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

CERTIFICATION BLUETOOTH TEST REPORT

FOR

HANDS-FREE WIRELESS COMPUTING HEADSET CONTAINING BT v 2.1 + EDR and 802.11b/g RADIO

MODEL NUMBER: 30-00818-04

FCC ID: ZAOGOLDENI350
IC: 9529A- GOLDENI350

REPORT NUMBER: 10U13572- 1, Revision C

ISSUE DATE: MARCH 18, 2011

Prepared for
KOPIN DISPLAY CORPORATION
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TAUNTON, MA 02780

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/18/11	Initial Issue	F. Ibrahim
A	03/16/11	Revised BE radiated for 8PSK mode	F. Ibrahim
B	03/17/11	Revised I/O cables list, test equipment list and radiated emissions data above 1 GHz.	F. Ibrahim
C	03/18/11	Removed MPE section	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: KOPIN DISPLAY CORPORATION
200 JOHN HANCOCK ROAD
TAUNTON, MA 02780

EUT DESCRIPTION: HANDS-FREE WIRELESS COMPUTING HEADSET CONTAINING BT v 2.1 + EDR and 802.11b/g RADIO

MODEL: 30-00818-04

SERIAL NUMBER: 12

DATE TESTED: FEBRUARY 1-4, 2011

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

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a hands-free wireless computing headset containing BT v 2.1 + EDR and 802.11b/g radio. The unit is manufactured by Kopin.

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	1.62	1.45
2402 - 2480	Enhanced 8PSK	0.03	1.01

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Patch antenna, with a maximum gain of 4 dBi.

5.4. SOFTWARE AND FIRMWARE

WLAN: 1) Murata-SyChip Wi-Fi Firmware: 9.70.7.0
2) Murata-SyChip Wi-Fi Driver 0.4.3.8

Bluetooth: 3) Stonestreet One Bluetopia Stack for WinCE: version 2.1.3.5

Stonestreet One -- Bluetooth FCC Test Tool
Tool Version: 2.1.3.5
This application was loaded onto the EUT and remotely controlled through USB using the SOTI – Pocket Controller Pro.

SOTI – Pocket Controller Pro:
Version 6.02
This application installs on the PC and on the EUT. It allows the Golden-I WinCE device to be controlled by the desktop PC through USB using ActiveSync or Windows Mobile Device Center. It simplifies configuring the EUT for compliance testing by using the PC's mouse and big screen to navigate the WinCE's menus.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. Radiated Emissions below 1 GHz was performed with the EUT set to transmit at the channel with highest output power.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

EUT is a stand-alone device and has no peripherals.

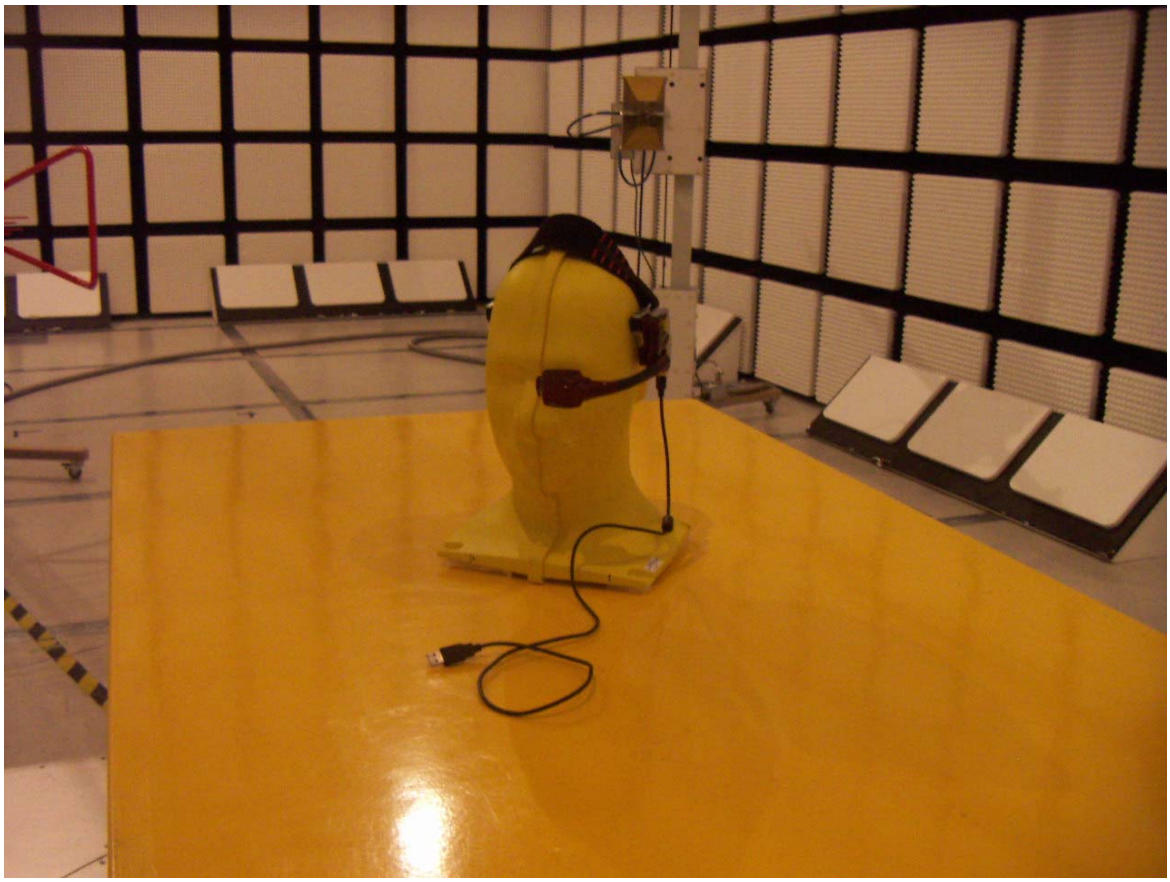
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	USB	shielded	1m	Ferrite bead at both sides

TEST SETUP

The EUT is a stand alone device, a host laptop computer used to activate the EUT and then it was taken out of the chamber 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**
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/10	12/18/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/27/10	01/27/12
PSA Series Spectrum Analyzer	Agilent / HP	E4446A	C01069	01/05/10	04/05/11
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	08/05/10	12/17/11
Antenna, Horn, 18 GHz	EMCO	3115	C00945	06/24/10	06/24/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR	CNR
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	09/29/10	11/29/11

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 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 * (# of pulses in 3.16 s) * pulse width.

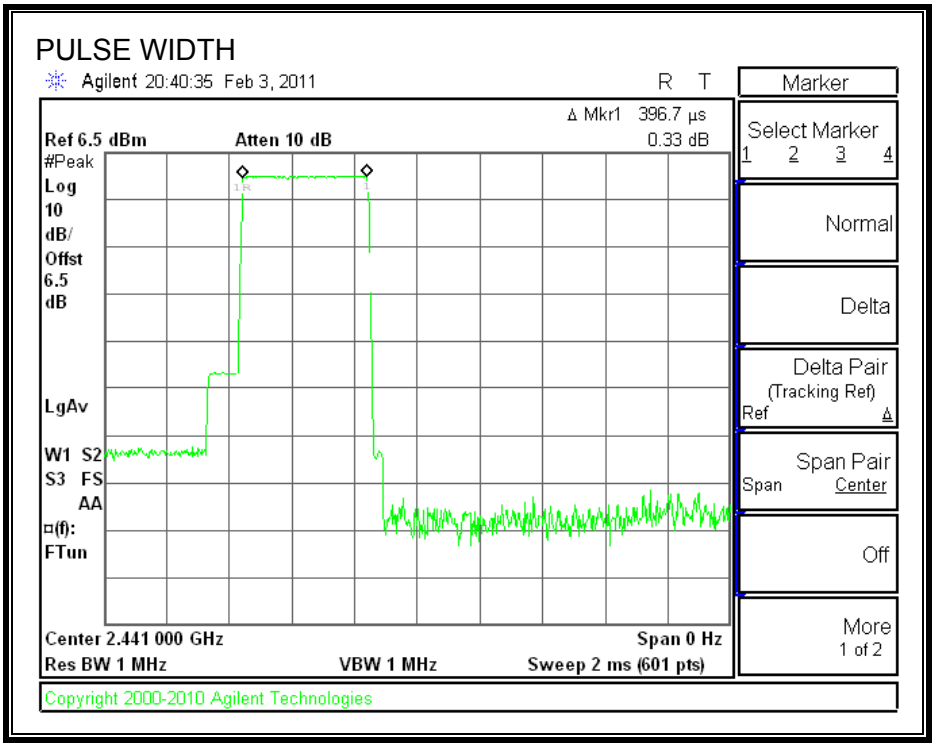
RESULTS

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

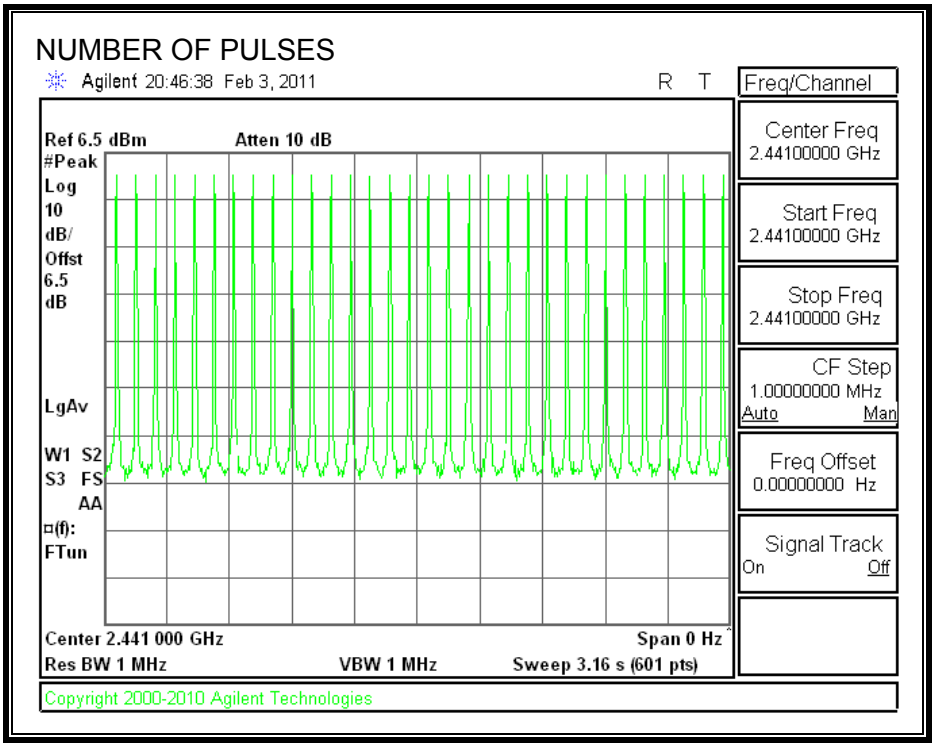
GFSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.3967	32	0.127	0.4	-0.273
DH3	1.654	16	0.265	0.4	-0.135
DH5	2.867	10	0.287	0.4	-0.113

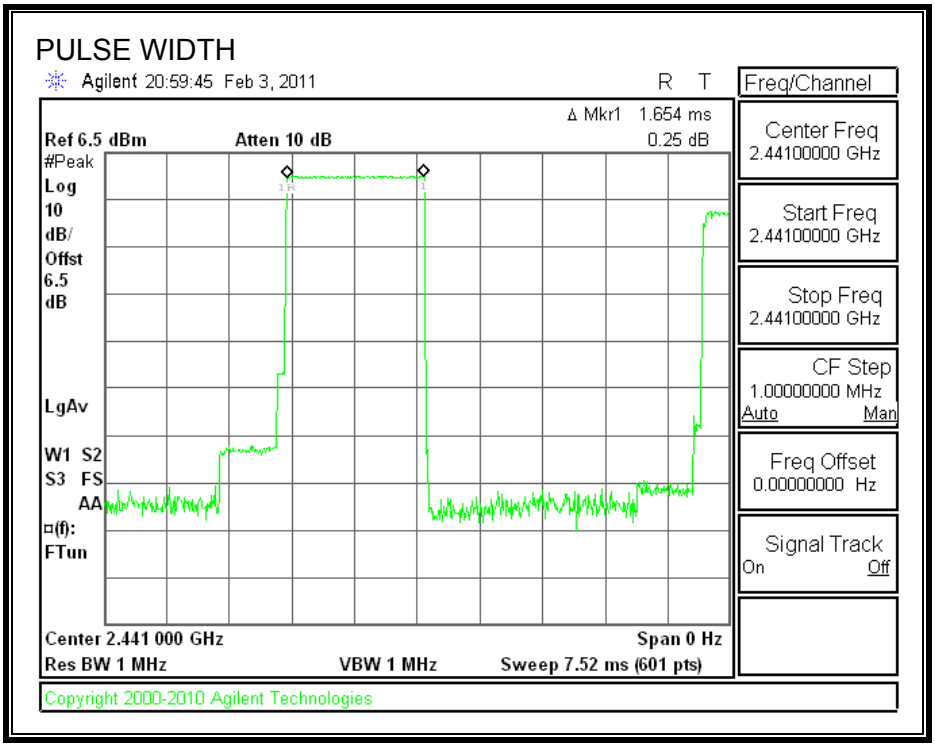
DH1 PULSE WIDTH



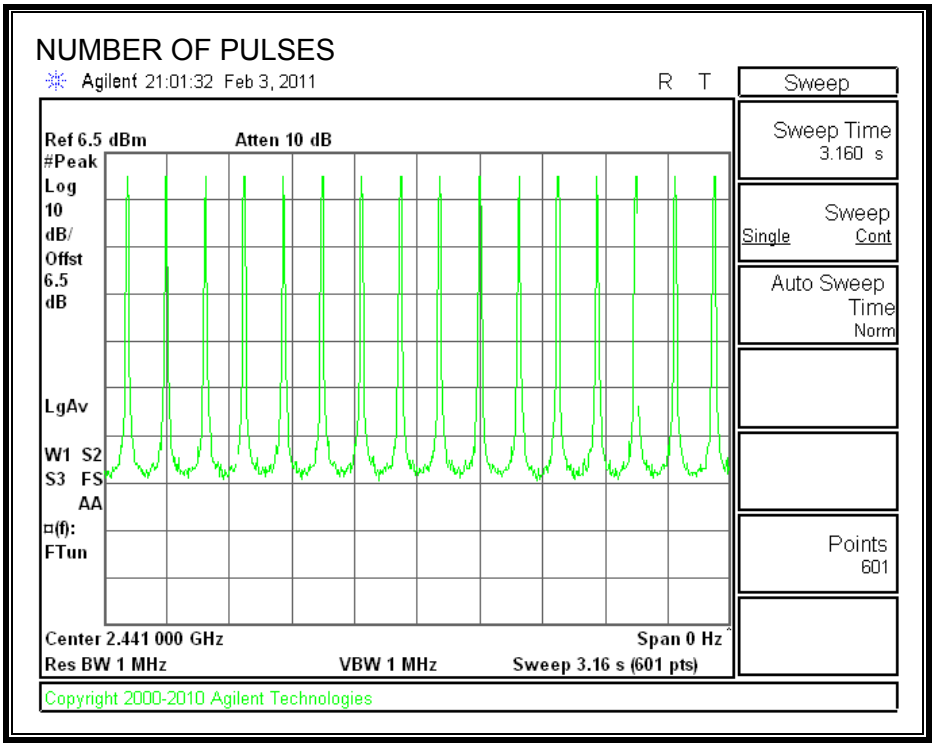
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



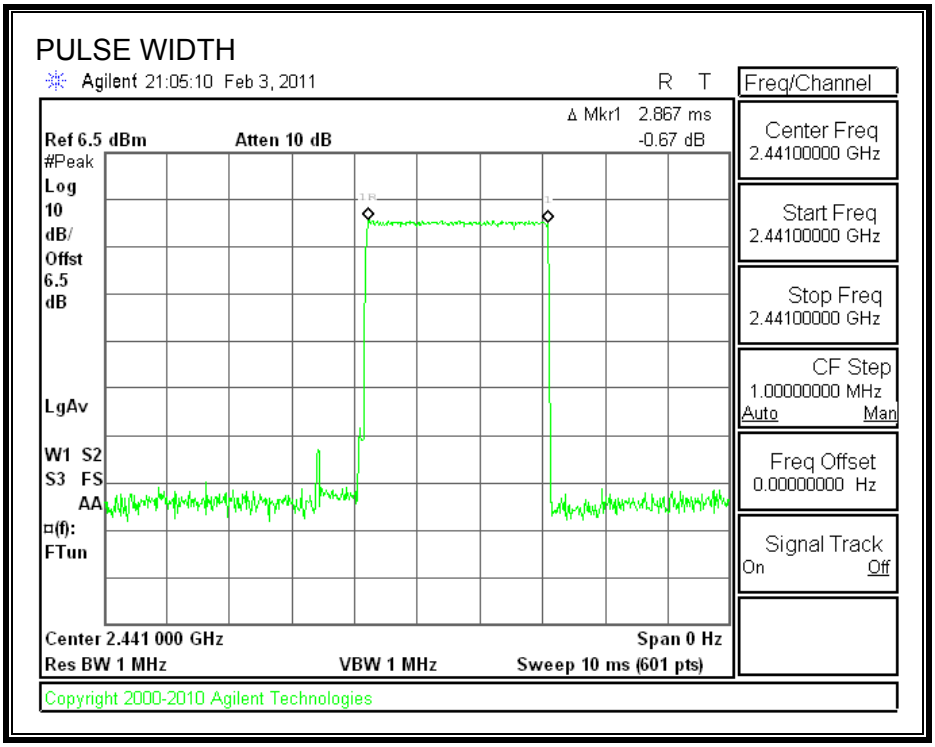
DH3 PULSE WIDTH



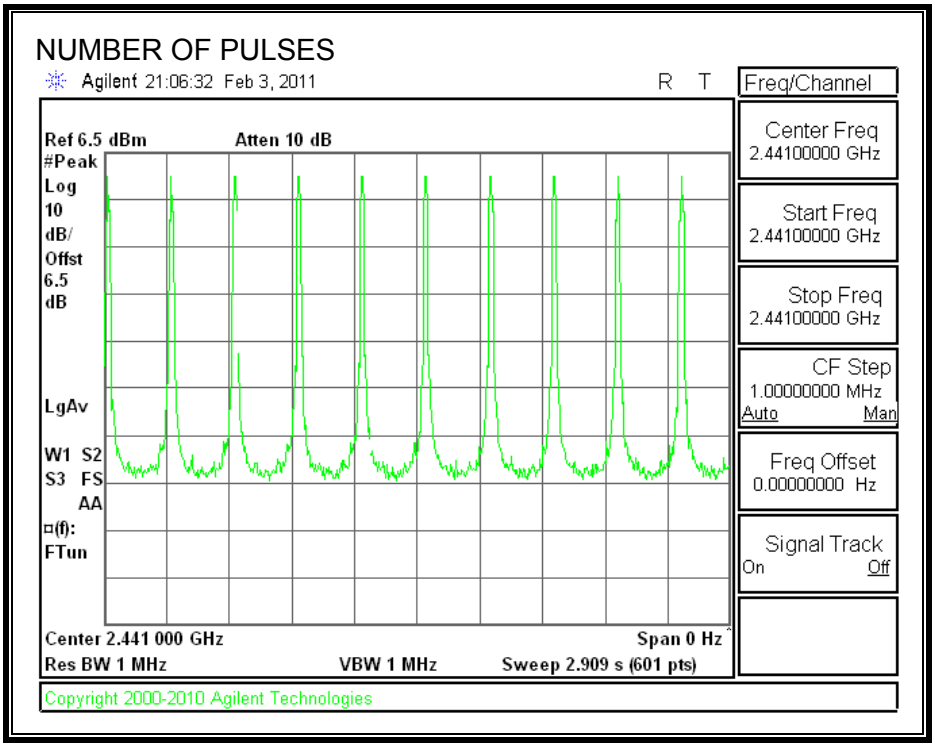
DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



DH5 PULSE WIDTH



DH5 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.2. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

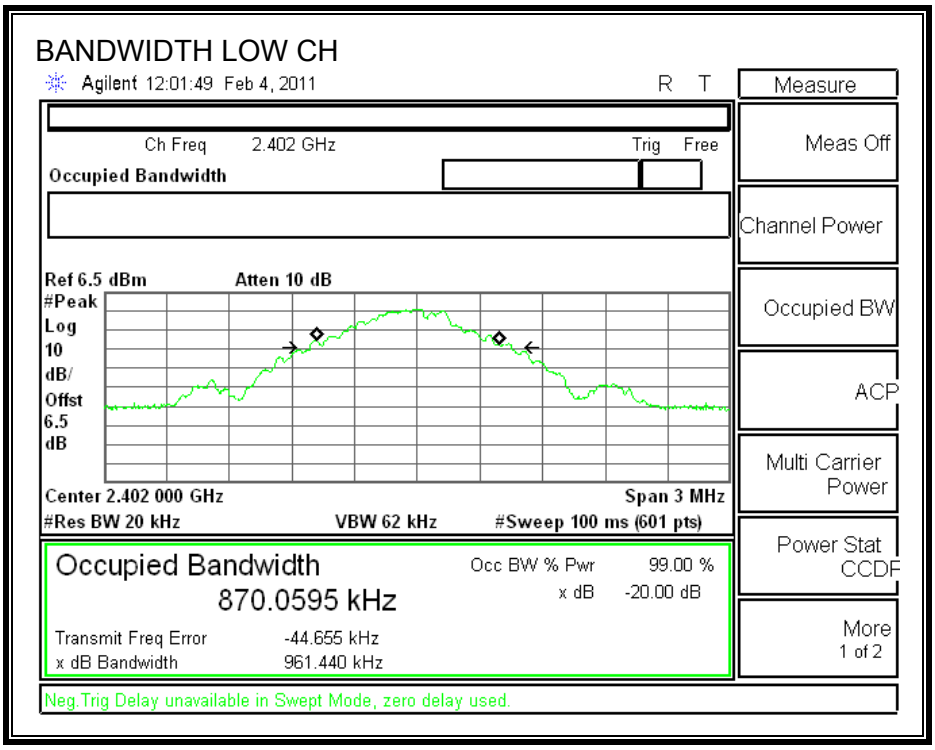
TEST PROCEDURE

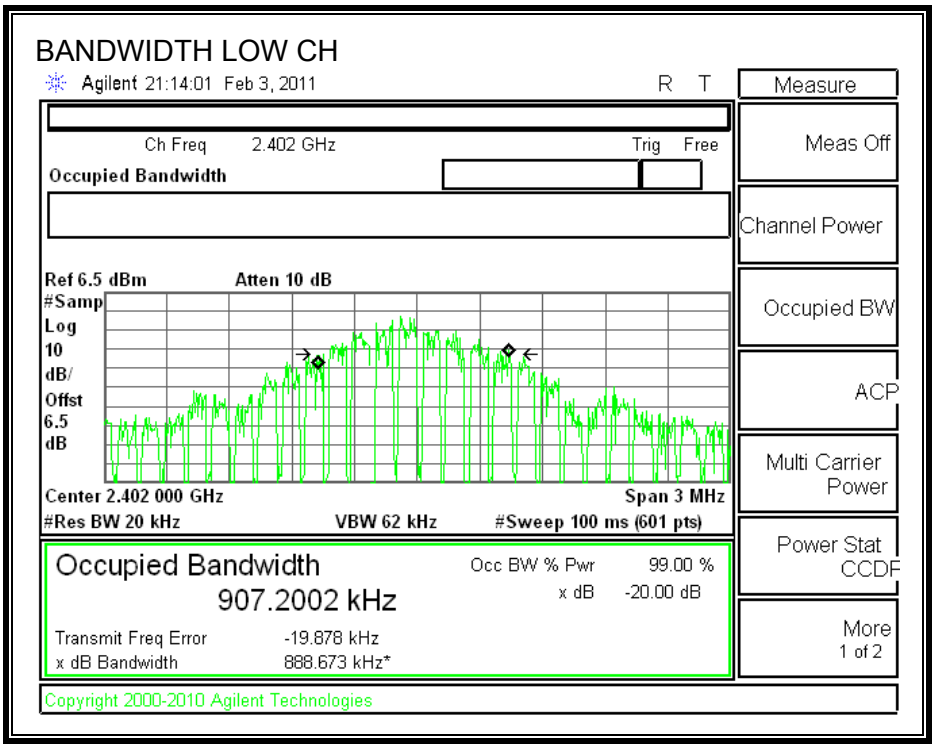
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

