



CERTIFICATION TEST REPORT

Report Number. : 11633253-E1V2

Applicant : FITBIT INC.
405 HOWARD STREET, SUITE 550
SAN FRANCISCO,
CA 94105, U.S.A

Model : FB503

FCC ID : XRAFB503

IC : 8542A-FB503

EUT Description : Smart Watch

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS - 247 ISSUE 2
INDUSTRY CANADA RSS-GEN Issue 4

Date Of Issue:

May 16, 2017

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	03/27/17	Initial Issue	C. Vergonio
V2	05/16/17	Updated Section 6. Updated Section 5.5 statement. Updated Section 8.1.2 Test Procedure. Updated Section 8 Summary table. Updated Section 10 limit table.	C. Vergonio

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: FITBIT INC.
405 HOWARD STREET, SUITE 550
SAN FRANCISCO, CA 94105, U.S.A

EUT DESCRIPTION: Smart Watch

MODEL: FB503

SERIAL NUMBER: 0x00001BA532AE3029 (Radiated Sample)
0x00001B8B472E4029 (Conducted Sample)

DATE TESTED: February 13 to March 14, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	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:

Prepared By:



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WiSE Project Lead
UL VERIFICATION SERVICES INC.

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WiSE Lab 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 2.

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 checked="" type="checkbox"/>	Chamber A (IC:2324B-1)	<input type="checkbox"/>	Chamber D (IC:2324B-4)
<input type="checkbox"/>	Chamber B (IC:2324B-2)	<input type="checkbox"/>	Chamber E (IC:2324B-5)
<input type="checkbox"/>	Chamber C (IC:2324B-3)	<input type="checkbox"/>	Chamber F (IC:2324B-6)
		<input type="checkbox"/>	Chamber G (IC:2324B-7)
		<input type="checkbox"/>	Chamber H (IC:2324B-8)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Smart Watch.

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	7.21	5.26
2402 - 2480	Enhanced 8PSK	9.49	8.89

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The EUT utilizes a monopole antenna with maximum gain of -3.01dBi across operation frequency 2.4GHz band.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Tera Term Ver 4.79.
The firmware installed in the EUT during testing was Version 27.20.11.4.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated bandedge, harmonics, and spurious emissions from 1 GHz to 18GHz were performed with the EUT set to transmit at the Low/Middle/High channels with designed (target) output powers.

Radiated emission below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was 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. (1Mbps).
8PSK mode: 3-DH5 (3Mbps).

6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/DC Adapter	Lenovo	ADLX65NLC2A	11S36200283ZZ10051KU2U	NA
Laptop	Lenovo	T460	PCOC3DUA	NA
AC Adapter	ANKER	A2141	FY6422FF	NA
Test Fixture	Fitbit	Compton 4	N/A	DOC

I/O CABLES (CONDUCTED TEST)

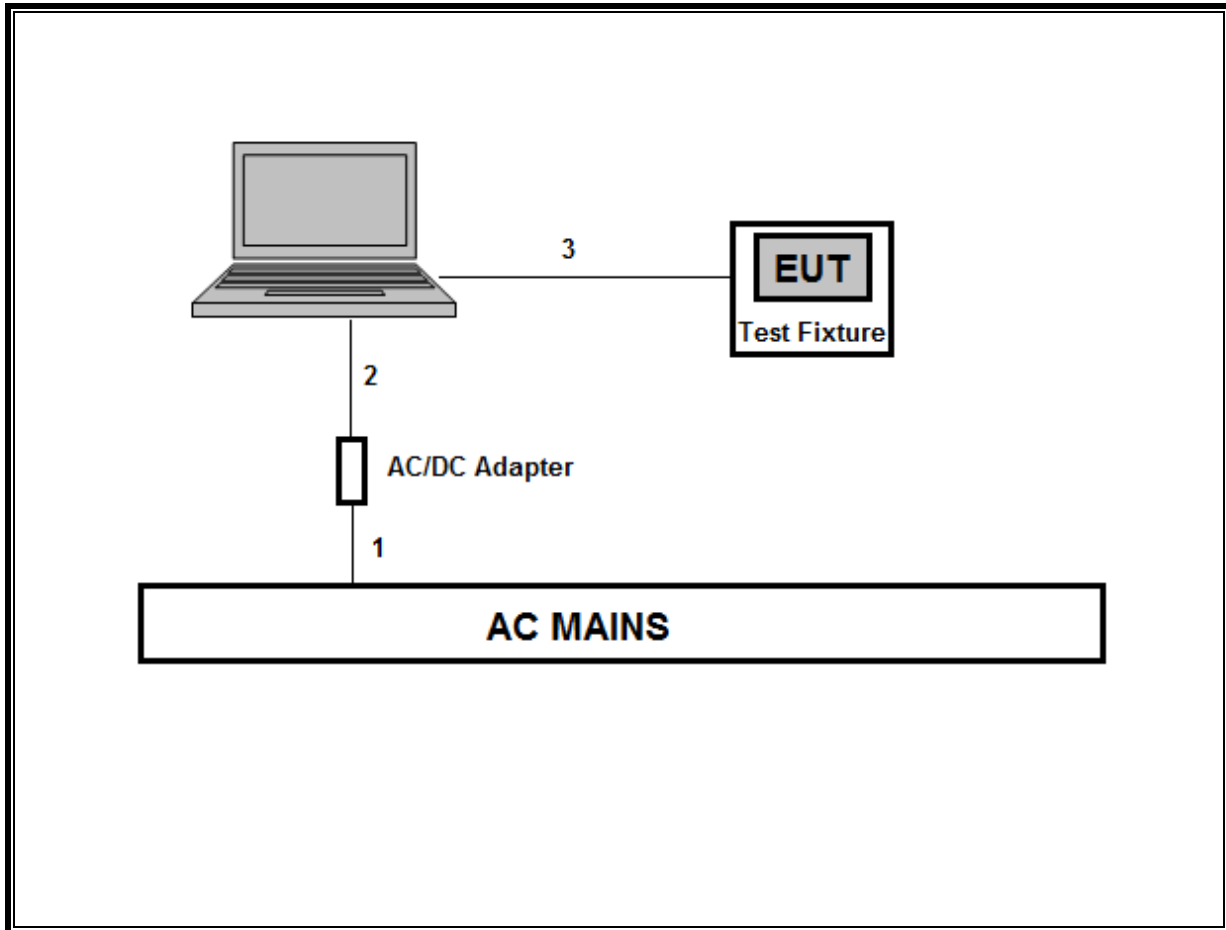
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	1	AC Mains to AC/DC Adapter
2	DC	1	DC	Unshielded	1.5	AC/DC Adapter to Laptop
3	USB	1	USB	Shielded	1	Laptop to EUT

I/O CABLES (RADIATED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Unshielded	1	EUT to AC Adapter

SETUP DIAGRAM

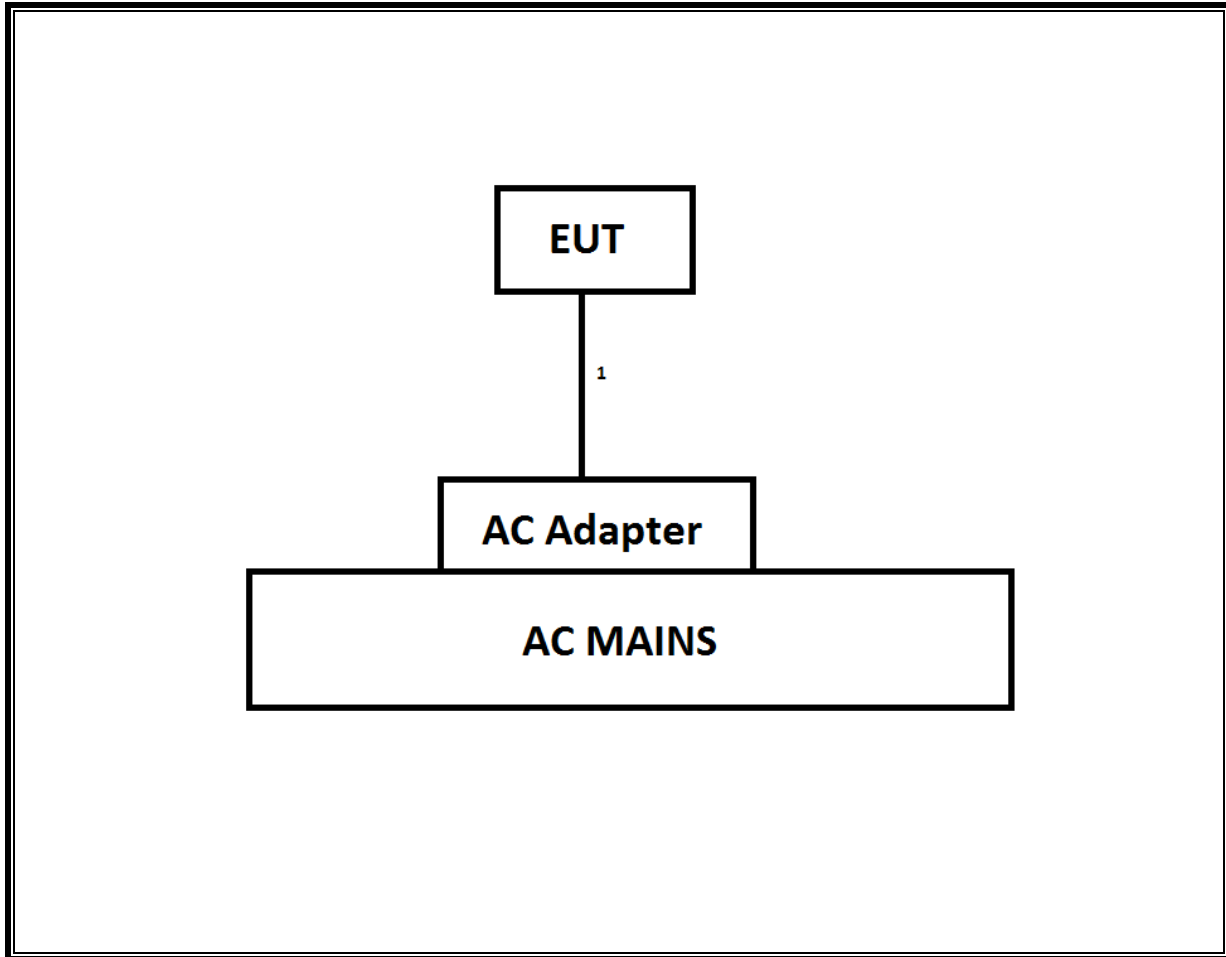
CONDUCTED



TEST SETUP

The EUT was connected to a test fixture which connected to a laptop via USB cable. Test software exercised the EUT.

RADIATED



TEST SETUP

The EUT was installed on a test fixture which connected to a laptop via USB cable to program the parameters such as modes, channels, output powers, & data rates.

After programed, the EUT was connected to an AC/DC adapter and tested without the test fixture and the laptop.

7. 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 Date	Cal Due
PSA Series Spectrum Analyzer, 3Hz - 26.5GHz	Agilent	E4440A	199	07/22/16	07/22/17
PXA Spectrum Analyzer, 3Hz to 44GHz	Agilent	N9030A	908	04/13/16	04/13/17
Horn Antenna, 18 - 26.5 GHz	Seavey Division	MWH-1826/B	449	05/26/16	05/26/17
Horn Antenna, 1-18GHz	ETS Lindgren	3117	711	01/30/17	01/30/18
Antenna, Broadband Hybrid 30MHz to 2000MHz	Sunol Sciences	JB1	130	09/23/16	09/23/17
Loop Antenna	EMCO	6502	1616	12/12/16	12/12/17
Amplifier, 1-26.5GHz	Miteq	AFS42-00101800-25-S-42	1165	08/01/16	08/01/17
Amplifier, 1 to 8GHz	Miteq	AMF-4D-01000800-30-29P	1170	04/28/16	04/28/17
Amplifier, 10KHz to 1GHz, 32dB	Keysight	8447D	300	11/10/16	11/10/17
P-Series Power Meter	Keysight	N1911A	1264	07/08/16	07/08/17
Wideband Power Sensor 50MHz - 18GHz	Agilent	N1921A	1224	03/22/16	03/22/17
EMI Receiver	Rohde & Schwarz	ESR-EMI	1436	12/19/16	12/19/17
LISN	FISCHER	FCC-LISN-50/250-25-2-01	1310	06/08/16	06/08/17

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, Apr 26, 2016
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Antenna Port Software	UL	UL RF	Ver 5.1.1, July 15, 2016

NOTE: *testing is completed before equipment calibration expiration date.

8. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049	RSS-GEN 4.6	Occupied Band width (99%)	N/A	Conducted	Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247 (b)(1)	RSS-247 5.4.2	TX conducted output power	<21dBm		Pass
15.247 (a)(1)	RSS-247 5.1.2	Hopping frequency separation	> 25KHz		Pass
15.247 (a)(1)(iii)	RSS-247 5.1.4	Number of Hopping channels	More than 15 non-overlapping channels		Pass
15.247 (a)(1)(iii)	RSS-247 5.1.4	Avg Time of Occupancy	< 0.4sec		Pass
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass
15.205, 15.209	RSS-GEN 8.9/7	Radiated Spurious Emission	< 54dBuV/m		Pass

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

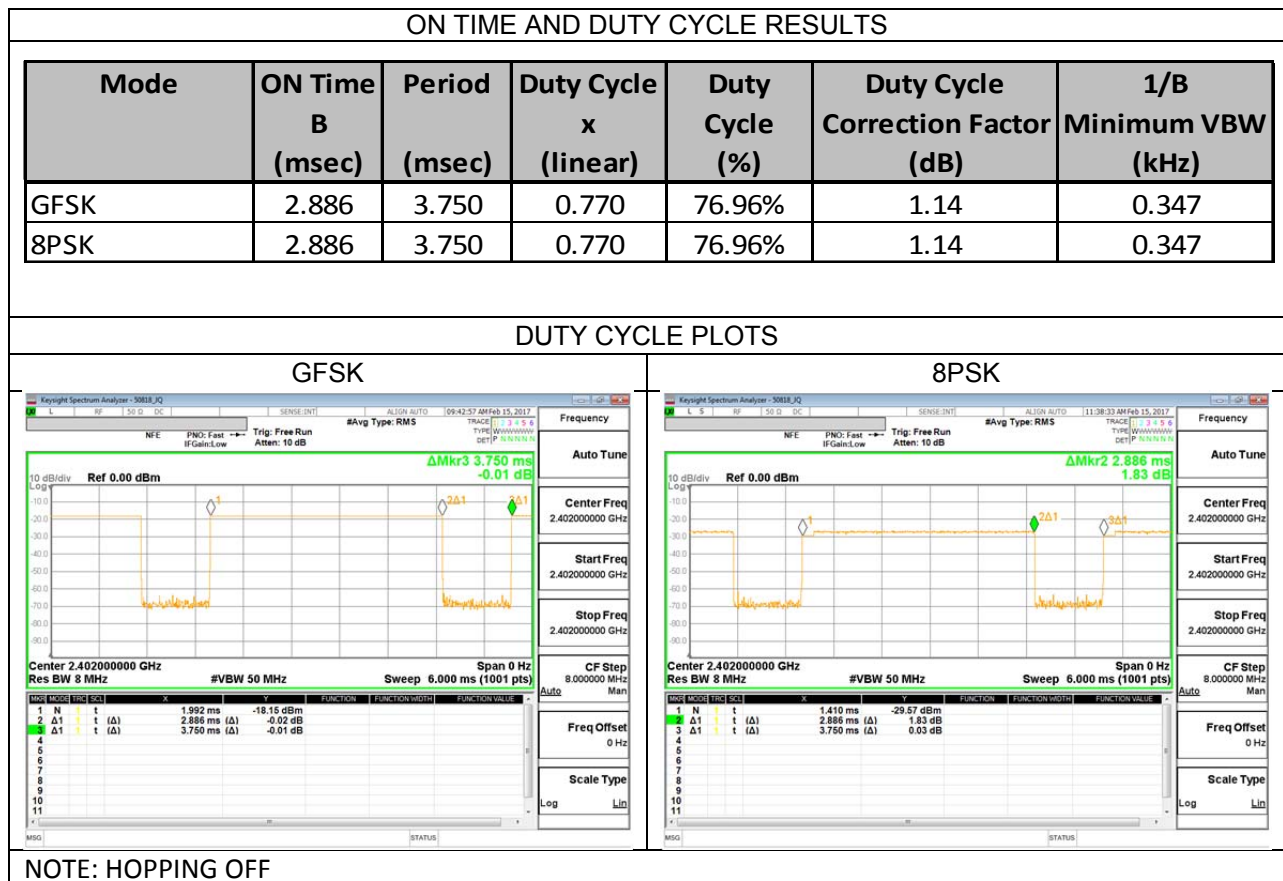
9.1.1. LIMITS

None; for reporting purposes only.

9.1.2. TEST PROCEDURE

The EUT is configured in accordance with ANSI C63.4: 2010.

