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

CERTIFICATION TEST REPORT

FOR

WIRELESS HEADSET

MODEL NUMBER: A1523

FCC ID: BGC-A1523
IC: 579C-A1523

REPORT NUMBER: 16U23784-E12V3

ISSUE DATE: AUGUST 29, 2016

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

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/22/2016	Initial Review	Mengistu Mekuria
V2	08/26/2016	Address TCBs Questions	Chin Pang
V3	08/29/2016	Add below 1GHz and LC test data	Chin Pang

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: WIRELESS HEADPHONE

MODEL: A1523

SERIAL NUMBER: CC4S30UZFKVP (Conducted) CC4S31VZFKVP (Radiated)

DATE TESTED: AUGUST 04, 2016 - AUGUST 26, 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.

Approved & Released For
UL Verification Services Inc. By:

Mengistu Mekuria

MENGISTU MEKURIA
PROJECT LEAD
UL VERIFICATION SERVICES INC.

Prepared By:

JOE VANG
EMC WISE ENGINEER
UL VERIFICATION SERVICES INC.

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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 47266 Benicia Street, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☒ Chamber D
☐ Chamber B	☒ Chamber E
☐ Chamber C	☒ Chamber F
	☒ Chamber G
	☐ Chamber H

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

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

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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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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	3.84 dB
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	5.24 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT (right) is one of a pair of earbuds for left and right ears, with Bluetooth Radio. It has an integral battery, microphone and antenna. The rechargeable battery is not user accessible. It can change via bottom contacts and charge case. It is designed to work in conjunction with the left earbud.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	12.77	18.92
2402 - 2480	Enhanced QPSK	12.65	18.41

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	-7.20

5.4. SOFTWARE AND FIRMWARE

The software installed in the EUT during testing was 9A217.

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5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case mode and channel used for 30-1000 MHz radiated emissions and AC line conducted emission were including AC/DC charger, mode and channel with the highest output power. EUT transmit with Case cover open while in charging mode

Above 1G radiated emission were performed with low, middle and high channels. And above 18GHz radiated emission were performed with the EUT only 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-flatbed orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in x-flatbed orientation.

Data rates set for test were:

GFSK mode: DH5
DQPSK mode: 2-DH5

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Apple	A1424	NSW25679	N/A
Laptop	Apple	MacBook AIR	C02P52H6G085	N/A
USB	Apple	N/A	N/A	N/A
Test Jig	Apple	Proto2 Controller ARB	920-01148-01	N/A

I/O CABLES (CONDUCTED TEST)

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

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

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

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

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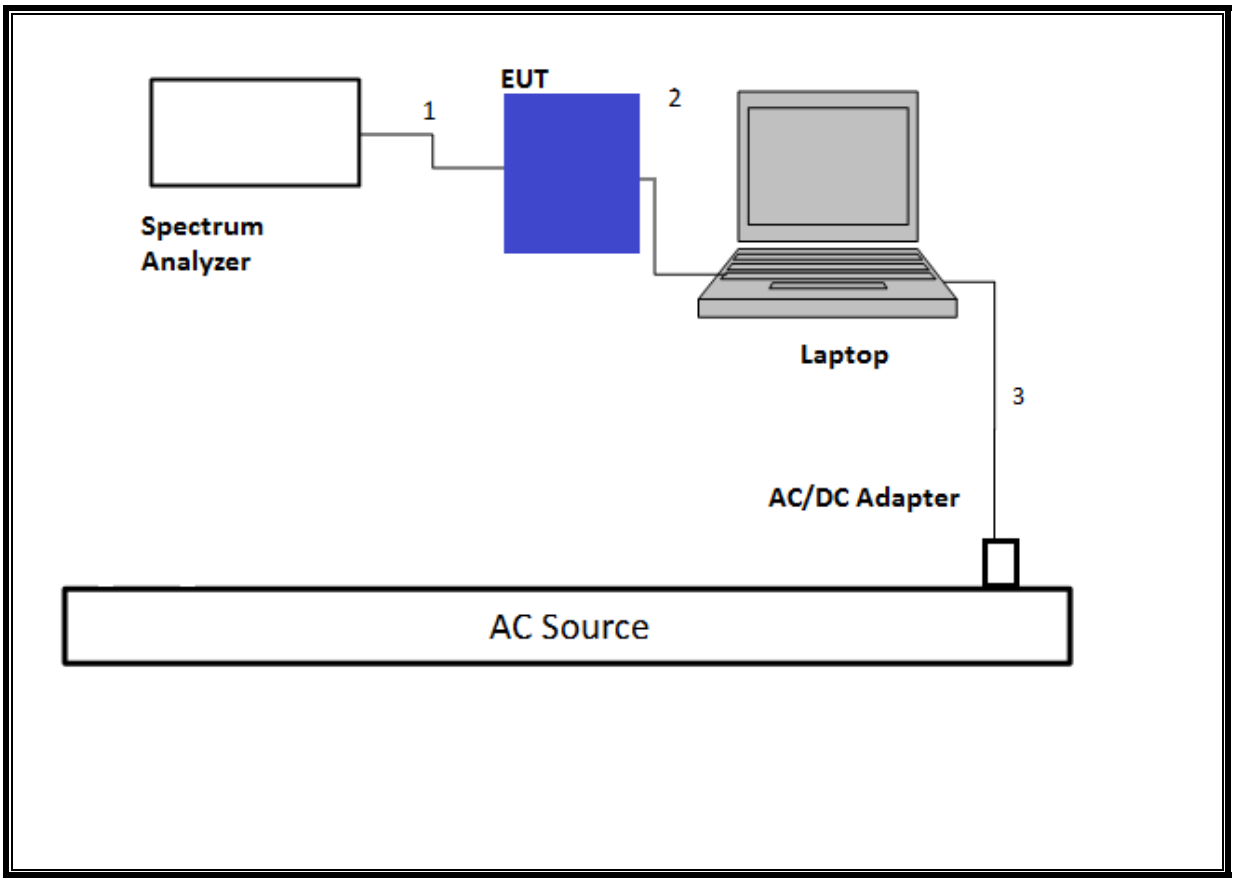
TEST SETUP- CONDUCTED PORT

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



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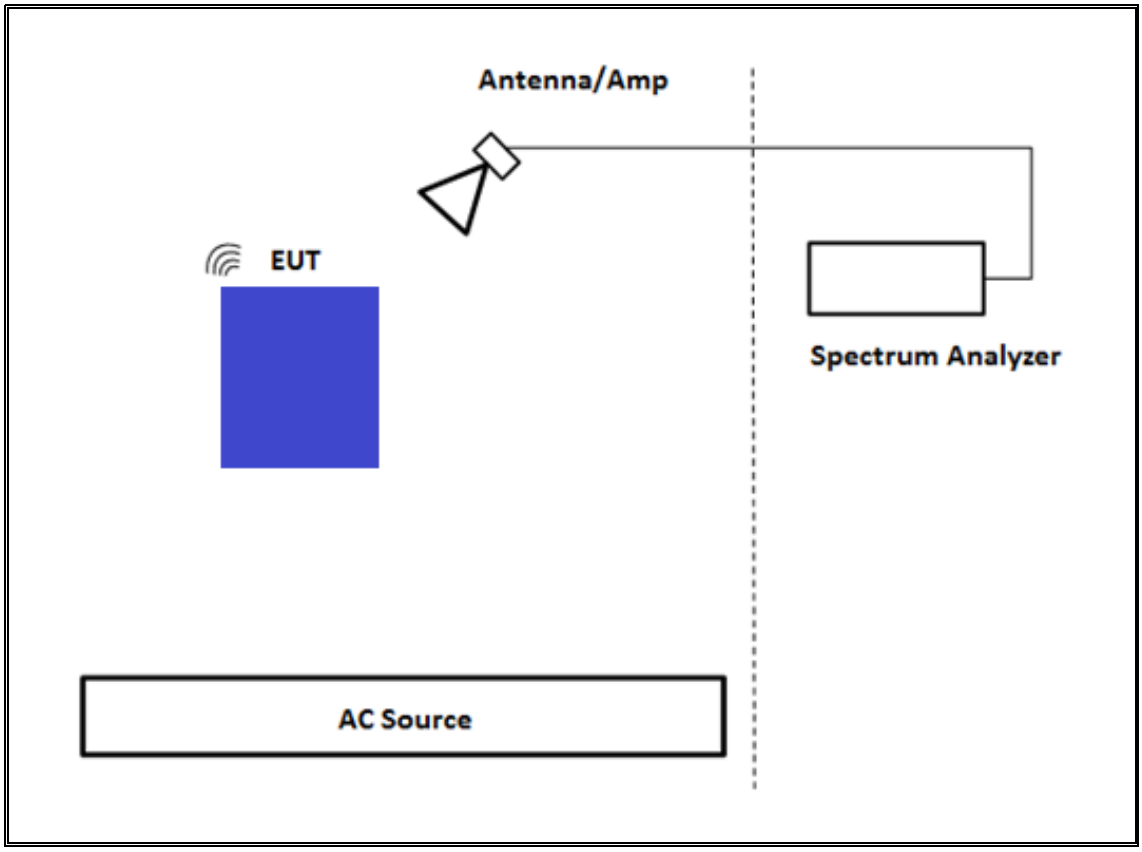
TEST SETUP- RADIATED-BELOW AND ABOVE 1 GHZ

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

SETUP DIAGRAM



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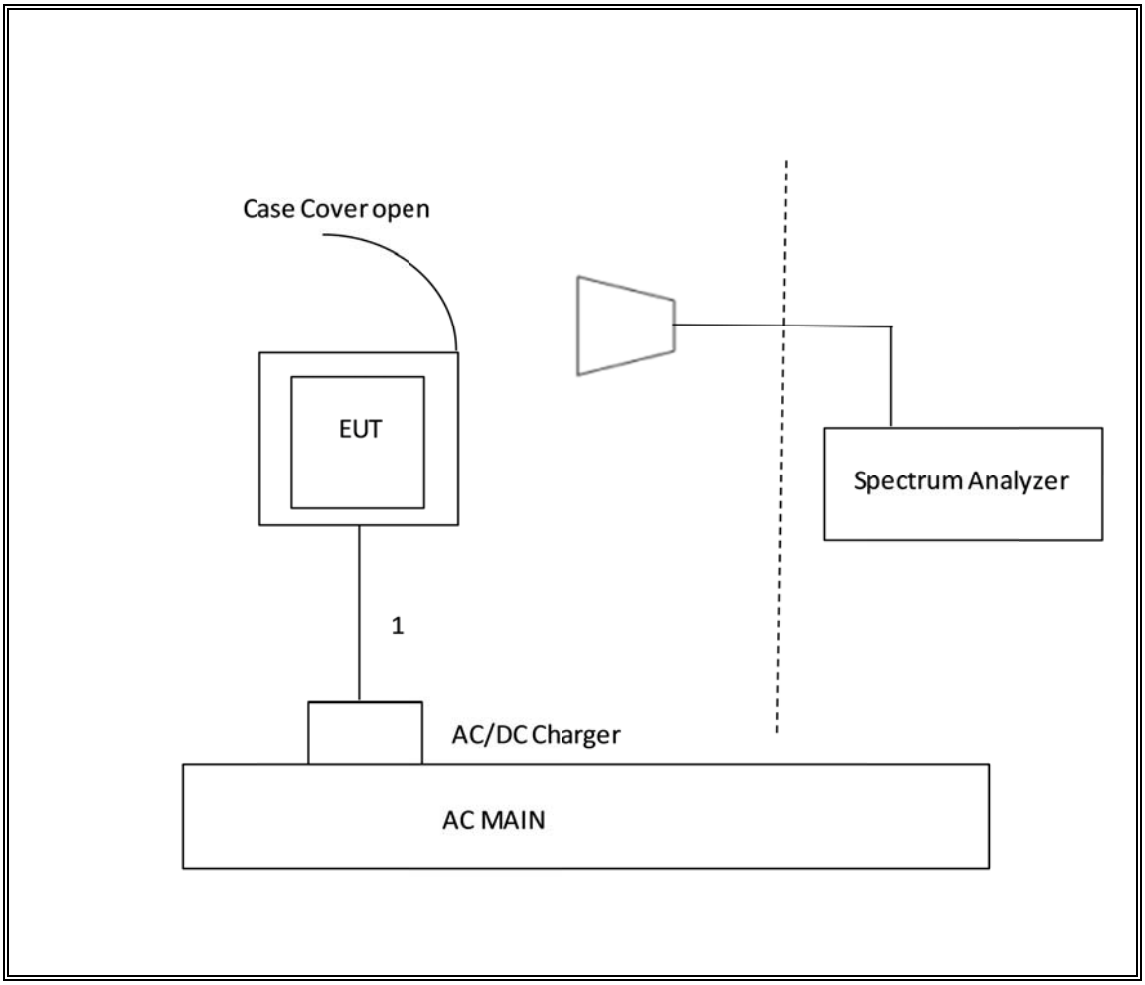
TEST SETUP- BELOW 1GHz

The EUT was tested with Case Cover open while charging and powered by AC/DC adapter via USB cable.

SETUP DIAGRAM



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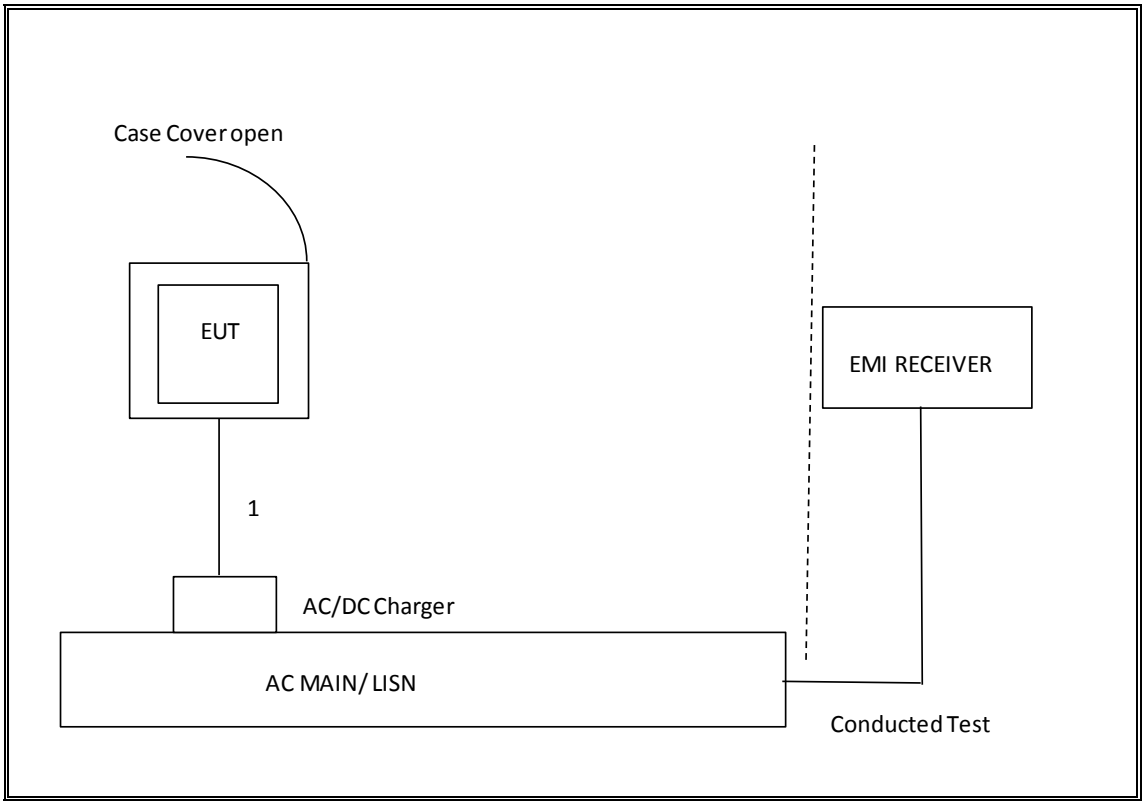
TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER

The EUT was tested in charging capsule and powered by AC/DC adapter via USB cable. Test software exercised the EUT.

SETUP DIAGRAM



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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**	**T Number**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	4/5/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T122	1/29/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T173	6/17/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T341	10/14/2016
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T862	4/18/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T899	5/26/2017
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T491	5/31/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T834	6/17/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T905	6/21/2017
Power Meter, P-series single channel	Agilent	N1911A	T1271	7/8/2017
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	T1228	6/20/2017
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	T447	6/16/2017
Spectrum Analyzer, 40 GHz	Agilent	N9030A	T340	11/15/2016
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T402	7/5/2017
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	12/19/2016
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	6/8/2017
AC Source	Shaffner	NSG 1007	T134	9/11/2016
UL SOFTWARE				
* Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015	
* Conducted Software	UL	UL EMC	Ver 4.0, January 11, 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

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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 QPSK	1.000	1.000	1.000	100.00%	0.00	0.010

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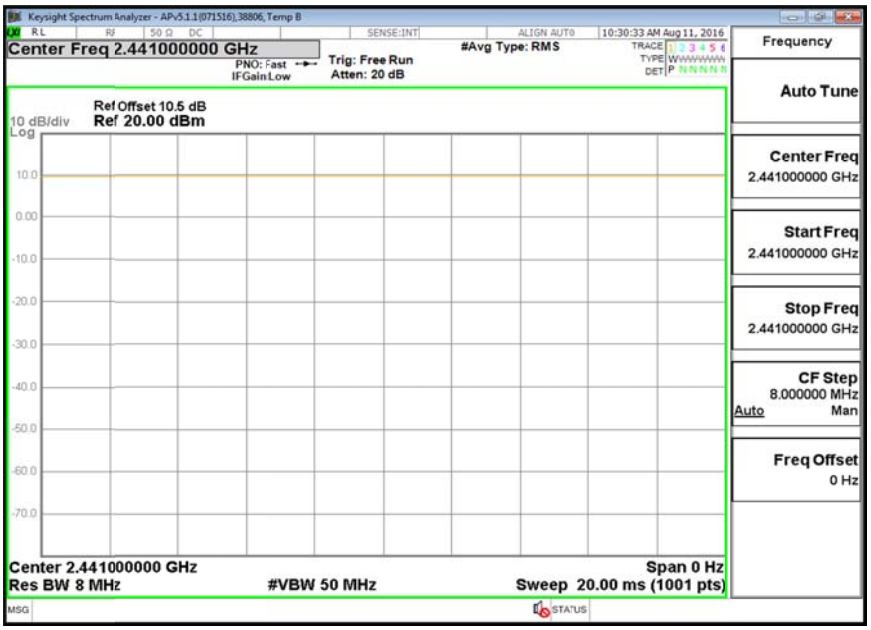
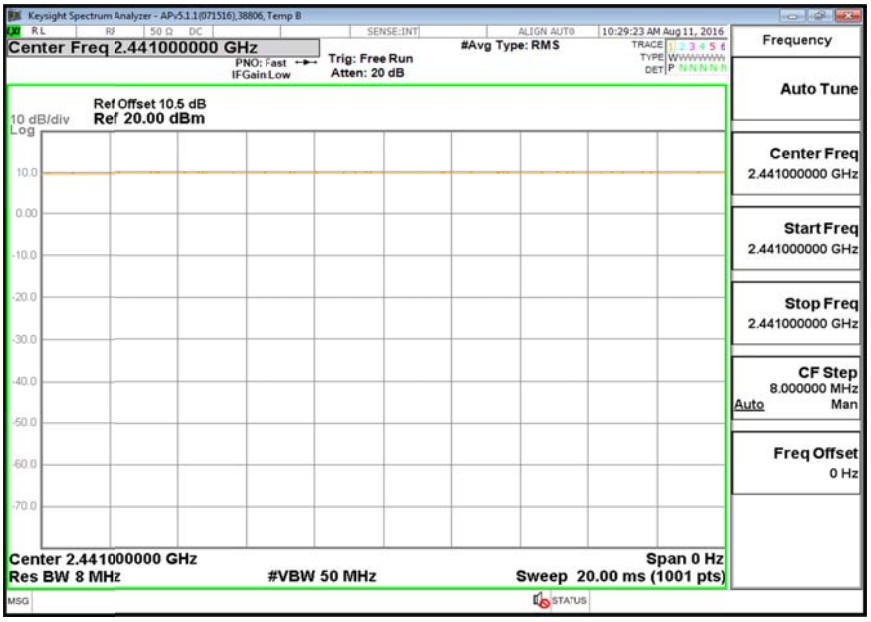
DUTY CYCLE PLOTS

HOPPING OFF

DUTY CYCLE GFSK MODE



DUTY CYCLE QPSK MODE



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7.2. BASIC DATA RATE GFSK MODULATION

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)
Low	2402	957.0	912.95
Middle	2441	941.5	907.87
High	2480	928.2	889.97

