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

CERTIFICATION TEST REPORT

FOR

802.11b/g/n WLAN + Bluetooth Module Combo Card

MODEL NUMBER: BCM94319SDB

FCC ID: QDS-BRCM1056
IC: 4324A- BRCM1056

REPORT NUMBER: 11U13681-4

ISSUE DATE: FEBRUARY 28, 2011

Prepared for
BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/28/11	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: 802.11b/g/n WLAN + Bluetooth Module Combo Card

MODEL: BCM94319SDB

SERIAL NUMBER: 336

DATE TESTED: FEBRUARY 23 to 28, 2011

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

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:

THU CHAN
ENGINEERING MANAGER
UL CCS

Tested By:

VIEN TRAN
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

802.11b/g/n WLAN + Bluetooth Module Combo 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	-1.29	0.74
2402 - 2480	Enhanced 8PSK	1.75	1.50
2402 - 2480	Low Energy BLE	-0.98	0.80

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an 802.11bgn WLAN and Bluetooth antenna with a maximum gain of 3.9 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom Bluetooth 4.0 + HS USB, rev. 5.6.0.3200.

The test utility software used during testing was Bluetool, ver. 1.4.3.0 and BCM_BTDL,ver 1.8.17.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

5.6. DESCRIPTION OF TEST SETUP

FOR GFSK, 8PSK MODES; Hopping ON & OFF and LE MODE; Hopping OFF

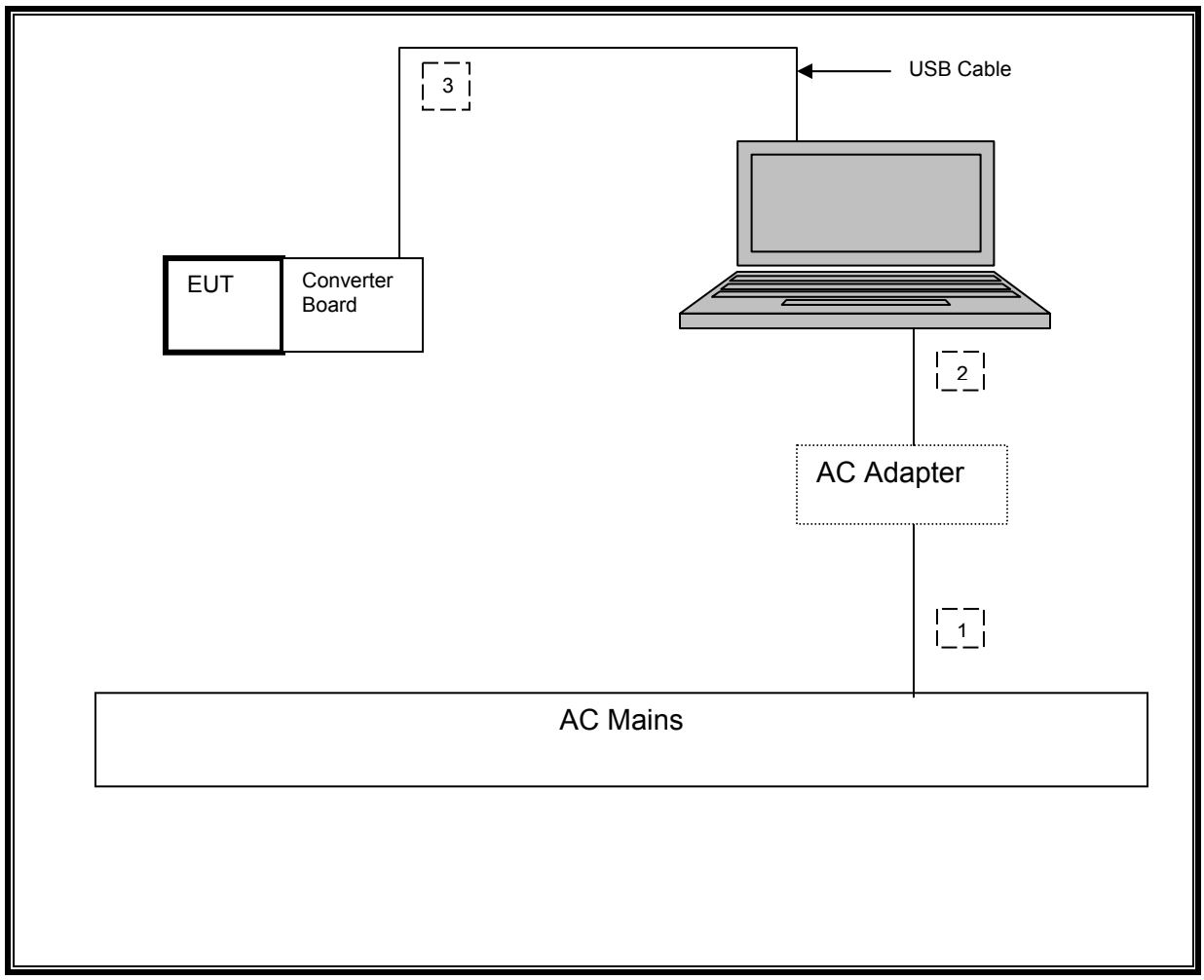
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	PP09S	N/A	DoC
AC Adapter	Dell	PA-1650-05D	CN-05U092-71615-49Q-18B8	DoC
Converter Board	Broadcom	BCM94319SDB	1396825	N/A
USB Cable	N/A	N/A	N/A	N/A

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Shielded	1.5m	NA
2	DC	1	DC	Un-shielded	1.5m	Ferrite at laptop's end
4	USB	1	USB	Un-shielded	1.0m	NA

SETUP DIAGRAM



TEST SETUP

The EUT was tested as an external module that installed on a converter board connected to a host Laptop PC USB cable.

FOR LE MODE; Hopping ON

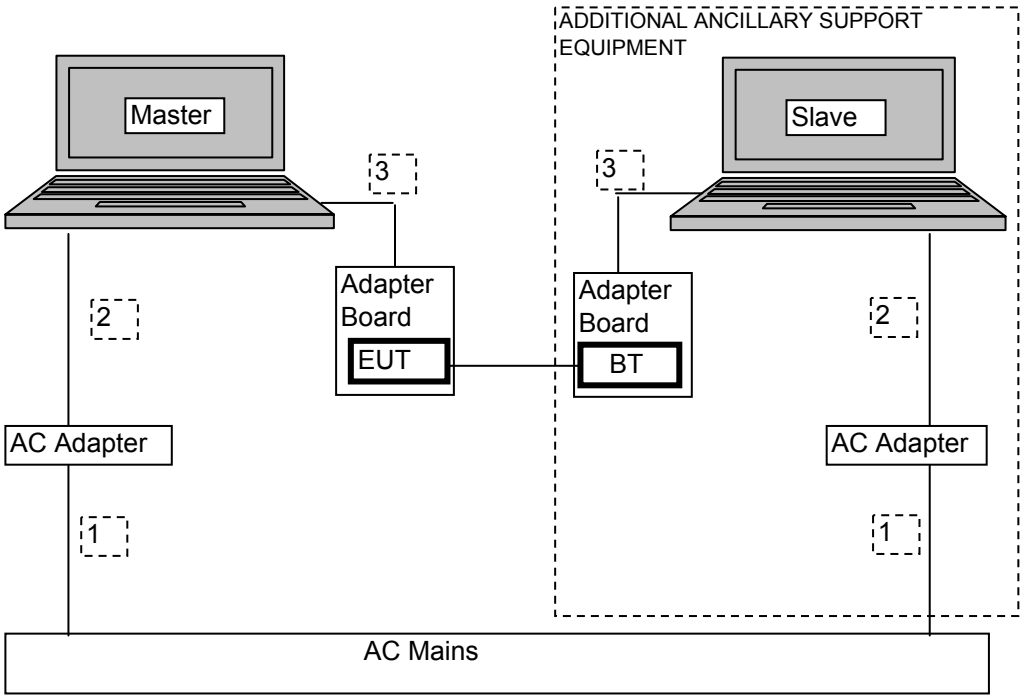
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	PP09S	N/A	DoC
AC Adapter	Dell	PA-1650-05D	CN-05U092-71615-49Q-18B8	DoC
Converter Board	Broadcom	BCM94319SDB	1396825	N/A
USB Cable	N/A	N/A	N/A	N/A
Laptop	Dell	Inspiron 0000	N/A	N/A
AC Adapter	Dell	PA-1600-06D1	CN-0F9710-71616-56H-510D	N/A
Converter Board	Broadcom	BCM94319SDB	1408781	N/A
USB Cable	N/A	N/A	N/A	N/A

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	AC	Unshielded	1.8m	N/A
2	DC	2	DC	Unshielded	1.8m	Ferrite at laptop's end
3	USB	2	USB	Unshielded	1.0m	N/A

SETUP DIAGRAM FOR HOPPING TEST



TEST SETUP

The EUT and the ancillary support equipment are configured to create an operating communications link. Traffic is sent forward across this link, acknowledgements are sent back, and the performance of the link is monitored.

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	C00996	10/29/11
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01171	07/14/11
Antenna, Horn, 18 GHz	EMCO	3115	C00872	07/29/11
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	07/29/11
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	01/26/12
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	08/04/11
Peak Power Meter	Agilent / HP	E9327A	C00964	12/04/11
Peak Power Sensor	Agilent / HP	E4416A	C00963	12/04/11
Reject Filter, 2.4-2.5 GHz	Micro-Tronics	BRM50702	N02685	CNR
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	11/06/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	05/06/11

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

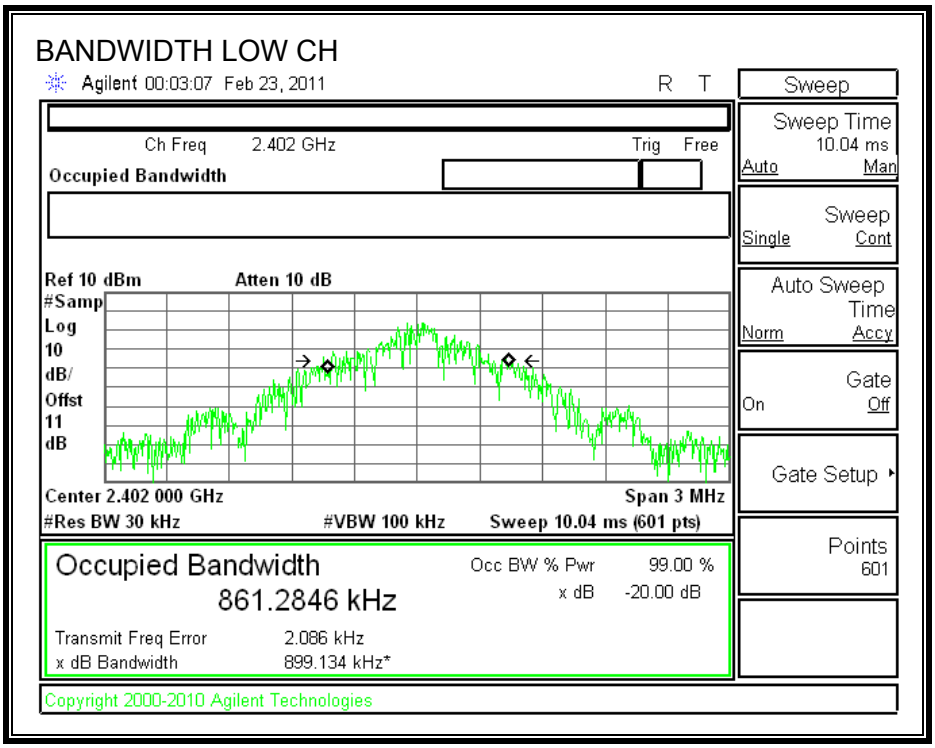
TEST PROCEDURE

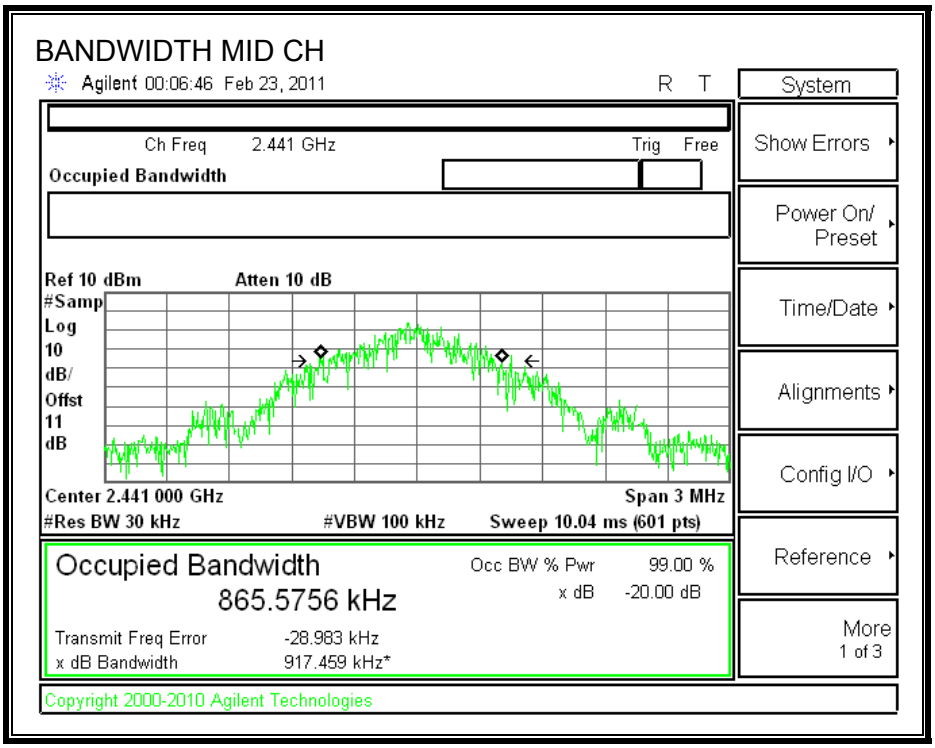
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 99% bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

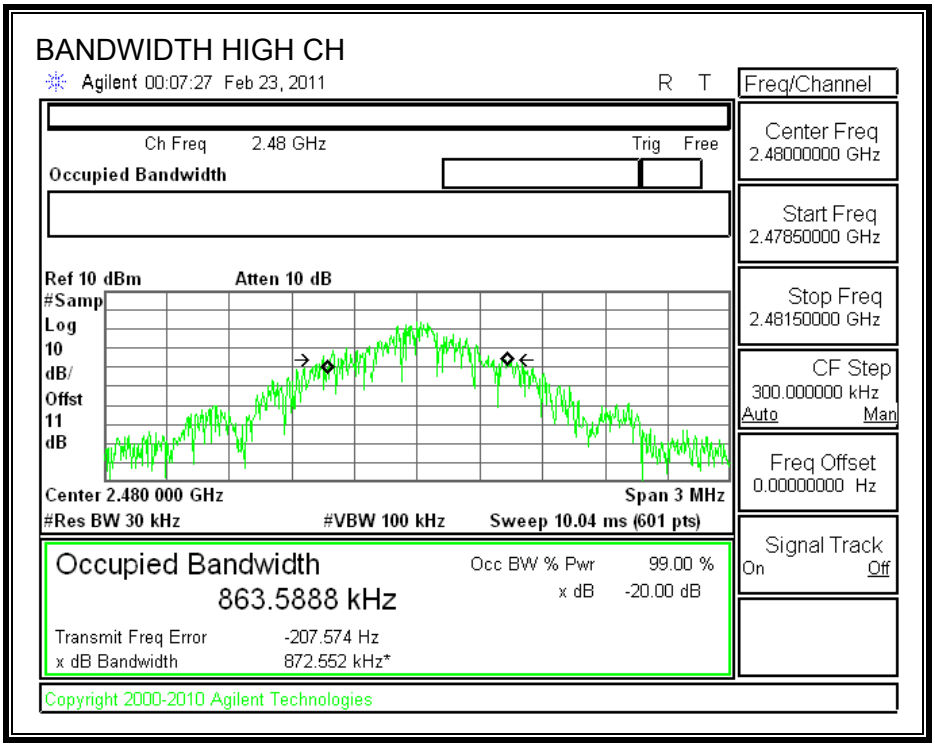
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)
Low	2402	861.2846
Middle	2441	865.5756
High	2480	863.5888

99% BANDWIDTH







7.1.2. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

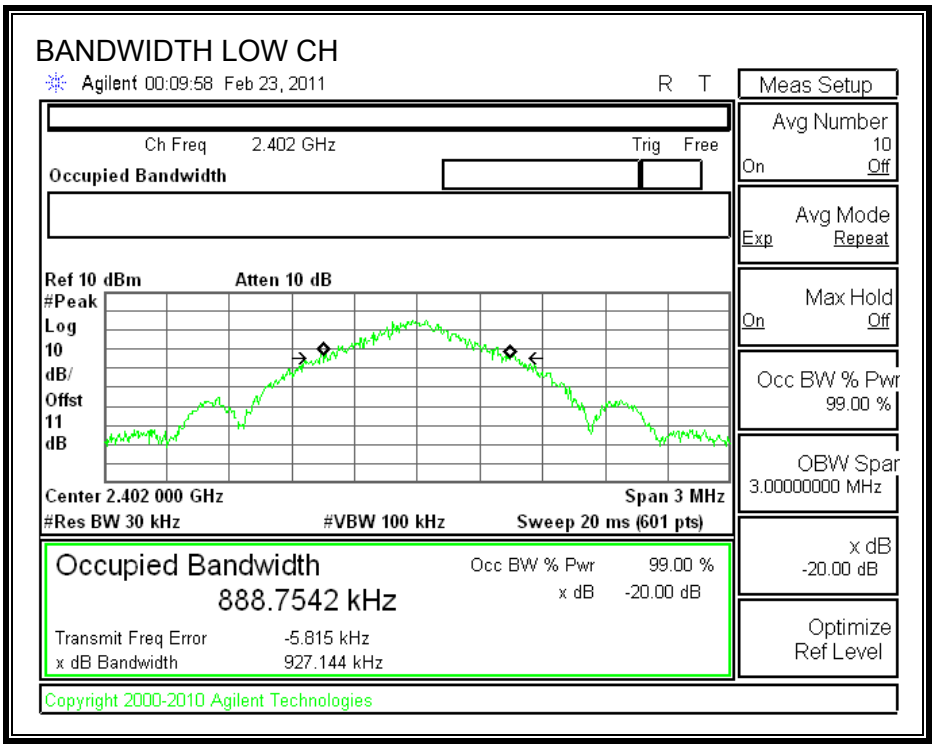
TEST PROCEDURE

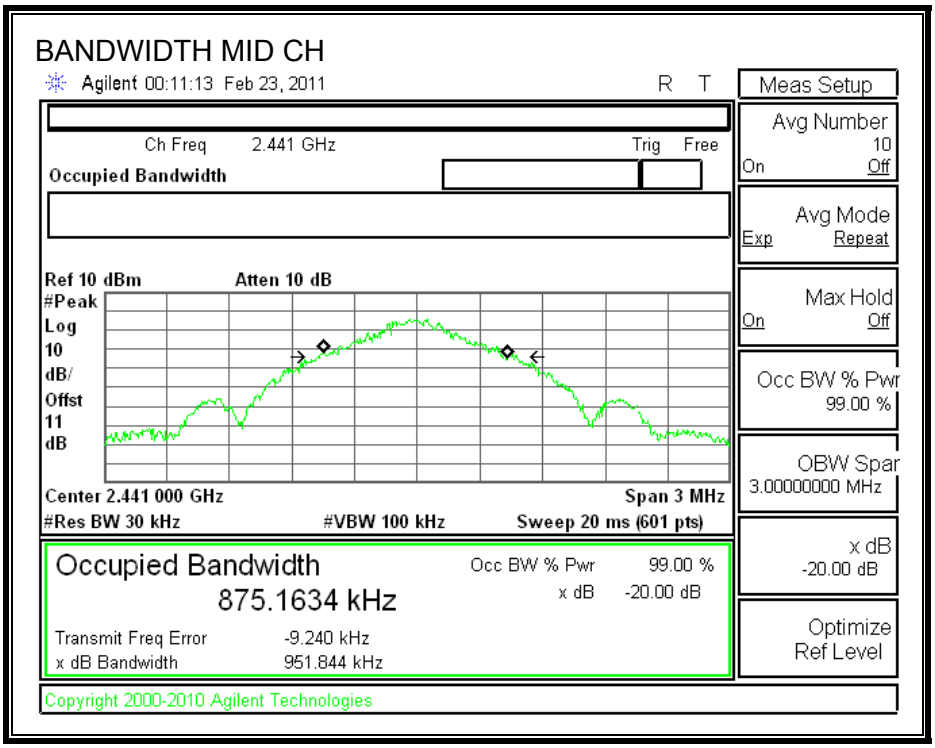
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

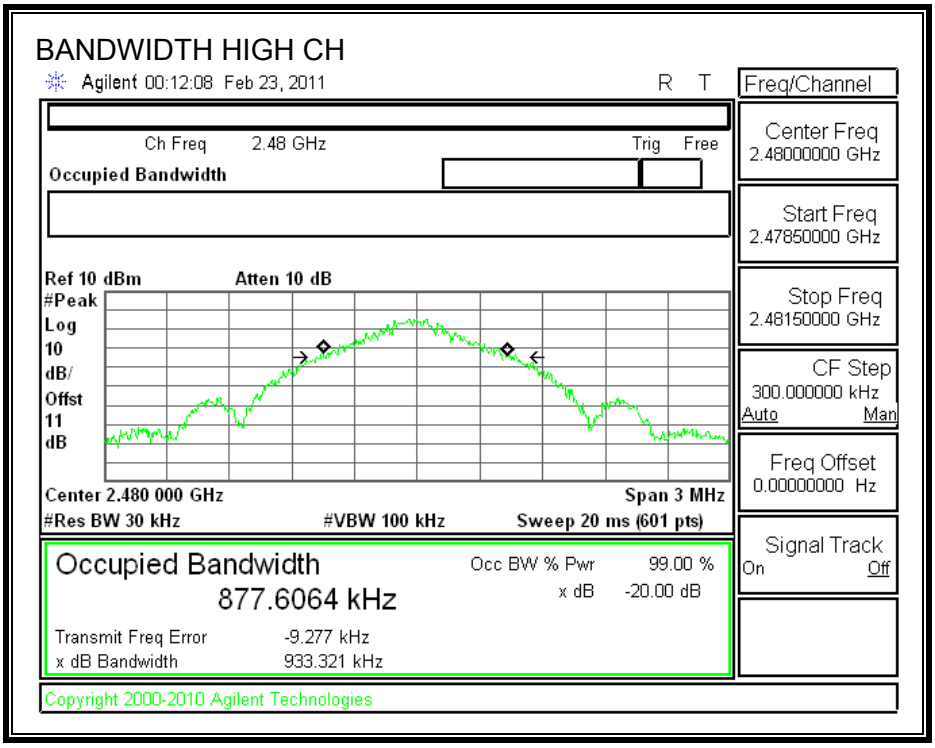
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	927.144
Middle	2441	951.844
High	2480	933.321

20 dB 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.

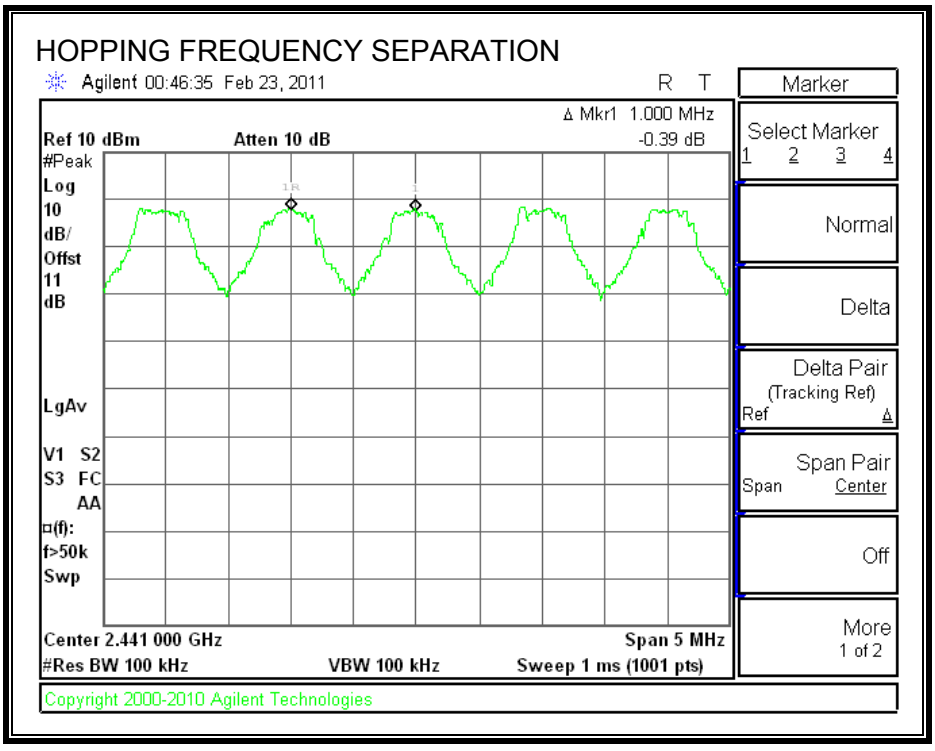
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

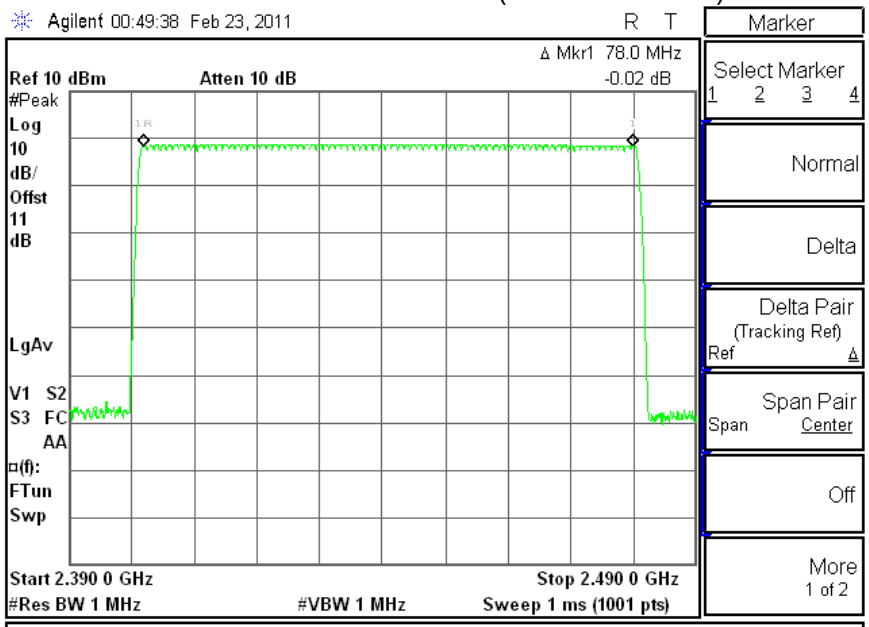
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

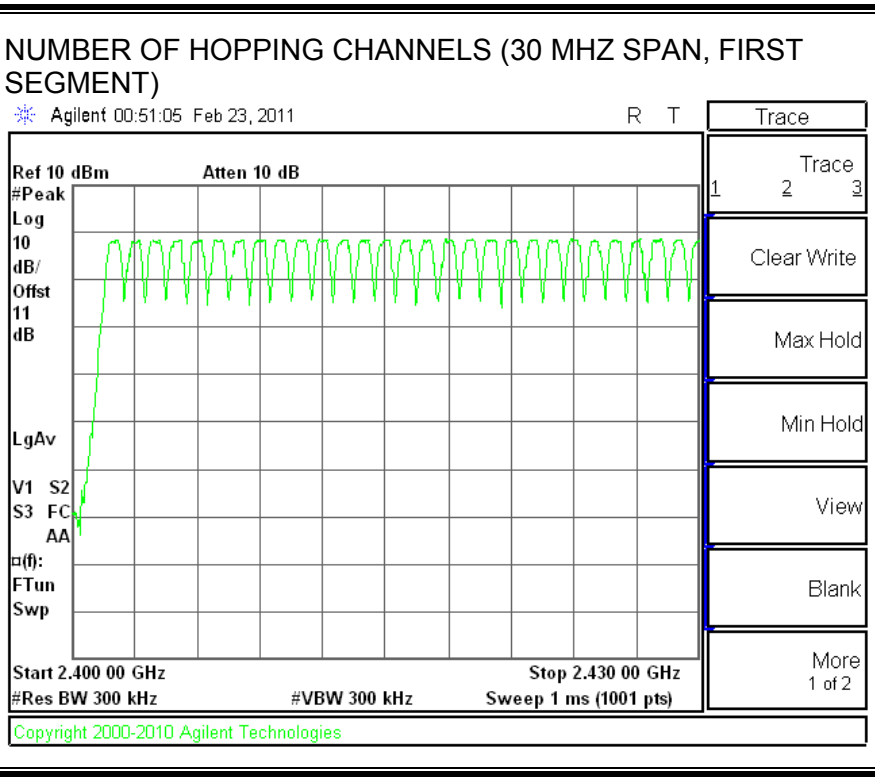
79 Channels observed.

NUMBER OF HOPPING CHANNELS

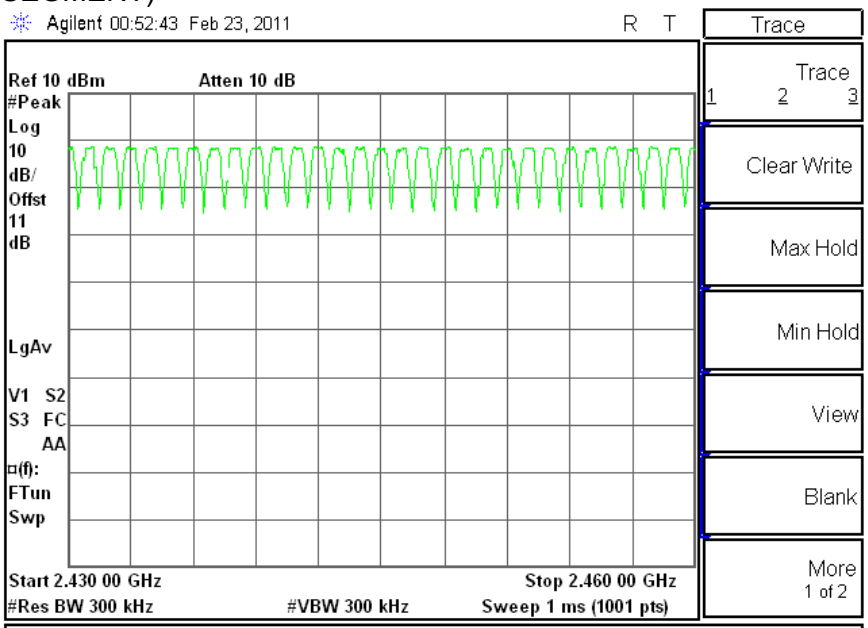
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



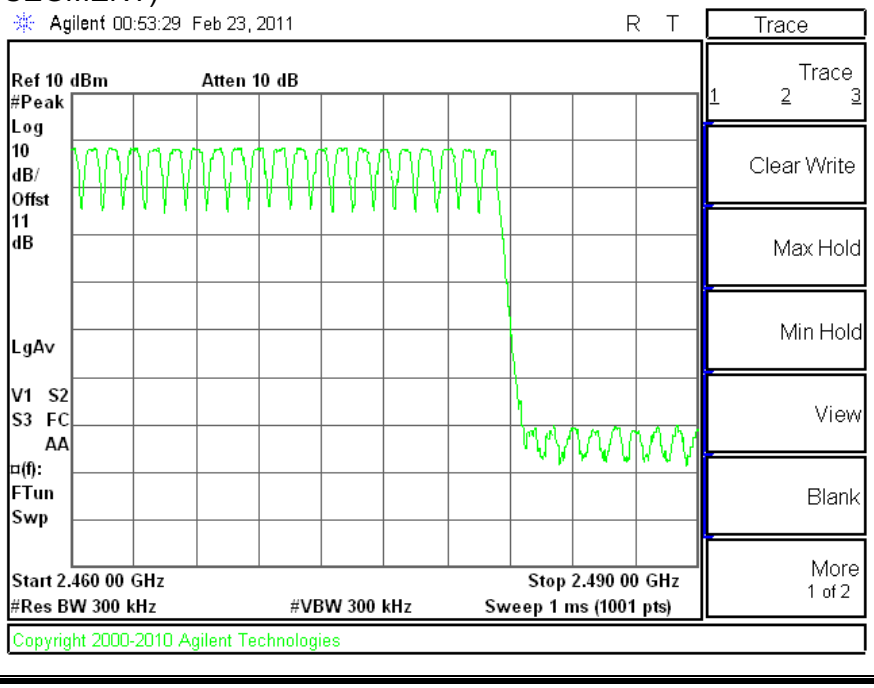
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



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



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



7.1.5. 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.

