



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1**

CERTIFICATION TEST REPORT

FOR

APPLE TV

MODEL NUMBER: A1625

**FCC ID: BCGA1625
IC: 579C-A1625**

REPORT NUMBER: 15U20087-E1, REVISION B

ISSUE DATE: July 25, 2015

Prepared for
**APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.**

Prepared by
**UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/20/2015	Initial Review	M. Mekuria
A	06/01/2015	Revised report to RSS-247 standard	T. Chu
B	07/25/2015	Updated report per ANSI 63.10-2013 standard	E. YU

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION	7
4.2. SAMPLE CALCULATION	7
4.3. MEASUREMENT UNCERTAINTY.....	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. SOFTWARE AND FIRMWARE.....	8
5.5. WORST-CASE CONFIGURATION AND MODE.....	9
5.6. DESCRIPTION OF TEST SETUP.....	10
6. TEST AND MEASUREMENT EQUIPMENT	14
7. ANTENNA PORT TEST RESULTS	15
7.1. ON TIME AND DUTY CYCLE.....	15
7.2. BASIC DATA RATE GFSK MODULATION.....	17
7.2.1. 20 dB AND 99% BANDWIDTH	17
7.2.2. HOPPING FREQUENCY SEPARATION	20
7.2.3. NUMBER OF HOPPING CHANNELS.....	21
7.2.4. AVERAGE TIME OF OCCUPANCY	24
7.2.5. OUTPUT POWER	28
7.2.6. AVERAGE POWER.....	29
7.2.7. CONDUCTED SPURIOUS EMISSIONS.....	30
7.3. ENHANCED DATA RATE QPSK MODULATION.....	35
7.3.1. OUTPUT POWER	35
7.3.2. AVERAGE POWER.....	36
7.4. ENHANCED DATA RATE 8PSK MODULATION	37
7.4.1. 20 dB AND 99% BANDWIDTH	37
7.4.2. HOPPING FREQUENCY SEPARATION	40
7.4.3. NUMBER OF HOPPING CHANNELS.....	41
7.4.4. AVERAGE TIME OF OCCUPANCY	44
7.4.5. OUTPUT POWER	48
7.4.6. AVERAGE POWER.....	49
7.4.7. CONDUCTED SPURIOUS EMISSIONS.....	50
8. RADIATED TEST RESULTS.....	55
8.1. LIMITS AND PROCEDURE.....	55

8.2.	TRANSMITTER ABOVE 1 GHz	56
8.2.1.	BASIC DATA RATE GFSK MODULATION	56
8.2.2.	ENHANCED DATA RATE 8PSK MODULATION	66
8.3.	WORST-CASE BELOW 1 GHz.....	76
8.4.	WORST-CASE ABOVE 18 GHz	78
9.	AC POWER LINE CONDUCTED EMISSIONS.....	80
10.	SETUP PHOTOS	84

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: APPLE TV

MODEL: A1625

SERIAL NUMBER: C07NW001GFM5

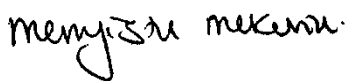
DATE TESTED: FEBRUARY 28 - MARCH 17, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	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.

Approved & Released For
UL Verification Services Inc. By:



MENGISTU MEKURIA
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Tested By:



TRI PHAM
EMC ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
<input type="checkbox"/> Chamber A	<input checked="" type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input checked="" type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F
	<input type="checkbox"/> Chamber G
	<input type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

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:

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

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 Apple TV device is a digital media receiver designed to play internet content onto a TV through an HDMI port. It incorporates Wi-Fi and Bluetooth radios.

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	13.41	21.93
2402 - 2480	Enhanced 8PSK	13.53	22.54

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain
2.4	0.25

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Broadcom BlueTool version 1.8.4.

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

Worst-case data rates were:

GFSK mode: DH5
8PSK mode: 3-DH5

DQPSK mode has been verified to have the lowest power.

For the co-location test, no other emissions were found after the conducted measurement with all different combination frequencies between BT & 5GHz bands were investigated.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	92P1160	11S92P1160Z1ZBGH798B12	NA
Laptop	Lenovo	7659	L3-AL664 08/03	NA
Dongle	N/A	N/A	HDG1409226823	NA

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	3	N/A

I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	3	N/A

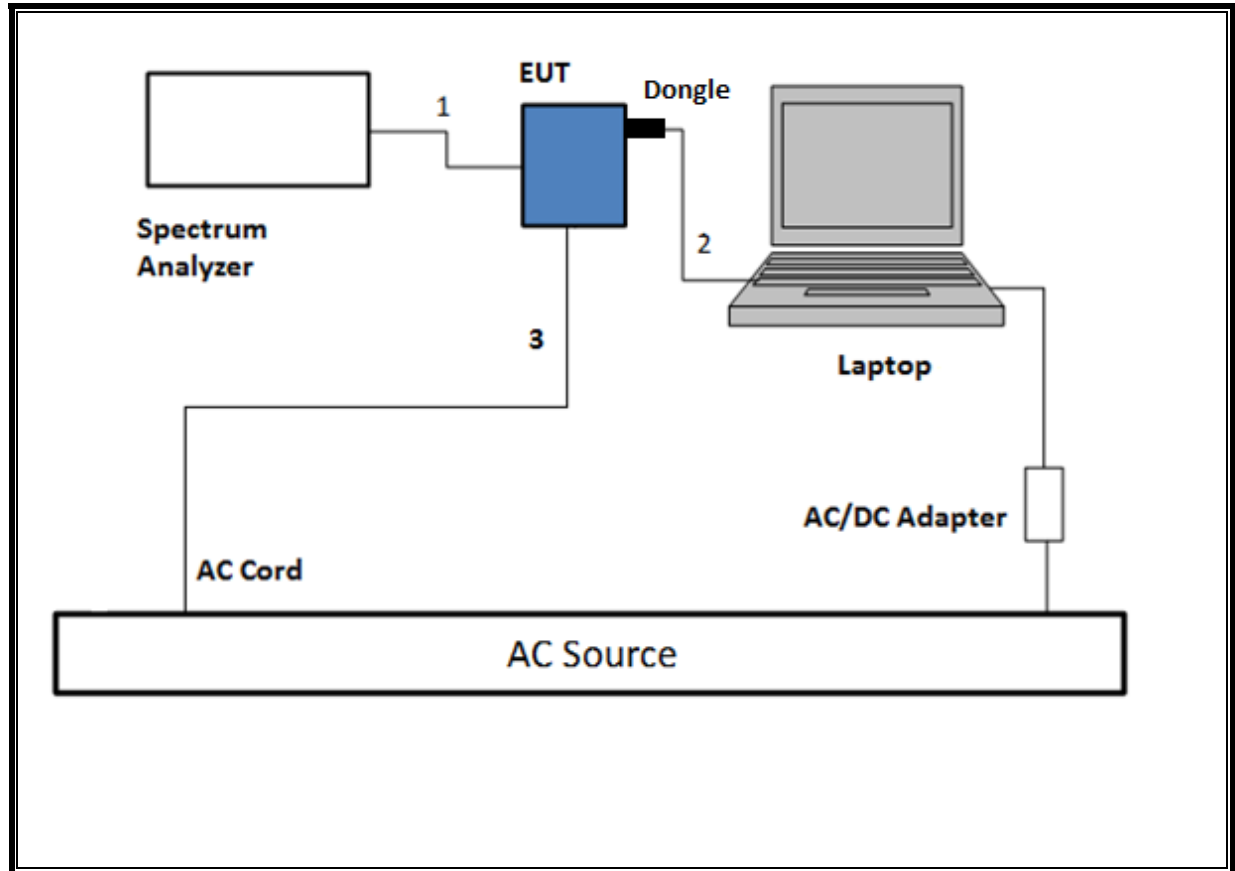
I/O CABLES (AC POWER CONDUCTED TEST AND BELOW 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	3	N/A

TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

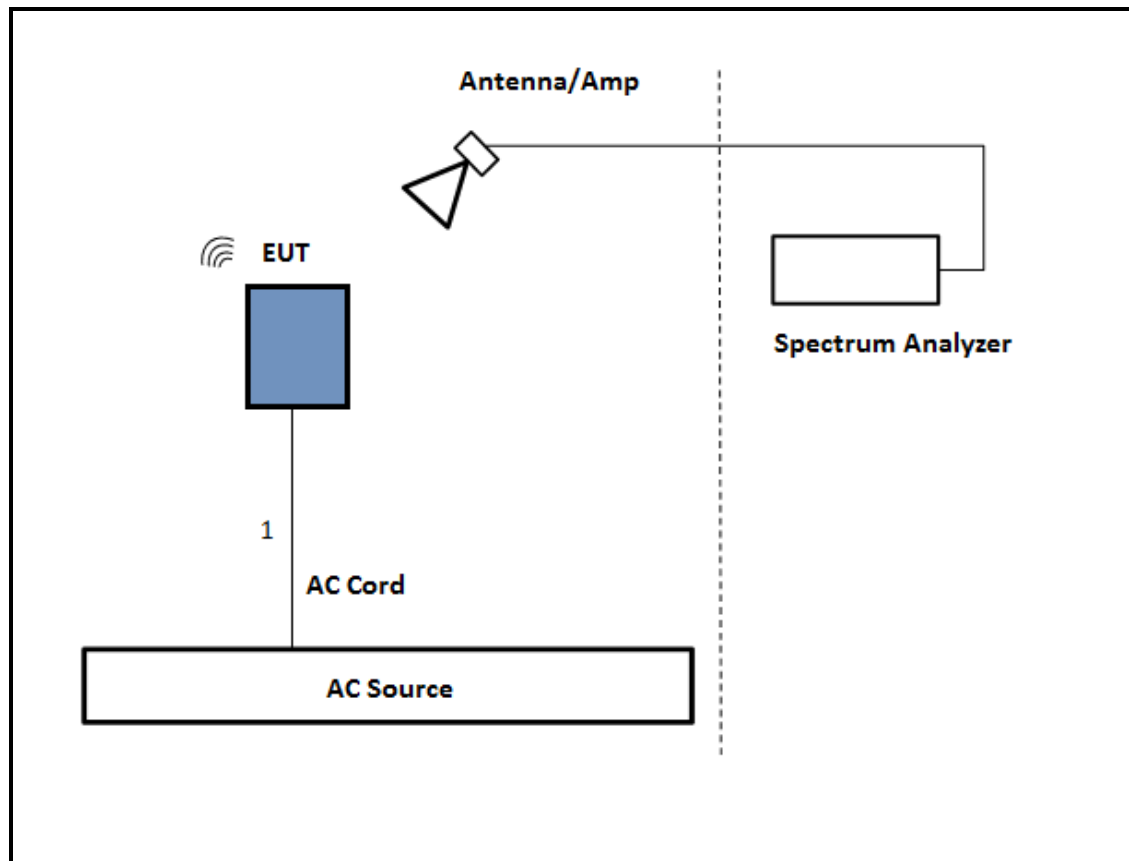
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was powered by AC cord. Test software exercised the EUT.

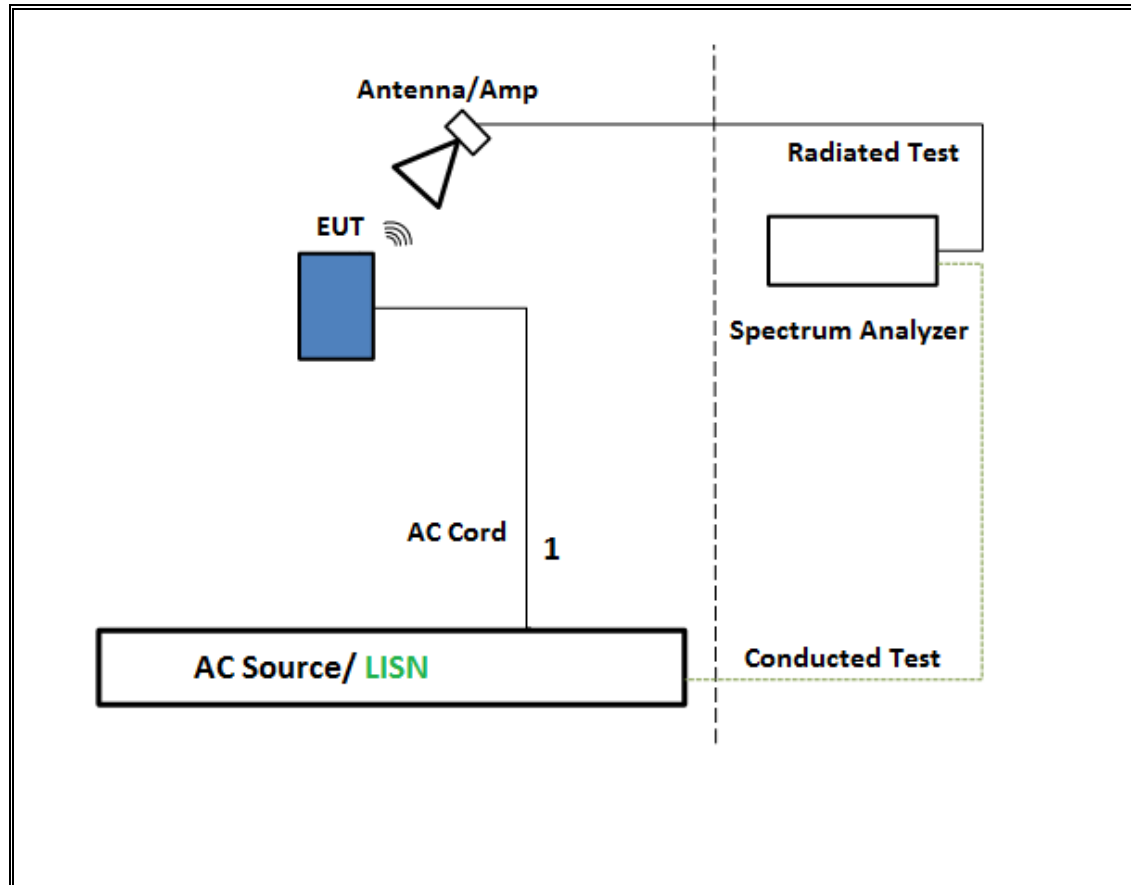
SETUP DIAGRAM



TEST SETUP- BELOW 1GHZ & AC LINE CONDUCTED TESTS

The EUT was powered by AC cord. Test software exercised the EUT.

SETUP DIAGRAM



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
Antenna, Horn 1-18GHz	ETS Lindgren	3117	00143449	2/10/2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	1/14/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782158	1/26/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323561	5/28/2015
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	US51350187	5/2/2015
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	A121003	2/13/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	185623	6/7/2015
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY51380911	2/20/2016
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	10/9/2015
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	7/12/2015
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	1049	12/17/2015
Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	8/6/2015
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	3008A01114	10/4/2015
AC Line Conducted				
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ESCI7	100935	9/16/2015
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	114	1/16/2016
Power Cable, Line Conducted Emissions ANSI 63.4	UL	PG1	N/A	7/28/2015
UL SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 2.1.2, February 23, 2015 Ver 2.1.3 March 12, 2015	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 2015	

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

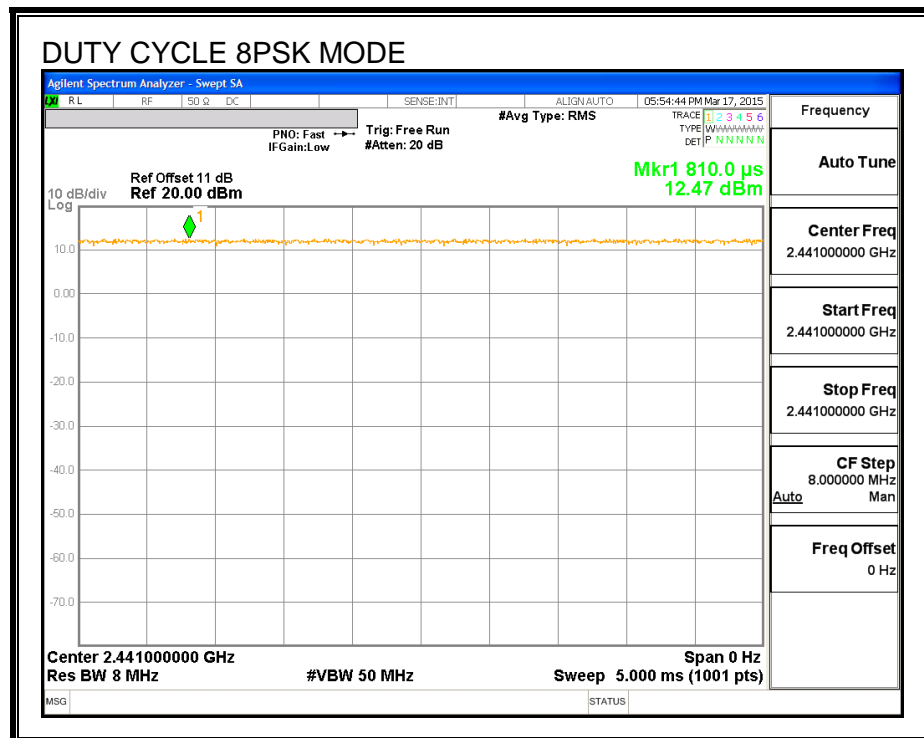
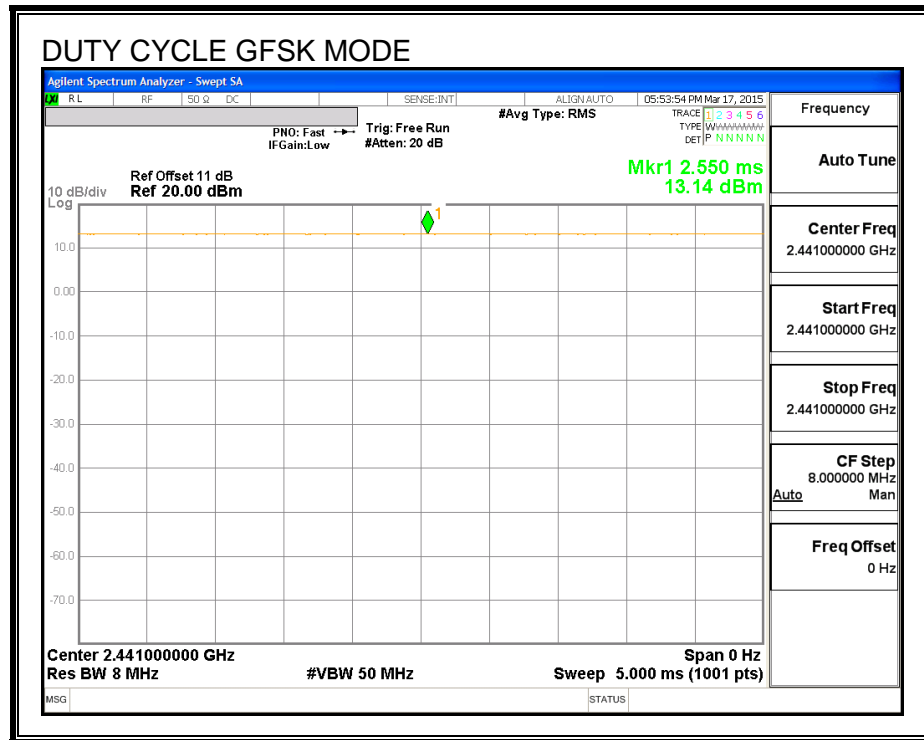
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
Bluetooth GFSK	5.000	5.000	1.000	100.00%	0.00	0.010
Bluetooth 8PSK	5.000	5.000	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS

HOPPING OFF



7.2. BASIC DATA RATE GFSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

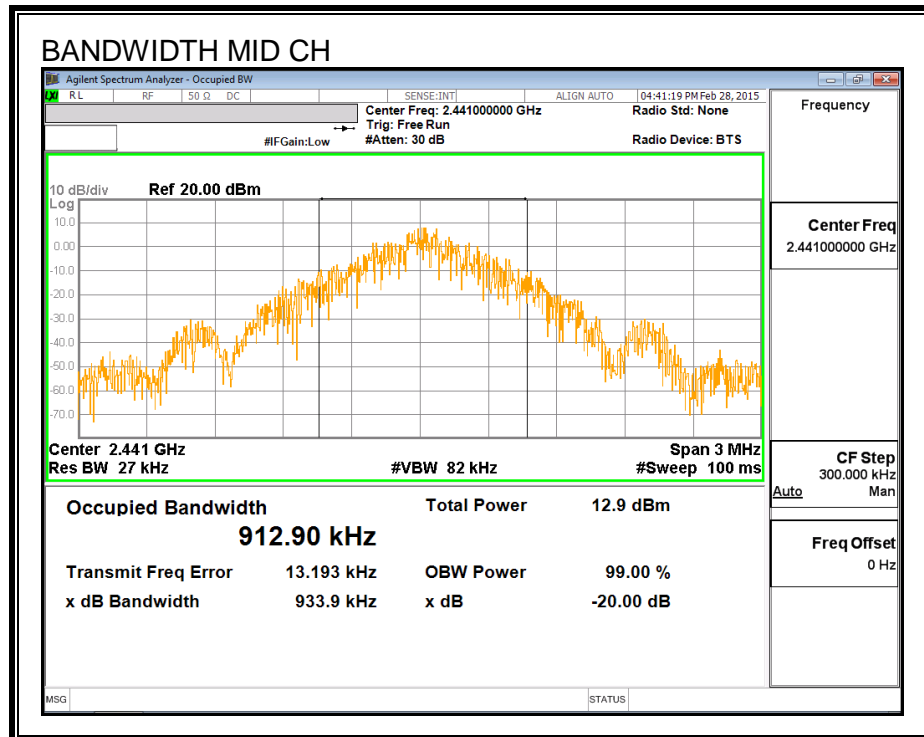
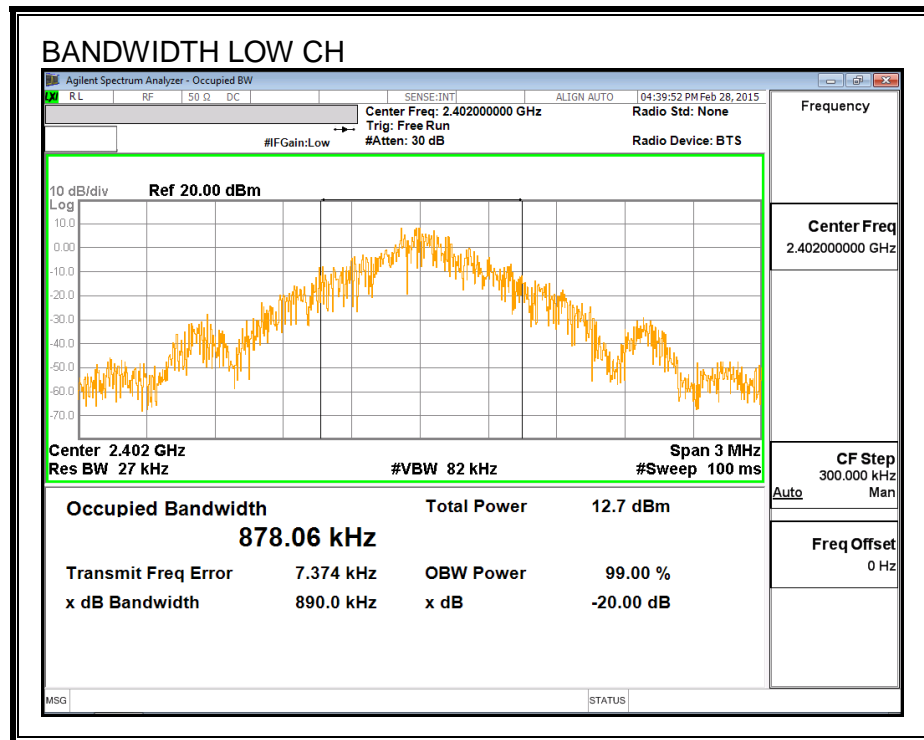
TEST PROCEDURE

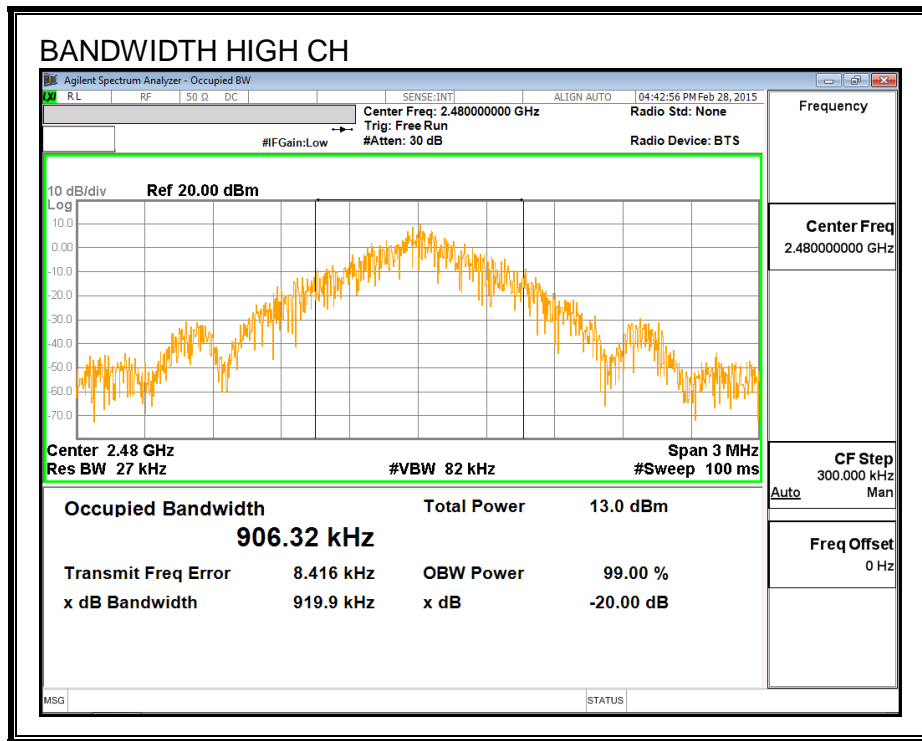
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)
Low	2402	890.0	878.06
Middle	2441	933.9	912.90
High	2480	919.9	906.32

20 dB AND 99% BANDWIDTH





7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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.