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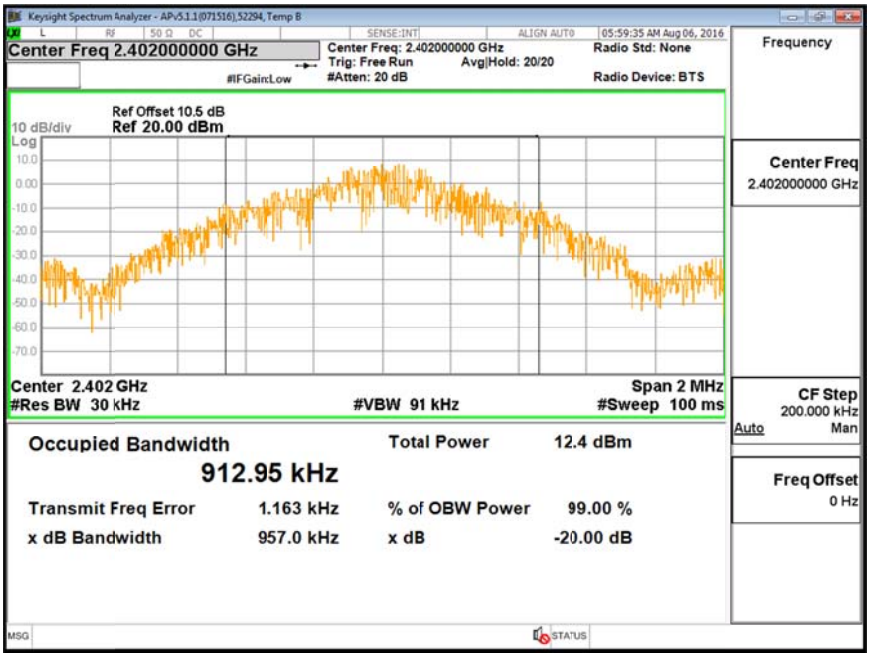
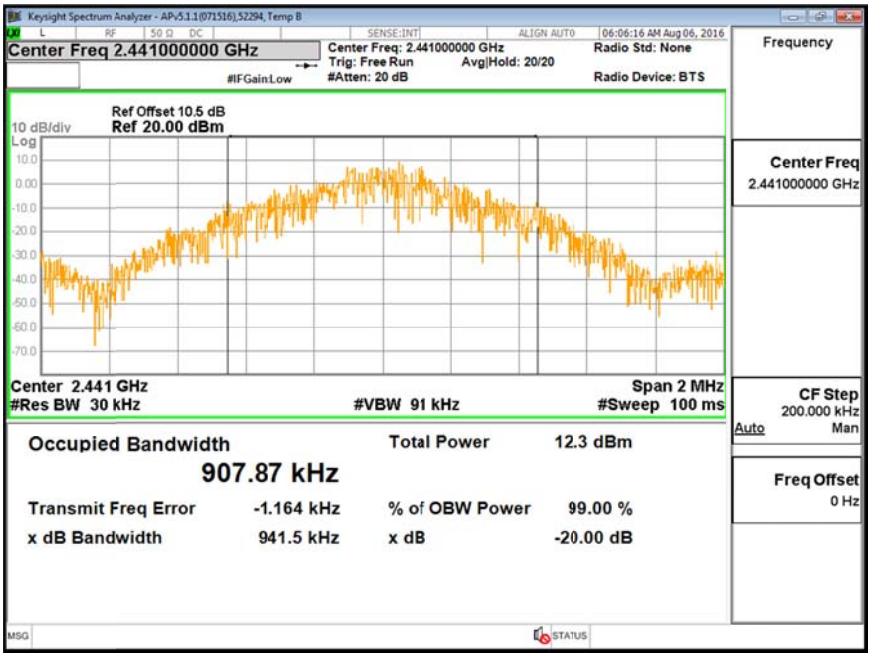
20 dB AND 99% BANDWIDTH

BANDWIDTH LOW CH



BANDWIDTH MID CH



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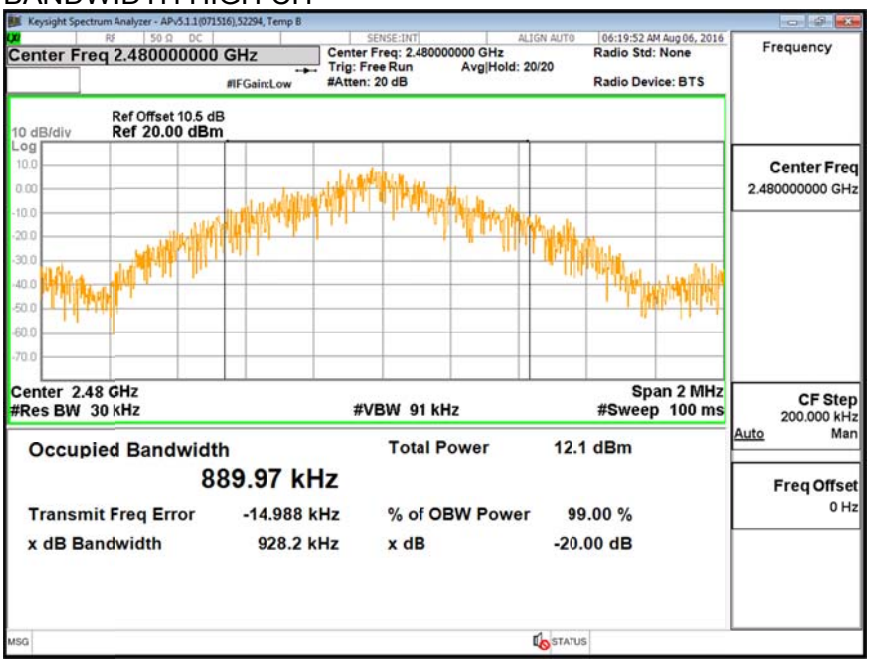
BANDWIDTH HIGH CH



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7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

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

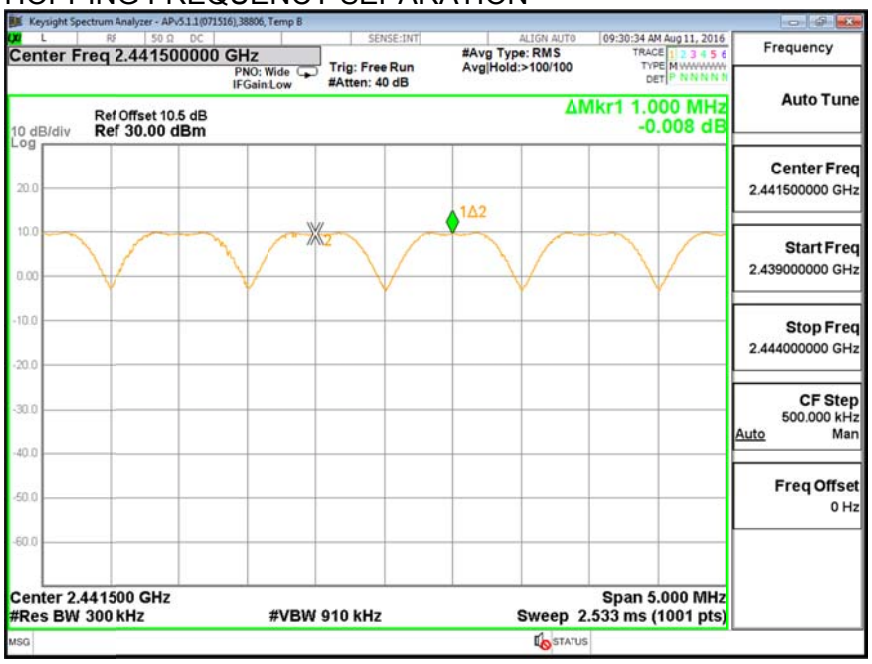
TEST PROCEDURE

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

HOPPING FREQUENCY SEPARATION



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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.

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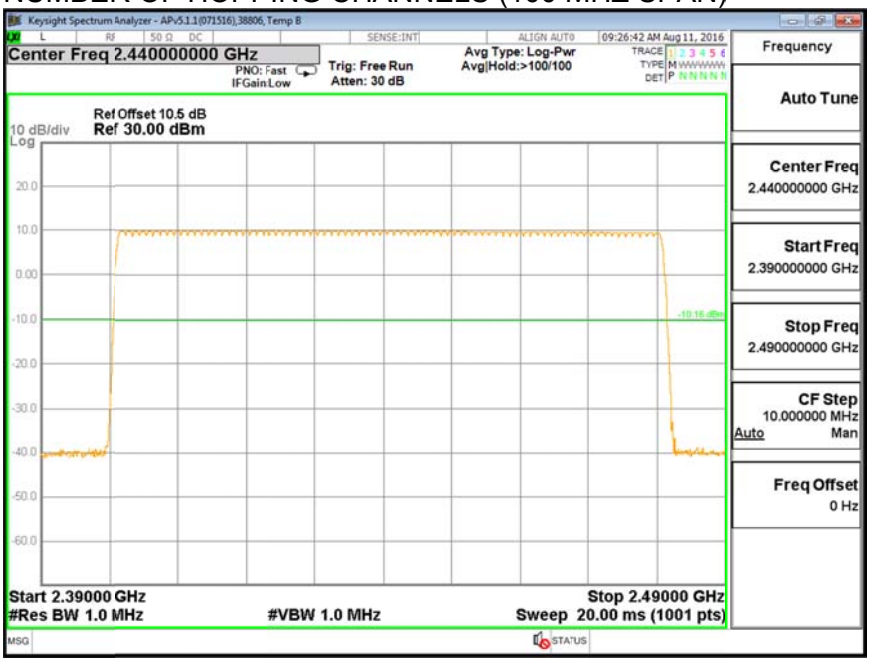
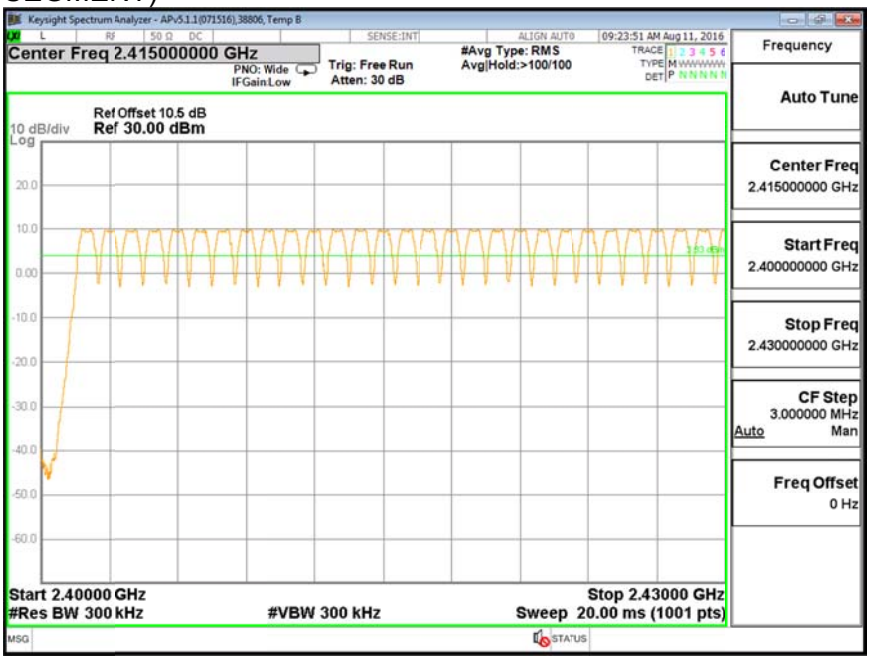
NUMBER OF HOPPING CHANNELS

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



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



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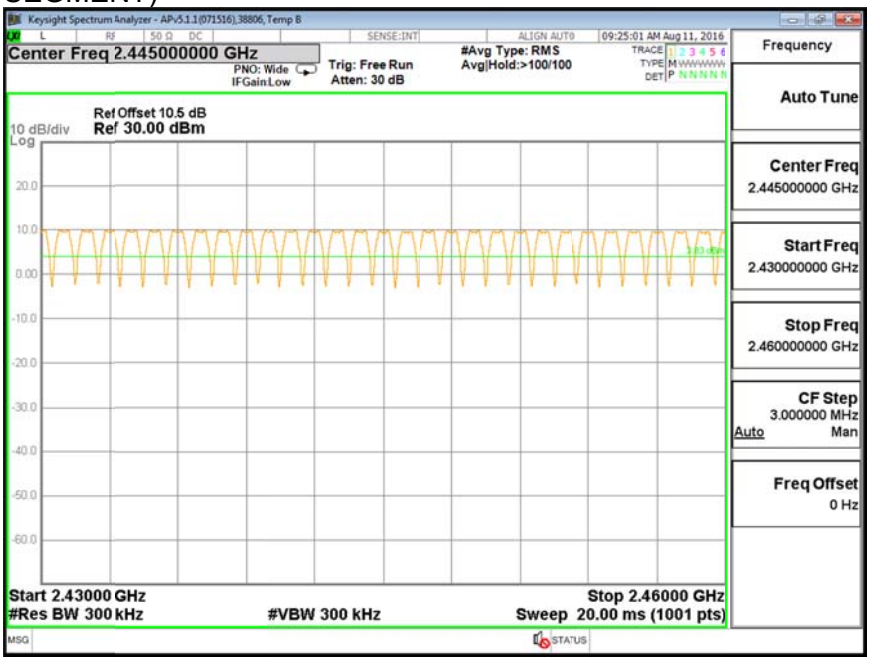
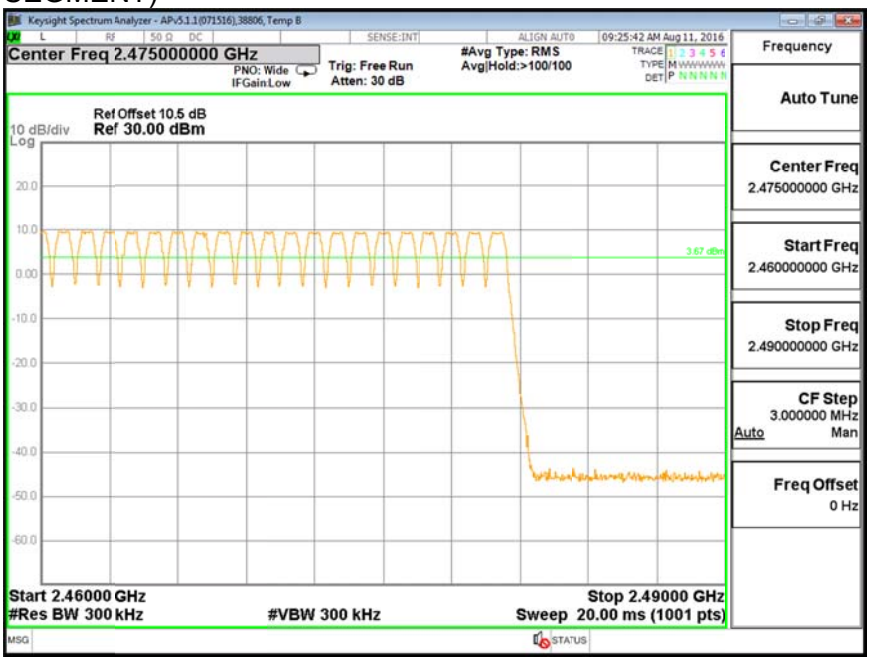
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



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



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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 * (# of pulses in 3.16 s) * pulse width.

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

RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH5	2.876	5	0.144	0.4	-0.256
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH5	2.876	1.25	0.036	0.4	-0.364

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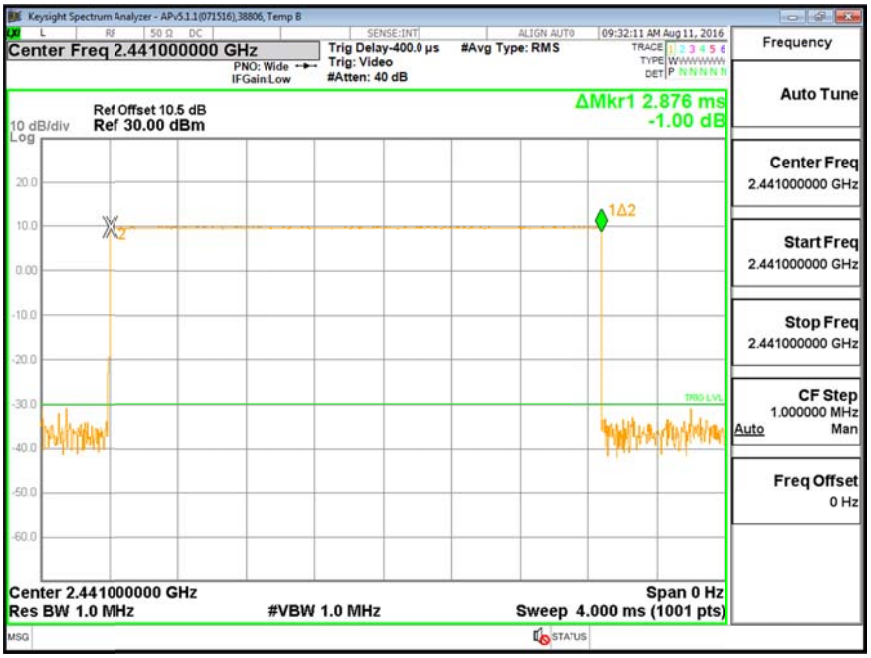
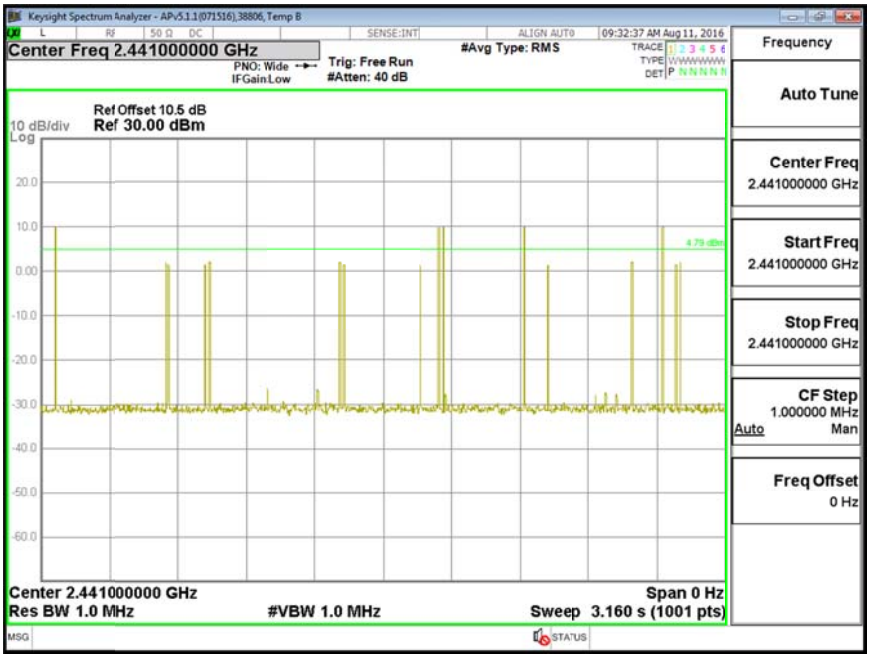
PULSE WIDTH – DH5

PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

NUMBER OF PULSES – DH5



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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 power meter.