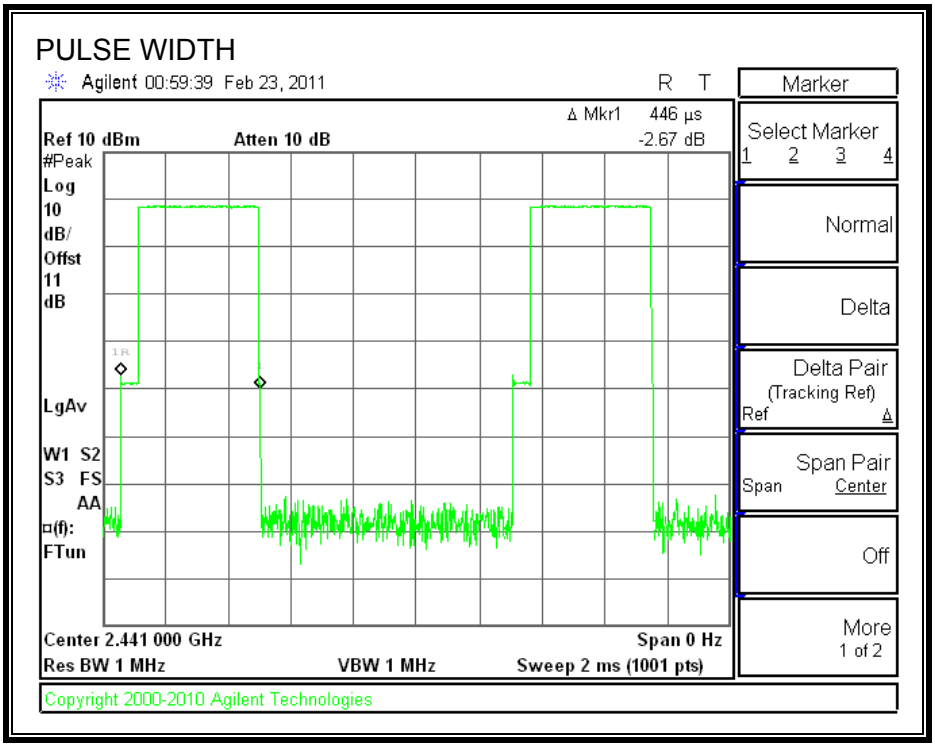
RESULTS

GFSK Mode

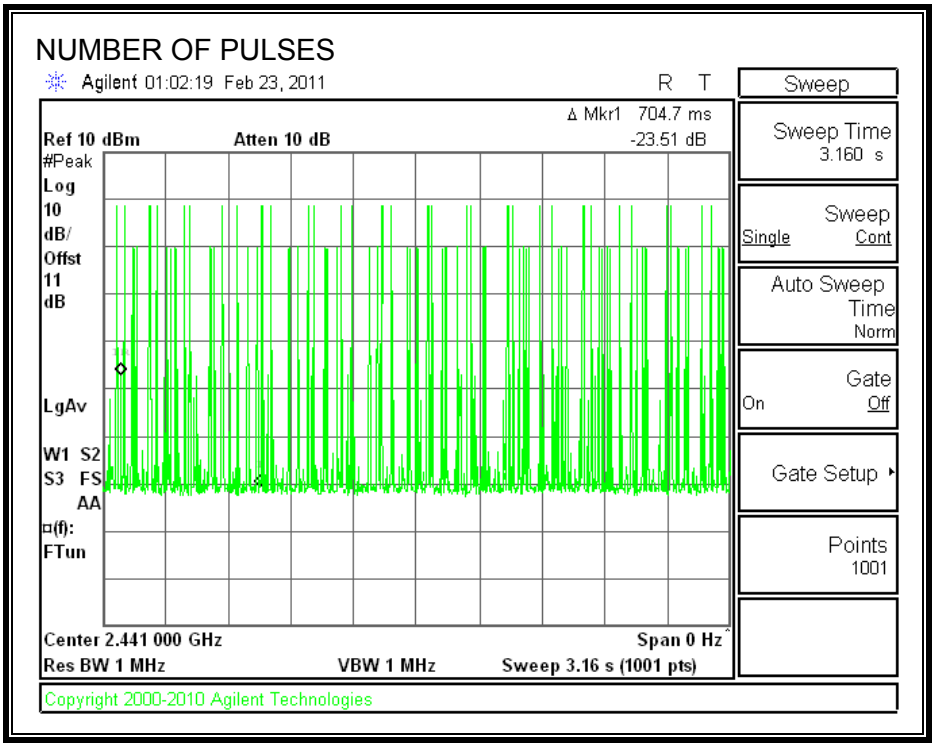
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.446	32	0.143	0.4	-0.257
DH3	1.705	18	0.307	0.4	-0.093
DH5	2.949	13	0.383	0.4	-0.017

DH1

PULSE WIDTH

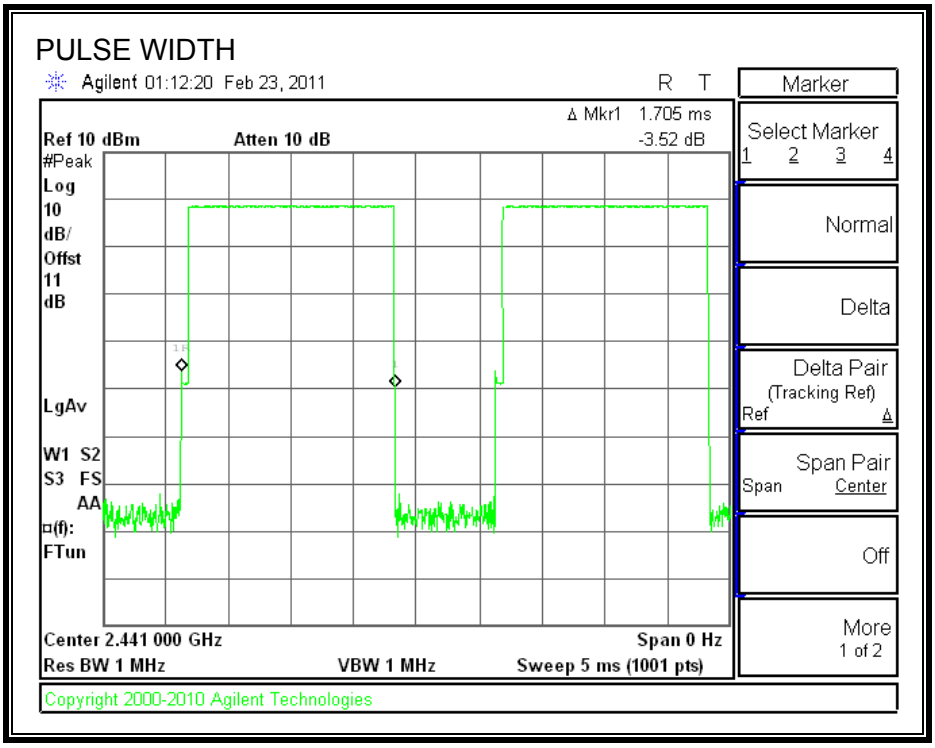


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

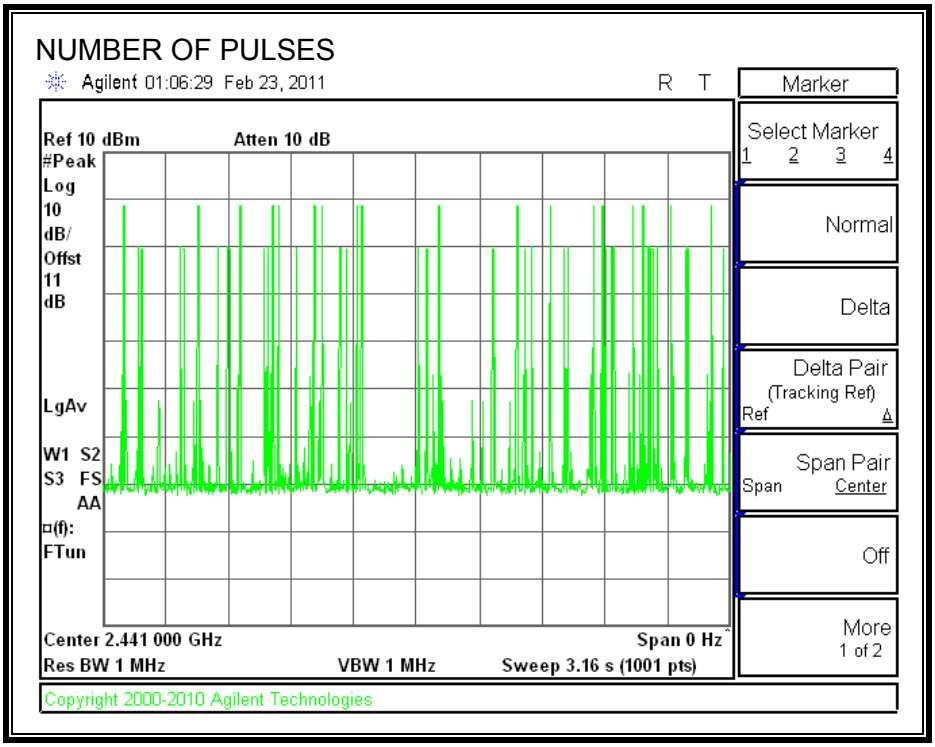


DH3

PULSE WIDTH

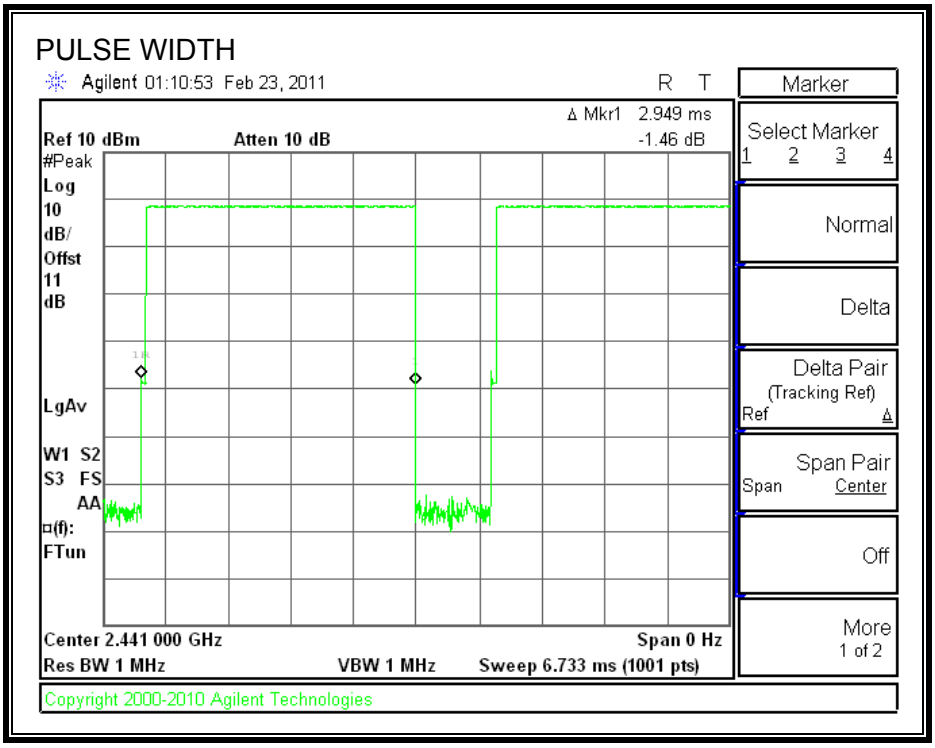


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

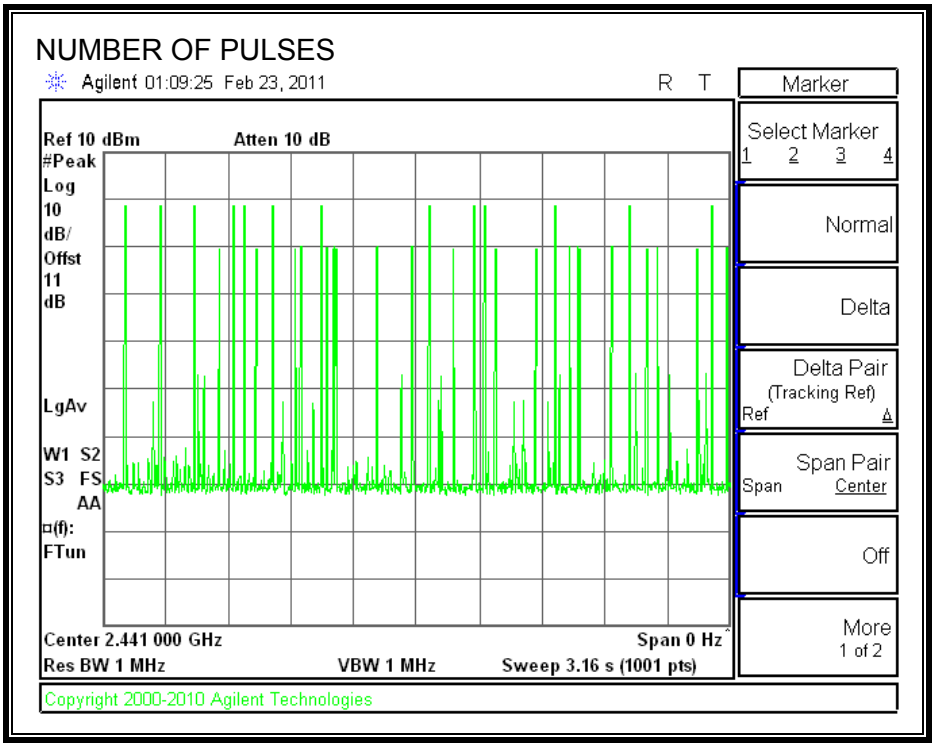


DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.6. 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.

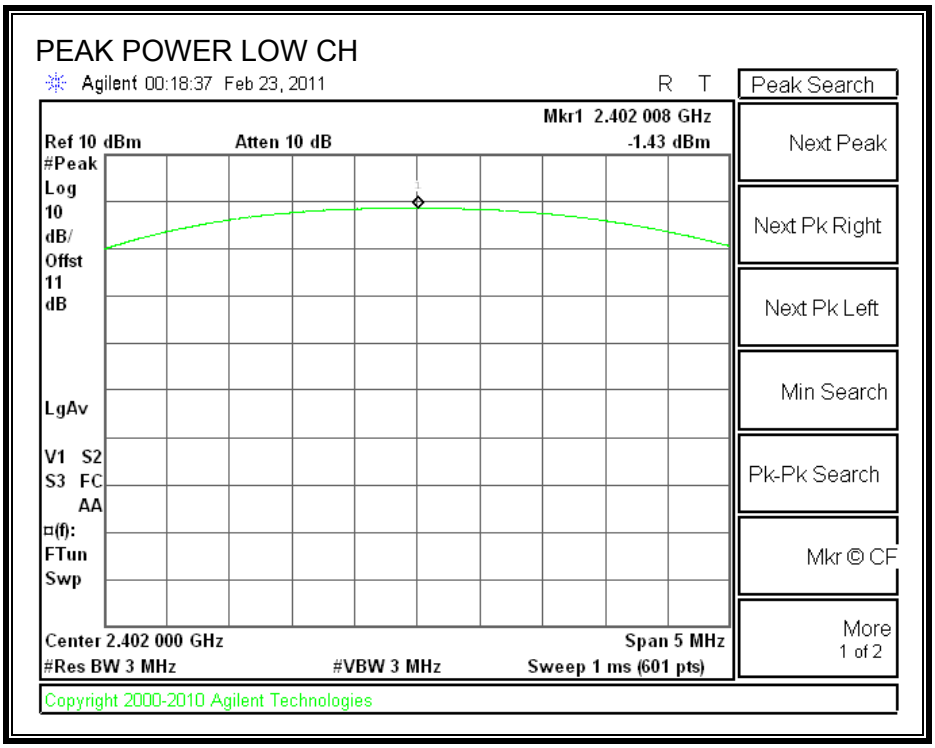
TEST PROCEDURE

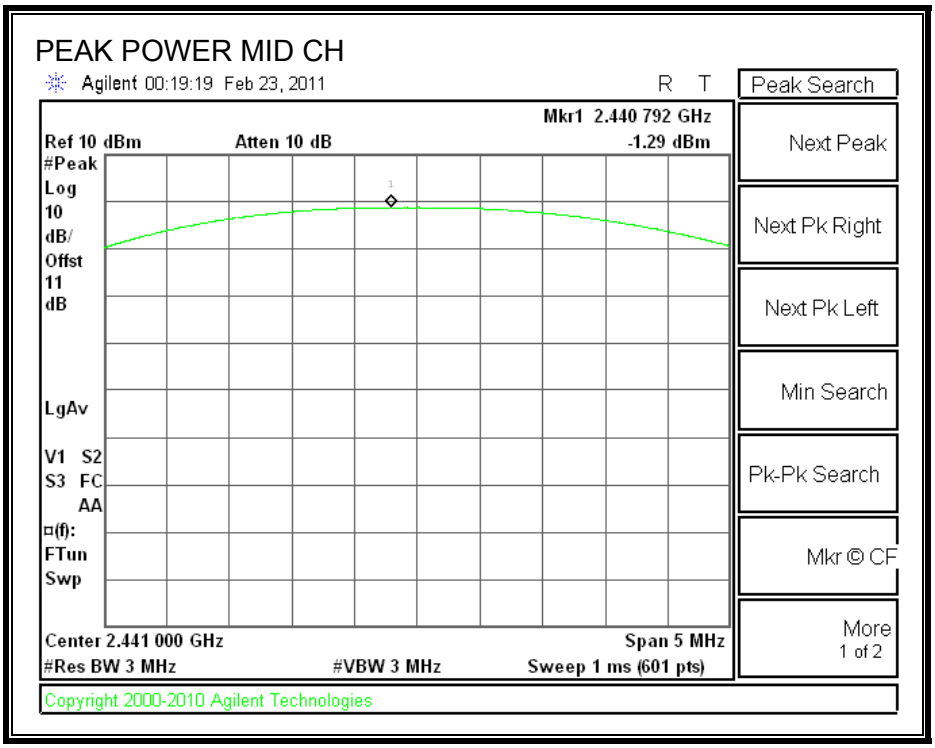
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

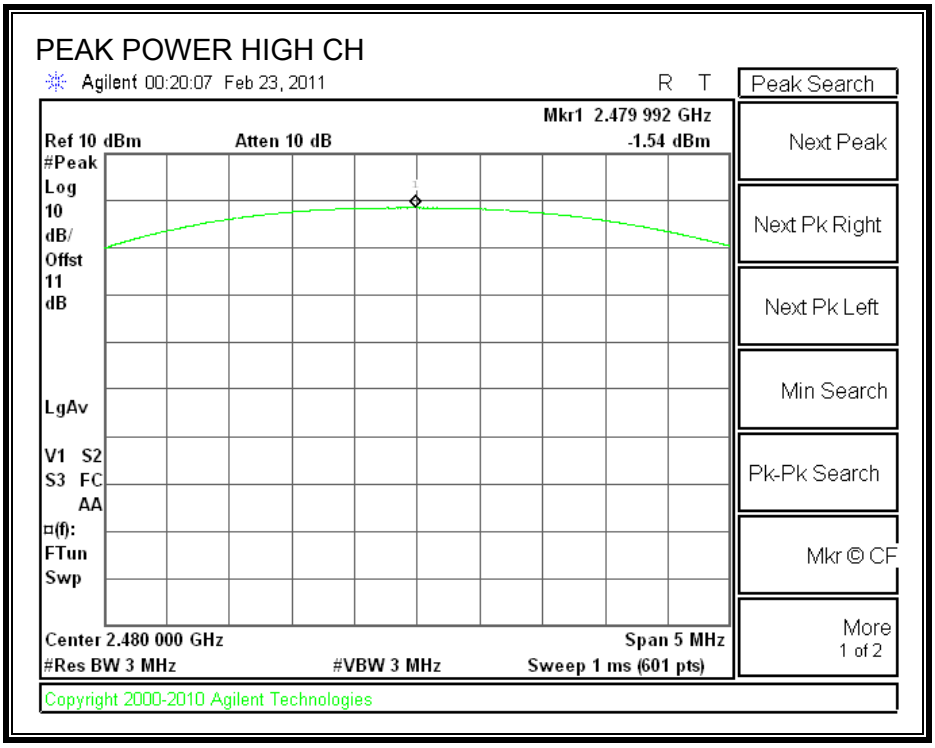
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-1.43	30	-31.43
Middle	2441	-1.29	30	-31.29
High	2480	-1.54	30	-31.54

OUTPUT POWER







7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

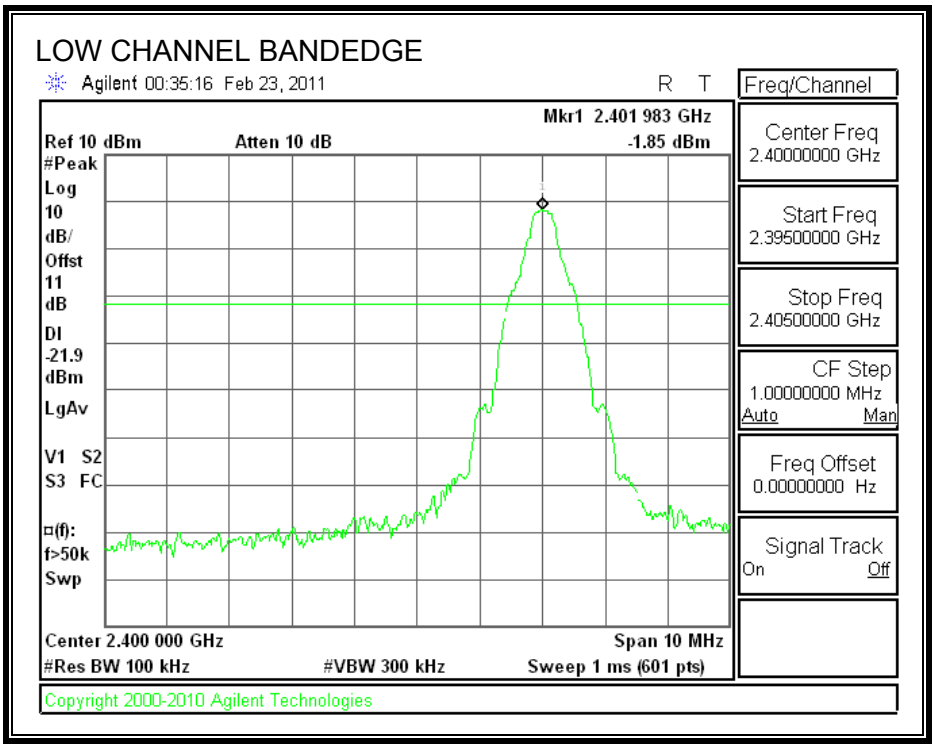
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

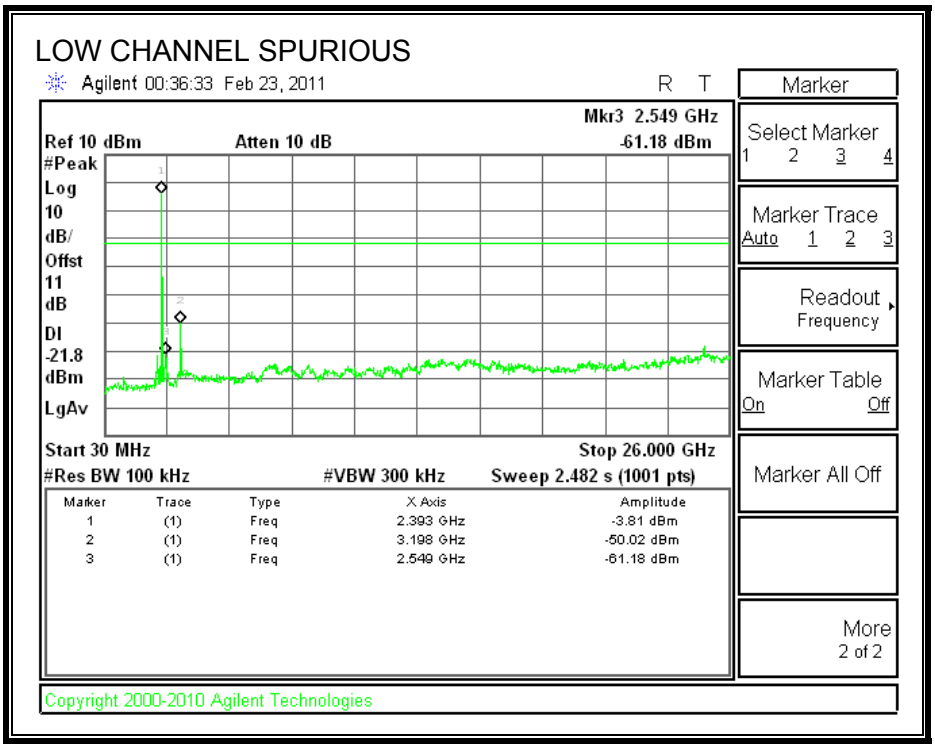
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