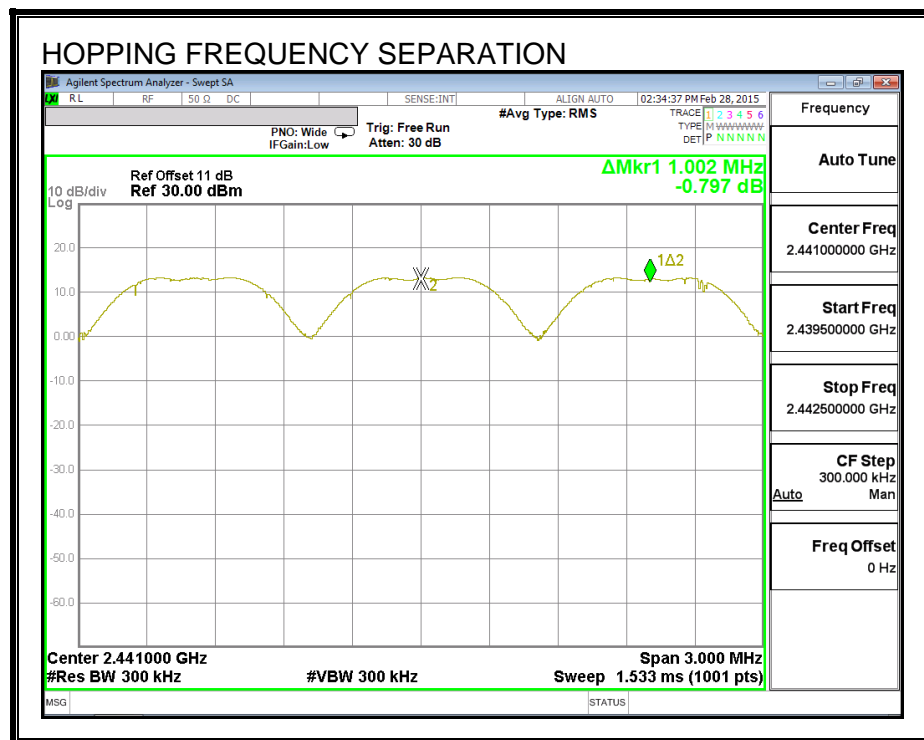
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

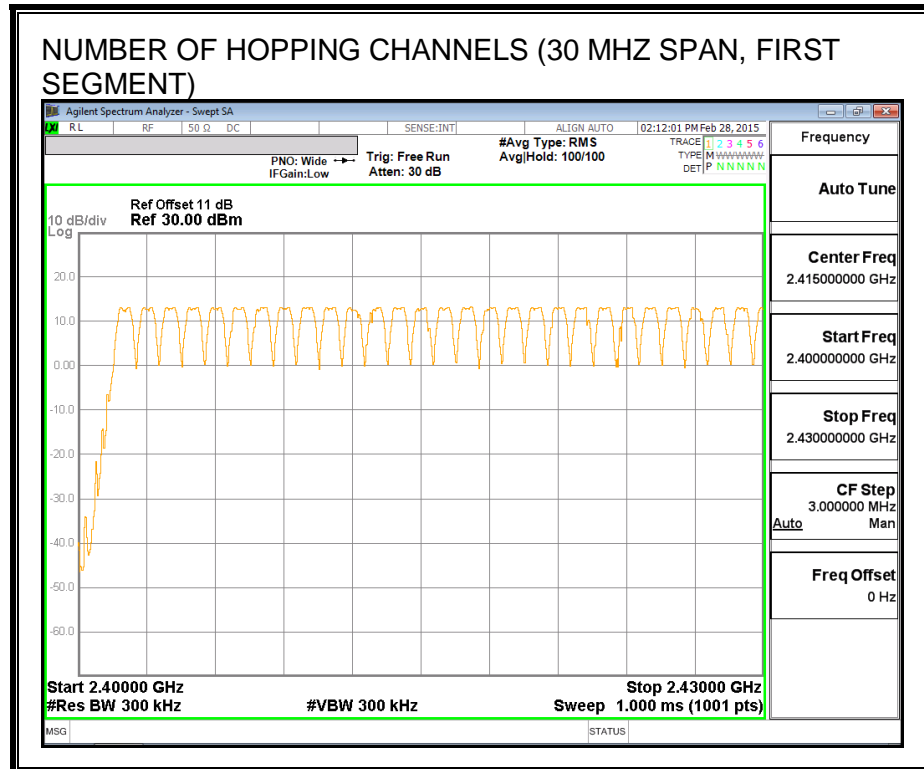
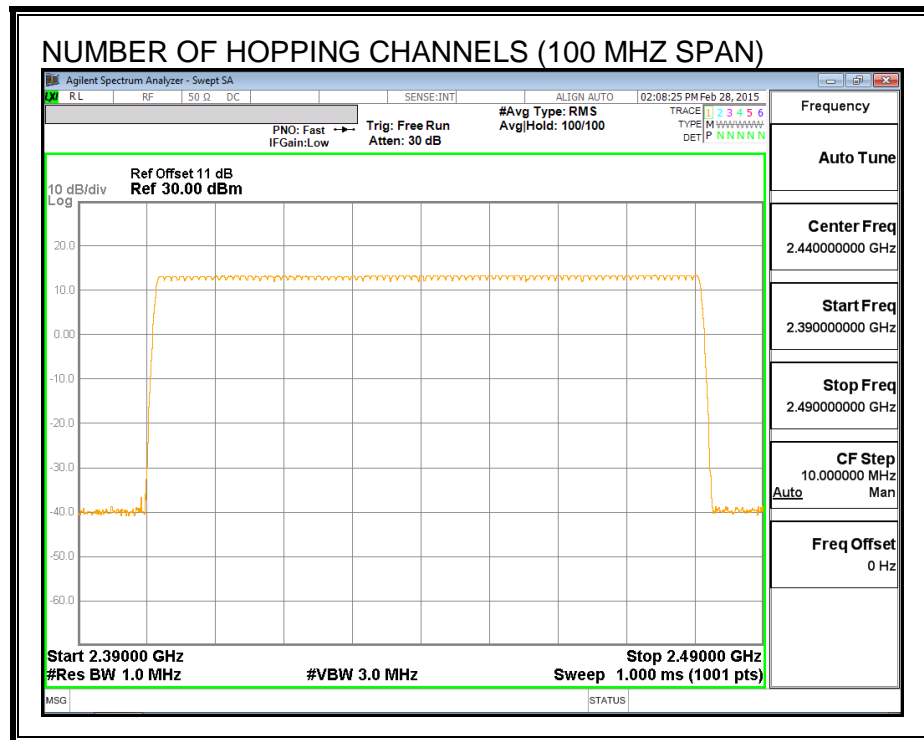
TEST PROCEDURE

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.

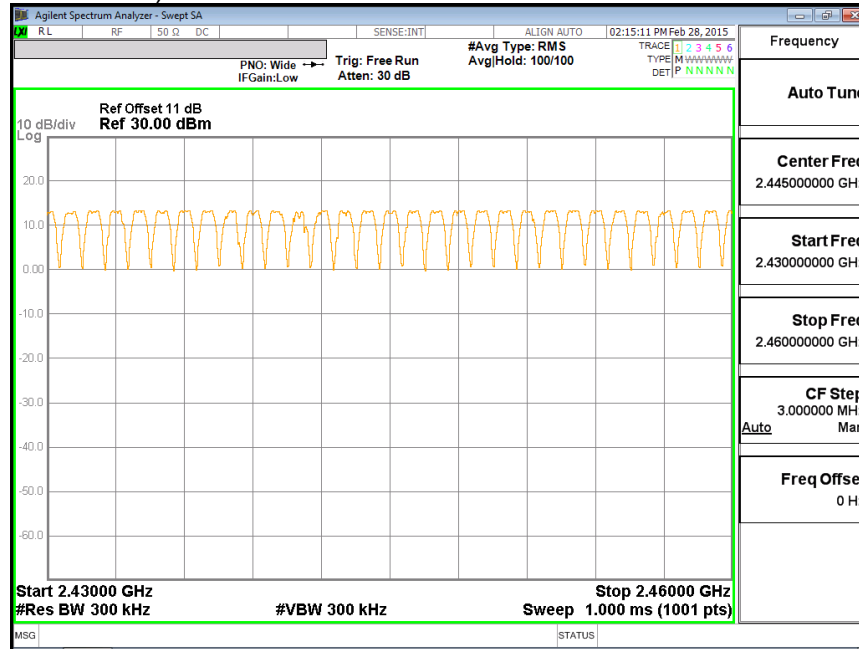
RESULTS

Normal Mode: 79 Channels observed.

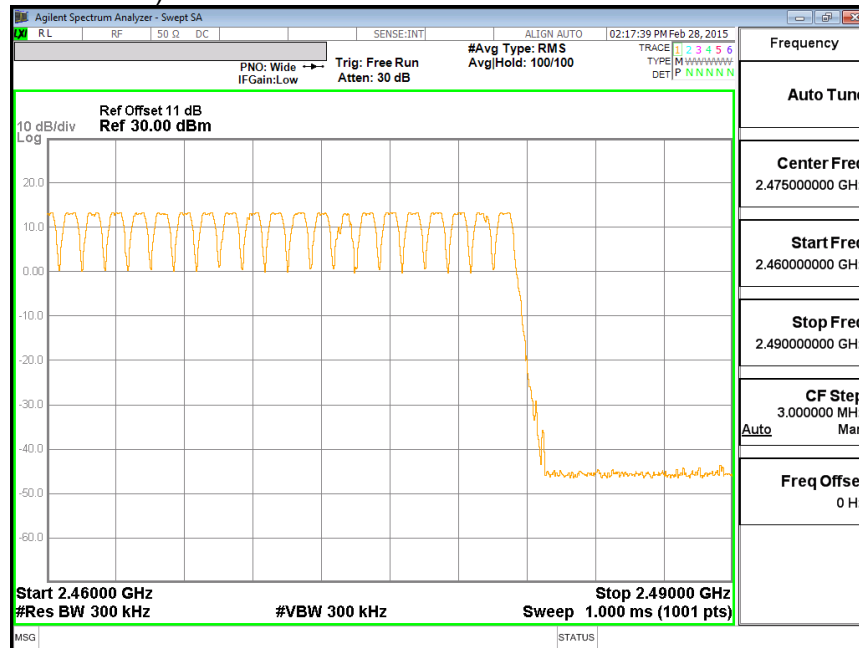
NUMBER OF HOPPING CHANNELS



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



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



7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

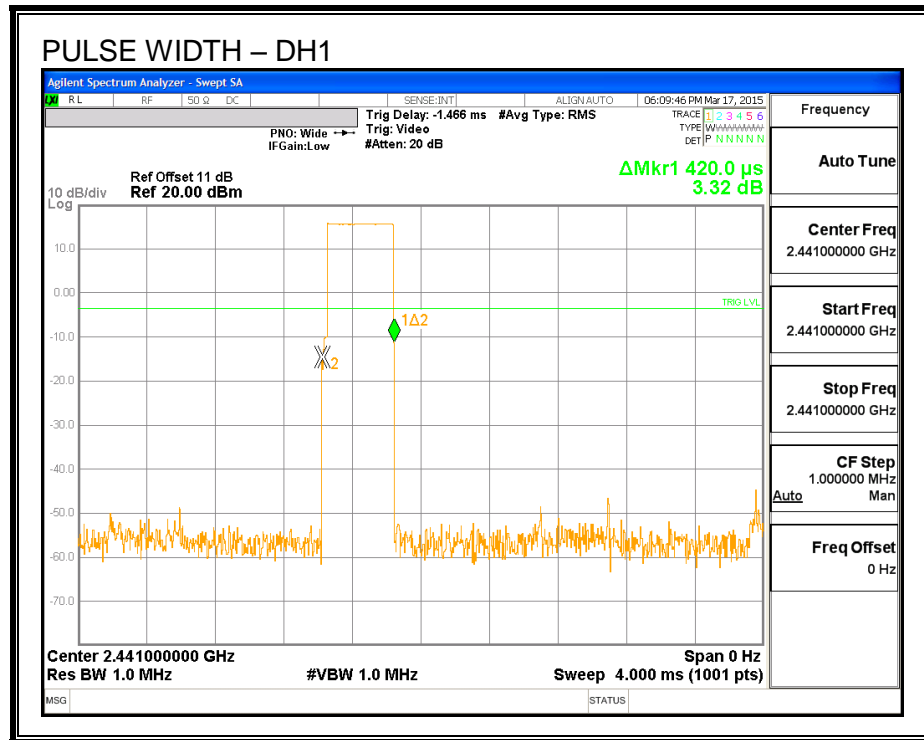
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

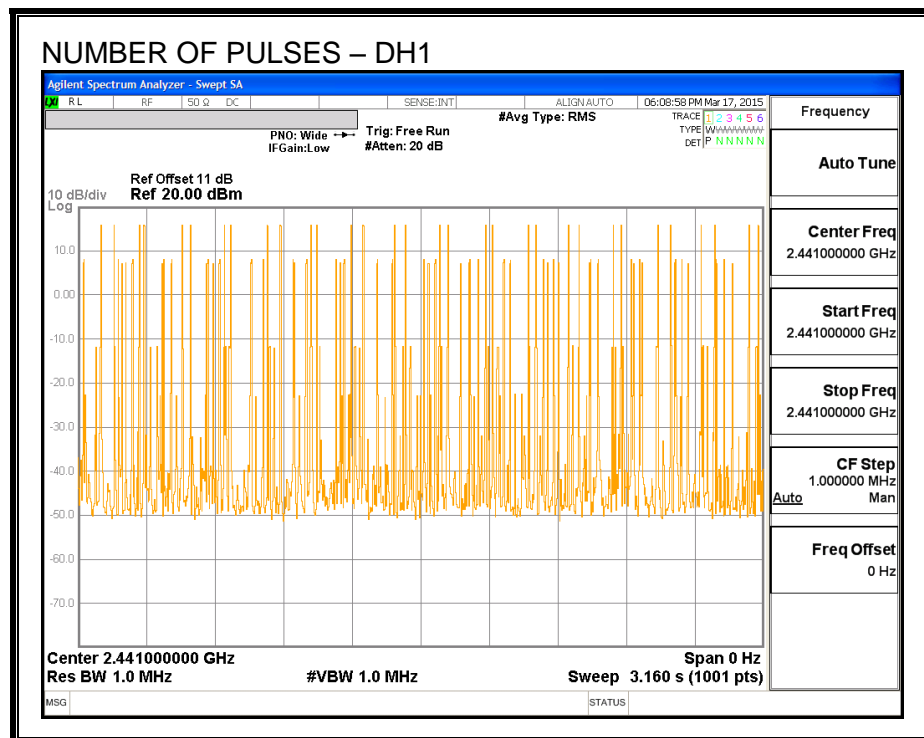
RESULTS

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	0.42	32	0.134	0.4	-0.266
DH3	1.676	16	0.268	0.4	-0.132
DH5	2.926	11	0.322	0.4	-0.078

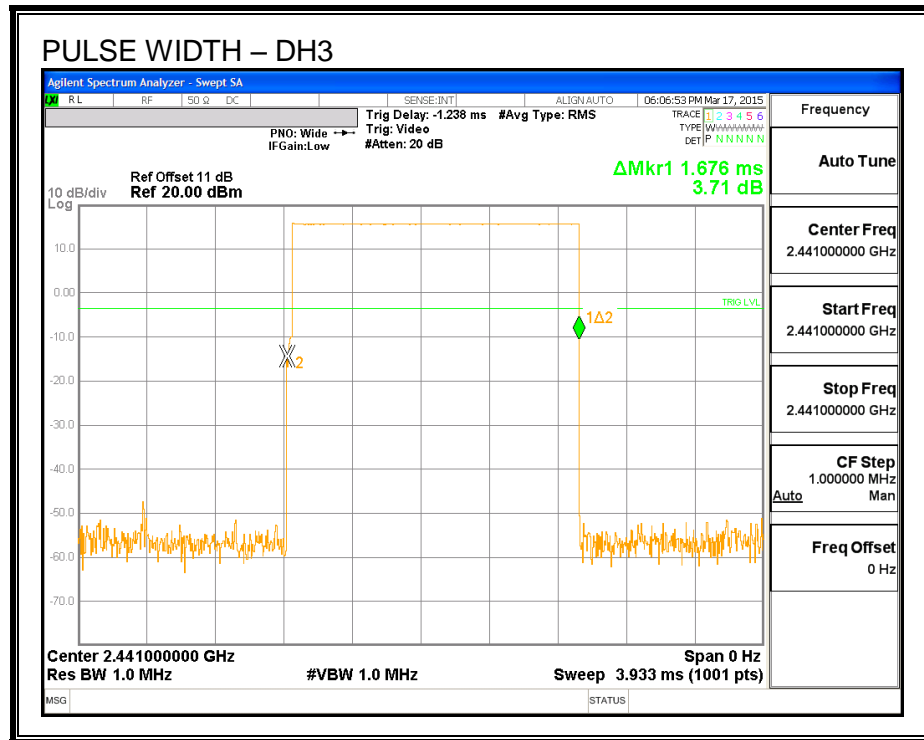
PULSE WIDTH - DH1



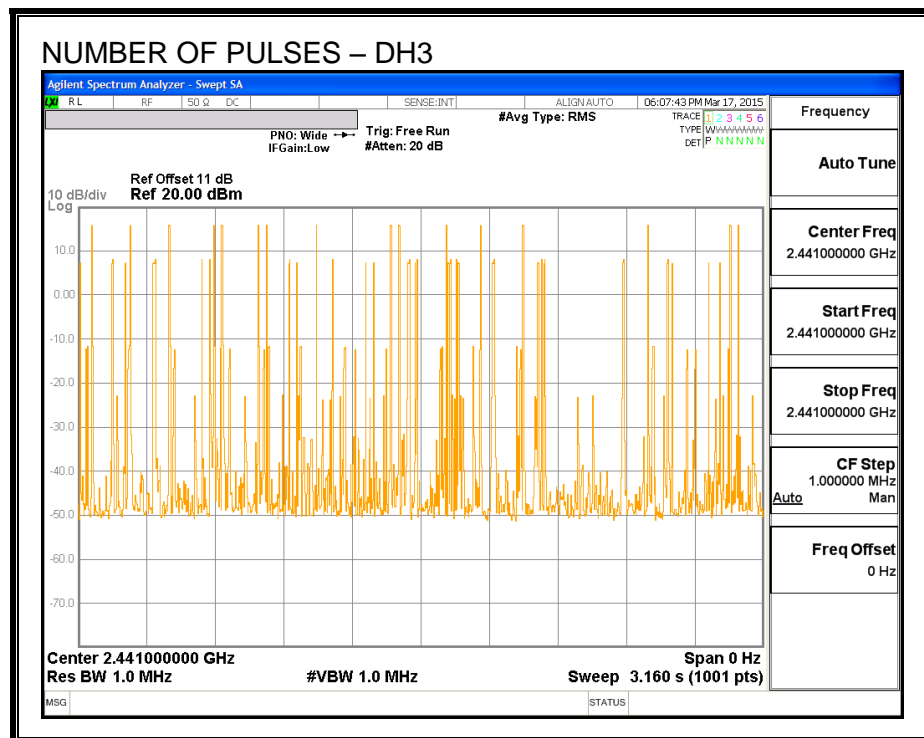
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



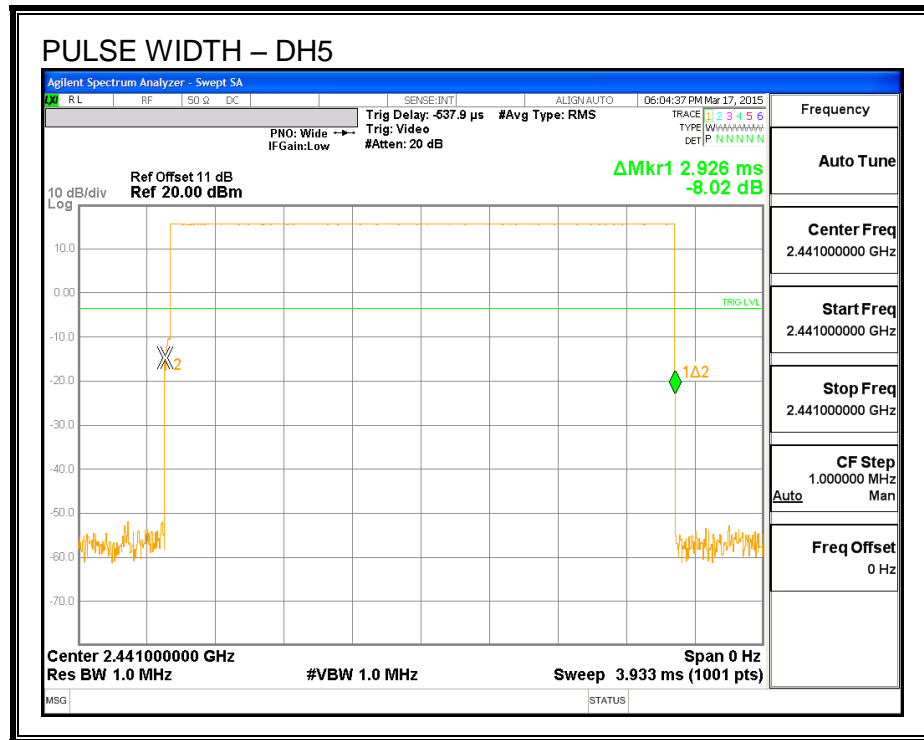
PULSE WIDTH – DH3



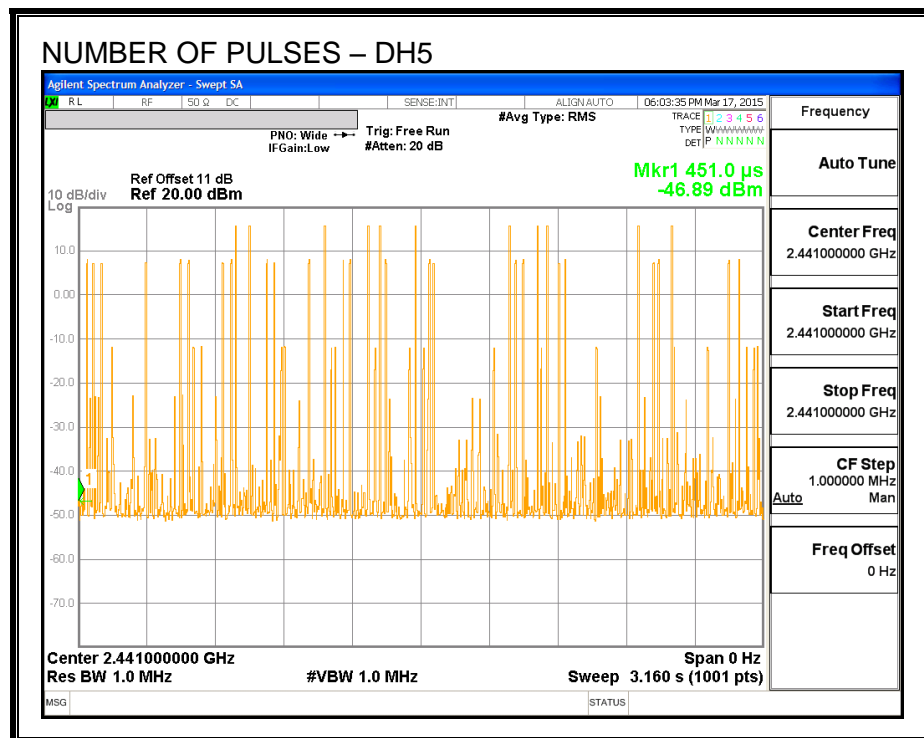
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 (5.4) (2)

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

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.12	30	-16.88
Middle	2441	13.30	30	-16.70
High	2480	13.41	30	-16.59

