



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

**CERTIFICATION TEST REPORT**

**FOR**

**802.11 b/g SYNCHRONOUS NETWORK SYSTEM PERSONAL SERIES CLOCK**

**MODEL NUMBER: SNS4Z200**

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

**REPORT NUMBER: 10U13421-1**

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**NVLAP LAB CODE 200065-0**

Revision History

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** PRIMEX WIRELESS, INC.  
965 WELLS STREET  
LAKE GENEVA, WI 53147, U.S.A.

**EUT DESCRIPTION:** 802.11 b/g Synchronous Network system Personal Series clock

**MODEL:** SNS4Z200

**SERIAL NUMBER:** CCS10012010-1

**DATE TESTED:** SEPTEMBER 28-29, 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 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:



FRANK IBRAHIM  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

Tested By:



TOM CHEN  
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:

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

### 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 Synchronous Network system Personal Series Clock.

### 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	17.80	60.26
2412 - 2462	802.11g	22.74	187.93

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

### 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was SNS\_RADIO-2.1.68.rom.

The test utility software used during testing was ART, rev. 5.2 #58.

### 5.5. WORST-CASE CONFIGURATION AND MODE

The fundamental signal of the EUT was measured in two different orientations; Y orientation was when the EUT stands vertically at right angle on the table, and the second configuration was desktop with the EUT leaning and supported by two legs. Y orientation was found to be worst-case and therefore all final testing was performed with the EUT in Y orientation.

The worst-case channel is determined as the channel with the highest output power; therefore, radiated emission 30-1000 MHz was performed with the EUT set to the channel with highest output power.

Worst-case data rates as provided by the client were:

11b: 1 Mbps

11g: 6 Mbps

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT FOR SETUP PURPOSE ONLY

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Laptop PC	DELL	INSPIRON 8200	12961-29T
AC Power Adapter	DELL	ADP-90FB	6G356-17971-44N-1AR9

### TEST SETUP

Laptop PC was used for the initial configuration of the EUT and to control changing the mode and channels, once the EUT is transmitting it was disconnected from the laptop PC and placed on the table for testing, so the EUT was tested in stand-alone configuration for the radio portion.



## 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, 44 GHz	Agilent / HP	E4446A	C00986	05/05/11
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/18/11
Antenna, Horn, 18 GHz	EMCO	3115	C00783	07/29/11
RF Power Meter	Boonton	4541	C01189	02/26/11
Peak Power Sensor	Boonton	57006	C01202	02/23/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	08/04/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/14/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	07/06/11

## 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.

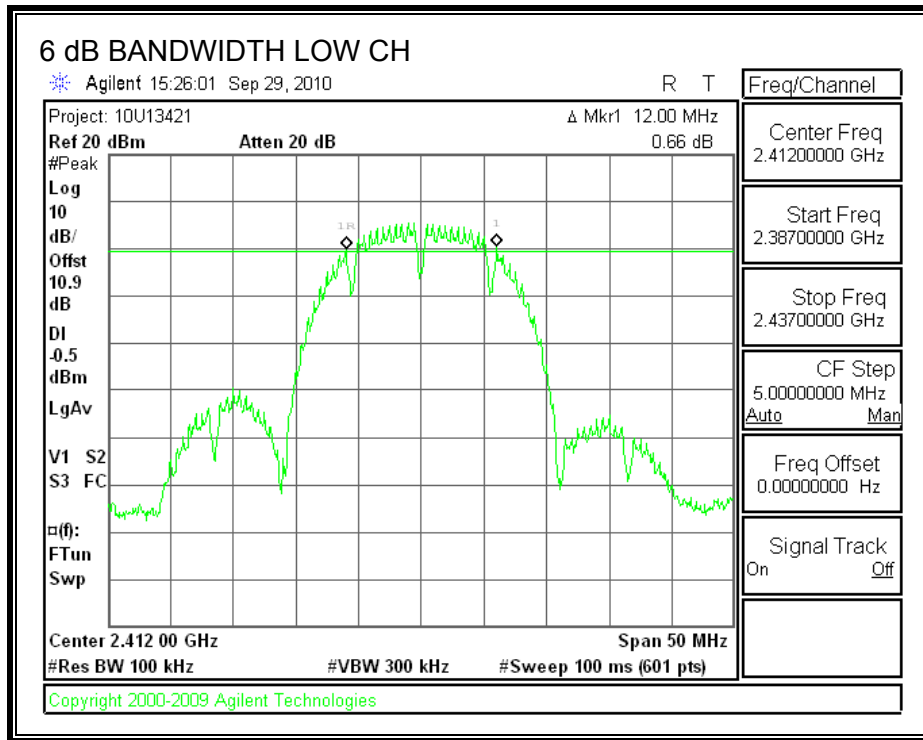
##### TEST PROCEDURE

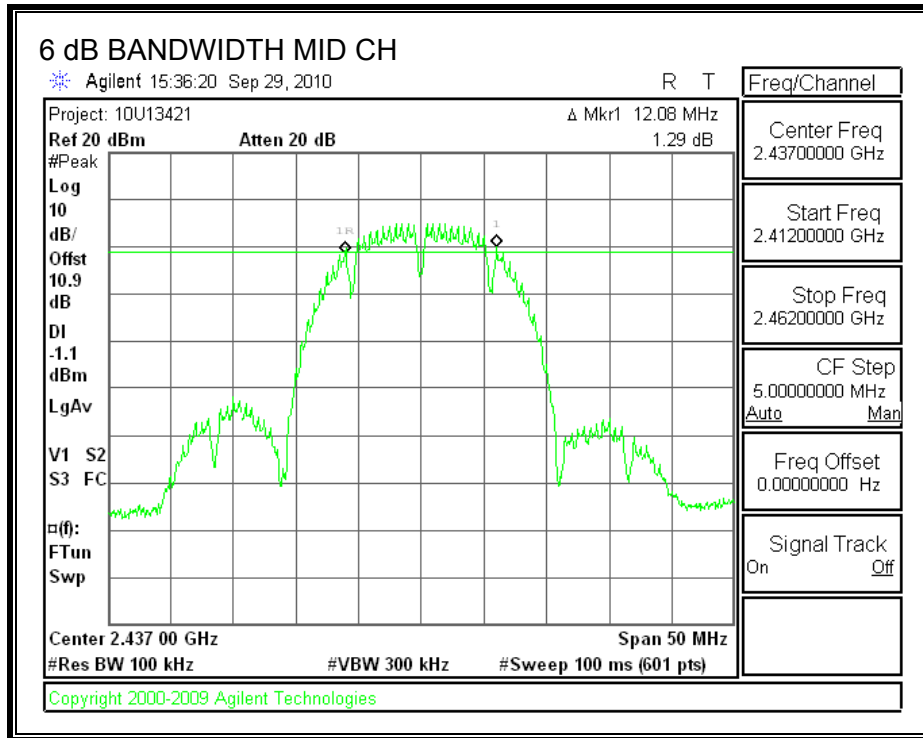
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

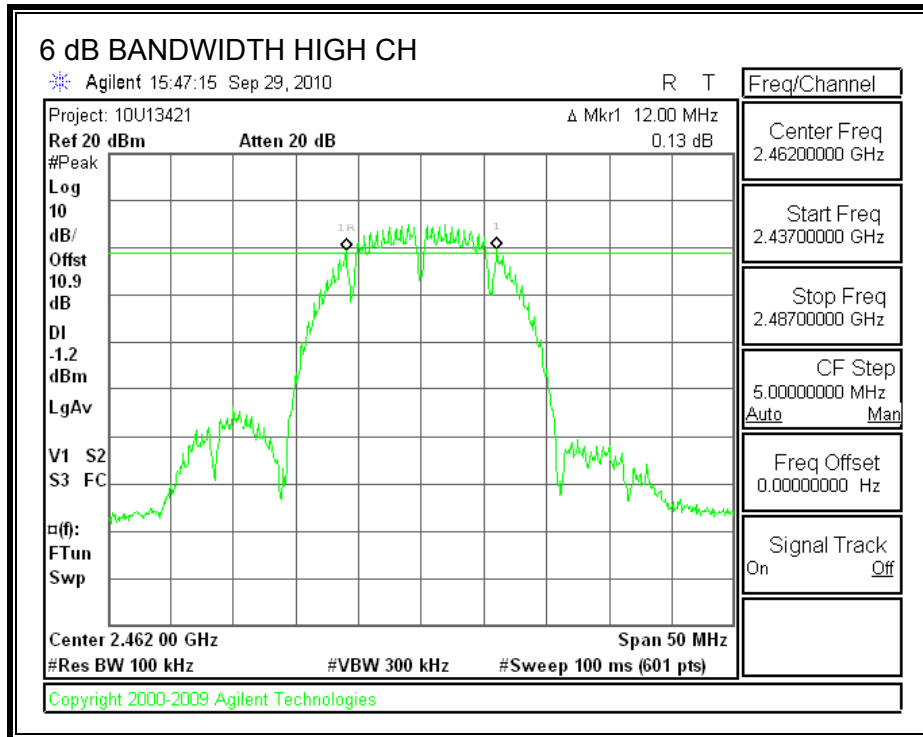
##### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	12.00	0.5
Middle	2437	12.08	0.5
High	2462	12.00	0.5

**6 dB BANDWIDTH**







## 7.1.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

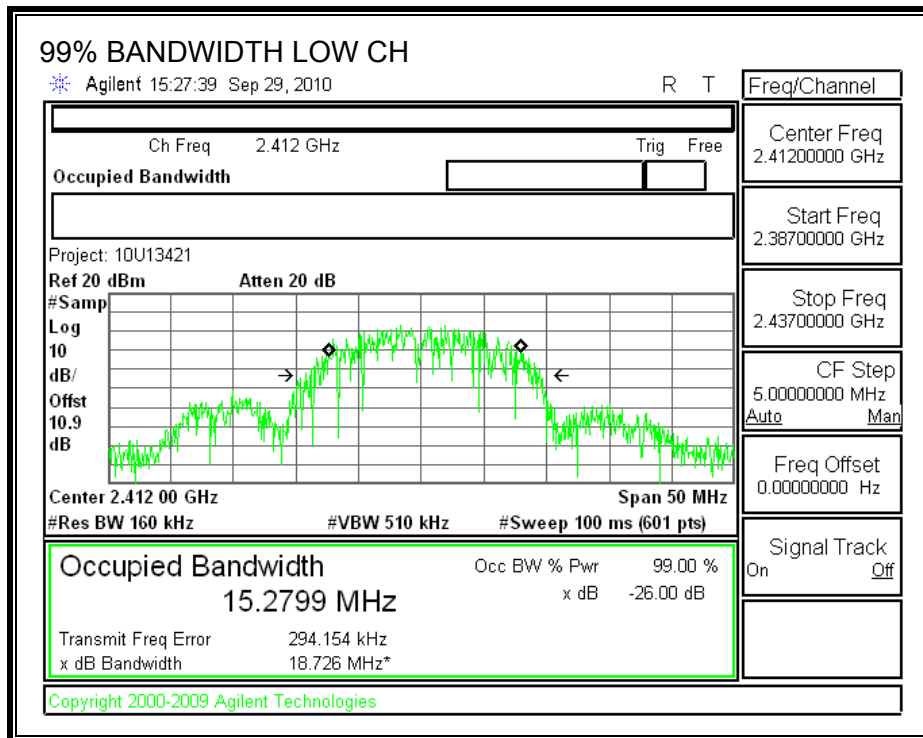
### TEST PROCEDURE

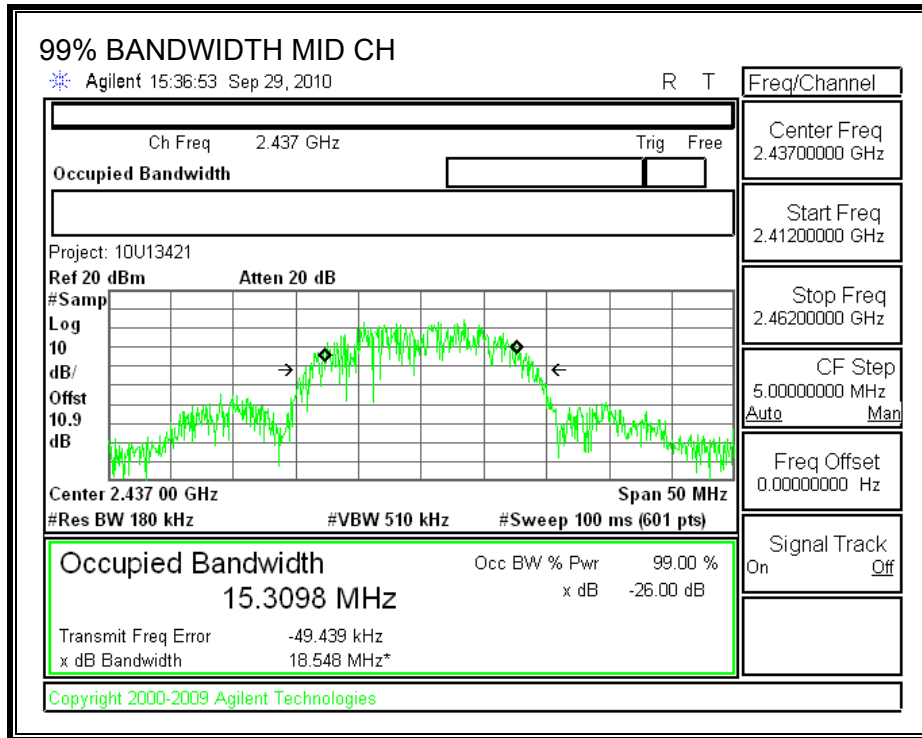
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

### RESULTS

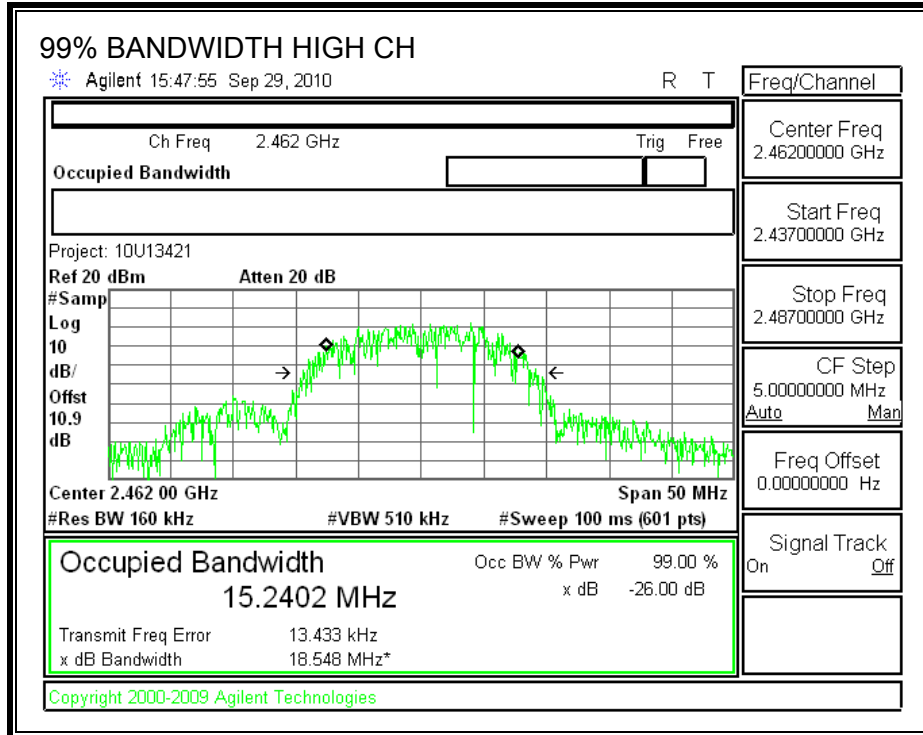
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.2799
Middle	2437	15.3098
High	2462	15.2402

**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

Peak power is measured using the Peak Power Meter.

#### RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	6.90	10.9	17.80	30	-12.20
Middle	2437	6.87	10.9	17.77	30	-12.23
High	2462	6.38	10.9	17.28	30	-12.72

### 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 10.9 dB (including 10 dB pad and 0.9 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	15.10
High	2462	14.40

### 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.

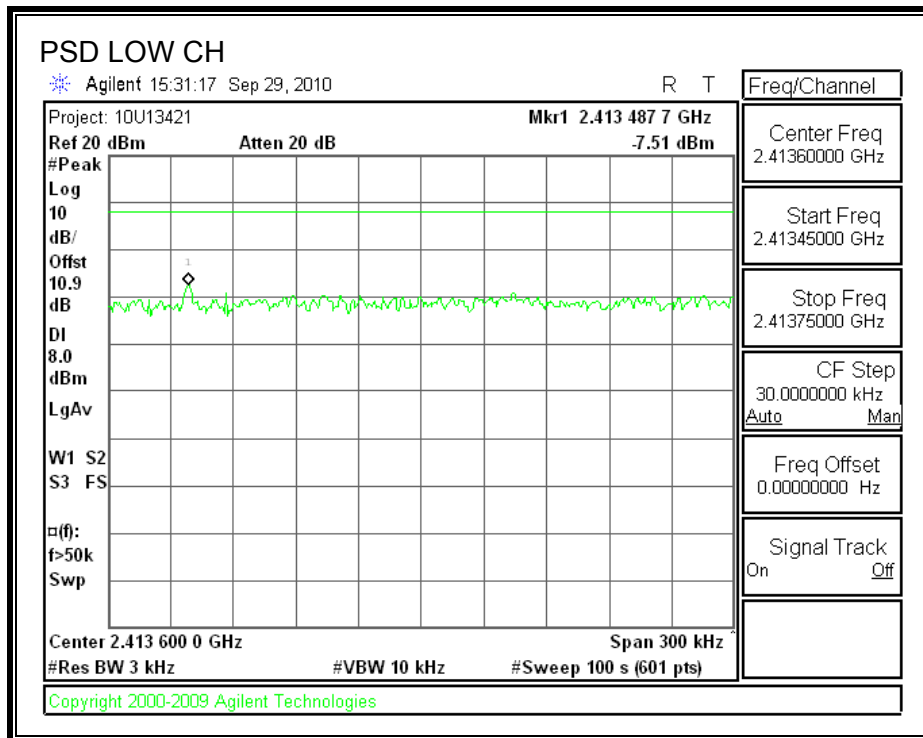
#### TEST PROCEDURE

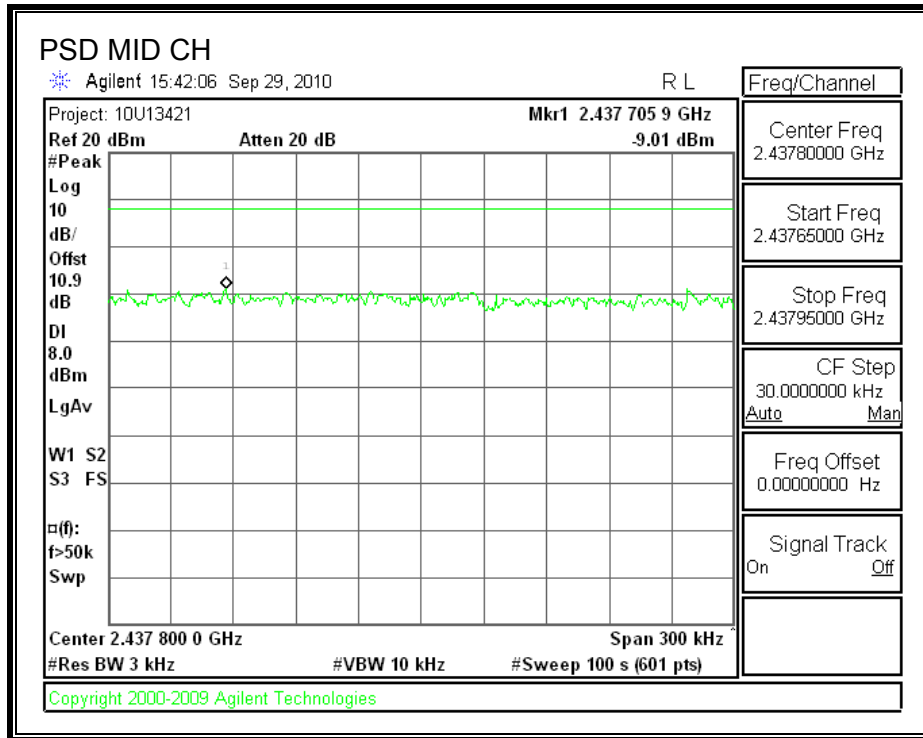
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

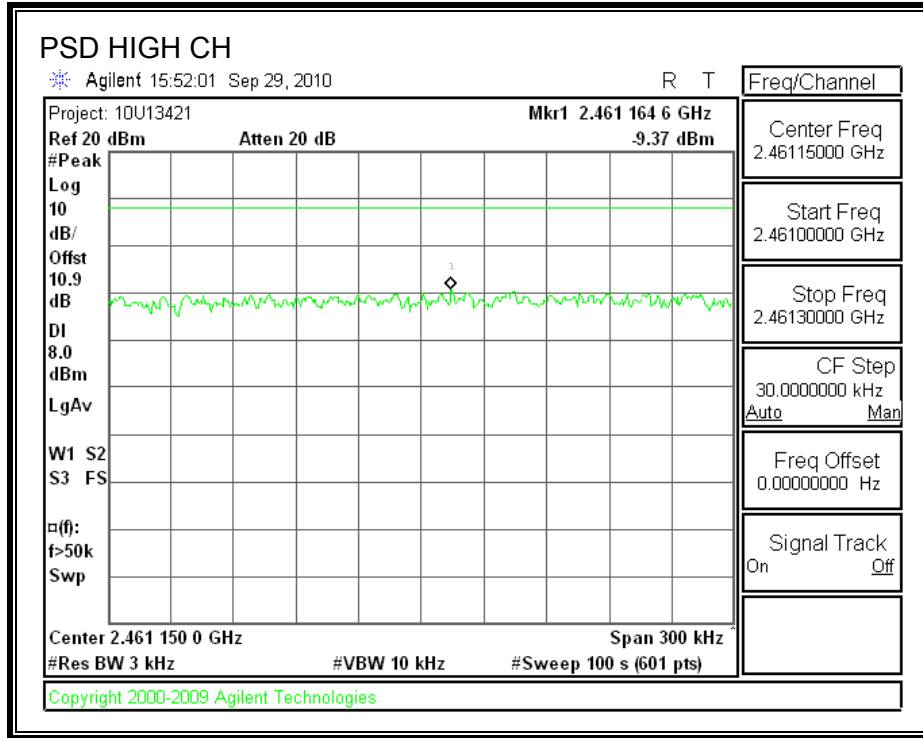
#### RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-7.51	8	-15.51
Middle	2437	-9.01	8	-17.01
High	2462	-9.37	8	-17.37

**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

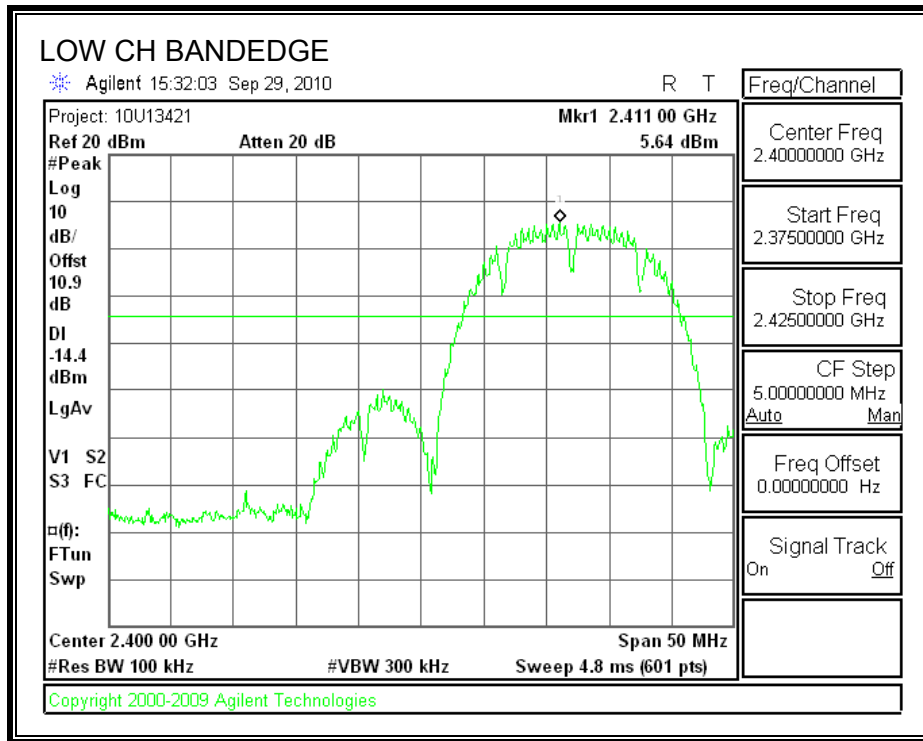
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

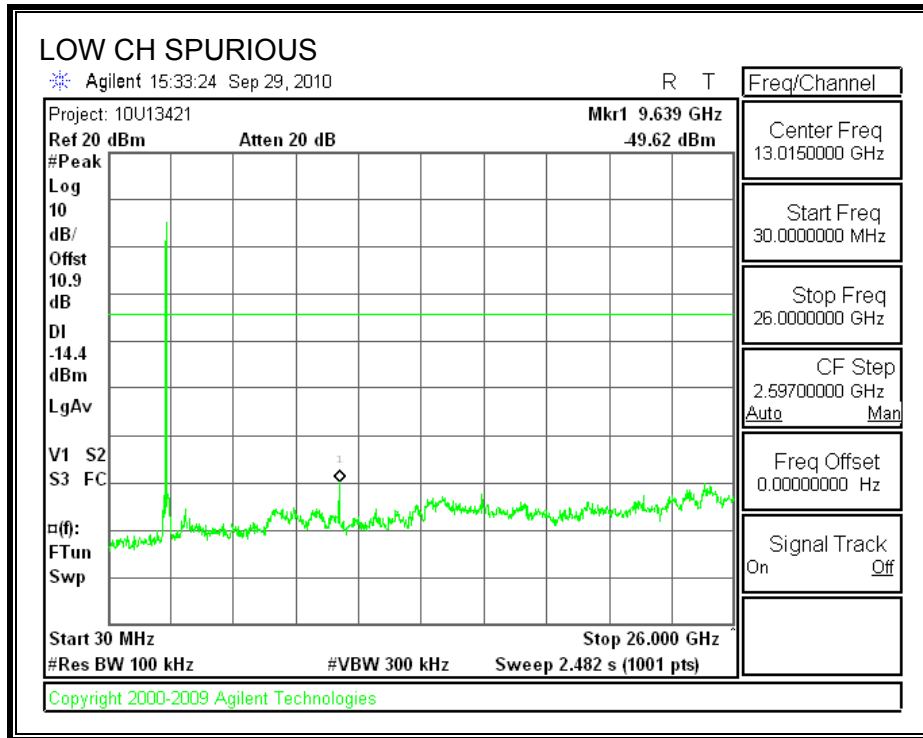
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.



