



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

CERTIFICATION TEST REPORT

FOR

802.11a/g/n/ac WLAN + BLUETOOTH PCI-E CUSTOM COMBINATION CARD

MODEL NUMBER: BCM94360CS2

FCC ID: QDS-BRCM1072
IC: 4324A-BRCM1072

REPORT NUMBER: 13U14796-2, Revision A

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	03/18/13	Initial Issue	F. Ibrahim
A	03/20/13	Revised sections 7.1.3, 7.2.3, 7.1.4, 7.2.4, and 7.1.5	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

EUT DESCRIPTION: 802.11a/g/n/ac WLAN + Bluetooth PCI-E Custom Combination Card

MODEL: BCM94360CS2

SERIAL NUMBER: C8Y2504007GFC31E9

DATE TESTED: February 20 – March 06, 2013

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

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.

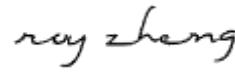
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this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

Tested By:



ROY ZHENG
WiSE LAB TECH III
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/g/n/ac WLAN + Bluetooth PCI-E Custom Combination Card.

The radio module is manufactured by Broadcom.

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)
2402 - 2480	Basic GFSK	8.34	6.82
2402 - 2480	Enhanced 8PSK	9.22	8.36

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an Amphenol/ Pulse 802.11a/b/g/n WLAN/BT antenna, with a maximum gain of 4.97 dBi for the BT antenna.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, Ver. 5.1.0.1400
The test utility software used during testing was Broadcom BlueTool, Ver 1.7.2

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC. The EUT was oriented in a flat orientation, similar to the orientation it would have in real installations; see setup photos for details.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Dell	E6400	BDRBKK1	DoC
AC Adapter	Dell	DA90PE3	WTC0V	DoC
Adapter Board	Broadcom	BCM94331CSAD	1583414	N/A

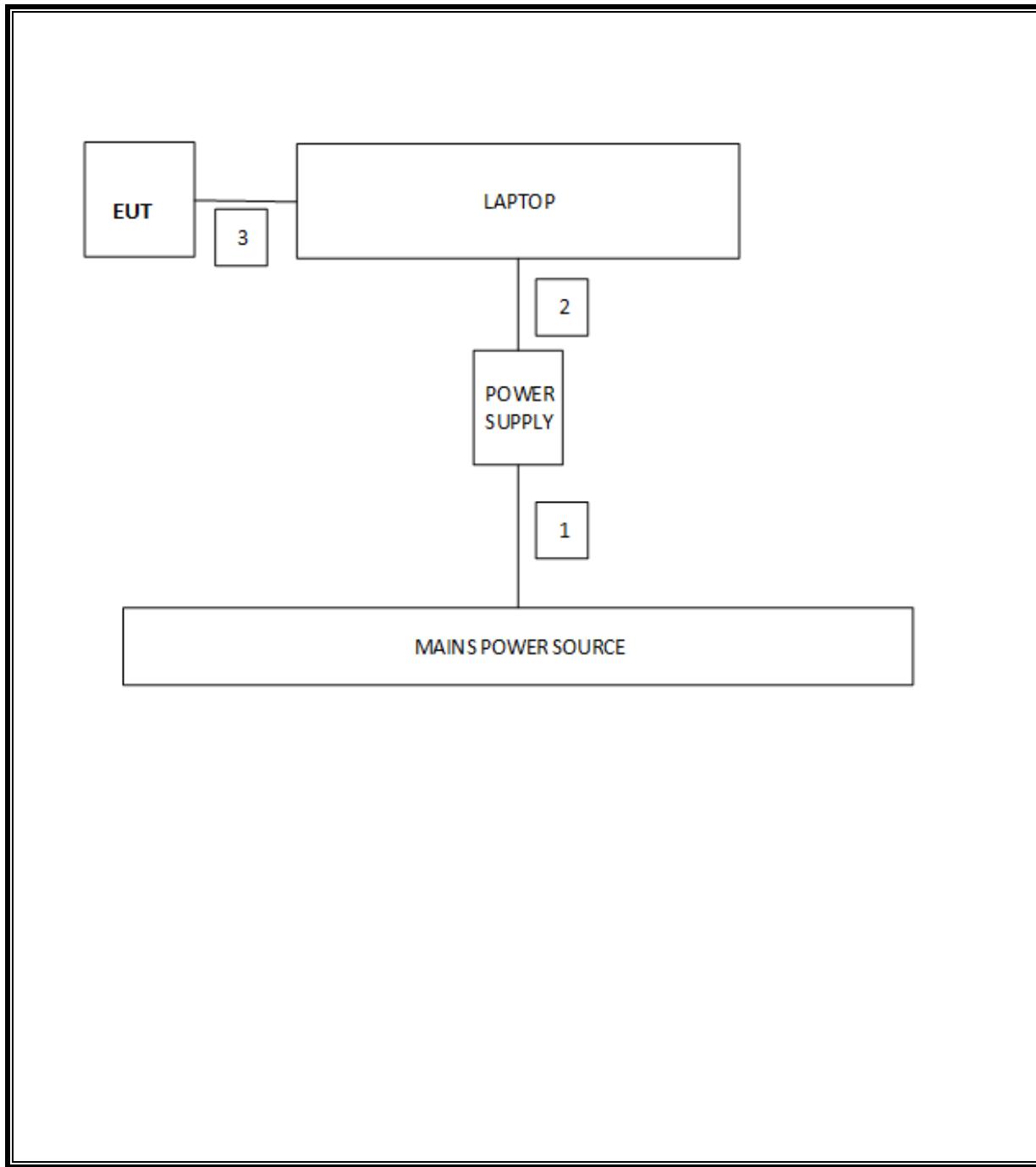
I/O CABLES

I/O Cable List						
Cable	Port	# of identical	Connector	Cable Type	Cable	Remarks
1	AC	1	US 115V	Un-Shielded	1.8	N/A
2	DC	1	DC	Shielded	1.8	N/A
3	USB	1	USB	Shielded	1.8	N/A

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/13/11	12/13/13
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/11	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/11	12/13/13
Antenna, Horn, 18 GHz	EMCO	3115	C00945	11/12/12	11/12/13
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00946	11/12/12	11/12/13
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/12	10/22/13
LISN, 30 MHz	FCC	50/250-25-2	N02396	08/08/12	08/08/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	02/21/12	03/21/13
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/23/12	03/23/13
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRC13192	N02683	CNR	CNR

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

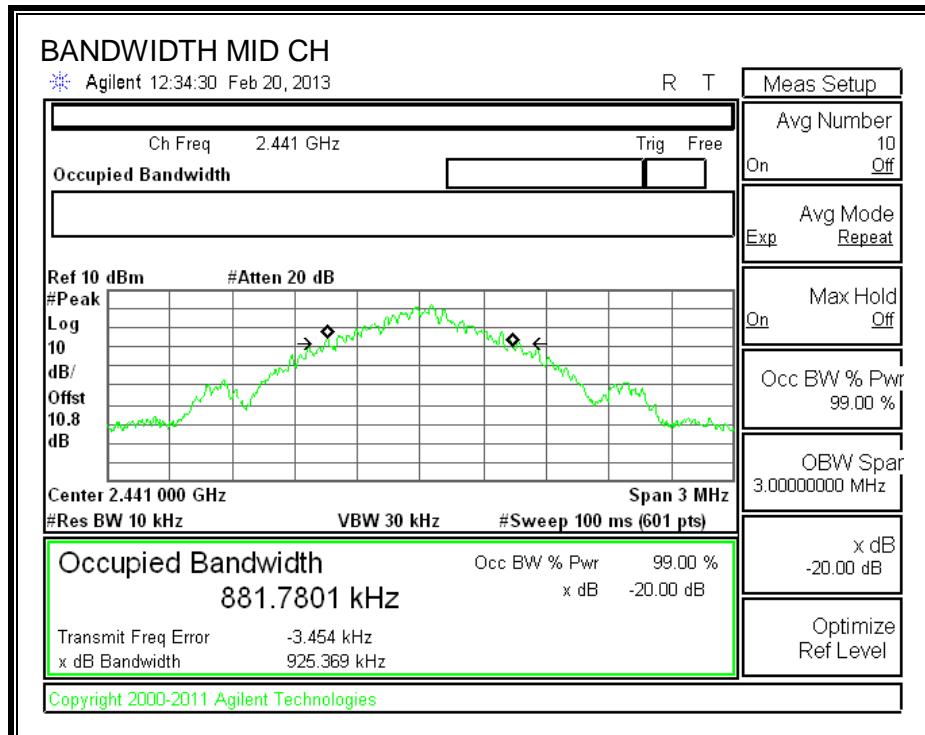
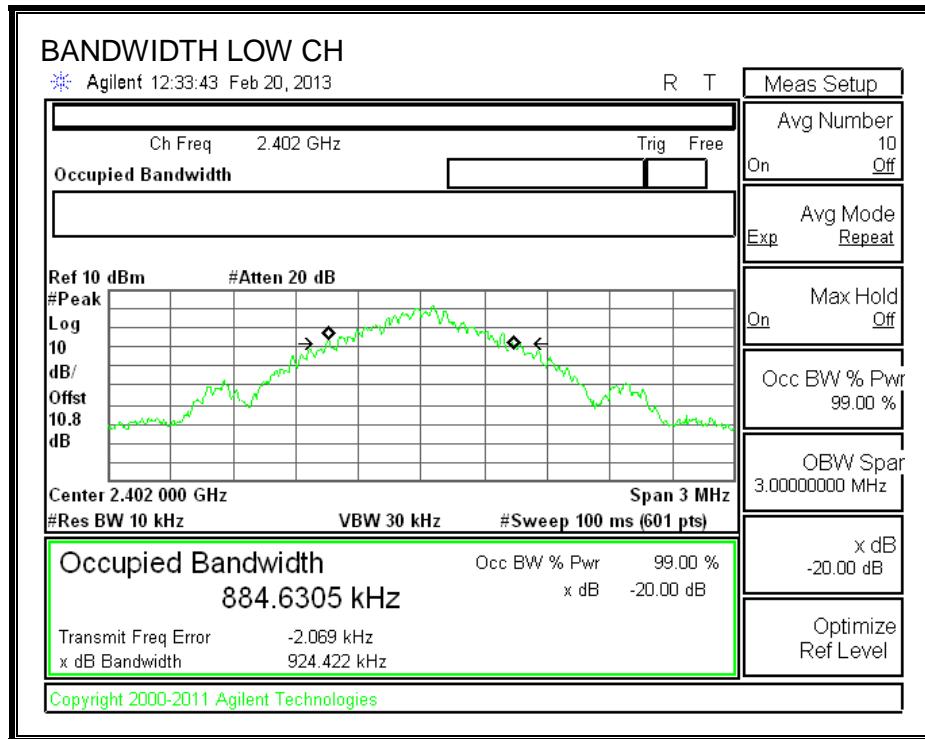
TEST PROCEDURE

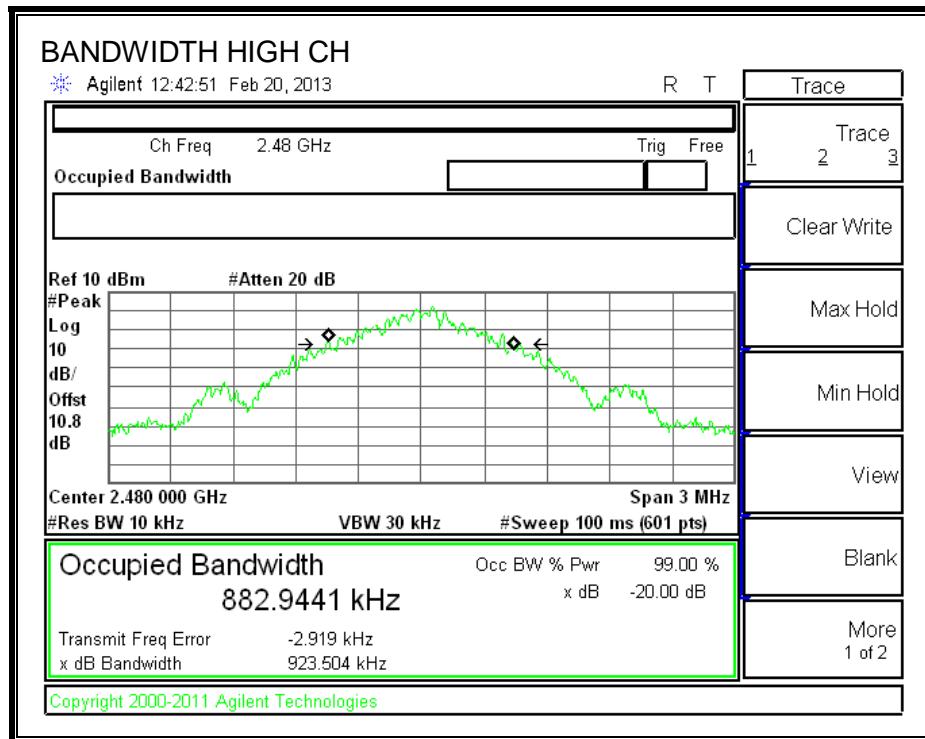
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

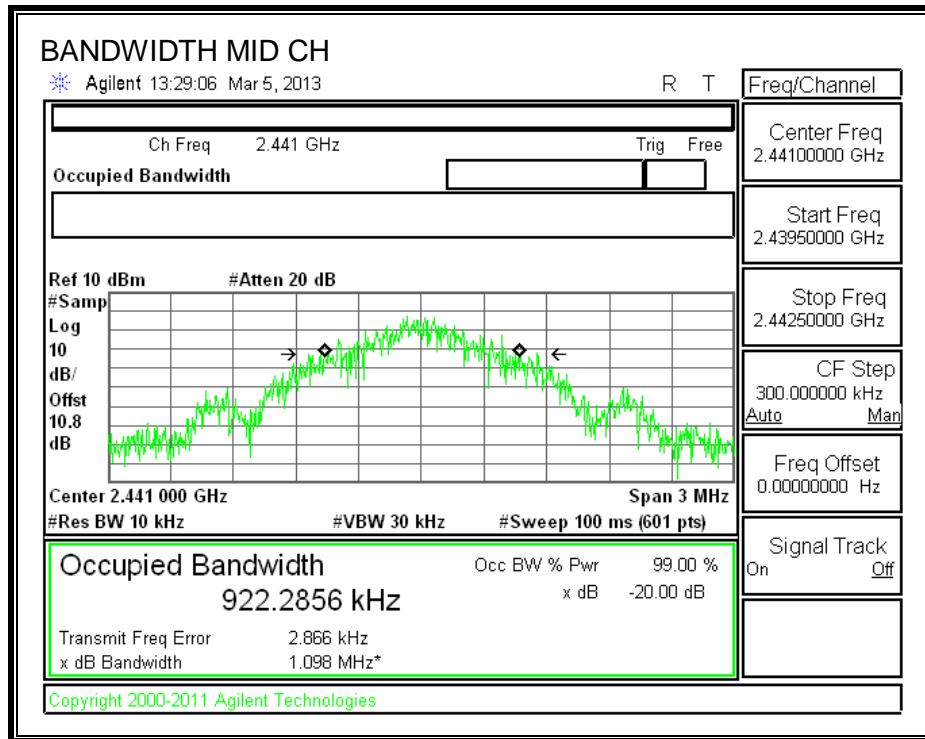
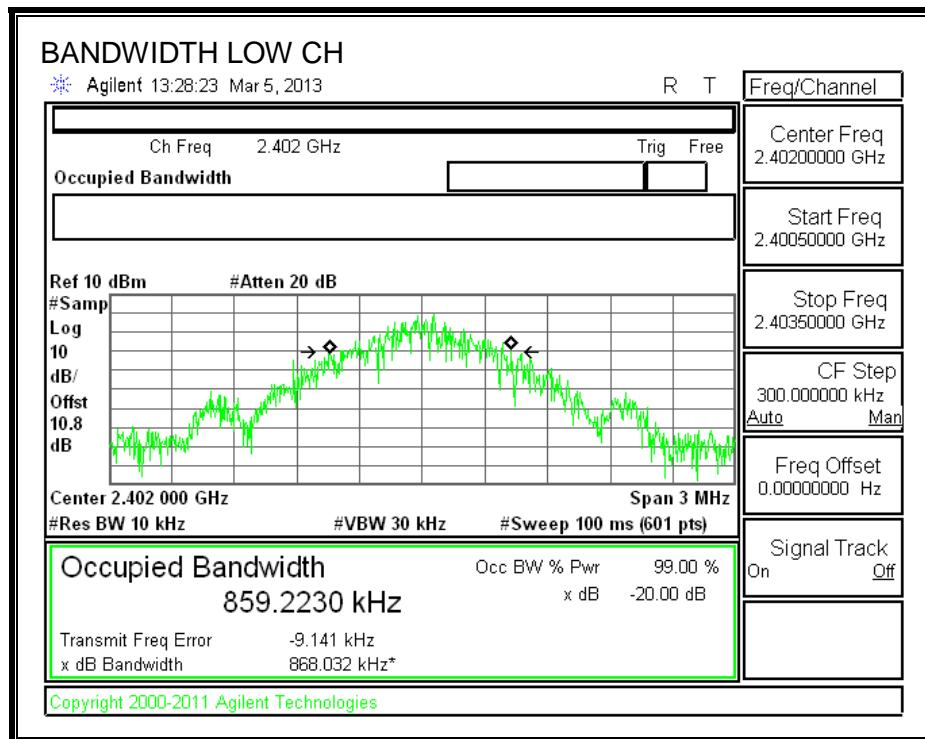
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	924.422	859.2230
Middle	2441	925.369	922.2856
High	2480	923.504	859.1657

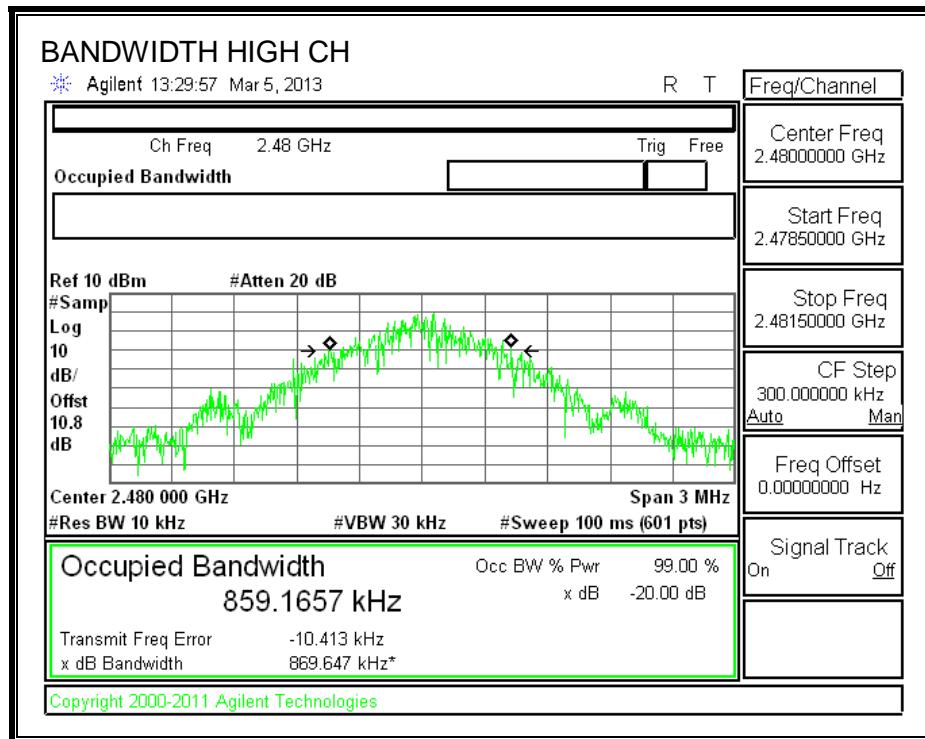
20 dB BANDWIDTH





99% BANDWIDTH





7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

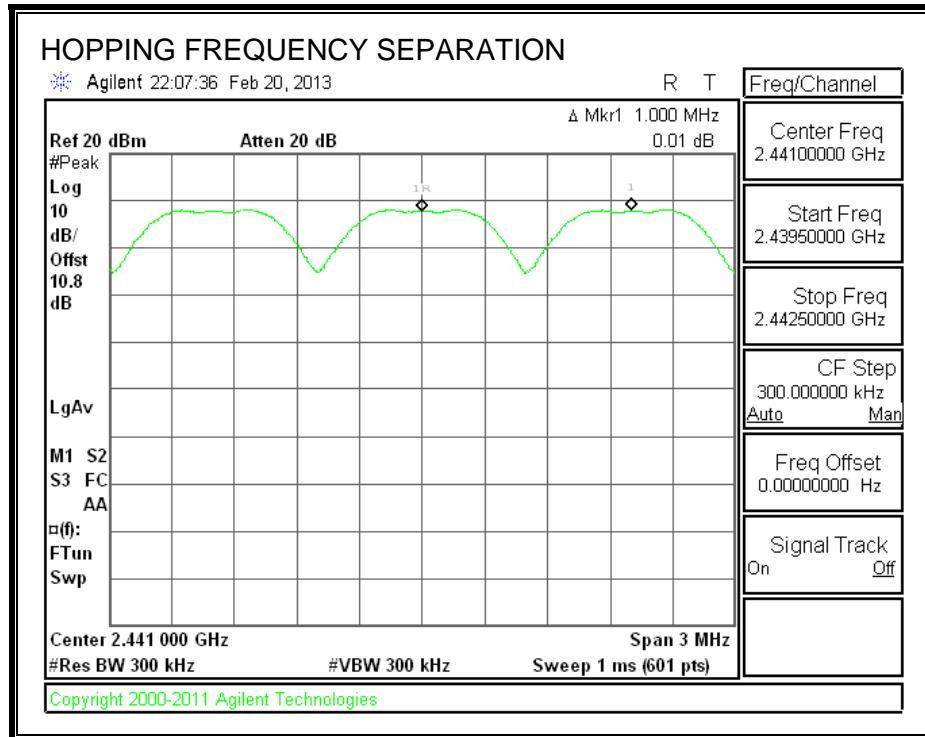
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

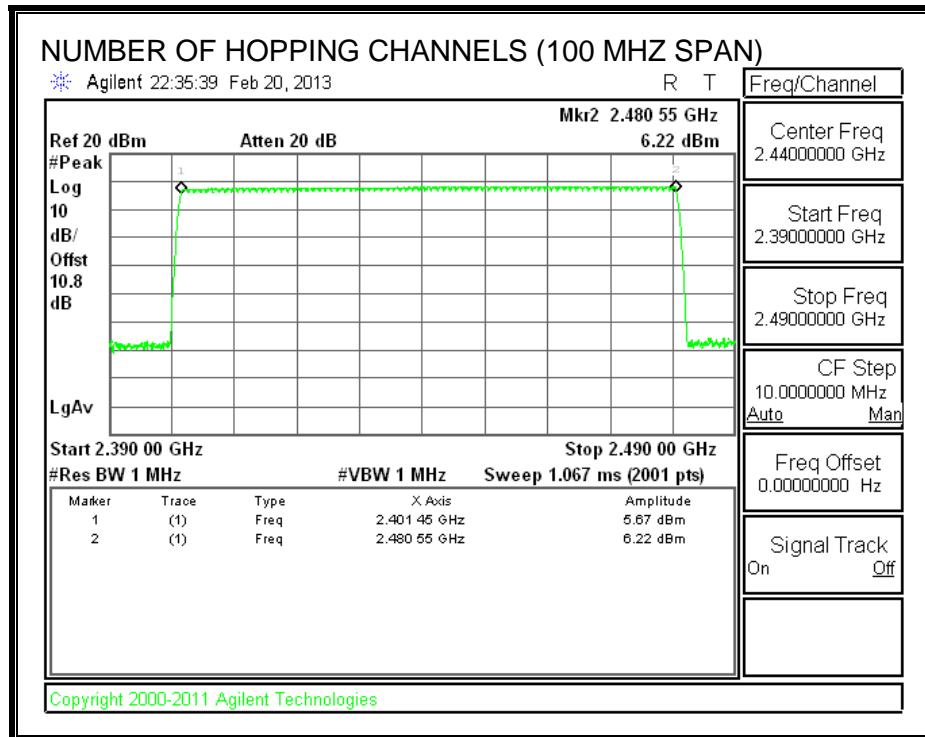
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

