



# **CERTIFICATION TEST REPORT**

**Report Number. :** 12455723-E1V1

**Applicant :** FITBIT INC.  
199 FREMONT ST, 14TH FLOOR  
SAN FRANCISCO,  
CA 94105, U.S.A.

**Model :** FB415

**FCC ID :** XRAFB415

**IC :** 8542A-FB415

**EUT Description :** SMART WATCH

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 5

**Date Of Issue:**

November 26, 2018

**Prepared by:**

UL Verification Services Inc.  
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	11/26/2018	Initial Issue	--

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** FITBIT INC.  
199 FREMONT ST, 14<sup>TH</sup> FLOOR  
SAN FRANCISCO,  
CA 94105, U.S.A.

**EUT DESCRIPTION:** SMART WATCH

**MODEL:** FB415

**SERIAL NUMBER:** EVT-FA2-342 , EVT-FA2-338 (CONDUCTED)  
EVT-FA7197 (RADIATED)

**DATE TESTED:** OCTOBER 10 to NOVEMBER 19, 2018

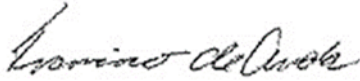
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
INDUSTRY CANADA RSS-247 Issue 2	Complies
INDUSTRY CANADA RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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 the U.S. government.

Approved & Released For  
UL Verification Services Inc. By:



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FRANCISCO DE ANDA  
OPERATIONS LEAD  
UL Verification Services Inc.

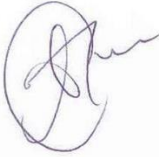
Prepared By:



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ERIC YU  
TEST ENGINEER  
UL Verification Services Inc.

Reviewed By:



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TINA CHU  
SENIOR PROJECT 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, KDB 558074 D01 15.247 Meas Guidance v05, ANSI C63.10-2013, RSS-GEN Issue 5, 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, and 47658 Kato Road, 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	47658 Kato Rd.
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input type="checkbox"/> Chamber I (ISED: 2324A-5)
<input type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input checked="" type="checkbox"/> Chamber J (ISED: 2324A-6)
<input checked="" type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED: 2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED: 2324A-3)
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

## 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

#### RADIATED EMISSIONS

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)  
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

#### MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.  
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

### 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 equipment under test 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	BLE	8.61	7.26

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Peak Gain (dBi)
2.4	-8.37

### 5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Teraterm.

The firmware installed in the EUT during testing was Version 38.4.0.21

### 5.5. WORST-CASE CONFIGURATION AND MODE

EUT has 1 type of plastic wristband and 3 types of metallic bands: Tri-Link with AC/DC adapter. The worst-case configuration was investigated with wristbands with and without a charger and it was determined that EUT with Tri-Link wristband and with a charger was the worst-case; therefore, all final radiated testing was performed with this configuration.

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

Radiated emission below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

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

Worst-case data rate as provided by the client was:

BLE: 1 Mbps.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC
Laptop AC/DC Adapter	Lenovo	ADLX45DLCC2A	11S36200283ZZ10051KU2U	DoC
Laptop	Lenovo	ThinkPad X1 Carbon	R9-0G4NPM 15/06	DoC
AC/DC Adapter	Apple	A1357	N/A	DoC

### I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical	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
4	Antenna	1	SMA	Unshielded	0.08	To spectrum analyzer

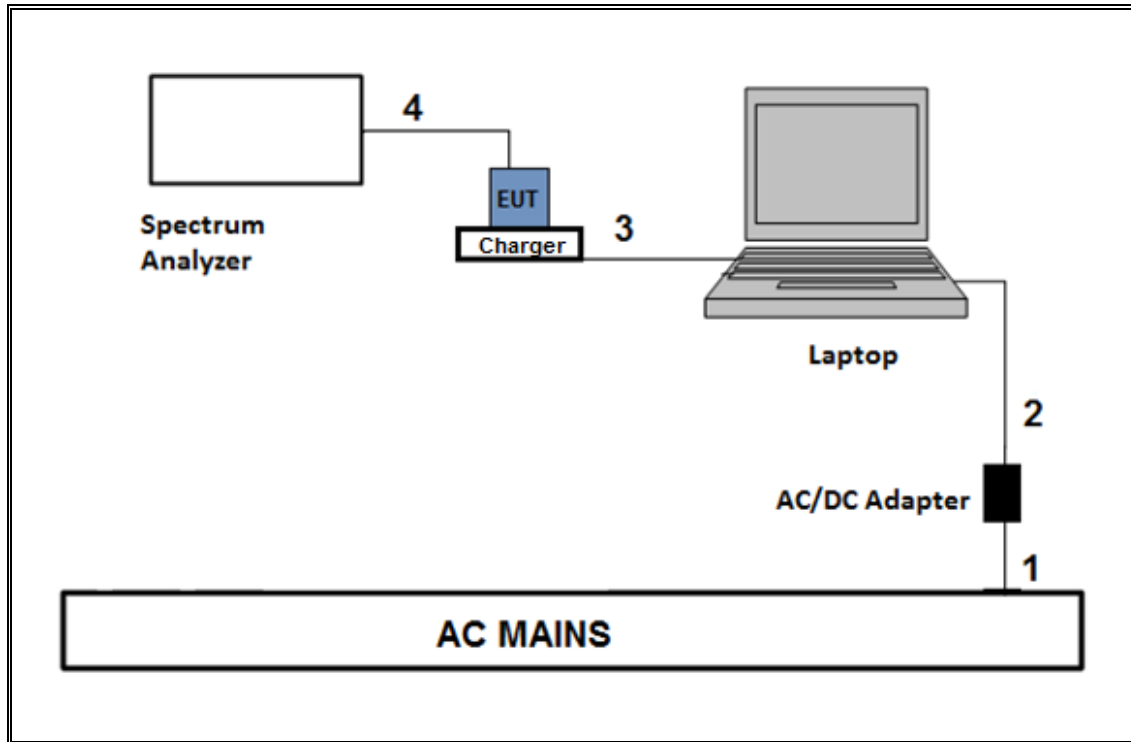
### I/O CABLES (AC POWER CONDUCTED TEST AND RADIATED TEST)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Shielded	1	Charger to AC/DC adapter

### **TEST SETUP-CONDUCTED TEST**

The EUT was placed in charger and powered by host laptop. Test software exercised the EUT.

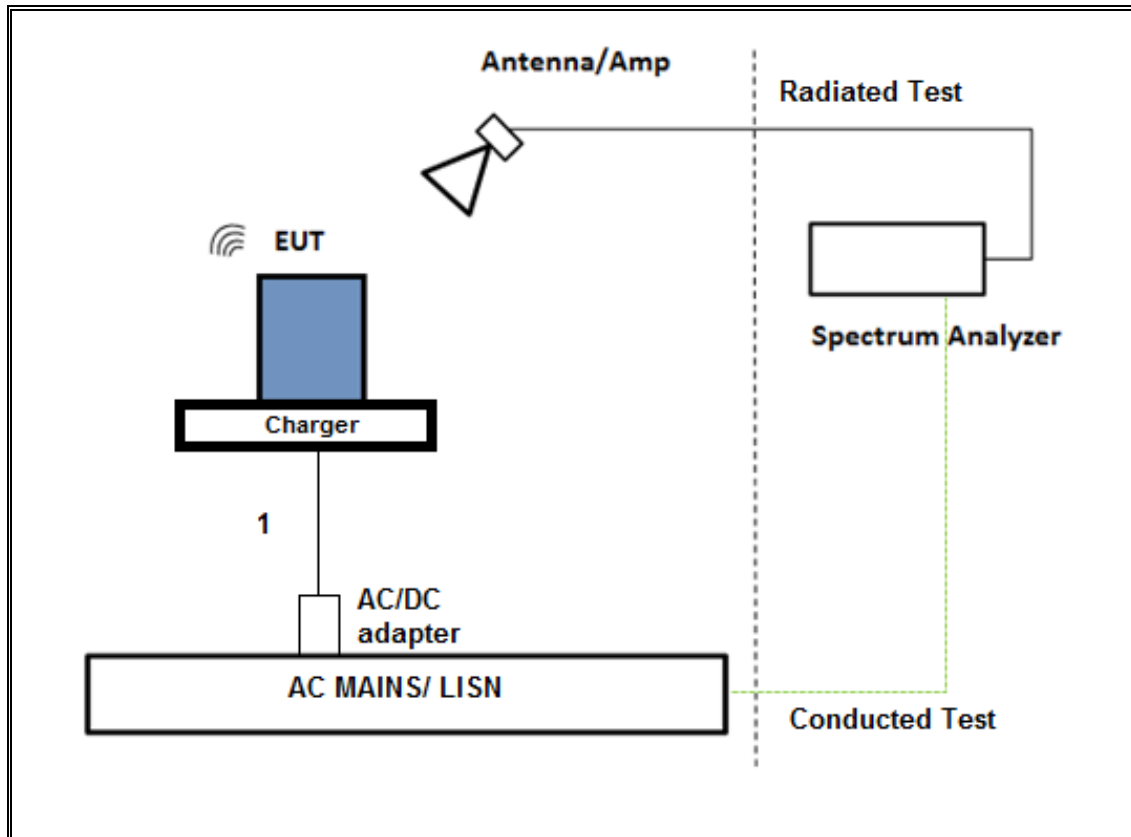
### **SETUP DIAGRAM**



### **TEST SETUP- AC LINE CONDUCTED TEST AND RADIATED TEST**

The EUT was placed in charger and powered by an AC/DC adapter. Test software exercised the EUT.

### **SETUP DIAGRAM**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Active Loop 9KHz to 30MHz	MICRO-TRONICS	AL-130R	PRE0165308	12/13/2018
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	T300	12/11/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1450	02/05/2019
Antenna, Horn 1-18GHz	ETS Lindgren	3117	AT0067	03/26/2019
Amplifier, 1 to 18GHz	Ampical	AMP1G18-35	T1571	06/03/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	PRE0181575	08/01/2019
Amplifier, 30kHz-1000MHz	SONOMA INSTRUMENT	310	PRE0180174	05/31/2019
EMI Test Receiver	Rohde&Schwarz	ESW44	PRE0179372	05/04/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A-544	T1113	12/21/2018
Antenna Horn, 18 to 26GHz	ARA	MWH-1826/B	T448	03/13/2019
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	03/09/2019
EMI Test Receiver	Rohde&Schwarz	ESW44	PRE0179376	05/08/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1271	07/17/2019
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1225	04/10/2019
AC Line Conducted				
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ESC17	T1124	11/07/2018
LISN for Conducted Emissions CISPR-16	FCC INC.	FCC LISN 50/250	T1310	06/15/2019
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018	
Radiated Software (below 30MHz only)	UL	UL EMC	Ver 9.5, Dec 01, 2016	
Antenna Port Software	UL	UL RF	Ver 8.8.1, Sep 26, 2018	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

### NOTES:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

## 7. MEASUREMENT METHODS

6 dB BW: ANSI C63.10 Subclause -11.8.1

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Subclause -11.13.3.4 Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME, DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

