



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

TOQ SMARTWATCH WITH BLUETOOTH 3.0 + EDR

MODEL NUMBER: ToqSW1

**FCC ID: 2AAIMSW1
IC: 10756B-SW1**

REPORT NUMBER: 13U15244-1, Revision A

ISSUE DATE: SEPTEMBER 13, 2013

Prepared for
**QUALCOMM CONNECTED EXPERIENCE
5775 MOREHOUSE DRIVE
SAN DIEGO, CA 92121**

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NVLAP LAB CODE 200065-0

Revision History

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--	08/16/2013	Initial Issue	G. Quizon
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM CONNECTED EXPERIENCE, INC.
5775 MOREHOUSE DRIVE
SAN DIEGO, CA 92121

EUT DESCRIPTION: TOQ SMARTWATCH WITH BLUETOOTH 3.0 + EDR

MODEL: ToqSW1

SERIAL NUMBER: 174

DATE TESTED: AUGUST 13 to 15, 2013

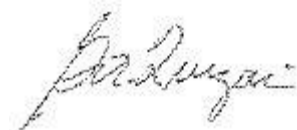
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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.

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Tested By:



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WISE PROJECT LEAD
UL Verification Services Inc.



DANNY VU
EMC ENGINEER
UL Verification Services Inc.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth 3.0 + EDR enabled wrist watch with a wireless charging receiver that is manufactured by Qualcomm

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	0.96	1.25
2402 - 2480	QPSK	8PSK represents QPSK based on actual power measurements. The peak power measurements are +0.2 dBm higher in 8PSK mode than QPSK.	
2402 - 2480	Enhanced 8PSK	1.96	1.57

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes monopole antenna, with a maximum gain of -3 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was FYX-Beacon v1.0.1

The test utility software used during testing is Qualcomm QSPR Version 4.1

5.5. WORST-CASE CONFIGURATION AND MODE

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

Power line conducted emission was not performed since the EUT is operated by DC volts battery.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that the X-orientation was worst-case orientation; therefore; all final radiated testing was performed with the EUT in X-orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	HP	nc6400	CND7171537	DoC
AC Adaptor	HP	PPP012D-S	WBGTON0BAR1HDOX	DoC
GPIB - USB	NI	GPIB-USB-HS	14BB344	N/A
Bluetooth tester	ANRITSU	MT8852B	837006	N/A
Wireless Cradle	Qualcomm (SD)	N/A	N/A	N/A

I/O CABLES

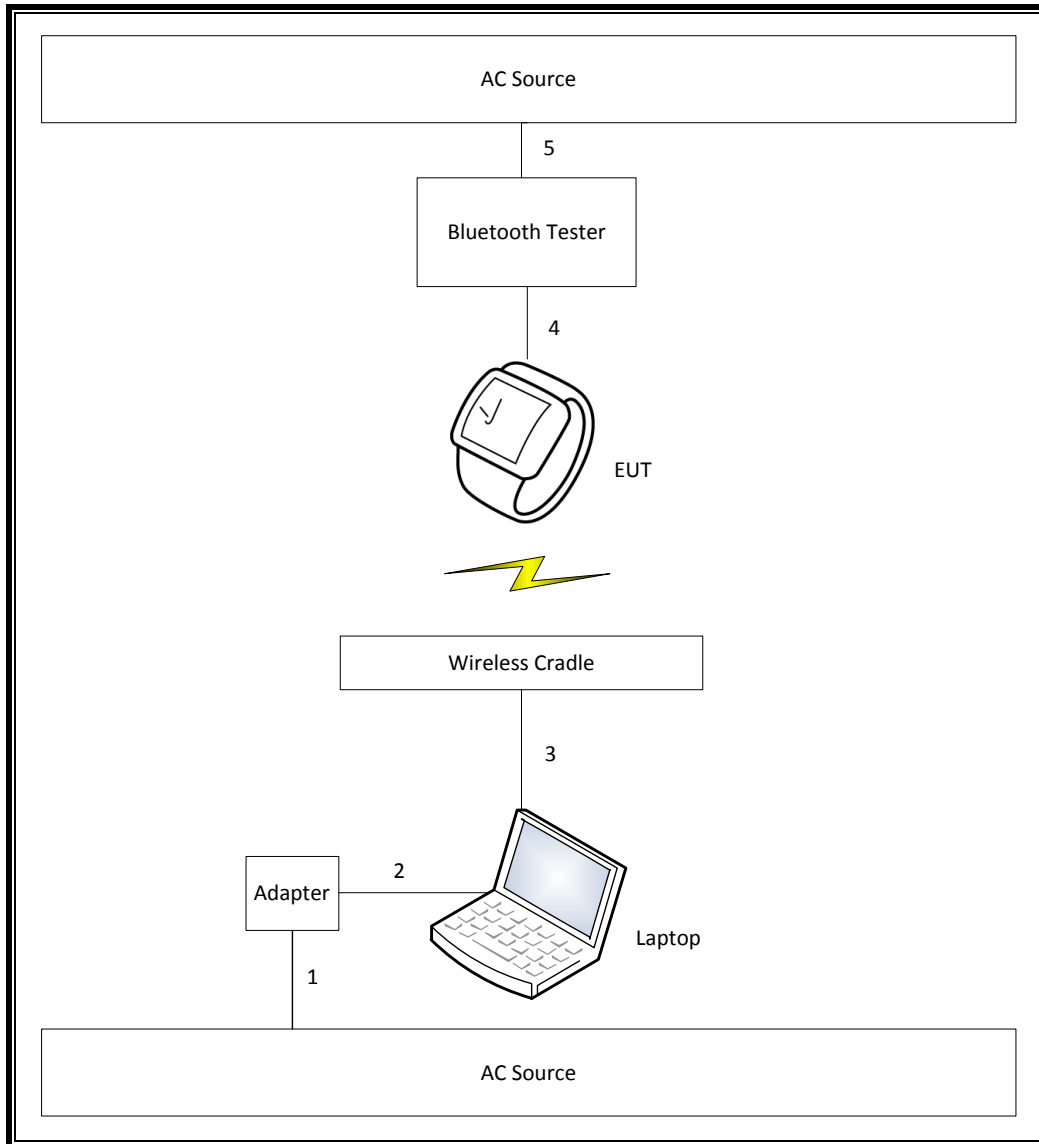
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	2	2-prong	Shielded	1.5	N/A
2	DC	2	DC	Un-shielded	1.5	N/A
3	USB-GPIB	1	USB	Un-shielded	1	N/A
4	RF	1	RF	Shielded	0.5	N/A
5	AC	1	3-prong	Shielded	1	N/A
6	I/O	1	GPIB	Un-shielded	1	N/A
7	Antenna	1	N	Shielded	7.6	N/A

TEST SETUP

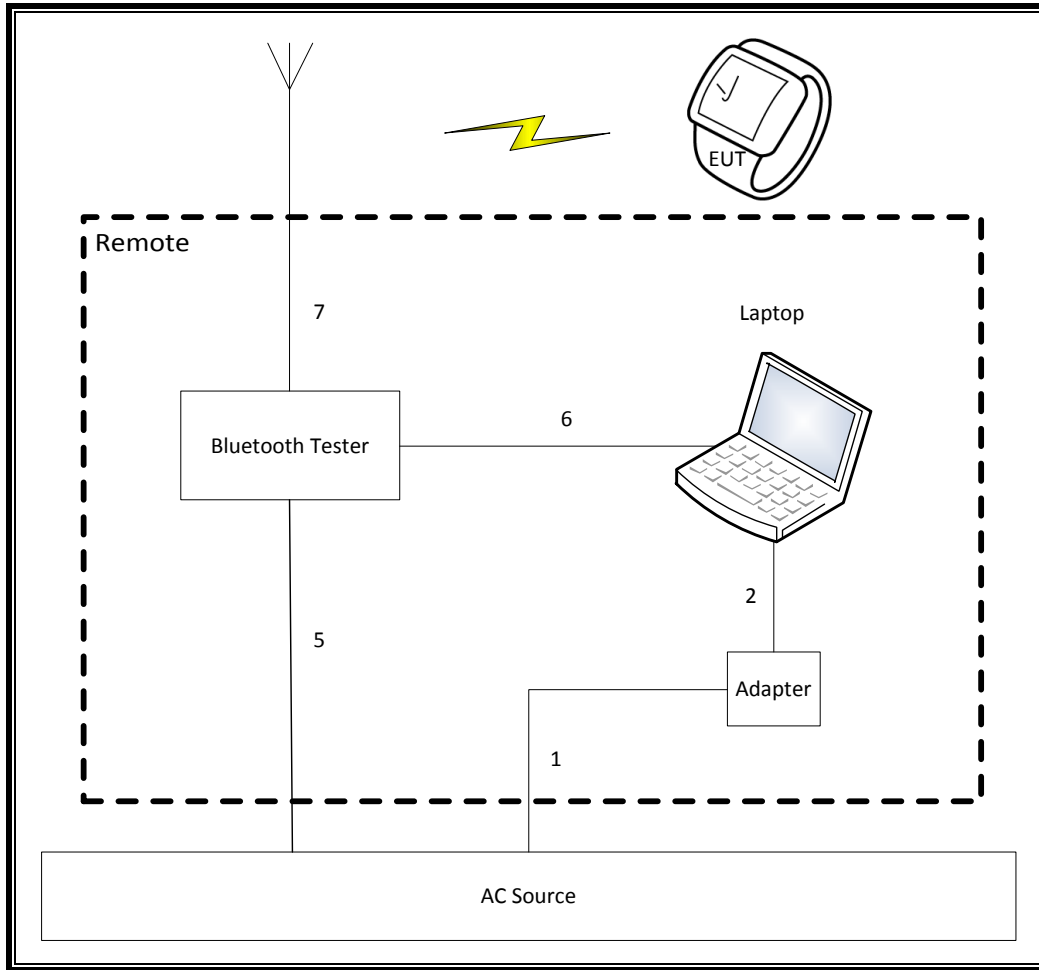
The EUT was continuously communicating with the Bluetooth tester during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS

Antenna Port Conducted Test



Radiated Test



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	05/22/13	05/22/14
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01161	05/07/13	05/07/14
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/28/13	03/28/14
Antenna, Horn, 18 GHz	ETS	3117	C01005	03/20/13	03/20/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00946	11/12/12	11/12/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00558	03/23/13	03/23/14
Peak Power Meter	Agilent / HP	N1911A	T386	04/02/13	04/02/14

7. ANTENNA PORT TEST RESULTS

7.1. BASIC DATA RATE GFSK MODULATION

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

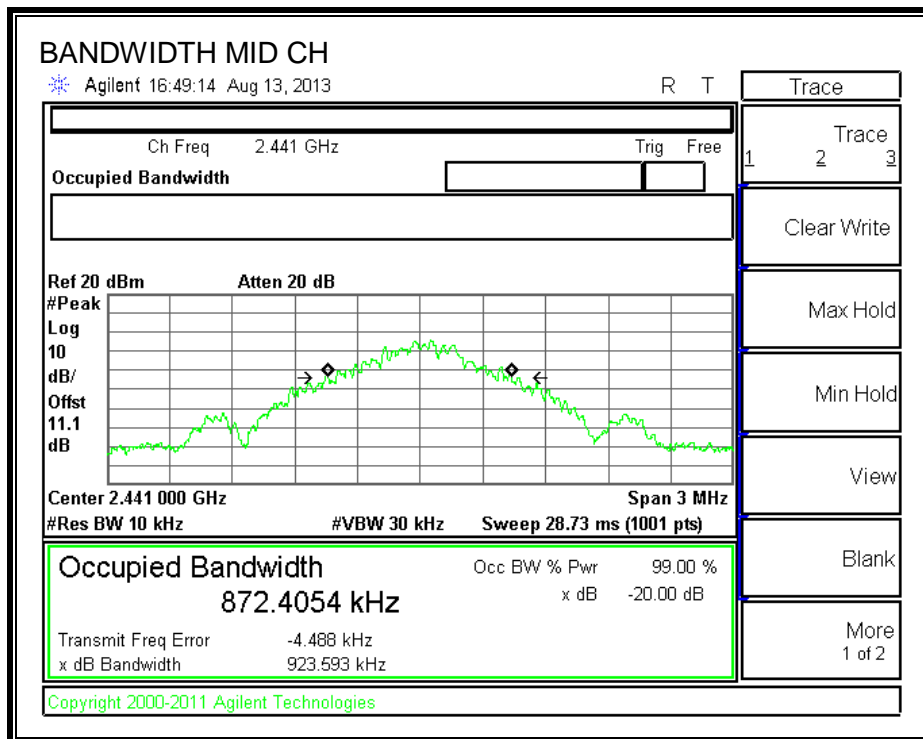
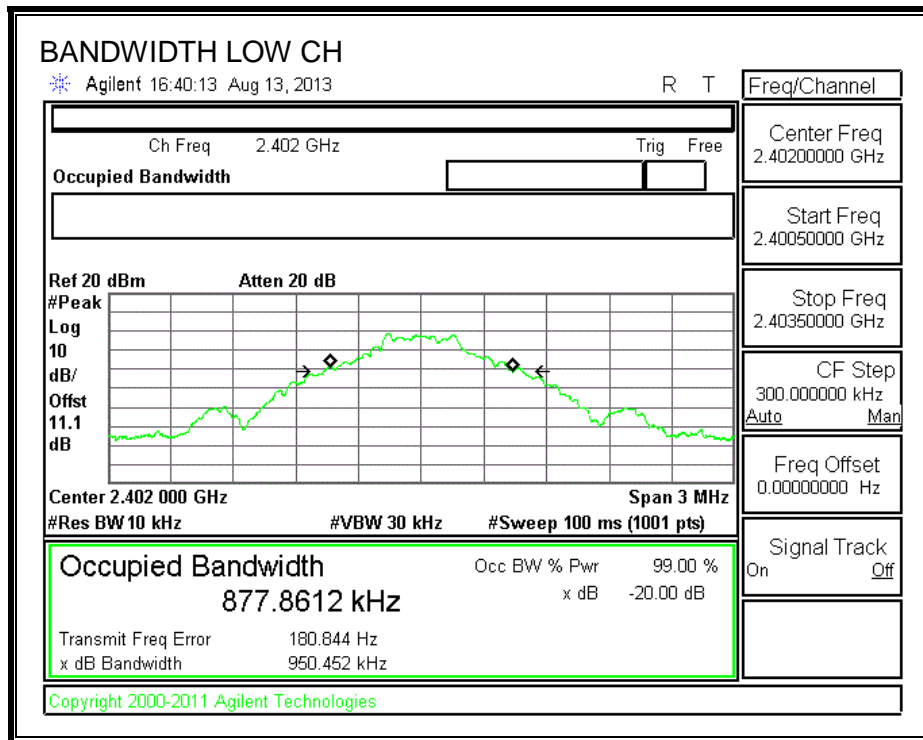
TEST PROCEDURE

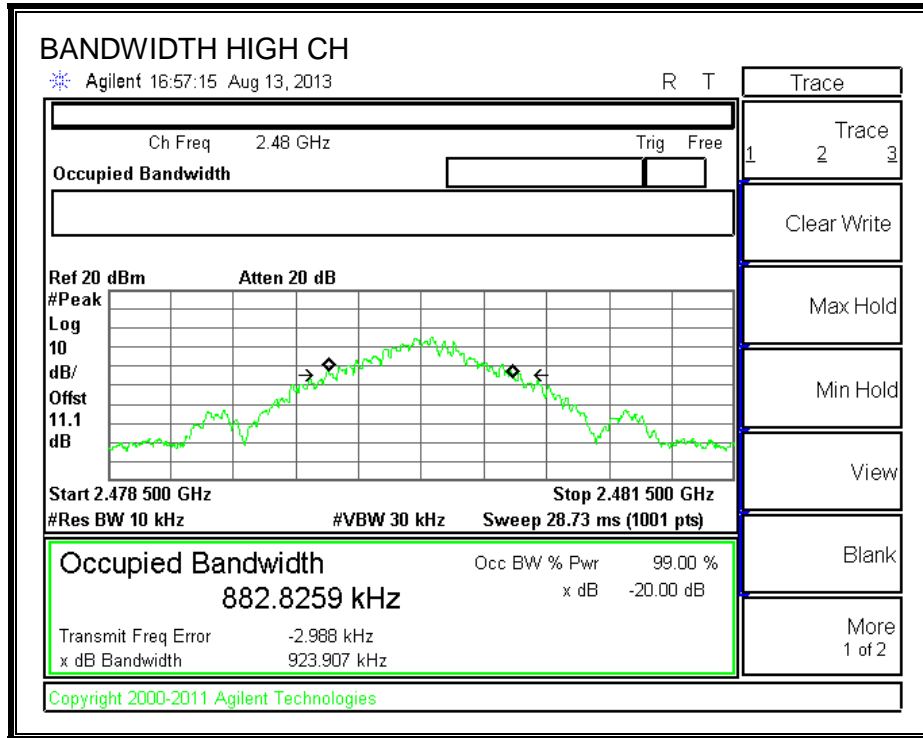
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

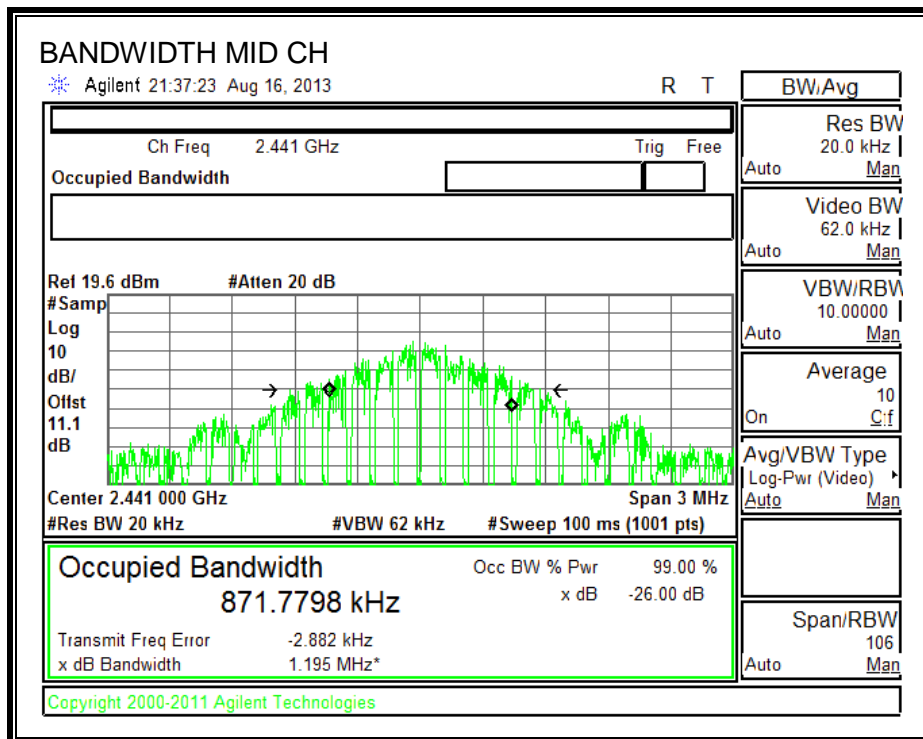
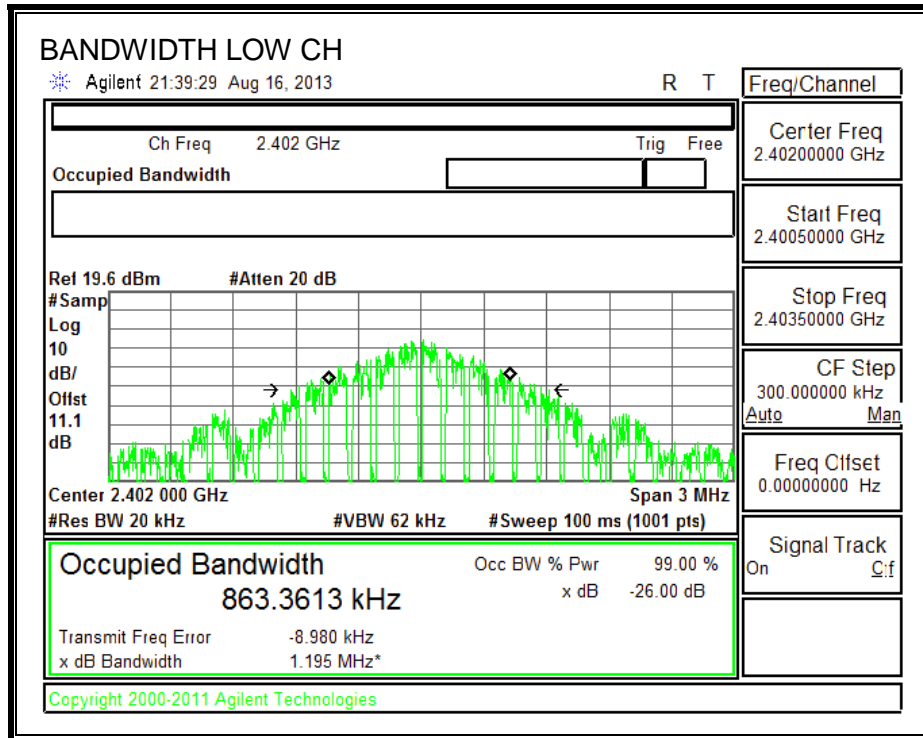
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	950.452	863.3613
Middle	2441	923.593	871.7798
High	2480	923.907	888.3459

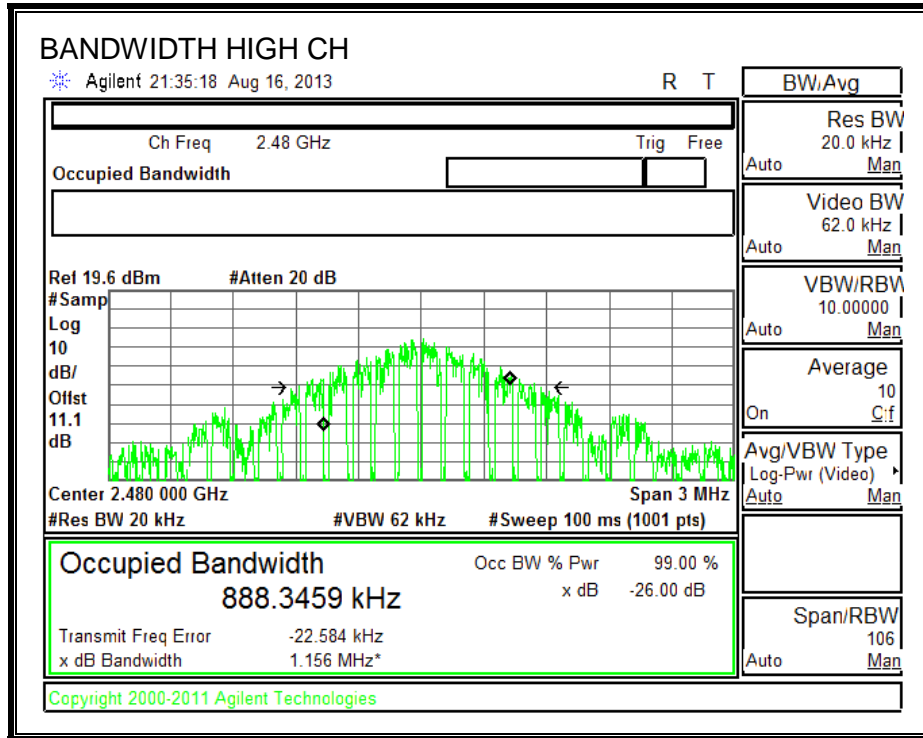
20 dB BANDWIDTH





99% BANDWIDTH





7.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

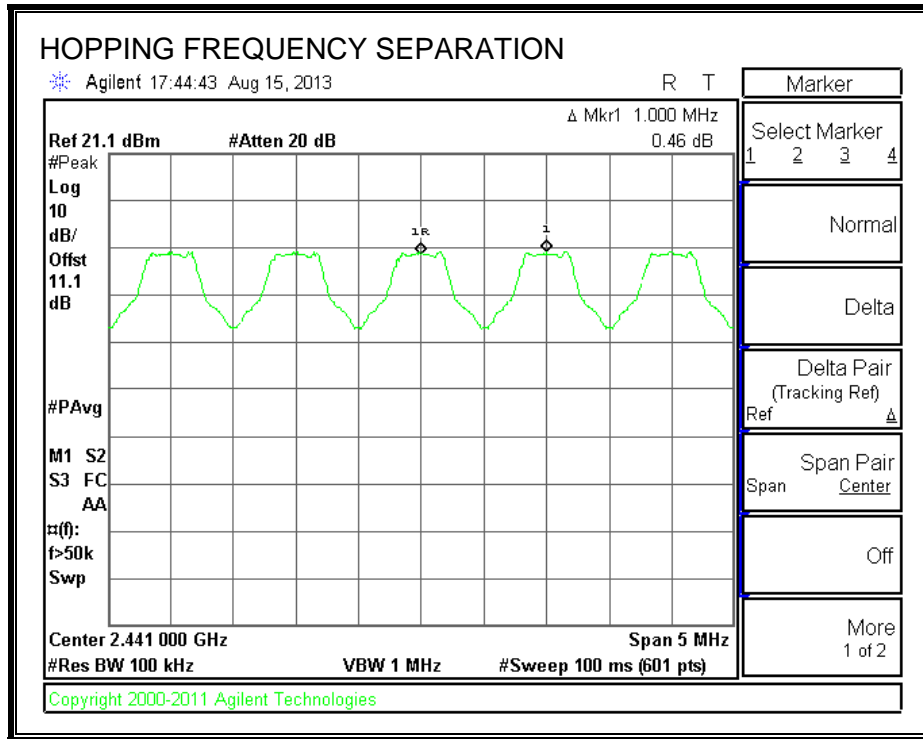
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



