



CERTIFICATION TEST REPORT

Report Number. : 12804406-E2V1

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

Model : FB507

Brand : Fitbit

FCC ID : XRAFB507

IC : 8542A-FB507

EUT Description : SMARTWATCH

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

Date Of Issue:

June 06, 2019

Prepared by:

UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	6/6/2019	Initial Issue	---

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: SMARTWATCH

MODEL: FB507

SERIAL NUMBER: 23 42 BA C6 B0 41; 23 60 7F C6 B0 21 (RADIATED)
23 3C 06 0C 46 B0 41(CONDUCTED)

DATE TESTED: APRIL 17, 2019 –MAY 17, 2019

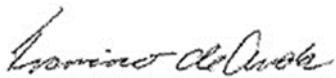
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

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:



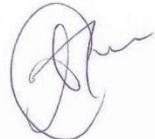
FRANCISCO DE ANDA
OPERATIONS LEAD
UL Verification Services Inc.

Prepared By:



ERIC YU
TEST ENGINEER
UL Verification Services Inc.

Reviewed By:



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, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, 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. 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	47658 Kato Road
<input type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D	<input checked="" type="checkbox"/> Chamber I
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E	<input checked="" type="checkbox"/> Chamber J
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F	<input checked="" type="checkbox"/> Chamber K
	<input type="checkbox"/> Chamber G	<input type="checkbox"/> Chamber L
	<input type="checkbox"/> Chamber H	<input type="checkbox"/> Chamber M

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: 2324A.

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	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a smartwatch.

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 1Mbps	7.22	5.27
	BLE 2Mbps	7.49	5.61

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Peak Gain (dBi)
2.4	-4.60

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 35.6.0.239

The test utility software used during testing was TeraTerm

5.5. WORST-CASE CONFIGURATION AND MODE

EUT has 1 type of plastic wristband and 3 types of metallic bands: Link, Tri-Link and Mesh. 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 rates as provided by the client were:

BLE: 1 Mbps.
BLE: 2 Mbps.

BLE and Wifi bands do not transmit simultaneously.

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	HomeSpot	S005BPU0500100	N/A	DoC
EUT Charger	Fitbit	N/A	Proto 1	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	Unshielded	1	Laptop to EUT
4	Antenna	1	SMA	Unshielded	0.08	To spectrum analyzer

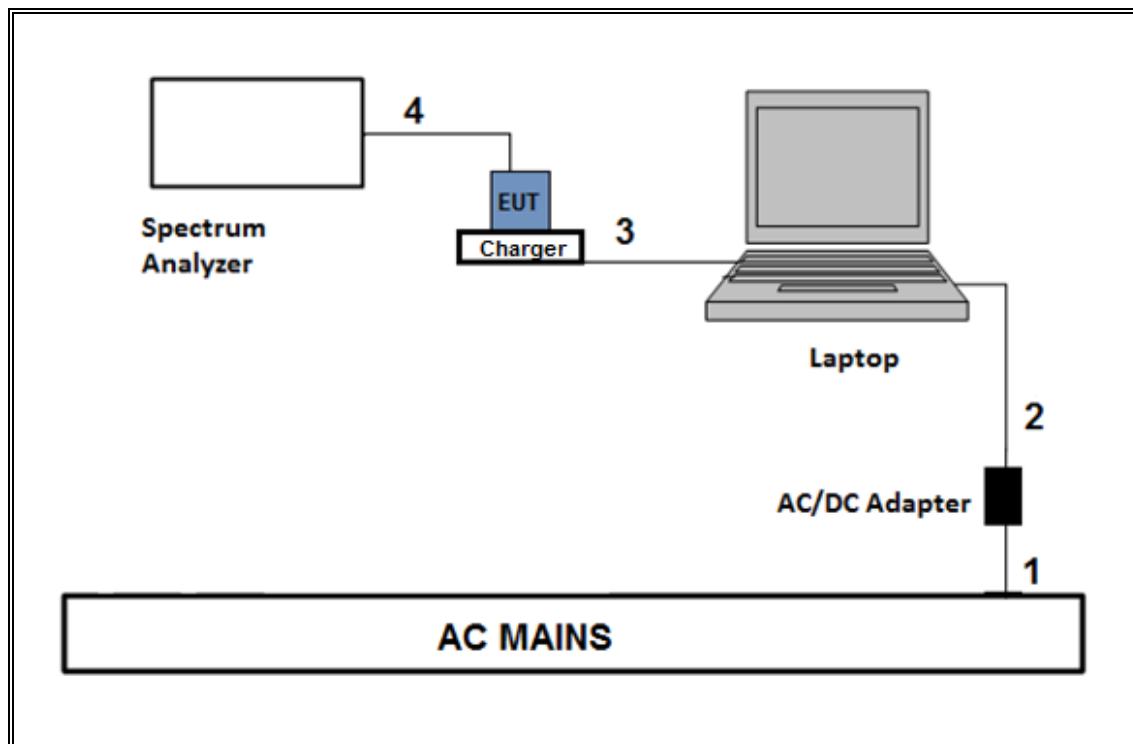
I/O CABLES (AC POWER CONDUCTED TEST AND RADIATED TEST)

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

TEST SETUP-CONDUCTED TEST

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

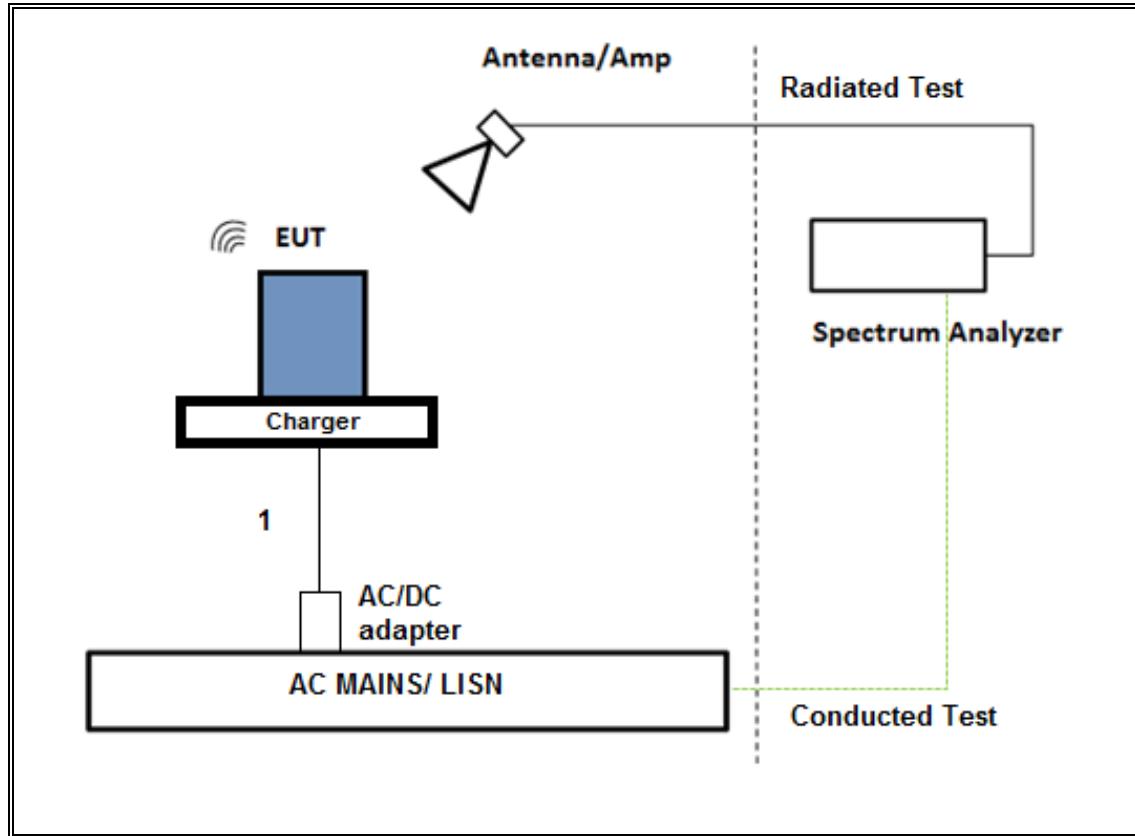
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED TEST AND RADIATED TEST

The EUT was placed in charger dock 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	ID Num	Cal Due	Last Cal
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1265	01/29/2020	01/29/2019
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1227	02/05/2020	02/05/2019
Antenna, Passive Loop 30Hz to 1MHz	ELETRO METRICS	EM-6871	PRE0179465	05/22/2019	05/22/2018
Antenna, Passive Loop 100kHz to 30MHz	ELETRO METRICS	EM-6872	PRE0179467	05/22/2019	05/22/2018
Amplifier, 100kHz to 1GHz, 32 dB	Sonoma Instrument	310	PRE0180175	07/09/2019	07/09/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344*	04/30/2019	04/30/2018
Amplifier, 1 to18GHz, 35dB	AMPLICAL	AMP1G18-35	T1569*	04/30/2019	04/30/2018
Antenna, Horn 1-18GHz	AR	AMPL-ATH1G18	PRE0189055	04/20/2020	04/20/2018
Amplifier, 1 to18GHz, 35dB	AMPLICAL	AMP1G18-35	T1571	07/30/2019	07/30/2018
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0181575	08/01/2019	08/01/2018
Amplifier, 100kHz to 1GHz, 32 dB	Sonoma Instrument	310	PRE0180174	05/31/2019	05/31/2018
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	PRE0182188	08/29/2019	08/29/2018
Rf Amplifier, 18-26.5GHz, 60dB gain	Amplical	AMP18G26.5-60	PRE0181238	05/01/2020	05/01/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179367	02/14/2020	02/14/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179377	02/15/2020	02/15/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179376	02/14/2020	02/14/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T908	01/23/2020	01/23/2019
AC Line Conducted					
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/14/2020	02/14/2019
LISN for Conducted Emissions CISPR-16	FCC INC.	FCC LISN 50/250	T1310	01/24/2020	01/24/2019
Test Software List					
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018 & Jan 11, 2019		
Antenna Port Software	UL	UL RF	Ver 9.6, April 18, 2019		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

* Testing performed before calibration due date.

7. MEASUREMENT METHOD

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-11.9.1.3 PKPM1 Peak power meter method

Average Power: ANSI C63.10 Subclause -11.9.2.3.2Method 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.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

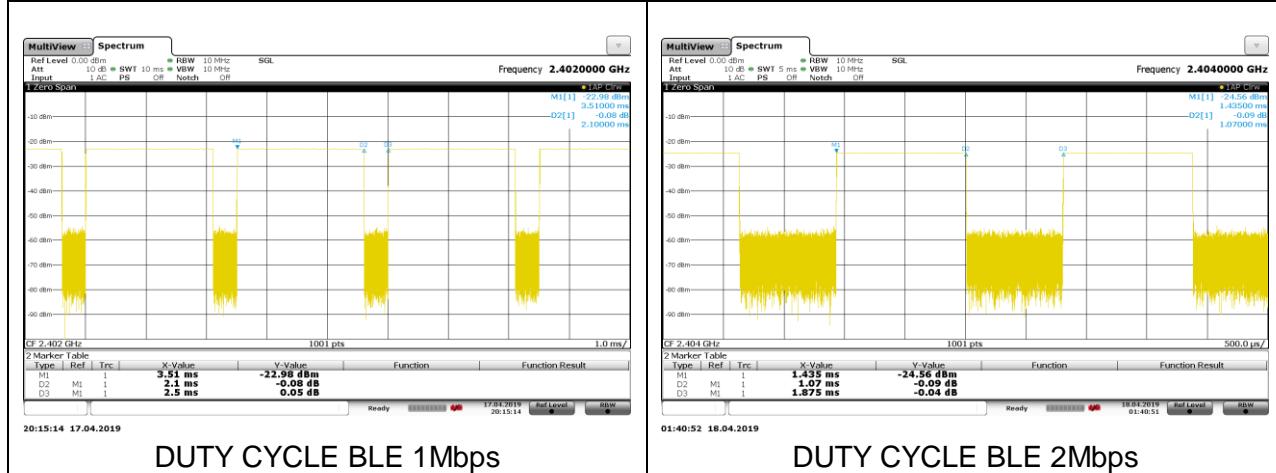
KDB 558074 Zero-Span Spectrum Analyzer Method.

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)
2.4GHz Band						
BLE 1Mbps	2.10	2.50	0.840	84.00%	0.76	0.476
BLE 2Mbps	1.070	1.875	0.571	57.07%	2.44	0.935

DUTY CYCLE PLOTS

Tester ID: 10649 JR



8.2. 99% BANDWIDTH

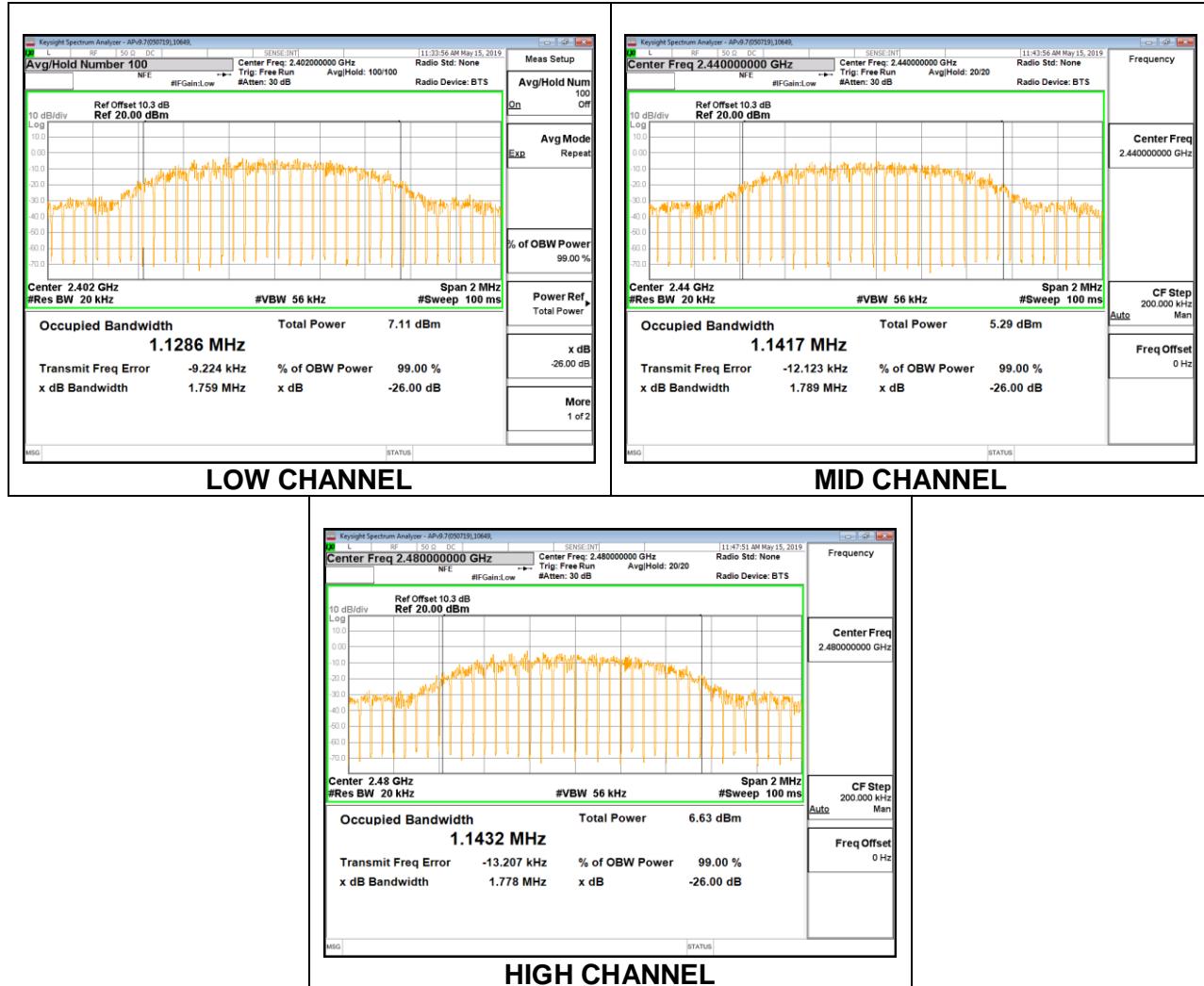
LIMITS

None; for reporting purposes only.