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 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	11.95
Middle	2441	12.10
High	2480	12.13

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

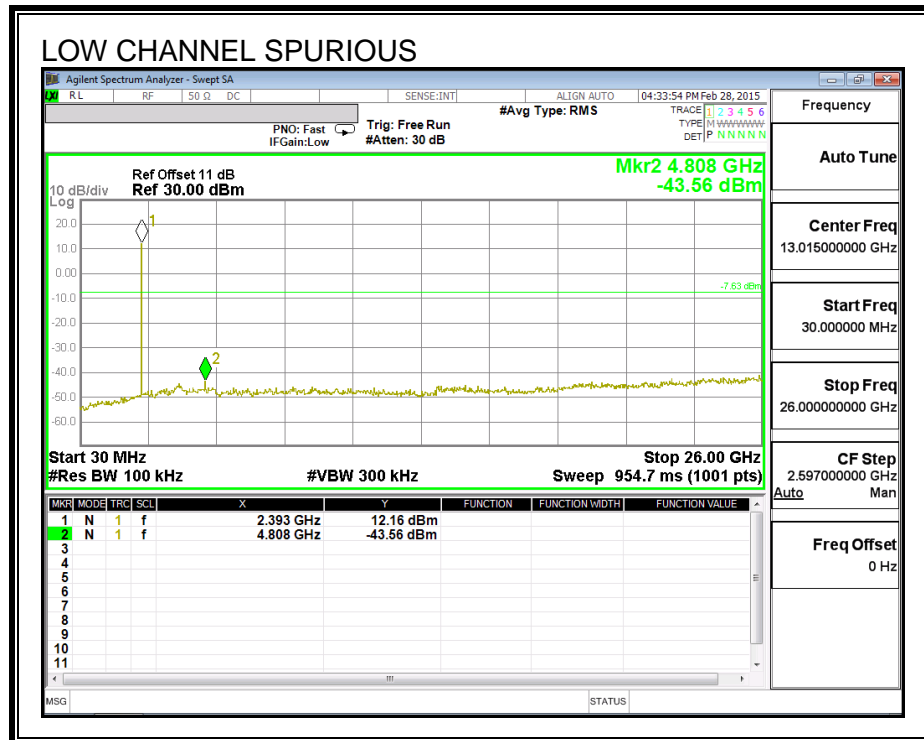
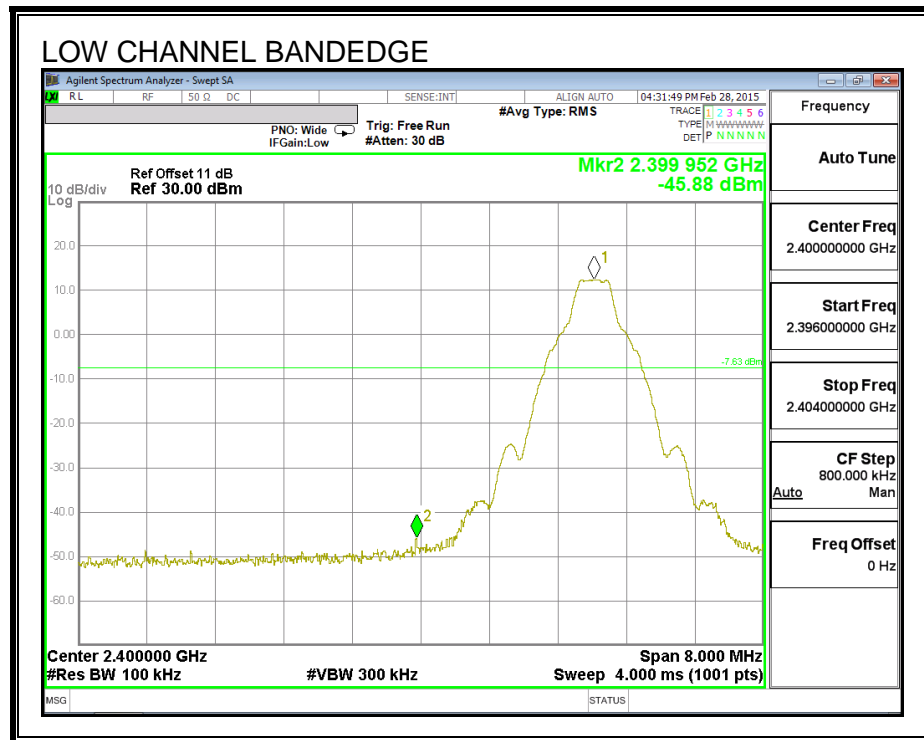
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

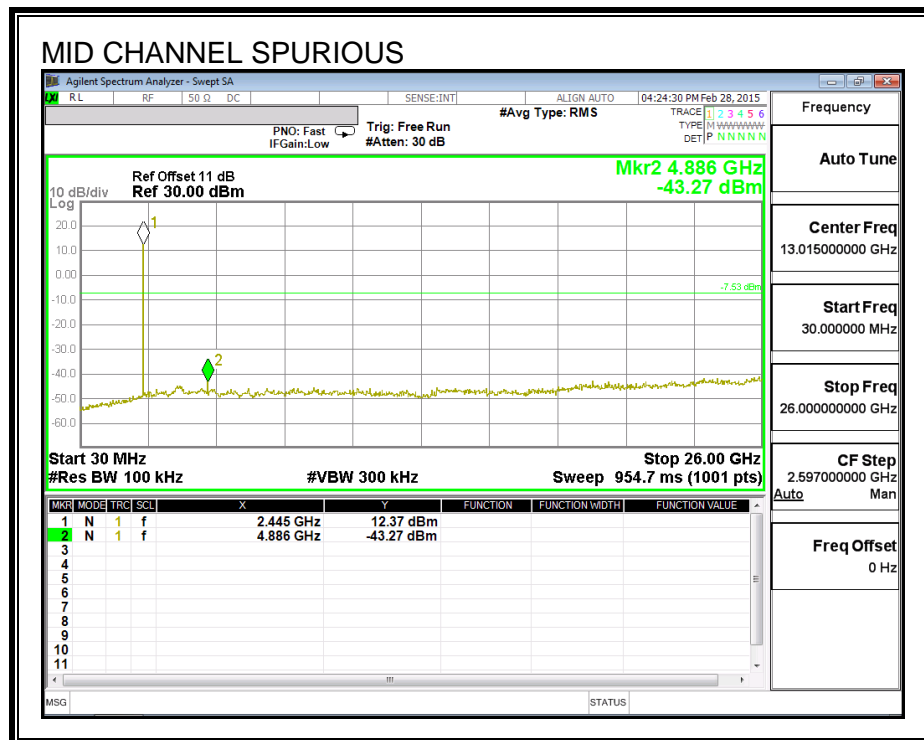
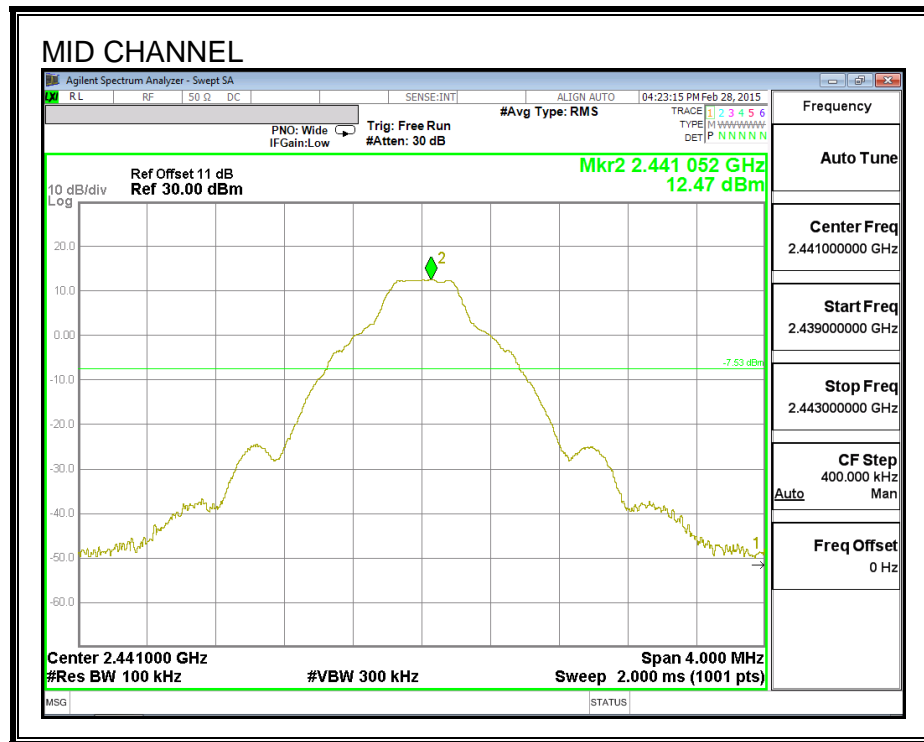
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

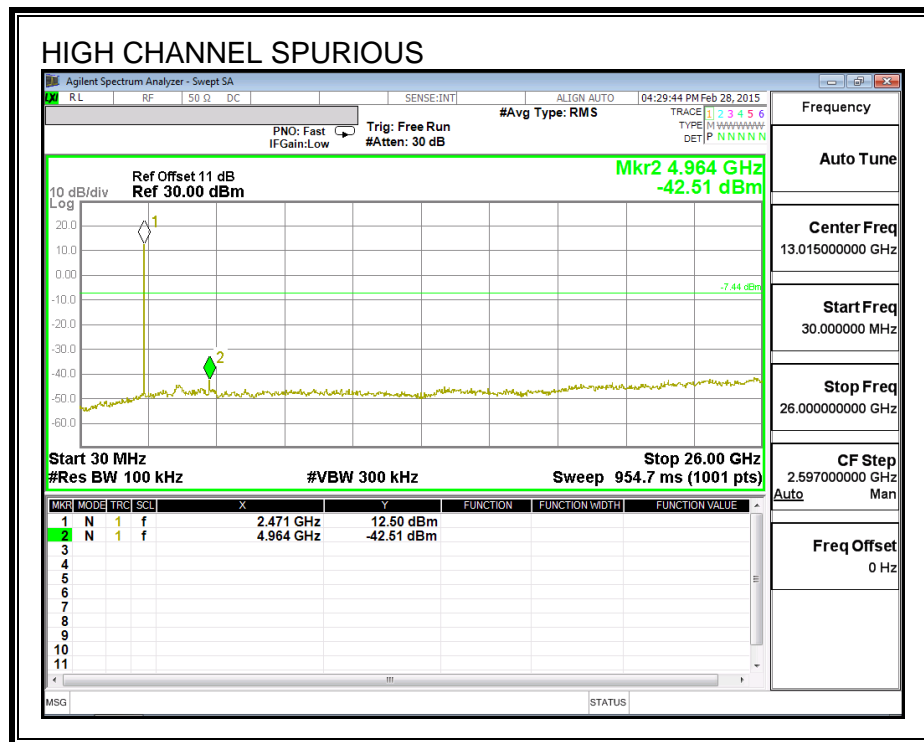
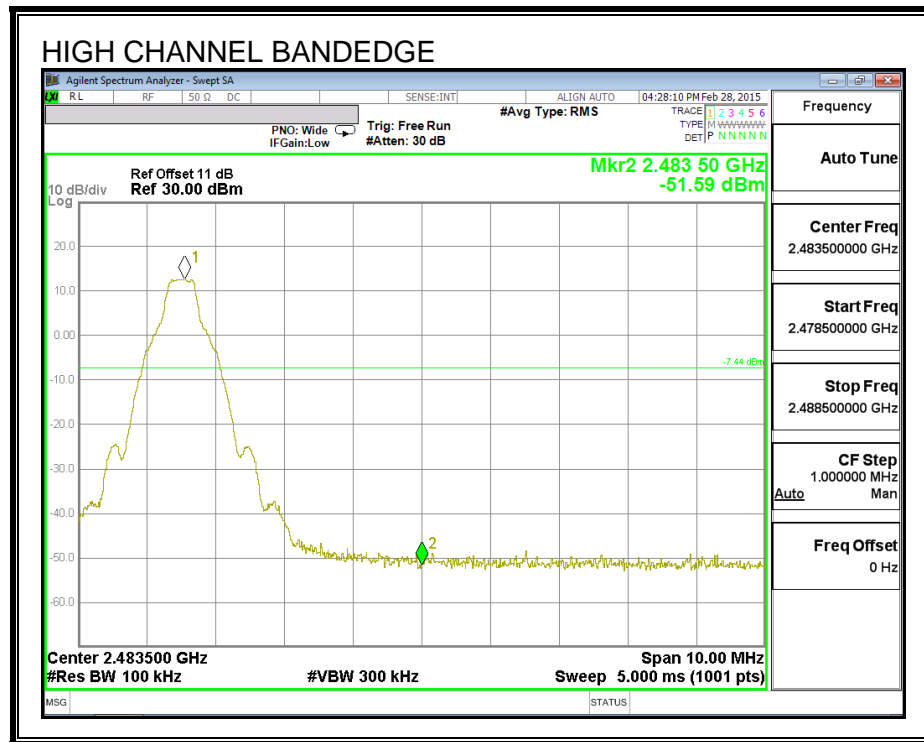
SPURIOUS EMISSIONS, LOW CHANNEL



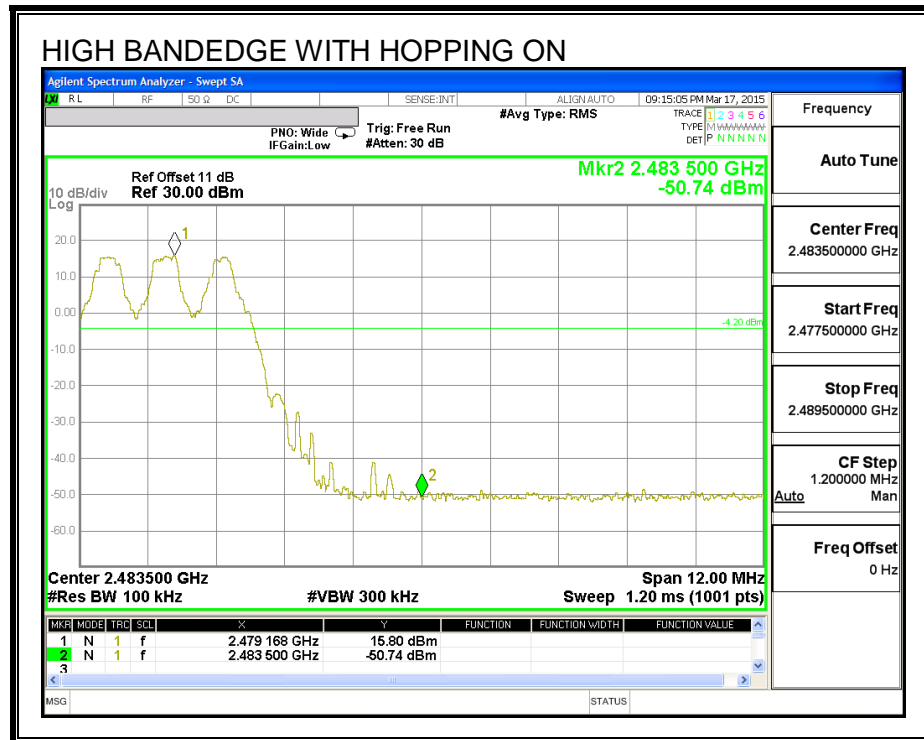
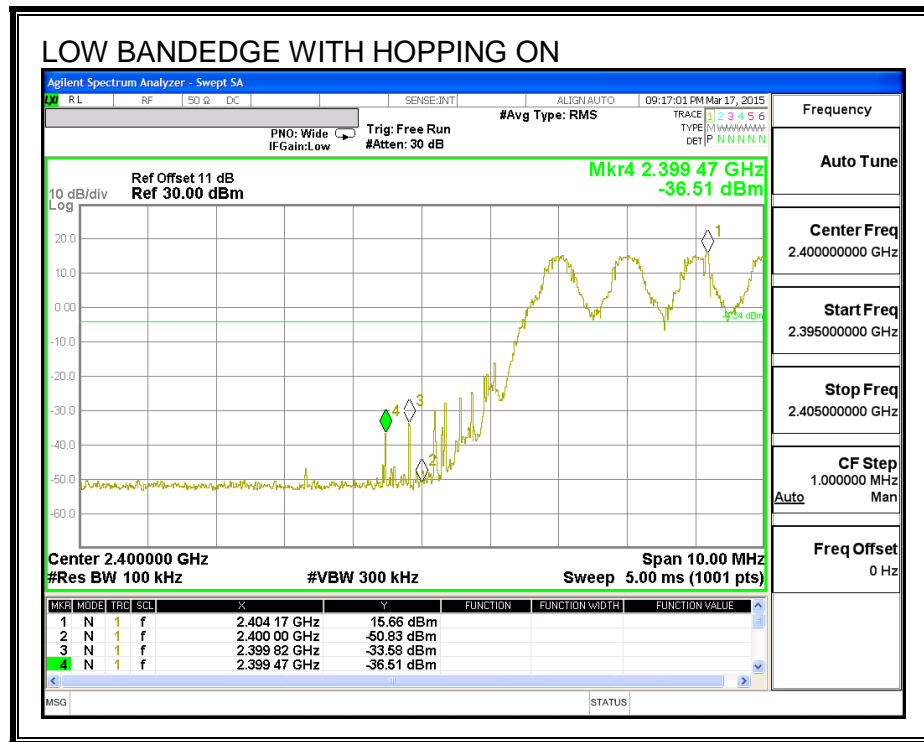
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.3. ENHANCED DATA RATE QPSK MODULATION

7.3.1. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 (5.4) (2)

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 wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.12	21	-7.85
Middle	2441	13.28	21	-7.69
High	2480	13.29	21	-7.68

7.3.2. 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 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.93
Middle	2441	10.09
High	2480	10.12

7.4. ENHANCED DATA RATE 8PSK MODULATION

7.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

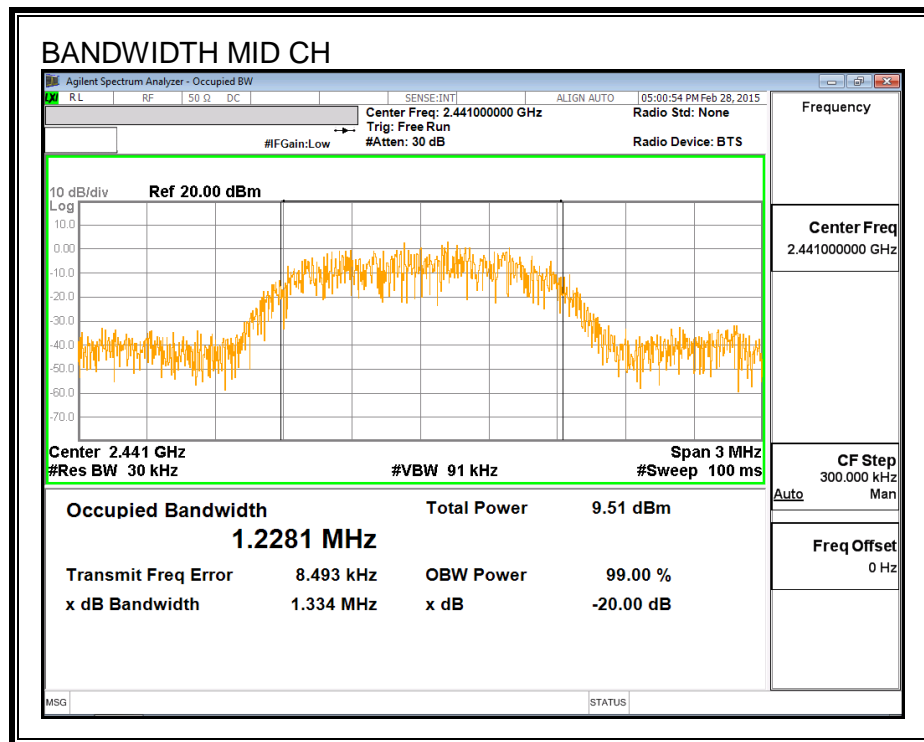
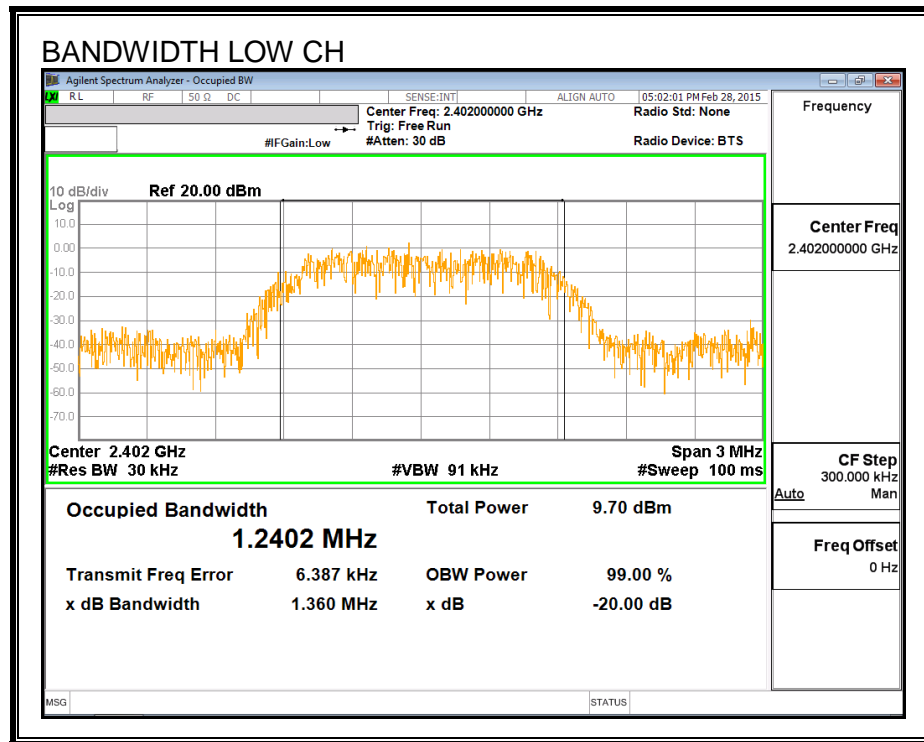
TEST PROCEDURE

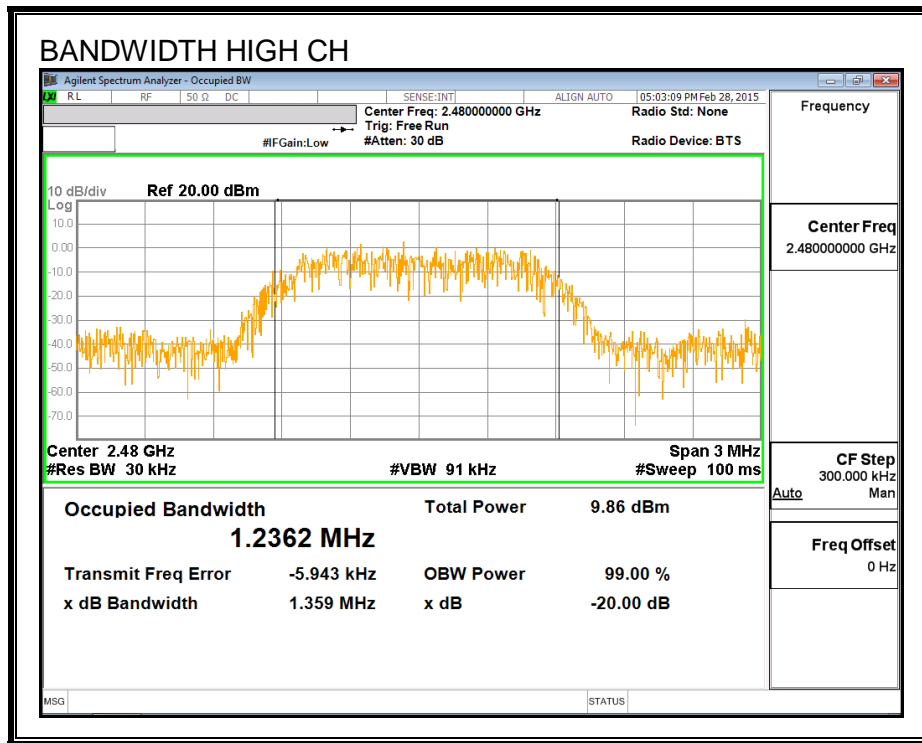
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.360	1.2402
Middle	2441	1.334	1.2281
High	2480	1.359	1.2362

20 dB AND 99% BANDWIDTH





7.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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.

