



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

CERTIFICATION TEST REPORT

FOR

TABLET DEVICE

MODEL NUMBER: A1550

FCC ID: BCGA1550

IC: 579C-A1550

REPORT NUMBER: 14U19187-E1, REVISION B

ISSUE DATE: JUNE 01, 2015

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/21/2015	Initial Issue	T. Chan
A	05/18/2015	Revised report to address TCB's questions	T. Chu
B	06/01/2015	Revised report to RSS-247 standard and Section 2	T. Chu

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: TABLET DEVICE

MODEL: A1550

SERIAL NUMBER: F4KPC009GJK2 (CONDUCTED); F4KP604KGJK5 (RADIATED);

DATE TESTED: FEBRUARY 17, 2015 – MARCH 12, 2015

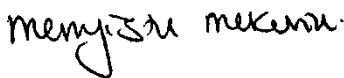
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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:

Tested By:



MENGISTU MEKURIA
EMC SUPERVISOR
UL Verification Services Inc.

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, RSS-GEN Issue 4, and RSS-247 Issue 1, and ANSI C63.10-2009 for FCC test and ANSI C63.10-2013 with deviation of measurement height of 0.8m rather than 1.5m for IC test.

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
☐ Chamber A	☐ Chamber D
☐ Chamber B	☒ Chamber E
☐ Chamber C	☒ Chamber F
	☐ Chamber G
	☐ 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:

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

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 tablet with multimedia functions (music, application support, and video), Cellular GSM/GPRS/EGPRS/CDMA2000 1xRTT/1x Advanced/EVDO Rev.A/EVDO Rev.B /WCDMA /HSPA+/DC-HSDPA/LTE FDD & Carrier Aggregation/TDD/TD-SCDMA radio, IEEE 802.11a/b/g/n/ac radio, and Bluetooth radio. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Antenna B Output Power (dBm)	Antenna B Output Power (mW)	Antenna D Output Power (dBm)	Antenna D Output Power (mW)
2402 - 2480	Basic GFSK	10.62	11.53	7.95	6.24
2402 - 2480	DQPSK	10.08	10.19	9.05	8.04
2402 - 2480	Enhanced 8PSK	10.14	10.33	9.41	8.73

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain	
	Antenna B	Antenna D
2.4	-1.00	2.50

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 12H33.

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 following configurations were investigated and EUT powered by AC/DC adapter was the worst-case scenario. AC power line and below 1G radiated tests were conducted on configuration 1.

Configuration	Descriptions
1	EUT powered by AC/DC adapter via USB cable
2	EUT powered by host PC via USB cable

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

EUT supports BT/BLE operation on antenna B or antenna D, testing was performed on both antenna B and antenna D.

Worst-case data rates were:

GFSK mode: DH5
8PSK mode: 3-DH5

DQPSK mode has been verified to have lower power than 8PSK.

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

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
Earphone	Apple	NA	NA	NA
EUT AC/DC adapter	Apple	MD836LL/A	NA	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

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
None used						

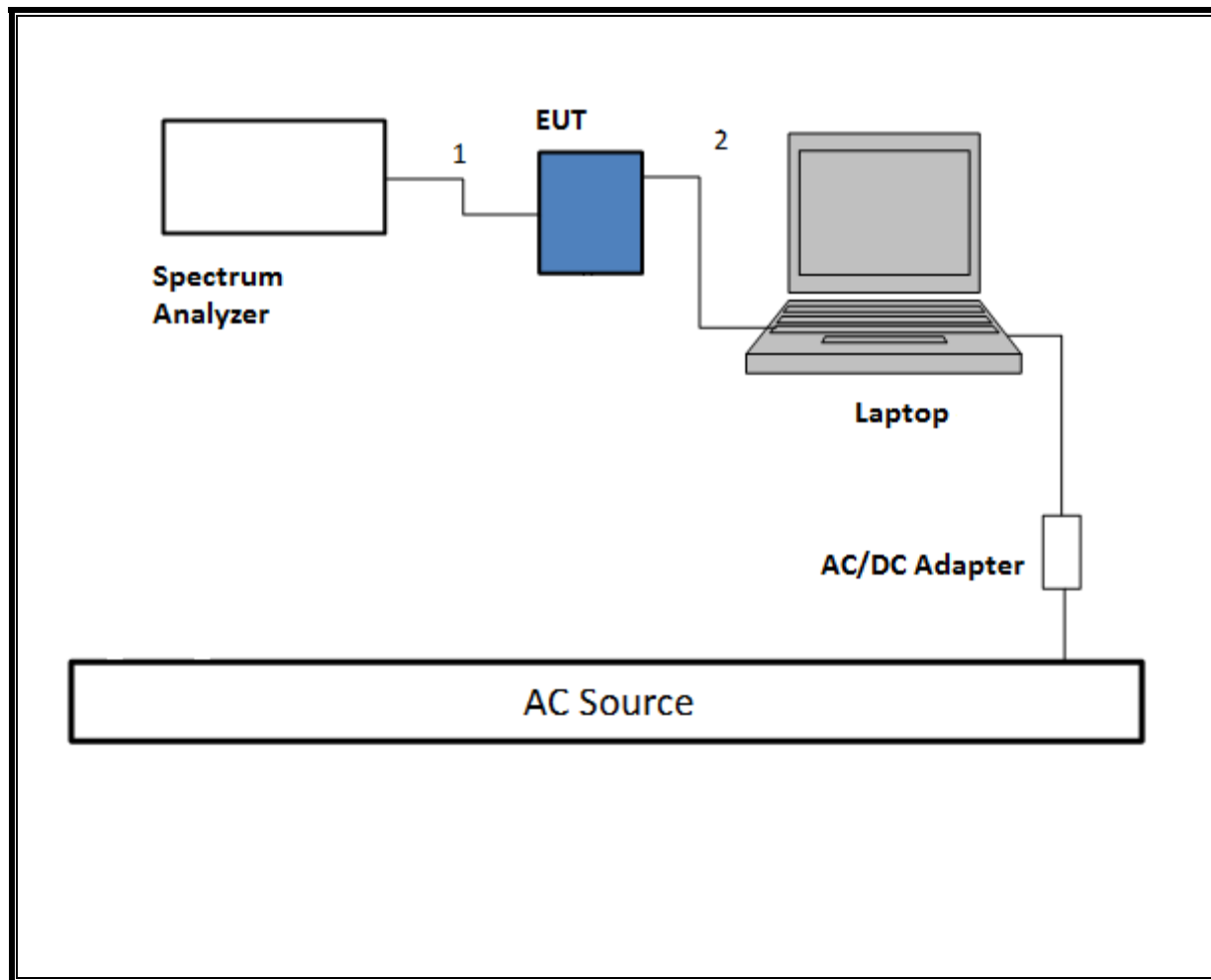
I/O CABLES (AC POWER CONDUCTED TEST and below 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	US115	Un-Shielded	0.8	NA
2	DC	1	lightning	Un-Shielded	1	NA
3	Audio	1	Jack	Un-Shielded	0.5	NA

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.

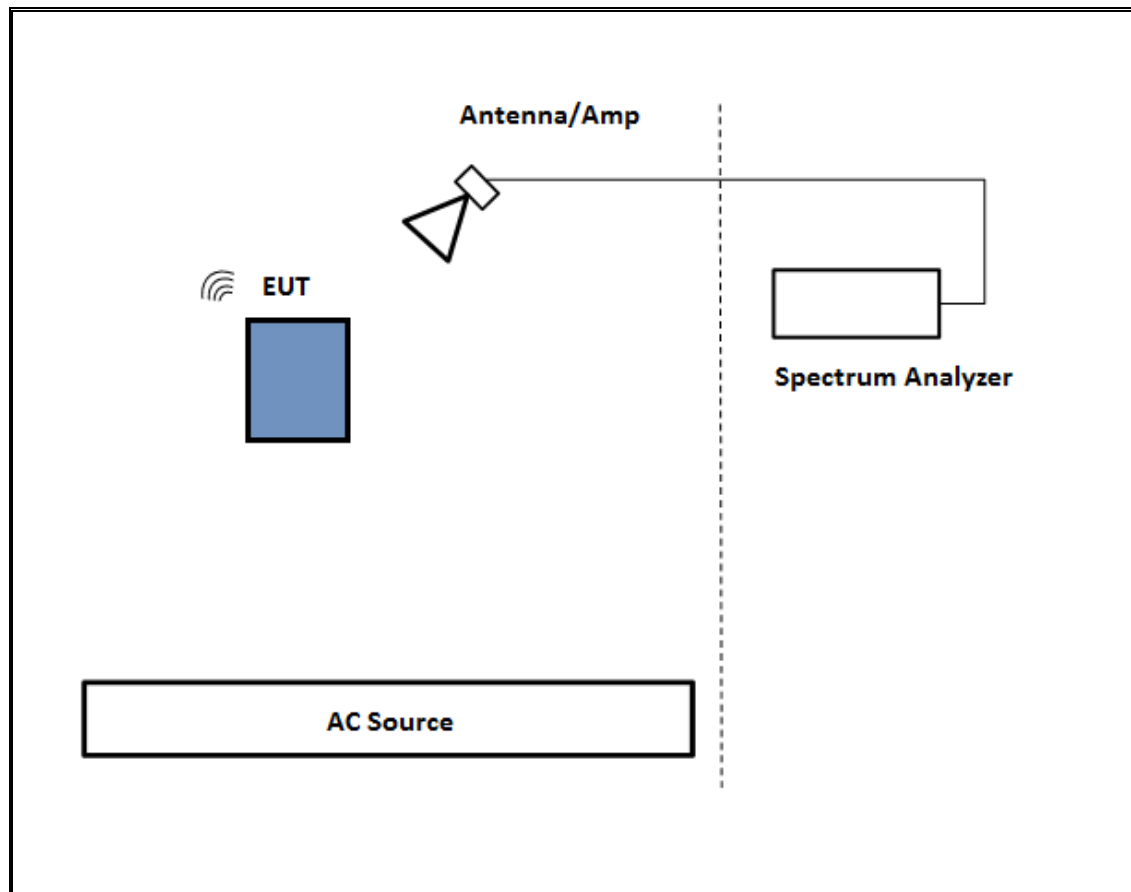
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was tested battery powered. Test software exercised the EUT.

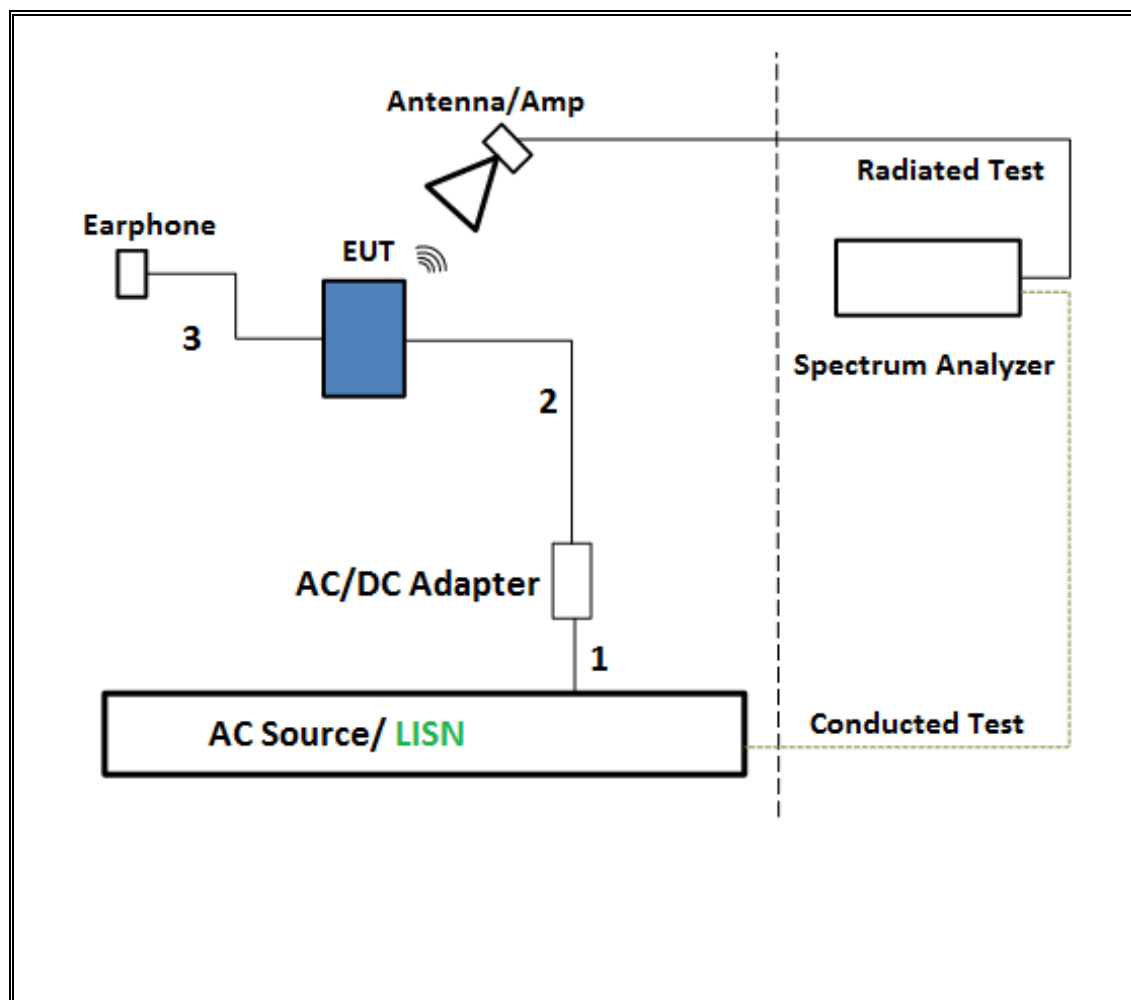
SETUP DIAGRAM



TEST SETUP- BELOW 1GHZ & AC LINE CONDUCTED TESTS

The EUT was tested with earphone connected and powered by AC adapter. 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	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, February 26, 2015	

7. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

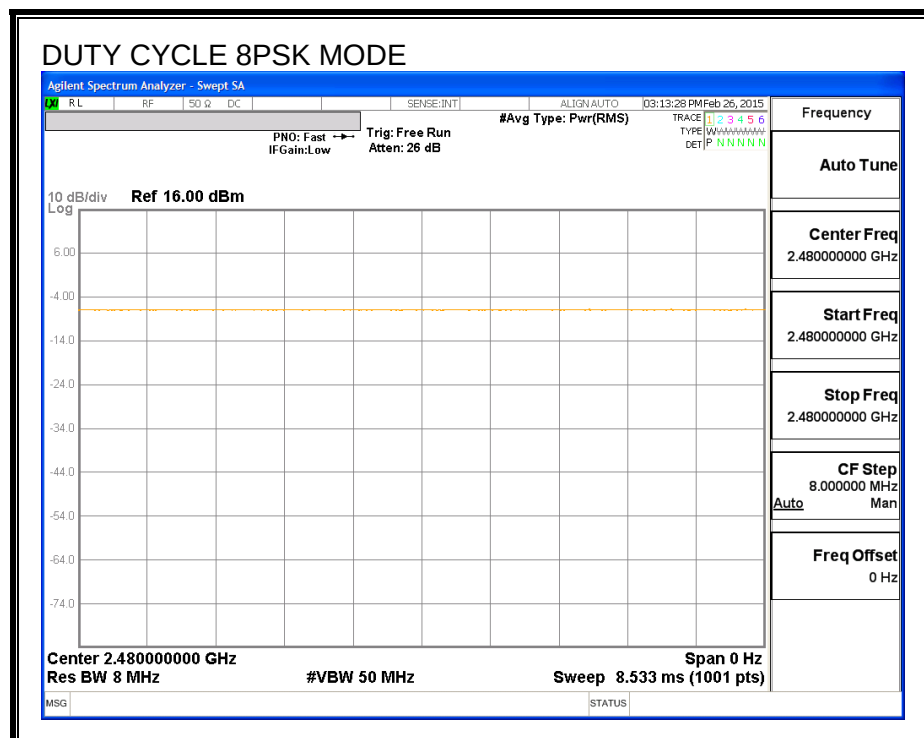
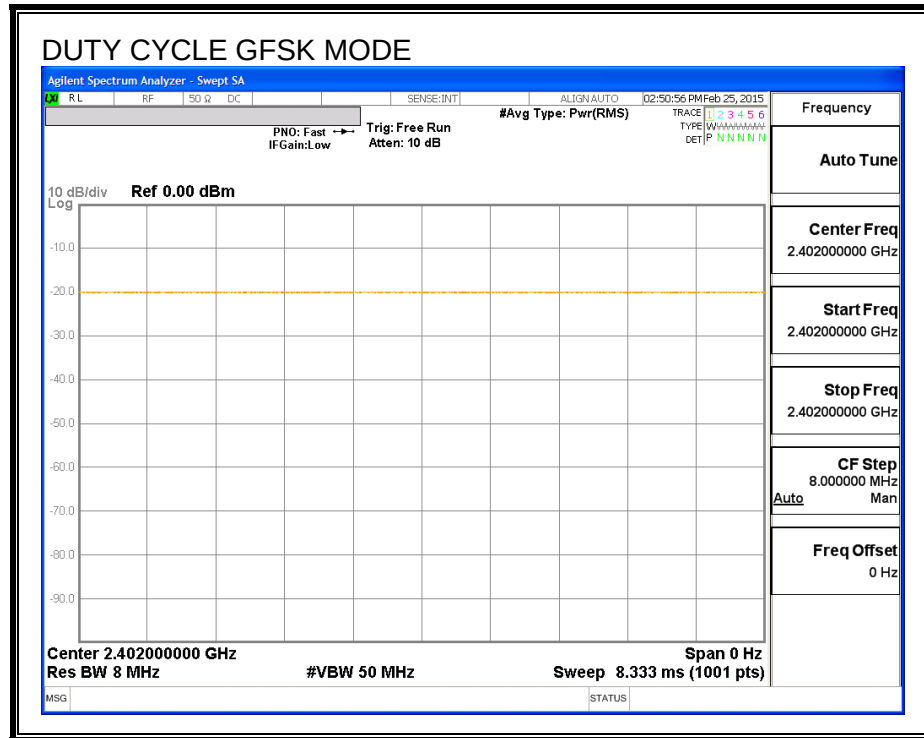
KDB 558074 Zero-Span Spectrum Analyzer Method.

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	1.000	1.000	1.000	100.00%	0.00	0.010
Bluetooth 8PSK	1.000	1.000	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS

HOPPING OFF



8. ANTENNA PORT TEST RESULTS

8.1. BASIC DATA RATE GFSK MODULATION (ANTENNA B)

8.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

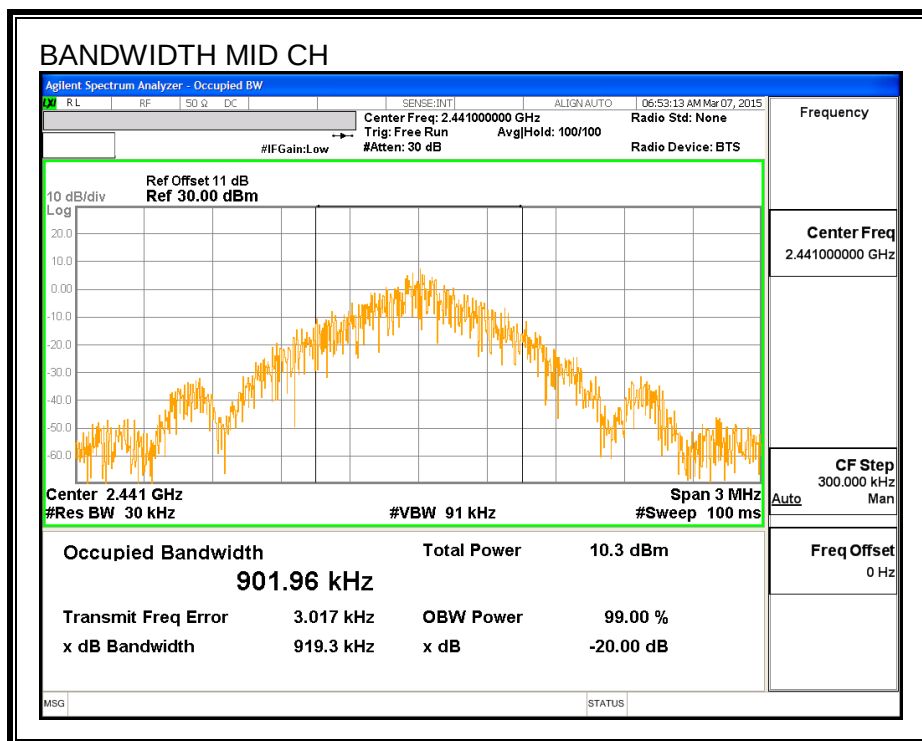
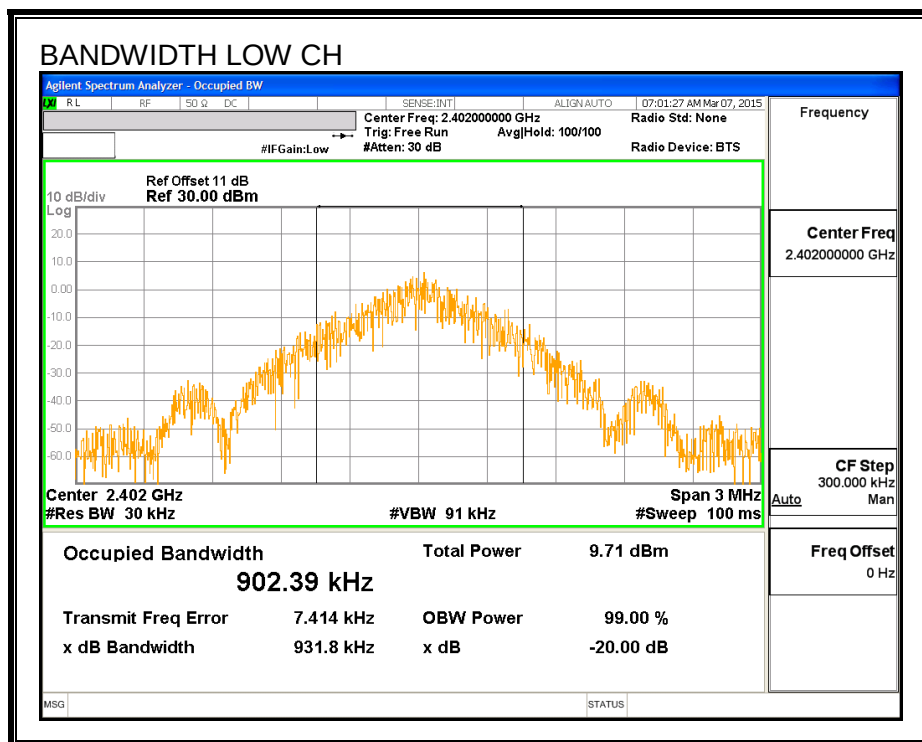
TEST PROCEDURE

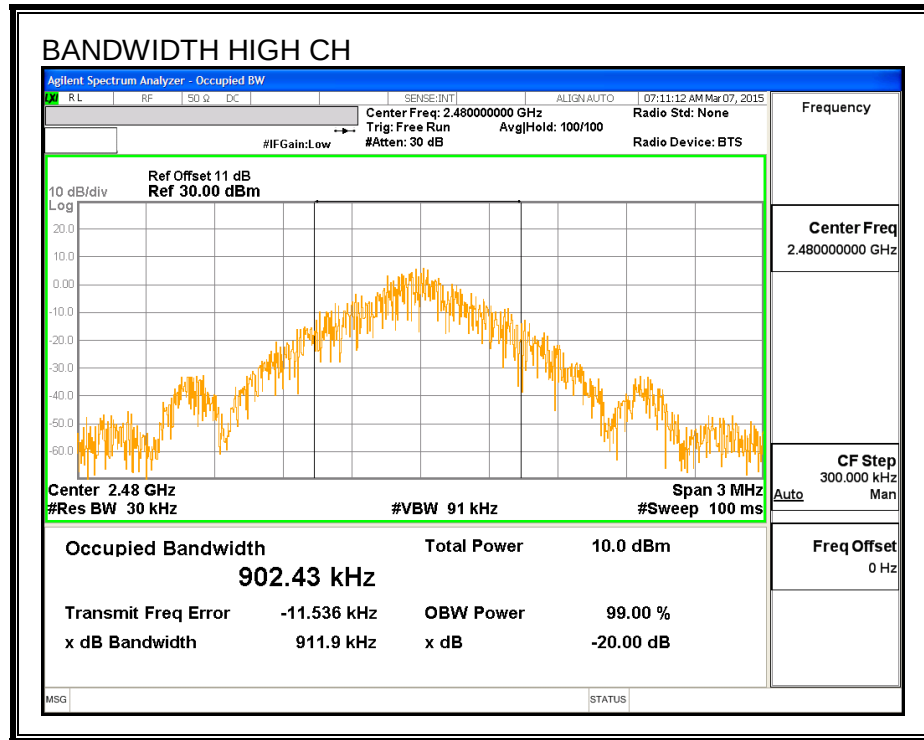
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	931.8	902.39
Middle	2441	919.3	901.96
High	2480	911.9	902.43

20 dB AND 99% BANDWIDTH





8.1.2. 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.

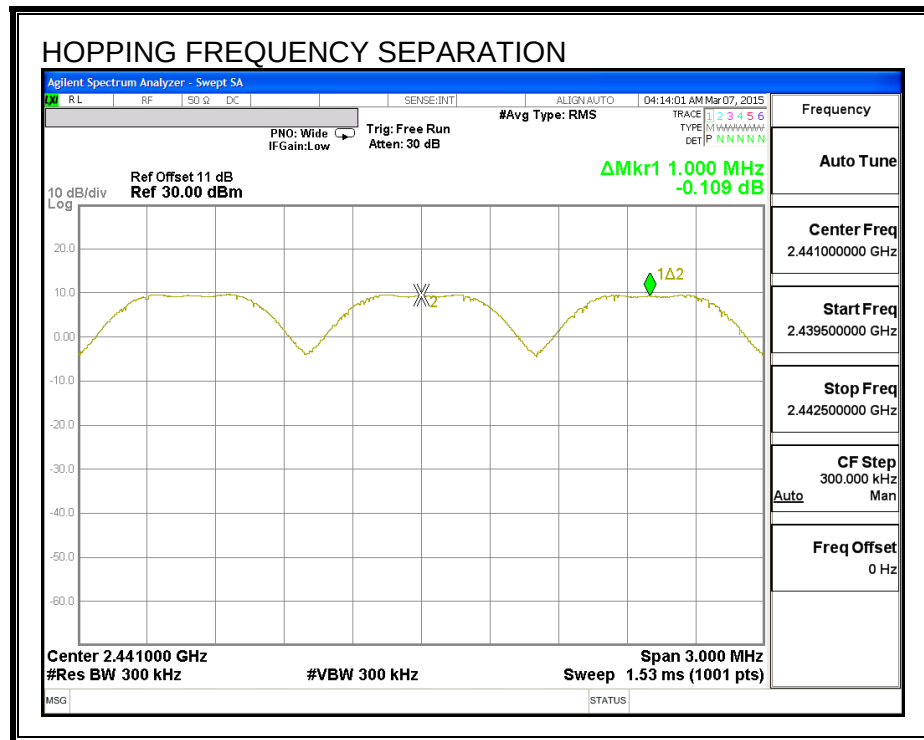
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



8.1.3. 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.

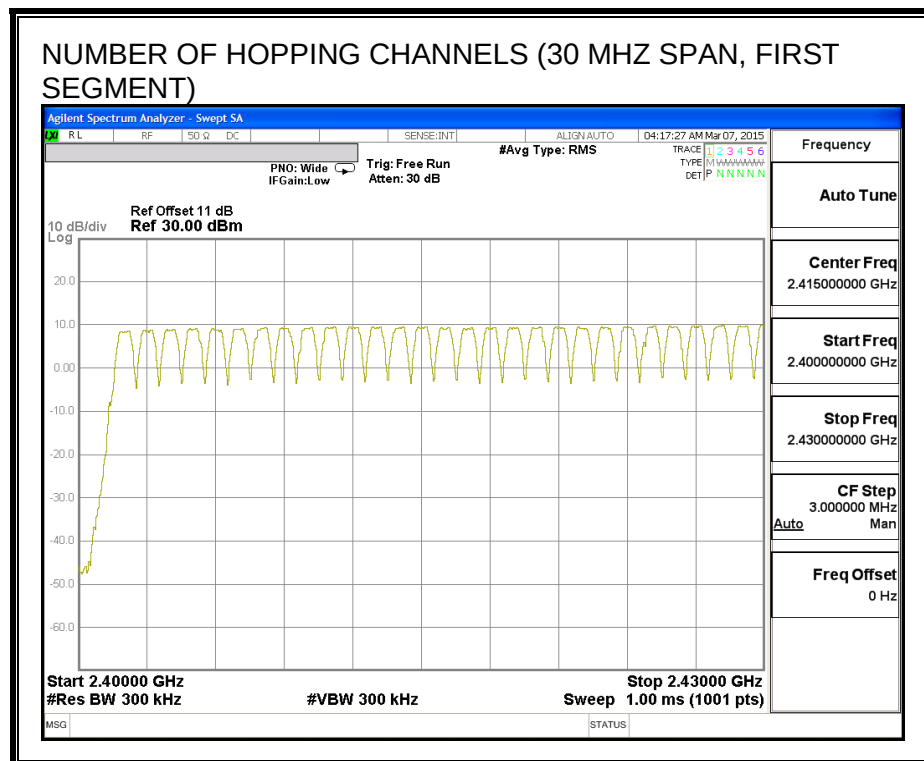
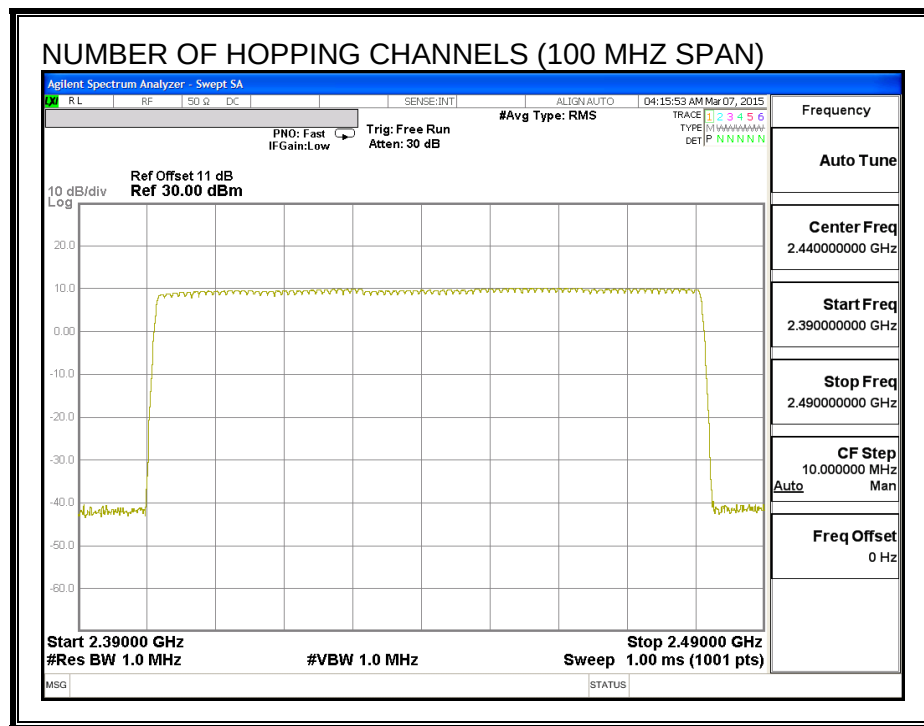
TEST PROCEDURE

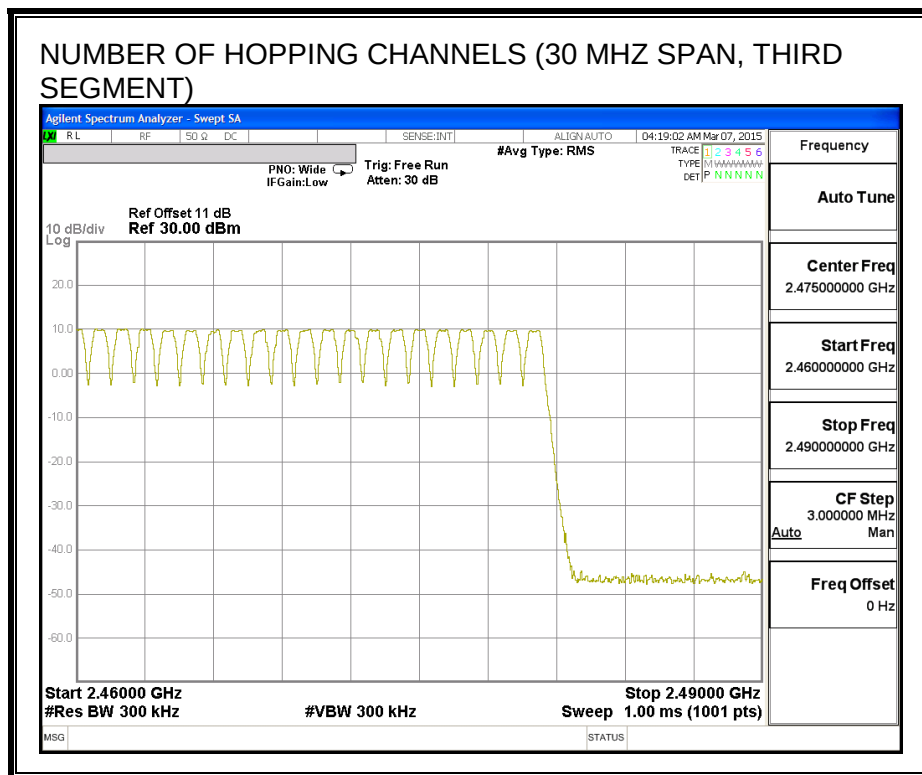
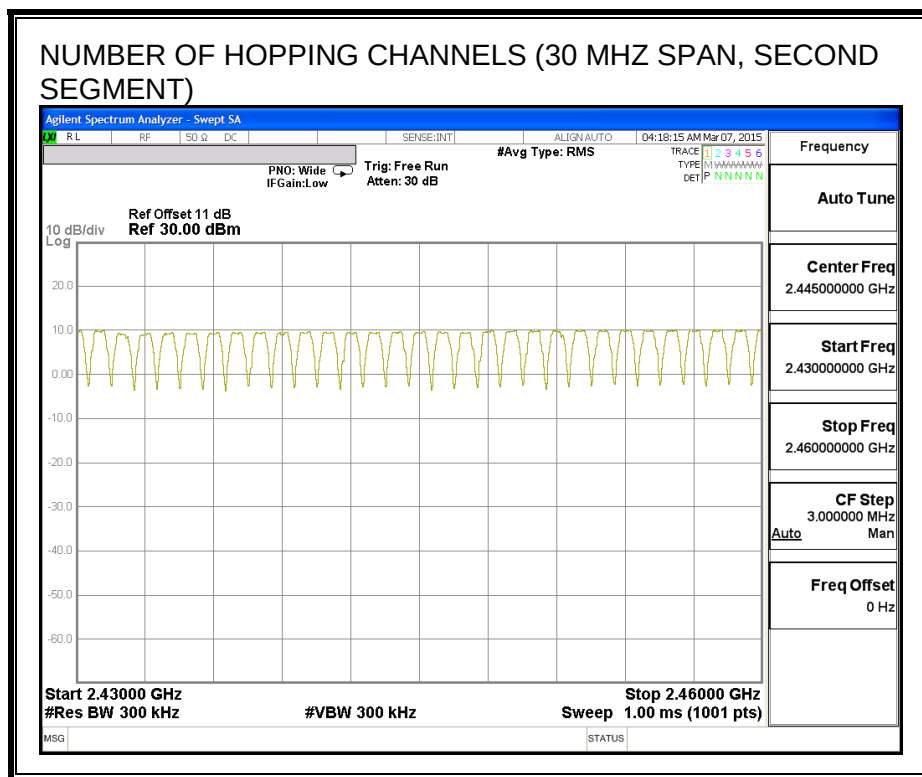
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





8.1.4. 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.

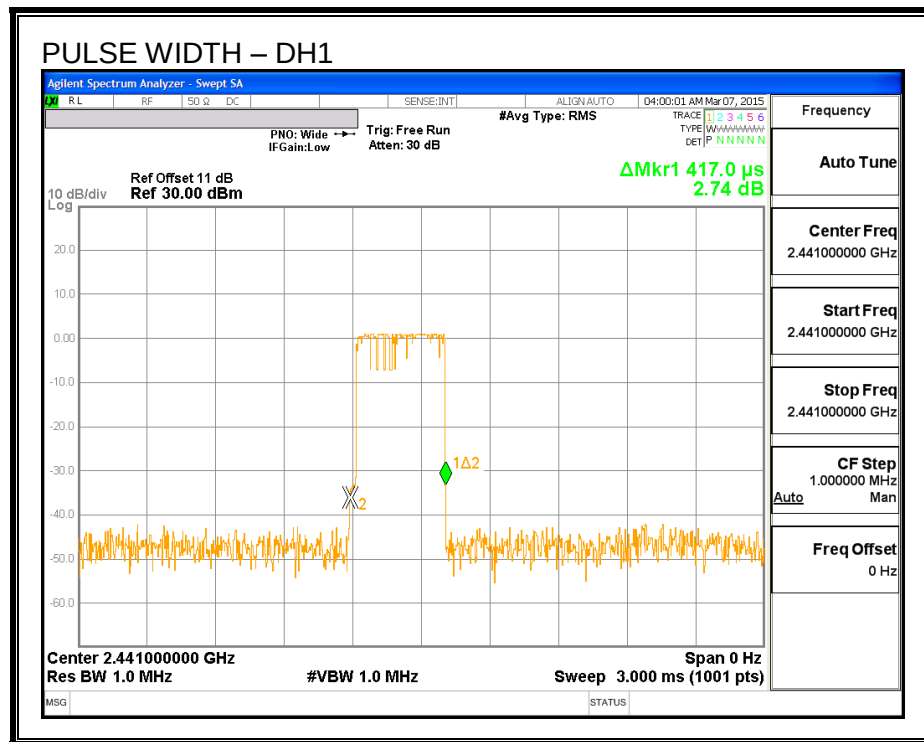
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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

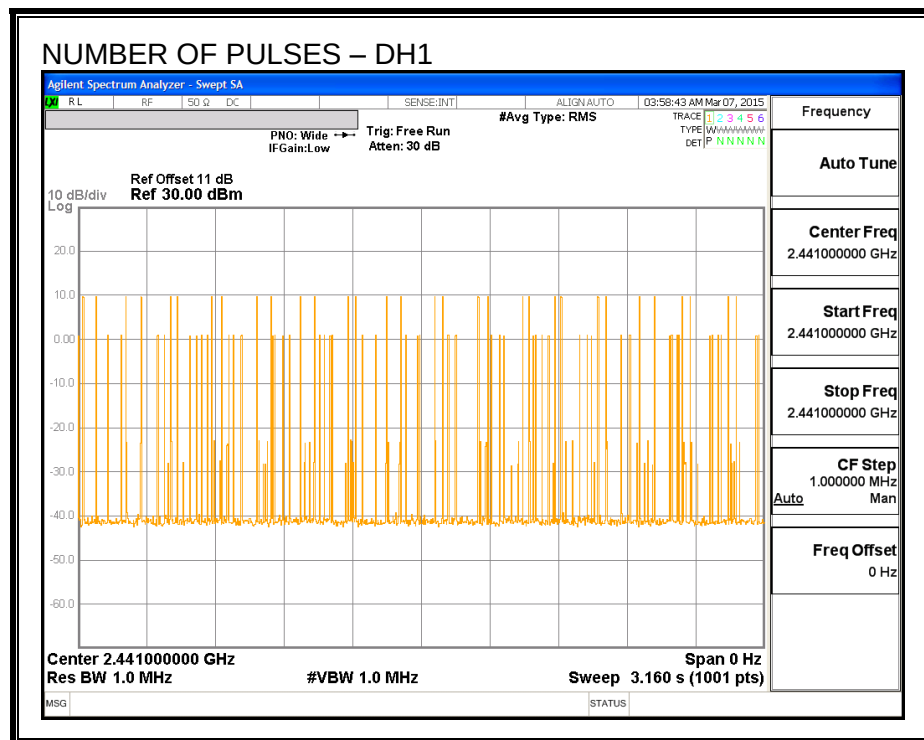
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.417	32	0.133	0.4	-0.267
DH3	1.675	18	0.302	0.4	-0.099
DH5	2.93	11	0.322	0.4	-0.078

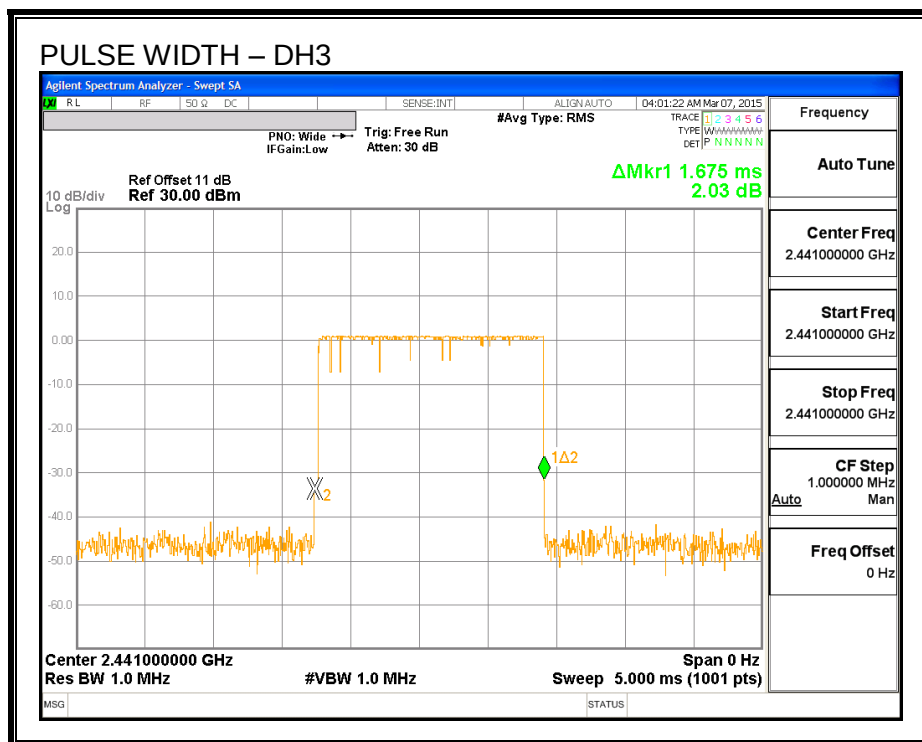
PULSE WIDTH - DH1



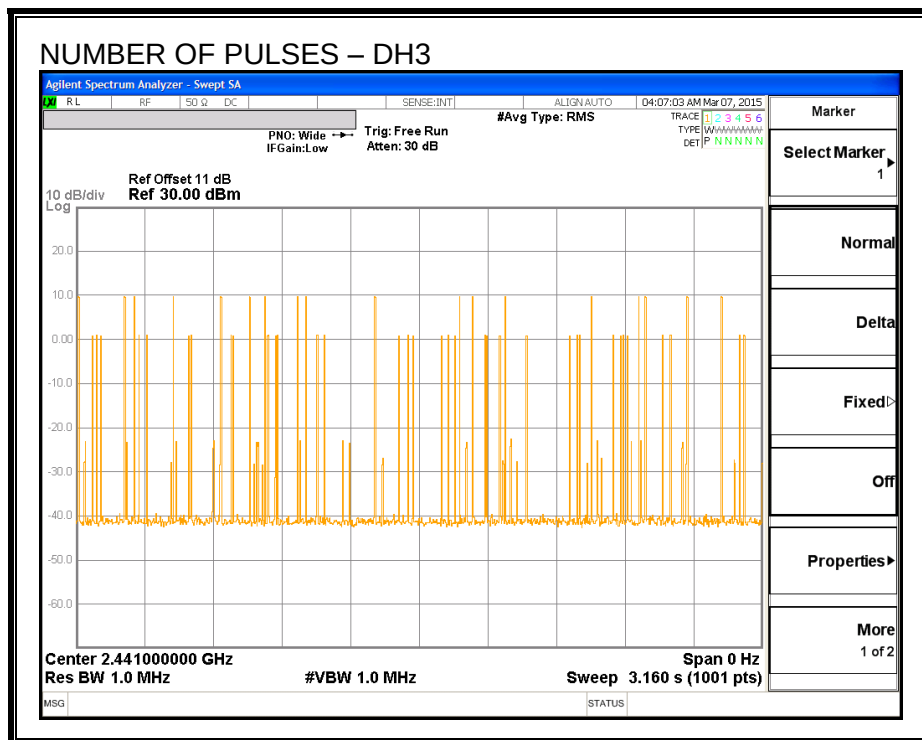
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