RESULTS

8.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.129
Middle	2440	1.142
High	2480	1.143



8.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.087
Middle	2440	2.087
High	2480	2.083



8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

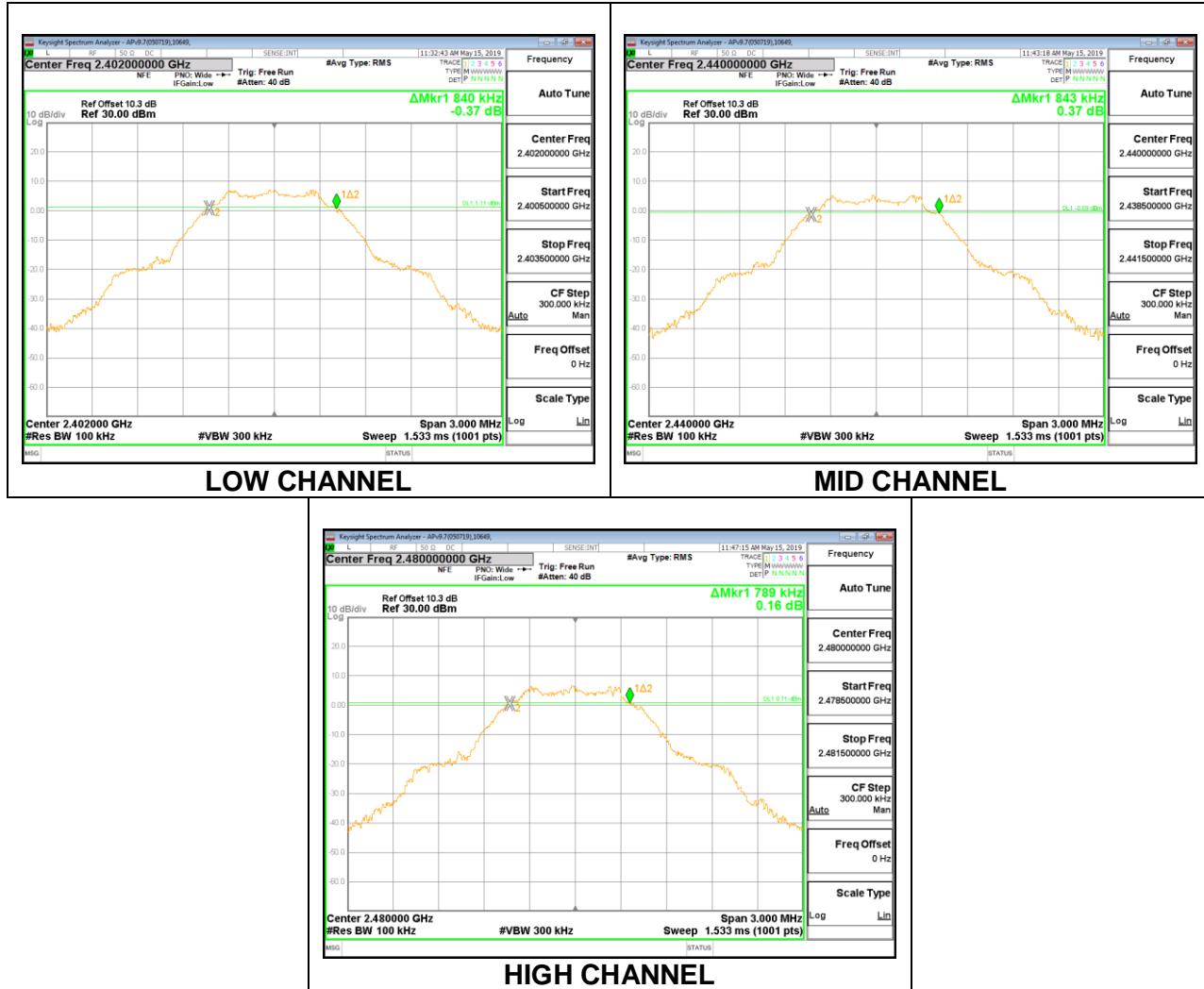
RSS-247 5.2 (a)

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

RESULTS

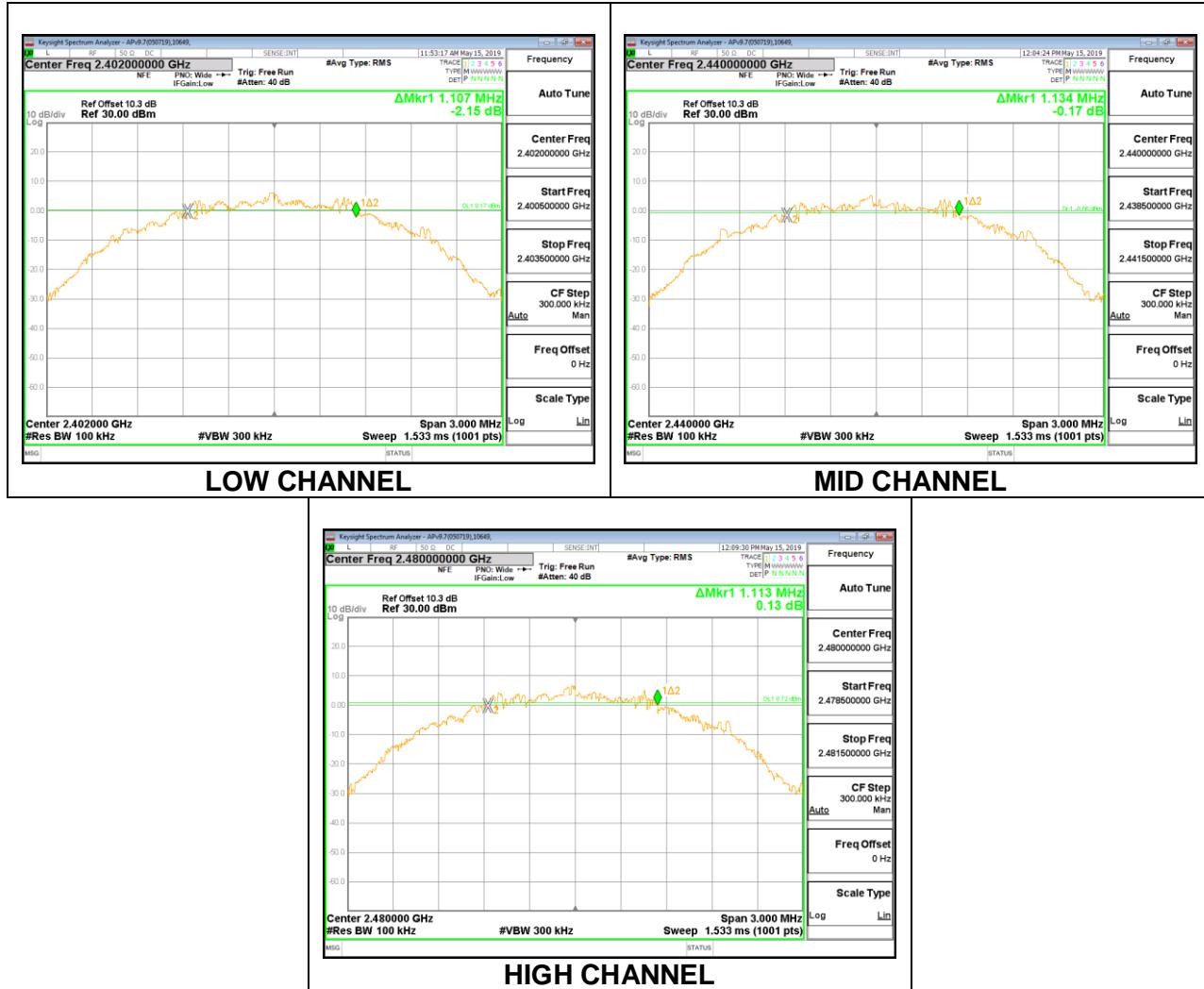
8.3.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.840	0.5
Middle	2440	0.843	0.5
High	2480	0.789	0.5



8.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.107	0.5
Middle	2440	1.134	0.5
High	2480	1.113	0.5



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

TEST PROCEDURE

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 a gated peak reading of power.

RESULTS

8.4.1. BLE (1Mbps)

Tested By:	10649 JR
Date:	5/15/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	6.49	30	-23.510
Middle	2440	5.76	30	-24.240
High	2480	7.22	30	-22.780

8.4.2. BLE (2Mbps)

Tested By:	10649 JR
Date:	5/15/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	6.55	30	-23.450
Middle	2440	7.00	30	-23.000
High	2480	7.49	30	-22.510

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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 a gated average reading of power.

RESULTS

8.5.1. BLE (1Mbps)

Tested By:	10649 JR
Date:	5/15/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	6.41
Middle	2440	5.70
High	2480	7.14

8.5.2. BLE (2Mbps)

Tested By:	10649 JR
Date:	5/15/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	6.47
Middle	2440	6.90
High	2480	7.41

8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

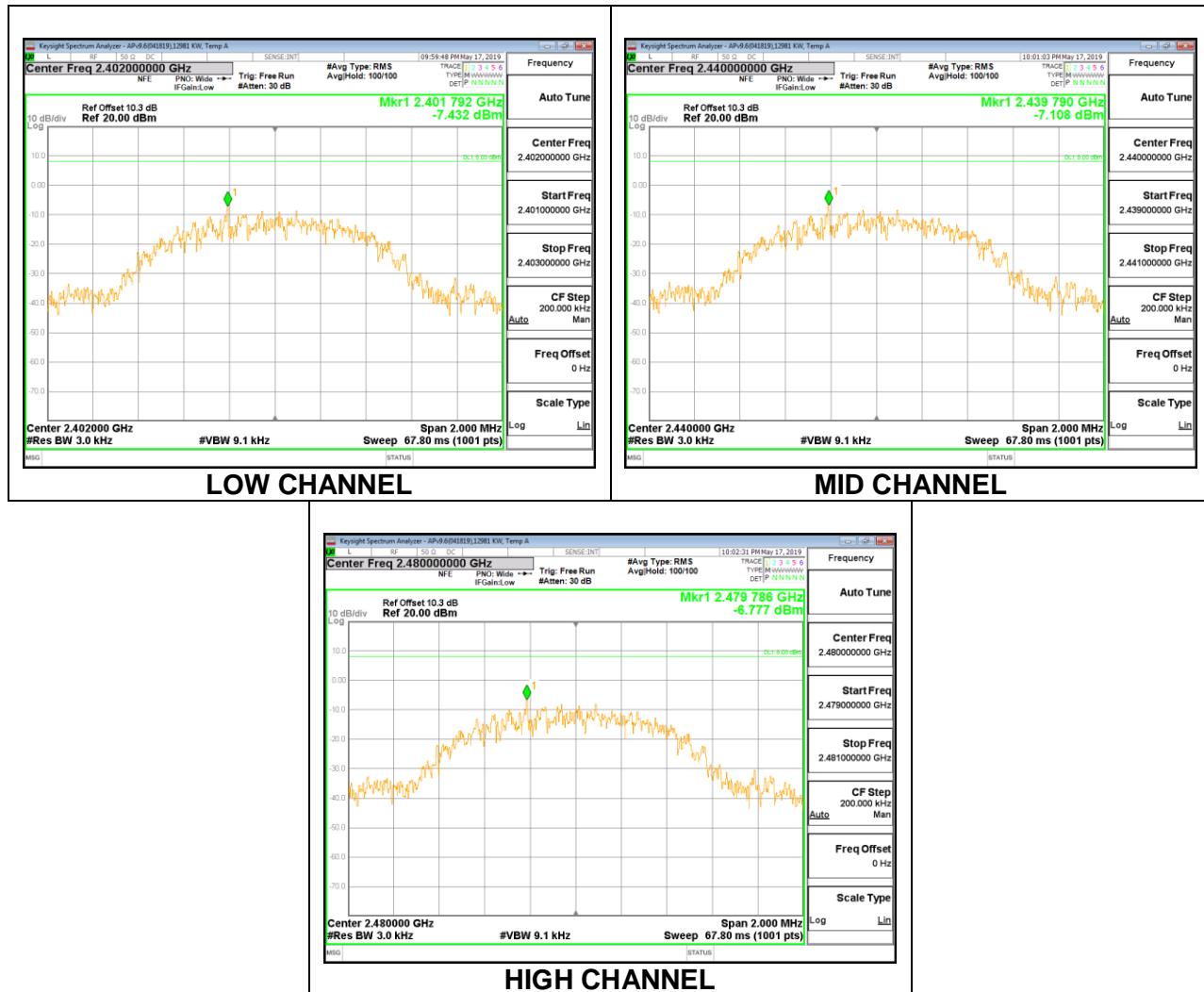
RSS-247 (5.2) (b)

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

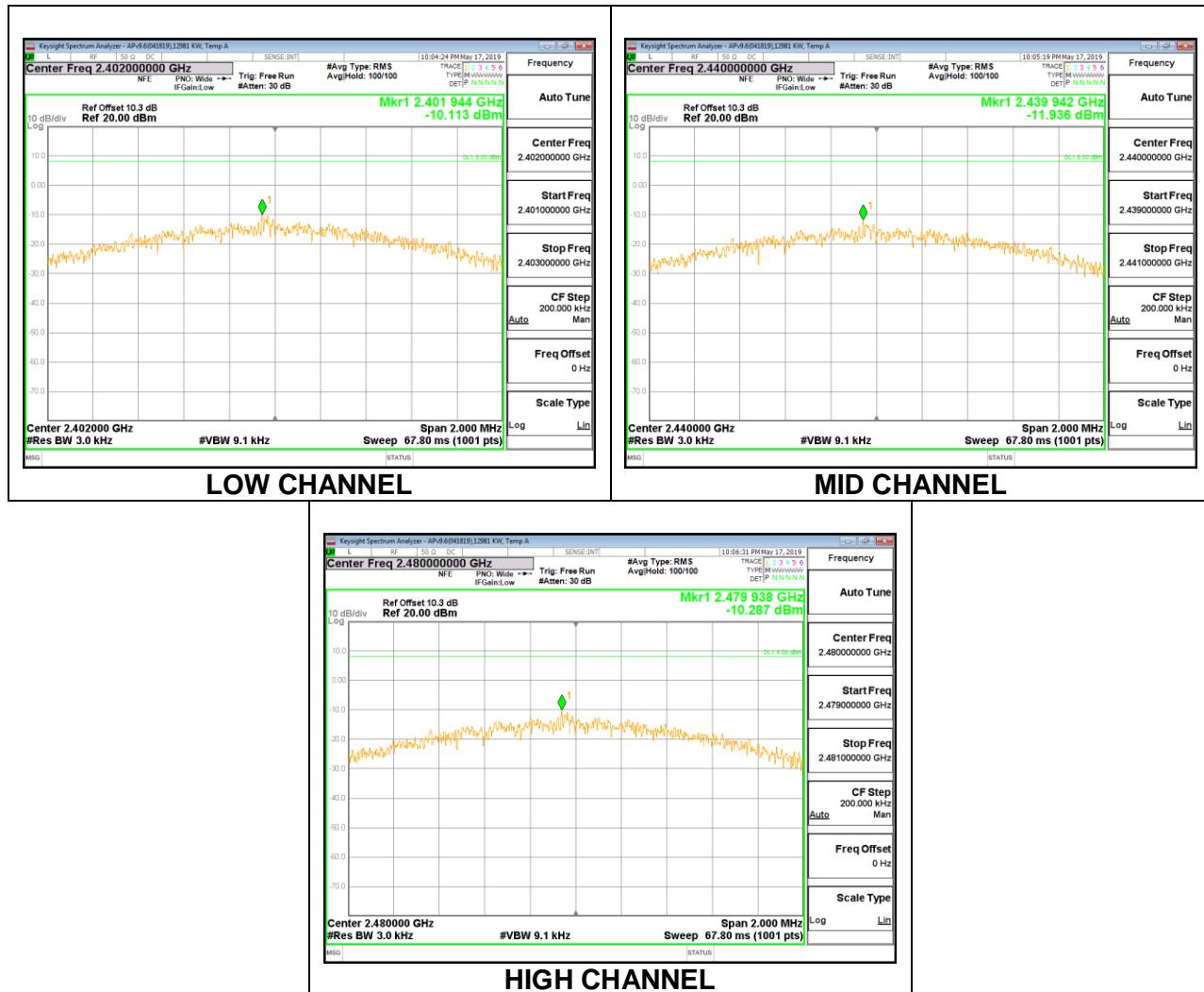
8.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-7.43	8	-15.43
Middle	2440	-7.11	8	-15.11
High	2480	-6.78	8	-14.78



8.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-10.11	8	-18.11
Middle	2440	-11.94	8	-19.94
High	2480	-10.29	8	-18.29



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

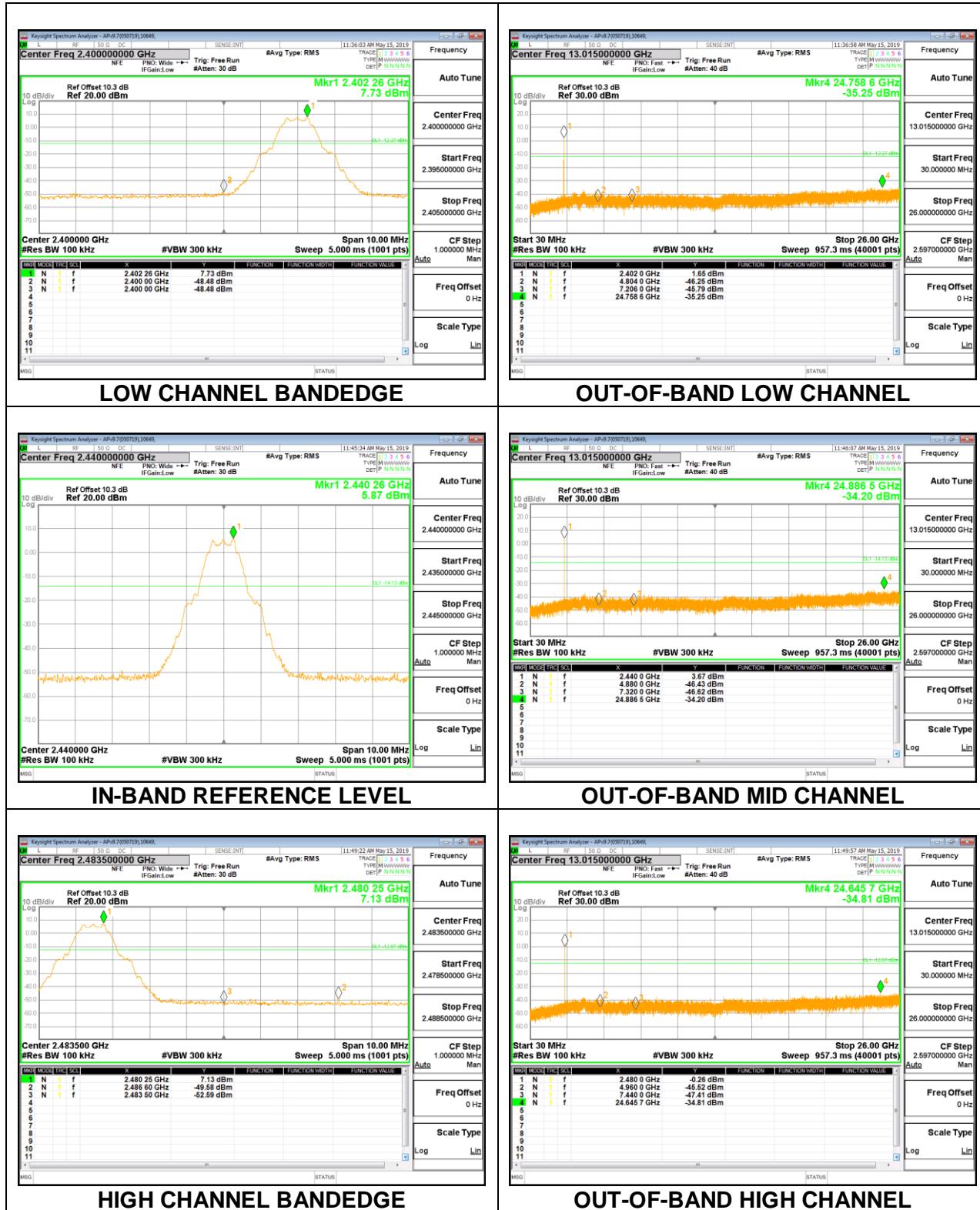
FCC §15.247 (d)