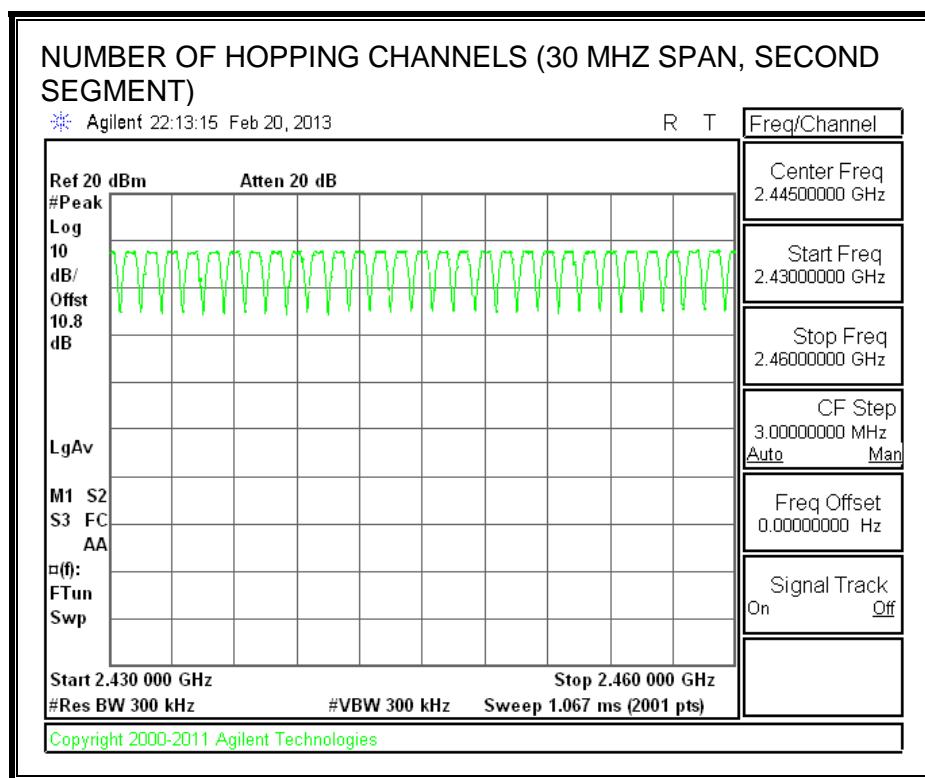
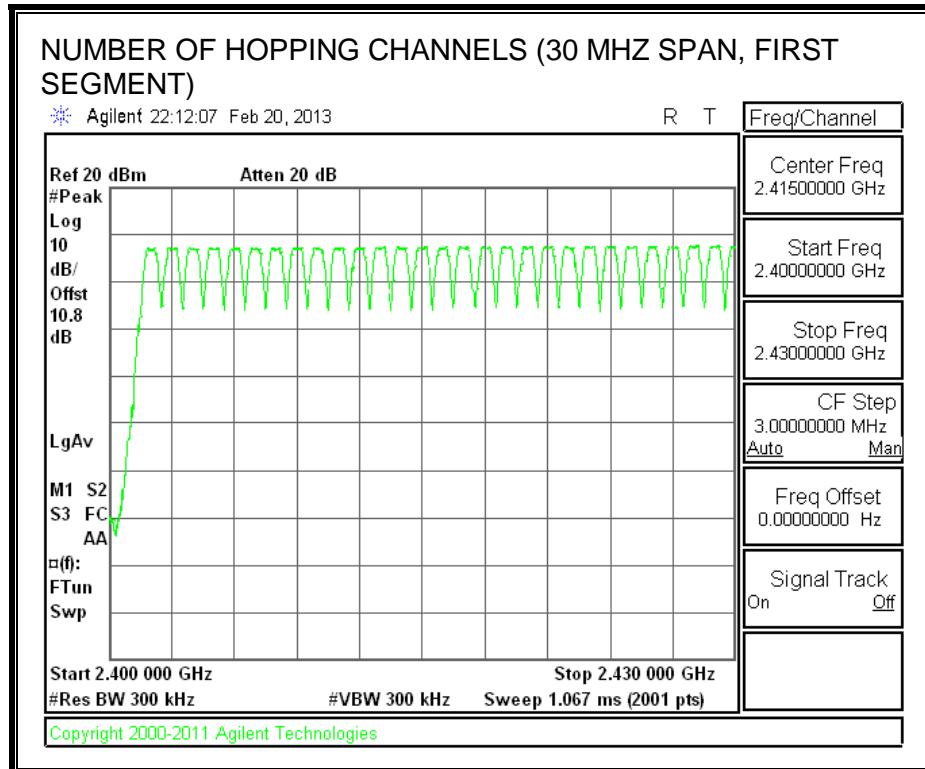
RESULTS

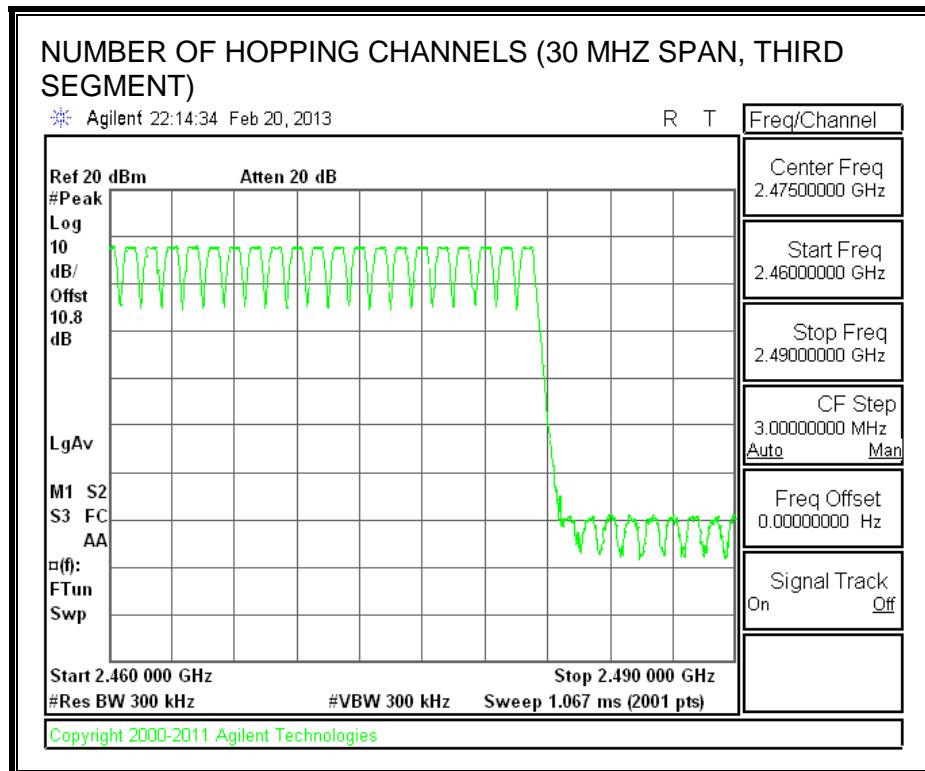
Normal Mode: 79 Channels observed.

AFH Mode: a minimum number of 20 channels declared by the client.

NUMBER OF HOPPING CHANNELS







7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

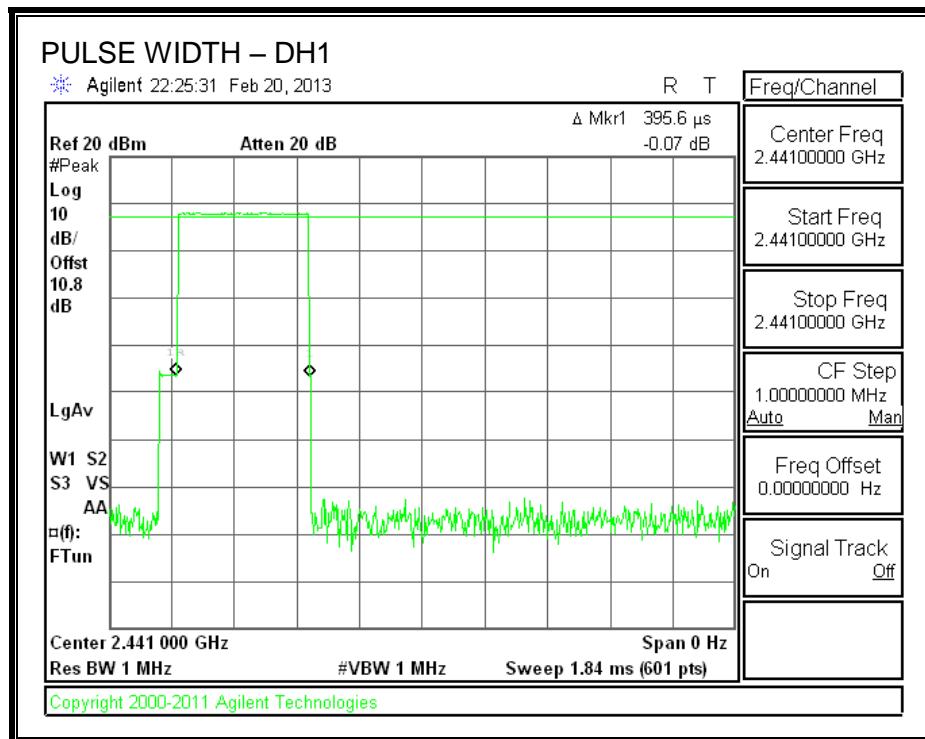
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{pulse width}$.

RESULTS

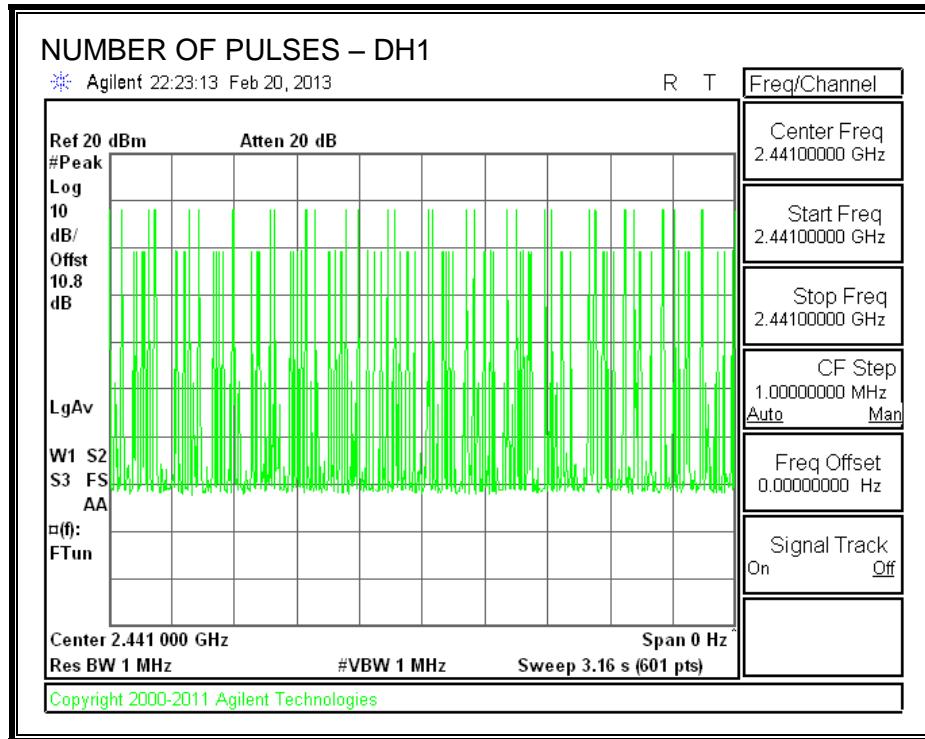
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.3956	32	0.1266	0.4	-0.2734
DH3	1.6530	16	0.2645	0.4	-0.1355
DH5	2.9520	11	0.3247	0.4	-0.0753
GFSK AFH Mode					
DH1	0.3956	64	0.2532	0.4	-0.1468
DH3	1.6530	21	0.3471	0.4	-0.0529
DH5	2.9520	13	0.3838	0.4	-0.0162

Note: This device supports adaptive frequency hopping (AFH) which uses the same pseudo random channel selection algorithm as is used for non AFH mode. By showing compliance with the channel dwell time requirements for 79 channels, since the dwell time requirements are based on the number of channels compliance is also demonstrated for N channels where $20 \leq N \leq 79$.

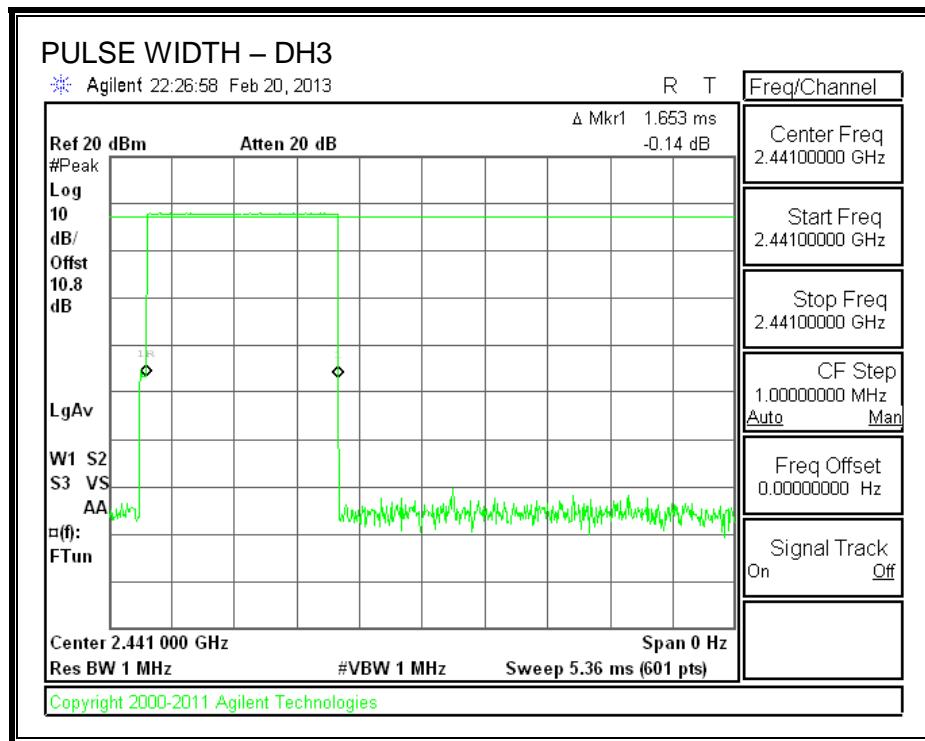
PULSE WIDTH - DH1



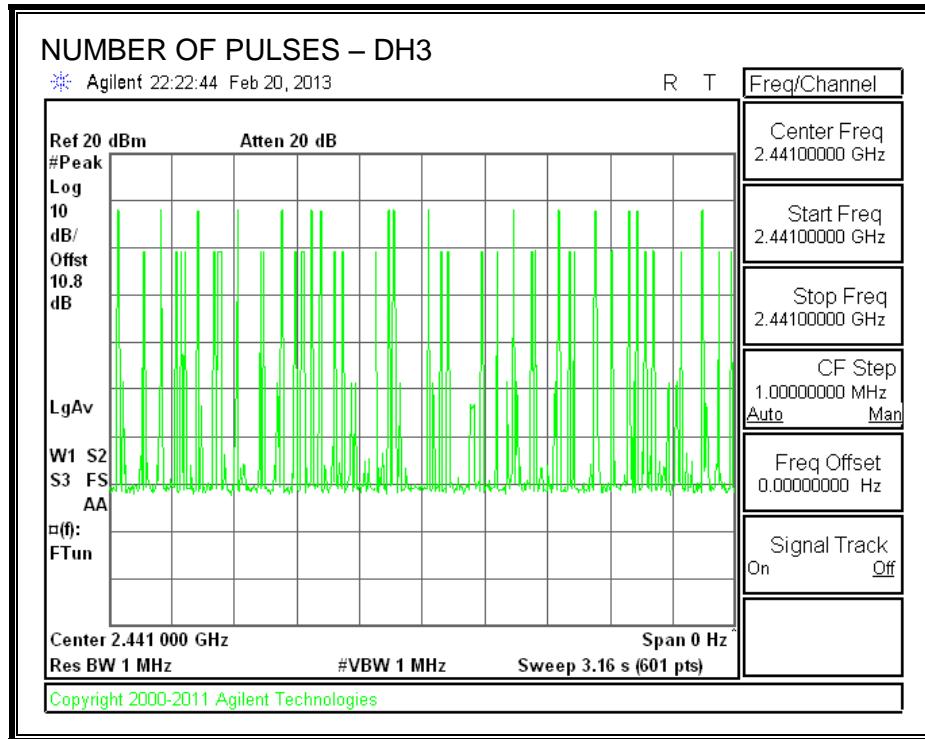
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



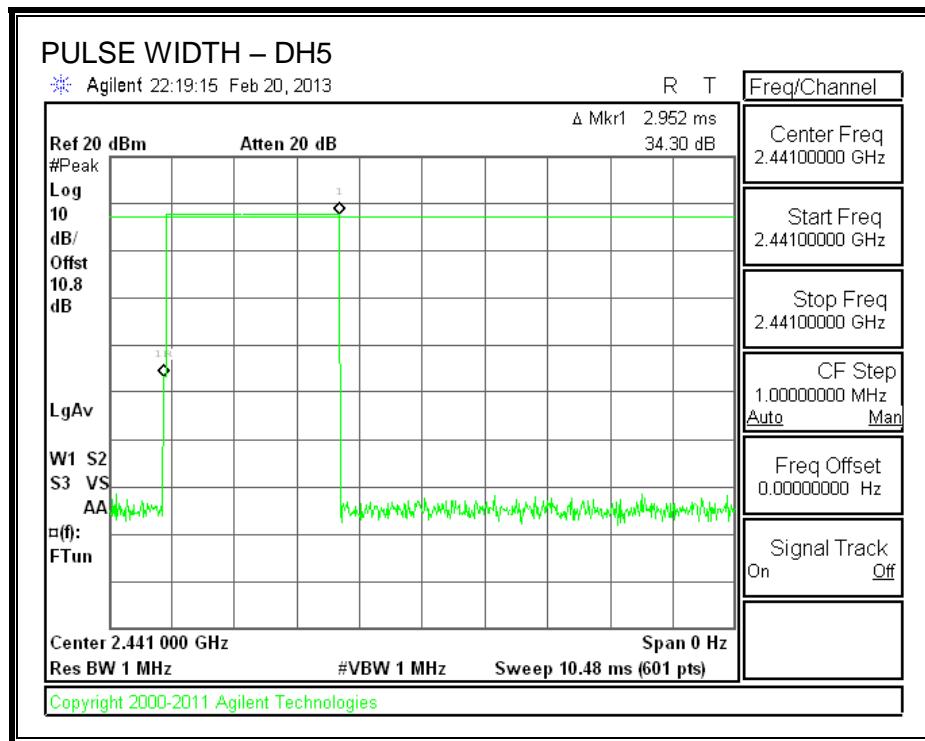
PULSE WIDTH – DH3



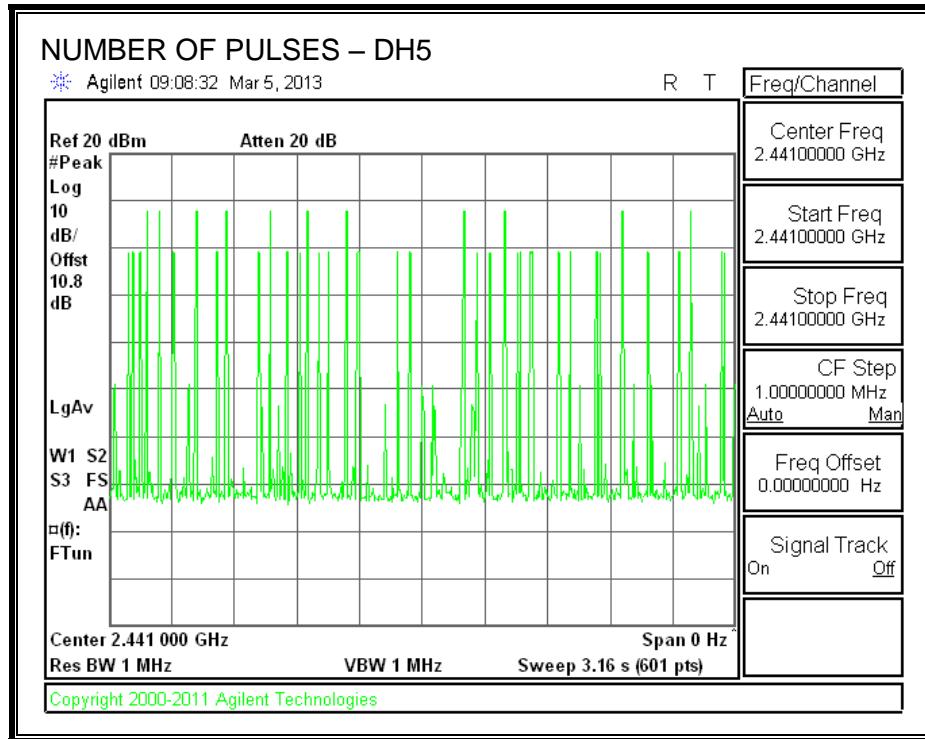
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