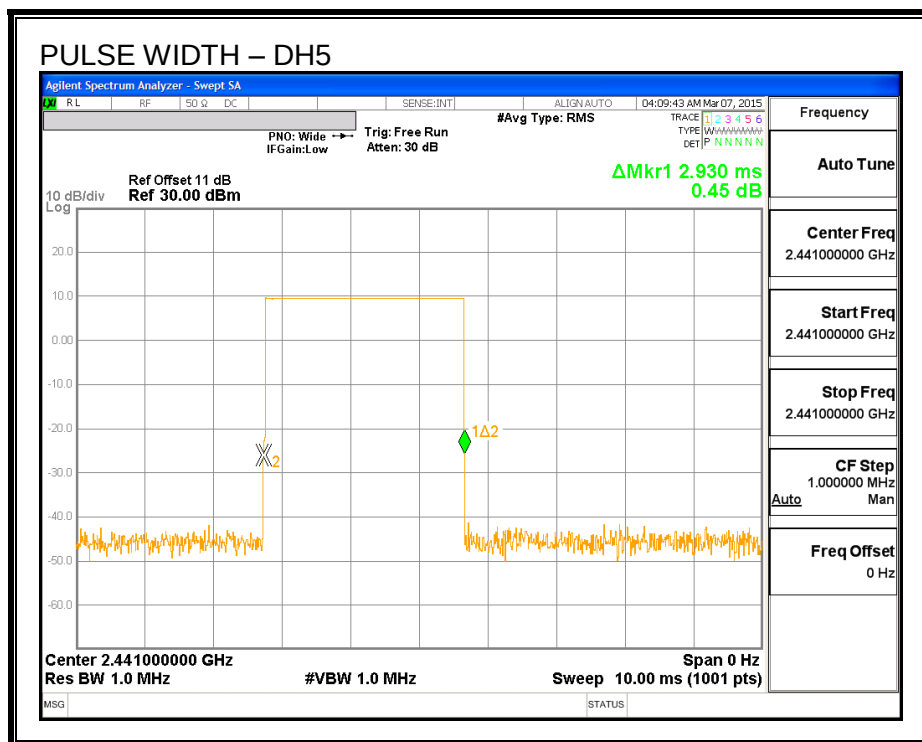
PULSE WIDTH – DH3



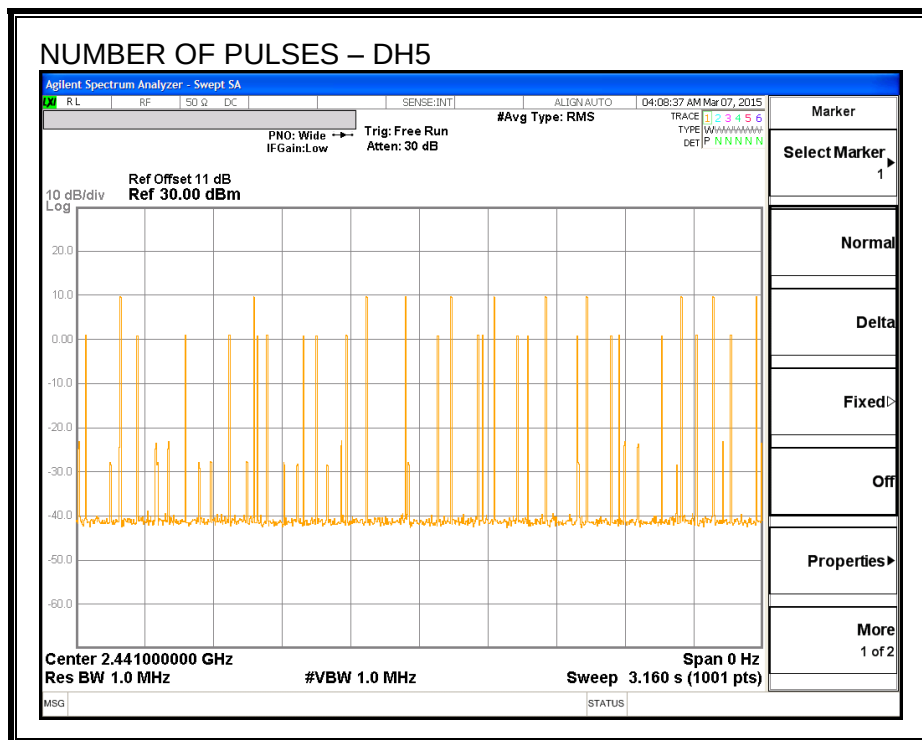
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.1.5. 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	10.27	30	-19.73
Middle	2441	10.62	30	-19.38
High	2480	10.34	30	-19.66

8.1.6. 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 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	10.07
Middle	2441	10.51
High	2480	10.24

8.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

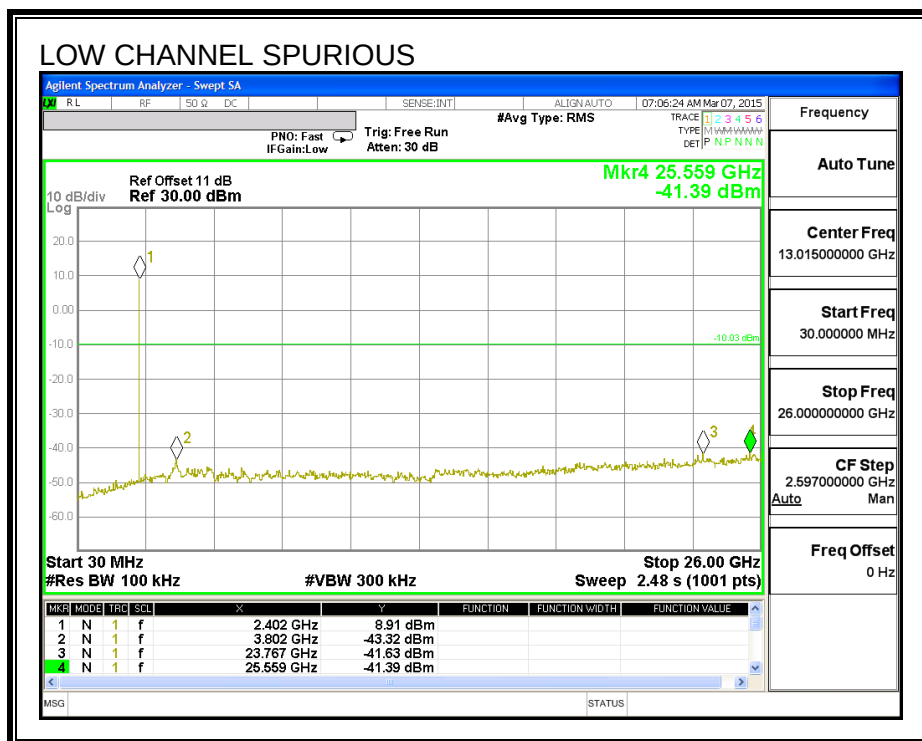
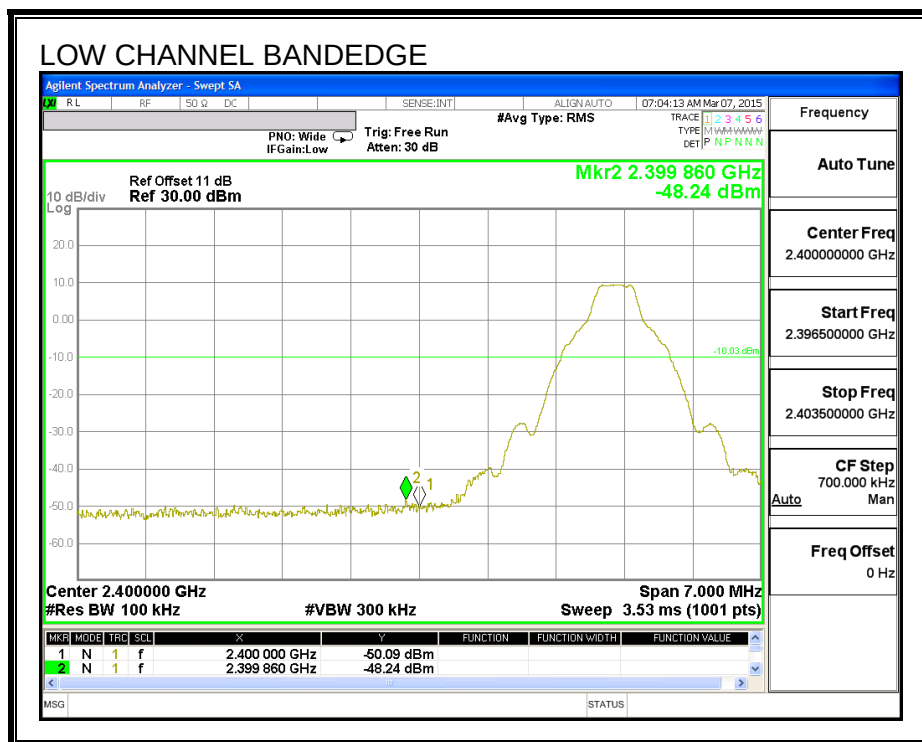
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

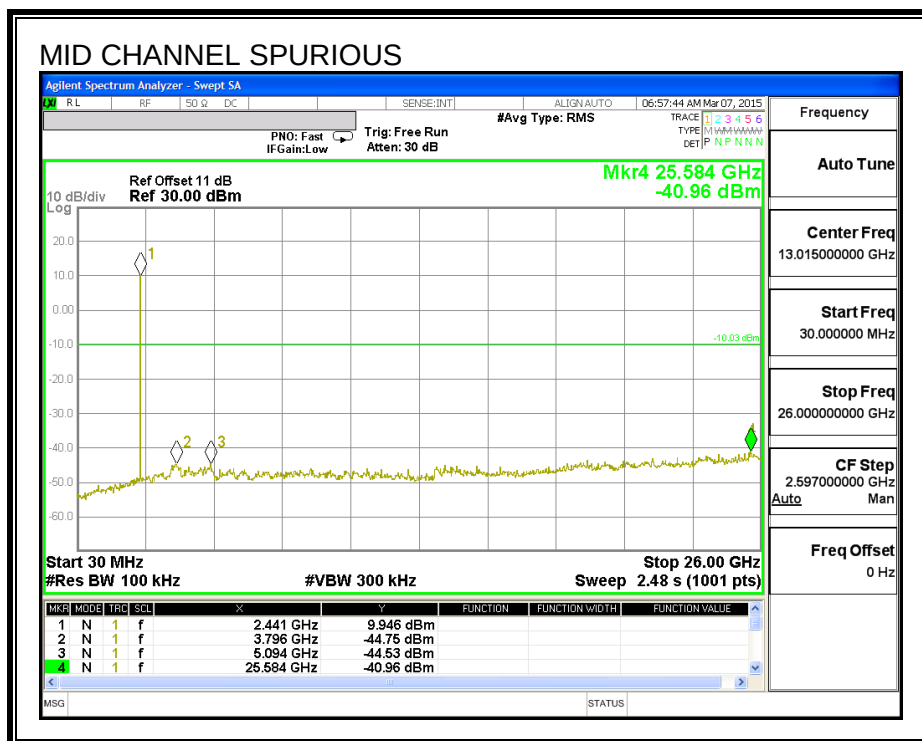
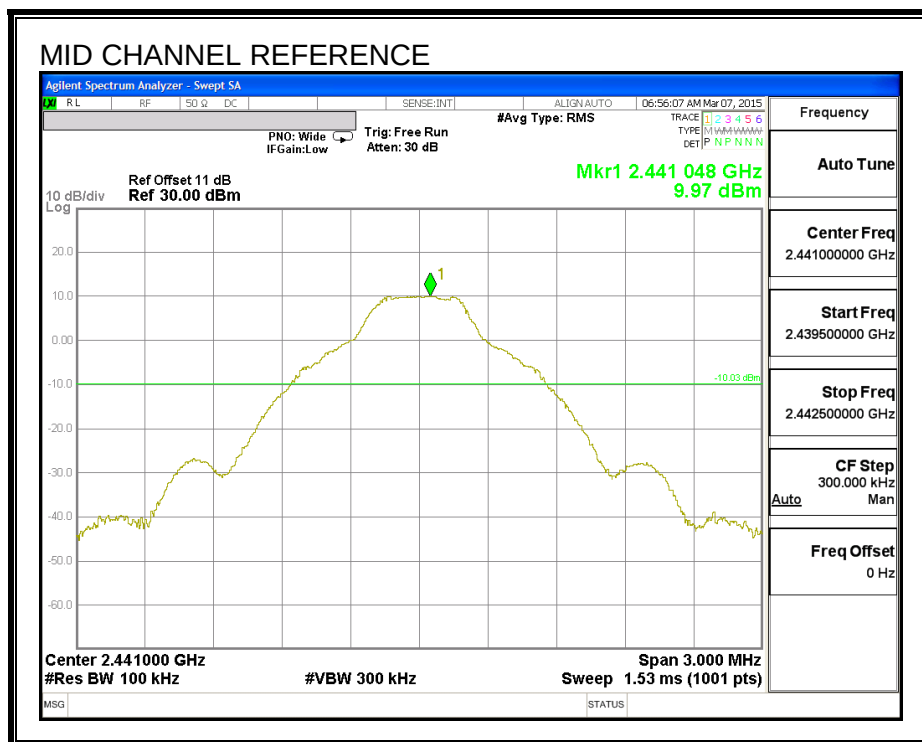
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

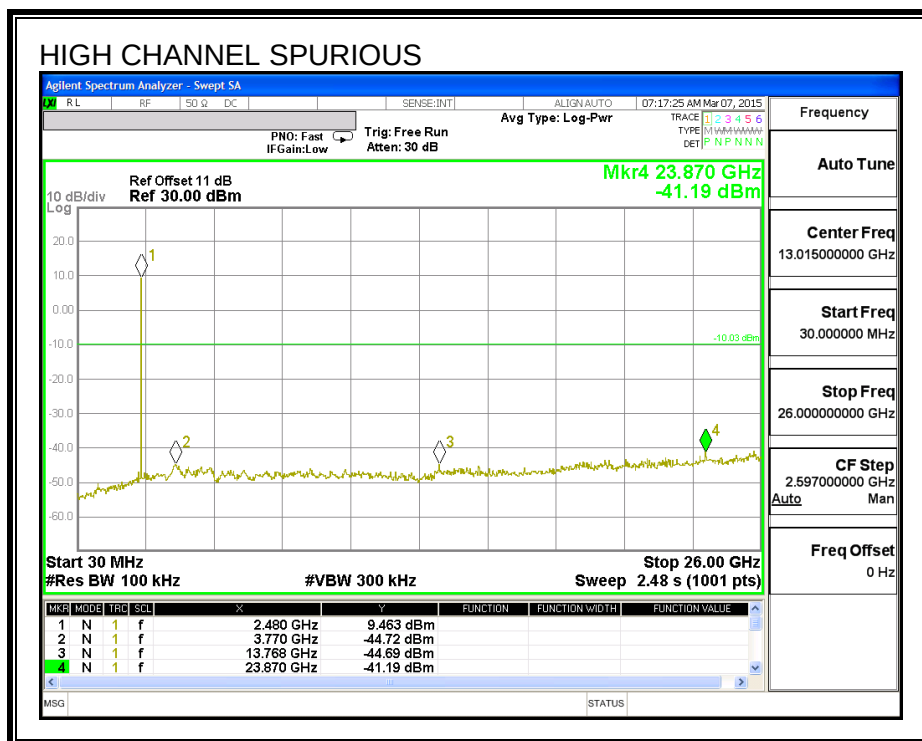
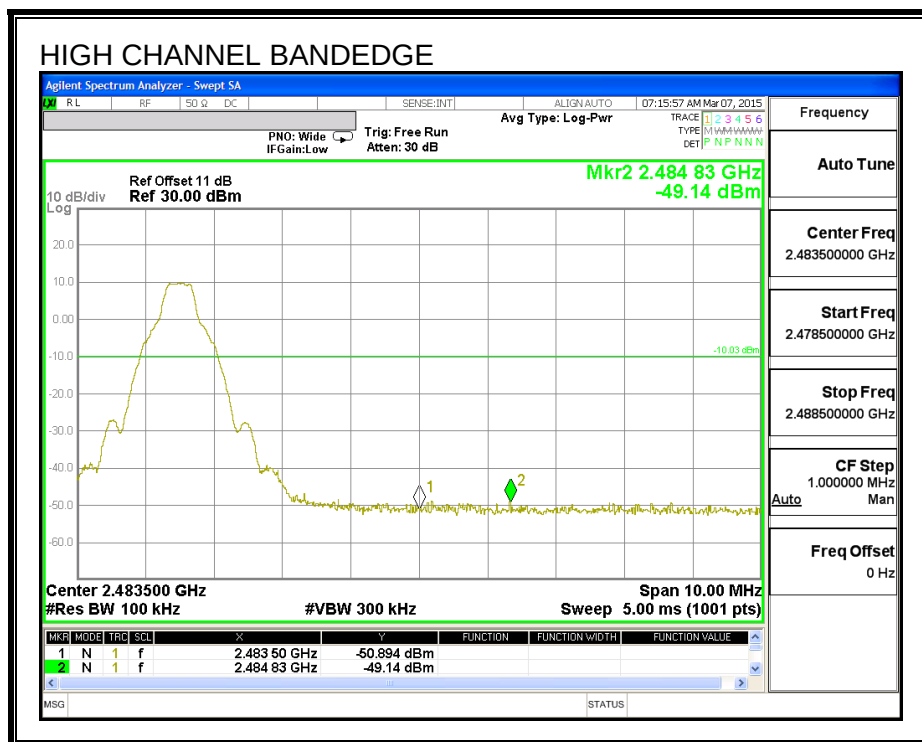
SPURIOUS EMISSIONS, LOW CHANNEL



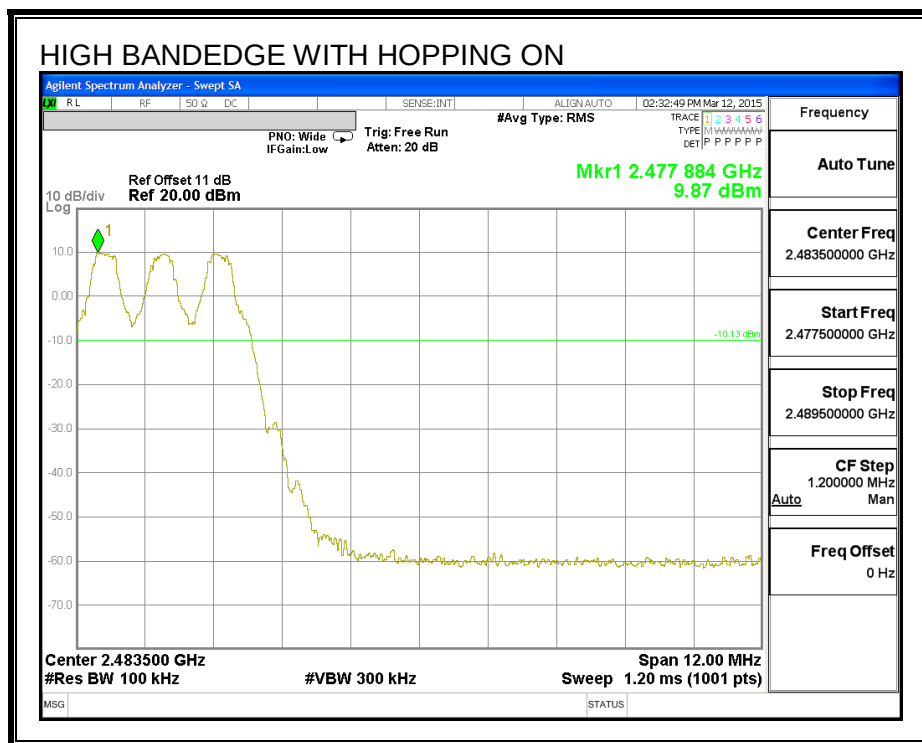
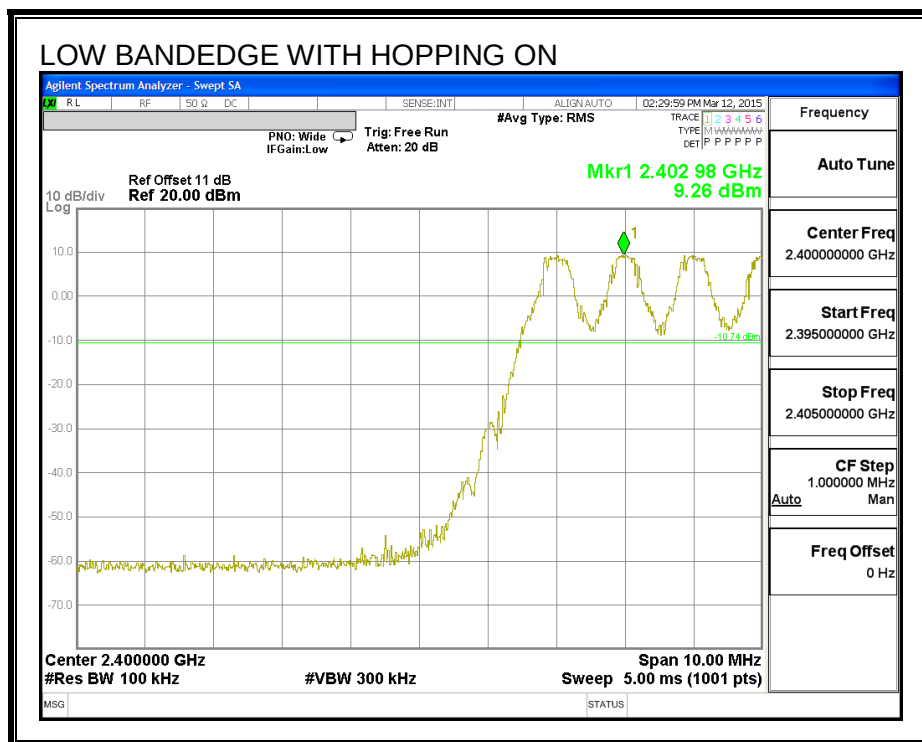
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8.2. BASIC DATA RATE GFSK MODULATION (ANTENNA D)

8.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

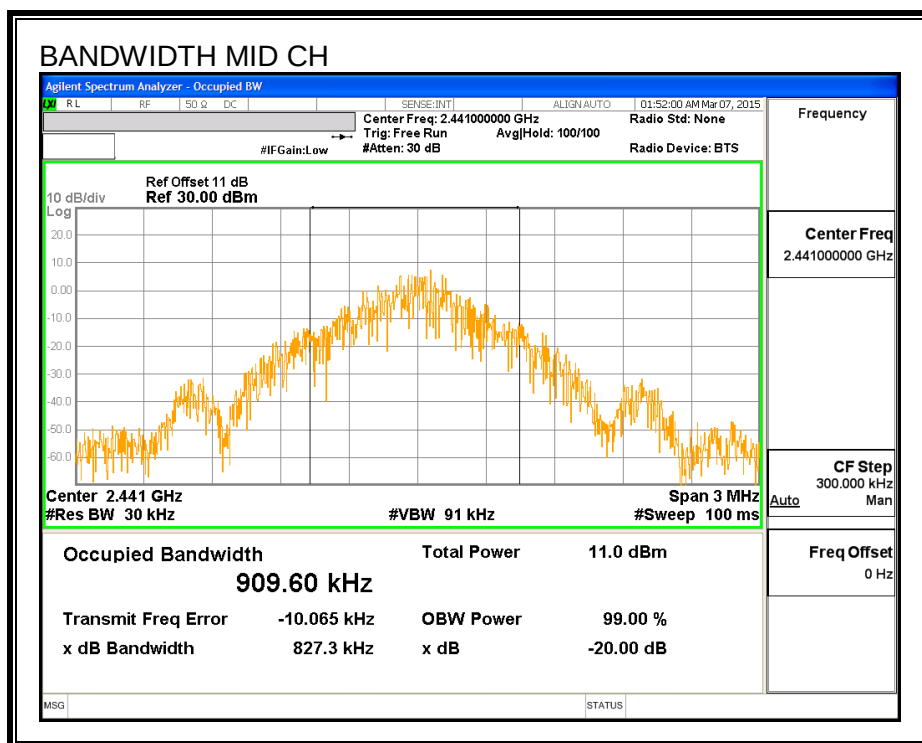
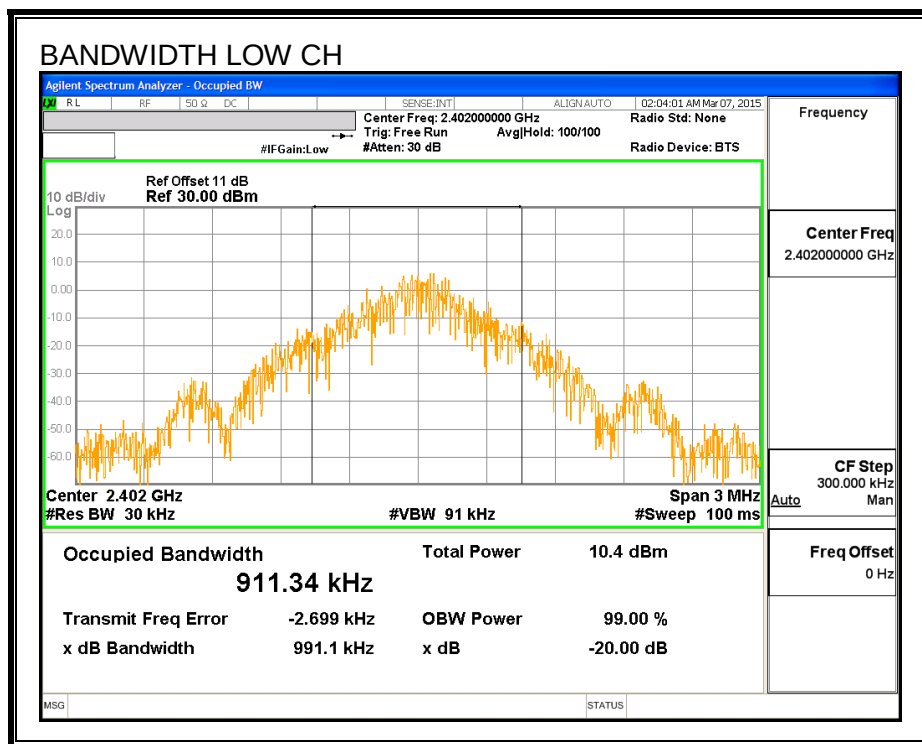
TEST PROCEDURE

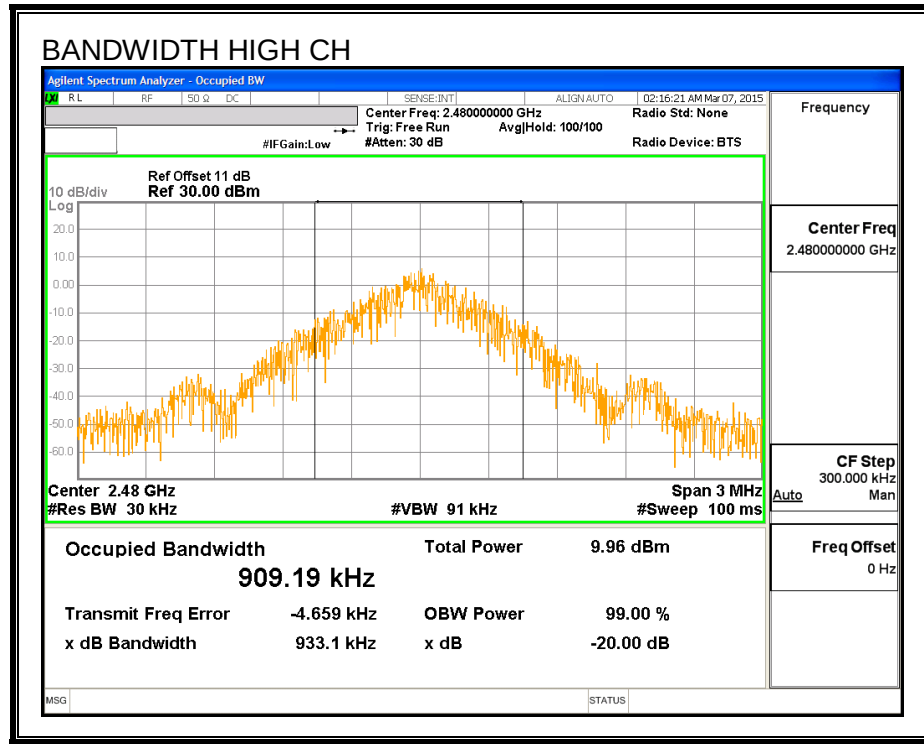
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	991.1	911.34
Middle	2441	827.3	909.6
High	2480	933.1	909.19

20 dB AND 99% BANDWIDTH





8.2.2. 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.

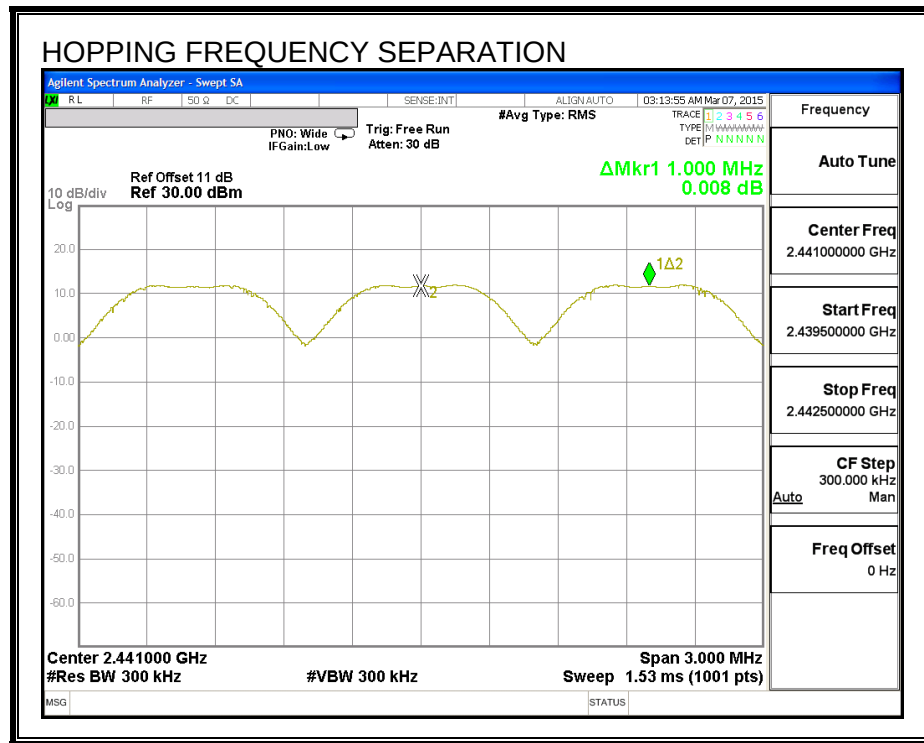
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



8.2.3. 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.

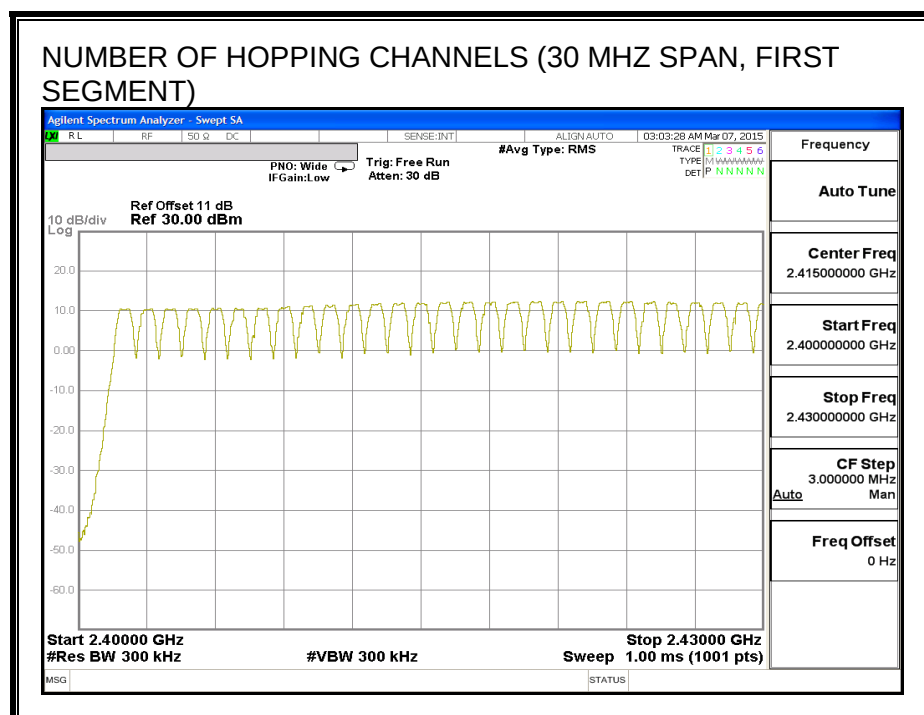
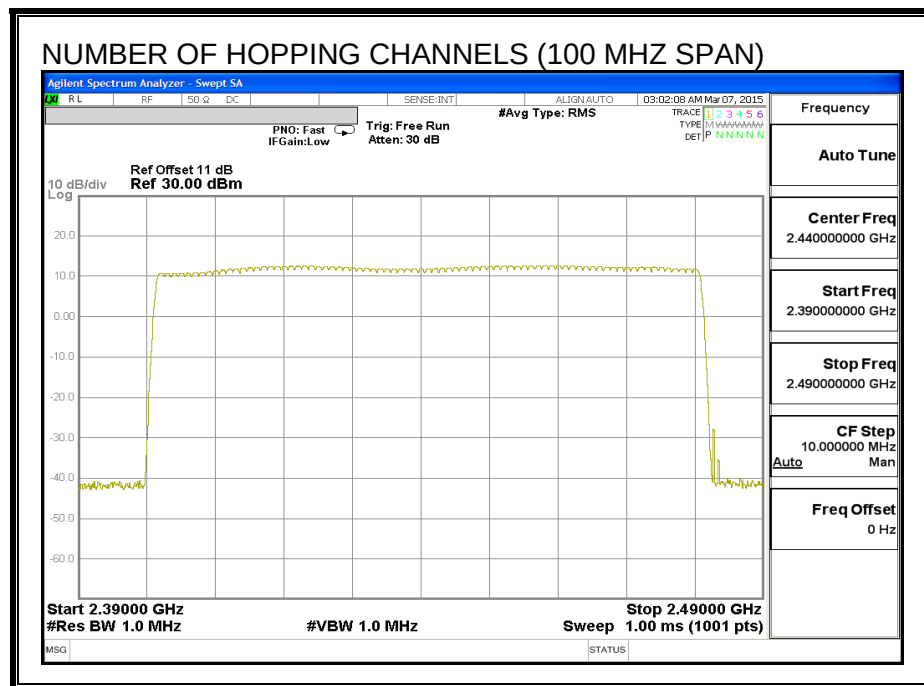
TEST PROCEDURE

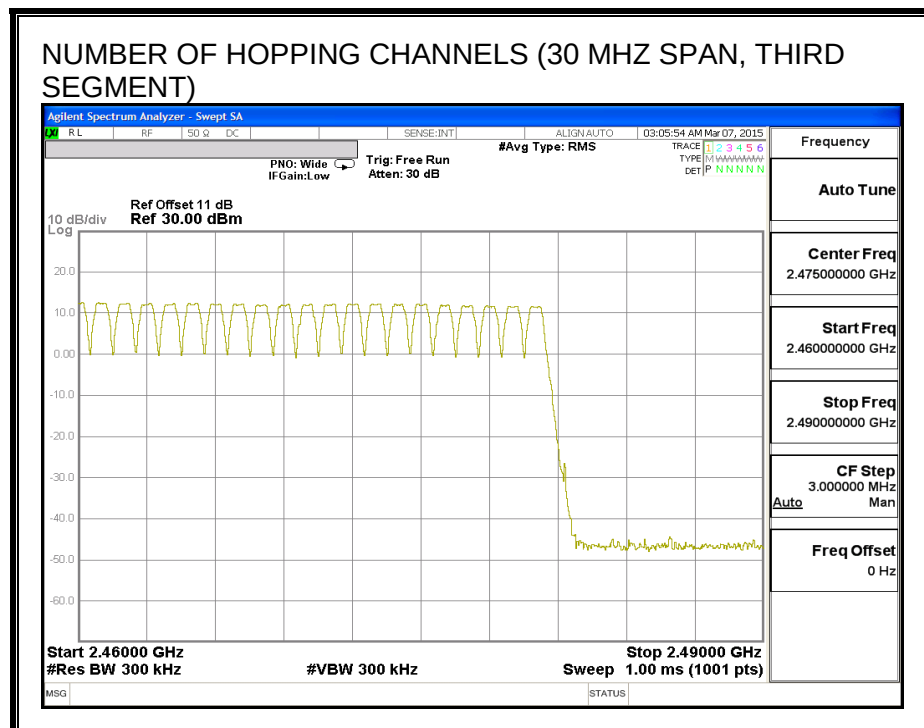
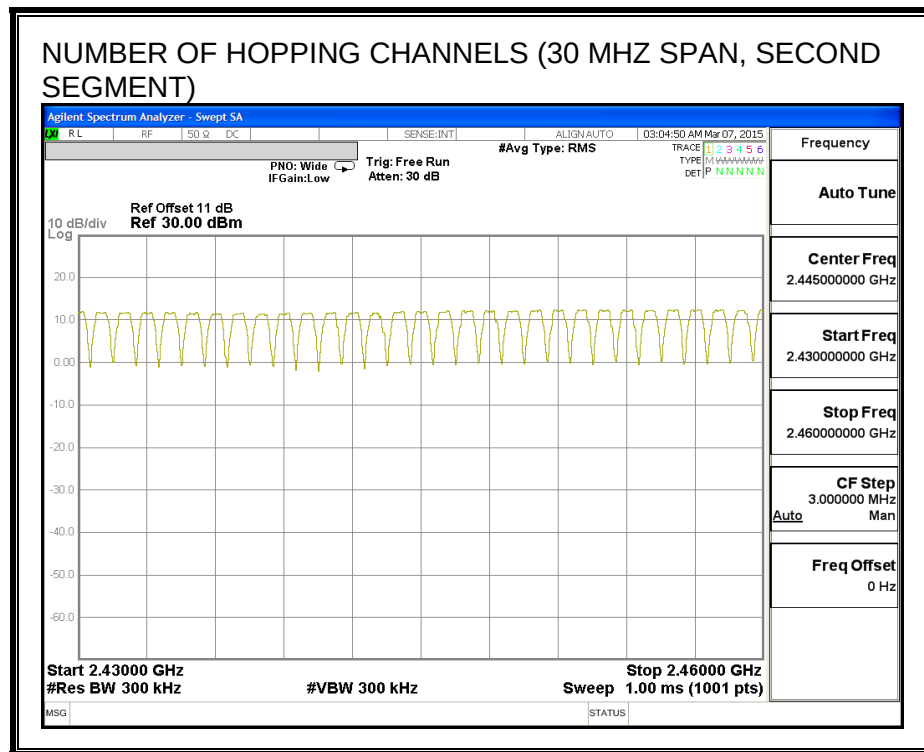
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





8.2.4. 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.

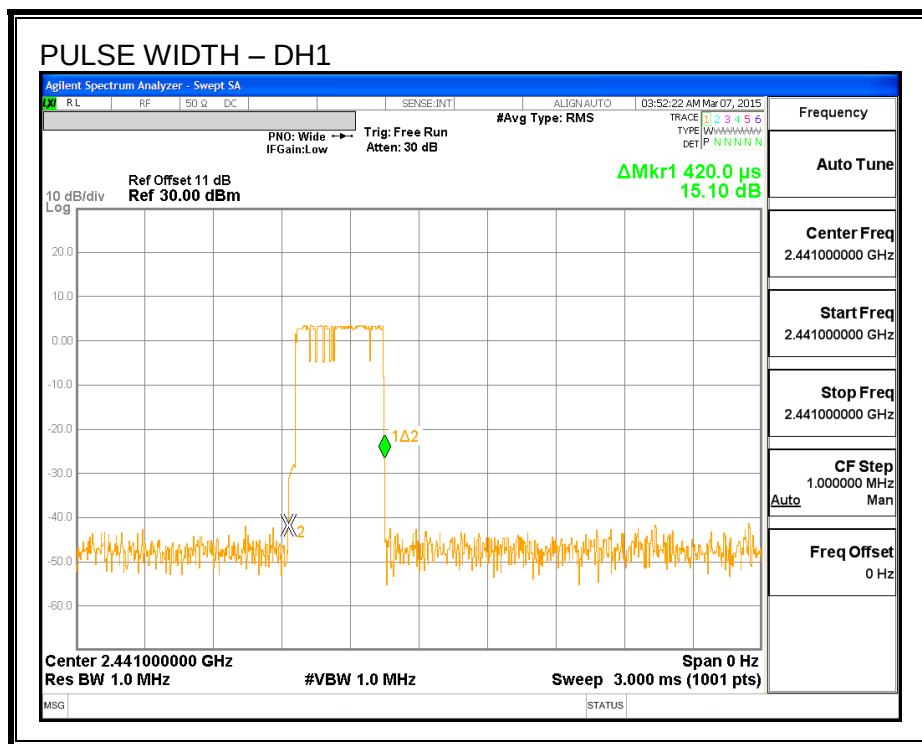
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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

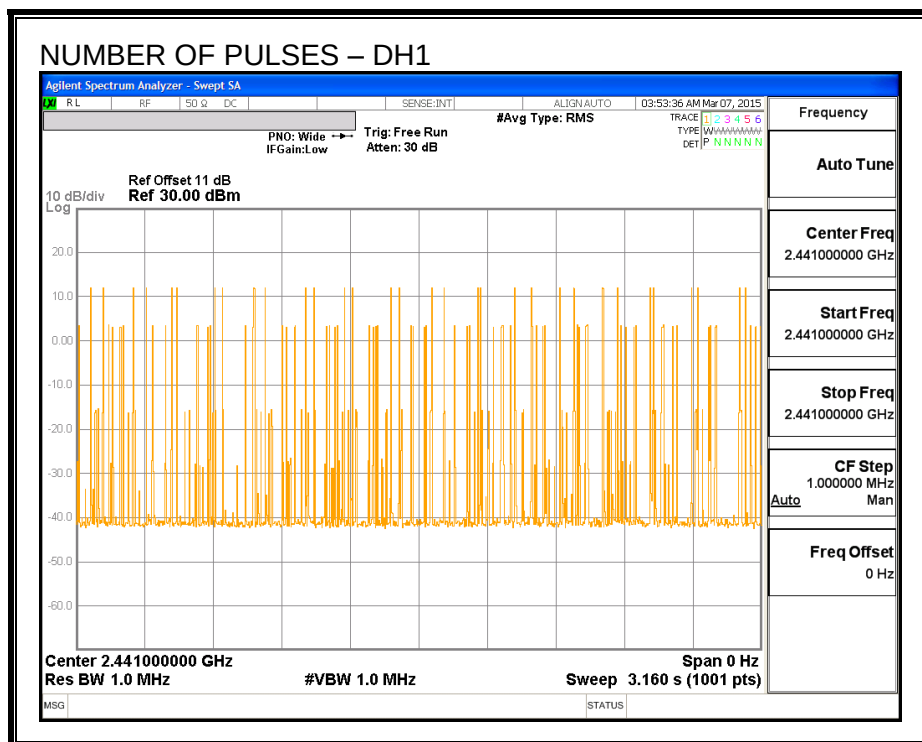
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.42	32	0.134	0.4	-0.266
DH3	1.675	19	0.318	0.4	-0.082
DH5	2.92	11	0.321	0.4	-0.079

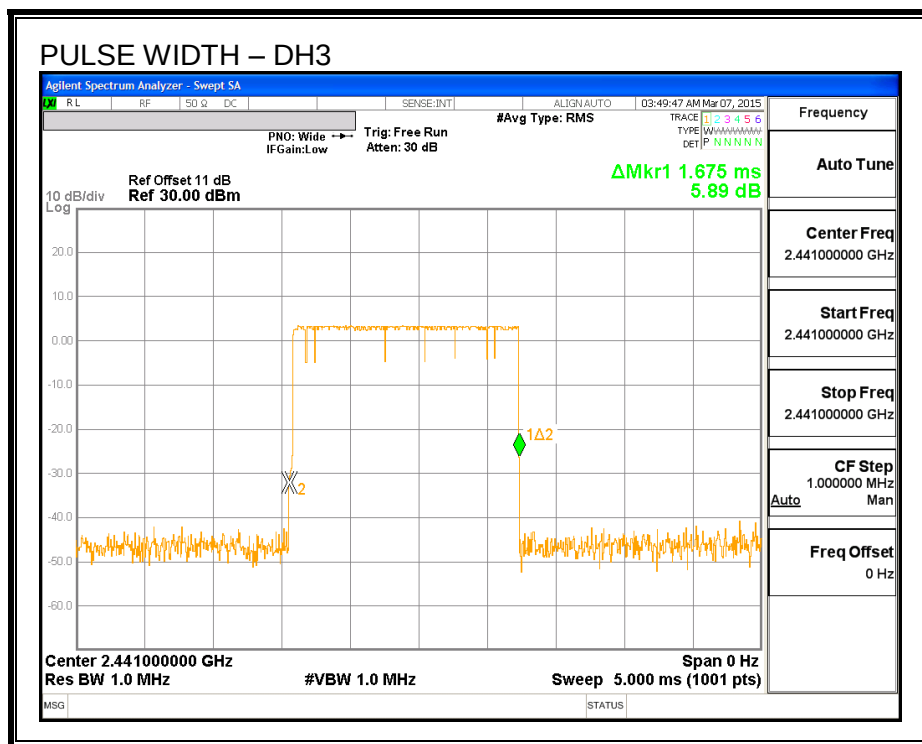
PULSE WIDTH - DH1



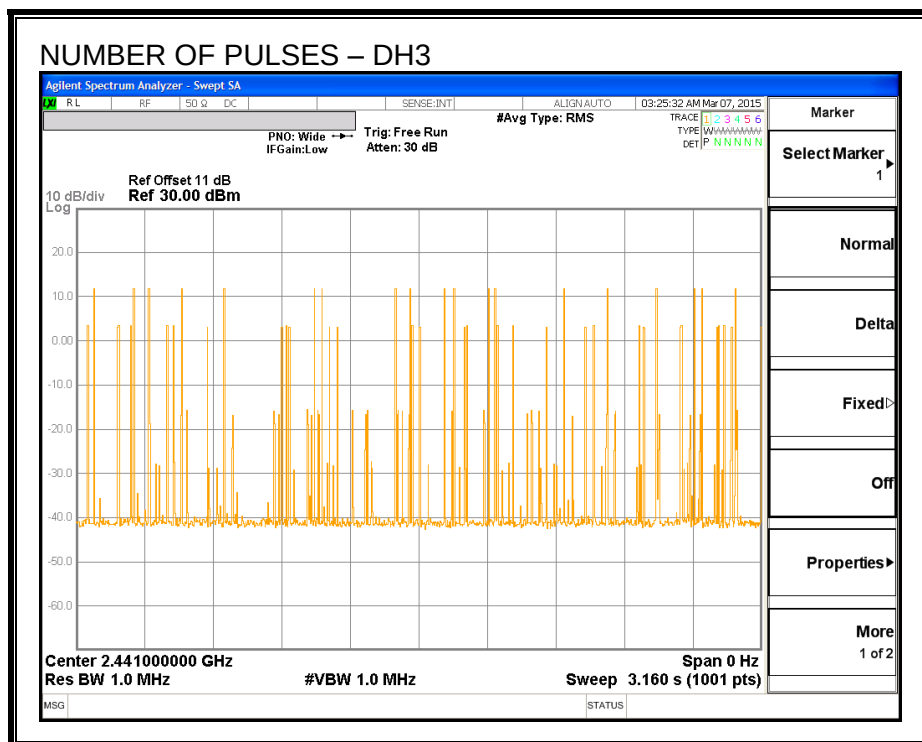
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