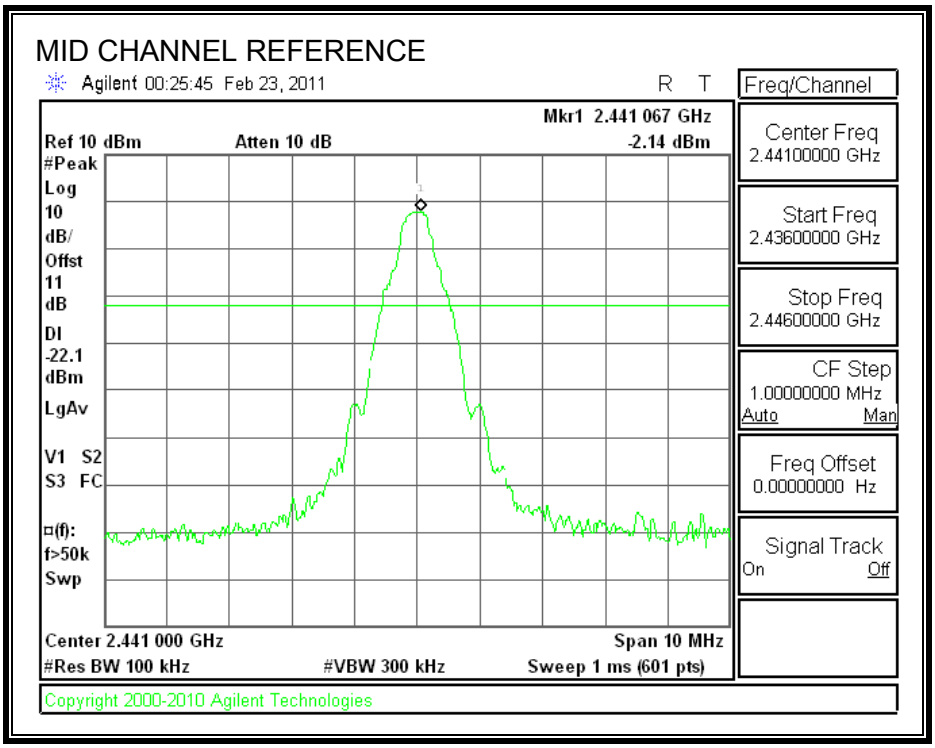
RESULTS

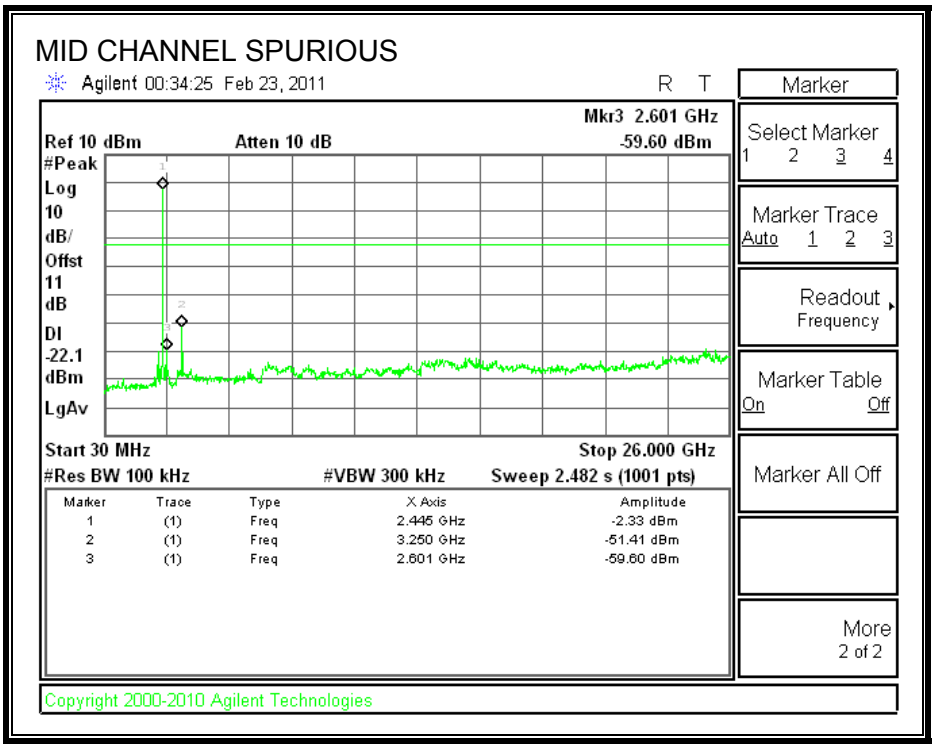
SPURIOUS EMISSIONS, LOW CHANNEL



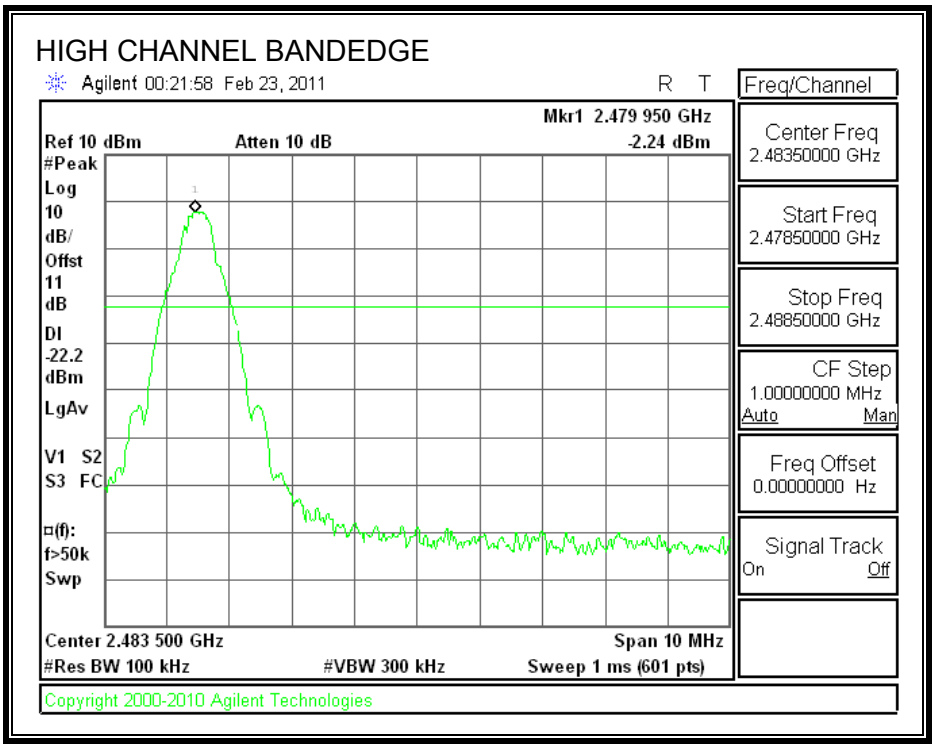


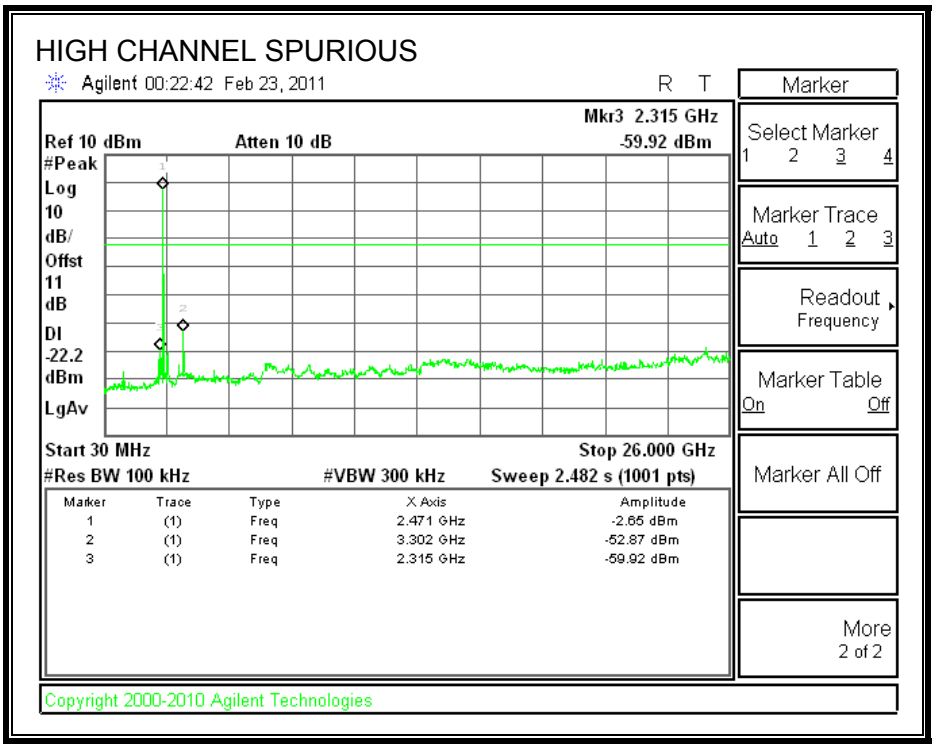
SPURIOUS EMISSIONS, MID CHANNEL



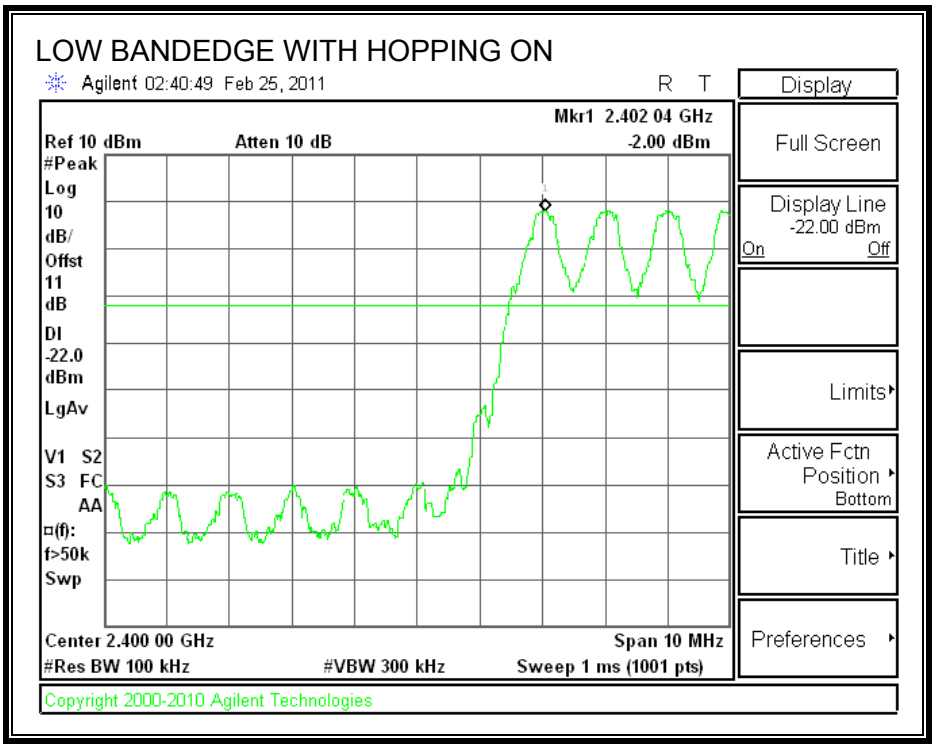


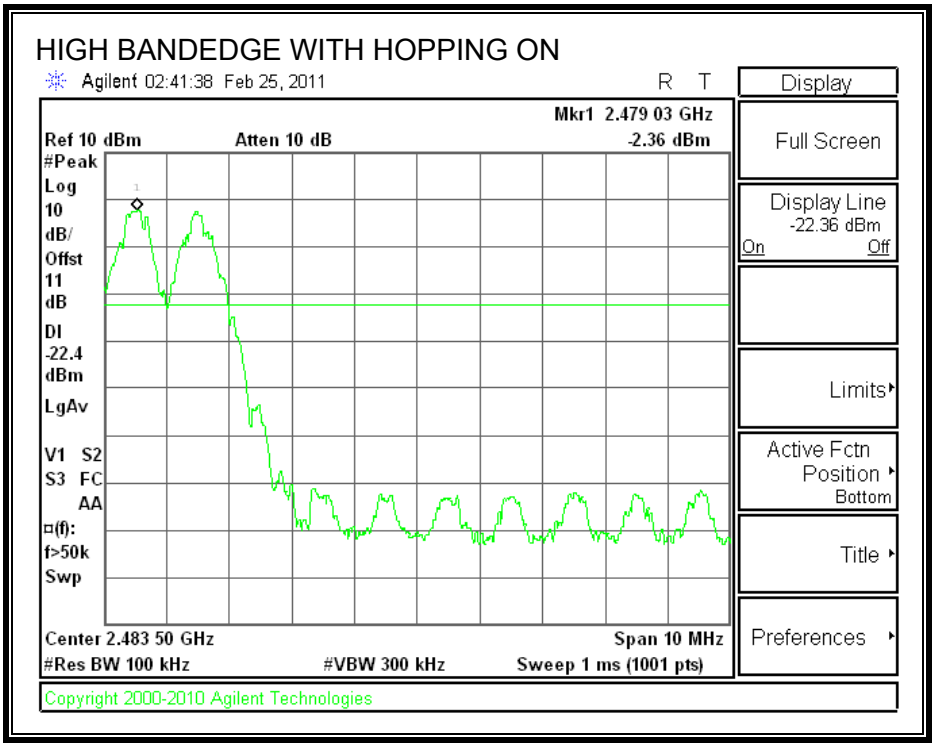
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

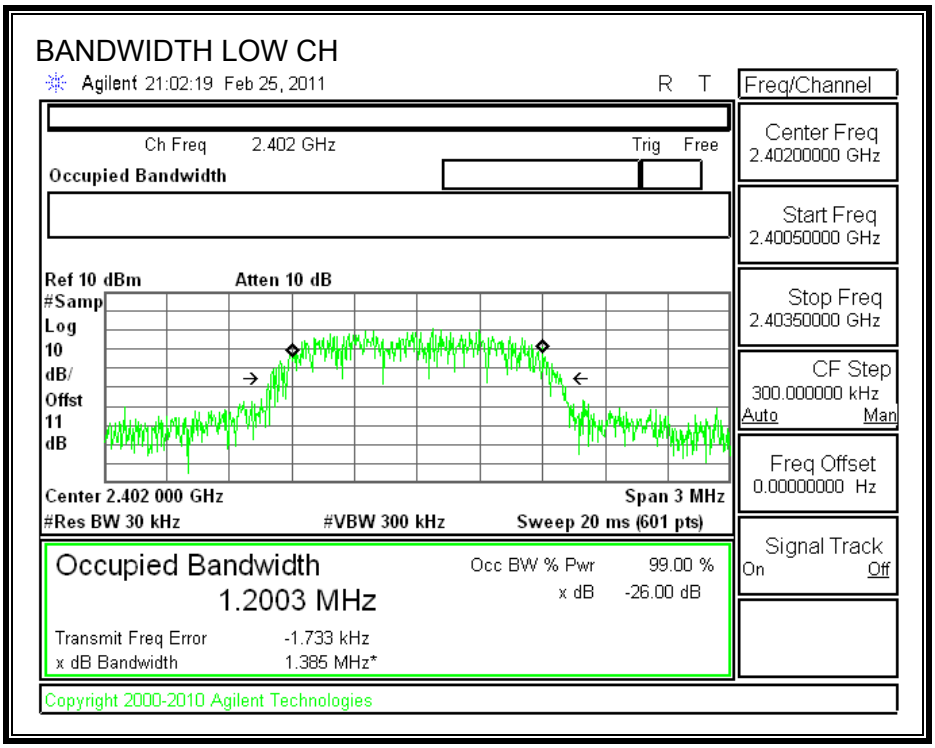
TEST PROCEDURE

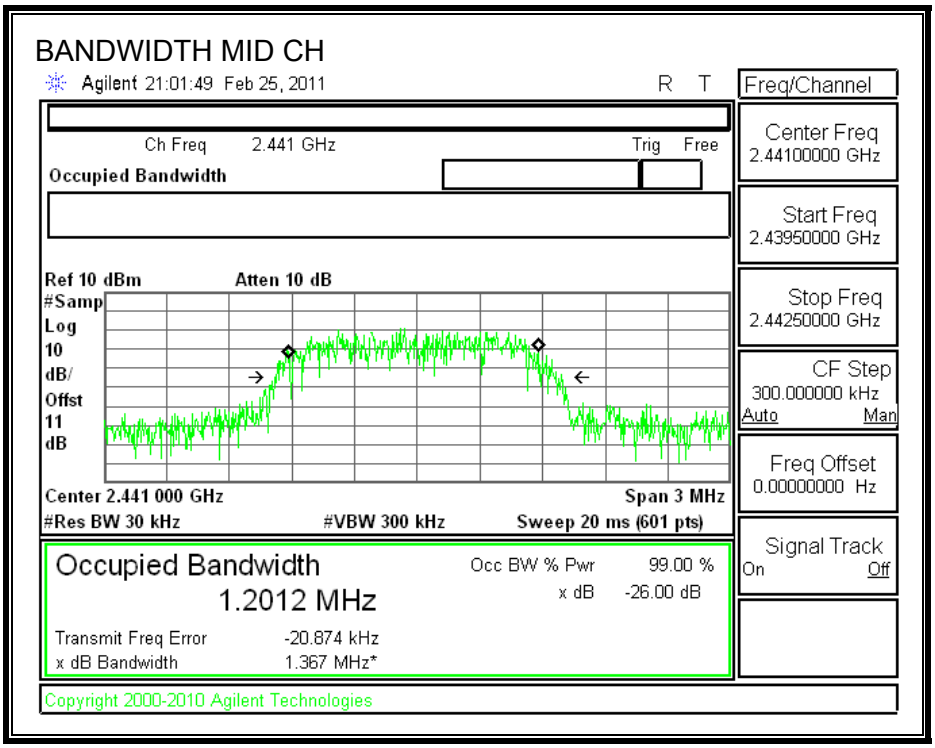
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 99% bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

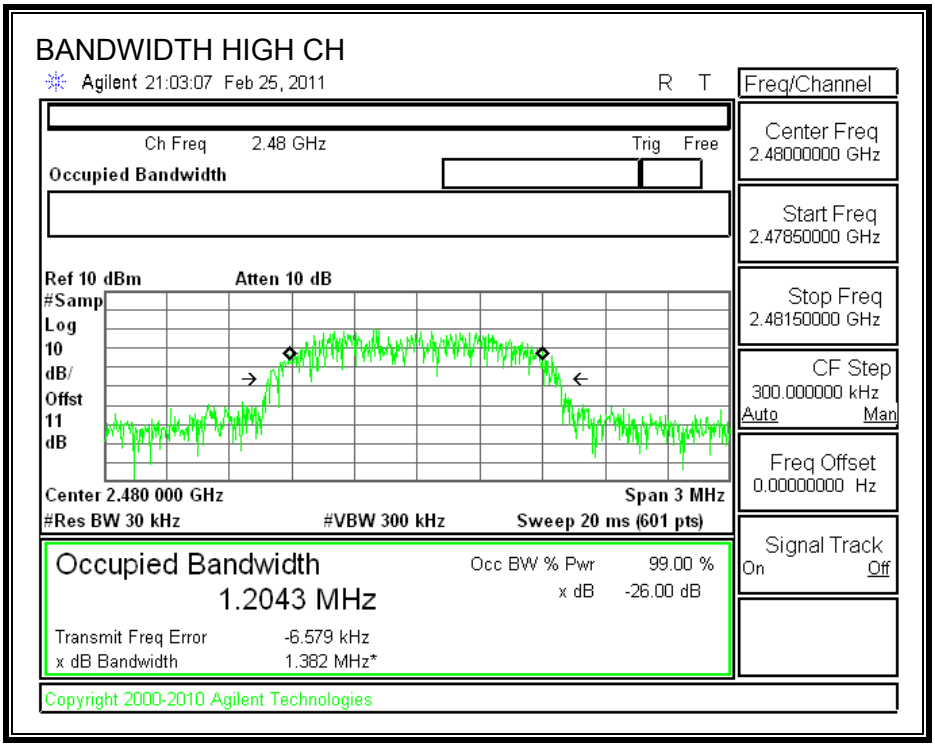
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.2003
Middle	2441	1.2012
High	2480	1.2043

99% BANDWIDTH







7.2.2. 20dB BANDWIDTH

LIMIT

None; for reporting purposes only.

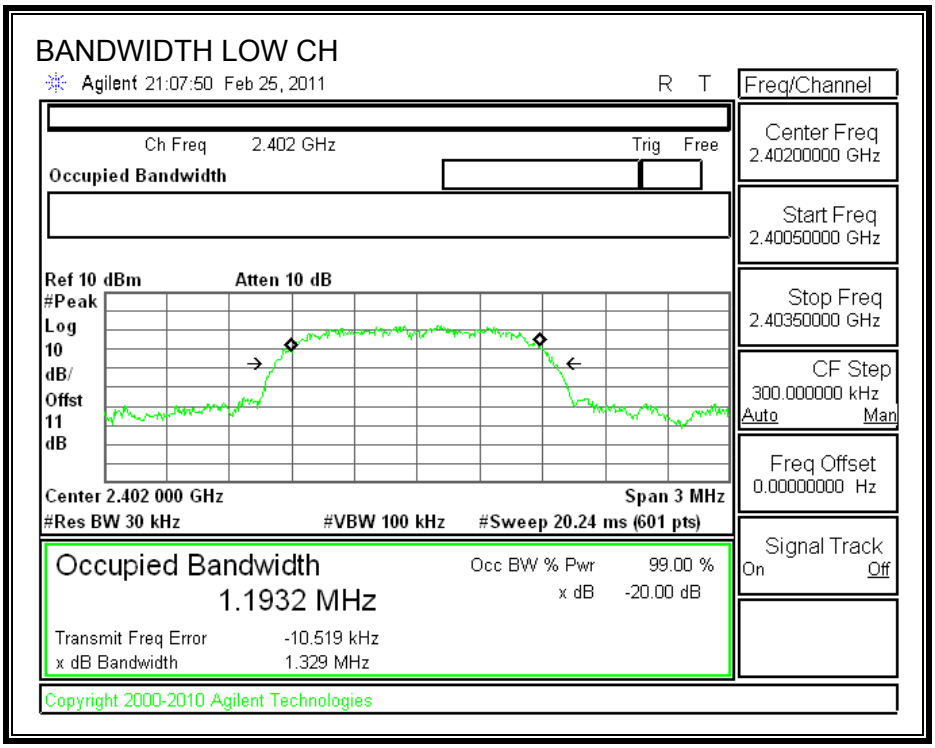
TEST PROCEDURE

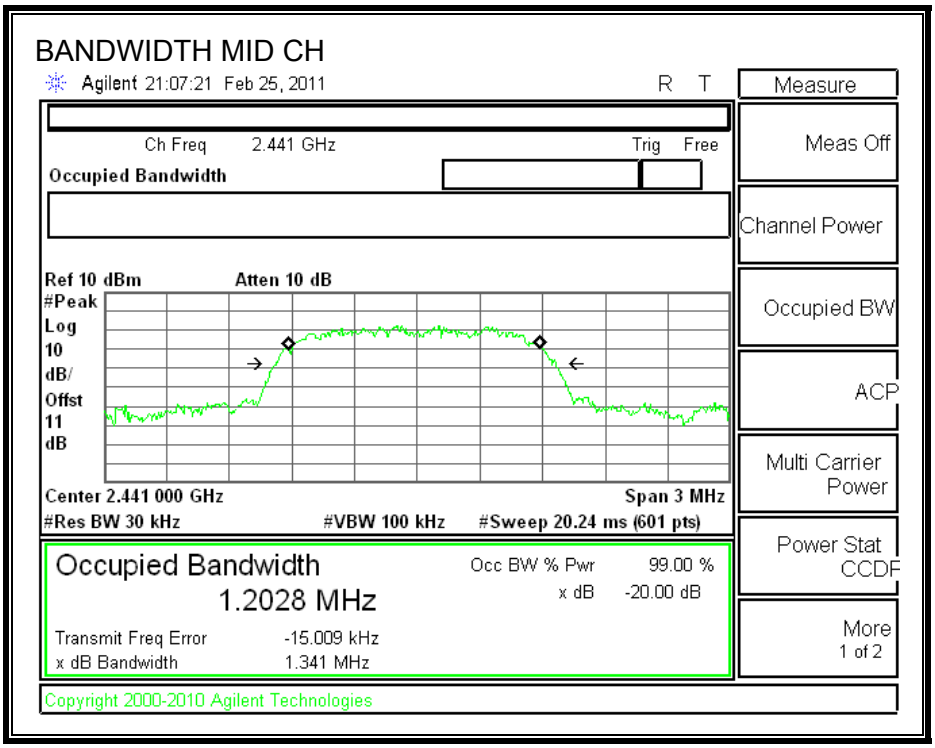
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

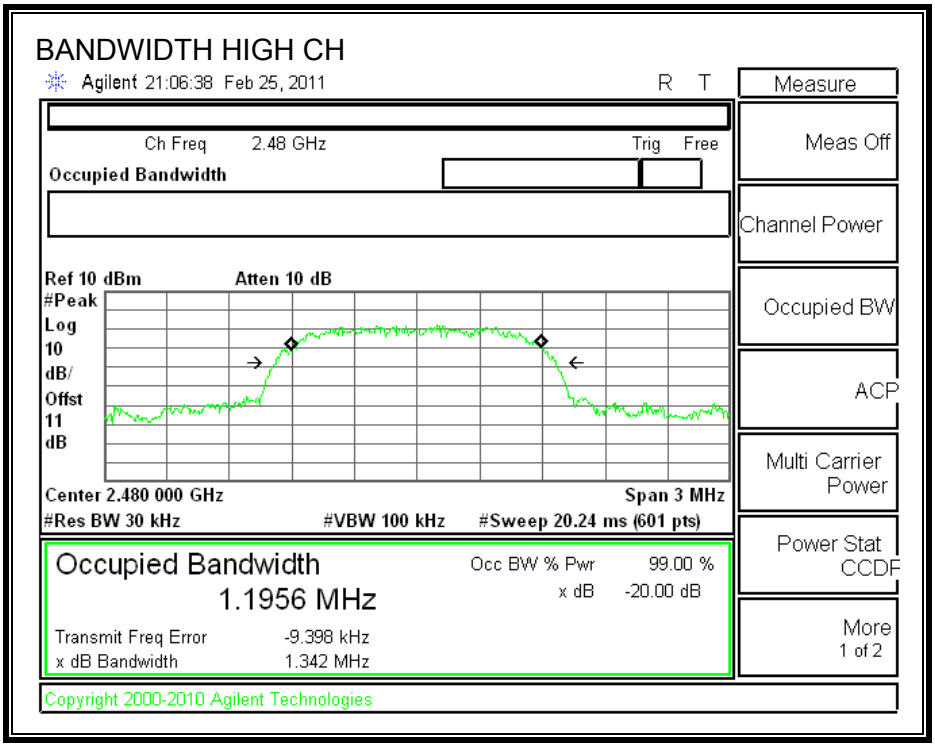
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	1.329
Middle	2441	1.341
High	2480	1.342

20 dB 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.

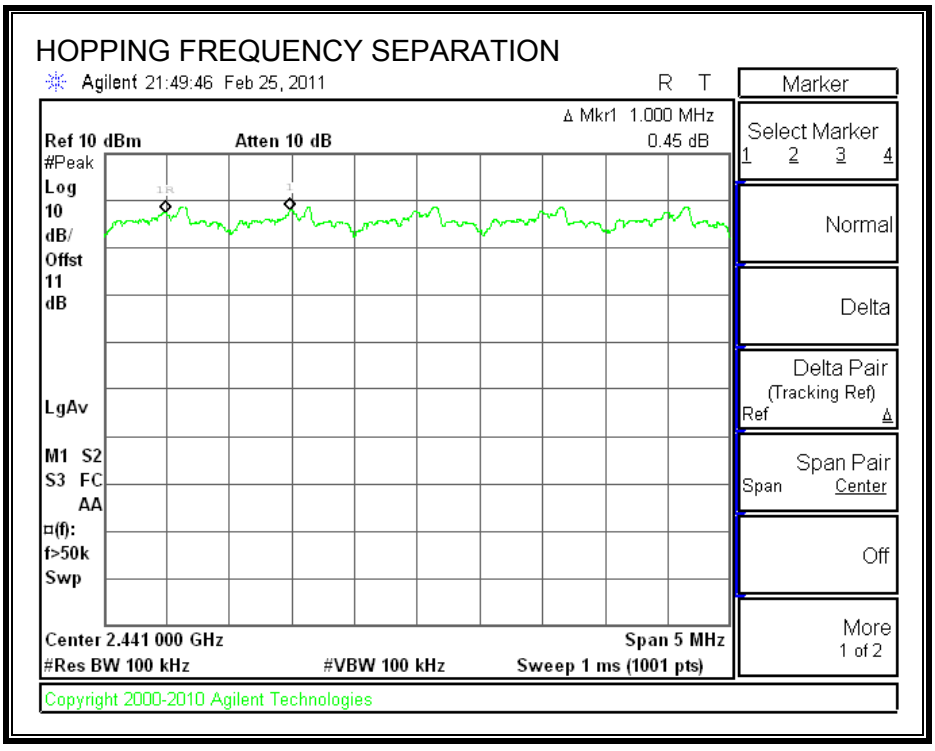
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

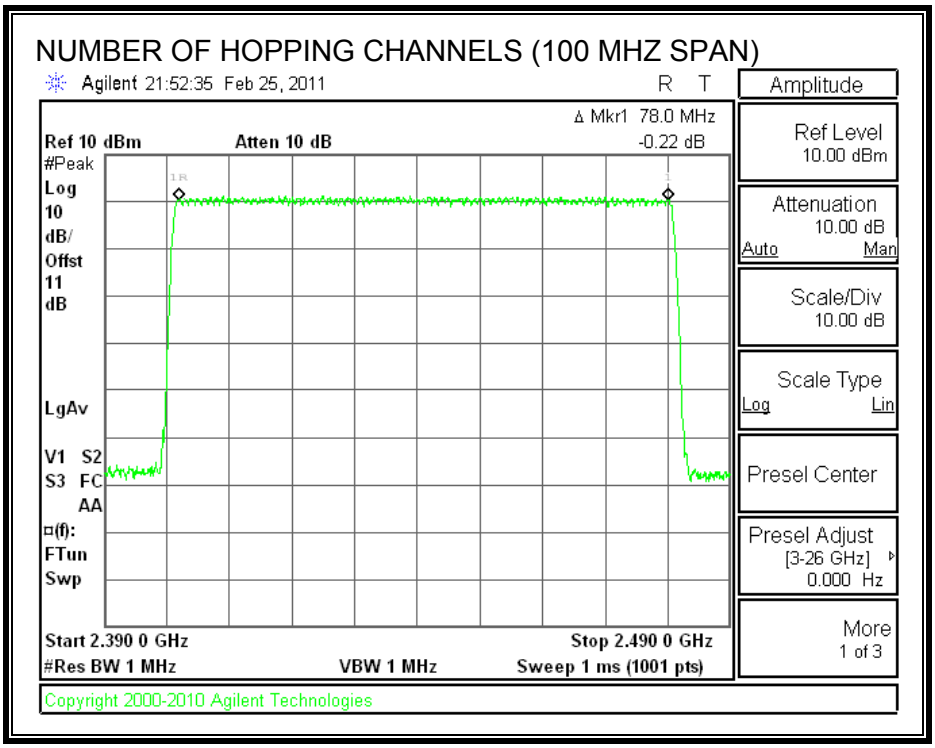
TEST PROCEDURE

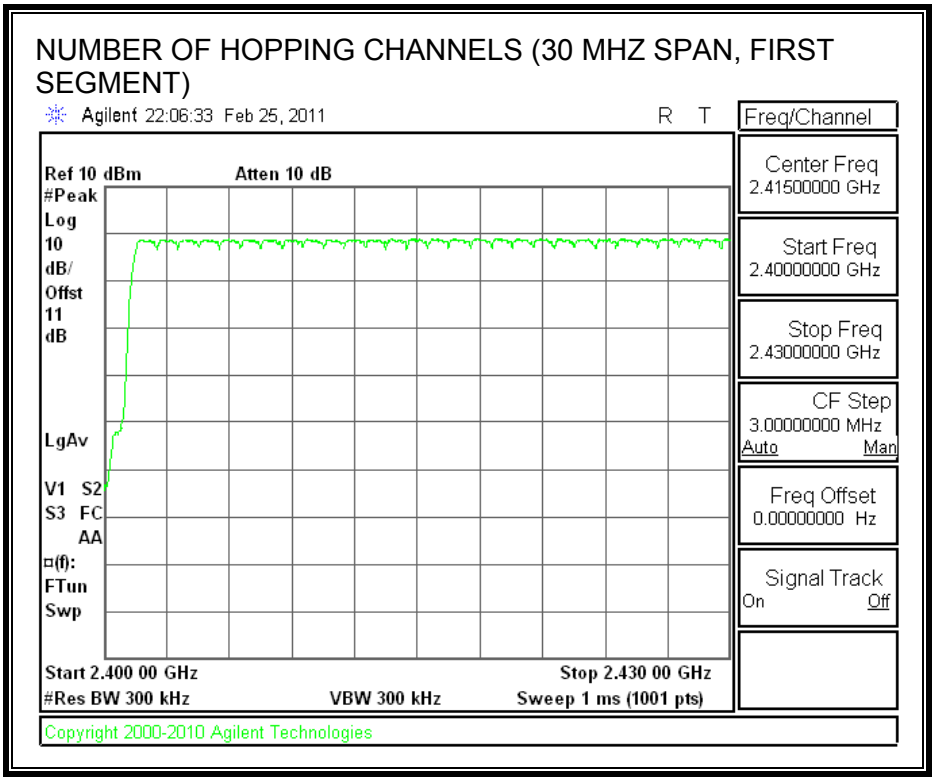
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

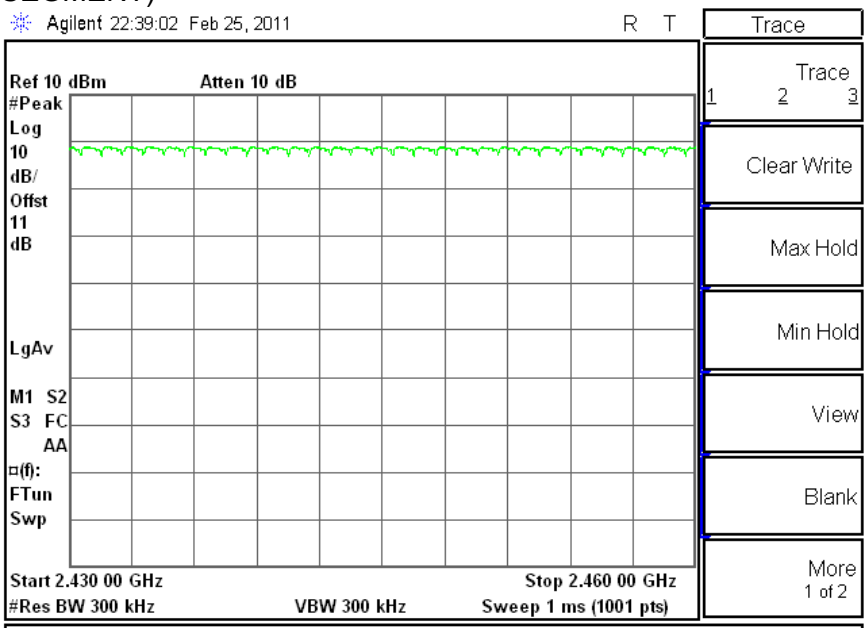
79 Channels observed.

NUMBER OF HOPPING CHANNELS

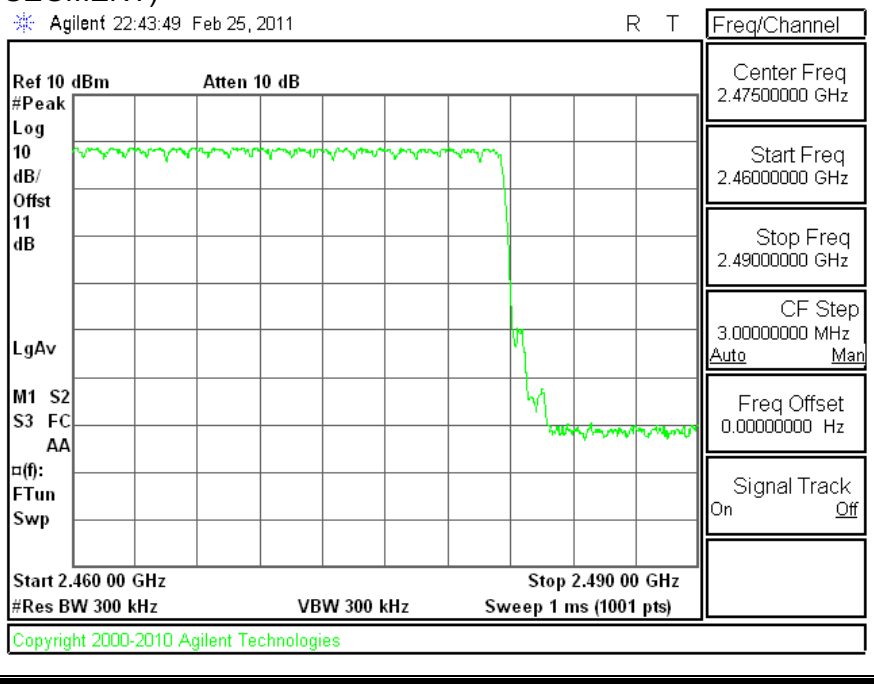




NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



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



7.2.5. 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.