9.1.3. ON TIME AND DUTY CYCLE RESULTS



9.2. BASIC DATA RATE GFSK MODULATION

9.2.1. 20 dB AND 99% BANDWIDTH

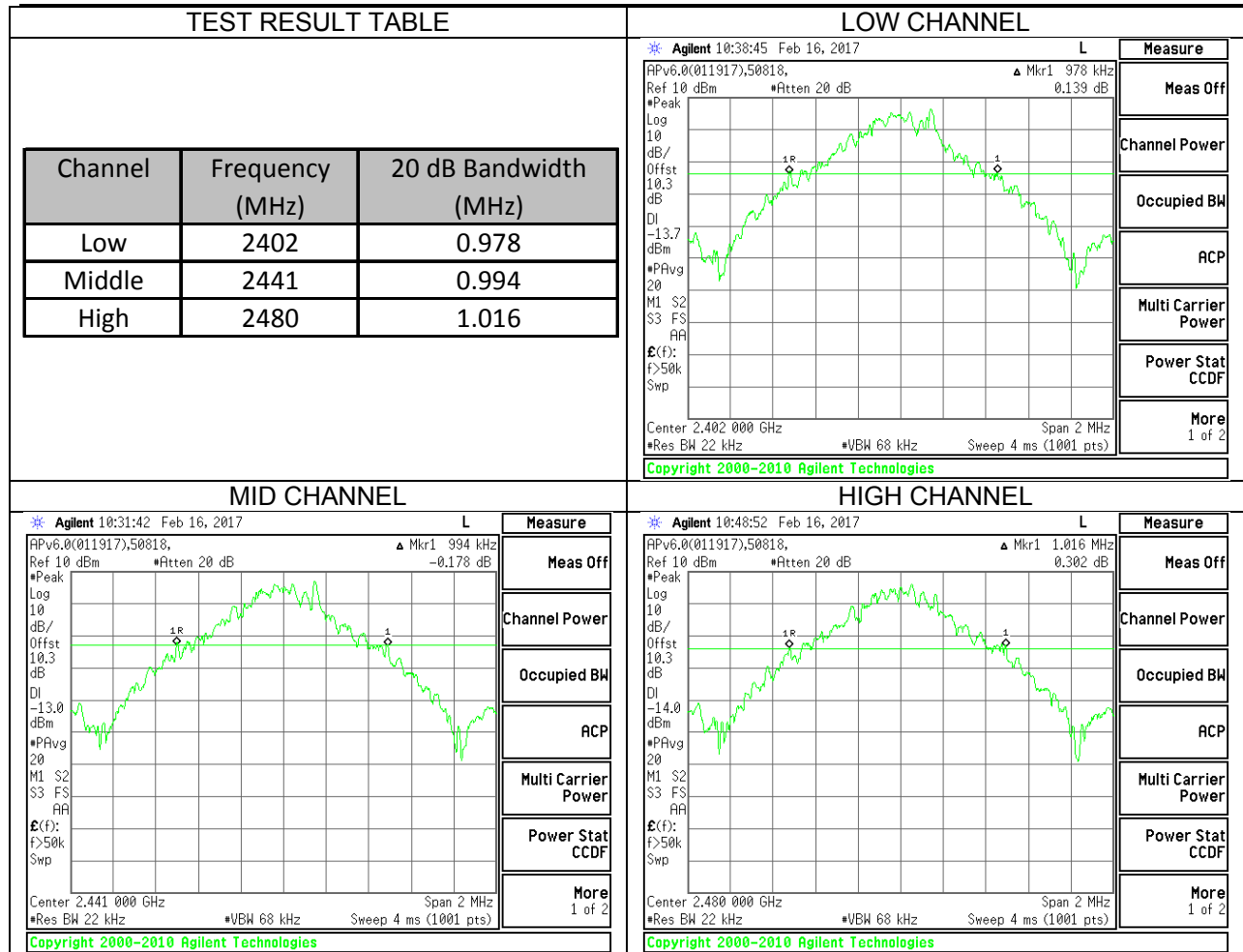
LIMITS

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



TEST RESULT TABLE			LOW CHANNEL		
Channel	Frequency (MHz)	99% Bandwidth (MHz)	<p>Agilent 10:39:54 Feb 16, 2017 L</p> <p>Ch Freq 2.402 GHz Trig Free</p> <p>Occupied Bandwidth Averages: 20</p> <p>APv6.0(011917),50018, Ref 10 dBm *Atten 20 dB</p> <p>*Samp Log 10 dB/Offst 10.3 dB</p> <p>Center 2.402 000 GHz Span 2 MHz *Res BW 30 kHz *VBW 91 kHz *Sweep 100 ms (1001 pts)</p> <p>Occupied Bandwidth 903.4802 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -17.180 kHz x dB Bandwidth 901.727 kHz*</p> <p>Copyright 2000-2010 Agilent Technologies</p>		
Low	2402	0.903	Measure	Meas Off	Channel Power
Middle	2441	0.891	Occupied BW	ACP	Multi Carrier Power
High	2480	0.900	Power Stat CCDF	More 1 of 2	
			MID CHANNEL		
			<p>Agilent 10:32:25 Feb 16, 2017 L</p> <p>Ch Freq 2.441 GHz Trig Free</p> <p>Occupied Bandwidth Averages: 20</p> <p>APv6.0(011917),50018, Ref 10 dBm *Atten 20 dB</p> <p>*Samp Log 10 dB/Offst 10.3 dB</p> <p>Center 2.441 000 GHz Span 2 MHz *Res BW 30 kHz *VBW 91 kHz *Sweep 100 ms (1001 pts)</p> <p>Occupied Bandwidth 891.0004 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -14.967 kHz x dB Bandwidth 915.769 kHz*</p> <p>Copyright 2000-2010 Agilent Technologies</p>		
			Measure	Meas Off	Channel Power
			Occupied BW	ACP	Multi Carrier Power
			Power Stat CCDF	More 1 of 2	
			HIGH CHANNEL		
			<p>Agilent 10:51:24 Feb 16, 2017 L</p> <p>Ch Freq 2.48 GHz Trig Free</p> <p>Occupied Bandwidth Averages: 20</p> <p>APv6.0(011917),50018, Ref 10 dBm *Atten 20 dB</p> <p>*Samp Log 10 dB/Offst 10.3 dB</p> <p>Center 2.480 000 GHz Span 2 MHz *Res BW 30 kHz *VBW 91 kHz *Sweep 100 ms (1001 pts)</p> <p>Occupied Bandwidth 899.8933 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -8.983 kHz x dB Bandwidth 909.584 kHz*</p> <p>Copyright 2000-2010 Agilent Technologies</p>		
			Measure	Meas Off	Channel Power
			Occupied BW	ACP	Multi Carrier Power
			Power Stat CCDF	More 1 of 2	

9.2.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (b)

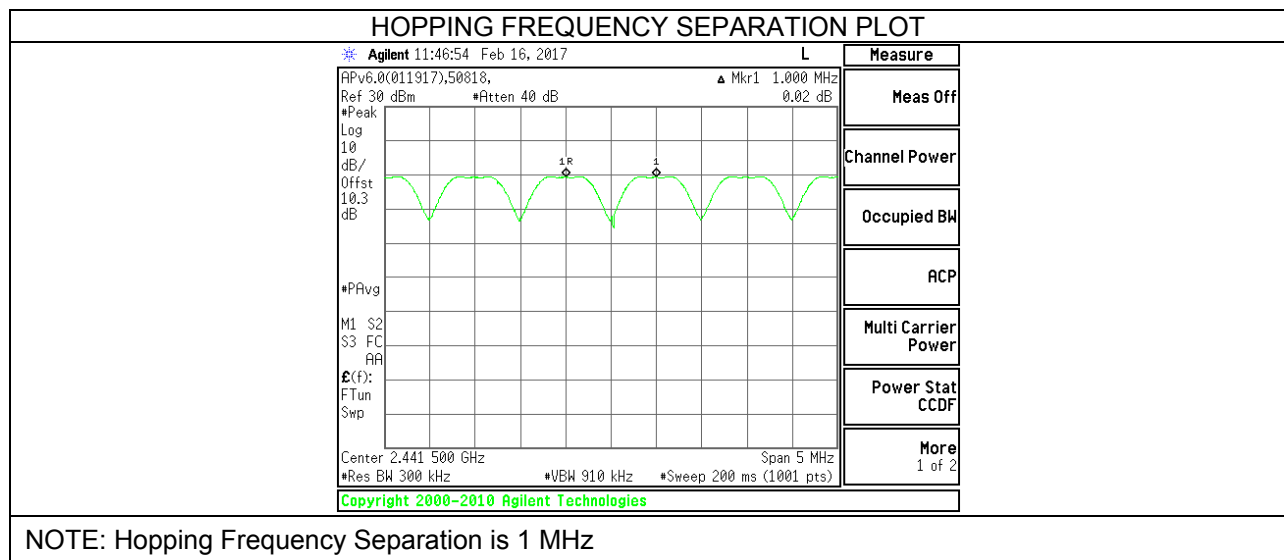
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

TEST PROCEDURE

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

RESULTS



9.2.3. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (d)

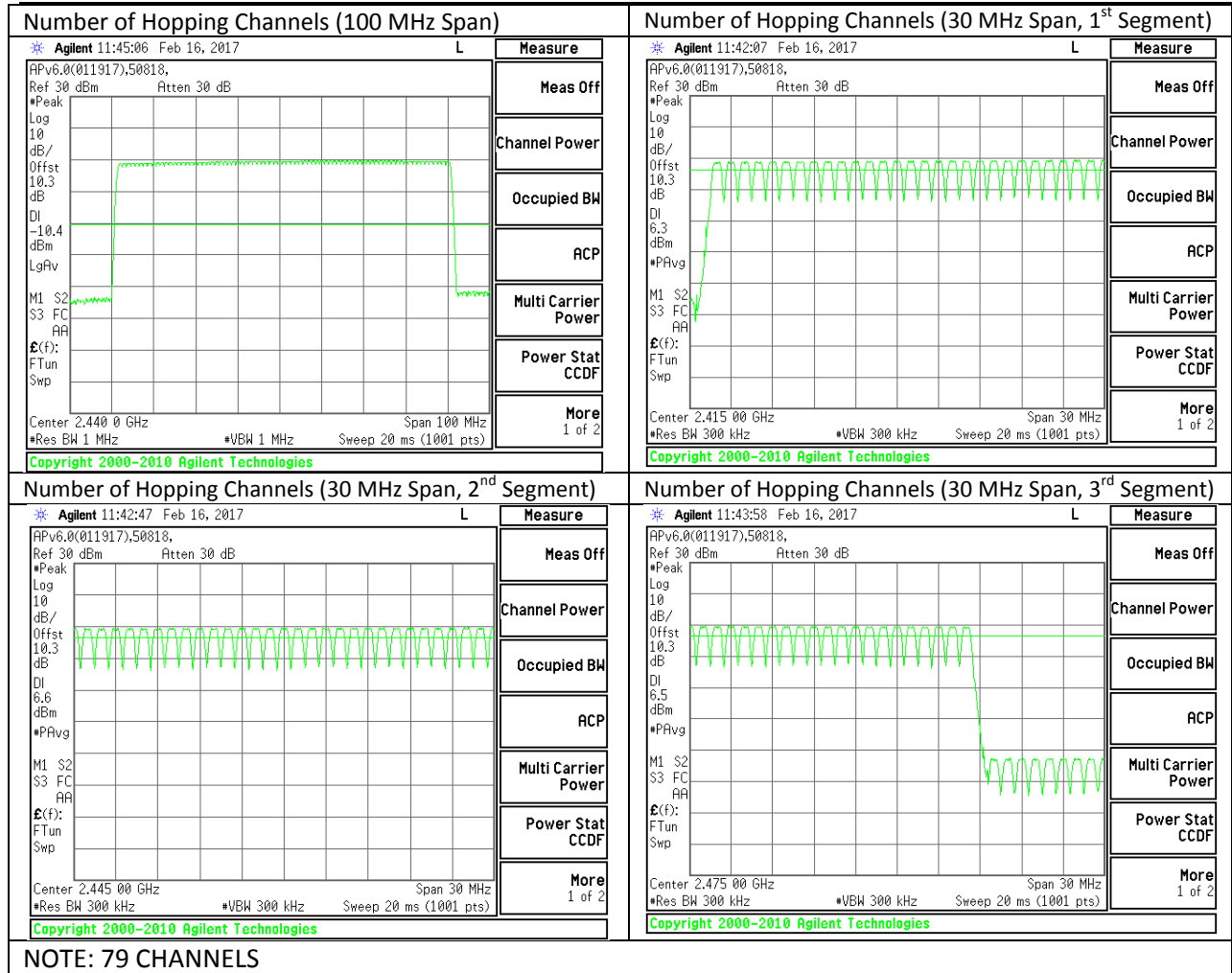
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

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

RESULTS

Normal Mode: 79 Channels observed.



NOTE: 79 CHANNELS

9.2.4. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (d)

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

TEST PROCEDURE

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

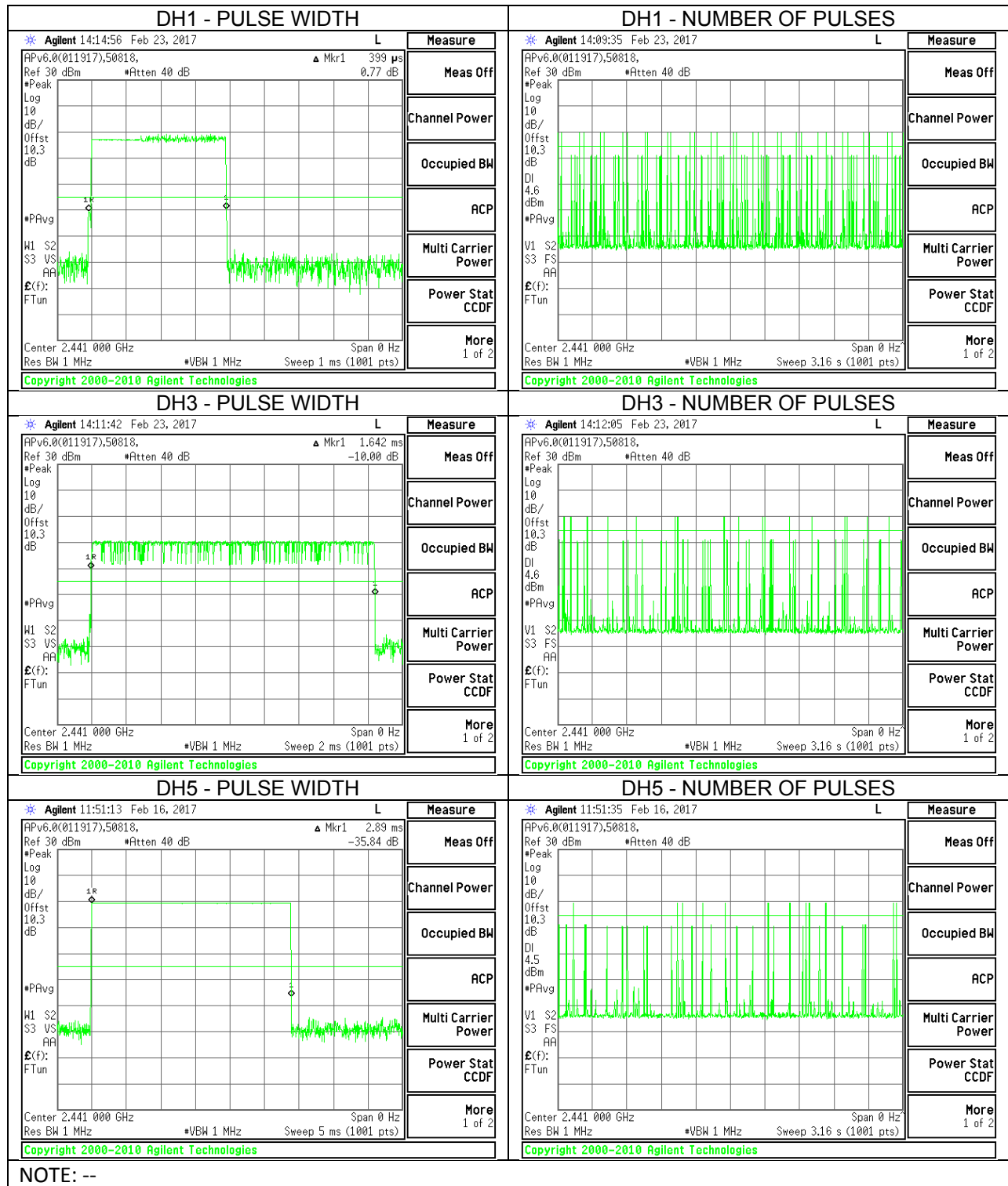
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

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

RESULTS

AVERAGE TIME OF OCCUPANCY						
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	0.399	33	0.1317	0.4	-0.2683	
DH3	1.642	17	0.2791	0.4	-0.1209	
DH5	2.890	12	0.3468	0.4	-0.0532	
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)	
GFSK AFH Mode						
DH1	0.399	8.25	0.03292	0.4	-0.3671	
DH3	1.642	4.25	0.06979	0.4	-0.3302	
DH5	2.890	3	0.08670	0.4	-0.3133	
NOTE: --						

Pulse Width and Number of Pulses in 3.16 Seconds Period Plots



NOTE: --

9.2.5. OUTPUT POWER

LIMITS

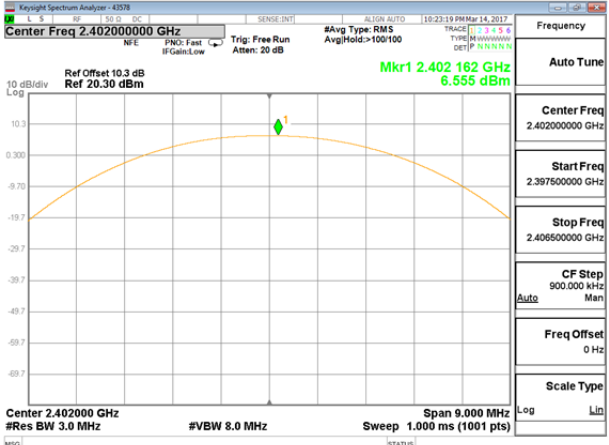
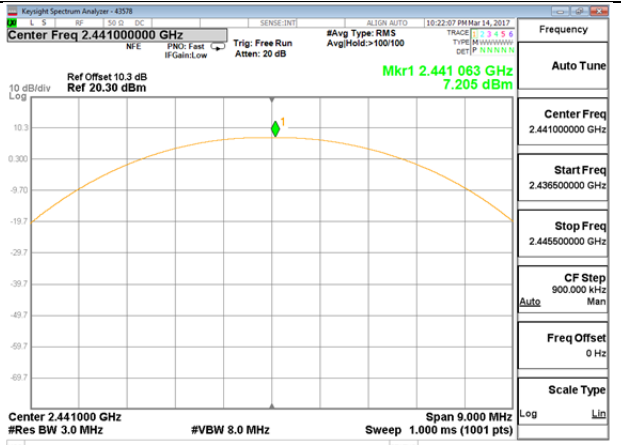
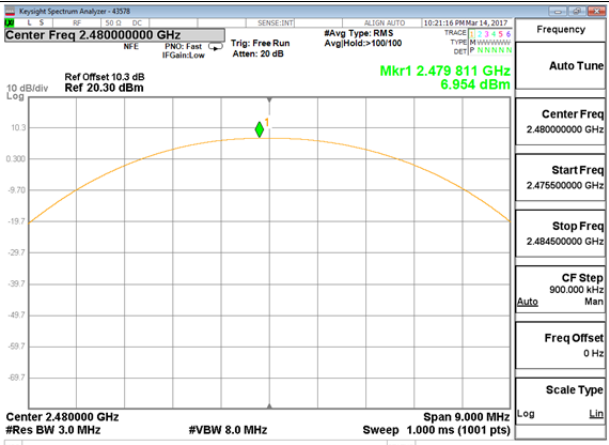
§15.247 (b) (1)

RSS-247 (5.4) (b)

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

TEST RESULT TABLE					LOW CHANNEL	
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)		
Low	2402	6.56	30	-23.45		
Middle	2441	7.21	30	-22.80		
High	2480	6.95	30	-23.05		
						
						
NOTE:						

9.2.6. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

TEST ENGINEER ID:	50818	Date:	02/14/17
--------------------------	-------	--------------	----------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.10
Middle	2441	6.70
High	2480	6.40

9.2.7. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

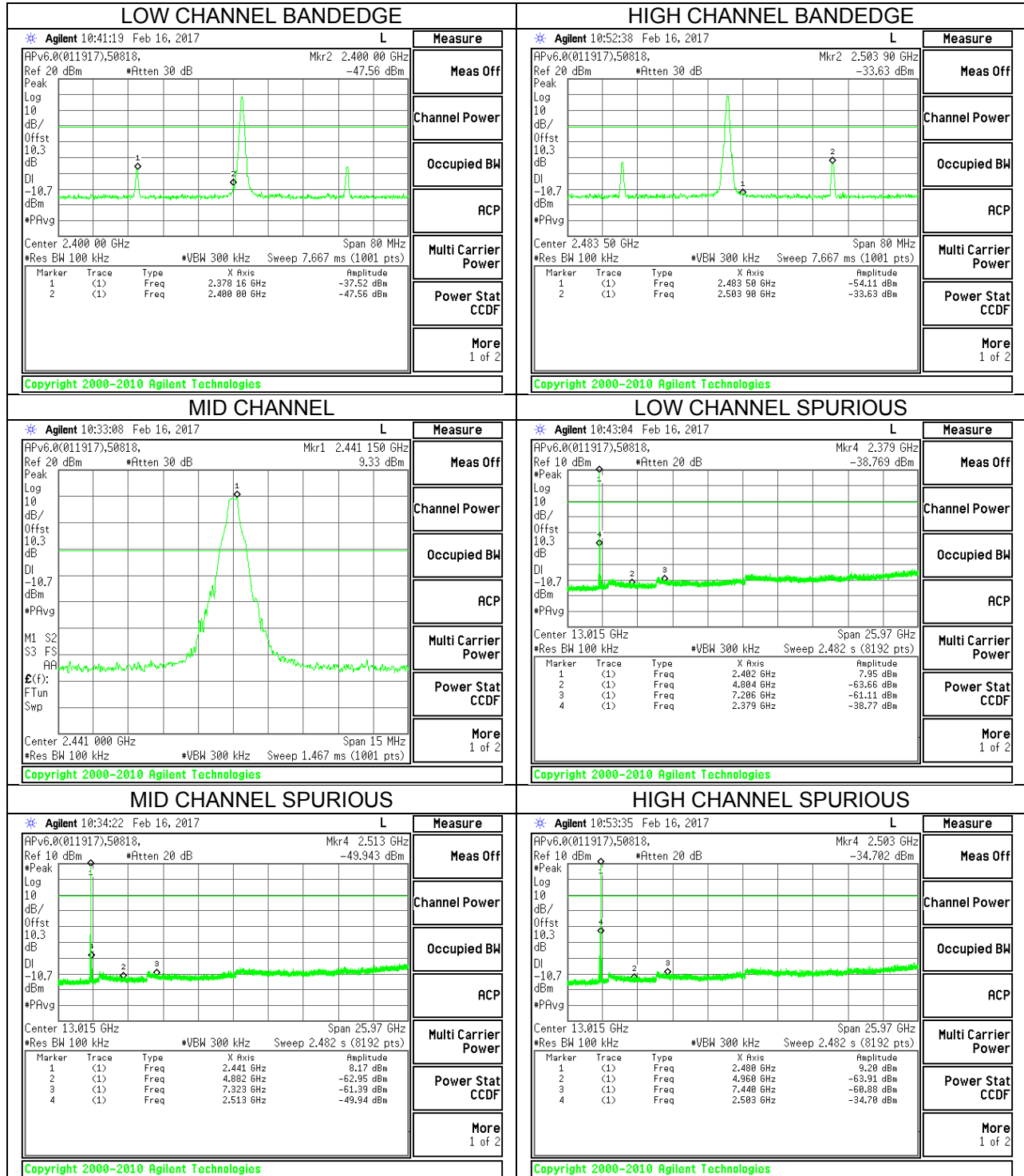
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