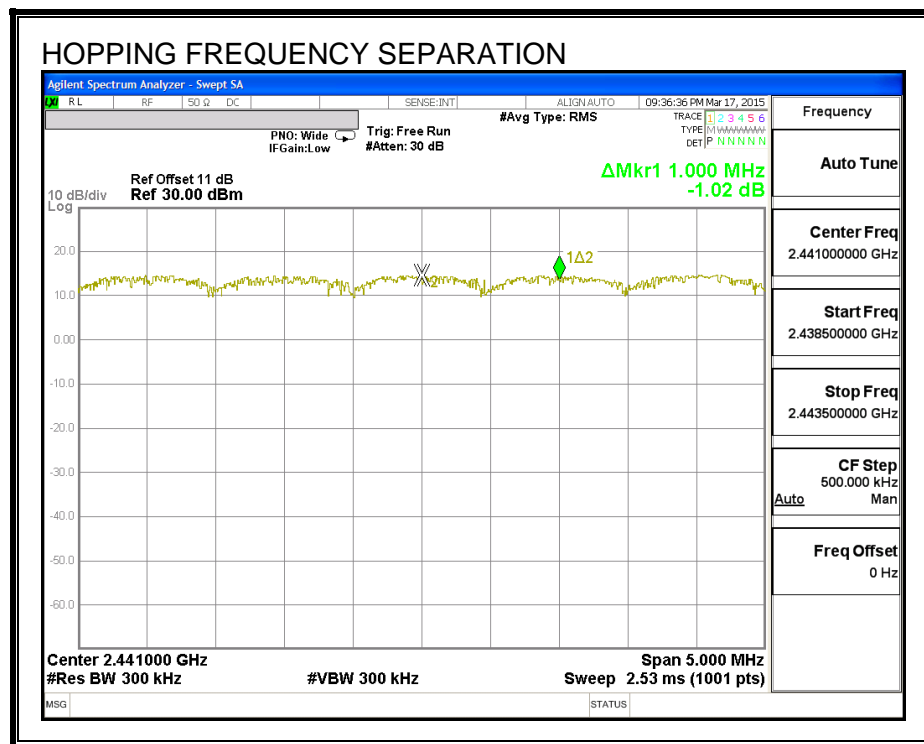
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION



7.4.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

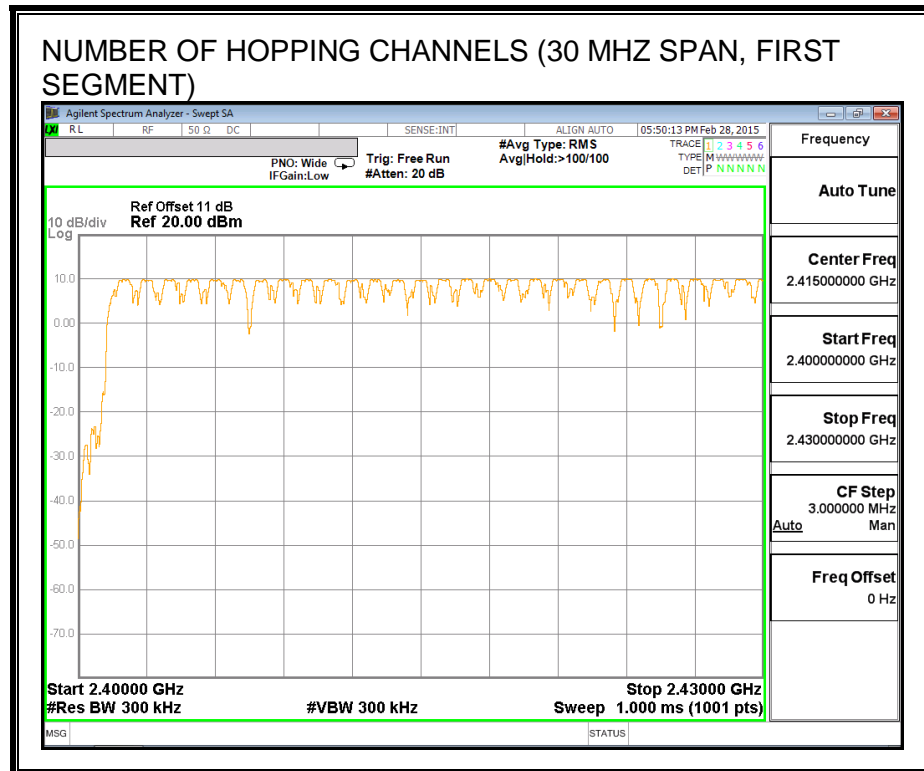
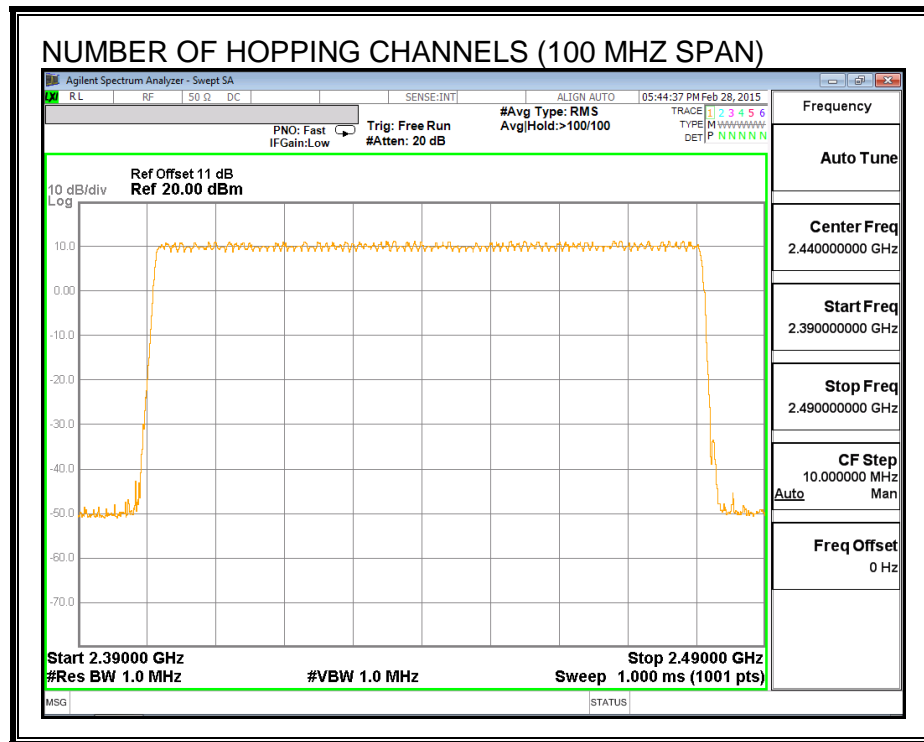
TEST PROCEDURE

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.

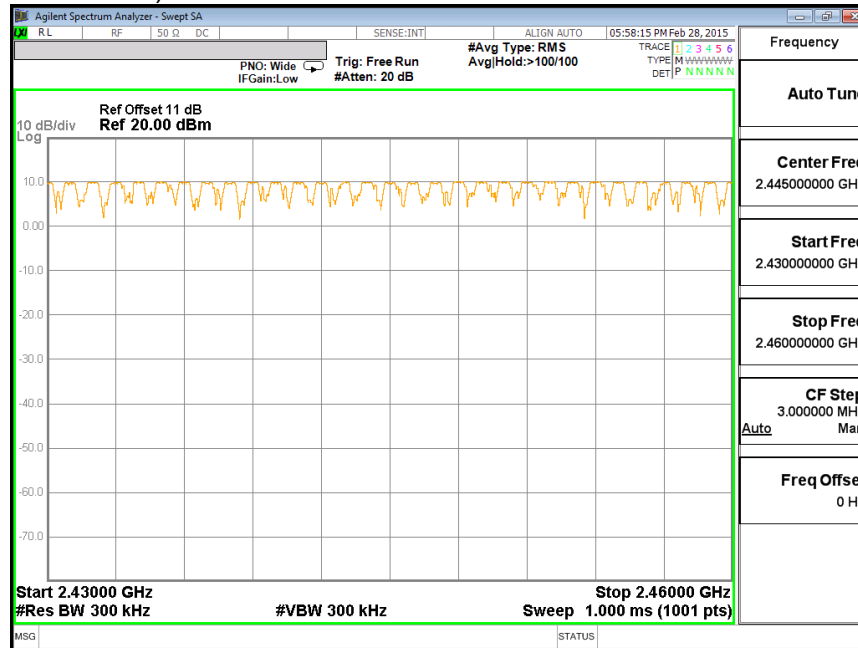
RESULTS

Normal Mode: 79 Channels observed.

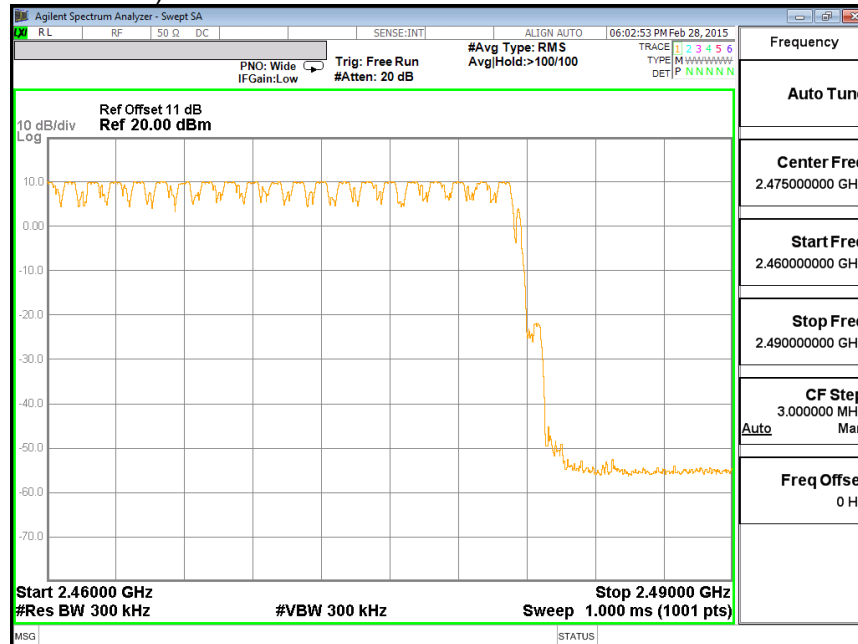
NUMBER OF HOPPING CHANNELS



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



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



7.4.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

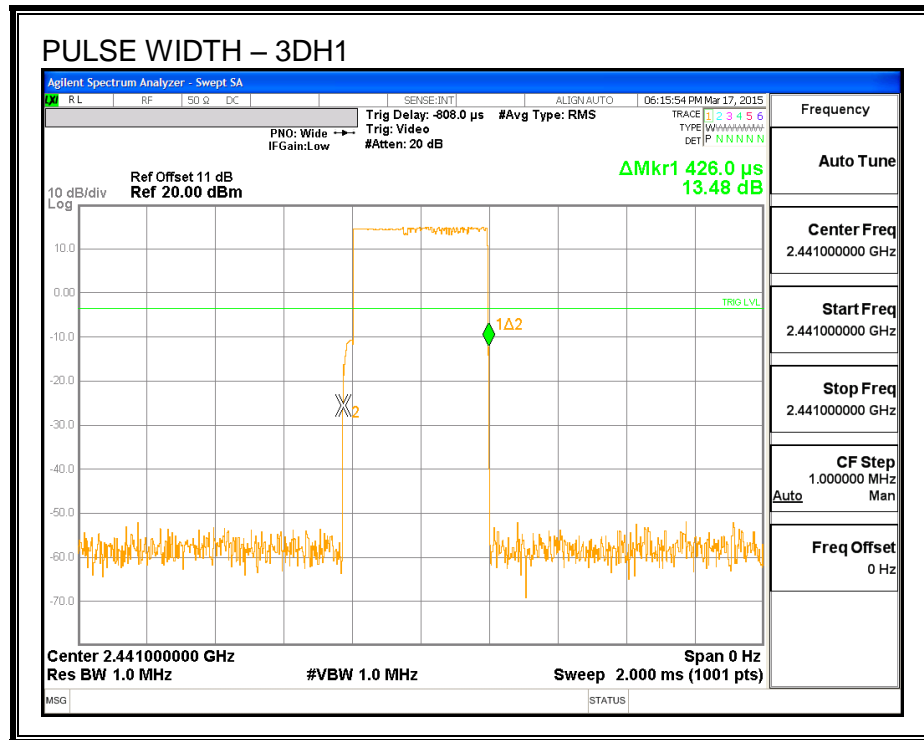
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

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

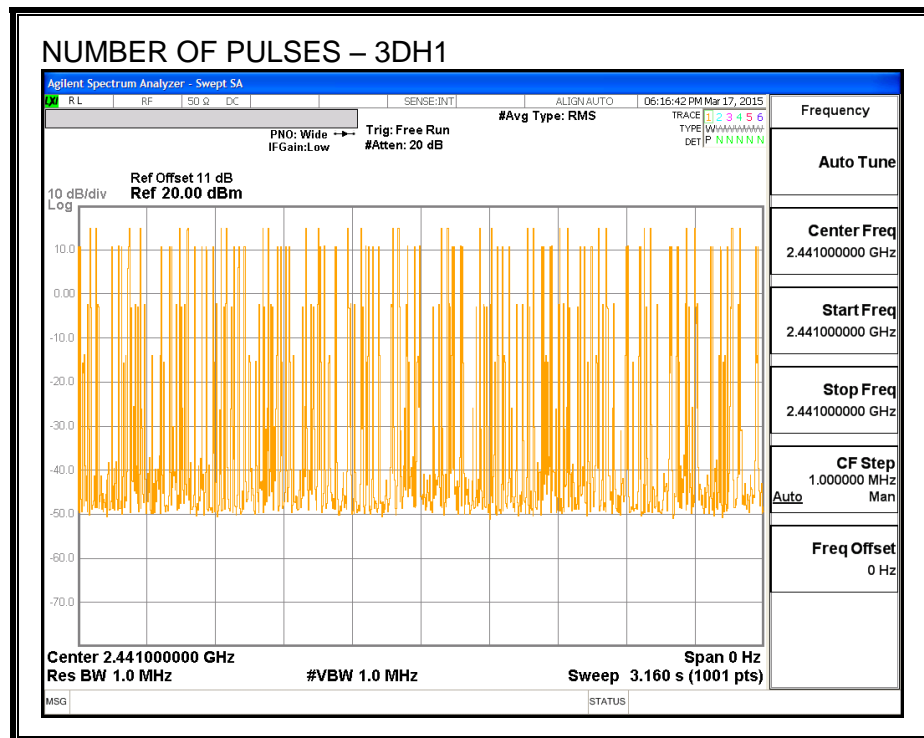
RESULTS

8PSK (EDR) Mode

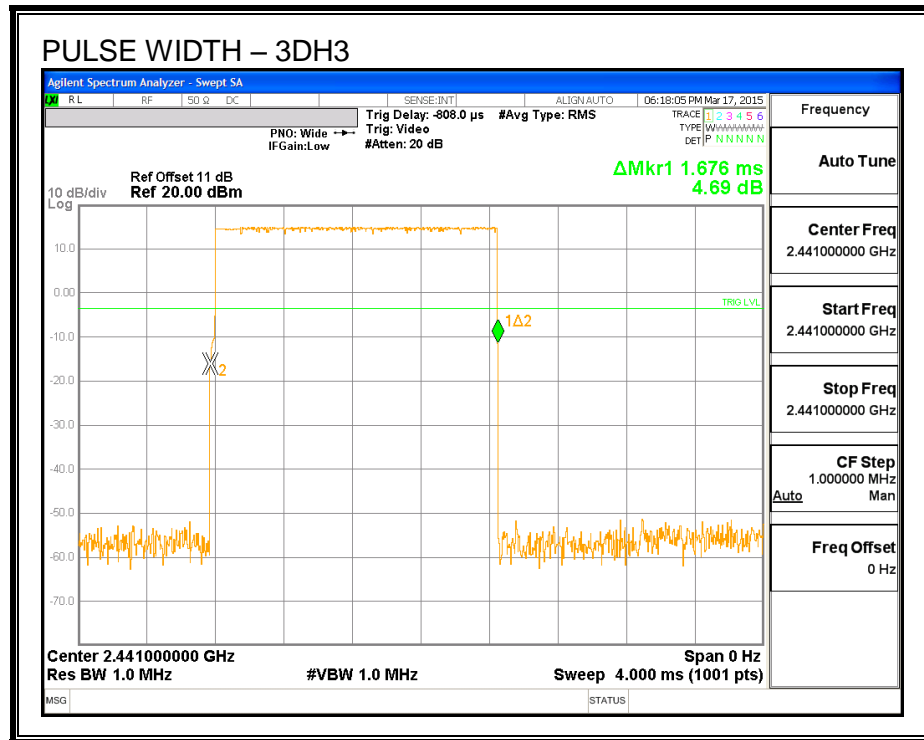
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.426	32	0.136	0.4	-0.264
3DH3	1.676	16	0.268	0.4	-0.132
3DH5	2.928	12	0.351	0.4	-0.049



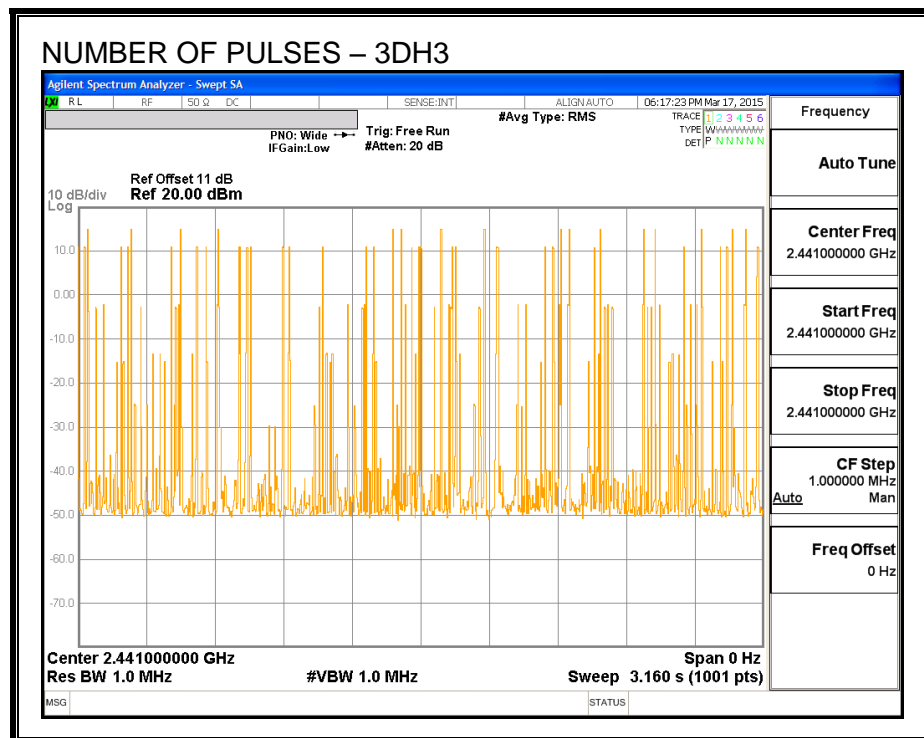
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



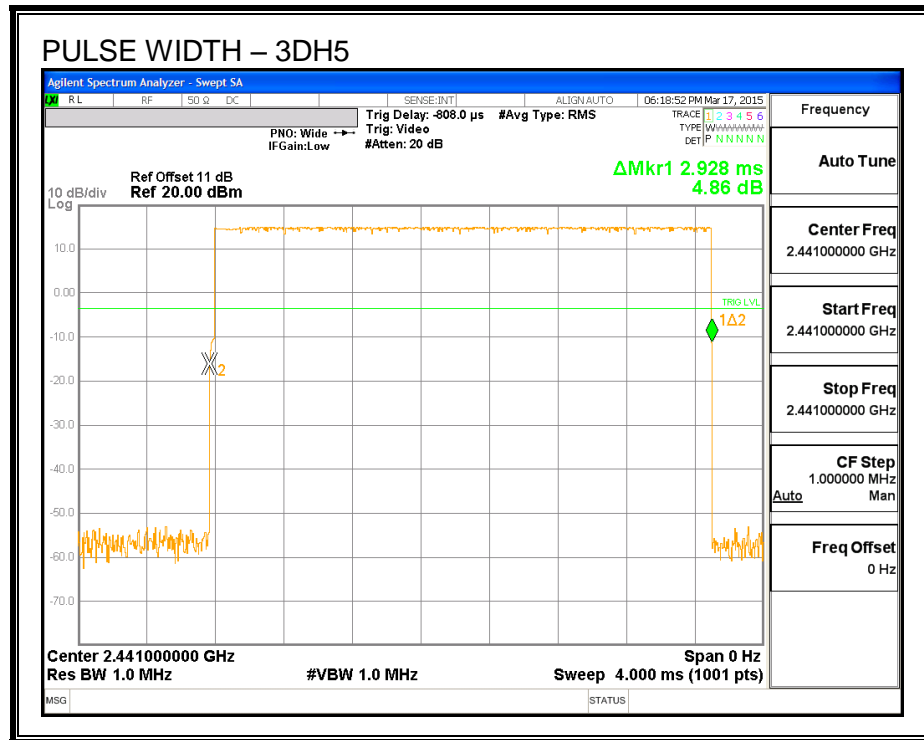
PULSE WIDTH – 3DH3



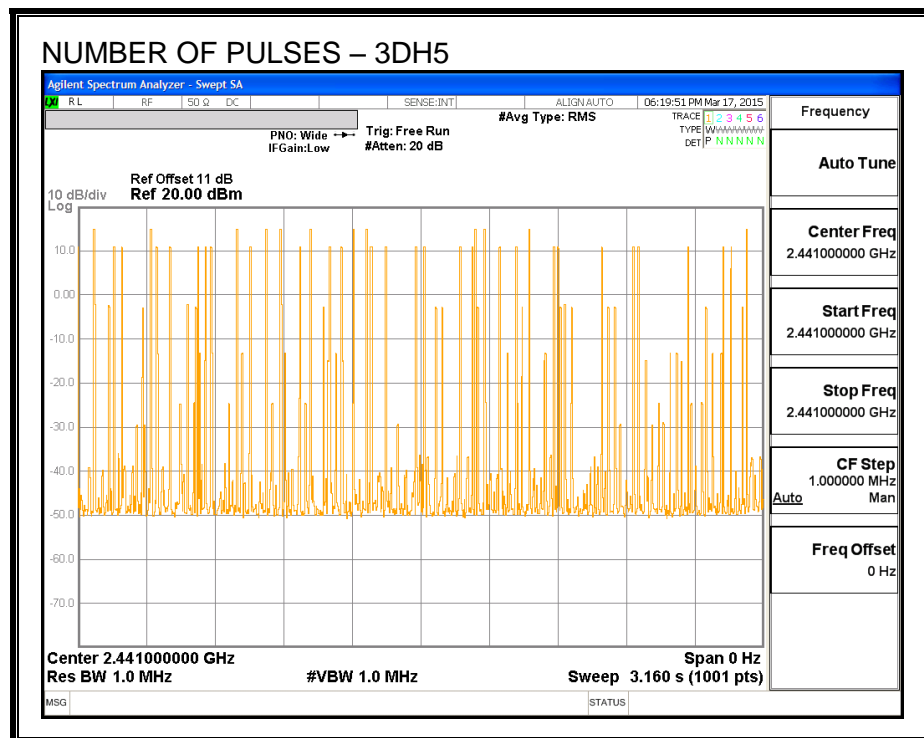
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5



7.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 (5.4) (2)

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 wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.17	21	-7.80
Middle	2441	13.50	21	-7.47
High	2480	13.53	21	-7.44

7.4.6. 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 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.95
Middle	2441	10.11
High	2480	10.15

