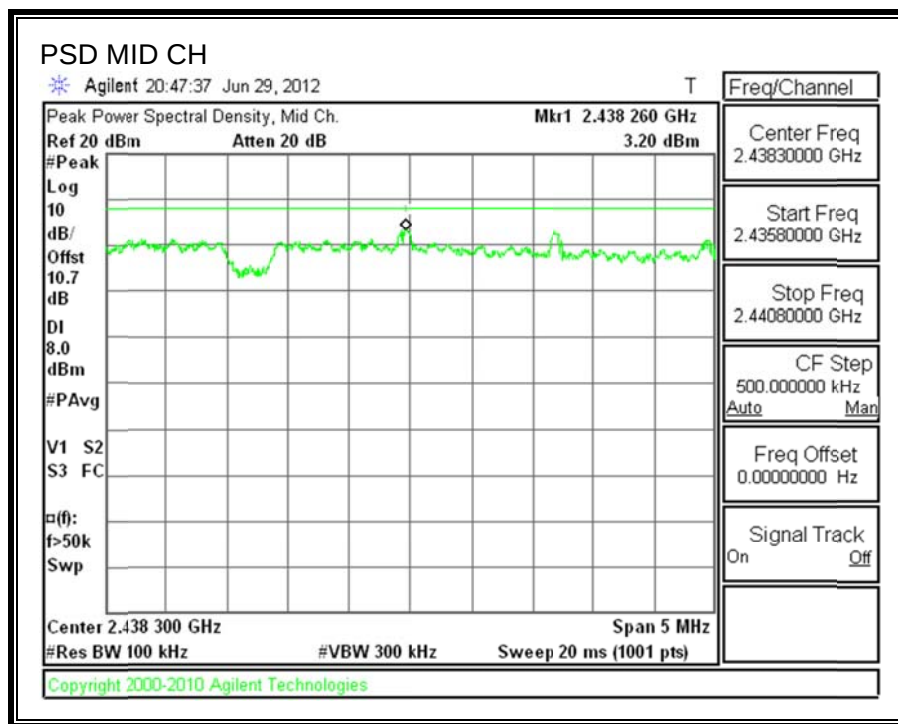
RESULTS

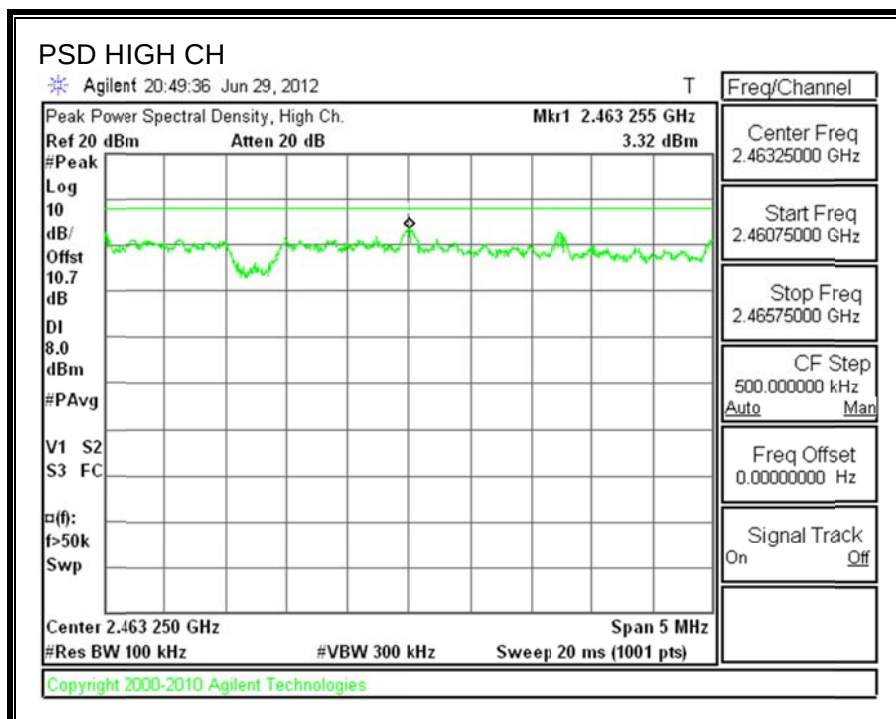
Channel	Frequency (MHz)	PSD/100kHz (dBm)	PSD/3kHz (dBm)	Limit (dBm)	Margin (dB)
Low	2412	3.30	-11.90	8	-19.90
Middle	2437	3.20	-12.00	8	-20.00
High	2462	3.32	-11.88	8	-19.88

Note: Conversion factor to an equivalent value in 3 kHz for comparison to the limit is;
 $10\log(3\text{kHz}/100\text{kHz}) = -15.2\text{dB}$

POWER SPECTRAL DENSITY







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.

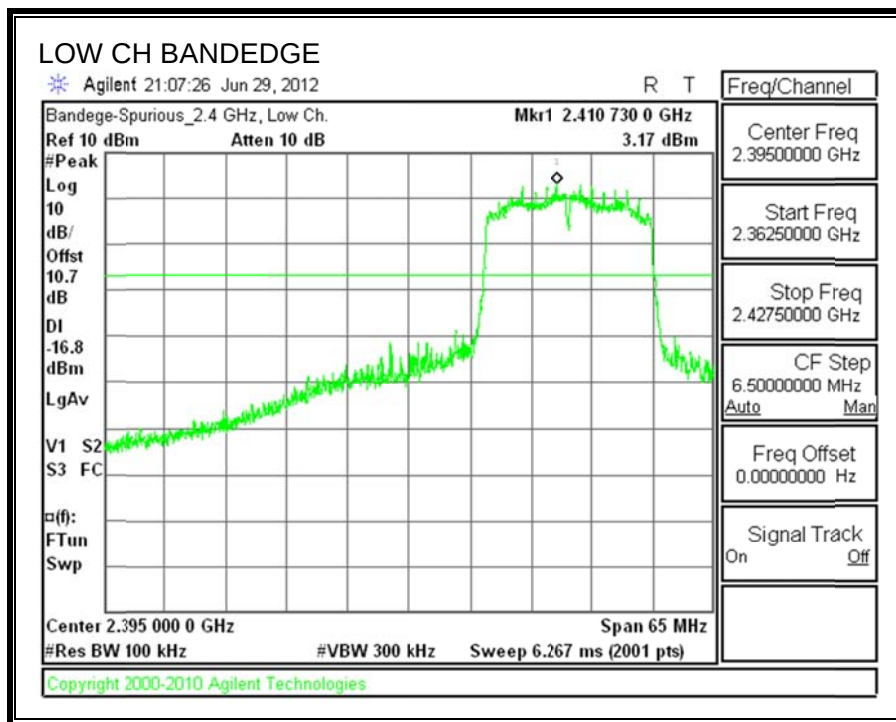
TEST PROCEDURE

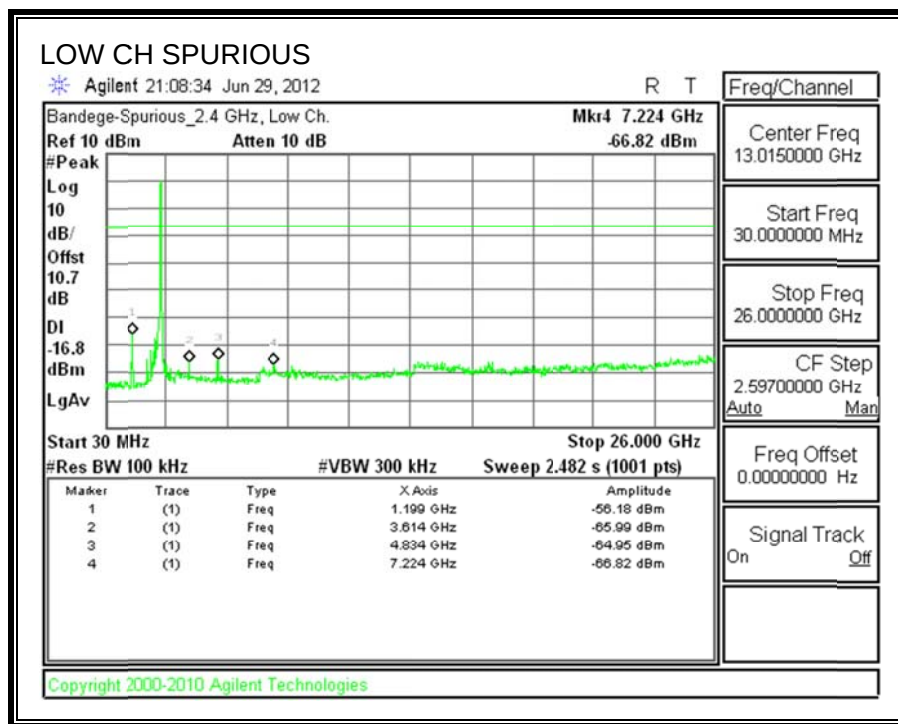
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

