



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

CERTIFICATION TEST REPORT

FOR

CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL NUMBER: A1784

**FCC ID: BCG-E3092A
IC: 579C-E3092A**

REPORT NUMBER: 16U23366-E1V4

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	7/21/2016	Initial Review	Eric Yu
V2	7/30/2016	Revise to address TCB questions	Francisco Guarnero
V3	8/26/2016	Update testing for raise in power for 8PSK, QPSK, & GFSK for high power mode.	Mona Hua
V4	8/28/2016	Corrected typo on Section 7.2.1, 7.4.1, 7.7.1 and Section 8.1	Tina Chu

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL: A1784

SERIAL NUMBER: C39RV054HFPQ (CONDUCTED); C39RV064HFPQ (RADIATED)

DATE TESTED: MARCH 02, 2016 – AUGUST 25, 2016

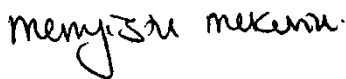
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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.

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Prepared By:



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SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

ERIC YU
EMC ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	± 3.84dB
Conducted Disturbance, 0.15 to 30 MHz	± 3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	± 3.15 dB
Radiated Disturbance, 30 to 1000 MHz	± 5.36 dB
Radiated Disturbance, 1000 to 18000 MHz	± 4.32 dB
Radiated Disturbance, 18000 to 26000 MHz	± 4.45 dB
Radiated Disturbance, 26000 to 40000 MHz	± 5.24dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT, Model A1784 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE-radio, IEEE 802.11a/b/g/n/ac, NFC 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	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	16.43	43.95
2402 - 2480	DQPSK	19.28	84.72
2402 - 2480	Enhanced 8PSK	19.32	85.51

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	-1.85

5.4. SOFTWARE AND FIRMWARE

The firmware version installed in the EUT during testing was 9.44.11.27.
The test utility software used during testing was wl 1.359 RC65.0

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

Worst-case data rates were:

GFSK mode: DH5
8PSK mode: 3-DH5

DQPSK mode has been verified to have the lowest power.

For simultaneous transmission of multiple channels from the same antenna in the 2.4GHz and 5GHz bands, tests were conducted for various configurations having the highest power. No noticeable new emission was found.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude 3540	9J6WQZ1	NA
Laptop Power Supply	Dell	LA65NM130	0JNKWD	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	2	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 (BELOW 1 GHZ)

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

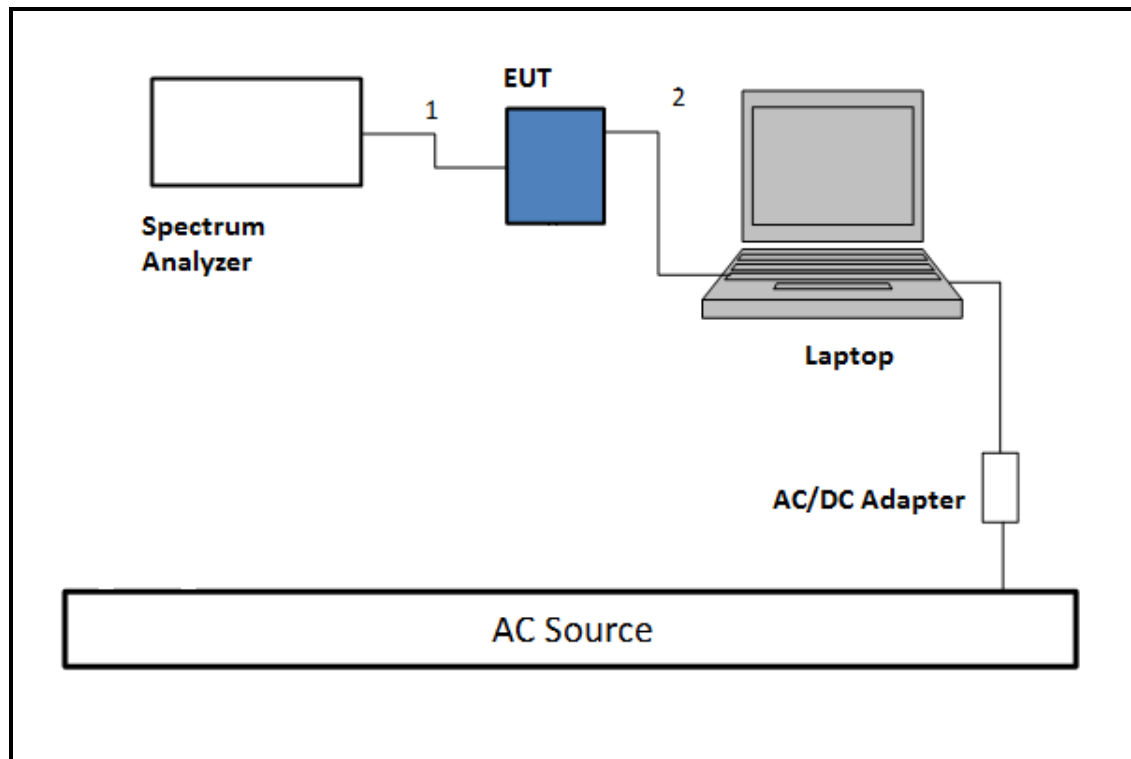
I/O CABLES (AC LINE CONDUCTED: AC/DC ADAPTER & LAPTOP CONFIGURATION)

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

TEST SETUP- CONDUCTED PORT

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

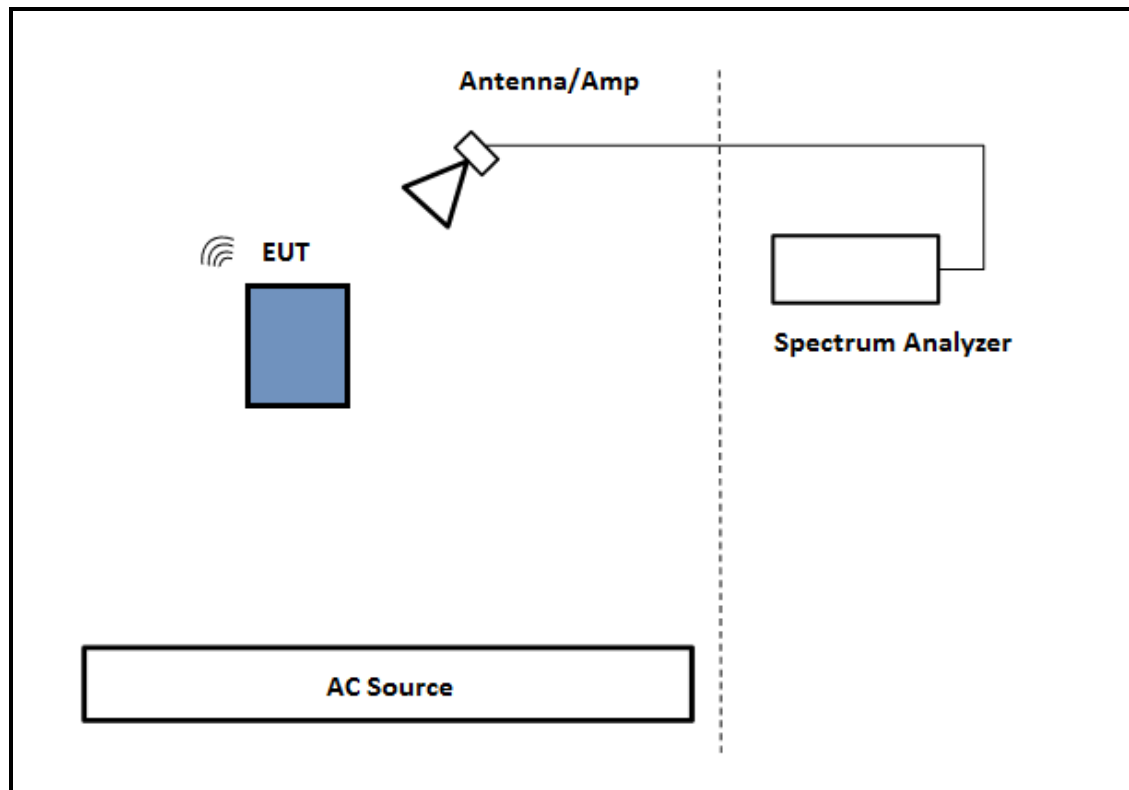
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

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

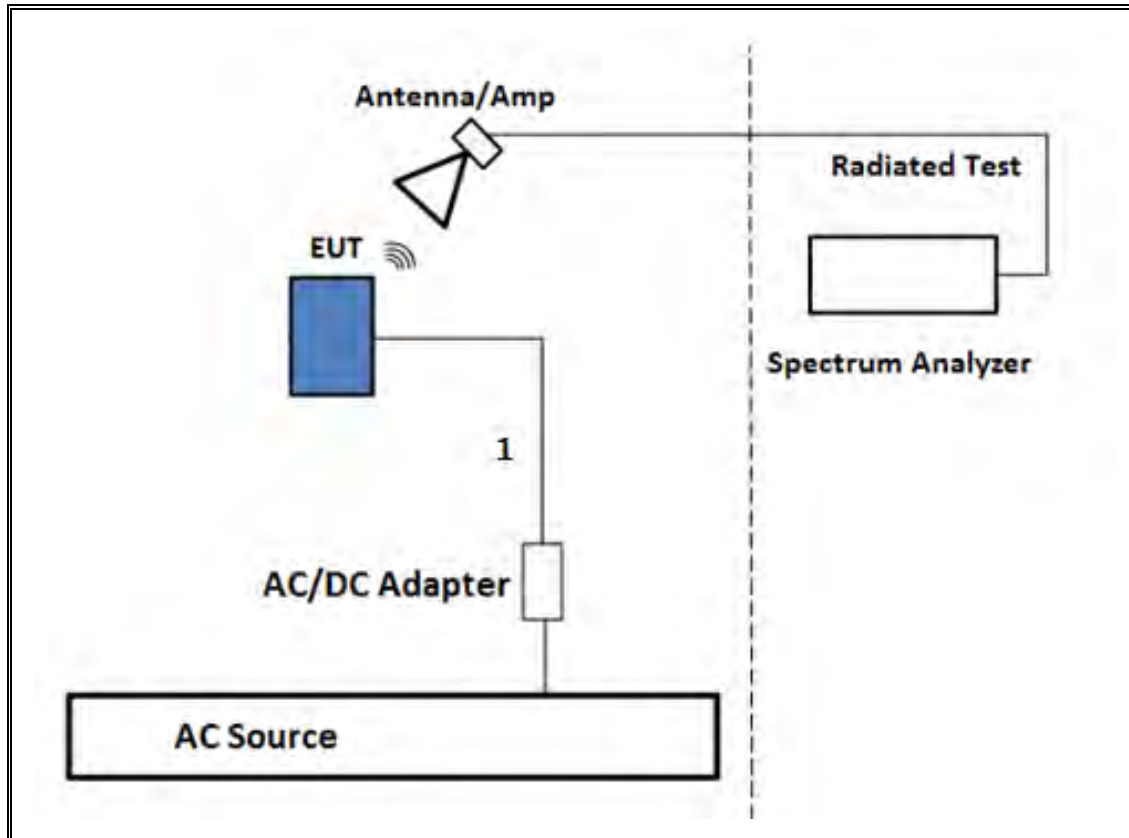
SETUP DIAGRAM



TEST SETUP- BELOW 1GHZ

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

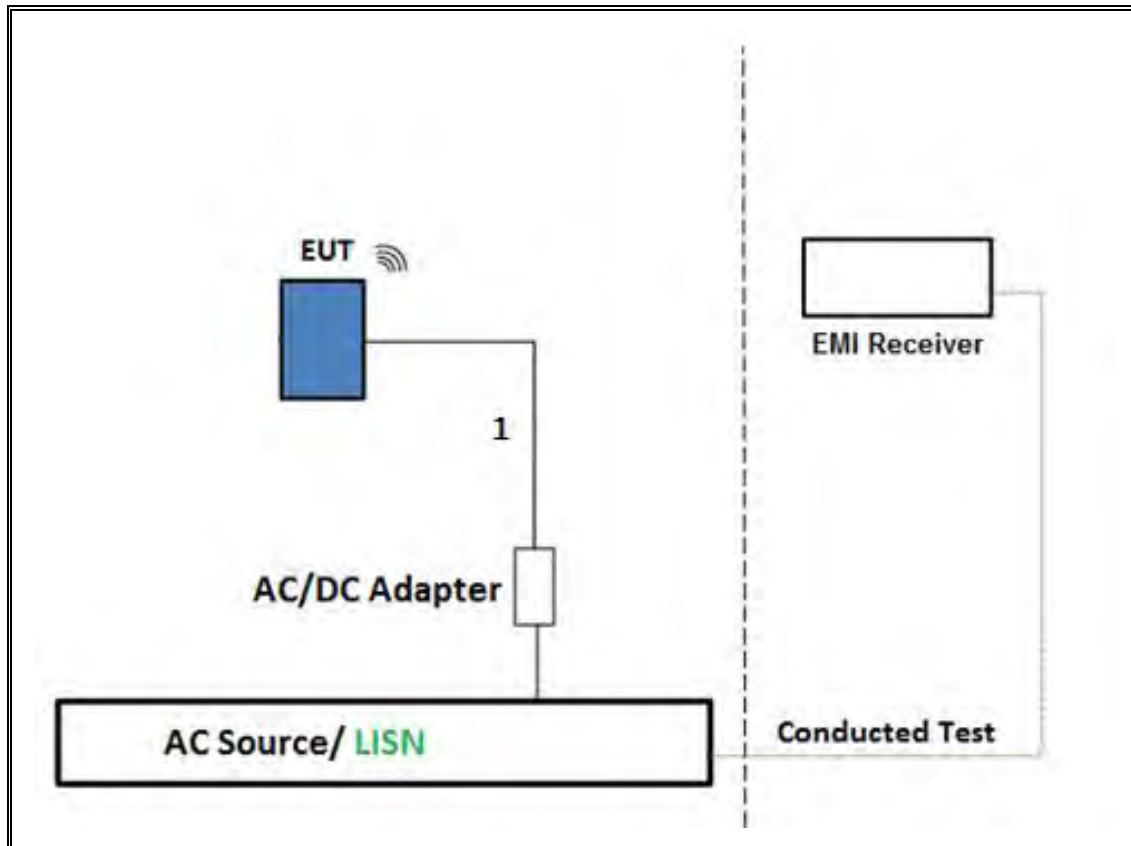
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER

The EUT was tested with powered by AC/DC adapter via USB cable. Test software exercised the EUT.

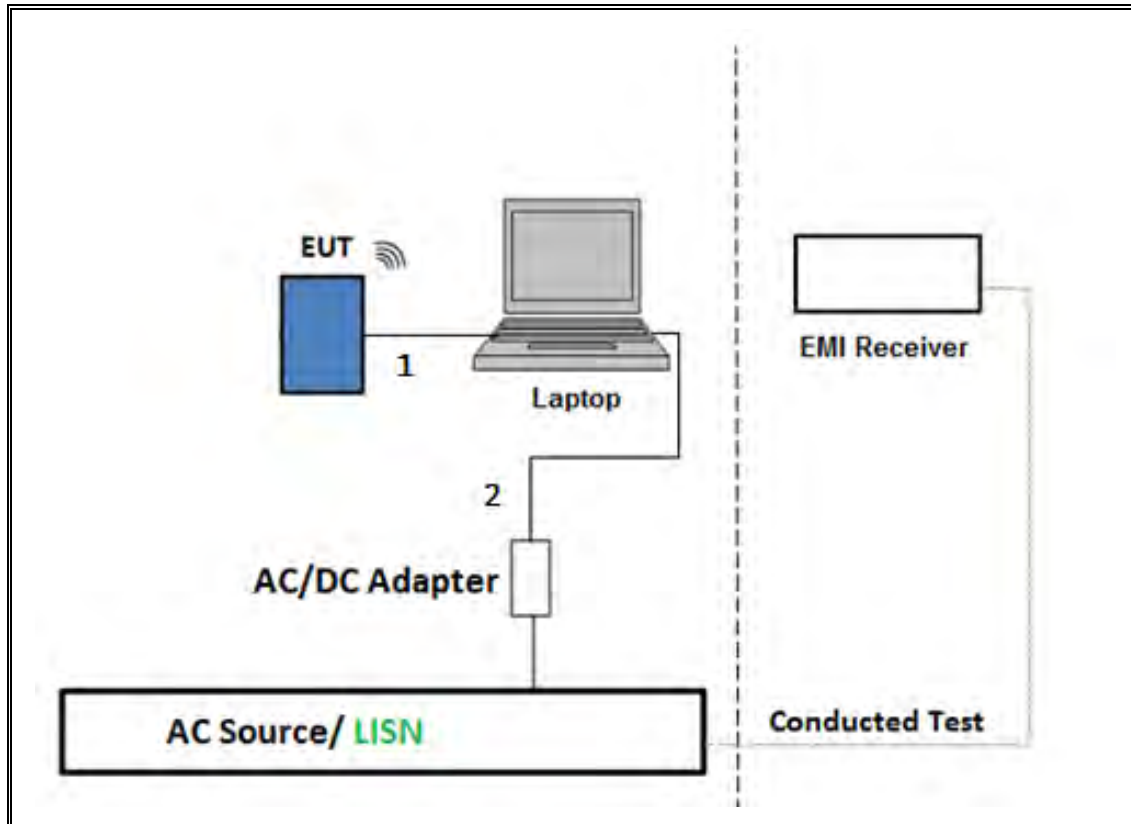
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION

The EUT was tested with powered by host PC via USB cable. 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	00154522	1/12/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	10/28/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782158	1/25/2017
**Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323561	6/8/2016
**Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	US51350187	6/1/2016
**Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	185623	6/9/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY51380911	10/15/2016
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	9/25/2016
**Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	7/8/2016
***Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY55200004	5/18/2017
**Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	209336	5/12/2016
**Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	8/14/2016
**Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	3008A04710	6/29/2016
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	9/10/2016
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2	161124	9/16/2016
**Power Cable, Line Conducted Emissions	UL	PG1	N/A	7/28/2016
UL SOFTWARE				
* Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015	
* Radiated Software	UL	UL EMC	Ver 9.5, June 26, 2016	
* Conducted Software	UL	UL EMC	Ver 4.6, April 13, 2016	
* AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

Note: * indicates automation software version used in the compliance certification testing

**Testing is completed before equipment expiration date.

*** equipment was used after calibration.

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	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

7.2. HIGH POWER BASIC DATA RATE GFSK MODULATION

7.2.1. 99% AND 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

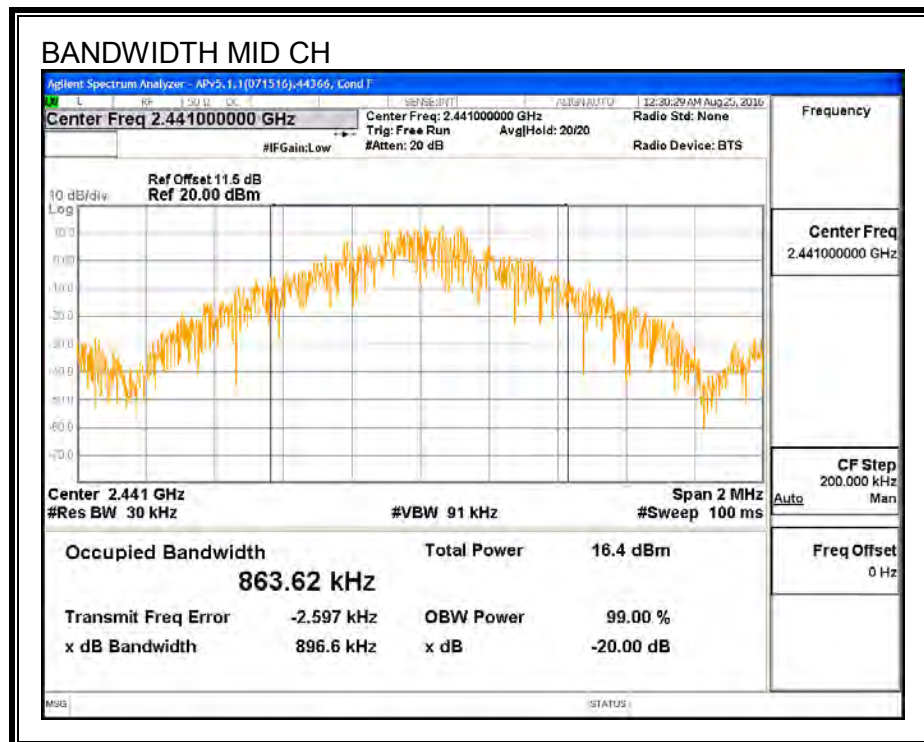
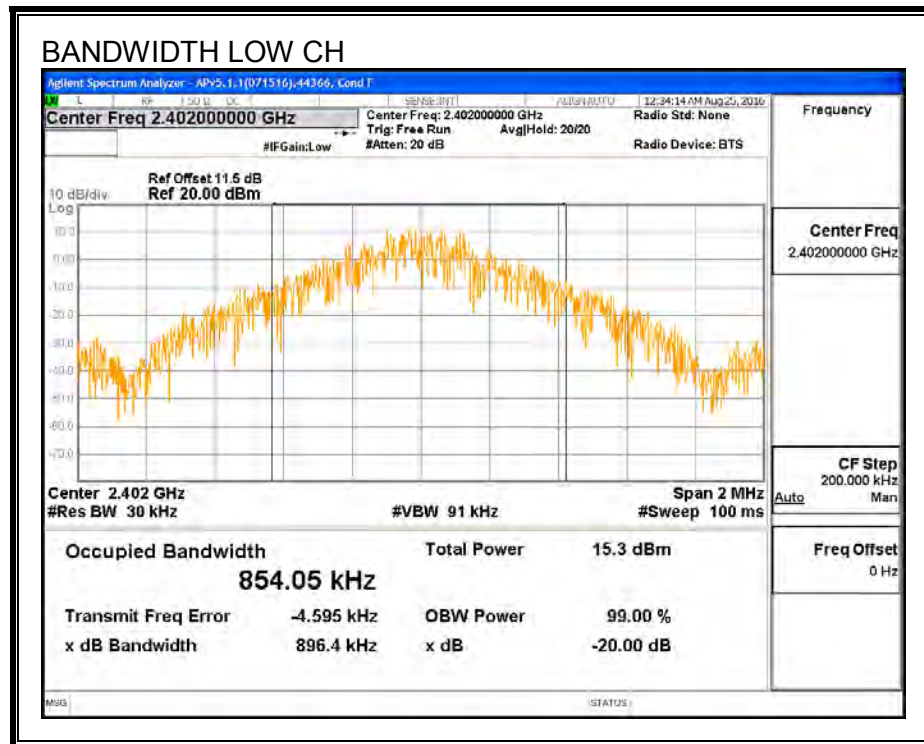
TEST PROCEDURE

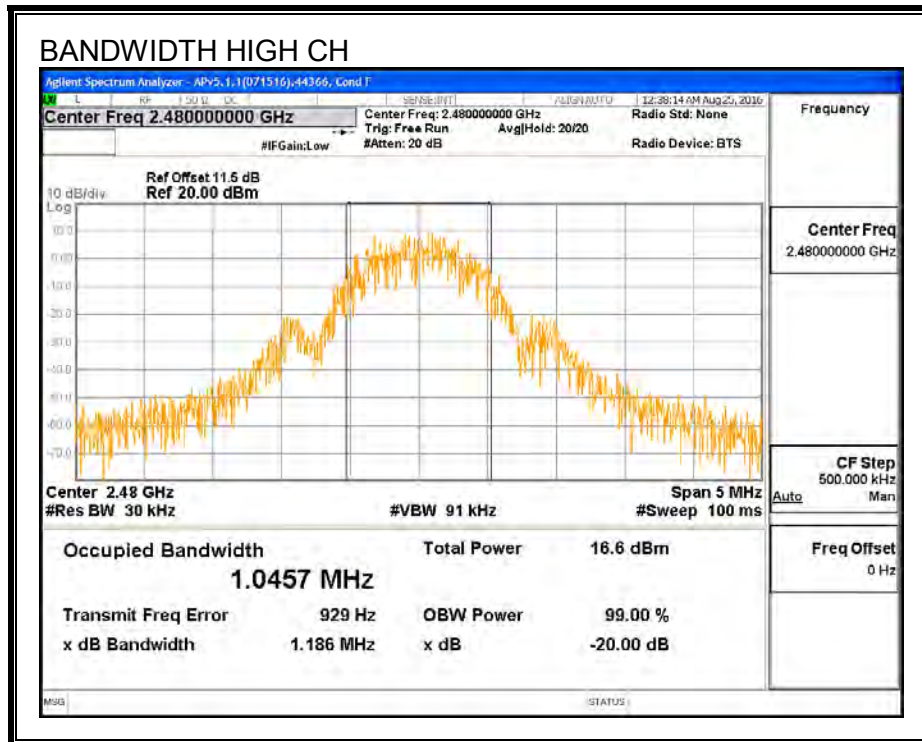
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (KHz)	20 dB Bandwidth (KHz)
Low	2402	854.05	896.4
Middle	2441	863.62	896.6
High	2480	1045.7	1186

99% AND 20 dB BANDWIDTH





7.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

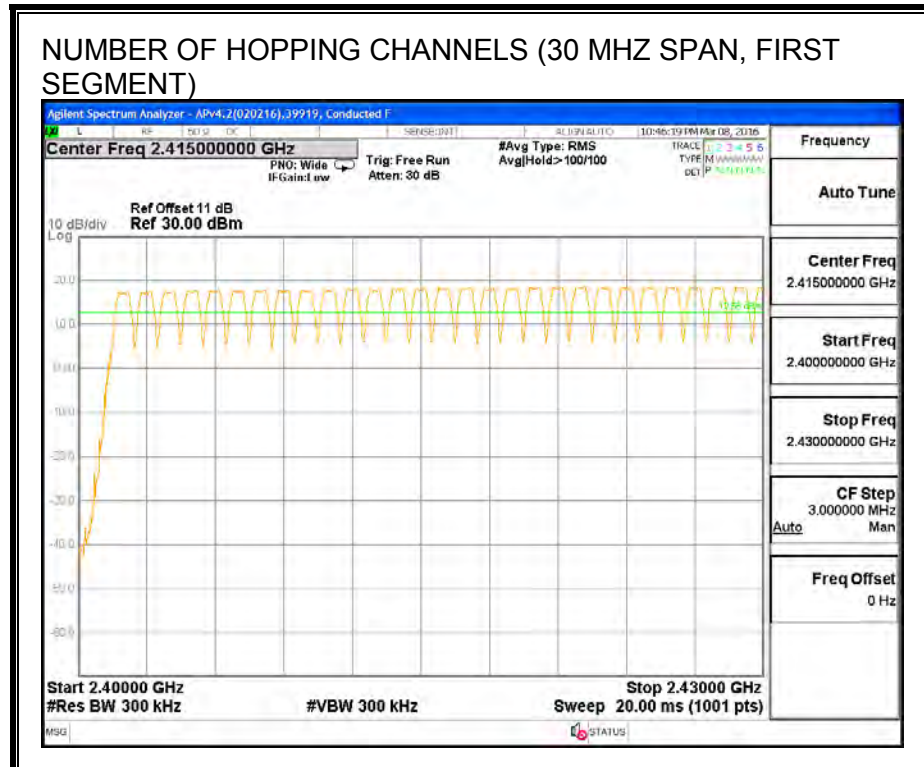
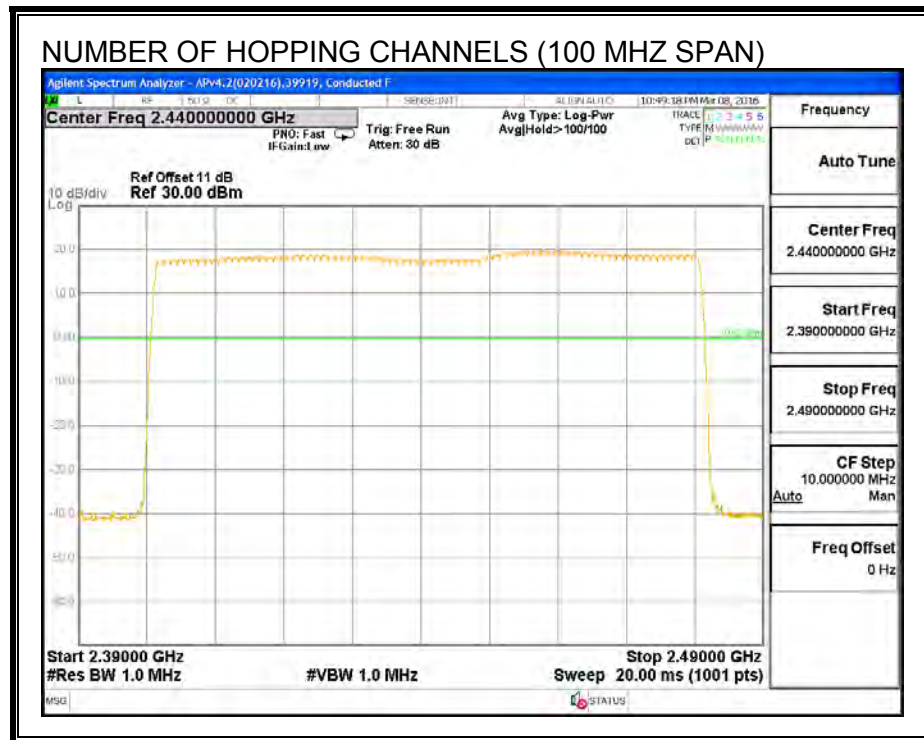
TEST PROCEDURE

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

RESULTS

Normal Mode: 79 Channels observed.

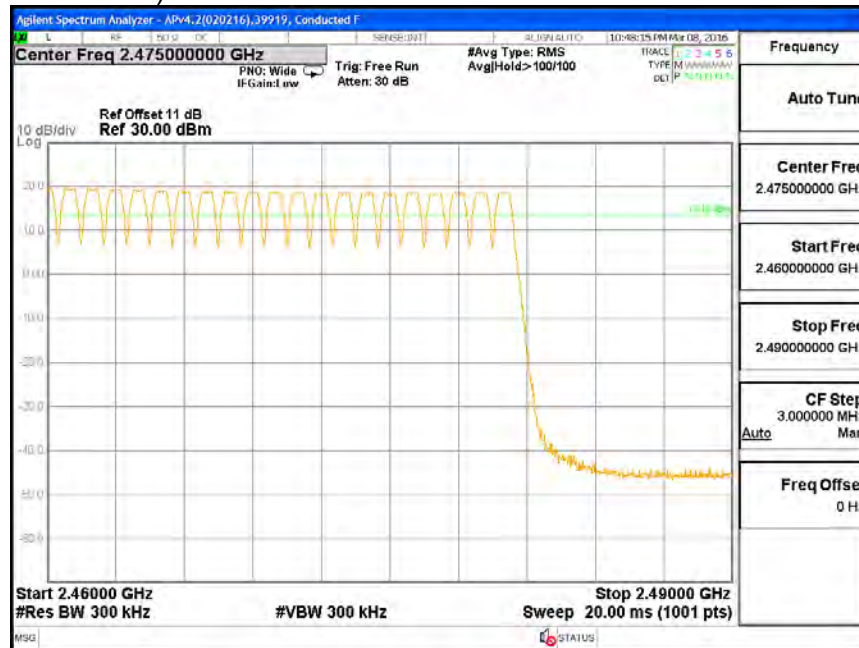
NUMBER OF HOPPING CHANNELS



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



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



7.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

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

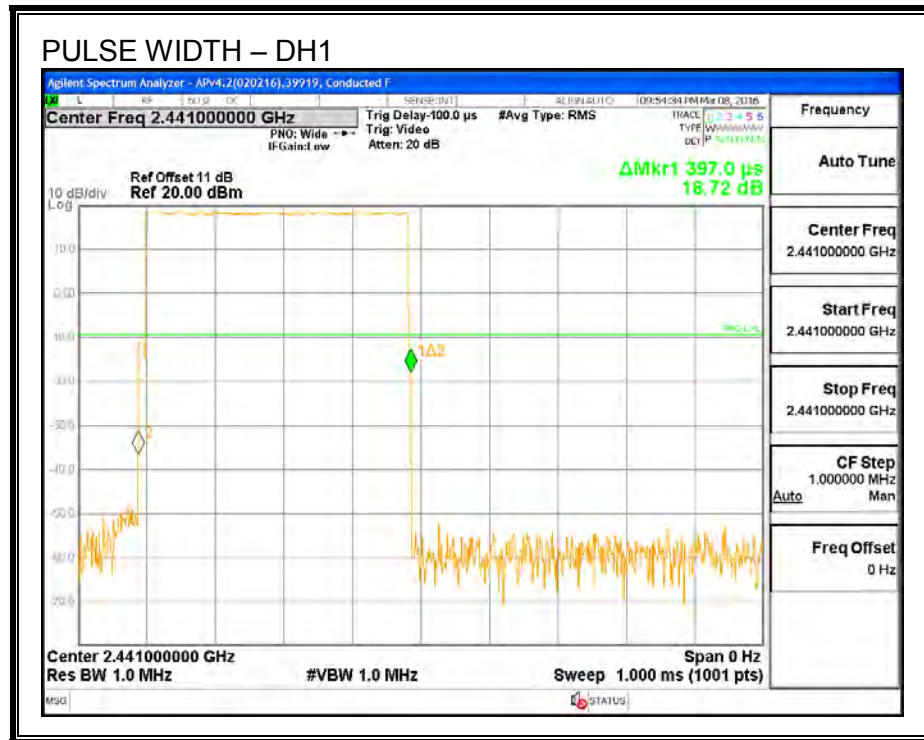
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

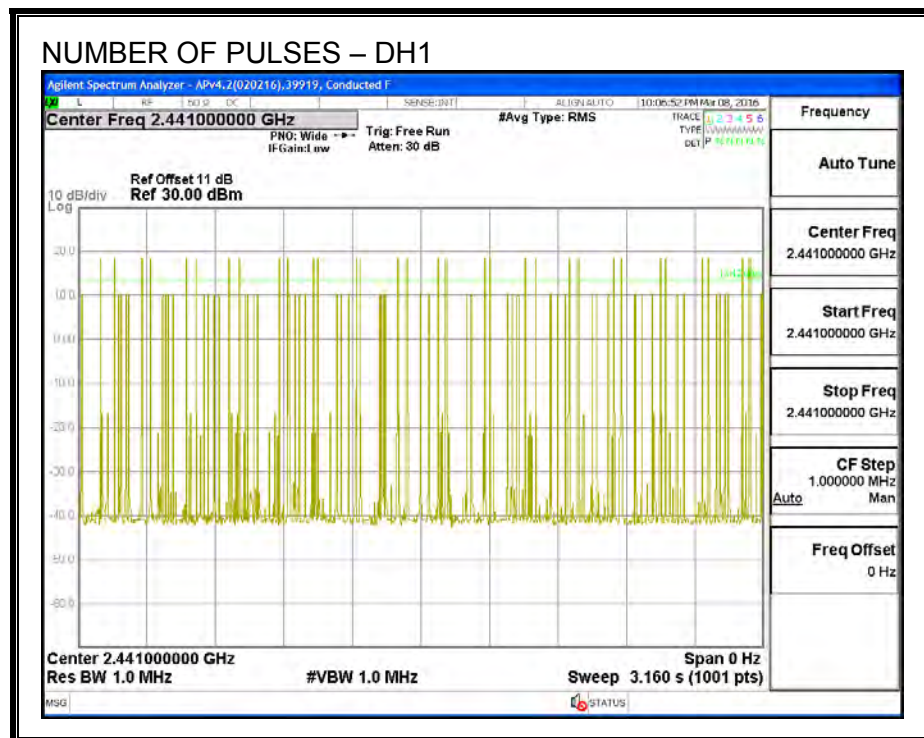
RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.397	32	0.127	0.4	-0.273
DH3	1.652	18	0.297	0.4	-0.103
DH5	2.908	12	0.349	0.4	-0.051
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.397	8	0.032	0.4	-0.368
DH3	1.652	4.5	0.074	0.4	-0.326
DH5	2.908	3	0.087	0.4	-0.313

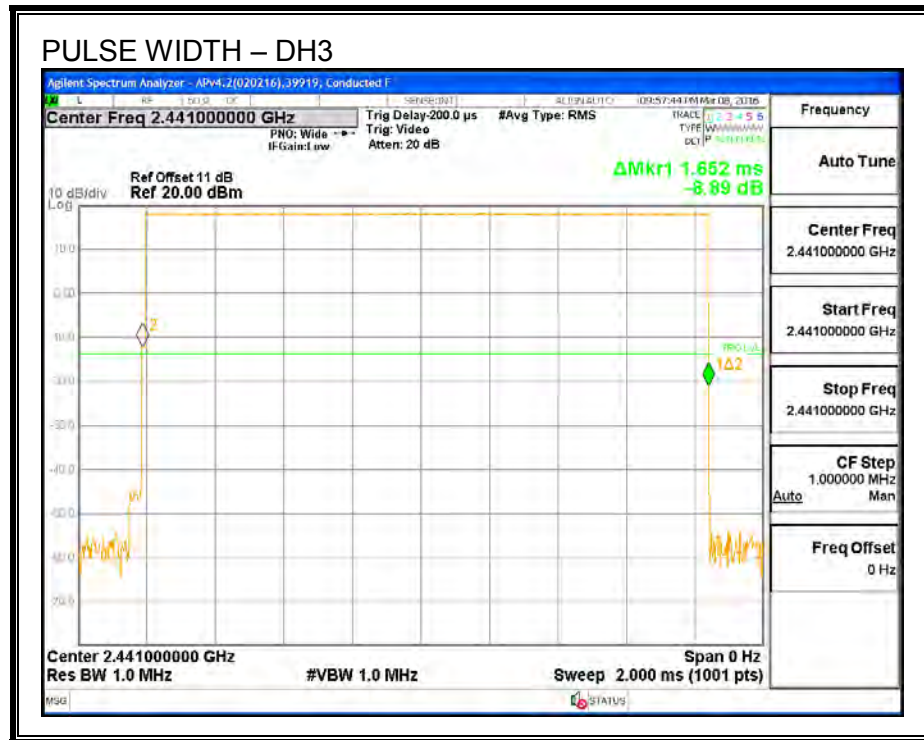
PULSE WIDTH - DH1



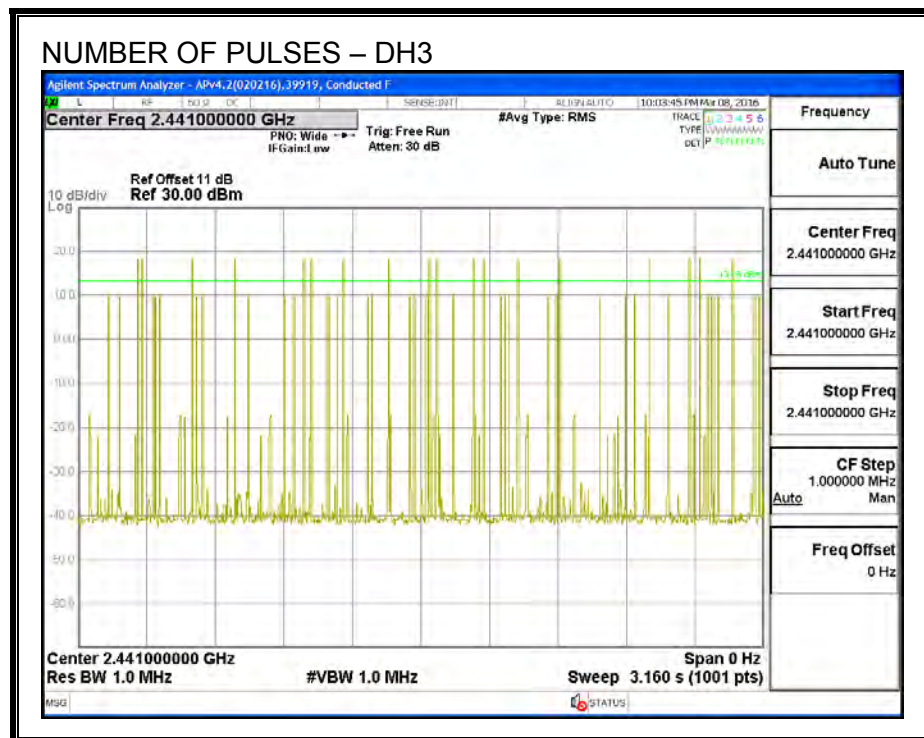
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



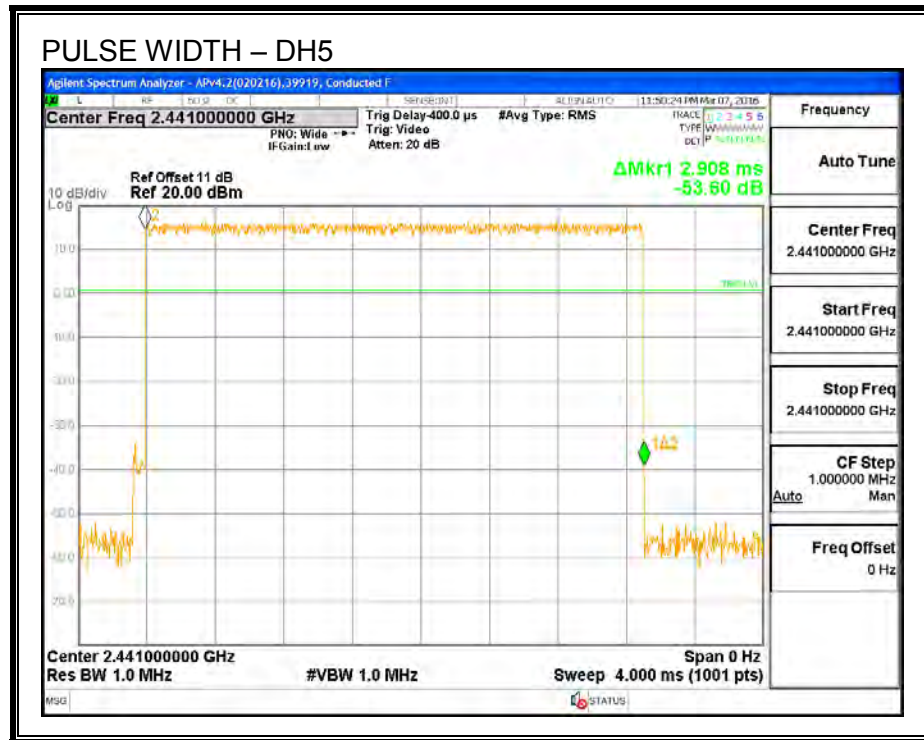
PULSE WIDTH – DH3



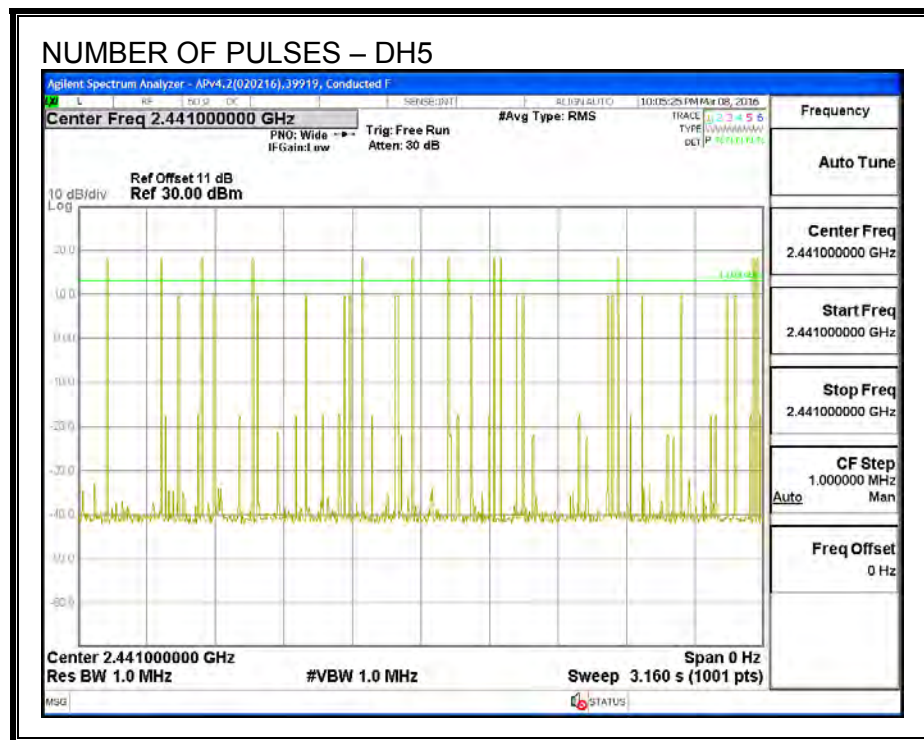
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.2.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 (5.4) (2)

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

TEST PROCEDURE

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

RESULTS

ID:	44366	Date:	8/24/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.18	30	-13.82
Middle	2441	16.43	30	-13.57
High	2480	16.22	30	-13.78

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.