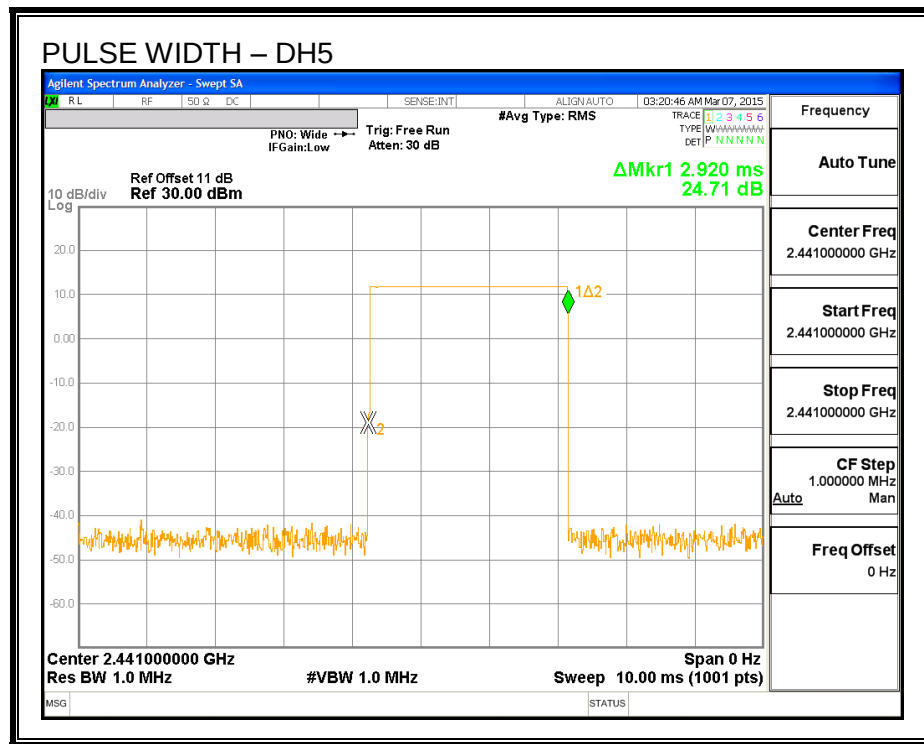
PULSE WIDTH – DH3



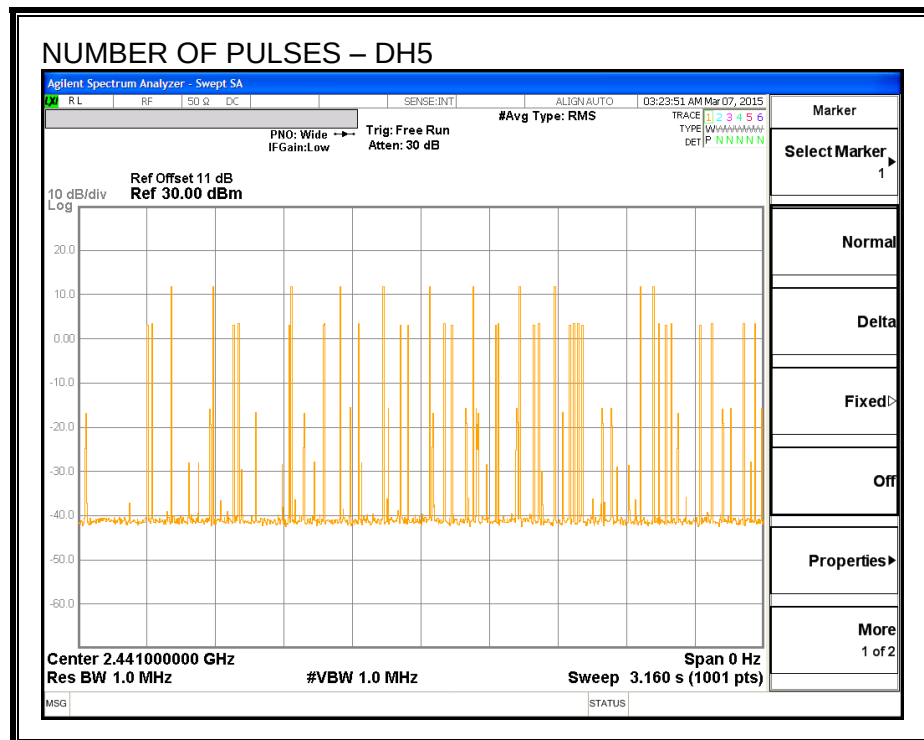
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



8.2.5. 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	7.92	30	-22.08
Middle	2441	7.95	30	-22.05
High	2480	7.93	30	-22.07

8.2.6. 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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.84
Middle	2441	7.85
High	2480	7.84

8.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

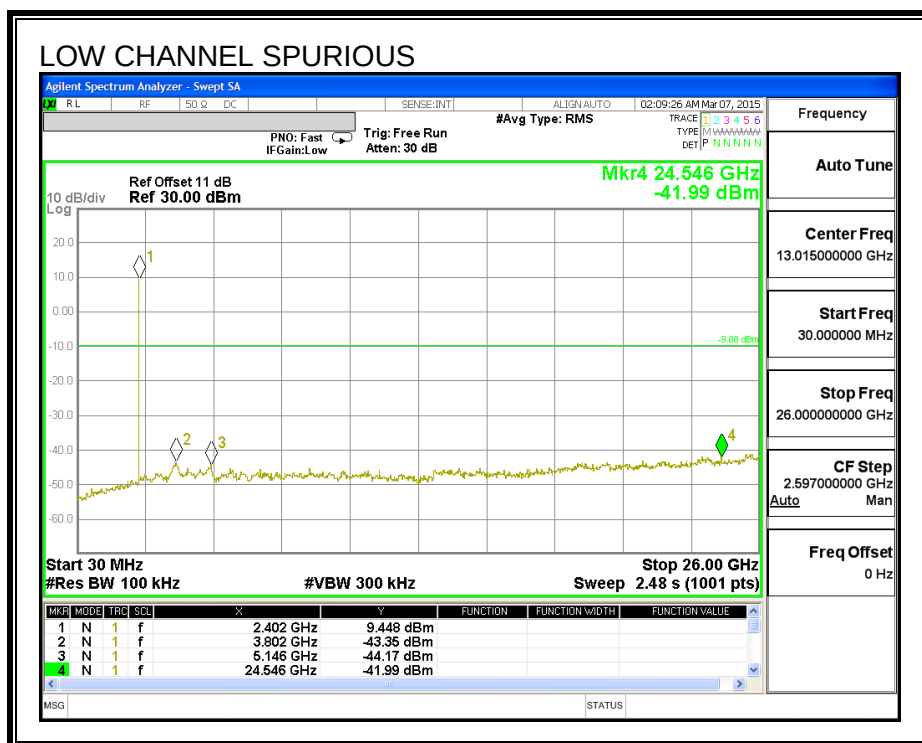
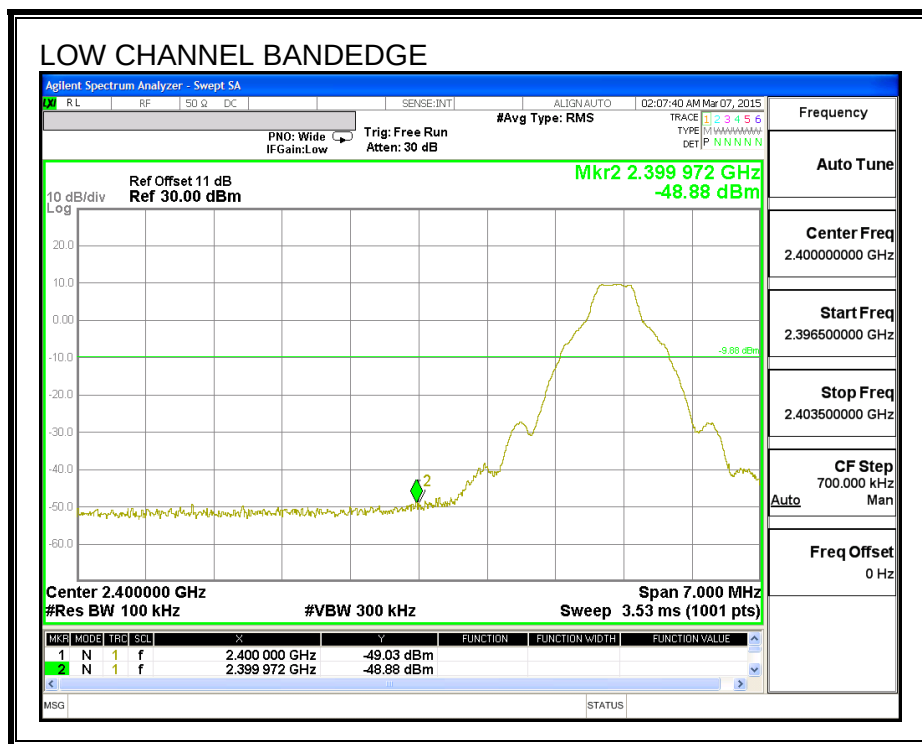
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

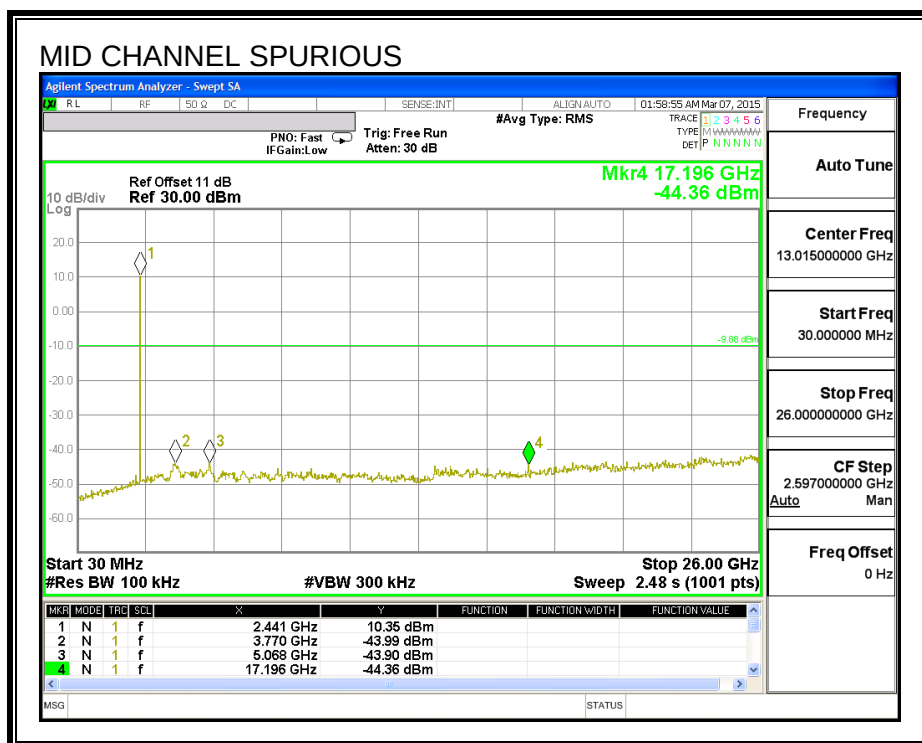
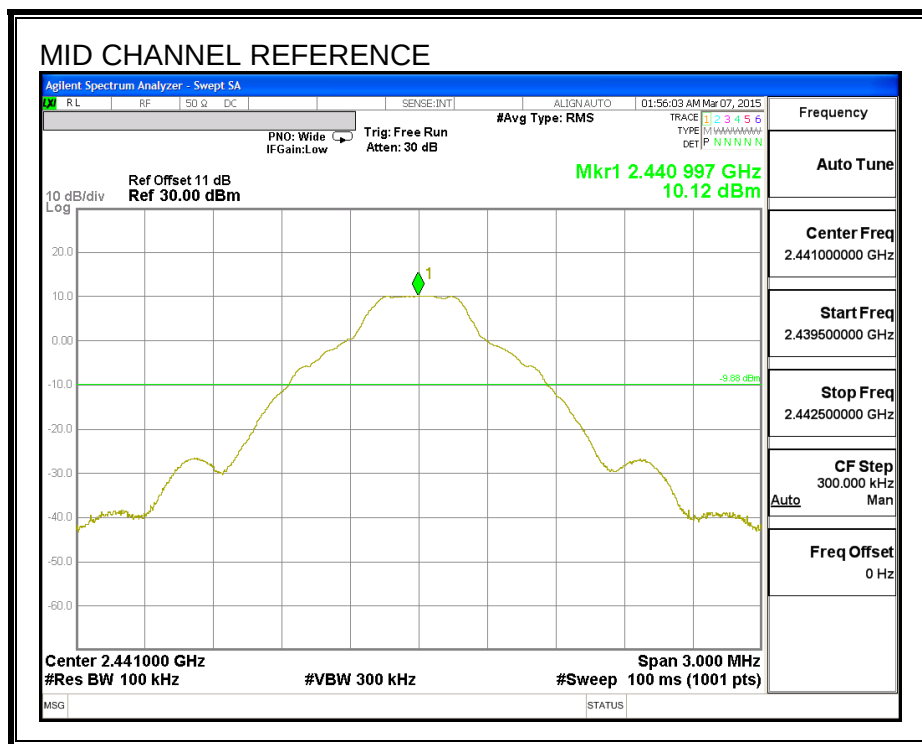
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

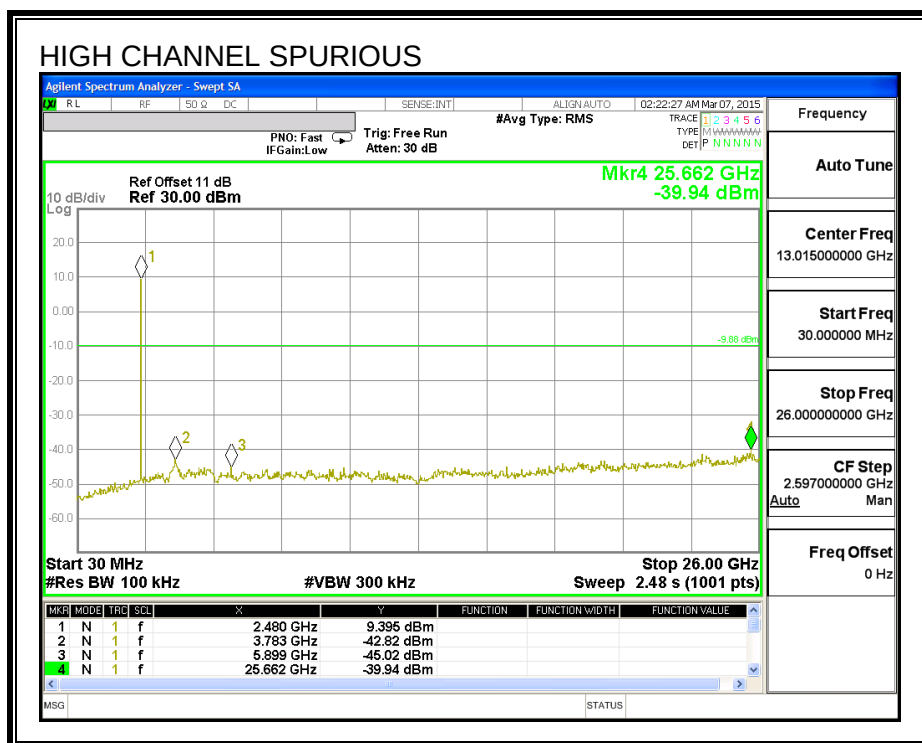
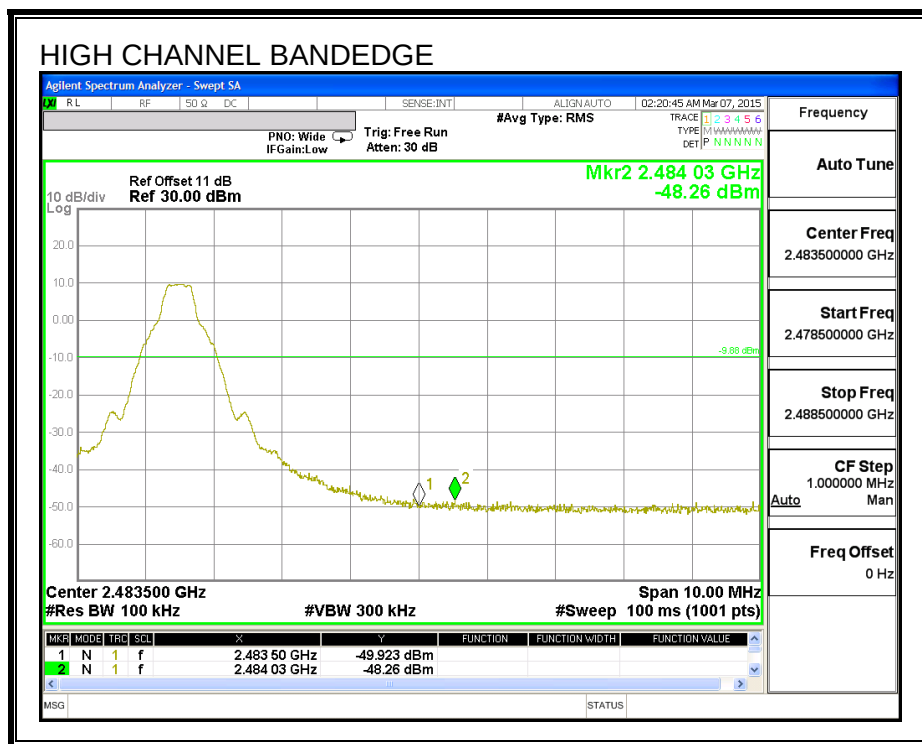
SPURIOUS EMISSIONS, LOW CHANNEL



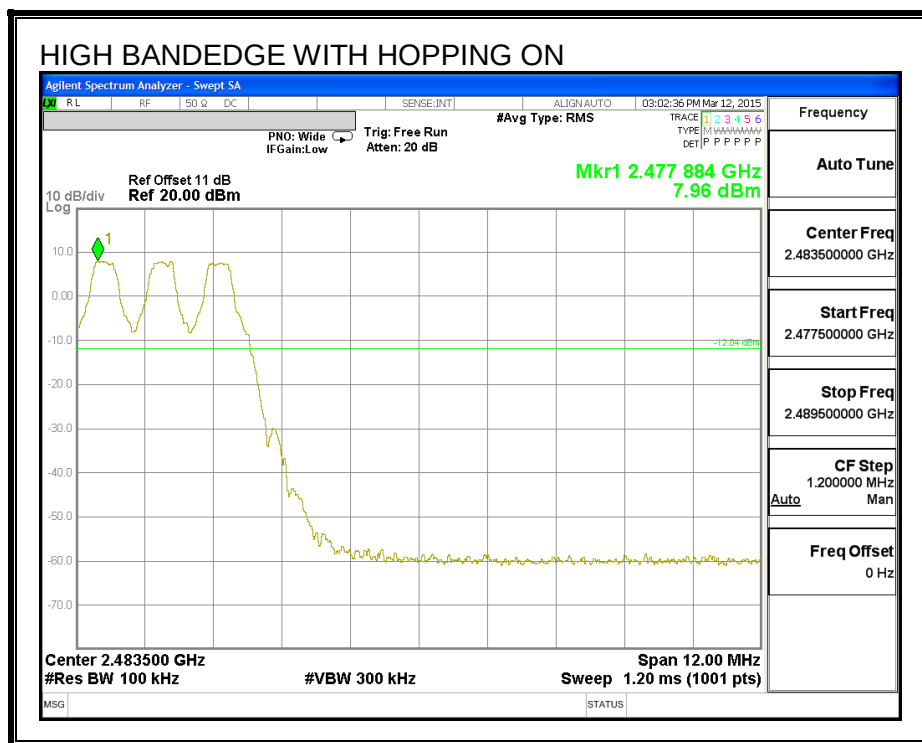
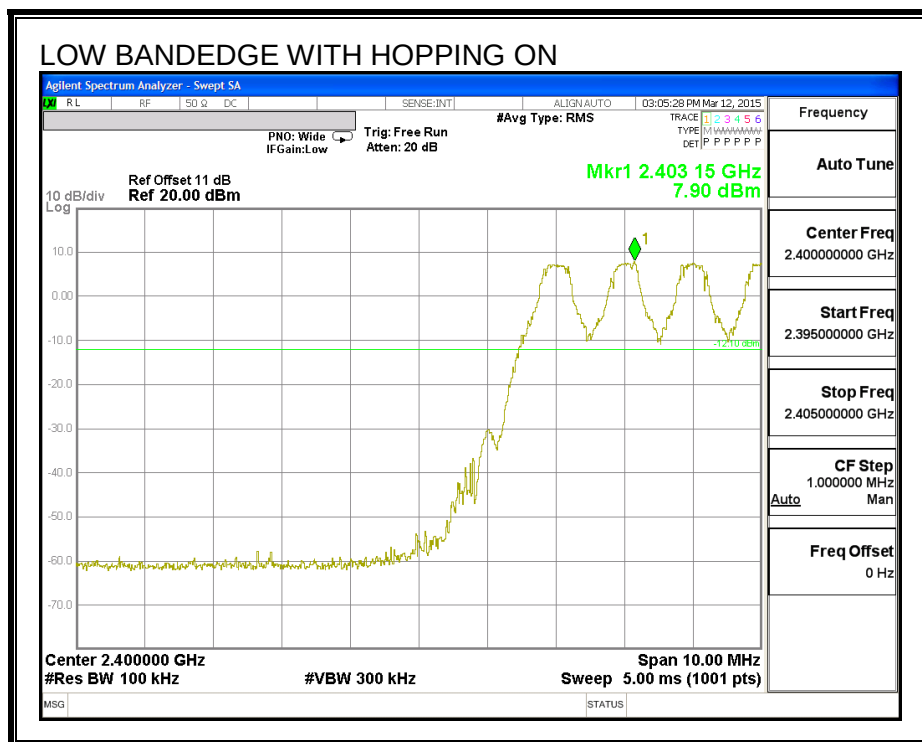
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8.3. ENHANCED DATA RATE QPSK MODULATION (ANTENNA B)

8.3.1. 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	10.04	21	-10.93
Middle	2441	10.08	21	-10.89
High	2480	10.05	21	-10.92

8.3.2. 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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.98
Middle	2441	8.10
High	2480	8.02

8.4. ENHANCED DATA RATE QPSK MODULATION (ANTENNA D)

8.4.1. 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	8.58	21	-12.39
Middle	2441	9.05	21	-11.92
High	2480	9.02	21	-11.95

8.4.2. 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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.66
Middle	2441	6.95
High	2480	6.94

8.5. ENHANCED DATA RATE 8PSK MODULATION (ANTENNA B)

8.5.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

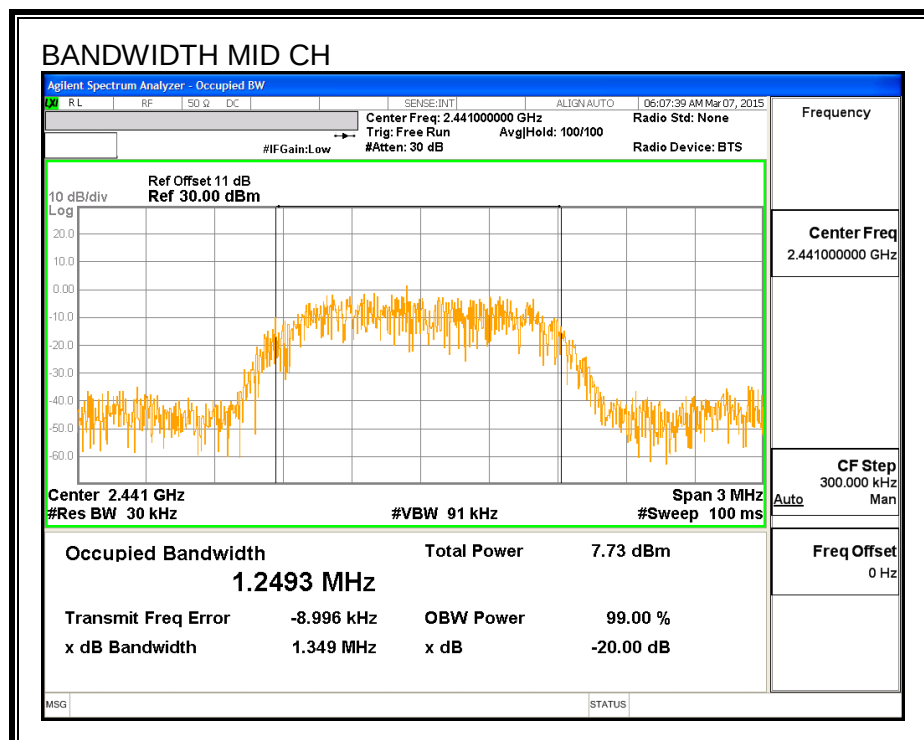
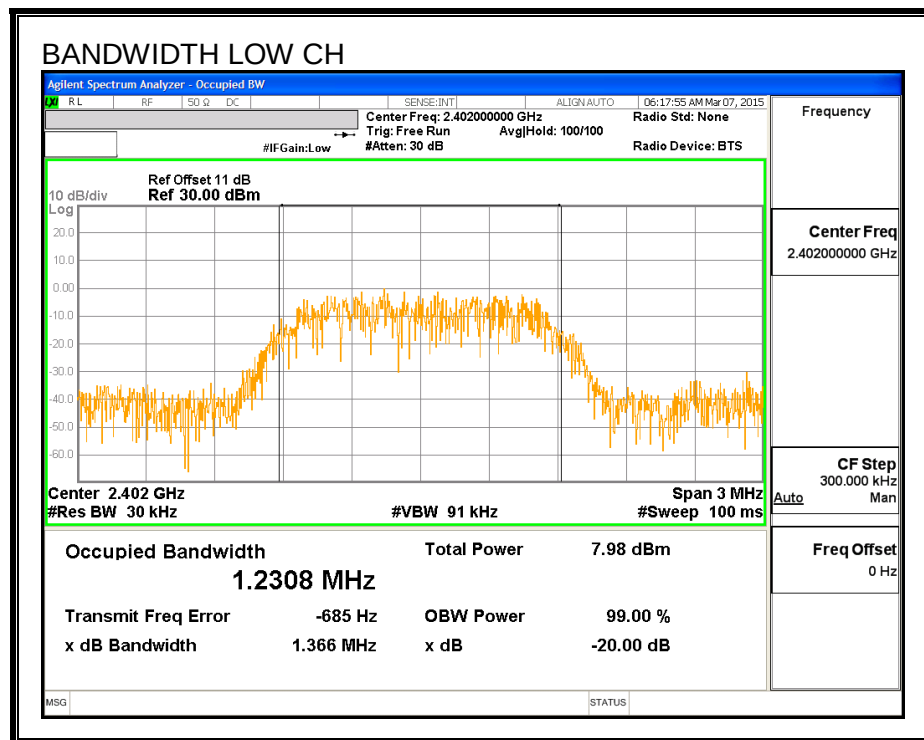
TEST PROCEDURE

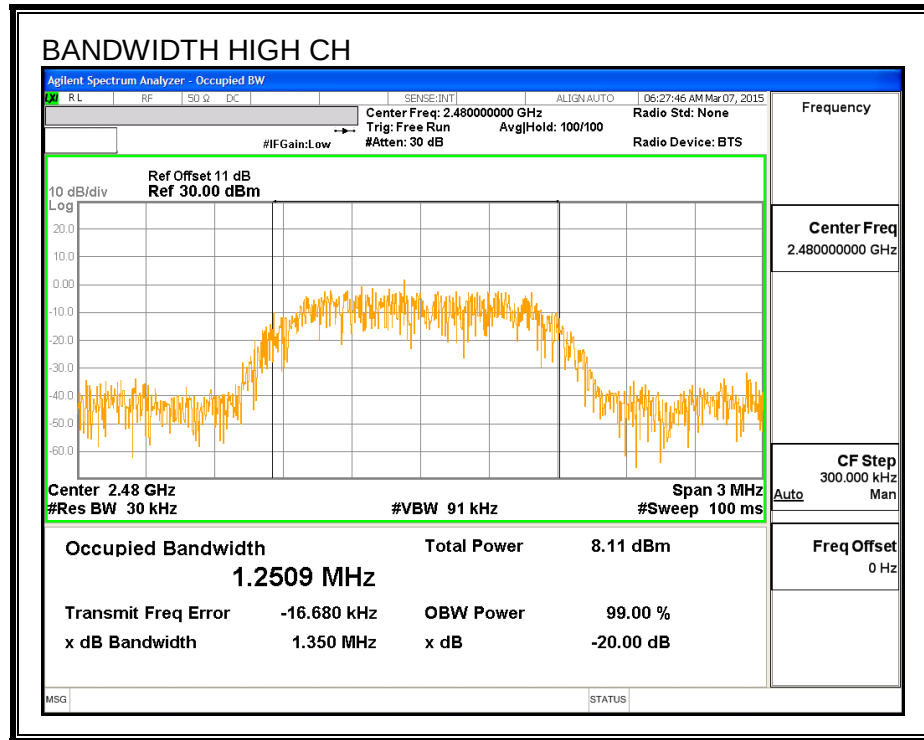
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.366	1.2308
Middle	2441	1.349	1.2493
High	2480	1.350	1.2509

20 dB AND 99% BANDWIDTH





8.5.2. 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.

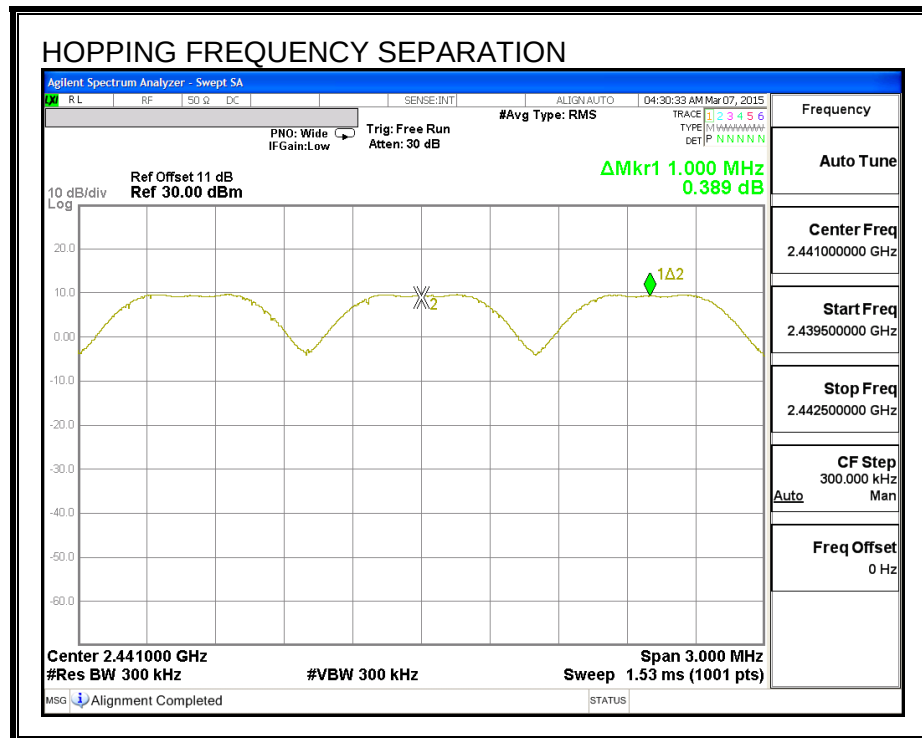
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



8.5.3. 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.

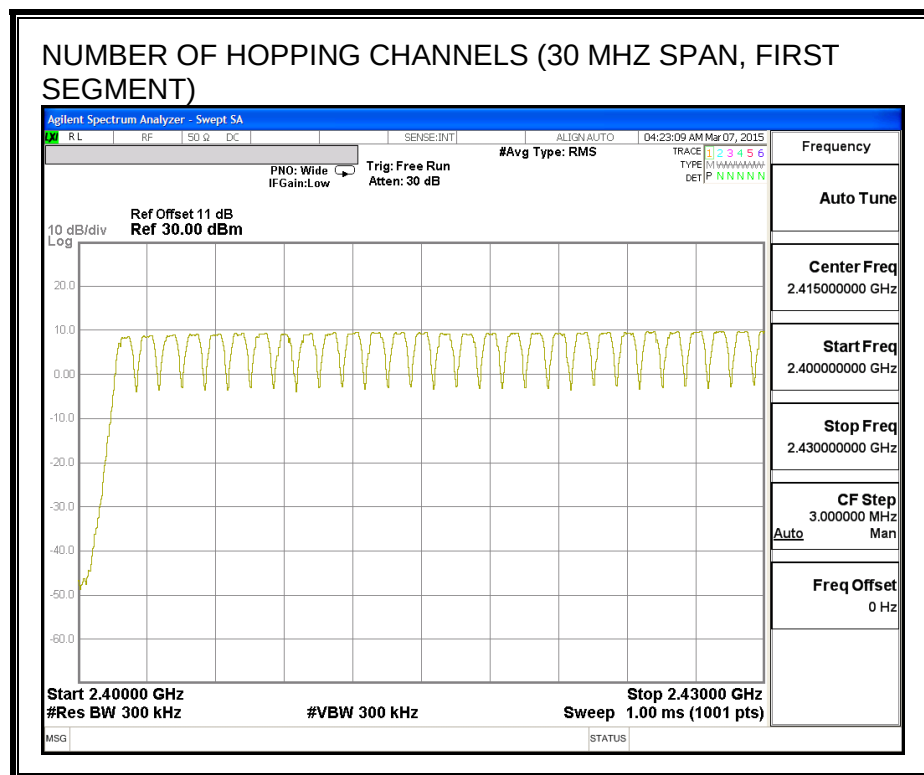
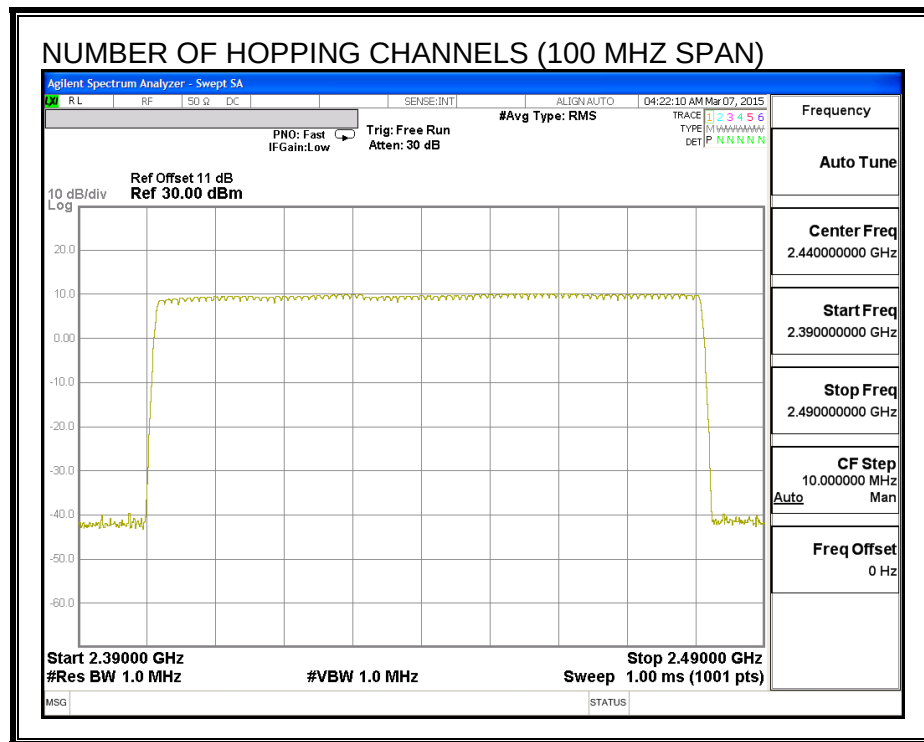
TEST PROCEDURE

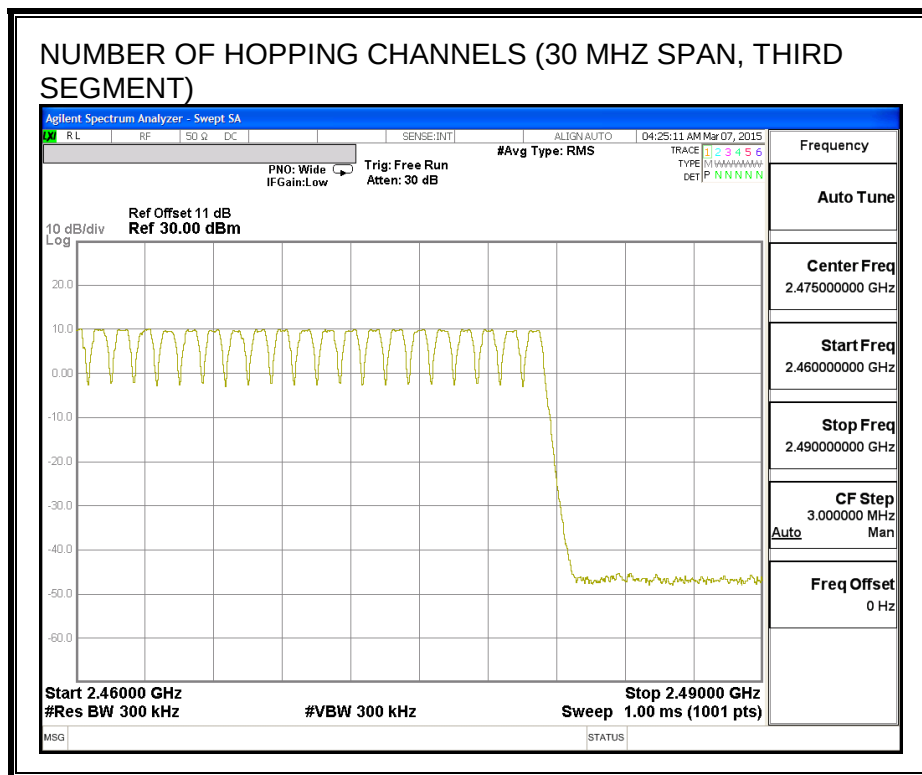
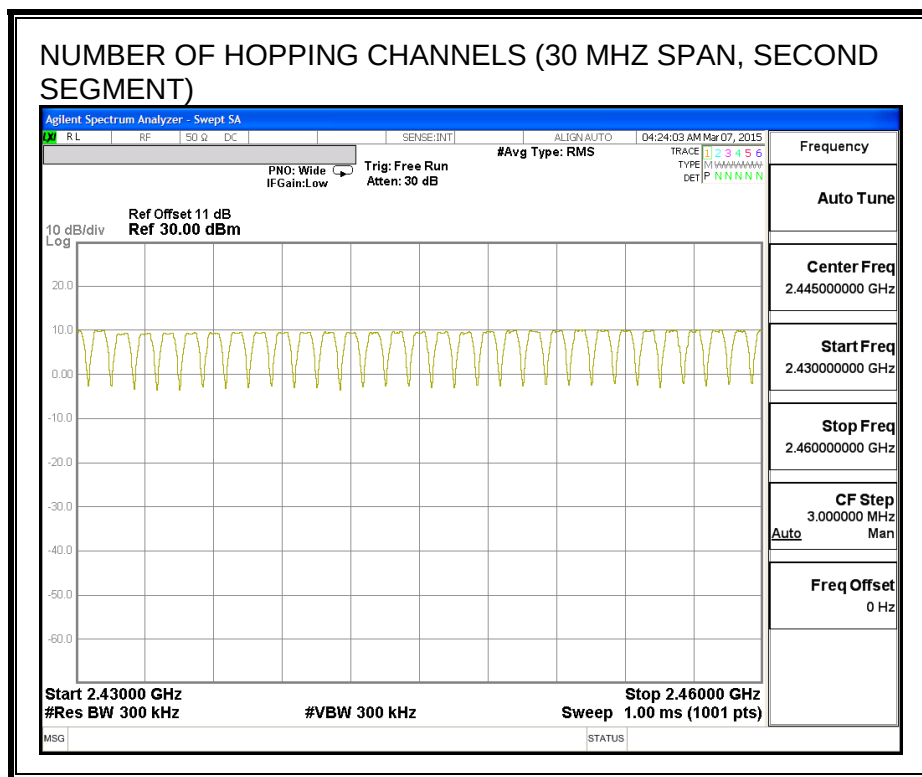
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





8.5.4. 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.