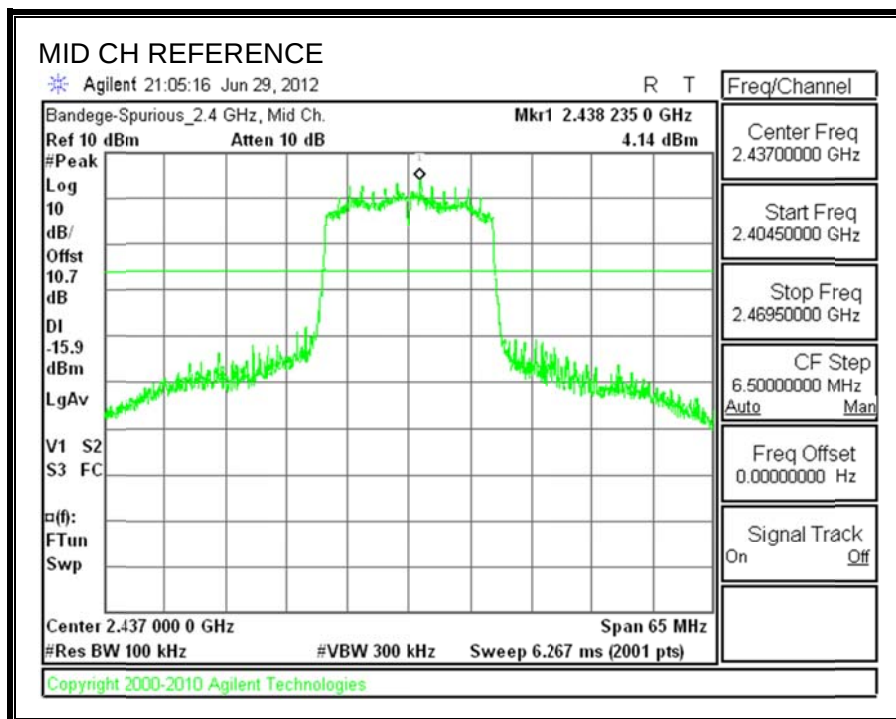
RESULTS

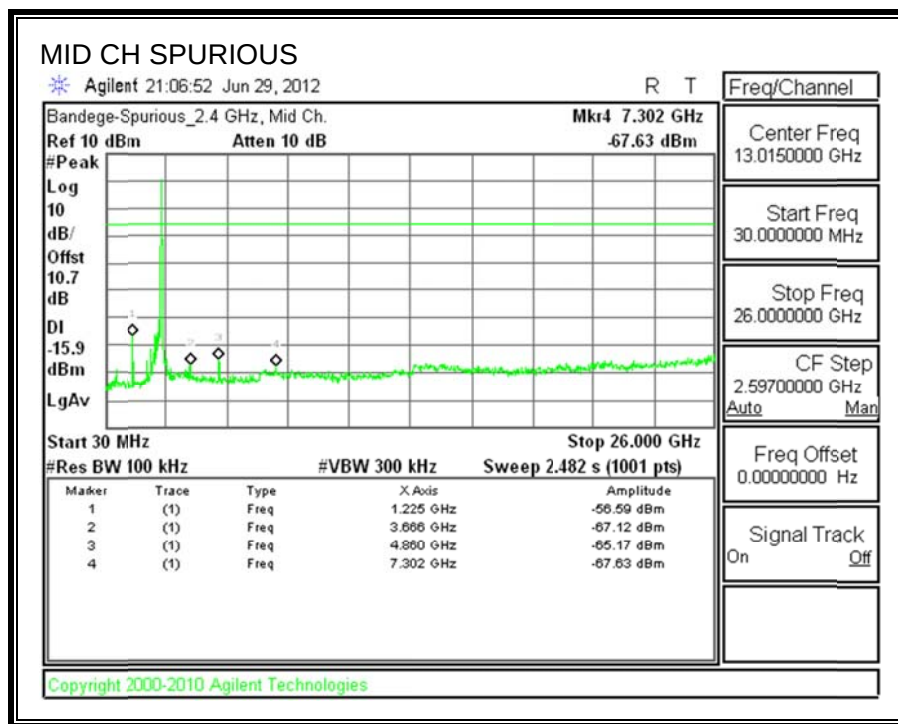
SPURIOUS EMISSIONS, LOW CHANNEL



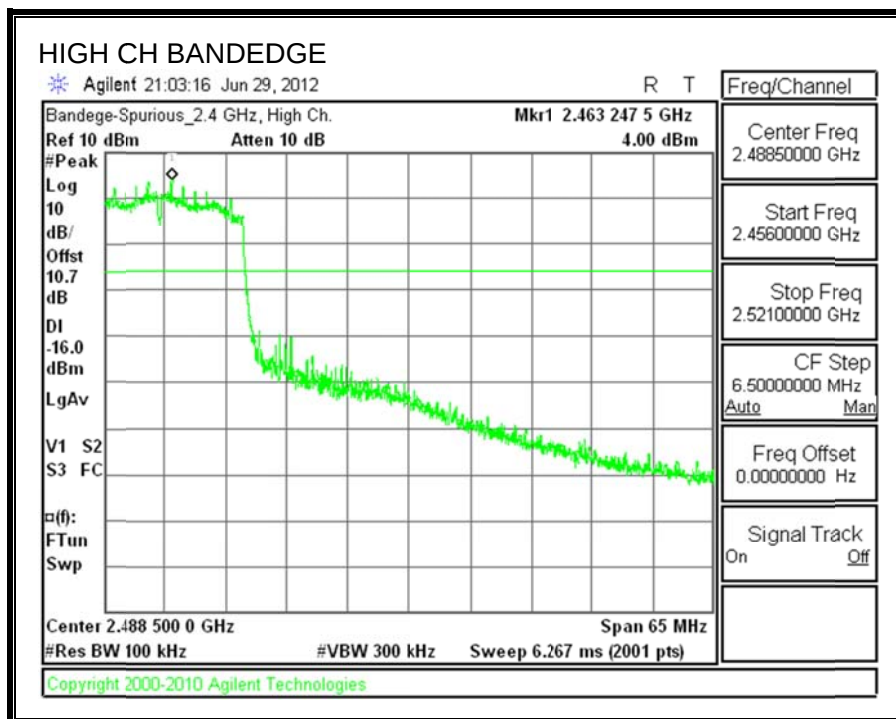


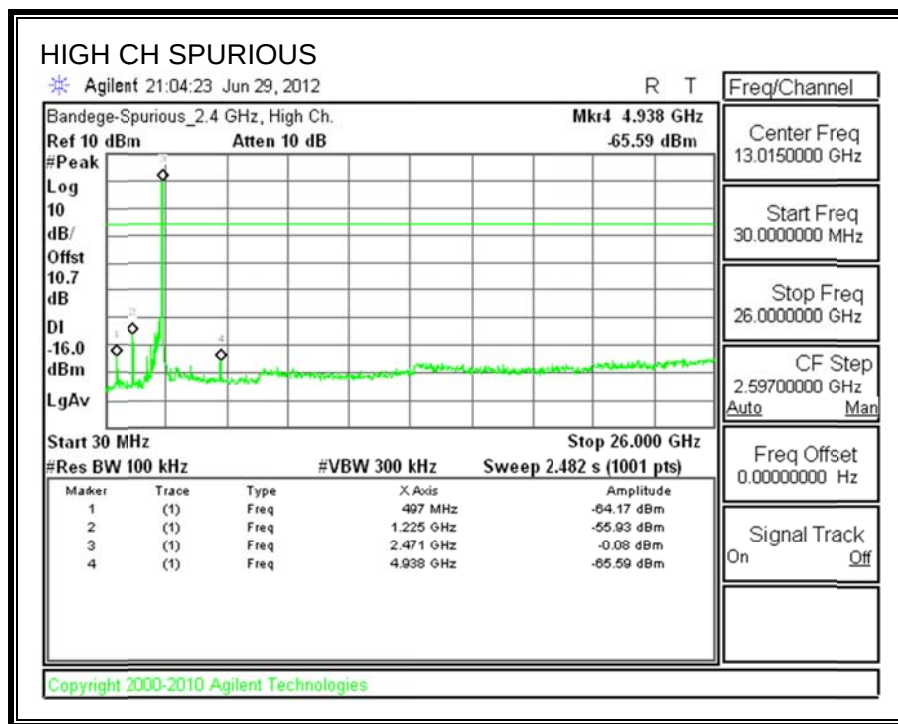
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5 (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.

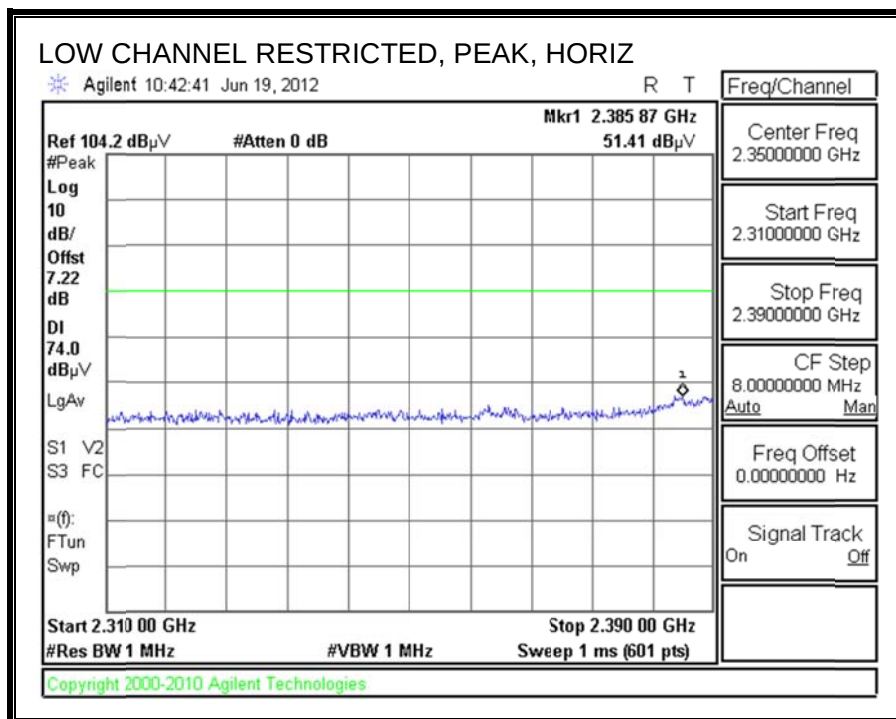
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