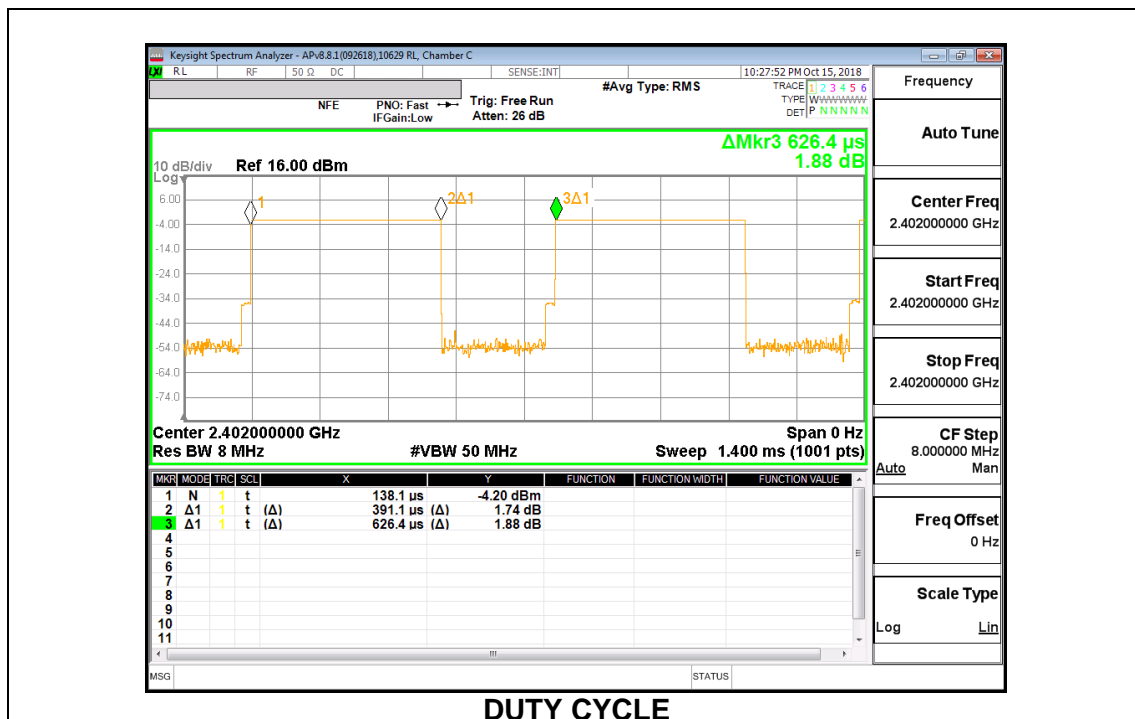
#### PROCEDURE

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)
BLE	0.391	0.626	0.624	62.44%	2.05	2.557

#### DUTY CYCLE PLOTS



## **8.2. 6 dB BANDWIDTH**

### **LIMITS**

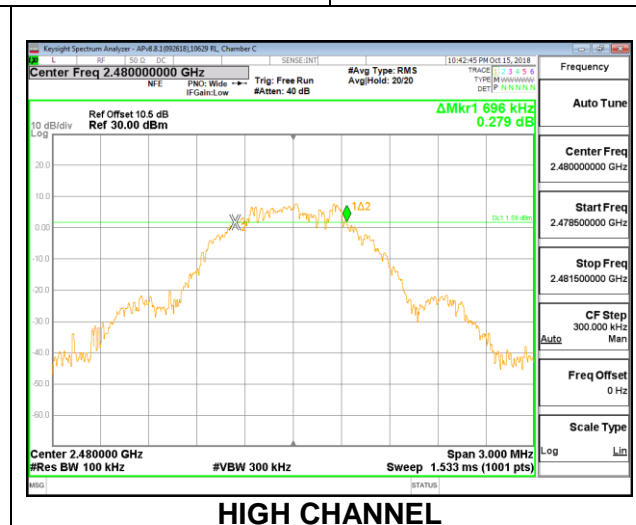
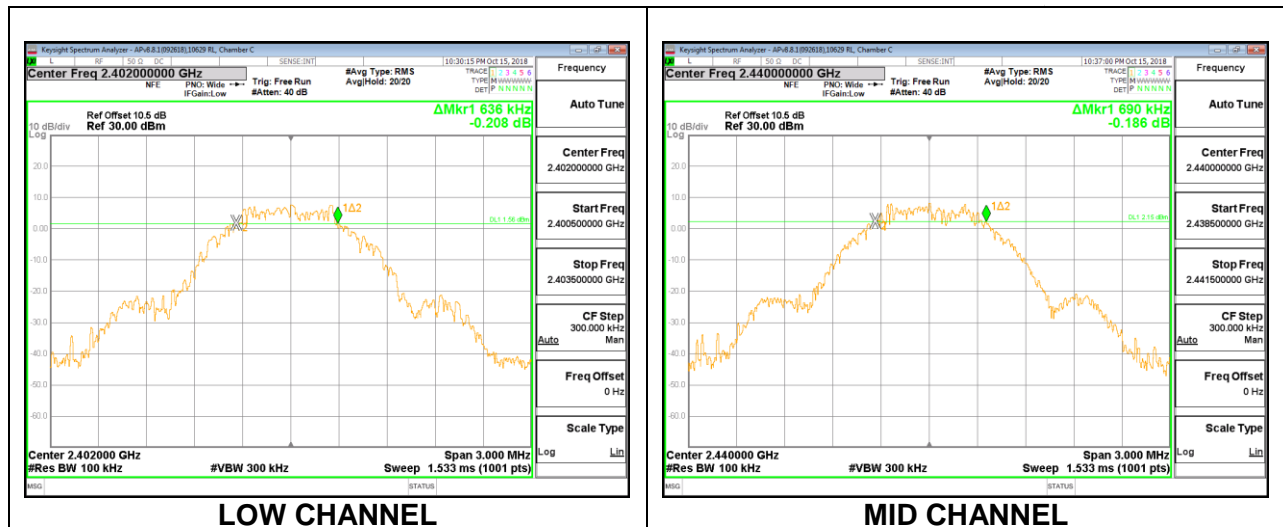
FCC §15.247 (a) (2)

IC RSS-247 (5.2) (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

## RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6360	0.5
Middle	2440	0.6900	0.5
High	2480	0.6960	0.5



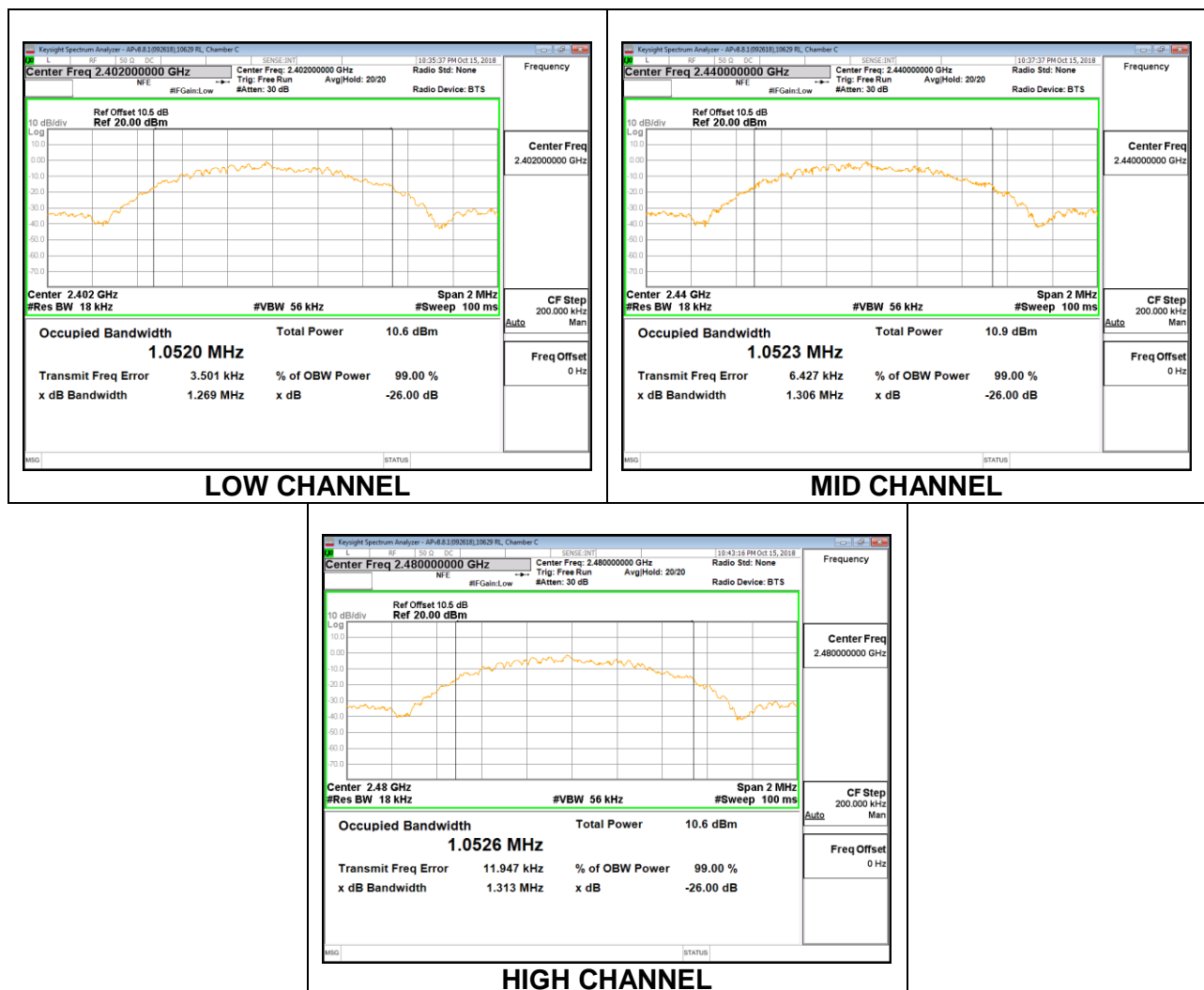
### 8.3. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0520
Middle	2440	1.0523
High	2480	1.0526



## 8.4. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.3 dB (including 10 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

### RESULTS

<b>Tested By:</b>	43573
<b>Date:</b>	11/19/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	8.23
Middle	2440	8.45
High	2480	7.70

## 8.5. OUTPUT POWER

### LIMITS

FCC §15.247 (b) (3)

IC RSS-247 (5.4) (d)

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

### RESULTS

<b>Tested By:</b>	43573
<b>Date:</b>	11/19/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.40	30	-21.60
Middle	2440	8.61	30	-21.39
High	2480	7.84	30	-22.16