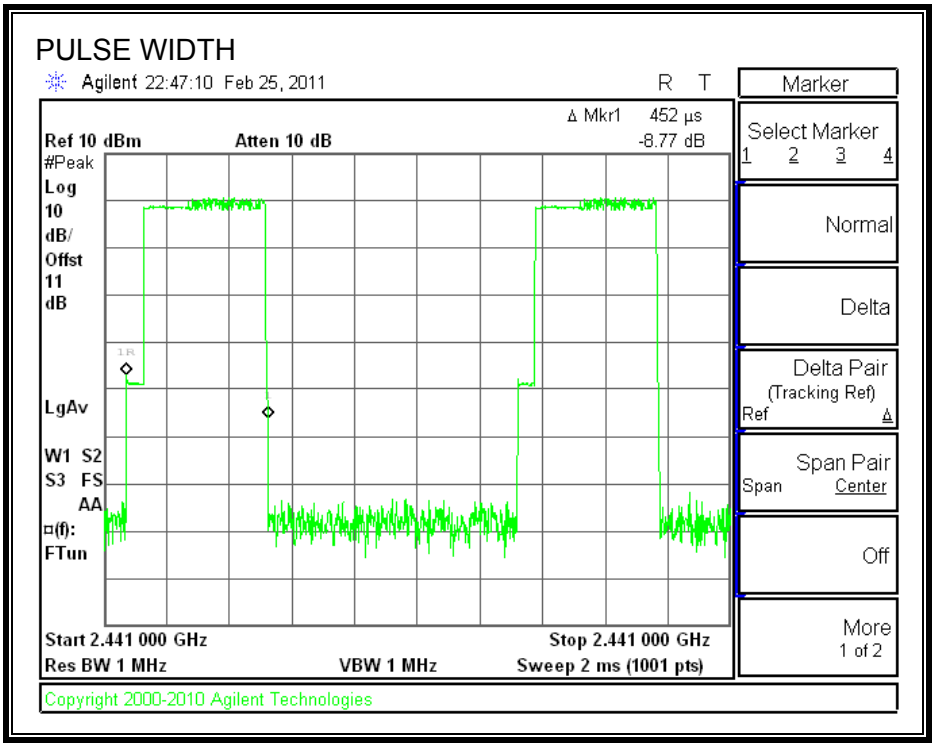
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

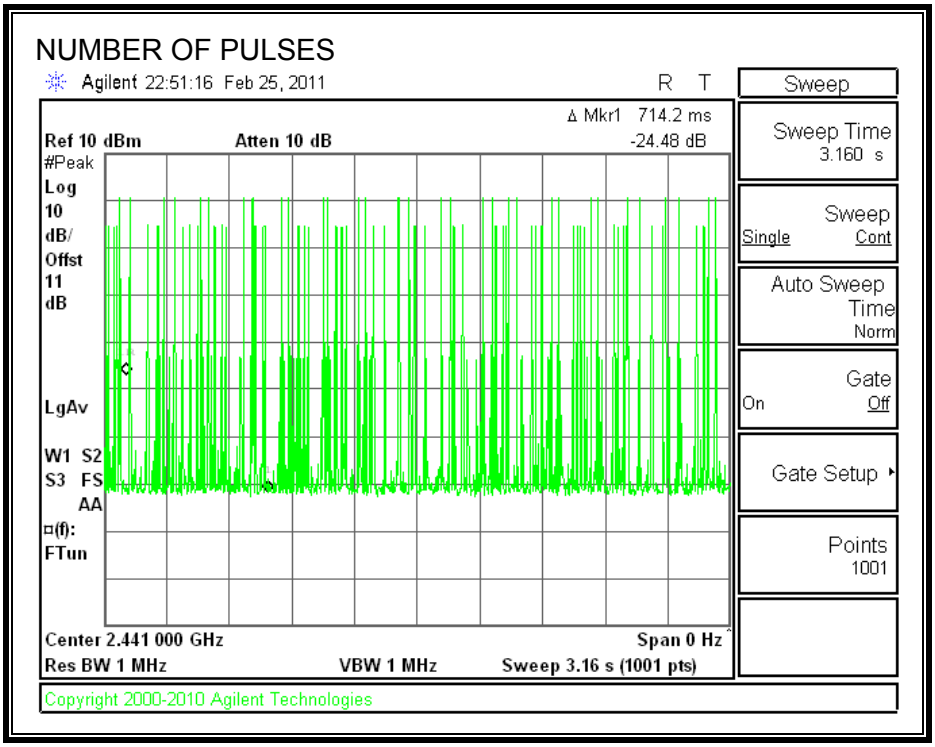
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
DH1	0.452	32	0.145	0.4	-0.255
DH3	1.700	17	0.289	0.4	-0.111
DH5	2.950	13	0.384	0.4	-0.017

DH1

PULSE WIDTH

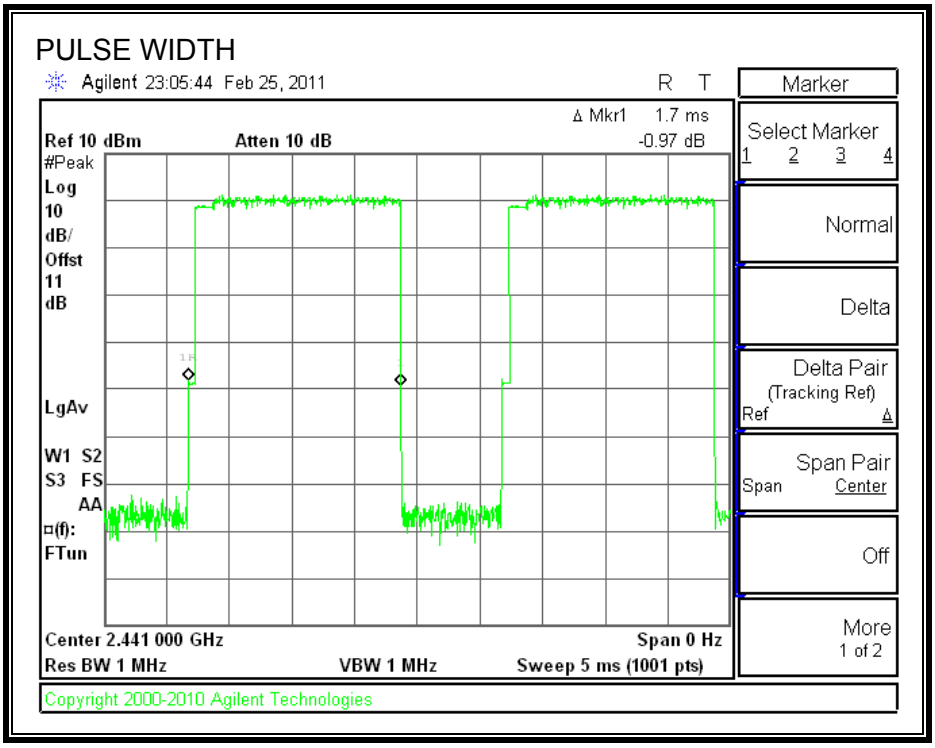


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

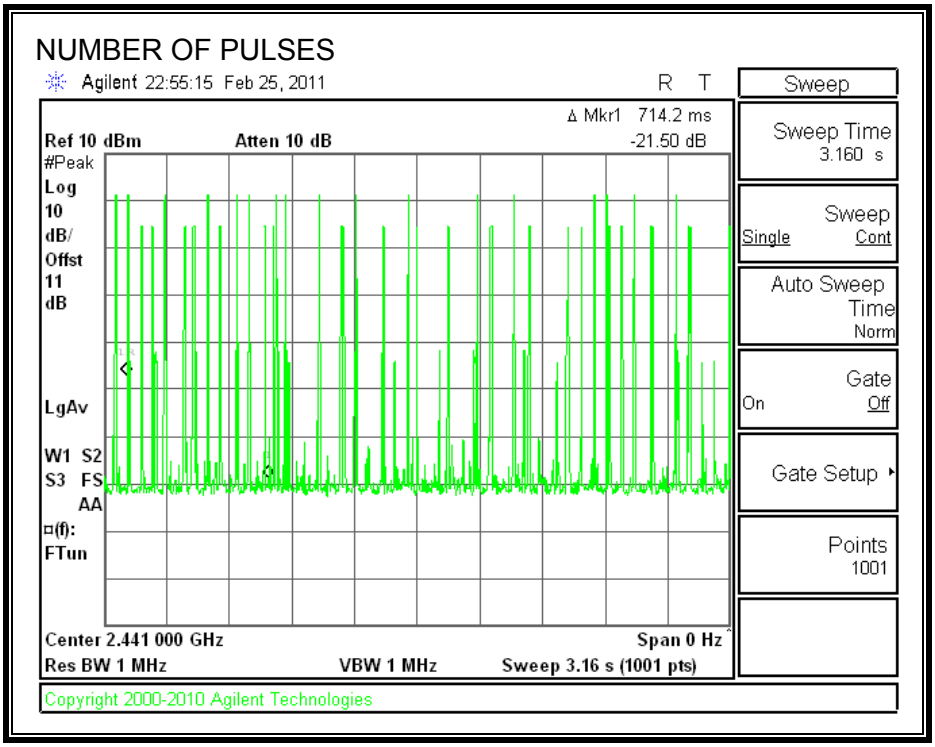


DH3

PULSE WIDTH

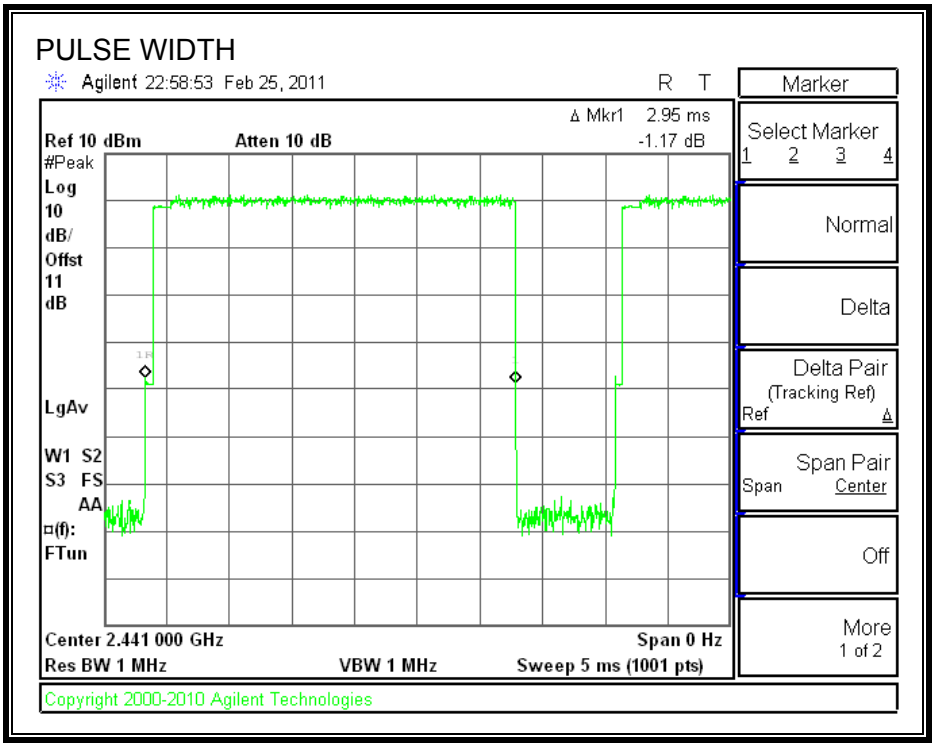


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

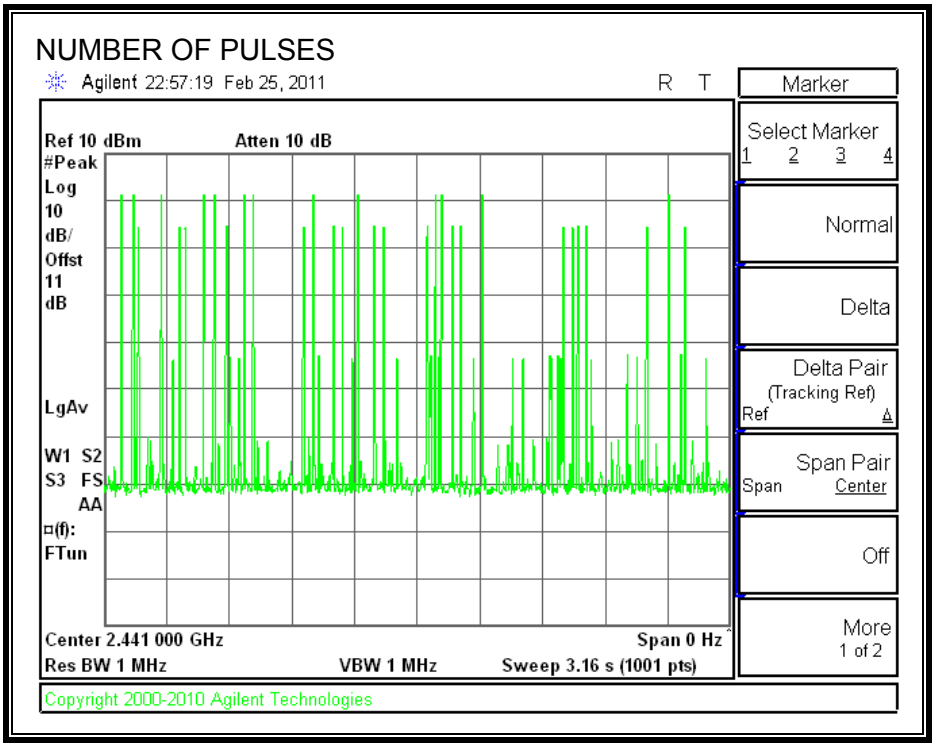


DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.2.6. 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.

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.

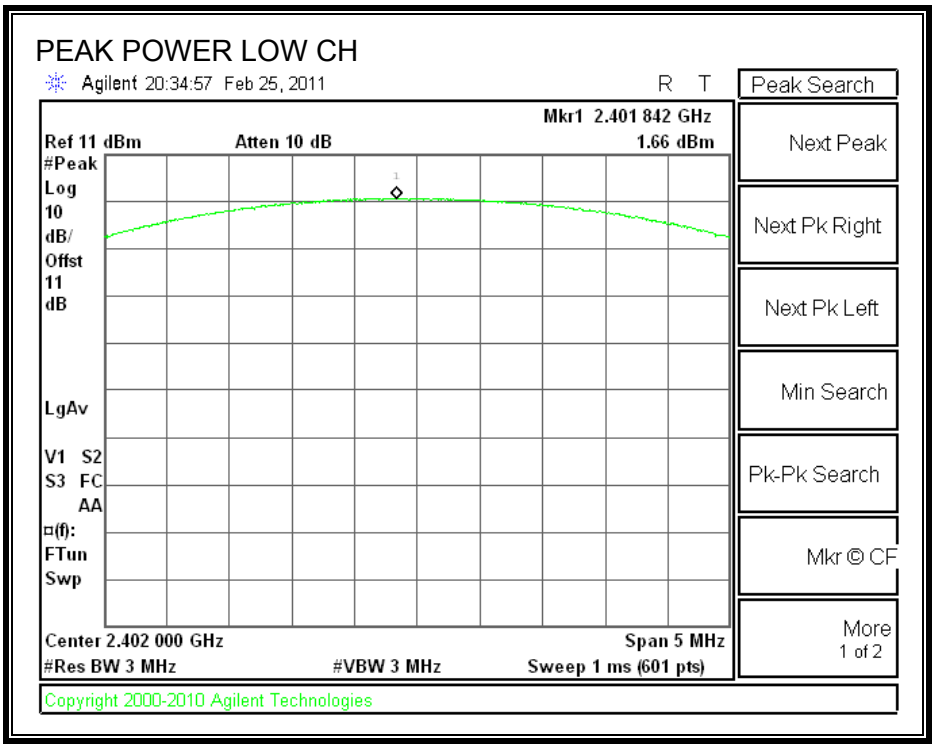
TEST PROCEDURE

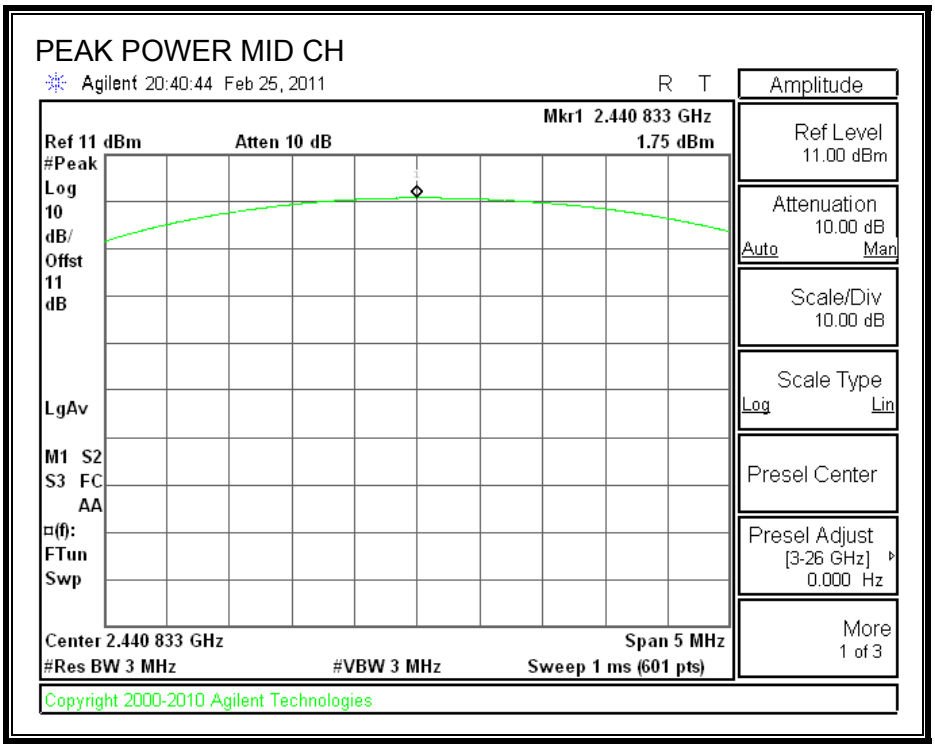
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

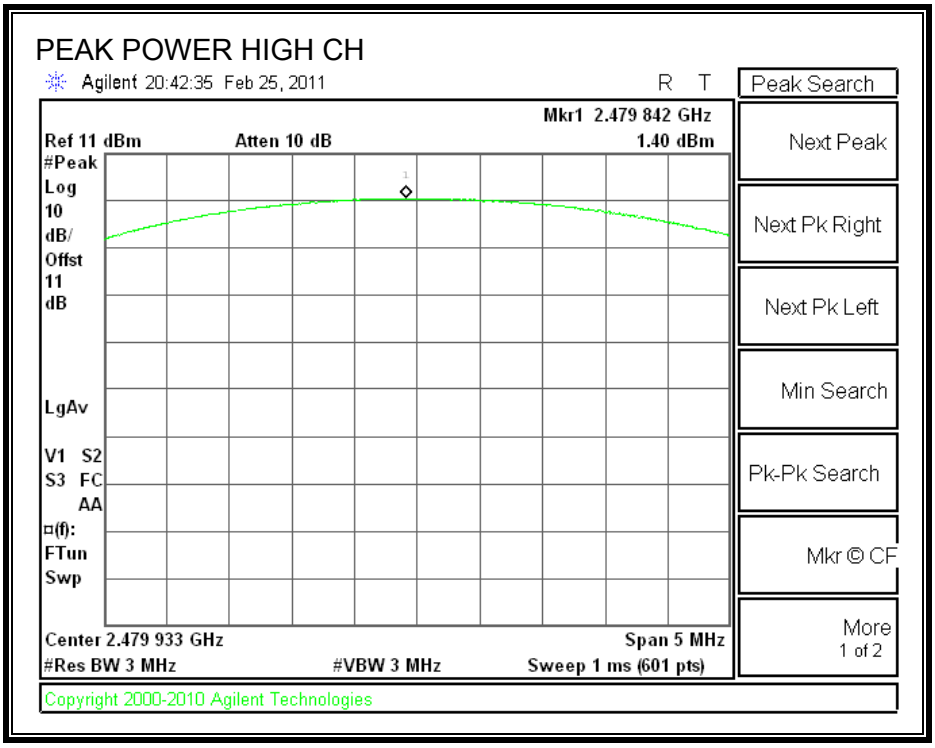
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.66	20.97	-19.31
Middle	2441	1.75	20.97	-19.22
High	2480	1.40	20.97	-19.57

OUTPUT POWER





PEAK POWER HIGH CH



7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

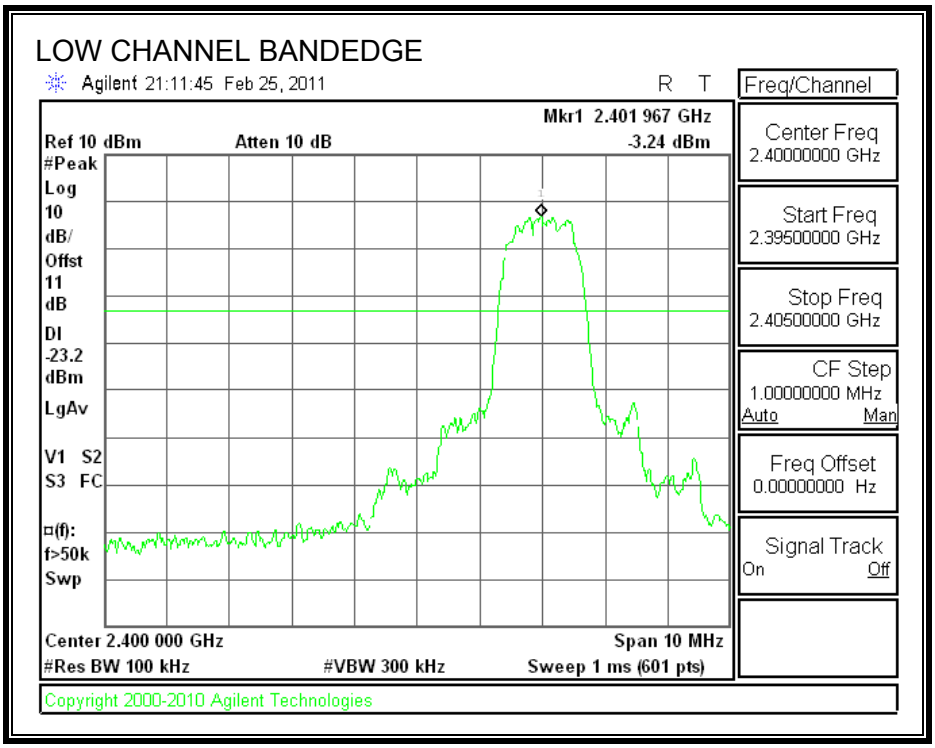
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

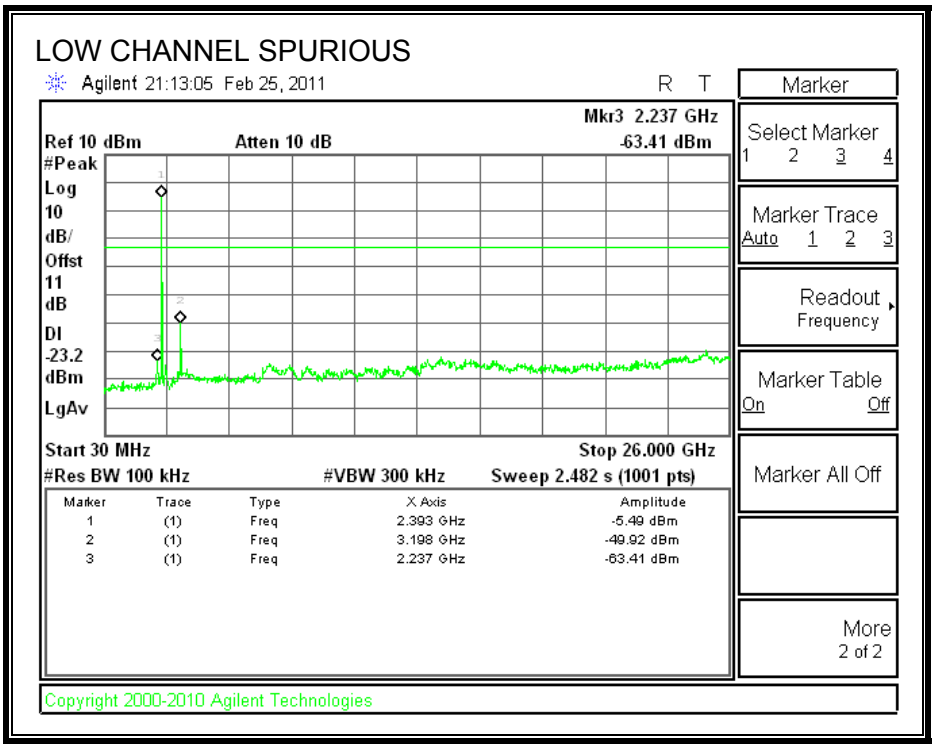
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

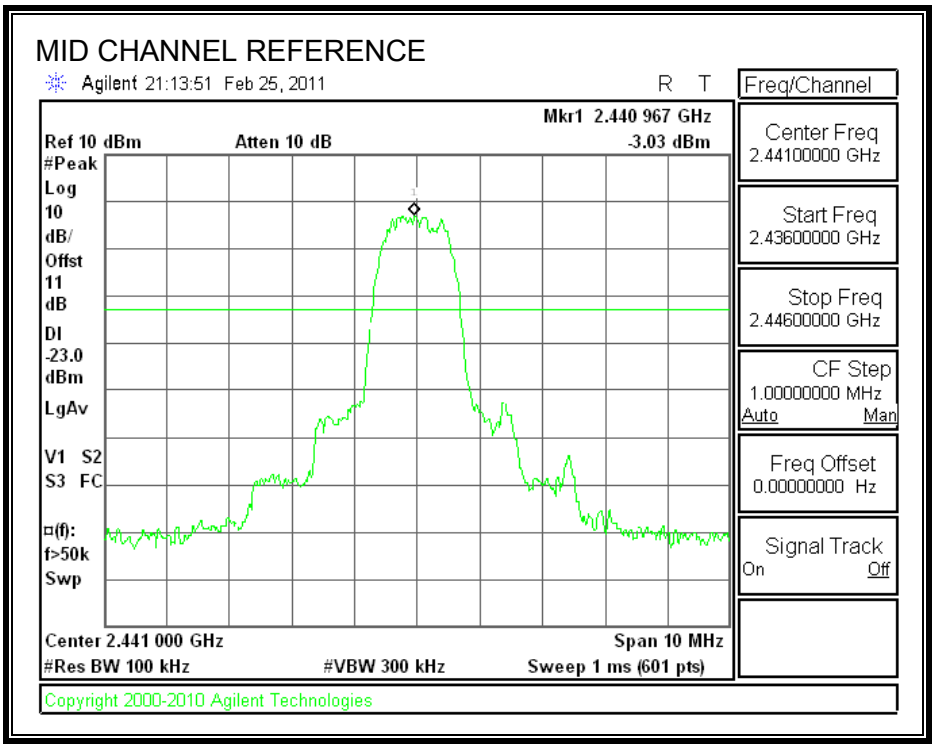
RESULTS

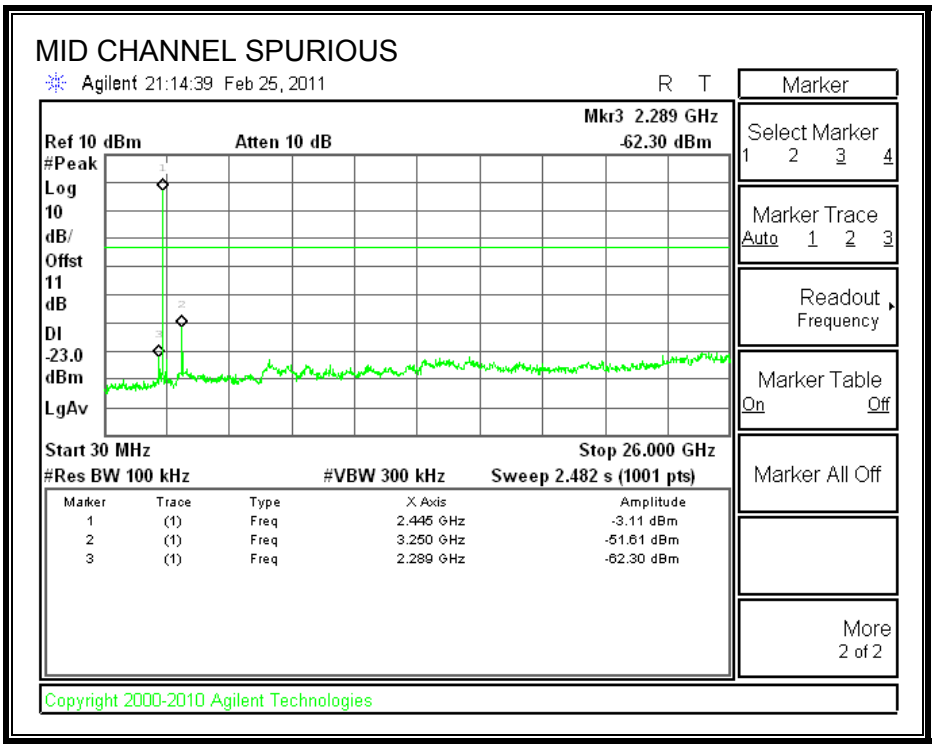
SPURIOUS EMISSIONS, LOW CHANNEL



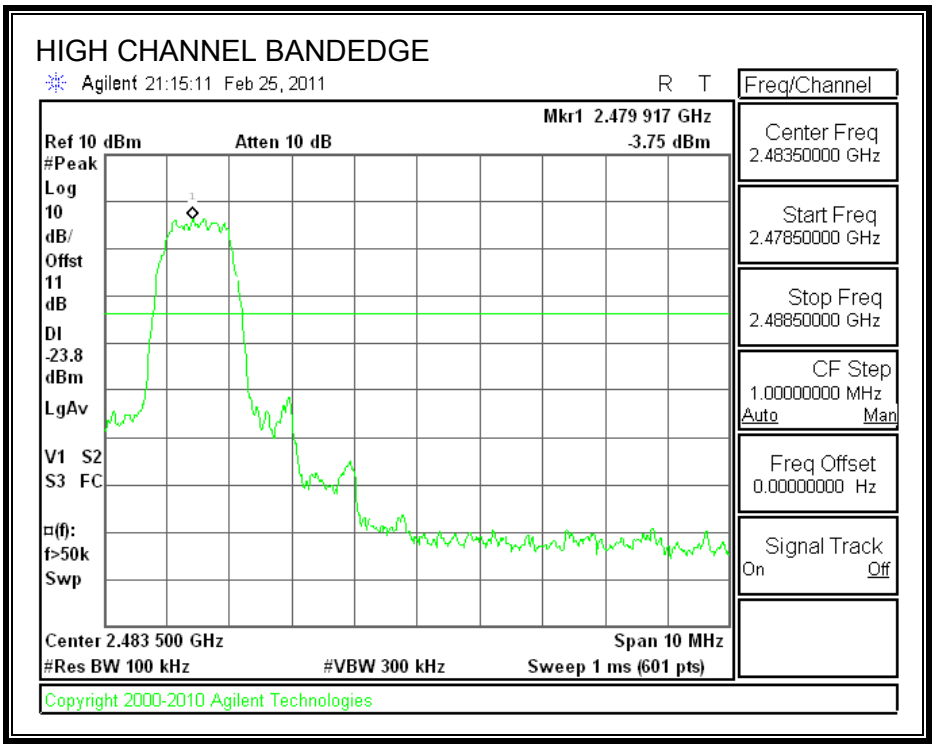


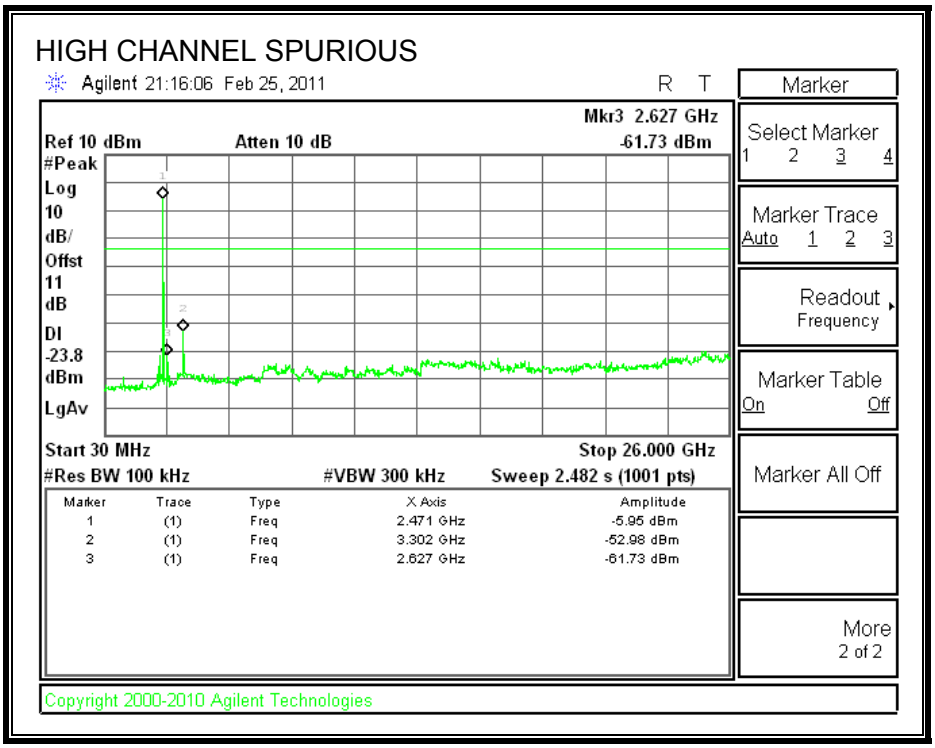
SPURIOUS EMISSIONS, MID CHANNEL



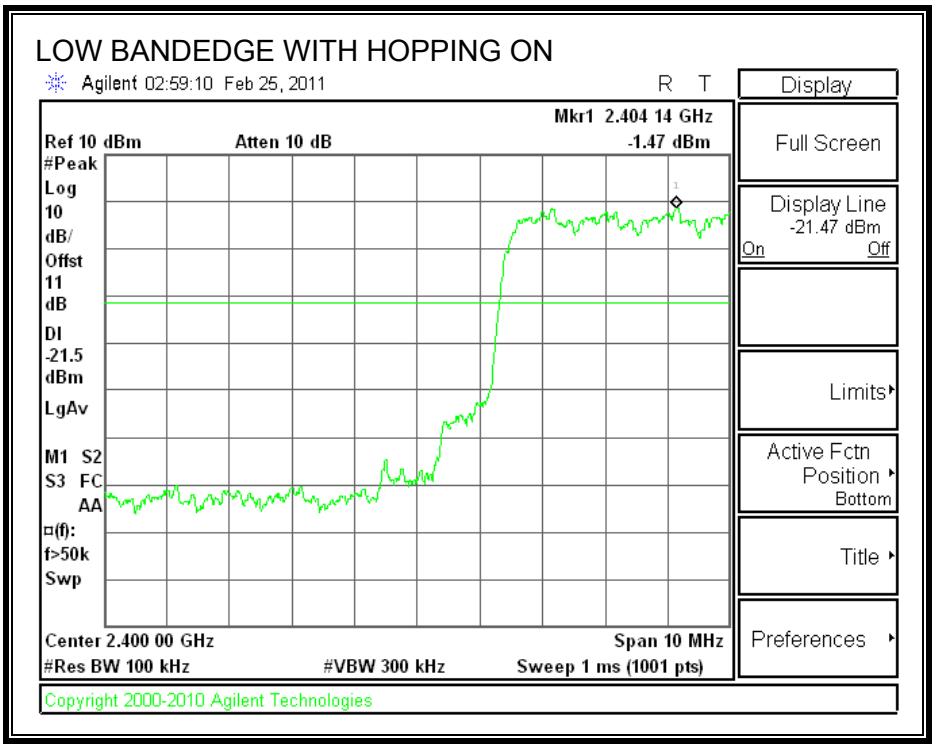


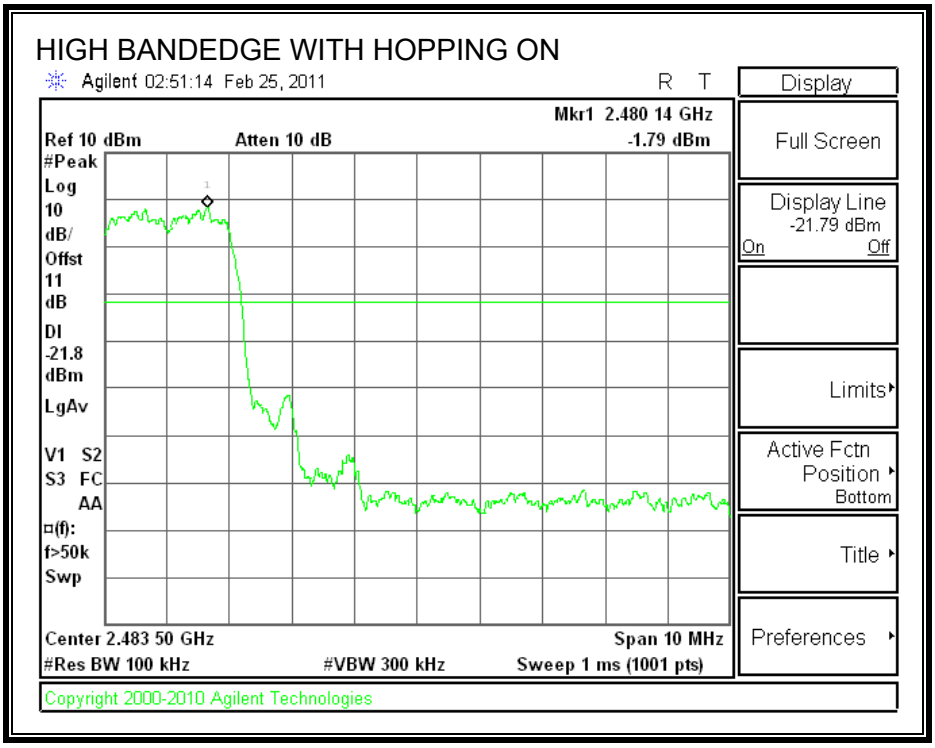
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.3. LE (LOW ENERGY) MODULATION