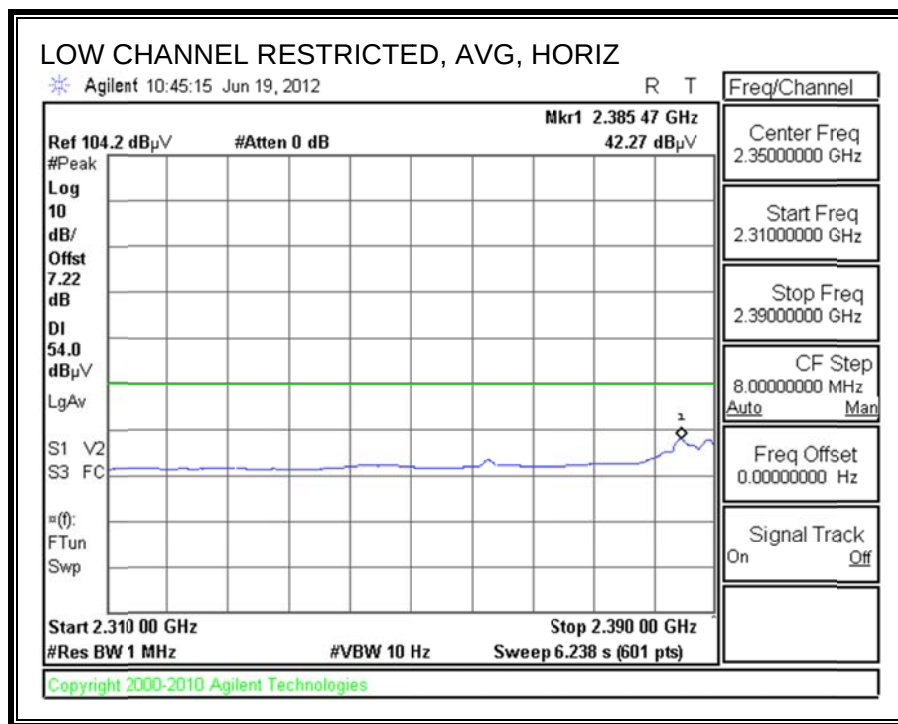
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

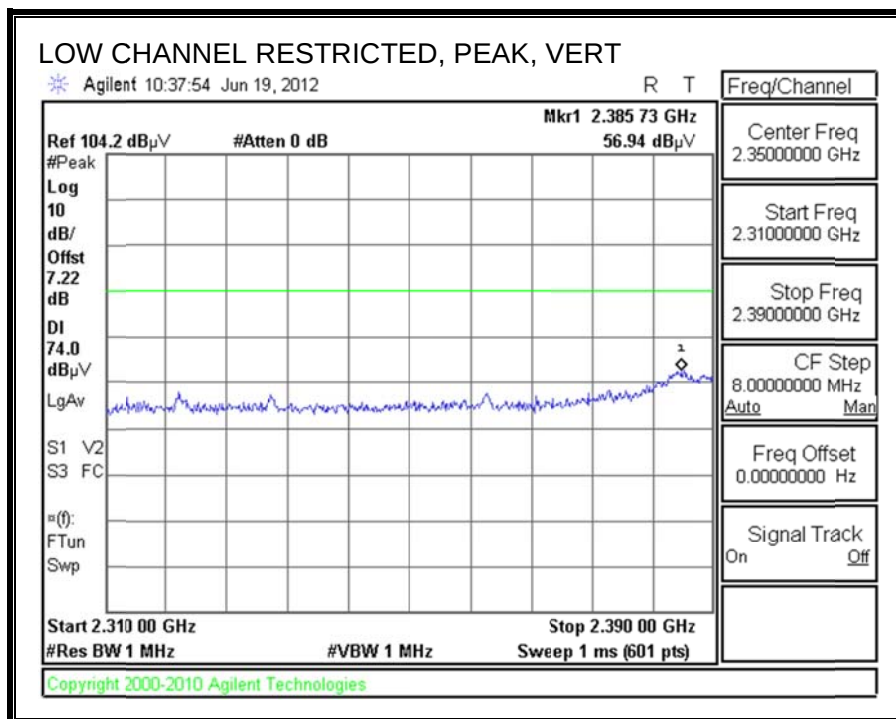
8.2.1. TX ABOVE 1 GHz FOR 802.11b 1TX MODE IN THE 2.4 GHz BAND

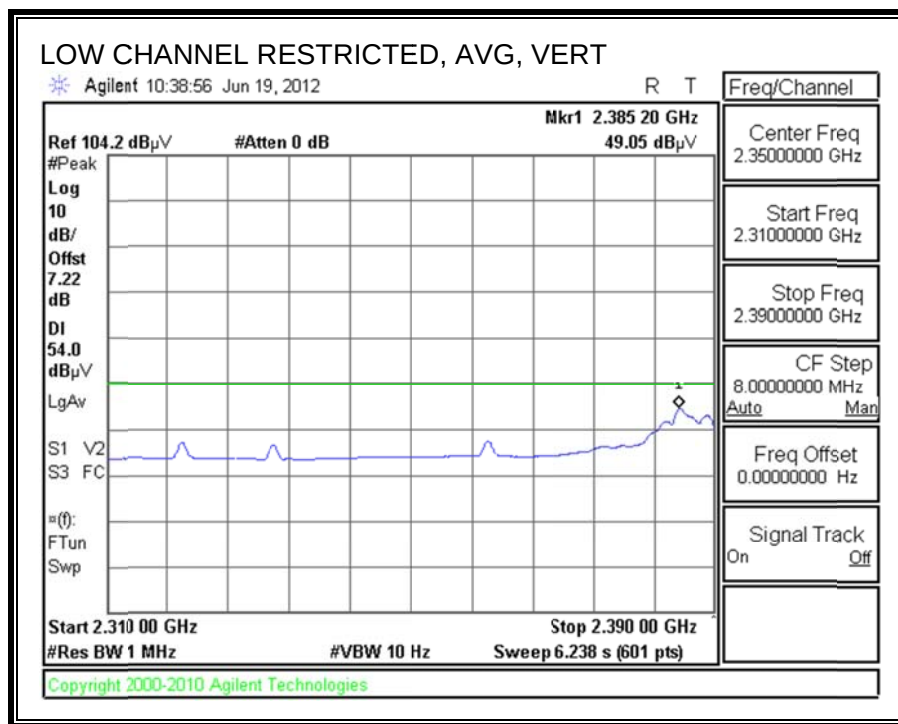
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)





Agilent 10:56:36 Jun 19, 2012 R T

Ref 104.4 dB μ V #Atten 0 dB

Mkr1 2.494 225 0 GHz 50.66 dB μ V

Center Freq 2.49175000 GHz

Start Freq 2.48350000 GHz

Stop Freq 2.50000000 GHz

CF Step 1.65000000 MHz Auto Man

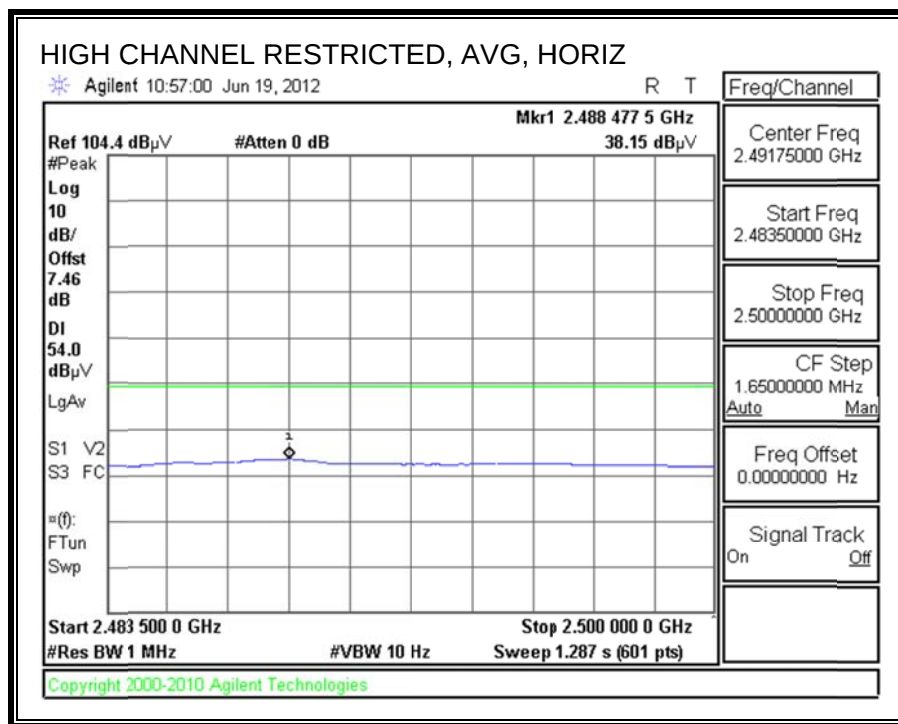
Freq Offset 0.00000000 Hz

Signal Track On Off

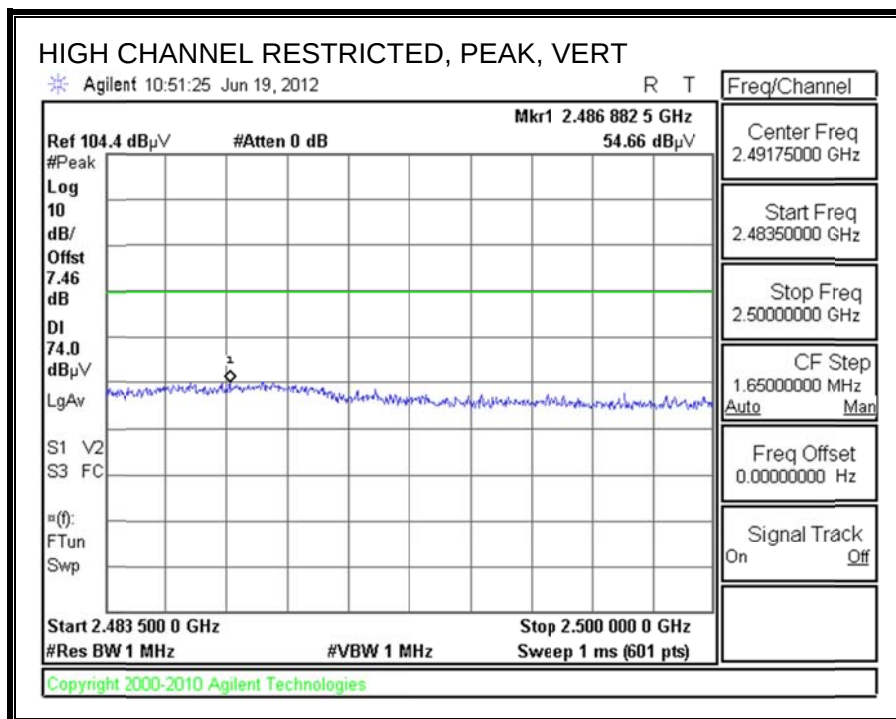
Start 2.483 500 0 GHz Stop 2.500 000 0 GHz