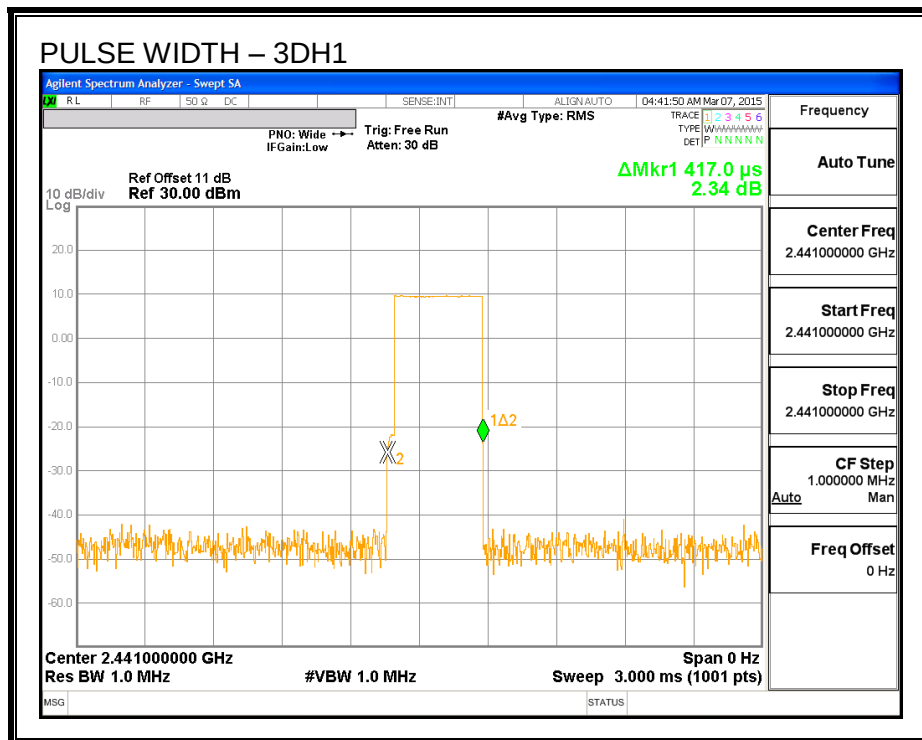
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

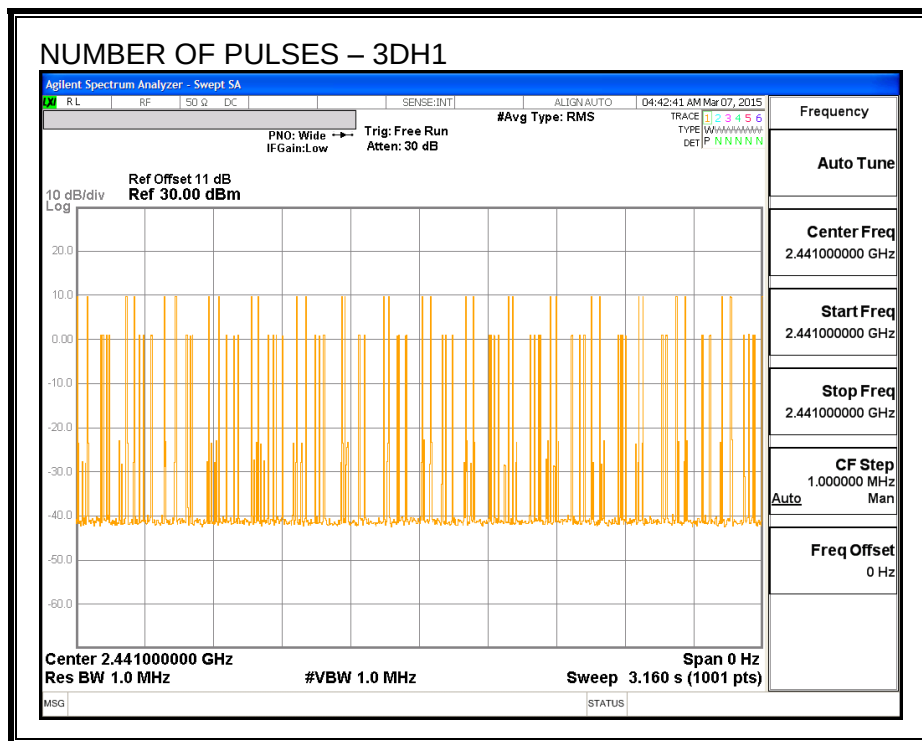
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.417	32	0.133	0.4	-0.267
3DH3	1.675	18	0.302	0.4	-0.099
3DH5	2.92	11	0.321	0.4	-0.079

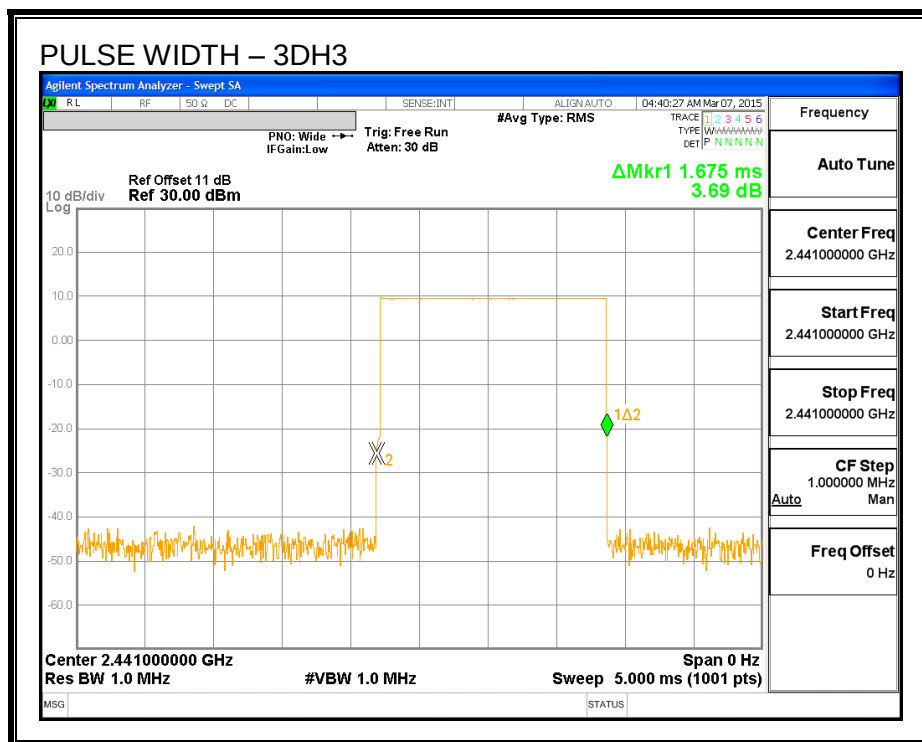
PULSE WIDTH - 3DH1



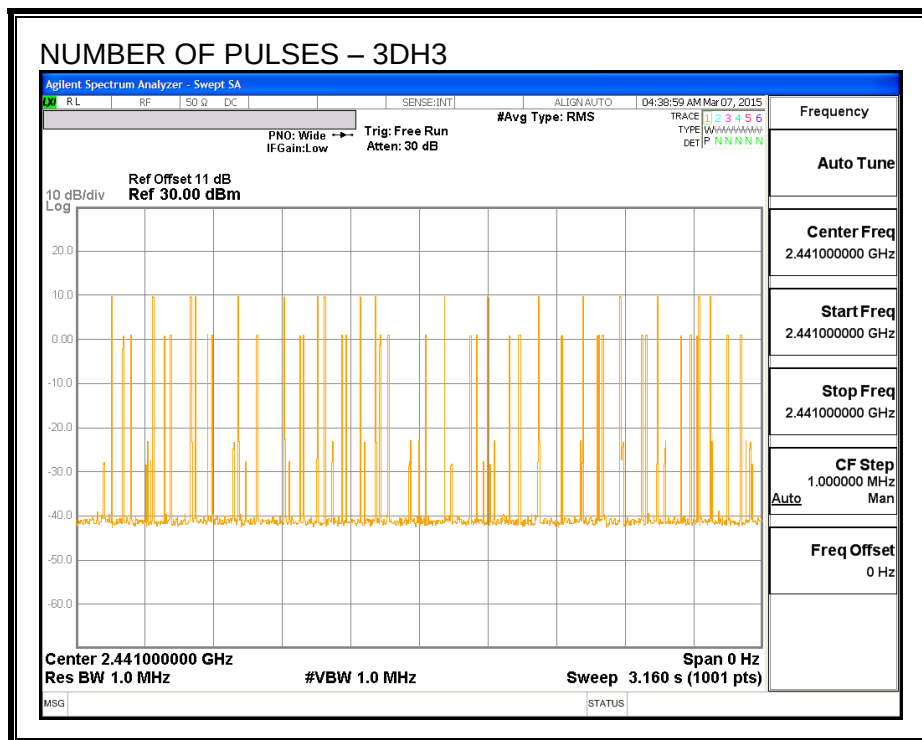
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



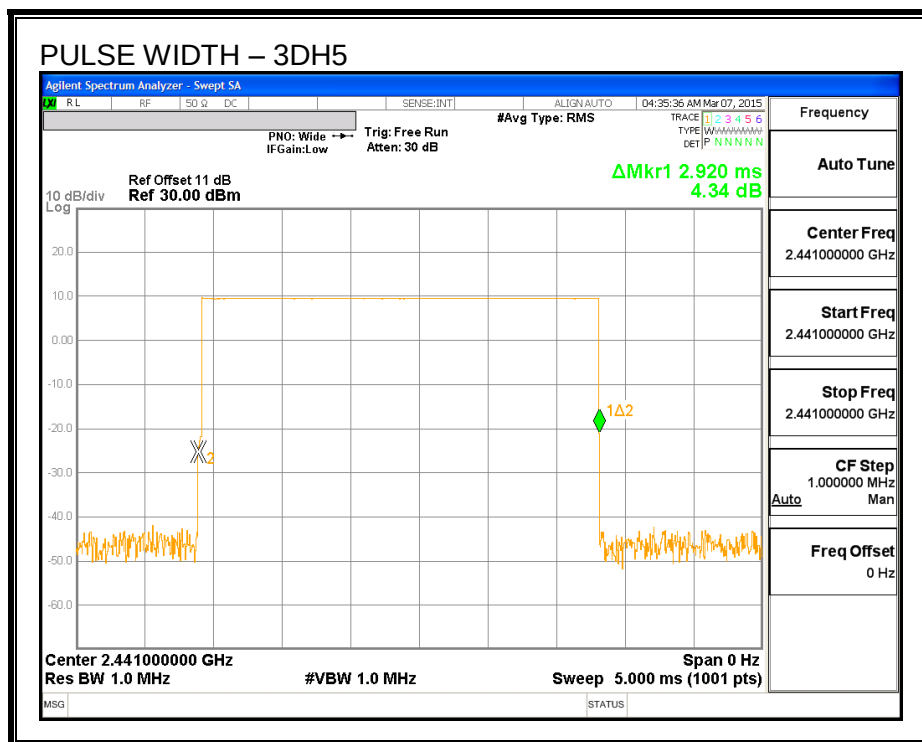
PULSE WIDTH – 3DH3



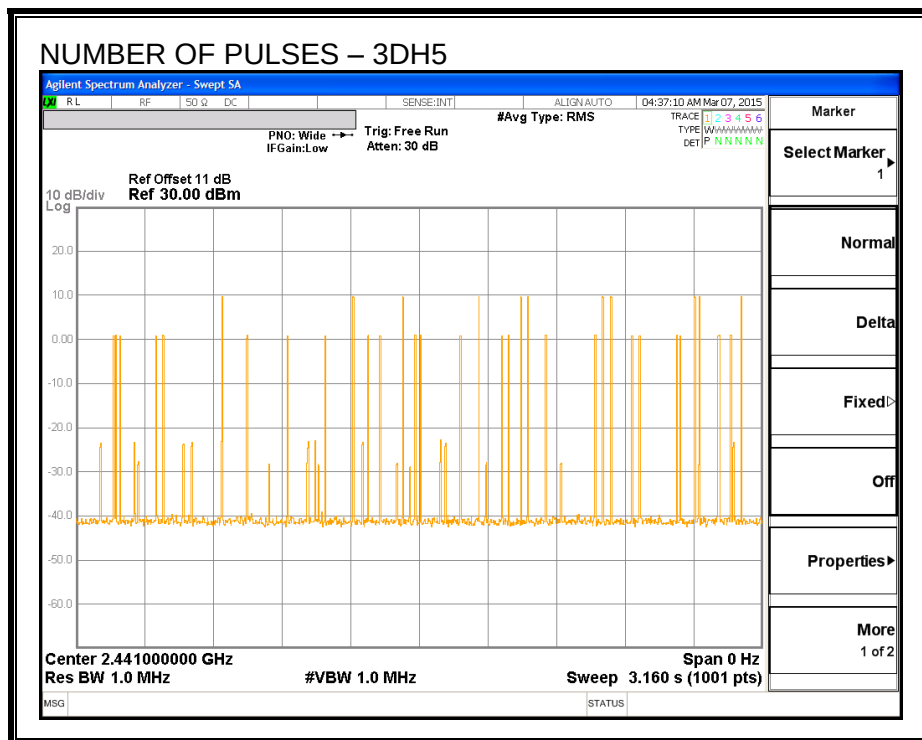
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5



8.5.5. 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	10.08	21	-10.89
Middle	2441	10.14	21	-10.83
High	2480	10.13	21	-10.84

8.5.6. 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	8.01
Middle	2441	8.14
High	2480	8.13

8.5.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

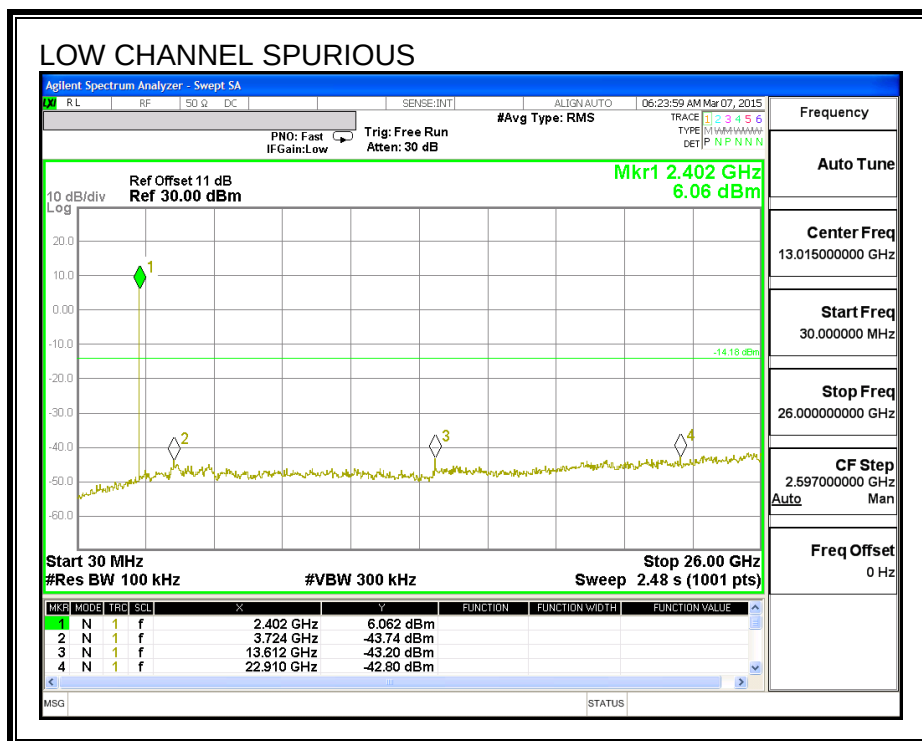
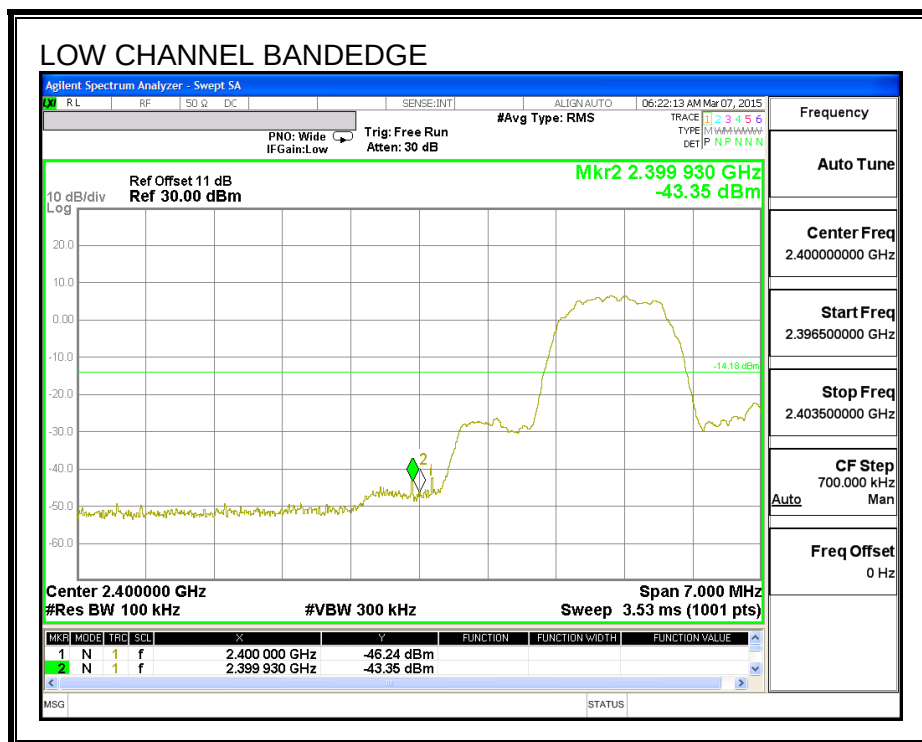
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

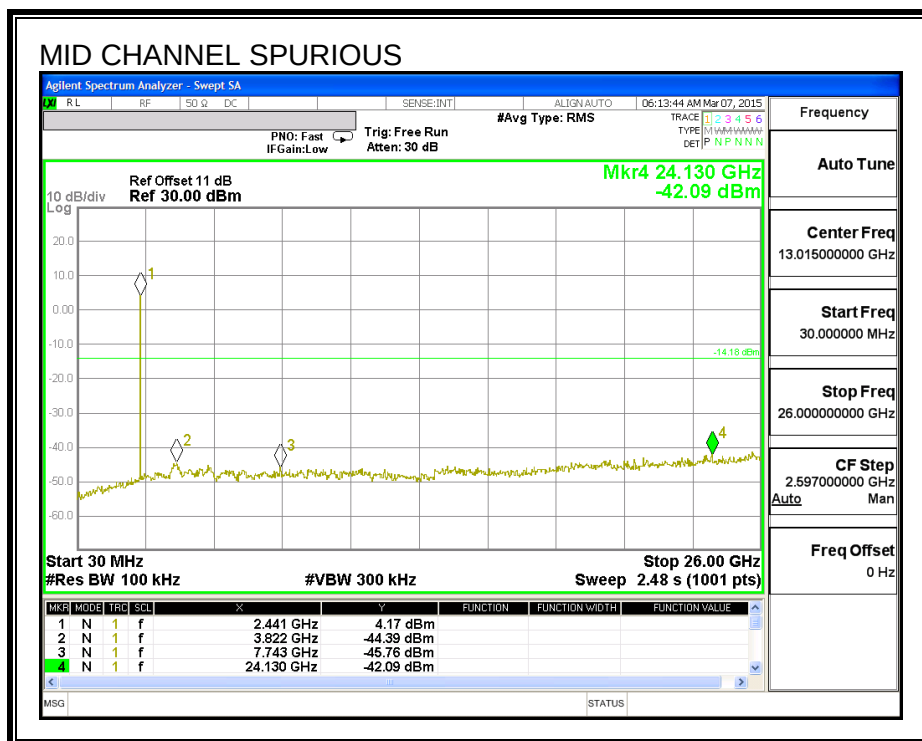
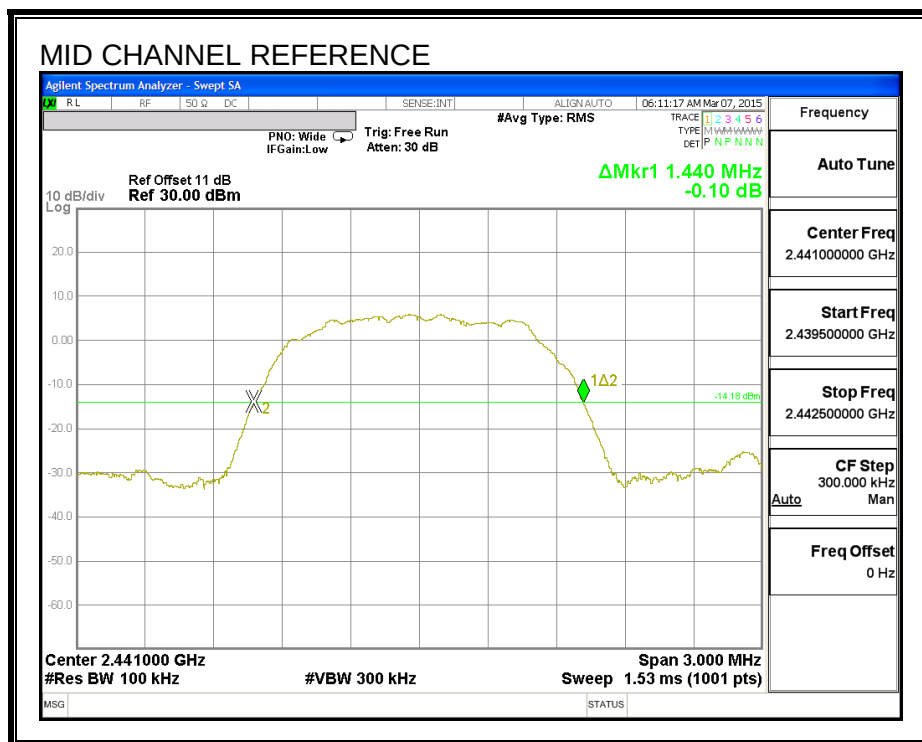
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

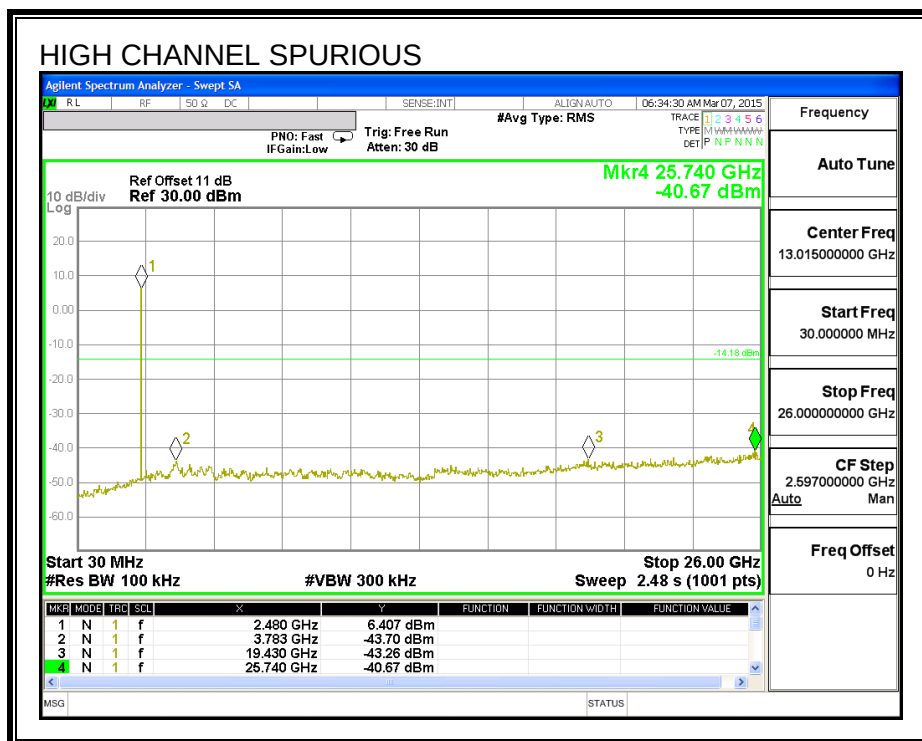
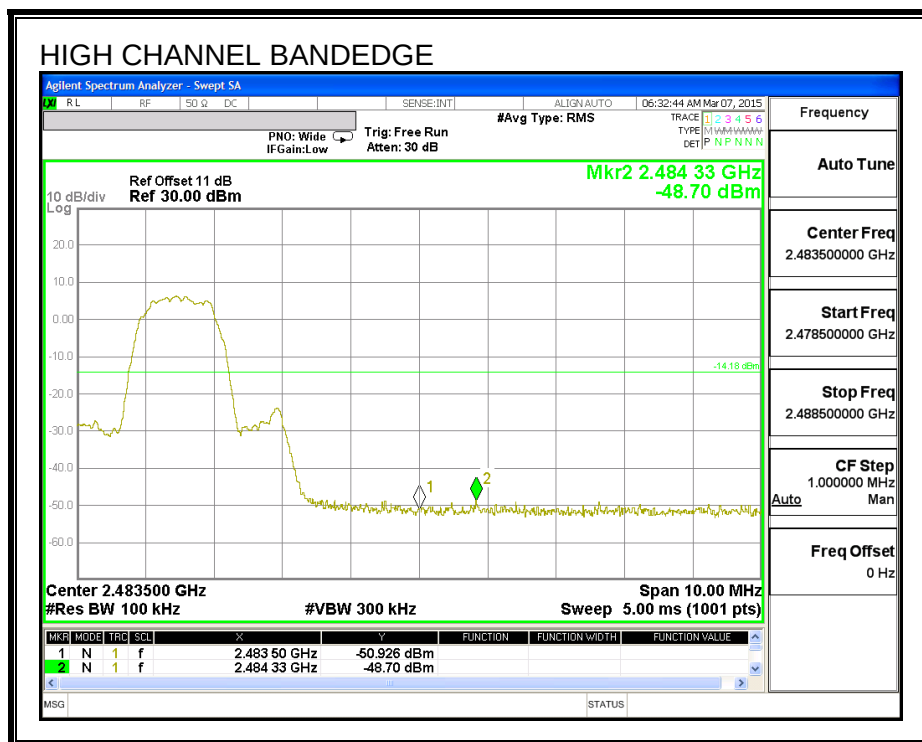
SPURIOUS EMISSIONS, LOW CHANNEL



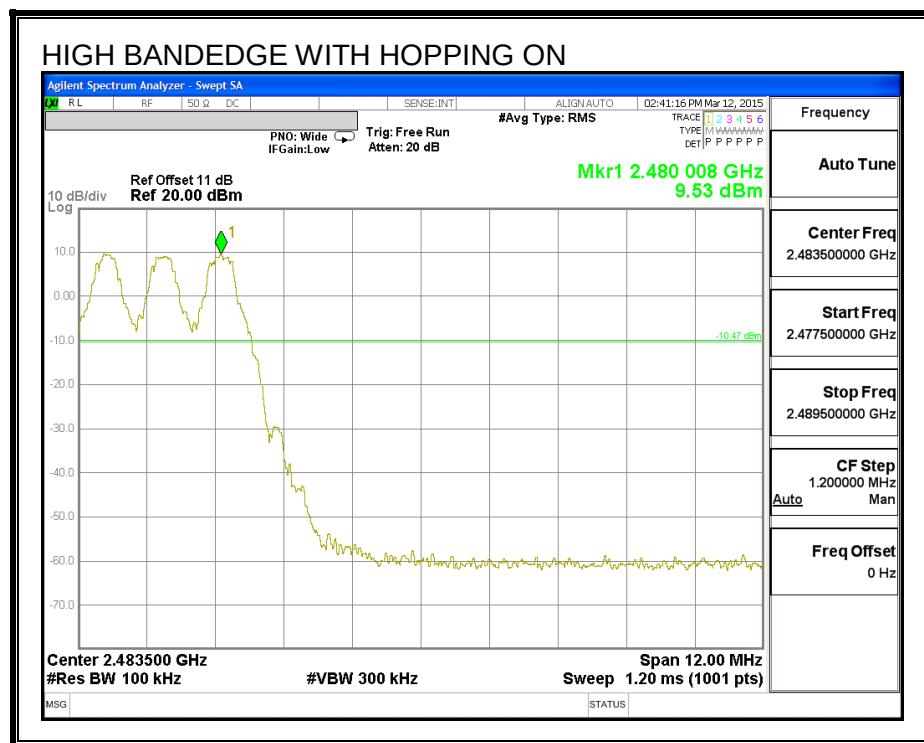
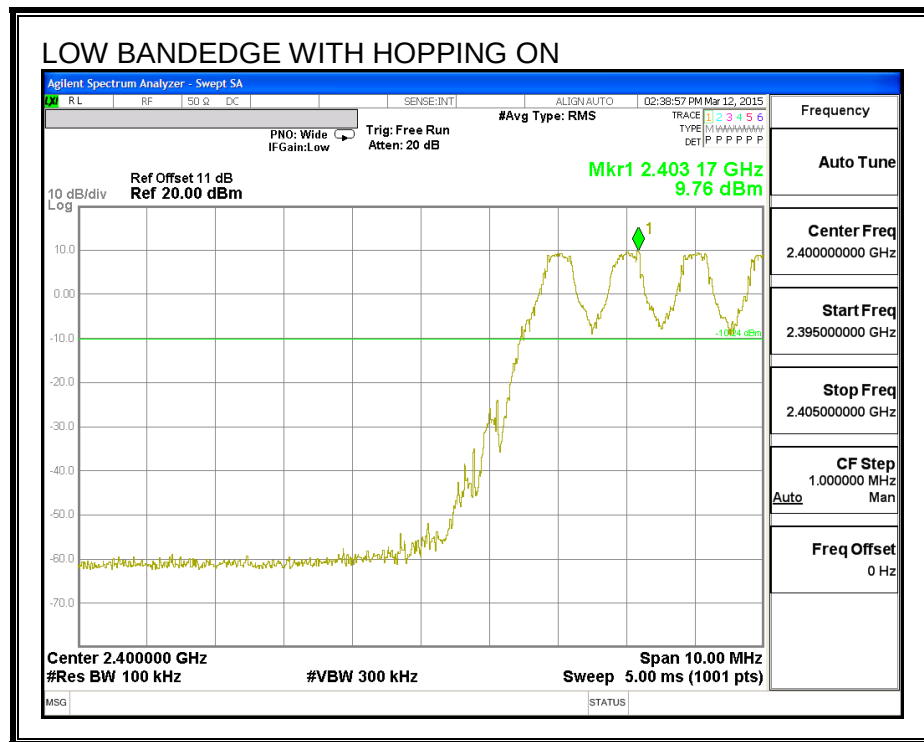
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8.6. ENHANCED DATA RATE 8PSK MODULATION (ANTENNA D)

8.6.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

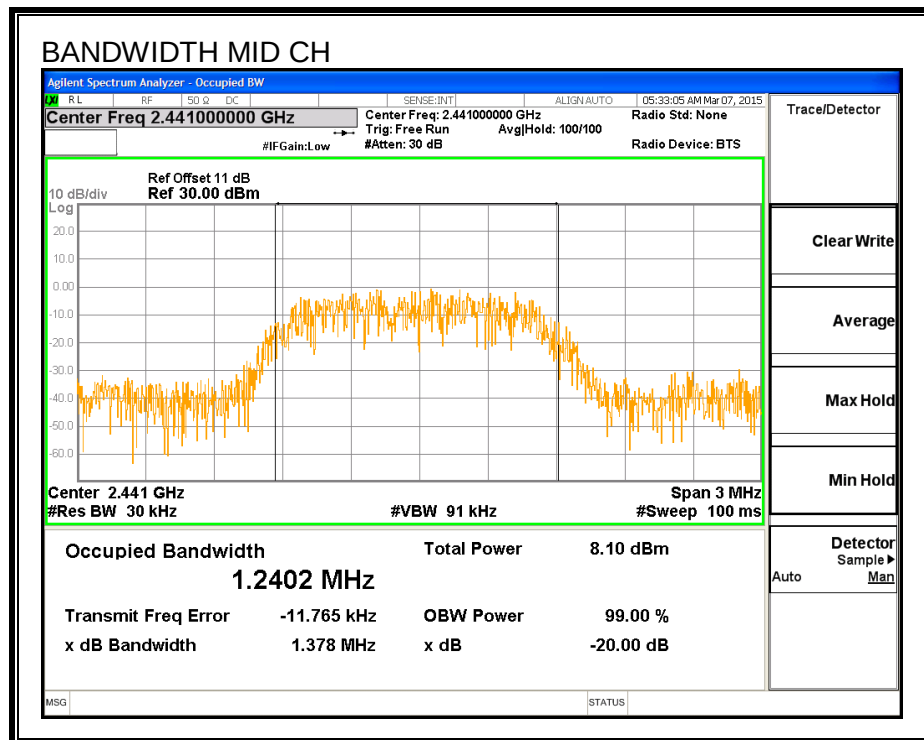
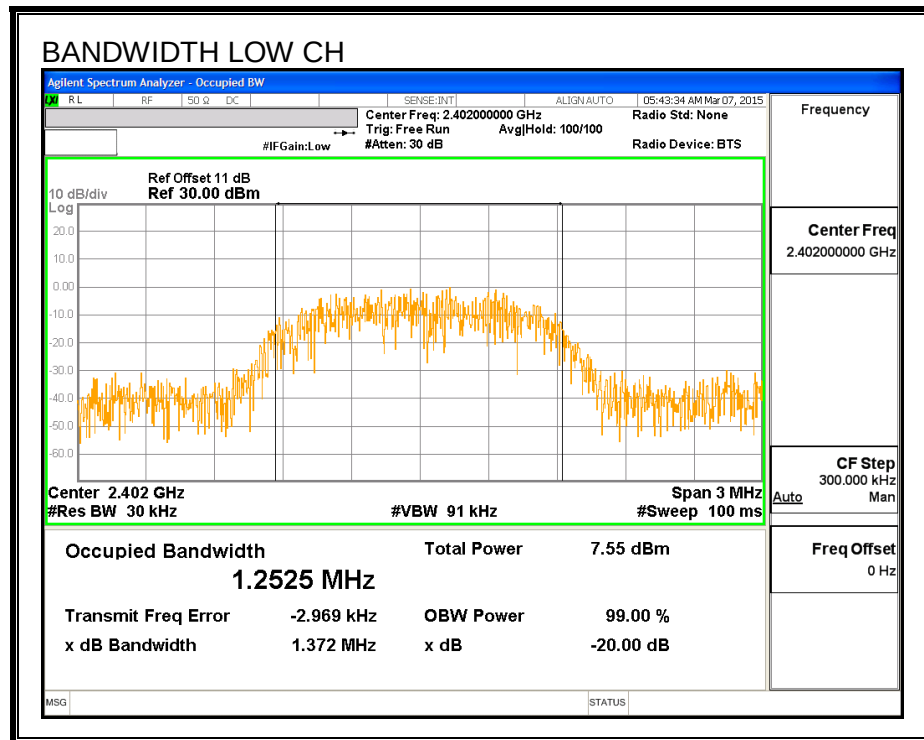
TEST PROCEDURE

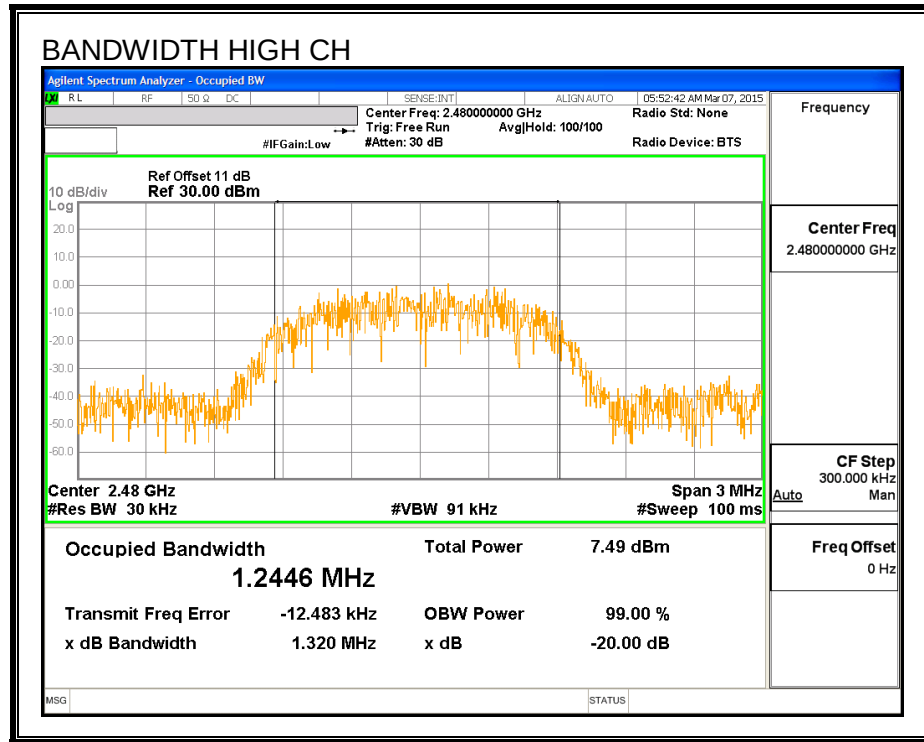
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.372	1.2525
Middle	2441	1.378	1.2402
High	2480	1.32	1.2446

20 dB AND 99% BANDWIDTH





8.6.2. 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.

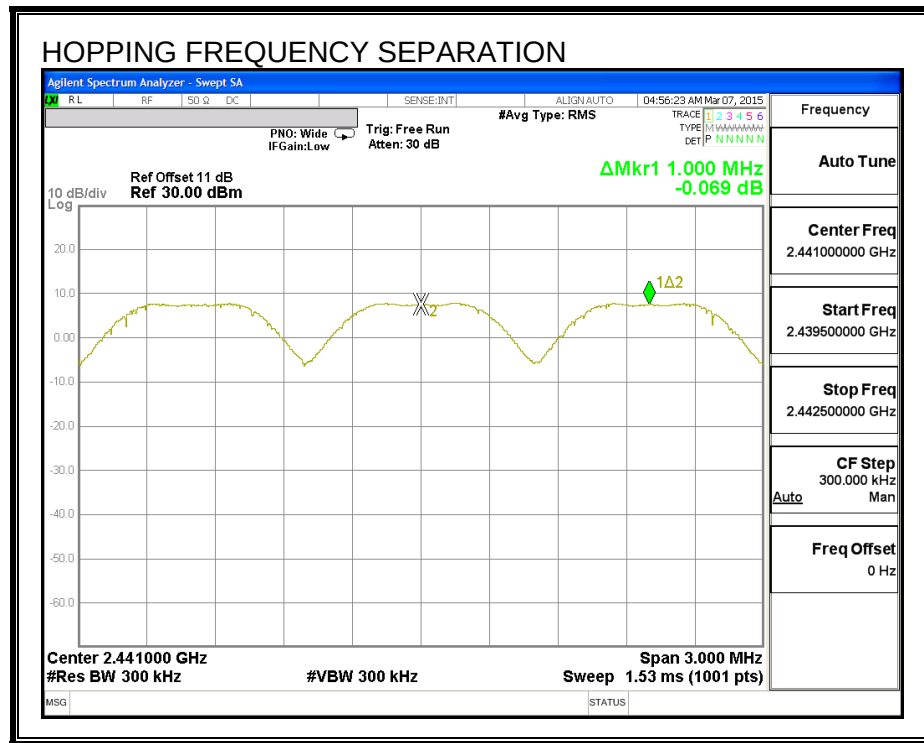
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



8.6.3. 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.

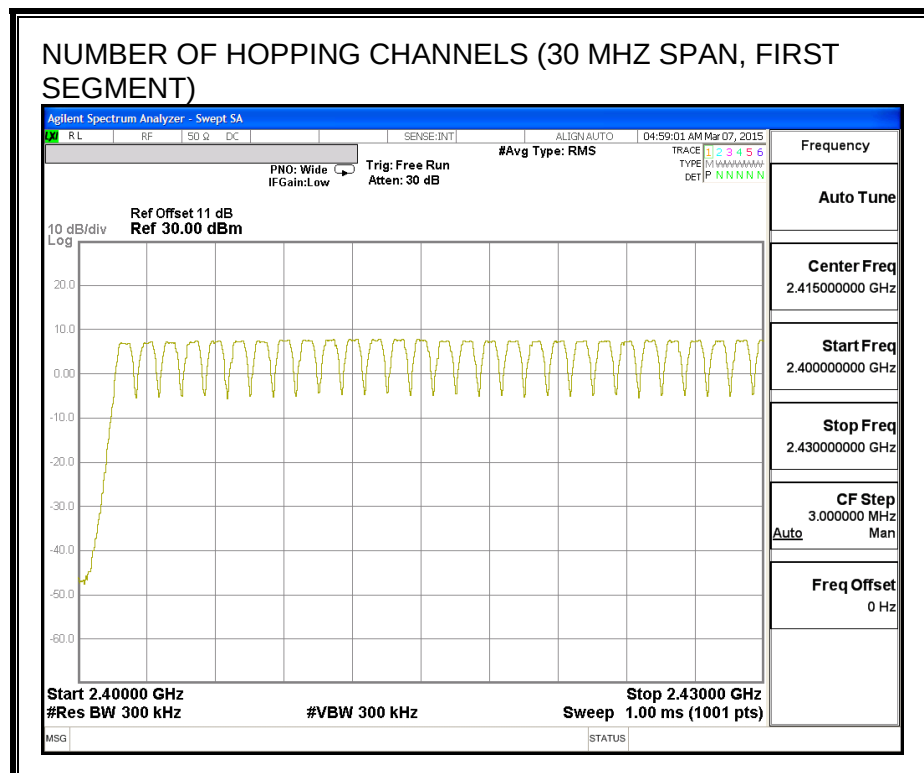
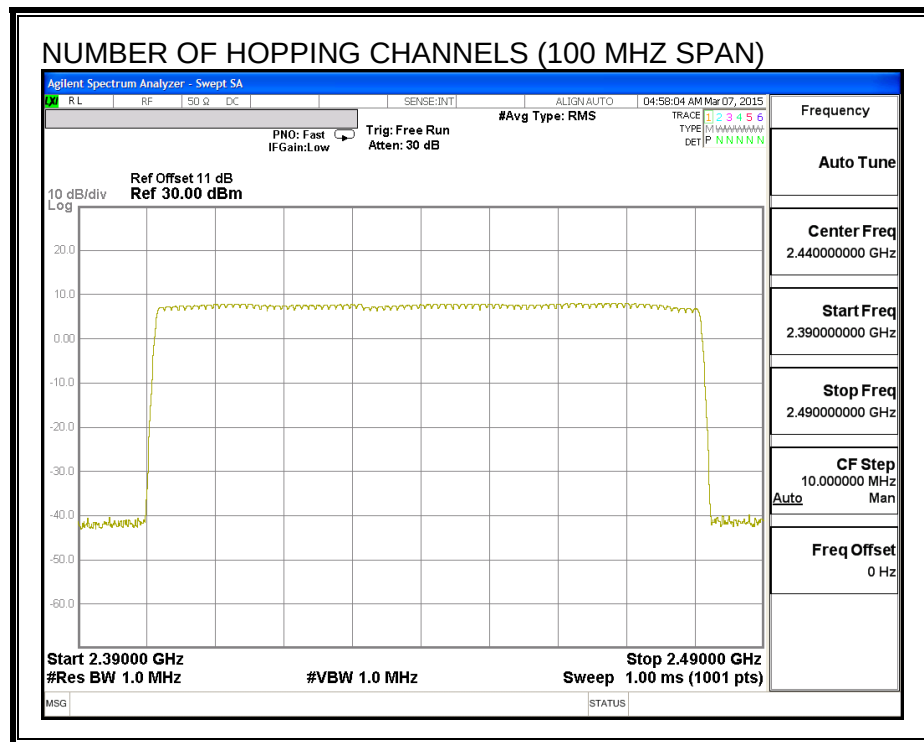
TEST PROCEDURE

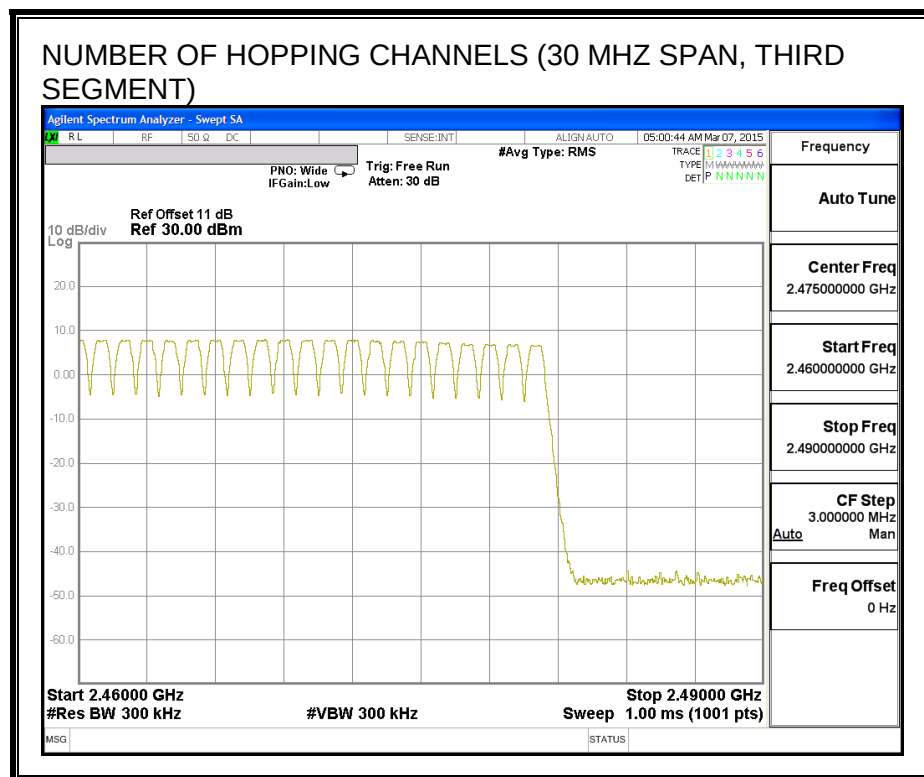
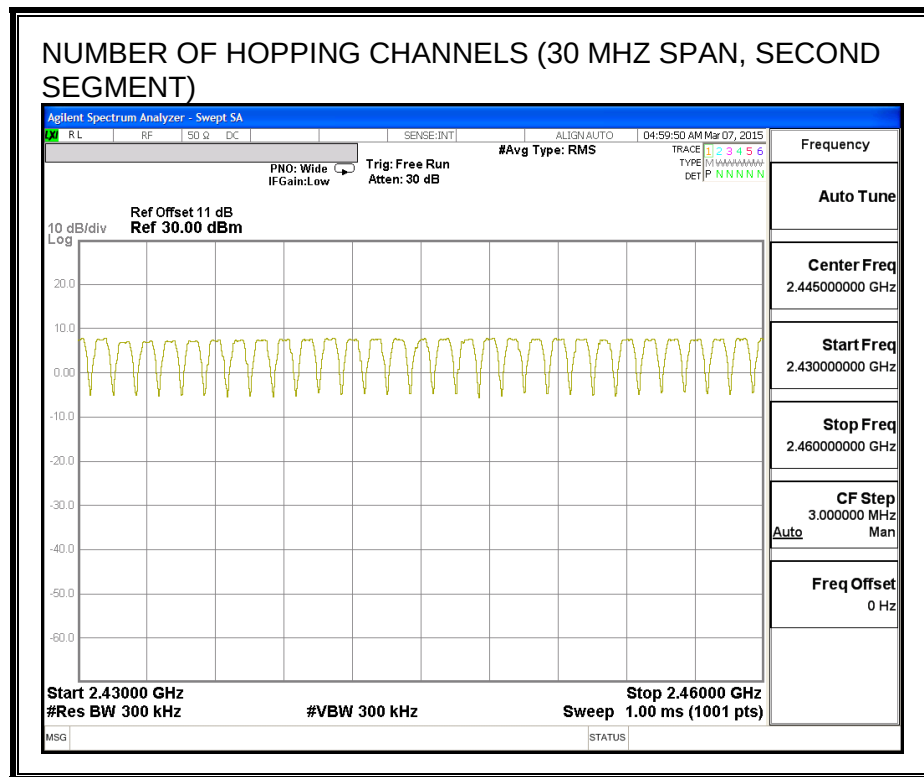
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS





8.6.4. 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.