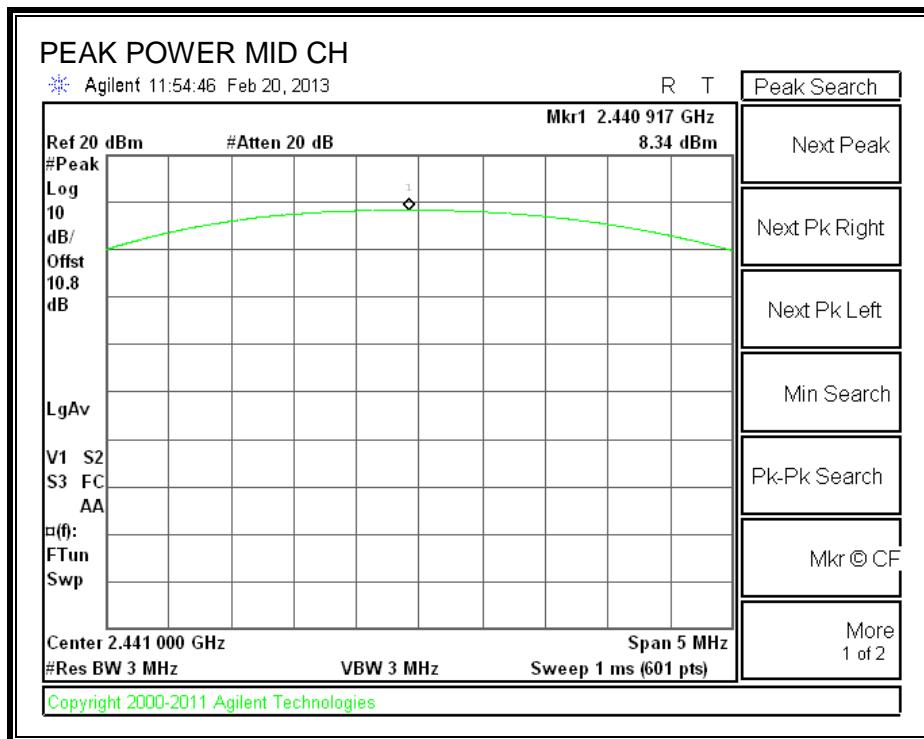
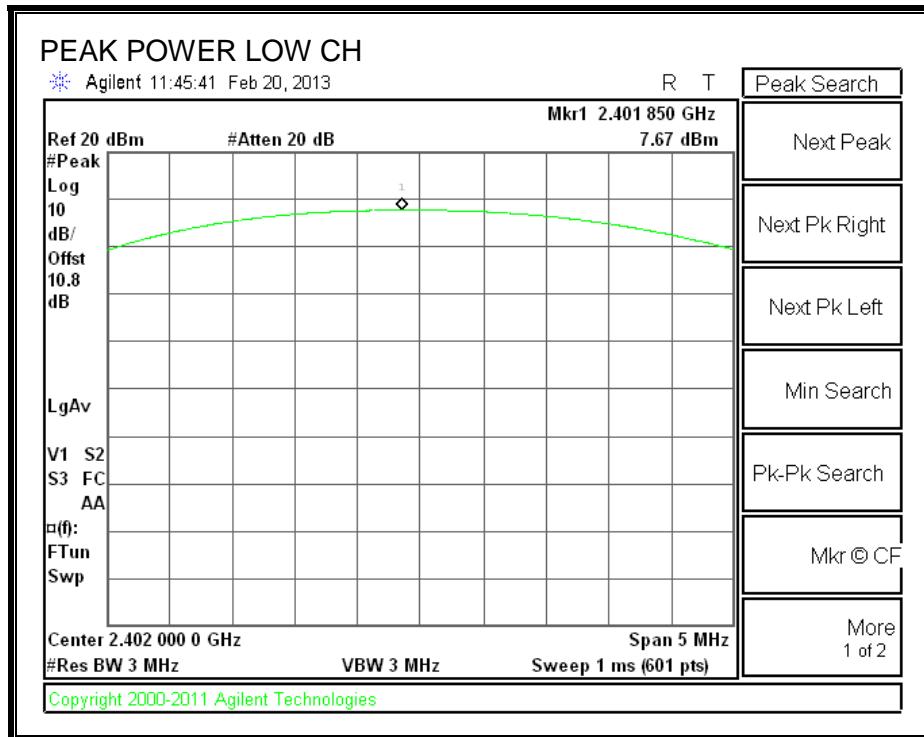
TEST PROCEDURE

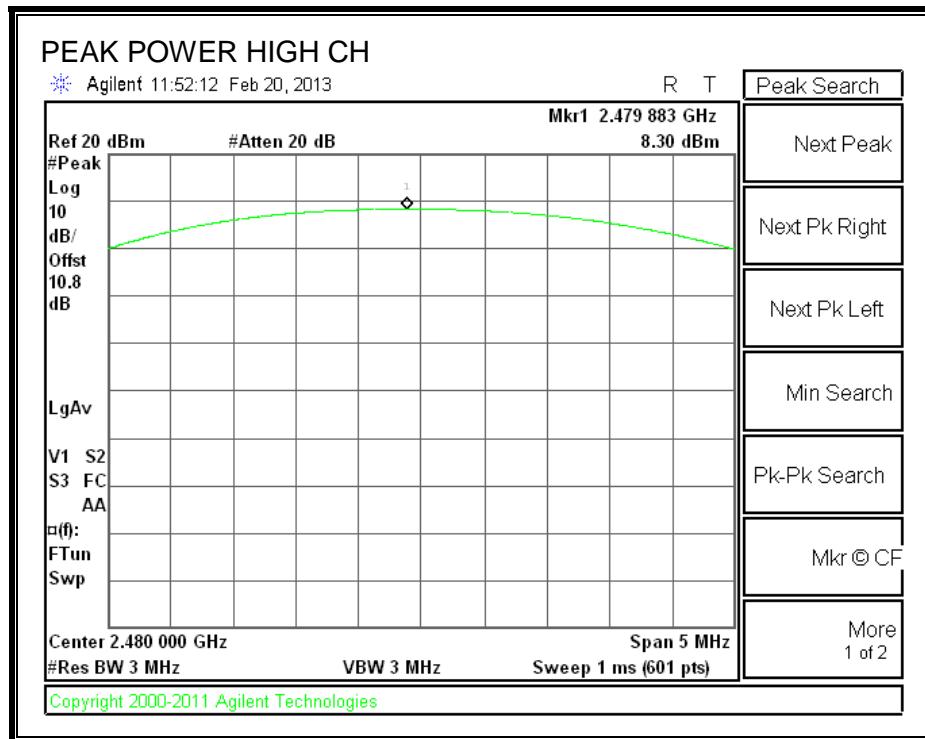
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.67	21	-13.33
Middle	2441	8.34	21	-12.66
High	2480	8.30	21	-12.70

OUTPUT POWER





7.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 0.4 dB (including 0 dB pad and 0.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.07
Middle	2441	7.55
High	2480	7.59

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

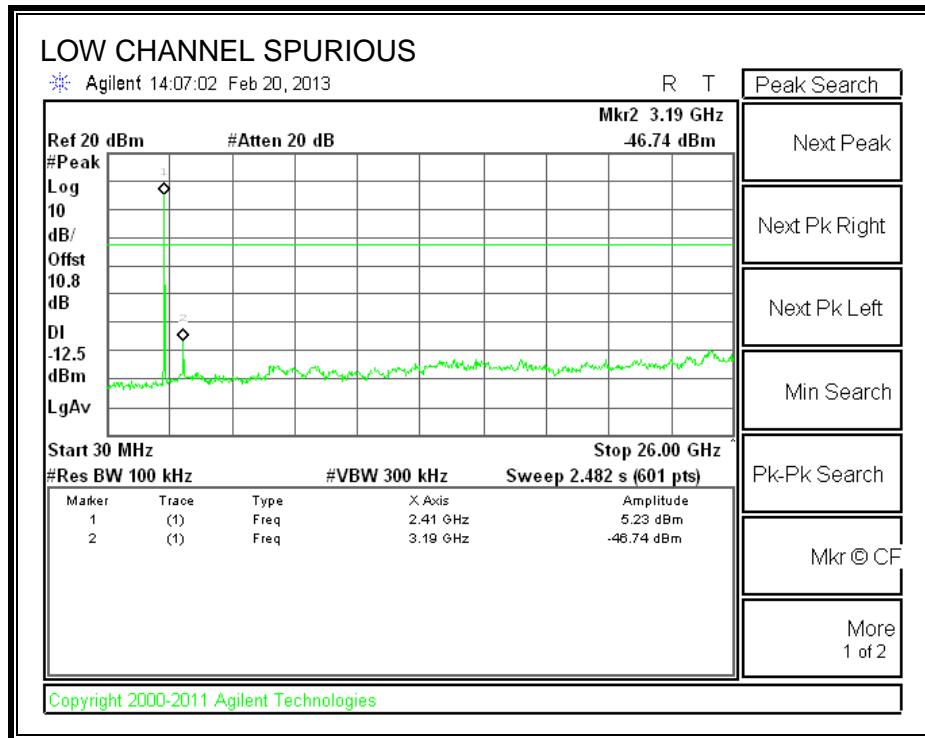
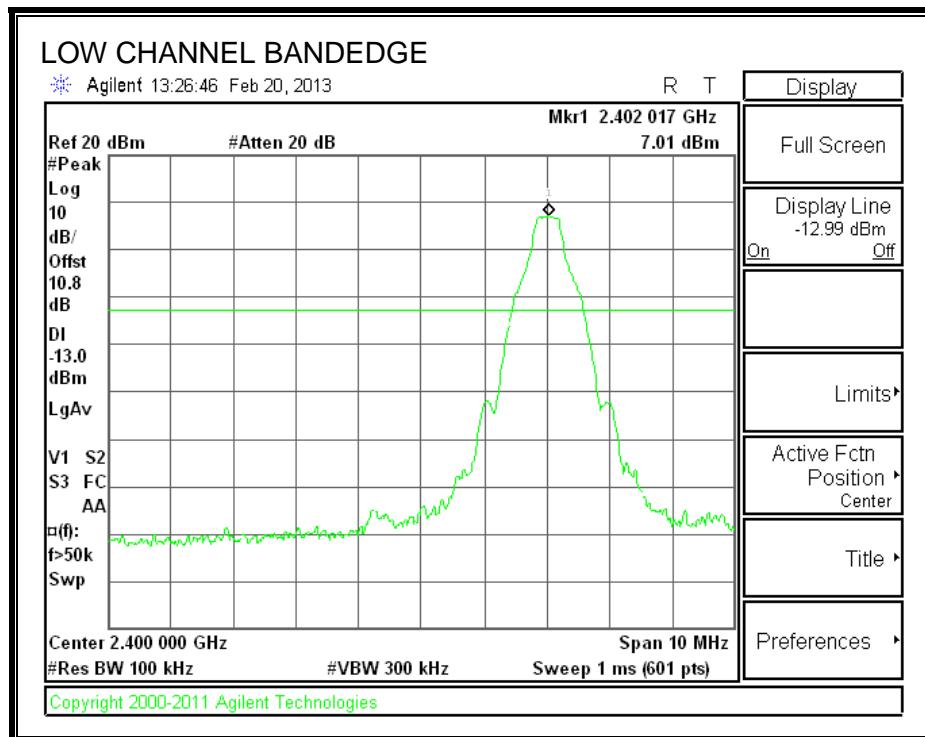
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

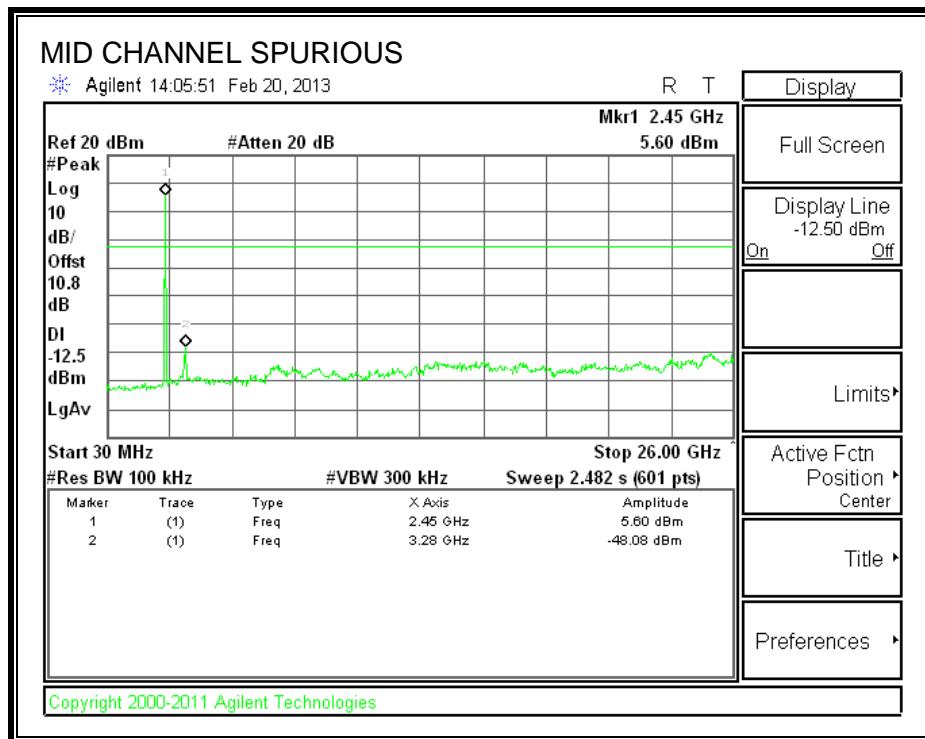
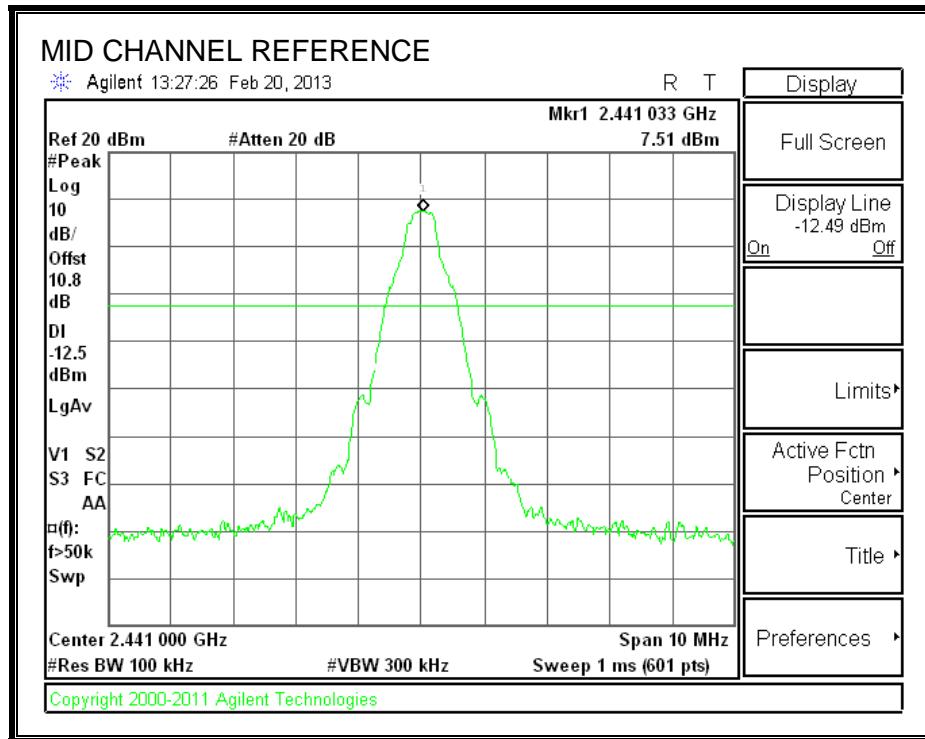
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

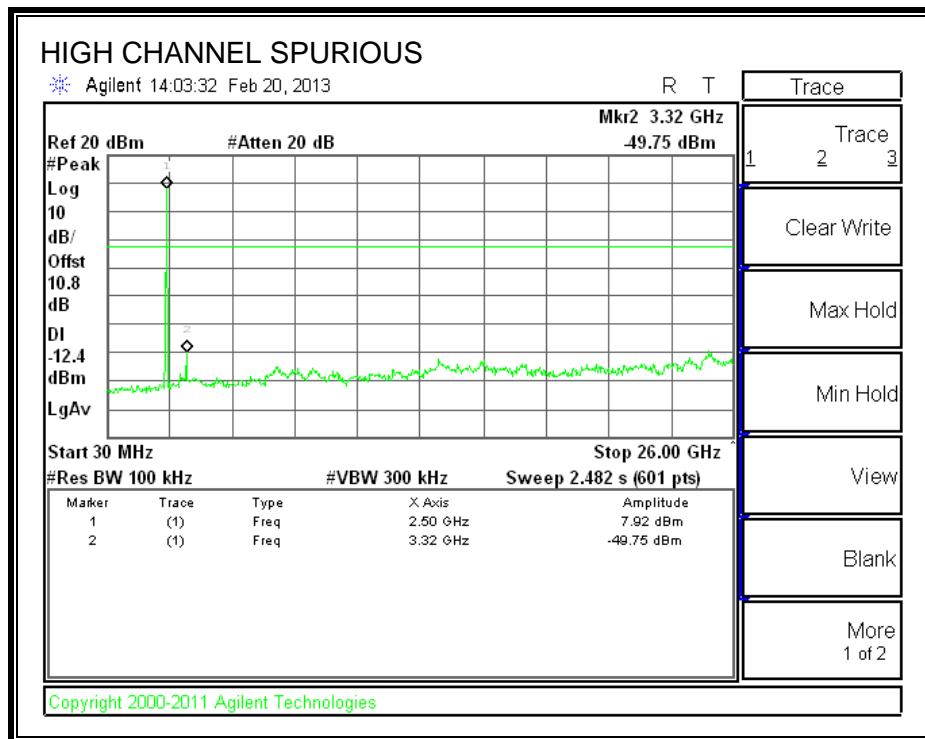
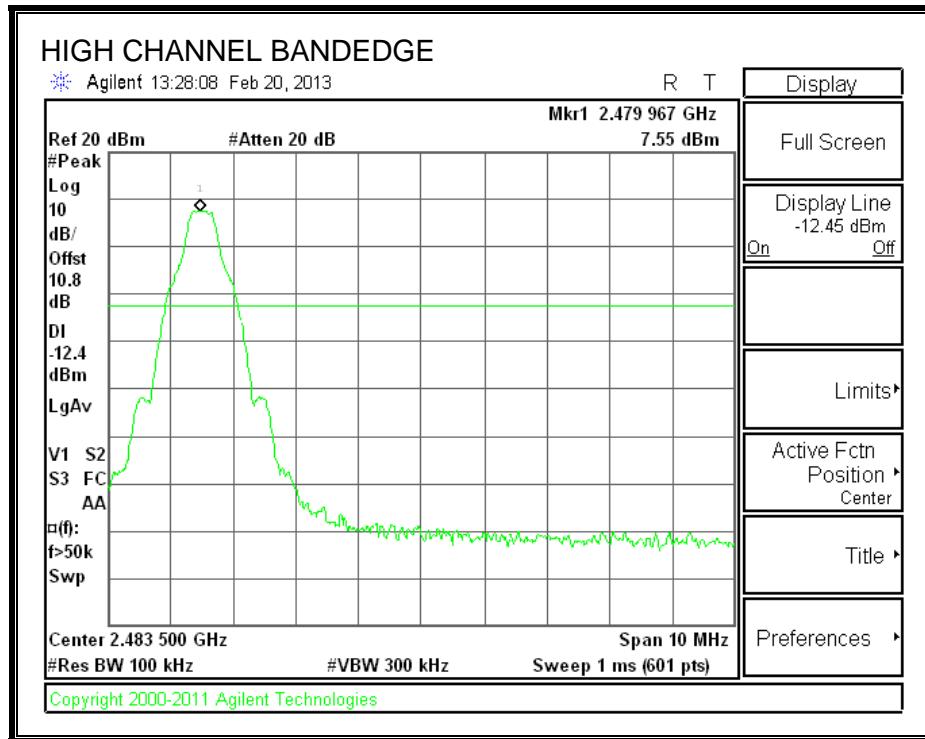
SPURIOUS EMISSIONS, LOW CHANNEL



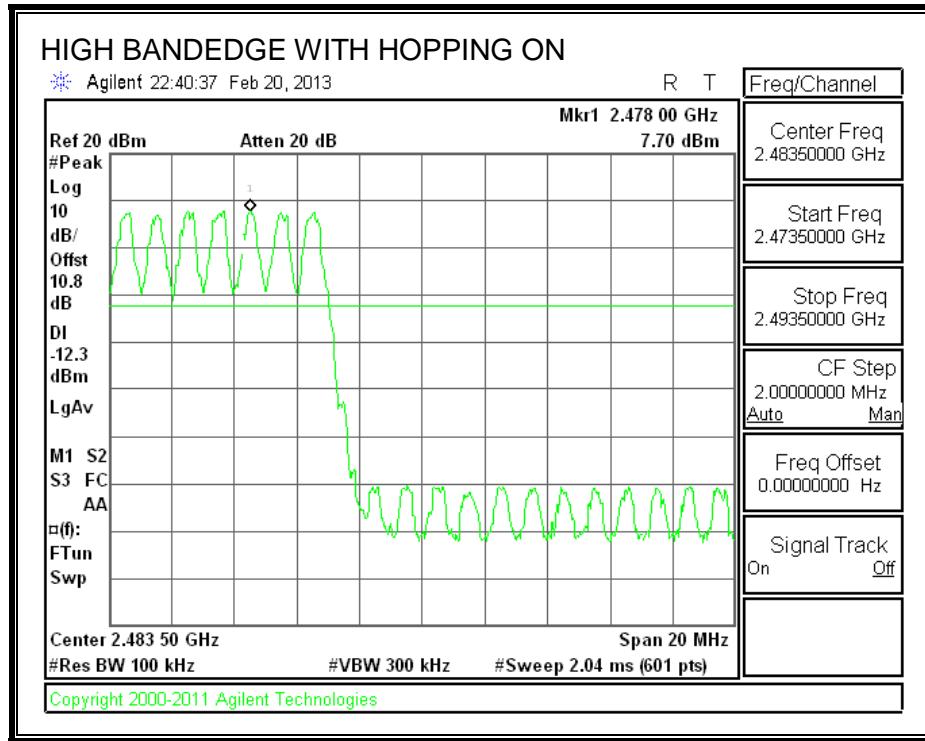
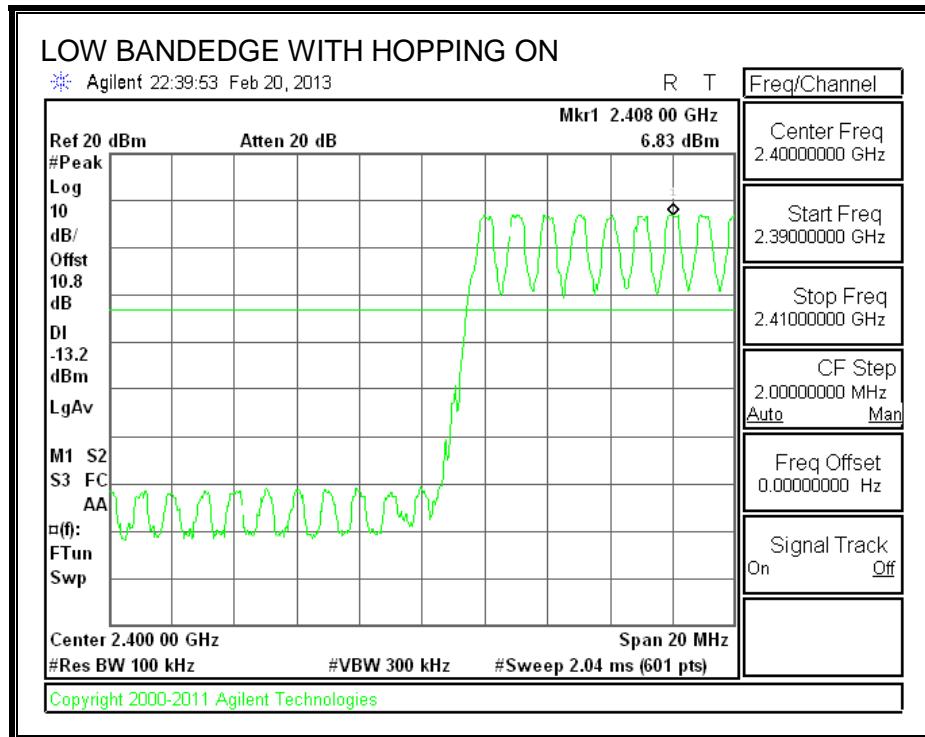
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