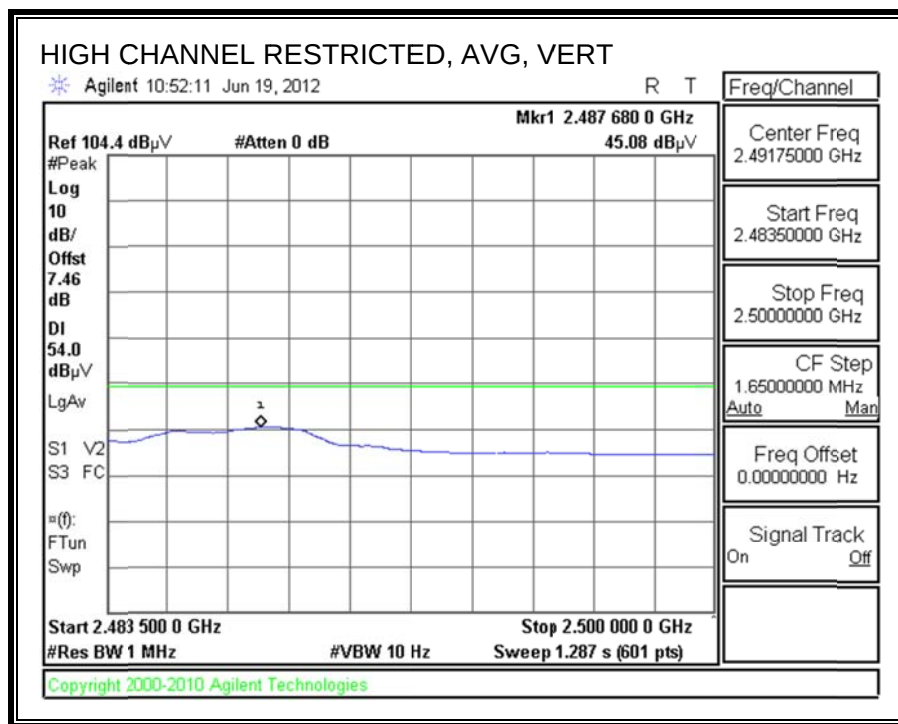
#Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts)

Copyright 2000-2010 Agilent Technologies



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



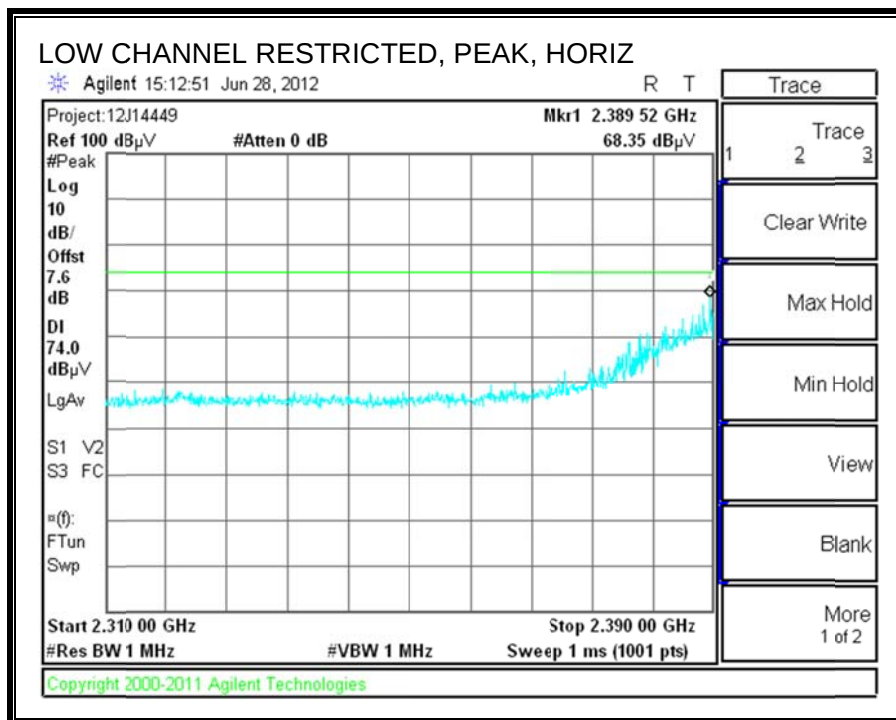


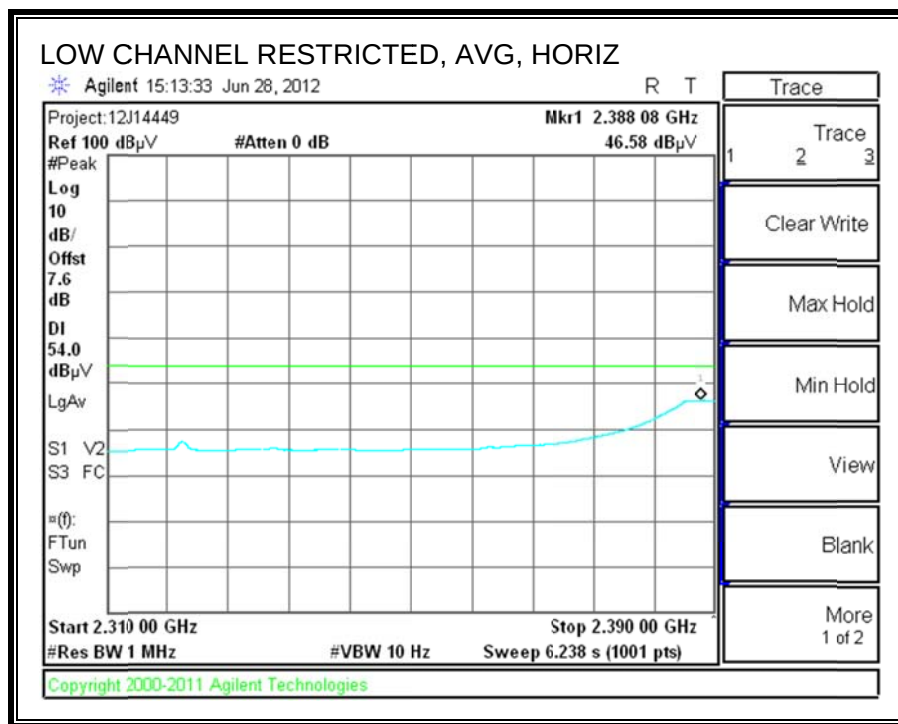
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																
Compliance Certification Services, Fremont 5m Chamber-B																
Company:		Mitsumi Electronic Co.														
Project #:		12J14449														
Date:		6/27/2012														
Test Engineer:		Mengistu Mekuria														
Configuration:		EUT and Support Equipment														
Mode:		TX, 802.11b Mode														
Test Equipment:																
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit				
T59; S/N: 3245 @3m			T145 Agilent 3008A0056						T125; ARA 18-26GHz; S/N:1007			FCC 15.209				
Hi Frequency Cables																
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements RBW=VBW=1MHz	
3' cable 22807700			12' cable 22807600			20' cable 22807500						R_001			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)	
Low Channel (2412MHz)																
4.824	3.0	45.7	41.6	33.1	6.3	-34.8	0.0	0.0	50.3	46.1	74	54	-23.7	-7.9	V	
4.824	3.0	45.3	41.2	33.1	6.3	-34.8	0.0	0.0	49.8	45.7	74	54	-24.2	-8.3	E	
Mid Channel (2437 MHz)																
4.874	3.0	44.3	40.2	33.1	6.3	-34.8	0.0	0.0	48.9	44.9	74	54	-25.1	-9.1	V	
7.311	3.0	40.5	32.7	35.8	8.5	-34.9	0.0	0.0	49.9	42.1	74	54	-24.1	-11.9	V	
4.874	3.0	42.8	37.5	33.1	6.3	-34.8	0.0	0.0	47.4	42.1	74	54	-26.6	-11.9	E	
7.311	3.0	39.2	29.8	35.8	8.5	-34.9	0.0	0.0	48.6	39.2	74	54	-25.4	-14.8	E	
Hi Channel (2462 MHz)																
4.924	3.0	43.8	38.9	33.2	6.3	-34.8	0.0	0.0	48.5	43.6	74	54	-25.5	-10.4	V	
7.386	3.0	40.4	28.9	35.9	8.5	-34.9	0.0	0.0	49.9	38.4	74	54	-24.1	-15.6	V	
4.924	3.0	42.6	36.9	33.2	6.3	-34.8	0.0	0.0	47.3	41.6	74	54	-26.7	-12.4	E	
7.386	3.0	39.9	27.1	35.9	8.5	-34.9	0.0	0.0	49.4	36.7	74	54	-24.6	-17.3	E	
Rev. 11.10.11																
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											

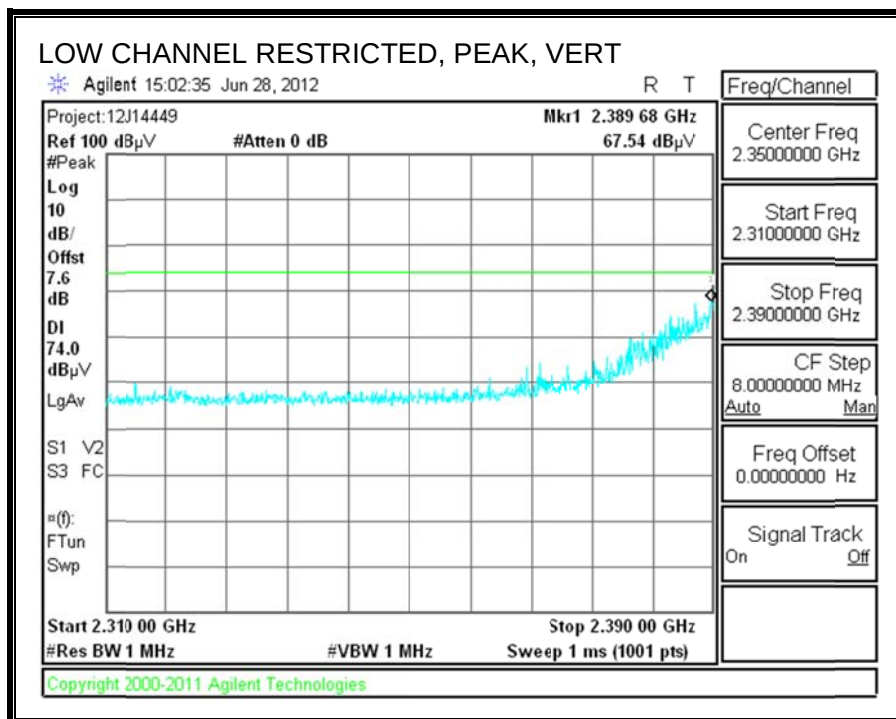
8.2.2. TX ABOVE 1 GHz FOR 802.11g 1TX MODE IN THE 2.4 GHz BAND

