



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

CERTIFICATION TEST REPORT

FOR

EMERGENCY LIGHTING CONTROLLER

MODEL NUMBER: SNSELM100

**FCC ID: PZ3-SNSE
IC: 4256A-SNSE**

REPORT NUMBER: 10U13541-1

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Prepared for
Primex, Inc.
N3211 Highway H
Lake Geneva, WI 53147

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

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Primex, Inc.
N3211 Highway H
Lake Geneva, WI 53147

EUT DESCRIPTION: EMERGENCY LIGHTNING CONTROLLER

MODEL: SNSELM100

SERIAL NUMBER: CCS01001& 01003

DATE TESTED: DECEMBER 01-02, 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 UL CCS By:



FRANK IBRAHIM
EMC SUPERVISOR
UL CCS

Tested By:



THANH NGUYEN
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 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:

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

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 an 802.11b/g transceiver module used in Emergency Lighting Controller.

The radio module is manufactured by Primex Wireless, Inc.

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	15.63	36.56
2412 - 2462	802.11g	21.24	133.05

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

5.4. SOFTWARE AND FIRMWARE

The Micro Controller firmware installed in the EUT during testing was SNS_E_LIGHT-1_0.a43.

The Radio firmware used during testing was SNS_RADIO-2.1.74.rom.

The test utility software used during testing was ART Rev 5.2 Build #58.

5.5. WORST-CASE CONFIGURATION AND MODE

EUT was investigated for three orthogonal orientations and it was determined that orientation X is worst-case, see set up photos for details.

The worst-case channel is determined as the channel with the highest output power; therefore, radiated emission below 1000 MHz was performed with the EUT set to the channel with highest output power.

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

All final tests in the 802.11b mode were made at 1 Mb/s.

All final tests in the 802.11g mode were made at 6 Mb/s.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	DELL	PP01X	8619137497	DoC
AC/DC Adapter	DELL	ADP-90FB Rev B	TH-06G356-17971	DoC

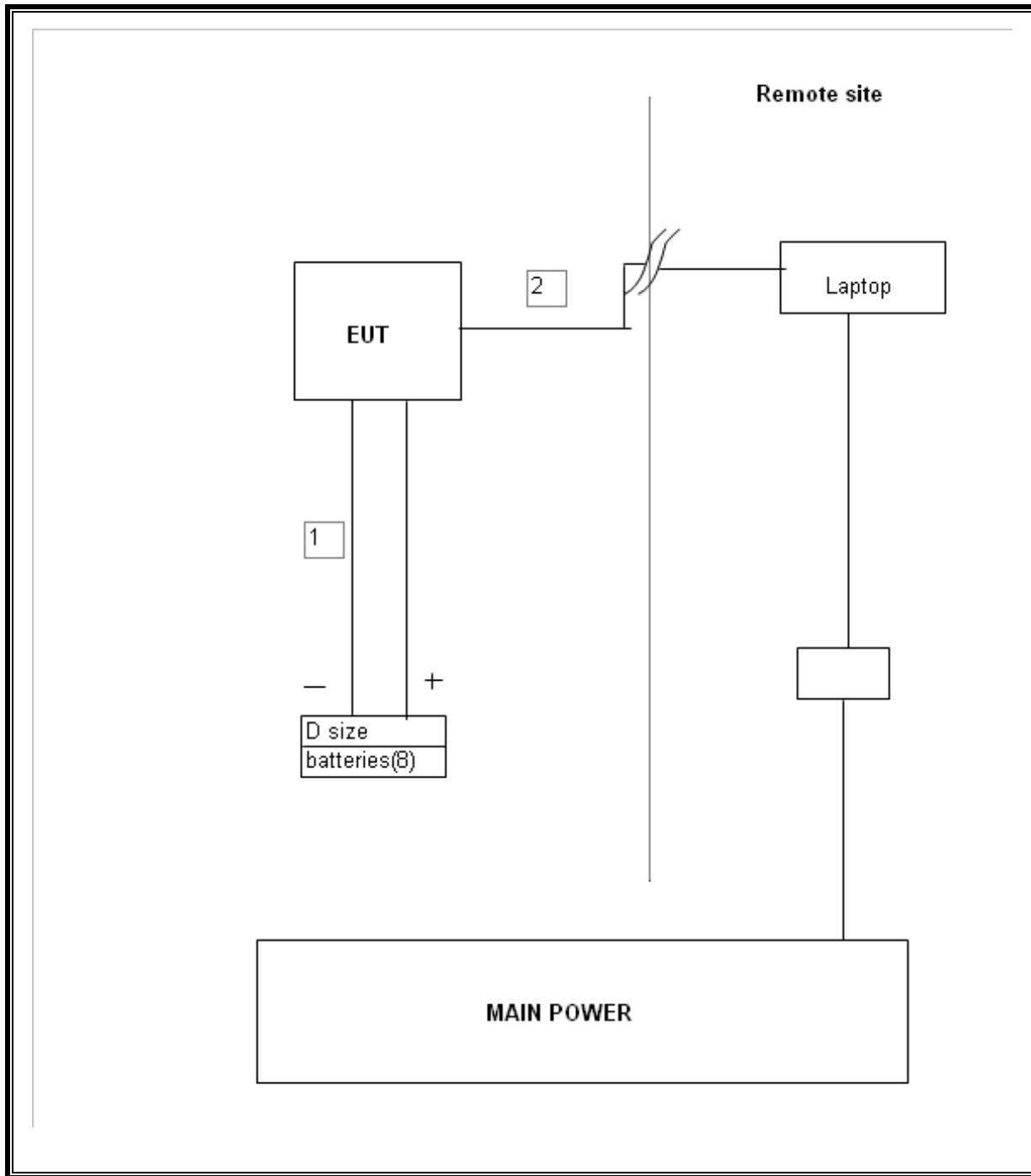
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	DC Plug	26 AWG	.5m	Batteries power
2	WLAN	1	RJ45	Un-shielded	10m	to remote Laptop

TEST SETUP

The EUT is a stand alone unit connected to a host laptop computer at remote site. 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 Date	Cal Due
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	1/14/2009	12/18/2010
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	3/31/2009	12/19/2010
Spectrum Analyzer	Agilent / HP	E4446A	C01069	1/5/2010	4/5/2011
Power Meter	HP	4416A	C00963	12/4/2009	12/4/2011
Power sensor	HP	8482A	2349A08568	4/14/2009	4/14/2011
Antenna, Horn, 18 GHz	EMCO	3115	C00945	4/22/2009	12/18/2010
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	8/5/2009	12/17/2010
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/2010	10/29/2011
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/2010	10/29/2011
EMI Receiver	R & S	ESHS 20	N02396	6/8/2009	5/6/2011

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.

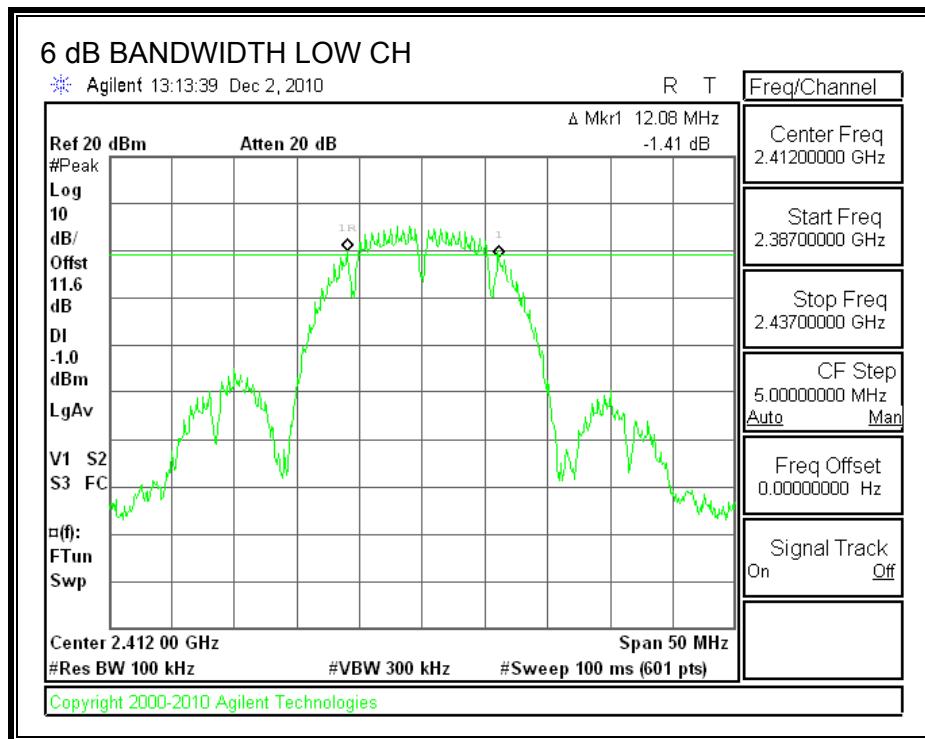
TEST PROCEDURE

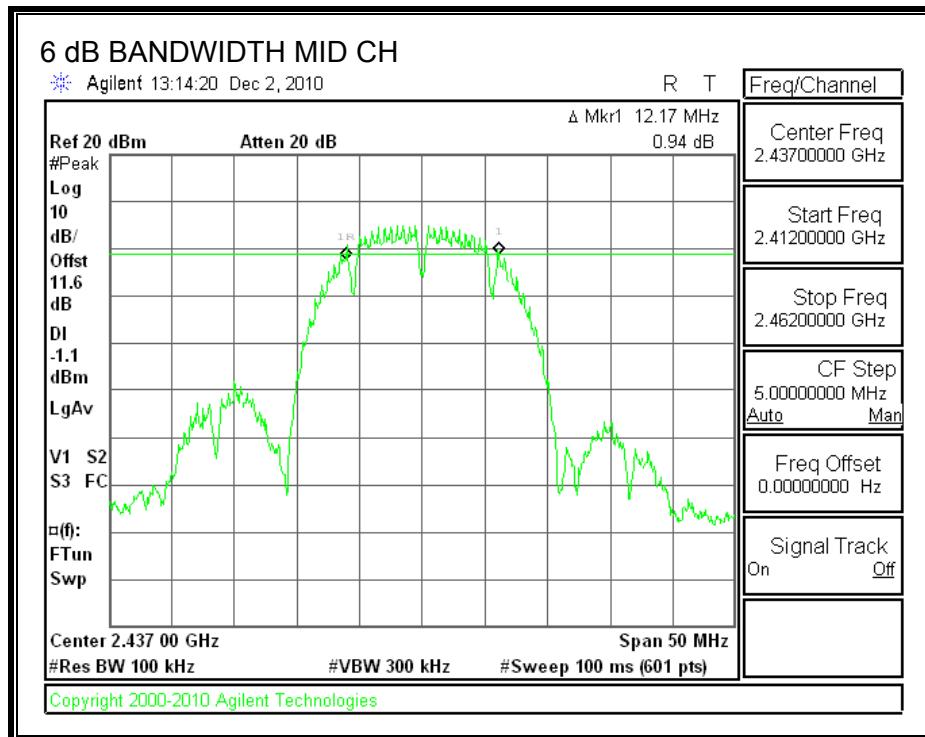
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

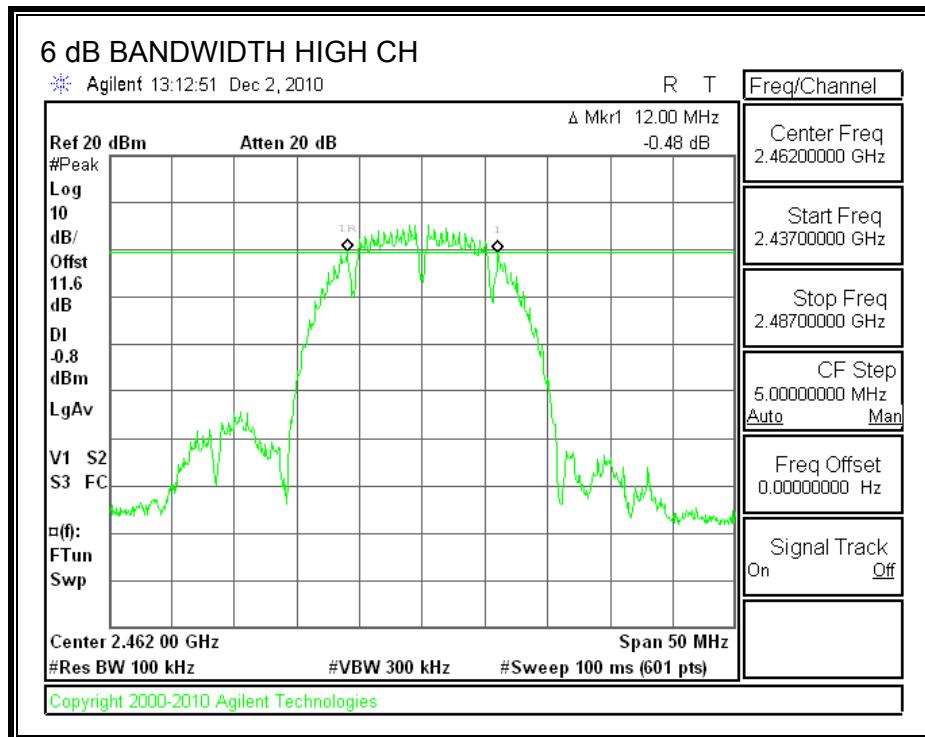
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	12.08	0.5
Middle	2437	12.17	0.5
High	2462	12	0.5

6 dB BANDWIDTH







7.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

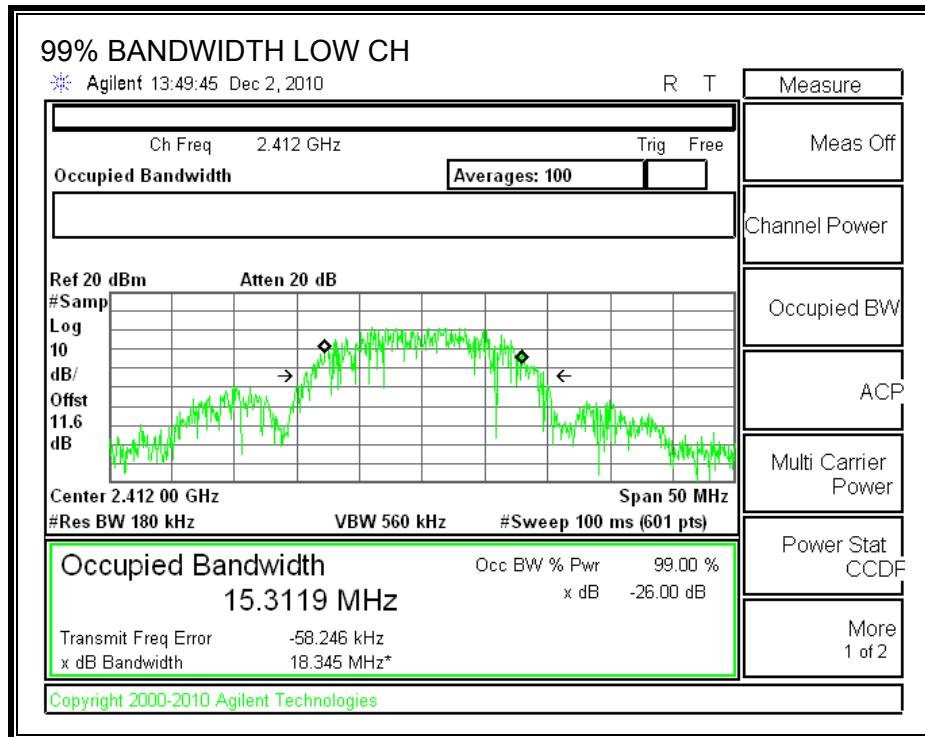
TEST PROCEDURE

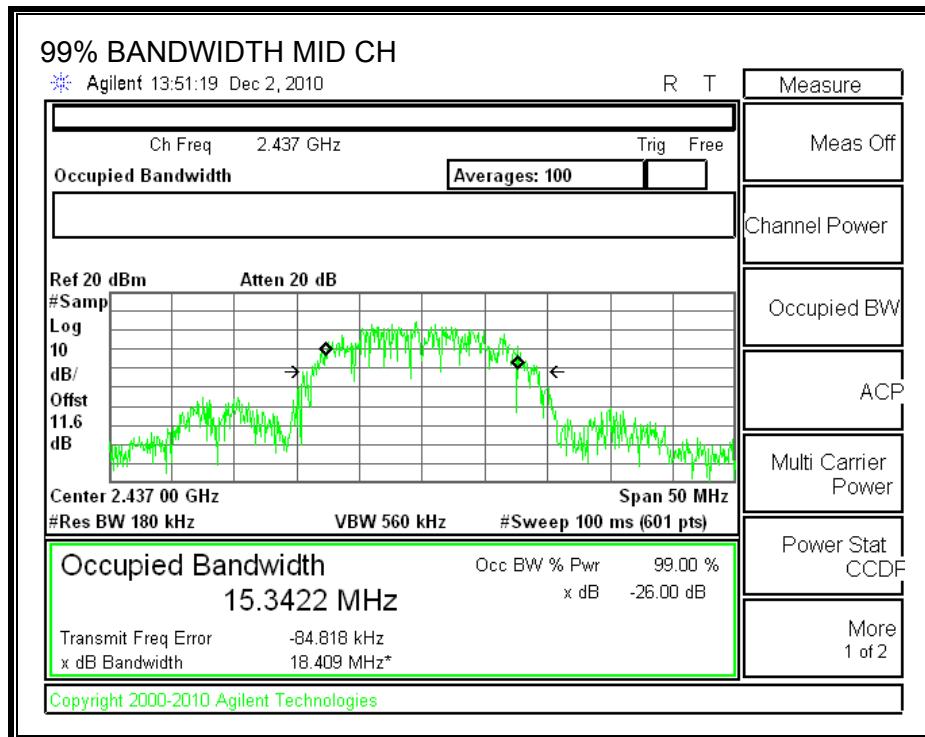
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