## **8.6. POWER SPECTRAL DENSITY**

### **LIMITS**

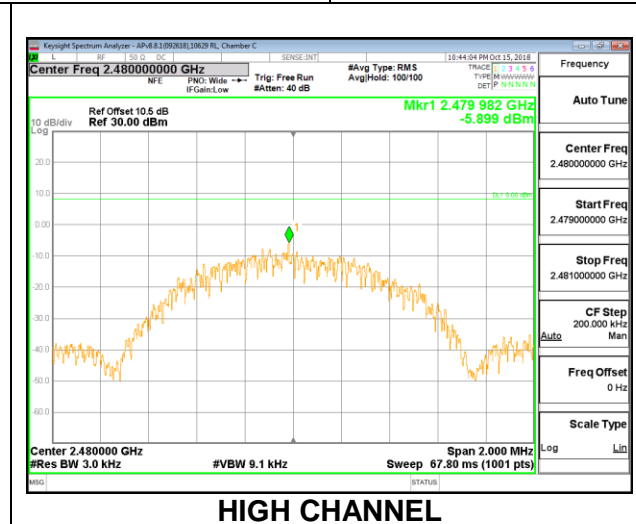
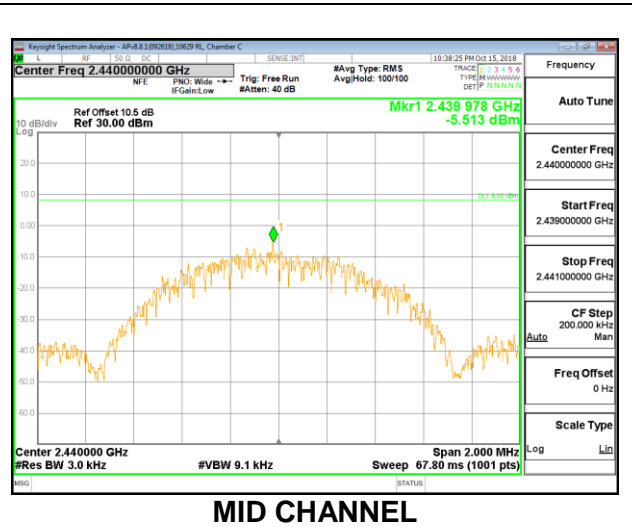
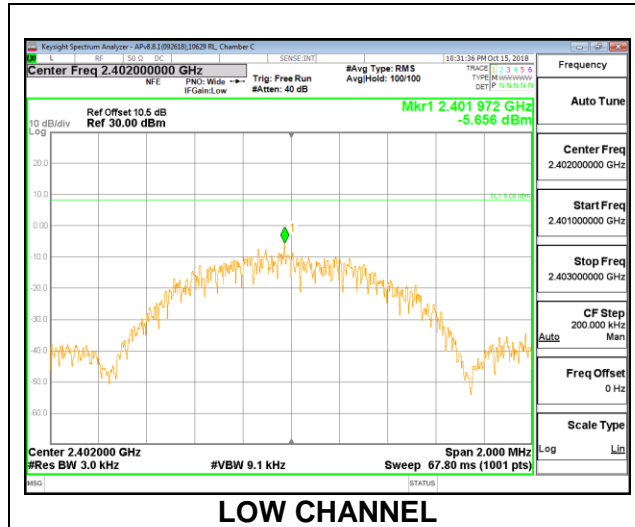
FCC §15.247 (e)

IC RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### **RESULTS**

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-5.66	8	-13.66
Middle	2440	-5.51	8	-13.51
High	2480	-5.90	8	-13.90



## **8.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS**

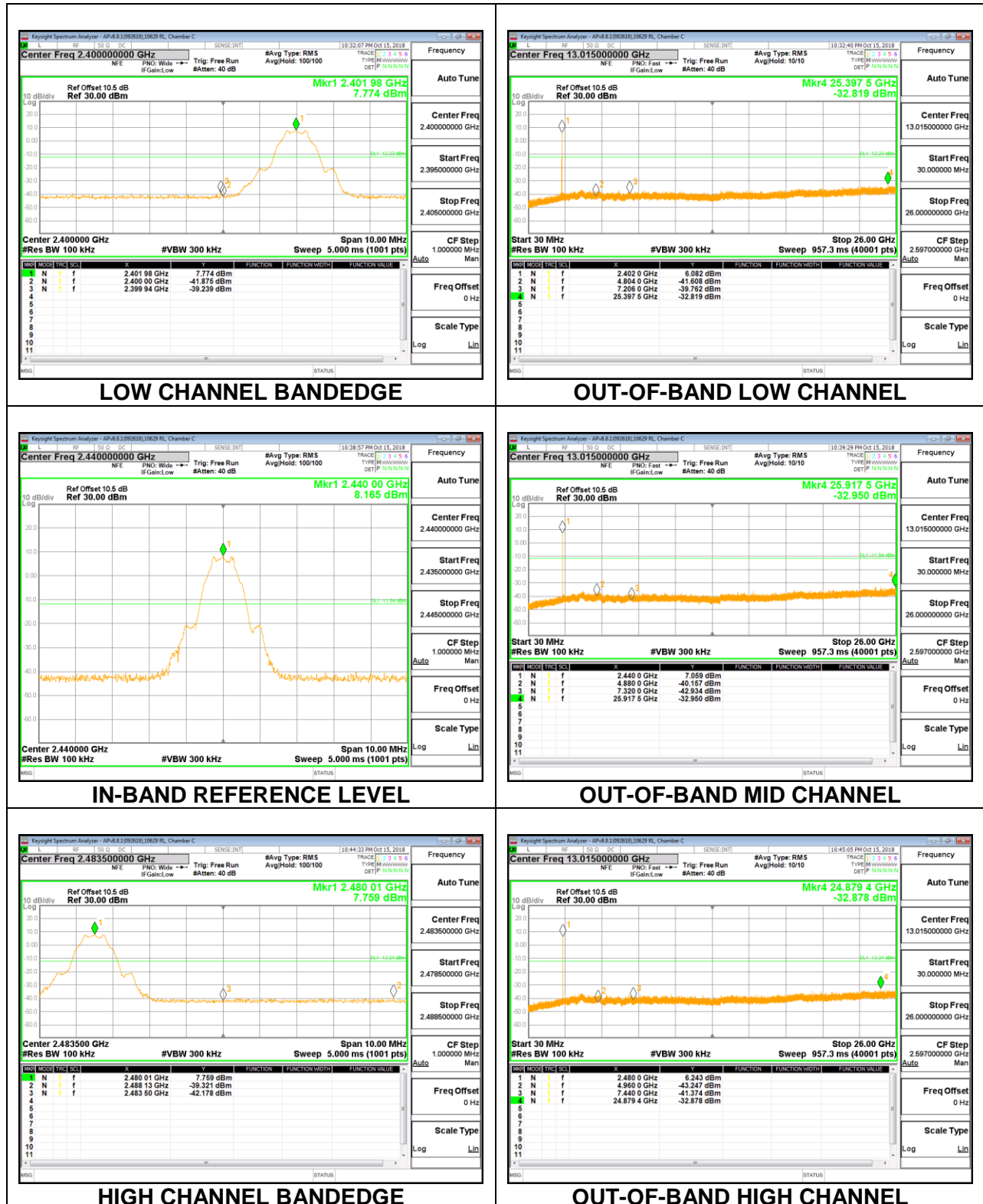
### **LIMITS**

FCC §15.247 (d)

IC RSS-247 (5.5)

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

### **RESULTS**



## 9. RADIATED TEST RESULTS

### 9.1. 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
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

#### TEST PROCEDURE

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

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

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

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

**KDB 414788 OATS and Chamber Correlation Justification**

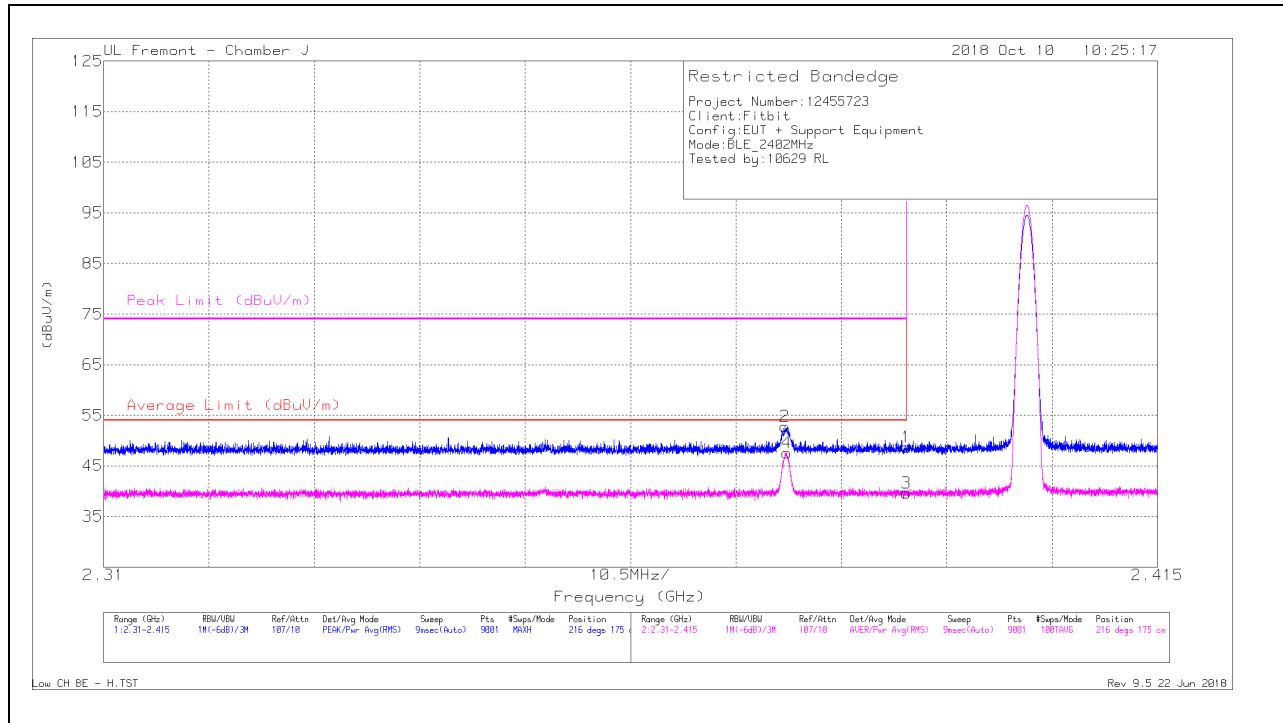
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

## 9.2. TRANSMITTER ABOVE 1 GHz

### BANDEDGE (LOW CHANNEL)

#### HORIZONTAL RESULT



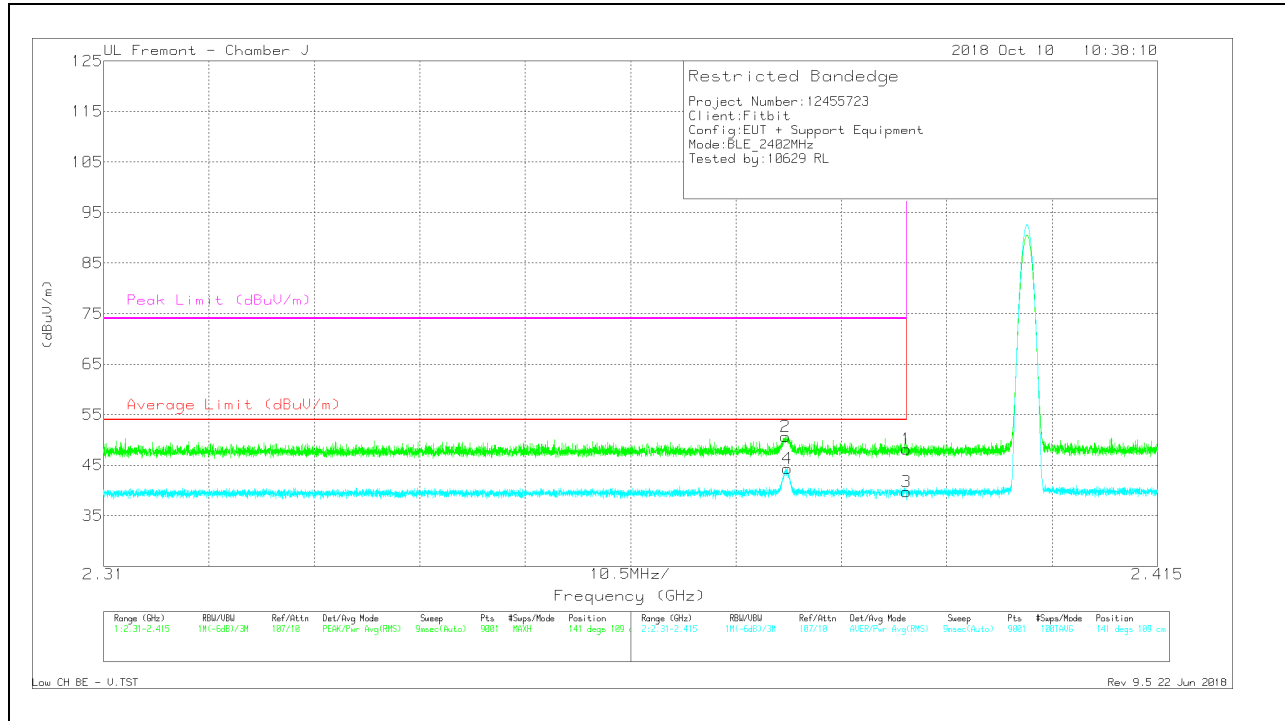
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0067 (dB/m)	Amp/Cb/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	42.47	Pk	32	-25.8	0	48.67	-	-	74	-25.33	216	175	H
2	* 2.378	46.63	Pk	32	-25.8	0	52.83	-	-	74	-21.17	216	175	H
3	* 2.39	31.3	RMS	32	-25.8	2.05	39.55	54	-14.43	-	-	216	175	H
4	* 2.378	39.25	RMS	32	-25.8	2.05	47.50	54	-6.48	-	-	216	175	H