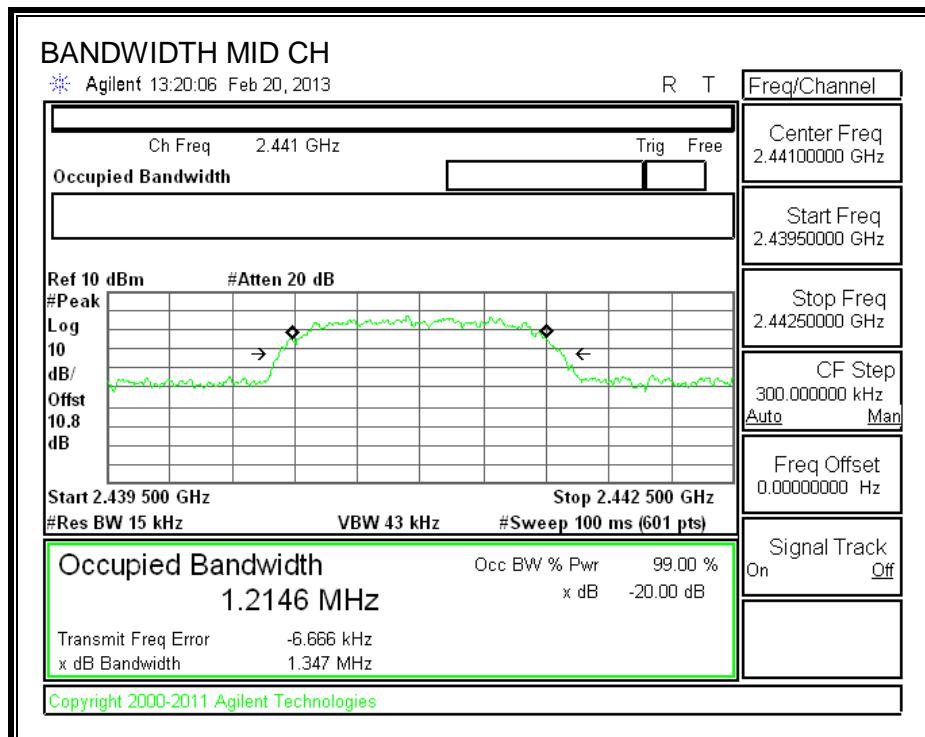
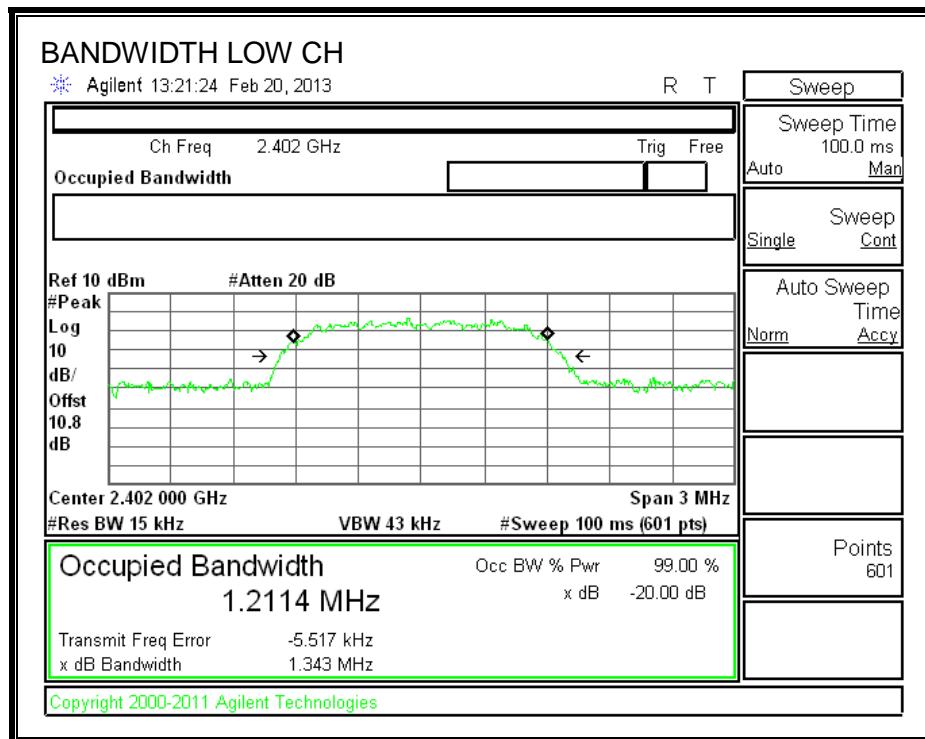
TEST PROCEDURE

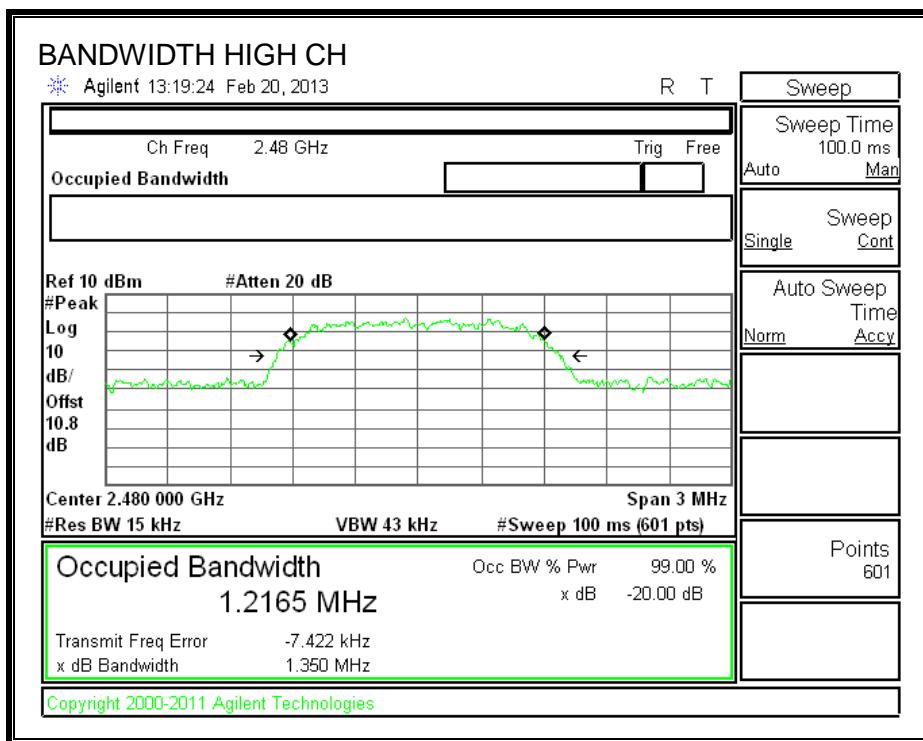
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

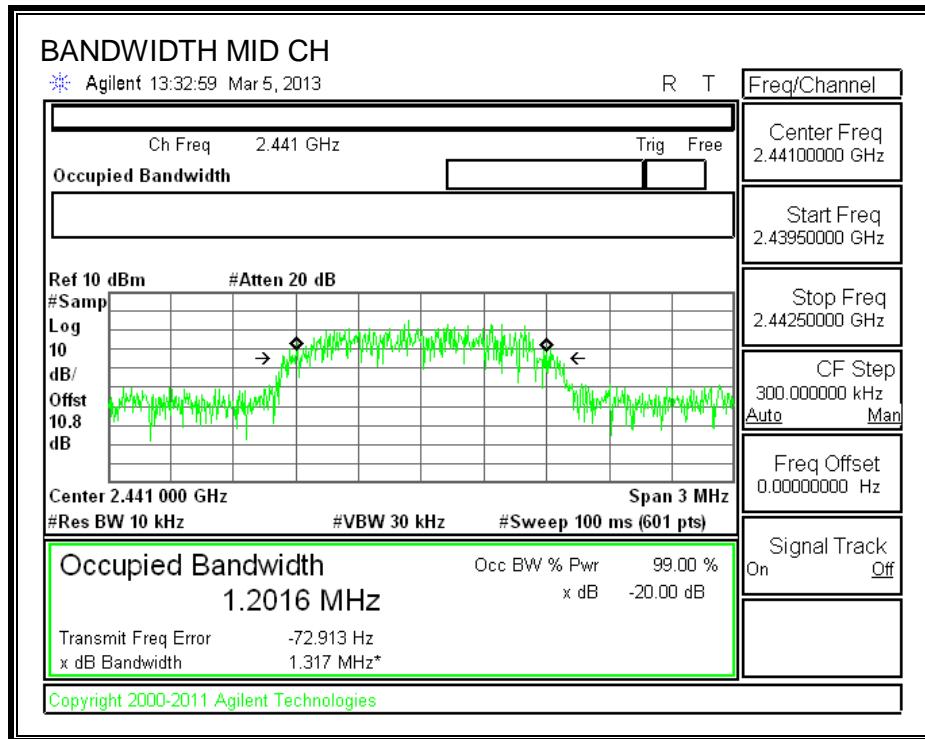
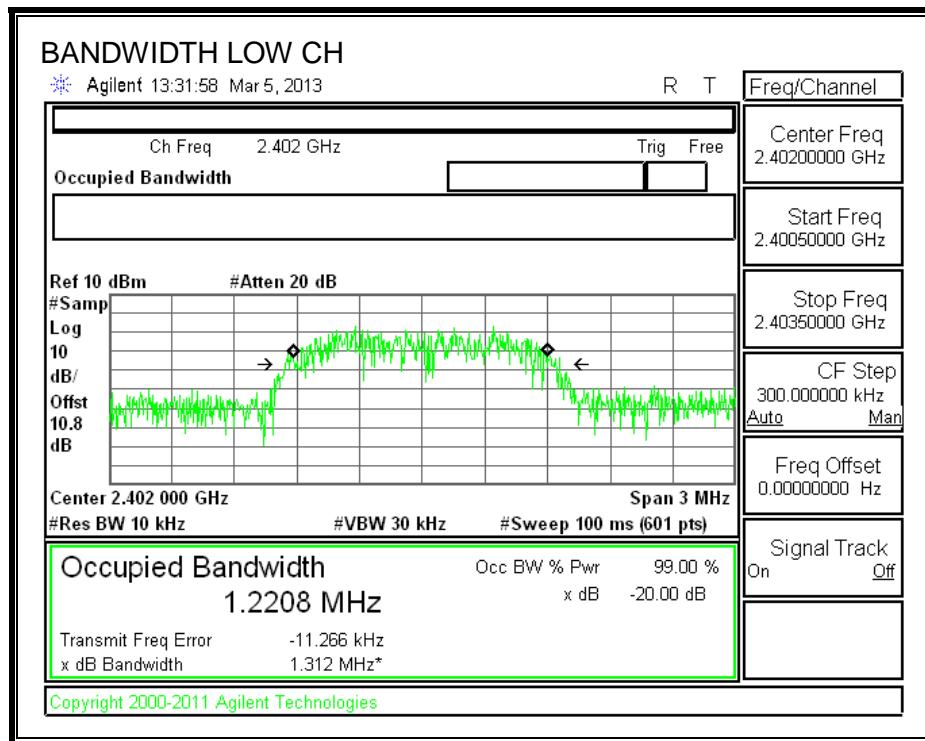
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.343	1.2208
Middle	2441	1.347	1.2016
High	2480	1.350	1.2121

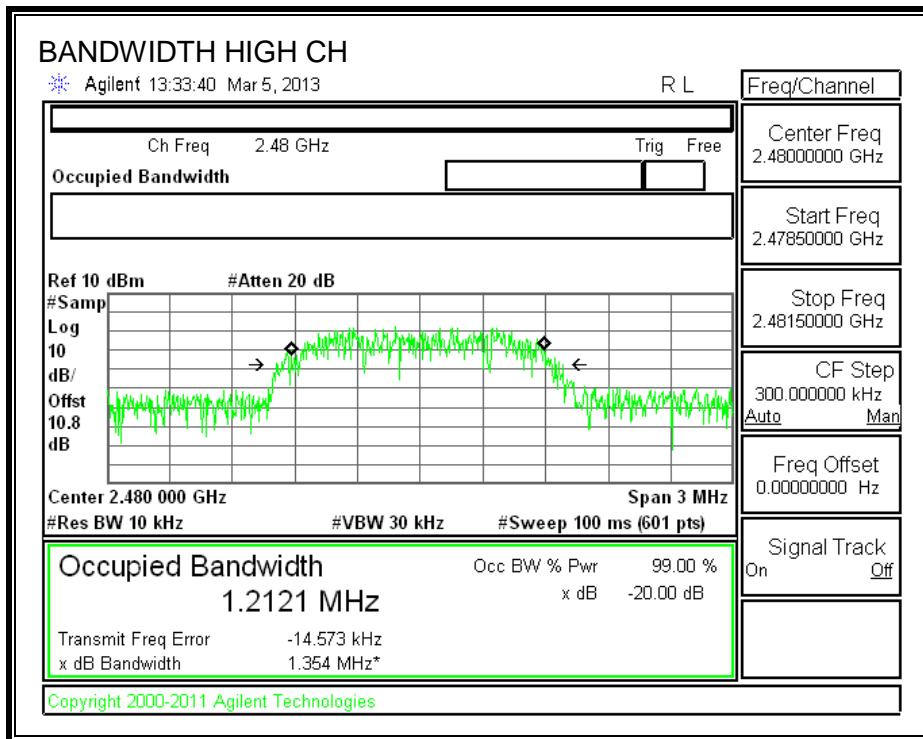
20 dB BANDWIDTH





99% BANDWIDTH





7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

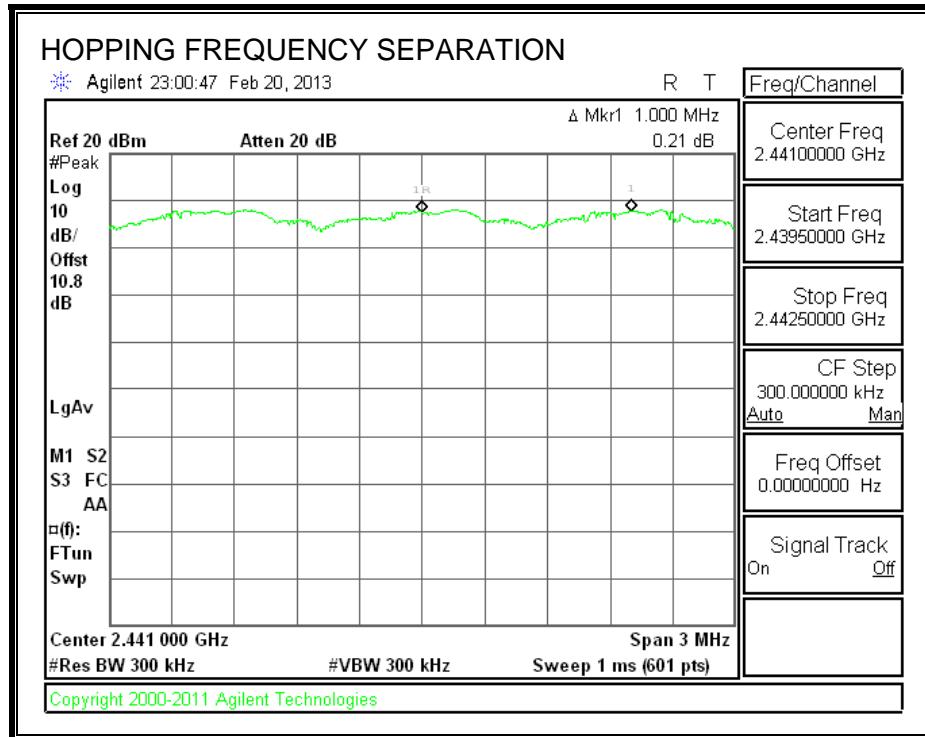
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

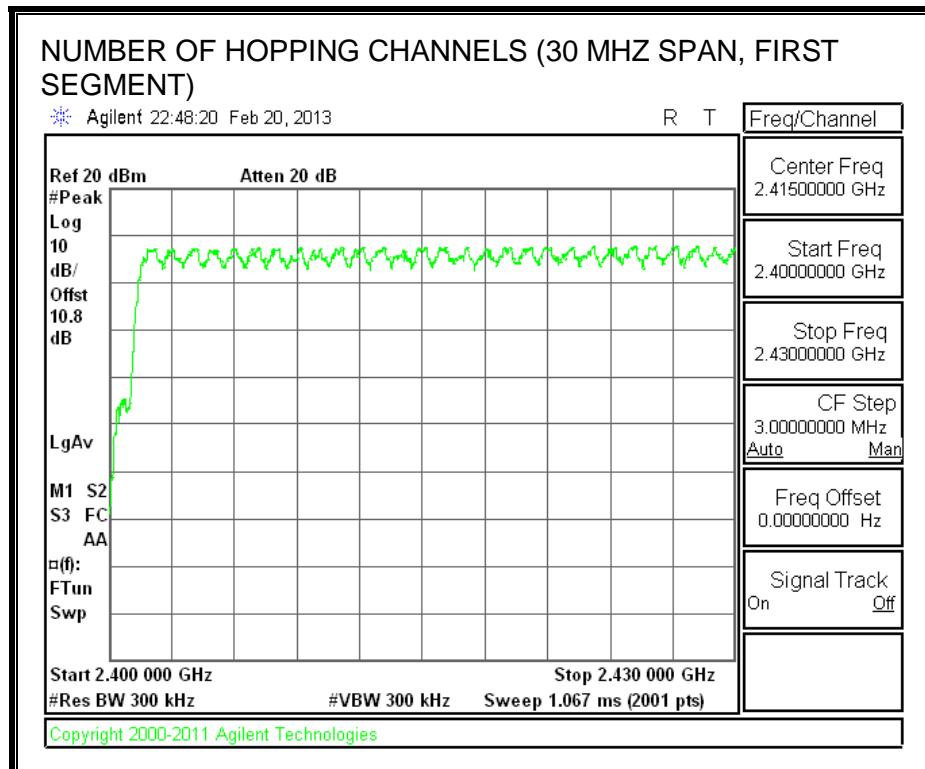
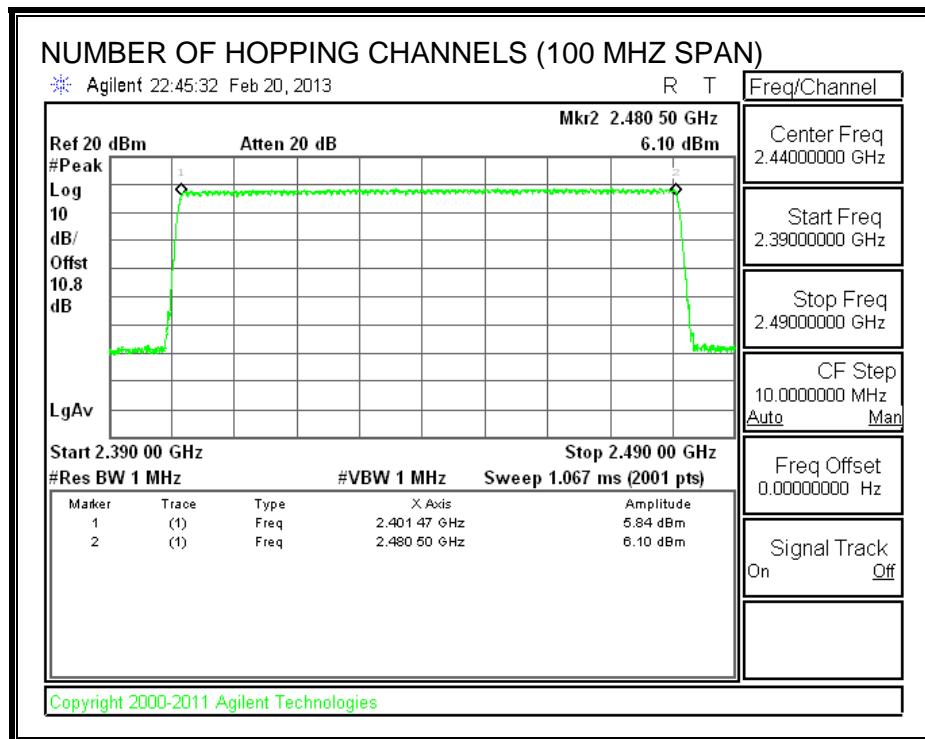
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

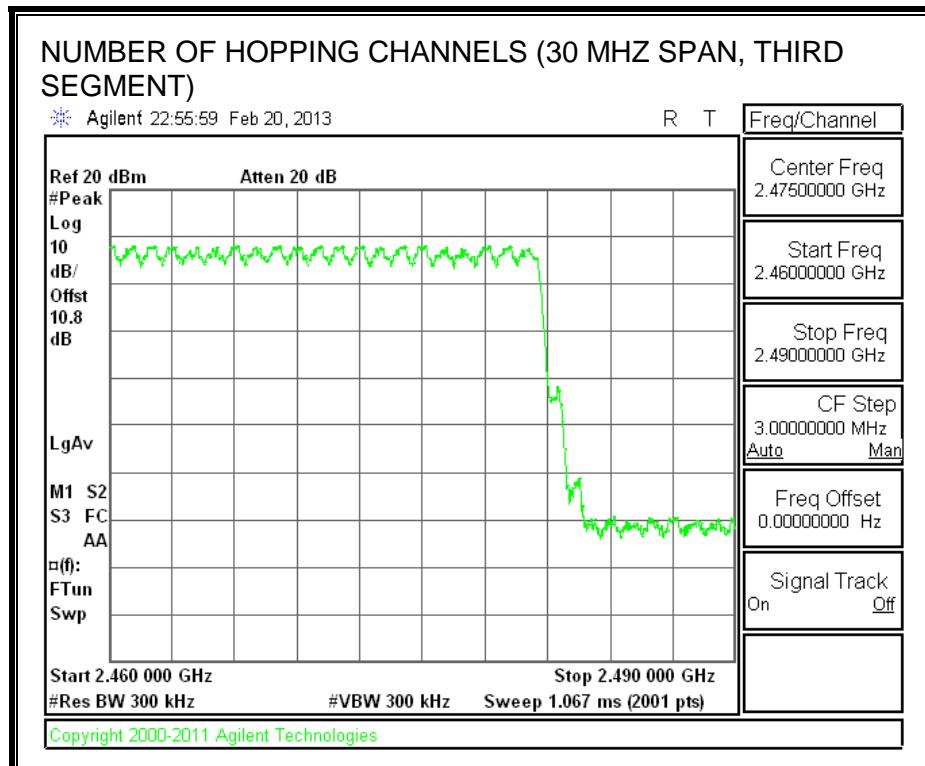
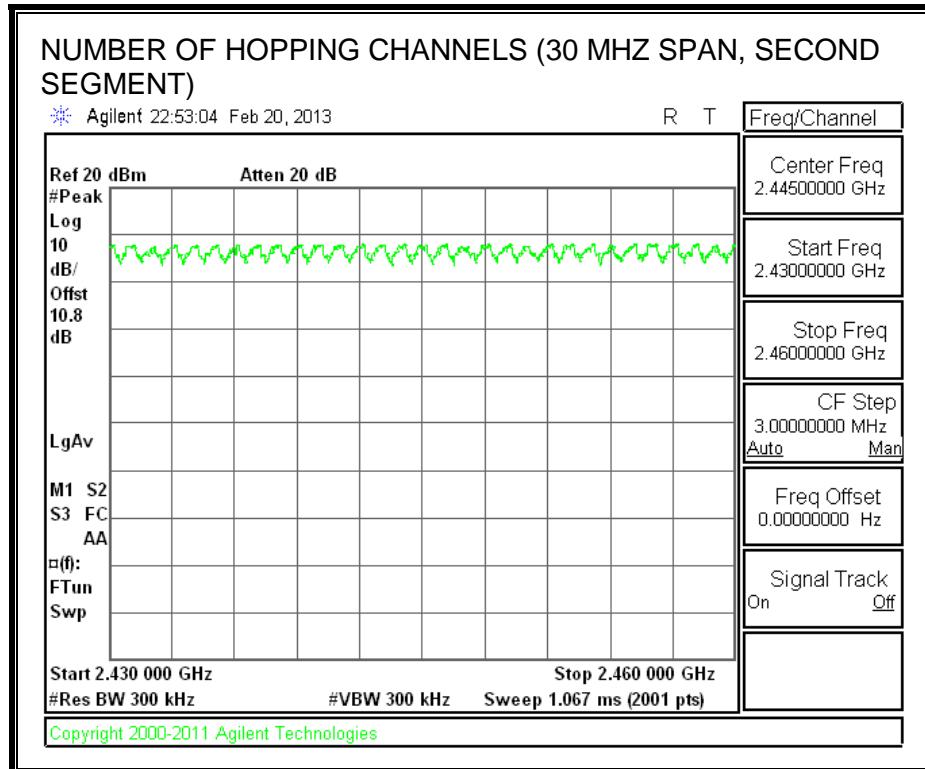
RESULTS

Normal Mode: 79 Channels observed.