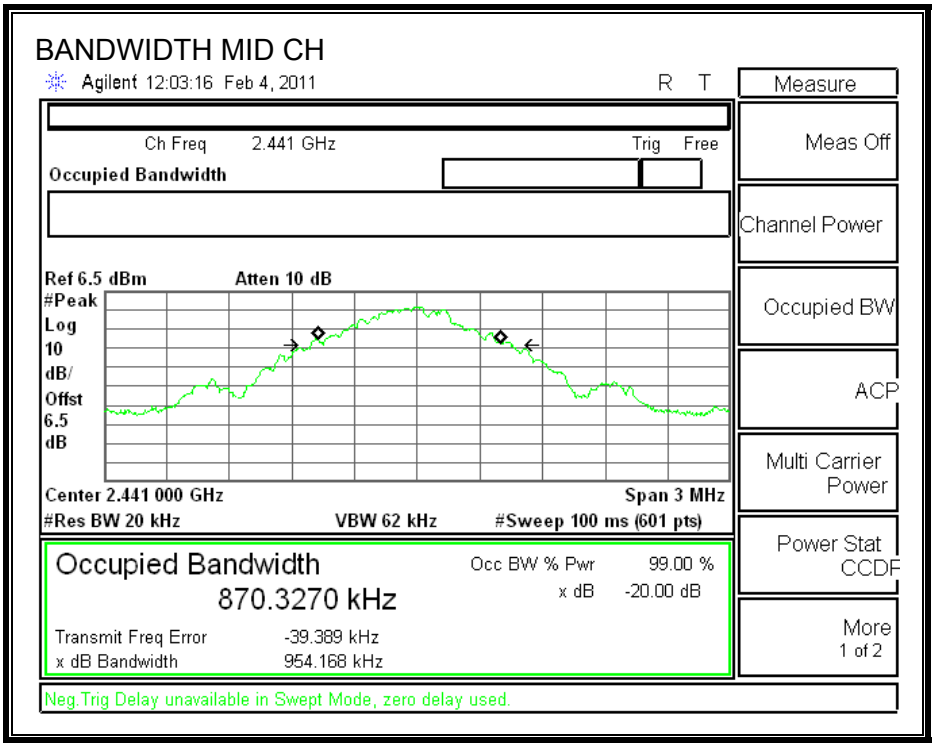
RESULTS

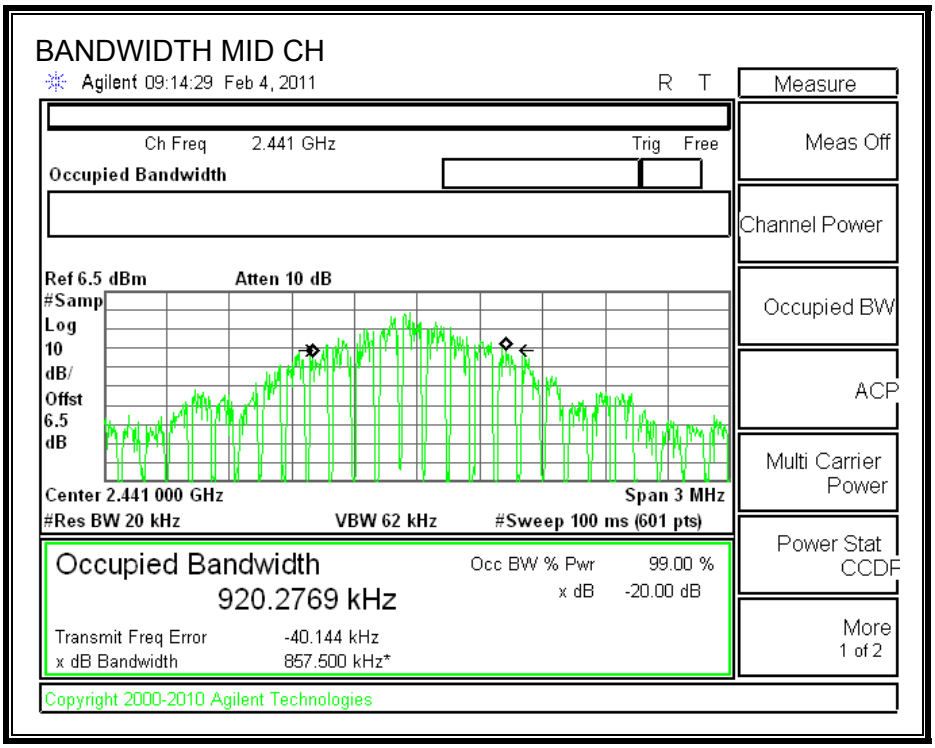
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	961.440	907.2002
Middle	2441	954.168	920.2769
High	2480	951.140	929.2868

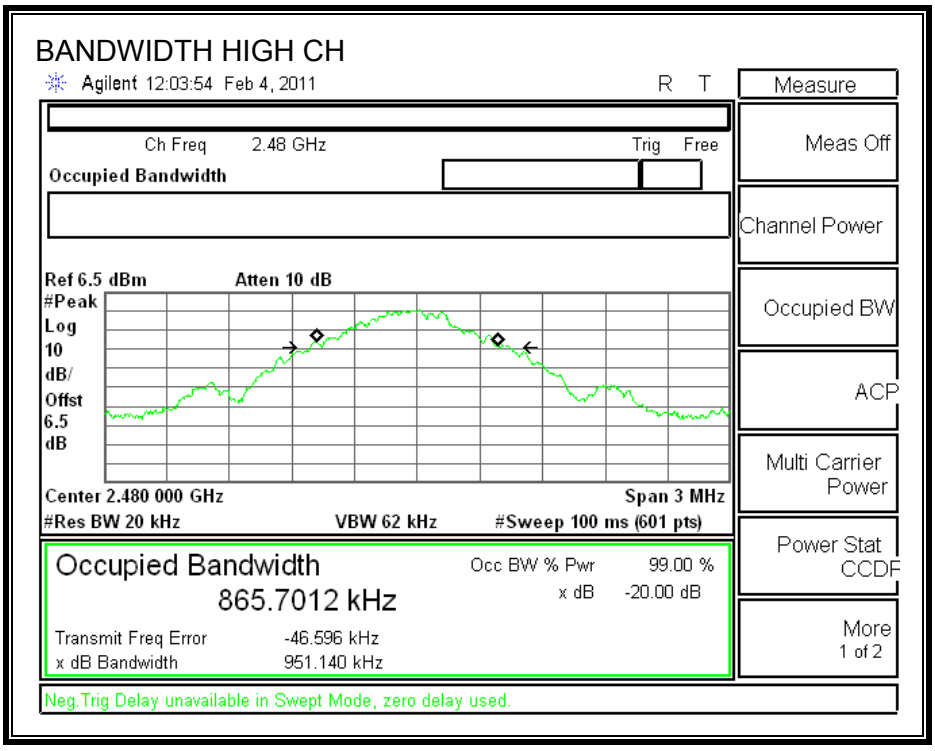
20 dB AND 99% BANDWIDTH

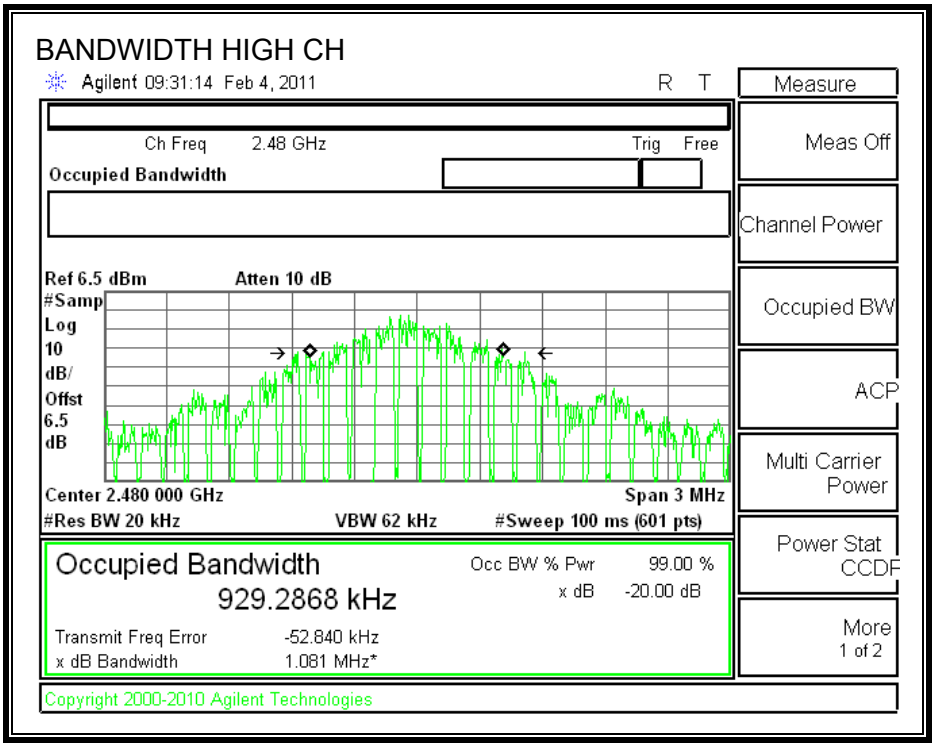












7.1.3. HOPPING FREQUENCY SEPARATION

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.

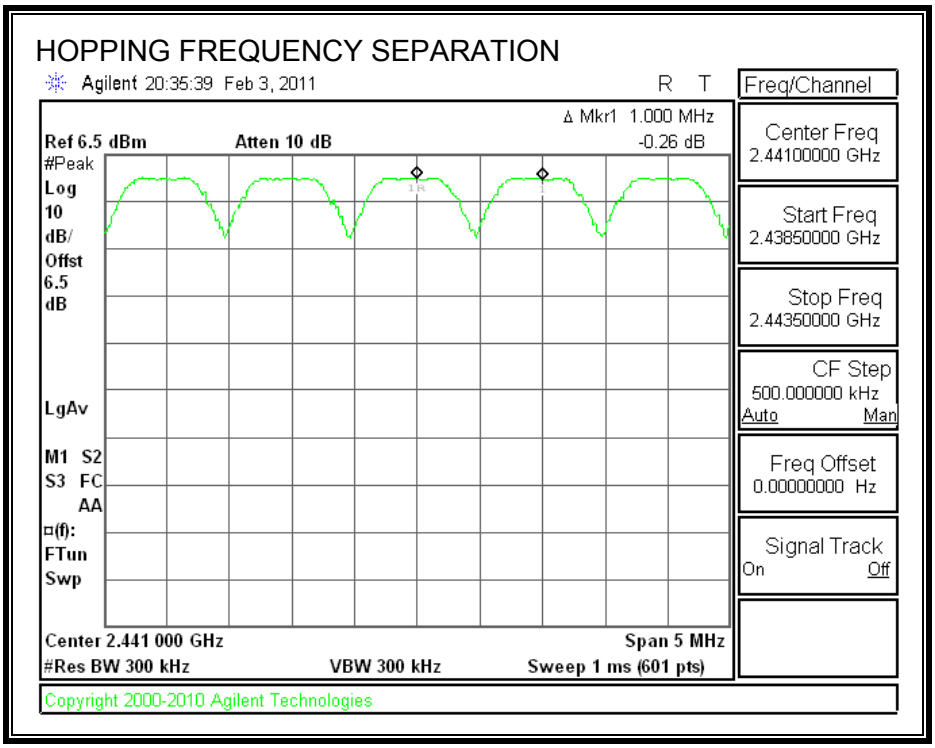
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



7.1.4. 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.

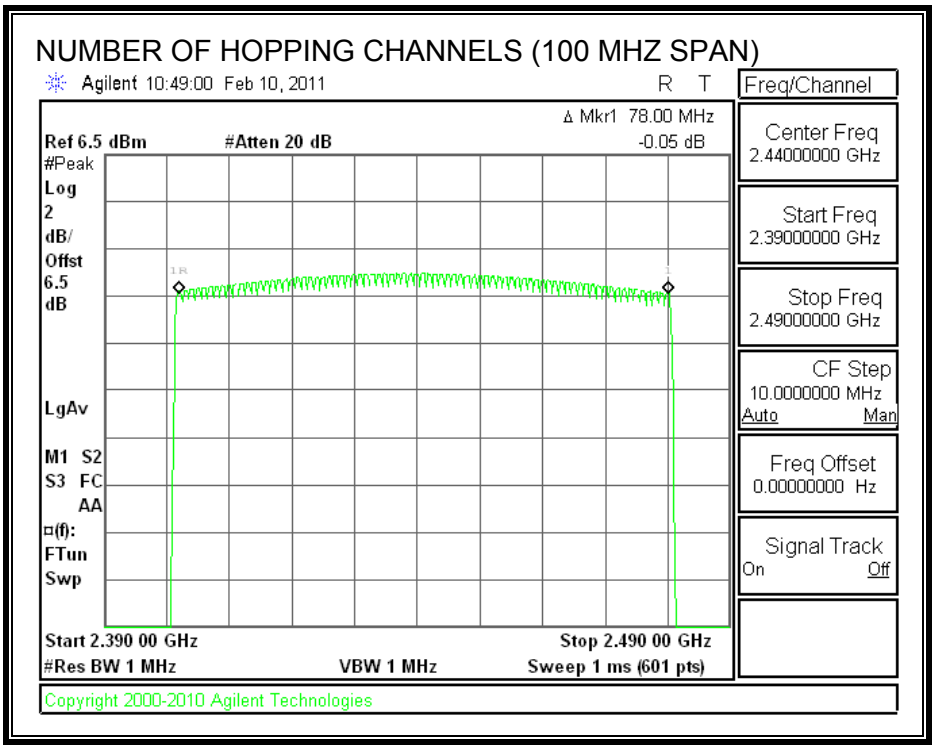
TEST PROCEDURE

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.

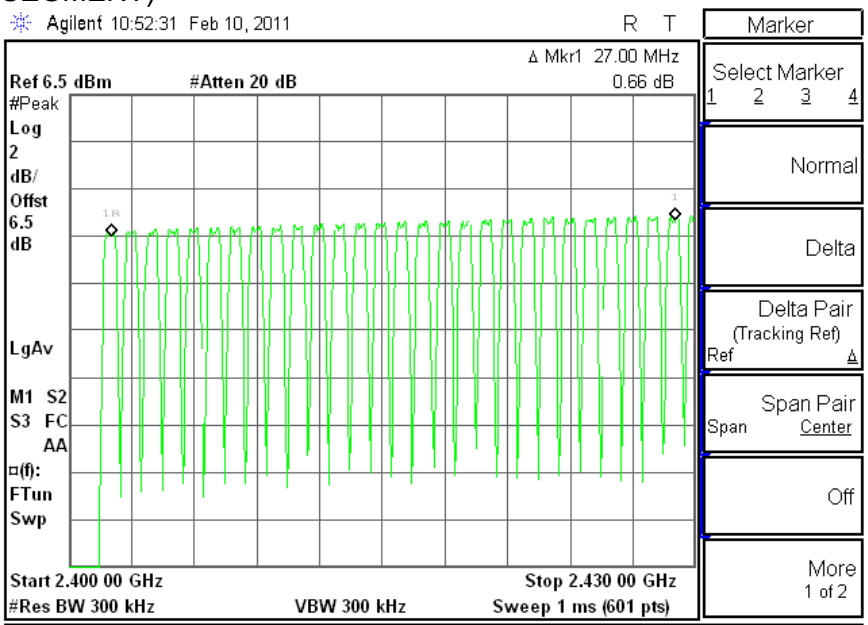
RESULTS

79 Channels observed.

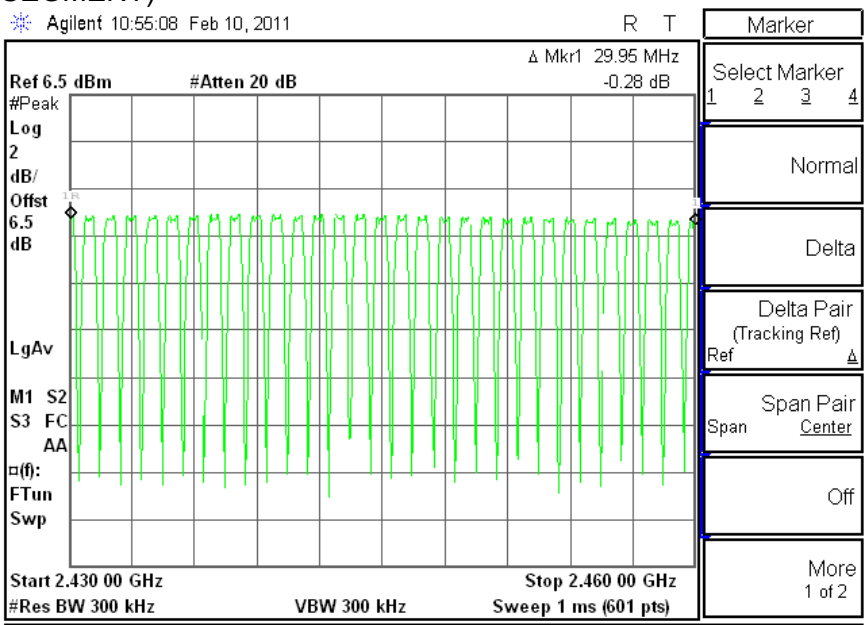
NUMBER OF HOPPING CHANNELS



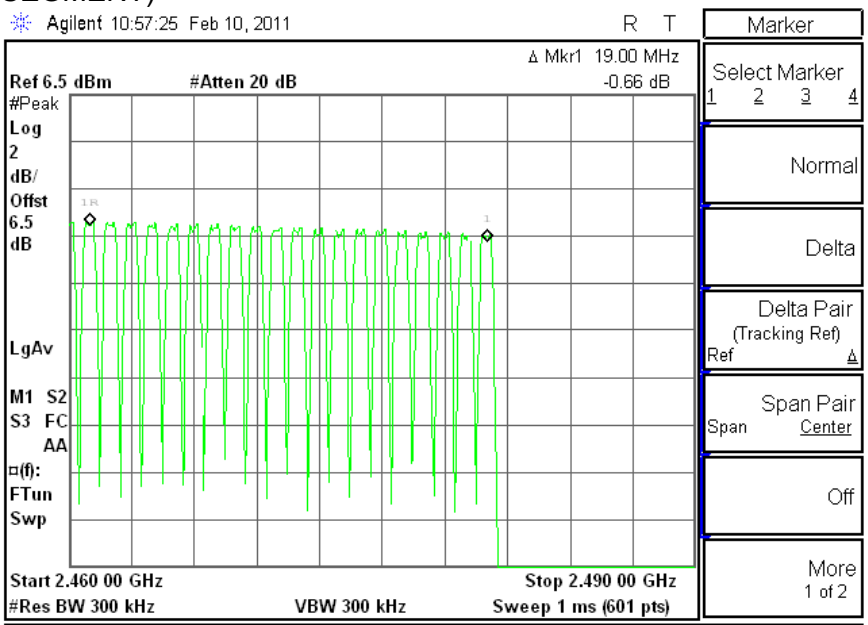
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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 30 dBm.

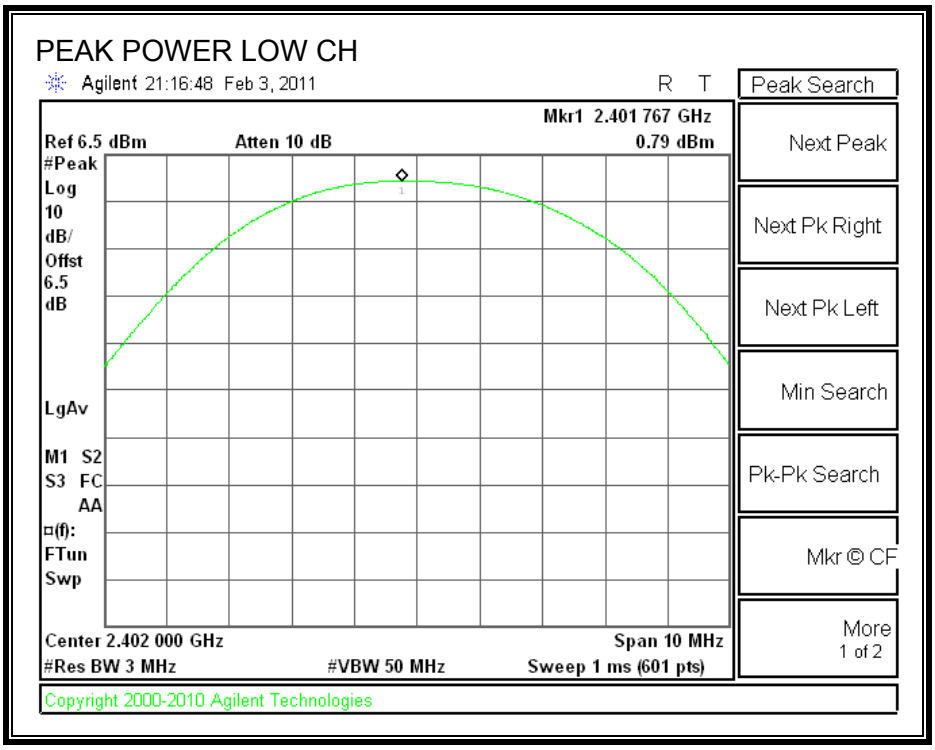
TEST PROCEDURE

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.