ID:	44366	Date:	8/24/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	15.94
Middle	2441	16.21
High	2480	16.02

7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

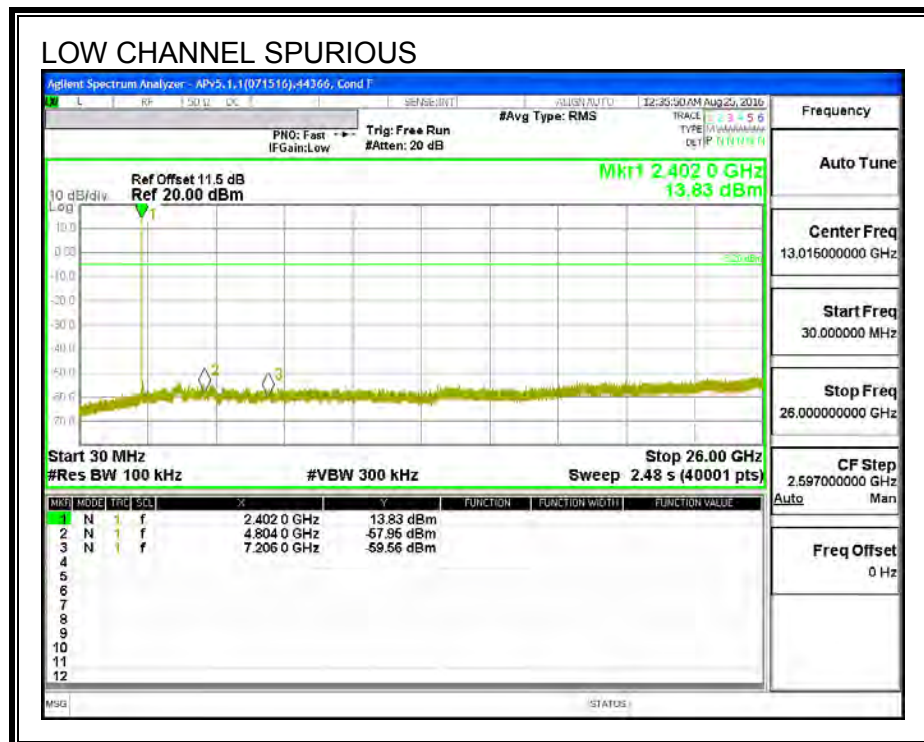
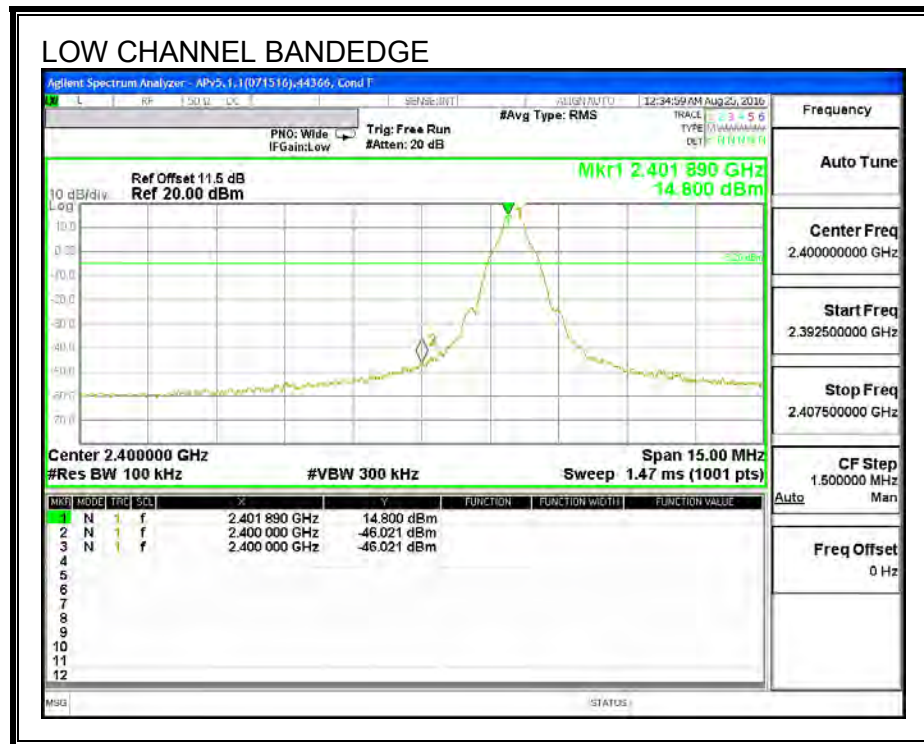
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

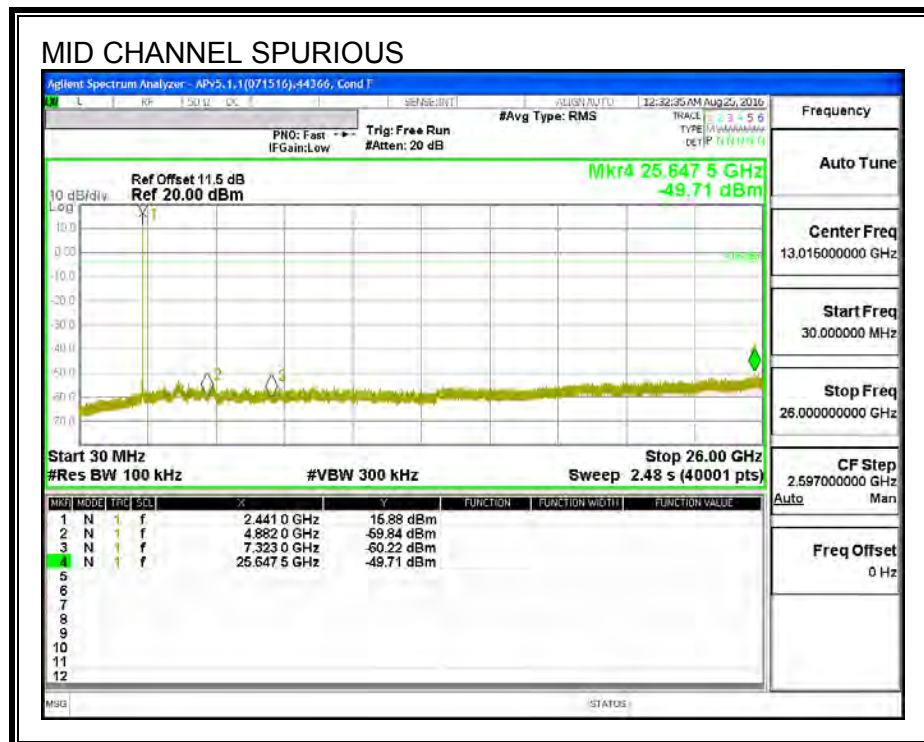
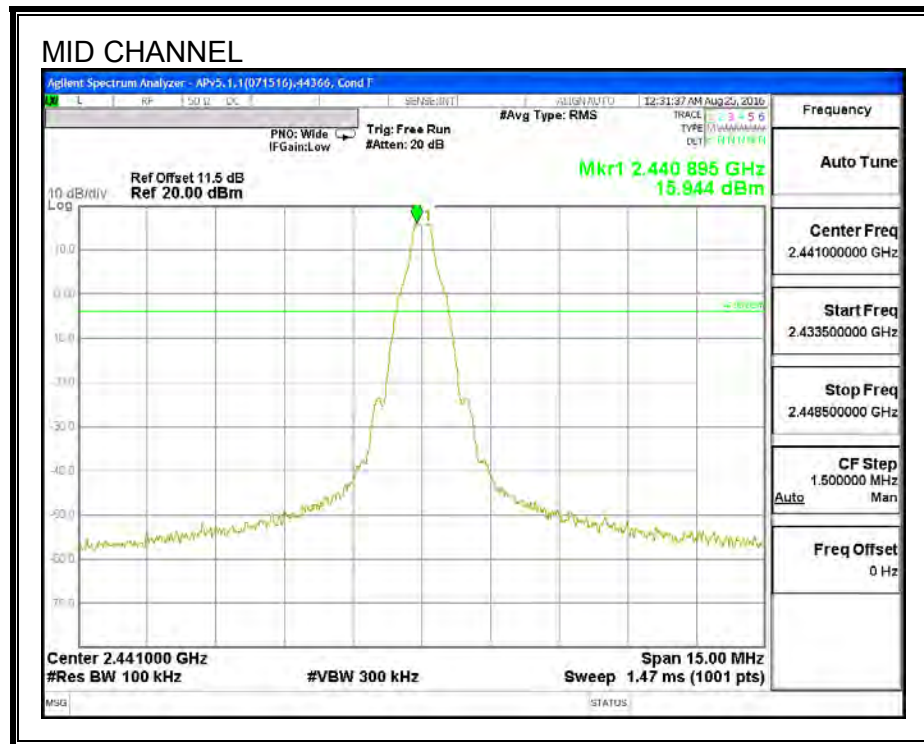
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

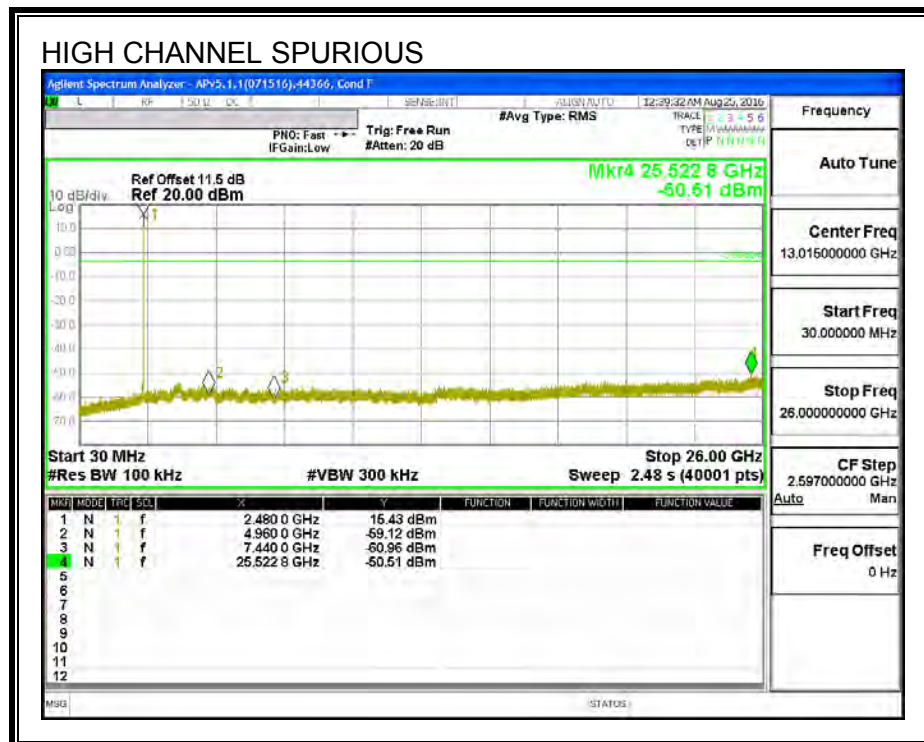
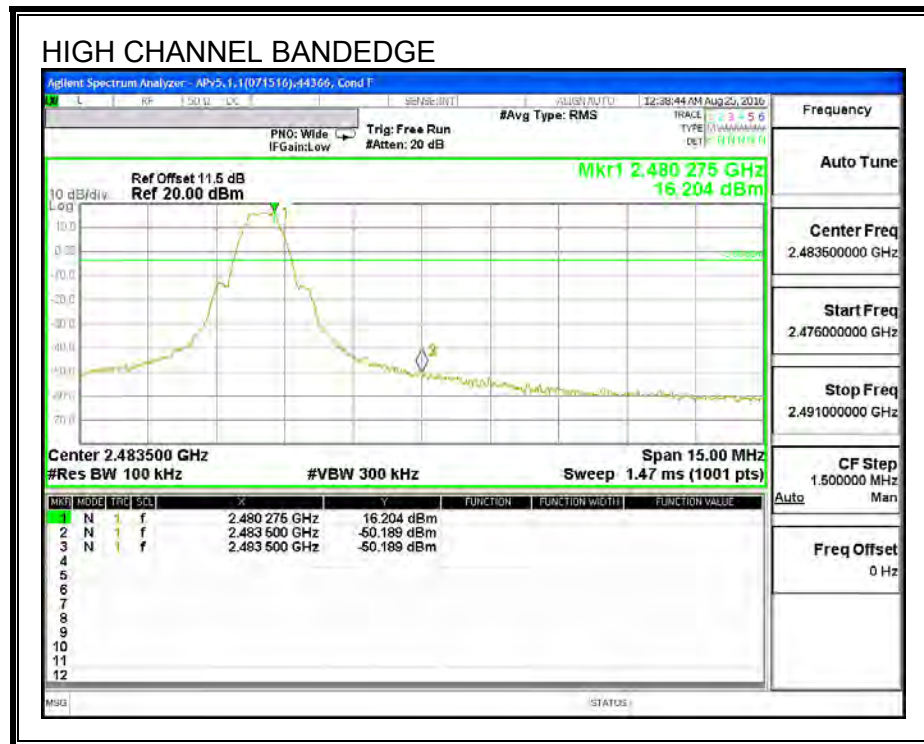
SPURIOUS EMISSIONS, LOW CHANNEL



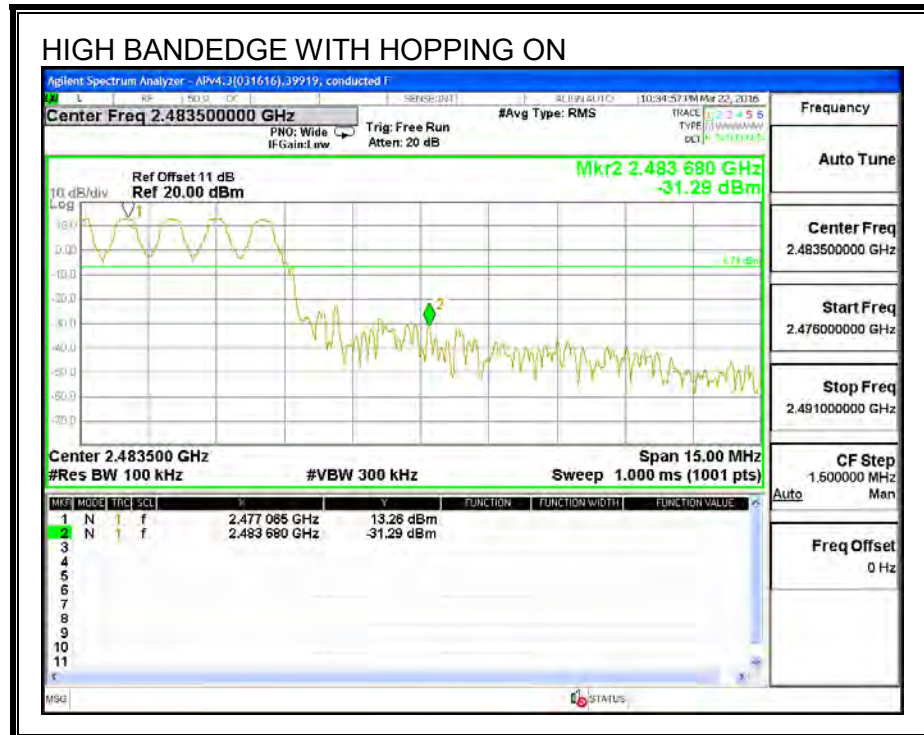
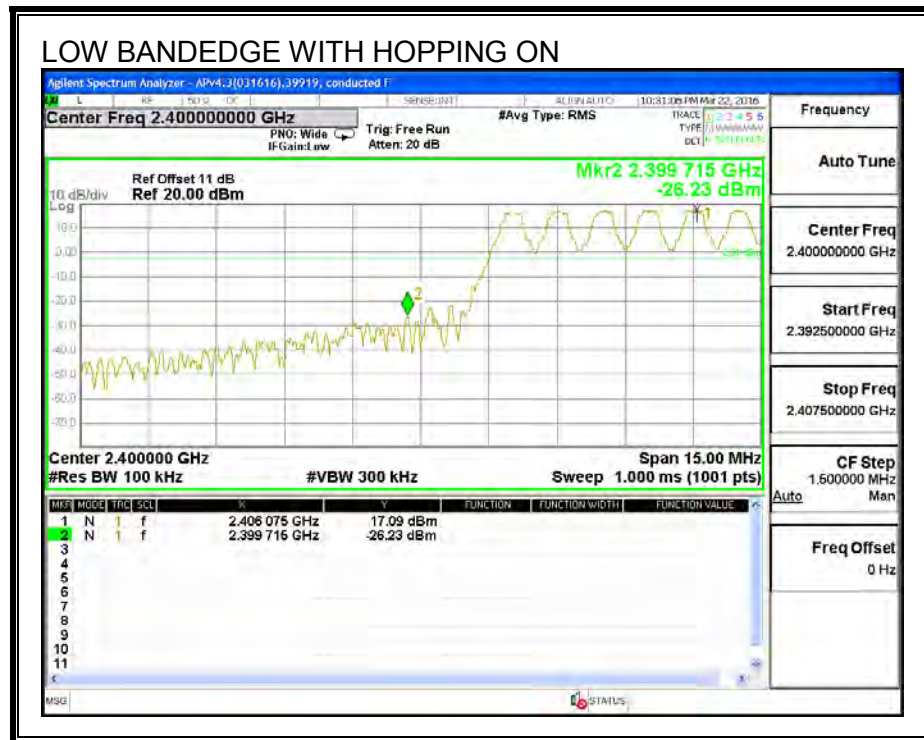
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.3. HIGH POWER ENHANCED DATA RATE QPSK MODULATION

7.3.1. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 (5.4) (2)

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

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

TEST PROCEDURE

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

RESULTS

ID:	44366	Date:	8/24/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.11	21	-1.86
Middle	2441	19.28	21	-1.69
High	2480	19.15	21	-1.82

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.

ID:	44366	Date:	8/24/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	15.96
Middle	2441	16.19
High	2480	15.93

7.4. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

7.4.1. 99% AND 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

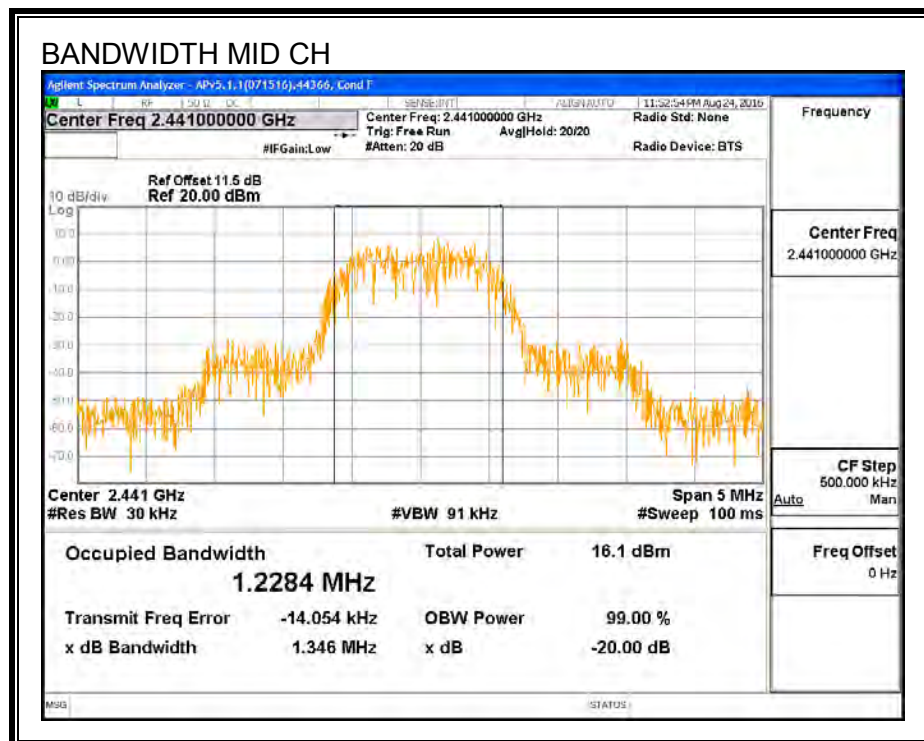
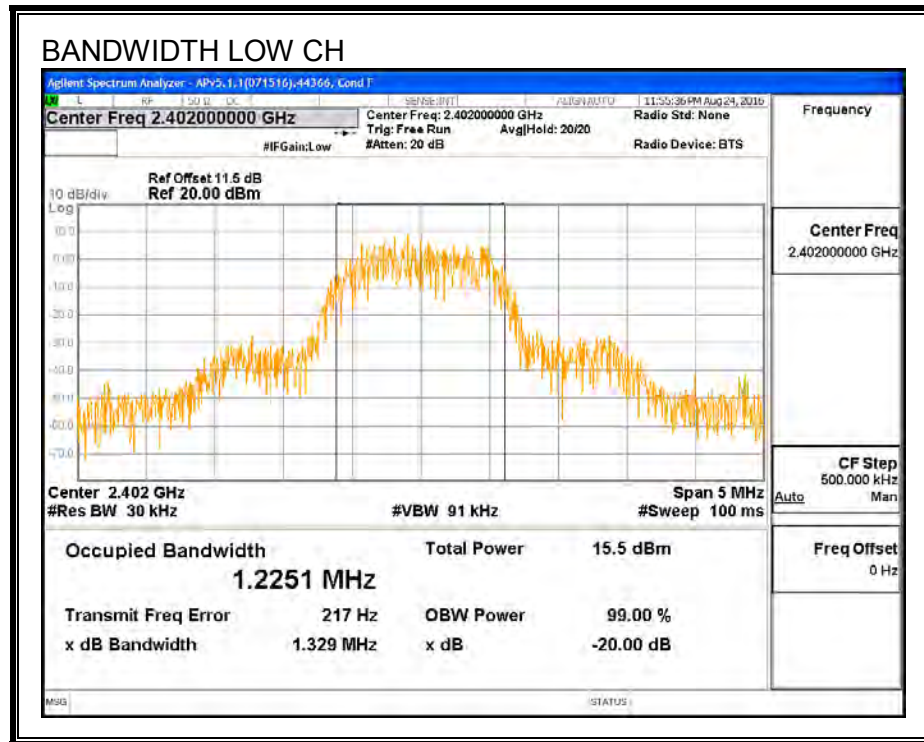
TEST PROCEDURE

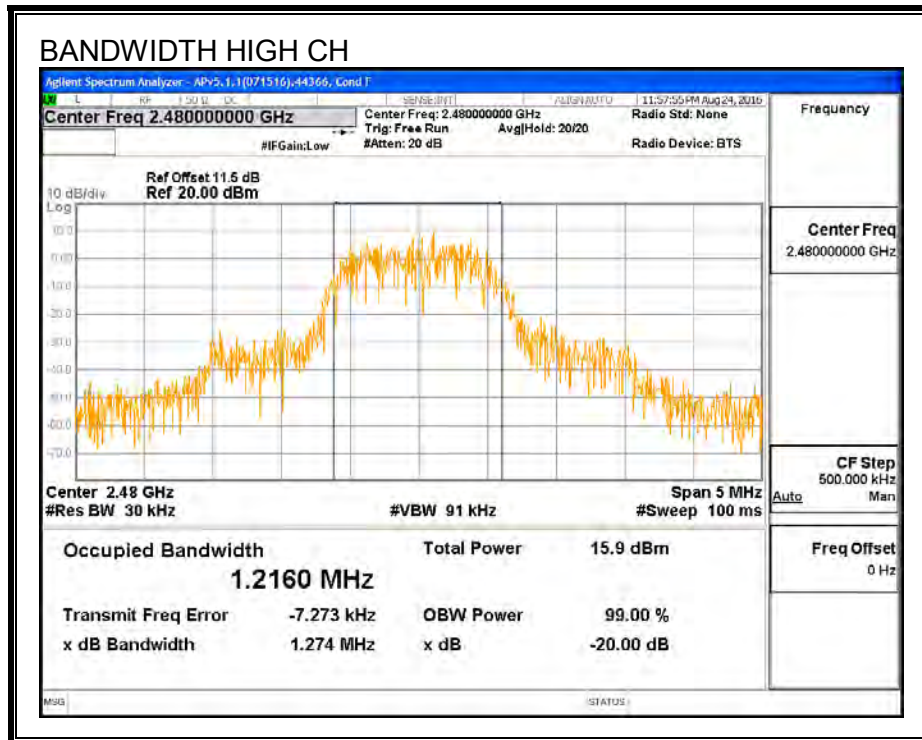
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (kHz)	20 dB Bandwidth (kHz)
Low	2402	1225.1	1329.0
Middle	2441	1228.4	1346.0
High	2480	1216.0	1274.0

99% AND 20 dB BANDWIDTH





7.4.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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

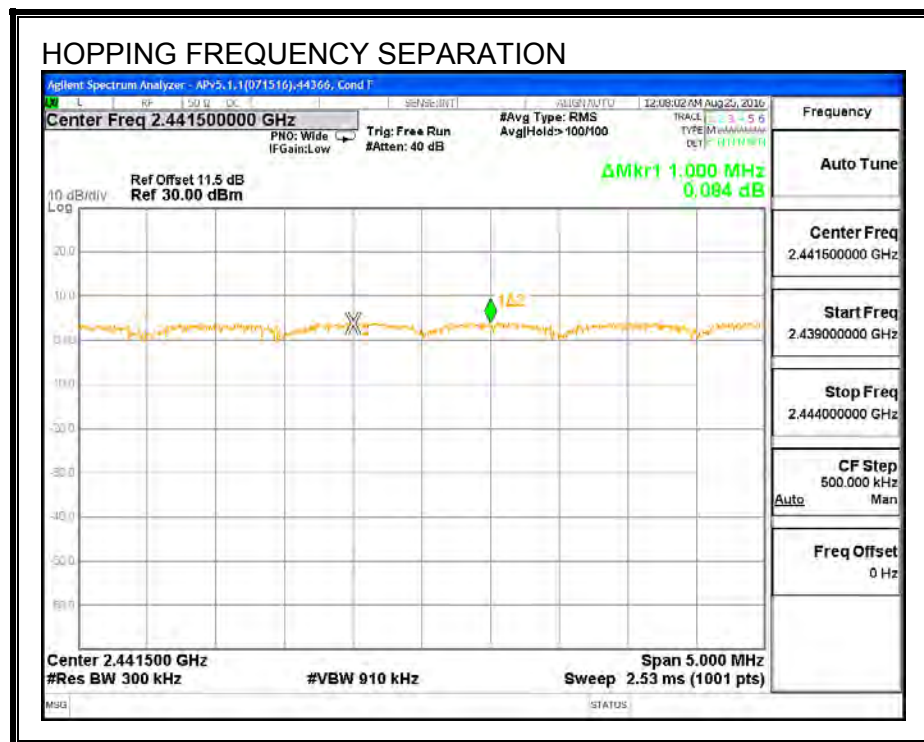
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 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-247 (5.1) (4)

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

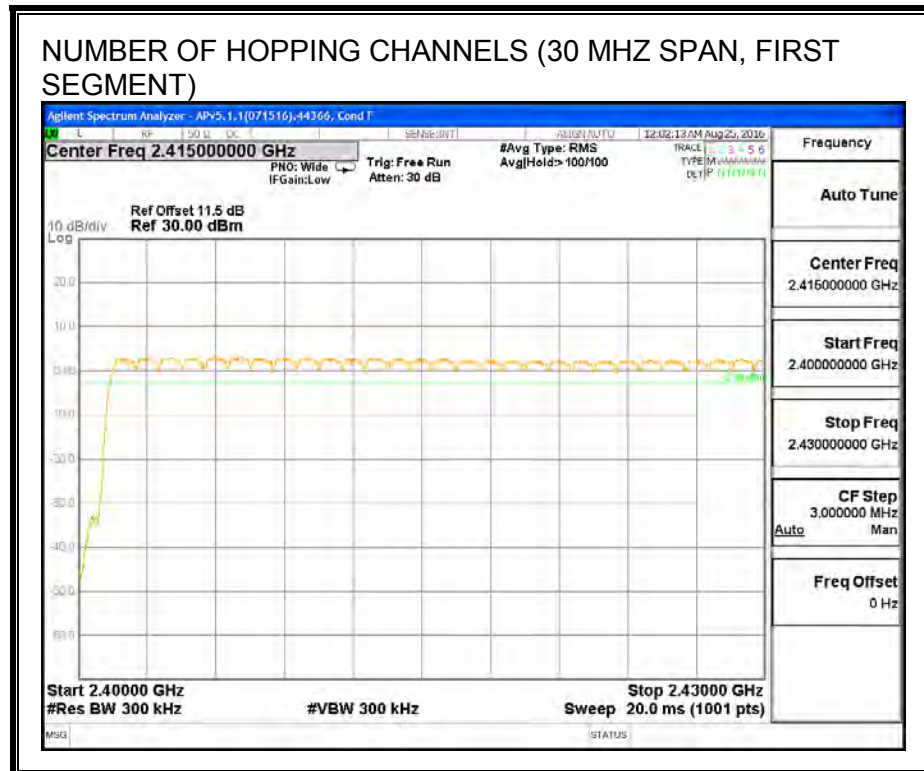
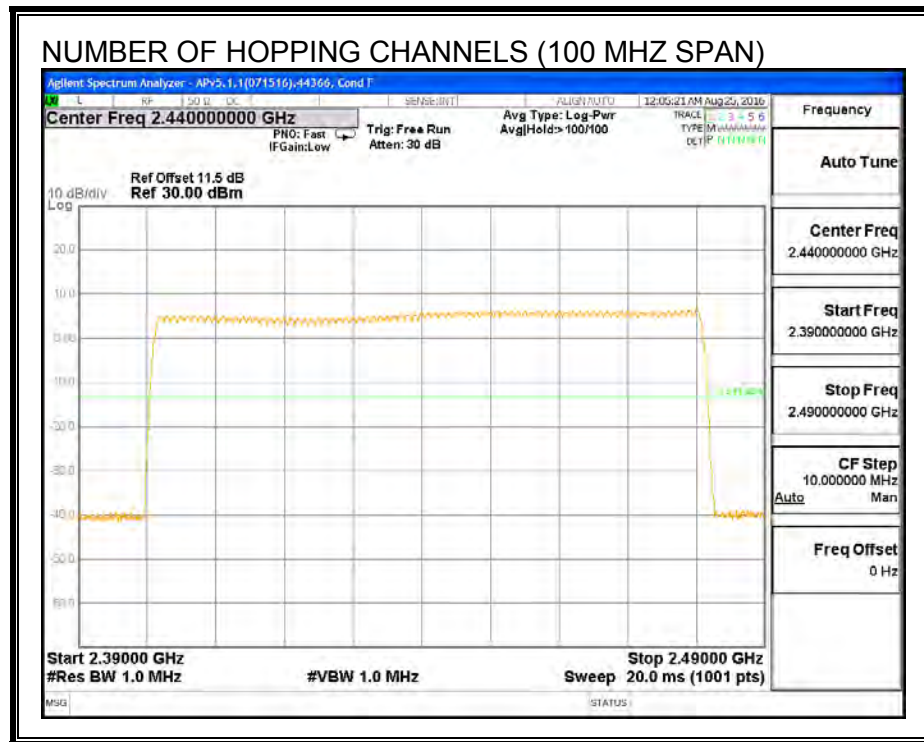
TEST PROCEDURE

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

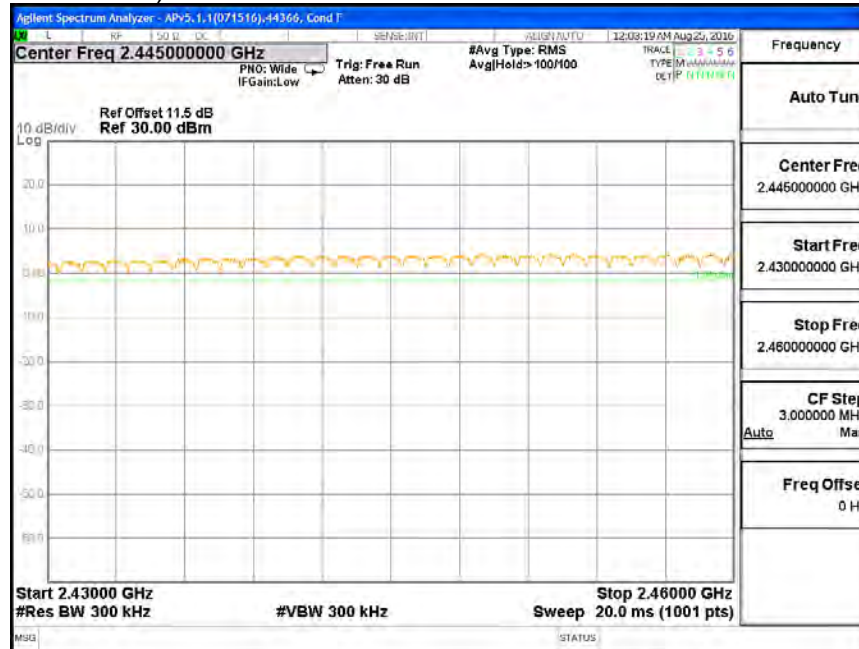
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS



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



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



7.4.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

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

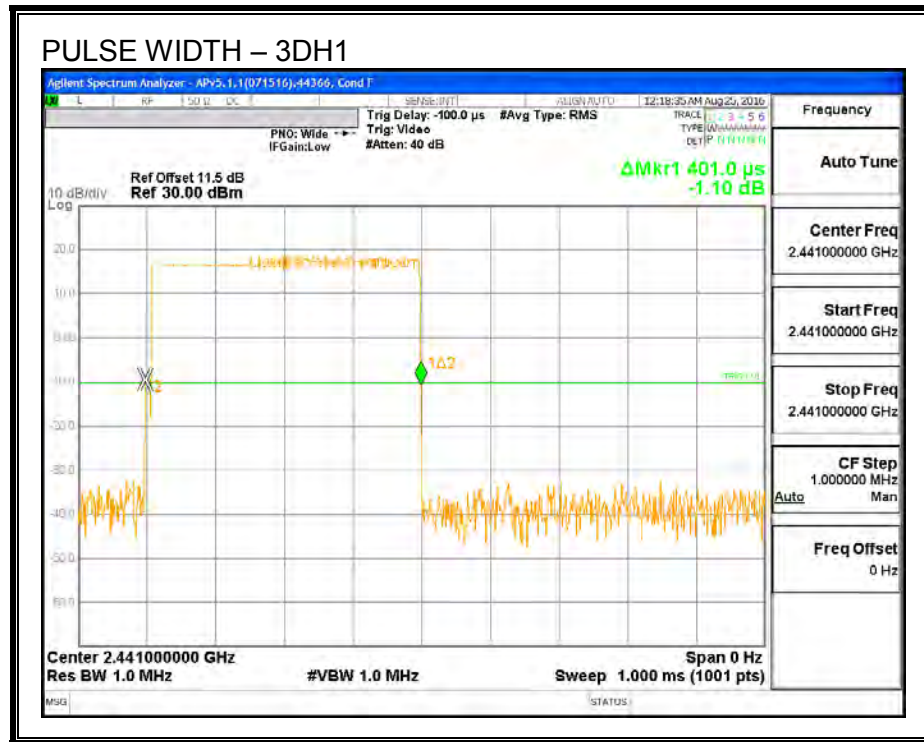
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

RESULTS

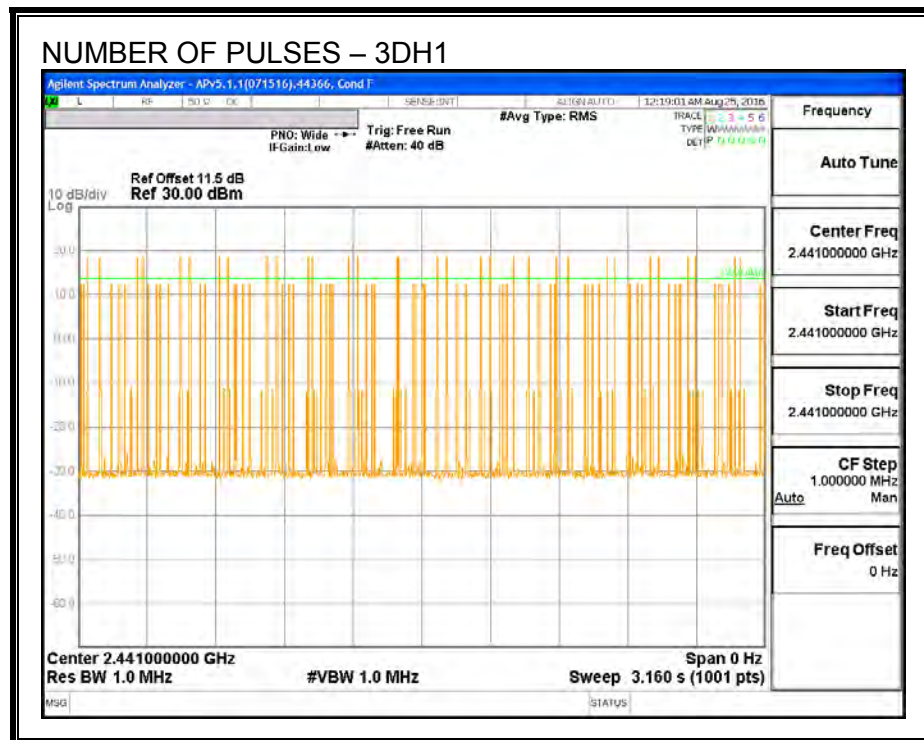
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.401	32	0.128	0.4	-0.272
3DH3	1.542	18	0.278	0.4	-0.122
3DH5	2.9	11	0.319	0.4	-0.081

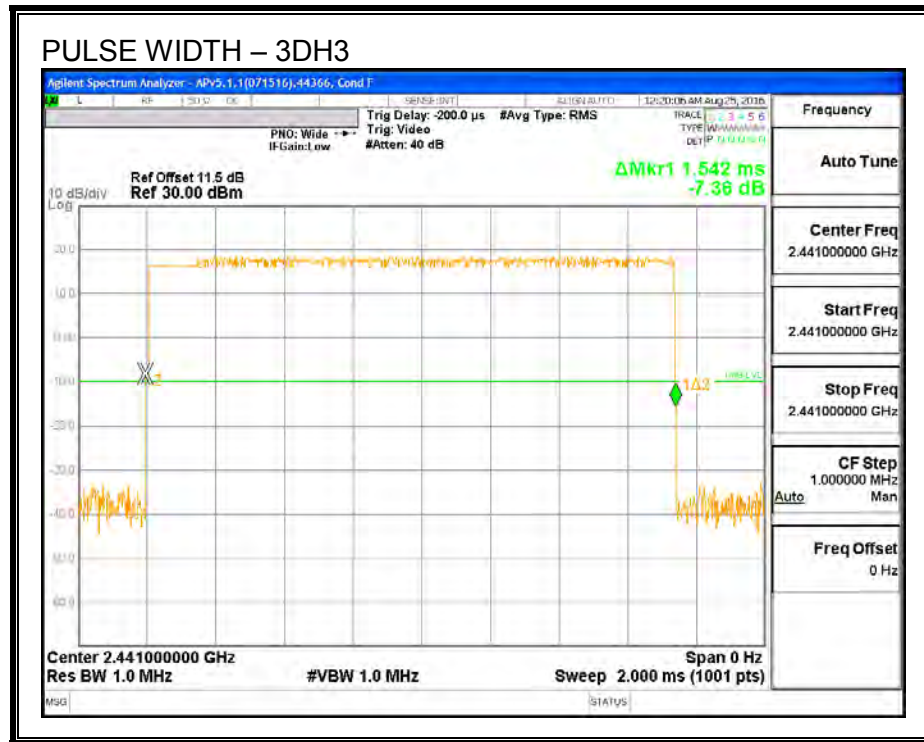
PULSE WIDTH - 3DH1



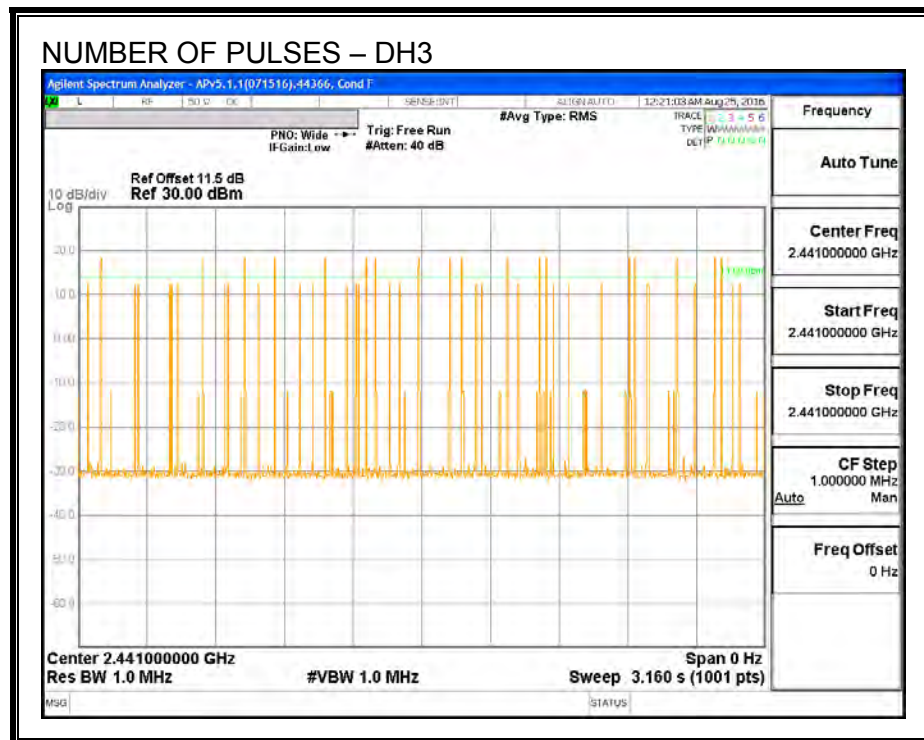
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



PULSE WIDTH – 3DH3



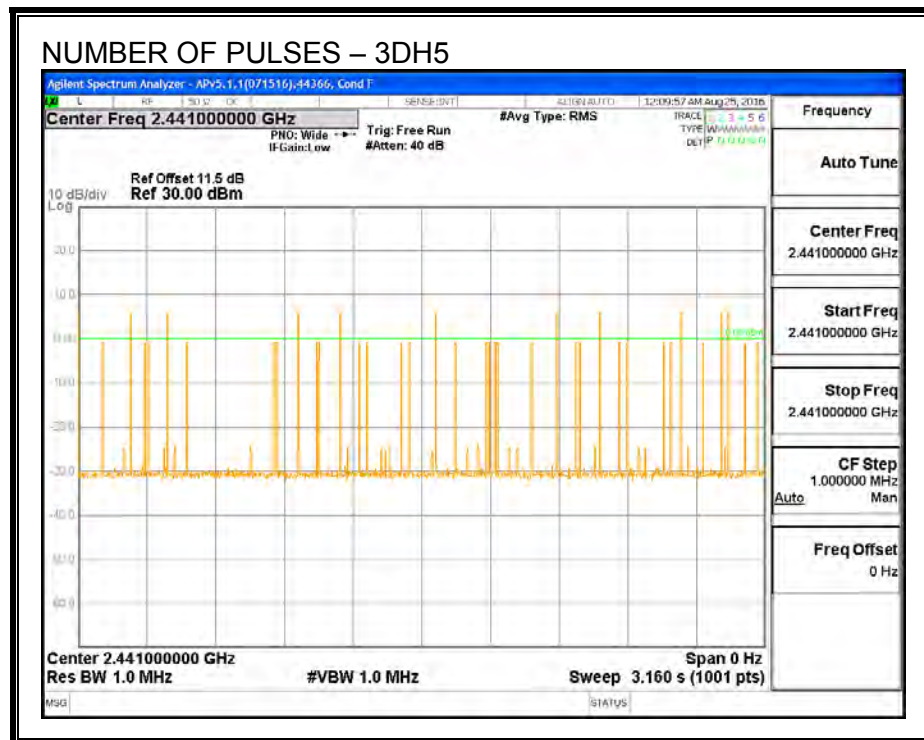
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5



7.4.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-247 (5.4) (2)

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

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

TEST PROCEDURE

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

RESULTS

ID:	44366	Date:	8/24/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	19.20	21	-1.77
Middle	2441	19.32	21	-1.65
High	2480	19.22	21	-1.75

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.