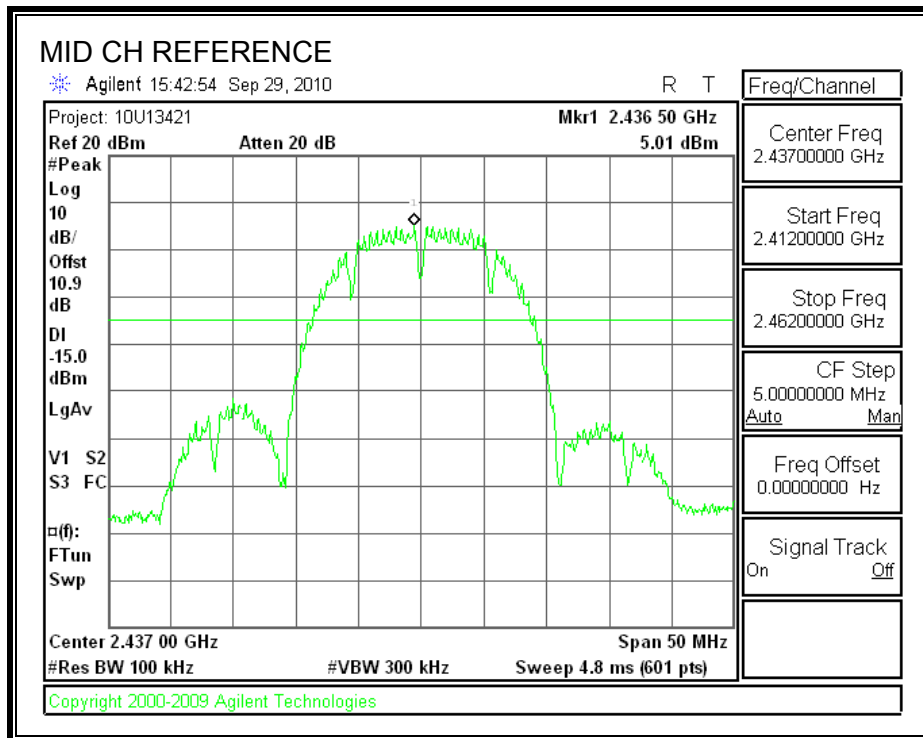
**RESULTS**

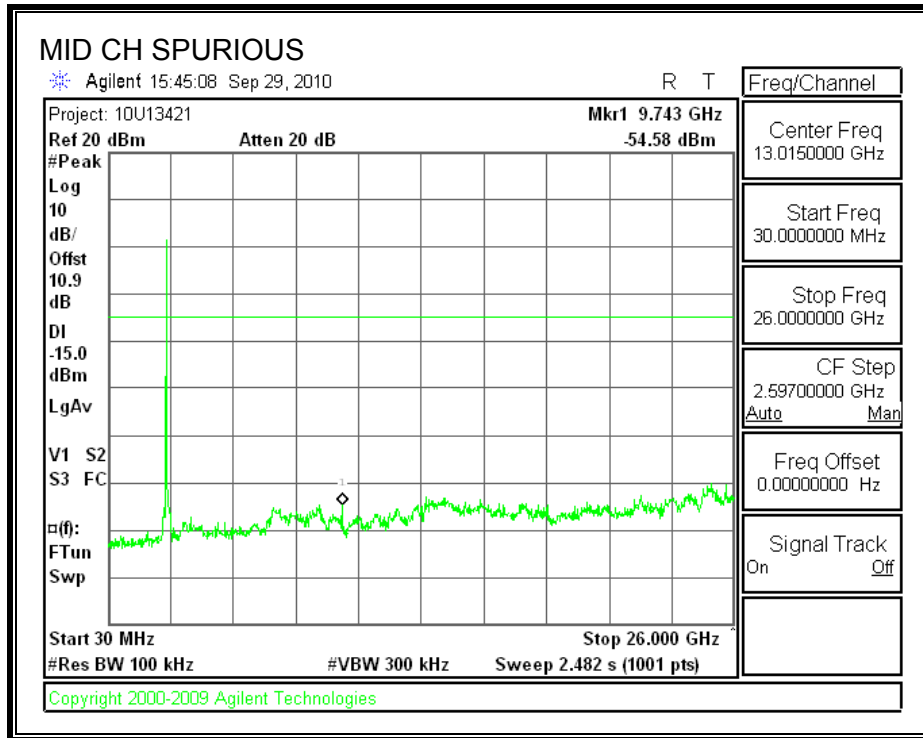
**SPURIOUS EMISSIONS, LOW CHANNEL**



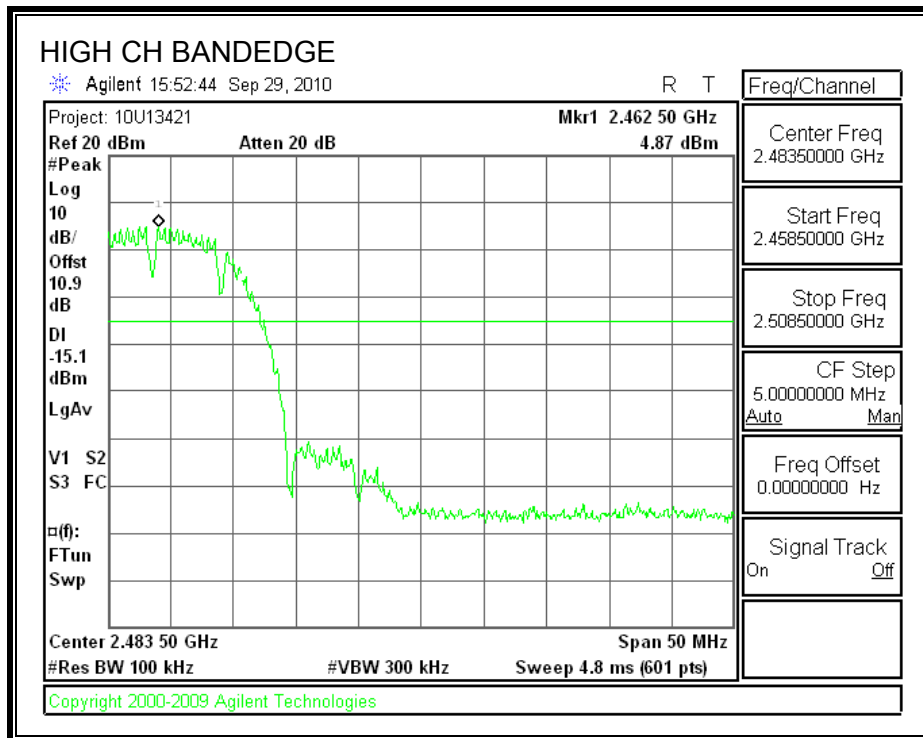


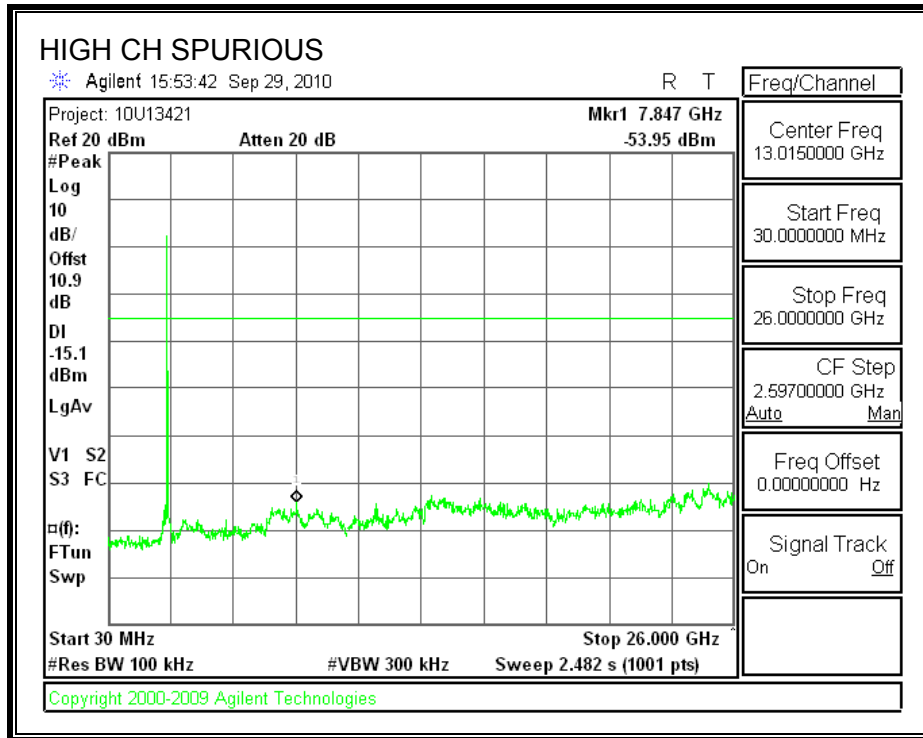
**SPURIOUS EMISSIONS, MID CHANNEL**





**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.

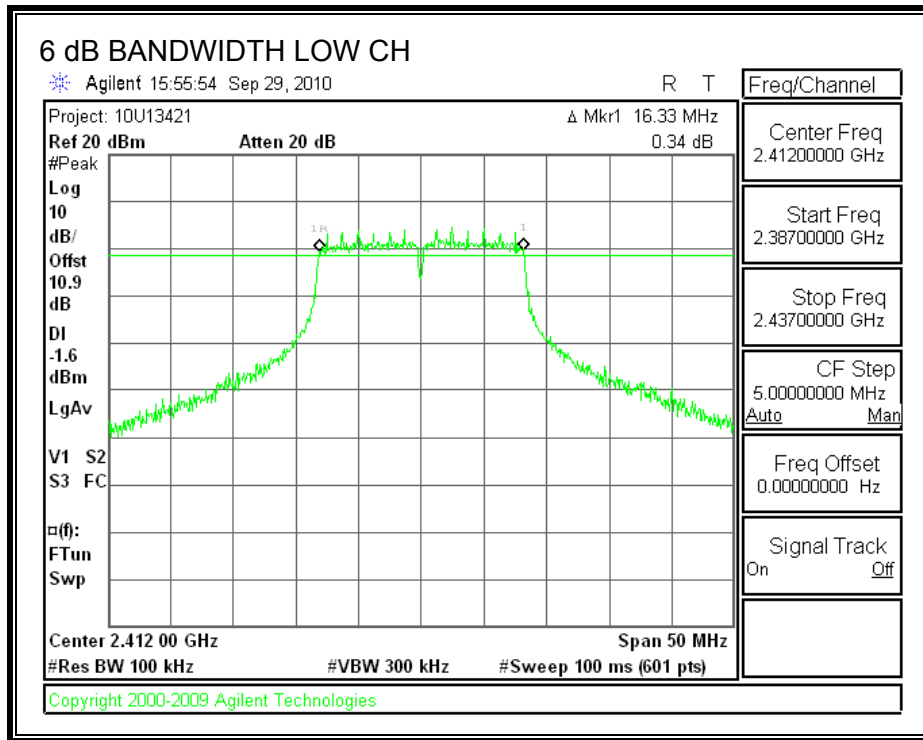
#### TEST PROCEDURE

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.

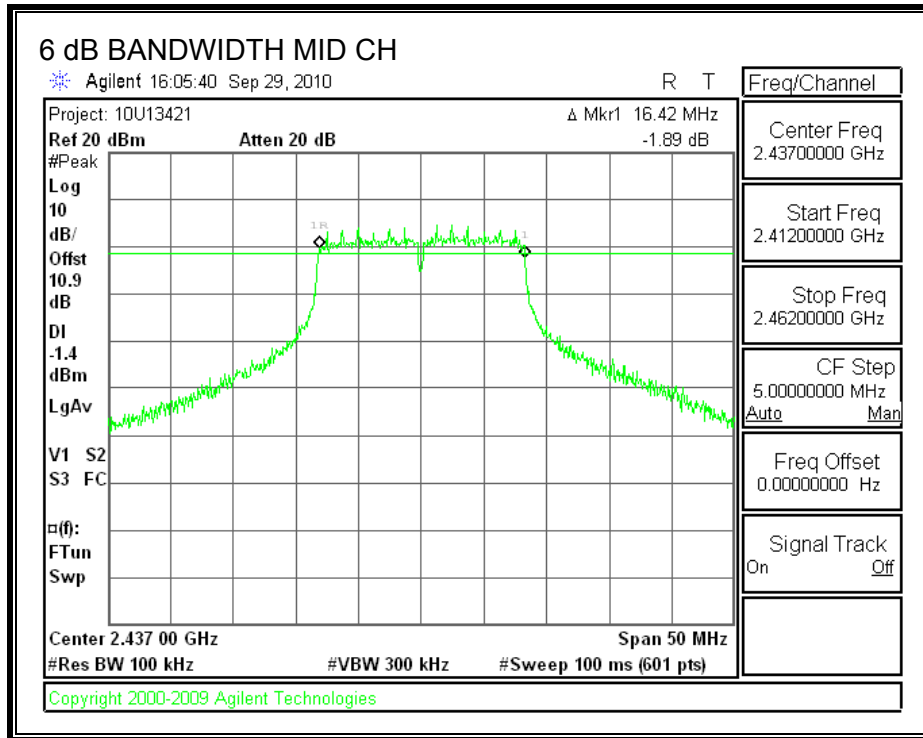
#### RESULTS

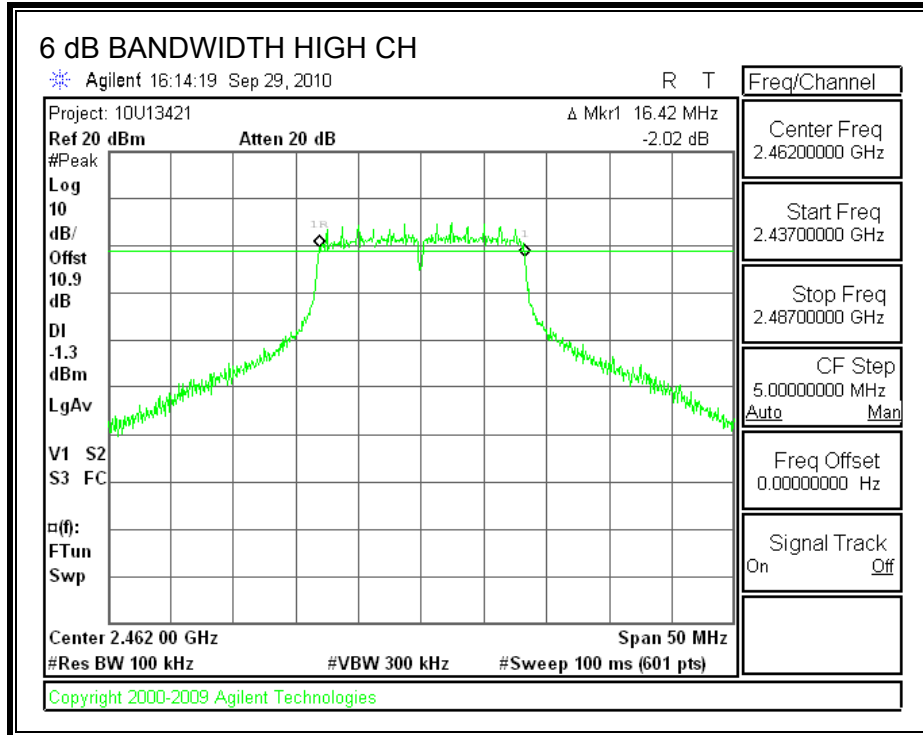
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2412	16.33	0.5
Middle	2437	16.42	0.5
High	2462	16.42	0.5

**6 dB BANDWIDTH**









## 7.2.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

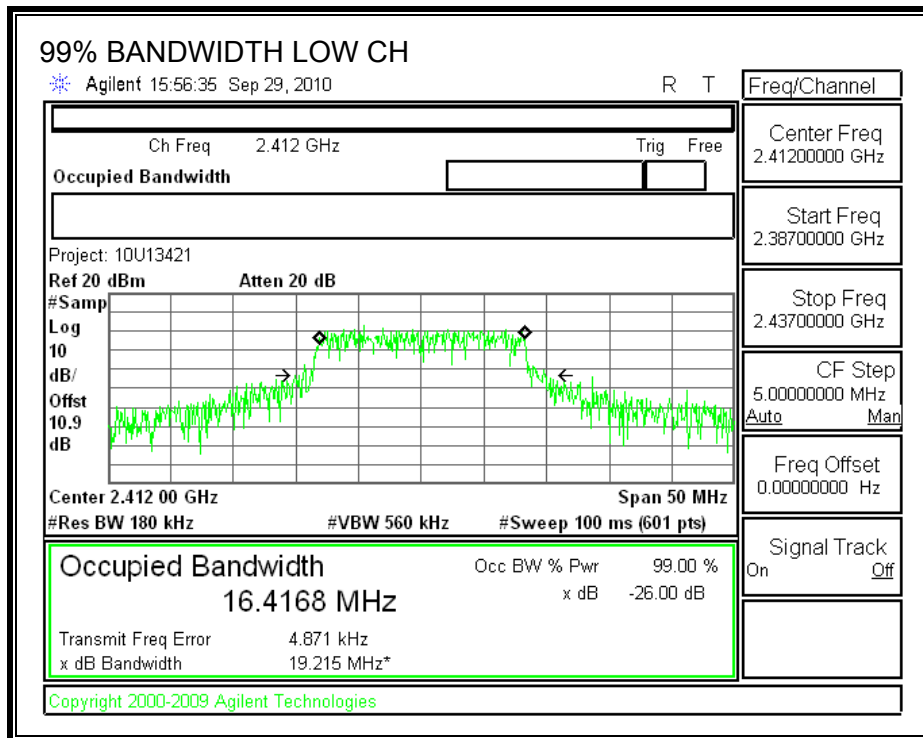
### TEST PROCEDURE

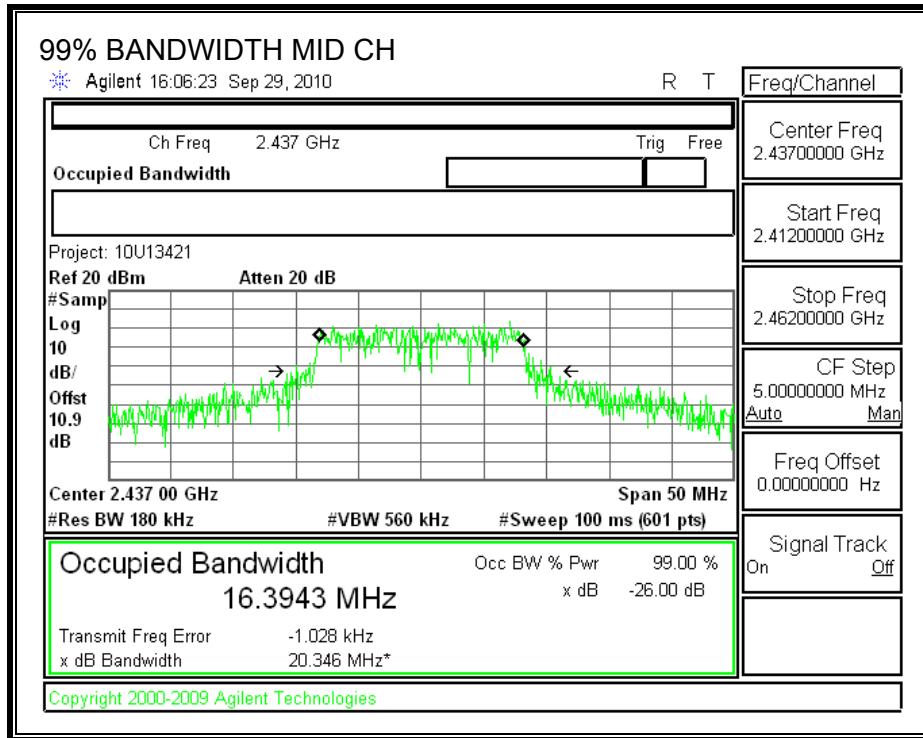
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