RSS-247 5.5

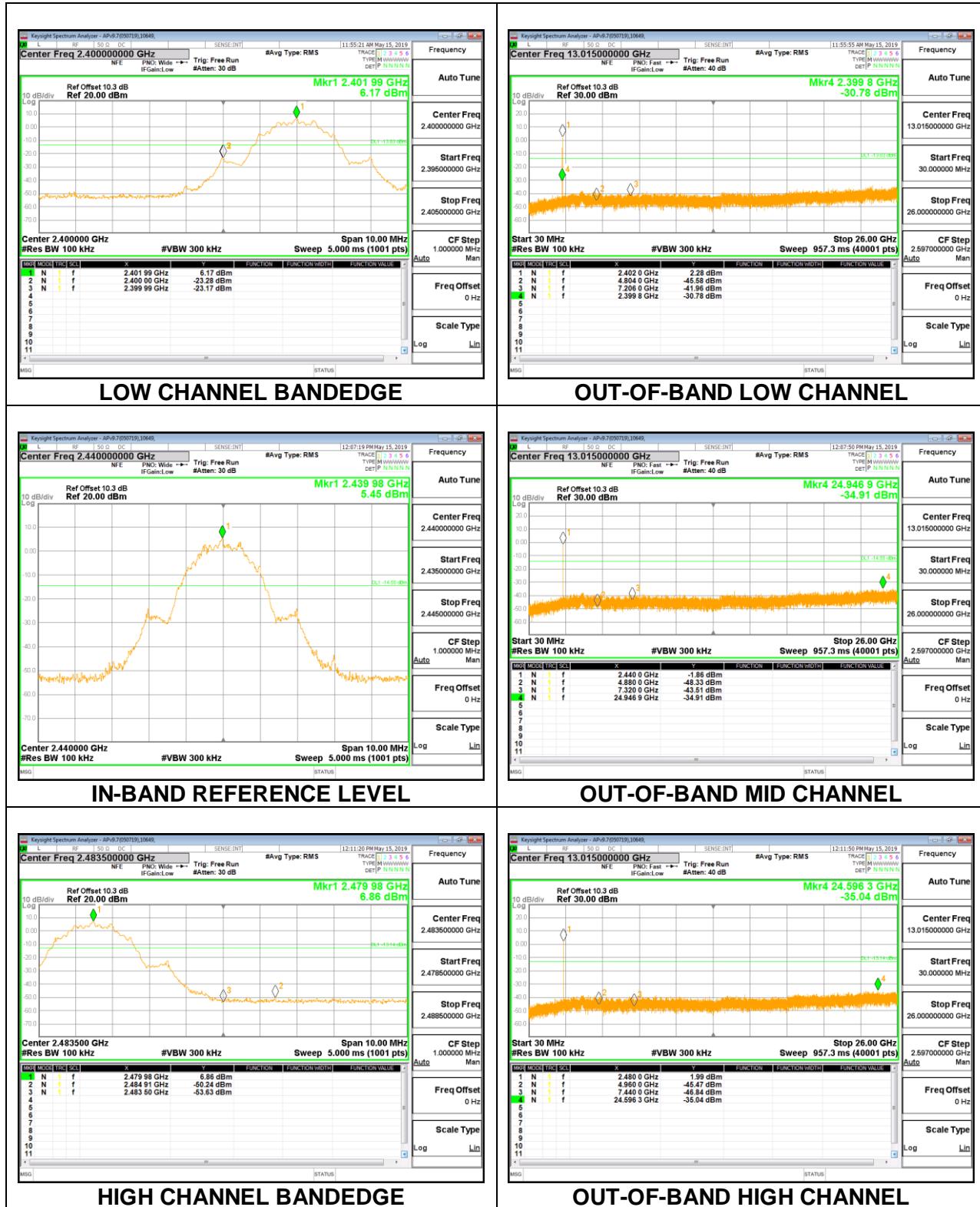
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

8.7.1. BLE (1Mbps)



8.7.2. BLE (2Mbps)



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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 Open Field Site(OFS) 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.

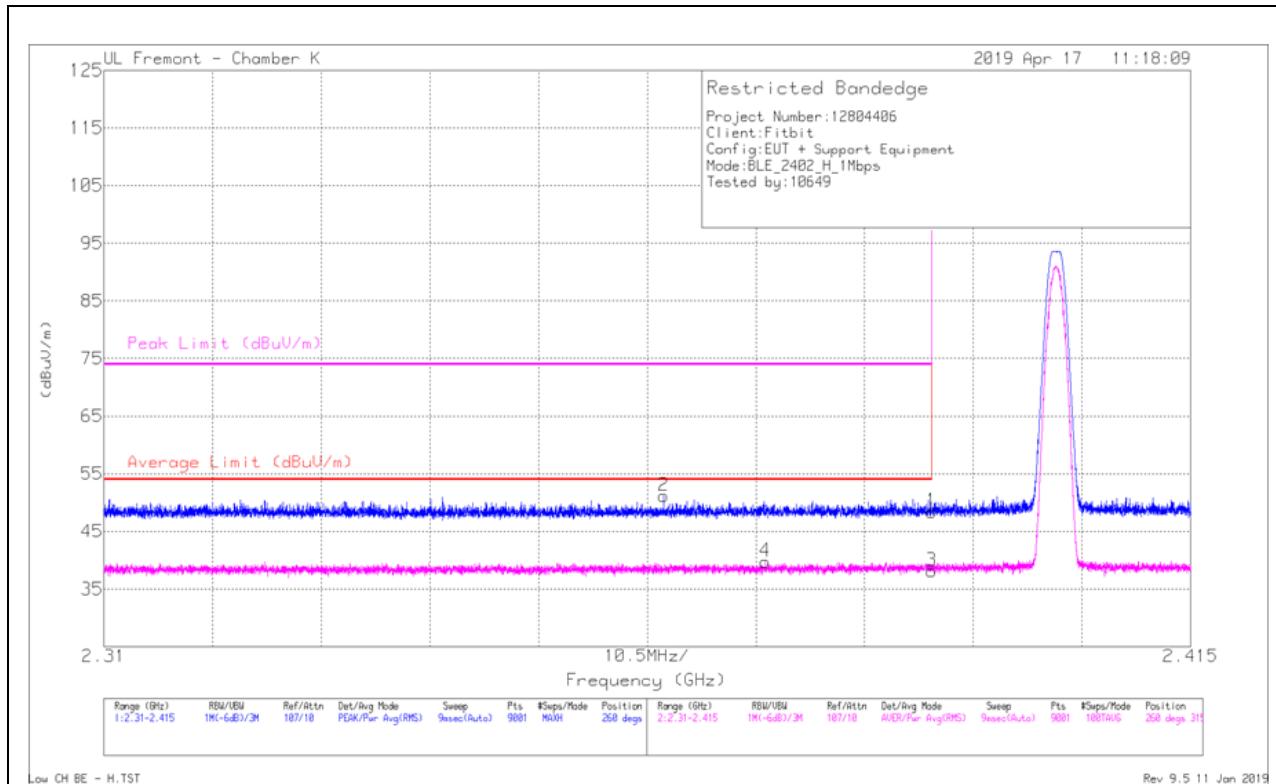
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



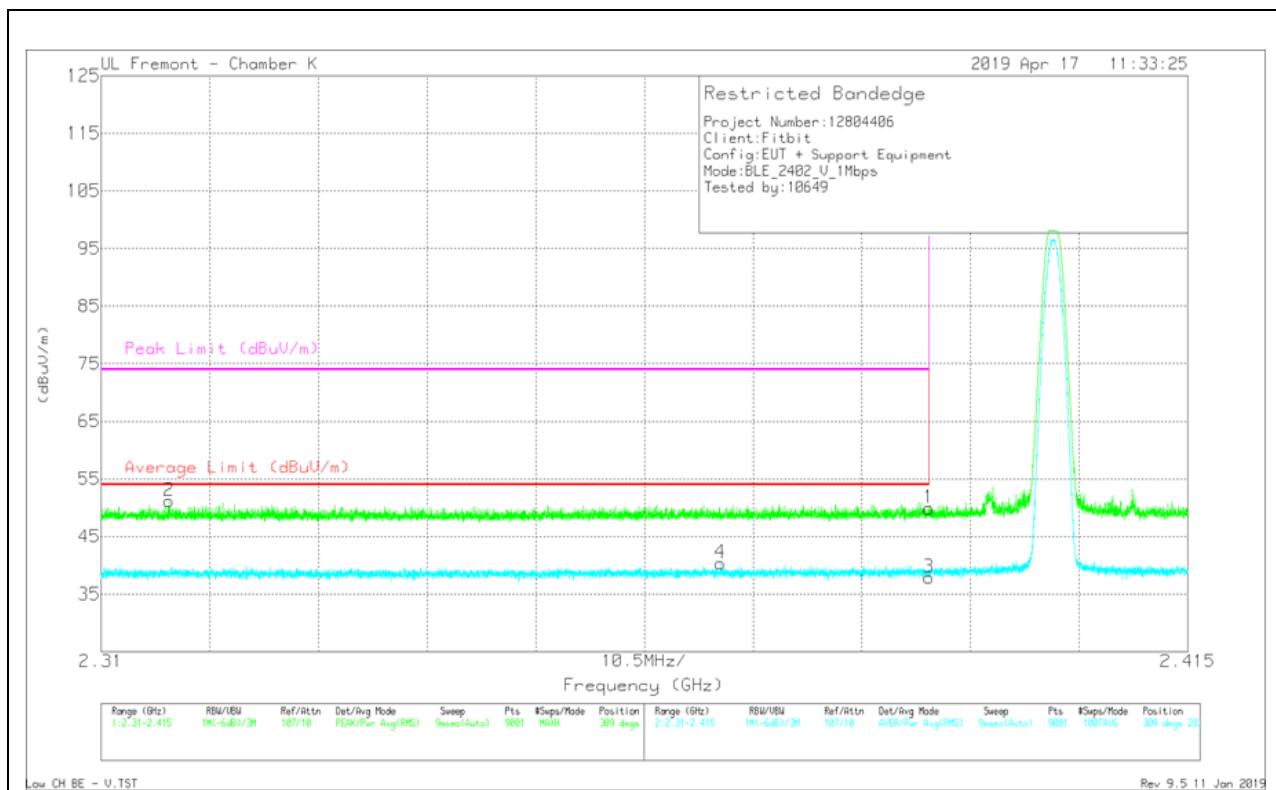
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuVm)	Average Limit (dBuVm)	Margin (dB)	Peak Limit (dBuVm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.21	Pk	31.9	-24.7	0	48.41	-	-	74	-25.59	260	315	H
2	* 2.364	43.97	Pk	31.8	-24.6	0	51.17	-	-	74	-22.83	260	315	H
3	* 2.39	30.35	RMS	31.9	-24.7	.76	38.31	54	-15.69	-	-	260	315	H
4	* 2.374	31.97	RMS	31.8	-24.6	.76	39.93	54	-14.07	-	-	260	315	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 T344 (dB/m)	Amp/Cbf/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuVm)	Average Limit (dBuVm)	Margin (dB)	Peak Limit (dBuVm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.7	Pk	31.9	-24.7	0	49.9	-	-	74	-24.1	309	283	V
2	* 2.317	44.06	Pk	31.7	-24.6	0	51.16	-	-	74	-22.84	309	283	V
3	* 2.39	29.93	RMS	31.9	-24.7	.76	37.89	54	-16.11	-	-	309	283	V
4	* 2.37	32.42	RMS	31.8	-24.6	.76	40.38	54	-13.62	-	-	309	283	V

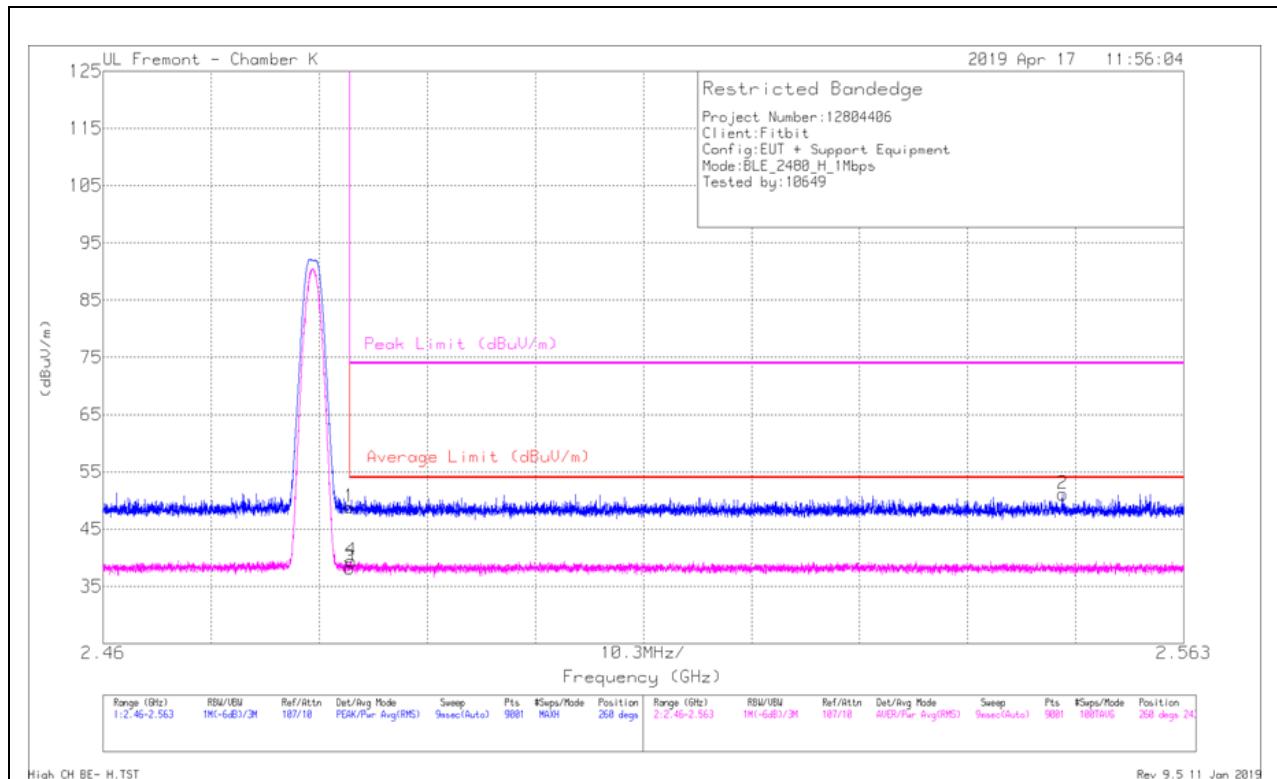
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



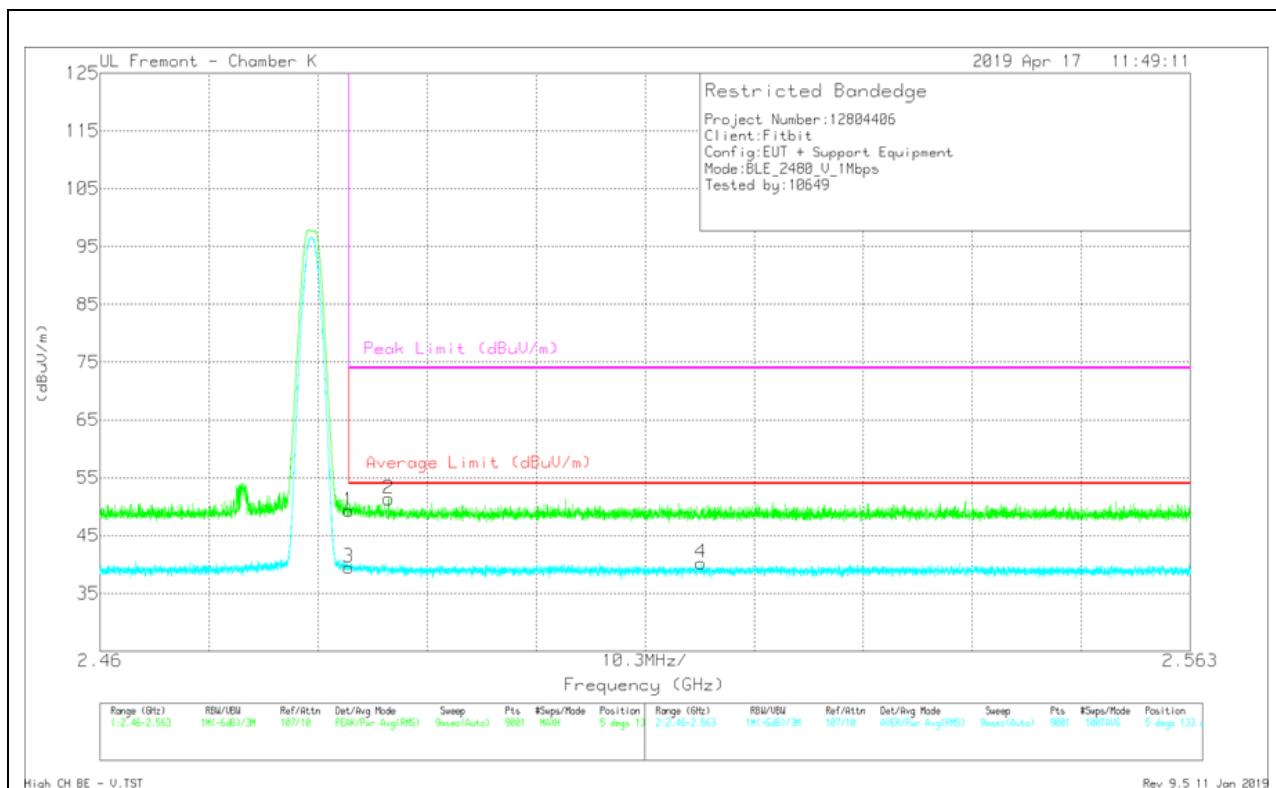
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (deg)	Height (cm)	Polarity
1	* 2.484	41.35	Pk	32.3	-24.8	0	48.85	-	-	74	-25.15	260	243	H
2	2.551	43.62	Pk	32.3	-24.8	0	51.12	-	-	74	-22.88	260	243	H
3	* 2.484	30.72	RMS	32.3	-24.8	.76	38.98	54	-15.02	-	-	260	243	H
4	* 2.484	31.93	RMS	32.3	-24.8	.76	40.19	54	-13.81	-	-	260	243	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 T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuVm)	Average Limit (dBuVm)	Margin (dB)	Peak Limit (dBuVm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.83	Pk	32.3	-24.8	0	49.33	-	-	74	-24.67	5	133	V
2	* 2.487	43.88	Pk	32.3	-24.8	0	51.38	-	-	74	-22.62	5	133	V
3	* 2.484	31.23	RMS	32.3	-24.8	.76	39.49	54	-14.51	-	-	5	133	V
4	2.517	32	RMS	32.3	-24.8	.76	40.26	54	-13.74	-	-	5	133	V