ID:	44366	Date:	8/24/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	15.98
Middle	2441	16.21
High	2480	15.94

7.4.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

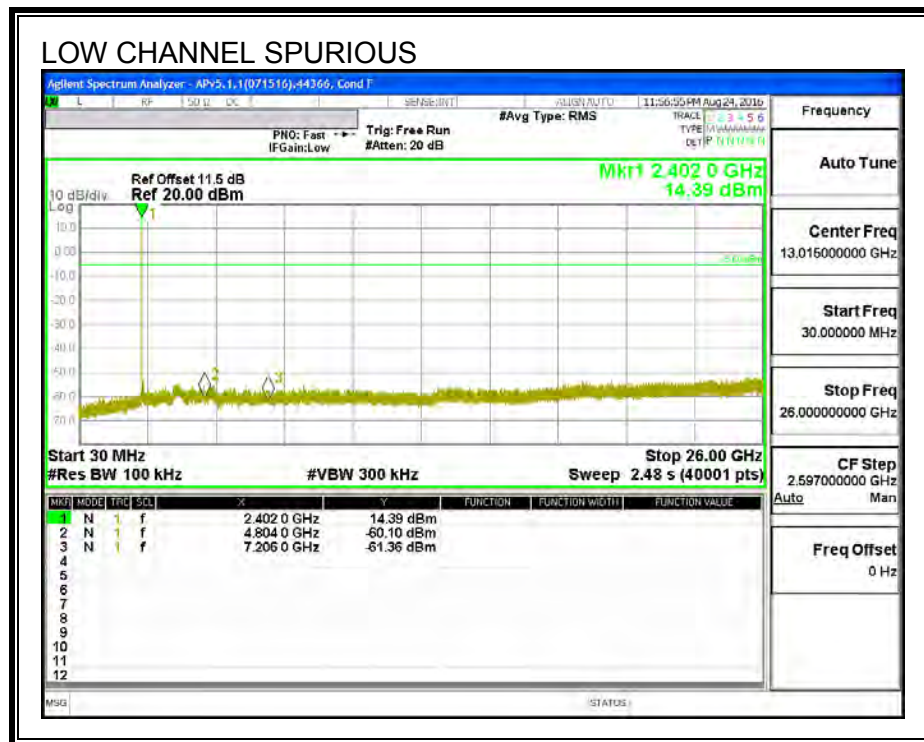
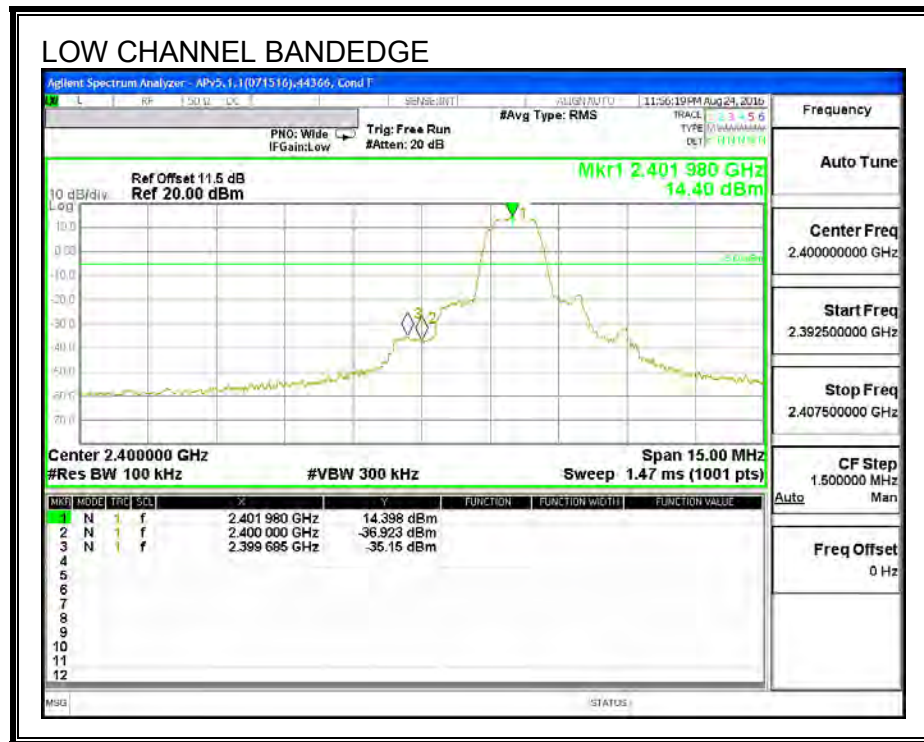
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

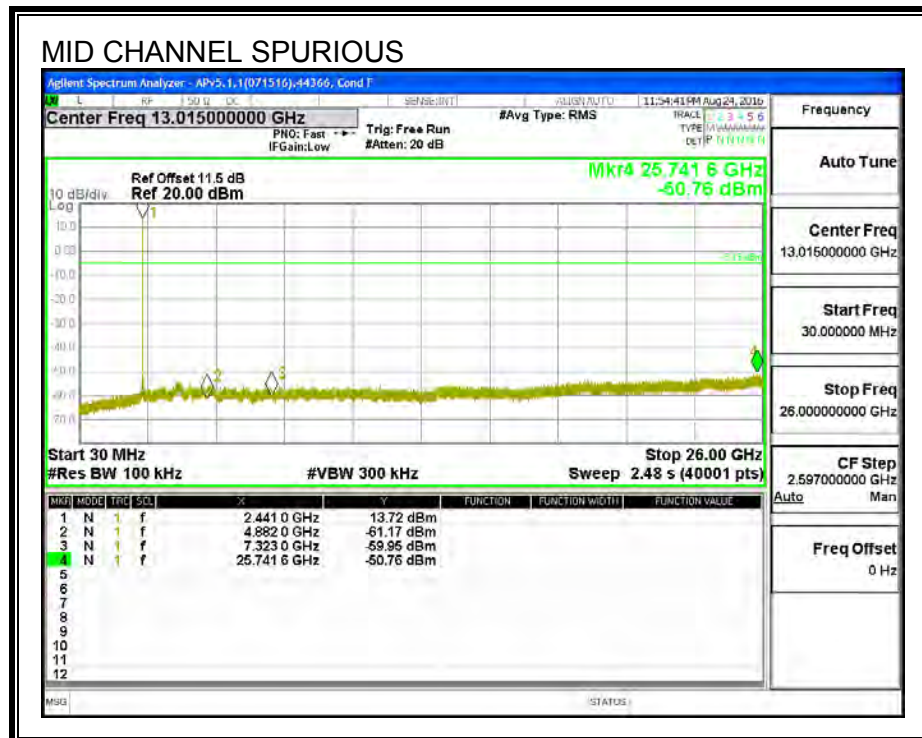
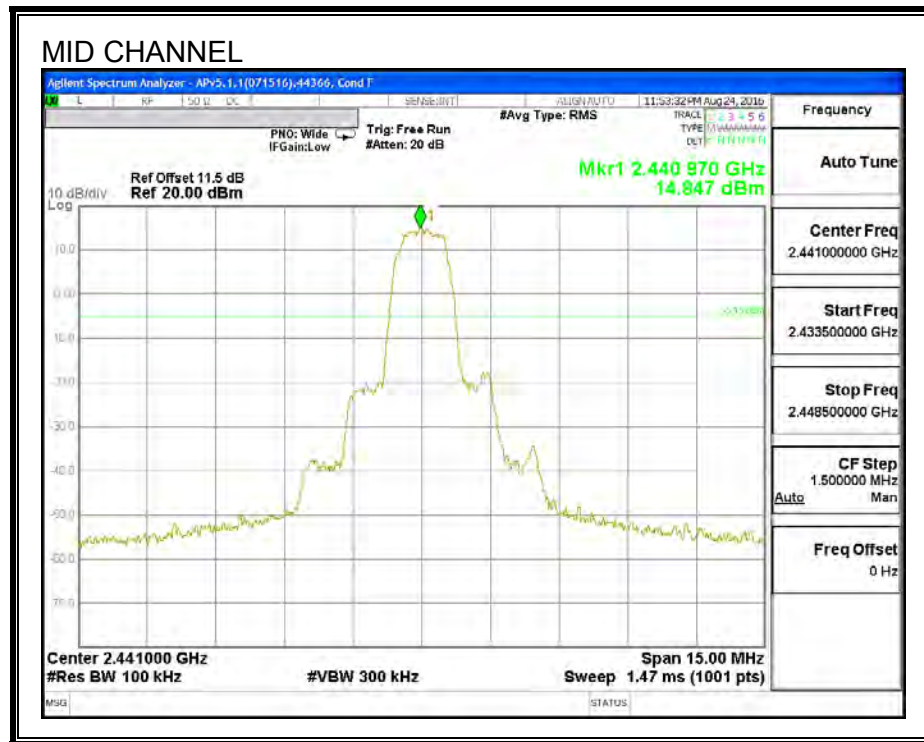
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

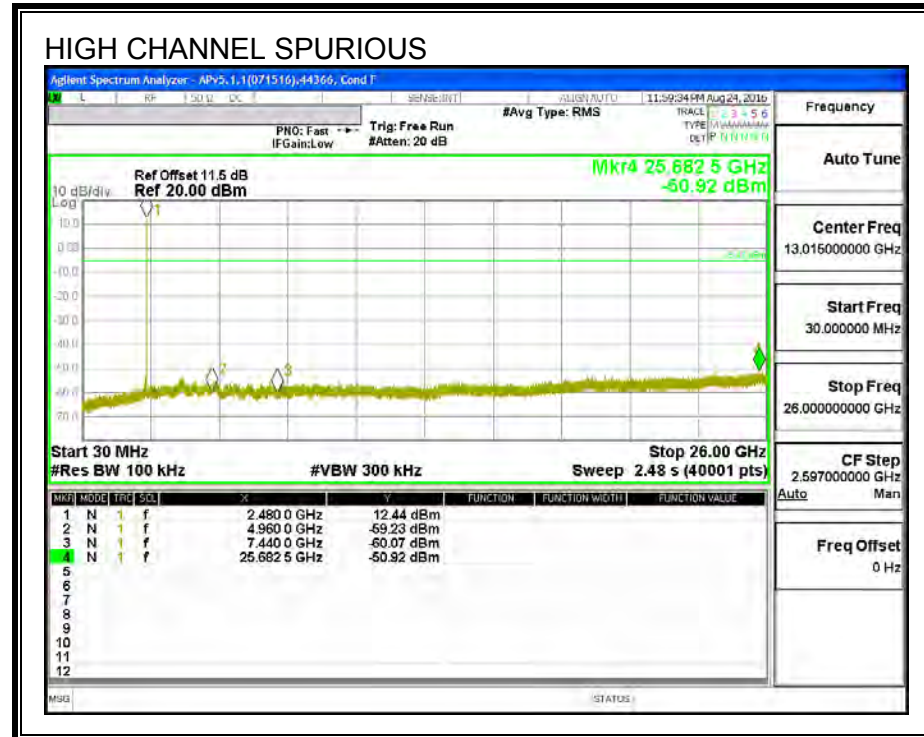
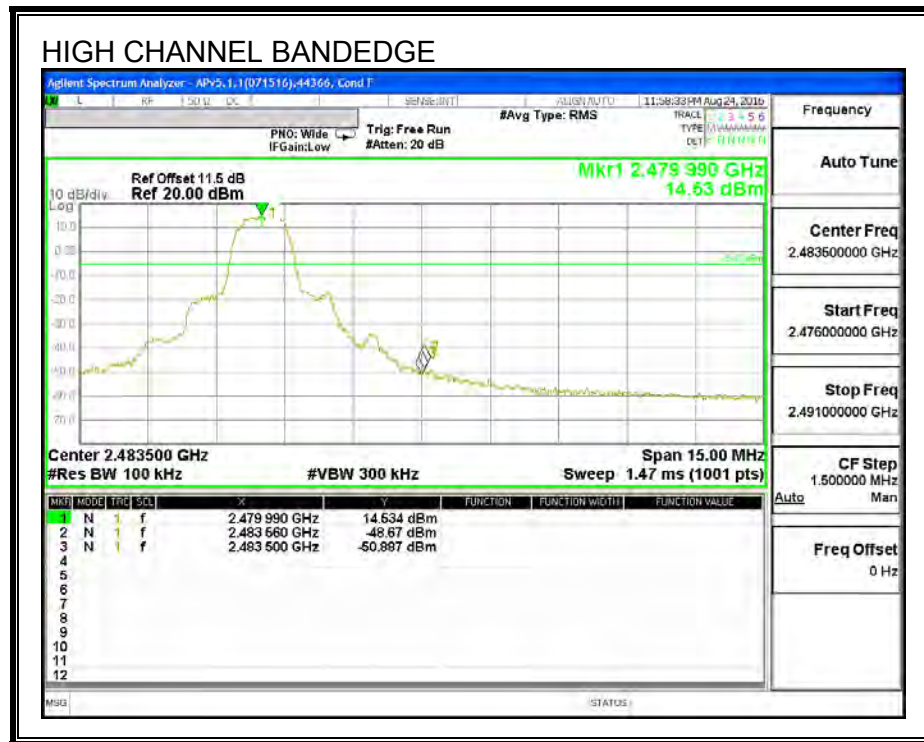
SPURIOUS EMISSIONS, LOW CHANNEL



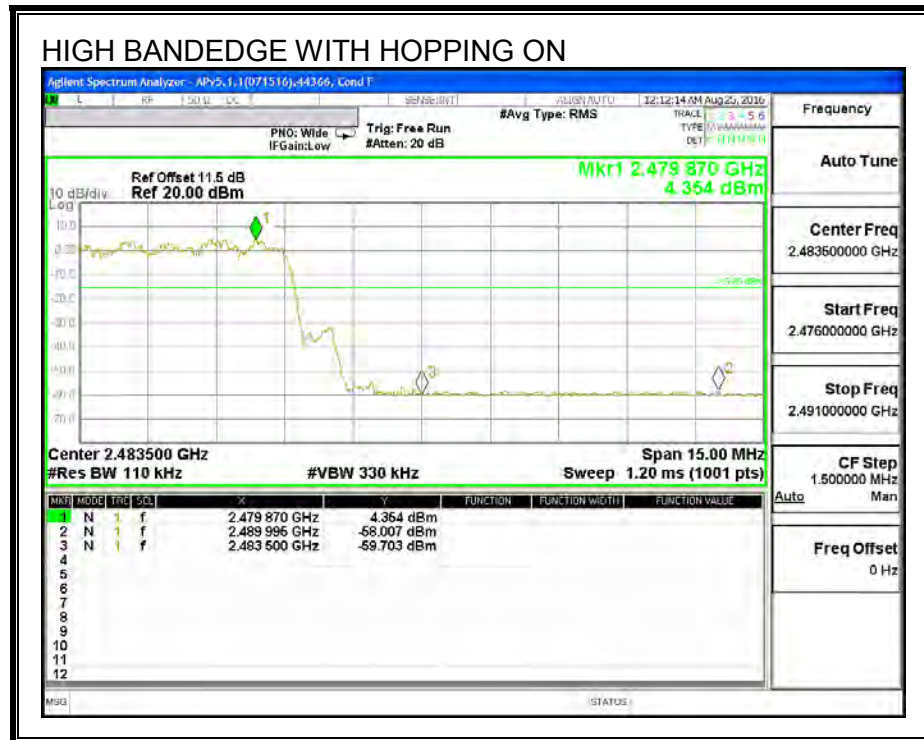
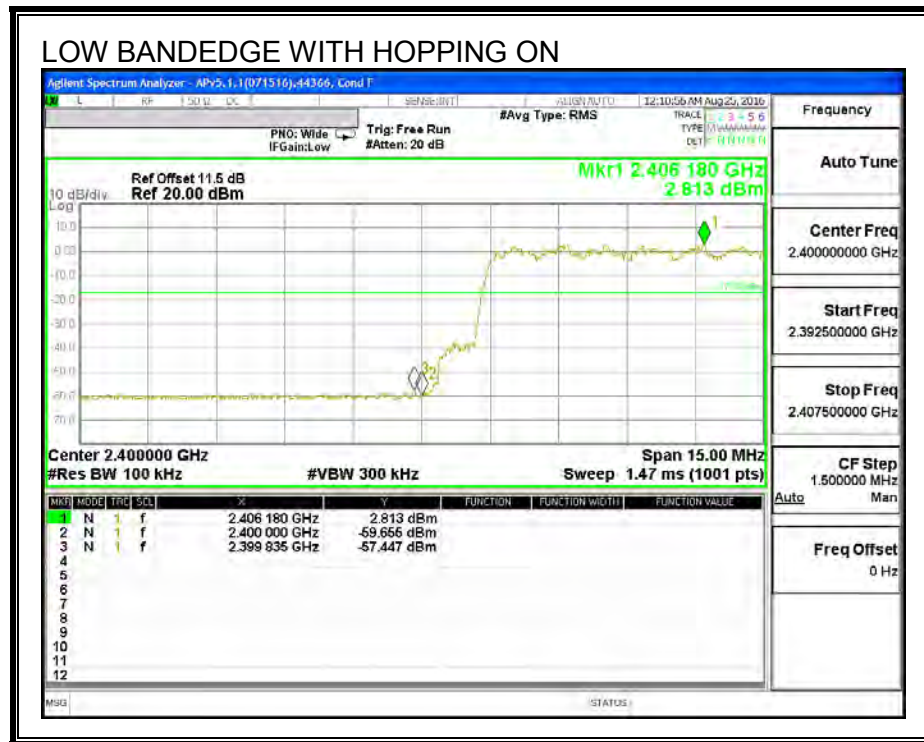
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.5. LOW POWER BASIC DATA RATE GFSK MODULATION

7.5.1. 99% AND 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

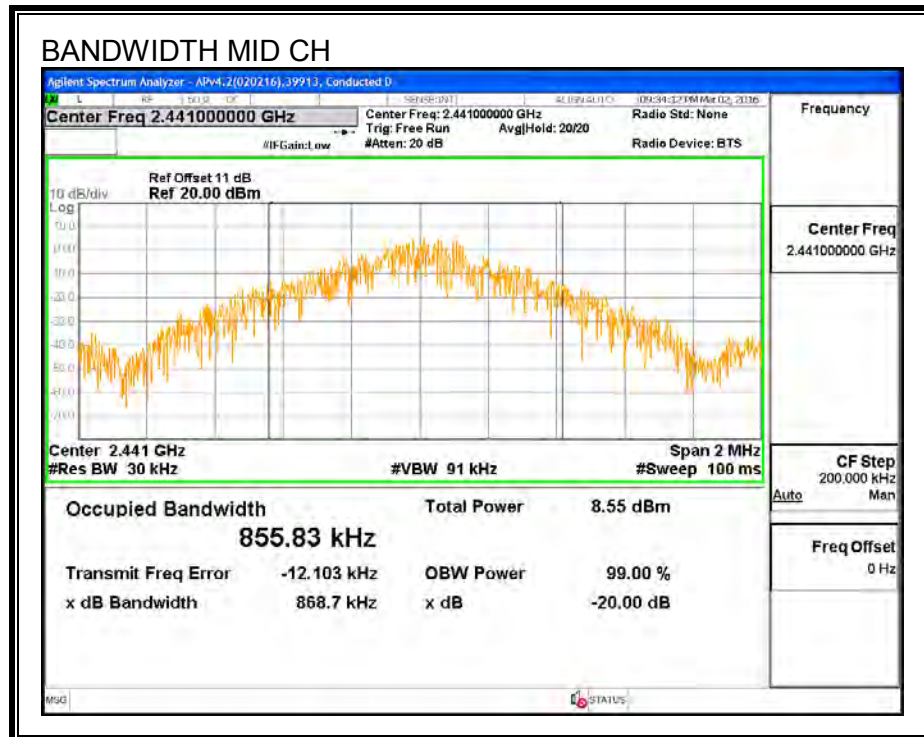
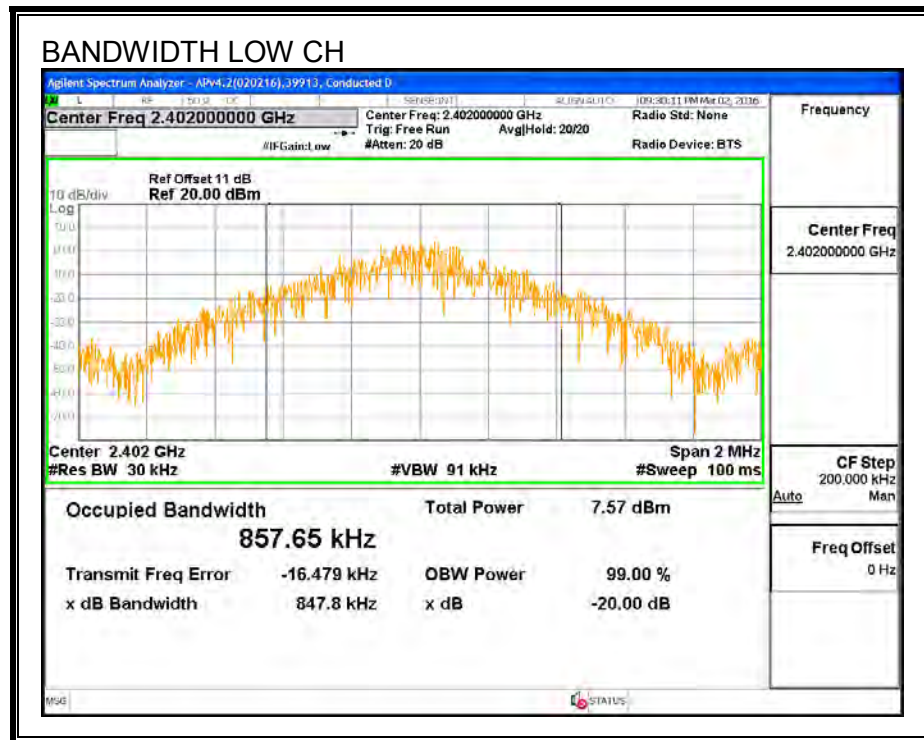
TEST PROCEDURE

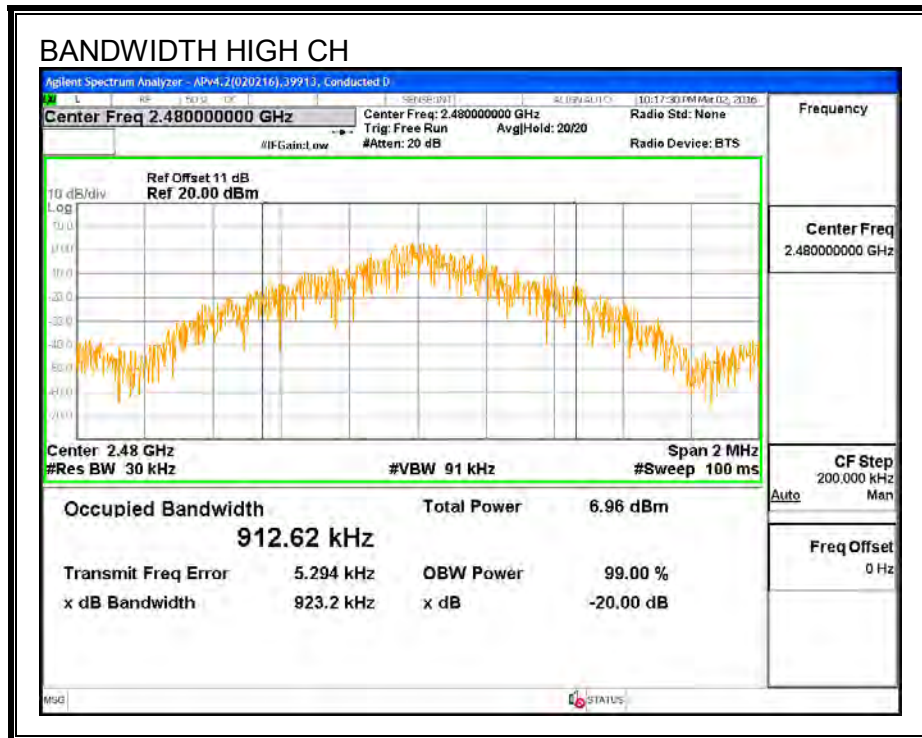
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (KHz)	20 dB Bandwidth (KHz)
Low	2402	857.65	847.8
Middle	2441	855.83	868.7
High	2480	912.62	923.2

99% AND 20dB BANDWIDTH





7.5.2. 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.

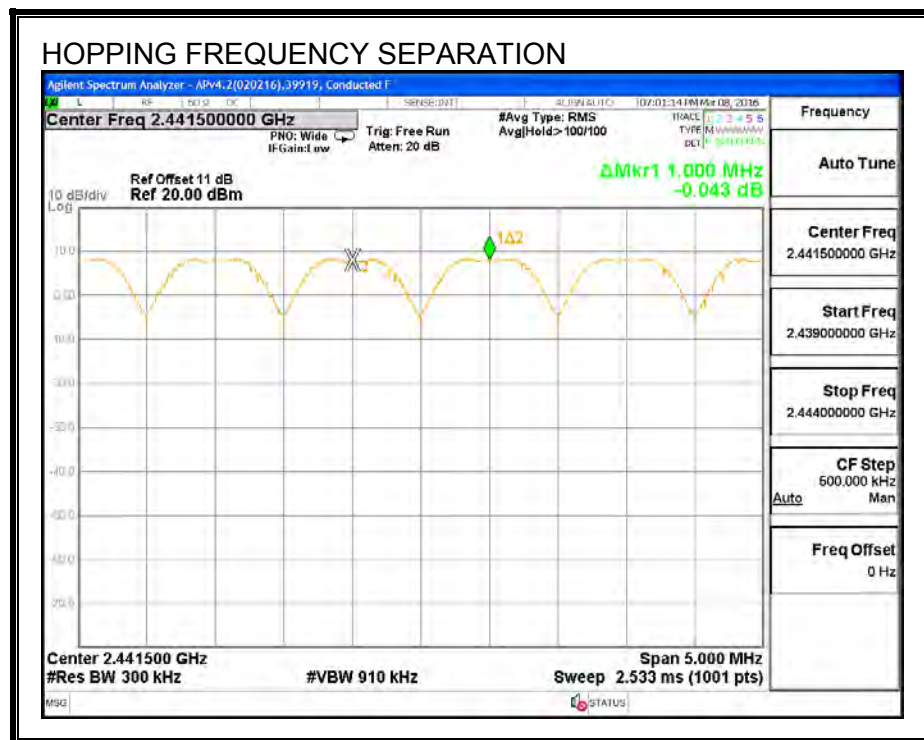
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 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 910 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.5.3. 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.

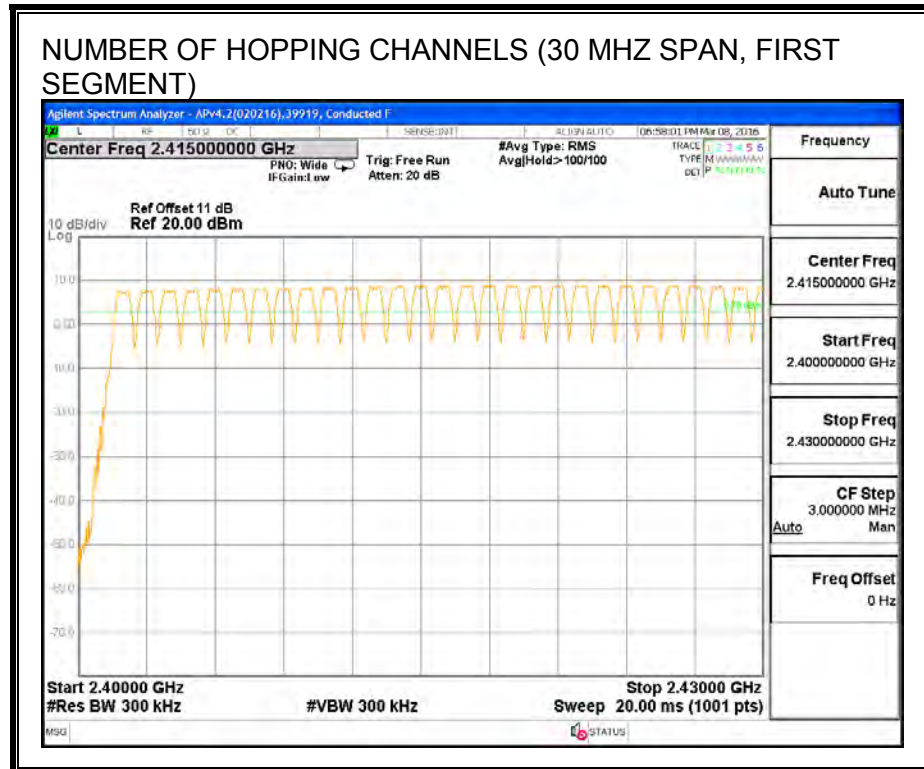
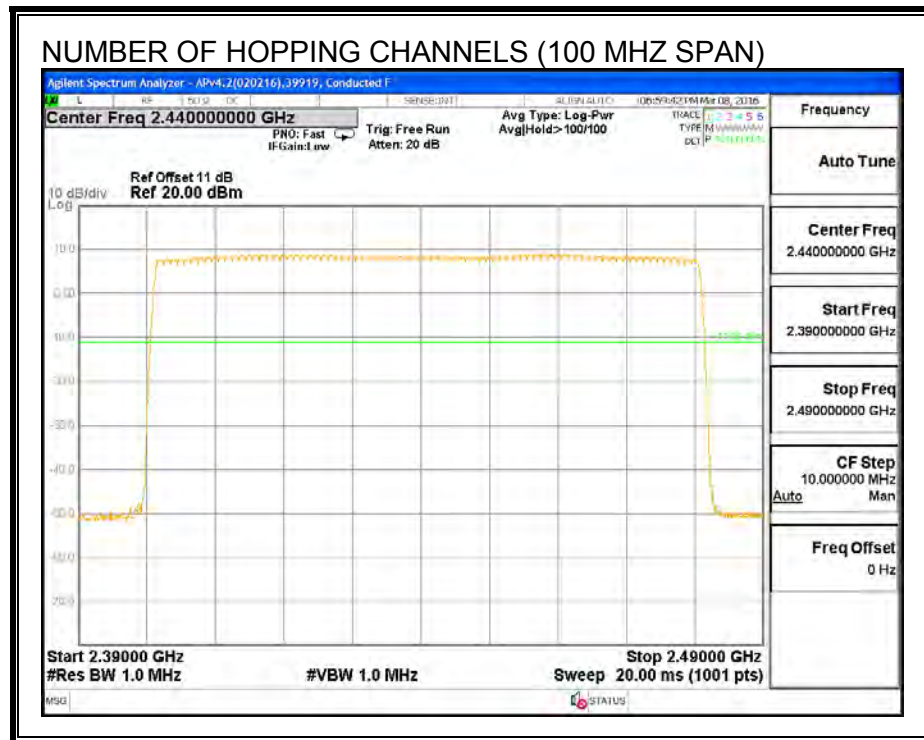
TEST PROCEDURE

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.

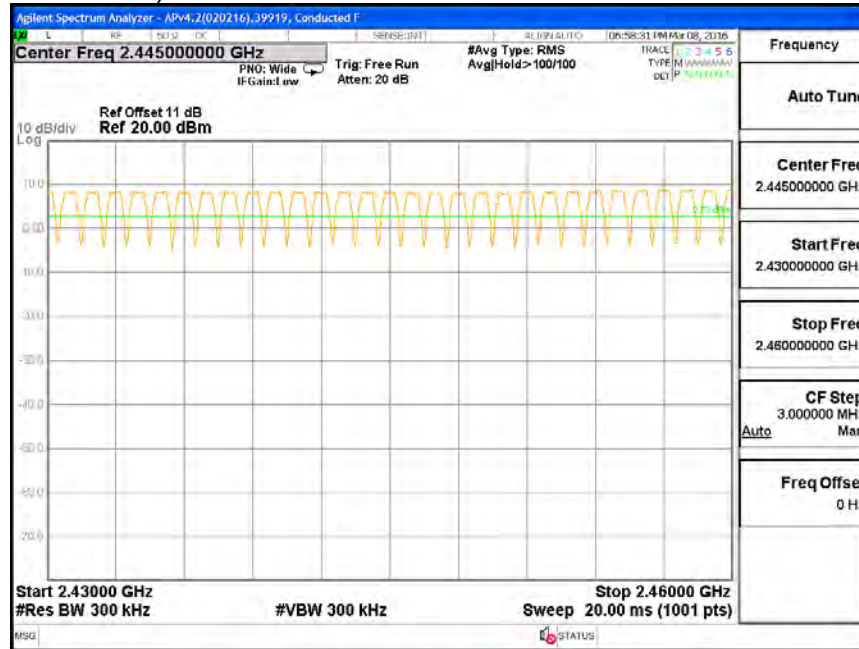
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS



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



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



7.5.4. 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.

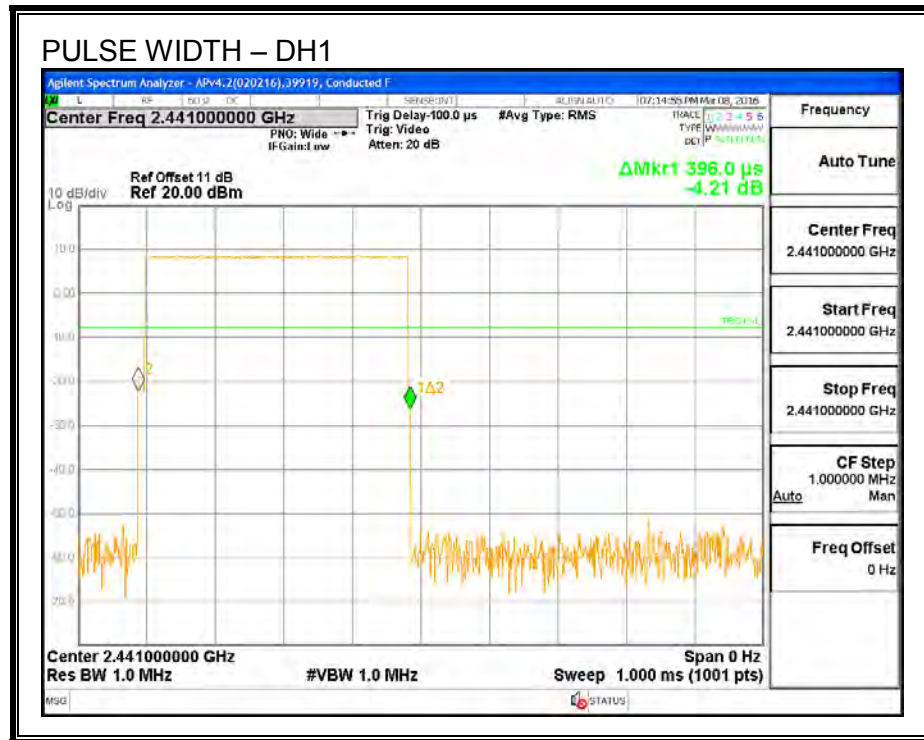
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

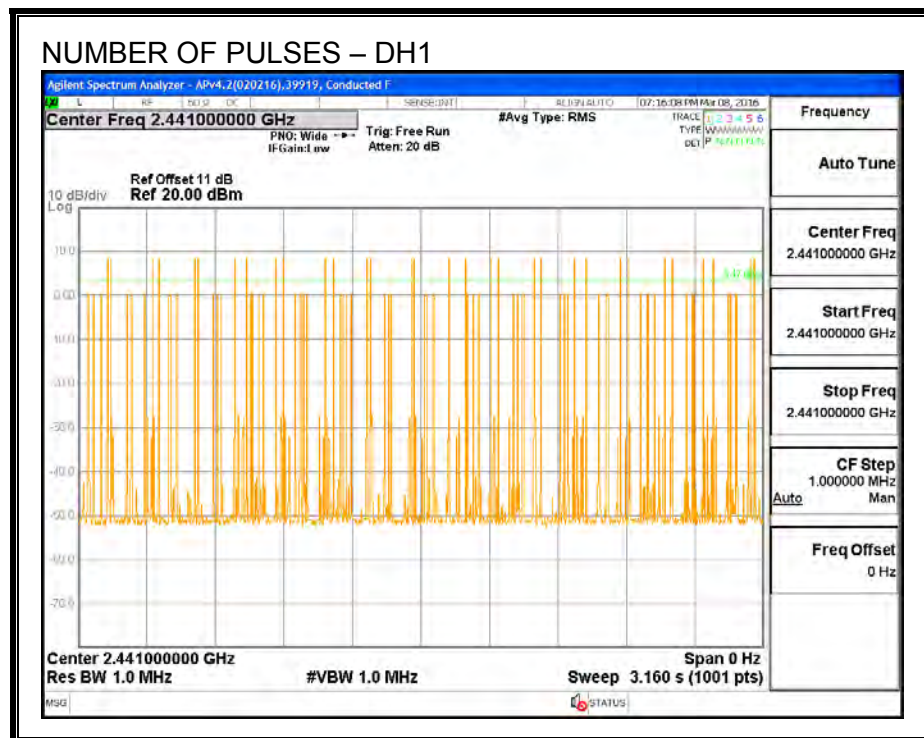
RESULTS

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	0.396	32	0.127	0.4	-0.273
DH3	1.652	18	0.297	0.4	-0.103
DH5	2.900	13	0.377	0.4	-0.023
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.396	8	0.032	0.4	-0.368
DH3	1.652	4.5	0.074	0.4	-0.326
DH5	2.9	3.25	0.094	0.4	-0.306

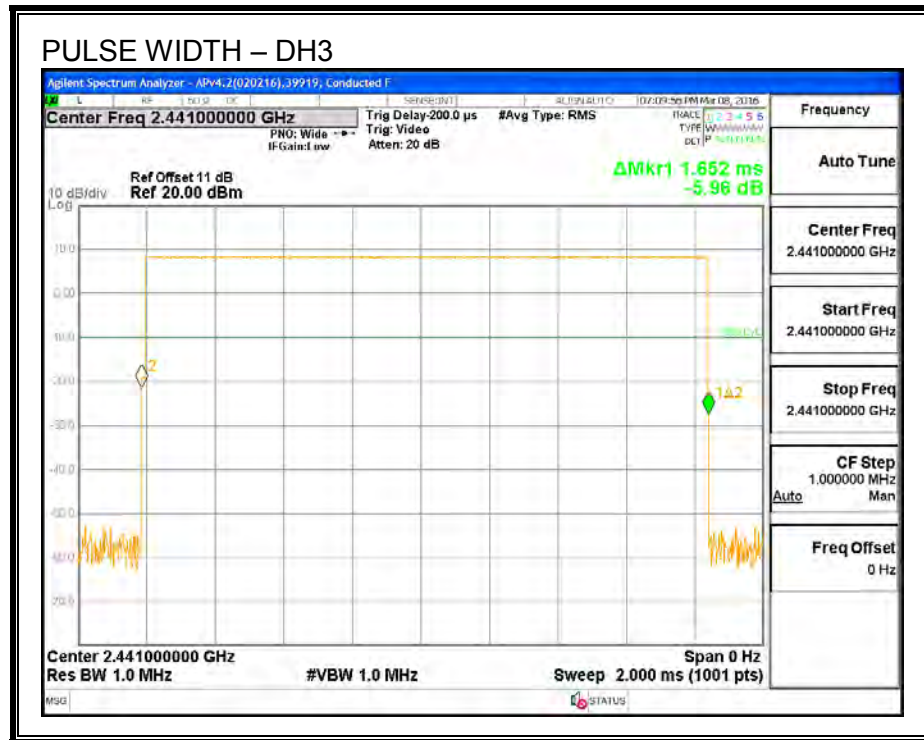
PULSE WIDTH - DH1



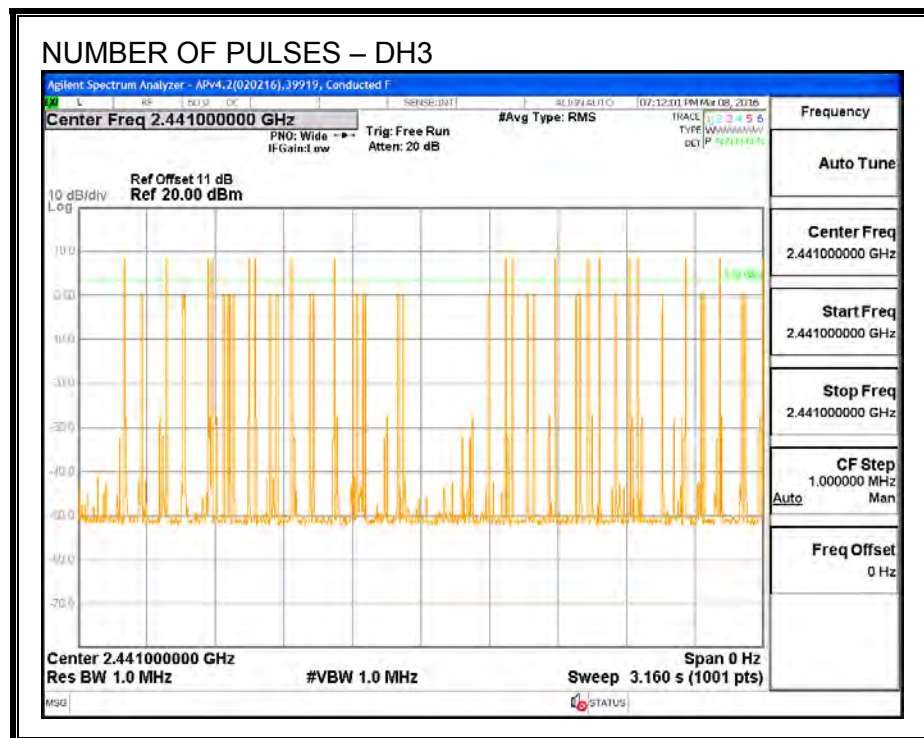
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



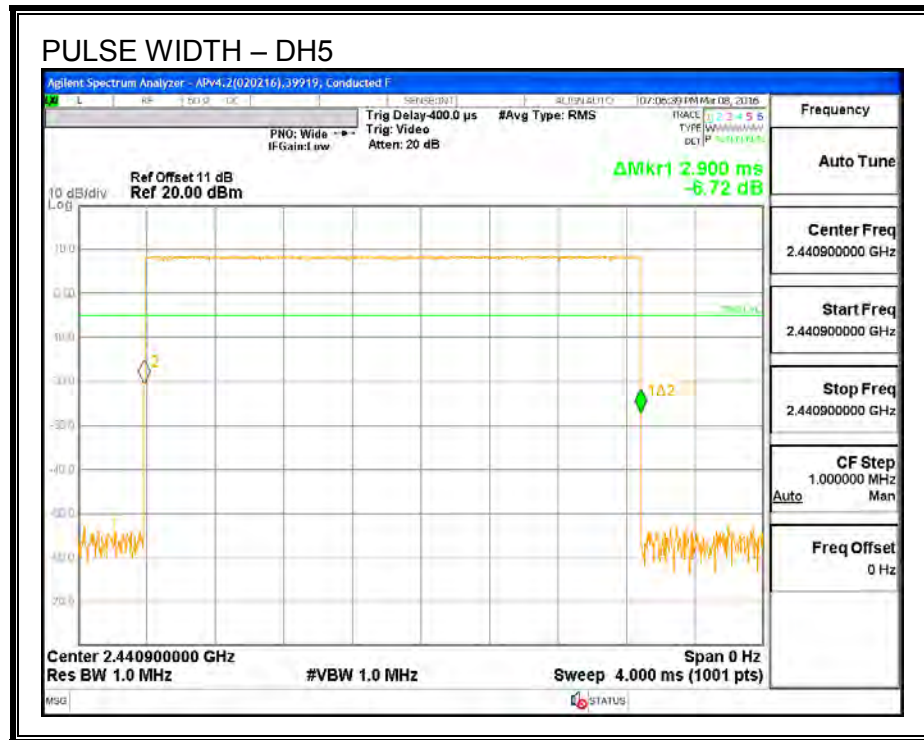
PULSE WIDTH – DH3



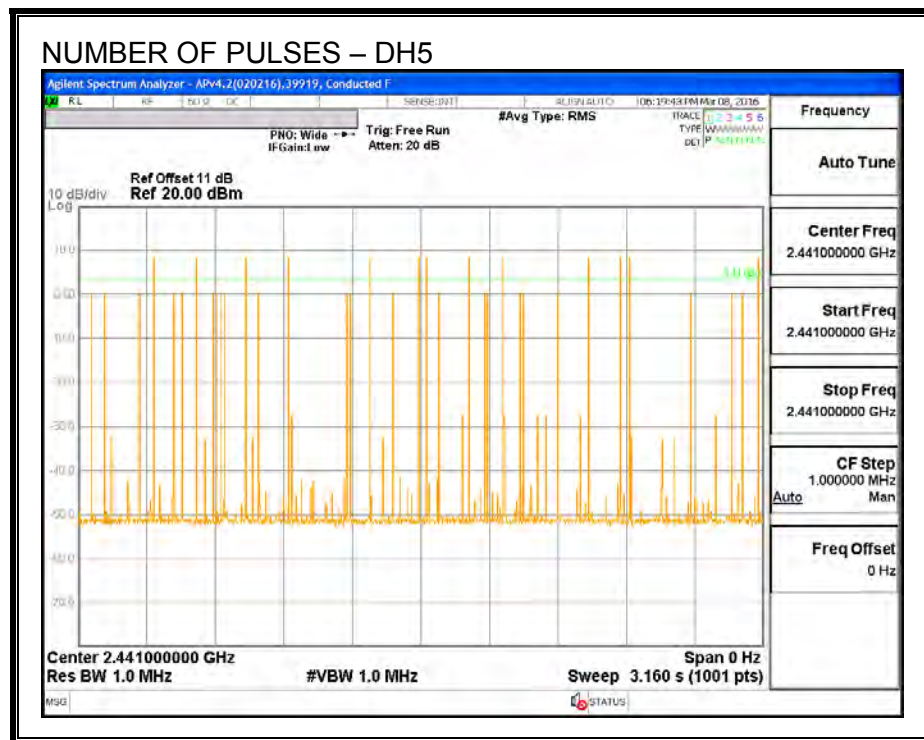
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5



7.5.5. 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.