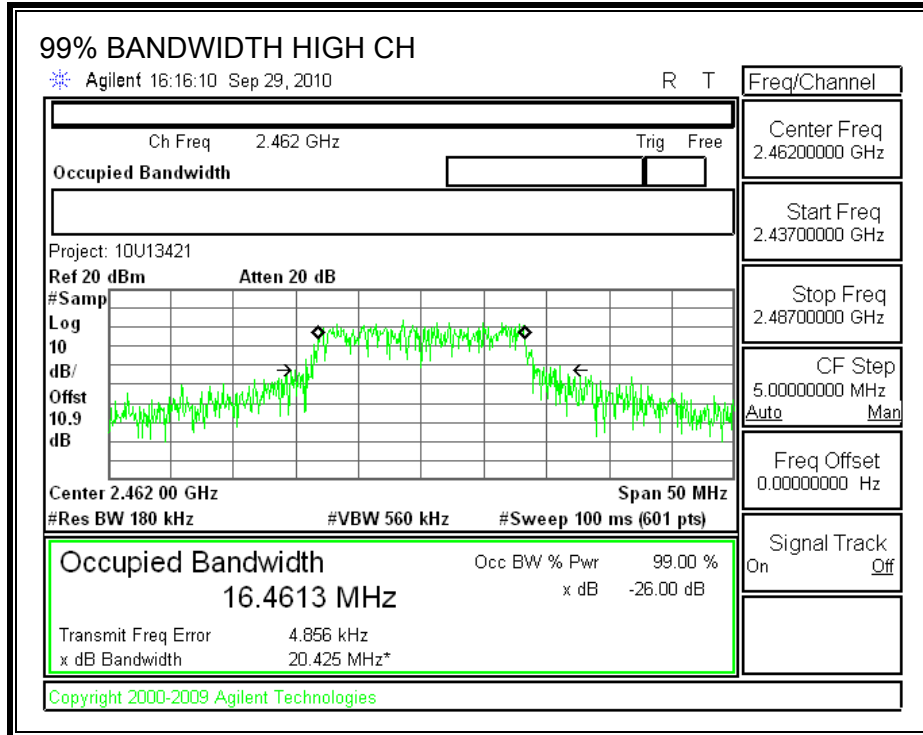
### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.4168
Middle	2437	16.3943
High	2462	16.4613

**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

Peak power is measured using the Peak Power Meter.

#### RESULTS

Channel	Frequency (MHz)	Peak Power Meter Reading (dBm)	Attenuator and Cable Offset (dB)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.84	10.90	22.74	30	-7.26
Middle	2437	11.31	10.90	22.21	30	-7.79
High	2462	10.89	10.90	21.79	30	-8.21

## 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 10.9 dB (including 10 dB pad and 0.9 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	15.00
Middle	2437	15.20
High	2462	15.30



## 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.

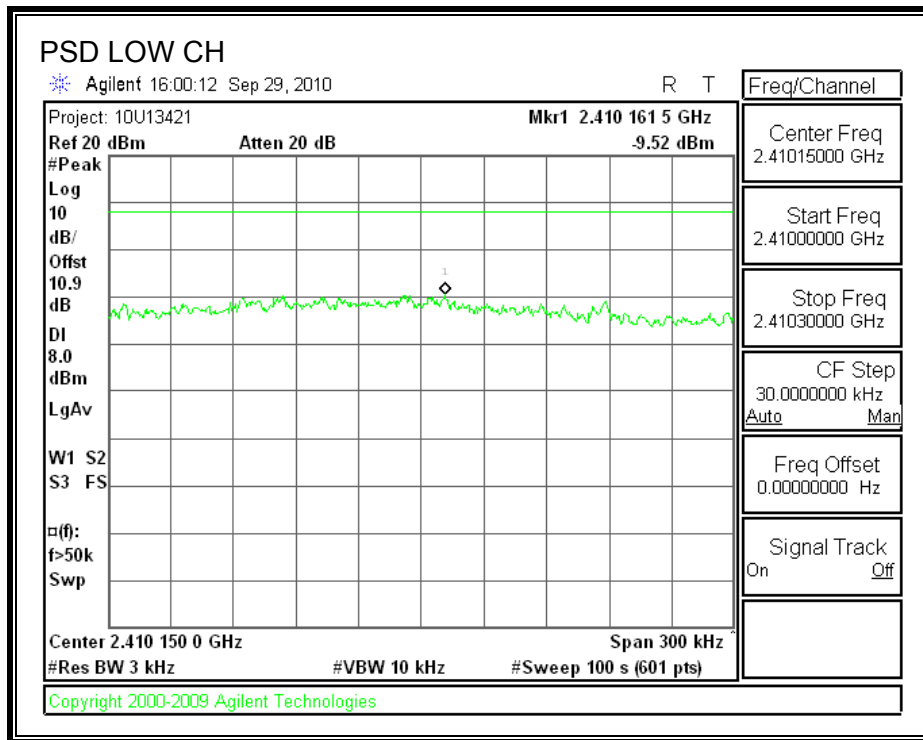
### TEST PROCEDURE

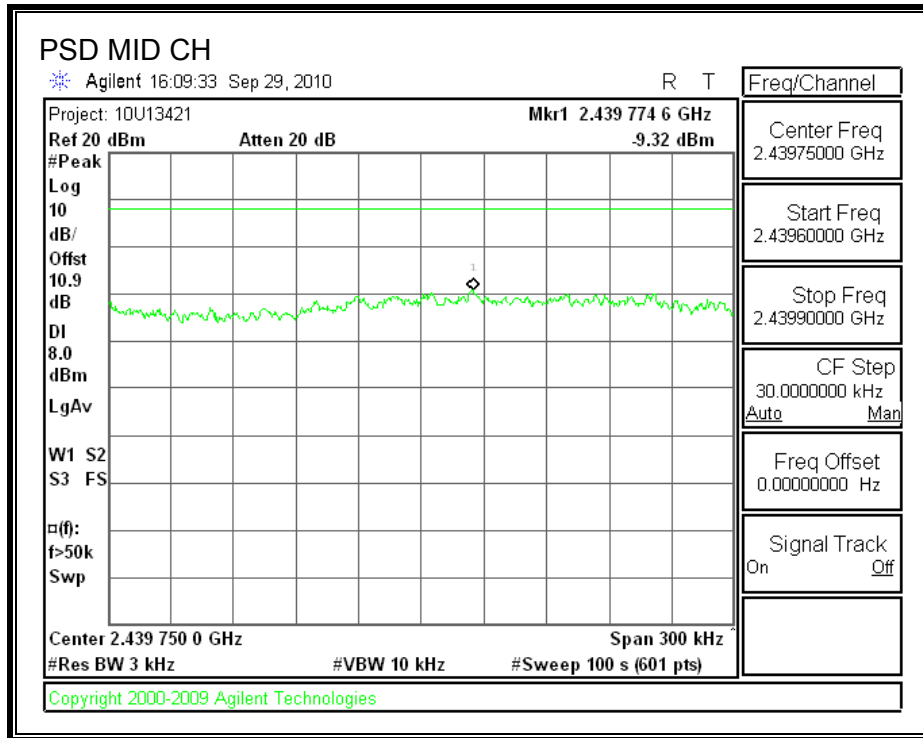
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

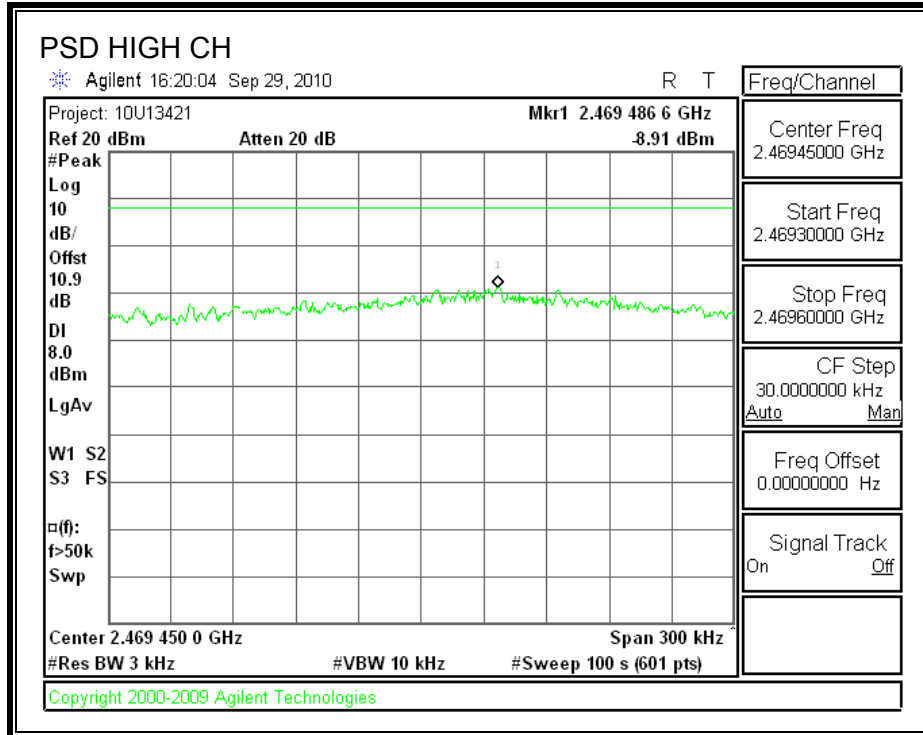
### RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.52	8	-17.52
Middle	2437	-9.32	8	-17.32
High	2462	-8.91	8	-16.91

**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.

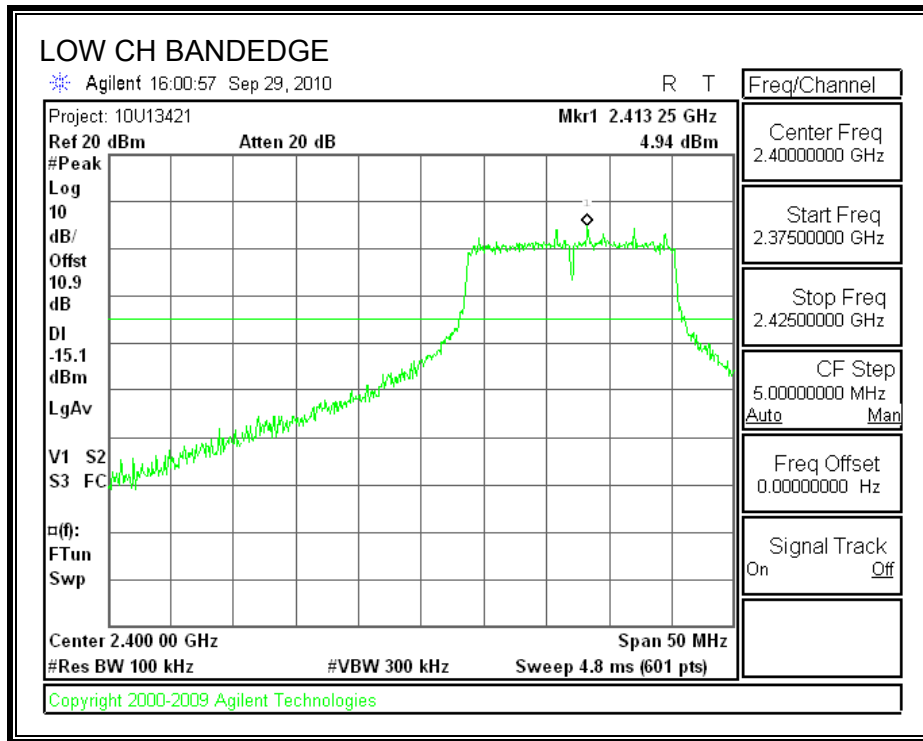
### **TEST PROCEDURE**

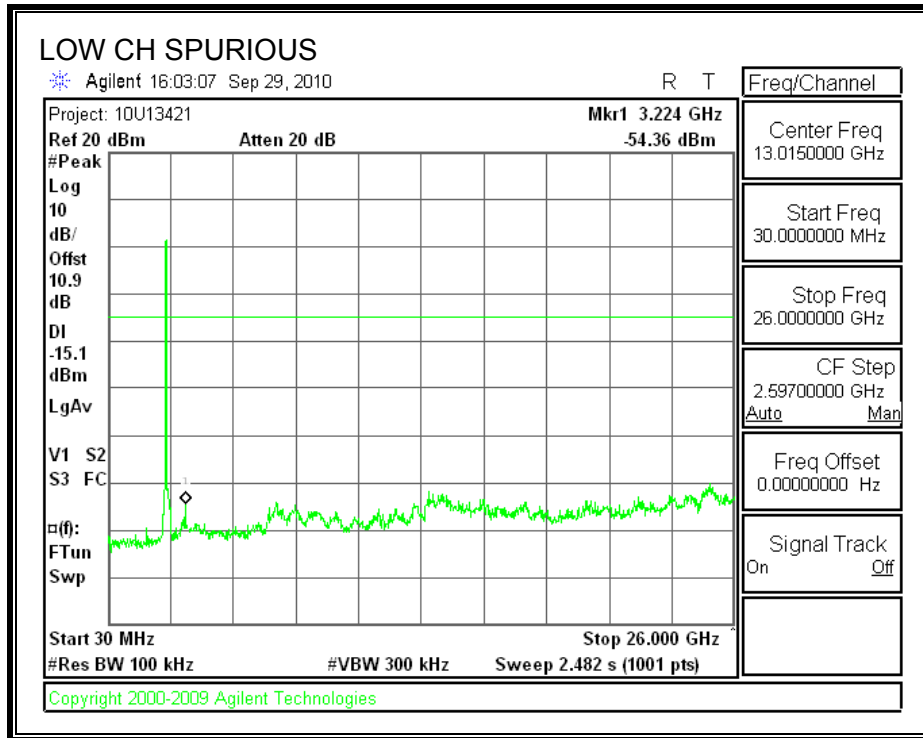
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

