



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

CERTIFICATION TEST REPORT

FOR

iPOD TOUCH

MODEL NUMBER: A1574

FCC ID: BCGA1574

IC: 579C-A1574

REPORT NUMBER: 15U20058-E1, REVISION E

ISSUE DATE: MAY 27, 2015

Prepared for

APPLE, INC.

1 INFINITE LOOP

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	04/20/2015	Initial Review	M. Mekuria
A	05/15/2015	Updated EDR modulation out power limit and updated EUT name	T. Chu
B	05/29/2015	Revised report to address TCB's questions	T. Chu
C	06/02/2015	Revised report to address TCB's questions	T. Chu
D	06/03/2015	Revised report to address TCB's questions	T. Chu
E	06/08/2015	Revised the issue date to MAY 27, 2015	C. Pang

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: IPOD TOUCH

MODEL: A1574

SERIAL NUMBER: CCQP704HGJ1Y (CONDUCTED); CCQP704KGJ1Y (RADIATED)

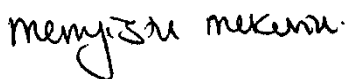
DATE TESTED: MARCH 19, 2015- MARCH 20, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 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
LAB TECHNICIAN
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-210 Issue 8, 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
<input type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input checked="" type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input checked="" 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

EUT is a multimedia device with IEEE 802.11a/b/g/n/ac and BLUETOOTH Radio.

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	12.33	17.10
2402 - 2480	Enhanced 8PSK	11.89	15.45

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain
2.400-2.480	-0.452

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 12.4.312.1014.

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.

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	Dell	Latitude 3540	D49G802	NA
Laptop AC/DC adapter	Dell	HA65NM130	CN-06TFFF-75661-426-030Y-A00	NA
Earphone	Apple	NA	NA	NA
EUT AC/DC adapter	Apple	A1265	1X3276SZZ08QZ	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						

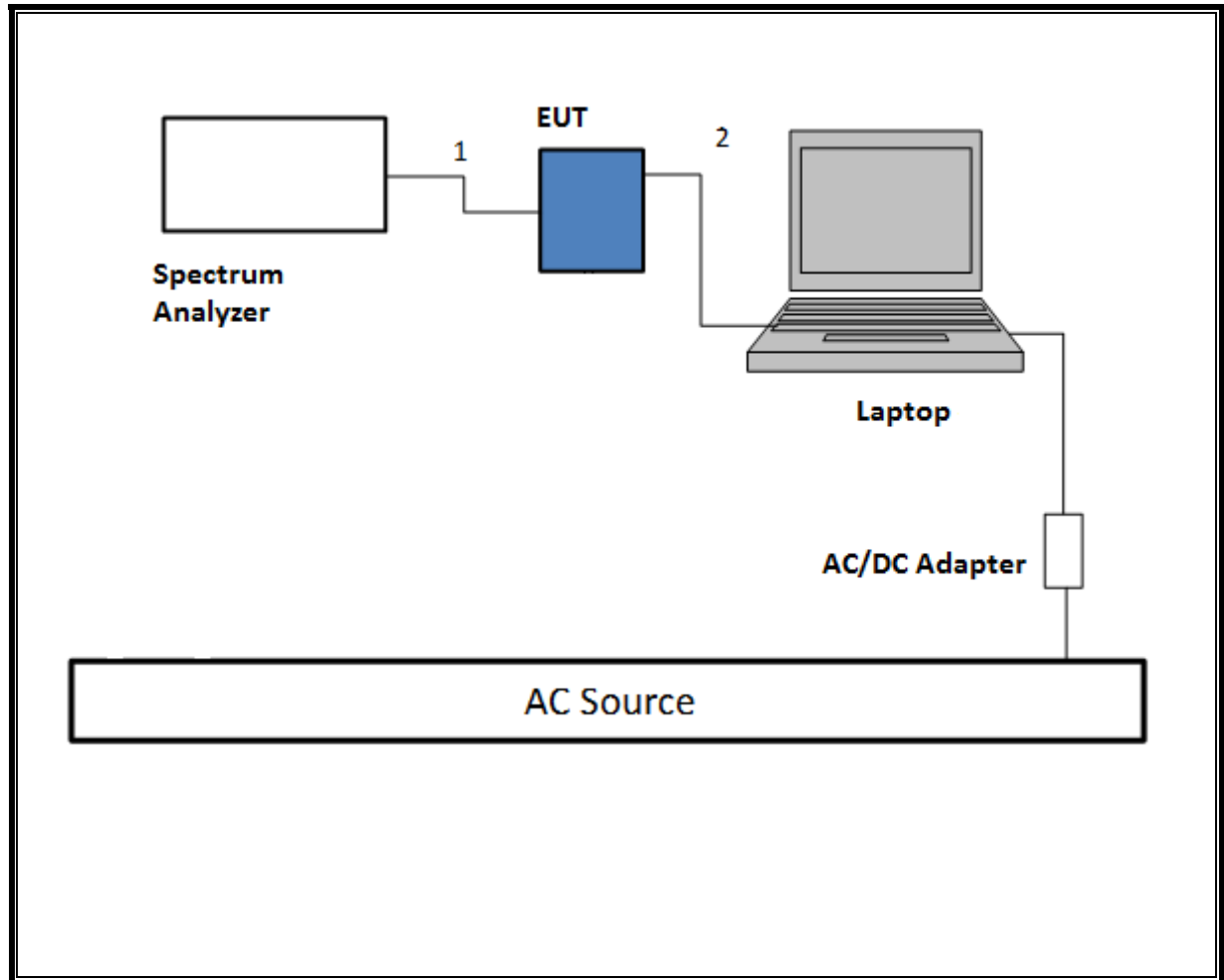
I/O CABLES (AC POWER CONDUCTED TEST and below 1 GHZ)

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.

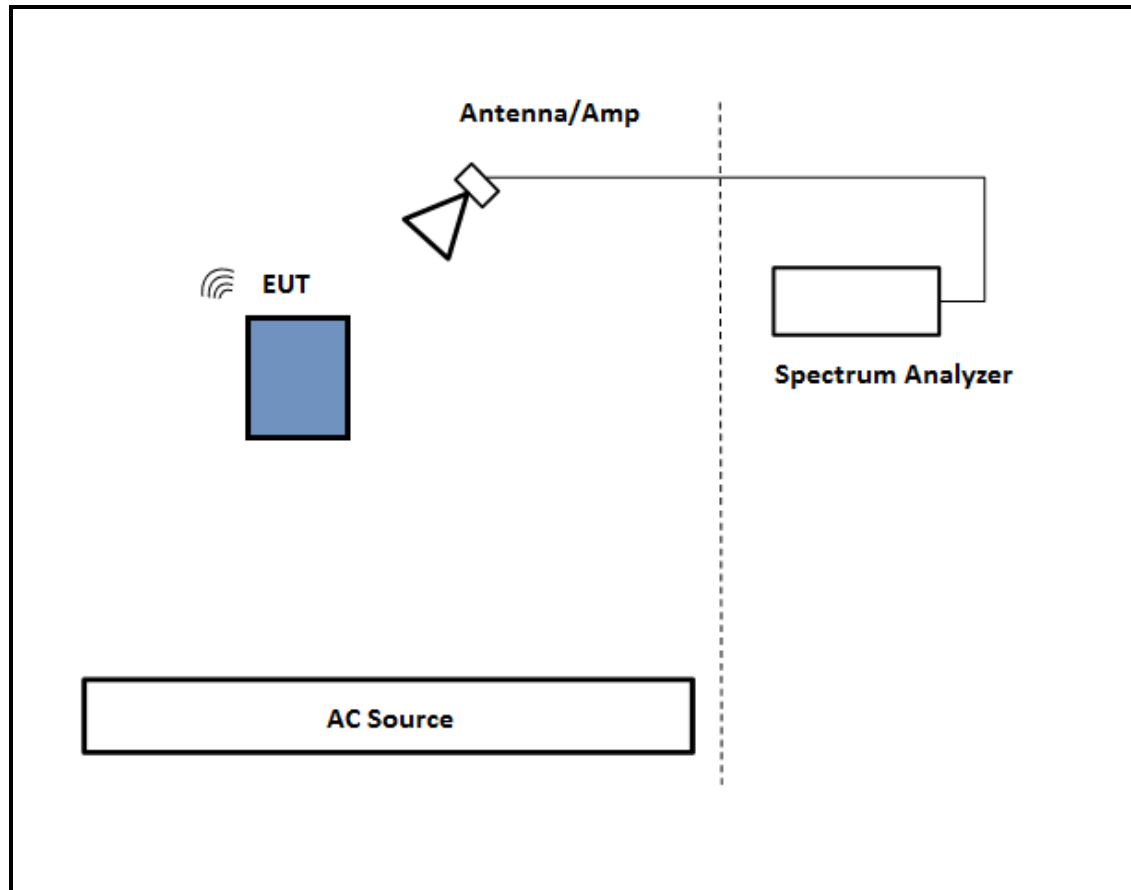
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

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

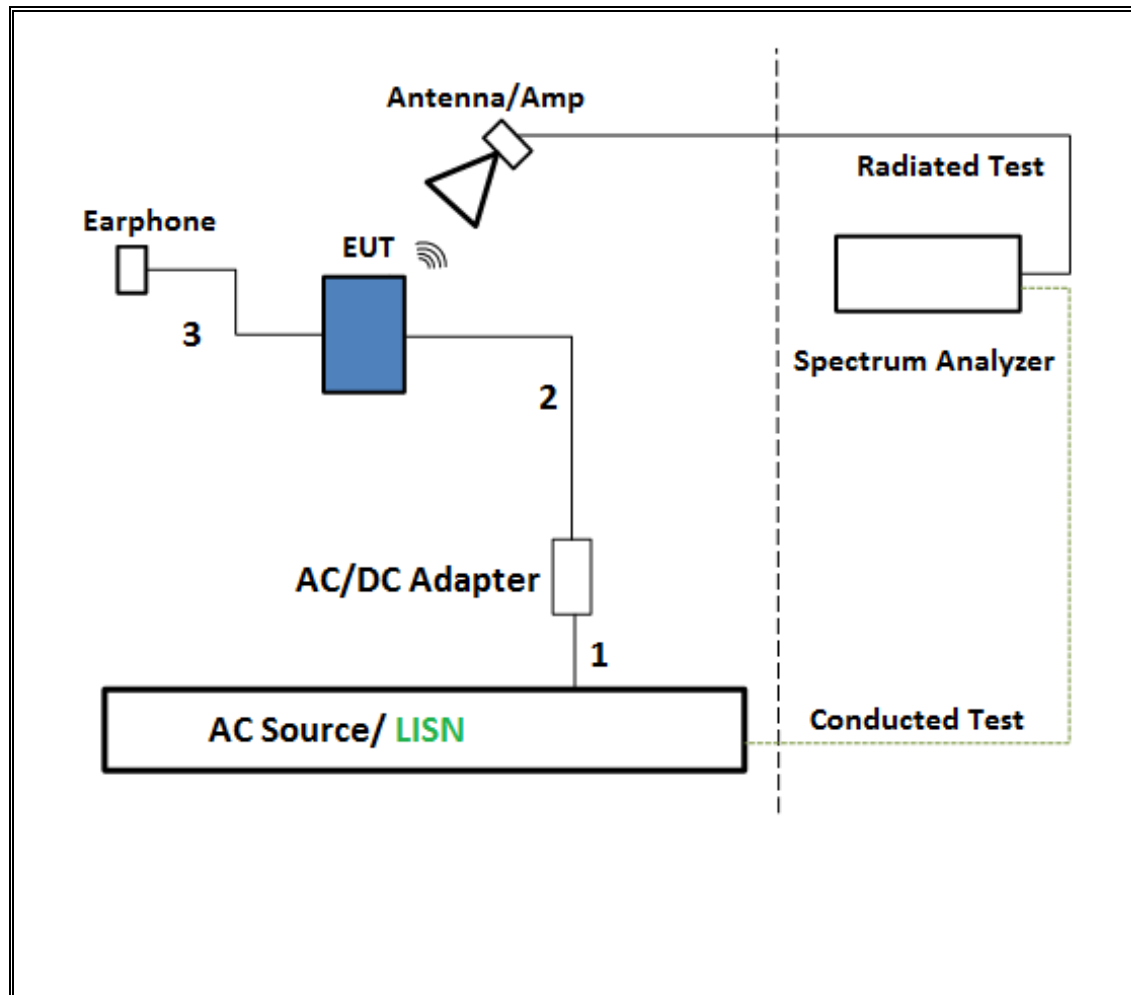
SETUP DIAGRAM



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	Cal Date	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	3117	2/10/2015	2/10/2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	1/14/2015	1/14/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1/26/2015	1/26/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	5/28/2014	5/28/2015
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	5/2/2014	5/2/2015
Power Meter, P-series single channel	Agilent	N1911A	10/9/2014	10/9/2015
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	7/12/2014	7/12/2015
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	12/17/2014	12/17/2015
Spectrum Analyzer, 40 GHz	Agilent	8564E	8/6/2014	8/6/2015
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	10/4/2014	10/4/2015
AC Line Conducted				
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ECSI7	09/16/14	09/16/15
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	01/16/15	01/16/16
Power Cable, Line Conducted Emissions ANSI 63.4	UL	PG1	7/28/2014	7/28/2015
UL SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 2.1.3, March 12, 2015 Ver 2.2, March 31, 2015	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, February 26, 2015	

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

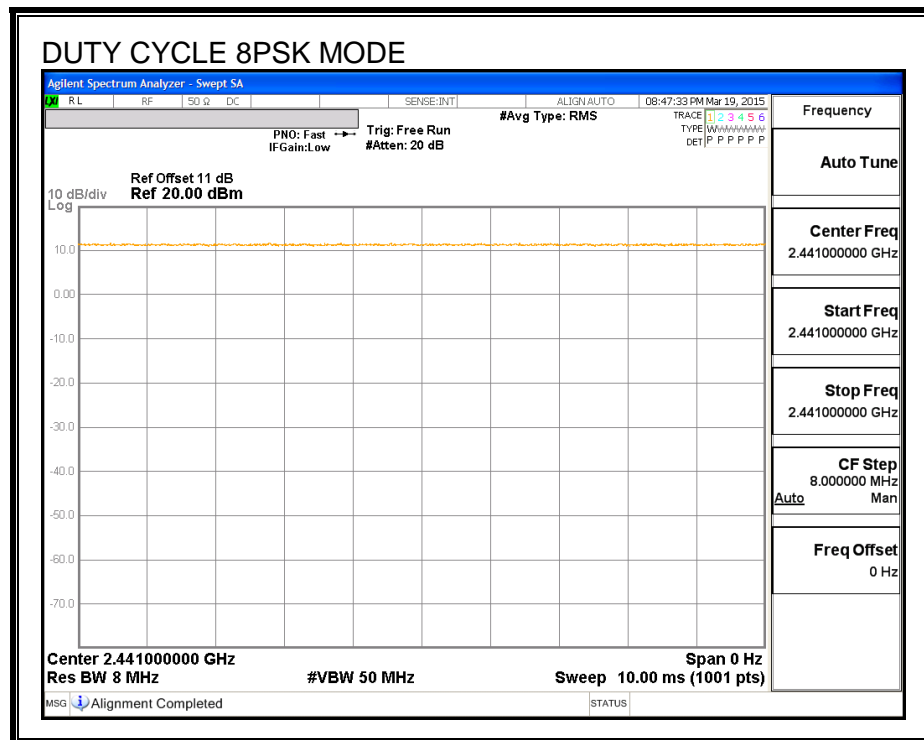
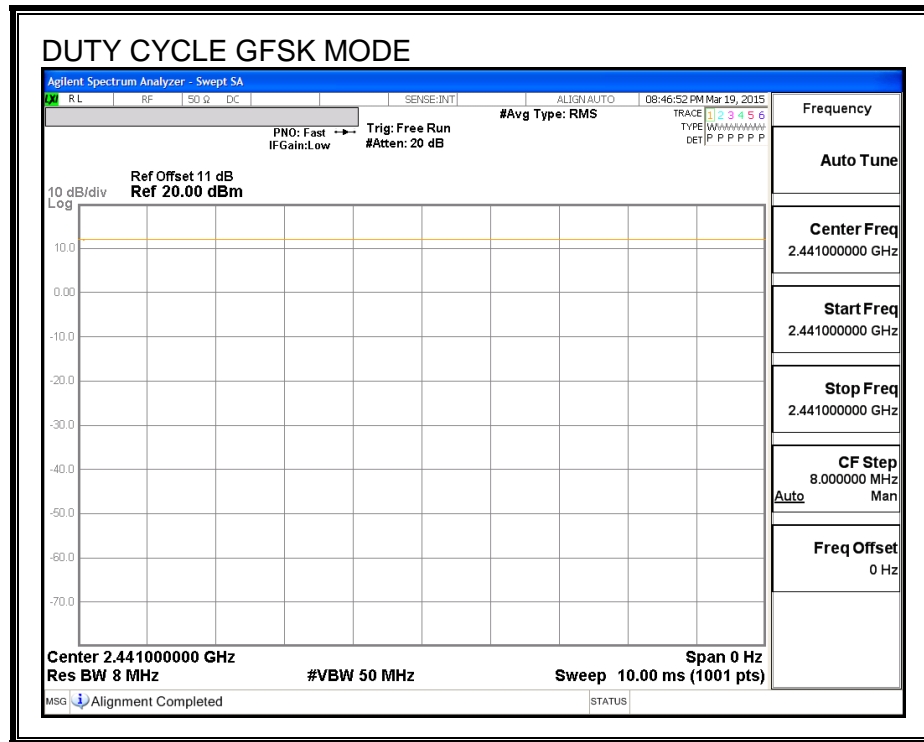
KDB 558074 Zero-Span Spectrum Analyzer Method.

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.

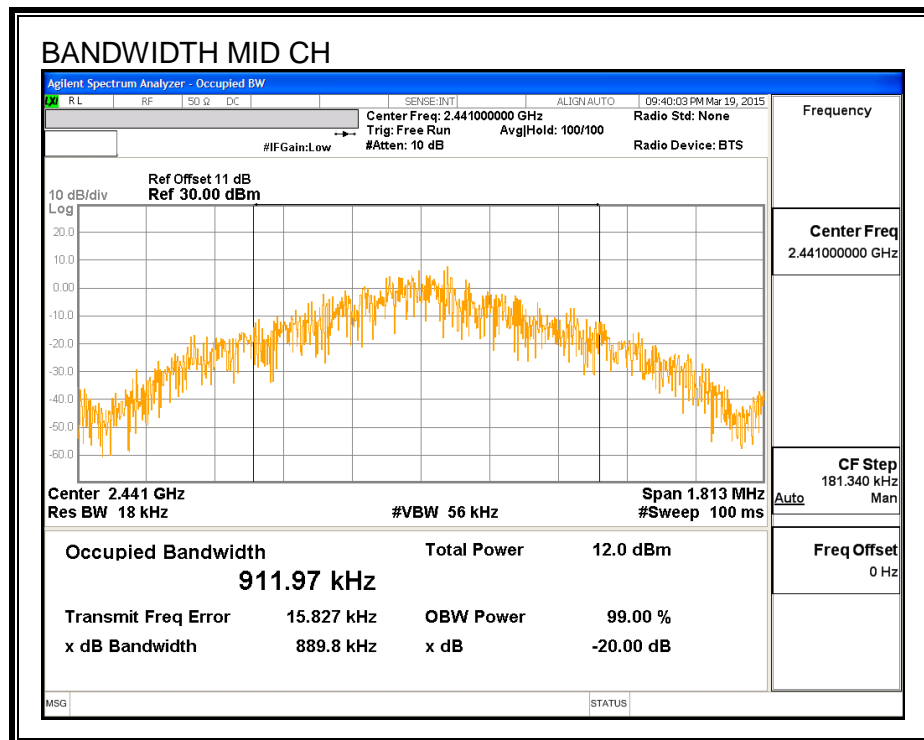
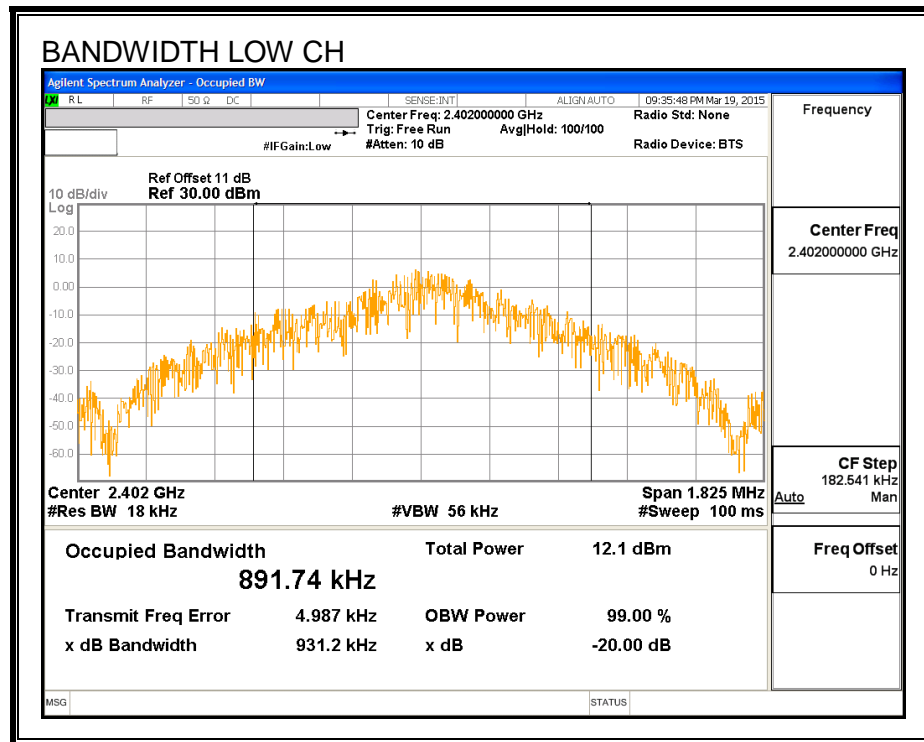
TEST PROCEDURE

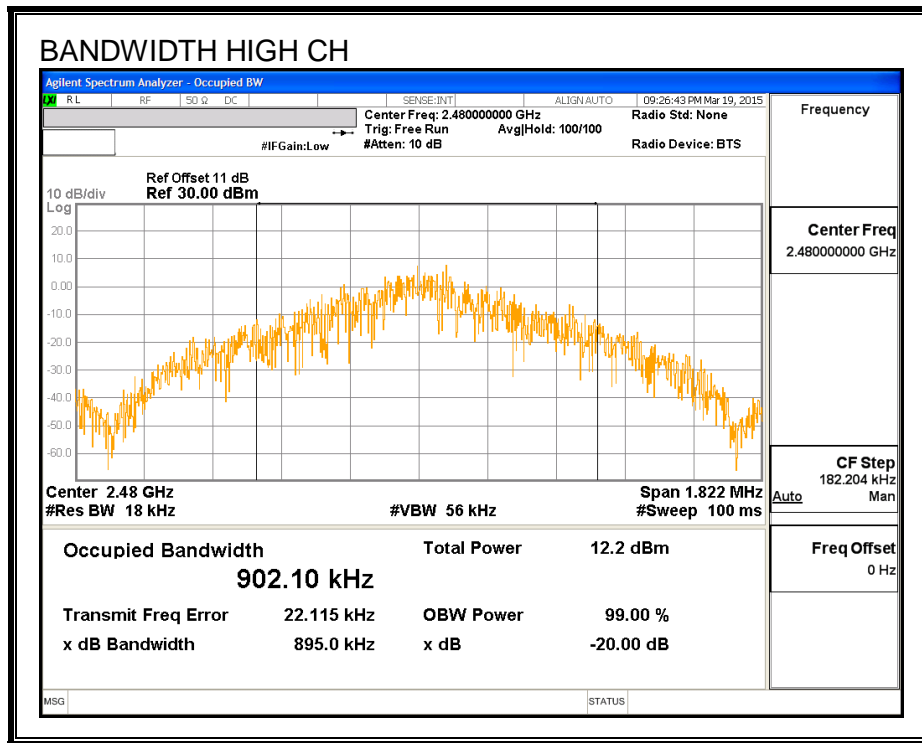
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	931.2	891.7
Middle	2441	889.8	912.0
High	2480	895.0	902.1