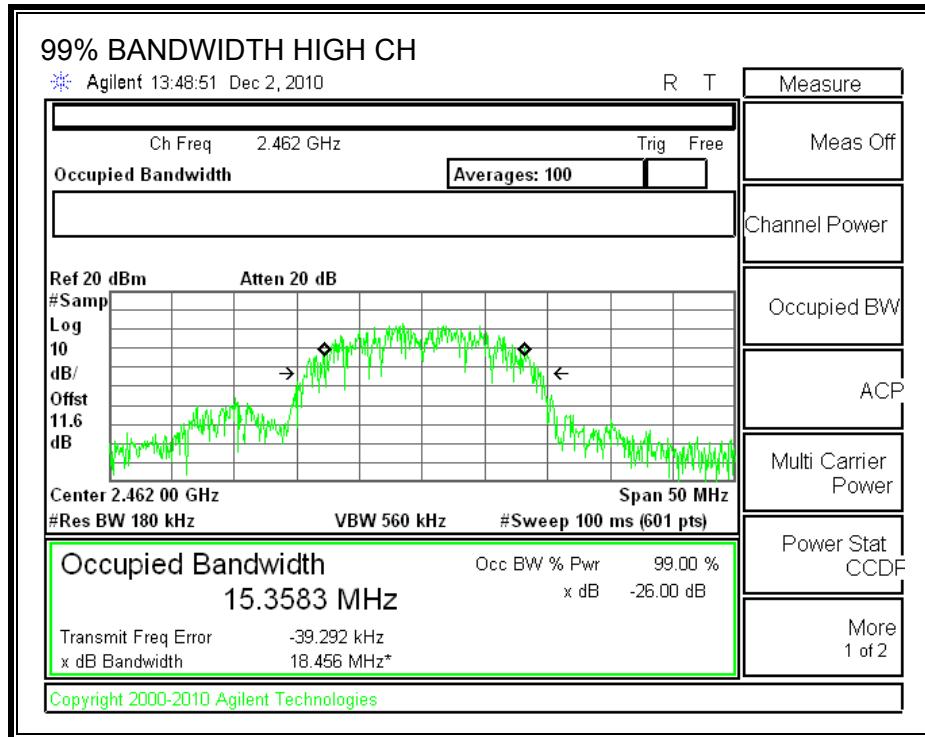
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.3119
Middle	2437	15.3422
High	2462	15.3583

99% BANDWIDTH







7.1.3. PEAK 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 11.6 dB (including 10 dB pad and 1.6 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	15.63
Middle	2437	15.35
High	2462	15.57

7.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.6 dB (including 10 dB pad and 1.6 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	14.80
Middle	2437	14.86
High	2462	14.99

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.

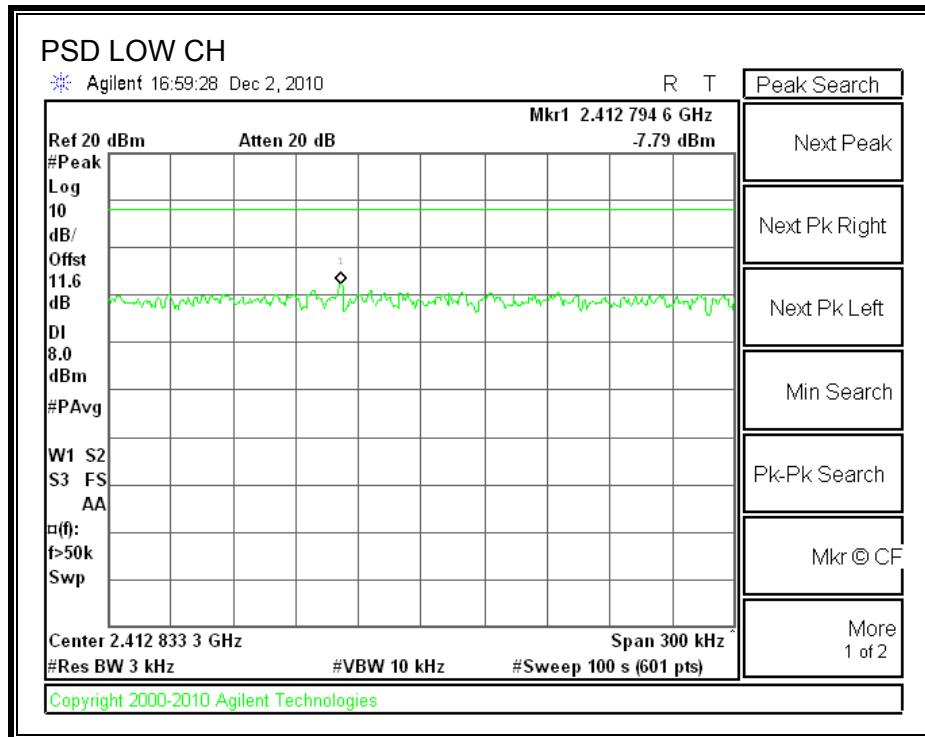
TEST PROCEDURE

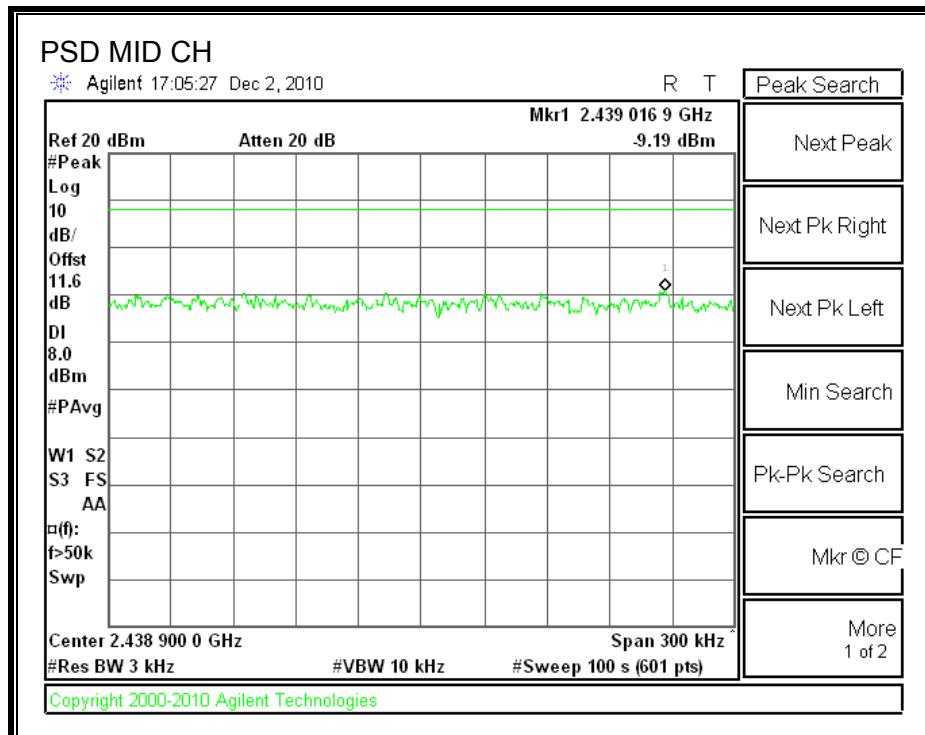
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

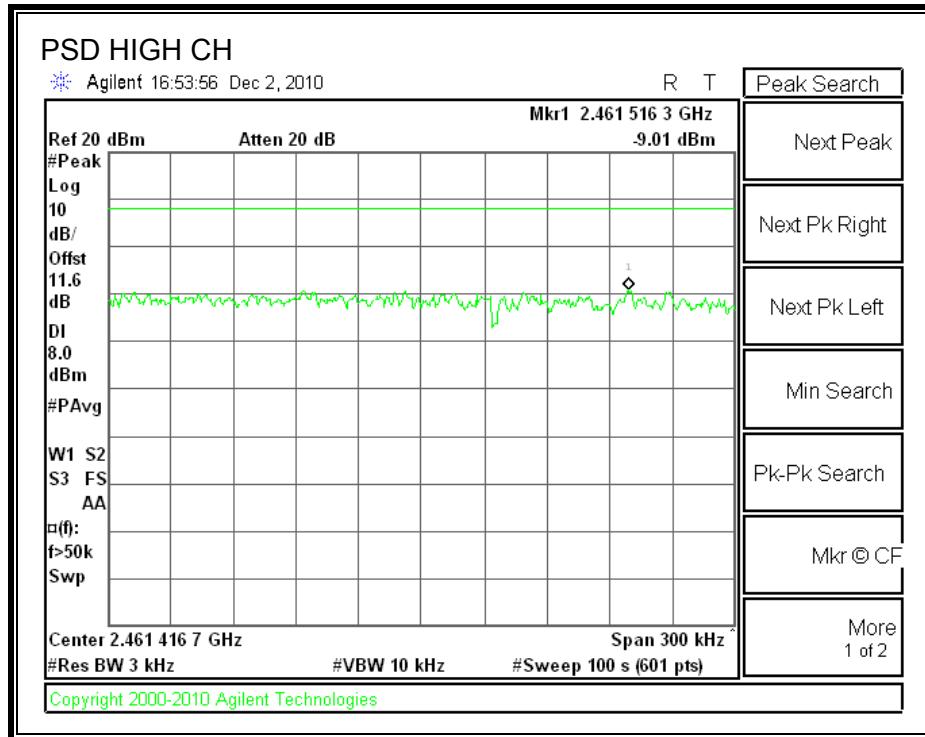
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-7.79	8	-15.79
Middle	2437	-9.19	8	-17.19
High	2462	-9.01	8	-17.01

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.

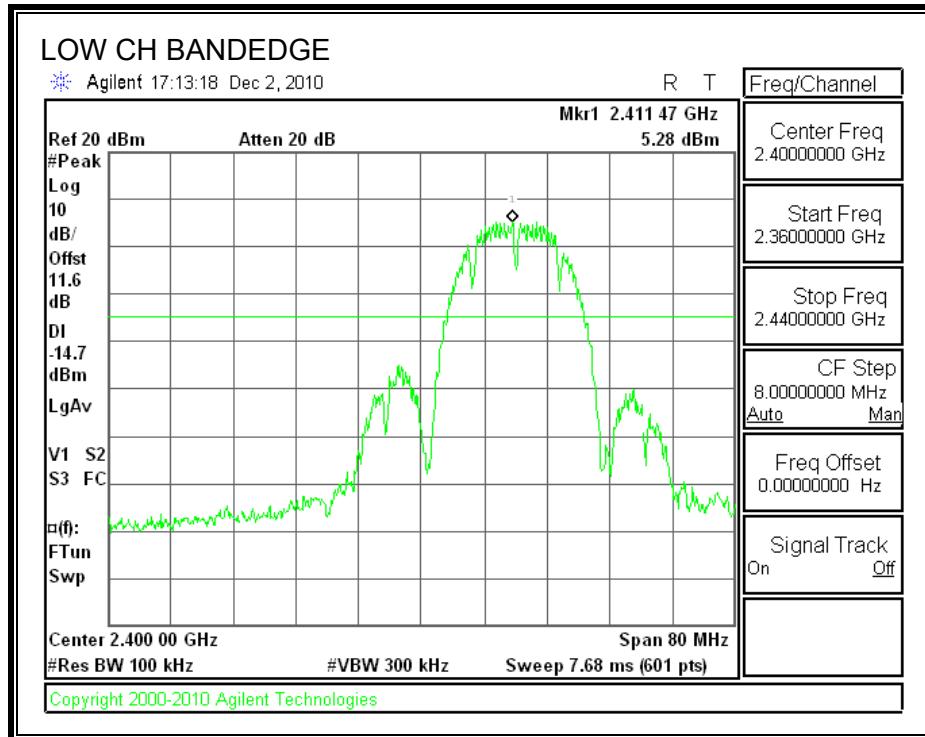
TEST PROCEDURE

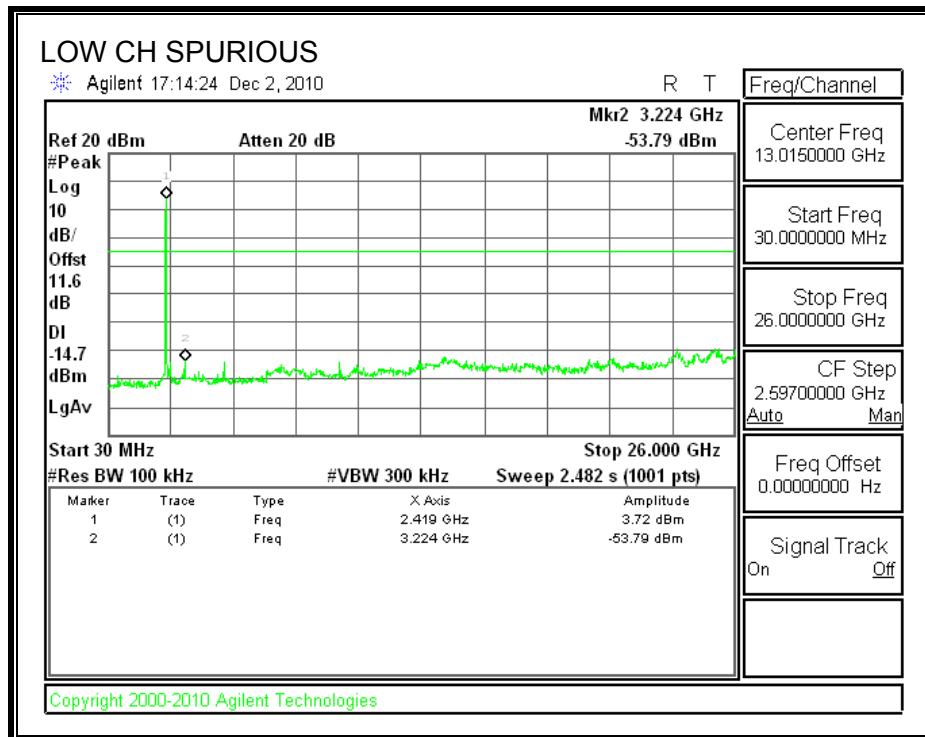
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