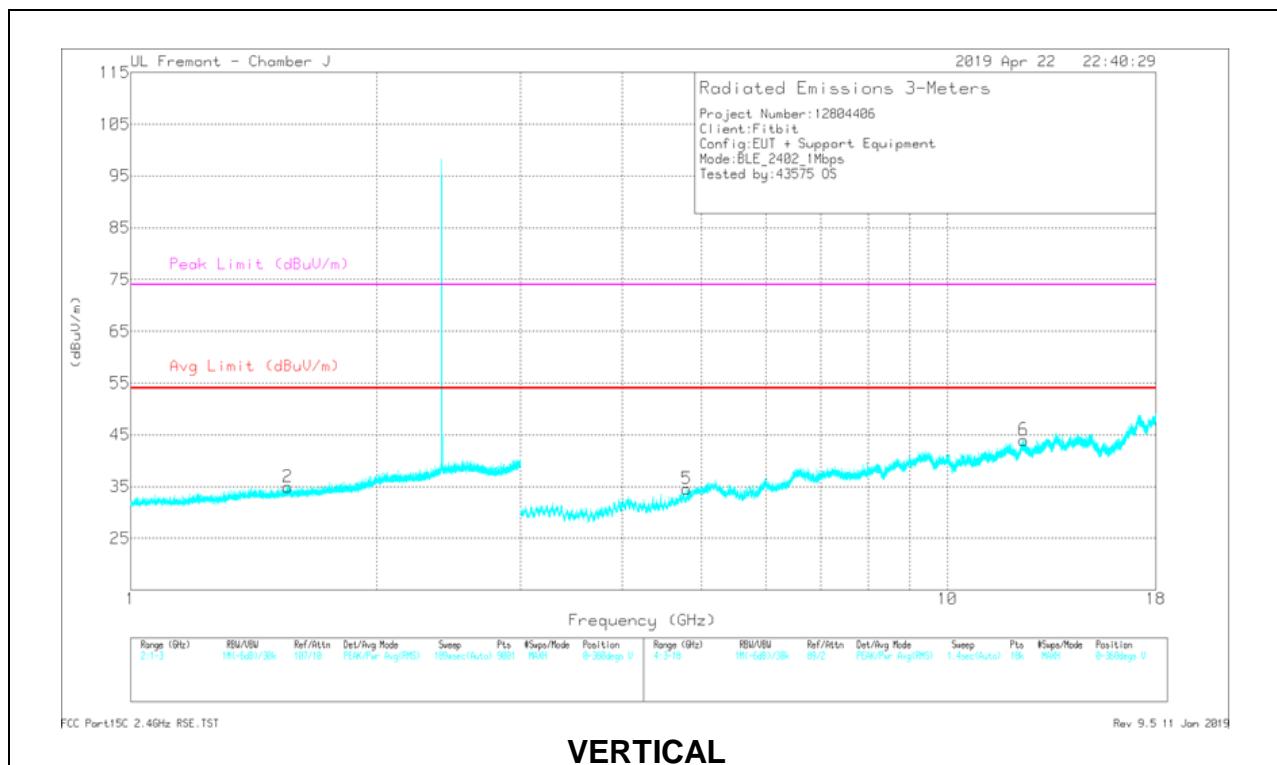
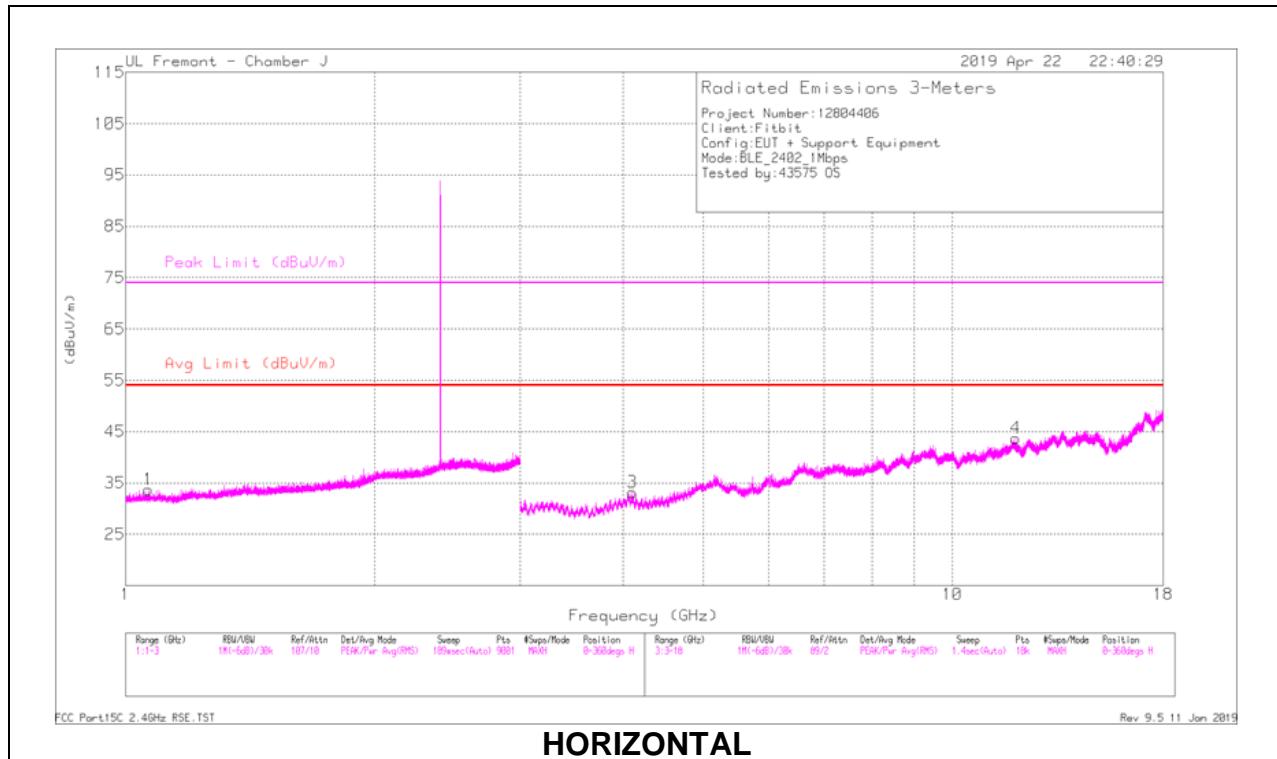
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

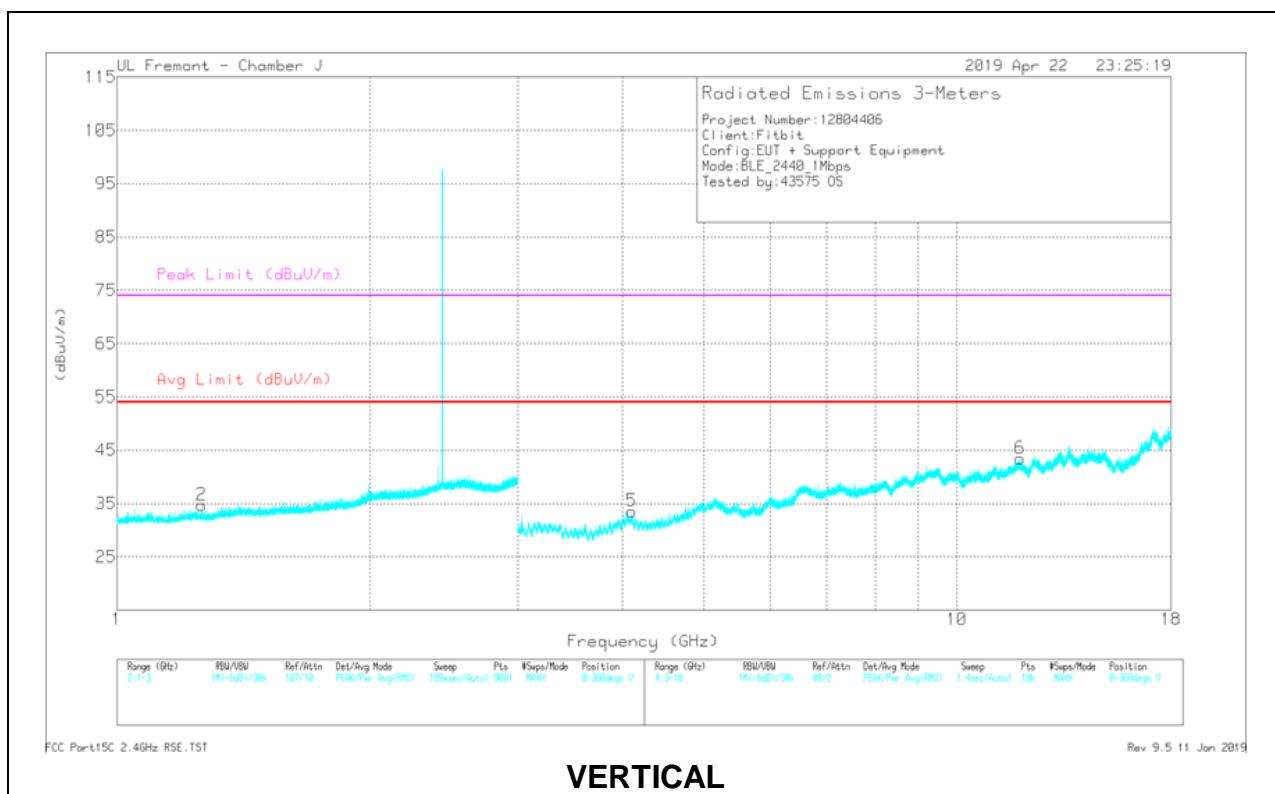
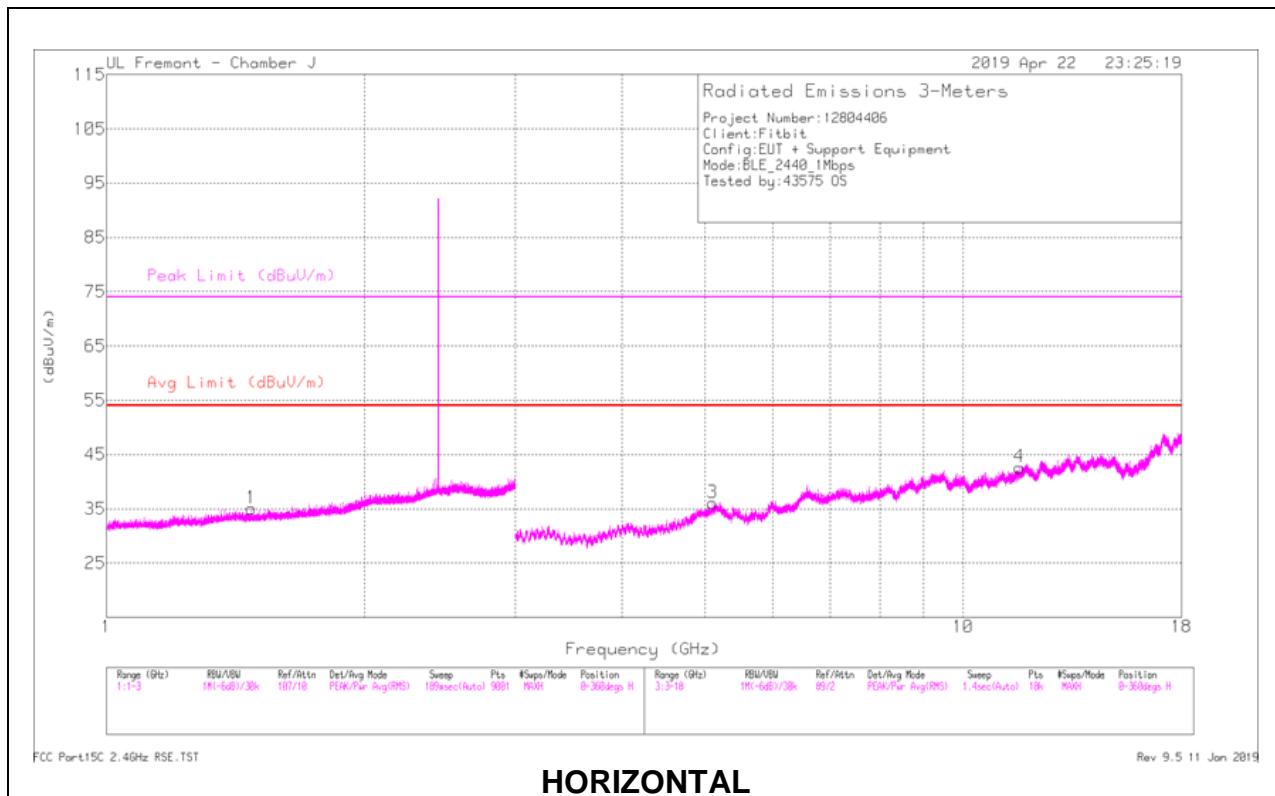
Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE01890 55 (dB/m)	Amp/Cbi/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.066	42.44	PK2	23.9	-25.8	0	40.54	-	-	74	-33.46	18	139	H
* 1.067	33.05	MAv1	23.9	-25.8	.76	31.91	54	-22.09	-	-	18	139	H
* 1.555	42.58	PK2	25.5	-26.1	0	41.98	-	-	74	-32.02	35	384	V
* 1.556	33.43	MAv1	25.5	-26.1	.76	33.59	54	-20.41	-	-	35	384	V
* 4.103	39.45	PK2	32.3	-31.7	0	40.05	-	-	74	-33.95	78	286	H
* 4.104	29.39	MAv1	32.3	-31.6	.76	30.85	54	-23.15	-	-	78	286	H
* 11.939	33.77	PK2	39.9	-22.6	0	51.07	-	-	74	-22.93	178	195	H
* 11.938	22.91	MAv1	39.9	-22.6	.76	40.97	54	-13.03	-	-	178	195	H
* 4.797	38.46	PK2	33.9	-31.2	0	41.16	-	-	74	-32.84	144	285	V
* 4.8	28.91	MAv1	33.9	-31.3	.76	32.27	54	-21.73	-	-	144	285	V
* 12.394	33.08	PK2	40.4	-22.2	0	51.28	-	-	74	-22.72	18	198	V
* 12.395	22.85	MAv1	40.4	-22.2	.76	41.81	54	-12.19	-	-	18	198	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