20 dB AND 99% BANDWIDTH





7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

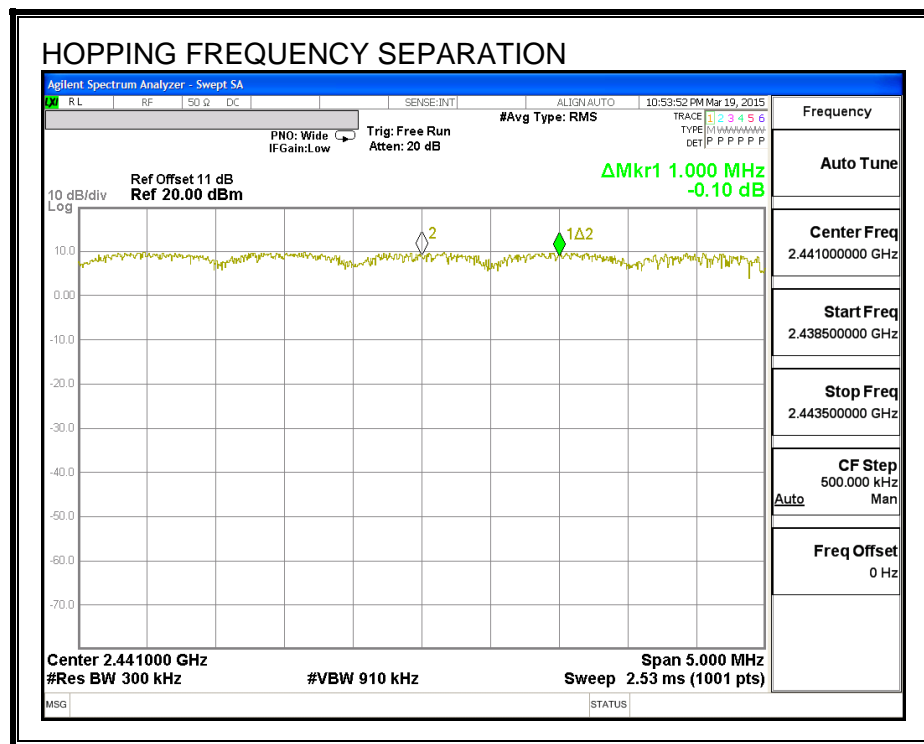
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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

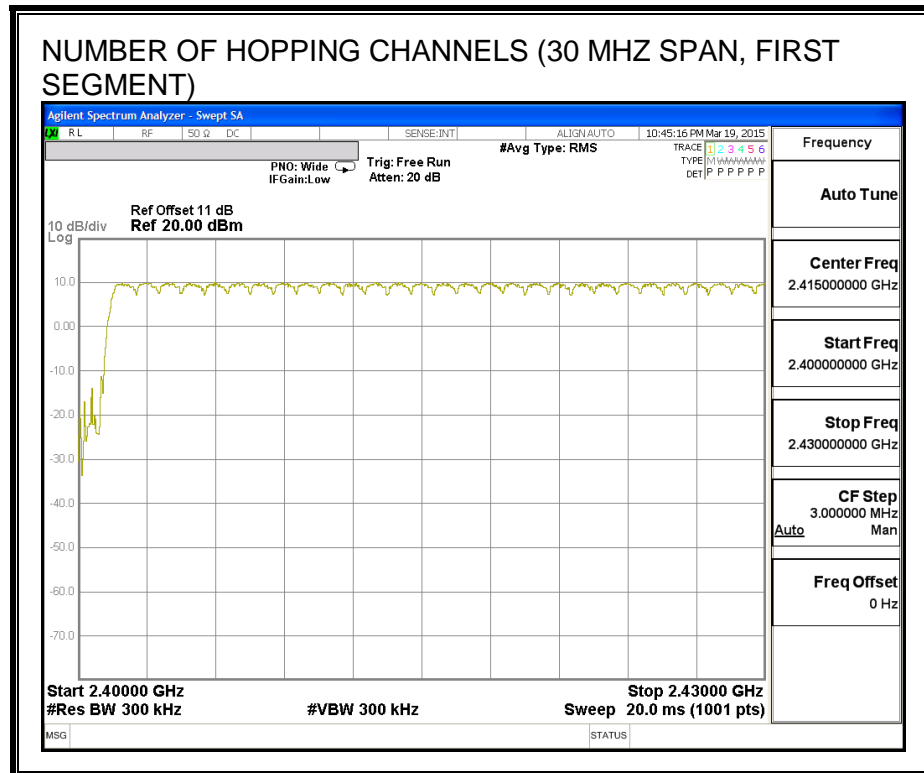
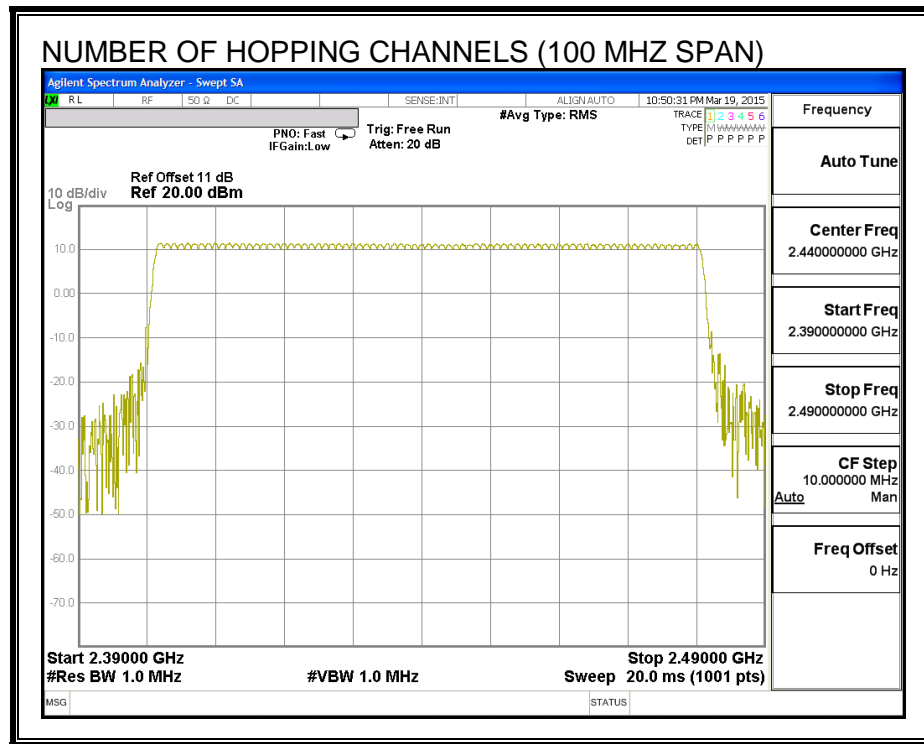
TEST PROCEDURE

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

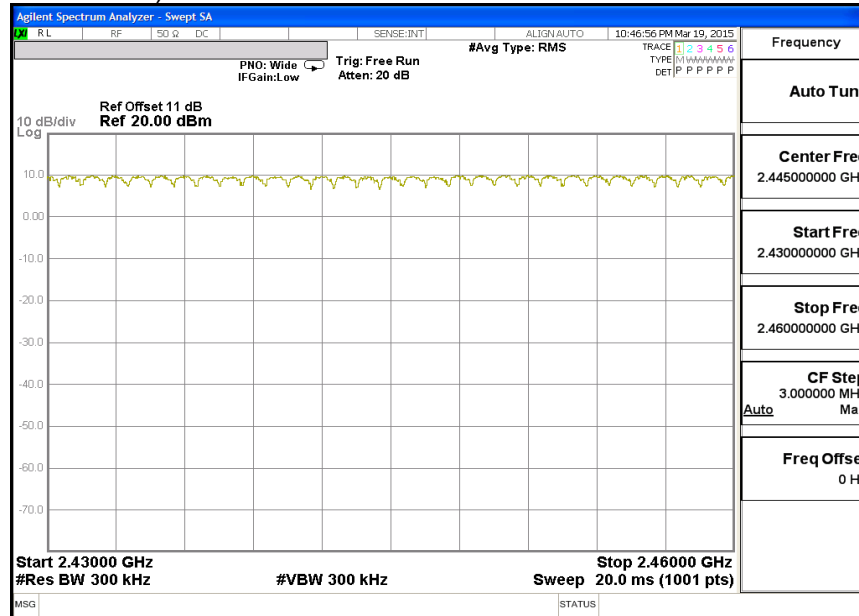
RESULTS

Normal Mode: 79 Channels observed.

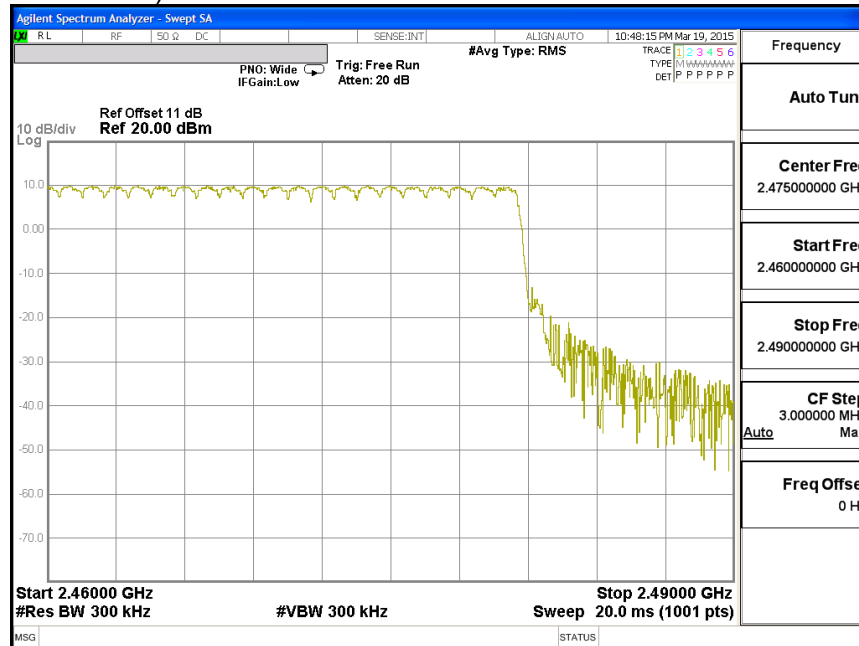
NUMBER OF HOPPING CHANNELS



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-210 A8.1 (d)

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

TEST PROCEDURE

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

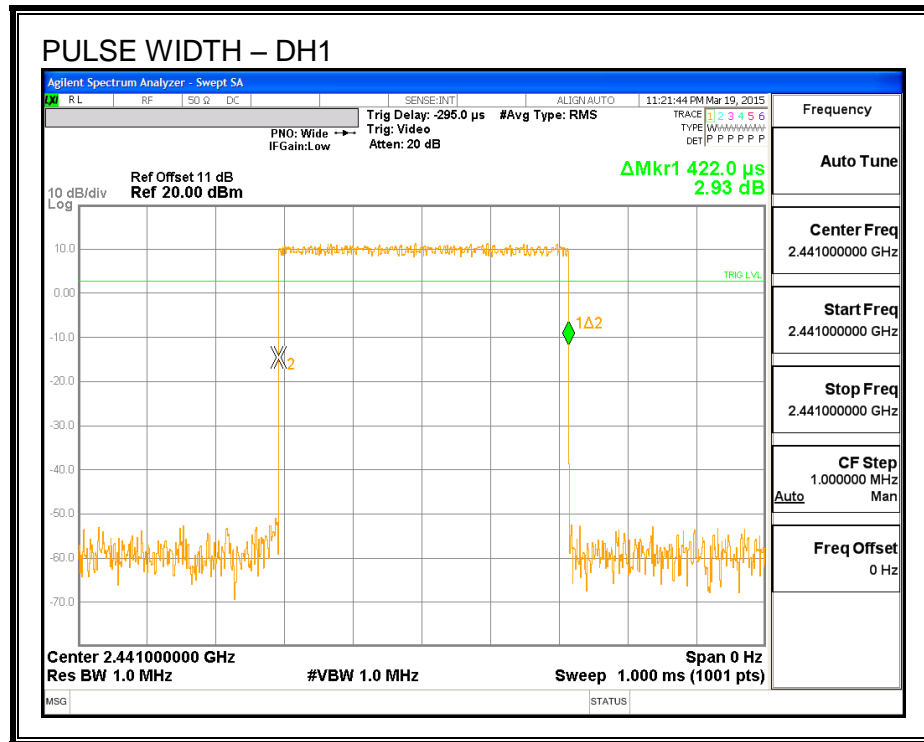
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

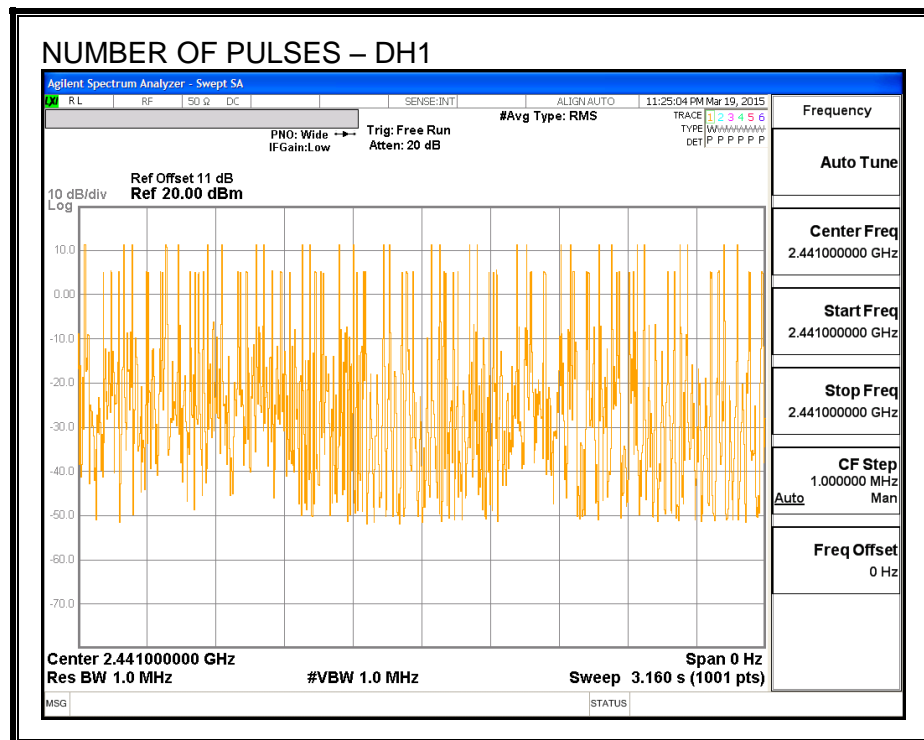
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.422	31	0.131	0.4	-0.269
DH3	1.68	20	0.336	0.4	-0.064
DH5	2.925	10	0.293	0.4	-0.108

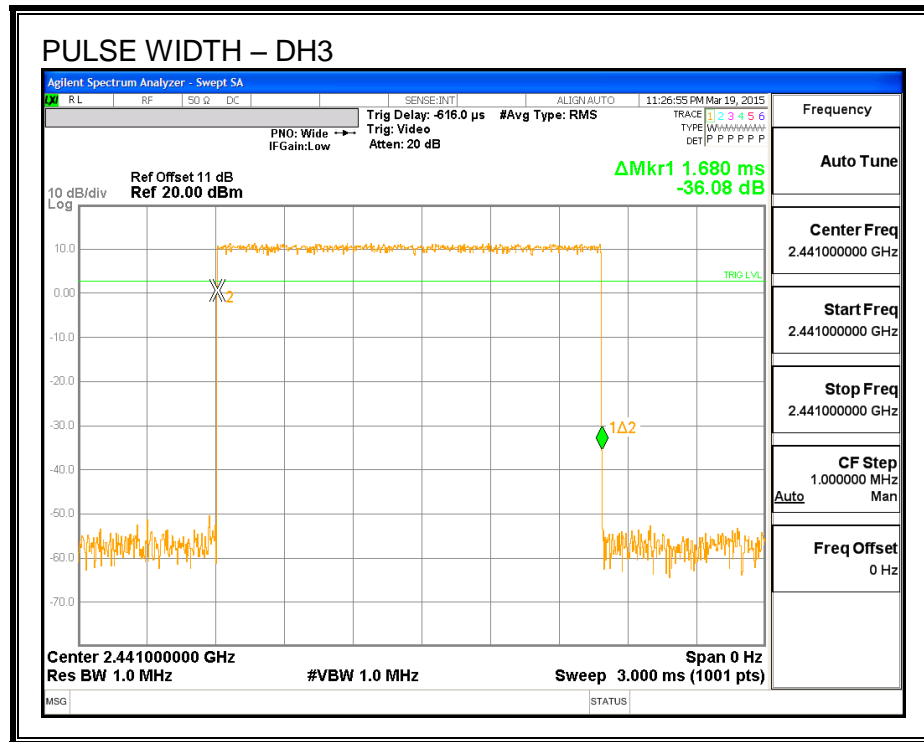
PULSE WIDTH - DH1



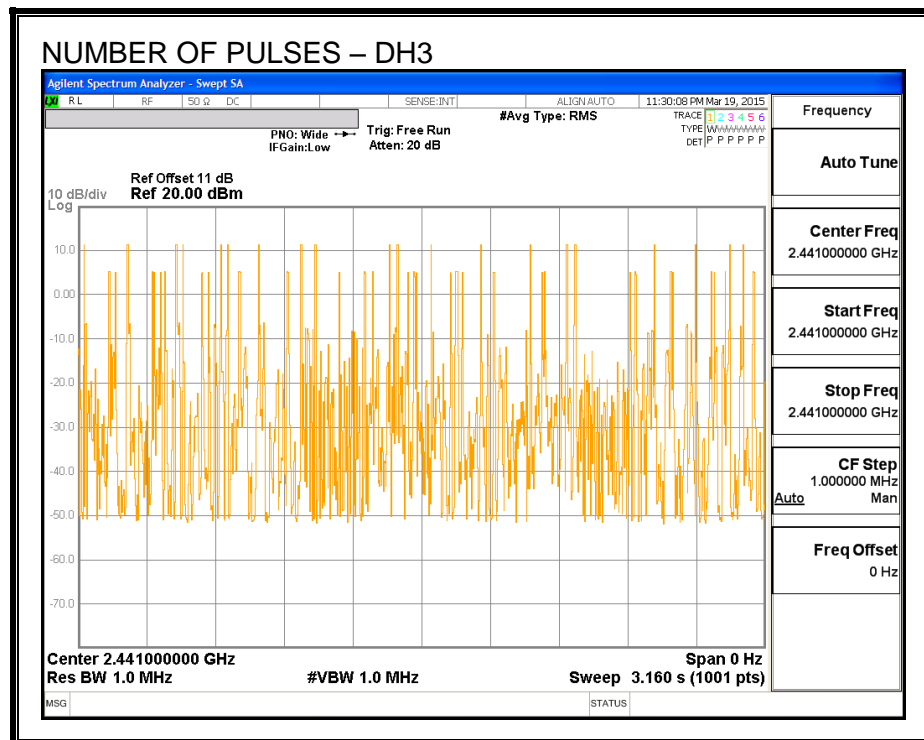
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



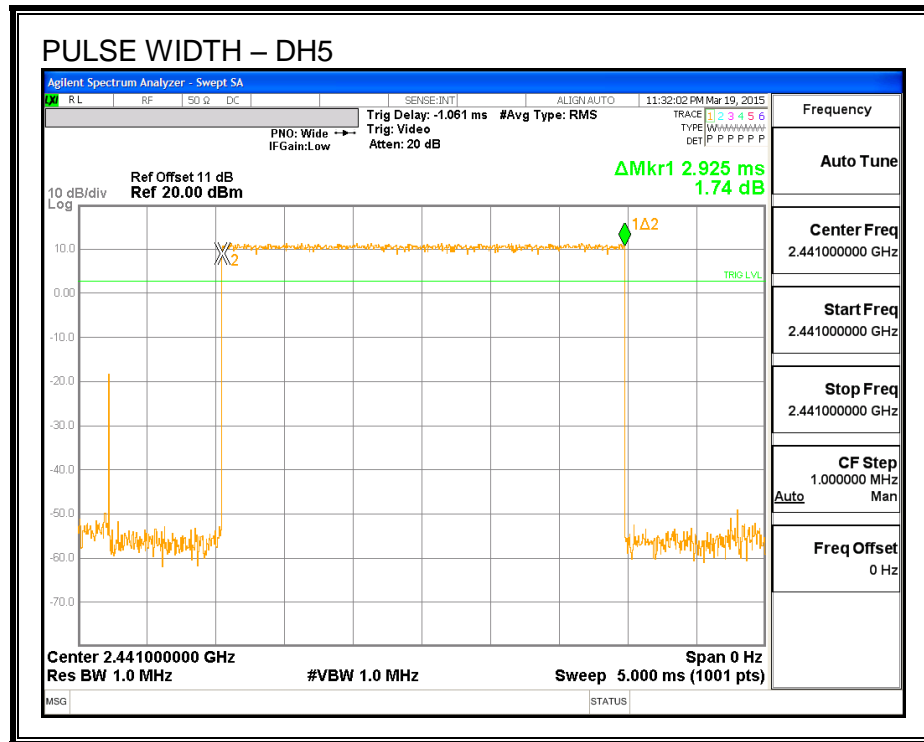
PULSE WIDTH – DH3



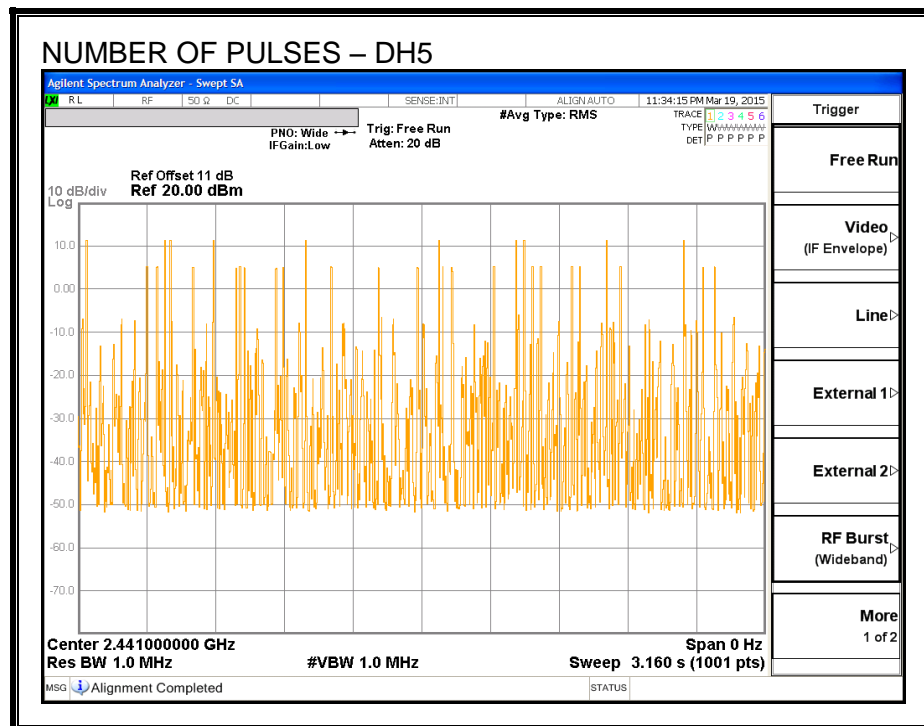
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Clause A8.4