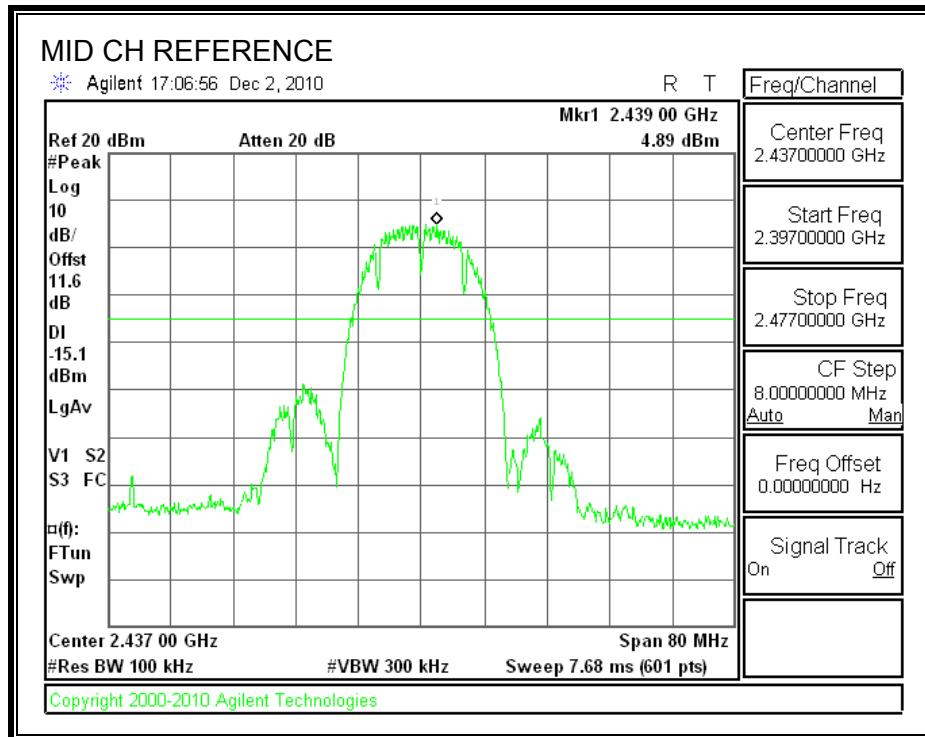
RESULTS

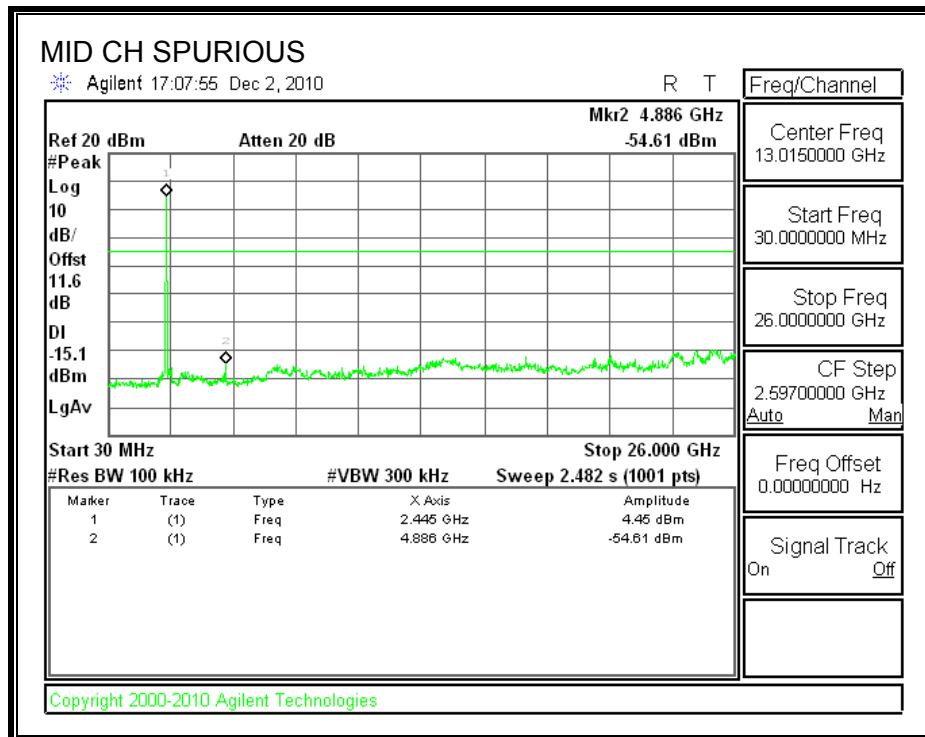
SPURIOUS EMISSIONS, LOW CHANNEL



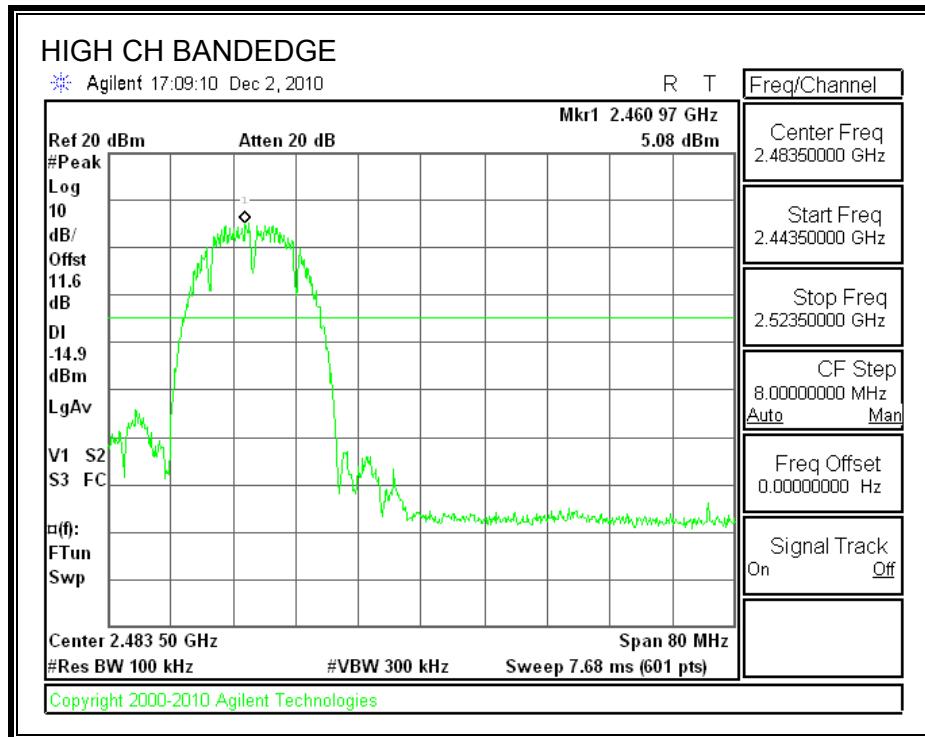


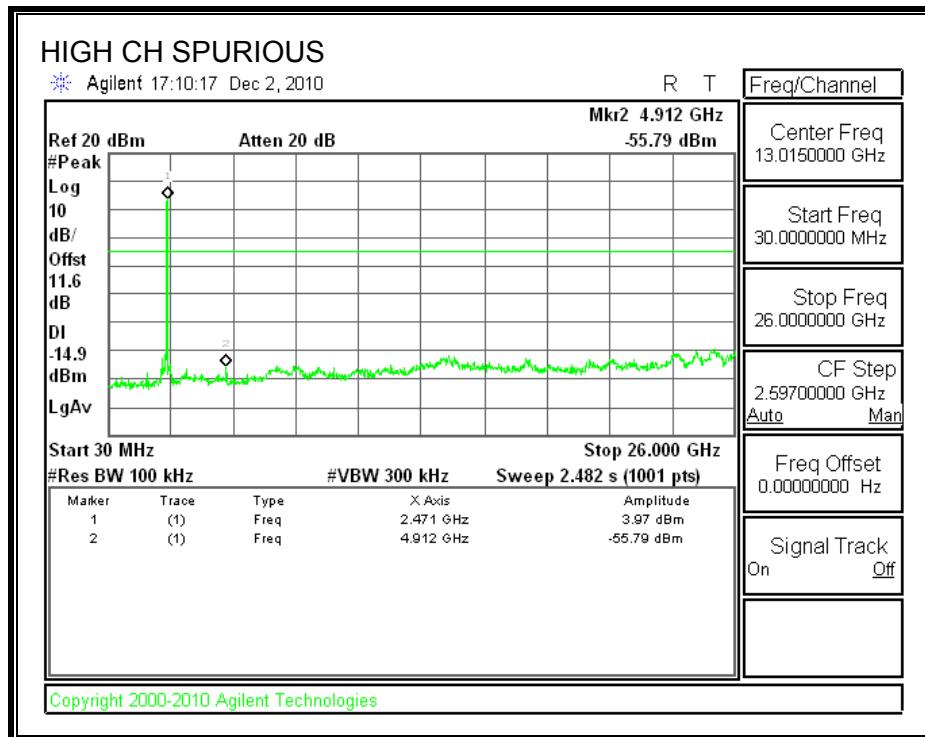
SPURIOUS EMISSIONS, MID CHANNEL





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.

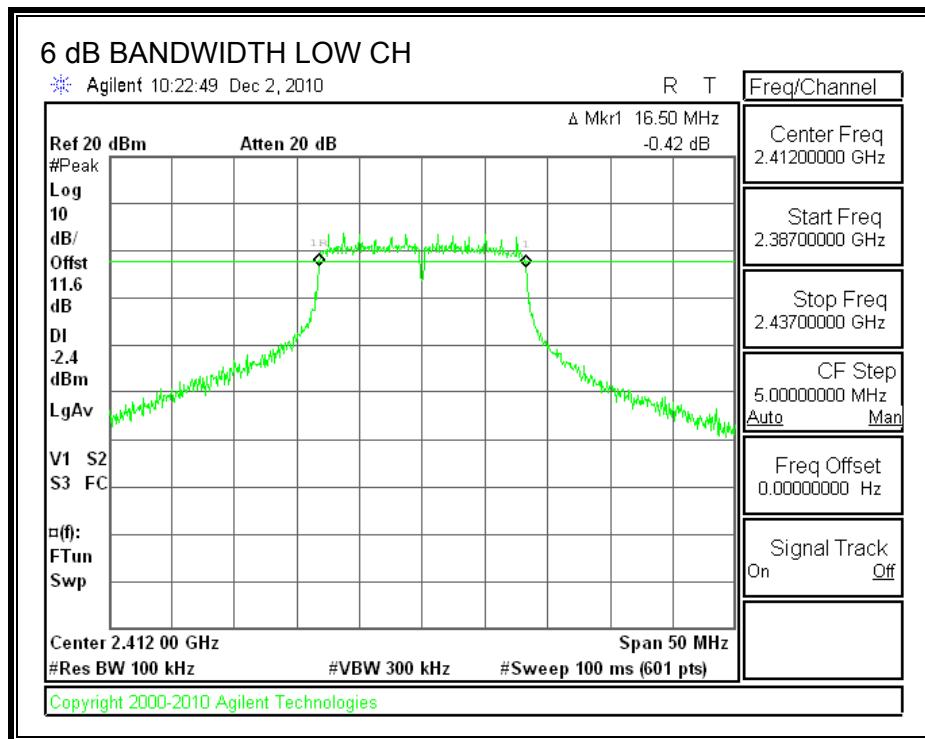
TEST PROCEDURE

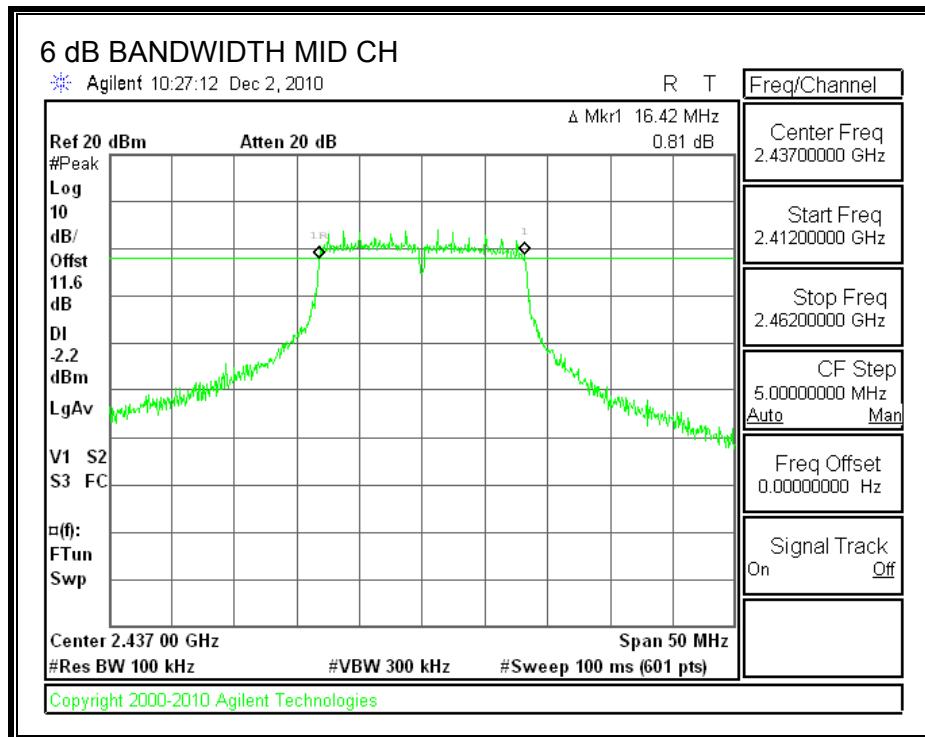
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

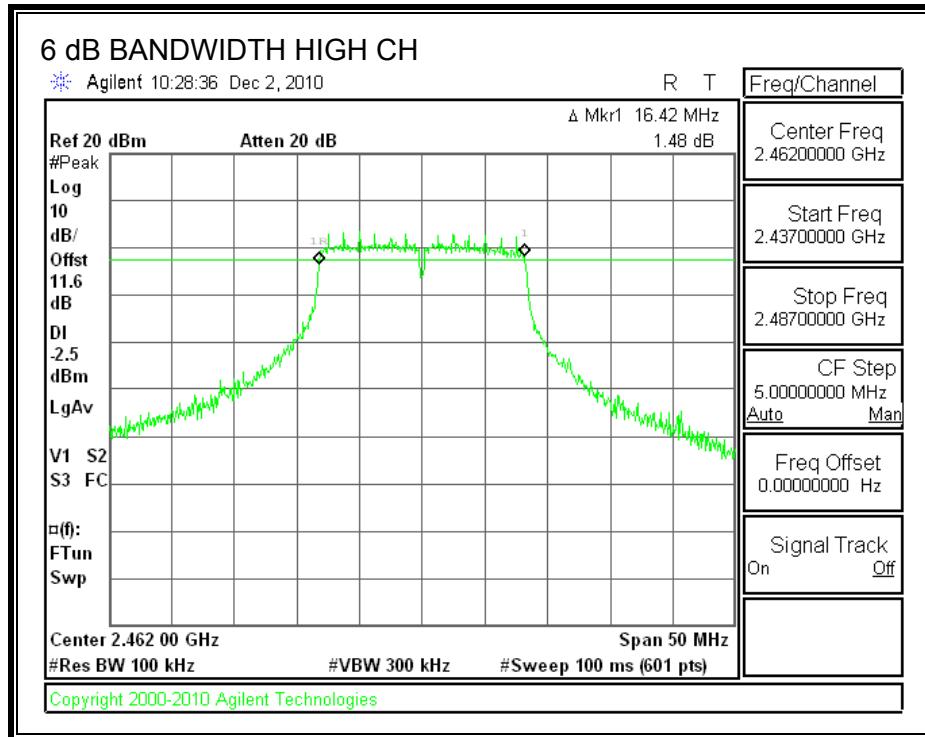
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.5	0.5
Middle	2437	16.42	0.5
High	2462	16.42	0.5

