FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

WIFI 11B/G/N MODULE

MODEL NUMBER: WIN-A1
FCC ID: MCLWINA1
IC: 2878D-WINA1

REPORT NUMBER: 10J13452-1

ISSUE DATE: OCTOBER 12, 2010

Prepared for
HON HAI PRECISION IND. CO., LTD.
5F-1, 5 HSIN-AN ROAD
HSINCHU SCIENCE-BASED INDUSTRIAL PARK, R.O.C.,
TAIWAN

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
---	10/12/10	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HON HAI PRECISION IND. CO., LTD.
5F-1, 5 HSIN-AN ROAD
HSINCHU SCIENCE-BASED INDUSTRIAL PARK, R.O.C
TAIWAN

EUT DESCRIPTION: WIFI 11B/G/N MODULE

MODEL: WIN-A1

SERIAL NUMBER: 800809

DATE TESTED: OCTOBER 05-08, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 7 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 2	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 CCS By:

THU CHAN
ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
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, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

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 EUT is WIFI Module with 802.11B/G/HT20.

The radio module is manufactured by Hon Hai Precision.

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	19.15	82.22
2412 - 2462	802.11g	25.40	346.74
2412 - 2462	802.11n HT20 SISO	24.90	309.03

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA antenna for TX/RX diversity, with maximum peak gains of 1.94dBi

5.4. SOFTWARE AND FIRMWARE

The EUT test utility software installed in the host computer during testing was Broadcom test program 5.90RC42.0 version 5.90.42 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.

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5.6. DESCRIPTION OF TEST SETUP

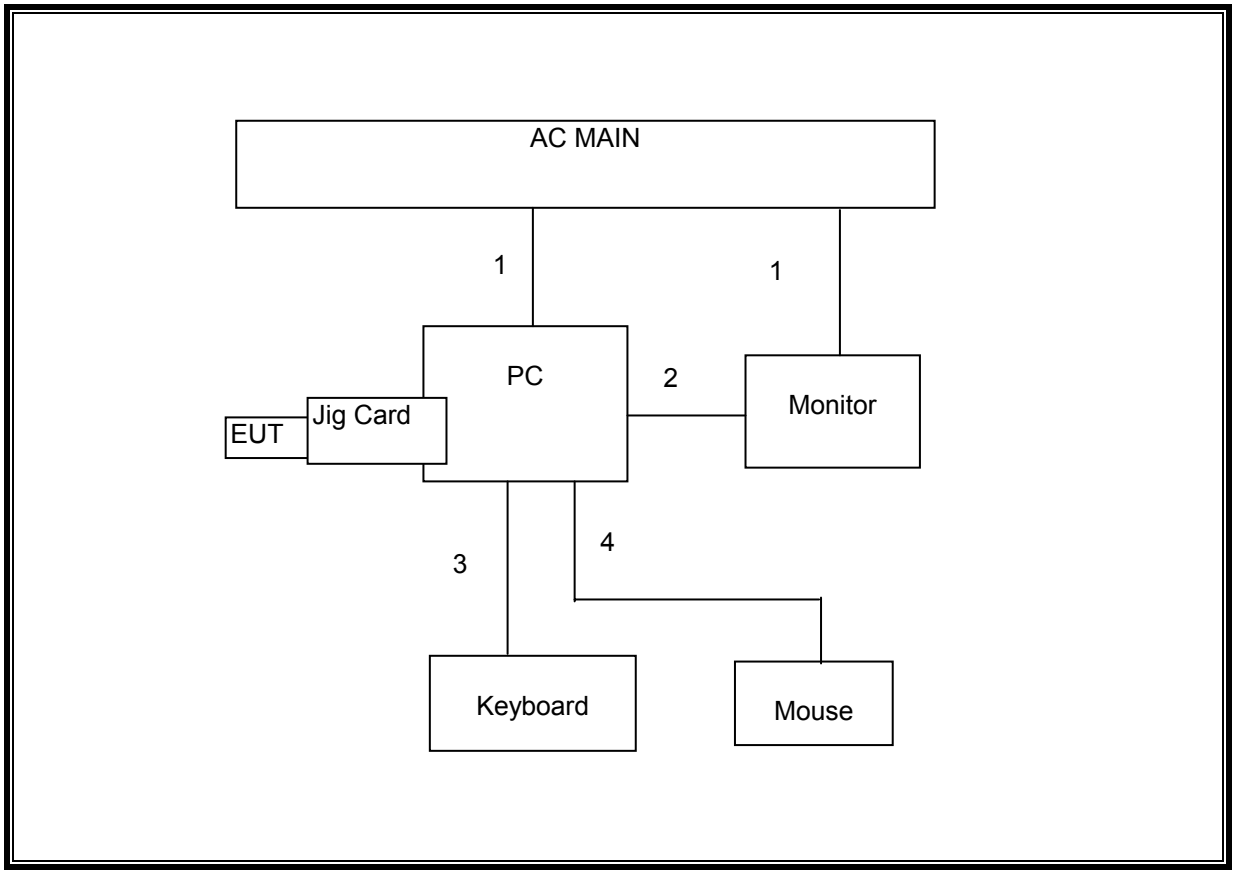
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
PC	Dell	Optiplex 320	NA	DoC
Keyboard	Dell	L100	CNORH65965890746069U	DoC
Mouse	Dell	M-UK Del 3	HCG320G2CEN	DoC

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	US 115V	Un-shielded	2m	NA
2	Video	1	DB15	Shielded	2m	One Torroid on Each End
3	USB	1	KB	Un-shielded	1m	Yes
4	USB	1	Mouse	Un-shielded	1m	Yes

SETUP DIAGRAM



TEST SETUP

The EUT is connected to a host computer via a Jig card during the 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	C01052	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/06/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/12/11
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/30/11
Peak Power Meter	Boonton	4541	C01186	03/01/11
Peak Power Sensor	Boonton	57318	C01202	02/23/11

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.

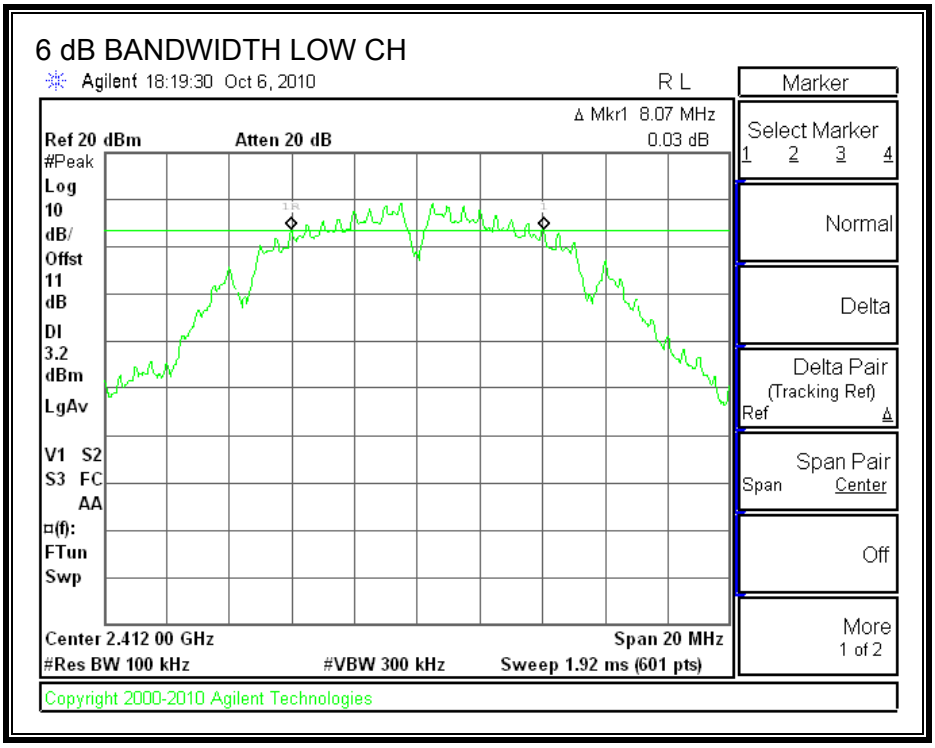
TEST PROCEDURE

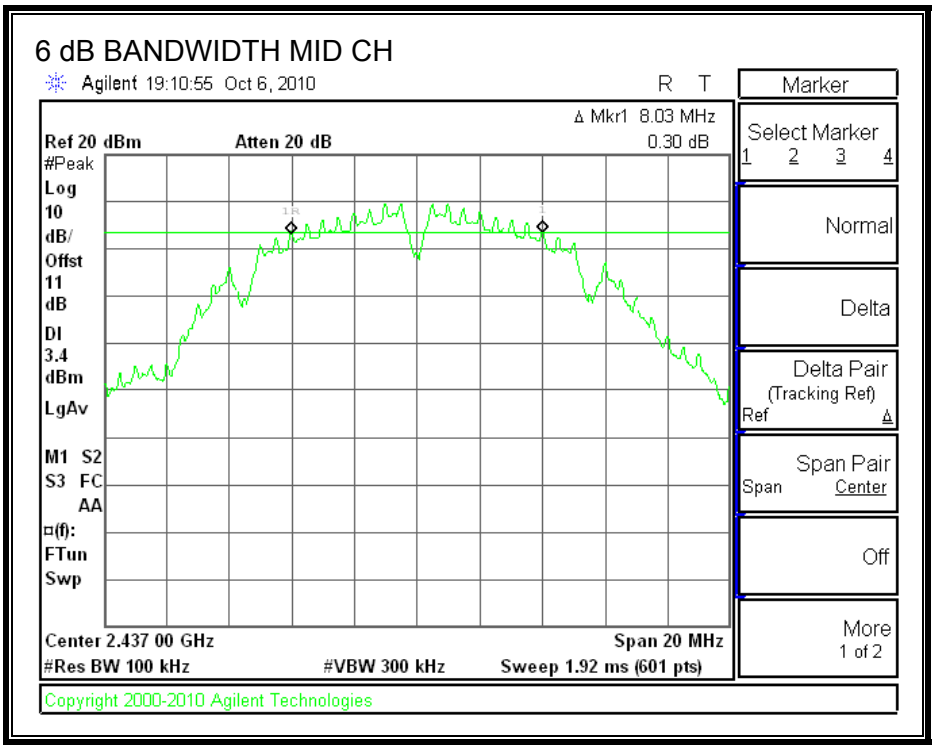
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

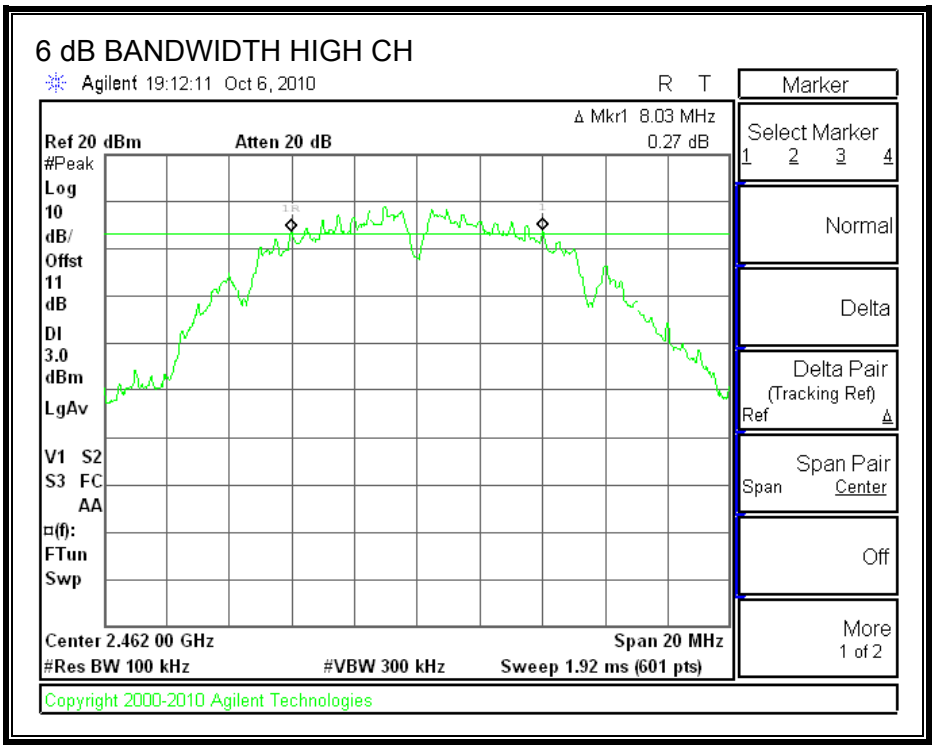
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	8.07	0.5
Middle	2437	8.03	0.5
High	2462	8.03	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

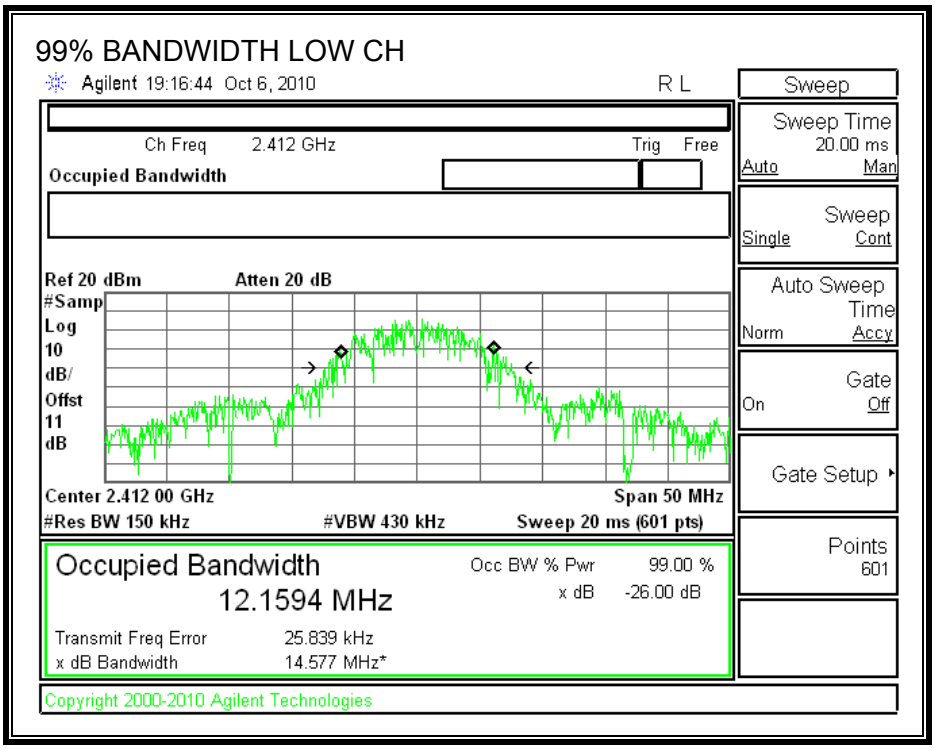
TEST PROCEDURE

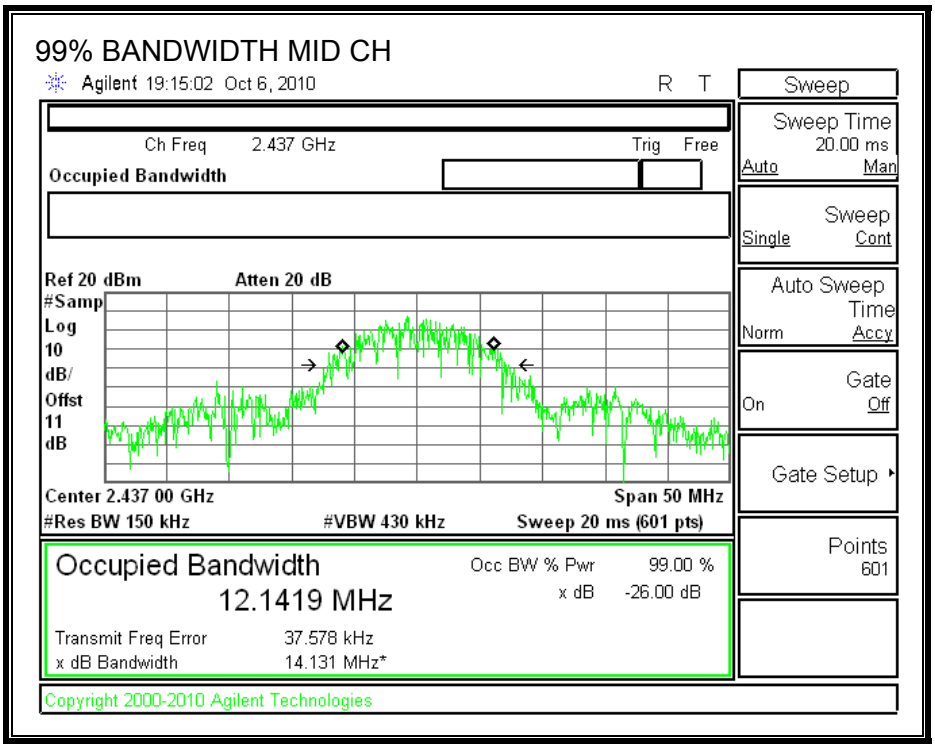
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

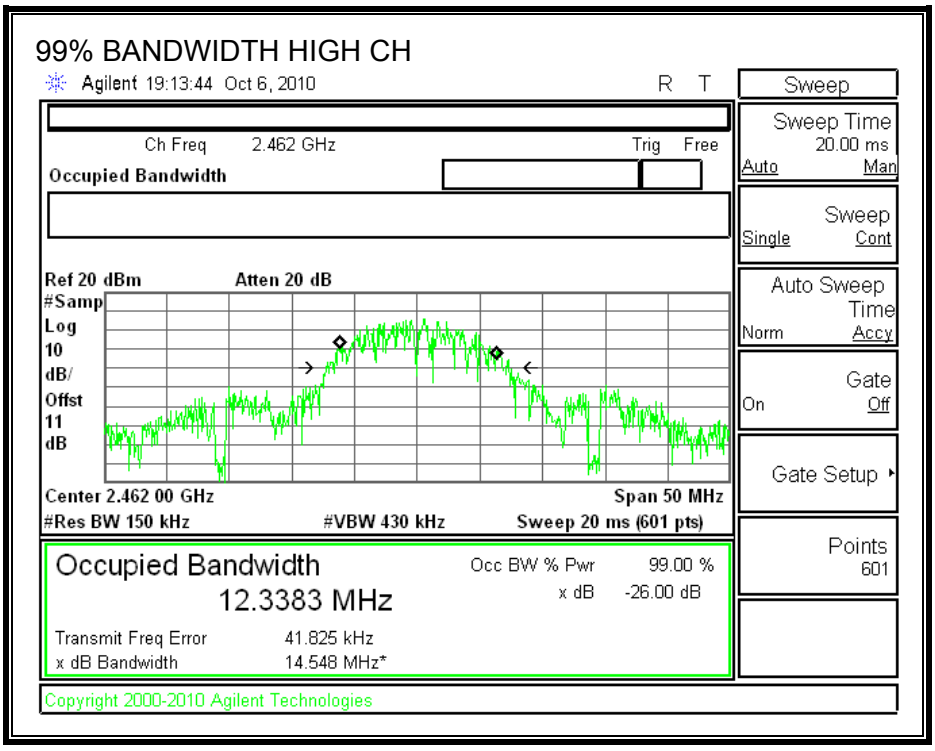
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	12.1594
Middle	2437	12.1419
High	2462	12.3383

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)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.11	30	-10.89
Middle	2437	19.10	30	-10.90
High	2462	19.15	30	-10.85

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 11dB (including 10 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2412	15.95
Middle	2437	16.20
High	2462	16.20

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.