7.3.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

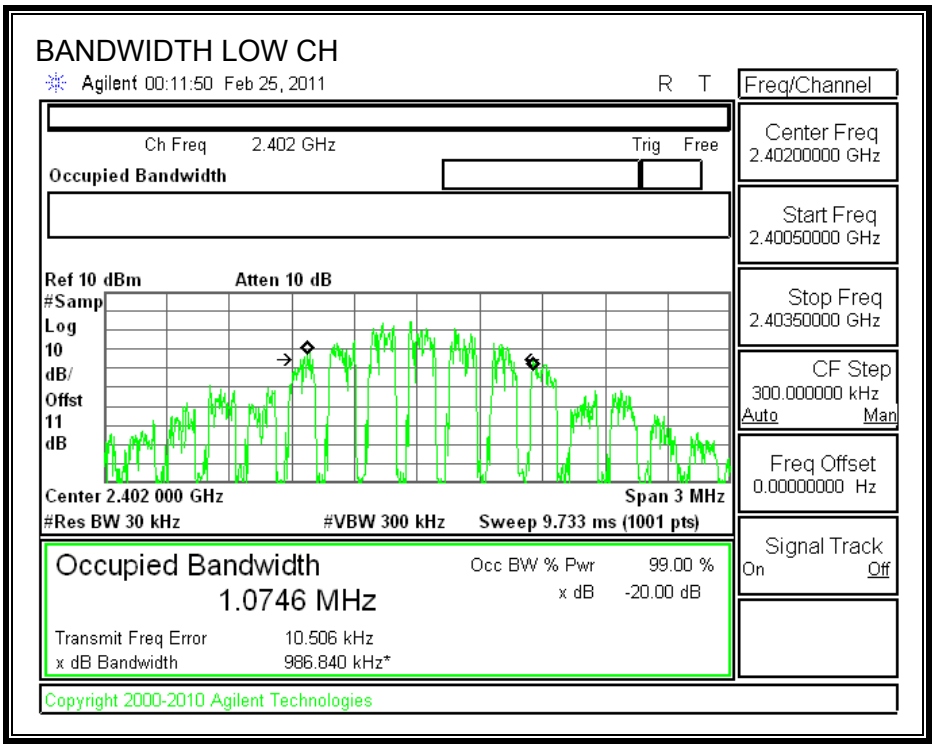
TEST PROCEDURE

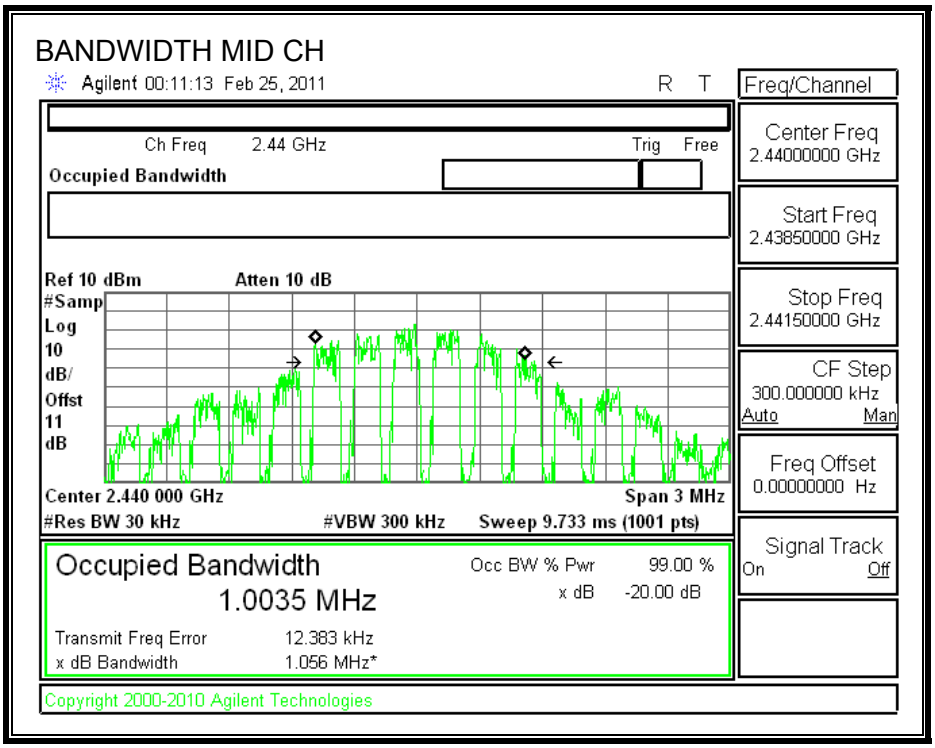
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 99% bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

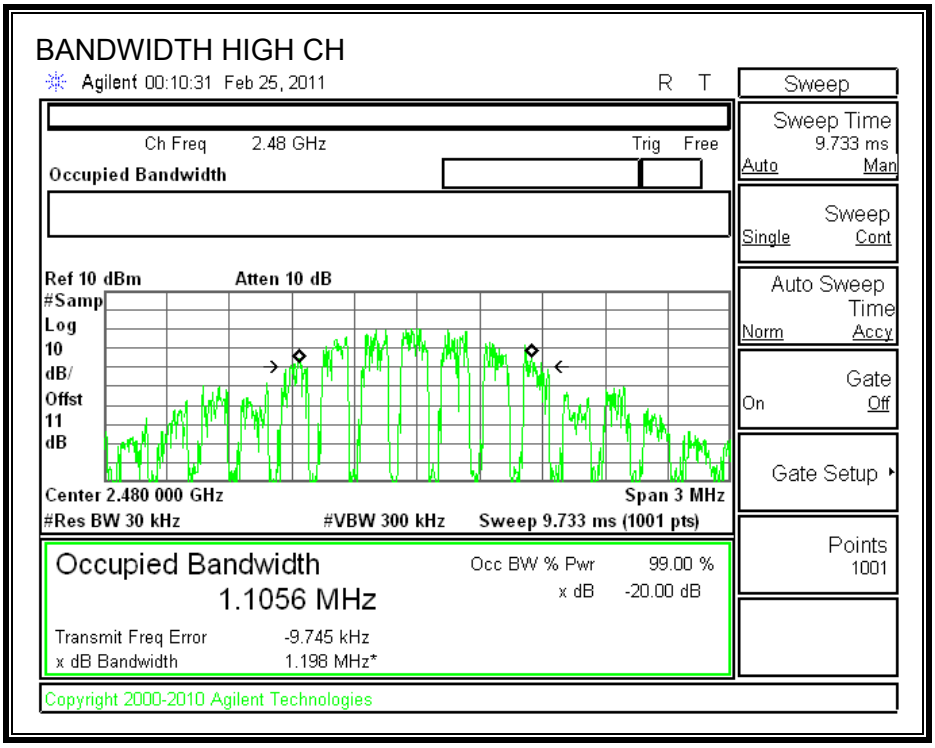
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0746
Middle	2440	1.0035
High	2480	1.1056

99% BANDWIDTH







7.3.2. 20dB BANDWIDTH

LIMIT

None; for reporting purposes only.

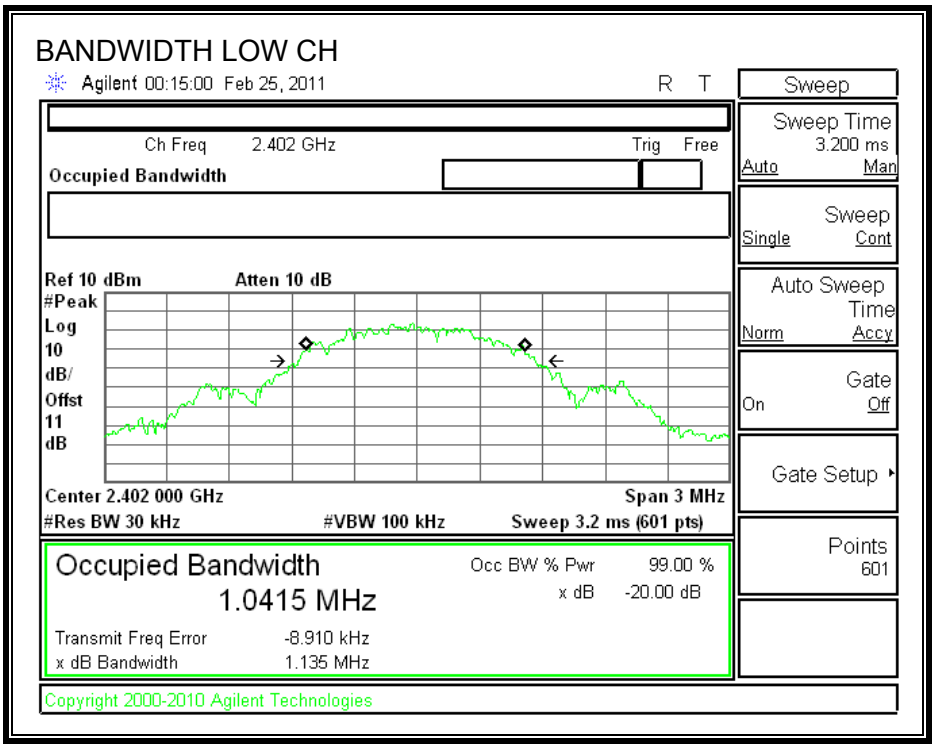
TEST PROCEDURE

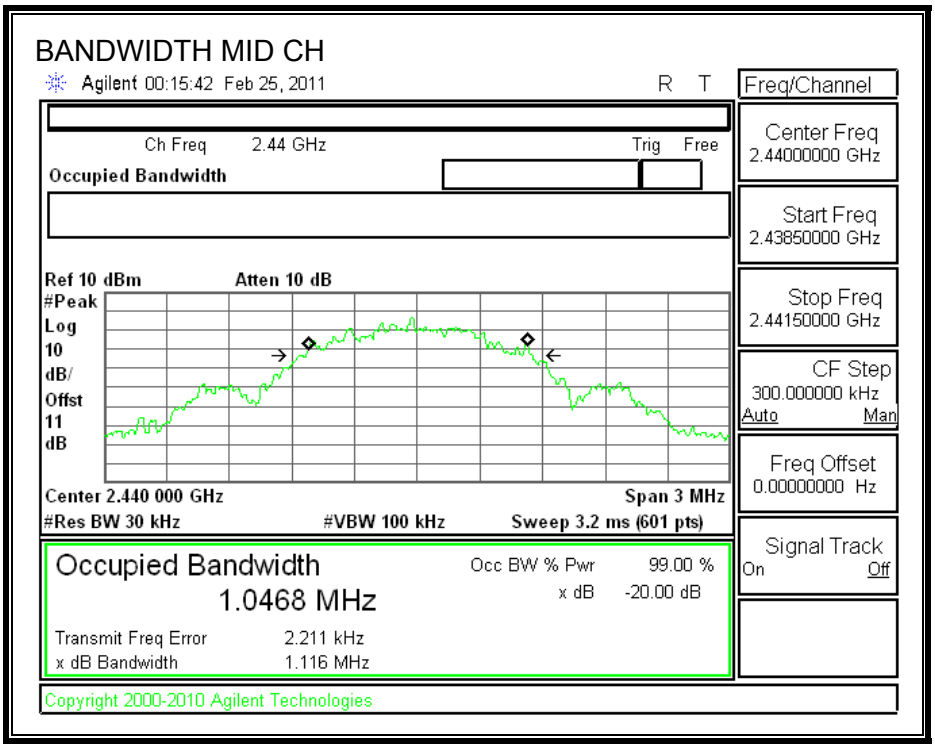
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

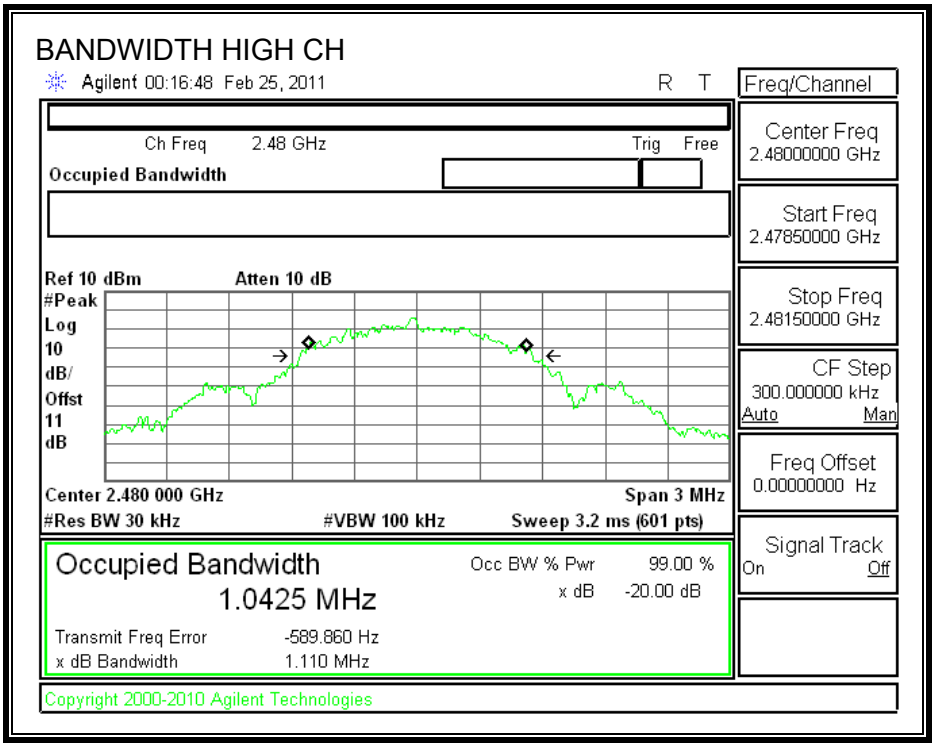
RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	1.135
Middle	2440	1.116
High	2480	1.110

20 dB BANDWIDTH







7.3.3. 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.

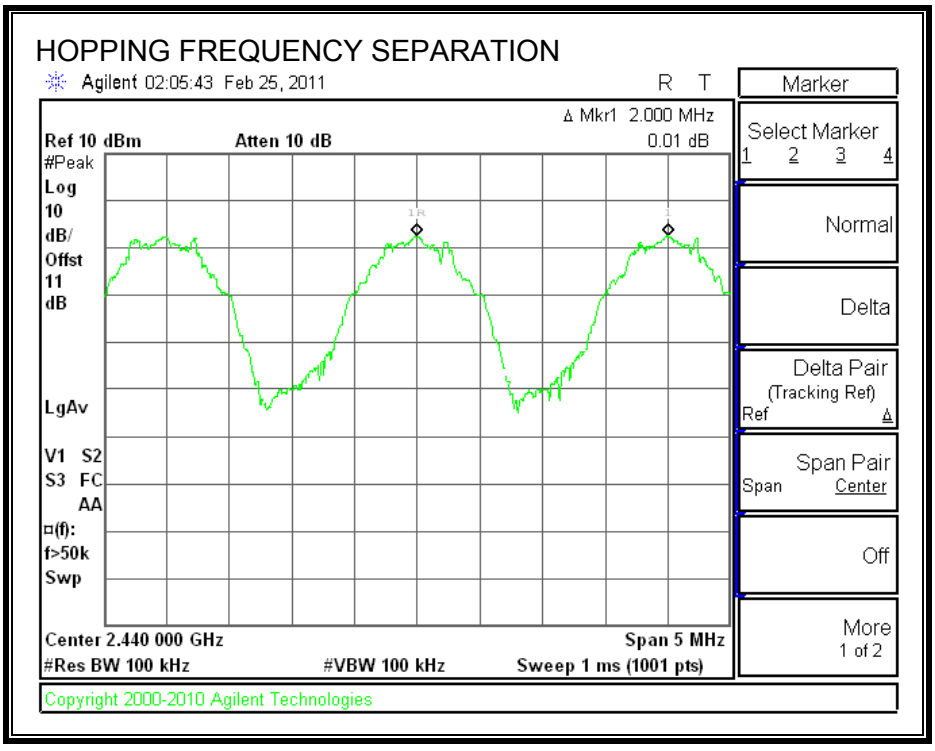
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



7.3.4. 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.

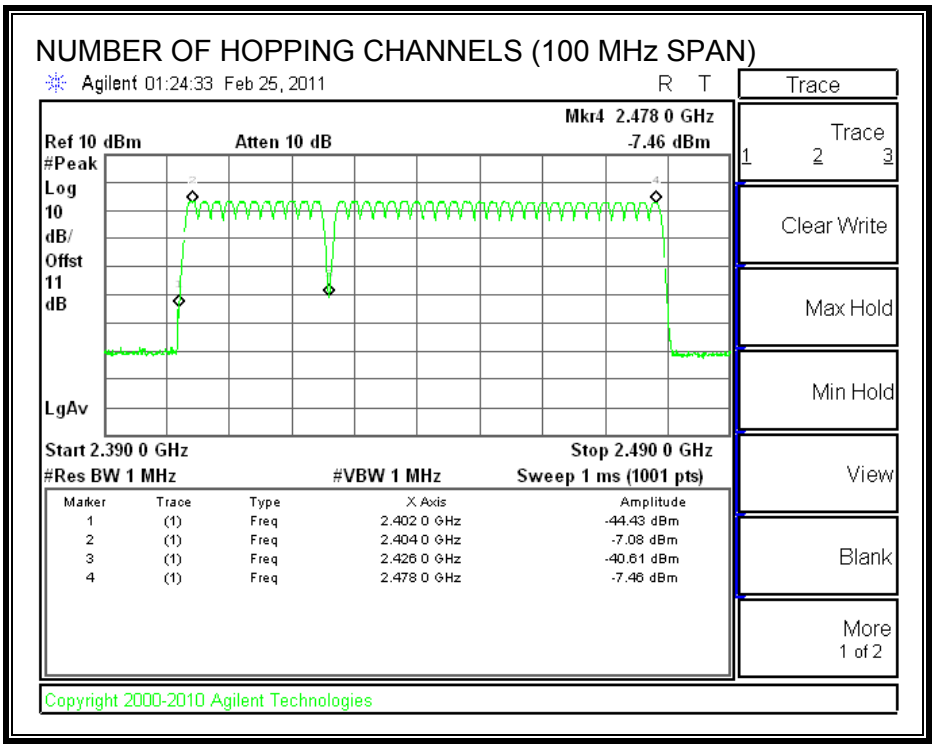
TEST PROCEDURE

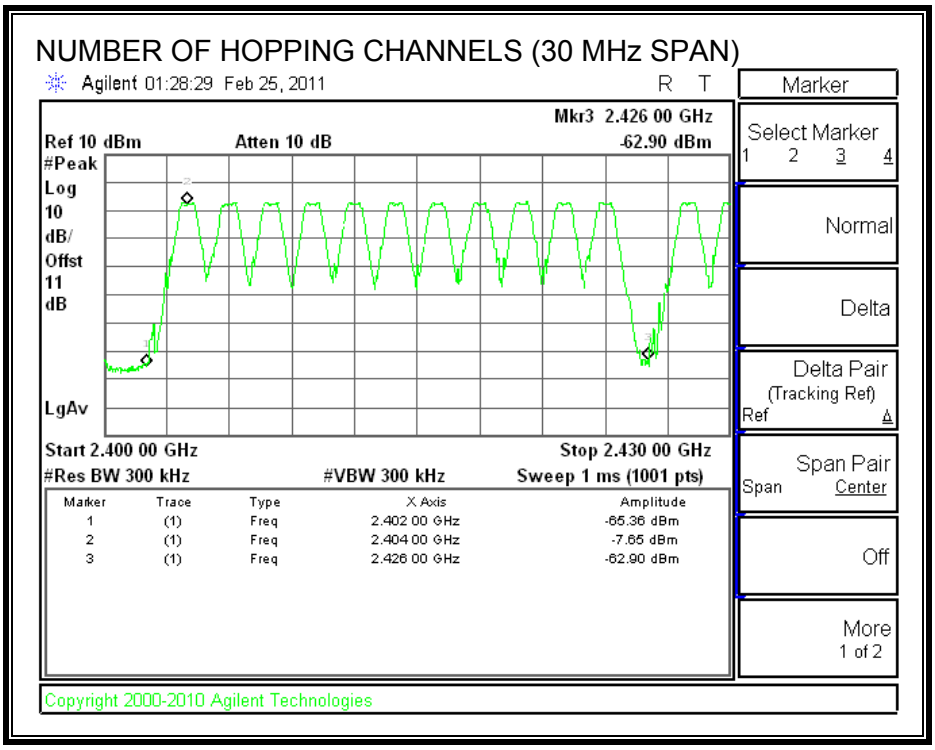
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

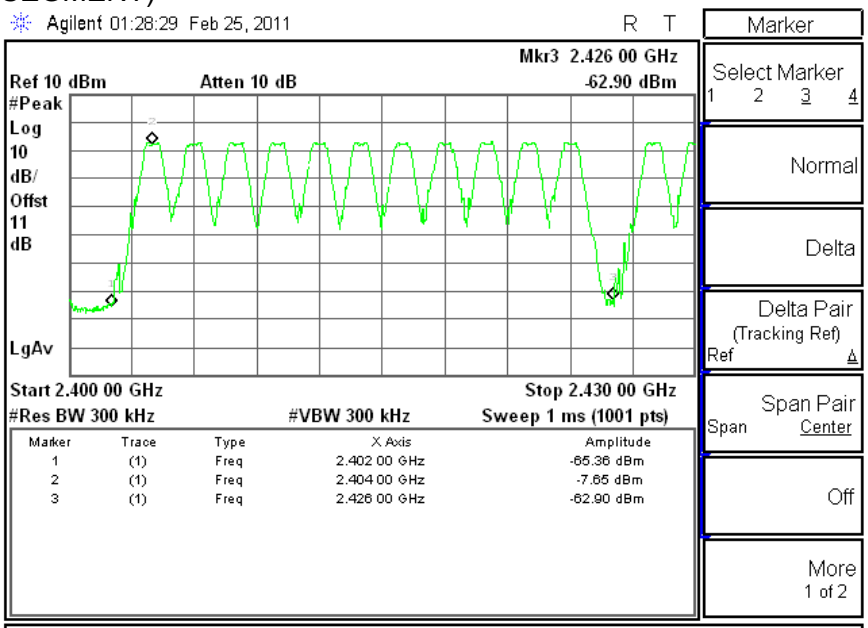
Please see advertising channels for 2402, 2426, and 2480MHz explanation in separated document.

NUMBER OF HOPPING CHANNELS

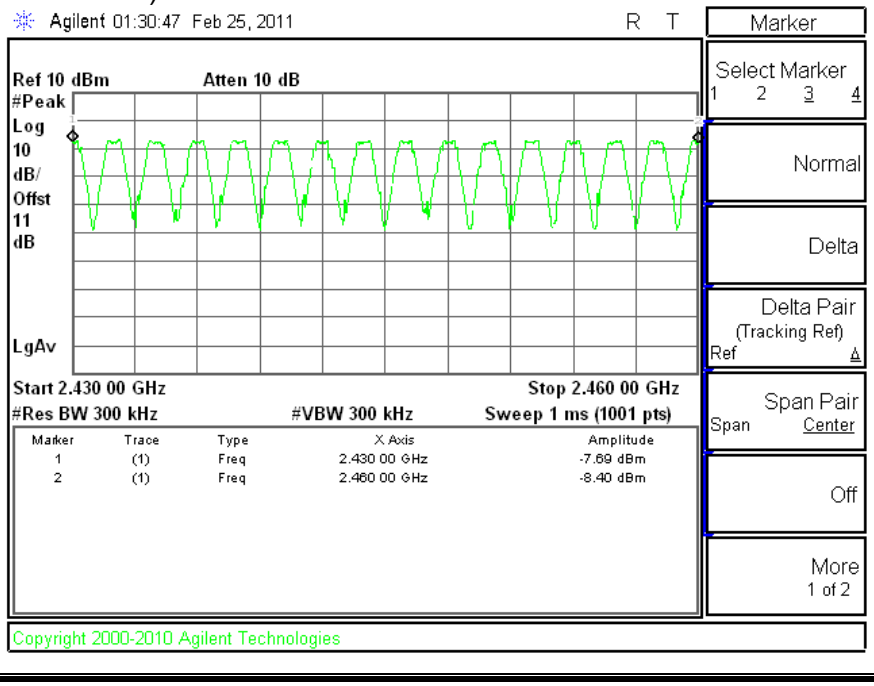




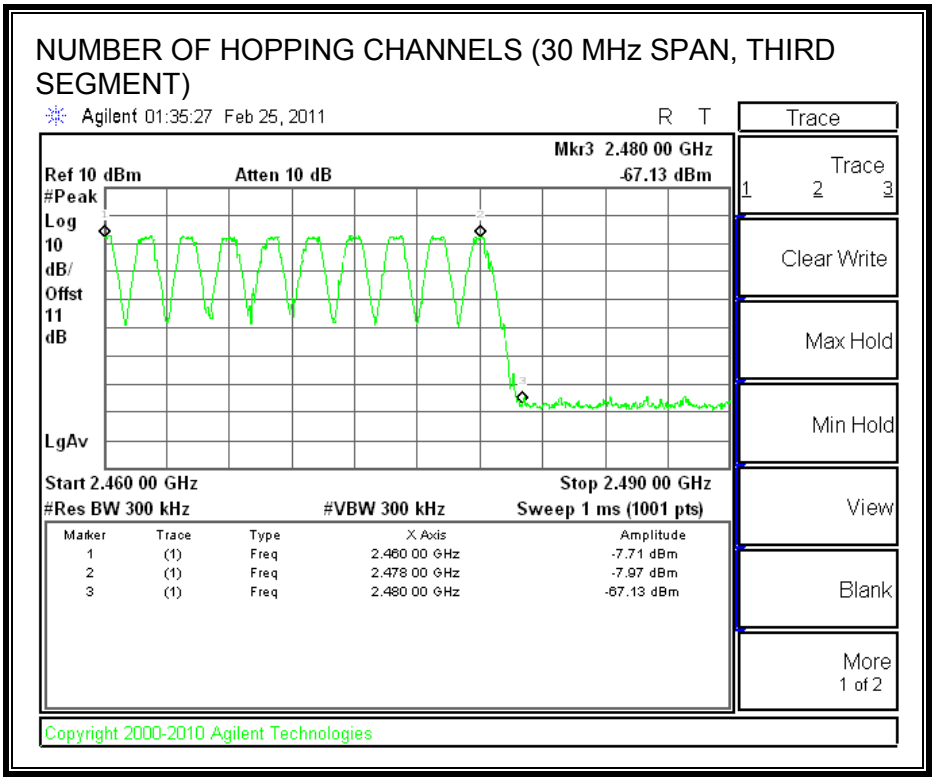
NUMBER OF HOPPING CHANNELS (30 MHz SPAN, FIRST SEGMENT)



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



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



7.3.5. 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

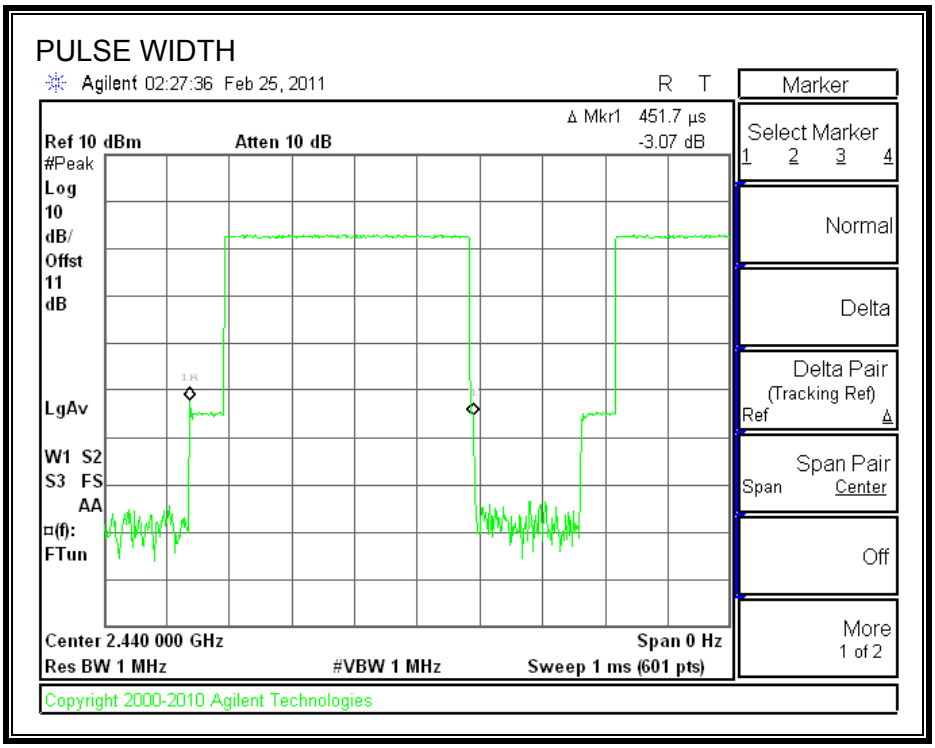
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 1.60 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 1.60 second period (40 channels * 0.4 s) is equal to 10 * (# of pulses in 1.60 s) * pulse width.

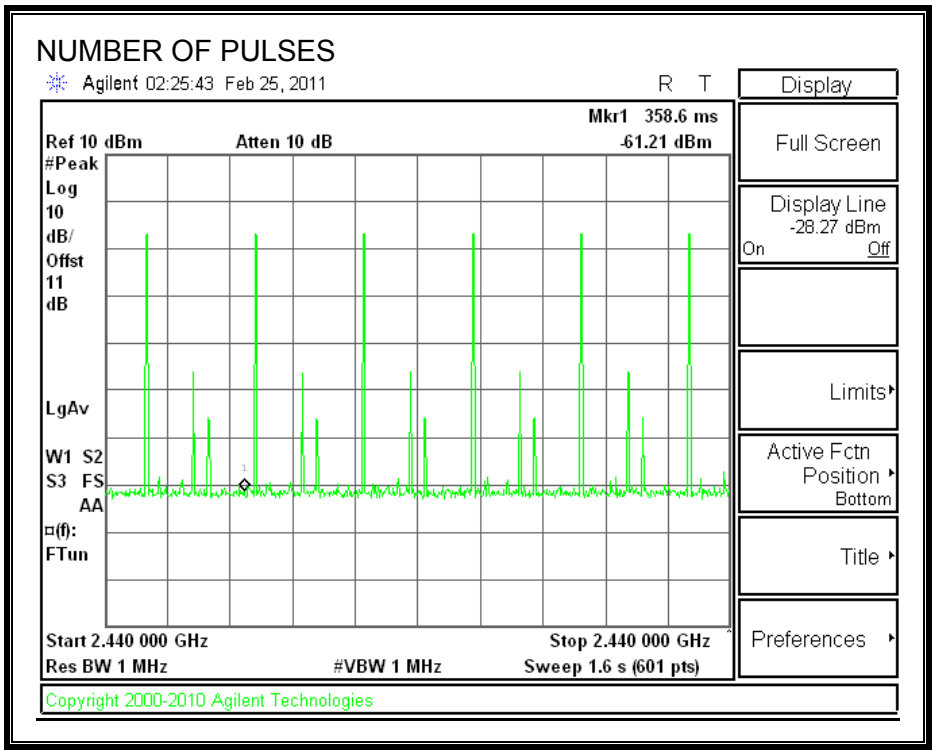
RESULTS

Pulse Width (msec)	Number of Pulses in 1.6 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
0.452	6	0.027	0.4	-0.373

PULSE WIDTH



NUMBER OF PULSES IN 1.60 SECOND OBSERVATION PERIOD



7.3.6. 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.