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.18	30	-17.82
Middle	2441	12.06	30	-17.94
High	2480	12.33	30	-17.68

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	11.98
Middle	2441	11.84
High	2480	12.00

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

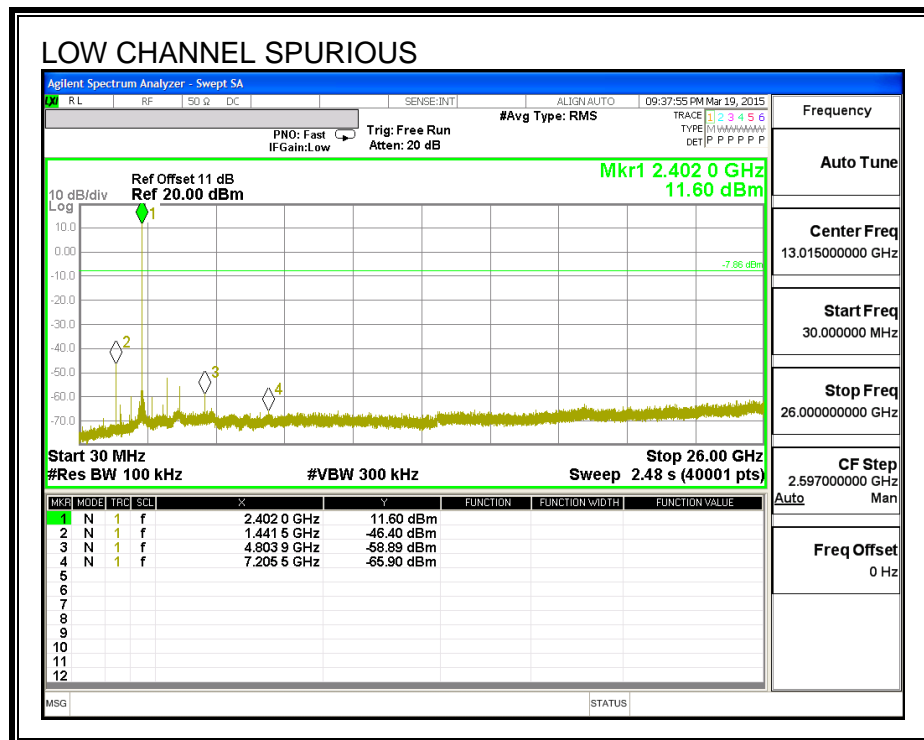
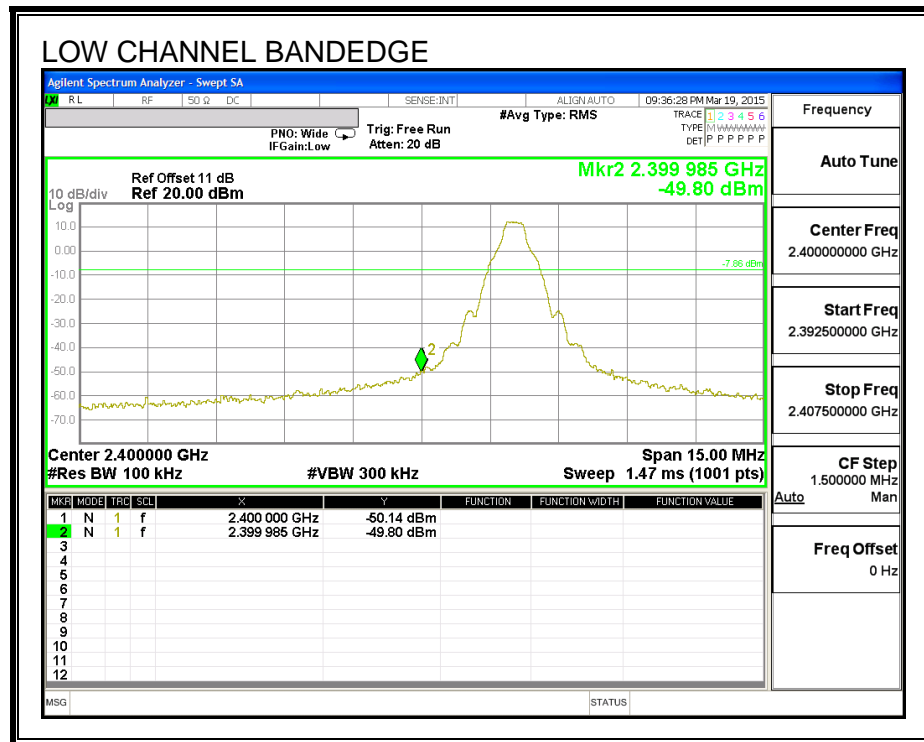
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

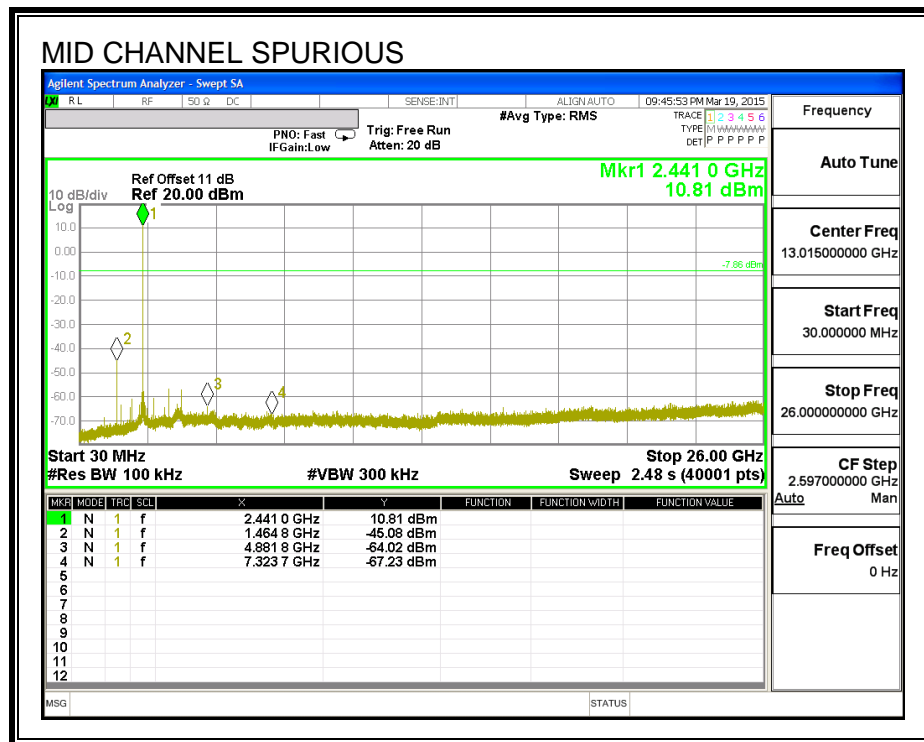
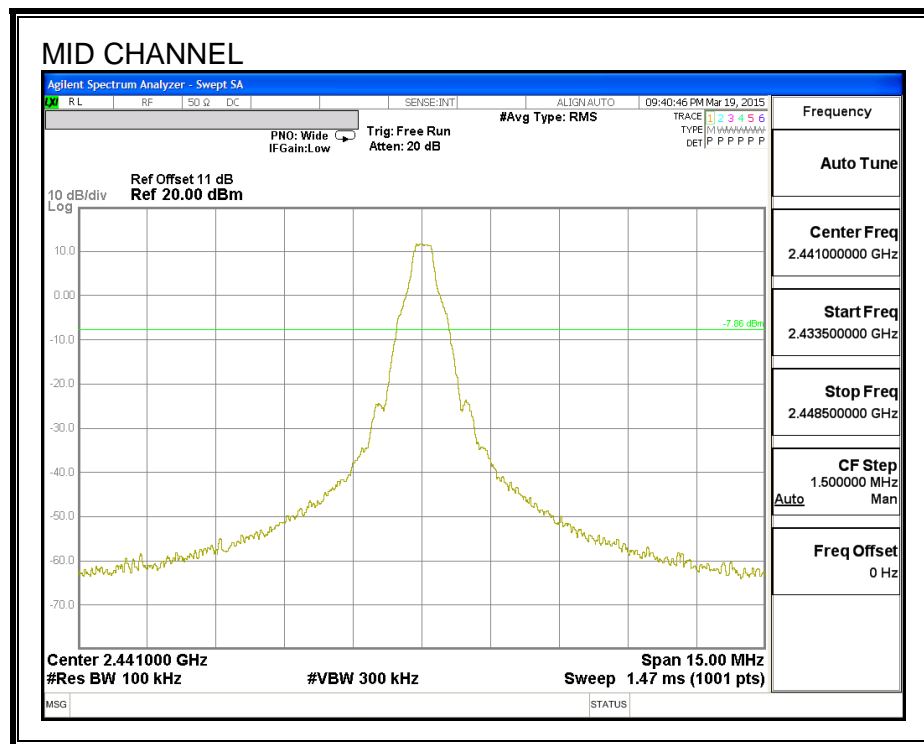
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

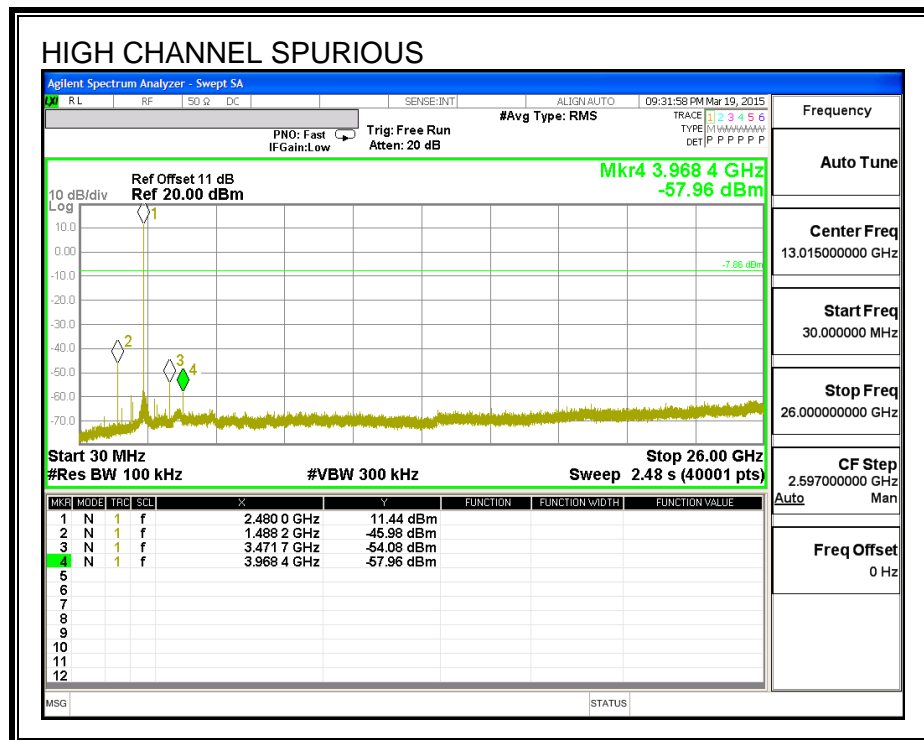
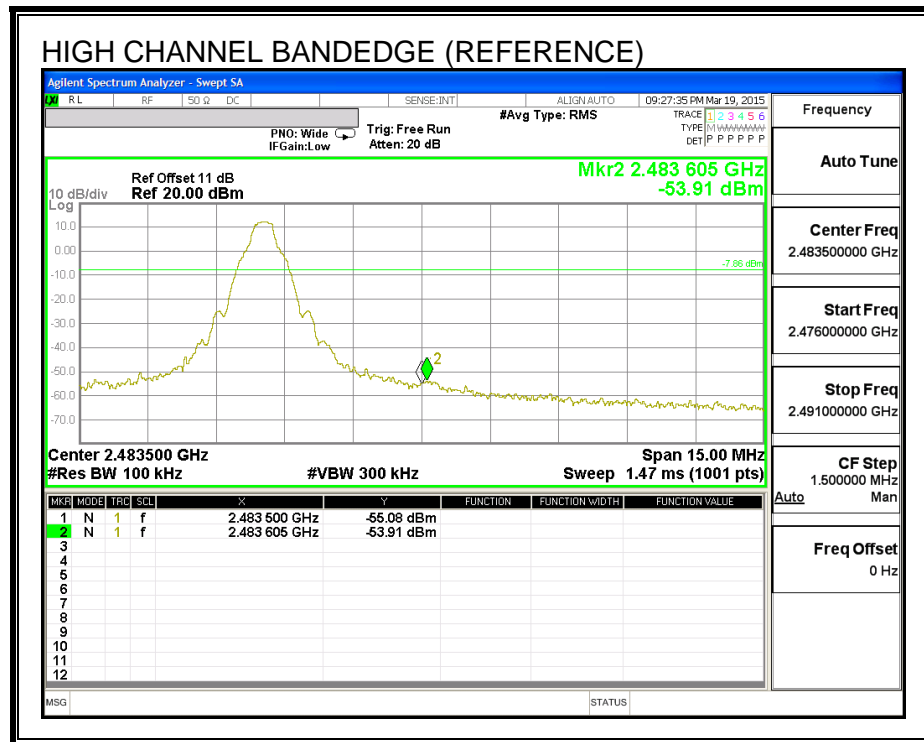
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

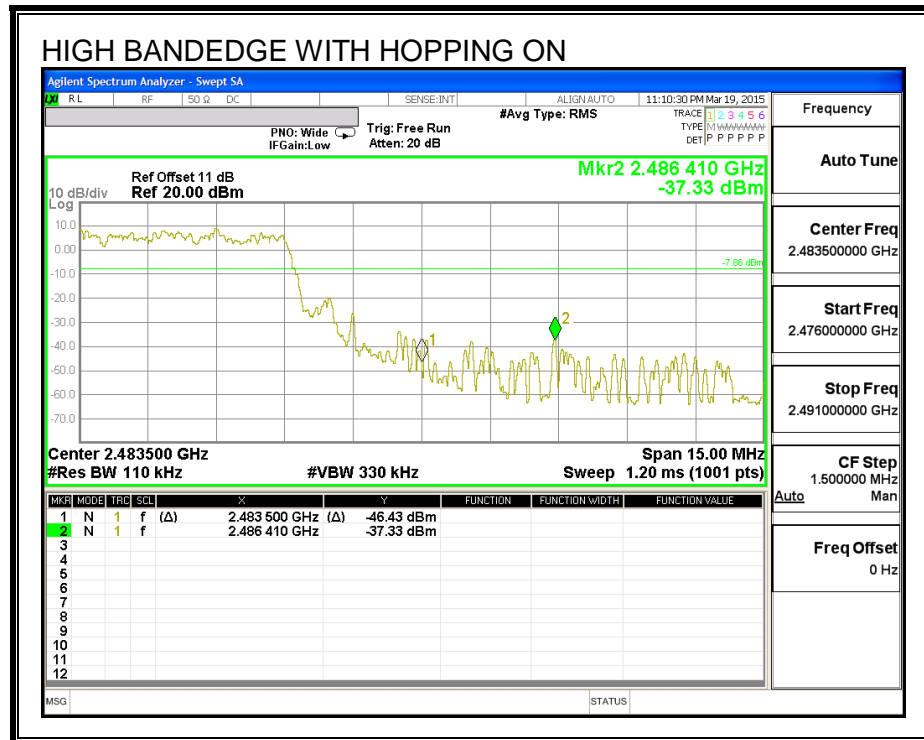
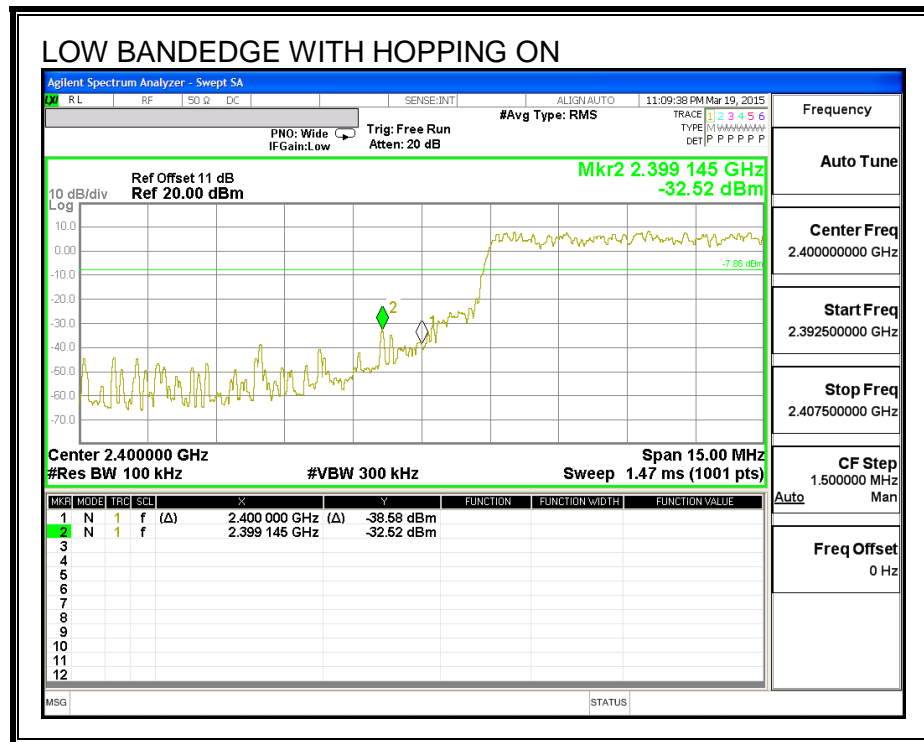




SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.3. ENHANCED DATA RATE QPSK MODULATION

7.3.1. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Clause A8.4

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

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.62	21	-9.35
Middle	2441	11.54	21	-9.43
High	2480	11.34	21	-9.63

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.

7.4.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	10.29
Middle	2441	10.14
High	2480	10.15

ENHANCED DATA RATE 8PSK MODULATION

7.4.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

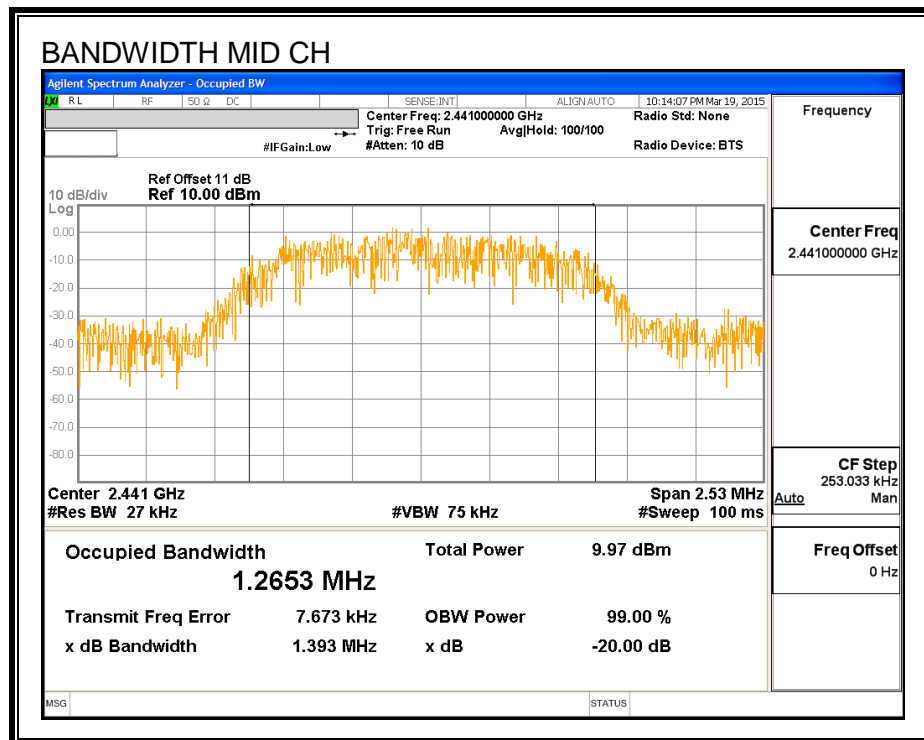
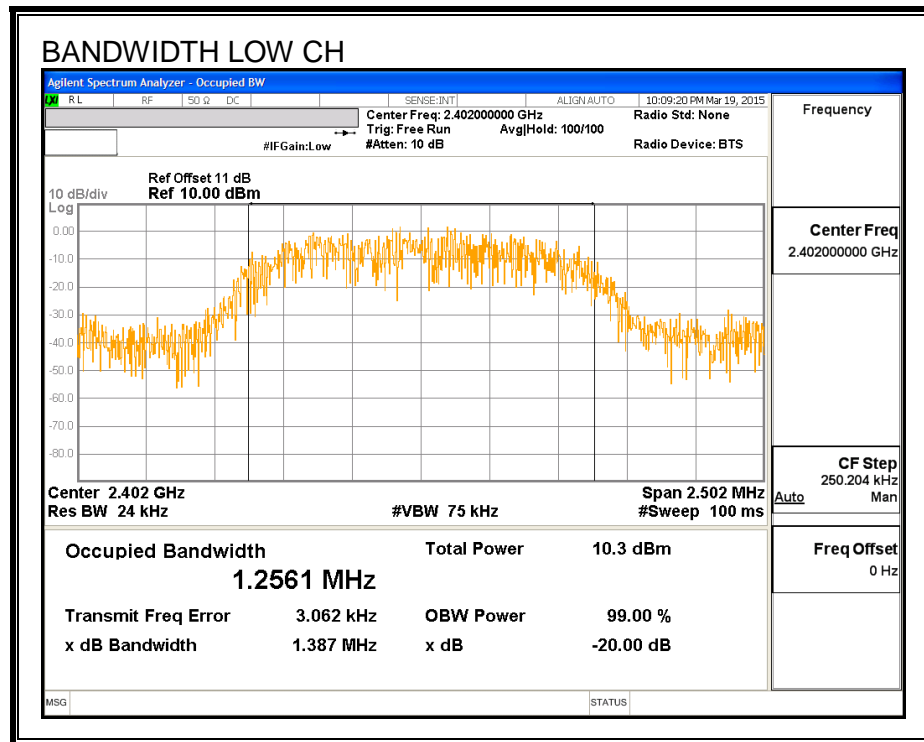
TEST PROCEDURE