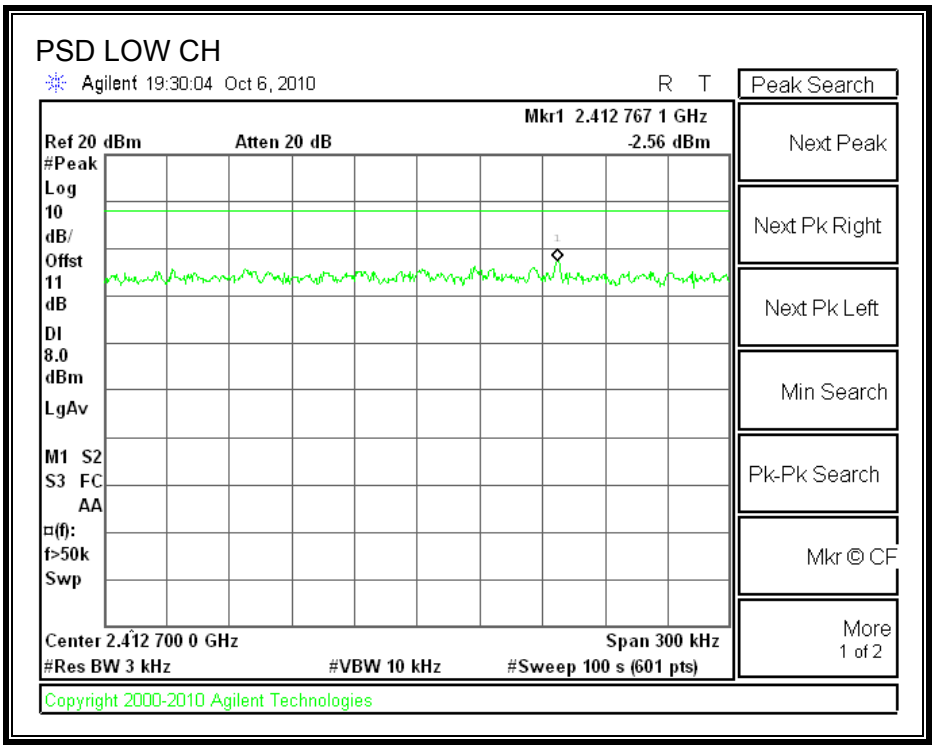
TEST PROCEDURE

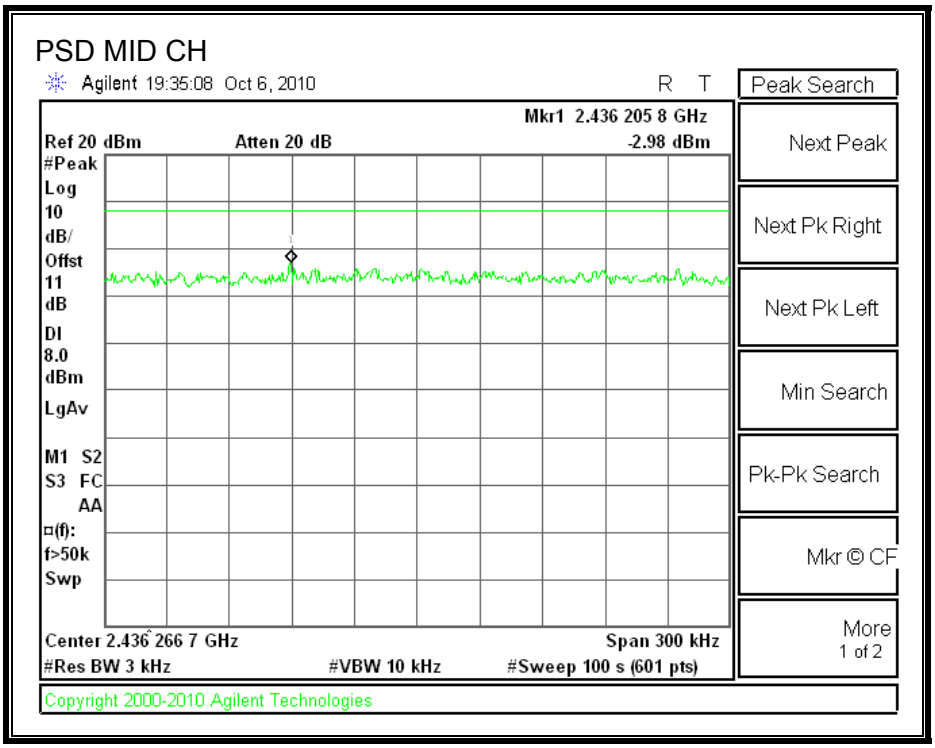
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

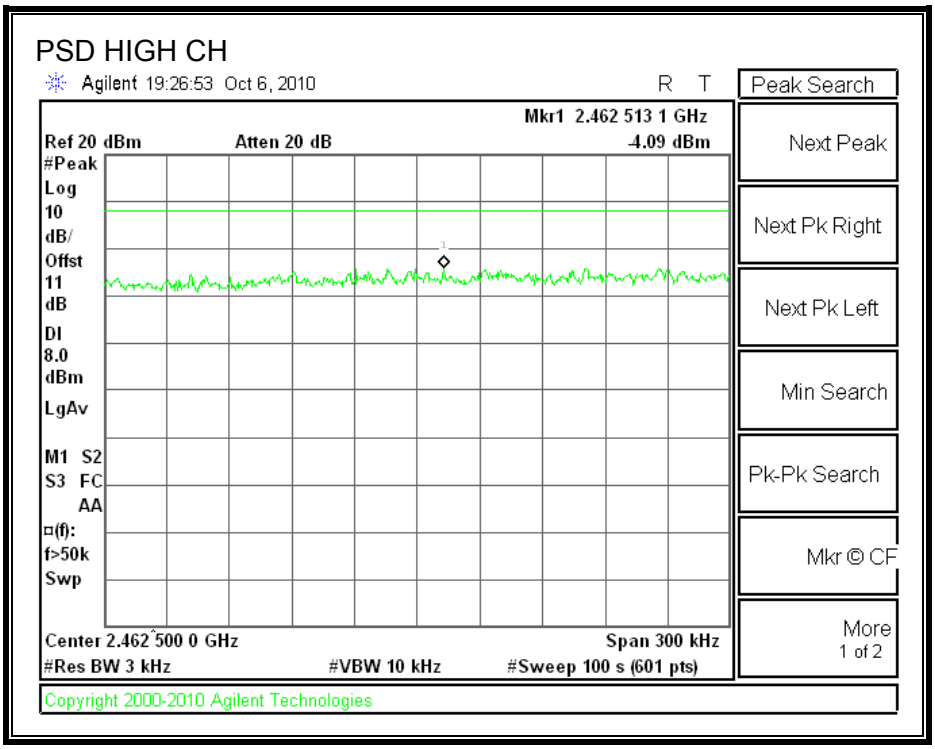
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-2.56	8	-10.56
Middle	2437	-2.98	8	-10.98
High	2462	-4.09	8	-12.09

POWER SPECTRAL DENSITY





PSD HIGH CH



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.

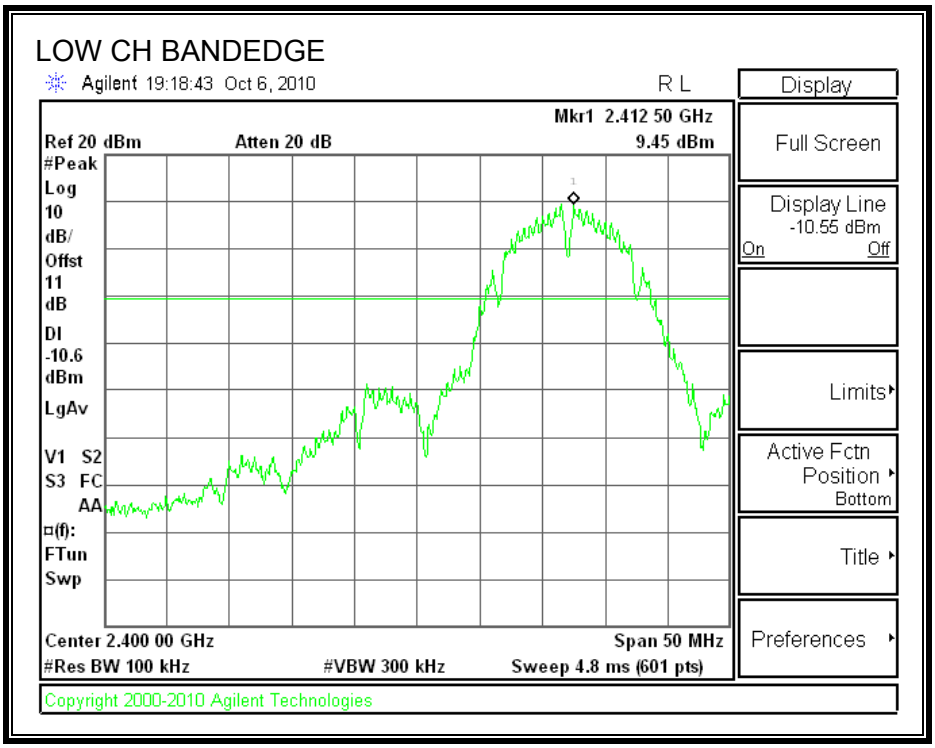
TEST PROCEDURE

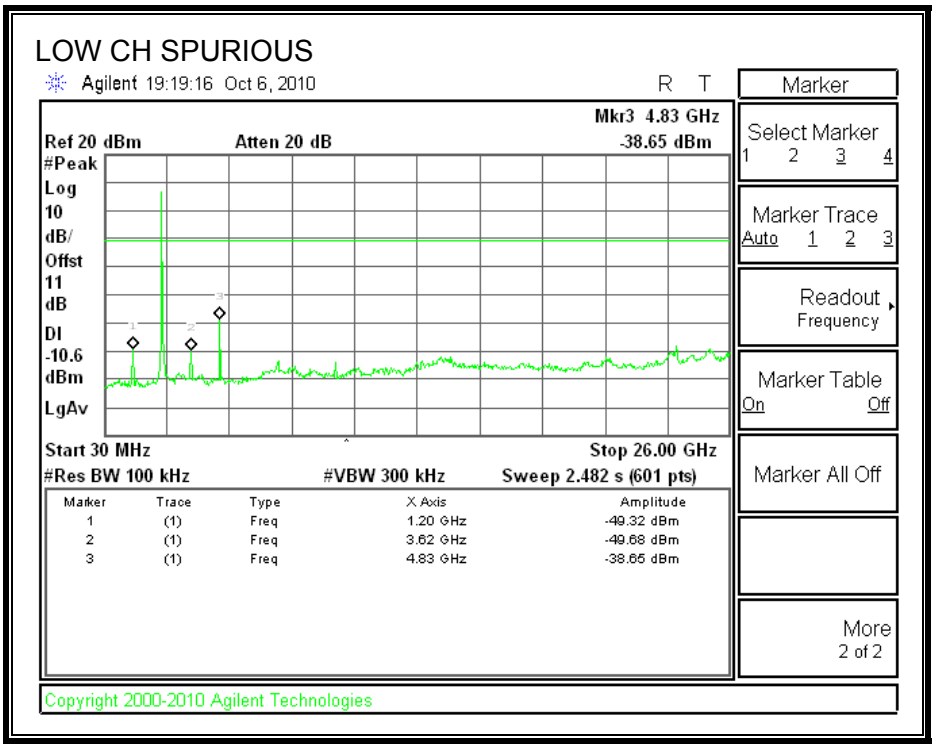
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

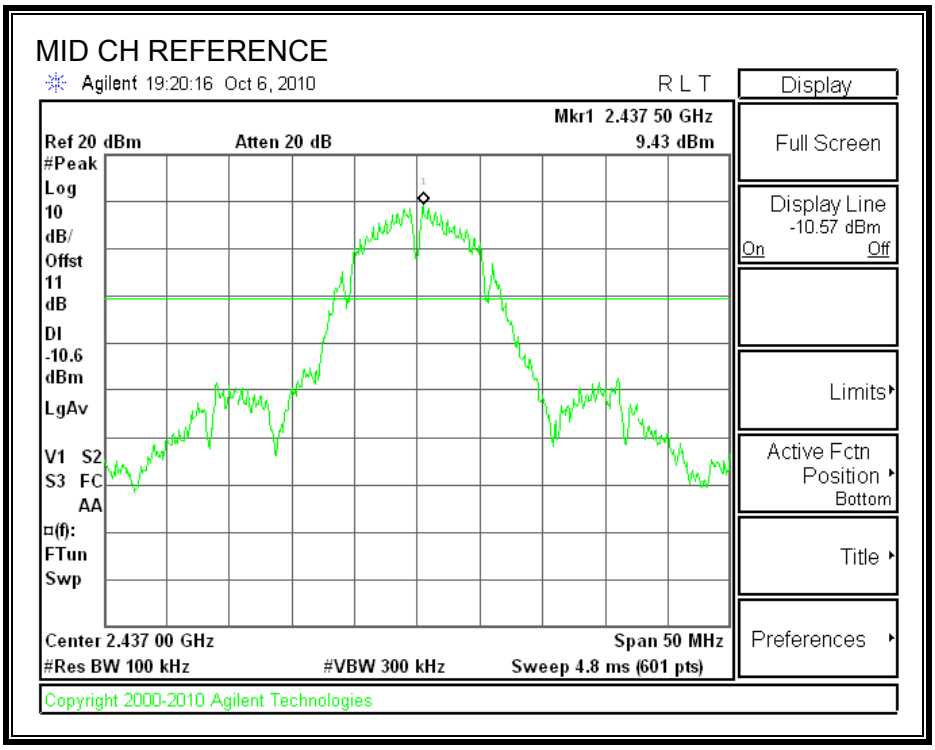
RESULTS

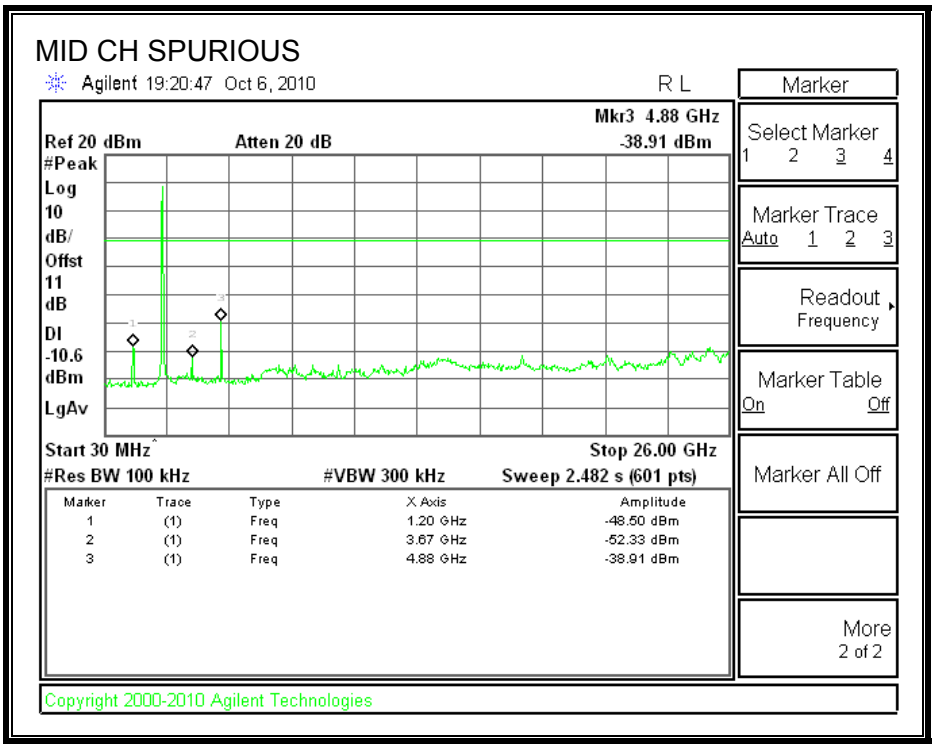
SPURIOUS EMISSIONS, LOW CHANNEL



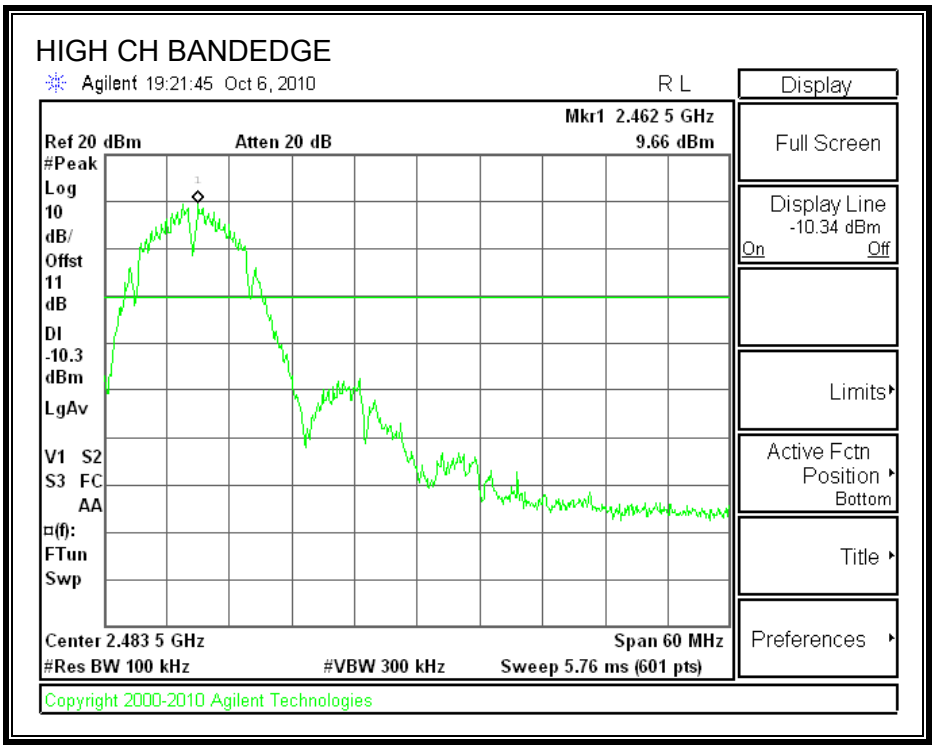


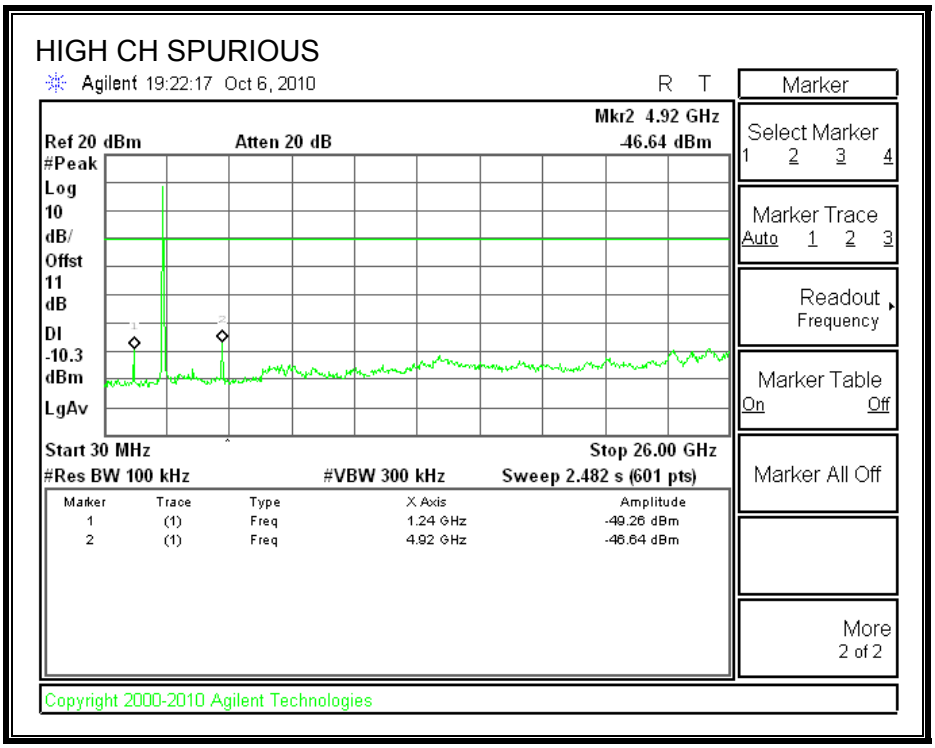
SPURIOUS EMISSIONS, MID CHANNEL





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.

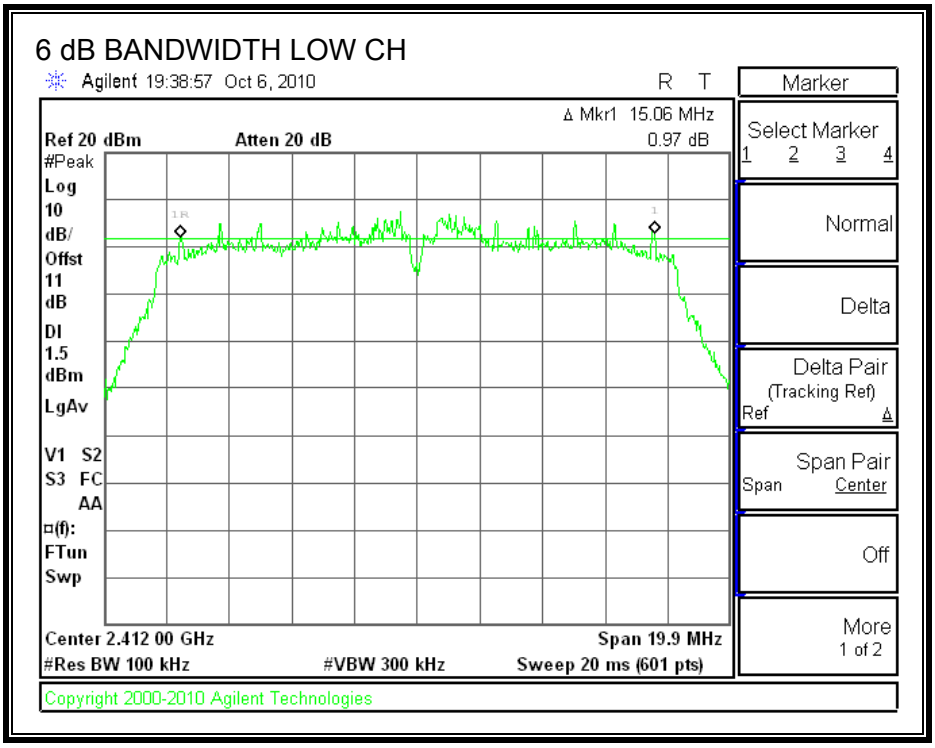
TEST PROCEDURE

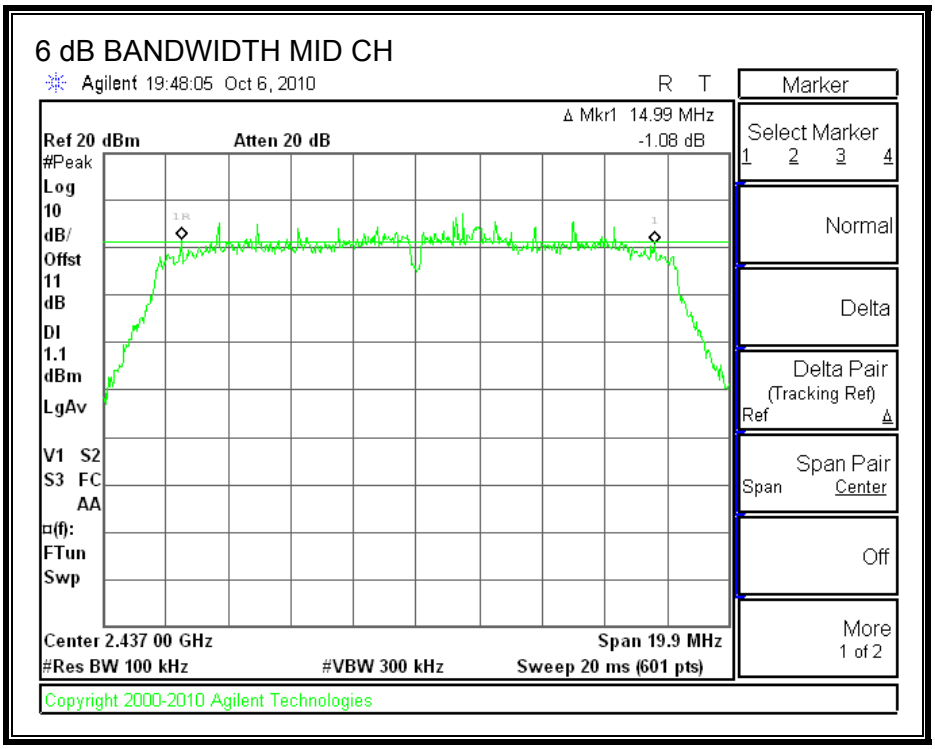
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