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

Pk - Peak detector

RMS - RMS detection

## VERTICAL RESULT



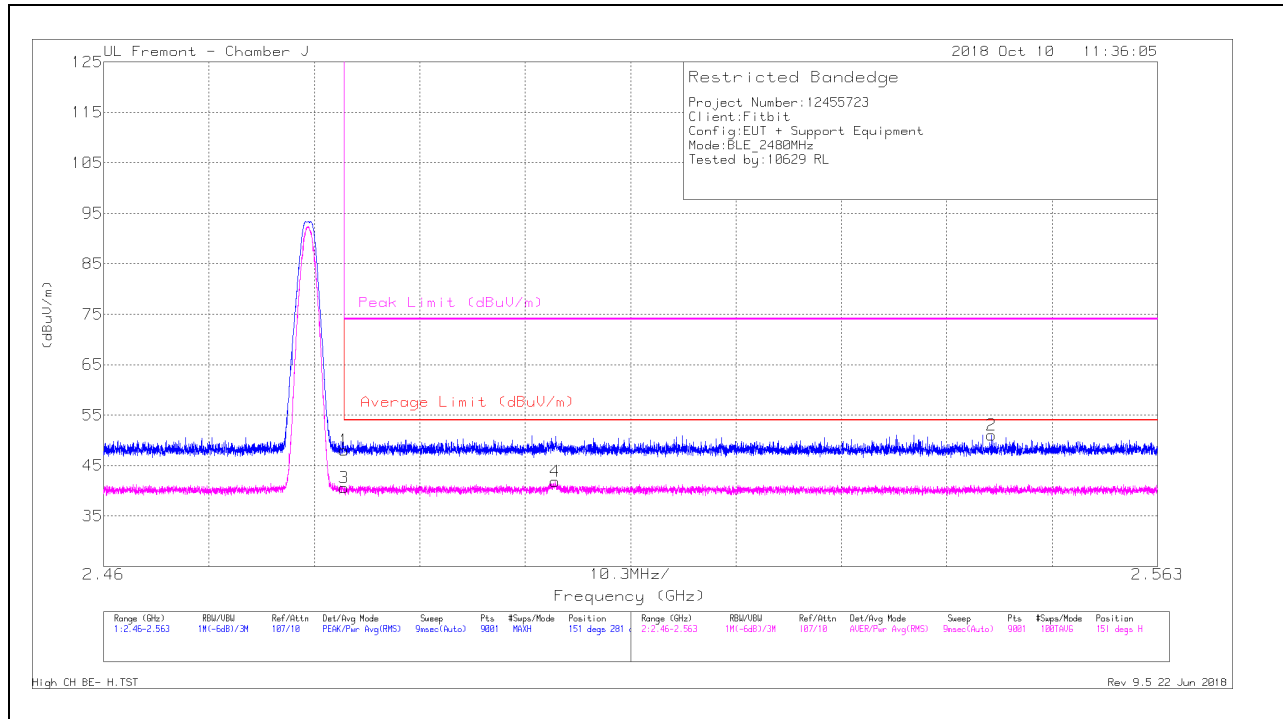
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF A70067 (dB/m)	Amp/Cb/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Asimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.93	Pk	32	-25.8	0	48.13	-	-	74	-25.87	141	109	V
2	* 2.378	44.51	Pk	32	-25.8	0	50.71	-	-	74	-23.29	141	109	V
3	* 2.39	31.48	RMS	32	-25.8	2.05	39.73	54	-14.25	-	-	141	109	V
4	* 2.378	36.03	RMS	32	-25.8	2.05	44.28	54	-9.7	-	-	141	109	V

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

Pk - Peak detector

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



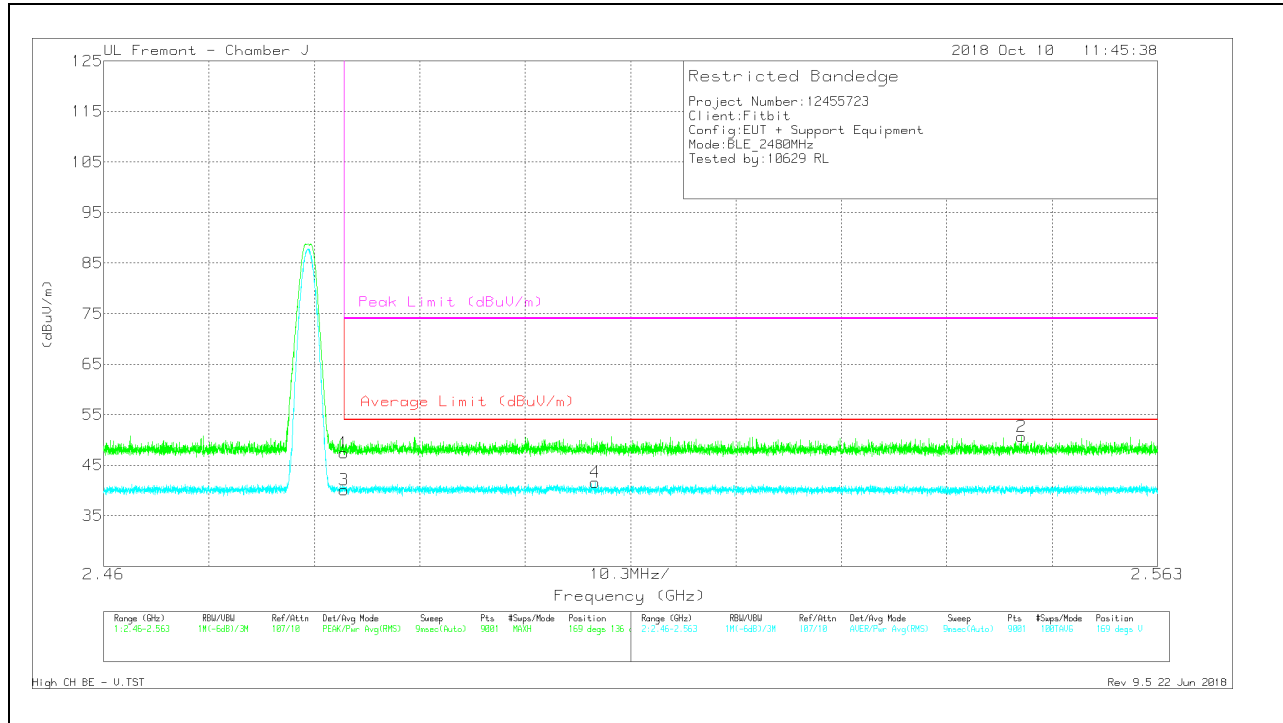
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0067 (dB/m)	Amp/Cb/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	41.38	Pk	32.5	-25.8	0	48.08	-	-	74	-25.92	151	281	H
2	2.547	44.26	Pk	32.5	-25.7	0	51.06	-	-	74	-22.94	151	281	H
3	* 2.484	31.84	RMS	32.5	-25.8	2.05	40.59	54	-13.39	-	-	151	281	H
4	2.504	33.07	RMS	32.5	-25.8	2.05	41.82	54	-12.16	-	-	151	281	H

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

Pk - Peak detector

RMS - RMS detection

## VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF A70067 (dB/m)	Amp/Cb/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Asimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.78	Pk	32.5	-25.8	0	47.48	-	-	74	-26.52	169	136	V
2	2.55	43.88	Pk	32.5	-25.7	0	50.68	-	-	74	-23.32	169	136	V
3	* 2.484	31.32	RMS	32.5	-25.8	2.05	40.07	54	-13.91	-	-	169	136	V
4	2.508	32.7	RMS	32.5	-25.7	2.05	41.55	54	-12.43	-	-	169	136	V