7.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

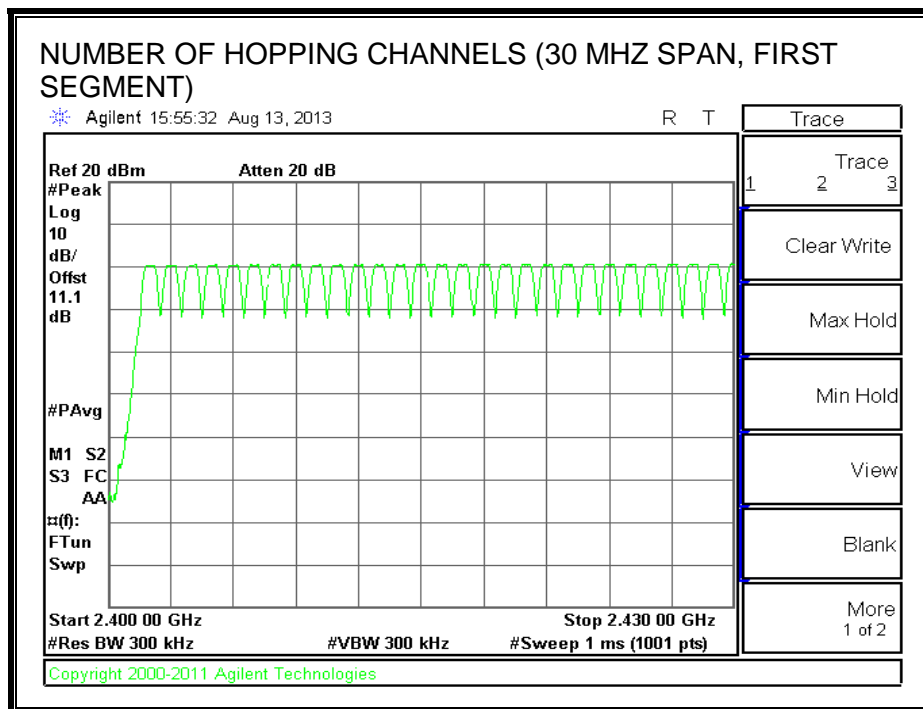
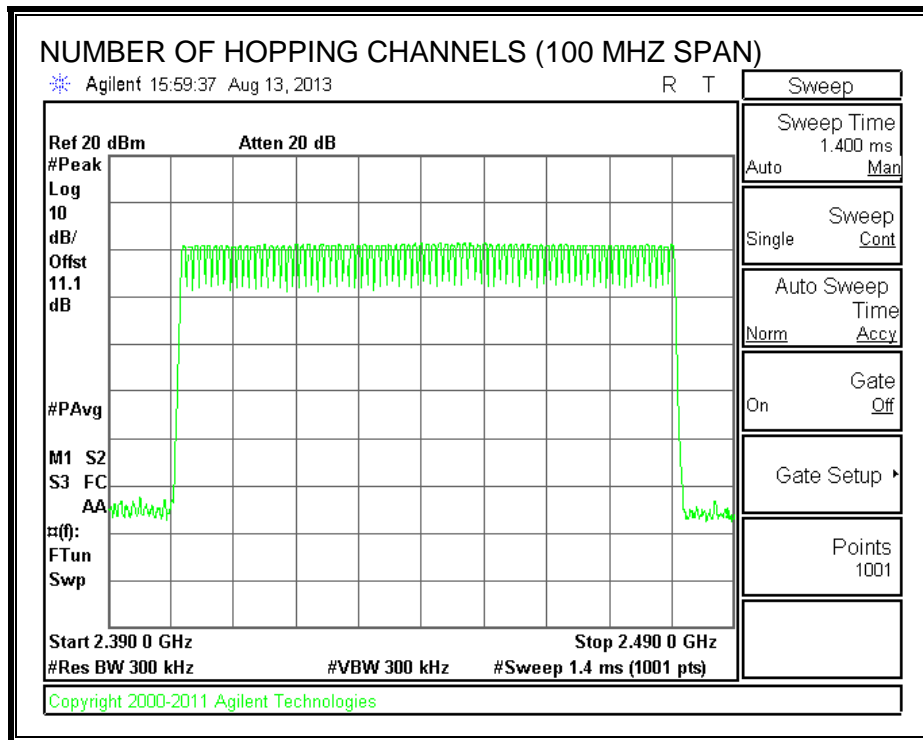
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

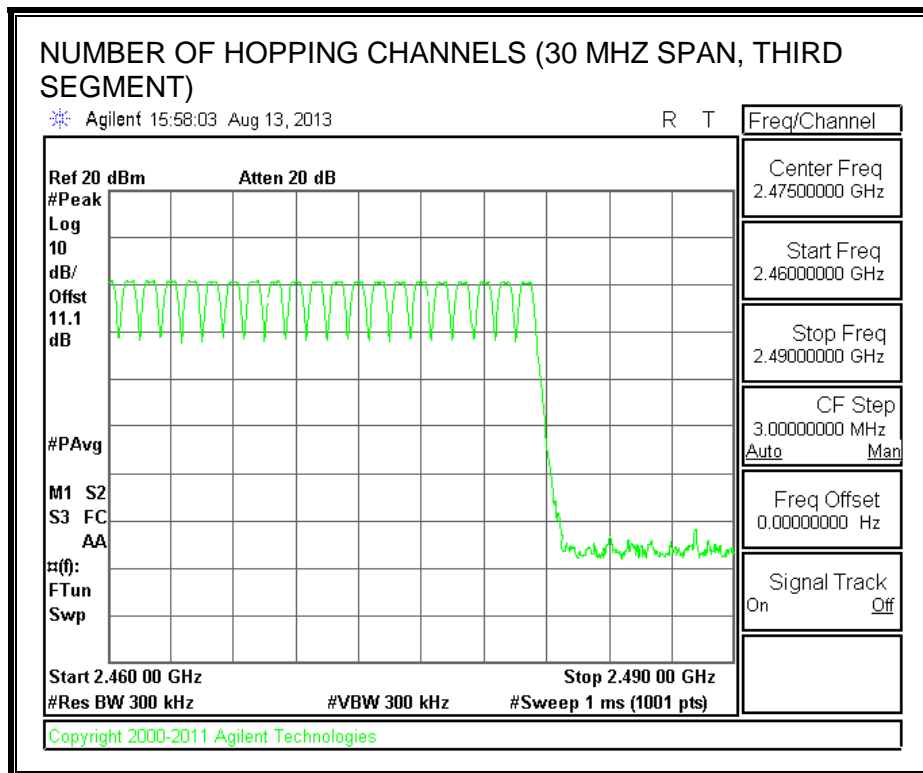
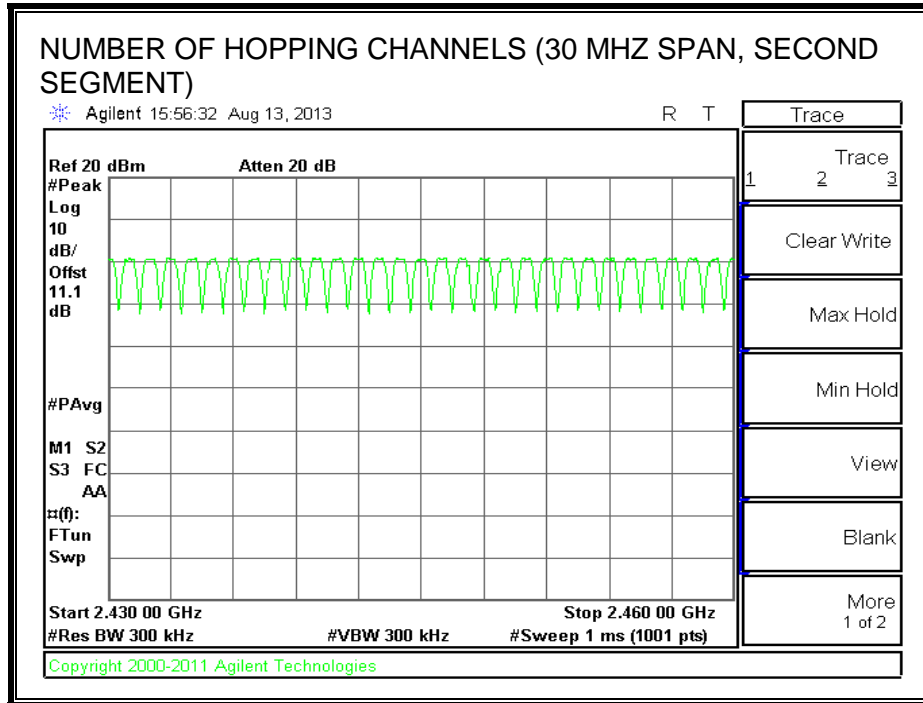
RESULTS

Normal Mode: 79 Channels observed.

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

NUMBER OF HOPPING CHANNELS





7.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

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

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

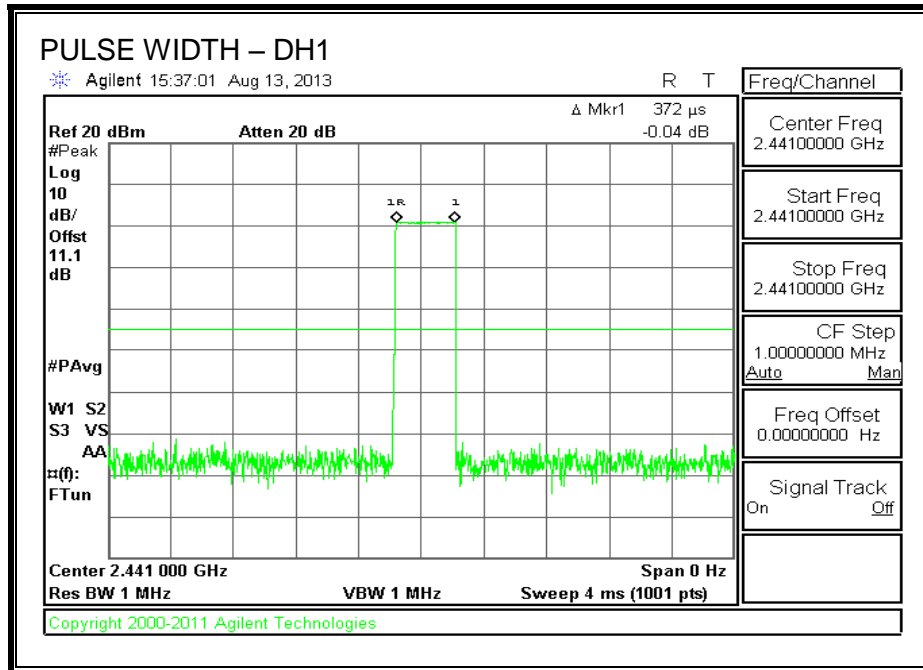
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{ pulse width}$.

RESULTS

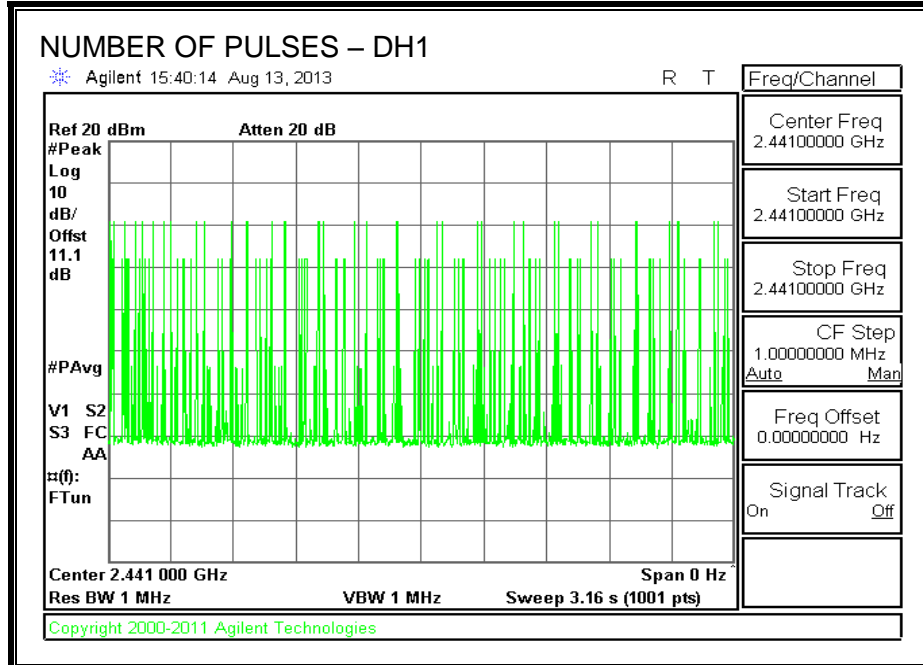
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.372	34	0.126	0.4	-0.274
DH3	1.632	14	0.228	0.4	-0.172
DH5	2.876	11	0.316	0.4	-0.084
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.372	34	0.126	0.4	-0.274
DH3	1.632	14	0.228	0.4	-0.172
DH5	2.876	11	0.316	0.4	-0.084

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

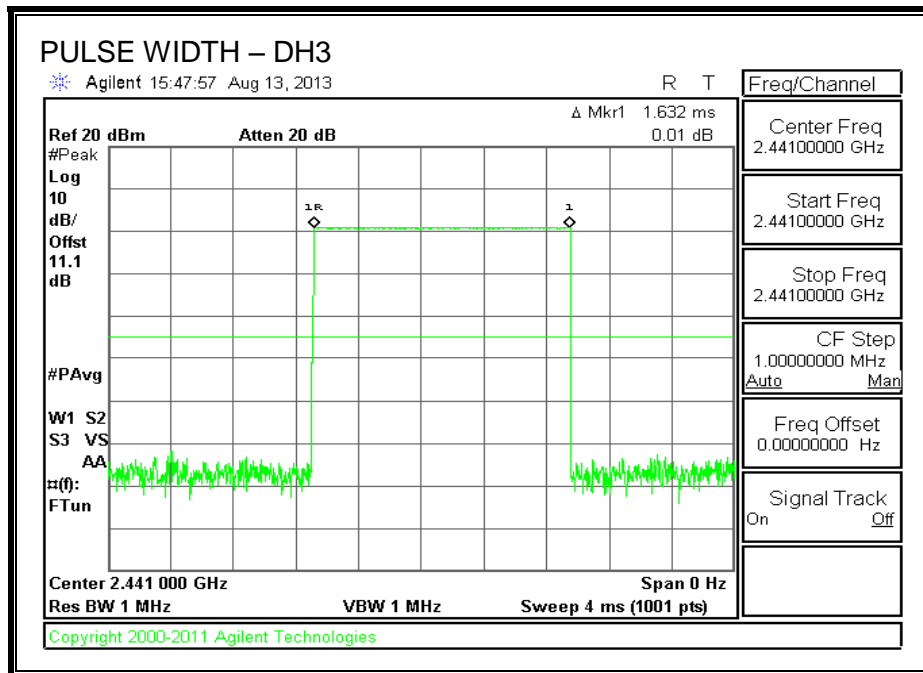
PULSE WIDTH - DH1



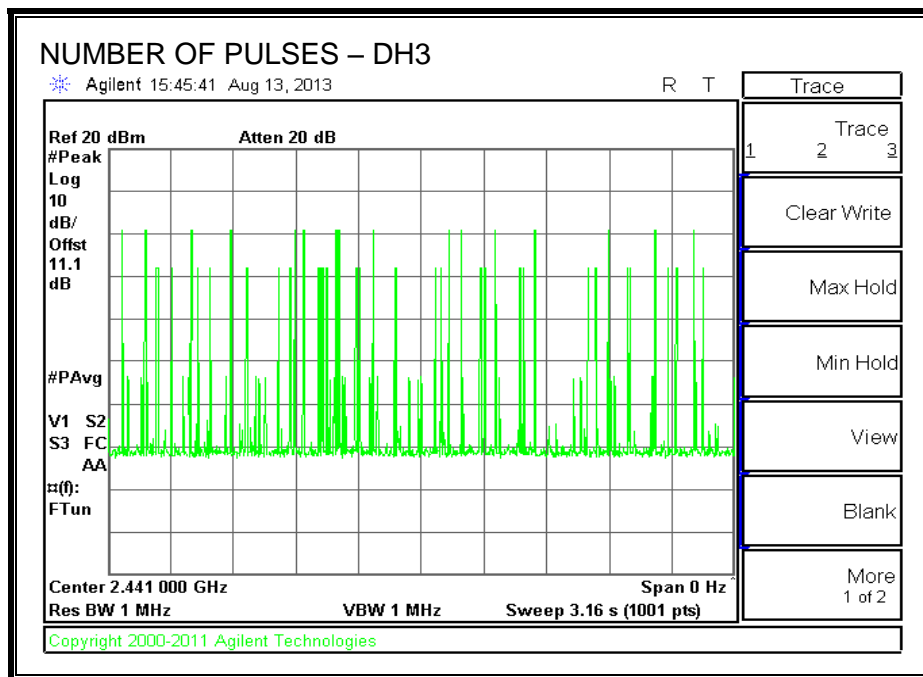
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



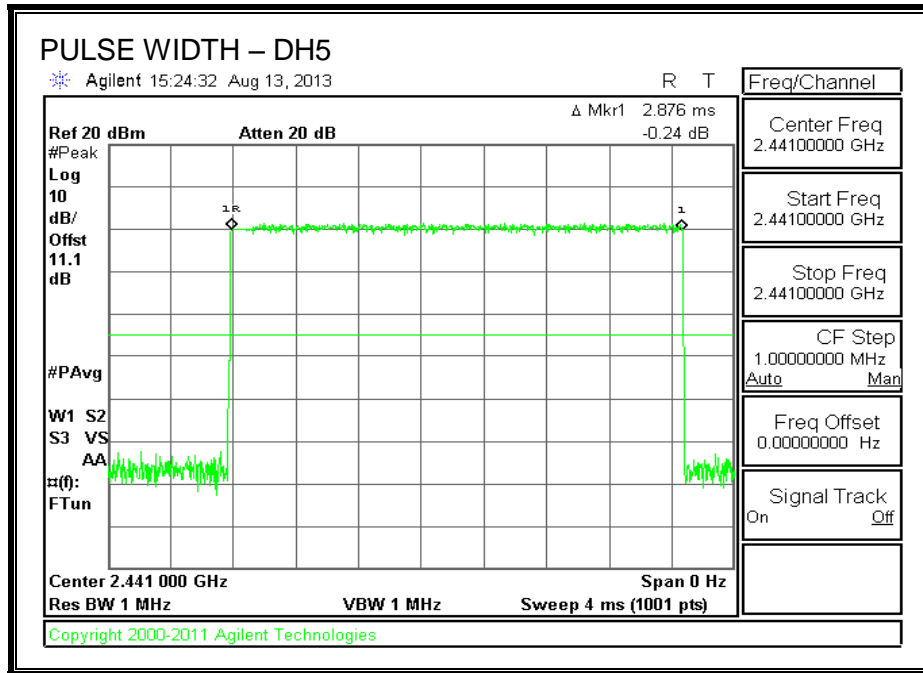
PULSE WIDTH – DH3



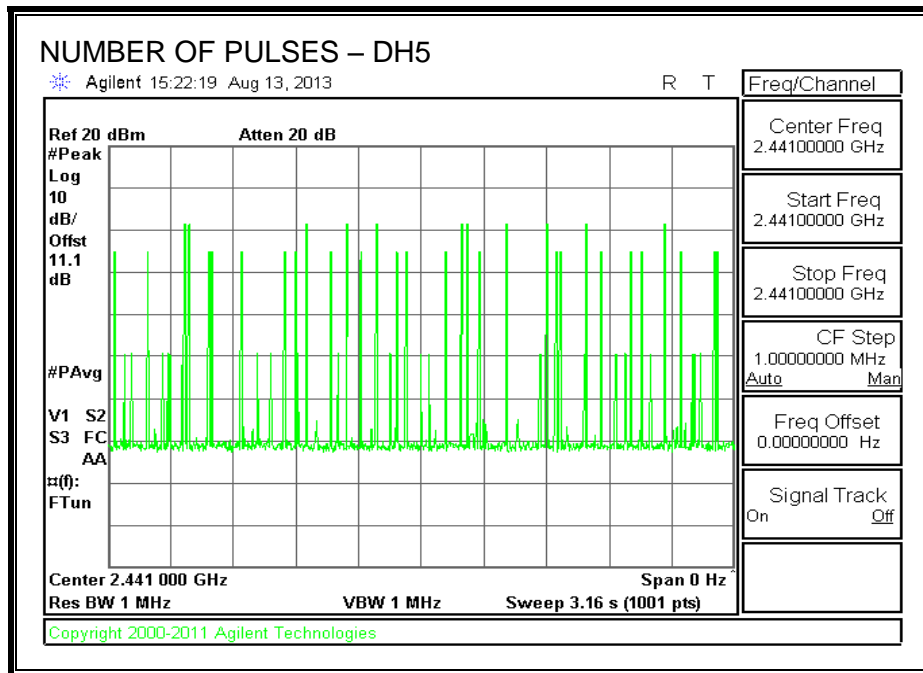
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.1.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

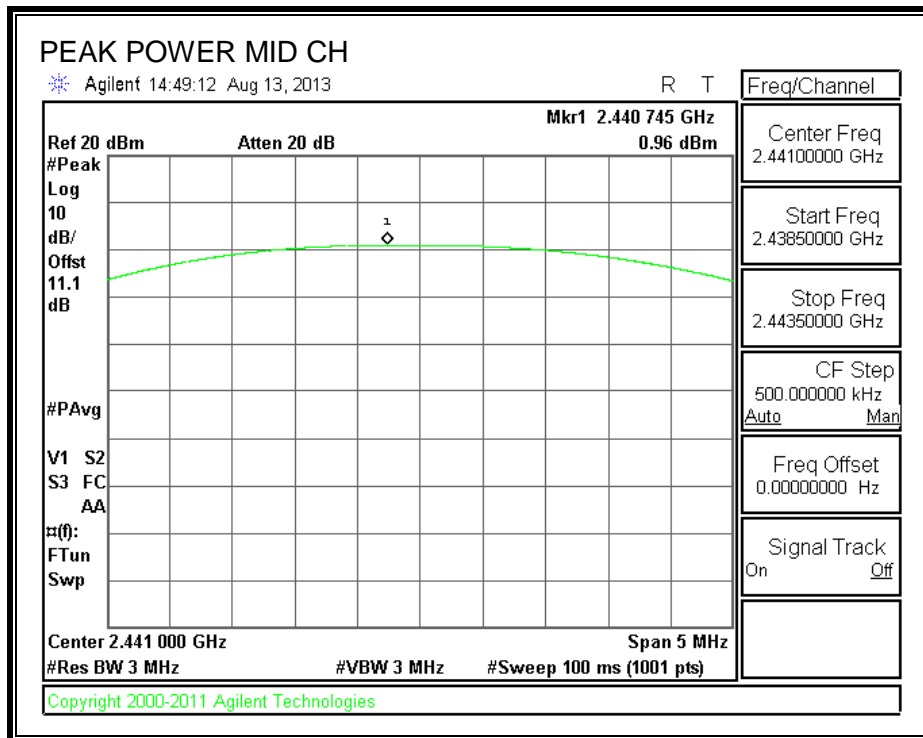
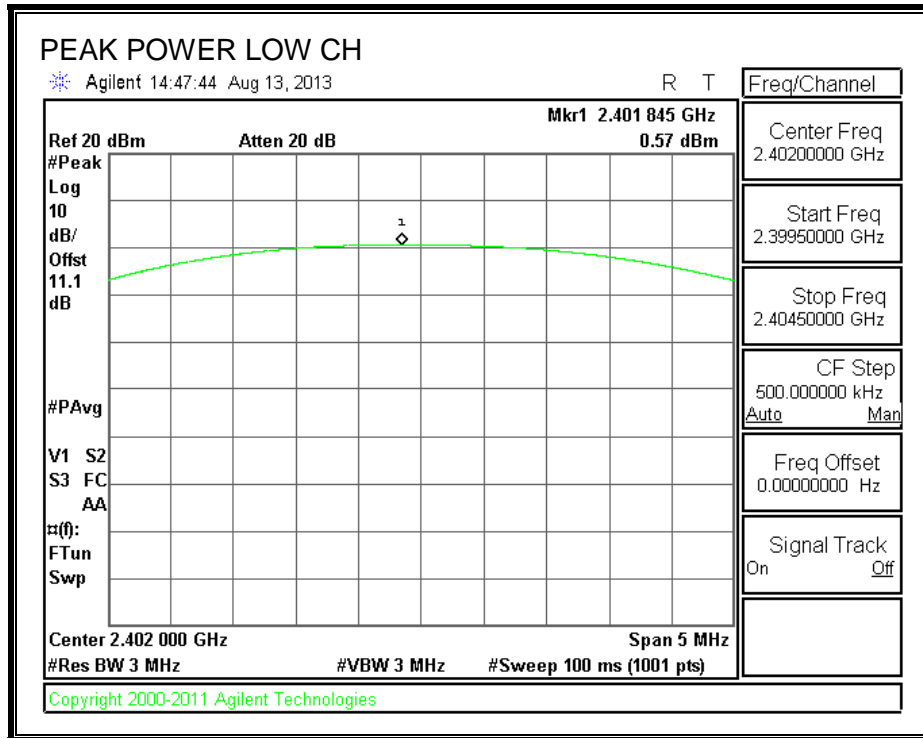
TEST PROCEDURE

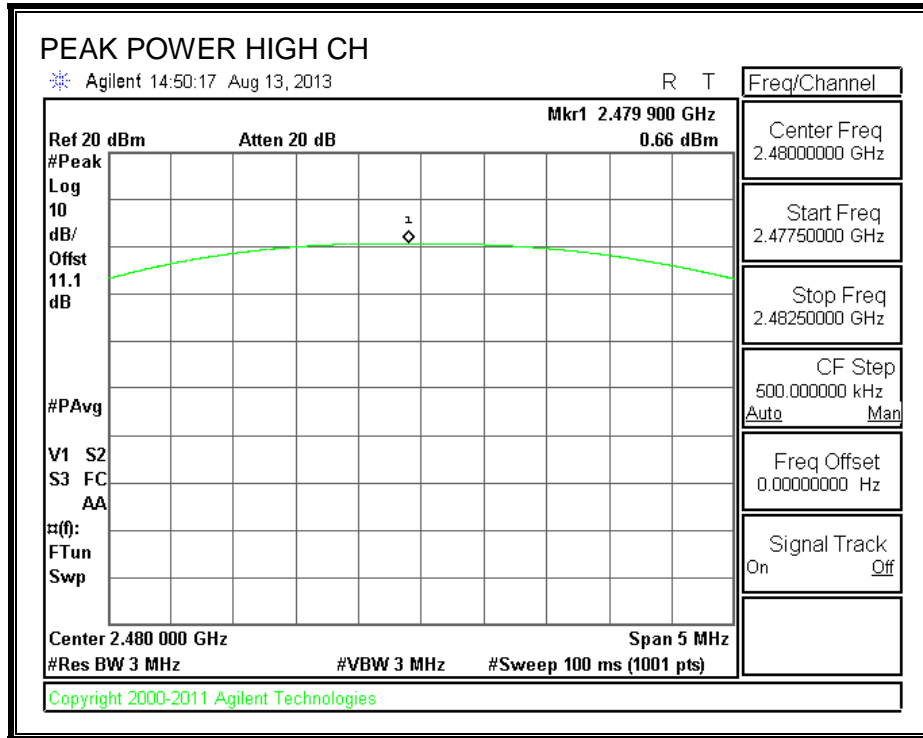
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	0.57	30	-29.43
Middle	2441	0.96	30	-29.04
High	2480	0.66	30	-29.34

OUTPUT POWER





7.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Frequency (MHz)	Average Power (dBm)
2402	0.36
2441	0.69
2480	0.44