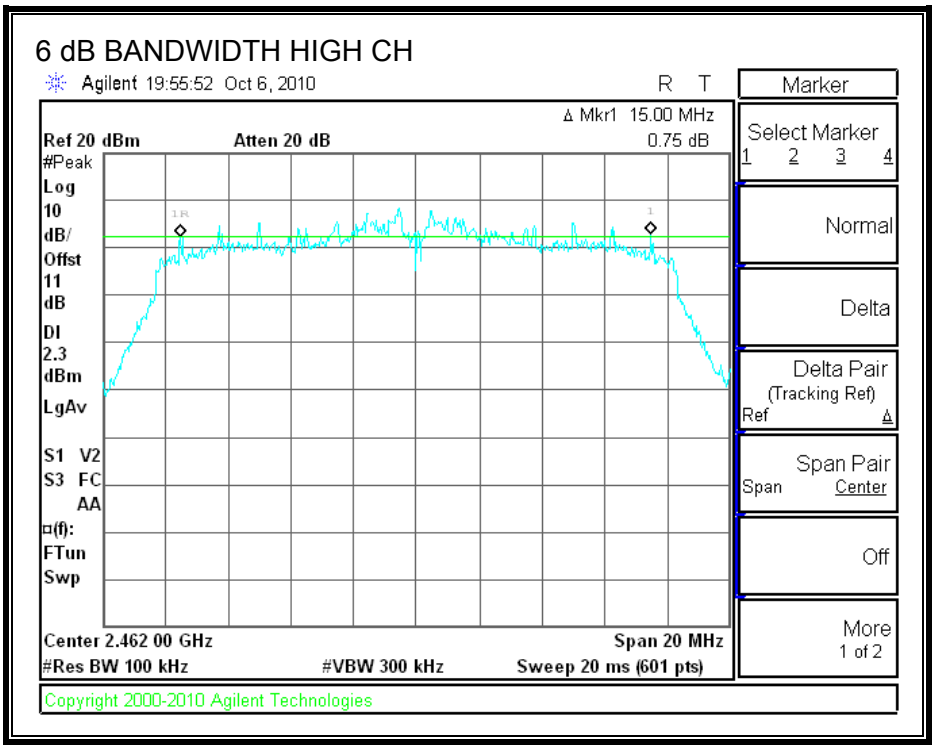
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15.06	0.5
Middle	2437	14.99	0.5
High	2462	15	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

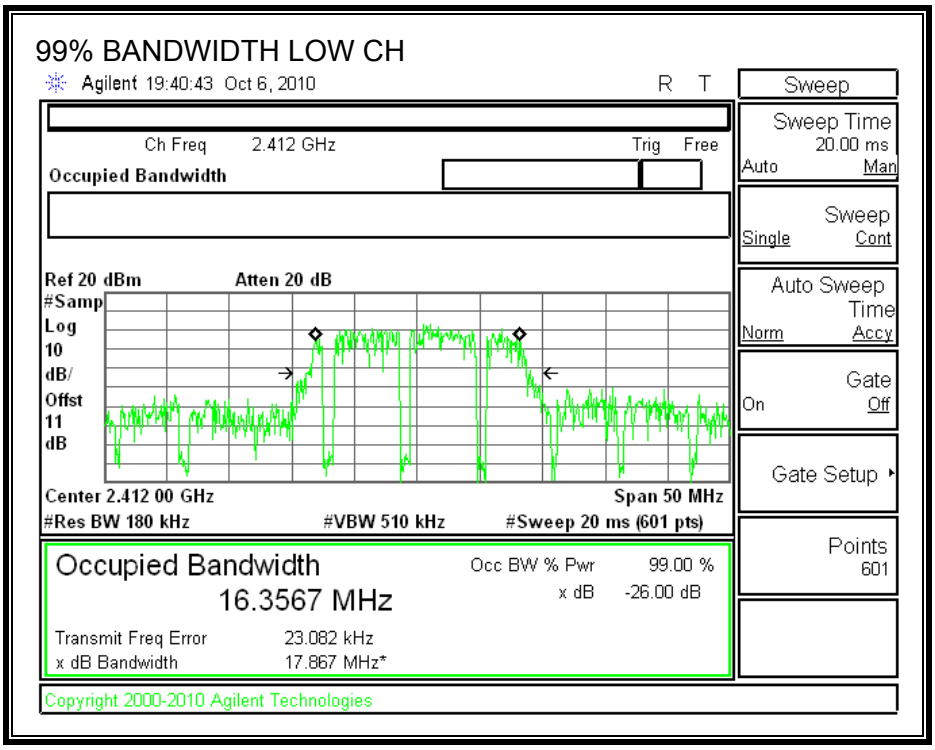
TEST PROCEDURE

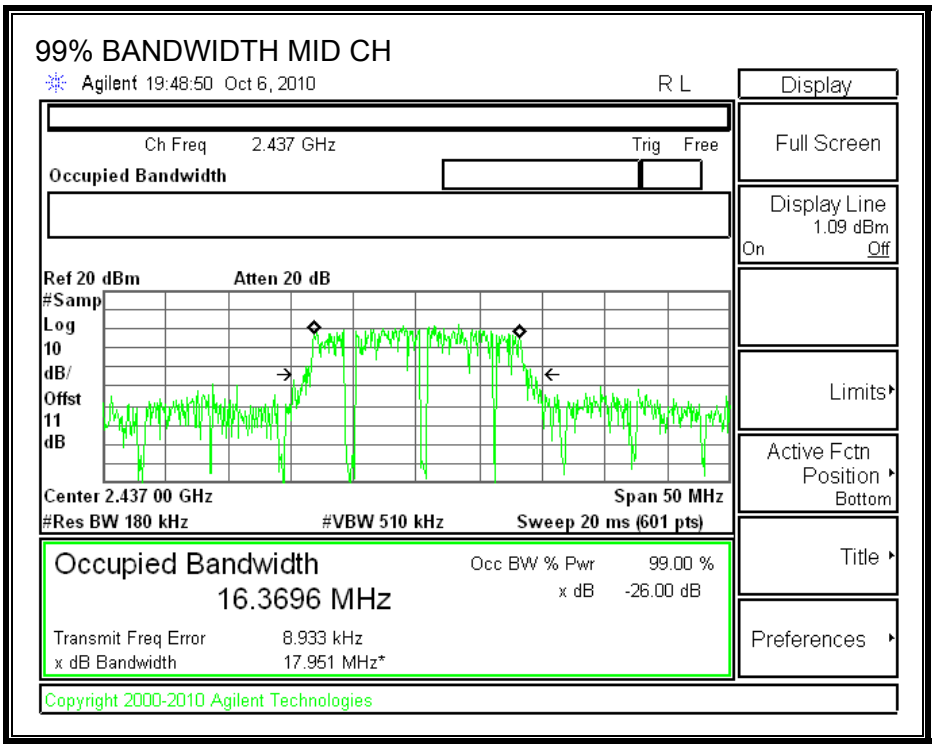
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

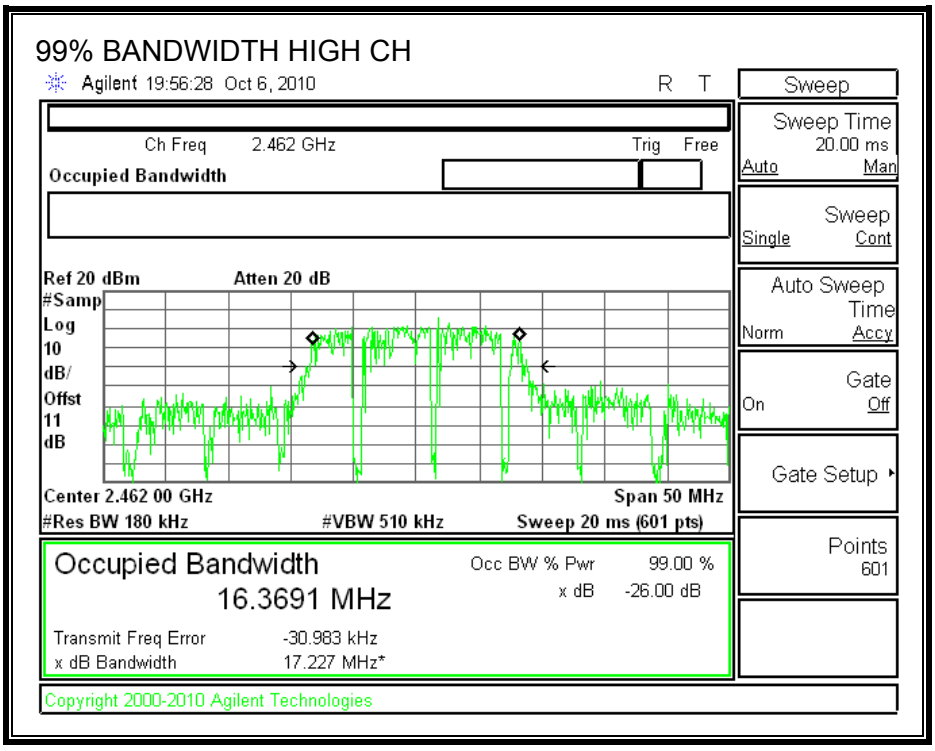
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.3567
Middle	2437	16.3696
High	2462	16.3691

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. z

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	25.40	30	-4.60
Middle	2437	25.22	30	-4.78
High	2462	25.20	30	-4.80

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 11 dB (including 10 dB pad and 1 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	15.15
Middle	2437	15.37
High	2462	15.20

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.

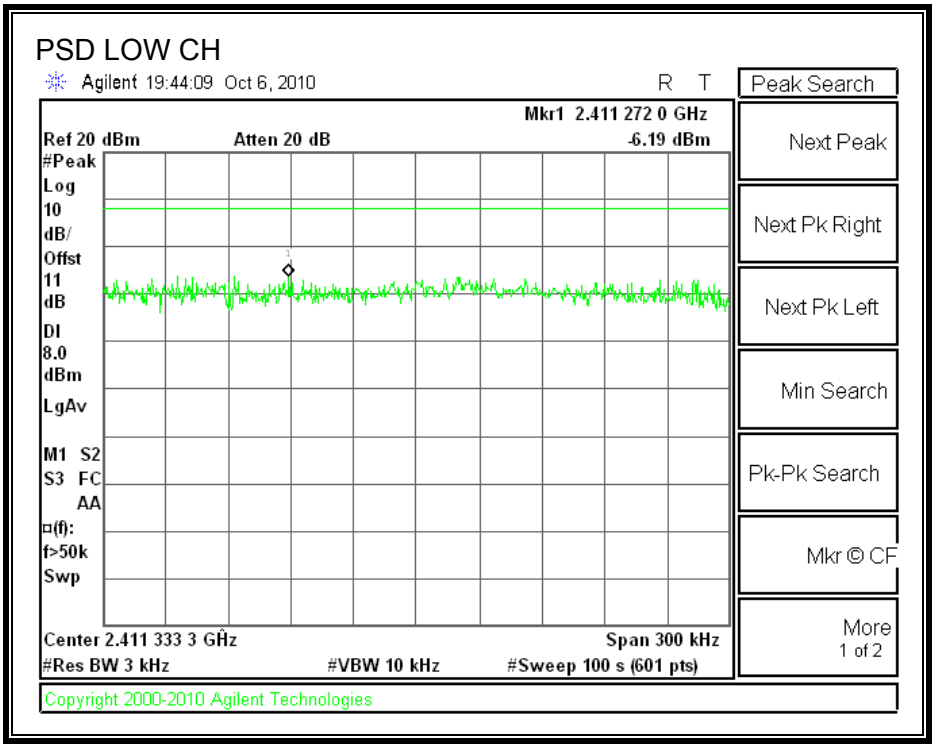
TEST PROCEDURE

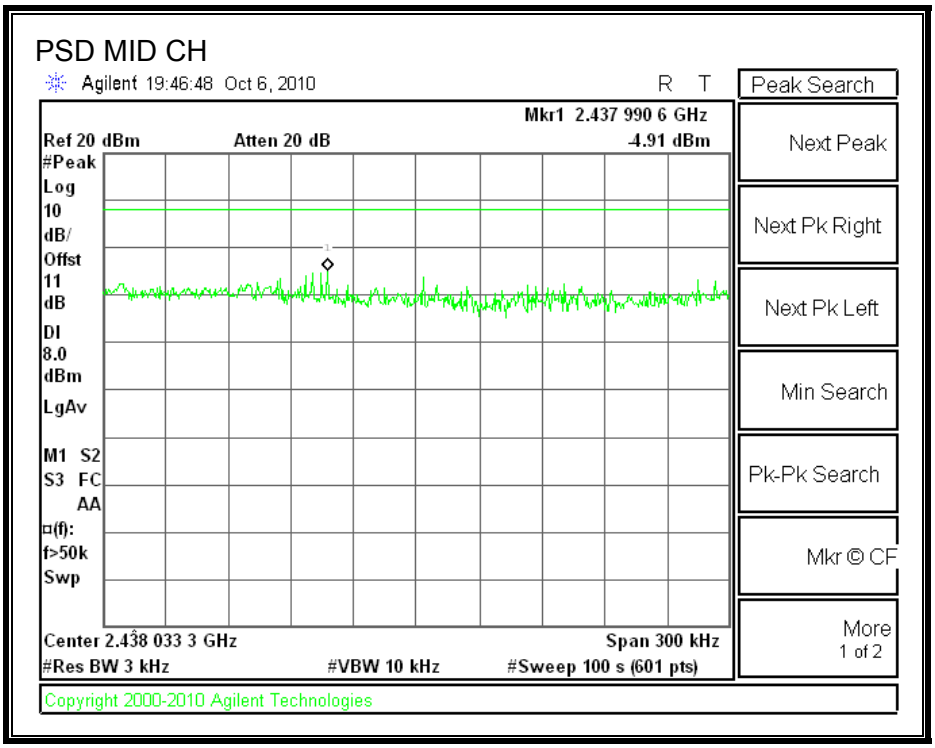
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

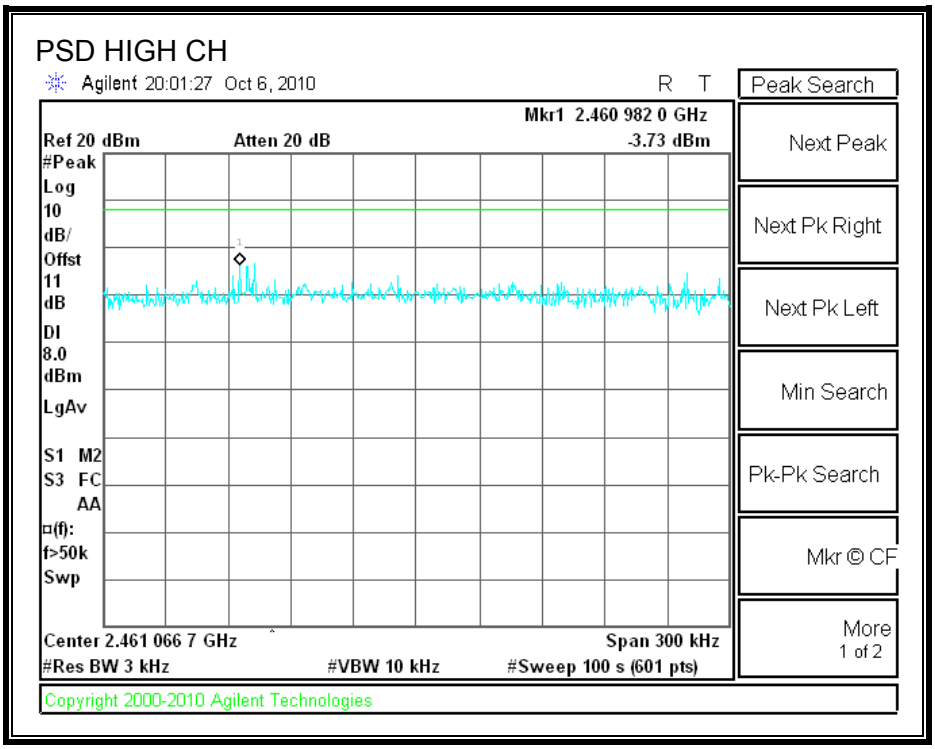
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.19	8	-14.19
Middle	2437	-4.91	8	-12.91
High	2462	-3.73	8	-11.73

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.

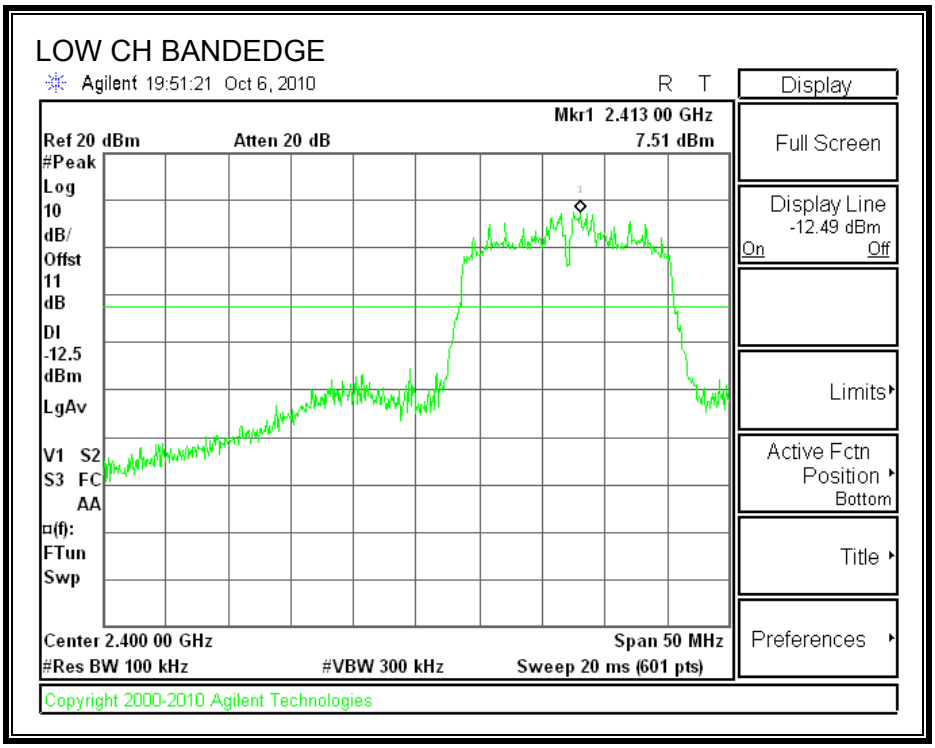
TEST PROCEDURE

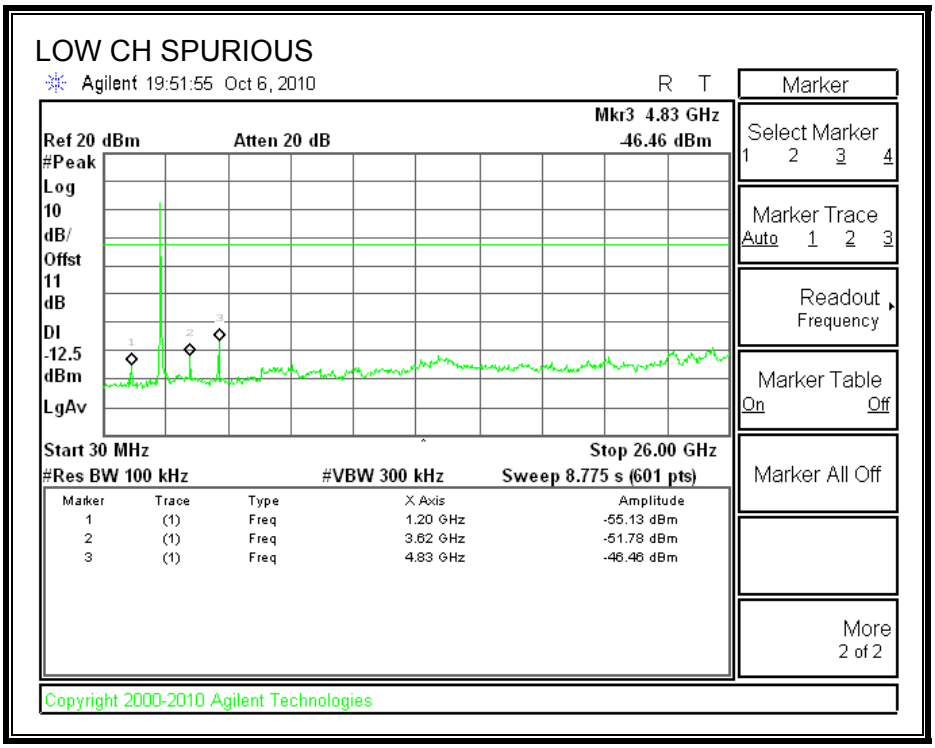
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