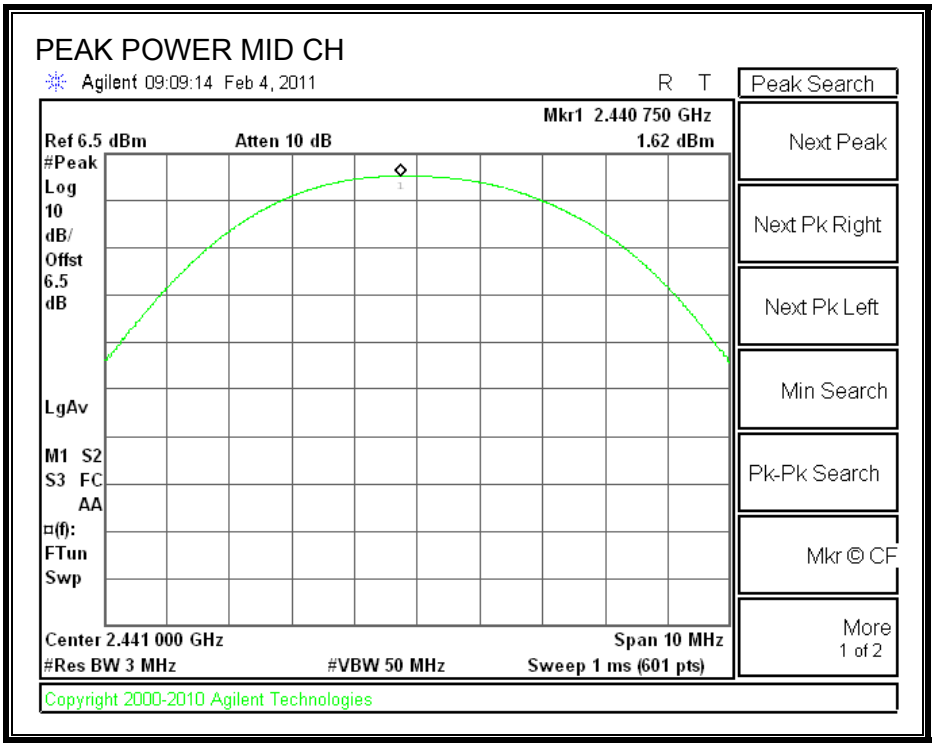
RESULTS

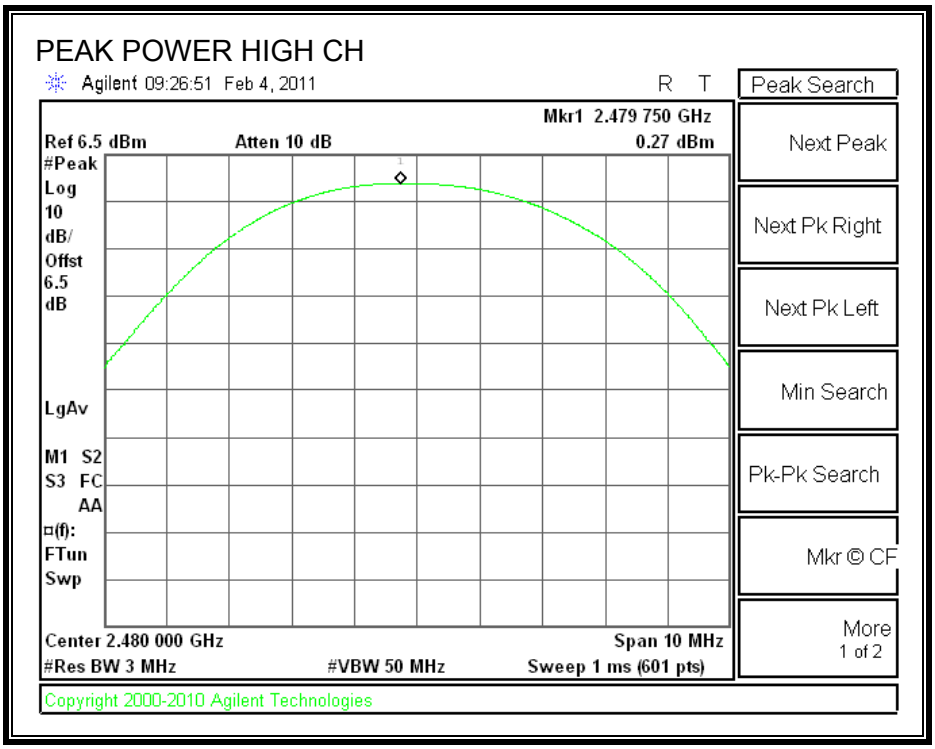
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	0.79	30	-29.21
Middle	2441	1.62	30	-28.38
High	2480	0.27	30	-29.73

OUTPUT POWER



PEAK POWER MID CH





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 6.5 dB (including 6 dB pad and .5 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	-0.65
Middle	2441	0.58
High	2480	-0.51

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

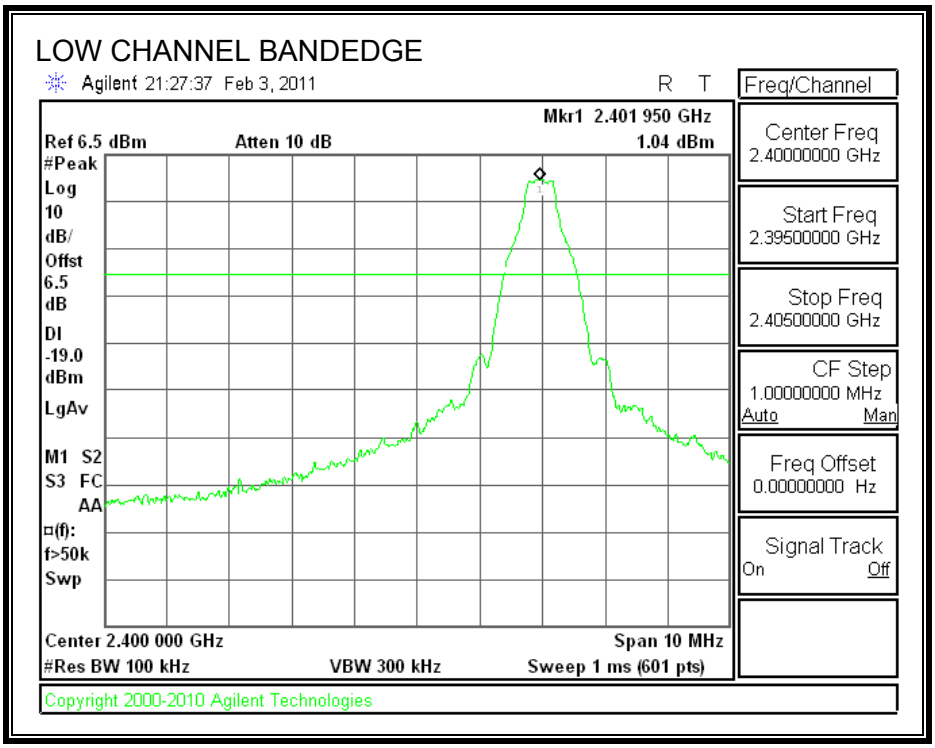
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

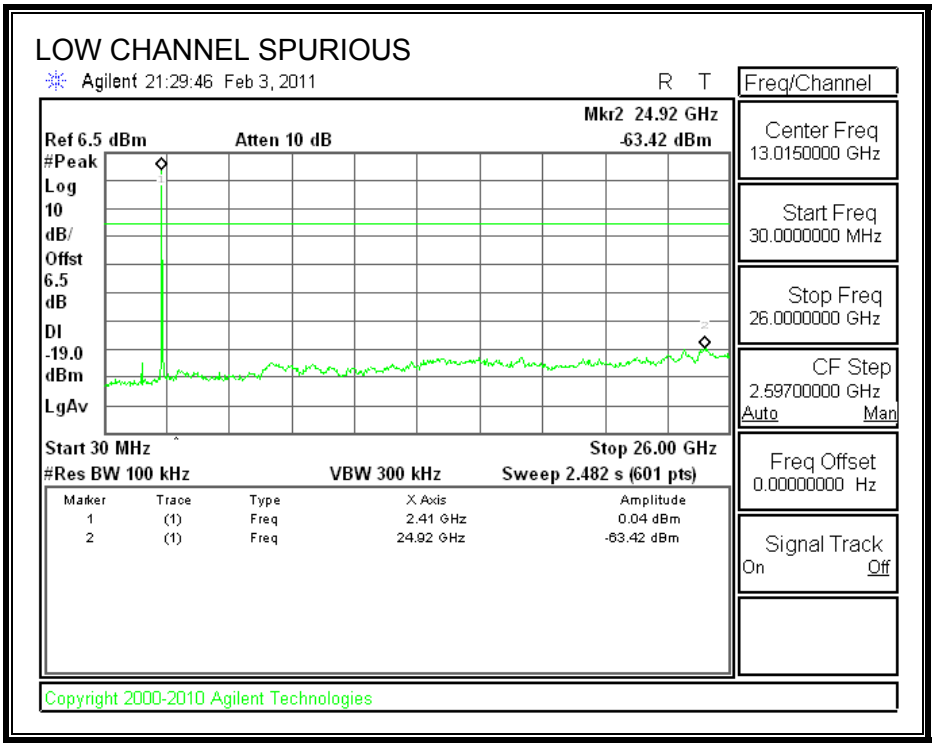
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

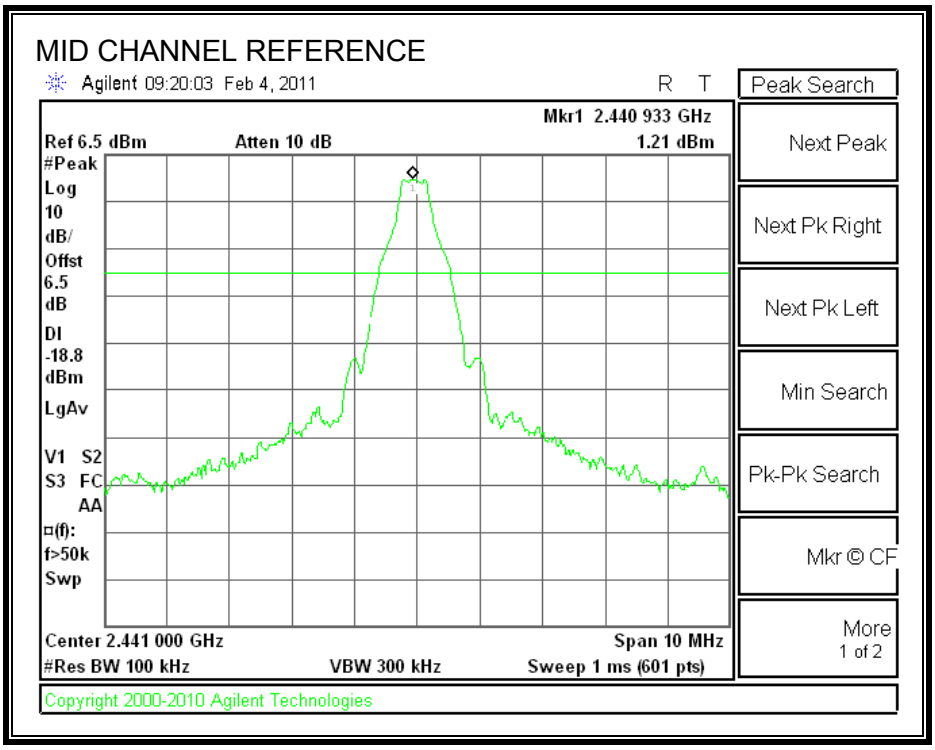
RESULTS

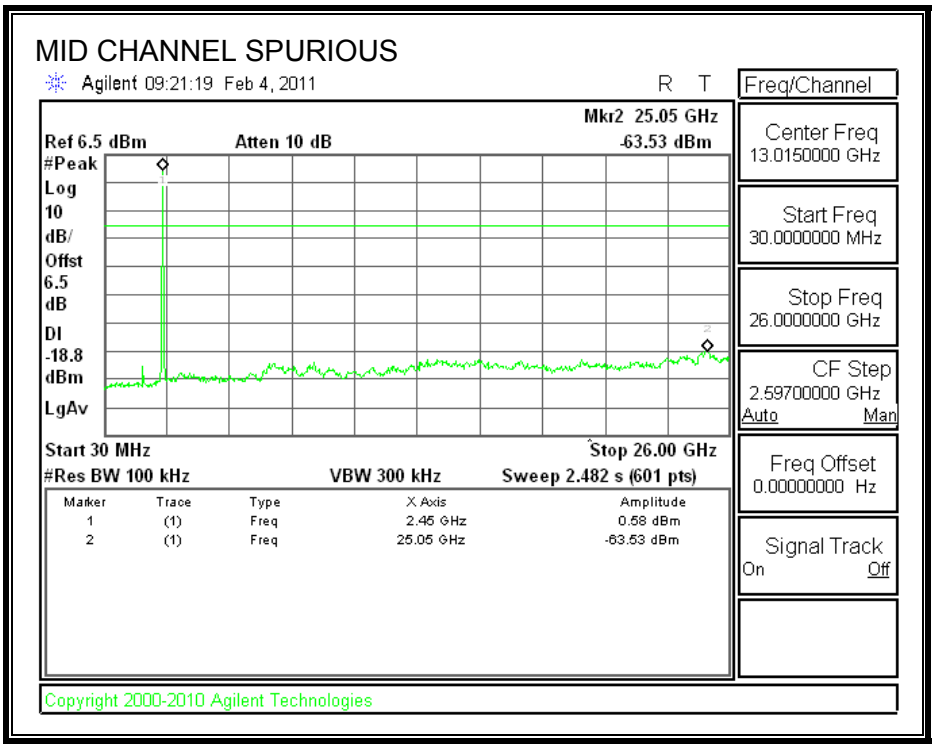
SPURIOUS EMISSIONS, LOW CHANNEL



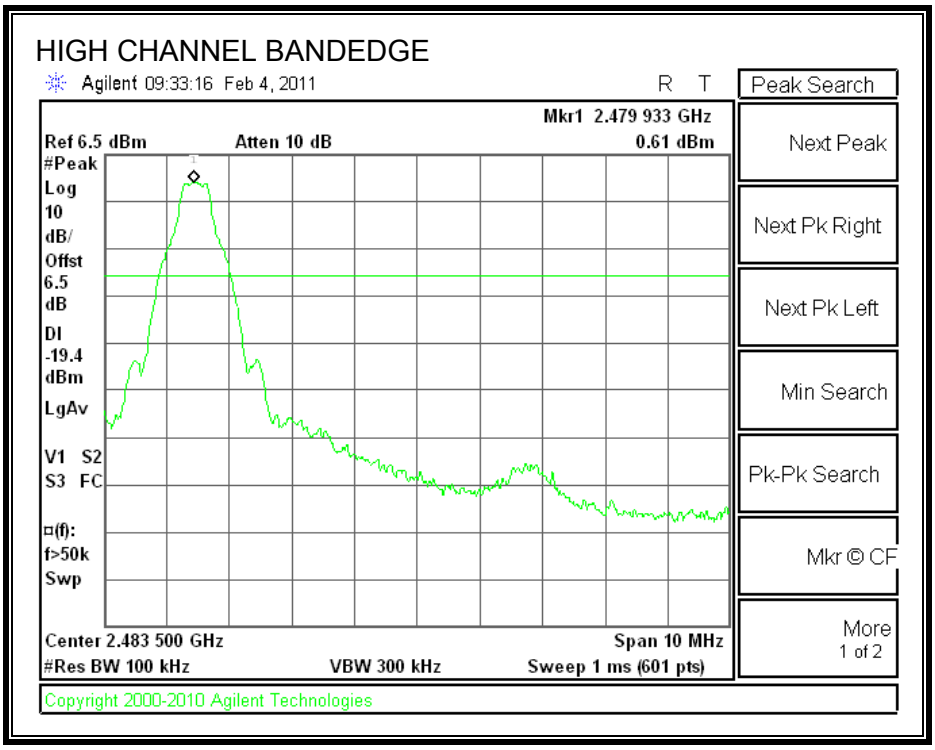


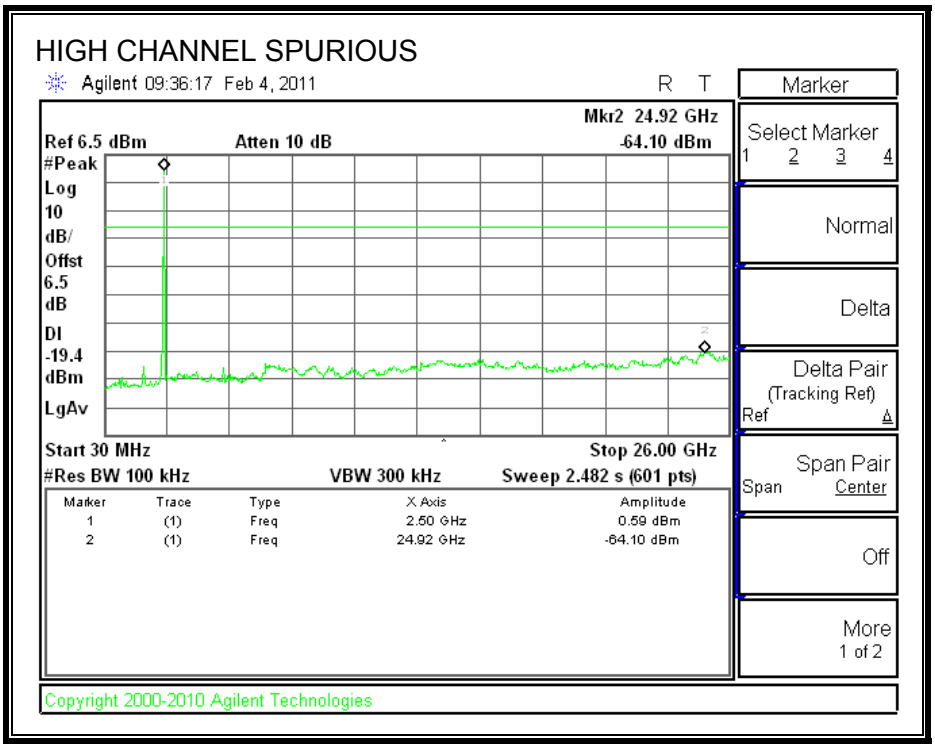
SPURIOUS EMISSIONS, MID CHANNEL



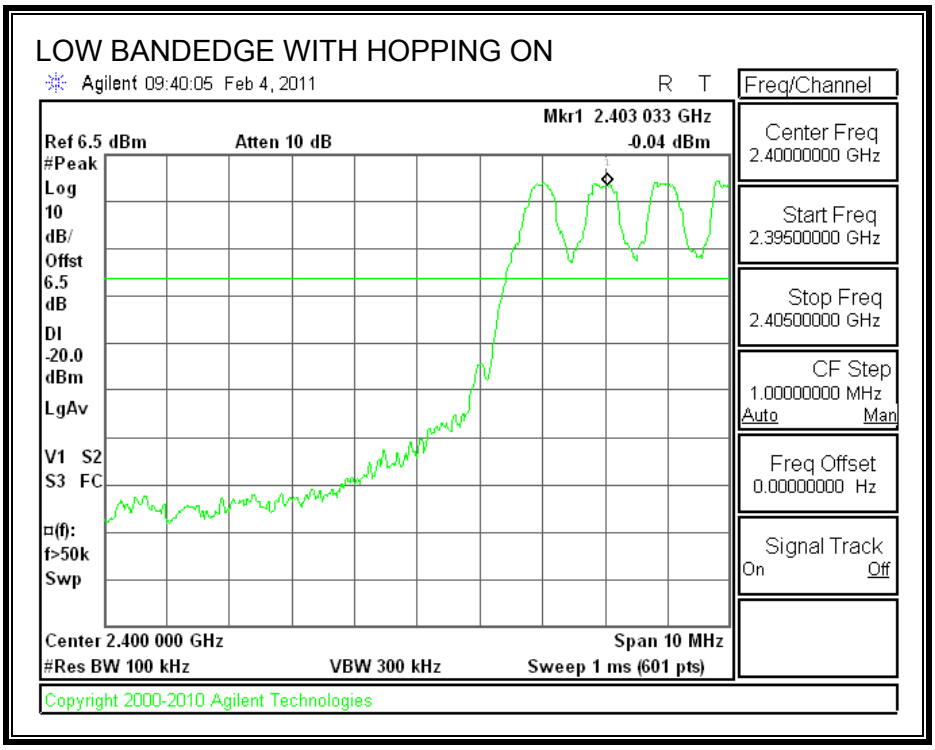


SPURIOUS EMISSIONS, HIGH CHANNEL

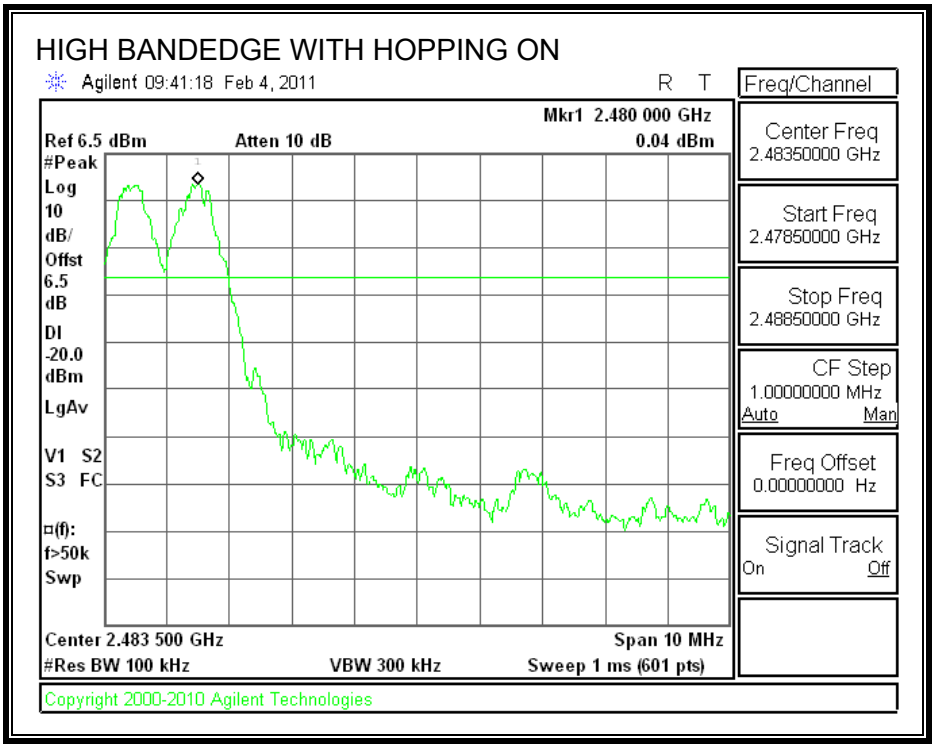




SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 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 * (# of pulses in 3.16 s) * pulse width.