6 dB BANDWIDTH







7.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

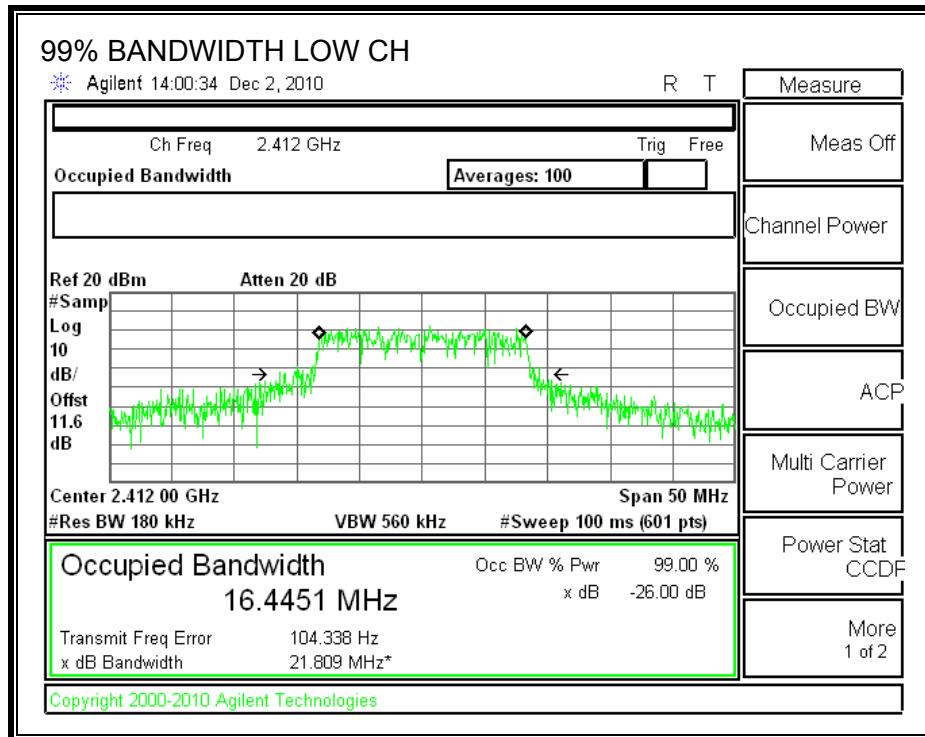
TEST PROCEDURE

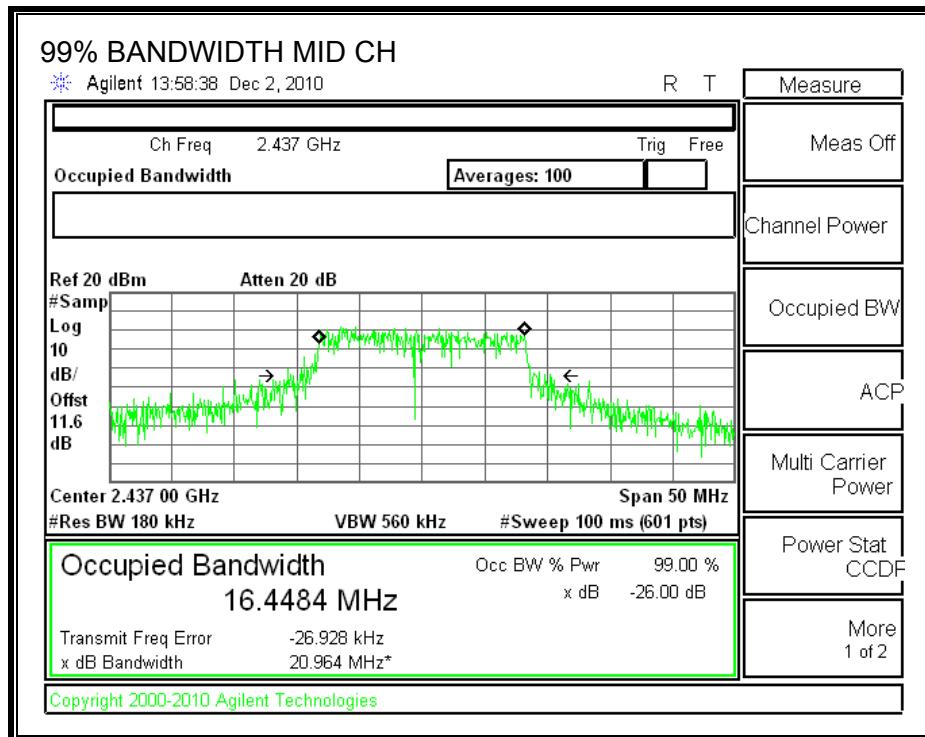
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

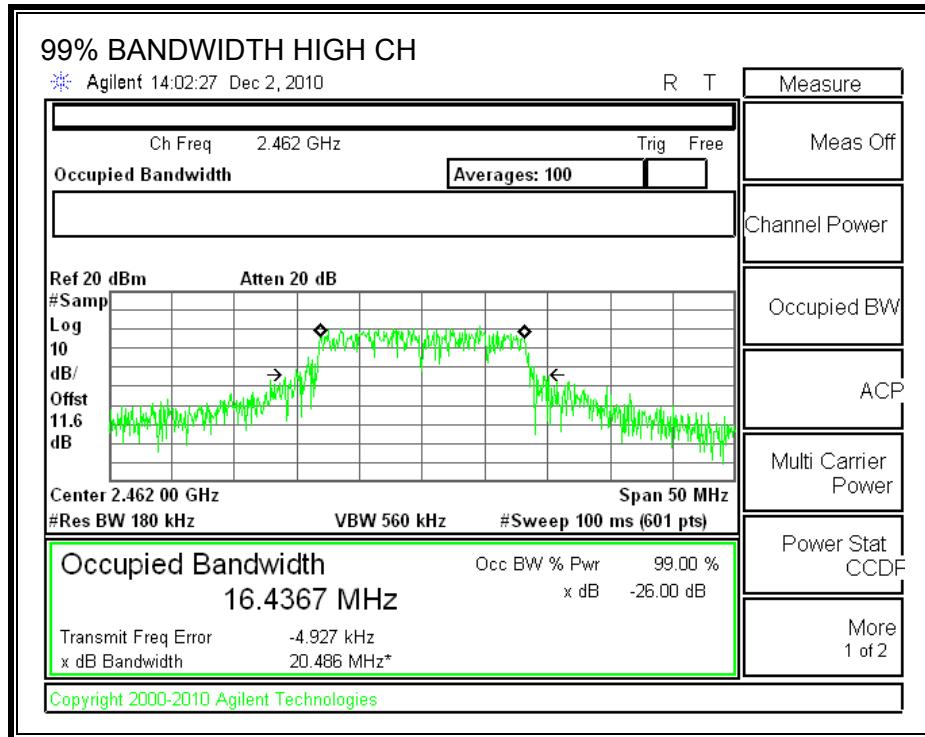
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4451
Middle	2437	16.4484
High	2462	16.4367

99% BANDWIDTH







7.2.3. PEAK 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 11.6 dB (including 10 dB pad and 1.6 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	20.98
Middle	2437	21.24
High	2462	20.32

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 11.6 dB (including 10 dB pad and 1.6 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	15.23
Middle	2437	15.09
High	2462	14.92

7.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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

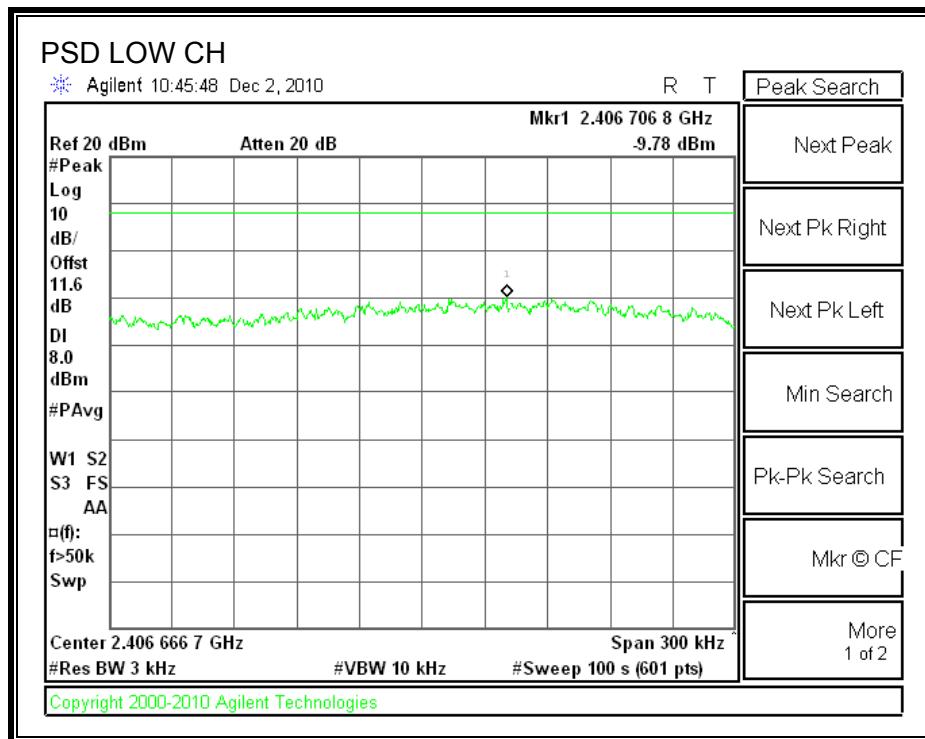
TEST PROCEDURE

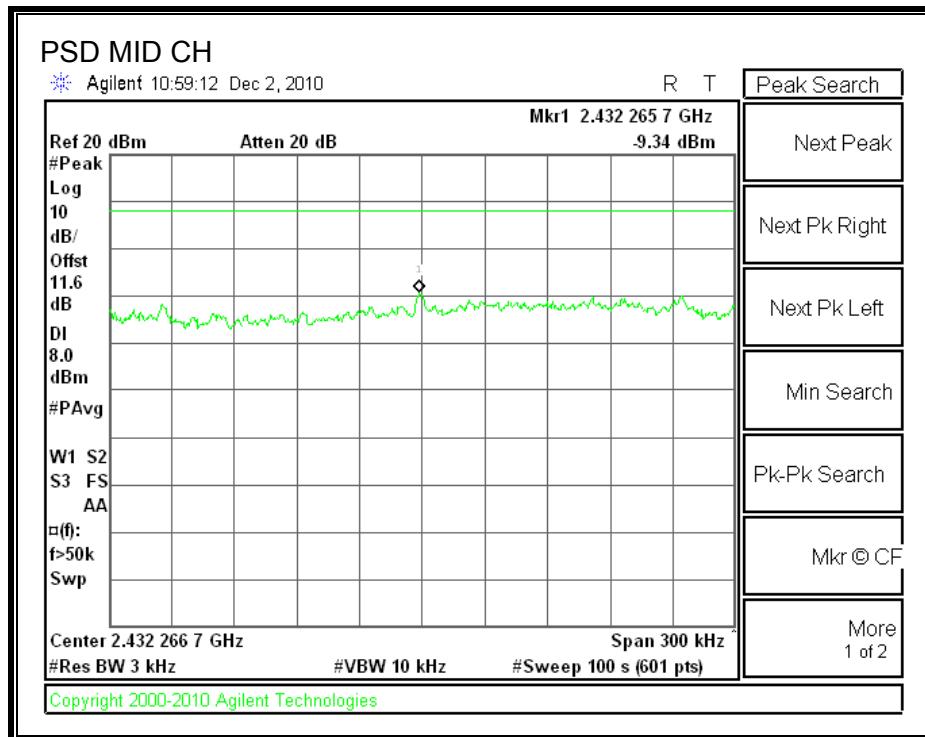
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

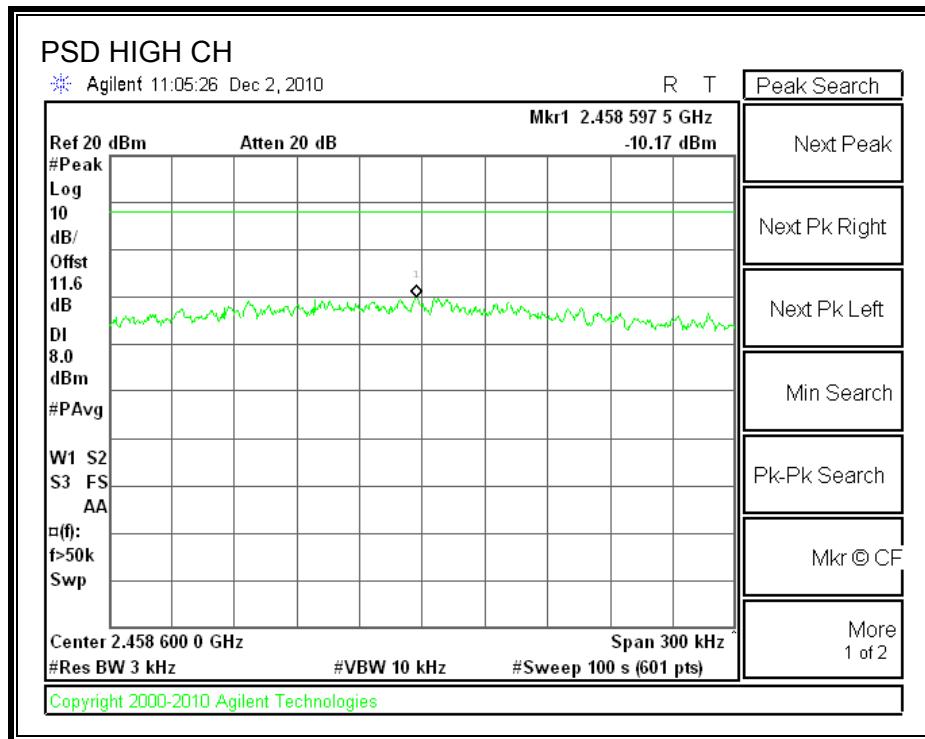
RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.78	8	-17.78
Middle	2437	-9.34	8	-17.34
High	2462	-10.17	8	-18.17

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.