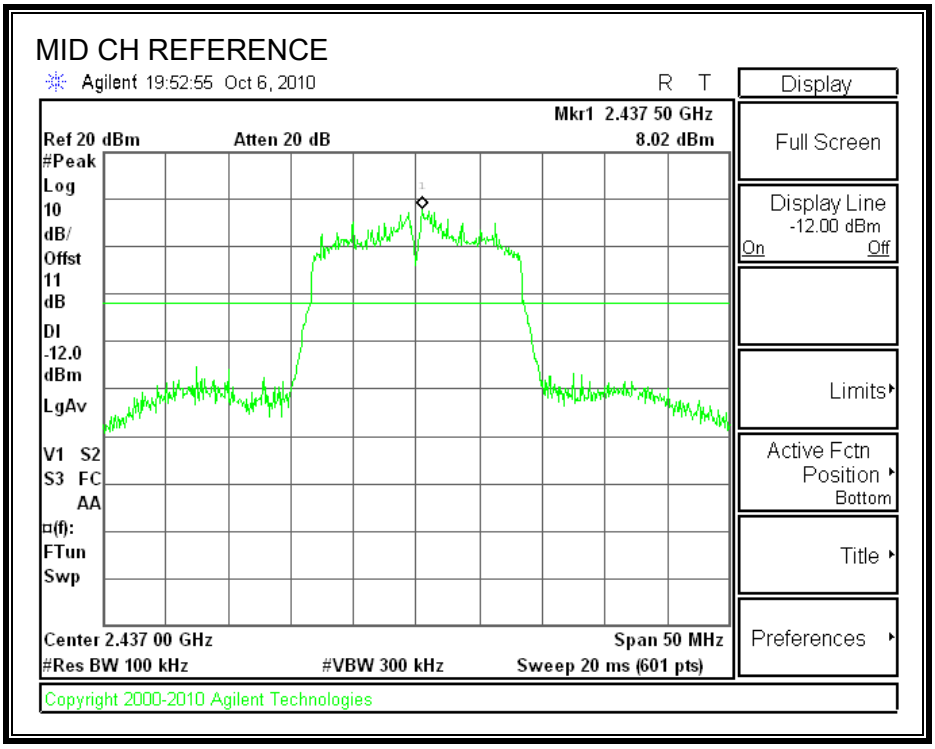
RESULTS

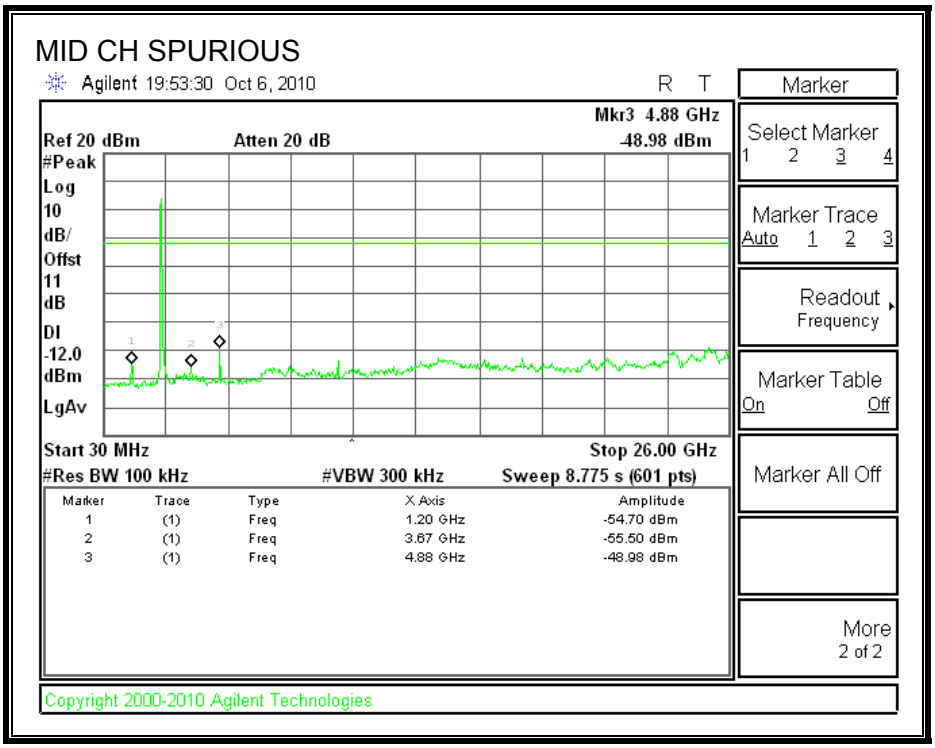
SPURIOUS EMISSIONS, LOW CHANNEL



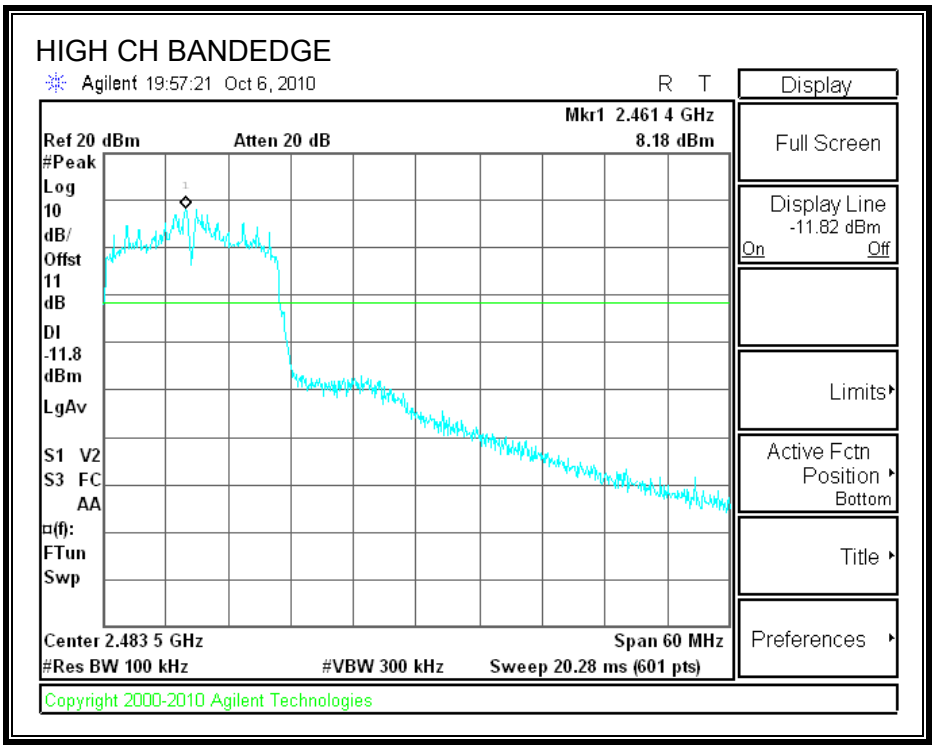


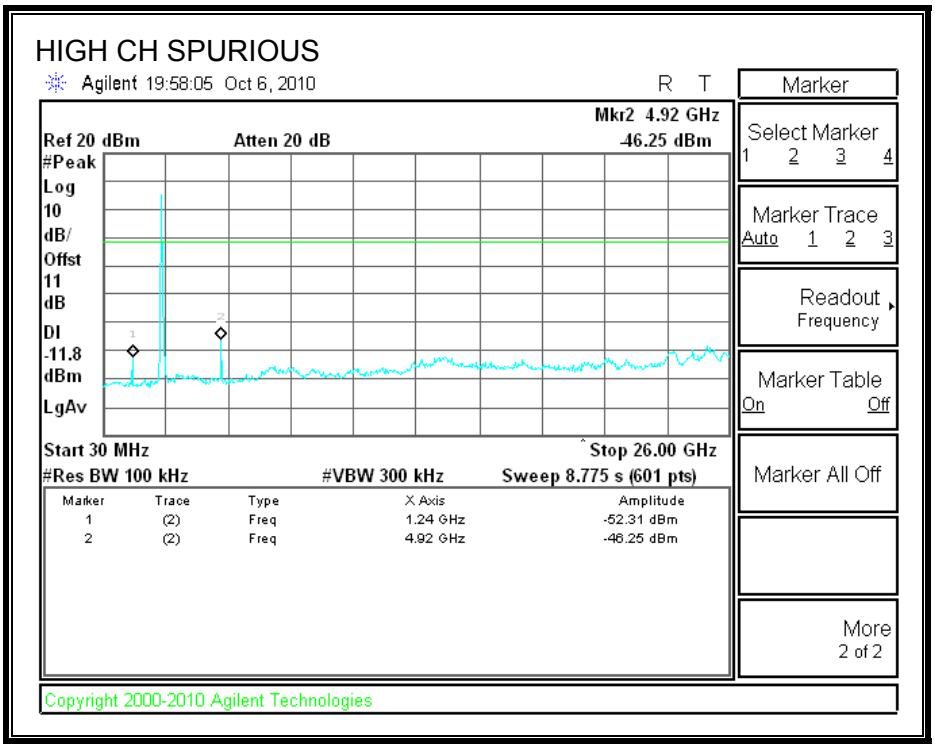
SPURIOUS EMISSIONS, MID CHANNEL





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.

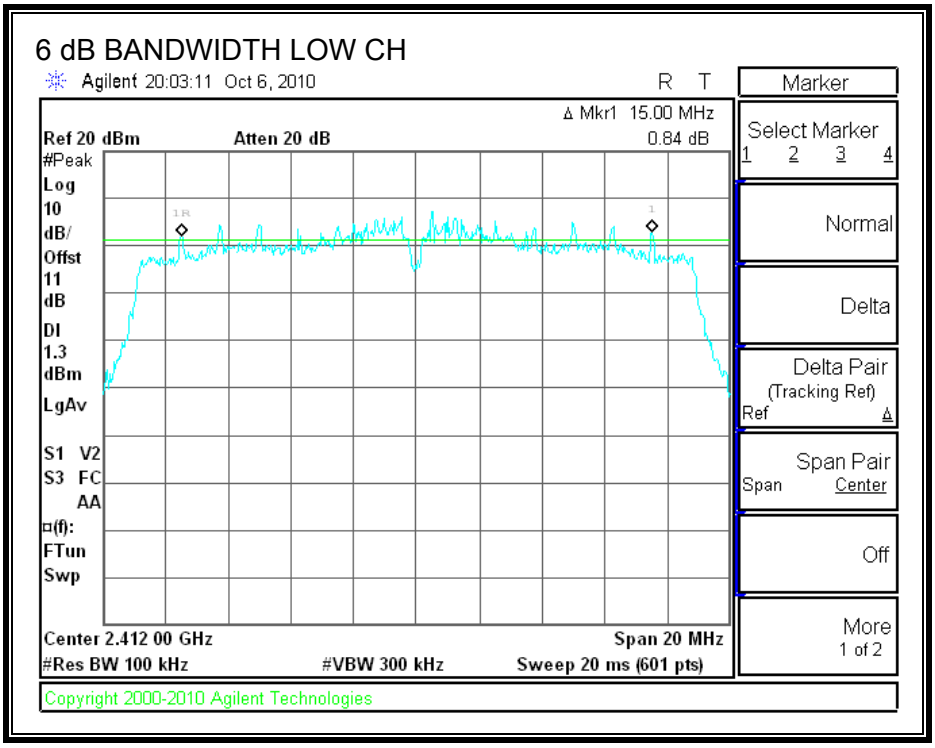
TEST PROCEDURE

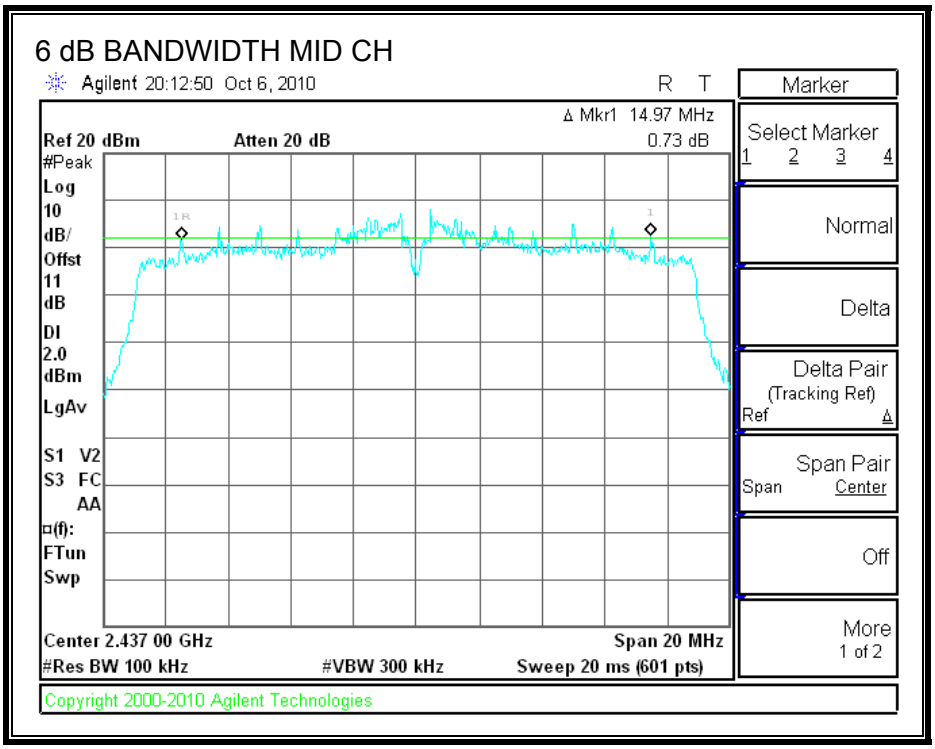
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

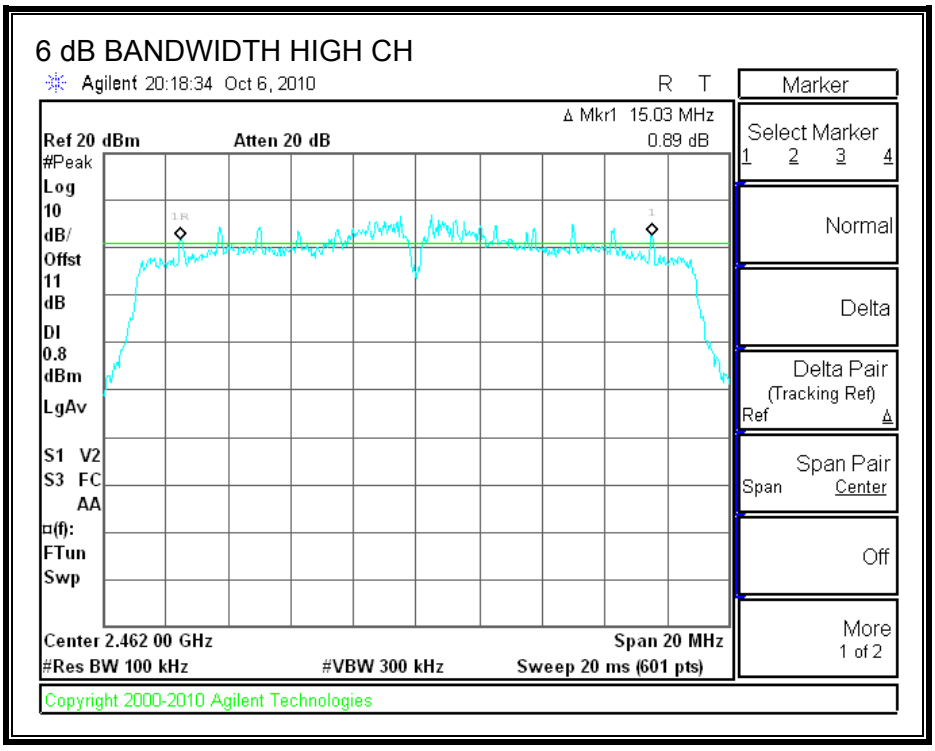
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	15	0.5
Middle	2437	14.97	0.5
High	2462	15.03	0.5

6 dB BANDWIDTH







7.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

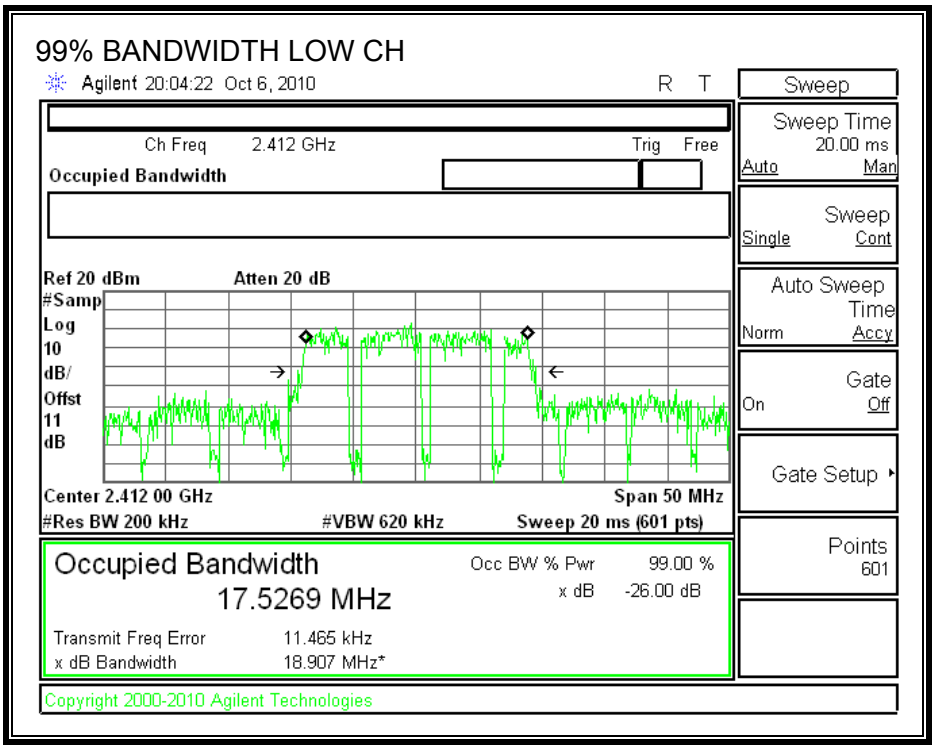
TEST PROCEDURE

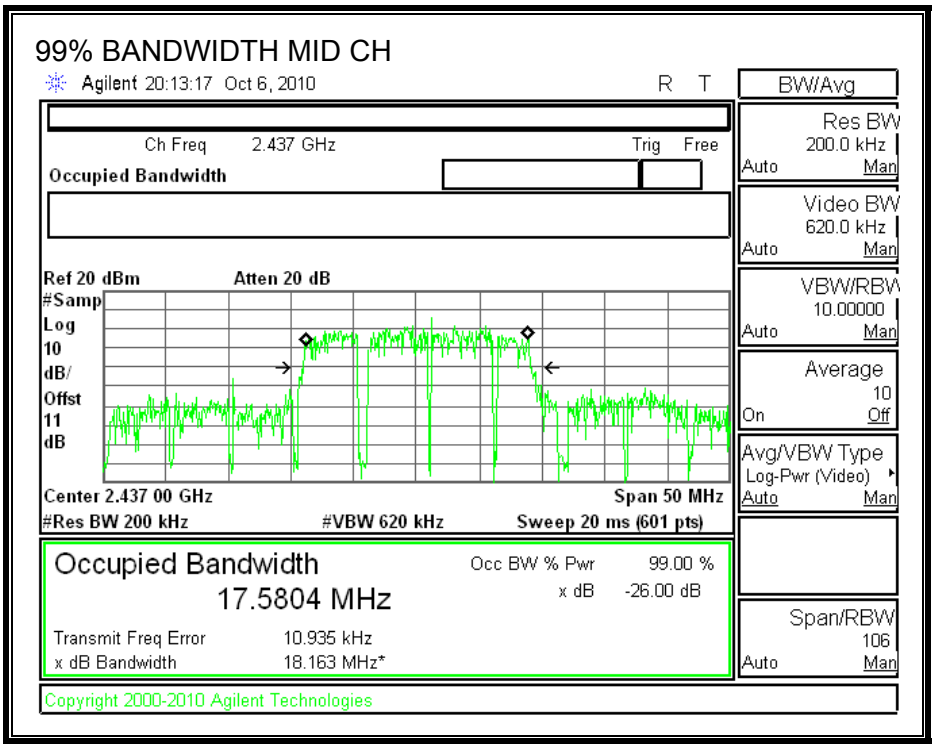
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

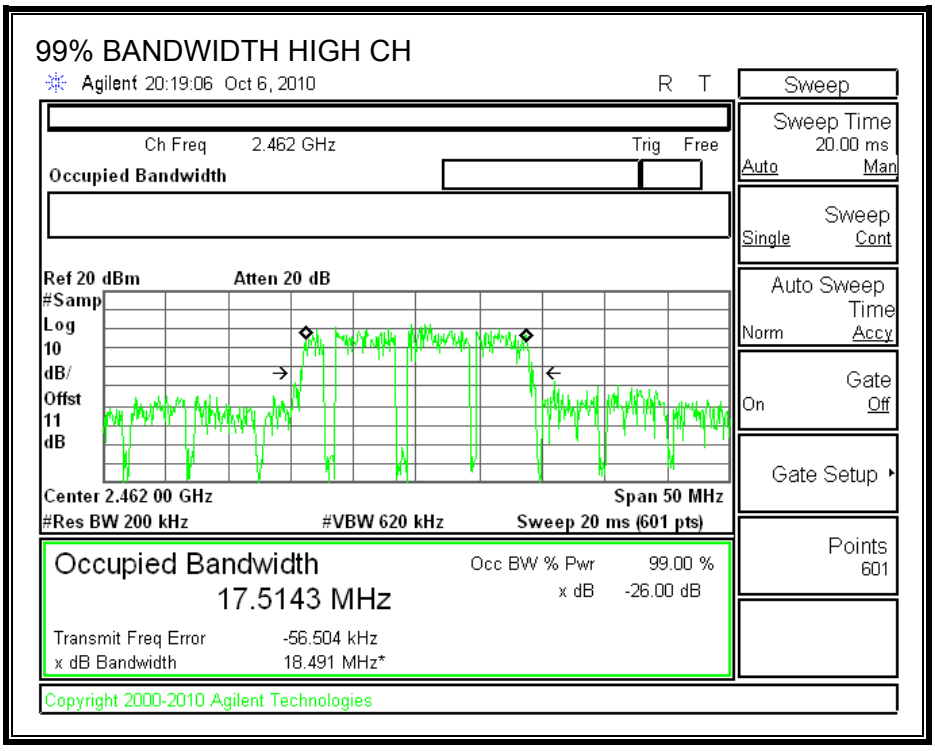
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.5269
Middle	2437	17.5804
High	2462	17.5143

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)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	24.84	30	-5.16
Middle	2437	24.90	30	-5.10
High	2462	24.71	30	-5.29

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 11 dB (including 10 dB pad and 1.0 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	14.50
Middle	2437	14.60
High	2462	14.50

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.