AFH Mode: a minimum number of 20 channels declared by the client

NUMBER OF HOPPING CHANNELS





7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

RESULTS

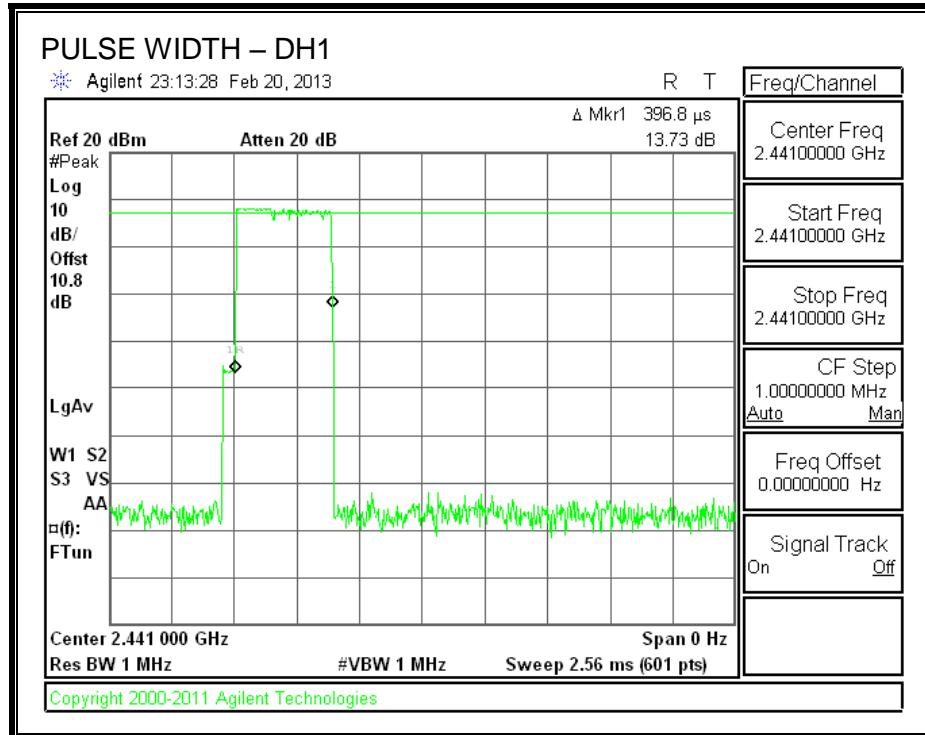
Time Of Occupancy = $10 * \text{xx pulses} * \text{yy msec} = \text{zz msec}$

8PSK (EDR) Mode

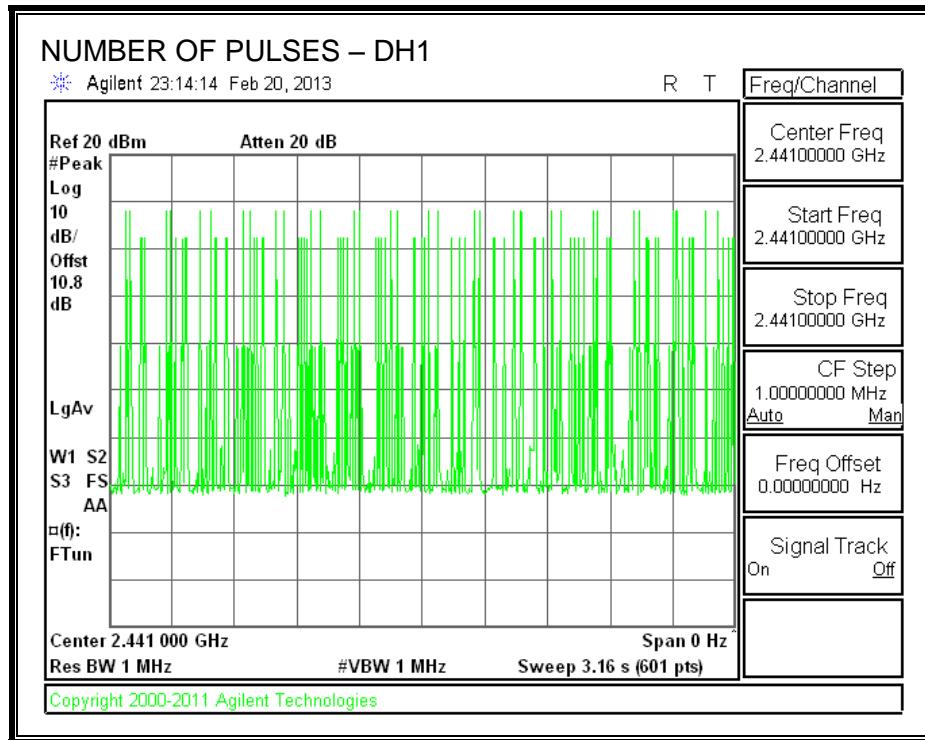
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.3968	32	0.1270	0.4	-0.2730
DH3	1.6670	16	0.2667	0.4	-0.1333
DH5	2.9130	12	0.3496	0.4	-0.0504

Note: This device supports adaptive frequency hopping (AFH) which uses the same pseudo random channel selection algorithm as is used for non AFH mode. By showing compliance with the channel dwell time requirements for 79 channels, since the dwell time requirements are based on the number of channels compliance is also demonstrated for N channels where $20 \leq N \leq 79$.

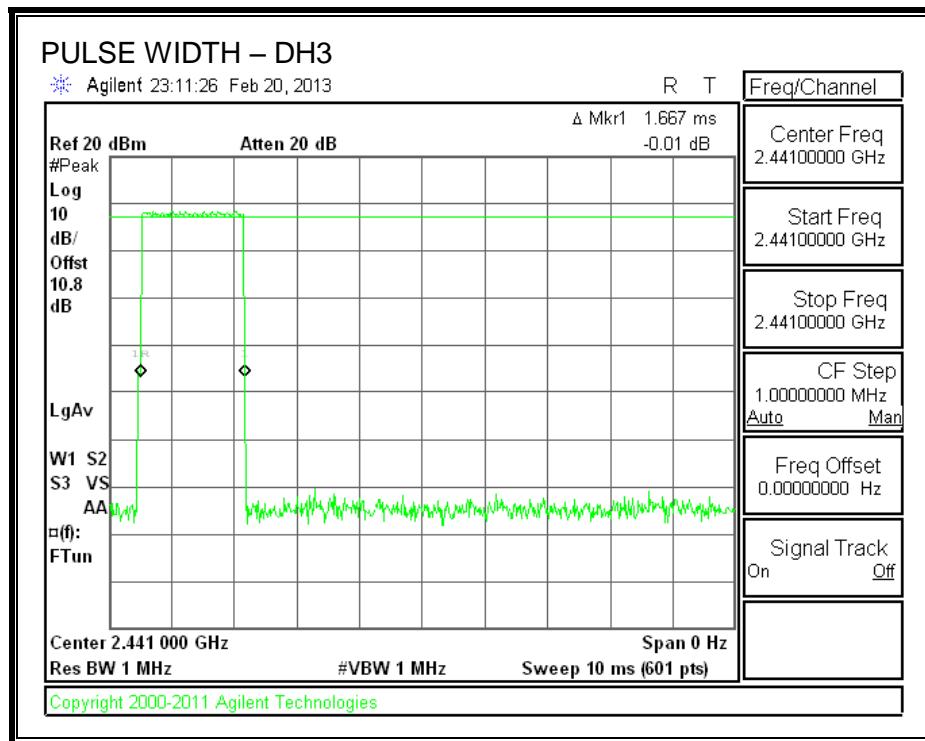
PULSE WIDTH - DH1



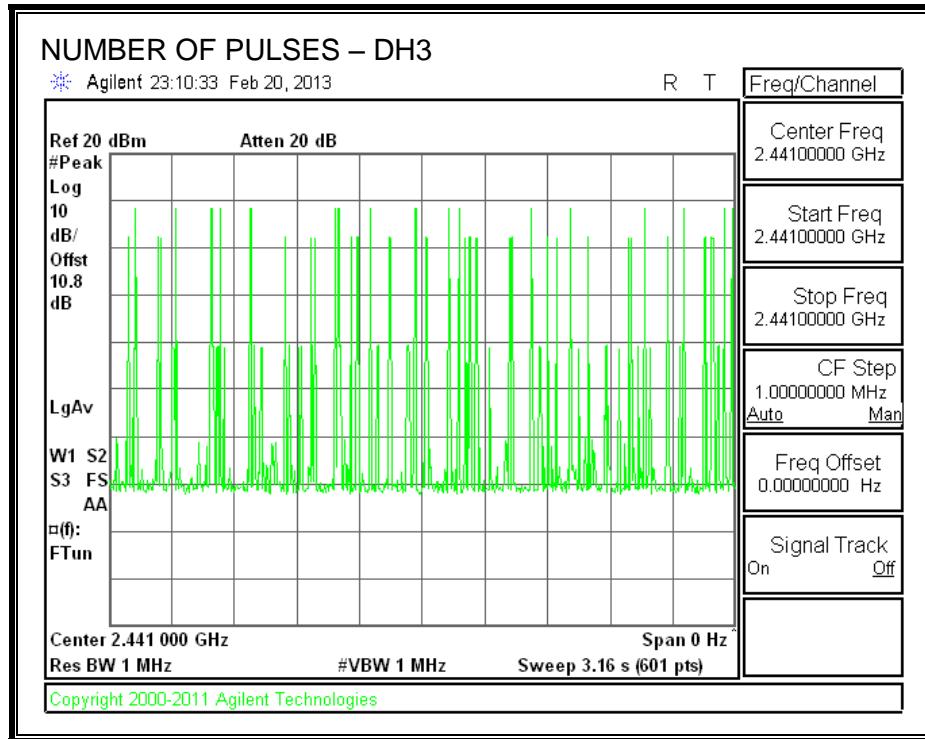
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



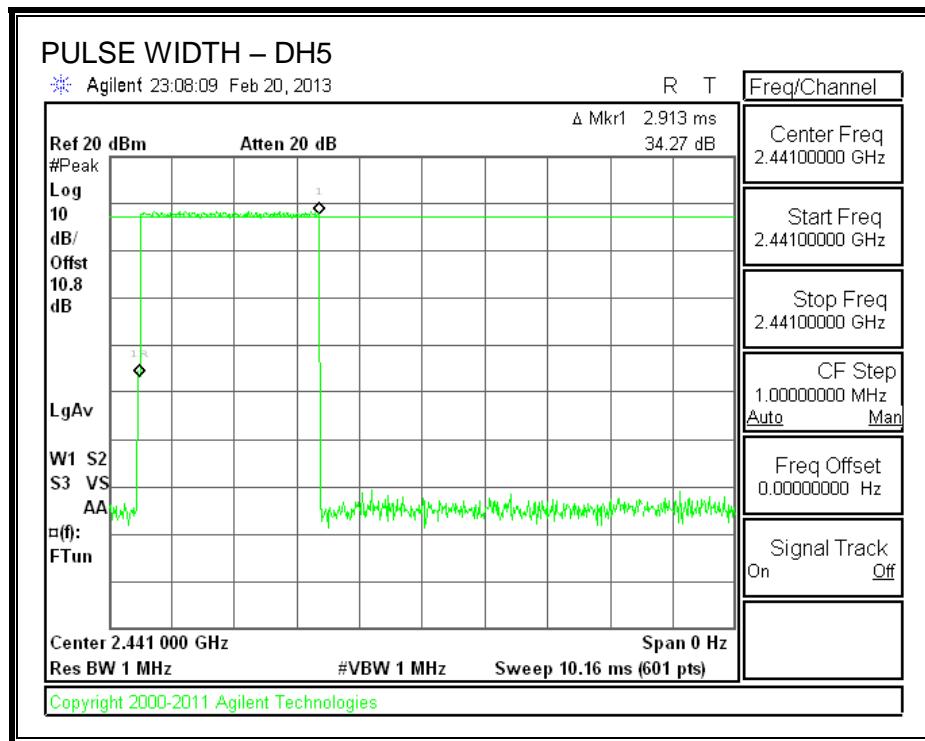
PULSE WIDTH – DH3



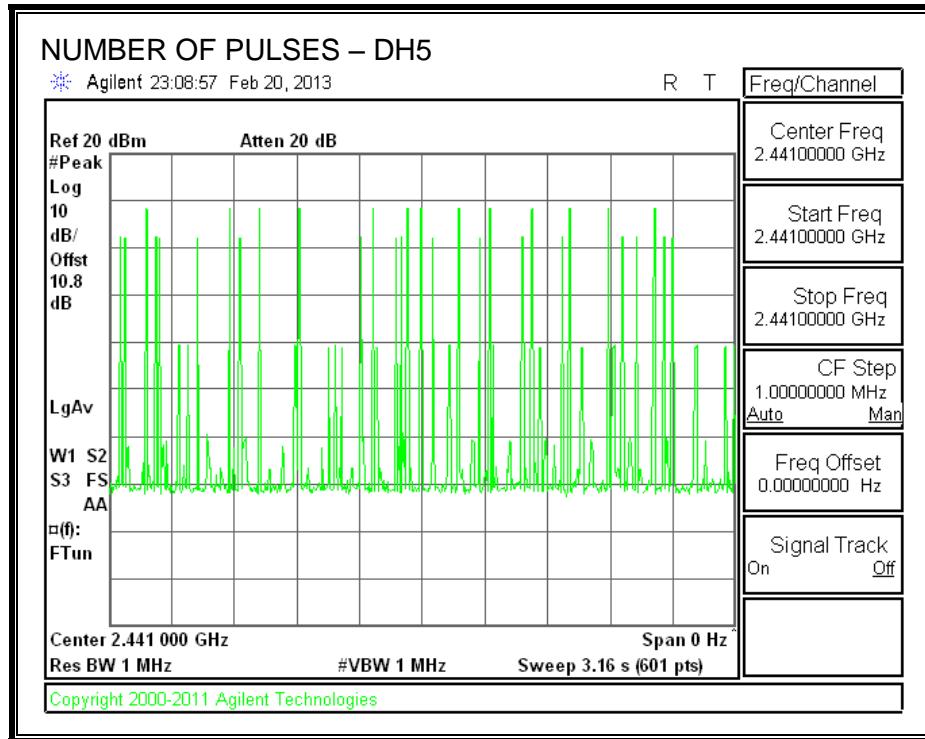
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 20.97 dBm.

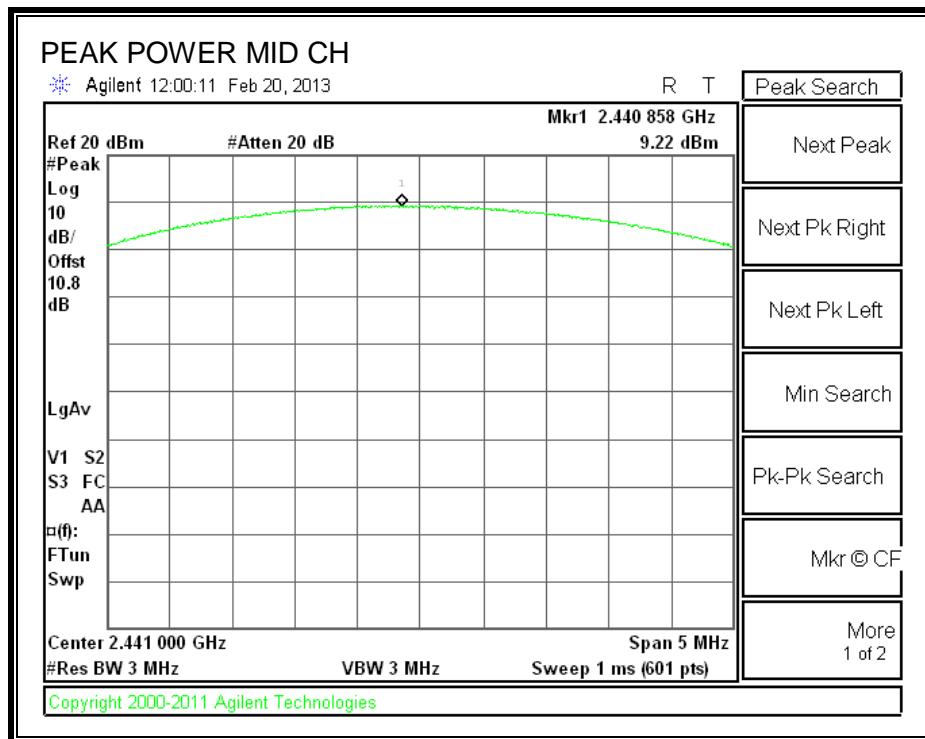
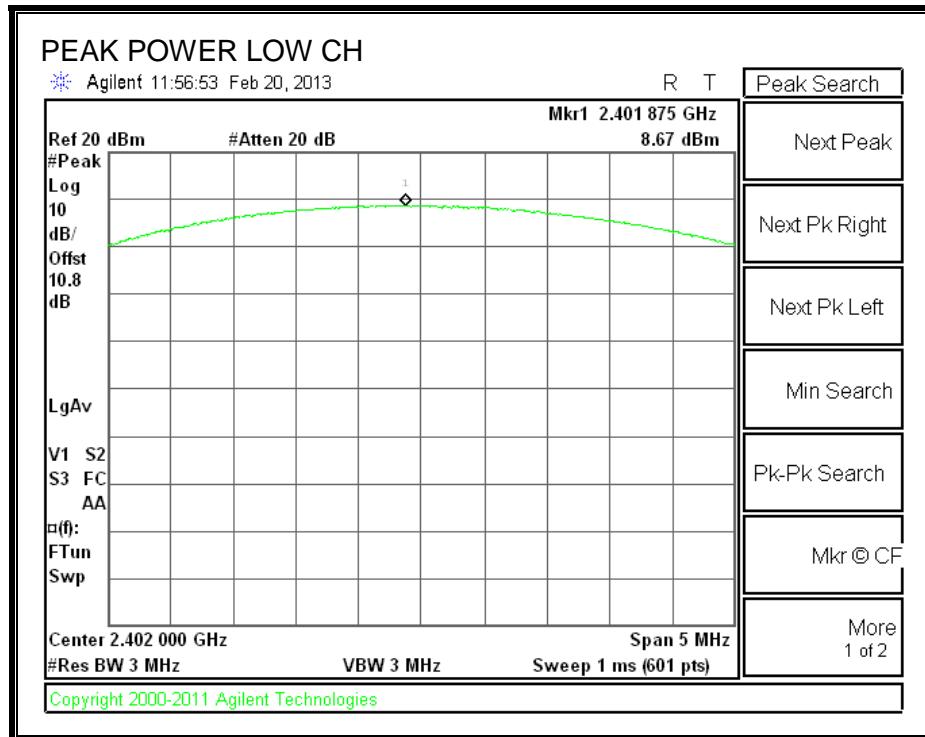
TEST PROCEDURE

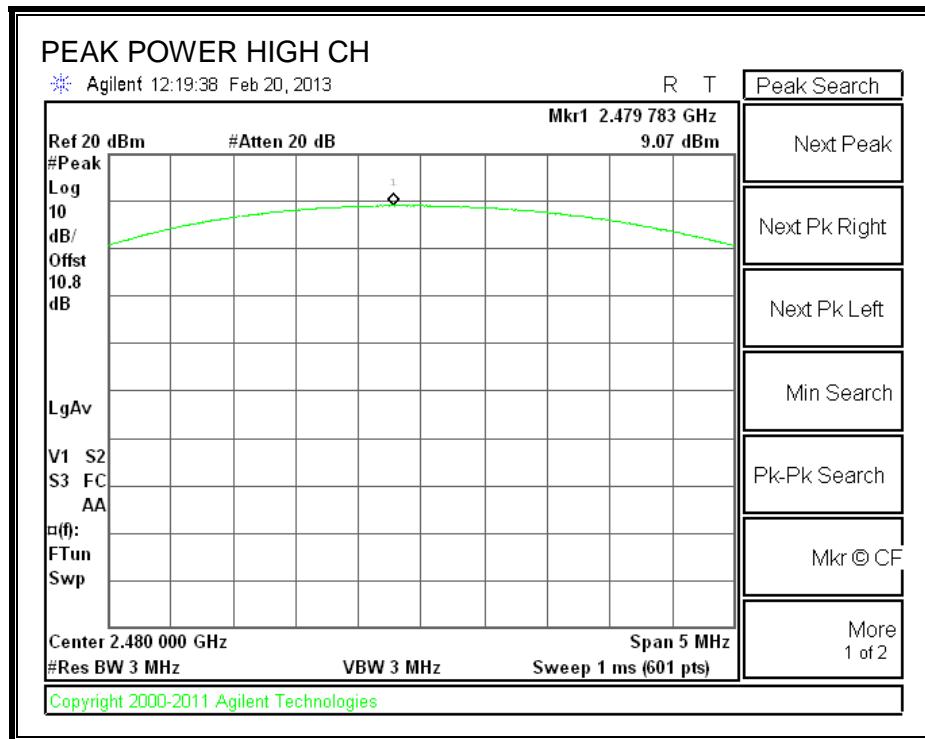
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.67	20.97	-12.30
Middle	2441	9.22	20.97	-11.75
High	2480	9.07	20.97	-11.90

OUTPUT POWER





7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of .4 dB (including 0 dB pad and 0.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.84
Middle	2441	6.33
High	2480	6.34