7.4.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

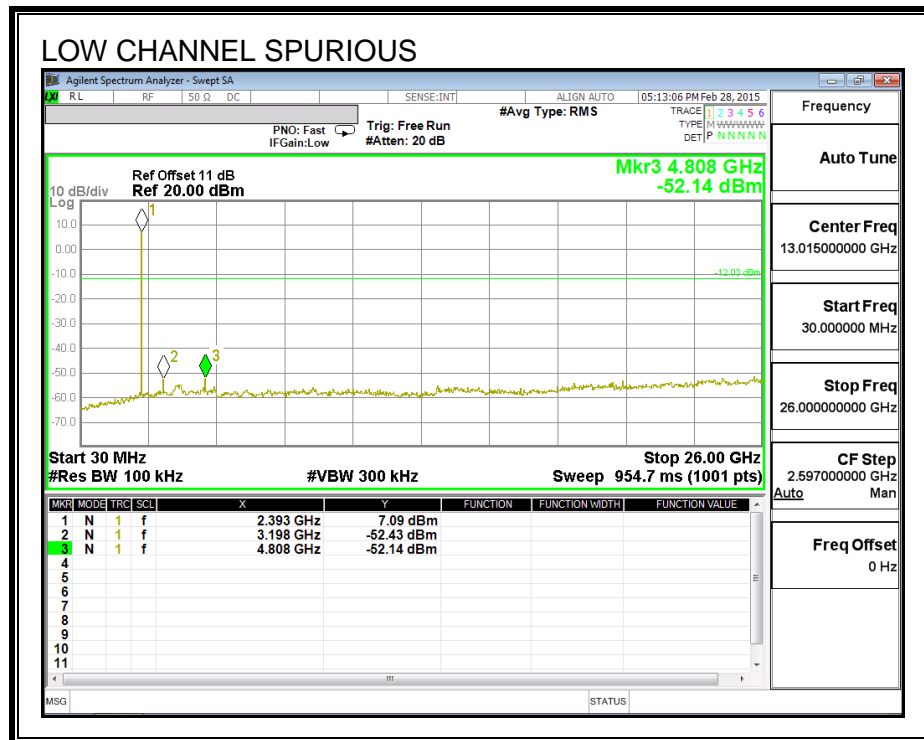
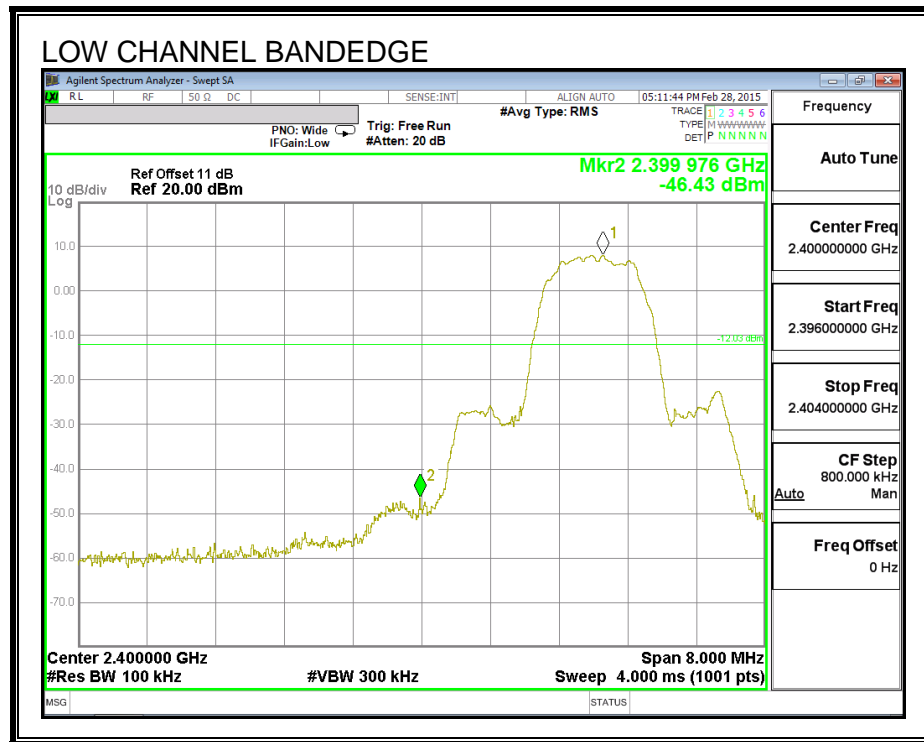
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

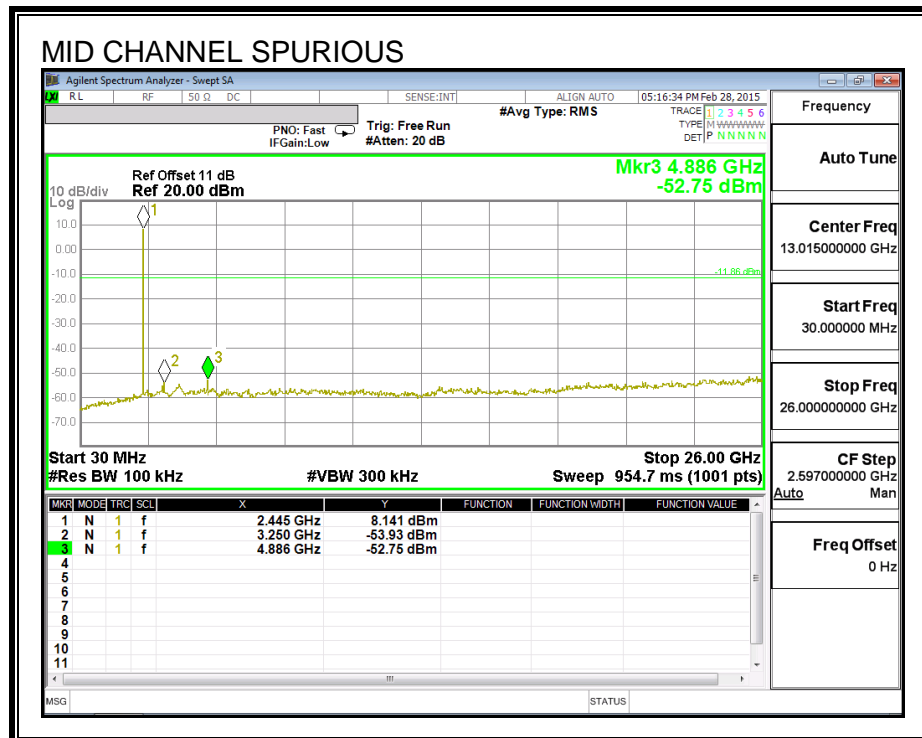
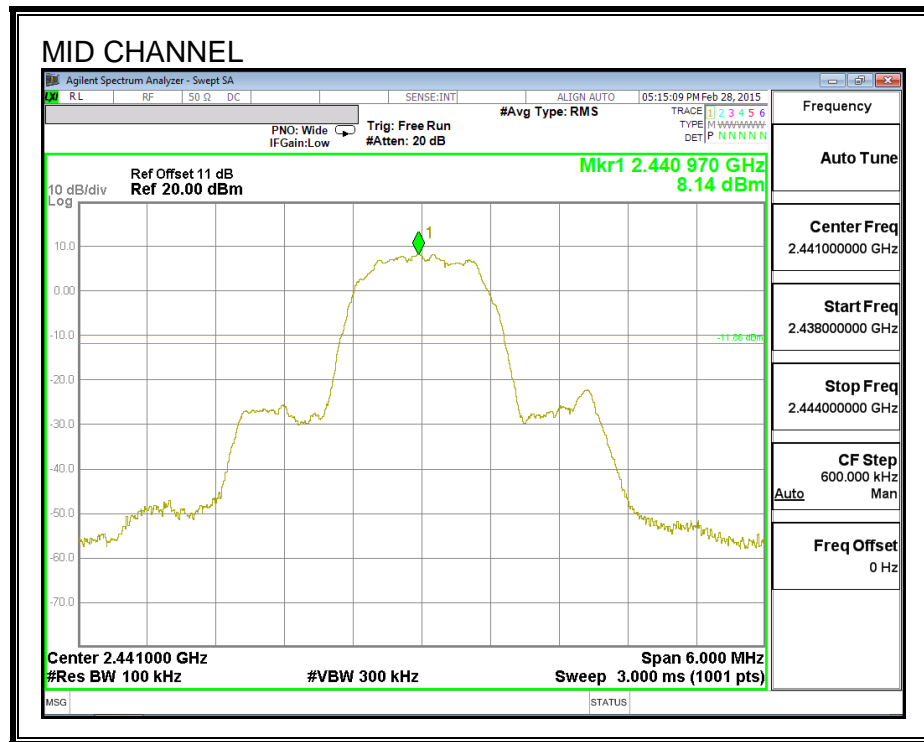
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

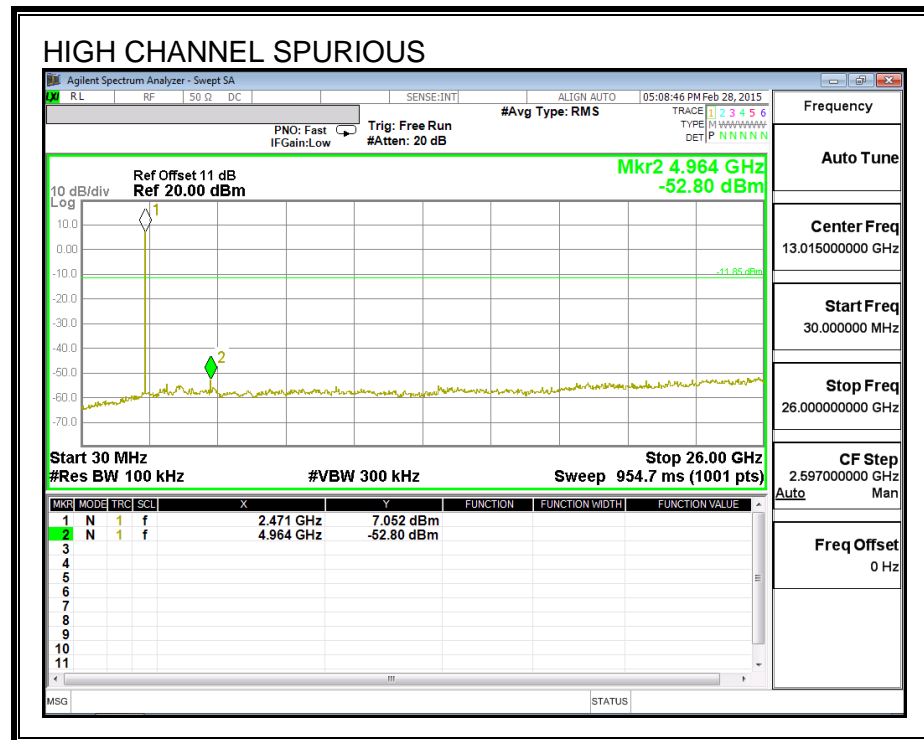
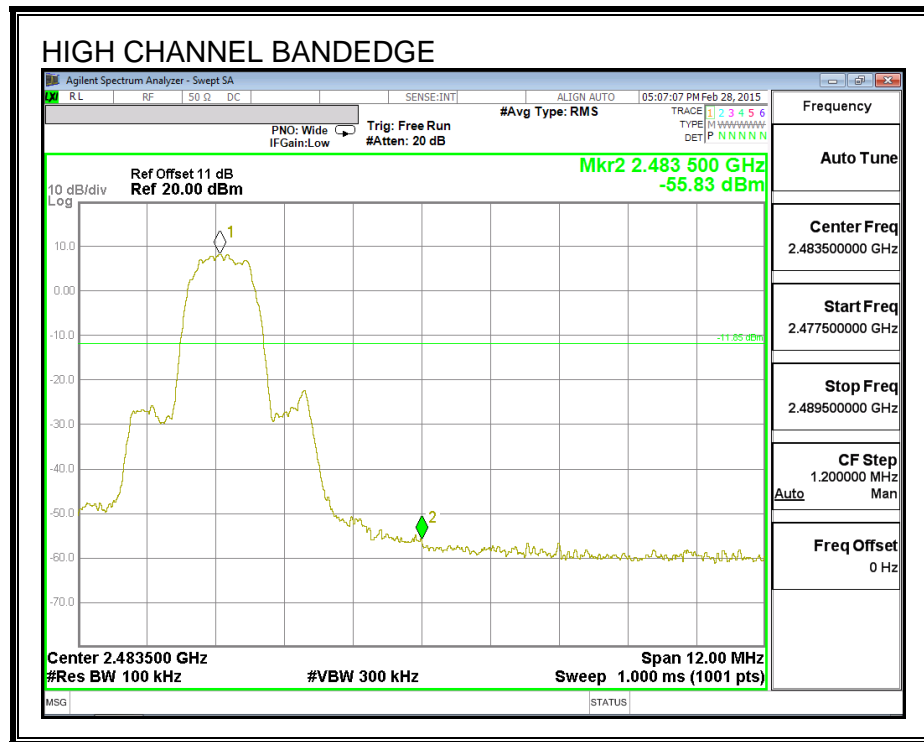
SPURIOUS EMISSIONS, LOW CHANNEL



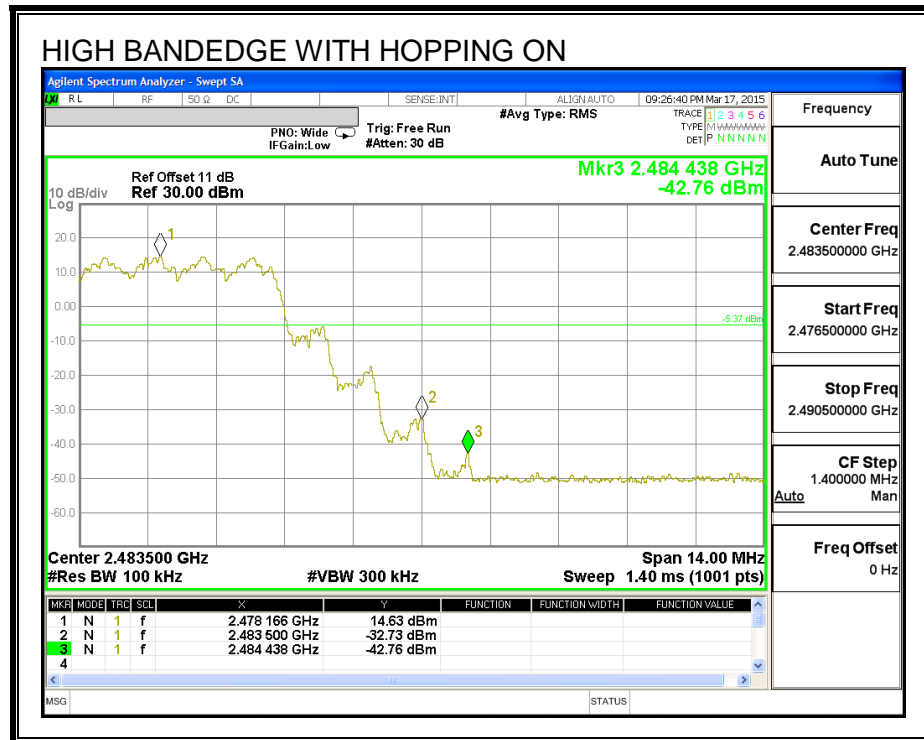
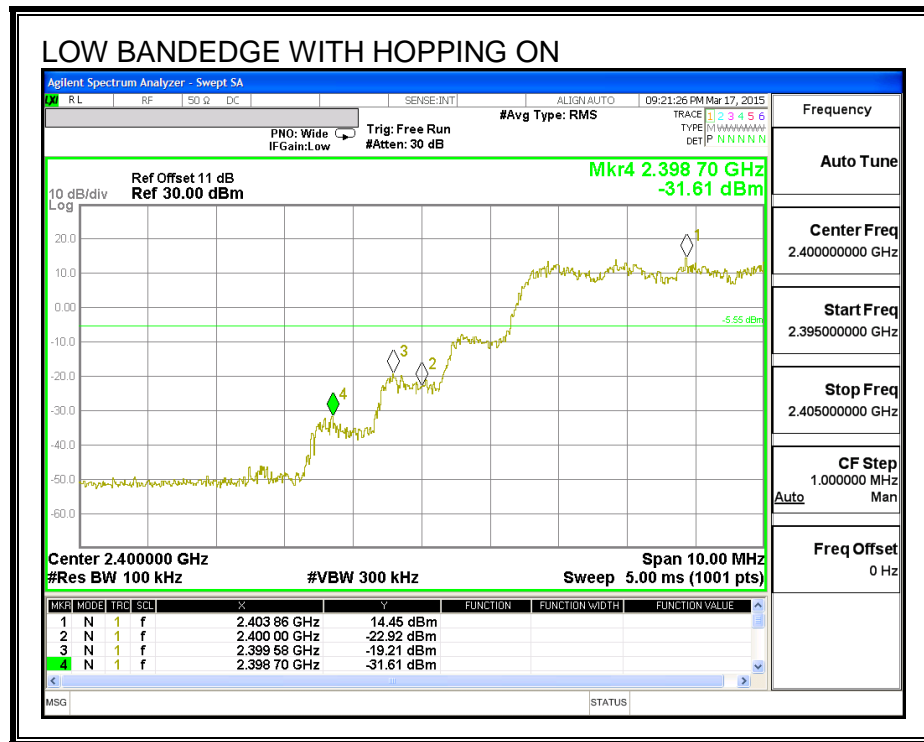
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

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 for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. 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, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T(10 Hz) video bandwidth with peak detector 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.

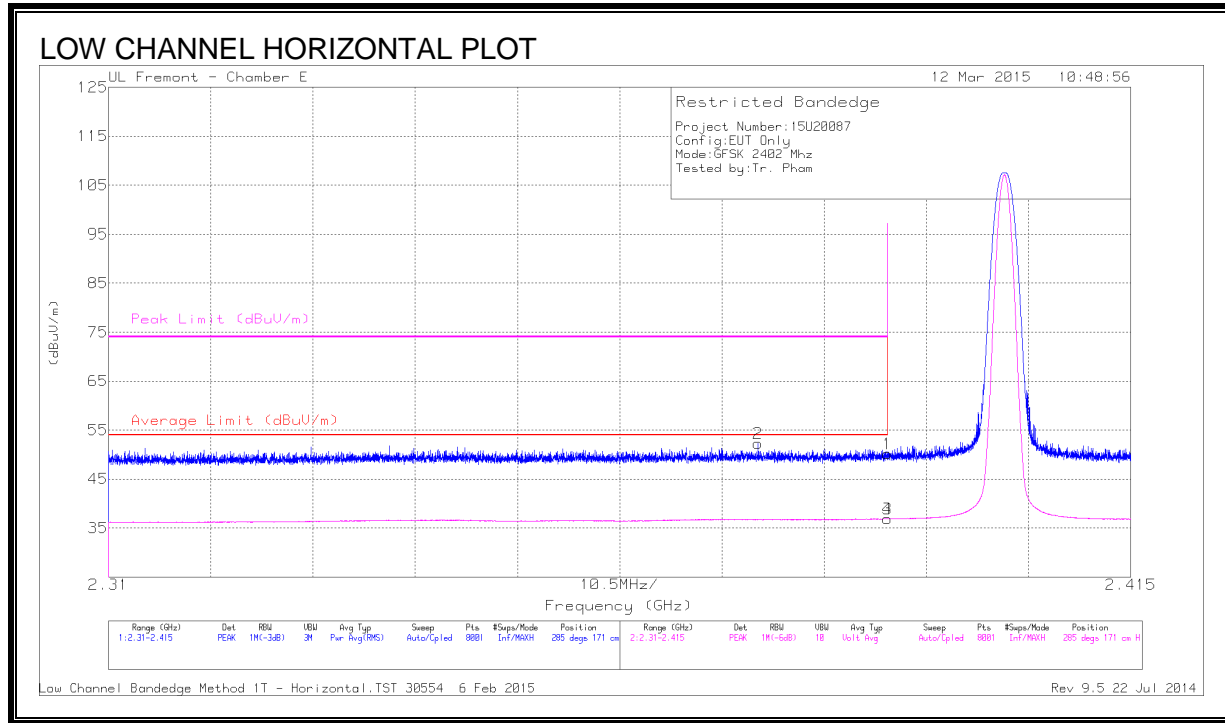
RESULTS

For the harmonic measurement, the average reading = peak reading – 20*log (1/duty cycle), and the 20*log (1/duty cycle) is greater than 20dB.

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

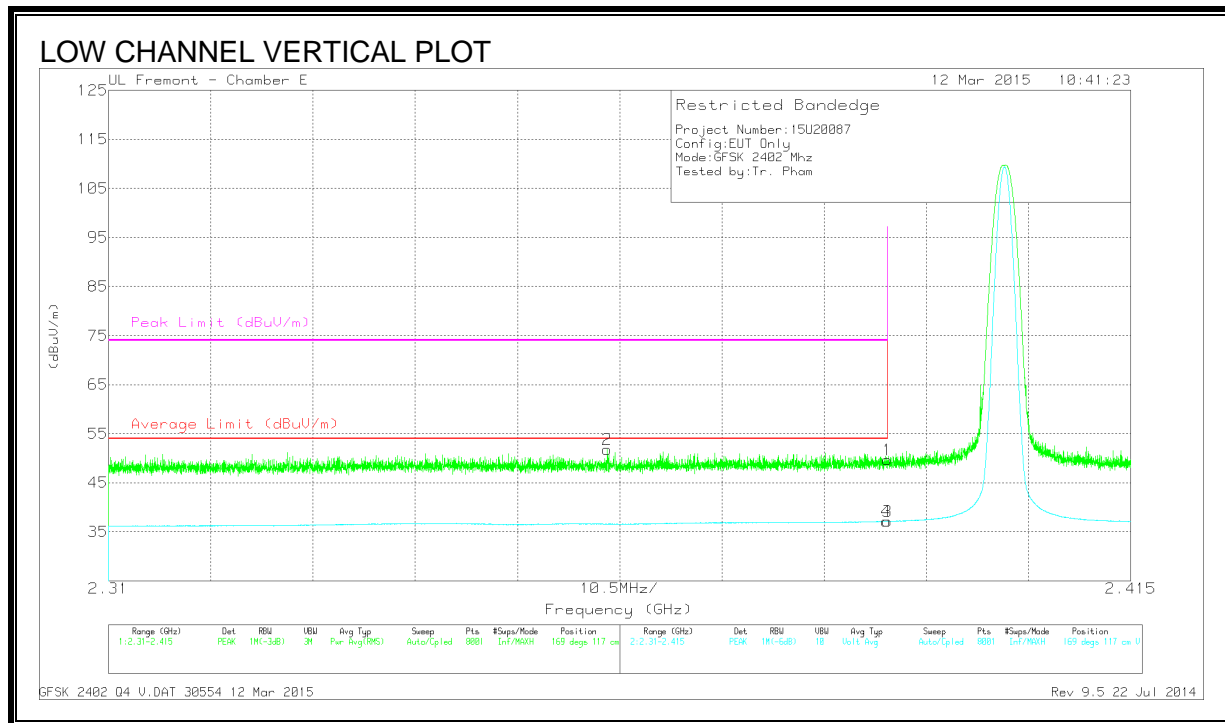
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	DC Corr (dB)	Correct ed Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.72	PK	32.1	-24.7	0	50.12	-	-	74	-23.88	285	171	H
2	* 2.377	44.88	PK	32	-24.6	0	52.28	-	-	74	-21.72	285	171	H
3	* 2.39	29.49	VB1T	32.1	-24.7	0	36.89	54	-17.11	-	-	285	171	H
4	* 2.39	29.48	VB1T	32.1	-24.7	0	36.88	54	-17.12	-	-	285	171	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



DATA

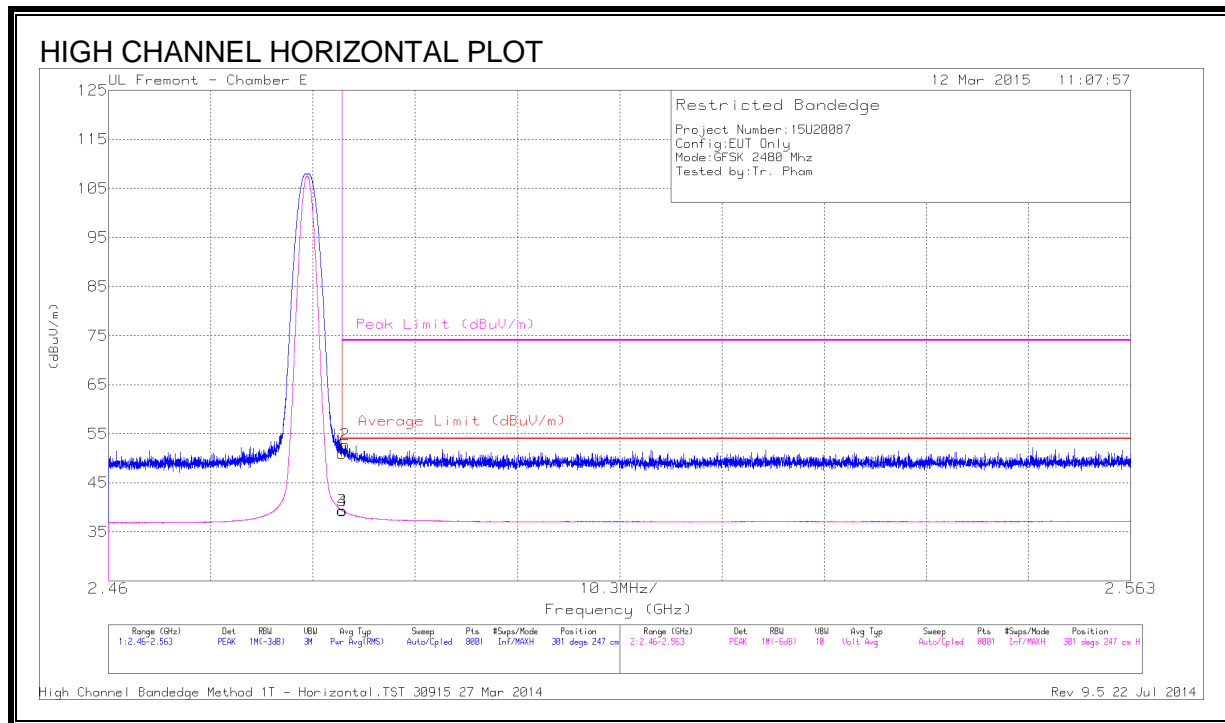
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.24	PK	32.1	-24.7	49.64	-	-	74	-24.36	169	117	V
2	* 2.361	44.62	PK	32	-24.8	51.82	-	-	74	-22.18	169	117	V
3	* 2.39	29.7	VB1T	32.1	-24.7	37.1	54	-16.9	-	-	169	117	V
4	* 2.39	29.73	VB1T	32.1	-24.7	37.13	54	-16.87	-	-	169	117	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