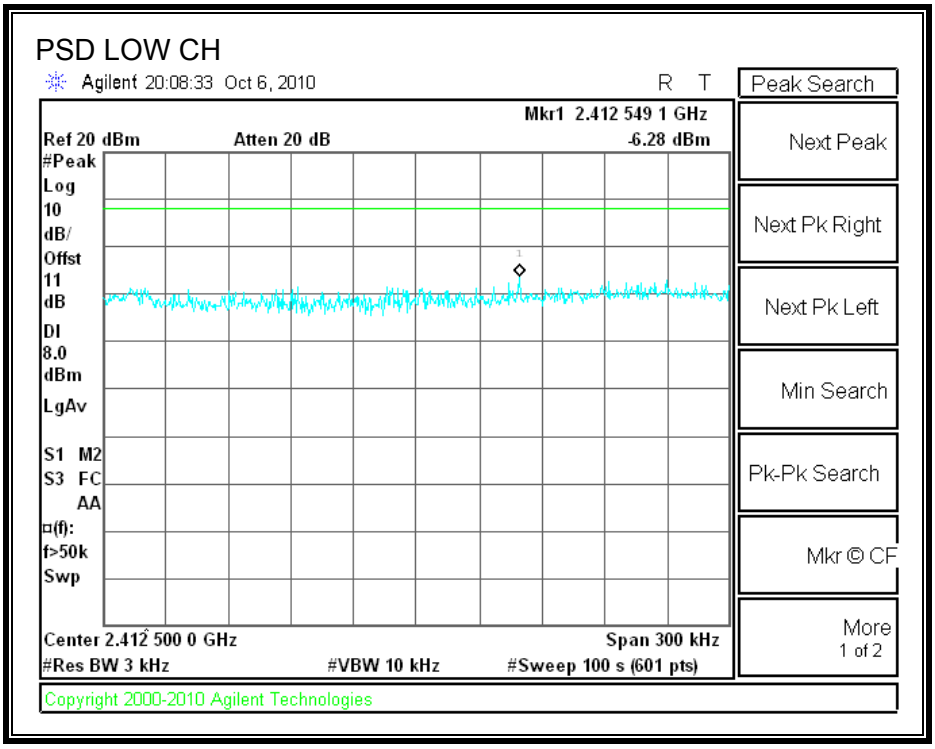
TEST PROCEDURE

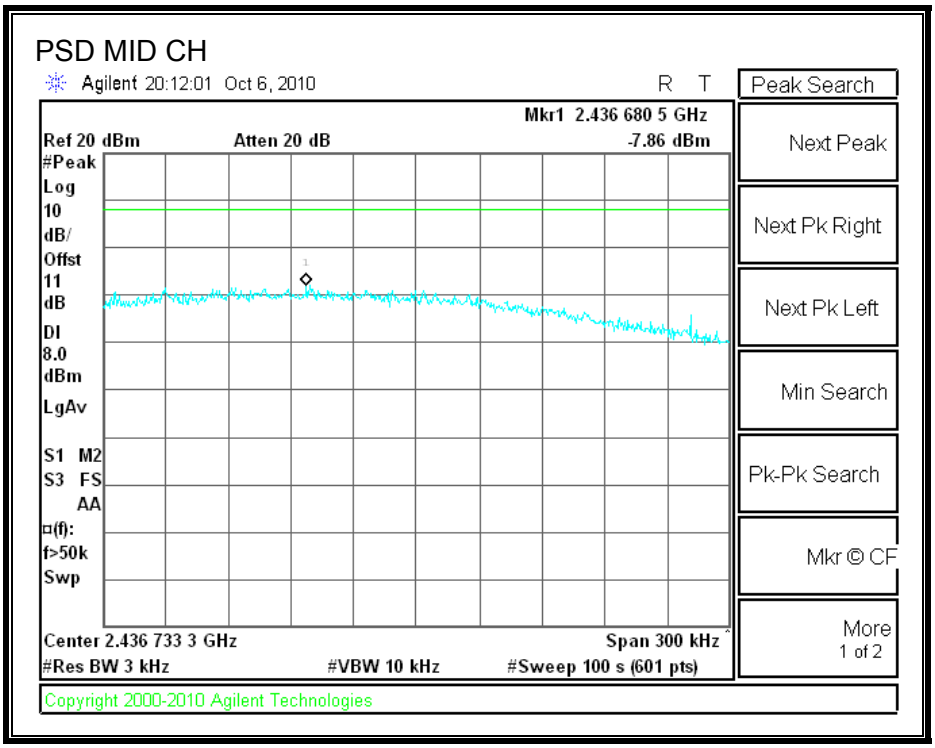
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

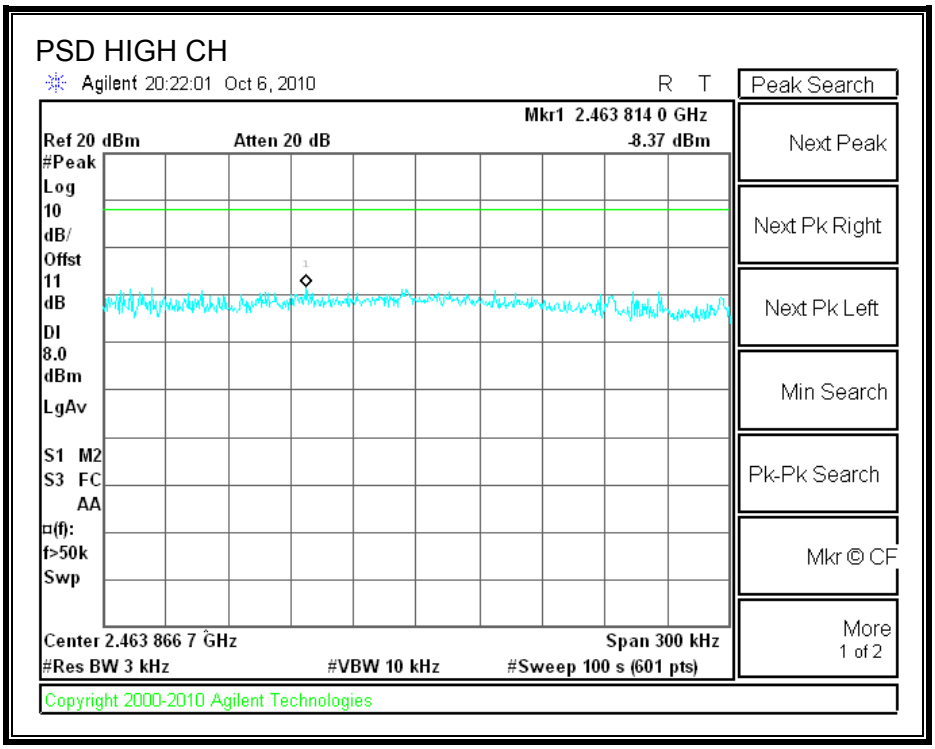
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-6.28	8	-14.28
Middle	2437	-7.86	8	-15.86
High	2462	-8.37	8	-16.37

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.

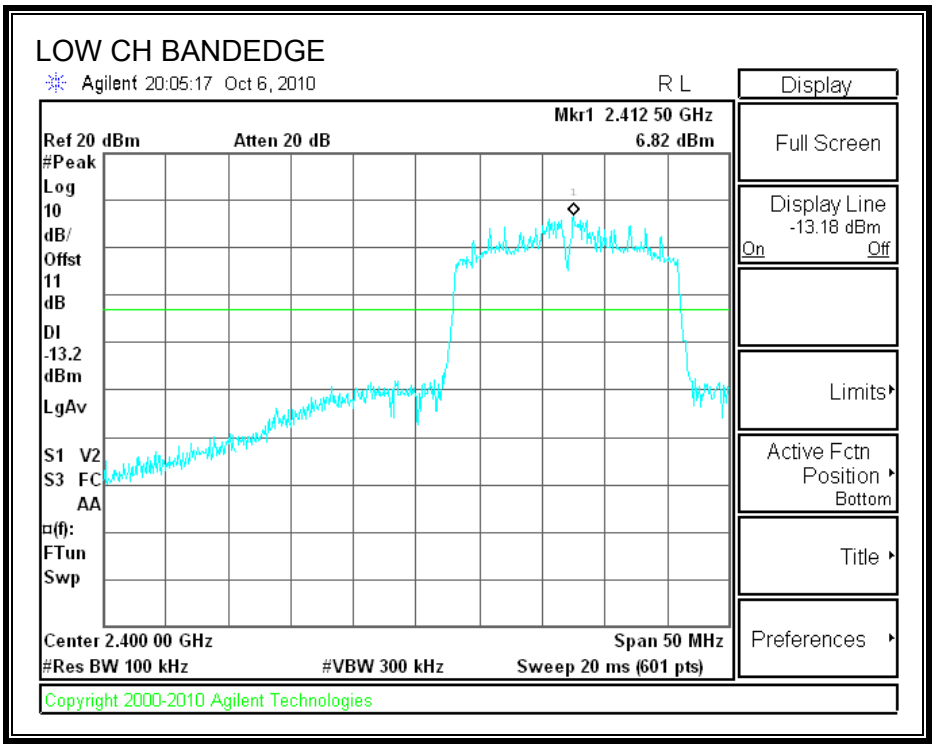
TEST PROCEDURE

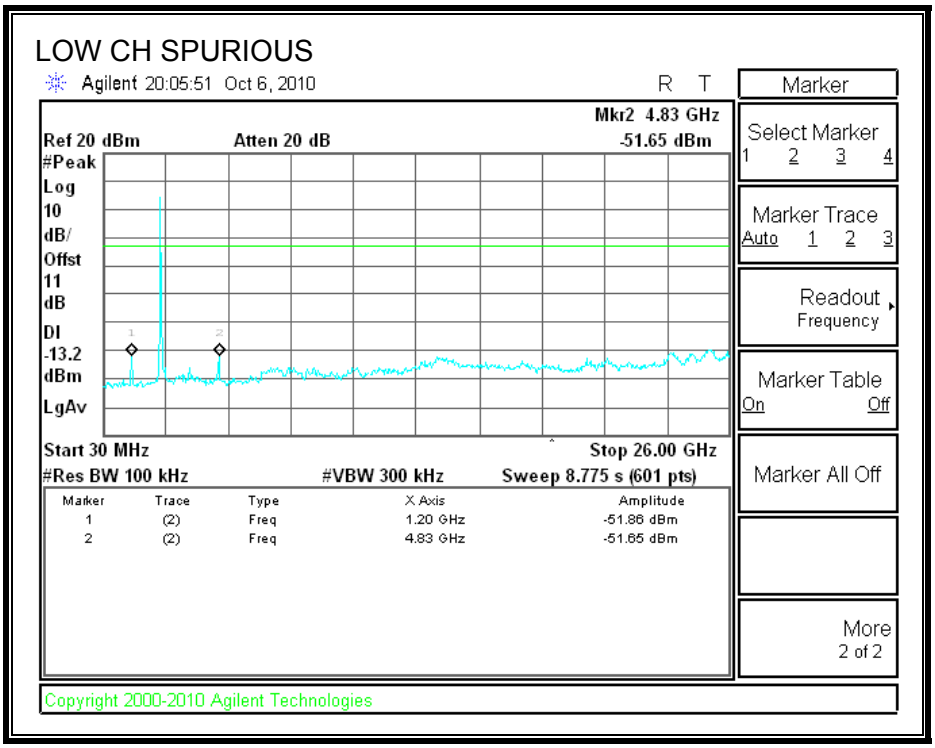
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

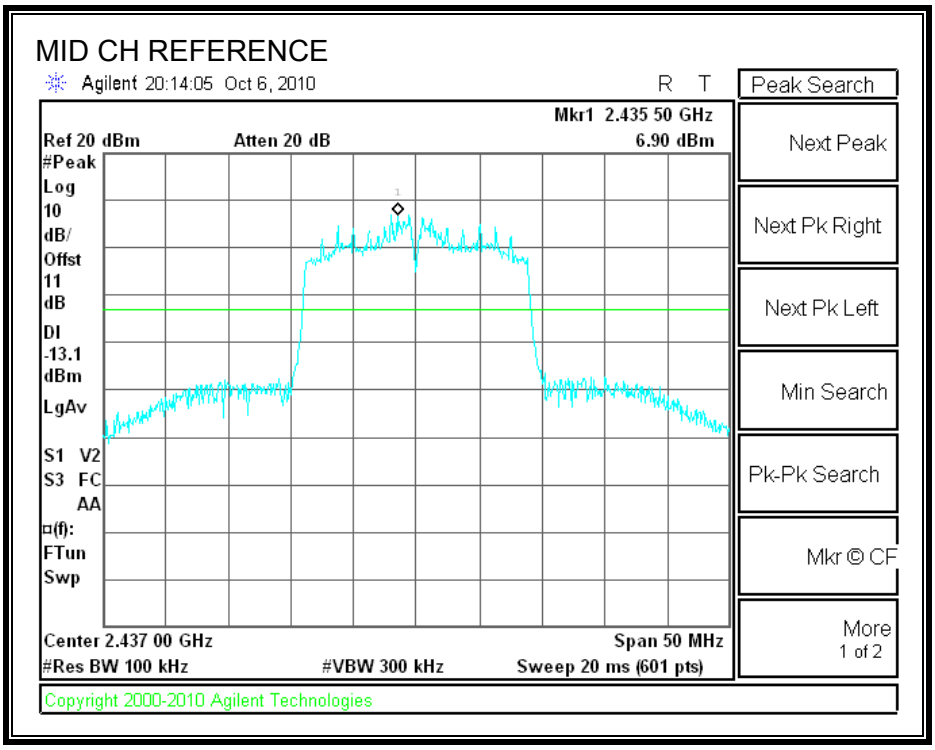
RESULTS

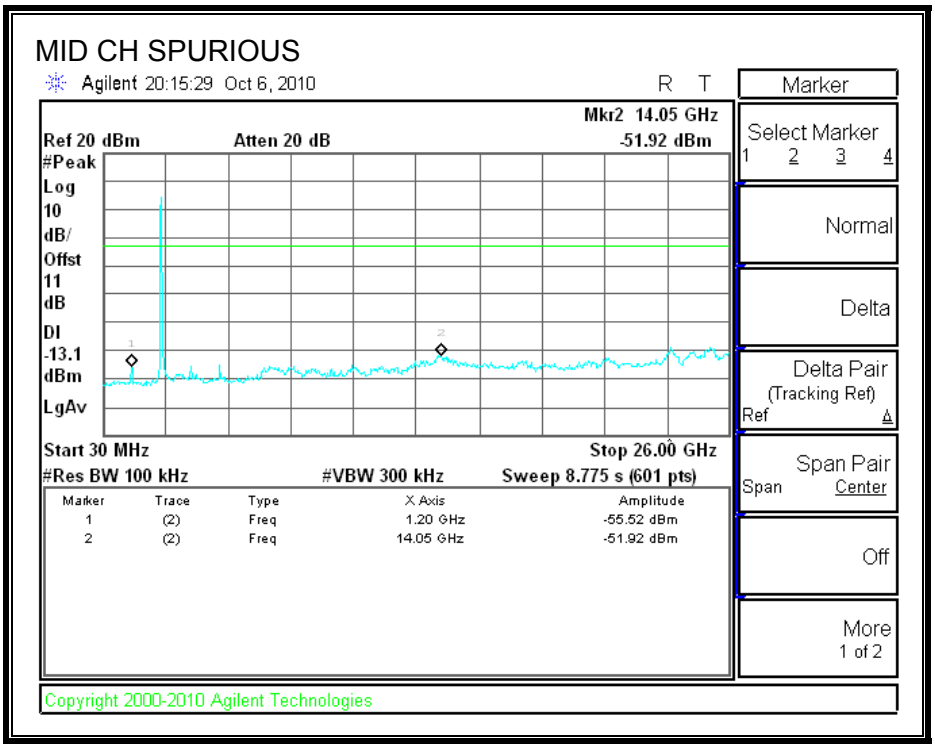
SPURIOUS EMISSIONS, LOW CHANNEL



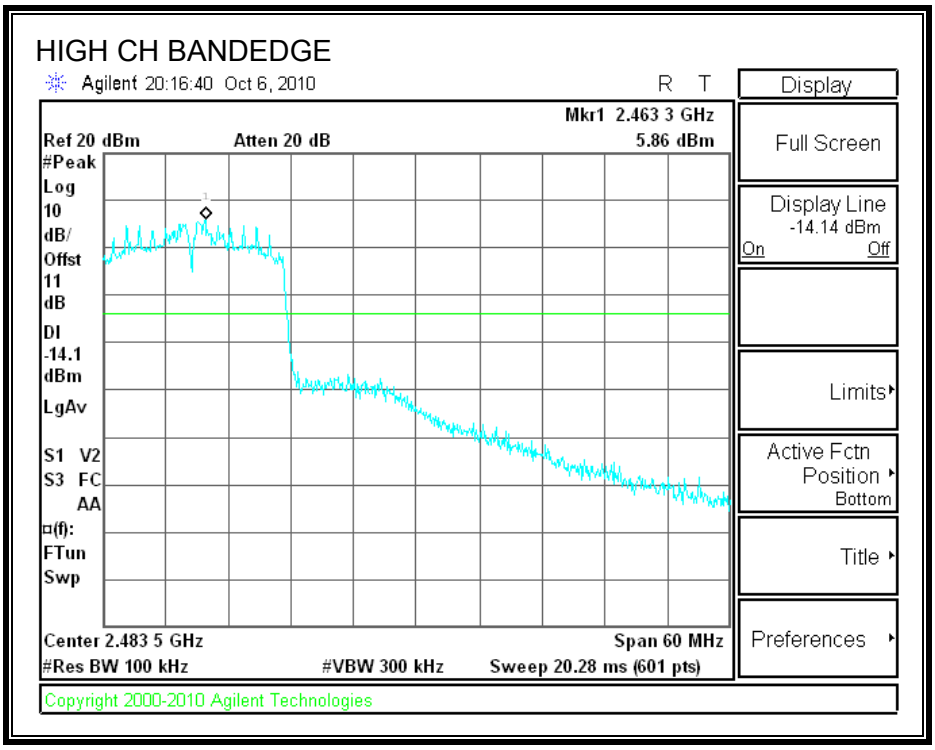


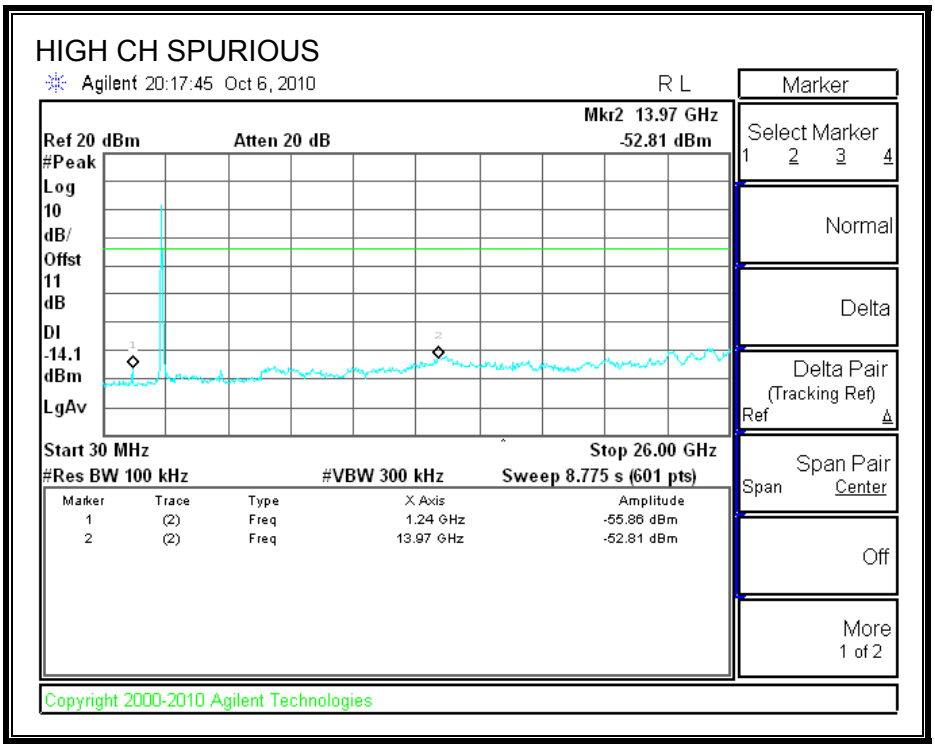
SPURIOUS EMISSIONS, MID CHANNEL





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

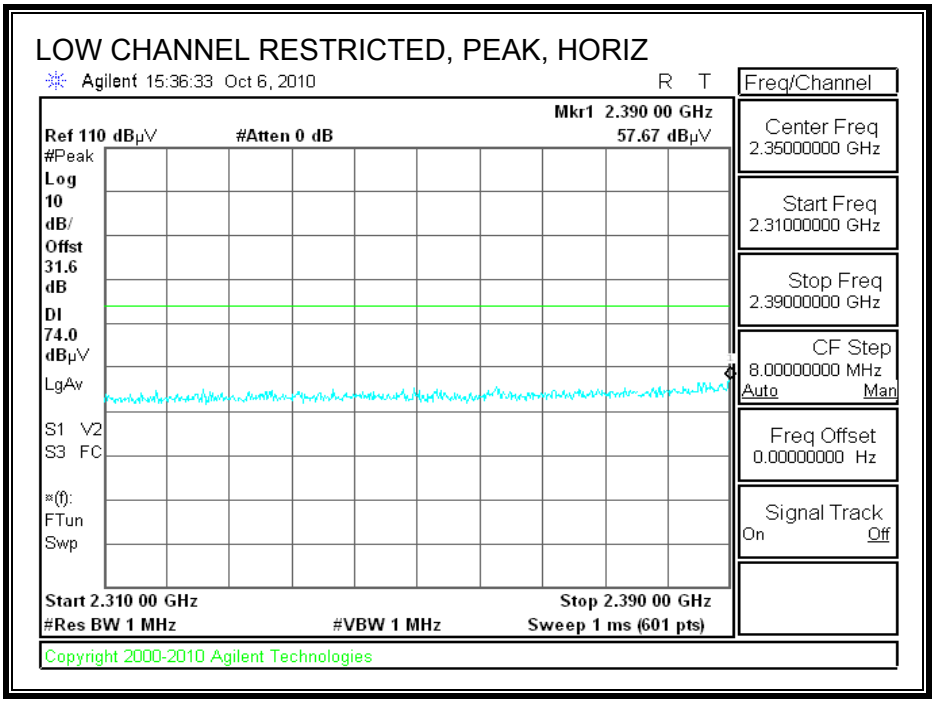
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