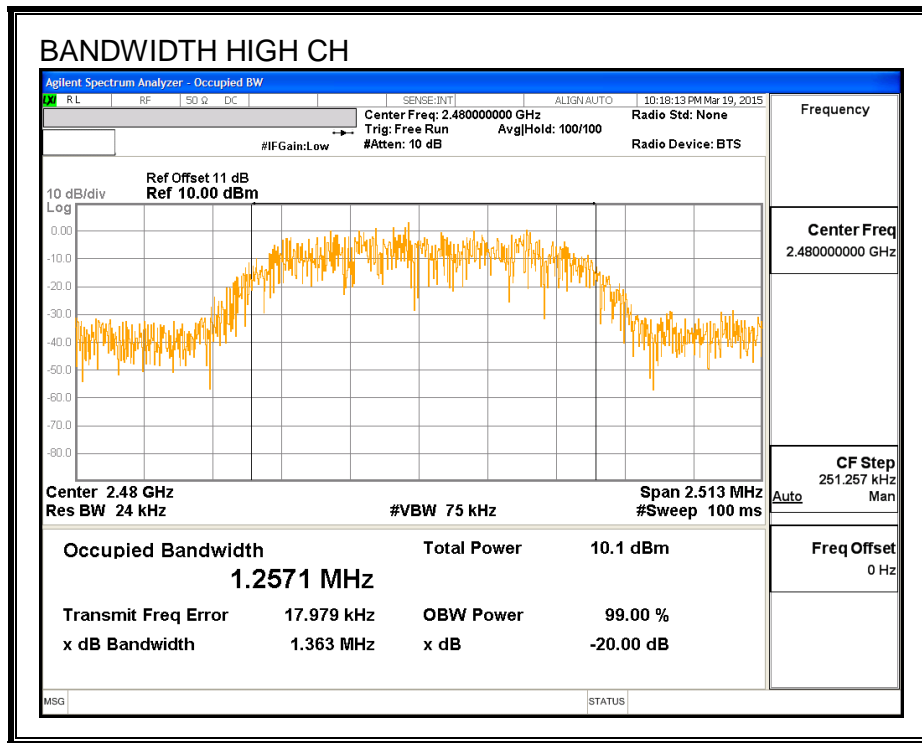
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.387	1.2561
Middle	2441	1.393	1.2653
High	2480	1.363	1.2571

20 dB AND 99% BANDWIDTH





7.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

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

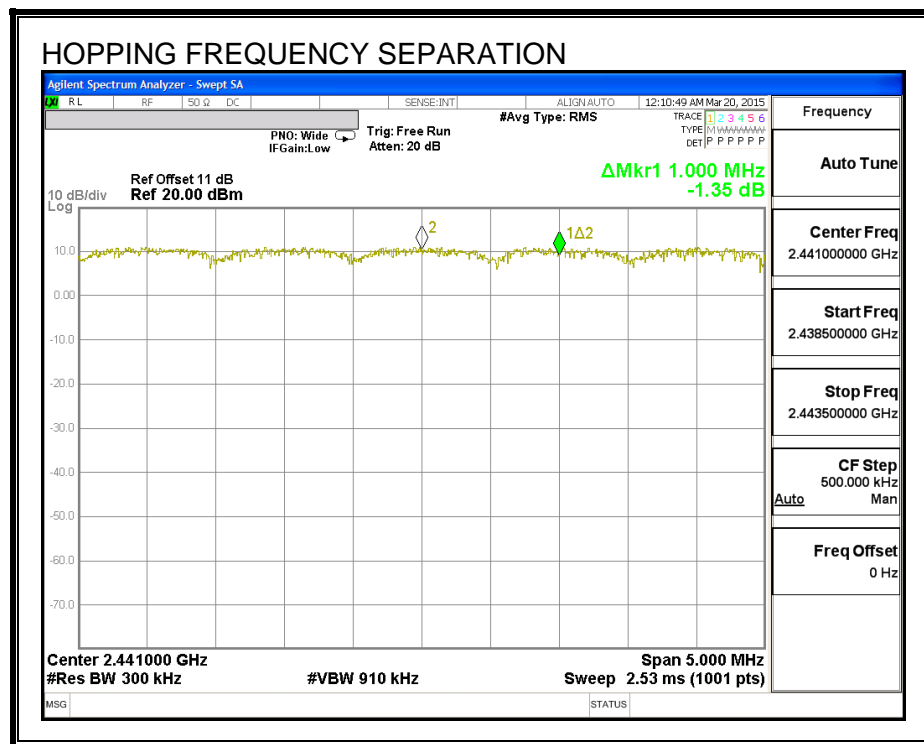
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 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-210 A8.1 (d)

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

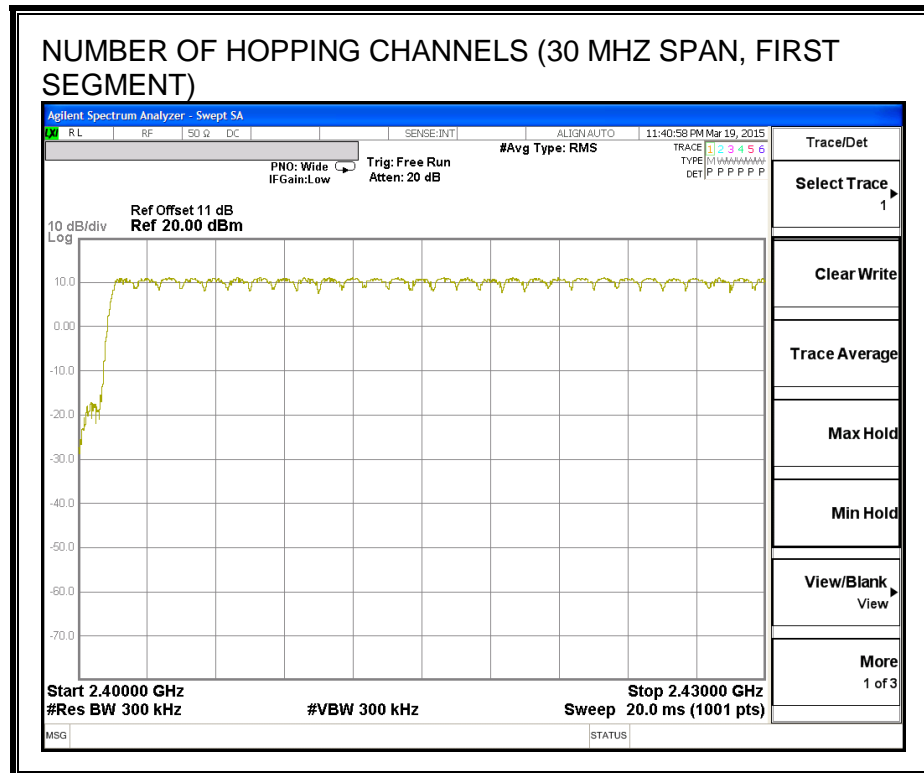
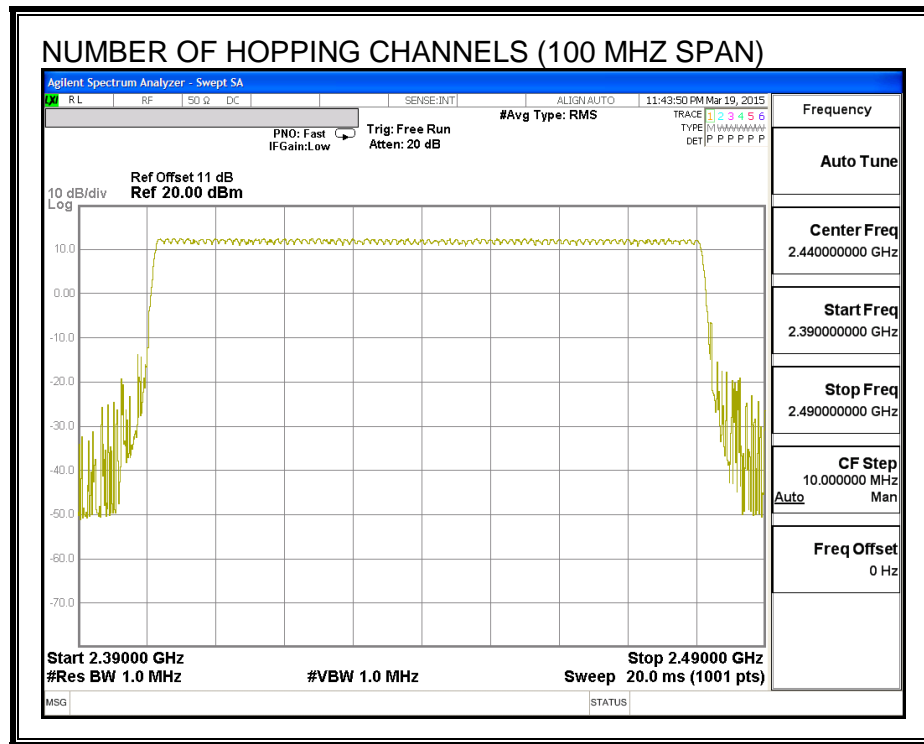
TEST PROCEDURE

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

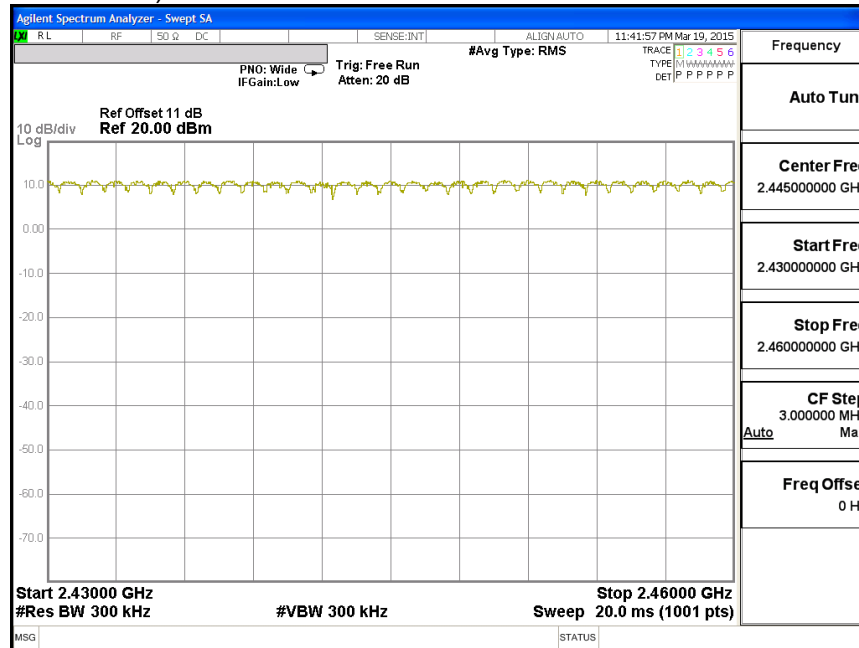
RESULTS

Normal Mode: 79 Channels observed.

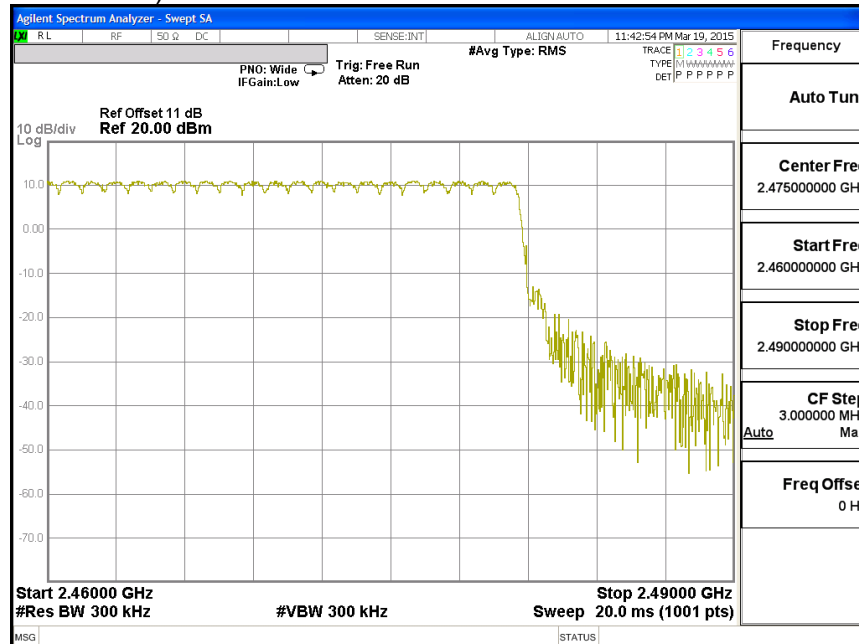
NUMBER OF HOPPING CHANNELS



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-210 A8.1 (d)

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

TEST PROCEDURE

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

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

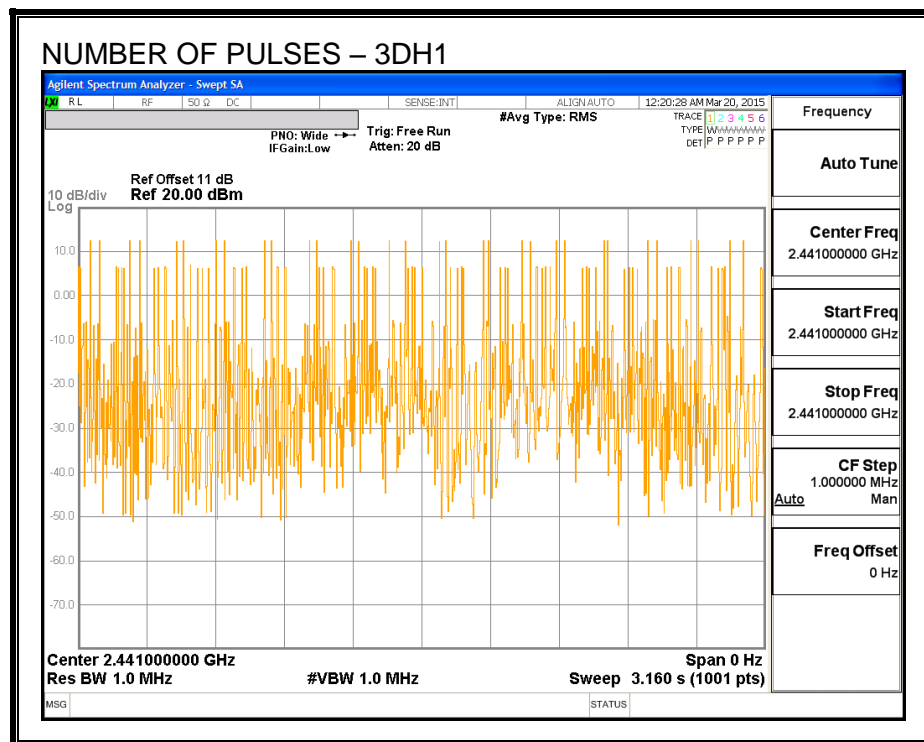
RESULTS

8PSK (EDR) Mode

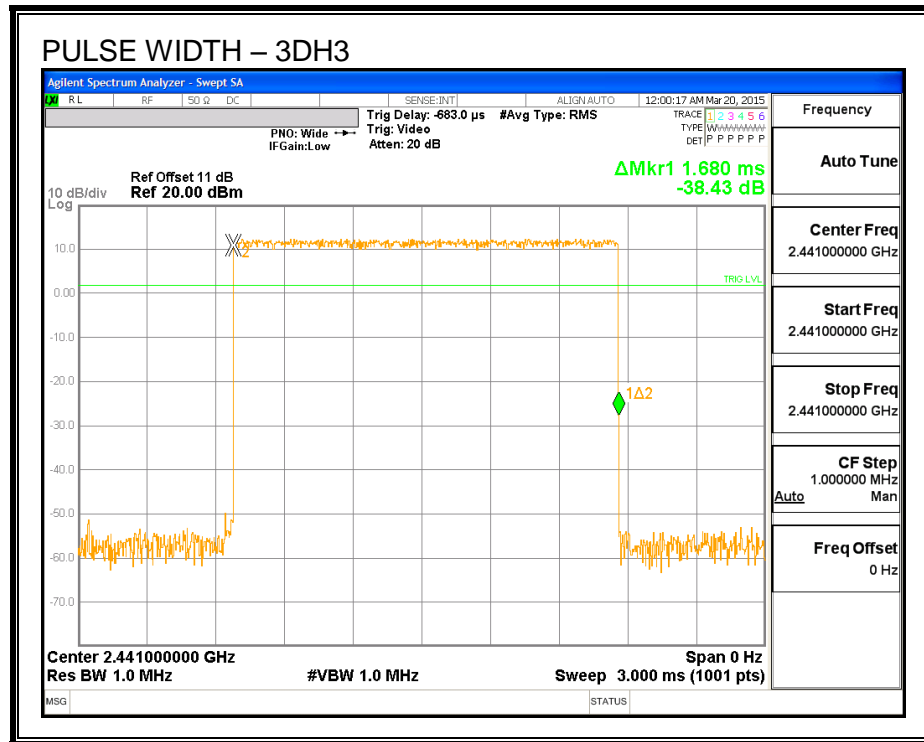
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.427	32	0.137	0.4	-0.263
3DH3	1.68	12	0.202	0.4	-0.198
3DH5	2.935	9	0.264	0.4	-0.136



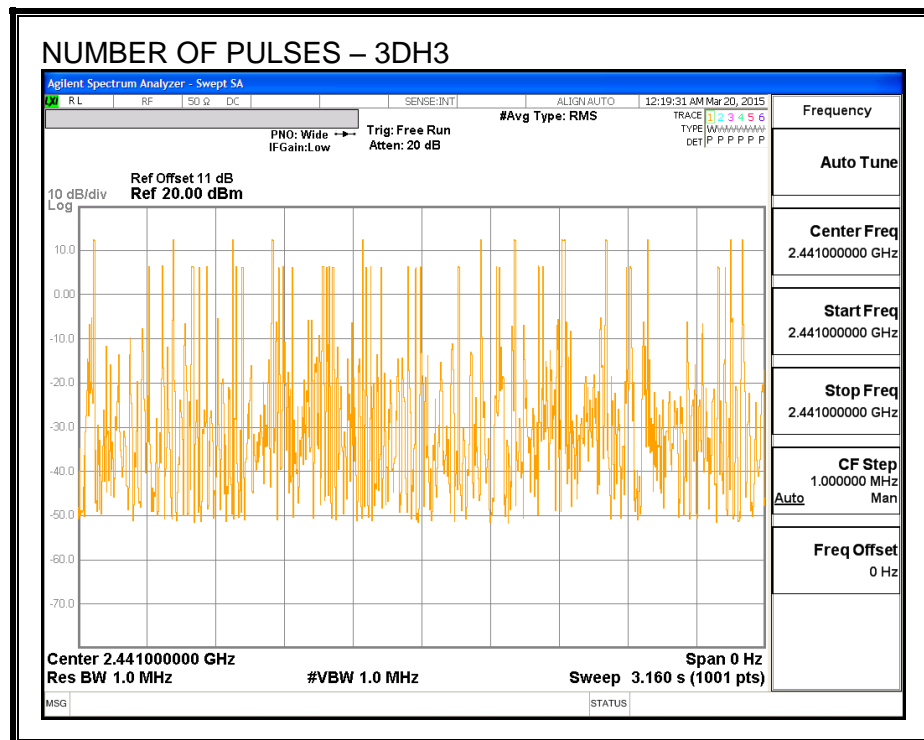
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



PULSE WIDTH – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5

Agilent Spectrum Analyzer – Sweep SA

RL RF 50 Ω DC SENSE: INT1 ALIGN: AUTO 12:02:58 AM Mar 20, 2015

Trig Delay: -1.065 ms #Avg Type: RMS
 Trig: Video
 Atten: 20 dB

PN0: Wide IF Gain: Low

TRACE 1 2 3 4 5 6
 TYPE W W W W W W W W
 DET P P P P P P

Ref Offset 11 dB
 Ref 20.00 dBm

10 dB/div
 Log

1Δ2

2

ΔMkr1 2.935 ms
 21.81 dB

TRIG LVL

Center 2.441000000 GHz
 Res BW 1.0 MHz #VBW 1.0 MHz Span 0 Hz
 Sweep 5.000 ms (1001 pts)

Frequency

Auto Tune

Center Freq
 2.441000000 GHz

Start Freq
 2.441000000 GHz

Stop Freq
 2.441000000 GHz

CF Step
 1.000000 MHz
 Auto Man

Freq Offset
 0 Hz

NUMBER OF PULSES – 3DH5

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN:AUTO 12:18:01 AM Mar 20, 2015

PN0: Wide Trig: Free Run #Avg Type: RMS
IF Gain: Low Atten: 20 dB

TRACE 1 2 3 4 5 6
TYPE W W W W W W W W
DET P P P P P P

Ref Offset 11 dB
Ref 20.00 dBm

10 dB/div
Log

Center 2.441000000 GHz
Res BW 1.0 MHz
Span 0 Hz
#VBW 1.0 MHz
Sweep 3.160 s (1001 pts)

Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto Man
Freq Offset
0 Hz

7.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Clause A8.4

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

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

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.89	21	-9.08
Middle	2441	11.70	21	-9.27
High	2480	11.66	21	-9.31

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	10.37
Middle	2441	10.21
High	2480	10.22

7.4.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

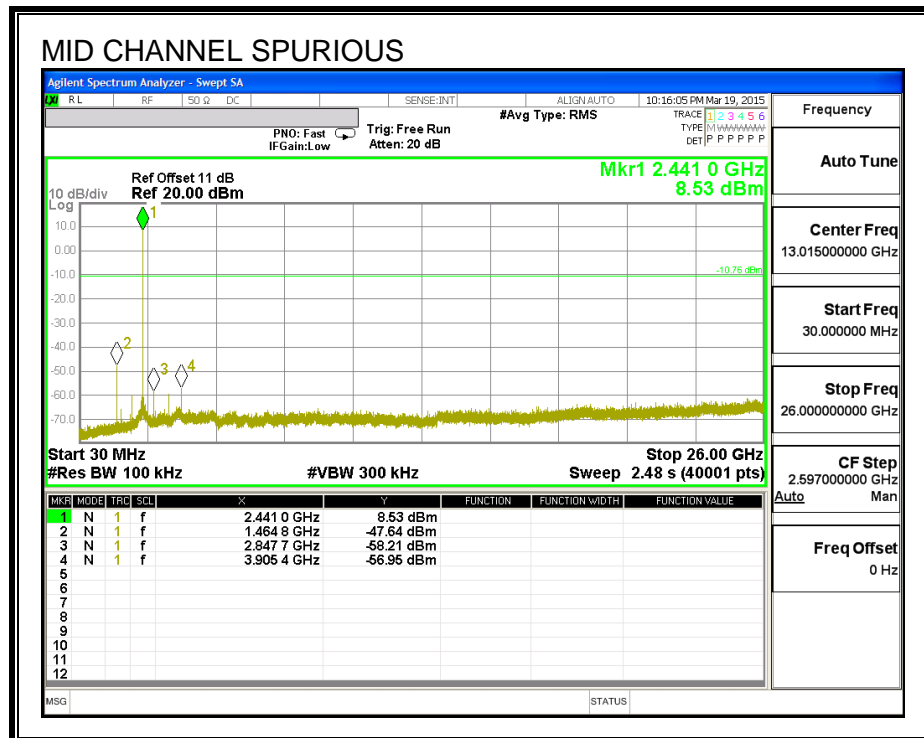
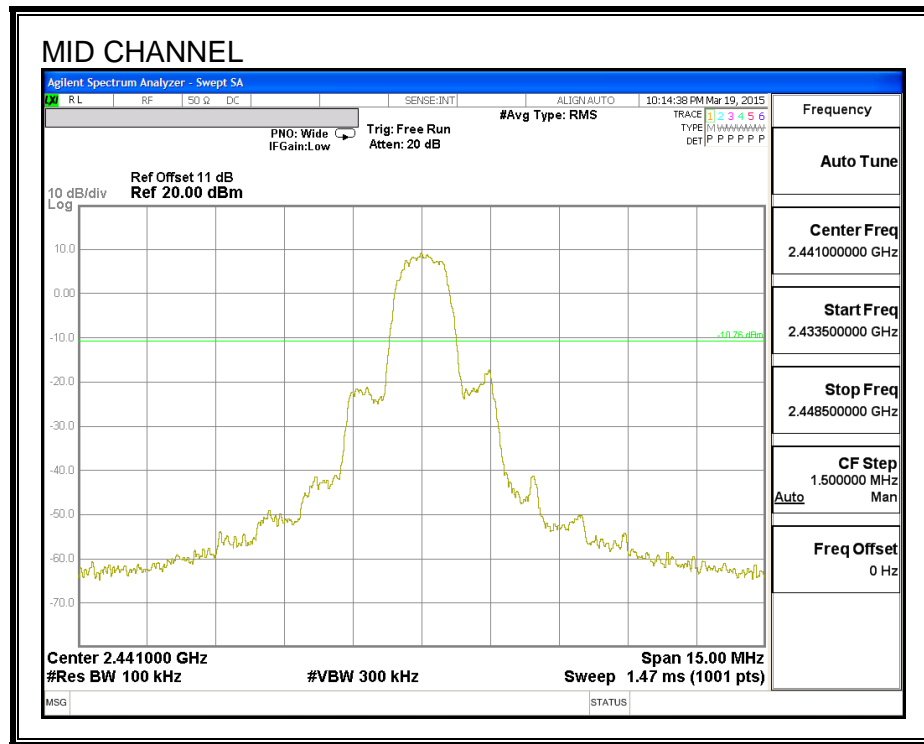
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