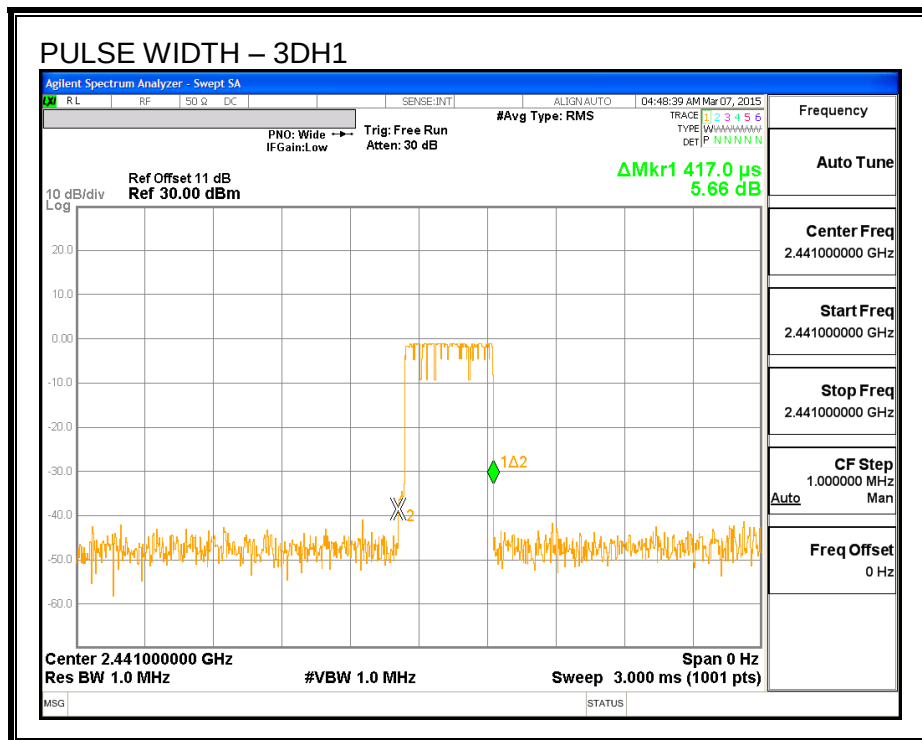
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

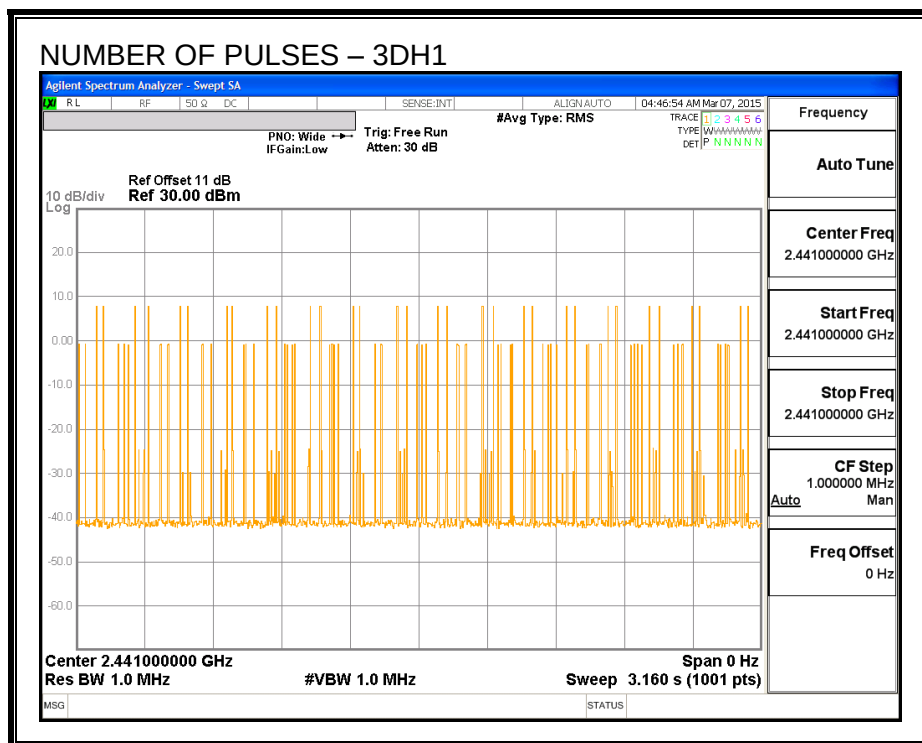
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.417	32	0.133	0.4	-0.267
3DH3	1.67	18	0.301	0.4	-0.099
3DH5	2.92	11	0.321	0.4	-0.079

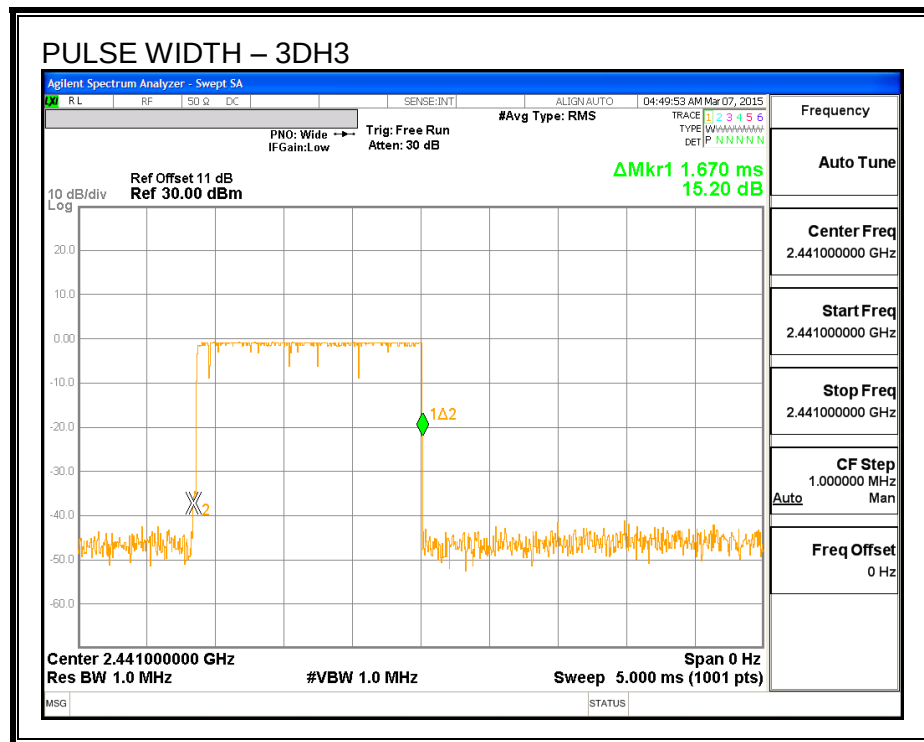
PULSE WIDTH - 3DH1



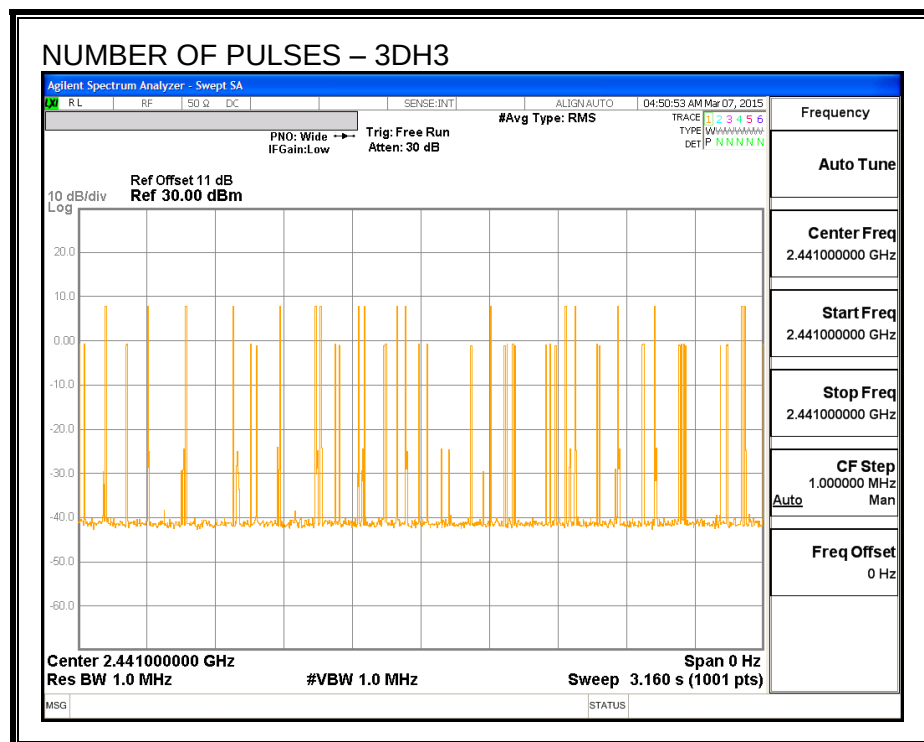
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



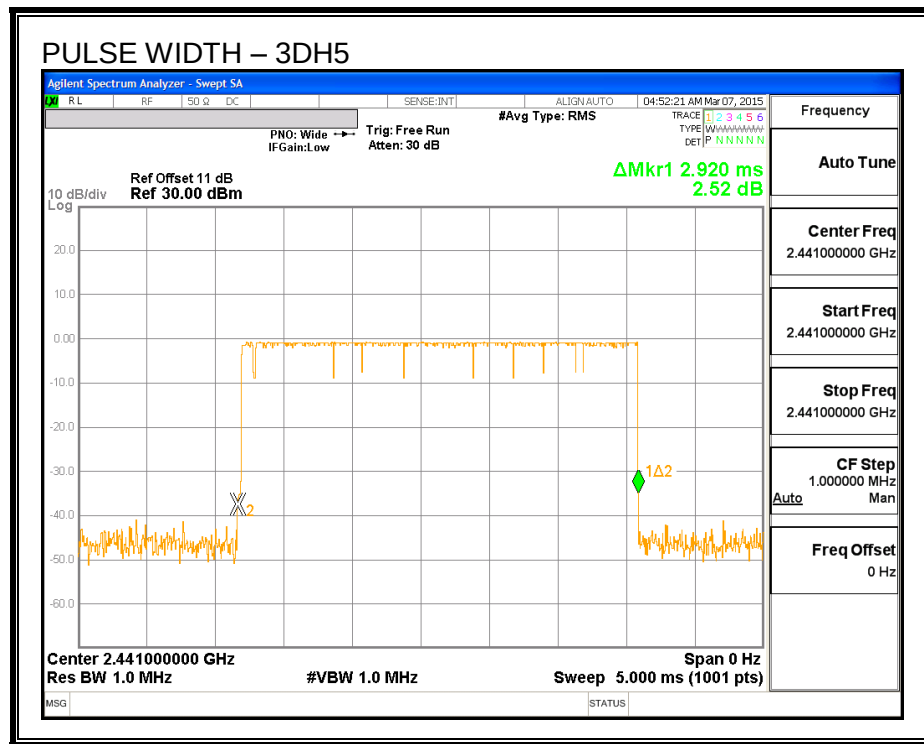
PULSE WIDTH – 3DH3



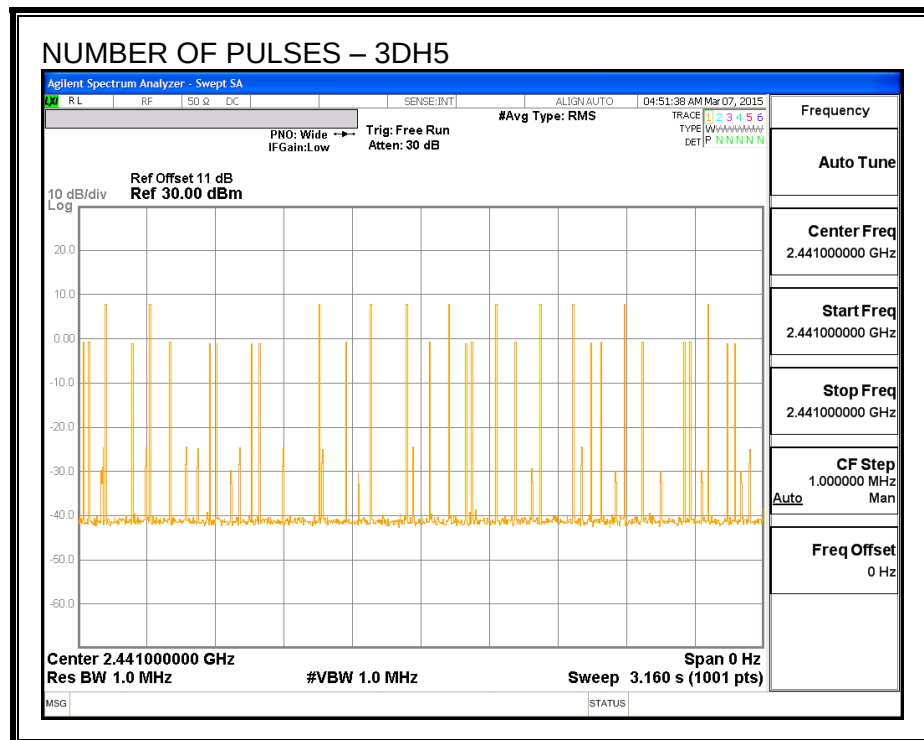
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5



8.6.5. 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	8.90	21	-12.07
Middle	2441	9.41	21	-11.56
High	2480	9.40	21	-11.57

8.6.6. 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 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.83
Middle	2441	6.99
High	2480	6.98

8.6.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

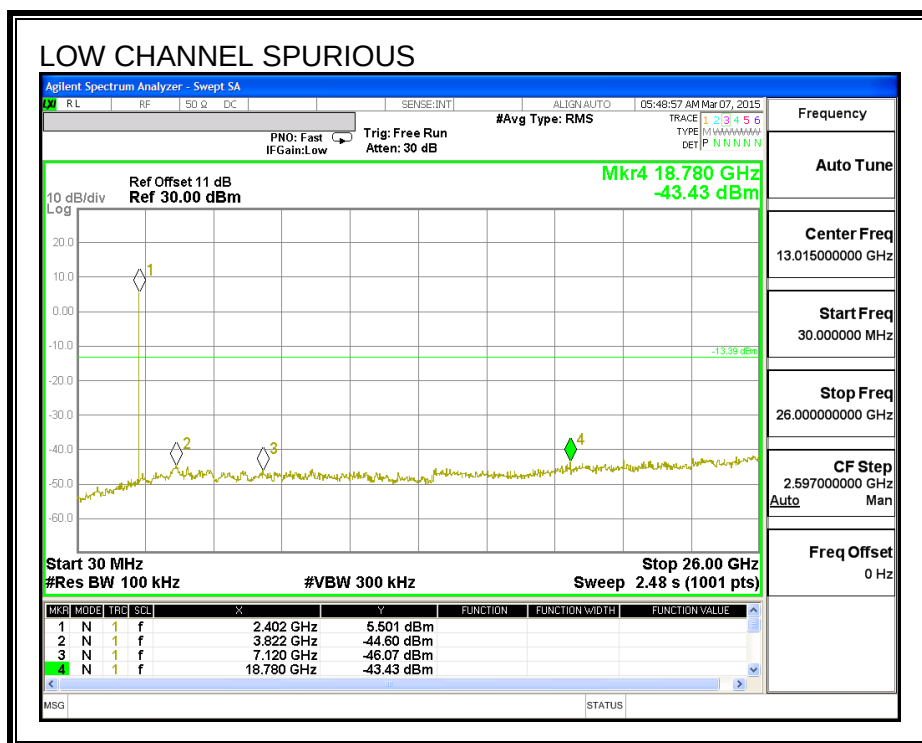
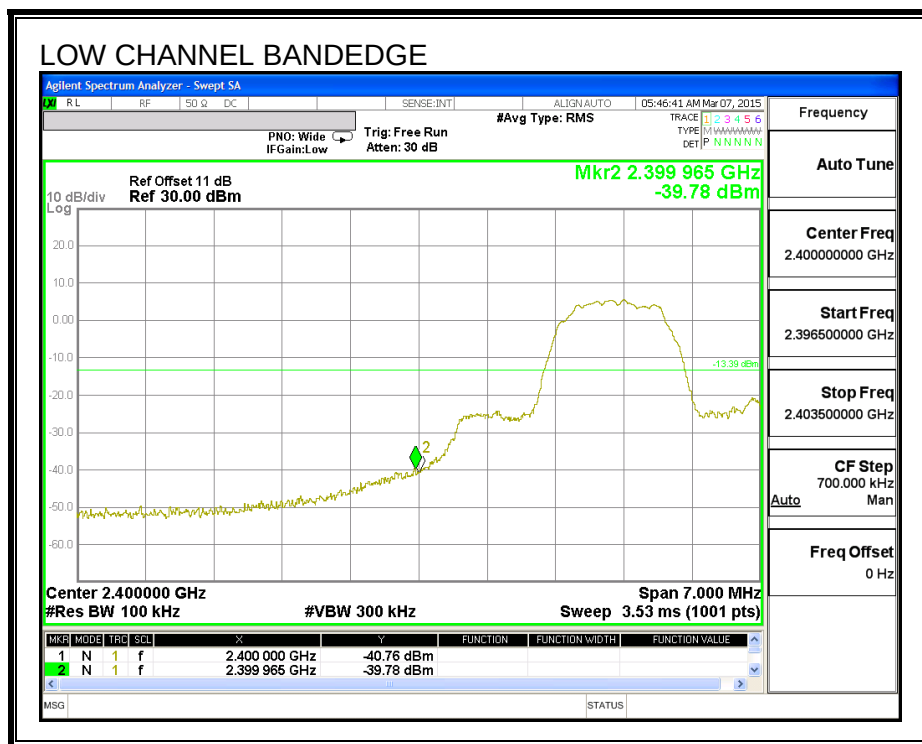
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

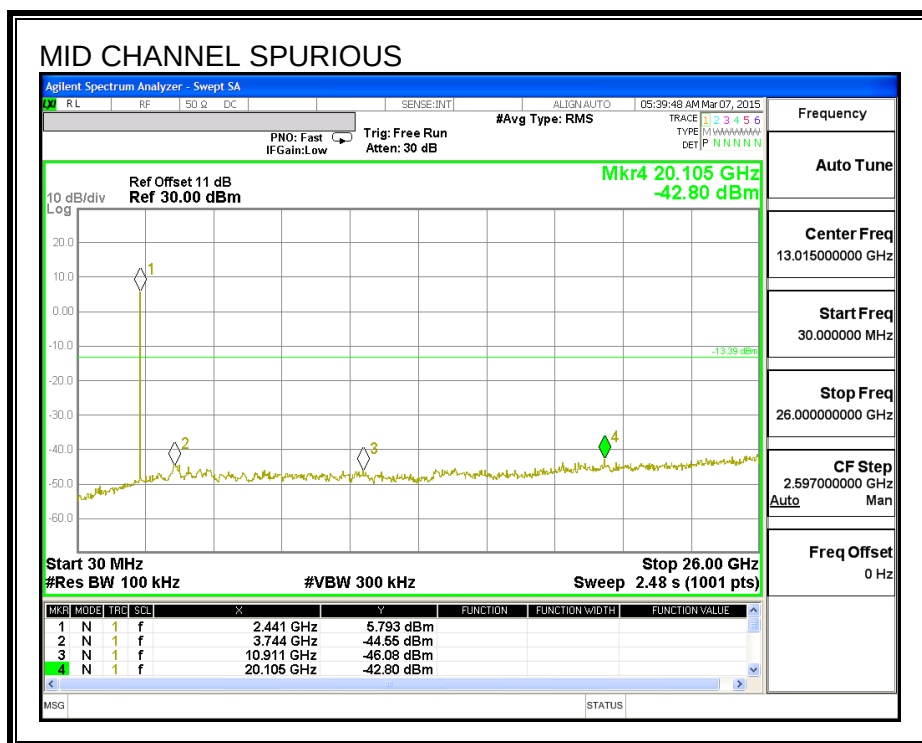
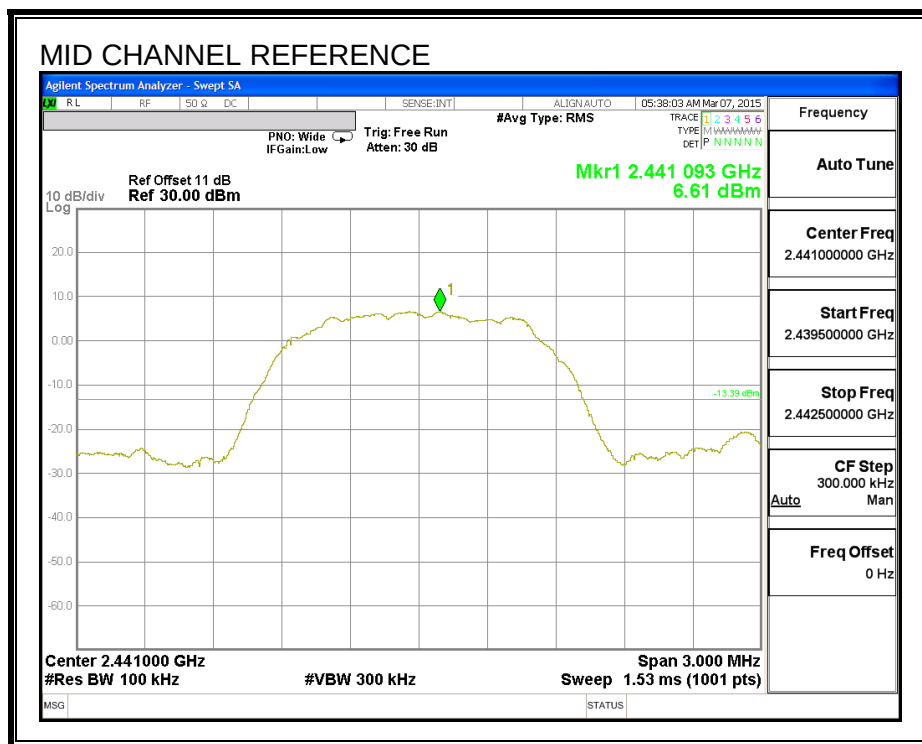
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

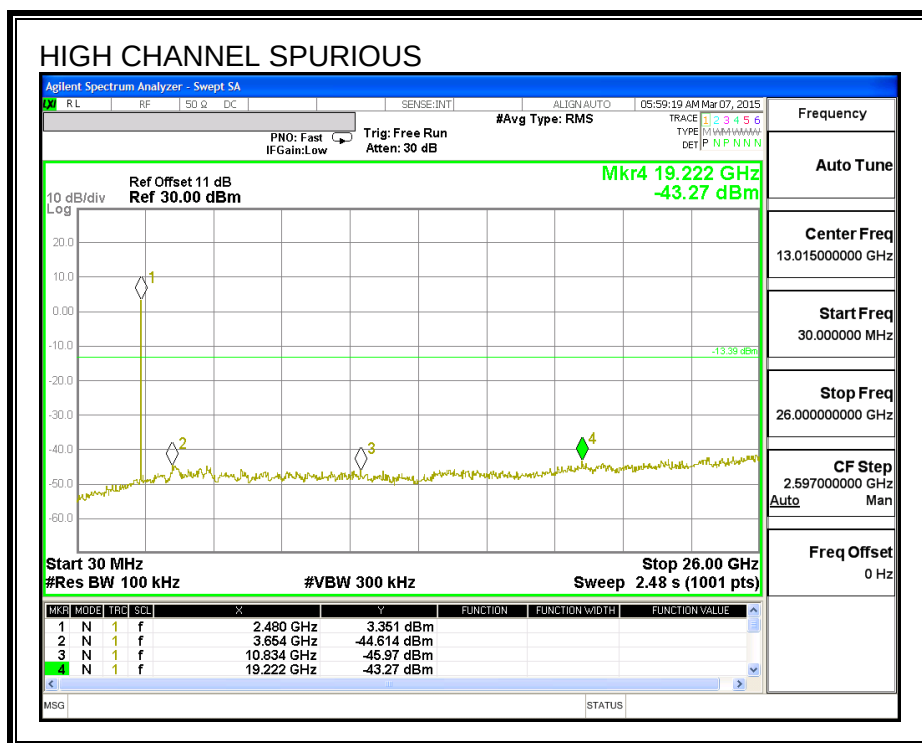
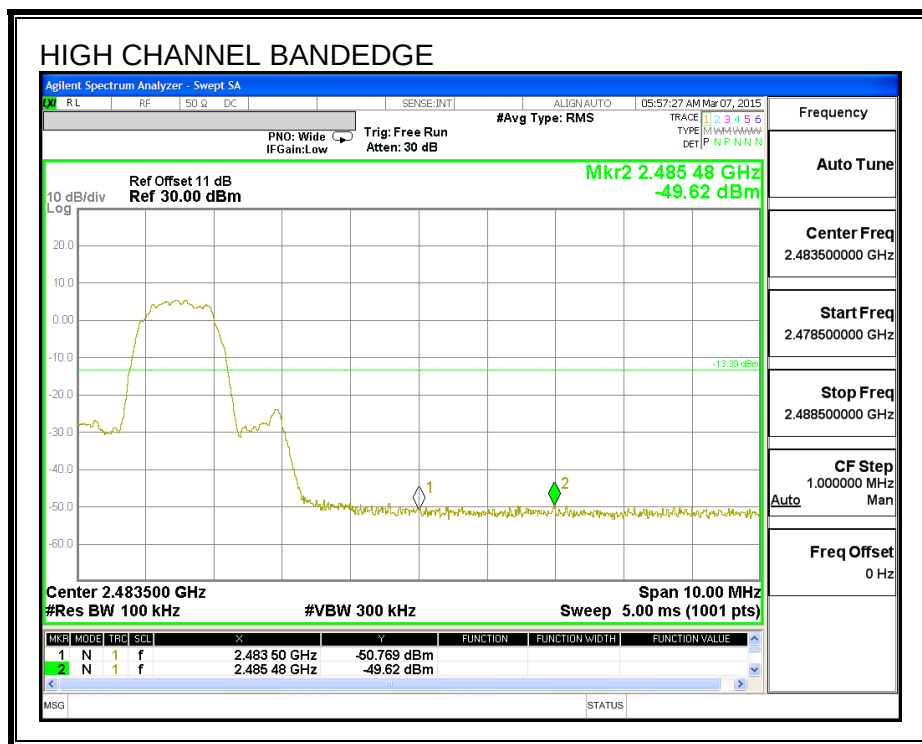
SPURIOUS EMISSIONS, LOW CHANNEL



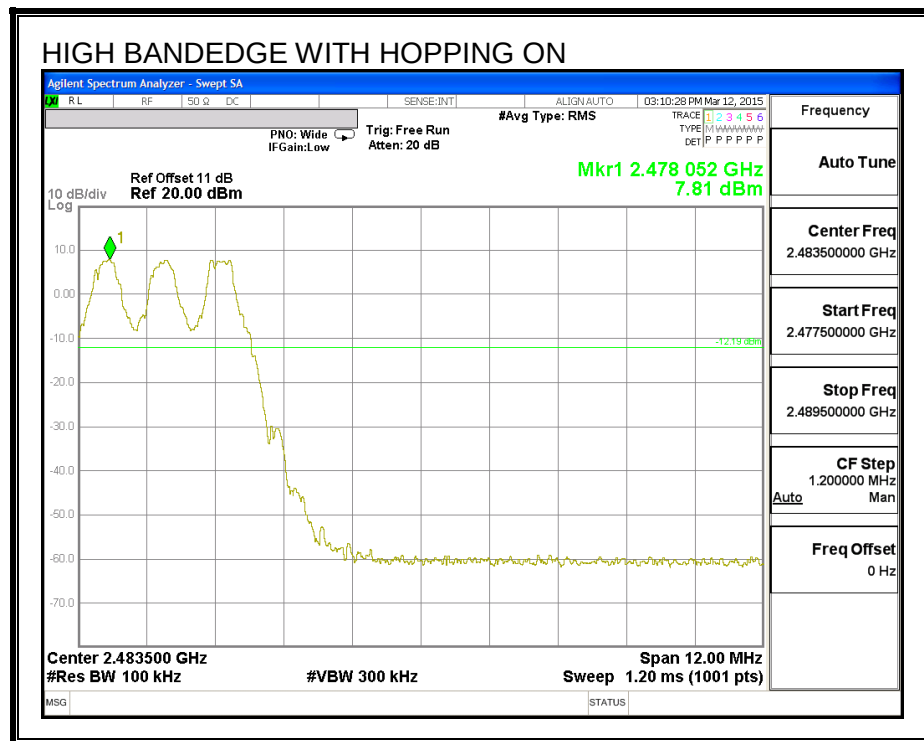
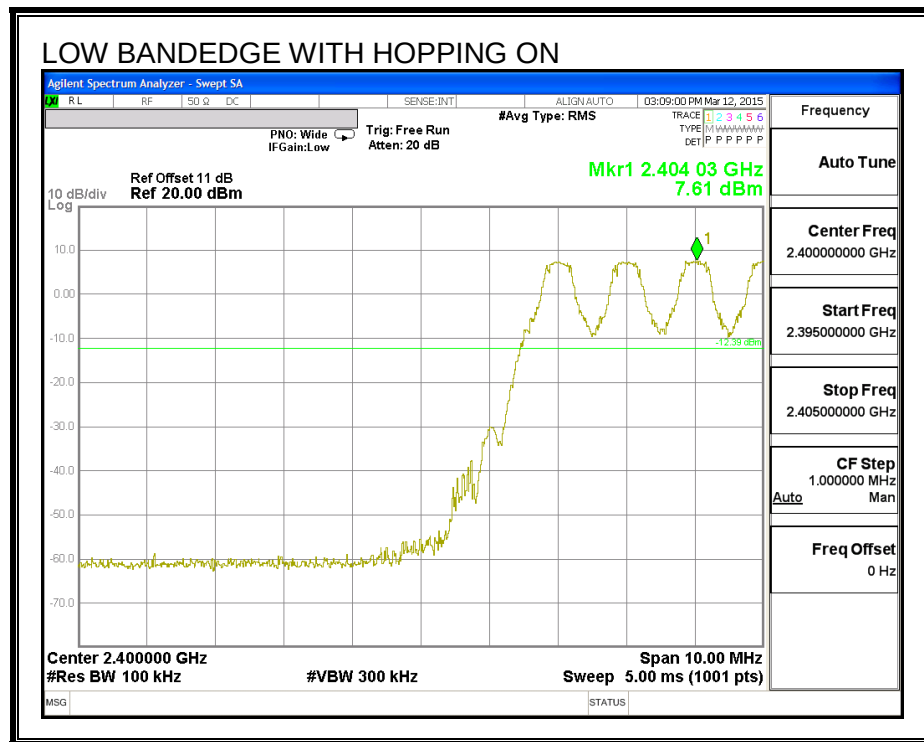
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



10. RADIATED TEST RESULTS

10.1. 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. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements.

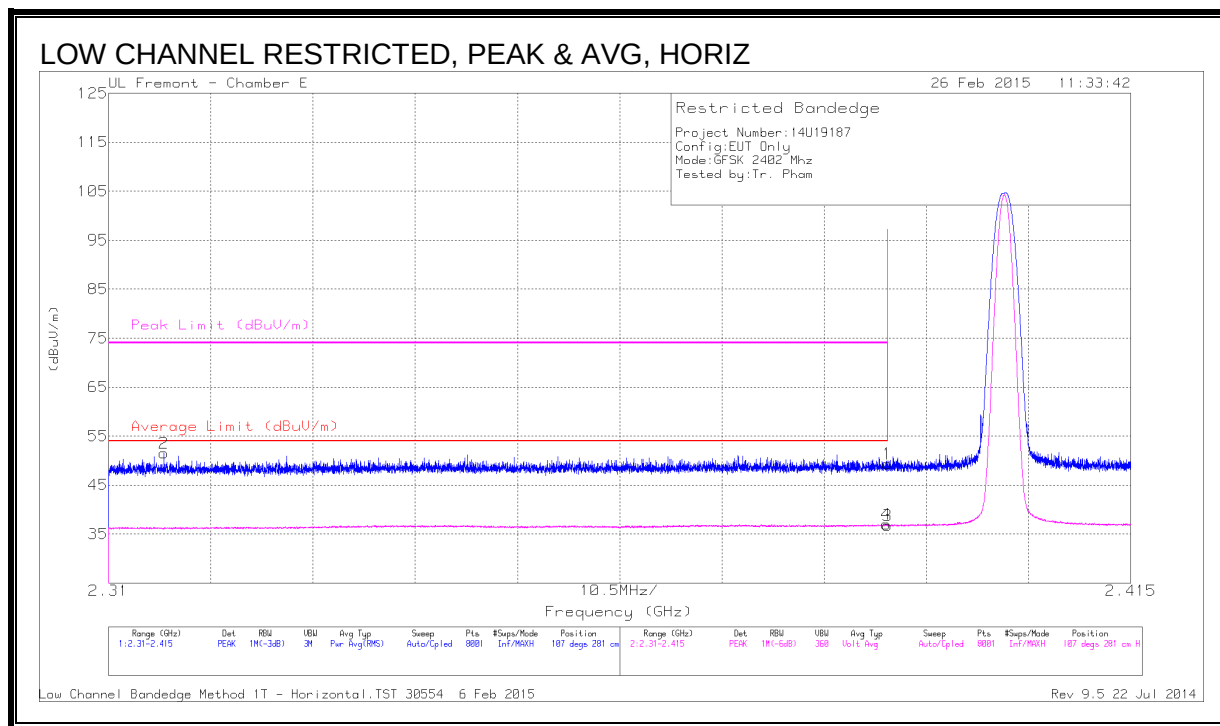
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

10.1. ANTENNA B TRANSMITTER ABOVE 1 GHz

10.1.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

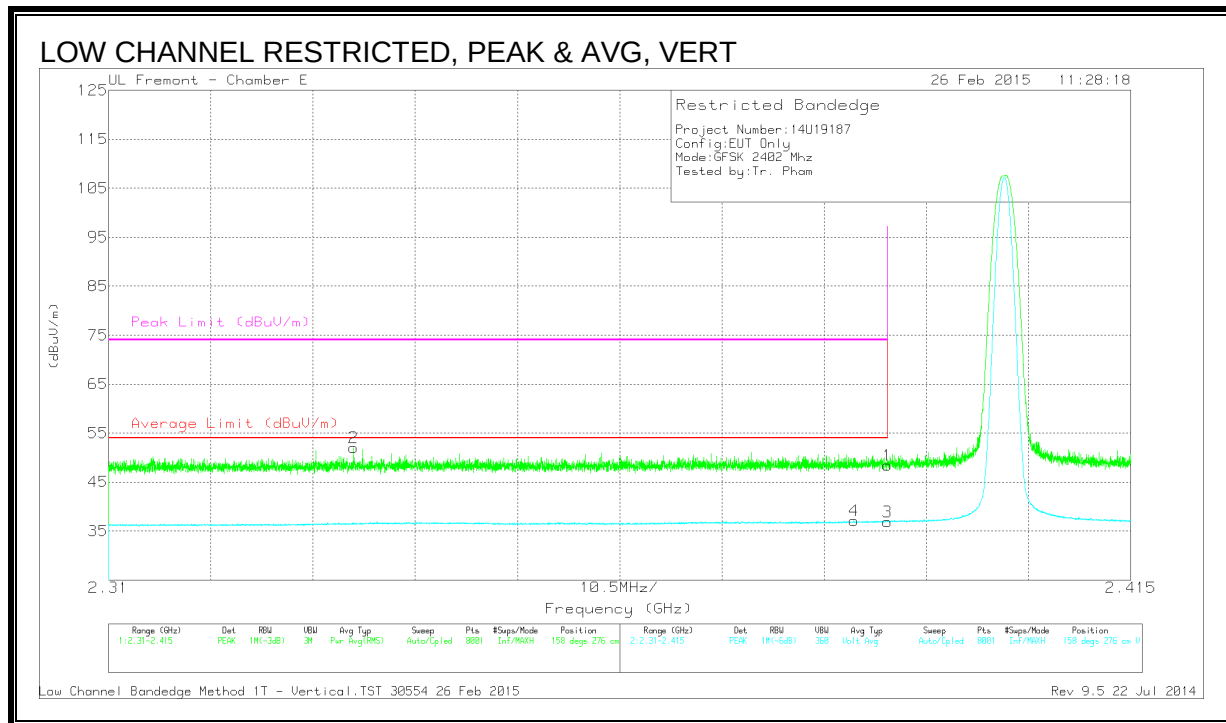
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.316	44.65	PK	31.9	-25	0	51.55	-	-	74	-22.45	107	281	H
1	* 2.39	41.96	PK	32.1	-24.7	0	49.36	-	-	74	-24.64	107	281	H
3	* 2.39	29.4	VB1T	32.1	-24.7	0	36.8	54	-17.2	-	-	107	281	H
4	* 2.39	29.58	VB1T	32.1	-24.7	0	36.98	54	-17.02	-	-	107	281	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

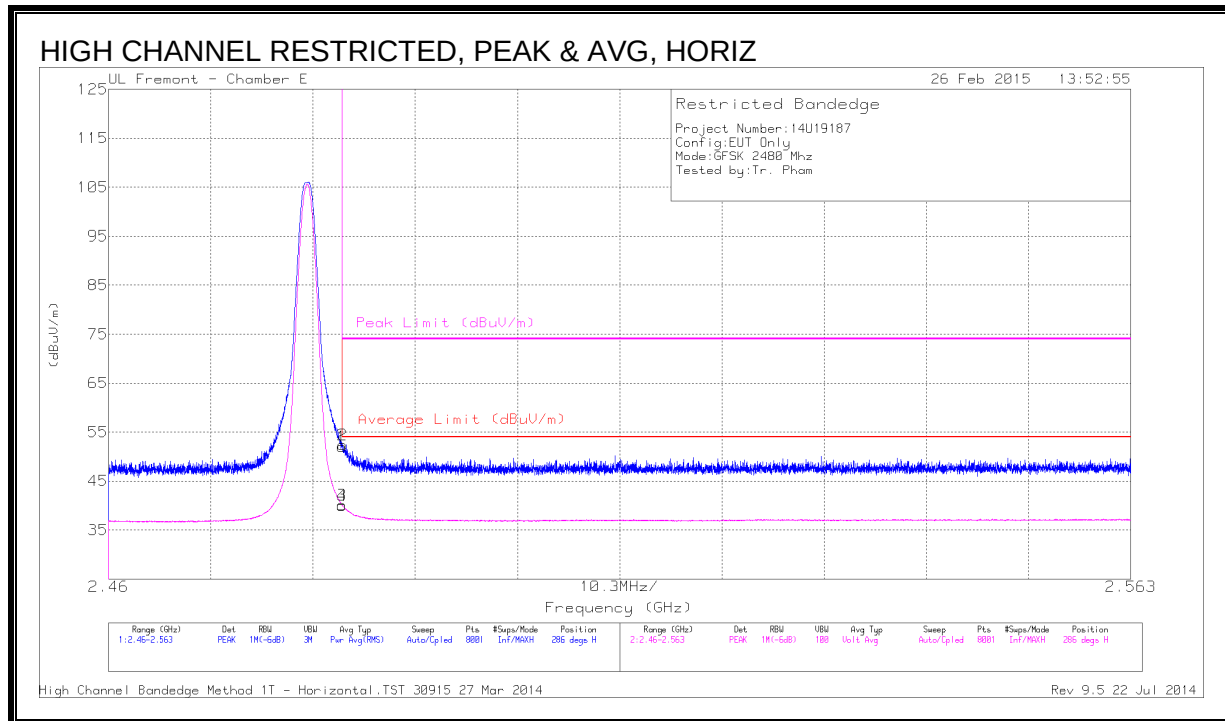
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.05	PK	32.1	-24.7	48.45	-	-	74	-25.55	158	276	V
2	* 2.335	44.79	PK	32	-24.8	51.99	-	-	74	-22.01	158	276	V
3	* 2.39	29.49	VB1T	32.1	-24.7	36.89	54	-17.11	-	-	158	276	V
4	* 2.387	29.79	VB1T	32	-24.7	37.09	54	-16.91	-	-	158	276	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

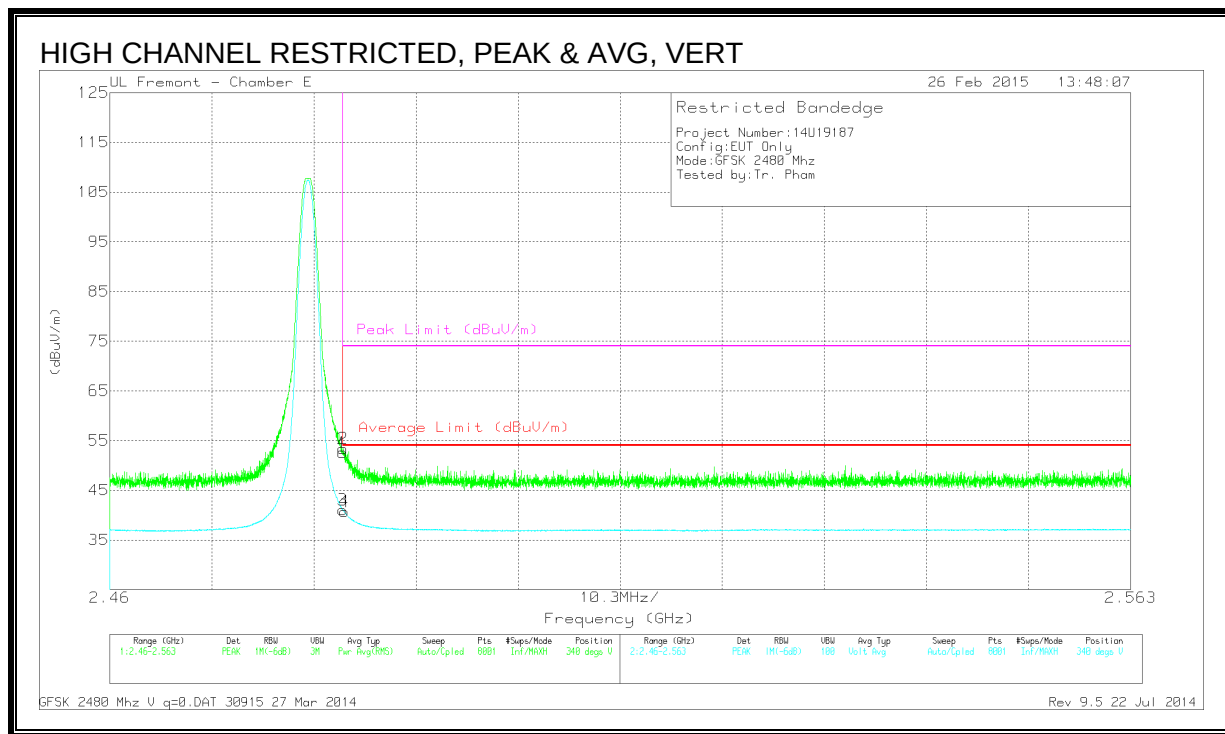
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cb/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	44.16	PK	32.2	-24.3	52.06	-	-	74	-21.94	286	266	H
2	* 2.484	44.55	PK	32.2	-24.3	52.45	-	-	74	-21.55	286	266	H
3	* 2.484	32.2	VB1T	32.2	-24.3	40.1	54	-13.9	-	-	286	266	H
4	* 2.484	32.13	VB1T	32.2	-24.3	40.03	54	-13.97	-	-	286	266	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

Trace Markers

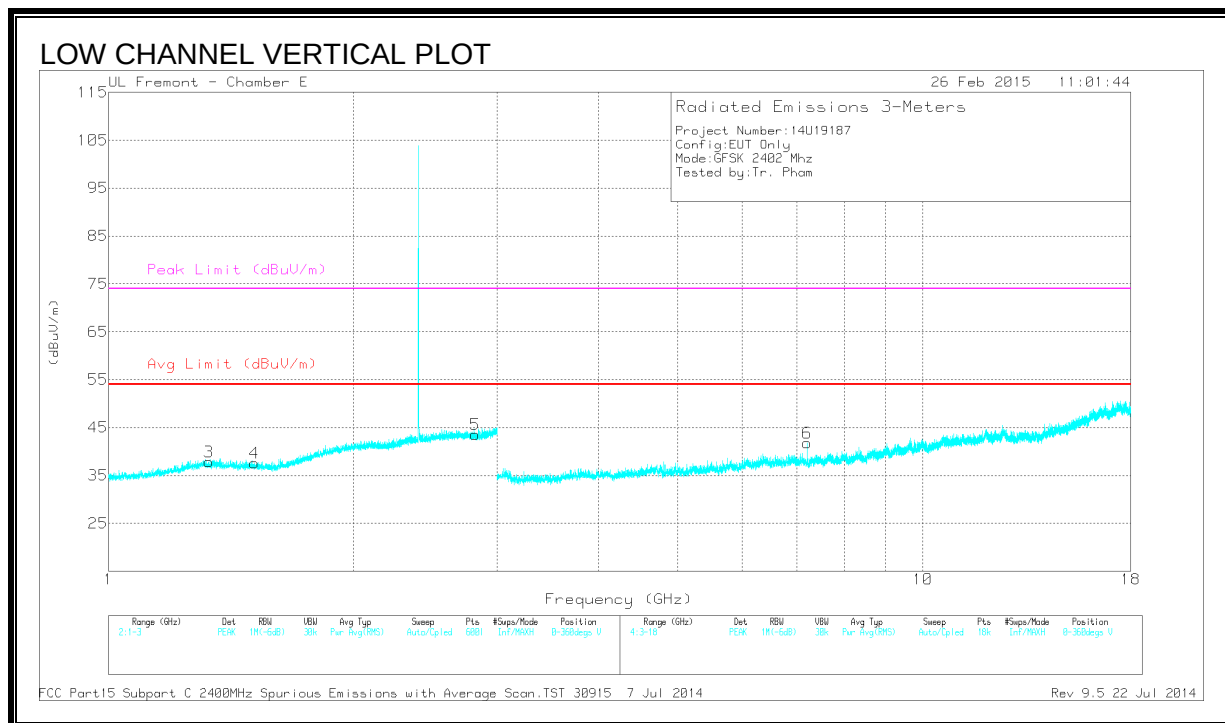
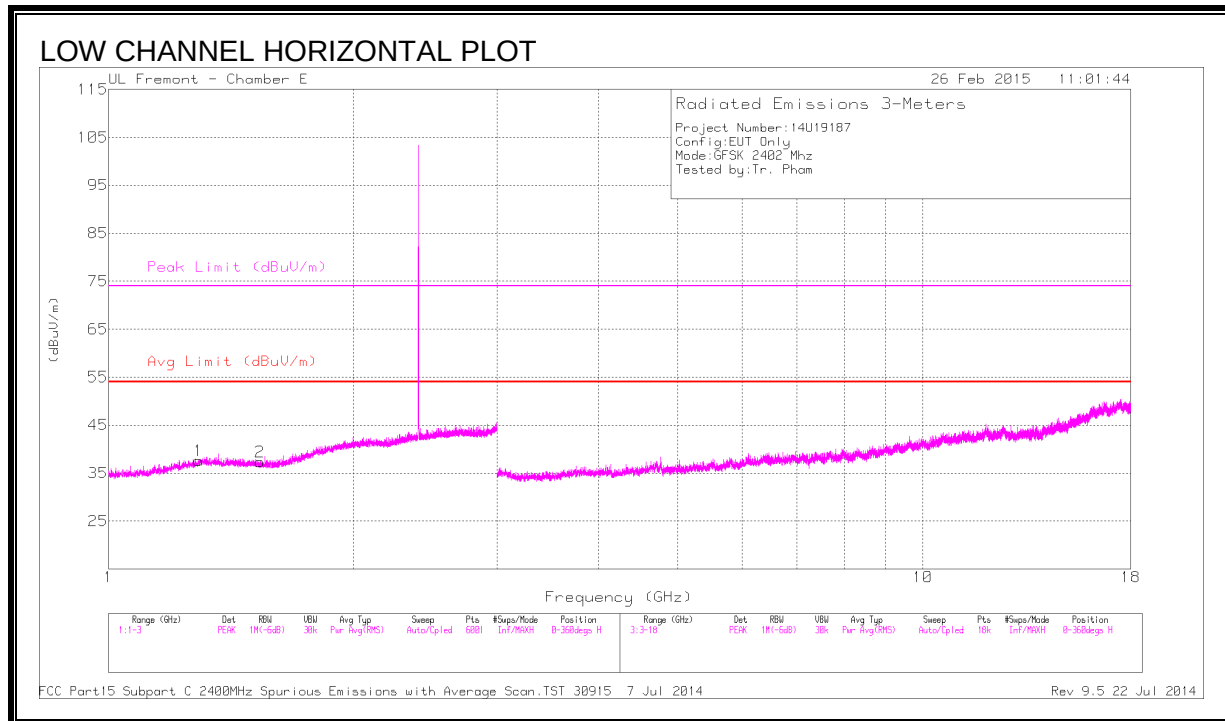
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	44.7	PK	32.2	-24.3	52.6	-	-	74	-21.4	340	262	V
2	* 2.484	45.51	PK	32.2	-24.3	53.41	-	-	74	-20.59	340	262	V
3	* 2.484	33.16	VB1T	32.2	-24.3	41.06	54	-12.94	-	-	340	262	V
4	* 2.484	32.82	VB1T	32.2	-24.3	40.72	54	-13.28	-	-	340	262	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