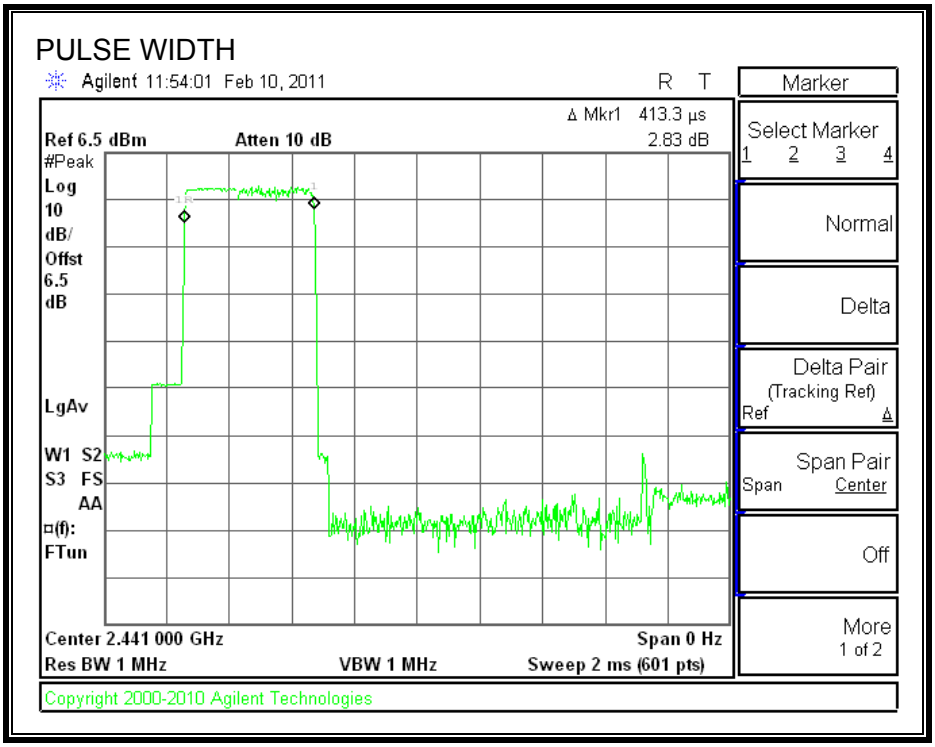
RESULTS

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

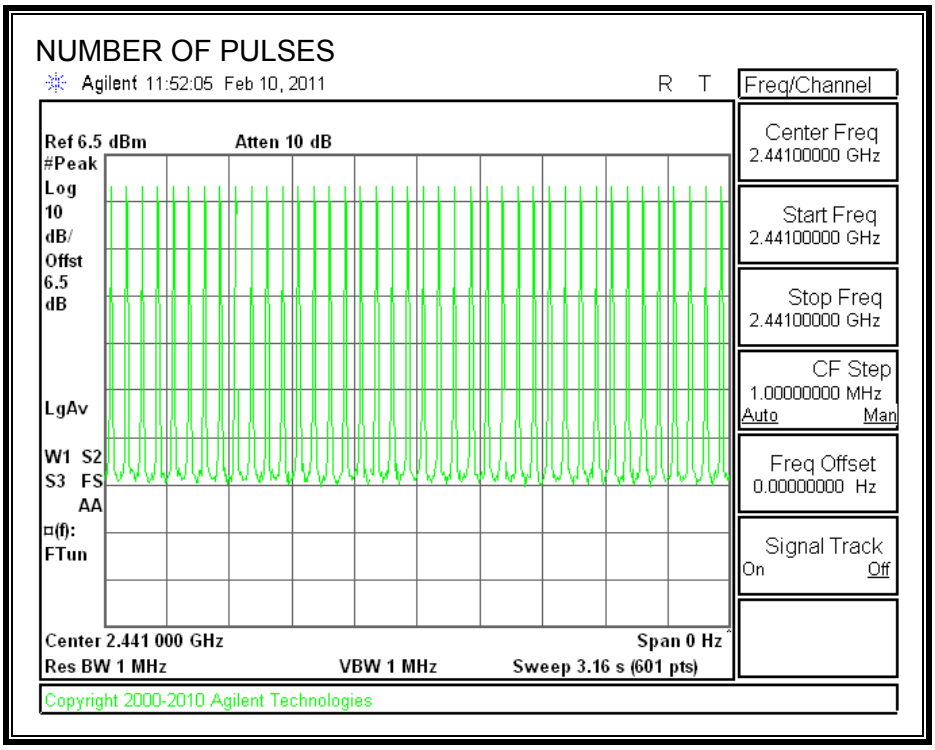
8PSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.4133	41	0.169	0.4	-0.231
DH3	1.658	14	0.232	0.4	-0.168
DH5	2.9	11	0.319	0.4	-0.081

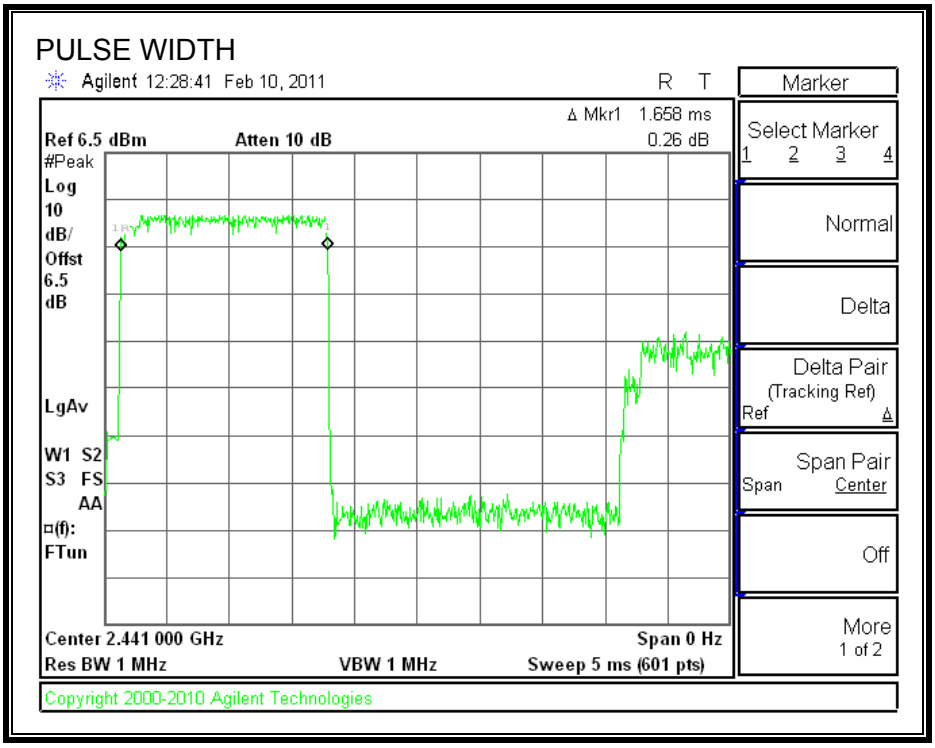
3DH1 PULSE WIDTH



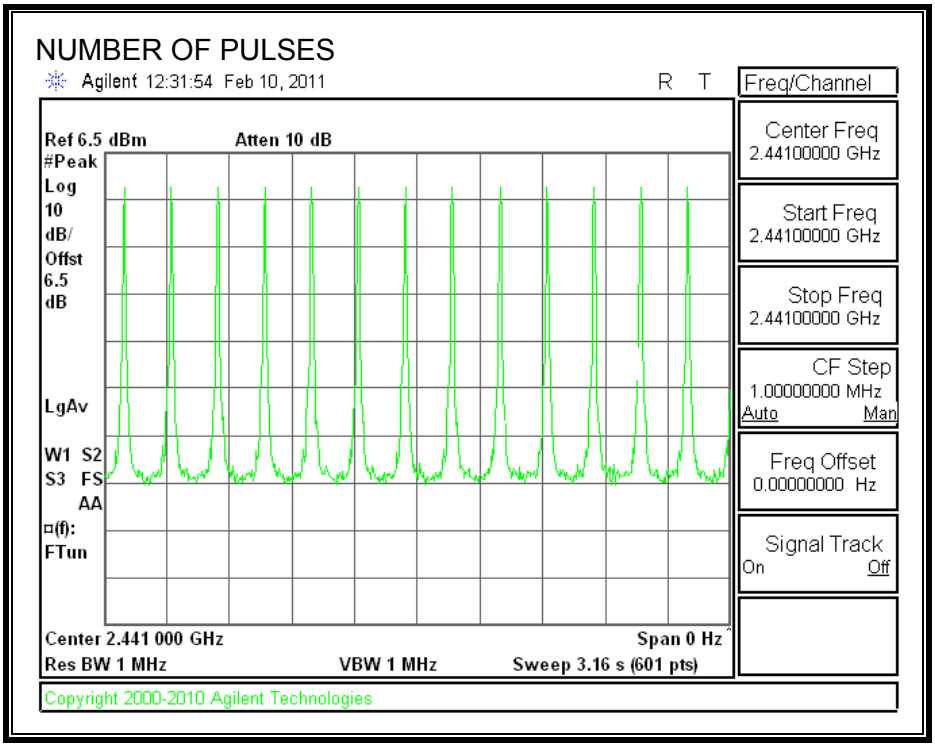
3DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



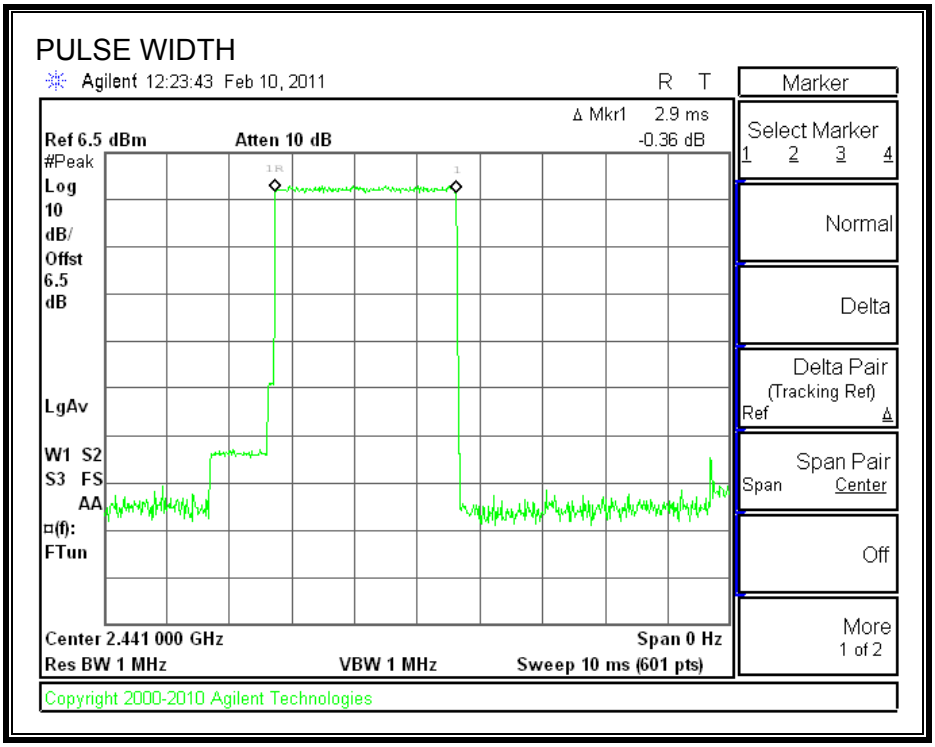
3DH3 PULSE WIDTH



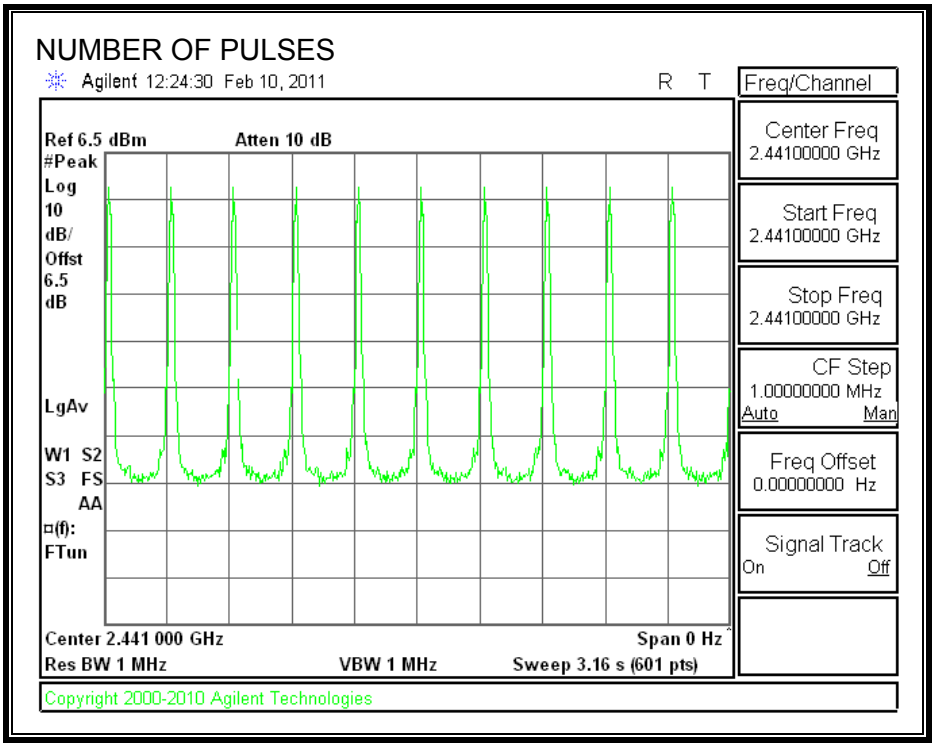
3DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



3DH5 PULSE WIDTH



3DH5 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.2.2. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

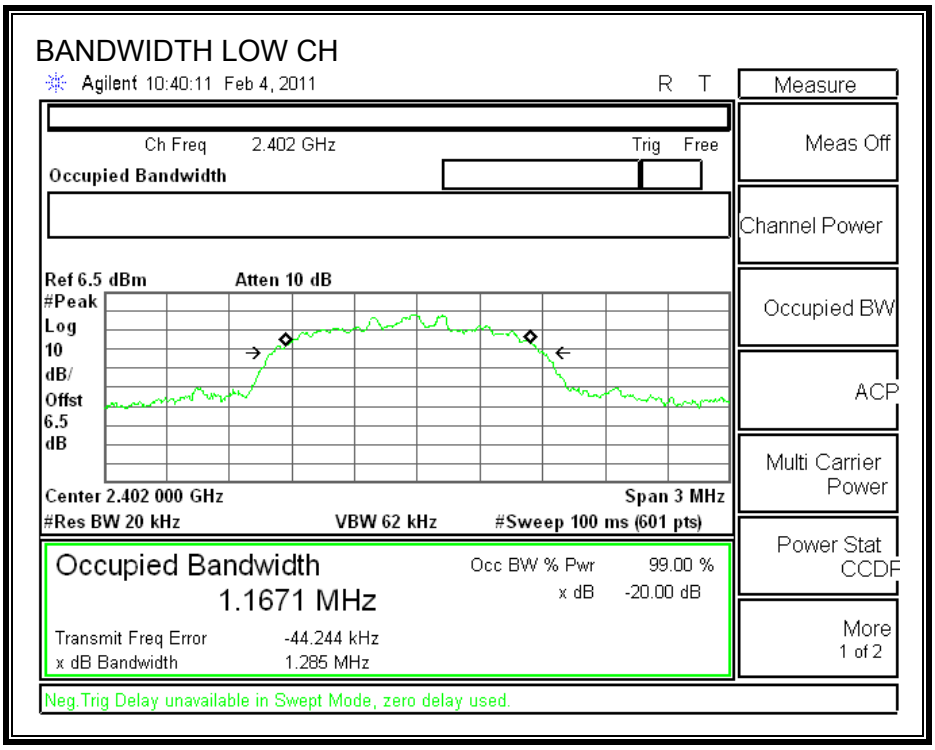
TEST PROCEDURE

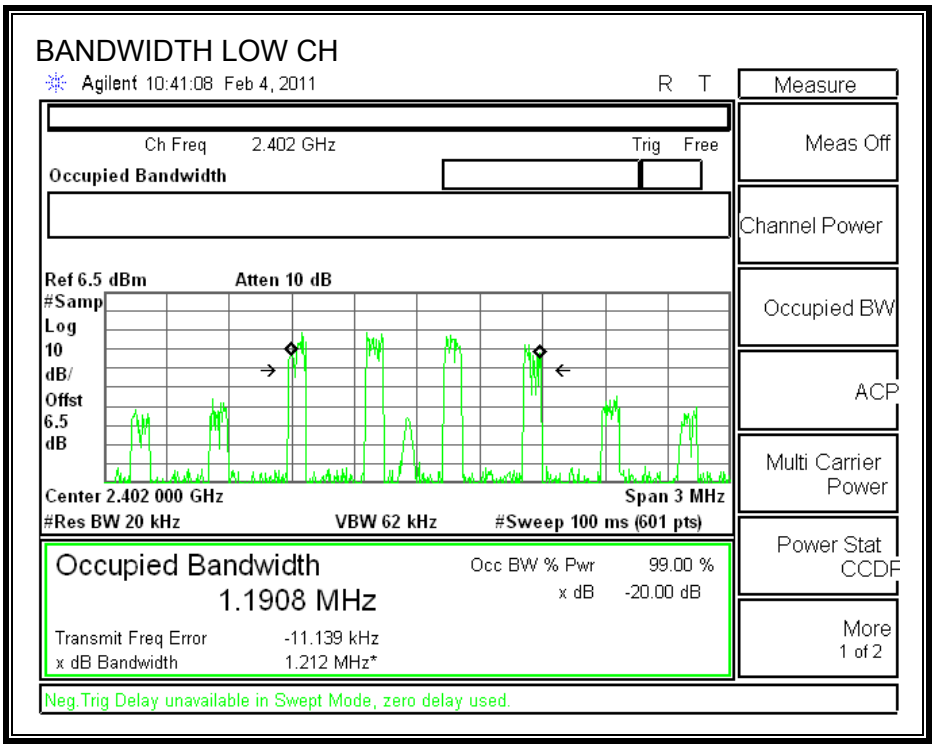
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

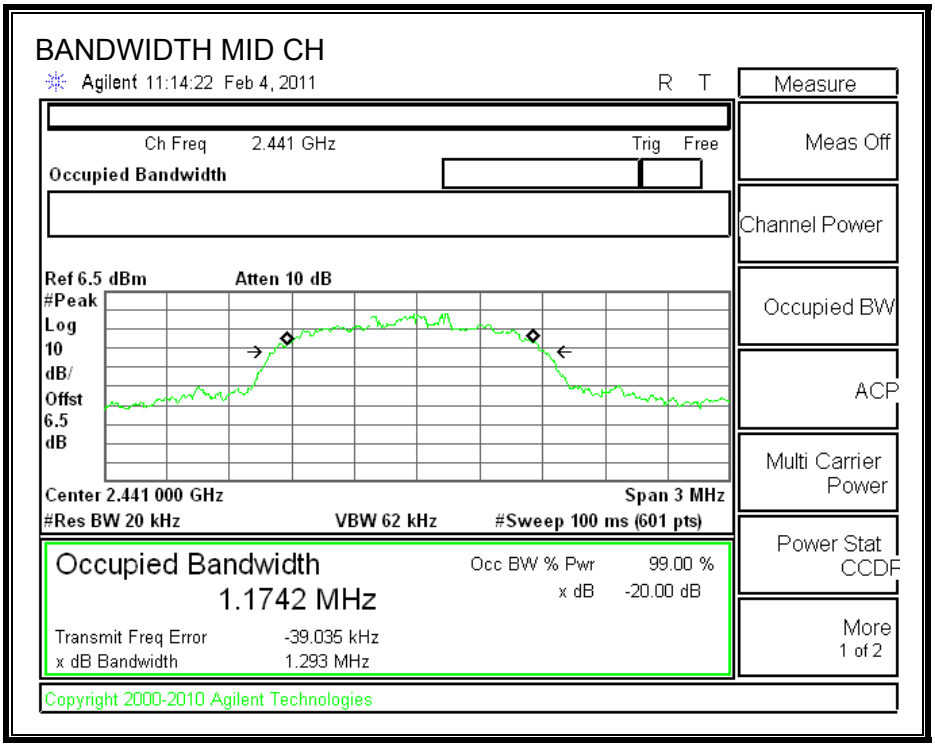
RESULTS

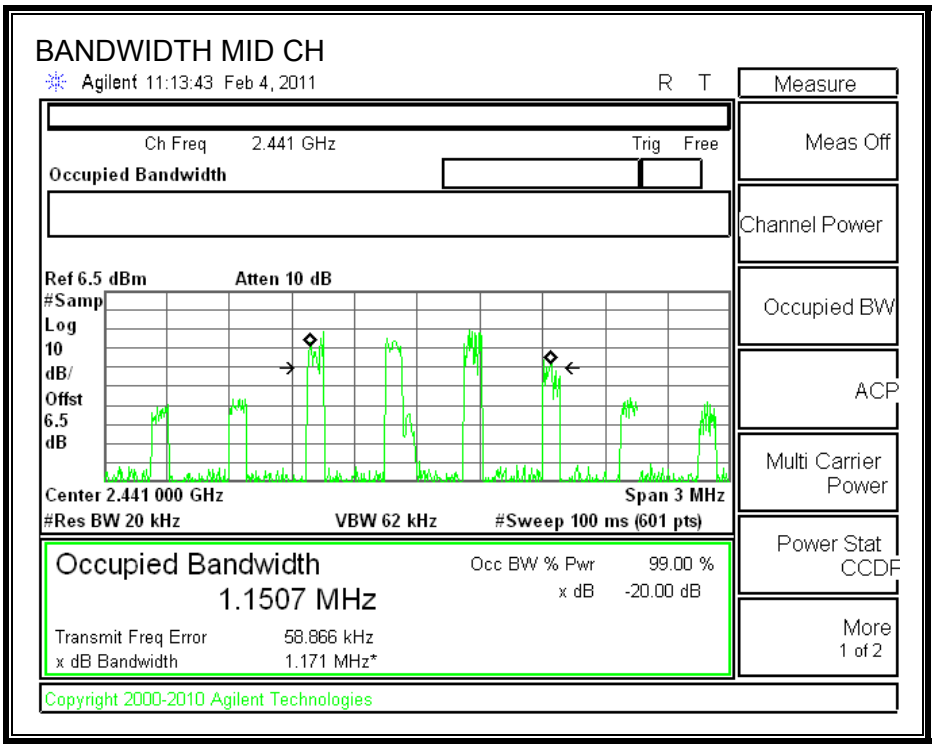
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.285	1.1908
Middle	2441	1.293	1.1507
High	2480	1.290	1.878