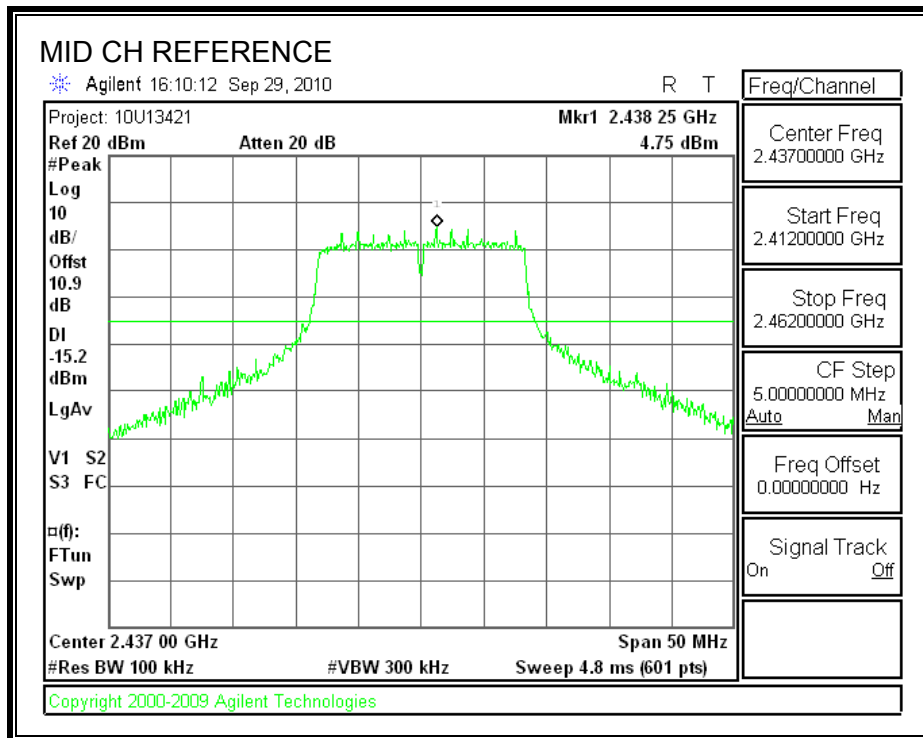
**RESULTS**

**SPURIOUS EMISSIONS, LOW CHANNEL**

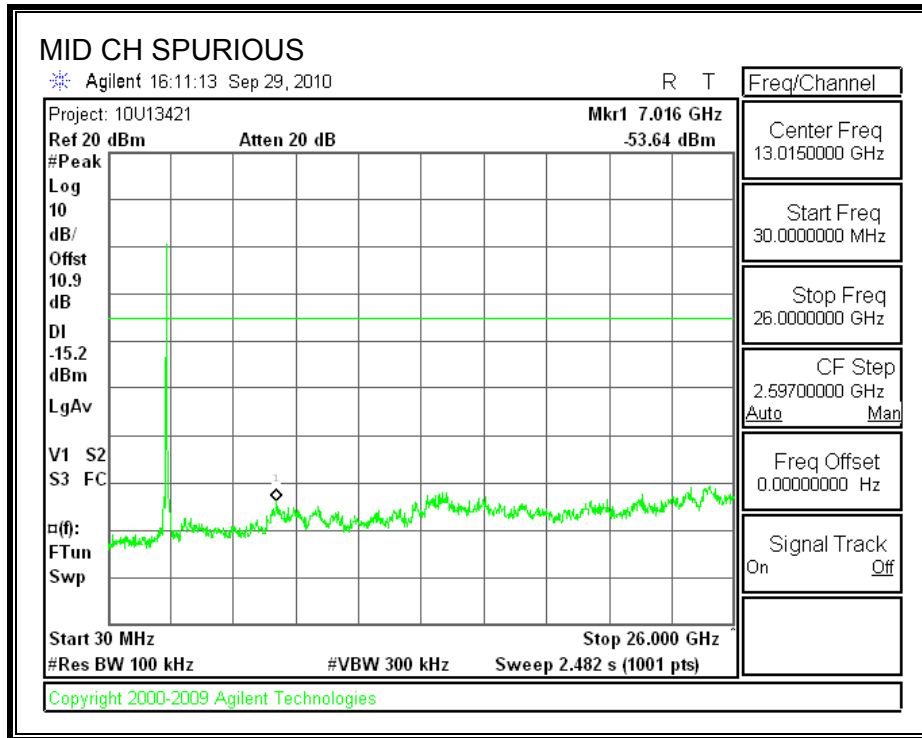




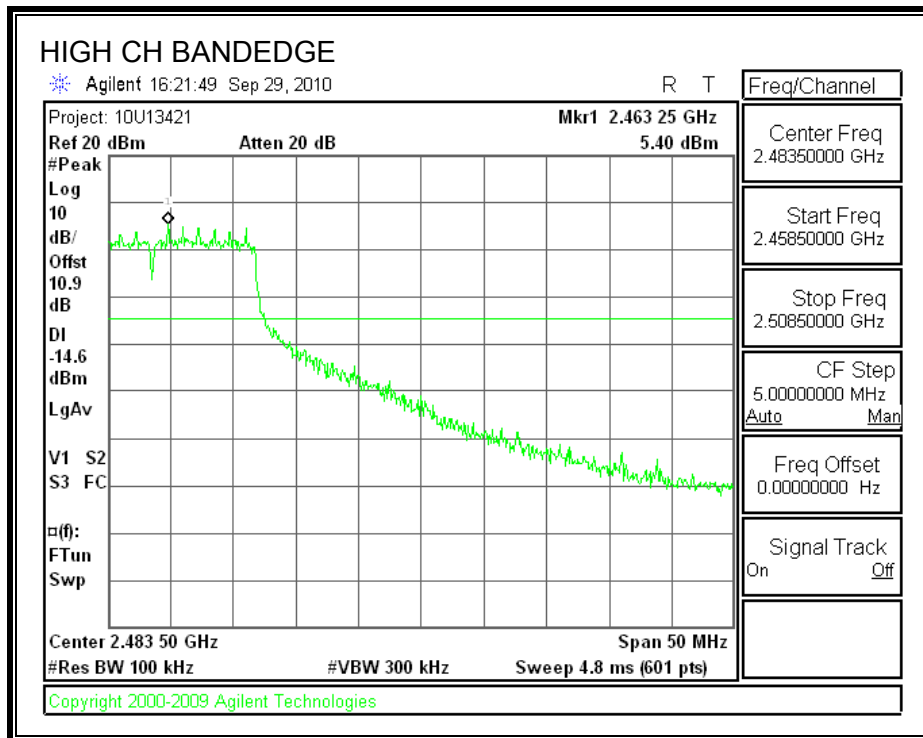
**SPURIOUS EMISSIONS, MID CHANNEL**

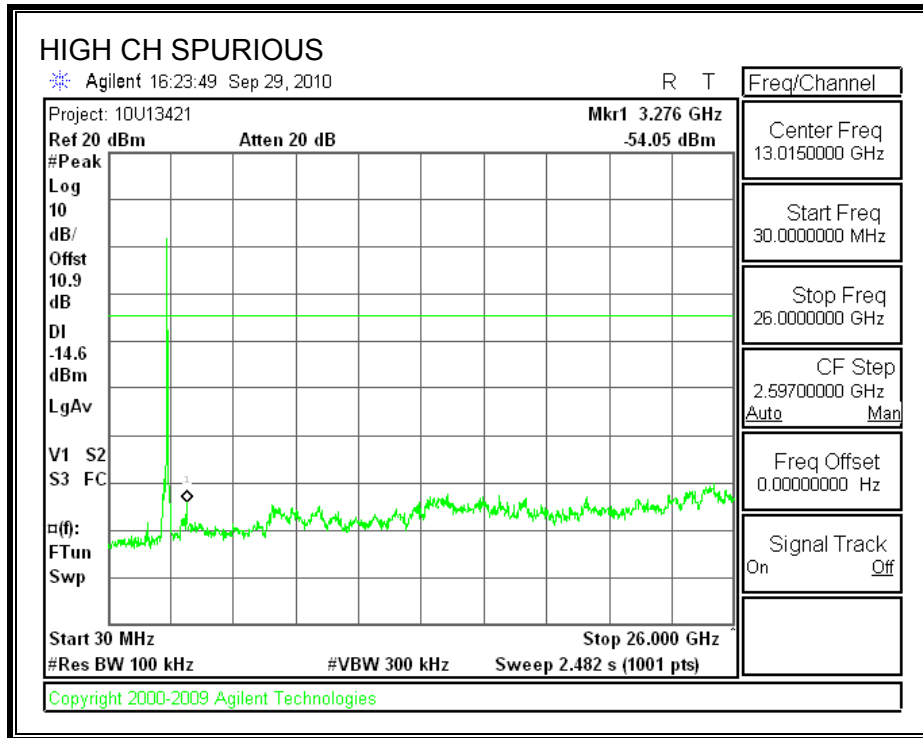






**SPURIOUS EMISSIONS, HIGH CHANNEL**





## 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.

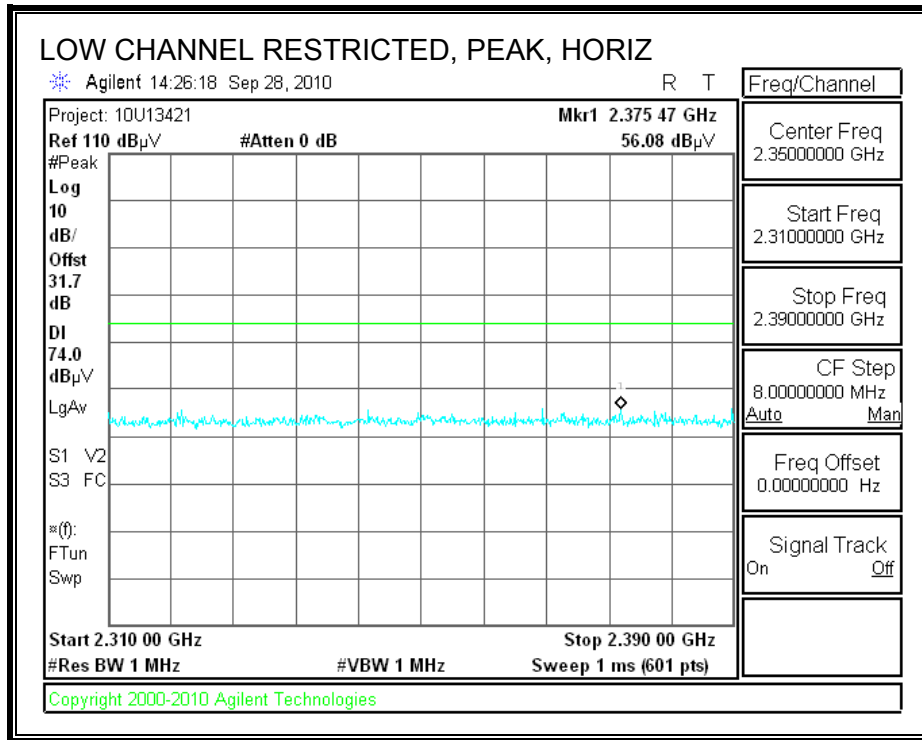
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

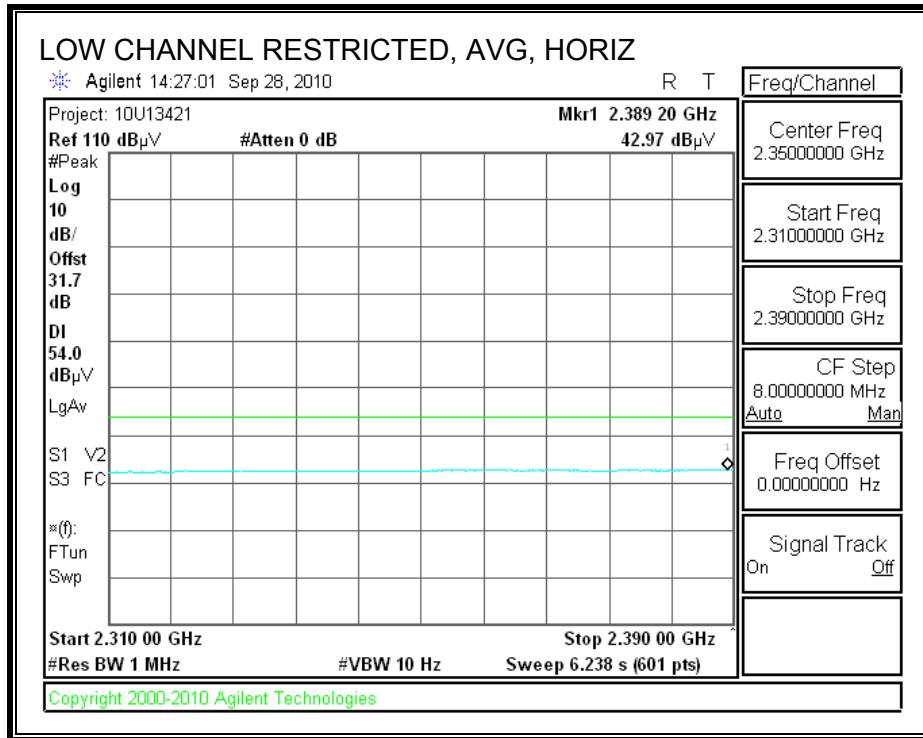
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 8.2. TRANSMITTER ABOVE 1 GHz

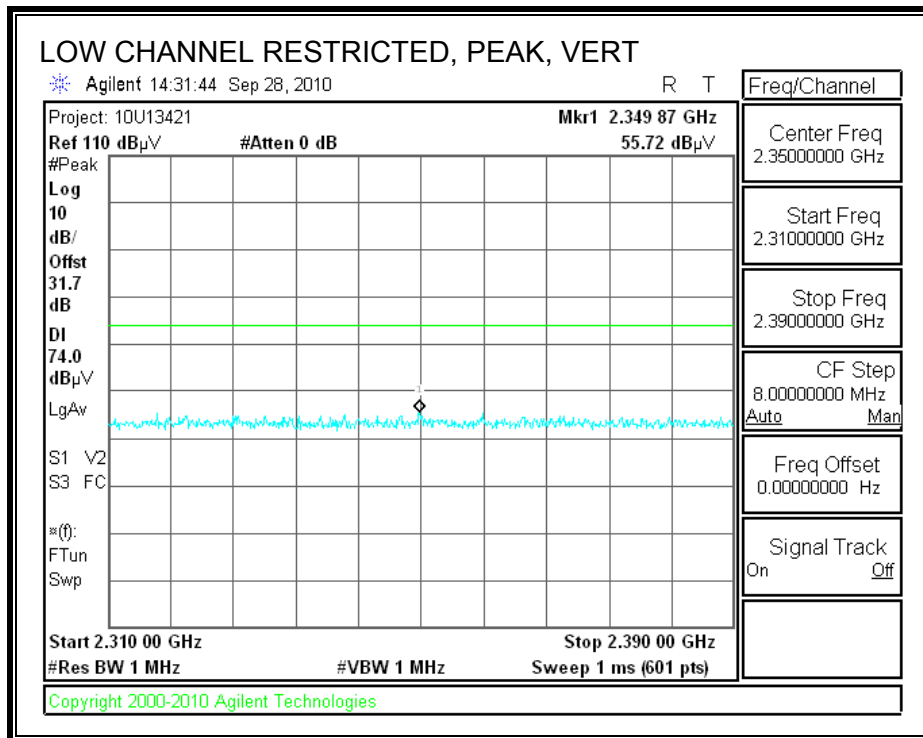
### 8.2.1. TX ABOVE 1 GHz FOR 802.11b MODE IN THE 2.4 GHz BAND

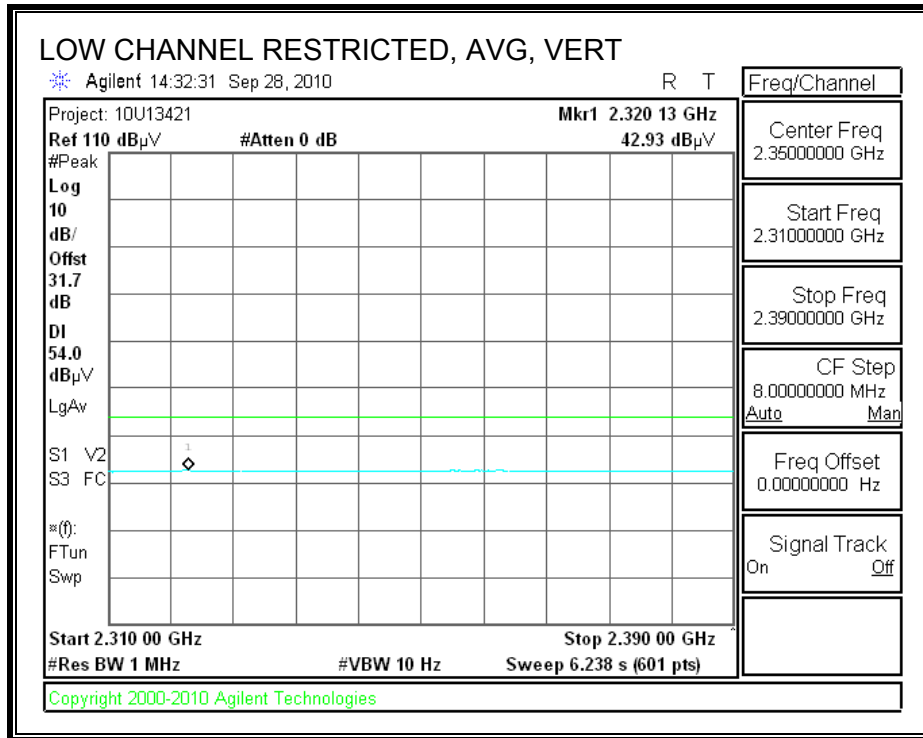
#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