7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

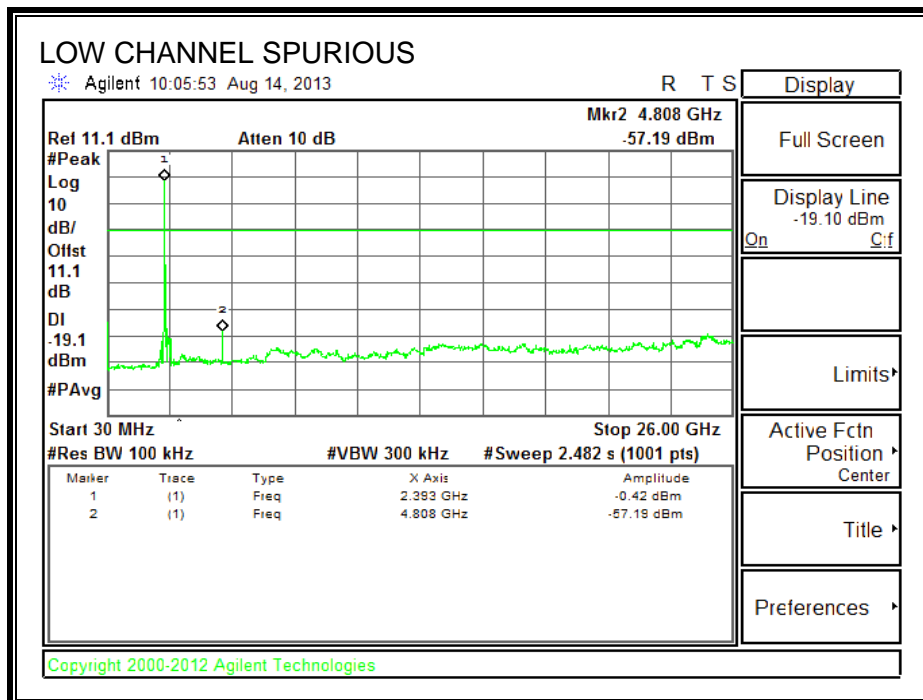
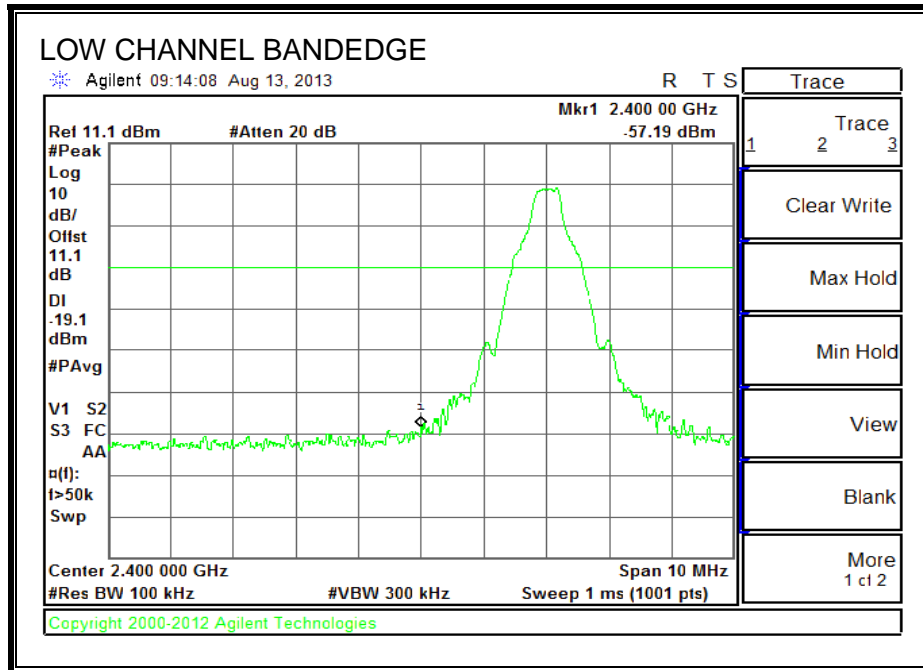
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

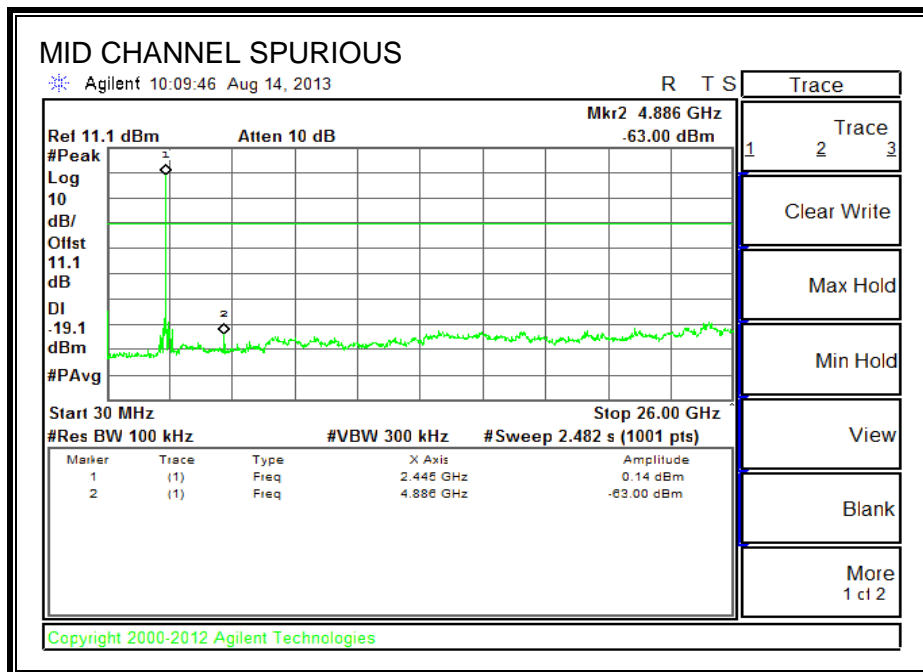
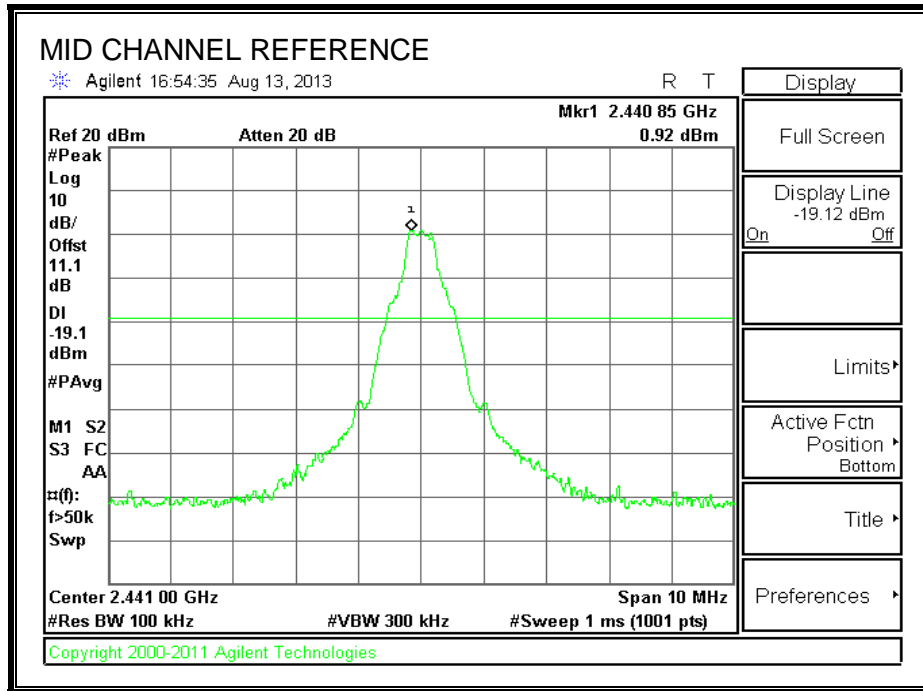
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

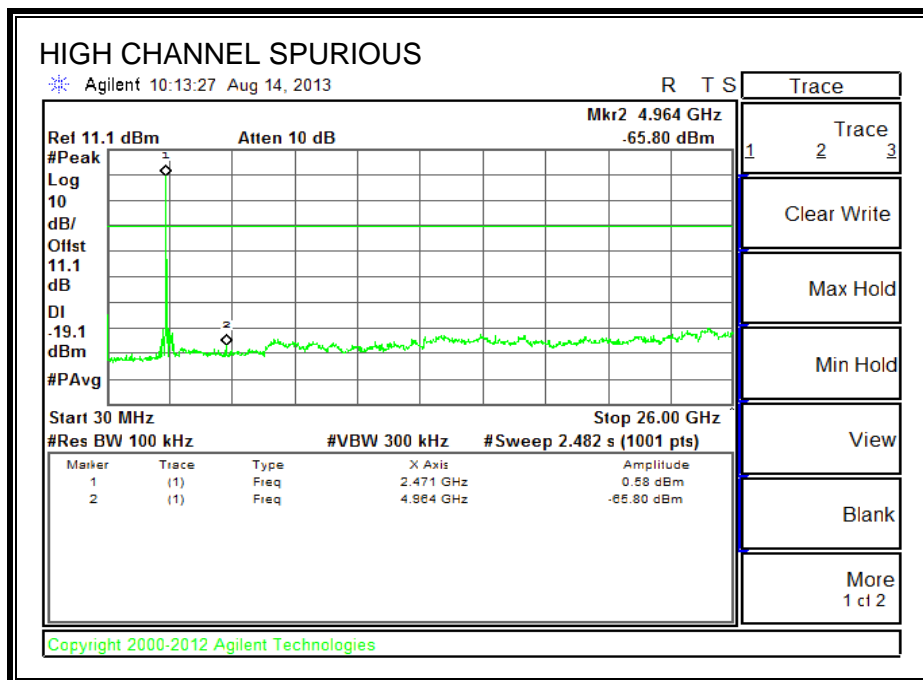
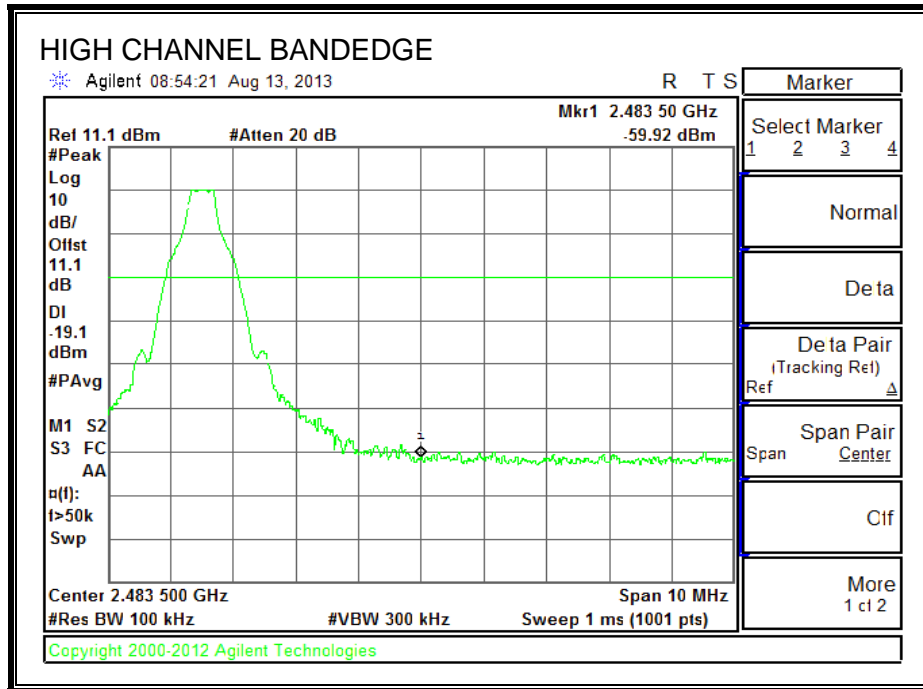
SPURIOUS EMISSIONS, LOW CHANNEL



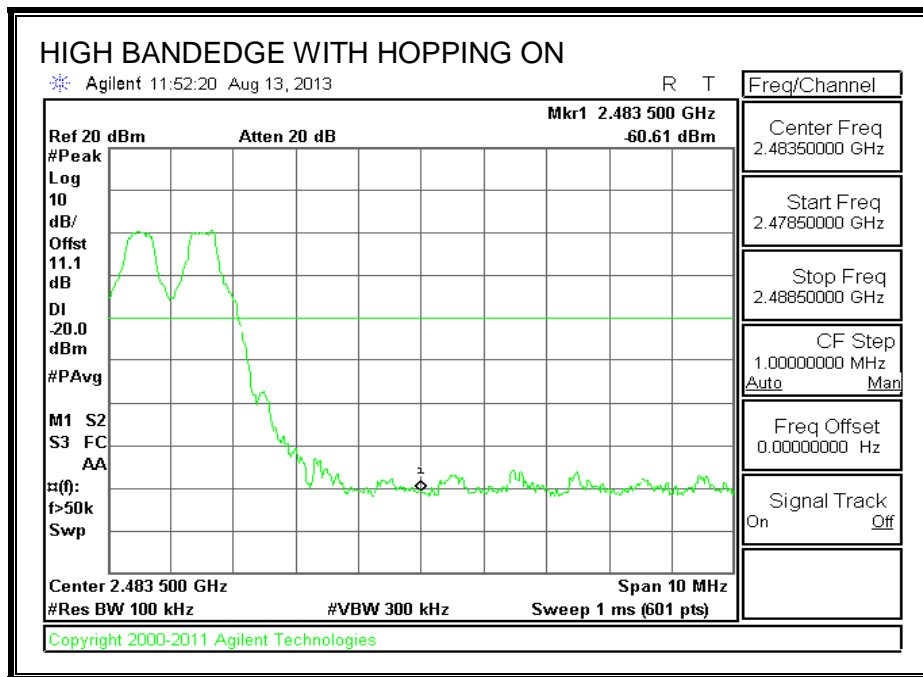
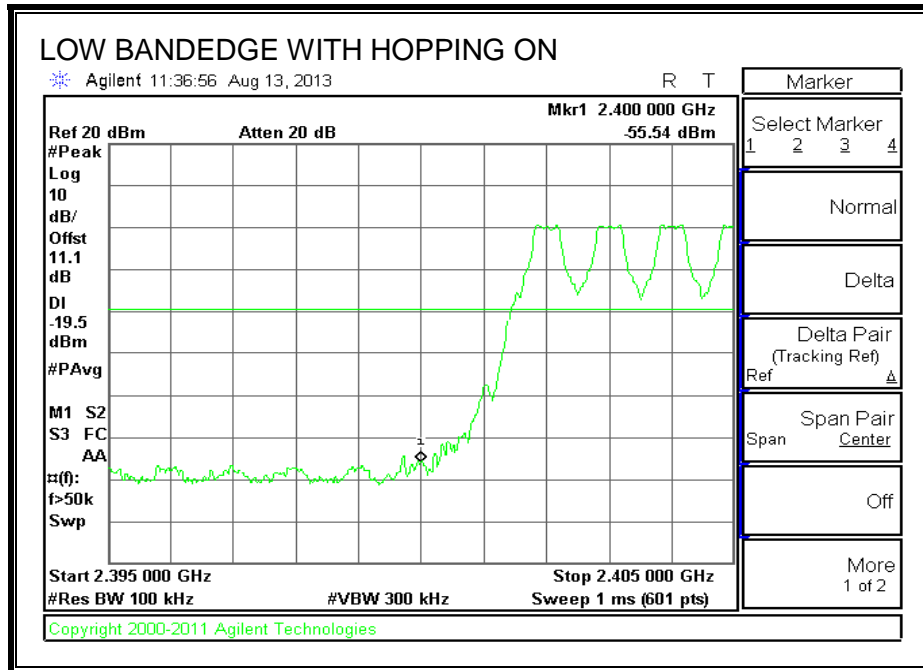
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEGE EMISSIONS WITH HOPPING ON



7.2. ENHANCED DATA RATE 8PSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

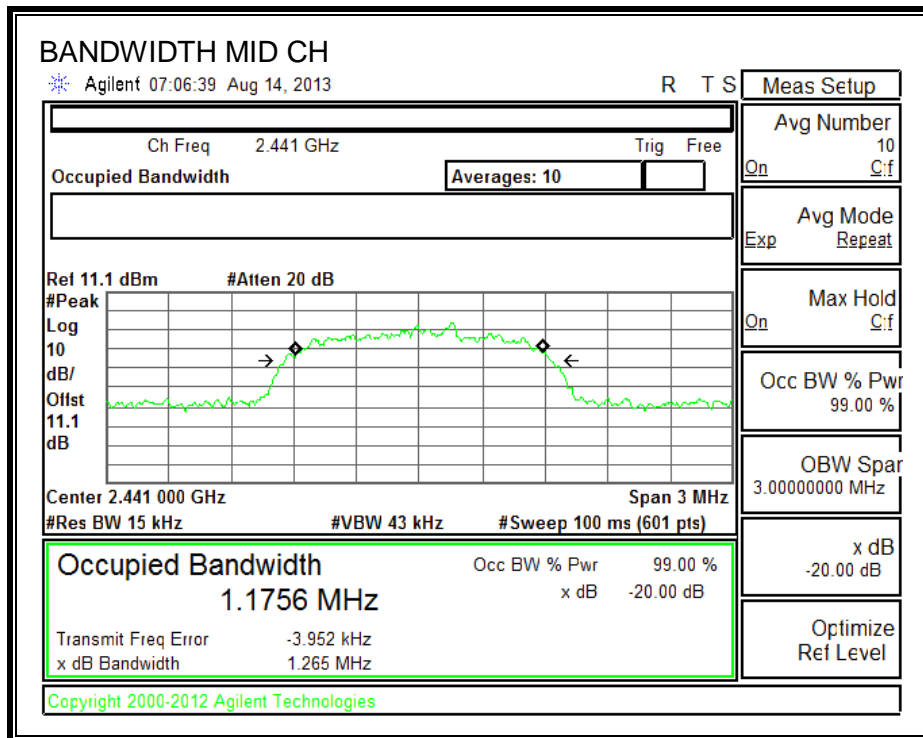
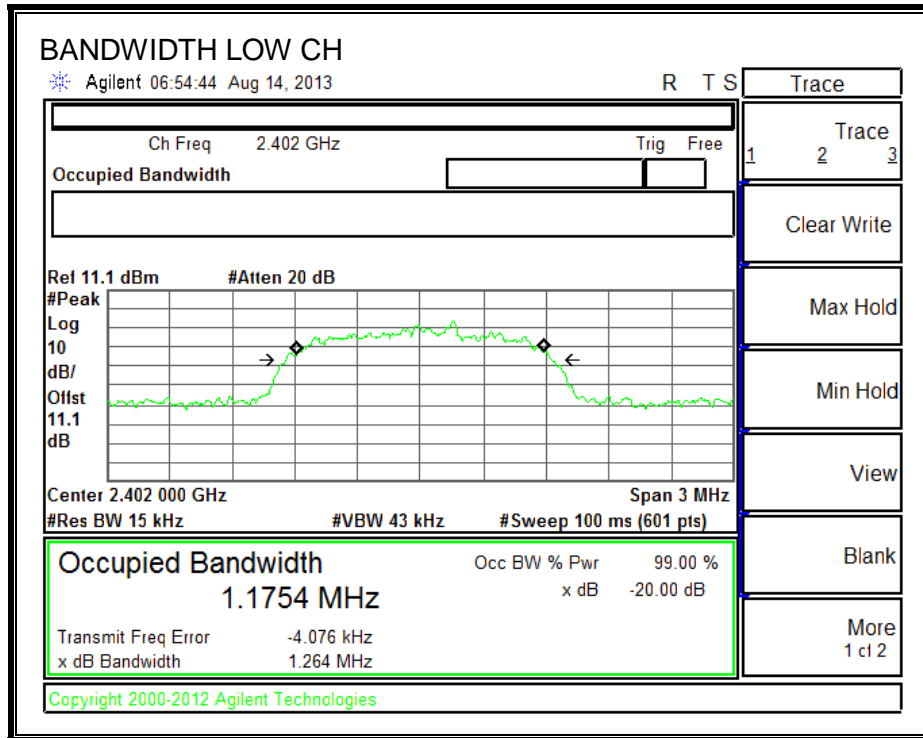
TEST PROCEDURE

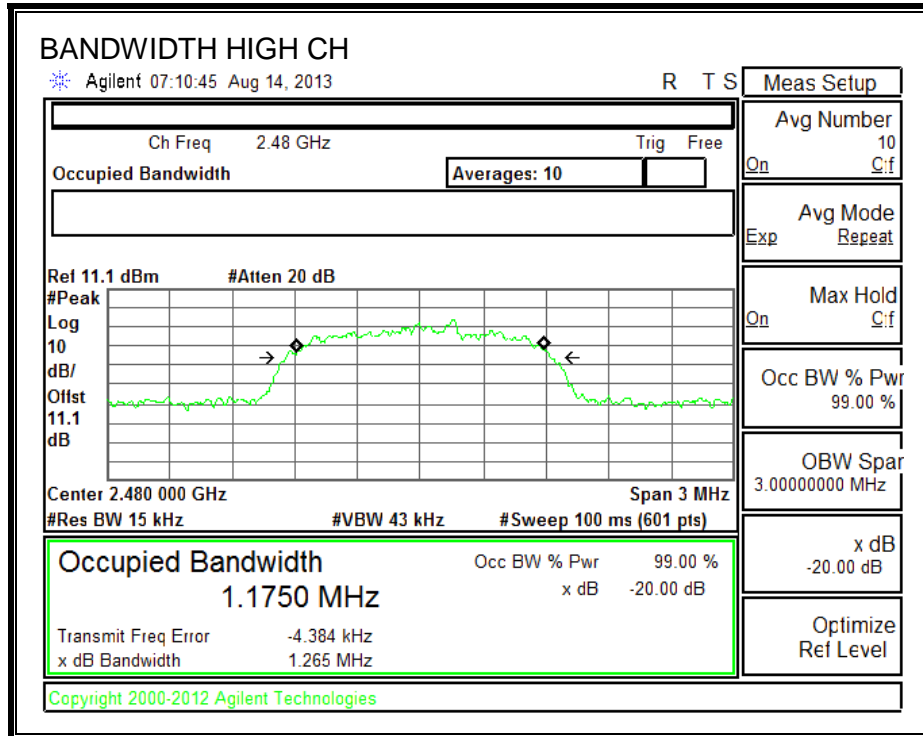
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

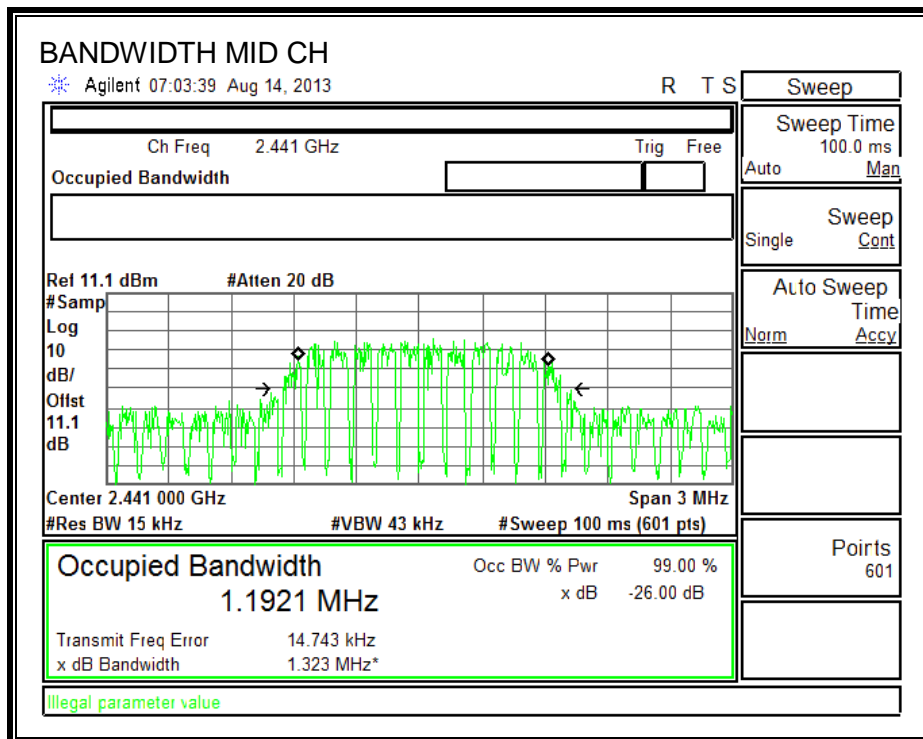
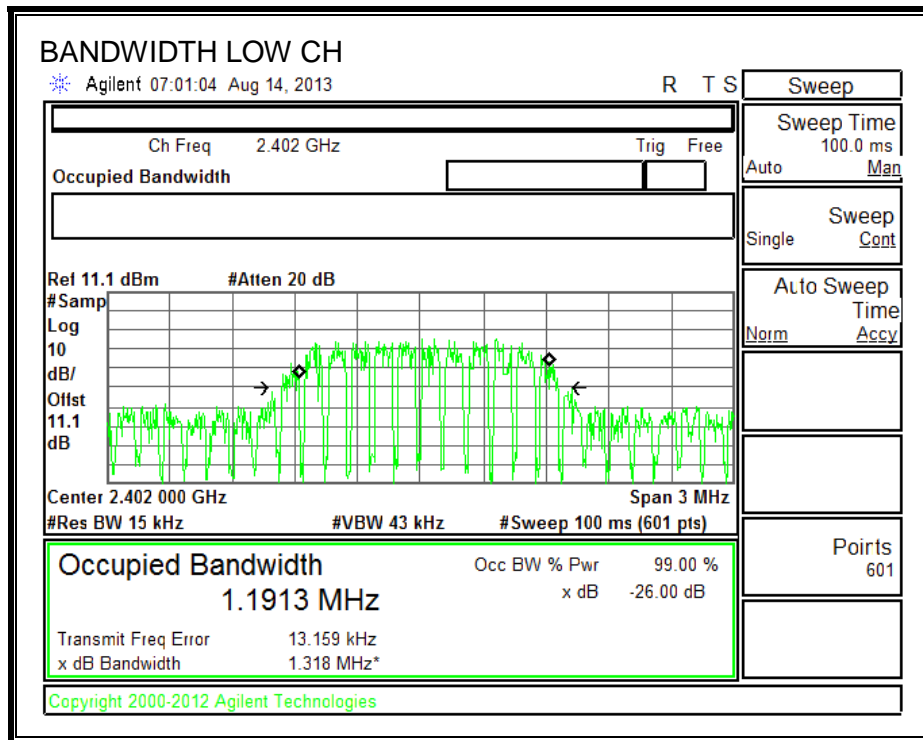
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	1264	1191.3
Middle	2441	1265	1192.1
High	2480	1265	1202.7