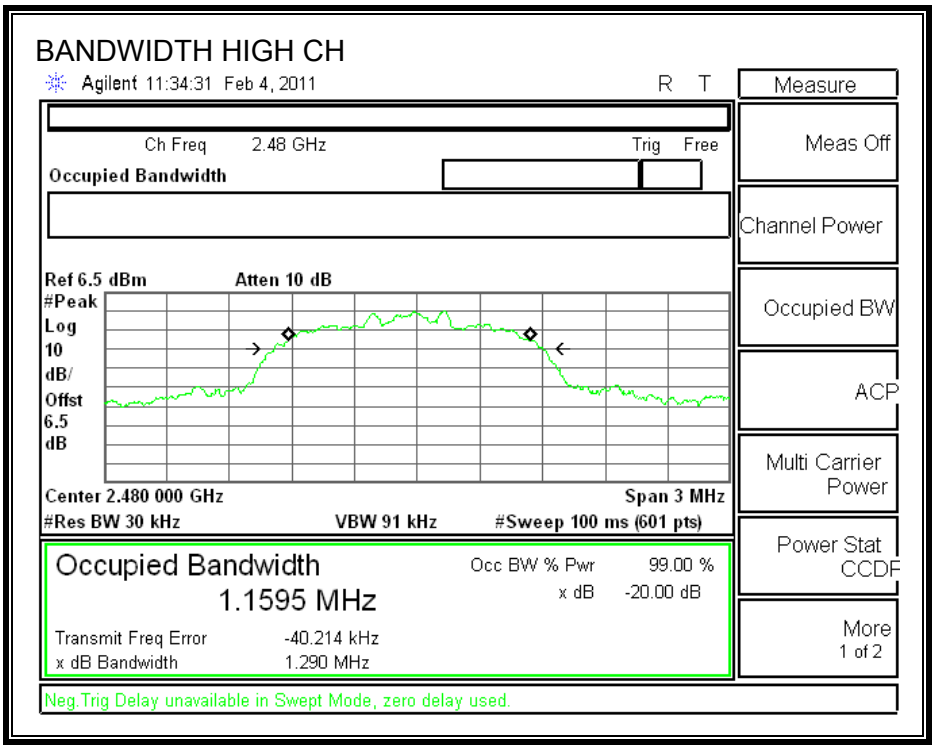
20 dB AND 99% BANDWIDTH

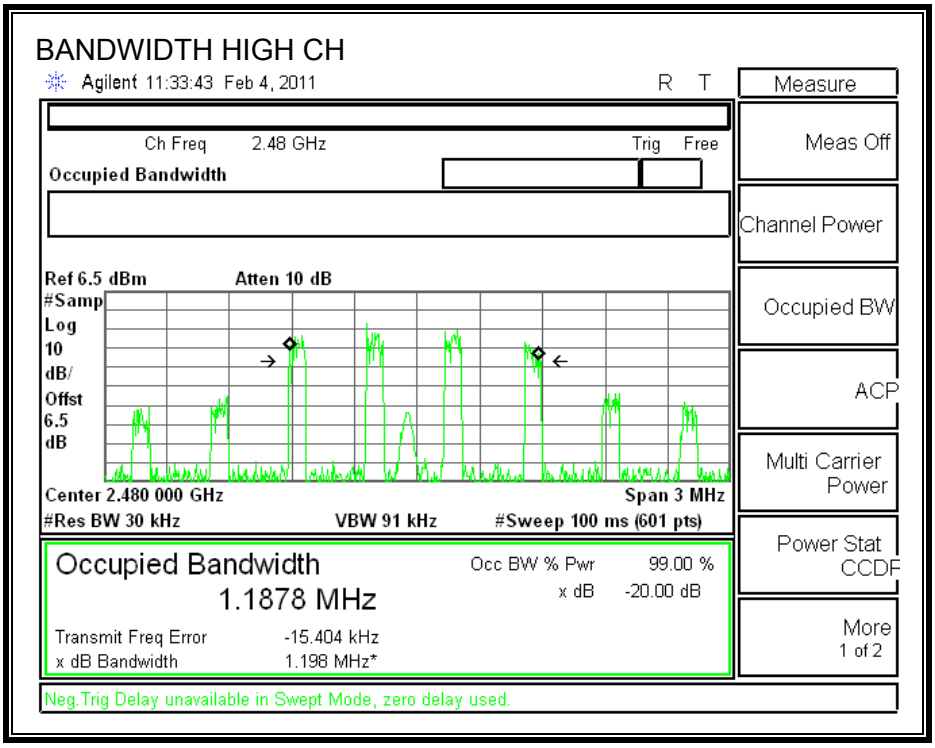












7.2.3. HOPPING FREQUENCY SEPARATION

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.

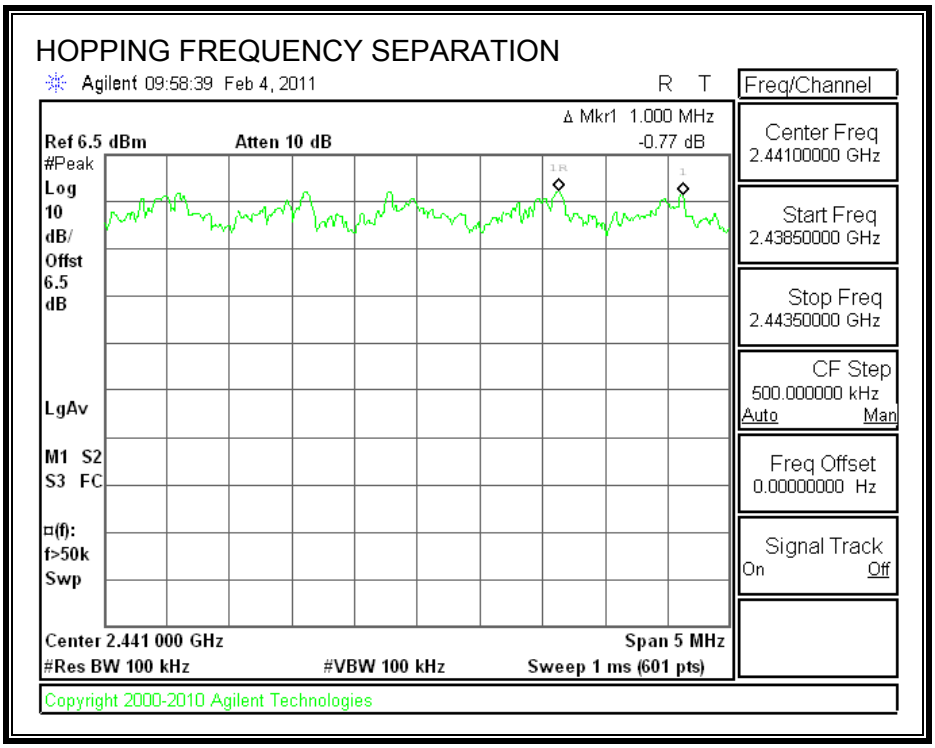
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.4. 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.

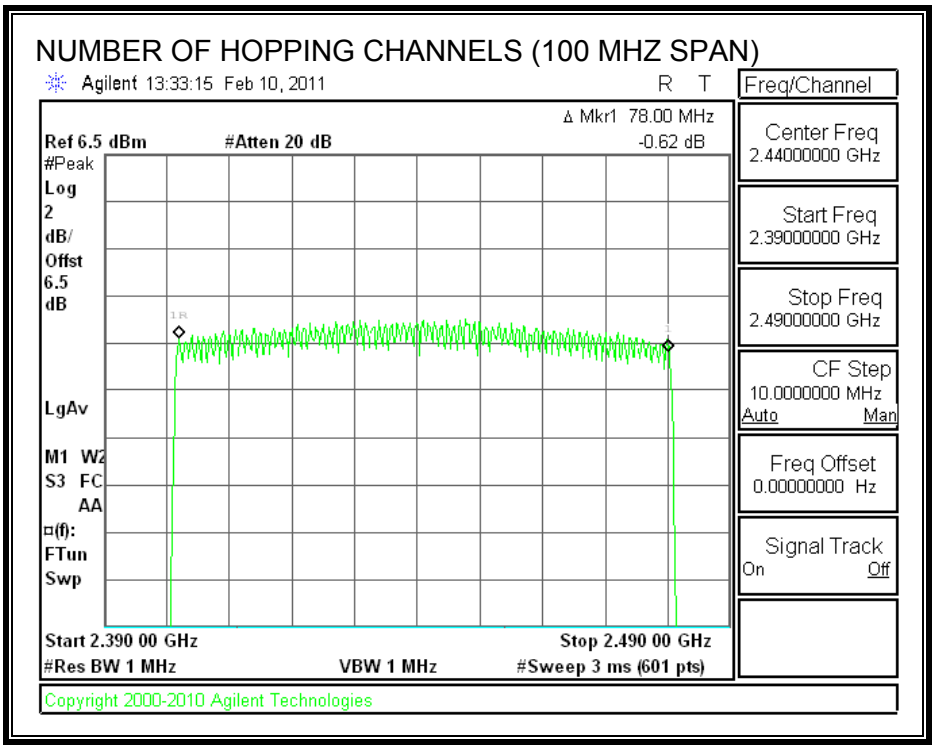
TEST PROCEDURE

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.

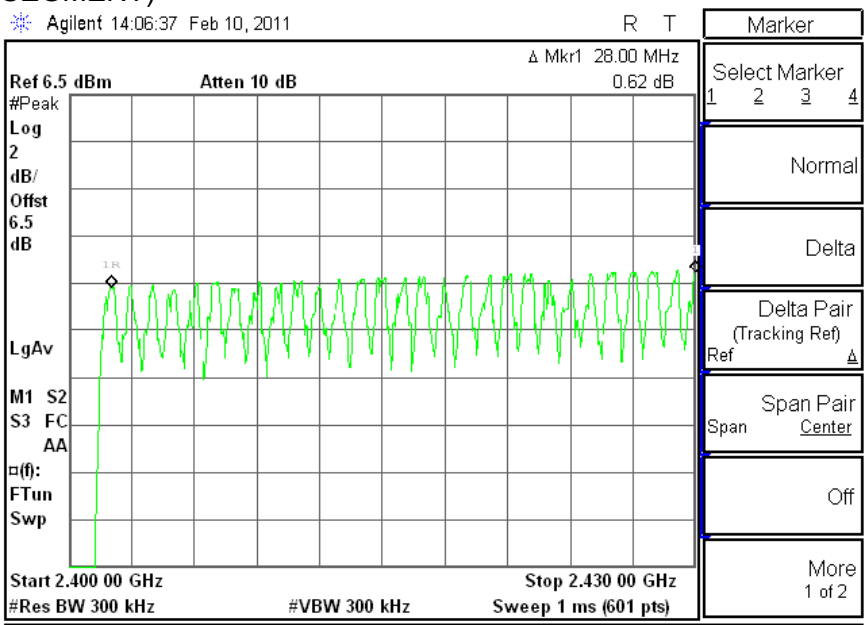
RESULTS

79 Channels observed.

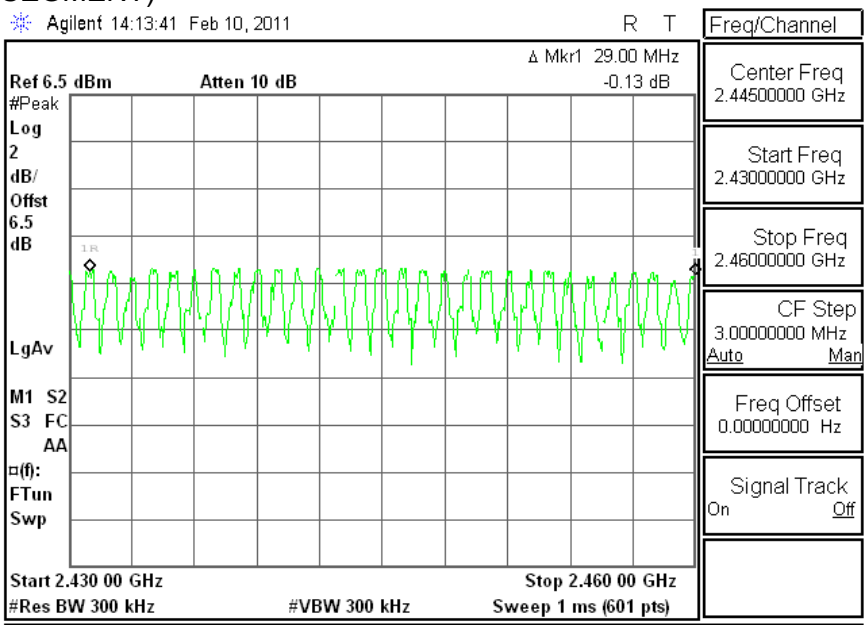
NUMBER OF HOPPING CHANNELS



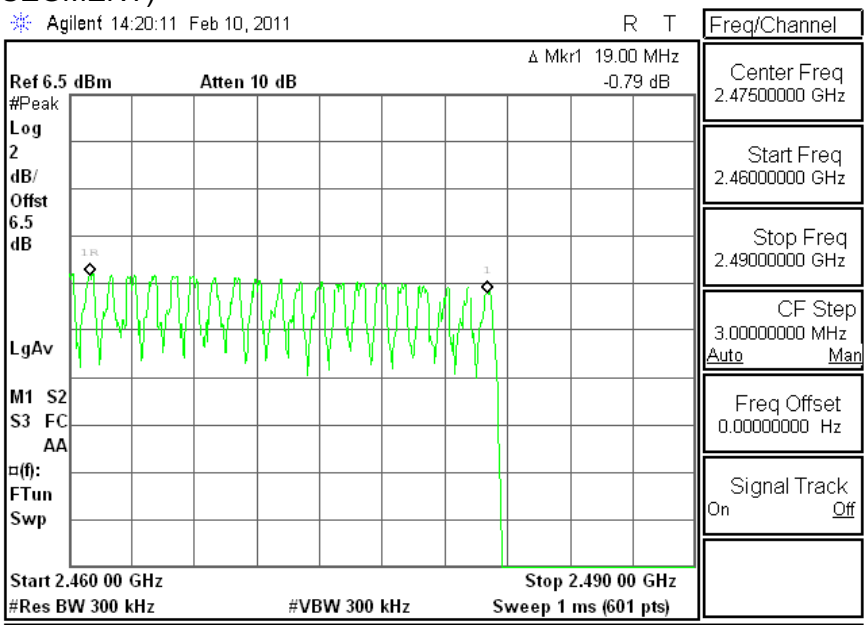
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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 30 dBm.

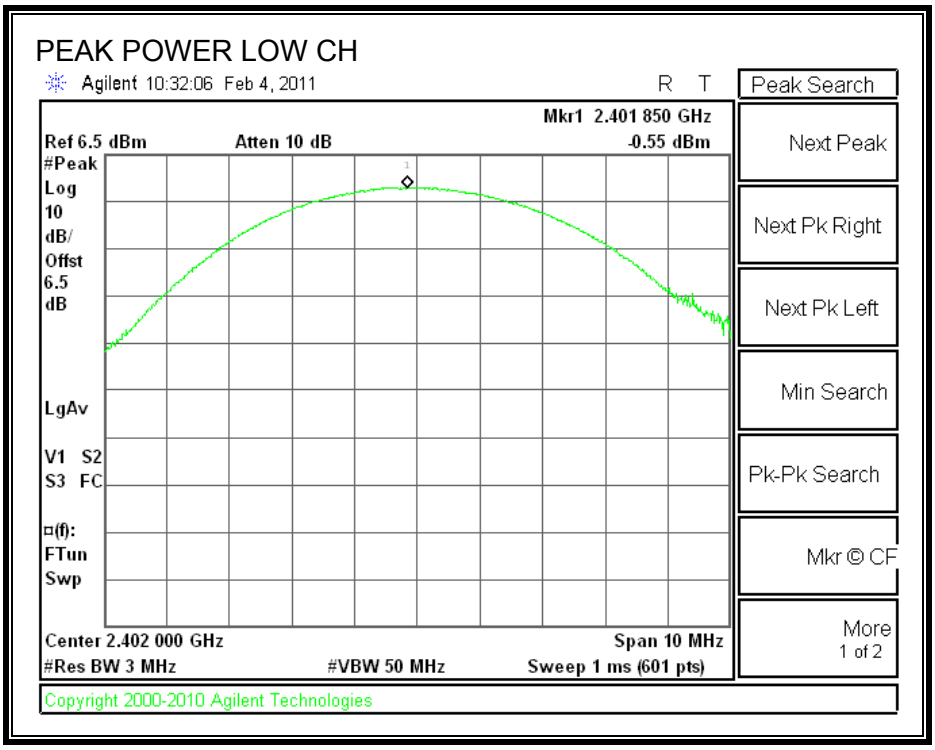
TEST PROCEDURE

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.

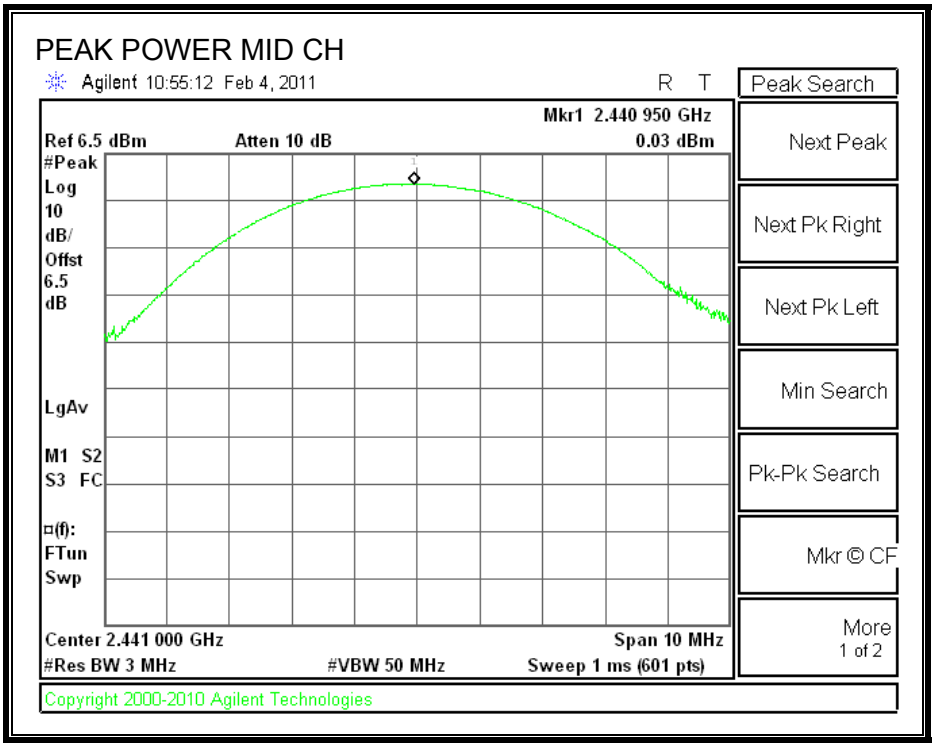
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.55	30	-30.55
Middle	2441	0.03	30	-29.97
High	2480	-0.61	30	-30.61

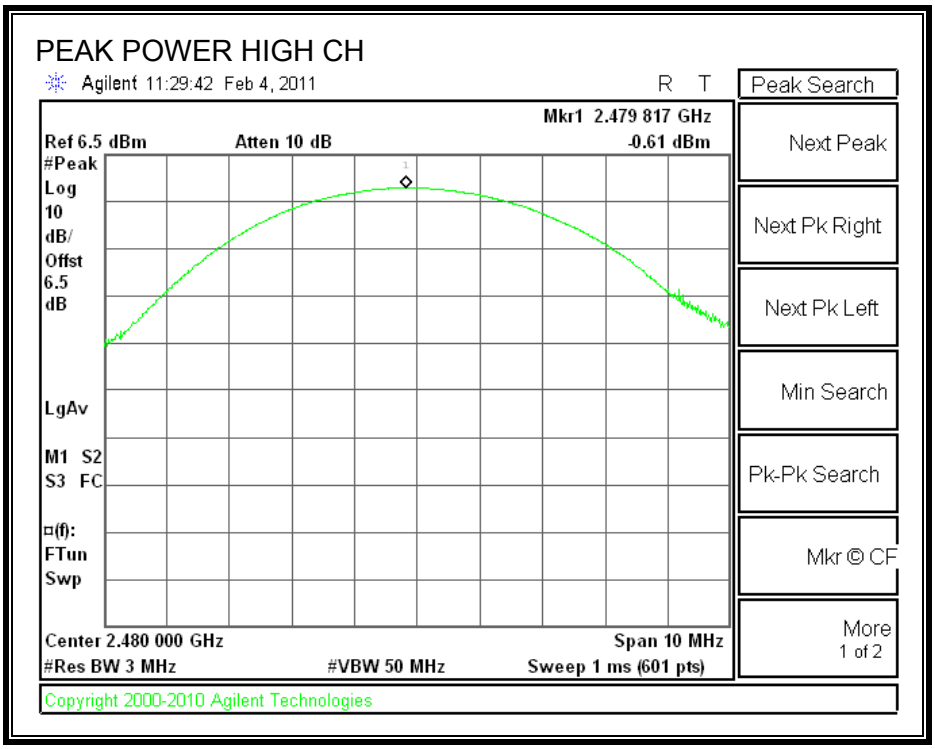
OUTPUT POWER



PEAK POWER MID CH



PEAK POWER HIGH CH



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 6.5 dB (including 6 dB pad and .5 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	-1.99
Middle	2441	-1.01
High	2480	-1.39