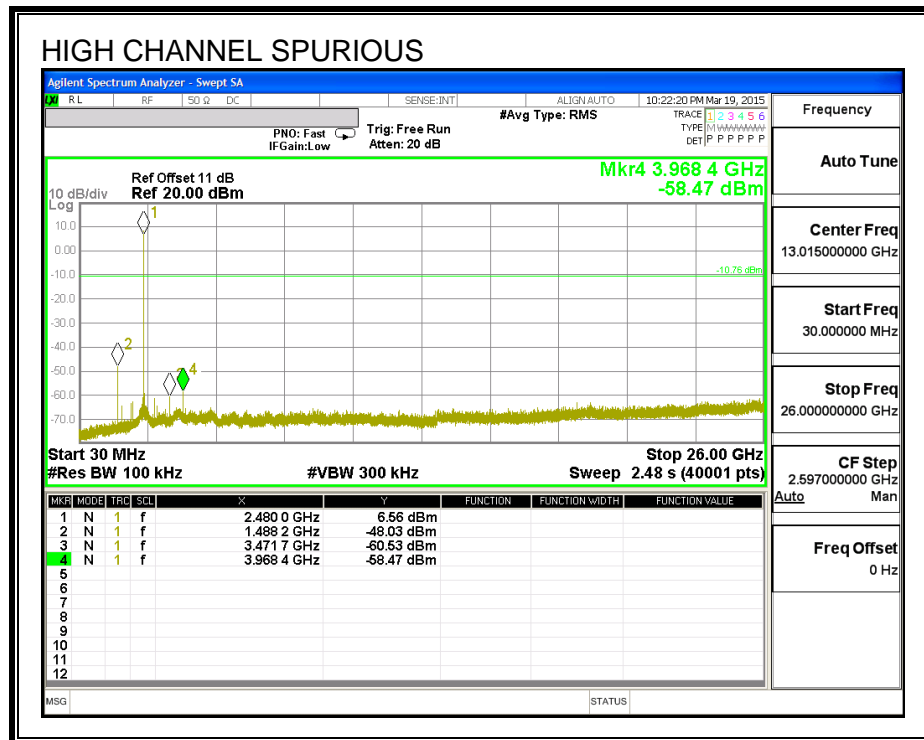
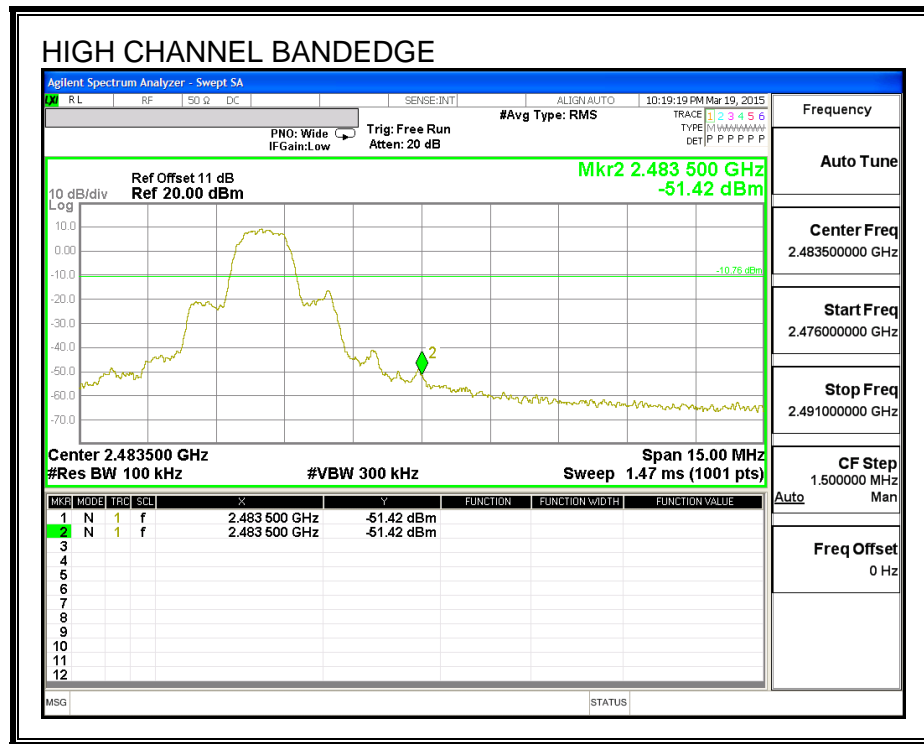
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

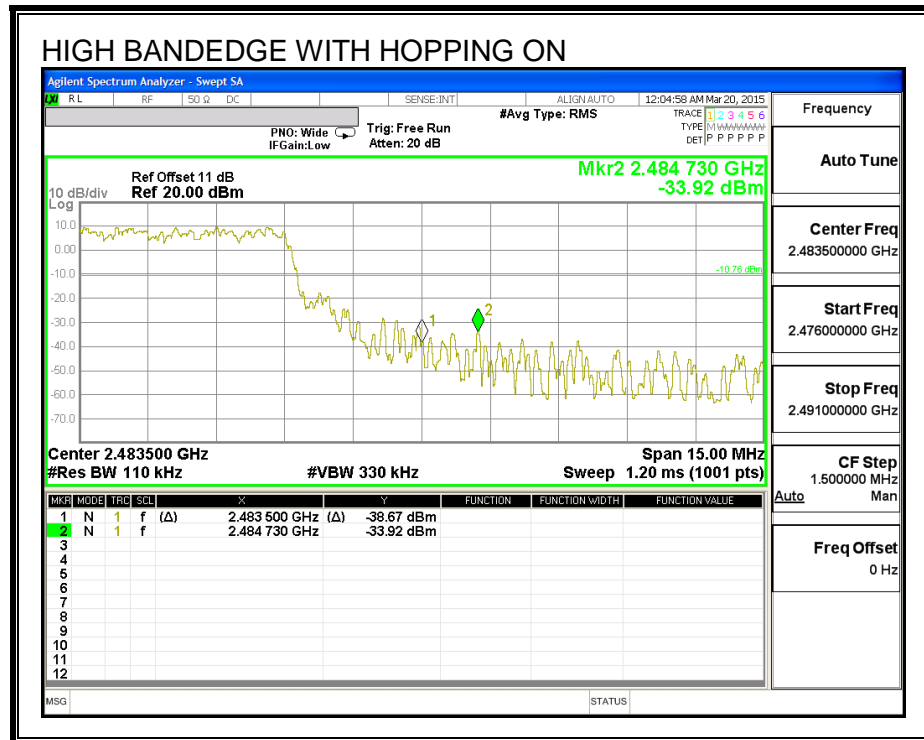
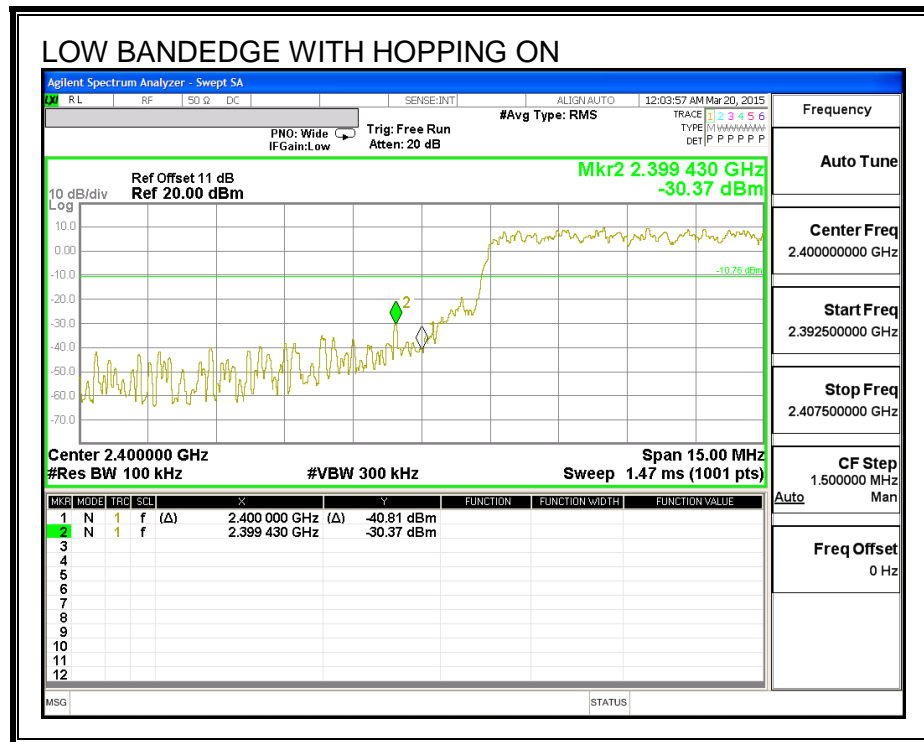
SPURIOUS EMISSIONS, MID CHANNEL



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. 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 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.

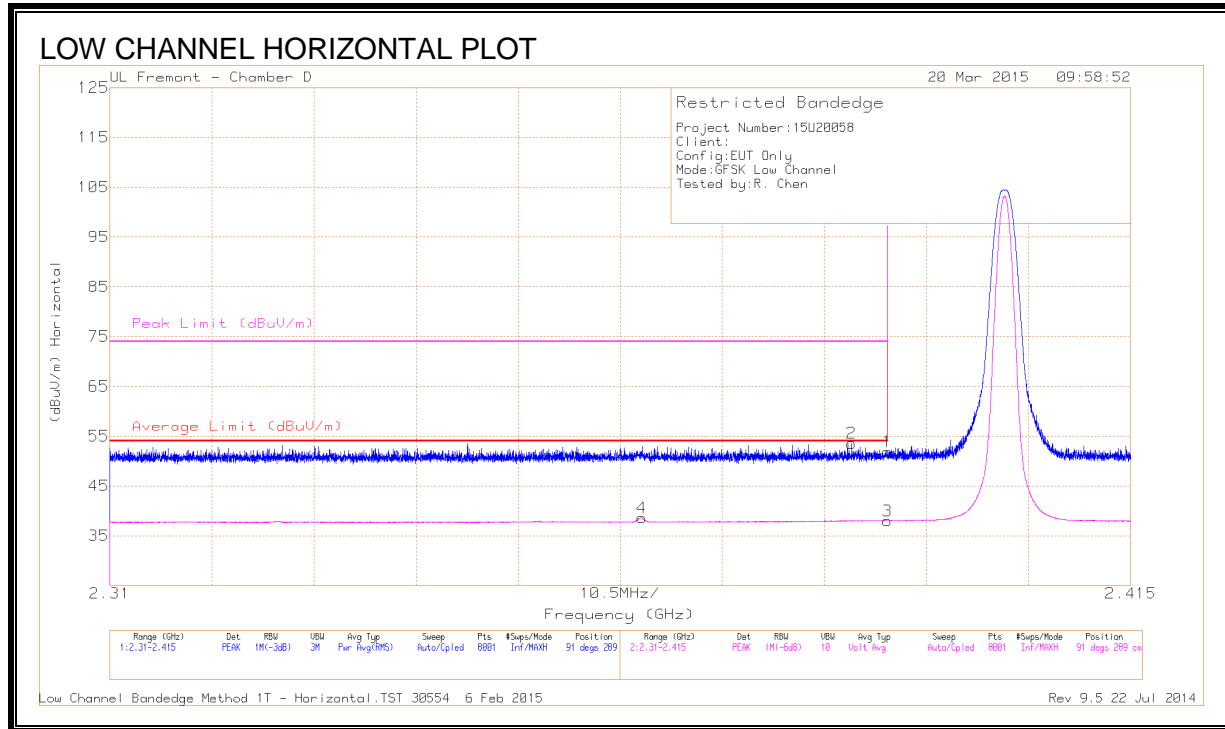
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

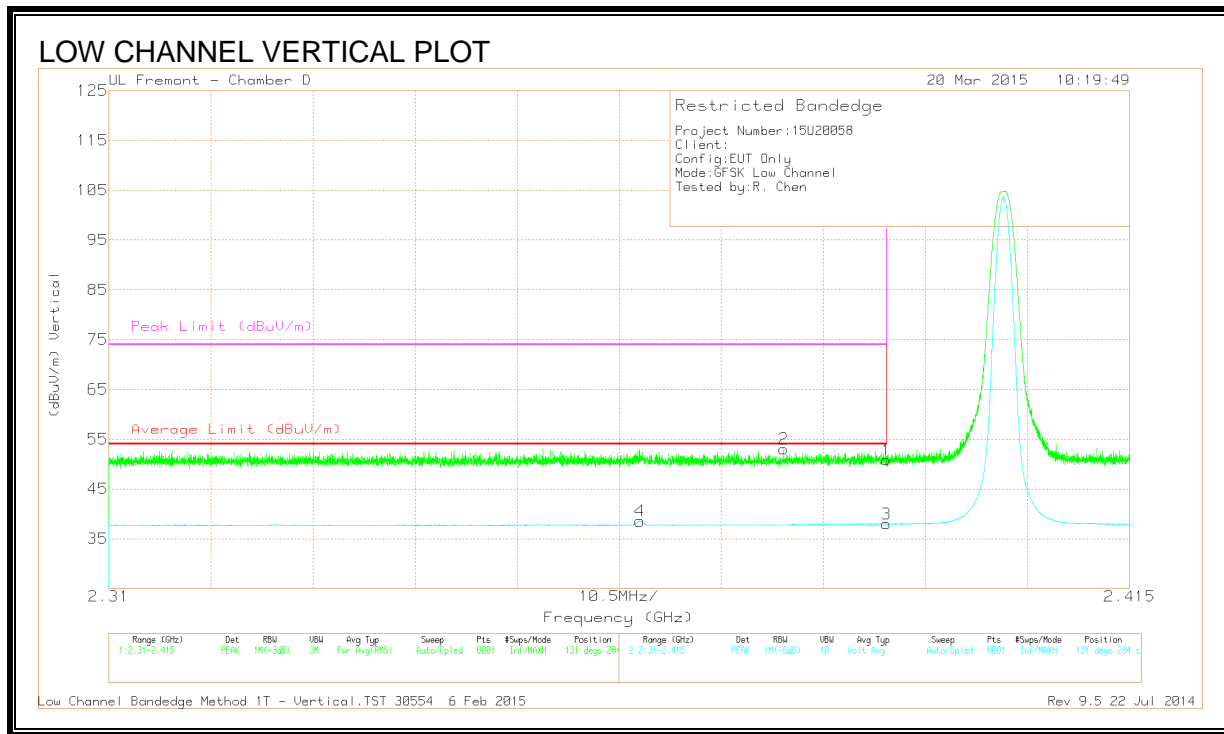
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.5	PK	32.1	-20.7	0	51.9	-	-	74	-22.1	91	289	H
2	* 2.386	42.27	PK	32.1	-20.8	0	53.57	-	-	74	-20.43	91	289	H
3	* 2.39	26.58	VB1T	32.1	-20.7	0	37.98	54	-16.02	-	-	91	289	H
4	* 2.365	27.51	VB1T	32	-20.9	0	38.61	54	-15.39	-	-	91	289	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

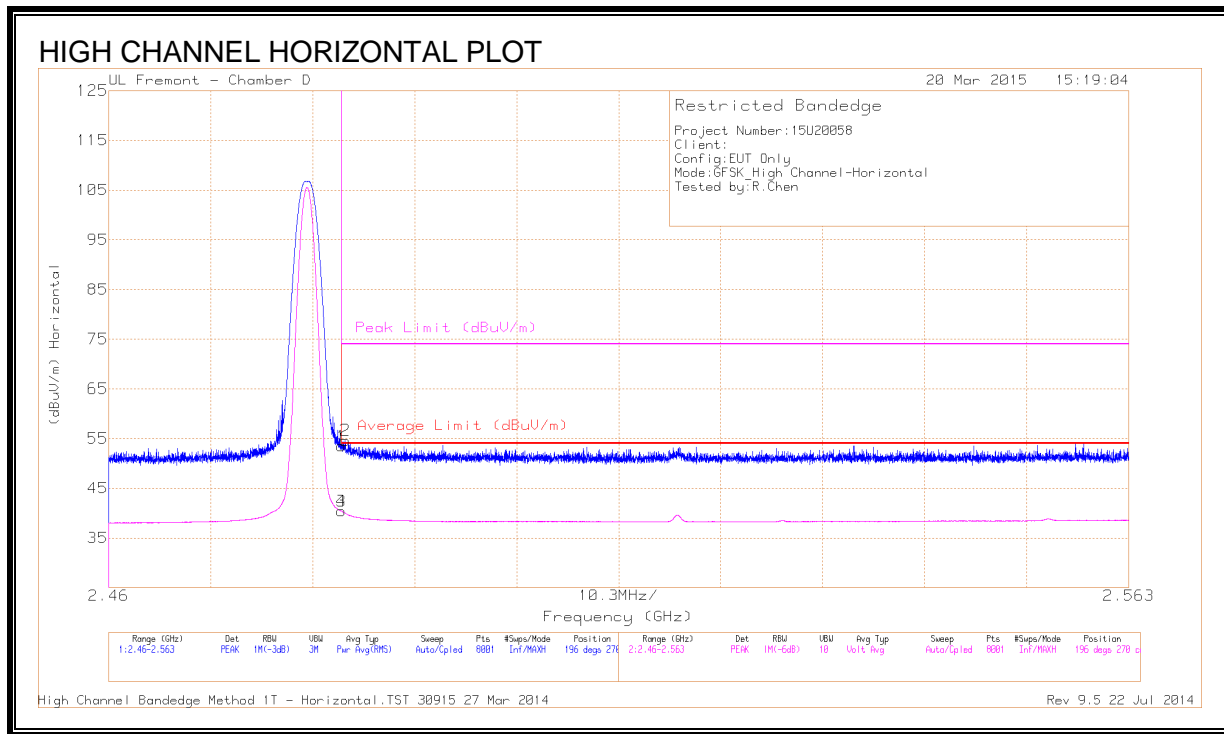
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.39	PK	32.1	-20.7	50.79	-	-	74	-23.21	131	284	V
2	* 2.379	41.73	PK	32.1	-20.8	53.03	-	-	74	-20.97	131	284	V
3	* 2.39	26.56	VB1T	32.1	-20.7	37.96	54	-16.04	-	-	131	284	V
4	* 2.365	27.46	VB1T	32	-20.9	38.56	54	-15.44	-	-	131	284	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

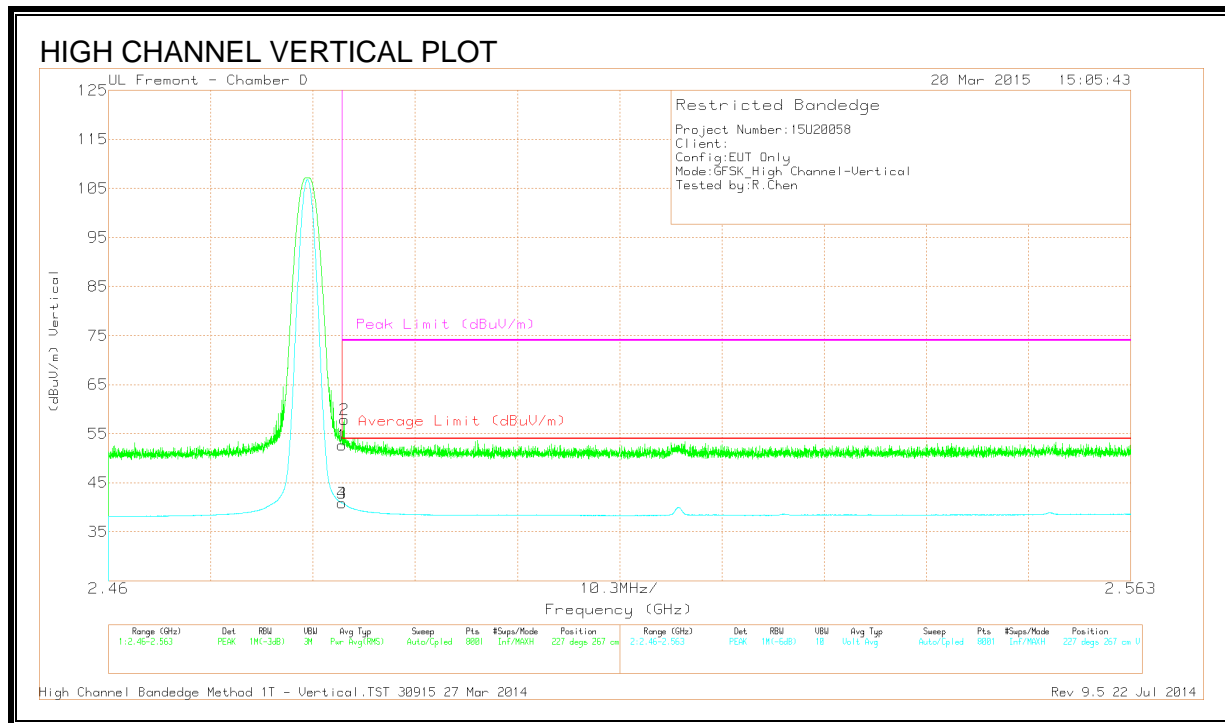
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.1	PK	32.2	-20.8	53.5	-	-	74	-20.5	196	270	H
2	* 2.484	43.23	PK	32.2	-20.8	54.63	-	-	74	-19.37	196	270	H
3	* 2.484	29.01	VB1T	32.2	-20.8	40.41	54	-13.59	-	-	196	270	H
4	* 2.484	29.01	VB1T	32.2	-20.8	40.41	54	-13.59	-	-	196	270	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