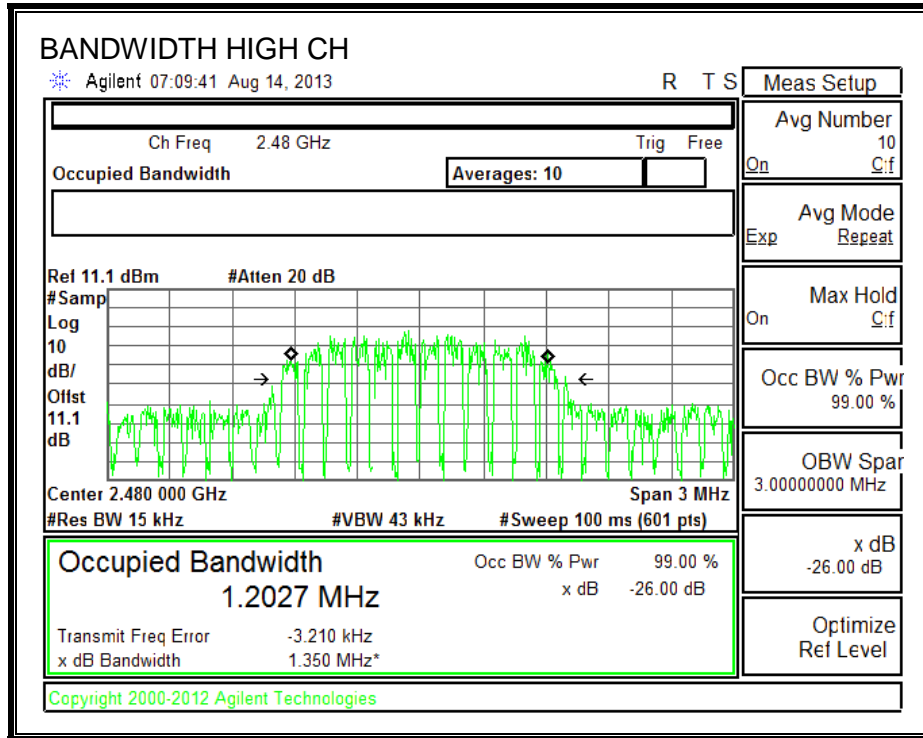
20 dB BANDWIDTH





99% BANDWIDTH





7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

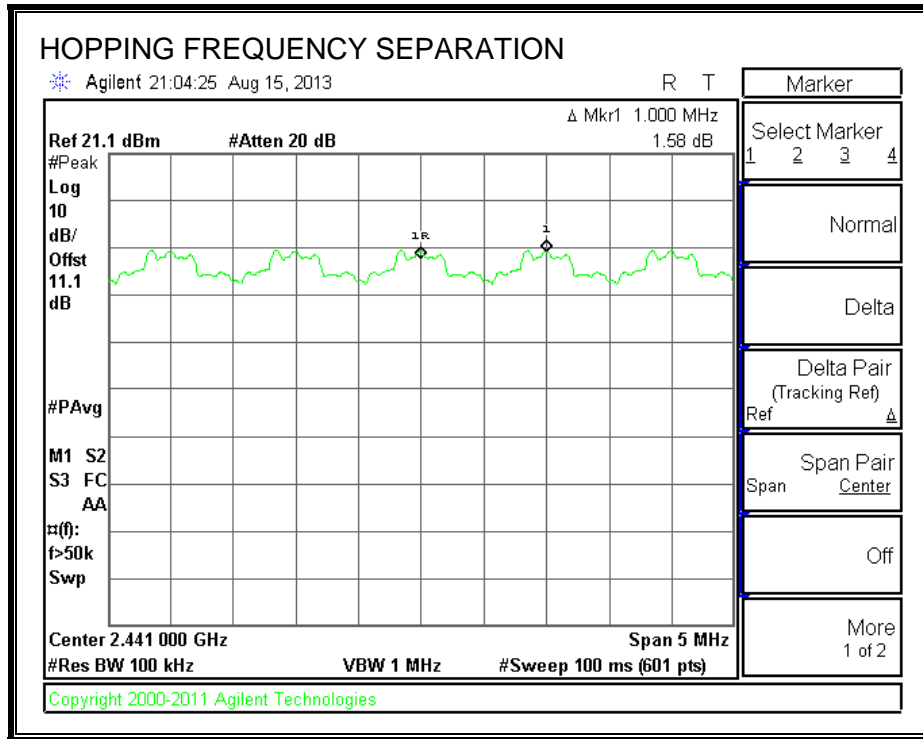
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

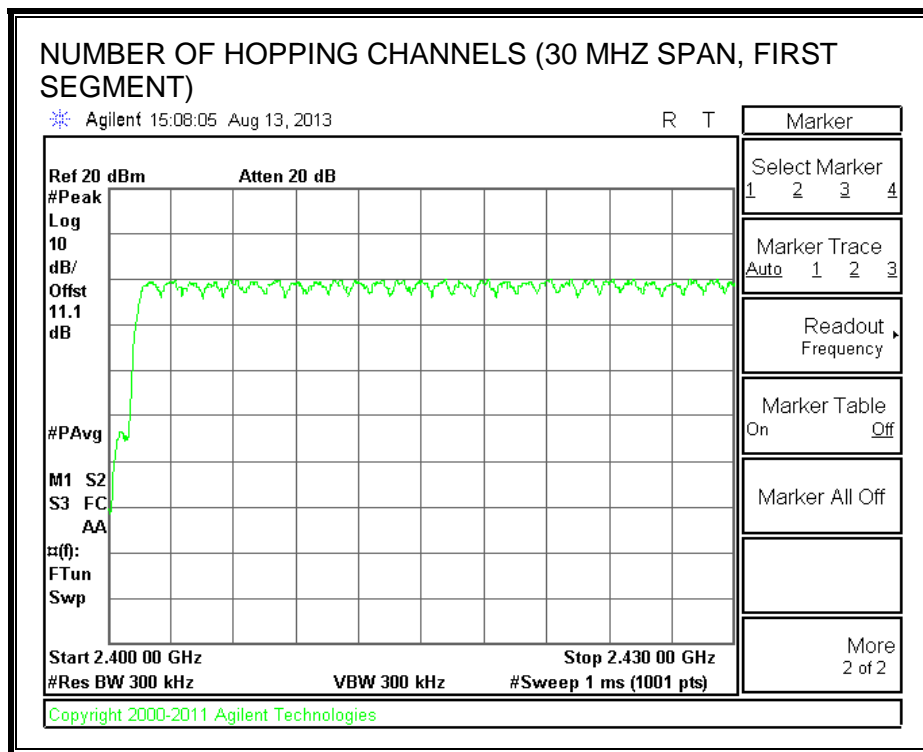
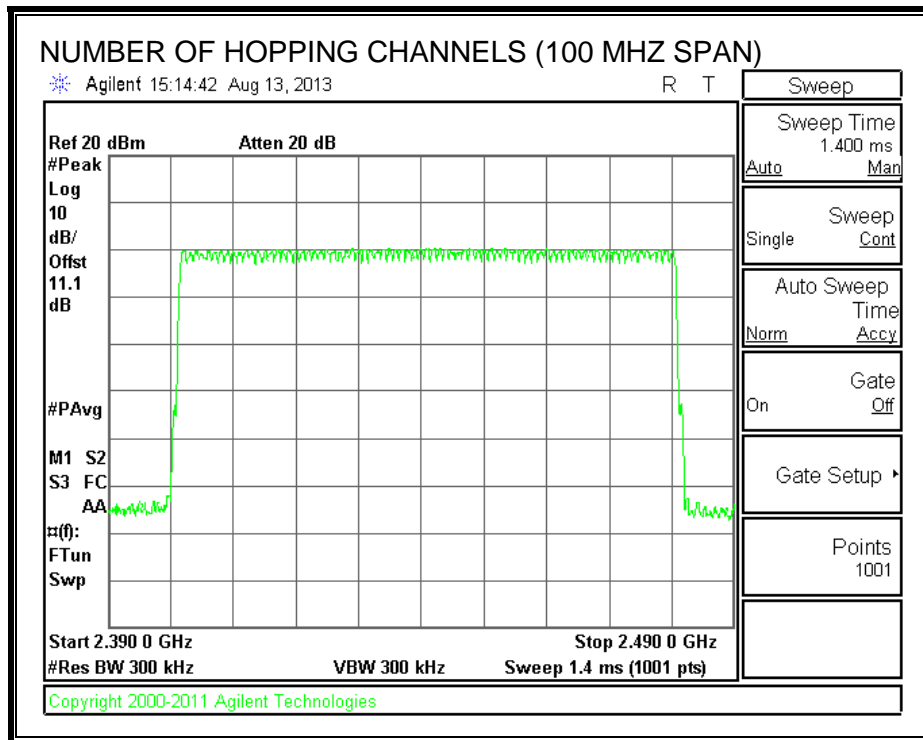
TEST PROCEDURE

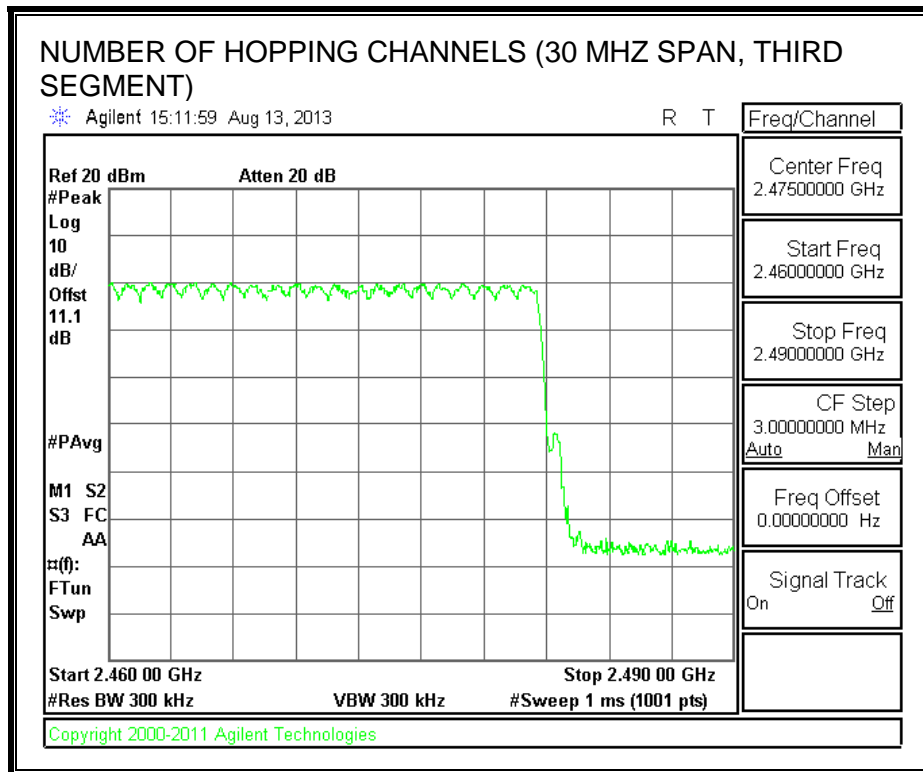
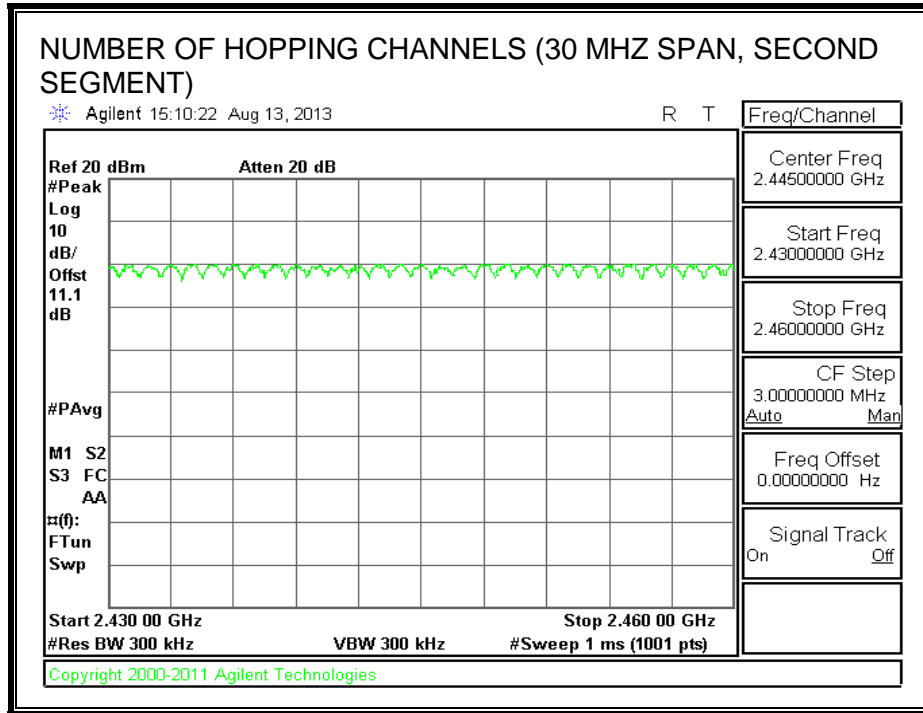
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

TEST PROCEDURE

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

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

RESULTS

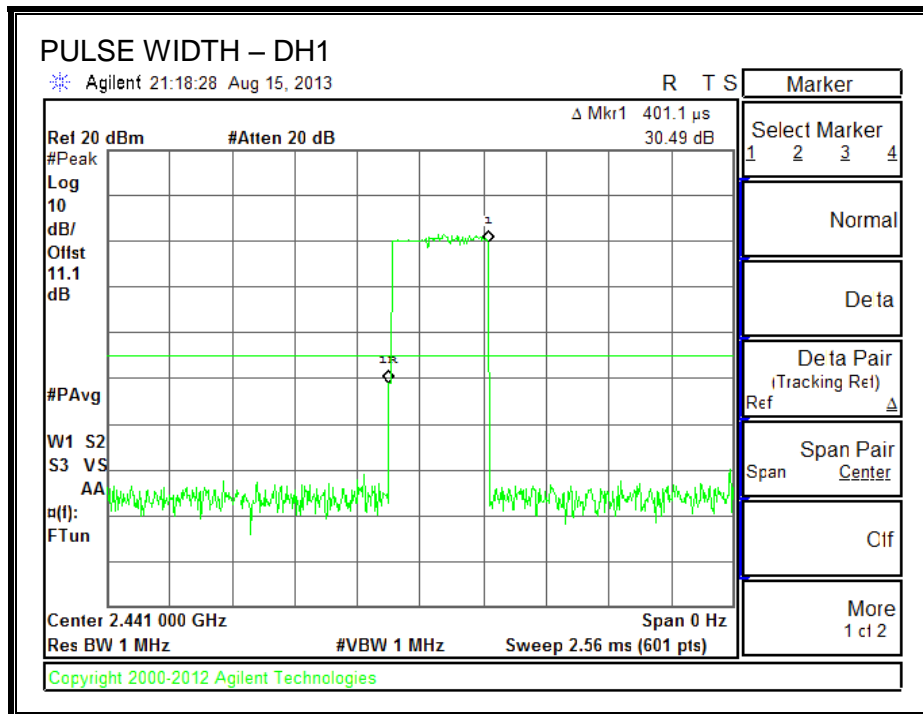
Time Of Occupancy = $10 * xx \text{ pulses} * yy \text{ msec} = zz \text{ msec}$

8PSK (EDR) Mode

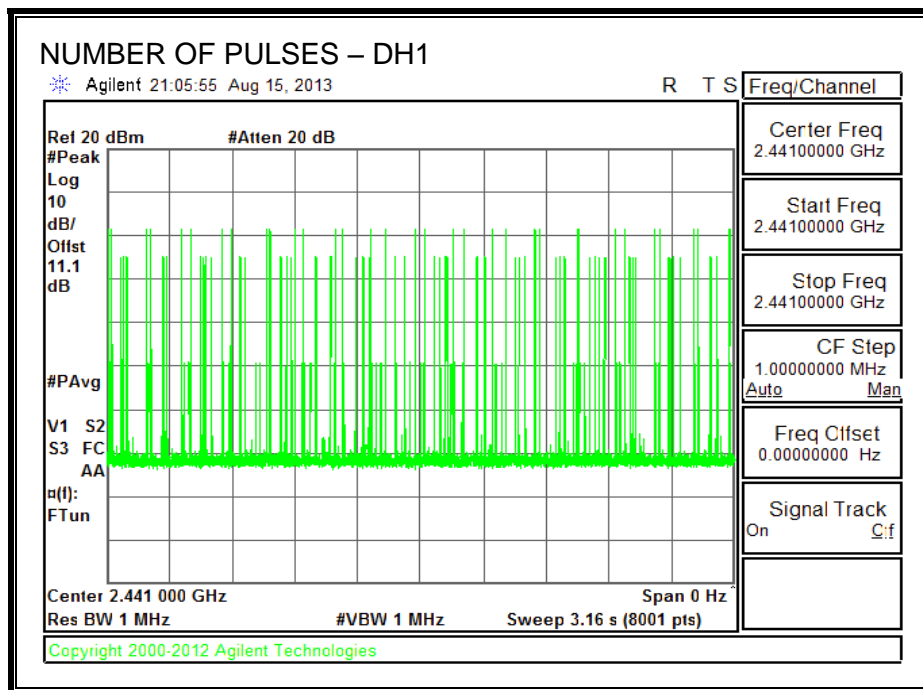
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.401	31	0.124	0.4	-0.276
DH3	1.651	16	0.264	0.4	-0.136
DH5	2.900	11	0.319	0.4	-0.081

Note: for AFH (8PSK) mode, please refer to the results of AFH (GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate on page 23 demonstrates compliance with channel occupancy when AFH is employed

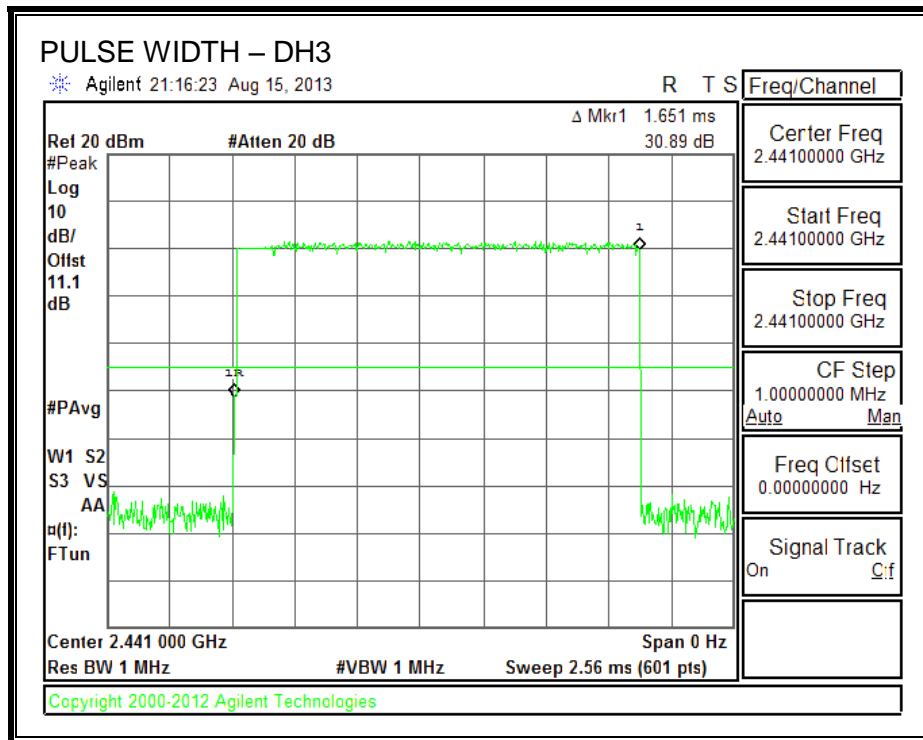
PULSE WIDTH - DH1



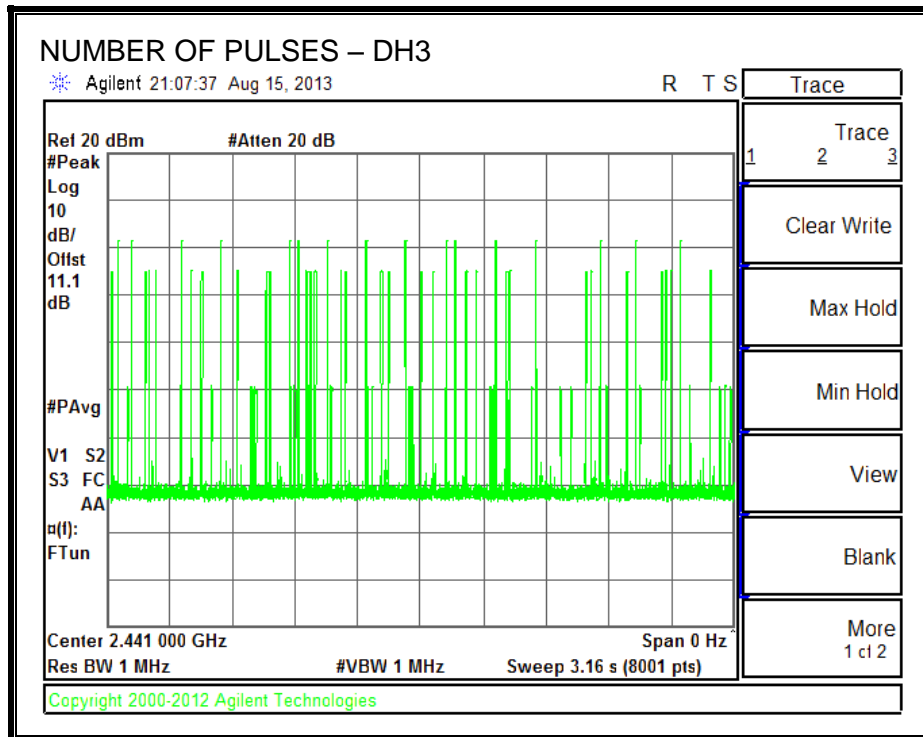
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



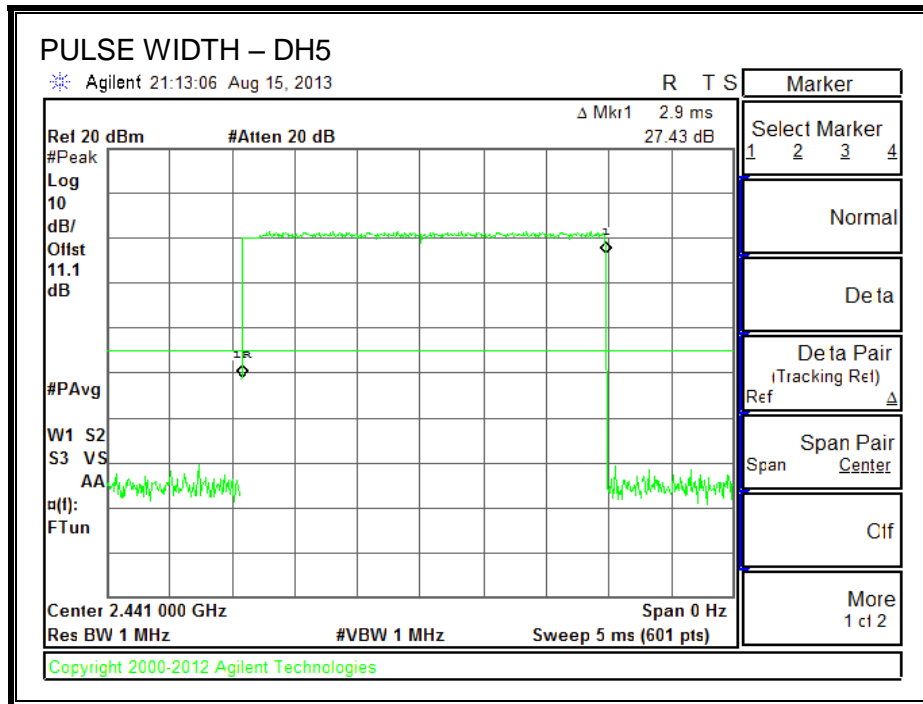
PULSE WIDTH – DH3



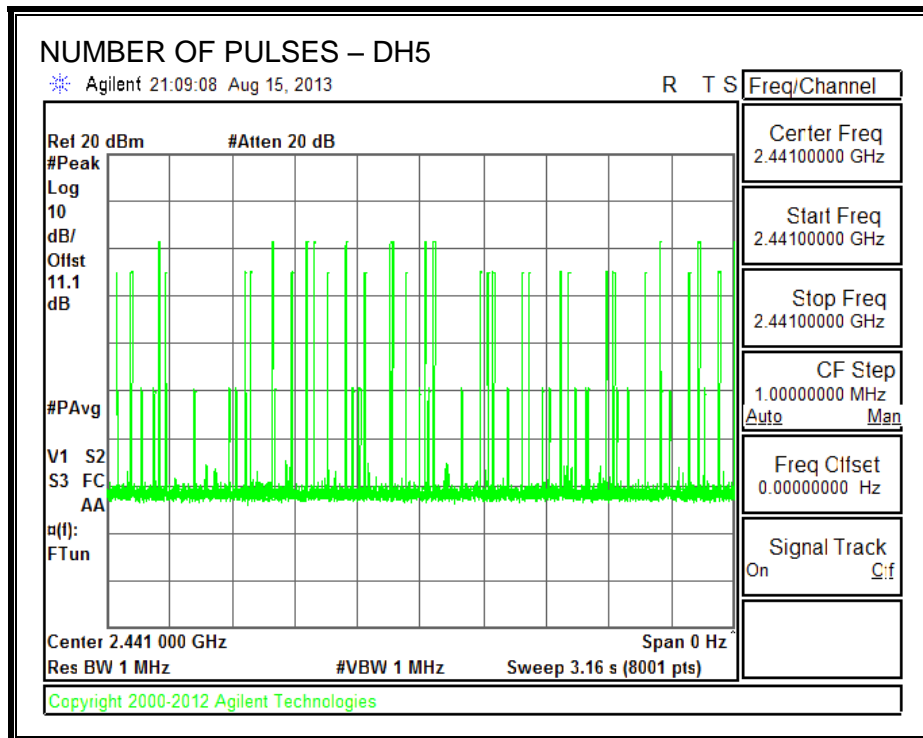
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

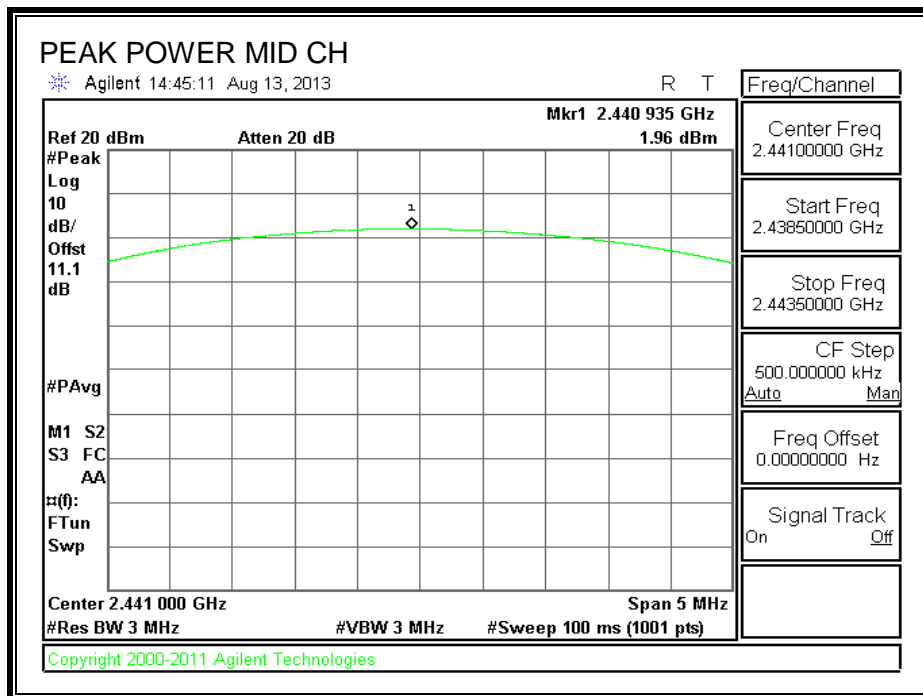
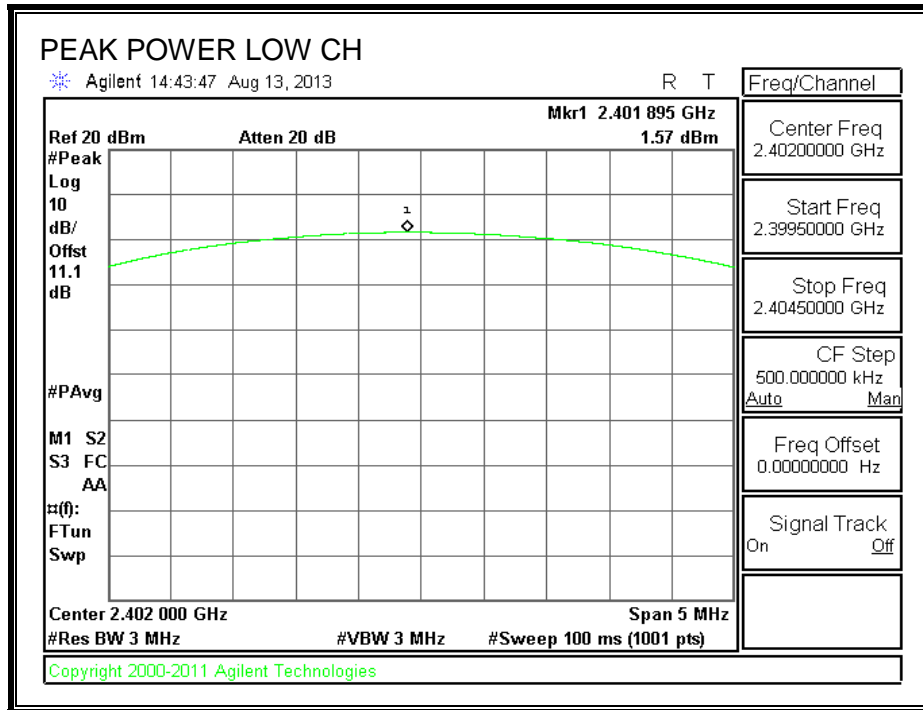
TEST PROCEDURE