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

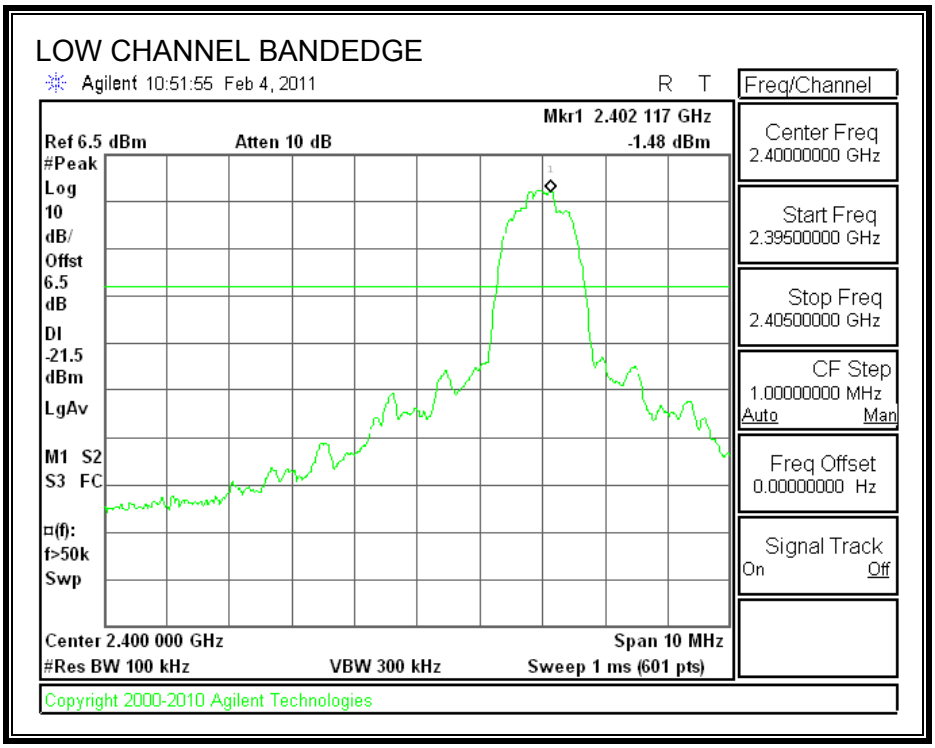
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

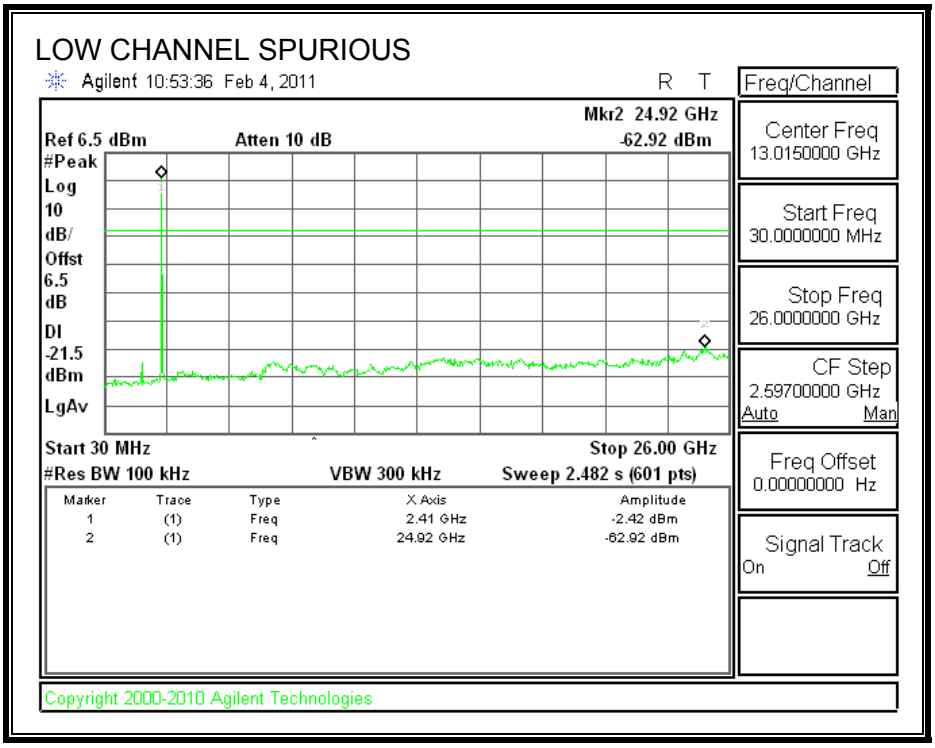
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

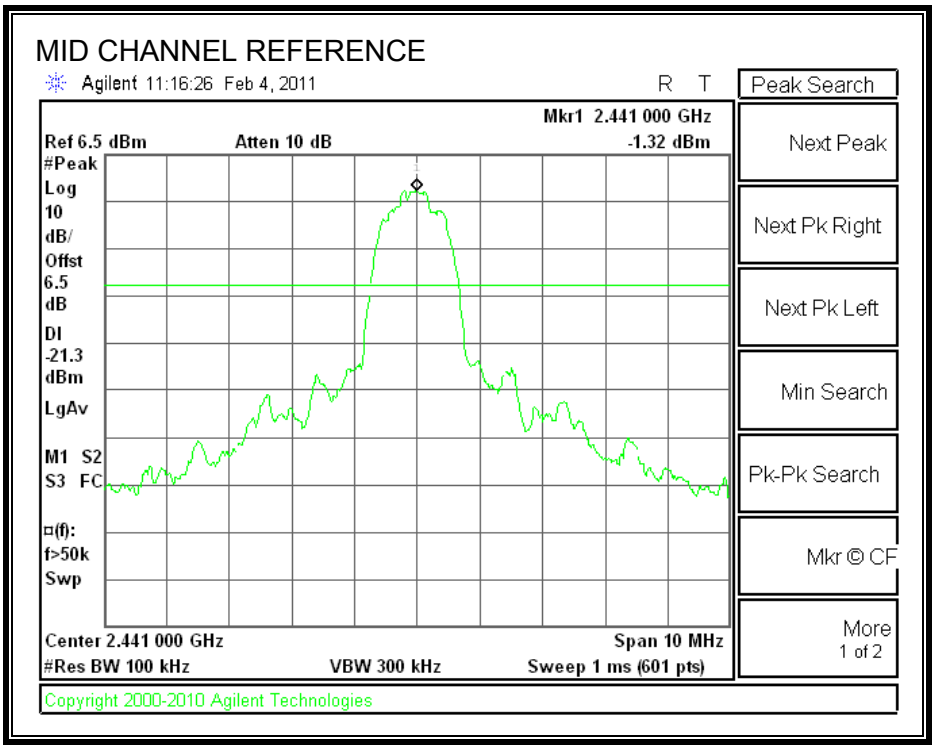
RESULTS

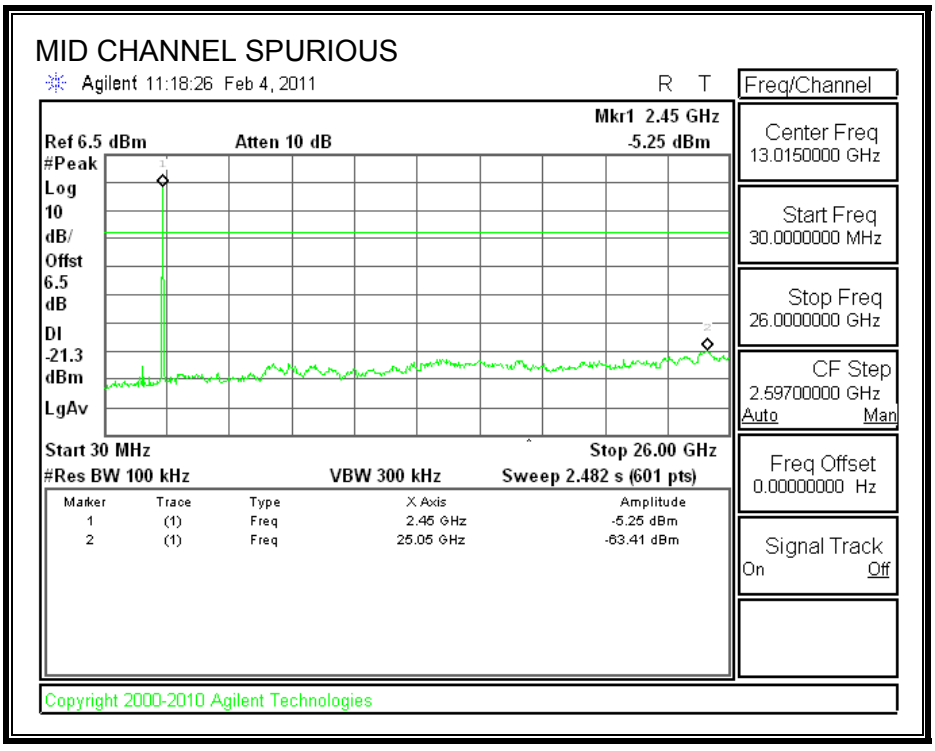
SPURIOUS EMISSIONS, LOW CHANNEL



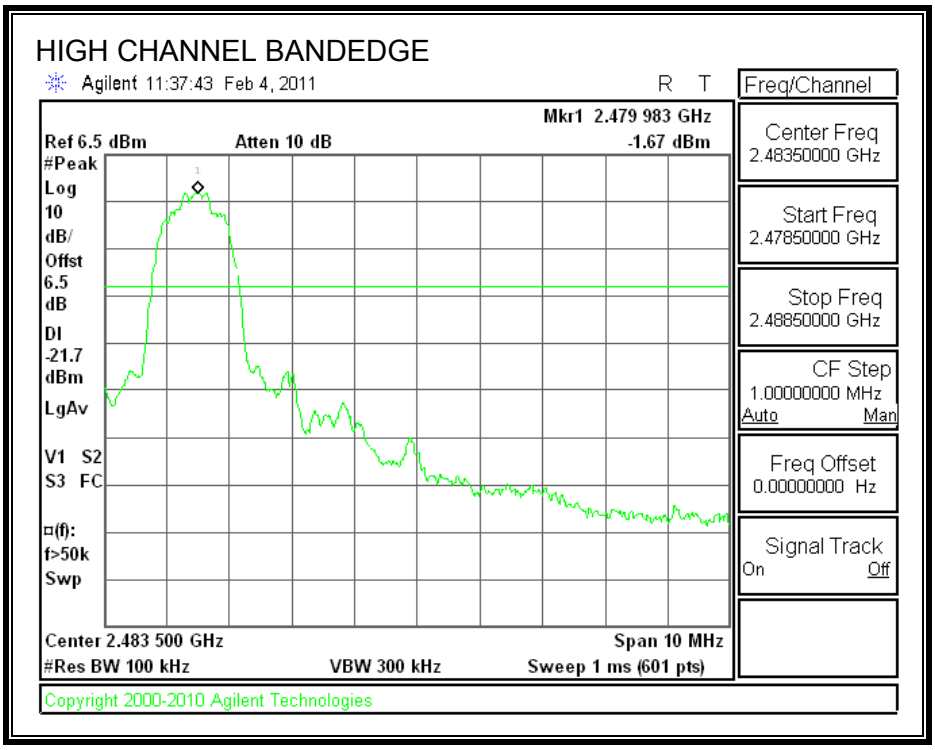


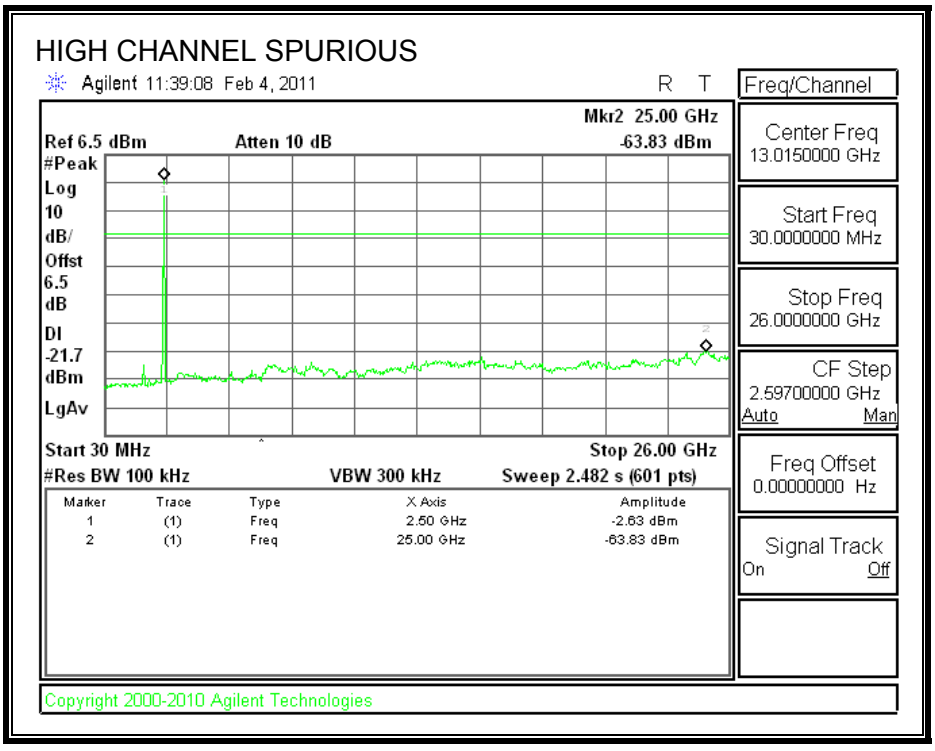
SPURIOUS EMISSIONS, MID CHANNEL



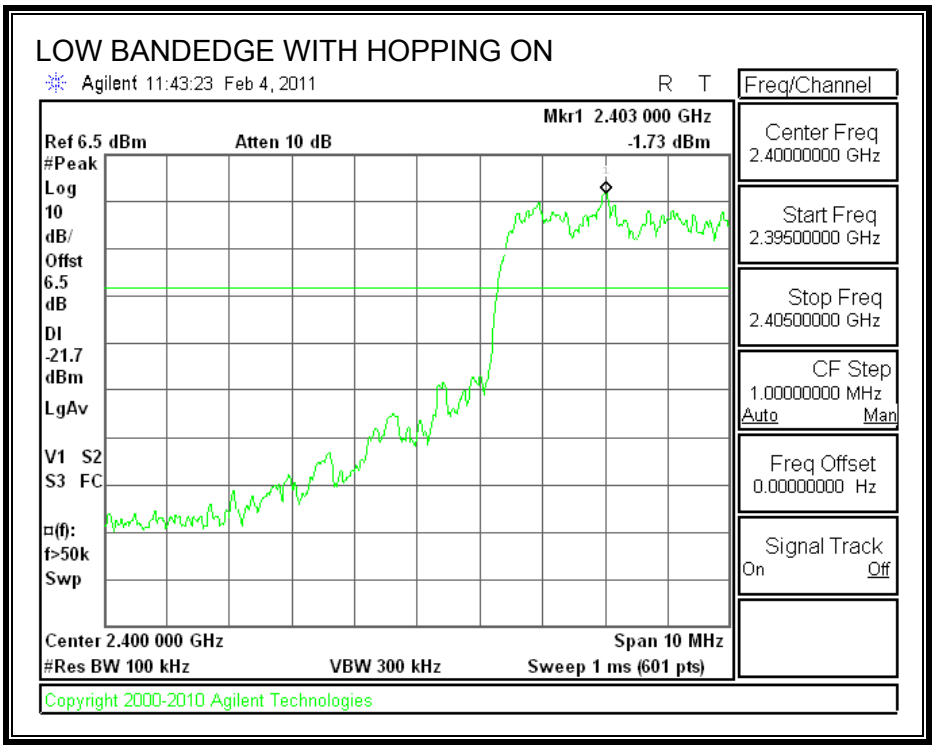


SPURIOUS EMISSIONS, HIGH CHANNEL

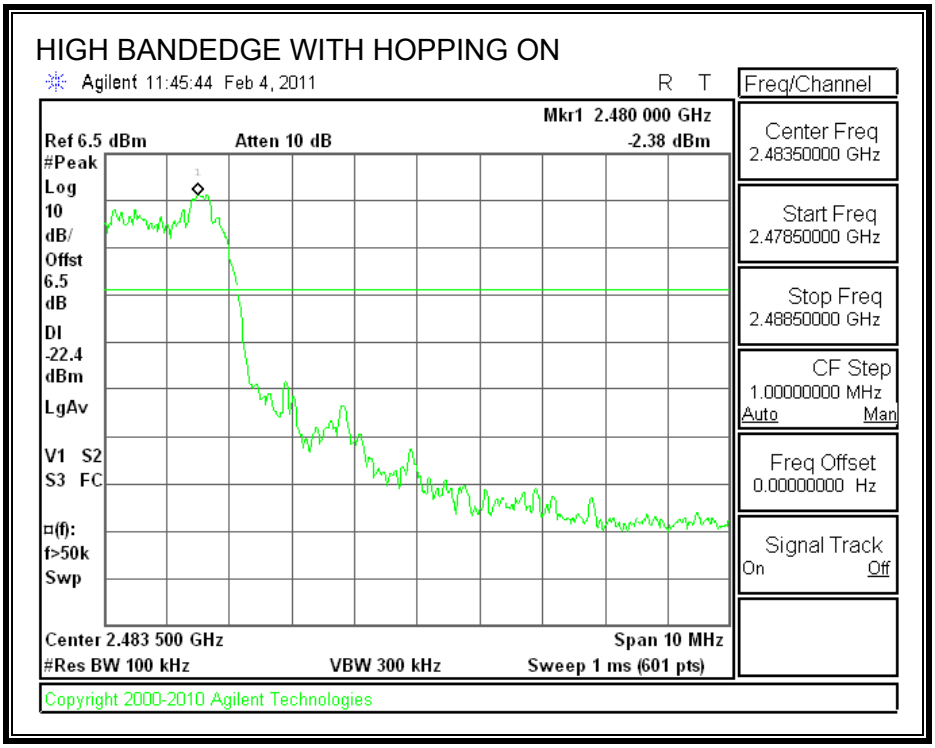




SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



HIGH BANDEDGE 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.

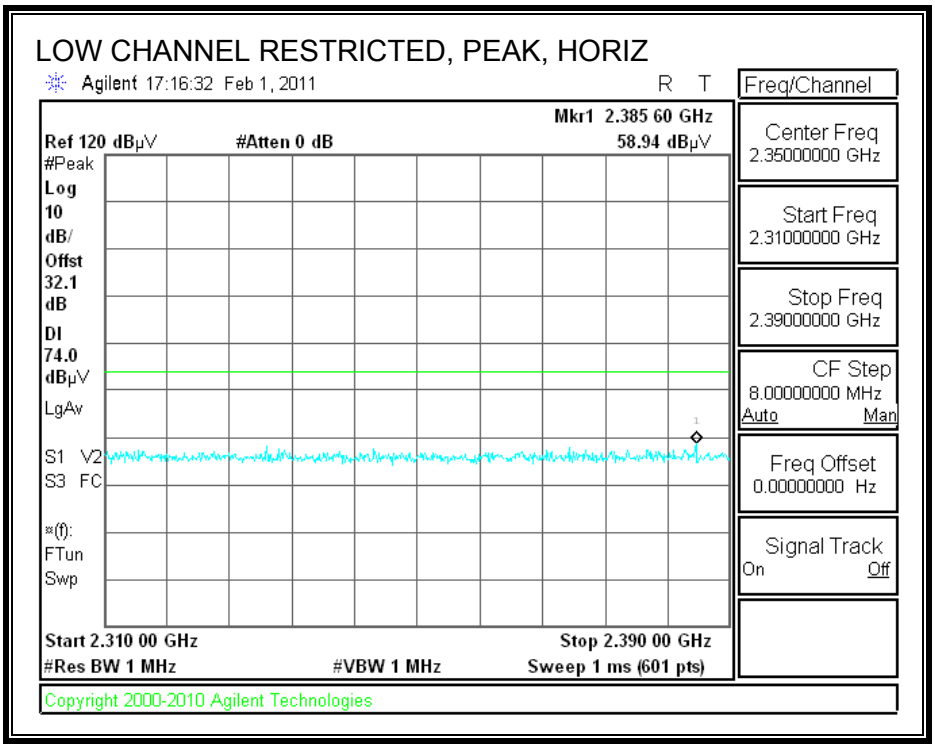
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