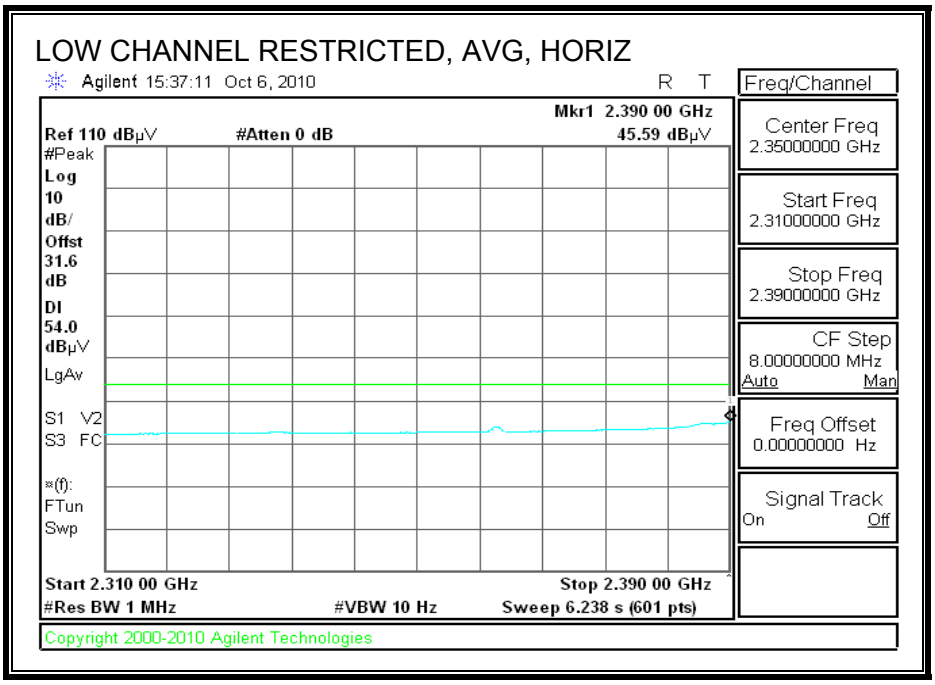
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

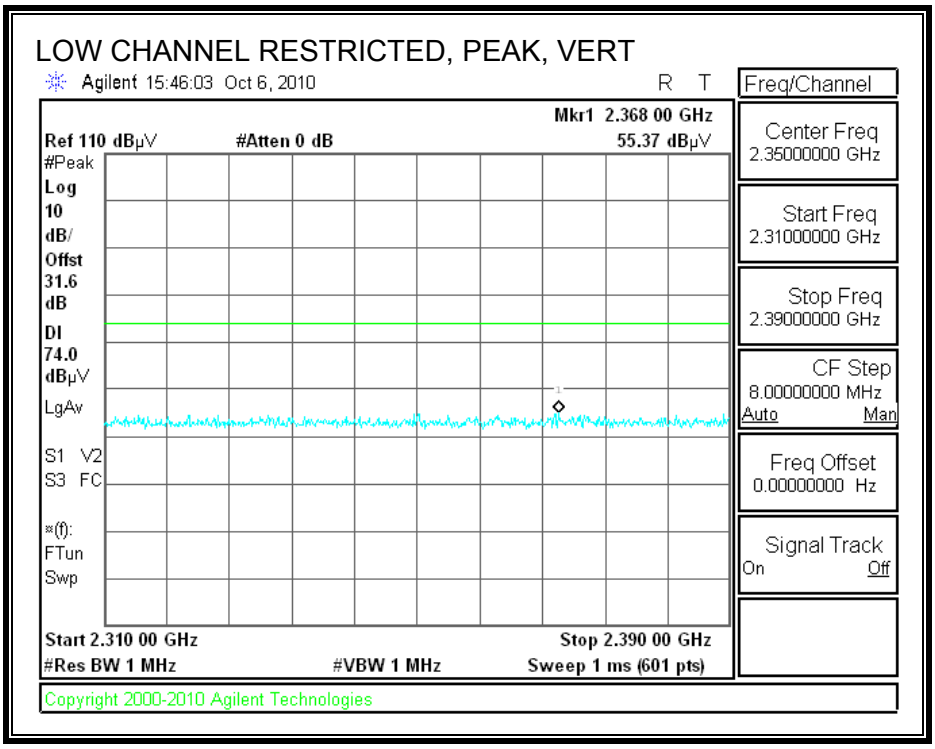
8.2.1. 802.11b MODE IN THE 2.4 GHz BAND

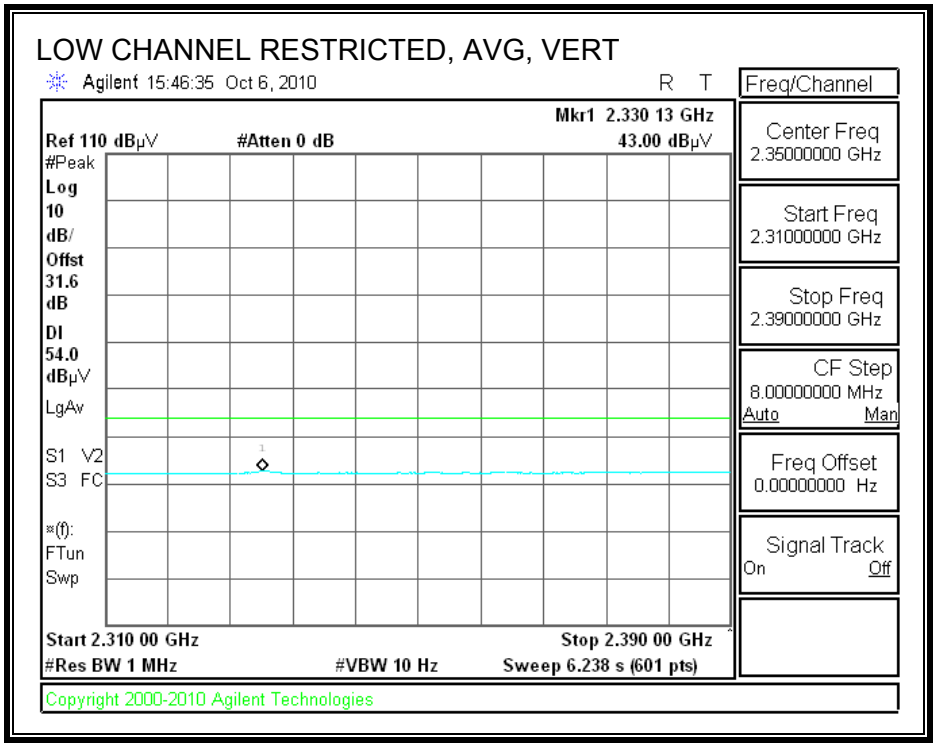
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



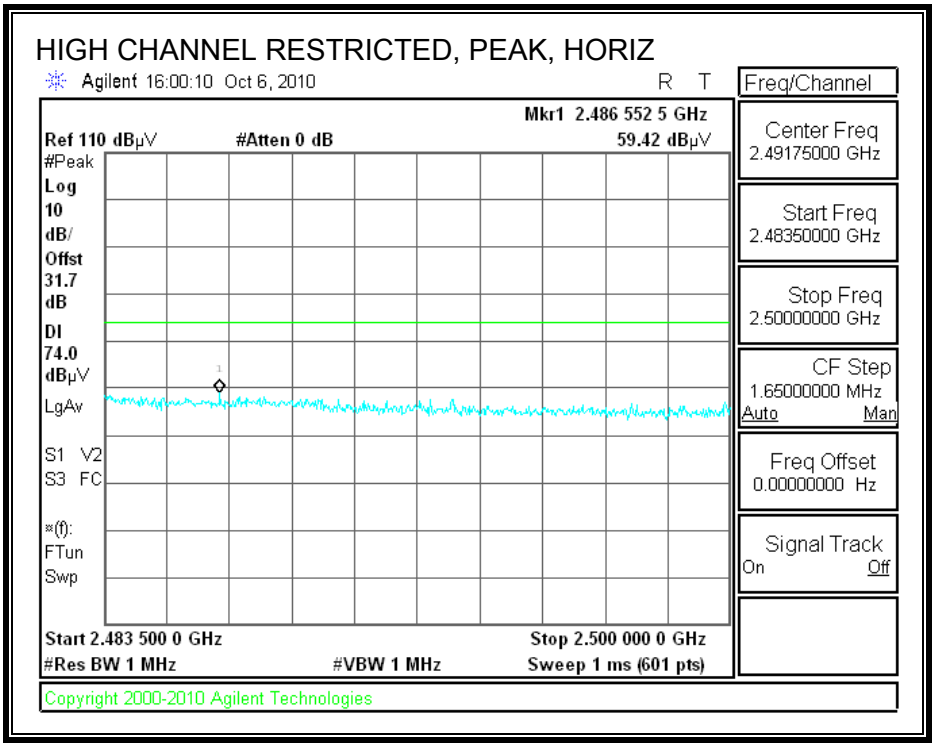


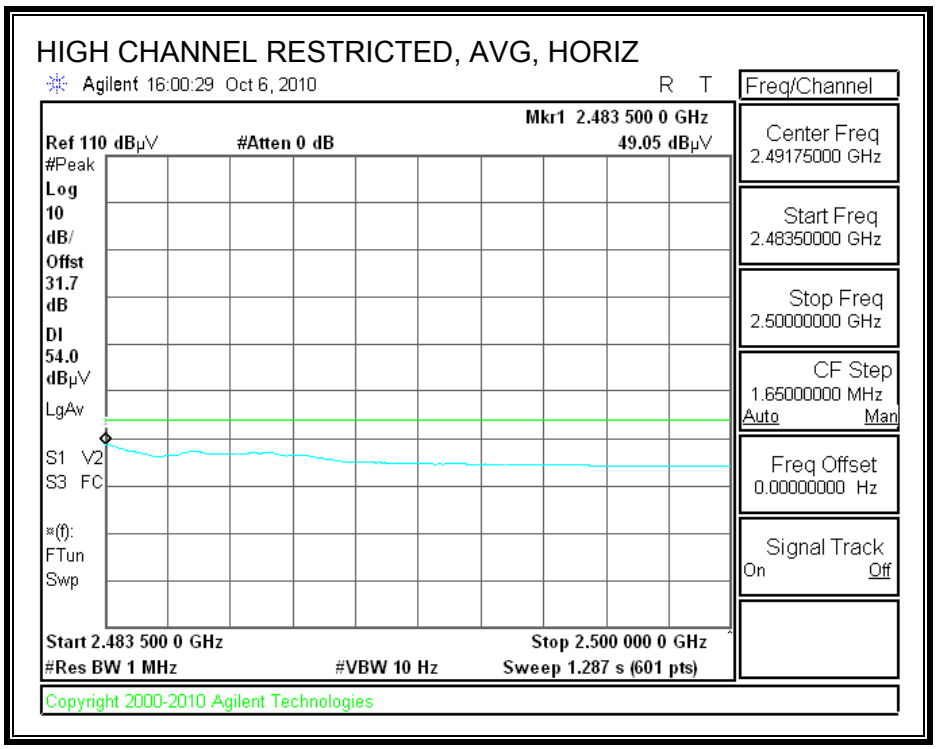
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



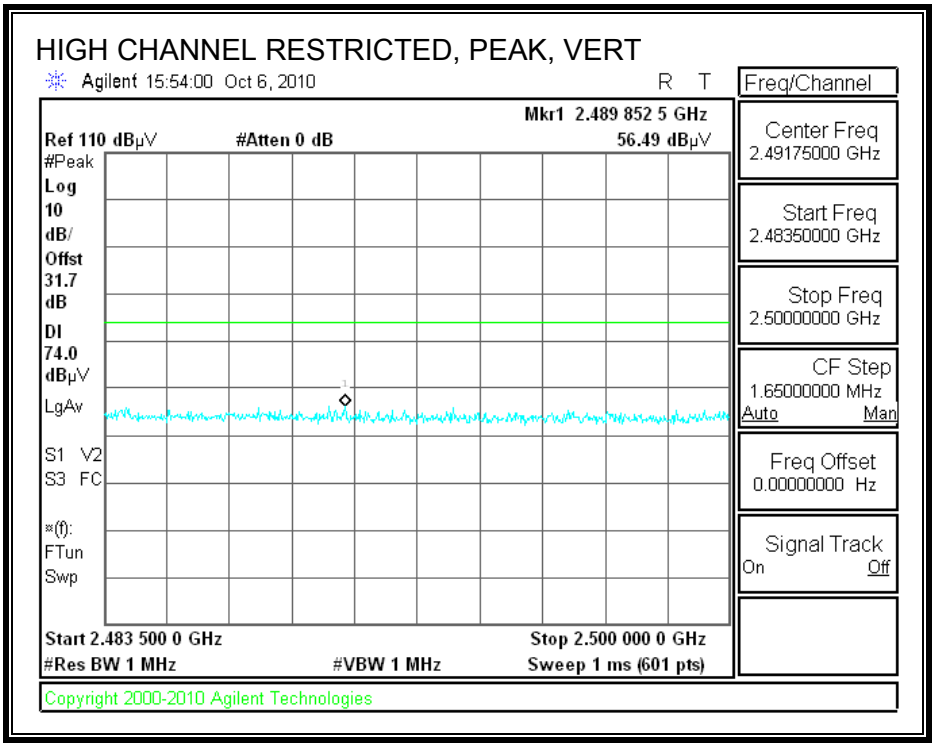


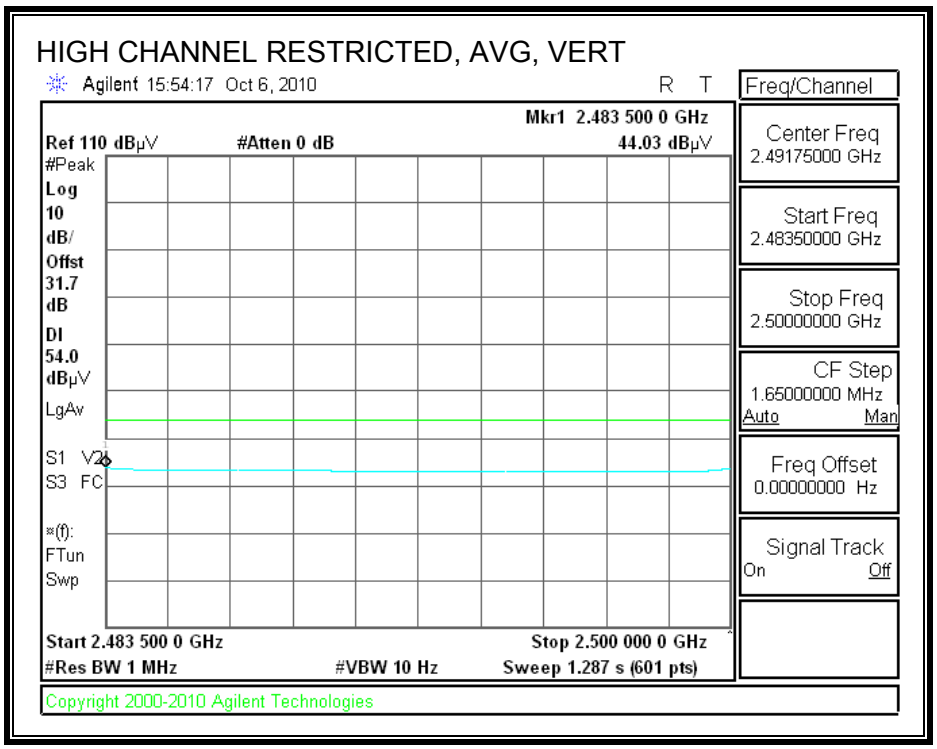
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/07/10
Project #: 10J13452
Company: Hon Hai Precision
Test Target: FCC 15.247
Mode Oper: TX, b 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

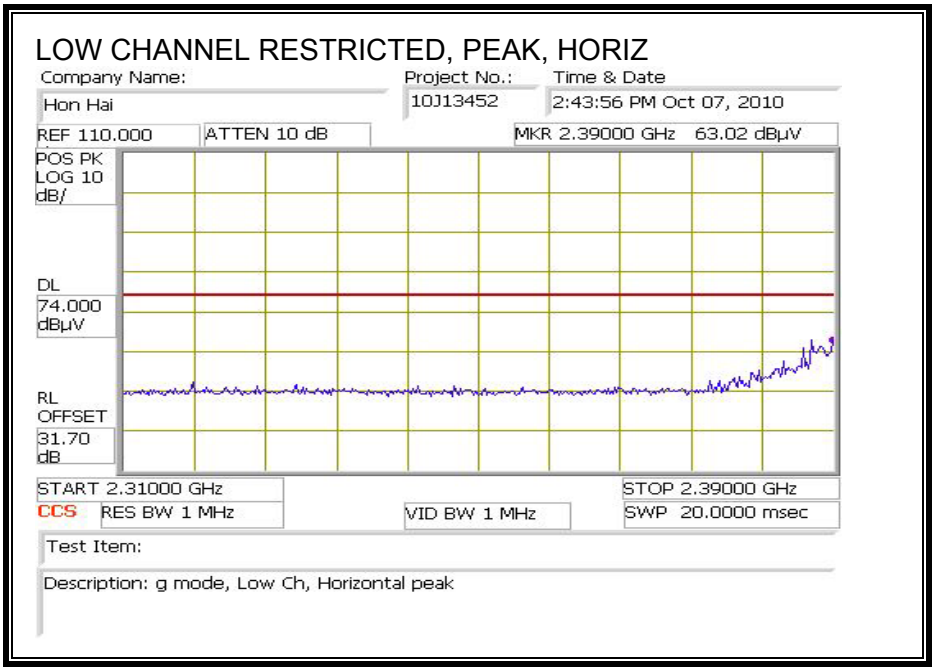
Average Field Strength Limit
Peak Field Strength Limit
Margin vs. Average Limit
Margin vs. Peak Limit

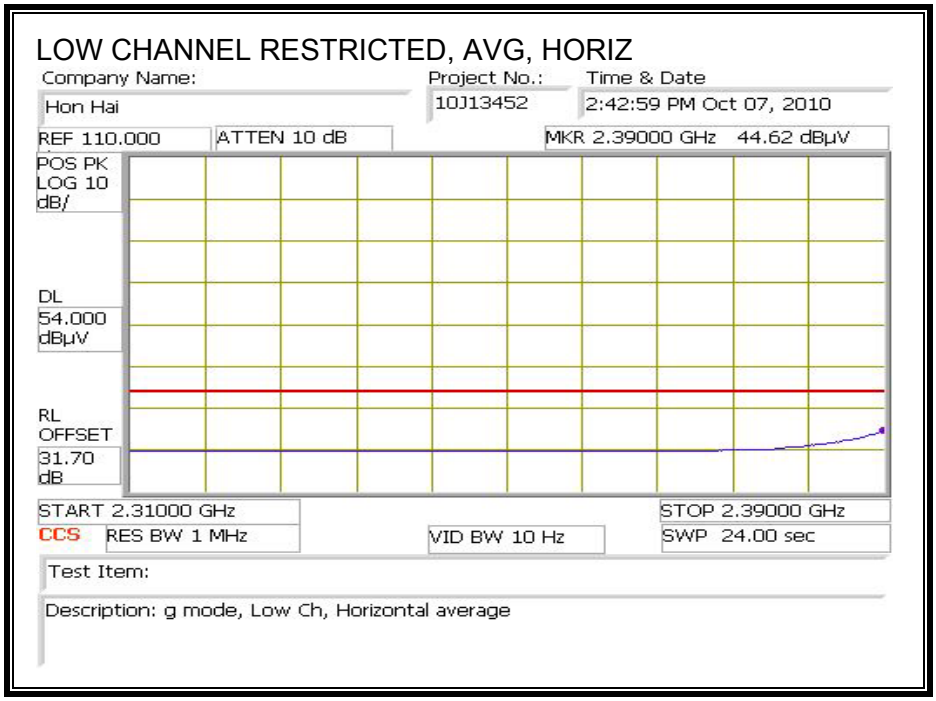
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	48.7	33.0	5.8	-34.8	0.0	0.0	52.7	74.0	-21.3	H	P	
4.824	3.0	45.8	33.0	5.8	-34.8	0.0	0.0	49.8	54.0	-4.2	H	A	
4.824	3.0	45.9	33.0	5.8	-34.8	0.0	0.0	49.9	74.0	-24.1	V	P	
4.824	3.0	42.6	33.0	5.8	-34.8	0.0	0.0	46.6	54.0	-7.4	V	A	
Mid Ch, 2437MHz													
4.874	3.0	50.6	33.1	5.8	-34.9	0.0	0.0	54.7	74.0	-19.3	H	P	
4.874	3.0	48.2	33.1	5.8	-34.9	0.0	0.0	52.2	54.0	-1.8	H	A	
7.311	3.0	43.8	35.3	7.3	-34.7	0.0	0.0	51.7	74.0	-22.3	H	P	
7.311	3.0	36.9	35.3	7.3	-34.7	0.0	0.0	44.8	54.0	-9.2	H	A	
4.874	3.0	50.3	33.1	5.8	-34.9	0.0	0.0	54.4	74.0	-19.6	V	P	
4.874	3.0	47.3	33.1	5.8	-34.9	0.0	0.0	51.3	54.0	-2.7	V	A	
7.311	3.0	43.9	35.3	7.3	-34.7	0.0	0.0	51.8	74.0	-22.2	V	P	
7.311	3.0	36.6	35.3	7.3	-34.7	0.0	0.0	44.5	54.0	-9.5	V	A	
High Ch, 2462MHz													
4.924	3.0	52.3	33.1	5.9	-34.9	0.0	0.0	56.5	74.0	-17.5	H	P	
4.924	3.0	48.0	33.1	5.9	-34.9	0.0	0.0	52.0	54.0	-2.0	H	A	
7.386	3.0	43.9	35.4	7.3	-34.6	0.0	0.0	52.0	74.0	-22.0	H	P	
7.386	3.0	38.0	35.4	7.3	-34.6	0.0	0.0	46.0	54.0	-8.0	H	A	
4.924	3.0	52.5	33.1	5.9	-34.9	0.0	0.0	56.6	74.0	-17.4	V	P	
4.924	3.0	49.3	33.1	5.9	-34.9	0.0	0.0	52.8	54.0	-1.2	V	A	
7.386	3.0	45.5	35.4	7.3	-34.6	0.0	0.0	53.5	74.0	-20.5	V	P	
7.386	3.0	39.1	35.4	7.3	-34.6	0.0	0.0	47.2	54.0	-6.8	V	A	