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

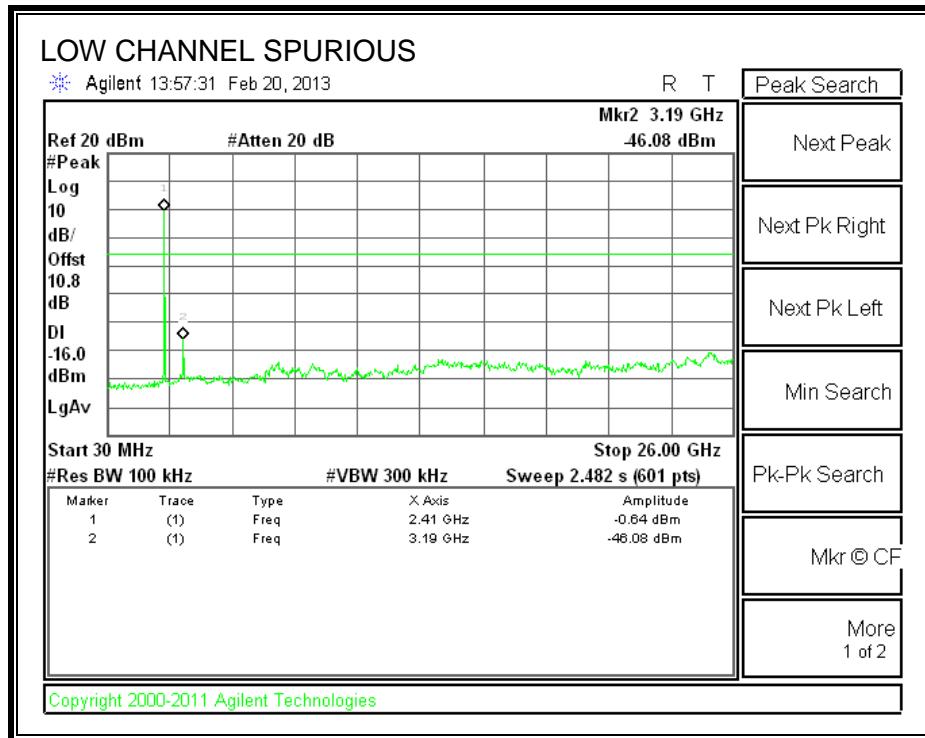
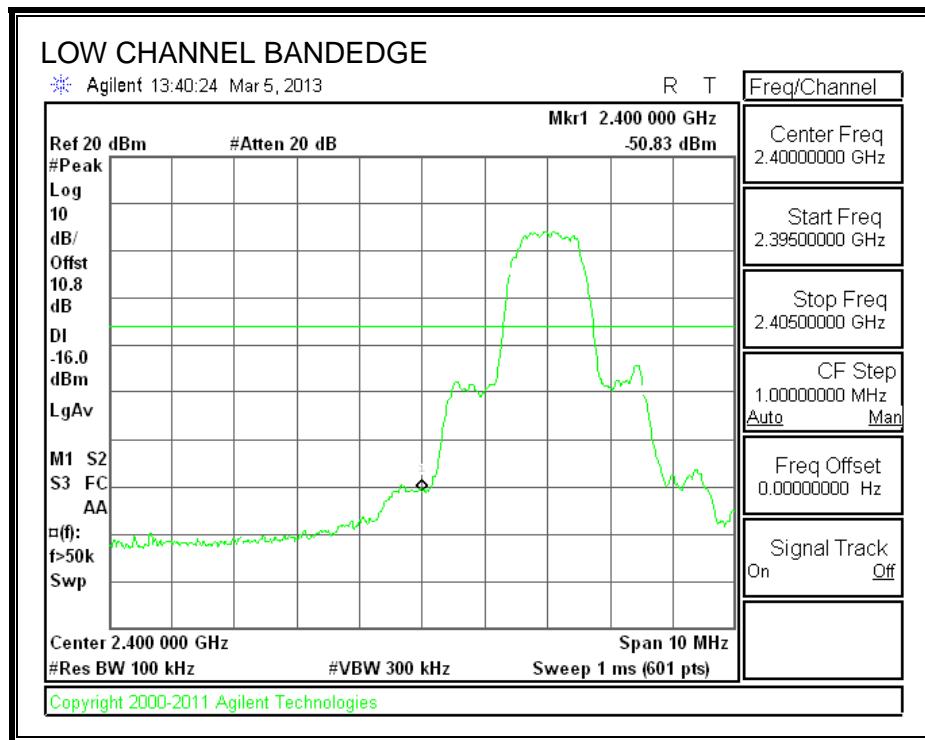
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

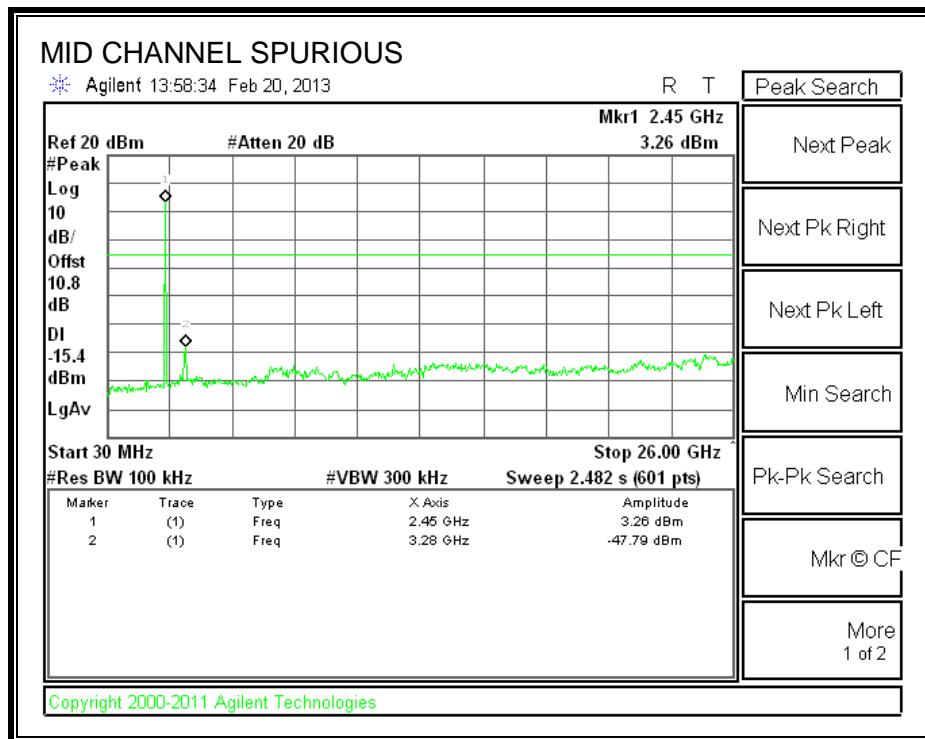
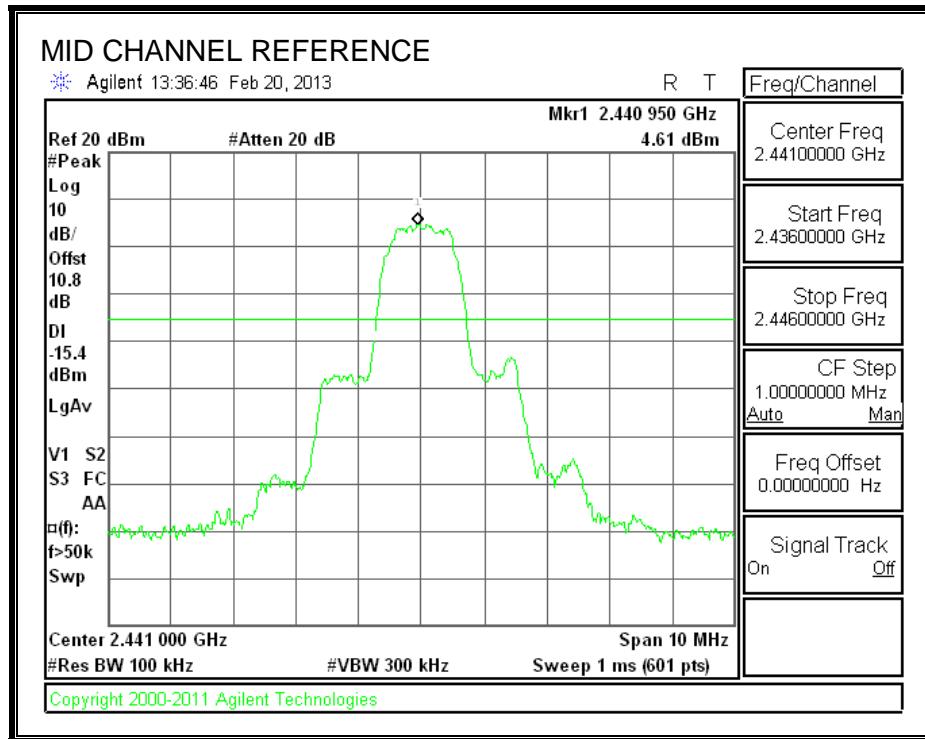
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

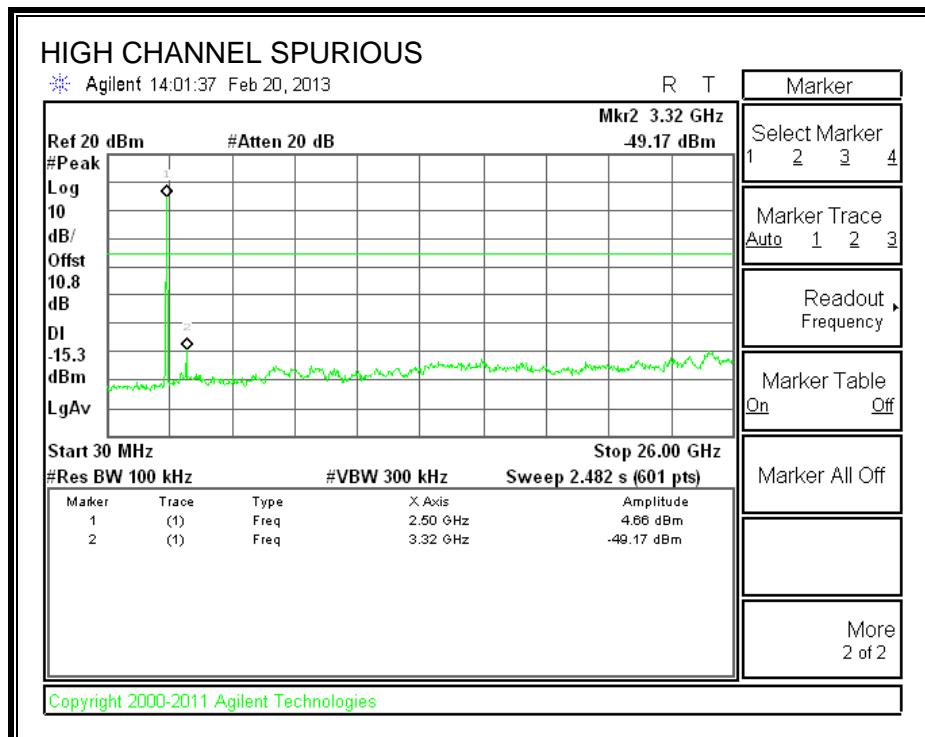
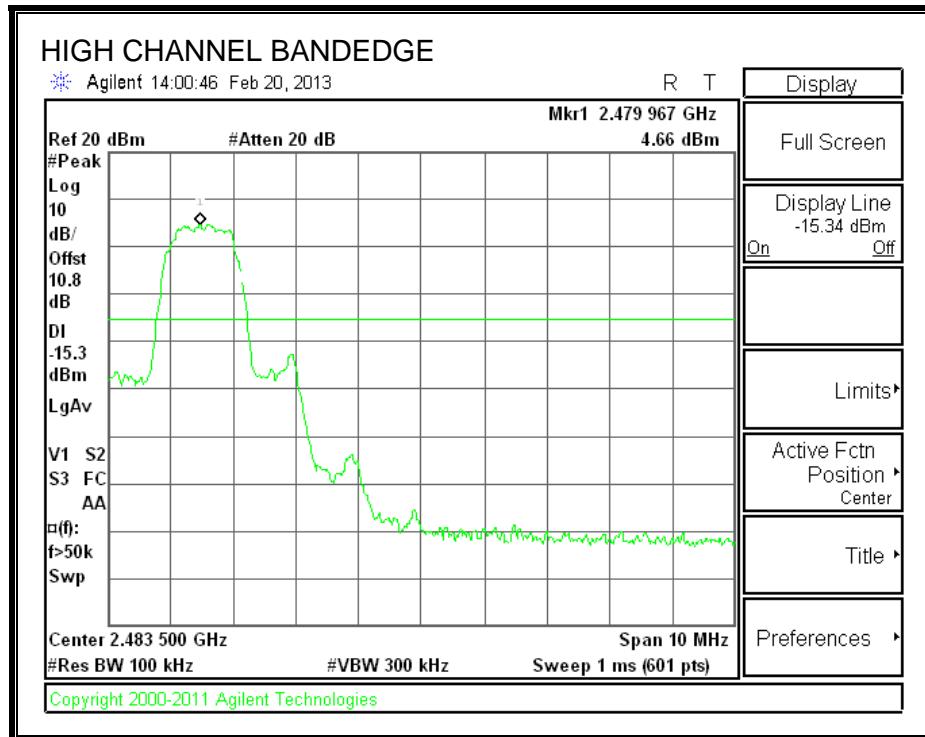
SPURIOUS EMISSIONS, LOW CHANNEL



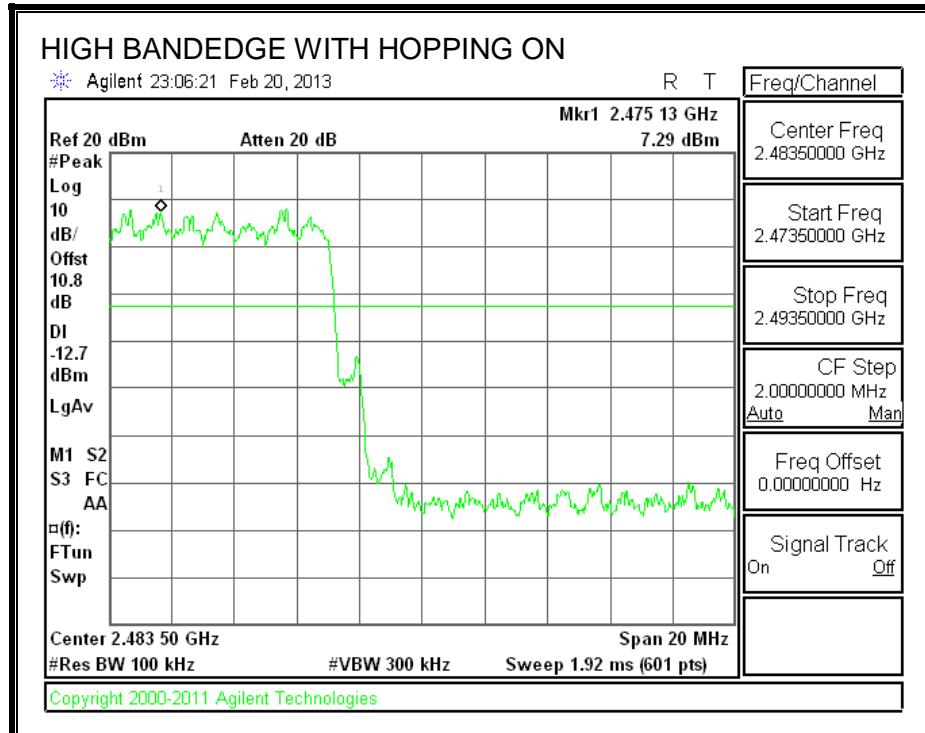
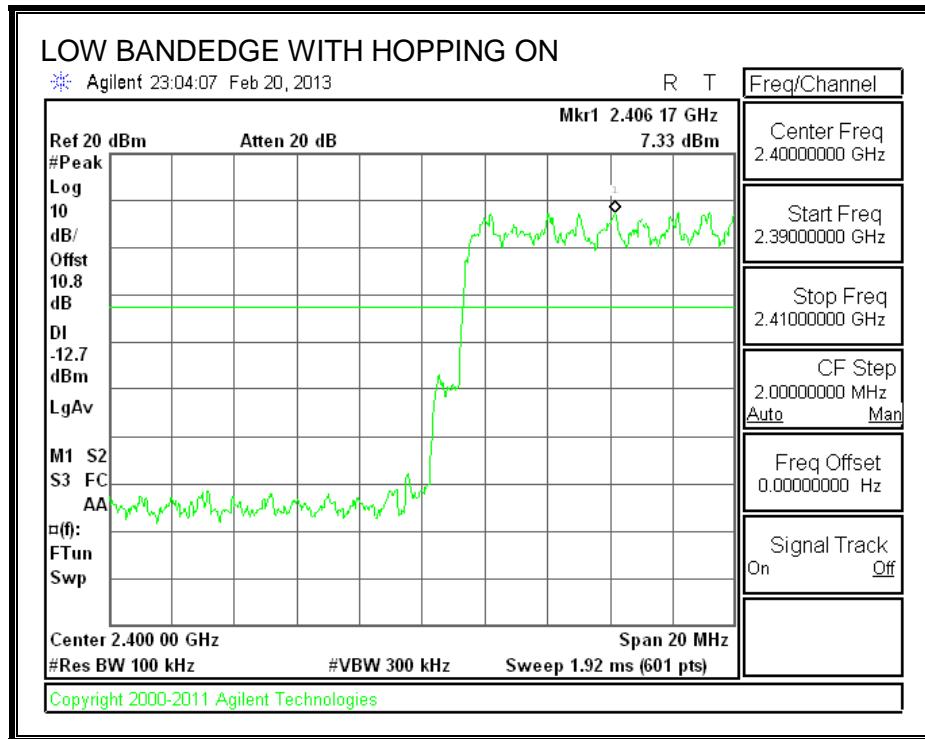
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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.

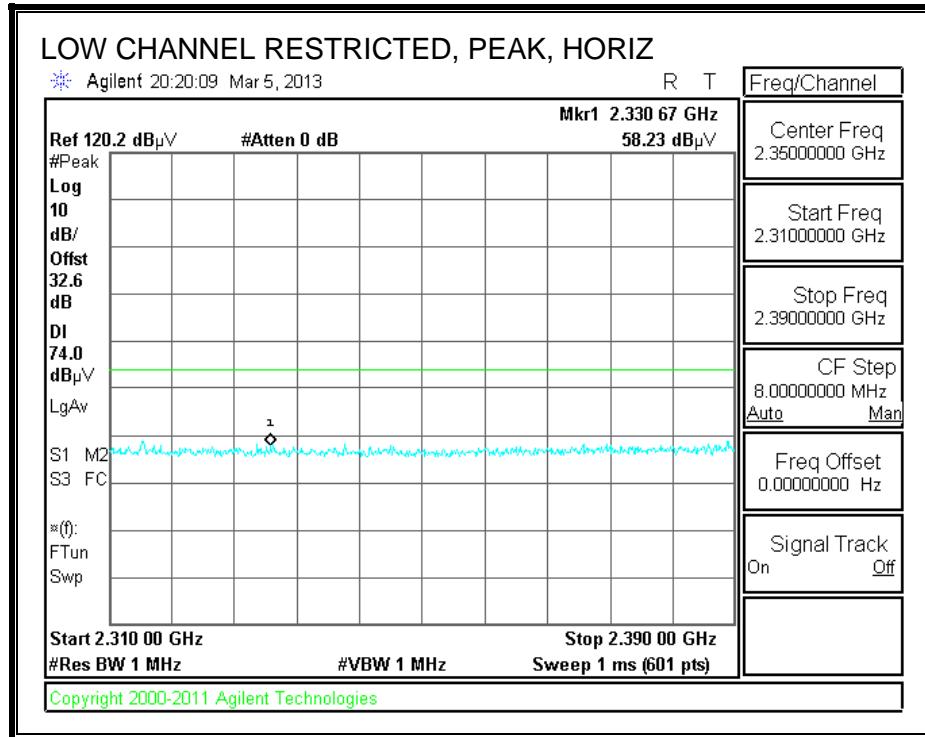
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

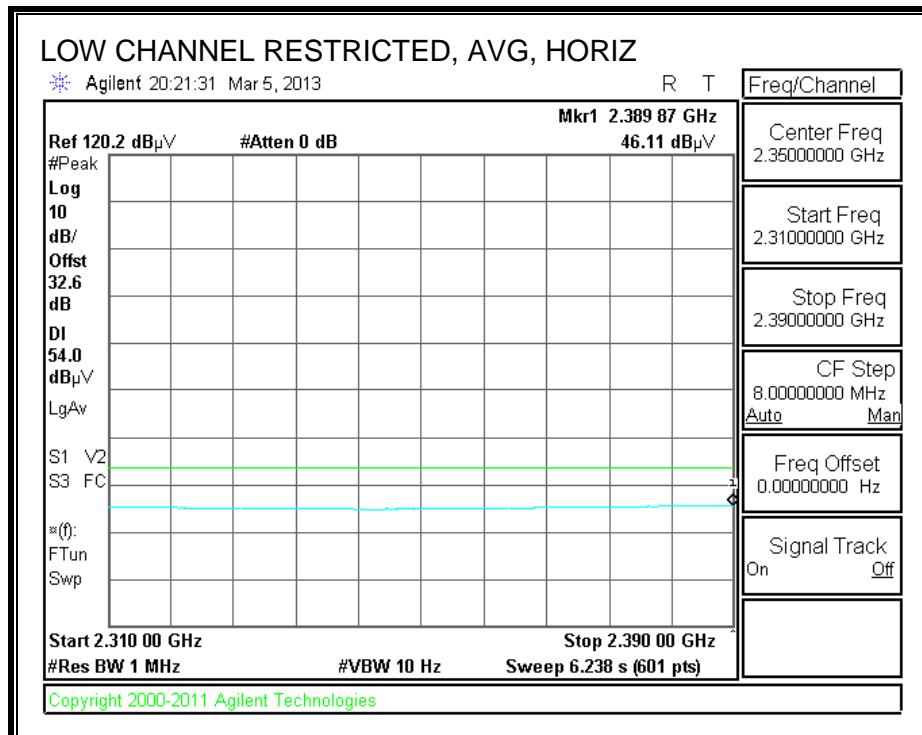
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.2. TRANSMITTER ABOVE 1 GHz

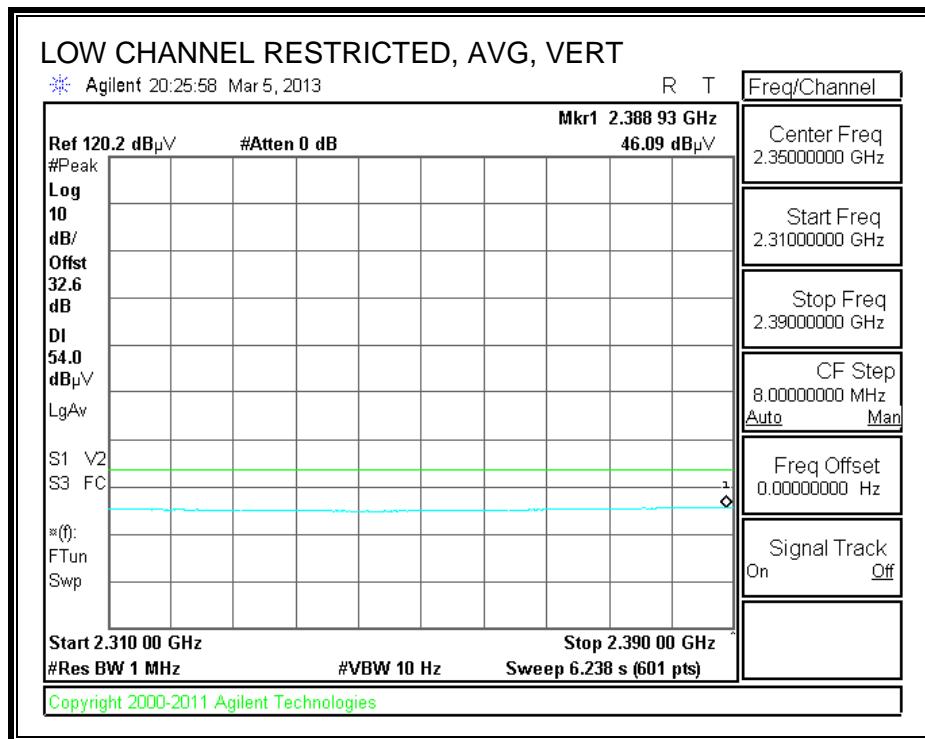
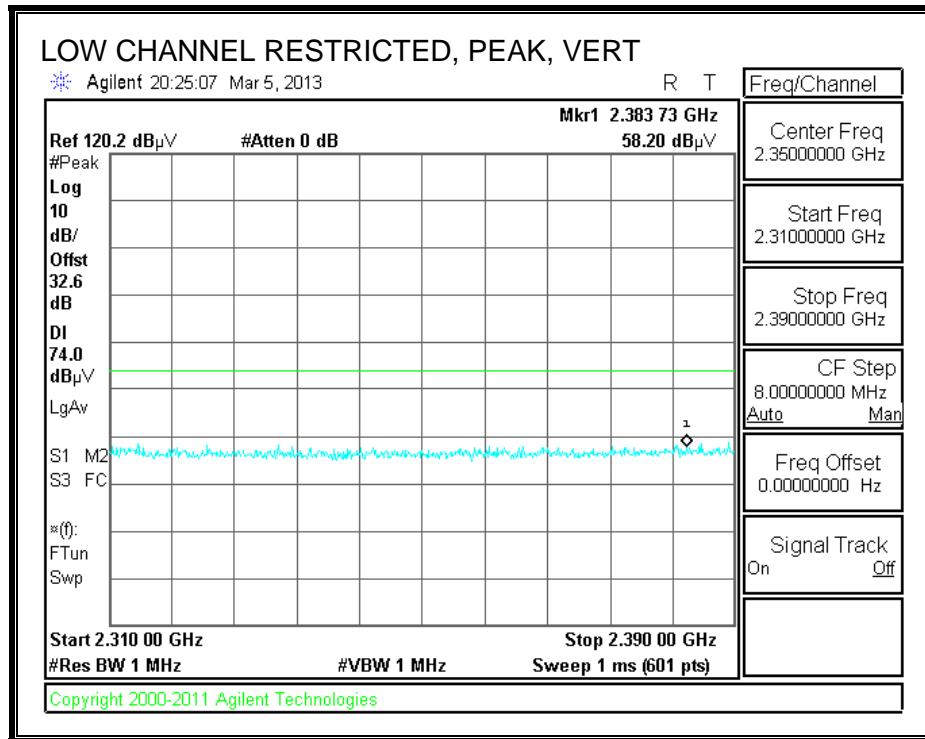
8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