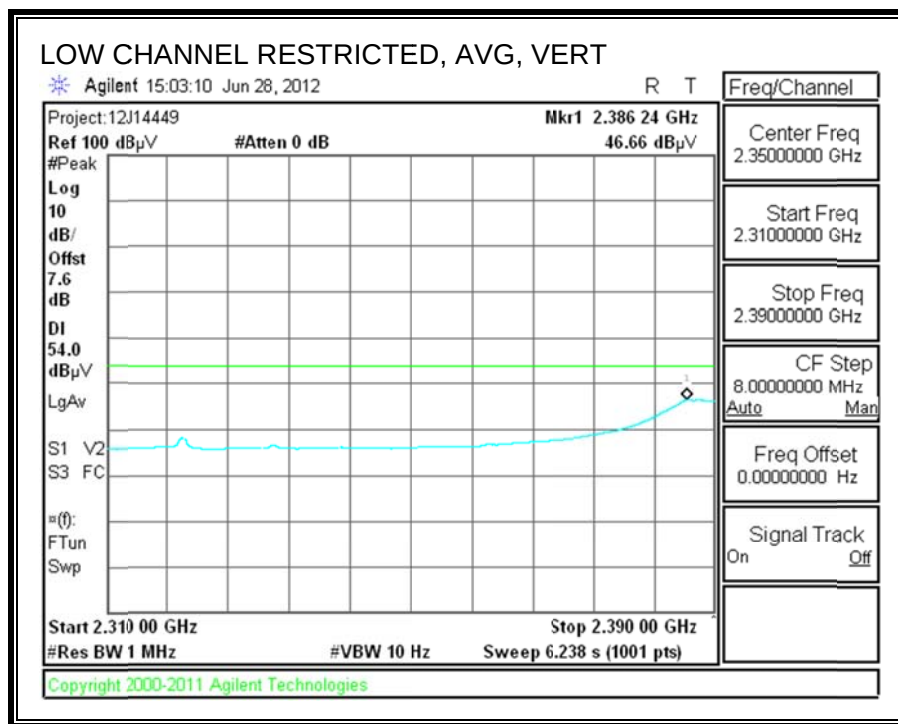
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



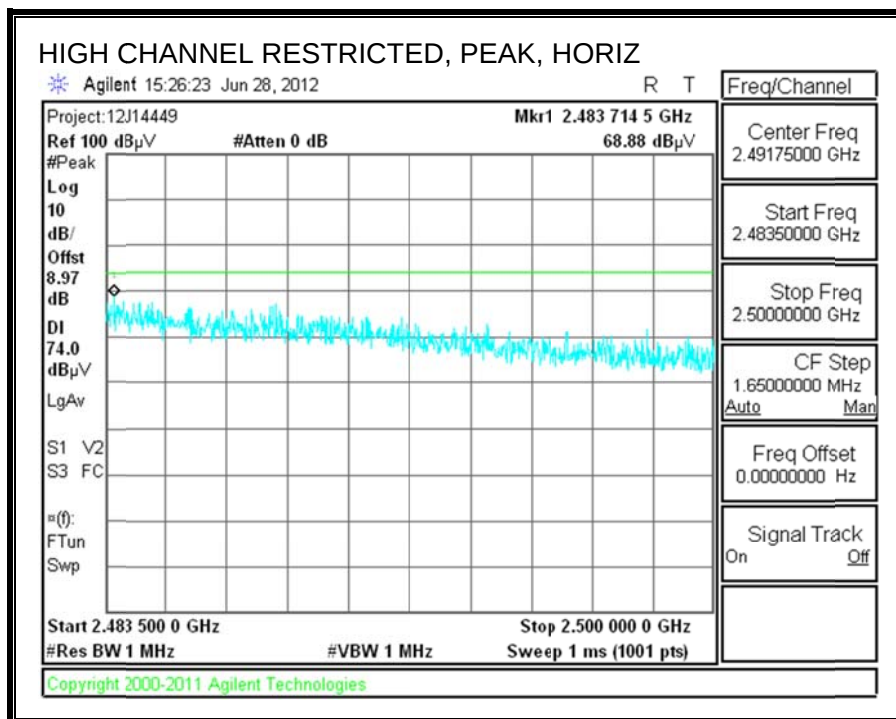


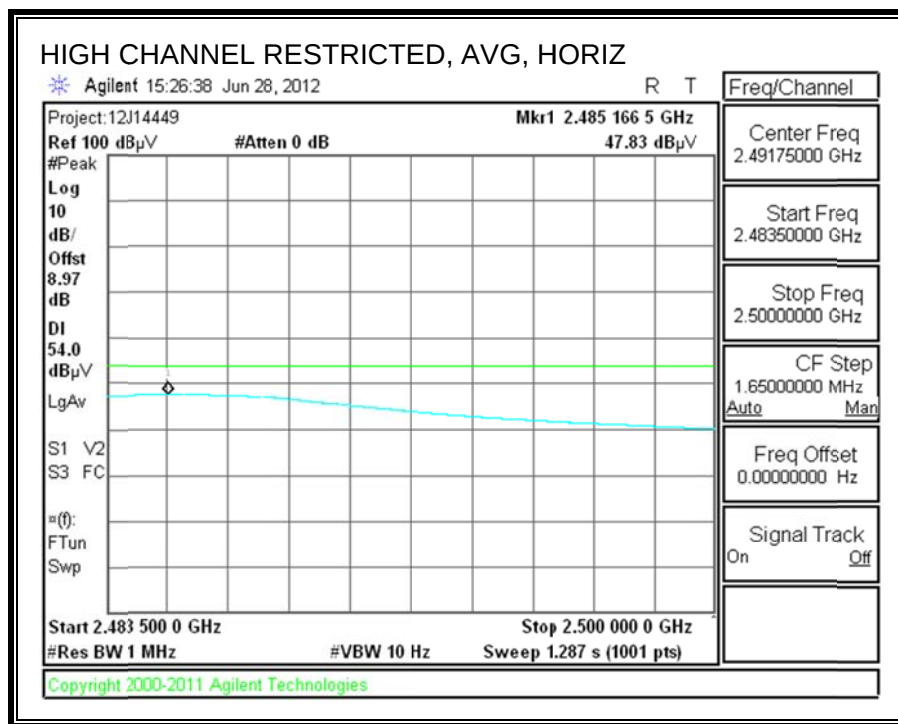
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



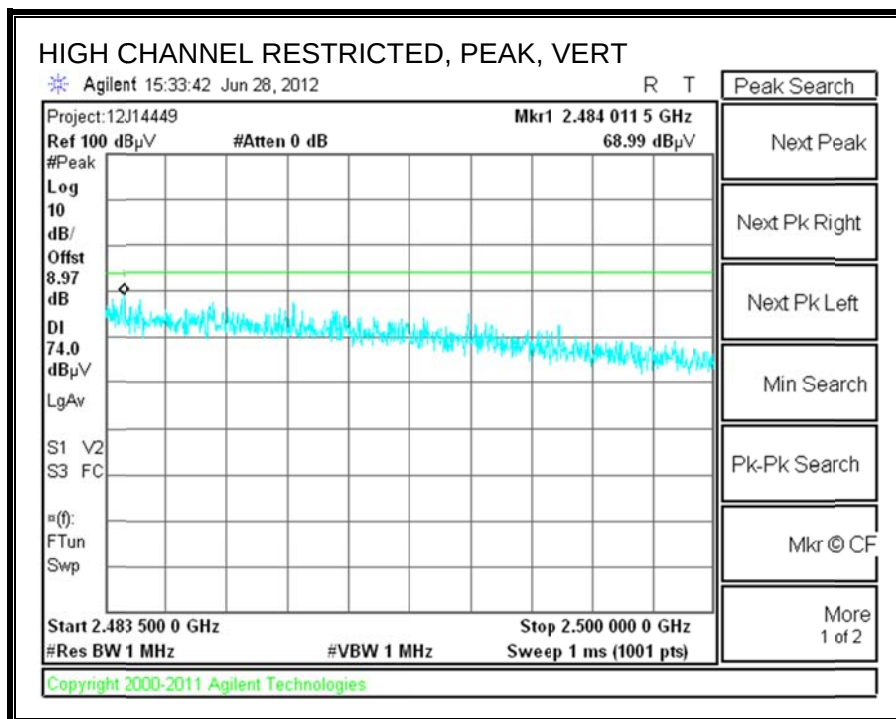


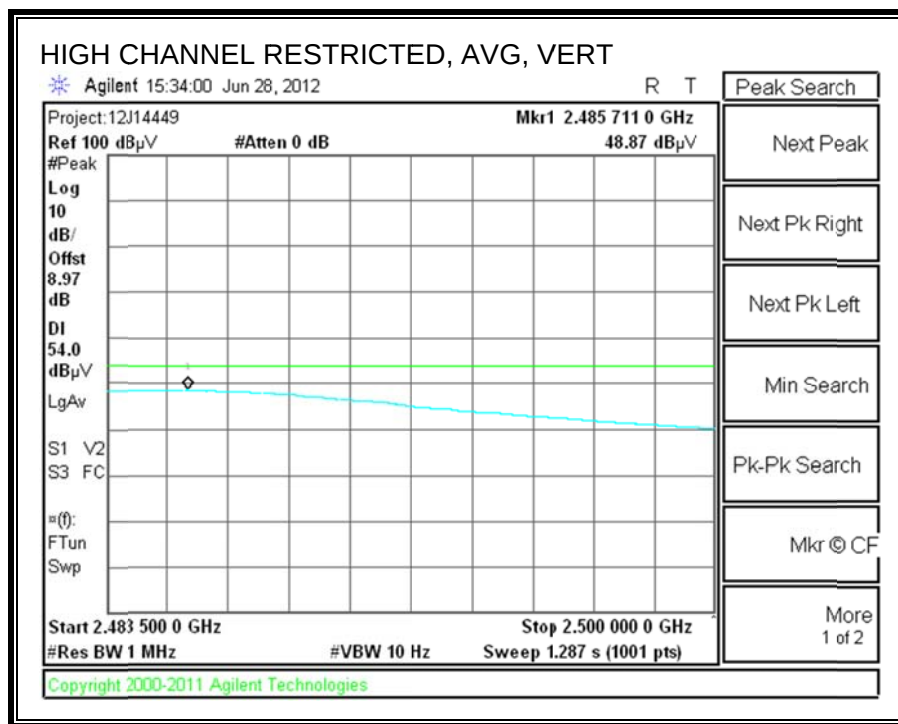
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