RESULTS

ID:	38806	Date:	8/11/16

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.68	30	-17.32
Middle	2441	12.70	30	-17.30
High	2480	12.77	30	-17.23

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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:	38806	Date:	8/11/16

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	12.45
Middle	2441	12.47
High	2480	12.44

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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

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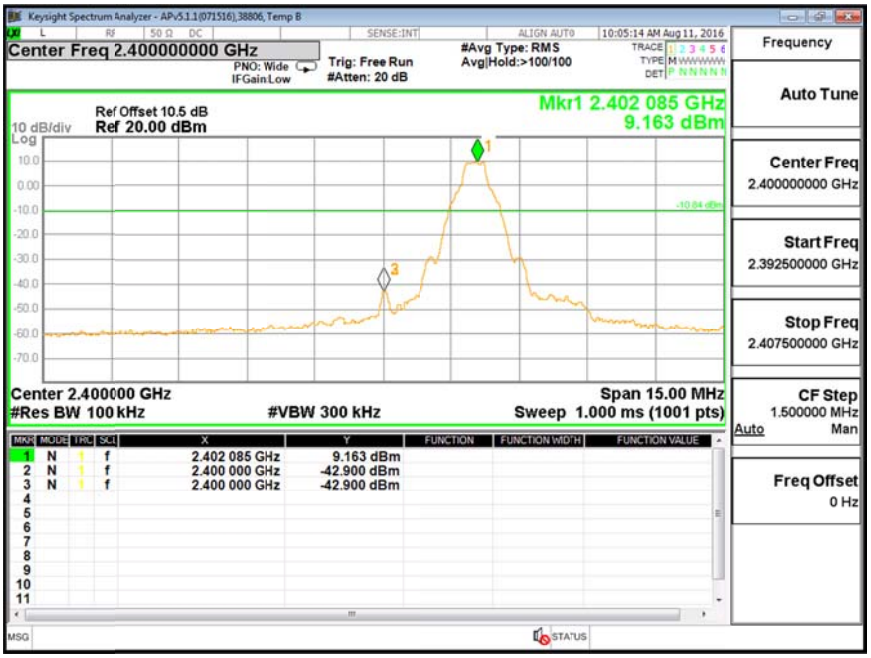
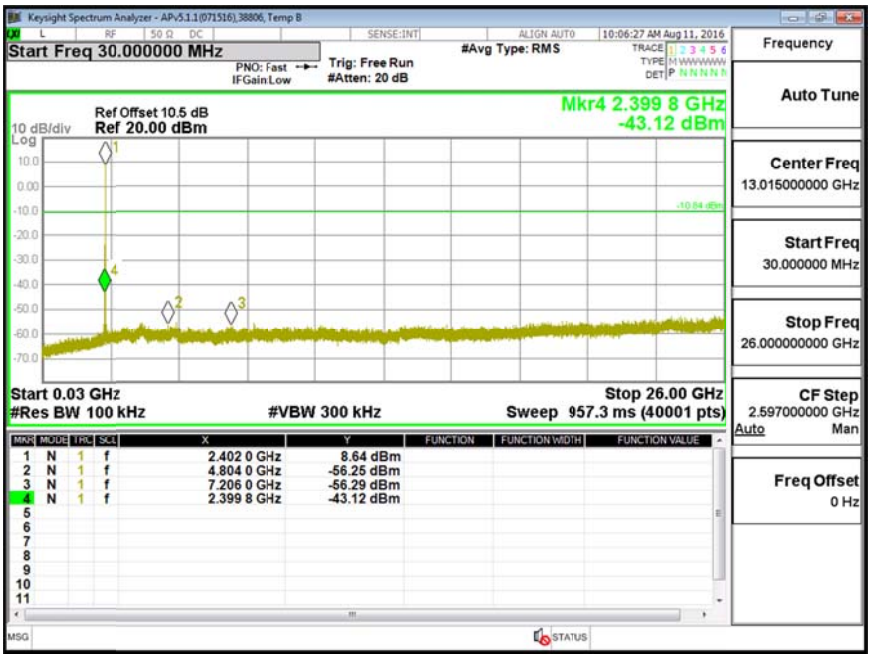
SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE



LOW CHANNEL SPURIOUS



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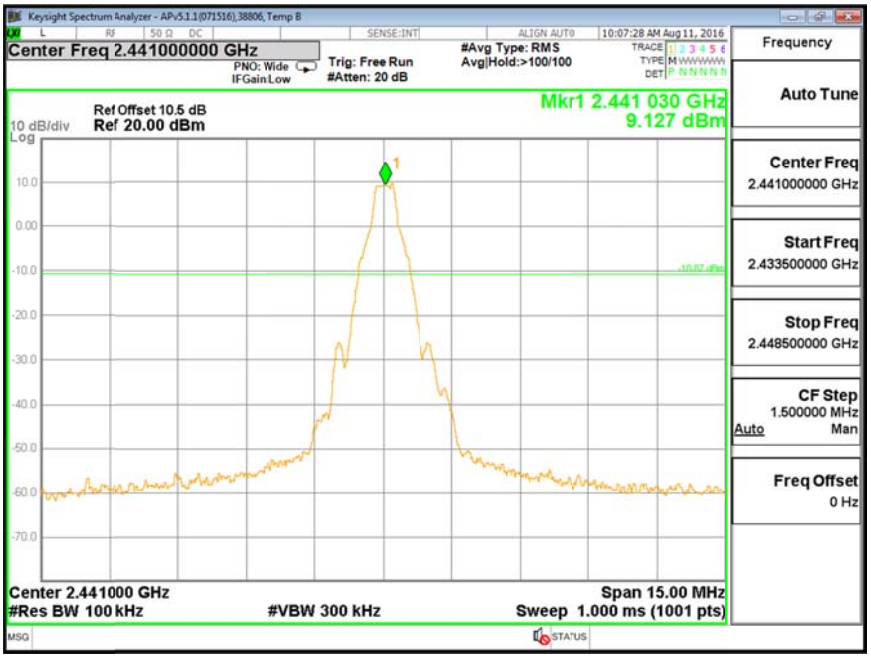
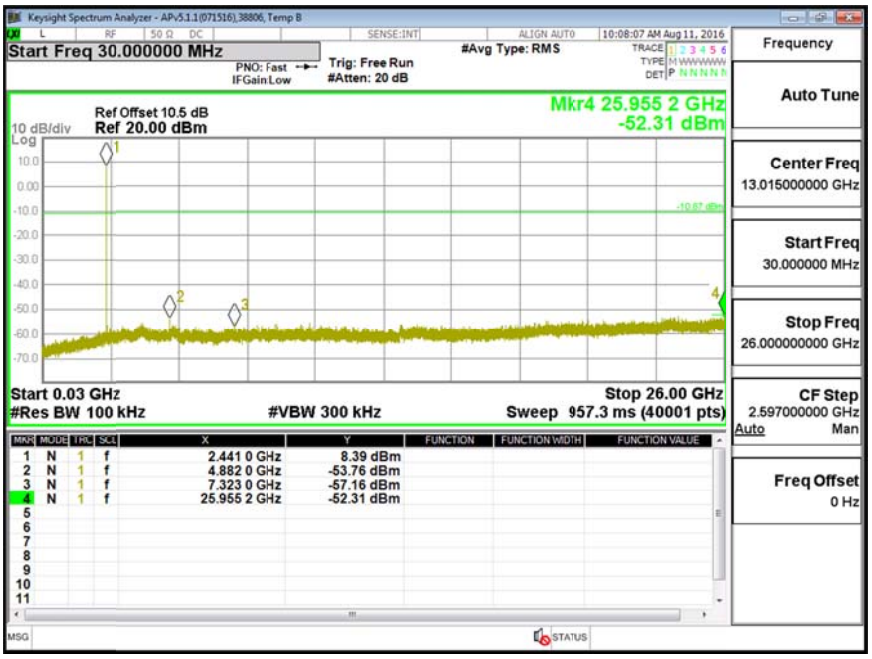
SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL



MID CHANNEL SPURIOUS



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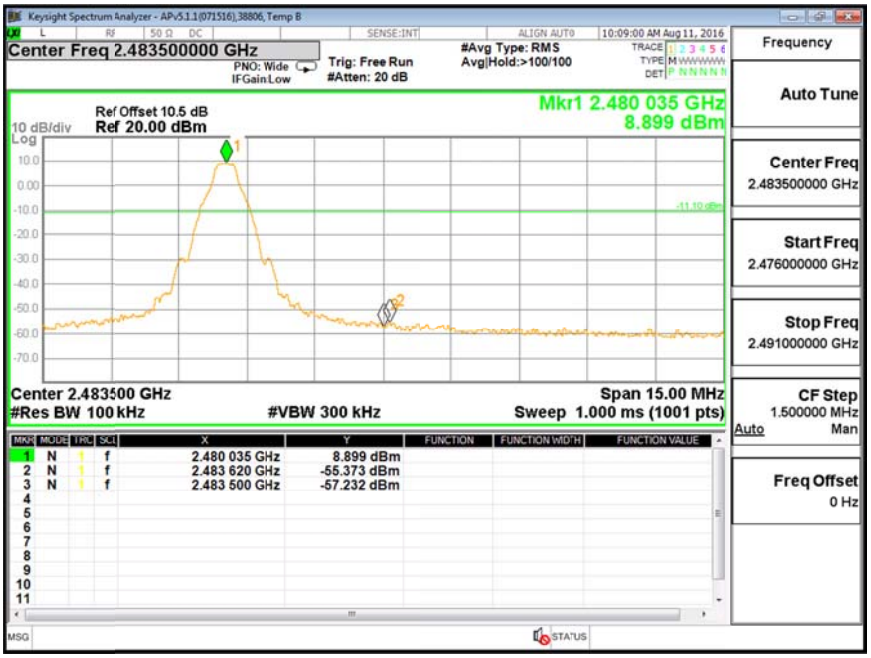
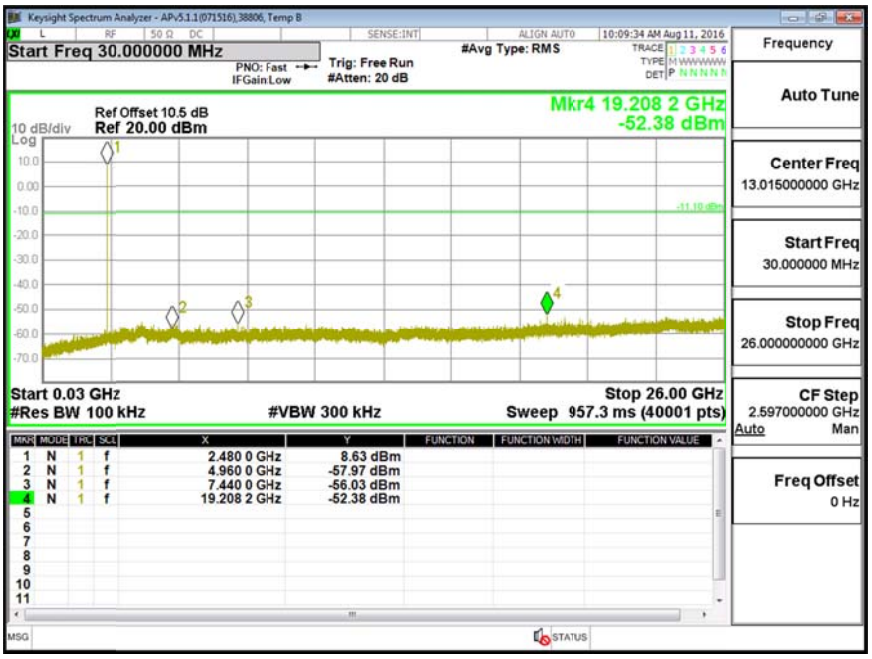
SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE



HIGH CHANNEL SPURIOUS



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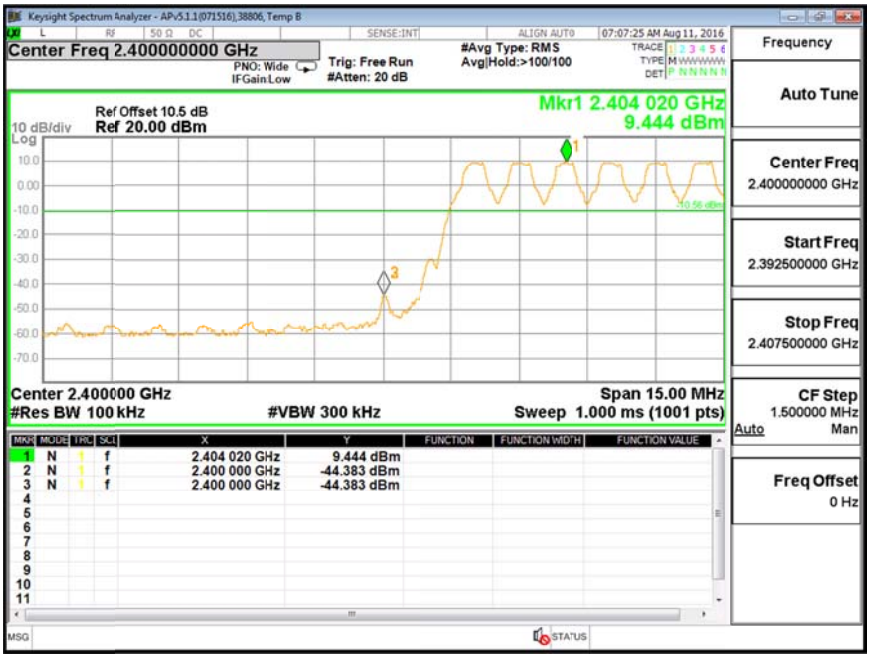
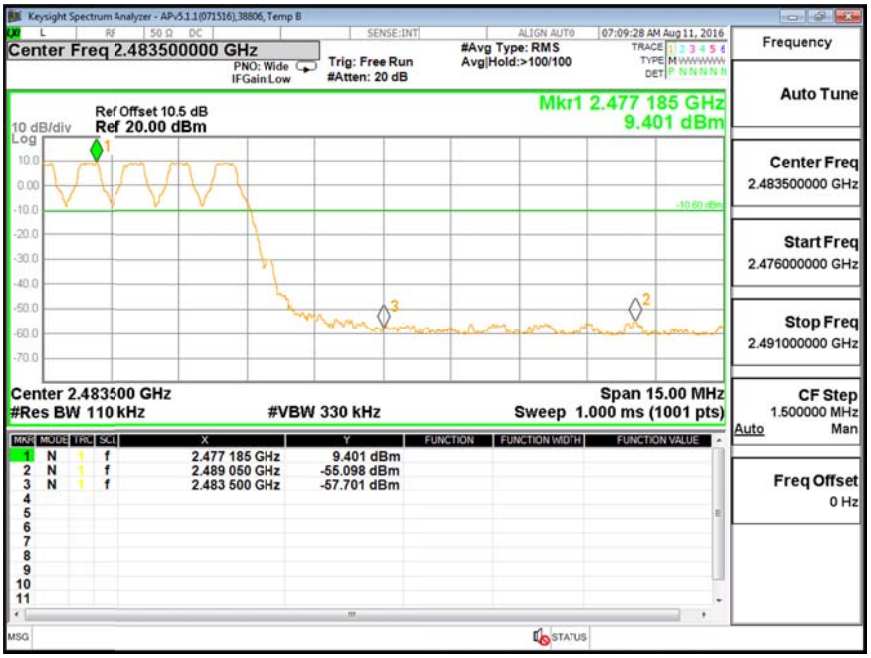
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



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7.3. ENHANCED DATA RATE QPSK MODULATION

7.3.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)
Low	2402	1.3530	1.1936
Middle	2441	1.3520	1.2252
High	2480	1.3250	1.1988

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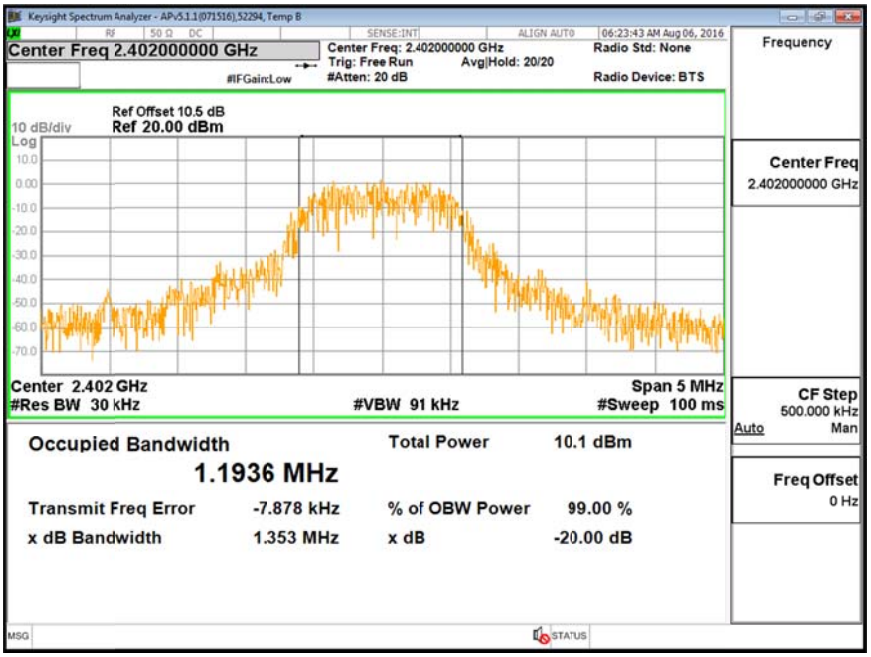
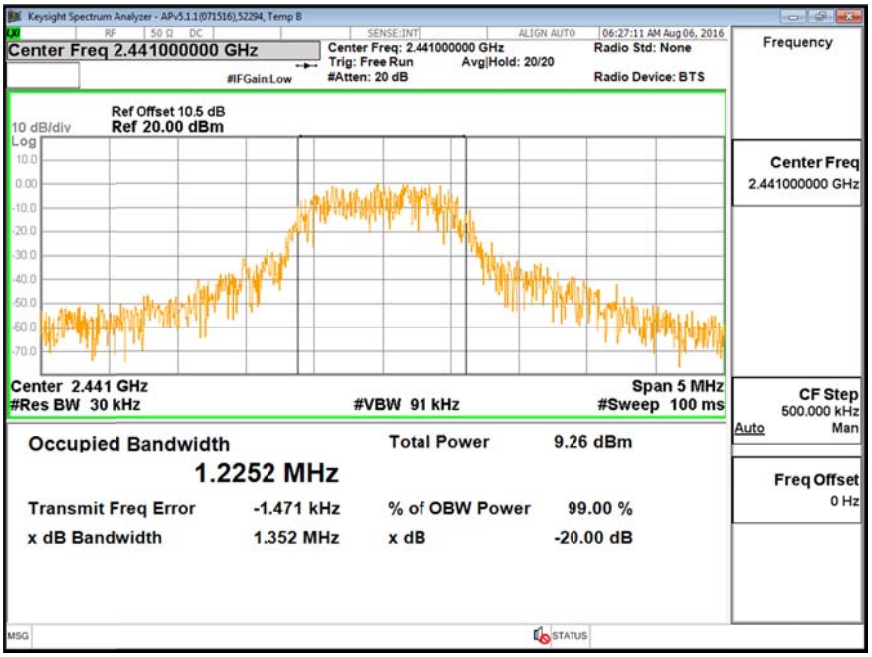
20 dB AND 99% BANDWIDTH

BANDWIDTH LOW CH



BANDWIDTH MID CH



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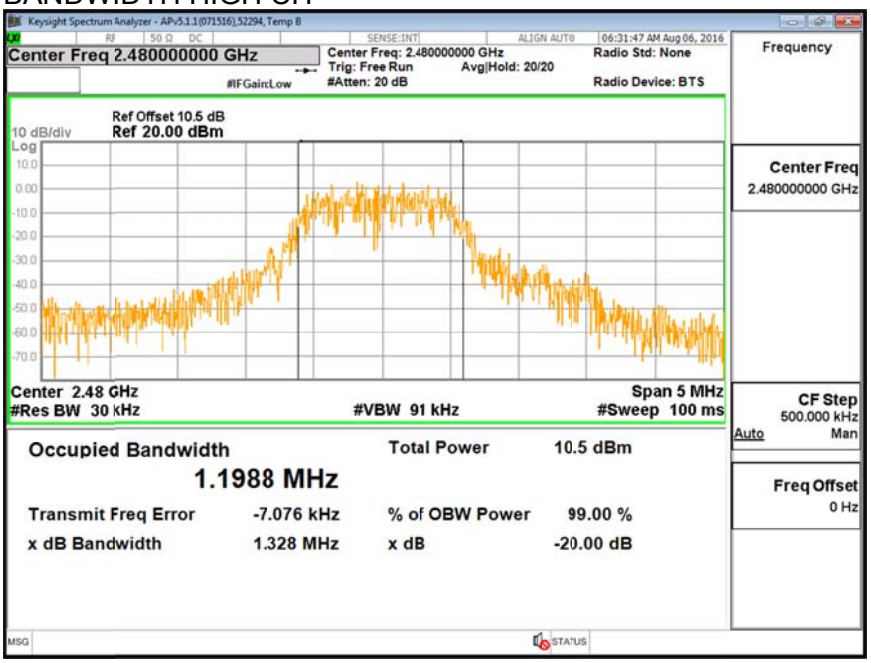
BANDWIDTH HIGH CH



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7.3.2. 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 hoping 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.

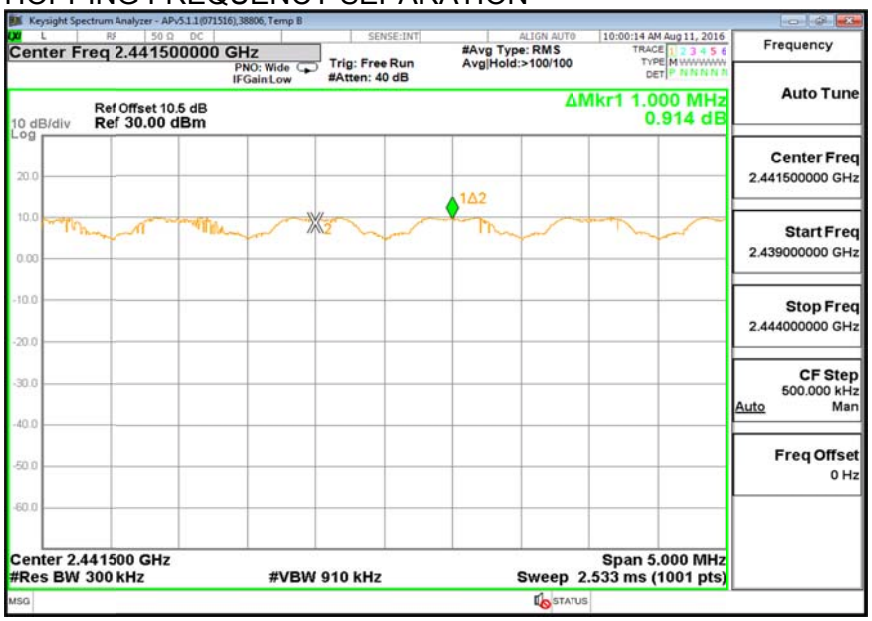
TEST PROCEDURE

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

HOPPING FREQUENCY SEPARATION



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7.3.3. 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.