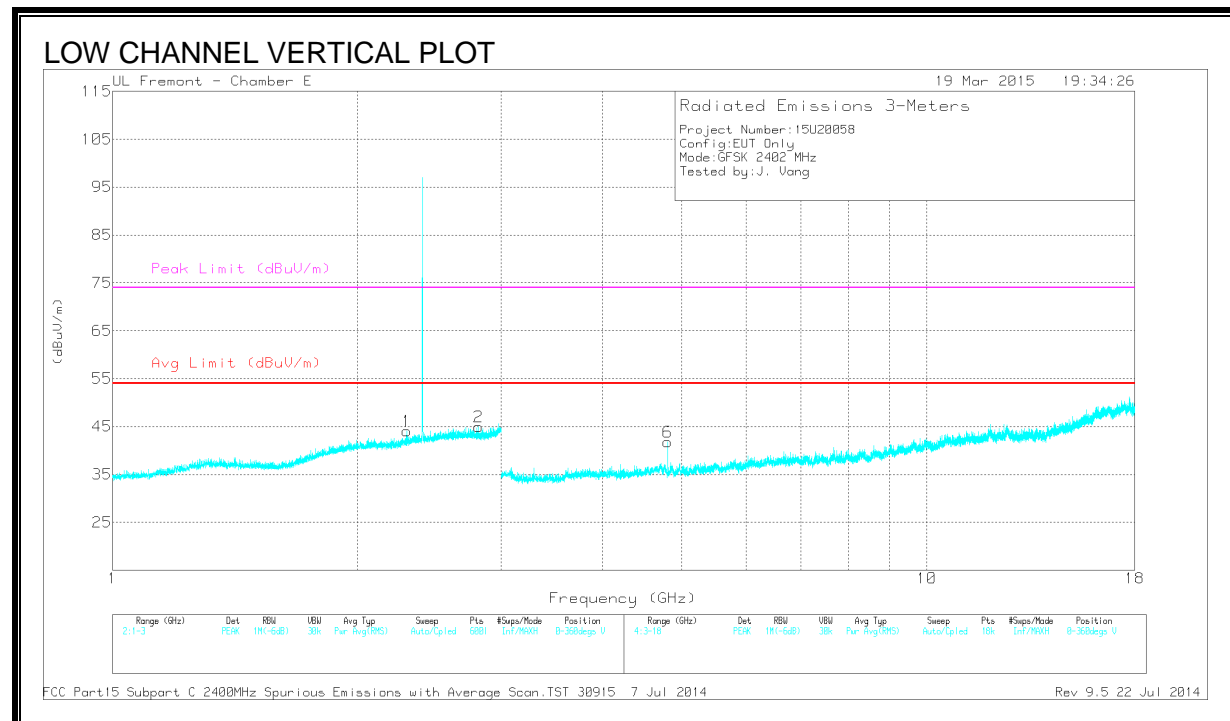
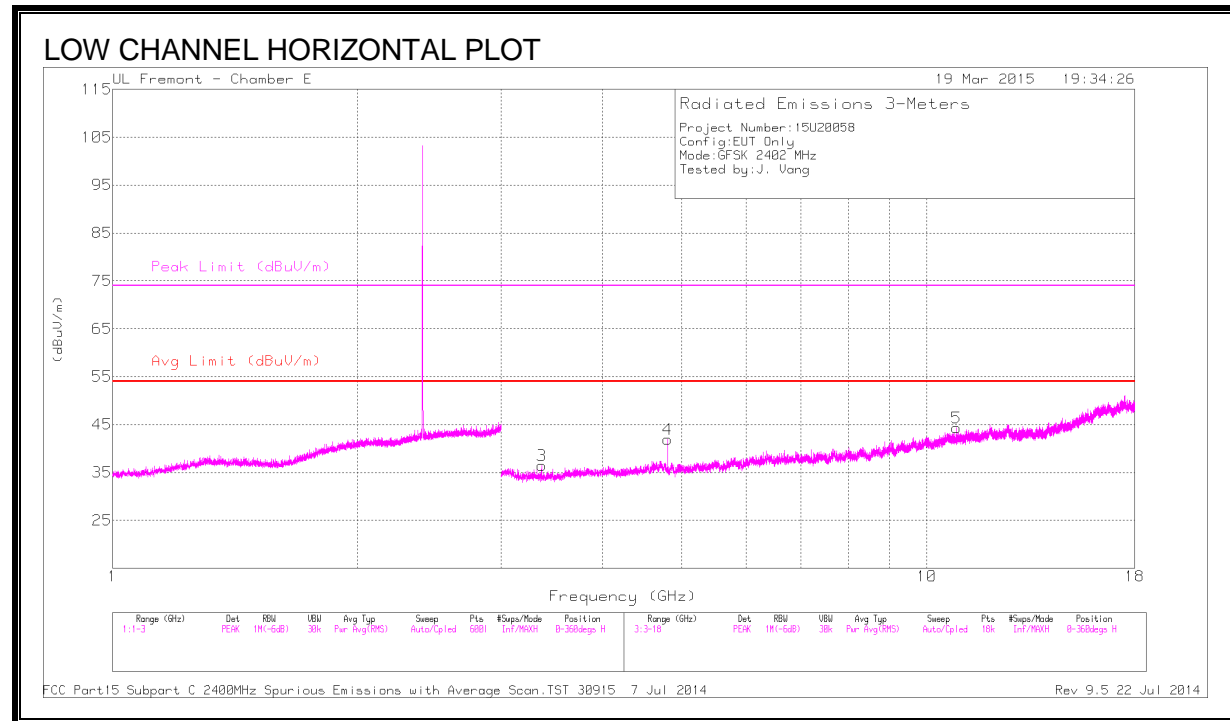
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.3	PK	32.2	-20.8	52.7	-	-	74	-21.3	227	267	V
2	* 2.484	46.47	PK	32.2	-20.8	57.87	-	-	74	-16.13	227	267	V
3	* 2.484	29.48	VB1T	32.2	-20.8	40.88	54	-13.12	-	-	227	267	V
4	* 2.484	29.49	VB1T	32.2	-20.8	40.89	54	-13.11	-	-	227	267	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

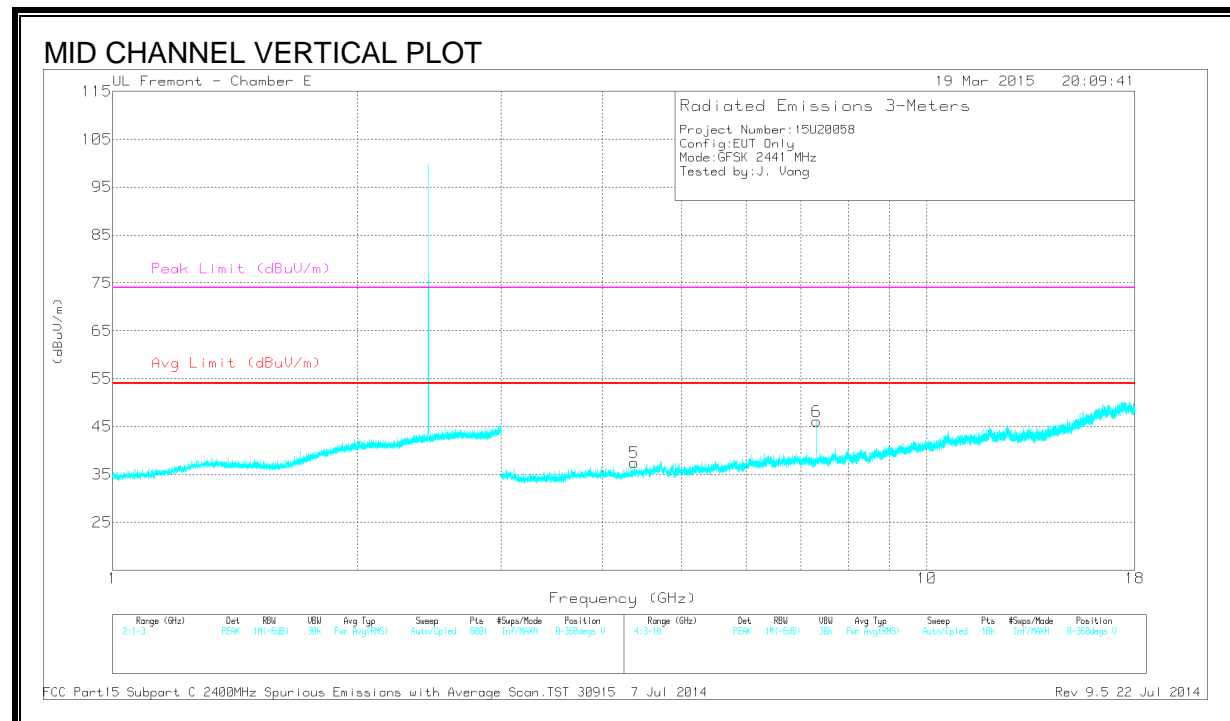
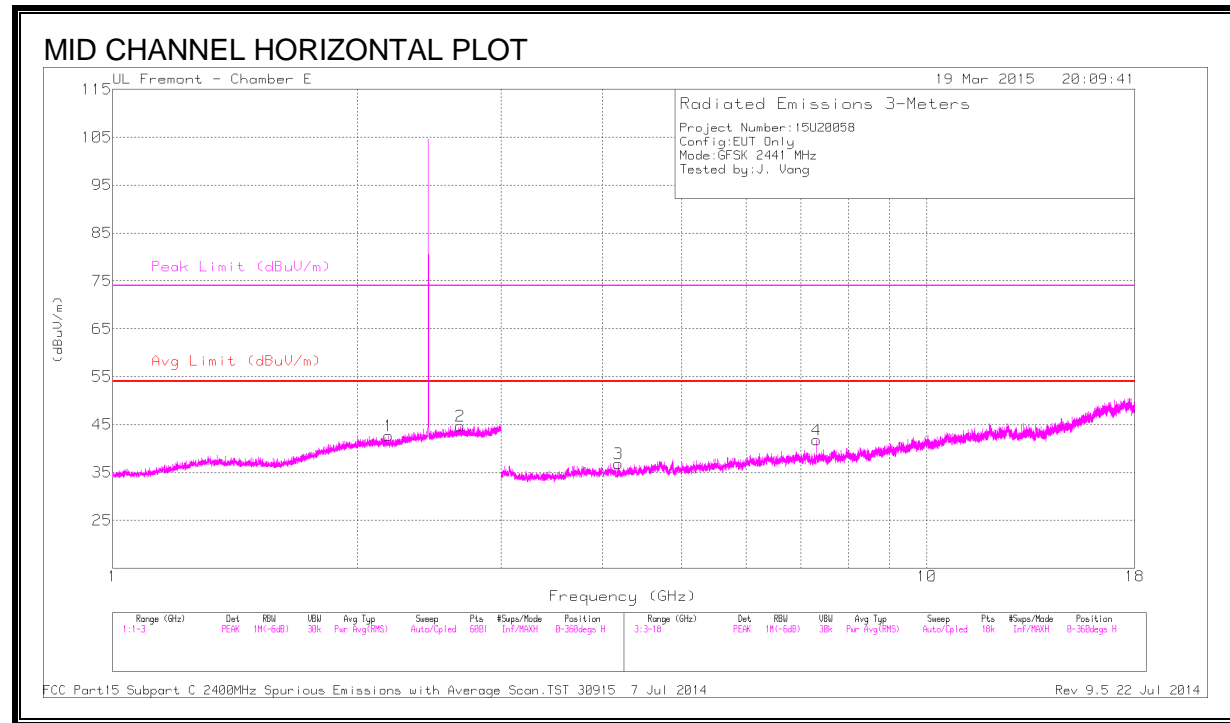
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.299	44.19	PK3	31.9	-25.1	50.99	-	-	74	-23.01	226	279	V
	* 2.299	30.8	VB10	31.9	-25.1	37.6	54	-16.4	-	-	226	279	V
2	* 2.815	43.58	PK3	32.4	-24.1	51.88	-	-	74	-22.12	84	191	V
	* 2.815	30.53	VB10	32.4	-24.1	38.83	54	-15.17	-	-	84	191	V
4	* 4.804	45.47	PK3	34.1	-30.9	48.67	-	-	74	-25.33	178	195	H
	* 4.804	38.88	VB10	34.1	-30.9	42.08	54	-11.92	-	-	178	195	H
5	* 10.874	37.13	PK3	37.9	-24.1	50.93	-	-	74	-23.07	313	257	H
	* 10.87	24.17	VB10	37.9	-24	38.07	54	-15.93	-	-	313	257	H
6	* 4.804	46.6	PK3	34.1	-30.9	49.8	-	-	74	-24.2	162	266	V
	* 4.804	40.56	VB10	34.1	-30.9	43.76	54	-10.24	-	-	162	266	V
3	3.363	35.35	PK	32.7	-31.6	36.45	-	-	-	-	288	200	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

HARMONICS AND SPURIOUS EMISSIONS



DATA

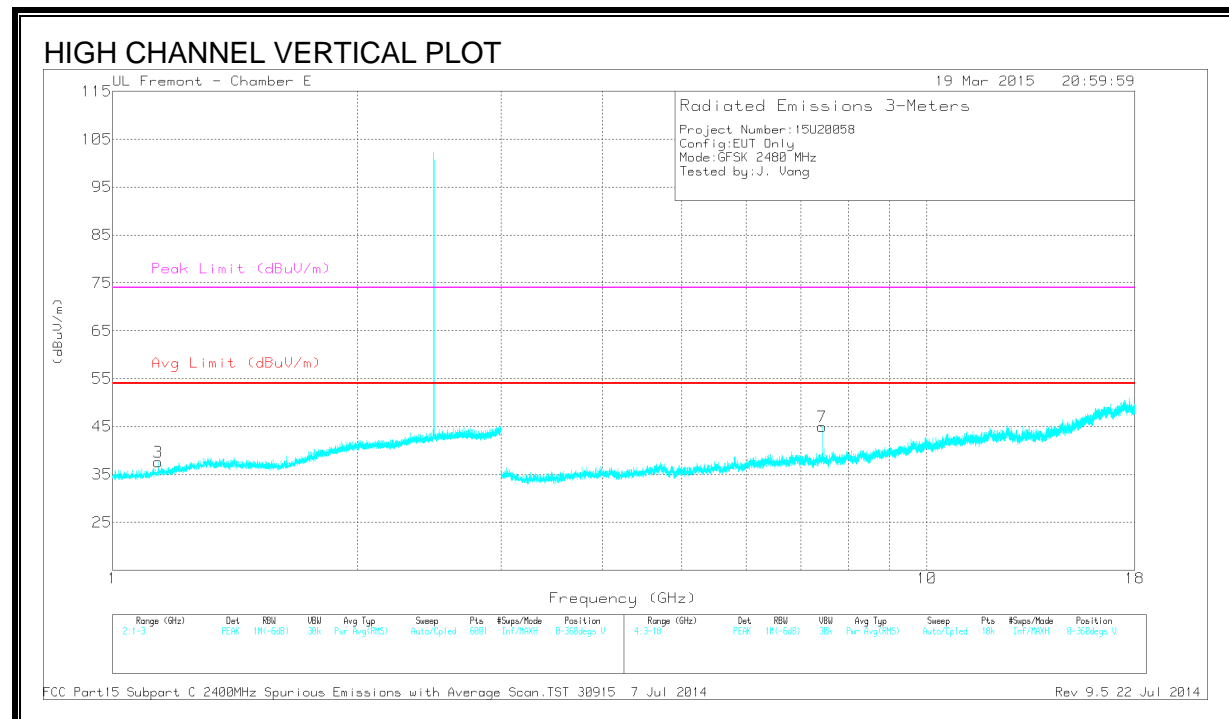
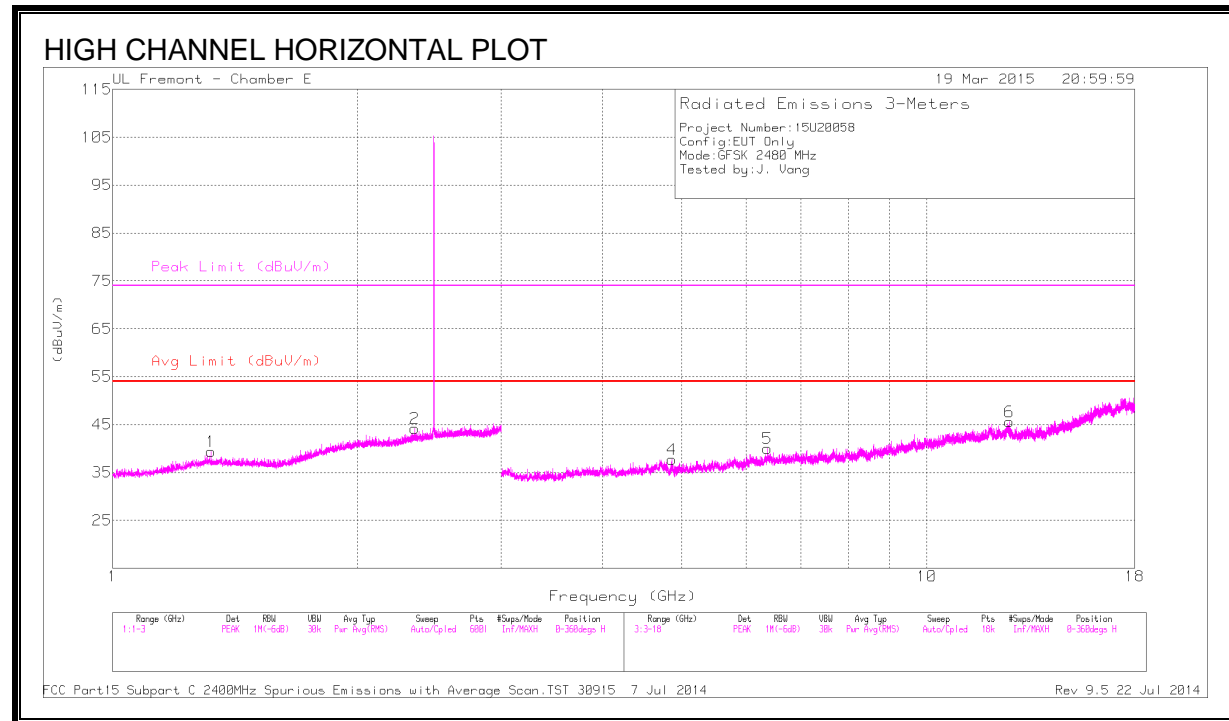
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.674	43.41	PK3	32.4	-23.9	51.91	-	-	74	-22.09	132	308	H
	* 2.673	30.36	VB10	32.4	-23.9	38.86	54	-15.14	-	-	132	308	H
3	* 4.183	41.56	PK3	33.5	-31.7	43.36	-	-	74	-30.64	213	250	H
	* 4.182	29.01	VB10	33.5	-31.7	30.81	54	-23.19	-	-	213	250	H
4	* 7.323	44.9	PK3	35.5	-27.6	52.8	-	-	74	-21.2	162	245	H
	* 7.323	38.29	VB10	35.5	-27.6	46.19	54	-7.81	-	-	162	245	H
5	* 4.371	40.46	PK3	33.7	-30.1	44.06	-	-	74	-29.94	273	188	V
	* 4.371	27.74	VB10	33.7	-30.1	31.34	54	-22.66	-	-	273	188	V
6	* 7.324	47.4	PK3	35.5	-27.6	55.3	-	-	74	-18.7	179	270	V
	* 7.323	42.9	VB10	35.5	-27.6	50.8	54	-3.2	-	-	179	270	V
1	2.182	43.67	PK3	31.3	-25.1	49.87	-	-	-	-	255	200	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

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	* 1.32	44.48	PK3	28.9	-26.8	46.58	-	-	74	-27.42	206	332	H
	* 1.32	30.94	VB10	28.9	-26.8	33.04	54	-20.96	-	-	206	332	H
2	* 2.348	43.33	PK3	32	-24.7	50.63	-	-	74	-23.37	166	191	H
	* 2.348	30.64	VB10	32	-24.7	37.94	54	-16.06	-	-	166	191	H
3	* 1.137	44.51	PK3	27.4	-27.6	44.31	-	-	74	-29.69	218	101	V
	* 1.138	31.4	VB10	27.4	-27.6	31.2	54	-22.8	-	-	218	101	V
4	* 4.857	42.36	PK3	34.1	-31.2	45.26	-	-	74	-28.74	358	299	H
	* 4.859	29.02	VB10	34.1	-31.2	31.92	54	-22.08	-	-	358	299	H
6	* 12.626	37	PK3	39	-24.4	51.6	-	-	74	-22.4	81	200	H
	* 12.627	24.59	VB10	39	-24.4	39.19	54	-14.81	-	-	81	200	H
7	* 7.44	43.99	PK3	35.6	-28.2	51.39	-	-	74	-22.61	182	261	V
	* 7.44	36.67	VB10	35.6	-28.2	44.07	54	-9.93	-	-	182	261	V
5	6.369	32.43	PK	35.5	-27.9	40.03	-	-	-	-	255	200	H

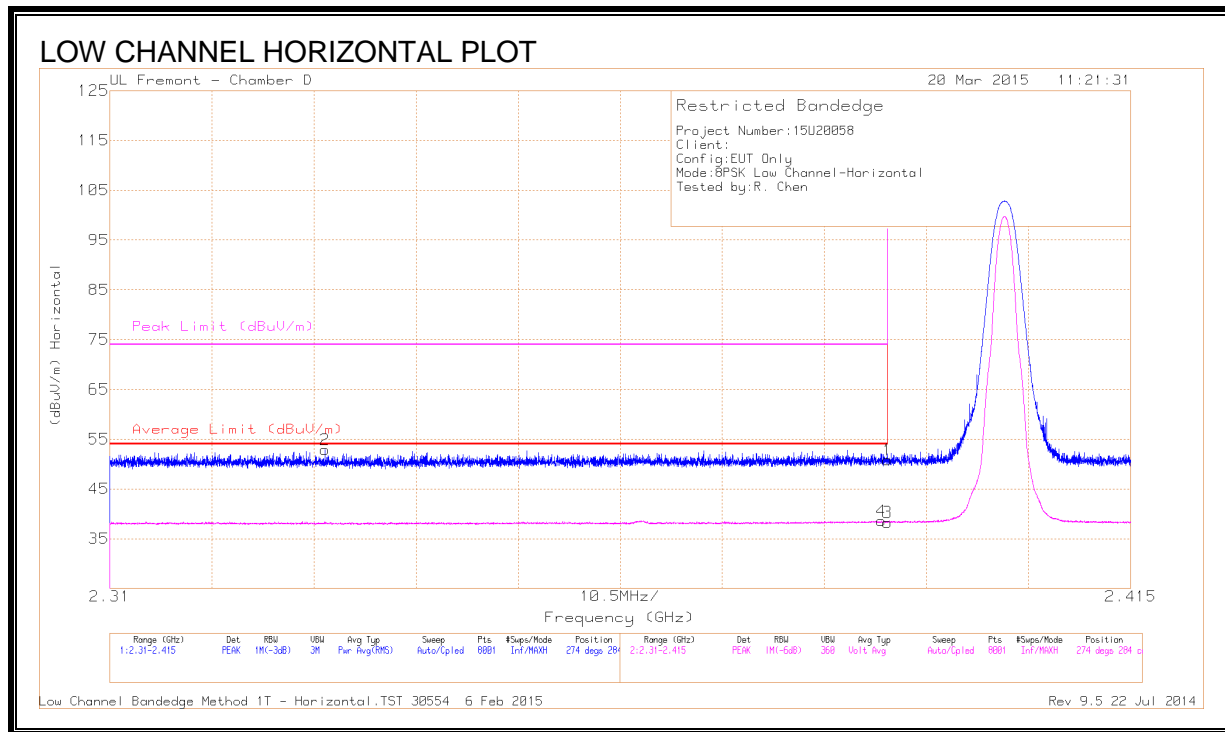
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