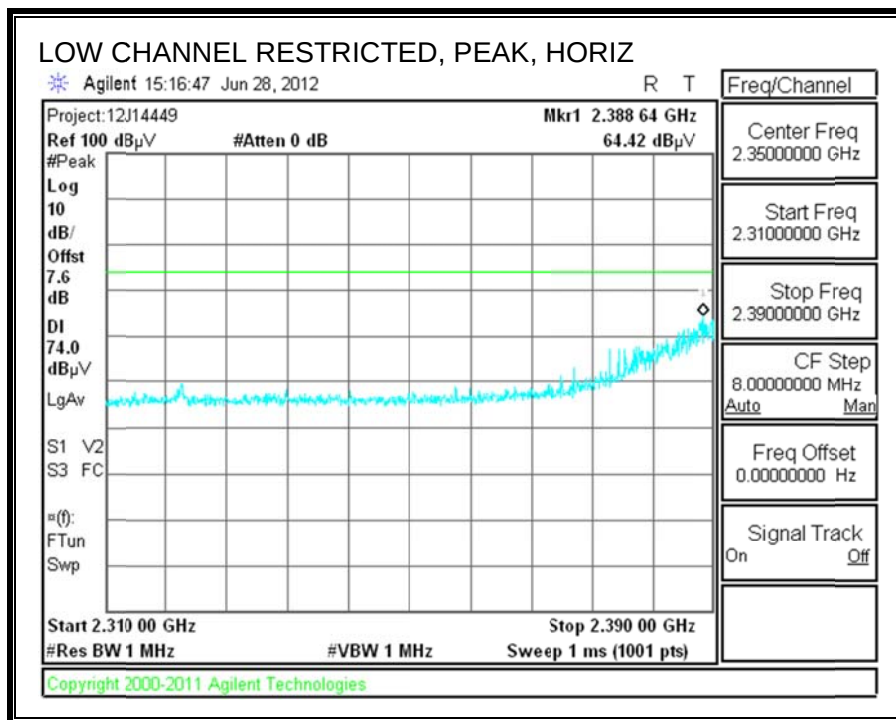


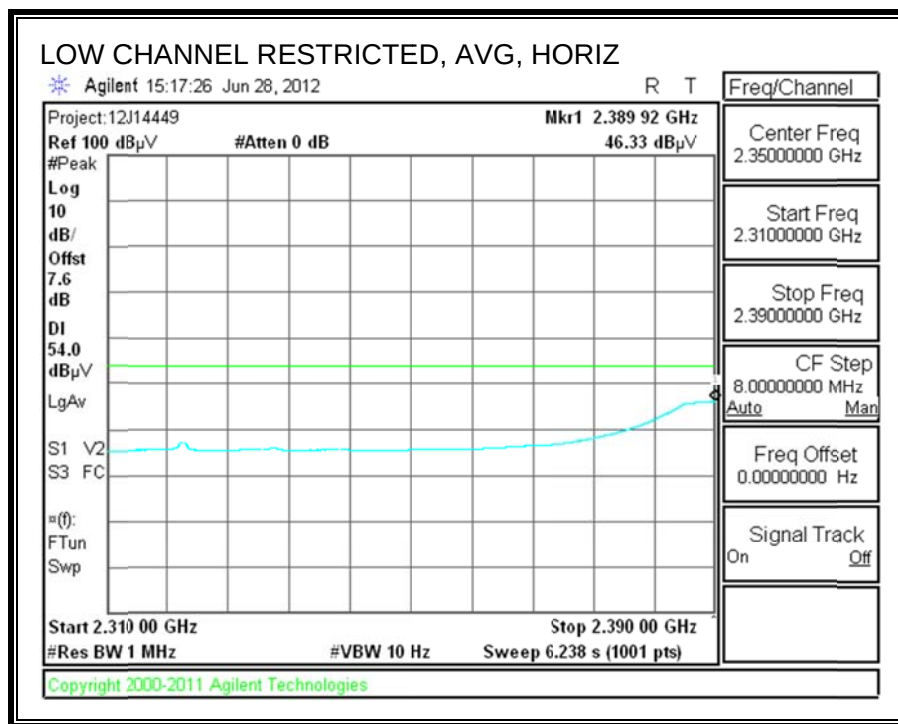
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber-B																	
Company:		Mitsumi Electronic Co.															
Project #:		12J14449															
Date:		6/27/2012															
Test Engineer:		Mengistu Mekuria															
Configuration:		EUT and Support Equipment															
Mode:		TX, 802.11g Mode															
Test Equipment:																	
Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz				Limit	
T59; S/N: 3245 @3m				T145 Agilent 3008A0056								T125; ARA 18-26GHz; S/N:1007				FCC 15.205	
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	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 Channel (2412MHz)																	
4.824	3.0	45.3	30.5	33.1	6.3	-34.8	0.0	0.0	49.9	35.1	74	54	-24.1	-18.9	V		
4.824	3.0	44.1	30.4	33.1	6.3	-34.8	0.0	0.0	48.7	34.9	74	54	-25.3	-19.1	H		
Mid Channel (2437 MHz)																	
4.874	3.0	45.7	29.7	33.1	6.3	-34.8	0.0	0.0	50.3	34.4	74	54	-23.7	-19.6	V		
7.311	3.0	46.7	29.8	35.8	8.5	-34.9	0.0	0.0	56.1	39.2	74	54	-17.9	-14.8	V		
4.874	3.0	44.2	28.2	33.1	6.3	-34.8	0.0	0.0	48.8	32.9	74	54	-25.2	-21.1	H		
7.311	3.0	43.6	27.6	35.8	8.5	-34.9	0.0	0.0	53.0	37.0	74	54	-21.0	-17.0	H		
Hi Channel (2462 MHz)																	
4.924	3.0	44.0	28.5	33.2	6.3	-34.8	0.0	0.0	48.7	33.2	74	54	-25.3	-20.8	V		
7.386	3.0	41.0	26.6	35.9	8.5	-34.9	0.0	0.0	50.6	36.1	74	54	-23.4	-17.9	V		
4.924	3.0	42.3	27.5	33.2	6.3	-34.8	0.0	0.0	47.0	32.2	74	54	-27.0	-21.8	H		
7.386	3.0	39.3	24.8	35.9	8.5	-34.9	0.0	0.0	48.8	34.4	74	54	-25.2	-19.6	H		
Rev. 11.10.11																	
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													

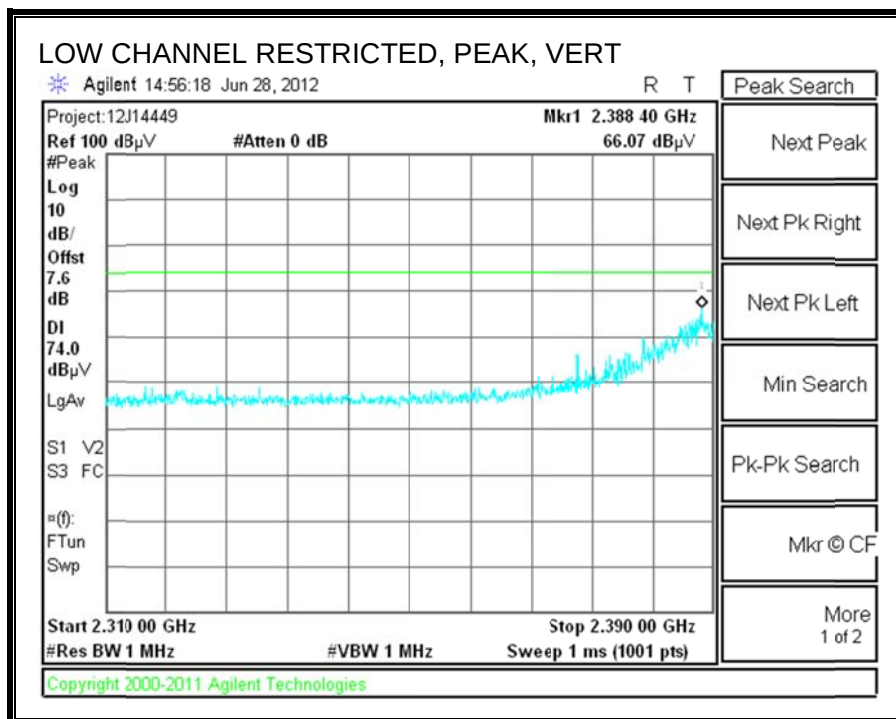
8.2.3. TX ABOVE 1 GHz FOR 802.11n HT20 1TX MODE IN THE 2.4 GHz BAND