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

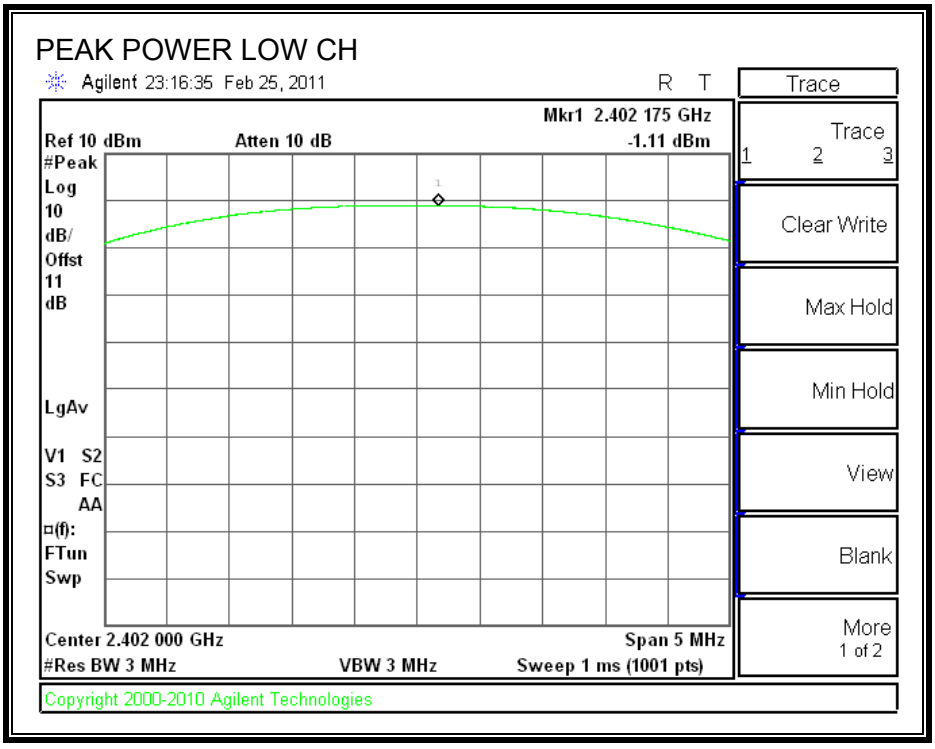
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

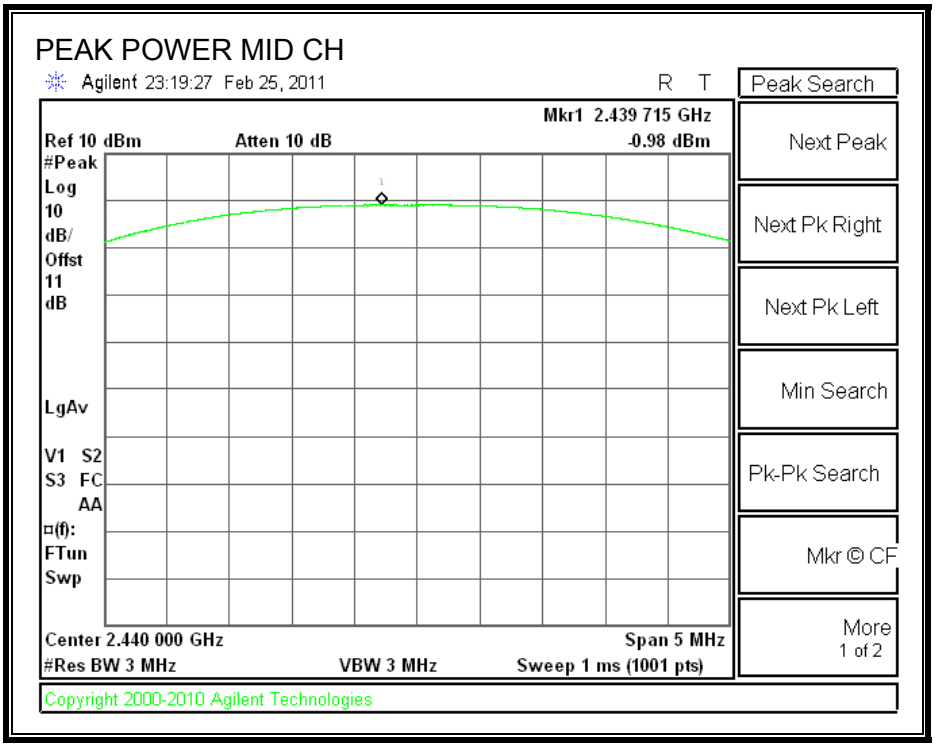
RESULTS

LE MODE

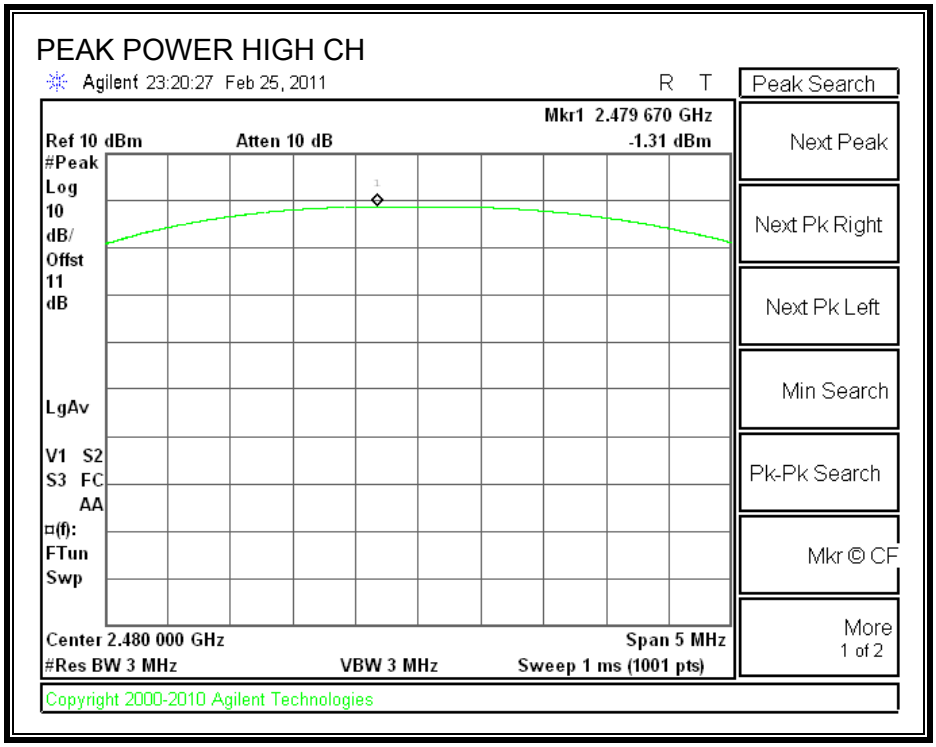
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-1.11	30	-31.11
Middle	2440	-0.98	30	-30.98
High	2480	-1.31	30	-31.31

LE MODE





PEAK POWER HIGH CH



7.3.7. 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.

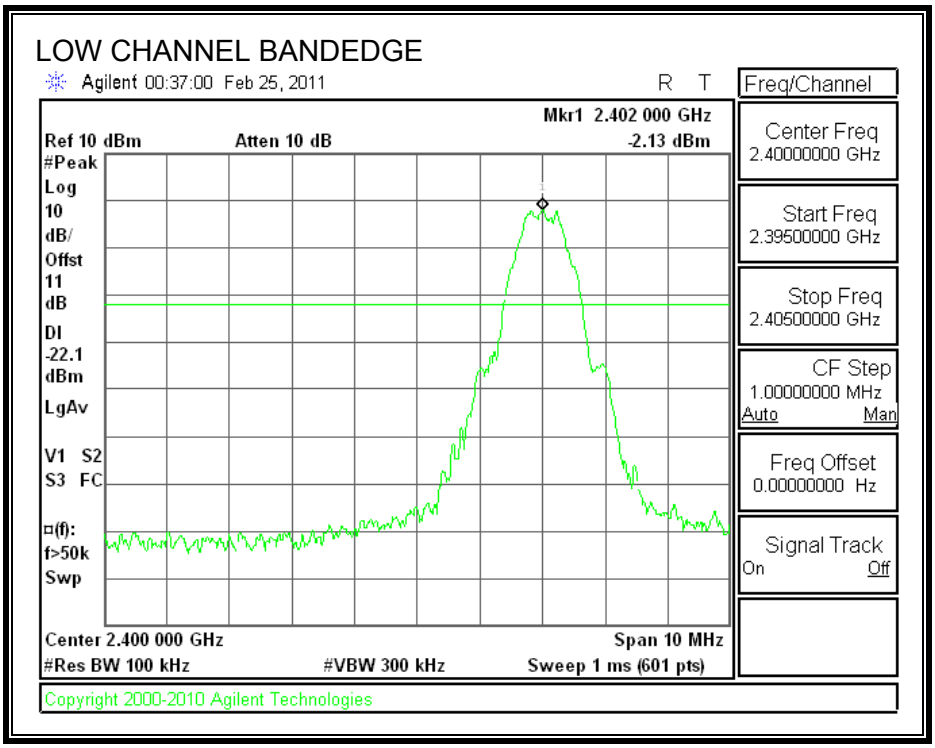
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

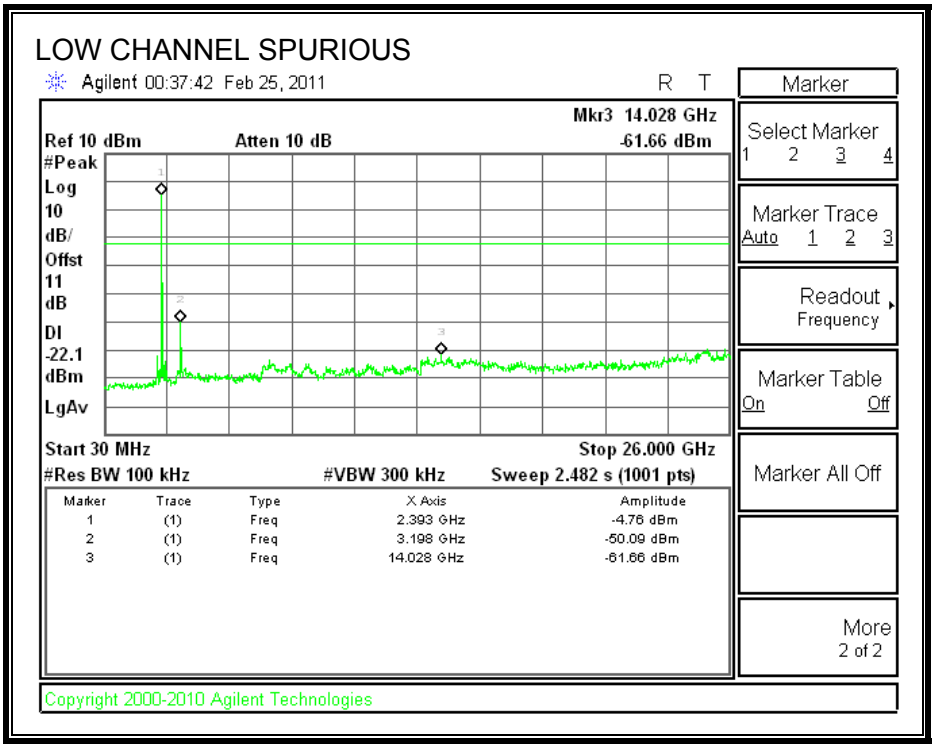
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

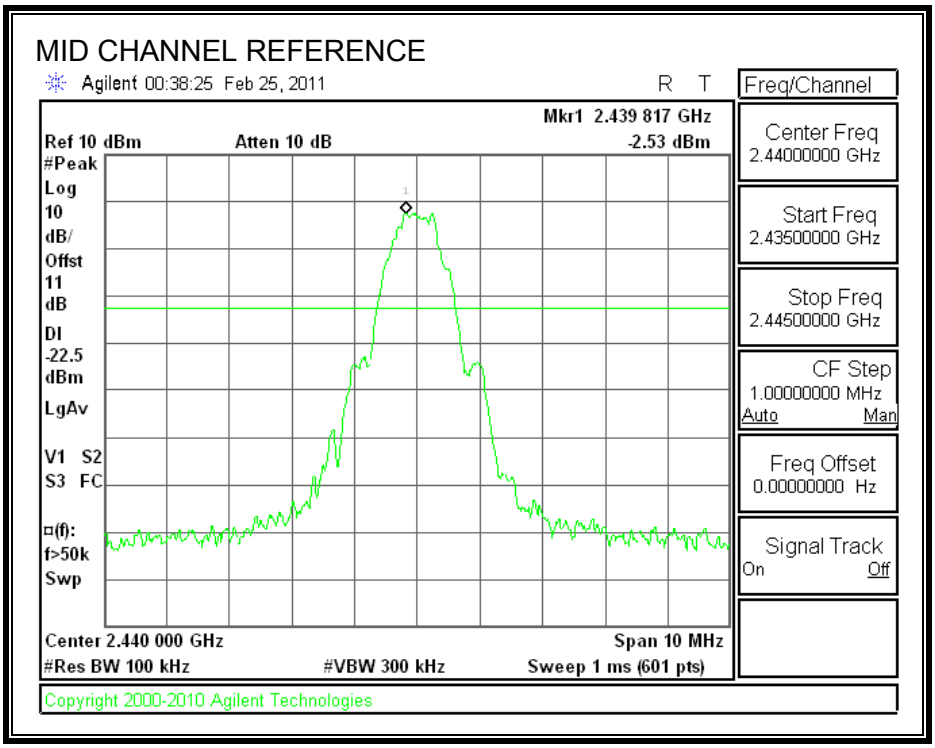
LE MODE

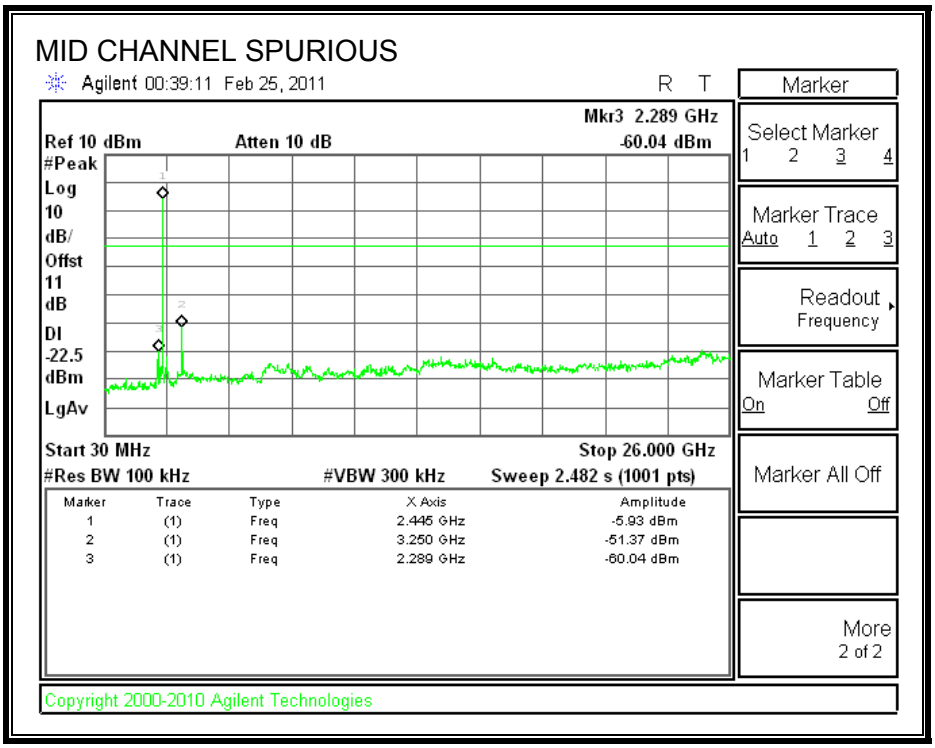
SPURIOUS EMISSIONS, LOW CHANNEL



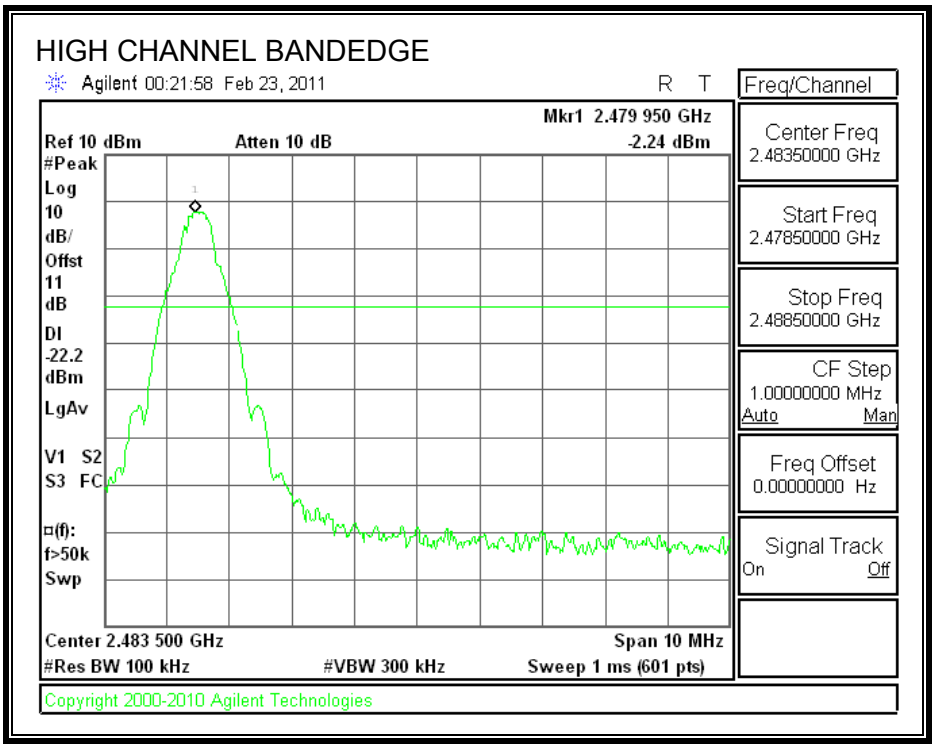


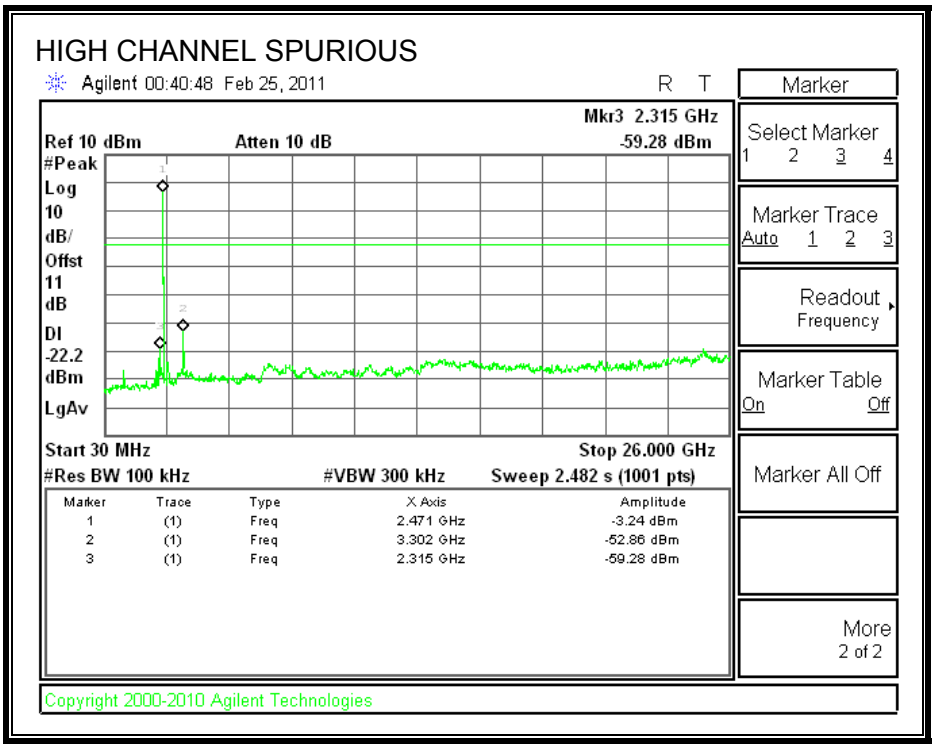
SPURIOUS EMISSIONS, MID CHANNEL



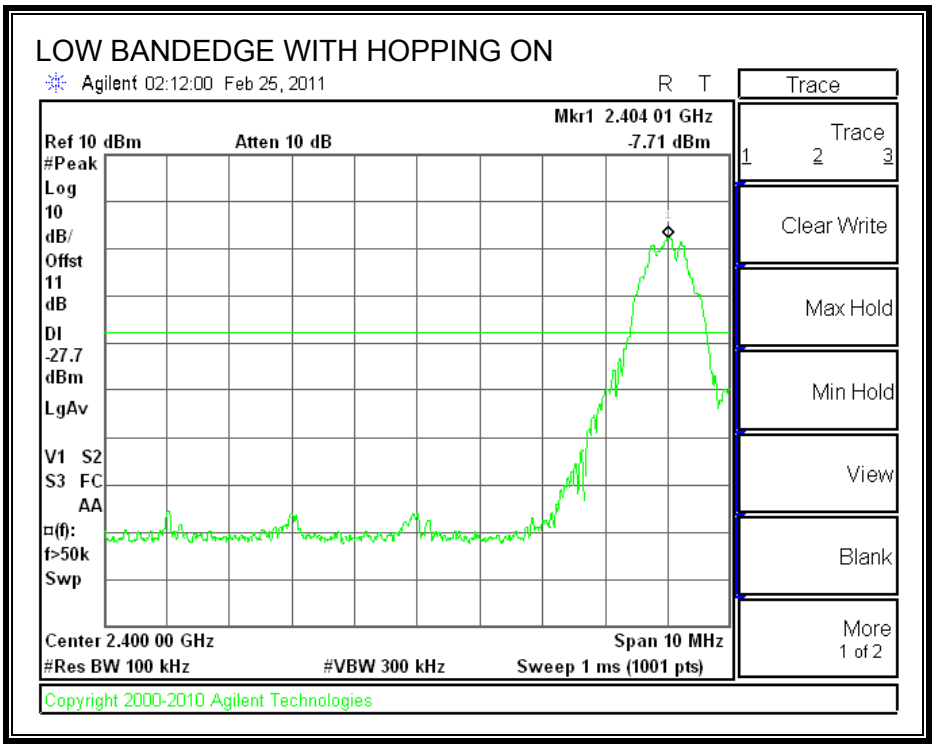


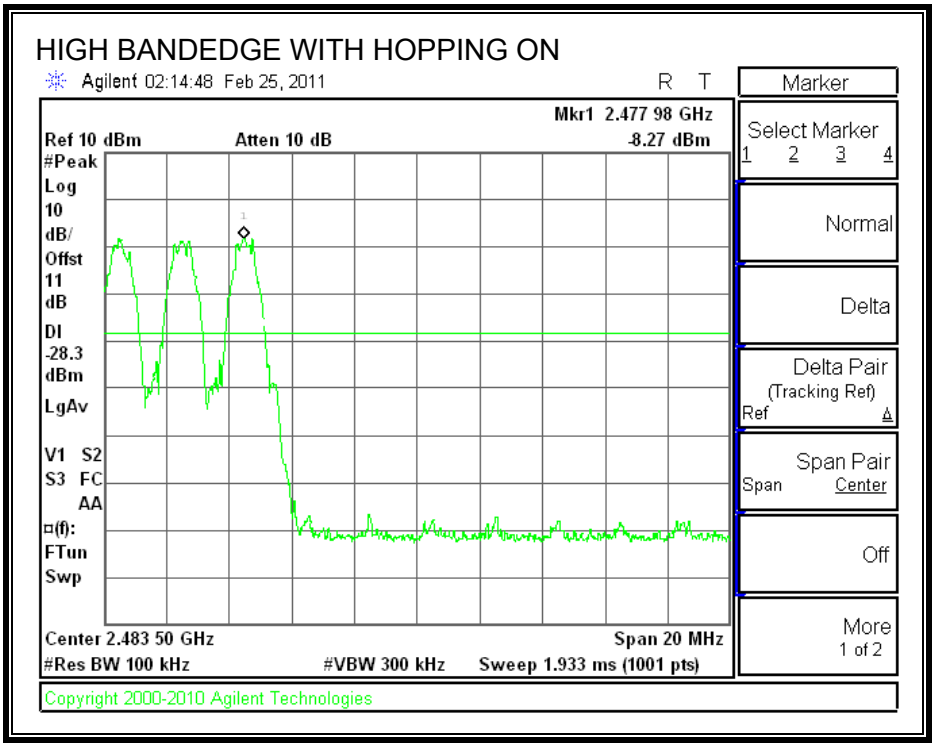
SPURIOUS EMISSIONS, HIGH CHANNEL





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.

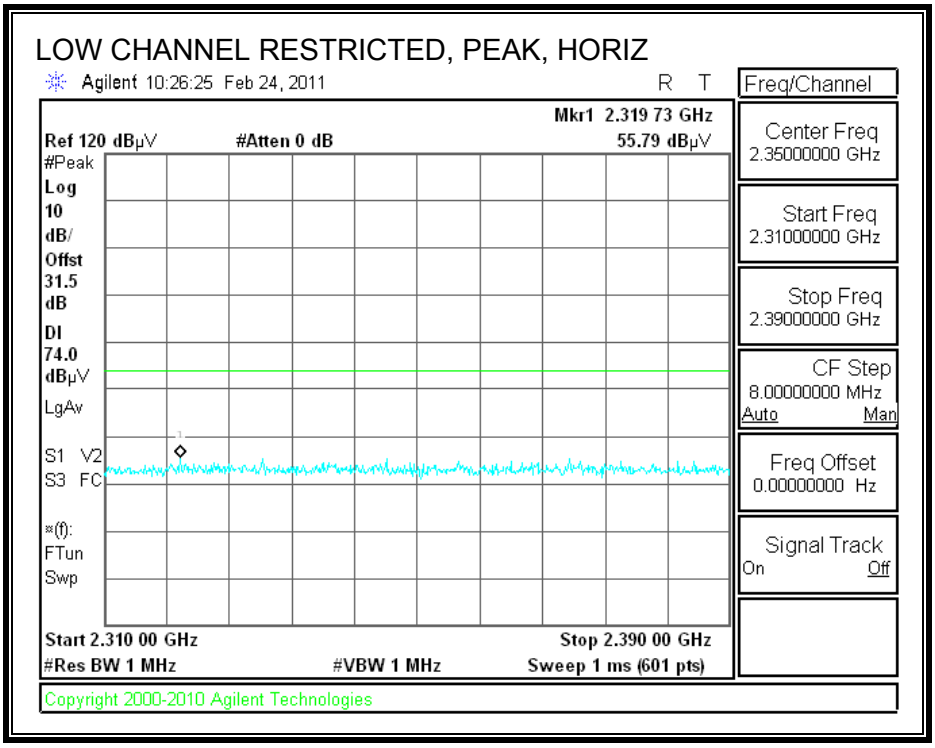
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

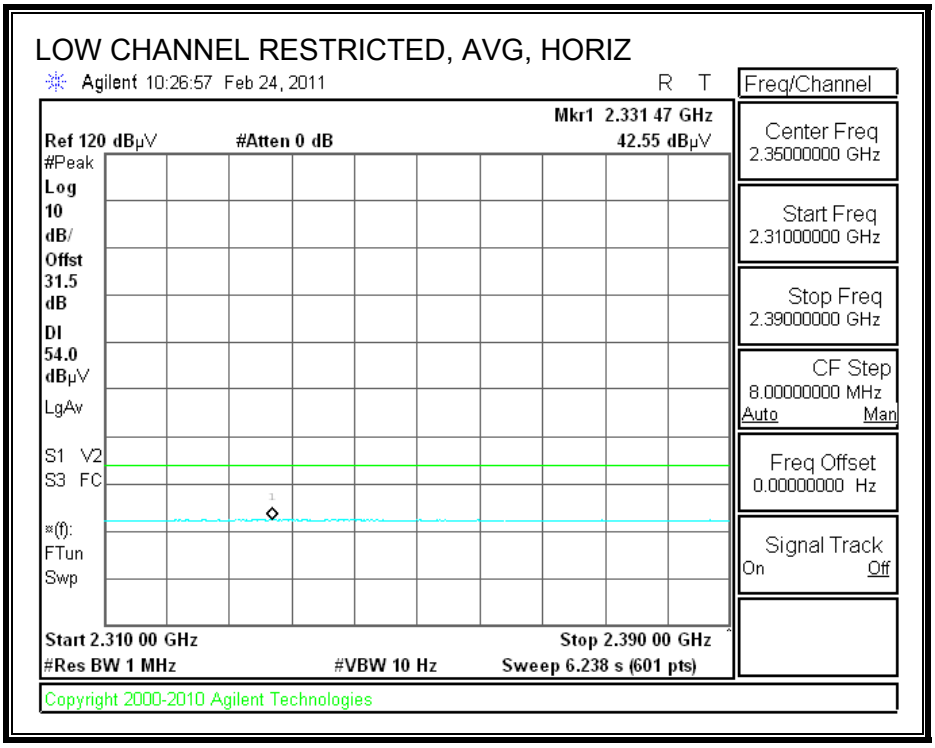
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

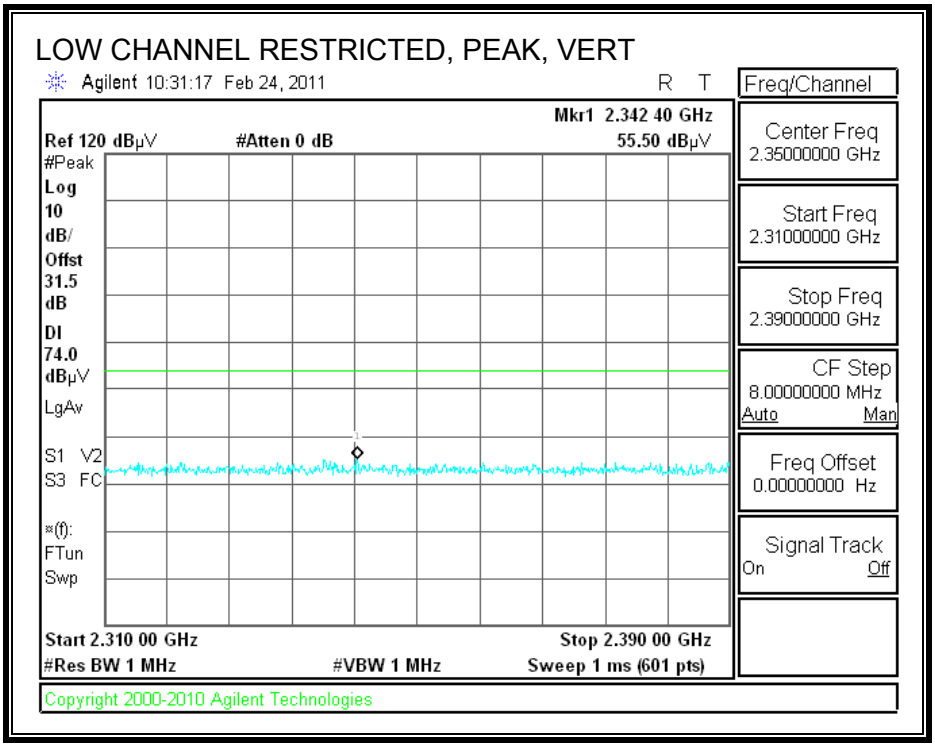
8.1.1. BASIC DATA RATE GFSK MODULATION

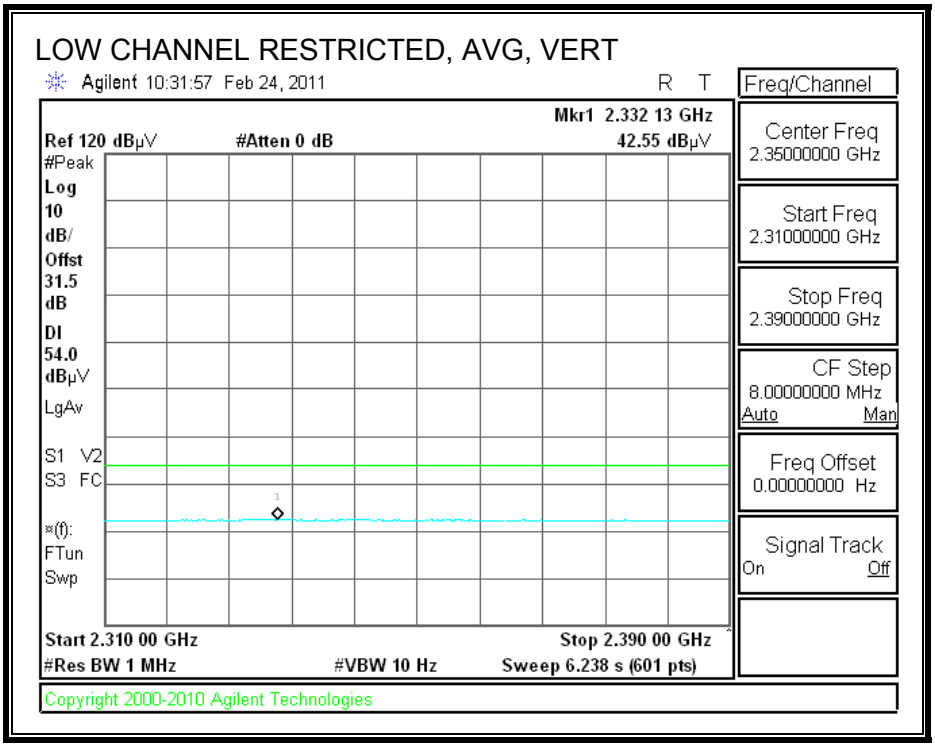
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