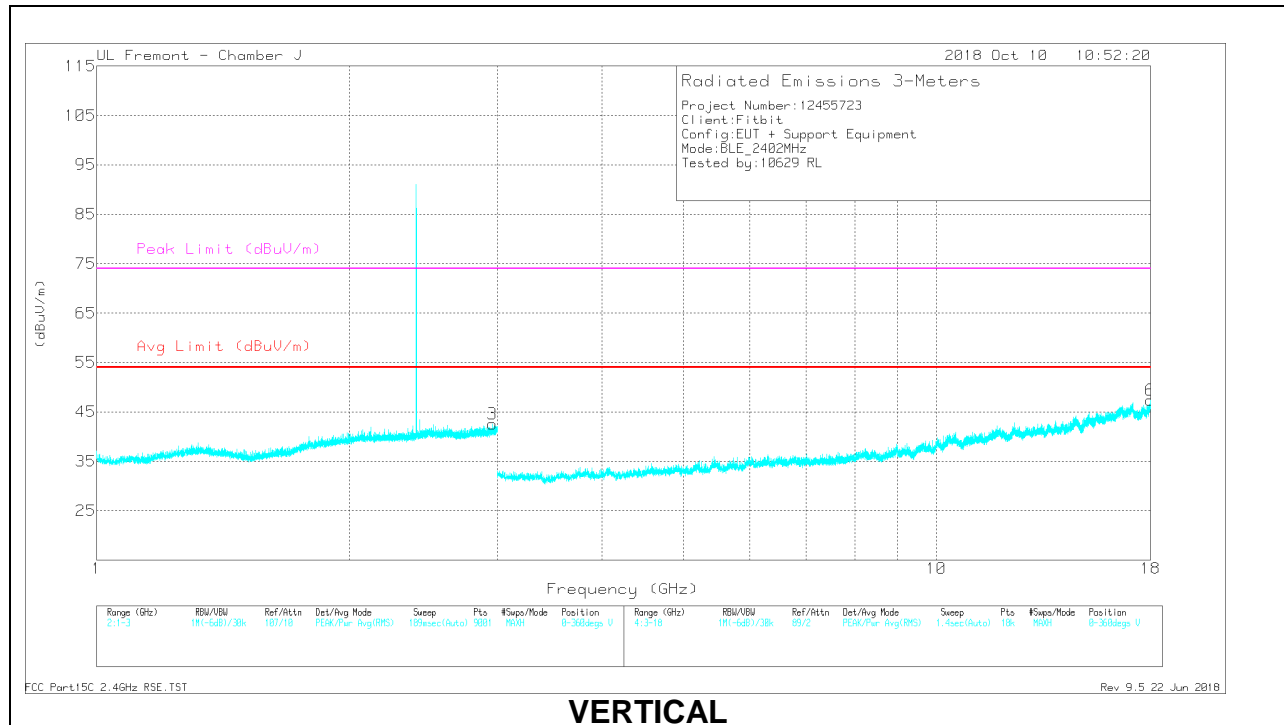
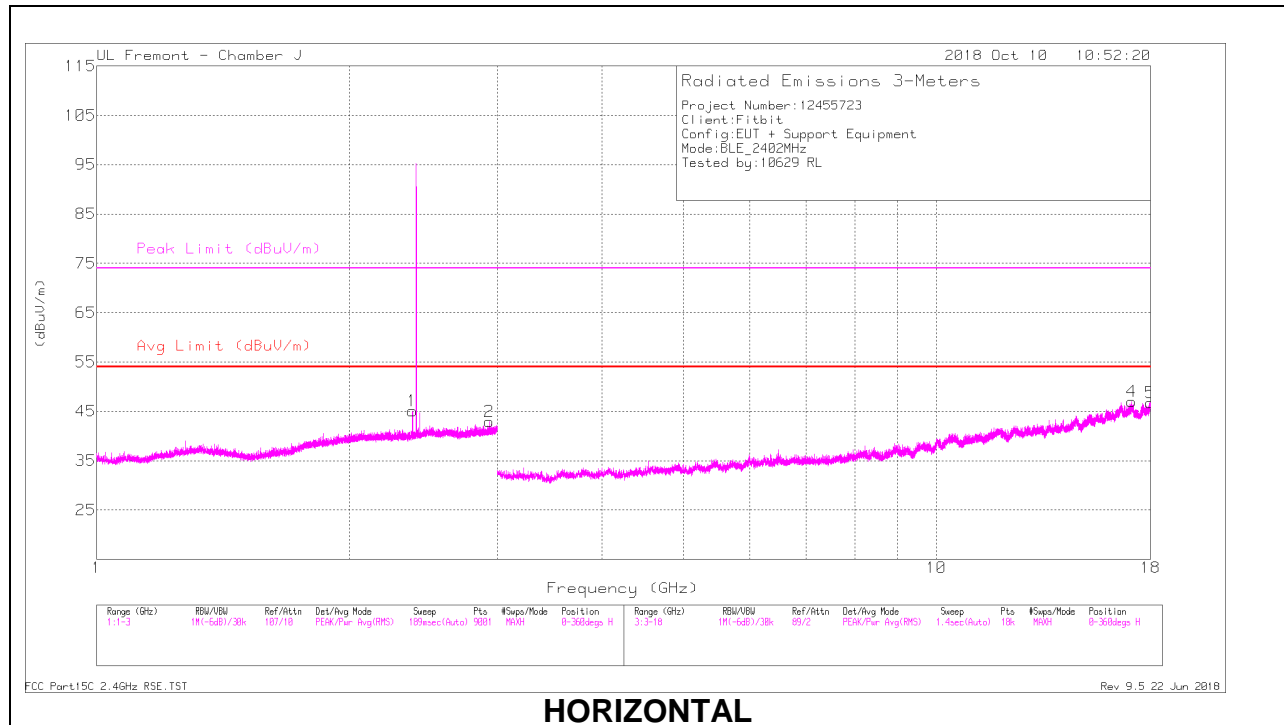
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS



## RADIATED EMISSIONS

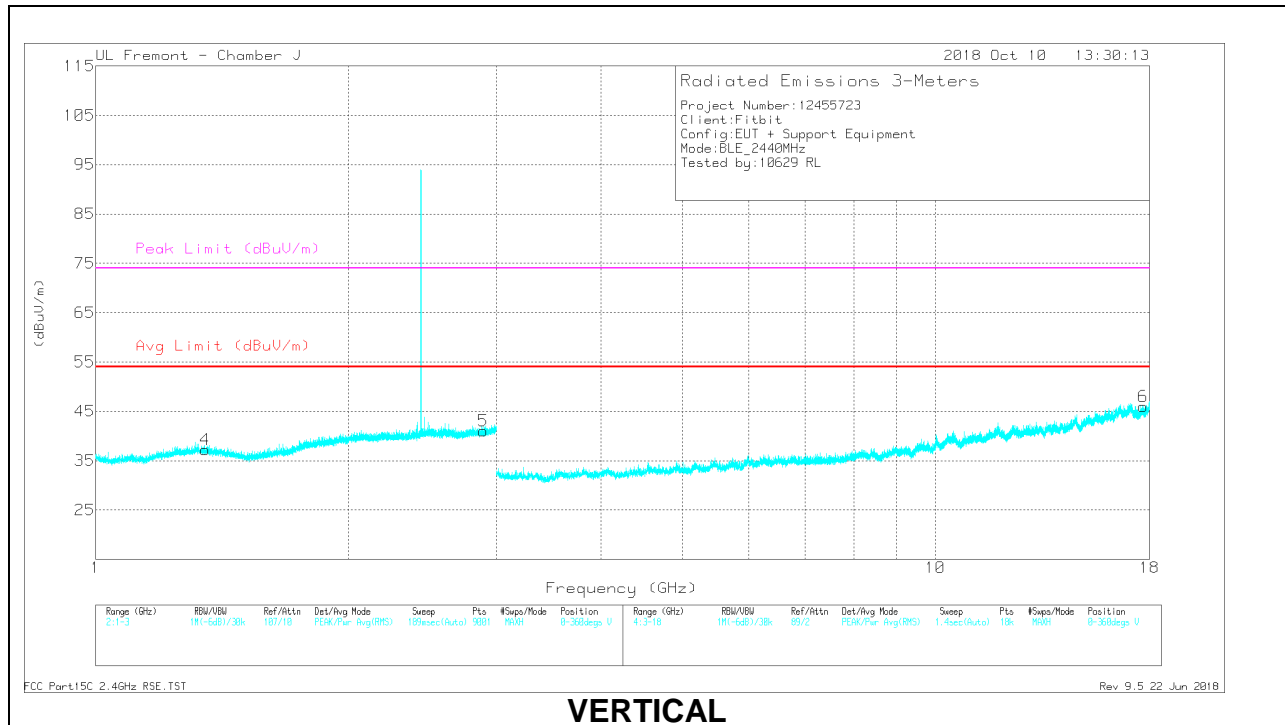
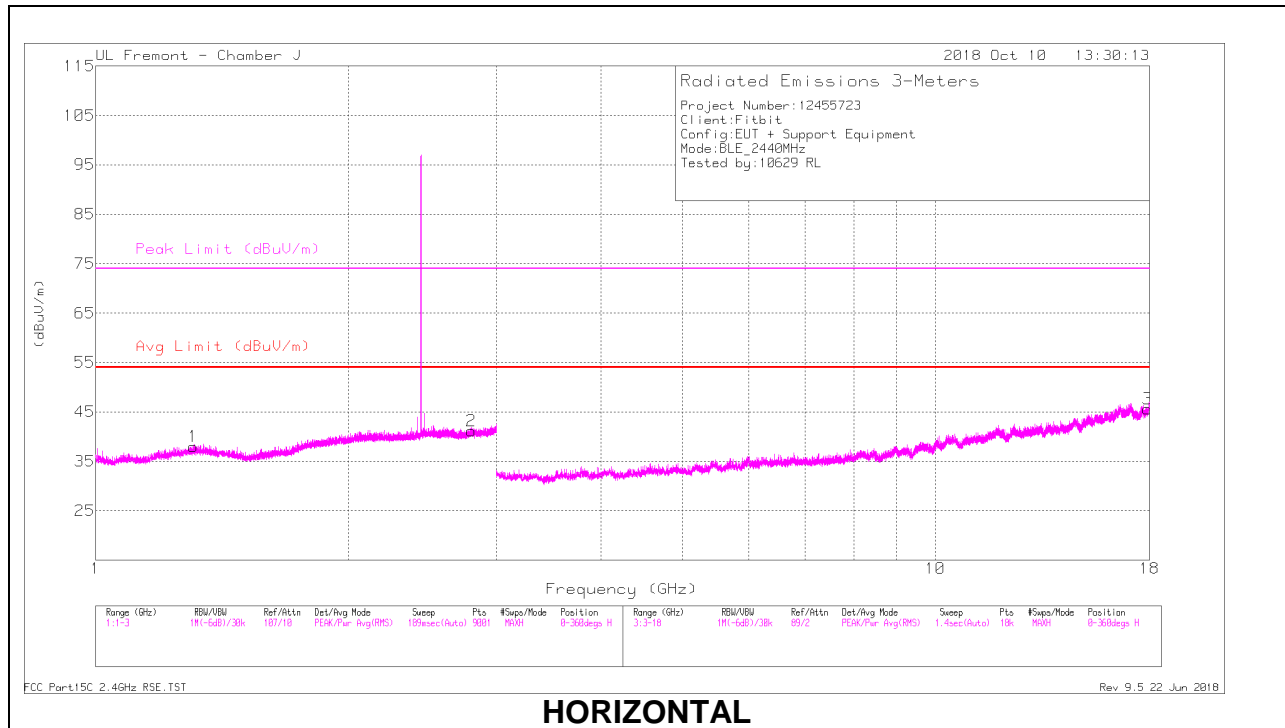
Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0067 (dB/m)	Amp/Cb/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.378	45.39	PK2	32	-25.8	0	51.59	-	-	74	-22.41	215	172	H
* 2.378	39.28	MAV1	32	-25.8	2.05	47.53	54	-6.45	-	-	215	172	H
2.933	41.31	PK2	32.6	-25.3	0	48.61	-	-	-	-	259	209	H
2.935	32.02	MAV1	32.6	-25.3	2.05	41.37	-	-	-	-	259	209	H
2.958	40.75	PK2	32.7	-25.3	0	48.15	-	-	-	-	150	129	V
2.958	32.12	MAV1	32.7	-25.2	2.05	41.67	-	-	-	-	150	129	V
17.092	29.04	PK2	41	-18.1	0	51.94	-	-	-	-	94	104	H
17.091	20.84	MAV1	41	-18.1	2.05	45.79	-	-	-	-	94	104	H
* 17.997	29.99	PK2	40.8	-17.8	0	52.99	-	-	74	-21.01	213	229	H
* 17.996	20.99	MAV1	40.8	-17.8	2.05	46.04	54	-7.94	-	-	213	229	H
* 17.986	29.68	PK2	40.7	-17.9	0	52.48	-	-	74	-21.52	301	189	V
* 17.988	20.91	MAV1	40.7	-17.9	2.05	45.76	54	-8.22	-	-	301	189	V