TEST PROCEDURE

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

RESULTS

ID:	30606	Date:	7/10/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.97	30	-20.03
Middle	2441	9.87	30	-20.13
High	2480	10.06	30	-19.94

7.5.6. 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.

ID:	30606	Date:	7/10/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.88
Middle	2441	9.75
High	2480	9.97

7.5.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

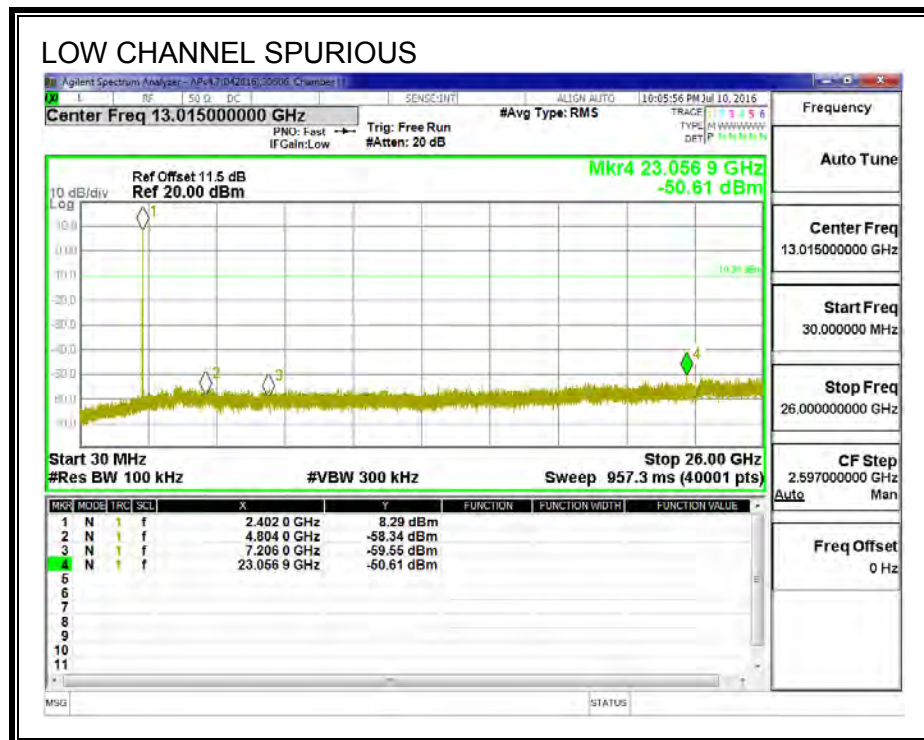
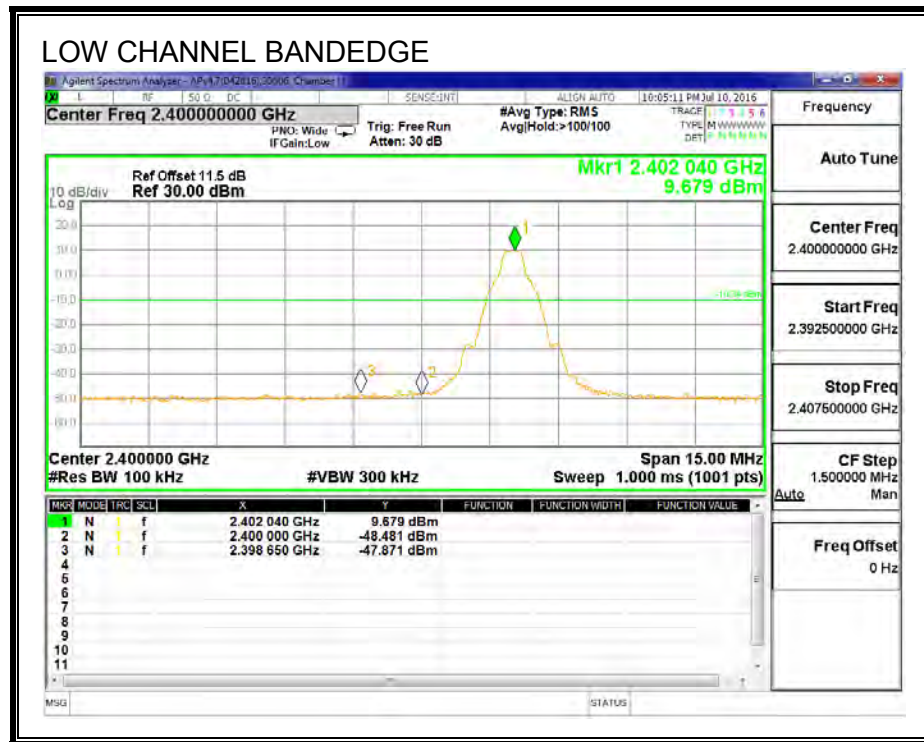
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

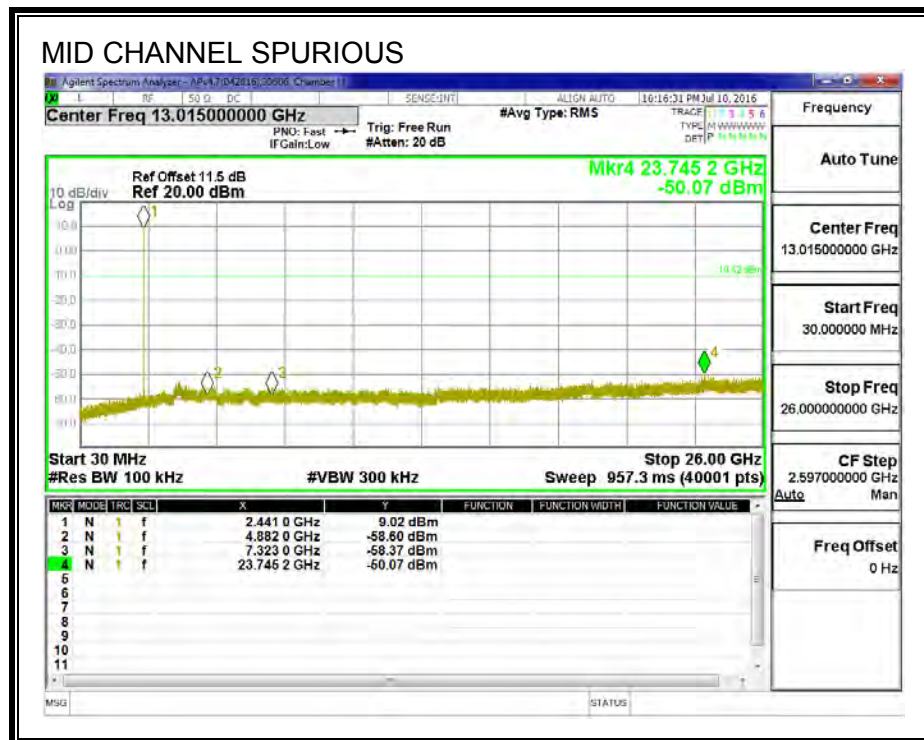
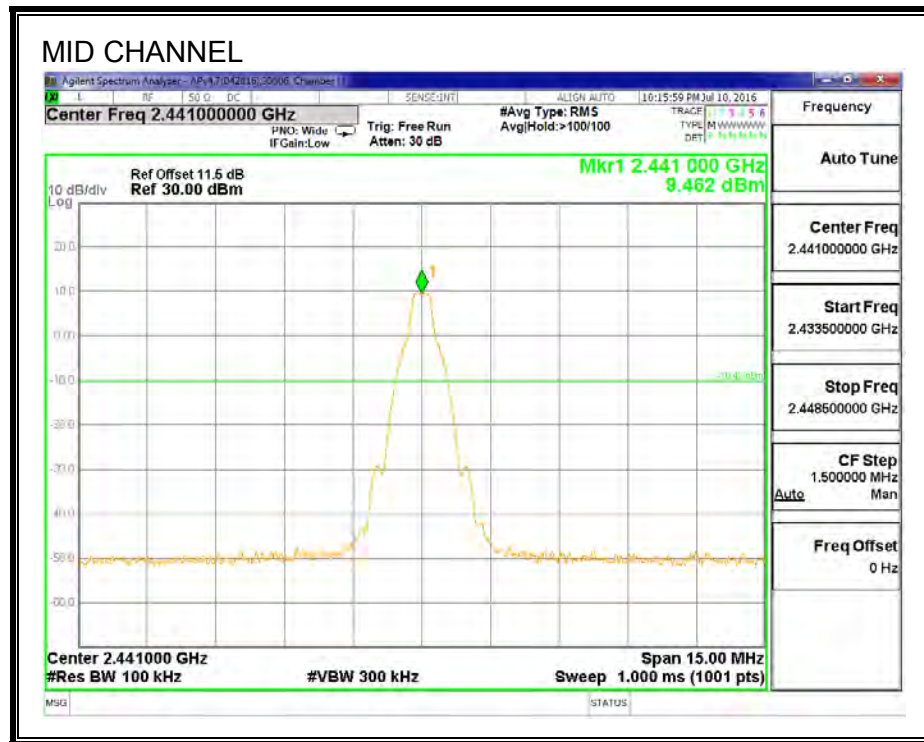
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

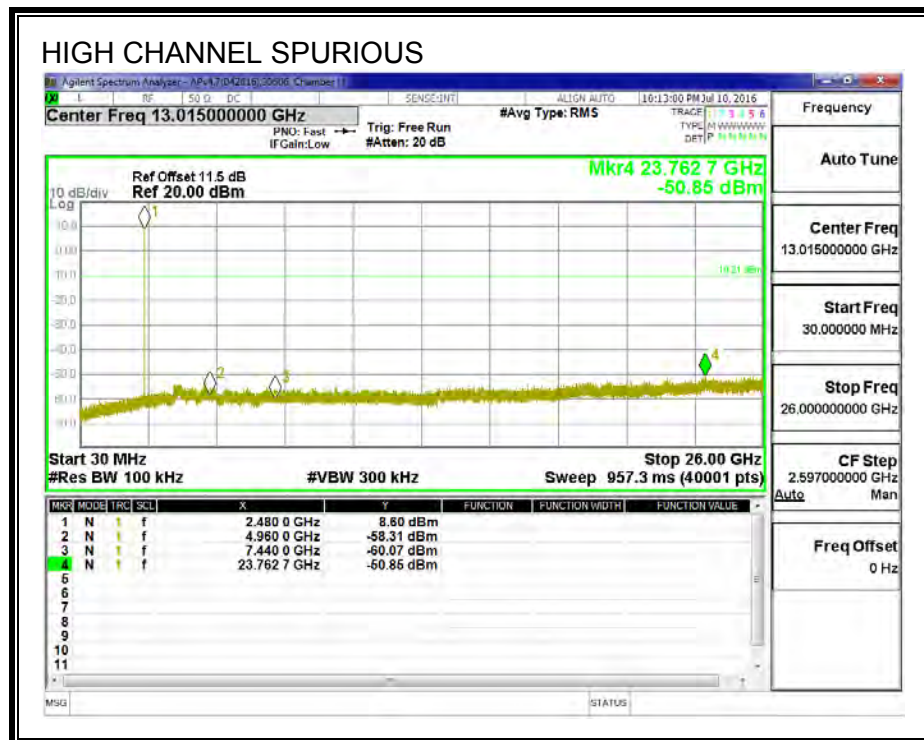
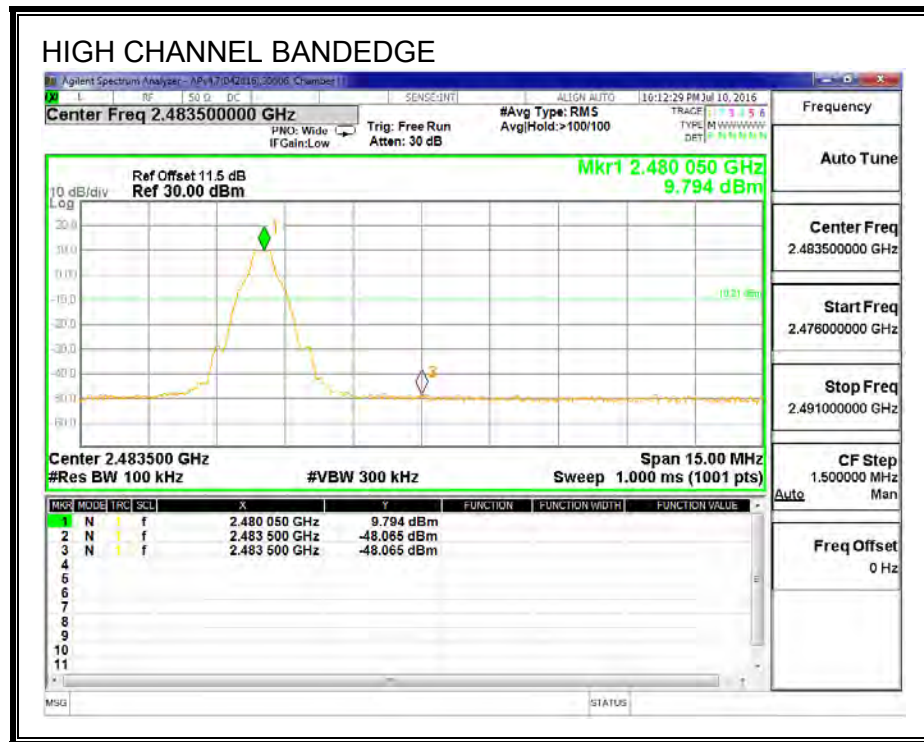
SPURIOUS EMISSIONS, LOW CHANNEL



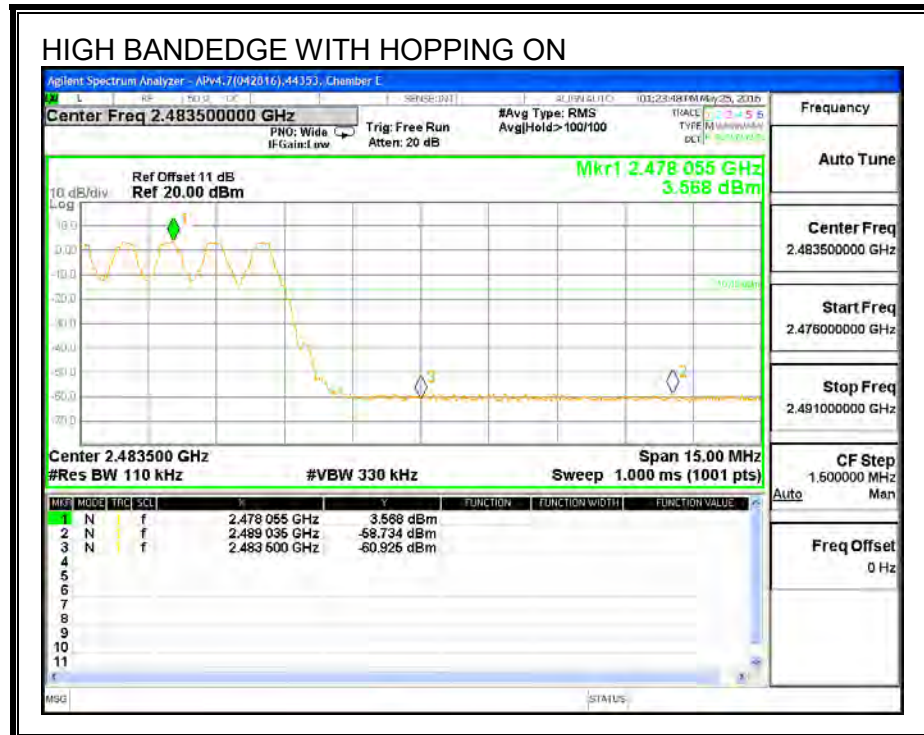
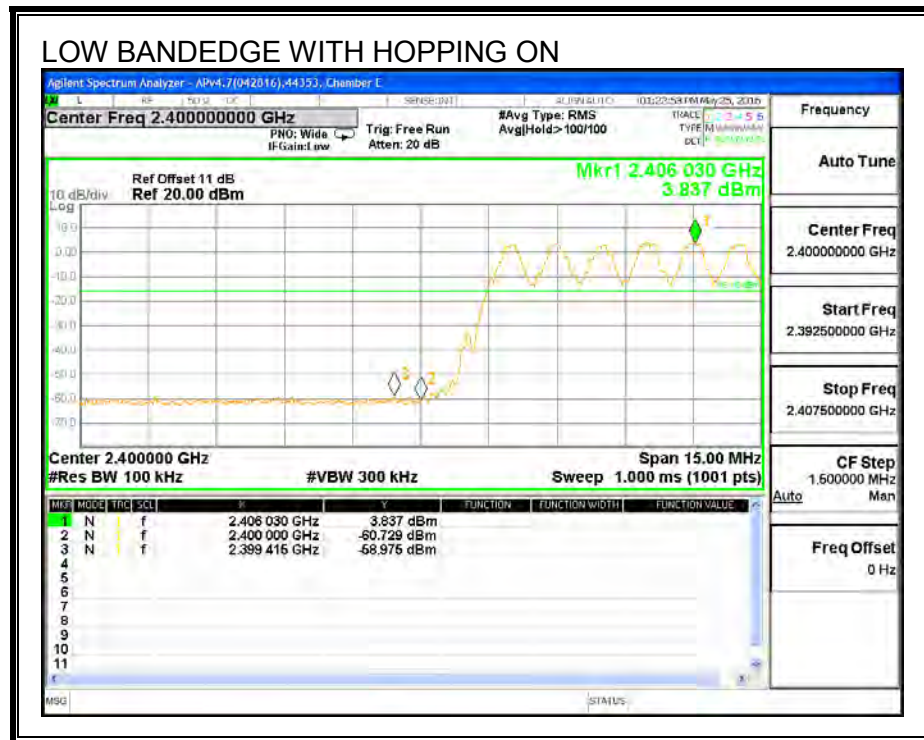
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



7.6. LOW POWER ENHANCED DATA RATE QPSK MODULATION

7.6.1. 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

ID:	30606	Date:	7/10/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.15	21	-11.82
Middle	2441	9.48	21	-11.49
High	2480	9.66	21	-11.31

7.6.2. 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.

ID:	30606	Date:	7/10/16
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Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.09
Middle	2441	7.40
High	2480	7.45

7.7. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

7.7.1. 99% AND 20dB BANDWIDTH

LIMIT

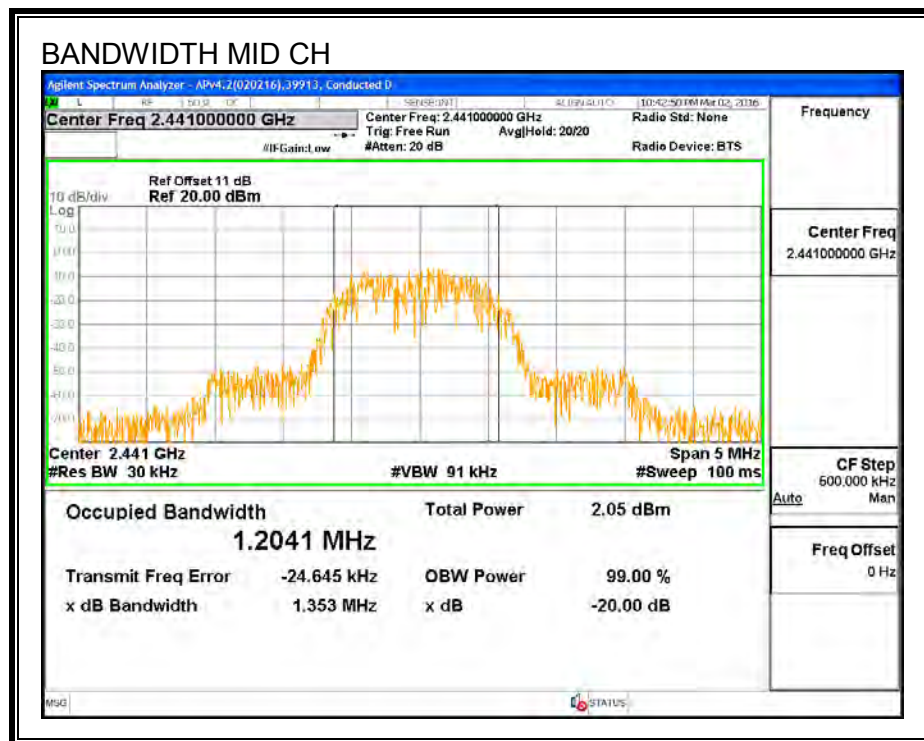
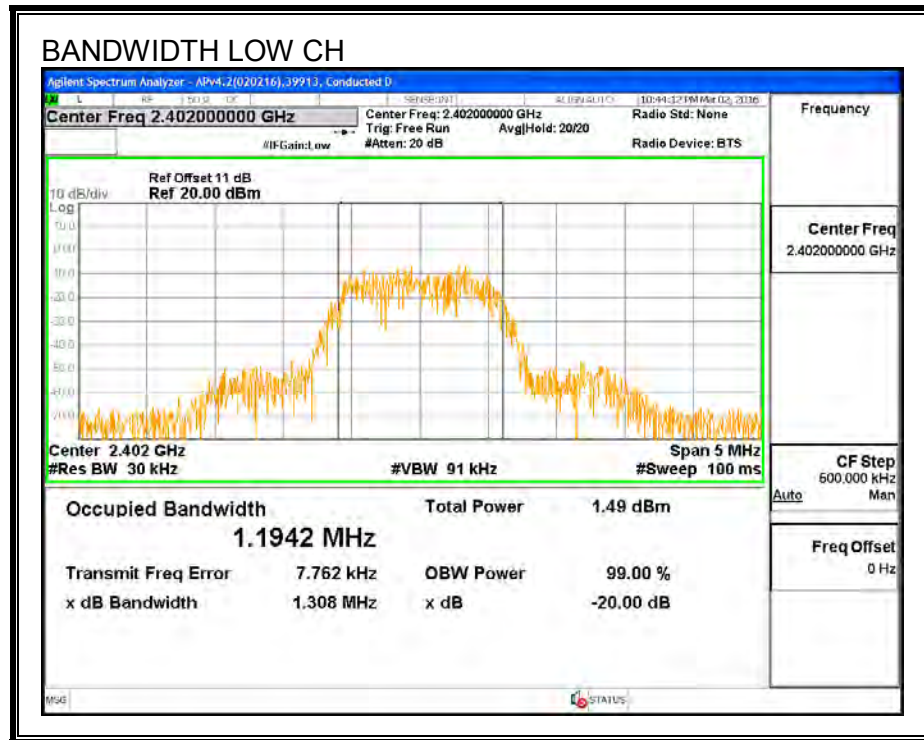
None; for reporting purposes only.

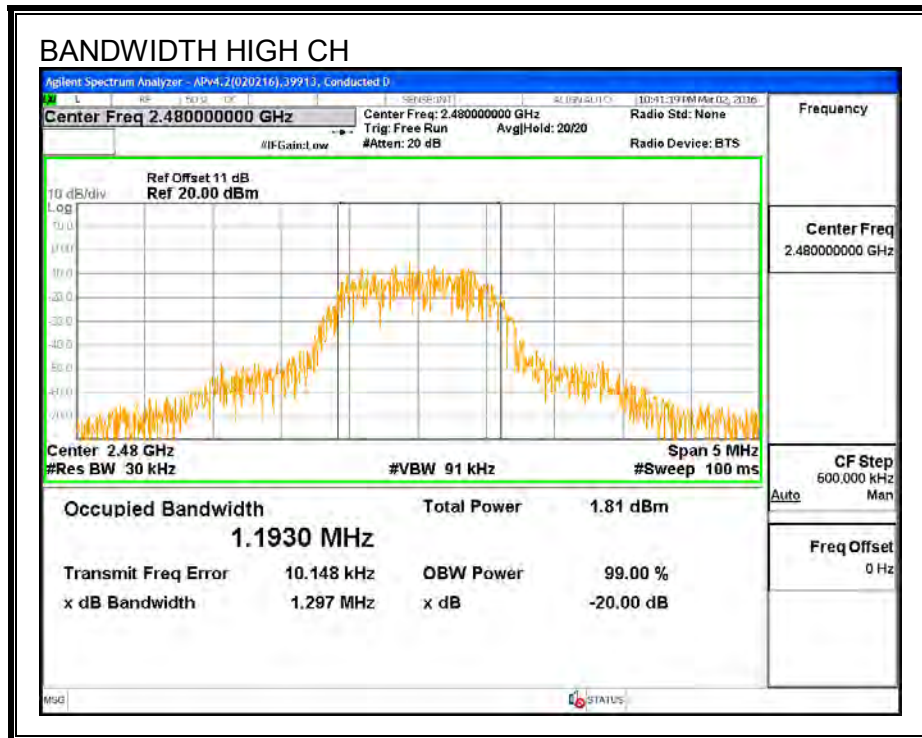
TEST PROCEDURE

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)	99% Bandwidth (KHz)	20 dB Bandwidth (KHz)
Low	2402	1194.2	1308.0
Middle	2441	1204.1	1353.0
High	2480	1193.0	1297.0





7.7.2. 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.

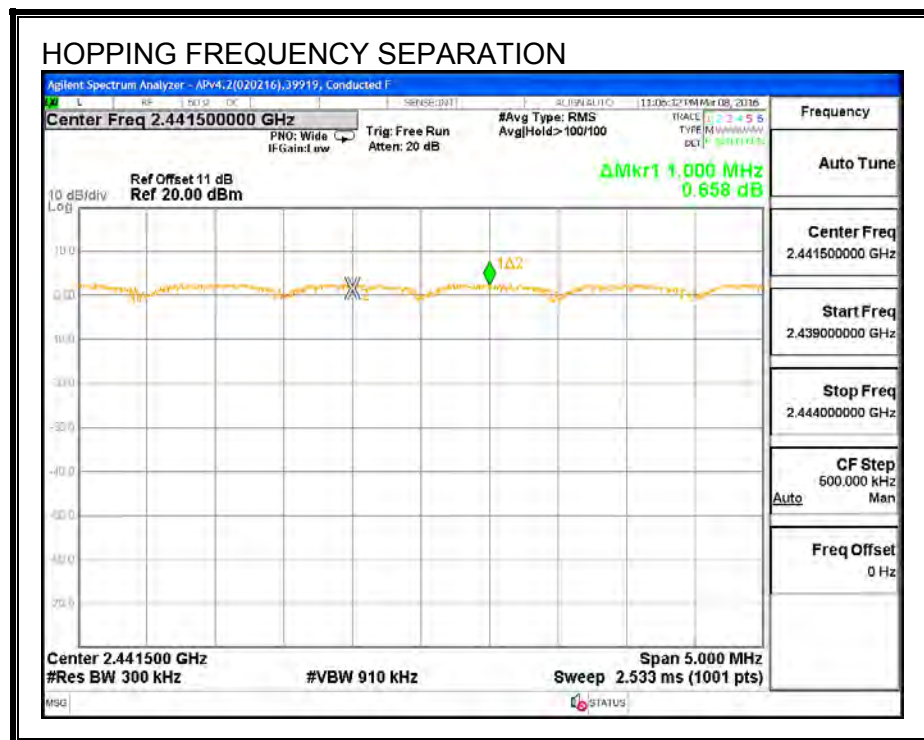
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 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 910 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION



7.7.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

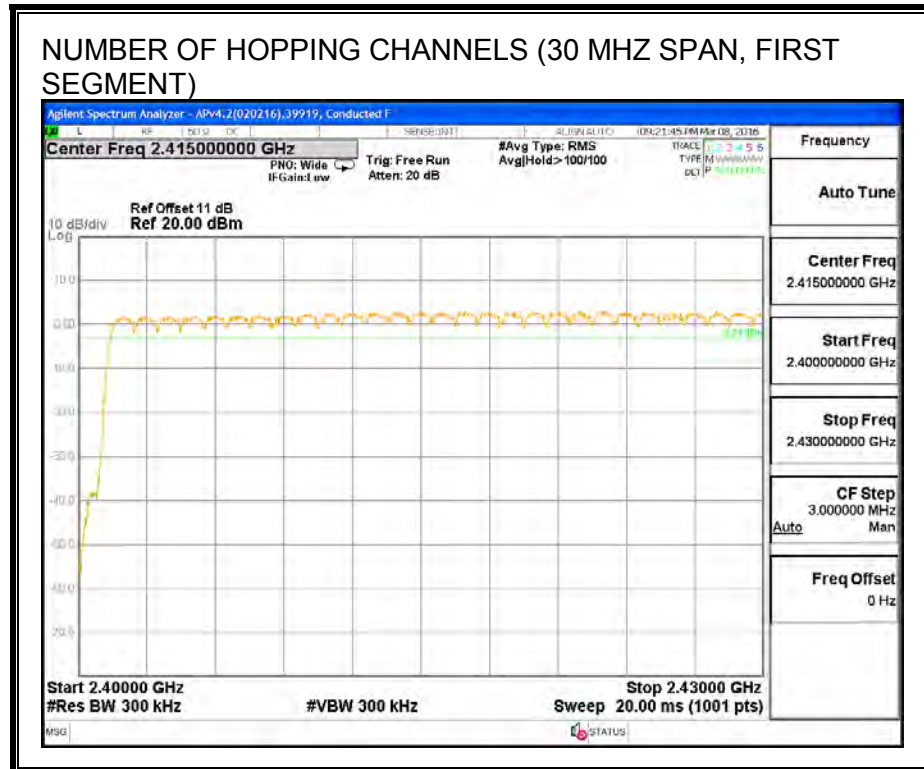
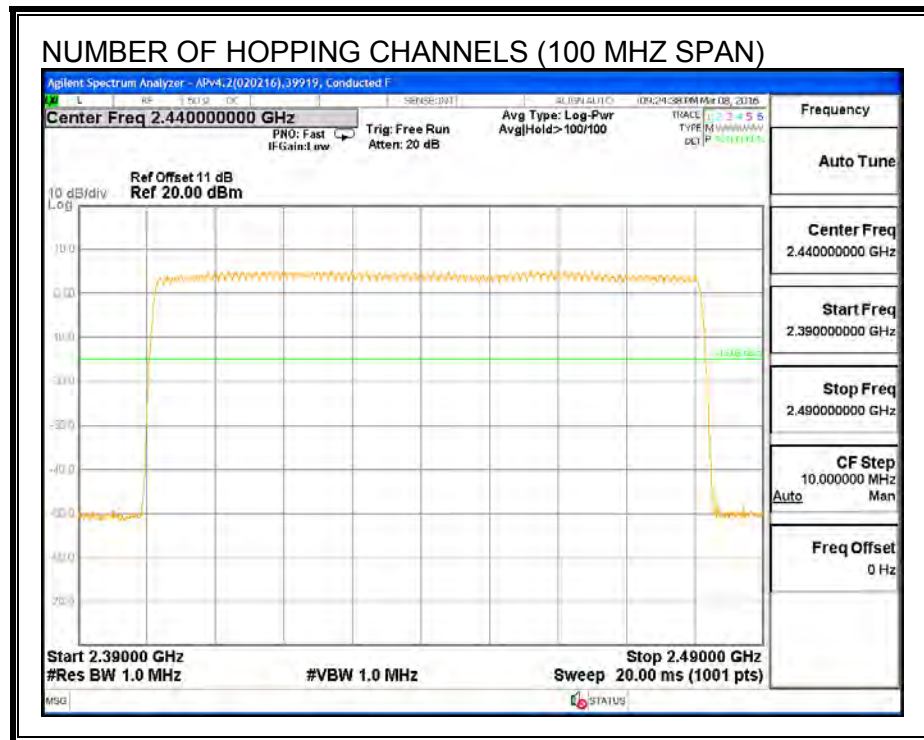
TEST PROCEDURE

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

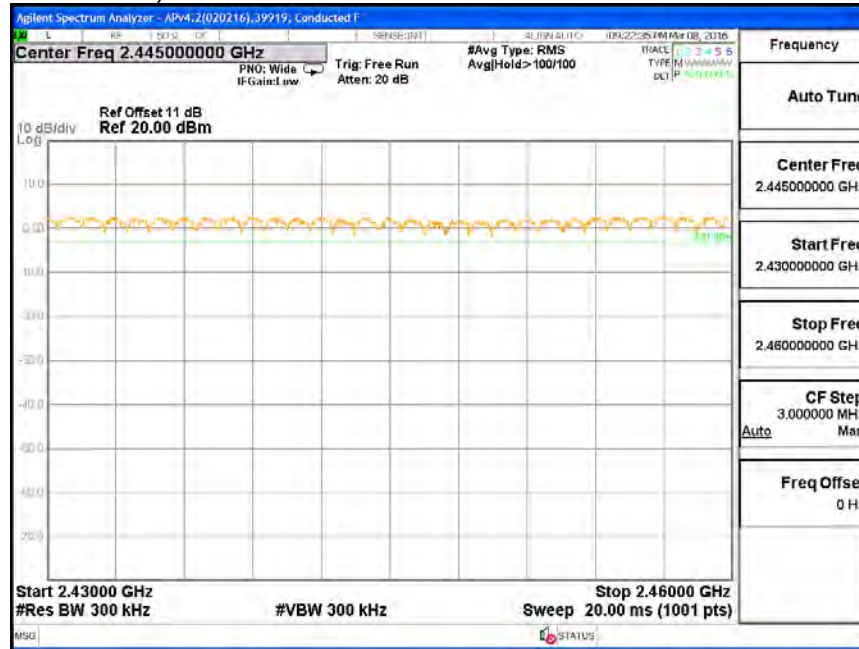
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS



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



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



7.7.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

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

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

RESULTS

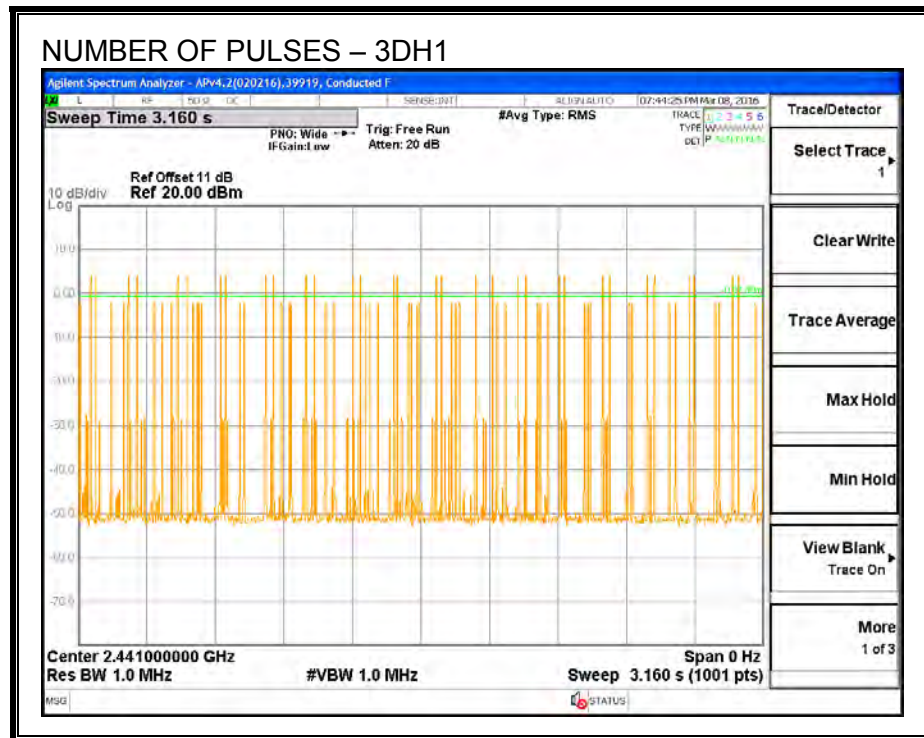
8PSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.402	32	0.129	0.4	-0.271
3DH3	1.084	17	0.184	0.4	-0.216
3DH5	2.904	13	0.378	0.4	-0.022

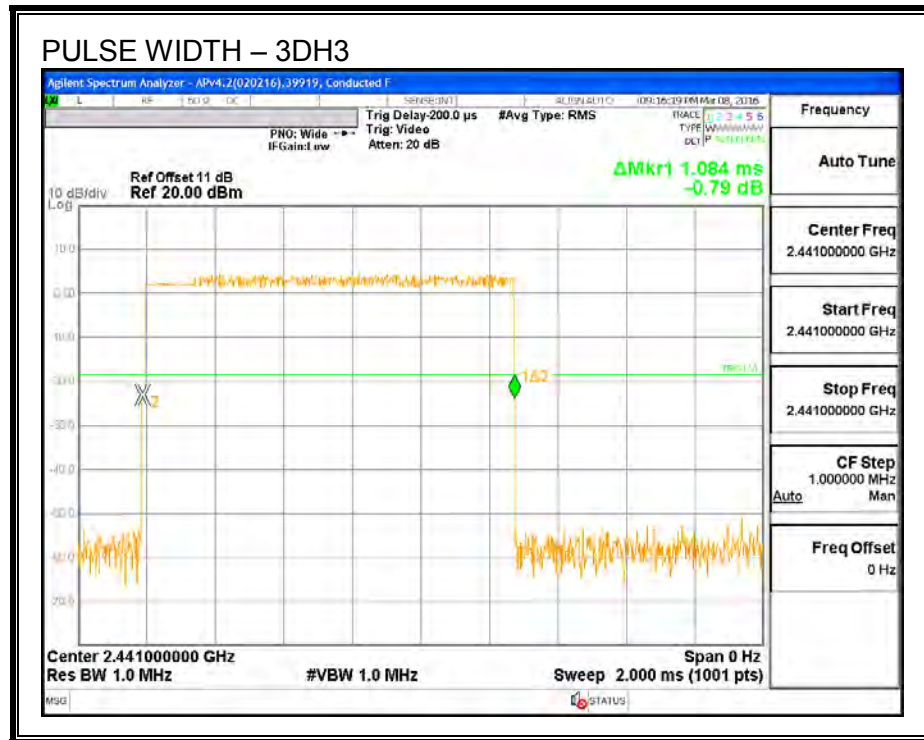
PULSE WIDTH - 3DH1



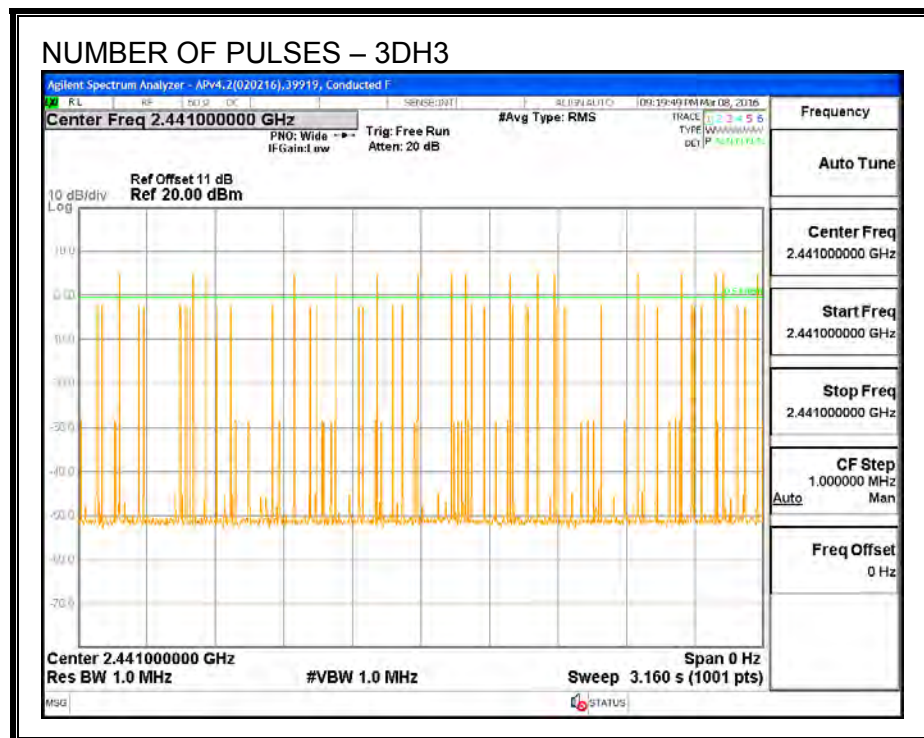
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



PULSE WIDTH – 3DH3



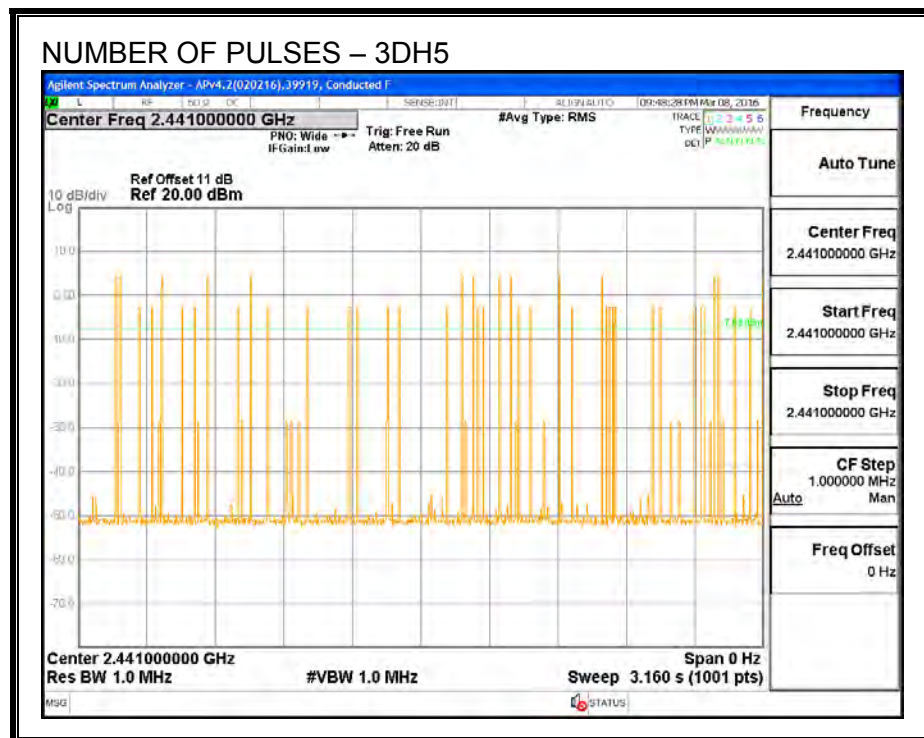
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5



7.7.5. 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

ID:	30606	Date:	7/10/16
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Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.01	21	-11.96
Middle	2441	9.61	21	-11.36
High	2480	9.67	21	-11.30

7.7.6. 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.