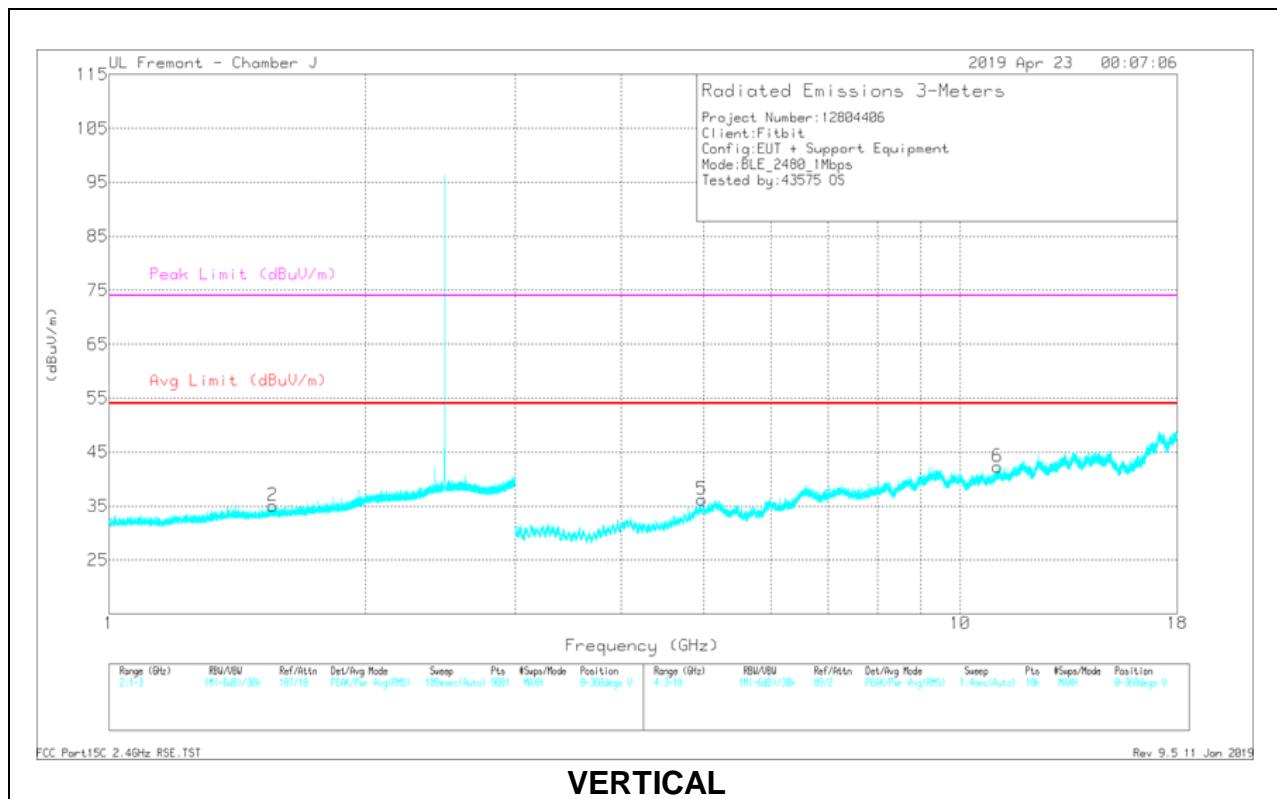
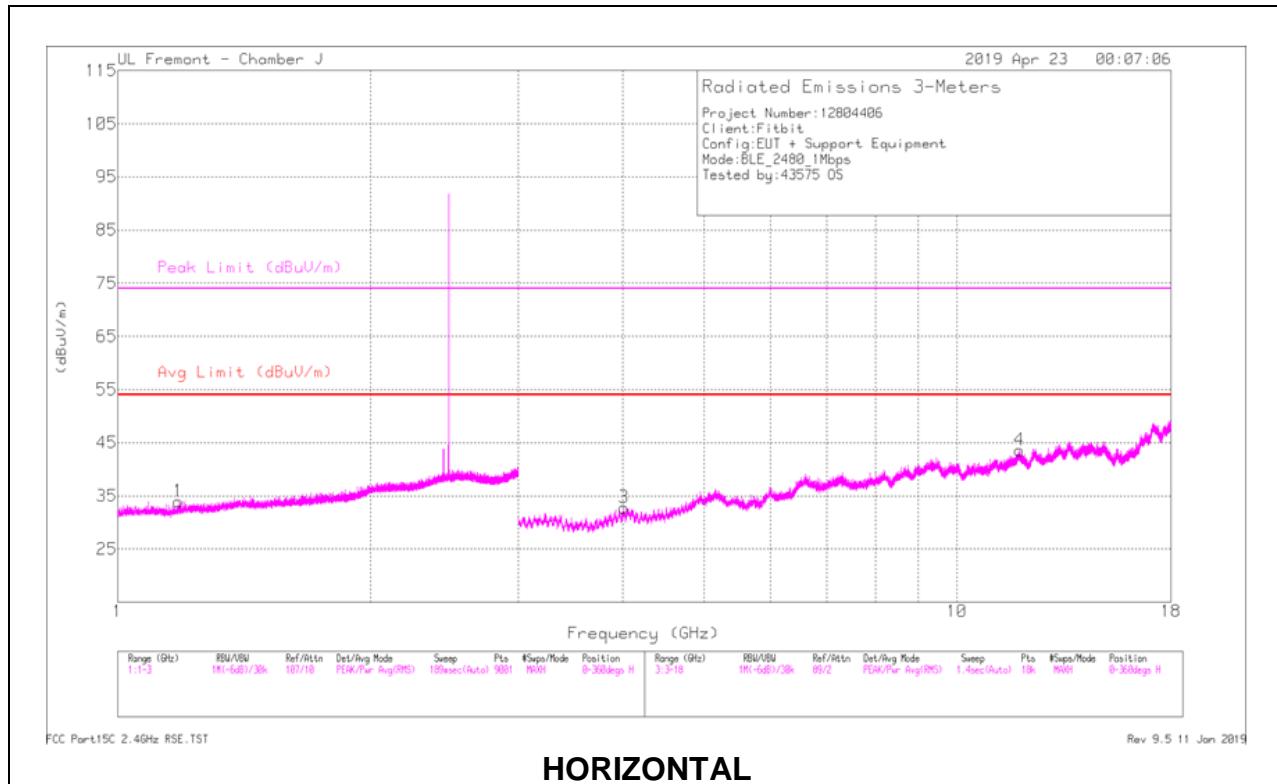
Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE01890 55 (dB/m)	Amp/Cbi/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.478	43.76	PK2	25	-26.1	0	42.66	-	-	74	-31.34	337	190	H
* 1.476	32.93	MAv1	25	-26.1	.76	32.59	54	-21.41	-	-	337	190	H
* 1.259	43.09	PK2	24.4	-26	0	41.49	-	-	74	-32.51	34	173	V
* 1.261	33.65	MAv1	24.4	-26.1	.76	32.71	54	-21.29	-	-	34	173	V
* 5.101	38.93	PK2	35.7	-31.2	0	43.43	-	-	74	-30.57	103	336	H
* 5.1	28.88	MAv1	35.7	-31.2	.76	34.14	54	-19.86	-	-	103	336	H
* 11.63	33.61	PK2	39.6	-22.6	0	50.61	-	-	74	-23.39	71	336	H
* 11.631	22.24	MAv1	39.6	-22.6	.76	40	54	-14	-	-	71	336	H
* 4.107	42.81	PK2	32.3	-31.6	0	43.51	-	-	74	-30.49	23	217	V
* 4.104	31.17	MAv1	32.3	-31.6	.76	32.63	54	-21.37	-	-	23	217	V
* 11.901	33.55	PK2	39.9	-22.5	0	50.95	-	-	74	-23.05	319	111	V
* 11.901	22.44	MAv1	39.9	-22.5	.76	40.6	54	-13.4	-	-	319	111	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 PRE01890 55 (dB/m)	Amp/Cbi/FI tr/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
* 1.18	42.55	PK2	23.9	-26	0	40.45	-	-	74	-33.55	36	289	H
* 1.18	32.23	MAv1	23.9	-26	.76	30.89	54	-23.11	-	-	36	289	H
* 1.56	43.01	PK2	25.5	-26.1	0	42.41	-	-	74	-31.59	338	365	V
* 1.557	33.34	MAv1	25.5	-26.1	.76	33.5	54	-20.5	-	-	338	365	V
* 4.012	40.81	PK2	32.3	-32.4	0	40.71	-	-	74	-33.29	58	196	H
* 4.012	29.73	MAv1	32.3	-32.4	.76	30.39	54	-23.61	-	-	58	196	H
* 11.876	33.41	PK2	39.9	-22.4	0	50.91	-	-	74	-23.09	249	335	H
* 11.878	22.55	MAv1	39.9	-22.4	.76	40.81	54	-13.19	-	-	249	335	H
* 4.967	37.82	PK2	34.9	-30.4	0	42.32	-	-	74	-31.68	188	267	V
* 4.971	28.28	MAv1	34.9	-30.4	.76	33.54	54	-20.46	-	-	188	267	V
* 11.072	34.38	PK2	39.1	-23.4	0	50.08	-	-	74	-23.92	230	380	V
* 11.075	23.19	MAv1	39.1	-23.4	.76	39.65	54	-14.35	-	-	230	380	V

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

PK2 - KDB558074 Method: Maximum Peak

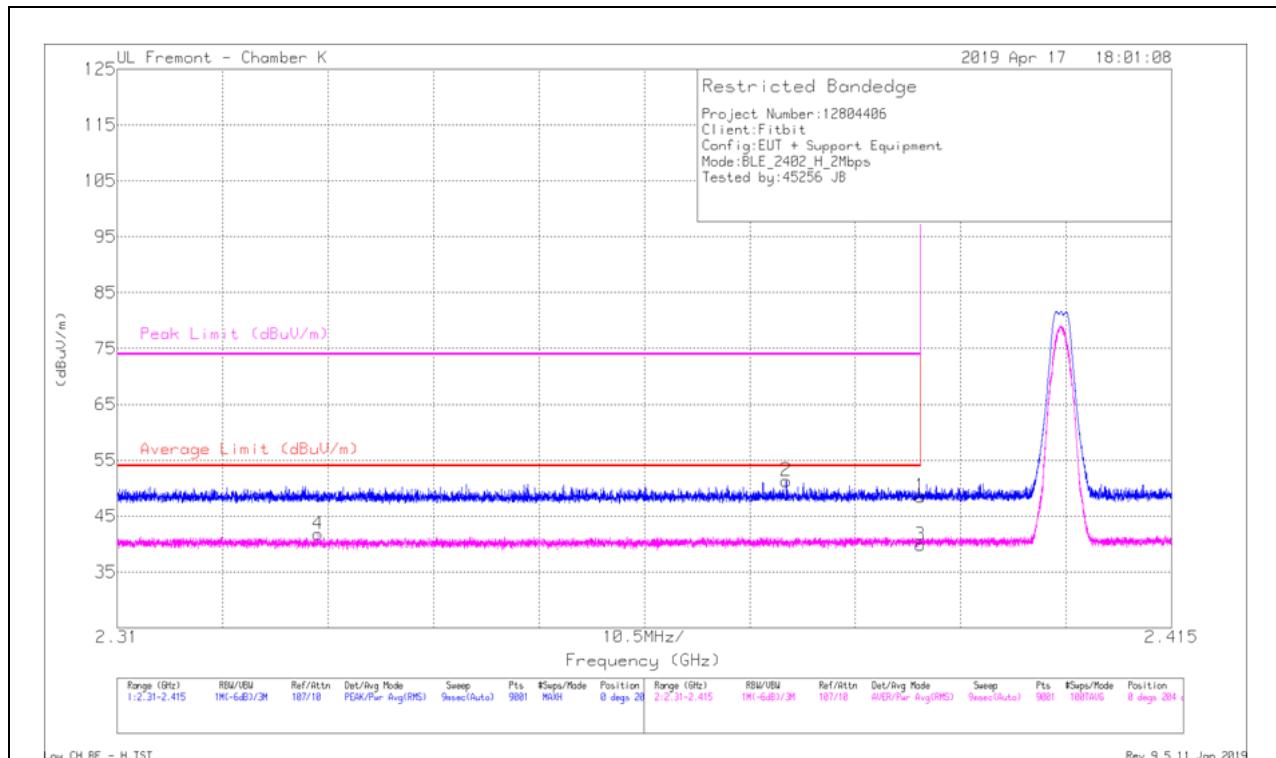
MAv1 - KDB558074 Option 1 Maximum RMS Average

9.2.2. BLE (2Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



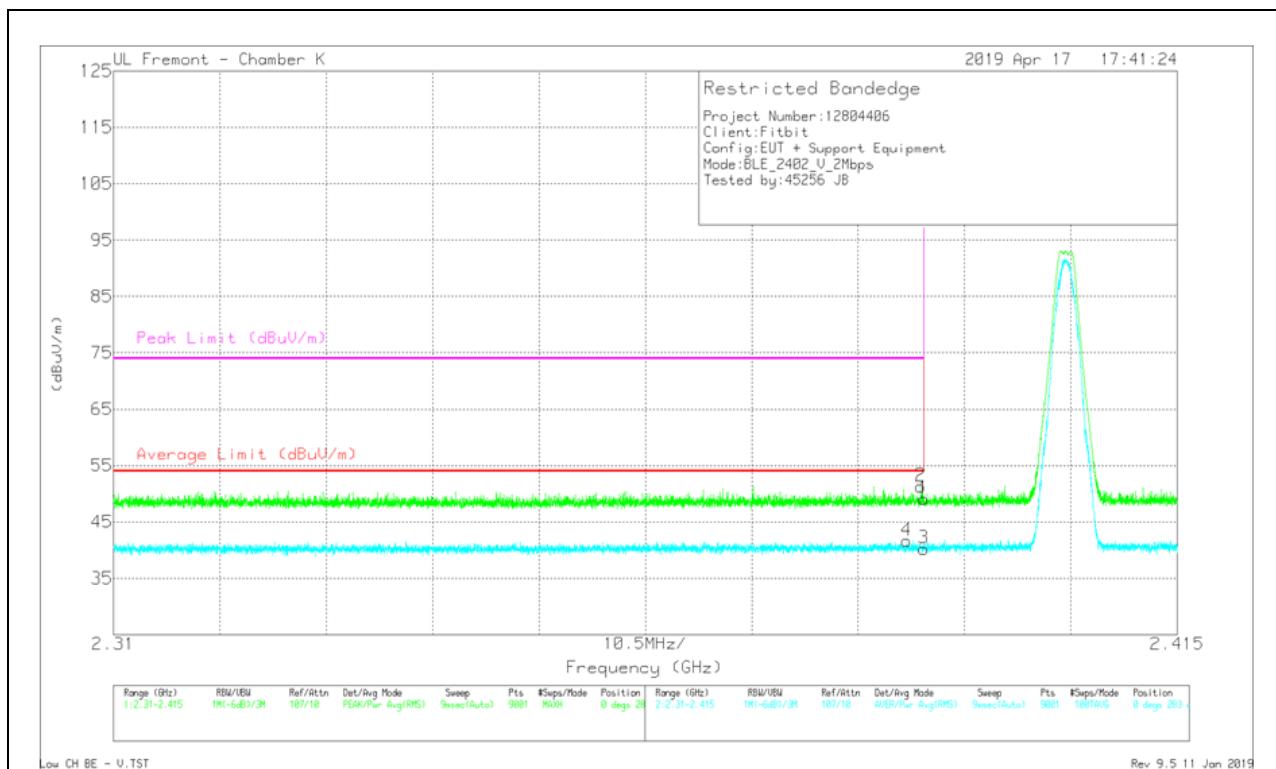
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.35	Pk	31.9	-24.7	0	46.55	-	-	74	-25.45	0	204	H
2	* 2.377	44.22	Pk	31.8	-24.7	0	51.32	-	-	74	-22.68	0	204	H
3	* 2.39	30.19	RMS	31.9	-24.7	2.44	39.83	54	-14.17	-	-	0	204	H
4	* 2.33	32.25	RMS	31.7	-24.6	2.44	41.79	54	-12.21	-	-	0	204	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 T344 (dB/m)	Amp/Cbl/Filtz/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuVm)	Average Limit (dBuVm)	Margin (dB)	Peak Limit (dBuVm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.9	Pk	31.9	-24.7	0	49.1	-	-	74	-24.9	0	283	V
2	* 2.39	44.13	Pk	31.9	-24.7	0	51.33	-	-	74	-22.67	0	283	V
3	* 2.39	30.62	RMS	31.9	-24.7	2.44	40.26	54	-13.74	-	-	0	283	V
4	* 2.388	31.92	RMS	31.9	-24.6	2.44	41.66	54	-12.34	-	-	0	283	V

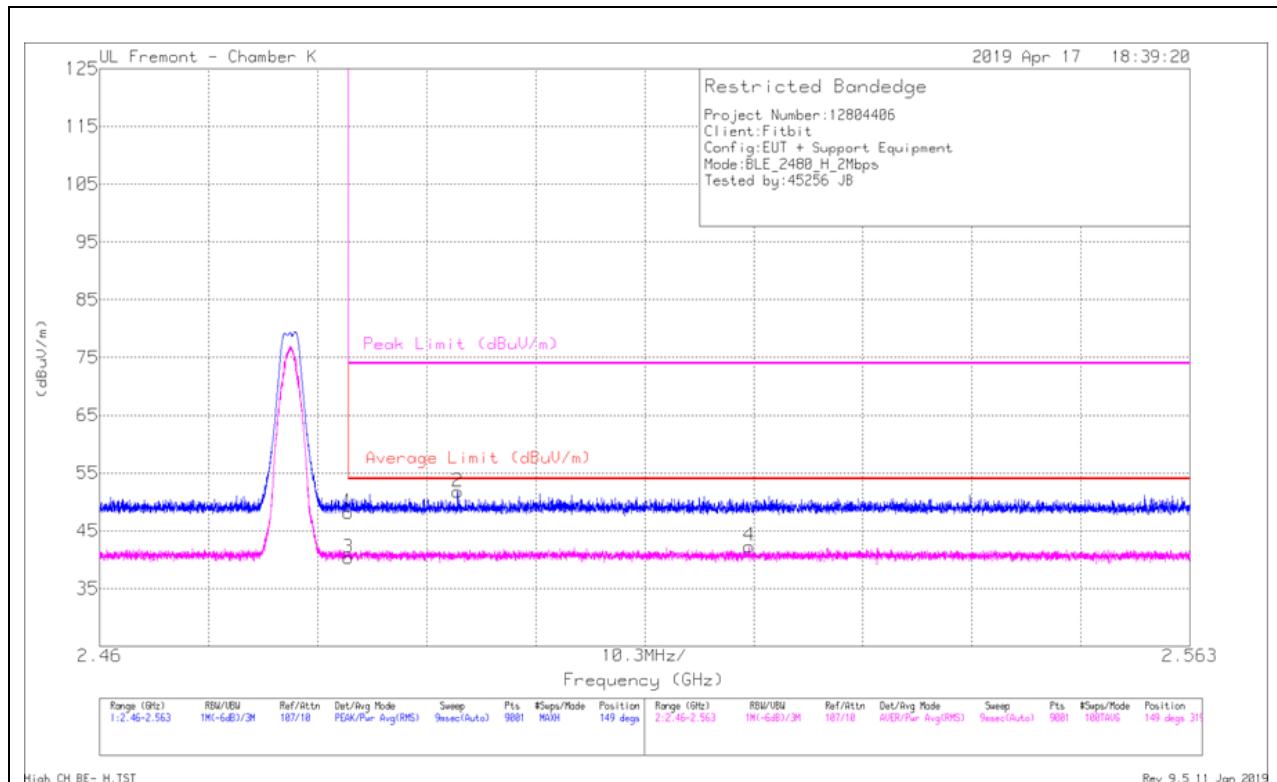
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