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

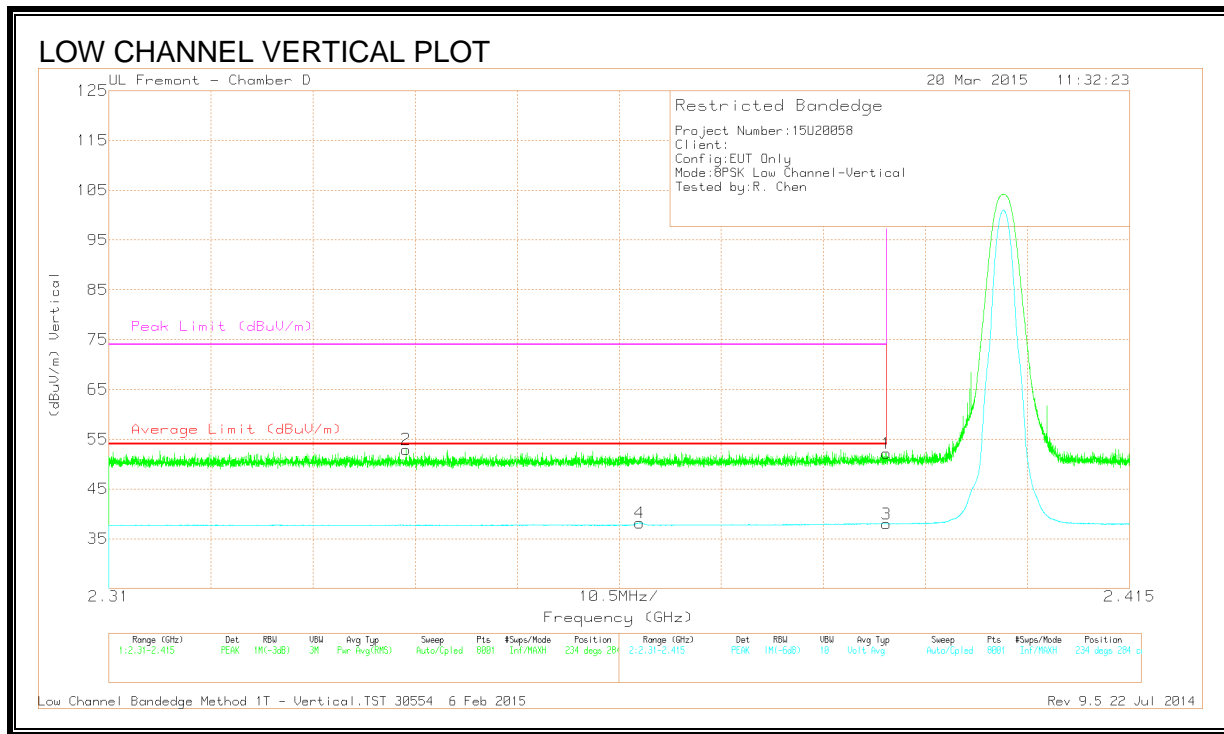
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Filtr /Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.332	41.87	PK	32	-21	52.87	-	-	74	-21.13	274	284	H
4	* 2.389	27.21	VB1T	32.1	-20.7	38.61	54	-15.39	-	-	274	284	H
1	* 2.39	39.43	PK	32.1	-20.7	50.83	-	-	74	-23.17	274	284	H
3	* 2.39	26.87	VB1T	32.1	-20.7	38.27	54	-15.73	-	-	274	284	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

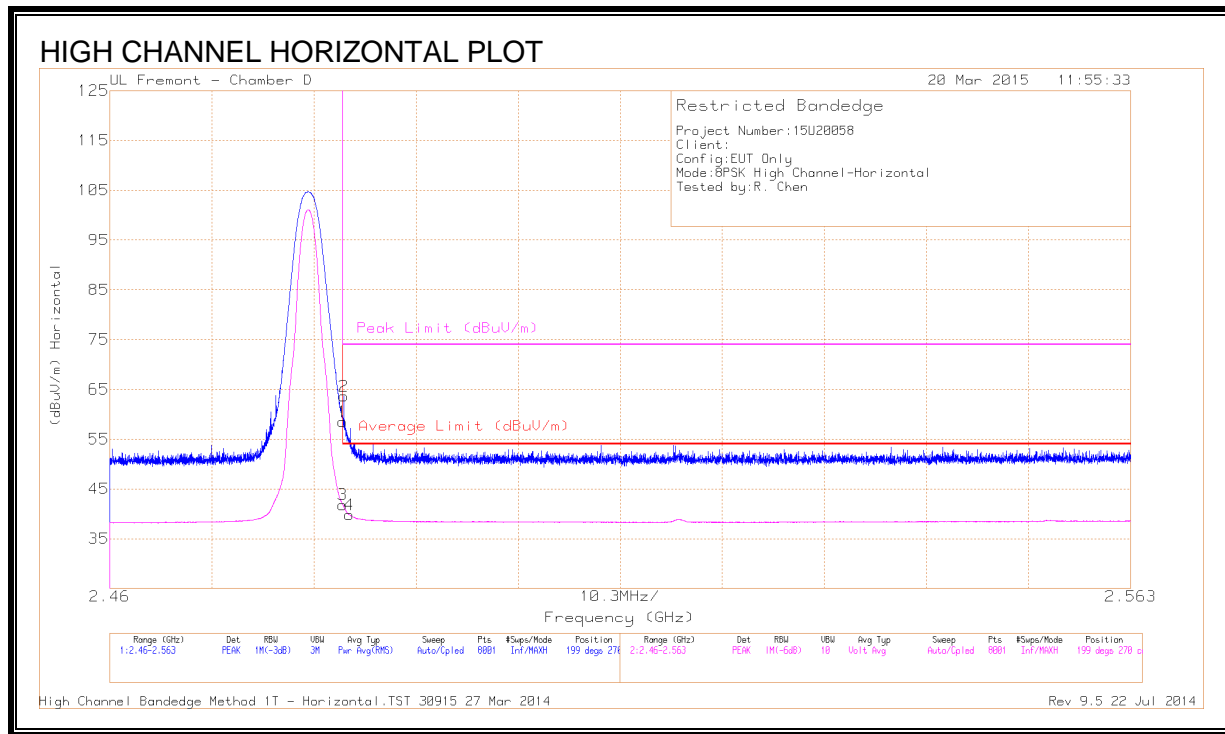
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.73	PK	32.1	-20.7	52.13	-	-	74	-21.87	234	284	V
2	* 2.341	41.83	PK	32	-20.9	52.93	-	-	74	-21.07	234	284	V
3	* 2.39	26.59	VB1T	32.1	-20.7	37.99	54	-16.01	-	-	234	284	V
4	* 2.365	27.09	VB1T	32	-20.9	38.19	54	-15.81	-	-	234	284	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 BANEDGE (HIGH CHANNEL, HORIZONTAL)



DATA

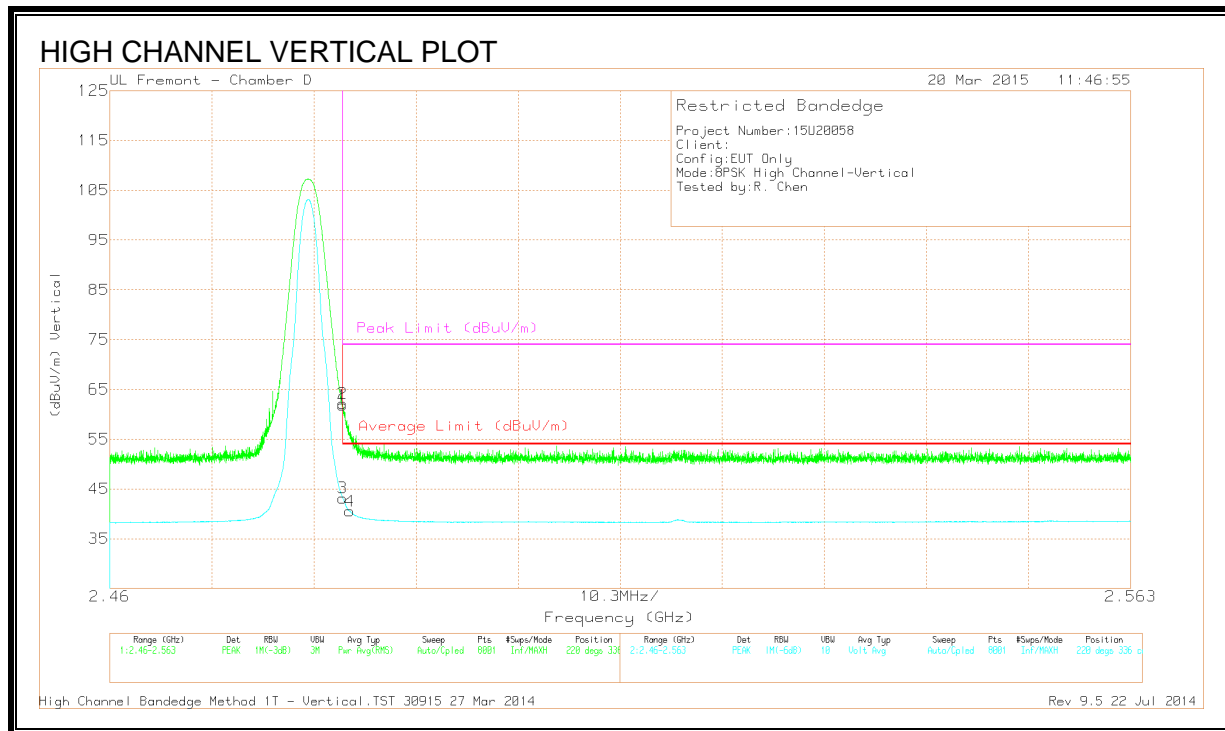
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	47.11	PK	32.2	-20.8	58.51	-	-	74	-15.49	199	270	H
2	* 2.484	52.24	PK	32.2	-20.8	63.64	-	-	74	-10.36	199	270	H
3	* 2.484	30.44	VB1T	32.2	-20.8	41.84	54	-12.16	-	-	199	270	H
4	* 2.484	28.41	VB1T	32.2	-20.8	39.81	54	-14.19	-	-	199	270	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 BANDEGE (HIGH CHANNEL, VERTICAL)



DATA

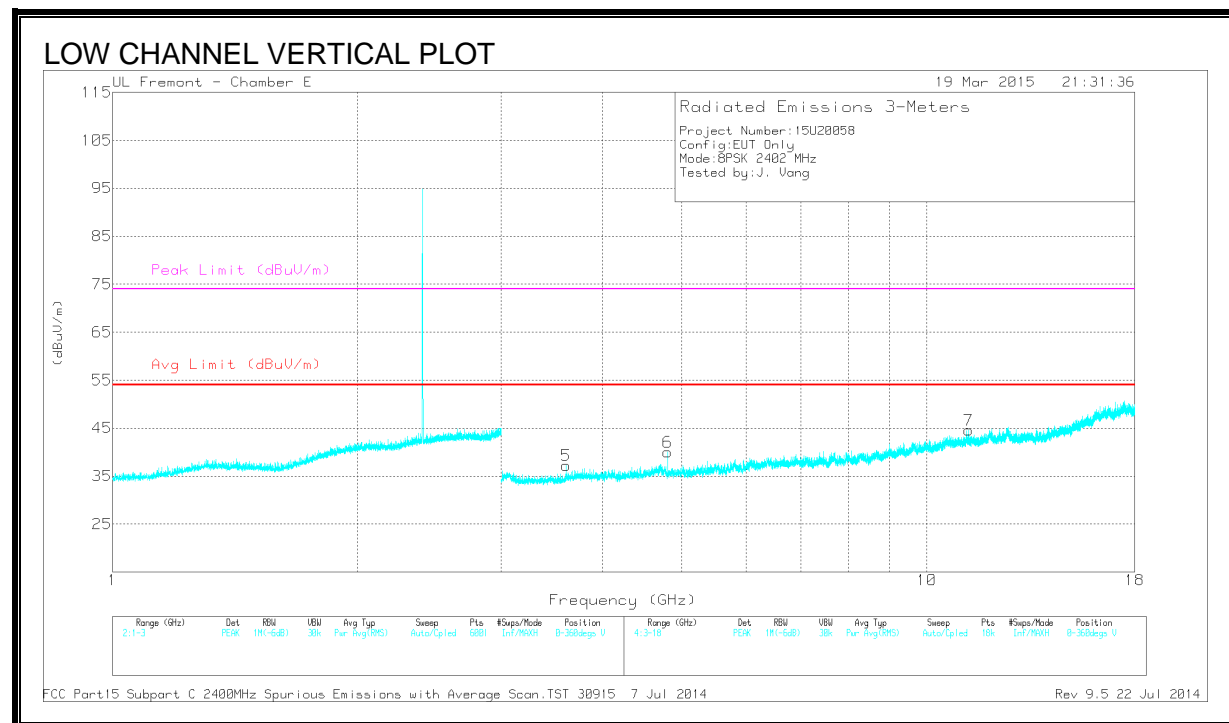
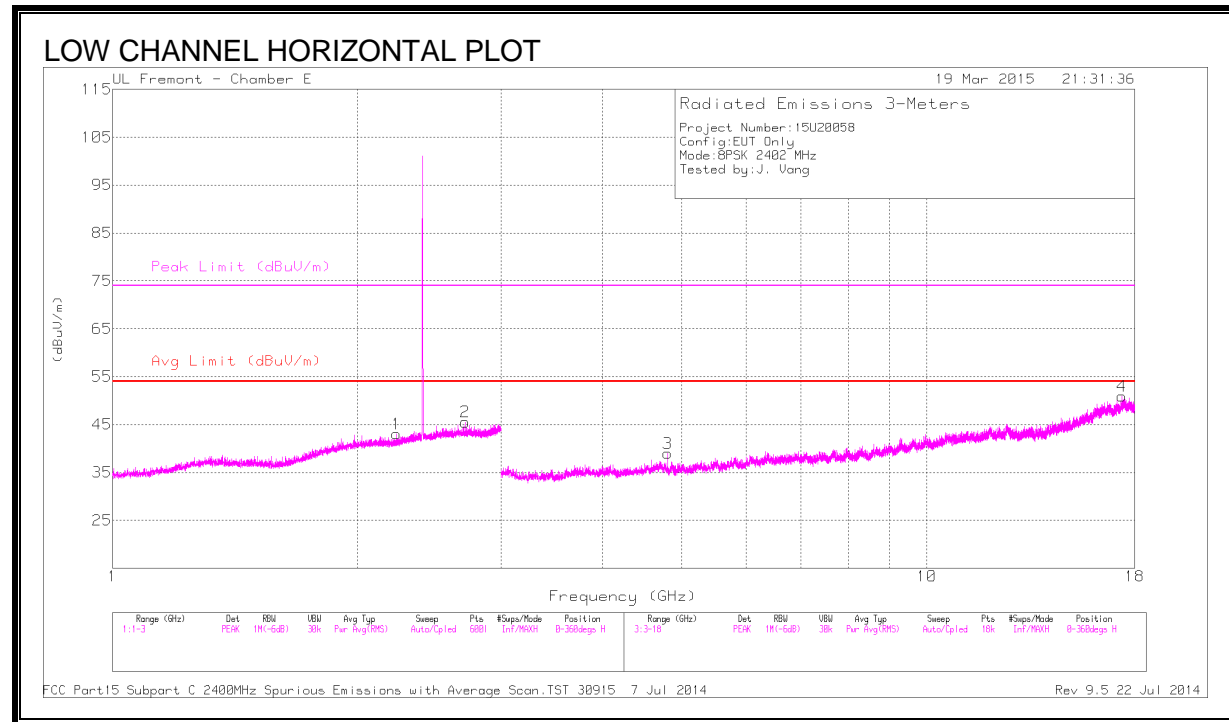
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cb1/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	50.42	PK	32.2	-20.8	61.82	-	-	74	-12.18	220	336	V
2	* 2.484	50.75	PK	32.2	-20.8	62.15	-	-	74	-11.85	220	336	V
3	* 2.484	31.78	VB1T	32.2	-20.8	43.18	54	-10.82	-	-	220	336	V
4	* 2.484	29.13	VB1T	32.2	-20.8	40.53	54	-13.47	-	-	220	336	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

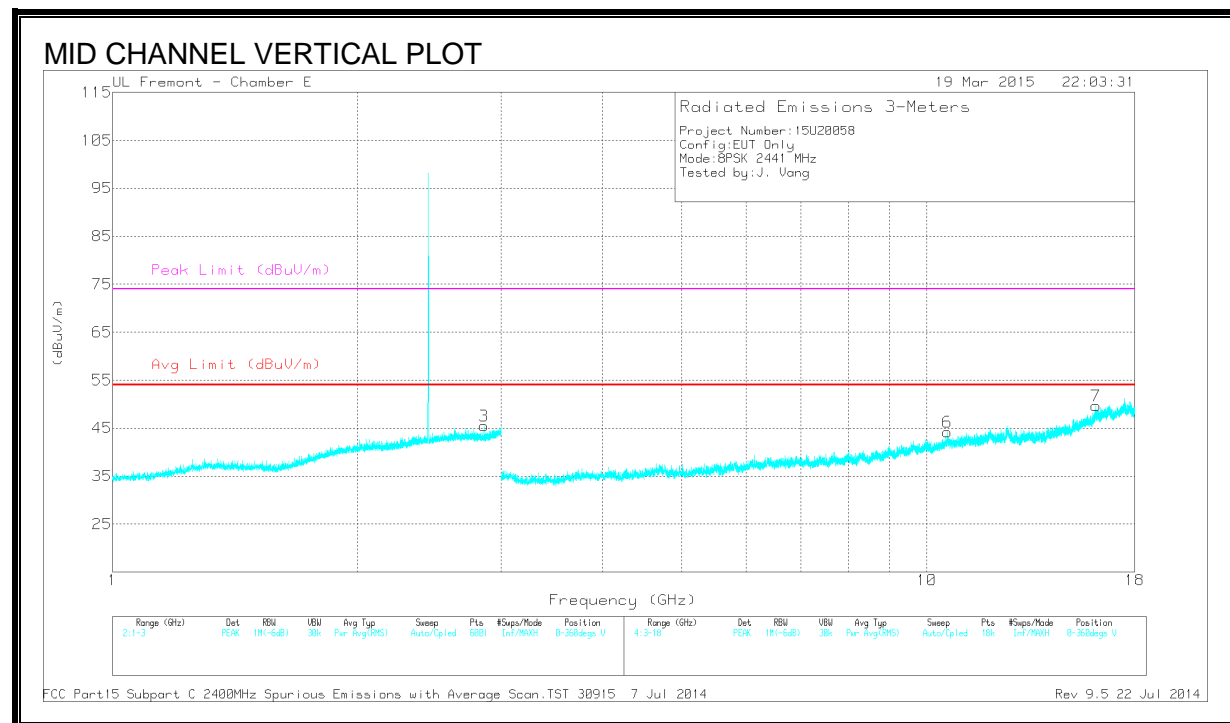
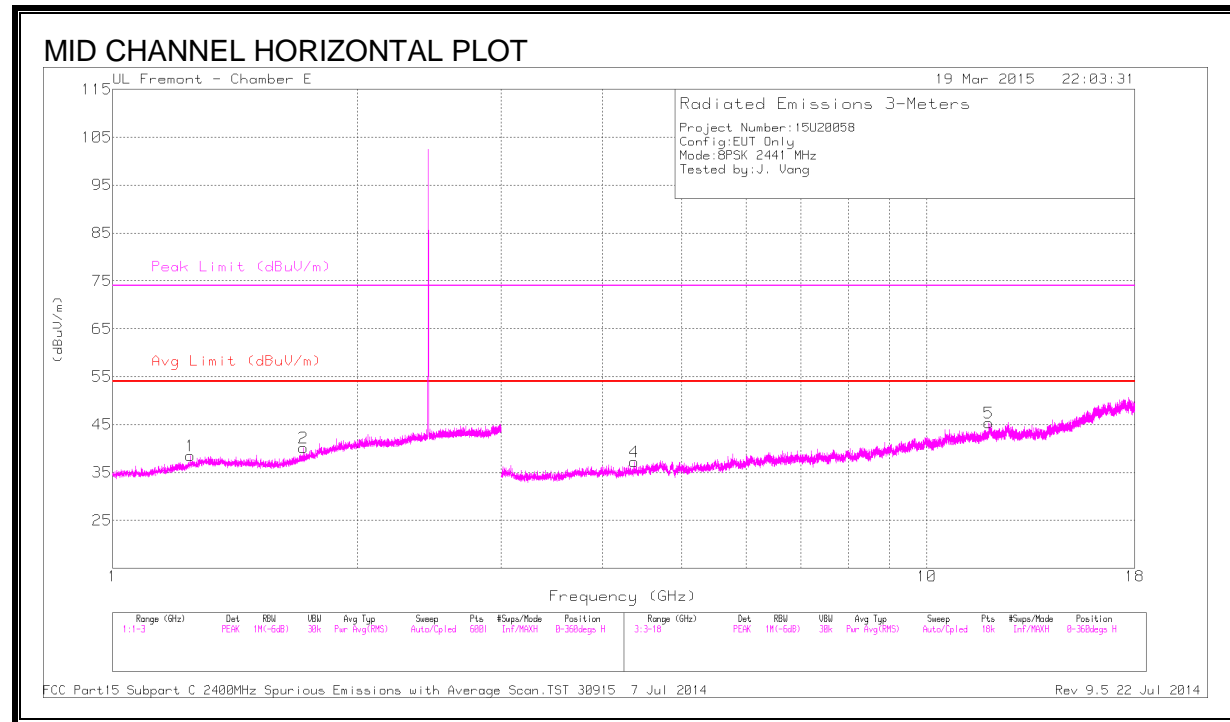
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.233	43.51	PK3	31.5	-25.2	49.81	-	-	74	-24.19	85	369	H
	* 2.234	30.64	VB10	31.5	-25.2	36.94	54	-17.06	-	-	85	369	H
2	* 2.708	42.96	PK3	32.4	-23.9	51.46	-	-	74	-22.54	325	248	H
	* 2.708	30.36	VB10	32.4	-23.9	38.86	54	-15.14	-	-	325	248	H
3	* 4.804	44.63	PK3	34.1	-30.9	47.83	-	-	74	-26.17	174	216	H
	* 4.804	36.18	VB10	34.1	-30.9	39.38	54	-14.62	-	-	174	216	H
5	* 3.603	42.11	PK3	33	-31.7	43.41	-	-	74	-30.59	175	141	V
	* 3.604	29.24	VB10	33	-31.7	30.54	54	-23.46	-	-	175	141	V
6	* 4.804	45.45	PK3	34.1	-30.9	48.65	-	-	74	-25.35	133	333	V
	* 4.804	36.28	VB10	34.1	-30.9	39.48	54	-14.52	-	-	133	333	V
7	* 11.257	36.89	PK3	37.9	-23.6	51.19	-	-	74	-22.81	218	102	V
	* 11.257	23.99	VB10	37.9	-23.6	38.29	54	-15.71	-	-	218	102	V
4	17.367	34.82	PK3	41.2	-18.8	57.22	-	-	-	-	276	102	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