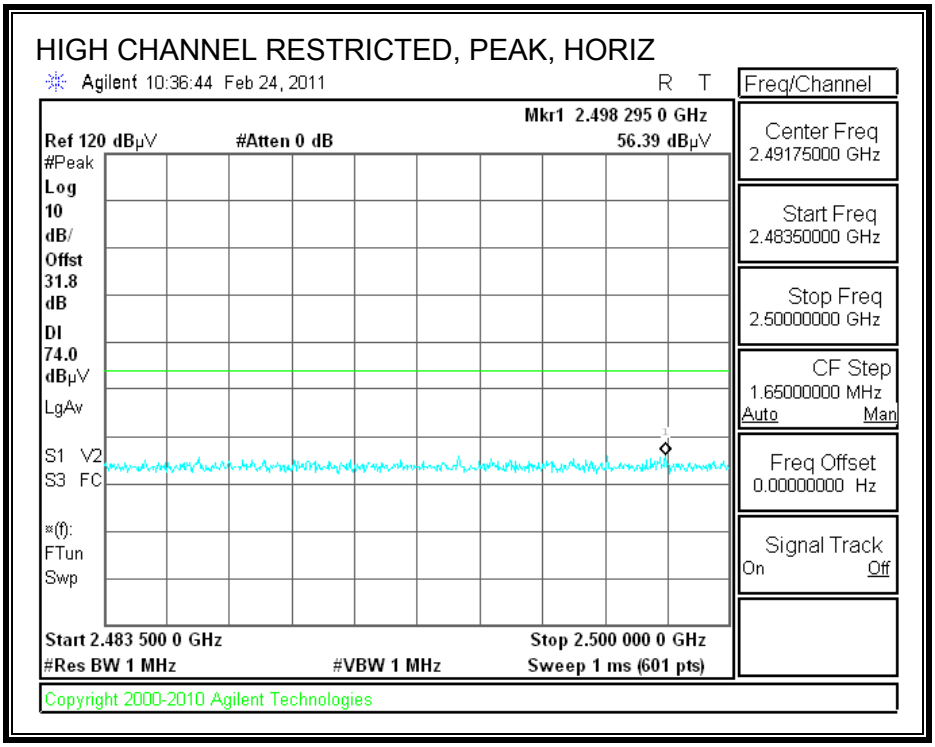


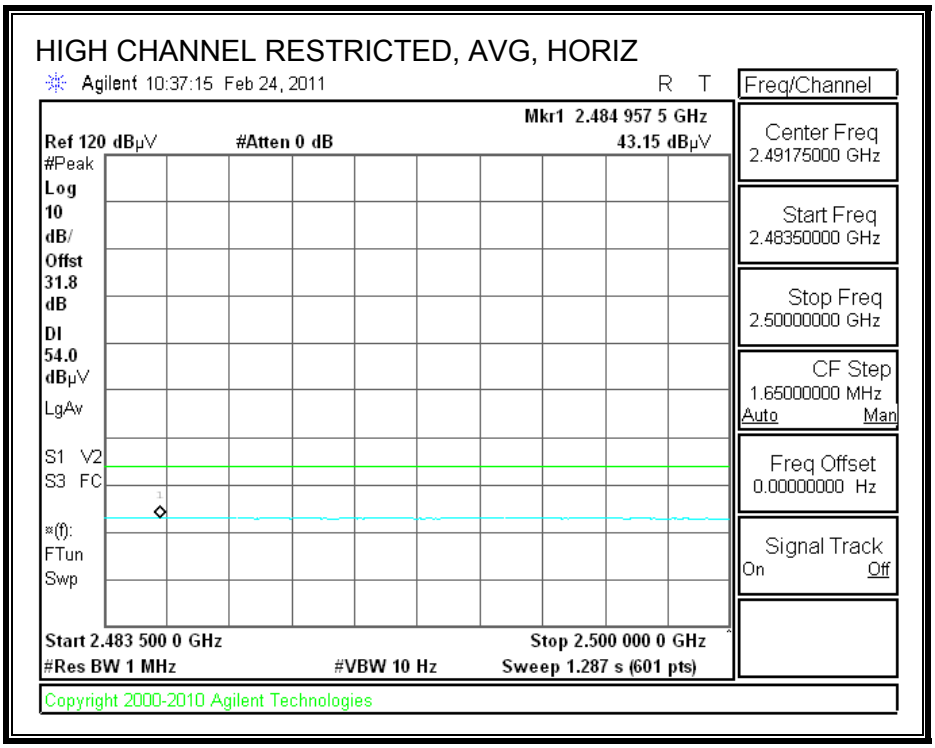
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



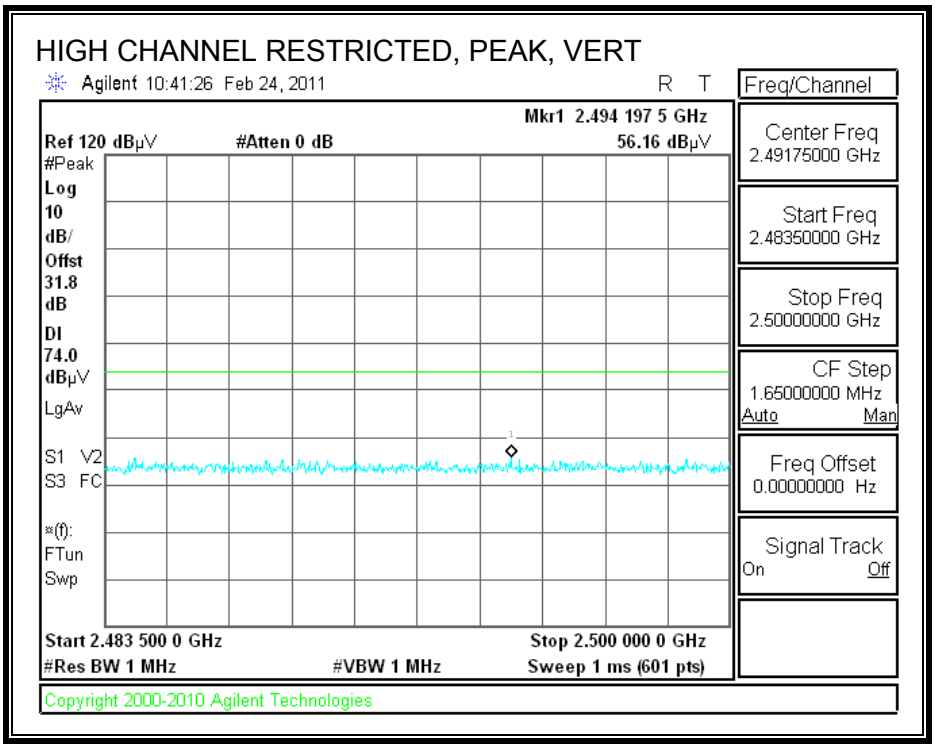


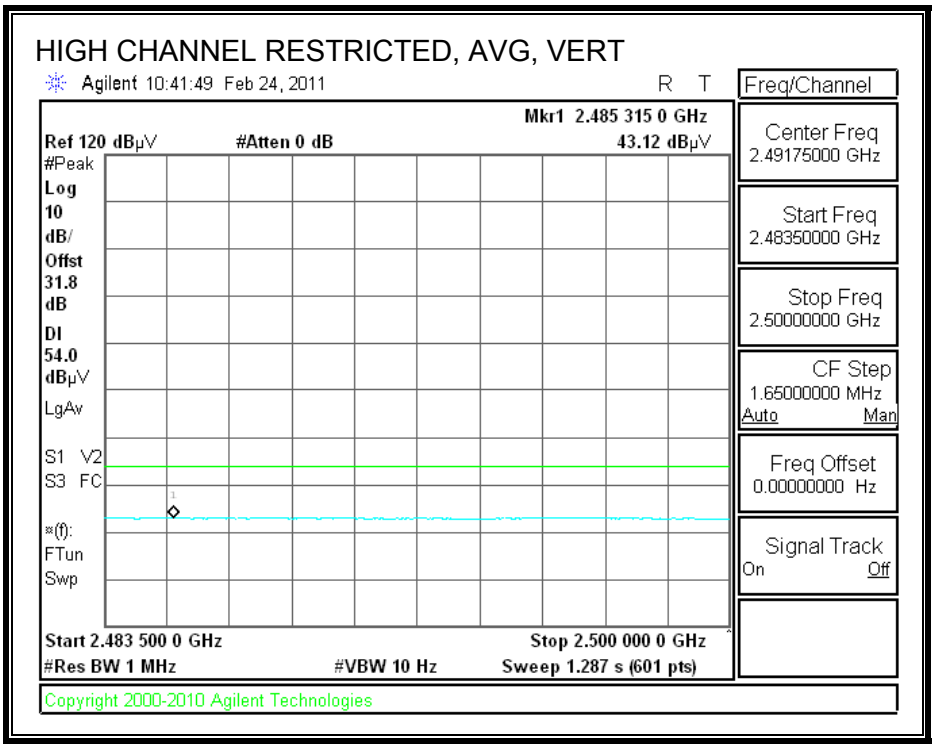
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: David Garcia
Date: 02/24/11
Project #: 11U13681
Company: Broadcom
Test Target: FCC 15.205
Mode Oper: Tx GFSK

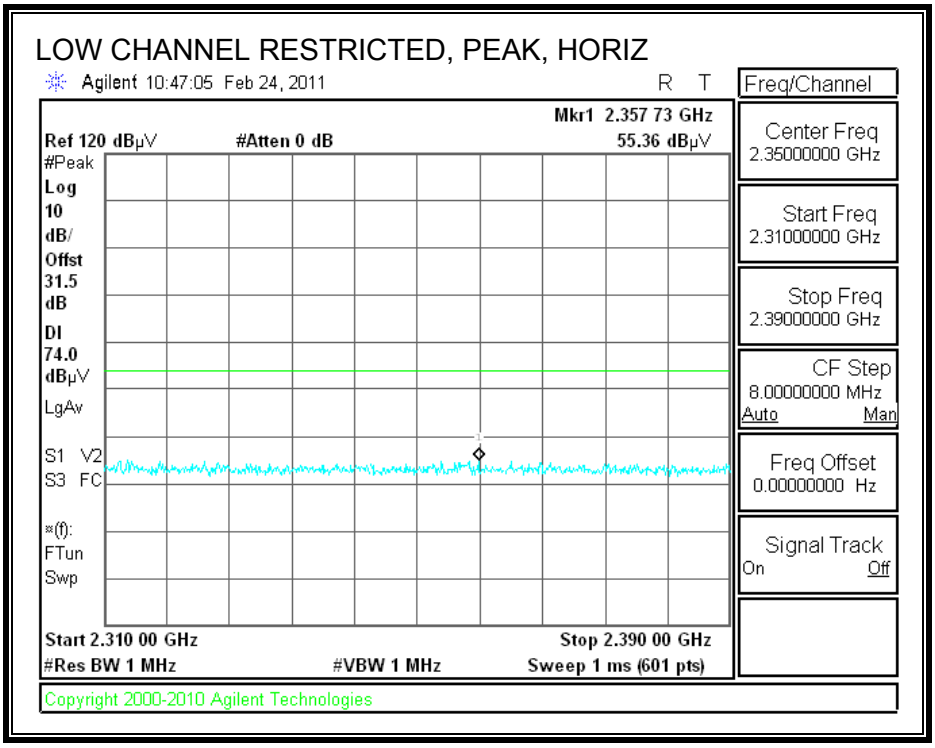
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

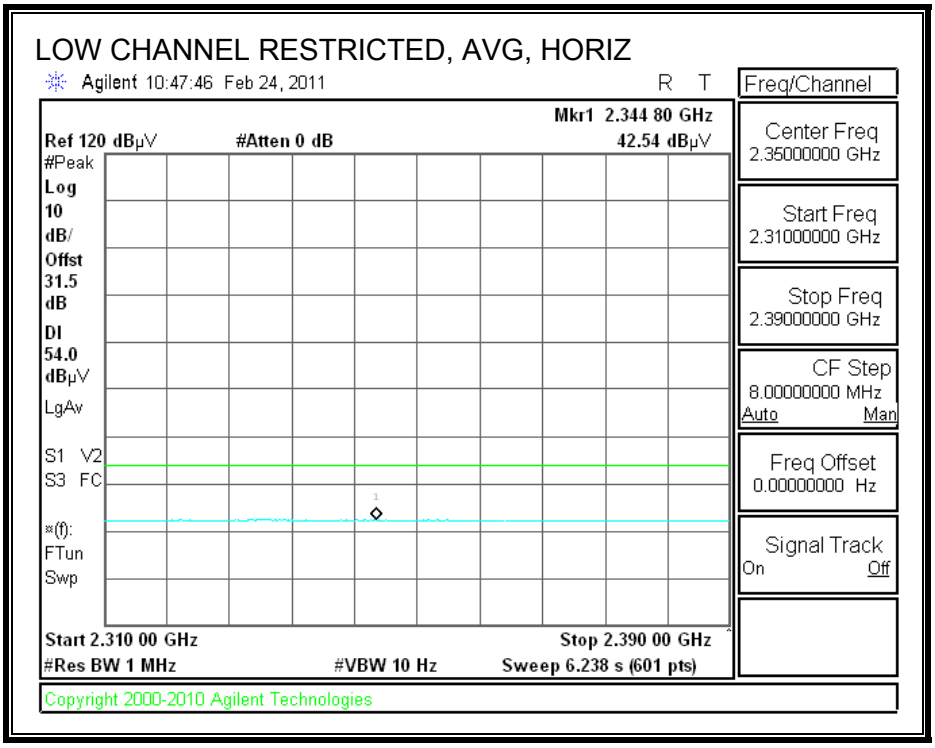
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL: 2402 MHz													
4.804	3.0	36.7	32.7	5.8	-34.8	0.0	0.0	40.3	74.0	-33.7	V	P	
4.804	3.0	23.7	32.7	5.8	-34.8	0.0	0.0	27.3	54.0	-26.7	V	A	
4.804	3.0	35.9	32.7	5.8	-34.8	0.0	0.0	39.5	74.0	-34.5	H	P	
4.804	3.0	23.7	32.7	5.8	-34.8	0.0	0.0	27.4	54.0	-26.6	H	A	
MID CHANNEL: 2441 MHz													
4.882	3.0	36.2	32.7	5.8	-34.8	0.0	0.0	39.9	74.0	-34.1	V	P	
4.882	3.0	23.3	32.7	5.8	-34.8	0.0	0.0	27.1	54.0	-26.9	V	A	
7.323	3.0	34.9	35.5	7.3	-34.1	0.0	0.0	43.5	74.0	-30.5	V	P	
7.323	3.0	23.0	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
4.882	3.0	36.0	32.7	5.8	-34.8	0.0	0.0	39.7	74.0	-34.3	H	P	
4.882	3.0	23.3	32.7	5.8	-34.8	0.0	0.0	27.0	54.0	-27.0	H	A	
7.323	3.0	36.3	35.5	7.3	-34.1	0.0	0.0	44.9	74.0	-29.1	H	P	
7.323	3.0	23.0	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	H	A	
HIGH CHANNEL: 2480 MHz													
4.960	3.0	36.6	32.8	5.9	-34.8	0.0	0.0	40.5	74.0	-33.5	V	P	
4.960	3.0	23.6	32.8	5.9	-34.8	0.0	0.0	27.5	54.0	-26.5	V	A	
7.440	3.0	35.1	35.6	7.3	-34.1	0.0	0.0	44.0	74.0	-30.0	V	P	
7.440	3.0	22.9	35.6	7.3	-34.1	0.0	0.0	31.8	54.0	-22.2	V	A	
4.960	3.0	36.4	32.8	5.9	-34.8	0.0	0.0	40.3	74.0	-33.7	H	P	
4.960	3.0	23.7	32.8	5.9	-34.8	0.0	0.0	27.6	54.0	-26.4	H	A	
7.440	3.0	35.6	35.6	7.3	-34.1	0.0	0.0	44.5	74.0	-29.5	H	P	
7.440	3.0	22.9	35.6	7.3	-34.1	0.0	0.0	31.8	54.0	-22.2	H	A	

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

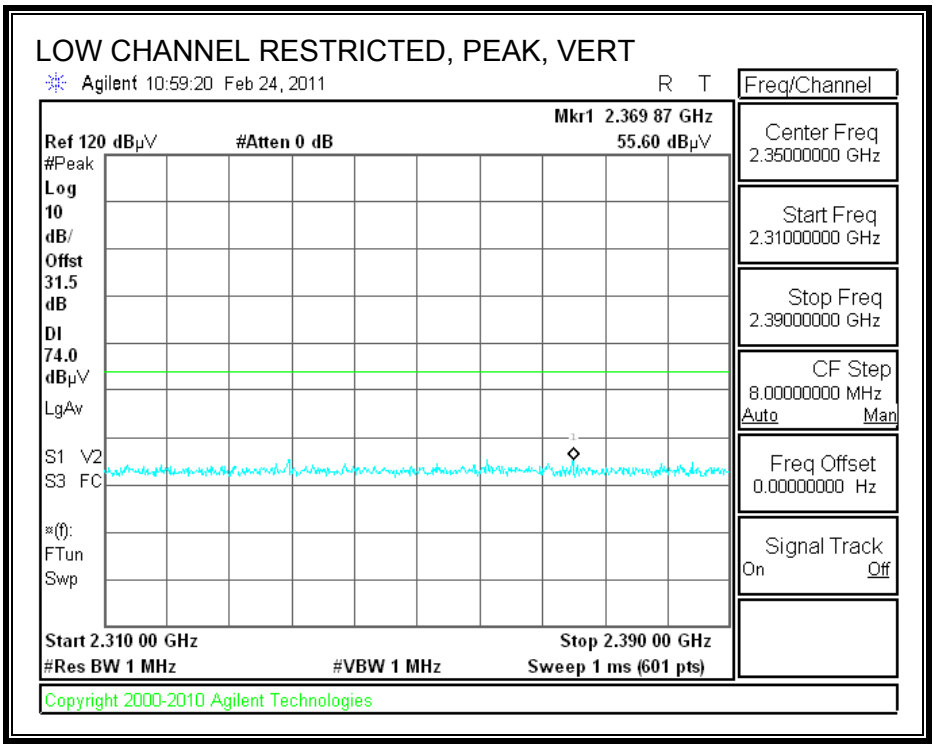
8.1.2. ENHANCED DATA RATE 8PSK MODULATION

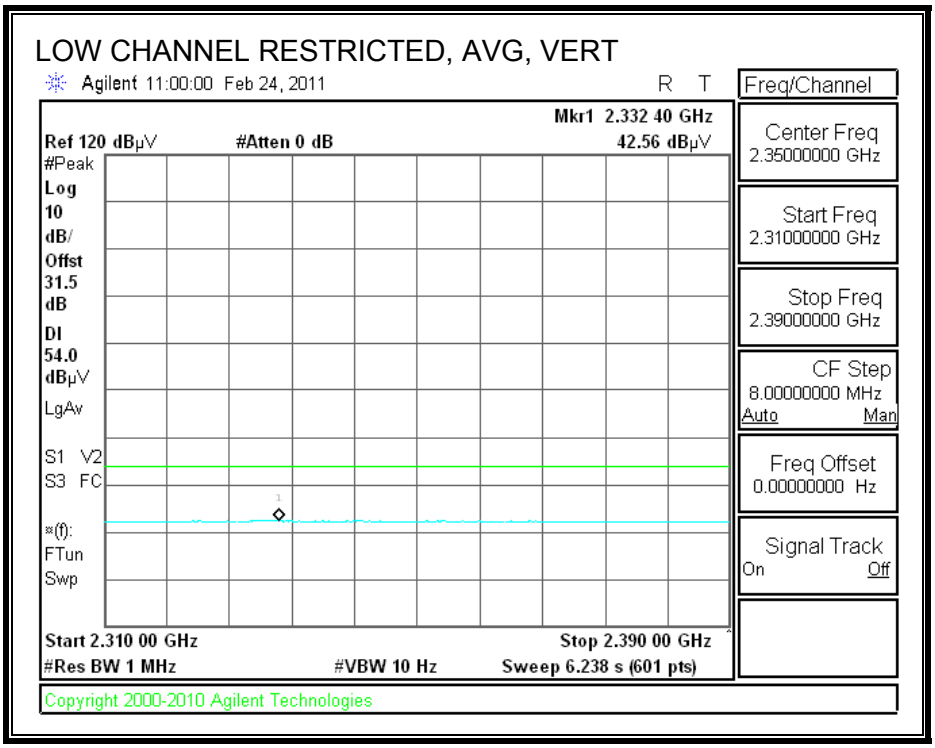
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



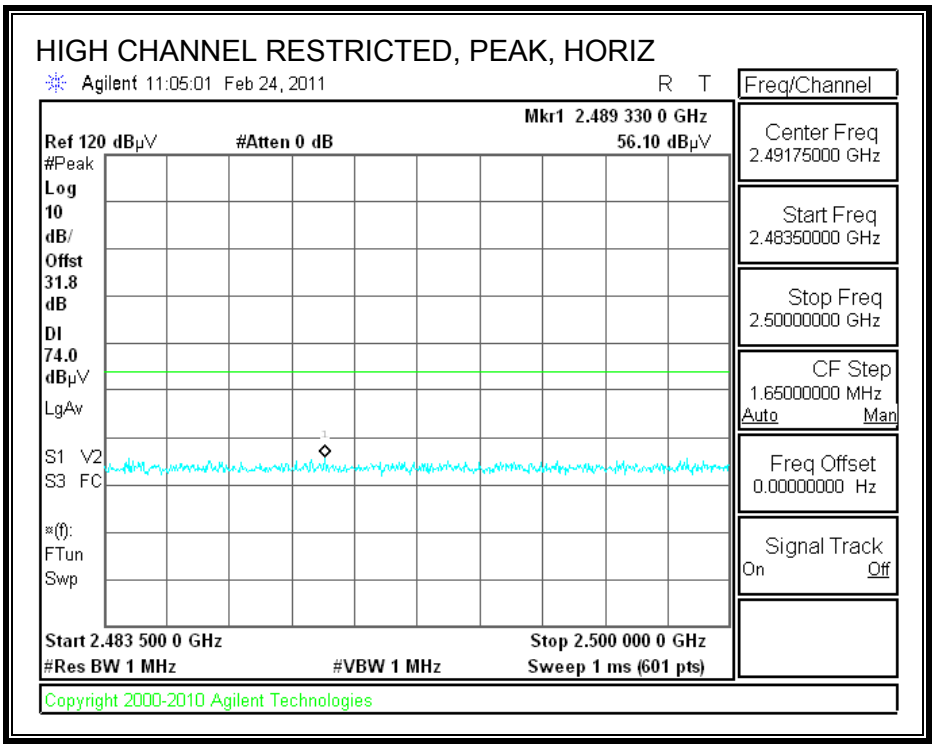


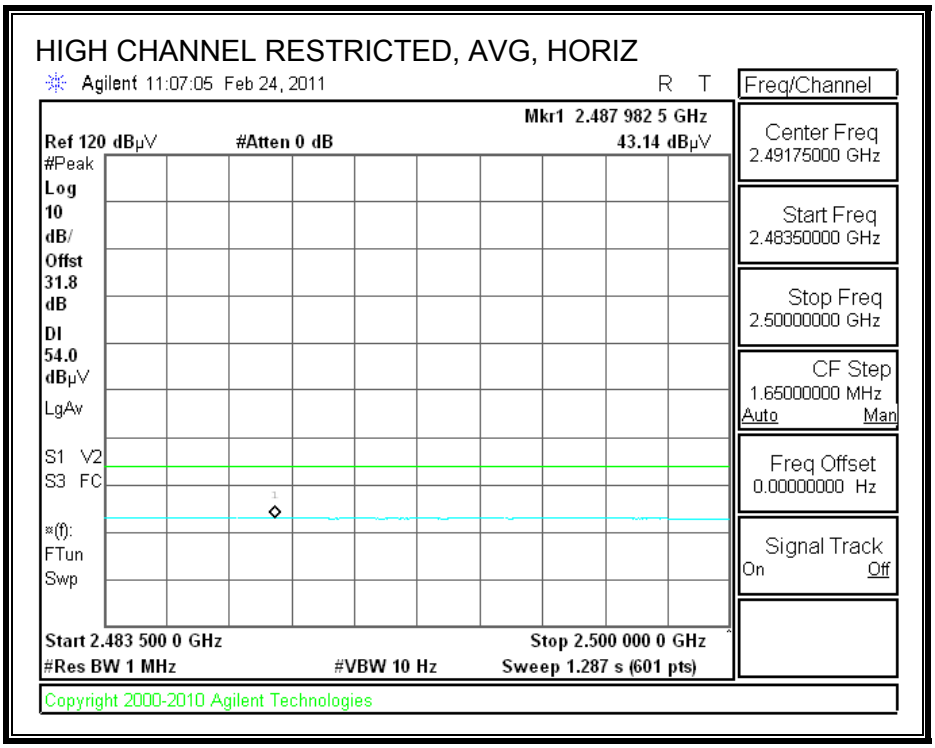
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



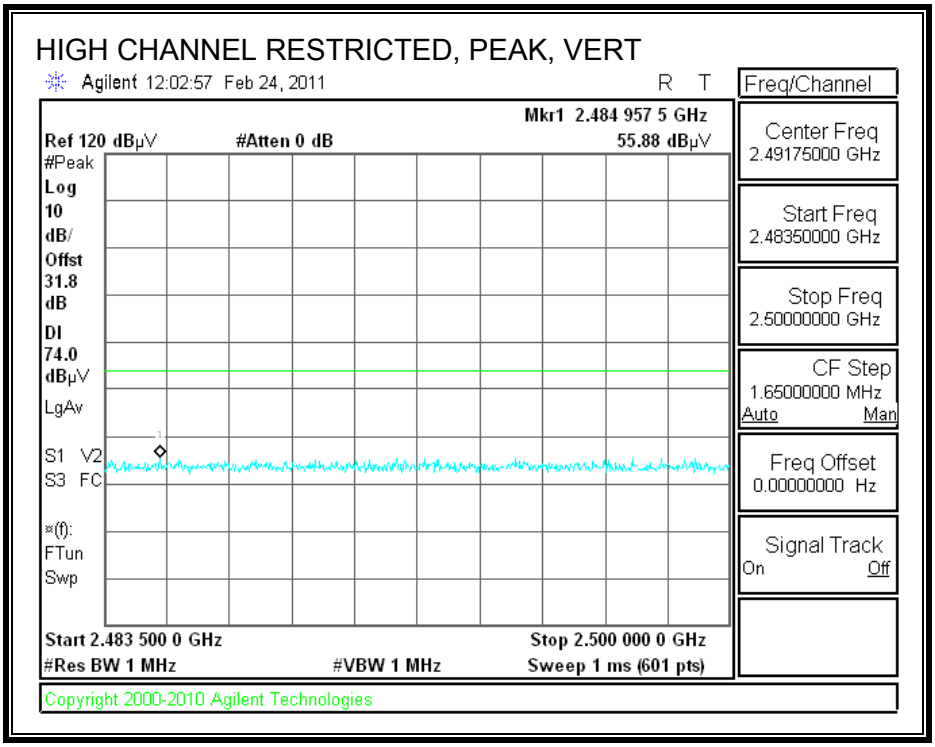


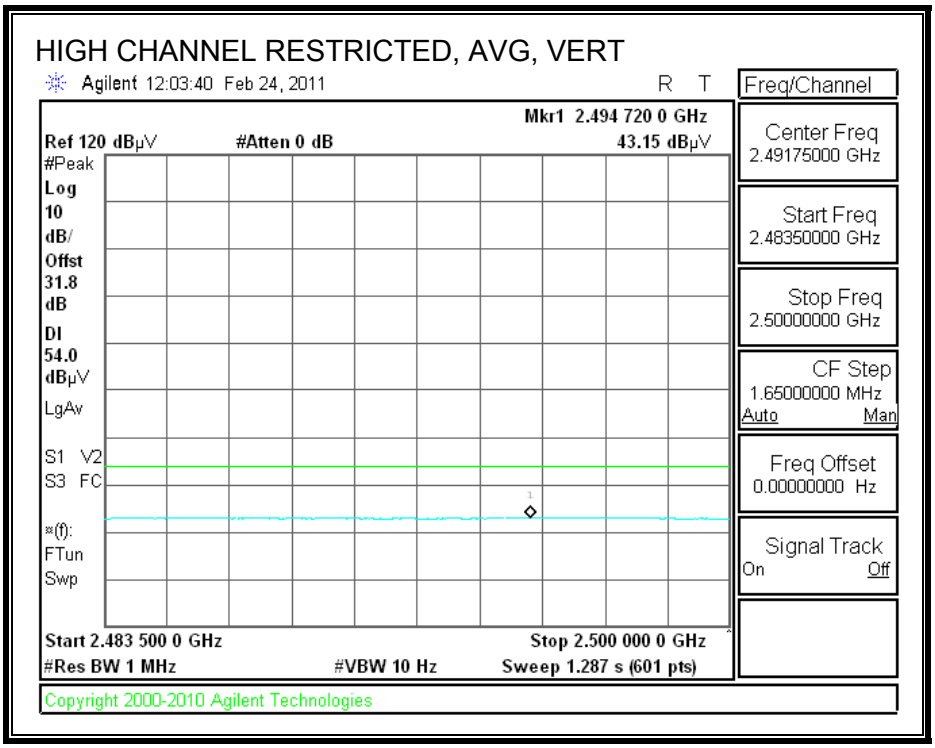
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: David Garcia
Date: 02/24/11
Project #: 11U13681
Company: Broadcom
Test Target: FCC 15.205
Mode Oper: Tx 8PSK

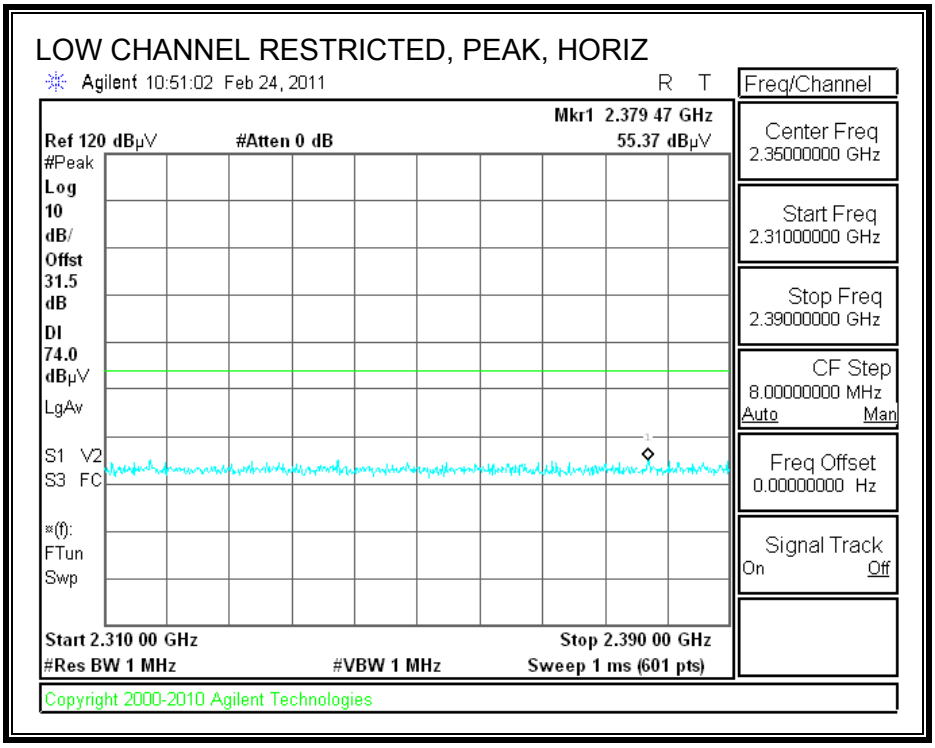
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin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