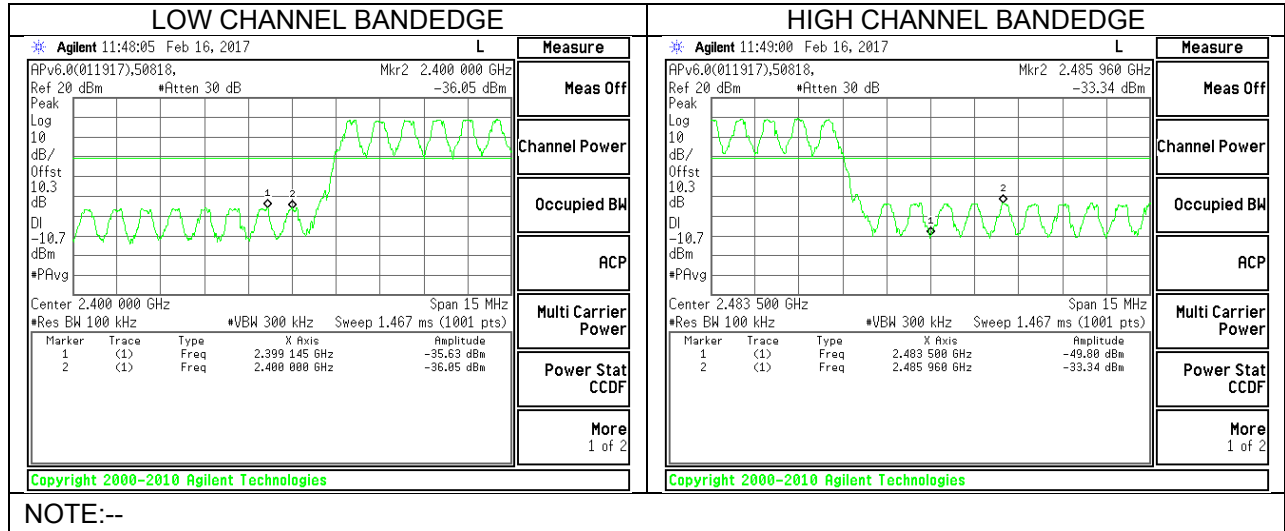
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

BANDEGE AND SPURIOUS EMISSIONS PLOTS



9.2.8. BASIC DATA RATE GFSK MODULATION HOPPING MODE



9.3. ENHANCED DATA RATE 8PSK MODULATION

9.3.1. 20 dB AND 99% BANDWIDTH

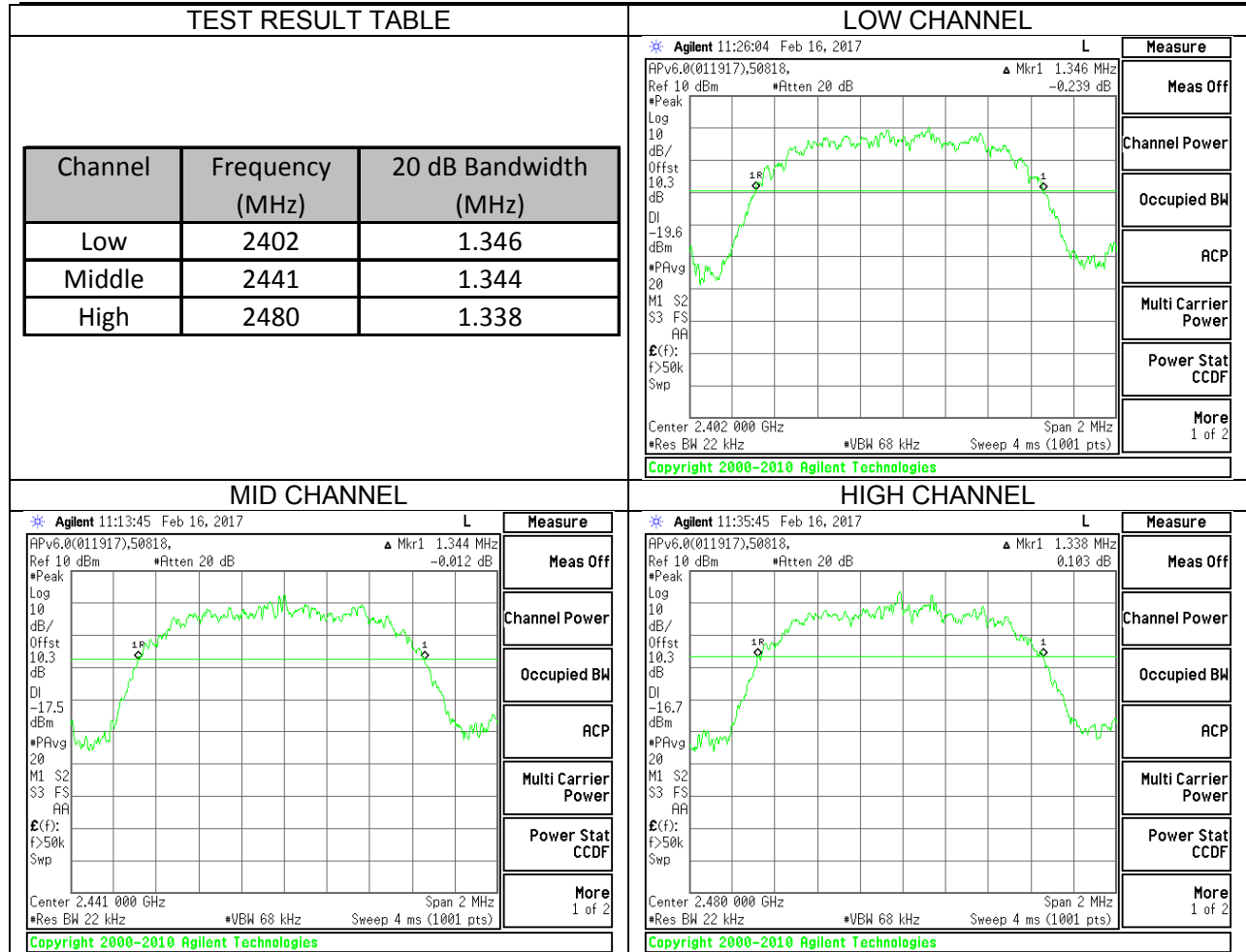
LIMITS

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



TEST RESULT TABLE			LOW CHANNEL																																													
Channel	Frequency (MHz)	99% Bandwidth (MHz)	<table border="1"> <tr> <td>Ch Freq</td> <td>2.402 GHz</td> <td>Trig</td> <td>Free</td> </tr> <tr> <td>Occupied Bandwidth</td> <td colspan="3">Averages: 20</td> </tr> <tr> <td colspan="4">APv6.0(011917),50018, Ref 10 dBm #Atten 20 dB</td> </tr> <tr> <td colspan="4">*Samp Log 10 dB/Offst 10.3 dB</td> </tr> <tr> <td colspan="4">Center 2.402 000 GHz Span 5 MHz</td> </tr> <tr> <td colspan="4">*Res BW 30 kHz *VBW 91 kHz *Sweep 100 ms (1001 pts)</td> </tr> <tr> <td>Occupied Bandwidth</td> <td>1.2095 MHz</td> <td>Occ BW % Pwr</td> <td>99.00 %</td> </tr> <tr> <td></td> <td></td> <td>x dB</td> <td>-20.00 dB</td> </tr> <tr> <td>Transmit Freq Error</td> <td colspan="3">-20.025 kHz</td> </tr> <tr> <td>x dB Bandwidth</td> <td colspan="3">1.320 MHz*</td> </tr> <tr> <td colspan="4">Copyright 2000-2010 Agilent Technologies</td> </tr> </table>		Ch Freq	2.402 GHz	Trig	Free	Occupied Bandwidth	Averages: 20			APv6.0(011917),50018, Ref 10 dBm #Atten 20 dB				*Samp Log 10 dB/Offst 10.3 dB				Center 2.402 000 GHz Span 5 MHz				*Res BW 30 kHz *VBW 91 kHz *Sweep 100 ms (1001 pts)				Occupied Bandwidth	1.2095 MHz	Occ BW % Pwr	99.00 %			x dB	-20.00 dB	Transmit Freq Error	-20.025 kHz			x dB Bandwidth	1.320 MHz*			Copyright 2000-2010 Agilent Technologies			
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Copyright 2000-2010 Agilent Technologies																																																
Low	2402	1.2095	Measure	Meas Off																																												
Middle	2441	1.2207	Channel Power	Channel Power																																												
High	2480	1.2193	Occupied BW	Occupied BW																																												
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			More	More																																												
			1 of 2	1 of 2																																												

9.3.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (b)

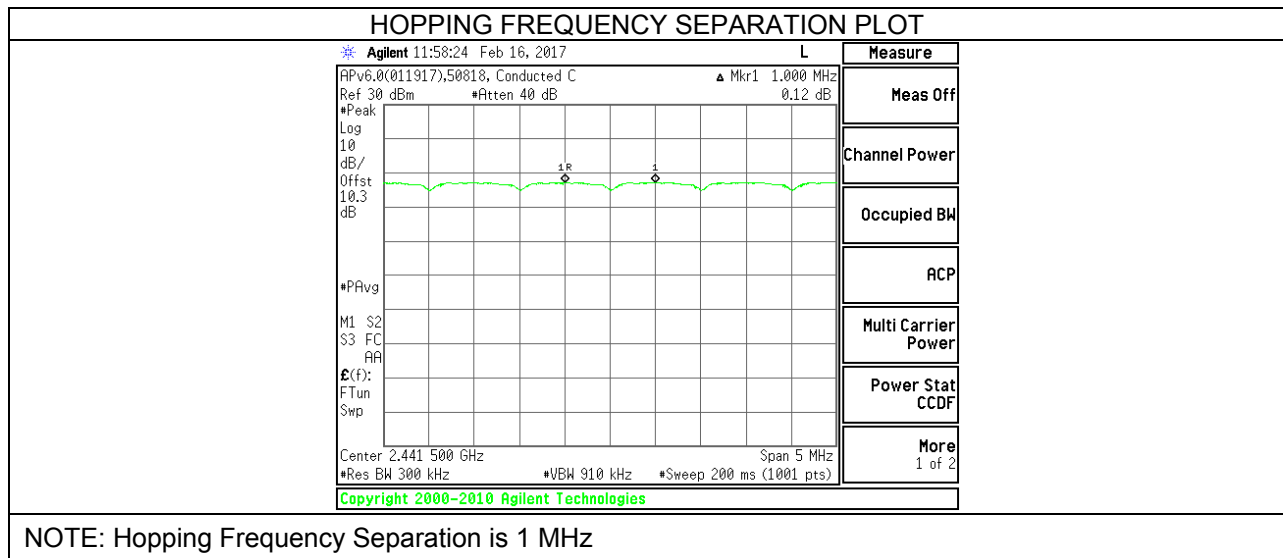
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

TEST PROCEDURE

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

RESULTS



9.3.3. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (d)

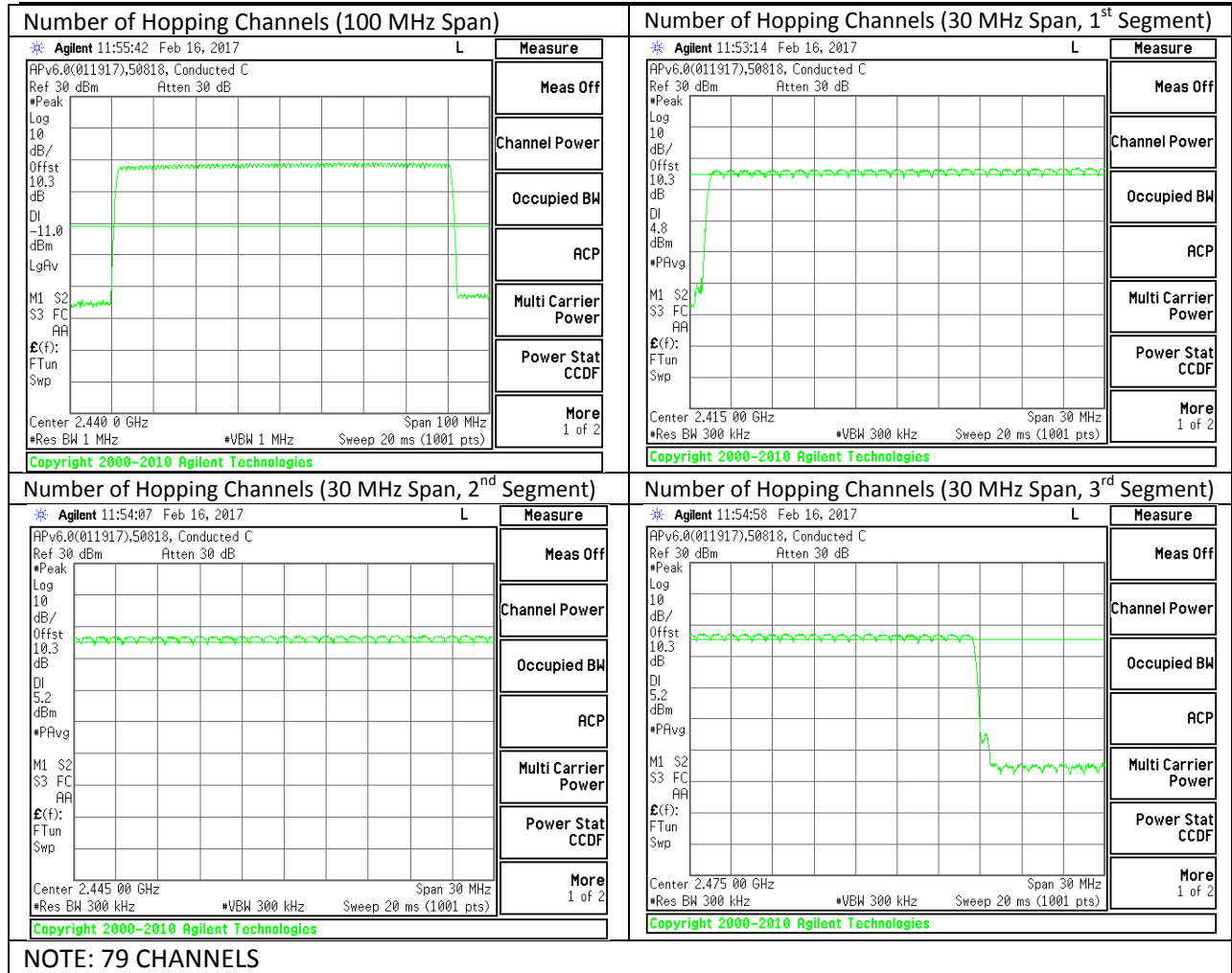
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

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

RESULTS

Normal Mode: 79 Channels observed.



NOTE: 79 CHANNELS

9.3.4. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (d)

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

TEST PROCEDURE

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

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

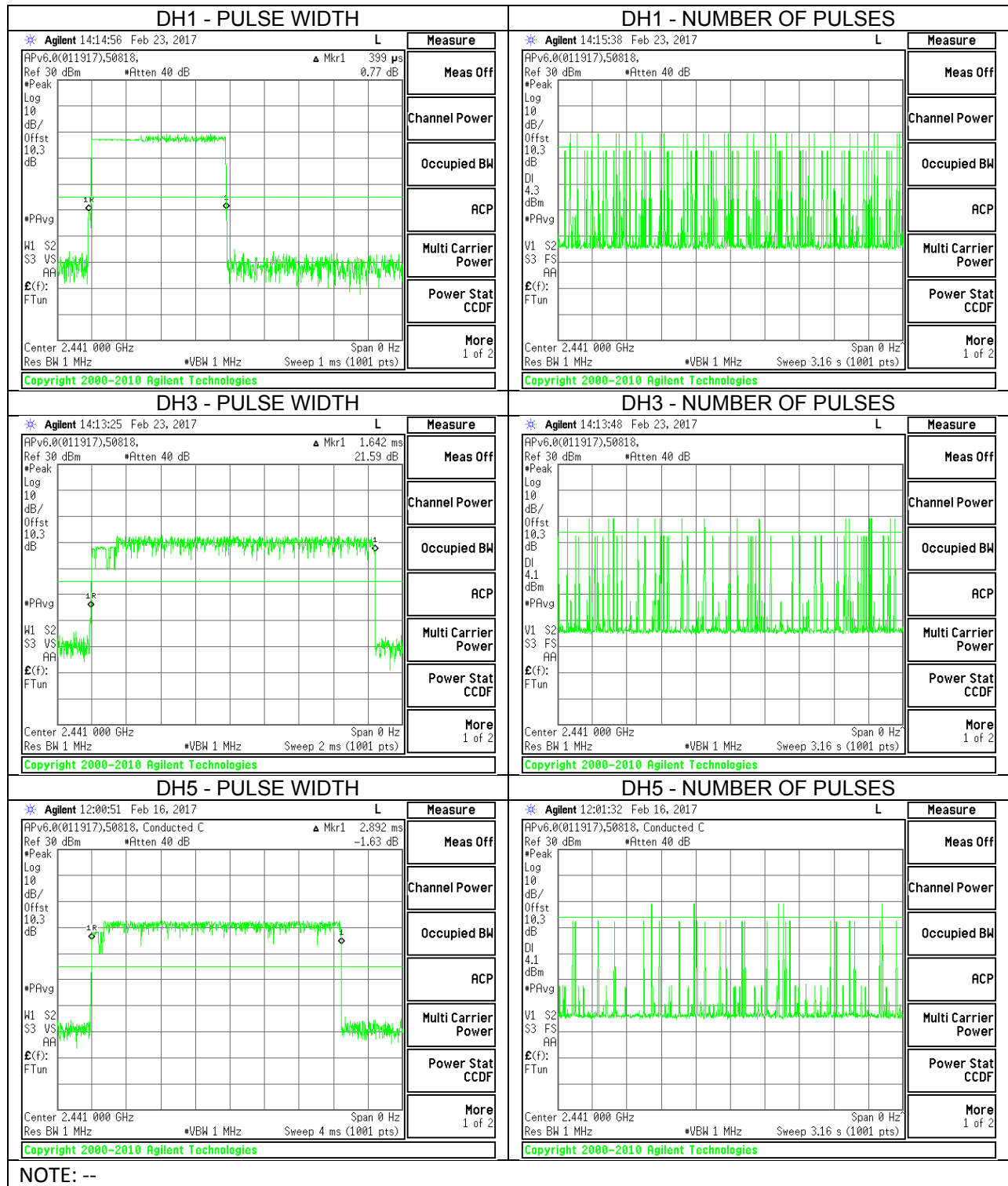
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{ pulse width}$.