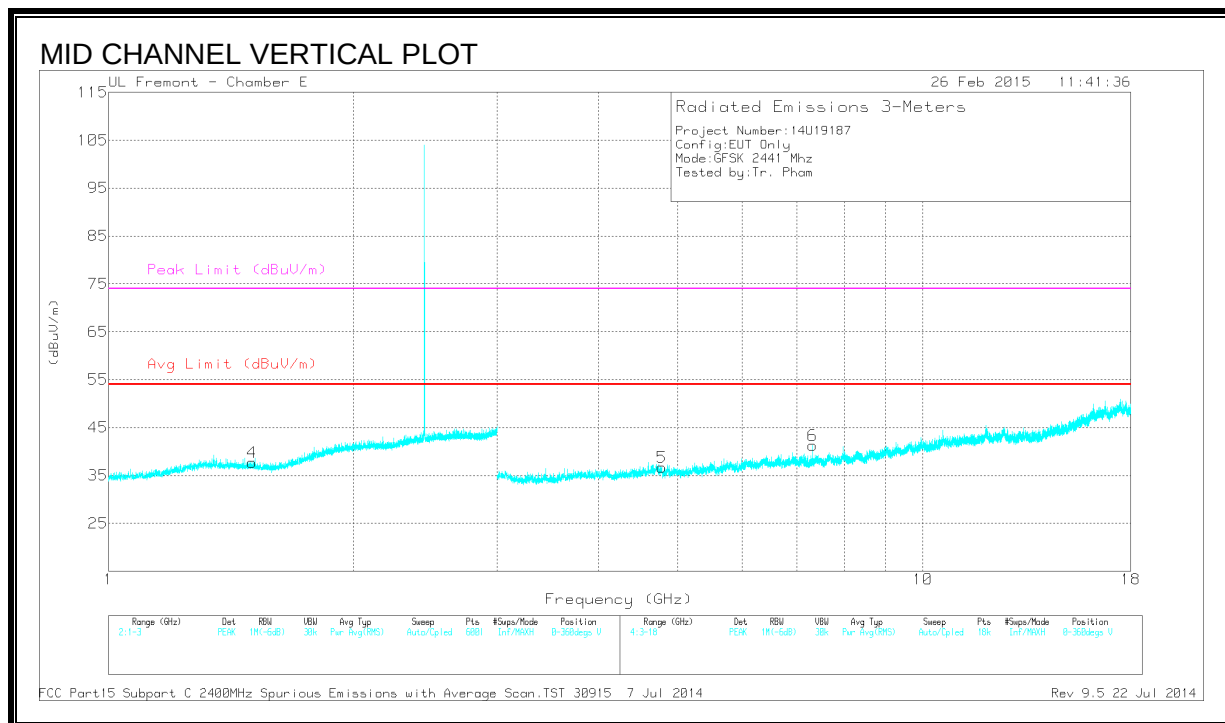
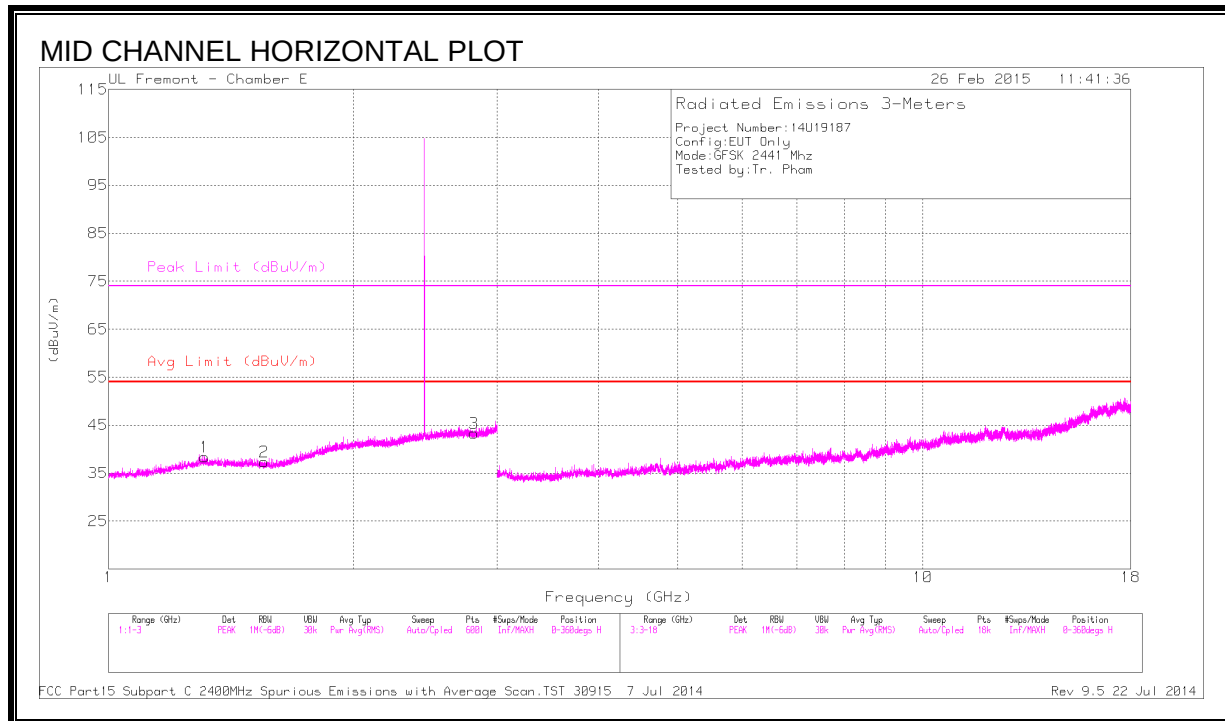
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.291	44.08	PK3	28.9	-27	45.98	-	-	74	-28.02	360	101	H
	* 1.291	31.12	VB10	28.9	-27	33.02	54	-20.98	-	-	360	101	H
2	* 1.535	44.14	PK3	28.1	-26.4	45.84	-	-	74	-28.16	360	101	H
	* 1.534	30.95	VB10	28.1	-26.4	32.65	54	-21.35	-	-	360	101	H
3	* 1.329	43.91	PK3	28.9	-26.8	46.01	-	-	74	-27.99	360	101	V
	* 1.328	31.01	VB10	28.9	-26.8	33.11	54	-20.89	-	-	360	101	V
4	* 1.509	43.95	PK3	28.2	-26.3	45.85	-	-	74	-28.15	360	101	V
	* 1.511	31.03	VB10	28.2	-26.3	32.93	54	-21.07	-	-	360	101	V
5	* 2.818	44.13	PK3	32.4	-24.1	52.43	-	-	74	-21.57	360	101	V
	* 2.819	30.55	VB10	32.4	-24.1	38.85	54	-15.15	-	-	360	101	V
6	7.205	41.85	PK3	35.5	-28.4	48.95	-	-	-	-	152	172	V
	7.206	32.47	VB10	35.5	-28.4	39.57	-	-	-	-	152	172	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

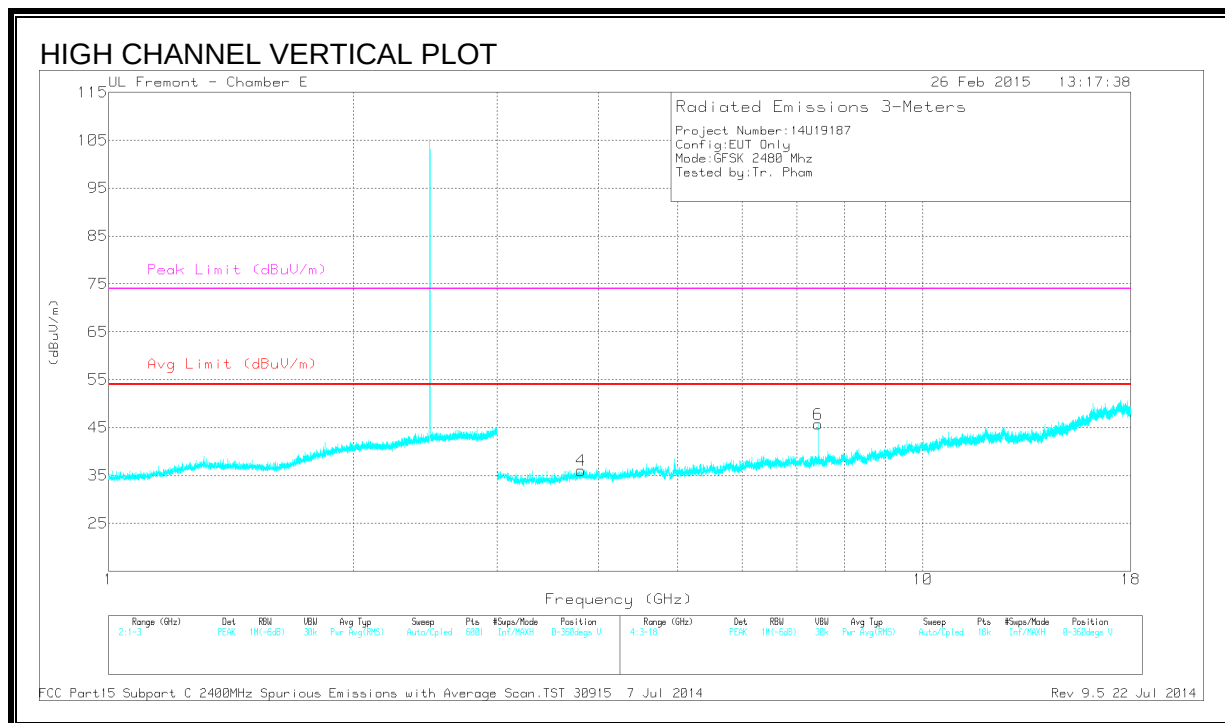
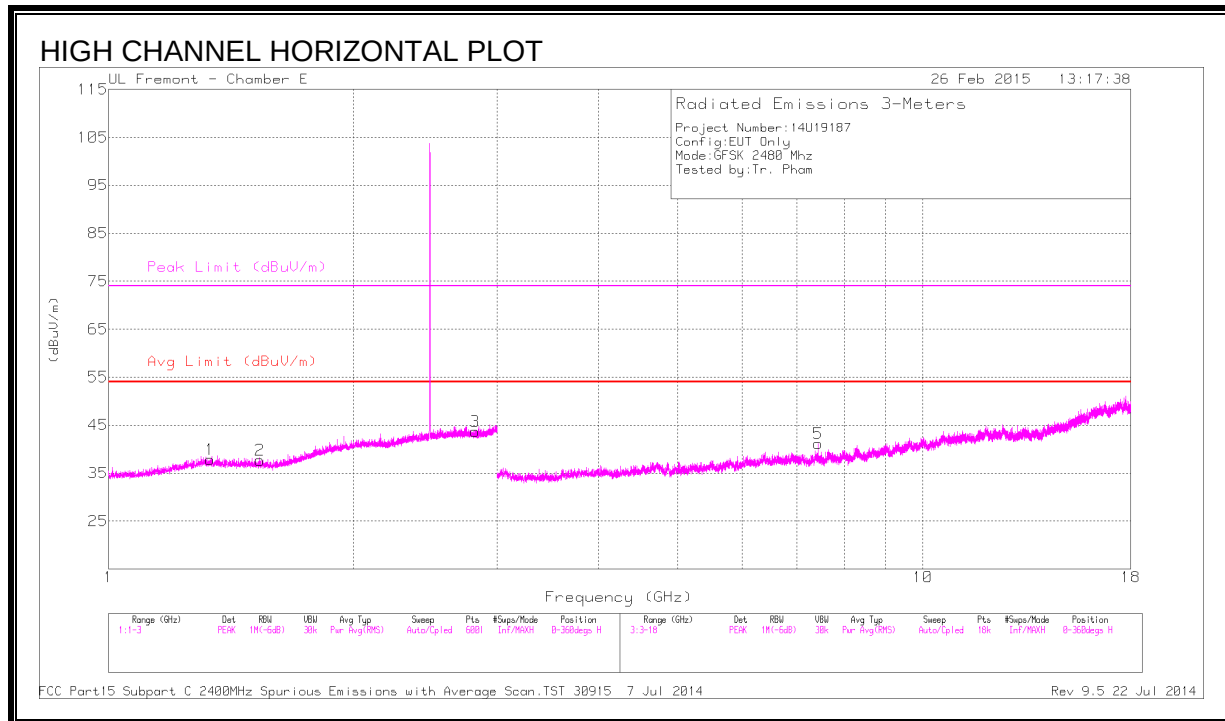
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.311	45.25	PK3	29	-26.9	47.35	-	-	74	-26.65	0	101	H
	* 1.312	31.18	VB10	29	-26.9	33.28	54	-20.72	-	-	0	101	H
4	* 1.551	44.22	PK3	28.1	-26.4	45.92	-	-	74	-28.08	0	101	H
	* 1.551	30.92	VB10	28.1	-26.4	32.62	54	-21.38	-	-	0	101	H
3	* 2.809	43.49	PK3	32.4	-24.1	51.79	-	-	74	-22.21	0	101	H
	* 2.81	30.52	VB10	32.4	-24.1	38.82	54	-15.18	-	-	0	101	H
2	* 1.5	43.76	PK3	28.2	-26.2	45.76	-	-	74	-28.24	0	101	V
	* 1.502	30.9	VB10	28.2	-26.3	32.8	54	-21.2	-	-	0	101	V
5	* 4.778	41.59	PK3	34.1	-31.1	44.59	-	-	74	-29.41	0	101	V
	* 4.778	29.15	VB10	34.1	-31.1	32.15	54	-21.85	-	-	0	101	V
6	* 7.324	42.33	PK3	35.5	-27.6	50.23	-	-	74	-23.77	35	158	V
	* 7.323	33.32	VB10	35.5	-27.6	41.22	54	-12.78	-	-	35	158	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

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Filt/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	* 1.335	44.82	PK3	28.8	-26.8	46.82	-	-	74	-27.18	0	101	H
	* 1.331	30.87	VB10	28.9	-26.8	32.97	54	-21.03	-	-	0	101	H
2	* 1.534	43.99	PK3	28.1	-26.4	45.69	-	-	74	-28.31	0	101	H
	* 1.535	30.8	VB10	28.1	-26.4	32.5	54	-21.5	-	-	0	101	H
3	* 2.819	43.6	PK3	32.4	-24.1	51.9	-	-	74	-22.1	0	101	H
	* 2.817	30.45	VB10	32.4	-24.1	38.75	54	-15.25	-	-	0	101	H
5	* 7.44	42.78	PK3	35.6	-28.2	50.18	-	-	74	-23.82	152	246	H
	* 7.44	33.59	VB10	35.6	-28.2	40.99	54	-13.01	-	-	152	246	H
4	* 3.803	41.55	PK3	33.5	-31.2	43.85	-	-	74	-30.15	152	246	V
	* 3.806	28.8	VB10	33.5	-31.2	31.1	54	-22.9	-	-	152	246	V
6	* 7.44	44.94	PK3	35.6	-28.2	52.34	-	-	74	-21.66	243	177	V
	* 7.44	37.66	VB10	35.6	-28.2	45.06	54	-8.94	-	-	243	177	V

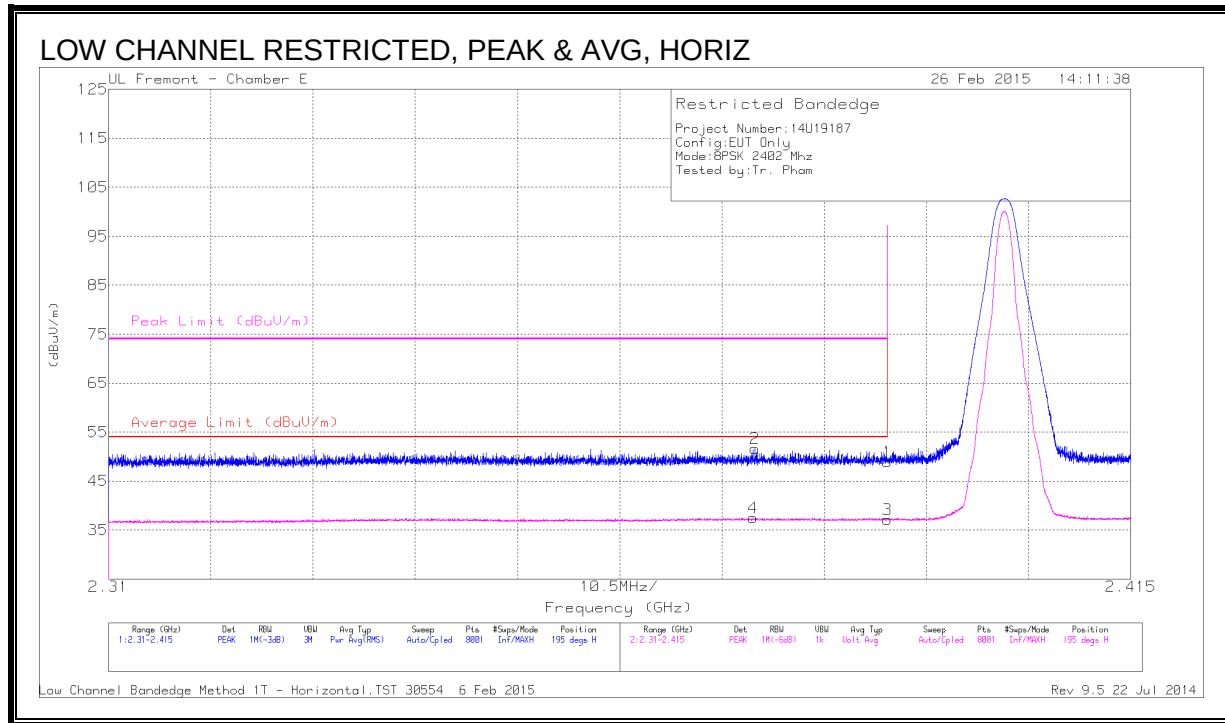
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

10.1.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

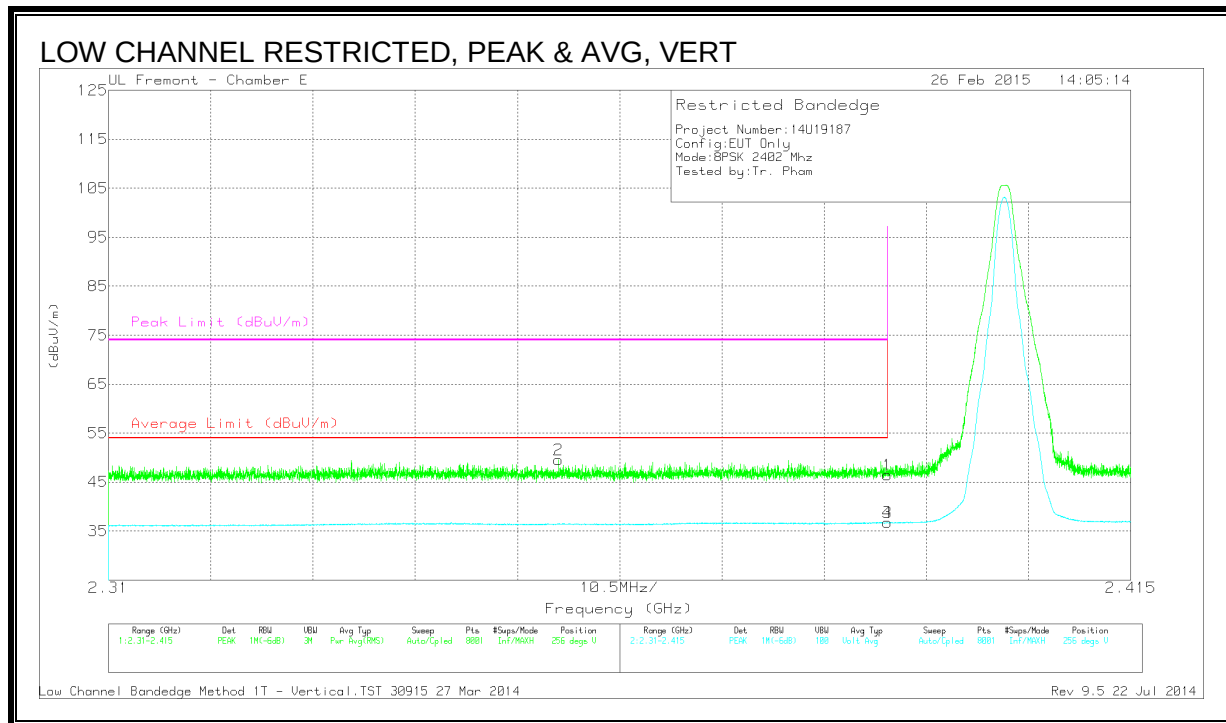
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.51	PK	32.1	-24.7	0	48.91	-	-	74	-25.09	195	283	H
2	* 2.376	44.21	PK	32	-24.6	0	51.61	-	-	74	-22.39	195	283	H
3	* 2.39	29.69	VB1T	32.1	-24.7	0	37.09	54	-16.91	-	-	195	283	H
4	* 2.376	30.13	VB1T	32	-24.6	0	37.53	54	-16.47	-	-	195	283	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

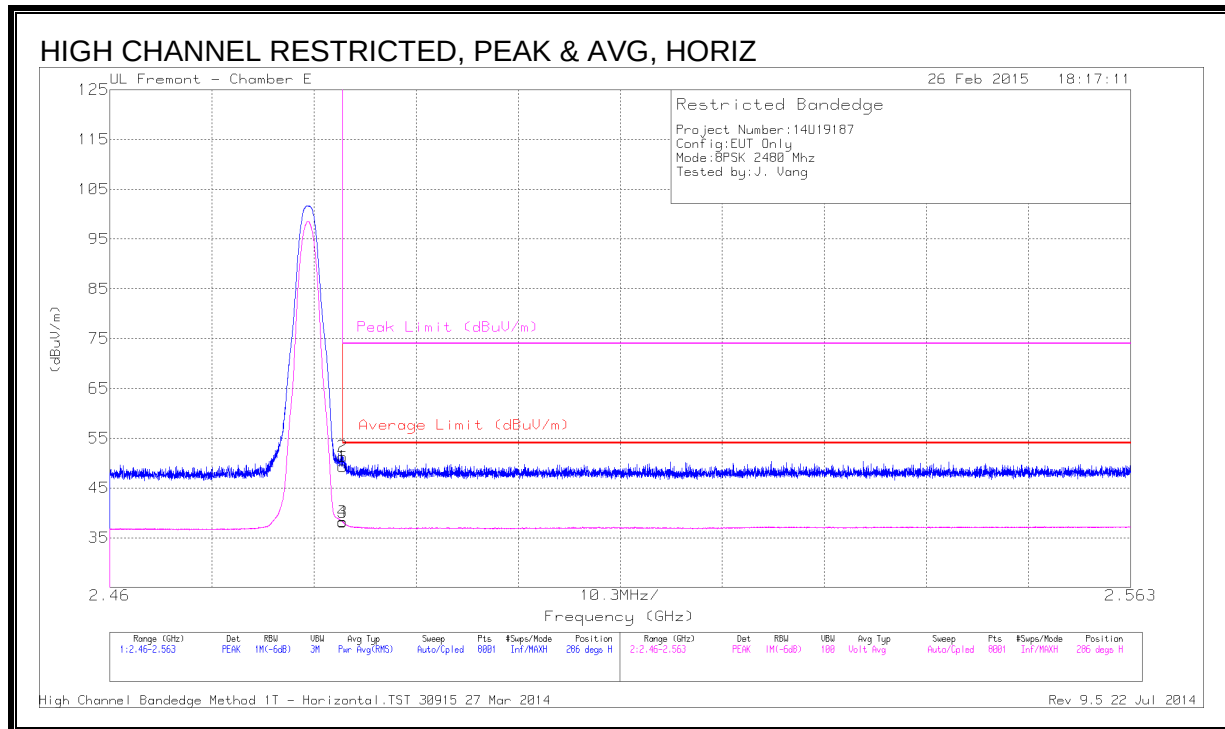
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cb1/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39	PK	32.1	-24.7	46.4	-	-	74	-27.6	256	276	V
2	* 2.356	42.2	PK	32	-24.7	49.5	-	-	74	-24.5	256	276	V
3	* 2.39	29.37	VB1T	32.1	-24.7	36.77	54	-17.23	-	-	256	276	V
4	* 2.39	29.39	VB1T	32.1	-24.7	36.79	54	-17.21	-	-	256	276	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

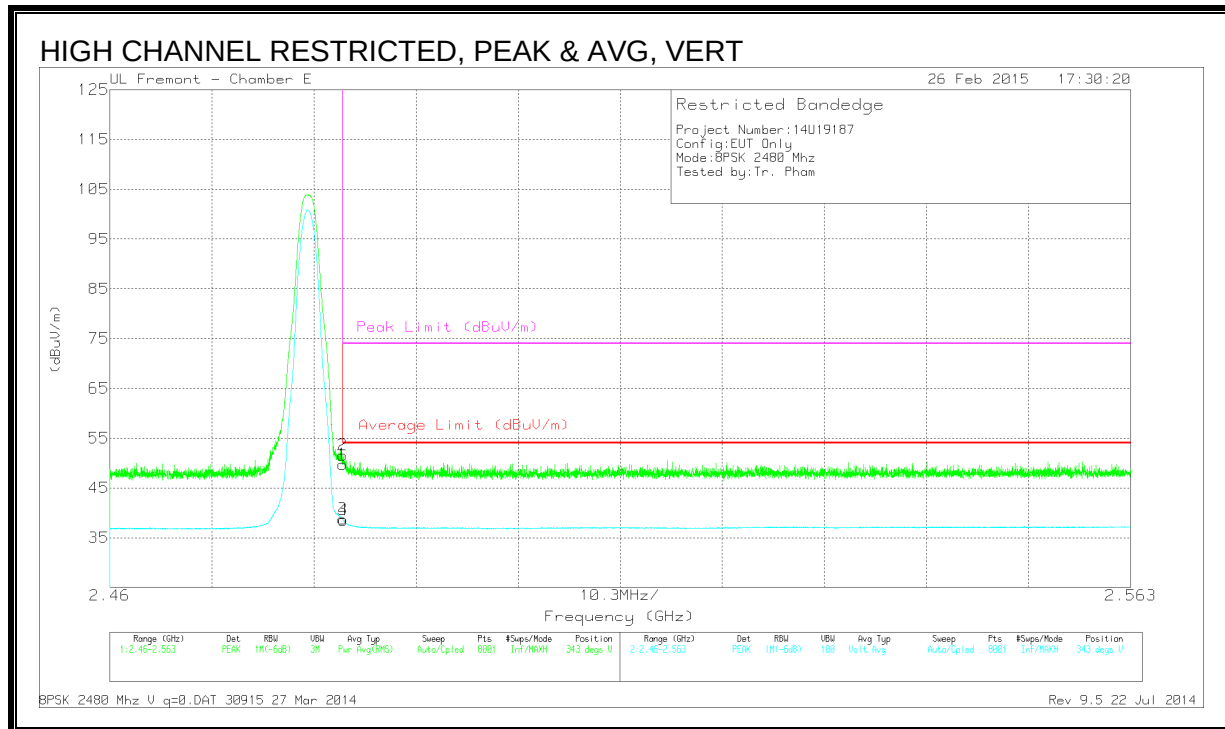
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarit y
1	* 2.484	41.4	PK	32.2	-24.3	49.3	-	-	74	-24.7	286	265	H
2	* 2.484	43.45	PK	32.2	-24.3	51.35	-	-	74	-22.65	286	265	H
3	* 2.484	30.26	VB1T	32.2	-24.3	38.16	54	-15.84	-	-	286	265	H
4	* 2.484	30.3	VB1T	32.2	-24.3	38.2	54	-15.8	-	-	286	265	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

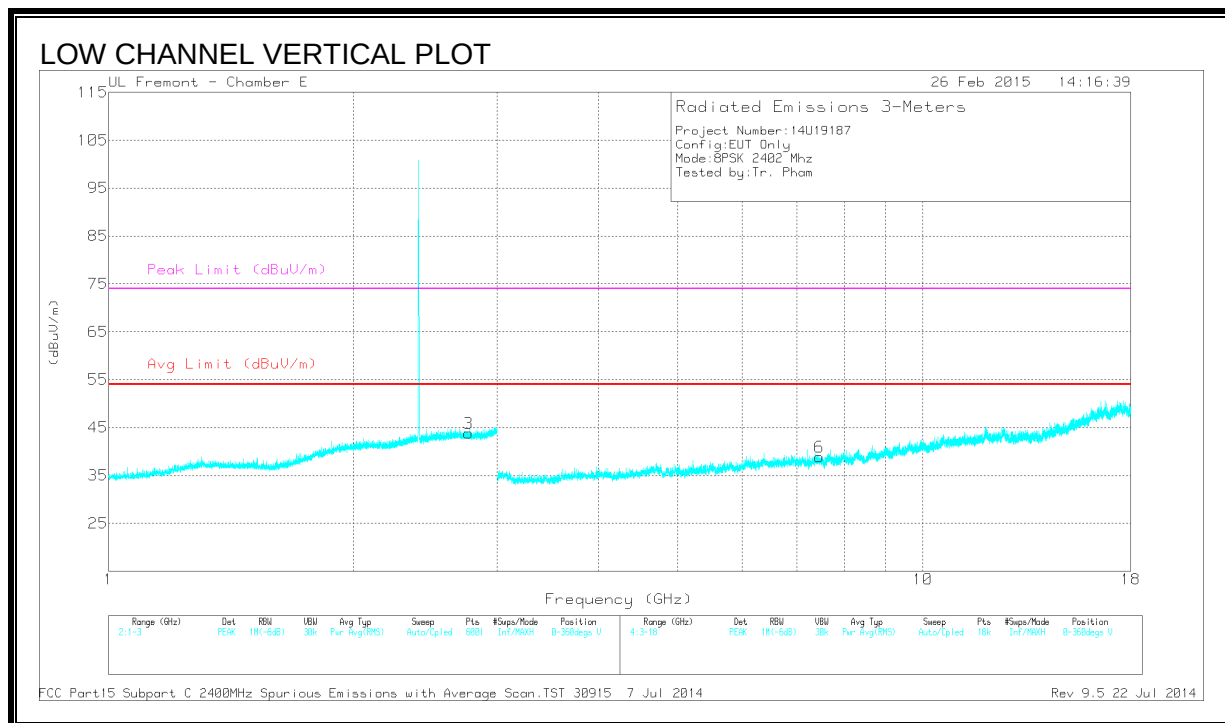
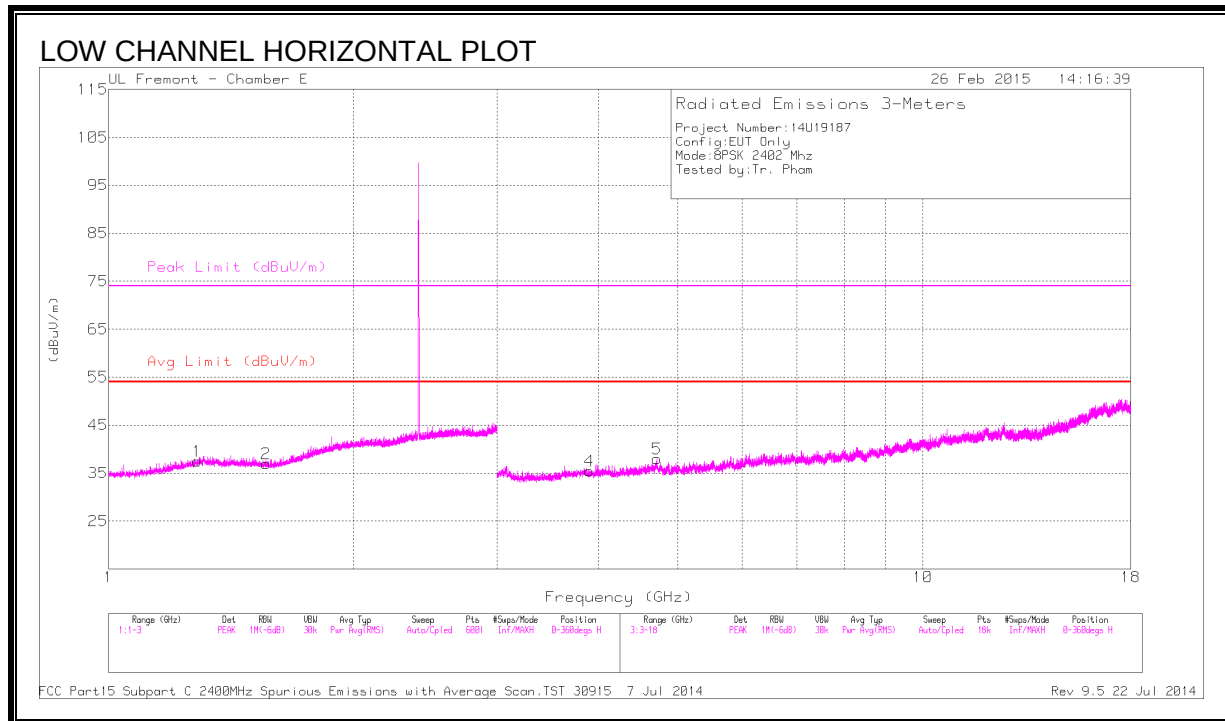
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.88	PK	32.2	-24.3	49.78	-	-	74	-24.22	343	268	V
2	* 2.484	43.71	PK	32.2	-24.3	51.61	-	-	74	-22.39	343	268	V
3	* 2.484	30.84	VB1T	32.2	-24.3	38.74	54	-15.26	-	-	343	268	V
4	* 2.484	30.66	VB1T	32.2	-24.3	38.56	54	-15.44	-	-	343	268	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

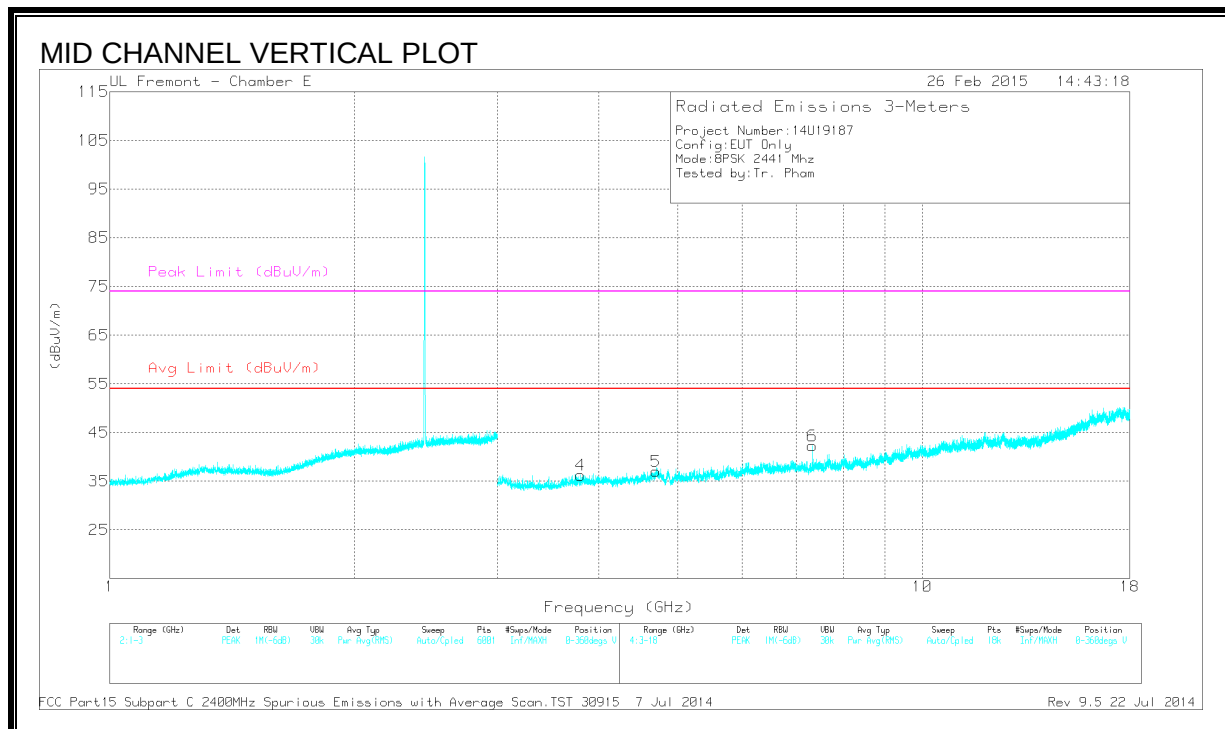
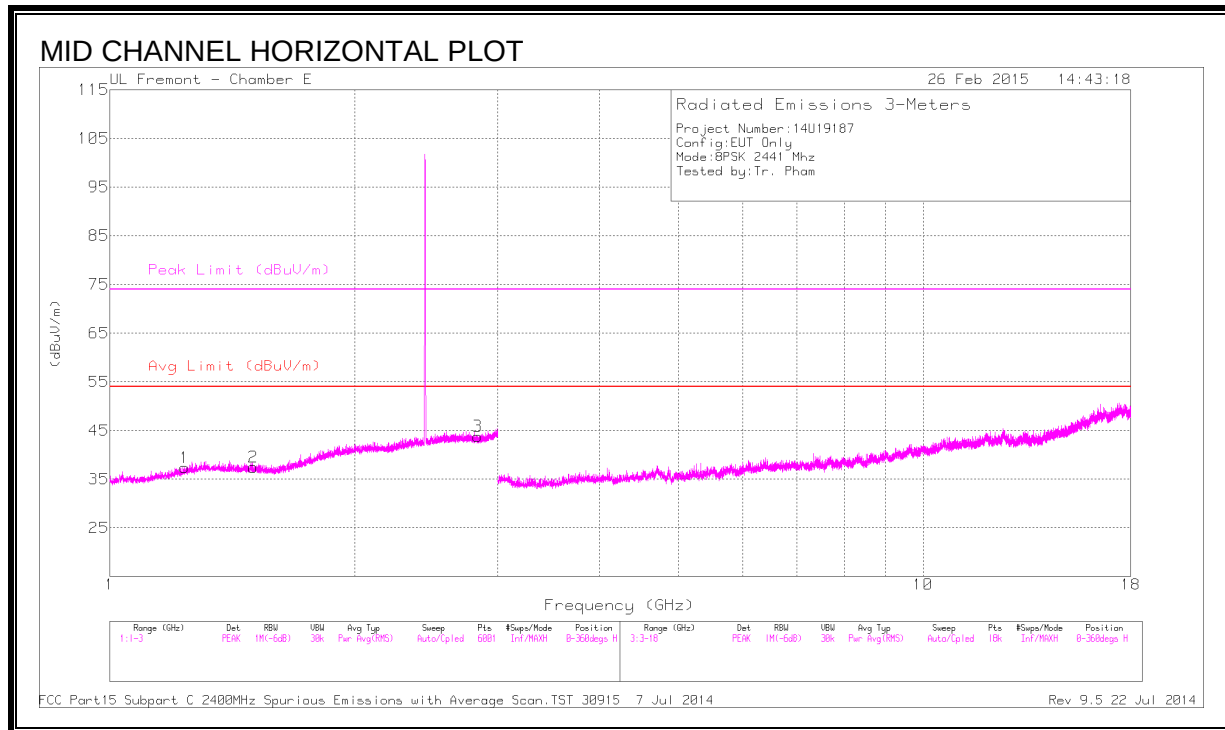
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.286	44.67	PK3	28.9	-27.1	46.47	-	-	74	-27.53	360	101	H
	* 1.286	31.02	VB10	28.9	-27	32.92	54	-21.08	-	-	360	101	H
2	* 1.562	43.51	PK3	28	-26.4	45.11	-	-	74	-28.89	360	101	H
	* 1.561	30.91	VB10	28	-26.4	32.51	54	-21.49	-	-	360	101	H
3	* 2.766	44.55	PK3	32.4	-24	52.95	-	-	74	-21.05	360	101	V
	* 2.766	30.53	VB10	32.4	-24	38.93	54	-15.07	-	-	360	101	V
4	* 3.894	41.55	PK3	33.5	-31.7	43.35	-	-	74	-30.65	360	101	H
	* 3.892	29.17	VB10	33.5	-31.7	30.97	54	-23.03	-	-	360	101	H
5	* 4.718	42.24	PK3	34.2	-30.7	45.74	-	-	74	-28.26	360	101	H
	* 4.719	29.3	VB10	34.2	-30.7	32.8	54	-21.2	-	-	360	101	H
6	* 7.461	39.28	PK3	35.6	-28.5	46.38	-	-	74	-27.62	360	101	V
	* 7.463	26.84	VB10	35.6	-28.5	33.94	54	-20.06	-	-	360	101	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

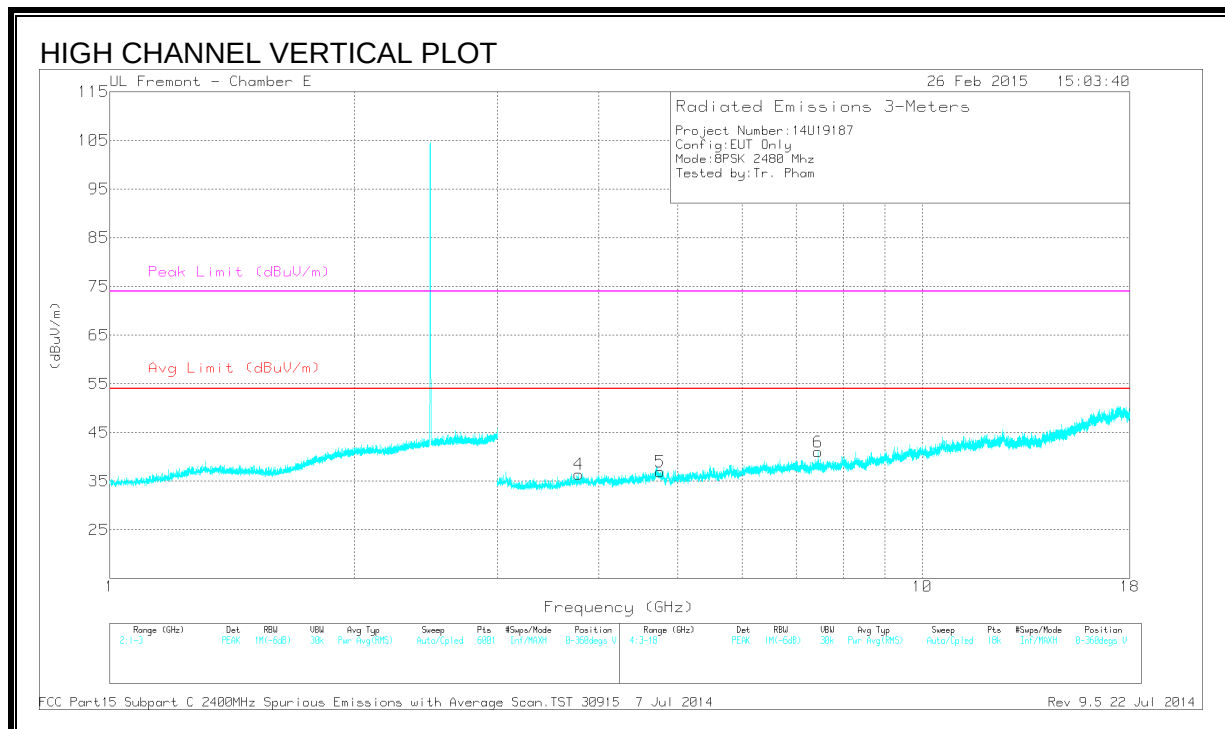
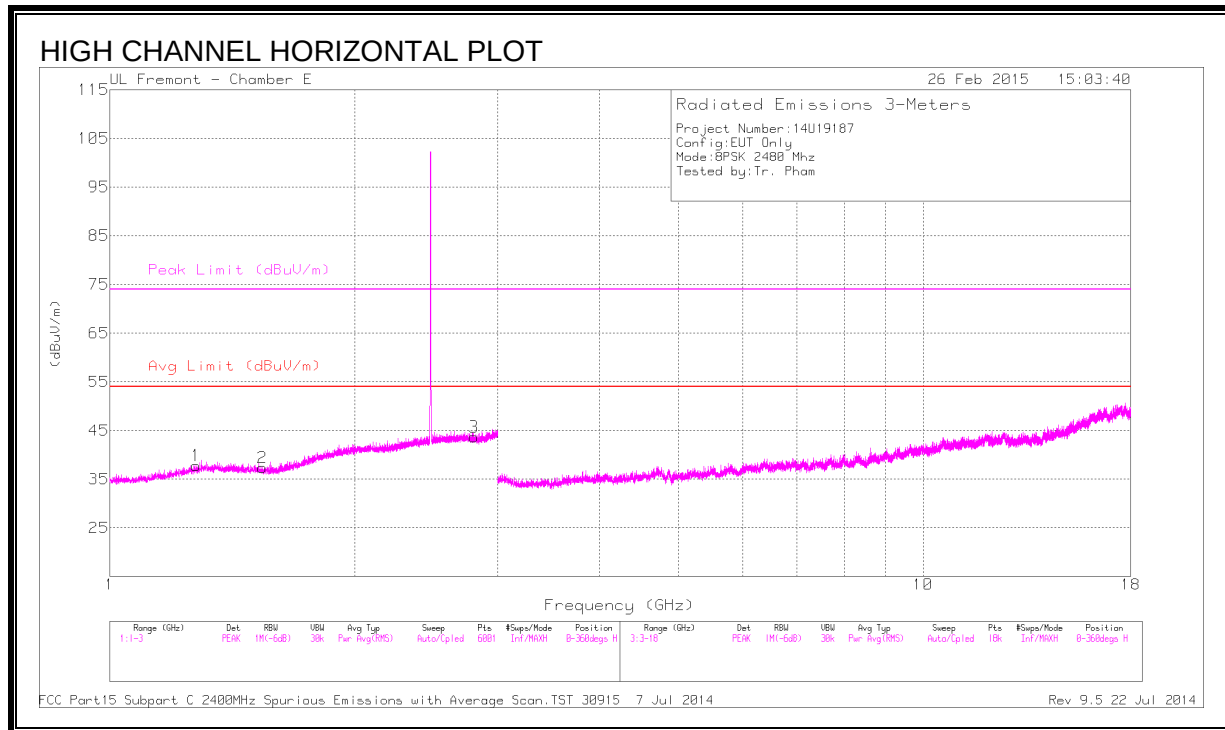
Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.234	44.62	PK3	28.4	-27.3	45.72	-	-	74	-28.28	360	100	H
	* 1.237	31.16	VB10	28.4	-27.3	32.26	54	-21.74	-	-	360	100	H
2	* 1.499	43.88	PK3	28.2	-26.2	45.88	-	-	74	-28.12	360	100	H
	* 1.502	30.92	VB10	28.2	-26.3	32.82	54	-21.18	-	-	360	100	H
3	* 2.837	43.35	PK3	32.4	-24.2	51.55	-	-	74	-22.45	360	100	H
	* 2.836	30.52	VB10	32.4	-24.2	38.72	54	-15.28	-	-	360	100	H
4	* 3.798	40.98	PK3	33.5	-31.3	43.18	-	-	74	-30.82	360	100	V
	* 3.796	28.81	VB10	33.5	-31.3	31.01	54	-22.99	-	-	360	100	V
5	* 4.699	40.89	PK3	34.2	-30.3	44.79	-	-	74	-29.21	360	100	V
	* 4.7	28.72	VB10	34.2	-30.3	32.62	54	-21.38	-	-	360	100	V
6	* 7.323	42.85	PK3	35.5	-27.6	50.75	-	-	74	-23.25	264	196	V
	* 7.323	32.72	VB10	35.5	-27.6	40.62	54	-13.38	-	-	264	196	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
1	* 1.277	43.9	PK3	28.8	-27.1	45.6	-	-	74	-28.4	360	101	H
	* 1.276	31.02	VB10	28.8	-27.1	32.72	54	-21.28	-	-	360	101	H
2	* 1.54	43.61	PK3	28.1	-26.3	45.41	-	-	74	-28.59	360	101	H
	* 1.539	30.86	VB10	28.1	-26.3	32.66	54	-21.34	-	-	360	101	H
3	* 2.806	43.3	PK3	32.4	-24.1	51.6	-	-	74	-22.4	360	101	H
	* 2.807	30.49	VB10	32.4	-24.1	38.79	54	-15.21	-	-	360	101	H
4	* 3.778	41.37	PK3	33.4	-31.2	43.57	-	-	74	-30.43	360	101	V
	* 3.776	28.82	VB10	33.4	-31.1	31.12	54	-22.88	-	-	360	101	V
5	* 4.761	42.71	PK3	34.1	-31	45.81	-	-	74	-28.19	360	101	V
	* 4.761	30.14	VB10	34.1	-31	33.24	54	-20.76	-	-	360	101	V
6	* 7.44	39.93	PK3	35.6	-28.2	47.33	-	-	74	-26.67	360	101	V
	* 7.44	27.44	VB10	35.6	-28.2	34.84	54	-19.16	-	-	360	101	V