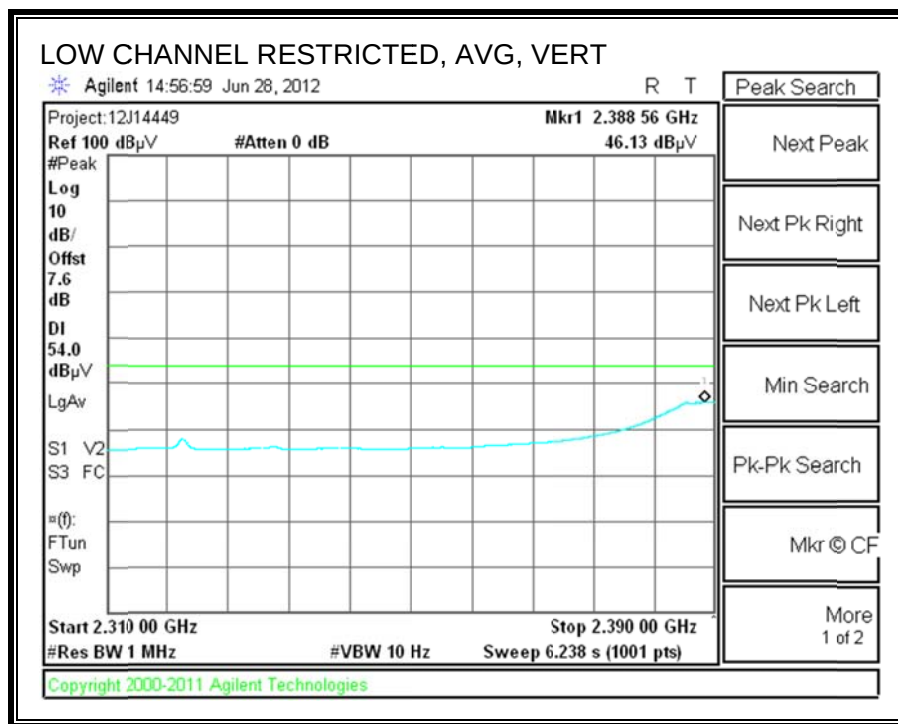
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



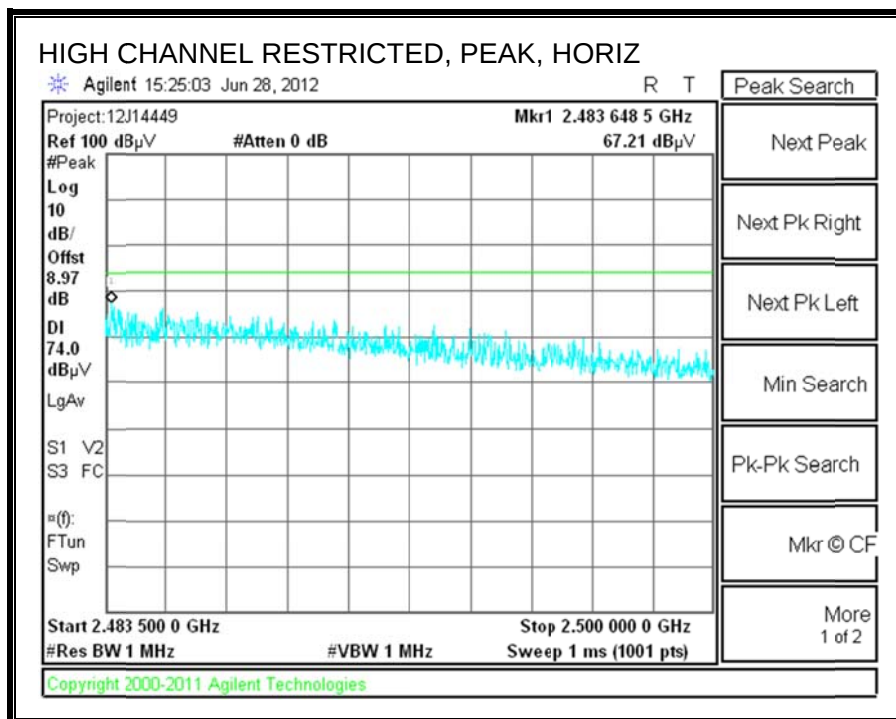


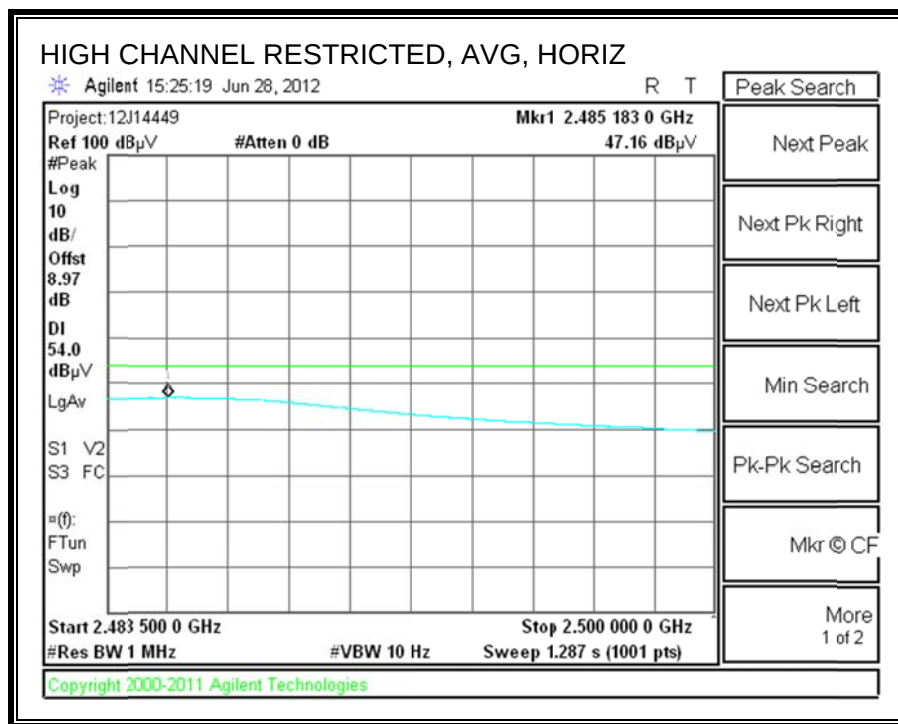
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



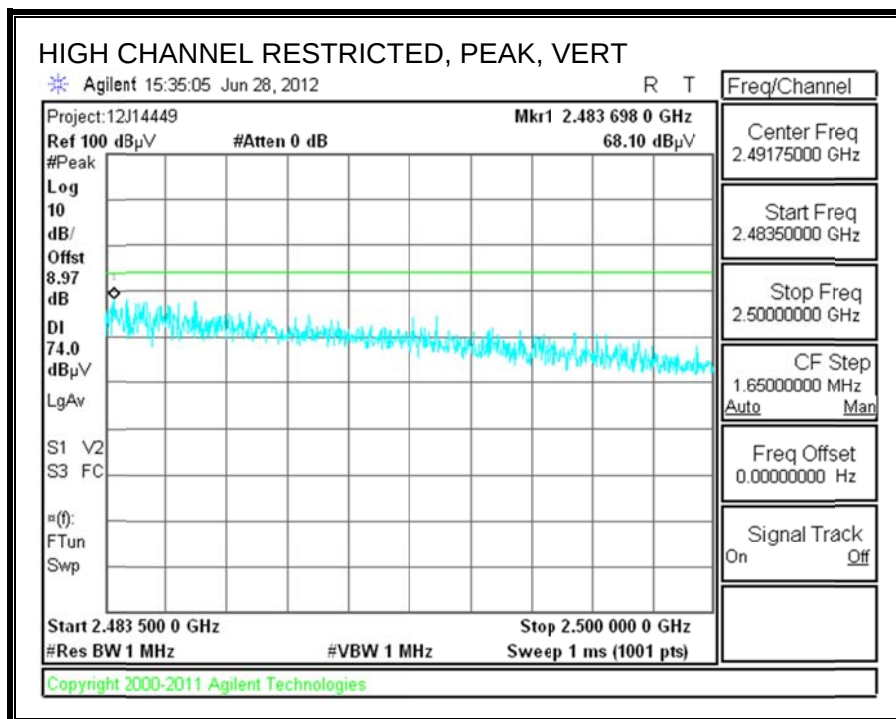


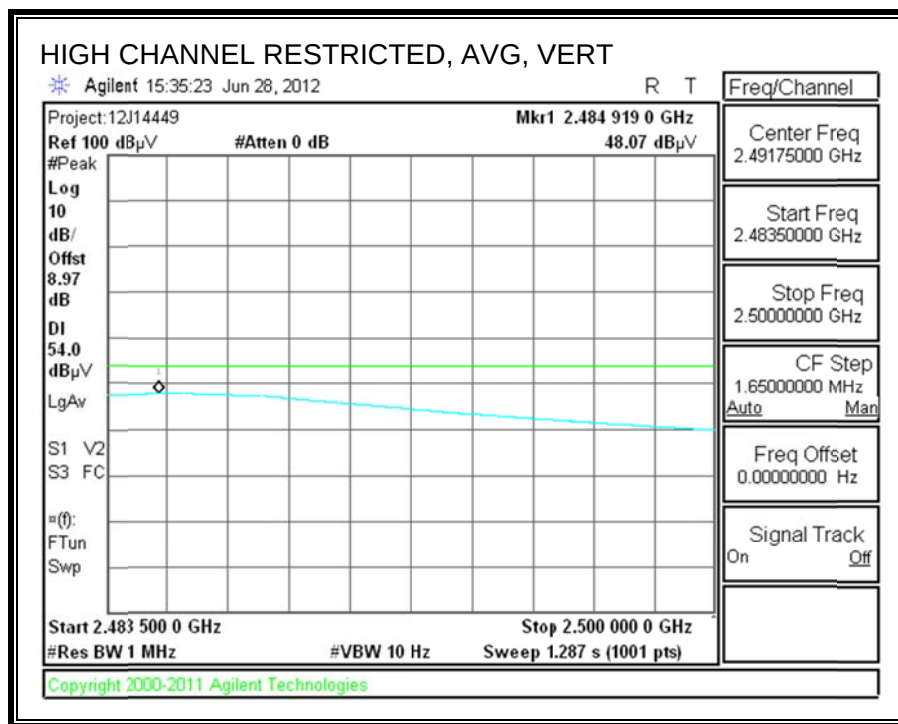
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