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

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

## MID CHANNEL RESULTS



## RADIATED EMISSIONS

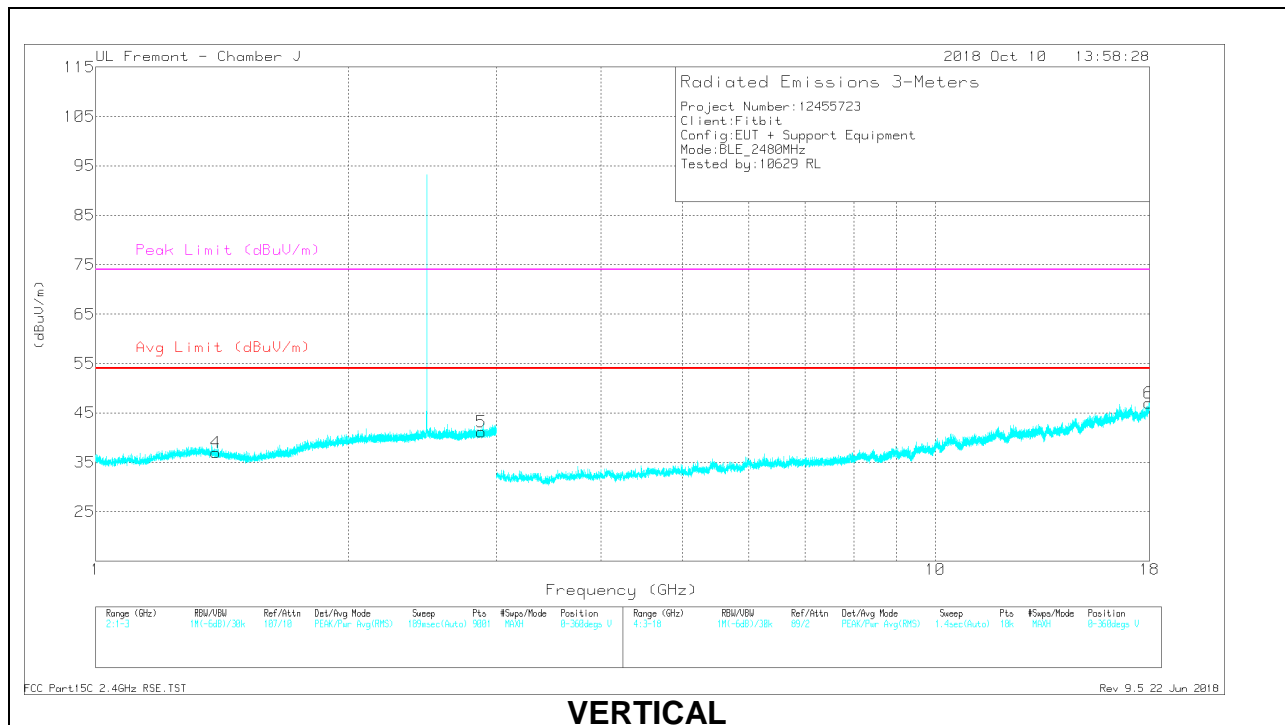
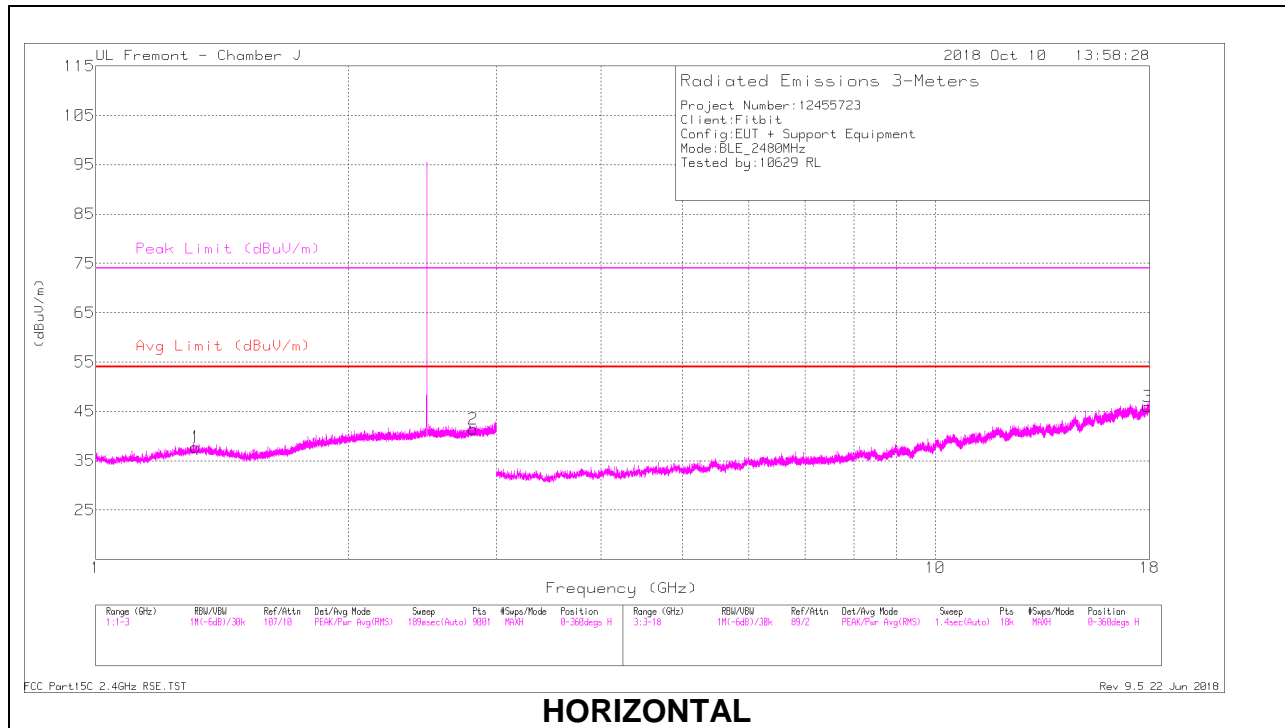
Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0067 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.306	39.98	PK2	29.2	-26	0	43.18	-	-	74	-30.82	32	229	H
* 1.305	32.06	MAV1	29.2	-26	2.05	37.31	54	-16.67	-	-	32	229	H
* 2.802	40.49	PK2	32.5	-25.5	0	47.49	-	-	74	-26.51	185	186	H
* 2.801	32.36	MAV1	32.5	-25.5	2.05	41.41	54	-12.57	-	-	185	186	H
* 1.353	40.27	PK2	29.3	-26	0	43.57	-	-	74	-30.43	85	300	V
* 1.353	32.05	MAV1	29.3	-26.1	2.05	37.3	54	-16.68	-	-	85	300	V
* 2.894	43.73	PK2	32.6	-25.4	0	50.93	-	-	74	-23.07	331	209	V
* 2.893	32.56	MAV1	32.6	-25.4	2.05	41.81	54	-12.17	-	-	331	209	V
* 17.912	29.27	PK2	40.6	-18.5	0	51.37	-	-	74	-22.63	250	310	H
* 17.909	21.02	MAV1	40.5	-18.4	2.05	45.17	54	-8.81	-	-	250	310	H
17.695	29.09	PK2	40.6	-18	0	51.69	-	-	-	-	183	343	V
17.696	20.83	MAV1	40.6	-18.1	2.05	45.38	-	-	-	-	183	343	V

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

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

## HIGH CHANNEL RESULTS



## RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0067 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.316	40.62	PK2	29.3	-26.1	0	43.82	-	-	74	-30.18	250	128	H
* 1.315	32.52	MAV1	29.3	-26	2.05	37.87	54	-16.11	-	-	250	128	H
* 2.816	39.44	PK2	32.5	-25.5	0	46.44	-	-	74	-27.56	172	187	H
* 2.817	32.33	MAV1	32.5	-25.5	2.05	41.38	54	-12.6	-	-	172	187	H
* 1.388	39.4	PK2	29	-26.1	0	42.3	-	-	74	-31.7	131	210	V
* 1.388	31.86	MAV1	29	-26.1	2.05	36.81	54	-17.17	-	-	131	210	V
* 2.877	40.24	PK2	32.5	-25.4	0	47.34	-	-	74	-26.66	65	239	V
* 2.879	31.97	MAV1	32.5	-25.4	2.05	41.12	54	-12.86	-	-	65	239	V
* 17.909	29.79	PK2	40.5	-18.4	0	51.89	-	-	74	-22.11	311	350	H
* 17.907	20.81	MAV1	40.5	-18.4	2.05	44.96	54	-9.02	-	-	311	350	H
* 17.975	31.25	PK2	40.7	-18	0	53.95	-	-	74	-20.05	263	299	V
* 17.975	21.41	MAV1	40.7	-18	2.05	46.16	54	-7.82	-	-	263	299	V

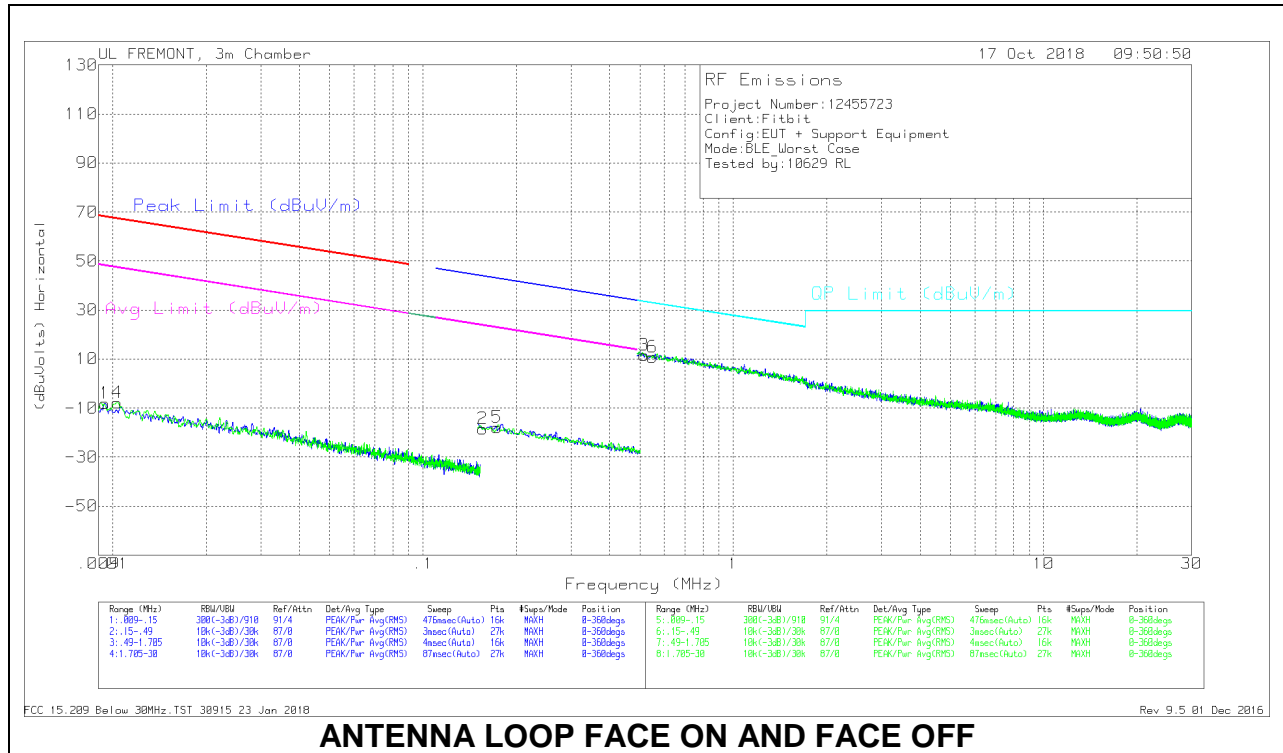
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