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

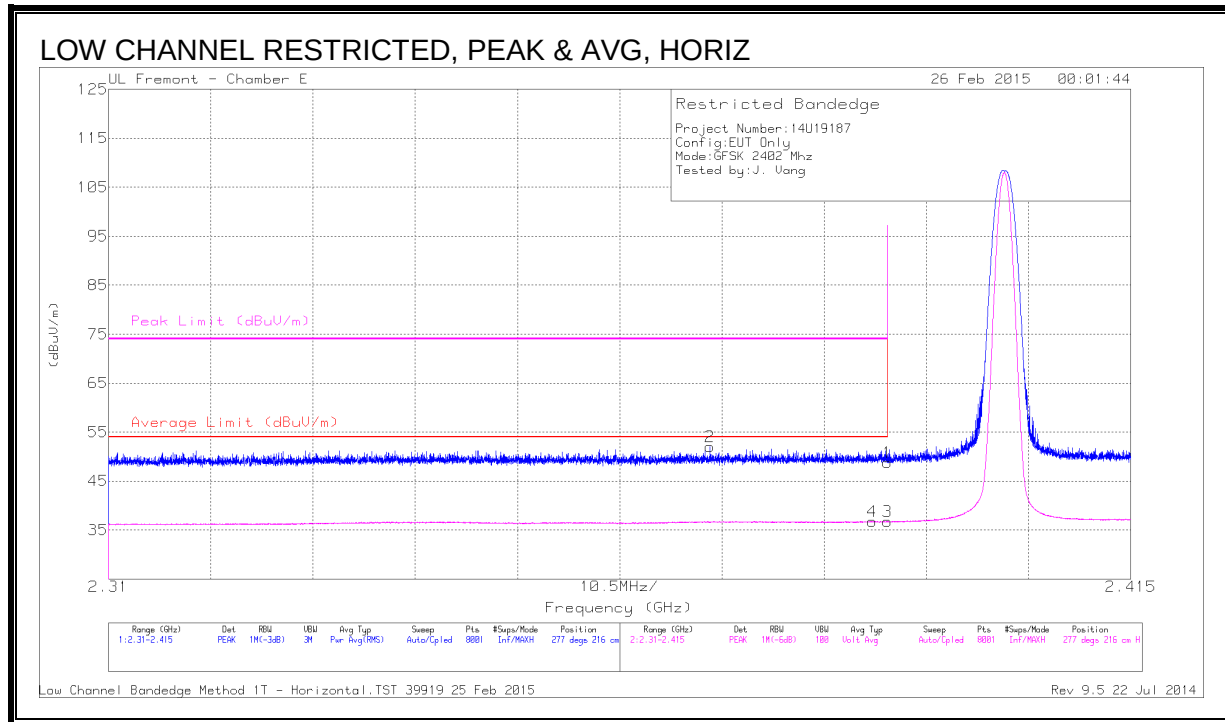
PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

10.2. ANTENNA D TRANSMITTER ABOVE 1 GHz

10.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

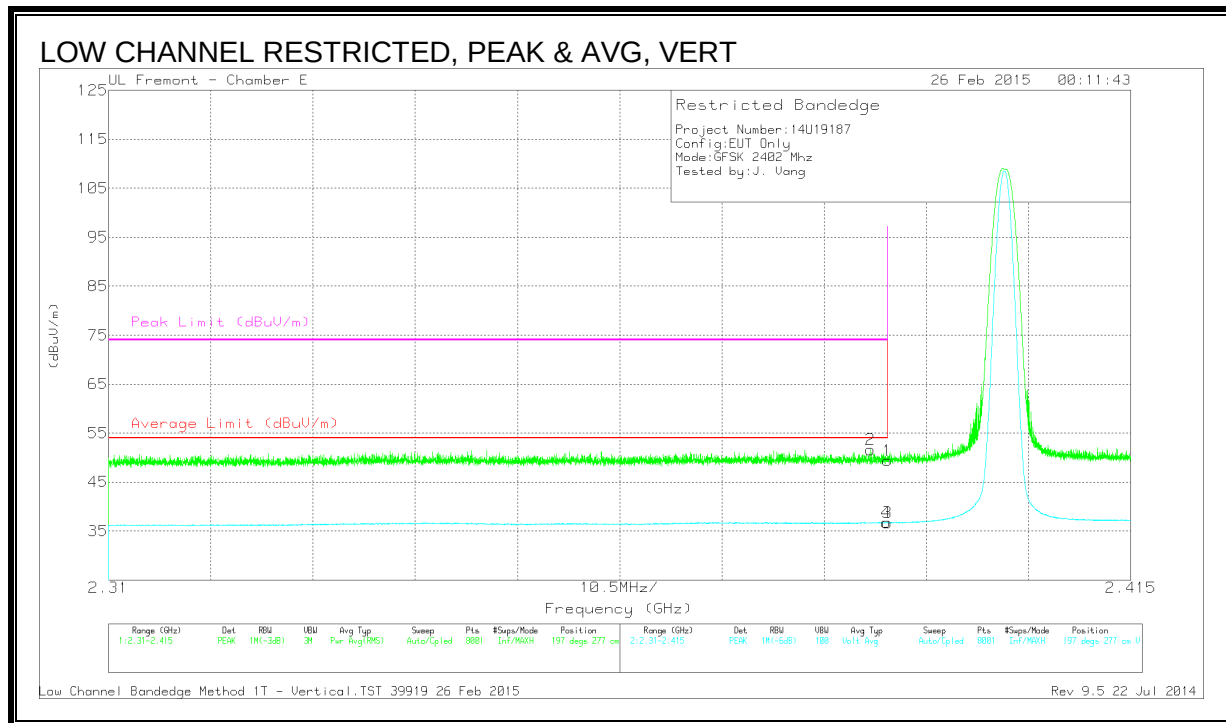
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.372	44.66	PK	32	-24.6	52.06	-	-	74	-21.94	277	216	H
4	* 2.388	29.39	VB1T	32.1	-24.7	36.79	54	-17.21	-	-	277	216	H
1	* 2.39	41.4	PK	32.1	-24.7	48.8	-	-	74	-25.2	277	216	H
3	* 2.39	29.35	VB1T	32.1	-24.7	36.75	54	-17.25	-	-	277	216	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

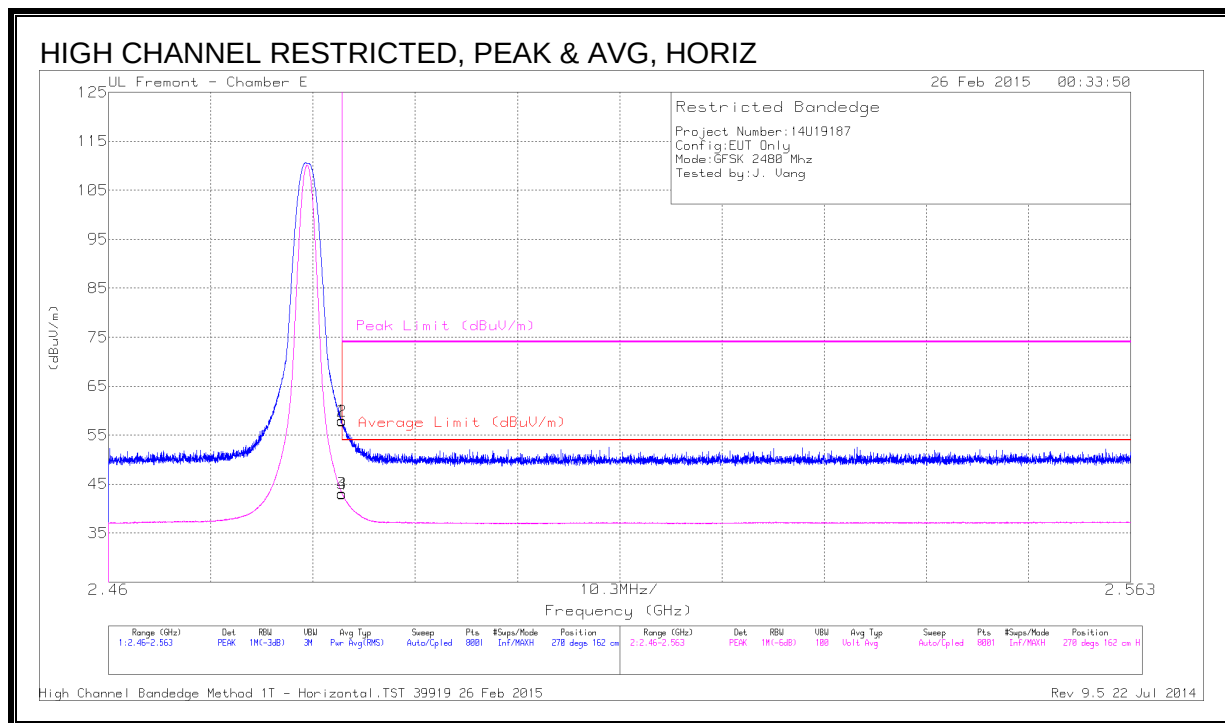
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.388	44.2	PK	32.1	-24.7	51.6	-	-	74	-22.4	197	277	V
1	* 2.39	42.05	PK	32.1	-24.7	49.45	-	-	74	-24.55	197	277	V
3	* 2.39	29.3	VB1T	32.1	-24.7	36.7	54	-17.3	-	-	197	277	V
4	* 2.39	29.4	VB1T	32.1	-24.7	36.8	54	-17.2	-	-	197	277	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

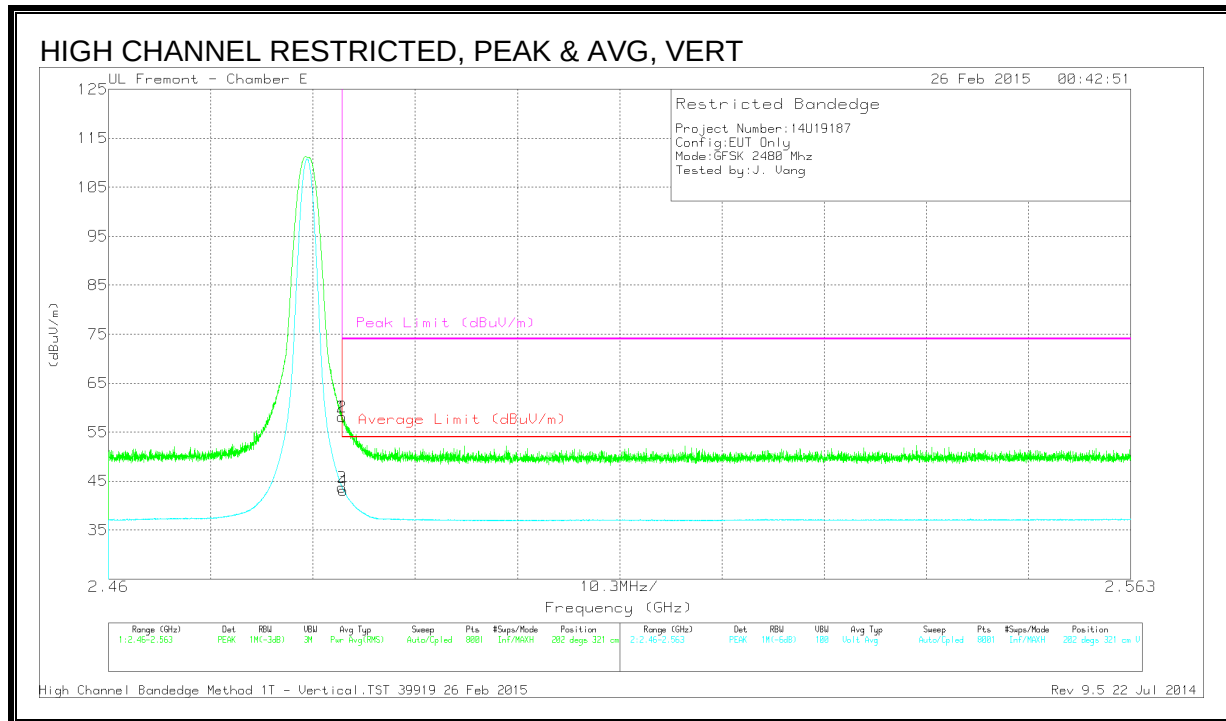
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fi tr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	50.09	PK	32.2	-24.3	57.99	-	-	74	-16.01	270	162	H
2	* 2.484	49.91	PK	32.2	-24.3	57.81	-	-	74	-16.19	270	162	H
3	* 2.484	35.21	VB1T	32.2	-24.3	43.11	54	-10.89	-	-	270	162	H
4	* 2.484	35.06	VB1T	32.2	-24.3	42.96	54	-11.04	-	-	270	162	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

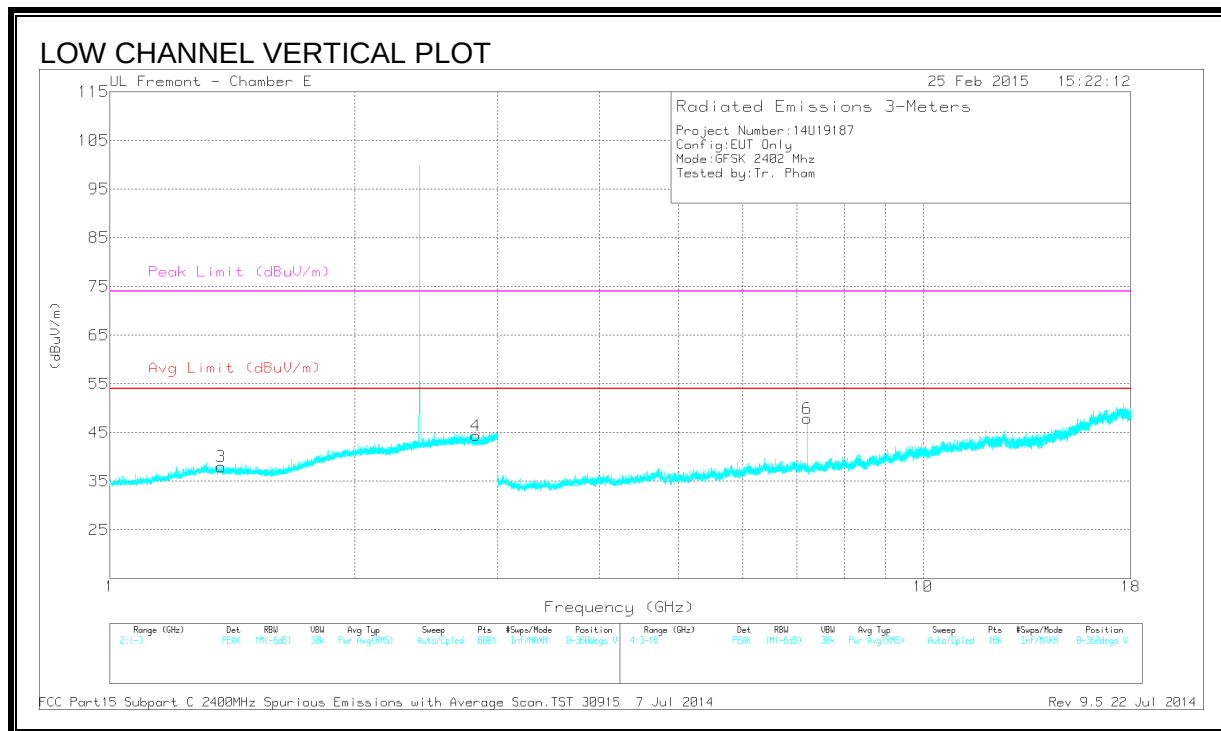
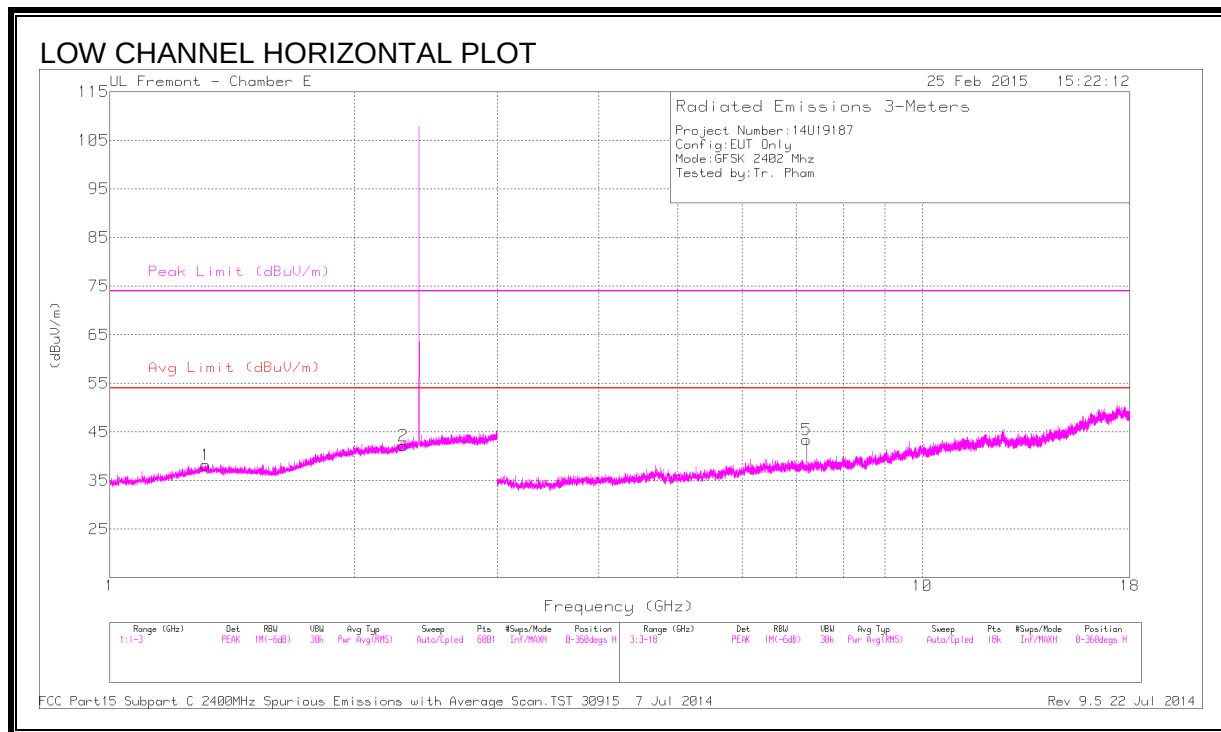
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	50.25	PK	32.2	-24.3	58.15	-	-	74	-15.85	202	321	V
2	* 2.484	50.2	PK	32.2	-24.3	58.1	-	-	74	-15.9	202	321	V
3	* 2.484	35.86	VB1T	32.2	-24.3	43.76	54	-10.24	-	-	202	321	V
4	* 2.484	35.21	VB1T	32.2	-24.3	43.11	54	-10.89	-	-	202	321	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

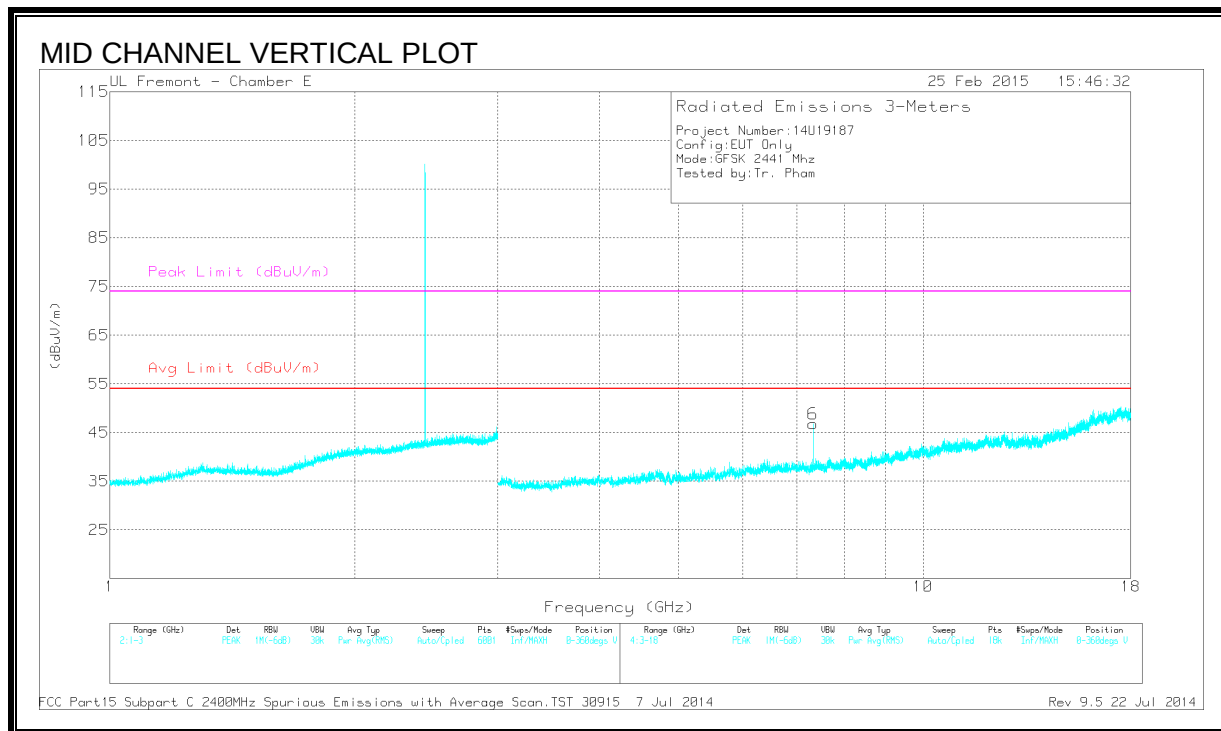
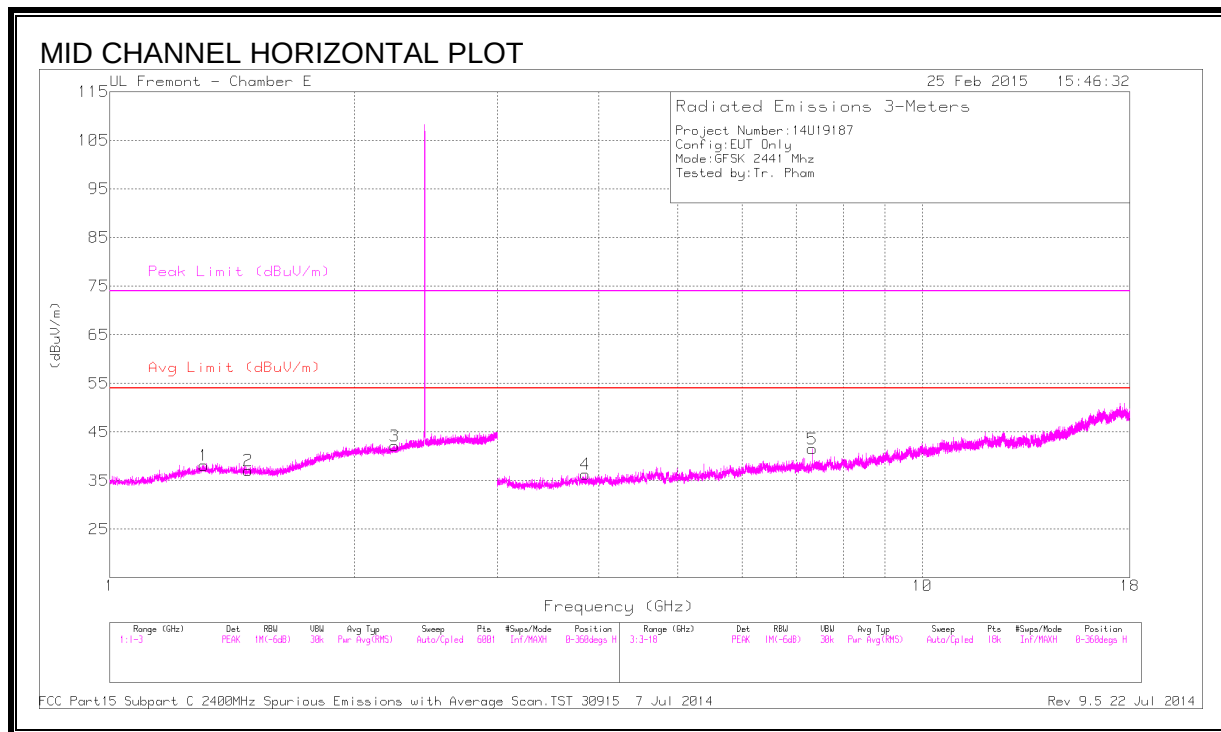
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degr)	Height (cm)	Polarity
1	* 1.314	44.32	PK3	28.9	-26.9	46.32	-	-	74	-27.68	360	200	H
	* 1.314	31	VB10	29	-26.9	33.1	54	-20.9	-	-	360	200	H
2	* 2.299	43.94	PK3	31.9	-25.1	50.74	-	-	74	-23.26	360	200	H
	* 2.299	30.73	VB10	31.9	-25.1	37.53	54	-16.47	-	-	360	200	H
3	* 1.37	44.14	PK3	28.7	-26.6	46.24	-	-	74	-27.76	360	200	V
	* 1.37	30.85	VB10	28.7	-26.6	32.95	54	-21.05	-	-	360	200	V
4	* 2.819	43.59	PK3	32.4	-24.1	51.89	-	-	74	-22.11	360	200	V
	* 2.821	30.45	VB10	32.4	-24.1	38.75	54	-15.25	-	-	360	200	V
5	7.206	43.79	PK3	35.5	-28.4	50.89	-	-	-	-	331	216	H
6	7.207	45.66	PK3	35.5	-28.4	52.76	-	-	-	-	227	183	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

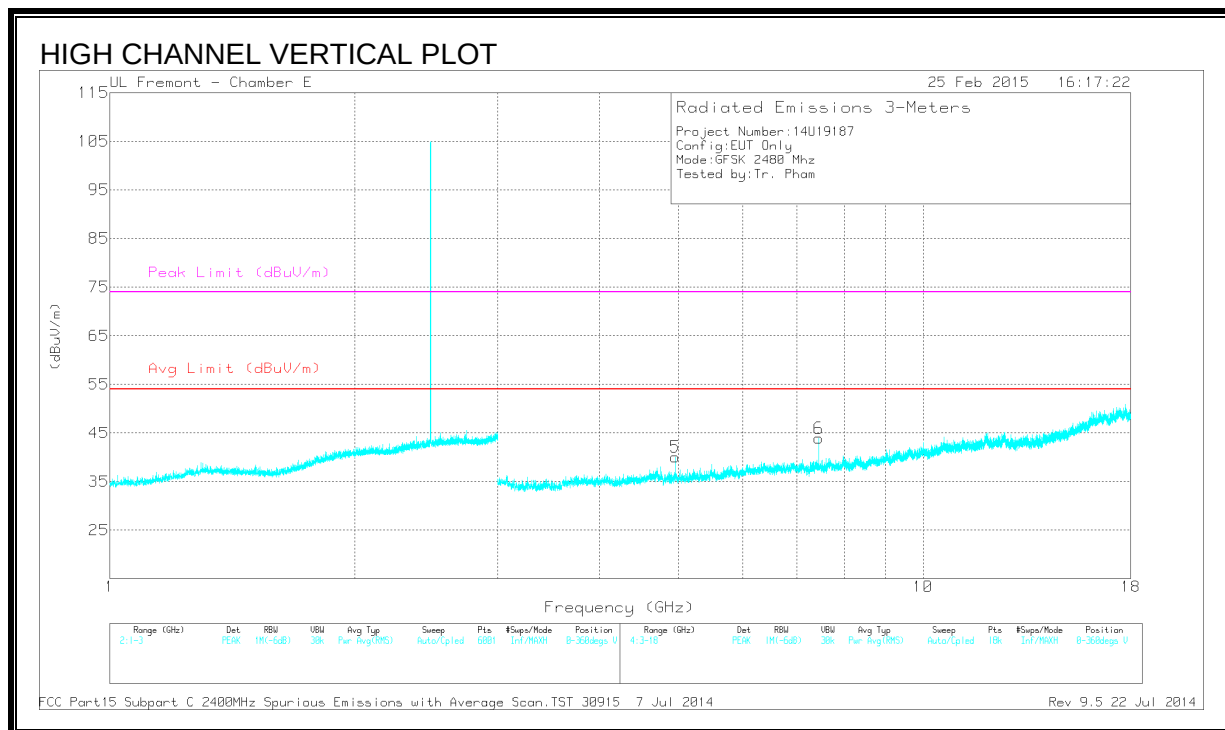
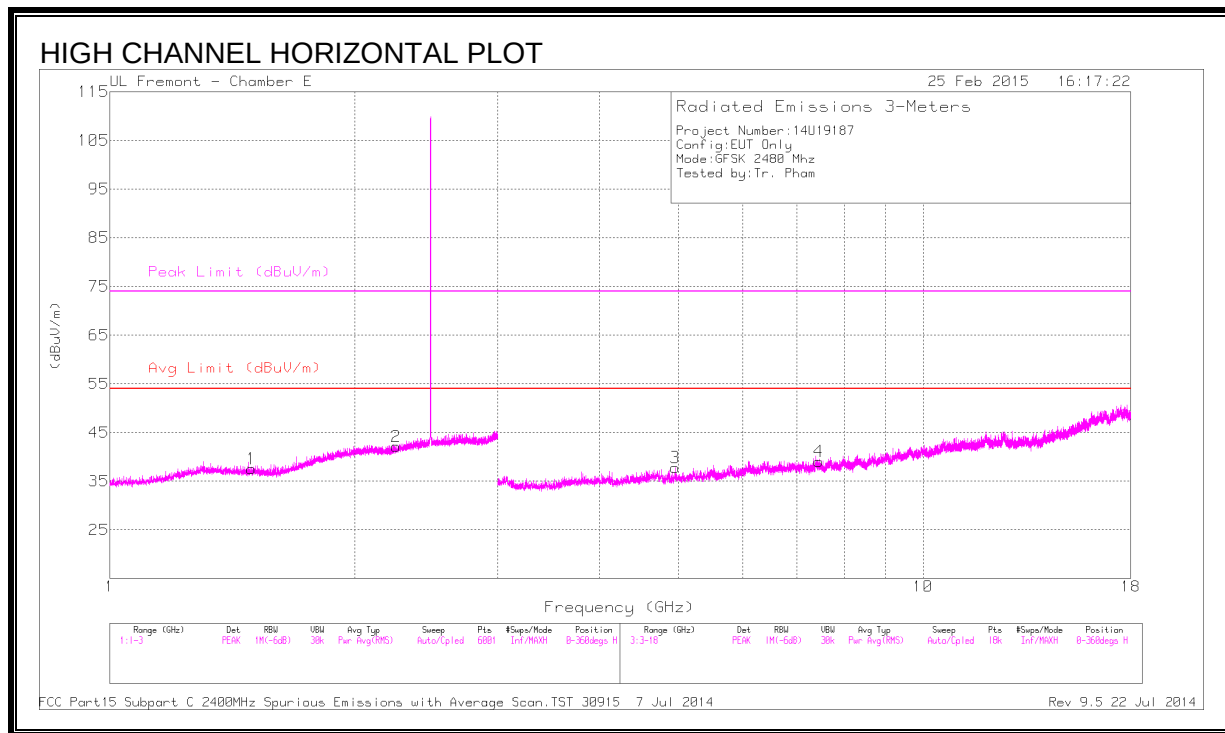
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.306	44.06	PK3	29	-26.9	46.16	-	-	74	-27.84	360	100	H
	* 1.306	31.03	VB10	29	-26.9	33.13	54	-20.87	-	-	360	100	H
2	* 1.48	43.87	PK3	28.3	-26.3	45.87	-	-	74	-28.13	360	100	H
	* 1.481	30.78	VB10	28.3	-26.3	32.78	54	-21.22	-	-	360	100	H
3	* 2.243	43.86	PK3	31.6	-25.2	50.26	-	-	74	-23.74	360	100	H
	* 2.242	30.68	VB10	31.6	-25.2	37.08	54	-16.92	-	-	360	100	H
4	* 3.848	42.05	PK3	33.5	-31.3	44.25	-	-	74	-29.75	360	100	H
	* 3.849	29.04	VB10	33.5	-31.4	31.14	54	-22.86	-	-	360	100	H
5	* 7.322	42.02	PK3	35.5	-27.6	49.92	-	-	74	-24.08	329	240	H
	* 7.323	31.12	VB10	35.5	-27.6	39.02	54	-14.98	-	-	329	240	H
6	* 7.322	44.91	PK3	35.5	-27.6	52.81	-	-	74	-21.19	276	234	V
	* 7.323	37.81	VB10	35.5	-27.6	45.71	54	-8.29	-	-	276	234	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
1	* 1.494	43.67	PK3	28.2	-26.2	45.67	-	-	74	-28.33	360	100	H
	* 1.492	30.79	VB10	28.2	-26.2	32.79	54	-21.21	-	-	360	100	H
2	* 2.248	43.92	PK3	31.6	-25.2	50.32	-	-	74	-23.68	360	100	H
	* 2.248	30.7	VB10	31.6	-25.2	37.1	54	-16.9	-	-	360	100	H
3	* 4.961	42.3	PK3	34.1	-30.2	46.2	-	-	74	-27.8	129	200	H
	* 4.96	31.62	VB10	34.1	-30.2	35.52	54	-18.48	-	-	129	200	H
4	* 7.441	39.93	PK3	35.6	-28.2	47.33	-	-	74	-26.67	233	117	H
	* 7.44	28.23	VB10	35.6	-28.2	35.63	54	-18.37	-	-	233	117	H
5	* 4.96	43.39	PK3	34.1	-30.2	47.29	-	-	74	-26.71	298	189	V
	* 4.96	34.65	VB10	34.1	-30.2	38.55	54	-15.45	-	-	298	189	V
6	* 7.44	42.78	PK3	35.6	-28.2	50.18	-	-	74	-23.82	244	214	V
	* 7.44	33.96	VB10	35.6	-28.2	41.36	54	-12.64	-	-	244	214	V

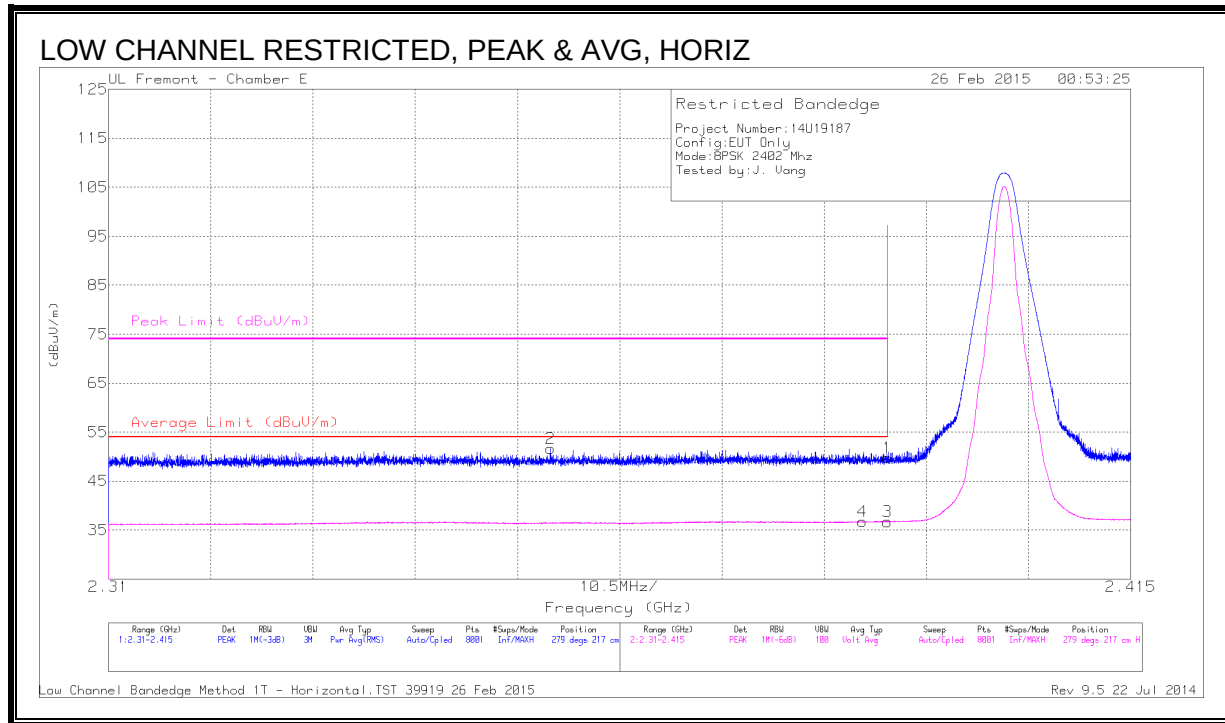
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

10.2.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

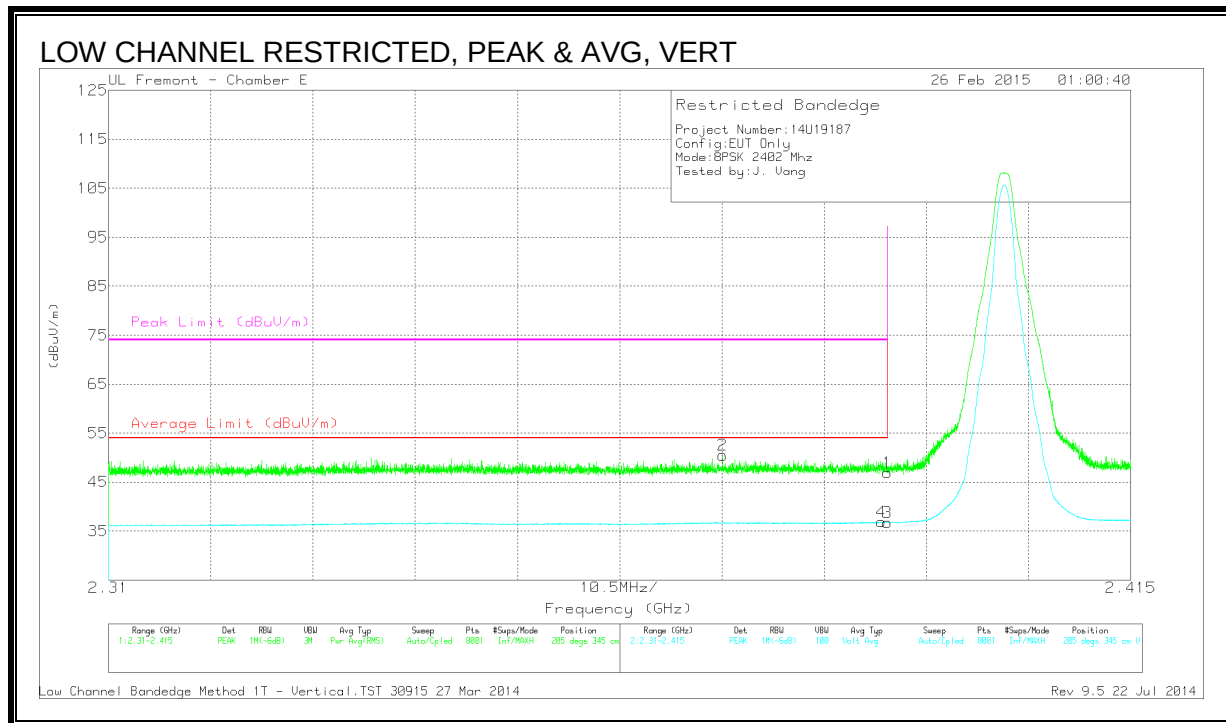
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.355	44.36	PK	32	-24.7	51.66	-	-	74	-22.34	279	217	H
4	* 2.387	29.39	VB1T	32.1	-24.7	36.79	54	-17.21	-	-	279	217	H
1	* 2.39	42.43	PK	32.1	-24.7	49.83	-	-	74	-24.17	279	217	H
3	* 2.39	29.3	VB1T	32.1	-24.7	36.7	54	-17.3	-	-	279	217	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

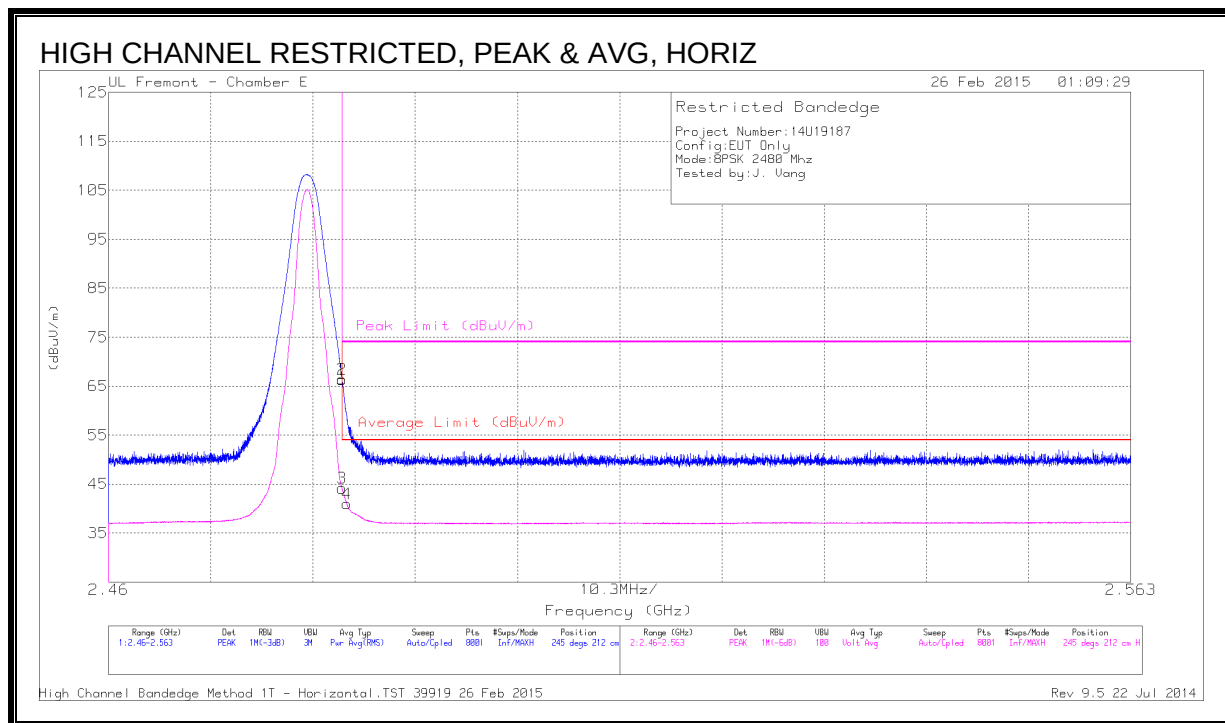
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.373	43.08	PK	32	-24.6	50.48	-	-	74	-23.52	205	345	V
4	* 2.389	29.43	VB1T	32.1	-24.7	36.83	54	-17.17	-	-	205	345	V
1	* 2.39	39.59	PK	32.1	-24.7	46.99	-	-	74	-27.01	205	345	V
3	* 2.39	29.41	VB1T	32.1	-24.7	36.81	54	-17.19	-	-	205	345	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

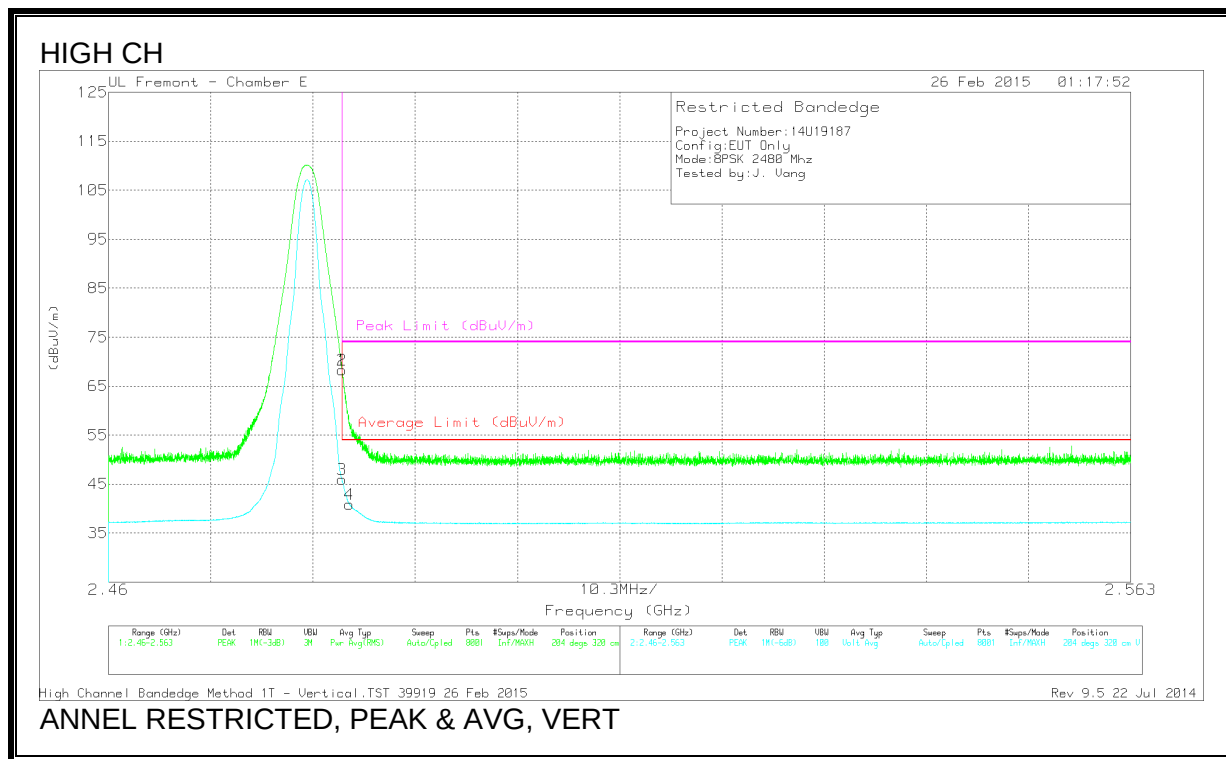
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	58.4	PK	32.2	-24.3	66.3	-	-	74	-7.7	245	212	H
2	* 2.484	58.57	PK	32.2	-24.3	66.47	-	-	74	-7.53	245	212	H
3	* 2.484	36.25	VB1T	32.2	-24.3	44.15	54	-9.85	-	-	245	212	H
4	* 2.484	33.1	VB1T	32.2	-24.3	41	54	-13	-	-	245	212	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