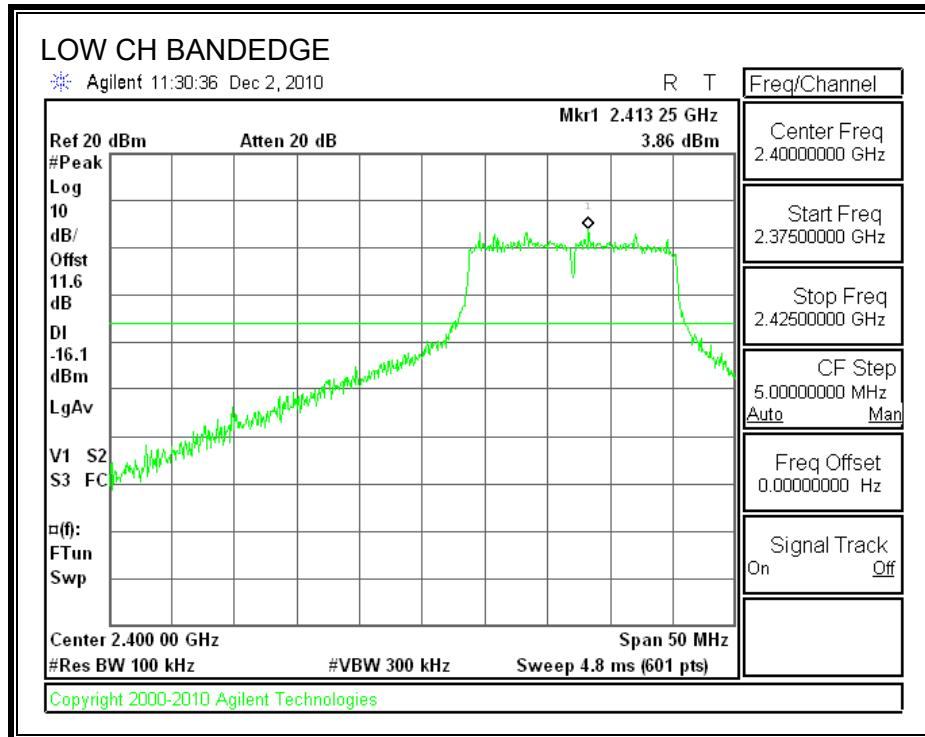
TEST PROCEDURE

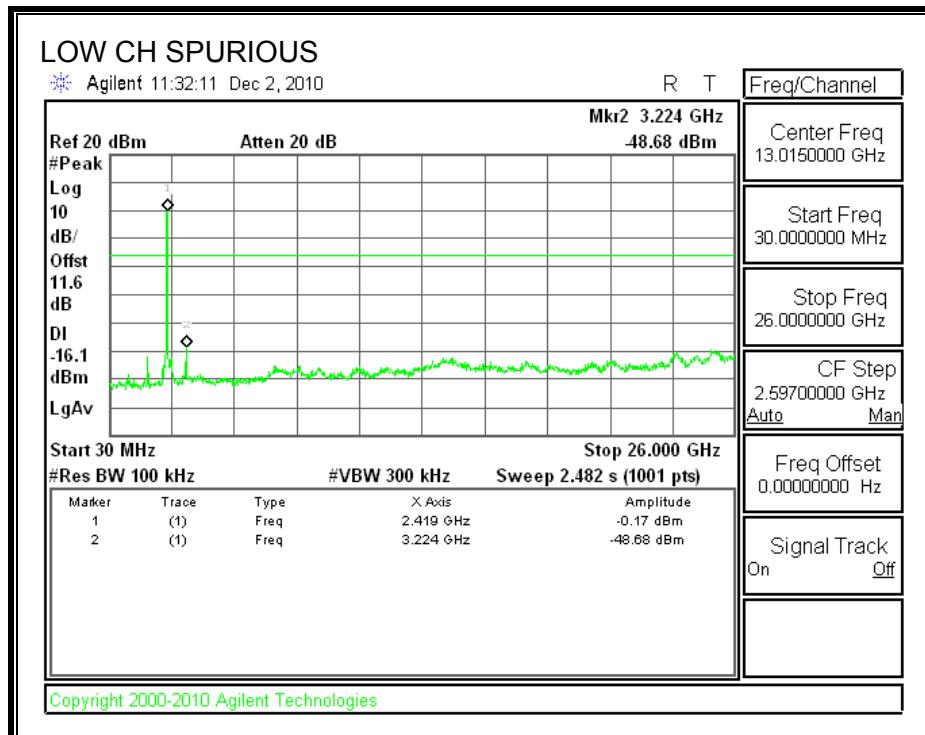
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

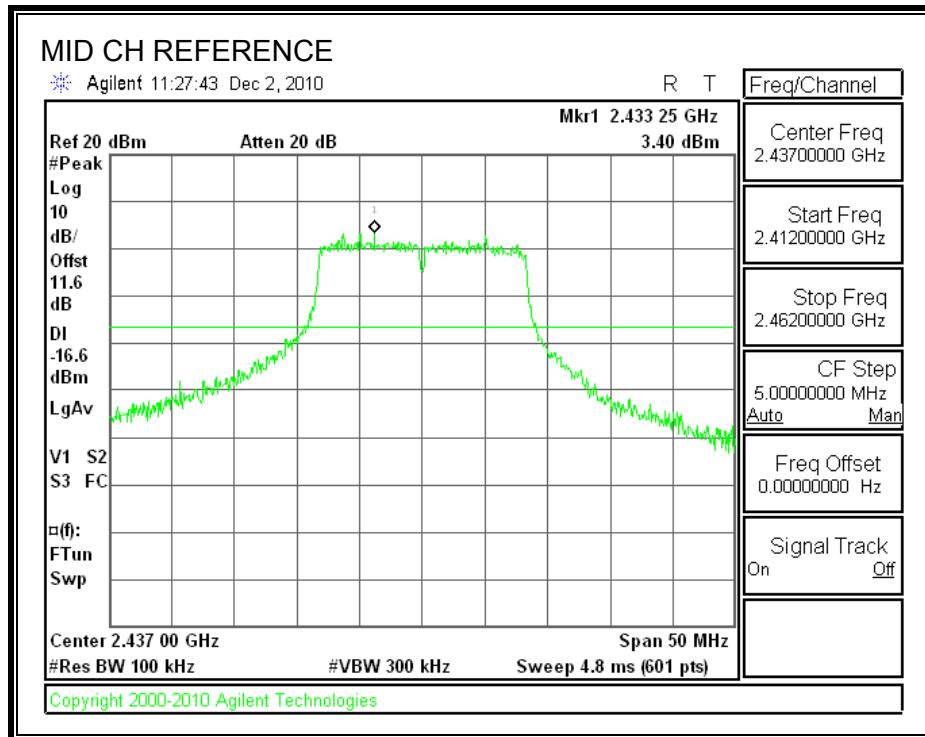
RESULTS

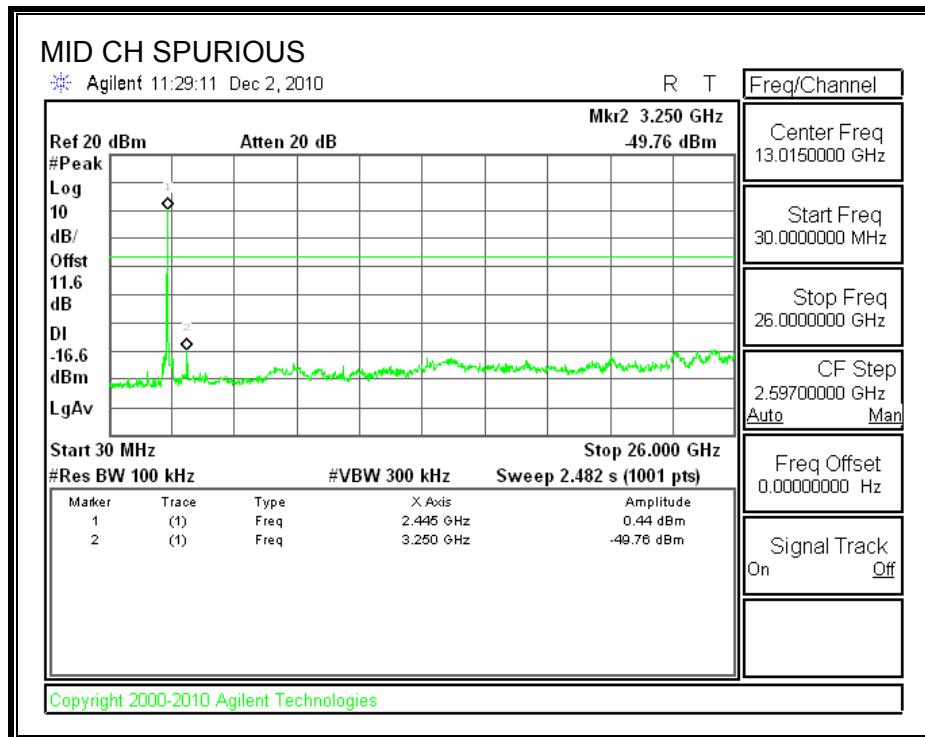
SPURIOUS EMISSIONS, LOW CHANNEL



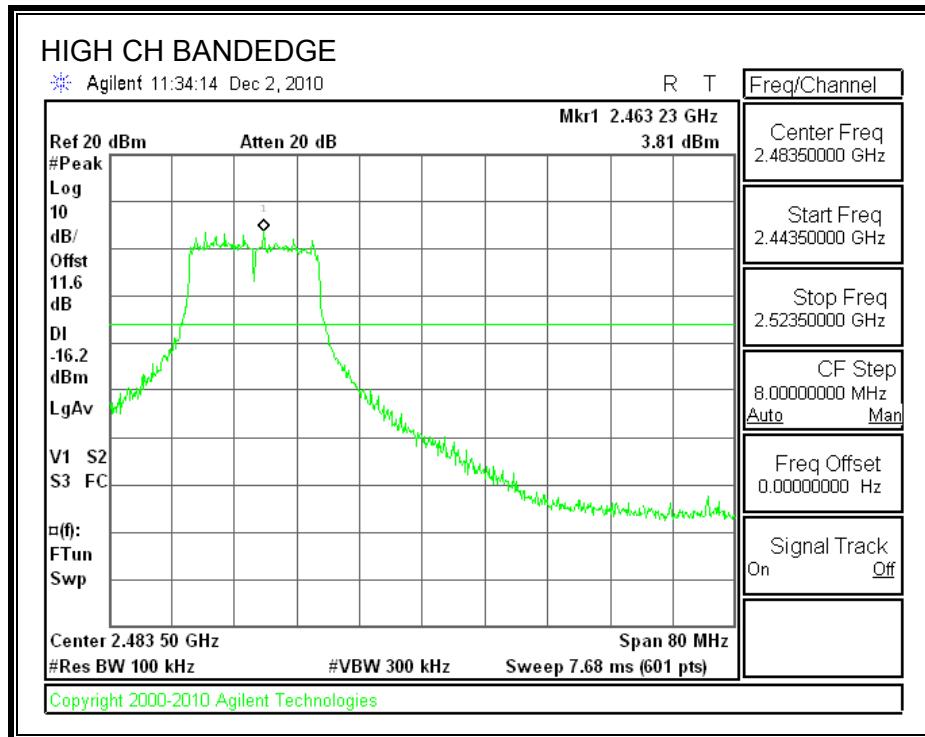


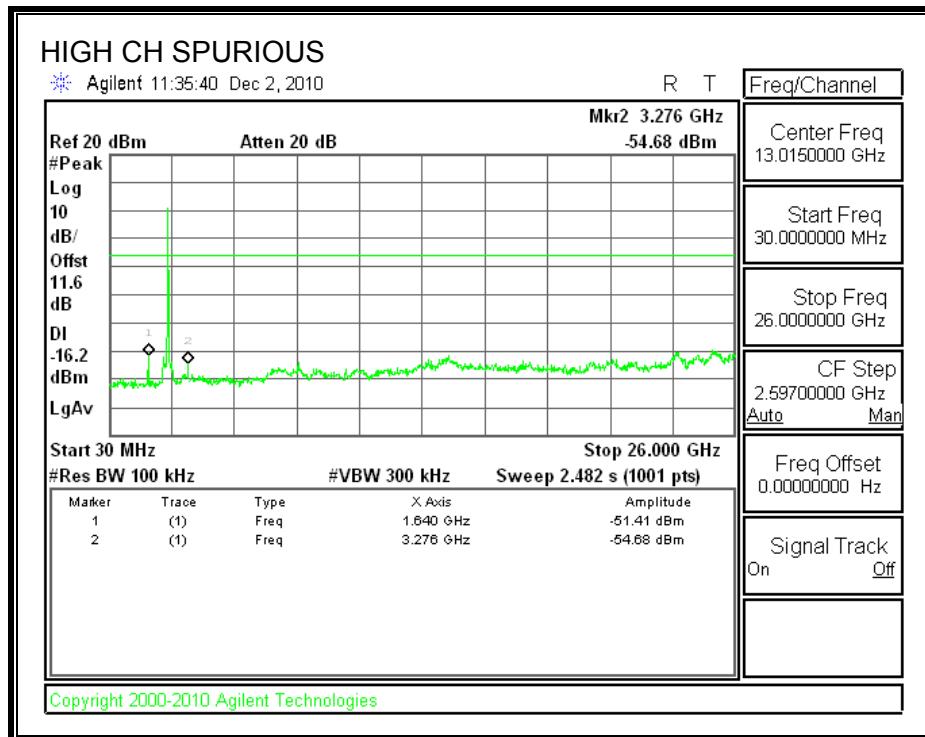
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

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

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

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

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

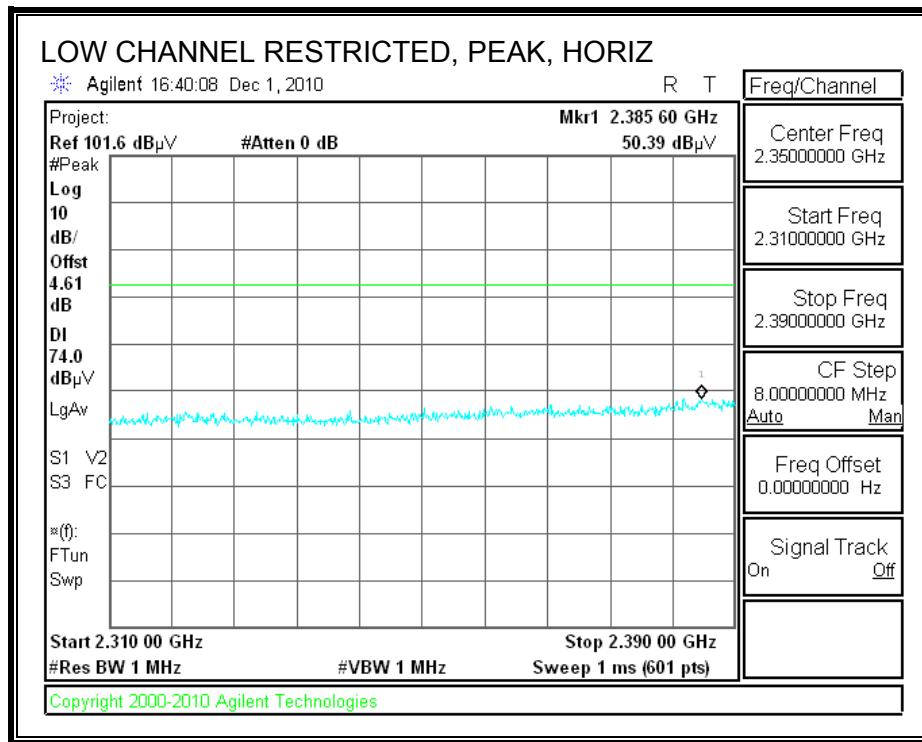
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

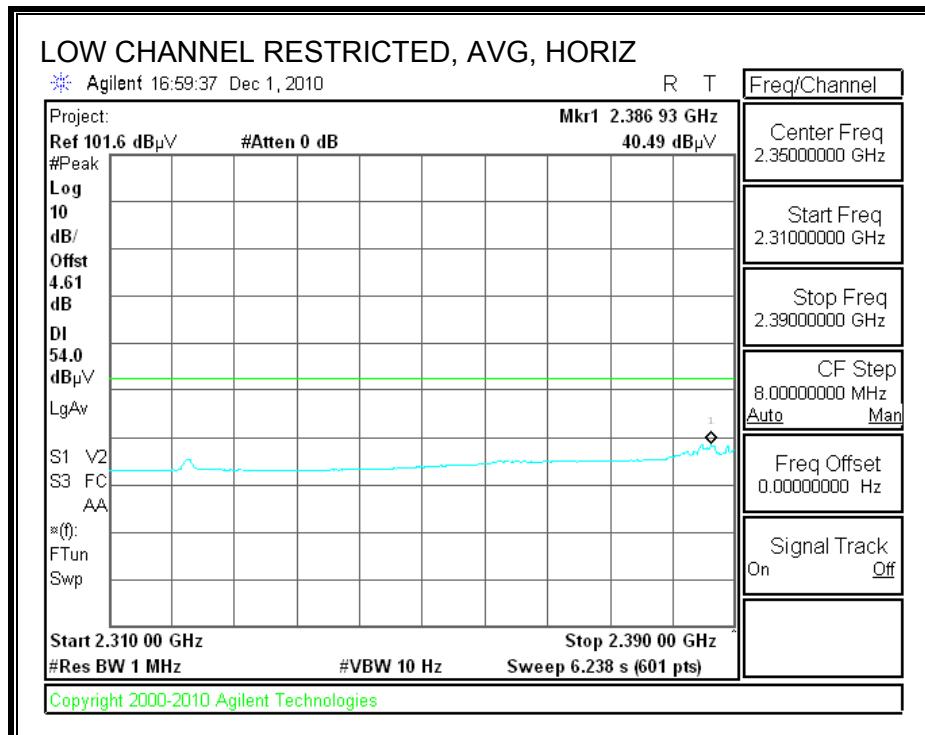
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