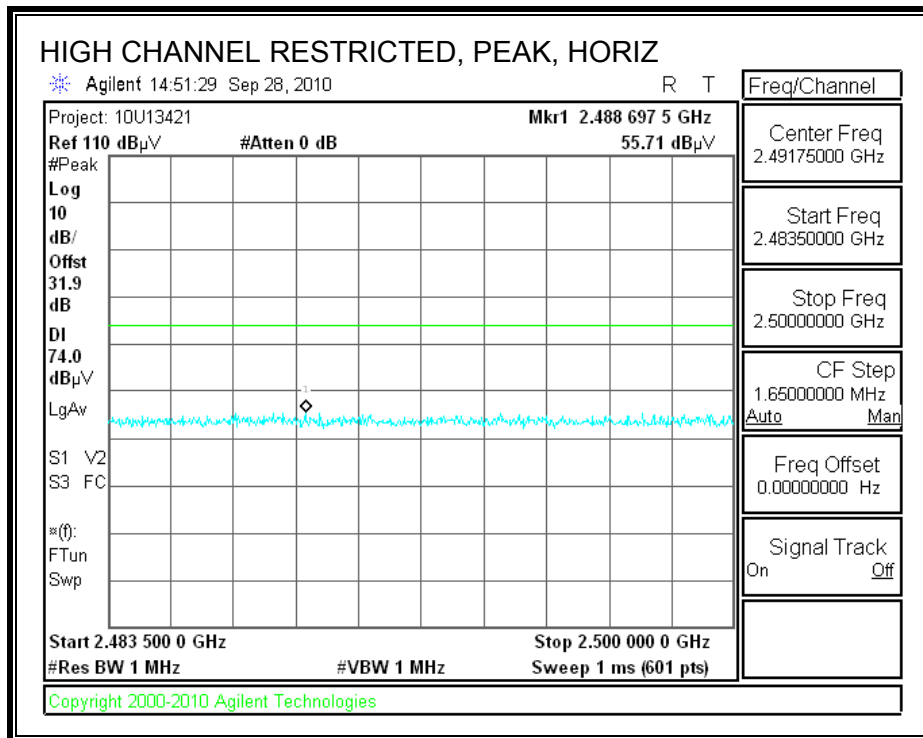
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

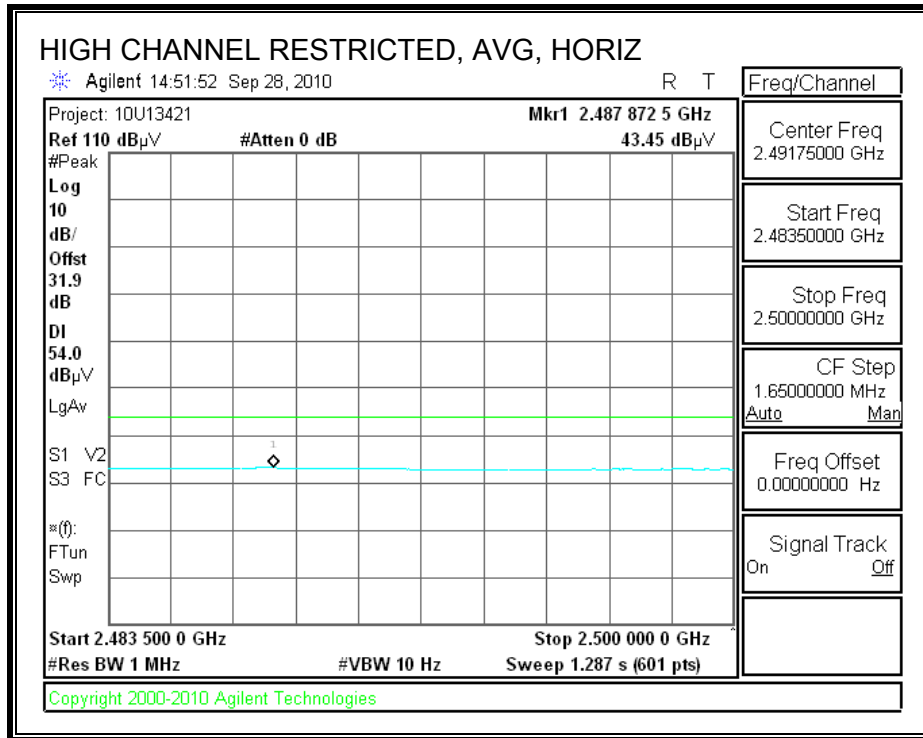




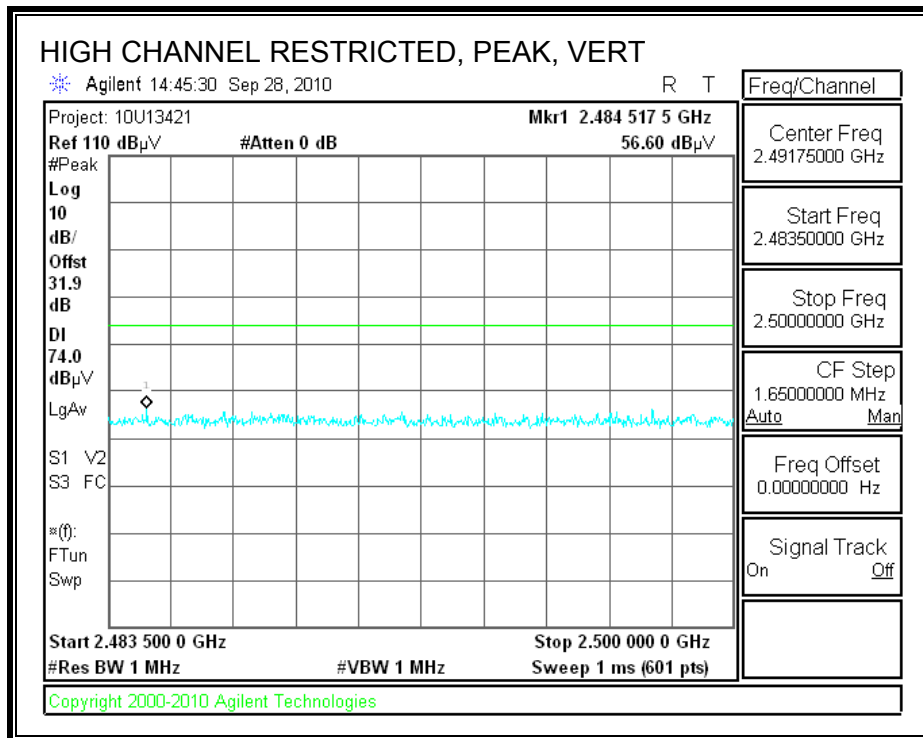


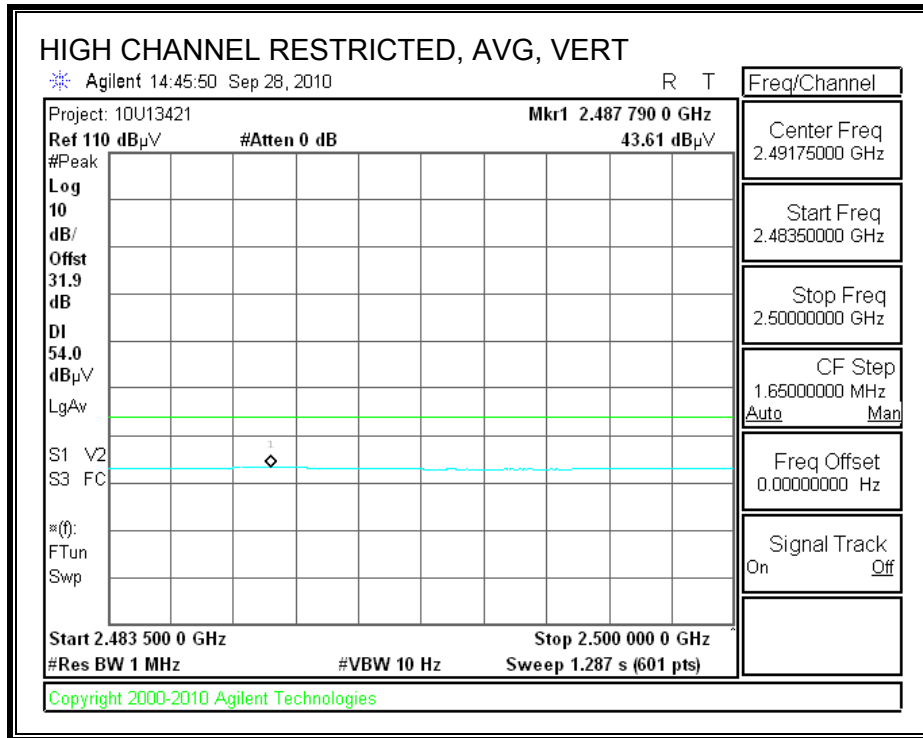
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



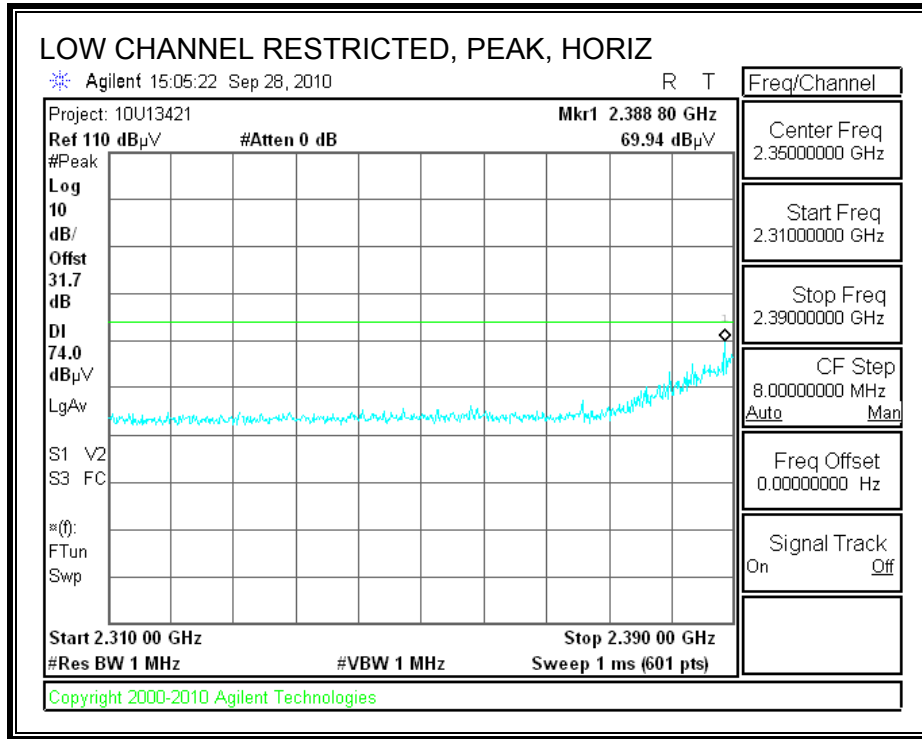


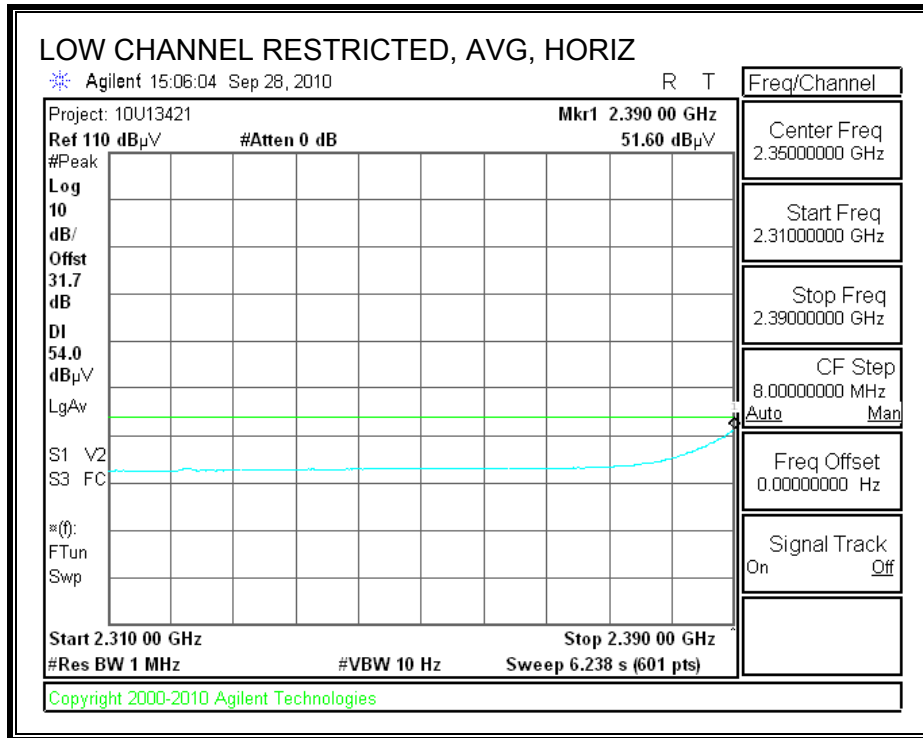
**HARMONICS AND SPURIOUS EMISSIONS**

High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Tom Chen											
Date:		09/28/10											
Project #:		10U13421											
Company:		Primex Wireless											
Test Target:		FCC Class B											
Mode Oper:		802.11 b, TX mode											
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit									
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit									
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit									
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit									
CL	Cable Loss	HPF	High Pass Filter										
f	Dist	Read	AF	CL	Amp	D Corr	Filtr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
<b>2412Mhz Low CH, b mode</b>													
4.824	3.0	51.2	32.8	5.8	-34.8	0.0	0.0	55.0	74.0	-19.0	V	P	
4.824	3.0	50.0	32.8	5.8	-34.8	0.0	0.0	53.8	54.0	-0.2	V	A	
7.236	3.0	37.5	35.1	7.2	-34.7	0.0	0.0	45.2	74.0	-28.8	V	P	
7.236	3.0	26.5	35.1	7.2	-34.7	0.0	0.0	34.2	54.0	-19.8	V	A	
<b>2412Mhz Low CH, h mode</b>													
4.824	3.0	51.3	32.8	5.8	-34.8	0.0	0.0	55.0	74.0	-19.0	H	P	
4.824	3.0	49.9	32.8	5.8	-34.8	0.0	0.0	53.6	54.0	-0.4	H	A	
7.236	3.0	37.3	35.1	7.2	-34.7	0.0	0.0	44.9	74.0	-29.1	H	P	
7.236	3.0	26.8	35.1	7.2	-34.7	0.0	0.0	34.4	54.0	-19.6	H	A	
<b>2437Mhz Mid CH, b mode</b>													
4.874	3.0	50.8	32.8	5.8	-34.9	0.0	0.0	54.6	74.0	-19.4	H	P	
4.874	3.0	49.2	32.8	5.8	-34.9	0.0	0.0	53.0	54.0	-1.0	H	A	
7.311	3.0	37.1	35.2	7.3	-34.7	0.0	0.0	44.9	74.0	-29.1	H	P	
7.311	3.0	25.5	35.2	7.3	-34.7	0.0	0.0	33.3	54.0	-20.7	H	A	
<b>2437Mhz Mid CH, h mode</b>													
4.874	3.0	50.4	32.8	5.8	-34.9	0.0	0.0	54.2	74.0	-19.8	V	P	
4.874	3.0	49.0	32.8	5.8	-34.9	0.0	0.0	52.8	54.0	-1.2	V	A	
7.311	3.0	38.2	35.2	7.3	-34.7	0.0	0.0	46.0	74.0	-28.0	V	P	
7.311	3.0	26.6	35.2	7.3	-34.7	0.0	0.0	34.4	54.0	-19.6	V	A	
<b>2462Mhz High CH, b mode</b>													
4.924	3.0	50.7	32.8	5.9	-34.9	0.0	0.0	54.6	74.0	-19.4	V	P	
4.924	3.0	48.6	32.8	5.9	-34.9	0.0	0.0	52.4	54.0	-1.6	V	A	
7.386	3.0	38.1	35.3	7.3	-34.6	0.0	0.0	46.1	74.0	-27.9	V	P	
7.386	3.0	26.7	35.3	7.3	-34.6	0.0	0.0	34.7	54.0	-19.4	V	A	
<b>2462Mhz High CH, h mode</b>													
4.924	3.0	50.7	32.8	5.9	-34.9	0.0	0.0	54.6	74.0	-19.4	H	P	
4.924	3.0	48.8	32.8	5.9	-34.9	0.0	0.0	52.7	54.0	-1.3	H	A	
7.386	3.0	37.2	35.3	7.3	-34.6	0.0	0.0	45.1	74.0	-28.9	H	P	
7.386	3.0	25.7	35.3	7.3	-34.6	0.0	0.0	33.7	54.0	-20.3	H	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