Test Engineer: Mengistu Mekuria															
Configuration: EUT and Support Equipment															
Mode: TX, 902.11n Mode															
Test Equipment:															
Horn 1-18GHz T59; S/N: 3245 @3m	Pre-amplifier 1-26GHz T145 Agilent 3008A0056														
Pre-amplifier 26-40GHz	Horn > 18GHz T125; ARA 18-26GHz; S/N:1007														
Limit FCC 15.245															
Hi Frequency Cables															
3' cable 22807700 3' cable 22807700	12' cable 22807600 12' cable 22807600														
20' cable 22807500 20' cable 22807500	HPF														
Reject Filter 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)
Low Channel (2412MHz)															
4.824	3.0	44.5	29.4	33.1	6.3	-34.8	0.0	0.0	49.1	34.0	74	54	-24.9	-20.0	V
4.824	3.0	42.9	29.3	33.1	6.3	-34.8	0.0	0.0	47.4	33.9	74	54	-26.6	-20.1	H
Mid Channel (2437 MHz)															
4.874	3.0	45.7	28.7	33.1	6.3	-34.8	0.0	0.0	50.3	33.3	74	54	-23.7	-20.7	V
7.311	3.0	45.4	28.6	35.8	8.5	-34.9	0.0	0.0	54.8	38.0	74	54	-19.2	-16.0	V
4.874	3.0	42.4	27.2	33.1	6.3	-34.8	0.0	0.0	47.0	31.9	74	54	-27.0	-22.1	H
7.311	3.0	42.0	26.6	35.8	8.5	-34.9	0.0	0.0	51.4	35.0	74	54	-22.6	-18.0	H
Hi Channel (2462 MHz)															
4.924	3.0	42.0	27.7	33.2	6.3	-34.8	0.0	0.0	46.7	31.4	74	54	-27.3	-21.6	V
7.386	3.0	41.7	27.5	35.9	8.5	-34.9	0.0	0.0	51.3	37.0	74	54	-22.7	-17.0	V
4.924	3.0	40.3	26.7	33.2	6.3	-34.8	0.0	0.0	45.0	31.4	74	54	-29.0	-22.6	H
7.386	3.0	39.9	24.9	35.9	8.5	-34.9	0.0	0.0	49.4	34.4	74	54	-24.6	-19.6	H
Rev. 11.10.11															
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											

8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL AND VERTICAL DATA

Project No:12J14449									
Client Name:Mitsumi Electronic Co. Ltd.									
Model / Device:DWM-W051									
Config / Other:EUT and Support Equipment									
Test By:M. Mekuria									
Horizontal 30 - 1000MHz									
Test Frequency	Meter Reading	Detector	25MHz-1GHz ChmbrA Amplified.TX (dB)	T243 Sunol Bilog.TXT (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
47.0584	36.81	PK	-27.4	9.4	18.81	40	-21.19	300	Horz
73.2274	49.89	PK	-27.1	8.1	30.89	40	-9.11	100	Horz
866.247	40.86	PK	-23.2	21.4	39.06	46	-6.94	100	Horz
Vertical 30 - 1000MHz									
Test Frequency	Meter Reading	Detector	25MHz-1GHz ChmbrA Amplified.TX (dB)	T243 Sunol Bilog.TXT (dB)	dBuV/m	CFR 47 Part 15 Class B 3m	Margin	Height [cm]	Polarity
40.2738	41.93	PK	-27.3	13.7	28.33	40	-11.67	100	Vert
93.775	55.29	PK	-27	8.5	36.79	43.5	-6.71	100	Vert

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

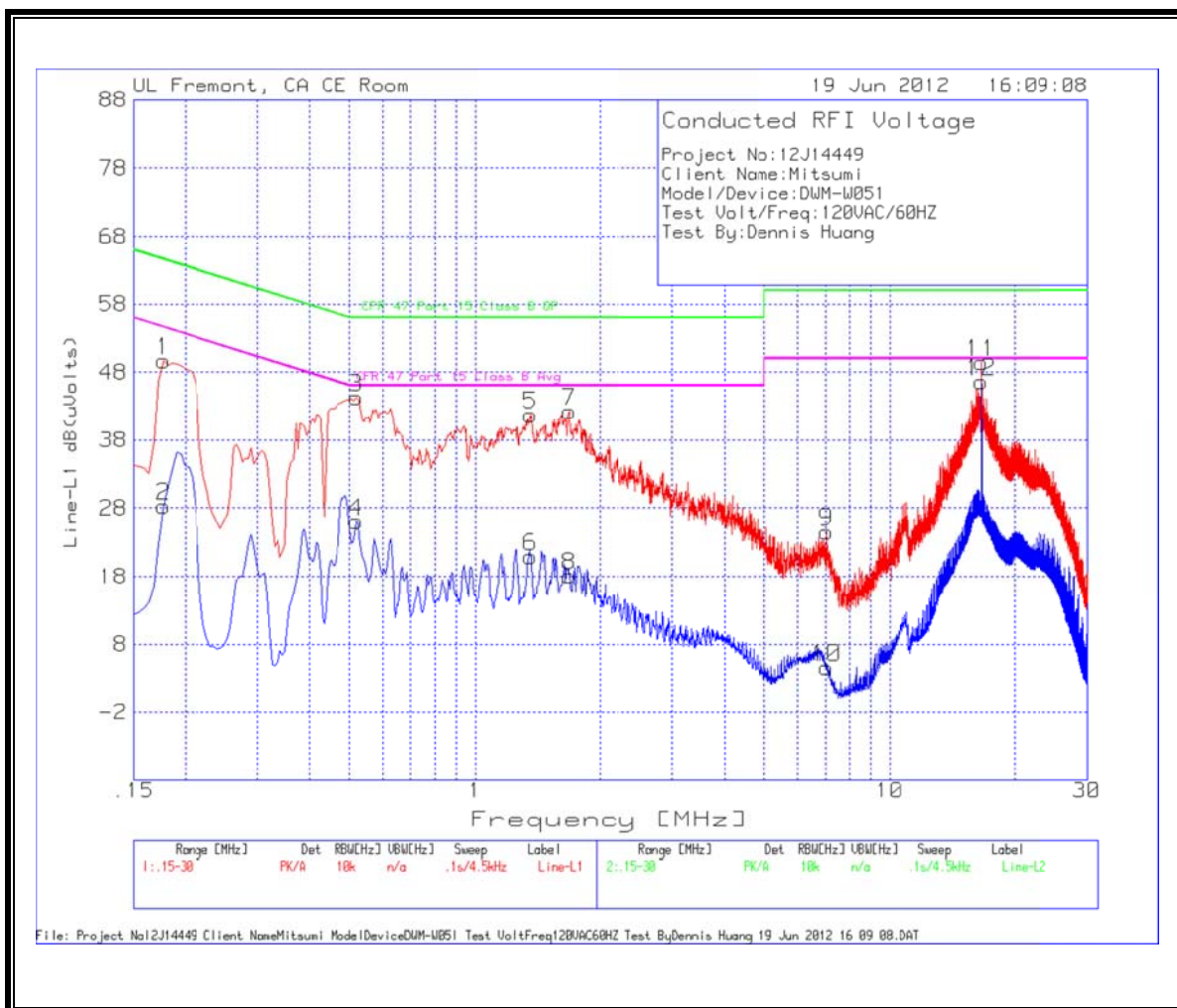
RESULTS

SUPPORT LAPTOP

6 WORST EMISSIONS

Project No:12J14449									
Client Name:Mitsumi									
Model/Device:DWM-W051									
Test Volt/Freq:120VAC/60HZ									
Test By:Dennis Huang									
Line-L1 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.177	49.55	PK	0.1	0	49.65	64.6	-14.95	-	-
0.177	28.25	Av	0.1	0	28.35	-	-	54.6	-26.25
0.519	44.17	PK	0.1	0	44.27	56	-11.73	-	-
0.519	25.95	Av	0.1	0	26.05	-	-	46	-19.95
1.3605	41.56	PK	0.1	0.1	41.76	56	-14.24	-	-
1.3605	20.73	Av	0.1	0.1	20.93	-	-	46	-25.07
1.6845	42.05	PK	0.1	0.1	42.25	56	-13.75	-	-
1.6845	17.9	Av	0.1	0.1	18.1	-	-	46	-27.9
7.044	24.35	PK	0.1	0.1	24.55	60	-35.45	-	-
7.044	4.43	Av	0.1	0.1	4.63	-	-	50	-45.37
16.6245	49.03	PK	0.2	0.2	49.43	60	-10.57	-	-
16.6245	46.23	Av	0.2	0.2	46.63	-	-	50	-3.37
Line-L2 .15 - 30MHz									
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CFR 47 Part 15 Class B QP	Margin	CFR 47 Part 15 Class B Avg	Margin
0.177	49.13	PK	0.1	0	49.23	64.6	-15.37	-	-
0.177	27.51	Av	0.1	0	27.61	-	-	54.6	-26.99
0.5235	44.05	PK	0.1	0	44.15	56	-11.85	-	-
0.5235	25.27	Av	0.1	0	25.37	-	-	46	-20.63
1.365	40.65	PK	0.1	0.1	40.85	56	-15.15	-	-
1.365	20.05	Av	0.1	0.1	20.25	-	-	46	-25.75
1.68	41.67	PK	0.1	0.1	41.87	56	-14.13	-	-
1.68	17.44	Av	0.1	0.1	17.64	-	-	46	-28.36
10.7565	29.69	PK	0.2	0.2	30.09	60	-29.91	-	-
10.7565	13.6	Av	0.2	0.2	14	-	-	50	-36
16.6245	50.94	PK	0.2	0.2	51.34	60	-8.66	-	-
16.6245	46.16	Av	0.2	0.2	46.56	-	-	50	-3.44

LINE 1 RESULTS



LINE 2 RESULTS