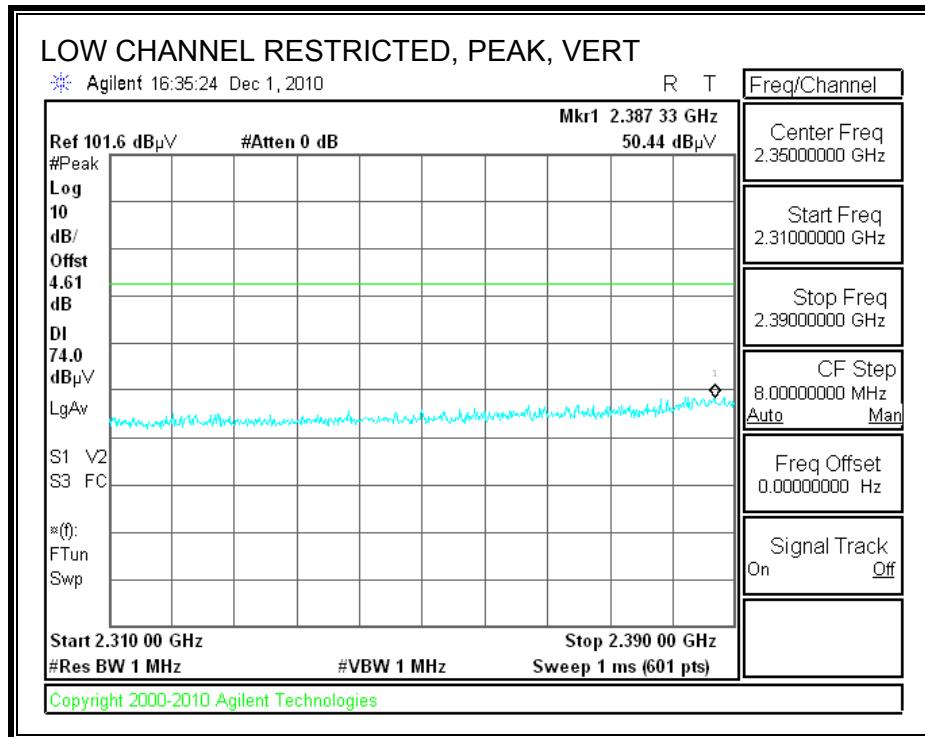
8.2.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

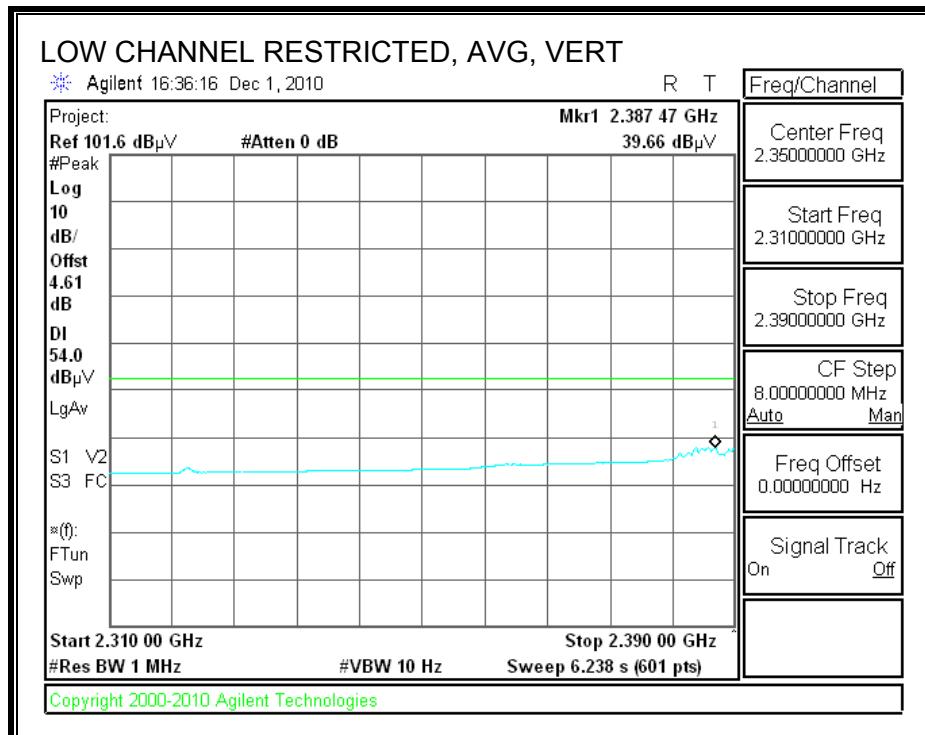
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



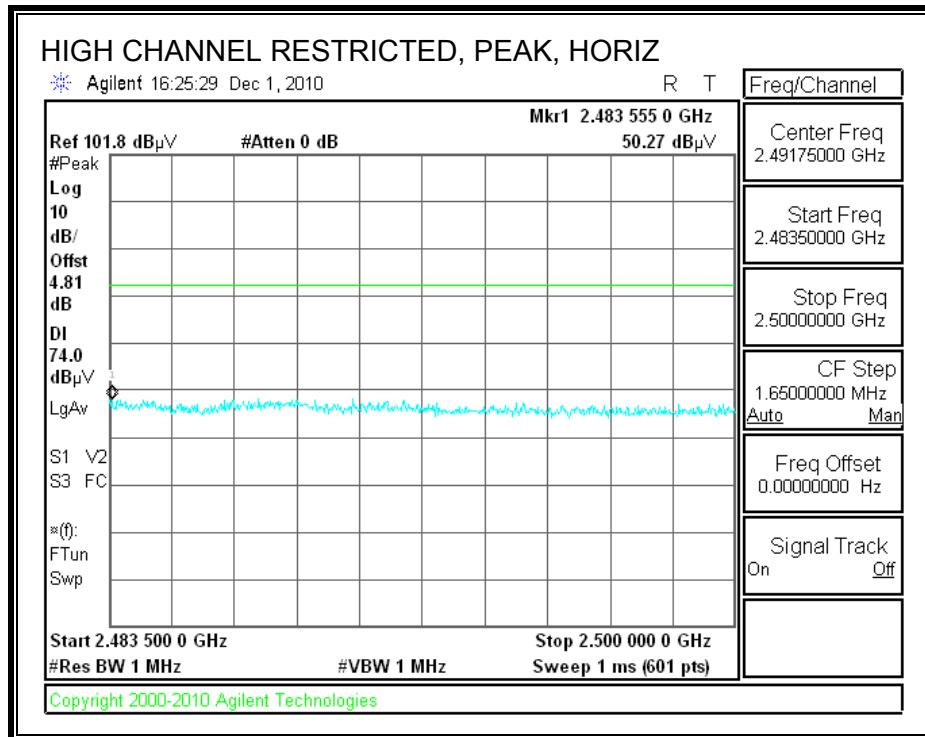


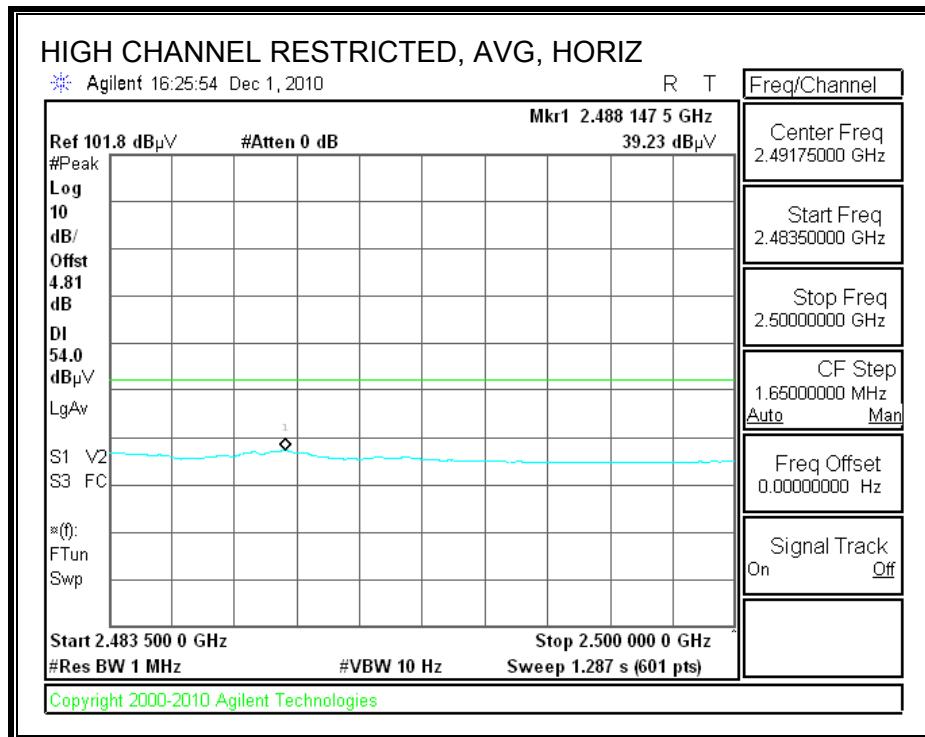
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



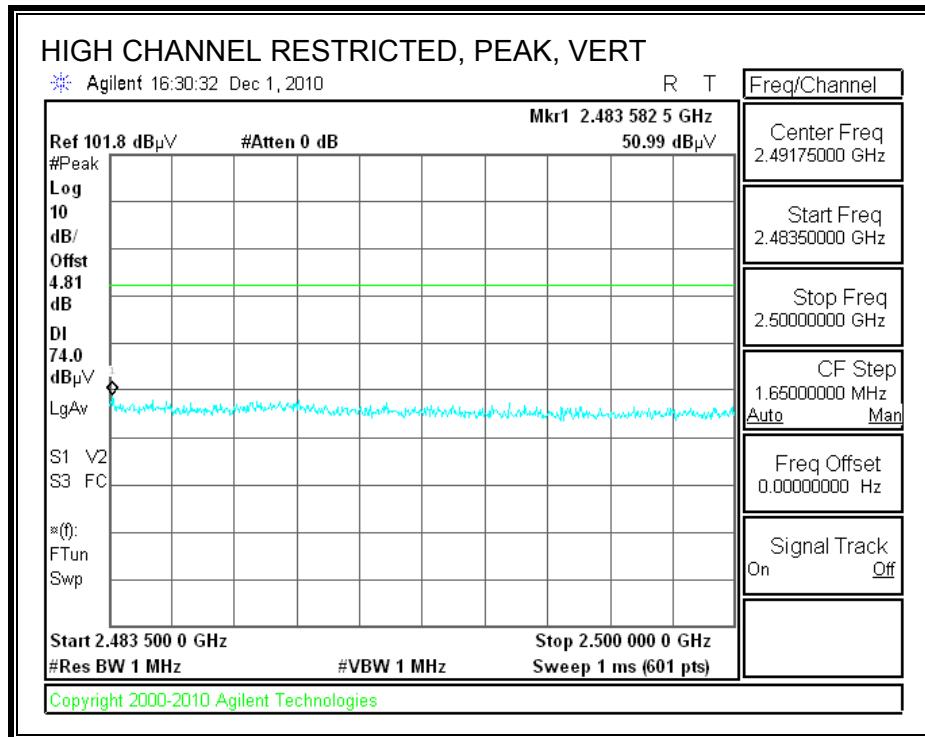


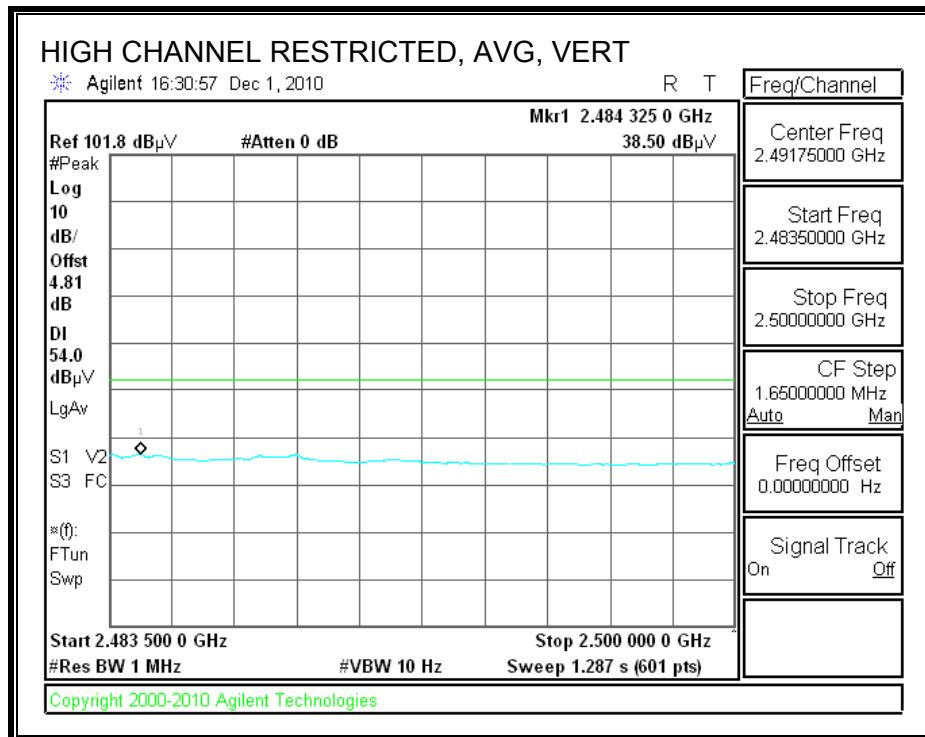
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