RESULTS

AVERAGE TIME OF OCCUPANCY					
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.399	32	0.1277	0.4	-0.2723
DH3	1.642	17	0.2791	0.4	-0.1209
DH5	2.892	5	0.1446	0.4	-0.2554
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK AFH Mode					
DH1	0.399	8	0.03192	0.4	-0.3681
DH3	1.642	4.25	0.06979	0.4	-0.3302
DH5	2.892	1.25	0.03615	0.4	-0.3639

NOTE: --

Pulse Width and Number of Pulses in 3.16 Seconds Period Plots



NOTE: --

9.3.5. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

TEST RESULT TABLE					LOW CHANNEL	
					* Agilent 15:33:09 Feb 13, 2017 AFV6.0(011917),50818, Conducted C Ref 30 dBm #Atten 40 dB Mkr1 2.401 910 GHz 8.73 dBm Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF More 1 cl 2 Copyright 2000-2010 Agilent Technologies	
Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margi n (dB)		
Low	2402	8.73	30	-21.27		
Middle	2441	9.49	30	-20.51		
High	2480	9.31	30	-20.69		
MID CHANNEL					HIGH CHANNEL	
					* Agilent 15:33:55 Feb 13, 2017 AFV6.0(011917),50818, Conducted C Ref 30 dBm #Atten 40 dB Mkr1 2.441 135 GHz 9.49 dBm Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF More 1 cl 2 Copyright 2000-2010 Agilent Technologies	
					* Agilent 15:34:30 Feb 13, 2017 AFV6.0(011917),50818, Conducted C Ref 30 dBm #Atten 40 dB Mkr1 2.479 928 GHz 9.31 dBm Peak Search Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search Mkr © CF More 1 cl 2 Copyright 2000-2010 Agilent Technologies	
NOTE:						

9.3.6. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

TEST ENGINEER ID:	50818	Date:	02/23/17
--------------------------	-------	--------------	----------

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.9
Middle	2441	6.8
High	2480	7.0

9.3.7. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 (5.5)

Limit = -20 dBc

TEST PROCEDURE

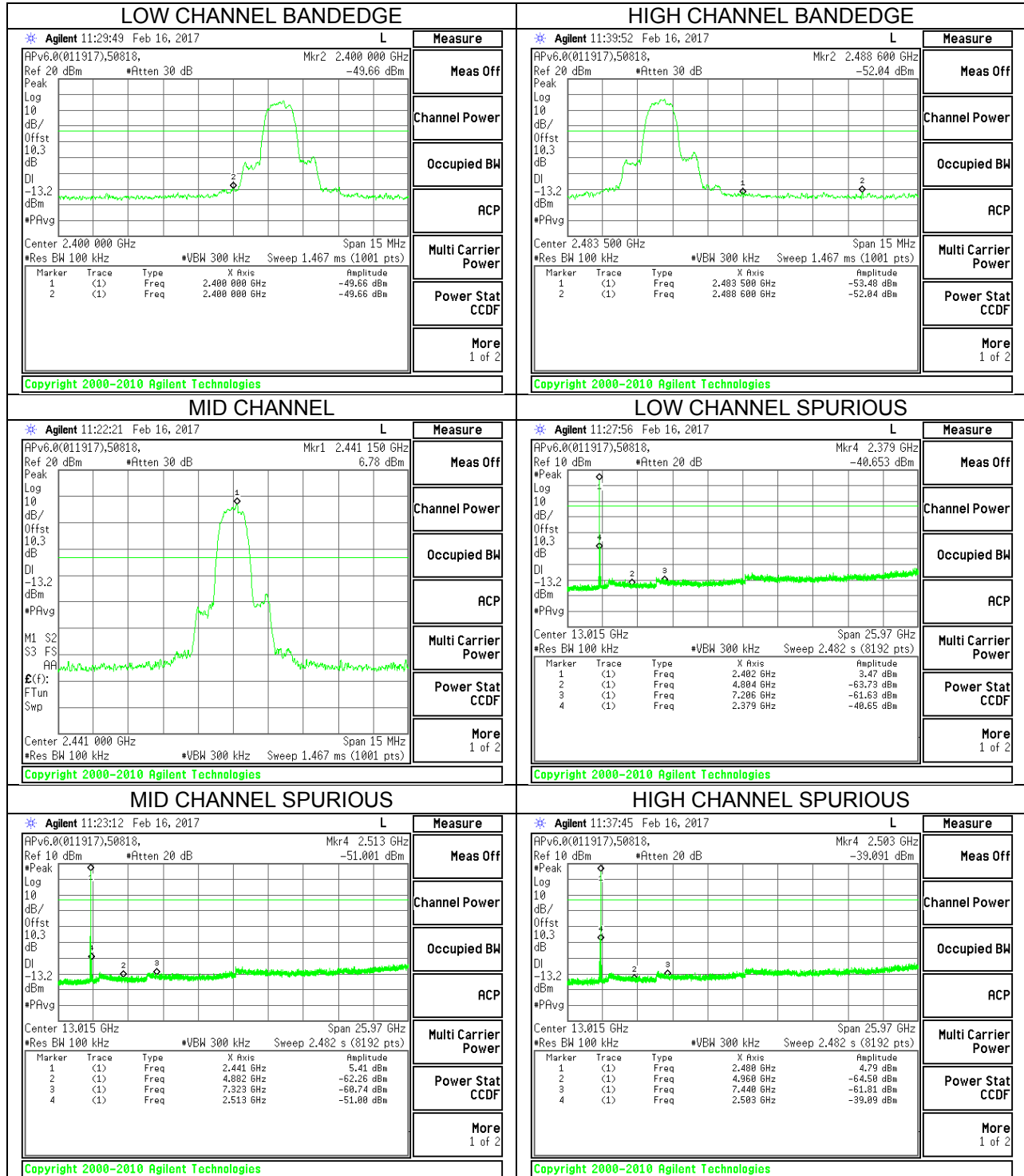
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

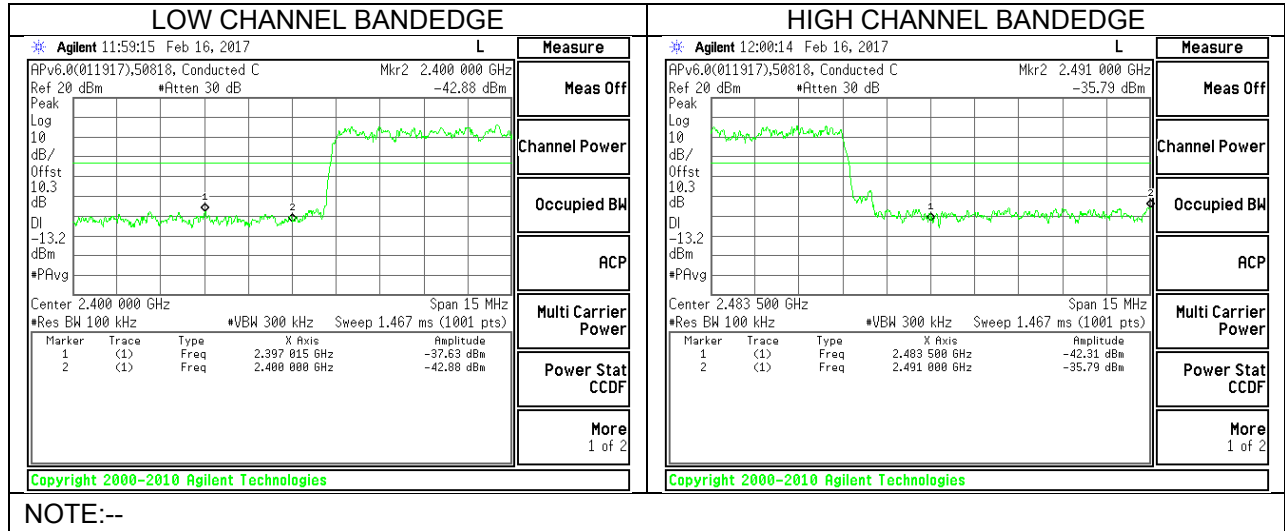
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

BANDEGE AND SPURIOUS EMISSIONS PLOTS



9.3.8. BASIC DATA RATE 8PSK MODULATION HOPPING MODE



10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

IC RSS-GEN Clause 7.1.2 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009 – 0.490	2400/F (kHz)	2400/F (kHz)
0.490 – 1.705	24000/F (kHz)	24000/F (kHz)
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; the video bandwidth is set to 3 MHz for peak measurements and 1/Ton for average measurements. Please refer to test report section 7.1.3 for duty cycle factor information. Note: The pre-scan measurements above 1GHz the VBW is set to 30 kHz.

The spectrum from 9 kHz 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.

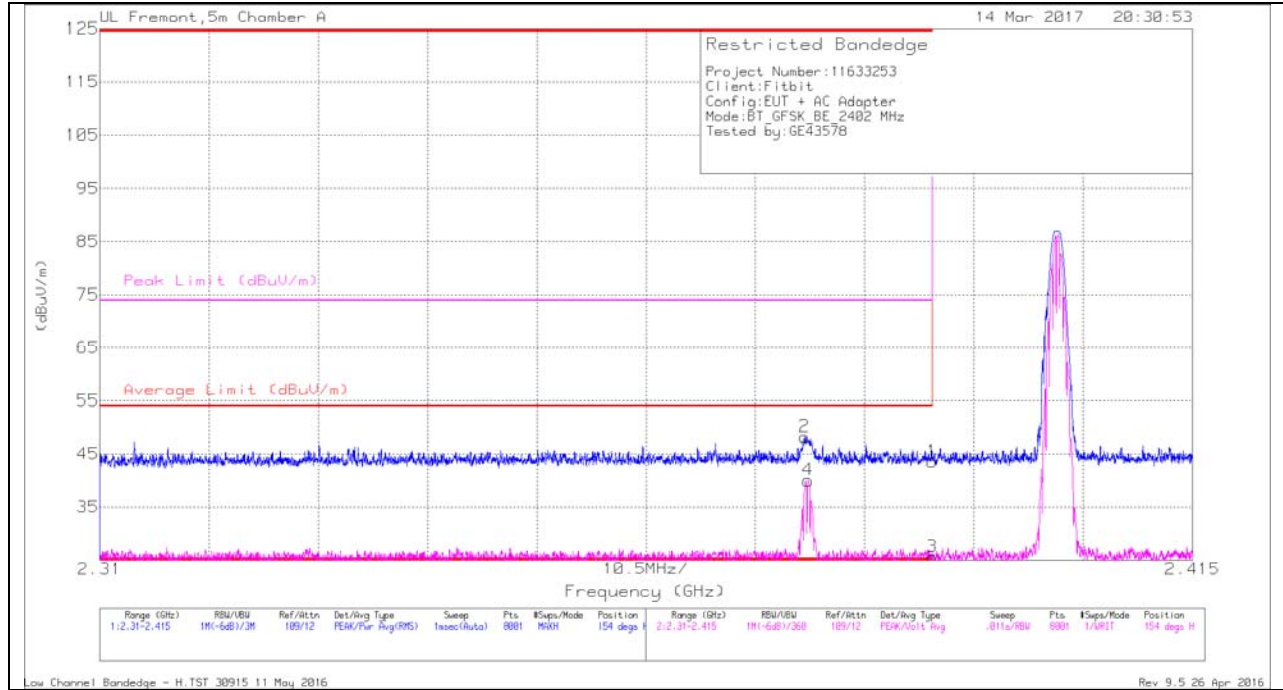
RESULTS

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK PLOT



HORIZONTAL DATA

Trace Markers

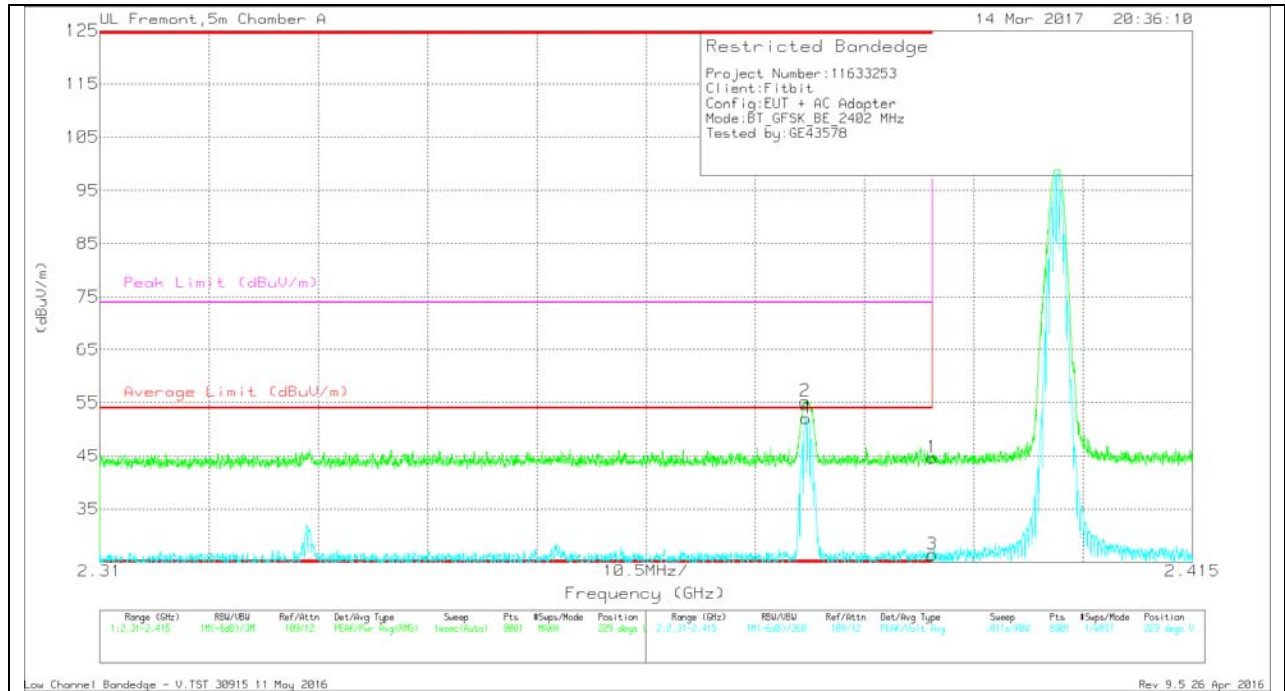
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.378	39.77	Pk	32.1	-23.7	48.17	-	-	74	-25.83	154	101	H
4	* 2.378	31.61	VA1T	32.1	-23.7	40.01	54	-13.99	-	-	154	101	H
1	* 2.39	35.16	Pk	32.1	-23.7	43.56	-	-	74	-30.44	154	101	H
3	* 2.39	17.21	VA1T	32.1	-23.7	25.61	54	-28.39	-	-	154	101	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

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

VERTICAL PEAK PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.378	46.84	Pk	32.1	-23.7	55.24	-	-	74	-18.76	229	107	V
4	* 2.378	43.63	VA1T	32.1	-23.7	52.03	54	-1.97	-	-	229	107	V
1	* 2.39	36.24	Pk	32.1	-23.7	44.64	-	-	74	-29.36	229	107	V
3	* 2.39	18.05	VA1T	32.1	-23.7	26.45	54	-27.55	-	-	229	107	V

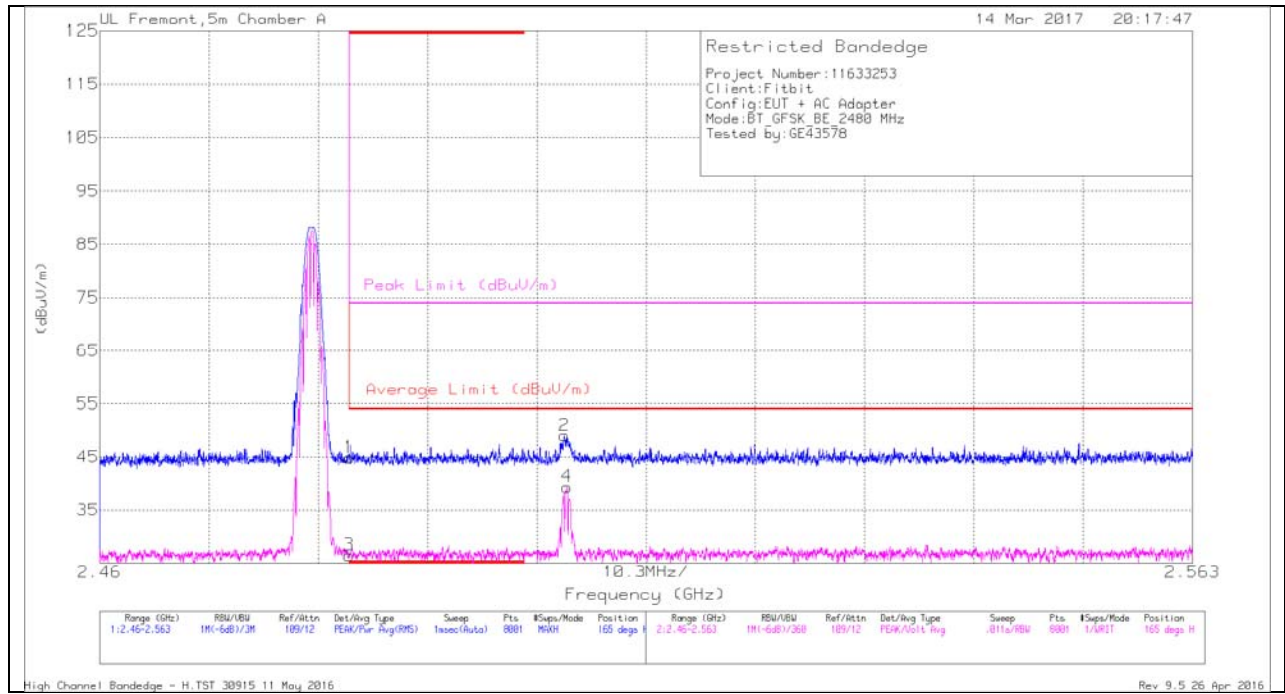
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

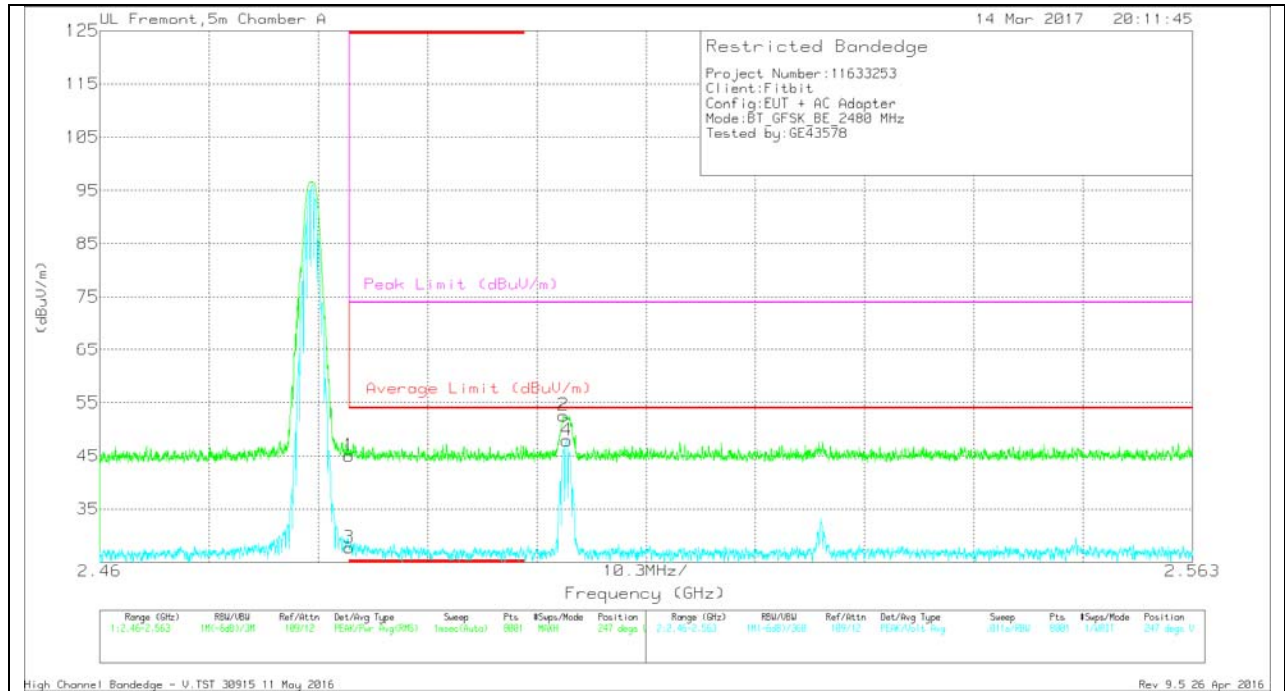
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	35.92	Pk	32.5	-23.6	44.82	-	-	74	-29.18	165	102	H
3	* 2.484	17.64	VA1T	32.5	-23.6	26.54	54	-27.46	-	-	165	102	H
2	2.504	39.97	Pk	32.6	-23.6	48.97	-	-	74	-25.03	165	102	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.13	Pk	32.5	-23.6	45.03	-	-	74	-28.97	247	130	V
3	* 2.484	18.86	VA1T	32.5	-23.6	27.76	54	-26.24	-	-	247	130	V
2	2.504	43.58	Pk	32.6	-23.6	52.58	-	-	74	-21.42	247	130	V