ID:	30606	Date:	7/10/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.83
Middle	2441	7.49
High	2480	7.50

7.7.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

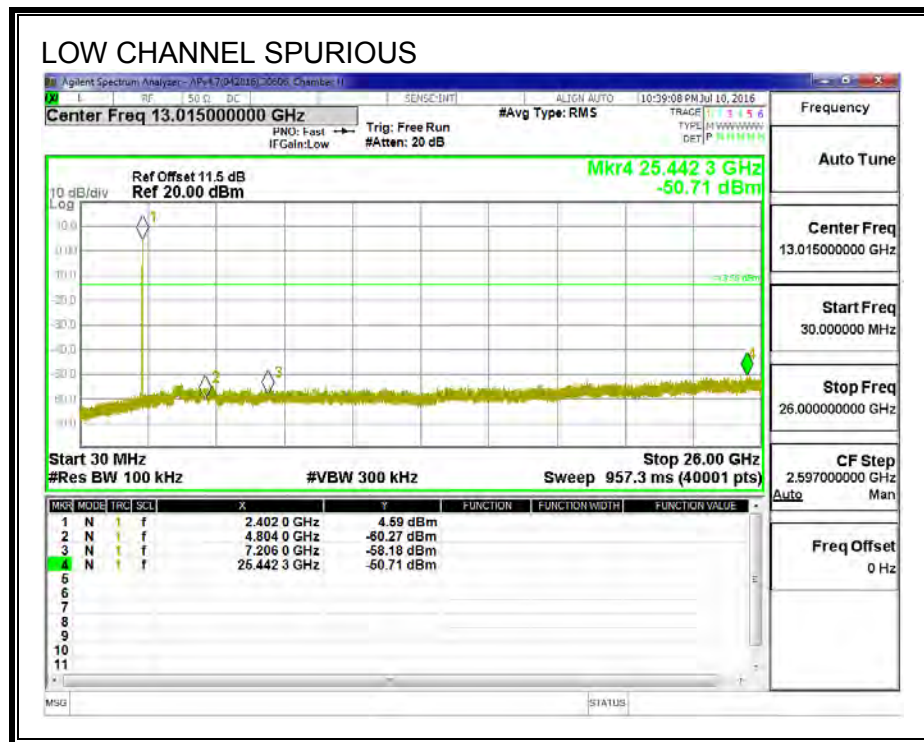
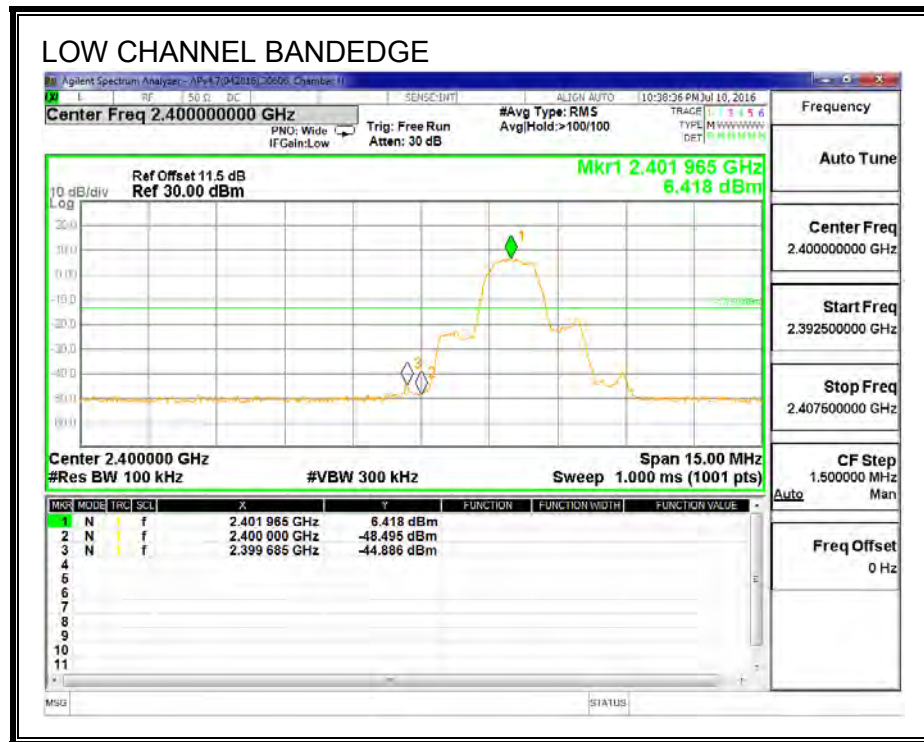
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

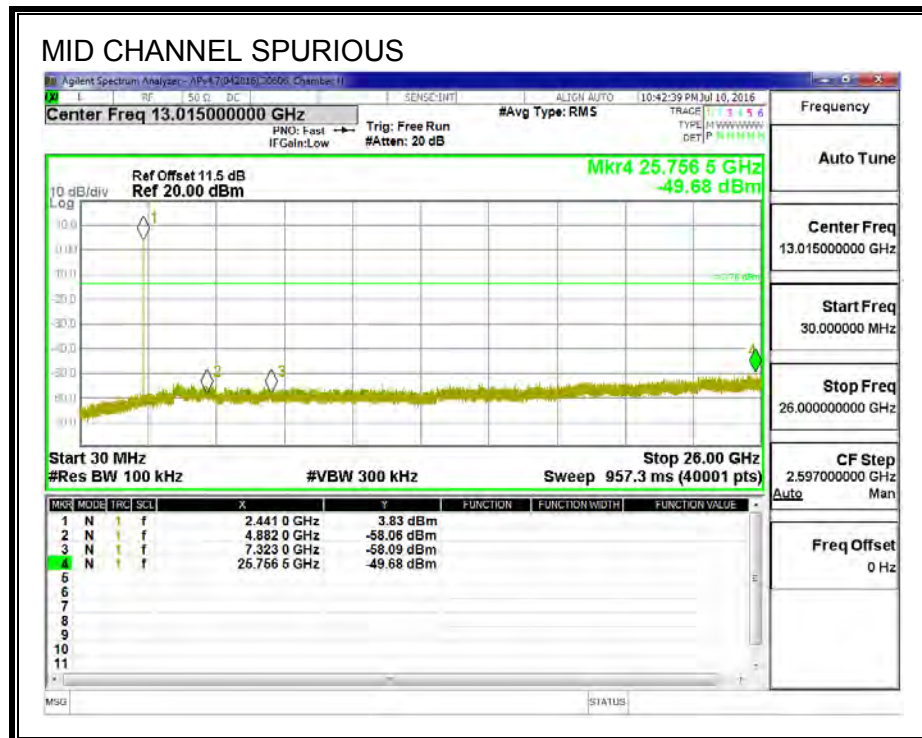
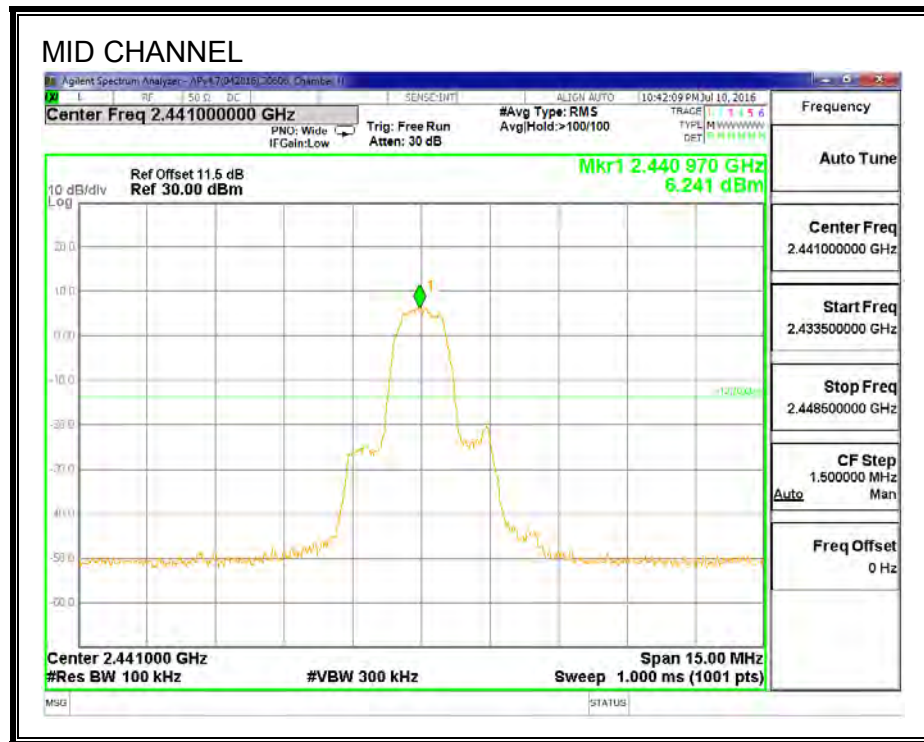
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

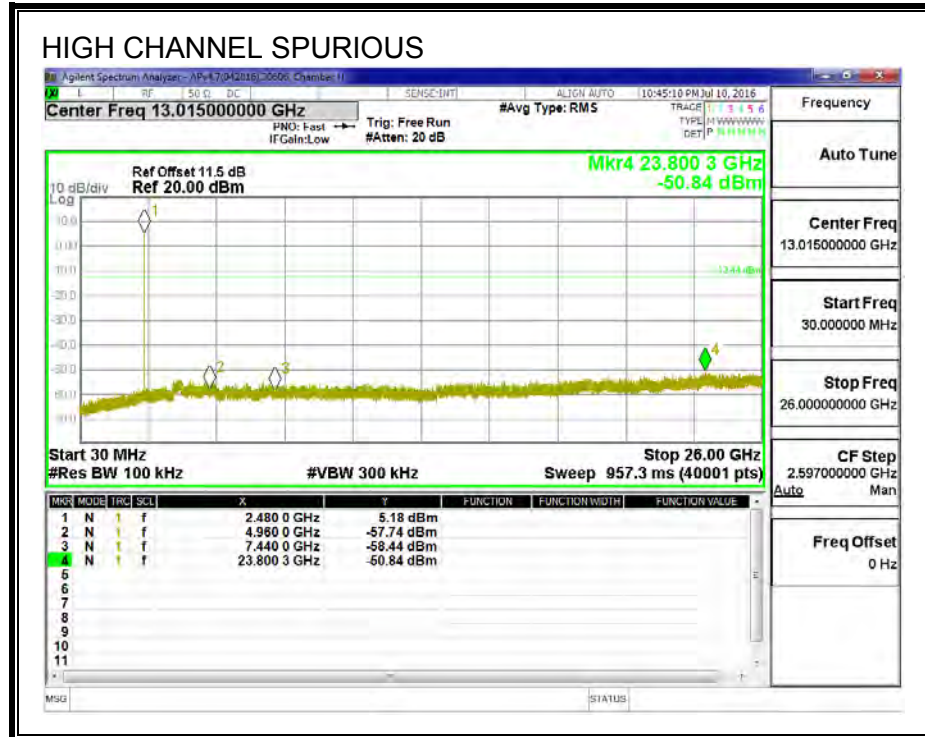
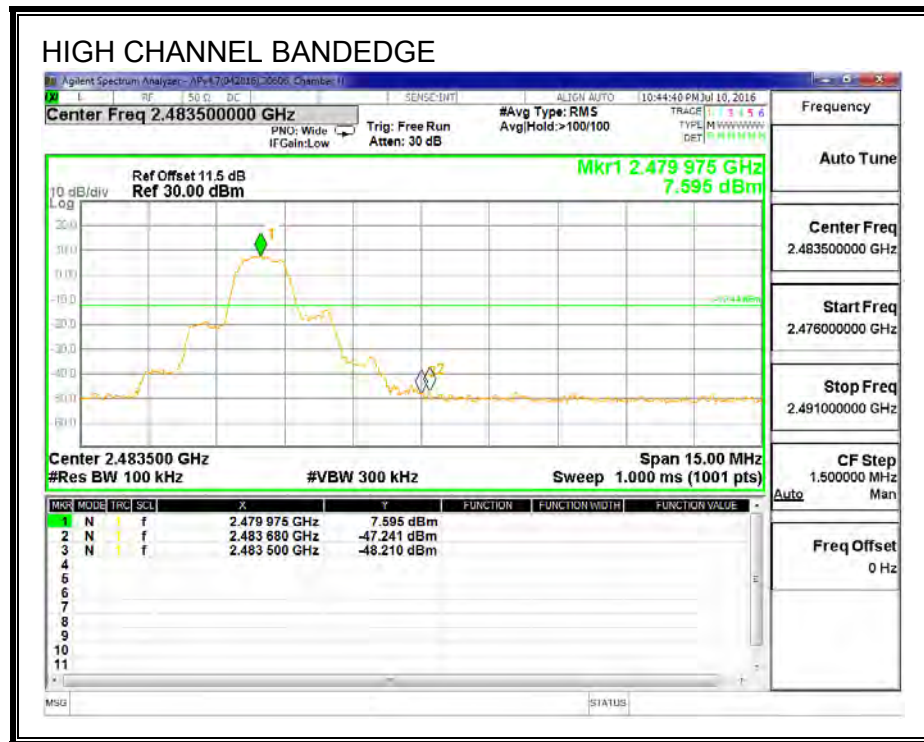
SPURIOUS EMISSIONS, LOW CHANNEL



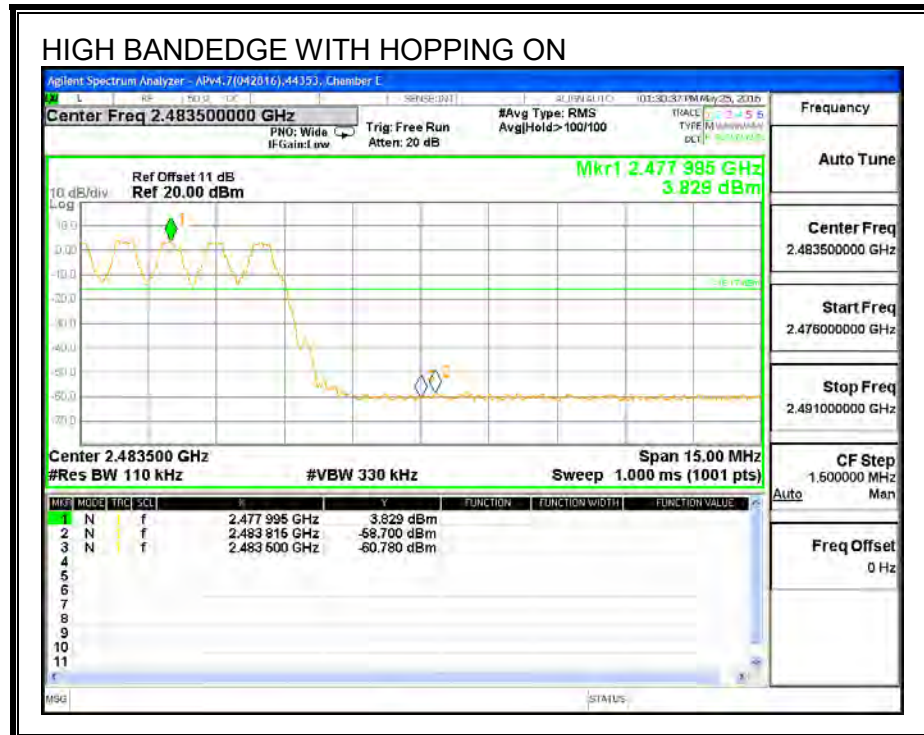
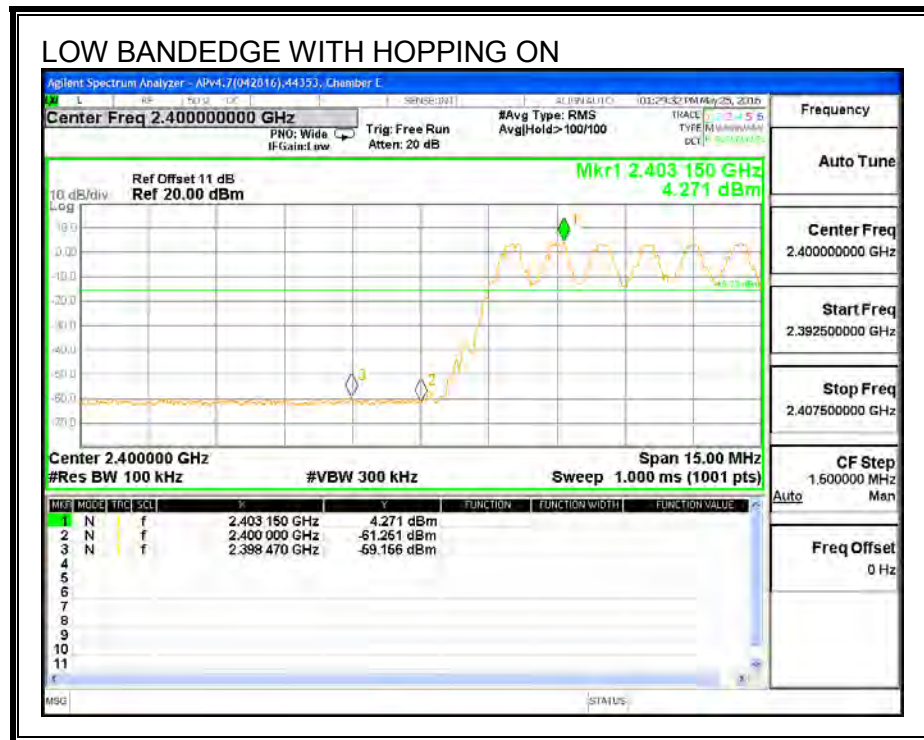
SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final scans above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T (10 Hz) video bandwidth with peak detector for average measurements.

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

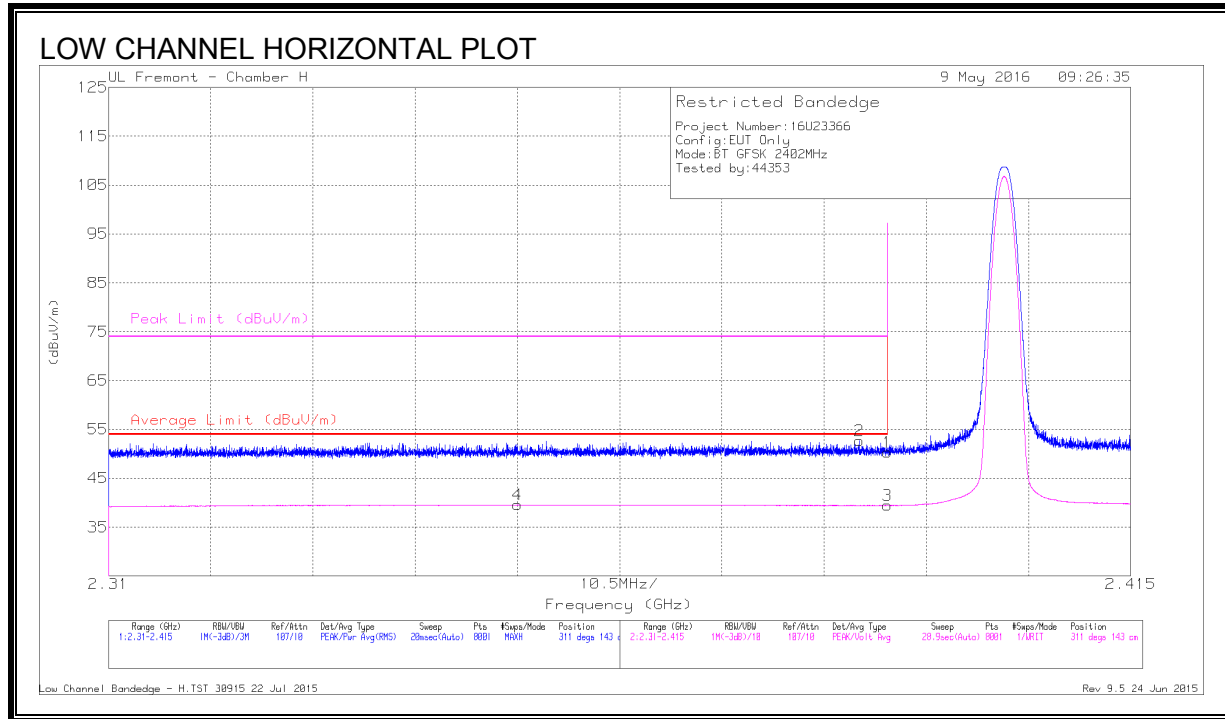
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

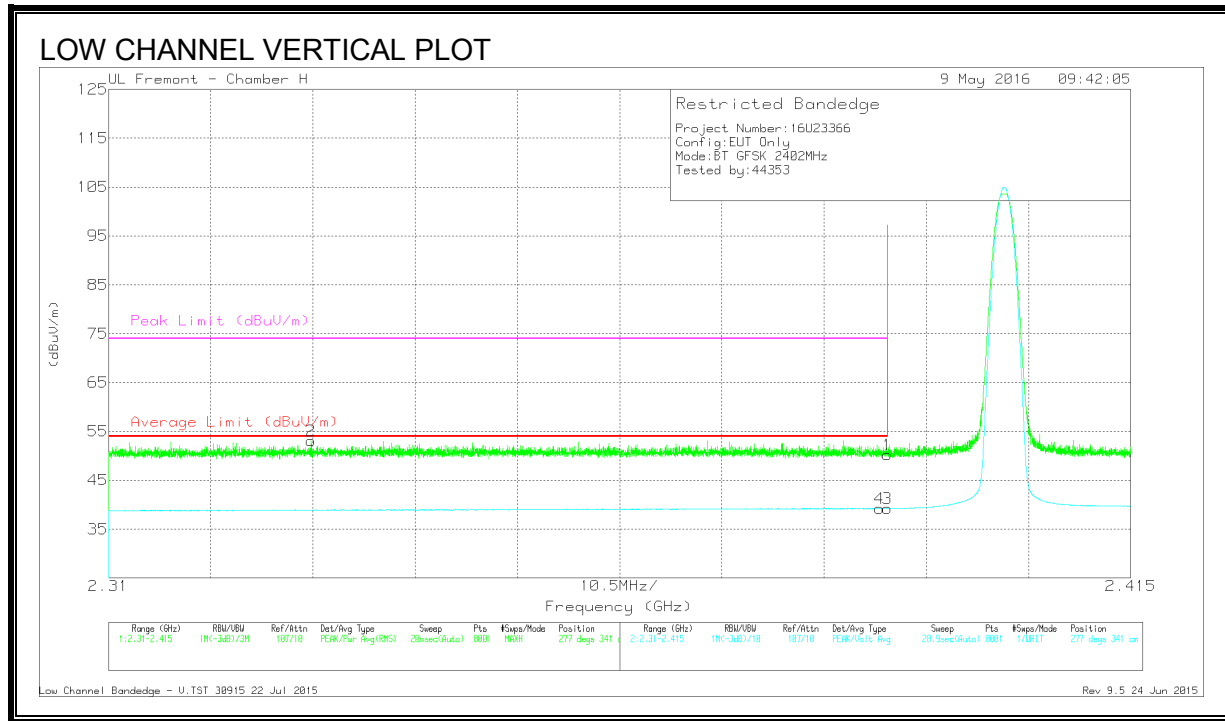
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.36	Pk	31.9	-21.9	50.36	-	-	74	-23.64	311	143	H
2	* 2.387	42.68	Pk	31.9	-21.9	52.68	-	-	74	-21.32	311	143	H
3	* 2.39	29.45	VA1T	31.9	-21.9	39.45	54	-14.55	-	-	311	143	H
4	* 2.352	29.68	VA1T	31.8	-21.9	39.58	54	-14.42	-	-	311	143	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEGE (LOW CHANNEL, VERTICAL)



DATA

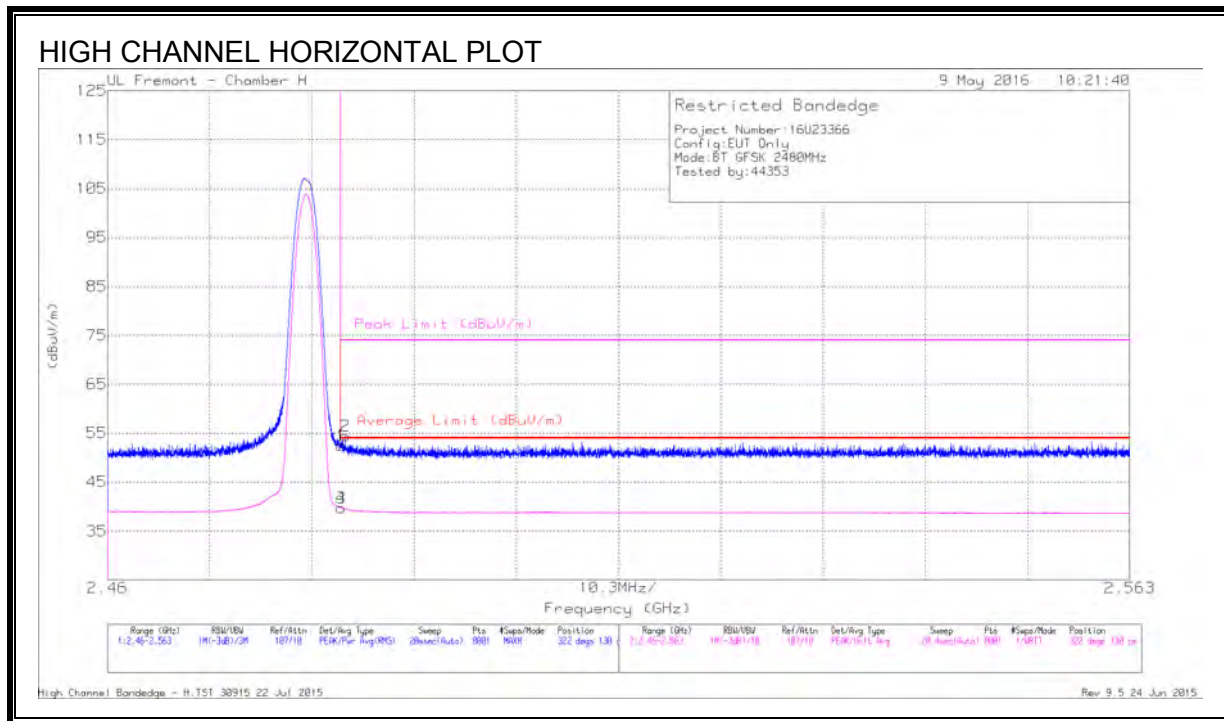
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.2	Pk	31.9	-21.9	50.2	-	-	74	-23.8	277	341	V
2	* 2.331	43.32	Pk	31.7	-21.9	53.12	-	-	74	-20.88	277	341	V
3	* 2.39	29.2	VA1T	31.9	-21.9	39.2	54	-14.8	-	-	277	341	V
4	* 2.389	29.25	VA1T	31.9	-21.9	39.25	54	-14.75	-	-	277	341	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



DATA

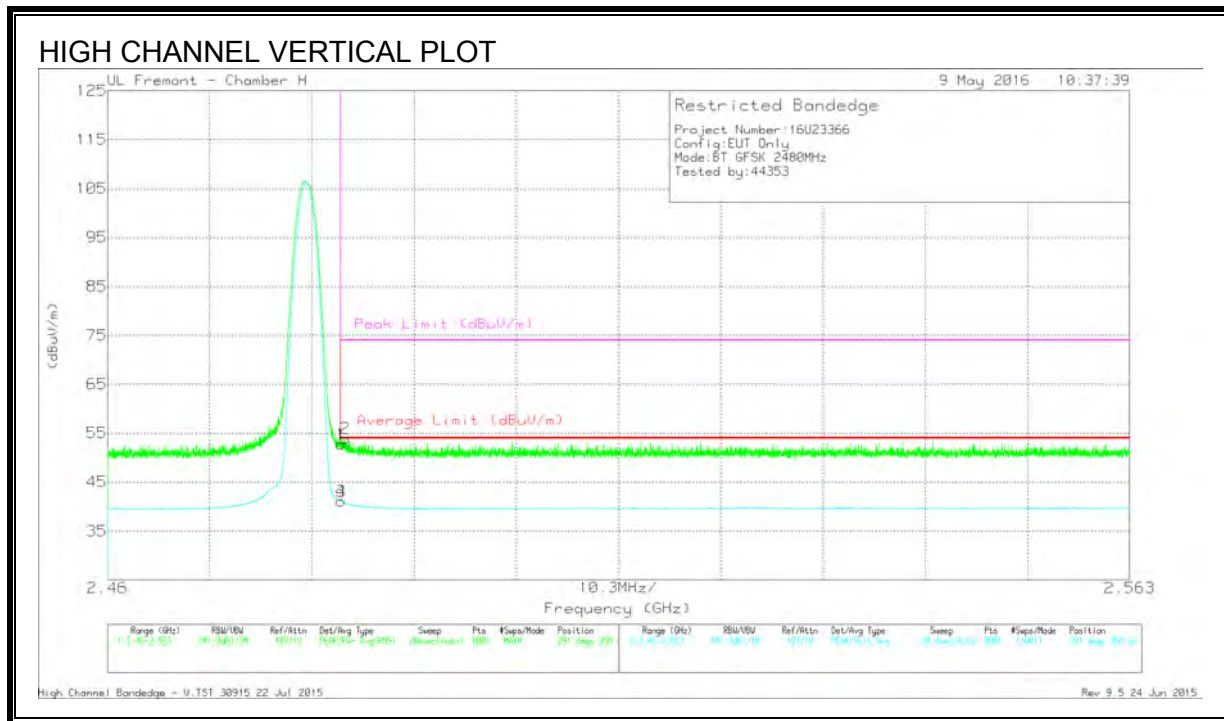
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.98	Pk	32.2	-21.7	52.48	-	-	74	-21.52	322	130	H
2	* 2.484	43.94	Pk	32.2	-21.7	54.44	-	-	74	-19.56	322	130	H
3	* 2.484	29.27	VA1T	32.2	-21.7	39.77	54	-14.23	-	-	322	130	H
4	* 2.484	29.27	VA1T	32.2	-21.7	39.77	54	-14.23	-	-	322	130	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



DATA

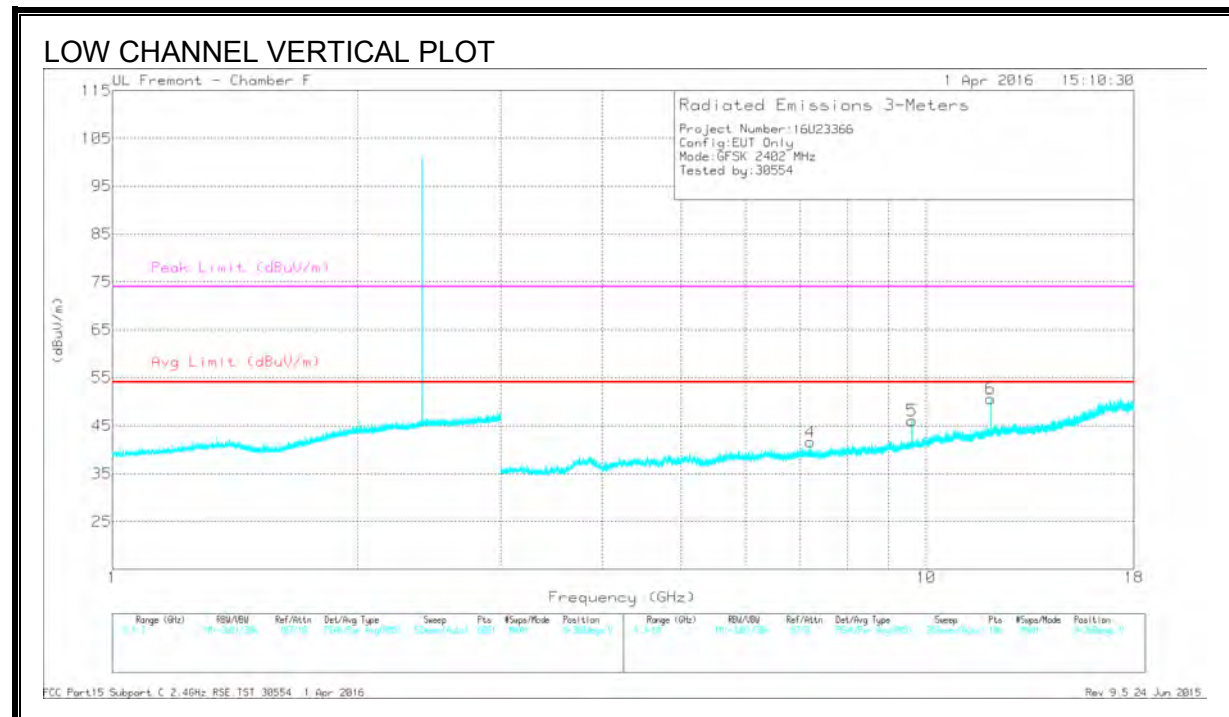
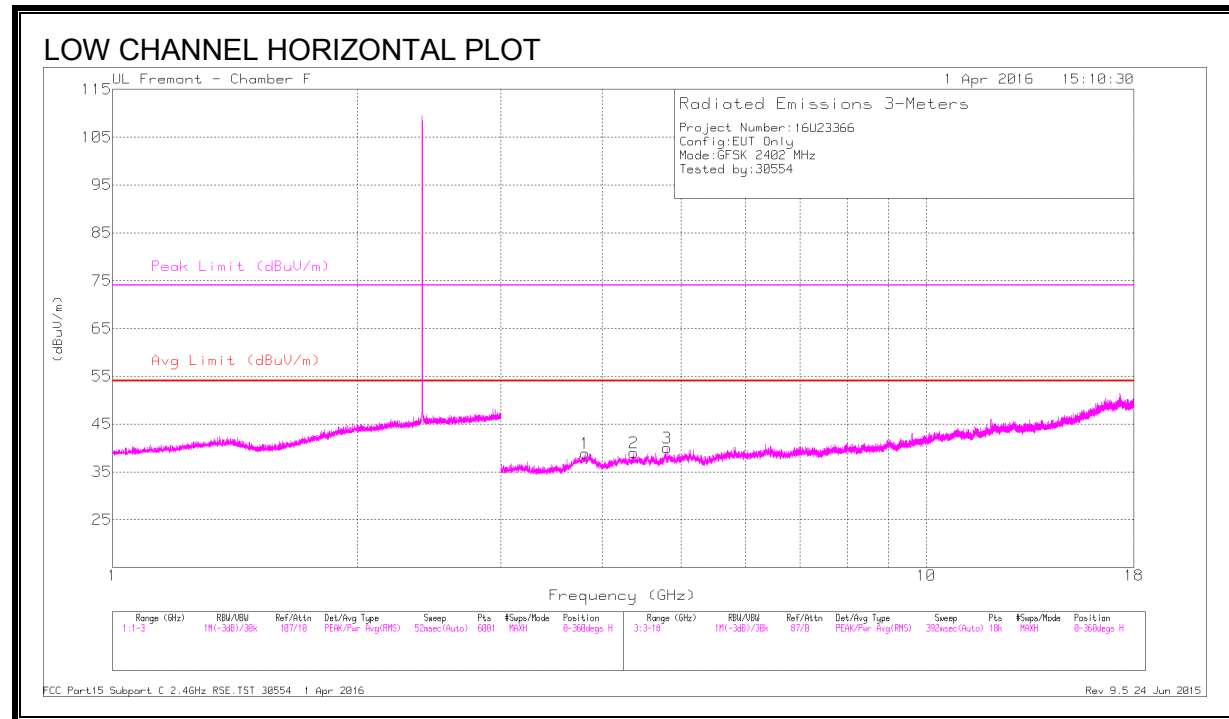
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.25	Pk	32.2	-21.7	52.75	-	-	74	-21.25	291	358	V
2	* 2.484	43.47	Pk	32.2	-21.7	53.97	-	-	74	-20.03	291	358	V
3	* 2.484	30.64	VA1T	32.2	-21.7	41.14	54	-12.86	-	-	291	358	V
4	* 2.484	30.64	VA1T	32.2	-21.7	41.14	54	-12.86	-	-	291	358	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

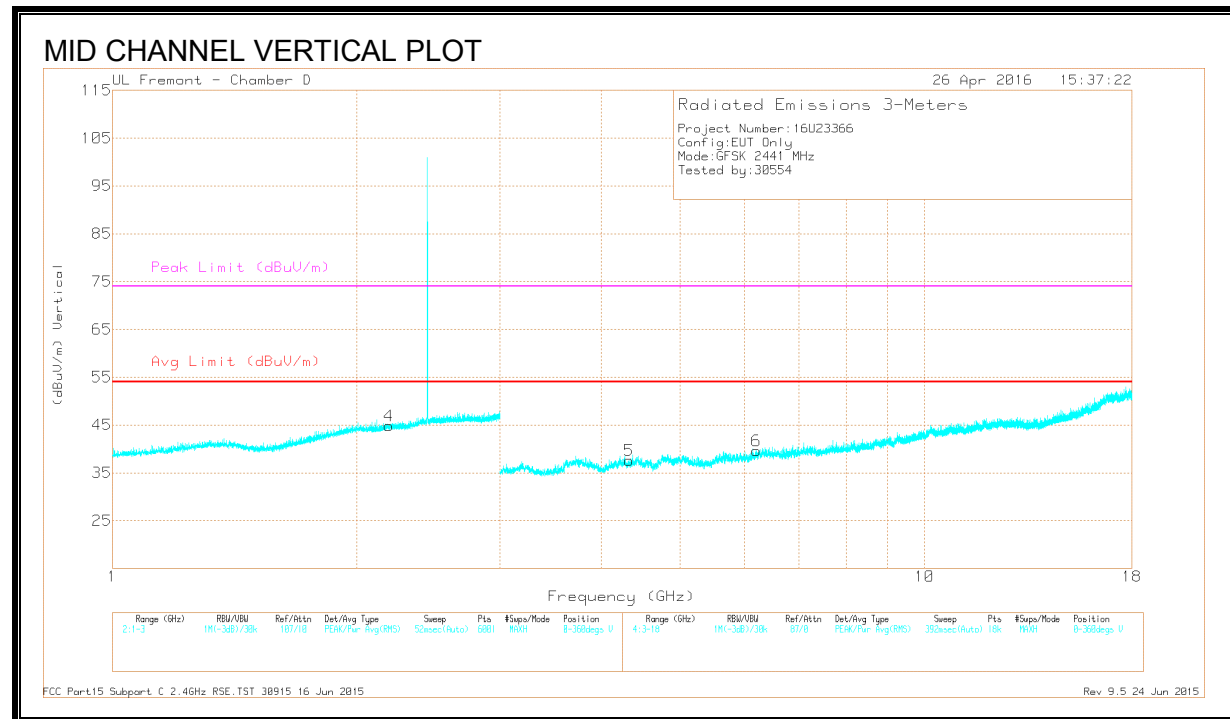
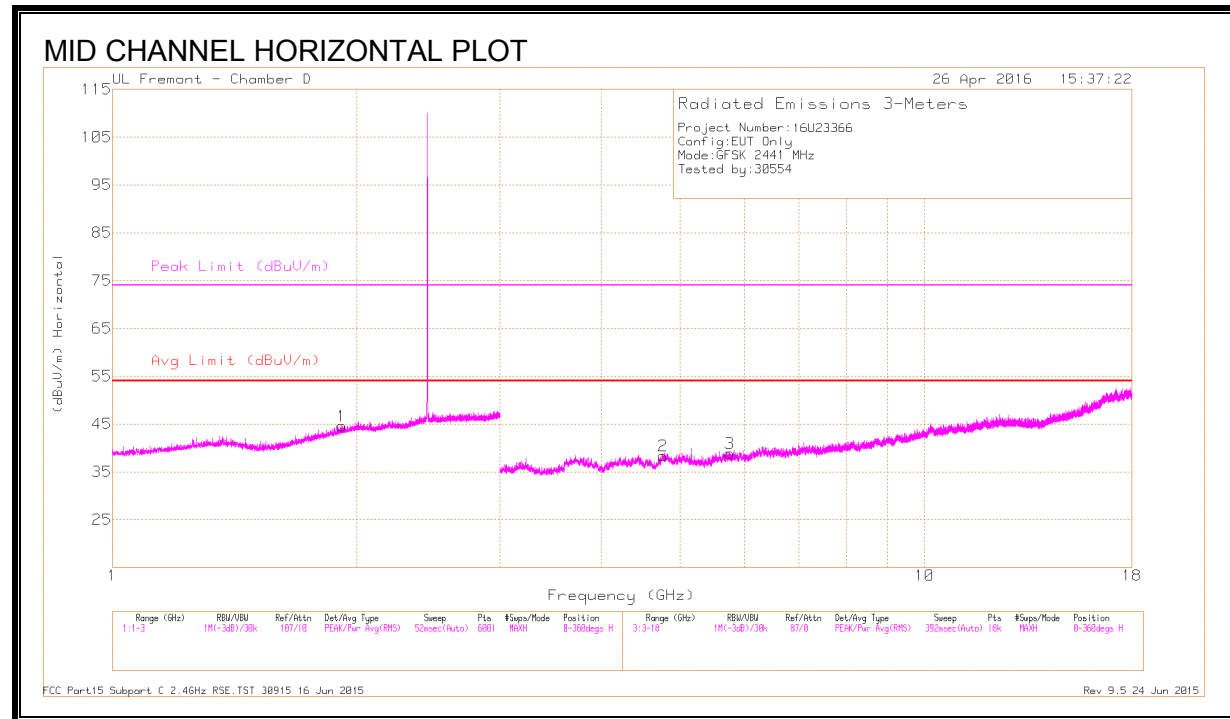
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.807	38.97	PK-2	33.4	-28.6	43.77	-	-	74	-30.23	308	363	H
	* 3.806	25.8	VA1T	33.4	-28.6	30.6	54	-23.4	-	-	308	363	H
2	* 4.367	38.47	PK-2	33.9	-28.8	43.57	-	-	74	-30.43	317	343	H
	* 4.37	25.83	VA1T	33.9	-28.8	30.93	54	-23.07	-	-	317	343	H
3	* 4.804	38.67	PK-2	34	-27.6	45.07	-	-	74	-28.93	281	303	H
	* 4.804	27.75	VA1T	34	-27.6	34.15	54	-19.85	-	-	281	303	H
4	7.206	40.27	PK-2	35.6	-26.4	49.47	-	-	-	-	16	265	V
5	9.608	38.19	PK-2	36.5	-22.1	52.59	-	-	-	-	16	265	V
6	* 12.011	38.42	PK-2	38.7	-22.6	54.52	-	-	74	-19.48	16	265	V
	* 12.01	28.01	VA1T	38.7	-22.6	44.11	54	-9.89	-	-	16	265	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