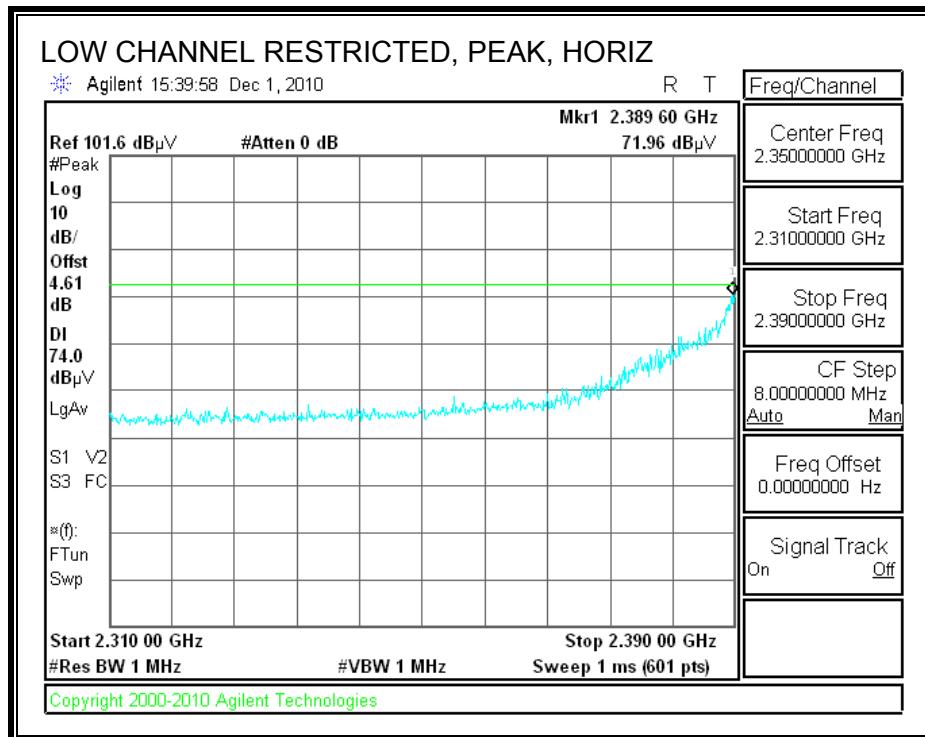


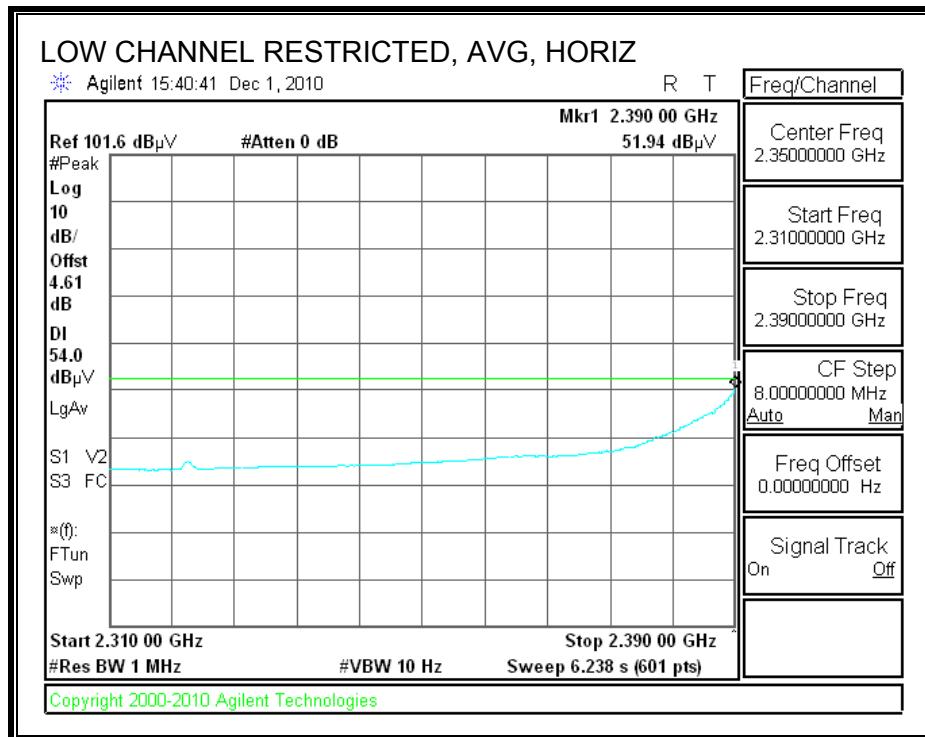
HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber															
Company:	Primex Wireless														
Project #:	10U13541														
Date:	12/1/2010														
Test Engineer:	Thanh Nguyen														
Configuration:	EUT only														
Mode:	Transmit b mode														
Test Equipment:															
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit			
T73; S/N: 6717 @3m			T144 Miteq 3008A00931									FCC 15.205			
Hi Frequency Cables															
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			
			12' cable 22807600			20' cable 22807500						R_001			
Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz															
f GHz	Dist (m)	Read Ph dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuVm	Avg dBuVm	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch															
4.824	3.0	47.3	42.6	33.0	5.2	-36.5	0.0	0.0	49.1	44.4	74	54	-24.9	9.6	V
4.824	3.0	47.6	44.8	33.0	5.2	-36.5	0.0	0.0	49.4	46.6	74	54	-24.6	7.4	H
12.060	3.0	35.8	23.2	39.0	8.8	-35.4	0.0	0.0	48.1	35.5	74	54	-25.9	-18.5	Noise floor
Mid Ch															
4.874	3.0	51.6	49.0	33.1	5.3	-36.5	0.0	0.0	53.5	50.9	74	54	-20.5	-3.1	V
7.311	3.0	41.8	33.7	35.3	6.5	-36.2	0.0	0.0	47.4	39.3	74	54	-26.6	-14.7	V
4.874	3.0	51.3	49.6	33.1	5.3	-36.5	0.0	0.0	53.2	51.5	74	54	-20.8	-2.5	H
7.311	3.0	41.3	34.6	35.3	6.5	-36.2	0.0	0.0	46.9	40.2	74	54	-27.1	-13.8	H
High Ch															
4.924	3.0	51.9	49.2	33.1	5.3	-36.5	0.0	0.0	53.9	51.2	74	54	-20.1	-2.8	V
7.386	3.0	41.4	33.2	35.4	6.6	-36.2	0.0	0.0	47.1	39.0	74	54	-26.9	-15.0	V
4.924	3.0	52.3	49.4	33.1	5.3	-36.5	0.0	0.0	54.3	51.4	74	54	-19.7	-2.6	H
7.386	3.0	39.6	30.1	35.4	6.6	-36.2	0.0	0.0	45.4	35.8	74	54	-28.6	-18.2	H
12.310	3.0	36.3	23.1	39.0	8.9	-35.4	0.0	0.0	48.8	35.5	74	54	-25.2	-18.5	Noise floor
Rev. 07.22.09															
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										

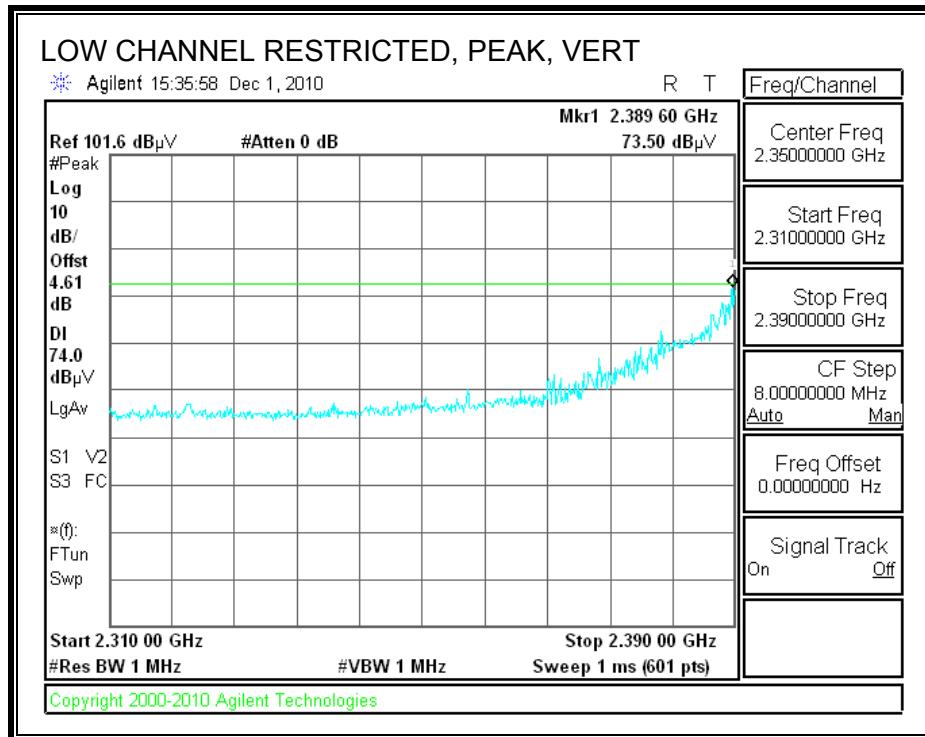
8.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

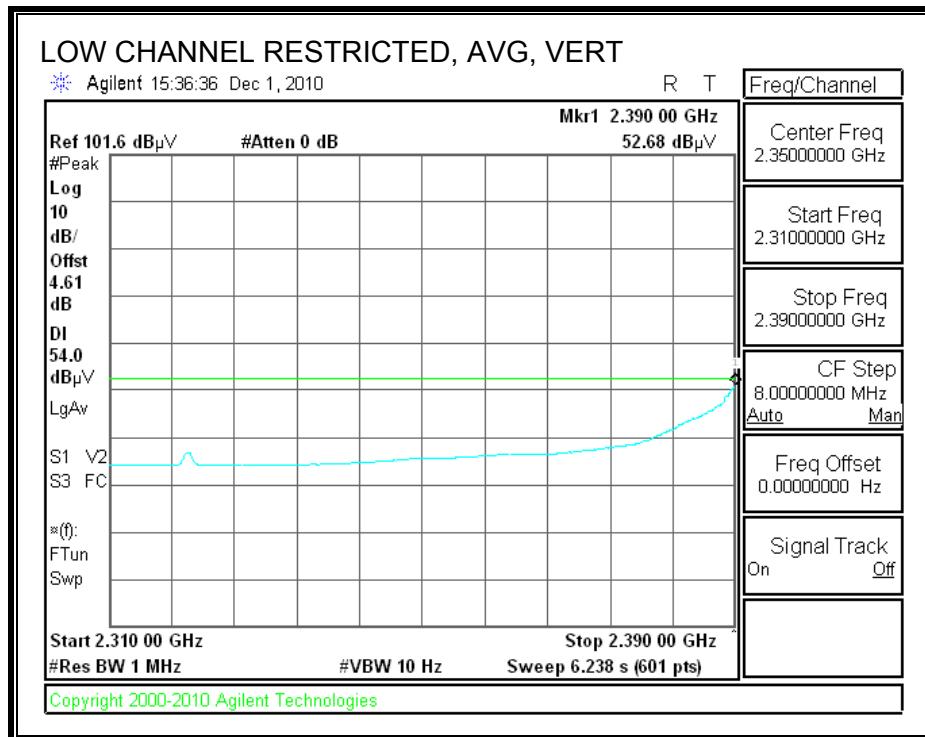
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



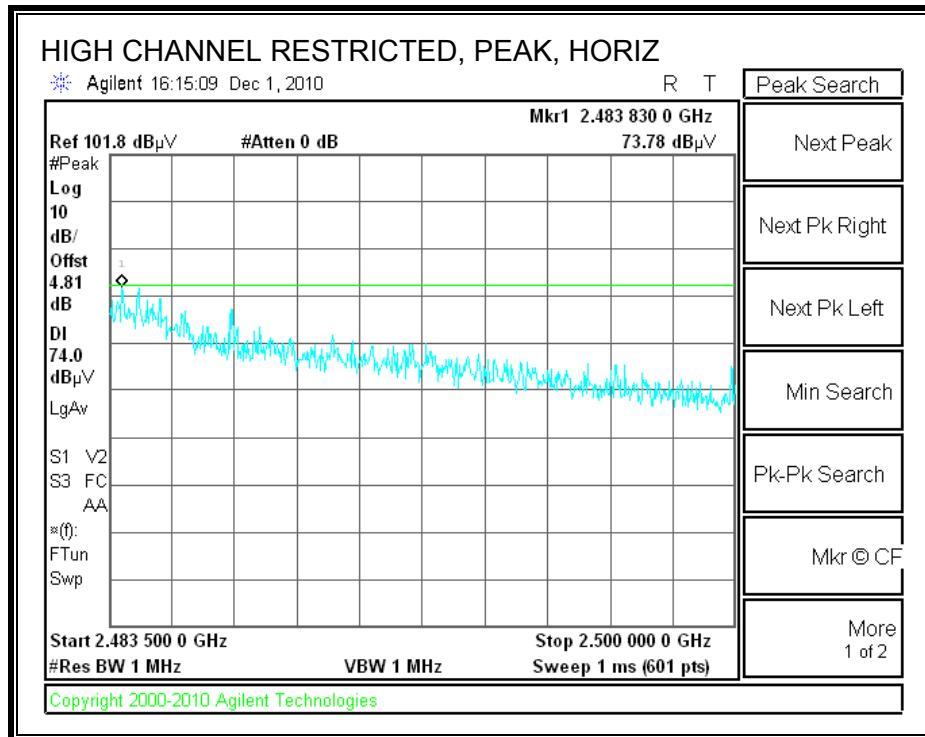


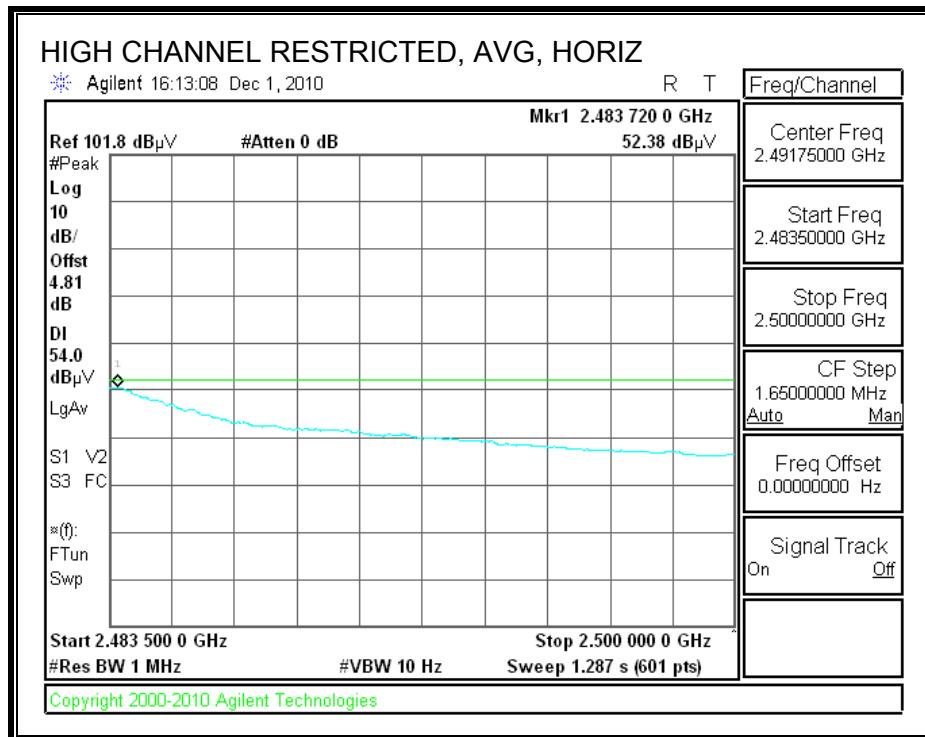
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



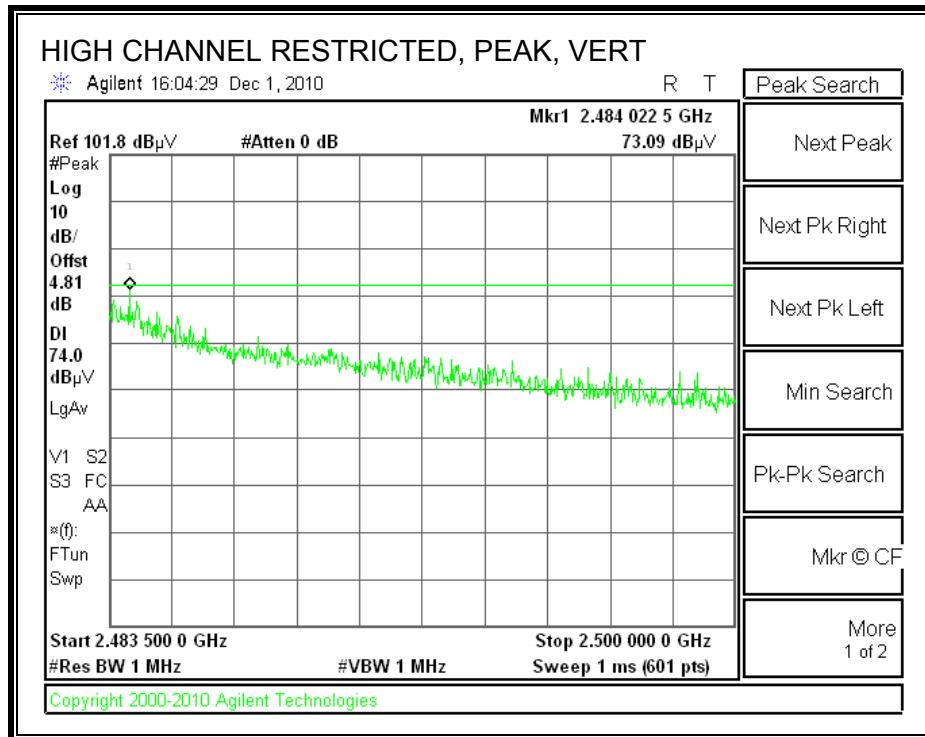


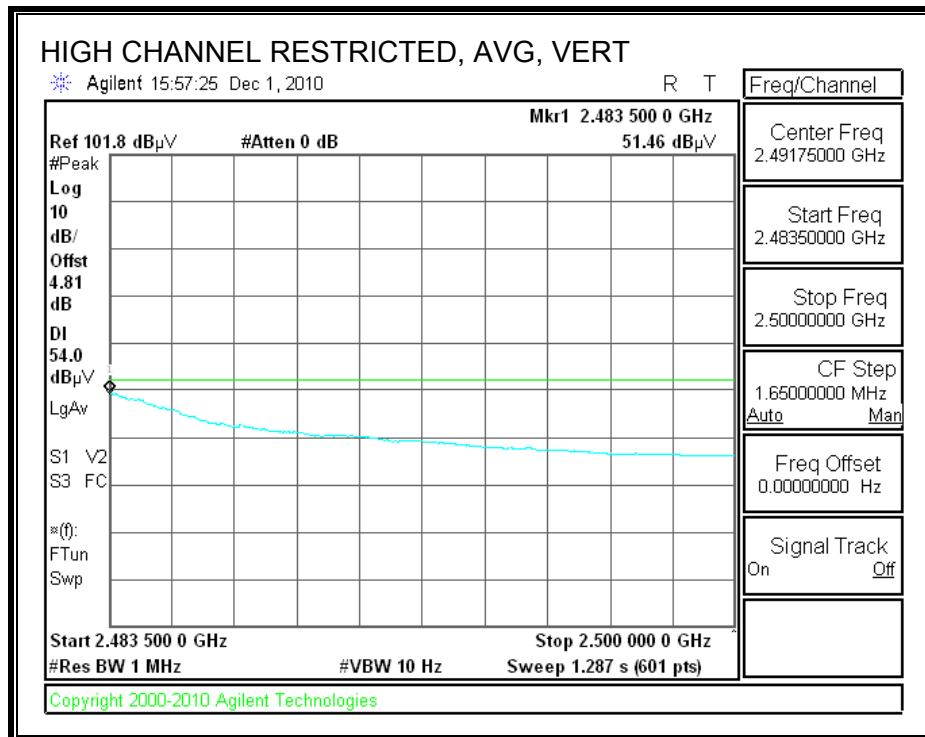
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