### 9.3. WORST-CASE BELOW 30 MHz

#### SPURIOUS EMISSIONS 9kHz TO 30 MHz (WORST-CASE CONFIGURATION)



#### ANTENNA LOOP FACE ON AND FACE OFF

#### DATA

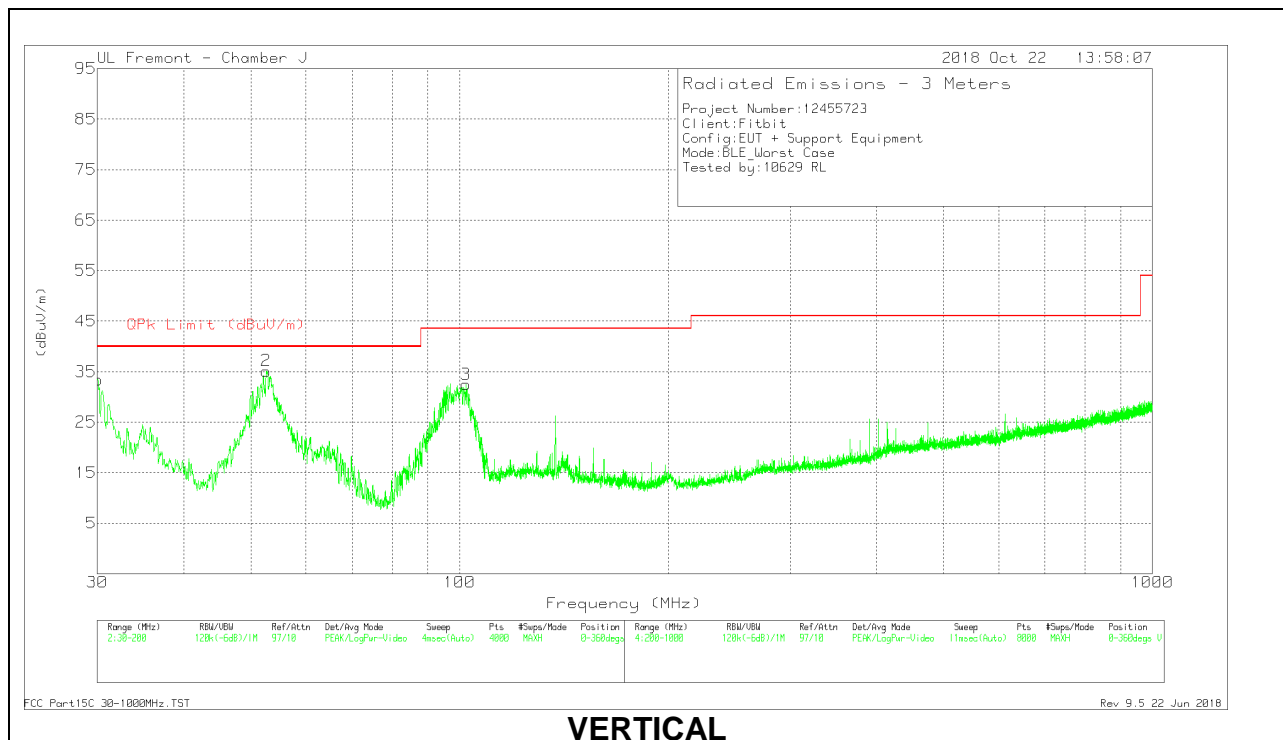
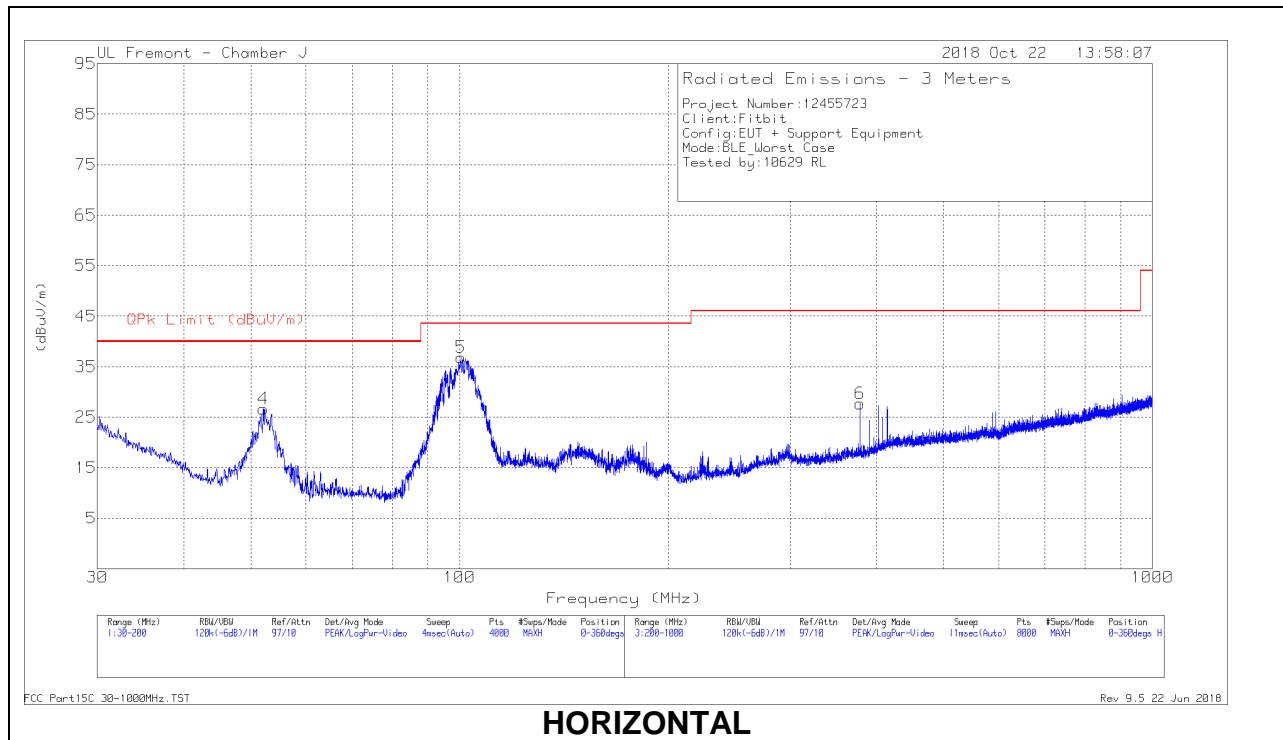
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.00945	54.99	Pk	15.5	1.4	-80	-8.11	68.08	-76.19	48.08	-56.19	-	-	0-360
4	.01035	55.64	Pk	15.2	1.4	-80	-7.76	67.29	-75.05	47.29	-55.05	-	-	0-360
2	.15588	46.11	Pk	13.8	1.5	-80	-18.59	43.77	-62.36	23.77	-42.36	-	-	0-360
5	.17332	46.74	Pk	13.8	1.5	-80	-17.96	42.84	-60.8	22.84	-40.8	-	-	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.51516	36.19	Pk	13.9	1.5	-40	11.59	33.37	-21.78	0-360
6	.54932	35.45	Pk	13.9	1.5	-40	10.85	32.81	-21.96	0-360

Pk - Peak detector

## 9.4. WORST-CASE BELOW 1 GHz

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



# DATA

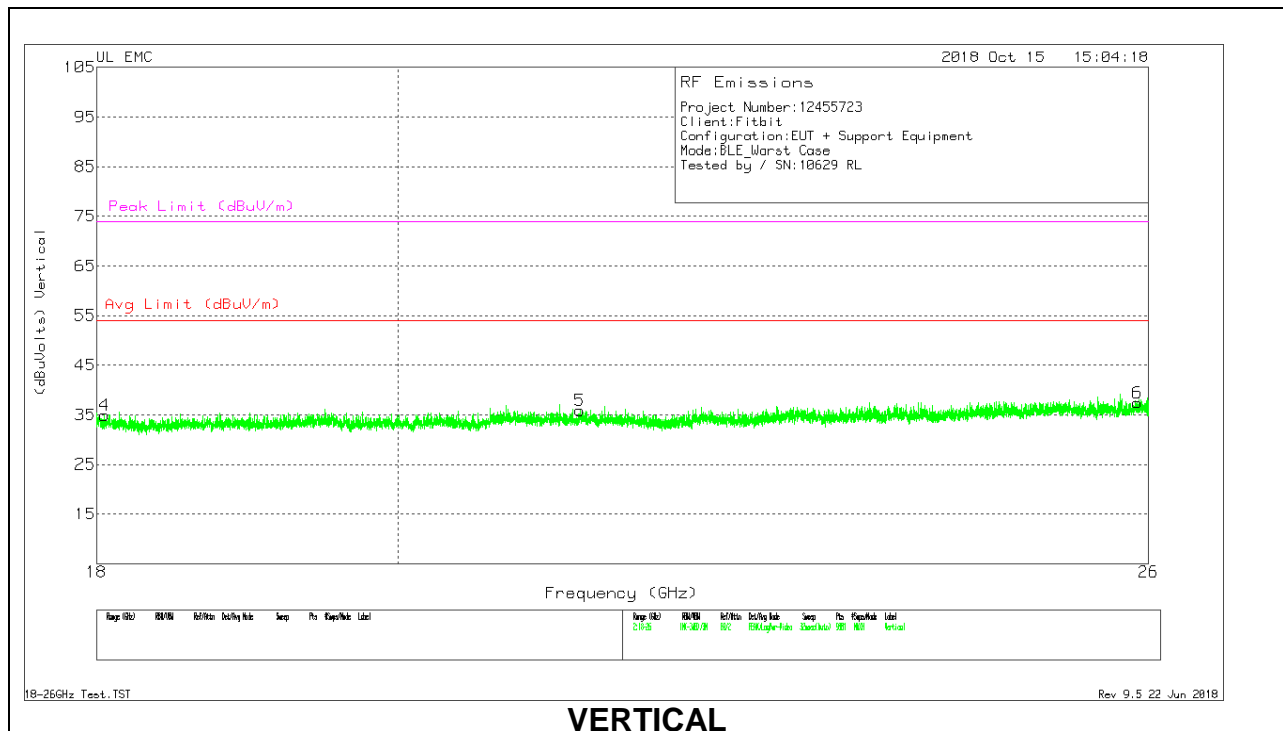
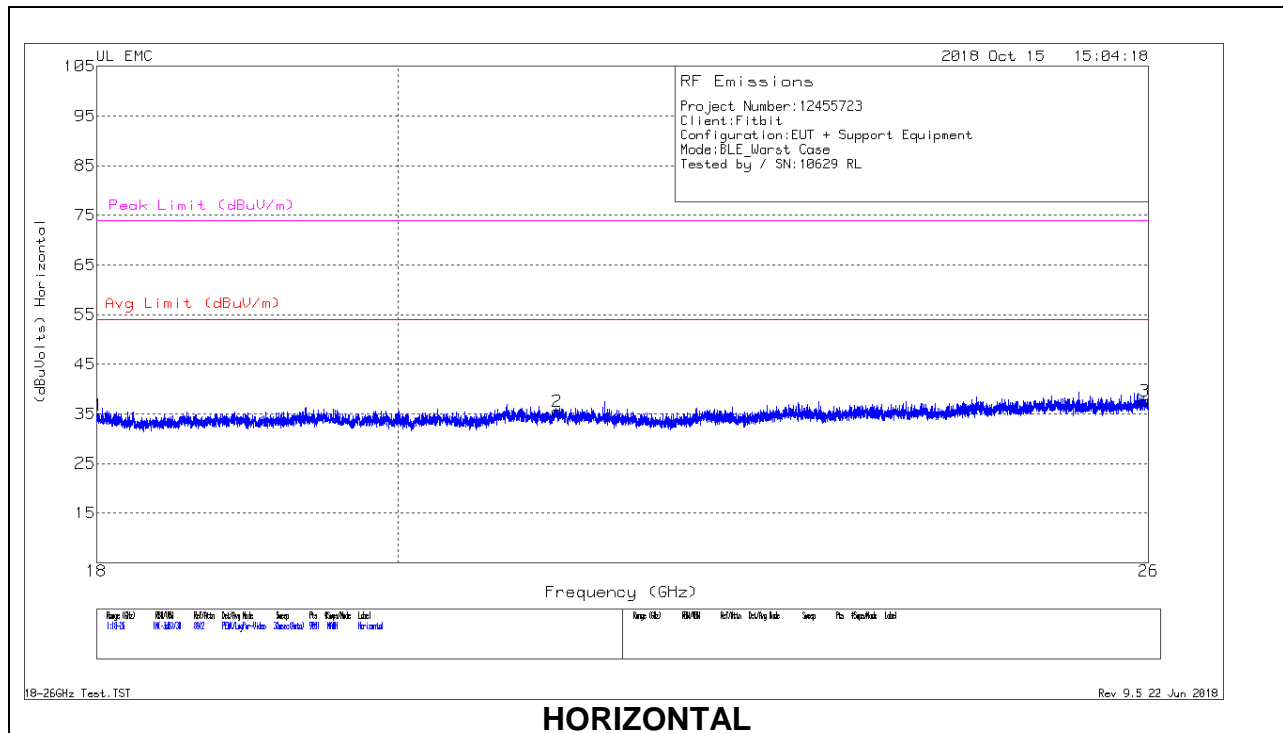
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181575 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	52.3822	46.22	Pk	13.3	-31.3	28.22	40	-11.78	198	193	H
	52.3822	37.9	Qp	13.3	-31.3	19.9	40	-20.1	198	193	H
5	101.1957	49.38	Pk	16.7	-30.9	35.18	43.52	-8.34	9	194	H
	101.1957	42.65	Qp	16.7	-30.9	28.45	43.52	-15.07	9	194	H
1	30.1227	40.17	Pk	26.6	-31.6	35.17	40	-4.83	107	122	V
	30.1227	28.68	Qp	26.6	-31.6	23.68	40	-16.32	107	122	V
2	52.5429	54.03	Pk	13.2	-31.3	35.93	40	-4.07	247	102	V
	52.5429	45.99	Qp	13.2	-31.3	27.89	40	-12.11	247	102	V
3	95.4347	49.05	Pk	15	-30.9	33.15	43.52	-10.37	2	114	V
	95.4347	38.82	Qp	15	-30.9	22.92	43.52	-20.6	2	114	V
6	378.3644	37.39	Pk	20.9	-29.7	28.59	46.02	-17.43	204	276	H
	378.3644	22.58	Qp	20.9	-29.7	13.78	46.02	-32.24	204	276	H