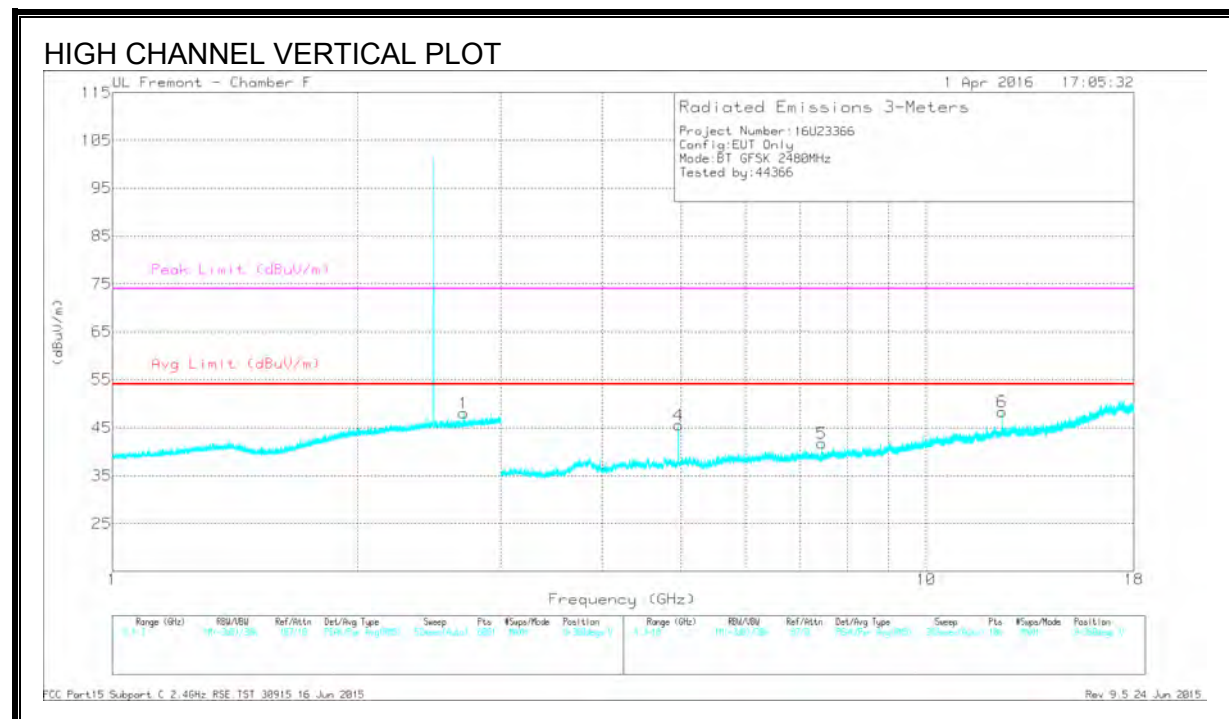
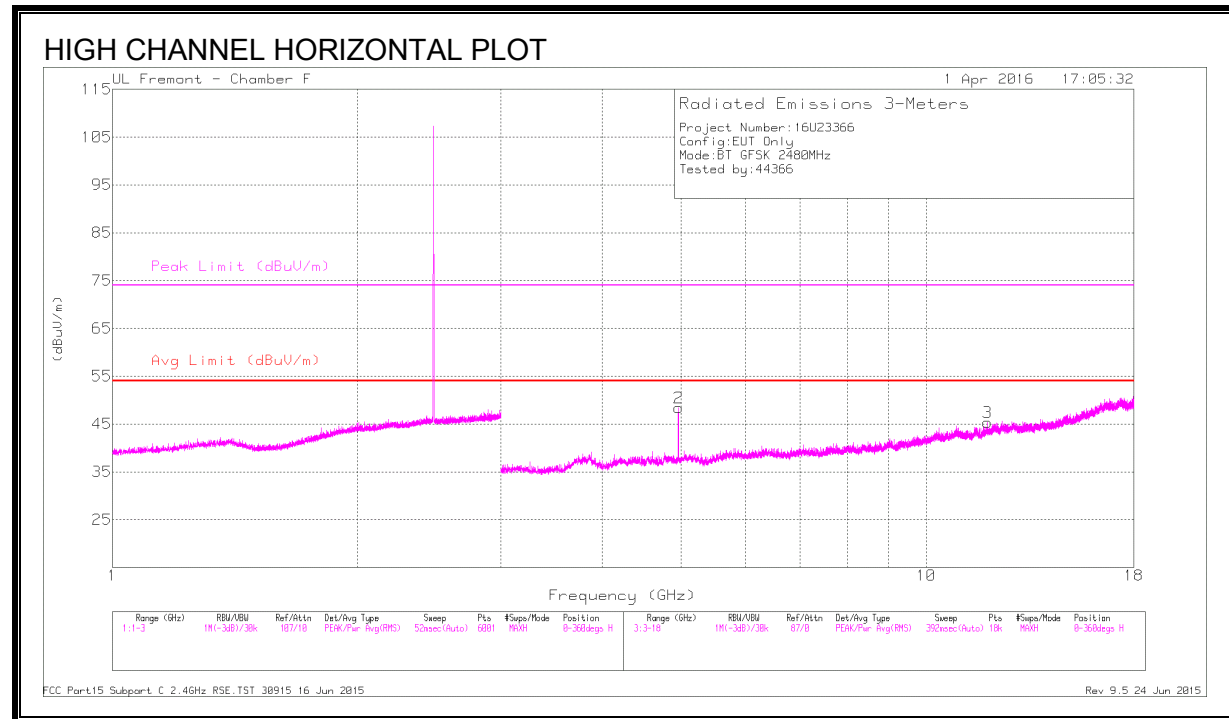
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.76	38.4	PK2	34	-26.4	46	-	-	74	-28	155	255	H
	* 4.759	25.37	VA1T	34	-26.4	32.97	54	-21.03	-	-	155	255	H
5	* 4.325	39.16	PK2	33.6	-28.4	44.36	-	-	74	-29.64	210	296	V
	* 4.326	25.74	VA1T	33.6	-28.4	30.94	54	-23.06	-	-	210	296	V
1	1.917	28.52	VA1T	31	-21.2	38.32	-	-	-	-	98	165	H
	1.918	42.13	PK2	31	-21.2	51.93	-	-	-	-	98	165	H
4	2.189	28.53	VA1T	31.5	-20.8	39.23	-	-	-	-	110	226	V
	2.19	42.04	PK2	31.5	-20.8	52.74	-	-	-	-	110	226	V
3	5.755	37.94	PK2	34.8	-26.9	45.84	-	-	-	-	155	261	H
	5.758	25.06	VA1T	34.8	-26.9	32.96	-	-	-	-	155	261	H
6	6.209	37.11	PK2	35.6	-26.3	46.41	-	-	-	-	224	270	V
	6.21	24.12	VA1T	35.6	-26.3	33.42	-	-	-	-	224	270	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	* 2.7	42.38	PK2	32.4	-20.6	54.18	-	-	74	-19.82	93	306	V
	* 2.7	28.61	VA1T	32.4	-20.6	40.41	54	-13.59	-	-	93	306	V
2	* 4.96	44.95	PK2	34.2	-28.5	50.65	-	-	74	-23.35	281	111	H
	* 4.96	40.09	VA1T	34.2	-28.5	45.79	54	-8.21	-	-	281	111	H
3	* 11.905	34.1	PK2	38.6	-21.7	51	-	-	74	-23	159	286	H
	* 11.905	21.46	VA1T	38.6	-21.7	38.36	54	-15.64	-	-	159	286	H
4	* 4.96	44.16	PK2	34.2	-28.5	49.86	-	-	74	-24.14	336	245	V
	* 4.96	39.08	VA1T	34.2	-28.5	44.78	54	-9.22	-	-	336	245	V
5	* 7.439	39.4	PK2	35.6	-25.8	49.2	-	-	74	-24.8	13	269	V
	* 7.44	29.94	VA1T	35.6	-25.8	39.74	54	-14.26	-	-	13	269	V
6	* 12.399	38	PK2	38.9	-22	54.9	-	-	74	-19.1	344	101	V
	* 12.399	27.37	VA1T	38.9	-22	44.27	54	-9.73	-	-	344	101	V

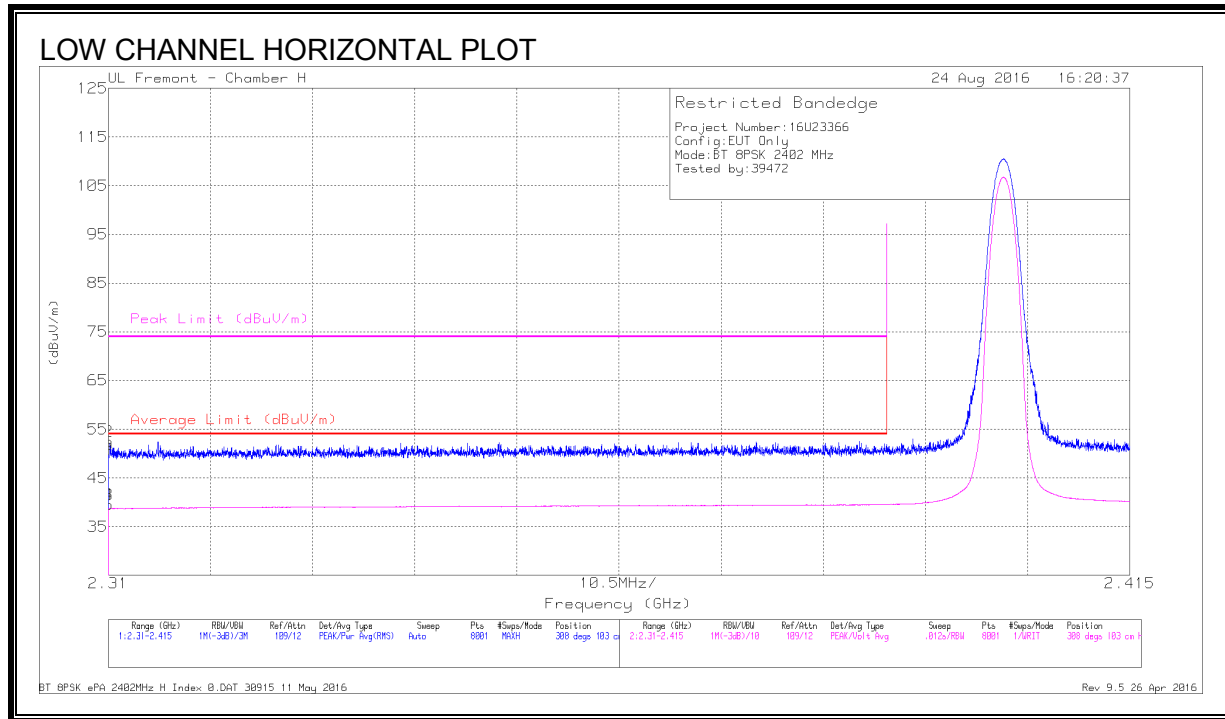
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

8.2.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

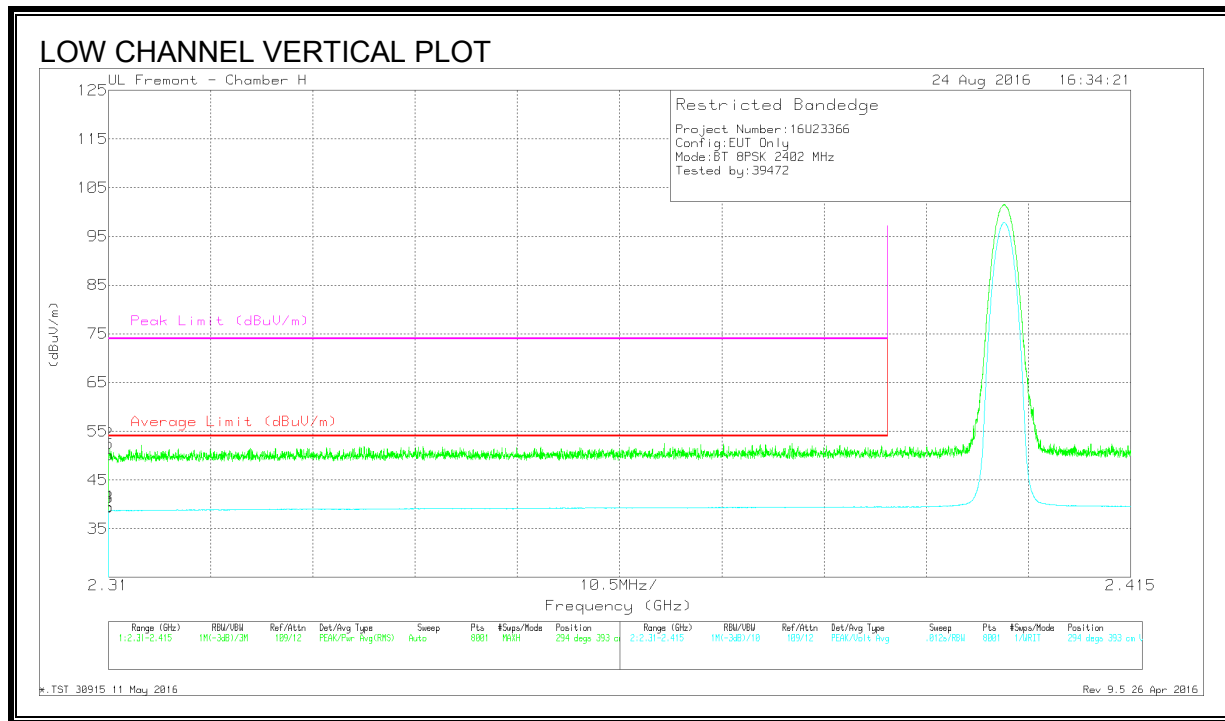
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.31	40.11	Pk	31.6	-19.8	51.91	-	-	74	-22.09	308	103	H
2	2.31	40.72	Pk	31.6	-19.8	52.52	-	-	74	-21.48	308	103	H
3	2.31	27.79	VA1T	31.6	-19.8	39.59	54	-14.41	-	-	308	103	H
4	2.31	27.79	VA1T	31.6	-19.8	39.59	54	-14.41	-	-	308	103	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



DATA

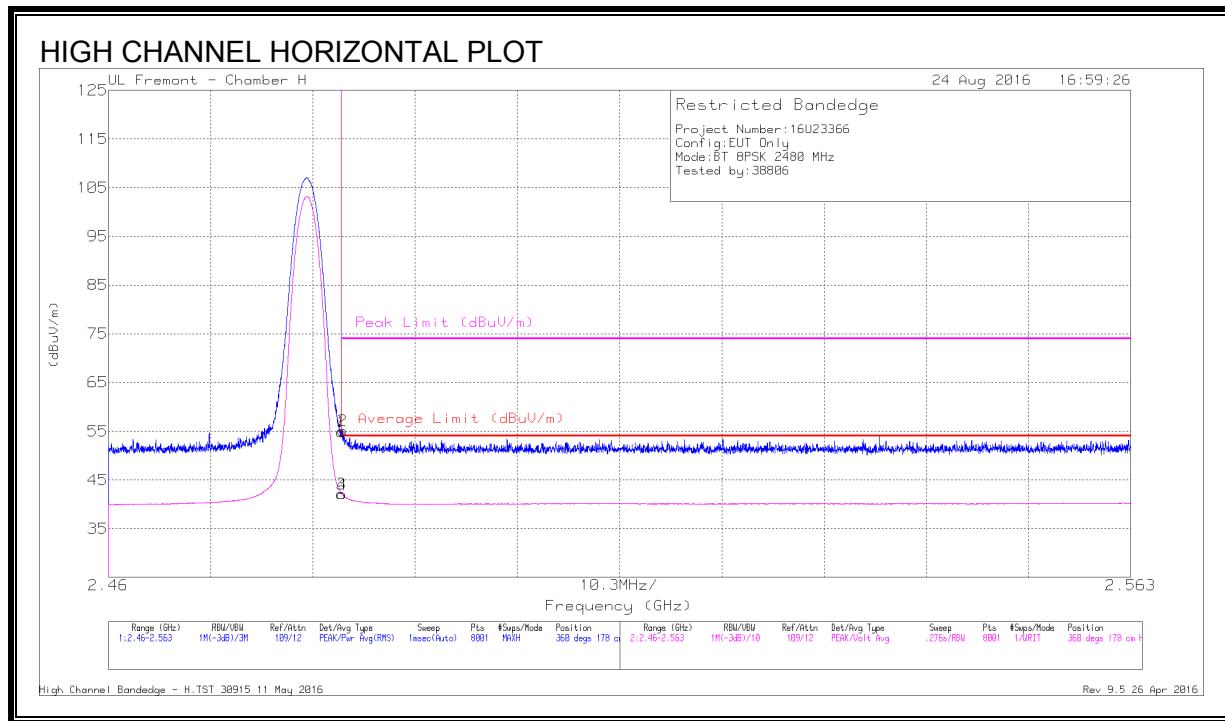
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.31	38.3	Pk	31.6	-19.8	50.1	-	-	74	-23.9	294	393	V
2	2.31	40.67	Pk	31.6	-19.8	52.47	-	-	74	-21.53	294	393	V
3	2.31	27.66	VA1T	31.6	-19.8	39.46	54	-14.54	-	-	294	393	V
4	2.31	27.71	VA1T	31.6	-19.8	39.51	54	-14.49	-	-	294	393	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



DATA

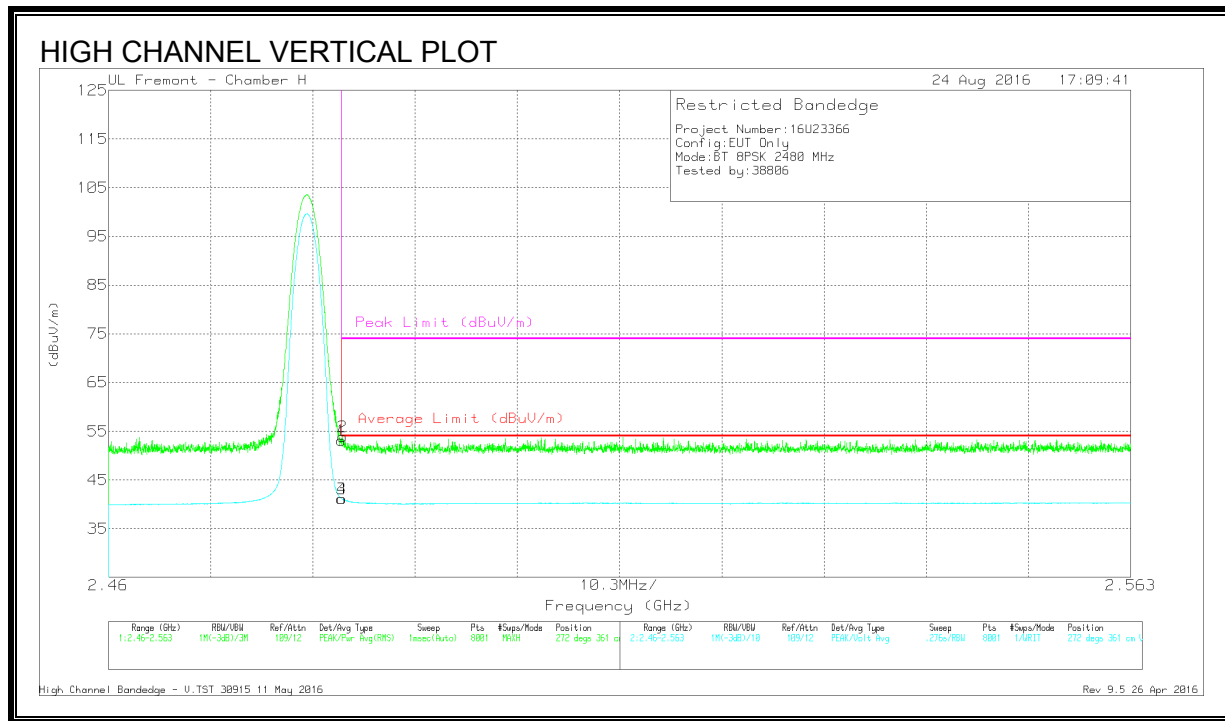
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1	* 2.484	42.21	Pk	32.2	-19.5	54.91	-	-	74	-19.09	360	178	H
2	* 2.484	42.47	Pk	32.2	-19.5	55.17	-	-	74	-18.83	360	178	H
3	* 2.484	29.41	VA1T	32.2	-19.5	42.11	54	-11.89	-	-	360	178	H
4	* 2.484	29.39	VA1T	32.2	-19.5	42.09	54	-11.91	-	-	360	178	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEGE (HIGH CHANNEL, VERTICAL)



DATA

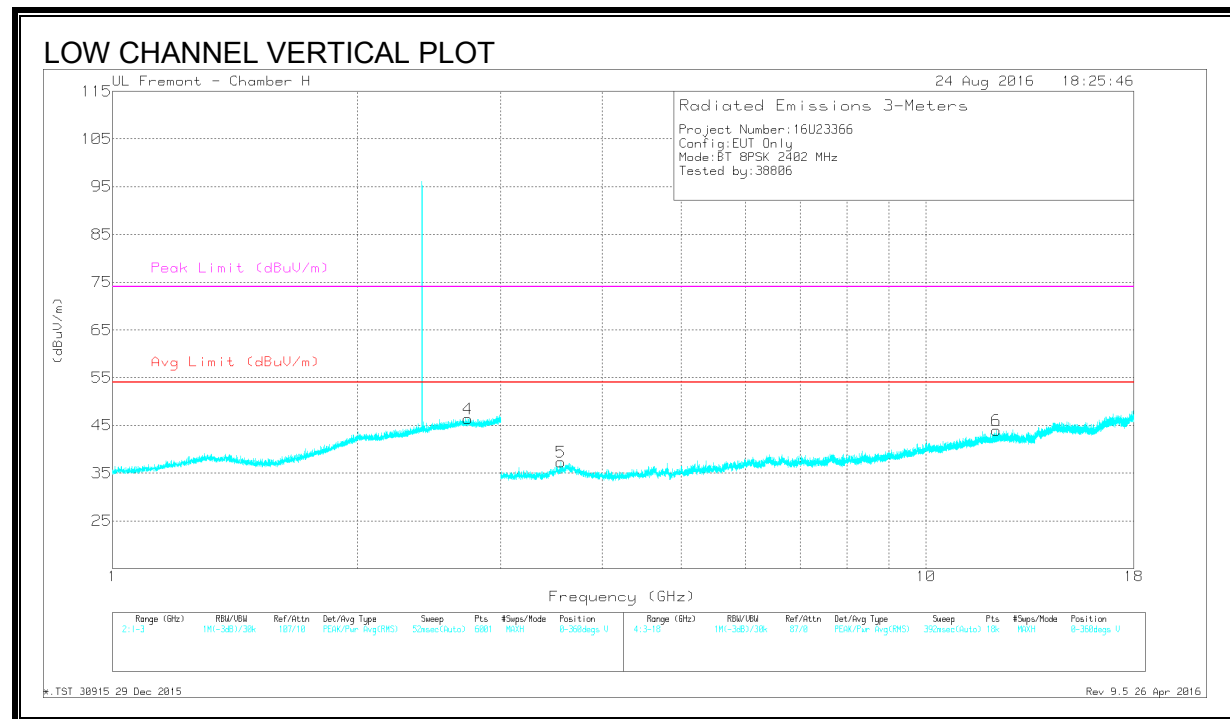
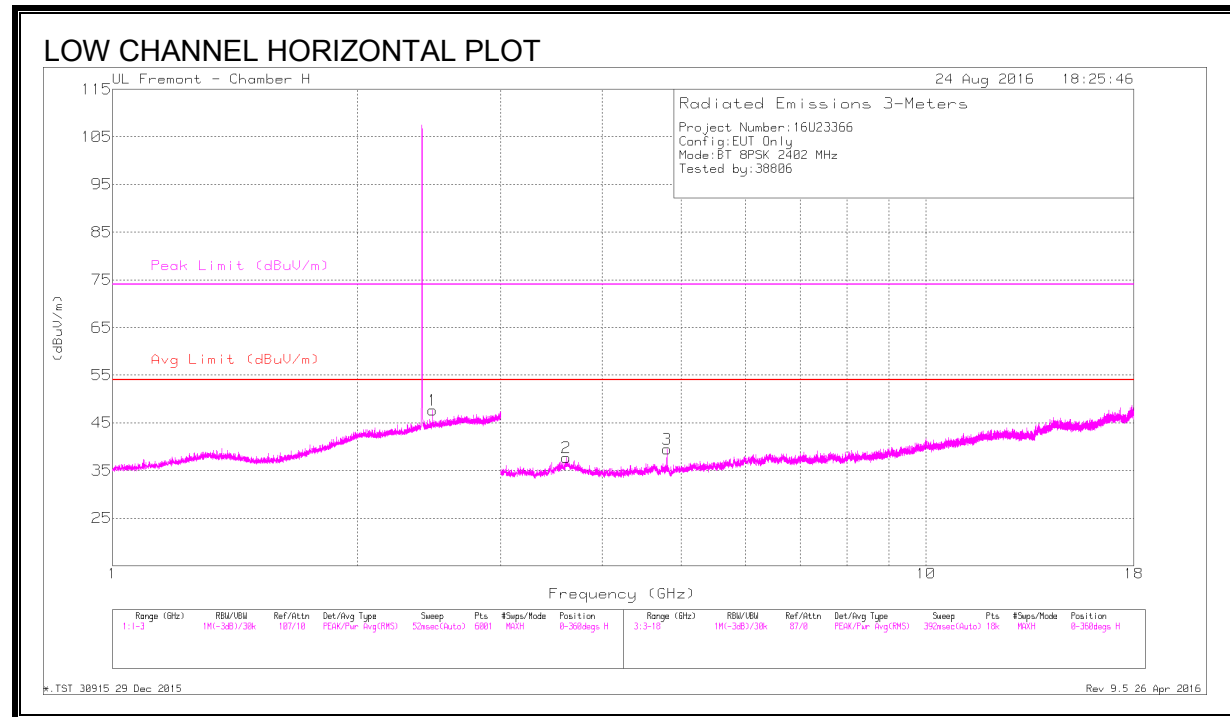
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.39	Pk	32.2	-19.5	53.09	-	-	74	-20.91	272	361	V
2	* 2.484	41.17	Pk	32.2	-19.5	53.87	-	-	74	-20.13	272	361	V
3	* 2.484	28.46	VA1T	32.2	-19.5	41.16	54	-12.84	-	-	272	361	V
4	* 2.484	28.41	VA1T	32.2	-19.5	41.11	54	-12.89	-	-	272	361	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

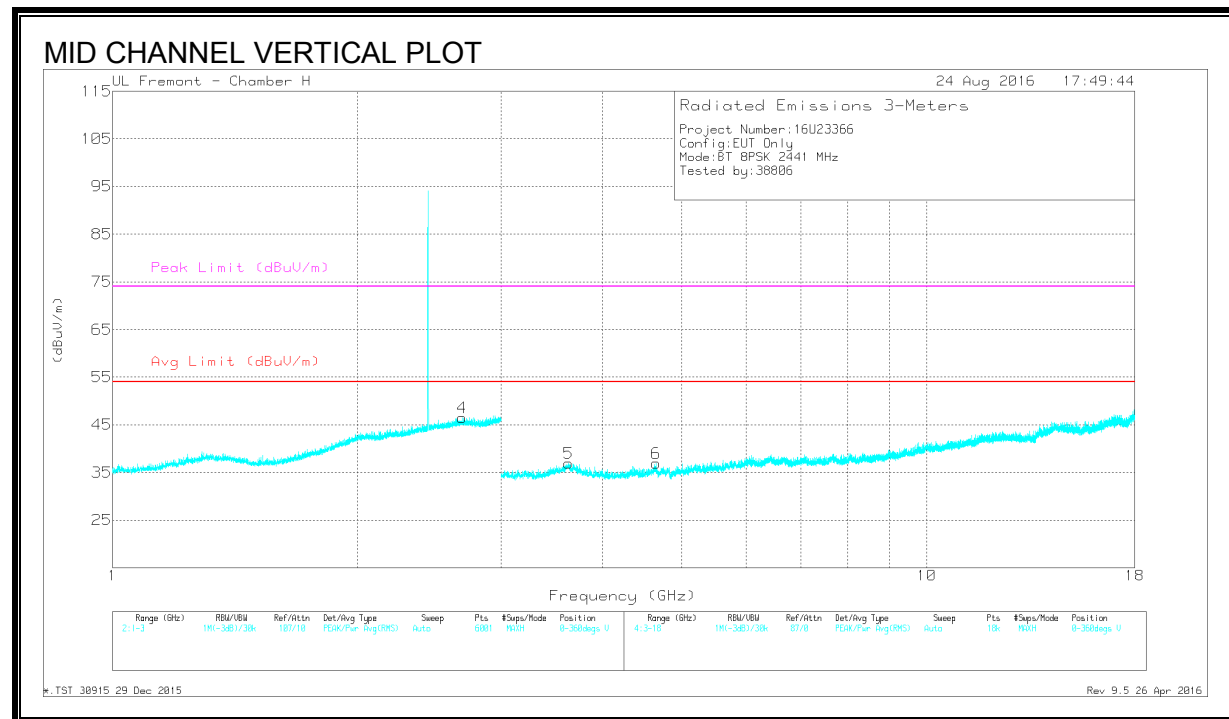
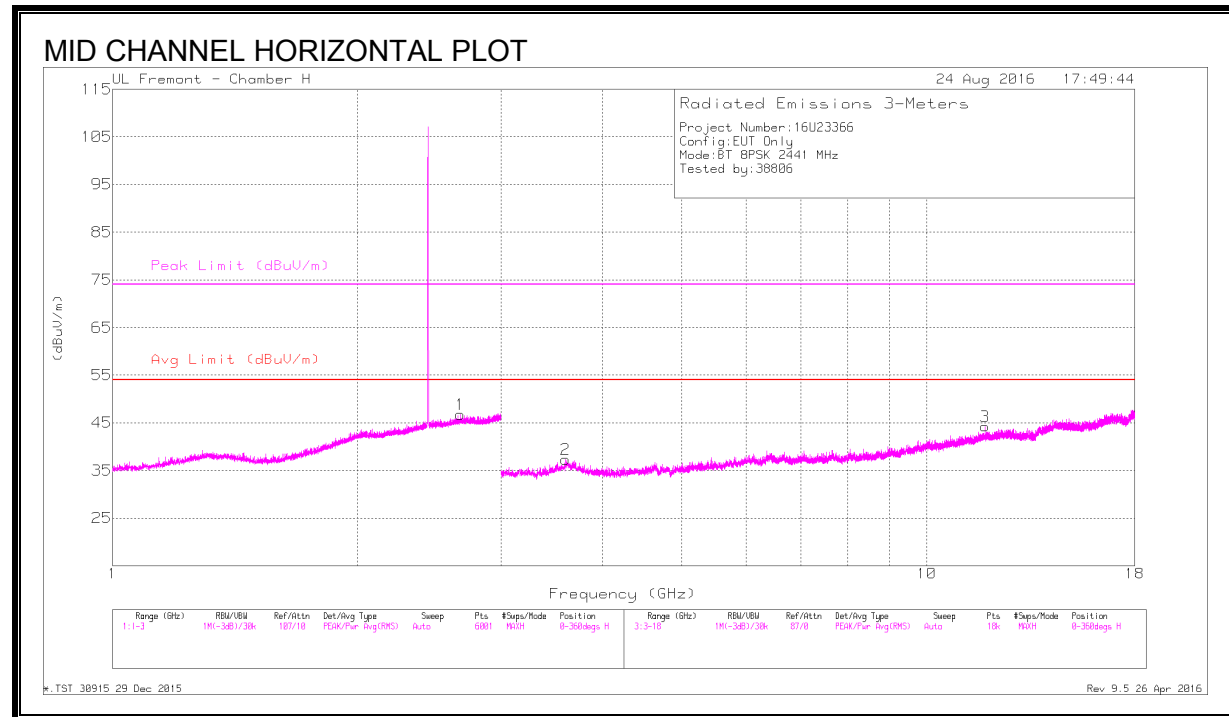
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.477	38.41	PKFH	32.2	-19.5	51.11	-	-	-	-	252	173	H
	2.477	28.12	VA1T	32.2	-19.5	40.82	-	-	-	-	252	173	H
2	* 3.612	45.29	PKFH	34.9	-35.7	44.49	-	-	74	-29.51	202	238	H
	* 3.613	33.84	VA1T	34.9	-35.7	33.04	54	-20.96	-	-	202	238	H
3	* 4.804	48.25	PKFH	34	-35.1	47.15	-	-	74	-26.85	292	111	H
	* 4.804	38.47	VA1T	34	-35.1	37.37	54	-16.63	-	-	292	111	H
4	* 2.733	37.84	PKFH	32.6	-19.2	51.24	-	-	74	-22.76	226	135	V
	* 2.733	26.39	VA1T	32.6	-19.2	39.79	54	-14.21	-	-	226	135	V
5	* 3.559	44.58	PKFH	34.6	-35.8	43.38	-	-	74	-30.62	24	311	V
	* 3.561	33.07	VA1T	34.6	-35.8	31.87	54	-22.13	-	-	24	311	V
6	* 12.203	41.39	PKFH	39.3	-26.8	53.89	-	-	74	-20.11	360	321	V
	* 12.205	29.57	VA1T	39.3	-26.8	42.07	54	-11.93	-	-	360	321	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

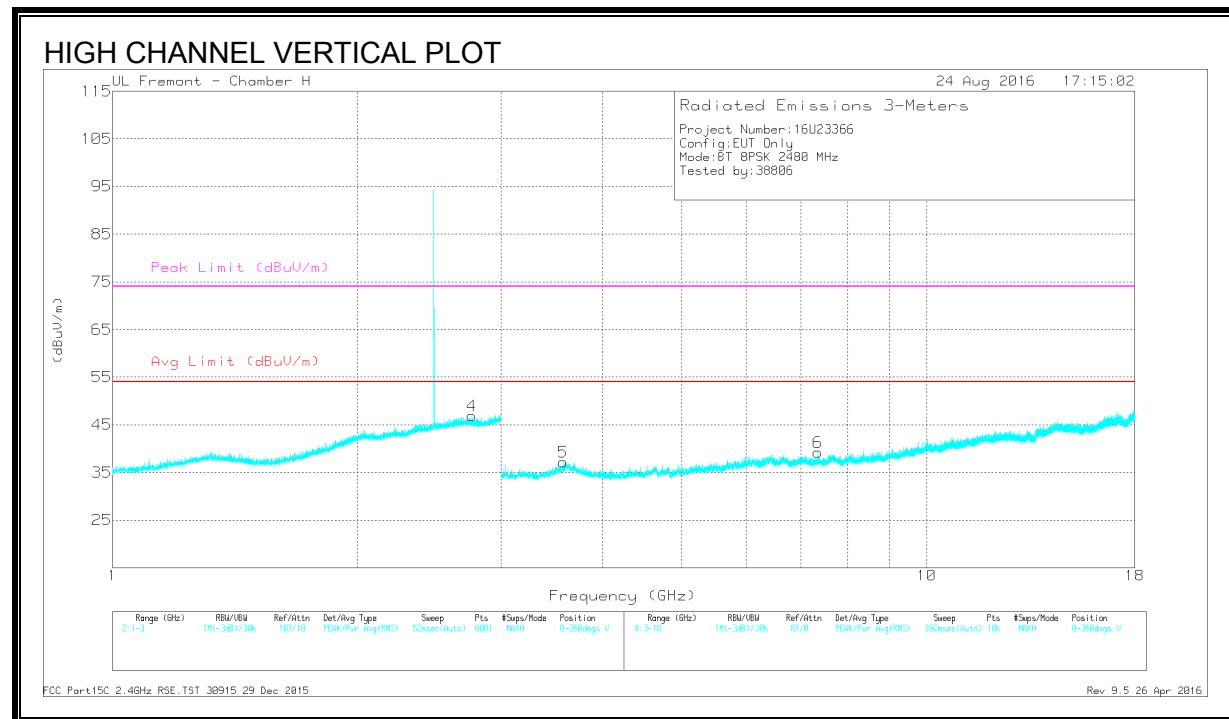
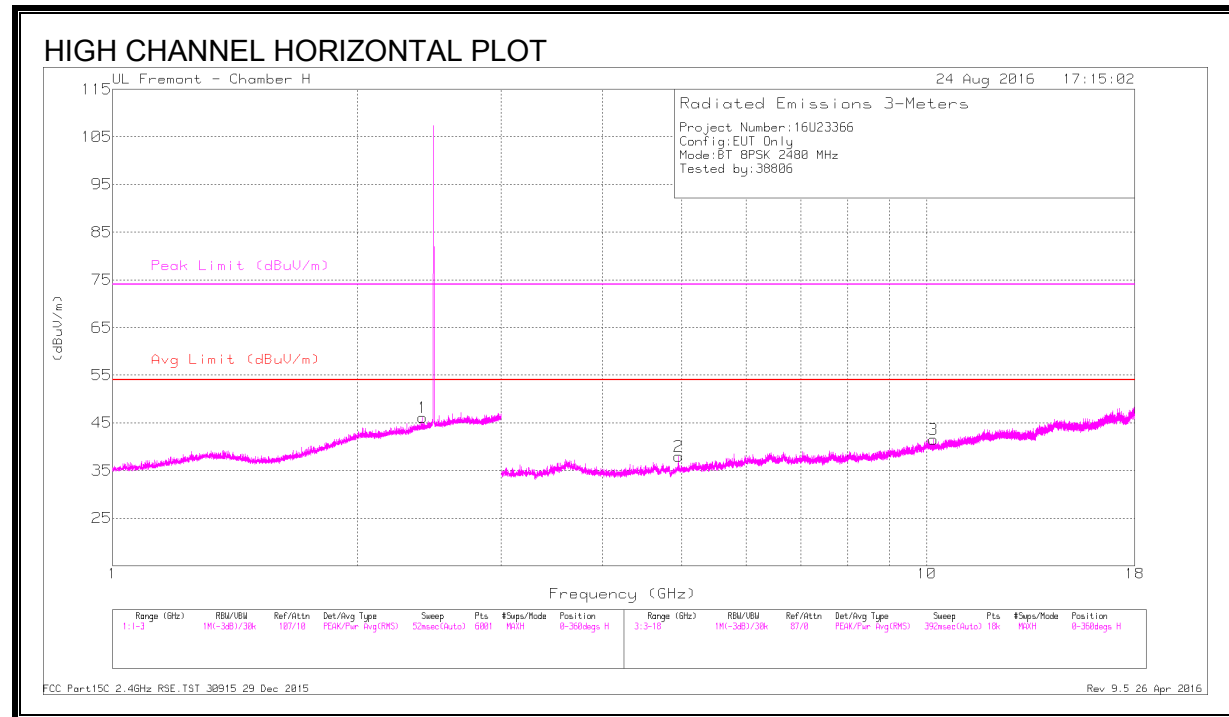
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.676	38.04	PKFH	32.5	-19.2	51.34	-	-	74	-22.66	177	344	H
	* 2.673	26.46	VA1T	32.5	-19.2	39.76	54	-14.24	-	-	177	344	H
2	* 3.599	43.16	PKFH	34.9	-35.6	42.46	-	-	74	-31.54	242	323	H
	* 3.599	32.9	VA1T	34.9	-35.6	32.2	54	-21.8	-	-	242	323	H
3	* 11.782	39.94	PKFH	39.1	-26.8	52.24	-	-	74	-21.76	210	215	H
	* 11.782	29.57	VA1T	39.1	-26.8	41.87	54	-12.13	-	-	210	215	H
4	* 2.689	37.5	PKFH	32.6	-19.3	50.8	-	-	74	-23.2	36	277	V
	* 2.689	26.39	VA1T	32.6	-19.2	39.79	54	-14.21	-	-	36	277	V
5	* 3.635	45.72	PKFH	34.9	-35.8	44.82	-	-	74	-29.18	342	177	V
	* 3.636	34.21	VA1T	34.9	-35.8	33.31	54	-20.69	-	-	342	177	V
6	* 4.649	45.48	PKFH	34	-34.4	45.08	-	-	74	-28.92	135	194	V
	* 4.651	33.55	VA1T	34	-34.5	33.05	54	-20.95	-	-	135	194	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT120 (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	2.405	38.66	PKFH	32	-19.6	51.06	-	-	-	-	311	136	H
	2.405	27.94	VA1T	32	-19.6	40.34	-	-	-	-	311	136	H
2	* 4.961	45.69	PKFH	34	-34.3	45.39	-	-	74	-28.61	301	118	H
	* 4.96	35.55	VA1T	34	-34.3	35.25	54	-18.75	-	-	301	118	H
3	10.182	30.52	VA1T	37.6	-29.3	38.82	-	-	-	-	246	215	H
	10.184	42.33	PKFH	37.6	-29.3	50.63	-	-	-	-	246	215	H
4	* 2.76	37.37	PKFH	32.6	-19.2	50.77	-	-	74	-23.23	341	272	V
	* 2.762	26.31	VA1T	32.6	-19.2	39.71	54	-14.29	-	-	341	272	V
5	* 3.576	44.93	PKFH	34.8	-35.7	44.03	-	-	74	-29.97	40	128	V
	* 3.575	33.12	VA1T	34.8	-35.7	32.22	54	-21.78	-	-	40	128	V
6	* 7.351	42.83	PKFH	35.7	-31.2	47.33	-	-	74	-26.67	102	391	V
	* 7.351	31.24	VA1T	35.7	-31.2	35.74	54	-18.26	-	-	102	391	V

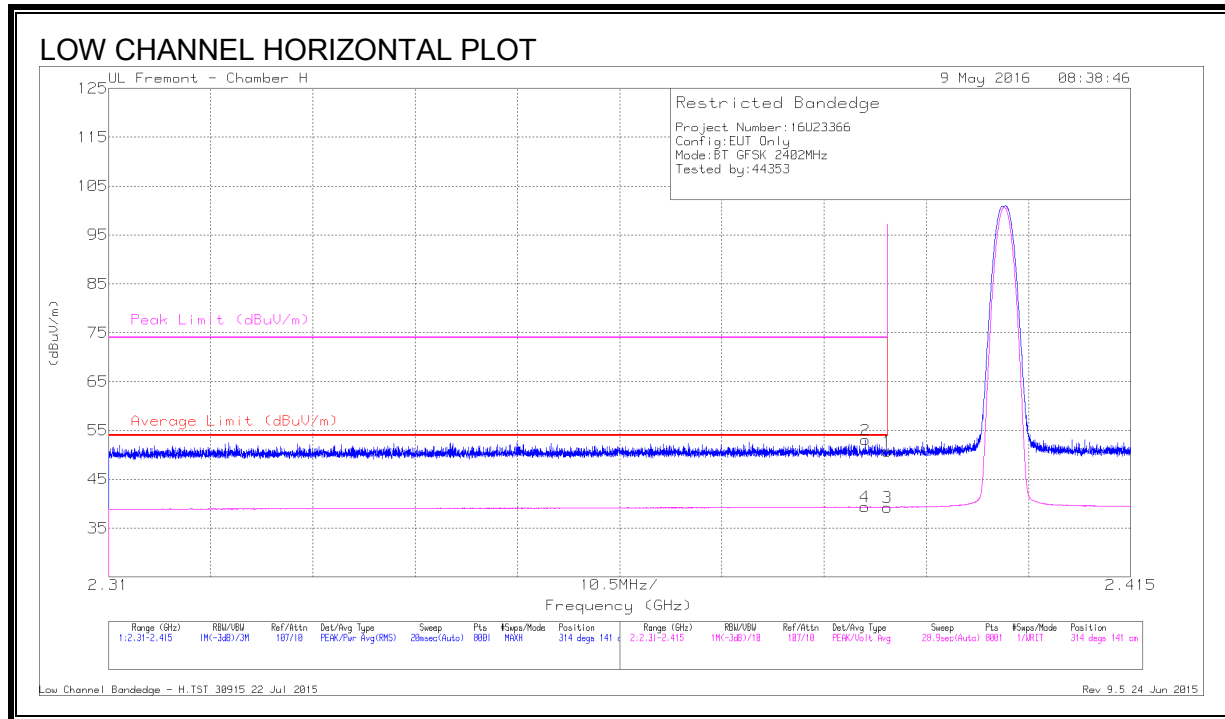
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