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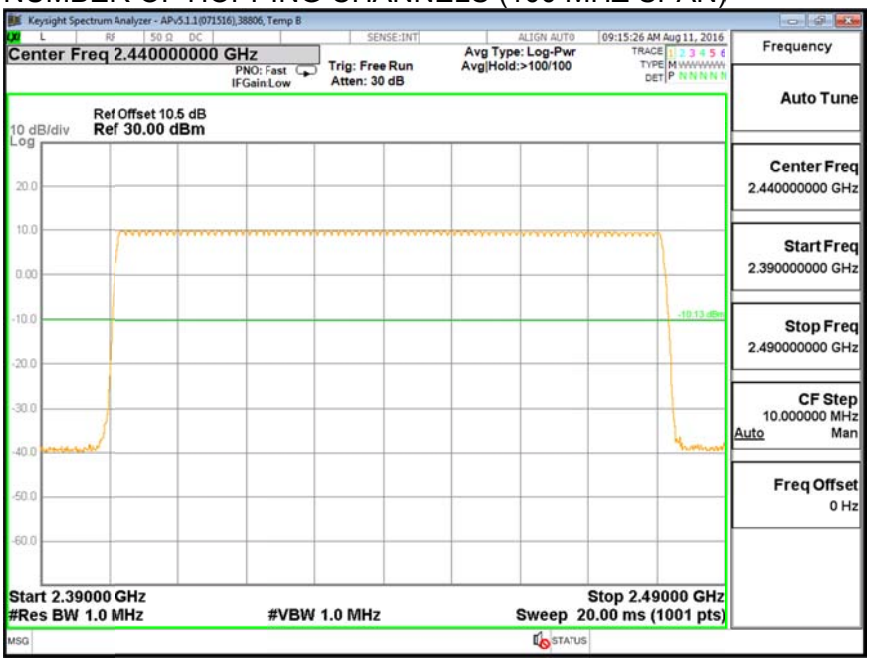
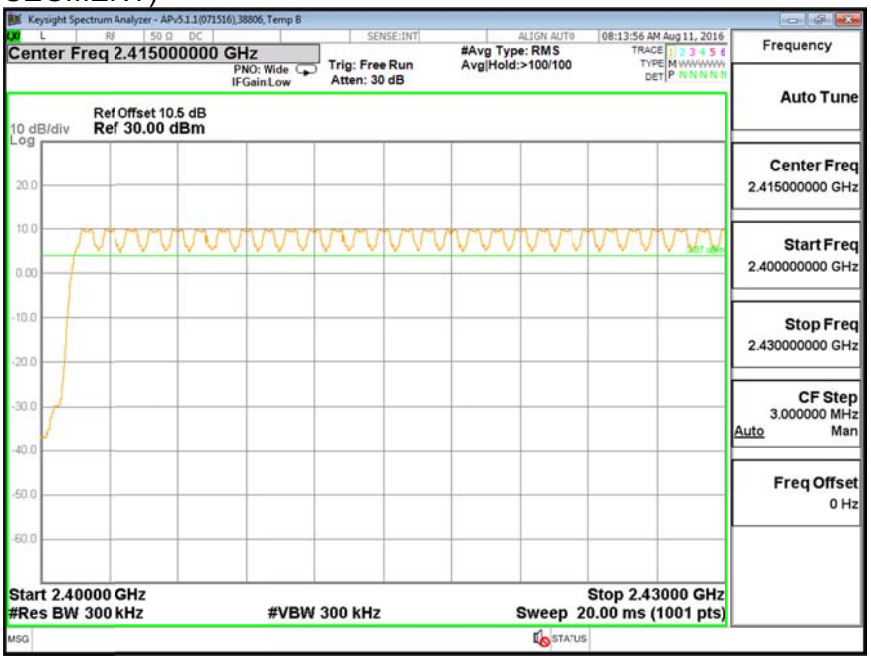
NUMBER OF HOPPING CHANNELS

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



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



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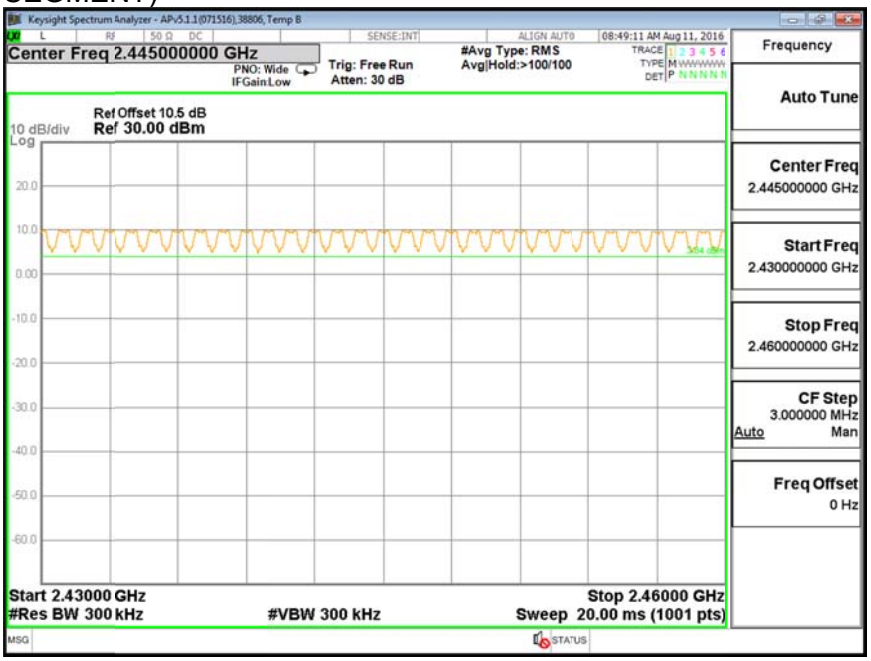
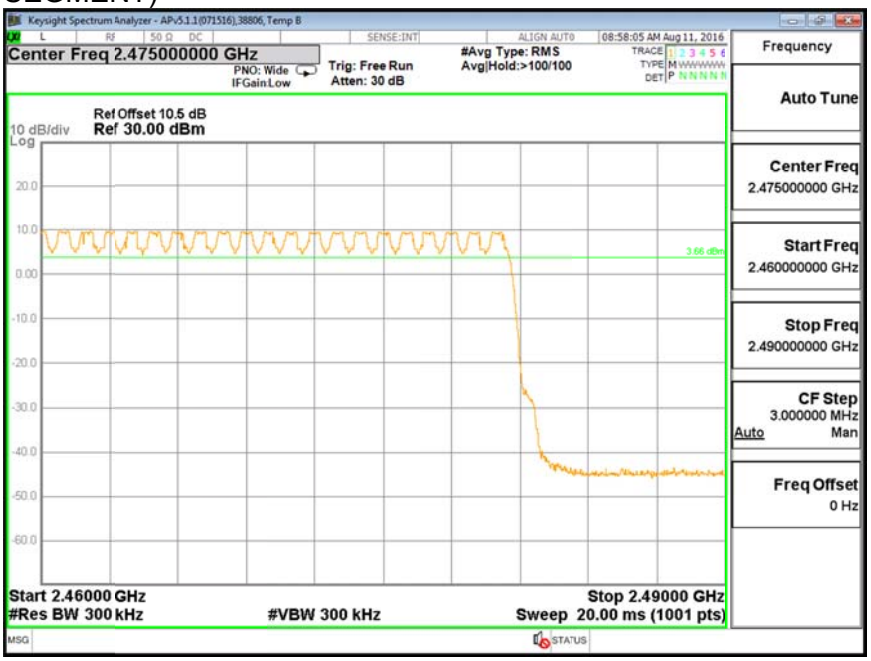
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



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



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7.3.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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

TEST PROCEDURE

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

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

RESULTS

QPSK (EDR) Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
2DH5	2.884	4	0.115	0.4	-0.285

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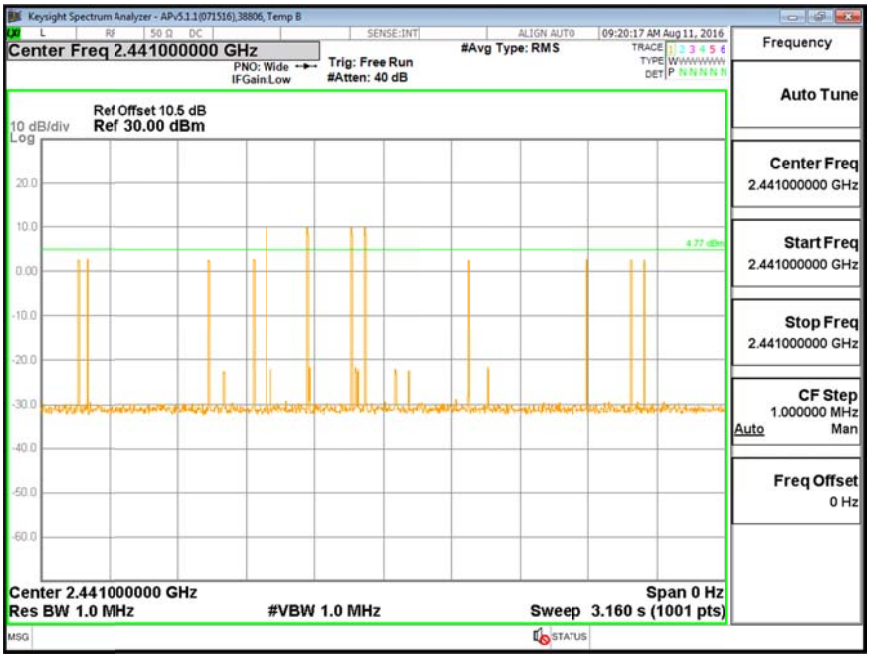
PULSE WIDTH – 2DH5

PULSE WIDTH – 2DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 2DH5

NUMBER OF PULSES – 3DH5



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7.3.5. 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 power meter.

RESULTS

ID:	38806	Date:	8/11/16

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.55	21	-8.42
Middle	2441	12.53	21	-8.44
High	2480	12.65	21	-8.32

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7.3.6. 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:	38806	Date:	8/11/16

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.91
Middle	2441	9.90
High	2480	9.97

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7.3.7. 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

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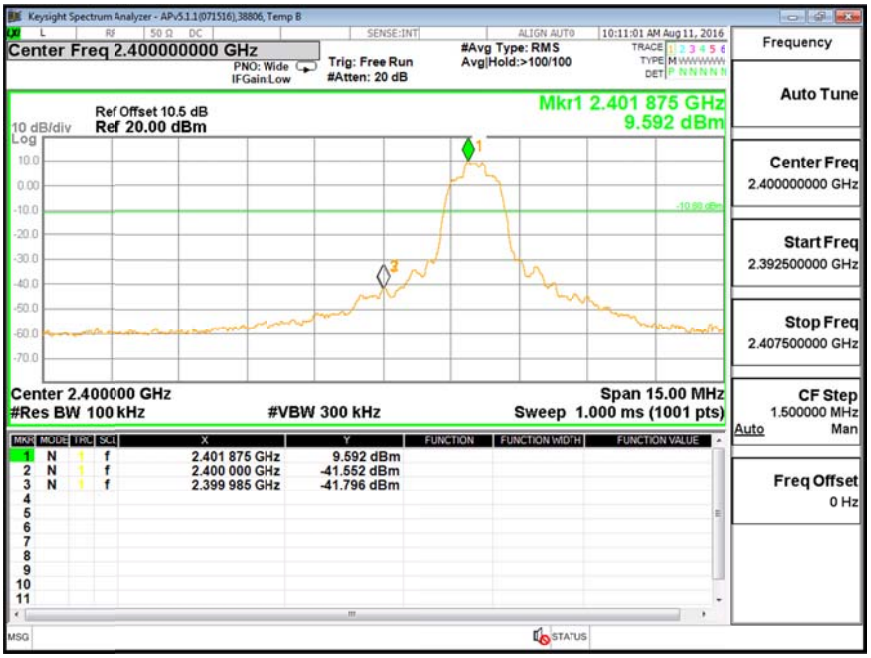
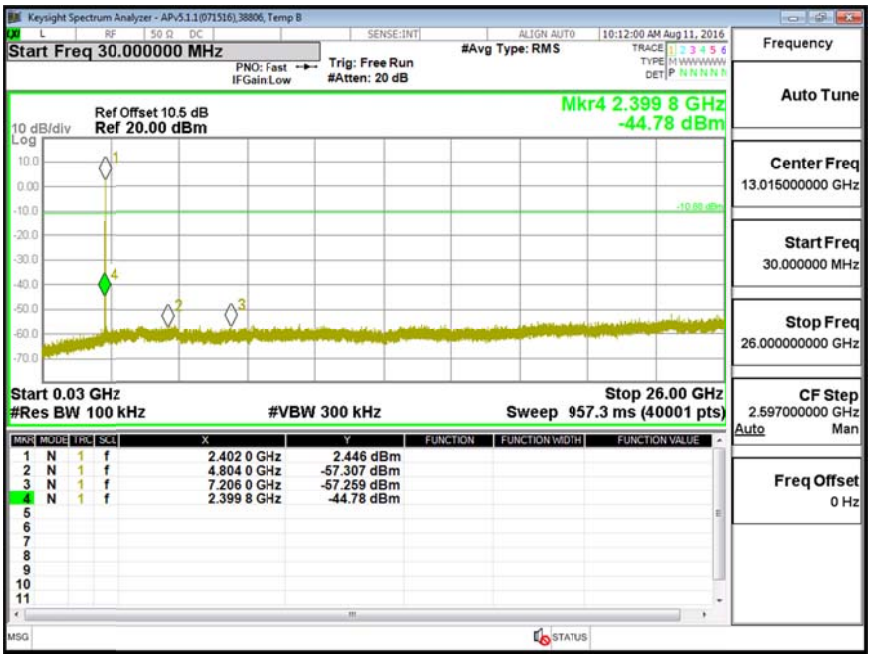
SPURIOUS EMISSIONS, LOW CHANNEL

LOW CHANNEL BANDEDGE



LOW CHANNEL SPURIOUS



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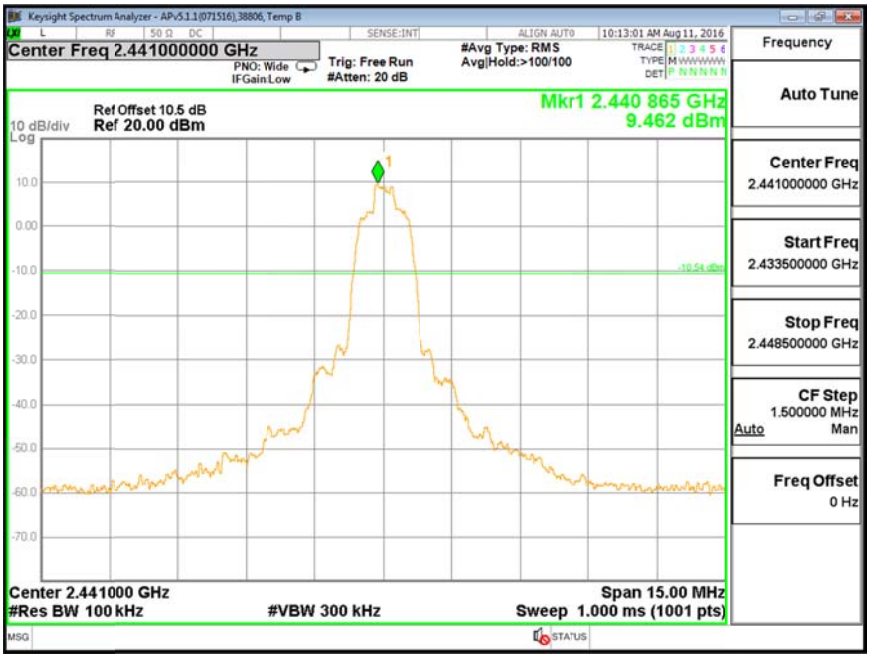
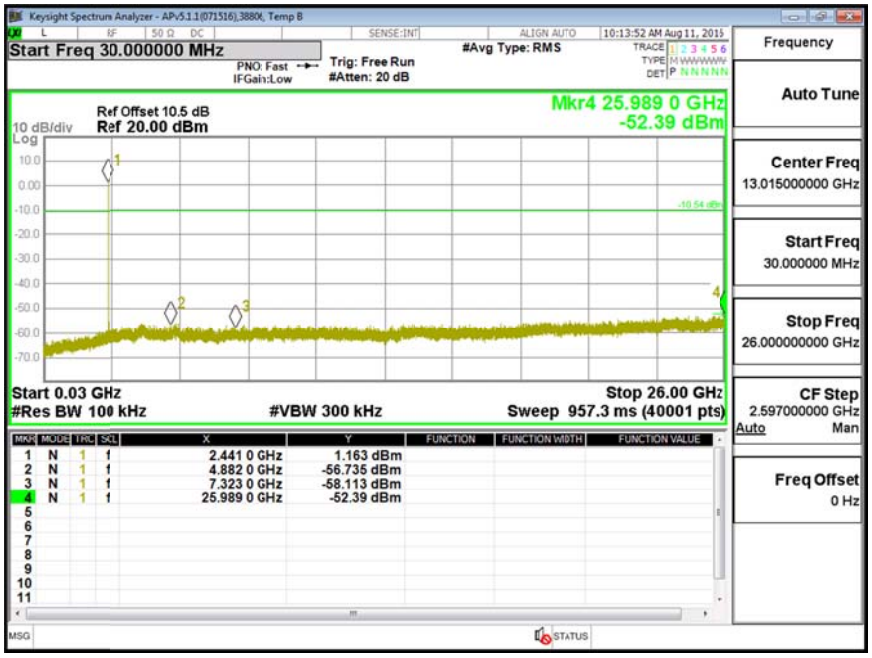
SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL



MID CHANNEL SPURIOUS



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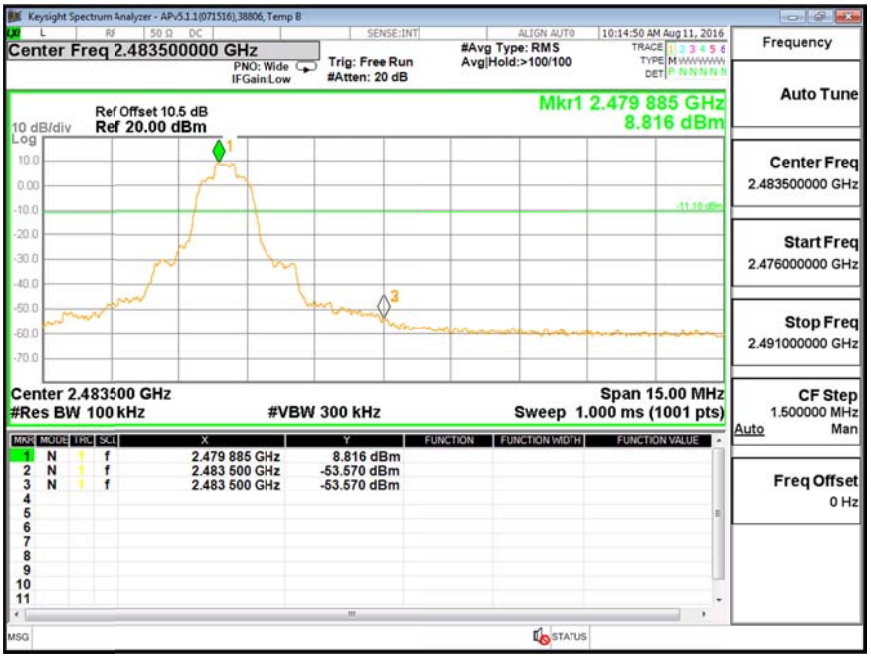
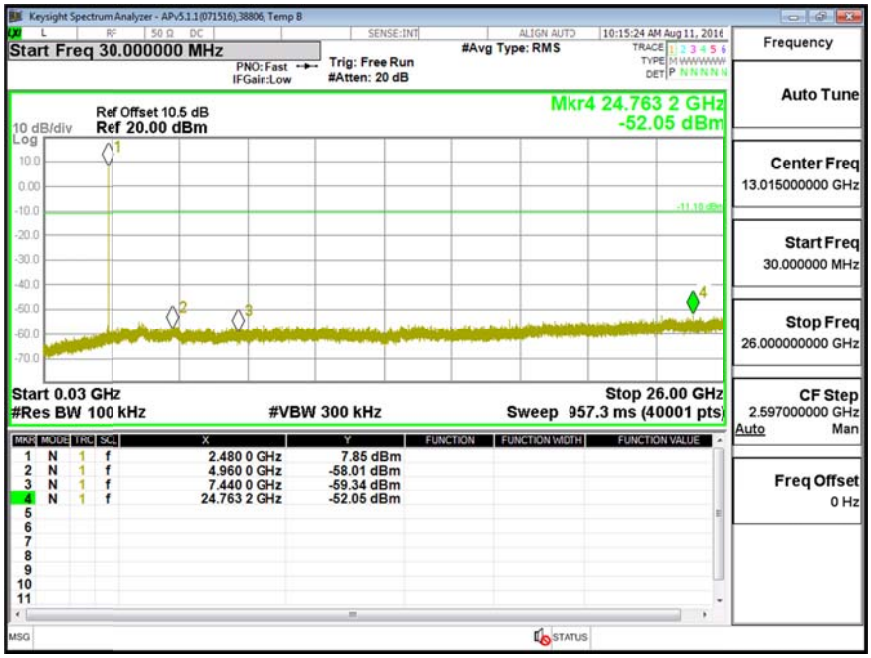
SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE



HIGH CHANNEL SPURIOUS



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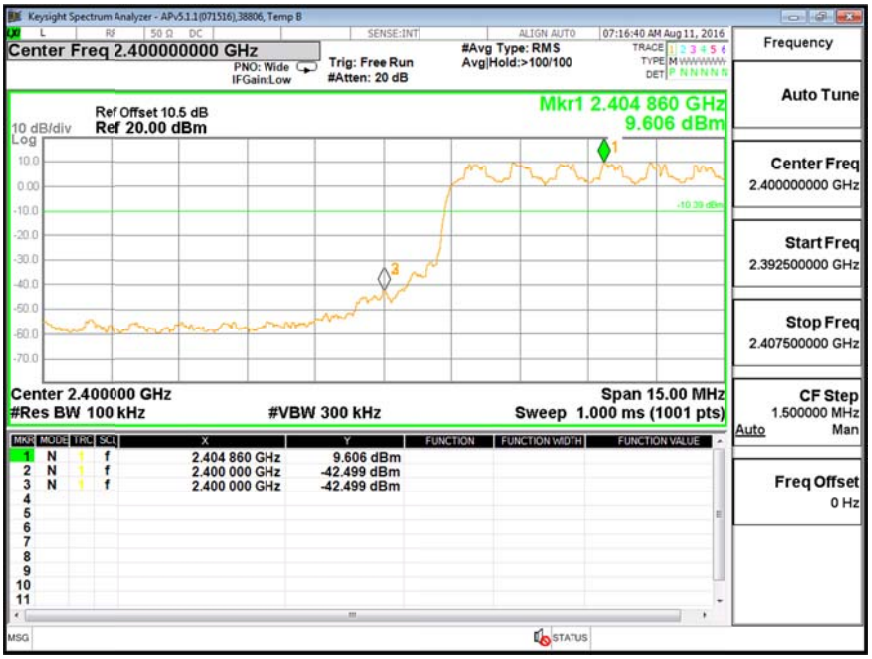
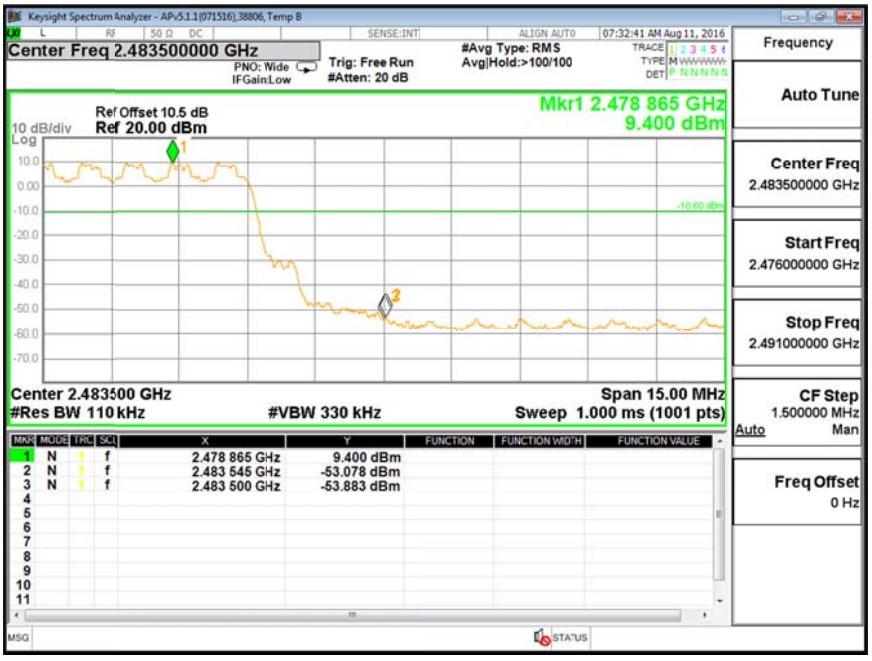
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

LOW BANDEDGE WITH HOPPING ON



HIGH BANDEDGE WITH HOPPING ON



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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

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

TEST PROCEDURE

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

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

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

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

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

RESULTS

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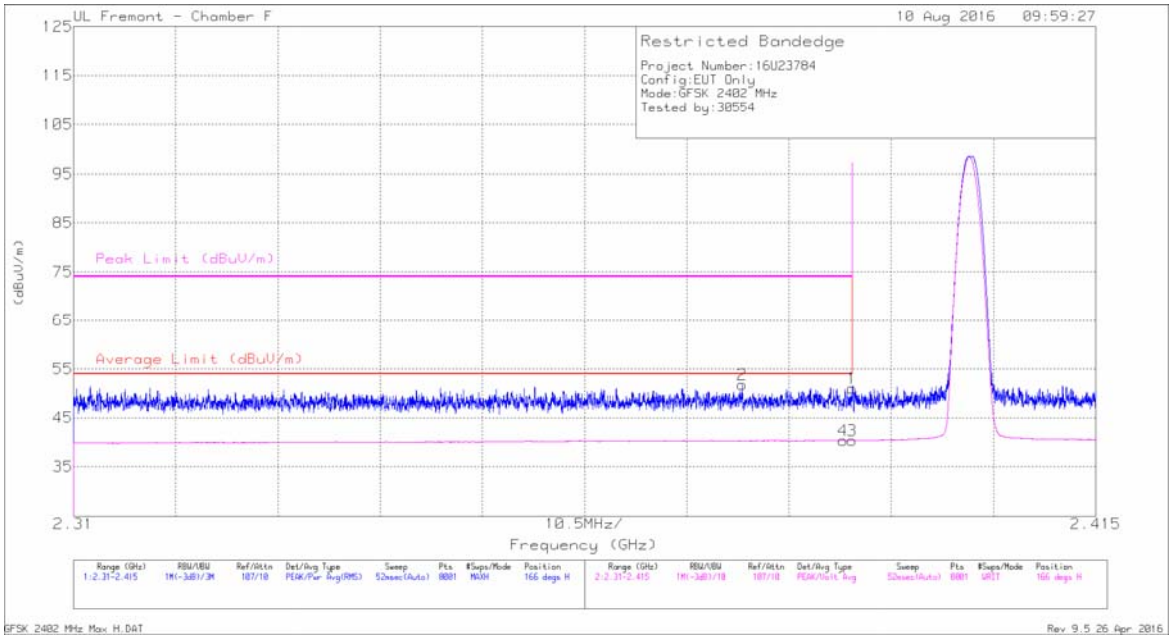
8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	39.79	Pk	32.1	-20.9	50.99	-	-	74	-23.01	166	145	H
2	* 2.379	40.59	Pk	32.1	-20.9	51.79	-	-	74	-22.21	166	145	H
3	* 2.39	29.15	VA1T	32.1	-20.9	40.35	54	-13.65	-	-	166	145	H
4	* 2.389	29.2	VA1T	32.1	-20.9	40.4	54	-13.6-	-	-	166	145	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

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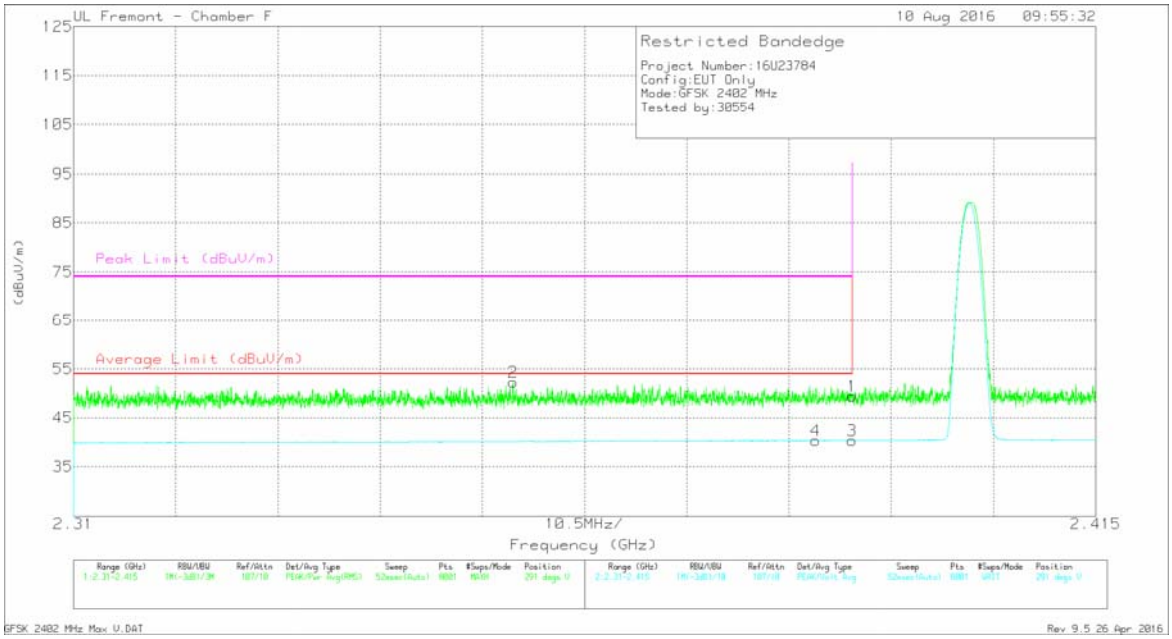
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	38.26	Pk	32.1	-20.9	49.46	-	-	74	-24.54	291	134	V
2	* 2.355	41.16	Pk	32	-20.9	52.26	-	-	74	-21.74	291	134	V
3	* 2.39	29.16	VA1T	32.1	-20.9	40.36	54	-13.64	-	-	291	134	V
4	* 2.386	29.21	VA1T	32.1	-20.9	40.41	54	-13.59	-	-	291	134	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

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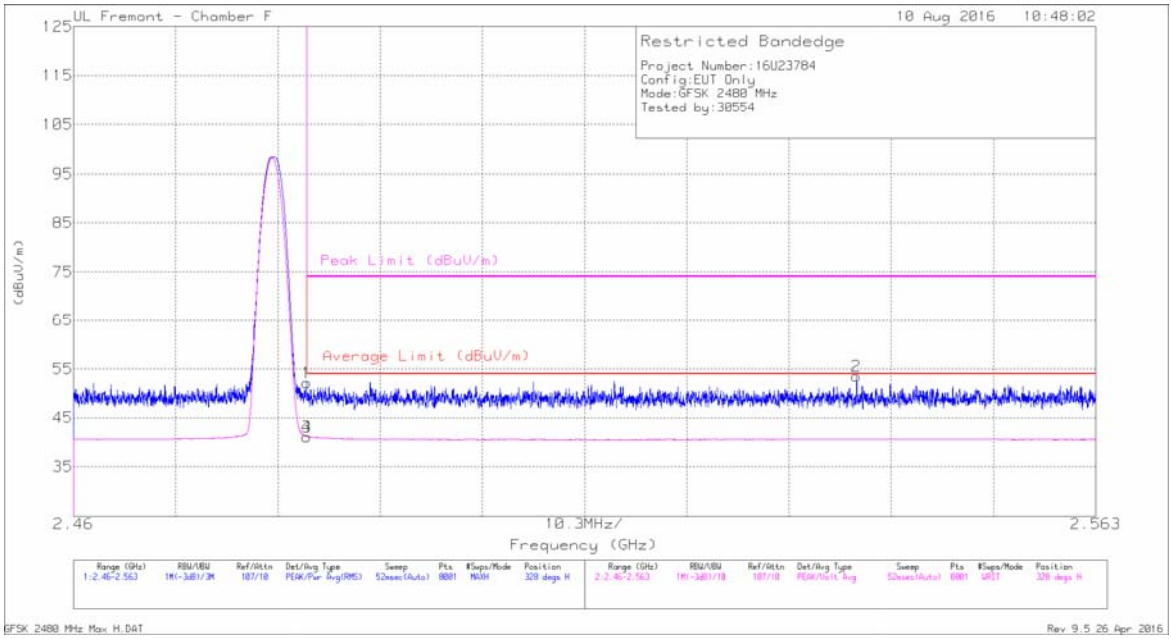
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	40.86	Pk	32.3	-21	52.16	-	-	74	-21.84	328	124	H
2	2.539	42.22	Pk	32.2	-20.9	53.52	-	-	74	-20.48	328	124	H
3	* 2.484	29.85	VA1T	32.3	-21	41.15	54	-12.85	-	-	328	124	H
4	* 2.484	29.86	VA1T	32.3	-21	41.16	54	-12.84	-	-	328	124	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

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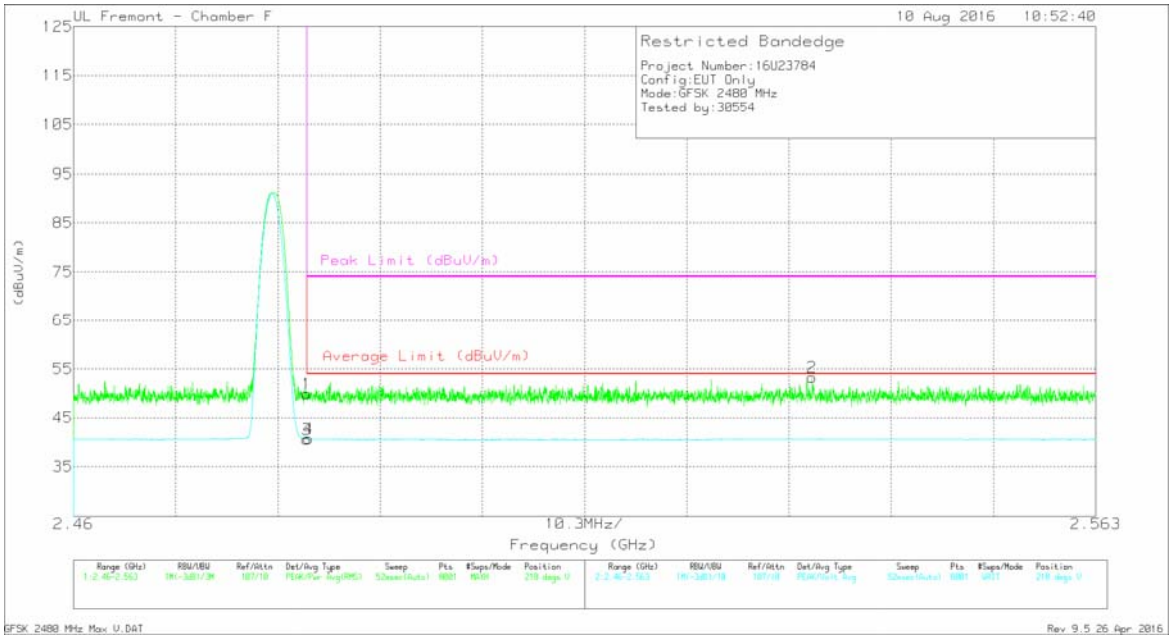
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	38.67	Pk	32.3	-21	49.97	-	-	74	-24.03	218	103	V
2	2.534	41.92	Pk	32.2	-20.8	53.32	-	-	74	-20.68	218	103	V
3	* 2.484	29.36	VA1T	32.3	-21	40.66	54	-13.34	-	-	218	103	V
4	* 2.484	29.38	VA1T	32.3	-21	40.68	54	-13.32	-	-	218	103	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

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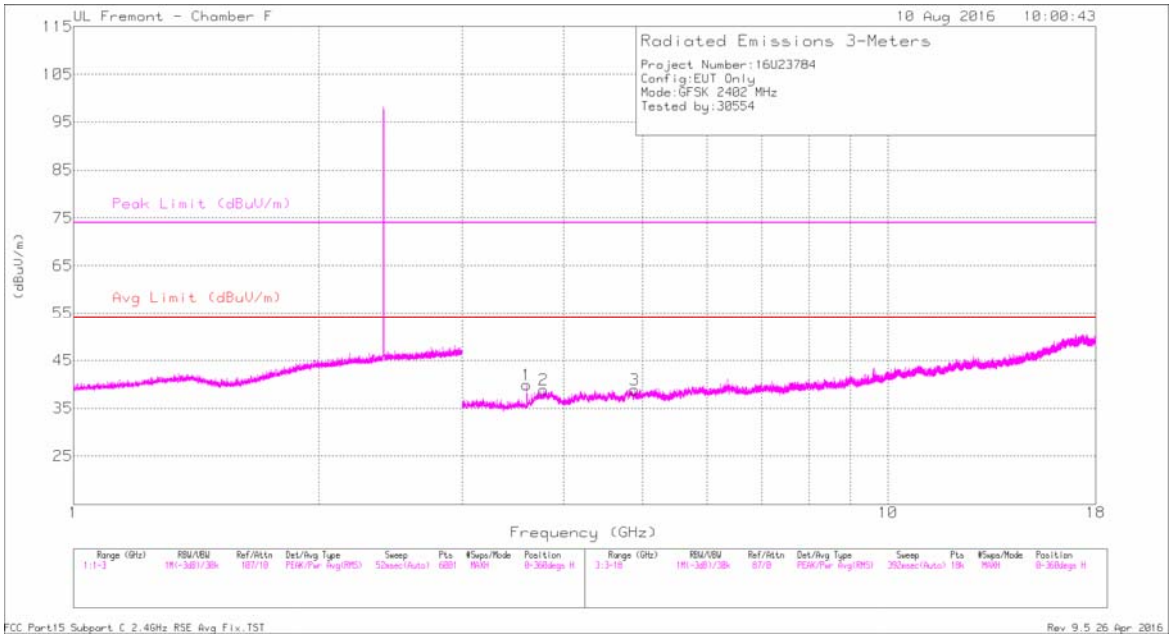
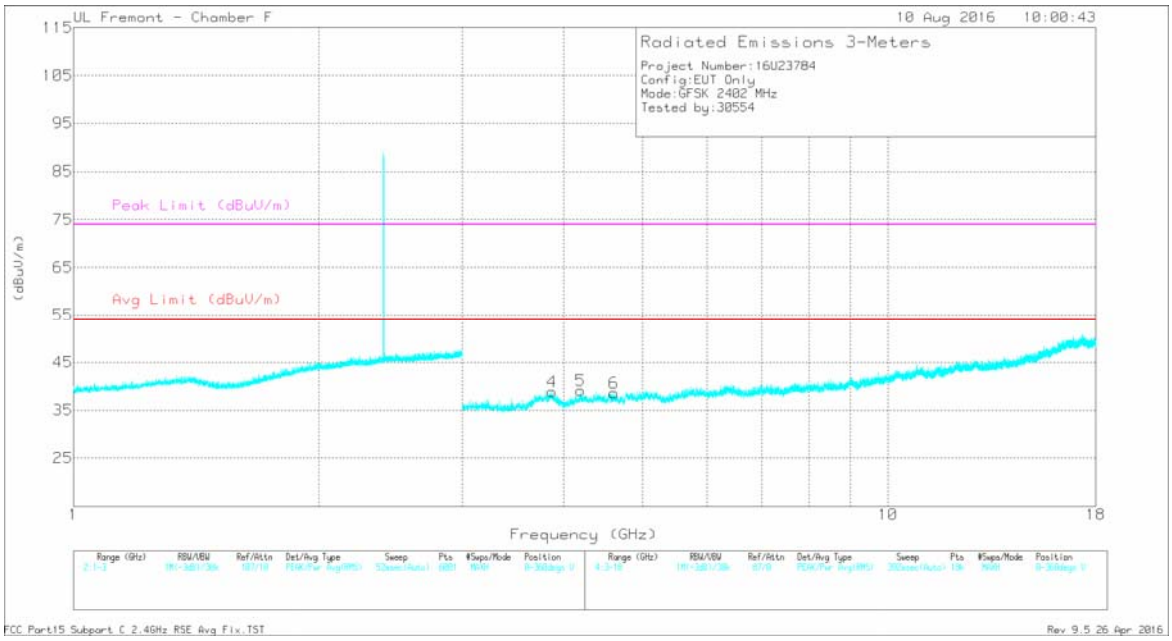
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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DATA