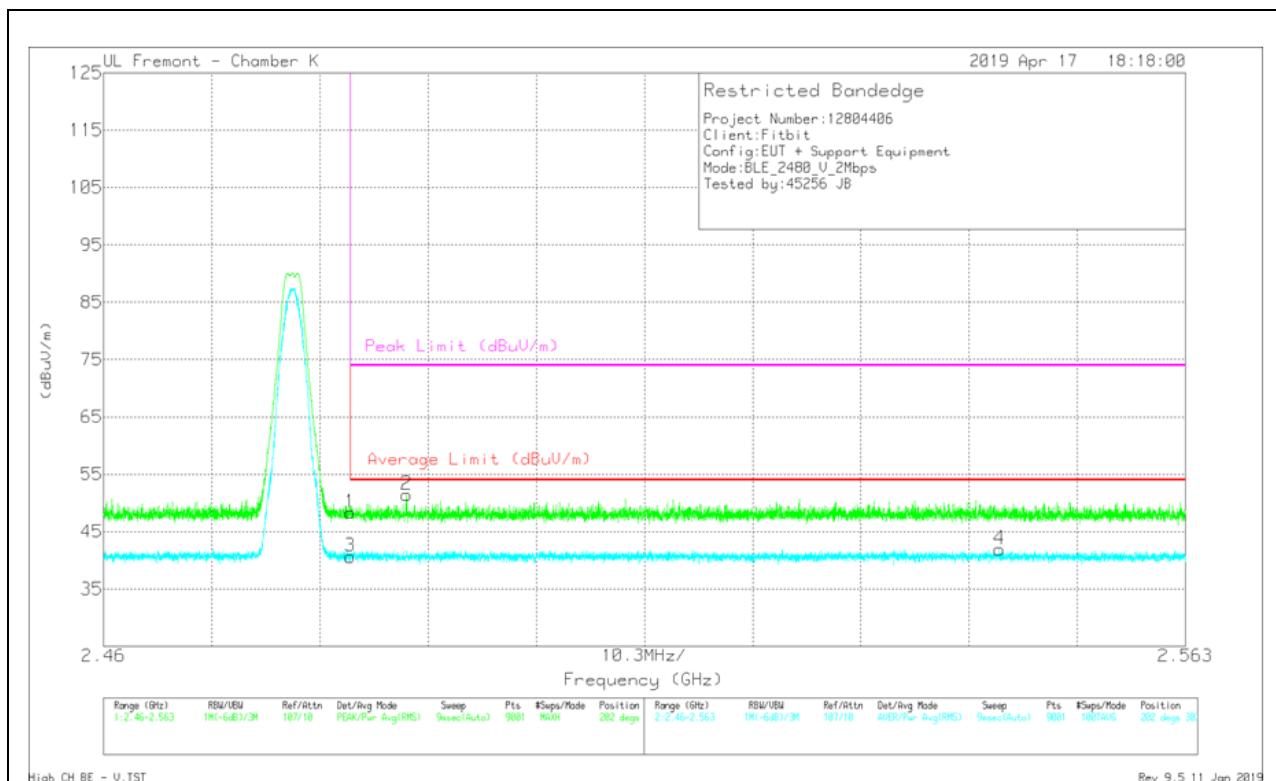
Marker	Frequency (GHz)	Meter Reading (dB _{uV})	Det	AF T344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dB _{uV/m})	Average Limit (dB _{uV/m})	Margin (dB)	Peak Limit (dB _{uV/m})	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.69	Pk	32.3	-24.8	0	46.19	-	-	74	-25.81	149	319	H
2	* 2.494	44.27	Pk	32.3	-24.8	0	51.77	-	-	74	-22.23	149	319	H
3	* 2.484	30.36	RMS	32.3	-24.8	2.44	40.3	54	-13.7	-	-	149	319	H
4	2.521	32.39	RMS	32.3	-24.8	2.44	42.33	54	-11.67	-	-	149	319	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



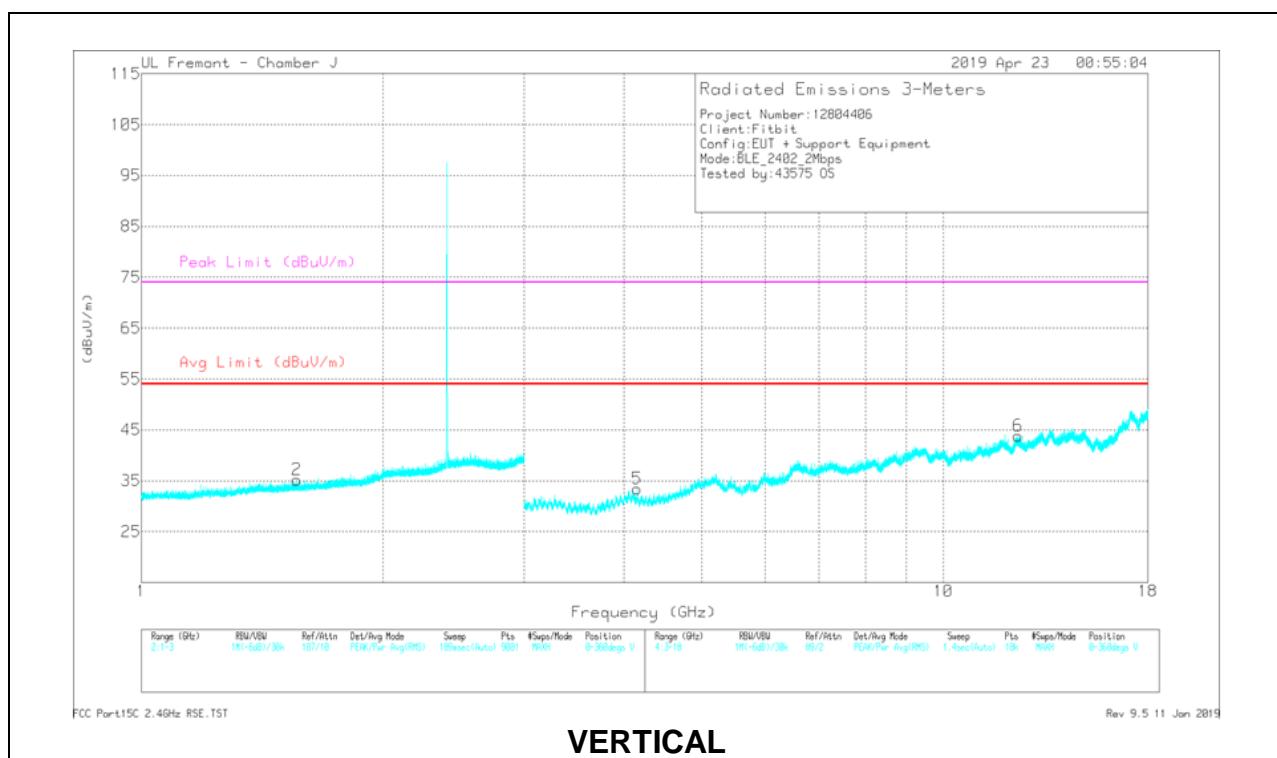
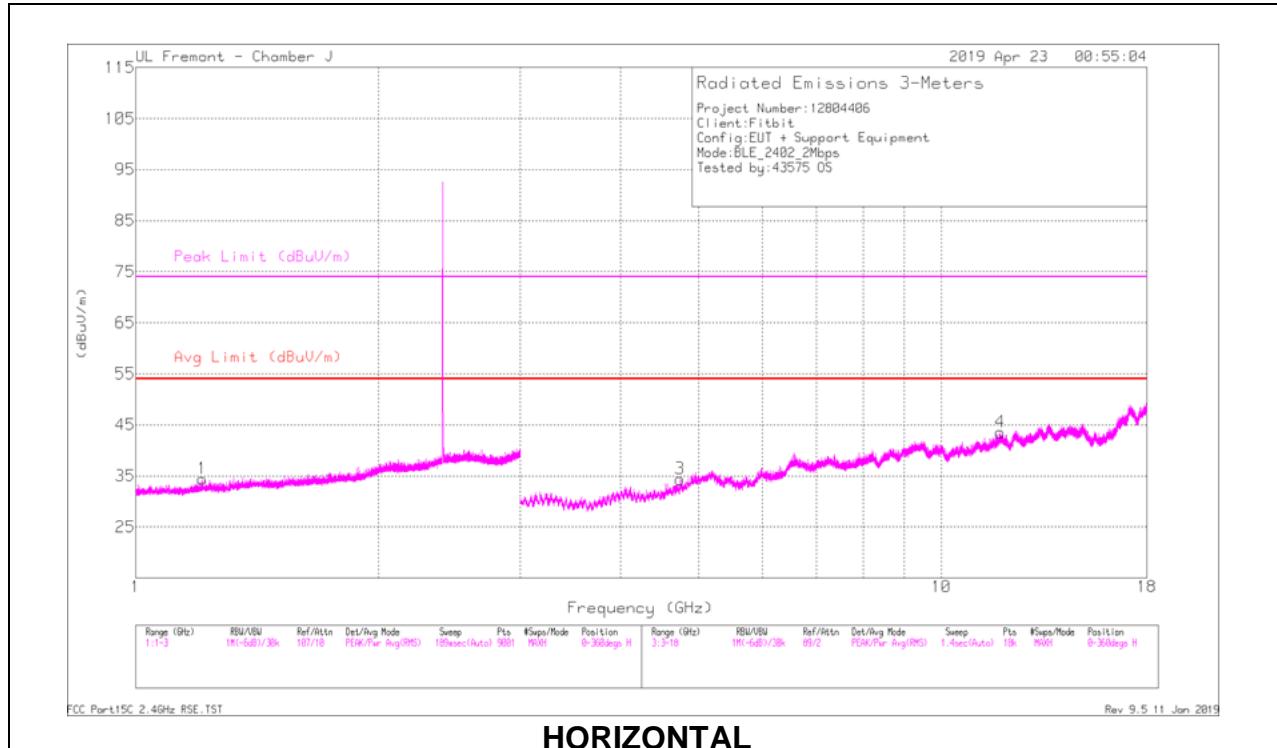
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

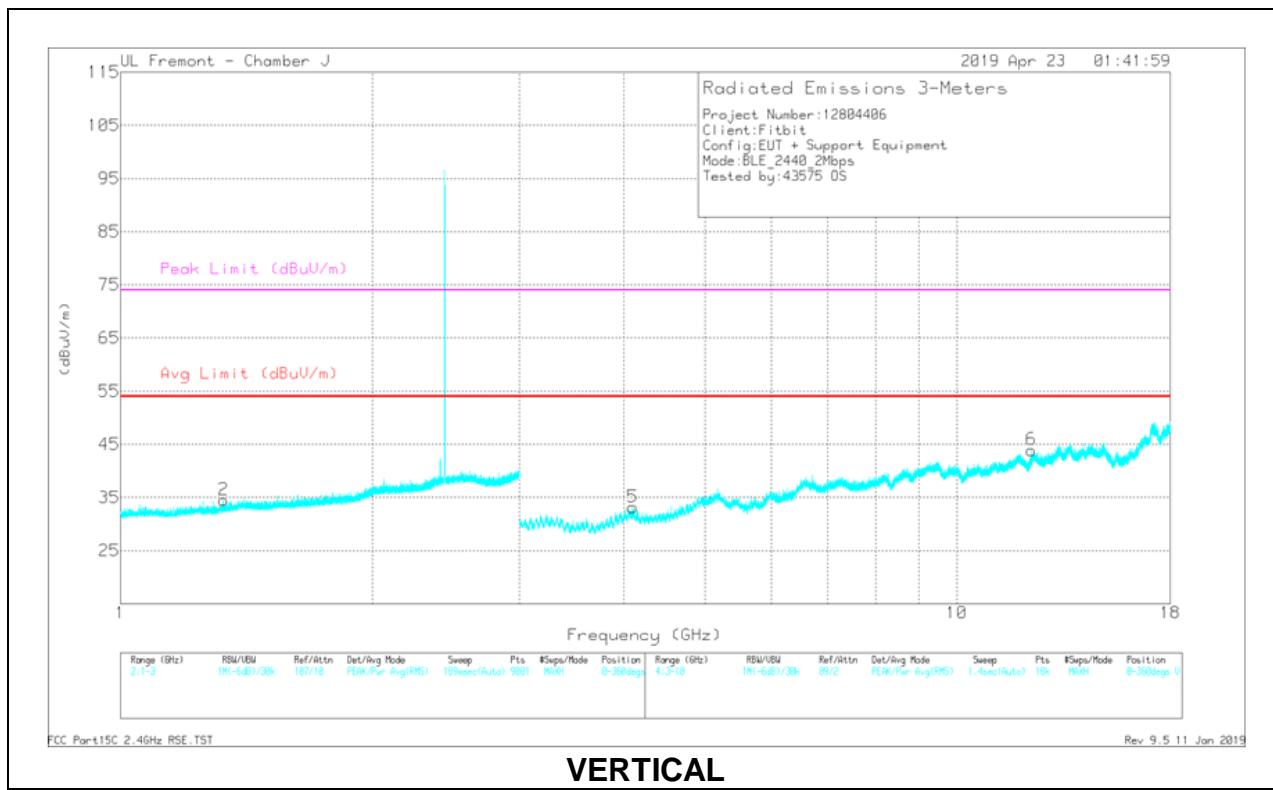
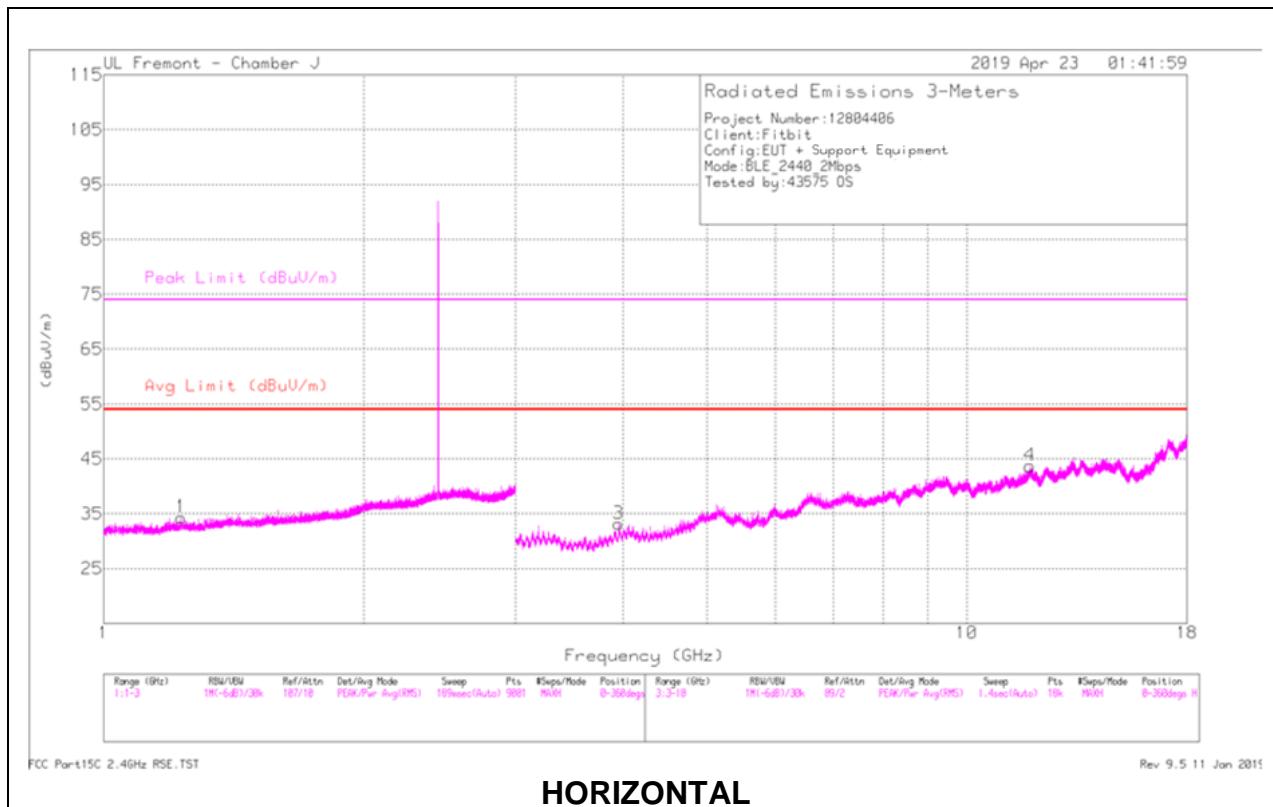
Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE01890 55 (dB/m)	Amp/Cbi/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.209	43.3	PK2	24.1	-26	0	41.4	-	-	74	-32.6	78	152	H
* 1.21	32.68	MAv1	24.1	-26	2.44	33.22	54	-20.78	-	-	78	152	H
* 1.563	43.07	PK2	25.5	-26.1	0	42.47	-	-	74	-31.53	213	201	V
* 1.561	32.34	MAv1	25.5	-26.1	2.44	34.18	54	-19.82	-	-	213	201	V
* 4.742	38.8	PK2	33.6	-31	0	41.4	-	-	74	-32.6	226	152	H
* 4.743	28.24	MAv1	33.6	-30.9	2.44	33.38	54	-20.62	-	-	226	152	H
* 11.837	32.34	PK2	40	-22.3	0	50.04	-	-	74	-23.96	223	360	H
* 11.834	23.08	MAv1	40	-22.2	2.44	43.32	54	-10.68	-	-	223	360	H
* 4.154	39.44	PK2	32.2	-31.7	0	39.94	-	-	74	-34.06	153	129	V
* 4.155	30.18	MAv1	32.2	-31.8	2.44	33.02	54	-20.98	-	-	153	129	V
* 12.397	32.94	PK2	40.4	-22.2	0	51.14	-	-	74	-22.86	8	277	V
* 12.397	22.85	MAv1	40.4	-22.2	2.44	43.49	54	-10.51	-	-	8	277	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