8.2.3. LOW POWER BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

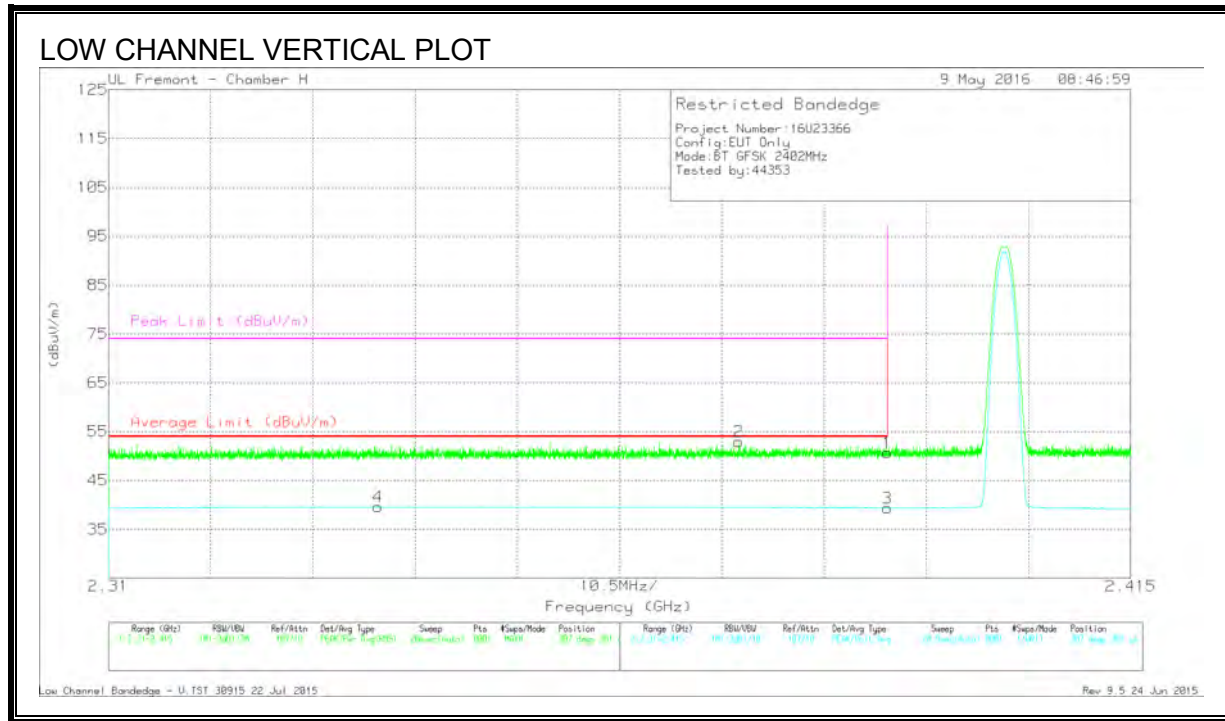
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.76	Pk	31.9	-21.9	50.76	-	-	74	-23.24	314	141	H
2	* 2.388	43.03	Pk	31.9	-21.9	53.03	-	-	74	-20.97	314	141	H
3	* 2.39	29.29	VA1T	31.9	-21.9	39.29	54	-14.71	-	-	314	141	H
4	* 2.388	29.35	VA1T	31.9	-21.9	39.35	54	-14.65	-	-	314	141	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEGE (LOW CHANNEL, VERTICAL)



DATA

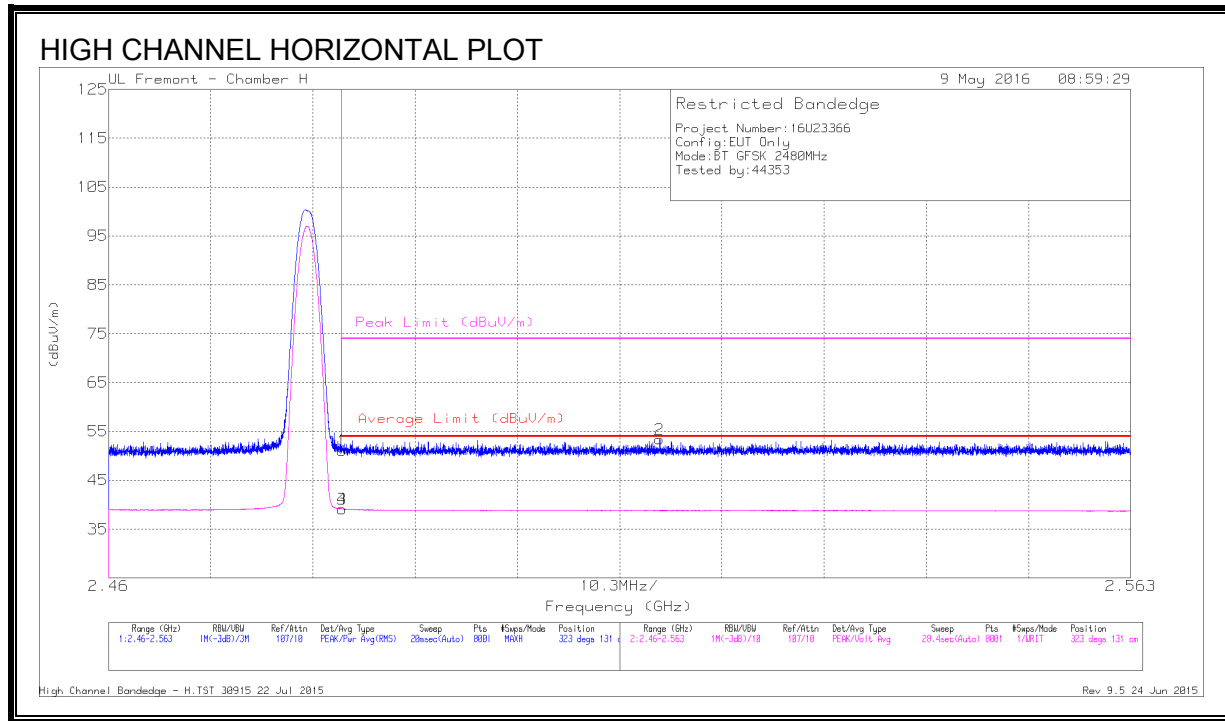
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.68	Pk	31.9	-21.9	50.68	-	-	74	-23.32	307	381	V
2	* 2.375	43.02	Pk	31.9	-21.9	53.02	-	-	74	-20.98	307	381	V
3	* 2.39	29.42	VA1T	31.9	-21.9	39.42	54	-14.58	-	-	307	381	V
4	* 2.338	29.78	VA1T	31.7	-21.9	39.58	54	-14.42	-	-	307	381	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

RESTRICTED BANDEGE (HIGH CHANNEL, HORIZONTAL)



DATA

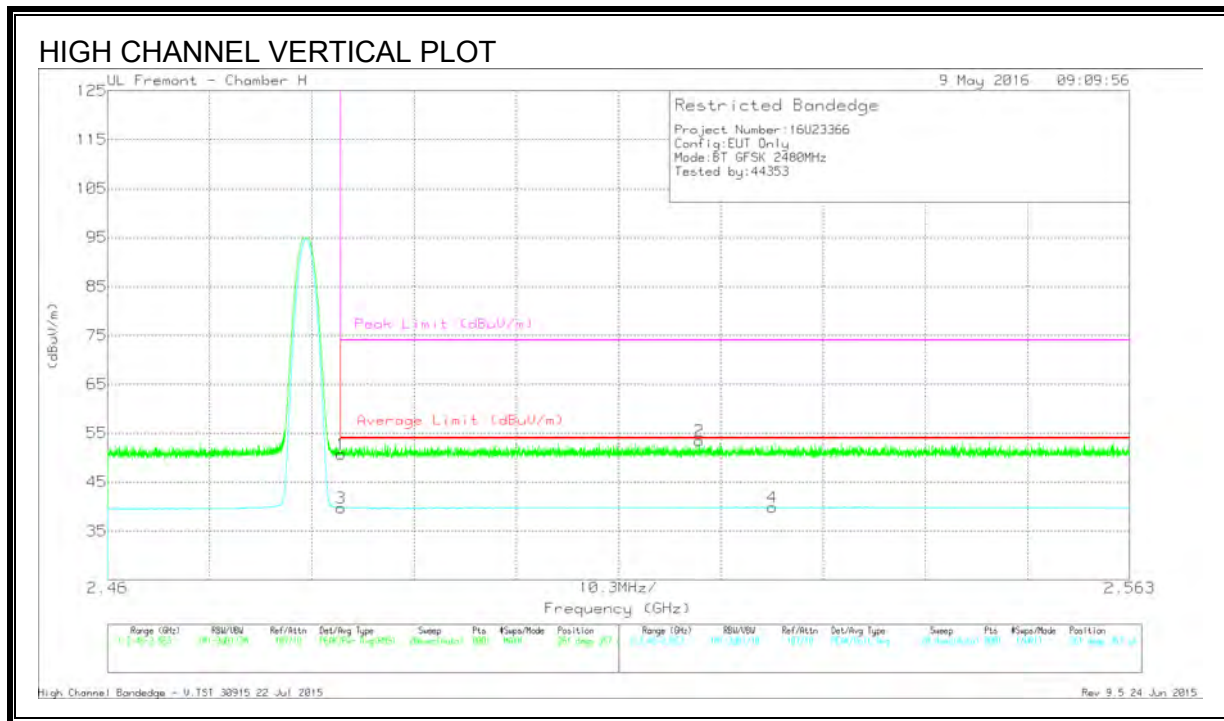
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.54	Pk	32.2	-21.7	51.04	-	-	74	-22.96	323	131	H
3	* 2.484	28.64	VA1T	32.2	-21.7	39.14	54	-14.86	-	-	323	131	H
4	* 2.484	28.63	VA1T	32.2	-21.7	39.13	54	-14.87	-	-	323	131	H
2	2.516	42.8	Pk	32.2	-21.6	53.4	-	-	74	-20.6	323	131	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



DATA

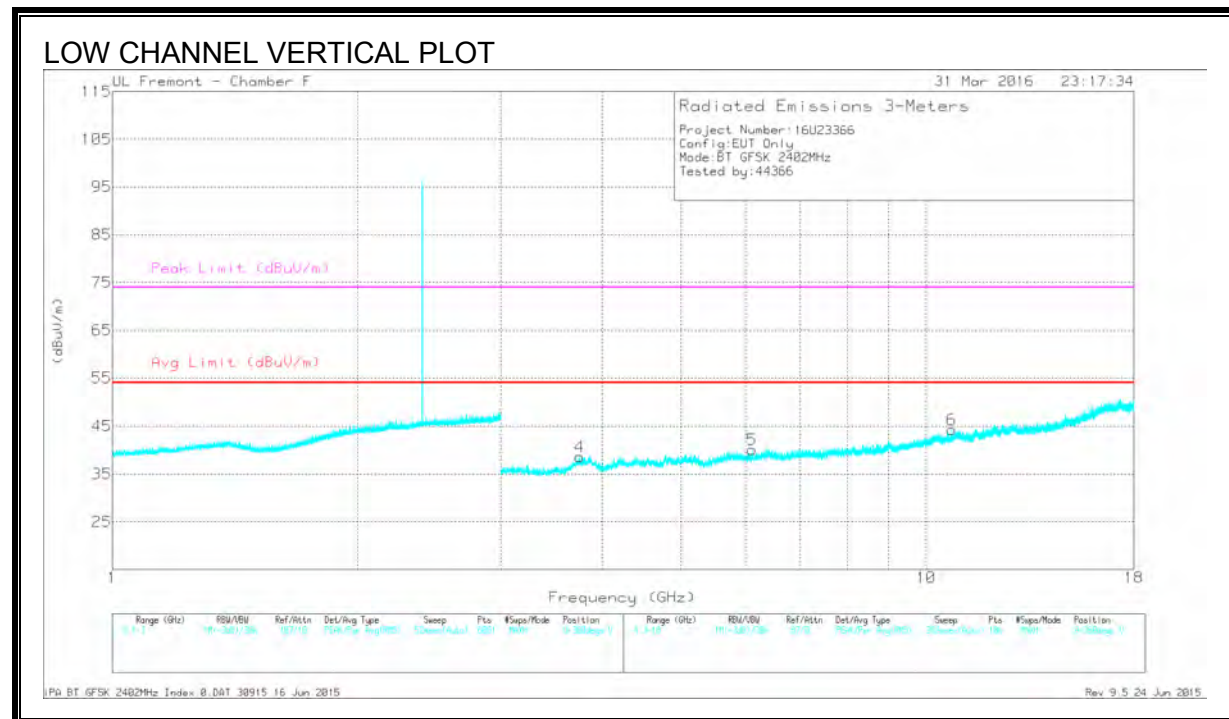
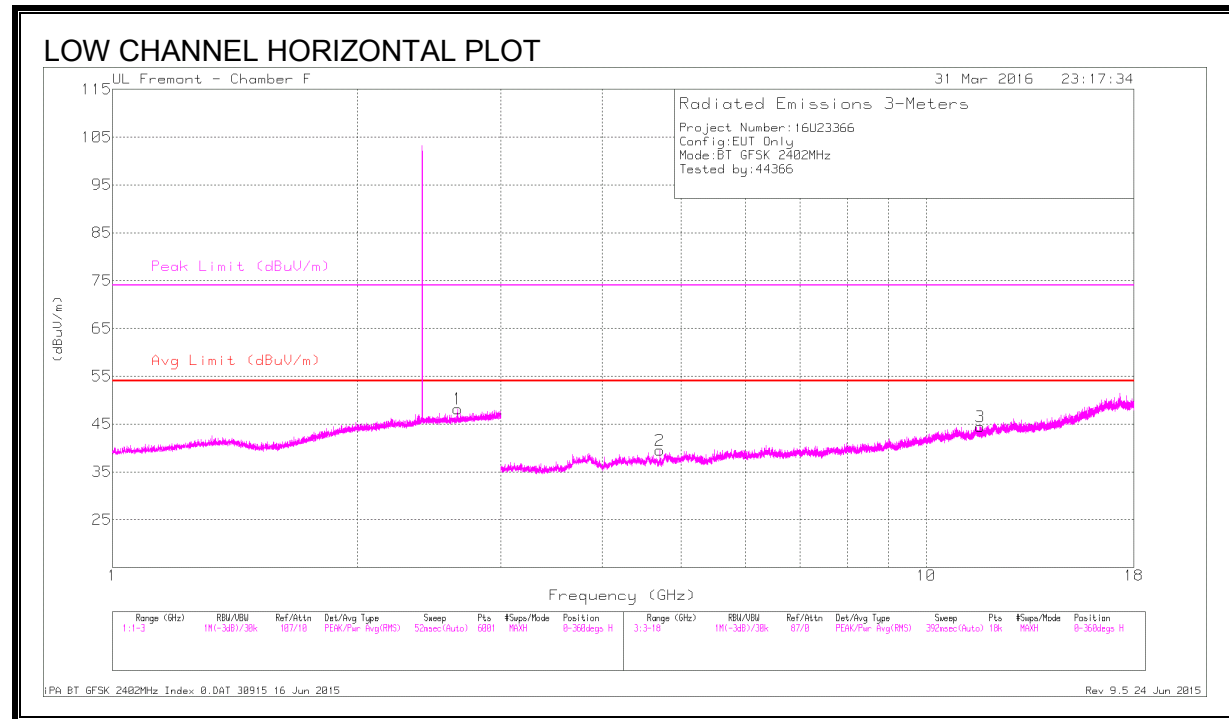
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.19	Pk	32.2	-21.7	50.69	-	-	74	-23.31	261	357	V
3	* 2.484	29.29	VA1T	32.2	-21.7	39.79	54	-14.21	-	-	261	357	V
2	2.52	42.85	Pk	32.2	-21.6	53.45	-	-	74	-20.55	261	357	V
4	2.527	29.17	VA1T	32.2	-21.5	39.87	54	-14.13	-	-	261	357	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

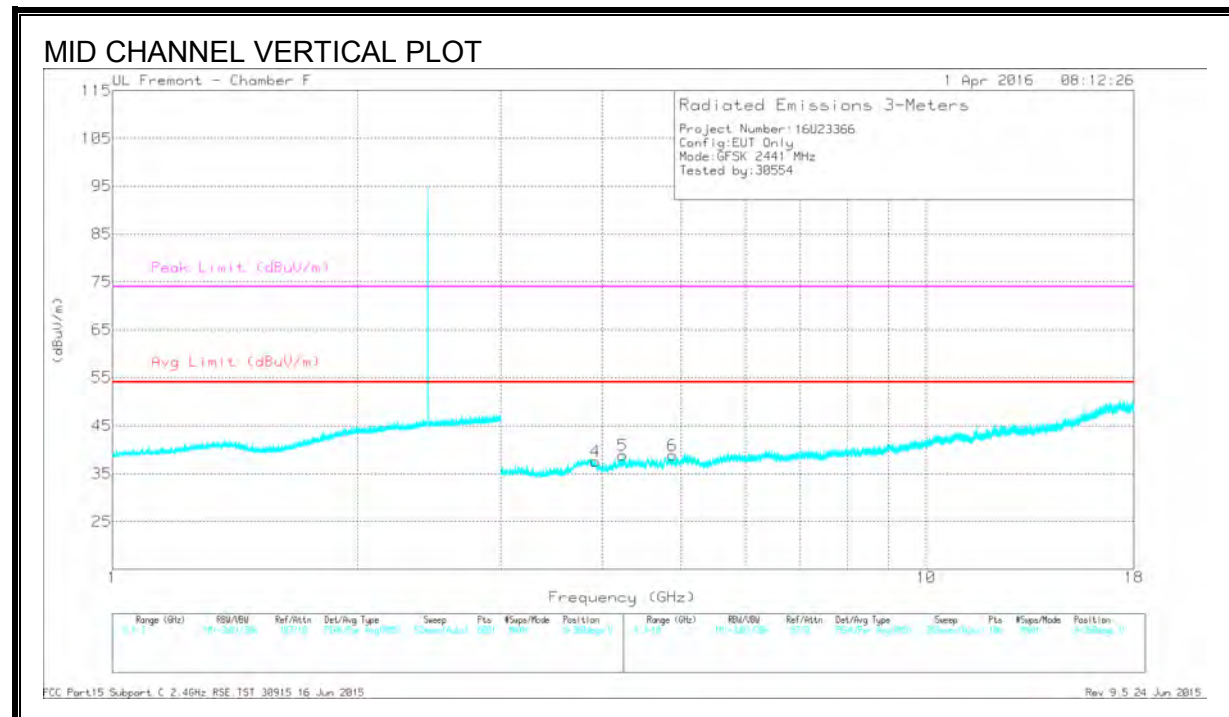
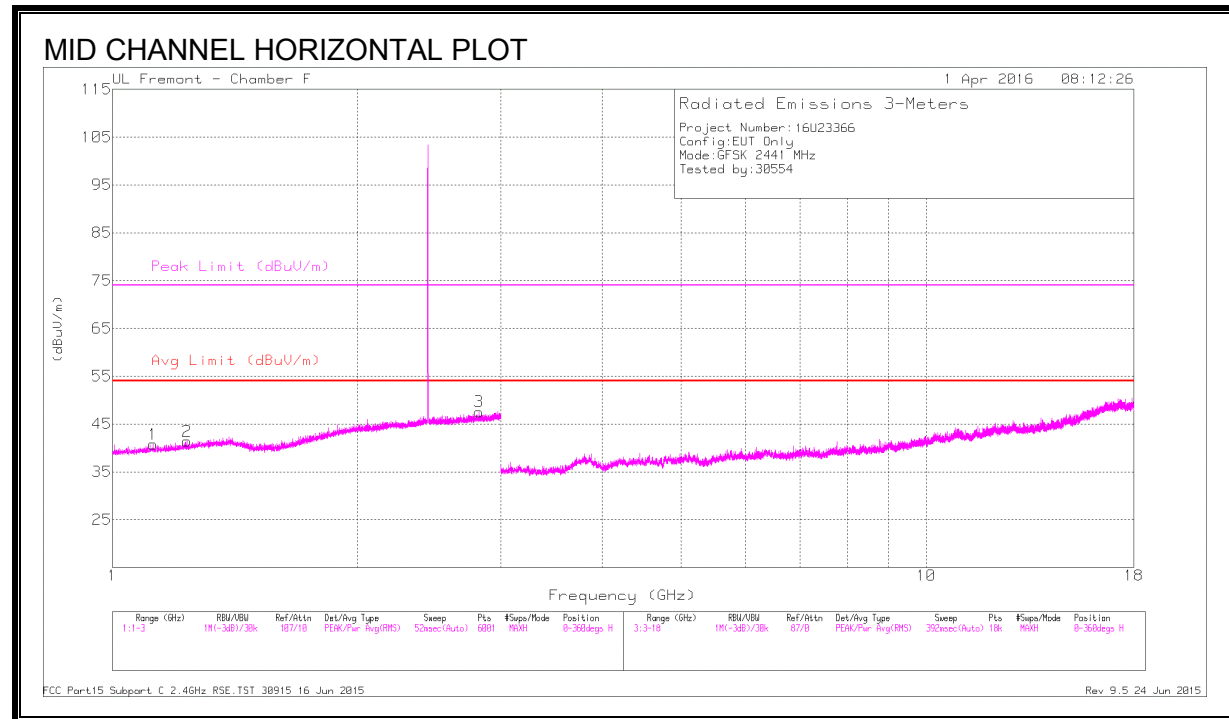
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1	* 2.657	41.77	PK2	32.3	-20.7	53.37	-	-	74	-20.63	357	240	H
	* 2.655	28.63	VA1T	32.3	-20.7	40.23	54	-13.77	-	-	357	240	H
2	* 4.71	39.57	PK2	34.2	-28.5	45.27	-	-	74	-28.73	272	231	H
	* 4.71	26.32	VA1T	34.2	-28.5	32.02	54	-21.98	-	-	272	231	H
3	* 11.656	34.33	PK2	38.2	-22.3	50.23	-	-	74	-23.77	75	303	H
	* 11.657	21.61	VA1T	38.2	-22.3	37.51	54	-16.49	-	-	75	303	H
4	* 3.754	38.83	PK2	33.4	-29.1	43.13	-	-	74	-30.87	127	266	V
	* 3.752	25.89	VA1T	33.4	-29.1	30.19	54	-23.81	-	-	127	266	V
5	6.112	36.92	PK2	35.5	-26.8	45.62	-	-	-	-	184	266	V
6	* 10.754	34.51	PK2	37.7	-21.9	50.31	-	-	74	-23.69	130	244	V
	* 10.754	21.19	VA1T	37.7	-21.9	36.99	54	-17.01	-	-	130	244	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

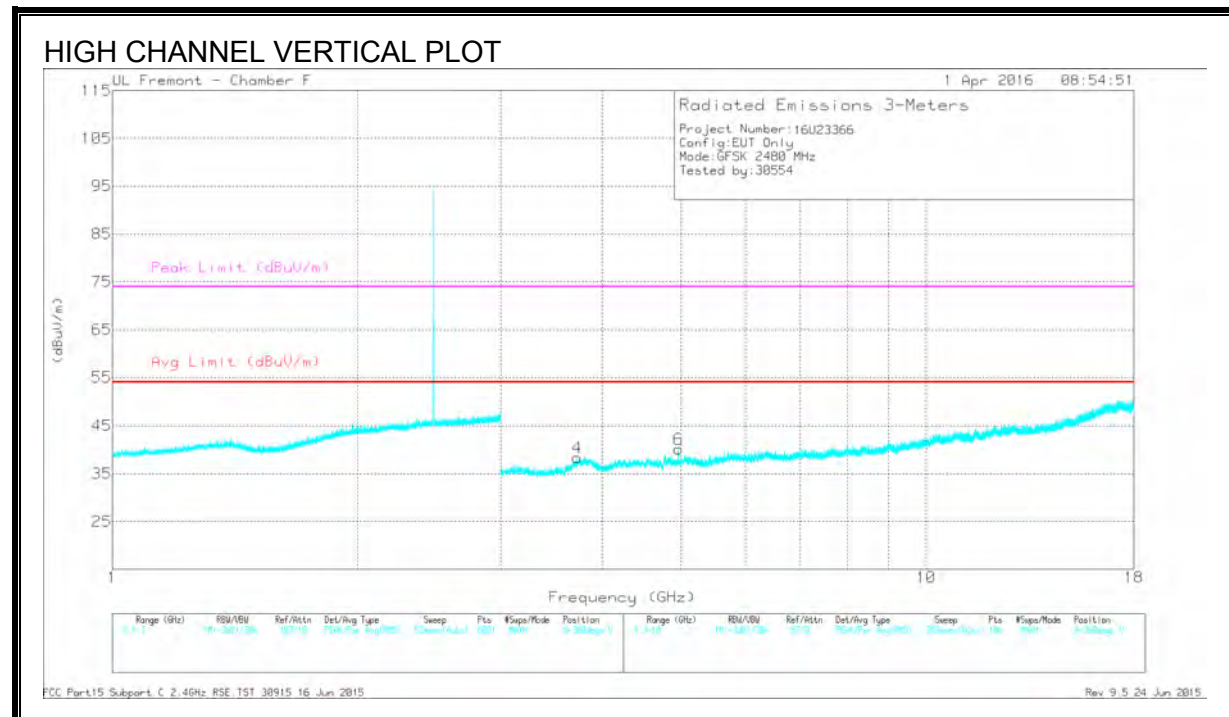
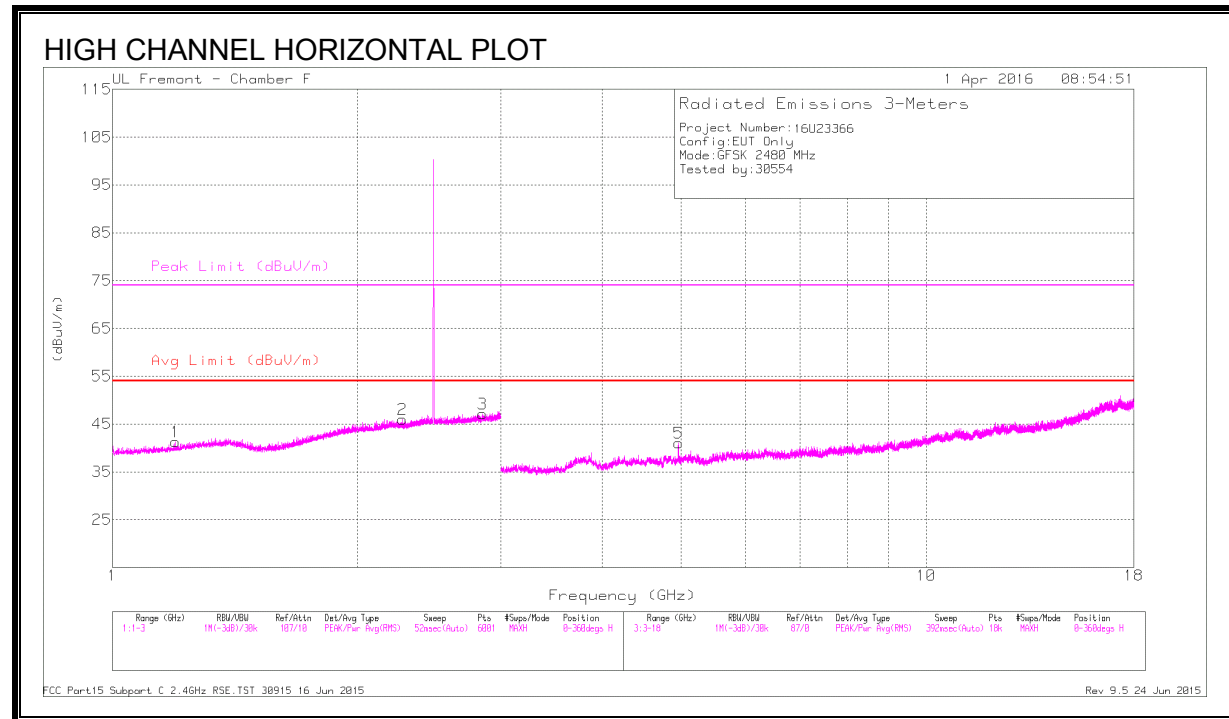
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.121	41.95	PK-2	28	-22.7	47.25	-	-	74	-26.75	336	121	H
	* 1.121	28.86	VA1T	28	-22.7	34.16	54	-19.84	-	-	336	121	H
2	* 1.234	41.82	PK-2	28.5	-22.3	48.02	-	-	74	-25.98	314	135	H
	* 1.233	28.76	VA1T	28.5	-22.3	34.96	54	-19.04	-	-	314	135	H
3	* 2.82	41.51	PK-2	32.5	-20.3	53.71	-	-	74	-20.29	329	160	H
	* 2.822	28.35	VA1T	32.5	-20.3	40.55	54	-13.45	-	-	329	160	H
4	* 3.922	39.68	PK-2	33.4	-29.1	43.98	-	-	74	-30.02	259	153	V
	* 3.922	26.07	VA1T	33.4	-29.1	30.37	54	-23.63	-	-	259	153	V
5	* 4.243	37.98	PK-2	33.7	-28.1	43.58	-	-	74	-30.42	269	192	V
	* 4.241	25.1	VA1T	33.7	-28.1	30.7	54	-23.3	-	-	269	192	V
6	* 4.882	37.38	PK-2	34.1	-27.8	43.68	-	-	74	-30.32	282	209	V
	* 4.882	24.55	VA1T	34.1	-27.8	30.85	54	-23.15	-	-	282	209	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	* 1.195	42.75	PK-2	28.3	-22.5	48.55	-	-	74	-25.45	296	138	H
	* 1.195	28.92	VA1T	28.3	-22.5	34.72	54	-19.28	-	-	296	138	H
2	* 2.271	41.84	PK-2	31.7	-21	52.54	-	-	74	-21.46	276	157	H
	* 2.271	28.62	VA1T	31.7	-21	39.32	54	-14.68	-	-	276	157	H
3	* 2.847	42.78	PK-2	32.6	-20.3	55.08	-	-	74	-18.92	237	186	H
	* 2.847	28.41	VA1T	32.6	-20.3	40.71	54	-13.29	-	-	237	186	H
4	* 4.96	39.51	PK-2	34.2	-28.5	45.21	-	-	74	-28.79	207	210	H
	* 4.96	27.6	VA1T	34.2	-28.5	33.3	54	-20.7	-	-	207	210	H
5	* 3.728	38.81	PK-2	33.4	-29.3	42.91	-	-	74	-31.09	216	190	V
	* 3.726	26.2	VA1T	33.4	-29.3	30.3	54	-23.7	-	-	216	190	V
6	* 4.96	39.14	PK-2	34.2	-28.5	44.84	-	-	74	-29.16	232	175	V
	* 4.96	27.48	VA1T	34.2	-28.5	33.18	54	-20.82	-	-	232	175	V

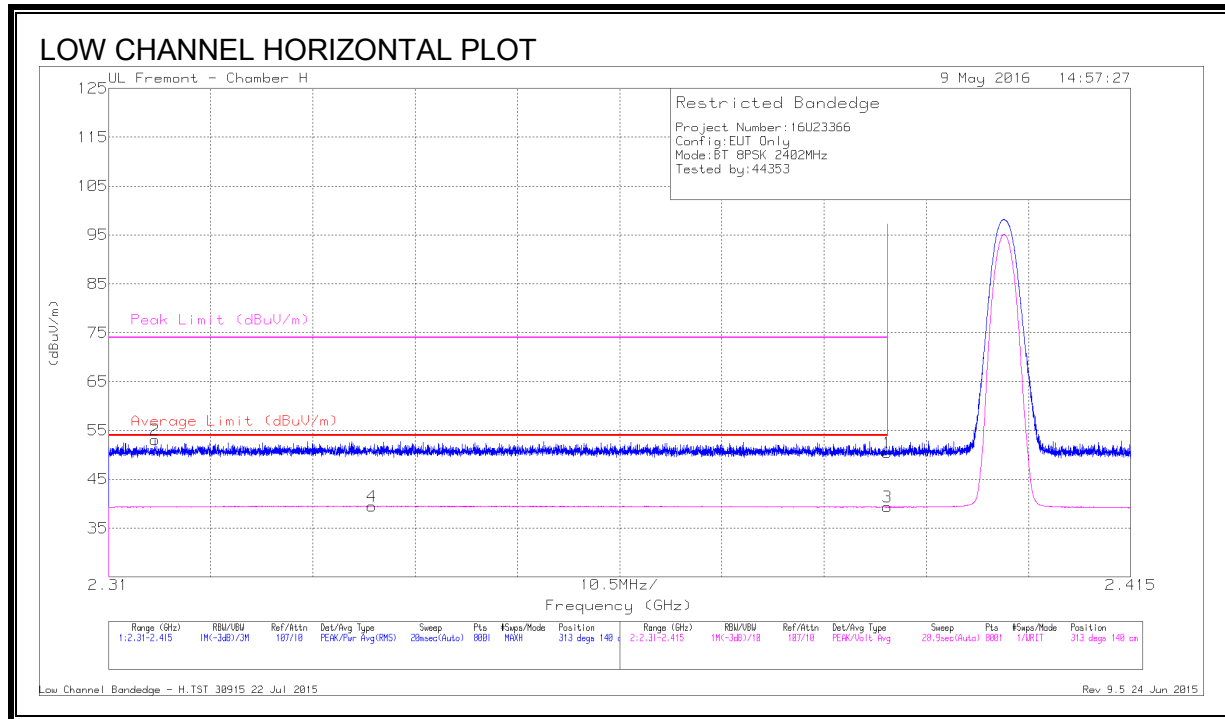
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

8.2.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



DATA

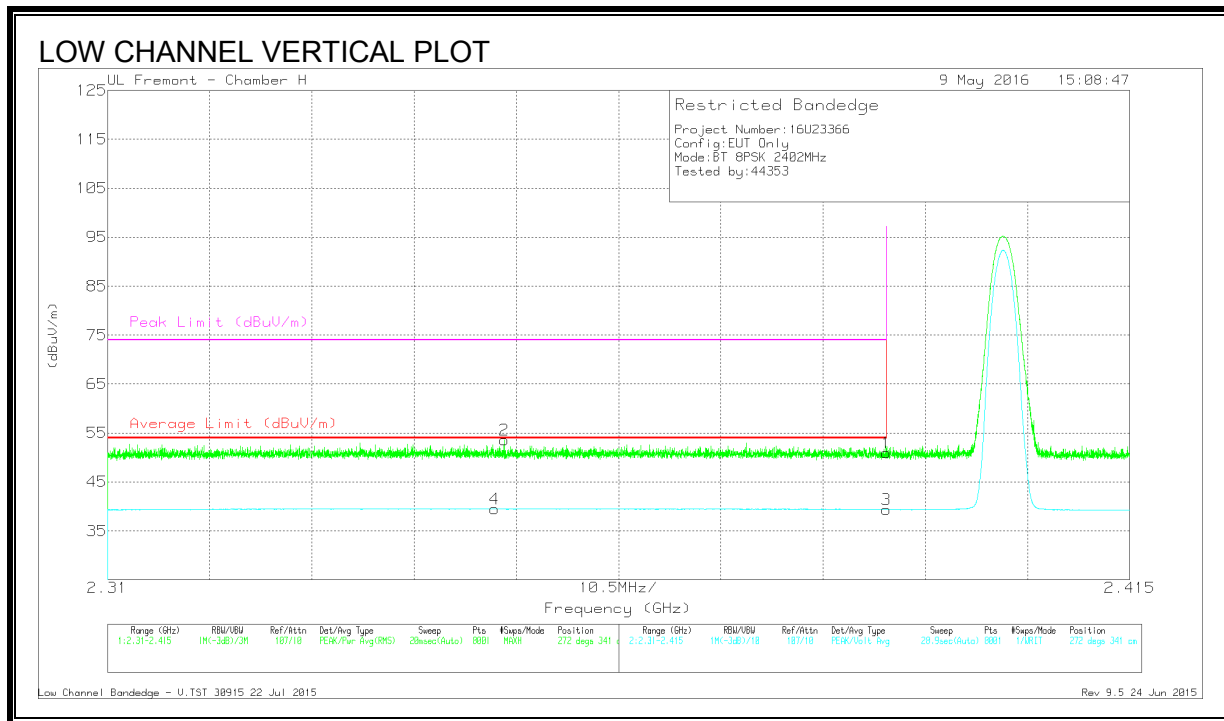
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.53	Pk	31.9	-21.9	50.53	-	-	74	-23.47	313	140	H
2	* 2.315	43.36	Pk	31.6	-21.9	53.06	-	-	74	-20.94	313	140	H
3	* 2.39	29.35	VA1T	31.9	-21.9	39.35	54	-14.65	-	-	313	140	H
4	* 2.337	29.72	VA1T	31.7	-21.9	39.52	54	-14.48	-	-	313	140	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



DATA

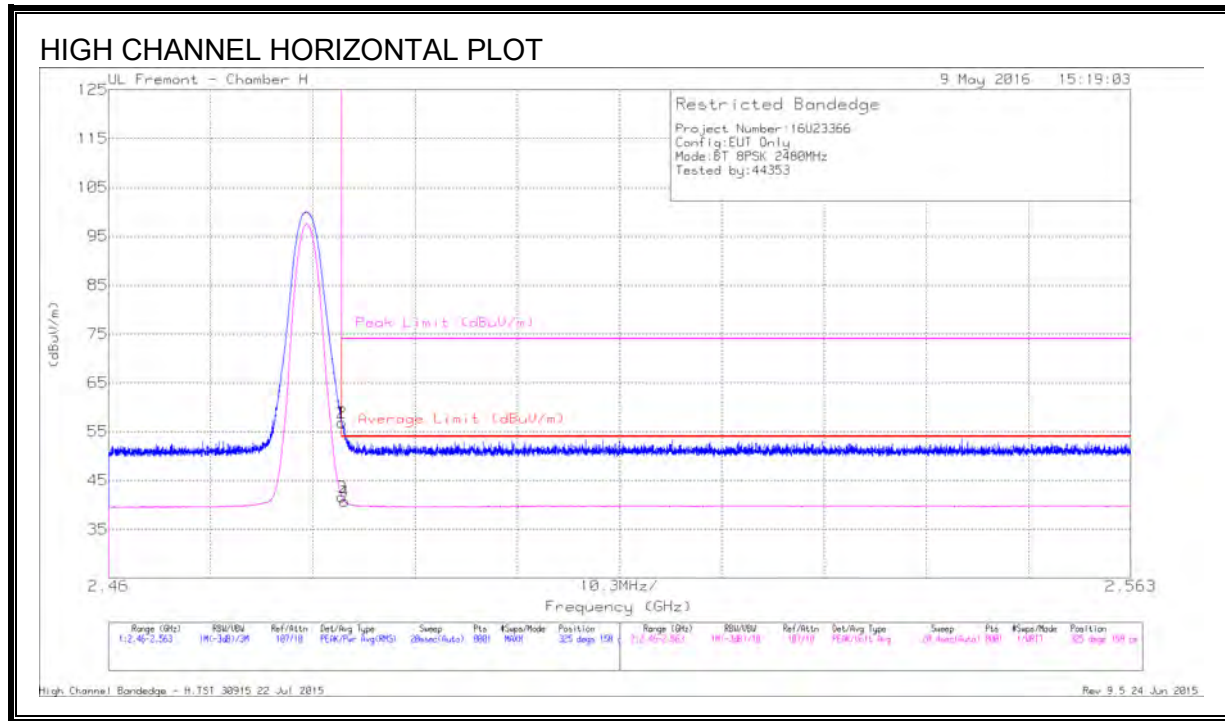
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.03	Pk	31.9	-21.9	51.03	-	-	74	-22.97	272	341	V
2	* 2.351	43.76	Pk	31.7	-21.9	53.56	-	-	74	-20.44	272	341	V
3	* 2.39	29.4	VA1T	31.9	-21.9	39.4	54	-14.6	-	-	272	341	V
4	* 2.35	29.76	VA1T	31.7	-21.9	39.56	54	-14.44	-	-	272	341	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



DATA

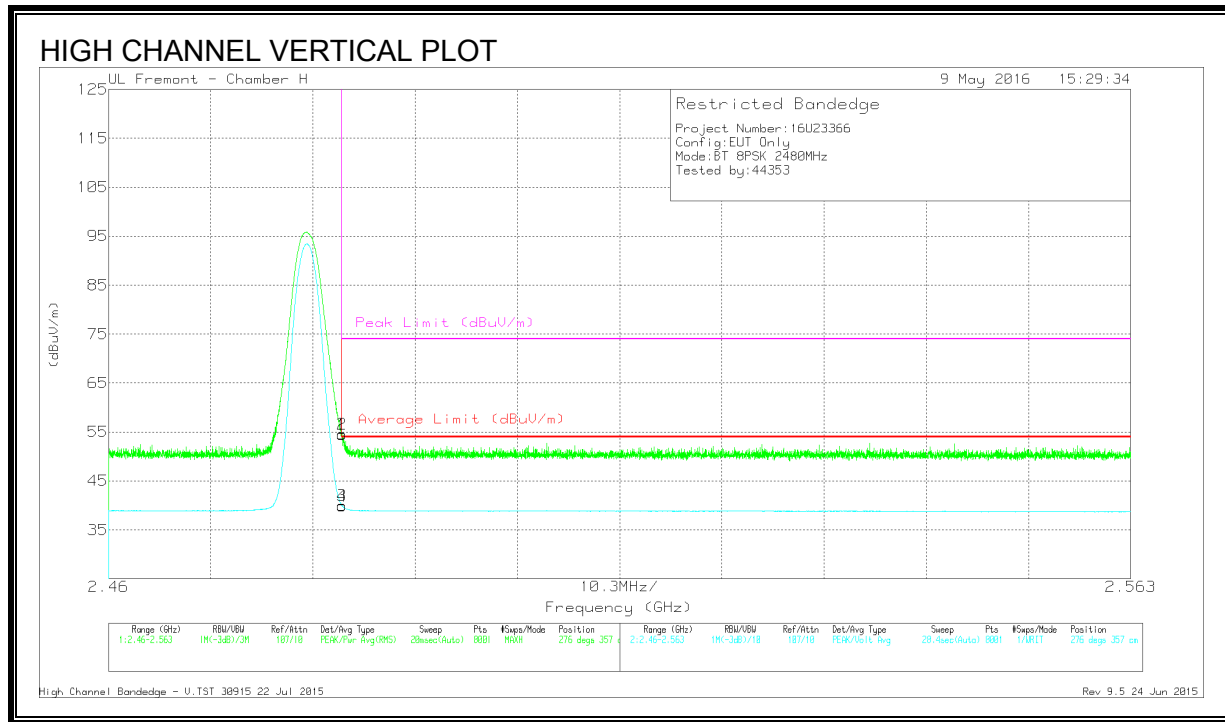
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.28	Pk	32.2	-21.7	56.78	-	-	74	-17.22	325	158	H
2	* 2.484	46.33	Pk	32.2	-21.7	56.83	-	-	74	-17.17	325	158	H
3	* 2.484	31.14	VA1T	32.2	-21.7	41.64	54	-12.36	-	-	325	158	H
4	* 2.484	30.24	VA1T	32.2	-21.7	40.74	54	-13.26	-	-	325	158	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

RESTRICTED BANDEGE (HIGH CHANNEL, VERTICAL)