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/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	* 3.603	39.94	PKFH	33	-29.1	43.84	-	-	74	-30.16	360	308	H
	* 3.603	31.82	VA1T	33	-29.1	35.72	54	-18.28	-	-	360	308	H
2	* 3.778	37.68	PKFH	33.4	-28.9	42.18	-	-	74	-31.82	360	308	H
	* 3.776	26.56	VA1T	33.4	-28.9	31.06	54	-22.94	-	-	360	308	H
3	* 4.891	37.09	PKFH	34.1	-27.9	43.29	-	-	74	-30.71	360	308	H
	* 4.892	25.91	VA1T	34.1	-27.9	32.11	54	-21.89	-	-	360	308	H
4	* 3.873	38.28	PKFH	33.4	-28.3	43.38	-	-	74	-30.62	360	308	V
	* 3.87	26.44	VA1T	33.4	-28.3	31.54	54	-22.46	-	-	360	308	V
5	* 4.196	37.33	PKFH	33.7	-28	43.03	-	-	74	-30.97	360	308	V
	* 4.192	26.26	VA1T	33.7	-28.1	31.86	54	-22.14	-	-	360	308	V
6	* 4.612	37.6	PKFH	34.1	-28	43.7	-	-	74	-30.3	360	308	V
	* 4.612	25.97	VA1T	34.1	-28	32.07	54	-21.93	-	-	360	308	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

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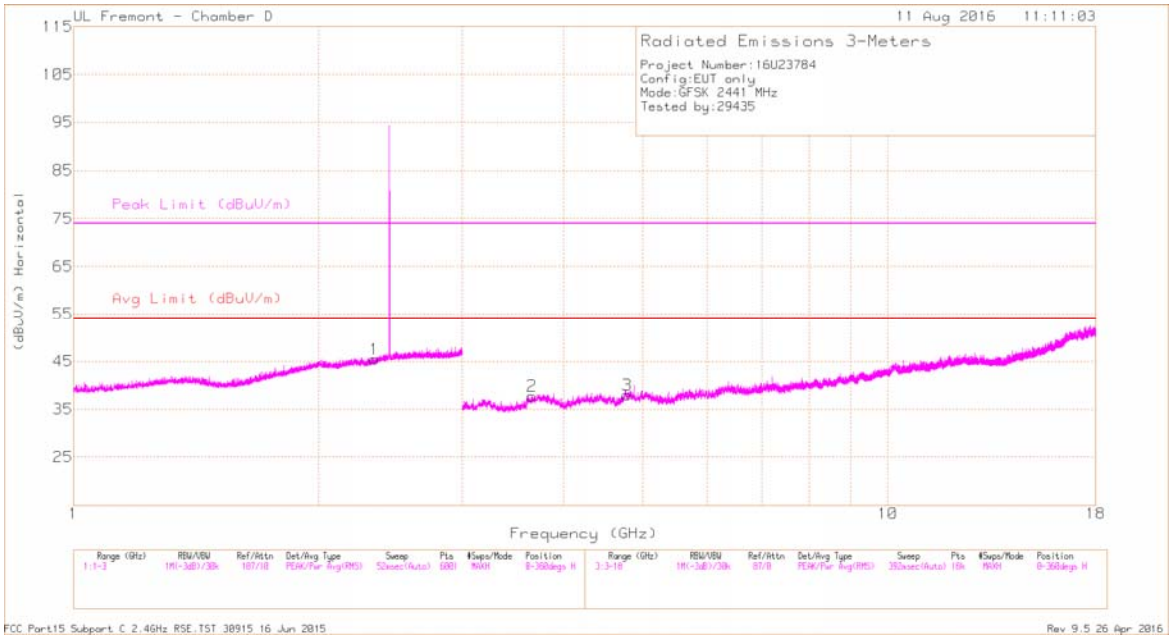
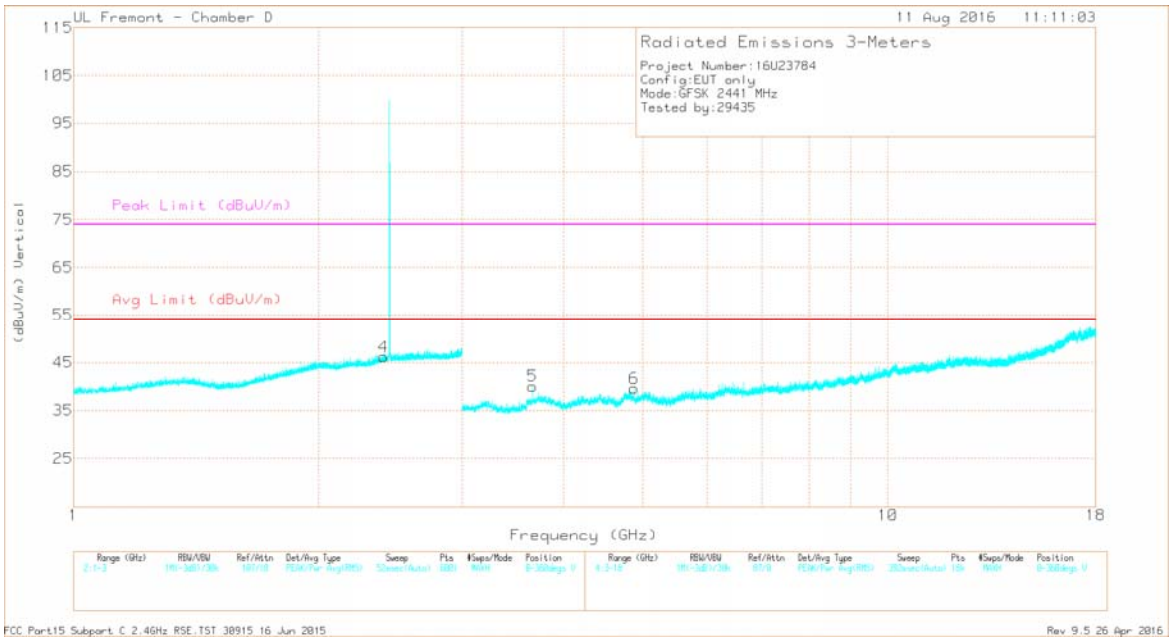
HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/ Cbl/Fltr/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	* 2.342	39.85	PKFH	31.7	-20.7	50.85	-	-	74	-23.15	323	181	H
	* 2.343	29	VA1T	31.7	-20.7	40	54	-14	-	-	323	181	H
2	* 3.652	37.64	PKFH	33.4	-28.8	42.24	-	-	74	-31.76	159	278	H
	* 3.652	26.21	VA1T	33.4	-28.9	30.71	54	-23.29	-	-	159	278	H
3	* 4.784	35.94	PKFH	34	-26.6	43.34	-	-	74	-30.66	165	261	H
	* 4.784	24.91	VA1T	34	-26.6	32.31	54	-21.69	-	-	165	261	H
4	2.402	28.99	VA1T	32.2	-20.6	40.59	-	-	-	-	204	238	V
	2.404	41.02	PKFH	32.2	-20.6	52.62	-	-	-	-	204	238	V
5	* 3.663	37.82	PKFH	33.4	-28.9	42.32	-	-	74	-31.68	195	292	V
	* 3.662	26.37	VA1T	33.4	-28.9	30.87	54	-23.13	-	-	195	292	V
6	* 4.883	37.36	PKFH	34.1	-28	43.46	-	-	74	-30.54	146	278	V
	* 4.882	25.78	VA1T	34.1	-28	31.88	54	-22.12	-	-	146	278	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

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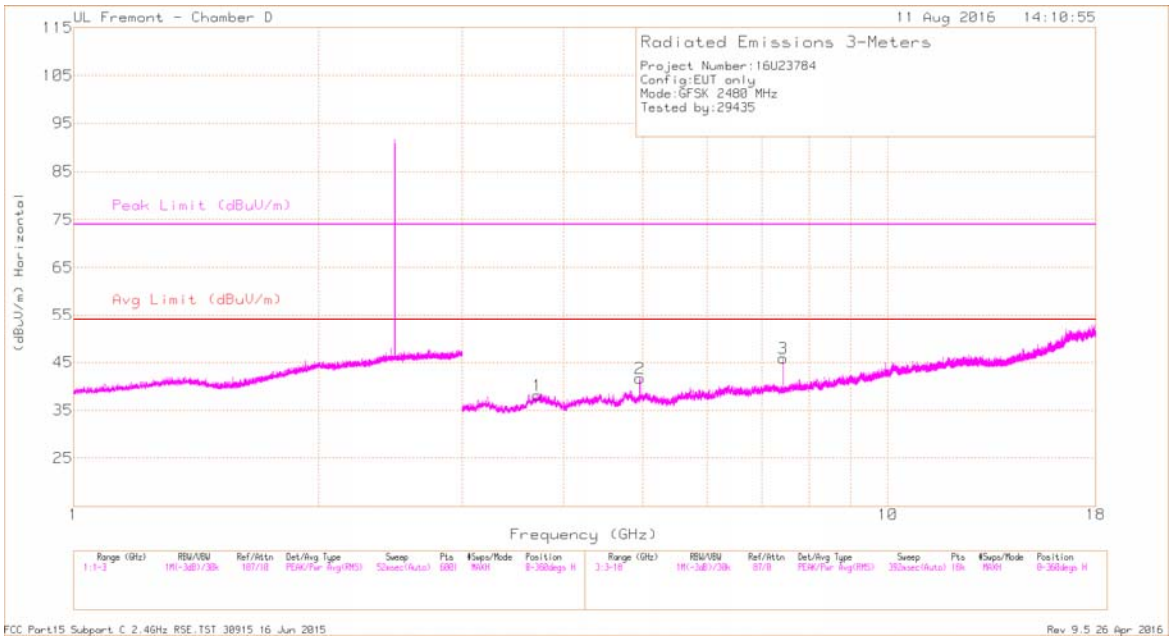
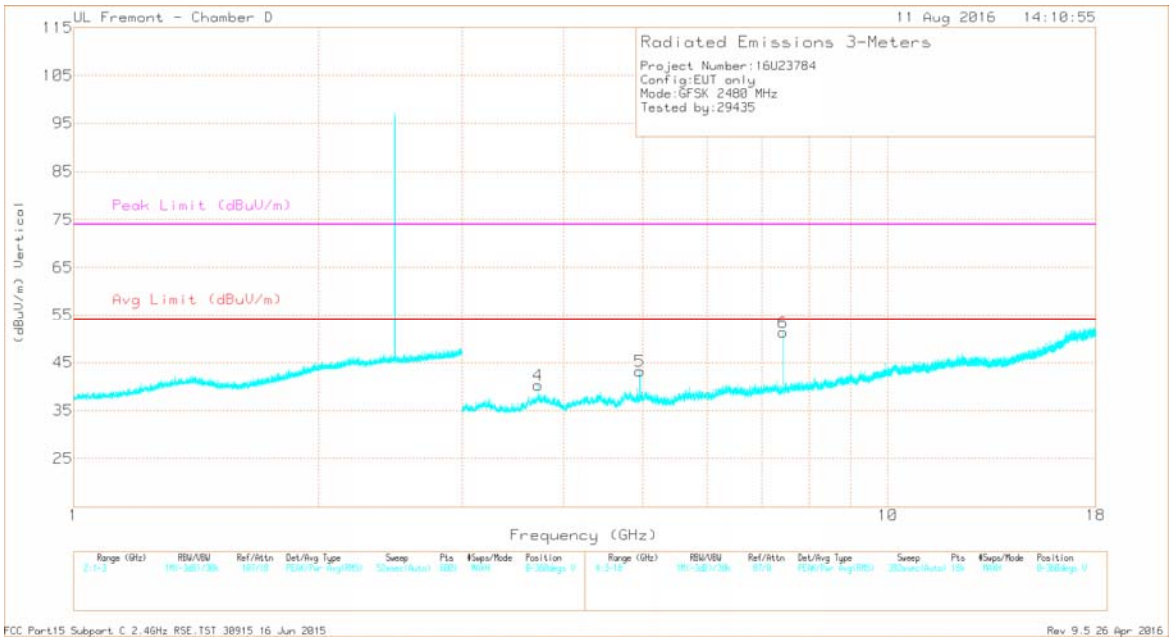
HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/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	* 3.714	39.41	PKFH	33.5	-28.6	44.31	-	-	74	-29.69	107	161	H
	* 3.714	26.31	VA1T	33.5	-28.6	31.21	54	-22.79	-	-	107	161	H
2	* 4.961	40.06	PKFH	34.1	-27.5	46.66	-	-	74	-27.34	26	122	H
	* 4.96	32.42	VA1T	34.1	-27.5	39.02	54	-14.98	-	-	26	122	H
3	* 7.438	34.92	PKFH	35.6	-24.2	46.32	-	-	74	-27.68	63	282	H
	* 7.438	23.18	VA1T	35.6	-24.2	34.58	54	-19.42	-	-	63	282	H
4	* 3.722	37.93	PKFH	33.5	-28.6	42.83	-	-	74	-31.17	112	361	V
	* 3.722	26.24	VA1T	33.5	-28.6	31.14	54	-22.86	-	-	112	361	V
5	* 4.962	36.35	PKFH	34.1	-27.4	43.05	-	-	74	-30.95	55	129	V
	* 4.96	25.38	VA1T	34.1	-27.5	31.98	54	-22.02	-	-	55	129	V
6	* 7.439	35.12	PKFH	35.6	-24.2	46.52	-	-	74	-27.48	188	102	V
	* 7.439	23.09	VA1T	35.6	-24.2	34.49	54	-19.51	-	-	188	102	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

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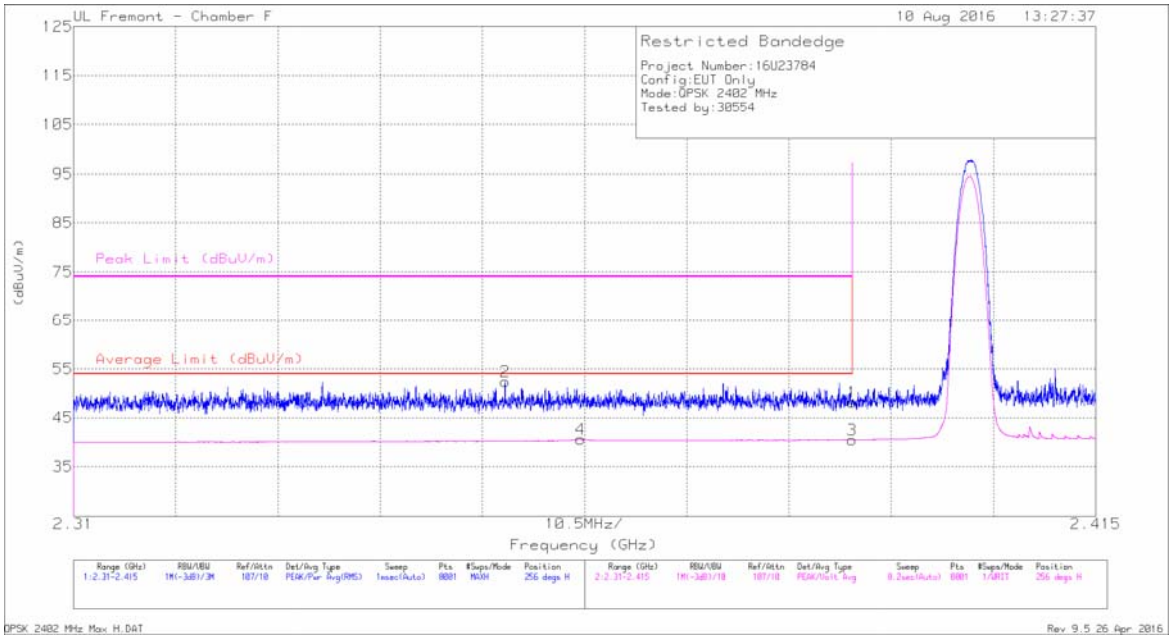
8.2.2. ENHANCED DATA RATE QPSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

LOW CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	36.95	Pk	32.1	-20.9	48.15	-	-	74	-25.85	256	150	H
2	* 2.354	41.34	Pk	32	-20.9	52.44	-	-	74	-21.56	256	150	H
3	* 2.39	29.32	VA1T	32.1	-20.9	40.52	54	-13.48	-	-	256	150	H
4	* 2.362	29.48	VA1T	32	-20.9	40.58	54	-13.42	-	-	256	150	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

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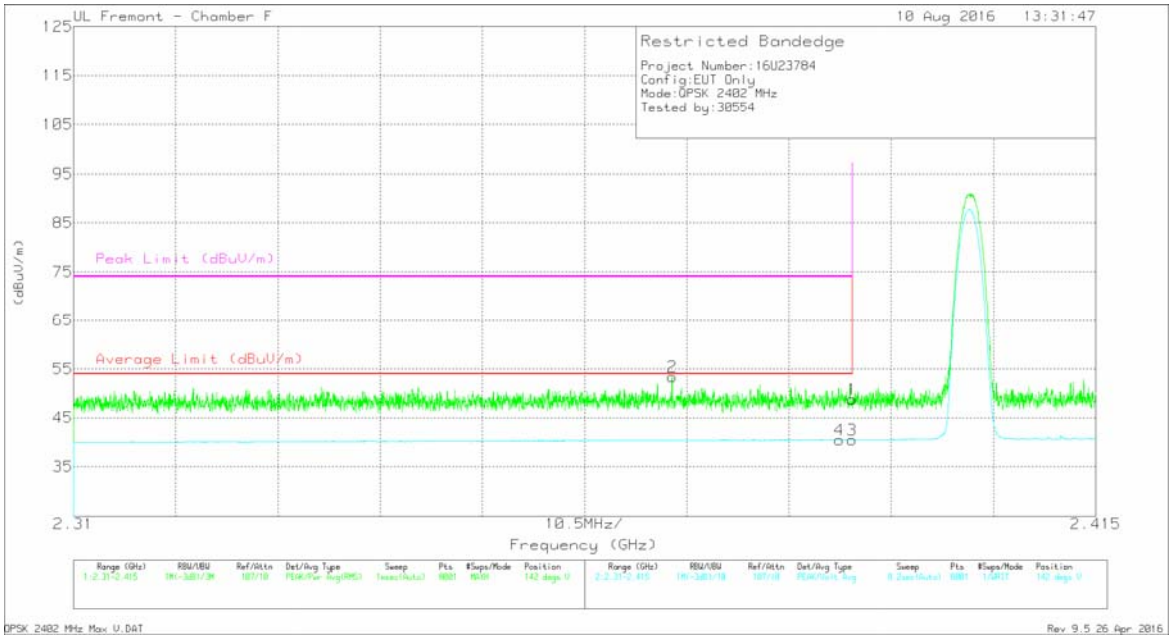
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	37.55	Pk	32.1	-20.9	48.75	-	-	74	-25.25	142	329	V
2	* 2.371	42.3	Pk	32	-20.9	53.4	-	-	74	-20.6	142	329	V
3	* 2.39	29.29	VA1T	32.1	-20.9	40.49	54	-13.51	-	-	142	329	V
4	* 2.389	29.33	VA1T	32.1	-20.9	40.53	54	-13.47	-	-	142	329	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

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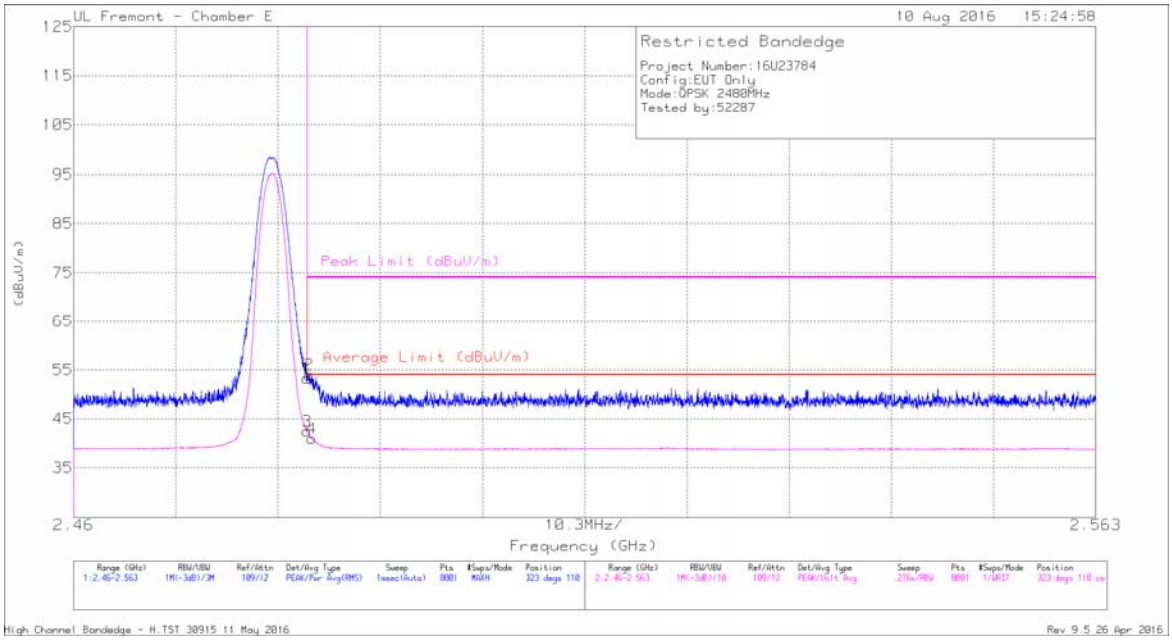
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