DATA

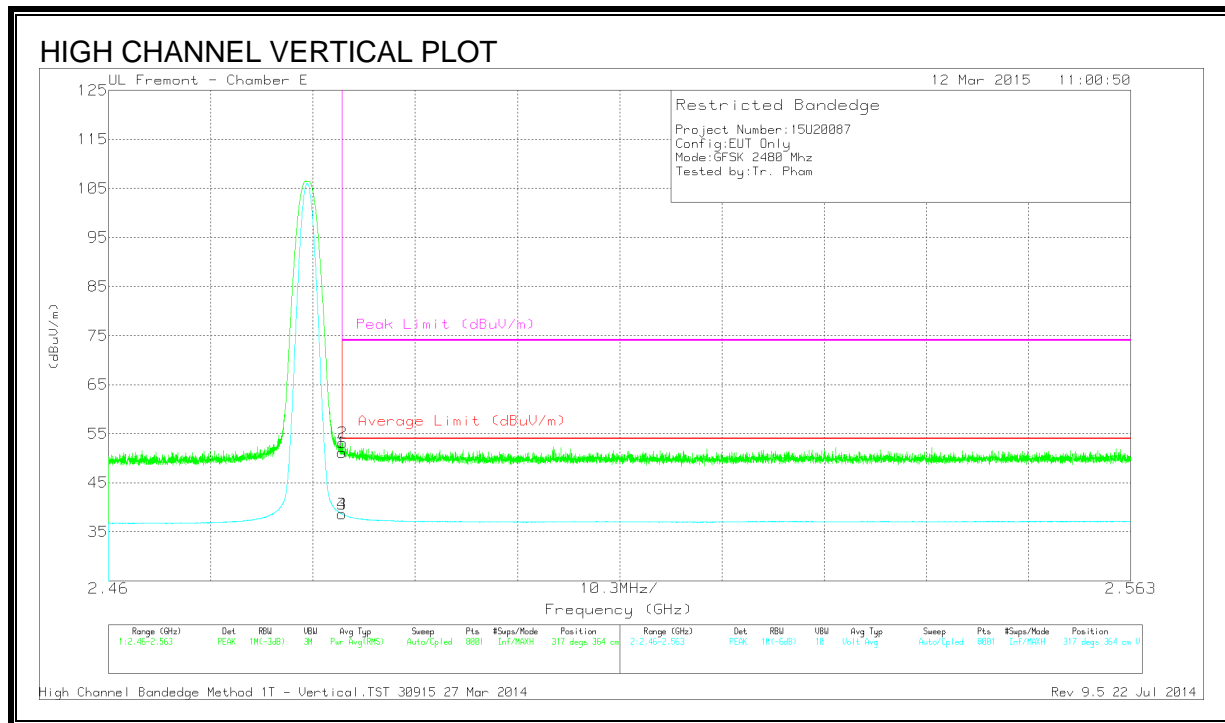
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.02	PK	32.2	-24.3	50.92	-	-	74	-23.08	301	247	H
2	* 2.484	44.82	PK	32.2	-24.3	52.72	-	-	74	-21.28	301	247	H
3	* 2.484	31.47	VB1T	32.2	-24.3	39.37	54	-14.63	-	-	301	247	H
4	* 2.484	31.39	VB1T	32.2	-24.3	39.29	54	-14.71	-	-	301	247	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



DATA

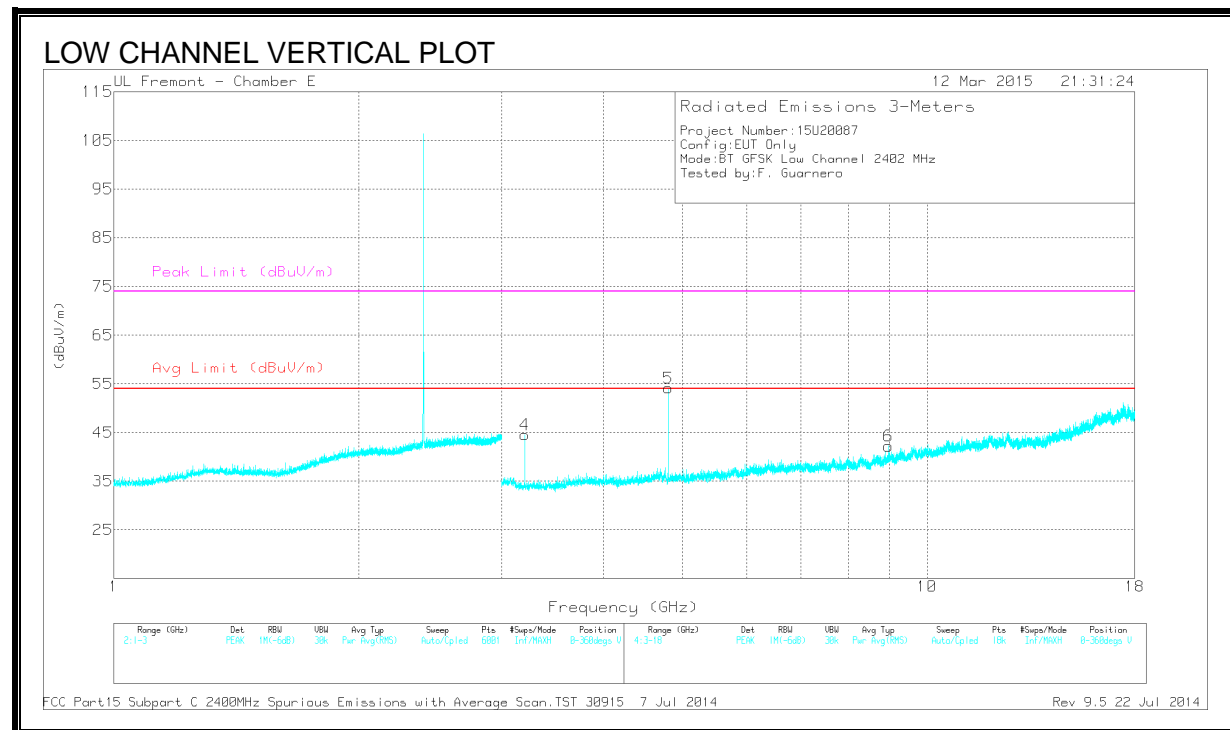
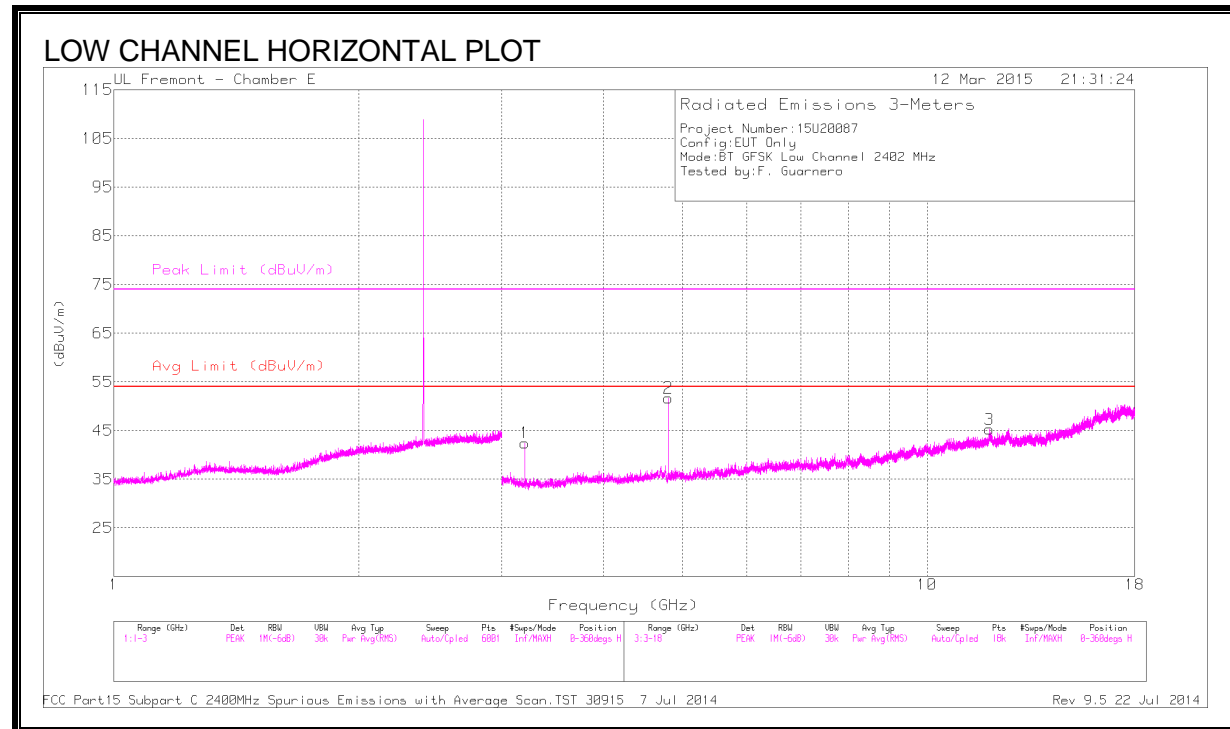
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.21	PK	32.2	-24.3	51.11	-	-	74	-22.89	317	364	V
2	* 2.484	45.2	PK	32.2	-24.3	53.1	-	-	74	-20.9	317	364	V
3	* 2.484	30.72	VB1T	32.2	-24.3	38.62	54	-15.38	-	-	317	364	V
4	* 2.484	30.73	VB1T	32.2	-24.3	38.63	54	-15.37	-	-	317	364	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HARMONICS AND SPURIOUS EMISSIONS



DATA

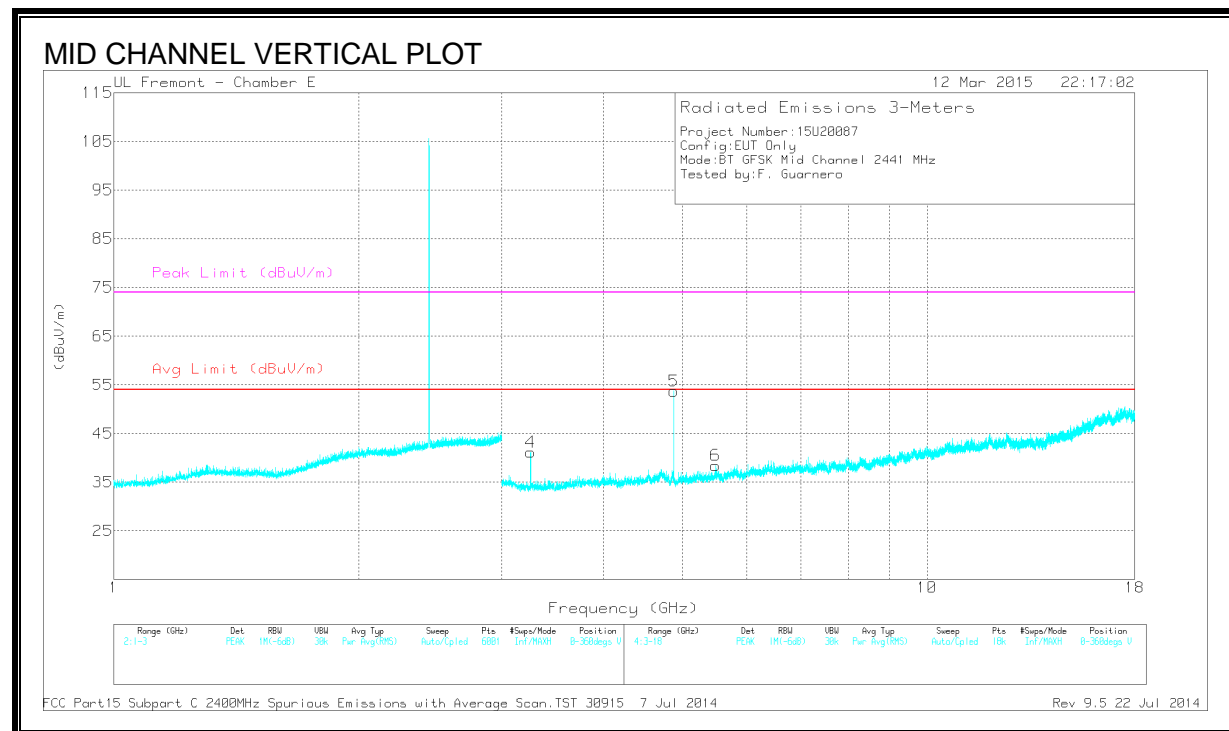
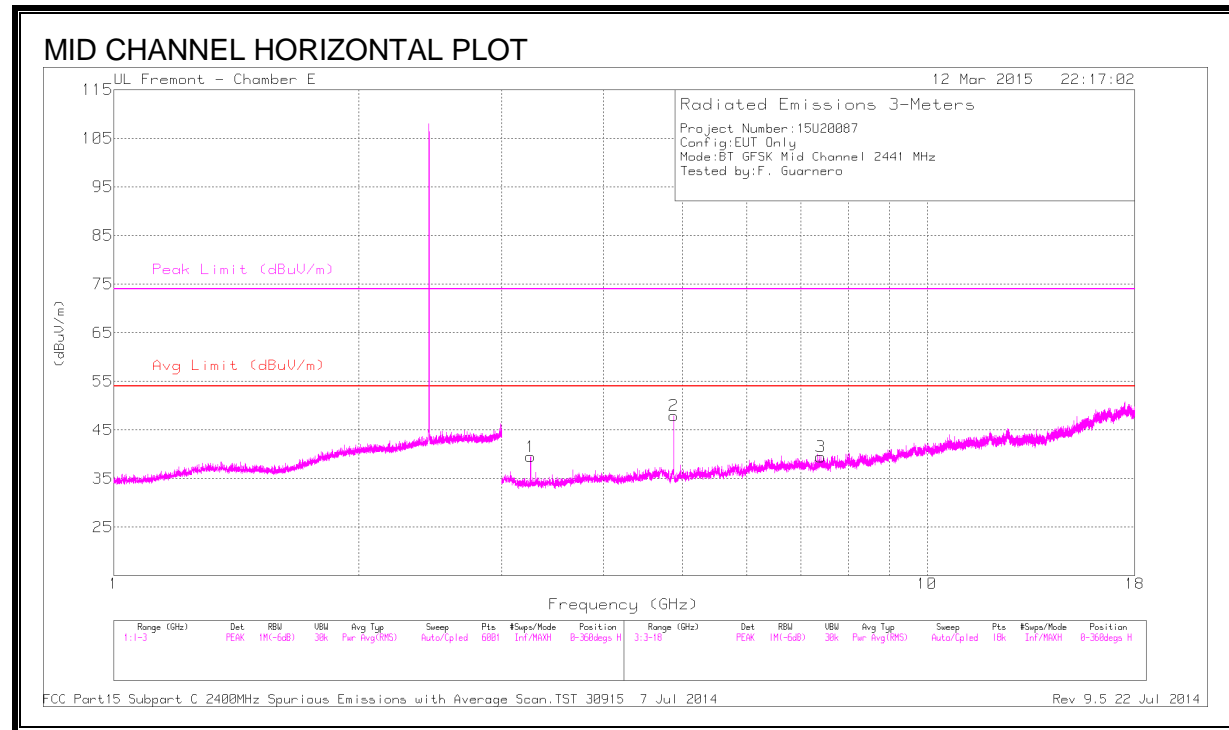
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.804	52.48	PK3	34.1	-30.9	55.68	-	-	74	-18.32	354	302	H
	* 4.804	32.48	VB10	34.1	-30.9	35.68	54	-18.32	-	-	354	302	H
3	* 11.93	36.4	PK3	38.5	-22.4	52.5	-	-	74	-21.5	5	355	H
	* 11.93	23.44	VB10	38.5	-22.4	39.54	54	-14.46	-	-	5	355	H
5	* 4.804	54.38	PK3	34.1	-30.9	57.58	-	-	74	-16.42	274	225	V
	* 4.804	34.38	VB10	34.1	-30.9	37.58	54	-16.42	-	-	274	225	V
1	3.203	47.14	PK3	32.7	-31.9	47.94	-	-	-	-	173	153	H
4	3.203	48.79	PK3	32.7	-31.9	49.59	-	-	-	-	278	155	V
6	8.967	37.58	PK3	36.2	-25.4	48.38	-	-	-	-	258	319	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS



DATA

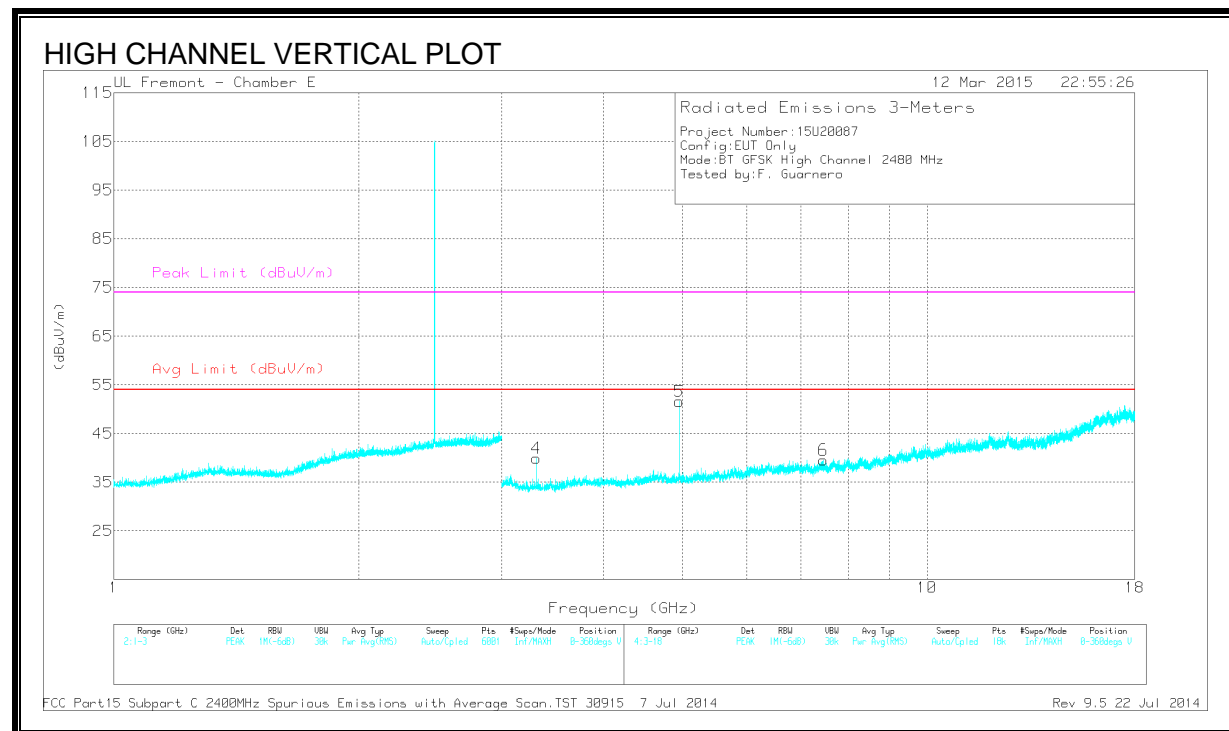
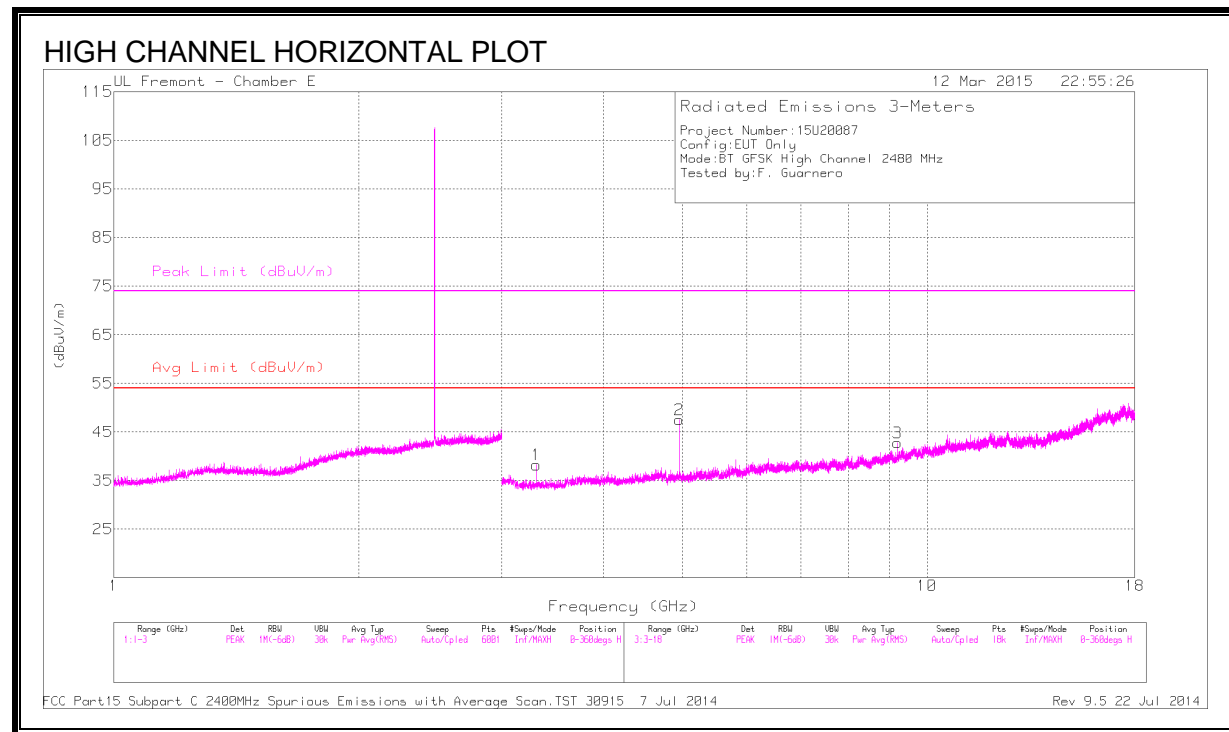
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.882	49.57	PK3	34.1	-30.9	52.77	-	-	74	-21.23	359	362	H
	* 4.882	29.57	VB10	34.1	-30.9	32.77	54	-21.23	-	-	359	362	H
3	* 7.399	38.36	PK3	35.5	-27.1	46.76	-	-	74	-27.24	18	365	H
	* 7.4	25.74	VB10	35.5	-27.2	34.04	54	-19.96	-	-	18	365	H
5	* 4.882	53.67	PK3	34.1	-30.9	56.87	-	-	74	-17.13	263	221	V
	* 4.882	33.67	VB10	34.1	-30.9	36.87	54	-17.13	-	-	263	221	V
1	3.255	46.68	PK3	32.7	-32.1	47.28	-	-	-	-	174	177	H
4	3.255	47.04	PK3	32.7	-32.1	47.64	-	-	-	-	274	150	V
6	5.493	40.63	PK3	34.6	-30	45.23	-	-	-	-	297	388	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.96	48.73	PK3	34.1	-30.2	52.63	-	-	74	-21.37	345	322	H
	* 4.96	28.73	VB10	34.1	-30.2	32.63	54	-21.37	-	-	345	322	H
3	* 9.193	38.28	PK3	36.4	-25.6	49.08	-	-	74	-24.92	360	239	H
	* 9.193	18.28	VB10	36.4	-25.6	29.08	54	-24.92	-	-	360	239	H
5	* 4.959	50.74	PK3	34.1	-30.2	54.64	-	-	74	-19.36	240	291	V
	* 4.96	30.74	VB10	34.1	-30.2	34.64	54	-19.36	-	-	240	291	V
6	* 7.456	32.45	PK	35.6	-28.5	39.55	-	-	74	-34.45	256	105	V
	7.457	23.46	VB10	35.6	-28.5	30.56	54	-23.44			256	105	V
4	3.306	45.23	PK3	32.7	-31.4	46.53	-	-	-	-	281	171	V
1	3.307	44.47	PK3	32.7	-31.4	45.77	-	-	-	-	171	173	H