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

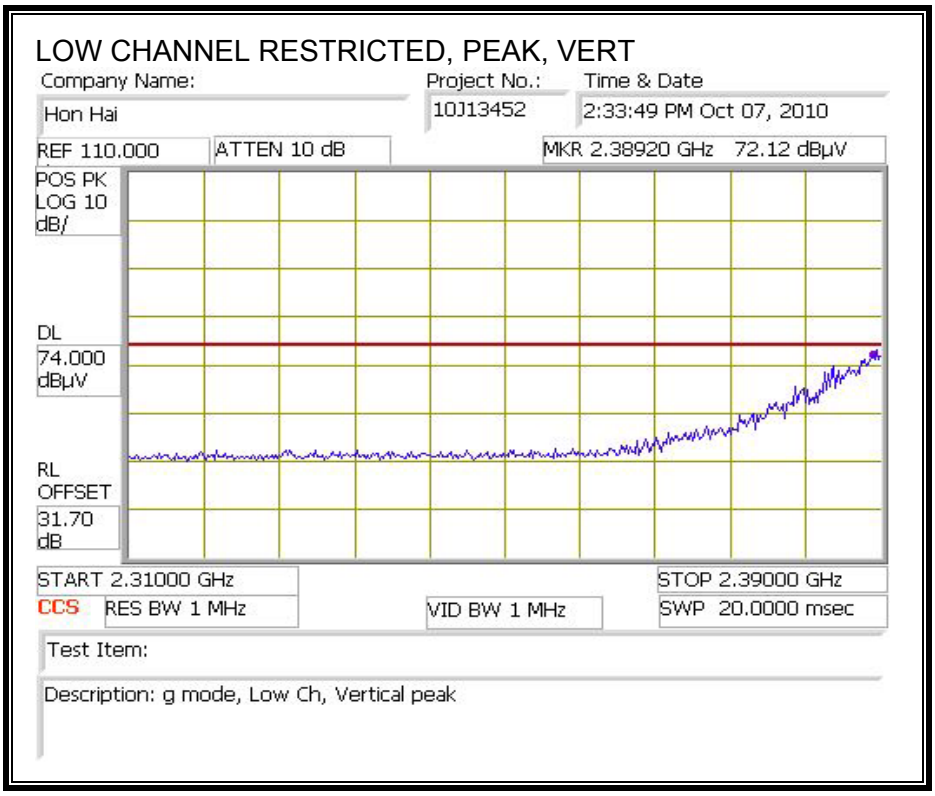
8.2.2. 802.11g MODE IN THE 2.4 GHz BAND

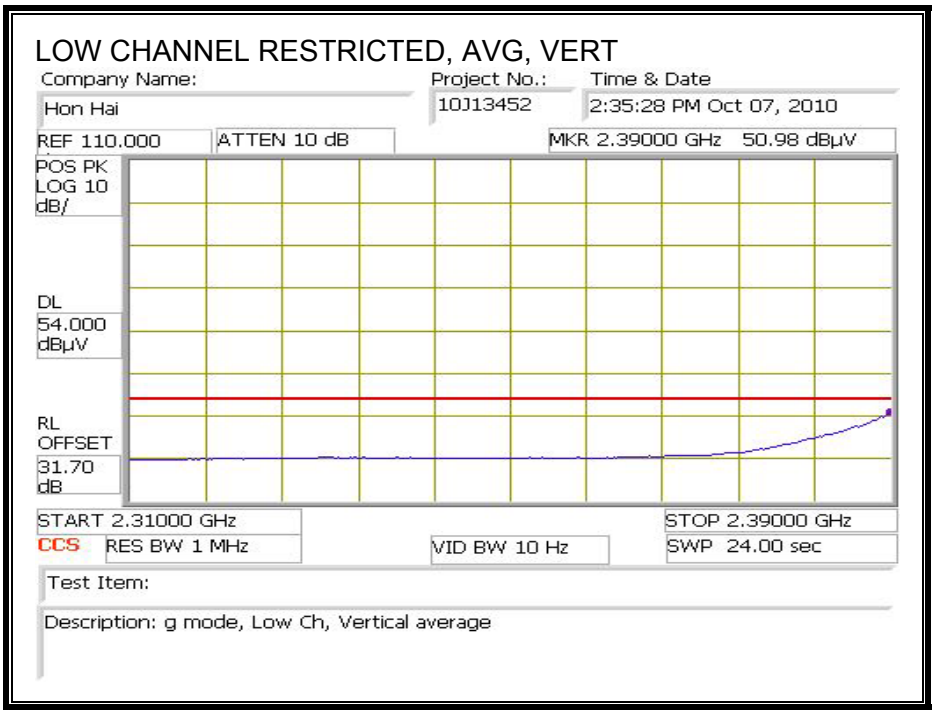
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



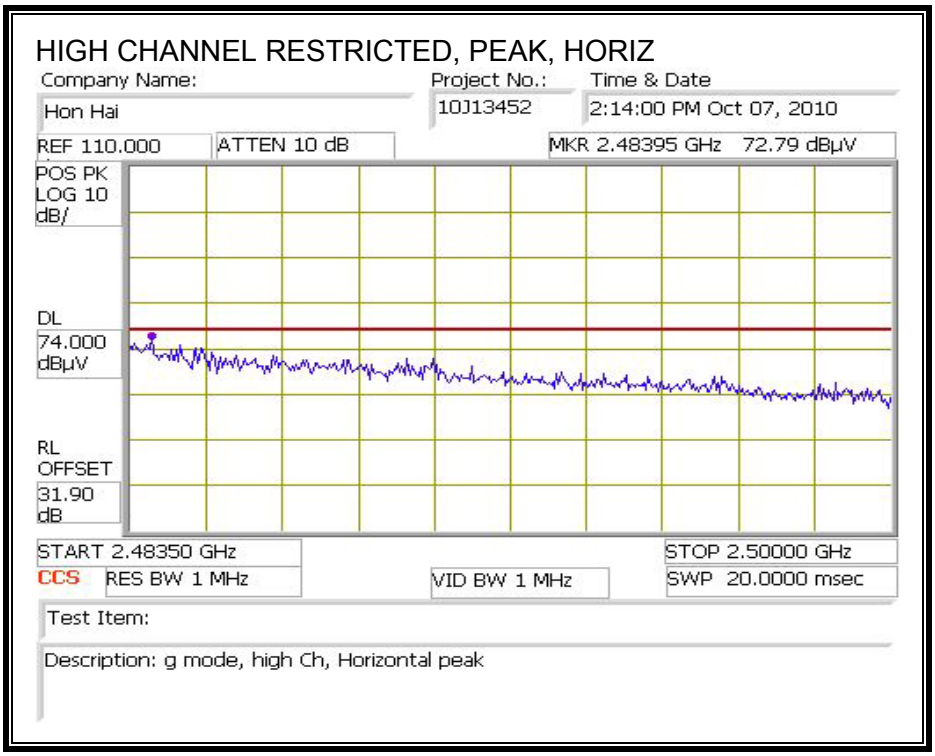


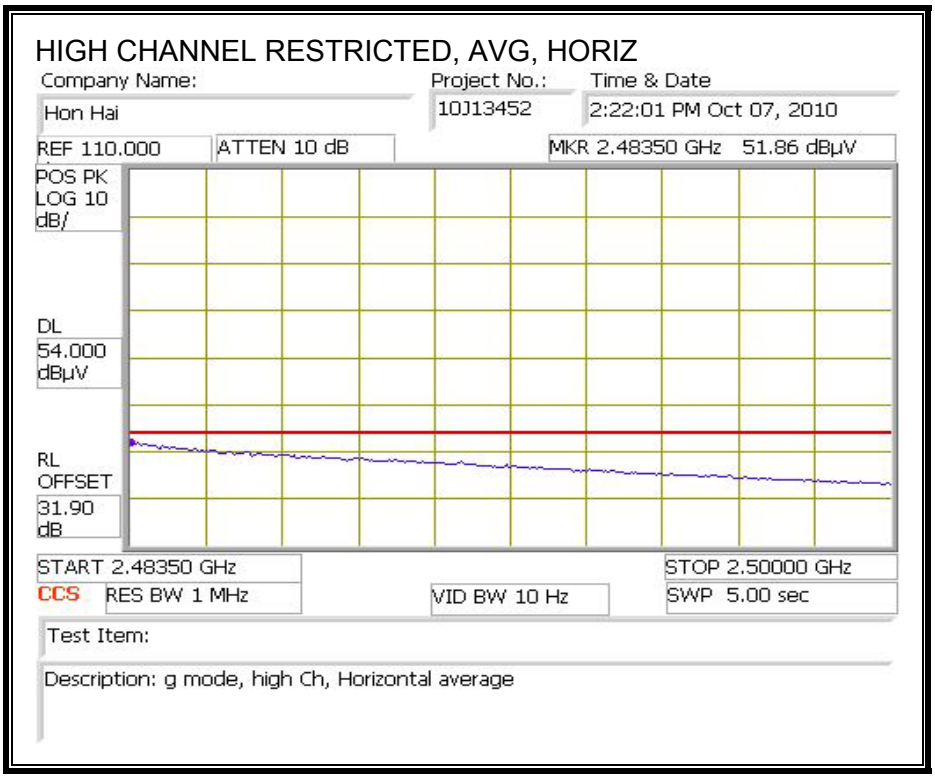
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



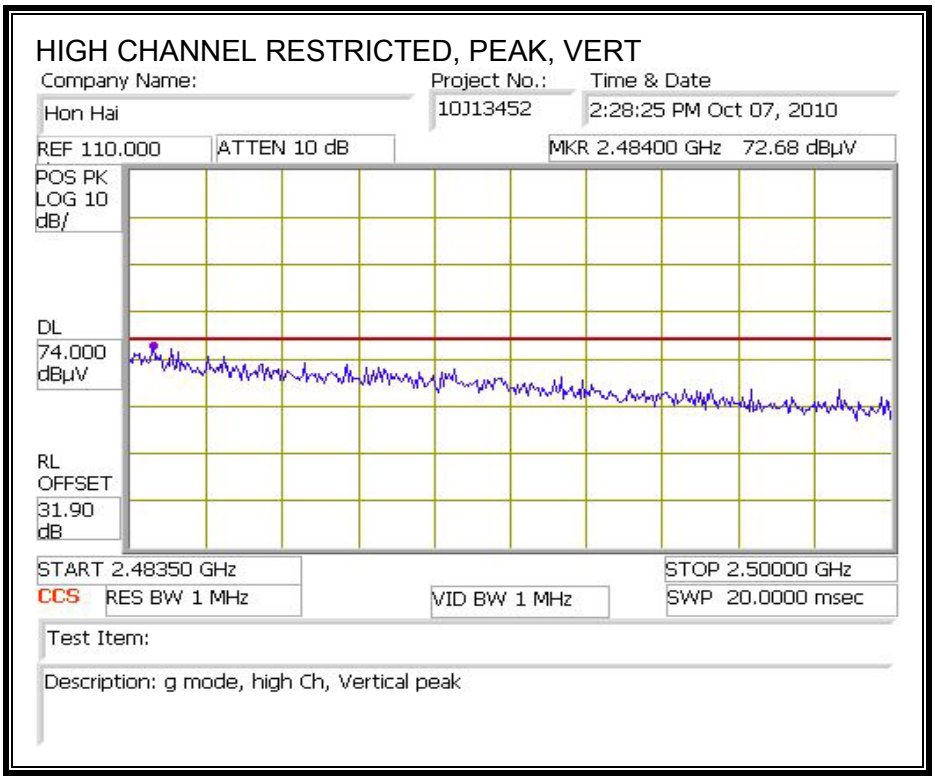


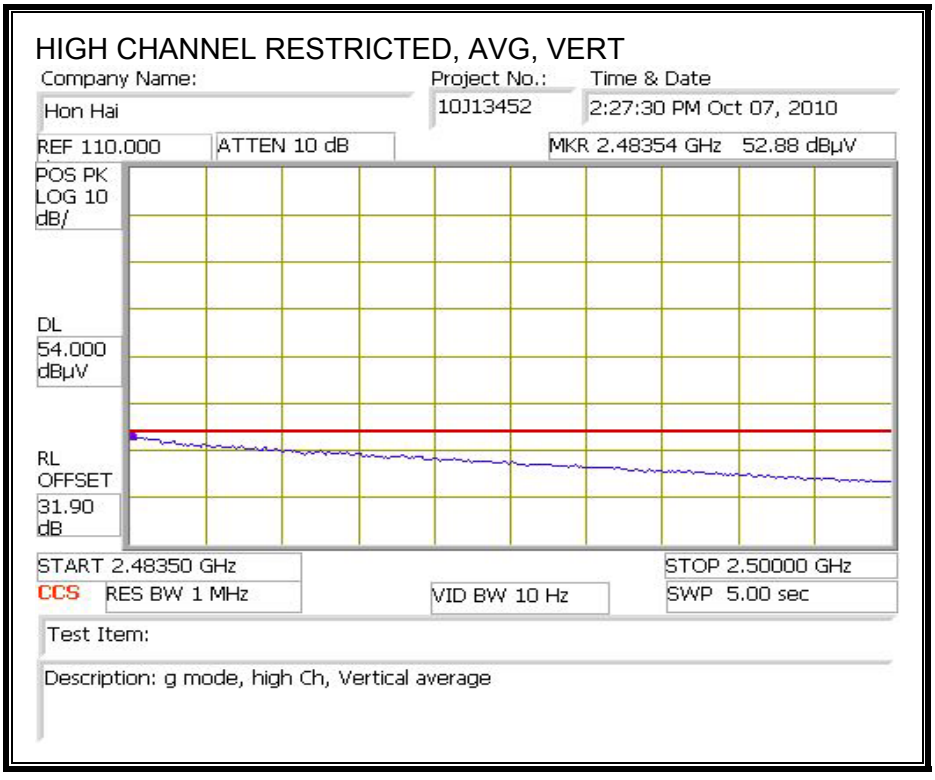
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/07/10
Project #: 10J13452
Company: Hon Hai Precision
Test Target: FCC 15.247
Mode Oper: TX, g mode

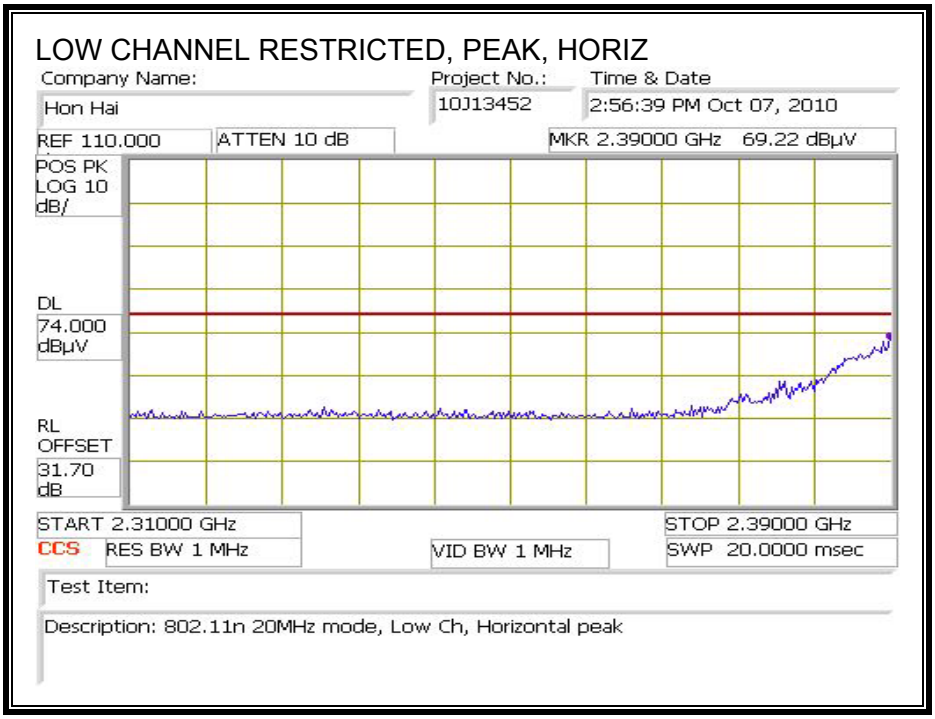
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs.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

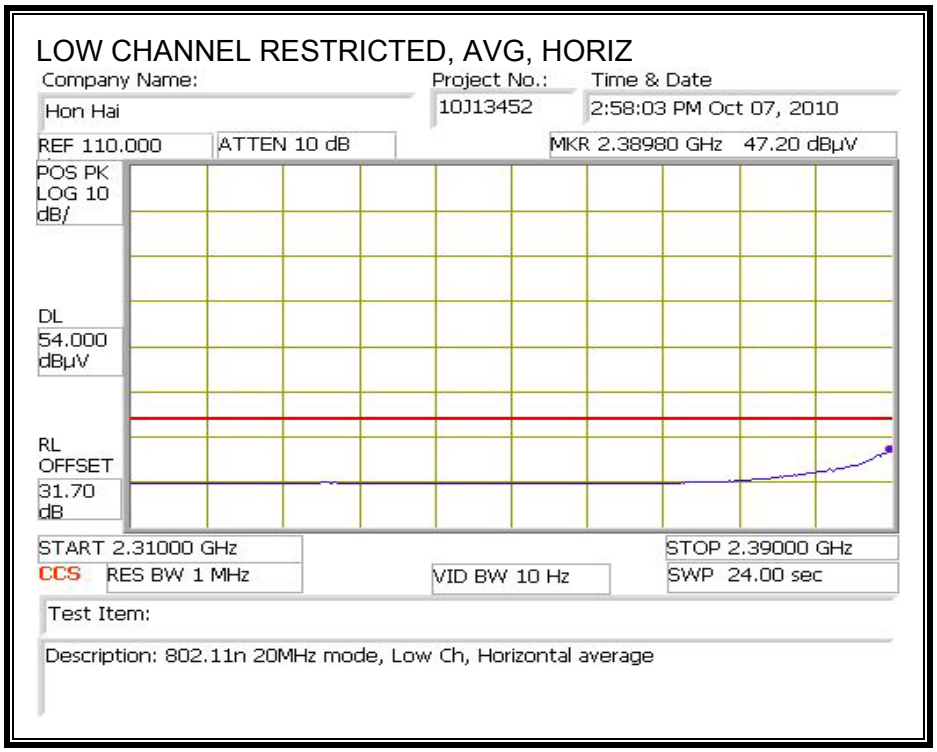
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
Low Ch, 2412MHz													
4.824	3.0	48.0	33.0	5.8	-34.8	0.0	0.0	52.0	74.0	-22.0	V	P	
4.824	3.0	30.2	33.0	5.8	-34.8	0.0	0.0	34.2	54.0	-19.8	V	A	
4.824	3.0	41.7	33.0	5.8	-34.8	0.0	0.0	45.7	74.0	-28.3	H	P	
4.824	3.0	28.1	33.0	5.8	-34.8	0.0	0.0	32.1	54.0	-21.9	H	A	
Mid Ch, 2437MHz													
4.874	3.0	49.6	33.1	5.8	-34.9	0.0	0.0	53.6	74.0	-20.4	V	P	
4.874	3.0	34.1	33.1	5.8	-34.9	0.0	0.0	38.2	54.0	-15.8	V	A	
7.311	3.0	43.5	35.3	7.3	-34.7	0.0	0.0	51.4	74.0	-22.6	V	P	
7.311	3.0	31.5	35.3	7.3	-34.7	0.0	0.0	39.4	54.0	-14.6	V	A	
4.874	3.0	49.0	33.1	5.8	-34.9	0.0	0.0	53.1	74.0	-20.9	H	P	
4.874	3.0	32.8	33.1	5.8	-34.9	0.0	0.0	36.9	54.0	-17.1	H	A	
7.311	3.0	42.0	35.3	7.3	-34.7	0.0	0.0	49.9	74.0	-24.1	H	P	
7.311	3.0	28.9	35.3	7.3	-34.7	0.0	0.0	36.8	54.0	-17.2	H	A	
High Ch, 2462MHz													
4.924	3.0	52.0	33.1	5.9	-34.9	0.0	0.0	56.2	74.0	-17.8	V	P	
4.924	3.0	36.5	33.1	5.9	-34.9	0.0	0.0	40.6	54.0	-13.4	V	A	
7.386	3.0	47.1	35.4	7.3	-34.6	0.0	0.0	55.2	74.0	-18.8	V	P	
7.386	3.0	32.1	35.4	7.3	-34.6	0.0	0.0	40.1	54.0	-13.9	V	A	
4.924	3.0	53.2	33.1	5.9	-34.9	0.0	0.0	57.3	74.0	-16.7	H	P	
4.924	3.0	28.1	33.1	5.9	-34.9	0.0	0.0	32.3	54.0	-21.7	H	A	
7.386	3.0	39.4	35.4	7.3	-34.6	0.0	0.0	47.5	74.0	-26.5	H	P	
7.386	3.0	25.9	35.4	7.3	-34.6	0.0	0.0	34.0	54.0	-20.0	H	A	

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

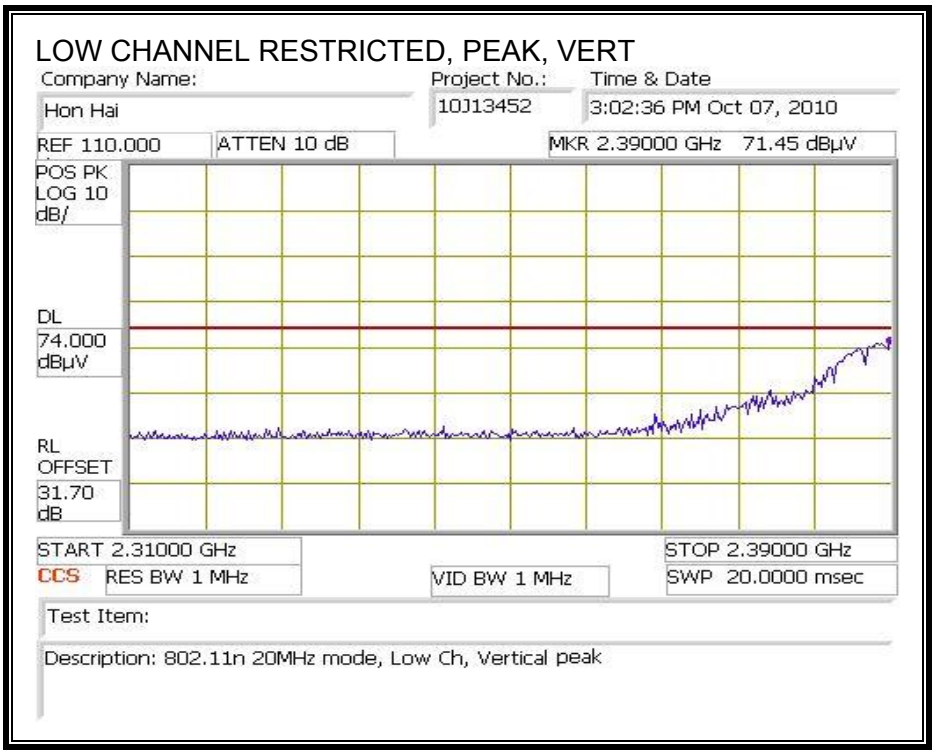
8.2.3. 802.11n HT20 SISO MODE IN THE 2.4 GHz BAND