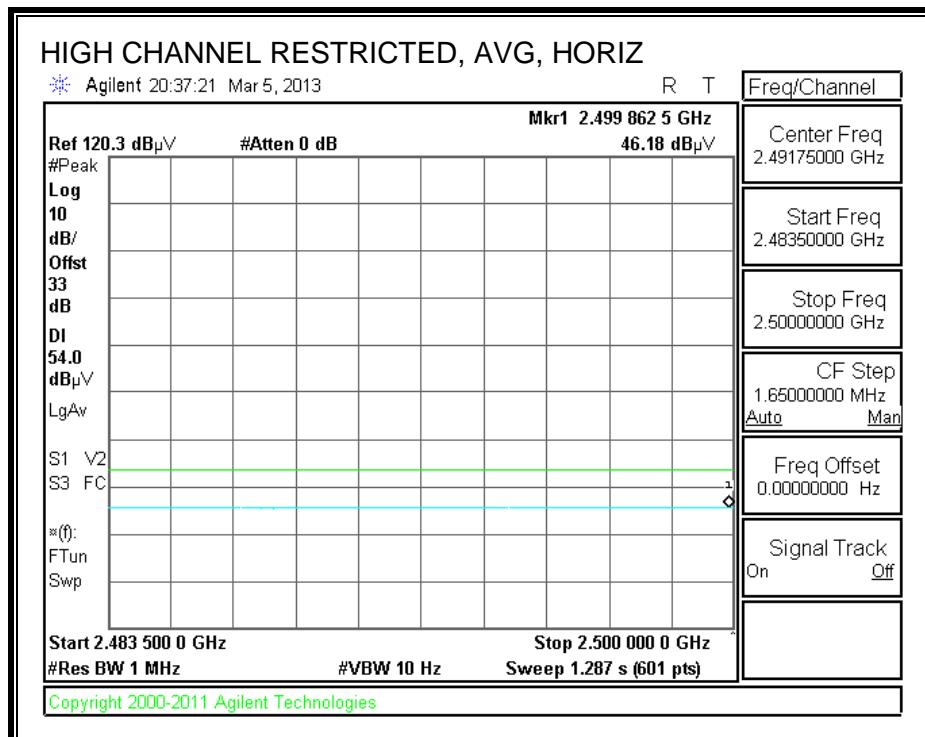
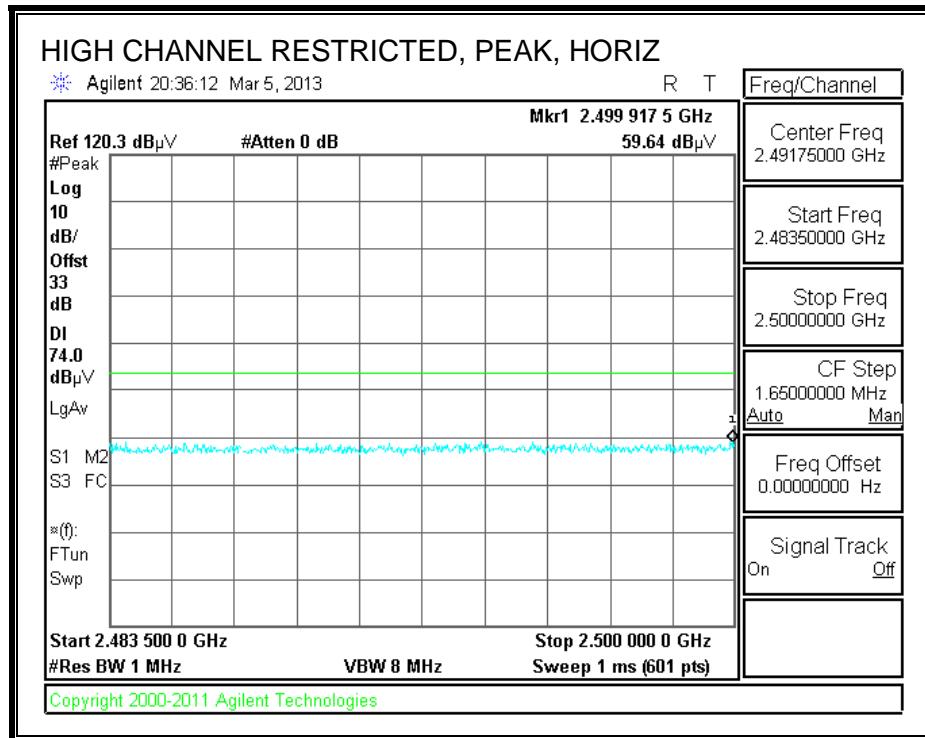




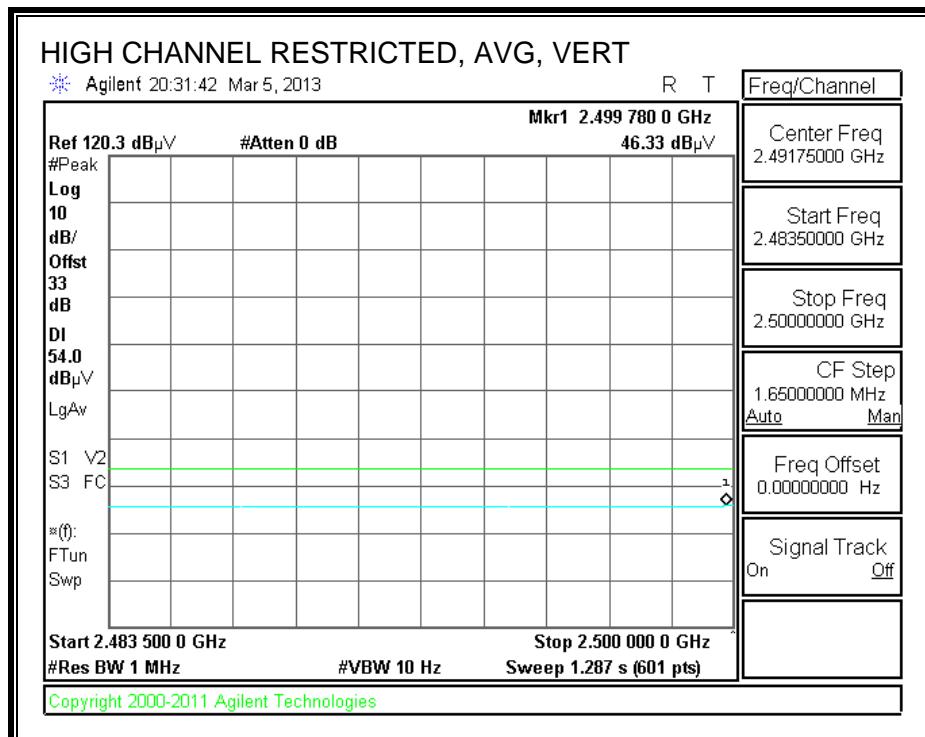
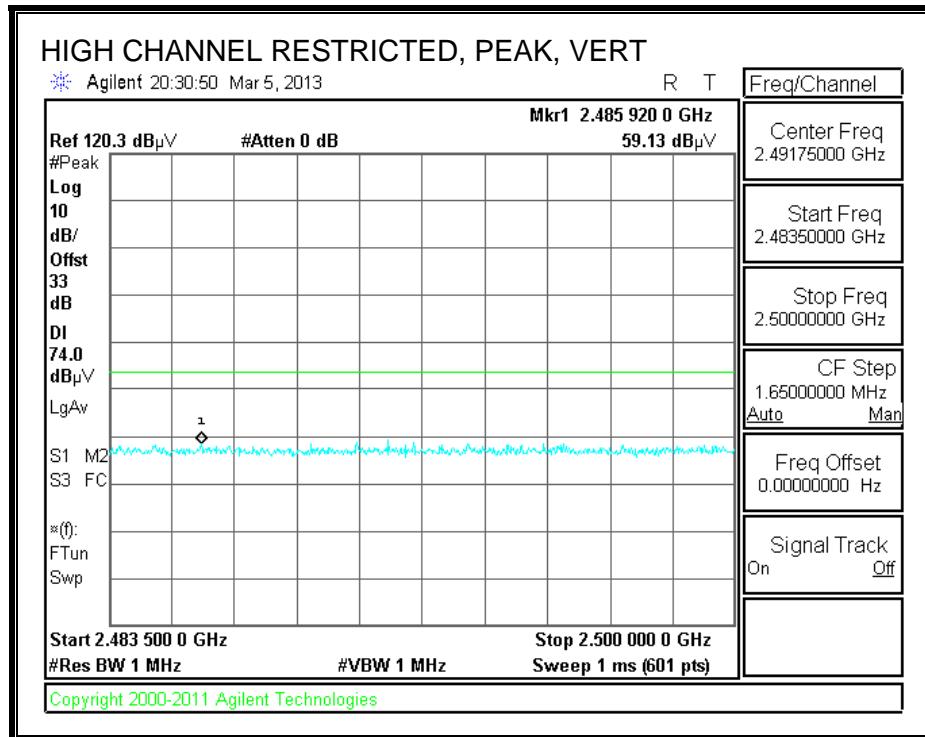
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

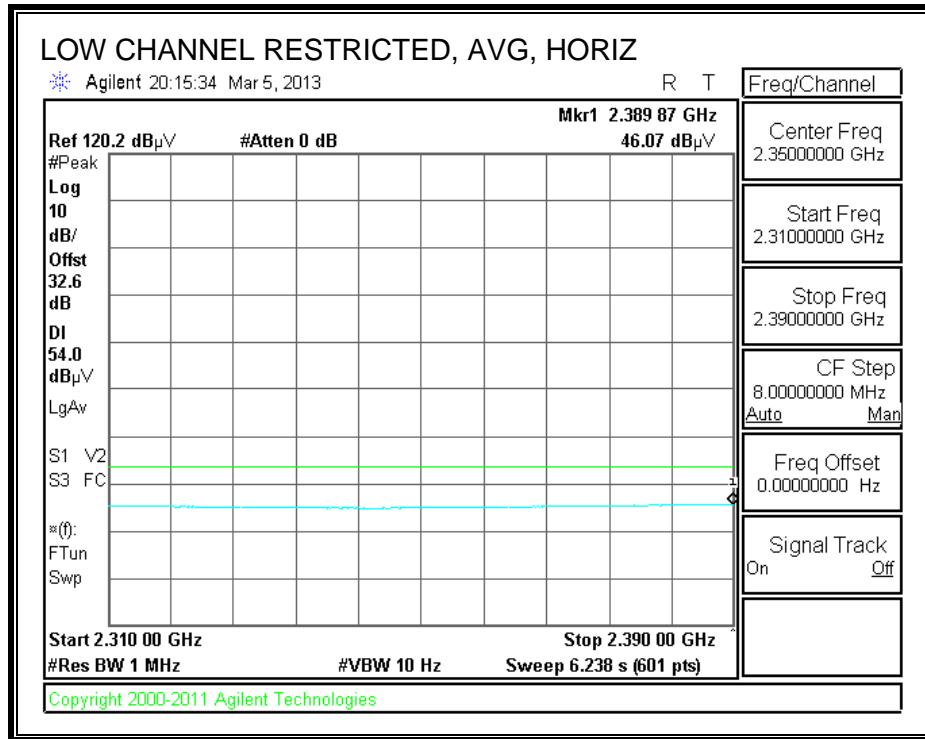
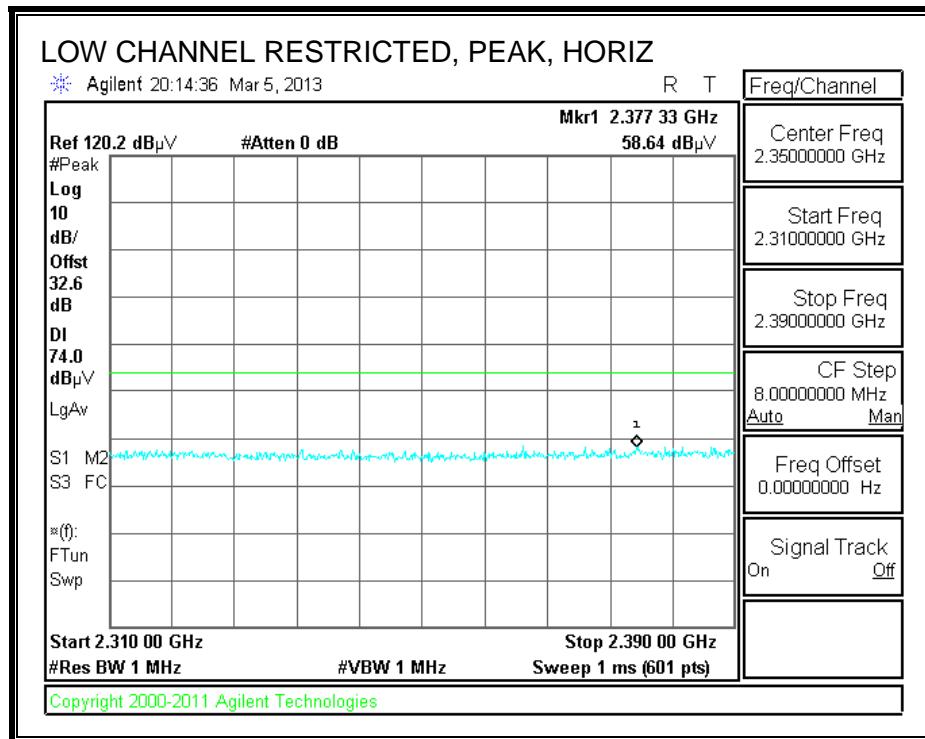


HARMONICS AND SPURIOUS EMISSIONS

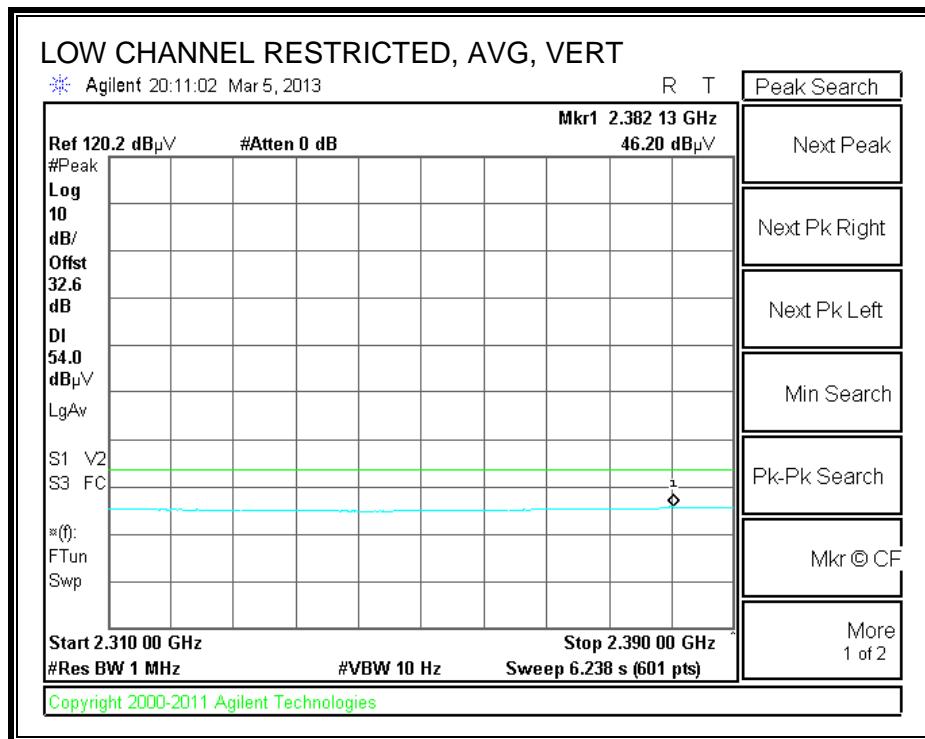
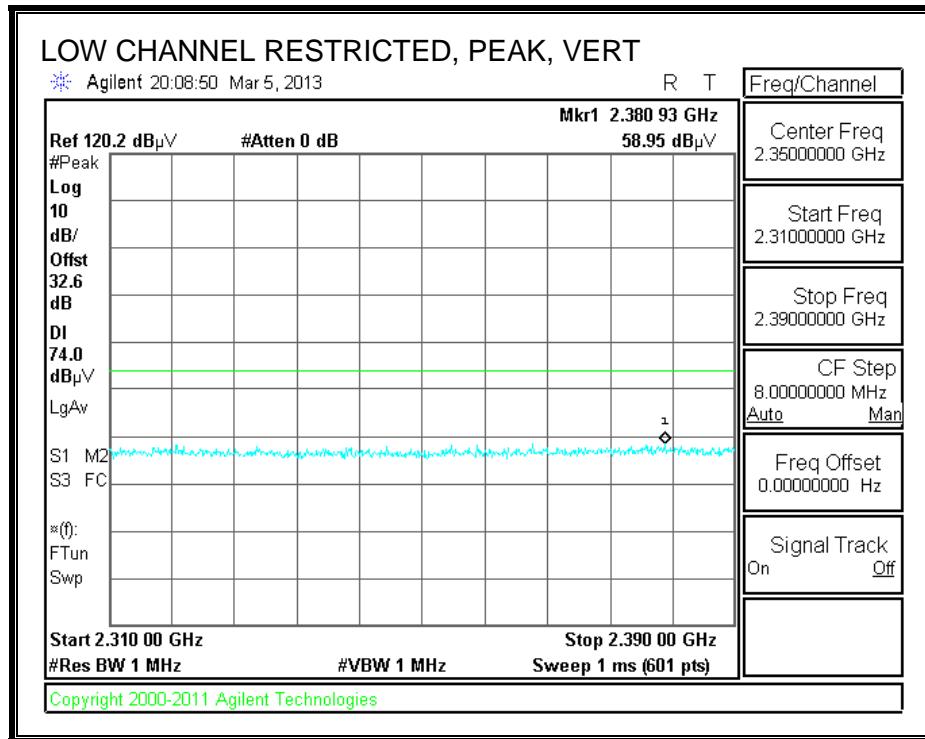
High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber-A															
Company:	Broadcom 13U14796														
Project #:	13U14796														
Date:	3/1/2013														
Test Engineer:	Tony Wagoner														
Configuration:	Tx Continuously														
Mode:	Bluetooth GFSK														
Test Equipment:															
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit			
T73; S/N: 6717 @3m			T144 Miteq 3008A00931						T89; ARA 18-26GHz; S/N:1049			FCC 15.205			
Hi Frequency Cables															
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			
3' cable 22807700			12' cable 22807600			20' cable 22807500						R_001			
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	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)
Low channel, 2402MHz															
4.804	3.0	38.6	28.6	33.4	6.7	-35.7	0.0	0.0	43.1	33.1	74.0	54.0	-30.9	-20.9	H
4.804	3.0	40.3	31.8	33.4	6.7	-35.7	0.0	0.0	44.8	36.3	74.0	54.0	-29.2	-17.7	V
Mid channel, 2441MHz															
4.882	3.0	37.8	27.4	33.5	6.8	-35.7	0.0	0.0	42.5	32.1	74.0	54.0	-31.5	-21.9	H
4.882	3.0	38.4	28.4	33.5	6.8	-35.7	0.0	0.0	43.1	33.1	74.0	54.0	-30.9	-20.9	V
7.323	3.0	36.5	23.5	36.0	8.7	-35.8	0.0	0.0	45.3	32.3	74.0	54.0	-28.7	-21.7	H
7.323	3.0	36.0	23.4	36.0	8.7	-35.8	0.0	0.0	44.9	32.3	74.0	54.0	-29.1	-21.7	V
High channel, 2480MHz															
4.960	3.0	38.1	28.5	33.6	6.9	-35.6	0.0	0.0	42.9	33.3	74.0	54.0	-31.1	-20.7	H
4.960	3.0	39.8	32.5	33.6	6.9	-35.6	0.0	0.0	44.6	37.3	74.0	54.0	-29.4	-16.7	V
7.440	3.0	36.6	23.6	36.1	8.8	-35.8	0.0	0.0	45.6	32.7	74.0	54.0	-28.4	-21.3	H
7.440	3.0	36.4	23.6	36.1	8.8	-35.8	0.0	0.0	45.5	32.7	74.0	54.0	-28.5	-21.3	V
Rev. 01.30.13															
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										

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

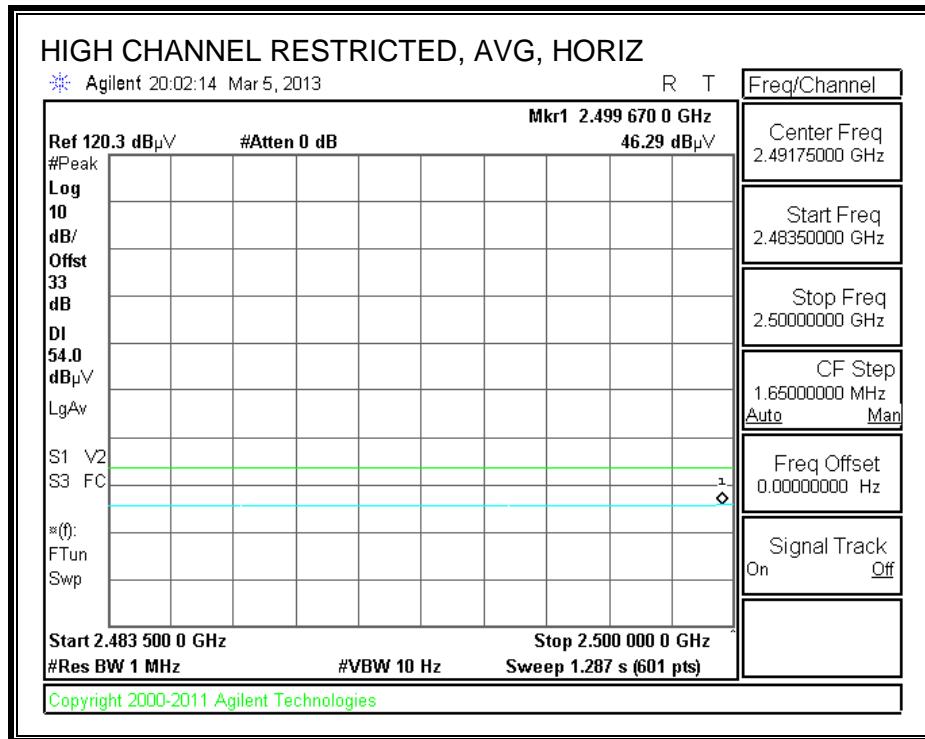
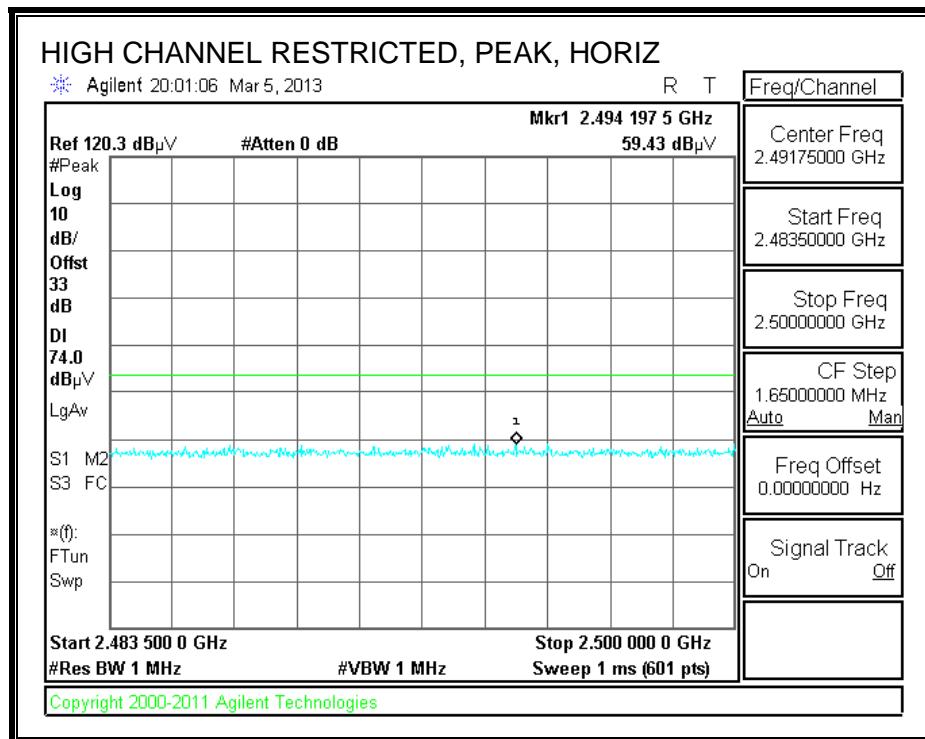
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