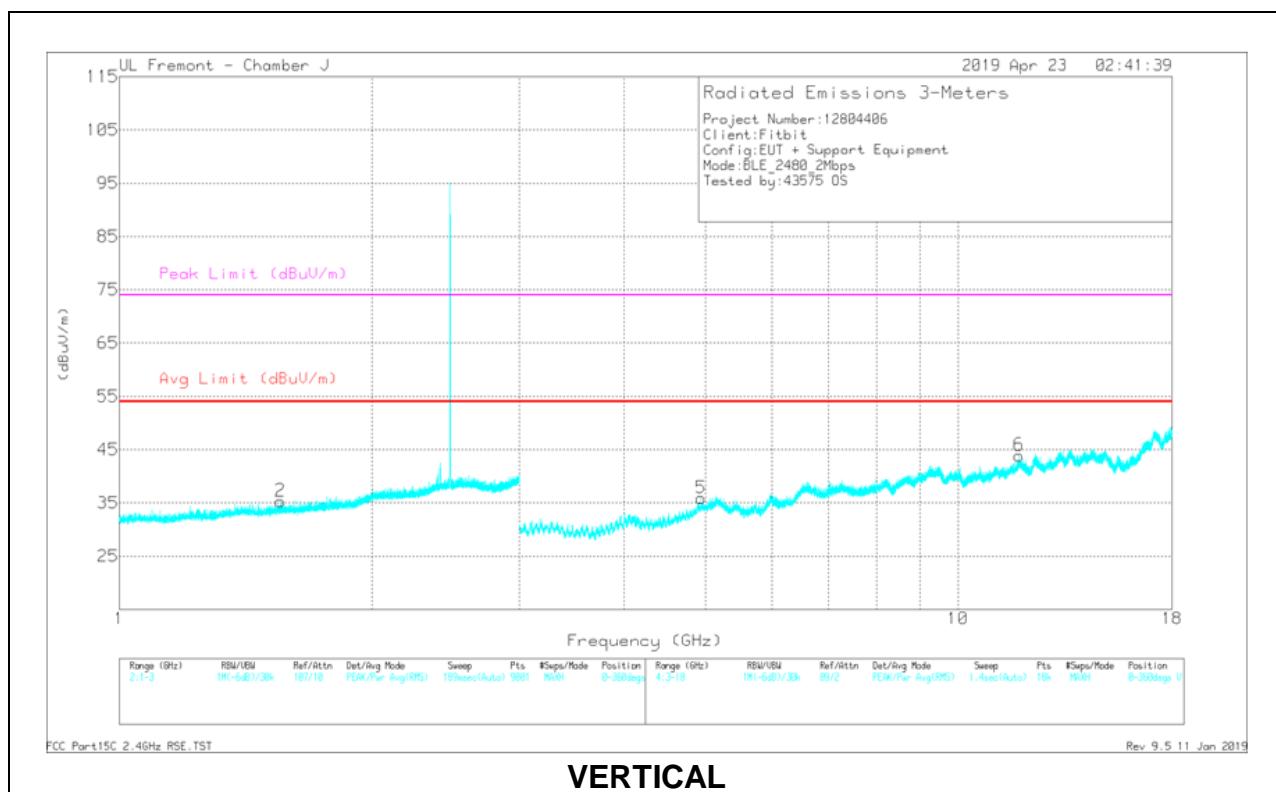
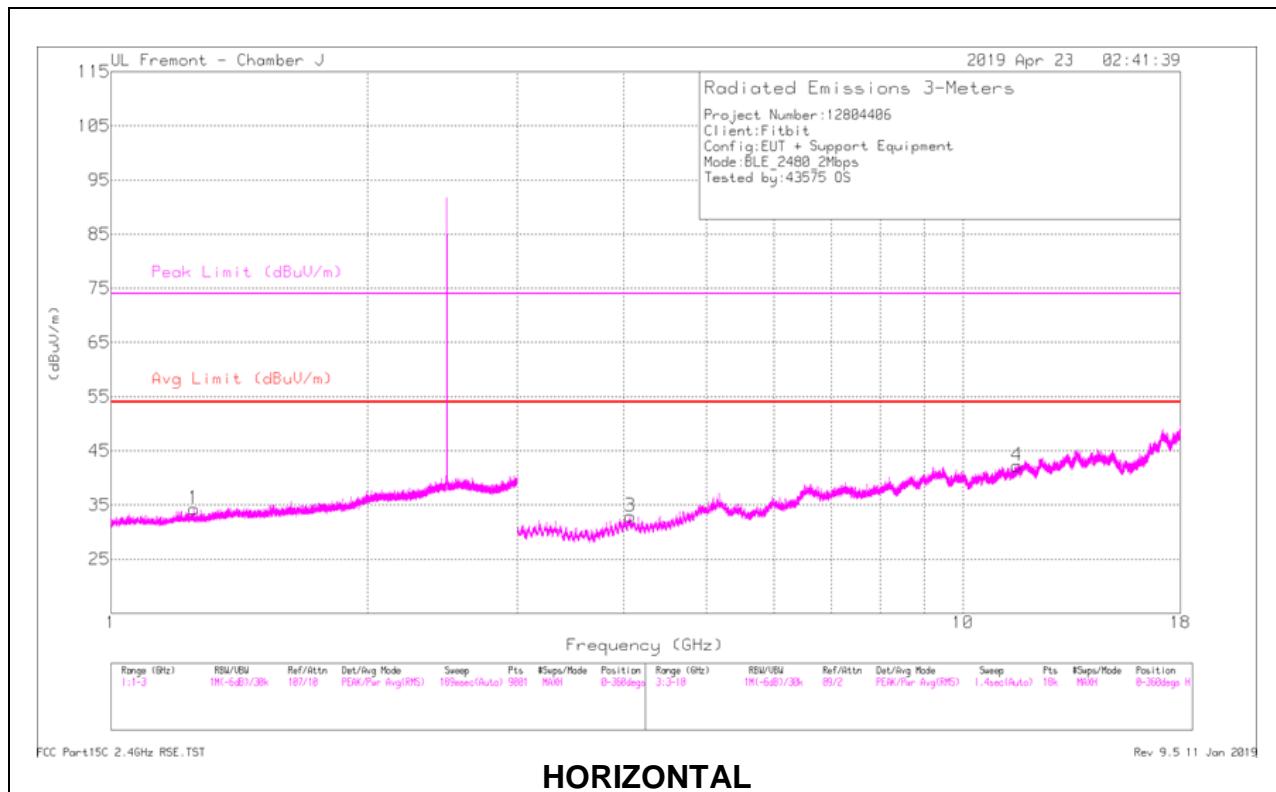
Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE01890 55 (dB/m)	Amp/Cbi/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.23	42.78	PK2	24.2	-26	0	40.98	-	-	74	-33.02	224	248	H
* 1.23	32.49	MAv1	24.2	-26	2.44	33.13	54	-20.87	-	-	224	248	H
* 1.327	42.7	PK2	24.6	-26	0	41.3	-	-	74	-32.7	297	315	V
* 1.327	33.19	MAv1	24.6	-26	2.44	34.23	54	-19.77	-	-	297	315	V
* 3.951	39.65	PK2	32.3	-32.6	0	39.35	-	-	74	-34.65	133	274	H
* 3.949	29.5	MAv1	32.3	-32.6	2.44	31.64	54	-22.36	-	-	133	274	H
* 11.836	32.52	PK2	40	-22.3	0	50.22	-	-	74	-23.78	182	219	H
* 11.837	23.07	MAv1	40	-22.3	2.44	43.21	54	-10.79	-	-	182	219	H
* 4.096	42.03	PK2	32.3	-31.7	0	42.63	-	-	74	-31.37	24	234	V
* 4.1	31.8	MAv1	32.3	-31.7	2.44	34.84	54	-19.16	-	-	24	234	V
* 12.29	32.35	PK2	40.2	-22.4	0	50.15	-	-	74	-23.85	179	351	V
* 12.29	22.77	MAv1	40.2	-22.4	2.44	43.01	54	-10.99	-	-	179	351	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 PRE01890 55 (dB/m)	Amp/Cbi/FI tr/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
* 1.251	43.16	PK2	24.3	-26	0	41.46	-	-	74	-32.54	280	183	H
* 1.252	32.67	MAv1	24.3	-26	2.44	33.41	54	-20.59	-	-	280	183	H
* 1.557	43.23	PK2	25.5	-26.1	0	42.63	-	-	74	-31.37	307	103	V
* 1.557	32.98	MAv1	25.5	-26.1	2.44	34.82	54	-19.18	-	-	307	103	V
* 4.068	39.53	PK2	32.3	-31.8	0	40.03	-	-	74	-33.97	194	350	H
* 4.068	30.02	MAv1	32.3	-31.8	2.44	32.96	54	-21.04	-	-	194	350	H
* 11.574	33.44	PK2	39.5	-22.7	0	50.24	-	-	74	-23.76	0	234	H
* 11.572	22.42	MAv1	39.5	-22.7	2.44	41.66	54	-12.34	-	-	0	234	H
* 4.938	38.75	PK2	34.7	-30.6	0	42.85	-	-	74	-31.15	136	218	V
* 4.935	28.83	MAv1	34.7	-30.8	2.44	35.17	54	-18.83	-	-	136	218	V
* 11.829	33.2	PK2	40	-22.2	0	51	-	-	74	-23	269	260	V
* 11.83	22.84	MAv1	40	-22.2	2.44	43.08	54	-10.92	-	-	269	260	V

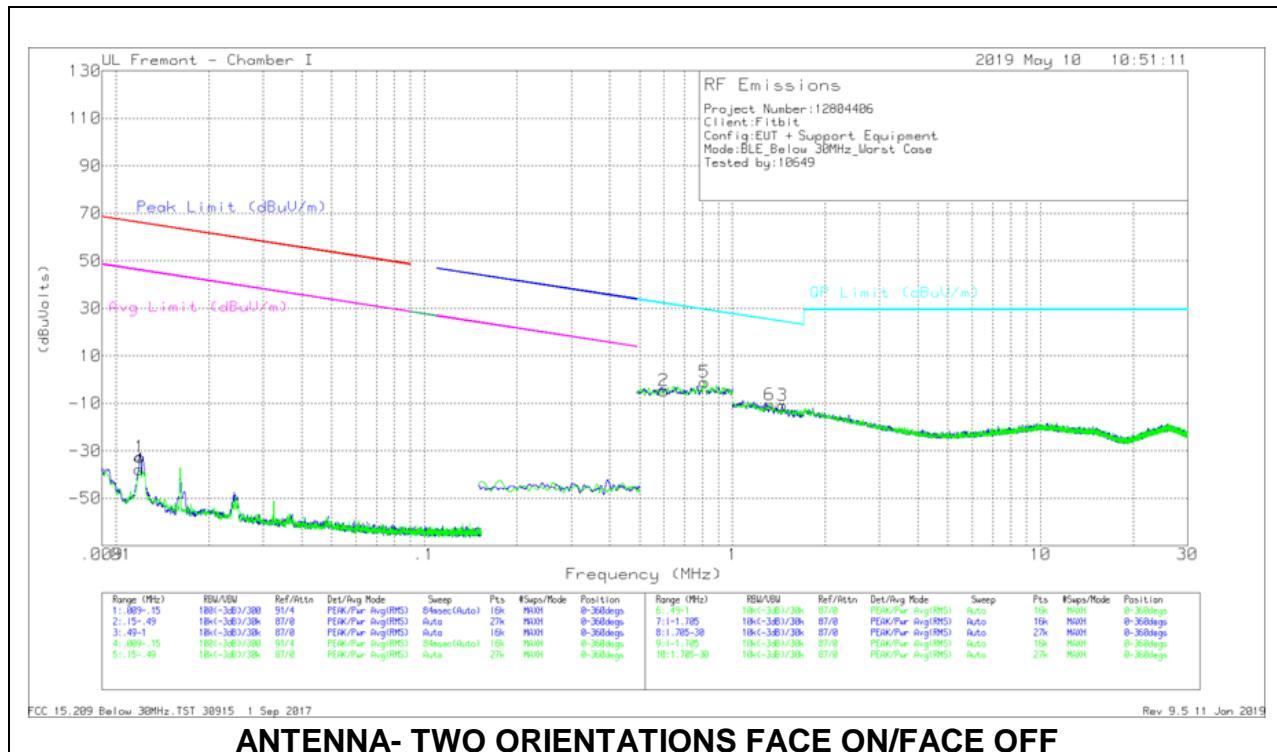
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHZ (WORST-CASE CONFIGURATION)



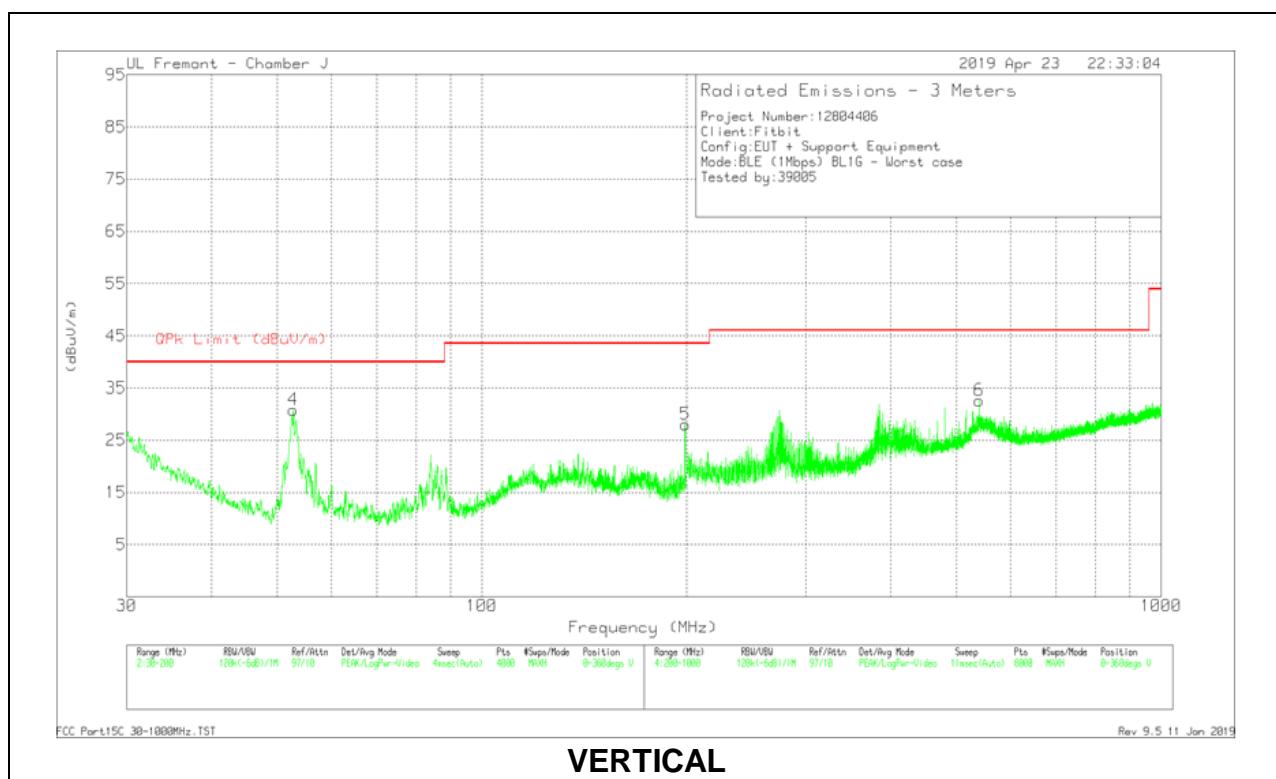
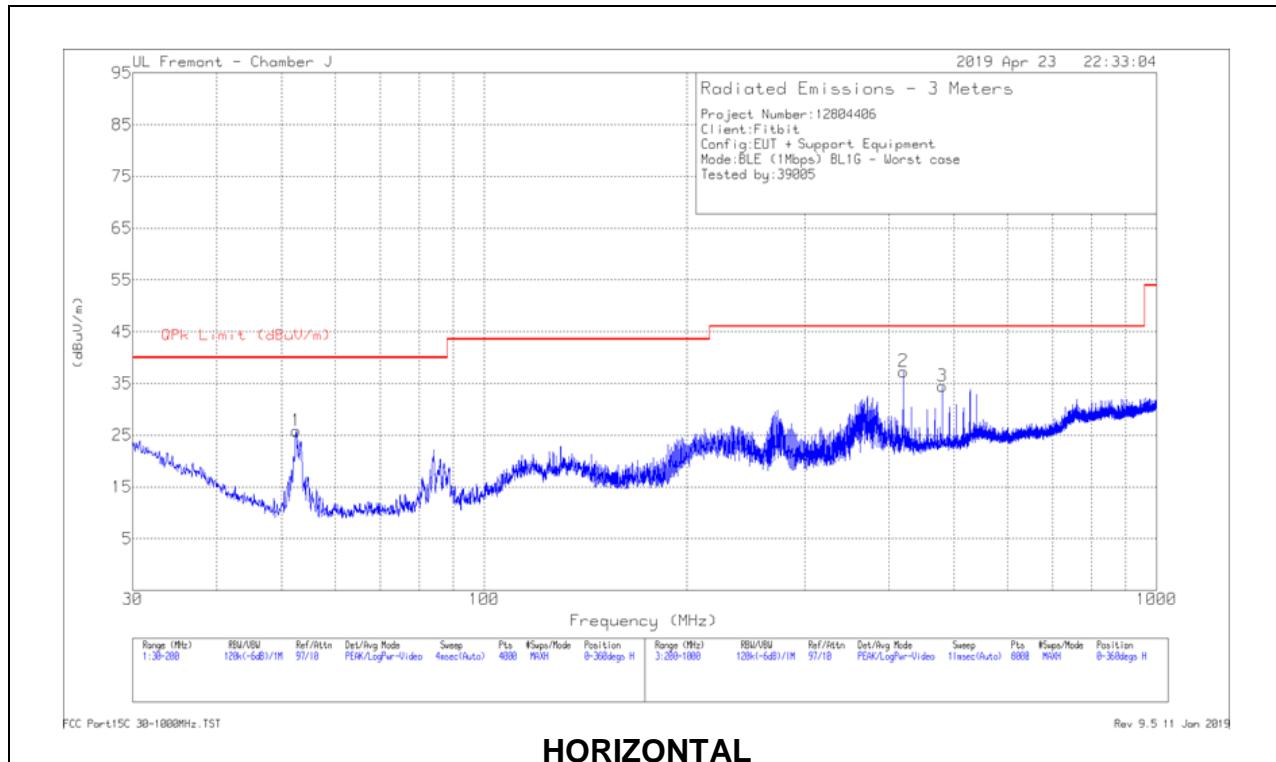
Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0180175 (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01197	19.84	Pk	60	-32.4	-80	-32.56	66.02	-98.58	46.02	-78.58	0-360
4	.01189	14.56	Pk	60.1	-32.4	-80	-37.74	66.08	-103.82	46.08	-83.82	0-360