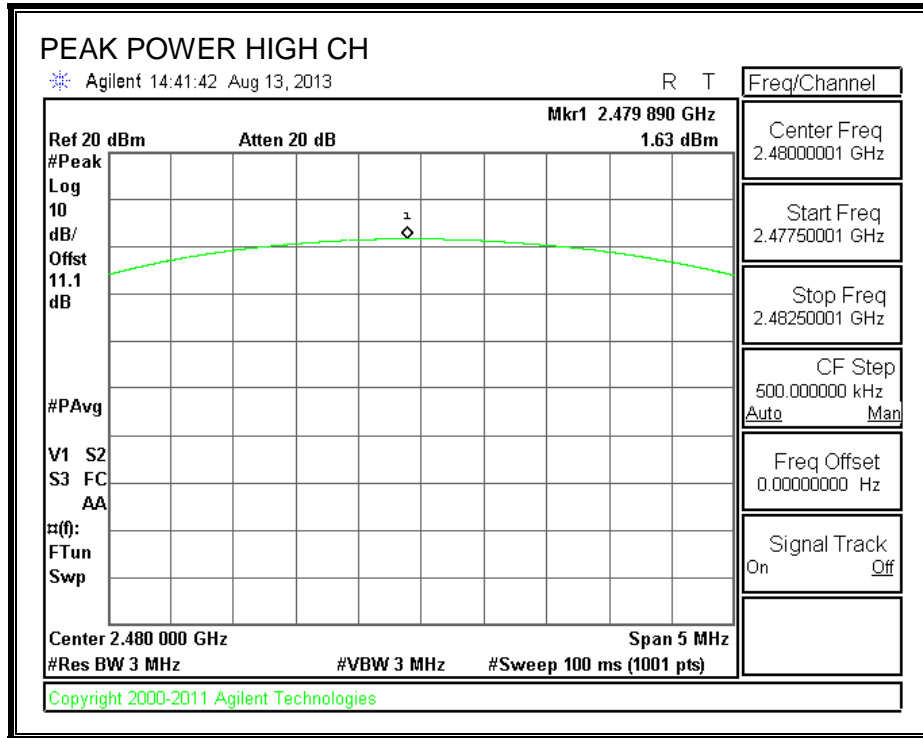
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.57	30	-28.43
Middle	2441	1.96	30	-28.04
High	2480	1.63	30	-28.37

OUTPUT POWER





7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1dB 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	-0.16
Middle	2441	-0.12
High	2480	-0.08

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

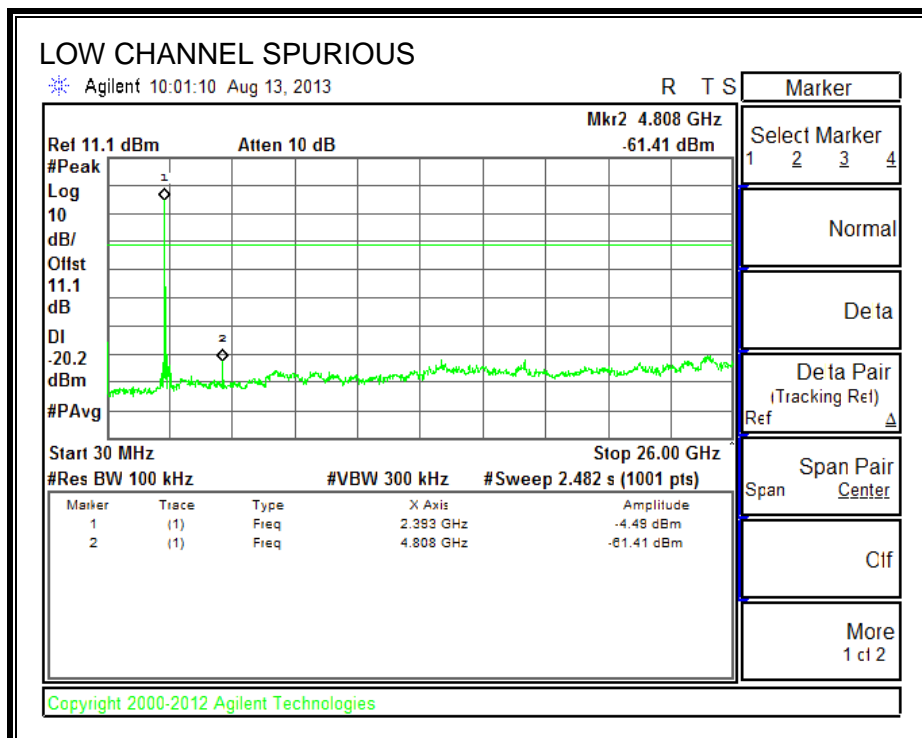
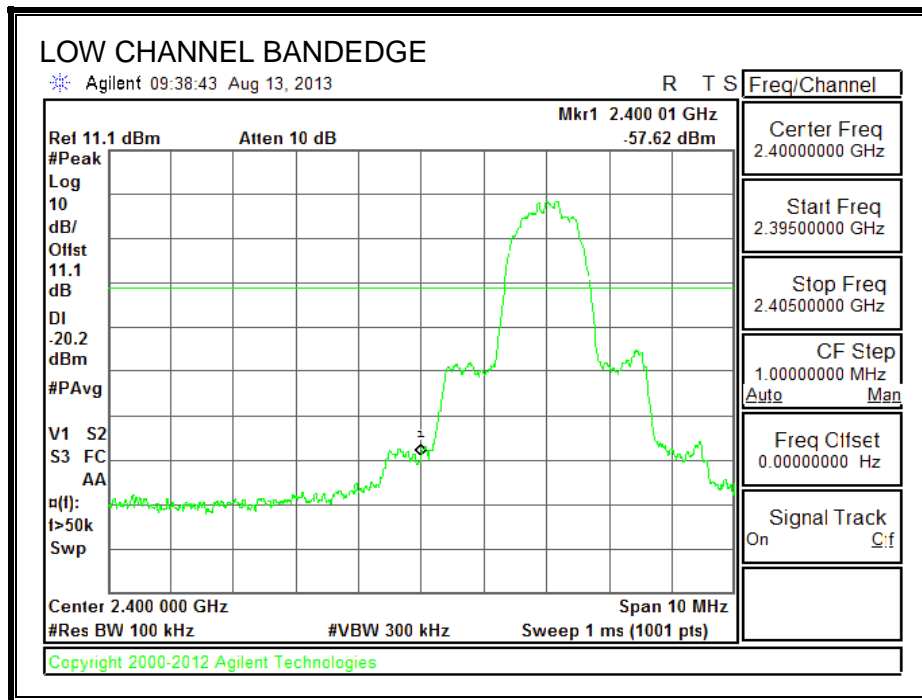
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

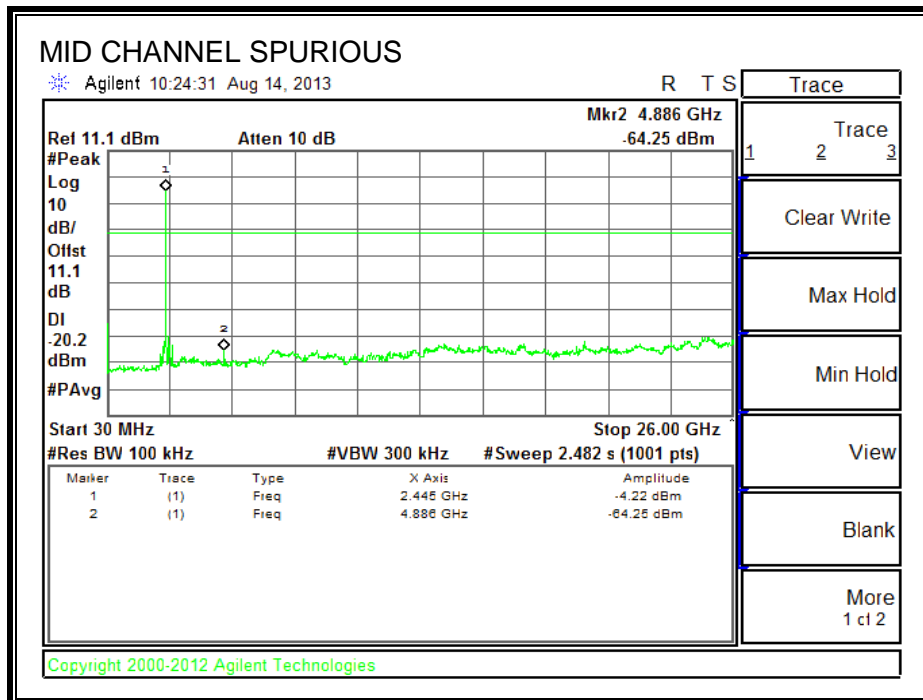
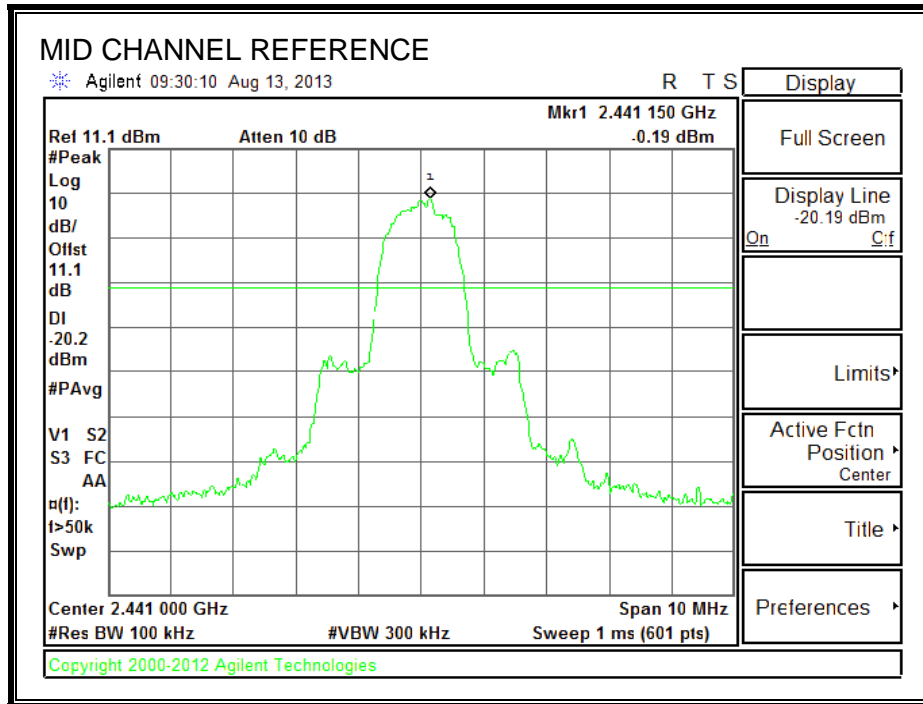
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

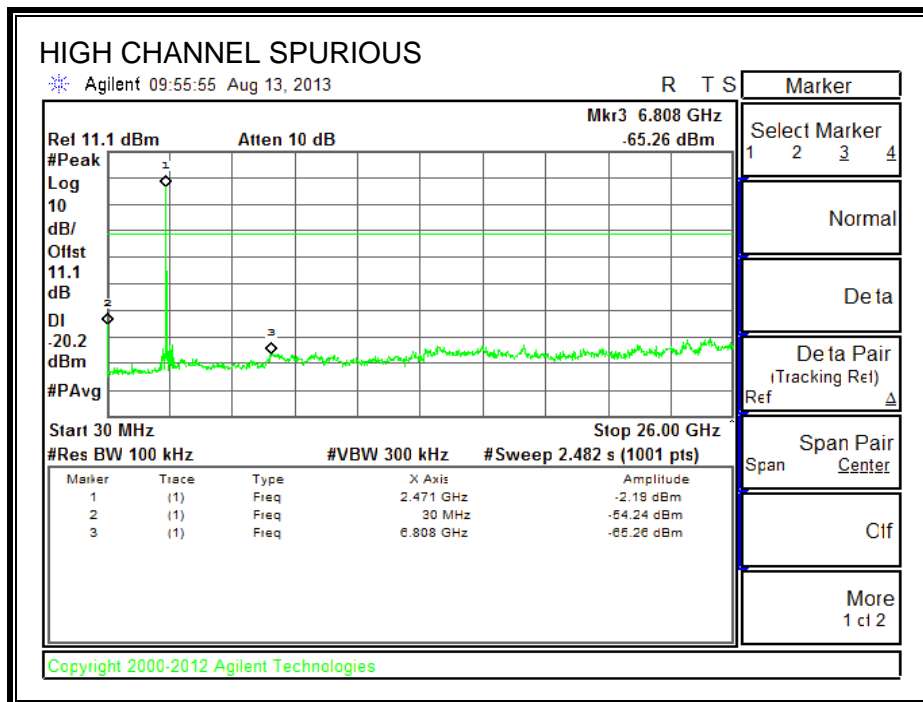
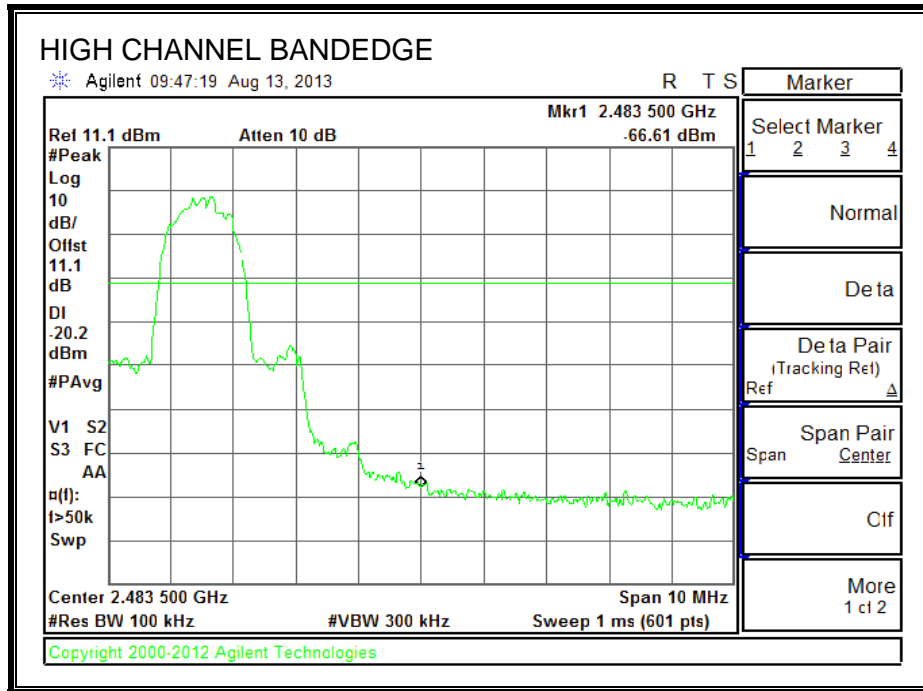
SPURIOUS EMISSIONS, LOW CHANNEL



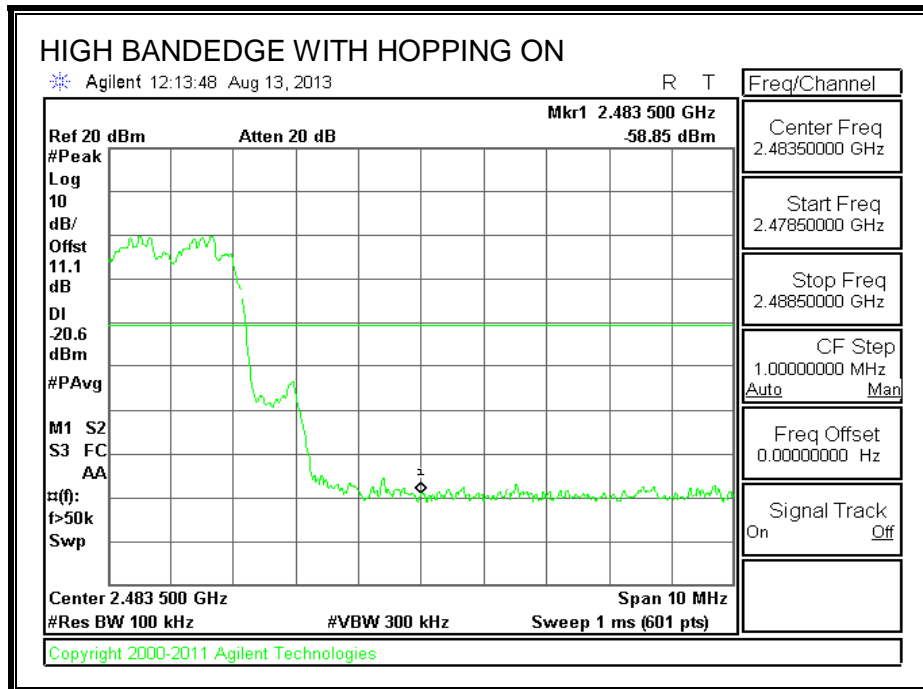
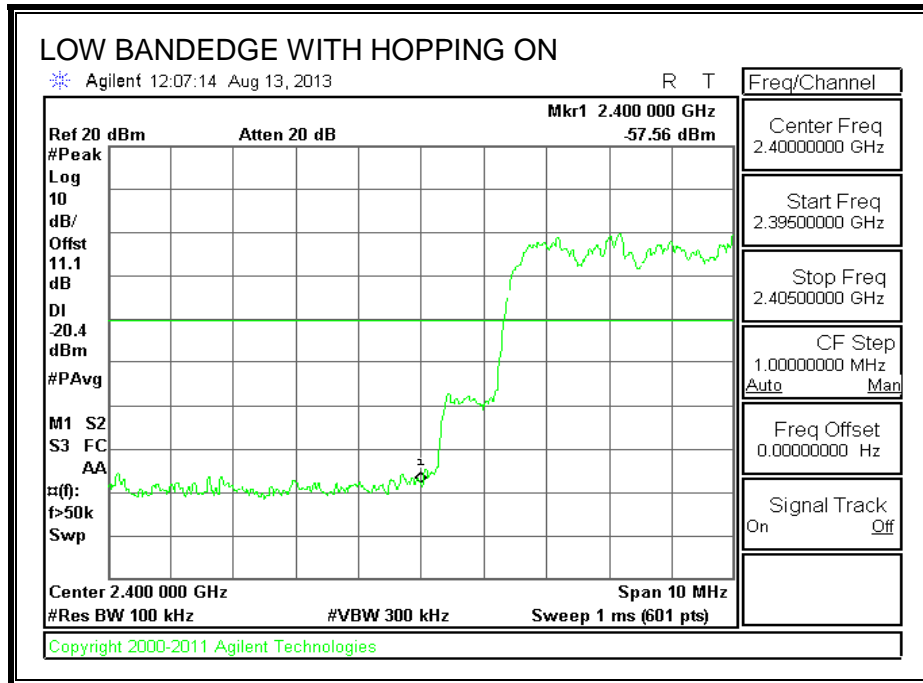
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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 3 MHz for peak measurements and 360 Hz for average measurements.

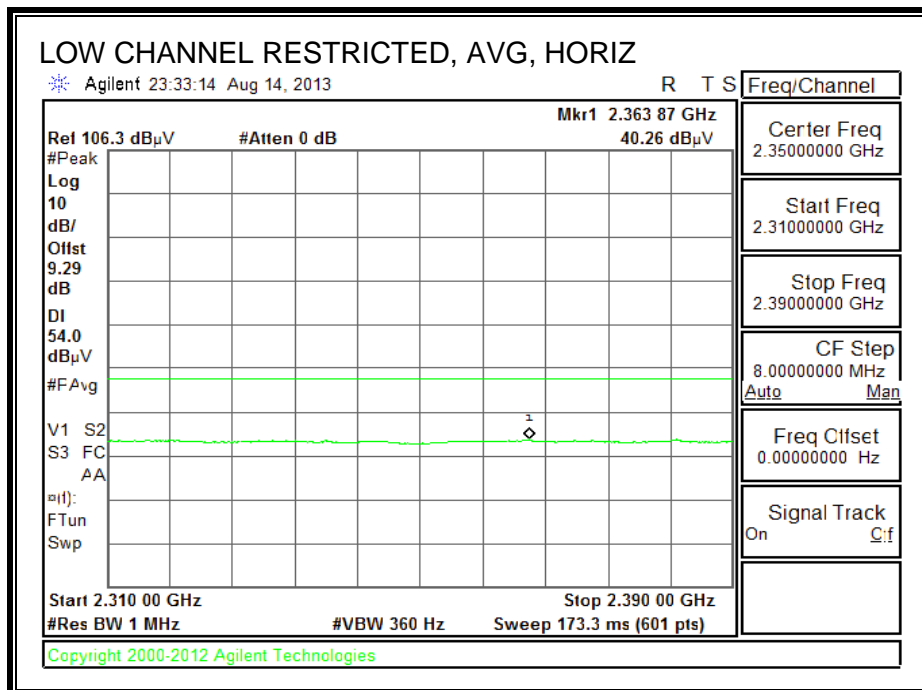
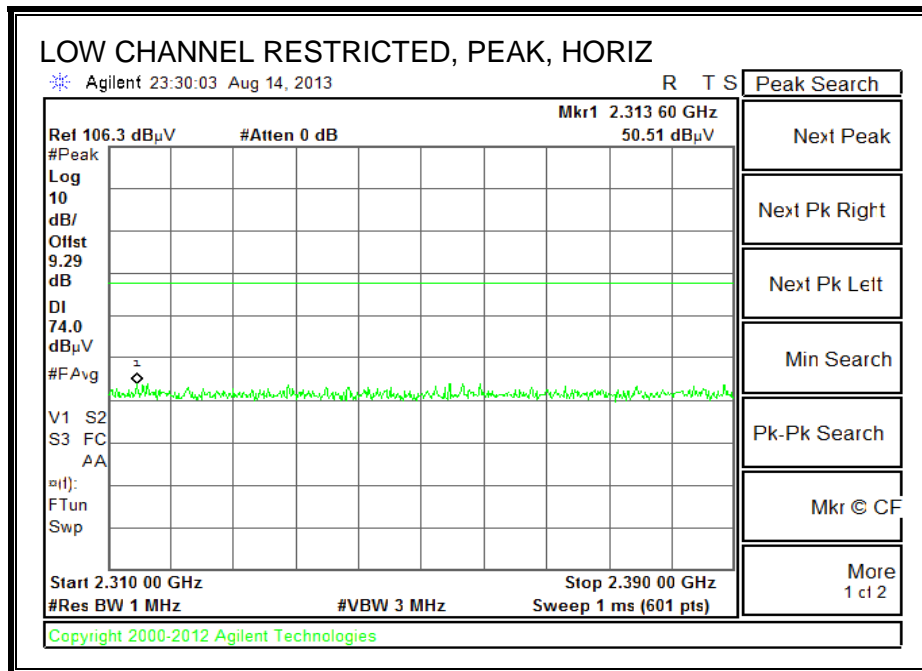
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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

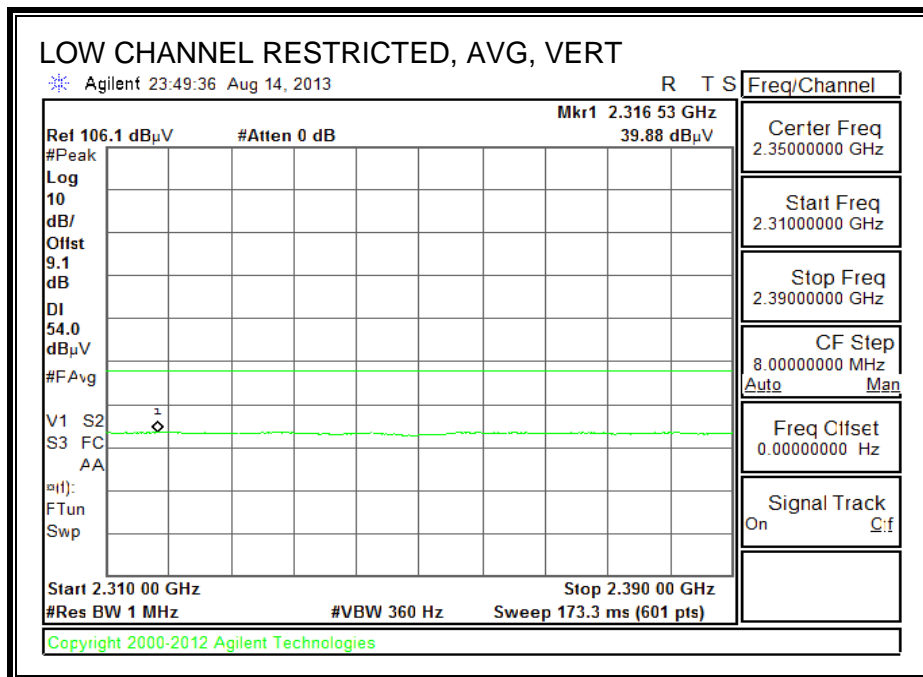
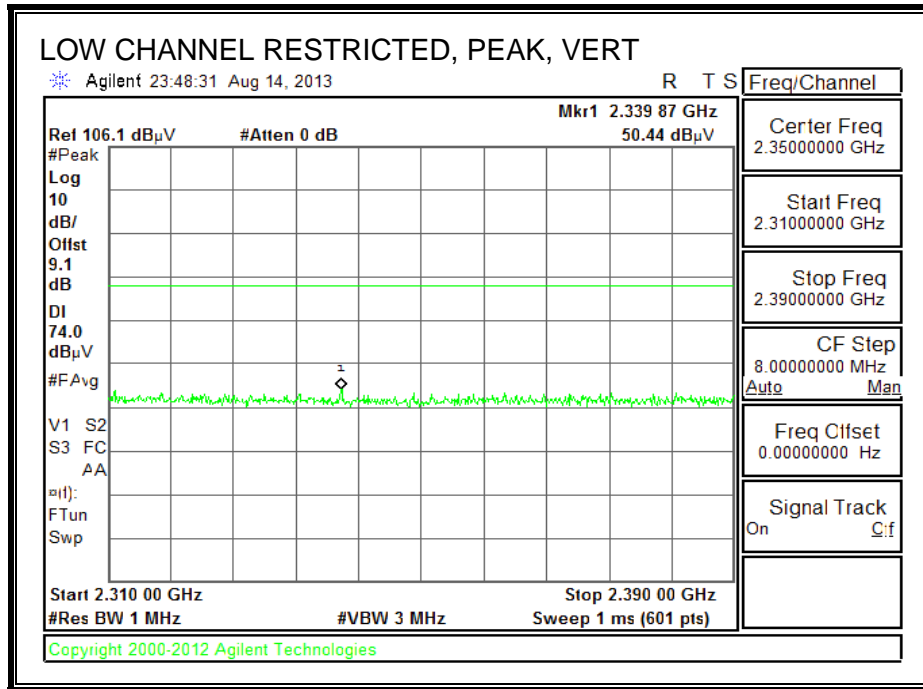
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