HARMONICS AND SPURIOUS EMISSIONS



DATA

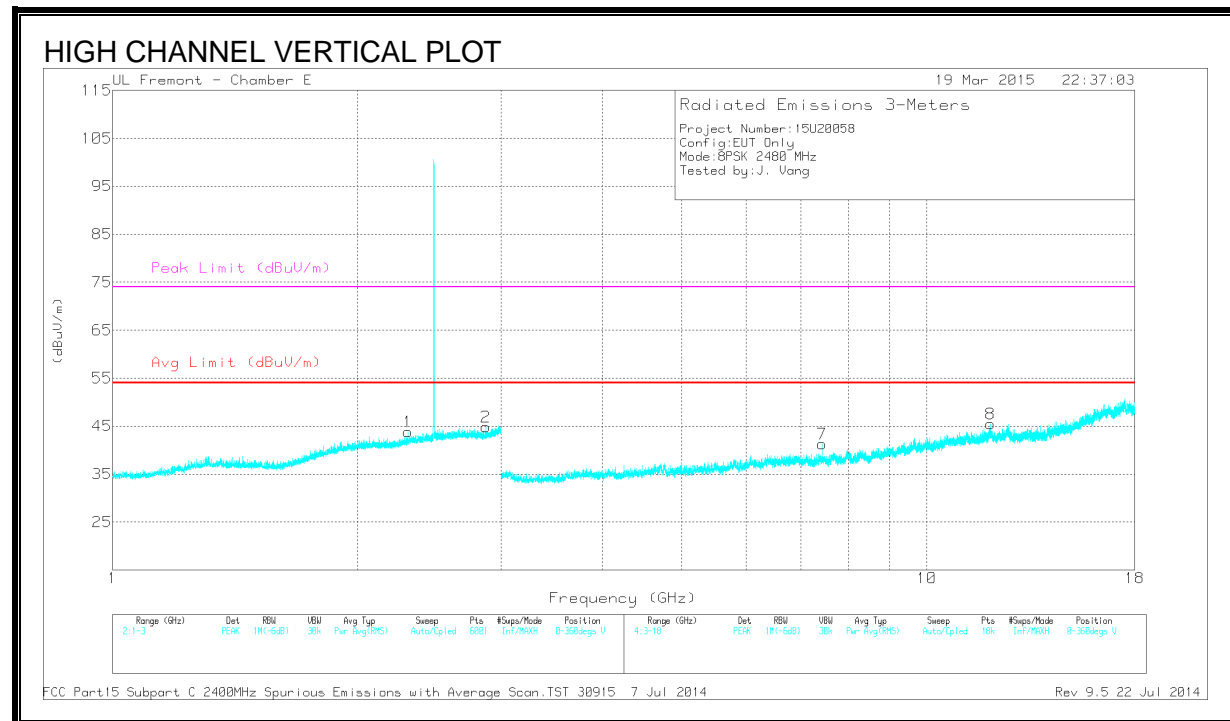
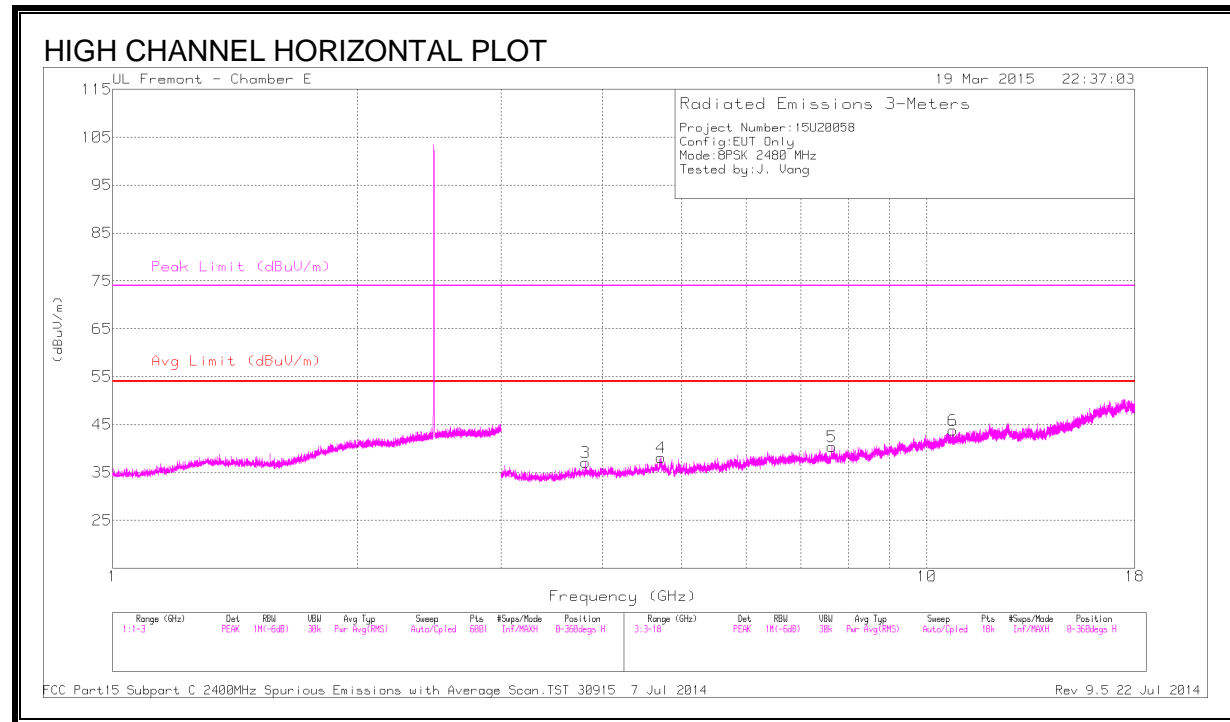
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.247	44.58	PK3	28.5	-27.2	45.88	-	-	74	-28.12	305	200	H
	* 1.245	31.16	VB10	28.5	-27.2	32.46	54	-21.54	-	-	305	200	H
3	* 2.86	43.36	PK3	32.5	-24.2	51.66	-	-	74	-22.34	114	212	V
	* 2.859	30.44	VB10	32.5	-24.2	38.74	54	-15.26	-	-	114	212	V
4	* 4.373	40.83	PK3	33.7	-30.2	44.33	-	-	74	-29.67	77	231	H
	* 4.372	27.75	VB10	33.7	-30.2	31.25	54	-22.75	-	-	77	231	H
5	* 11.918	36.12	PK3	38.5	-22.7	51.92	-	-	74	-22.08	232	102	H
	* 11.917	23.63	VB10	38.5	-22.8	39.33	54	-14.67	-	-	232	102	H
6	* 10.601	37.29	PK3	37.7	-23.2	51.79	-	-	74	-22.21	312	287	V
	* 10.601	23.93	VB10	37.7	-23.2	38.43	54	-15.57	-	-	312	287	V
7	* 16.132	36.03	PK3	40.8	-20.8	56.03	-	-	74	-17.97	176	138	V
	* 16.132	23.53	VB10	40.8	-20.8	43.53	54	-10.47	-	-	176	138	V
2	1.716	43.82	PK3	29.1	-26.2	46.72	-	-	-	-	360	200	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

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	* 2.872	43.98	PK3	32.5	-24.1	52.38	-	-	74	-21.62	255	101	V
	* 2.871	30.47	VB10	32.5	-24.2	38.77	54	-15.23	-	-	255	101	V
3	* 3.808	41.42	PK3	33.5	-31.2	43.72	-	-	74	-30.28	136	101	H
	* 3.811	28.77	VB10	33.5	-31.3	30.97	54	-23.03	-	-	136	101	H
4	* 4.711	42.02	PK3	34.2	-30.6	45.62	-	-	74	-28.38	173	212	H
	* 4.711	29.32	VB10	34.2	-30.6	32.92	54	-21.08	-	-	173	212	H
5	* 7.648	37.78	PK3	35.8	-26.8	46.78	-	-	74	-27.22	300	101	H
	* 7.647	25.33	VB10	35.8	-26.8	34.33	54	-19.67	-	-	300	101	H
6	* 10.753	36.73	PK3	37.9	-23.7	50.93	-	-	74	-23.07	154	350	H
	* 10.755	23.92	VB10	37.9	-23.7	38.12	54	-15.88	-	-	154	350	H
7	* 7.441	41.65	PK3	35.6	-28.2	49.05	-	-	74	-24.95	192	243	V
	* 7.44	30.88	VB10	35.6	-28.2	38.28	54	-15.72	-	-	192	243	V
8	* 11.97	36.24	PK3	38.5	-22.7	52.04	-	-	74	-21.96	244	200	V
	* 11.97	23.59	VB10	38.5	-22.7	39.39	54	-14.61	-	-	244	200	V
1	2.308	43.57	PK3	31.9	-25	50.47	-	-	-	-	360	101	V

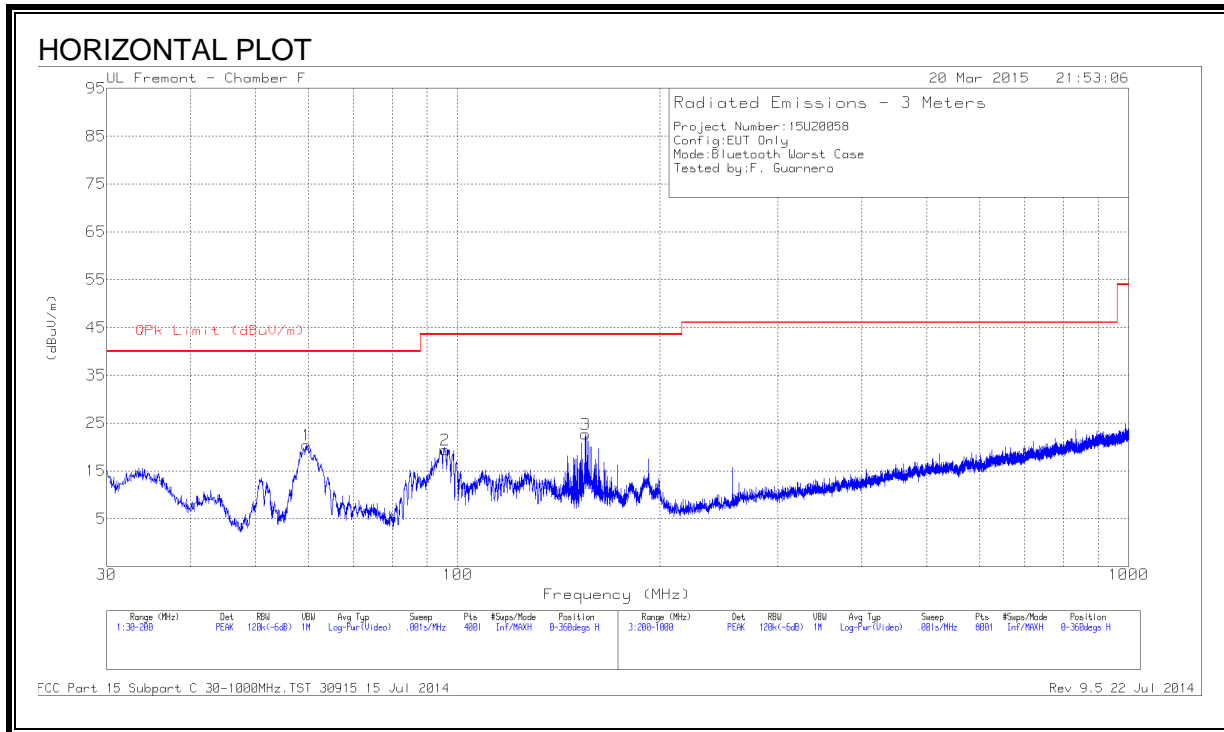
* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-Restricted Band.

PK3 - FHSS Method: Maximum Peak

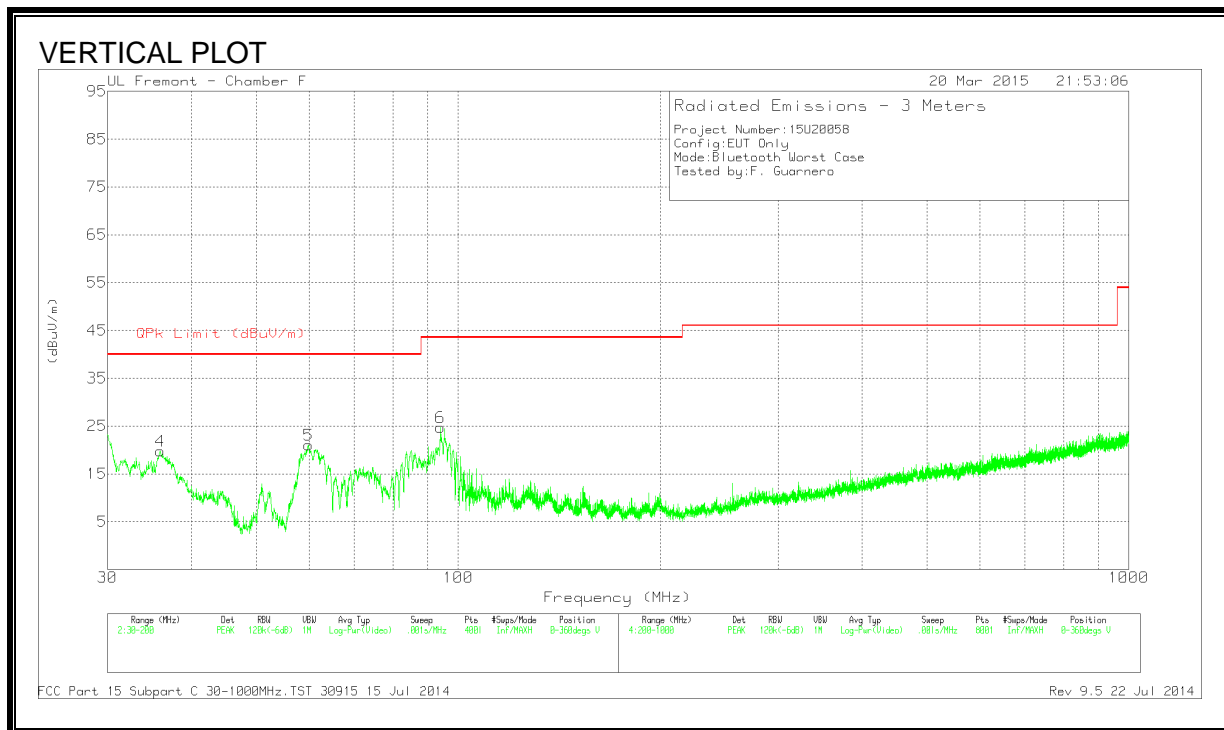
VB10Hz - FHSS Method: 10Hz Video Bandwidth

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 T122 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	59.6225	44.47	PK	7.5	-31.6	20.37	40	-19.63	0-360	401	H
2	95.875	41.62	PK	9.1	-31.3	19.42	43.52	-24.1	0-360	301	H
3	155.035	41.32	PK	12.2	-30.8	22.72	43.52	-20.8	0-360	201	H
4	35.95	34.8	PK	16.8	-31.8	19.8	40	-20.2	0-360	100	V
5	59.8775	45.11	PK	7.5	-31.6	21.01	40	-18.99	0-360	100	V
6	94.1325	47.39	PK	8.6	-31.3	24.69	43.52	-18.83	0-360	100	V

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	19.699	40.87	PK	33	-24.2	-9.5	40.17	54	-13.83	74	-33.83
2	21.75	41.43	PK	33.6	-23.7	-9.5	41.83	54	-12.17	74	-32.17
3	23.908	43.67	PK	34.2	-22.7	-9.5	45.67	54	-8.33	74	-28.33
4	19.152	40.97	PK	32.9	-24.2	-9.5	40.17	54	-13.83	74	-33.83
5	21.251	41.23	PK	33.3	-23.7	-9.5	41.33	54	-12.67	74	-32.67
6	23.975	44.23	PK	34.2	-22.6	-9.5	46.33	54	-7.67	74	-27.67

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

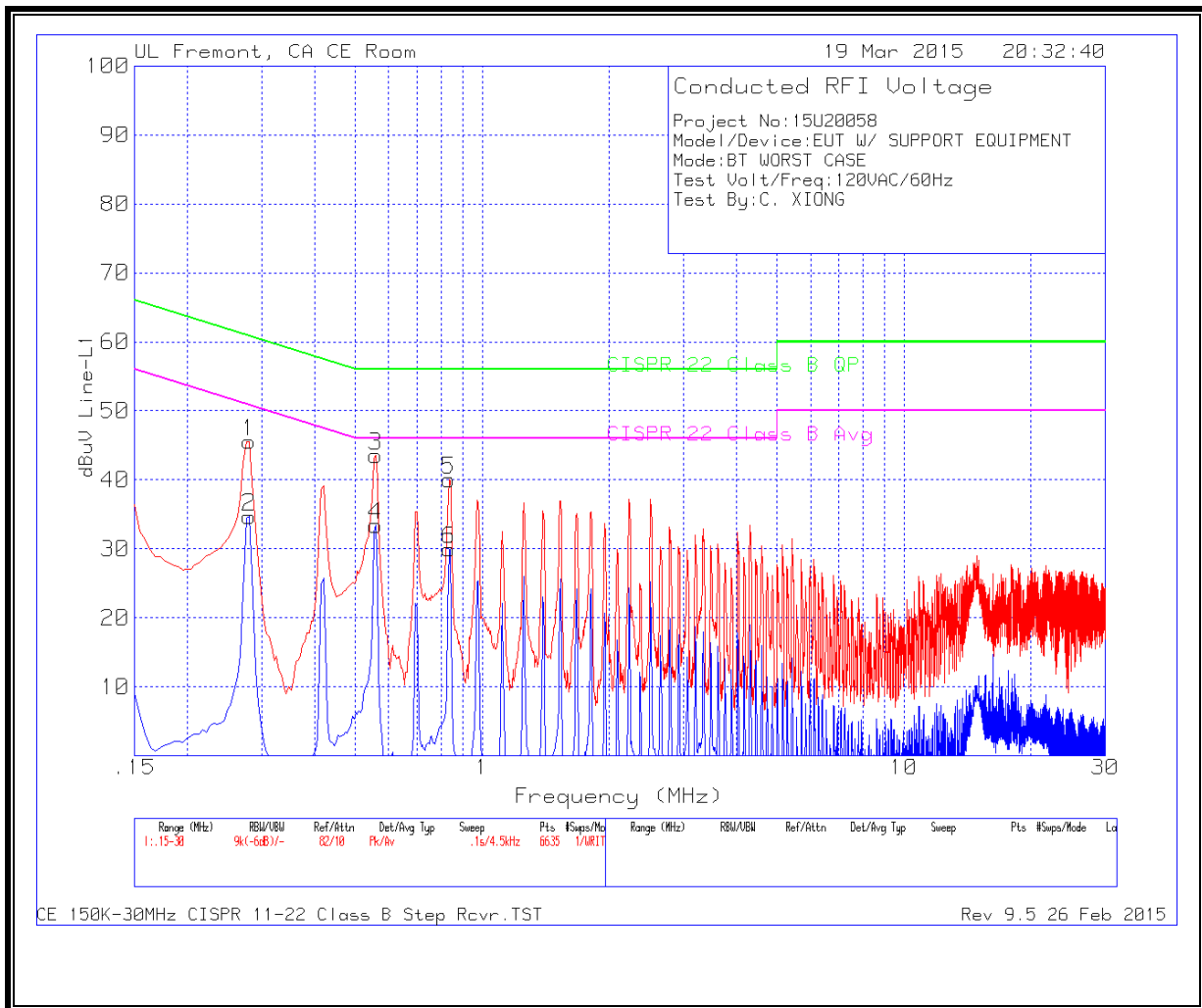
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

LINE 1 RESULTS



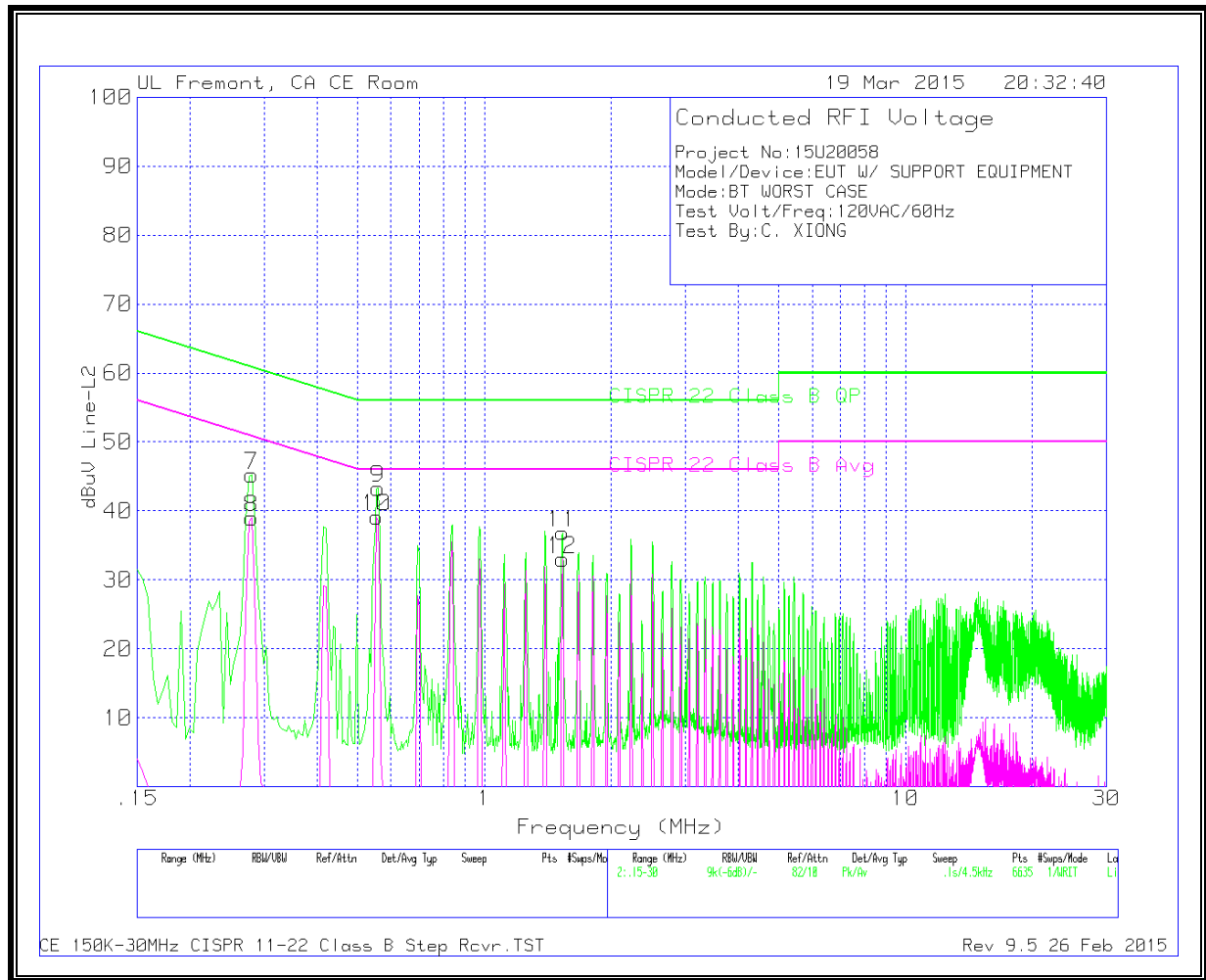
WORST EMISSIONS

Range 1: 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	.2805	44.95	Pk	.6	0	45.55	60.8	-15.25	-	-
2	.2805	34.07	Av	.6	0	34.67	-	-	50.8	-16.13
3	.5595	43.24	Pk	.3	0	43.54	56	-12.46	-	-
4	.5595	33.13	Av	.3	0	33.43	-	-	46	-12.57
5	.834	39.73	Pk	.3	0	40.03	56	-15.97	-	-
6	.834	29.65	Av	.3	0	29.95	-	-	46	-16.05

Pk - Peak detector

Av - Average detection

LINE 2 RESULTS



WORST EMISSIONS

Range 2: 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)
7	.2805	44.61	Pk	.6	0	45.21	60.8	-15.59	-	-
8	.2805	38.43	Av	.6	0	39.03	-	-	50.8	-11.77
9	.5595	43.01	Pk	.3	0	43.31	56	-12.69	-	-
10	.555	38.83	Av	.3	0	39.13	-	-	46	-6.87
11	1.5315	36.56	Pk	.2	.1	36.86	56	-19.14	-	-
12	1.5315	32.71	Av	.2	.1	33.01	-	-	46	-12.99

Pk - Peak detector

Av - Average detection