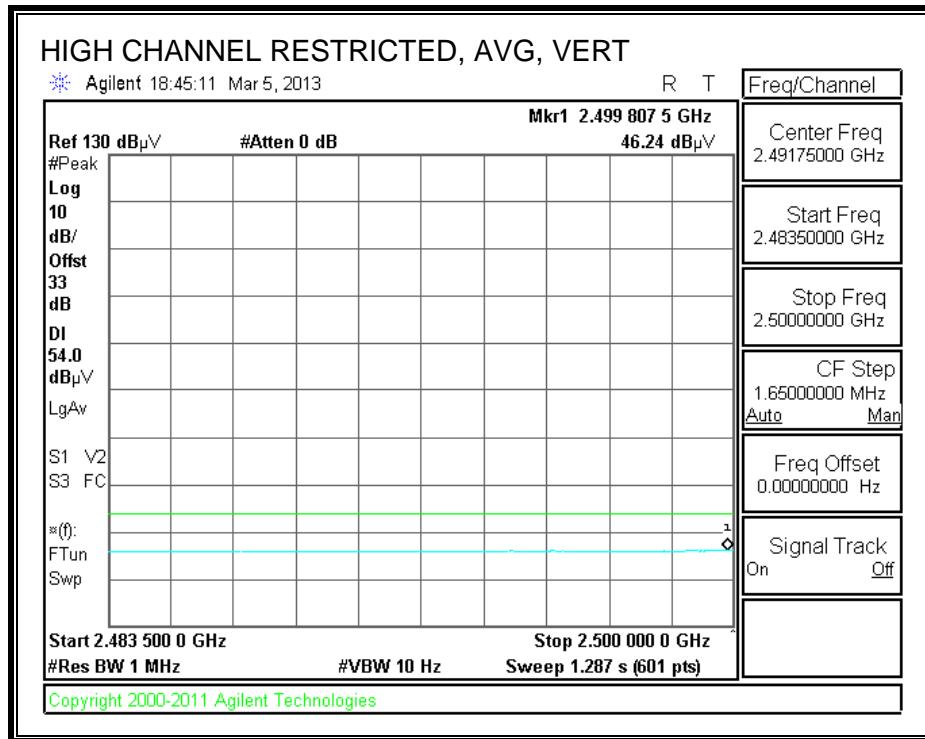
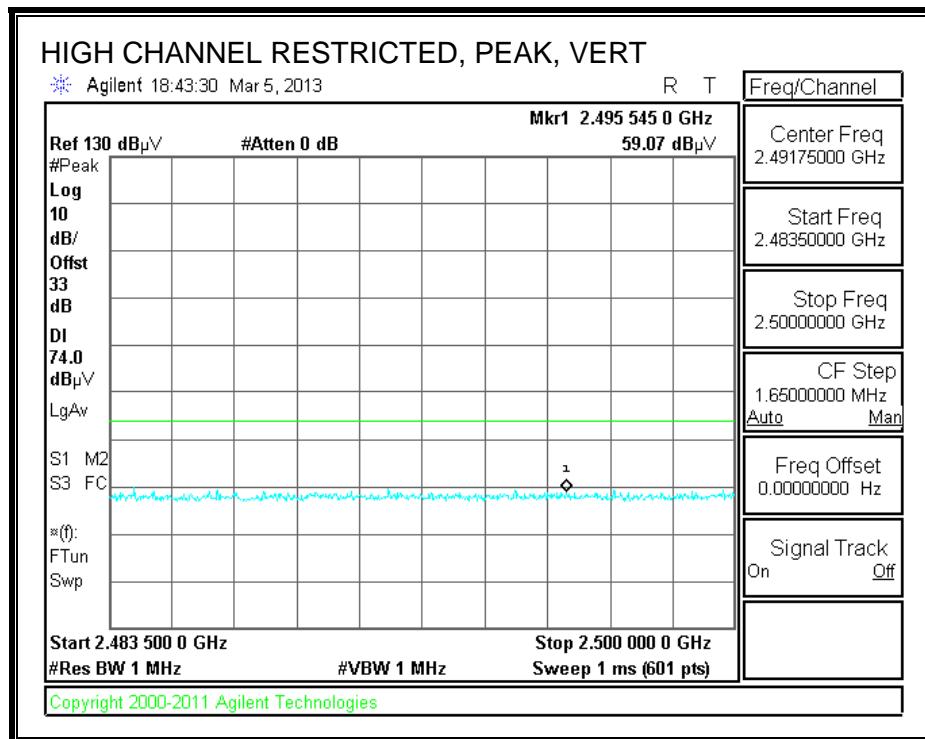
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

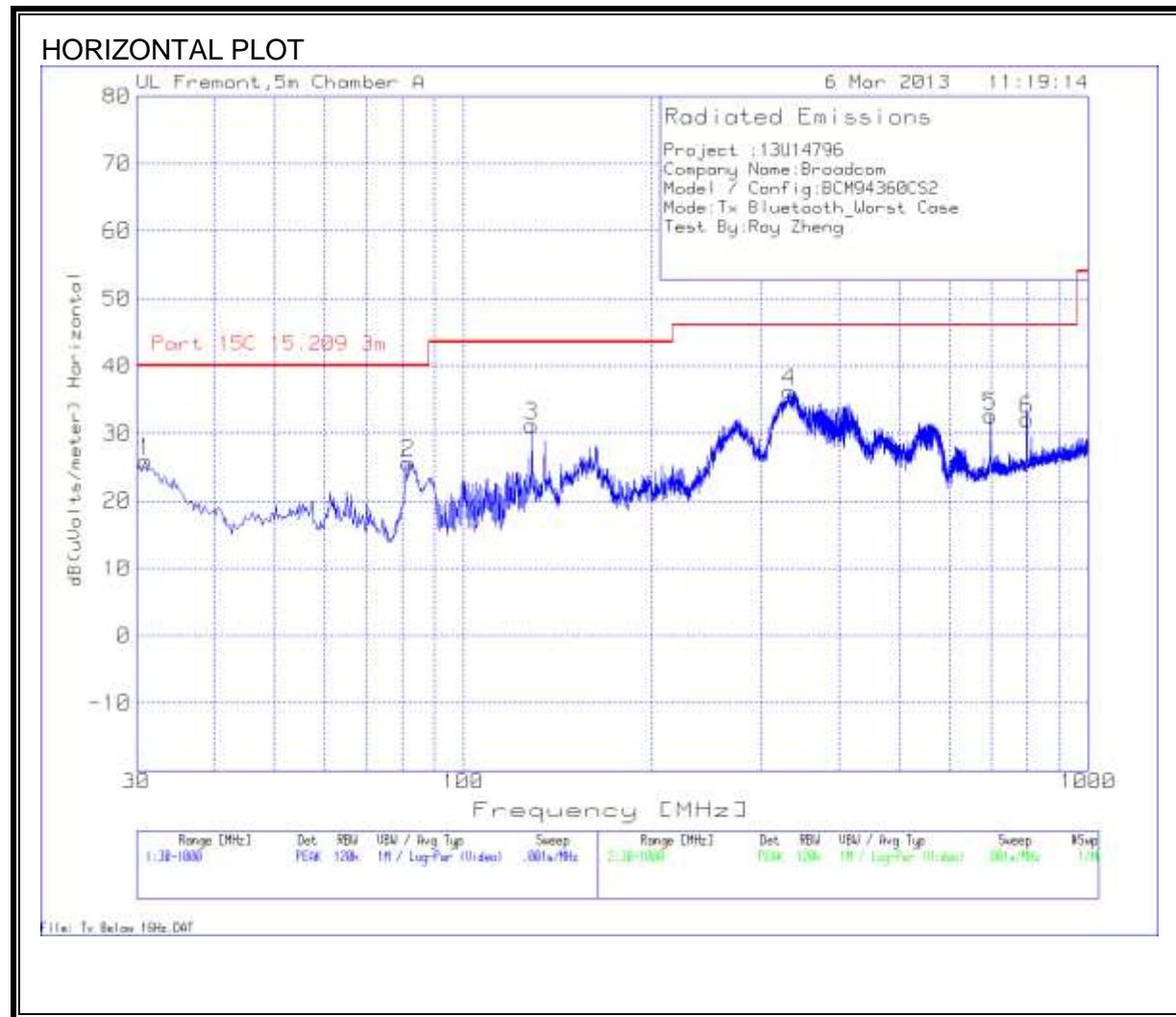


HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement Compliance Certification Services, Fremont 5m Chamber-A															
Company: Broadcom	Project #: 13U14796	Date: 3/4/2013	Test Engineer: Roy Zheng	Configuration: Tx Continuously	Mode: Bluetooth 8PSK										
Test Equipment:															
Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz					Limit							
T73; S/N: 6717 @3m	T144 Miteq 3008A00931		T89; ARA 18-26GHz; S/N:1049					FCC 15.205							
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 GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low channel, 2402MHz															
4.804	3.0	39.3	27.7	33.4	6.7	-35.7	0.0	0.0	43.8	32.2	74.0	54.0	-30.2	-21.8	V
4.804	3.0	40.5	27.3	33.4	6.7	-35.7	0.0	0.0	45.0	31.8	74.0	54.0	-29.0	-22.2	H
Mid channel, 2441MHz															
4.882	3.0	39.8	27.6	33.5	6.8	-35.7	0.0	0.0	44.5	32.3	74.0	54.0	-29.5	-21.7	V
4.882	3.0	38.8	27.0	33.5	6.8	-35.7	0.0	0.0	43.5	31.7	74.0	54.0	-30.5	-22.3	H
7.323	3.0	40.7	28.1	36.0	8.7	-35.8	0.0	0.0	49.6	36.9	74.0	54.0	-24.4	-17.1	V
7.323	3.0	40.3	28.1	36.0	8.7	-35.8	0.0	0.0	49.2	36.9	74.0	54.0	-24.8	-17.1	H
High channel, 2480MHz															
4.960	3.0	39.4	28.1	33.6	6.9	-35.6	0.0	0.0	44.2	32.9	74.0	54.0	-29.8	-21.1	V
4.960	3.0	39.3	27.1	33.6	6.9	-35.6	0.0	0.0	44.1	31.9	74.0	54.0	-29.9	-22.1	H
7.440	3.0	39.5	27.7	36.1	8.8	-35.8	0.0	0.0	48.6	36.8	74.0	54.0	-25.4	-17.2	V
7.440	3.0	39.7	27.7	36.1	8.8	-35.8	0.0	0.0	48.8	36.8	74.0	54.0	-25.2	-17.2	H
															H
Rev. 01.30.13															
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											

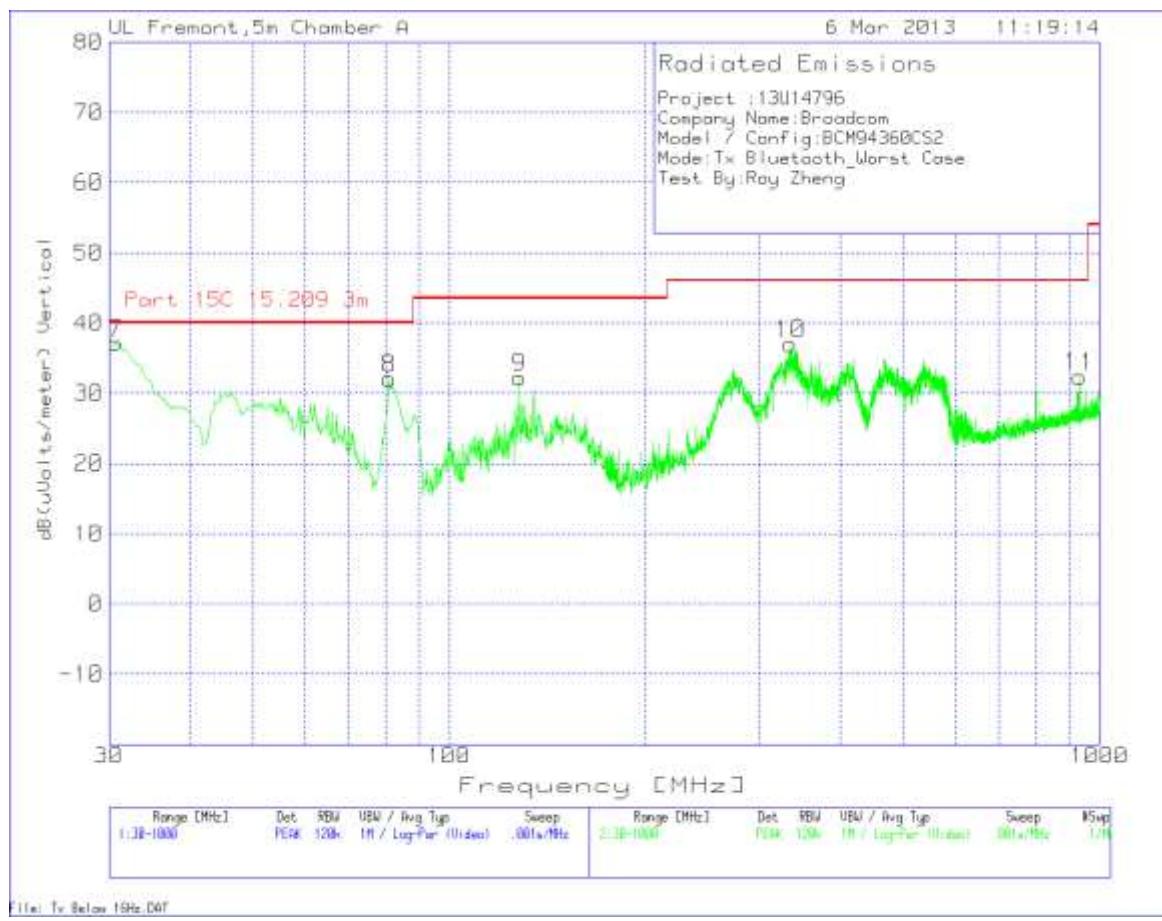
8.3. WORST-CASE BELOW 1 GHz

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



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

VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project :13U14796

Company Name:Broadcom

Model / Config:BCM94360CS2

Mode:Tx Bluetooth_Worst Case

Test By:Roy Zheng

Horizontal 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T185 Antenna Factor (dB)	T64 preamp/ cable loss loop (dB)	dB(uVolts /meter)	Part 15C 15.209 3m	Margin	Height [cm]	Polarity
1	30.9693	33.08	PK	20.5	-27.7	25.88	40.0	-14.12	400	Horz
2	81.8561	45.28	PK	7.5	-27.1	25.68	40.0	-14.32	200	Horz
3	128.8659	43.86	PK	14.1	-26.8	31.16	43.5	-12.34	200	Horz
4	332.6555	47.90	PK	13.9	-25.6	36.20	46.0	-9.80	100	Horz
5	697.1022	35.65	PK	20.1	-23.1	32.65	46.0	-13.35	100	Horz
6	799.6028	34.07	PK	21.0	-23.0	32.07	46.0	-13.93	100	Horz

Vertical 30 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	T185 Antenna Factor (dB)	T64 preamp/ cable loss loop (dB)	dB(uVolts /meter)	Part 15C 15.209 3m	Margin	Height [cm]	Polarity
7	30.727	44.25	PK	20.6	-27.7	37.15	40.0	-2.85	100	Vert
8	80.8868	51.61	PK	7.6	-27.1	32.11	40.0	-7.89	100	Vert
9	128.1389	44.98	PK	14.2	-26.9	32.28	43.5	-11.22	100	Vert
10	334.8364	48.87	PK	13.9	-25.7	37.07	46.0	-8.93	100	Vert
11	932.1509	32.84	PK	22.3	-22.8	32.34	46.0	-13.66	200	Vert

PK - Peak detector

Text File: Tx Below 1GHz.TXT

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

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

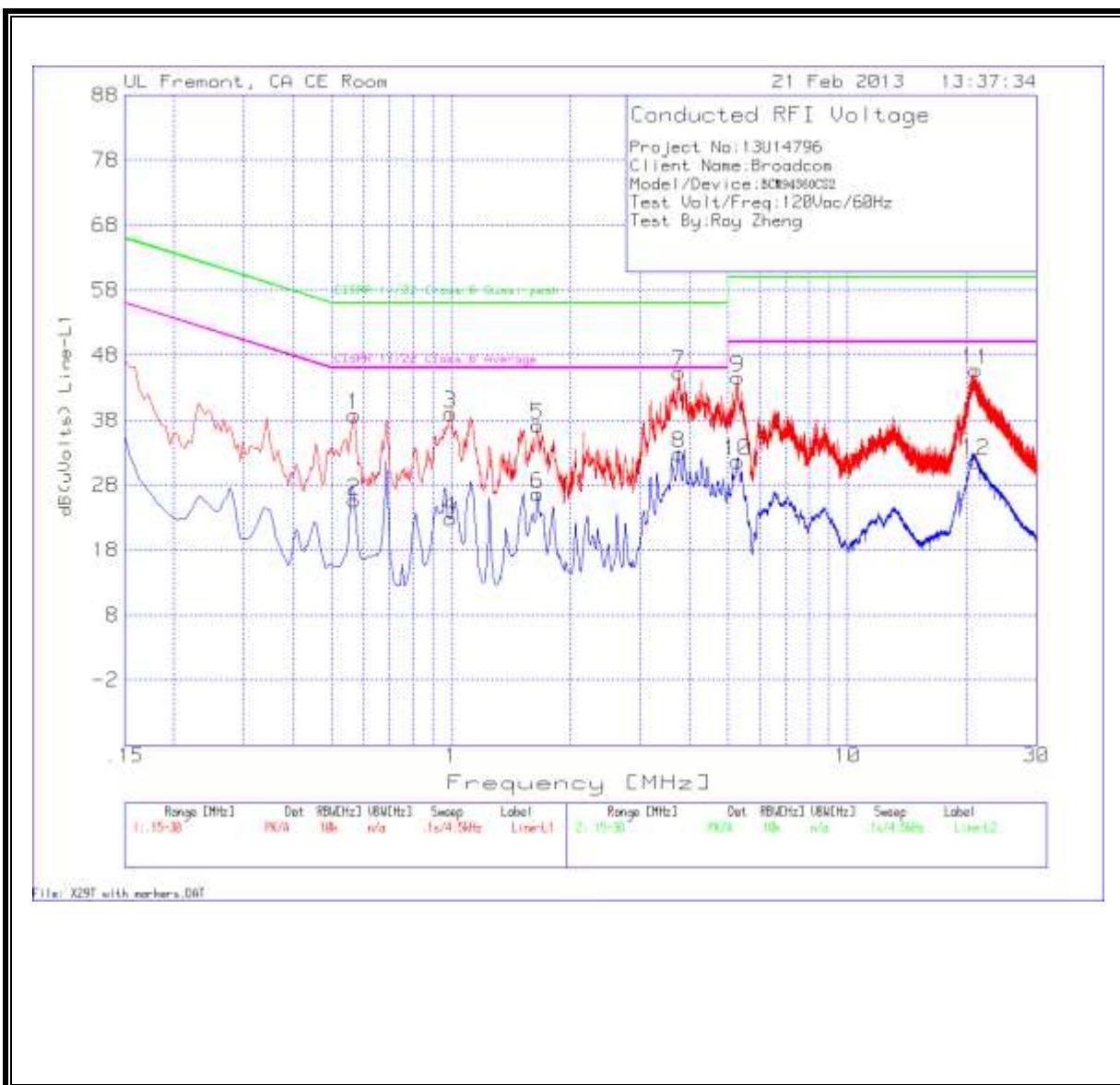
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

6 WORST EMISSIONS

Project No:	13U14796								
Client Name:	Broadcom								
Model/Device:	BCM94360CS2								
Test Volt/Freq:	120Vac/60Hz								
Test By:	Roy Zheng								
Test Frequency	Meter Reading	Detector	T24 IL L1.TXT (dB)	LC Cables 1&3.TXT (dB)	dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin	CISPR 11/22 Class B Average	Margin
Line-L1 .15 - 30MHz									
0.5685	38.63	PK	0.1	0	38.73	56	-17.27	-	-
0.5685	25.56	Av	0.1	0	25.66	-	-	46	-20.34
0.996	38.93	PK	0.1	0	39.03	56	-16.97	-	-
0.996	22.83	Av	0.1	0	22.93	-	-	46	-23.07
1.65525	37.04	PK	0.1	0.1	37.24	56	-18.76	-	-
1.65525	26.48	Av	0.1	0.1	26.68	-	-	46	-19.32
3.7545	45.13	PK	0.1	0.1	45.33	56	-10.67	-	-
3.7545	32.58	Av	0.1	0.1	32.78	-	-	46	-13.22
5.298	44.41	PK	0.1	0.1	44.61	60	-15.39	-	-
5.298	31.5	Av	0.1	0.1	31.7	-	-	50	-18.3
21.0615	45.15	PK	0.3	0.2	45.65	60	-14.35	-	-
21.0615	31.2	Av	0.3	0.2	31.7	-	-	50	-18.3
Line-L2 .15 - 30MHz									
0.402	42.88	PK	0.1	0	42.98	57.8	-14.82	-	-
0.402	27.73	Av	0.1	0	27.83	-	-	47.8	-19.97
0.636	40.36	PK	0.1	0	40.46	56	-15.54	-	-
0.636	29.43	Av	0.1	0	29.53	-	-	46	-16.47
1.2165	40.42	PK	0.1	0.1	40.62	56	-15.38	-	-
1.2165	24.39	Av	0.1	0.1	24.59	-	-	46	-21.41
3.255	41.96	PK	0.1	0.1	42.16	56	-13.84	-	-
3.255	24.18	Av	0.1	0.1	24.38	-	-	46	-21.62
13.0065	39.14	PK	0.2	0.2	39.54	60	-20.46	-	-
13.0065	25.72	Av	0.2	0.2	26.12	-	-	50	-23.88
20.9445	43.22	PK	0.3	0.2	43.72	60	-16.28	-	-
20.9445	31.12	Av	0.3	0.2	31.62	-	-	50	-18.38
PK - Peak detector									
QP - Quasi-Peak detector									
Av - Average detector									

LINE 1 RESULTS



LINE 2 RESULTS