HIGH CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	40.98	Pk	32.3	-20	53.28	-	-	74	-20.72	323	110	H
2	* 2.484	41.69	Pk	32.3	-20	53.99	-	-	74	-20.01	323	110	H
3	* 2.484	30.18	VA1T	32.3	-20	42.48	54	-11.52	-	-	323	110	H
4	* 2.484	28.63	VA1T	32.3	-20	40.93	54	-13.07	-	-	323	110	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

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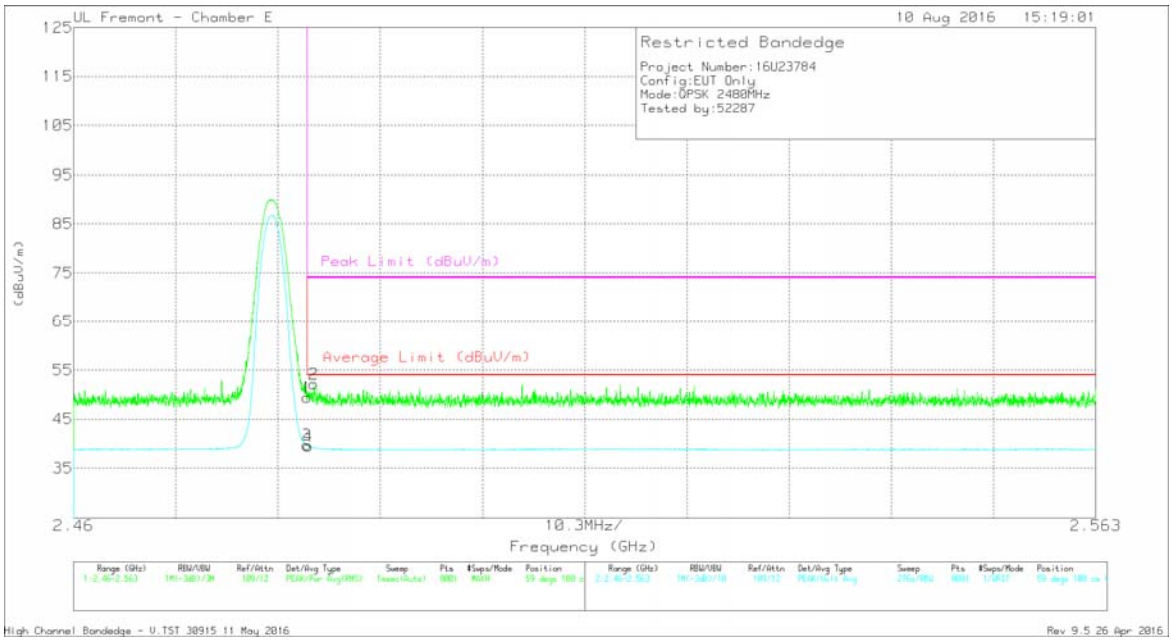
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	37.16	Pk	32.3	-20	49.46	-	-	74	-24.54	59	108	V
2	* 2.484	39.85	Pk	32.3	-20	52.15	-	-	74	-21.85	59	108	V
3	* 2.484	27.42	VA1T	32.3	-20	39.72	54	-14.28	-	-	59	108	V
4	* 2.484	27.22	VA1T	32.3	-20	39.52	54	-14.48	-	-	59	108	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

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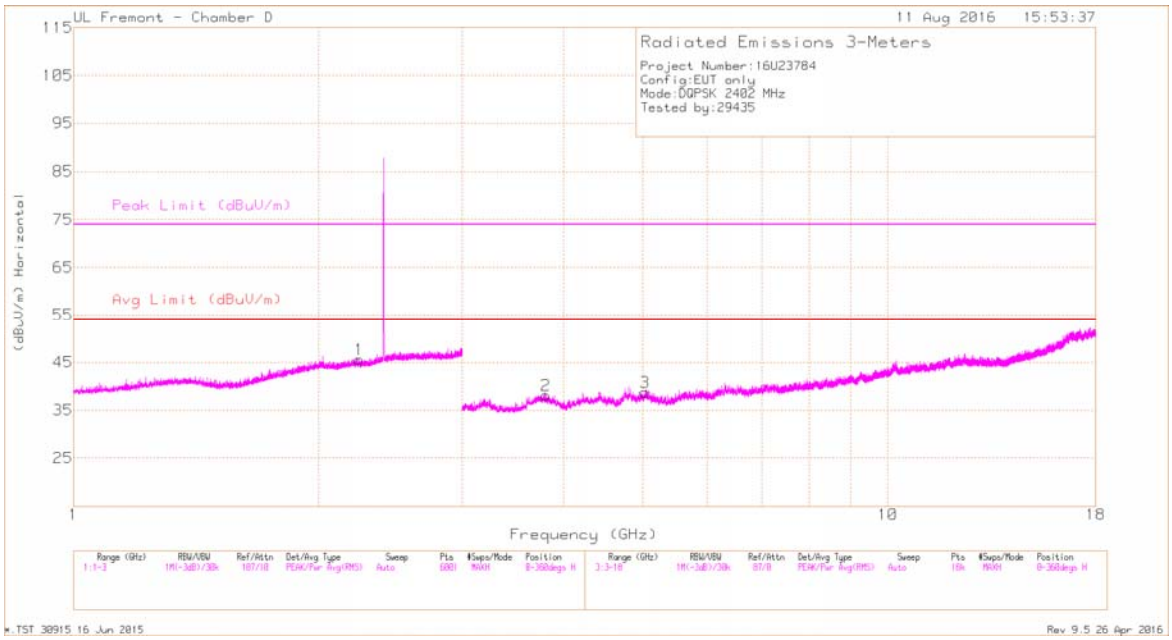
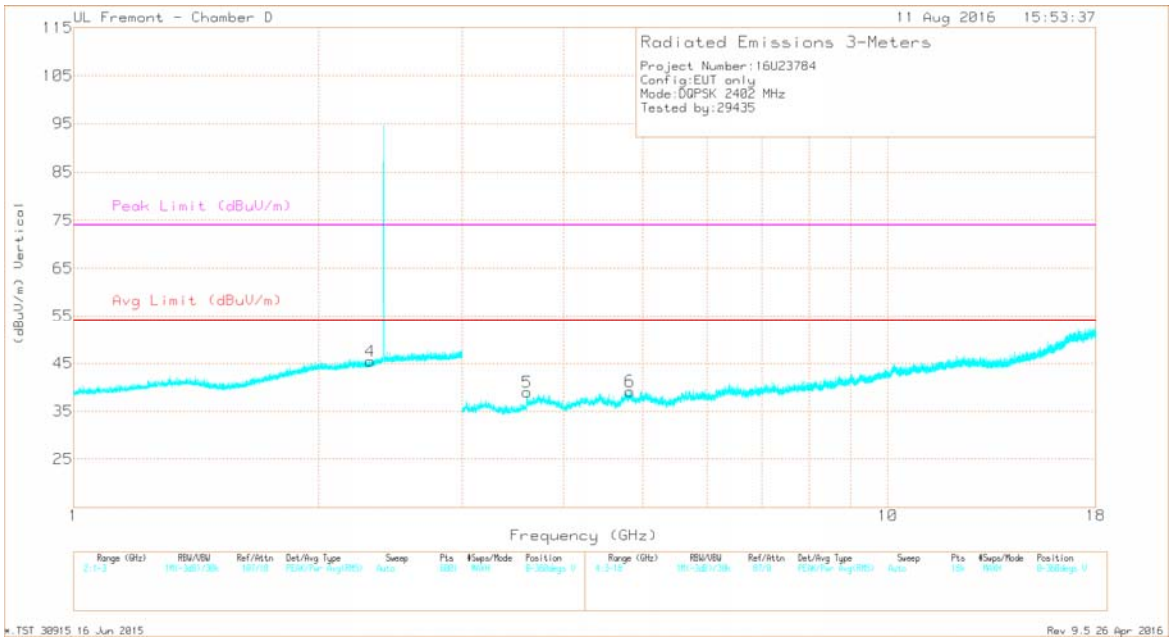
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/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	* 2.245	40.73	PKFH	31.5	-20.8	51.43	-	-	74	-22.57	236	259	H
	* 2.243	29	VA1T	31.5	-20.8	39.7	54	-14.3	-	-	236	259	H
2	* 3.798	37.36	PKFH	33.6	-28.1	42.86	-	-	74	-31.14	85	295	H
	* 3.802	26.07	VA1T	33.6	-28.1	31.57	54	-22.43	-	-	83	295	H
3	* 5.03	35.81	PKFH	34	-26.4	43.41	-	-	74	-30.59	133	264	H
	* 5.031	25	VA1T	34	-26.3	32.7	54	-21.3	-	-	133	264	H
4	* 2.313	40.22	PKFH	31.5	-20.8	50.92	-	-	74	-23.08	190	307	V
	* 2.315	29.03	VA1T	31.5	-20.8	39.73	54	-14.27	-	-	190	307	V
5	* 3.603	38.18	PKFH	33.3	-28	43.48	-	-	74	-30.52	180	292	V
	* 3.603	28.11	VA1T	33.3	-28	33.41	54	-20.59	-	-	180	292	V
6	* 4.82	36.03	PKFH	34.1	-26.9	43.23	-	-	74	-30.77	217	262	V
	* 4.822	25.42	VA1T	34.1	-27	32.52	54	-21.48	-	-	217	262	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

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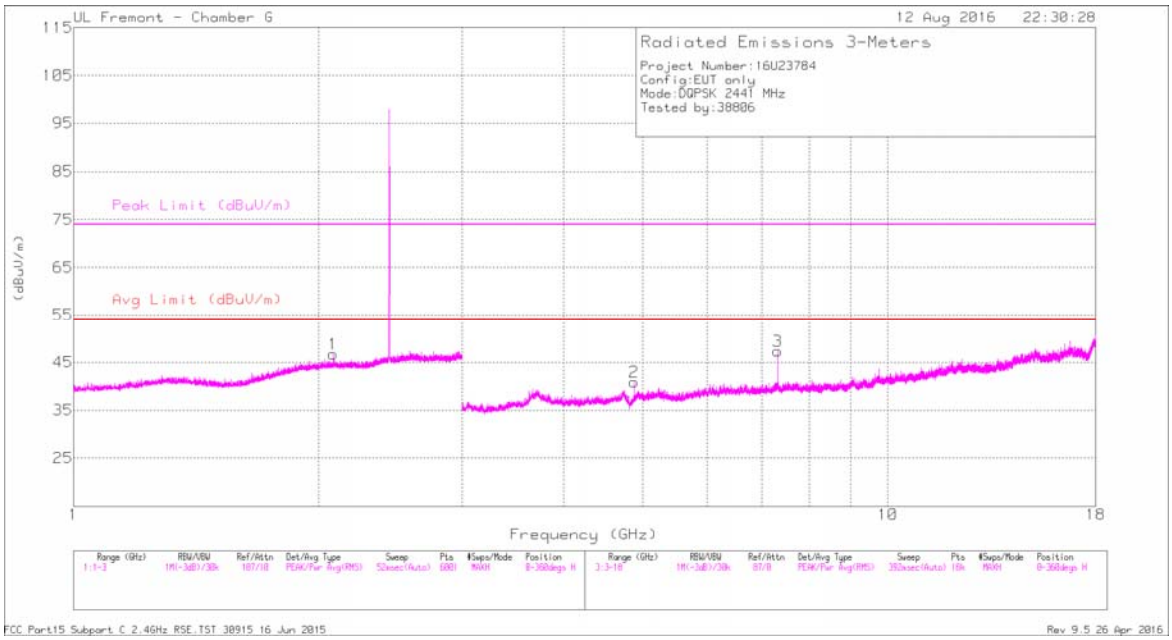
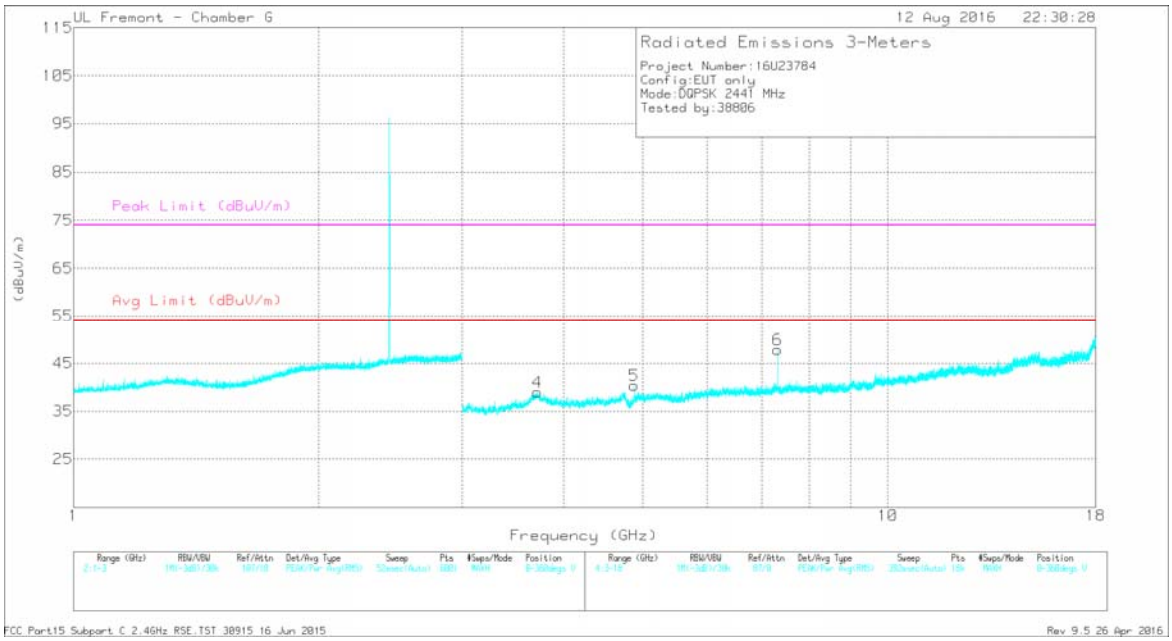
HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/ Cbl/Fltr/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	2.084	42.69	PKFH	31.6	-24	50.29	-	-	-	-	139	104	H
	2.086	31.57	VA1T	31.6	-24	39.17	-	-	-	-	139	104	H
2	* 4.882	44.97	PKFH	34.5	-31.8	47.67	-	-	74	-26.33	143	109	H
	* 4.882	35.5	VA1T	34.5	-31.8	38.2	54	-15.8	-	-	143	109	H
3	* 7.324	46.95	PKFH	35.8	-29.9	52.85	-	-	74	-21.15	278	102	H
	* 7.323	38.55	VA1T	35.8	-29.9	44.45	54	-9.55	-	-	278	102	H
4	* 3.713	44.36	PKFH	34.2	-30.7	47.86	-	-	74	-26.14	15	153	V
	* 3.712	32.73	VA1T	34.2	-30.7	36.23	54	-17.77	-	-	15	153	V
5	* 4.882	45.11	PKFH	34.5	-31.8	47.81	-	-	74	-26.19	153	108	V
	* 4.882	34.97	VA1T	34.5	-31.8	37.67	54	-16.33	-	-	153	108	V
6	* 7.322	47.28	PKFH	35.8	-29.9	53.18	-	-	74	-20.82	255	119	V
	* 7.323	38.77	VA1T	35.8	-29.9	44.67	54	-9.33	-	-	255	119	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

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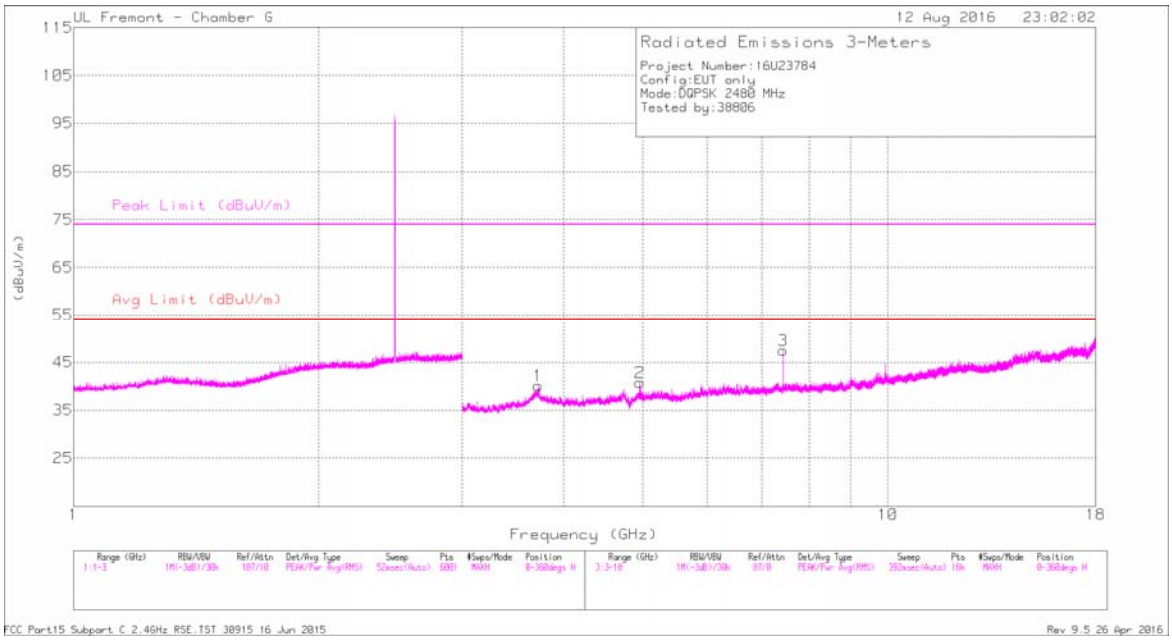
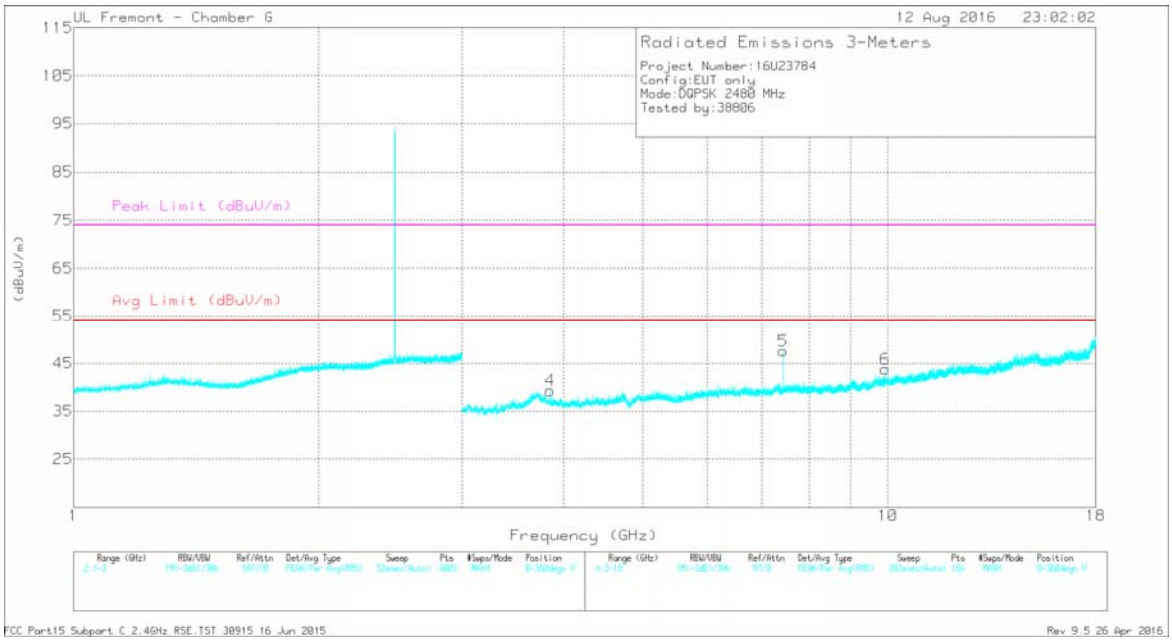
HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Fltr/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	* 3.719	45.05	PKFH	34.2	-30.7	48.55	-	-	74	-25.45	265	102	H
	* 3.72	33.66	VA1T	34.2	-30.7	37.16	54	-16.84	-	-	265	102	H
2	* 4.96	47.07	PKFH	34.6	-31.8	49.87	-	-	74	-24.13	106	242	H
	* 4.96	36.78	VA1T	34.6	-31.8	39.58	54	-14.42	-	-	106	242	H
3	* 7.44	47.27	PKFH	35.9	-30.2	52.97	-	-	74	-21.03	99	127	H
	* 7.44	37.7	VA1T	35.9	-30.2	43.4	54	-10.6	-	-	99	127	H
4	* 3.846	45.39	PKFH	33.9	-32.3	46.99	-	-	74	-27.01	240	195	V
	* 3.848	33.39	VA1T	33.9	-32.3	34.99	54	-19.01	-	-	240	195	V
5	* 7.44	47.47	PKFH	35.9	-30.2	53.17	-	-	74	-20.83	75	132	V
	* 7.44	38.67	VA1T	35.9	-30.2	44.37	54	-9.63	-	-	75	132	V
6	9.919	43.03	PKFH	37.1	-27.1	53.03	-	-	-	-	79	273	V
	9.92	31.3	VA1T	37.1	-27.1	41.3	-	-	-	-	79	273	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