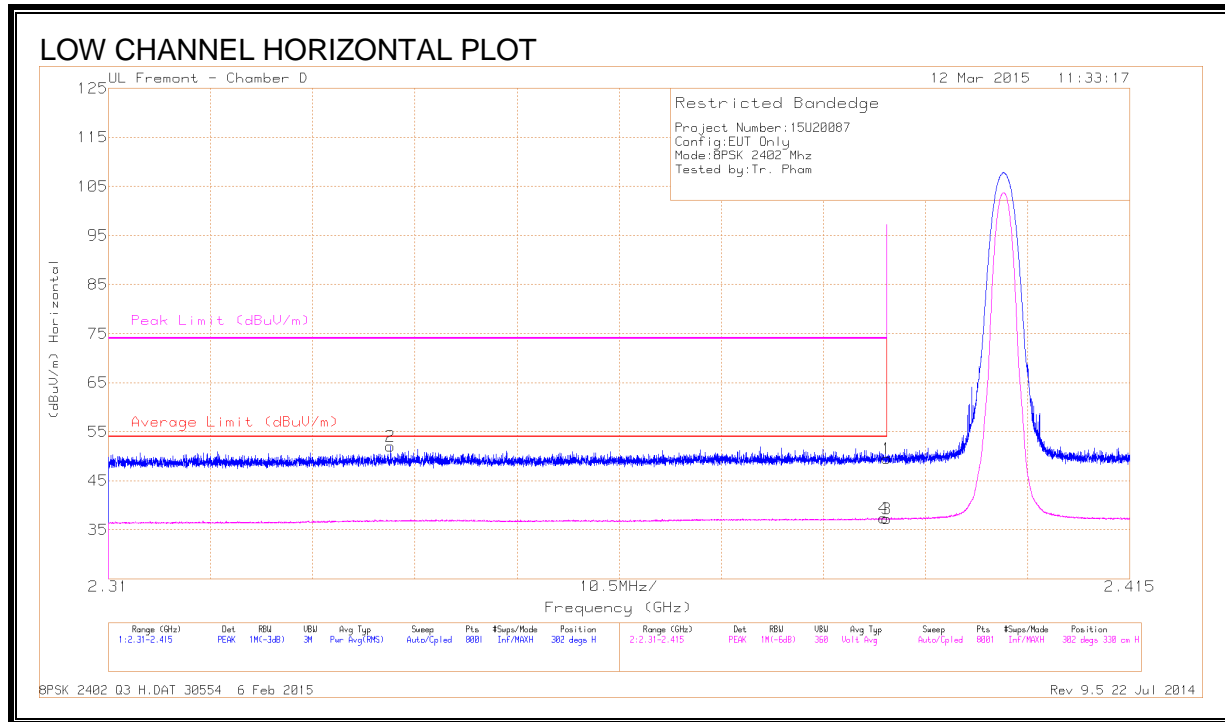
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

8.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

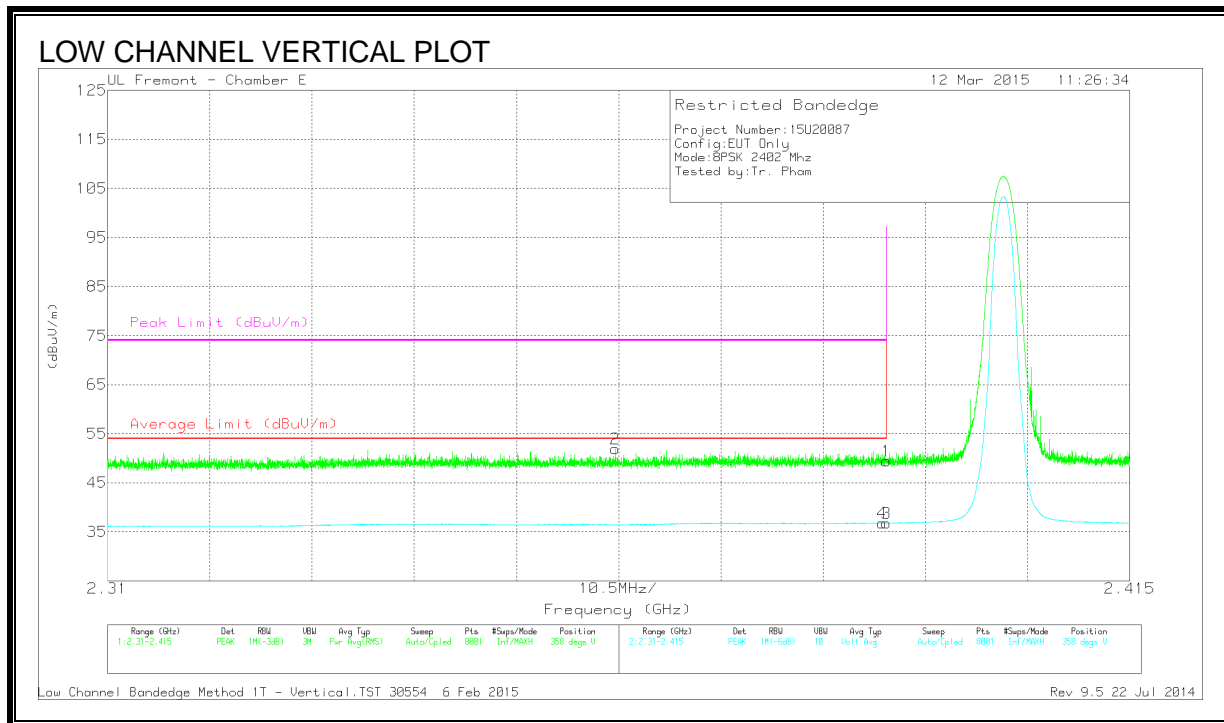
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.339	44.6	PK	32	-24.6	0	52	-	-	74	-22	302	330	H
1	* 2.39	42.13	PK	32.1	-24.7	0	49.53	-	-	74	-24.47	302	330	H
3	* 2.39	29.81	VB1T	32.1	-24.7	0	37.21	54	-16.79	-	-	302	330	H
4	* 2.39	29.98	VB1T	32.1	-24.7	0	37.38	54	-16.62	-	-	302	330	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



DATA

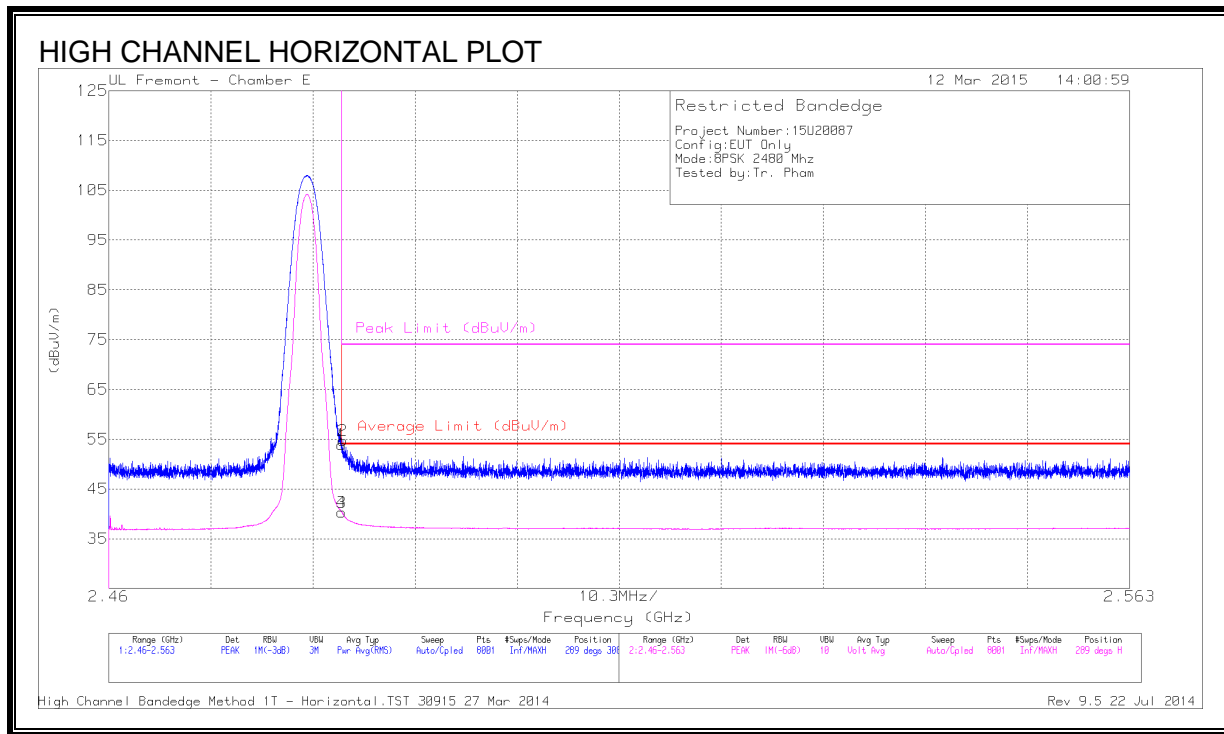
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.99	PK	32.1	-24.7	49.39	-	-	74	-24.61	358	324	V
2	* 2.362	44.66	PK	32	-24.7	51.96	-	-	74	-22.04	358	324	V
3	* 2.39	29.37	VB1T	32.1	-24.7	36.77	54	-17.23	-	-	358	324	V
4	* 2.39	29.41	VB1T	32.1	-24.7	36.81	54	-17.19	-	-	358	324	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



DATA

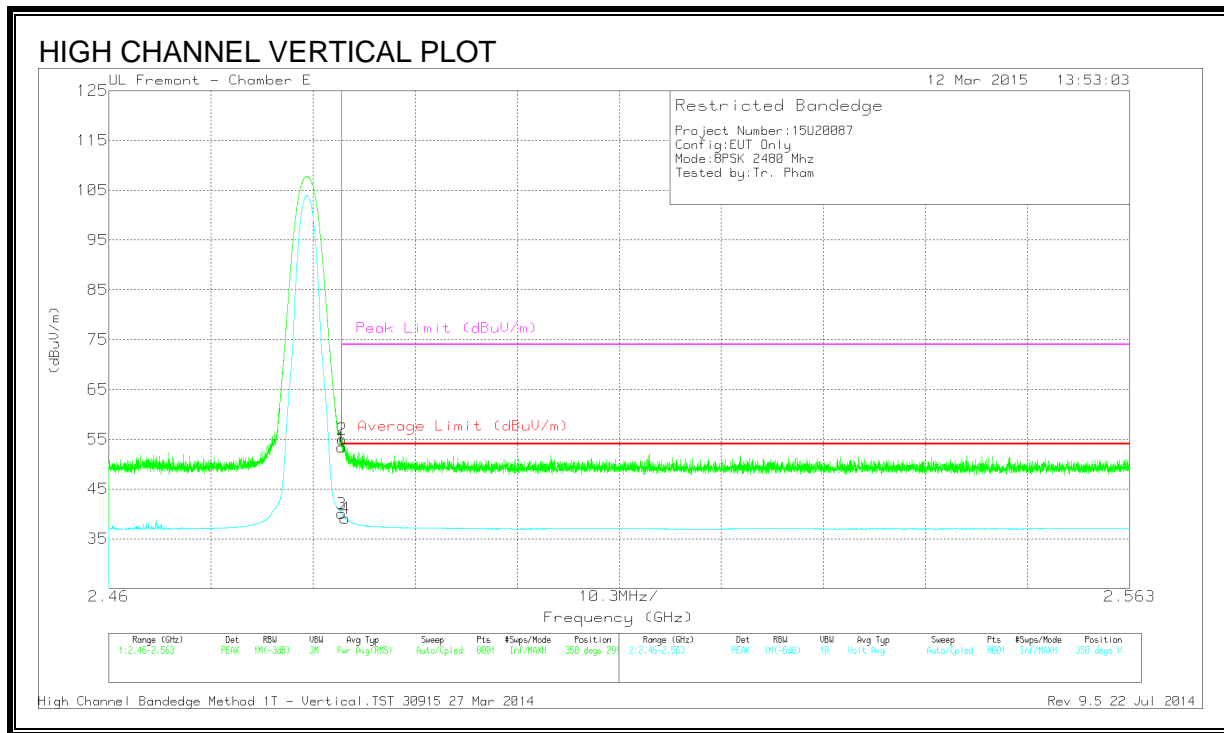
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46	PK	32.2	-24.3	53.9	-	-	74	-20.1	289	308	H
2	* 2.484	46.79	PK	32.2	-24.3	54.69	-	-	74	-19.31	289	308	H
3	* 2.484	32.42	VB1T	32.2	-24.3	40.32	54	-13.68	-	-	289	308	H
4	* 2.484	32.42	VB1T	32.2	-24.3	40.32	54	-13.68	-	-	289	308	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



DATA

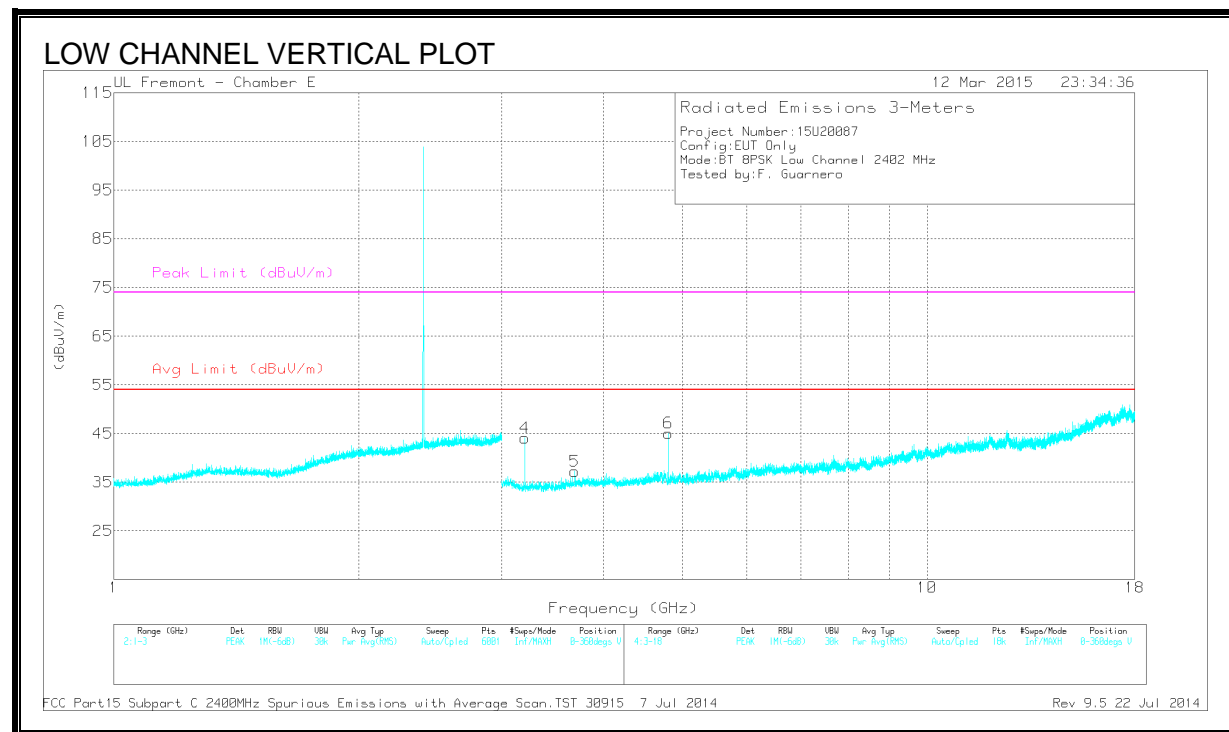
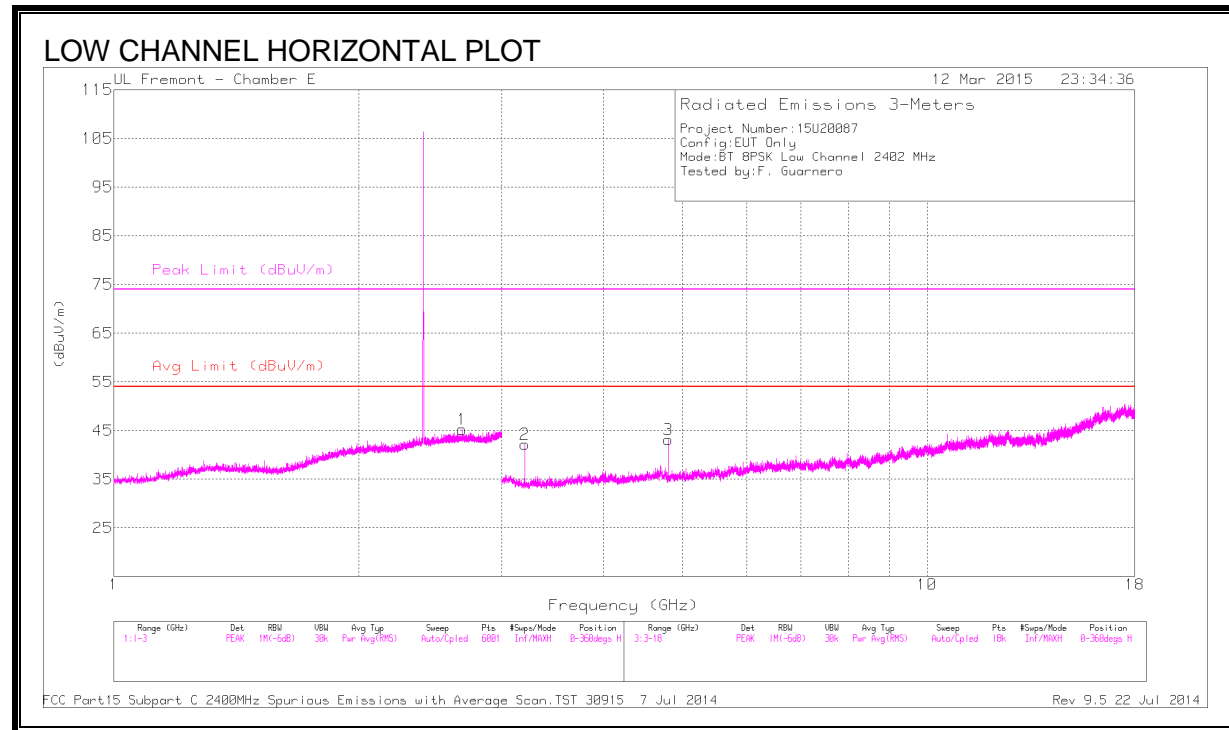
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl /Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.48	PK	32.2	-24.3	53.38	-	-	74	-20.62	350	299	V
2	* 2.484	47.09	PK	32.2	-24.3	54.99	-	-	74	-19.01	350	299	V
3	* 2.484	32.14	VB1T	32.2	-24.3	40.04	54	-13.96	-	-	350	299	V
4	* 2.484	31.21	VB1T	32.2	-24.3	39.11	54	-14.89	-	-	350	299	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HARMONICS AND SPURIOUS EMISSIONS



DATA

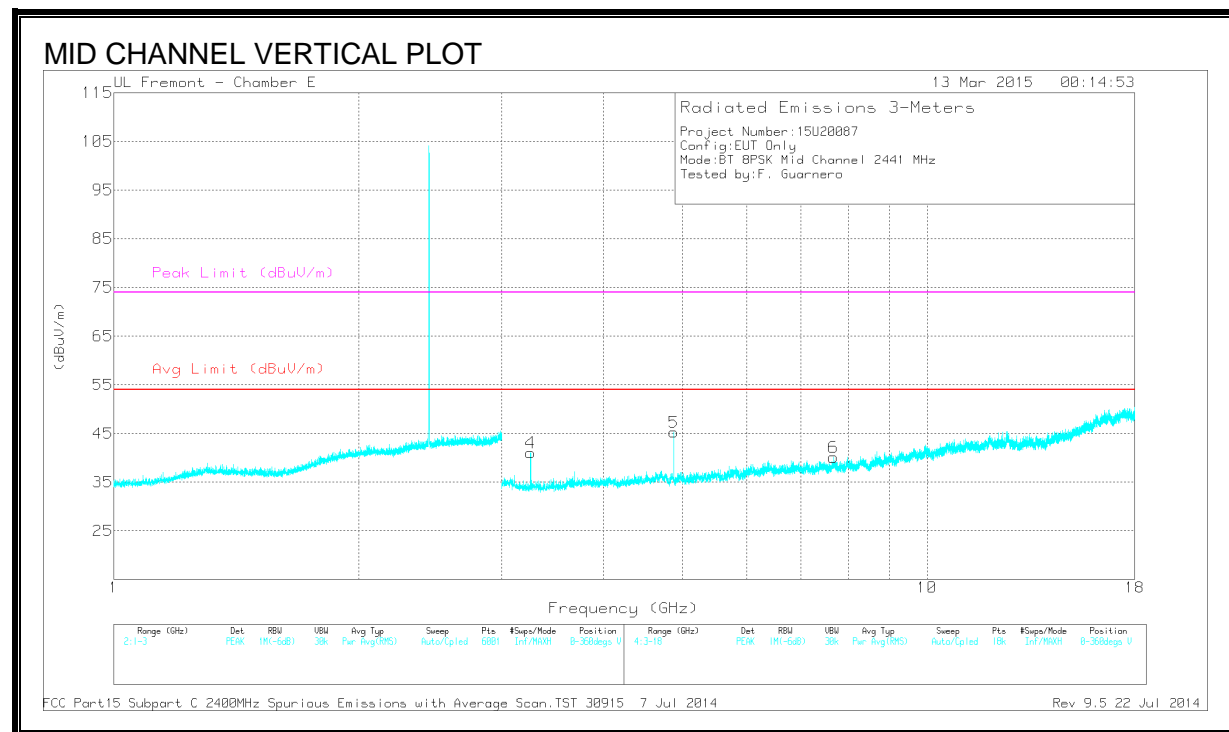
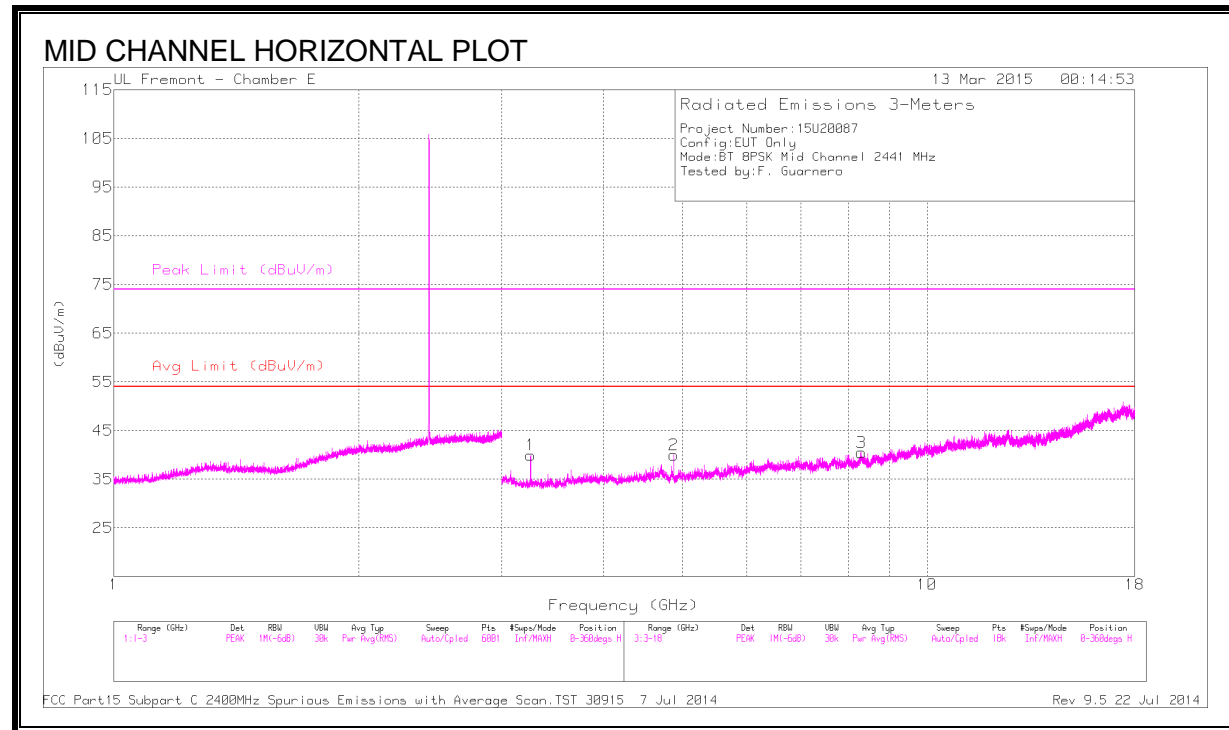
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.682	44.04	PK3	32.4	-23.9	52.54	-	-	74	-21.46	287	171	H
	* 2.683	30.33	VB10	32.4	-23.9	38.83	54	-15.17	-	-	287	171	H
3	* 4.804	47.29	PK3	34.1	-30.9	50.49	-	-	74	-23.51	353	302	H
	* 4.804	27.29	VB10	34.1	-30.9	30.49	54	-23.51	-	-	353	302	H
5	* 3.692	41.27	PK3	33.2	-30.7	43.77	-	-	74	-30.23	5	209	V
	* 3.688	28.23	VB10	33.2	-30.8	30.63	54	-23.37	-	-	5	209	V
6	* 4.804	48.7	PK3	34.1	-30.9	51.9	-	-	74	-22.1	268	280	V
	* 4.804	28.7	VB10	34.1	-30.9	31.9	54	-22.1	-	-	268	280	V
2	3.203	47.74	PK3	32.7	-31.9	48.54	-	-	-	-	168	150	H
4	3.203	49.03	PK3	32.7	-31.9	49.83	-	-	-	-	282	155	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS



DATA

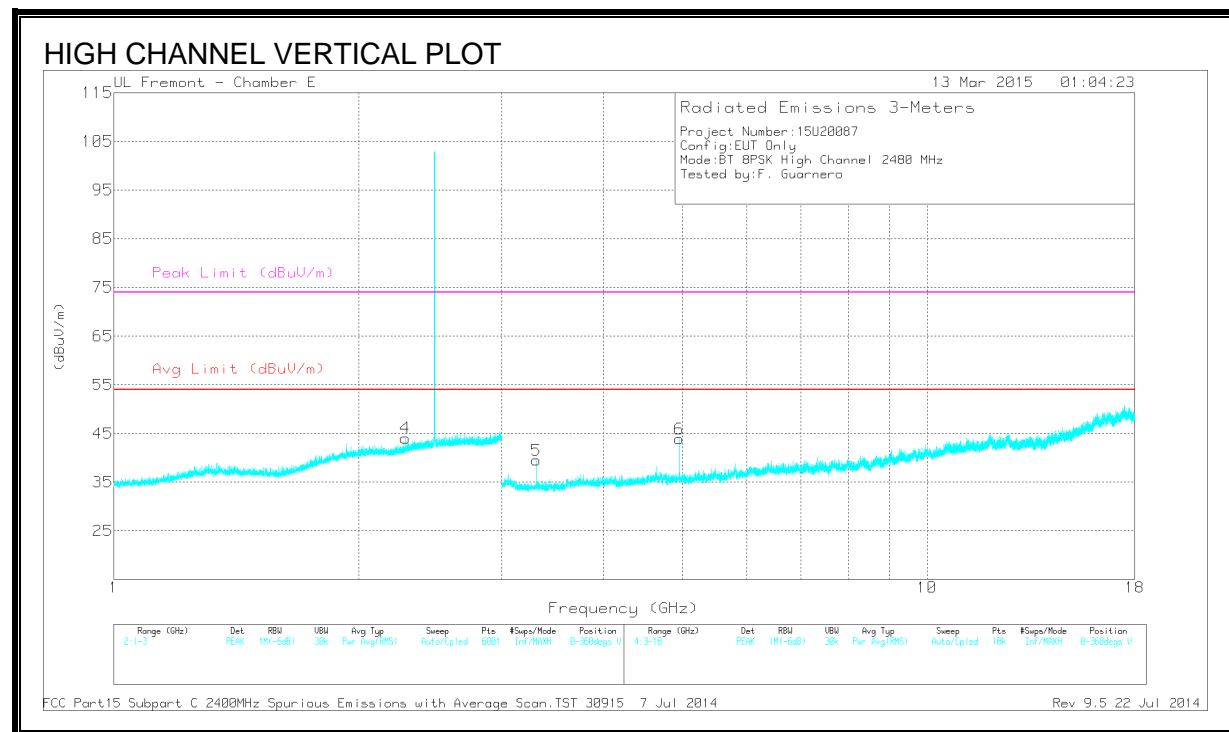
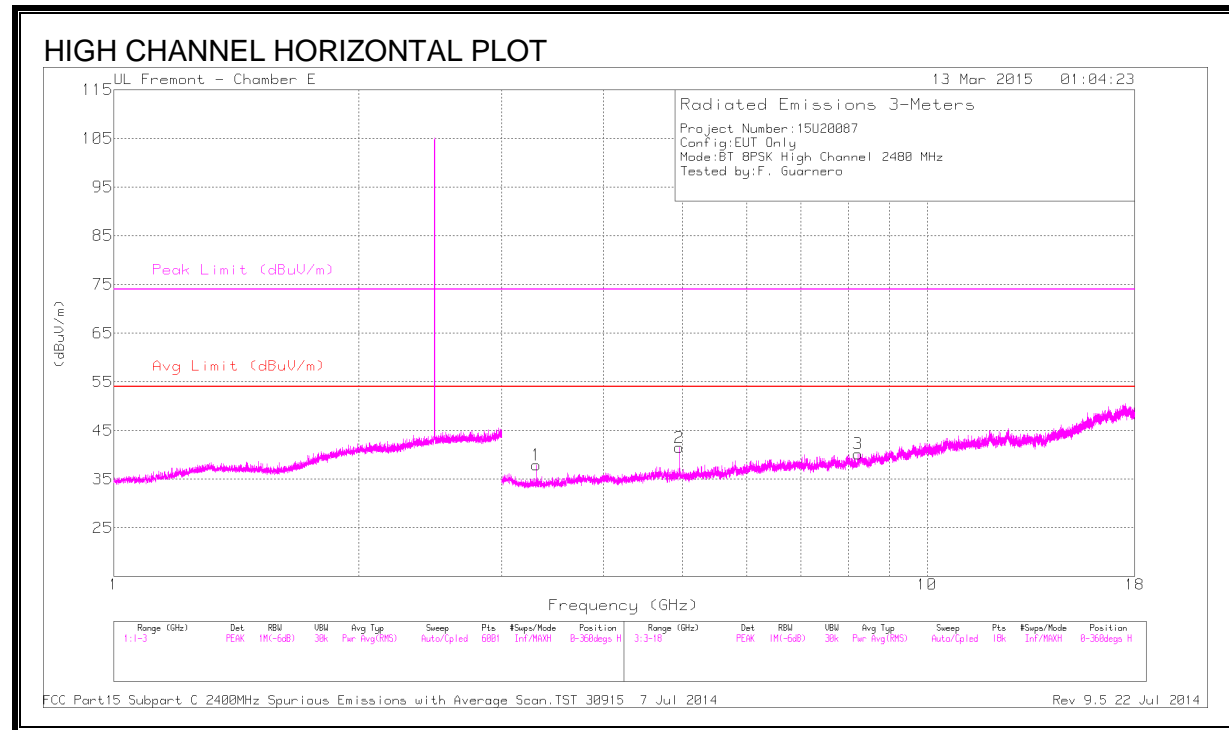
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.882	45.18	PK3	34.1	-30.9	48.38	-	-	74	-25.62	0	363	H
	* 4.882	25.18	VB10	34.1	-30.9	28.38	54	-25.62	-	-	0	363	H
3	* 8.302	37.78	PK3	35.7	-26.2	47.28	-	-	74	-26.72	272	383	H
	* 8.302	25.3	VB10	35.7	-26.2	34.8	54	-19.2	-	-	272	383	H
5	* 4.882	48.12	PK3	34.1	-30.9	51.32	-	-	74	-22.68	258	223	V
	* 4.882	28.12	VB10	34.1	-30.9	31.32	54	-22.68	-	-	258	223	V
6	* 7.672	38.03	PK3	35.8	-26.6	47.23	-	-	74	-26.77	46	334	V
	* 7.671	25.17	VB10	35.8	-26.6	34.37	54	-19.63	-	-	46	334	V
1	3.255	47.24	PK3	32.7	-32.1	47.84	-	-	-	-	171	177	H
4	3.255	47.59	PK3	32.7	-32.1	48.19	-	-	-	-	275	150	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

HARMONICS AND SPURIOUS EMISSIONS



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.285	44.03	PK3	31.8	-25.1	50.73	-	-	74	-23.27	116	108	V
	* 2.285	30.81	VB10	31.8	-25.1	37.51	54	-16.49	-	-	116	108	V
2	* 4.96	45.31	PK3	34.1	-30.2	49.21	-	-	74	-24.79	199	324	H
	* 4.96	25.31	VB10	34.1	-30.2	29.21	54	-24.79	-	-	199	324	H
3	* 8.226	38.58	PK3	35.7	-27.1	47.18	-	-	74	-26.82	209	179	H
	* 8.225	25.72	VB10	35.7	-27.1	34.32	54	-19.68	-	-	209	179	H
6	* 4.96	45.91	PK3	34.1	-30.2	49.81	-	-	74	-24.19	249	239	V
	* 4.96	25.91	VB10	34.1	-30.2	29.81	54	-24.19	-	-	249	239	V
5	3.306	45.28	PK3	32.7	-31.4	46.58	-	-	-	-	274	173	V
1	3.307	43.82	PK3	32.7	-31.4	45.12	-	-	-	-	175	203	H

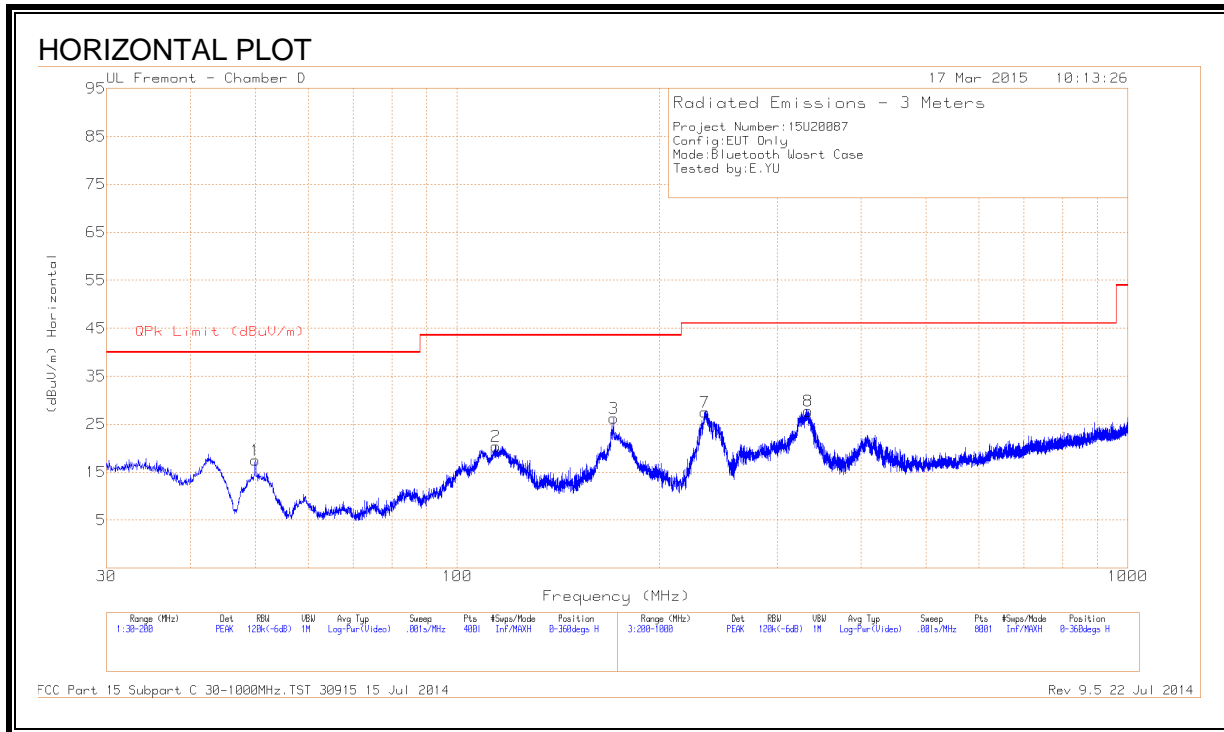
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

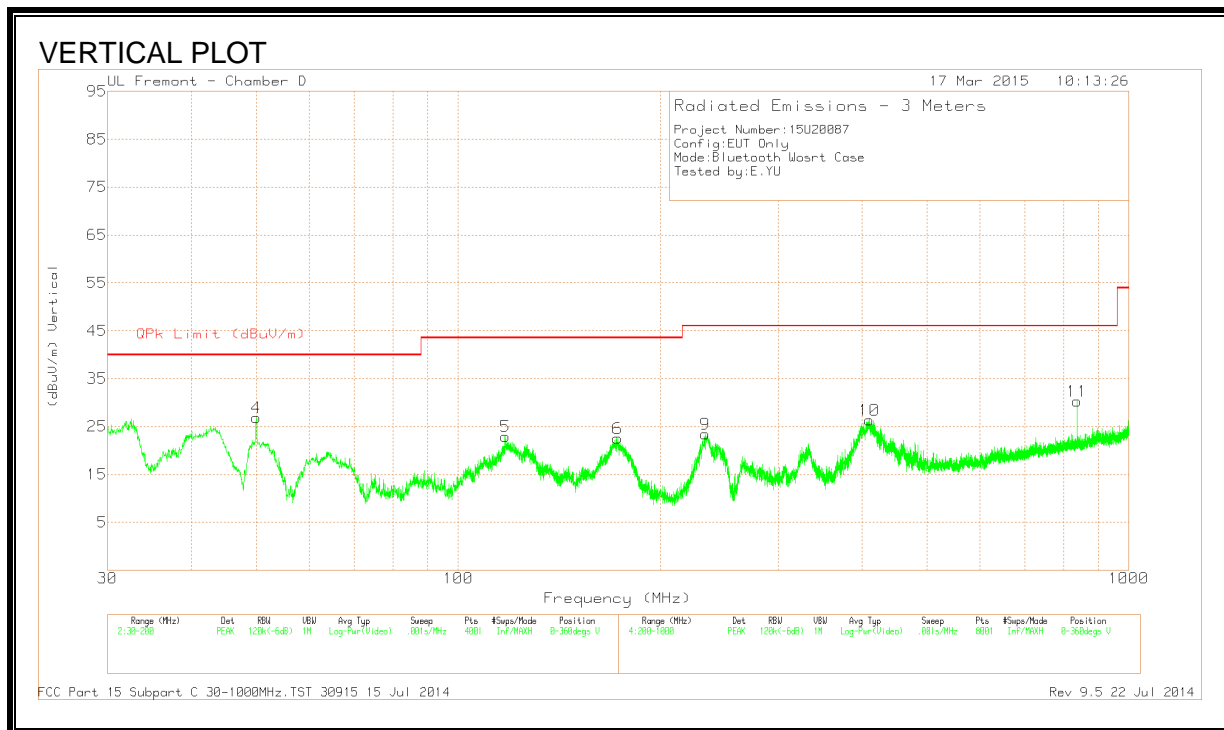
VB10Hz - FHSS Method: 10Hz Video Bandwidth

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)



DATA

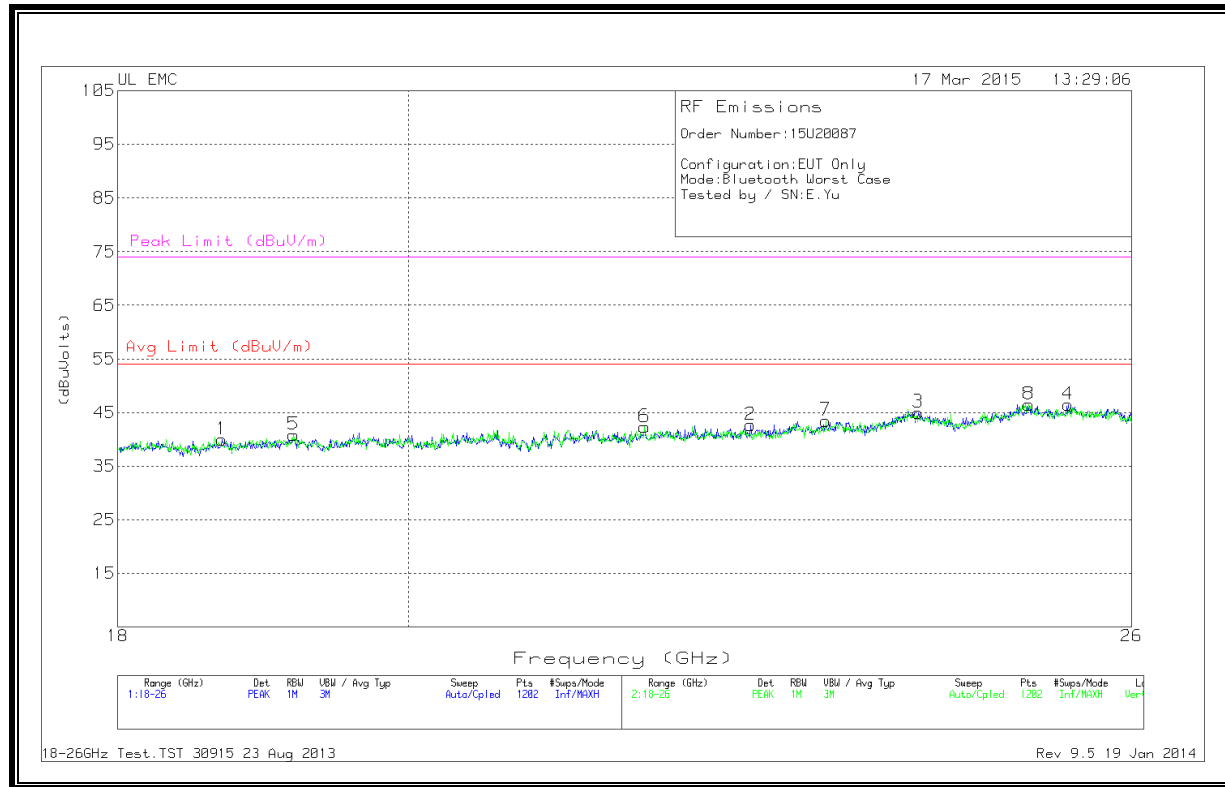
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T407 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 114.2775	38.53	PK	13.2	-31.3	20.43	43.52	-23.09	0-360	301	H
3	* 171.1	45.75	PK	11.5	-31	26.25	43.52	-17.27	0-360	98	H
5	* 117.635	40.58	PK	13.6	-31.2	22.98	43.52	-20.54	0-360	100	V
6	* 172.8	42.06	PK	11.5	-31	22.56	43.52	-20.96	0-360	100	V
8	* 333.9	43.9	PK	14	-30.2	27.7	46.02	-18.32	0-360	100	H
1	50.0175	41.07	PK	8.1	-31.7	17.47	40	-22.53	0-360	401	H
4	50.0175	50.46	PK	8.1	-31.7	26.86	40	-13.14	0-360	100	V
9	233.7	42.87	PK	11.2	-30.6	23.47	46.02	-22.55	0-360	201	V
7	234.2	46.75	PK	11.3	-30.6	27.45	46.02	-18.57	0-360	100	H
10	410.4	40.9	PK	15.4	-29.9	26.4	46.02	-19.62	0-360	100	V
11	836.6	37.84	PK	21.3	-28.8	30.34	46.02	-15.68	0-360	301	V

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

8.4. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)



Data

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.693	41.2	PK	32.7	-24.4	-9.5	40	54	-14	74	-34
2	22.643	42.17	PK	33.8	-23.8	-9.5	42.67	54	-11.33	74	-31.38
3	24.062	42.9	PK	34.2	-22.6	-9.5	45	54	-9	74	-29
4	25.407	44.2	PK	34.6	-22.8	-9.5	46.5	54	-7.5	74	-27.5
5	19.186	40.93	PK	32.9	-23.5	-9.5	40.83	54	-13.17	74	-33.17
6	21.79	41.33	PK	33.7	-23.2	-9.5	42.33	54	-11.67	74	-31.67
7	23.269	42.2	PK	33.8	-23	-9.5	43.5	54	-10.5	74	-30.5
8	25.047	44.1	PK	34.5	-22.6	-9.5	46.5	54	-7.5	74	-27.5

PK - Peak detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of emission (MHz)	Conducted limit (dBμV)	
	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 C63.10.

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

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

RESULTS

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.1545	49.39	Pk	1.3	0	50.69	-	-	55.75	-5.06
2	.1545	27.24	Av	1.3	0	28.54	65.75	-37.21	55.75	-27.21
3	.8205	24.62	Pk	.3	0	24.92	-	-	46	-21.08
4	.8115	14.79	Av	.3	0	15.09	56	-40.91	46	-30.91
5	4.8525	31.5	Pk	.2	.1	31.8	-	-	46	-14.2
6	4.857	12.67	Av	.2	.1	12.97	56	-43.03	46	-33.03
7	12.129	39.94	Pk	.2	.2	40.34	-	-	50	-9.66
8	11.9445	24.88	Av	.2	.2	25.28	60	-34.72	50	-24.72
9	24.1125	38.96	Pk	.3	.2	39.46	-	-	50	-10.54
10	24	32.64	Av	.3	.2	33.14	60	-26.86	50	-16.86

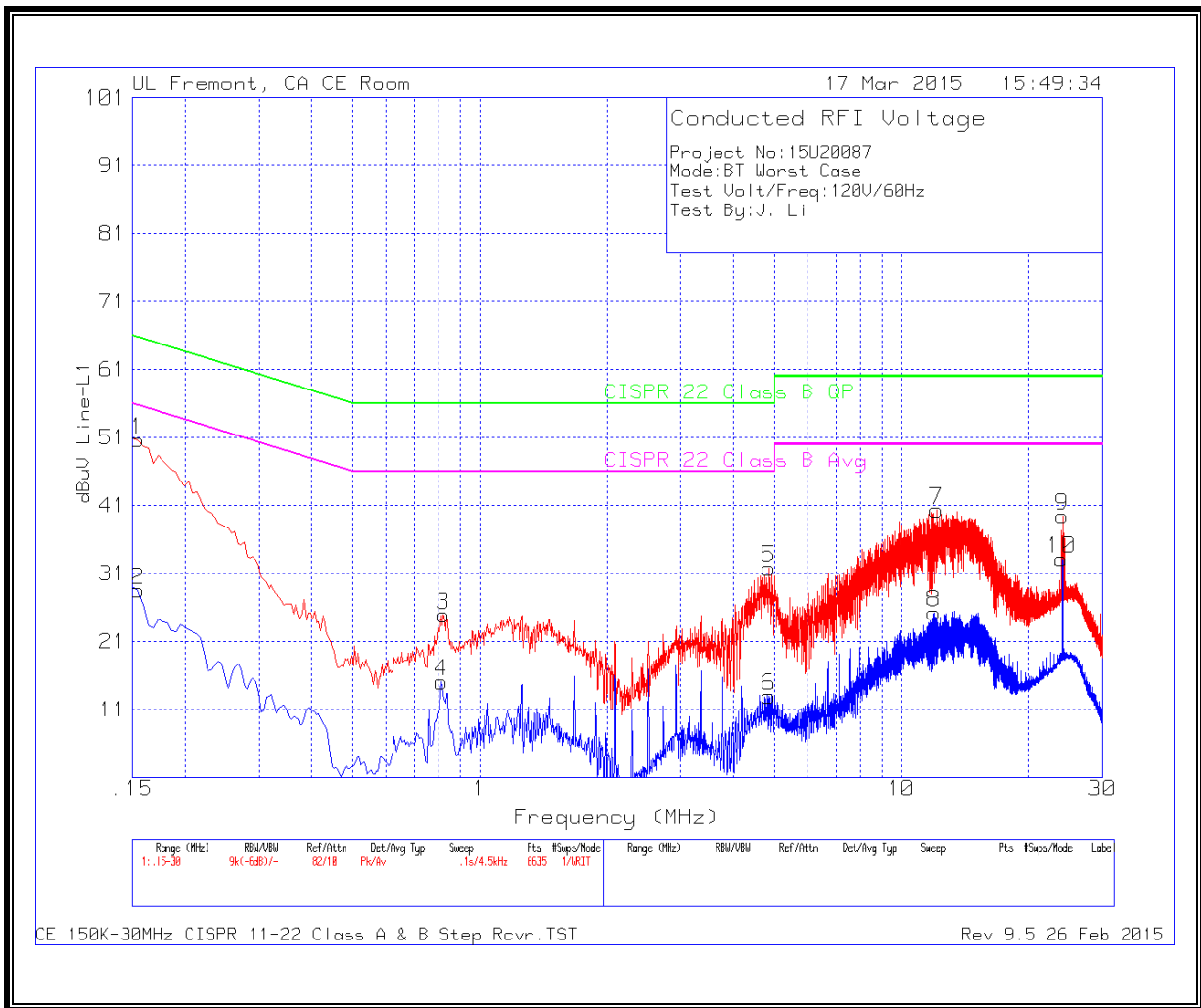
Pk - Peak detector
Av - Average detection

Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
11	.159	48.09	Pk	1.4	0	49.49	-	-	55.52	-6.03
12	.1545	23.86	Av	1.4	0	25.26	65.75	-40.49	55.75	-30.49
13	.8205	25.02	Pk	.3	0	25.32	-	-	46	-20.68
14	.8115	15.29	Av	.3	0	15.59	56	-40.41	46	-30.41
15	4.9245	31.93	Pk	.2	.1	32.23	-	-	46	-13.77
16	4.9245	15.79	Av	.2	.1	16.09	56	-39.91	46	-29.91
17	12.7185	39.24	Pk	.2	.2	39.64	-	-	50	-10.36
18	12.7185	24.93	Av	.2	.2	25.33	60	-34.67	50	-24.67
19	24.5625	37.44	Pk	.3	.3	38.04	-	-	50	-11.96
20	24.5625	18.5	Av	.3	.3	19.1	60	-40.9	50	-30.9

Pk - Peak detector
Av - Average detection
CE 150K-30MHz CISPR 11-22 Class A & B Step Rcvr.TST
Rev 9.5 26 Feb 2015

LINE 1 RESULTS



LINE 2 RESULTS