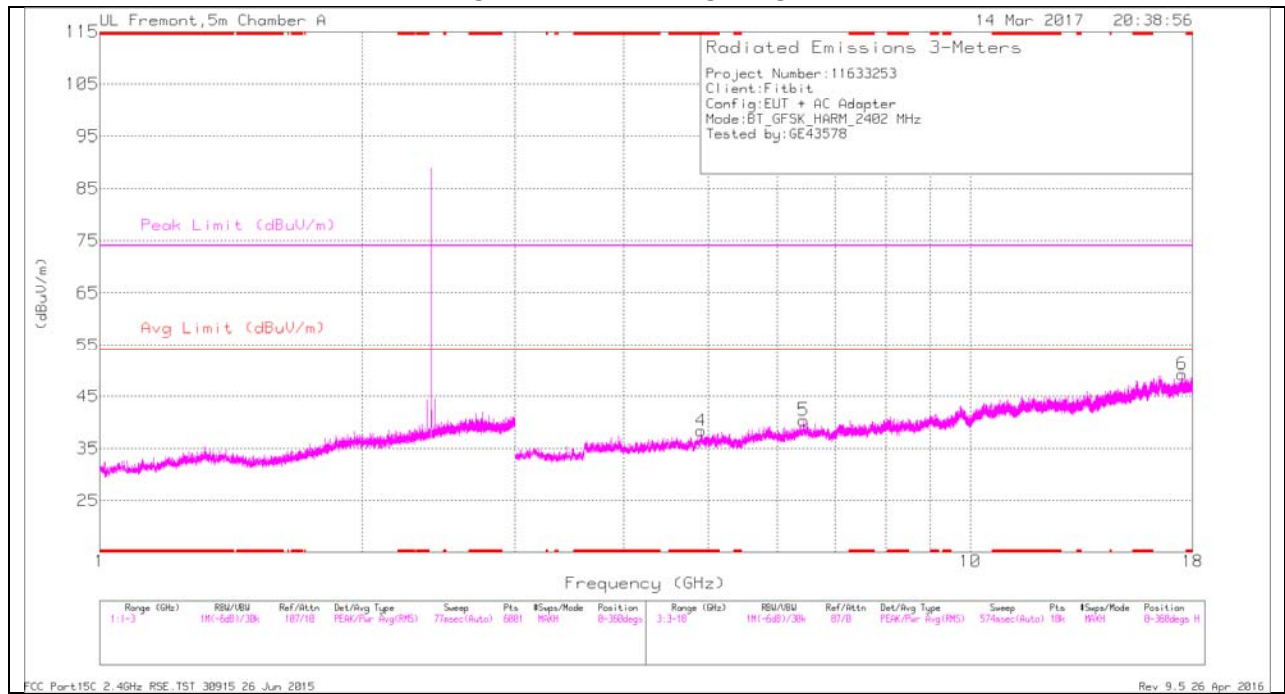
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

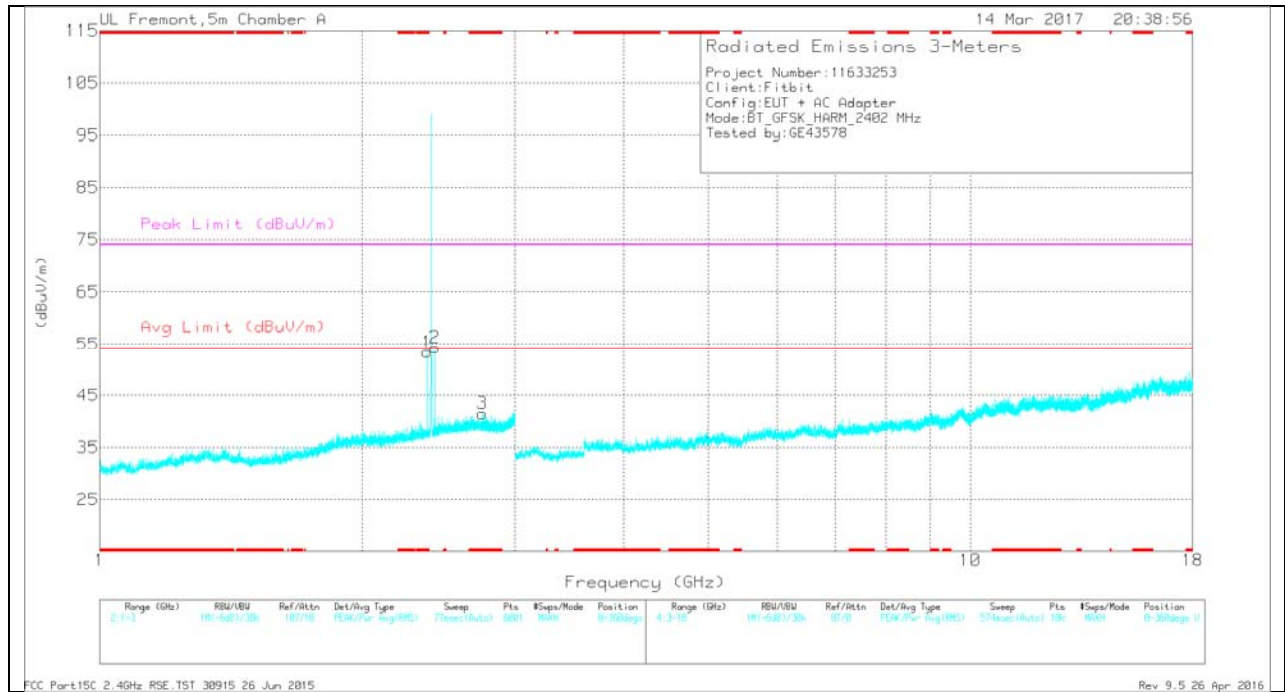
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (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	* 2.378	44.97	Pk	32.1	-23.7	53.37	-	-	74	-20.63	0-360	101	V
3	* 2.752	31.84	Pk	32.5	-22.8	41.54	-	-	74	-32.46	0-360	199	V
4	* 4.904	31.78	Pk	34	-27.4	38.38	-	-	74	-35.62	0-360	101	H
6	17.505	27.45	Pk	41.7	-19.9	49.25	-	-	-	-	0-360	199	H
2	2.426	45.65	Pk	32.3	-23.7	54.25	-	-	-	-	0-360	101	V
5	6.435	30.02	Pk	35.5	-25.1	40.42	-	-	-	-	0-360	101	H

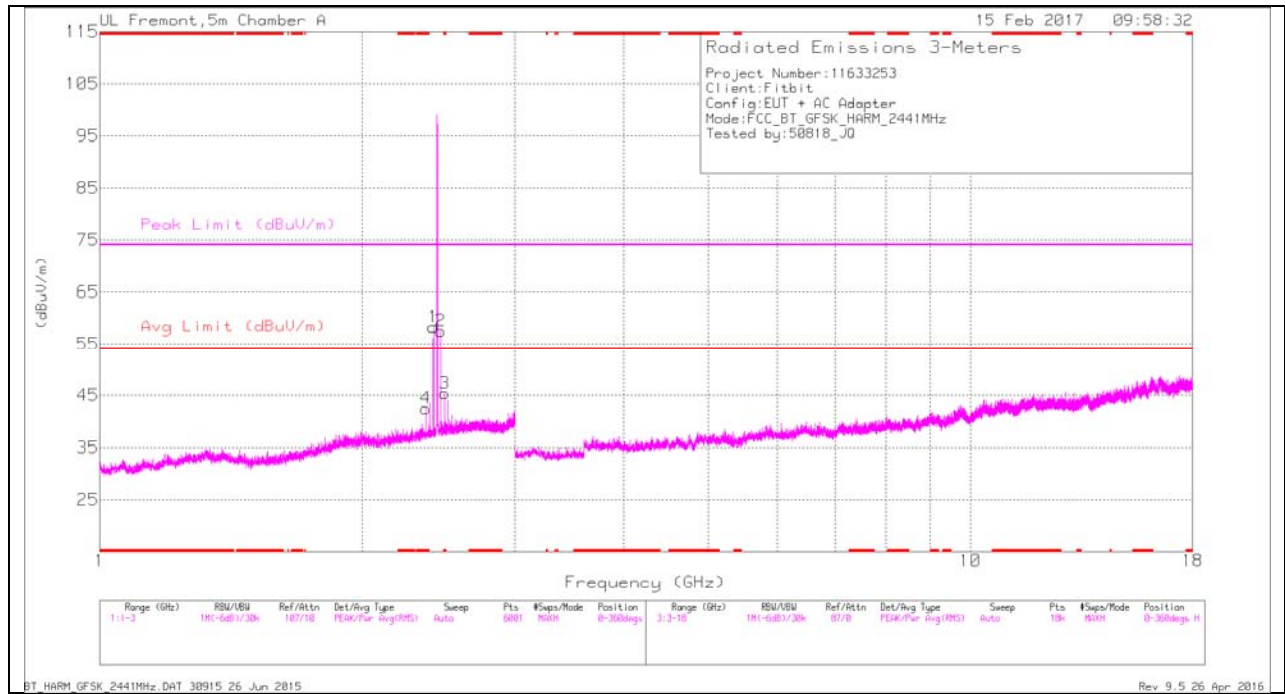
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
 - Refer to Restricted Bandedge data for Marker 1
 Pk - Peak detector

Radiated Emissions

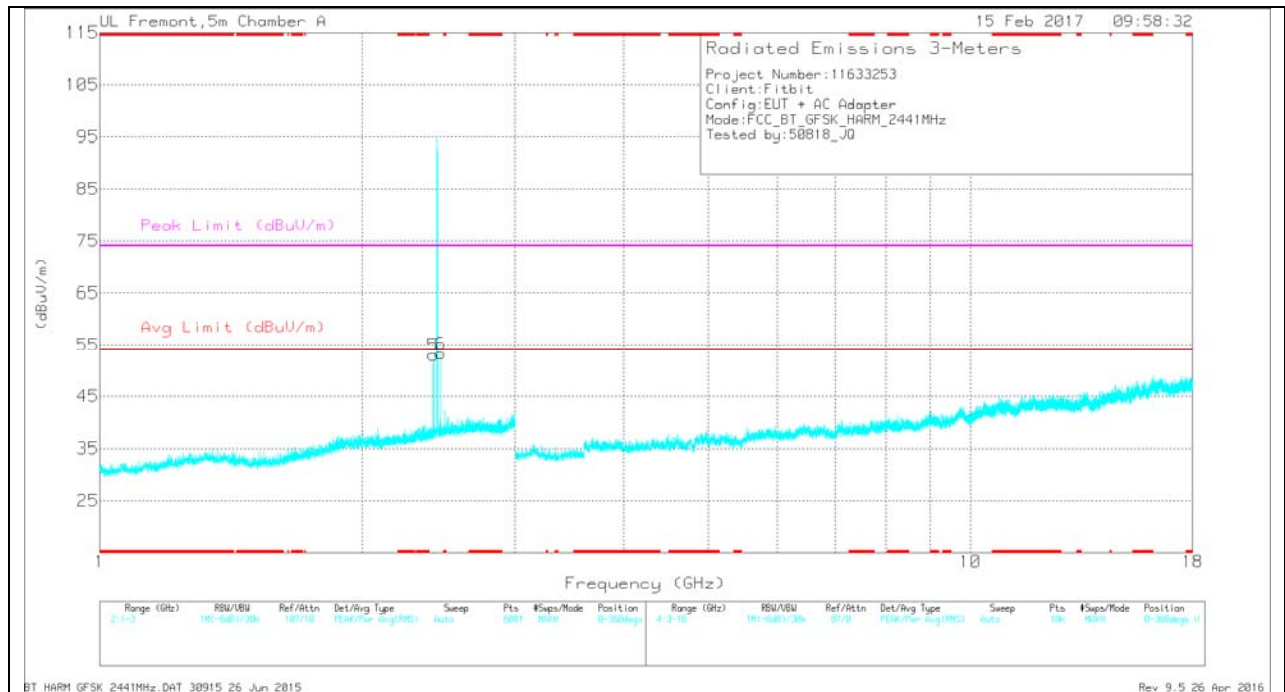
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.751	35.44	PKFH	32.5	-22.8	45.14	-	-	74	-28.86	37	310	V
* 2.753	17.85	VA1T	32.5	-22.8	27.55	54	-26.45	-	-	37	310	V
* 4.903	35.99	PKFH	34	-27.4	42.59	-	-	74	-31.41	134	102	H
* 4.904	24.42	VA1T	34	-27.4	31.02	54	-22.98	-	-	134	102	H
6.434	33.48	PKFH	35.5	-25.1	43.88	-	-	74	-30.12	357	102	H
17.504	30.24	PKFH	41.7	-19.9	52.04	-	-	74	-1.96	147	199	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.489	36.44	Pk	32.6	-23.7	45.34	-	-	74	-28.66	0-360	101	H
4	* 2.369	34.04	Pk	32.1	-23.7	42.44	-	-	74	-31.56	0-360	101	H
1	2.417	49.7	Pk	32.2	-23.7	58.2	-	-	-	-	0-360	285	H
5	2.417	44.43	Pk	32.2	-23.7	52.93	-	-	-	-	0-360	101	V
2	2.465	48.64	Pk	32.5	-23.7	57.44	-	-	-	-	0-360	101	H
6	2.465	44.42	Pk	32.5	-23.7	53.22	-	-	-	-	0-360	101	V

-Compliance for emissions in non-restricted bands shown in conducted out of band testing

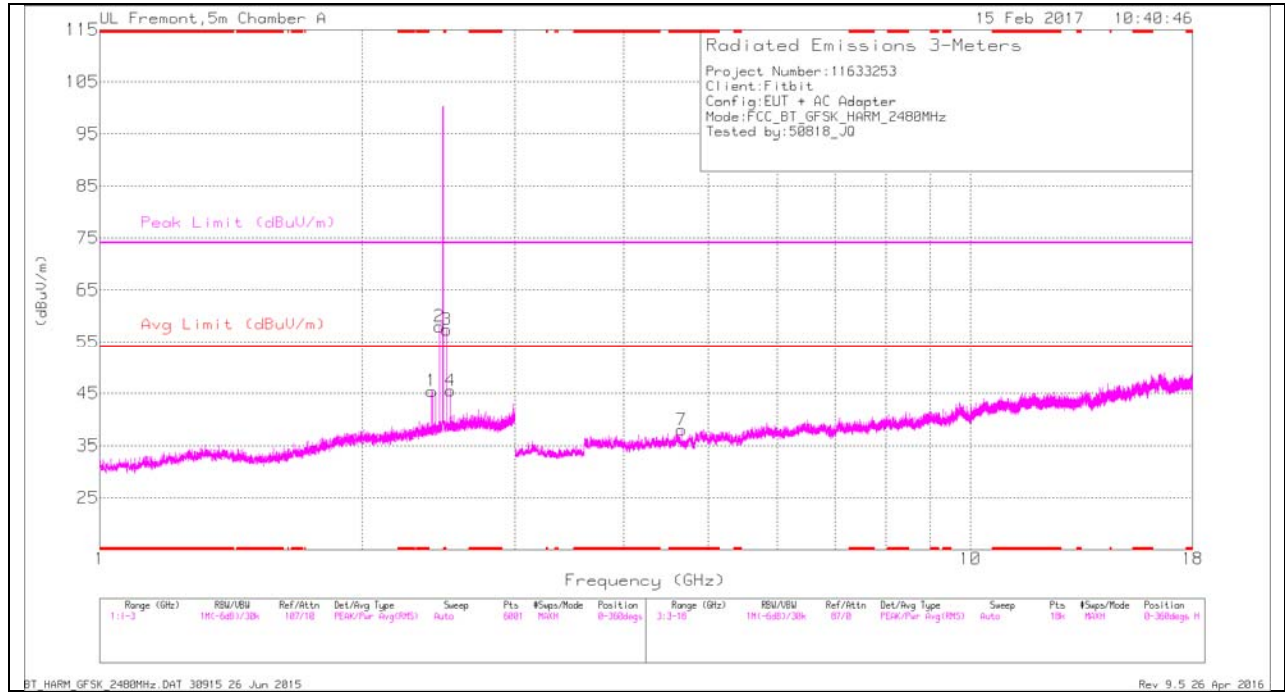
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.489	38.89	PKFH	32.6	-23.7	47.79	-	-	74	-26.21	231	106	H
* 2.489	33.84	VA1T	32.6	-23.7	42.74	54	-11.26	-	-	231	106	H
* 2.369	38.2	PKFH	32.1	-23.7	46.6	-	-	74	-27.4	220	195	H
* 2.369	32.39	VA1T	32.1	-23.7	40.79	54	-13.21	-	-	220	195	H
* 4.657	36.32	PKFH	33.8	-29.4	40.72	-	-	74	-33.28	104	194	H
* 4.66	25.33	VA1T	33.8	-29.4	29.73	54	-24.27	-	-	104	194	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

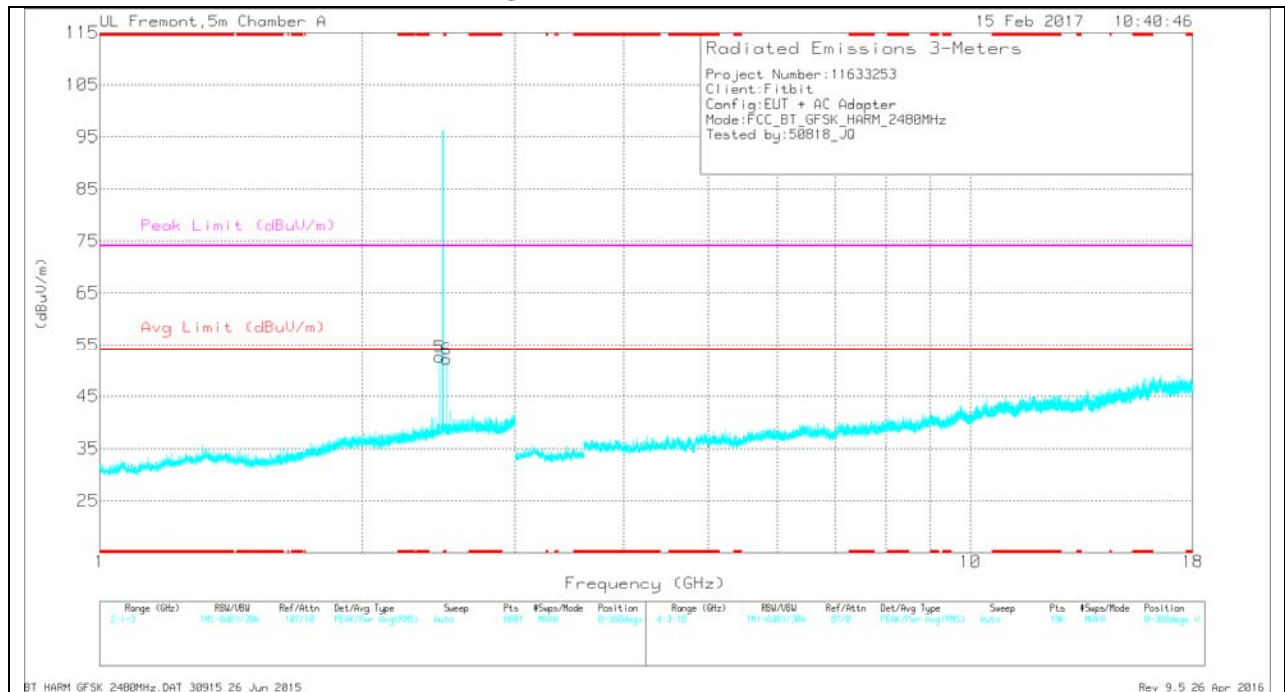
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 4.658	33.56	Pk	33.8	-29.4	37.96	-	-	74	-36.04	0-360	101	H
1	2.408	36.9	Pk	32.2	-23.7	45.4	-	-	-	-	0-360	199	H
2	2.456	49.24	Pk	32.4	-23.7	57.94	-	-	-	-	0-360	199	H
5	2.456	43.84	Pk	32.4	-23.7	52.54	-	-	-	-	0-360	101	V
3	2.504	48.33	Pk	32.6	-23.6	57.33	-	-	-	-	0-360	199	H
6	2.504	43.12	Pk	32.6	-23.6	52.12	-	-	-	-	0-360	101	V
4	2.528	36.44	Pk	32.6	-23.6	45.44	-	-	-	-	0-360	199	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
 -Compliance for emissions in non-restricted bands shown in conducted out of band testing

Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.657	36.32	PKFH	33.8	-29.4	40.72	-	-	74	-33.28	104	194	H
* 4.66	25.33	VA1T	33.8	-29.4	29.73	54	-24.27	-	-	104	194	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

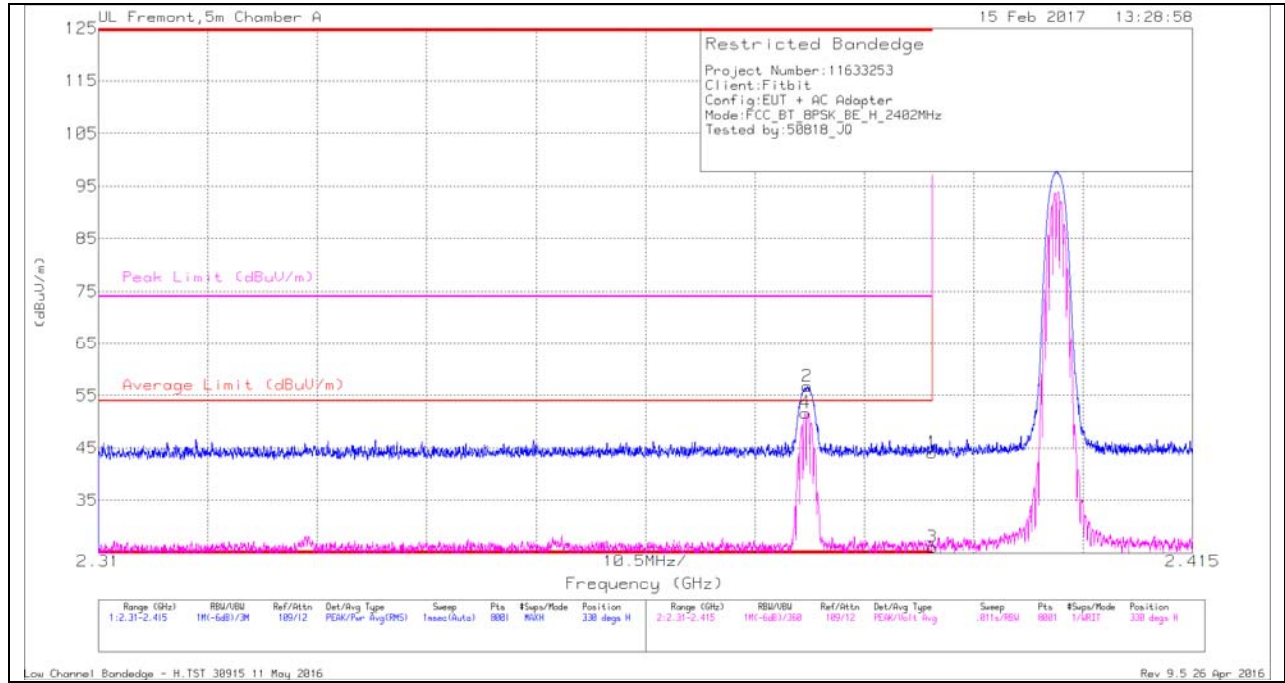
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

10.1.2. ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

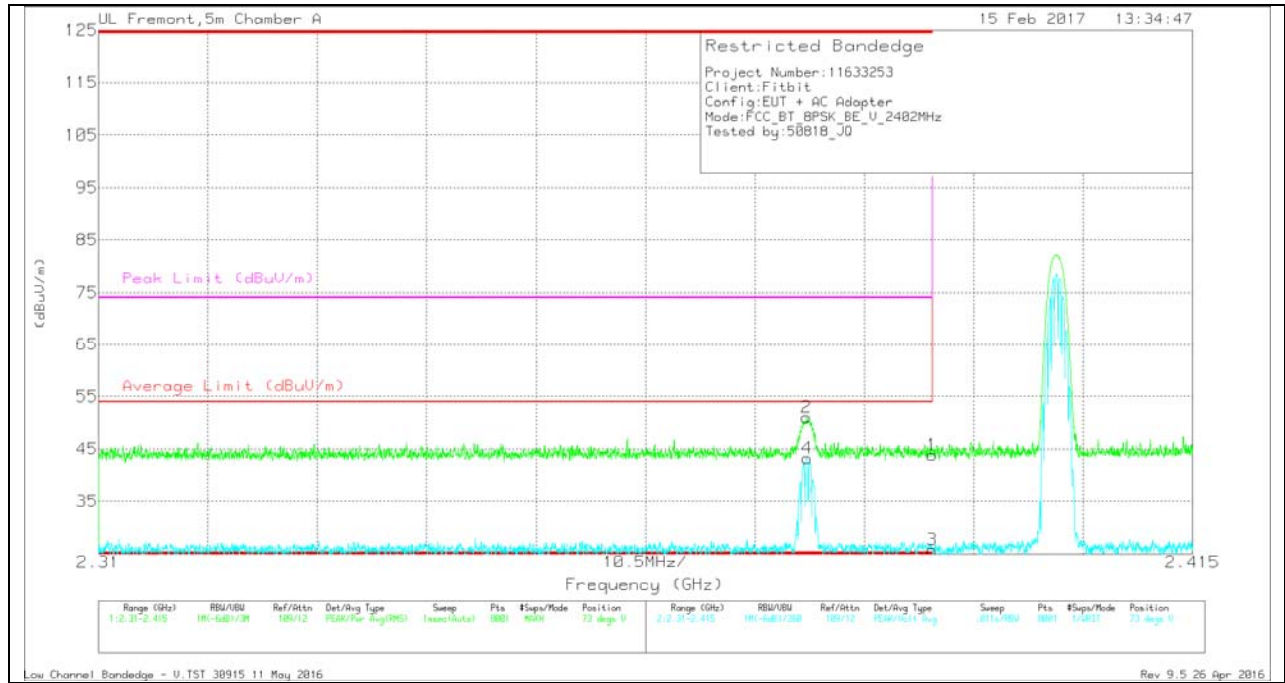
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	35.74	Pk	32.1	-23.7	44.14	-	-	74	-29.86	330	253	H
2	* 2.378	48.32	Pk	32.1	-23.7	56.72	-	-	74	-17.28	330	253	H
3	* 2.39	17.66	VA1T	32.1	-23.7	26.06	54	-27.94	-	-	330	253	H
4	* 2.378	43.24	VA1T	32.1	-23.7	51.64	54	-2.36	-	-	330	253	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/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
2	* 2.378	42.58	Pk	32.1	-23.7	50.98	-	-	74	-23.02	73	332	V
4	* 2.378	34.87	VA1T	32.1	-23.7	43.27	54	-10.73	-	-	73	332	V
1	* 2.39	35.46	Pk	32.1	-23.7	43.86	-	-	74	-30.14	73	332	V
3	* 2.39	17.33	VA1T	32.1	-23.7	25.73	54	-28.27	-	-	73	332	V

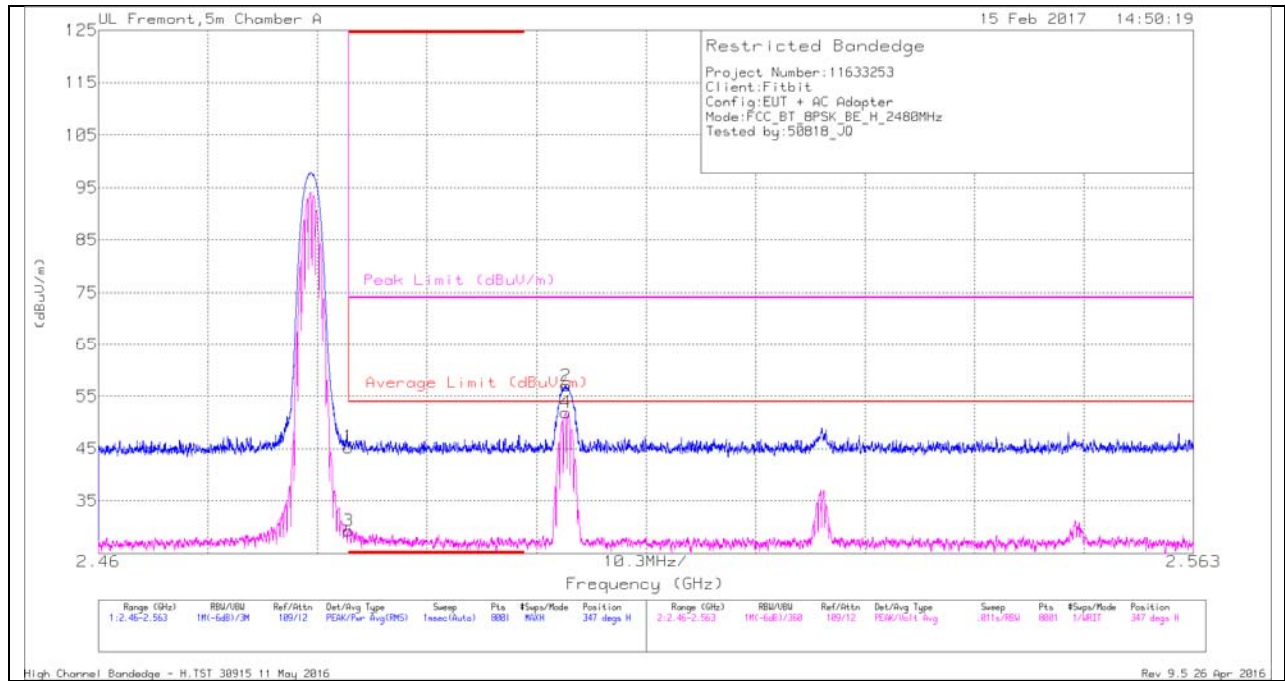
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

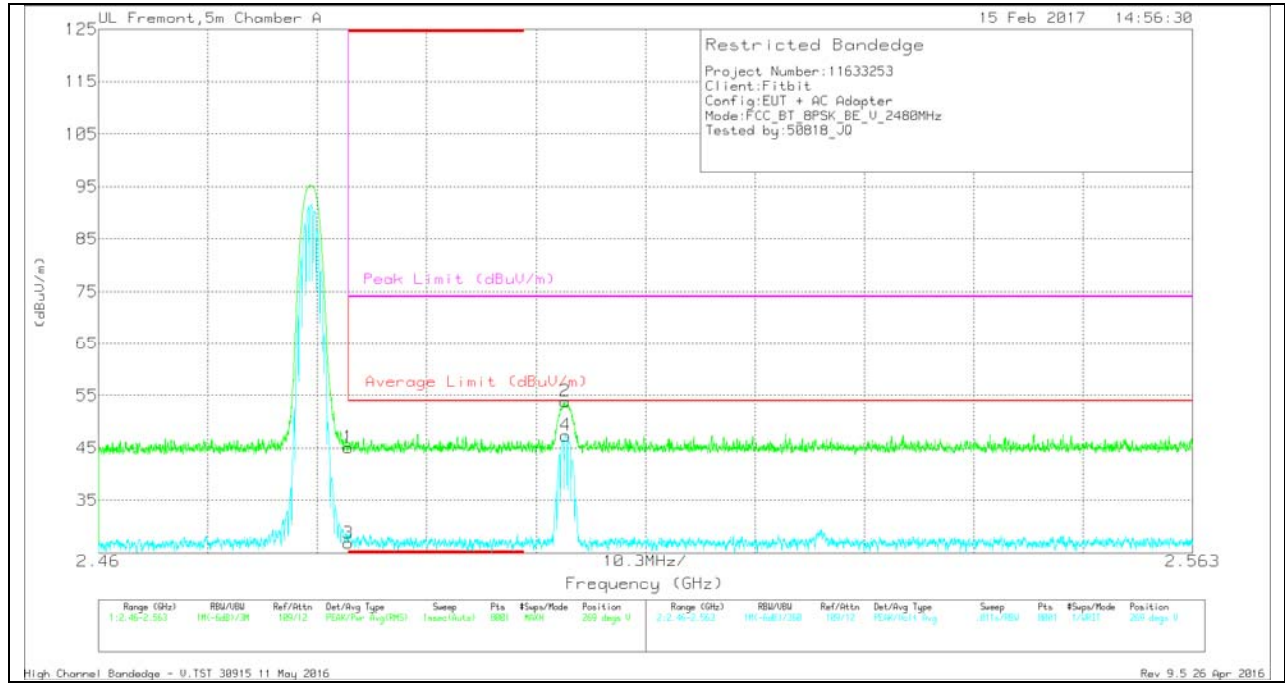
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.36	Pk	32.5	-23.6	45.26	-	-	74	-28.74	347	297	H
3	* 2.484	20.37	VA1T	32.5	-23.6	29.27	54	-24.73	-	-	347	297	H
2	2.504	48.05	Pk	32.6	-23.6	57.05	-	-	74	-16.95	347	297	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/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	36.2	Pk	32.5	-23.6	45.1	-	-	74	-28.9	269	386	V
3	* 2.484	17.9	VA1T	32.5	-23.6	26.8	54	-27.2	-	-	269	386	V
2	2.504	44.92	Pk	32.6	-23.6	53.92	-	-	74	-20.08	269	386	V

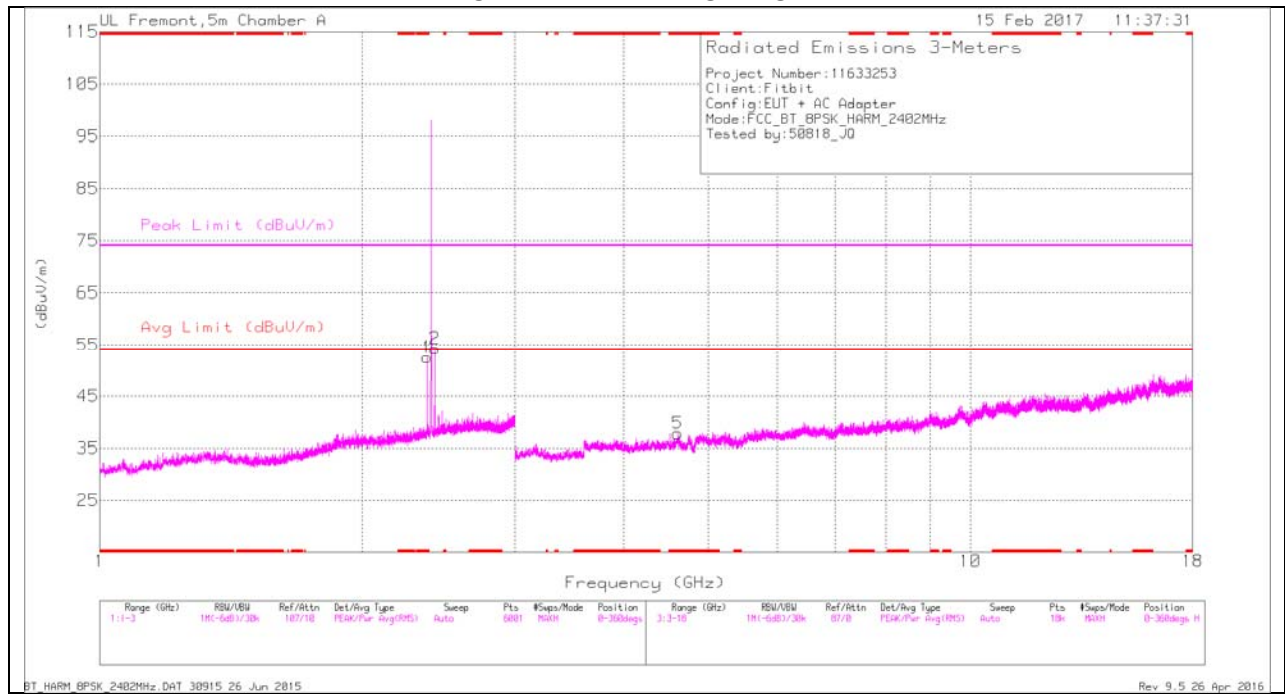
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

Pk - Peak detector

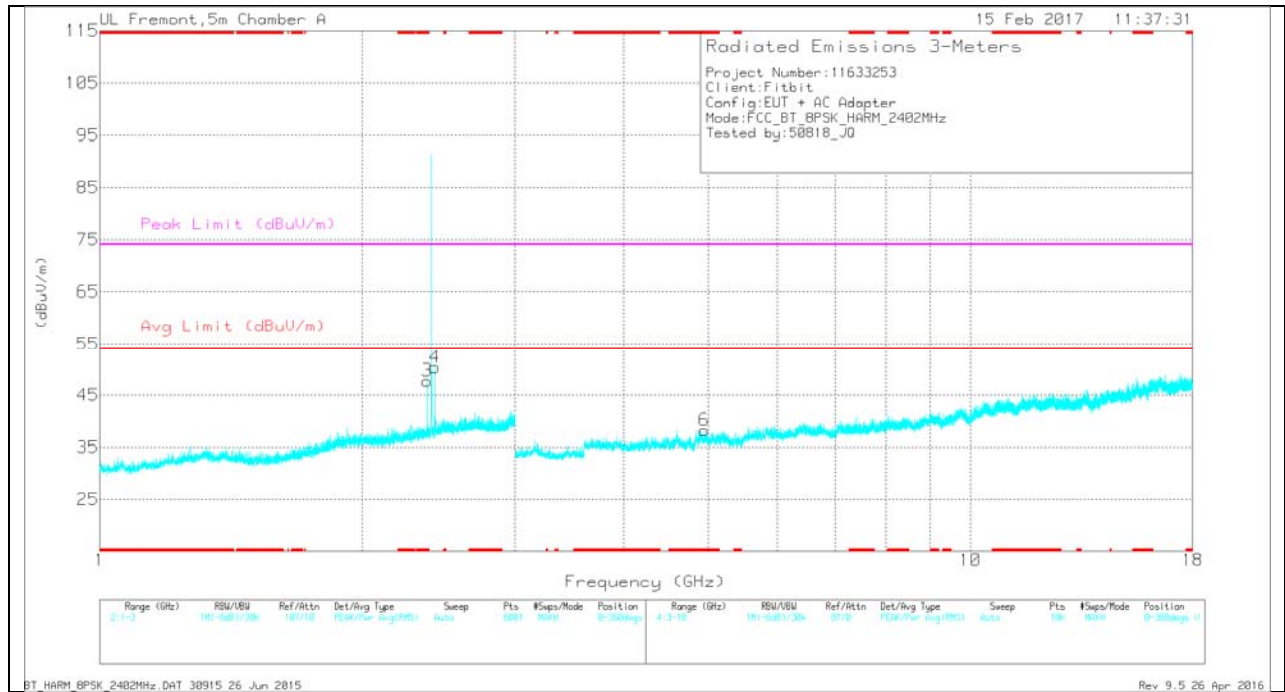
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.378	44.09	Pk	32.1	-23.7	52.49	-	-	74	-21.51	0-360	199	H
3	* 2.378	39.34	Pk	32.1	-23.7	47.74	-	-	74	-26.26	0-360	101	V
5	* 4.613	32.9	Pk	33.7	-28.8	37.8	-	-	74	-36.2	0-360	199	H
6	* 4.951	32.35	Pk	34.1	-28.2	38.25	-	-	74	-35.75	0-360	101	V
2	2.426	45.61	Pk	32.3	-23.7	54.21	-	-	-	-	0-360	101	H
4	2.426	41.72	Pk	32.3	-23.7	50.32	-	-	-	-	0-360	101	V