DATA

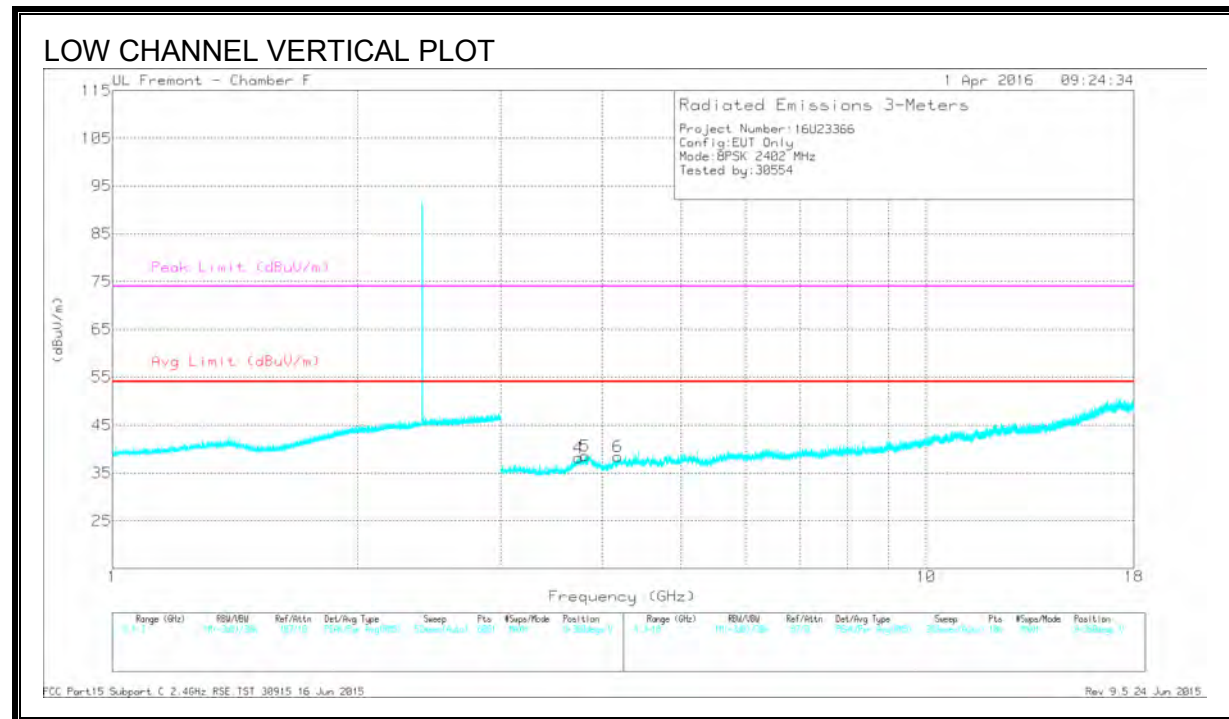
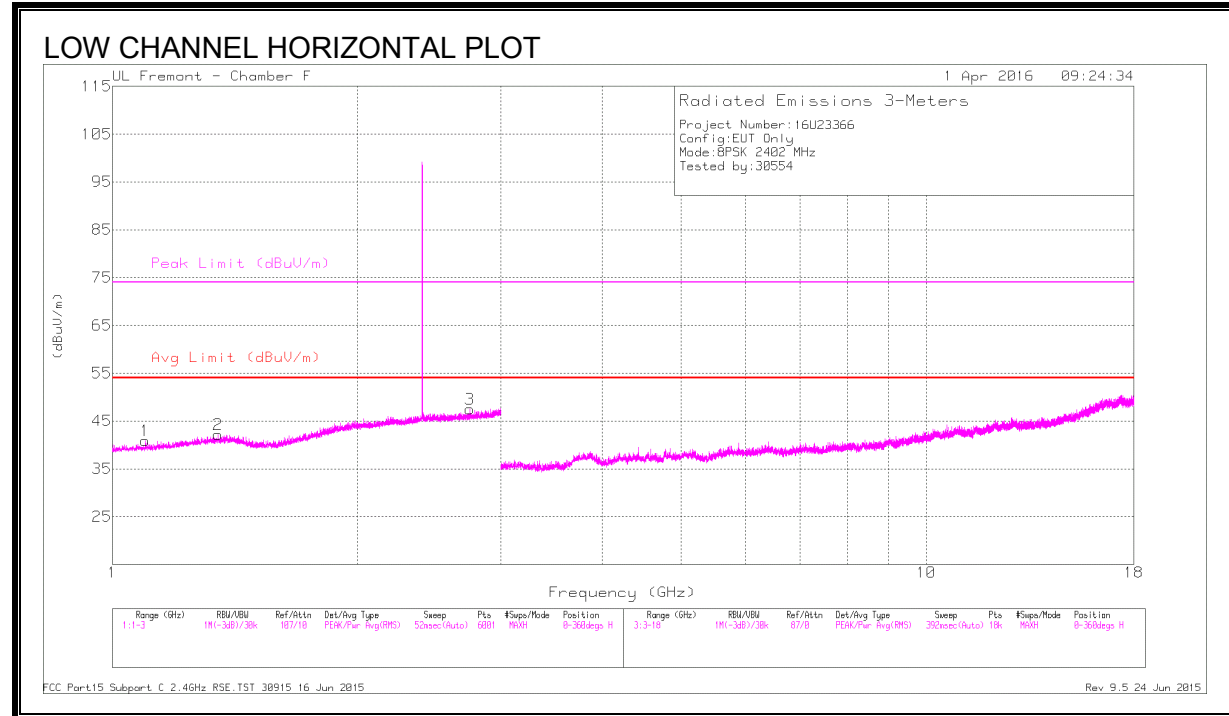
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.99	Pk	32.2	-21.7	54.49	-	-	74	-19.51	276	357	V
2	* 2.484	44.08	Pk	32.2	-21.7	54.58	-	-	74	-19.42	276	357	V
3	* 2.484	29.52	VA1T	32.2	-21.7	40.02	54	-13.98	-	-	276	357	V
4	* 2.484	29.43	VA1T	32.2	-21.7	39.93	54	-14.07	-	-	276	357	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

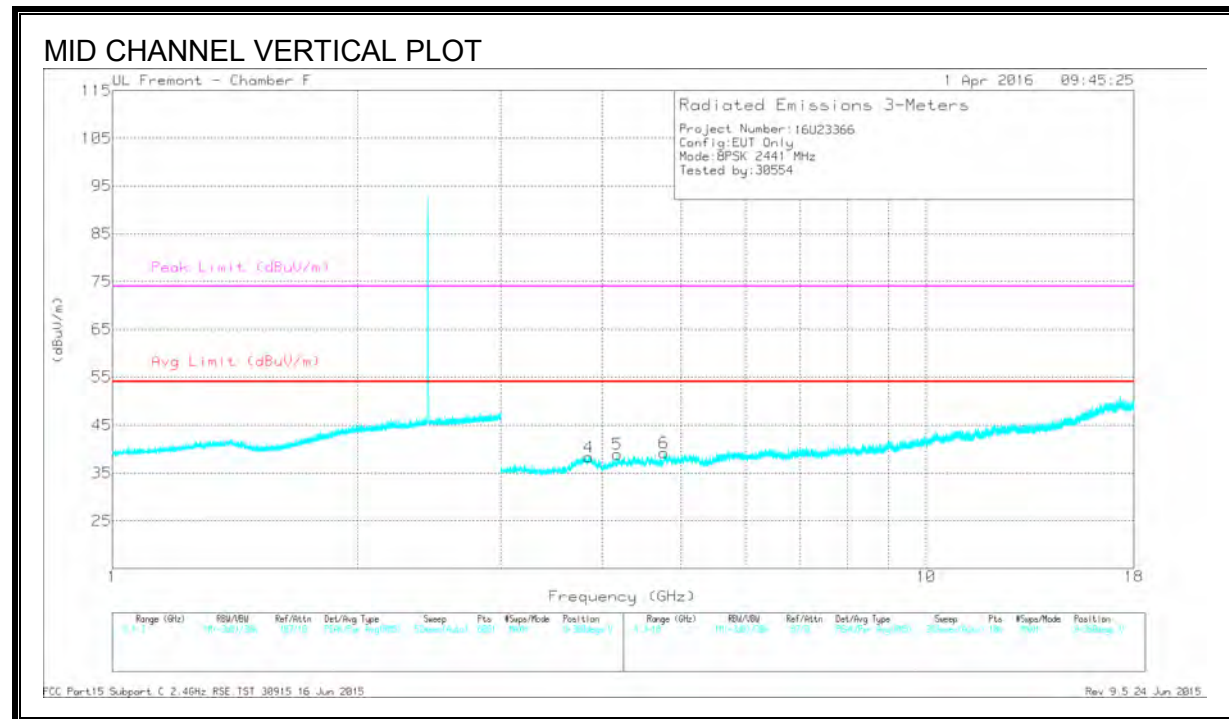
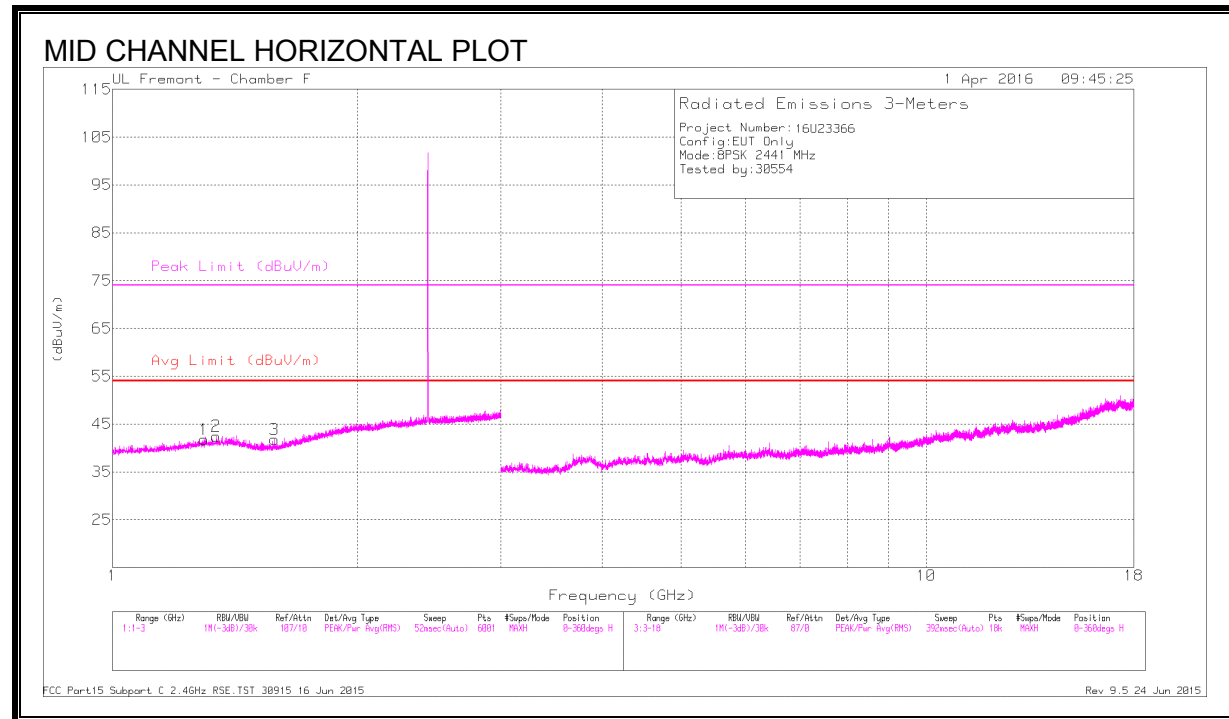
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.099	42.2	PK-2	28	-22.7	47.5	-	-	74	-26.5	314	128	H
	* 1.099	29.11	VA1T	28	-22.7	34.41	54	-19.59	-	-	314	128	H
2	* 1.347	41.98	PK-2	29.1	-22.1	48.98	-	-	74	-25.02	275	150	H
	* 1.349	28.72	VA1T	29.1	-22.1	35.72	54	-18.28	-	-	275	150	H
3	* 2.75	42.2	PK-2	32.5	-20.5	54.2	-	-	74	-19.8	257	140	H
	* 2.748	28.5	VA1T	32.4	-20.6	40.3	54	-13.7	-	-	257	140	H
4	* 3.737	38.66	PK-2	33.4	-29.1	42.96	-	-	74	-31.04	305	179	V
	* 3.736	26.21	VA1T	33.4	-29.1	30.51	54	-23.49	-	-	305	179	V
5	* 3.814	38.69	PK-2	33.4	-28.5	43.59	-	-	74	-30.41	288	218	V
	* 3.811	25.85	VA1T	33.4	-28.5	30.75	54	-23.25	-	-	288	218	V
6	* 4.18	38.89	PK-2	33.7	-28.4	44.19	-	-	74	-29.81	320	210	V
	* 4.182	25.65	VA1T	33.7	-28.3	31.05	54	-22.95	-	-	320	210	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

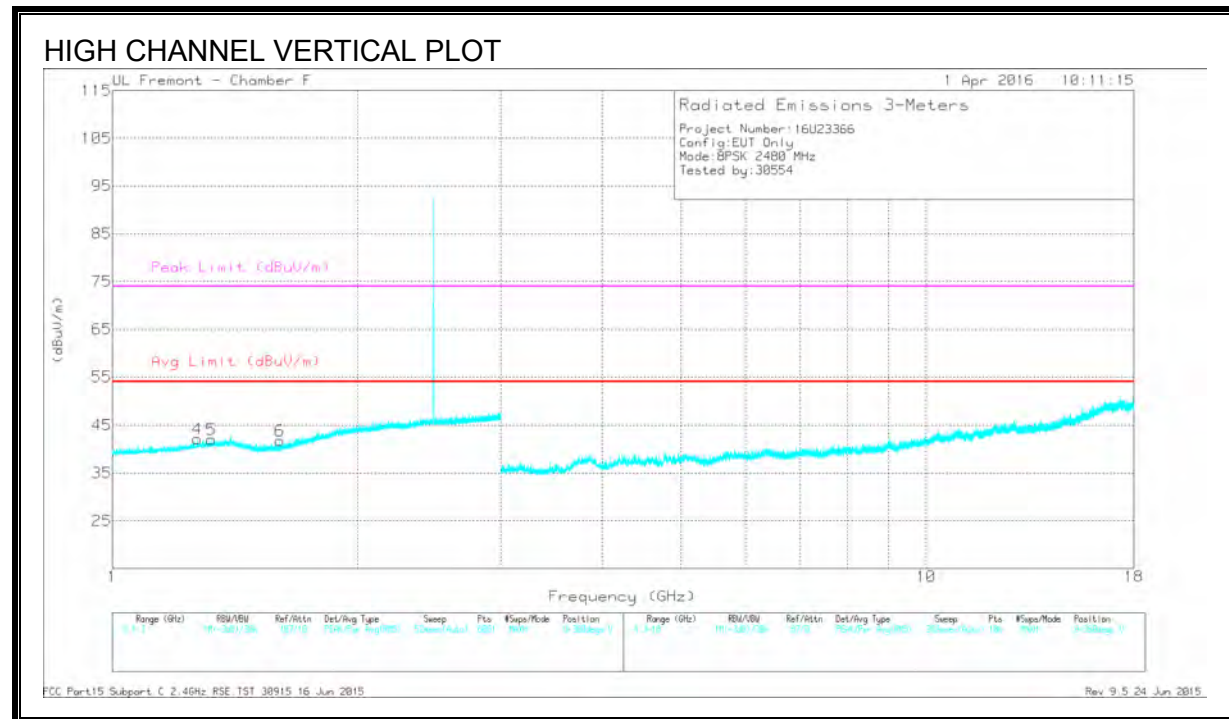
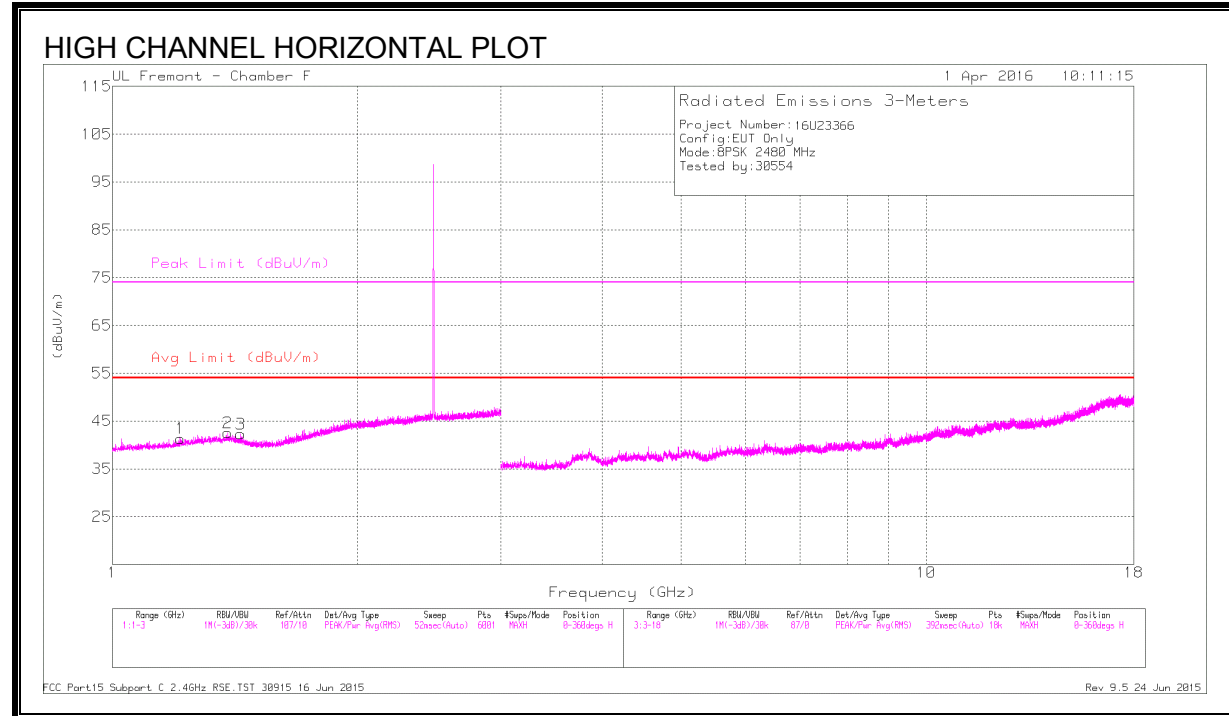
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/ Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.297	42.1	PK-2	28.9	-22.2	48.8	-	-	74	-25.2	323	129	H
	* 1.297	28.78	VA1T	28.9	-22.2	35.48	54	-18.52	-	-	323	129	H
2	* 1.343	42.32	PK-2	29.1	-22.1	49.32	-	-	74	-24.68	301	148	H
	* 1.343	28.74	VA1T	29.1	-22.1	35.74	54	-18.26	-	-	301	148	H
3	* 1.581	41.78	PK-2	28.1	-22	47.88	-	-	74	-26.12	287	164	H
	* 1.58	28.72	VA1T	28.1	-22	34.82	54	-19.18	-	-	287	164	H
4	* 3.854	38.69	PK-2	33.4	-28.2	43.89	-	-	74	-30.11	293	179	V
	* 3.854	25.94	VA1T	33.4	-28.2	31.14	54	-22.86	-	-	293	179	V
5	* 4.176	38.53	PK-2	33.7	-28.5	43.73	-	-	74	-30.27	272	207	V
	* 4.172	25.62	VA1T	33.7	-28.6	30.72	54	-23.28	-	-	272	207	V
6	* 4.764	40.17	PK-2	34.1	-28	46.27	-	-	74	-27.73	221	193	V
	* 4.767	26.12	VA1T	34.1	-27.9	32.32	54	-21.68	-	-	221	193	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	* 1.211	42.41	PK-2	28.4	-22.4	48.41	-	-	74	-25.59	282	130	H
	* 1.214	29.02	VA1T	28.4	-22.4	35.02	54	-18.98	-	-	282	130	H
2	* 1.385	42	PK-2	29.2	-22.1	49.1	-	-	74	-24.9	293	146	H
	* 1.388	28.75	VA1T	29.3	-22.1	35.95	54	-18.05	-	-	293	146	H
3	* 1.437	42.09	PK-2	28.8	-22	48.89	-	-	74	-25.11	312	231	H
	* 1.439	28.71	VA1T	28.8	-22	35.51	54	-18.49	-	-	312	231	H
4	* 1.269	42.56	PK-2	28.8	-22.3	49.06	-	-	74	-24.94	320	200	V
	* 1.272	28.97	VA1T	28.8	-22.3	35.47	54	-18.53	-	-	320	200	V
5	* 1.325	42.45	PK-2	29	-22.1	49.35	-	-	74	-24.65	268	211	V
	* 1.325	28.76	VA1T	29	-22.1	35.66	54	-18.34	-	-	268	211	V
6	* 1.605	42.46	PK-2	28.2	-22	48.66	-	-	74	-25.34	275	196	V
	* 1.605	28.73	VA1T	28.2	-22	34.93	54	-19.07	-	-	275	196	V

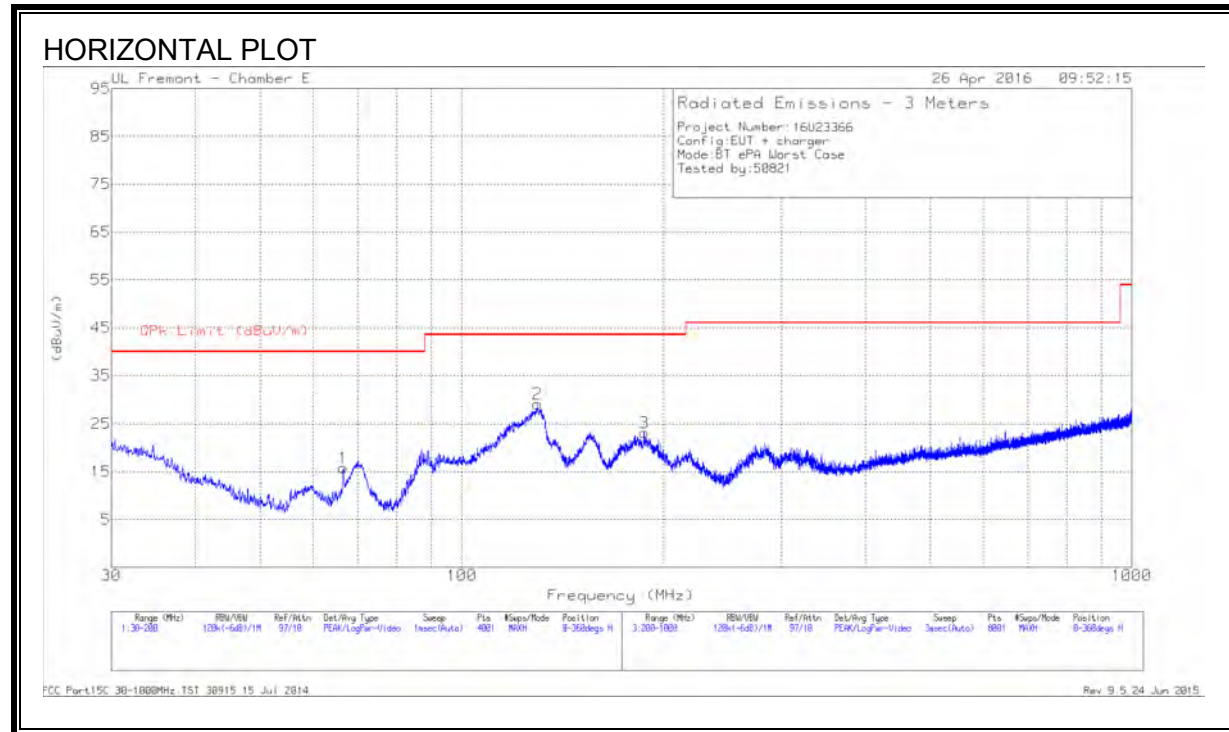
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

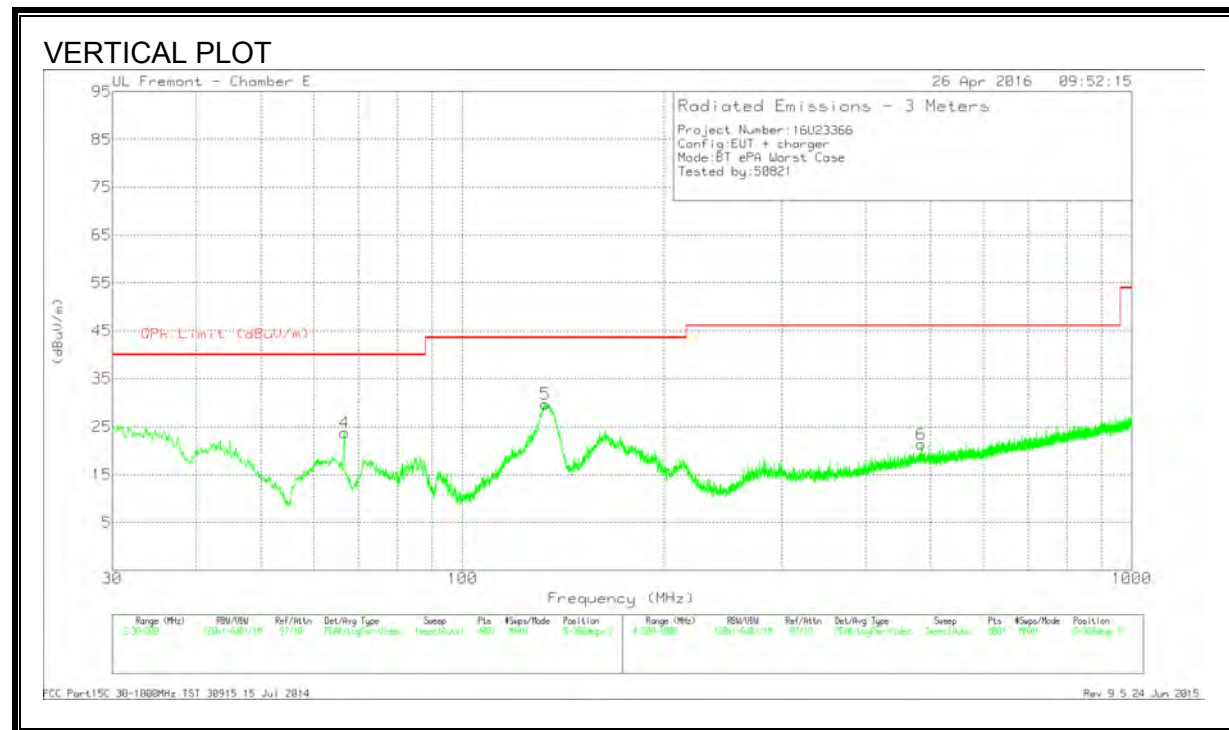
VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

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

Trace Markers

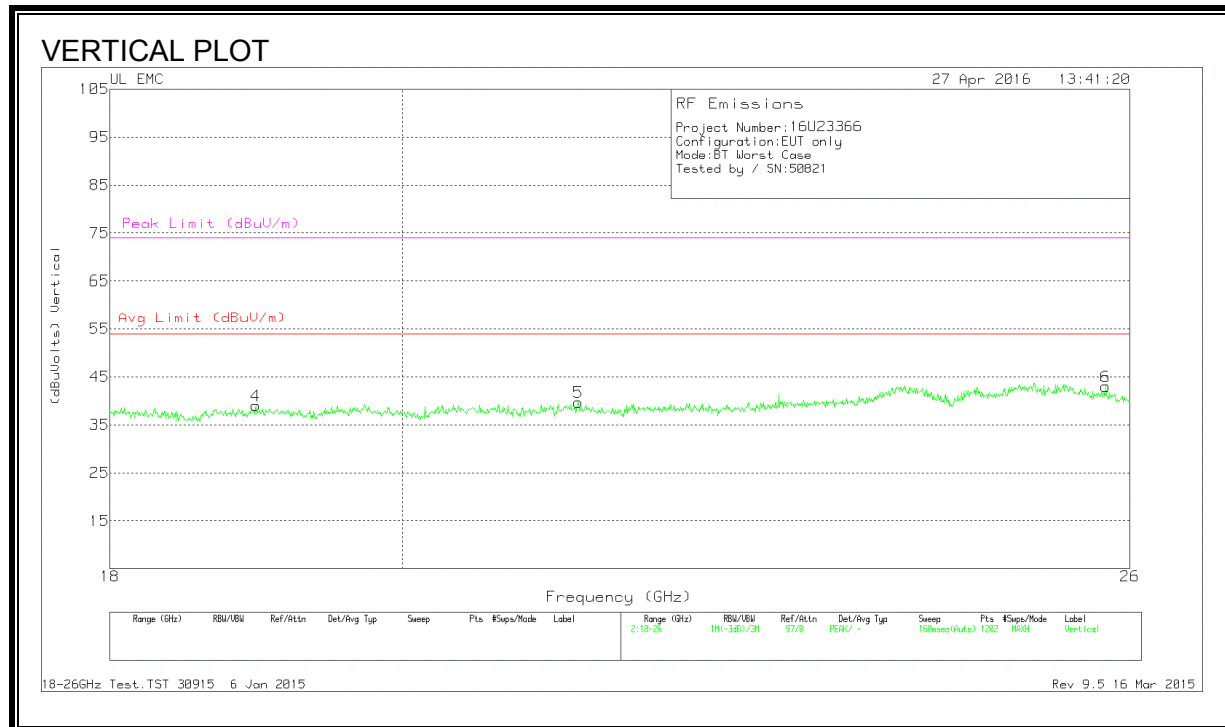
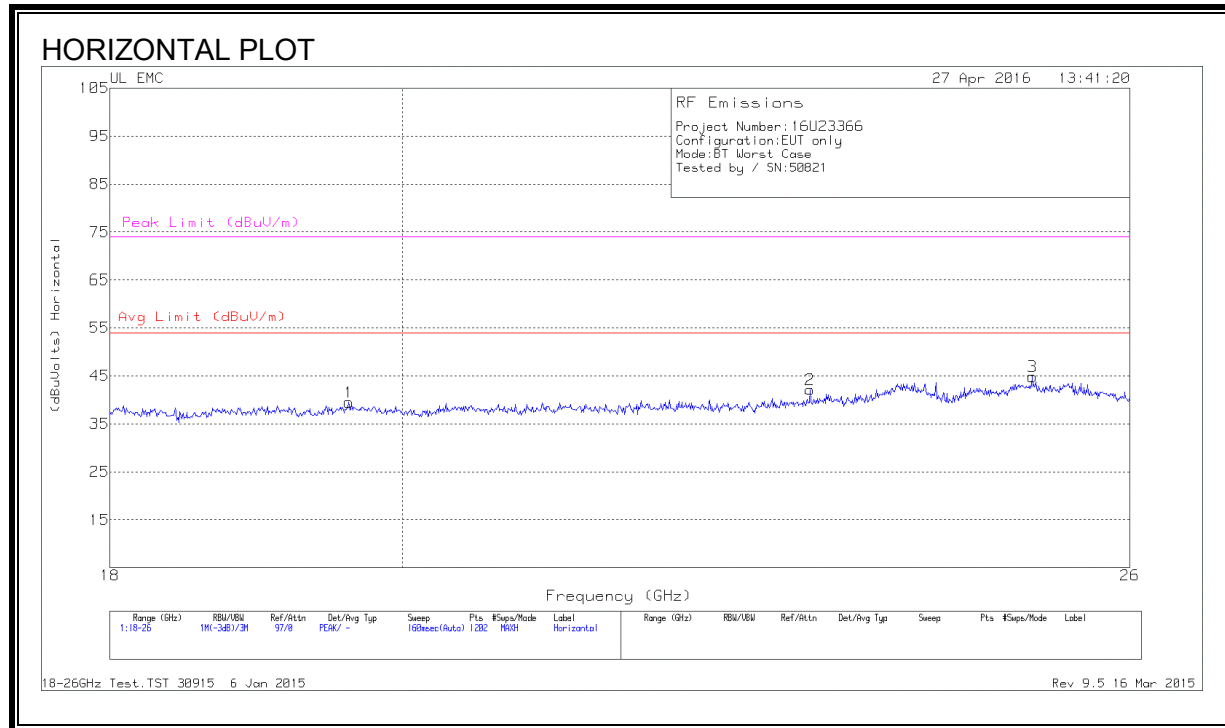
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 129.7263	42.42	Pk	17.9	-31.2	29.12	43.52	-14.4	0-360	201	H
5	* 133.0413	43.24	Pk	17.7	-31.1	29.84	43.52	-13.68	0-360	100	V
1	66.5925	35.45	Pk	11.9	-31.5	15.85	40	-24.15	0-360	401	H
4	66.635	43.47	Pk	11.9	-31.5	23.87	40	-16.13	0-360	100	V
3	187.08	39.03	Pk	15.1	-30.9	23.23	43.52	-20.29	0-360	100	H
6	485.2	29.26	Pk	21.7	-29.6	21.36	46.02	-24.66	0-360	201	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

8.4. WORST-CASE ABOVE 18 GHz

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



Data

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T477 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	19.619	41.2	Pk	32.7	-24.9	-9.5	39.5	54	-14.5	74	-34.5
2	23.169	43.47	Pk	33.3	-25.1	-9.5	42.17	54	-11.83	74	-31.83
3	25.101	44.53	Pk	34.2	-24.4	-9.5	44.83	54	-9.17	74	-29.17
4	18.973	41.3	Pk	32.5	-25.3	-9.5	39	54	-15	74	-35
5	21.311	41.37	Pk	33	-25.2	-9.5	39.67	54	-14.33	74	-34.33
6	25.774	42.9	Pk	34.4	-24.8	-9.5	43	54	-11	74	-31

Pk - Peak detector

18-26GHz Test.TST 30915 6 Jan 2015

Rev 9.5 16 Mar 2015

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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

9.1. EUT POWERED BY AC/DC ADAPTER VIA USB CABLE

WORST EMISSIONS

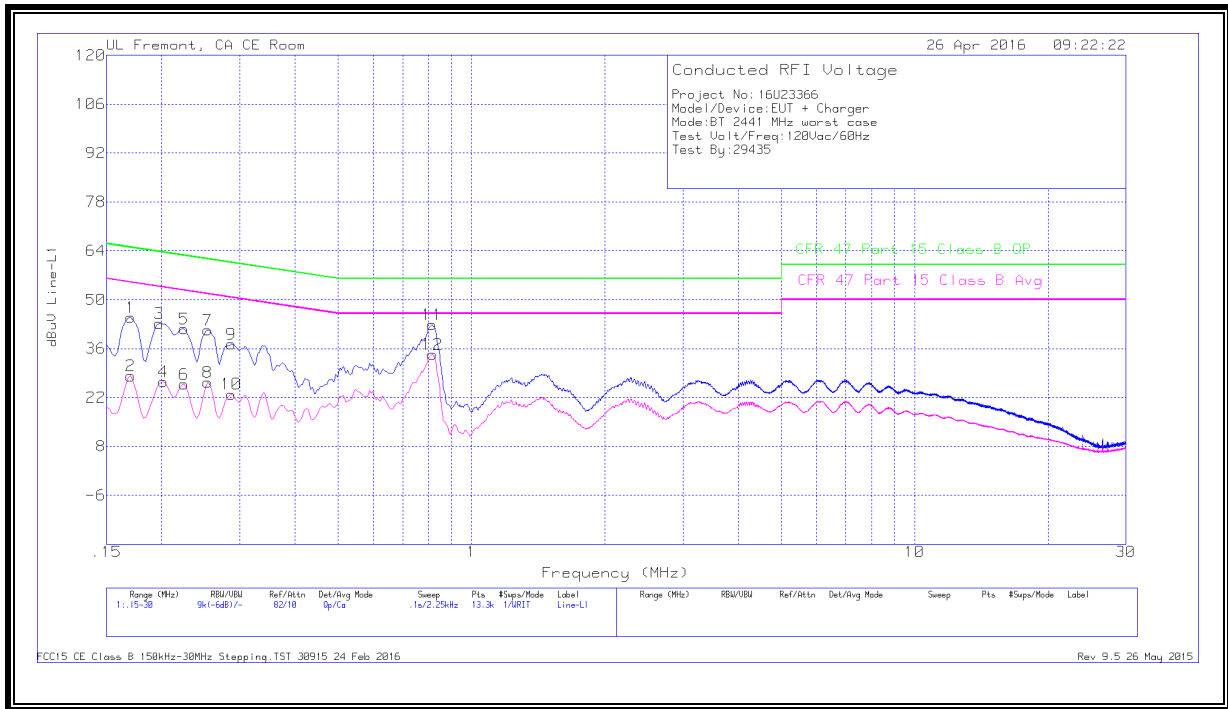
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.17025	33.65	Qp	1.2	0	10.1	44.95	64.95	-20	-	-
2	.17025	16.89	Ca	1.2	0	10.1	28.19	-	-	54.95	-26.76
3	.19725	32.08	Qp	1	0	10.1	43.18	63.73	-20.55	-	-
4	.20175	15.5	Ca	.9	0	10.1	26.5	-	-	53.54	-27.04
5	.22425	30.83	Qp	.8	0	10.1	41.73	62.66	-20.93	-	-
6	.22425	14.89	Ca	.8	0	10.1	25.79	-	-	52.66	-26.87
7	.2535	30.46	Qp	.7	0	10.1	41.26	61.64	-20.38	-	-
8	.2535	15.48	Ca	.7	0	10.1	26.28	-	-	51.64	-25.36
9	.28725	26.6	Qp	.6	0	10.1	37.3	60.6	-23.3	-	-
10	.28725	12.27	Ca	.6	0	10.1	22.97	-	-	50.6	-27.63
11	.81375	32.49	Qp	.3	0	10.1	42.89	56	-13.11	-	-
12	.816	24.01	Ca	.3	0	10.1	34.41	-	-	46	-11.59

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.17025	34.21	Qp	1.2	0	10.1	45.51	64.95	-19.44	-	-
14	.17025	16.06	Ca	1.2	0	10.1	27.36	-	-	54.95	-27.59
15	.1995	30.61	Qp	1	0	10.1	41.71	63.63	-21.92	-	-
16	.1995	12.4	Ca	1	0	10.1	23.5	-	-	53.63	-30.13
17	.222	29.98	Qp	.9	0	10.1	40.98	62.74	-21.76	-	-
18	.22425	12.28	Ca	.9	0	10.1	23.28	-	-	52.66	-29.38
19	.2535	31.06	Qp	.7	0	10.1	41.86	61.64	-19.78	-	-
20	.2535	13.78	Ca	.7	0	10.1	24.58	-	-	51.64	-27.06
21	.28725	27.28	Qp	.6	0	10.1	37.98	60.6	-22.62	-	-
22	.28725	10.23	Ca	.6	0	10.1	20.93	-	-	50.6	-29.67
23	.816	32.97	Qp	.3	0	10.1	43.37	56	-12.63	-	-
24	.81375	20.18	Ca	.3	0	10.1	30.58	-	-	46	-15.42

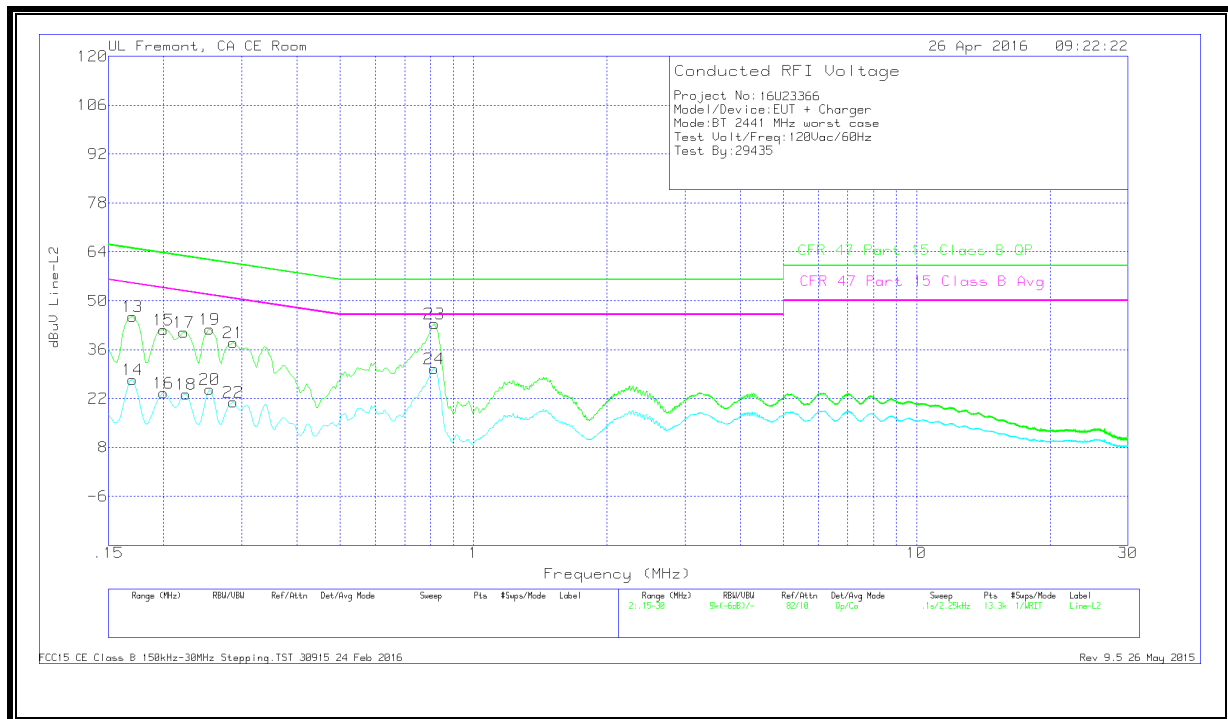
Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS



9.2. EUT POWERED BY HOST PC VIA USB CABLE

WORST EMISSIONS

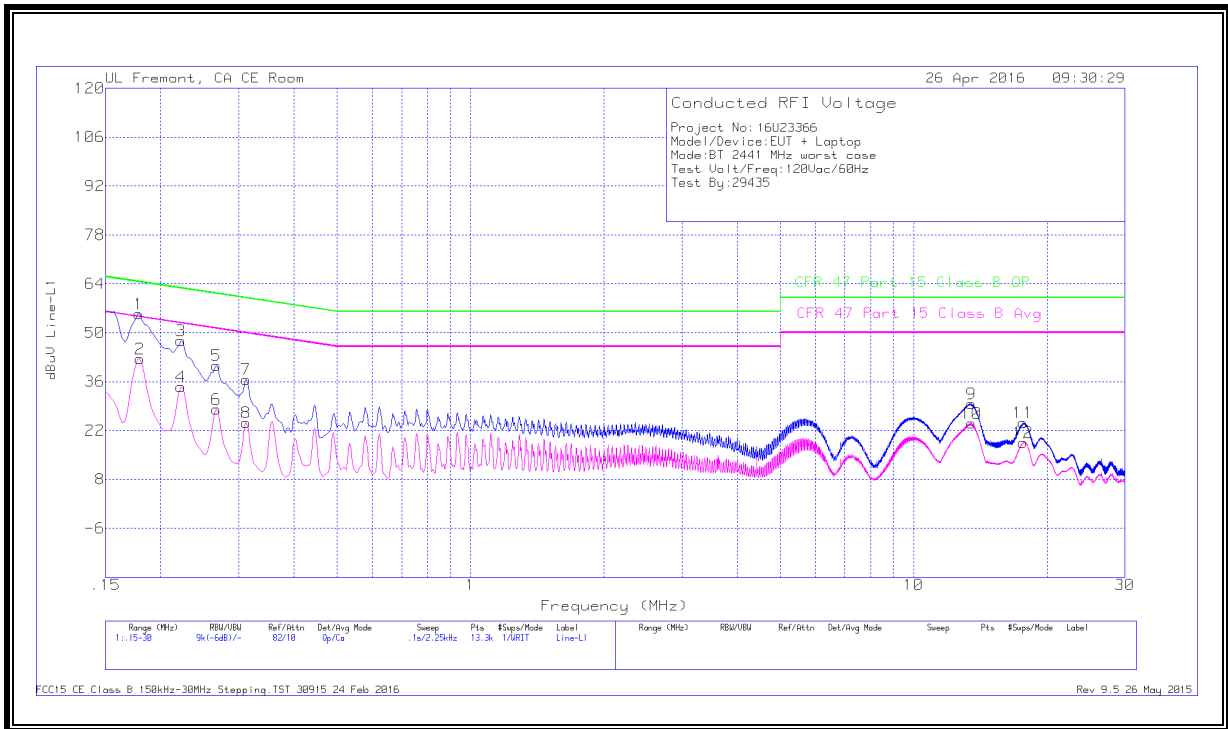
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.17813	44.17	Qp	1.1	0	10.1	55.37	64.57	-9.2	-	-
2	.17925	31.31	Ca	1.1	0	10.1	42.51	-	-	54.52	-12.01
3	.222	36.87	Qp	.8	0	10.1	47.77	62.74	-14.97	-	-
4	.222	23.7	Ca	.8	0	10.1	34.6	-	-	52.74	-18.14
5	.267	29.88	Qp	.6	0	10.1	40.58	61.21	-20.63	-	-
6	.267	17.4	Ca	.6	0	10.1	28.1	-	-	51.21	-23.11
7	.312	25.98	Qp	.5	0	10.1	36.58	59.92	-23.34	-	-
8	.312	13.67	Ca	.5	0	10.1	24.27	-	-	49.92	-25.65
9	13.497	18.99	Qp	.2	.2	10.2	29.59	60	-30.41	-	-
10	13.497	13.43	Ca	.2	.2	10.2	24.03	-	-	50	-25.97
11	17.6505	13.46	Qp	.3	.2	10.3	24.26	60	-35.74	-	-
12	17.6685	7.76	Ca	.3	.2	10.3	18.56	-	-	50	-31.44

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.17475	48.12	Qp	1.2	0	10.1	59.42	64.73	-5.31	-	-
14	.177	35.86	Ca	1.2	0	10.1	47.16	-	-	54.63	-7.47
15	.23325	38.32	Qp	.8	0	10.1	49.22	62.33	-13.11	-	-
16	.2355	27.77	Ca	.8	0	10.1	38.67	-	-	52.25	-13.58
17	.29175	31.46	Qp	.6	0	10.1	42.16	60.47	-18.31	-	-
18	.29175	22.05	Ca	.6	0	10.1	32.75	-	-	50.47	-17.72
19	.64275	25.84	Qp	.3	0	10.1	36.24	56	-19.76	-	-
20	.64275	19.37	Ca	.3	0	10.1	29.77	-	-	46	-16.23
21	13.89075	25.49	Qp	.2	.2	10.2	36.09	60	-23.91	-	-
22	13.8885	18.94	Ca	.2	.2	10.2	29.54	-	-	50	-20.46
23	18.22875	23.99	Qp	.3	.2	10.3	34.79	60	-25.21	-	-
24	18.22088	16.86	Ca	.3	.2	10.3	27.66	-	-	50	-22.34

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS