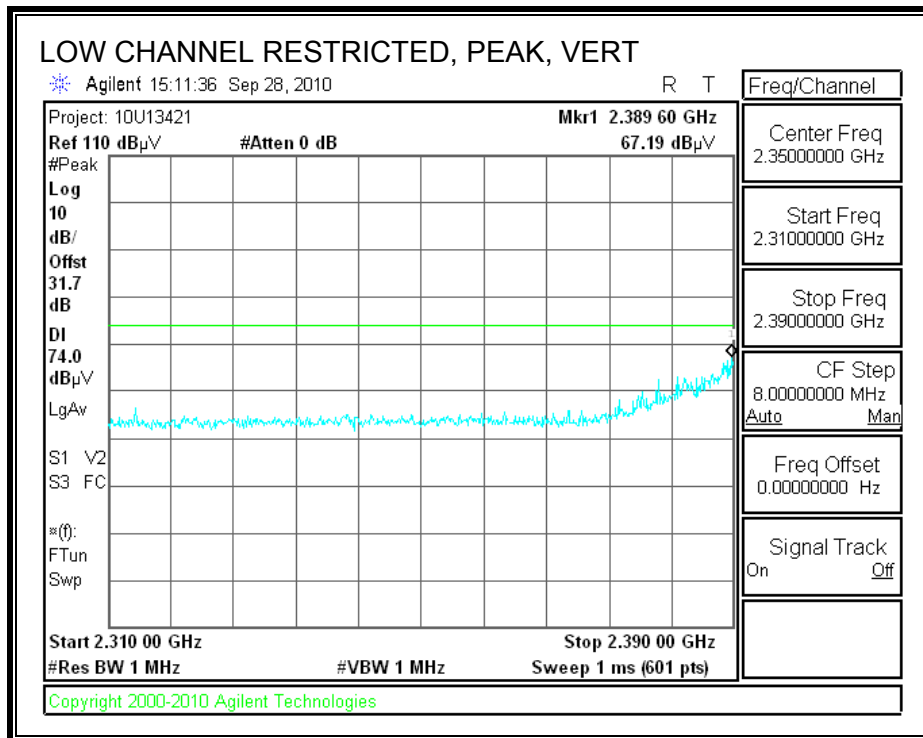
### 8.2.2. TX ABOVE 1 GHz FOR 802.11g MODE IN THE 2.4 GHz BAND

#### RESTRICTED BANEDGE (LOW CHANNEL, HORIZONTAL)

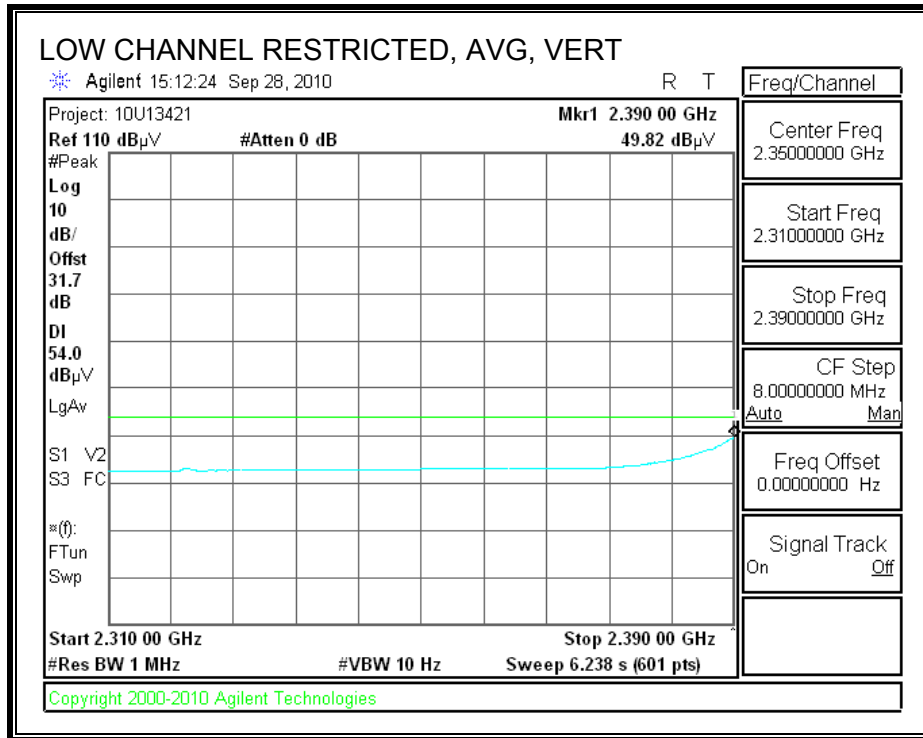




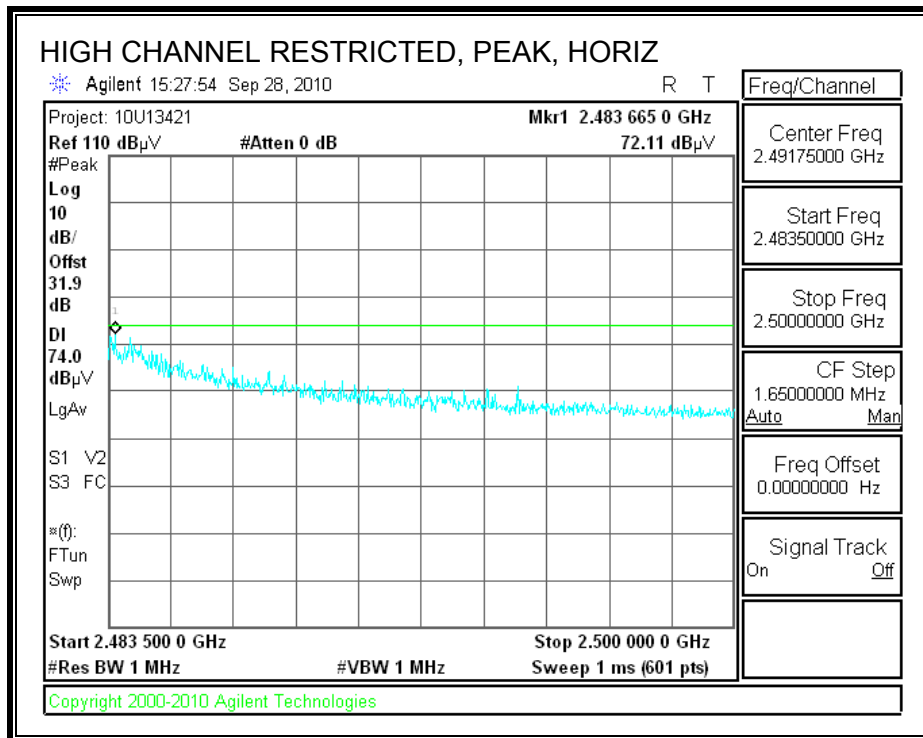
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

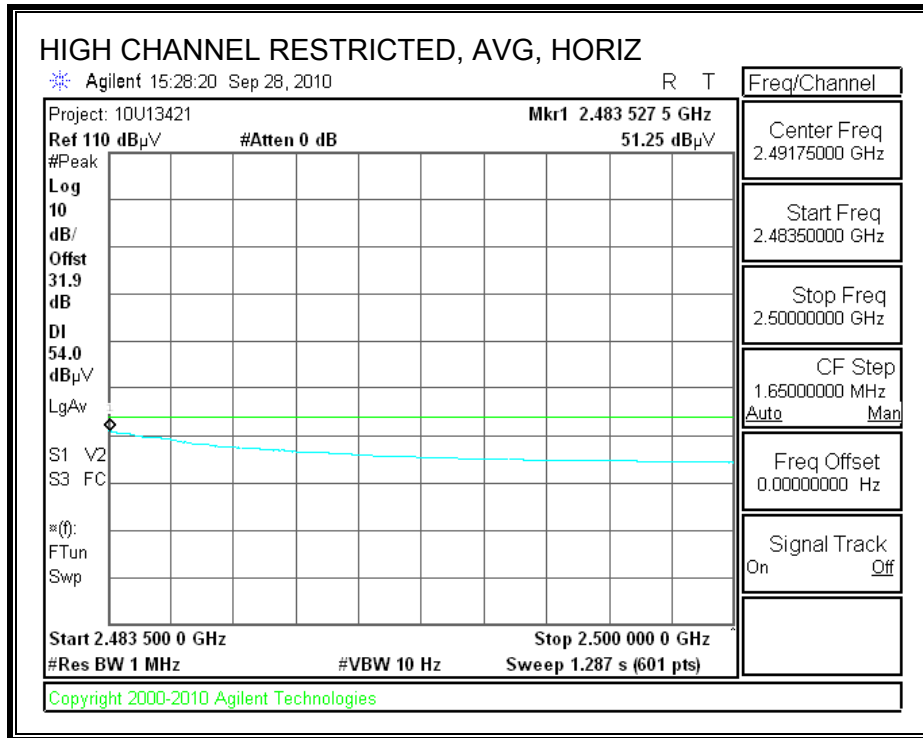




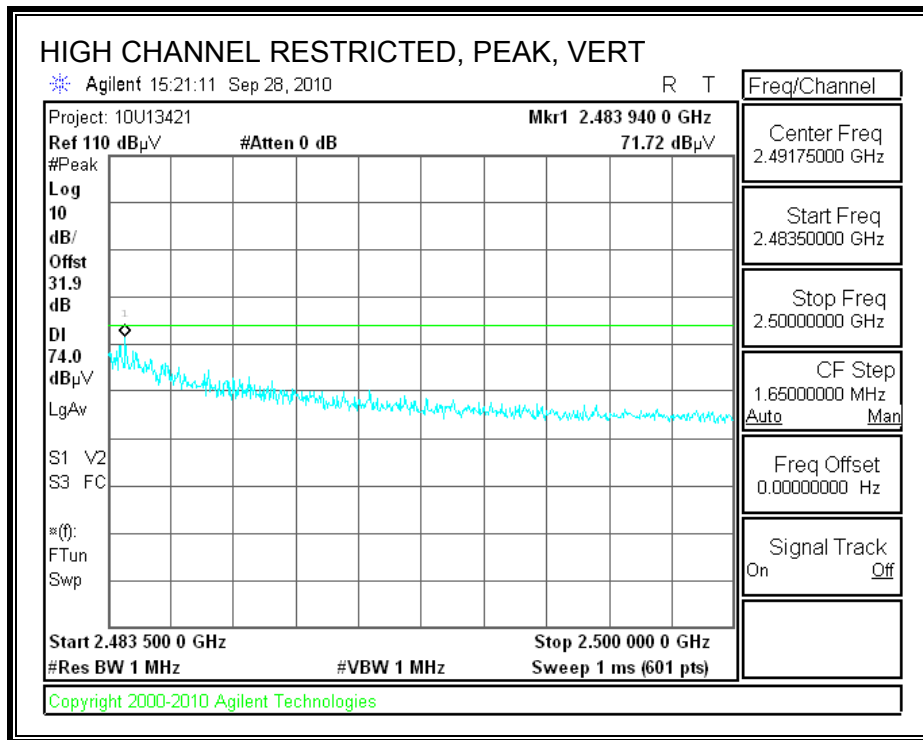


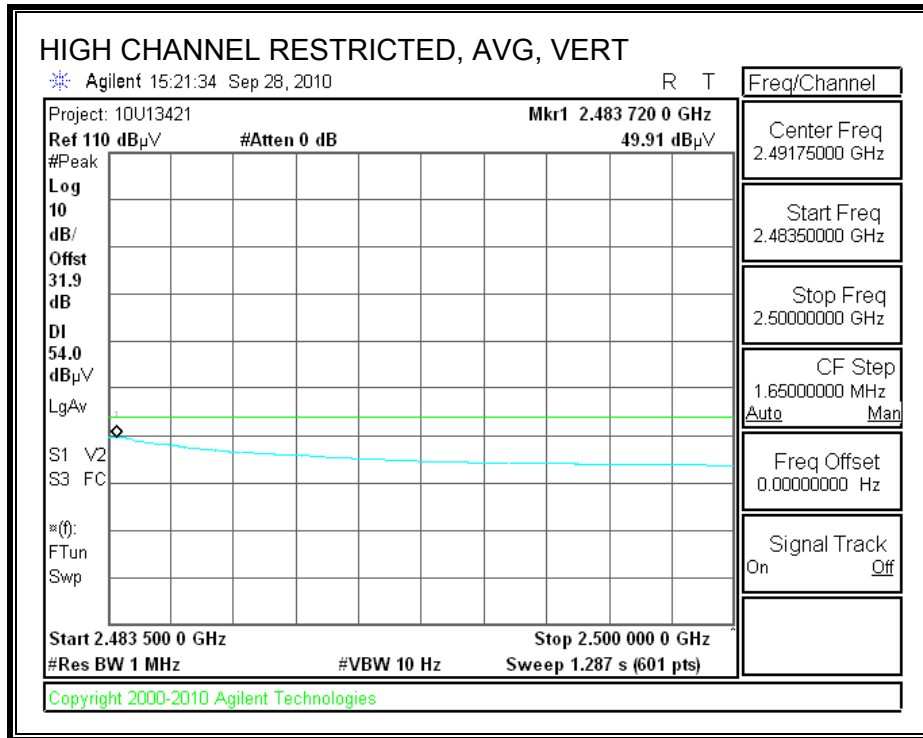
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