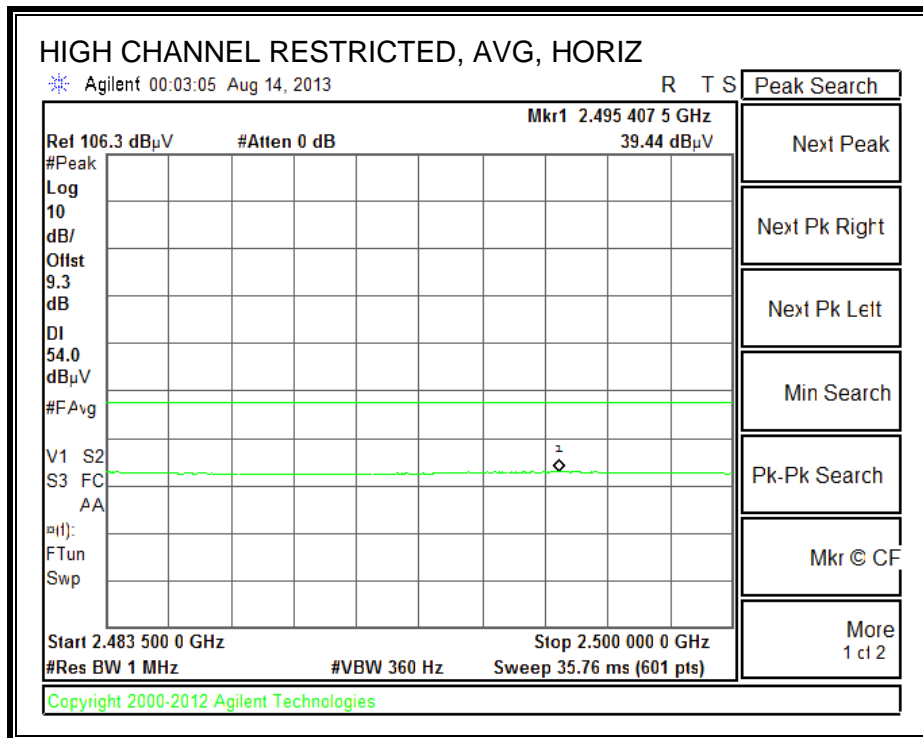
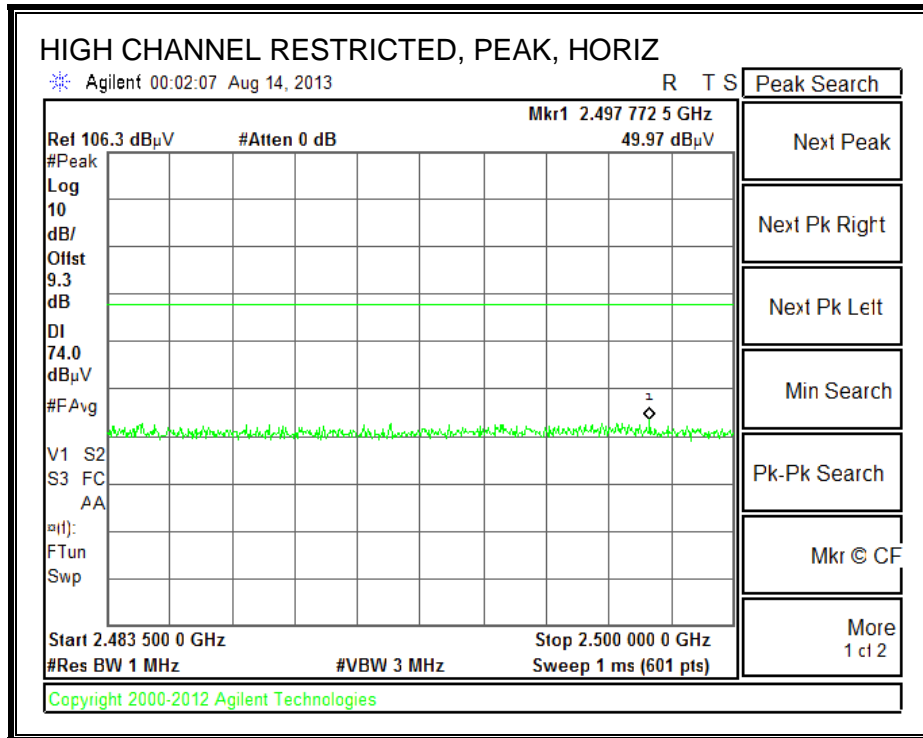
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



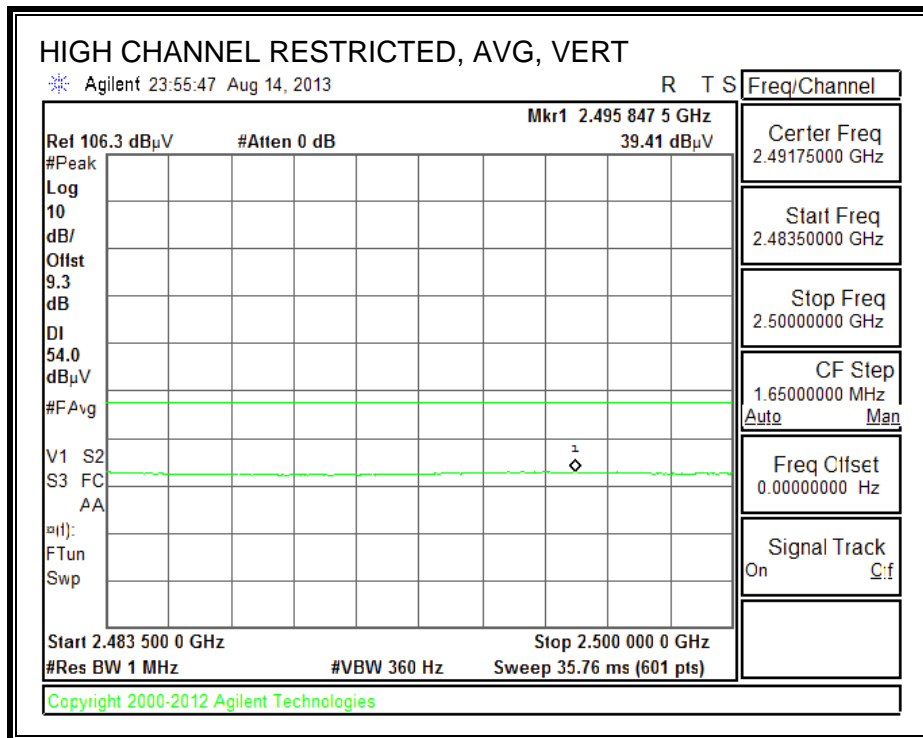
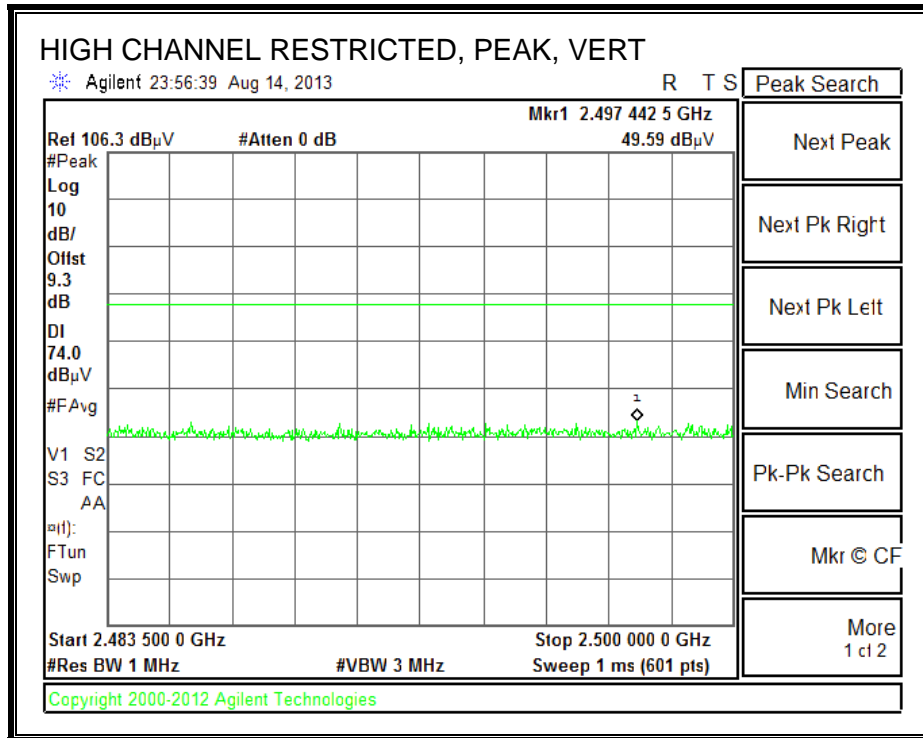
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

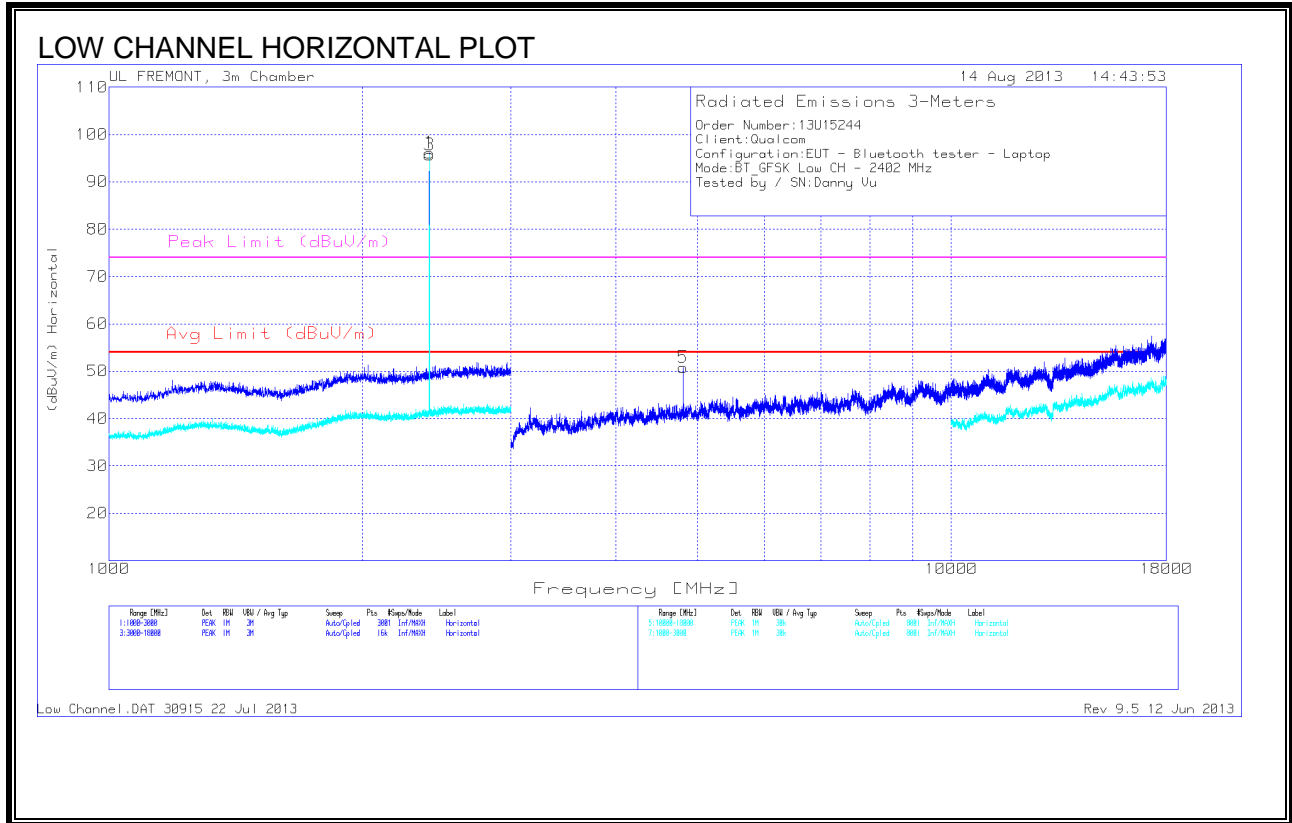


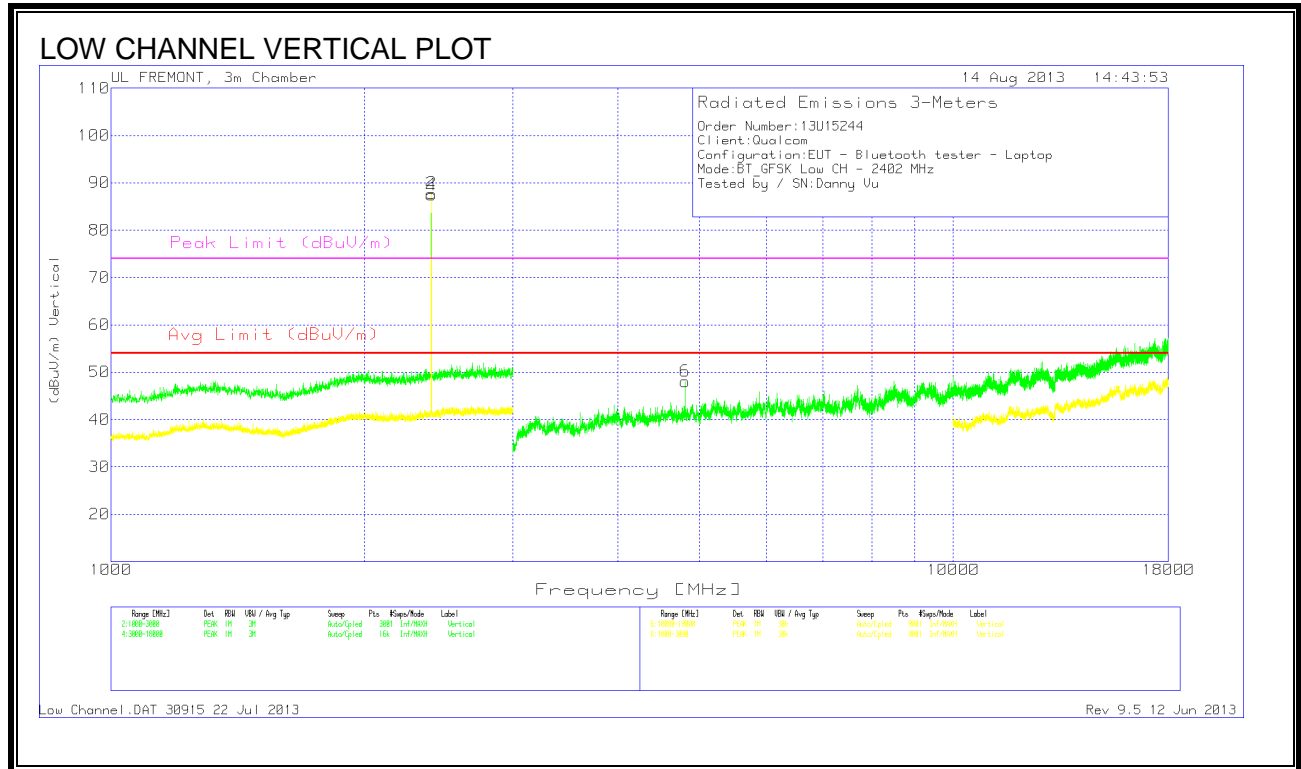
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL





LOW CHANNEL HORIZONTAL AND VERTICAL DATA

Marker	Frequency	Meter	Det	AF T136 (dB/m)	Amp/CbI/Flt r/Pad (dB)	Corrected	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
	(GHz)	Reading				Reading						
		(dBuV)										
*1,2,3,4	2.402	--	PK	--	--	--	--	--	--	--	200	Horz
5	4.804	44.15	PK	33.9	-27.3	50.75	53.97	-3.22	74	-23.25	100	Horz
6	4.804	41.44	PK	33.9	-27.3	48.04	53.97	-5.93	74	-25.96	100	Vert

*: Fundamental

PK - Peak detector

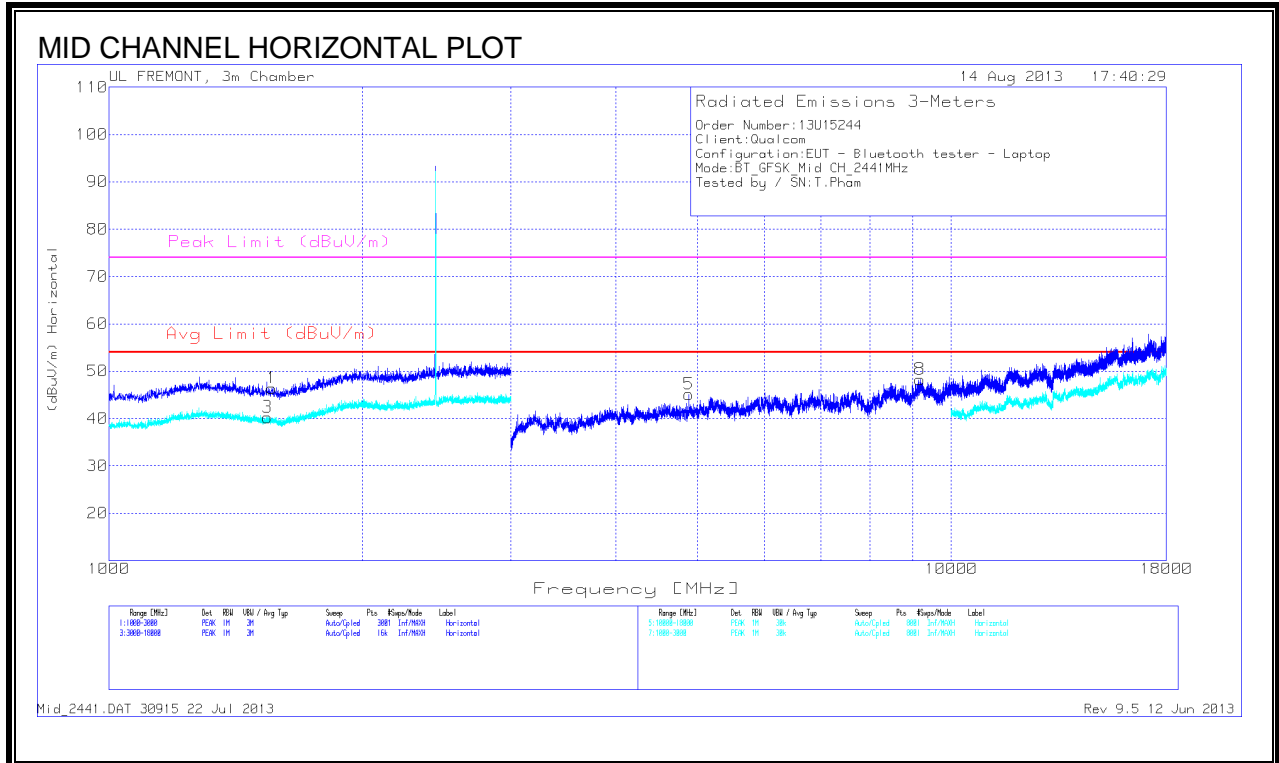
Frequency	Meter	Det	AF T136 (dB/m)	Amp/CbI/Flt r/Pad (dB)	Corrected	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
(GHz)	Reading				Reading							
		(dBuV)										
4.812	37.59	VB1	34	-27.9	43.69	53.97	-10.28	74	-30.33	256	356	H
4.822	29.67	VB1	34	-27.9	35.77	53.97	-18.2	74	-28.23	312	107	V

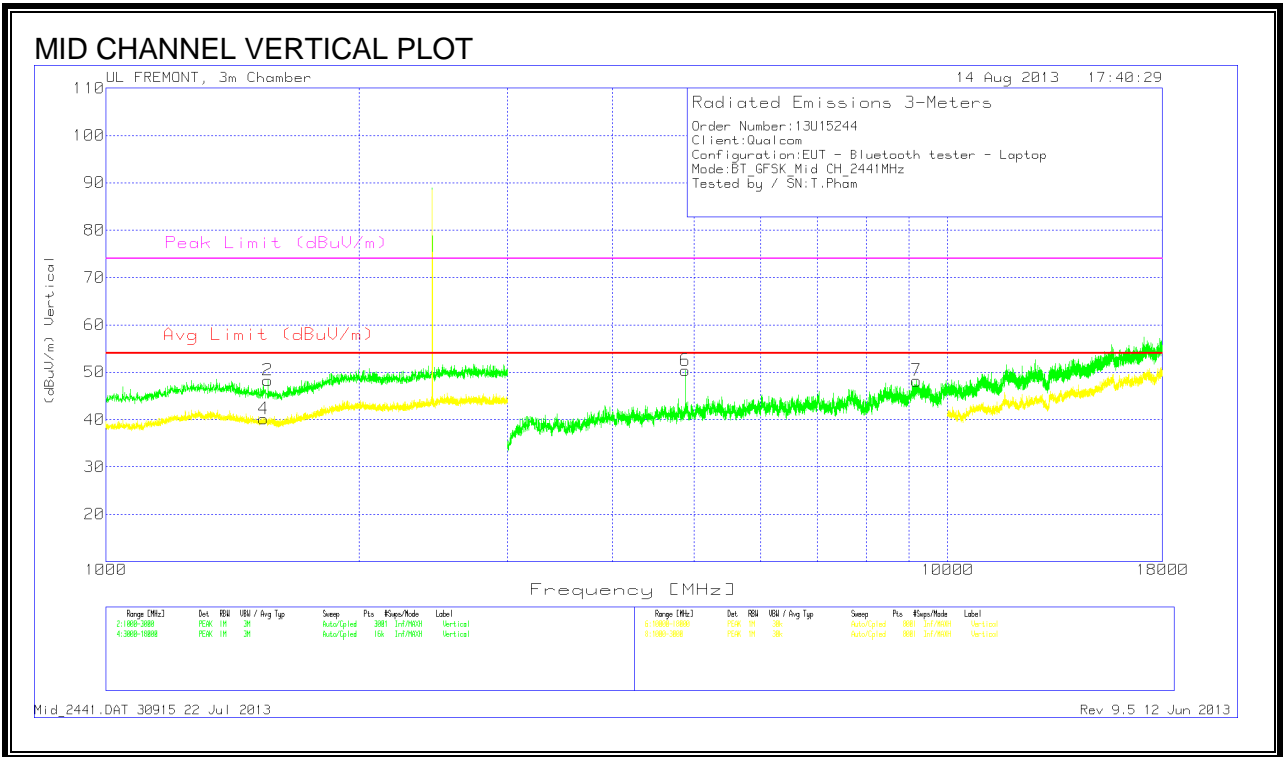
VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

Low Channel.DAT 30915 22 Jul 2013 Rev 9.5 12 Jun 2013

Note: No emissions found above noise floor from 18 – 26GHz.

MID CHANNEL





MID CHANNEL HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.56	42.12	PK	28.5	-24.2	46.42	53.97	-7.55	74	-27.58	0-360	100	H
1.557	43.88	PK	28.6	-24.2	48.28	53.97	-5.69	74	-25.72	0-360	200	V
4.882	38.12	PK	34	-27	45.12	53.97	-8.85	74	-28.88	0-360	200	H
9.181	35.14	PK	36.1	-23	48.24	53.97	-5.73	74	-25.76	0-360	100	H
4.881	43.45	PK	34	-27.1	50.35	53.97	-3.62	74	-23.65	0-360	200	V
9.187	35.01	PK	36.1	-22.9	48.21	53.97	-5.76	74	-25.79	0-360	100	V
1.543	35.84	PK	28.6	-24.2	40.24	53.97	-13.73	74	-33.76	0-360	100	H
1.539	35.63	PK	28.7	-24.2	40.13	53.97	-13.84	74	-33.87	0-360	100	V

PK - Peak detector

Radiated Emissions

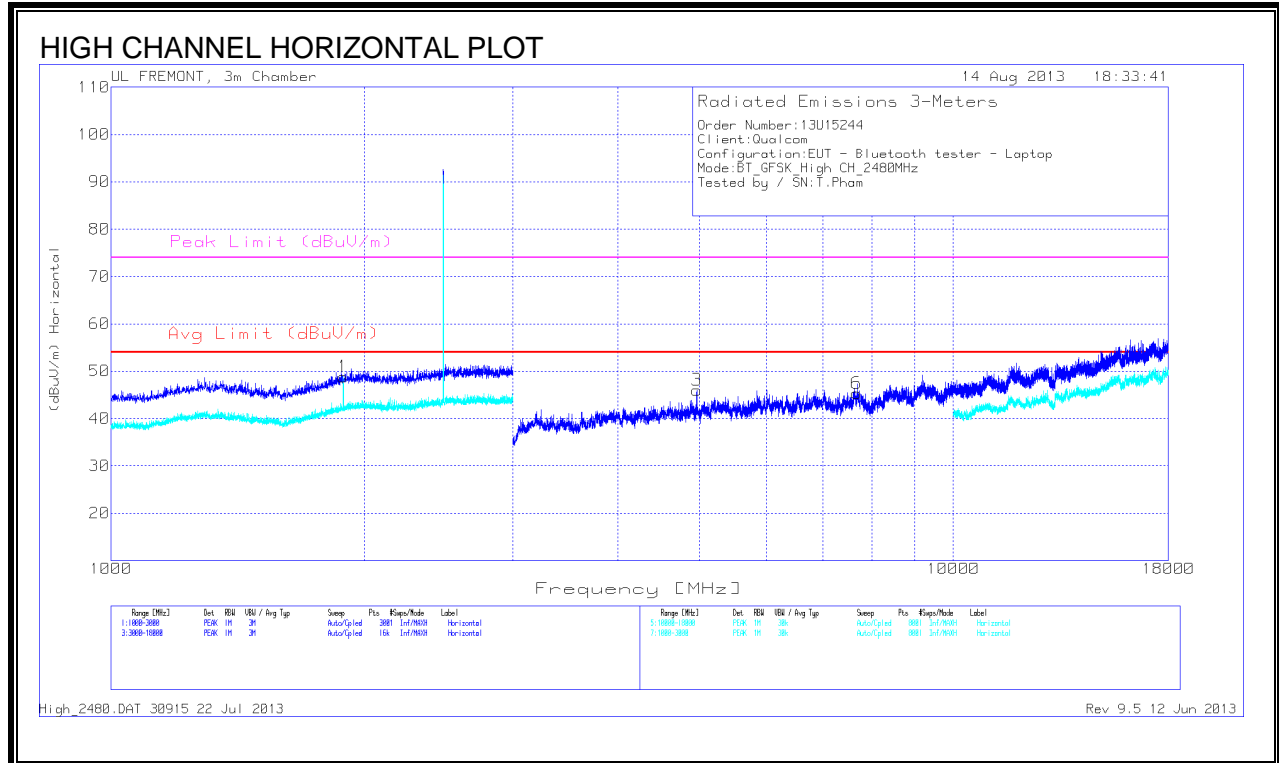
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.552	31.41	VB1	28.6	-24.3	35.71	53.97	-18.26	74	-38.29	329	400	V
9.181	24.3	VB1	36.1	-23	37.4	53.97	-16.57	74	-36.6	123	339	H
4.867	27.46	VB1	34	-27.9	33.56	53.97	-20.41	74	-40.44	256	356	V
9.181	24.27	VB1	36.1	-23	37.37	53.97	-16.6	74	-36.63	312	107	V

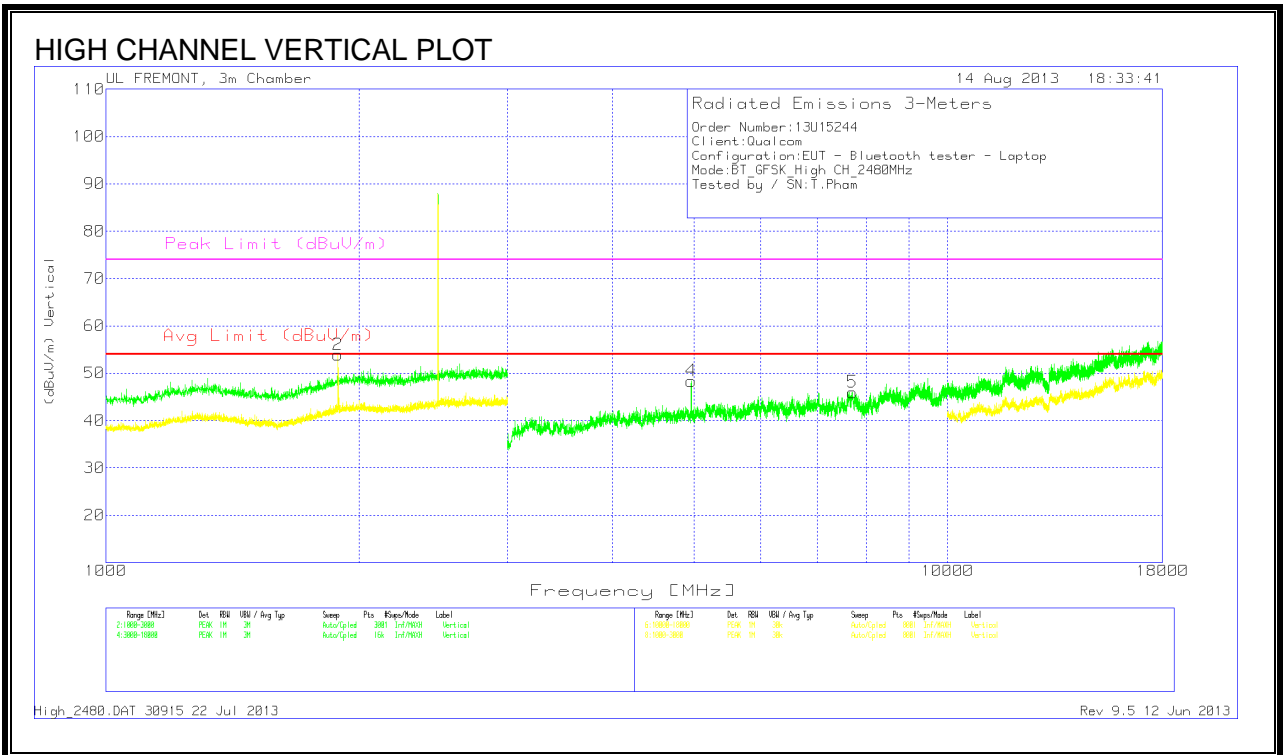
VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 22 Jul 2013 Rev 9.5 12 Jun 2013

Note: No emissions found above noise floor from 18 – 26GHz.