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
 -Compliance for emissions in non-restricted bands shown in conducted out of band testing

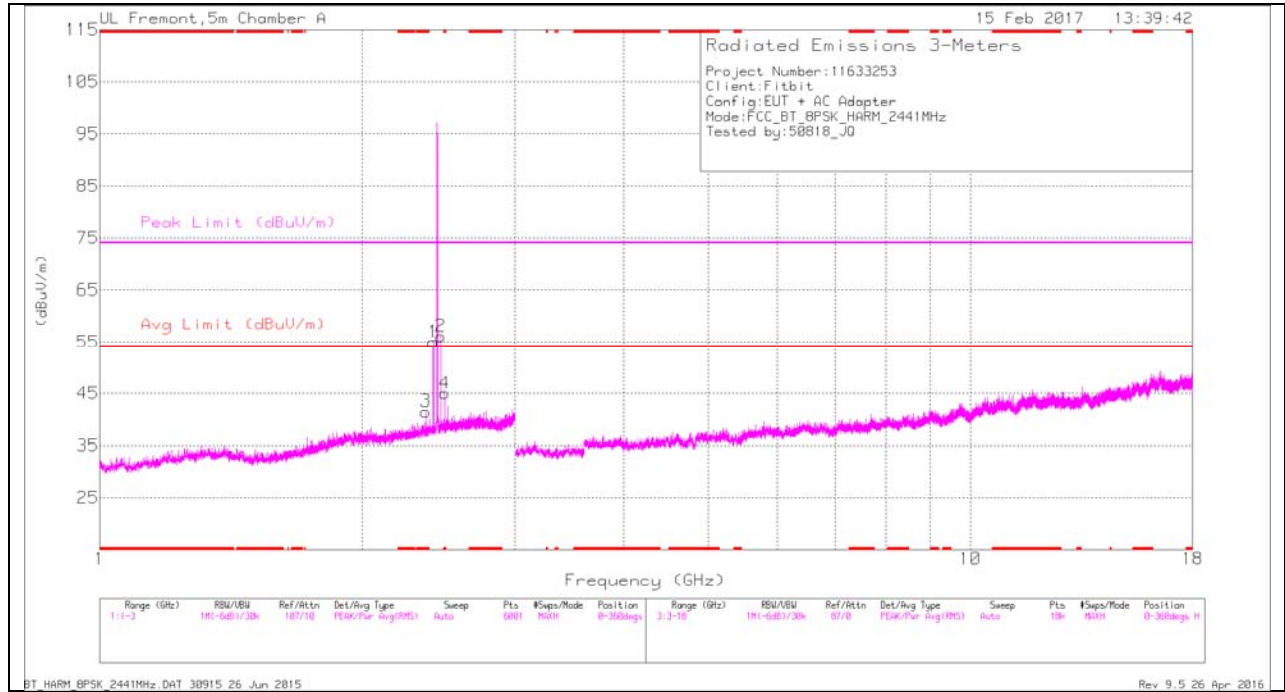
Pk - Peak detector

Radiated Emissions

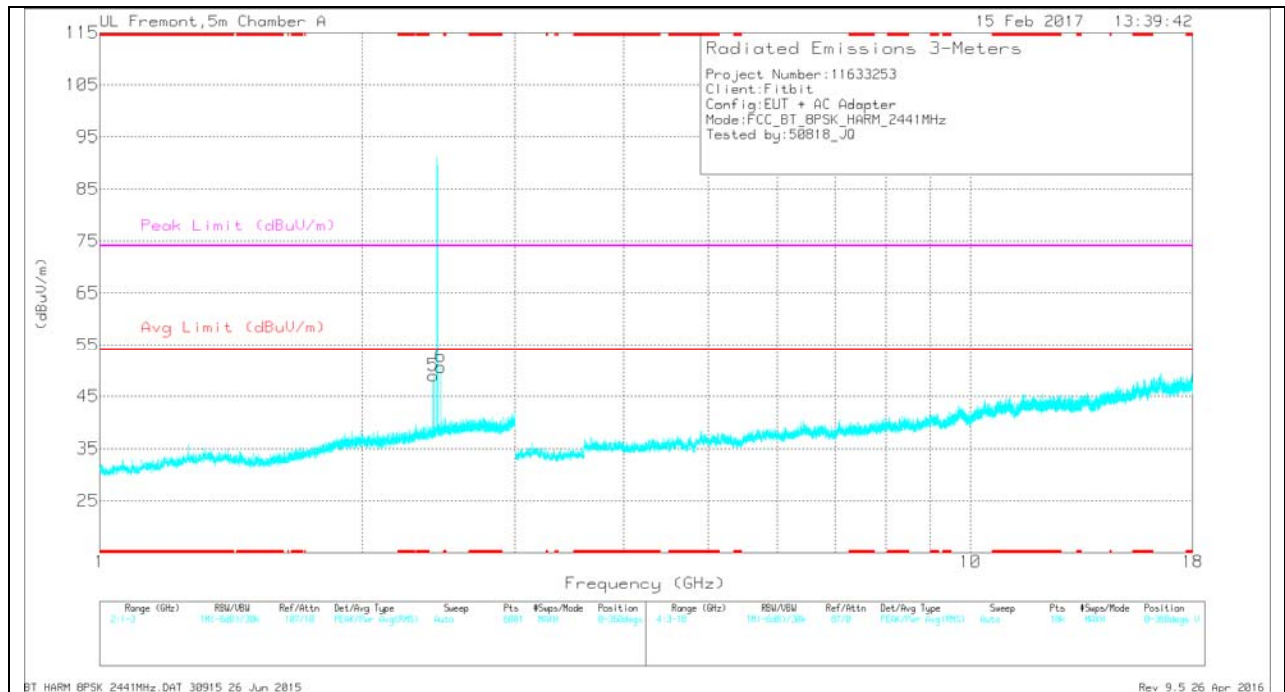
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.378	45.55	PKFH	32.1	-23.7	53.95	-	-	74	-20.05	162	263	H
* 2.378	41.64	VA1T	32.1	-23.7	50.04	54	-3.96	-	-	162	263	H
* 2.378	42.51	PKFH	32.1	-23.7	50.91	-	-	74	-23.09	243	105	V
* 2.378	36.37	VA1T	32.1	-23.7	44.77	54	-9.23	-	-	243	105	V
* 4.617	37.29	PKFH	33.7	-28.9	42.09	-	-	74	-31.91	11	181	H
* 4.611	25.37	VA1T	33.7	-28.7	30.37	54	-23.63	-	-	11	181	H
* 4.657	36.32	PKFH	33.8	-29.4	40.72	-	-	74	-33.28	104	194	H
* 4.66	25.33	VA1T	33.8	-29.4	29.73	54	-24.27	-	-	104	194	H
* 4.949	36.61	PKFH	34.1	-28.3	42.41	-	-	74	-31.59	30	260	V
* 4.949	25.11	VA1T	34.1	-28.3	30.91	54	-23.09	-	-	30	260	V

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.369	33.12	Pk	32.1	-23.7	41.52	-	-	74	-32.48	0-360	231	H
4	* 2.489	36.08	Pk	32.6	-23.7	44.98	-	-	74	-29.02	0-360	231	H
1	2.417	46.48	Pk	32.2	-23.7	54.98	-	-	-	-	0-360	101	H
5	2.417	40.46	Pk	32.2	-23.7	48.96	-	-	-	-	0-360	201	V
2	2.465	47.26	Pk	32.5	-23.7	56.06	-	-	-	-	0-360	101	H
6	2.465	41.84	Pk	32.5	-23.7	50.64	-	-	-	-	0-360	201	V

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
 -Compliance for emissions in non-restricted bands shown in conducted out of band testing

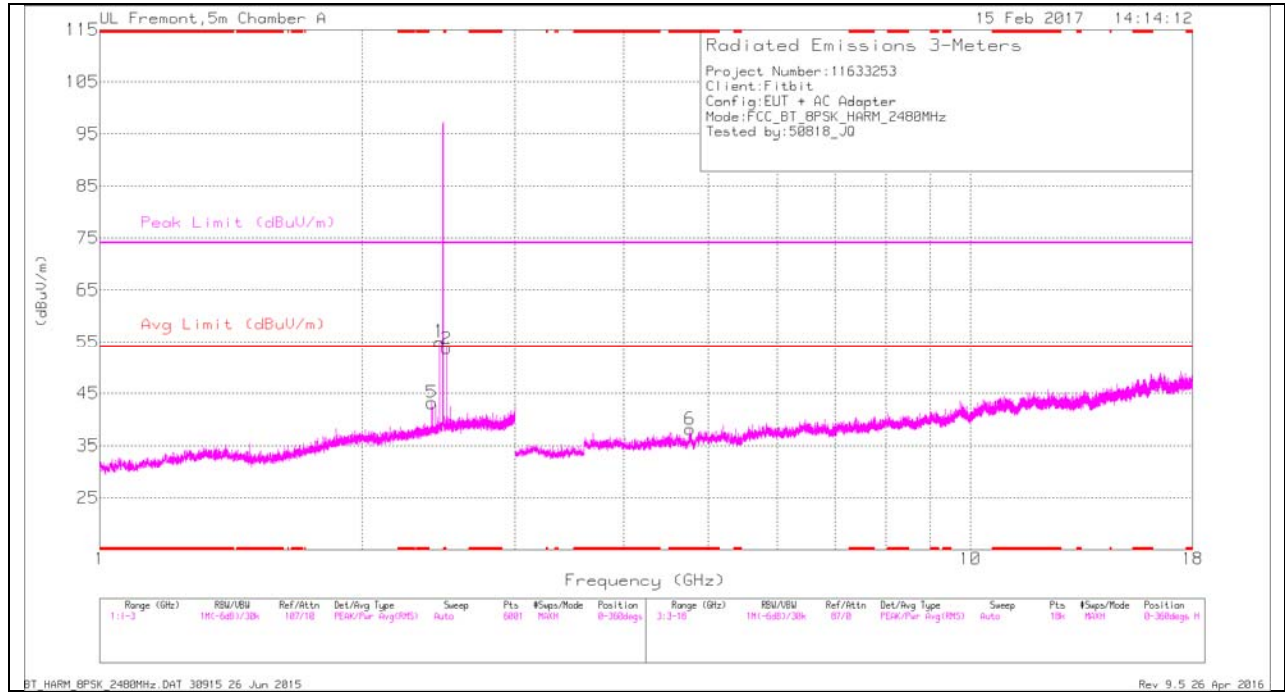
Pk - Peak detector

Radiated Emissions

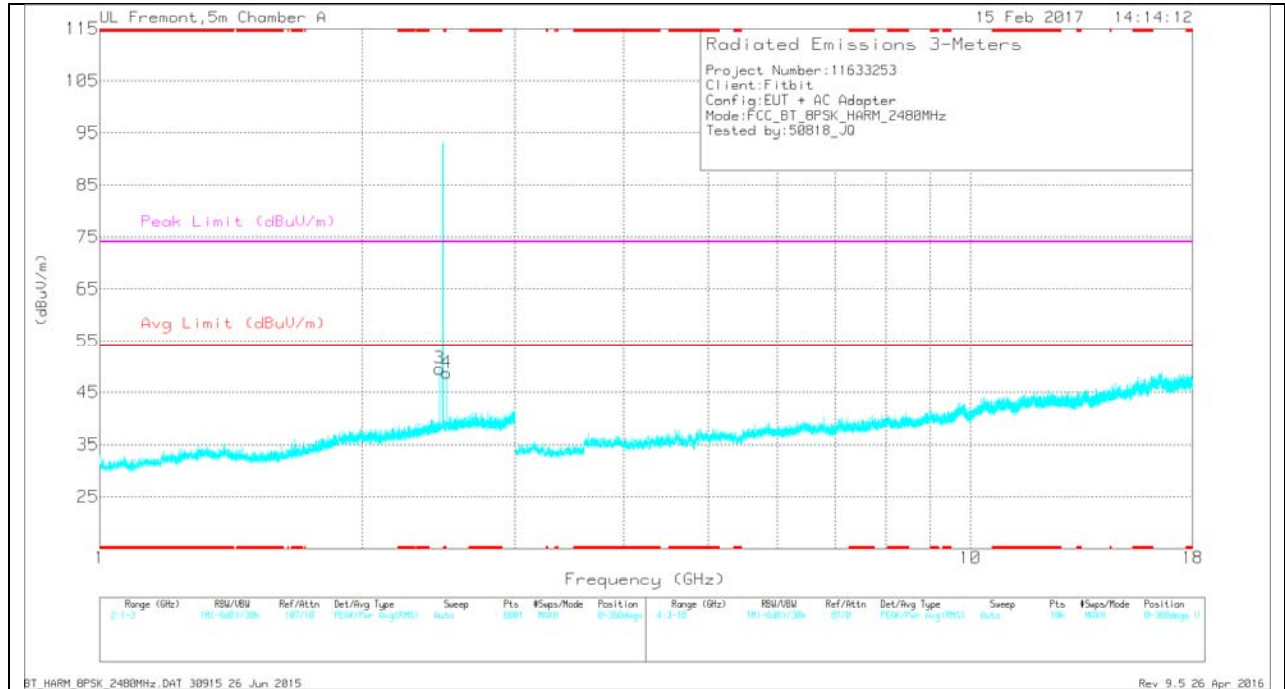
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.369	37.49	PKFH	32.1	-23.7	45.89	-	-	74	-28.11	162	262	H
* 2.369	29.08	VA1T	32.1	-23.7	37.48	54	-16.52	-	-	162	262	H
* 2.489	39.28	PKFH	32.6	-23.7	48.18	-	-	74	-25.82	161	140	H
* 2.489	31.86	VA1T	32.6	-23.7	40.76	54	-13.24	-	-	161	140	H
* 4.657	36.32	PKFH	33.8	-29.4	40.72	-	-	74	-33.28	104	194	H
* 4.66	25.33	VA1T	33.8	-29.4	29.73	54	-24.27	-	-	104	194	H

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -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

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 4.767	32.71	Pk	33.9	-28.5	38.11	-	-	74	-35.89	0-360	199	H
5	2.408	34.68	Pk	32.2	-23.7	43.18	-	-	-	-	0-360	199	H
1	2.456	46.31	Pk	32.4	-23.7	55.01	-	-	-	-	0-360	199	H
3	2.456	40.85	Pk	32.4	-23.7	49.55	-	-	-	-	0-360	101	V
2	2.504	44.68	Pk	32.6	-23.6	53.68	-	-	-	-	0-360	199	H
4	2.504	39.73	Pk	32.6	-23.6	48.73	-	-	-	-	0-360	101	V

* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band
 -Compliance for emissions in non-restricted bands shown in conducted out of band testing

Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.766	36.34	PKFH	33.9	-28.4	41.84	-	-	74	-32.16	37	264	H
* 4.766	25.09	VA1T	33.9	-28.5	30.49	54	-23.51	-	-	37	264	H
* 4.657	36.32	PKFH	33.8	-29.4	40.72	-	-	74	-33.28	104	194	H
* 4.66	25.33	VA1T	33.8	-29.4	29.73	54	-24.27	-	-	104	194	H

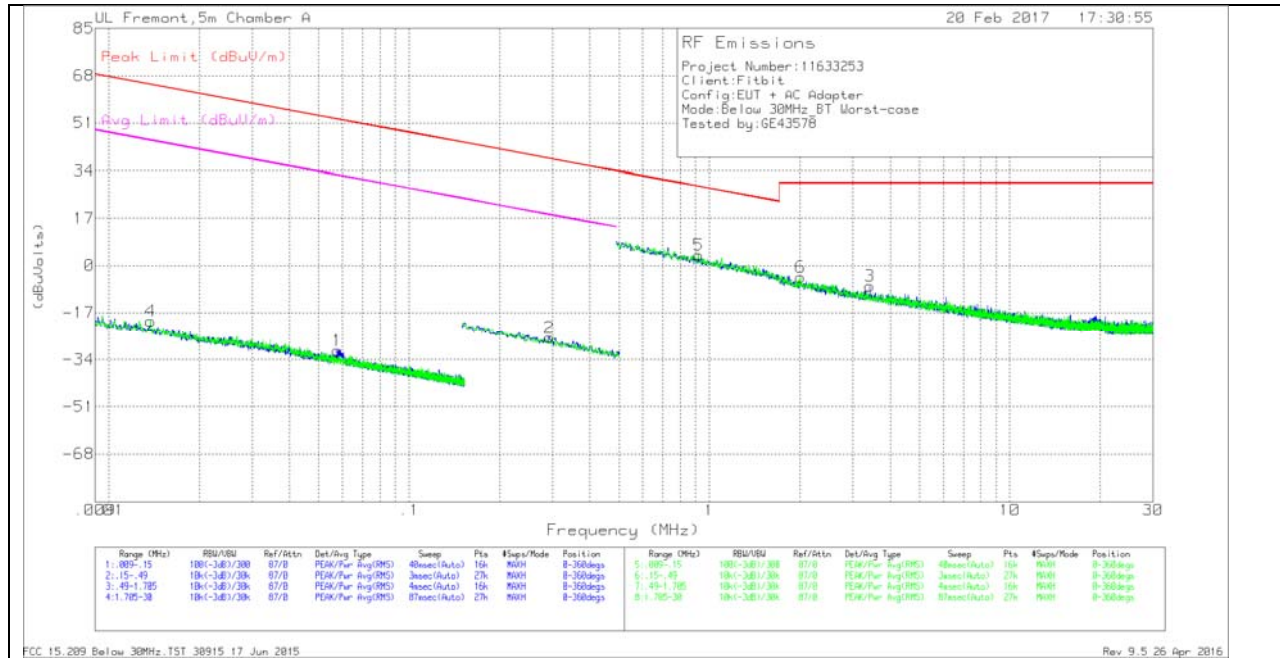
* - indicates frequency in CFR15.205/RSS-GEN 8.10 -Restricted Band

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

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

10.2. WORST-CASE BELOW 30 MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



NOTE: KDB 937606 OATS and Chamber Correlation Justification

- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.01379	43.49	Pk	16.4	.1	-80	-20.01	64.81	-84.82	44.81	-64.82	0-360
1	.05767	37.96	Pk	11.2	.1	-80	-30.74	52.39	-83.13	32.39	-63.13	0-360
2	.29309	42.95	Pk	10.8	.1	-80	-26.15	38.26	-64.41	18.26	-44.41	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.91955	32.86	Pk	10.7	.2	-40	3.76	28.33	-24.57	-	-	0-360
6	2.00578	24.77	Pk	10.8	.2	-40	-4.23	29.54	-33.77	-	-	0-360
3	3.42005	21.49	Pk	10.8	.3	-40	-7.41	29.54	-36.95	-	-	0-360

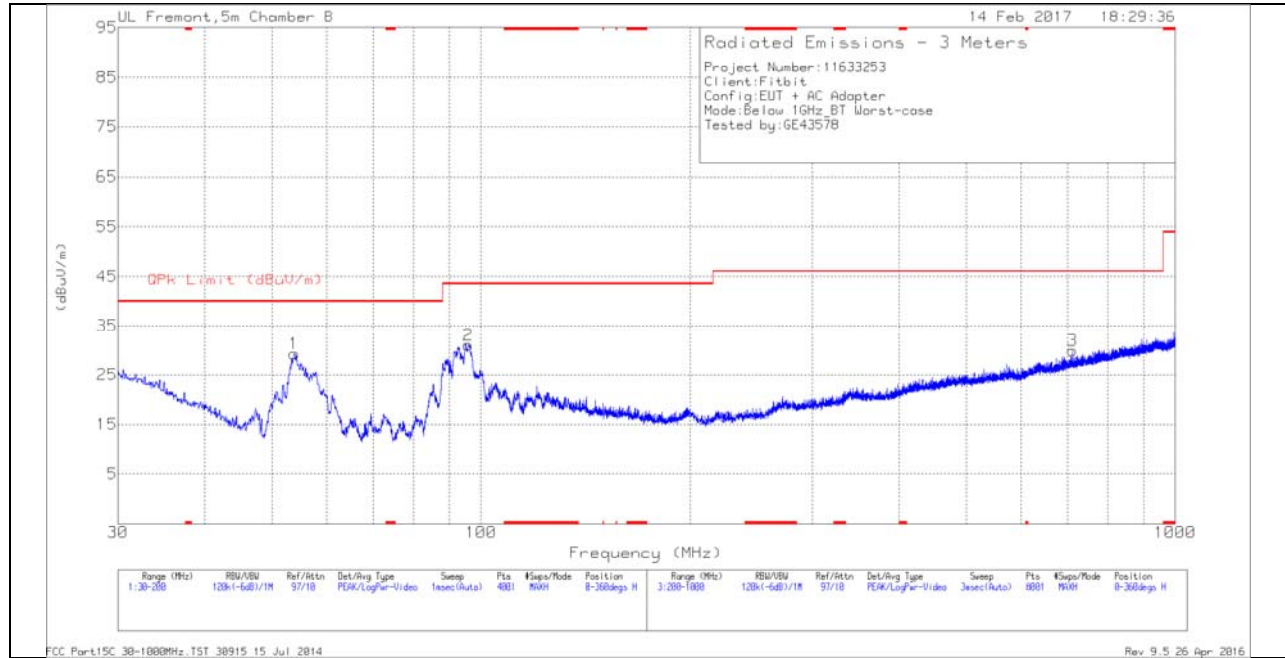
Pk - Peak detector

Note: No emissions were detected above the noise floor.