**HARMONICS AND SPURIOUS EMISSIONS**

High Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Tom Chen											
Date:		09/28/10											
Project #:		10U13421											
Company:		Primex Wireless											
Test Target:		FCC Class B											
Mode Oper:		802.11 g, TX mode											
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit									
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit									
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit									
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit									
CL	Cable Loss	HPF	High Pass Filter										
f	Dist	Read	AF	CL	Amp	D Corr	Fitr	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
GHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
<b>2412Mhz Low CH, g mode</b>													
4.824	3.0	50.3	32.8	5.8	-34.8	0.0	0.0	54.1	74.0	-19.9	V	P	
4.824	3.0	37.4	32.8	5.8	-34.8	0.0	0.0	41.2	54.0	-12.8	V	A	
7.236	3.0	40.7	35.1	7.2	-34.7	0.0	0.0	48.3	74.0	-25.7	V	P	
7.236	3.0	26.2	35.1	7.2	-34.7	0.0	0.0	33.8	54.0	-20.2	V	A	
<b>2412Mhz Low CH, g mode</b>													
4.824	3.0	48.4	32.8	5.8	-34.8	0.0	0.0	52.1	74.0	-21.9	H	P	
4.824	3.0	35.2	32.8	5.8	-34.8	0.0	0.0	38.9	54.0	-15.1	H	A	
7.236	3.0	40.1	35.1	7.2	-34.7	0.0	0.0	47.7	74.0	-26.3	H	P	
7.236	3.0	27.1	35.1	7.2	-34.7	0.0	0.0	34.8	54.0	-19.2	H	A	
<b>2437Mhz Mid CH, g mode</b>													
4.874	3.0	48.5	32.8	5.8	-34.9	0.0	0.0	52.3	74.0	-21.7	H	P	
4.874	3.0	35.6	32.8	5.8	-34.9	0.0	0.0	39.4	54.0	-14.6	H	A	
7.311	3.0	37.9	35.2	7.3	-34.7	0.0	0.0	45.7	74.0	-28.3	H	P	
7.311	3.0	25.8	35.2	7.3	-34.7	0.0	0.0	33.6	54.0	-20.4	H	A	
<b>2437Mhz Mid CH, g mode</b>													
4.874	3.0	48.5	32.8	5.8	-34.9	0.0	0.0	52.3	74.0	-21.7	V	P	
4.874	3.0	36.3	32.8	5.8	-34.9	0.0	0.0	40.1	54.0	-13.9	V	A	
7.311	3.0	42.5	35.2	7.3	-34.7	0.0	0.0	50.3	74.0	-23.7	V	P	
7.311	3.0	27.0	35.2	7.3	-34.7	0.0	0.0	34.8	54.0	-19.2	V	A	
<b>2462Mhz High CH</b>													
4.924	3.0	50.1	32.8	5.9	-34.9	0.0	0.0	54.0	74.0	-20.0	H	P	
4.924	3.0	35.1	32.8	5.9	-34.9	0.0	0.0	38.9	54.0	-15.1	H	A	
7.386	3.0	37.6	35.3	7.3	-34.6	0.0	0.0	45.5	74.0	-28.5	H	P	
7.386	3.0	25.7	35.3	7.3	-34.6	0.0	0.0	33.6	54.0	-20.4	H	A	
<b>2462Mhz High CH, g mode</b>													
4.924	3.0	48.9	32.8	5.9	-34.9	0.0	0.0	52.8	74.0	-21.2	V	P	
4.924	3.0	36.5	32.8	5.9	-34.9	0.0	0.0	40.3	54.0	-13.7	V	A	
7.386	3.0	37.8	35.3	7.3	-34.6	0.0	0.0	45.7	74.0	-28.3	V	P	
7.386	3.0	25.4	35.3	7.3	-34.6	0.0	0.0	33.4	54.0	-20.6	V	A	
Rev. 4.1.2.7													
Note: No other emissions were detected above the system noise floor.													

### 8.3. RX ABOVE 1 GHz IN THE 2.4 GHz BAND

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber

Company: Primex Wireless  
 Project #: 10U13421  
 Date: 09/29/10  
 Test Engineer: Tom Chen  
 Configuration: EUT only  
 Mode: Synchronous Network System Personal Series clock

**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
3' cable 22807700	12' cable 22807600	20' cable 22807500			Average Measurements RBW=1MHz ; VBW=10Hz

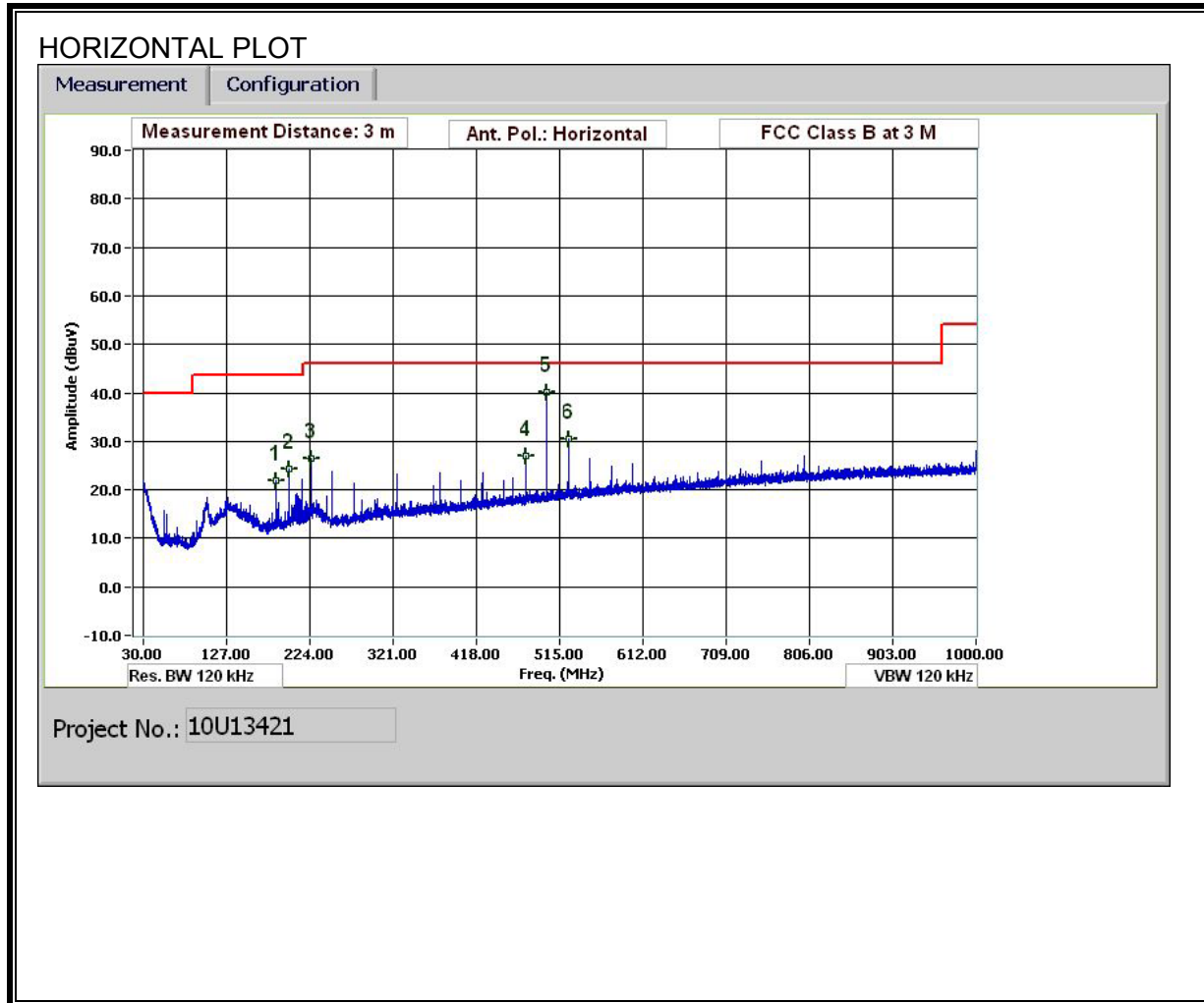
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Filtr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
1.100	3.0	45.3		24.2	2.5	-39.3	0.0	0.0	32.6	-12.7	74	54	-41.4	-66.7	V
1.249	3.0	44.7		24.7	2.7	-39.1	0.0	0.0	32.9	-11.8	74	54	-41.1	-65.8	V
1.750	3.0	43.9		26.4	3.2	-38.4	0.0	0.0	35.0	-8.8	74	54	-39.0	-62.8	V
3.249	3.0	44.6		30.6	4.6	-37.2	0.0	0.0	42.5	-2.1	74	54	-31.5	-56.1	V
1.196	3.0	40.8		24.5	2.6	-39.2	0.0	0.0	28.7	-12.1	74	54	-45.3	-66.1	H
3.249	3.0	43.0		30.6	4.6	-37.2	0.0	0.0	40.9	-2.1	74	54	-33.1	-56.1	H

**Note:** No other emissions were detected above the system 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		

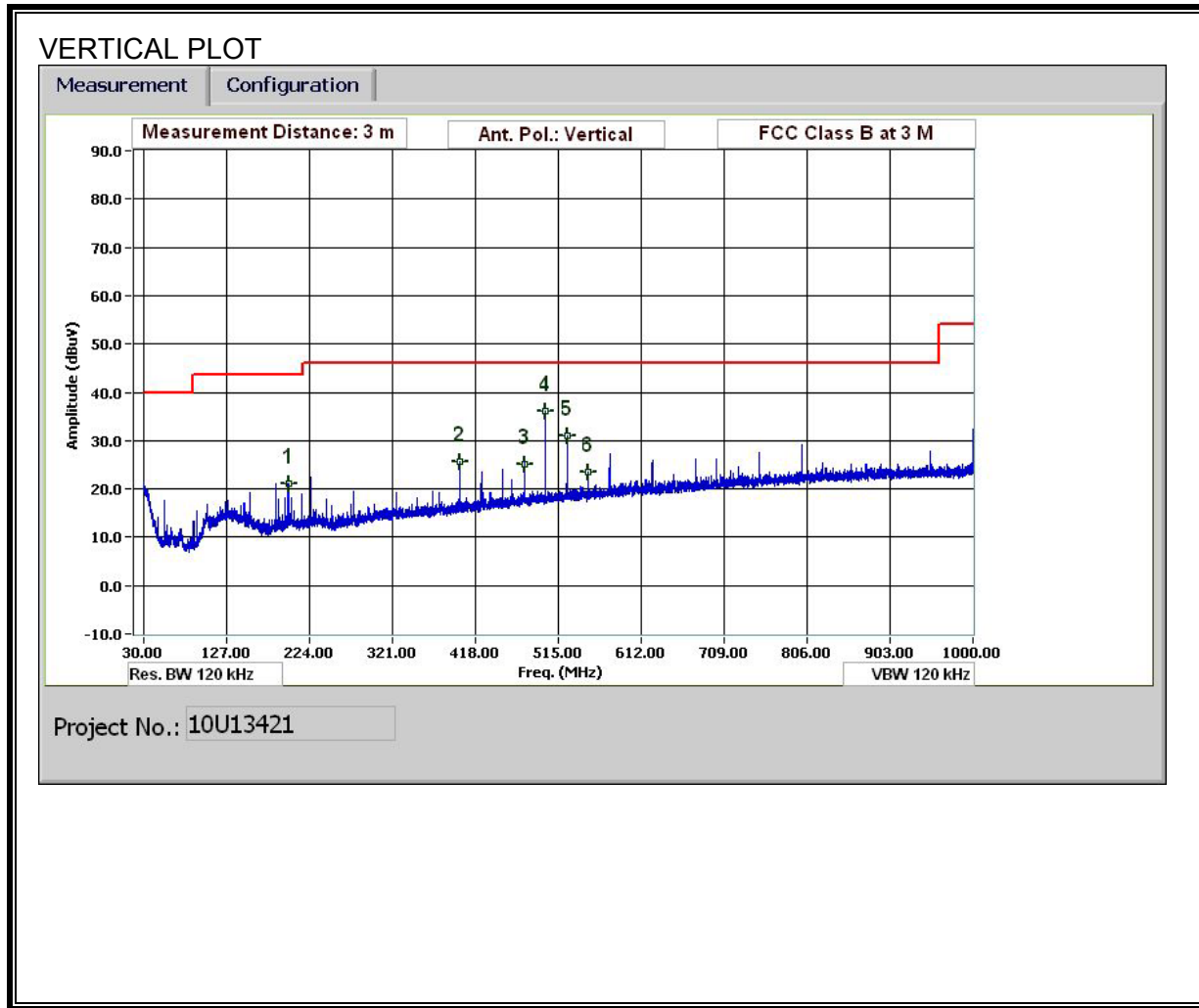
### 8.4. WORST-CASE BELOW 1 GHz

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





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



### HORIZONTAL AND VERTICAL DATA

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

Test Engr: Tom Chen  
 Date: 09/28/10  
 Project #: 10U13421  
 Company: Primex Wireless  
 Test Target: FCC Class B  
 Mode Oper: TX mode, Worst Case

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

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
<b>Horizontal</b>													
183.966	3.0	37.7	11.2	1.2	28.2	0.0	0.0	21.9	43.5	-21.6	H	P	
200.047	3.0	39.4	12.0	1.3	28.2	0.0	0.0	24.4	43.5	-19.1	H	P	
225.008	3.0	41.4	11.9	1.3	28.2	0.0	0.0	26.4	46.0	-19.6	H	P	
475.098	3.0	36.8	16.3	2.0	27.9	0.0	0.0	27.1	46.0	-18.9	H	P	
500.059	3.0	49.2	16.7	2.0	27.8	0.0	0.0	40.2	46.0	-5.8	H	P	
525.02	3.0	39.1	17.2	2.1	27.7	0.0	0.0	30.6	46.0	-15.4	H	P	
<b>Vertical</b>													
199.087	3.0	36.0	11.9	1.2	28.2	0.0	0.0	21.0	43.5	-22.5	V	P	
400.095	3.0	37.0	14.9	1.8	28.1	0.0	0.0	25.7	46.0	-20.3	V	P	
474.978	3.0	34.8	16.3	2.0	27.9	0.0	0.0	25.2	46.0	-20.8	V	P	
500.059	3.0	45.1	16.7	2.0	27.8	0.0	0.0	36.0	46.0	-10.0	V	P	
525.02	3.0	39.4	17.2	2.1	27.7	0.0	0.0	30.9	46.0	-15.1	V	P	
549.981	3.0	31.5	17.6	2.1	27.7	0.0	0.0	23.6	46.0	-22.4	V	P	

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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	280/ <i>f</i>	2.19/ <i>f</i>		6
10–30	28	2.19/ <i>f</i>		6
30–300	28	0.073	2*	6
300–1 500	1.585 <i>f</i> <sup>0.5</sup>	0.0042 <i>f</i> <sup>0.5</sup>	<i>f</i> /150	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	616 000 / <i>f</i> <sup>1.2</sup>
150 000–300 000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616 000 / <i>f</i> <sup>1.2</sup>

\* 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<sup>2</sup> is equivalent to 1 mW/cm<sup>2</sup>.
  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:

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

where

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

Power density in units of W/m<sup>2</sup> is converted to units of mW/cm<sup>2</sup> by dividing by 10.

Distance is given by:

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

where

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

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/cm<sup>2</sup>

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m<sup>2</sup>

**RESULTS**

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m <sup>2</sup> )	FCC Power Density (mW/cm <sup>2</sup> )
2.4 GHz	WLAN	0.20	22.74	-1.20	0.28	0.028