HIGH CHANNEL





HIGH CHANNEL HORIZONTAL AND VERTICAL DATA

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.96	39.57	PK	33.9	-27.5	45.97	53.97	-8	74	-28.03	0-360	100	H
7.68	34.91	PK	35.5	-25.1	45.31	53.97	-8.66	74	-28.69	0-360	100	H
4.96	41.94	PK	33.9	-27.5	48.34	53.97	-5.63	74	-25.66	0-360	200	V
7.713	35.45	PK	35.5	-25	45.95	53.97	-8.02	74	-28.05	0-360	100	V
1.887	41.18	PK	31.5	-23.9	48.78	53.97	-5.19	74	-25.22	0-360	200	H
1.886	46.3	PK	31.5	-23.9	53.9	53.97	-0.07	74	-20.1	0-360	100	V

PK - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.876	31.11	VB1	31.4	-23.8	38.71	53.97	-15.26	74	-35.29	277	394	H
1.879	31.07	VB1	31.4	-23.8	38.67	53.97	-15.3	74	-35.33	160	311	V
4.96	33.32	VB1	33.9	-27.5	39.72	53.97	-14.25	74	-34.28	55	158	V

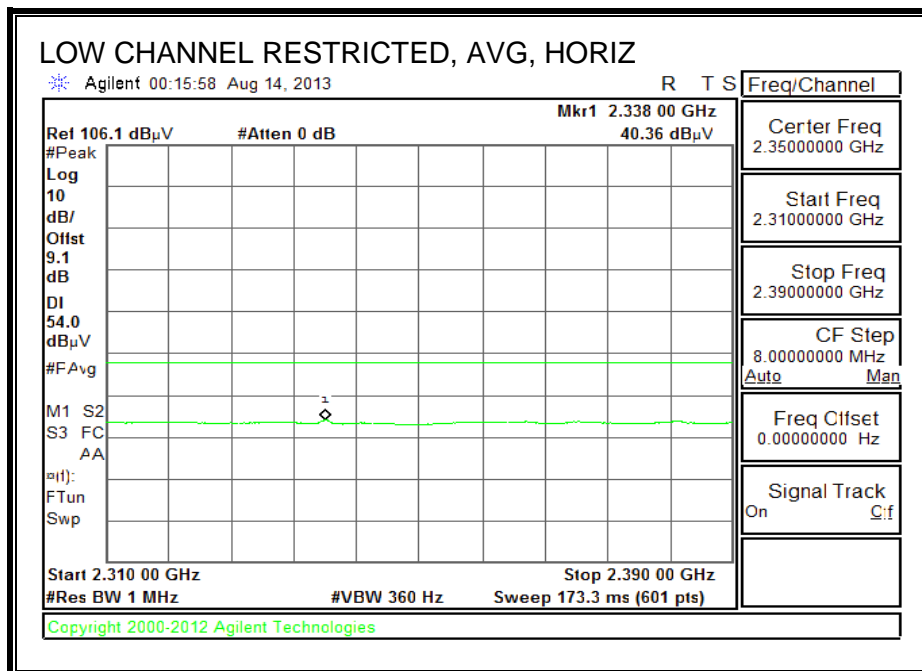
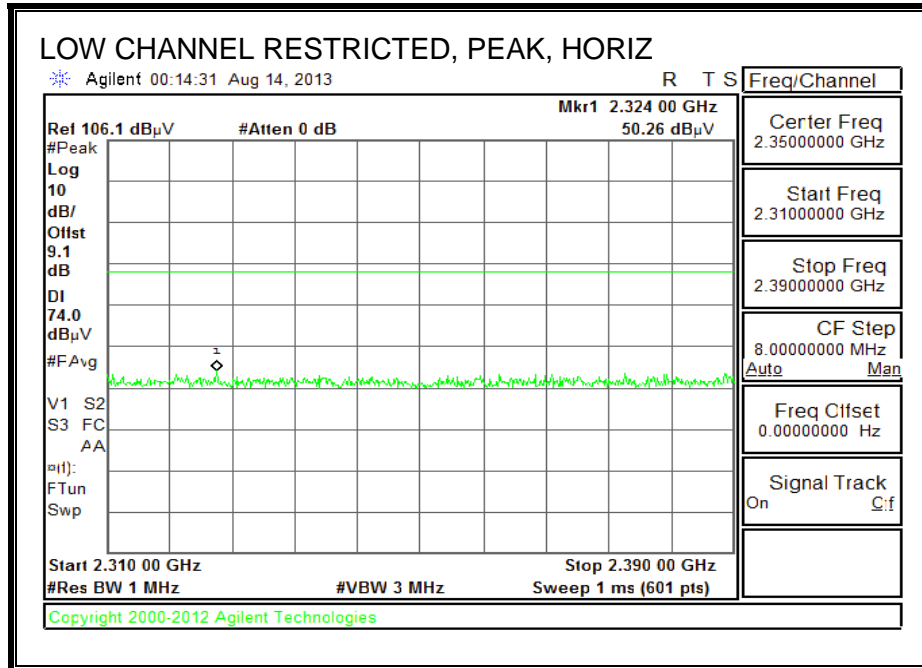
VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 22 Jul 2013 Rev 9.5 12 Jun 2013

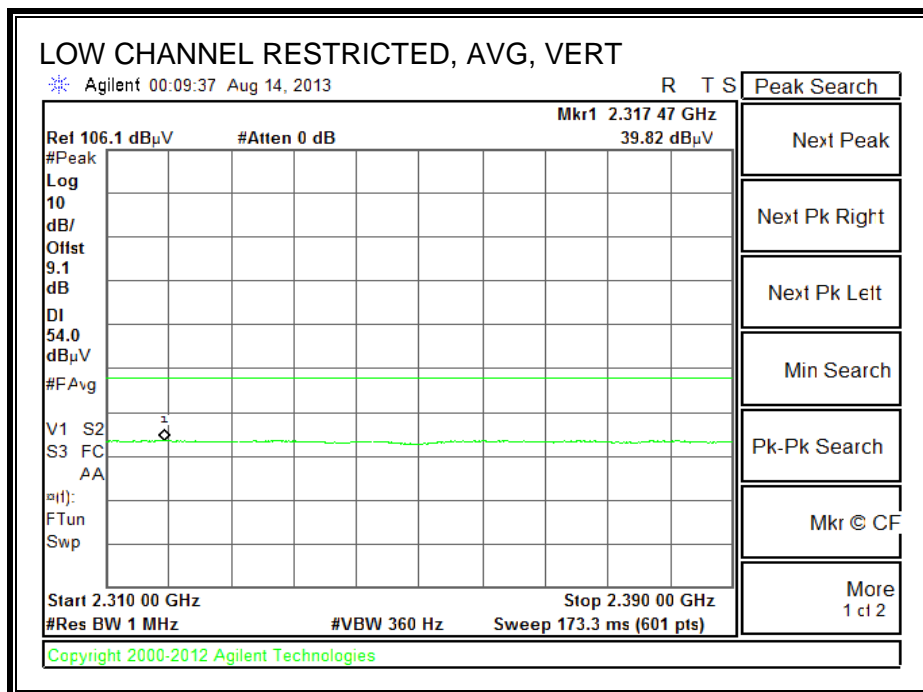
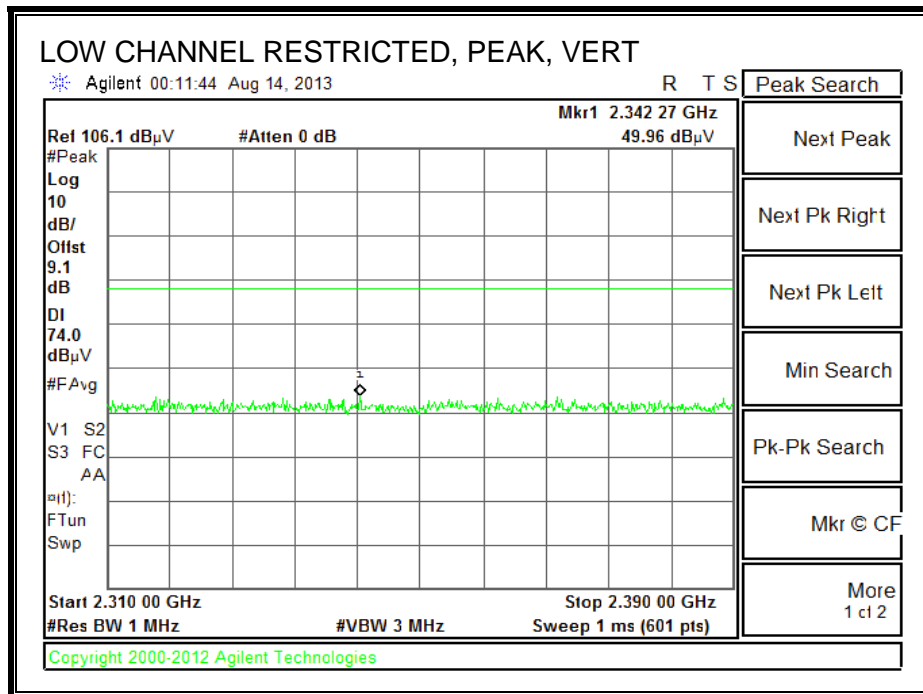
Note: No emissions found above noise floor from 18 – 26GHz.

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

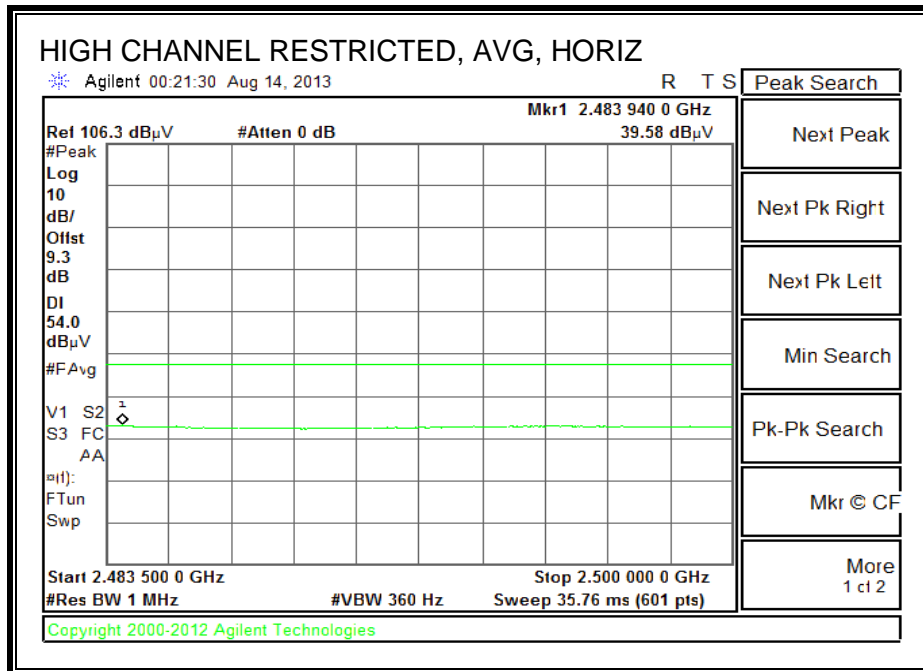
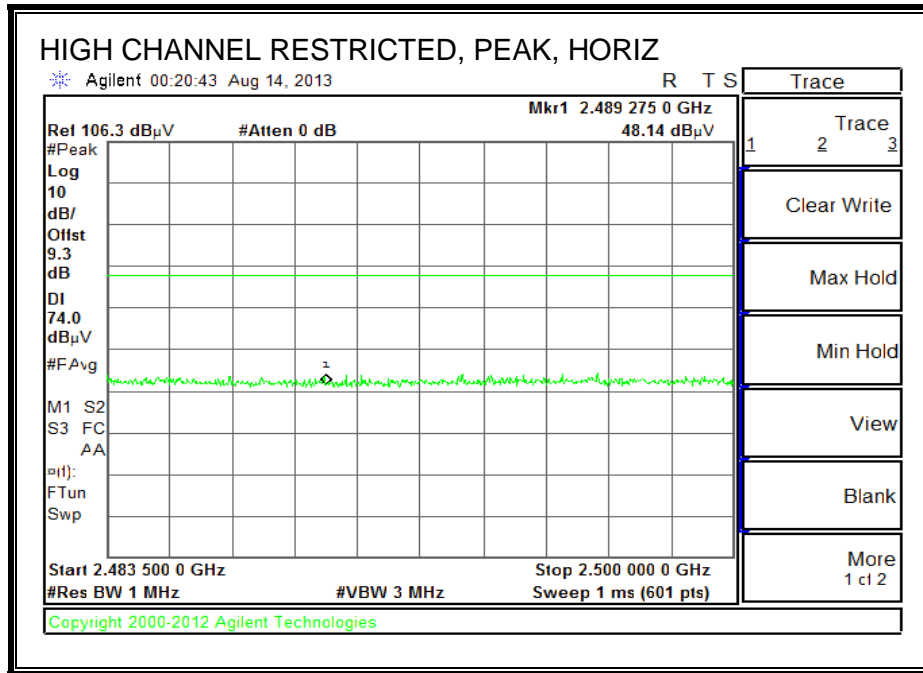
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



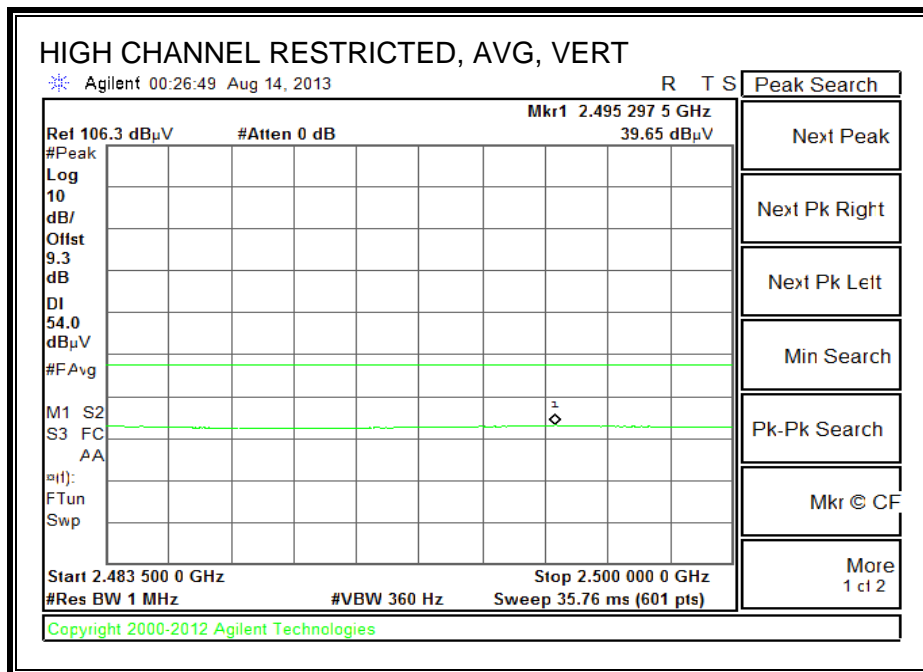
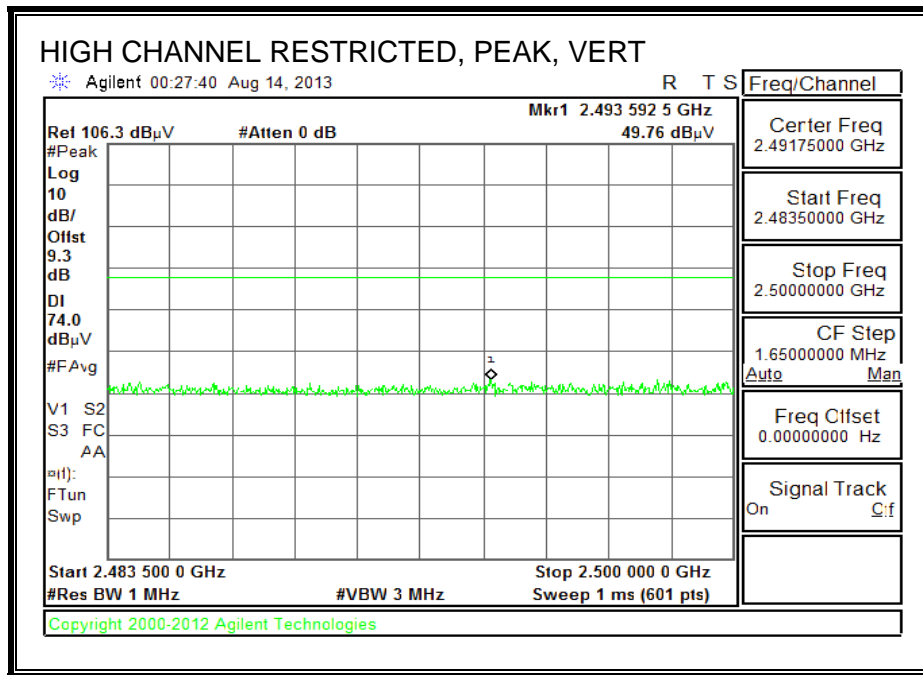
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



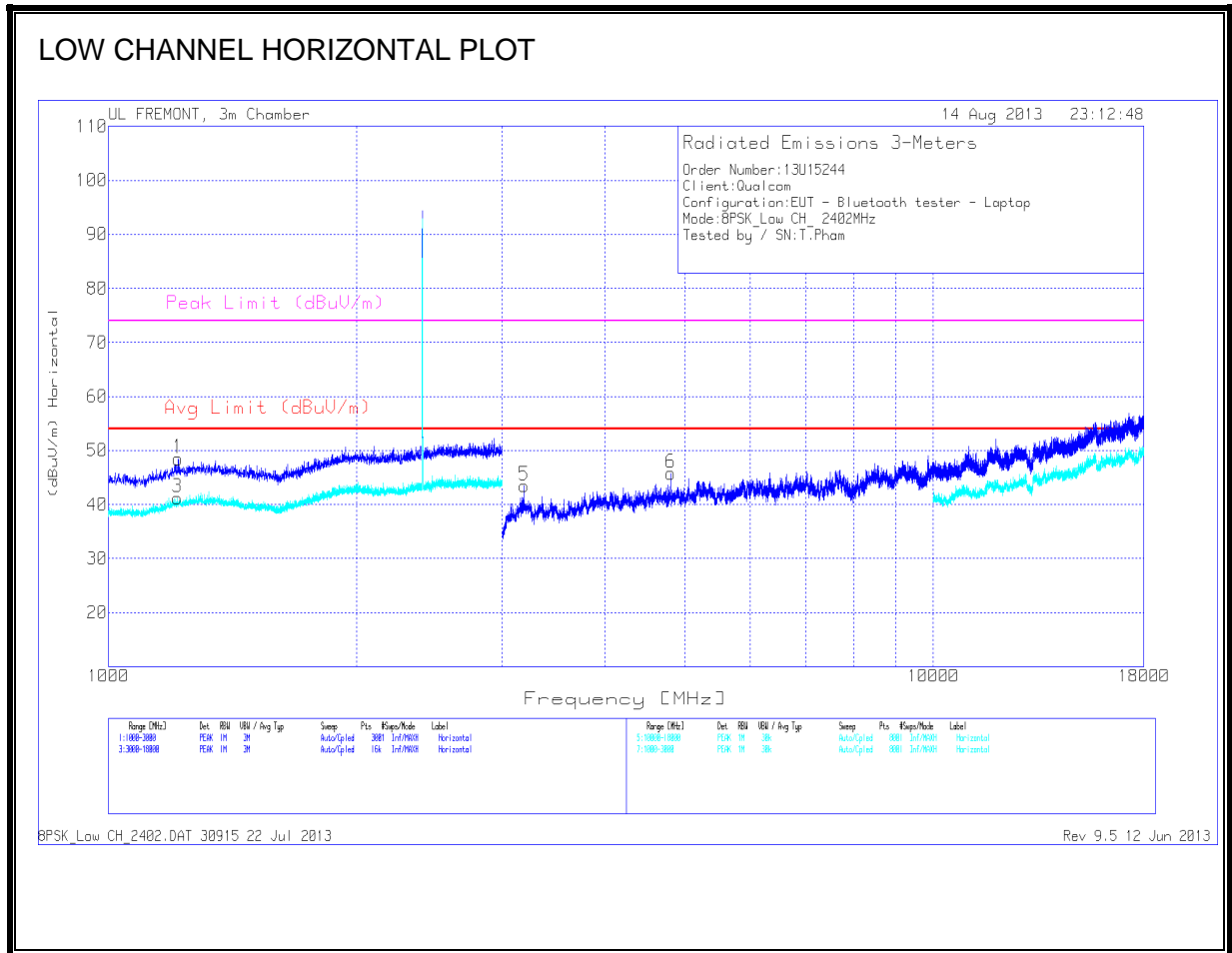
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

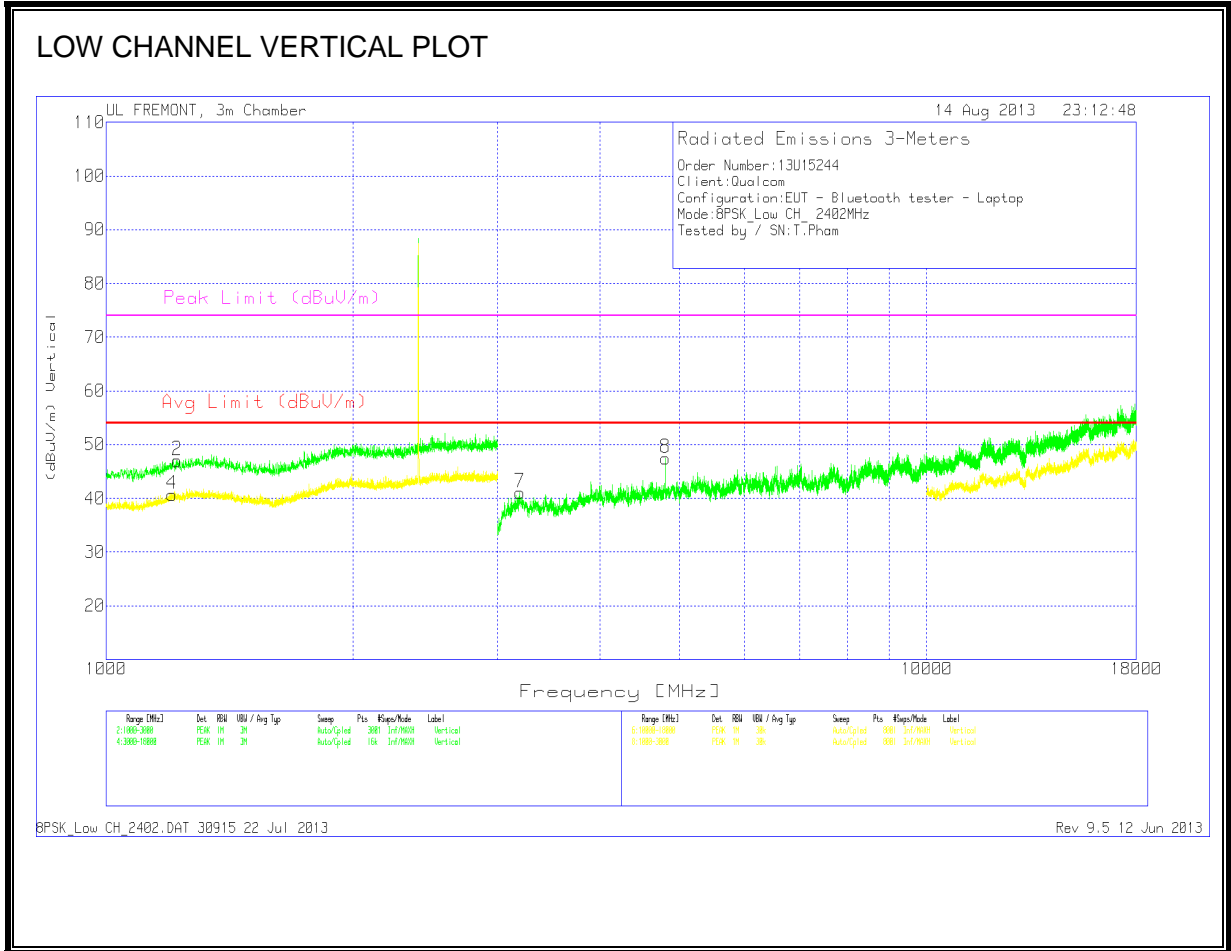


RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS
LOW CHANNEL





LOW CHANNEL HORIZONTAL AND VERTICAL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Fitter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1215	44.18	PK	29.6	-25.3	48.48	53.97	-5.49	74	-25.52	0-360	100	H
1221	42.62	PK	29.7	-25.3	47.02	53.97	-6.95	74	-26.98	0-360	200	V
3.92	40.96	PK	33.5	-31	43.46	53.97	-10.51	74	-30.54	0-360	200	H
4.804	39.19	PK	33.9	-27.3	45.79	53.97	-8.18	74	-28.21	0-360	100	H
3.93	38.58	PK	33.5	-31	41.08	53.97	-12.89	74	-32.92	0-360	100	V
4.804	40.84	PK	33.9	-27.3	47.44	53.97	-6.53	74	-26.56	0-360	200	V
1212	36.94	PK	29.6	-25.3	41.24	53.97	-12.73	74	-32.76	0-360	200	H
1203	36.53	PK	29.5	-25.3	40.73	53.97	-13.24	74	-33.27	0-360	200	V