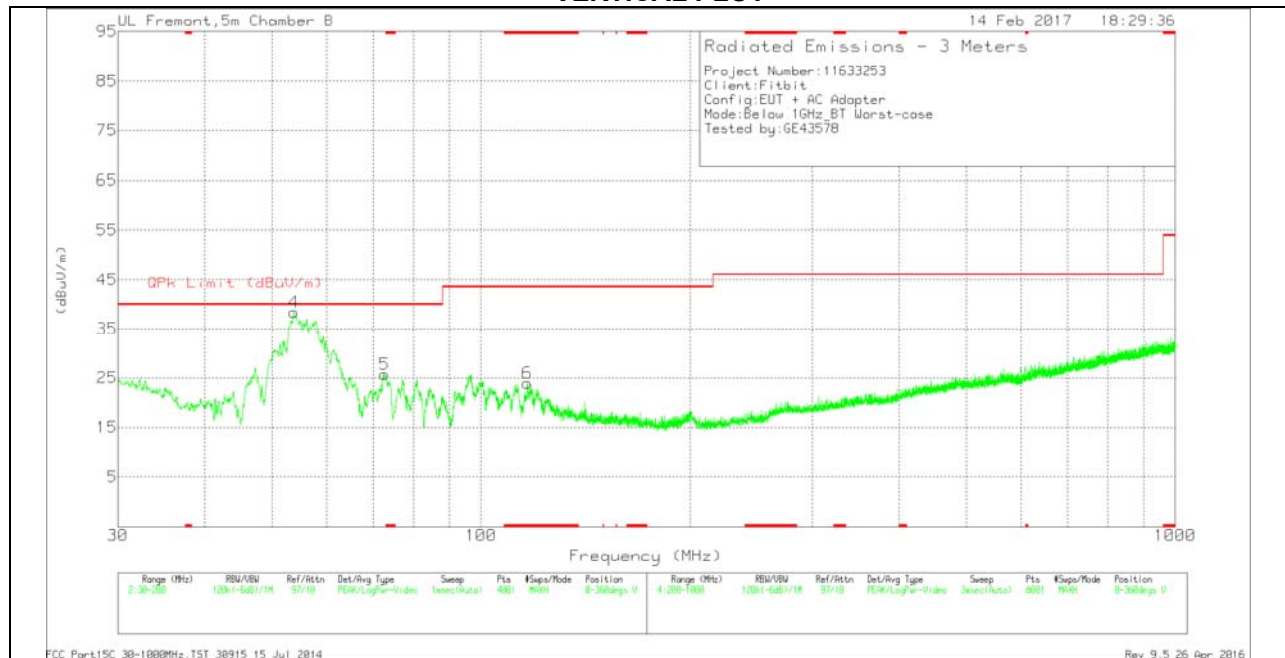
10.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 116.7	34.58	Pk	17.4	-28	23.98	43.52	-19.54	0-360	100	V
4	53.7575	55.84	Pk	11.2	-28.6	38.44	40	-1.56	0-360	100	V
		48.06	Qp	11.2	-28.5	30.76	40	-9.24	223	137	V
1	53.8425	46.63	Pk	11.2	-28.6	29.23	40	-10.77	0-360	400	H
5	72.6275	42.25	Pk	12	-28.5	25.75	40	-14.25	0-360	100	V
2	95.8113	46.12	Pk	13	-28.1	31.02	43.52	-12.5	0-360	300	H
3	711.7	30.87	Pk	24.3	-25.2	29.97	46.02	-16.05	0-360	400	H

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

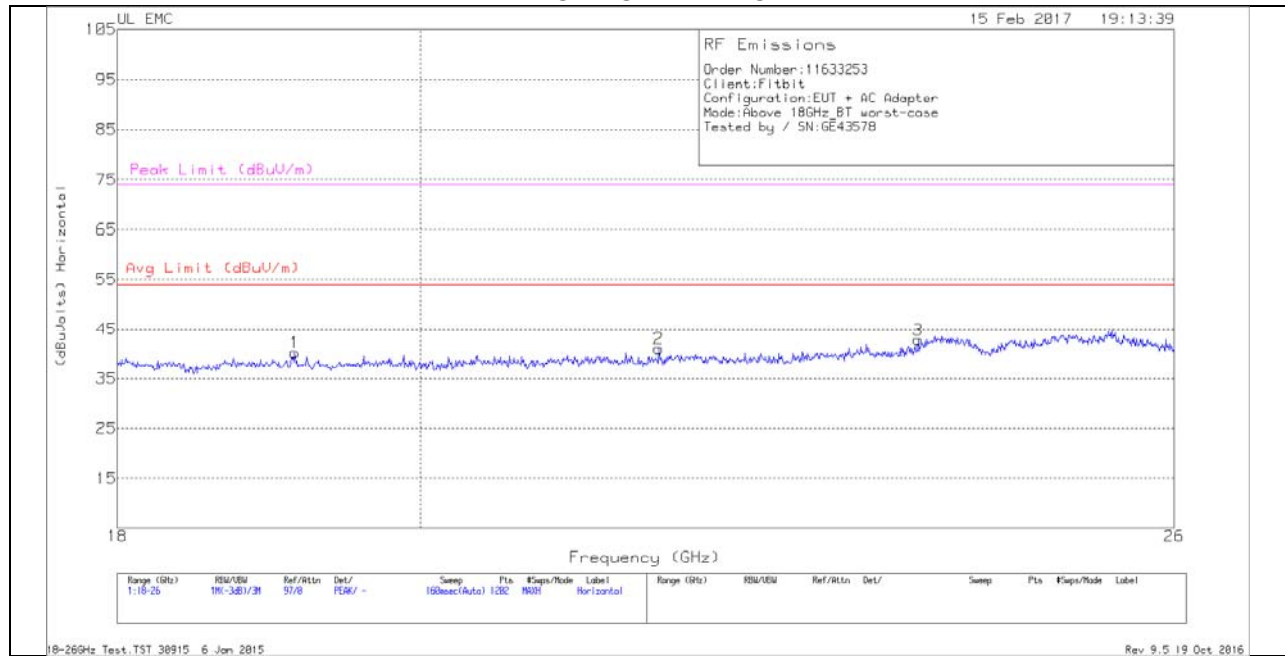
Pk - Peak detector

Qp - Quasi-Peak detector

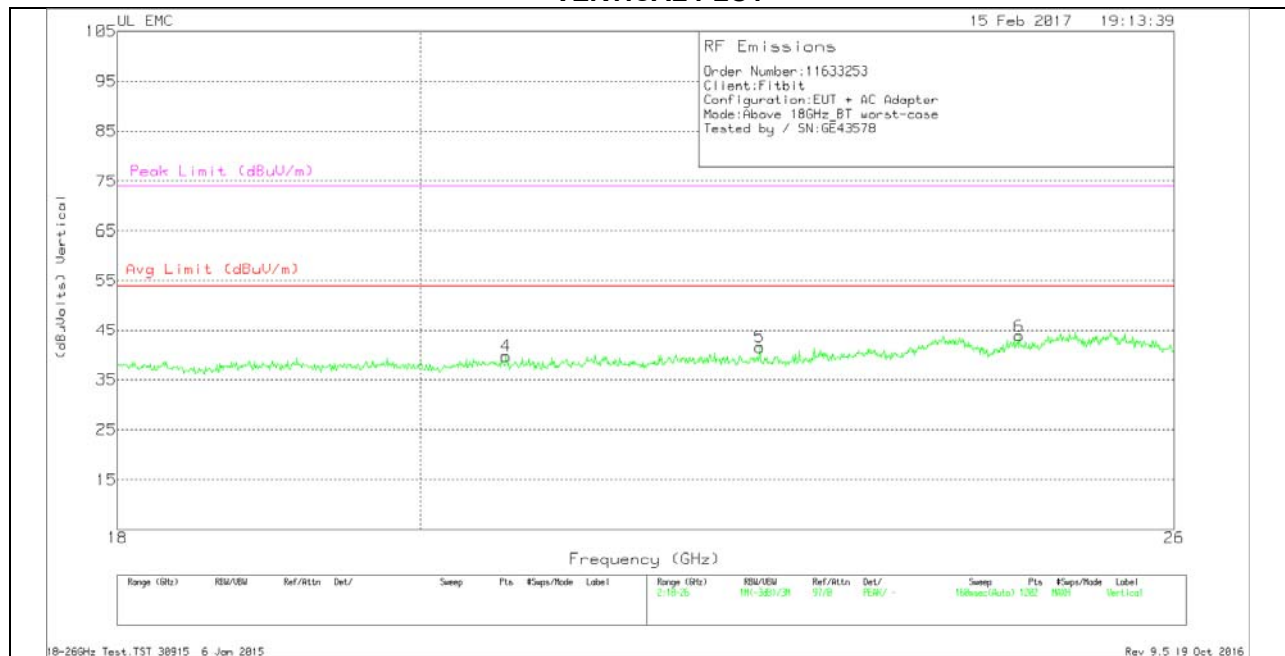
10.4. WORST-CASE ABOVE 18 GHz

GFSK SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



18 TO 26 GHz TABLE

Trace Markers

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	19.146	41.77	Pk	32.7	-24.8	-9.5	40.17	54	-13.83	74	-33.83
2	21.73	42.1	Pk	33.2	-24.8	-9.5	41	54	-13	74	-33
3	23.782	42.73	Pk	33.8	-24.2	-9.5	42.83	54	-11.17	74	-31.17
4	20.604	41.77	Pk	32.9	-25.5	-9.5	39.67	54	-14.33	74	-34.33
5	22.51	42.5	Pk	33.5	-25	-9.5	41.5	54	-12.5	74	-32.5
6	24.634	43.43	Pk	34.1	-24.2	-9.5	43.83	54	-10.17	74	-30.17

Pk - Peak detector

Note: No emissions were detected above the noise floor.

11. 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.

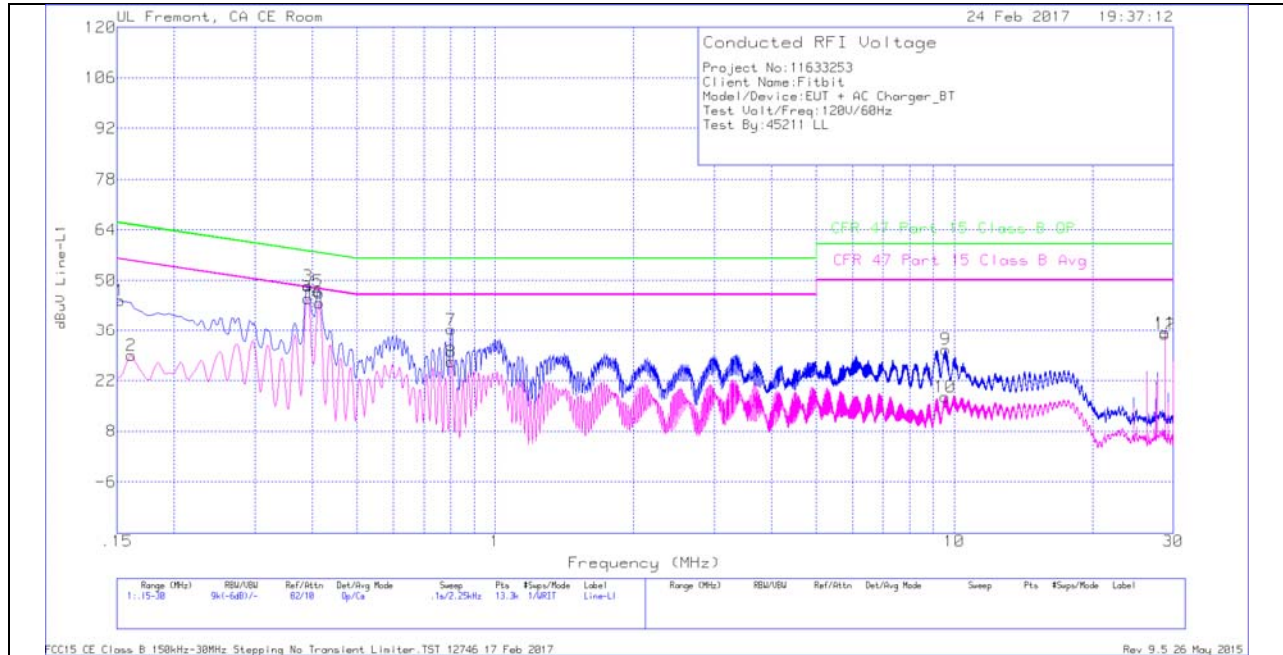
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both Line 1 (HOT) and Line 2 (NEUTRAL).

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULT

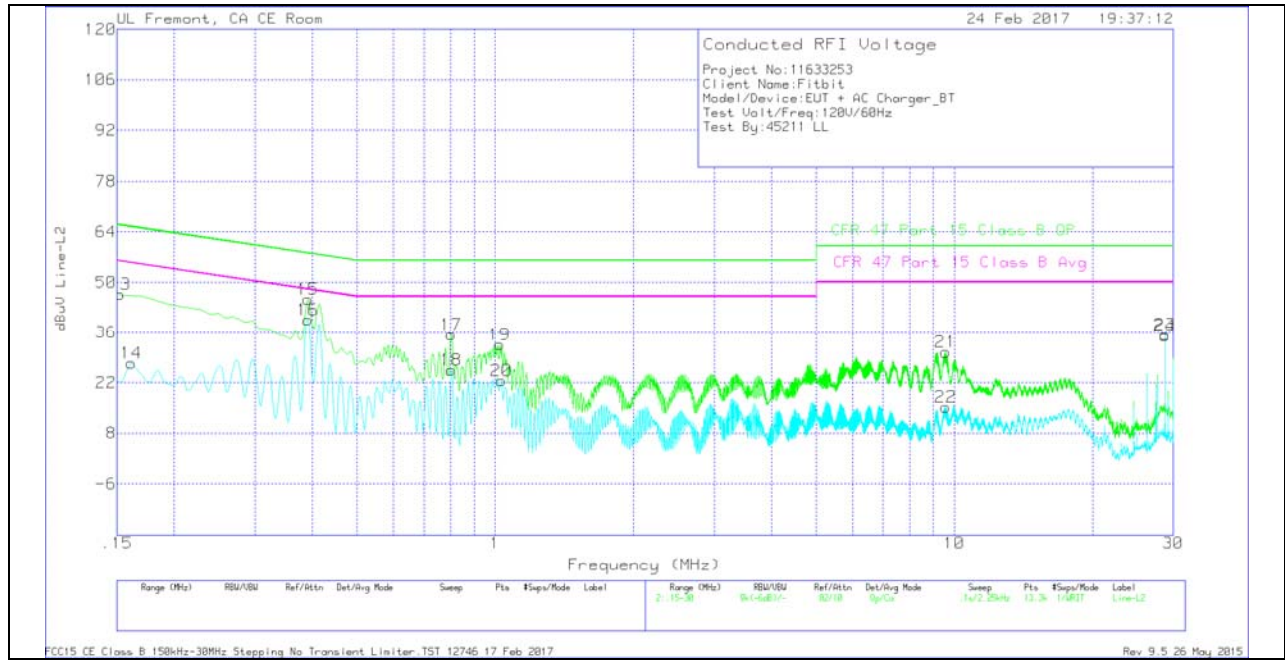
Trace Markers

Range 1: Line=L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	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	.15225	44.21	Qp	.1	.1	44.41	65.88	-21.47	-	-
2	.16125	28.87	Ca	0	.1	28.97	-	-	55.4	-26.43
3	.39075	48.26	Qp	0	.1	48.36	58.05	-9.69	-	-
4	.39075	44.83	Ca	0	.1	44.93	-	-	48.05	-3.12
5	.411	47.02	Qp	0	.1	47.12	57.63	-10.51	-	-
6	.41325	43.71	Ca	0	.1	43.81	-	-	47.58	-3.77
7	.8025	36.22	Qp	0	.1	36.32	56	-19.68	-	-
8	.8025	27.13	Ca	0	.1	27.23	-	-	46	-18.77
9	9.573	30.42	Qp	0	.2	30.62	60	-29.38	-	-
10	9.54825	17.35	Ca	0	.2	17.55	-	-	50	-32.45
11	28.74975	35.03	Qp	.1	.3	35.43	60	-24.57	-	-
12	28.74975	34.51	Ca	.1	.3	34.91	-	-	50	-15.09

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 PLOT



LINE 2 RESULT

Trace Markers

Range 2: Line=L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	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	.15225	46.62	Qp	0	0	46.62	65.88	-19.26	-	-
14	.16125	27.3	Ca	0	.1	27.4	-	-	55.4	-28
15	.39075	45.16	Qp	0	.1	45.26	58.05	-12.79	-	-
16	.39075	39.42	Ca	0	.1	39.52	-	-	48.05	-8.53
17	.8025	35.35	Qp	0	.1	35.45	56	-20.55	-	-
18	.8025	25.43	Ca	0	.1	25.53	-	-	46	-20.47
19	1.023	32.49	Qp	0	.1	32.59	56	-23.41	-	-
20	1.032	22.46	Ca	0	.1	22.56	-	-	46	-23.44
21	9.57075	30.25	Qp	0	.2	30.45	60	-29.55	-	-
22	9.57075	15.08	Ca	0	.2	15.28	-	-	50	-34.72
23	28.74975	35	Qp	.1	.3	35.4	60	-24.6	-	-
24	28.74975	34.65	Ca	.1	.3	35.05	-	-	50	-14.95

Qp - Quasi-Peak detector

Ca - CISPR average detection