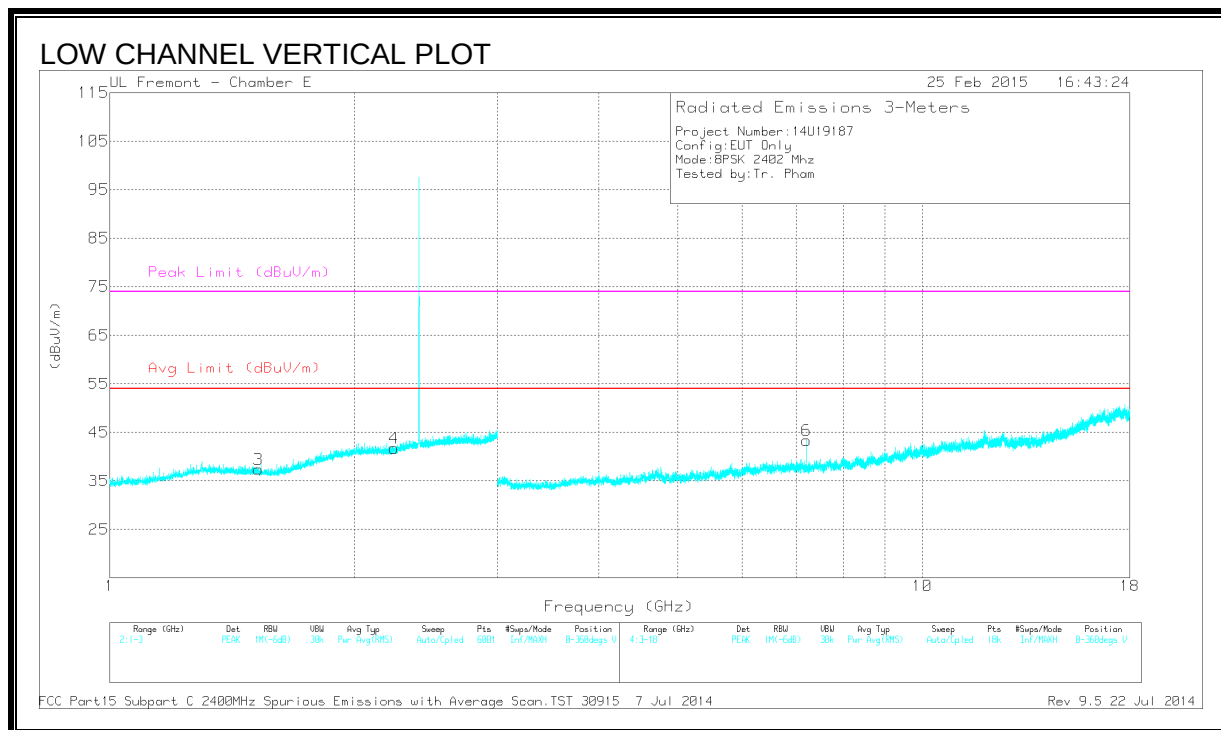
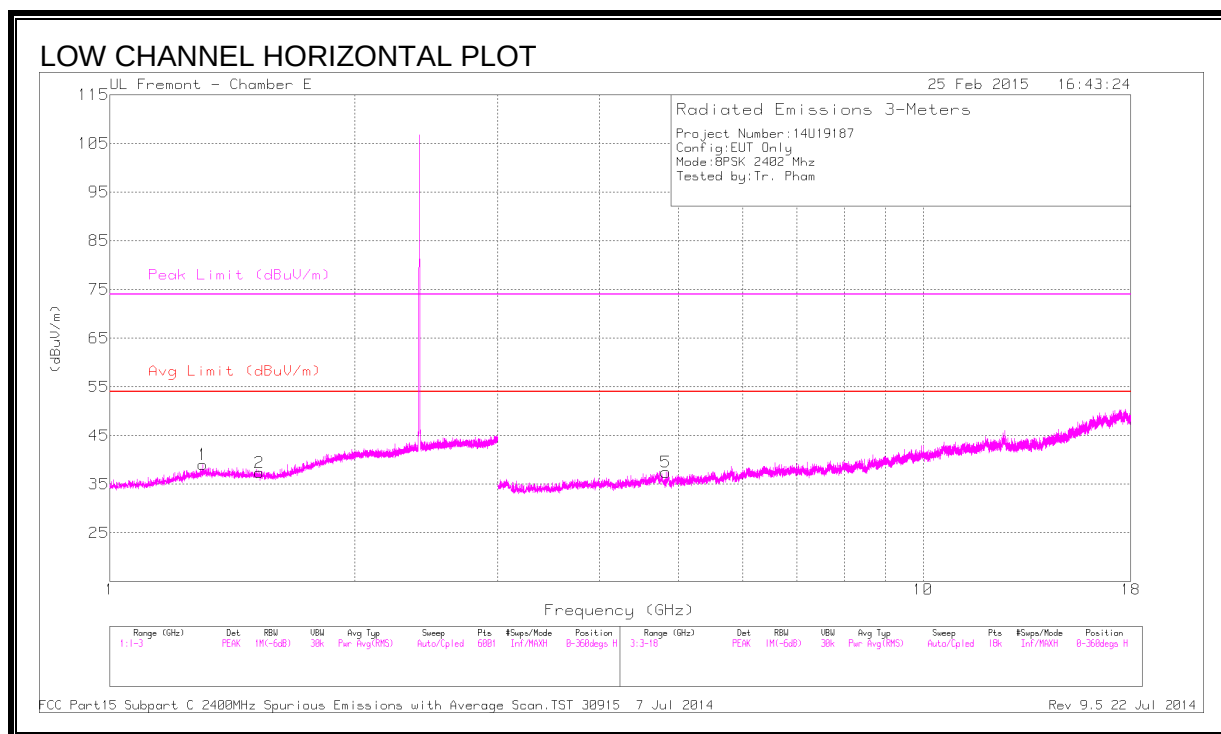
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	60.35	PK	32.2	-24.3	68.25	-	-	74	-5.75	204	320	V
2	* 2.484	60.42	PK	32.2	-24.3	68.32	-	-	74	-5.68	204	320	V
3	* 2.484	37.99	VB1T	32.2	-24.3	45.89	54	-8.11	-	-	204	320	V
4	* 2.484	32.98	VB1T	32.2	-24.3	40.88	54	-13.12	-	-	204	320	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

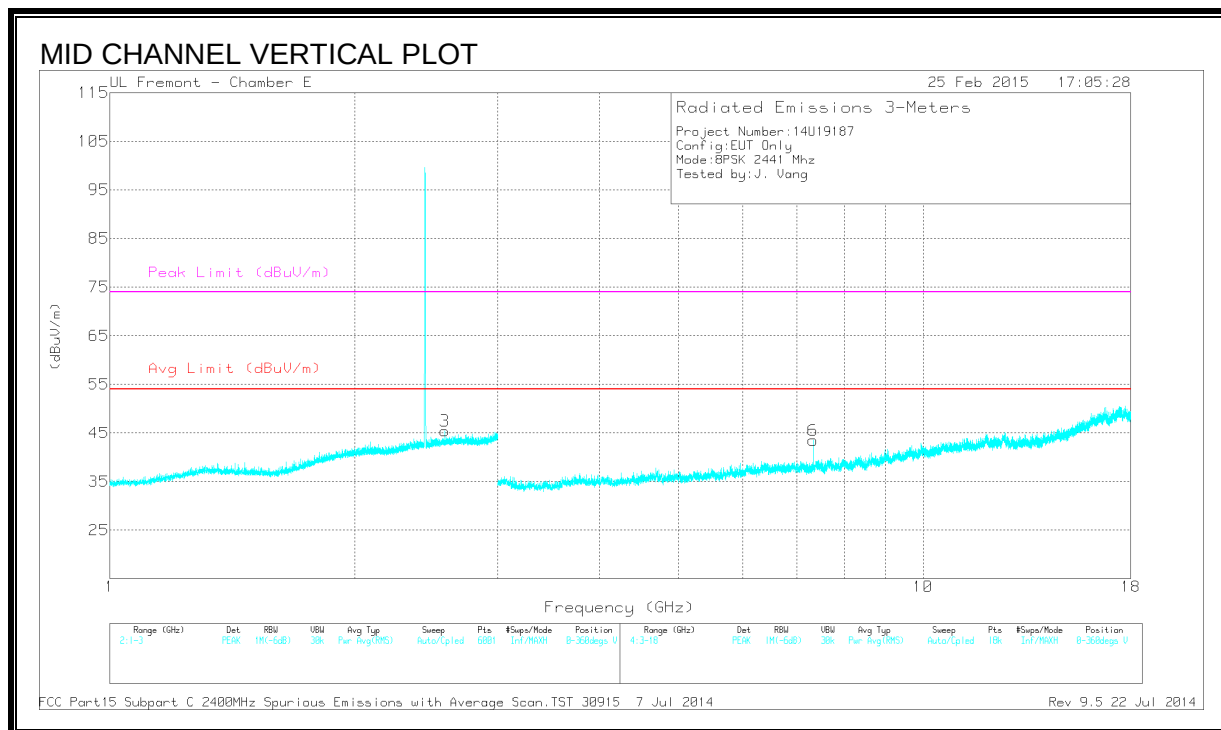
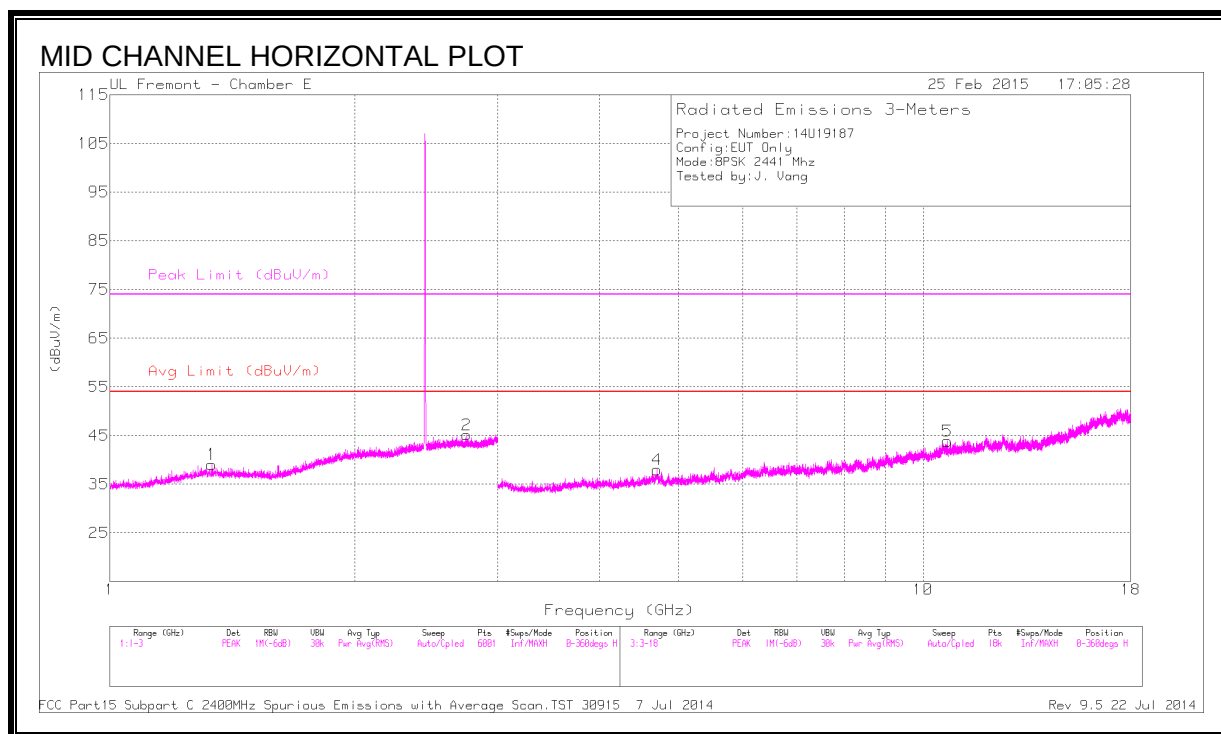
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.302	43.79	PK3	29	-27	45.79	-	-	74	-28.21	360	101	H
	* 1.301	31.06	VB10	29	-27	33.06	54	-20.94	-	-	360	101	H
2	* 1.529	44.19	PK3	28.1	-26.4	45.89	-	-	74	-28.11	360	101	H
	* 1.528	30.84	VB10	28.1	-26.4	32.54	54	-21.46	-	-	360	101	H
3	* 1.524	43.89	PK3	28.1	-26.3	45.69	-	-	74	-28.31	360	101	V
	* 1.523	30.9	VB10	28.1	-26.3	32.7	54	-21.3	-	-	360	101	V
4	* 2.24	44.02	PK3	31.5	-25.2	50.32	-	-	74	-23.68	360	101	V
	* 2.239	30.74	VB10	31.5	-25.2	37.04	54	-16.96	-	-	360	101	V
5	* 4.829	41.96	PK3	34.1	-31.2	44.86	-	-	74	-29.14	360	101	H
	* 4.829	28.42	VB10	34.1	-31.2	31.32	54	-22.68	-	-	360	101	H
6	7.206	43.42	PK3	35.5	-28.4	50.52	-	-	-	-	238	200	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

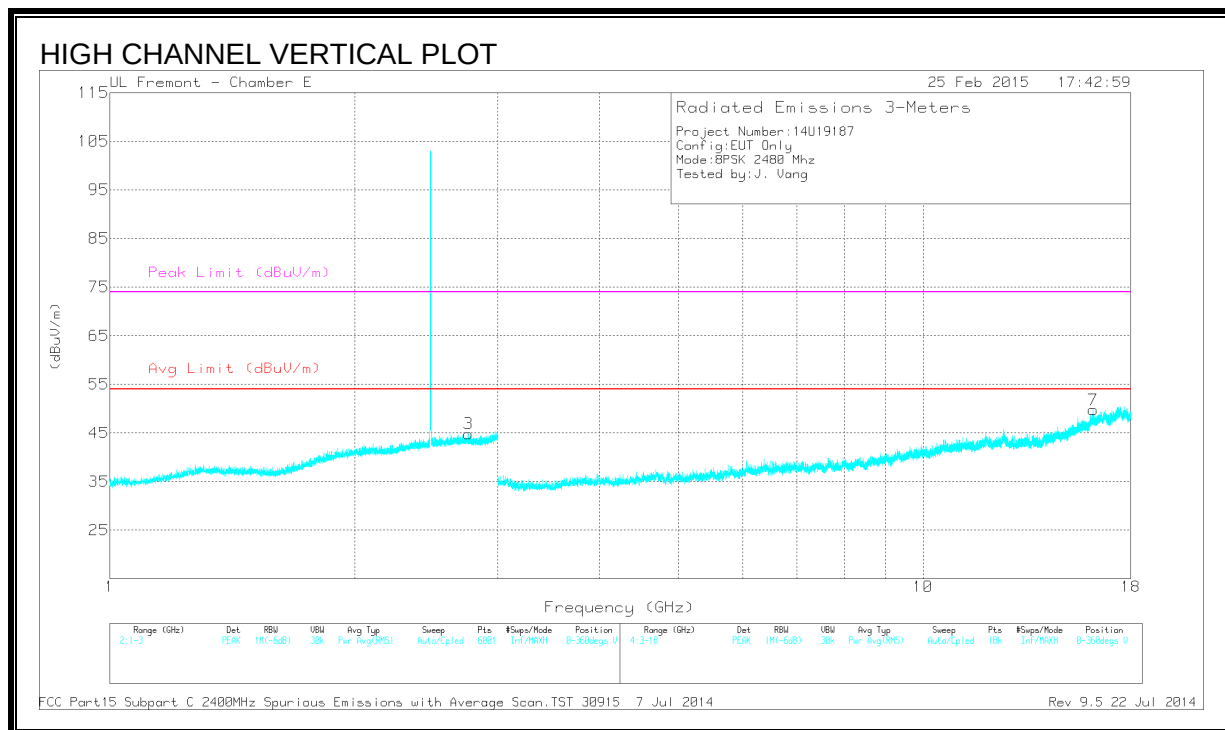
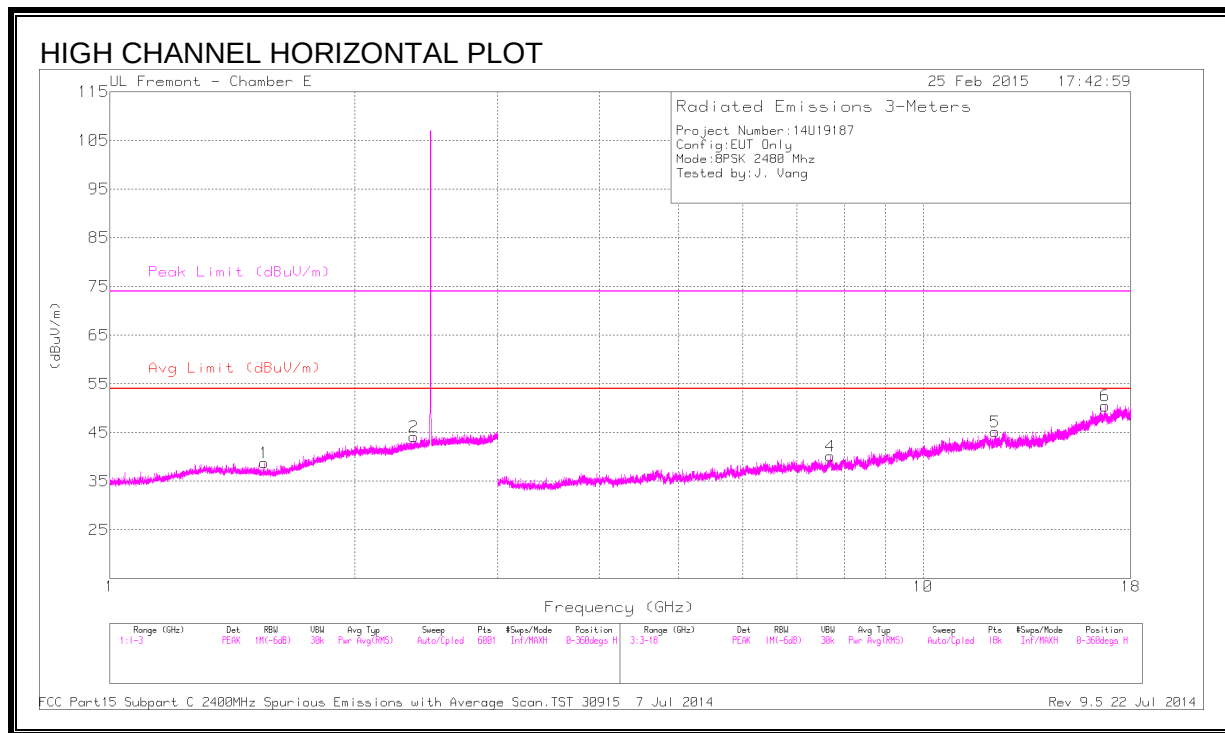
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.336	44.75	PK3	28.8	-26.8	46.75	-	-	74	-27.25	184	308	H
	* 1.333	30.84	VB10	28.8	-26.8	32.84	54	-21.16	-	-	184	308	H
2	* 2.744	43.67	PK3	32.4	-23.8	52.27	-	-	74	-21.73	78	160	H
	* 2.754	30.45	VB10	32.4	-23.9	38.95	54	-15.05	-	-	78	160	H
4	* 4.709	42.46	PK3	34.2	-30.5	46.16	-	-	74	-27.84	42	101	H
	* 4.71	29.39	VB10	34.2	-30.5	33.09	54	-20.91	-	-	42	101	H
5	* 10.711	36.93	PK3	37.9	-23.6	51.23	-	-	74	-22.77	9	319	H
	* 10.709	23.9	VB10	37.9	-23.6	38.2	54	-15.8	-	-	9	319	H
6	* 7.323	43.22	PK3	35.5	-27.6	51.12	-	-	74	-22.88	248	165	V
	* 7.323	32.95	VB10	35.5	-27.6	40.85	54	-13.15	-	-	248	165	V
3	2.58	44.01	PK3	32.3	-24.2	52.11	-	-	-	-	248	165	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
1	* 1.55	43.76	PK3	28.1	-26.4	45.46	-	-	74	-28.54	207	355	H
	* 1.551	30.89	VB10	28.1	-26.4	32.59	54	-21.41	-	-	207	355	H
2	* 2.364	42.97	PK3	32	-24.7	50.27	-	-	74	-23.73	260	102	H
	* 2.366	30.54	VB10	32	-24.7	37.84	54	-16.16	-	-	260	102	H
3	* 2.764	43.78	PK3	32.4	-24	52.18	-	-	74	-21.82	118	212	V
	* 2.764	30.49	VB10	32.4	-24	38.89	54	-15.11	-	-	118	212	V
4	* 7.694	38.63	PK3	35.8	-26.5	47.93	-	-	74	-26.07	281	236	H
	* 7.695	25.52	VB10	35.8	-26.5	34.82	54	-19.18	-	-	281	236	H
5	* 12.27	37.56	PK3	38.8	-23.8	52.56	-	-	74	-21.44	141	262	H
	* 12.268	24.31	VB10	38.8	-23.8	39.31	54	-14.69	-	-	141	262	H
7	* 16.188	35.49	PK3	40.9	-20.5	55.89	-	-	74	-18.11	279	260	V
	* 16.187	23.16	VB10	40.9	-20.6	43.46	54	-10.54	-	-	279	260	V
6	16.736	35.53	PK3	41.1	-19.6	57.03	-	-	-	-	279	260	H

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

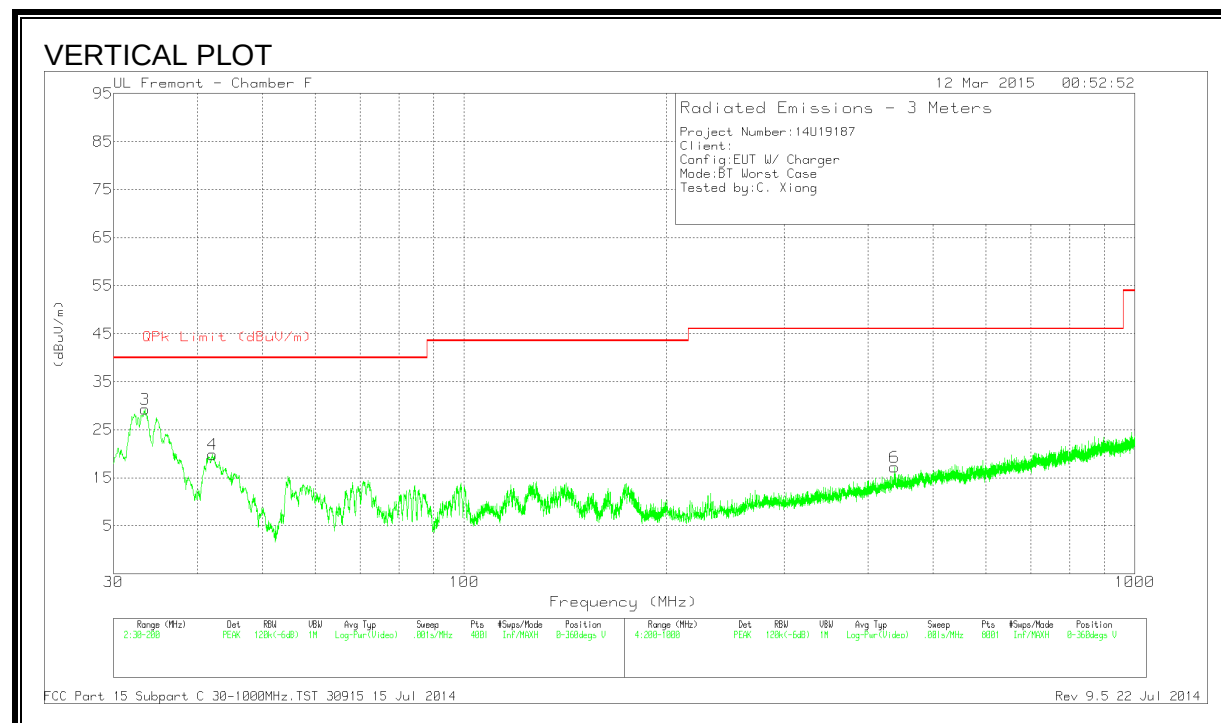
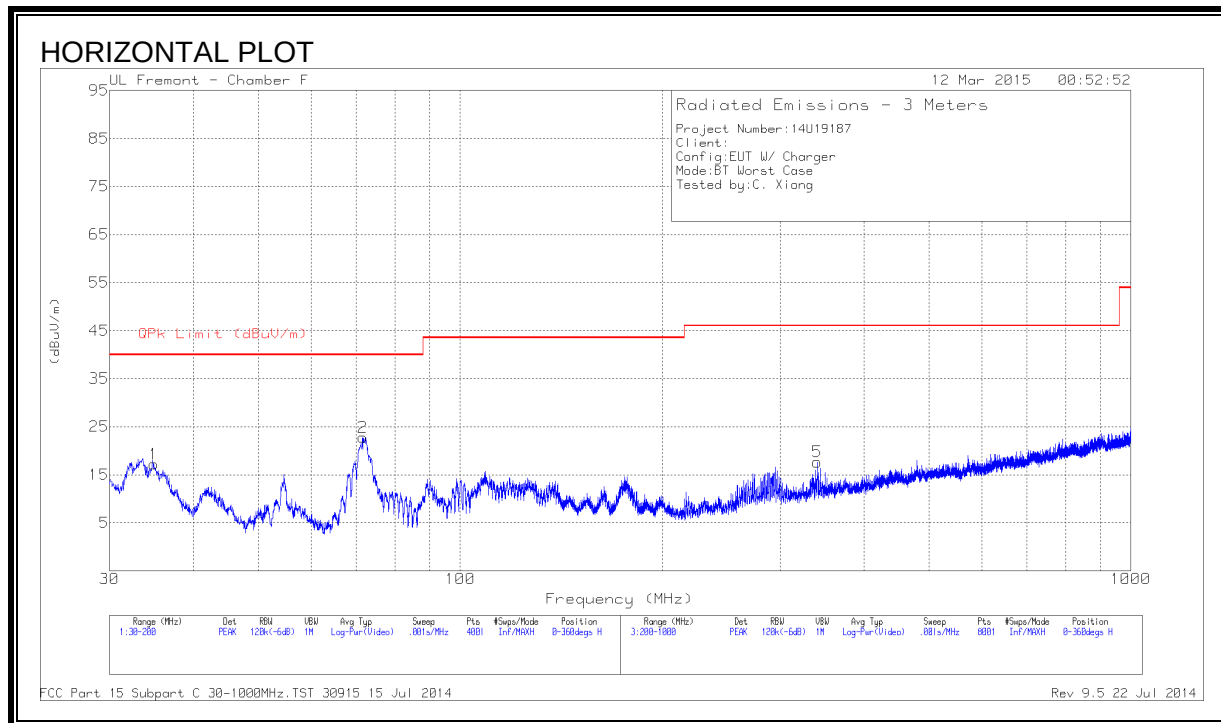
PK3 - FHSS Method: Maximum Peak

VB10Hz - FHSS Method: 10Hz Video Bandwidth

10.3. WORST-CASE BELOW 1 GHz

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

ANTENNA B

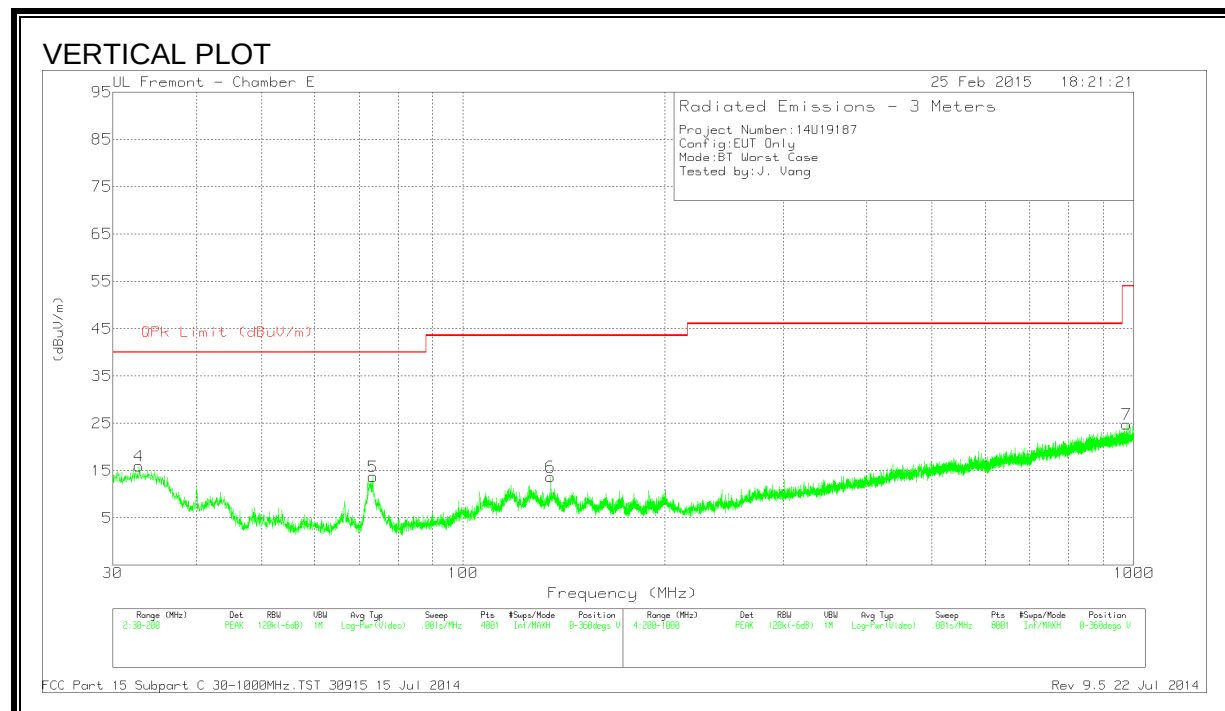
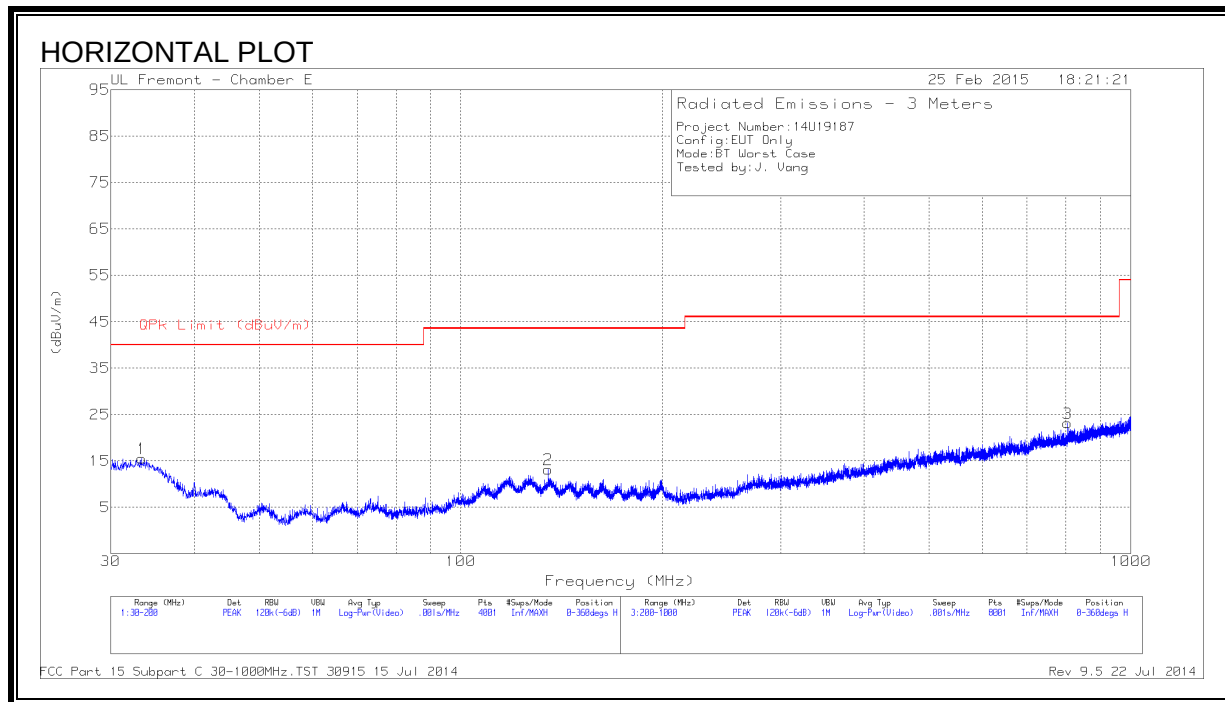


DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	34.93	31.68	PK	17.4	-31.8	17.28	40	-22.72	0-360	201	H
2	71.65	45.94	PK	8.4	-31.5	22.84	40	-17.16	0-360	201	H
3	33.4	42.34	PK	18.8	-31.9	29.24	40	-10.76	0-360	100	V
4	42.1125	39.03	PK	12.6	-31.8	19.83	40	-20.17	0-360	100	V
5	340.7	33.47	PK	14.1	-29.9	17.67	46.02	-28.35	0-360	99	H
6	438.1	30.01	PK	16.7	-29.5	17.21	46.02	-28.81	0-360	201	V

PK - Peak detector

ANTENNA D



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 134.975	30.98	PK	13.3	-31.1	13.18	43.52	-30.34	0-360	301	H
5	* 73.3075	36.74	PK	8.5	-31.5	13.74	40	-26.26	0-360	100	V
6	* 135.0175	31.51	PK	13.3	-31.1	13.71	43.52	-29.81	0-360	100	V
7	* 976	29.61	PK	22.5	-27.3	24.81	53.97	-29.16	0-360	301	V
4	32.8475	28.28	PK	19.5	-31.8	15.98	40	-24.02	0-360	100	V
1	33.3575	28.25	PK	19.1	-31.8	15.55	40	-24.45	0-360	201	H
3	805	30.73	PK	21.1	-28.7	23.13	46.02	-22.89	0-360	99	H

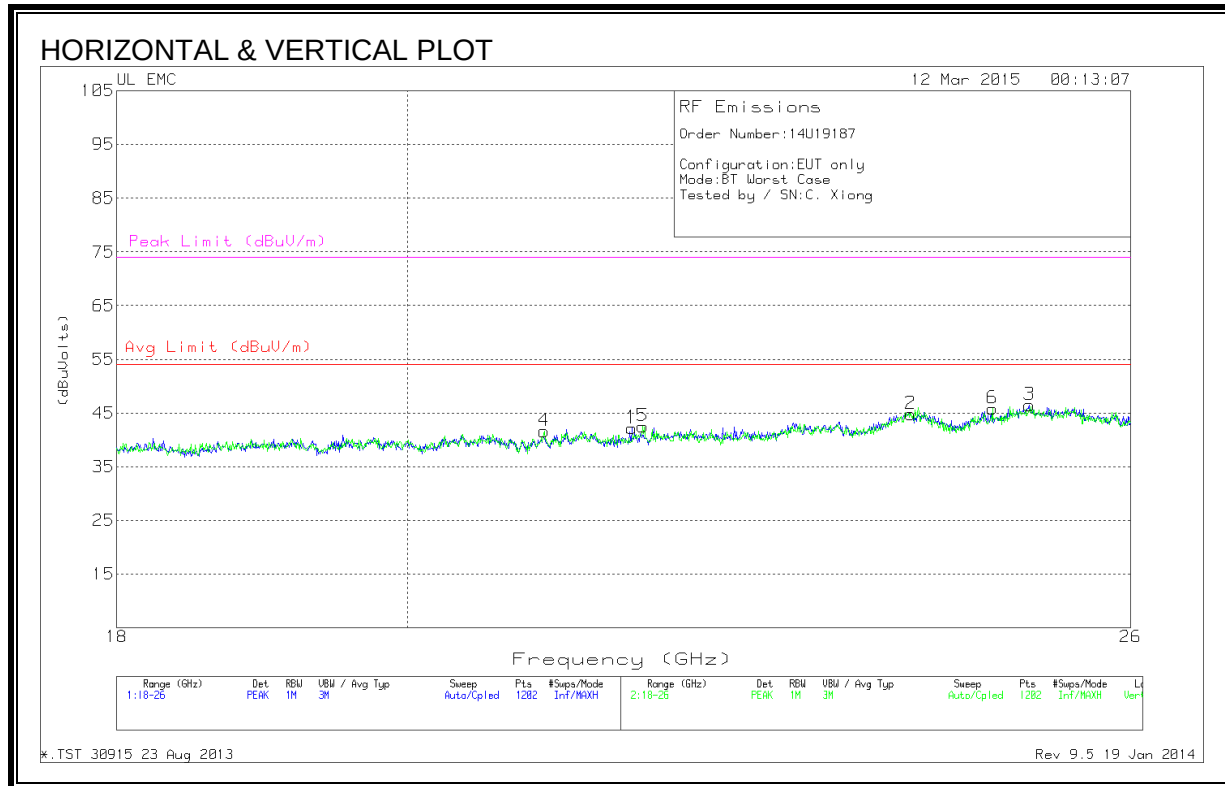
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK - Peak detector

10.4. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18000 TO 26000 MHz (WORST-CASE CONFIGURATION)

ANTENNA B

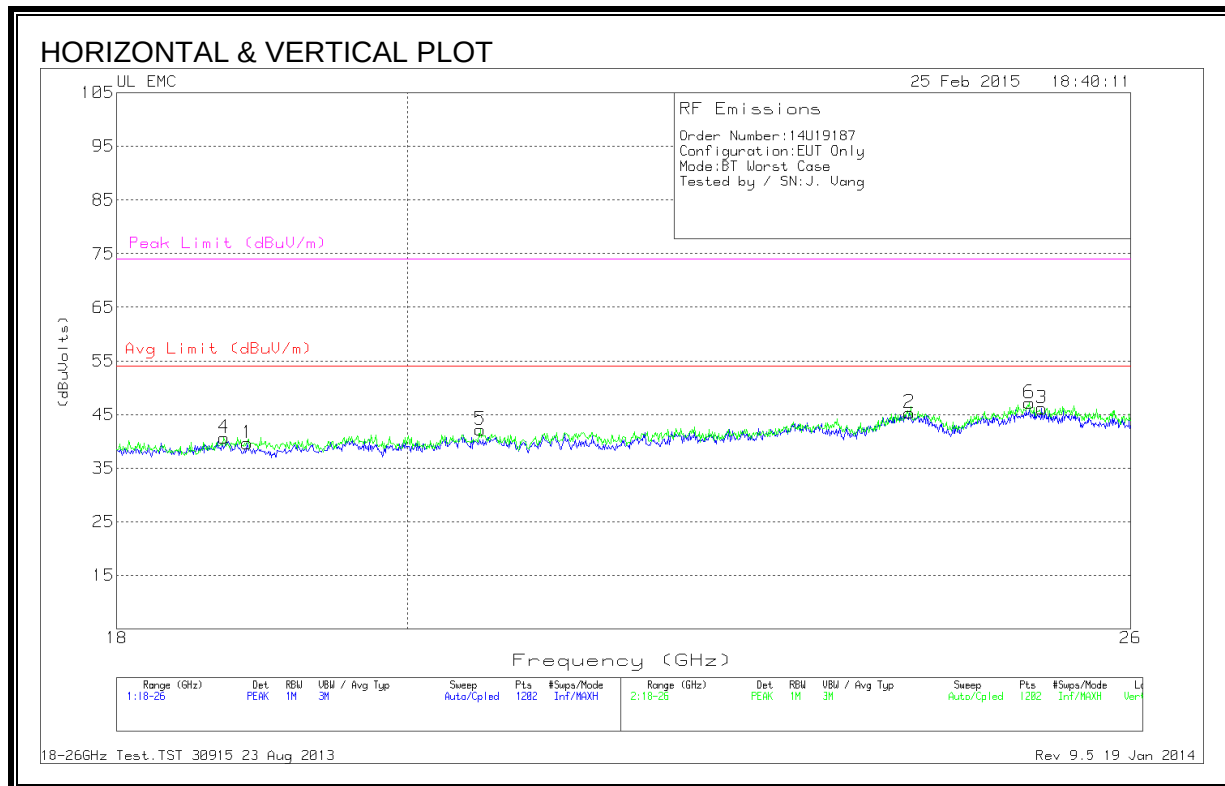


DATA

Marker	Frequency (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	21.697	41.77	PK	33.6	-23.7	-9.5	42.16	54	-11.83	74	-31.83
2	24.005	42.83	PK	34.2	-22.7	-9.5	44.83	54	-9.16	74	-29.16
3	25.061	44.1	PK	34.5	-22.6	-9.5	46.5	54	-7.5	74	-27.5
4	21.017	41.57	PK	33.3	-23.7	-9.5	41.66	54	-12.33	74	-32.33
5	21.784	41.5	PK	33.6	-23.1	-9.5	42.5	54	-11.5	74	-31.5
6	24.728	43.63	PK	34.5	-22.8	-9.5	45.83	54	-8.16	74	-28.16

PK - Peak detector

ANTENNA D



DATA

Marker	Frequency (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	18.873	40.87	PK	32.8	-24.5	-9.5	39.6	54	-14.3	74	-34.3
2	23.995	43.33	PK	34.2	-22.7	-9.5	45.3	54	-8.6	74	-28.6
3	25.174	44.07	PK	34.5	-22.9	-9.5	46.1	54	-7.8	74	-27.8
4	18.713	41.67	PK	32.7	-24.2	-9.5	40.6	54	-13.3	74	-33.3
5	20.538	42.47	PK	33	-23.8	-9.5	42.1	54	-11.8	74	-31.8
6	25.061	44.77	PK	34.5	-22.6	-9.5	47.1	54	-6.8	74	-26.8

PK - Peak detector

11. 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 C63.4.

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

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

RESULTS

6 WORST EMISSIONS

Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.204	37.73	PK	.9	0	38.63	63.4	-24.77	-	-
2	.204	30.63	Av	.9	0	31.53	-	-	53.4	-21.87
3	.582	42.55	PK	.3	0	42.85	56	-13.15	-	-
4	.582	29.04	Av	.3	0	29.34	-	-	46	-16.66
5	1.7475	31.67	PK	.2	.1	31.97	56	-24.03	-	-
6	1.7475	19.27	Av	.2	.1	19.57	-	-	46	-26.43
7	9.15	28.87	PK	.2	.2	29.27	60	-30.73	-	-
8	9.15	18.52	Av	.2	.2	18.92	-	-	50	-31.08

Line-L2 .15 - 30MHz

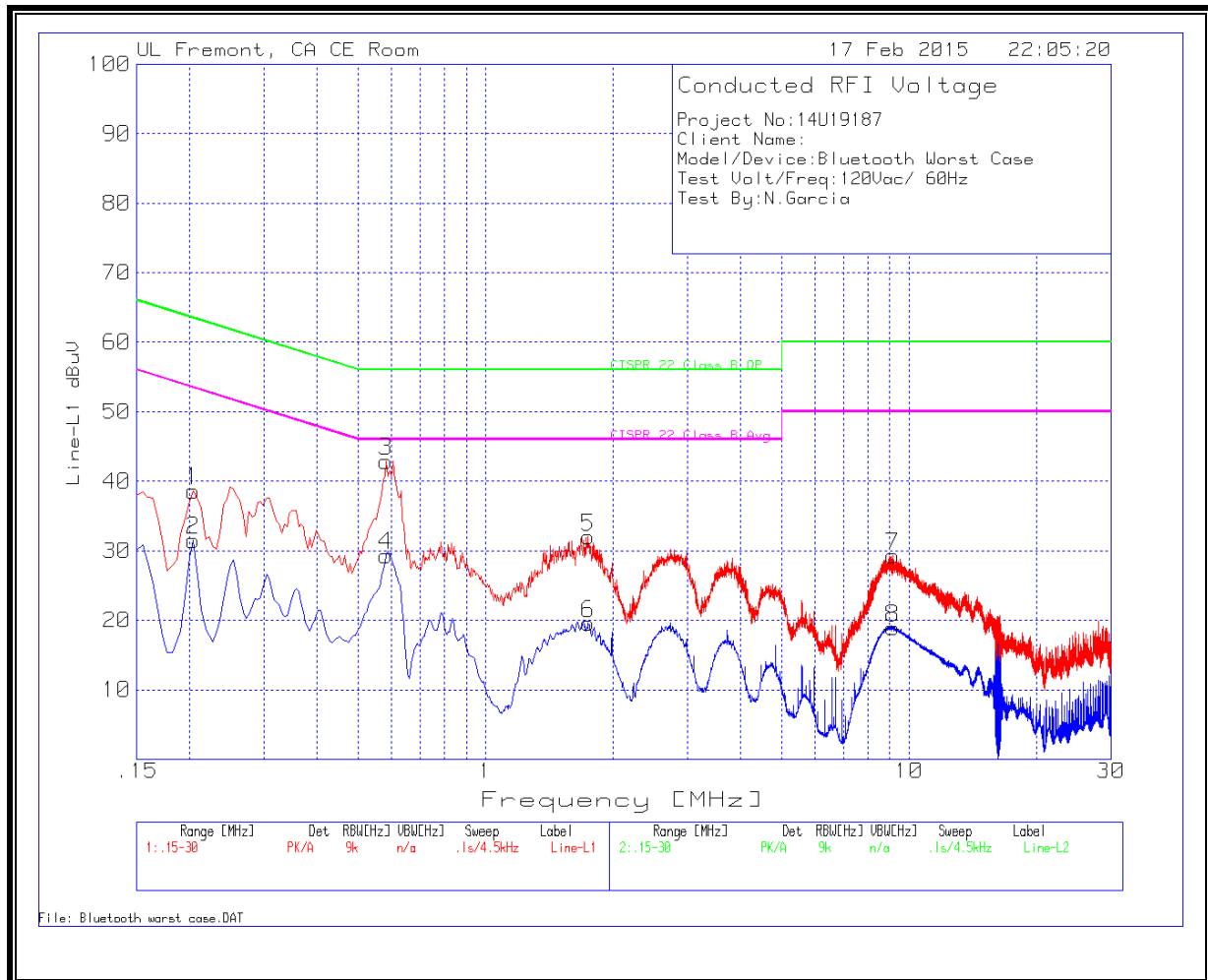
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
9	.204	36.84	PK	1	0	37.84	63.4	-25.56	-	-
10	.204	28.7	Av	1	0	29.7	-	-	53.4	-23.7
11	.591	38.33	PK	.3	0	38.63	56	-17.37	-	-
12	.591	24.25	Av	.3	0	24.55	-	-	46	-21.45
13	1.5765	28.79	PK	.2	.1	29.09	56	-26.91	-	-
14	1.5765	10.93	Av	.2	.1	11.23	-	-	46	-34.77
15	9.1815	30.56	PK	.2	.2	30.96	60	-29.04	-	-
16	9.1815	19.85	Av	.2	.2	20.25	-	-	50	-29.75

PK - Peak detector

Av - average detection

LINE 1 RESULTS



LINE 2 RESULTS