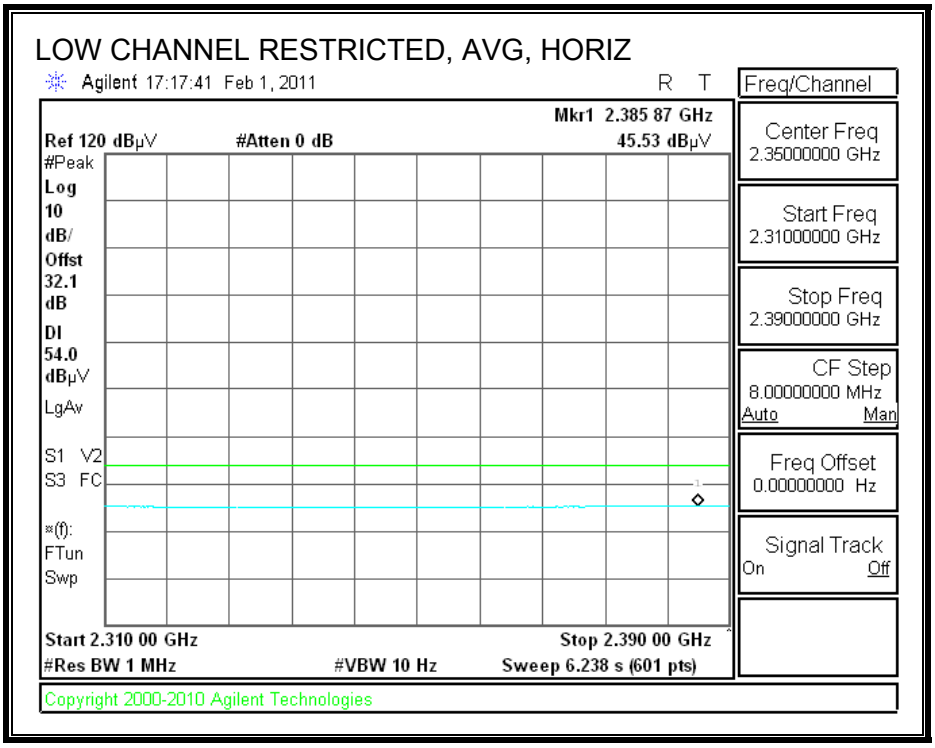
8.2. RADIATED EMISSIONS ABOVE 1 GHZ

8.2.1. BASIC DATA RATE GFSK MODULATION

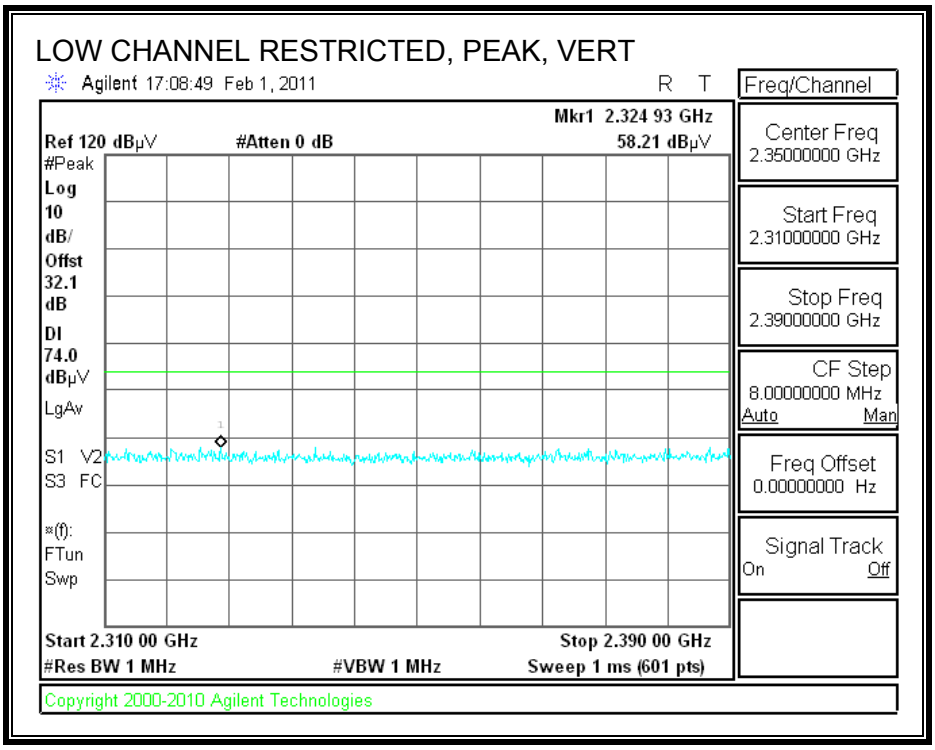
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

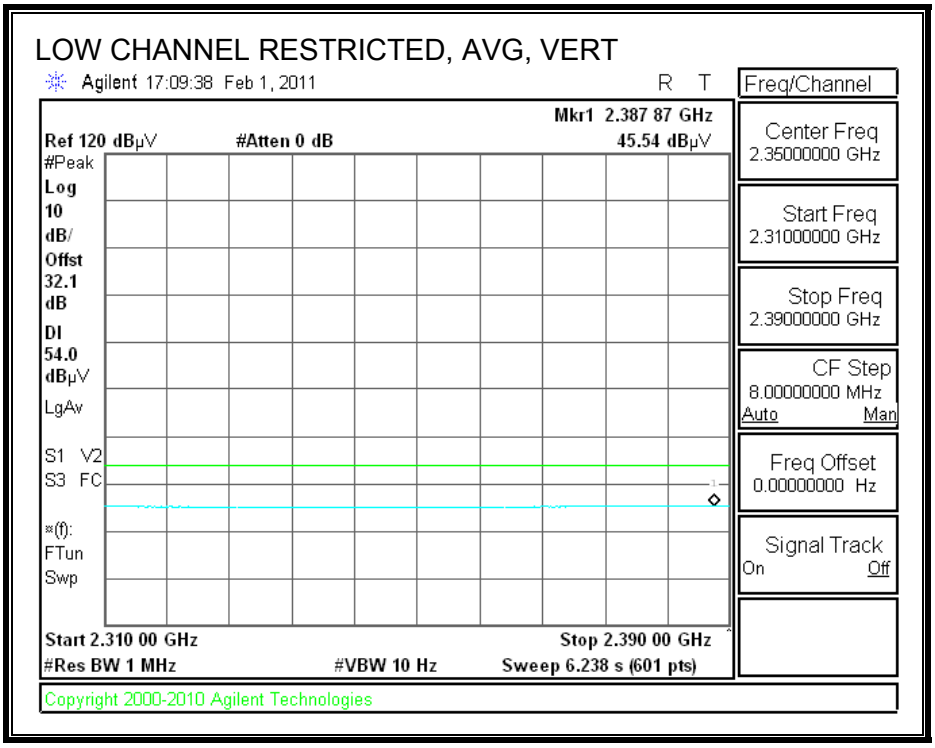


LOW CHANNEL RESTRICTED, AVG, HORIZ

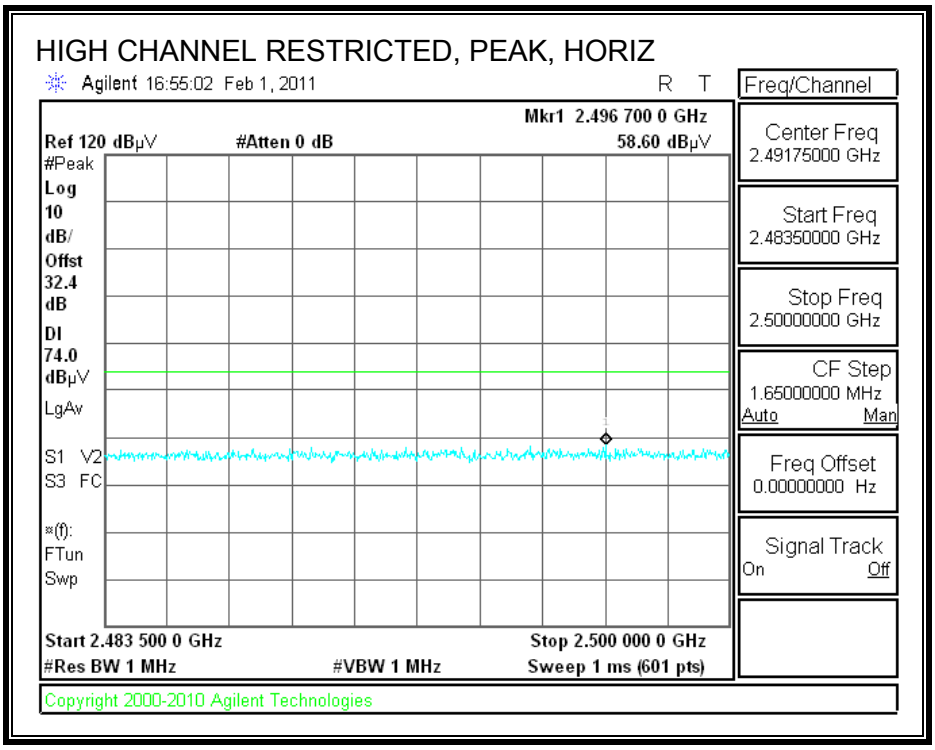


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

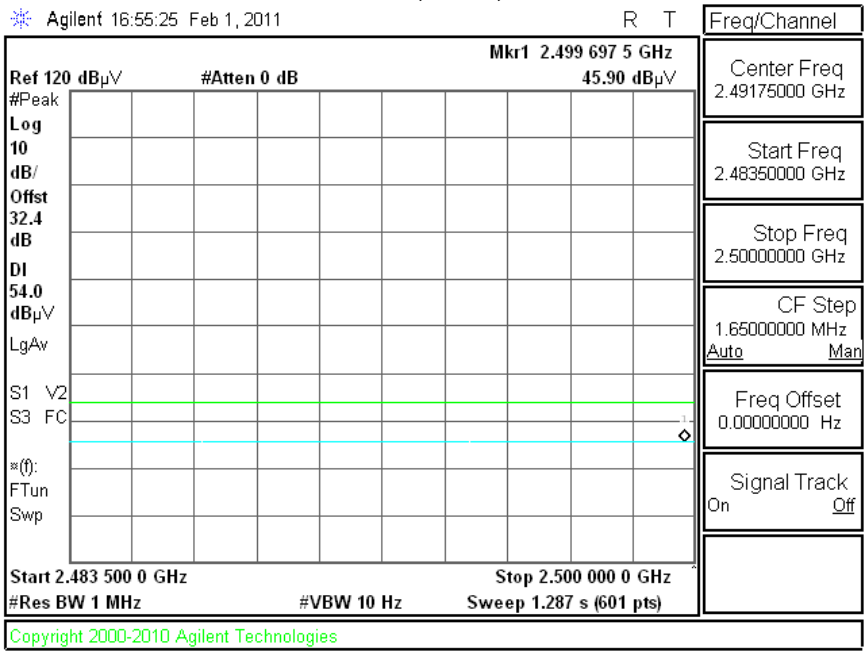




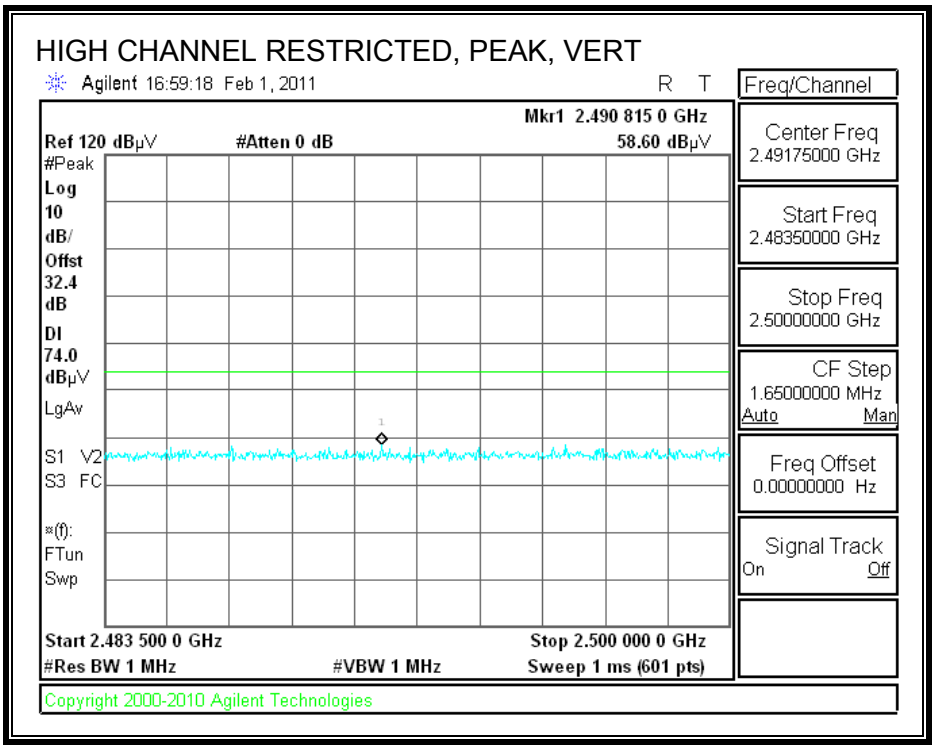
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



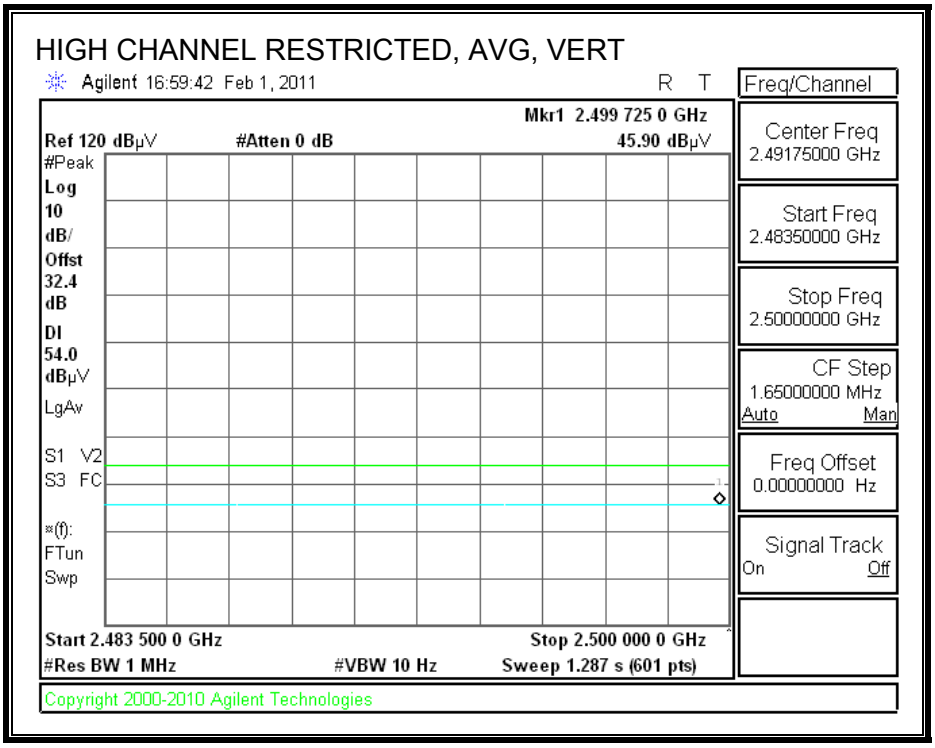
HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL RESTRICTED, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Kopin Corporation
Project #: 10U13572
Date: 2/1/2011
Test Engineer: Thanh Nguyen
Configuration: EUT only
Mode: Bluetooth Tx GFSK

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931		T125; ARA 18-26GHz; S/N:1007	FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

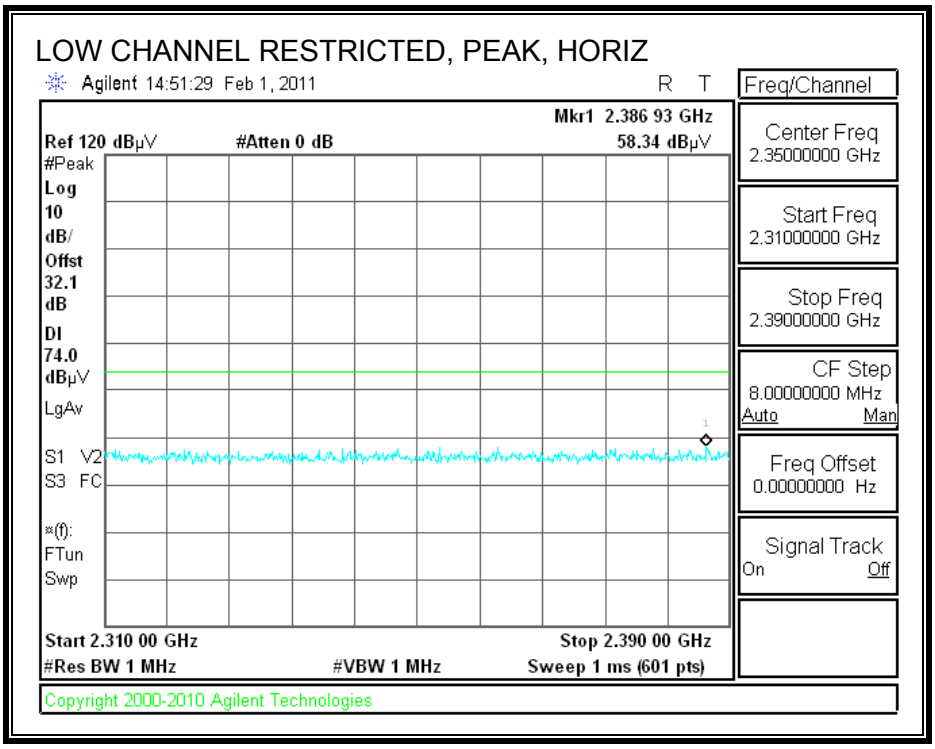
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low ch															
4.804	3.0	38.6	25.4	33.0	5.8	-36.5	0.0	0.0	40.9	27.7	74	54	-33.1	-26.3	V
7.206	3.0	36.8	24.5	35.1	7.2	-36.2	0.0	0.0	42.9	30.6	74	54	-31.1	-23.4	Noise floor
4.804	3.0	41.4	25.8	33.0	5.8	-36.5	0.0	0.0	43.7	28.1	74	54	-30.3	-25.9	V
7.206	3.0	36.8	24.5	35.1	7.2	-36.2	0.0	0.0	42.9	30.6	74	54	-31.1	-23.4	Noise floor
Mid ch															
4.882	3.0	40.0	28.4	33.1	5.8	-36.5	0.0	0.0	42.4	30.9	74	54	-31.6	-23.1	V
7.323	3.0	36.4	24.7	35.3	7.3	-36.2	0.0	0.0	42.7	31.0	74	54	-31.3	-23.0	Noise floor
4.882	3.0	43.6	28.4	33.1	5.8	-36.5	0.0	0.0	46.1	30.8	74	54	-27.9	-23.2	H
7.323	3.0	36.5	24.1	35.3	7.3	-36.2	0.0	0.0	42.9	30.4	74	54	-31.1	-23.6	Noise floor
High Ch															
4.960	3.0	39.1	32.1	33.2	5.9	-36.5	0.0	0.0	41.7	34.8	74	54	-32.3	-19.2	V
7.440	3.0	38.4	24.8	35.5	7.3	-36.2	0.0	0.0	45.0	31.4	74	54	-29.0	-22.6	Noise floor
4.960	3.0	42.4	28.8	33.2	5.9	-36.5	0.0	0.0	45.0	31.4	74	54	-29.0	-22.6	H
7.440	3.0	36.8	25.4	35.5	7.3	-36.2	0.0	0.0	43.4	32.0	74	54	-30.6	-22.0	Noise floor

Rev. 07.22.09

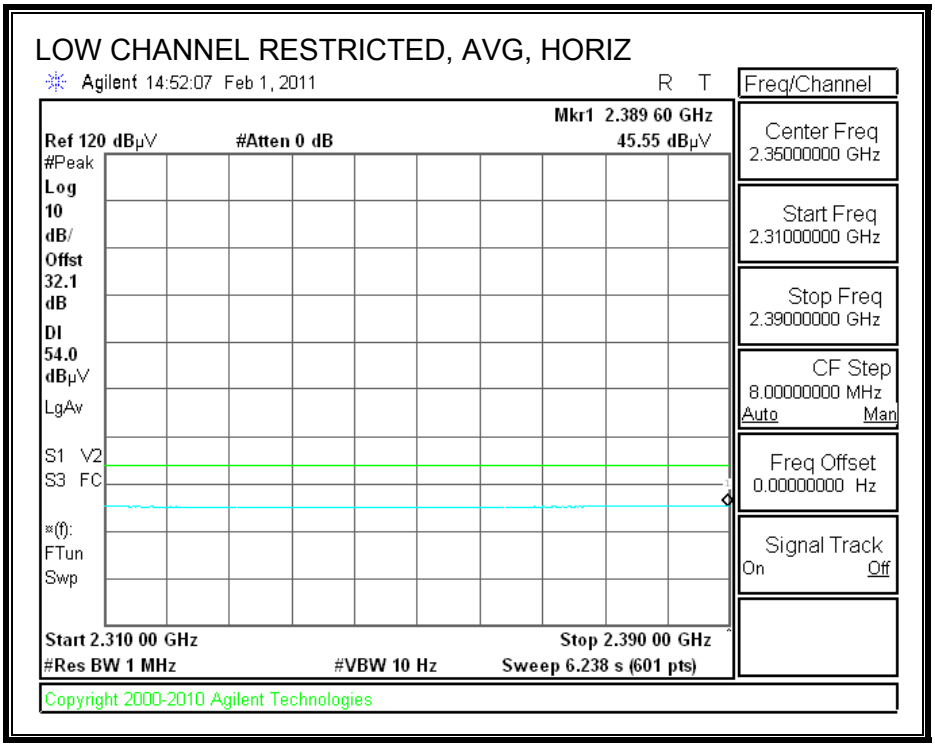
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

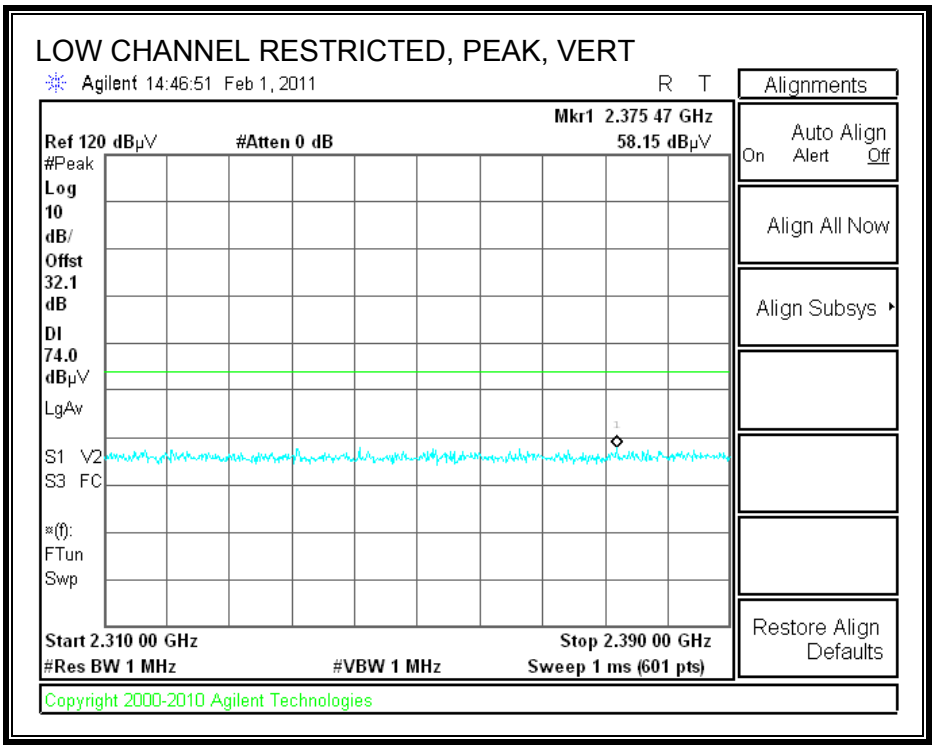
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