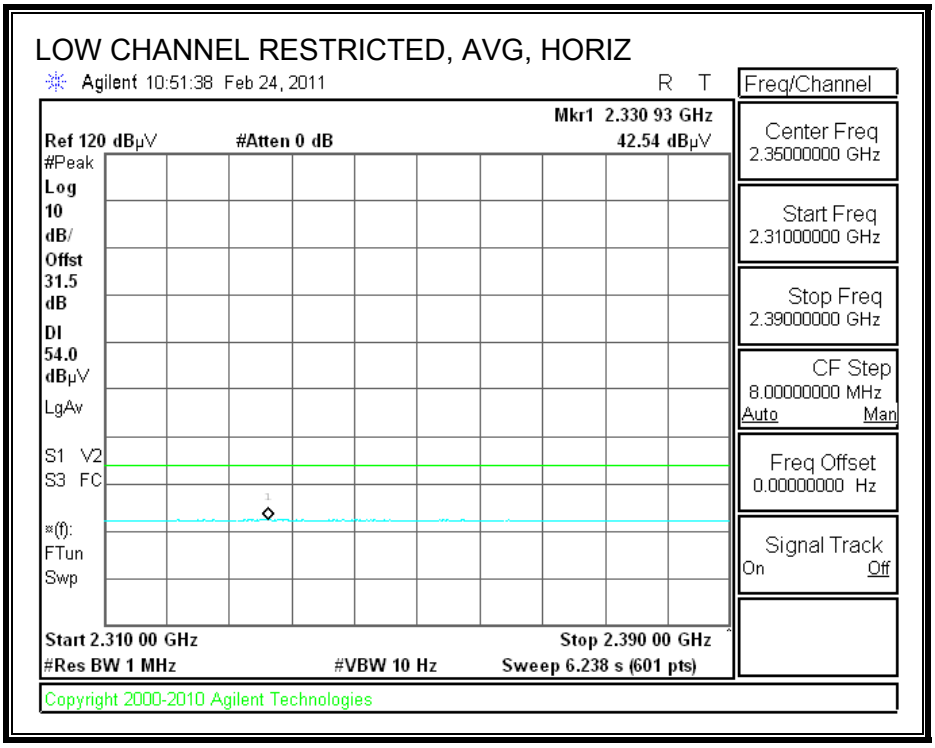
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL: 2402 MHz													
4.804	3.0	36.1	32.7	5.8	-34.8	0.0	0.0	39.7	74.0	-34.3	V	P	
4.804	3.0	23.8	32.7	5.8	-34.8	0.0	0.0	27.4	54.0	-26.6	V	A	
4.804	3.0	35.9	32.7	5.8	-34.8	0.0	0.0	39.5	74.0	-34.5	H	P	
4.804	3.0	23.8	32.7	5.8	-34.8	0.0	0.0	27.4	54.0	-26.6	H	A	
MID CHANNEL: 2441 MHz													
4.882	3.0	35.8	32.7	5.8	-34.8	0.0	0.0	39.5	74.0	-34.5	V	P	
4.882	3.0	23.3	32.7	5.8	-34.8	0.0	0.0	27.0	54.0	-27.0	V	A	
7.323	3.0	34.9	35.5	7.3	-34.1	0.0	0.0	43.6	74.0	-30.4	V	P	
7.323	3.0	23.0	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
4.882	3.0	36.0	32.7	5.8	-34.8	0.0	0.0	39.8	74.0	-34.2	H	P	
4.882	3.0	23.4	32.7	5.8	-34.8	0.0	0.0	27.1	54.0	-26.9	H	A	
7.323	3.0	35.6	35.5	7.3	-34.1	0.0	0.0	44.2	74.0	-29.8	H	P	
7.323	3.0	23.1	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	H	A	
HIGH CHANNEL: 2480 MHz													
4.960	3.0	36.9	32.8	5.9	-34.8	0.0	0.0	40.8	74.0	-33.2	V	P	
4.960	3.0	23.7	32.8	5.9	-34.8	0.0	0.0	27.6	54.0	-26.4	V	A	
7.440	3.0	35.1	35.6	7.3	-34.1	0.0	0.0	44.0	74.0	-30.0	V	P	
7.440	3.0	22.9	35.6	7.3	-34.1	0.0	0.0	31.8	54.0	-22.2	V	A	
4.960	3.0	36.6	32.8	5.9	-34.8	0.0	0.0	40.4	74.0	-33.6	H	P	
4.960	3.0	23.7	32.8	5.9	-34.8	0.0	0.0	27.6	54.0	-26.4	H	A	
7.440	3.0	35.7	35.6	7.3	-34.1	0.0	0.0	44.6	74.0	-29.4	H	P	
7.440	3.0	22.9	35.6	7.3	-34.1	0.0	0.0	31.8	54.0	-22.2	H	A	

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

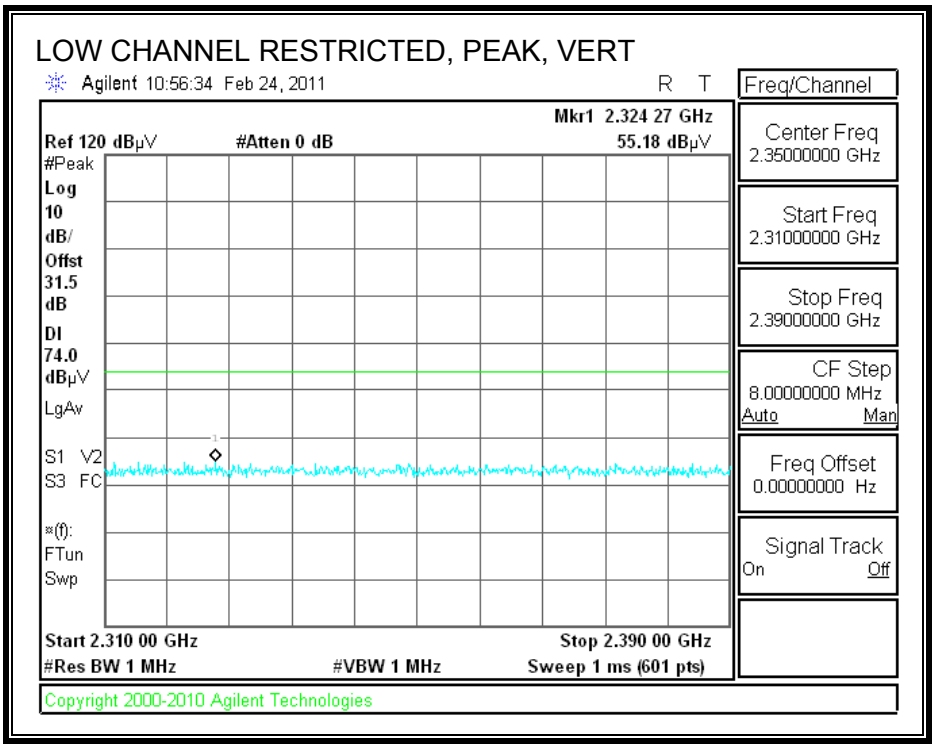
8.1.3. LE (LOW ENERGY) MODULATION

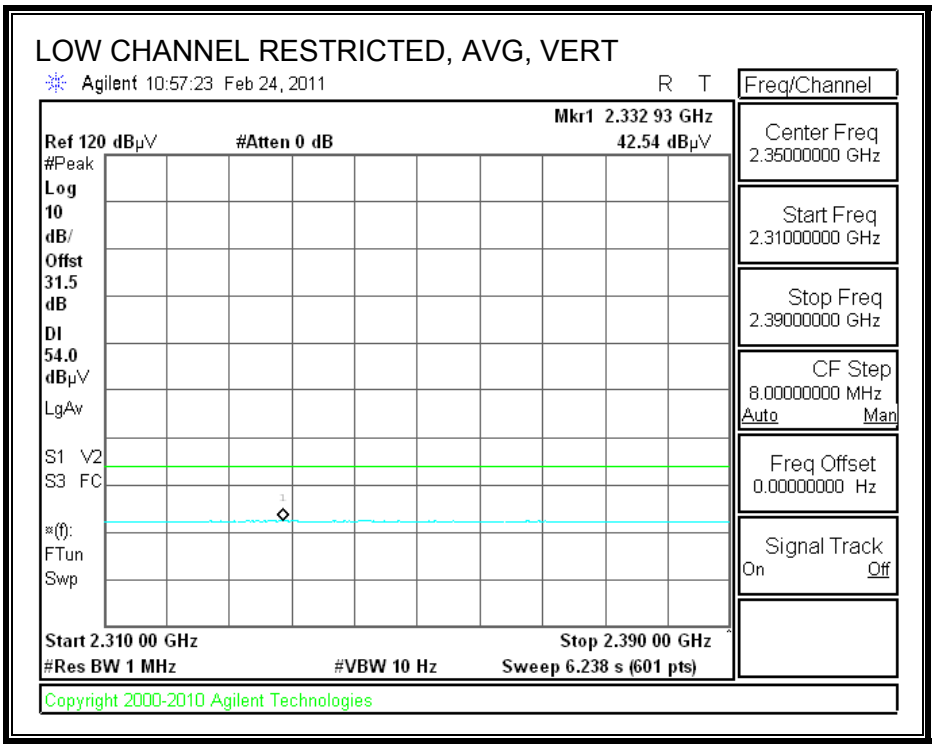
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



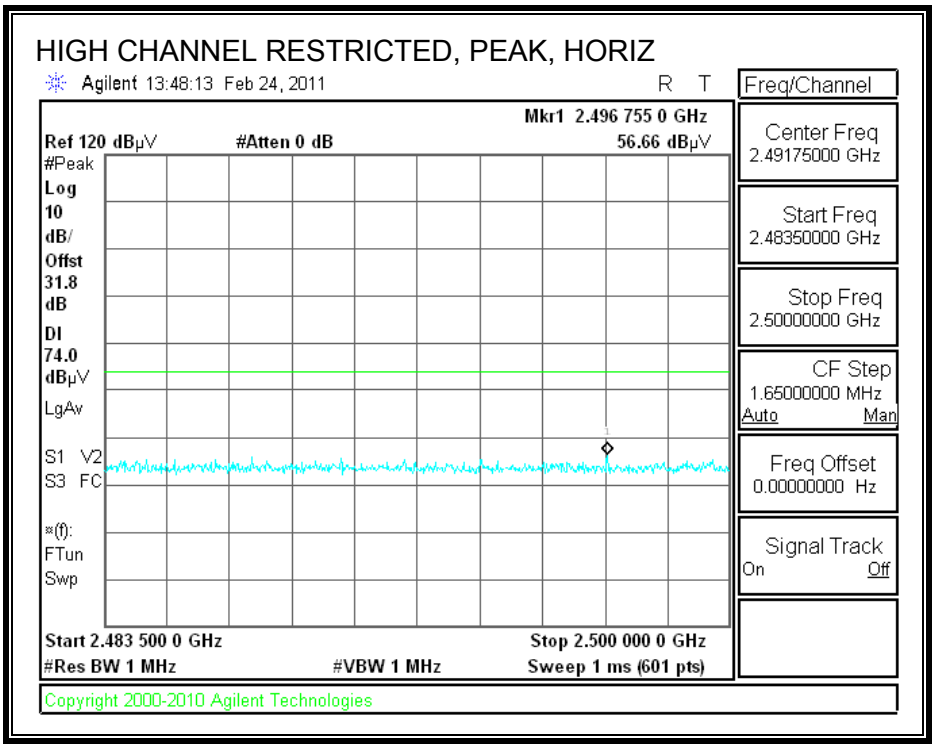


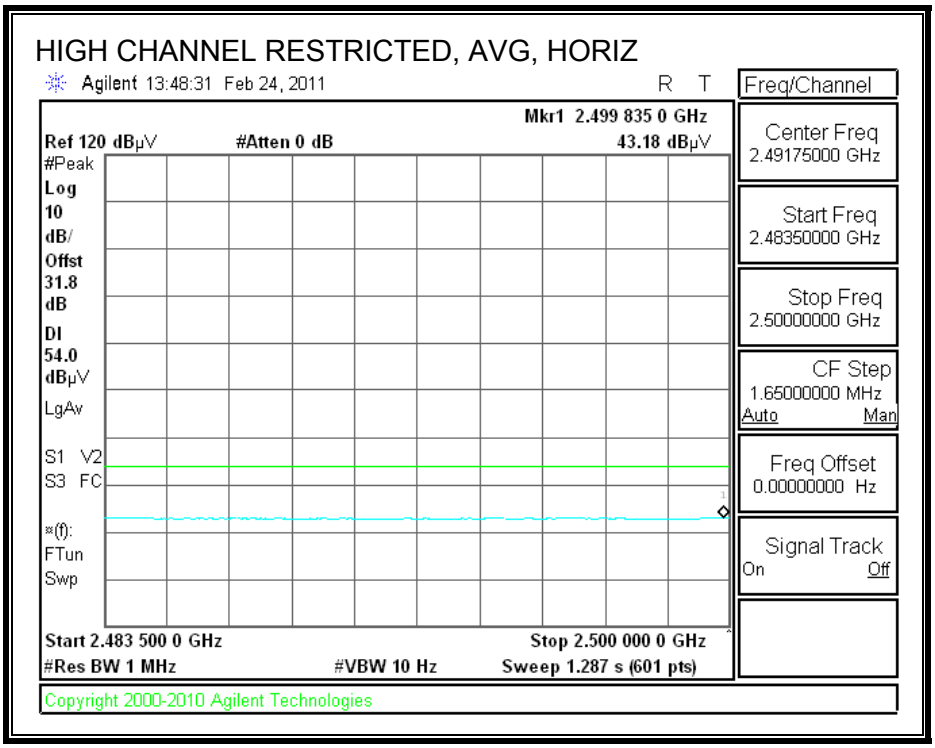
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



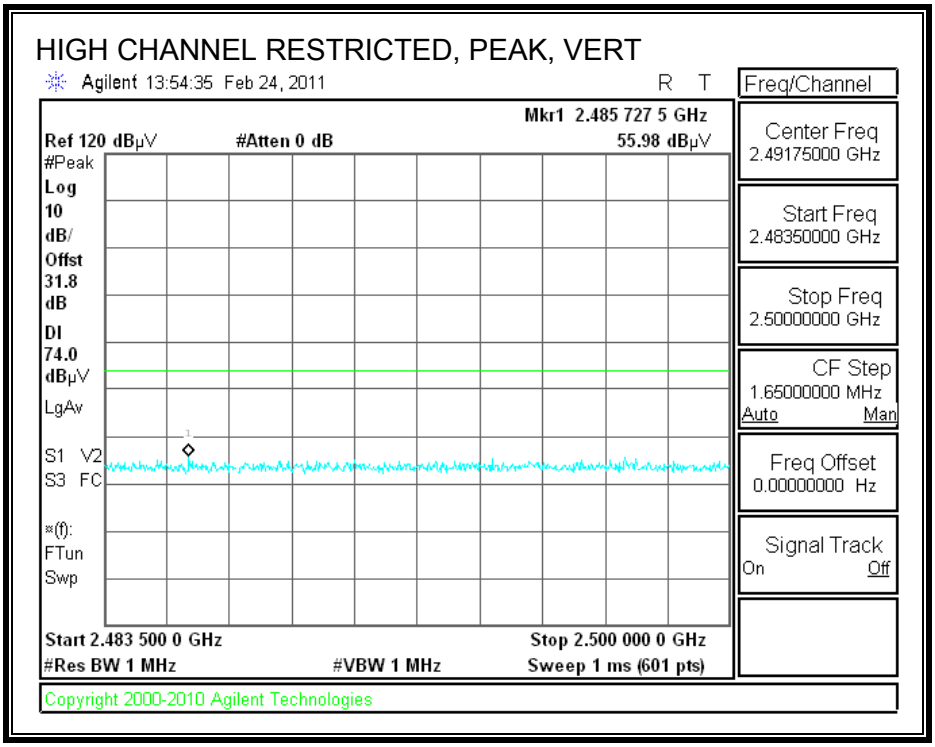


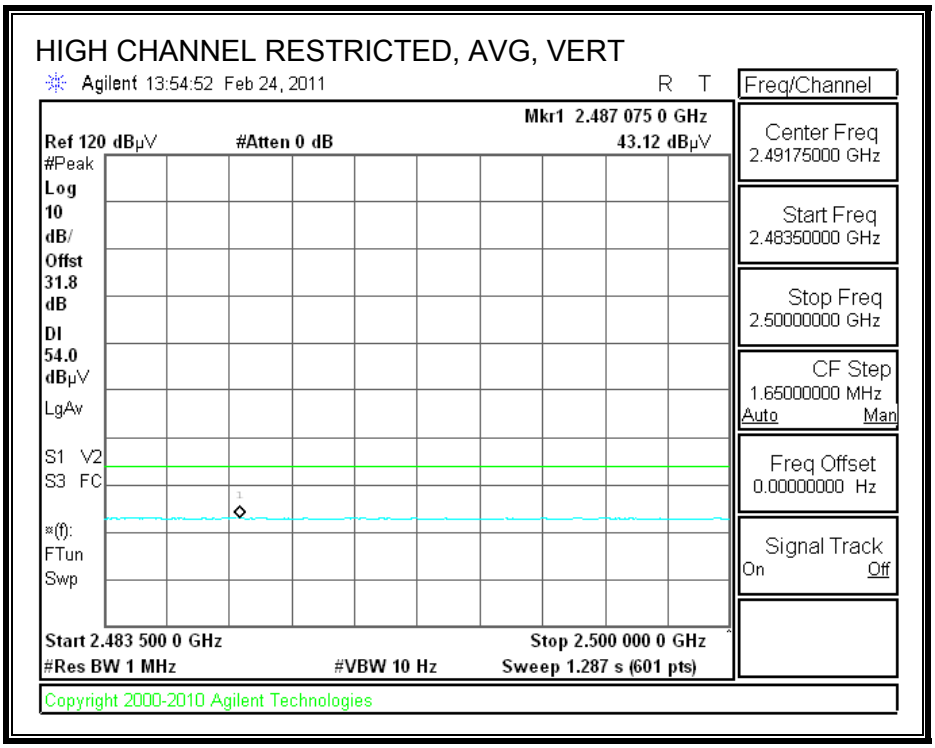
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Test Engr: David Garcia
Date: 02/24/11
Project #: 11U13681
Company: Broadcom
Test Target: FCC 15.205
Mode Oper: Tx LE GFSK

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

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
LOW CHANNEL: 2402 MHz													
4.804	3.0	38.0	32.7	5.8	-34.8	0.0	0.0	41.6	74.0	-32.4	V	P	
4.804	3.0	27.4	32.7	5.8	-34.8	0.0	0.0	31.0	54.0	-23.0	V	A	
4.804	3.0	41.1	32.7	5.8	-34.8	0.0	0.0	44.8	74.0	-29.3	H	P	
4.804	3.0	30.2	32.7	5.8	-34.8	0.0	0.0	33.8	54.0	-20.2	H	A	
MID CHANNEL: 2440 MHz													
4.880	3.0	35.6	32.7	5.8	-34.8	0.0	0.0	39.3	74.0	-34.7	V	P	
4.880	3.0	23.3	32.7	5.8	-34.8	0.0	0.0	27.0	54.0	-27.0	V	A	
7.320	3.0	35.8	35.5	7.3	-34.1	0.0	0.0	44.4	74.0	-29.6	V	P	
7.320	3.0	23.0	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
4.880	3.0	42.5	32.7	5.8	-34.8	0.0	0.0	46.2	74.0	-27.8	H	P	
4.880	3.0	32.2	32.7	5.8	-34.8	0.0	0.0	35.9	54.0	-18.1	H	A	
7.320	3.0	35.5	35.5	7.3	-34.1	0.0	0.0	44.1	74.0	-29.9	H	P	
7.320	3.0	23.0	35.5	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	H	A	
HIGH CHANNEL: 2480 MHz													
4.960	3.0	36.5	32.8	5.9	-34.8	0.0	0.0	40.4	74.0	-33.6	V	P	
4.960	3.0	24.9	32.8	5.9	-34.8	0.0	0.0	28.7	54.0	-25.3	V	A	
7.440	3.0	35.3	35.6	7.3	-34.1	0.0	0.0	44.2	74.0	-29.8	V	P	
7.440	3.0	22.8	35.6	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	V	A	
4.960	3.0	40.7	32.8	5.9	-34.8	0.0	0.0	44.6	74.0	-29.4	H	P	
4.960	3.0	30.0	32.8	5.9	-34.8	0.0	0.0	33.8	54.0	-20.2	H	A	
7.440	3.0	35.3	35.6	7.3	-34.1	0.0	0.0	44.2	74.0	-29.8	H	P	
7.440	3.0	22.8	35.6	7.3	-34.1	0.0	0.0	31.7	54.0	-22.3	H	A	

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

8.2. RECEIVER ABOVE 1 GHz

8.2.1. WORST-CASE MODE

High Frequency Measurement
Compliance Certification Services, Fremont 3m Chamber

Company:	Broadcom
Project #:	11U13681
Date:	2/24/2011
Test Engineer:	David Garcia
Configuration:	EUT, Laptop PC
Mode:	BT Rx

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			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)
1.036	3.0	48.5	35.2	24.6	2.4	-38.2	0.0	0.0	37.3	24.0	74	54	-36.7	-30.0	H
1.141	3.0	48.9	33.5	24.9	2.5	-38.1	0.0	0.0	38.3	22.9	74	54	-35.7	-31.1	H
1.230	3.0	46.7	33.1	25.2	2.6	-37.9	0.0	0.0	36.6	23.0	74	54	-37.4	-31.0	H
1.295	3.0	48.3	35.3	25.5	2.7	-37.9	0.0	0.0	38.6	25.6	74	54	-35.4	-28.4	H
1.795	3.0	50.5	33.0	27.1	3.2	-37.2	0.0	0.0	43.7	26.2	74	54	-30.3	-27.8	H
2.491	3.0	45.5	34.1	28.3	3.9	-36.3	0.0	0.0	41.5	30.1	74	54	-32.5	-23.9	H
1.036	3.0	50.6	38.5	24.6	2.4	-38.2	0.0	0.0	39.4	27.3	74	54	-34.6	-26.7	V
1.141	3.0	48.1	36.2	24.9	2.5	-38.1	0.0	0.0	37.5	25.6	74	54	-36.5	-28.4	V
1.230	3.0	50.2	34.5	25.2	2.6	-37.9	0.0	0.0	40.1	24.4	74	54	-33.9	-29.6	V
1.295	3.0	48.5	34.8	25.5	2.7	-37.9	0.0	0.0	38.8	25.1	74	54	-35.2	-28.9	V
1.795	3.0	49.1	35.0	27.1	3.2	-37.2	0.0	0.0	42.3	28.2	74	54	-31.7	-25.8	V
2.491	3.0	48.1	33.9	28.3	3.9	-36.3	0.0	0.0	44.1	29.9	74	54	-29.9	-24.1	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		

8.3. WORST-CASE BELOW 1 GHz

8.3.1. WORST-CASE MODE

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

HORIZONTAL AND VERTICAL DATA

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

Test Engr: David Garcia
Date: 02/24/11
Project #: 11U13681
Company: Broadcom
Test Target: FCC Class B
Mode Oper: Tx Worst Case

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

Margin Margin vs. Limit

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
117.484	3.0	53.7	13.0	0.9	28.1	0.0	0.0	39.5	43.5	-4.0	V	P	
125.524	3.0	50.7	14.1	0.9	28.0	0.0	0.0	37.7	43.5	-5.8	V	P	
128.524	3.0	50.8	13.9	0.9	28.0	0.0	0.0	37.7	43.5	-5.8	V	P	
144.125	3.0	52.7	12.9	1.0	27.9	0.0	0.0	38.7	43.5	-4.8	V	P	
194.647	3.0	52.9	11.6	1.1	27.4	0.0	0.0	38.2	43.5	-5.3	V	P	
305.651	3.0	47.7	13.6	1.5	27.4	0.0	0.0	35.3	46.0	-10.7	V	P	
312.012	3.0	46.5	13.7	1.5	27.5	0.0	0.0	34.2	46.0	-11.8	V	P	
449.057	3.0	44.8	15.9	1.9	28.3	0.0	0.0	34.3	46.0	-11.7	V	P	
831.753	3.0	37.3	21.3	2.6	28.1	0.0	0.0	33.0	46.0	-13.0	V	P	
895.836	3.0	36.3	22.0	2.7	27.9	0.0	0.0	33.2	46.0	-12.8	V	P	
970.839	3.0	33.4	22.5	2.9	27.7	0.0	0.0	31.1	54.0	-22.9	V	P	
312.012	3.0	49.4	13.7	1.5	27.5	0.0	0.0	37.2	46.0	-8.8	H	P	
346.573	3.0	49.4	14.2	1.6	27.7	0.0	0.0	37.5	46.0	-8.5	H	P	
381.134	3.0	47.0	14.7	1.7	27.9	0.0	0.0	35.5	46.0	-10.5	H	P	
479.899	3.0	44.4	16.5	1.9	28.5	0.0	0.0	34.3	46.0	-11.7	H	P	
543.861	3.0	42.5	17.6	2.1	28.6	0.0	0.0	33.5	46.0	-12.5	H	P	
554.782	3.0	36.4	17.7	2.1	28.6	0.0	0.0	27.6	46.0	-18.4	H	P	
831.753	3.0	35.7	21.3	2.6	28.1	0.0	0.0	31.4	46.0	-14.6	H	P	

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

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

9.1. WORST-CASE MODE

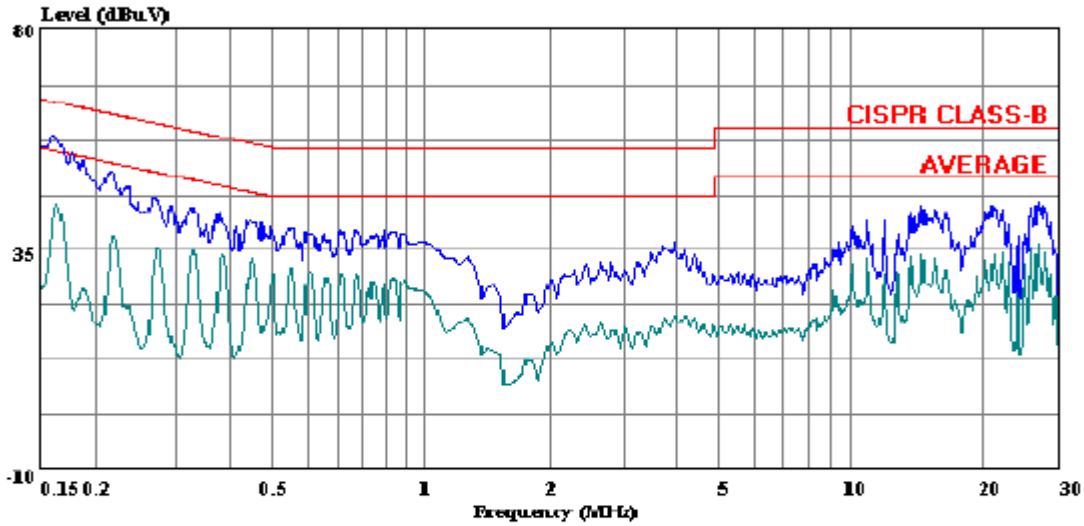
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.16	58.49	--	44.36	0.00	65.46	55.46	-6.97	-11.10	L1
0.22	50.60	--	38.07	0.00	62.86	52.86	-12.26	-14.79	L1
26.70	45.11	--	36.33	0.00	60.00	50.00	-14.89	-13.67	L1
0.18	55.82	--	43.55	0.00	64.67	54.67	-8.85	-11.12	L2
0.23	48.74	--	39.30	0.00	62.31	52.31	-13.57	-13.01	L2
2.95	44.28	--	30.61	0.00	56.00	46.00	-11.72	-15.39	L2
6 Worst Data									

LINE 1 RESULTS

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

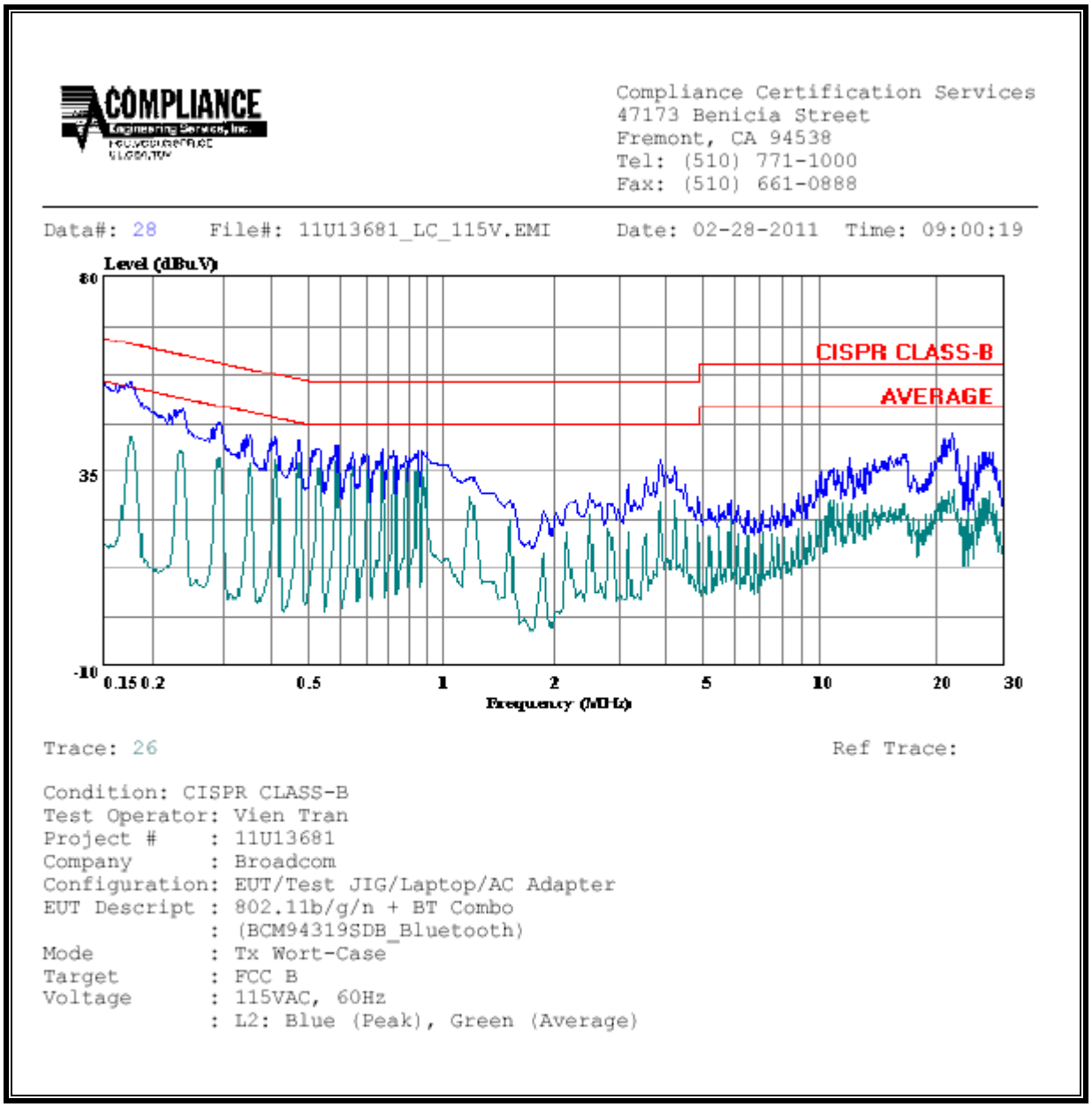
Data#: 21 File#: 11U13681_LC_115V.EMI Date: 02-28-2011 Time: 08:24:24



Trace: 19 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: Vien Tran
Project # : 11U13681
Company : Broadcom
Configuration: EUT/Test JIG/Laptop/AC Adapter
EUT Descript : 802.11b/g/n + BT Combo
: (BCM94319SDB_Bluetooth)
Mode : Tx Wort-Case
Target : FCC B
Voltage : 115VAC, 60Hz
: L1 Blue (Peak), Green (Average)

LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

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

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

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

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

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

EQUATIONS

Power density is given by:

S = EIRP / (4 * Pi * D^2)

where

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

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

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

where

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

For multiple 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.

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

where

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

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2
From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (mW/cm^2)
2.4 GHz	Bluetooth	0.20	1.75	3.90	0.01	0.001