Pk - Peak detector

Qp - Quasi-Peak detector

## 9.5. WORST-CASE 18-26 GHz

### SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



## DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T448 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.016	71.88	Pk	32.4	-60	-9.5	34.78	54	-19.22	74	-39.22
2	21.147	69.05	Pk	33.2	-57.2	-9.5	35.55	54	-18.45	74	-38.45
3	25.962	67.43	Pk	34.6	-54.9	-9.5	37.63	54	-16.37	74	-36.37
4	18.052	72.26	Pk	32.3	-60.1	-9.5	34.96	54	-19.04	74	-39.04
5	21.314	69.37	Pk	33.1	-57.1	-9.5	35.87	54	-18.13	74	-38.13
6	25.899	67.35	Pk	34.6	-55	-9.5	37.45	54	-16.55	74	-36.55

Pk - Peak detector

## 10. 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.

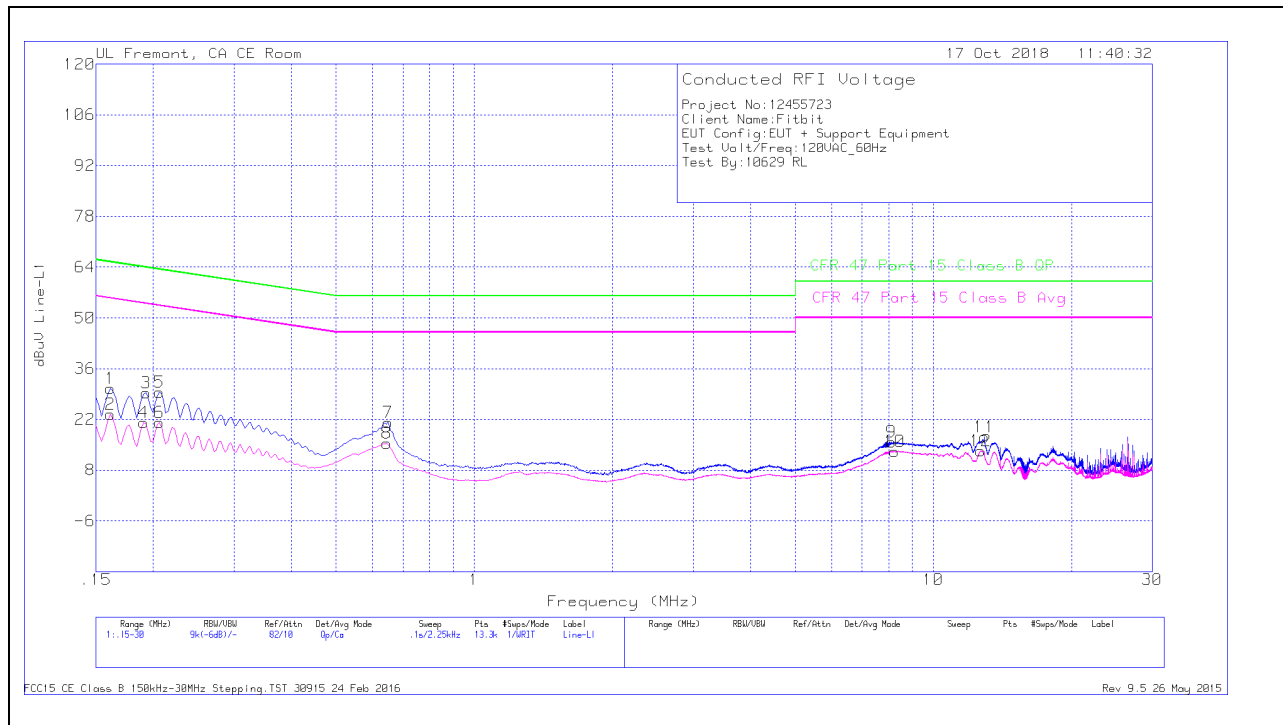
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

### RESULTS

Note: EUT powered by AC/DC adapter via USB cable.

## LINE 1 RESULTS

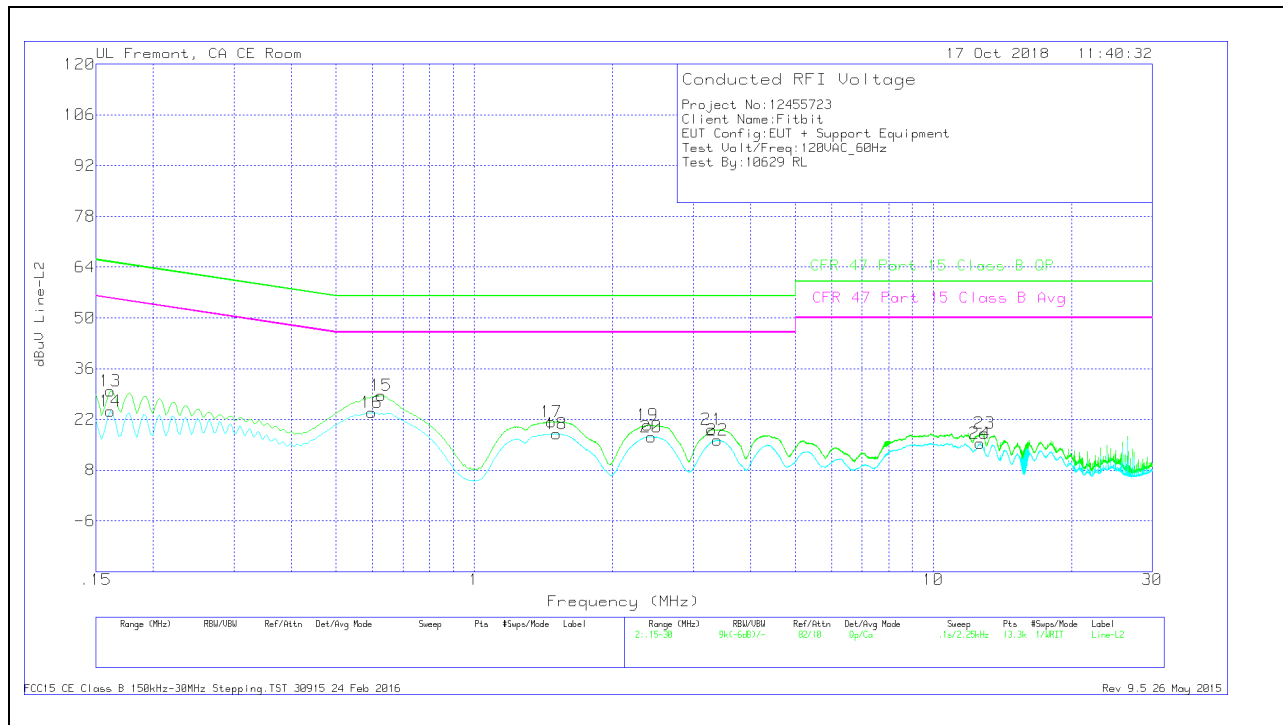


## WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	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	.16125	20.32	Qp	.1	0	10.1	30.52	65.4	-34.88	-	-
2	.16125	13.14	Ca	.1	0	10.1	23.34	-	-	55.4	-32.06
3	.19275	19.27	Qp	0	0	10.1	29.37	63.92	-34.55	-	-
4	.1905	10.97	Ca	0	0	10.1	21.07	-	-	54.01	-32.94
5	.20625	19.38	Qp	0	0	10.1	29.48	63.35	-33.87	-	-
6	.20625	11.06	Ca	0	0	10.1	21.16	-	-	53.35	-32.19
7	.64837	11.1	Qp	0	0	10.1	21.2	56	-34.8	-	-
8	.645	5.25	Ca	0	0	10.1	15.35	-	-	46	-30.65
9	8.09925	5.33	Qp	0	.2	10.2	15.73	60	-44.27	-	-
10	8.23538	2.82	Ca	0	.2	10.2	13.22	-	-	50	-36.78
11	12.93675	6.7	Qp	.1	.2	10.2	17.2	60	-42.8	-	-
12	12.69713	2.82	Ca	.1	.2	10.2	13.32	-	-	50	-36.68

Qp - Quasi-Peak detector  
Ca - CISPR average detection

## LINE 2 RESULTS



## WORST EMISSIONS

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	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	.16125	19.57	Qp	.1	0	10.1	29.77	65.4	-35.63	-	-
14	.16125	14.15	Ca	.1	0	10.1	24.35	-	-	55.4	-31.05
15	.627	18.56	Qp	0	0	10.1	28.66	56	-27.34	-	-
16	.59775	13.78	Ca	0	0	10.1	23.88	-	-	46	-22.12
17	1.473	11.12	Qp	0	.1	10.1	21.32	56	-34.68	-	-
18	1.509	7.79	Ca	0	.1	10.1	17.99	-	-	46	-28.01
19	2.3865	10.21	Qp	0	.1	10.1	20.41	56	-35.59	-	-
20	2.4315	7	Ca	0	.1	10.1	17.2	-	-	46	-28.8
21	3.2955	9.03	Qp	0	.1	10.1	19.23	56	-36.77	-	-
22	3.3855	6.05	Ca	0	.1	10.1	16.25	-	-	46	-29.75
23	12.9345	7.74	Qp	.1	.2	10.2	18.24	60	-41.76	-	-
24	12.63525	4.83	Ca	.1	.2	10.2	15.33	-	-	50	-34.67

Qp - Quasi-Peak detector  
Ca - CISPR average detection