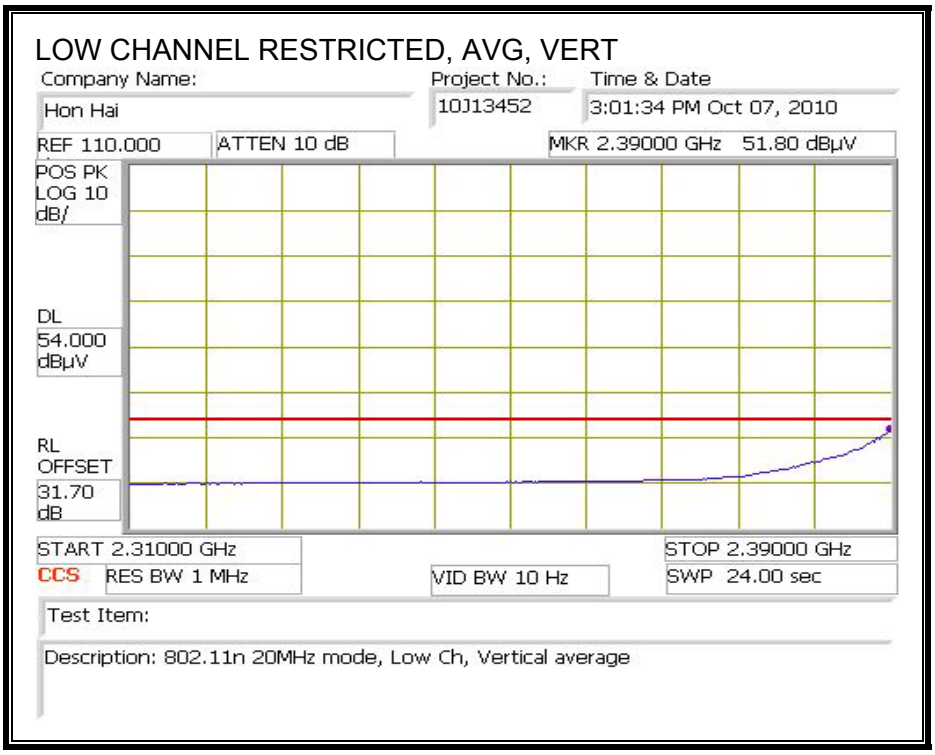
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



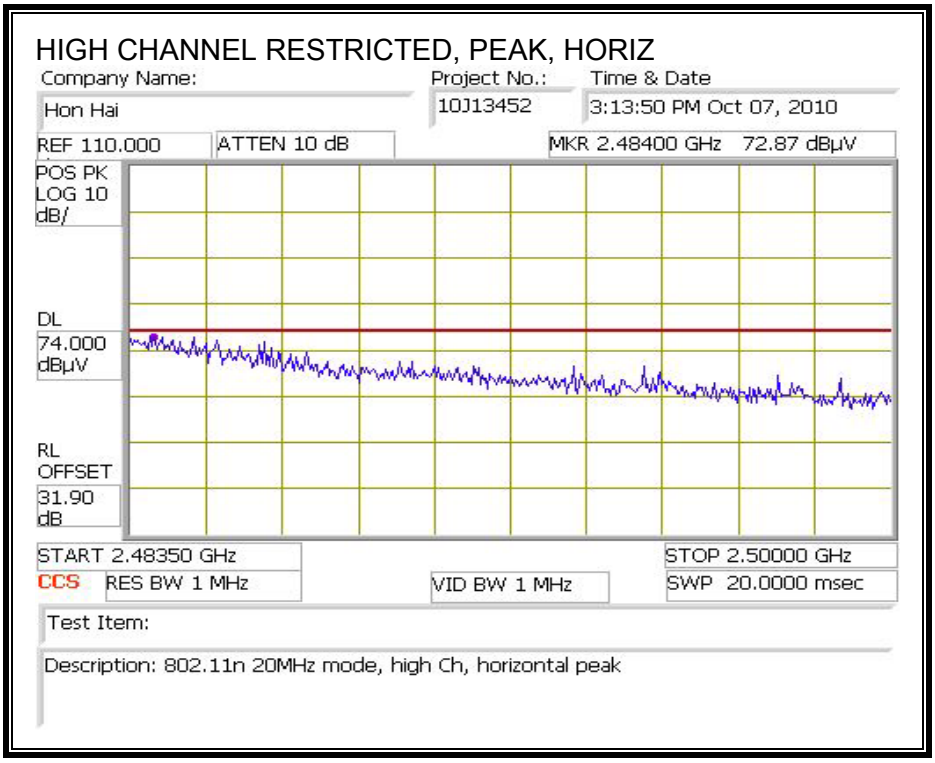


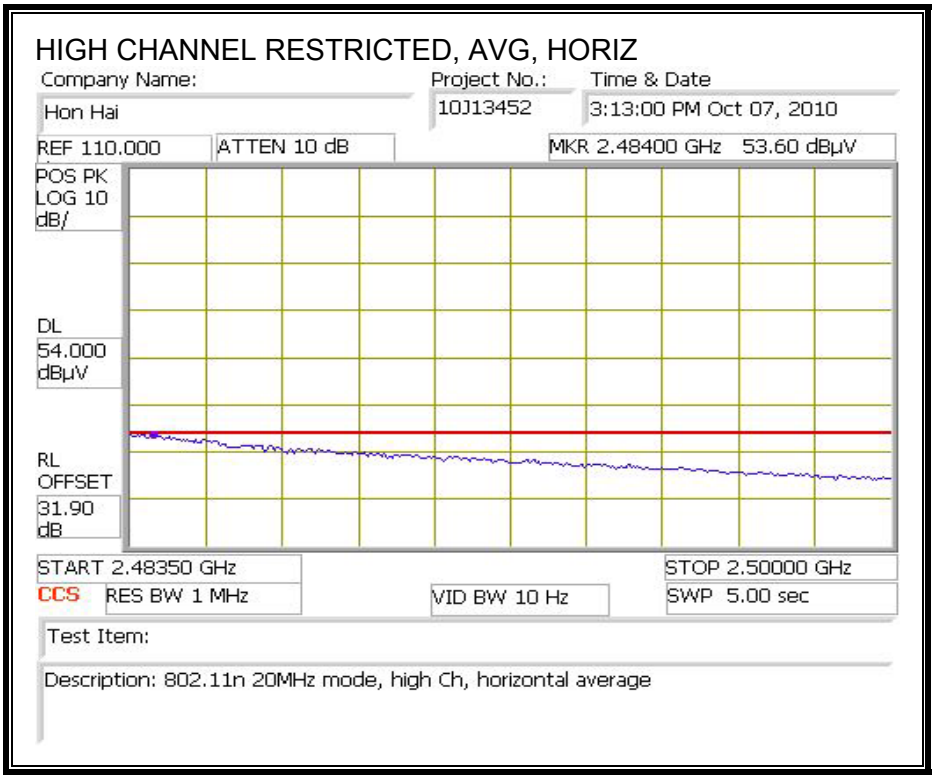
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



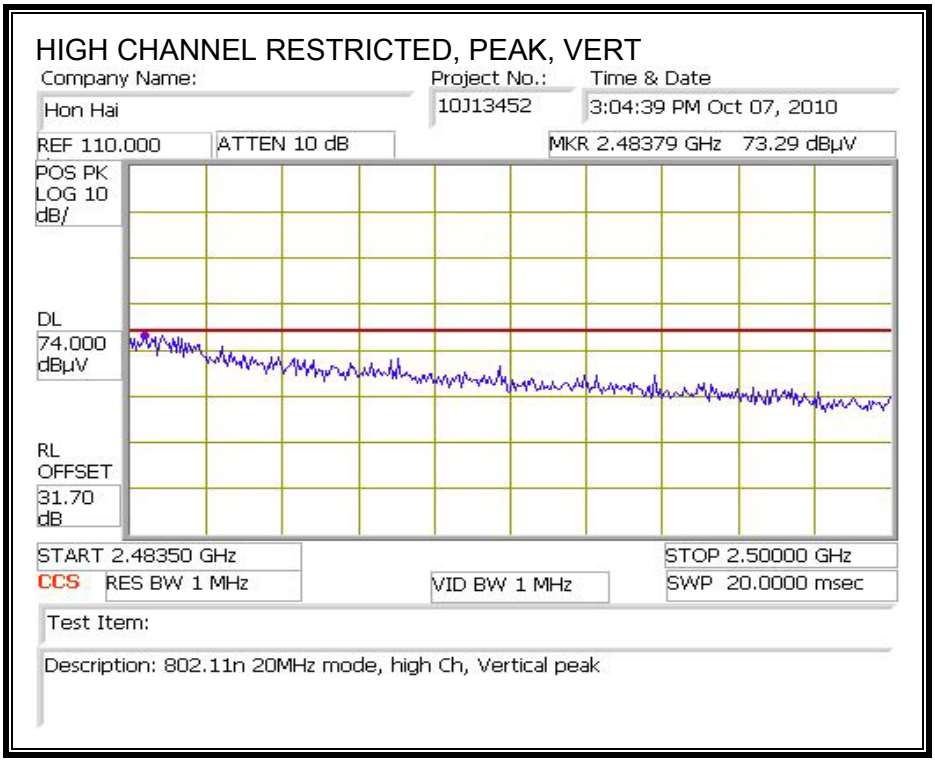


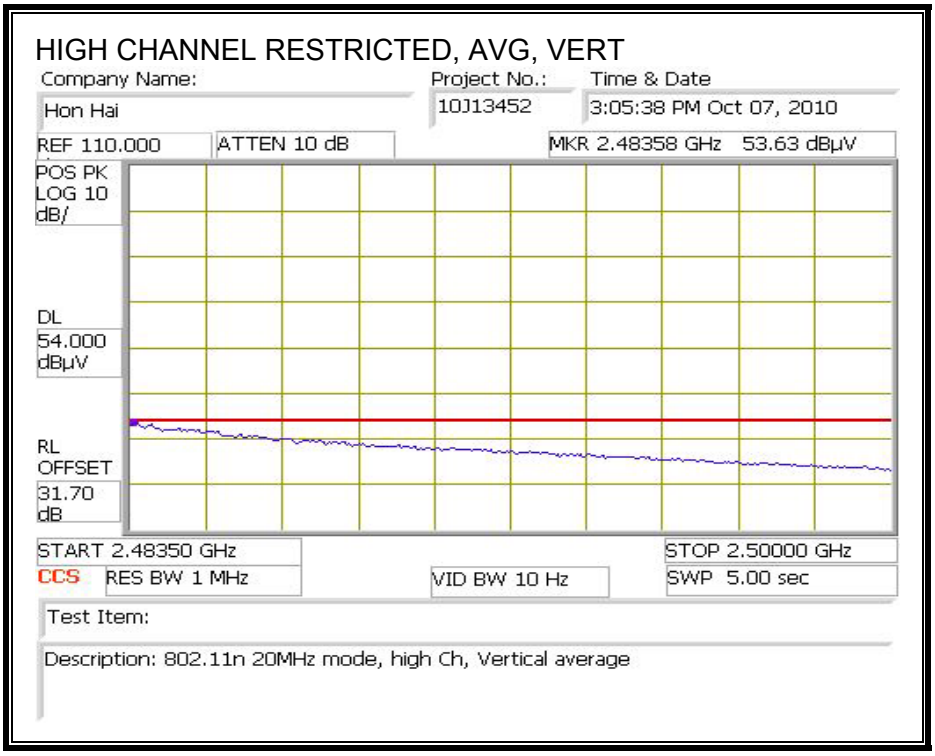
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Chin Pang
Date: 10/07/10
Project #: 10J13452
Company: Hon Hai Precision
Test Target: FCC 15.247
Mode Oper: TX, 802.11n, 20MHz

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
Low Ch, 2412MHz													
4.824	3.0	41.3	33.0	5.8	-34.8	0.0	0.0	45.3	74.0	-28.7	H	P	
4.824	3.0	29.2	33.0	5.8	-34.8	0.0	0.0	33.2	54.0	-20.8	H	A	
4.824	3.0	45.1	33.0	5.8	-34.8	0.0	0.0	49.1	74.0	-24.9	V	P	
4.824	3.0	32.1	33.0	5.8	-34.8	0.0	0.0	36.1	54.0	-17.9	V	A	
Mid Ch, 2437MHz													
4.874	3.0	43.2	33.1	5.8	-34.9	0.0	0.0	47.2	74.0	-26.8	H	P	
4.874	3.0	34.4	33.1	5.8	-34.9	0.0	0.0	38.4	54.0	-15.6	H	A	
7.311	3.0	47.5	35.3	7.3	-34.7	0.0	0.0	55.4	74.0	-18.6	H	P	
7.311	3.0	31.5	35.3	7.3	-34.7	0.0	0.0	39.4	54.0	-14.6	H	A	
4.874	3.0	46.8	33.1	5.8	-34.9	0.0	0.0	50.9	74.0	-23.1	V	P	
4.874	3.0	33.0	33.1	5.8	-34.9	0.0	0.0	37.1	54.0	-16.9	V	A	
7.311	3.0	42.4	35.3	7.3	-34.7	0.0	0.0	50.3	74.0	-23.7	V	P	
7.311	3.0	31.3	35.3	7.3	-34.7	0.0	0.0	39.2	54.0	-14.8	V	A	
High Ch, 2462MHz													
4.924	3.0	51.0	33.1	5.9	-34.9	0.0	0.0	55.2	74.0	-18.8	H	P	
4.924	3.0	34.5	33.1	5.9	-34.9	0.0	0.0	38.6	54.0	-15.4	H	A	
7.386	3.0	41.9	35.4	7.3	-34.6	0.0	0.0	50.0	74.0	-24.0	H	P	
7.386	3.0	28.9	35.4	7.3	-34.6	0.0	0.0	36.9	54.0	-17.1	H	A	
4.924	3.0	50.8	33.1	5.9	-34.9	0.0	0.0	55.0	74.0	-19.0	V	P	
4.924	3.0	35.3	33.1	5.9	-34.9	0.0	0.0	39.5	54.0	-14.5	V	A	
7.386	3.0	44.5	35.4	7.3	-34.6	0.0	0.0	52.6	74.0	-21.4	V	P	
7.386	3.0	30.1	35.4	7.3	-34.6	0.0	0.0	38.1	54.0	-15.9	V	A	

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

8.3. WORST CASE RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Hon Hai Precision
Project #: 10J13452
Date: 10/11/2010
Test Engineer: Chin Pang
Configuration: EUT/PC
Mode: RX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			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		

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)
1.033	3.0	67.8	43.5	24.0	2.4	-39.4	0.0	0.0	54.7	30.4	74	54	-19.3	-23.6	V
1.200	3.0	65.8	41.6	24.5	2.6	-39.2	0.0	0.0	53.7	29.5	74	54	-20.3	-24.5	V
1.660	3.0	67.0	43.6	26.1	3.1	-38.5	0.0	0.0	57.6	34.2	74	54	-16.4	-19.8	V
3.000	3.0	57.5	42.8	30.0	4.3	-37.4	0.0	0.0	54.5	39.8	74	54	-19.5	-14.2	V
1.033	3.0	70.3	51.6	24.0	2.4	-39.4	0.0	0.0	57.2	38.5	74	54	-16.8	-15.5	H
1.650	3.0	68.5	46.3	26.0	3.1	-38.6	0.0	0.0	59.1	36.9	74	54	-14.9	-17.1	H
3.000	3.0	58.3	43.6	30.0	4.3	-37.4	0.0	0.0	55.3	40.6	74	54	-18.7	-13.4	H

Rev. 07.22.09

8.4. WORST CASE BELOW 1GHZ

VERTICAL& HORIZONTAL DATA

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

Test Engr: **Chin Pang**
Date: **10/07/10**
Project #: **10J13452**
Company: **Hon Hai Precision**
Test Target: **FCC 15C**
Mode Oper: **TX (Worst Case)**

f	Measurement Frequency	Amp	Preamp Gain
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

Margin Margin vs. 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
vert													
342.013	3.0	51.9	14.0	1.6	28.1	0.0	0.0	39.5	46.0	-6.5	V	P	
588.023	3.0	47.0	18.2	2.2	27.6	0.0	0.0	39.9	46.0	-6.1	V	P	
764.91	3.0	40.4	20.5	2.6	27.4	0.0	0.0	36.1	46.0	-9.9	V	P	
500.899	3.0	47.7	16.7	2.0	27.8	0.0	0.0	38.6	46.0	-7.4	H	P	
620.904	3.0	44.6	18.7	2.3	27.5	0.0	0.0	38.0	46.0	-8.0	H	P	
750.03	3.0	40.0	20.3	2.5	27.3	0.0	0.0	35.5	46.0	-10.5	H	P	
872.915	3.0	43.3	21.6	2.8	27.7	0.0	0.0	40.0	46.0	-6.0	H	P	

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

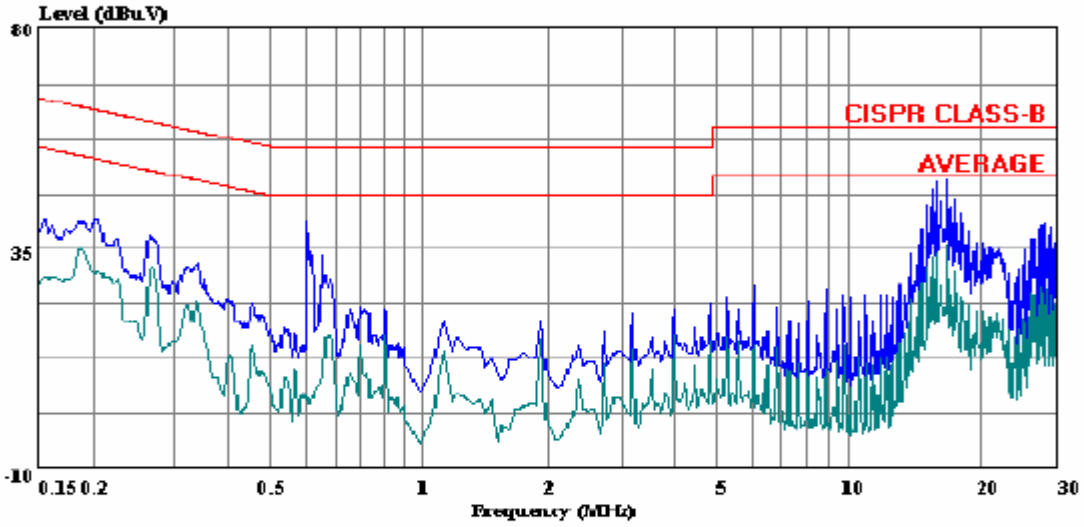
6 WORST EMISSIONS

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
0.19	40.85	--	35.08	0.00	64.21	54.21	-23.36	-19.13	L1
0.77	37.64	--	31.48	0.00	56.00	46.00	-18.36	-14.52	L1
15.97	49.13	--	37.04	0.00	60.00	50.00	-10.87	-12.96	L1
0.19	42.53	--	34.28	0.00	64.21	54.21	-21.68	-19.93	L2
0.27	35.00	--	28.46	0.00	61.06	51.06	-26.06	-22.60	L2
15.39	47.17	--	39.44	0.00	60.00	50.00	-12.83	-10.56	L2
6 Worst Data									

LINE 1 RESULTS

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

Data#: 7 File#: 10J13452.EMI Date: 10-09-2010 Time: 17:42:13



Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: Chin Pang
Project # : 10J13452
Company : Hon Hai
Configuration: EUT / PC
Mode : Tx (Worst Case)
Target : FCC Class B
Voltage : 115VAC / 60Hz
: L1: (Peak: Blue, Average: Green)

LINE 2 RESULTS

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

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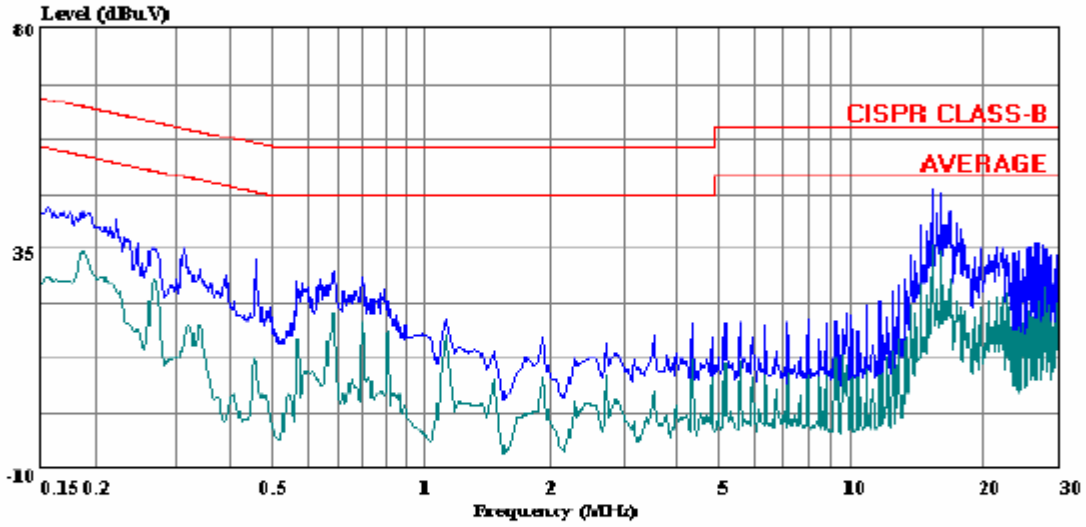

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: Chin Pang
Project # : 10J13452
Company : Hon Hai
Configuration: EUT / PC
Mode : Tx (Worst Case)
Target : FCC Class B
Voltage : 115VAC / 60Hz
: L2: (Peak: Blue, Average: Green)

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.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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.

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

Where

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

For multiple collocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

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
From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^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	WLAN	0.20	25.40	1.94	1.08	0.108