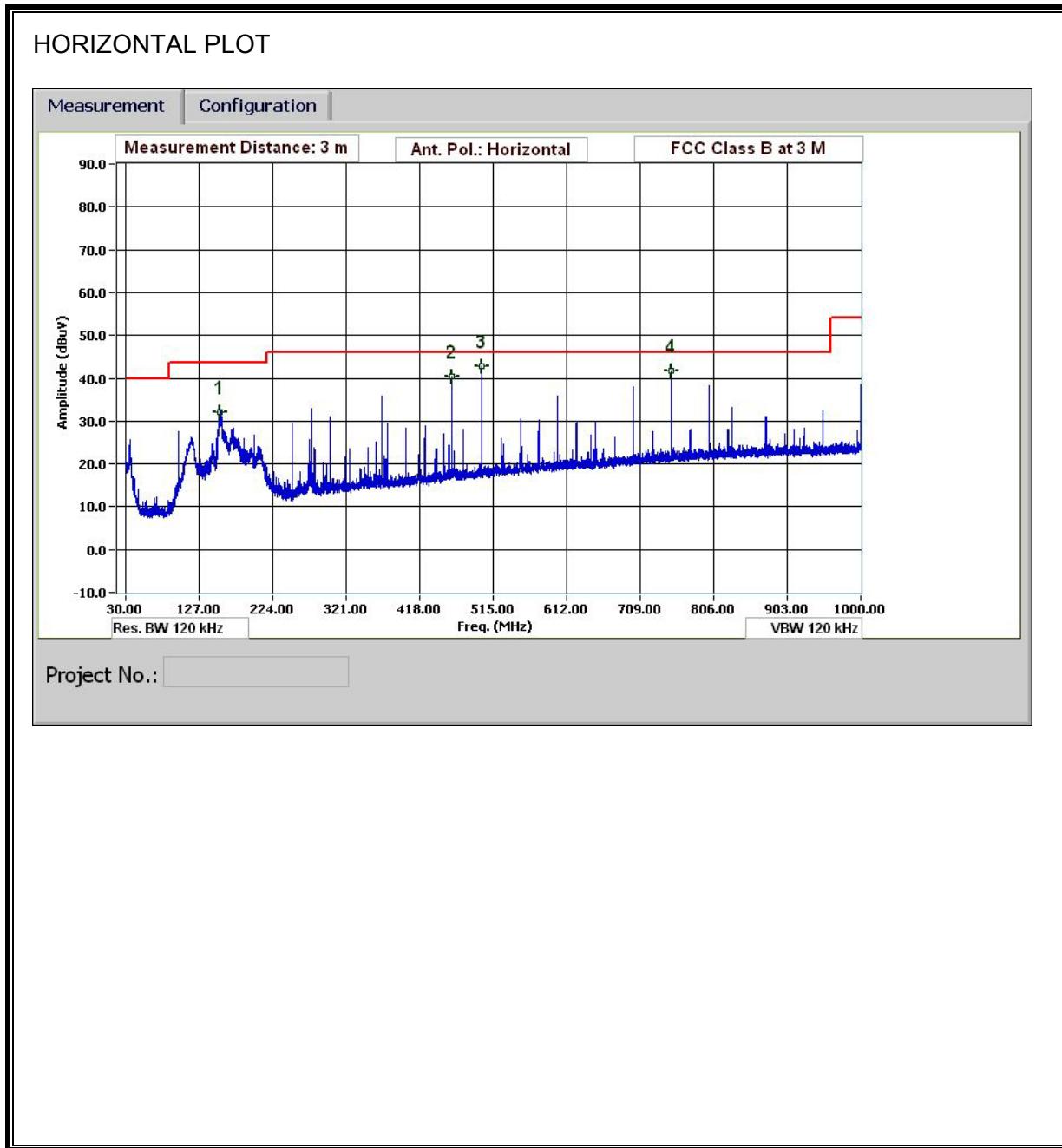
High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber															
Company:	Primex Wireless														
Project #:	10U13541														
Date:	12/1/2010														
Test Engineer:	Thanh Nguyen														
Configuration:	EUT only														
Mode:	Transmit g mode														
Test Equipment:															
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit							
T73; S/N: 6717 @3m		T144 Miteq 3008A00931						FCC 15.205							
Hi Frequency Cables															
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz					
								R_001		Average Measurements RBW=1MHz ; VBW=10Hz					
f GHz	Dist (m)	Read Ph 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 Ch															
4.824	3.0	48.7	35.3	33.0	5.2	-36.5	0.0	0.0	50.5	37.1	74	54	-23.5	-16.9	V
4.824	3.0	49.0	37.2	33.0	5.2	-36.5	0.0	0.0	50.8	39.0	74	54	-23.2	-15.0	H
12.960	3.0	36.2	23.5	39.0	8.8	-35.4	0.0	0.0	48.6	35.8	74	54	-25.4	-18.2	Noise floor
Mid Ch															
4.874	3.0	50.3	36.8	33.1	5.3	-36.5	0.0	0.0	52.2	38.7	74	54	-21.8	-15.3	V
7.311	3.0	50.7	34.2	35.3	6.5	-36.2	0.0	0.0	56.4	39.8	74	54	-17.6	-14.2	V
4.874	3.0	50.4	36.8	33.1	5.3	-36.5	0.0	0.0	52.3	38.7	74	54	-21.7	-15.3	H
7.311	3.0	52.8	35.8	35.3	6.5	-36.2	0.0	0.0	58.4	41.4	74	54	-15.6	-12.6	H
High Ch															
4.924	3.0	51.1	38.9	33.1	5.3	-36.5	0.0	0.0	53.1	40.9	74	54	-20.9	-13.1	V
7.386	3.0	47.4	31.5	35.4	6.6	-36.2	0.0	0.0	53.2	37.2	74	54	-20.8	-16.8	V
4.924	3.0	49.2	35.3	33.1	5.3	-36.5	0.0	0.0	51.2	37.3	74	54	-22.8	-16.7	H
7.386	3.0	53.5	36.6	35.4	6.6	-36.2	0.0	0.0	59.3	42.3	74	54	-14.7	-11.7	H
12.310	3.0	34.7	23.1	39.0	8.9	-35.4	0.0	0.0	47.2	35.6	74	54	-26.8	-18.4	Noise floor
Rev. 07.22.09															
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. RECEIVER ABOVE 1 GHz

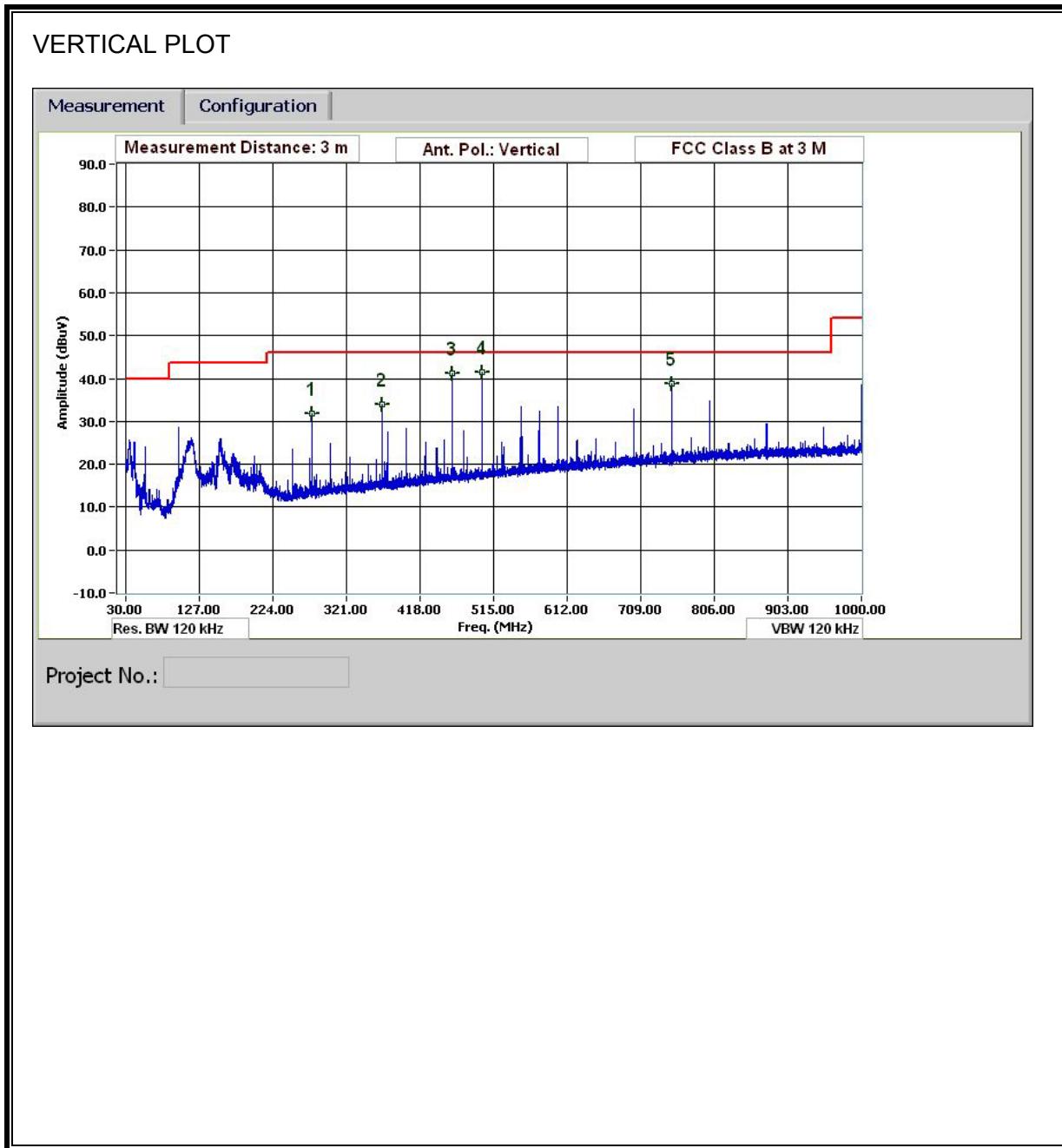
High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber																
Company:	Primex Wireless															
Project #:	10U13541															
Date:	12/1/2010															
Test Engineer:	Thanh Nguyen															
Configuration:	EUT only															
Mode:	Receive mode															
Test Equipment:																
Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit								
T73; S/N: 6717 @3m		T144 Miteq 3008A00931						RX RSS 210								
Hi Frequency Cables																
3' cable 22807700		12' cable 22807600		20' cable 22807500		HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz						
		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)	
1.000	3.0	52.8	50.8	23.9	2.1	-39.5	0.0	0.0	39.3	37.3	74	54	-34.7	-16.7	V	
1.250	3.0	50.2	44.7	24.7	2.4	-39.1	0.0	0.0	38.2	32.7	74	54	-35.8	-21.3	V	
1.380	3.0	48.5	35.9	25.1	2.5	-38.9	0.0	0.0	37.2	24.6	74	54	-36.8	-29.4	V	
1.500	3.0	46.1	35.0	25.5	2.7	-38.8	0.0	0.0	35.5	24.5	74	54	-38.5	-29.5	V	
1.000	3.0	55.1	50.6	23.9	2.1	-39.5	0.0	0.0	41.6	37.1	74	54	-32.4	-16.9	H	
1.250	3.0	51.6	43.8	24.7	2.4	-39.1	0.0	0.0	39.6	31.7	74	54	-34.4	-22.3	H	
1.290	3.0	50.7	42.6	24.8	2.4	-39.1	0.0	0.0	38.9	30.8	74	54	-35.1	-23.2	H	
1.380	3.0	51.2	36.4	25.1	2.5	-38.9	0.0	0.0	39.9	25.1	74	54	-34.1	-28.9	H	
Rev. 07.22.09																
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												

8.4. WORST-CASE BELOW 1 GHz

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



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



EMI DATA

30-1000MHz Frequency Measurement Compliance Certification Services, Fremont 5m Chamber																		
Test Engr:		Thanh Nguyen																
Date:	12/01/10																	
Project #:	10U13541																	
Company:	Primex Wireless																	
Test Target:	FCC 15.247																	
Mode Oper:	Transmit worst case.																	
f	Measurement Frequency	Amp	Preamp Gain							Margin	Margin vs. Limit							
Dist	Distance to Antenna	D	Corr	Distance Correct to 3 meters														
Read	Analyzer Reading	Filter	Filter	Filter Insert Loss														
AF	Antenna Factor	Corr.	Calculated Field Strength															
CL	Cable Loss	Limit	Field Strength Limit															
f	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	Ant. High cm	Table Angle Degree	Notes			
Tx worst case																		
276.01	3.0	45.8	12.6	1.4	28.1	0.0	0.0	31.8	46.0	-14.2	V	P	100.0	0 - 360				
368.054	3.0	45.9	14.4	1.7	28.1	0.0	0.0	33.9	46.0	-12.1	V	P	100.0	0 - 360				
459.978	3.0	51.3	16.0	1.9	27.9	0.0	0.0	41.3	46.0	-4.7	V	P	100.0	0 - 360				
500.059	3.0	50.5	16.7	2.0	27.8	0.0	0.0	41.4	46.0	-4.6	V	P	100.0	0 - 360				
750.03	3.0	43.3	20.3	2.5	27.3	0.0	0.0	38.8	46.0	-7.2	V	P	100.0	0 - 360				
154.205	3.0	47.0	12.2	1.1	28.3	0.0	0.0	32.1	43.5	-11.4	H	P	100.0	0 - 360				
459.978	3.0	50.3	16.0	1.9	27.9	0.0	0.0	40.3	46.0	-5.7	H	P	100.0	0 - 360				
500.059	3.0	51.9	16.7	2.0	27.8	0.0	0.0	42.9	46.0	-3.1	H	P	100.0	0 - 360				
750.15	3.0	46.2	20.3	2.5	27.3	0.0	0.0	41.7	46.0	-4.3	H	P	100.0	0 - 360				
Rev. 1.27.09																		
Note: No other emissions were detected above the system noise floor.																		

9. 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/m² is equivalent to 1 mW/cm².
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μ T) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

$$S = \text{EIRP} / (4 * \pi * D^2)$$

where

S = Power density in W/m²

EIRP = Equivalent Isotropic Radiated Power in W

D = Separation distance in m

Power density in units of W/m² is converted to units of mW/cm² by dividing by 10.

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \pi * S))$$

where

D = Separation distance in m

EIRP = Equivalent Isotropic Radiated Power in W

S = Power density in W/m²

For multiple colocated 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.

$$\text{Total EIRP} = (P1 * G1) + (P2 * G2) + \dots + (Pn * Gn)$$

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/cm²

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m²

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	21.24	0.00	0.26	0.026