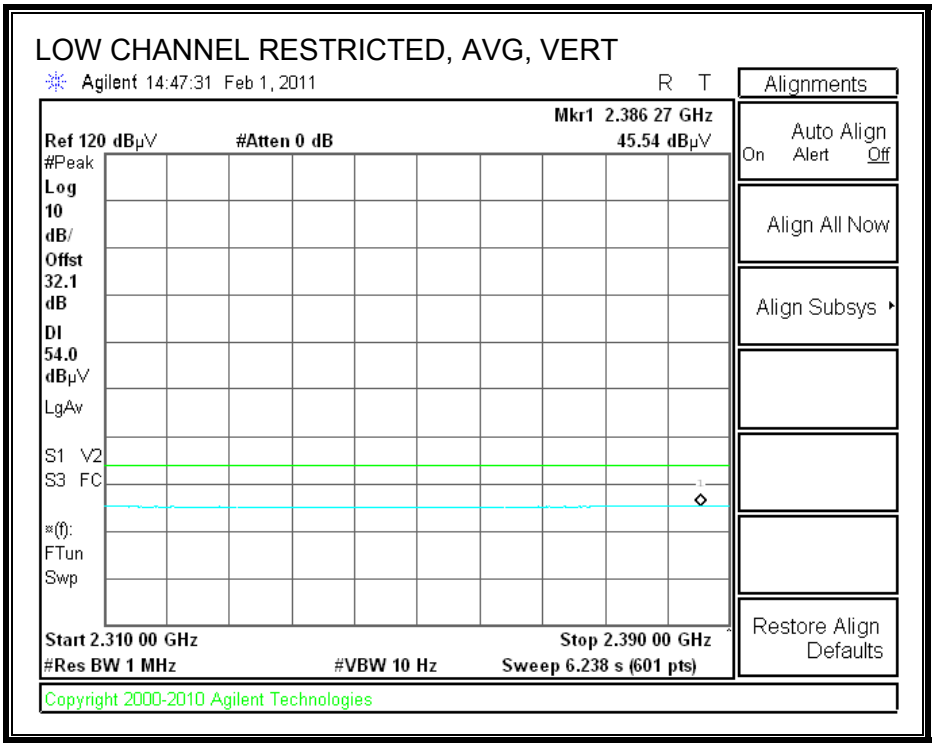


LOW CHANNEL RESTRICTED, AVG, HORIZ

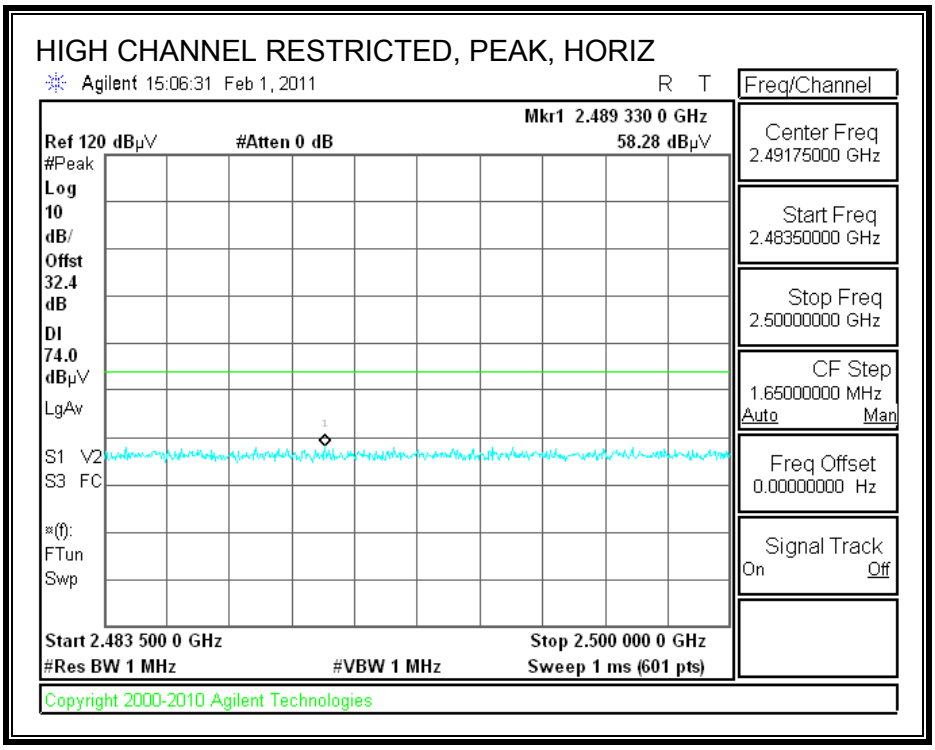


RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

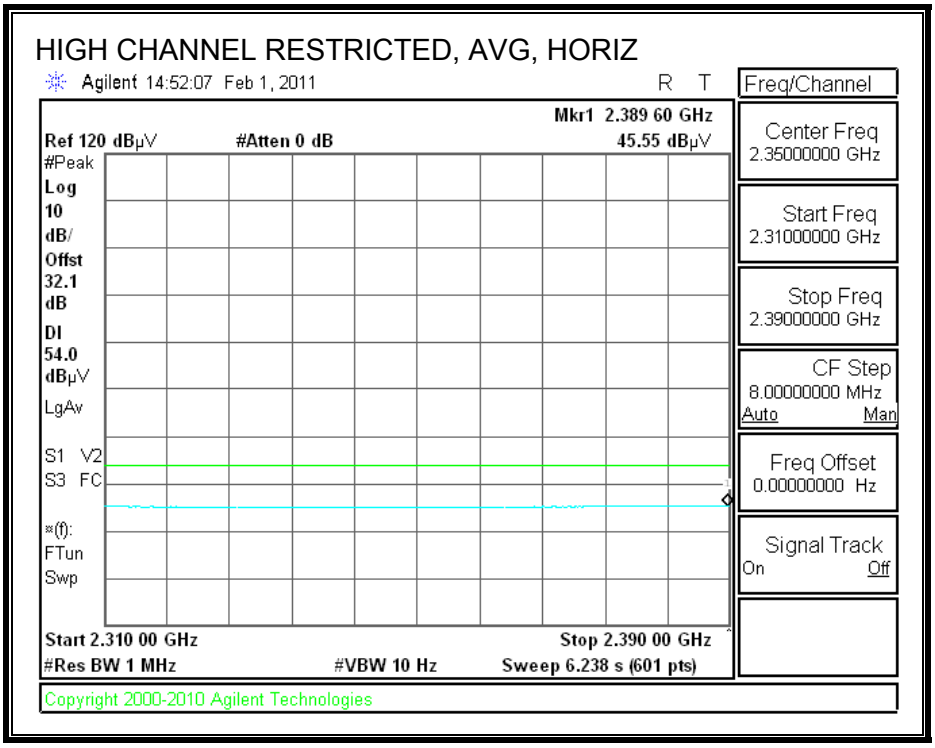




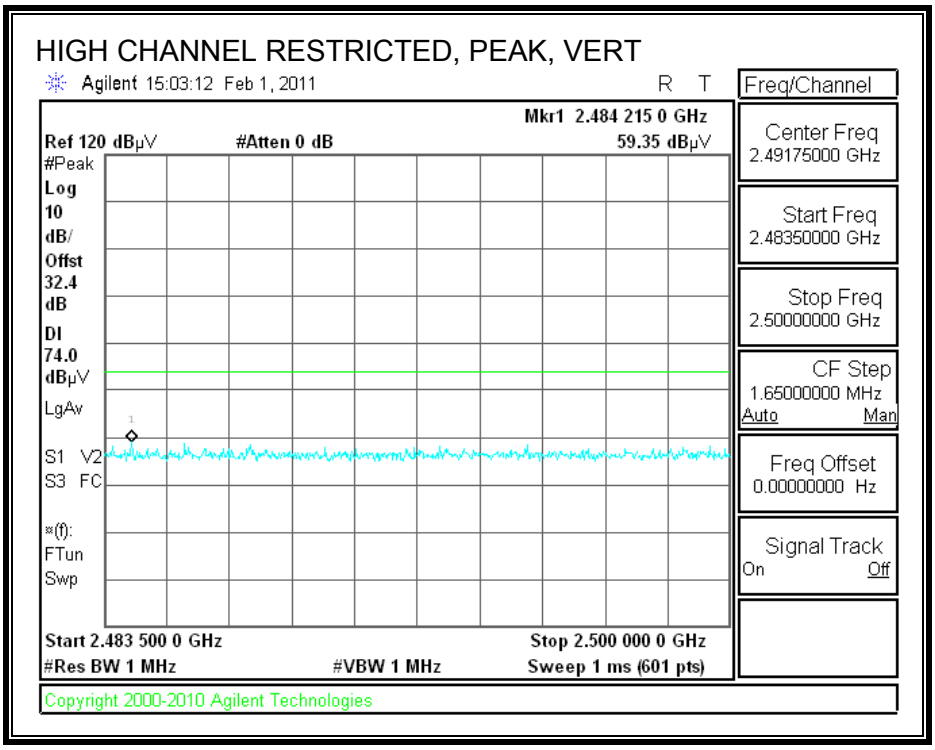
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

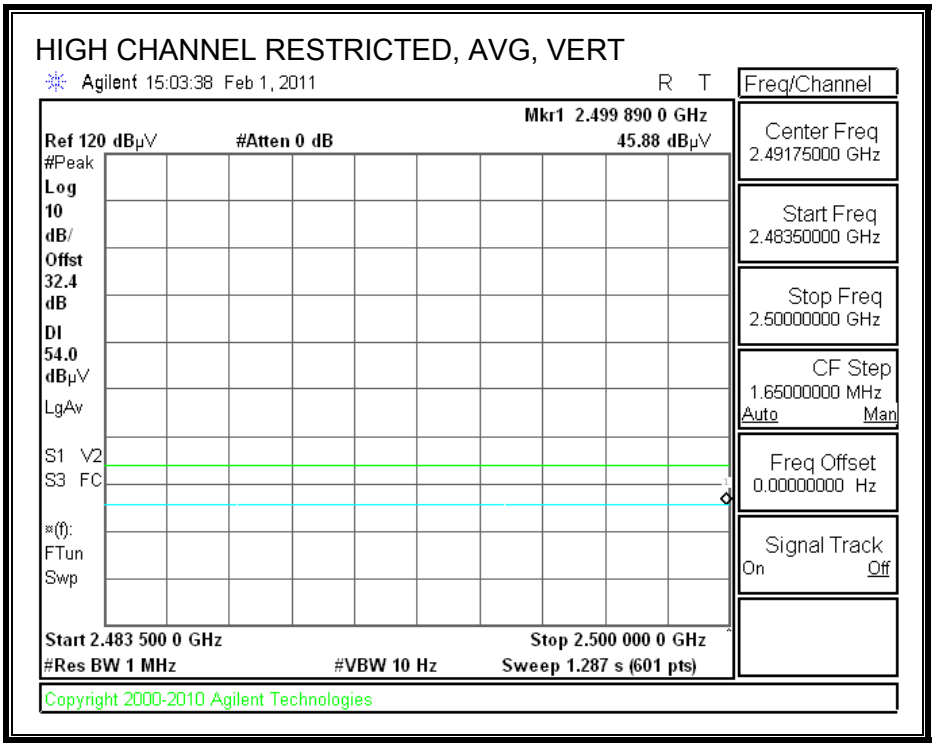


HIGH CHANNEL RESTRICTED, AVG, HORIZ



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	Kopin Corporation
Project #:	10U13572
Date:	2/1/2011
Test Engineer:	Thanh Nguyen
Configuration:	EUT only
Mode:	Bluetooth Tx 8PSK

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931		T125; ARA 18-26GHz; S/N:1007	FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low ch															
4.804	3.0	42.5	31.4	33.0	5.8	-36.5	0.0	0.0	44.8	33.8	74	54	-29.2	-20.2	V
7.206	3.0	34.7	25.7	35.1	7.2	-36.2	0.0	0.0	40.8	31.8	74	54	-33.2	-22.2	Noise floor
4.804	3.0	42.4	25.4	33.0	5.8	-36.5	0.0	0.0	44.7	27.7	74	54	-29.3	-26.3	V
7.206	3.0	35.8	25.7	35.1	7.2	-36.2	0.0	0.0	41.9	31.8	74	54	-32.1	-22.2	Noise floor
Mid ch															
4.882	3.0	41.3	30.2	33.1	5.8	-36.5	0.0	0.0	43.8	32.7	74	54	-30.2	-21.3	V
7.323	3.0	35.8	25.9	35.3	7.3	-36.2	0.0	0.0	42.1	32.3	74	54	-31.9	-21.7	Noise floor
4.882	3.0	42.4	29.6	33.1	5.8	-36.5	0.0	0.0	44.8	32.0	74	54	-29.2	-22.0	H
7.323	3.0	38.5	25.7	35.3	7.3	-36.2	0.0	0.0	44.8	32.0	74	54	-29.2	-22.0	Noise floor
High Ch															
4.960	3.0	41.2	35.4	33.2	5.9	-36.5	0.0	0.0	43.8	38.1	74	54	-30.2	-15.9	V
7.440	3.0	40.5	26.8	35.5	7.3	-36.2	0.0	0.0	47.1	33.4	74	54	-26.9	-20.6	Noise floor
4.960	3.0	40.4	30.3	33.2	5.9	-36.5	0.0	0.0	43.0	32.9	74	54	-31.0	-21.1	H
7.440	3.0	39.2	28.4	35.5	7.3	-36.2	0.0	0.0	45.8	35.0	74	54	-28.2	-19.0	Noise floor

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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: Kopin Corporation
Project #: 10U13572
Date: 2/3/2011
Test Engineer: Thanh Nguyen
Configuration: EUT only
Mode: Bluetooth Receive

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 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
3' cable 22807700	12' cable 22807600	20' cable 22807500		

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low ch															
2.160	**3.0**	**49.3**	**42.3**	**27.6**	**3.6**	**-37.8**	**0.0**	**0.0**	**42.7**	**35.7**	**74**	**54**	**-31.3**	**-18.3**	**H**
2.988	**3.0**	**48.4**	**42.6**	**30.0**	**4.3**	**-37.4**	**0.0**	**0.0**	**45.3**	**39.5**	**74**	**54**	**-28.7**	**-14.5**	**V**
Mid ch															
2.160	**3.0**	**51.3**	**44.2**	**27.6**	**3.6**	**-37.8**	**0.0**	**0.0**	**44.7**	**37.6**	**74**	**54**	**-29.3**	**-16.4**	**H**
2.988	**3.0**	**47.4**	**40.3**	**30.0**	**4.3**	**-37.4**	**0.0**	**0.0**	**44.3**	**37.2**	**74**	**54**	**-29.7**	**-16.8**	**V**
High Ch															
2.158	**3.0**	**51.4**	**46.3**	**27.6**	**3.6**	**-37.8**	**0.0**	**0.0**	**44.7**	**39.7**	**74**	**54**	**-29.3**	**-14.3**	**H**
2.988	**3.0**	**46.4**	**42.3**	**30.0**	**4.3**	**-37.4**	**0.0**	**0.0**	**43.3**	**39.3**	**74**	**54**	**-30.7**	**-14.7**	**V**

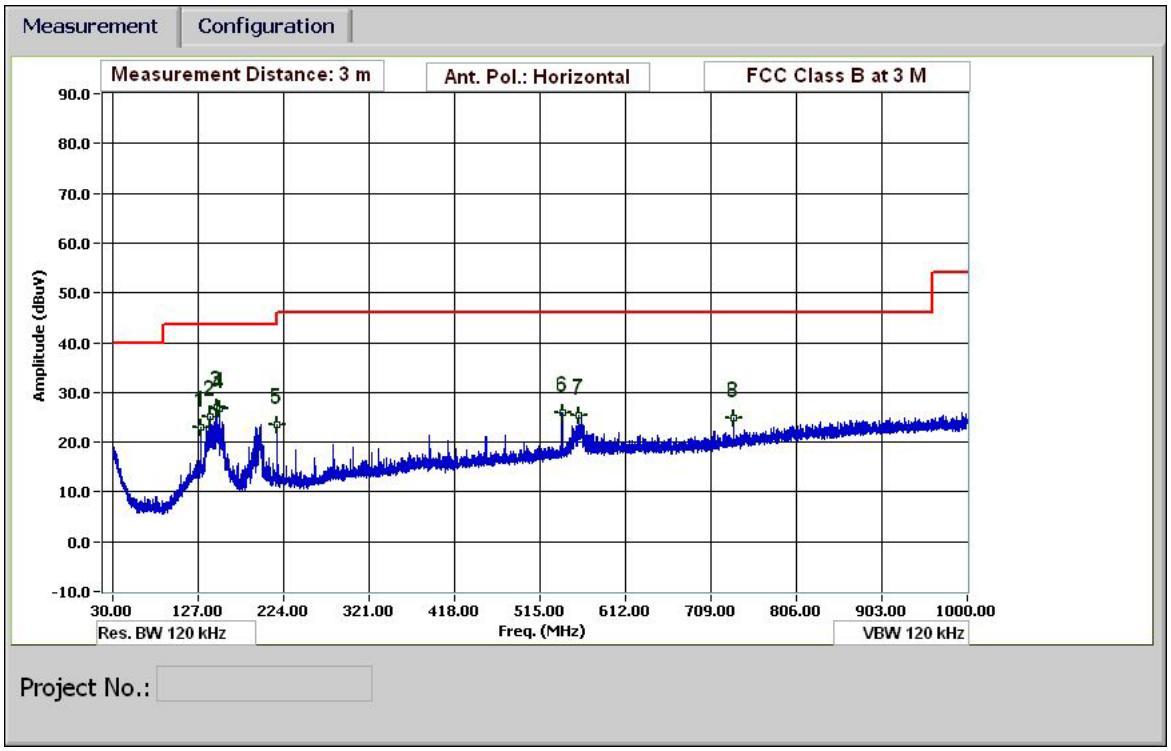
Rev. 07.22.09

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

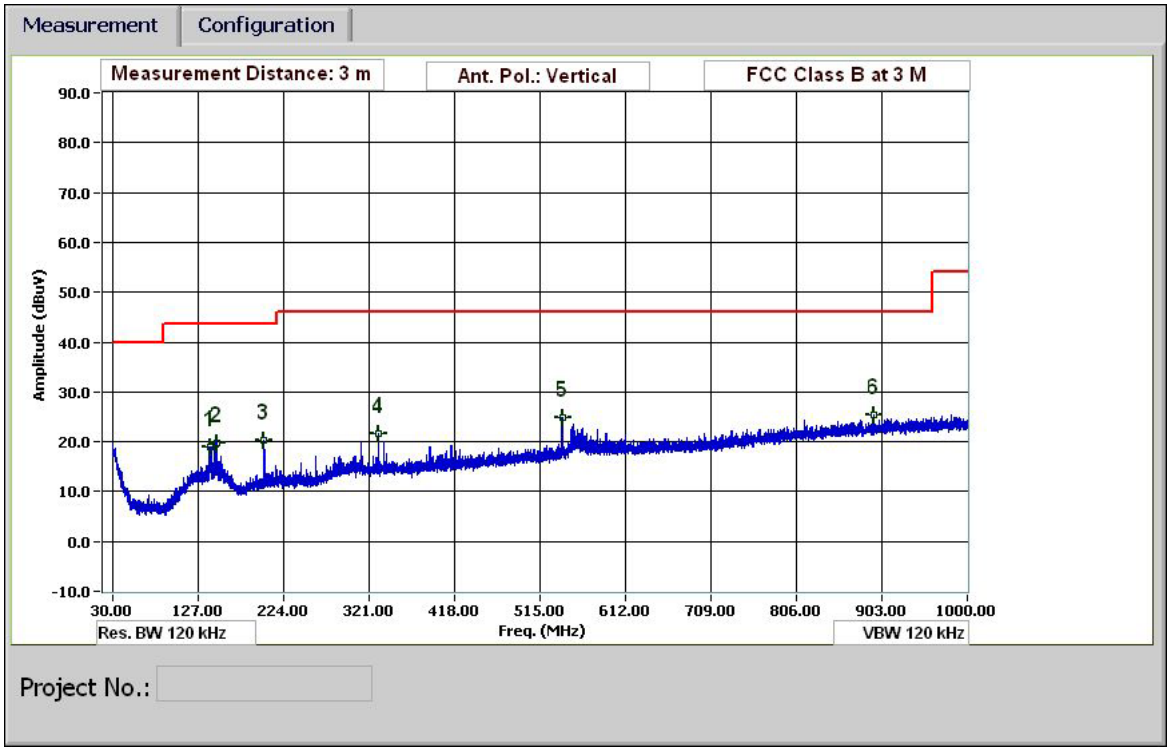
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



DATA

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

Test Engr: Thanh Nguyen
Date: 02/15/11
Project #: 10U13572
Company: Kopin Corporation
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 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	Ant. High cm	Table Angle Degree	Notes
NEW POWER															
129.604	3.0	36.2	13.8	0.9	28.0	0.0	0.0	23.0	43.5	-20.5	H	P	100.0	0 - 360	
141.365	3.0	39.0	13.1	1.0	27.9	0.0	0.0	25.1	43.5	-18.4	H	P	100.0	0 - 360	
147.605	3.0	41.1	12.8	1.0	27.8	0.0	0.0	27.1	43.5	-16.4	H	P	100.0	0 - 360	
151.085	3.0	40.9	12.7	1.0	27.8	0.0	0.0	26.8	43.5	-16.7	H	P	100.0	0 - 360	
216.008	3.0	37.9	11.9	1.2	27.4	0.0	0.0	23.6	46.0	-22.4	H	P	100.0	0 - 360	
540.021	3.0	34.9	17.5	2.1	28.6	0.0	0.0	25.8	46.0	-20.2	H	P	100.0	0 - 360	
559.702	3.0	34.0	17.8	2.1	28.6	0.0	0.0	25.3	46.0	-20.7	H	P	100.0	0 - 360	
734.429	3.0	31.1	19.6	2.5	28.4	0.0	0.0	24.8	46.0	-21.2	H	P	100.0	0 - 360	
139.925	3.0	32.9	13.1	1.0	27.9	0.0	0.0	19.1	43.5	-24.4	V	P	100.0	0 - 360	
148.085	3.0	33.9	12.8	1.0	27.8	0.0	0.0	19.9	43.5	-23.6	V	P	100.0	0 - 360	
200.887	3.0	34.6	11.9	1.2	27.4	0.0	0.0	20.3	43.5	-23.2	V	P	100.0	0 - 360	
331.932	3.0	33.8	14.0	1.6	27.6	0.0	0.0	21.7	46.0	-24.3	V	P	100.0	0 - 360	
540.021	3.0	34.0	17.5	2.1	28.6	0.0	0.0	24.9	46.0	-21.1	V	P	100.0	0 - 360	
893.796	3.0	28.6	22.0	2.7	27.9	0.0	0.0	25.4	46.0	-20.6	V	P	100.0	0 - 360	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.