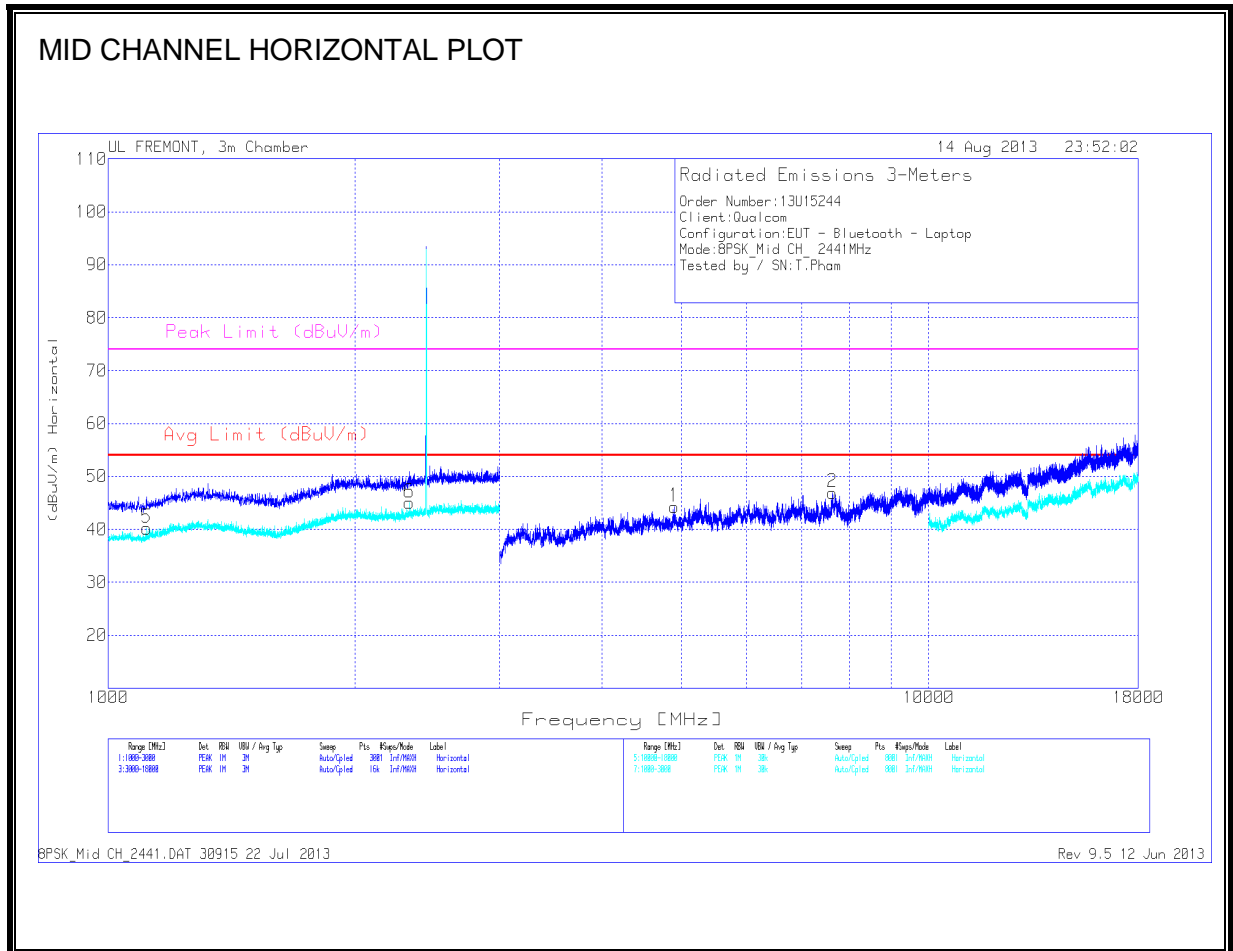
PK - Peak detector
 Radiated Emissions

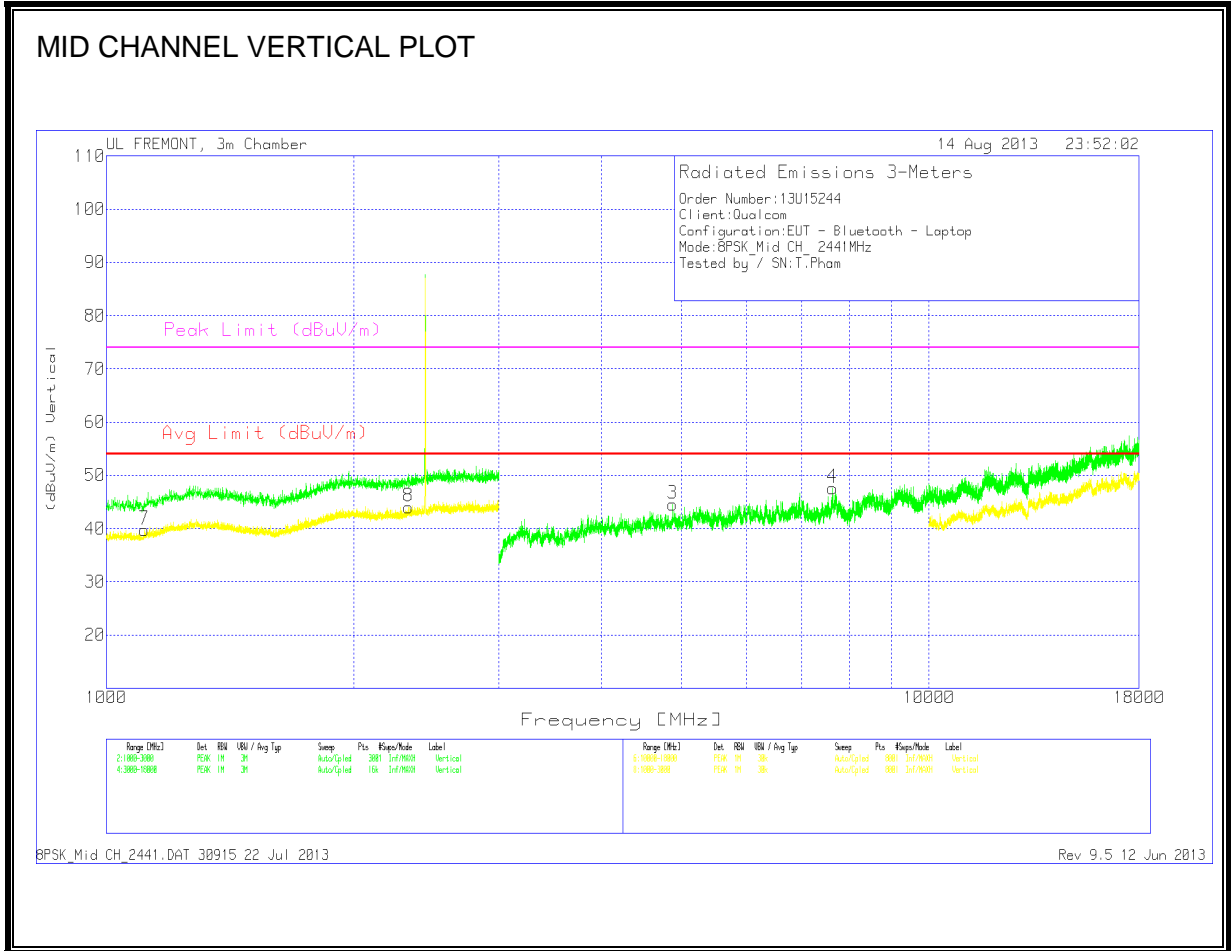
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Fitter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1206	32.23	VB1	29.5	-25.3	36.43	53.97	-17.54	74	-37.57	262	260	H

VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video
 FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 22 Jul 2013 Rev 9.5

Note: No emissions found above noise floor from 18 – 26GHz.

MID CHANNEL





MID CHANNEL HORIZONTAL AND VERTICAL DATA

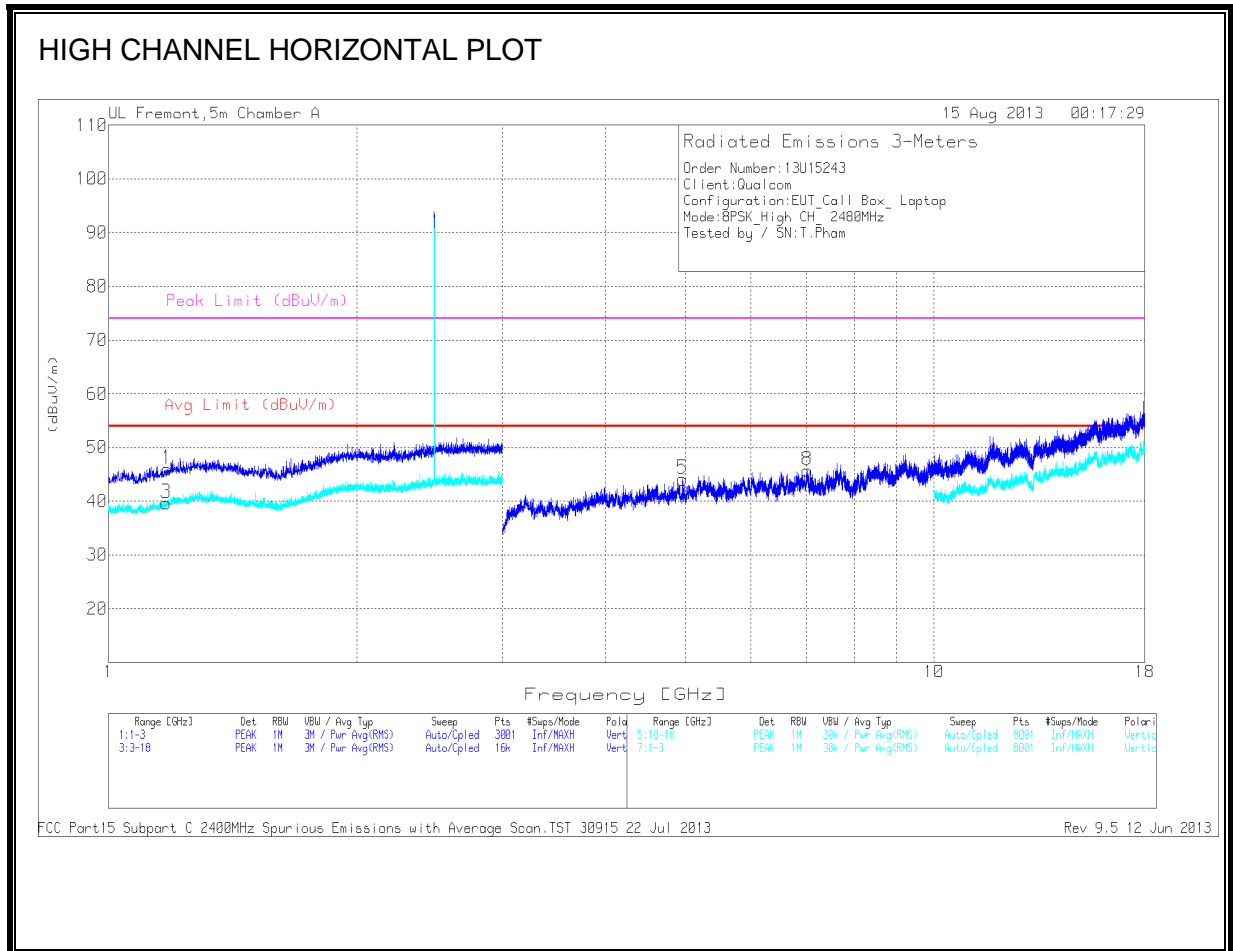
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filter/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4.897	36.95	PK	34	-26.7	44.25	53.97	-9.72	74	-29.75	0-360	200	H
7.632	36.57	PK	35.5	-25.1	46.97	53.97	-7	74	-27.03	0-360	200	H
4.882	37.57	PK	34	-27	44.57	53.97	-9.4	74	-29.43	0-360	200	V
7.636	37.21	PK	35.5	-25.1	47.61	53.97	-6.36	74	-26.39	0-360	200	V
1.115	37.42	PK	28.1	-25.3	40.22	53.97	-13.75	74	-33.78	0-360	100	H
2.328	36.04	PK	317	-22.7	45.04	53.97	-8.93	74	-28.96	0-360	200	H
1.113	37.02	PK	28.1	-25.4	39.72	53.97	-14.25	74	-34.28	0-360	100	V
2.331	35.05	PK	318	-22.8	44.05	53.97	-9.92	74	-29.95	0-360	200	V

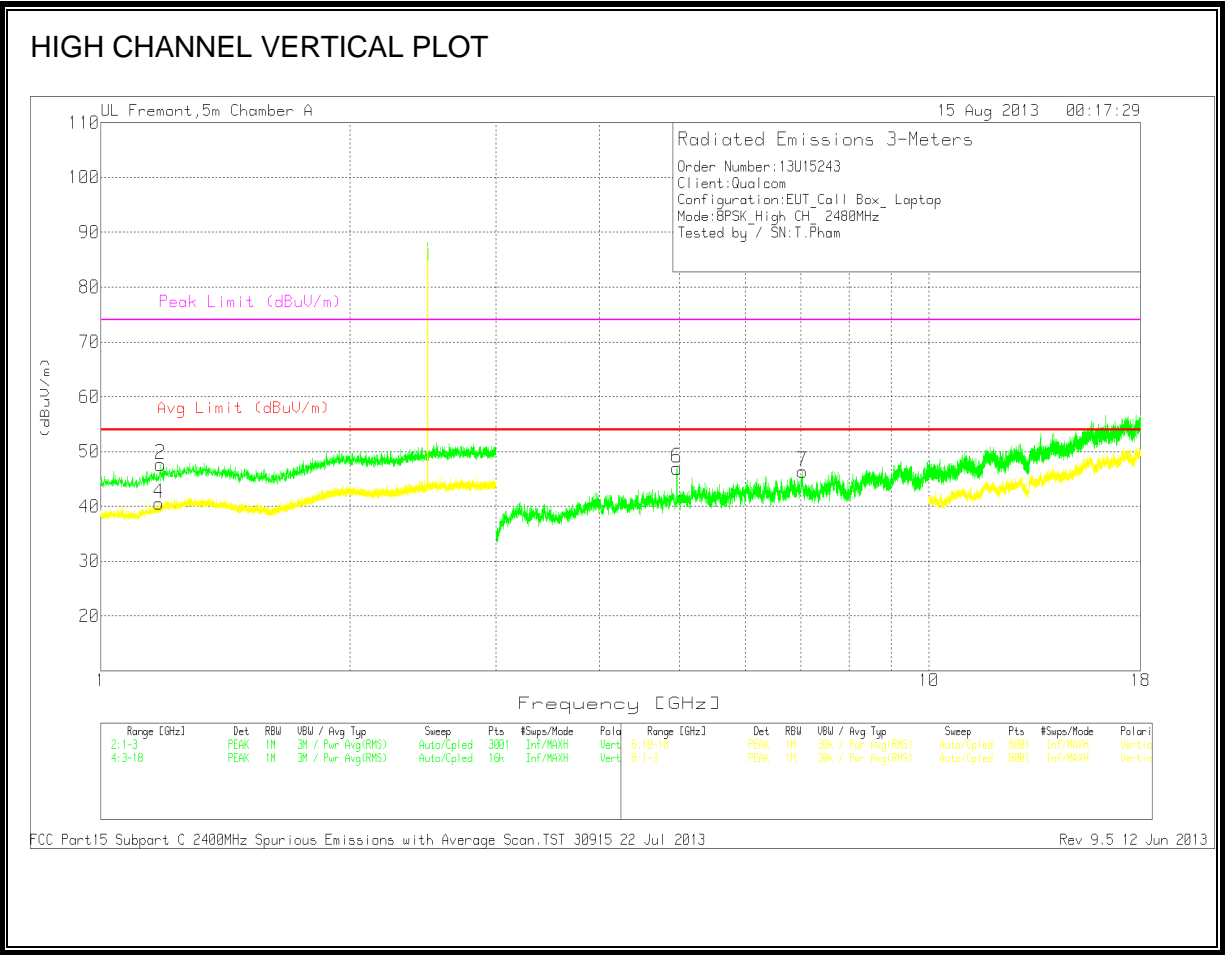
PK - Peak detector

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Note: No emissions found above noise floor from 18 – 26GHz.

HIGH CHANNEL





HIGH CHANNEL HORIZONTAL AND VERTICAL DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1.78	42.09	PK	29.1	-25.2	45.99	53.97	-7.98	74	-28.01	0-360	200	H
1.8	43.66	PK	29.2	-25.2	47.66	53.97	-6.31	74	-26.34	0-360	200	V
4.959	37.7	PK	33.9	-27.5	44.1	53.97	-9.87	74	-29.9	0-360	100	H
7.023	35.24	PK	35.4	-24.9	45.74	53.97	-8.23	74	-28.26	0-360	200	H
4.96	40.61	PK	33.9	-27.5	47.01	53.97	-6.96	74	-26.99	0-360	100	V
7.035	36.22	PK	35.4	-25.2	46.42	53.97	-7.55	74	-27.58	0-360	200	V
1.75	35.85	PK	29.1	-25.3	39.65	53.97	-14.32	74	-34.35	0-360	100	H
1.75	36.76	PK	29.1	-25.3	40.56	53.97	-13.41	74	-33.44	0-360	100	V

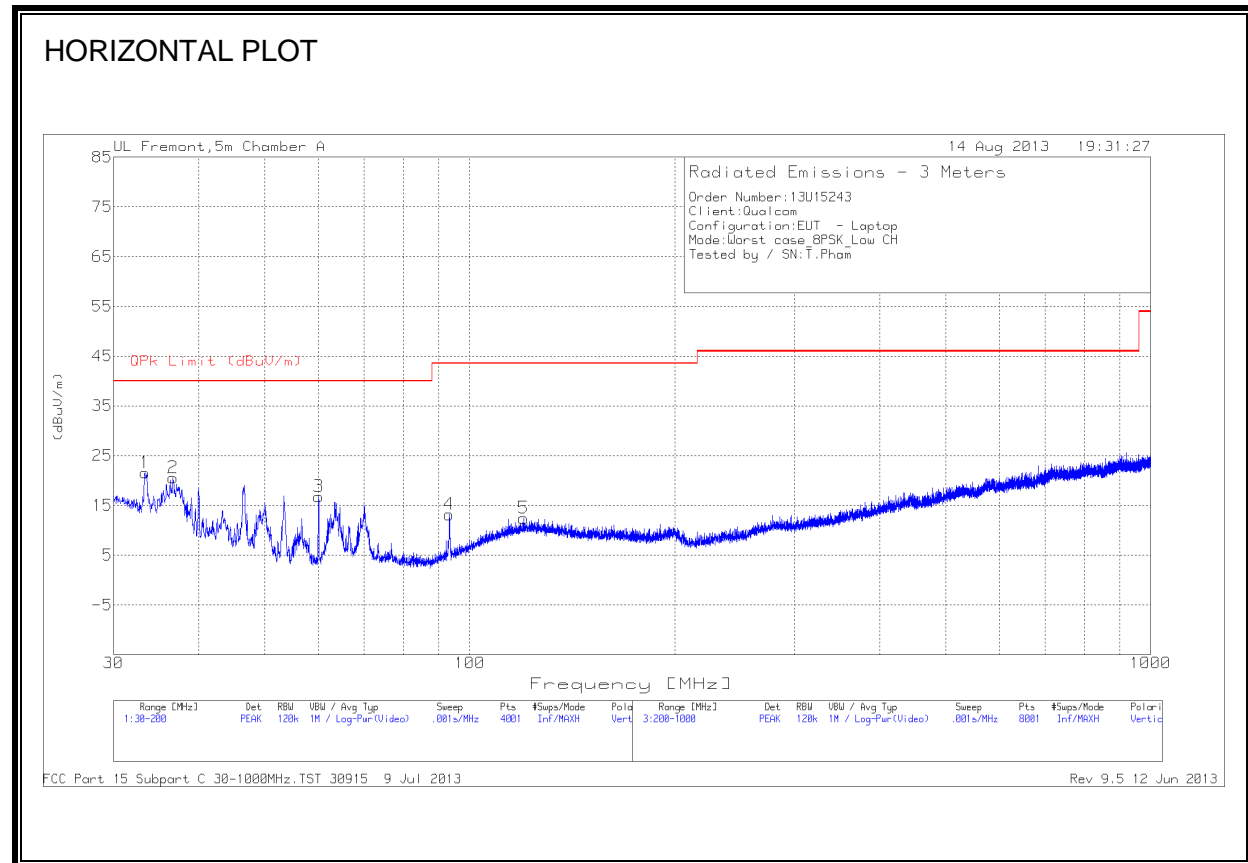
PK - Peak detector

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 22 Jul 2013 Rev 9.5 12 Jun 2013

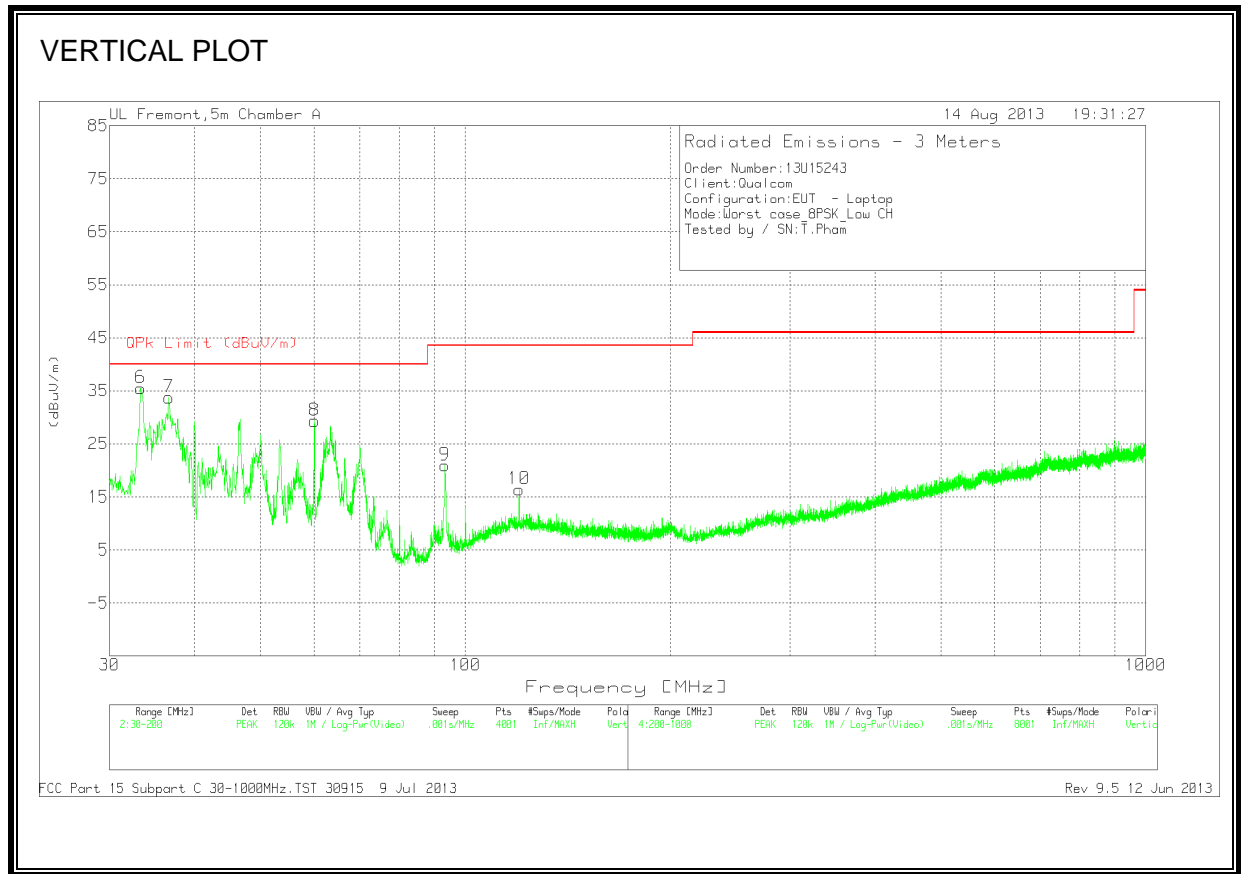
Note: No emissions found above noise floor from 18 – 26GHz.

8.3. WORST-CASE BELOW 1 GHz

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



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



HORIZONTAL AND VERTICAL DATA

Frequency (M Hz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
33.3575	30.66	PK	18.5	-27.6	21.56	40	-18.44	0-360	400	H
36.6725	31.97	PK	16.1	-27.5	20.57	40	-19.43	0-360	300	H
60.005	36.76	PK	7.3	-27.3	16.76	40	-23.24	0-360	100	H
93.325	31.47	PK	8.5	-26.8	13.17	43.52	-30.35	0-360	200	H
120.015	25.42	PK	13.7	-26.7	12.42	43.52	-31.1	0-360	200	H
33.315	44.52	PK	18.6	-27.6	35.52	40	-4.48	0-360	100	V
36.6725	45.16	PK	16.1	-27.5	33.76	40	-6.24	0-360	100	V
60.005	49.34	PK	7.3	-27.3	29.34	40	-10.66	0-360	100	V
93.325	39.25	PK	8.5	-26.8	20.95	43.52	-22.57	0-360	100	V
120.015	29.42	PK	13.7	-26.7	16.42	43.52	-27.1	0-360	100	V

PK - Peak detector
 Radiated Emissions

Frequency (M Hz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
33.415	42.9	LgAv	16	-27.5	31.4	40	-8.6	309	113	V

LgAv - average log detection
 FCC Part 15 Subpart C 30-1000MHz.TST 30915 9 Jul 2013 Rev 9.5 12 Jun 2013