Pk - Peak detector

9.4. WORST CASE BELOW 1 GHZ

SPURIOUS EMISSIONS 30 TO 1000 MHZ (WORST-CASE CONFIGURATION)



Below 1GHz Data

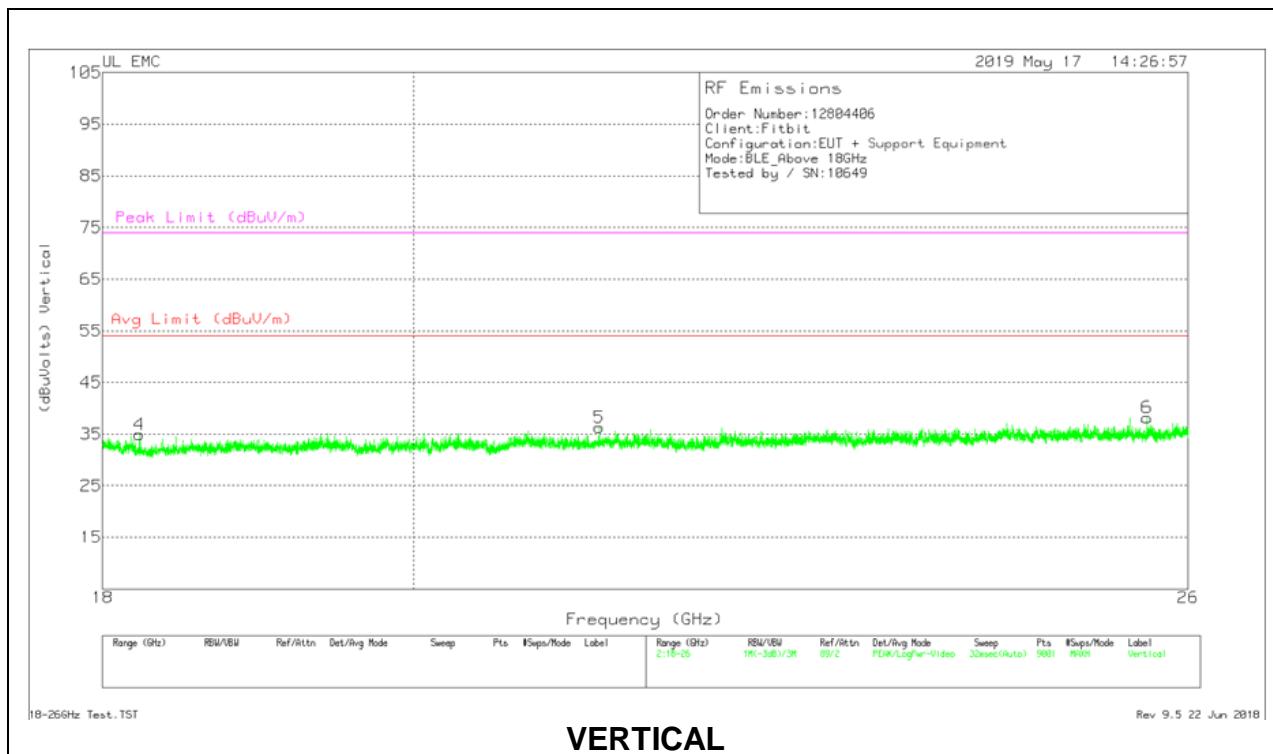
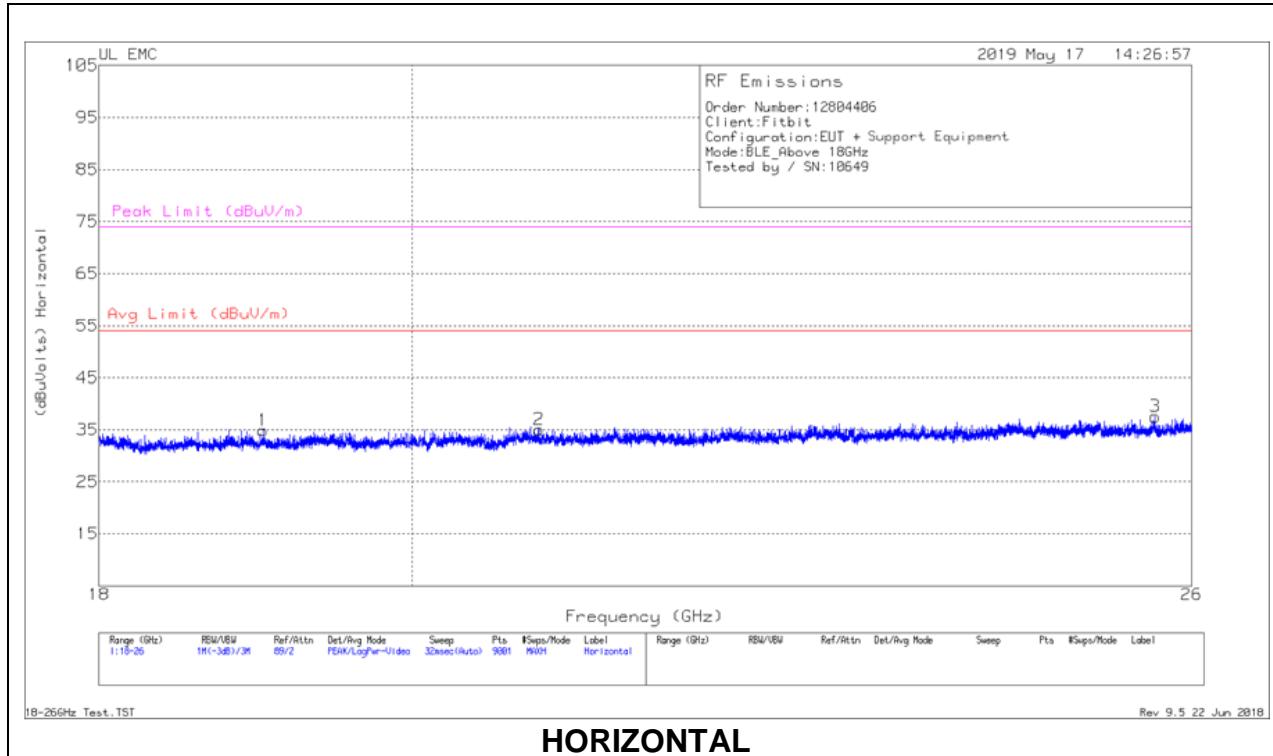
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181575 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	52.5733	43.91	Pk	13.2	-31.3	25.81	40	-14.19	0-360	398	H
4	52.7859	48.87	Pk	13.2	-31.3	30.77	40	-9.23	0-360	101	V
5	199.1513	40	Pk	18.4	-30.4	28	43.52	-15.52	0-360	101	V
2	419.9286	44.74	Pk	22.2	-29.6	37.34	46.02	-8.68	0-360	198	H
	420.014	42.03	Qp	22.2	-29.7	34.53	46.02	-11.49	144	200	H
3	479.9364	40.3	Pk	23.6	-29.4	34.5	46.02	-11.52	0-360	198	H
6	539.9442	37.92	Pk	24.1	-29.4	32.62	46.02	-13.4	0-360	101	V

Pk - Peak detector

Qp - Quasi-Peak detector

9.5. WORST CASE 18-26 GHZ

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0182188 (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	19.022	68.36	Pk	33.3	-57.3	-9.5	34.86	54	-19.14	74	-39.14
2	20.873	68.13	Pk	33.5	-57.1	-9.5	35.03	54	-18.97	74	-38.97
3	25.682	66.72	Pk	35.1	-54.8	-9.5	37.52	54	-16.48	74	-36.48
4	18.227	71.71	Pk	32.7	-60	-9.5	34.91	54	-19.09	74	-39.09
5	21.297	69.36	Pk	33.6	-57.2	-9.5	36.26	54	-17.74	74	-37.74
6	25.641	68.16	Pk	35	-55.5	-9.5	38.16	54	-15.84	74	-35.84

Pk - Peak detector

10. 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

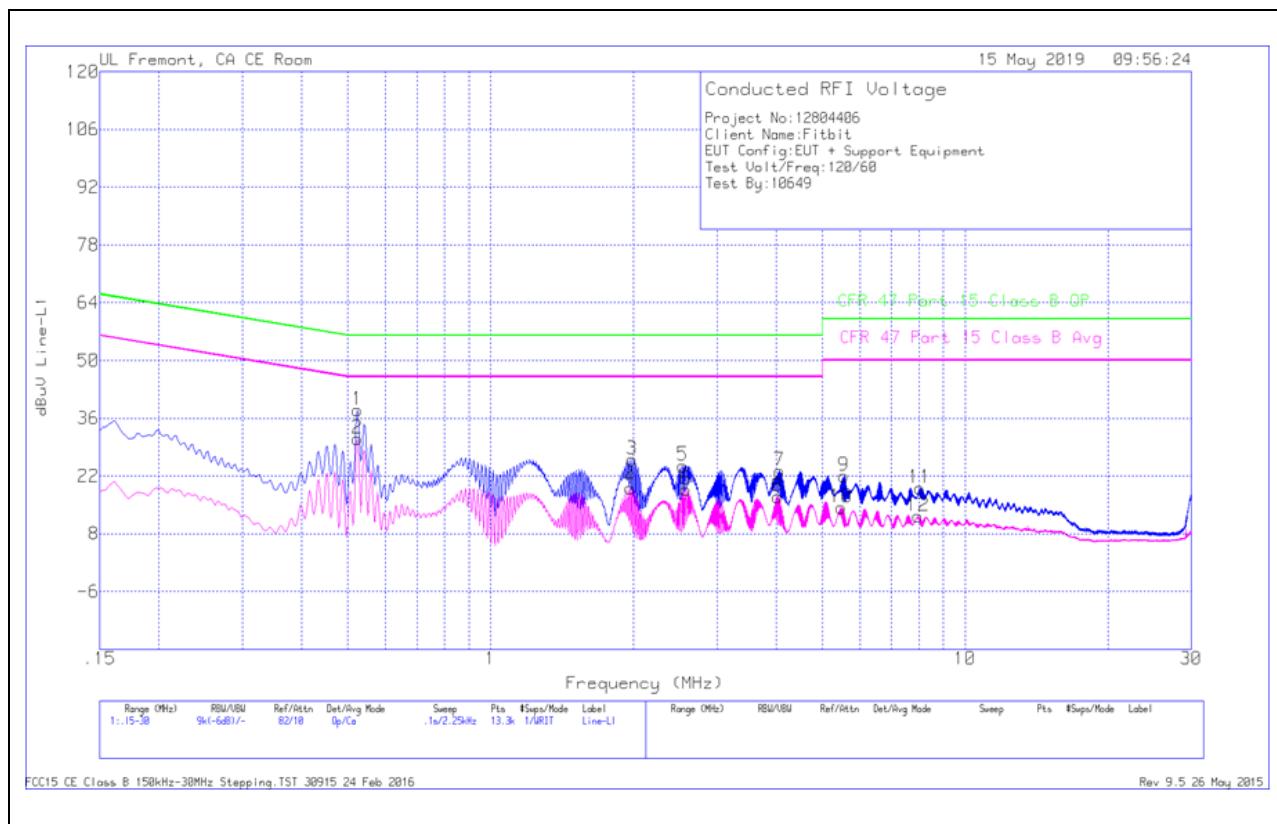
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

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

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

RESULTS

LINE 1 RESULTS

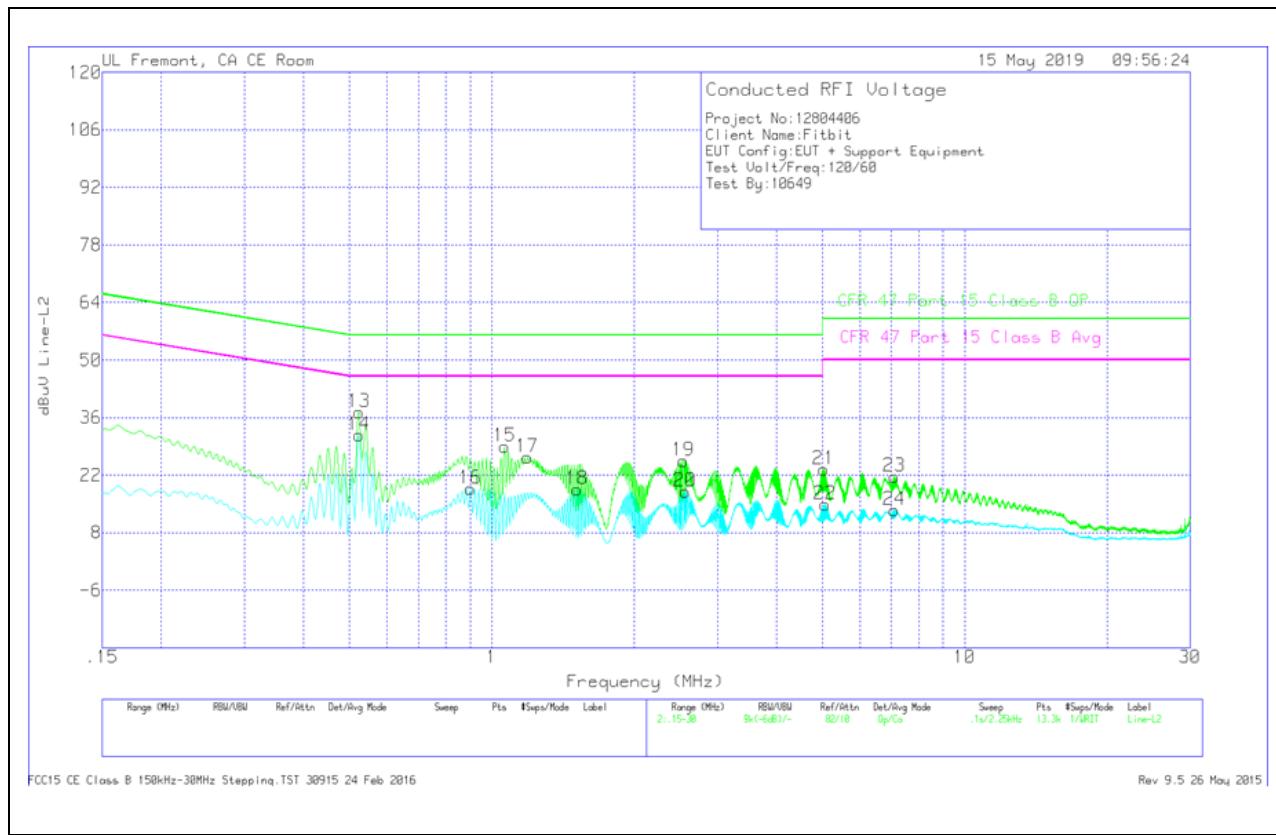


Range 1: Line-L1 .15 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)	
1	.5235	27.86	Qp	0	0	10.1	37.96	56	-18.04	-	-	
2	.5235	21.01	Ca	0	0	10.1	31.11	-	-	46	-14.89	
3	1.98825	15.73	Qp	0	.1	10.1	25.93	56	-30.07	-	-	
4	1.968	8.94	Ca	0	.1	10.1	19.14	-	-	46	-26.86	
5	2.544	14.33	Qp	0	.1	10.1	24.53	56	-31.47	-	-	
6	2.58225	8.51	Ca	0	.1	10.1	18.71	-	-	46	-27.29	
7	4.065	12.98	Qp	0	.1	10.1	23.18	56	-32.82	-	-	
8	4.02675	6.78	Ca	0	.1	10.1	16.98	-	-	46	-29.02	
9	5.54775	11.68	Qp	0	.2	10.1	21.98	60	-38.02	-	-	
10	5.4915	4.09	Ca	0	.1	10.1	14.29	-	-	50	-35.71	
11	8.04075	8.73	Qp	0	.2	10.2	19.13	60	-40.87	-	-	
12	7.9665	1.81	Ca	0	.2	10.2	12.21	-	-	50	-37.79	

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



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	.5235	27.28	Qp	0	0	10.1	37.38	56	-18.62	-	-	
14	.5235	21.69	Ca	0	0	10.1	31.79	-	-	46	-14.21	
15	1.0635	18.83	Qp	0	.1	10.1	29.03	56	-26.97	-	-	
16	.9015	8.65	Ca	0	0	10.1	18.75	-	-	46	-27.25	
17	1.1895	16.11	Qp	0	.1	10.1	26.31	56	-29.69	-	-	
18	1.51575	8.41	Ca	0	.1	10.1	18.61	-	-	46	-27.39	
19	2.54175	15.35	Qp	0	.1	10.1	25.55	56	-30.45	-	-	
20	2.562	7.84	Ca	0	.1	10.1	18.04	-	-	46	-27.96	
21	5.03025	13.2	Qp	0	.1	10.1	23.4	60	-36.6	-	-	
22	5.0685	4.67	Ca	0	.1	10.1	14.87	-	-	50	-35.13	
23	7.1025	11.21	Qp	0	.2	10.2	21.61	60	-38.39	-	-	
24	7.10475	3.07	Ca	0	.2	10.2	13.47	-	-	50	-36.53	

Qp - Quasi-Peak detector

Ca - CISPR average detection