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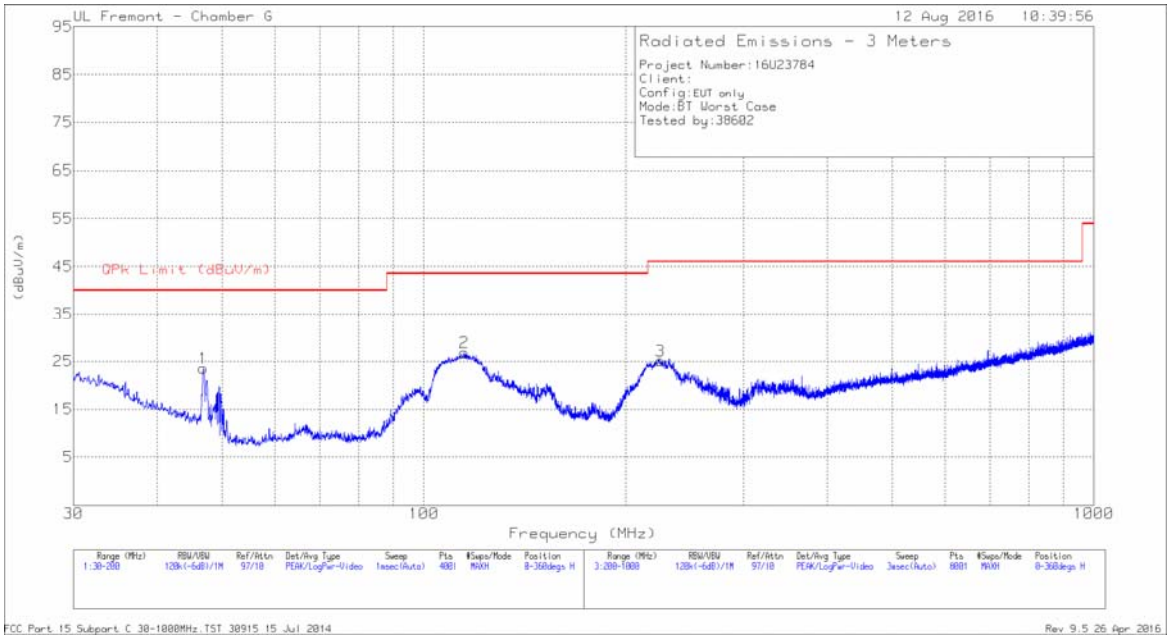
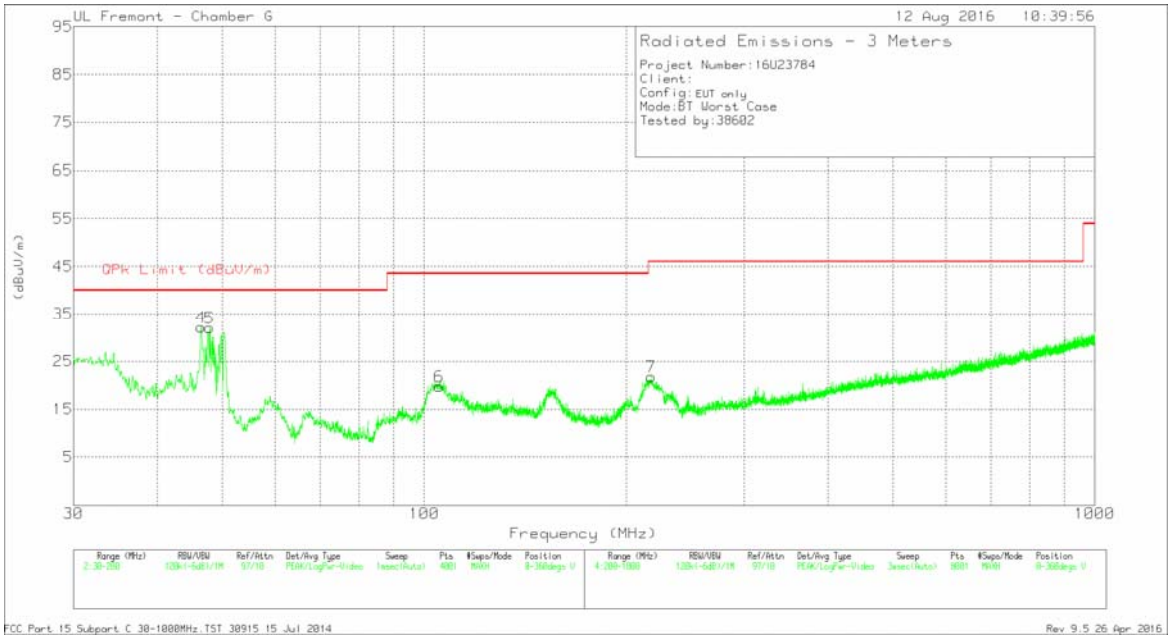
8.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T900 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	46.8938	41.34	Pk	13.2	-31	23.54	40	-16.46	0-360	300	H
2	* 114.8513	39.91	Pk	17.2	-30.3	26.81	43.52	-16.71	0-360	200	H
3	225.6	39.89	Pk	14.7	-29.5	25.09	46.02	-20.93	0-360	200	H
4	46.49	49.71	Pk	13.5	-31	32.21	40	-7.79	0-360	100	V
5	47.8925	50.44	Pk	12.6	-31	32.04	40	-7.96	0-360	100	V
6	105.1825	34.65	Pk	15.5	-30.4	19.75	43.52	-23.77	0-360	100	V
7	218	36.85	Pk	14.5	-29.5	21.85	46.02	-24.17	0-360	100	V

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

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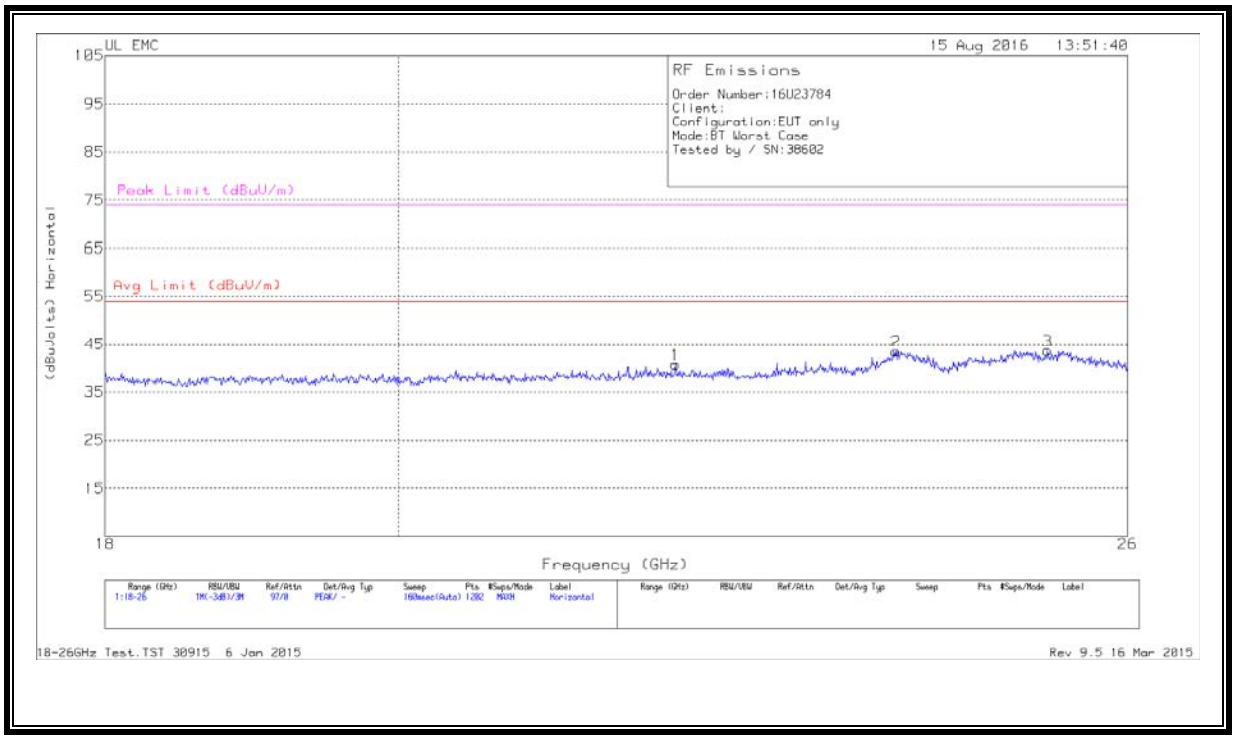
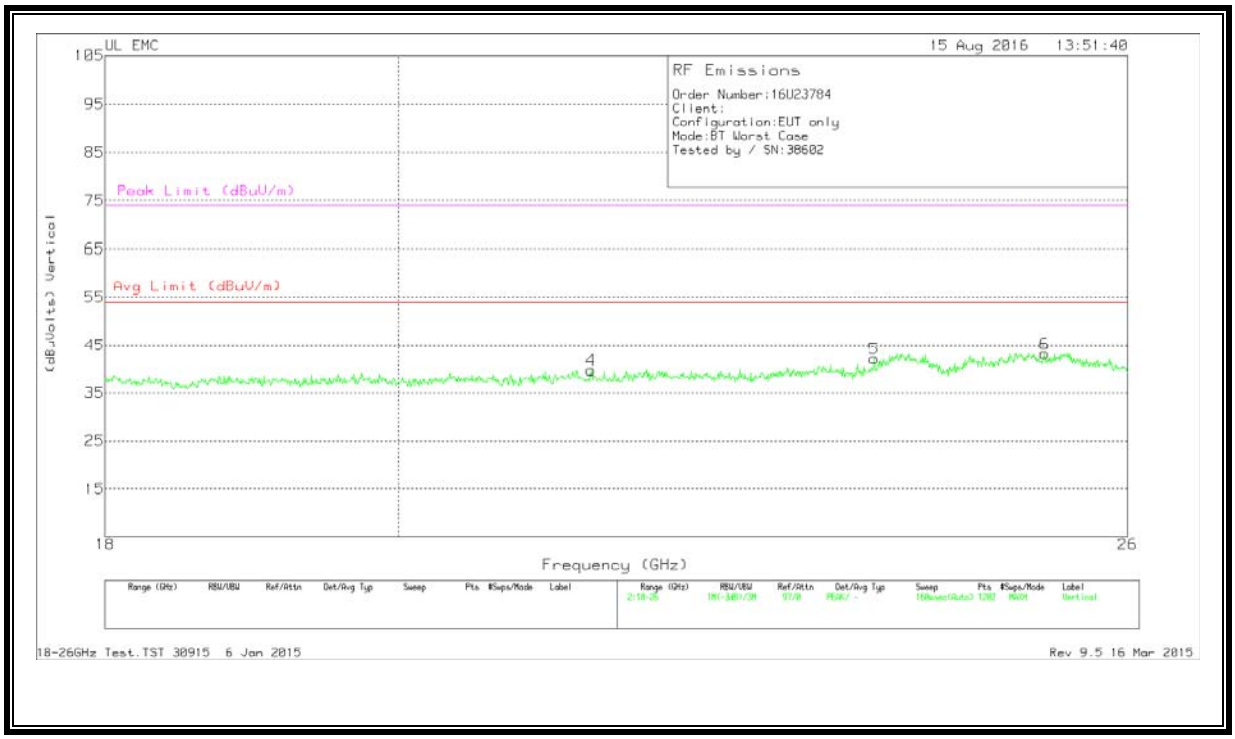
8.4. WORST-CASE ABOVE 18 GHz

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





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Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T449 (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	22.097	41.77	Pk	33.5	-25.1	-9.5	40.67	54	-13.3	74	-33.3
2	23.922	42.9	Pk	34	-23.9	-9.5	43.5	54	-10.5	74	-30.5
3	25.261	43.57	Pk	34.3	-24.7	-9.5	43.67	54	-10.3	74	-30.3
4	21.437	41.57	Pk	33.1	-25.5	-9.5	39.67	54	-14.3	74	-34.3
5	23.735	42.17	Pk	33.8	-24.3	-9.5	42.17	54	-11.8	74	-31.8
6	25.234	43.17	Pk	34.3	-24.8	-9.5	43.17	54	-10.8	74	-30.8

Pk - Peak detector

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9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

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Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN 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	37.34	Qp	0	0	10.1	47.44	64.95	-17.51	-	-
2	.17025	21.43	Ca	0	0	10.1	31.53	-	-	54.95	-23.42
3	.2535	34.29	Qp	0	0	10.1	44.39	61.64	-17.25	-	-
4	.2535	19.66	Ca	0	0	10.1	29.76	-	-	51.64	-21.88
5	.771	26.82	Qp	0	0	10.1	36.92	56	-19.08	-	-
6	.76987	20.24	Ca	0	0	10.1	30.34	-	-	46	-15.66
7	1.28513	18.63	Qp	0	.1	10.1	28.83	56	-27.17	-	-
8	1.284	11.04	Ca	0	.1	10.1	21.24	-	-	46	-24.76
9	5.24175	19.51	Qp	0	.1	10.1	29.71	60	-30.29	-	-
10	5.24175	13.04	Ca	0	.1	10.1	23.24	-	-	50	-26.76
11	18.213	17.99	Qp	0	.2	10.3	28.49	60	-31.51	-	-
12	18.22875	10.99	Ca	0	.2	10.3	21.49	-	-	50	-28.51

Qp - Quasi-Peak detector

Ca - CISPR average detection

Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN 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	38.68	Qp	0	0	10.1	48.78	64.95	-16.17	-	-
14	.17025	21.54	Ca	0	0	10.1	31.64	-	-	54.95	-23.31
15	.25575	35.24	Qp	0	0	10.1	45.34	61.57	-16.23	-	-
16	.25463	17.87	Ca	0	0	10.1	27.97	-	-	51.6	-23.63
17	.771	23.13	Qp	0	0	10.1	33.23	56	-22.77	-	-
18	.771	14.99	Ca	0	0	10.1	25.09	-	-	46	-20.91
19	1.2615	17.34	Qp	0	.1	10.1	27.54	56	-28.46	-	-
20	1.27275	7.14	Ca	0	.1	10.1	17.34	-	-	46	-28.66
21	5.24175	17.6	Qp	0	.1	10.1	27.8	60	-32.2	-	-
22	5.24175	11.47	Ca	0	.1	10.1	21.67	-	-	50	-28.33
23	18.2355	12.69	Qp	0	.2	10.3	23.19	60	-36.81	-	-
24	18.2355	4.84	Ca	0	.2	10.3	15.34	-	-	50	-34.66

Qp - Quasi-Peak detector

Ca - CISPR average detection

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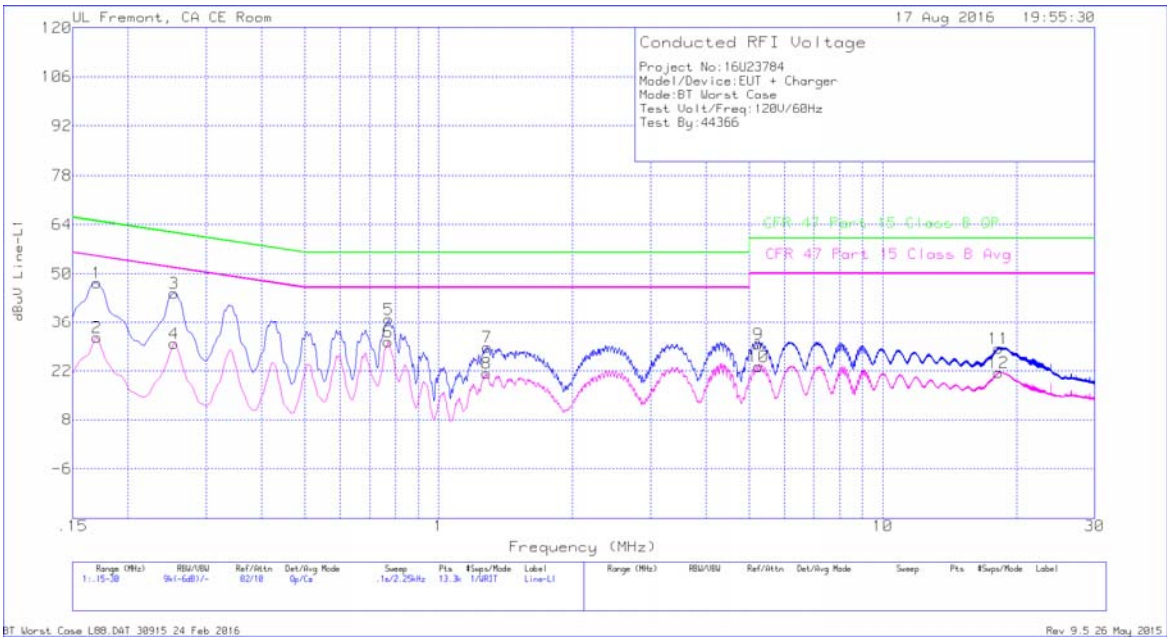
LINE 1 RESULTS



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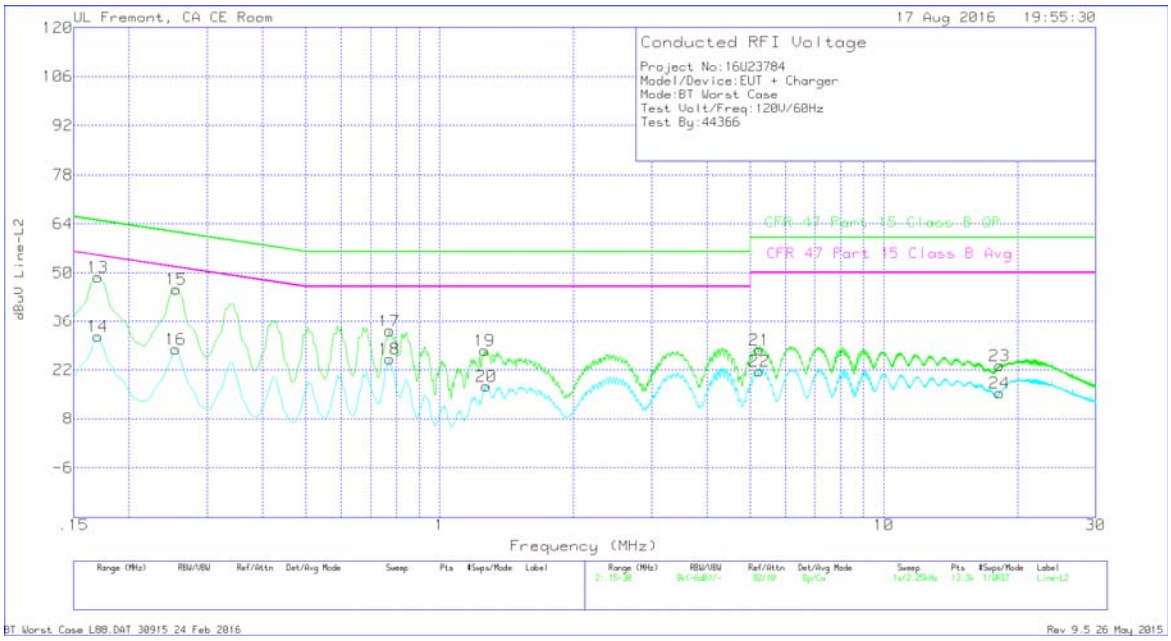
LINE 2 RESULTS



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